Panel PC 300

User's Manual

Version:	**1.00 (October 2007)**
Model number:	**MAPPC300-ENG**

Panel PC 300 User's Manual V 1.00

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Chapter 1 • General

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	18.10.2007	- First version

Table 1: Manual history

2. Safety guidelines

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 contacts of connectors 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 who are familiar with the transport, mounting, installation, commissioning, and operation of the product and who have the appropriate qualifications (e.g. IEC 60364). National accident prevention guidelines must be followed.
The safety guidelines, connection descriptions (rating plate and documentation) and limit values listed in the technical data must be read carefully and must be observed before installation and commissioning.

2.4 Transport and storage

During transport and storage, devices must be protected from excessive stress (mechanical load, temperature, humidity, aggressive atmosphere, 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, and 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 voltage-carrying parts 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 sulfuric, nitric and chloric components- spur chemical chemical process that can damage electronic components very quickly. Signs of the presence of aggressive gases are blackened copper surfaces and cables 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.

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 2: Organization of safety notices

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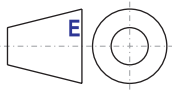
All dimension diagrams (e.g. dimension diagrams, etc.) are drawn according to European dimension standards.

5. Model numbers

5.1 Panel PC 300

Model number	Description	Note
5PC310.L800-00	**AP Slide-In PC LX800** 256 MB SDRAM; Compact Flash slot (type I); 2 x ETH 10/100; RS232; battery; 24 VDC (0TB103.9 screw clamp or 0TB103.91 cage clamp sold separately).	See page 26

Table 3: 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 36
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 42
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 48
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 54

Table 4: Model numbers for 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 60

Table 5: Model numbers for 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 66
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 72
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 78

Table 6: Model numbers - 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 84

Table 7: Model numbers for 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 90

Table 8: Model numbers for Automation Panel 19" SXGA

5.3 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, order CompactFlash separately (at least 128 MB).	See page 141
5SWWCE.0623-ENG	**WinCE5.0 ProPlus PPC300 LX800** Microsoft Windows CE 5.0 Professional Plus English including license; for PPC300 units 5PC310.L800-00, order CompactFlash separately (at least 128 MB).	See page 141
5SWWXP.0423-ENG	**WinXPe FP2007 PPC300 LX800** Microsoft Windows XP embedded English, Feature Pack 2007; for PPC300 units 5PC310.L800-00, order CompactFlash separately (at least 512 MB). Only delivered with a new Panel PC.	See page 143

Table 9: Model numbers - Software

5.4 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 167
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 167
0AC201.9	**Lithium batteries (5x)** Lithium batteries, 5 pcs., 3 V / 950 mAh, button cell	See page 169
4A0006.00-000	**Lithium battery (1x)** Lithium battery, 1 pc., 3 V / 950 mAh, button cell	See page 169
5AC900.104X-03	**Legend strip template 10.4"** for Automation Panel 5AP951.1043-01 and 5A981.1043-01, for 1 device.	See page 170
5AC900.104X-04	**Legend strip template 10.4"** for Automation Panel 5AP952.1043-01 and 5A982.1043-01, for 1 device.	See page 170
5AC900.104X-05	**Legend strip template 10.4"** for Automation Panel 5AP980.1043-01, for 3 devices.	See page 170
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 170
5AC900.1200-00	**USB interface cover (cannot be lost)** Front side USB interface cover (cannot be lost) for Automation Panel 900 and Panel PC 700 devices.	See page 172
5MMUSB.2048-00	**USB flash drive 2 GB SanDisk** USB 2.0 flash drive 2 GB	See page 173
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 177
5CFCRD.0064-03	**CompactFlash 64 MB SSI** CompactFlash card with 64 MB SLC NAND flash and IDE/ATA interface	See page 185
5CFCRD.0128-03	**CompactFlash 128 MB SSI** CompactFlash card with 128 MB SLC NAND flash and IDE/ATA interface	See page 185
5CFCRD.0256-03	**CompactFlash 256 MB SSI** CompactFlash card with 256 MB SLC NAND flash and IDE/ATA interface	See page 185
5CFCRD.0512-03	**CompactFlash 512 MB SSI** CompactFlash card with 512 MB SLC NAND flash and IDE/ATA interface	See page 185
5CFCRD.1024-03	**CompactFlash 1024 MB SSI** CompactFlash card with 1024 MB SLC NAND flash and IDE/ATA interface	See page 185
5CFCRD.2048-03	**CompactFlash 2048 MB SSI** CompactFlash card with 2048 MB SLC NAND flash and IDE/ATA interface	See page 185
5CFCRD.4096-03	**CompactFlash 4096 MB SSI** CompactFlash card with 4096 MB SLC NAND flash and IDE/ATA interface	See page 185
5CFCRD.8192-03	**CompactFlash 8192 MB SSI** CompactFlash card with 8192 MB SLC NAND flash and IDE/ATA interface	See page 185

Table 10: Model numbers - Accessories

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").
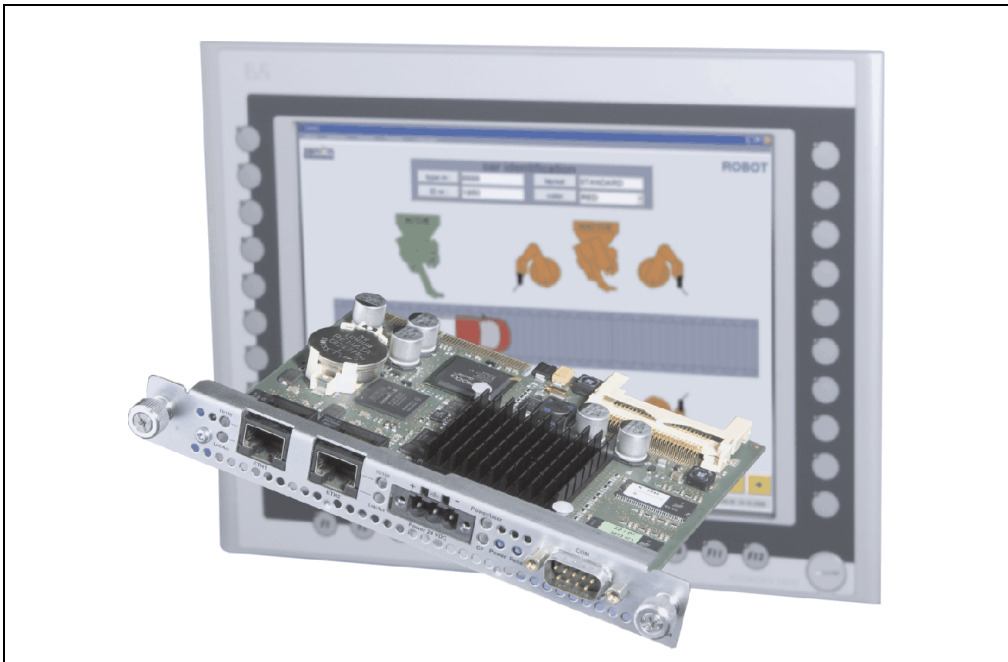
Figure 1: Panel PC 300 insert

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 "Start-up", section "PPC300 installation in an Automation Panel 900" on page 97.
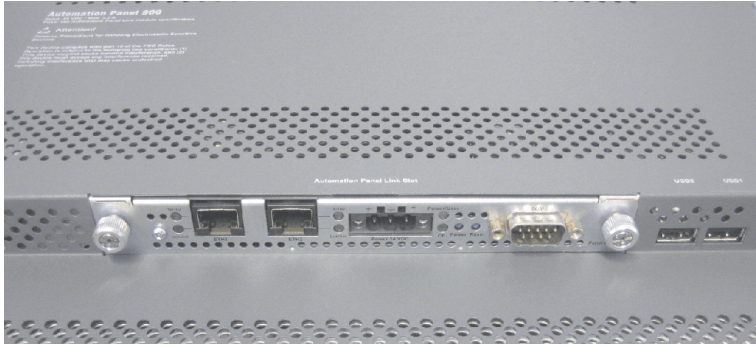
Figure 2: PPC300 mounted in the AP900

1.1 Features

- 500 MHz processor
- 256 MB SDRAM
- Compact Flash 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 Structure / 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.
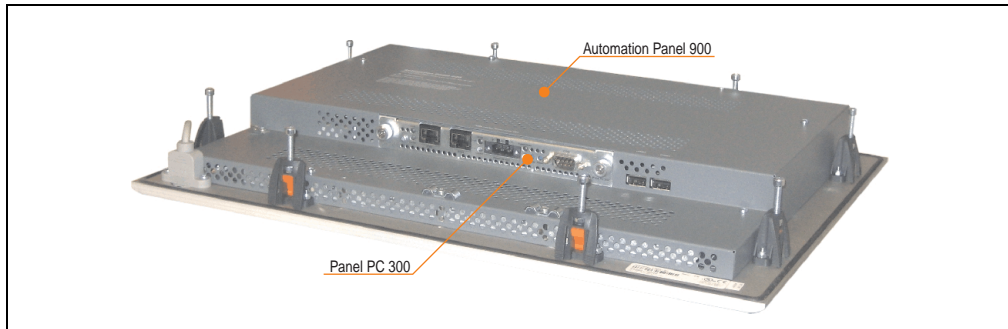
Figure 3: Entire device - PPC300 and AP900

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, dependent on mounting orientation (for specifications, see chapter 3 "Start-up", section 2.1 "Mounting orientation" on page 99).

PPC300 with	AP900 mounting orientation		
	0°	Up to -45°	Up to +45°
5AP920.1043-01	0 .. +50 °C	0 .. +TBD °C	0 .. +TBD °C
5AP980.1043-01	0 .. +50 °C	0 .. +TBD °C	0 .. +TBD °C
5AP981.1043-01	0 .. +50 °C	0 .. +TBD °C	0 .. +TBD °C
5AP982.1043-01	0 .. +50 °C	0 .. +TBD °C	0 .. +TBD °C
5AP920.1214-01	0 .. +50 °C	0 .. +TBD °C	0 .. +TBD °C
5AP920.1505-01	0 .. +50 °C	0 .. +TBD °C	0 .. +TBD °C
5AP980.1505-01	0 .. +50 °C	0 .. +TBD °C	0 .. +TBD °C
5AP981.1505-01	0 .. +50 °C	0 .. +TBD °C	0 .. +TBD °C
5AP920.1706-01	0 .. +40 °C	0 .. +TBD °C	0 .. +TBD °C
5AP920.1906-01	0 .. +40 °C	0 .. +TBD °C	0 .. +TBD °C

Table 11: 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.

Chapter 2
Technical data

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 - 90 %	5 - 90 %
5AP920.1043-01	5 - 90 %	5 - 90 %
5AP980.1043-01	5 - 90 %	5 - 90 %
5AP981.1043-01	5 - 90 %	5 - 90 %
5AP982.1043-01	5 - 90 %	5 - 90 %
5AP920.1214-01	5 - 90 %	5 - 90 %
5AP920.1505-01	5 - 90 %	5 - 90 %
5AP980.1505-01	5 - 90 %	5 - 90 %
5AP981.1505-01	5 - 90 %	5 - 90 %
5AP920.1706-01	20 - 90 %	5 - 90 %
5AP920.1906-01	20 - 90 %	5 - 90 %

Table 12: 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	**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 13: Power management according to mounting orientation

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

Chapter 2
Technical data

3. Individual components

3.1 Panel PC 300 insert 5PC310.L800-00
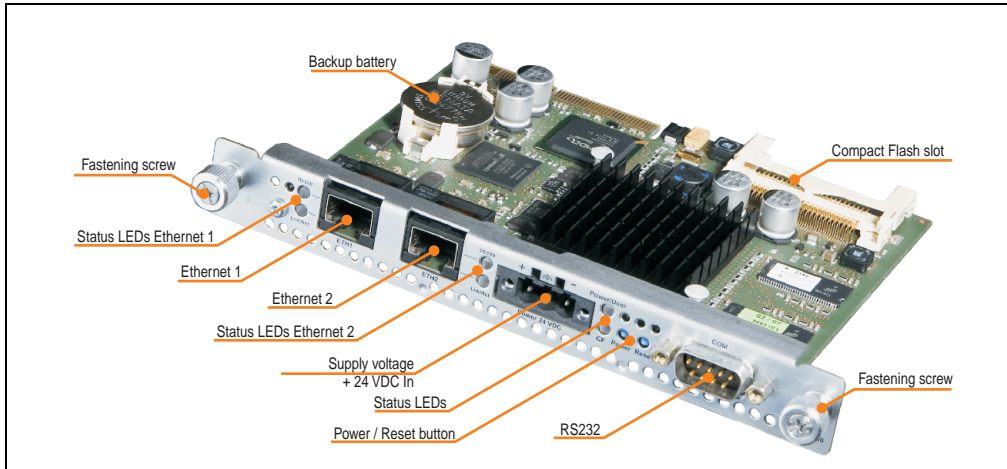
Figure 4: AP Slide-In PC 5PC310.L800-00

The AP Slide-In LX800 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

3.1.1 Technical data

Features	5PC310.L800-00
Boot loader / Operating system	BIOS (see section "BIOS settings" on page 109 for a description)

Processor
    Type
    Expanded command set
    L1 cache
    L2 cache
    Floating point unit (FPU)
Cooling
    Type
	Geode LX800 500 MHz, 32-bit x86
	MMX technology, 3D Now
	128 KB (64 KB L cache / 64 KB D cache)
	128 KB
	Yes
	
	Passive (heat sink)

Memory
    Type
    Size
	DDR SDRAM
	256 MB

Real-time clock (RTC)
    Battery-buffered
    Accuracy
	Yes
	at 25°C typ. 30 ppm (2.5 seconds) [1] per day

Battery
    Type
    Removable
    Lifespan
Backup capacitor[2] (for changing battery)
    Hold-up time
	Renata 950 mAh
	Yes
	4 years [3]
	
	10 minutes

Ethernet 1 (ETH1)
    Controller
    Transfer rate
    Connection
    cables
	Intel 82551ER
	10/100 Mbps
	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 Mbps
	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 using AP900 display unit (see section "USB connection (via AP900)" on page 35
	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

Table 14: Technical data - 5PC310.L800-00

Technical data • Individual components

Features	5PC310.L800-00
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

Ground resistance	1 MΩ
Mechanical characteristics	
Weight	Approx. 233 g

Table 14: Technical data - 5PC310.L800-00

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

2) Included starting with revision C0.

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

3.1.2 Interfaces

Ethernet connection - ETH1

Ethernet connection (ETH1)[1]			
Controller	Intel 82551ER		RJ45 twisted pair (10BaseT/100BaseT), female
Cabling	S/STP (category 5)		
Transfer rate	10/100 MBit/s [2]		
PXE boot possible	-		
LED	**On**	**Off**	
10/100 - green	100 MBit/s	10 MBit/s	
Lnk/Act - orange	Link (Ethernet network connection available)	Activity (blinking) (Data transfer in progress)	
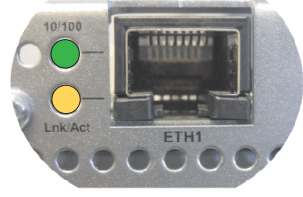
Table 15: Ethernet connection (ETH1)

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.

Ethernet connection - ETH2

Ethernet connection (ETH2)[1]			
Controller	Intel 82551ER		RJ45 twisted pair (10BaseT/100BaseT), female
Cabling	S/STP (category 5)		
Transfer rate	10/100 MBit/s [2]		
PXE boot possible	Yes		
LED	**On**	**Off**	
10/100 - green	100 MBit/s	10 MBit/s	
Lnk/Act - orange	Link (Ethernet network connection available)	Activity (blinking) (Data transfer in progress)	
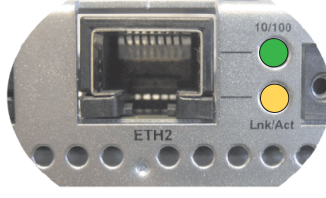
Table 16: Ethernet connection (ETH2)

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.

+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 fused internally (10A, fast-acting, soldered).

Supply voltage		
Protected against reverse polarity		3-pin, male
Pin	**Description**	
1	+	
2	Functional grounding	
3	-	
Accessories		
0TB103.9	Plug 24 V 5.08 3p screw clamps	
0TB103.91	Plug 24 V 5.08 3p cage clamps	

Figure 5: Supply voltage connection

Ground

Important!

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

Status LEDs

Status LEDs				
LED	**Color**		**Meaning**	
Power	Green	On	S0 state: PPC300 on.	1 x three-color, 1 x one-color
	Red	On	The system is in standby mode (S5: soft-off mode or S4: hibernate mode -Suspend-to-Disk)	
User	Yellow	On	Freely available for use in an application (e.g. can be switched on/off directly via the ADI Library - only possible in the S0 state).	
	Green	Off		
CF	Orange	On	IDE access (read, write) to the CompactFlash card.	
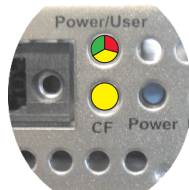
Table 17: Technical data - Status LEDs

Power button

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

Power button	
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.	

Table 18: Power button

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 19: Reset button

Warning!

A system reset can cause data to be lost!

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	
UART	16C550, 16 Byte FIFO	9-pin DSUB connector
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	
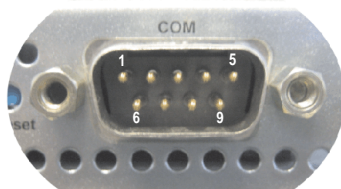
Table 20: Pin assignments - COM

The interrupt and address range of the interface can be changed in the BIOS setup. See section "BIOS default values" on page 135 for default setting.

CompactFlash slot CF

The PPC300 is equipped with a CompactFlash slot (type I) on the baseboard, connected via IDE interface.

Type I CompactFlash cards are supported. Available CompactFlash cards - see table 10 "Model numbers - Accessories" on page 20.
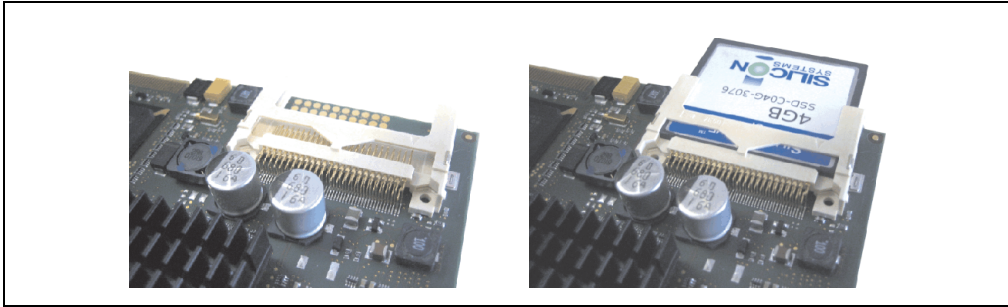
Figure 6: CompactFlash slot

The access method (PIO, MDMA or UDMA) is determined by the CompactFlash card being used. The speed can be changed in the BIOS setup. See section "BIOS default values" on page 135 for default setting.

Chapter 2
Technical data

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 current requirements 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).
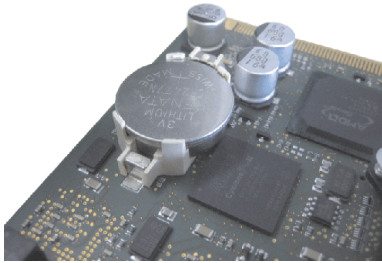
Battery		
Battery Type Removable Lifespan	Renata 950 mAh (CR2477N) Yes 4 years [1]	
Accessories	**Short description**	
0AC201.9	**Lithium batteries (5x)** Lithium batteries, 5 pcs., 3 V / 950 mAh, button cell	
4A0006.00-000	**Lithium battery (1x)** Lithium battery, 1 pc., 3 V / 950 mAh, button cell	

Table 21: 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 197.

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 122), but can also be read in a customer application via the ADI Library. Potential battery states include OK and Bad.

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.
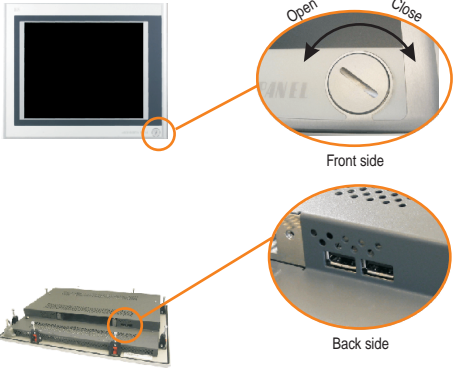
USB interfaces		
Type	USB 2.0	

Possible total number
   10.4" display diagonal
   Starting at 12.1" display
   diagonal
	2
	3
		
		Front side
		
		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	

Table 22: USB interfaces

3.2 Automation Panel 900

3.2.1 Automation Panel 5AP920.1043-01

Open Close

Front side USB connection
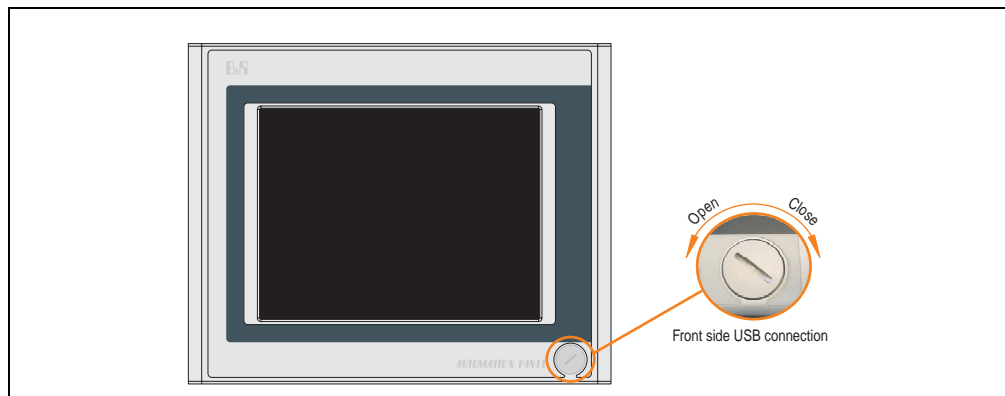
Figure 7: Front view - 5AP920.1043-01

Back side
USB connection

Automation Panel Link
insert slot
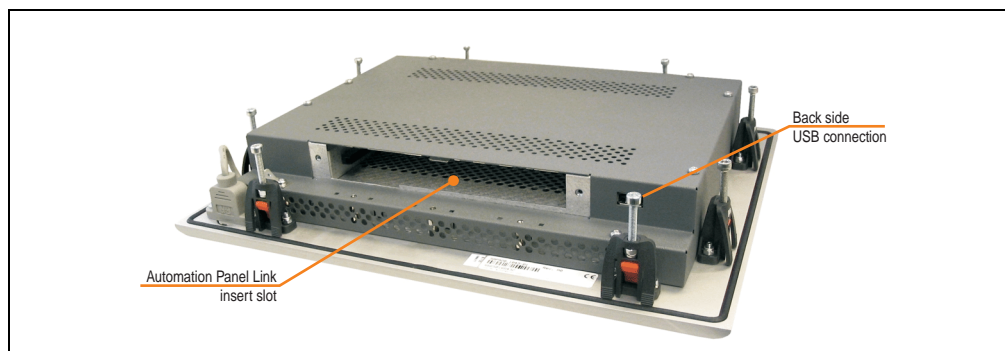
Figure 8: Rear view - 5AP920.1043-01

Technical data

Features	5AP920.1043-01
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
   Perspective (see page 211)
     Horizontal
     Vertical
Background lighting
   Brightness
   Half-brightness time
	
	TFT
	26.42 cm (264 mm)
	262144 colors
	VGA, 640 x 480 pixels
	300:1
	
	Direction R / direction L =70°
	Direction U = 40°/ direction D = 70°
	
	350 cd/m²
	50000 hours

Touch screen [2]
   Technology
   Controller
   Degree of transmission
	
	Analog, resistive
	Elo, serial, 12-bit
	Up to 78 %

Keys
   Function keys
   Soft keys
   Cursor keys
   Number block
   Other keys
   Key lifespan
   LED brightness
	-

Electrical characteristics	

Power supply
   Rated voltage
   Rated current[3]
   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, maximum 13 W or 19 W with USB
	Yes

Mechanical characteristics	

Front
   Frame
   Design
   Membrane
     Dark gray border around display
     Light background
   Gasket
	
	Aluminum, naturally anodized[4]
	Gray[4]
	Polyester
	Similar to Pantone 432CV[4]
	Similar to Pantone 427CV[4]
	Flat gasket around display front

Outer dimensions
   Width
   Height
   Depth
	
	323 mm
	260 mm
	55 mm

Table 23: Technical data - 5AP920.1043-01

Mechanical characteristics	5AP920.1043-01
Housing Paint	Metal Similar to Pantone 432CV[4]
Weight	Approx. 2.9 kg
Environmental characteristics	

Ambient temperature
    Operation
    Storage
    Transport
	See "Ambient temperatures" on page 23
	-30 °C .. +70 °C
	-30 °C .. +70 °C

Relative humidity Operation / Storage / Transport	T <= 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing

Vibration
    Operation (continuous)
    Operation (occasional)
    Storage / Transport
	5 - 9 Hz: 1.75 mm amplitude / 9 - 150 Hz: 0,5 g (4.9 m/s² 0-peak)
	5 - 9 Hz: 3 mm amplitude / 9 - 150 Hz: 1 g (9.8 m/s² 0-peak)
	Max. 10 - 57 Hz and 0.075 mm amplitude
	Max. 58 - 500 Hz and 1 g (9.8 m/s² 0-peak)

Shock
    Operation
    Storage / Transport
	Max. 15 g (147 m/s² 0-peak) and 11 ms duration
	Max. 50 g (490 m/s² 0-peak) and 11 ms duration

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

Table 23: Technical data - 5AP920.1043-01 (cont.)

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

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

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

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

Temperature humidity diagram - Operation and storage

Figure 9: Temperature humidity diagram - 5AP920.1043-01

Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1 °C per 1000 meters (from 500 meters above sea level).

Dimensions

Rated 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 10: 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 24: Delivery contents - 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.
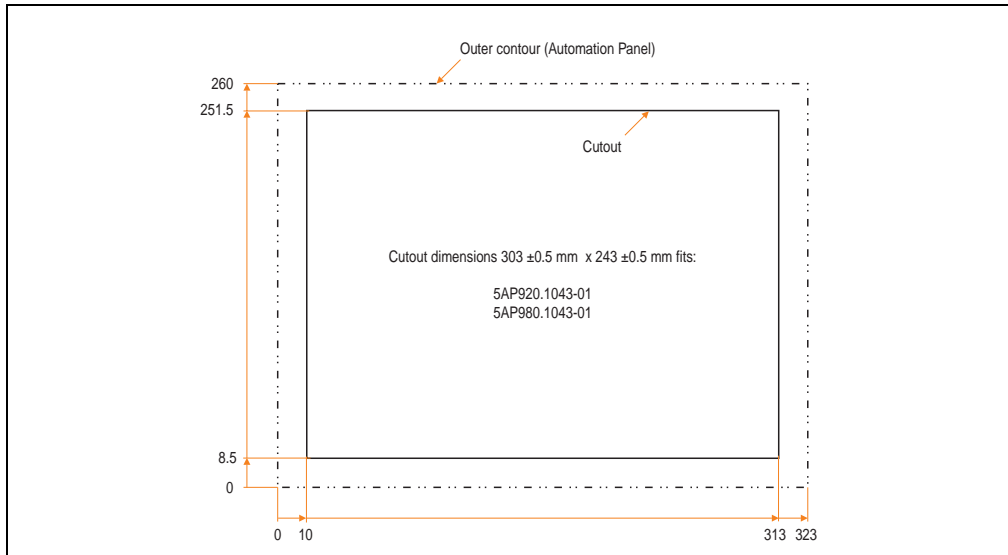
Figure 11: Cutout installation - 5AP920.1043-01

For further information regarding installation and mounting orientation, see chapter 3 "Start-up" starting on page 97.

3.2.2 Automation Panel 5AP980.1043-01
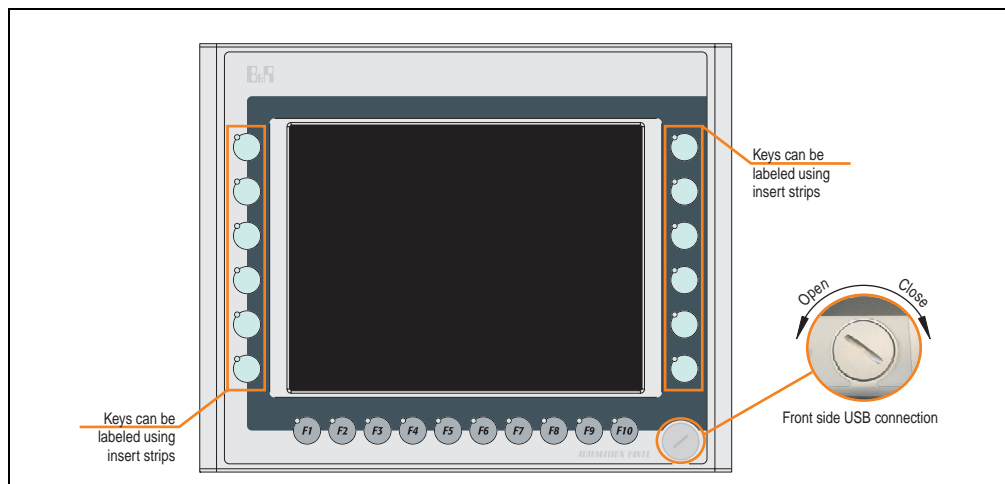
Figure 12: Front view - 5AP980.1043-01
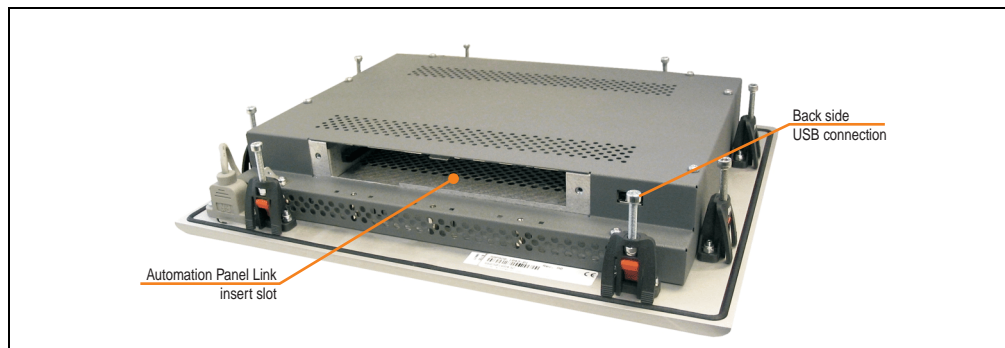
Figure 13: Rear view - 5AP980.1043-01

Technical data

Features	5AP980.1043-01
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
    Perspective (see page 211)
        Horizontal
        Vertical
Background lighting
    Brightness
    Half-brightness time
	TFT
	26.42 cm (264 mm)
	262144 colors
	VGA, 640 x 480 pixels
	300:1
	
	Direction R / direction L =70°
	Direction U = 40°/ direction D = 70°
	
	350 cd/m²
	50000 hours

Touch screen [2]
    Technology
    Controller
    Degree of transmission
	Analog, resistive
	Elo, serial, 12-bit
	Up to 78%

Keys/LED[3]
    Function keys
    Soft keys
    Cursor keys
    Number block
    Other keys
    Key lifespan
    LED brightness
	12 with LED (yellow)
	10 with LED (yellow)
	-
	-
	-
	$> 10^6$ actuations with 1 ±0.3 to 3 ±0.3 N operating force
	Typically 12 mcd (yellow)

Caution!

Pressing several keys at the same time may trigger unintended actions.

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 10 W (without LED), maximum 13 W or 20 W with USB
	Yes

Mechanical characteristics	

Front
    Frame
    Design
    Membrane
        Dark gray border around display
        Light background
        Legend strips (gray)
    Gasket
	Aluminum, naturally anodized[5]
	Gray[5]
	Polyester
	Similar to Pantone 432CV[5]
	Similar to Pantone 427CV[5]
	Similar to Pantone 429CV[5]
	Flat gasket around display front

Table 25: 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[5]
Weight	Approx. 2.9 kg
Environmental characteristics	

Ambient temperature
    Operation
    Storage
    Transport
	See "Ambient temperatures" on page 23
	-30 °C .. +70 °C
	-30 °C .. +70 °C

Relative humidity Operation / Storage / Transport	T <= 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing

Vibration
    Operation (continuous)
    Operation (occasional)
    Storage / Transport
	5 - 9 Hz: 1.75 mm amplitude / 9 - 150 Hz: 0,5 g (4.9 m/s² 0-peak)
	5 - 9 Hz: 3 mm amplitude / 9 - 150 Hz: 1 g (9.8 m/s² 0-peak)
	Max. 10 - 57 Hz and 0.075 mm amplitude
	Max. 58 - 500 Hz and 1 g (9.8 m/s² 0-peak)

Shock
    Operation
    Storage / Transport
	Max. 15 g (147 m/s² 0-peak) and 11 ms duration
	Max. 50 g (490 m/s² 0-peak) and 11 ms duration

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

Table 25: Technical data - 5AP980.1043-01 (cont.)

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

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

3) 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).

