

Power Panel 100/200

User's Manual

Version: **1.90 (September 2006)**

Model No.: **MAPP02-E**

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Chapter 1 • General information

Information:

B&R does its best to keep the printed versions of its user's manuals as current as possible. However, sometimes a newer version of the user's manual can be downloaded in electronic form (PDF) from the B&R homepage at www.br-automation.com.

1. Manual history

Version	Date	Changes
1.0	02.05.2002	- First version
1.1	20.08.2002	- Model numbers added for 24 VDC supply voltage plug - Metal housing for PP120 versions 4PP120.0571-01 and 4PP120.0571-21 added - CompactFlash cards (5CFCRD.0xxx-00) added
1.2	30.10.2002	- Layout changes
1.3	06.12.2002	- Layout changes - Restructuring of the manual - The following model numbers have either been updated or added: 4PP120.0571-01, 4PP120.0571-21, 4PP120.1043-31, 4PP120.1505-31, 4PP220.0571-45, 4PP220.0571-65, 4PP220.0571-85, 4PP220.0571-A5, 4PP220.1043-75, 4PP220.1043-B5, 4PP220.1505-75, 4PP220.1505-B5, 5PP120.0571-27, 5PP120.1043-37, 5PP120.1505-37, 0AC201.9, 0TB103.9, 0TB103.91, 0TB704.9, 0TB704.91, 3IF772.9, 3IF786.9, 3IF787.9, 3IF789.9, 9A0013.01, 9S0001.13-010, 9S0001.13-02 New Chapter 3, 4, 5, 6, 7 added
1.4	27.03.2003	- Description of BIOS revised (table formatting, content)
1.5	28.04.2003	- Technical data for the 3-pin supply plug updated - Mounting instructions (distance) and mounting position updated - Following Power Panel devices added: 4PP210.0000-95, 4PP251.0571-65, 4PP251.0571-A5 - Battery change, battery buffer time updated - Power consumption and operating temperatures added - BIOS Upgrade description added - REMHOST description added - CMOS backup description added - Windows CE section updated - Distribution of resources by BIOS added - Contents of delivery for each Power Panel device added

Table 1: Manual history

Version	Date	Changes
1.6	01.07.2004	- Changeover to a new A5 book template V3.3 - Ground resistance information added to the "Technical data" for the individual Power Panel devices - New figure for "Power Panel 100 and Power Panel 200 devices" on page 35. - "Features" on page 36 revised - Chapter 4 "Software", section 2 "Power Panel with BIOS" revised, separate BIOS descriptions for VGA, SVGA and XGA and for QVGA Power Panel devices - Section "BIOS upgrade und utilities" on page 478 regarding the new BIOS Upgrade disk set (3 disks) revised - Section "Power Panel 100 with BIOS and Windows XP Embedded" on page 495 as well as the model number for Windows XP Embedded image added - Device 4PP151.0571-01 added (see section "Device 4PP151.0571-01" on page 70) - Device 4PP151.0571-21 added (see section "Device 4PP151.0571-21" on page 76) - Device 4PP152.0571-01 added (See section "Device 4PP152.0571-01" on page 94) - Device 4PP152.0571-21 added (see section "Device 4PP152.0571-21" on page 100) - Device 4PP251.0571-45 added (see section "Device 4PP251.0571-45" on page 204) - Device 4PP251.0571-85 added (see section "Device 4PP251.0571-85" on page 216) - Device 4PP251.1043-75 added (see section "Device 4PP251.1043-75" on page 228) - Device 4PP251.1043-B5 added (see section "Device 4PP251.1043-B5" on page 234) - Device 4PP252.0571-65 added (see section "Device 4PP252.0571-65" on page 258) - Device 4PP252.0571-85 added (see section "Device 4PP252.0571-85" on page 264) - Device 4PP252.0571-A5 added (see section "Device 4PP252.0571-A5" on page 270) - Device 4PP252.1043-75 added (see section "Device 4PP252.1043-75" on page 276) - Device 4PP252.1043-B5 added (see section "Device 4PP252.1043-B5" on page 282) - Device 4PP280.1043-75 added (see section "Device 4PP280.1043-75" on page 288) - Device 4PP280.1043-B5 added (see section "Device 4PP280.1043-B5" on page 294) - Device 4PP280.1505-75 added (see section "Device 4PP280.1505-75" on page 300) - Device 4PP280.1505-B5 added (see section "Device 4PP280.1505-B5" on page 306) - Device 4PP281.1043-75 added (see section "Device 4PP281.1043-75" on page 312) - Device 4PP281.1043-B5 added (see section "Device 4PP281.1043-B5" on page 318) - Device 4PP281.1505-75 added (see section "Device 4PP281.1505-75" on page 324) - Device 4PP281.1505-B5 added (see section "Device 4PP281.1505-B5" on page 330) - Device 4PP282.1043-75 added (see section "Device 4PP282.1043-75" on page 336) - Device 4PP282.1043-B5 added (see section "Device 4PP282.1043-B5" on page 342) - Device 5PP120.1214-37 added (see section "Device 5PP120.1214-37" on page 374) - aPCI Interface Modules section deleted from the the Accesories chapter and Model Numbers Overview - Weight and dimension specifications for Power Panel devices corrected - Power Panel light / compact device types added (see section "Power Panel light / compact" on page 398) - 2 GB CompactFlash card (5CFCRD.2048-02) added - USB flash drives (5MMUSB.0128-00, 5MMUSB.0256-00, 5MMUSB.0512-00) added - Legend strip templates 5AC900.057X-00, 5AC900.057X-01, 5AC900.104X-00, 5AC900.104X-01, 5AC900.104X-02, 5AC900.150X-00 added

Table 1: Manual history (Forts.)

Version	Date	Changes
1.7	17.05.2005	- Section "Power Panel 100 as an intelligent visualization system" on page 427 added - Section "Power Panel 200 with Power Panel 100 terminals" on page 428 added - Error correction at an environmental temperature for 15" Power Panel devices (all 0-45°C) - Memory of Power Panel 100 devices with Automation Runtime expanded to 64 MB SDRAM - Accessory 4A0006.00-000 lithium battery 1 pc. added - Device 4PP151.1043-31 added (see section "Device 4PP151.1043-31" on page 82) - Device 4PP151.1505-31 added (see section "Device 4PP151.1505-31" on page 88) - Device 4PP152.1043-31 added (see section "Device 4PP152.1043-31" on page 106) - Device 4PP180.1043-31 added (see section "Device 4PP180.1043-31" on page 112) - Device 4PP180.1505-31 added (see section "Device 4PP180.1505-31" on page 118) - Device 4PP181.1505-31 added (see section "Device 4PP181.1043-31" on page 124) - Device 4PP181.1505-31 added (see section "Device 4PP181.1505-31" on page 130) - Device 4PP182.1043-31 added (see section "Device 4PP182.1043-31" on page 136) - Device 4PP251.1505-75 added (see section "Device 4PP251.1505-75" on page 240) - Device 4PP251.1505-B5 added (see section "Device 4PP251.1505-B5" on page 246) - Device 4PP120.1043-37A added (see section "Device 5PP120.1043-37A" on page 368) - Device 4PP120.1214-37A added (see section "Device 5PP120.1214-37A" on page 380) - Device 4PP120.1505-37A added (see section "Device 5PP120.1505-37A" on page 392) - aPCI slot cover 4AC200.1000-00 added (see section "aPCI slot cover" on page 527) - Lifespan calculation (white paper from SanDisk) for CompactFlash cards added (see section "Calculating the lifespan" on page 534) - Automation Runtime and SMC section added (see "Automation Runtime and SMC" on page 429) - Standards and certifications section added (see section 5 "Standards and certifications" on page 497) - Appendix A data (touch screen and mylar properties) added from page 561 - BIOS upgrade and utilities section revised for new BIOS version 1.12
1.8	31.01.2006	- Conductor cross section and AWG changes for the supply plug - Safety guidelines revised - IP65 protection specified in more detail - Legend strip position and color specifications added for each display front - Installation diagrams and tolerance information revised for the dimensions sections - Operating environment temperature of 15" Power Panel devices changed to 0 - 50 °C - Back view photos added for devices 4PP120.1505-31, 4PP151.1043-31, 4PP151.1505-31, 4PP152.1043-31, 4PP180.1043-31, 4PP180.1505-31, 4PP181.1043-31, 4PP181.1505-31, and 4PP182.1043-31 - International European (CE) certification symbol changed - Section "Standards and certifications" revised - 1 GB flash drive (mod. no 5MMUSB.1024-00) added, 128 MB flash drive cancelled - Silicon CompactFlash cards 5CFCRD.xxxx-03 added - Note for pressing several keys simultaneously - Power Panel display contrast and viewing angle specifications added - Null modem cable (9A0017.01 and 9A0017.02) added in the "Accessories" section
1.90	13.09.2006	- Safety guidelines updated to include ESD. - Maximum holding torque for aPCI modules included. - Storage and transport temperature for all 5.7" BW Power Panel devices increased from -20°C .. +60°C to -20°C .. +70°C. - New BIOS function "Auto (+Timing)" described for the video and flat panel configuration resolution settings. - Elo touch screen specification updated (see Appendix A).

Table 1: Manual history (Forts.)

2. Safety information

2.1 Intended use

Programmable logic controllers (PLCs, etc.), operating and monitoring devices (industrial PCs, Power Panels, Mobile Panels, etc.) as well as the 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 transportation 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 10cm 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.) in accordance with applicable national and international regulations must be observed. The same applies for all other devices connected to the system, such as drives.

All tasks such as installation, commissioning, and service may only 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 Mounting

- Installation must take place according to the documentation using suitable equipment and tools.
- Devices may only 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 operational 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 Programs, viruses and dangerous programs

The system is subject to a potential danger each time data is exchanged or software is installed using data media (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.

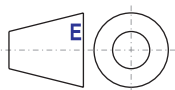
3. Organization of safety notices

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



European dimension standards apply to all dimension diagrams (e.g. dimension diagrams, etc.).

5. Model numbers

5.1 Power Panel 100 with Automation Runtime

Model number	Description	Note
4PP120.0571-01	Power Panel 120 LCD B/W QVGA 5.7in T MH Power Panel PP120; 5.7in QVGA b/w LC display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2xUSB; 64 MB SDRAM; metal housing, IP 65 protection (front side); 24 VDC.	
4PP120.0571-21	Power Panel 120 LCD C QVGA 5.7in T MH Power Panel PP120; 5.7in QVGA color LC display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2xUSB; 64 MB SDRAM; metal housing, IP 65 protection (front side); 24 VDC.	
4PP120.1043-31	Power Panel 120 TFT C VGA 10.4" T MH Power Panel PP120; 10.4in VGA color TFT display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2xUSB; 64 MB SDRAM; metal housing, IP 65 protection (front side); 24 VDC.	
4PP120.1505-31	Power Panel 120 TFT C XGA 15" T MH Power Panel PP120; 15in XGA color TFT display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2xUSB; 64 MB SDRAM; metal housing, IP 65 protection (front side); 24 VDC.	
4PP151.0571-01	Power Panel 151 LCD B/W QVGA 5.7" F MH Power Panel PP151; 5.7" QVGA b/w LC display; 6 soft keys; 16 function keys and 20 system keys; 64 MB SDRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2xUSB; metal housing, IP 65 protection (front side); 24 VDC.	
4PP151.0571-21	Power Panel 151 LCD C QVGA 5.7" F MH Power Panel PP151; 5.7" QVGA color LC display; 6 soft keys; 16 function keys and 20 system keys; 64 MB SDRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2xUSB; metal housing, IP 65 protection (front side); 24 VDC.	
4PP151.1043-31	Power Panel 151 TFT C VGA 10.4" F MH Power Panel PP151; 10.4" VGA color TFT display; 10 soft keys; 28 function keys and 20 system keys; 64 MB SDRAM; CompactFlash Slot (type I); ETH 10/100; RS 232; 2xUSB; metal housing, IP 65 protection (front side); 24 VDC.	
4PP151.1505-31	Power Panel 151 TFT C XGA 15" F MH Power Panel PP151; 15" XGA color TFT display; 12 soft keys; 20 function keys and 92 system keys; 64 MB SDRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2xUSB; metal housing, IP 65 protection (front side); 24 VDC.	
4PP152.0571-01	Power Panel 152 LCD B/W QVGA 5.7" F MH Power Panel PP152; 5.7" QVGA b/w LC display; 20 function keys and 20 system keys; 64 MB SDRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2xUSB; metal housing, IP 65 protection (front side); 24 VDC.	
4PP152.0571-21	Power Panel 152 LCD C QVGA 5.7" F MH Power Panel PP152; 5.7" QVGA color LC display; 20 function keys and 20 system keys; 64 MB SDRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2xUSB; metal housing, IP 65 protection (front side); 24 VDC.	
4PP152.1043-31	Power Panel 152 TFT VGA 10.4" F MH Power Panel PP152; 10.4" VGA color TFT display; 44 function keys and 20 system keys; 64 MB SDRAM; CompactFlash Slot (type I); ETH 10/100; RS 232; 2xUSB; metal housing, IP 65 protection (front side); 24 VDC.	

Table 3: Power Panel 100 with Automation Runtime

Model number	Description	Note
4PP180.1043-31	Power Panel 180 TFT VGA 10.4" F T MH Power Panel PP180; 10.4" VGA color TFT display with touch screen (resistive); 10 soft keys; 12 function keys; 64 MB SDRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2xUSB; metal housing, IP 65 protection (front side); 24 VDC.	
4PP180.1505-31	Power Panel 180 TFT VGA 15" F T MH Power Panel PP180; 15" XGA color TFT display with touch screen (resistive); 12 soft keys and 20 function keys; 64 MB SDRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2xUSB; metal housing, IP 65 protection (front side); 24 VDC.	
4PP181.1043-31	Power Panel 181 TFT VGA 10.4" F T MH Power Panel PP181; 10.4" VGA color TFT display with touch screen (resistive); 10 soft keys; 28 function keys and 20 system keys; 64 MB SDRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2xUSB; metal housing, IP 65 protection (front side); 24 VDC.	
4PP181.1505-31	Power Panel 181 TFT VGA 15" F T MH Power Panel PP181; 15" XGA color TFT display with touch screen (resistive); 12 soft keys; 20 function keys and 92 system keys; 64 MB SDRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2xUSB; metal housing, IP 65 protection (front side); 24 VDC.	
4PP182.1043-31	Power Panel 182 TFT VGA 10.4" F T MH Power Panel PP182; 10.4" VGA color TFT display with touch screen (resistive); 44 function keys and 20 system keys; 64 MB SDRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2xUSB; metal housing, IP 65 protection (front side); 24 VDC.	

Table 3: Power Panel 100 with Automation Runtime (Forts.)

5.2 Power Panel 200 with Automation Runtime

Model number	Description	Note
4PP210.0000-95	Power Panel 210 Controller MH 2aPCI Power Panel PP210 controller, CompactFlash slot (type I), ETH 10/100, RS 232, 2xUSB; 64 MB SDRAM; 2 aPCI slots; 256 KB SRAM; battery; metal housing, IP 65 protection (front side); 24 VDC.	
4PP220.0571-45	Power Panel 220 LCD B/W QVGA 5.7in T MH 1aPCI Power Panel PP220; 5.7in QVGA b/w LC display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2xUSB; 64 MB SDRAM; 1 aPCI Slot; 256 KB SRAM; battery; metal housing, IP 65 protection (front side); 24 VDC.	
4PP220.0571-65	Power Panel 220 LCD C QVGA 5.7in T MH 1aPCI Power Panel PP220; 5.7in QVGA color LC display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2xUSB; 64 MB SDRAM; 1 aPCI slot; 256 KB SRAM; battery; metal housing, IP 65 protection (front side); 24 VDC.	
4PP220.0571-85	Power Panel 220 LCD B/W QVGA 5.7in T MH 2aPCI Power Panel PP220; 5.7in QVGA b/w LC display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2xUSB; 64 MB SDRAM; 2 aPCI slots; 256 KB SRAM; battery; metal housing, IP 65 protection (front side); 24 VDC.	
4PP220.0571-A5	Power Panel 220 LCD C QVGA 5.7in T MH 2aPCI Power Panel PP220; 5.7in QVGA color LC display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2xUSB; 64 MB SDRAM; 2 aPCI slots; 256 KB SRAM; battery; metal housing, IP 65 protection (front side); 24 VDC.	

Table 4: Power Panel 200 with Automation Runtime

General information • Model numbers

Model number	Description	Note
4PP220.1043-75	Power Panel 220 TFT C VGA 10.4in T MH 1aPCI Power Panel PP220; 10.4in VGA color TFT display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2xUSB; 64 MB SDRAM; 1 aPCI slot; 256 KB SRAM; battery; metal housing, IP 65 protection (front side); 24 VDC.	
4PP220.1043-B5	Power Panel 220 TFT C VGA 10.4in T MH 2aPCI Power Panel PP220; 10.4in VGA color TFT display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2xUSB; 64 MB SDRAM; 2 aPCI slots; 256 KB SRAM; battery; metal housing, IP 65 protection (front side); 24 VDC.	
4PP220.1505-75	Power Panel 220 TFT C XGA 15in T MH 1aPCI Power Panel PP220; 15" XGA color TFT display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2xUSB; 64 MB SDRAM; 1 aPCI slot; 256 KB SRAM; battery; metal housing, IP 65 protection (front side); 24 VDC.	
4PP220.1505-B5	Power Panel 220 TFT C XGA 15in T MH 2aPCI Power Panel PP220; 15in XGA color TFT display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2xUSB; 64 MB SDRAM; 2 aPCI slots; 256 KB SRAM; battery; metal housing, IP 65 protection (front side); 24 VDC.	
4PP251.0571-45	Power Panel 251 LCD B/W QVGA 5.7" F MH 1aPCI Power Panel PP251; 5.7" QVGA b/w LC display; 6 soft keys; 16 function keys and 20 system keys; 1 aPCI slot; 64 MB SDRAM; 256 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2xUSB; battery; metal housing, IP 65 protection (front side); 24 VDC.	
4PP251.0571-65	Power Panel 251 LCD C QVGA 5.7in F MH 1aPCI Power Panel PP251; 5.7" QVGA color LC display; 6 soft keys; 16 function keys and 20 system keys; 1 aPCI slot; 64 MB SDRAM; 256 KB SRAM CompactFlash slot (type I); ETH 10/100; RS 232; 2xUSB; battery; metal housing, IP 65 protection (front side); 24 VDC.	
4PP251.0571-85	Power Panel 251 LCD B/W QVGA 5.7" F MH 2aPCI Power Panel PP251 5.7" QVGA color LC display; 6 soft keys; 16 function keys and 20 system keys; 2 aPCI slots; 64 MB SDRAM; 256 KB SRAM CompactFlash slot (type I); ETH 10/100; RS 232; 2xUSB; battery; metal housing, IP 65 protection (front side); 24 VDC.	
4PP251.0571-A5	Power Panel 251 LCD C QVGA 5.7in F MH 2aPCI Power Panel PP251 5.7in QVGA color LC display; 6 soft keys; 16 function keys and 20 system keys; 2 aPCI slots; 64 MB SDRAM; 256 KB SRAM CompactFlash slot (type I); ETH 10/100; RS 232; 2xUSB; battery metal housing, IP 65 protection (front side); 24 VDC.	
4PP251.1043-75	Power Panel 251 TFT C VGA 10.4" F MH 1aPCI Power Panel PP251; 10" VGA color TFT display; 10 soft keys; 28 function keys and 20 system keys; 1 aPCI slot; 64 MB SDRAM; 256 KB SRAM CompactFlash slot (type I); ETH 10/100; RS 232; 2xUSB; battery; metal housing, IP 65 protection (front side); 24 VDC.	
4PP251.1043-B5	Power Panel 251 TFT C VGA 10.4" F MH 2aPCI Power Panel PP251; 10" VGA color TFT display; 10 soft keys; 28 function keys and 20 system keys; 2 aPCI slots; 64 MB SDRAM; 256 KB SRAM CompactFlash slot (type I); ETH 10/100; RS 232; 2xUSB; battery; metal housing, IP 65 protection (front side); 24 VDC.	
4PP251.1505-75	Power Panel 251 TFT C XGA 15" F MH 1aPCI Power Panel PP281; 15" XGA color TFT display; 12 soft keys; 20 function keys and 92 system keys; 1 aPCI slot; 64 MB SDRAM; 256 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2xUSB; battery; metal housing, IP 65 protection (front side); 24 VDC.	
4PP251.1505-B5	Power Panel 251 TFT C XGA 15" F MH 2aPCI Power Panel PP251; 15" XGA color TFT display; 12 soft keys; 20 function keys and 92 system keys; 2 aPCI slots; 64 MB SDRAM; 256 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2xUSB; battery; metal housing, IP 65 protection (front side); 24 VDC.	
4PP252.0571-45	Power Panel 252 LCD B/W QVGA 5.7" F MH 1aPCI Power Panel PP252; 5.7" QVGA b/w LC display with touch screen (resistive); 20 function and 20 system keys; 1 aPCI slot; 64 MB SDRAM; 256 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2xUSB; battery; metal housing, IP 65 protection (front side); 24 VDC.	

Table 4: Power Panel 200 with Automation Runtime (Forts.)

Model number	Description	Note
4PP252.0571-65	Power Panel 252 LCD C QVGA 5.7in F MH 1aPCI Power Panel PP252; 5.7" QVGA color LC display; 20 function and 20 system keys; 1 aPCI slot; 64 MB SDRAM; 256 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2xUSB; battery; metal housing, IP 65 protection (front side); 24 VDC.	
4PP252.0571-85	Power Panel 252 LCD B/W QVGA 5.7" F MH 2aPCI Power Panel PP252; 5.7" QVGA b/w LC display; 20 functions and 20 system keys; 2 aPCI slots; 64 MB SDRAM; 256 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2xUSB; battery; metal housing, IP 65 protection (front side); 24 VDC.	
4PP252.0571-A5	Power Panel 252 LCD C QVGA 5.7in F MH 2aPCI Power Panel PP252; 5.7" QVGA color LC display; 20 function and 20 system keys; 2 aPCI slots; 64 MB SDRAM; 256 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS232; 2xUSB; battery; metal housing, IP 65 protection (front side); 24 VDC.	
4PP252.1043-75	Power Panel 252 TFT C VGA 10.4" F MH 1aPCI Power Panel PP252; 10.4" VGA color TFT display; 32 function keys and 32 system keys; 1 aPCI slots; 64 MB SDRAM; 256 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2xUSB; battery; metal housing, IP 65 protection (front side); 24 VDC.	
4PP252.1043-B5	Power Panel 252 TFT C VGA 10.4" F MH 2aPCI Power Panel PP252; 10.4" VGA color TFT display; 32 function keys and 32 system keys; 2 aPCI slots; 64 MB SDRAM; 256 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2xUSB; battery; metal housing, IP 65 protection (front side); 24 VDC.	
4PP280.1043-75	Power Panel 280 TFT C VGA 10.4" FT MH 1aPCI Power Panel PP280; 10" VGA color TFT display with touch screen (resistive); 10 soft keys and 12 function keys; 1 aPCI slot; 64 MB SDRAM; 256 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2xUSB; battery; metal housing, IP 65 protection (front side); 24 VDC.	
4PP280.1043-B5	Power Panel 280 TFT C VGA 10.4" FT MH 2aPCI Power Panel PP280; 10" VGA color TFT display with touch screen (resistive); 10 soft keys and 12 function keys; 2 aPCI slots; 64 MB SDRAM; 256 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2xUSB; battery; metal housing, IP 65 protection (front side); 24 VDC.	
4PP280.1505-75	Power Panel 280 TFT C XGA 15" FT MH 1aPCI Power Panel PP280; 15" XGA color TFT display with touch screen (resistive); 12 soft keys and 20 function keys; 1 aPCI slot; 64 MB SDRAM; 256 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2xUSB; battery; metal housing, IP 65 protection (front side); 24 VDC.	
4PP280.1505-B5	Power Panel 280 TFT C XGA 15" FT MH 2aPCI Power Panel PP280; 15" XGA color TFT display with touch screen (resistive); 12 soft keys and 20 function keys; 2 aPCI slots; 64 MB SDRAM; 256 KB SRAM; CompactFlash slot (type I); ETH10/100; RS232; 2xUSB; battery; metal housing, IP 65 protection (front side); 24VDC.	
4PP281.1043-75	Power Panel 281 TFT C VGA 10.4" FT MH 1aPCI Power Panel PP281; 10.4" VGA color TFT display with touch screen (resistive), 10 soft keys, 28 function keys and 20 system keys, CompactFlash slot (type I), ETH 10/100, RS 232, 2xUSB; 64 MB SDRAM; 1 aPCI slot; 256 KB SRAM; battery; metal housing, IP 65 protection (front side); 24 VDC.	
4PP281.1043-B5	Power Panel 281 TFT C VGA 10.4" FT MH 2aPCI Power Panel PP281; 10.4" VGA color TFT display with touch screen (resistive), 10 soft keys, 28 function keys and 20 system keys, CompactFlash slot (type I), ETH 10/100, RS 232, 2xUSB; 64 MB SDRAM; 2 aPCI slots; 256 KB SRAM; battery; metal housing, IP 65 protection (front side); 24 VDC.	
4PP281.1505-75	Power Panel 281 TFT C XGA 15" FT MH 1aPCI Power Panel PP281; 15" XGA color TFT display with touch screen (resistive); 12 soft keys; 20 function keys and 92 system keys; 1 aPCI slot; 64 MB SDRAM; 256 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2xUSB; battery; metal housing, IP 65 protection (front side); 24 VDC.	

Table 4: Power Panel 200 with Automation Runtime (Forts.)

General information • Model numbers

Model number	Description	Note
4PP281.1505-B5	Power Panel 281 TFT C XGA 15" FT MH 2aPCI Power Panel PP281; 15" XGA color TFT display with touch screen (resistive); 12 soft keys; 20 function keys and 92 system keys; 2 aPCI slots; 64 MB SDRAM; 256 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2xUSB; battery; metal housing, IP 65 protection (front side); 24 VDC.	
4PP282.1043-75	Power Panel 282 TFT C VGA 10.4" FT MH 1aPCI Power Panel PP282; 10.4" VGA color TFT display with touch screen (resistive), 12 soft keys, 32 function keys and 20 system keys, CompactFlash slot (type I), ETH 10/100, RS 232, 2xUSB; 64 MB SDRAM; 1 aPCI slots; 256 KB SRAM; battery; metal housing, IP 65 protection (front side); 24 VDC.	
4PP282.1043-B5	Power Panel 282 TFT C VGA 10.4" FT MH 2aPCI Power Panel PP282; 10.4" VGA color TFT display with touch screen (resistive), 12 soft keys, 32 function keys and 20 system keys, CompactFlash slot (type I), ETH 10/100, RS 232, 2xUSB; 64 MB SDRAM; 2 aPCI slots; 256 KB SRAM; battery; metal housing, IP 65 protection (front side); 24 VDC.	

Table 4: Power Panel 200 with Automation Runtime (Forts.)

5.3 Power Panel 100 with BIOS

Model number	Description	Note
5PP120.0571-27	Power Panel 120 LCD C QVGA 5.7in T MH Power Panel PP120 BIOS; 5.7" QVGA color LC display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2xUSB; 128 MB SDRAM; battery; metal housing, IP 65 protection (front side); 24 VDC.	
5PP120.1043-37	Power Panel 120 TFT C VGA 10.4" T (3M) MH Power Panel PP120 BIOS; 10.4" VGA TFT color display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2xUSB; 128 MB SDRAM; battery; metal housing, IP 65 protection (front side); 24 VDC.	
5PP120.1043-37A	Power Panel 120 TFT C VGA 10.4" T MH Power Panel PP120 BIOS; 10.4" VGA TFT color display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2xUSB; 128 MB SDRAM; battery; metal housing, IP 65 protection (front side); 24 VDC.	
5PP120.1214-37	Power Panel 120 TFT C VGA 12.1" T (3M) MH Power Panel PP120 BIOS; 12.1" SVGA color TFT display with touch screen (resistive); 128 MB SDRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2xUSB; battery; metal housing, IP 65 protection (front side); 24 VDC.	
5PP120.1214-37A	Power Panel 120 TFT C VGA 12.1" T MH Power Panel PP120 BIOS; 12.1" SVGA color TFT display with touch screen (resistive); 128 MB SDRAM; CompactFlash slot (type I); ETH 10/100; RS 232; 2xUSB; battery; metal housing, IP 65 protection (front side); 24 VDC.	
5PP120.1505-37	Power Panel 120 TFT C XGA 15" T (3M) MH Power Panel PP120 BIOS; 15" XGA color TFT display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2xUSB; 128 MB SDRAM; battery; metal housing, IP 65 protection (front side); 24 VDC.	
5PP120.1505-37A	Power Panel 120 TFT C XGA 15" T MH Power Panel PP120 BIOS; 15" XGA color TFT display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2xUSB; 128 MB SDRAM; battery; metal housing, IP 65 protection (front side); 24 VDC.	

Table 5: Power Panel 100 Model Numbers with BIOS

5.4 Accessories

Model number	Description	Note
0AC201.9	Lithium batteries (5x) Lithium batteries, 5 pcs., 3 V / 950 mAh, button cell	
0TB103.9	Plug 24V 5.08 3p screw clamps 24 VDC 3-pin connector, female. Screw clamps, 3.31 mm ² , protected against vibration by the screw flange	
0TB103.91	Plug 24V 5.08 3p cage clamps 24 VDC 3-pin connector, female. Cage clamps, 3.31 mm ² , protected against vibration by the screw flange	
4A0006.00-000	Lithium battery (1x) Lithium battery, 1 pc., 3 V / 950 mAh, button cell	
4AC200.1000-00	aPCI slot cover, 1 pc. Optional aPCI slot cover for inserting into an available aPCI slot on a Power Panel 200 device	
5AC900.057X-00	Legend strips 3x 5.7" high1 Legend strip template for Power Panels 4PP151.0571-01, 4PP151.0571-21, 4PP251.0571-45, 4PP251.0571-65, 4PP251.0571-85, 4PP251.0571-A5. For 3 devices.	
5AC900.057X-01	Legend strips 2x 5.7" diagonal2 Legend strip template for Power Panels 4PP152.0571-01, 4PP152.0571-21, 4PP252.0571-45, 4PP252.0571-65, 4PP252.0571-85, 4PP252.0571-A5. For 2 devices.	
5AC900.104X-00	Legend strip 1x 10.4" portrait1 Legend strip template for Power Panels 4PP151.1043-31, 4PP181.1043-31, 4PP251.1043-75, 4PP251.1043-B5, 4PP281.1043-75, 4PP281.1043-B5. For 1 device.	
5AC900.104X-01	Legend strip 1x 10.4" landscape2 Legend strip template for Power Panels 4PP152.1043-31, 4PP182.1043-31, 4PP252.1043-75, 4PP252.1043-B5, 4PP282.1043-75, 4PP282.1043-B5. For 1 device.	
5AC900.104X-02	Legend strips 3x 10.4" landscape1 Legend strip template for Power Panels 4PP180.1043-31, 4PP280.1043-75, 4PP280.1043-B5. For 3 devices.	
5AC900.150X-00	Legend strips 4x 15" Legend strip template for Power Panels 4PP151.1505-31, 4PP180.1505-31, 4PP181.1505-31, 4PP251.1505-75, 4PP251.1505-B5, 4PP280.1505-75, 4PP280.1505-B5, 4PP281.1505-75, 4PP281.1505-B5. For 4 devices.	
5CFCRD.0032-01	CompactFlash 32 MB True IDE SanDisk/R2 CompactFlash card with 32 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 11/2003</i>
5CFCRD.0032-02	CompactFlash 32 MB TrueIDE SanDisk/A CompactFlash card with 32 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 12/2005</i>
5CFCRD.0064-01	CompactFlash 64 MB True IDE SanDisk/R2 CompactFlash card with 64 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 11/2003</i>
5CFCRD.0064-02	CompactFlash 64 MB TrueIDE SanDisk/A CompactFlash card with 64 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 12/2005</i>
5CFCRD.0064-03	CompactFlash 64 MB TrueIDE SSI CompactFlash card with 64 MB SLC NAND Flash and True IDE/ATA interface	
5CFCRD.0128-01	CompactFlash 128 MB True IDE SanDisk/R2 CompactFlash card with 128 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 11/2003</i>
5CFCRD.0128-02	CompactFlash 128 MB TrueIDE SanDisk/A CompactFlash card with 128 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 12/2005</i>

Table 6: Model numbers - accessories

General information • Model numbers

Model number	Description	Note
5CFCRD.0128-03	CompactFlash 128 MB TrueIDE SSI CompactFlash card with 128 MB SLC NAND flash and True IDE/ATA interface	
5CFCRD.0128-01	CompactFlash 196 MB True IDE SanDisk/R2 CompactFlash card with 196 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 07/2003</i>
5CFCRD.0256-01	CompactFlash 256 MB True IDE SanDisk/R2 CompactFlash card with 256 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 11/2003</i>
5CFCRD.0256-02	CompactFlash 256 MB TrueIDE SanDisk/A CompactFlash card with 256 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 12/2005</i>
5CFCRD.0256-03	CompactFlash 256 MB TrueIDE SSI CompactFlash card with 256 MB SLC NAND flash and True IDE/ATA interface	
5CFCRD.0384-01	CompactFlash 384 MB True IDE SanDisk/R2 CompactFlash card with 384 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 07/2003</i>
5CFCRD.0512-01	CompactFlash 512 MB True IDE SanDisk/R2 CompactFlash card with 512 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 11/2003</i>
5CFCRD.0512-02	CompactFlash 512 MB TrueIDE SanDisk/A CompactFlash card with 512 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 12/2005</i>
5CFCRD.0512-03	CompactFlash 512 MB TrueIDE SSI CompactFlash card with 512 MB SLC NAND flash and True IDE/ATA interface	
5CFCRD.1024-02	CompactFlash 1024 MB TrueIDE SanDisk/A CompactFlash card with 1024 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 12/2005</i>
5CFCRD.1024-03	CompactFlash 1024 MB TrueIDE SSI CompactFlash card with 1024 MB SLC NAND flash and True IDE/ATA interface	
5CFCRD.2048-02	CompactFlash 2048 MB TrueIDE SanDisk/A CompactFlash card with 2048 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 12/2005</i>
5CFCRD.2048-03	CompactFlash 2048 MB TrueIDE SSI CompactFlash card with 2048 MB SLC NAND flash and True IDE/ATA interface	
5CFCRD.4096-03	CompactFlash 4096 MB TrueIDE SSI CompactFlash card with 4096 MB SLC NAND flash and True IDE/ATA interface	
5CFCRD.8192-03	CompactFlash 8192 MB TrueIDE SSI CompactFlash card with 8192 MB SLC NAND flash and True IDE/ATA interface	<i>In preparation</i>
5MMUSB.0128-00	USB flash drive 128 MB SanDisk USB 2.0 flash drive 128 MB	<i>Cancelled since 12/2005</i>
5MMUSB.0256-00	USB flash drive 256 MB SanDisk USB 2.0 flash drive 256 MB	
5MMUSB.0512-00	USB flash drive 512 MB SanDisk USB 2.0 flash drive 512 MB	
5MMUSB.1024-00	USB flash drive 1 GB SanDisk USB 2.0 flash drive 1 GB	
9A0013.01	Pen for resistive touch screen	
9A0017.01	RS232 DB9 null modem cable 0.6 m Null modem cable RS232 0.6 m to connect UPS and IPC (9-pin DSUB socket - 9-pin DSUB socket).	
9A0017.02	RS232 DB9 null modem cable 1.8 m Null modem cable RS232 1.8 m to connect UPS and IPC (9-pin DSUB socket - 9-pin DSUB socket).	