4) The 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.
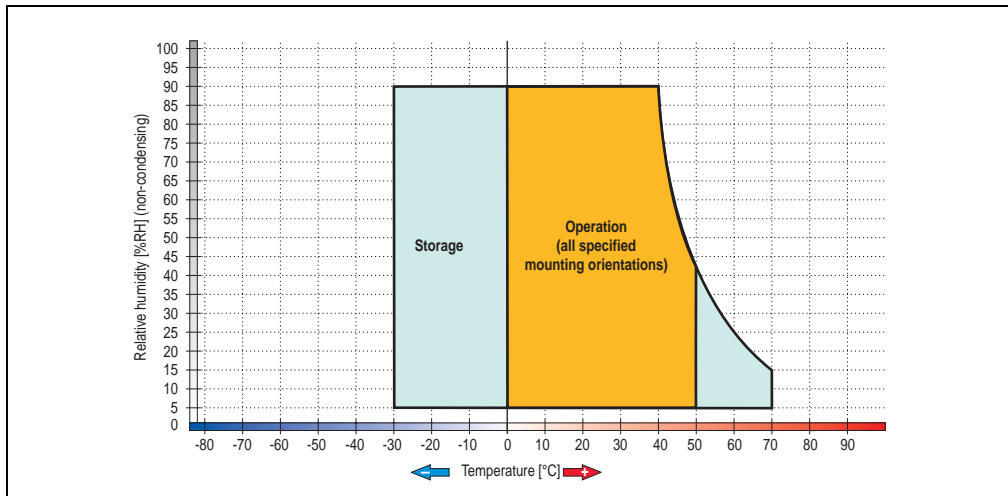
Temperature humidity diagram - Operation and storage

Figure 14: Temperature humidity diagram - 5AP980.1043-01

Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1 °C per 1000 meters (from 500 meters above sea level).
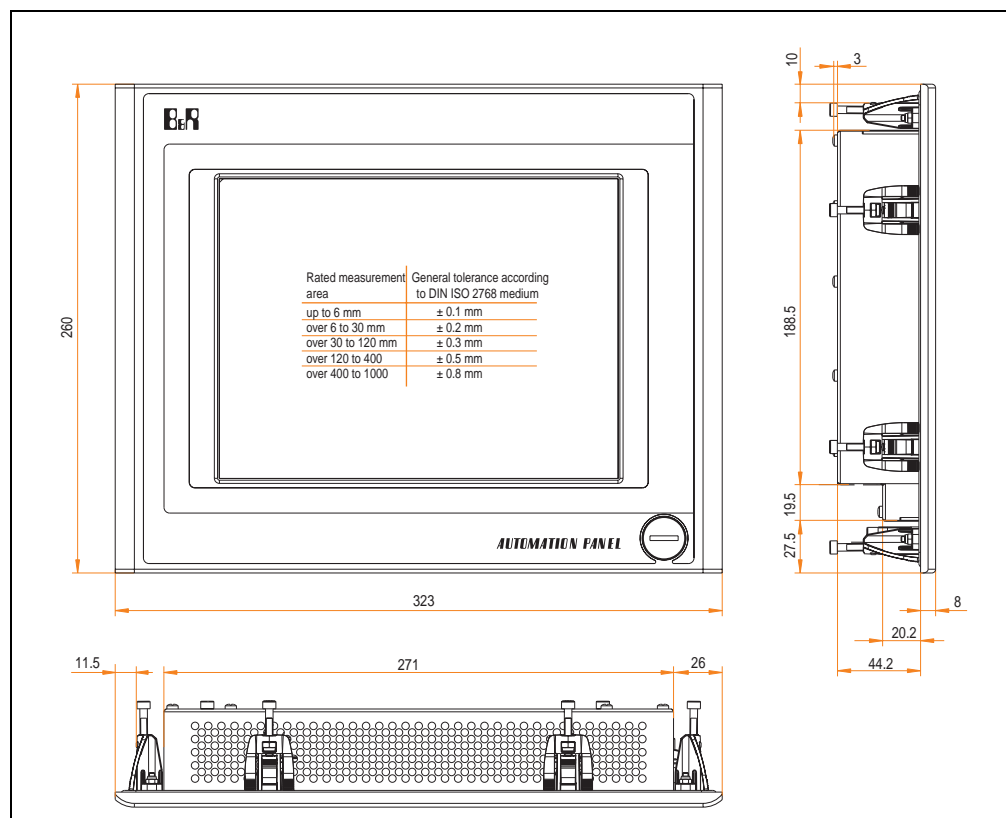
Dimensions

Rated 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 15: 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 26: Delivery contents - 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.

Figure 16: Cutout installation - 5AP980.1043-01

For further information regarding installation and mounting orientation, see chapter 3 "Start-up" starting on page 97.

Chapter 2
Technical data

3.2.3 Automation Panel 5AP981.1043-01
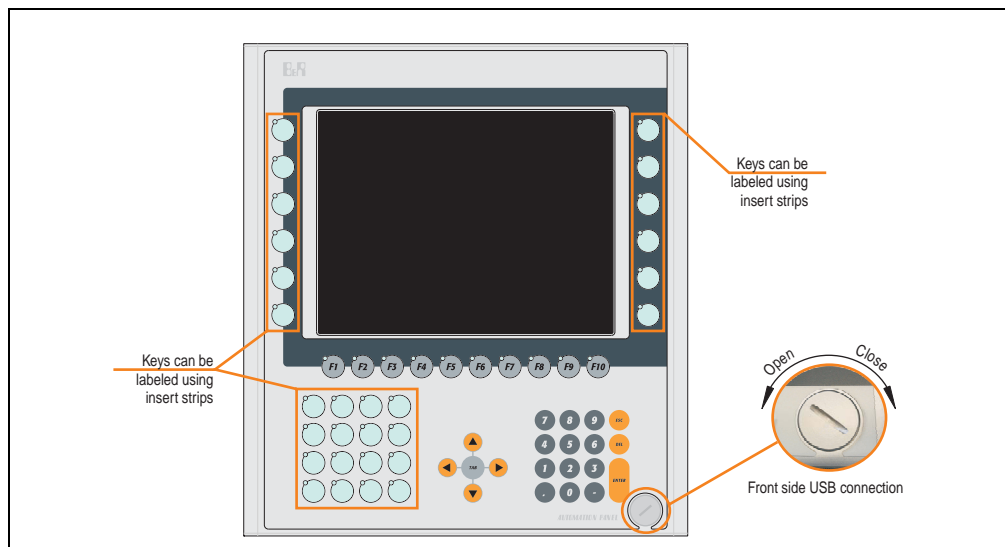
Figure 17: Front view - 5AP981.1043-01
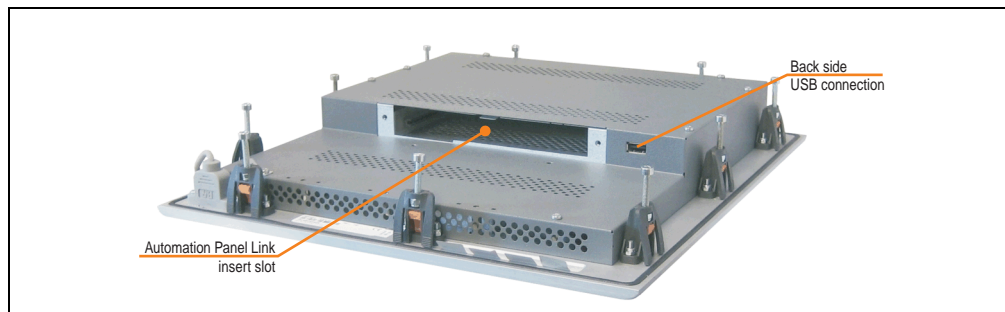
Figure 18: Rear view - 5AP981.1043-01

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
   Perspective (see page 211)
      Horizontal
      Vertical
Background lighting
   Brightness
   Half-brightness time
	
	TFT
	26.42 cm (264 mm)
	262144 colors
	VGA, 640 x 480 pixels
	300:1
	
	Direction R / direction L =70°
	Direction U = 40°/ direction D = 70°
	
	350 cd/m²
	50000 hours

Touch screen [2]
   Technology
   Controller
   Degree of transmission
	
	Analog, resistive
	Elo, serial, 12-bit
	Up to 78%

Keys/LED[3]
   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)

Caution!

Pressing several keys at the same time may trigger unintended actions.

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 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 27: Technical data - 5AP981.1043-01

Chapter 2
Technical data

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
	Aluminum, naturally anodized[5]
	Gray[5]
	Polyester
	Similar to Pantone 432CV[5]
	Similar to Pantone 427CV[5]
	Similar to Pantone 151CV[5]
	Similar to Pantone 431CV[5]
	Similar to Pantone 429CV[5]
	Flat gasket around display front

Housing Paint	Metal Similar to Pantone 432CV[5]
Weight	Approx. 3.6 kg
Environmental characteristics	

Ambient temperature
    Operation
    Storage
    Transport
	See "Ambient temperatures" on page 23
	-30 °C .. +70 °C
	-30 °C .. +70 °C

Relative humidity Operation / Storage / Transport	T <= 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing

Vibration
    Operation (continuous)
    Operation (occasional)
    Storage / Transport
	5 - 9 Hz: 1.75 mm amplitude / 9 - 150 Hz: 0,5 g (4.9 m/s² 0-peak)
	5 - 9 Hz: 3 mm amplitude / 9 - 150 Hz: 1 g (9.8 m/s² 0-peak)
	Max. 10 - 57 Hz and 0.075 mm amplitude
	Max. 58 - 500 Hz and 1 g (9.8 m/s² 0-peak)

Shock
    Operation
    Storage / Transport
	Max. 15 g (147 m/s² 0-peak) and 11 ms duration
	Max. 50 g (490 m/s² 0-peak) and 11 ms duration

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

Table 27: Technical data - 5AP981.1043-01 (cont.)

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

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

3) 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).

4) The 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.

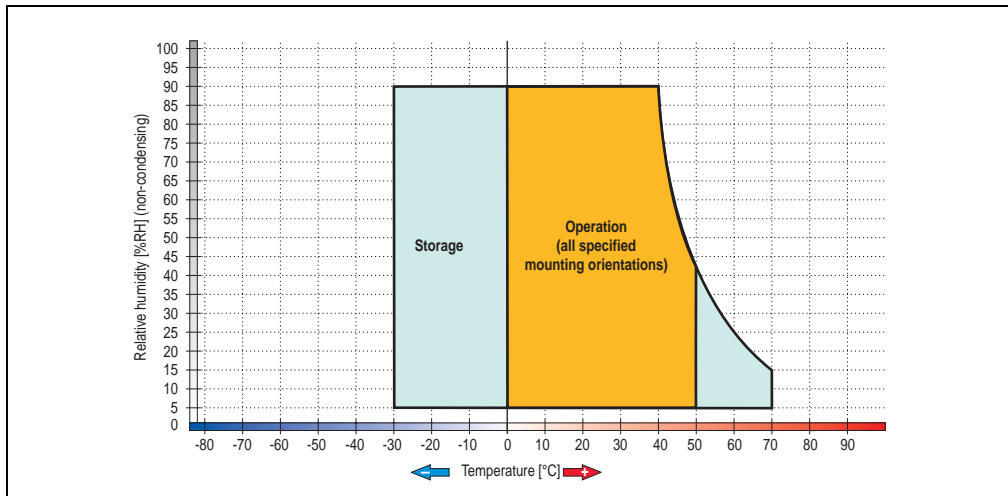Temperature humidity diagram - Operation and storage

Figure 19: Temperature humidity diagram - 5AP981.1043-01

Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1 °C per 1000 meters (from 500 meters above sea level).
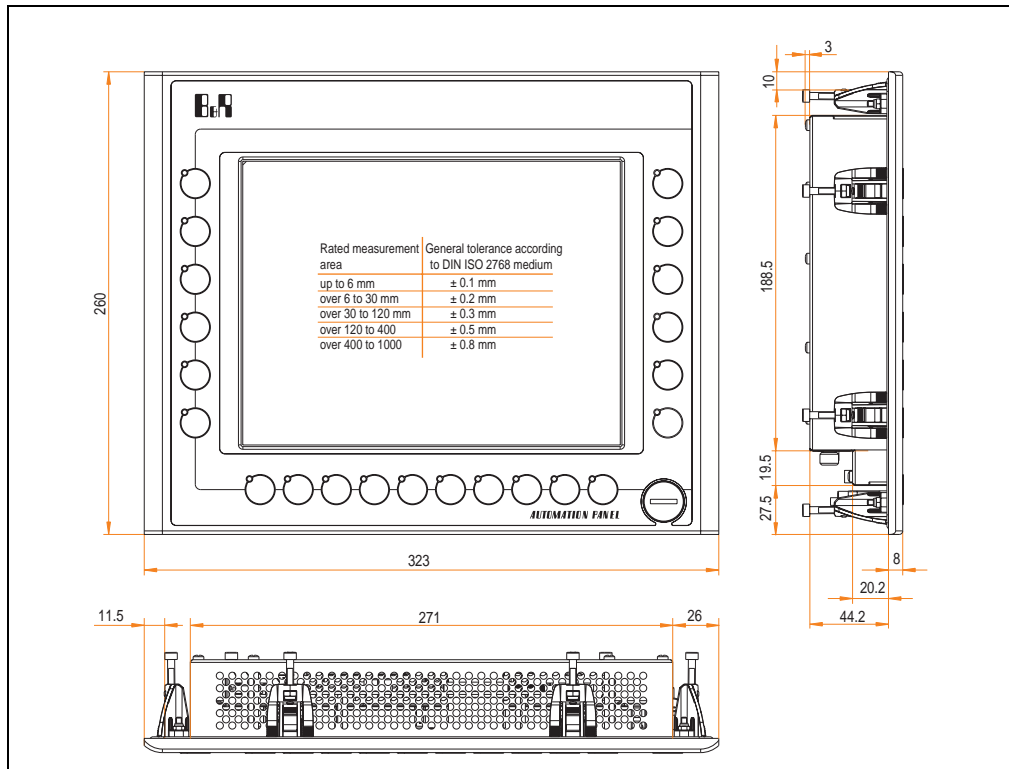
Dimensions

Figure 20: 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 28: Delivery contents - 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.
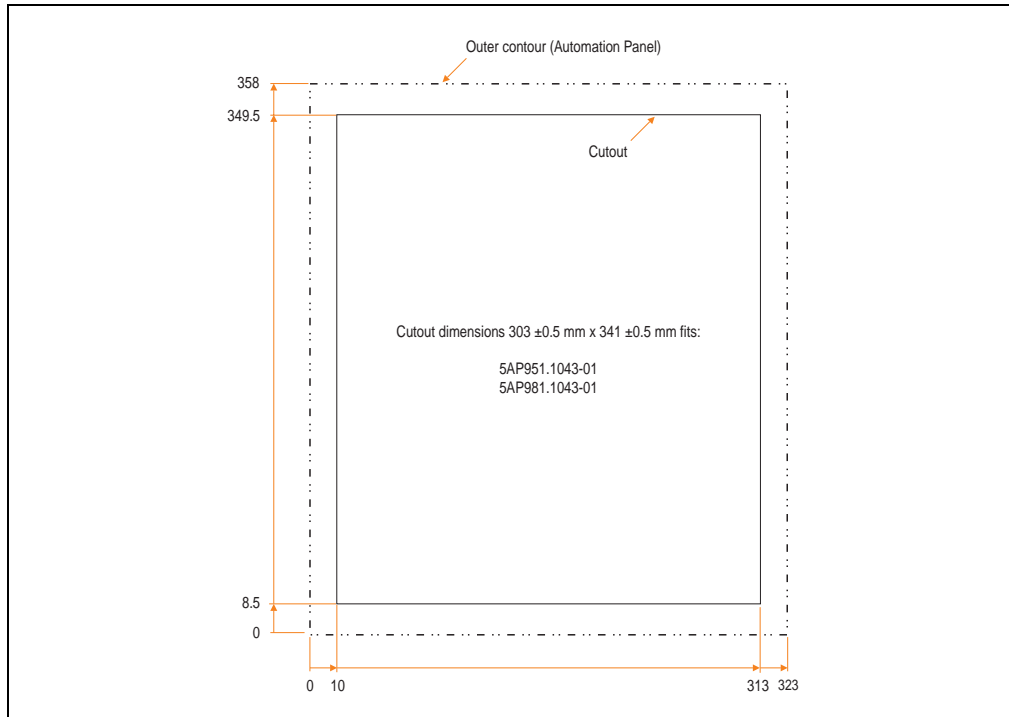
Figure 21: Cutout installation - 5AP981.1043-01

For further information regarding installation and mounting orientation, see chapter 3 "Start-up" starting on page 97.

3.2.4 Automation Panel 5AP982.1043-01
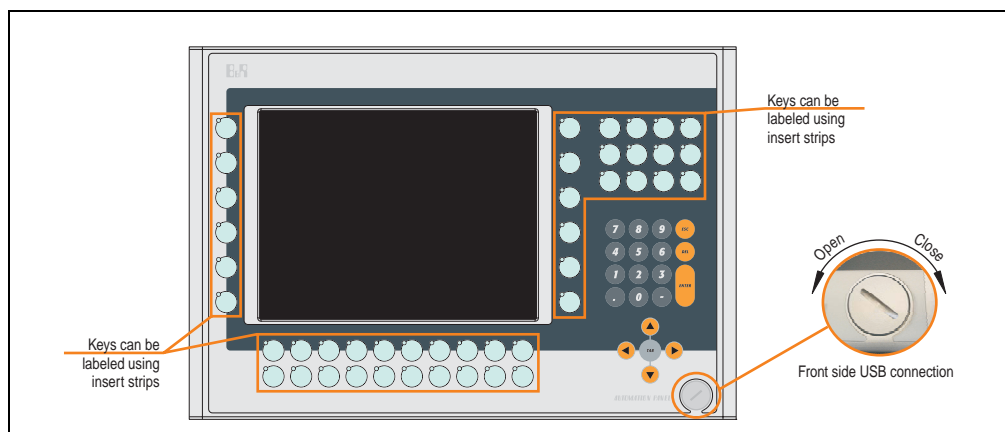
Figure 22: Front view - 5AP982.1043-01
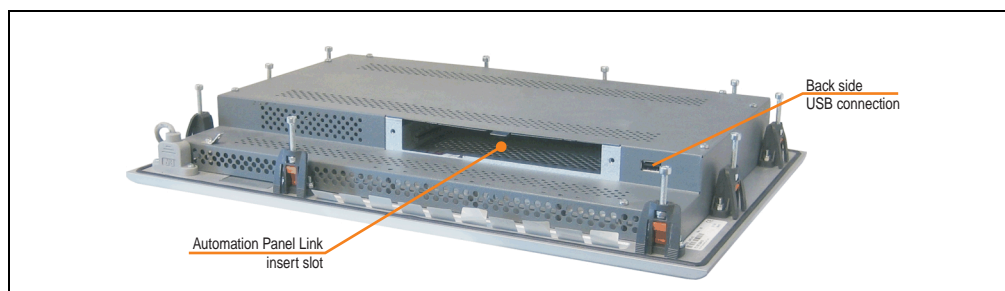
Figure 23: Rear view - 5AP982.1043-01

Technical data

Features	5AP982.1043-01
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
   Perspective (see page 211)
     Horizontal
     Vertical
Background lighting
   Brightness
   Half-brightness time
	
	TFT
	26.42 cm (264 mm)
	262144 colors
	VGA, 640 x 480 pixels
	300:1
	
	Direction R / direction L =70°
	Direction U = 40°/ direction D = 70°
	
	350 cd/m²
	50000 hours

Touch screen [2]
   Technology
   Controller
   Degree of transmission
	
	Analog, resistive
	Elo, serial, 12-bit
	Up to 78%

Keys/LED[3]
   Function keys
   Soft keys
   Cursor keys
   Number block
   Other keys
   Key lifespan
   LED brightness
	
	44 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)

Caution!

Pressing several keys at the same time may trigger unintended actions.

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 10 W (without LED), maximum 14 W or 21 W with USB
	Yes

Mechanical characteristics	

Outer dimensions
   Width
   Height
   Depth
	
	423 mm
	288 mm
	55 mm

Table 29: Technical data - 5AP982.1043-01

Chapter 2
Technical data

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
	Aluminum, naturally anodized[5]
	Gray[5]
	Polyester
	Similar to Pantone 432CV[5]
	Similar to Pantone 427CV[5]
	Similar to Pantone 151CV[5]
	Similar to Pantone 431CV[5]
	Similar to Pantone 429CV[5]
	Flat gasket around display front

Housing Paint	Metal Similar to Pantone 432CV[5]
Weight	Approx. 3.9 kg
Environmental characteristics	

Ambient temperature
   Operation
   Storage
   Transport
	See "Ambient temperatures" on page 23
	-30 °C .. +70 °C
	-30 °C .. +70 °C

Relative humidity Operation / Storage / Transport	T <= 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing

Vibration
   Operation (continuous)
   Operation (occasional)
   Storage / Transport
	5 - 9 Hz: 1.75 mm amplitude / 9 - 150 Hz: 0,5 g (4.9 m/s² 0-peak)
	5 - 9 Hz: 3 mm amplitude / 9 - 150 Hz: 1 g (9.8 m/s² 0-peak)
	Max. 10 - 57 Hz and 0.075 mm amplitude
	Max. 58 - 500 Hz and 1 g (9.8 m/s² 0-peak)

Shock
   Operation
   Storage / Transport
	Max. 15 g (147 m/s² 0-peak) and 11 ms duration
	Max. 50 g (490 m/s² 0-peak) and 11 ms duration

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

Table 29: Technical data - 5AP982.1043-01 (cont.)

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

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

3) 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).

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.

Temperature humidity diagram - Operation and storage

Figure 24: Temperature humidity diagram - 5AP982.1043-01

Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1 °C per 1000 meters (from 500 meters above sea level).
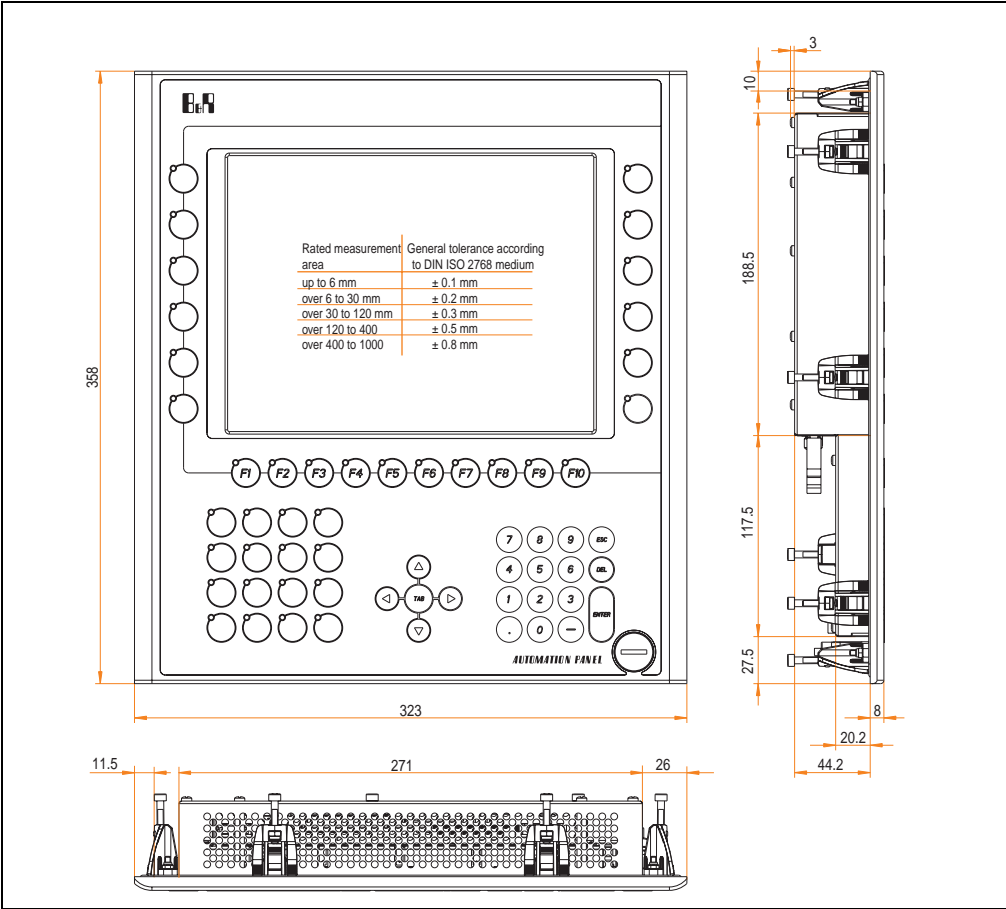
Chapter 2
Technical data

Dimensions

Figure 25: Dimensions 5AP982.1043-01

Contents of delivery

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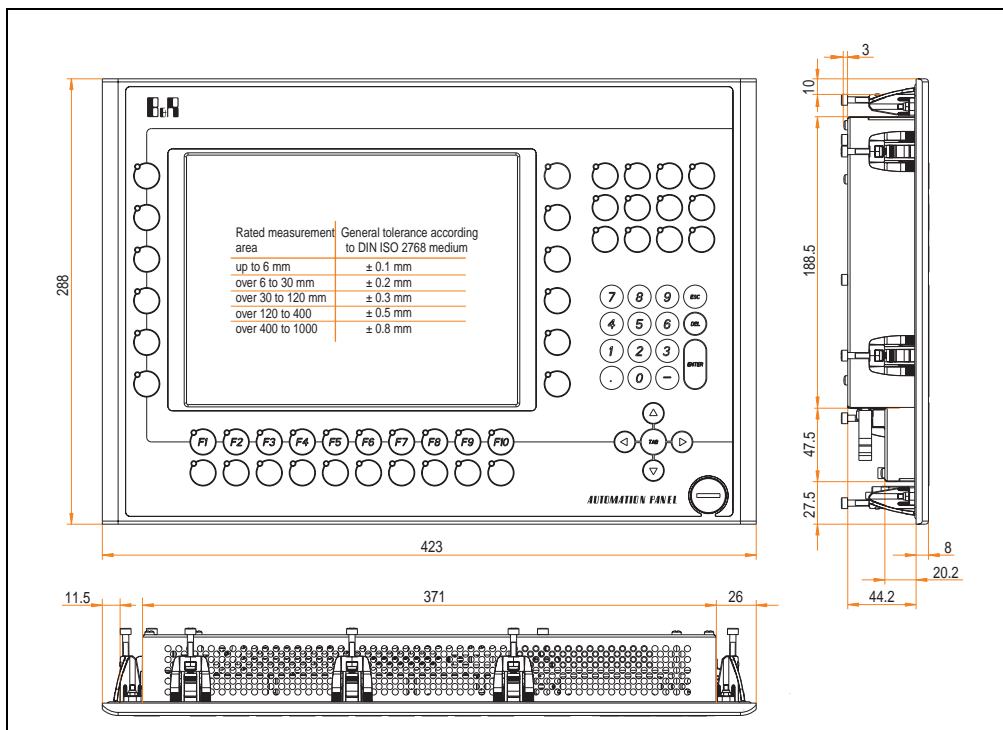
Amount	Component
1	Automation Panel 982 TFT VGA 10.4in with touch screen and keys
16	6 insert strips without labels - 10 partially labeled "F1-F10" (inserted in the front)

Table 30: Delivery contents - 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.
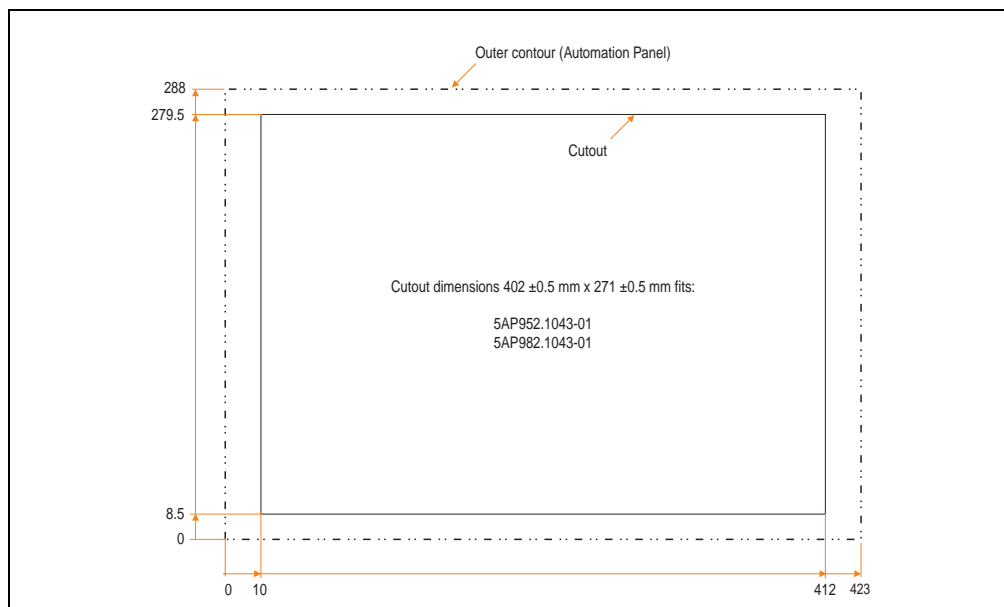
Figure 26: Cutout installation - 5AP982.1043-01

For further information regarding installation and mounting orientation, see chapter 3 "Start-up" starting on page 97.

3.2.5 Automation Panel 5AP920.1214-01
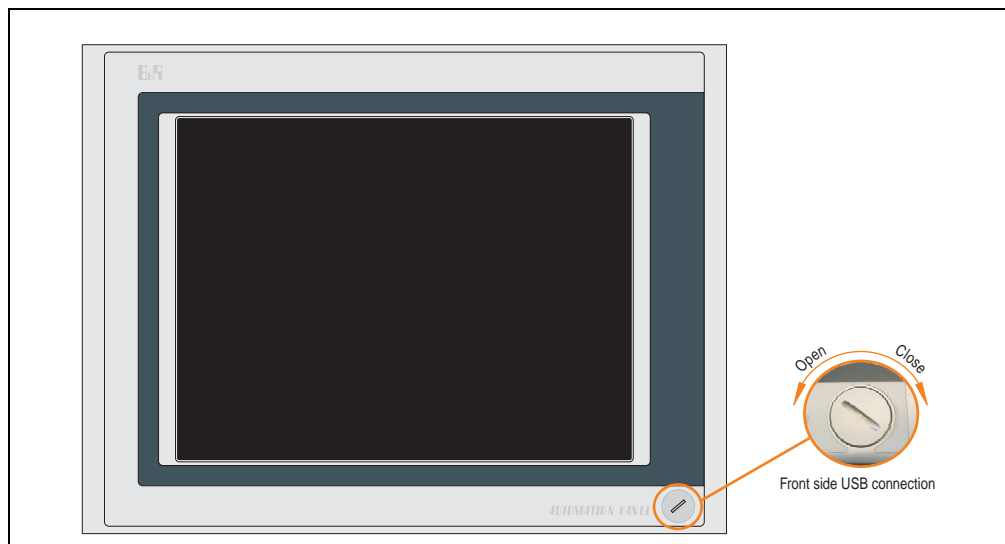
Figure 27: Front view - 5AP920.1214-01
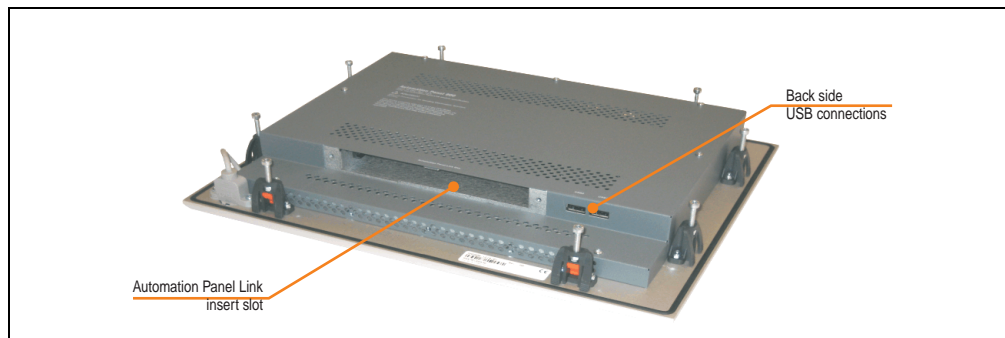
Figure 28: Rear view - 5AP920.1214-01

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
    Perspective (see page 211)
      Horizontal
      Vertical
 Background lighting
    Brightness
    Half-brightness time
	
	 TFT
	 12,1 in (307 mm)
	 262144 colors
	 SVGA, 800 x 600 pixels
	 300:1
	
	 Direction R / direction L =70°
	 Direction U = 50°/ direction D = 60°
	
	 350 cd/m²
	 50000 hours

Touch screen [2]
    Technology
    Controller
    Degree of transmission
	
	 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[3]
    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
	
	 Aluminum, naturally anodized[4]
	 Gray[4]
	 Polyester
	 Similar to Pantone 432CV[4]
	 Similar to Pantone 427CV[4]
	 Flat gasket around display front

Outer dimensions
    Width
    Height
    Depth
	
	 362 mm
	 284 mm
	 54 mm

Table 31: Technical data - 5AP920.1214-01

Mechanical characteristics	5AP920.1214-01
Housing Paint	Metal Similar to Pantone 432CV[4]
Weight	Approx. 3.4 kg
Environmental characteristics	

Ambient temperature
    Operation
    Storage
    Transport
	See "Ambient temperatures" on page 23
	-30 °C .. +70 °C
	-30 °C .. +70 °C

Relative humidity Operation / Storage / Transport	T <= 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing

Vibration
    Operation (continuous)
    Operation (occasional)
    Storage / Transport
	5 - 9 Hz: 1.75 mm amplitude / 9 - 150 Hz: 0,5 g (4.9 m/s² 0-peak)
	5 - 9 Hz: 3 mm amplitude / 9 - 150 Hz: 1 g (9.8 m/s² 0-peak)
	Max. 10 - 57 Hz and 0.075 mm amplitude
	Max. 58 - 500 Hz and 1 g (9.8 m/s² 0-peak)

Shock
    Operation
    Storage / Transport
	Max. 15 g (147 m/s² 0-peak) and 11 ms duration
	Max. 50 g (490 m/s² 0-peak) and 11 ms duration

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

Table 31: Technical data - 5AP920.1214-01 (cont.)