Table 6: Model numbers - accessories (Forts.)

5.5 Software

Model number	Description	
5S0000.01-090	HMI Drivers & Utilities CD HMI Drivers & Utilities CD-ROM, contains drivers (touch screen, graphics, etc.) and the latest BIOS upgrades for all HMI product families	
9S0001.13-010	OEM MS Win CE4.1 German Only delivered with a Power Panel BIOS device	
9S0001.13-020	OEM MS Win CE4.1 English Only delivered with a Power Panel BIOS device	
9S0001.16-020	OEM MS WinXPe PP100/200 w/CF OEM MS WinXP Embedded Runtime PP100 preinstalled on CompactFlash 256 MB; for Power Panel 100 BIOS. Only delivered with a Power Panel BIOS device	
9S0001.17-020	OEM MS WinCE4.2 English OEM Microsoft Windows CE 4.2 English license Only delivered with a Power Panel BIOS device	
9S0001.25-020	OEM MS WinXPe PP100/200 w/CF SP2 OEM Microsoft Windows XP embedded SP2 for PP100 BIOS, English; preinstalled on CompactFlash 256 MB. Only delivered with a Power Panel BIOS device	

Table 7: Model numbers - software

5.6 Documentation

Model number	Description	
MAPP02-0	Power Panel 100 / 200 User's Manual, German	<i>In preparation</i>
MAPP02-E	Power Panel 100 / 200 User's Manual, English	<i>In preparation</i>

Table 8: Model numbers - documentation

Chapter 2 • Technical data

1. General information

B&R offers the B&R Power Panel 100 and Power Panel 200 product range for automating small to mid-sized machines and systems.

The Power Panel 100 and Power Panel 200 product range encompasses a line of devices from operating units with QVGA, VGA or XGA displays to visualization and machine control. Programmable with Automation Studio (Visual Components), these devices close the gap between Panelware and IPC-based systems. Depending on the design, the devices contain the embedded operating system Automation Runtime or a BIOS-based operating system such as Windows CE or Windows XP Embedded. The number of onboard interfaces is reduced to a minimum and size is optimized to the smallest dimensions.

Depending on the variant, the devices have a 5.7" QVGA touch screen available in color or black/white, a 10.4" VGA, a 12.1" SVGA, or a 15" XGA touch screen in color. In addition, there are horizontally or vertically formatted devices available (numeric and alphanumeric keys, with/without insert strips) for all display sizes (exception: 12.1" SVGA - only available without keys and with touch screen).



Figure 1: Power Panel 100 and Power Panel 200 devices

1.1 Features

- 24 VDC supply voltage
- 2 USB 1.1 connections
- Ethernet 10/100 MBit interface
- CompactFlash card (type I) slot
- RS232 interface, modem-capable, not electrically isolated
- 2 operating mode switches (2 x 16 digit)
- 2 status LEDs (user or CompactFlash card access)
- Fan-free operation
- Touch screen (analog resistive), function keys or both¹⁾
- Filter glass (multiple-coated, non-reflective)¹⁾
- Horizontal and vertical mounting orientations, numeric and alphanumeric keys¹⁾
- Software compatible with B&R 2000 PLC family
- Maximum 2 aPCI slots (see B&R System 2005 User's Manual for available aPCI interface modules)¹⁾
- BIOS or Automation Runtime operating system¹⁾
- Real-time clock (battery-buffered)¹⁾
- Up to 128 MB SDRAM main memory¹⁾

¹⁾ Depending on the design of the Power Panel device version

2. Power Panel 100 with Automation Runtime

2.1 Device interfaces

The following section provides a description of all interfaces and plugs possible with a Power Panel 100 device with Automation Runtime.

2.1.1 Supply voltage

Input voltage: 24 VDC $\pm$ 25%

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 OTB103.9 (screw clamps) or OTB103.91 (cage clamps). The cable required for the connection must be supplied by the customer (see also section "TB103 3-pin supply voltage connector" on page 525).

The supply voltage is internally protected so that the device cannot be damaged if there is an overload or if the voltage supply is connected incorrectly.

Pin assignments can be found either in the following table or printed on the Power Panel plate or device label (see section 2.2.2 "Device label" on page 43).

Supply voltage		
Pin	Description	
1	+	
2	Functional grounding	
3	-	
Accessories		
OTB103.9	Plug 24 V 5.08 3p screw clamps	
OTB103.91	Plug 24 V 5.08 3p cage clamps	

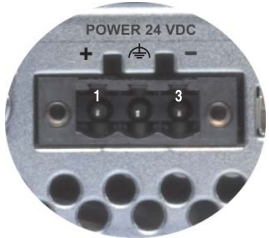


Figure 2: Supply voltage connection

Important!

The pin's connection to the functional ground (pin 2) should be as short as possible.

2.1.2 Grounding clip

Should be connected to ground using the shortest route possible.



Figure 3: Grounding clip

2.1.3 COM interface

The Power Panel is equipped with a PC-compatible serial interface with a 16 byte FIFO buffer. This non-electrically isolated interface is primarily intended for programming Power Panel devices using Automation Studio.

The RS232 can also be used as a general interface (e.g. third-party connections, barcode reader, etc.).

Serial interface		
RS232 interface Modem-capable, not electrically isolated Up to 115 kBaud		9-pin DSUB connector
Pin	RS232	
1	DCD	
2	RXD	
3	TxD	
4	DTR	
5	GND	
6	DSR	
7	RTS	
8	CTS	
9	RI	

Table 9: COM pin assignment

2.1.4 USB port

The Power Panel is equipped with a USB (Universal Serial Bus) host controller with two USB ports.

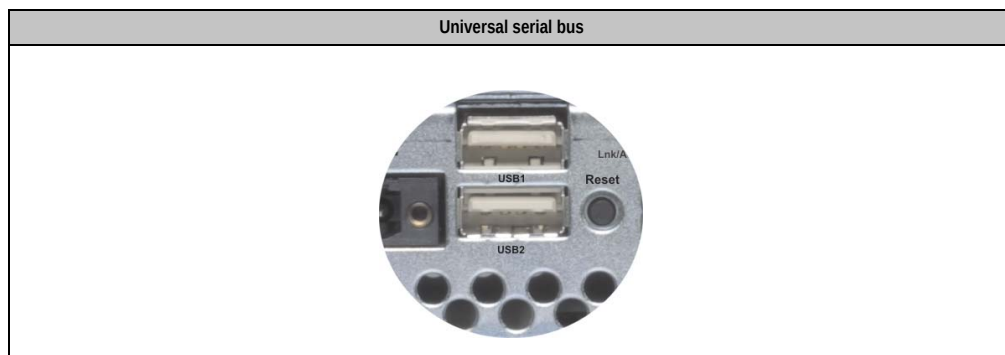


Figure 4: USB port

Technical data for USB port	
Transfer rate	1.5 MBit/s to 12 MBit/s
Power supply	500 mA for each port
Maximum cable length	5 m (can be extended using a USB hub)

Table 10: Technical data for USB connection

Warning!

Only the USB devices tested and verified by B&R and found in the section "Accessories" on page 521 may be connected to the USB interface.

Important!

Because of general PC specifications, this interface should be handled with extreme care with regard to EMC, location of cables, etc.

2.1.5 Mode/Node switches

Power Panel devices are equipped with 2 hex switches that serve as operating mode switches. Switch positions 01 up to FD are available for any purpose in an application and can be evaluated by the application program.

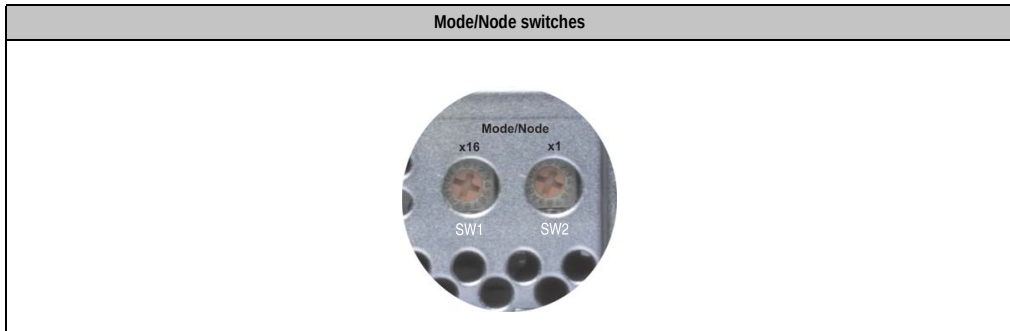


Figure 5: Mode/Node switch

Switch position		Function	Description
SW1 (x16)	SW2 (x1)	Operating mode switch	
0	0	Boot	Automation Runtime boot mode for operating system (firmware) upgrade (default Automation Runtime). In this position, a new or missing operating system can be downloaded.
0 to F	0 to F	Node	Automation Runtime run mode with node 01-FD (CompactFlash Automation Runtime or terminal operation). Freely available for use in an application, e.g. setting the INA2000 node number for the Ethernet interface.
F	E	Dyn. mode	Automation Runtime run mode with node 01-FD (CompactFlash Automation Runtime or terminal operation). Device addresses can be assigned through the software.
F	F	Diagnosis	Automation Runtime diagnostics mode (CompactFlash Automation Runtime or terminal operation).

Table 11: Switch settings for the mode/node switch

2.1.6 Status LEDs

Power Panels are equipped with two status LEDs that are visible on the outside.



Figure 6: Status LEDs

LED	Color	Function
User	Green	Available for use by the user (corresponding libraries for Automation Studio in preparation)
CF	Yellow	Indicates that a CompactFlash card is being accessed

Table 12: Status LEDs

2.1.7 Ethernet connection

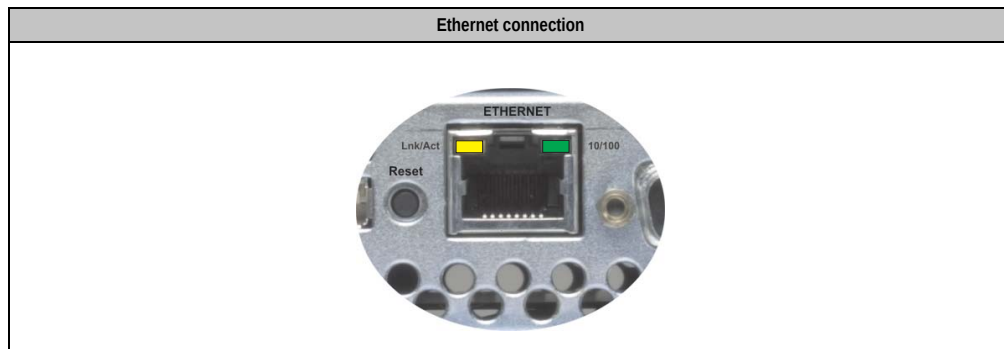


Figure 7: Ethernet connection

Ethernet	10/100 MBit/s ¹⁾
Connection	RJ45 twisted pair (10BaseT/100BaseT)
Controller	MacPhyter DP83815 or DP83816 - depends on the revision
Cabling	S/STP (category 5)

Table 13: Ethernet controller

1) Both operating modes are possible. Switching takes place automatically.

The onboard Ethernet controller for Power Panel devices provides an RJ45 twisted pair connection where 2 LEDs are attached for status checking:

LED	On	Off
Green	100 MBit/s	10 MBit/s
Yellow	Link	Activity (blinking)

Table 14: Status LEDs - Ethernet controller

2.1.8 Reset button

The reset button can be accessed through a small hole between the USB and the Ethernet connection. In order to avoid accidental activation, a reset can only be triggered with a pointed object.

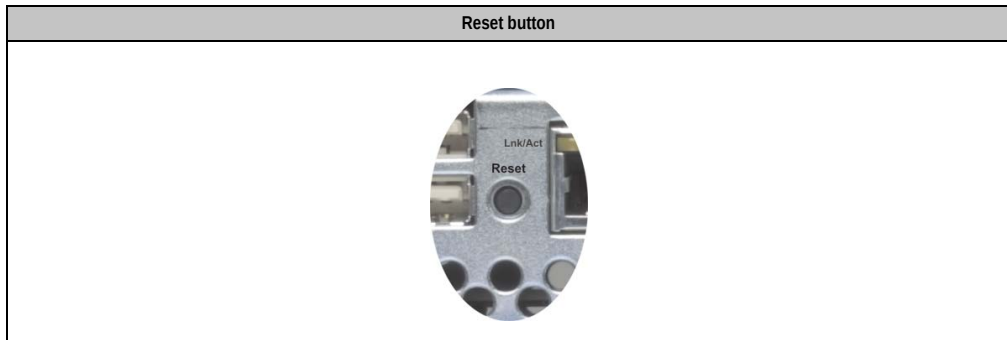


Figure 8: Reset button

2.1.9 CompactFlash slot

Power Panel devices are equipped with a CompactFlash slot that is accessible from the side. CompactFlash cards of type I are supported.



Figure 9: CompactFlash slot

It is possible to protect the CompactFlash slot using a safety clip. By pressing the ejector (using a pointed object is the best way to do this) the CompactFlash card can be changed quickly and safely.

Caution!

Changing the CompactFlash card can only take place without power applied! As a safety measure, a sticker is also attached to Power Panel devices stating this.

2.2 Labels

2.2.1 Safety sticker

A safety sticker attached over the CompactFlash slot advises that the power to the Power Panel device must be switched off when inserting or removing a CompactFlash card.



Figure 10: Safety sticker

2.2.2 Device label

The following label is attached to a suitable location on the Power Panel and displays short definitions for all of the interfaces:

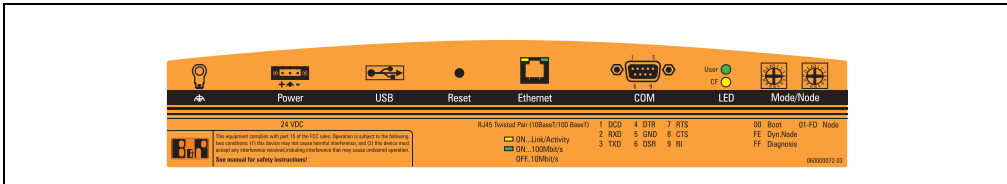


Figure 11: Device label

2.2.3 Serial number sticker

General information

Each B&R device is given a unique serial number sticker with a barcode that allows the device to be clearly identified.

Design/Dimensions

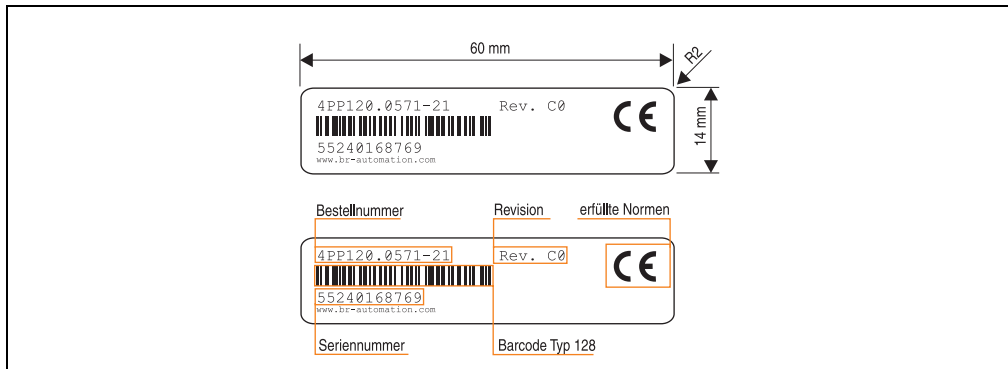


Figure 12: Serial number sticker design/dimensions

This page is only used as a place holder.

2.3 Device 4PP120.0571-01



Figure 13: Front view - 4PP120.0571-01

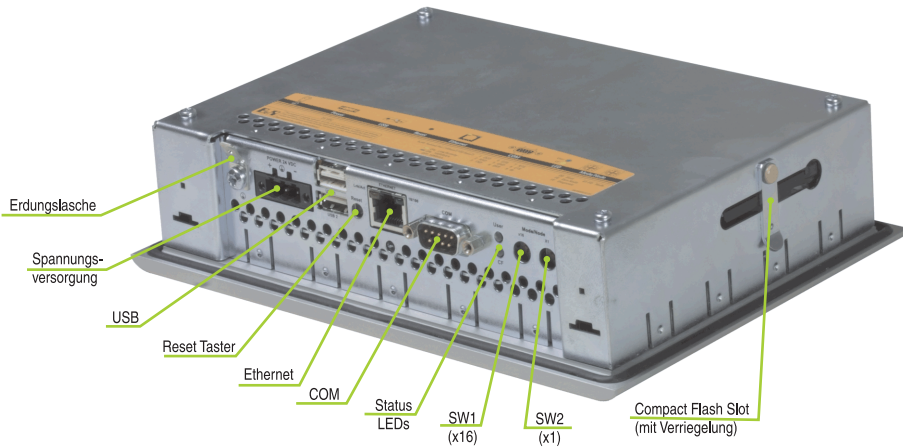


Figure 14: Rear view - 4PP120.0571-01

2.3.1 Technical data

Features	4PP120.0571-01
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB (rev. < H0: 16 MB) SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 2 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Hold-up time	-
Real-time clock Battery-buffered Precision	- 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	-
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 (rev. < D0 DP83615) 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 15: Technical data - 4PP120.0571-01

Technical data • Power Panel 100 with Automation Runtime

Features	4PP120.0571-01
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots	-
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	LCD 5.7 in (144 mm) 8 shades of gray QVGA, 320 x 240 pixels 25:1 80° / 80° 140 cd/m ² 50000 hours
Touch screen Technology Controller Degree of transmission	Analog, resistive (Gunze) Hampshire, serial, 12-bit 84 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	-
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 10 W typical, 15 W max. -
Ground resistance	0 Ohm

Table 15: Technical data - 4PP120.0571-01 (Forts.)

Mechanical characteristics	4PP120.0571-01
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	212 mm
Height	156 mm
Depth	55.5 mm
Weight	Approx. 1.4 kg
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 70 °C
Transportation	-20 .. 70 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s ² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s ² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s ² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s ² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s ² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s ² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s ² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 15: Technical data - 4PP120.0571-01 (Forts.)

2.3.2 Dimensions

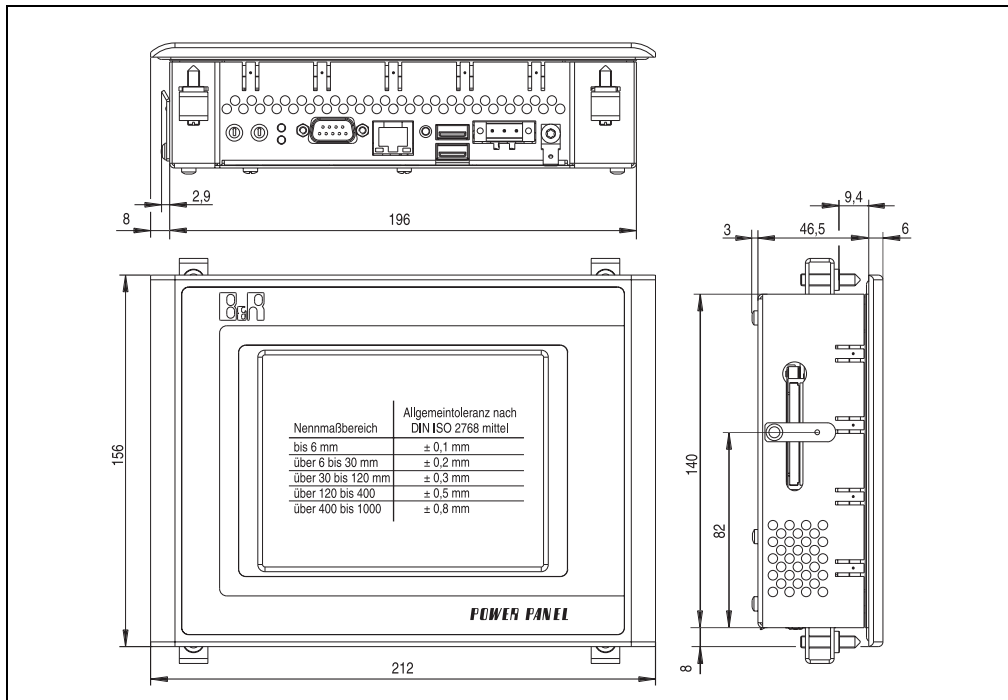


Figure 15: Dimensions - 4PP120.0571-01

2.3.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 15 "Dimensions - 4PP120.0571-01" on page 50) For further information regarding mounting, see section 3 "Installation" on page 421.

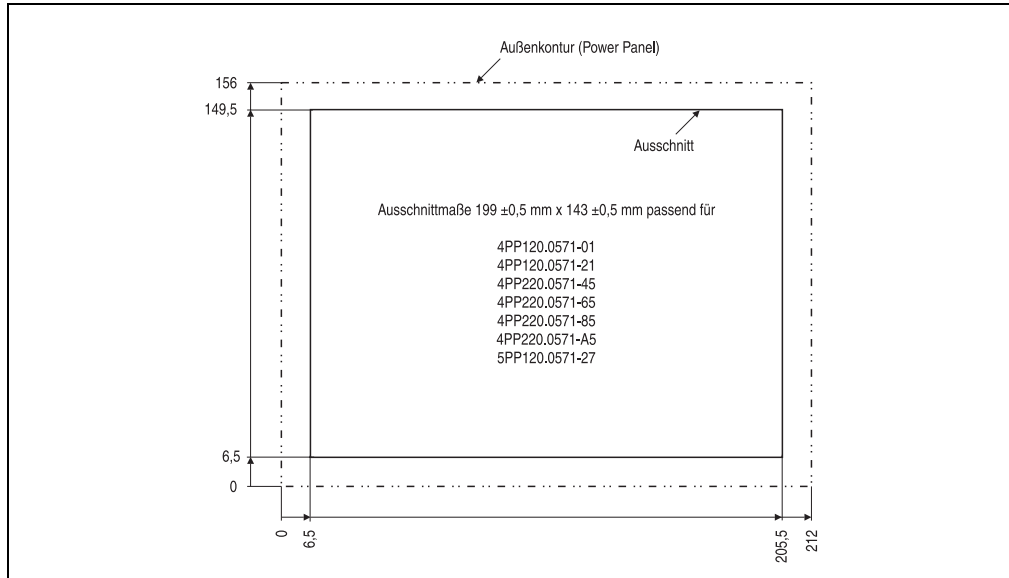


Figure 16: Cutout dimensions

2.3.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 120 LCD B/W QVGA 5.7in T MH
4	Retaining clips included

Table 16: Contents of delivery - 4PP120.0571-01

2.4 Device 4PP120.0571-21



Figure 17: Front view - 4PP120.0571-21

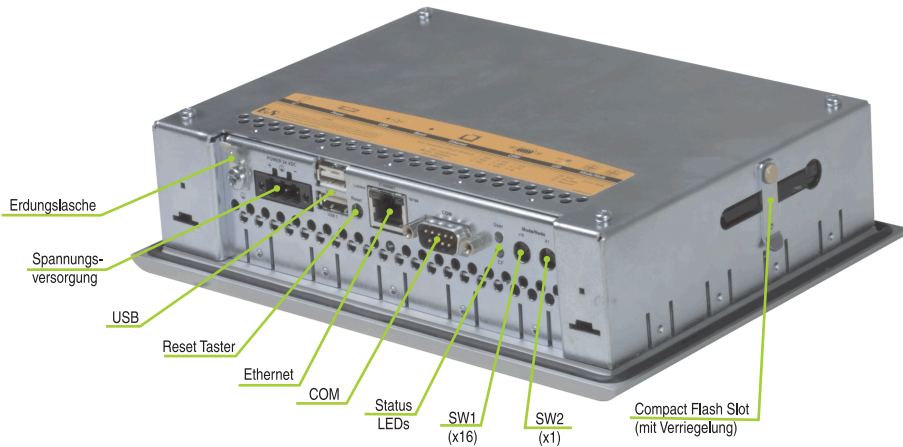


Figure 18: Rear view - 4PP120.0571-21

2.4.1 Technical data

Features	4PP120.0571-21
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB (rev. < H0: 16 MB) SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 2 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Hold-up time	-
Real-time clock Battery-buffered Precision	- 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	-
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 (rev. < D0 DP83615) 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 17: Technical data - 4PP120.0571-21

Technical data • Power Panel 100 with Automation Runtime

Features	4PP120.0571-21
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	LCD 5.7 in (144 mm) 256 colors QVGA, 320 x 240 pixels 40:1 80° / 90° 150 cd/m ² 50000 hours
Touch screen Technology Controller Degree of transmission	Analog, resistive (Gunze) Hampshire, serial, 12-bit 84 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	-
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 10 W typical, 15 W max. -
Ground resistance	0 Ohm

Table 17: Technical data - 4PP120.0571-21 (Forts.)

Mechanical characteristics	4PP120.0571-21
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	212 mm
Height	156 mm
Depth	55.5 mm
Weight	Approx. 1.4 kg
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 60 °C
Transportation	-20 .. 60 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s ² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s ² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s ² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s ² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s ² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s ² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s ² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 17: Technical data - 4PP120.0571-21 (Forts.)

2.4.2 Dimensions

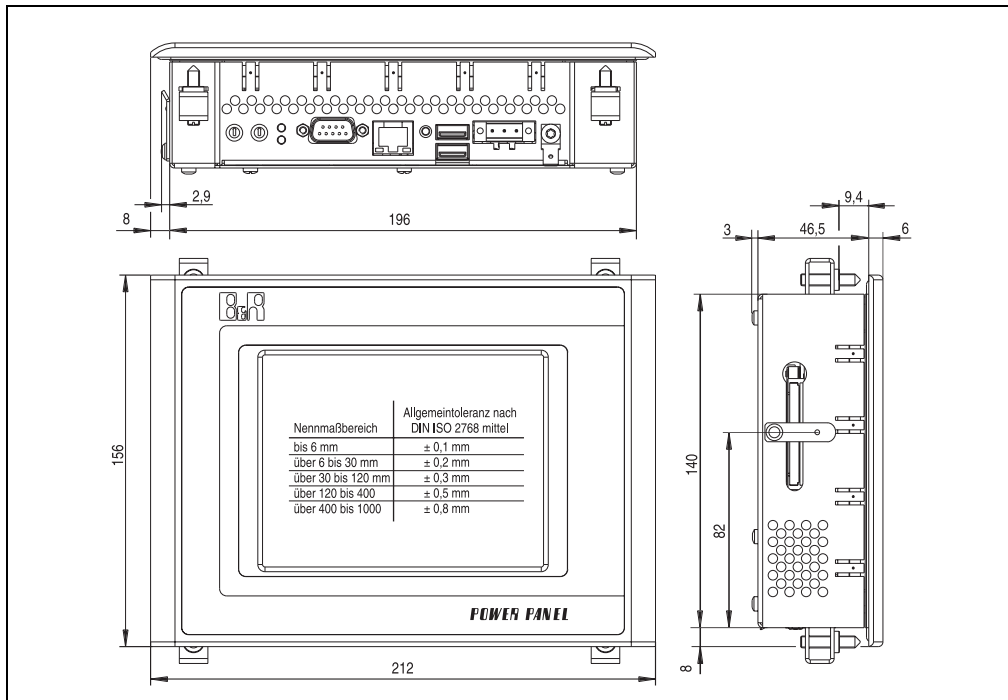


Figure 19: Dimensions - 4PP120.0571-21

2.4.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 19 "Dimensions - 4PP120.0571-21" on page 56) For further information regarding mounting, see section 3 "Installation" on page 421.

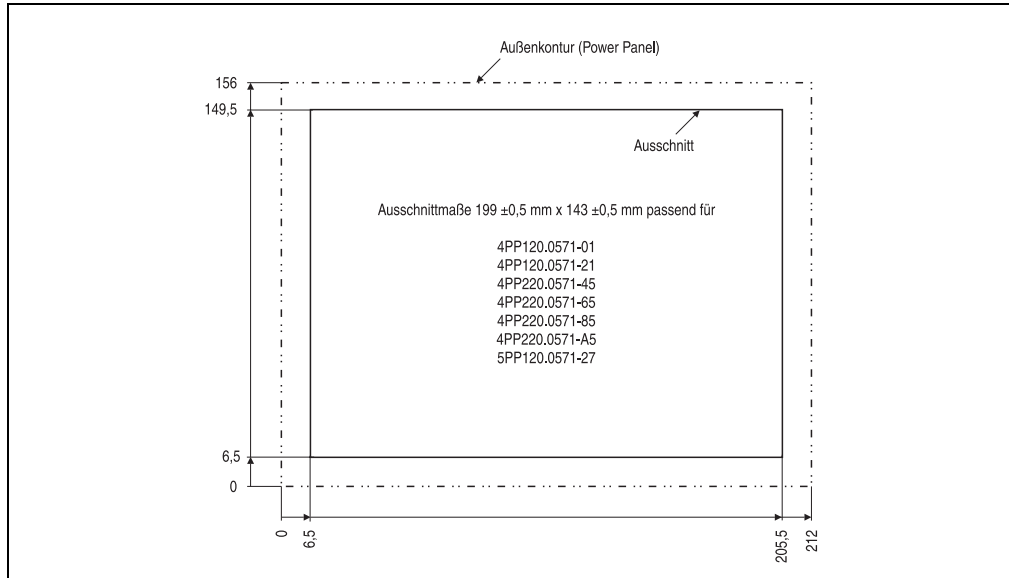


Figure 20: Cutout dimensions

2.4.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 120 LCD C QVGA 5.7in T MH
4	Retaining clips included

Table 18: Contents of delivery - 4PP120.0571-21

2.5 Device 4PP120.1043-31

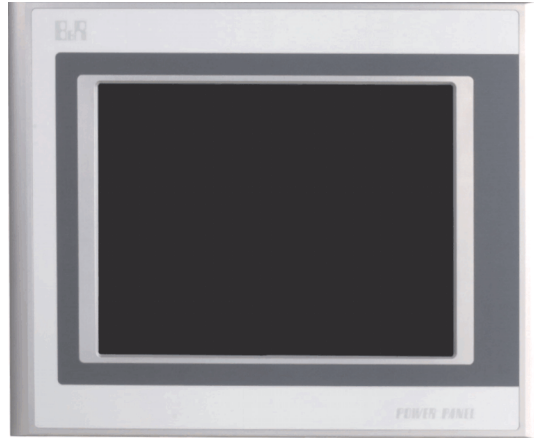


Figure 21: Front view - 4PP120.1043-31

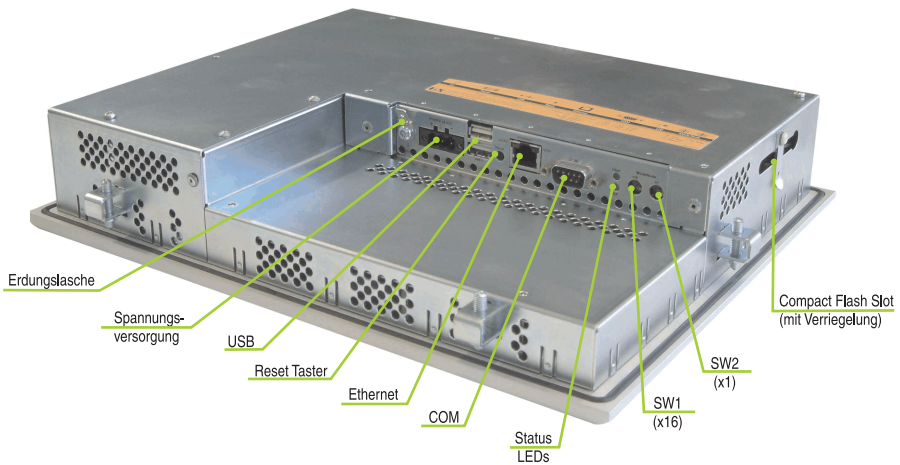


Figure 22: Rear view - 4PP120.1043-31

2.5.1 Technical data

Features	4PP120.1043-31
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 kByte - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB (rev. < H0: 16 MB) SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 2 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Hold-up time	-
Real-time clock Battery-buffered Precision	- 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	-
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 (rev. < C7 DP83615) 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 19: Technical data - 4PP120.1043-31

Technical data • Power Panel 100 with Automation Runtime

Features	4PP120.1043-31
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 70° / 55° 350 cd/m ² 55000 hours
Touch screen Technology Controller Degree of transmission	Analog, resistive, Elo (rev. < I0: 3M) Hampshire, serial, 12-bit 78 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	-
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. -
Ground resistance	≤ 24 kOhm

Table 19: Technical data - 4PP120.1043-31 (Forts.)

Mechanical characteristics	4PP120.1043-31
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	323 mm
Height	260 mm
Depth	65.5 mm
Weight	Approx. 3.7 kg
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 70 °C
Transportation	-20 .. 70 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s ² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s ² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s ² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s ² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s ² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s ² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s ² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 19: Technical data - 4PP120.1043-31 (Forts.)

2.5.2 Dimensions

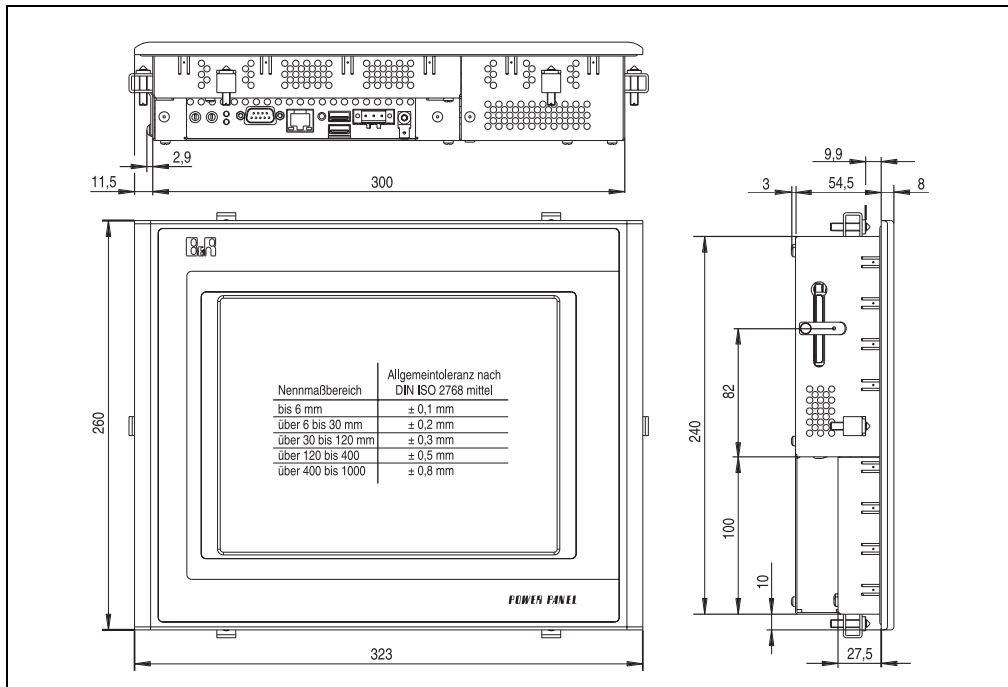


Figure 23: Dimensions - 4PP120.1043-31

2.5.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 23 "Dimensions - 4PP120.1043-31" on page 62) For further information regarding mounting, see section 3 "Installation" on page 421.