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

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

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

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

Temperature humidity diagram - Operation and storage

Figure 29: Temperature humidity diagram - 5AP920.1214-01

Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1 °C per 1000 meters (from 500 meters above sea level).

Chapter 2
Technical data

Dimensions

Rated 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
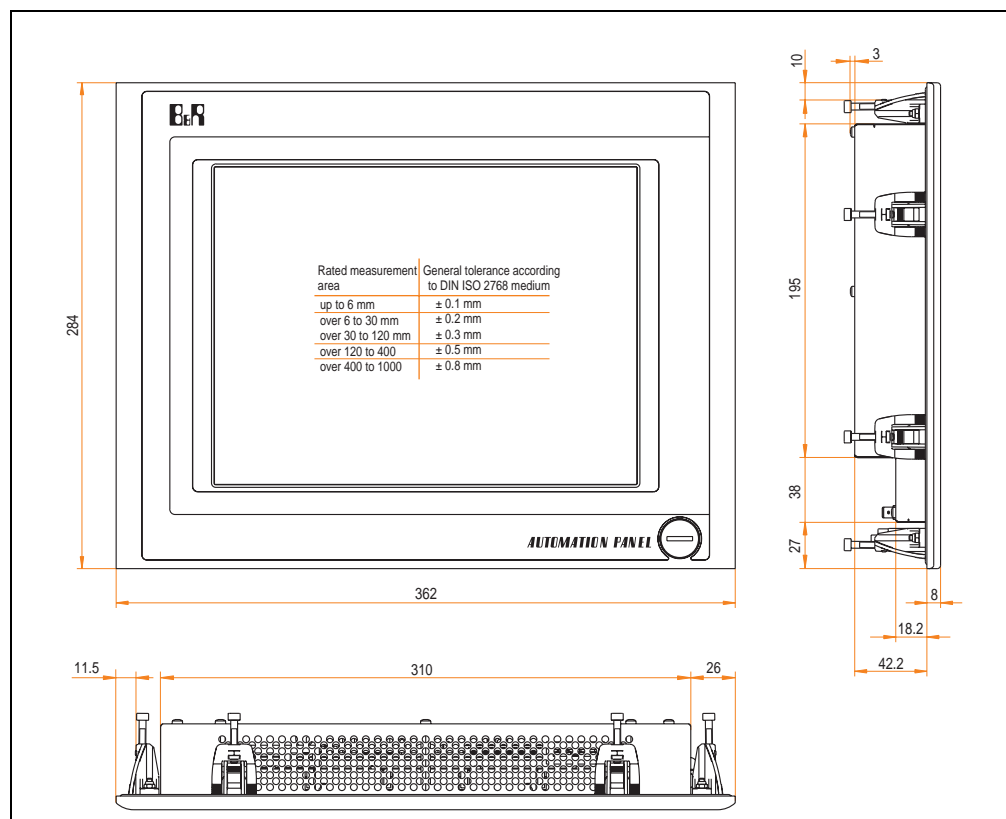
Figure 30: Dimensions - 5AP920.1214-01

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 32: Delivery contents - 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.
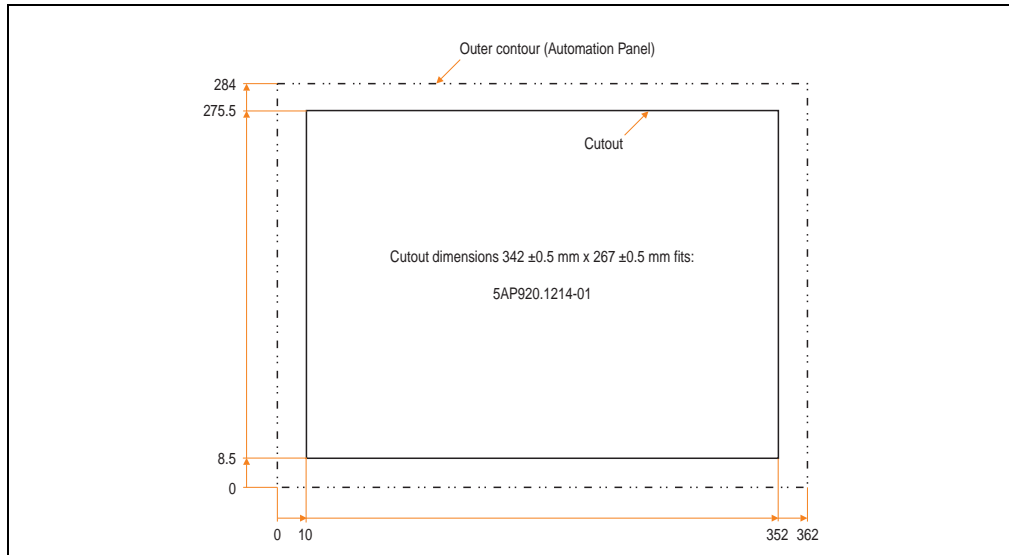
Figure 31: Cutout installation - 5AP920.1214-01

For further information regarding installation and mounting orientation, see chapter 3 "Start-up" starting on page 97.

3.2.6 Automation Panel 5AP920.1505-01

Front side USB connection

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

Back side
USB connections

Automation Panel Link
insert slot
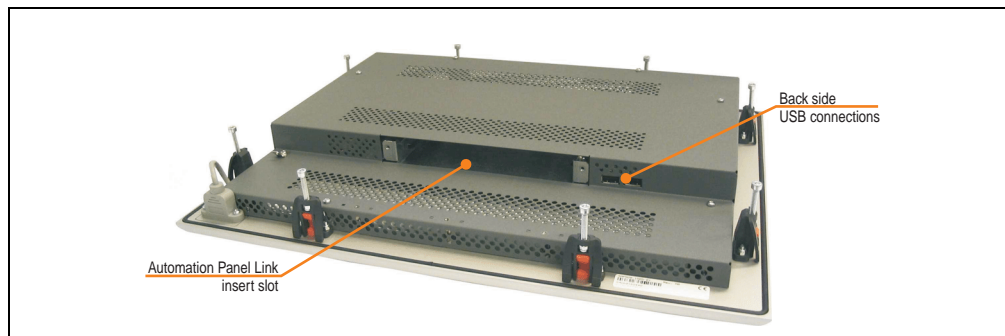
Figure 33: Rear view - 5AP920.1505-01

Technical data

| Features	5AP920.1505-01
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
    Perspective (see page 211)
        Horizontal
        Vertical
Background lighting
    Brightness
    Half-brightness time
	
	TFT
	15 in (381 mm)
	16.7 million
	XGA, 1024 x 768 pixels
	400:1
	
	Direction R / direction L =85°
	Direction U / direction D = 85°
	
	250 cd/m²
	50000 hours

Touch screen [2]
    Technology
    Controller
    Degree of transmission
	
	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[3]
    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 24 W, maximum 31 W or 41 W with USB
	Yes

Mechanical characteristics	

Front
    Frame
    Design
    Membrane
        Dark gray border around display
        Light background
    Gasket
	
	Aluminum, naturally anodized[4]
	Gray[4]
	Polyester
	Similar to Pantone 432CV[4]
	Similar to Pantone 427CV[4]
	Flat gasket around display front

Outer dimensions
    Width
    Height
    Depth
	
	435 mm
	330 mm
	54 mm

Table 33: Technical data - 5AP920.1505-01

Mechanical characteristics	5AP920.1505-01
Housing Paint	Metal Similar to Pantone 432CV[4]
Weight	Approx. 5.1 kg
Environmental characteristics	

Ambient temperature
    Operation
    Storage
    Transport
	See "Ambient temperatures" on page 23
	-25 °C .. +60 °C
	-25 °C .. +60 °C

Relative humidity Operation / Storage / Transport	T <= 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing

Vibration
    Operation (continuous)
    Operation (occasional)
    Storage / Transport
	5 - 9 Hz: 1.75 mm amplitude / 9 - 150 Hz: 0,5 g (4.9 m/s² 0-peak)
	5 - 9 Hz: 3 mm amplitude / 9 - 150 Hz: 1 g (9.8 m/s² 0-peak)
	Max. 10 - 57 Hz and 0.075 mm amplitude
	Max. 58 - 500 Hz and 1 g (9.8 m/s² 0-peak)

Shock
    Operation
    Storage / Transport
	Max. 15 g (147 m/s² 0-peak) and 11 ms duration
	Max. 50 g (490 m/s² 0-peak) and 11 ms duration

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

Table 33: Technical data - 5AP920.1505-01 (cont.)

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

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

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

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

Temperature humidity diagram - Operation and storage
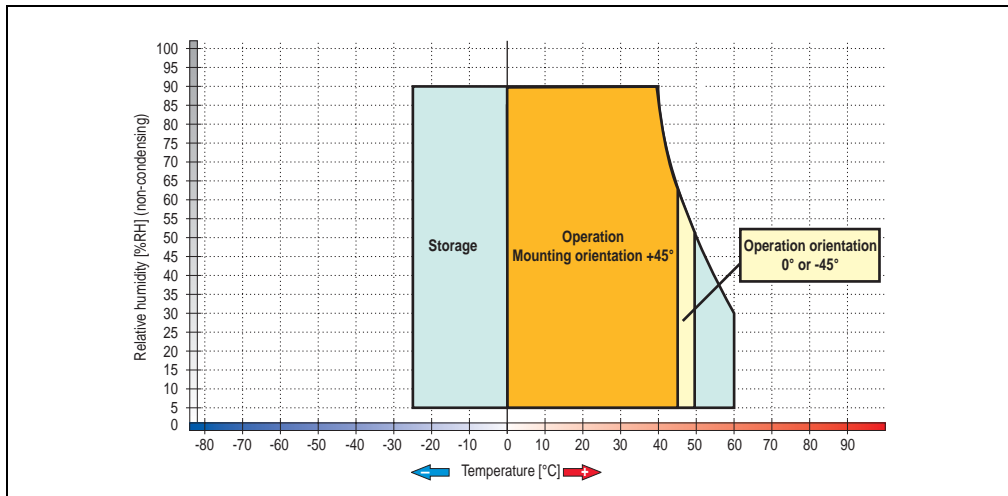
Figure 34: Temperature humidity diagram - 5AP920.1505-01

Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1 °C per 1000 meters (from 500 meters above sea level).

Dimensions

The following table appears within the figure:

Rated 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
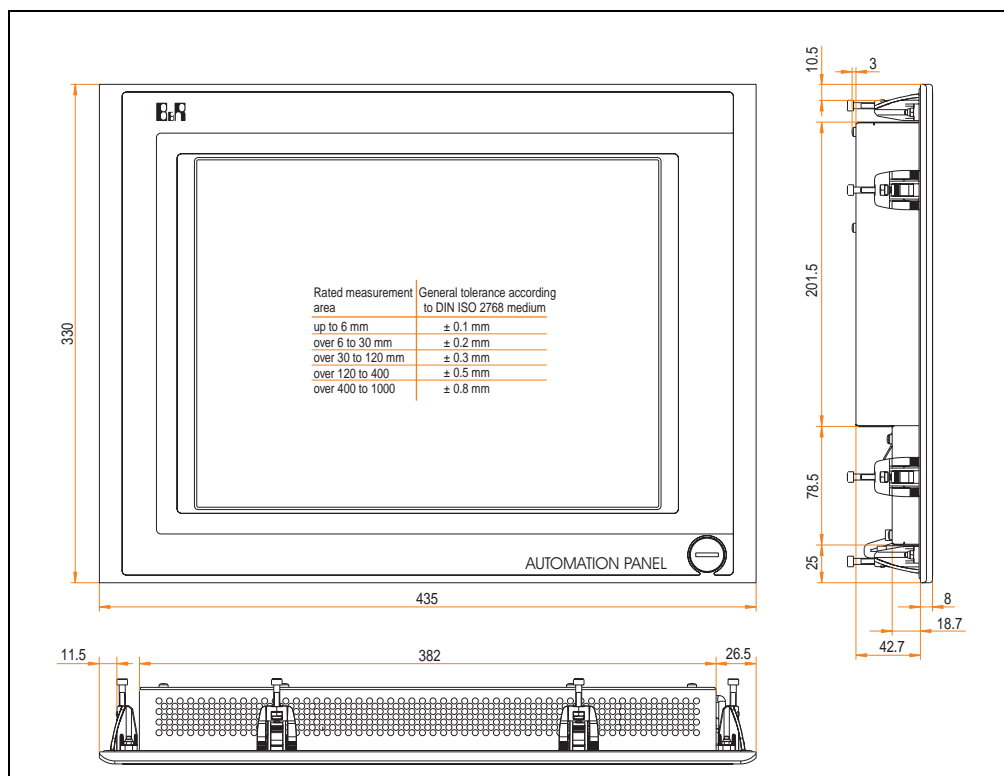
Figure 35: Dimensions 5AP920.1505-01

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 34: 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.
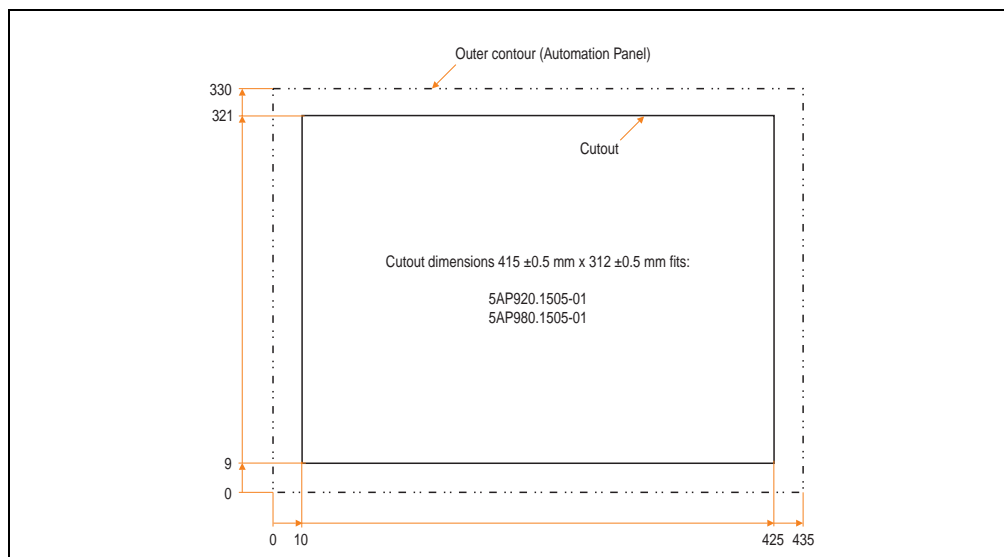
Figure 36: Cutout installation - 5AP920.1505-01

For further information regarding installation and mounting orientation, see chapter 3 "Start-up" starting on page 97.

Chapter 2
Technical data

3.2.7 Automation Panel 5AP980.1505-01

Keys can be
labeled using
insert strips

Keys can be
labeled using
insert strips

Front side USB connection

F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12
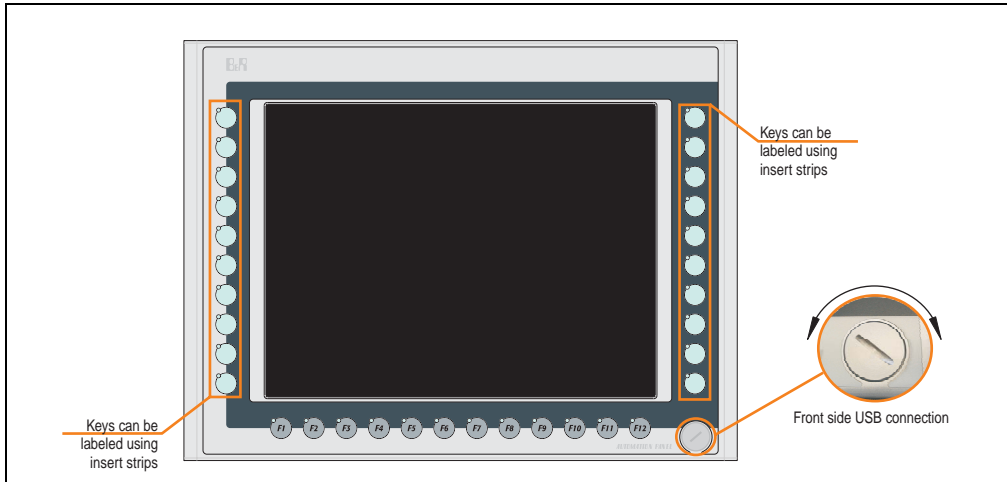
Figure 37: Front view - 5AP980.1505-01

Back side
USB connections

Automation Panel Link
insert slot
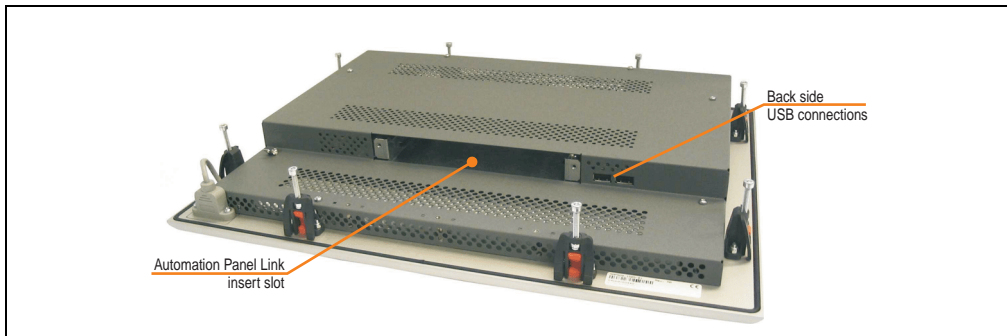
Figure 38: Rear view - 5AP980.1505-01

Technical data

Features	5AP980.1505-01
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
  Perspective (see page 211)
    Horizontal
    Vertical
Background lighting
  Brightness
  Half-brightness time
	
	TFT
	15 in (381 mm)
	16.7 million
	XGA, 1024 x 768 pixels
	400:1
	
	Direction R / direction L =85°
	Direction U / direction D = 85°
	
	250 cd/m²
	50000 hours

Touch screen [2]
  Technology
  Controller
  Degree of transmission
	
	Analog, resistive
	Elo, serial, 12-bit
	Up to 78%

Keys/LED[3]
  Function keys
  Soft keys
  Cursor keys
  Number block
  Other keys
  Key lifespan
  LED brightness
	
	20 with LED (yellow)
	12 with LED (yellow)
	-
	-
	-
	$> 10^6$ actuations with 1 ±0.3 to 3 ±0.3 N operating force
	Typically 12 mcd (yellow)

Caution!

Pressing several keys at the same time may trigger unintended actions.

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 24 W (without LED), maximum 32 W or 42 W with USB
	Yes

Mechanical characteristics	

Front
  Frame
  Design
  Membrane
    Dark gray border around display
    Light background
    Legend strips (gray)
  Gasket
	
	Aluminum, naturally anodized[5]
	Gray[5]
	Polyester
	Similar to Pantone 432CV[5]
	Similar to Pantone 427CV[5]
	Similar to Pantone 429CV[5]
	Flat gasket around display front

Table 35: Technical data - 5AP980.1505-01

Chapter 2
Technical data

Mechanical characteristics	5AP980.1505-01

Outer dimensions
    Width
    Height
    Depth
	435 mm
	330 mm
	54 mm

Housing Paint	Metal Similar to Pantone 432CV[5]
Weight	Approx. 5.1 kg
Environmental characteristics	

Ambient temperature
    Operation
    Storage
    Transport
	See "Ambient temperatures" on page 23
	-25 °C .. +60 °C
	-25 °C .. +60 °C

Relative humidity Operation / Storage / Transport	T <= 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing

Vibration
    Operation (continuous)
    Operation (occasional)
    Storage / Transport
	5 - 9 Hz: 1.75 mm amplitude / 9 - 150 Hz: 0,5 g (4.9 m/s² 0-peak)
	5 - 9 Hz: 3 mm amplitude / 9 - 150 Hz: 1 g (9.8 m/s² 0-peak)
	Max. 10 - 57 Hz and 0.075 mm amplitude
	Max. 58 - 500 Hz and 1 g (9.8 m/s² 0-peak)

Shock
    Operation
    Storage / Transport
	Max. 15 g (147 m/s² 0-peak) and 11 ms duration
	Max. 50 g (490 m/s² 0-peak) and 11 ms duration

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

Table 35: Technical data - 5AP980.1505-01 (cont.)

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

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

3) 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).

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.

Temperature humidity diagram - Operation and storage

Figure 39: Temperature humidity diagram - 5AP980.1505-01

Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1 °C per 1000 meters (from 500 meters above sea level).

Dimensions

The following table appears within the figure:

Rated 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
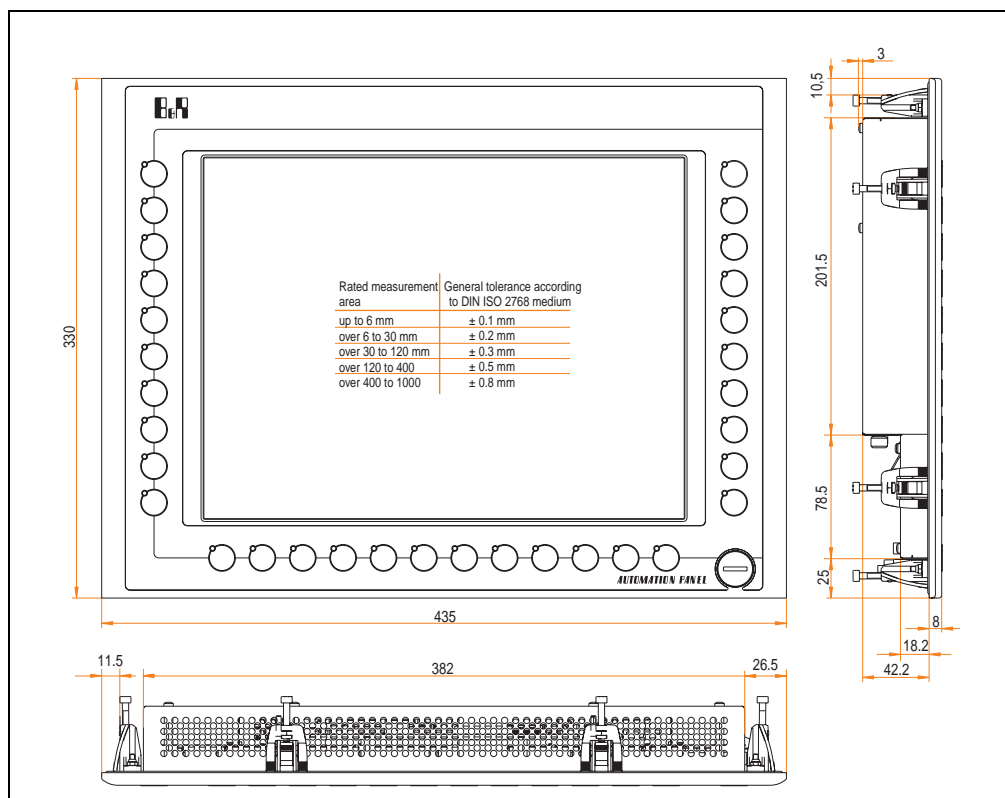
Figure 40: Dimensions 5AP980.1505-01

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 36: 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.

Figure 41: Cutout installation - 5AP980.1505-01

For further information regarding installation and mounting orientation, see chapter 3 "Start-up" starting on page 97.

Chapter 2
Technical data

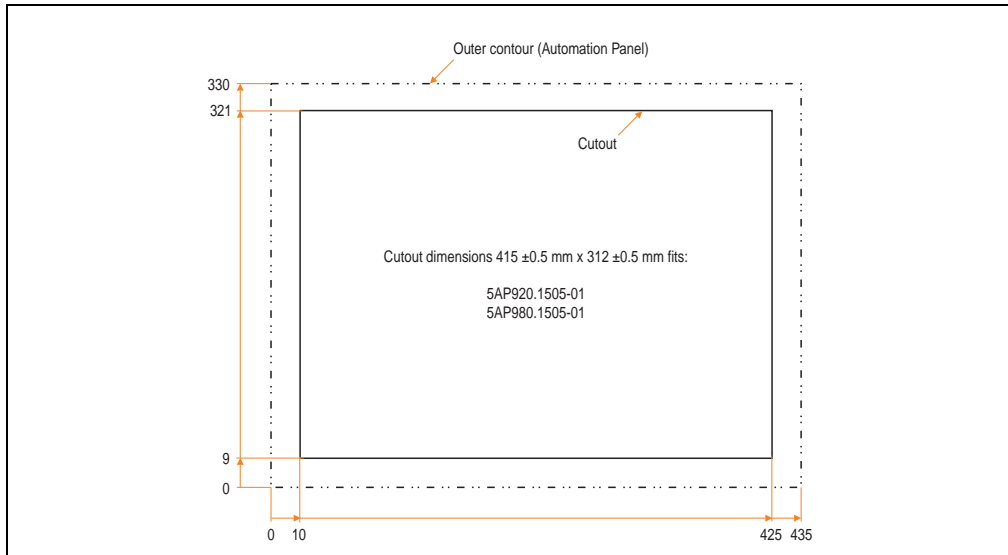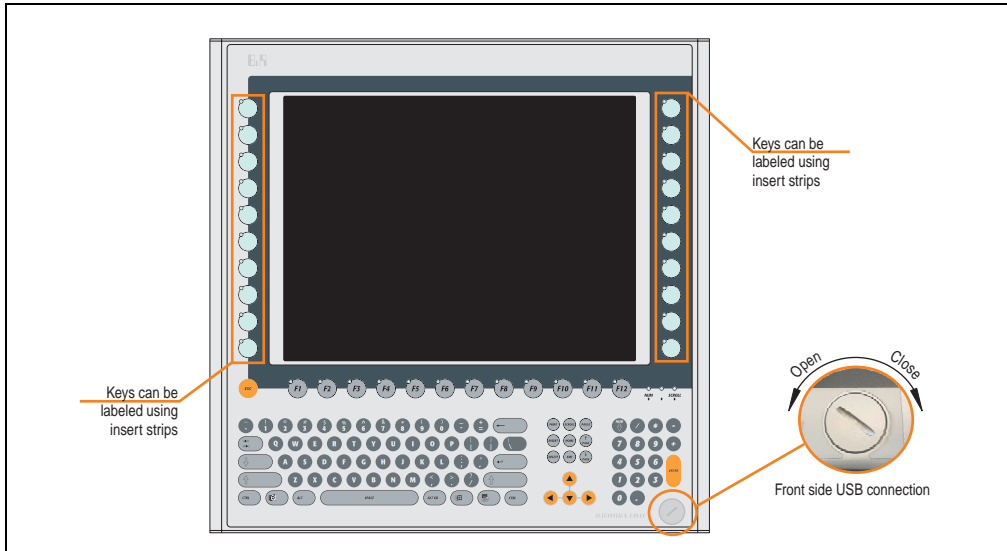### 3.2.8 Automation Panel 5AP981.1505-01

Figure 42: Front view - 5AP981.1505-01
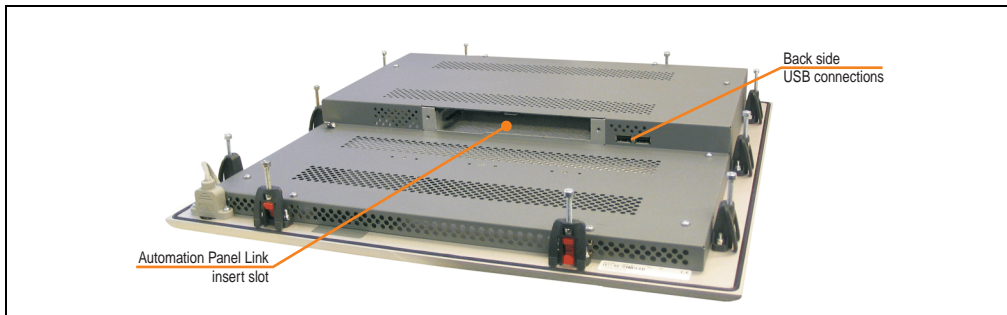
Figure 43: Rear view - 5AP981.1505-01

Technical data

Features	5AP981.1505-01
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
    Perspective (see page 211)
        Horizontal
        Vertical
Background lighting
    Brightness
    Half-brightness time
	
	TFT
	15 in (381 mm)
	16.7 million
	XGA, 1024 x 768 pixels
	400:1
	
	Direction R / direction L =85°
	Direction U / direction D = 85°
	
	250 cd/m²
	50000 hours

Touch screen [2]
    Technology
    Controller
    Degree of transmission
	
	Analog, resistive
	Elo, serial, 12-bit
	Up to 78%

Keys/LED[3]
    Function keys
    Soft keys
    Cursor keys
    Number block
    Other keys
    Key lifespan
    LED brightness
	
	20 with LED (yellow)
	12 with LED (yellow)
	-
	15 without LED
	77 without LED
	$> 10^6$ actuations with 1 ±0.3 to 3 ±0.3 N operating force
	Typically 12 mcd (yellow)

Caution!

Pressing several keys at the same time may trigger unintended actions.

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 24 W (without LED), maximum 32 W or 42 W with USB
	Yes

Mechanical characteristics	

Outer dimensions
    Width
    Height
    Depth
	
	435 mm
	430 mm
	54 mm

Table 37: Technical data - 5AP981.1505-01

Chapter 2
Technical data

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
	Aluminum, naturally anodized[5]
	Gray[5]
	Polyester
	Similar to Pantone 432CV[5]
	Similar to Pantone 427CV[5]
	Similar to Pantone 151CV[5]
	Similar to Pantone 431CV[5]
	Similar to Pantone 429CV[5]
	Flat gasket around display front

Housing Paint	Metal Similar to Pantone 432CV[5]
Weight	Approx. 5.9 kg
Environmental characteristics	

Ambient temperature
    Operation
    Storage
    Transport
	See "Ambient temperatures" on page 23
	-25 °C .. +60 °C
	-25 °C .. +60 °C

Relative humidity Operation / Storage / Transport	T <= 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing

Vibration
    Operation (continuous)
    Operation (occasional)
    Storage / Transport
	5 - 9 Hz: 1.75 mm amplitude / 9 - 150 Hz: 0,5 g (4.9 m/s² 0-peak)
	5 - 9 Hz: 3 mm amplitude / 9 - 150 Hz: 1 g (9.8 m/s² 0-peak)
	Max. 10 - 57 Hz and 0.075 mm amplitude
	Max. 58 - 500 Hz and 1 g (9.8 m/s² 0-peak)

Shock
    Operation
    Storage / Transport
	Max. 15 g (147 m/s² 0-peak) and 11 ms duration
	Max. 50 g (490 m/s² 0-peak) and 11 ms duration

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

Table 37: Technical data - 5AP981.1505-01 (cont.)

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

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

3) 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).

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.