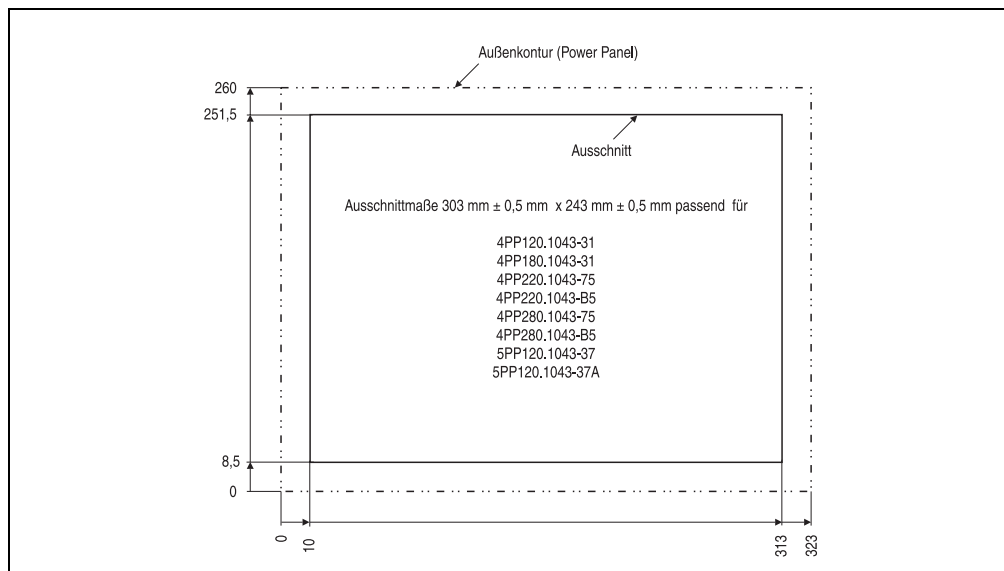


Figure 24: Cutout dimensions

2.5.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 120 TFT C VGA 10.4" T MH
6	Retaining clips included

Table 20: Contents of delivery - 4PP120.1043-31

2.6 Device 4PP120.1505-31



Figure 25: Front view - 4PP120.1505-31

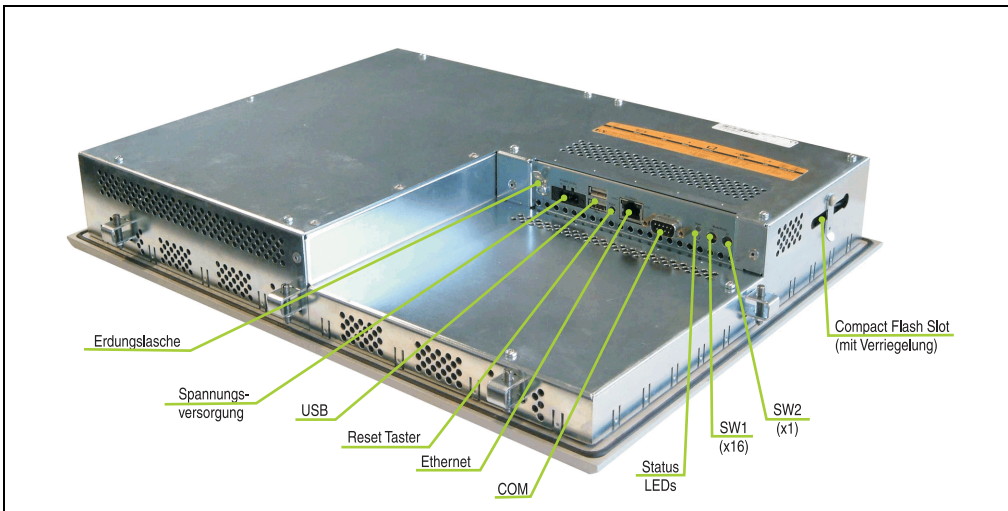


Figure 26: Rear view - 4PP120.1505-31

2.6.1 Technical data

Features	4PP120.1505-31
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB (rev. < K0: 16 MB) SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 2 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Hold-up time	-
Real-time clock Battery-buffered Precision	- 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	-
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 (rev. < E0 DP83615) 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 21: Technical data - 4PP120.1505-31

Technical data • Power Panel 100 with Automation Runtime

Features	4PP120.1505-31
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 15 inch (380 mm) 256 colors XGA, 1024 x 768 pixels 300:1 140° / 115° 330 cd/m ² 35000 hours
Touch screen Technology Controller Degree of transmission	Analog, resistive, Elo (rev. < L0: 3M) Hampshire, serial, 12-bit 78 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	-
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 30 W typical, 35 W max. Yes
Ground resistance	≤ 24 kOhm

Table 21: Technical data - 4PP120.1505-31 (Forts.)

Mechanical characteristics	4PP120.1505-31
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	435 mm
Height	330 mm
Depth	71.5 mm
Weight	Approx. 6.3 kg
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 60 °C
Transportation	-20 .. 60 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s ² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s ² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s ² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s ² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s ² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s ² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s ² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 21: Technical data - 4PP120.1505-31 (Forts.)

2.6.2 Dimensions

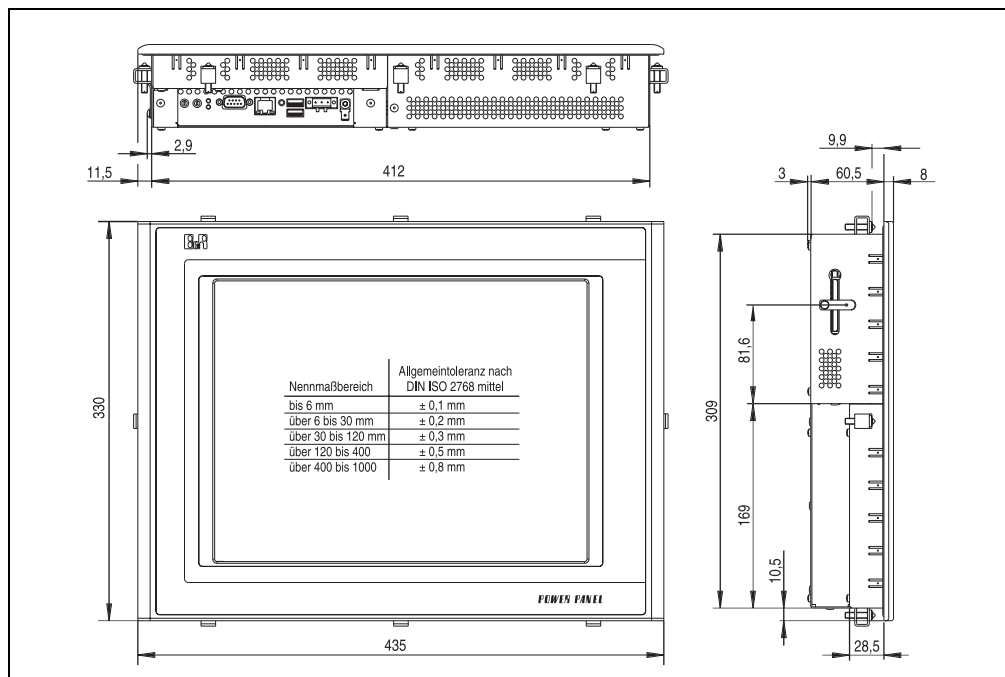


Figure 27: Dimensions - 4PP120.1505-31

2.6.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 27 "Dimensions - 4PP120.1505-31" on page 68) For further information regarding mounting, see section 3 "Installation" on page 421.

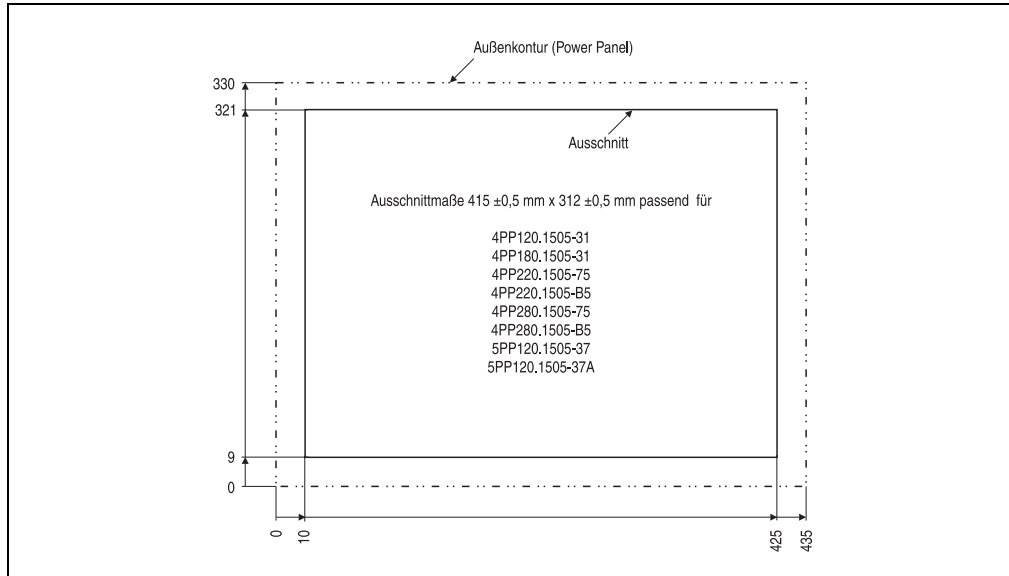


Figure 28: Cutout dimensions

2.6.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 120 TFT C XGA 15" T MH
8	Retaining clips included

Table 22: Contents of delivery - 4PP120.1505-31

2.7 Device 4PP151.0571-01

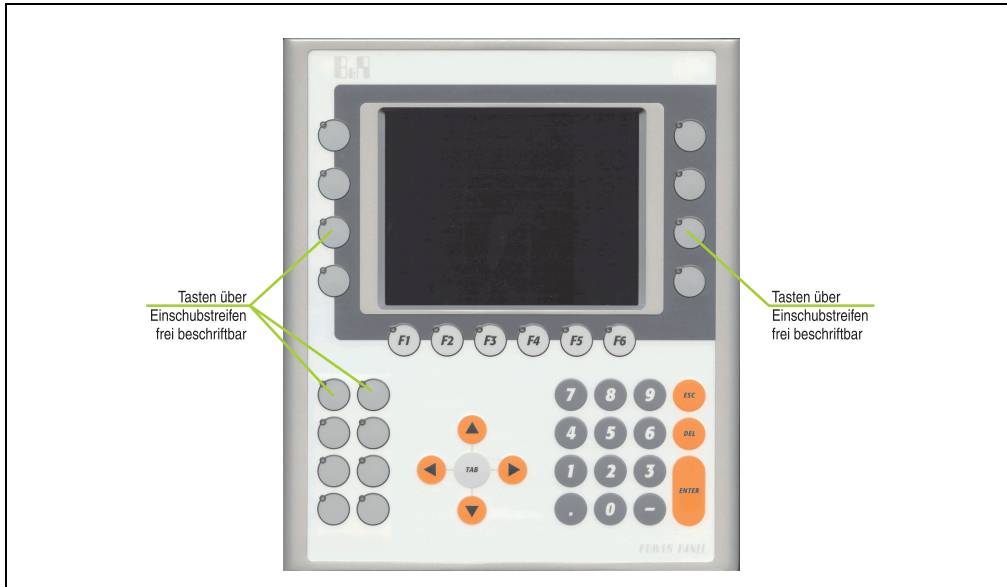


Figure 29: Front view - 4PP151.0571-01

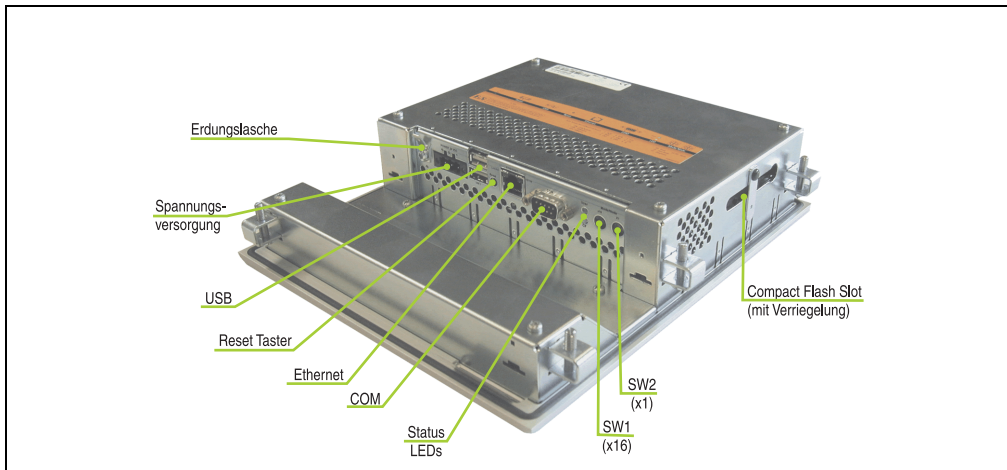


Figure 30: Rear view - 4PP151.0571-01

2.7.1 Technical data

Features	4PP151.0571-01
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB (rev. < E0: 16 MB) SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 2 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Hold-up time	-
Real-time clock Battery-buffered Precision	- 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	-
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 23: Technical data - 4PP151.0571-01

Technical data • Power Panel 100 with Automation Runtime

Features	4PP151.0571-01
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	LCD 5.7 in (144 mm) 8 shades of gray QVGA, 320 x 240 pixels 25:1 80° / 80° 140 cd/m ² 50000 hours
Touch screen Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys/LED Key lifespan Function keys Soft keys Cursor pad Number block Other keys	> 1000000 actions at 1 ±0.3 to 3 ±0.3 N force 16 with LED 6 with LED - 15 without LED 5 without LED
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 13 W typical, 18 W max. -
Ground resistance	0 Ohm

Table 23: Technical data - 4PP151.0571-01 (Forts.)

Mechanical characteristics	4PP151.0571-01
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Orange keys	Similar to Pantone 151CV
Dark gray keys	Similar to Pantone 431CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	212 mm
Height	245 mm
Depth	55.5 mm
Weight	Approx. 2 kg
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 70 °C
Transportation	-20 .. 70 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3000 m

Table 23: Technical data - 4PP151.0571-01 (Forts.)

2.7.2 Dimensions

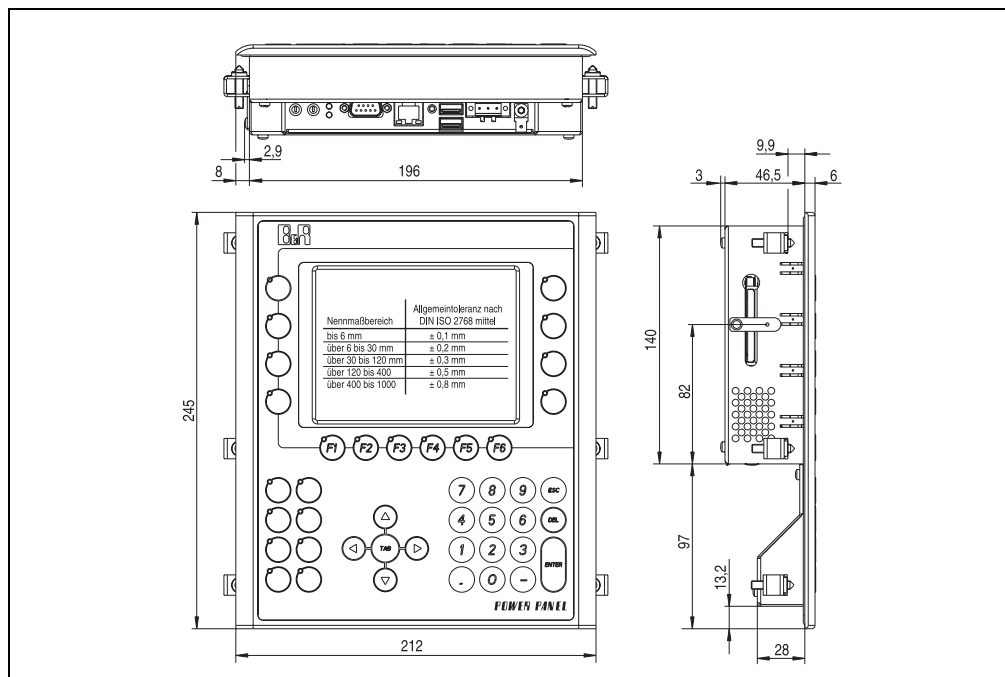


Figure 31: Dimensions - 4PP151.0571-01

2.7.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 31 "Dimensions - 4PP151.0571-01" on page 74) For further information regarding mounting, see section 3 "Installation" on page 421.