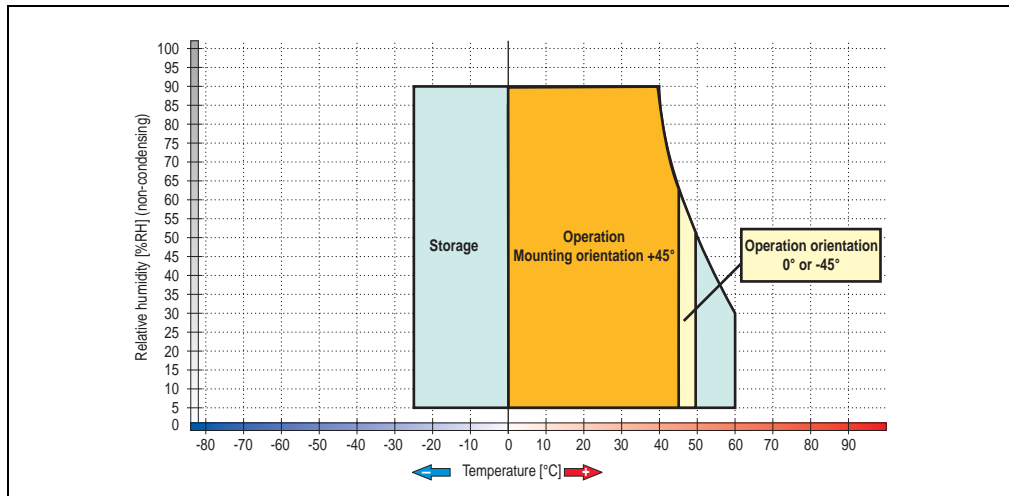Temperature humidity diagram - Operation and storage

Figure 44: Temperature humidity diagram - 5AP981.1505-01

Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1 °C per 1000 meters (from 500 meters above sea level).
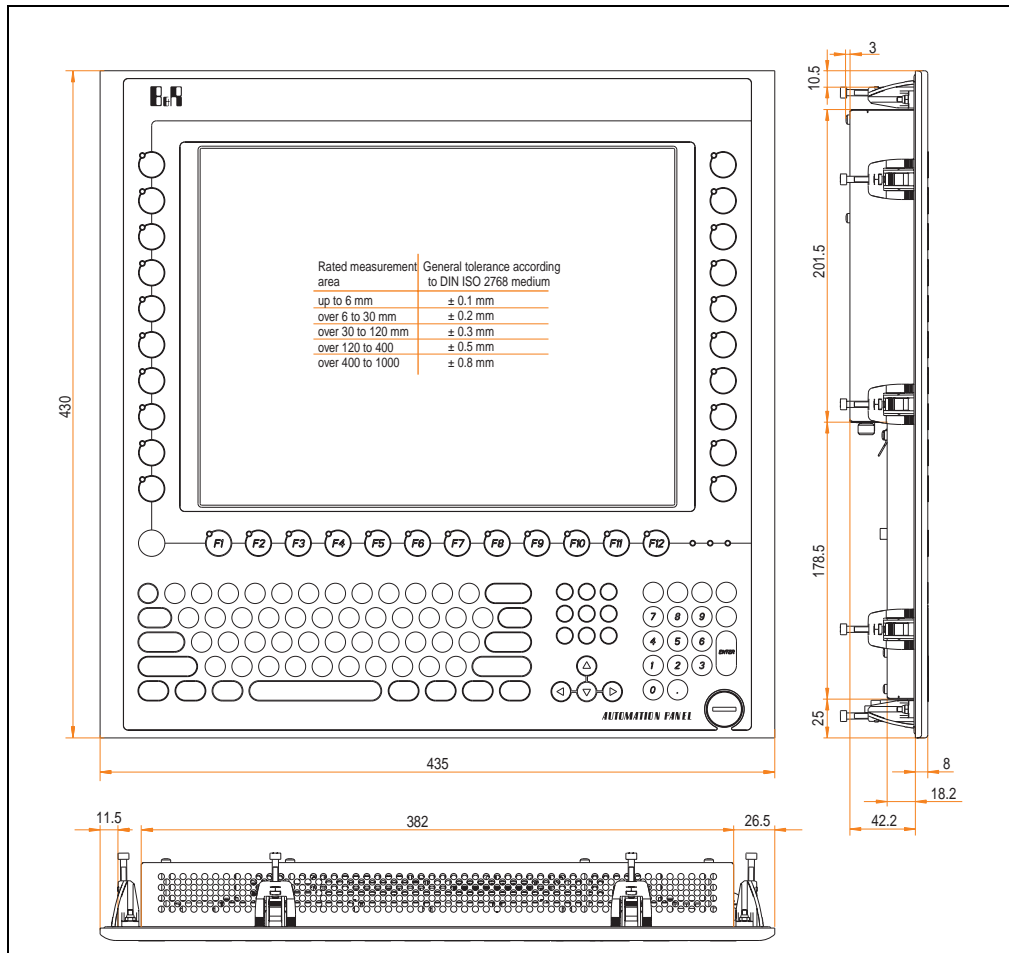
Dimensions

Rated 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 45: 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 38.10cm with touch screen and keys
2	2 insert strips without labels (inserted in the front)

Table 38: 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.
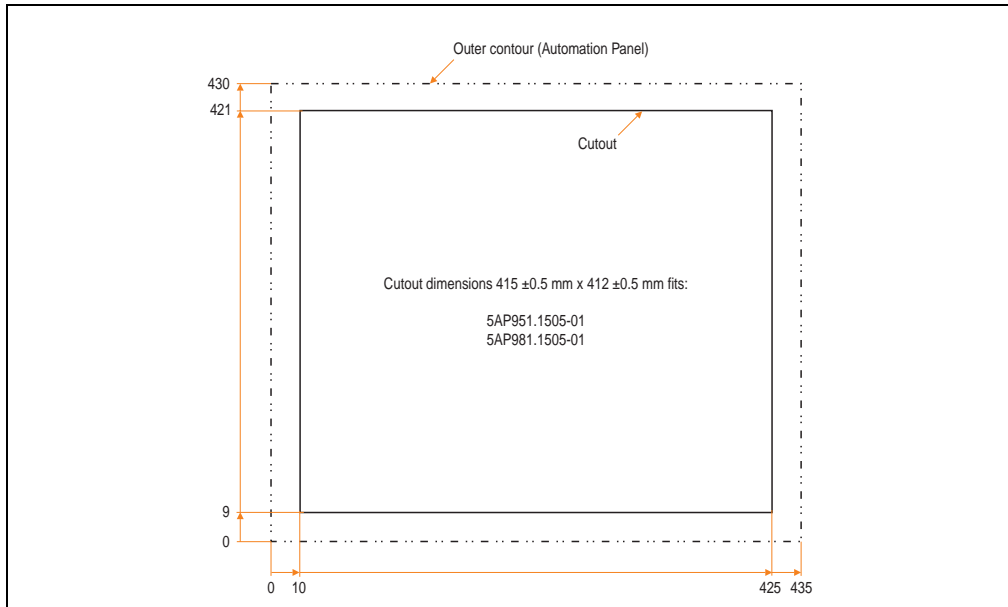

Figure 46: Cutout installation - 5AP981.1505-01

For further information regarding installation and mounting orientation, see chapter 3 "Start-up" starting on page 97.
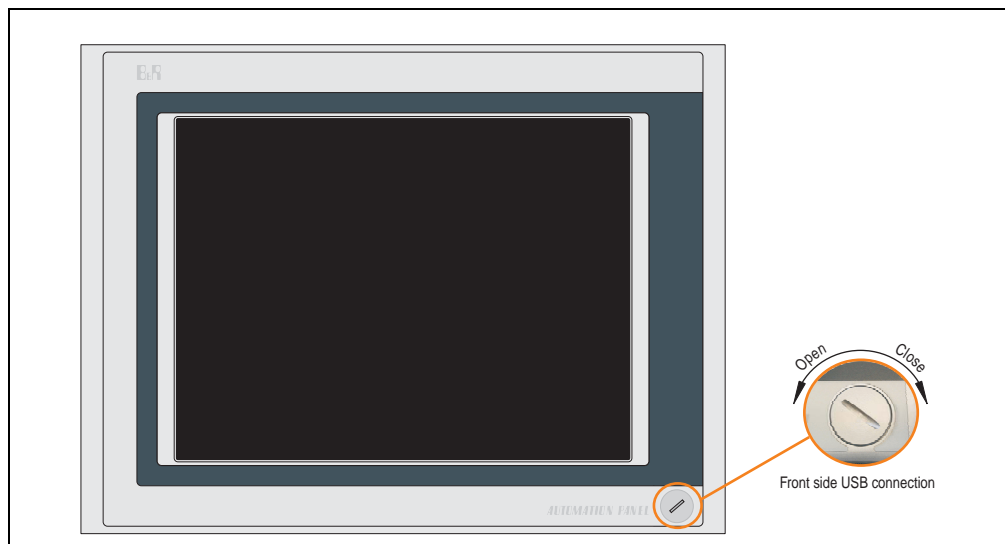
3.2.9 Automation Panel 5AP920.1706-01
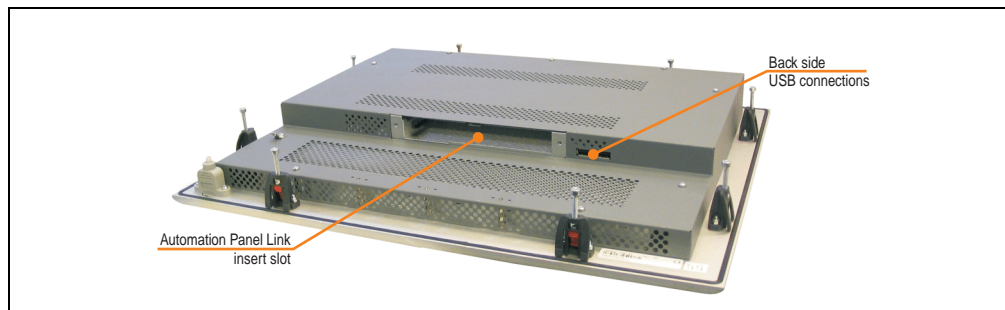

Figure 47: Front view - 5AP920.1706-01

Figure 48: Rear view - 5AP920.1706-01

Technical data

Features	5AP920.1706-01
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
   Perspective (see page 211)
      Horizontal
      Vertical
Background lighting
   Brightness
   Half-brightness time
	TFT
	17 in (431 mm)
	16.7 million
	SXGA, 1280 x 1024 pixels
	600:1
	
	Direction R / direction L =75°
	Direction U = 75°/ direction D = 60°
	
	250 cd/m²
	50000 hours [2]

Touch screen [3]
   Technology
   Controller
   Degree of transmission
	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 27 W, maximum 36 W or 46 W with USB
	Yes

Mechanical characteristics	

Front
   Frame
   Design
   Membrane
      Dark gray border around display
      Light background
   Gasket
	Aluminum, naturally anodized [5]
	Gray [5]
	Polyester
	Similar to Pantone 432CV [5]
	Similar to Pantone 427CV [5]
	Flat gasket around display front

Outer dimensions
   Width
   Height
   Depth
	477 mm
	390 mm
	59 mm

Table 39: Technical data - 5AP920.1706-01

Mechanical characteristics	5AP920.1706-01	
Housing Paint	Metal Similar to Pantone 432CV[5]	
Weight	Approx. 7 kg	
Environmental characteristics	**5AP920.1706-01 < Rev. D0**	**5AP920.1706-01, Rev. D0 and higher**
Ambient temperature Operation Storage Transport	See "Ambient temperatures" on page 23 -20 °C .. +60 °C -20 °C .. +60 °C	See "Ambient temperatures" on page 23 -25 °C .. +60 °C -25 °C .. +60 °C
Relative humidity Operation Storage / Transport	20 % to 90 %, non-condensing T <= 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing	
Vibration Operation (continuous) Operation (occasional) Storage Transport	5 - 9 Hz: 1.75 mm amplitude / 9 - 150 Hz: 0,5 g (4.9 m/s² 0-peak) 5 - 9 Hz: 3 mm amplitude / 9 - 150 Hz: 1 g (9.8 m/s² 0-peak) Max. 10 - 300 Hz and 1 g (9.8 m/s² 0-peak) Max. 10 - 300 Hz and 1 g (9.8 m/s² 0-peak)	
Shock Operation Storage / Transport	Max. 15 g (147 m/s² 0-peak) and 11 ms duration Max. 50 g (490 m/s² 0-peak) and 11 ms duration	
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	

Table 39: Technical data - 5AP920.1706-01 (cont.)

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

2) Revision < D0 - lifespan limited to 30000 hours.

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.

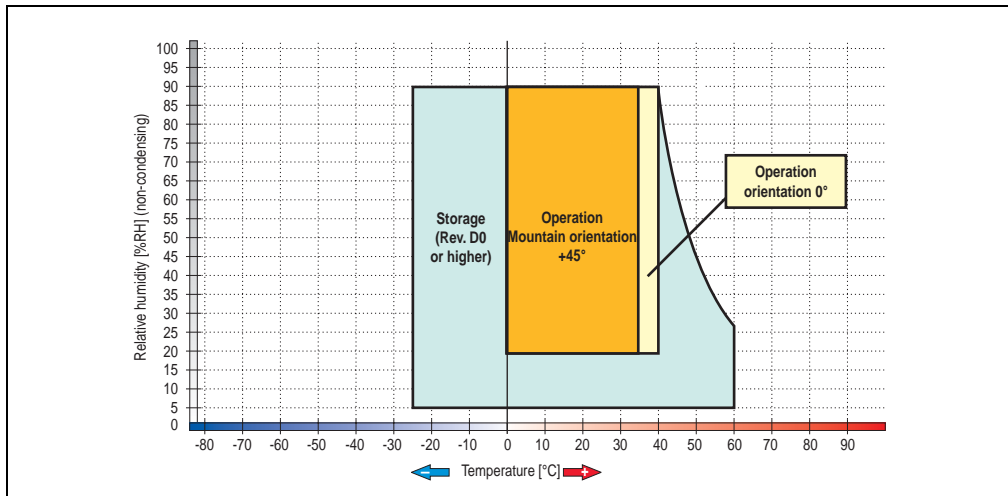Temperature humidity diagram - Operation and storage

Figure 49: Temperature humidity diagram - 5AP920.1706-01

Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1 °C per 1000 meters (from 500 meters above sea level).
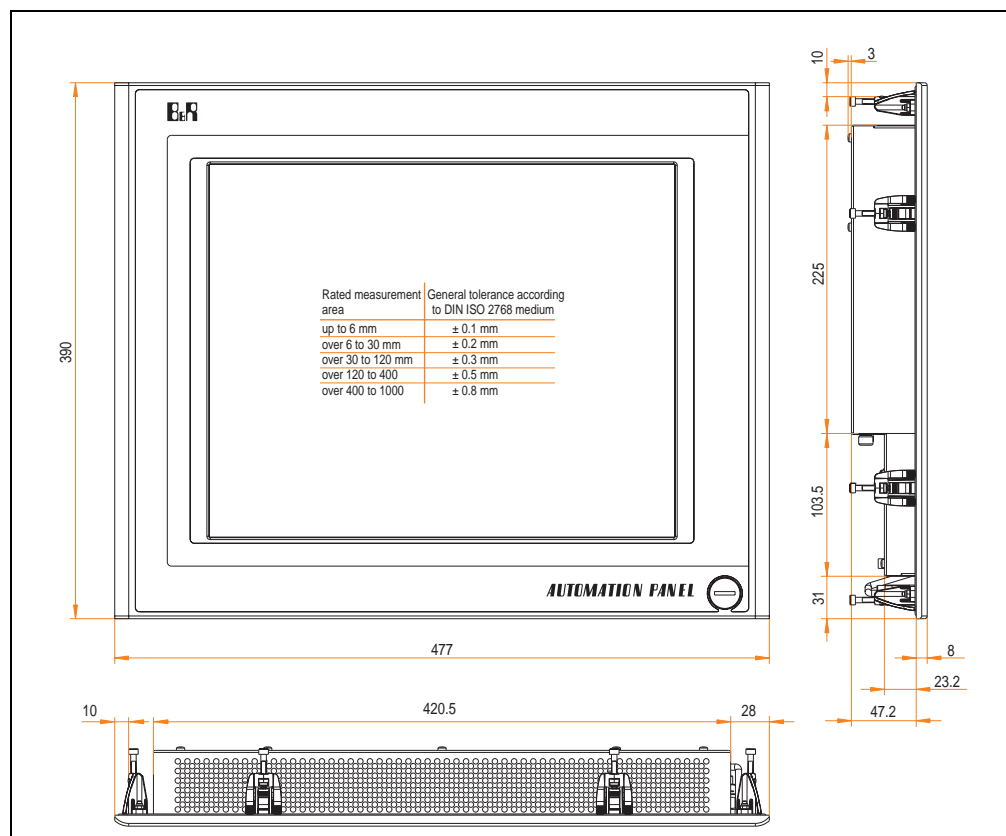
Dimensions

The following tolerance table appears within the figure:

Rated 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 50: 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 40: 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.
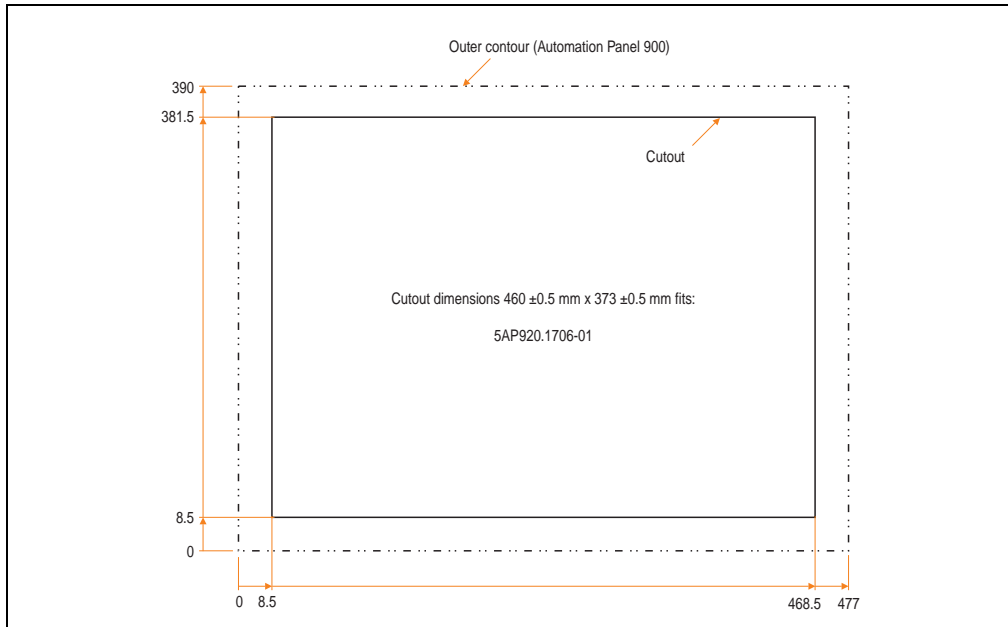
Figure 51: Cutout installation - 5AP920.1706-01

For further information regarding installation and mounting orientation, see chapter 3 "Start-up" starting on page 97.
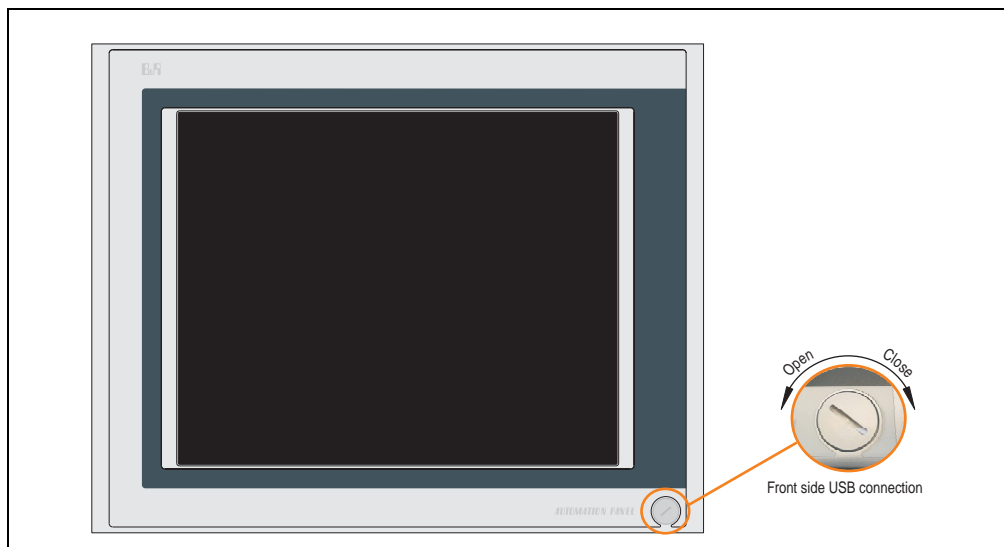
3.2.10 Automation Panel 5AP920.1906-01
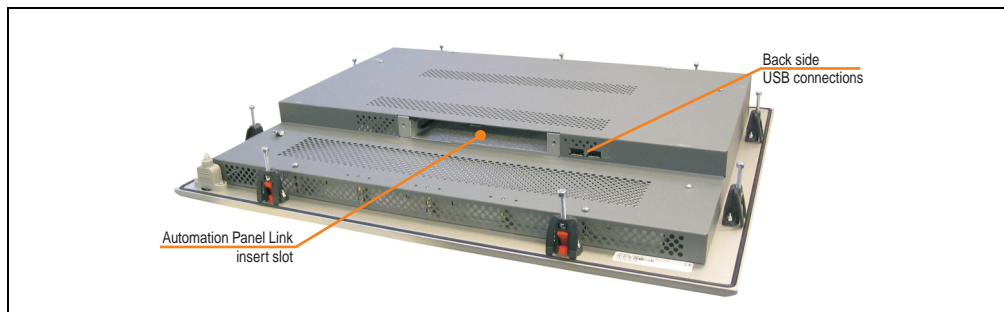
Figure 52: Front view - 5AP920.1906-01

Open   Close

Front side USB connection

Figure 53: Rear view - 5AP920.1906-01

Back side
USB connections

Automation Panel Link
insert slot

Technical data

Features	5AP920.1906-01
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
   Perspective (see page 211)
      Horizontal
      Vertical
Background lighting
   Brightness
   Half-brightness time
	
	TFT
	19 in (482 mm)
	16.7 million
	SXGA, 1280 x 1024 pixels
	600:1
	
	Direction R / direction L =75°
	Direction U = 75°/ direction D = 60°
	
	250 cd/m²
	35000 hours

Touch screen [2]
   Technology
   Controller
   Degree of transmission
	
	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[3]
   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 27 W, maximum 38 W or 48 W with USB
	Yes

Mechanical characteristics	

Front
   Frame
   Design
   Membrane
      Dark gray border around display
      Light background
   Gasket
	
	Aluminum, naturally anodized[4]
	Gray[4]
	Polyester
	Similar to Pantone 432CV[4]
	Similar to Pantone 427CV[4]
	Flat gasket around display front

Outer dimensions
   Width
   Height
   Depth
	
	527 mm
	421 mm
	62 mm

Table 41: Technical data - 5AP920.1906-01

Mechanical characteristics	5AP920.1906-01	
Housing Paint	Metal Similar to Pantone 432CV[4]	
Weight	Approx. 8.1 kg	
Environmental characteristics	**5AP920.1906-01 < Rev. D0**	**5AP920.1906-01, Rev. D0 and higher**

Ambient temperature
   Operation
   Storage
   Transport
	See "Ambient temperatures" on page 23
	-20 °C .. +60 °C
	-20 °C .. +60 °C
		See "Ambient temperatures" on page 23
		-25 °C .. +60 °C
		-25 °C .. +60 °C

Relative humidity
   Operation
   Storage / Transport
	20 % to 90 %, non-condensing
	T <= 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing	

Vibration
   Operation (continuous)
   Operation (occasional)
   Storage
   Transport
	5 - 9 Hz: 1.75 mm amplitude / 9 - 150 Hz: 0,5 g (4.9 m/s² 0-peak)
	5 - 9 Hz: 3 mm amplitude / 9 - 150 Hz: 1 g (9.8 m/s² 0-peak)
	Max. 10 - 300 Hz and 1 g (9.8 m/s² 0-peak)
	Max. 10 - 300 Hz and 1 g (9.8 m/s² 0-peak)	

Shock
   Operation
   Storage / Transport
	Max. 15 g (147 m/s² 0-peak) and 11 ms duration
	Max. 50 g (490 m/s² 0-peak) and 11 ms duration	

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	

Table 41: Technical data - 5AP920.1906-01 (cont.)

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

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

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

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

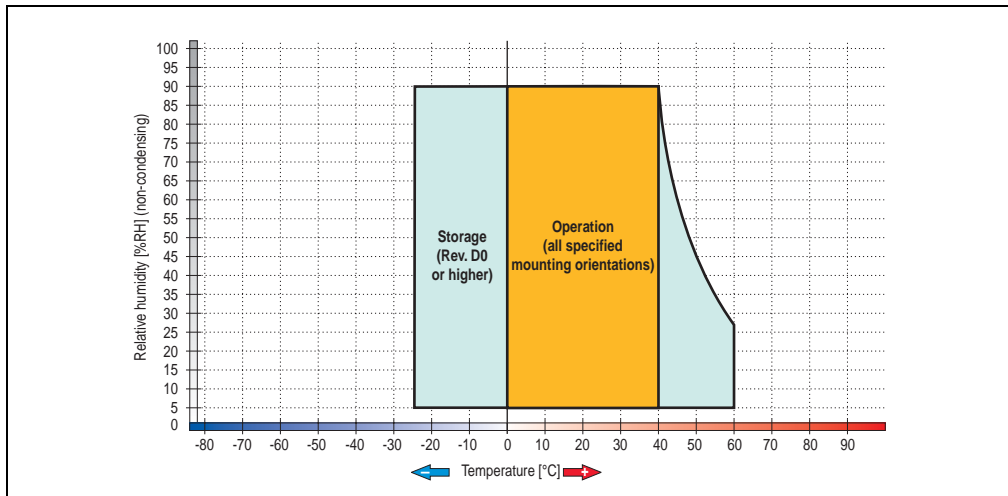Temperature humidity diagram - Operation and storage

Figure 54: Temperature humidity diagram - 5AP920.1906-01

Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1 °C per 1000 meters (from 500 meters above sea level).
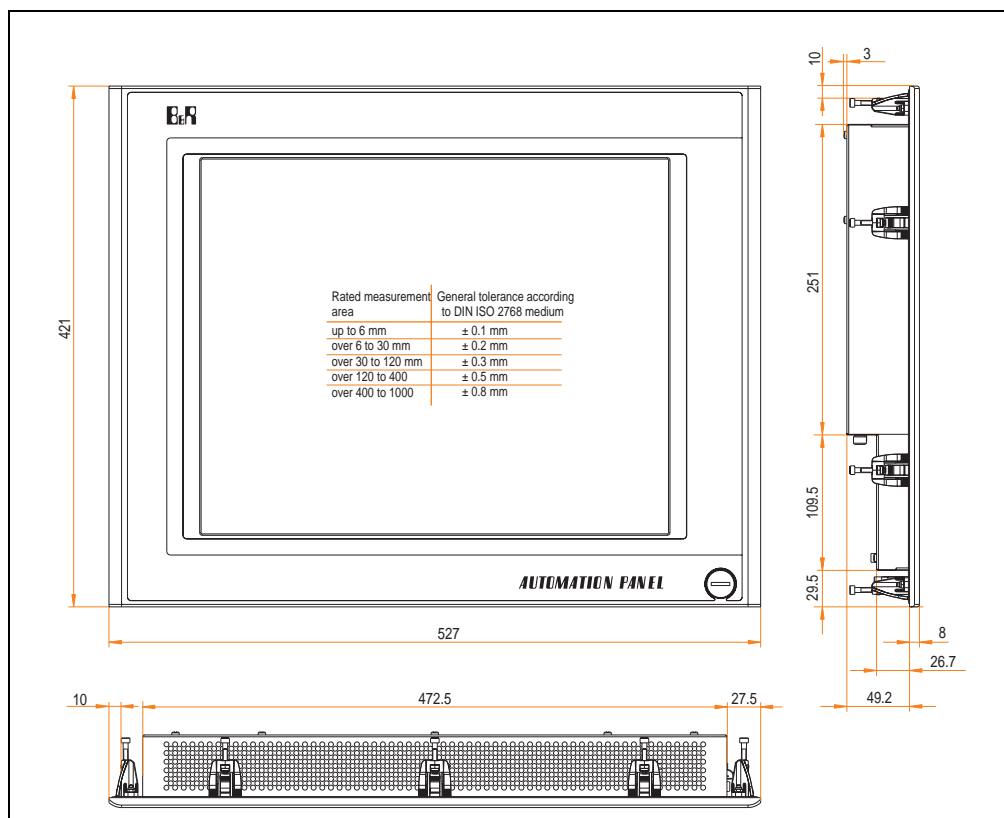
Dimensions

Rated 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 55: 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 48.26cm with touch screen

Table 42: 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.
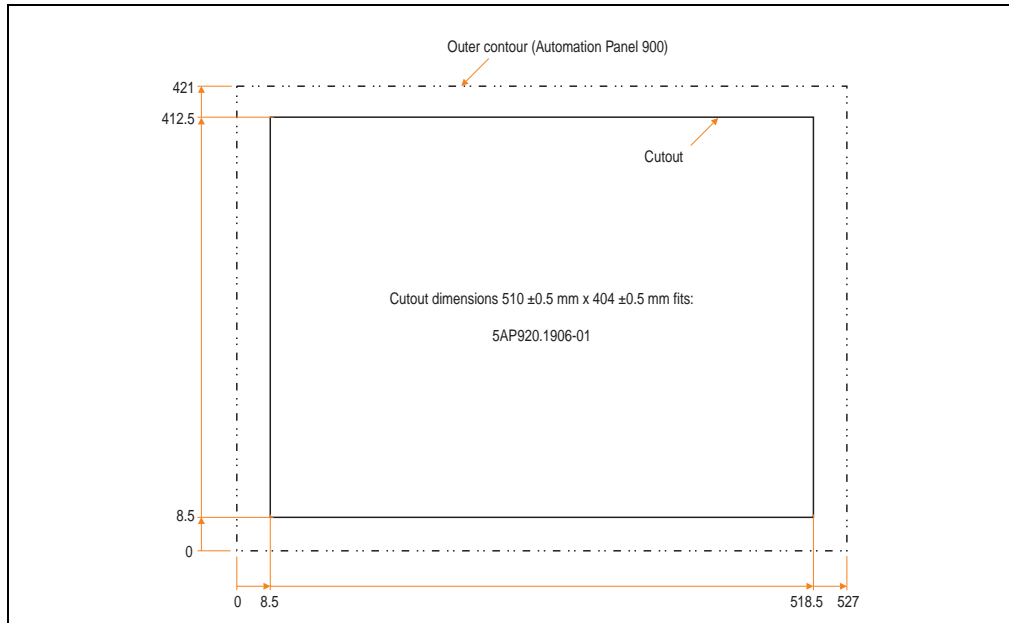

Figure 56: Cutout installation - 5AP920.1906-01

For further information regarding installation and mounting orientation, see chapter 3 "Start-up" starting on page 97.

Chapter 3 • Start-up

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.
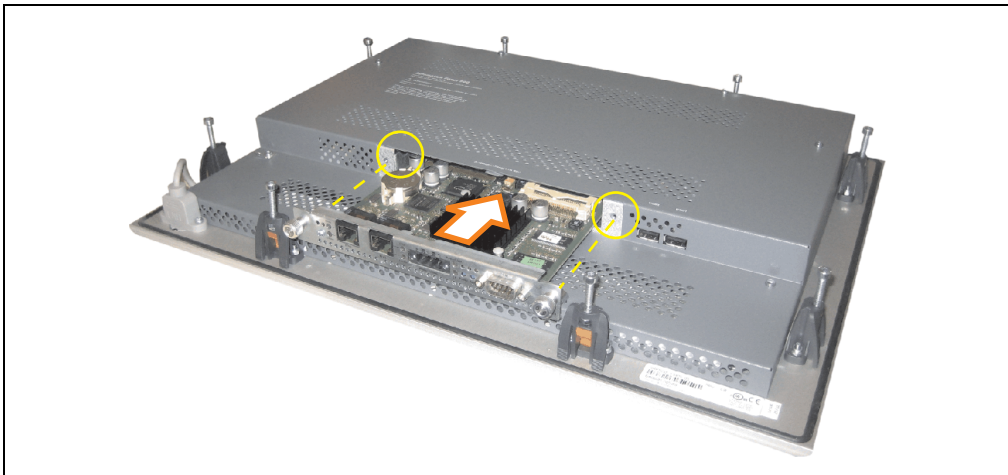

Figure 57: PPC300 mounted in the AP900

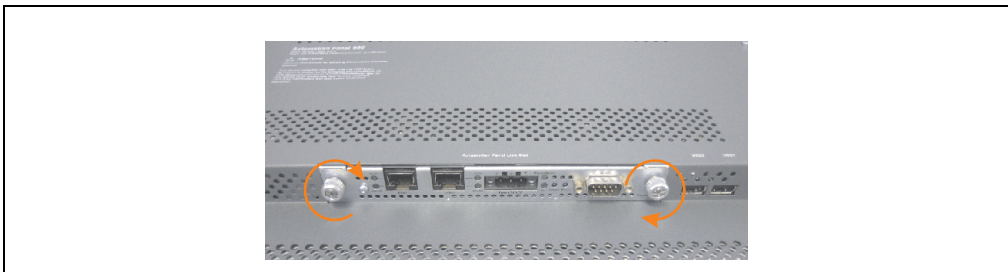The two fastening screws are then used to securely fasten the PPC300 to the AP900 (max. torque 0.5 Nm).

Figure 58: Fasten the PPC300 in the AP900

Chapter 3
Start-up

2. Mounting instructions for an AP900

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 21).
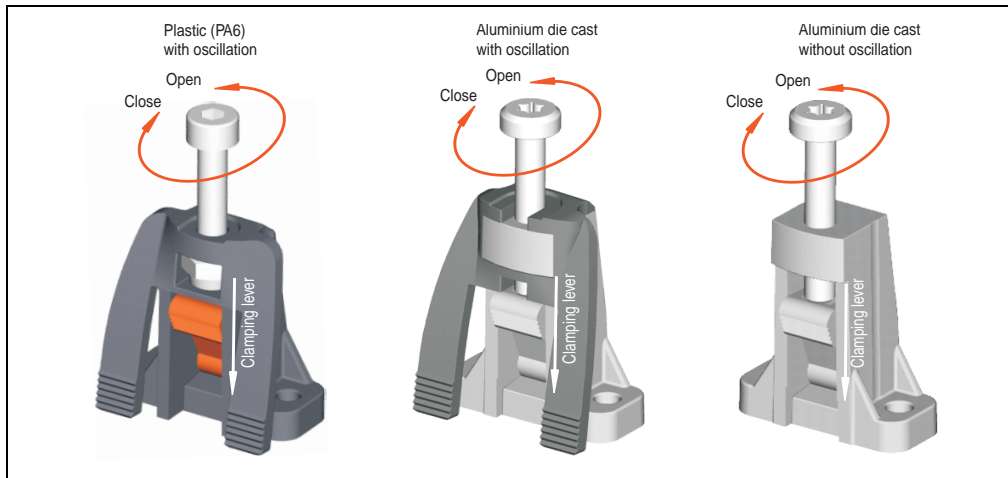

Figure 59: Clamps

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.

2.1 Mounting orientation

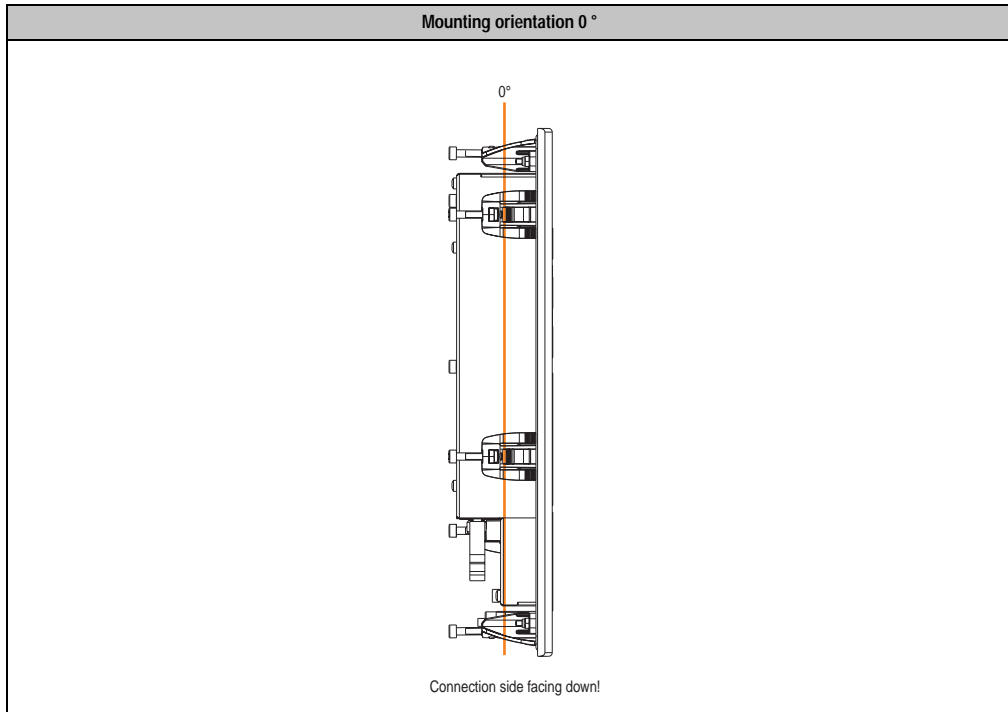The following diagrams specify the orientations for mounting an Automation Panel device.
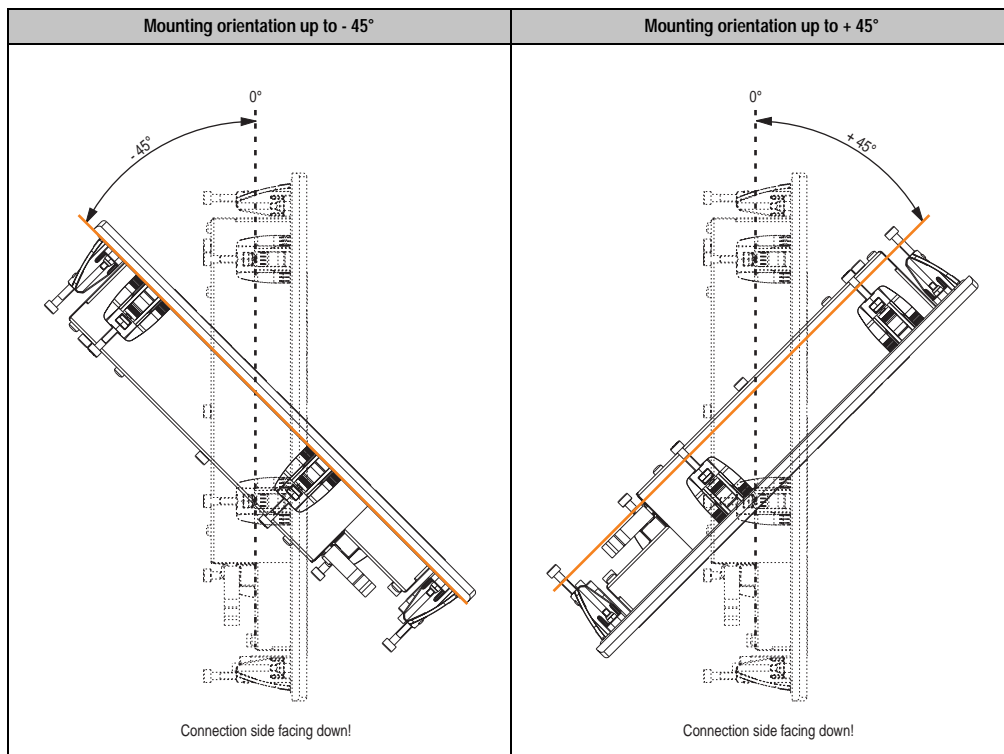
Mounting orientation 0 °
Connection side facing down!

Table 43: Mounting orientation 0 °

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

Table 44: Mounting orientations - -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 11 "Ambient temperature according to mounting orientation" on page 23 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.
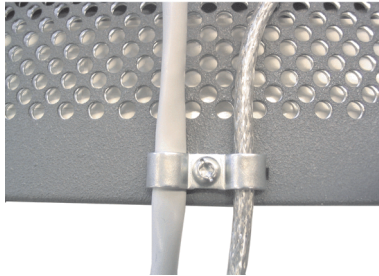

Figure 60: Mounting the cable clamps

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

Chapter 3
Start-up

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.
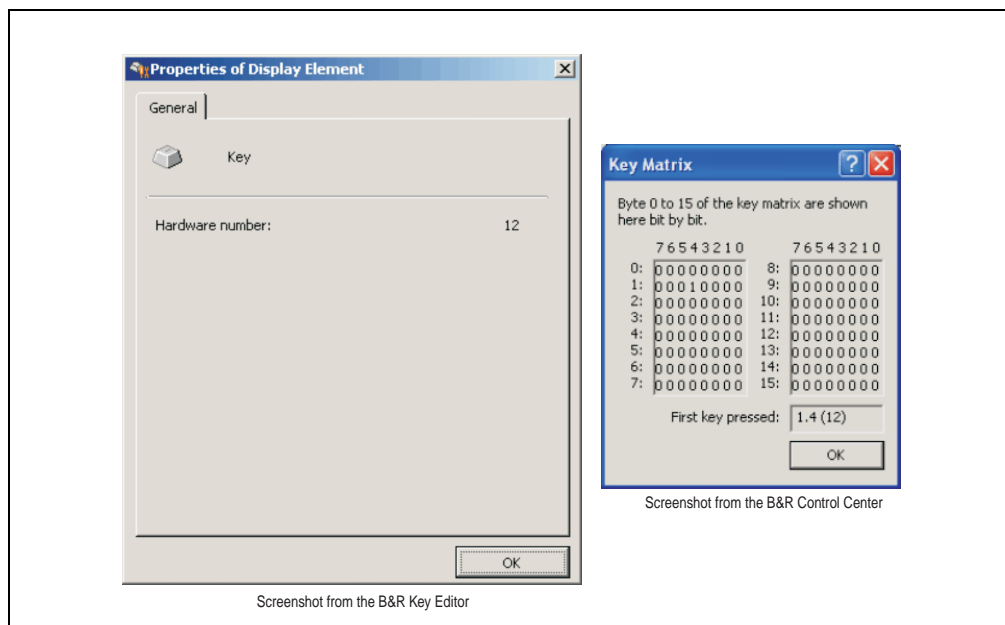

Figure 62: Example - Hardware number in the B&R Key Editor or in the B&R Control Center

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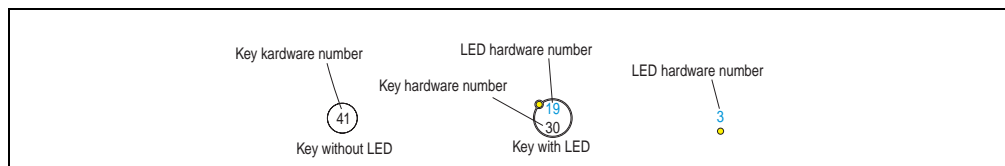

Figure 63: Display - Keys and LEDs in the matrix

5.1 Automation Panel 10.4" VGA

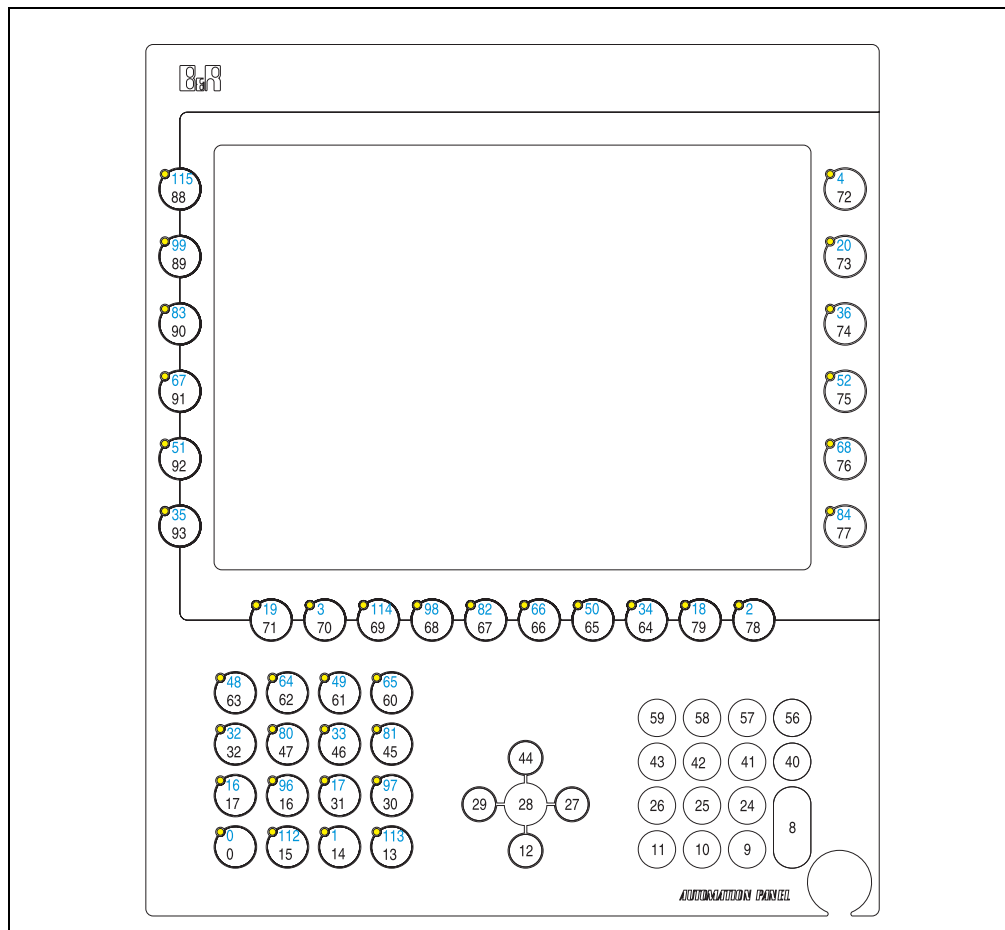### 5.1.1 Automation Panel 5AP981.1043-01

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

5.1.2 Automation Panel 5AP982.1043-01

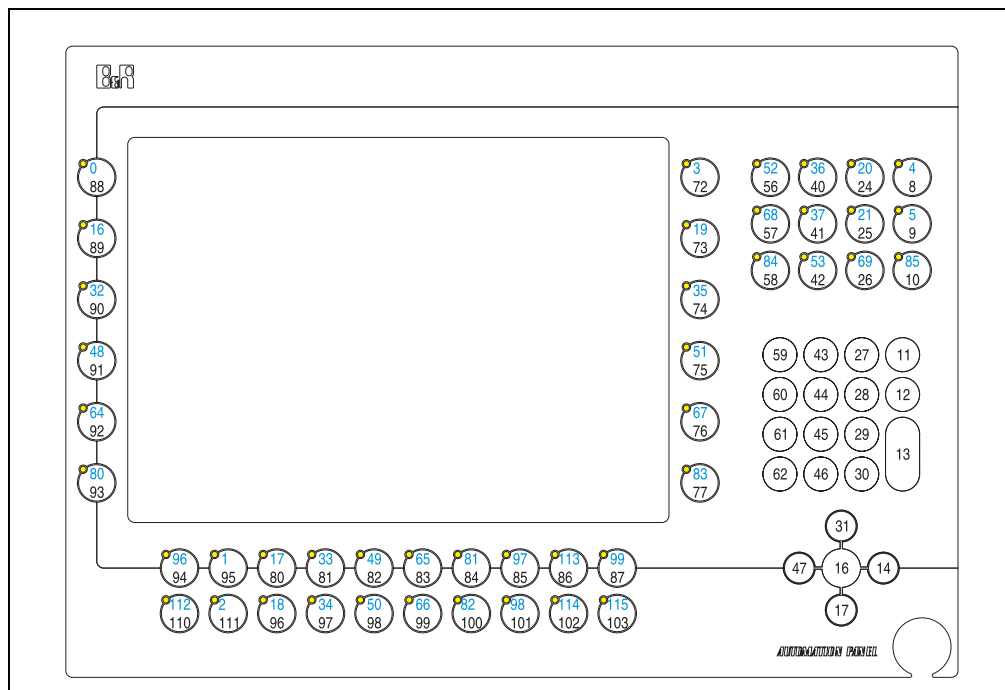Figure 65: Hardware numbers - 5AP982.1043-01

5.1.3 Automation Panel 5AP980.1043-01
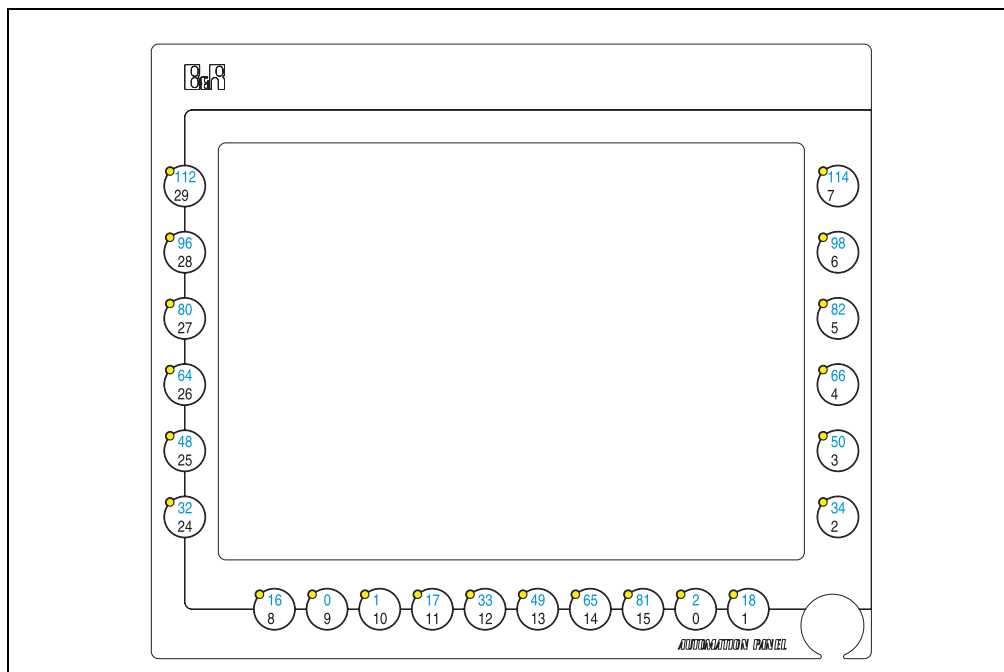
Figure 66: Hardware numbers - 5AP980.1043-01

Chapter 3
Start-up

5.2 Automation Panel 15" XGA
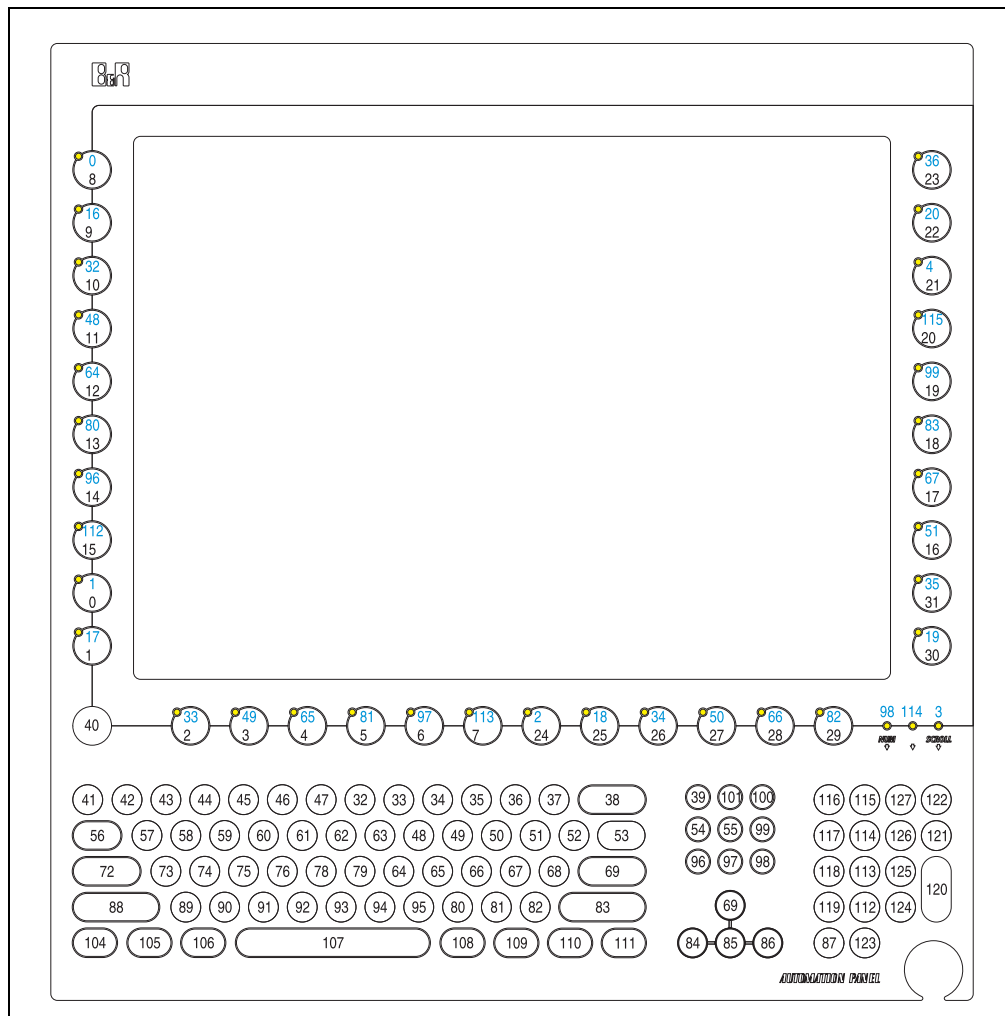
5.2.1 Automation Panel 5AP981.1505-01

Figure 67: Hardware numbers - 5AP981.1505-01
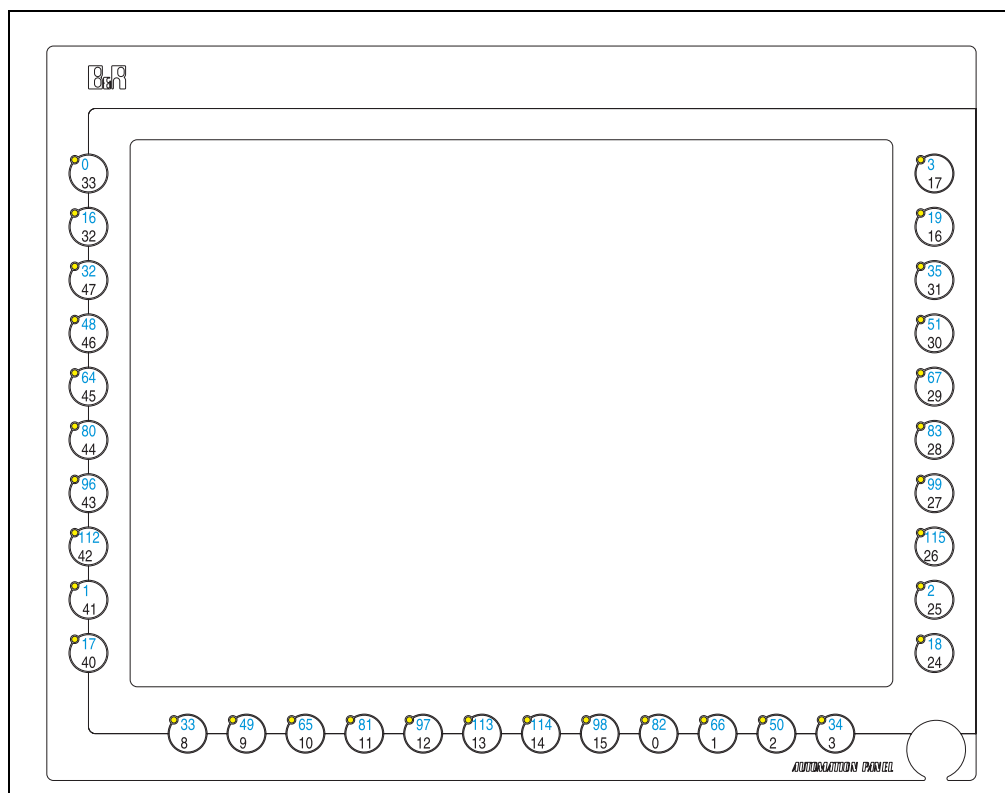
5.2.2 Automation Panel 5AP980.1505-01

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

Chapter 4 • Software

1. BIOS settings

> ## 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

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).

Chapter 4
Software

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 ┘      │
```
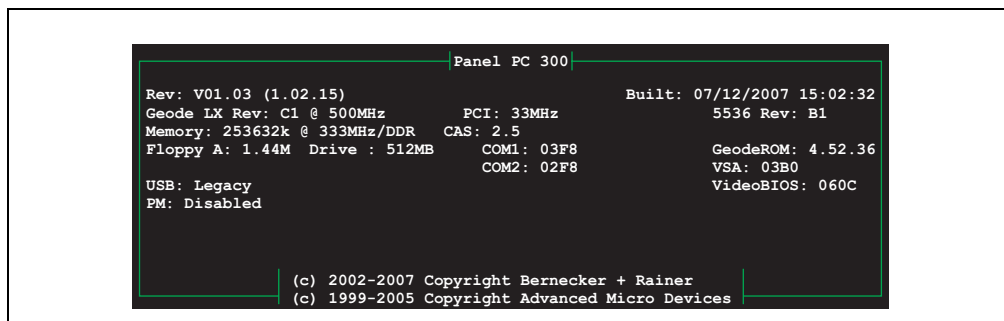
Figure 69: Summary screen

To deactivate this summary screen, see the section 1.3.9 "Miscellaneous configuration" on page 127.

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.

Important!

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 45: BIOS-relevant keys

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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 settings

1.3.1 Main menu

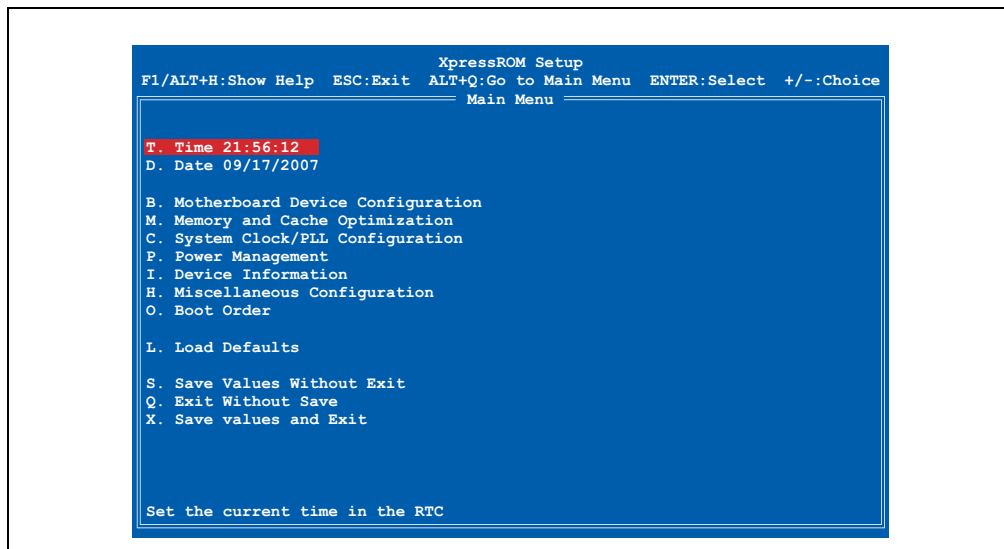The BIOS setup main menu appears immediately after pressing the DEL button while the system is booting:


```
                          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	Miscellaneous 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.

Table 46: Overview of BIOS main menu functions

Shortcut	BIOS setup menu	Function
Q	**Exit without save**	Exits BIOS setup without saving any changes.
X	**Save values and exit**	Saves settings and exits BIOS setup.

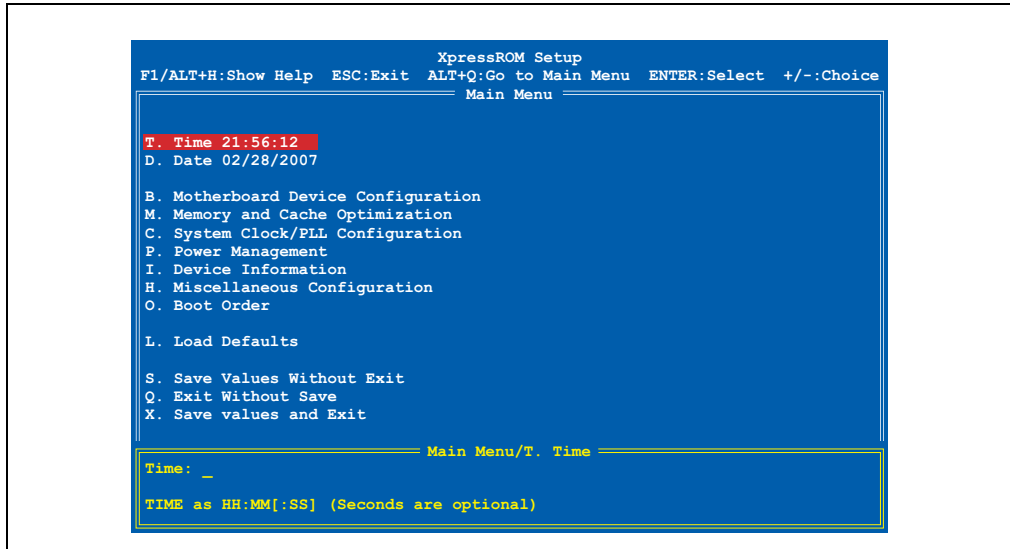Table 46: Overview of BIOS main menu functions (cont.)

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 34) after the Panel PC 300 device has been switched off.

A new system time can be entered with the shortcut "T" or by selecting "Time" and then confirming with Enter. 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:

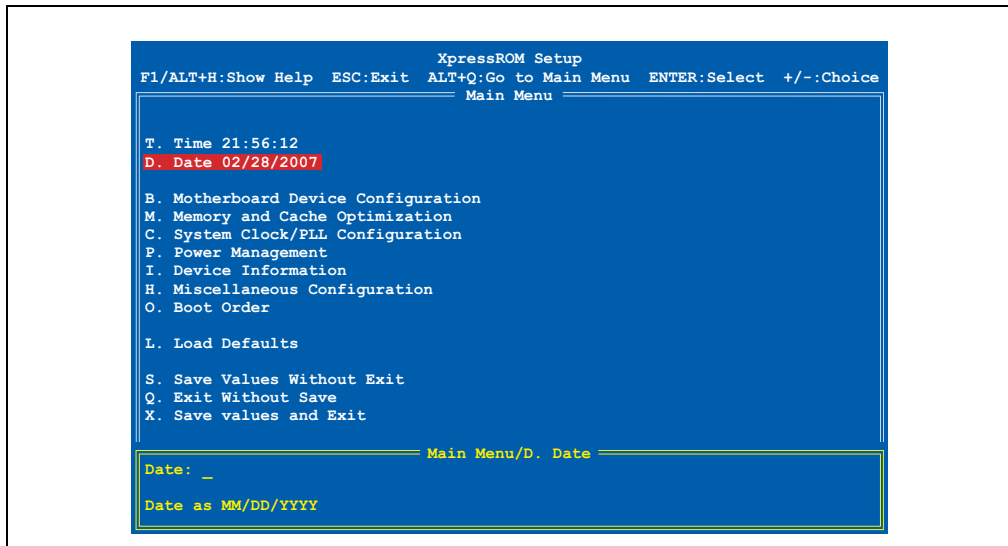**If using a German keyboard, press Shift + ö to enter ":".**

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.

A new system date can be entered with the shortcut "D" or by selecting "Date" and then confirming with Enter. The format MM:DD:YYYY must be entered as shown in the following example:

Example: Set date to 12.02.07.

Entry using keyboard:

• 02/12/2007 - 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
```
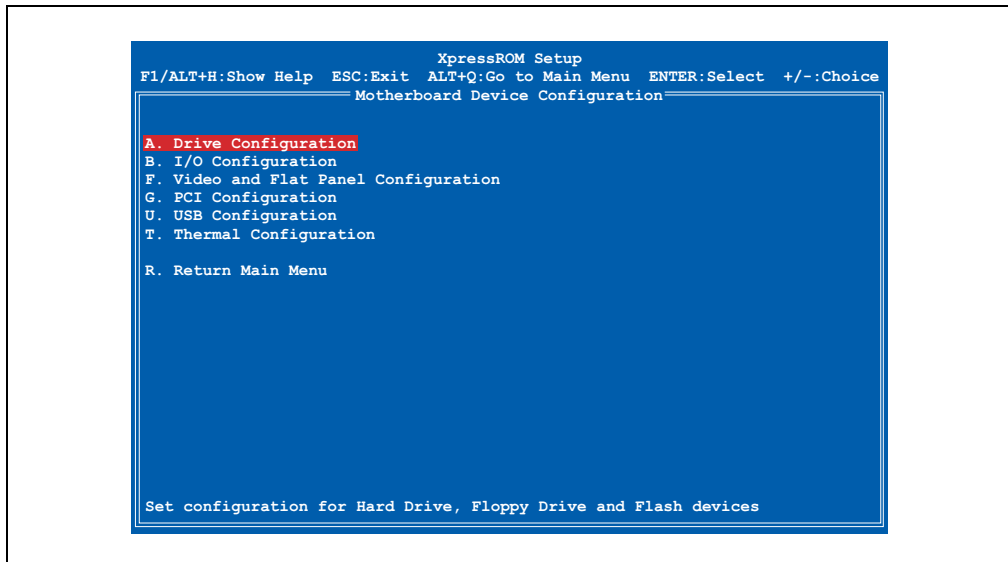
Figure 73: Motherboard device configuration

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 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 47: BIOS motherboard device configuration menu

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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
```
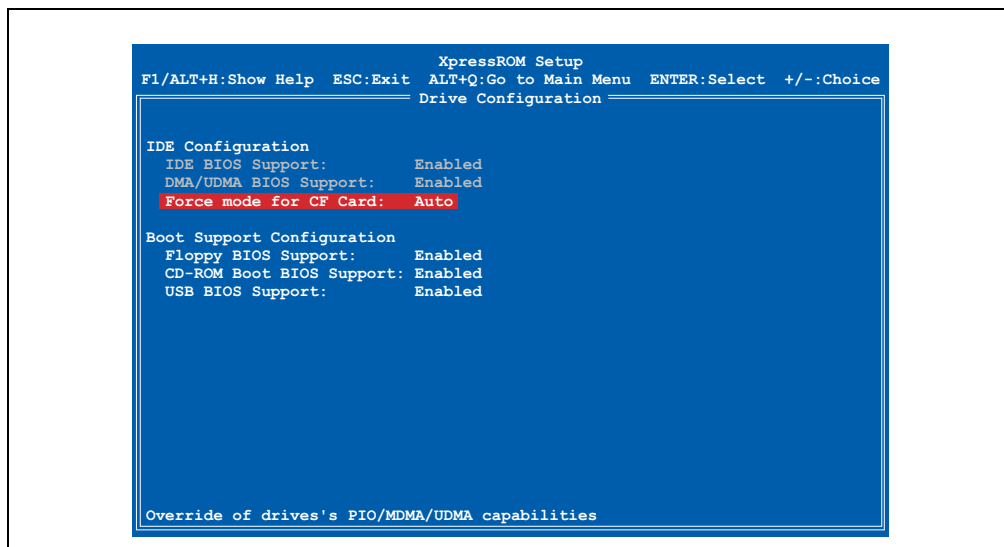
Figure 74: Motherboard device configuration - drive configuration

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 MByte/s) PIO 1 (5.2 MByte/s) PIO 2 (8.3 MByte/s) PIO 3 (11.1 MByte/s) PIO 4 (16.6 MByte/s)	Manual setting option for the PIO (Programmed Input/Output) mode.
		MDMA 0 (4.2 MByte/s) MDMA 1 (13.3 MByte/s) MDMA 2 (16.6 MByte/s)	Manual setting option for the MDMA (Multiword DMA) mode.
		UDMA 0 (16.6 MByte/s) UDMA 1 (25.0 MByte/s) UDMA 2 (33.3 MByte/s) UDMA 3 (44.4 MByte/s) UDMA 4 (66.6 MByte/s) UDMA 5 (100.0 MByte/s)	Manual setting option for the UDMA (Ultra DMA) mode.

Table 48: 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 48: BIOS drive configuration menu (cont.)