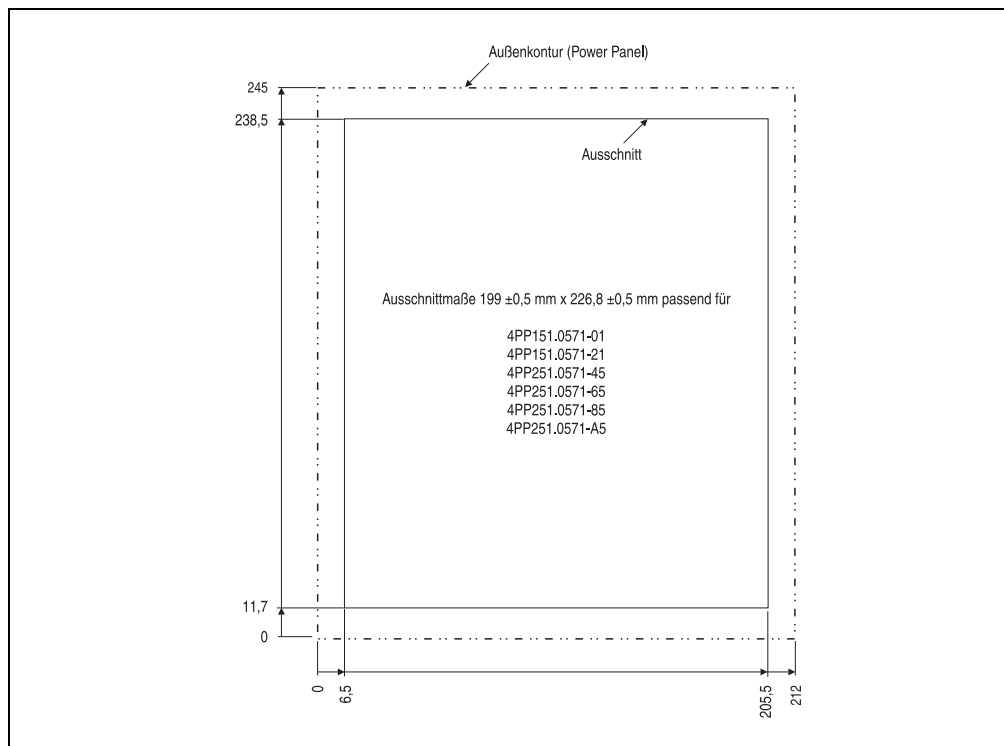


Figure 32: Cutout dimensions

2.7.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 151 LCD B/W QVGA 5.7" F MH
6	Retaining clips included
4	Legend strips (inserted in the front)

Table 24: Contents of delivery - 4PP151.0571-01

2.8 Device 4PP151.0571-21

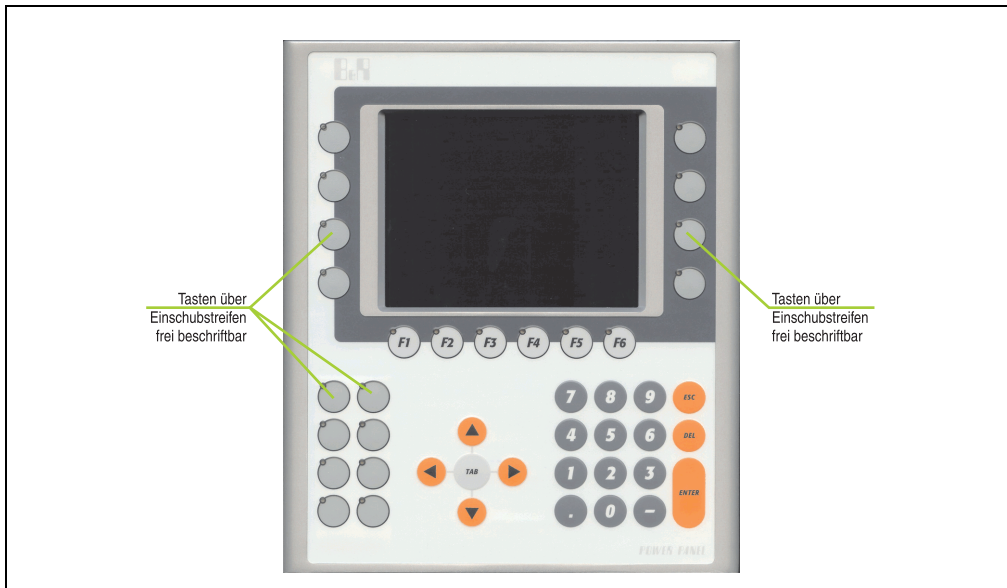


Figure 33: Front view - 4PP151.0571-21

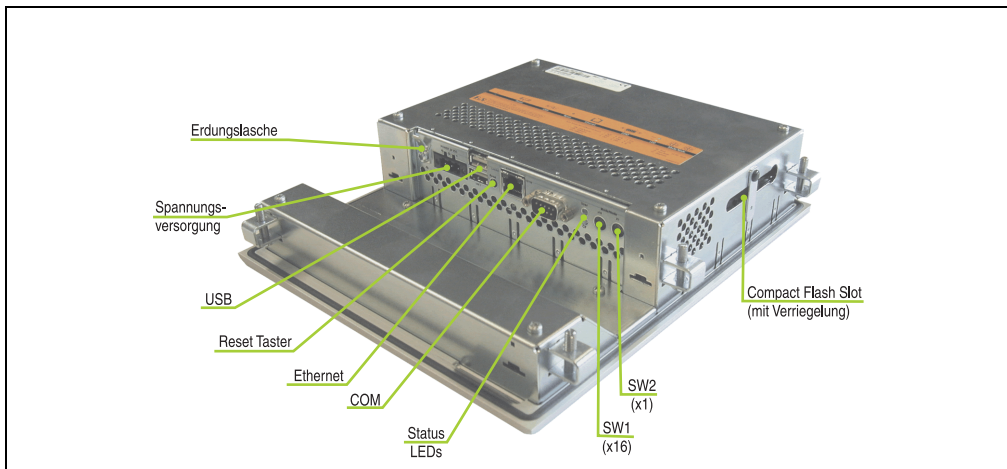


Figure 34: Rear view - 4PP151.0571-21

2.8.1 Technical data

Features	4PP151.0571-21
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB (rev. < E0: 16 MB) SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 2 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Hold-up time	-
Real-time clock Battery-buffered Precision	- 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	-
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 25: Technical data - 4PP151.0571-21

Technical data • Power Panel 100 with Automation Runtime

Features	4PP151.0571-21
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	LCD 5.7 in (144 mm) 256 colors QVGA, 320 x 240 pixels 40:1 80° / 90° 150 cd/m ² 50000 hours
Touch screen Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Function keys Soft keys Cursor pad Number block Other keys	16 with LED 6 with LED - 15 without LED 5 without LED
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 13 W typical, 18 W max. -
Ground resistance	0 Ohm

Table 25: Technical data - 4PP151.0571-21 (Forts.)

Mechanical characteristics	4PP151.0571-21
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Orange keys	Similar to Pantone 151CV
Dark gray keys	Similar to Pantone 431CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	212 mm
Height	245 mm
Depth	55.5 mm
Weight	Approx. 2 kg
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 60 °C
Transportation	-20 .. 60 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3000 m

Table 25: Technical data - 4PP151.0571-21 (Forts.)

2.8.2 Dimensions

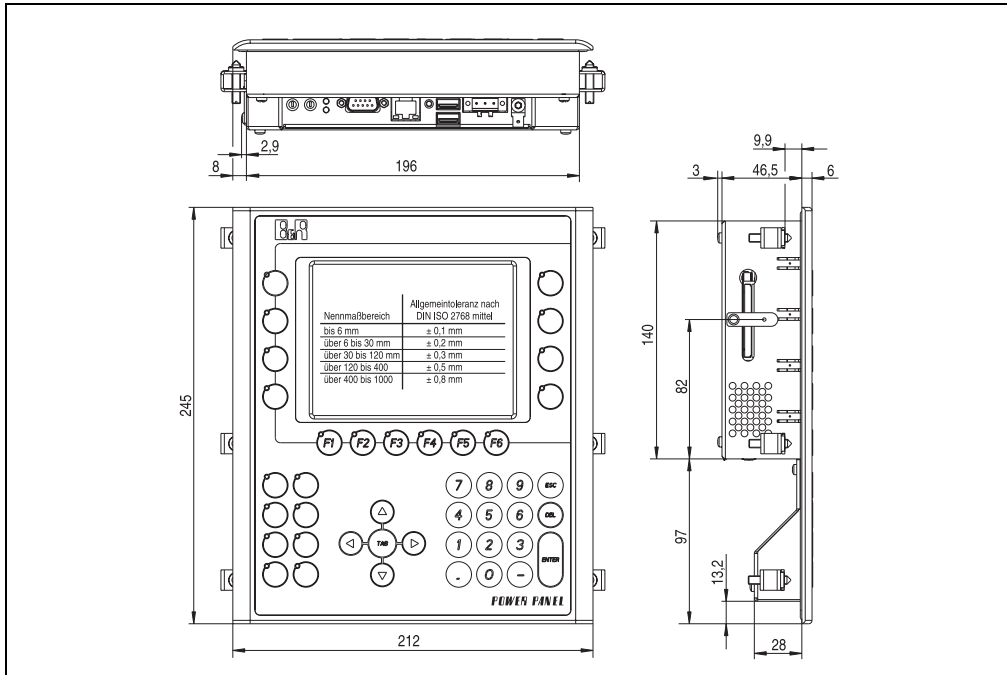


Figure 35: Dimensions - 4PP151.0571-21

2.8.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 35 "Dimensions - 4PP151.0571-21" on page 80) For further information regarding mounting, see section 3 "Installation" on page 421.

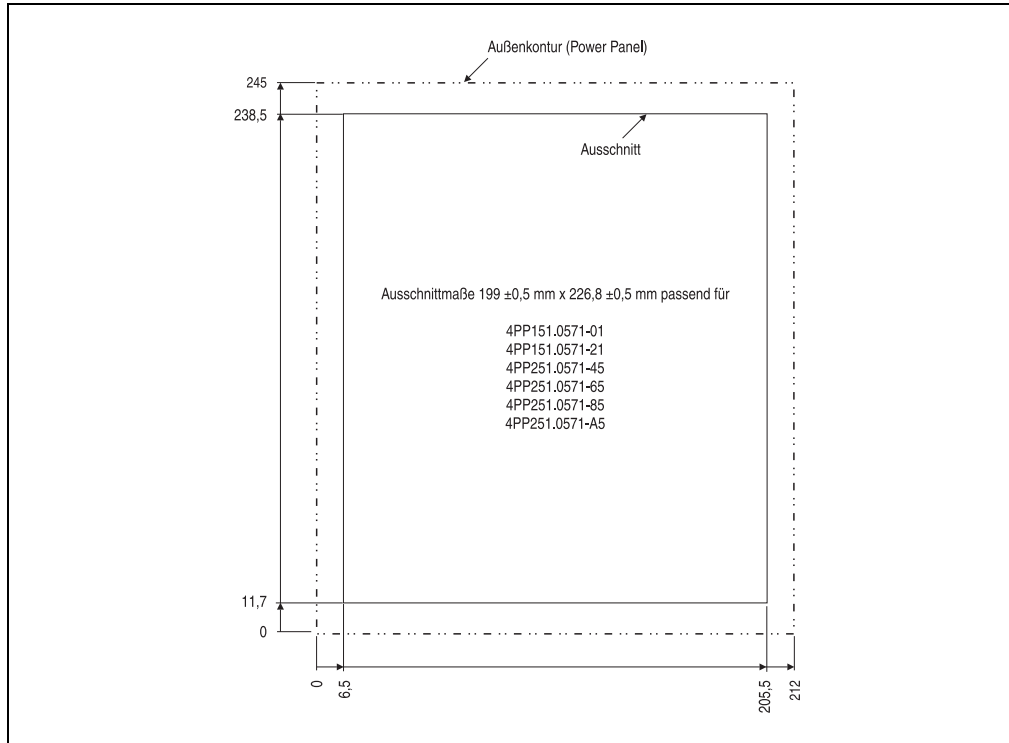


Figure 36: Cutout dimensions

2.8.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 120 LCD C QVGA 5.7in T MH
6	Retaining clips included
4	Insert strips (inserted in the front)

Table 26: Contents of delivery - 4PP151.0571-21

2.9 Device 4PP151.1043-31

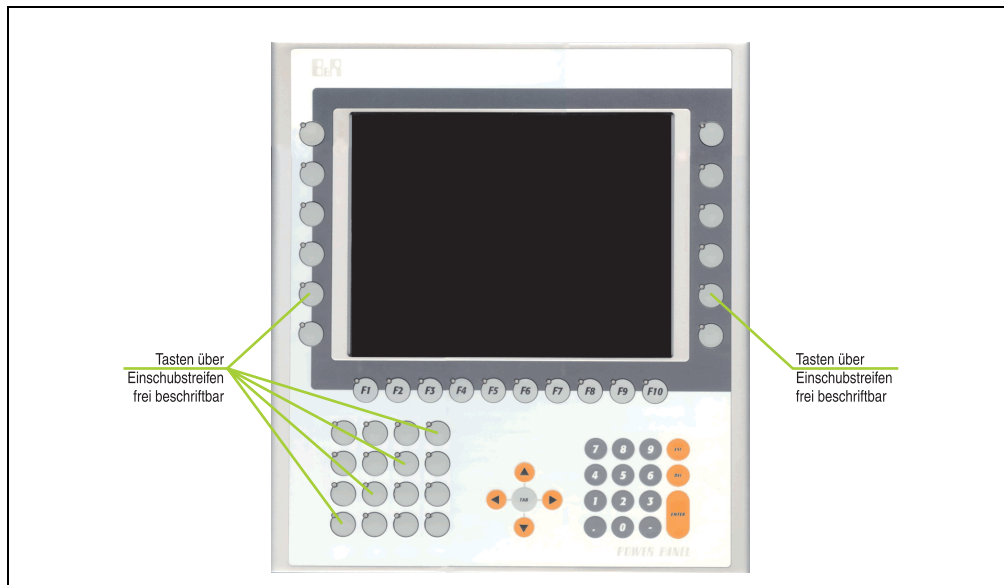


Figure 37: Front view - 4PP151.1043-31

TBD

Figure 38: Rear view - 4PP151.1043-31

2.9.1 Technical data

Features	4PP151.1043-31
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 2 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Hold-up time	-
Real-time clock Battery-buffered Precision	- 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	-
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 27: Technical data - 4PP120.1043-31

Technical data • Power Panel 100 with Automation Runtime

Features	4PP151.1043-31
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 70° / 55° 350 cd/m ² 55000 hours
Touch screen Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Function keys Soft keys Cursor pad Number block Other keys	28 with LED 10 with LED - 15 without LED 5 without LED
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 18 W typical, 23 W max. -
Ground resistance	≤ 24 kOhm

Table 27: Technical data - 4PP120.1043-31 (Forts.)

Mechanical characteristics	4PP151.1043-31
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Orange keys	Similar to Pantone 151CV
Dark gray keys	Similar to Pantone 431CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	323 mm
Height	358 mm
Depth	65.5 mm
Weight	Approx. 4.6 kg
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 70 °C
Transportation	-20 .. 70 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 27: Technical data - 4PP120.1043-31 (Forts.)

2.9.2 Dimensions

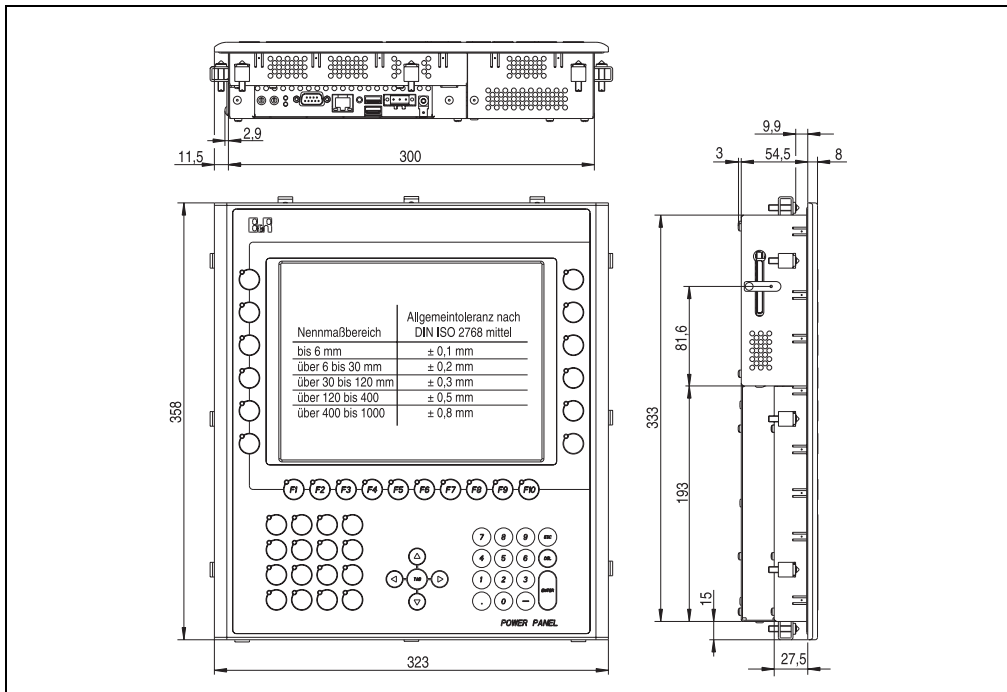


Figure 39: Dimensions - 4PP151.1043-31

2.9.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 39 "Dimensions - 4PP151.1043-31" on page 86) For further information regarding mounting, see section 3 "Installation" on page 421.