Motherboard device configuration - I/O configuration
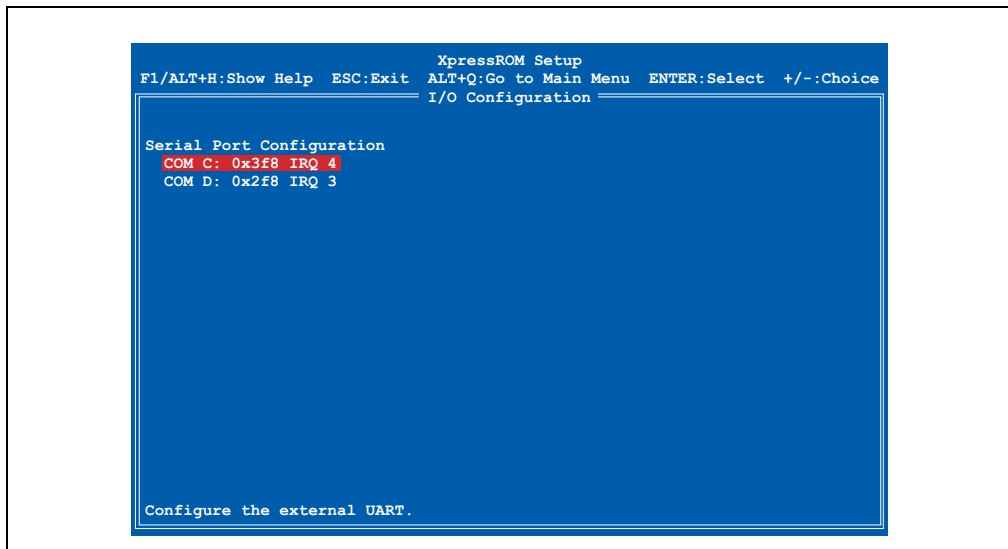
Figure 75: Motherboard device configuration - I/O configuration

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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 49: 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.
```
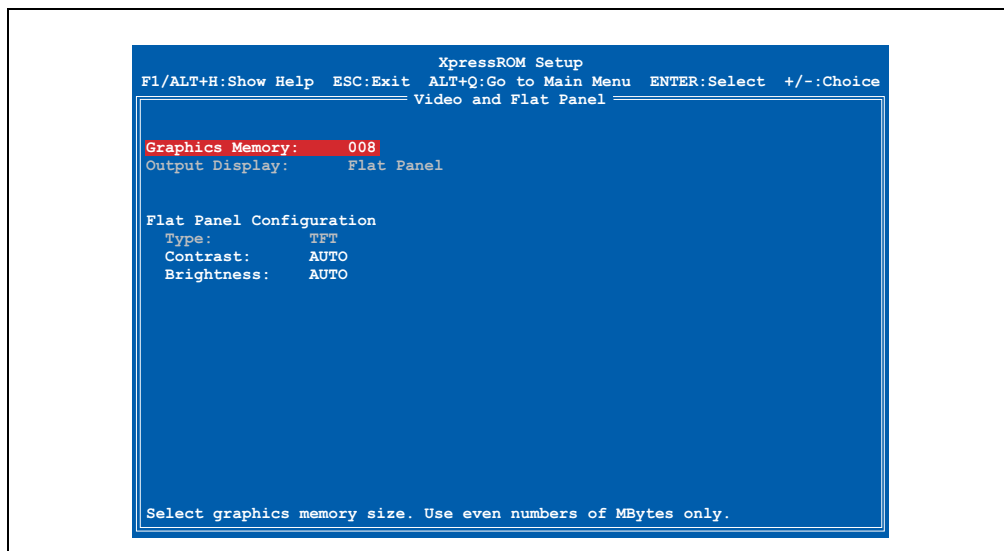
Figure 76: Motherboard device configuration - video and flat panel configuration

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 50: BIOS video configuration menu

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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
```
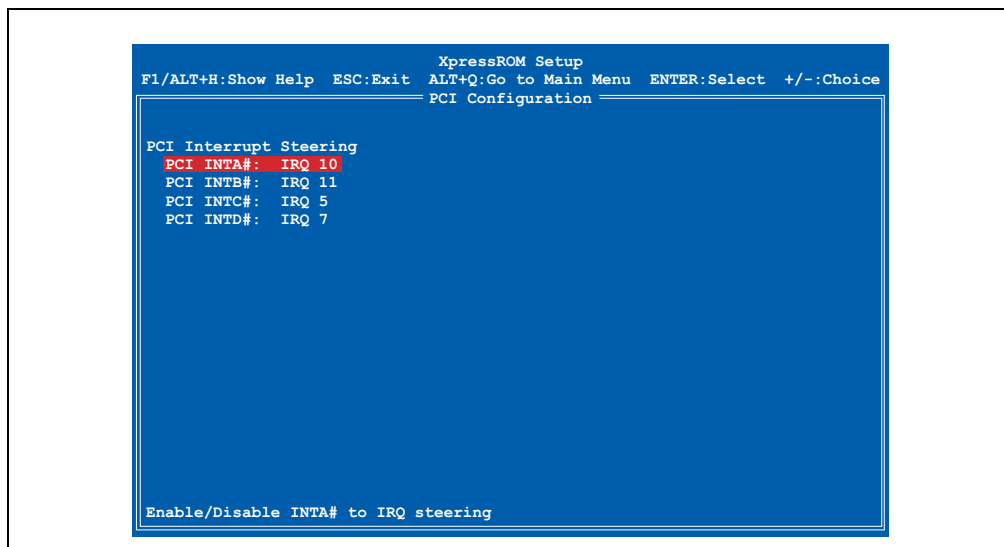
Figure 77: Motherboard device configuration - PCI configuration

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 51: 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
```
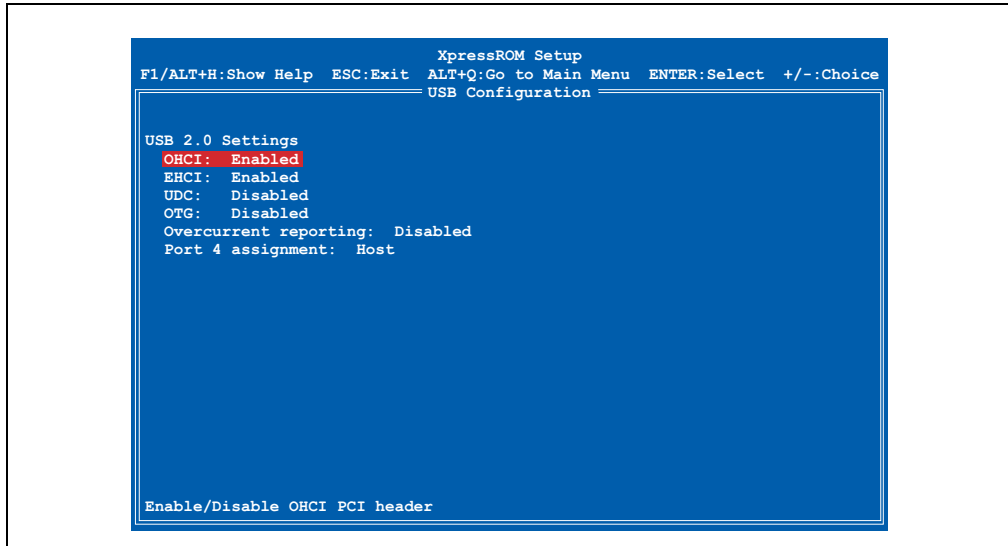
Figure 78: Motherboard device configuration - USB configuration

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 52: BIOS USB configuration menu

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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
```
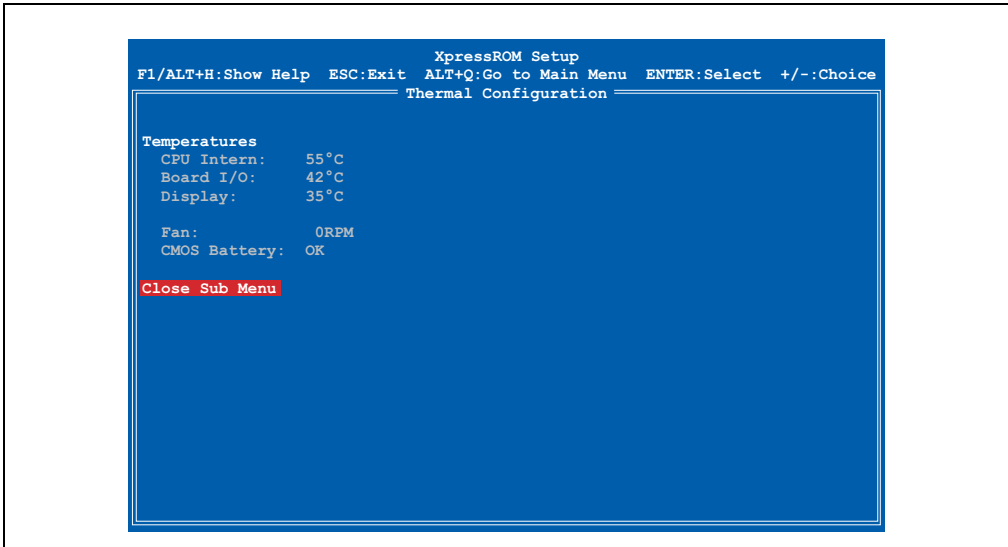
Figure 79: Motherboard device configuration - thermal configuration

BIOS setting	Meaning	Setting options	Effect
CPU intern	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 53: 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 137).

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.
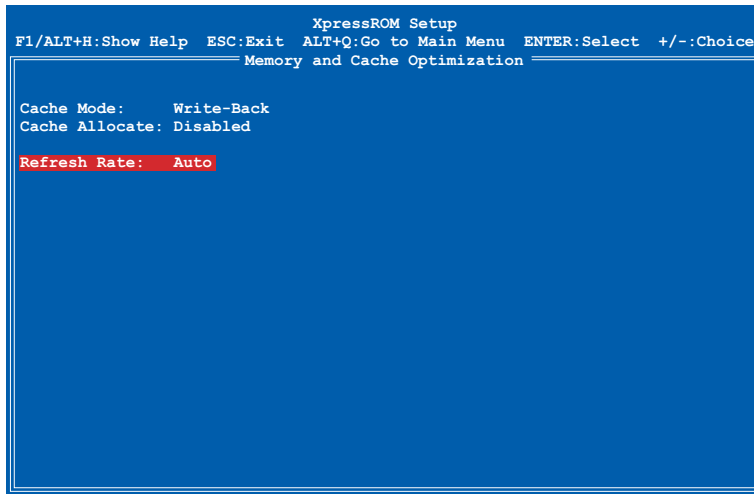
Figure 80: Memory and cache optimization

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. **Note:** **Enter the clock frequency, the chipset does the rest.**	Auto	Value selected automatically.
		15μs, 3μs, 7μs, 31μs, 62μs or 125μs	Manually setting the value.

Table 54: 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
```
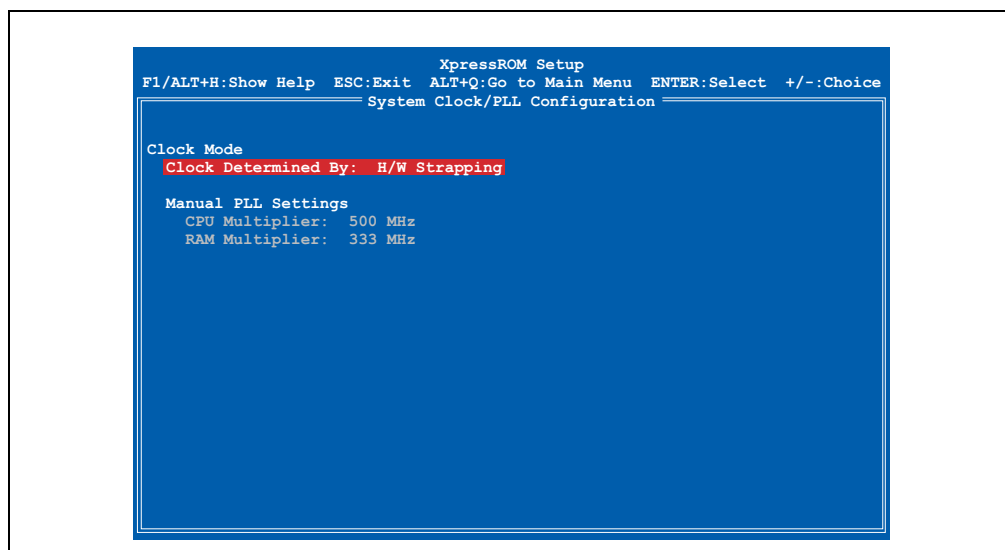
Figure 81: System clock/PLL configuration

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).
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	Manually setting the value.

Table 55: System clock/PLL configuration

BIOS setting	Meaning	Setting options	Effect
RAM multiplier	The RAM multiplier can be selected with this option.	200, 233, 266, 300, 333, 366 or 400 MHz	Manually setting the value.

Table 55: 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.
```
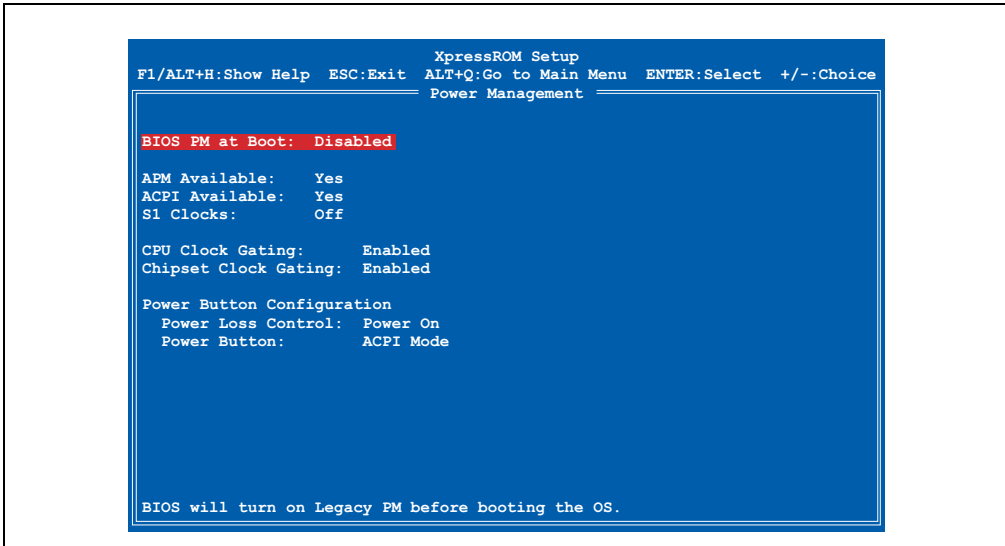
Figure 82: Power management

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.
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.

Table 56: BIOS power management menu

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BIOS setting	Meaning	Setting options	Effect
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 56: BIOS power management menu (cont.)

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	-
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	-

Table 57: BIOS device information menu

BIOS setting	Meaning	Setting options	Effect
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.	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 57: BIOS device information menu (cont.)

1.3.9 Miscellaneous configuration
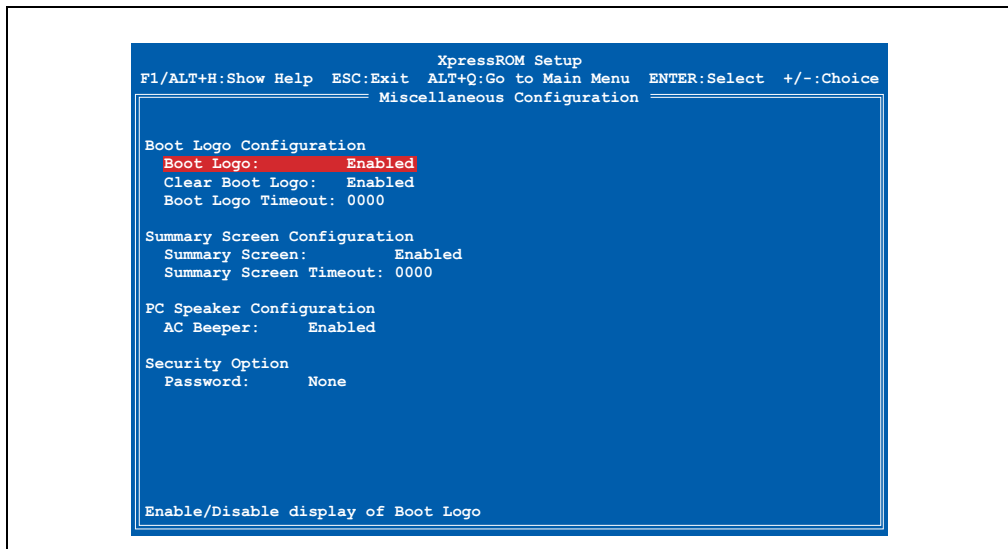
Figure 84: Miscellaneous configuration

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 . **By pressing any key the boot can be continued before the timeout has expired.**	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. **By pressing any key the boot can be continued before the timeout has expired.**	0	No waiting.
		1-65535 [milliseconds]	The manually set value in milliseconds that must pass before the boot process continues.
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 58: BIOS miscellaneous configuration menu

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
```
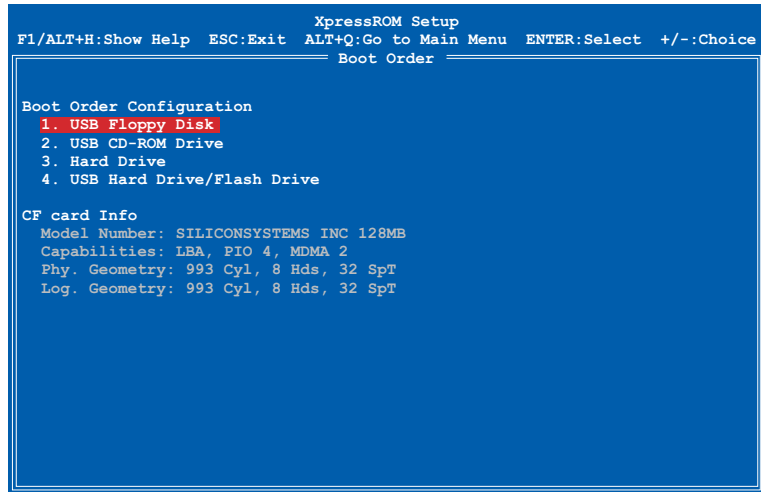
Figure 85: Boot order

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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 59: BIOS drive configuration menu

1.3.11 Load defaults
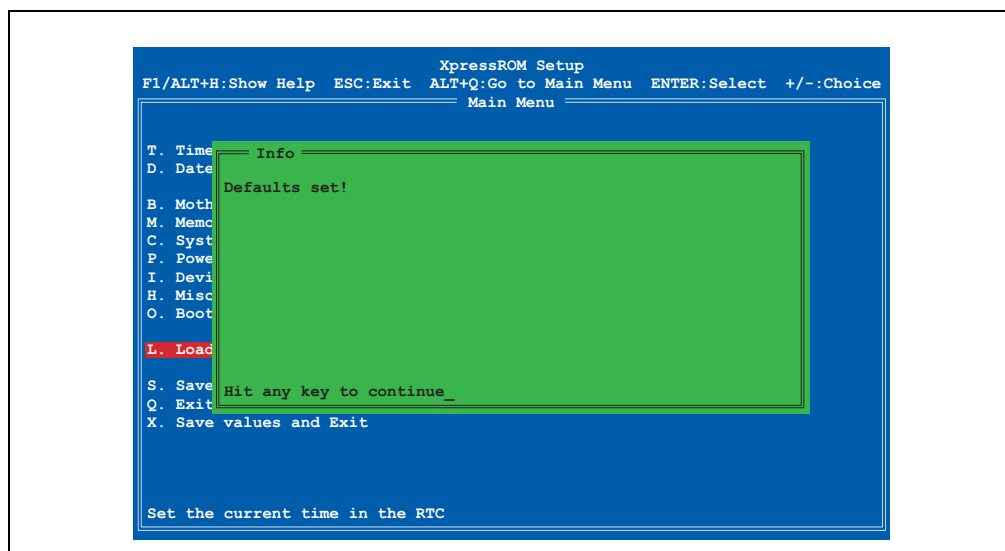
Figure 86: Load defaults

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 so 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
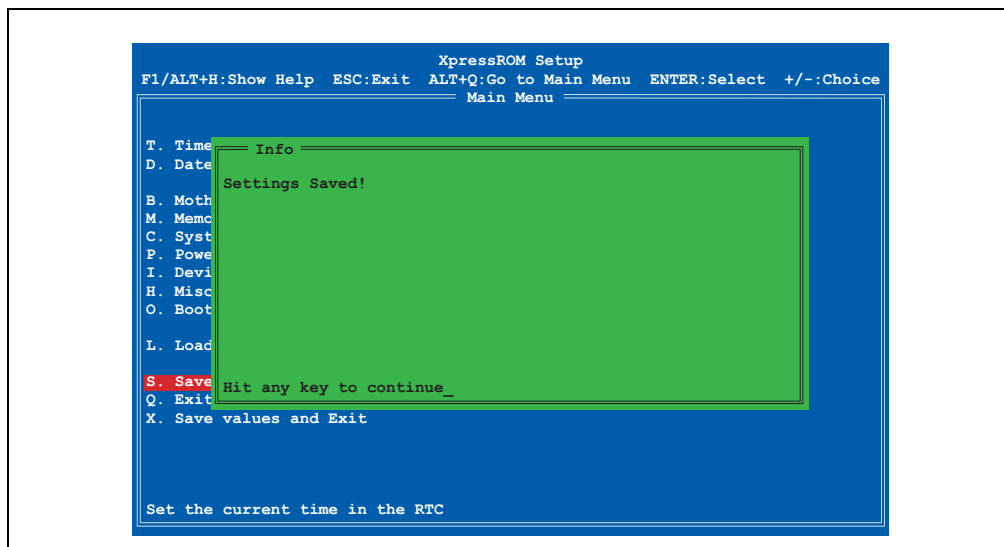
Figure 87: Save values without exit

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. Memc                     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, press the "z" key to enter "y".

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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
```
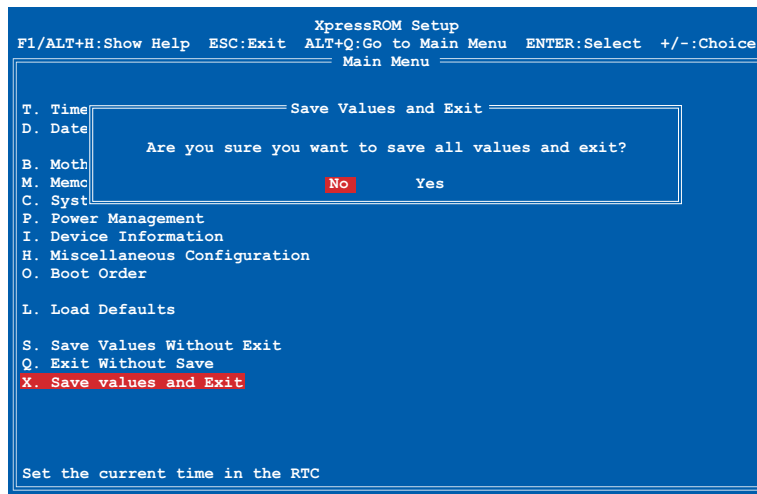
Figure 89: Save values and exit

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, press the "z" key to enter "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	Enabled
OTG	Disabled
Overcurrent reporting	Disabled
Port 4 assignment	Host
Thermal configuration	
CPU intern	-
Board I/O	-
Display	-

Table 60: Motherboard device configuration default values

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Drive configuration	Default value
Fan	-
Battery	-

Table 60: Motherboard device configuration default values (cont.)

1.4.2 Memory and cache optimization

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

Table 61: 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 62: 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 63: 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 64: 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 65: 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).

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1.5 BIOS and Firmware (MTCX) upgrade

An upgrade might be necessary for the following reason:

• To update implemented functions or to add newly implemented functions or components (information about changes can be found in the Readme files).

The BIOS and firmware upgrades can be downloaded directly from the service portal on the B&R homepage (www.br-automation.com).

1.5.1 BIOS upgrade procedure

1. Copy all files to a bootable diskette (USB diskette drive) or a bootable USB flash drive.

2. Insert the diskette drive including the diskette or USB flash drive into an available USB slot on the Automation Panel 900 device.

Take note of any BIOS settings that have been made before performing the BIOS upgrade!

3. A boot menu with the following options is displayed after booting:

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

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.

```
2. Save BIOS (into directory SAVED)
```

BIOS is automatically saved in the SAVED directory. There must be approximately 256KB free space on the disk.

```
3. Exit
```

Returns to the shell (MS-DOS).

4. After the upgrade has been performed successfully, remove the diskette / USB flash drive and restart the device.

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.

1.5.2 MTCX Firmware upgrade

1. Copy all files to a bootable diskette (USB diskette drive) or a bootable USB flash drive.

2. Insert the diskette drive including the diskette or USB flash drive into an available USB slot on the Automation Panel 900 device.

3. A boot menu with the following options is displayed after booting:

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

The MTCX Firmware FPGA and PX32 is automatically updated (default after 5 sec).

The update procedure must not be interrupted!

```
2. Exit
```

Returns to the shell (MS-DOS).

4. After the upgrade has been performed successfully, remove the diskette / USB flash drive and restart the device.

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.

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1.5.3 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).

1.6 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 134) 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. Windows CE

Figure 90: 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, 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, order CompactFlash separately (at least 128 MB).	

Table 66: Model numbers - Windows CE

2.1 General information

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.

2.1.1 Advantages / Features

- Internet Explorer 6.0 for Windows® CE - standard components
- Fonts for attractive text display
- TCP/IP for network and Internet communication
- Remote Desktop Protocol (RDP) for thin clients
- ActiveSync for synchronization with the PC
- Windows® Media Player application
- Compact Framework V1.0 Service Pack 2
- Network utilities
- VBScript 6.0
- JScript 6.0
- Viewers for Excel, Word, images, PDFs, PowerPoint (only in Windows CE 5.0 ProPlus)

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- Windows CE is also less expensive than other Windows licenses.

2.2 Differences between the different CE versions (Pro - PropPlus)

Features	Pro 5SWWCE.0523-ENG	ProPlus 5SWWCE.0623-ENG
Windows CE Version	5.0	
Screen resolution	VGA (TFT), SVGA (TFT), XGA (TFT)	
Color depth[1]	16 bit / 65536 colors	
Graphics card driver	AMD Geode LX graphics card driver with screen rotation without DirectX	
RAM	Automatic detection and use of up to 512 MB RAM	
Boot time	Approx. 20 seconds	
Screen rotation	The desktop can be turned in 90° intervals	
Web browser	Internet Explorer 6.0 for Windows CE	
.NET	Compact Framework 2.0 SP2	
Image size	Approx. 24 MB uncompressed	Approx. 25 MByte uncompressed
Custom keys	Supported	
PVI	Yes	
Automation Device Interface	Yes	
Serial interfaces	1 available for use	
PDF, Excel, Word, Power Point and Image viewer	-	Yes

Table 67: Differences between the CE versions (Pro - PropPlus)

1) The color depth depends on the display being used.

2.3 Installation

Windows CE is usually preinstalled at B&R Austria.

2.3.1 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 for free 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.

3. Windows XP Embedded

Figure 91: 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, order CompactFlash separately (at least 512 MB). Only delivered with a new Panel PC.	

Table 68: Model numbers - Windows XP embedded

3.1 General information

Windows XP embedded is the most modular version of the Windows XP Professional desktop operating system and makes it possible to quickly develop reliable and advanced embedded devices. 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.

3.2 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	✓

Table 69: Device functions in Windows XP embedded with FP2007

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Function	present
Internet information service (IIS)	-
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 69: Device functions in Windows XP embedded with FP2007 (cont.)

3.3 Installation

Windows XP embedded is usually preinstalled at B&R Austria on a suitable CompactFlash card (at least 512 MB - must be specified when placing order). The 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 can be downloaded from the download area on the B&R homepage (www.br-automation.com).

4. Automation Device Interface - ADI

The ADI (Automation Device Interface) driver 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. Control Center is already implemented in the B&R Windows XP embedded and Windows CE operating systems.
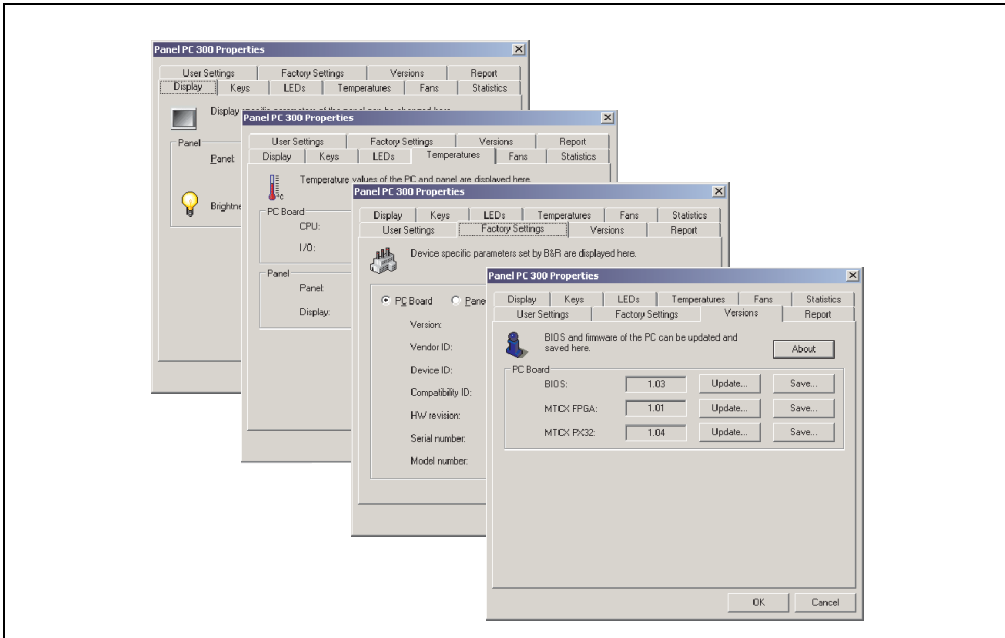
Figure 92: ADI Control Center screenshots for PPC300 (Version 1.10) - example

Features (device dependent)

- Adjusting the display brightness of connected Panels
- Reading device specific keys (in order for this to be possible, a key configuration must be installed that was created with the B&R Key Editor)
- Activation of device specific LEDs on a Mylar keypad
- Reading temperatures, fan speeds, and statistical data
- Reading user settings and factory settings
- Reading software versions
- Updating and securing firmware, boot logo
- Creating reports about the current system (support assistance)

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. With the B&R Key Editor, it is possible to quickly and easily set up the application individually. The PPC300 is only supported in Version 2.60 and higher.
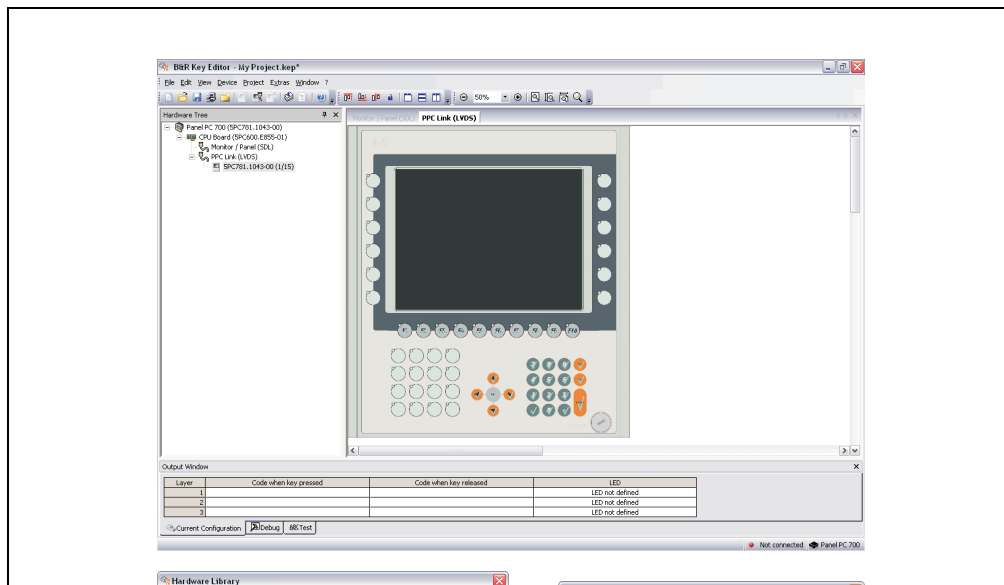
Figure 93: B&R Key Editor screenshots (Version 2.60)

Features:

- Configuration of normal keys like on a keyboard (A, B, C, etc.)
- Key combinations/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)

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**).

Chapter 5 • Standards and certifications

1. Applicable European guidelines

- EMC guidelines 89/336/EWG
- Low-voltage guidelines 73/23/EWG
- Machine guidelines 98/37/EG

2. Overview of standards

The PPC300 as entire device meets the following standards:

Standard	Description
EN 50081-2	Electromagnetic compatibility (EMC), generic emission standard - part 2: Industrial environments (EN 50081-2 has been replaced by EN 61000-6-4)
EN 50082-2	Electromagnetic compatibility (EMC), generic immunity standard - part 2: Industrial environments (EN 50082-2 has been replaced by EN 61000-6-2)
EN 55022 Class A	Electromagnetic compatibility (EMC), radio disturbance characteristics, information technology equipment (ITE devices), limits and methods of measurement
EN 55024	Electromagnetic compatibility (EMC), immunity 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 68068-2-2	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

Table 70: Overview of standards

Standard	Description
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
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 (EN 50082-2)	Electromagnetic compatibility (EMC), generic immunity standard - part 2: industrial environments (EN 50082-2 has been replaced by EN 61000-6-2)
EN 61000-6-4 (EN 50081-2)	Electromagnetic compatibility (EMC), generic emission standard - part 2: industrial environments (EN 50081-2 has been replaced by EN 61000-6-4)
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)
VDE 0701-1	Service, modification, and testing of electrical devices - part 1: General requirements
47 CFR	Federal Communications Commission (FCC), 47 CFR Part 15 Subpart B Class A

Table 70: Overview of standards (cont.)

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 71: 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) and 53 - 43 dB (µA) quasi-peak value 84 - 74 dB (µV) and 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 72: Test requirements - Network-related emissions for industrial areas

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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 72: Test requirements - Network-related emissions for industrial areas (cont.)

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 73: : 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
		EN 55024: Information technology equipment (ITE devices)
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
		EN 55024: Information technology equipment (ITE devices)
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
		EN 55024: Information technology equipment (ITE devices)
Immunity to surge voltages	EN 61000-4-5	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 55024: Information technology equipment (ITE devices)
Immunity to conducted disturbances	EN 61000-4-6	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 55024: Information technology equipment (ITE devices)
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
		EN 55024: Information technology equipment (ITE devices)
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
		EN 55024: Information technology equipment (ITE devices)
Immunity to damped vibration	EN 61000-4-12	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 55024: Information technology equipment (ITE devices)

Table 74: 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 intended **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.

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Criteria C:
A temporary function failure is permitted when 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	Limits according to EN 55024
Contact discharge to powder-coated and bare metal housing parts	± 4 kV, 10 discharges, criteria B	± 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	± 8 kV, 10 discharges, criteria B

Table 75: 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	Limits according to EN 55024
Housing, completely wired	80 MHz - 1 GHz, 10 V/m, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	80 MHz - 1 GHz, 1.4 - 2 GHz, 10 V/m, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A 800-960 MHz (GSM), 10 V/m, pulse modulation with 50% duty cycle, criteria A	80 MHz - 1 GHz, 1.4 - 2 GHz, 3 V/m, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A

Table 76: 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	Limits according to EN 55024
AC power I/O	± 2 kV, criteria B	-	± 1 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	-	± 0.5 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	± 0.5 kV, criteria B
Unshielded AC I/O >3 m	-	± 2 kV, criteria B	-

Table 77: Test requirements - High-speed transient electrical disturbances (burst)

Analog I/O	± 1 kV, criteria B	± 1 kV, criteria B	-

Table 77: Test requirements - High-speed transient electrical disturbances (burst) (cont.)

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	Limits according to EN 55024
AC power I/O, L to L	± 1 kV, criteria B	± 1 kV, criteria B	± 1 kV, criteria B
AC power I/O, L to PE	± 2 kV, criteria B	± 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	-	± 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	± 1 kV, criteria B
All shielded cables	-	± 1 kV, criteria B	-

Table 78: 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	Limits according to EN 55024
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	150 kHz - 80 MHz, 3 V, 80 % amplitude modulation with 1 kHz, criteria A
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	150 kHz - 80 MHz, 3 V, 80 % amplitude modulation with 1 kHz, 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	150 kHz - 80 MHz, 3 V, 80 % amplitude modulation with 1 kHz, criteria A

Table 79: Test requirements - Conducted disturbances

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	Limits according to EN 55024
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	50 Hz, 1 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	50 Hz, 1 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	50 Hz, 1 A/m, criteria A

Table 80: 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	Limits according to EN 55024
AC power inputs	Voltage dip 70% (30% reduction), 0.5 periods, criteria B	-	Voltage dip < 5% (> 95% reduction), 0.5 half-oscillations, criteria B
AC power inputs	Voltage dip 40% (60% reduction), 5 periods, criteria C	-	Voltage dip 70% (30% reduction), 25 half-oscillations, 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	-	Voltage interruptions < 5% (> 95% reduction), 250 half-oscillations, 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 81: 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 82: 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
		B&R
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
		B&R
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
		B&R

Table 83: 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 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 84: Test requirements - Vibration operation

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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
	Limit values according to B&R					
	10 sweeps per axis, not packaged					
	2 - 8 Hz	Amplitude 7.5 mm				
	8 - 200 Hz	Acceleration 2 g				
	200 - 500 Hz	Acceleration 4 g				

Table 85: 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 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 86: Test requirements - Shock 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
	Limits according to B&R		
	Acceleration 30 g, Length 11 ms, each 3 shocks, not packaged		

Table 87: Test requirements - Shock 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	
Toppling and knocking over	Devices: Toppling/knocking over on each edge		Devices: Toppling/knocking over on each edge		Devices: Toppling/knocking over 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 88: 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						
	Limits according to B&R							
	Devices packaged							
	Weight	**Height**						
	<40 kg	1 m						

Table 89: 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 90: 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 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 91: Test requirements - Worst case 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 92: 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 93: 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, 2 cycles, then 2 hours acclimatization and function testing, duration approximately 14 hours		

Table 94: 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 95: Test requirements - Temperature fluctuations in 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 96: 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 97: Test requirements - Humid heat, constant (storage)

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7. Safety

Safety	Test carried out according to	Limits according to
Ground resistance	EN 61131-2	
		EN 61131-2: Programmable logic controllers
Insulation resistance		
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
		B&R
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 98: 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 Ohm		

Table 99: 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 100: 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 101: Test requirements - Residual voltage

7.4 Leakage current

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

Table 102: 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 103: 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 104: 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 105: 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 106: 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 107: 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 108: Test requirements - Degree of pollution

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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 c $\textbf{UL}$ US	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 $C \, E$	All harmonized EN standards for the applicable guidelines are met.

Table 109: International certifications

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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	
0AC201.9	**Lithium batteries (5x)** Lithium batteries, 5 pcs., 3 V / 950 mAh, button cell	
4A0006.00-000	**Lithium battery (1x)** 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 interface cover (cannot be lost)** Front side USB interface cover (cannot be lost) 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	
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.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	

Table 110: Model numbers - Accessories

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Model number	Product ID	Note
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	

Table 110: Model numbers - Accessories (cont.)

2. TB103 3-pin supply voltage connector

2.1 General

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 111: Order data - TB103

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2.3 Technical data

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate from those 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 mm² - 3.31 mm²	
Cable type	Copper wires only (no aluminum wires!)	

Table 112: 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
0AC201.9	Lithium batteries, 5 pcs., 3 V / 950 mAh button cell	
4A0006.00-000	Lithium battery, 1 piece, 3 V / 950 mAh button cell	

Table 113: Order data - Lithium batteries

3.2 Technical data

Information:

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

Features	0AC201.9	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°C to +60°C	
Relative humidity	0 to 95%, non-condensing	

Table 114: Technical data - Lithium batteries

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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).
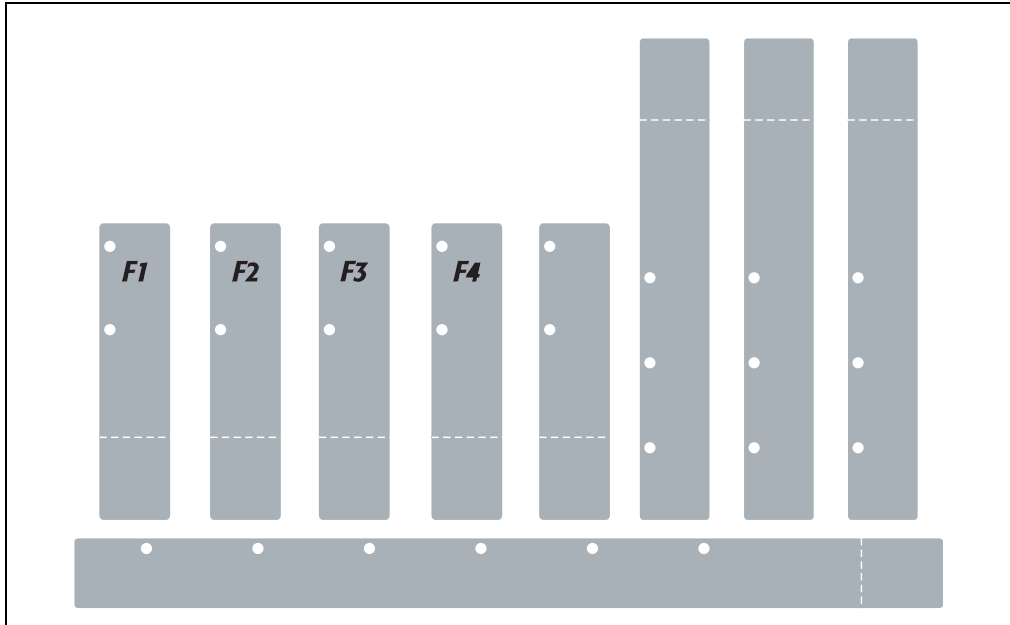
Figure 94: Legend strip templates

Printable legend strips (A4 format) can be ordered from B&R (see table 10 "Model numbers - Accessories" on page 20). 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 versions 7, 9 and 10) for the respective legend strip template can be downloaded from the B&R homepage at 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
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 115: Order data - Legend strip templates

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5. USB interface cover (cannot be lost)

Front side USB interface cover (cannot be lost) for Automation Panel 900 and Panel PC 700 devices.

5.1 Order data

Model number	Description	Figure
5AC900.1200-00	**USB interface cover (cannot be lost)** Front side USB interface cover (cannot be lost) for Automation Panel 900 and Panel PC 700 devices.	

Table 116: Order data - USB interface cover (cannot be lost)

5.2 Installation

- Remove old cover.
- Feed the USB interface cover through the small opening (see red markings).
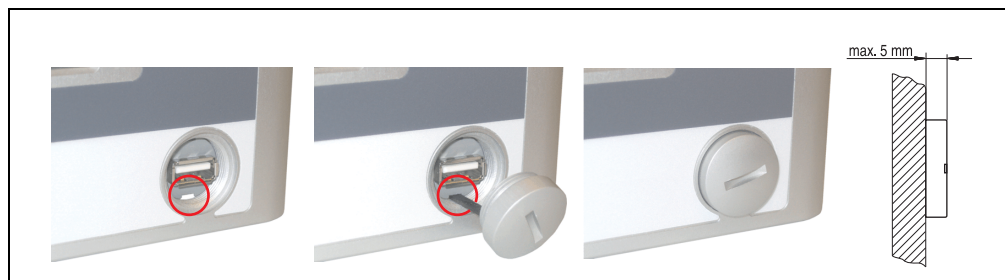
Figure 95: Front side USB interface cover - installation

- 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. As a result, it may be necessary (e.g. 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	

Table 117: Order data - USB flash drives

6.3 Technical data

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate from 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 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)	100000 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
    Storage
    Transport
	
	0°C to +45°C
	-20°C to +60°C
	-20°C to +60°C

Relative humidity
    Operation
    Storage
    Transport
	
	10% to 90%, non-condensing
	5% to 90%, non-condensing
	5% to 90%, non-condensing

Vibration
    Operation
    Storage
    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
    Storage
    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)

Altitude
    Operation
    Storage
    Transport
	
	3048 meters
	12192 meters
	12192 meters

Table 118: Technical data - USB flash drive 5MMUSB.2048-00

6.3.1 Temperature humidity diagram - Operation and storage
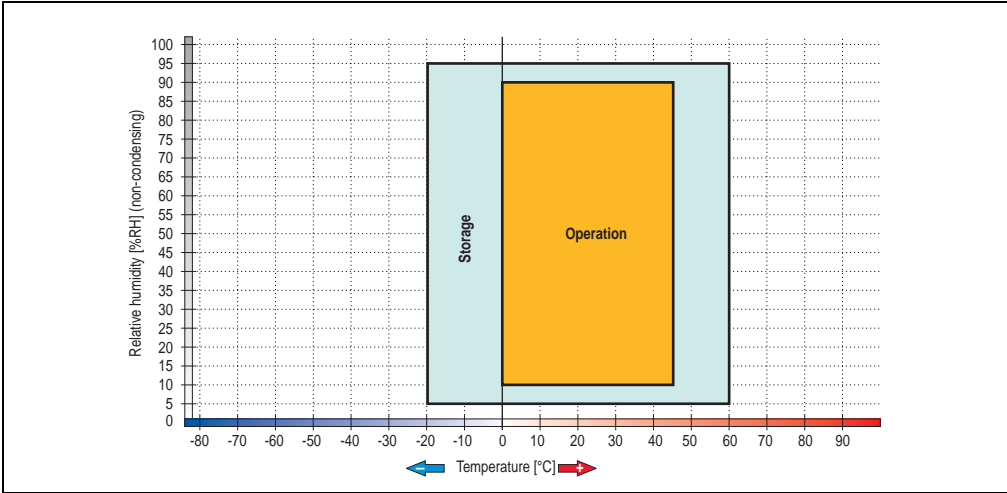
Figure 96: Temperature humidity diagram - USB flash drive - 5MMUSB.2048-00

6.4 Contents of delivery

SanDisk Cruzer Micro
1 USB flash drive in desired size + 2 replacement covers (blue and pink) + 1 strap[1]

Table 119: Contents of delivery - USB flash drive 5MMUSB.2048-00

1) Due to a change in the contents of delivery from the manufacturer, it is possible that the USB flash drive (with white cap) is delivered without the replacement covers or strap.

6.5 Creating a bootable USB flash drive

When used in connection with an Automation PC 620 / Panel PC 700, it is possible to boot the system from one of the flash drives available from B&R. The flash drive must be specially prepared for this.

6.5.1 Requirements

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

- B&R USB flash drive (see model number "USB Flash Drives", on page 30)
- Automation PC 620 or Panel PC 700
- USB floppy drive (external or slide-in USB floppy 5AC600.FDDS-00)
- PS/2 or USB keyboard
- A start disk created using MS-DOS 6.22 or Windows 98 - 1.44MB HDD (Windows Millennium, NT4.0, 2000, XP start disks cannot be used).
  The tools "`format.com`" and "`fdisk.exe`" must be located on the diskette!

6.5.2 Procedure

- Plug in the flash drive and boot from the start disk.
- Set active partition on the flash drive using "`fdisk`" and follow the further instructions.
- Reboot the system from the start disk.
- Format and simultaneously transfer the system files to the flash drive with the command "`format c: /s`".

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

Figure 97: 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 183)

7.2 Technical data

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate from those 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 kbits (720 KB) or 500 kbits (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	30000 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/sec.
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 120: 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	60000 POH (Power-On Hours) > 10000 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
   Storage
   Transport
	+5°C .. +45°C
	-20°C .. +60°C
	-40°C .. +60°C

Relative humidity
   Operation
   Storage
   Transport
	20 - 80%, non-condensing
	5 - 90%, non-condensing
	5 - 95%, non-condensing

Table 120: Technical data - USB Media Drive 5MD900.USB2-01 (cont.)

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Environmental characteristics	5MD900.USB2-01

Vibration
    Operation
    Storage
    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
    Storage
    Transport
	max. 5 g (49 m/s^2 0-peak) and 11 ms length
	max. 60 g (588 m/s^2 0-peak) and 11 ms length
	max. 60 g (588 m/s^2 0-peak) and 11 ms length

Altitude	Max. 3000 meters

Table 120: Technical data - USB Media Drive 5MD900.USB2-01 (cont.)

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
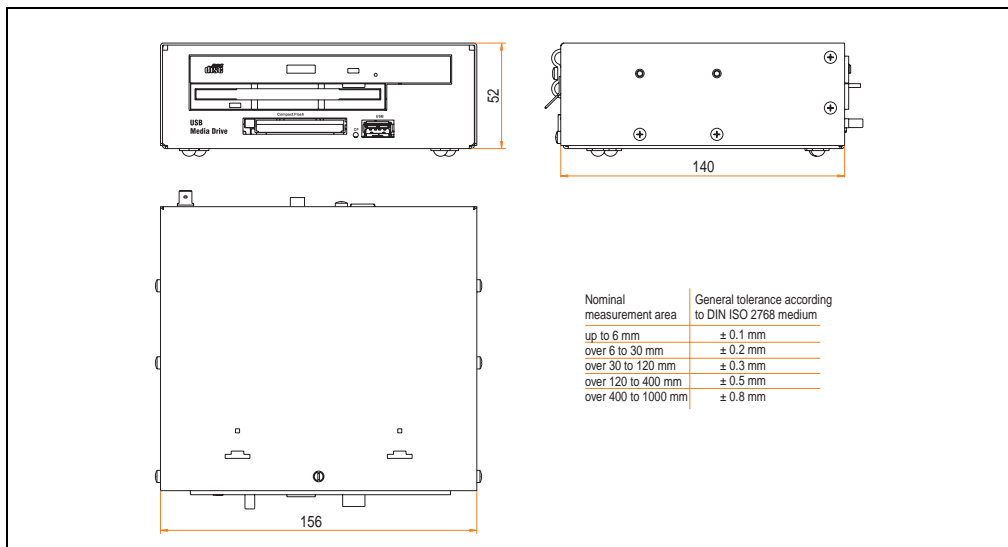
Figure 98: Dimensions - 5MD900.USB2-01

7.4 Dimensions with front cover
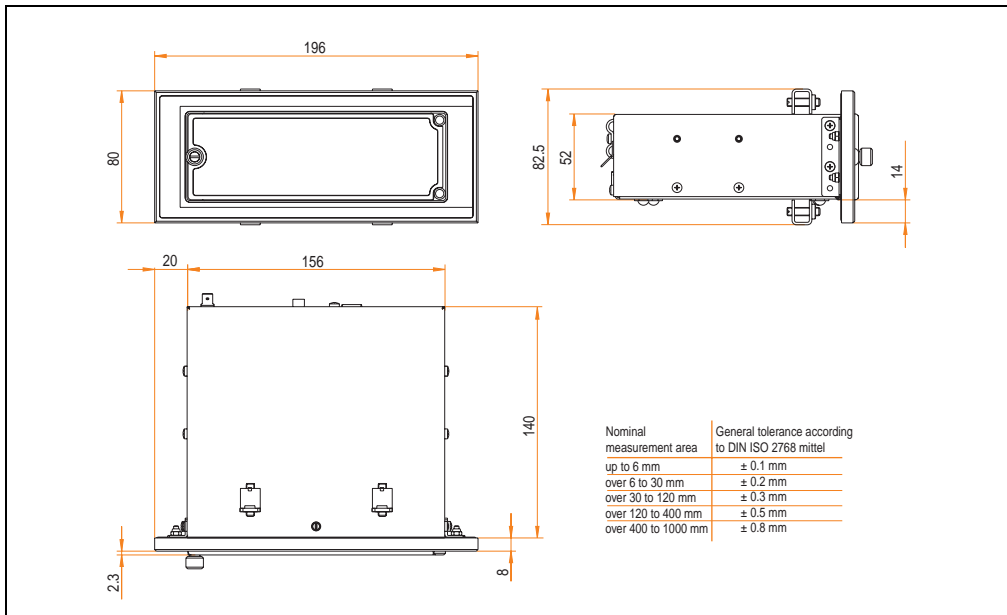
Figure 99: Dimensions - USB Media Drive with front cover

7.4.1 Cutout installation
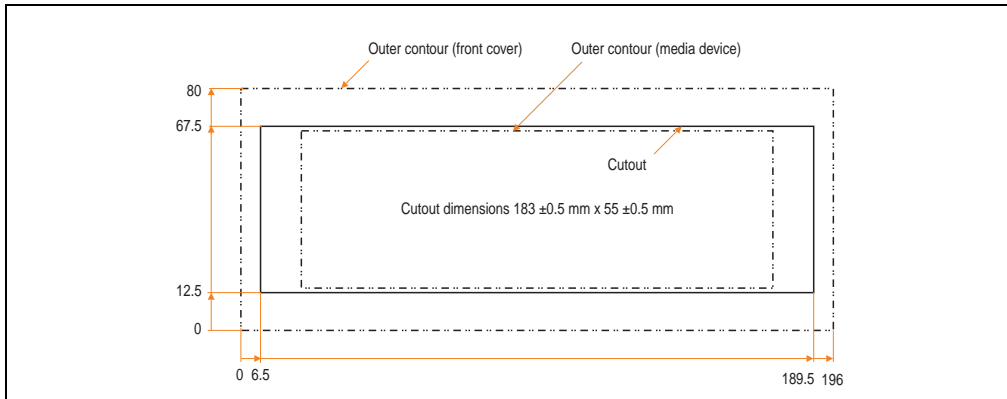
Figure 100: Installation cutout - USB Media Drive with front cover

7.5 Contents of delivery

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

Table 121: Contents of delivery - USB Media Drive - 5MD900.USB2-01

7.6 Interfaces
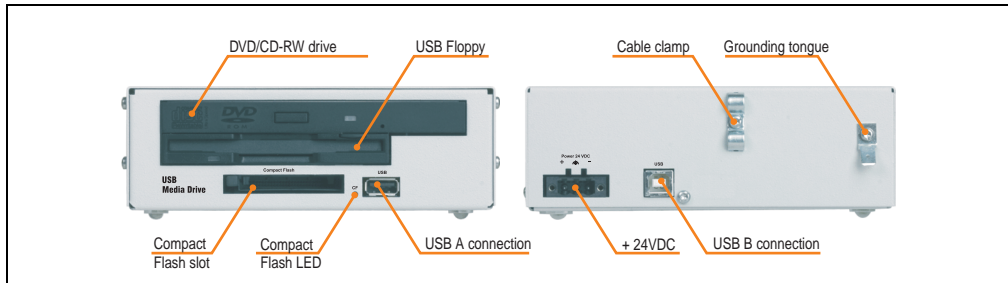
Figure 101: Interfaces - 5MD900.USB2-01

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.
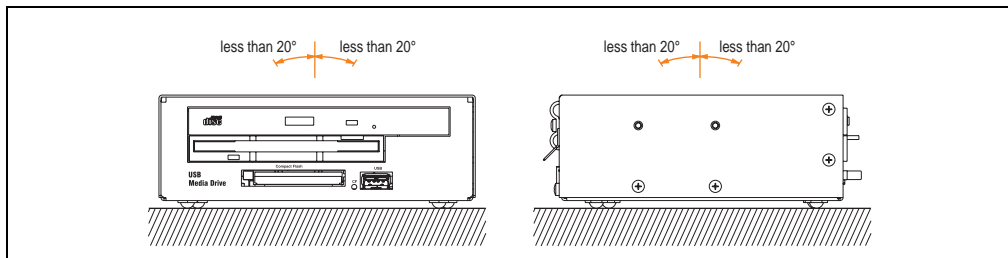
Figure 102: Mounting orientation - 5MD900.USB2-01

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.
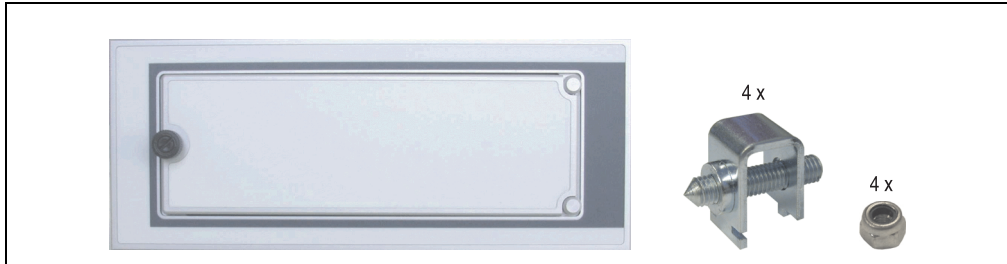
Figure 103: Front cover 5A5003.03

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 122: 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
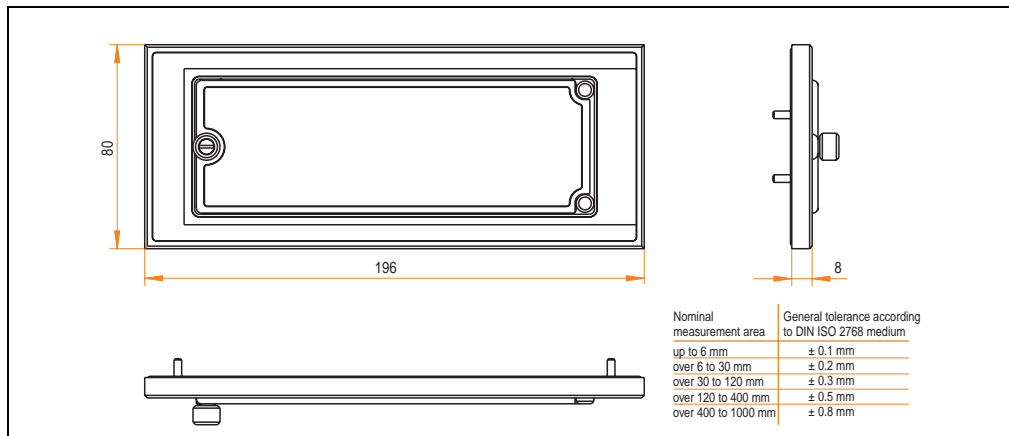
Figure 104: Dimensions - 5A5003.03

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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.
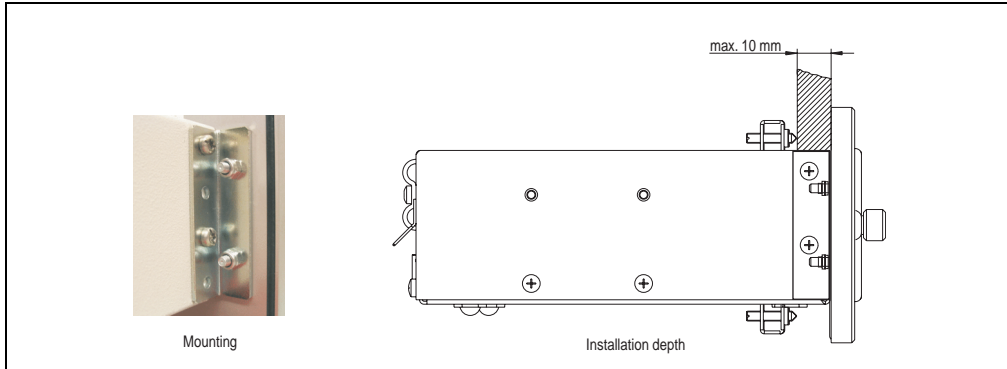
Figure 105: Front cover mounting and installation depth

7.8.4 Cutout installation

See the figure 100 "Installation cutout - USB Media Drive with front cover" on page 181.

8. CompactFlash cards 5CFCRD.xxxx-03

8.1 General information

CompactFlash cards are easy-to-exchange storage media. Due to their robustness against environmental influences (e.g. temperature, shock, vibration, etc.), CompactFlash cards are ideal for use as storage media in industrial environments.

8.2 Order data

Model number	Description	Figure
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	Example: 256 MB CompactFlash cards

Table 123: CompactFlash cards - Order data

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8.3 Technical data

> # Information:
>
> **The following characteristics, features and limit values only apply to this accessory and can deviate from the entire device. For the entire device where this accessory is installed, refer to the data provided specifically for the entire device.**

Features	5CFCRD.xxxx-03
MTBF (at 25 °C)	> 4000000 hours
Maintenance	None
Data reliability	< 1 unrecoverable error in 10^{14} bit read accesses
Write/erase procedures	> 2000000 times
Data retention	10 years
Mechanical characteristics	

Dimensions
   Length
   Width
   Thickness
	36.4 ± 0.15 mm
	42.8 ± 0.10 mm
	3.3 ± 0.10 mm

Weight	11.4 grams
Environmental characteristics	

Ambient temperature
   Operation
   Storage
   Transport
	0°C to +70°C
	-50°C to +100°C
	-50°C to +100°C

Relative humidity Operation / Storage	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 80000 feet (24,383 meters)

Table 124: Technical data - CompactFlash cards 5CFCRD.xxxx-03

8.3.1 Temperature humidity diagram - Operation and storage
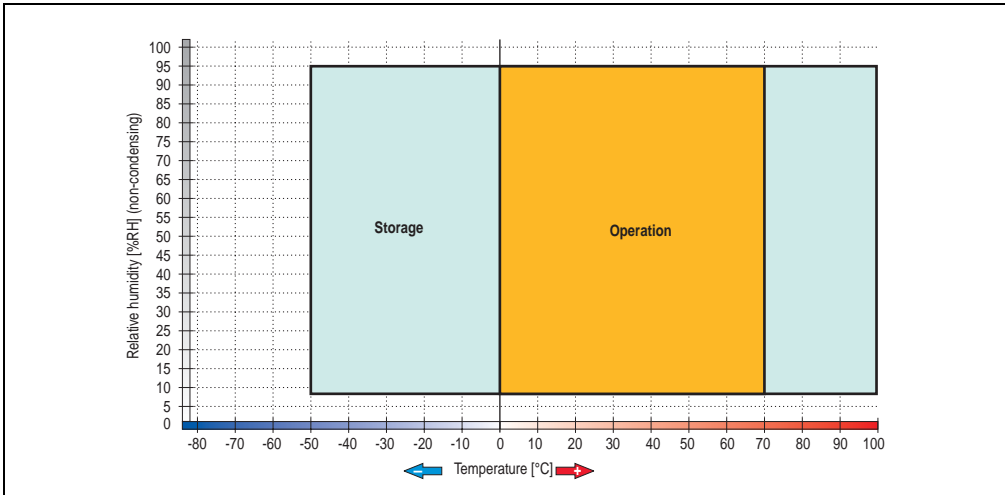
Figure 106: Temperature humidity diagram - CompactFlash cards 5CFCRD.xxxx-03

8.4 Dimensions
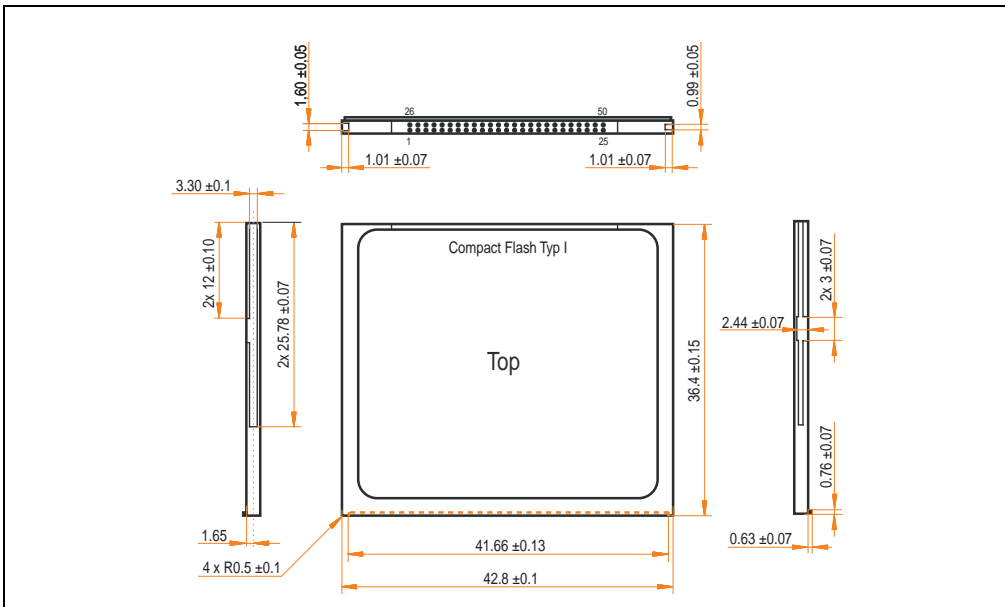
Figure 107: Dimensions - CompactFlash card Type I

8.5 Calculating the lifespan

Silicon Systems provides a 9-page "white paper" for the lifespan calculation for CompactFlash cards (see following pages). This document can also be found on the Silicon Systems homepage (**www.siliconsystems.com**).

Information:

A software tool for calculating the statistical lifespan of the Silicon Systems CompactFlash cards in various settings can be downloaded from the B&R Homepage (www.br-automation.com).
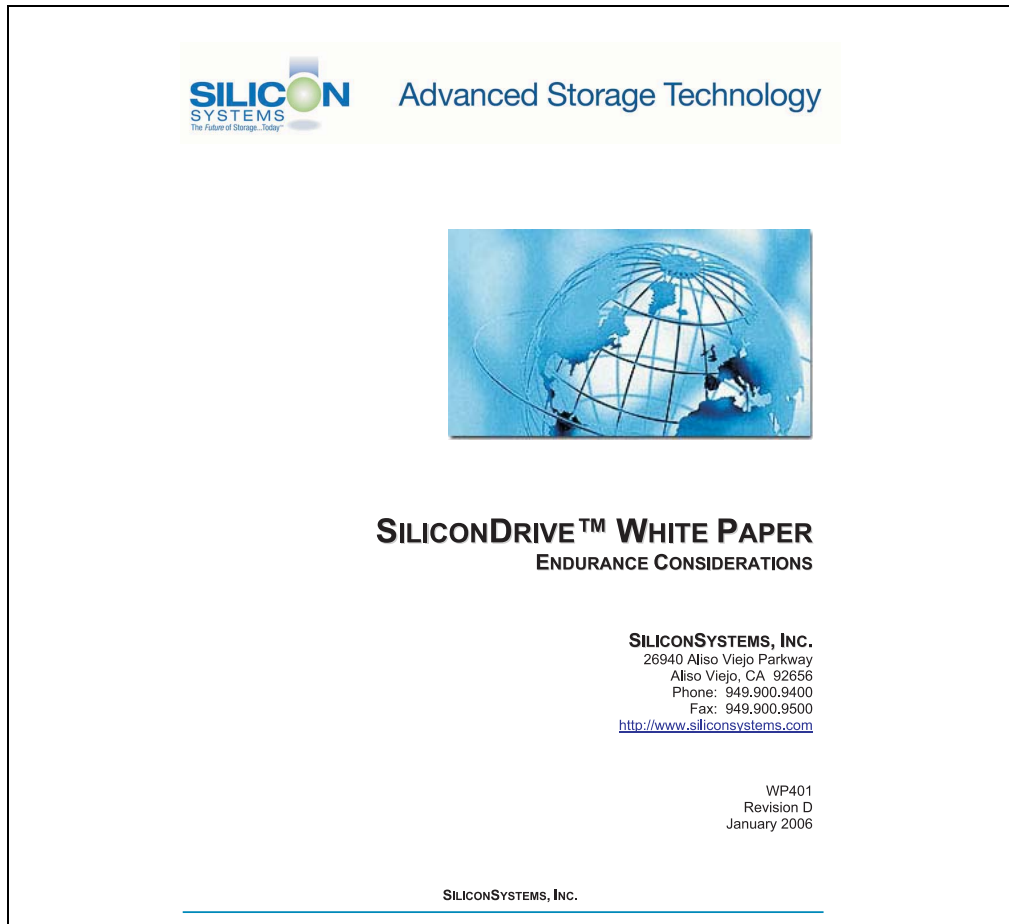
Figure 108: Silicon Systems white paper - page 1 of 9

SILICONDRIVE™ WHITE PAPER
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<u>I</u>NTRODUCTION

SiliconSystems' SiliconDrive™ technology is specifically designed to meet the high performance and high reliability requirements of Enterprise System OEMs in the netcom, military, industrial, interactive kiosk and medical markets. One of the measures of storage reliability in Enterprise System OEM applications is endurance – the number of write/erase cycles that can be performed before the storage product "wears out."