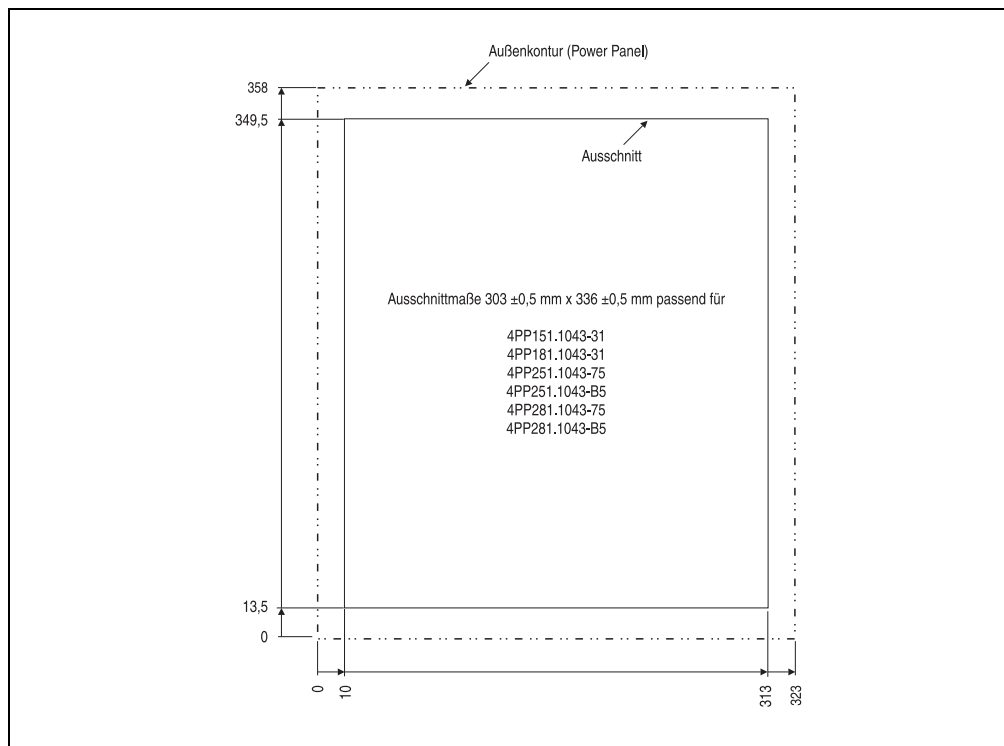


Figure 40: Cutout dimensions

2.9.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 151 TFT C VGA 10.4" F MH
12	Retaining clips included
6	Insert strips (inserted in the front)

Table 28: Contents of delivery - 4PP151.1043-31

2.10 Device 4PP151.1505-31

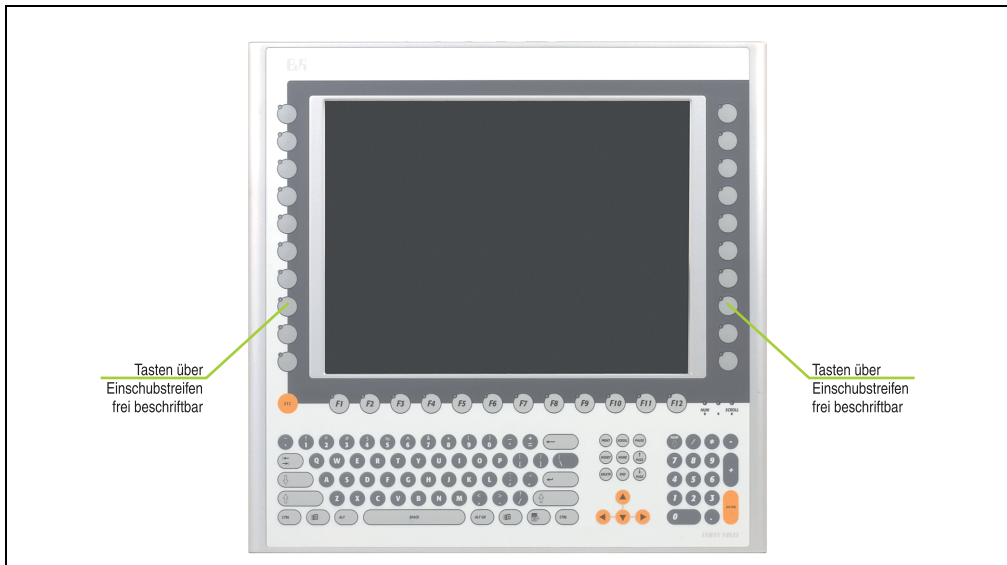


Figure 41: Front view - 4PP151.1505-31

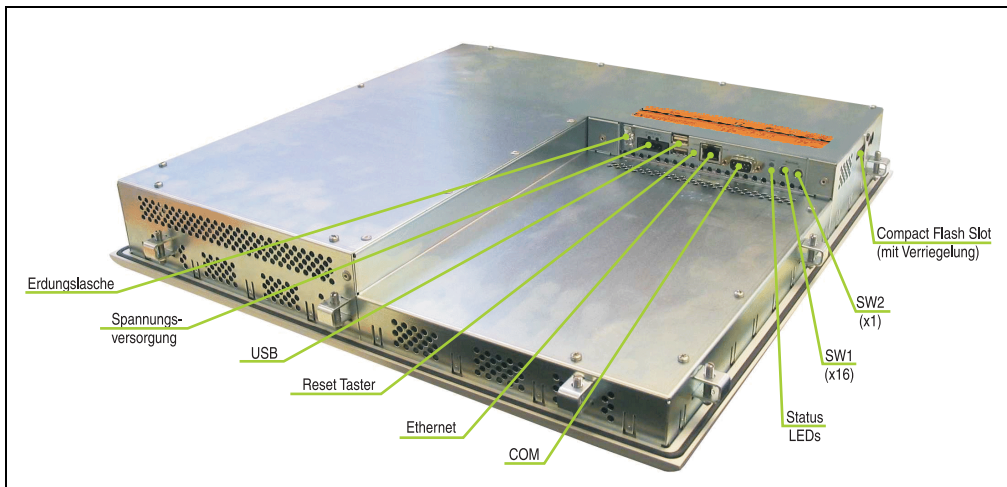


Figure 42: Rear view - 4PP151.1505-31

2.10.1 Technical data

Features	4PP151.1505-31
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 2 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Hold-up time	-
Real-time clock Battery-buffered Precision	- 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	-
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 29: Technical data - 4PP151.1505-31

Technical data • Power Panel 100 with Automation Runtime

Features	4PP151.1505-31
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 15 inch (380 mm) 256 colors XGA, 1024 x 768 pixels 300:1 140° / 115° 330 cd/m² 35000 hours
Touch screen Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Function keys Soft keys Cursor pad Number block Other keys	20 with LED 12 with LED - 15 without LED 77 without LED
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 33 W typical, 38 W max. Yes
Ground resistance	≤ 24 kOhm

Table 29: Technical data - 4PP151.1505-31 (Forts.)

Mechanical characteristics	4PP151.1505-31
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Orange keys	Similar to Pantone 151CV
Dark gray keys	Similar to Pantone 431CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	435 mm
Height	430 mm
Depth	71.5 mm
Weight	Approx. 7.6 kg
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 60 °C
Transportation	-20 .. 60 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 29: Technical data - 4PP151.1505-31 (Forts.)

2.10.2 Dimensions

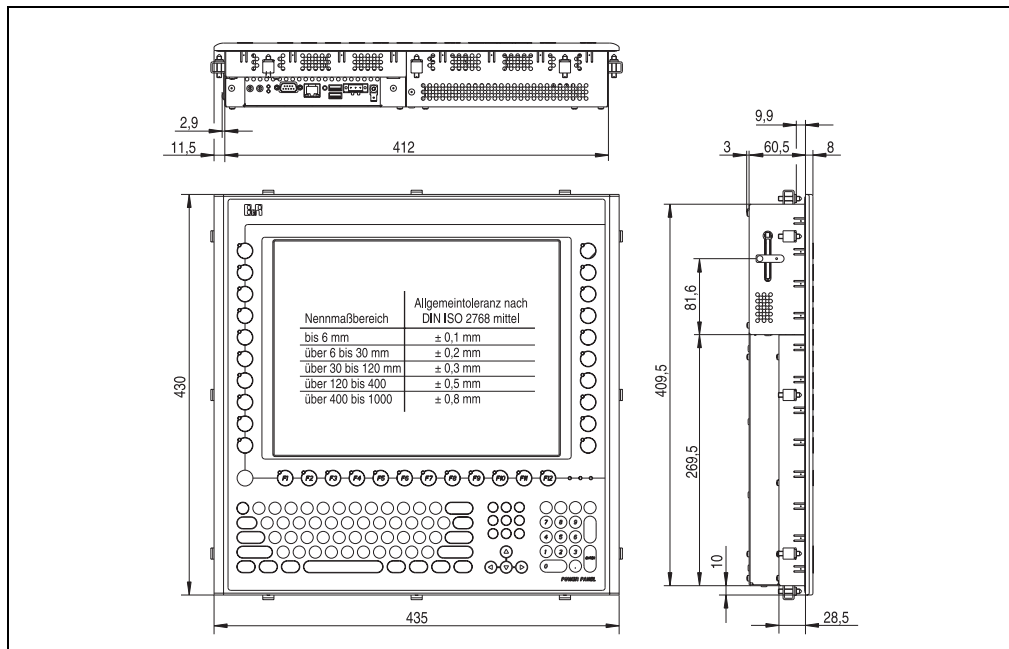


Figure 43: Dimensions - 4PP151.1505-31

2.10.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 43 "Dimensions - 4PP151.1505-31" on page 92) For further information regarding mounting, see section 3 "Installation" on page 421.

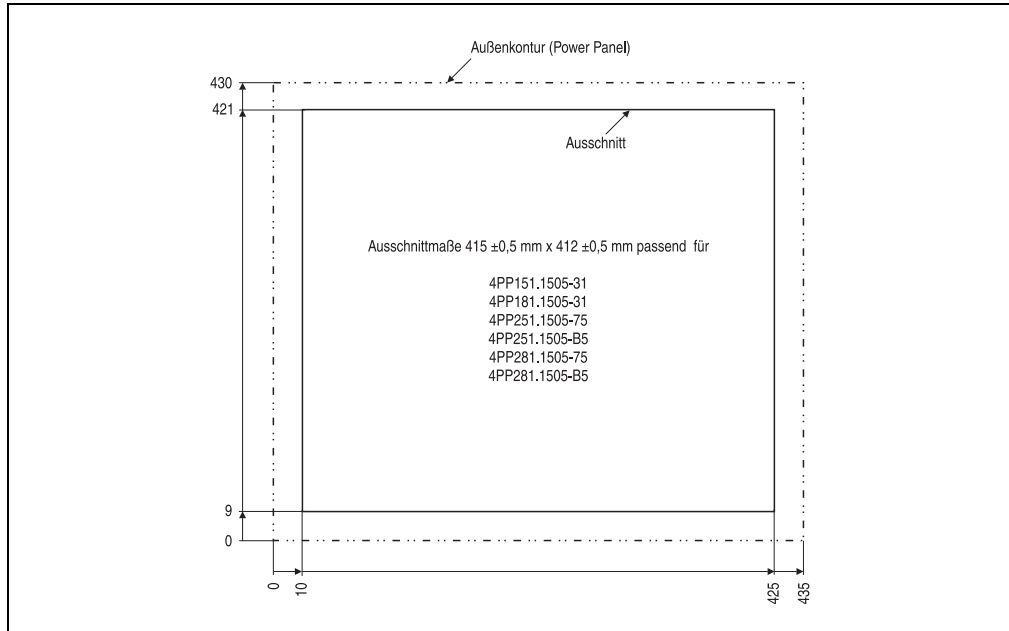


Figure 44: Cutout dimensions

2.10.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 151 TFT C XGA 15" F MH
12	Retaining clips included
2	Insert strips (inserted in the front)

Table 30: Contents of delivery - 4PP151.1505-31

2.11 Device 4PP152.0571-01

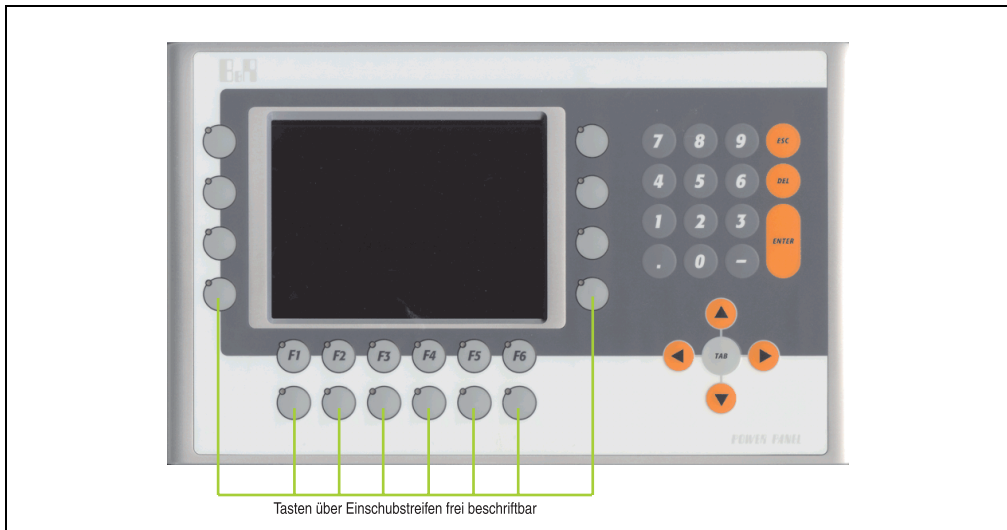


Figure 45: Front view - 4PP152.0571-01

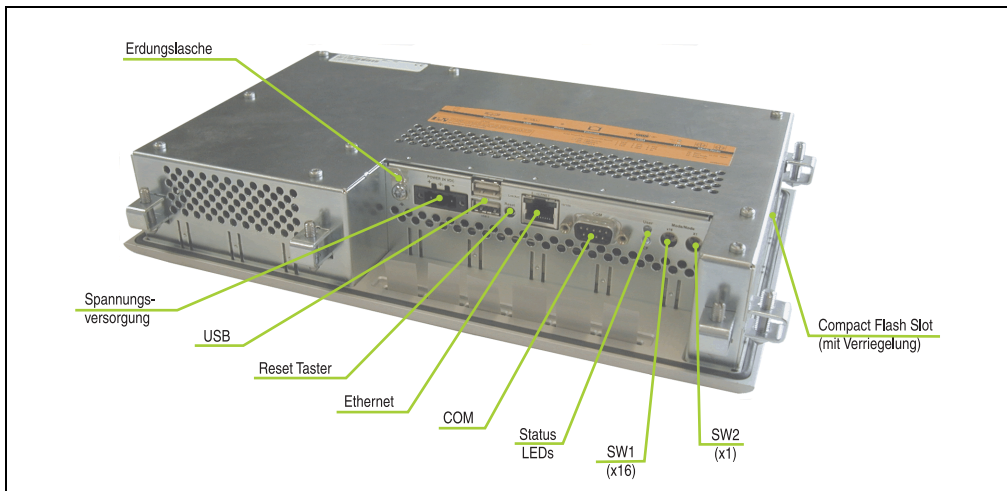


Figure 46: Rear view - 4PP152.0571-01

2.11.1 Technical data

Features	4PP152.0571-01
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB (rev. < D0: 16 MB) SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 2 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Hold-up time	-
Real-time clock Battery-buffered Precision	- 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	-
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 31: Technical data - 4PP152.0571-01

Technical data • Power Panel 100 with Automation Runtime

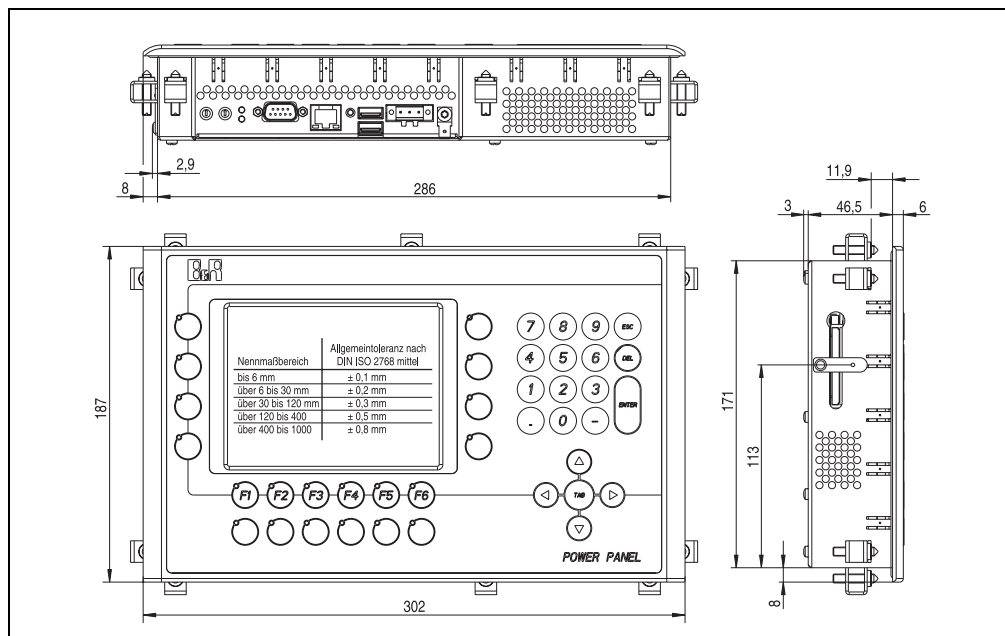
Features	4PP152.0571-01
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	LCD 5.7 in (144 mm) 8 shades of gray QVGA, 320 x 240 pixels 25:1 80° / 80° 140 cd/m ² 50000 hours
Touch screen Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Function keys Soft keys Cursor pad Number block Other keys	20 with LED - - 15 without LED 5 without LED
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 13 W typical, 18 W max. -
Ground resistance	0 Ohm

Table 31: Technical data - 4PP152.0571-01 (Forts.)

Mechanical characteristics	4PP152.0571-01
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Orange keys	Similar to Pantone 151CV
Dark gray keys	Similar to Pantone 431CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	302 mm
Height	187 mm
Depth	55.5 mm
Weight	Approx. 2.2 kg
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 70 °C
Transportation	-20 .. 70 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 31: Technical data - 4PP152.0571-01 (Forts.)

2.11.2 Dimensions



2.11.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 47 "Dimensions - 4PP152.0571-01" on page 98) For further information regarding mounting, see section 3 "Installation" on page 421.