<u>B</u>ACKGROUND

It is important to note that endurance is not just a function of the storage media. Rather, it is the combination of the storage media and the controller technology that determines the endurance. For example, magnetic media is an order of magnitude less reliable than NAND flash, yet the controller technology employed by rotating hard drives can compensate for this deficiency to yield reliability results that meet those of solid-state storage.

{NOTE: This is a completely different discussion from the mechanical reliability involving rotating hard drives versus solid-state storage that has no moving parts. This is just an example of how a controller, if it is good enough, can compensate for the deficiencies of the media}.

Write/erase cycle endurance for solid-state storage is specified in many ways by many different vendors. Some specify the endurance at the physical block level, while others specify at the logical block level. Still others specify it at the card or drive level. Since endurance is also related to data retention, endurance can be specified at a higher level if the data retention specification is lower. For these reasons, it is often difficult to make an "apples to apples" comparison of write/erase endurance by solely relying on these numbers in a datasheet.

A better way to judge endurance is to break the specification down into the main components that affect the endurance calculation:

1.   Storage Media
2.   Wear Leveling Algorithm
3.   Error Correction Capabilities

Other factors that affect endurance include the amount of spare sectors available and whether or not the write is done using a file system or direct logical block addressing. While these issues can contribute to the overall endurance calculation, their effects on the resulting number is much lower than the three parameters above. Each of those factors will be examined individually, assuming ten-year data retention.

Figure 109: Silicon Systems white paper - page 2 of 9

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STORAGE MEDIA

The scope of this white paper is confined to non-volatile storage – systems that do not lose their data when the power is turned off. The dominant technology for non-volatile solid-state storage is NAND flash. While NOR flash is also a possible solution, implementation of NOR technology is generally confined to applications like cell phones that require the functionality of DRAM, boot PROM and storage component in a single chip. The economies of scale and component densities of NAND relative to NOR make it the ideal solution for non-volatile, solid-state storage subsystems.

The two dominant NAND technologies available today are SLC (single-level cell, sometimes called binary) and MLC (multi-level cell). SLC technology stores one bit per cell and MLC stores two bits. A comparison of SLC and MLC is shown in figure 1.
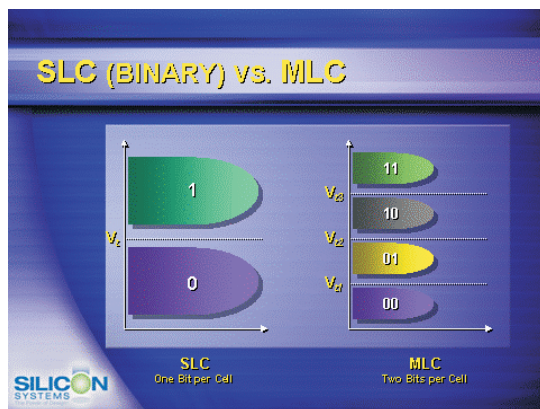
Figure 1

SLC NAND is generally specified at 100,000 write/erase cycles per block with 1-bit ECC (this is explained below). MLC NAND is specified at 10,000 write/erase cycles per block with ECC. The MLC datasheet does not specify a number of bits of ECC required. Therefore, when using the same controller, a storage device using SLC will have an endurance value roughly 10x that of a similar MLC-based product. In order to achieve maximum endurance, capacity and speed, SiliconSystems currently uses SLC NAND in our SiliconDrive technology.

Figure 110: Silicon Systems white paper - page 3 of 9

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A more thorough discussion of SLC vs. MLC can be found from the component manufacturers:
Samsung: http://www.samsung.com
Toshiba: http://www.toshiba.com

WEAR LEVELING

Wear leveling is defined as the allowing data writes to be evenly distributed over the entire storage device. More precisely, wear leveling is an algorithm by which the controller in the storage device re-maps logical block addresses to different physical block addresses in the solid-state storage array. The frequency of this re-map, the algorithm to find the "least worn" area to which to write and any data swapping capabilities are generally considered proprietary intellectual property of the controller vendor.

It is important to note that the wear leveling is done in the solid-state memory controller and is independent of the host system. The host system performs its reads and writes to logical block addresses only, so as far as the host is concerned, the data stays in the same place.

To illustrate the effects of wear leveling on overall endurance, assume three different storage devices with the following characteristics:
1.   Flash Card with No Wear Leveling
2.   Flash Card with Dynamic Wear Leveling
3.   SiliconDrive with Static Wear Leveling

In addition, assume that all three storage devices use the same solid-state storage technologies (SLC or MLC – for purposes of this discussion, it doesn't matter). All three devices will have 75% of the capacity as static data, which is defined below:

Static Data: Any data on a solid-state storage device that does not change. Examples include: operating system files, look-up tables and executable files.

Finally, the same type of write is performed to all three systems. The host system is writing a single block of data to the same logical block address over and over again.

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Figure 111: Silicon Systems white paper - page 4 of 9

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No Wear Leveling

Figure 2 shows a normalized distribution of writes to a flash card that does not use wear leveling. In this instance, the data gets written to the same physical block. Once that physical block wears out and all spare blocks are exhausted (see discussion below), the device ceases to operate, even though only a small percentage of the card was used.

In this instance, the endurance of the card is only dependent on the type of flash used and any error correction capabilities in excess of one byte per sector. Early flash cards did not use wear leveling and thus failed in write-intensive applications. For this reason, flash cards with no wear leveling are only useful in consumer electronic applications.

NO WEAR LEVELING

Normalized Number of
Write/Erase Cycles per PBA

Cycles

Physical Block Addresses (PBA)

75% Static Data

Figure 2

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Figure 112: Silicon Systems white paper - page 5 of 9
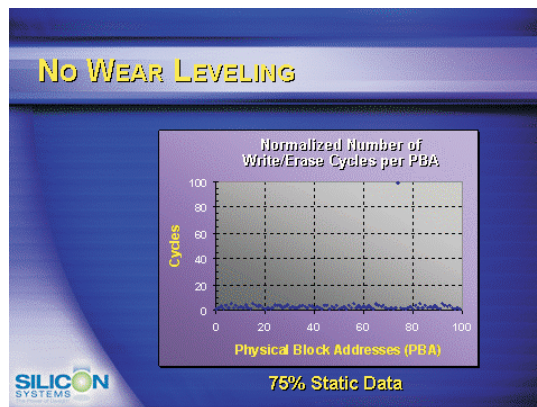
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WP401D

Dynamic Wear Leveling

Figure 3 shows a normalized distribution of writes to a flash card that employs dynamic wear leveling. This algorithm only wear levels over "free" or "dynamic" data areas. That is to say, if there is static data as defined above, this area is never involved in the wear leveling process. In the current example, since 75% of the flash card is used for static data, only 25% of the card is available for wear leveling. The endurance of the card is calculated to be 25 times better than for the card with no wear leveling, but only one-fourth that of static wear leveling.

Figure 3

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Figure 113: Silicon Systems white paper - page 6 of 9
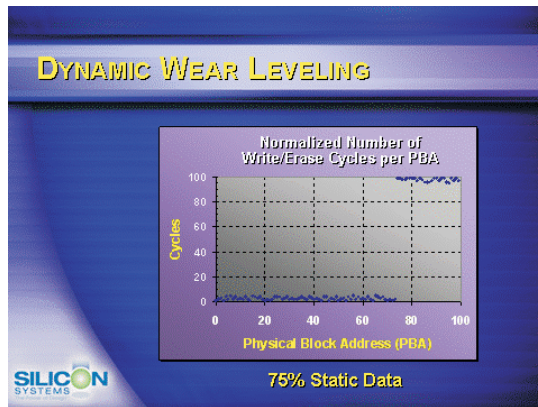
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Static Wear Leveling

Figure 4 shows a normalized distribution of writes to a SiliconDrive that employs static wear leveling. This algorithm evenly distributes the data over the entire SiliconDrive. The algorithm searches for the least-used physical blocks and writes the data to that location. If that location is empty, the write occurs normally. If that location contains static data, the static data is moved to a more heavily-used location prior to the new data being written. The endurance of the SiliconDrive is calculated to be 100 times better than for the card with no wear leveling and four times the endurance of the card that uses dynamic wear leveling.

Figure 4

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Figure 114: Silicon Systems white paper - page 7 of 9
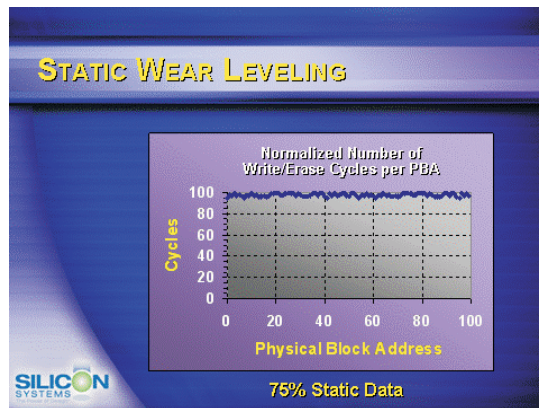
SILICONDRIVE™ WHITE PAPER
WP401D

ERROR CORRECTION

Part of the solid-state memory components specification is related to error correction. For example, SLC NAND components are specified at 100,000 write/erase cycles with one-bit ECC. It goes to reason that the specification increases with a better error correction algorithm. Most flash cards employ error correction algorithms ranging from two-bit to four-bit correction. SiliconSystems' SiliconDrive technology uses six-bit correction.

The term six-bit correction may be slightly confusing. Six-bit correction really defines the capability of correcting up to six bytes in a 512-byte sector. Since a byte is eight bits, this really means the SiliconDrive can correct 48 bits as long as those bits are confined to six bytes in the sector. The same definition holds for two-bit and four-bit correction.

The relationship between the number of bytes per sector the controller can correct does not appear to be directly proportional to the overall endurance, since the bit error rate of the NAND flash is not linear. To state it another way, six-bit error correction is not necessarily three times better than two-bit ECC. In most cases, it is significantly better than that.

SUMMARY OF MEDIA, WEAR LEVELING AND ECC

The matrix below summarizes the effects of the different items discussed above. In the table, a "1" indicates the best possible scenario, and a "10" indicates the least desirable in terms of endurance.

N = No Wear Leveling; D = Dynamic Wear Leveling; S = Static Wear Leveling

ECC	SLC NAND			MLC NAND		
	N	D	S	N	D	S
2-bit	6	5	4	10	9	8
4-bit	5	4	2	9	8	7
6-bit	4	3	1*	8	7	6

= SiliconSystems' SiliconDrive Configuration

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Figure 115: Silicon Systems white paper - page 8 of 9

Chapter 6
Accessories

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WP401D

ENDURANCE CALCULATIONS

To get an idea of how long a solid-state storage device will last in an application, the following calculations can be used. Note: These calculations are valid only for products that use either dynamic or static wear leveling. Use the solid-state memory component specifications for products that do not use wear leveling.

To calculate the expected life in years a product will last:

$$\text{Years} = \frac{(\alpha - \beta) \times \lambda \times (1 - \phi)}{(\omega \times \xi) \times k}$$

Where:

α = Capacity in MB (when converting from MB to GB, MB = GB x 1,024)
β = Amount of Static Data in MB (this value should be 0 for static wear leveling)
λ = Endurance Specification
φ = Safety Margin
ω = File Size in MB (when converting from KB to MB, KB = MB x 1,024)
ξ = Number of Writes of file size ω per minute
k = Number of minutes per year = 525,600

To calculate the number of data transactions:

$$\text{Transactions} = \frac{(\alpha - \beta) \times \lambda \times (1 - \phi)}{\omega}$$

Where:

α = Capacity in MB (when converting from MB to GB, MB = GB x 1,024)
β = Amount of Static Data in MB (this value should be 0 for static wear leveling)
λ = Endurance Specification
φ = Safety Margin Percentage (usually 25%)
ω = File Size in MB (when converting from KB to MB, KB = MB x 1,024)

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                                                         The Future of Storage…Today™

Figure 116: Silicon Systems white paper - page 9 of 9

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.
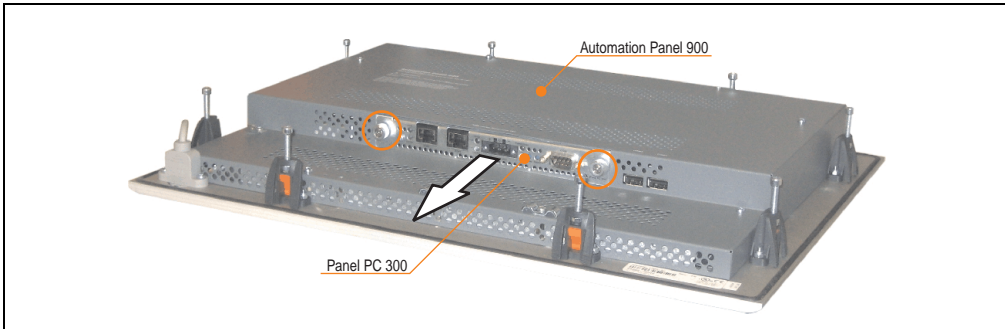
Figure 117: Remove Panel PC 300 insert

- 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.
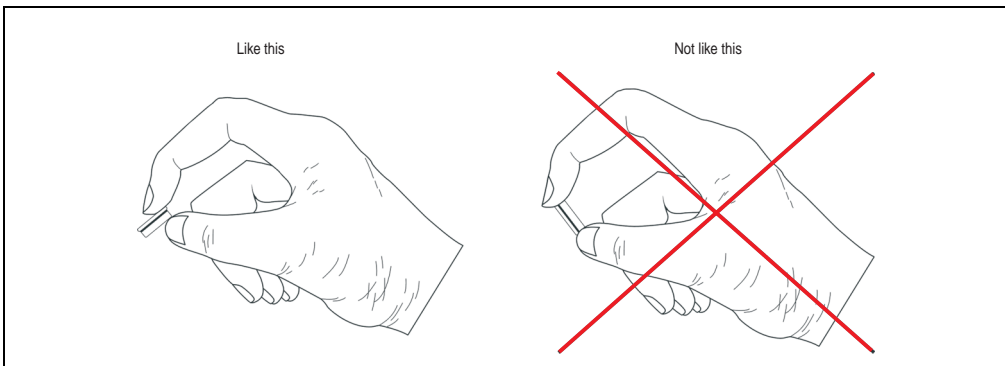
Figure 118: Battery handling

Chapter 7
Service and maintenance
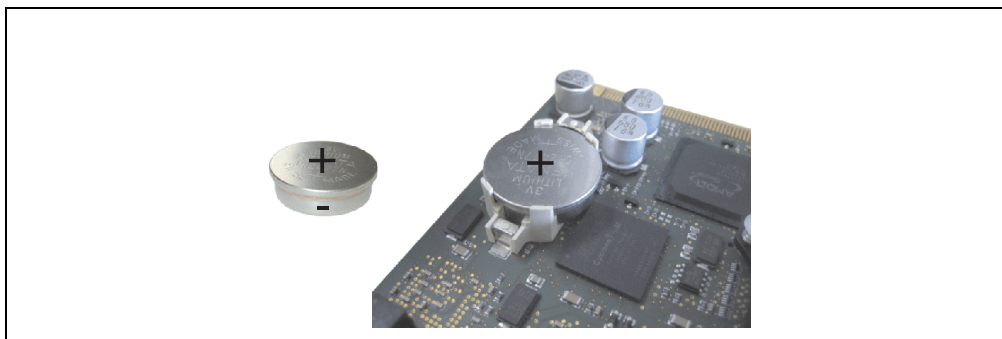
Figure 119: Battery polarity

• 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

After-image 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?

The 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

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.
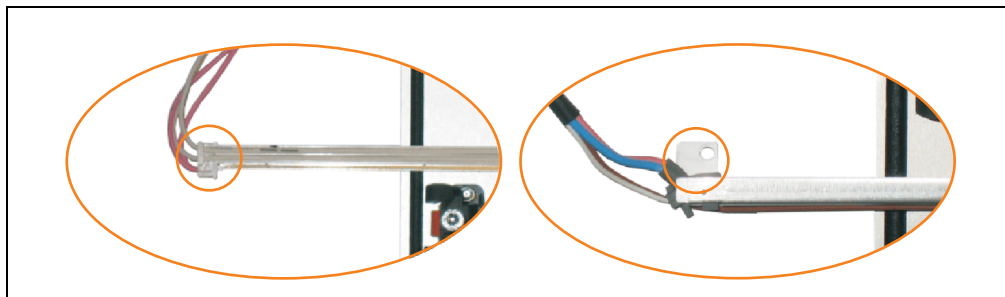
Figure 120: Warning - Exchanging the fluorescent lights

4.2 Procedure

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).
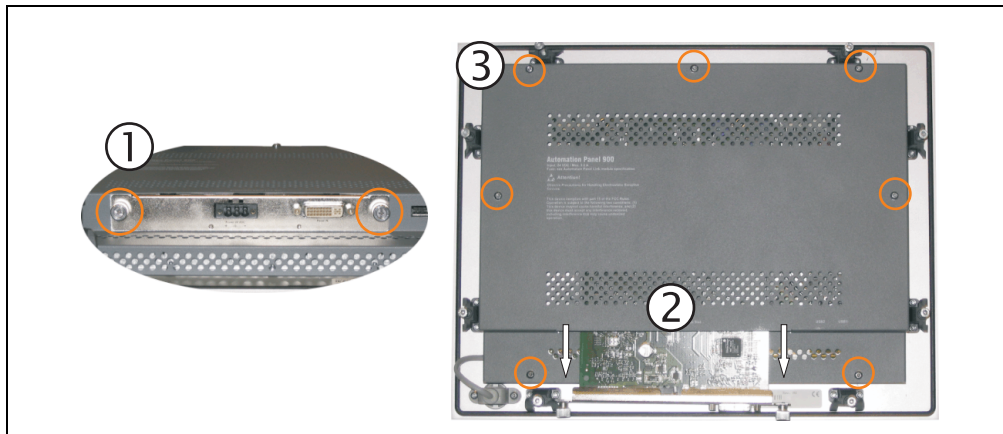
Figure 121: Remove the cover

4.2.1 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).
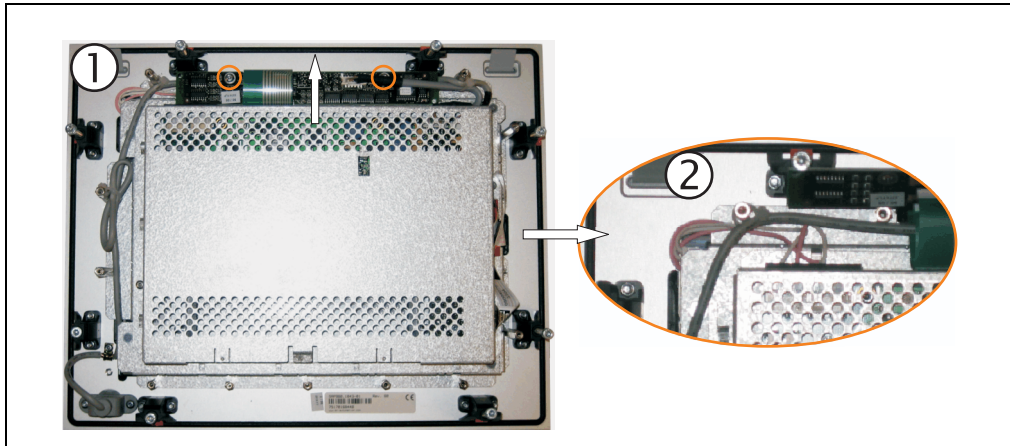
Figure 122: 10.4" Automation Panel - unscrew and unplug

2) Exchange fluorescent tube. To do this, carefully pull the tube out of its holder and replace with a new one.
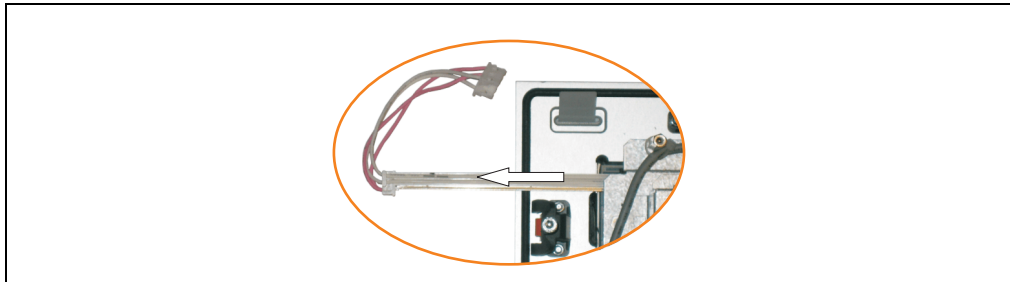
Figure 123: 10.4" Automation Panel - exchange fluorescent tube

4.2.2 Procedure for 12.1" Automation Panel

1) Using a small Phillips screwdriver, remove the screws and unplug the fluorescent tube.
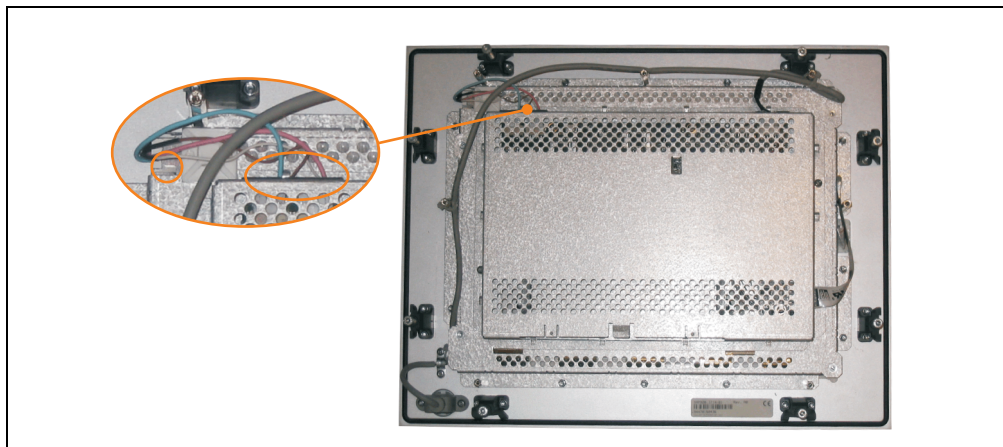
Figure 124: 12.1" Automation Panel - unscrew and unplug

2) Exchange fluorescent tube. To do this, carefully pull the tube out of its holder and replace with a new one.
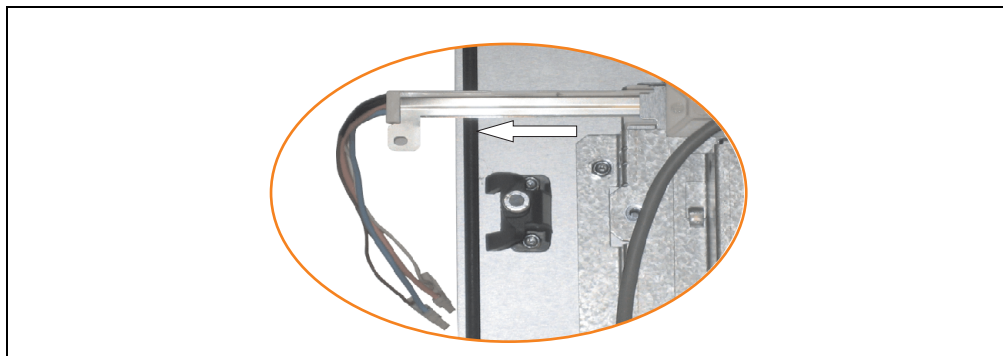
Figure 125: 12.1" Automation Panel - exchange fluorescent tube

Chapter 7
Service and maintenance

4.2.3 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.
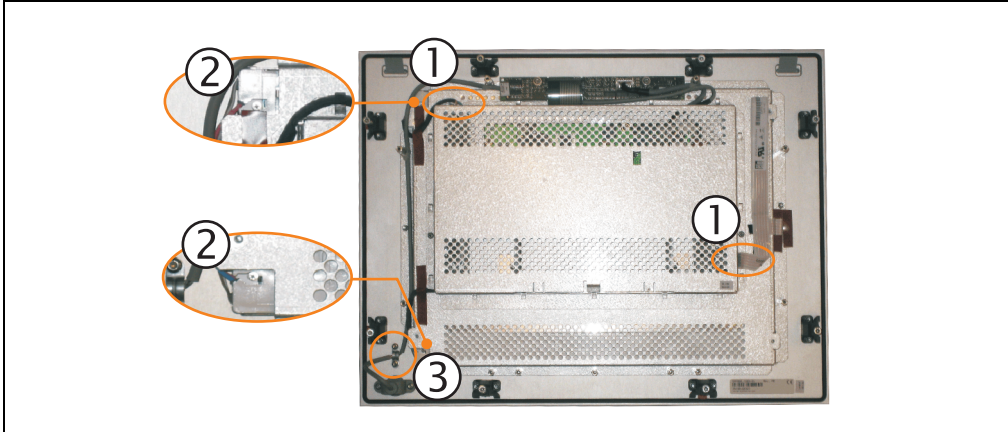
Figure 126: 15" Automation Panel - unscrew and unplug

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).
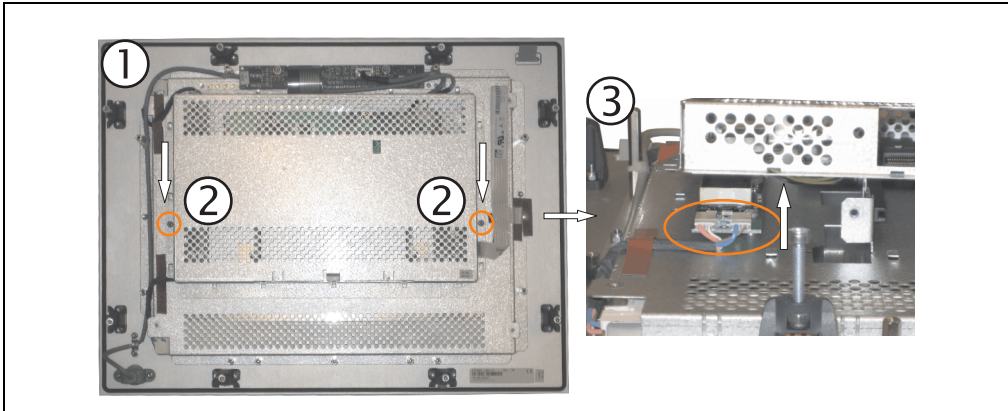
Figure 127: 15" Automation Panel - remove cover and unplug

3) Replacing fluorescent lights. To do this, carefully pull the fluorescent lights out of their holders and replace with new ones.
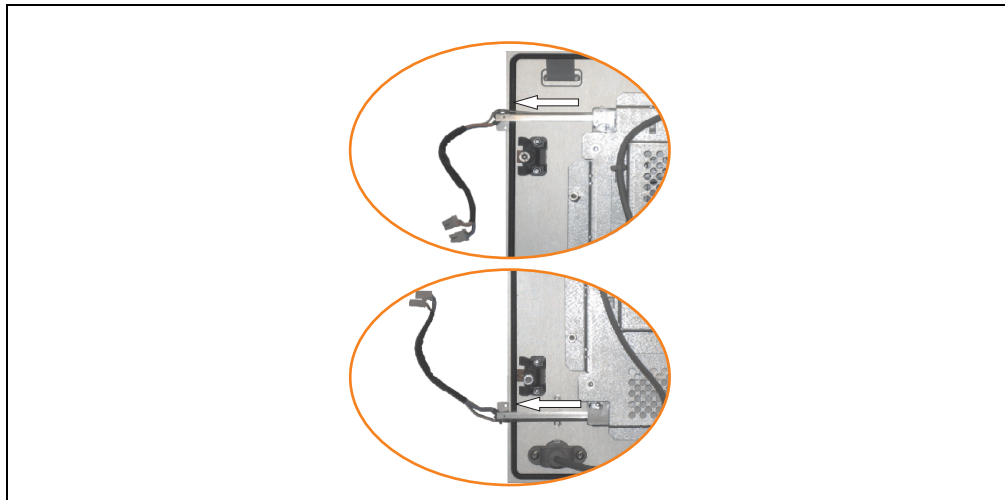
Figure 128: 15" Automation Panel - Replacing fluorescent lights

Appendix A

1. Touch screen - Elo Accu Touch

Information:

The following characteristics, features, and limit values only apply to this individual component and can deviate from those 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 grams
Resolution	4096 x 4096 touch points
Light permeability	Up to 80% ± 5%
Temperature 　Operation 　Storage 　Transport	- 10°C to + 50°C - 40°C to + 71°C - 40°C to + 71°C
Relative humidity 　Operation 　Storage 　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 contacts 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 Driver and Utilities DVD (Mod. No. 5SWHMI.0000-00).

Table 125: 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.

1.1 Temperature humidity diagram - Operation and storage
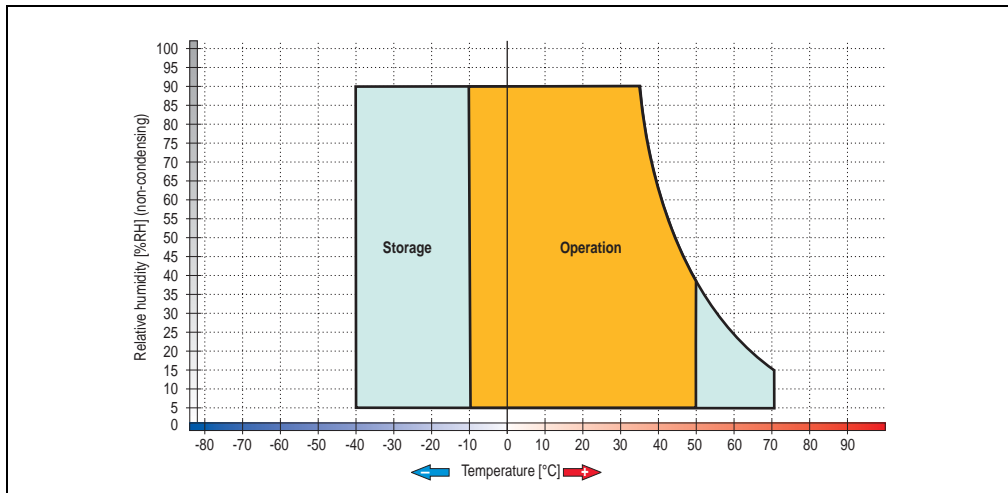
Figure 129: Temperature humidity diagram - Elo Accu touch screen

1.2 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 Driver requires calibration following installation.

1.2.1 Windows CE

Windows CE starts the touch calibration sequence during its first boot in the default configuration / delivered state.

1.2.2 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.

1.3 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.

Appendix A

2. Mylar

The Mylar 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 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.

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 Petrol Water Sea water Decon	

Table 126: Chemical resistance of the mylar

The Mylar conforms to DIN 42115 section 2 for exposure to glacial acetic acid for less than one hour without visible damage.

3. Perspectives

The viewing angle information (R, L, U, D) can be seen in the technical data for the individual components.
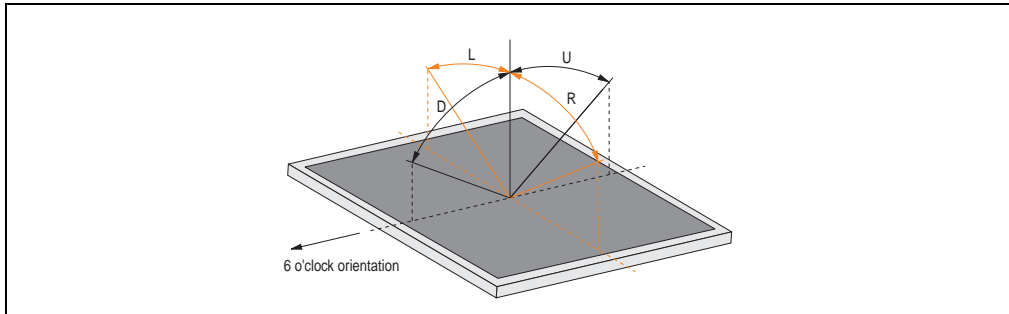
Figure 130: Viewing angles

4. 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 removable, nonvolatile mass storage 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 that 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 activating an item with 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.

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