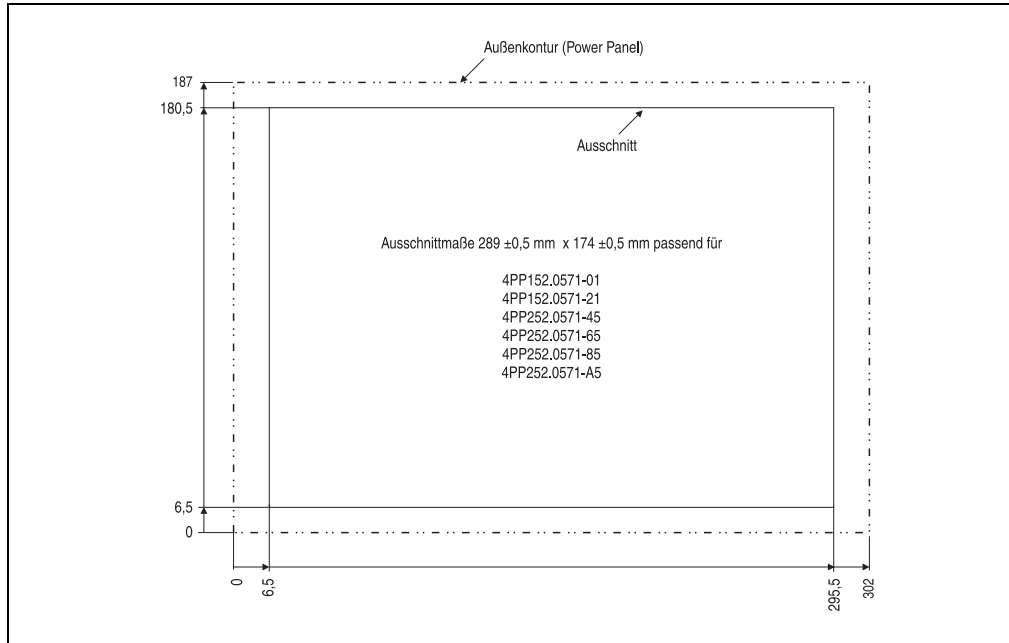


Figure 48: Cutout dimensions

2.11.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 152 LCD B/W QVGA 5.7" F MH
10	Retaining clips included
8	Insert strips (inserted in the front)

Table 32: Contents of delivery - 4PP152.0571-01

2.12 Device 4PP152.0571-21

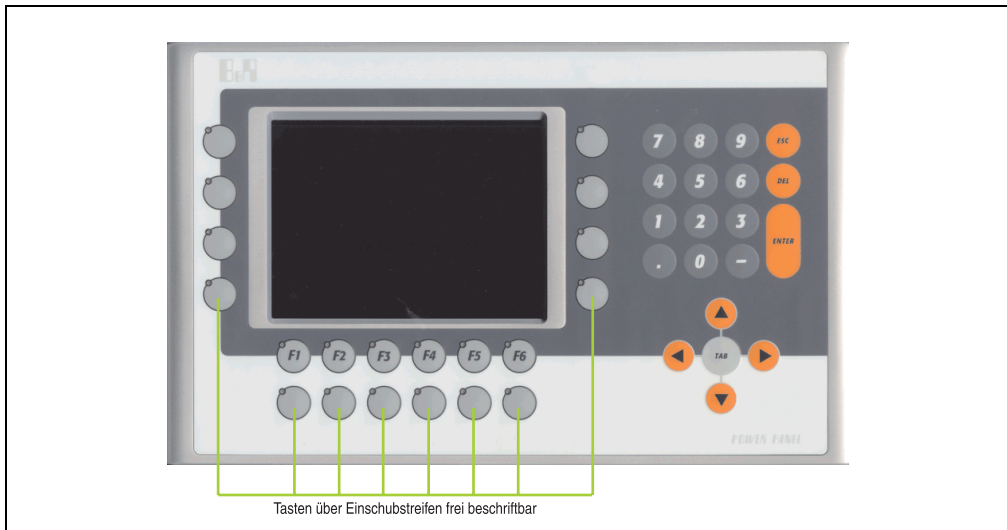


Figure 49: Front view - 4PP152.0571-21

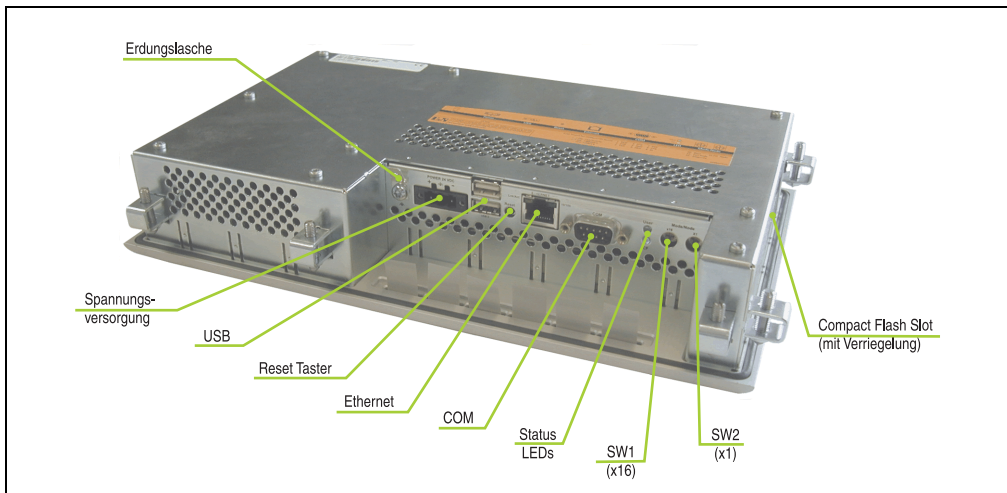


Figure 50: Rear view - 4PP152.0571-21

2.12.1 Technical data

Features	4PP152.0571-21
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB (rev. < F0: 16 MB) SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 2 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Hold-up time	-
Real-time clock Battery-buffered Precision	- 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	-
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 33: Technical data - 4PP152.0571-21

Technical data • Power Panel 100 with Automation Runtime

Features	4PP152.0571-21
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	LCD 5.7 in (144 mm) 256 colors QVGA, 320 x 240 pixels 40:1 80° / 90° 150 cd/m ² 50000 hours
Touch screen Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Function keys Soft keys Cursor pad Number block Other keys	20 with LED - - 15 without LED 5 without LED
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 13 W typical, 18 W max. -
Ground resistance	0 Ohm

Table 33: Technical data - 4PP152.0571-21 (Forts.)

Mechanical characteristics	4PP152.0571-21
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Orange keys	Similar to Pantone 151CV
Dark gray keys	Similar to Pantone 431CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	302 mm
Height	187 mm
Depth	55.5 mm
Weight	Approx. 2.2 kg
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 60 °C
Transportation	-20 .. 60 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 33: Technical data - 4PP152.0571-21 (Forts.)

2.12.2 Dimensions

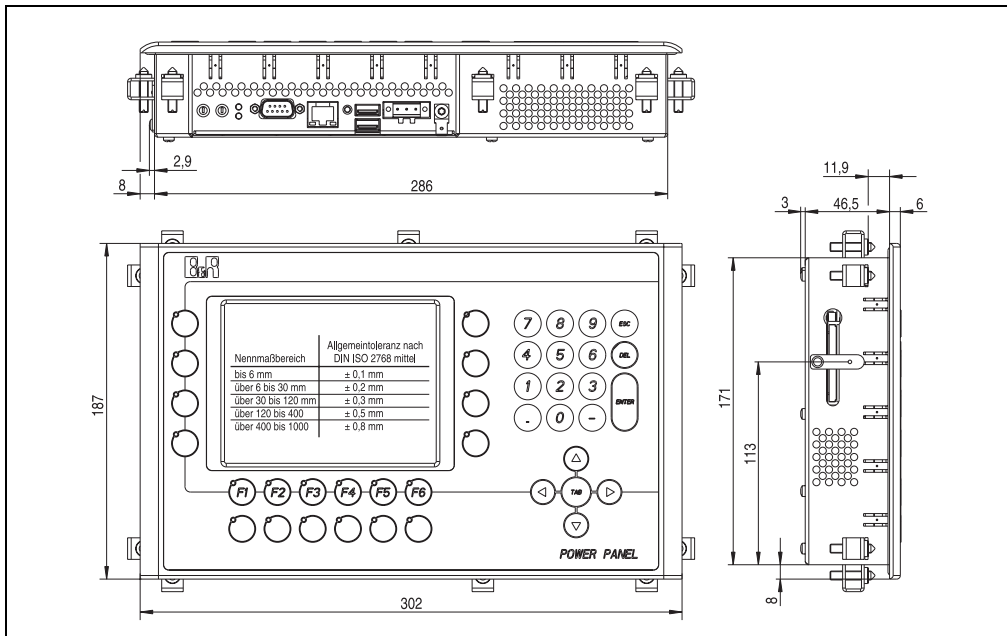


Figure 51: Dimensions - 4PP152.0571-21

2.12.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 51 "Dimensions - 4PP152.0571-21" on page 104) For further information regarding mounting, see section 3 "Installation" on page 421.

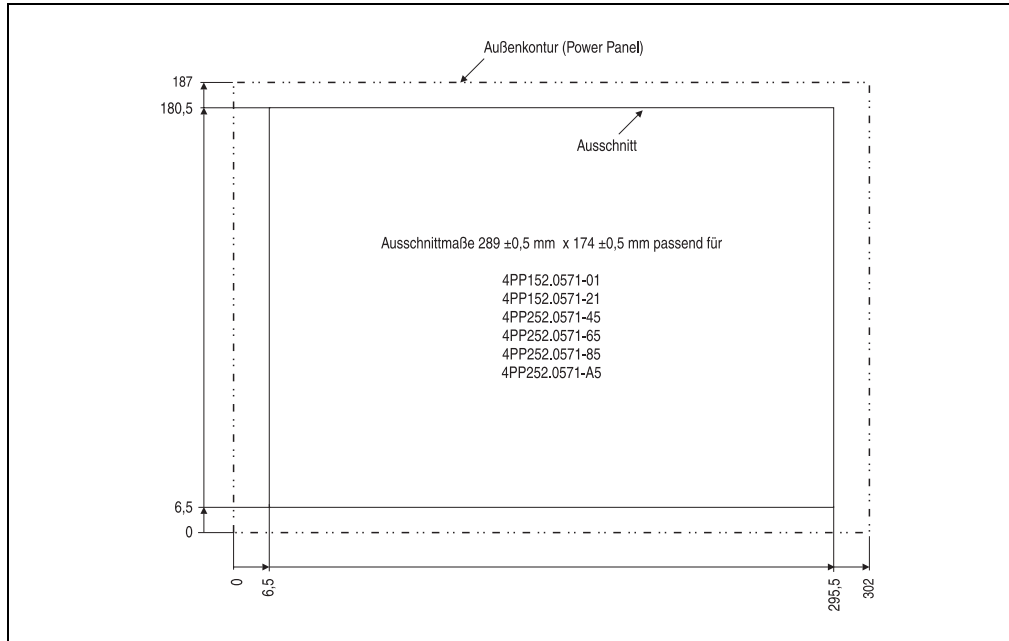


Figure 52: Cutout dimensions

2.12.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 152 LCD C QVGA 5.7" F MH
10	Retaining clips included
8	Insert strips (inserted in the front)

Table 34: Contents of delivery - 4PP152.0571-21

2.13 Device 4PP152.1043-31

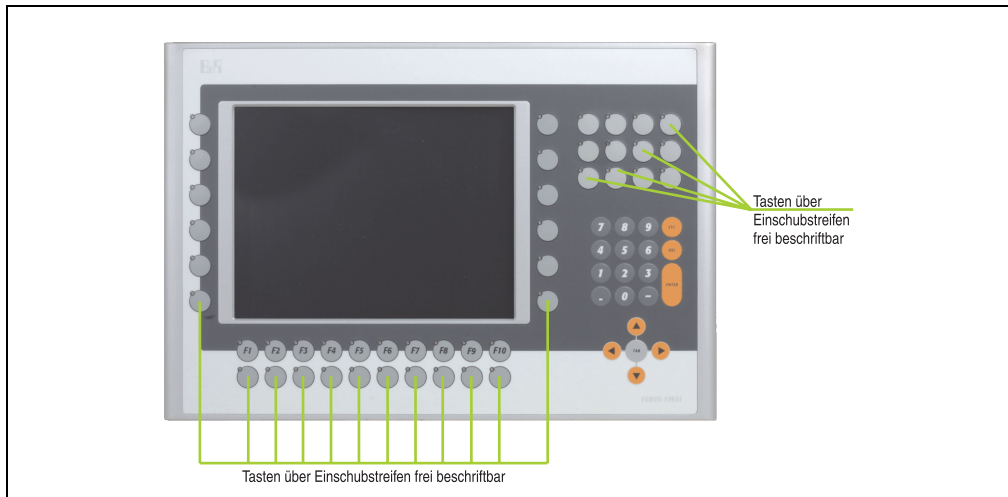


Figure 53: Front view - 4PP152.1043-31

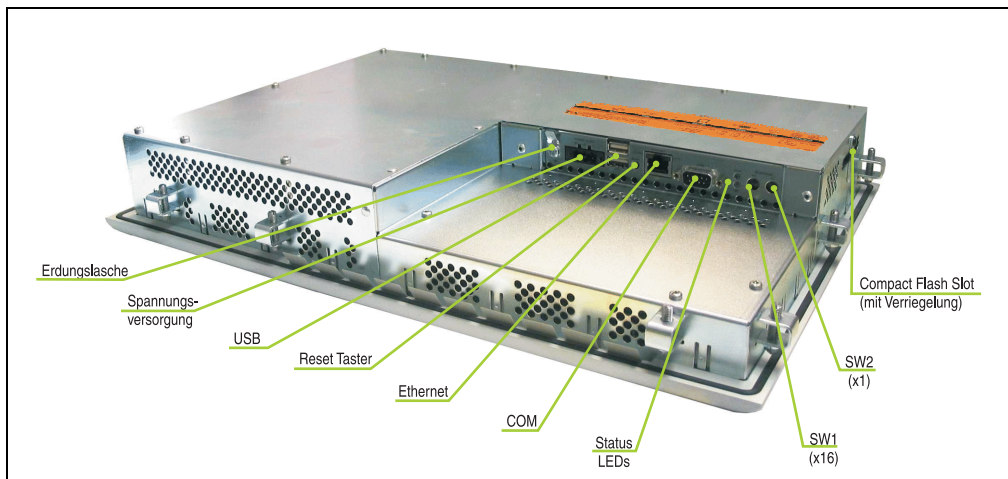


Figure 54: Rear view - 4PP152.1043-31

2.13.1 Technical data

Features	4PP152.1043-31
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 2 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Hold-up time	-
Real-time clock Battery-buffered Precision	- 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	-
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 35: Technical data - 4PP152.1043-31

Technical data • Power Panel 100 with Automation Runtime

Features	4PP152.1043-31
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 70° / 55° 350 cd/m ² 55000 hours
Touch screen Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Function keys Soft keys Cursor pad Number block Other keys	44 with LED - - 15 without LED 5 without LED
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 18 W typical, 23 W max. -
Ground resistance	≤ 24 kOhm

Table 35: Technical data - 4PP152.1043-31 (Forts.)

Mechanical characteristics	4PP152.1043-31
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Orange keys	Similar to Pantone 151CV
Dark gray keys	Similar to Pantone 431CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Mechanical characteristics	
Outer dimensions	
Width	423 mm
Height	288 mm
Depth	65.5 mm
Weight	Approx. 4.8 kg
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 70 °C
Transportation	-20 .. 70 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s ² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s ² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s ² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s ² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s ² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s ² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s ² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 35: Technical data - 4PP152.1043-31 (Forts.)

2.13.2 Dimensions

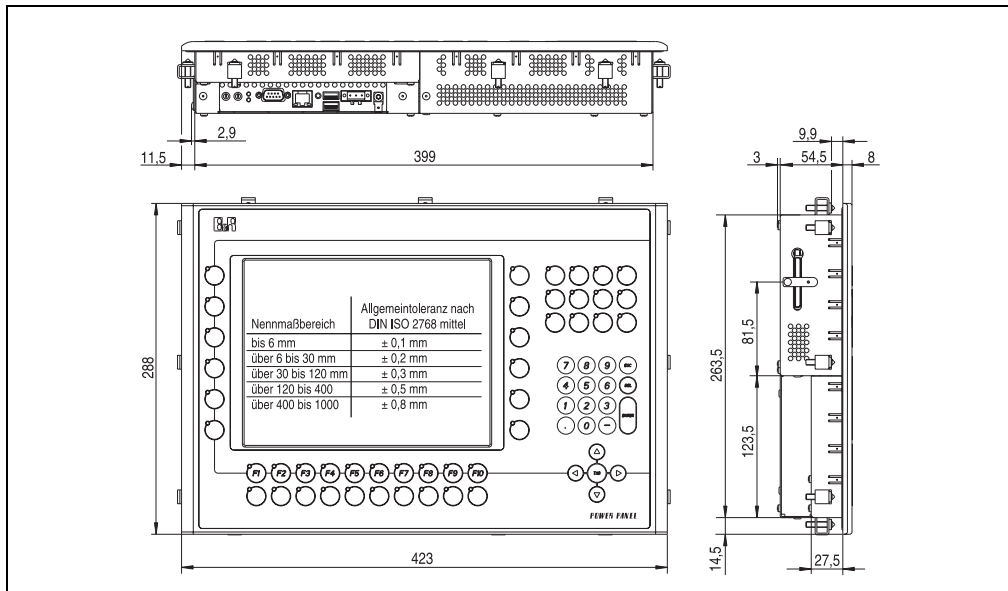


Figure 55: Dimensions - 4PP152.1043-31

2.13.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 55 "Dimensions - 4PP152.1043-31" on page 110) For further information regarding mounting, see section 3 "Installation" on page 421.

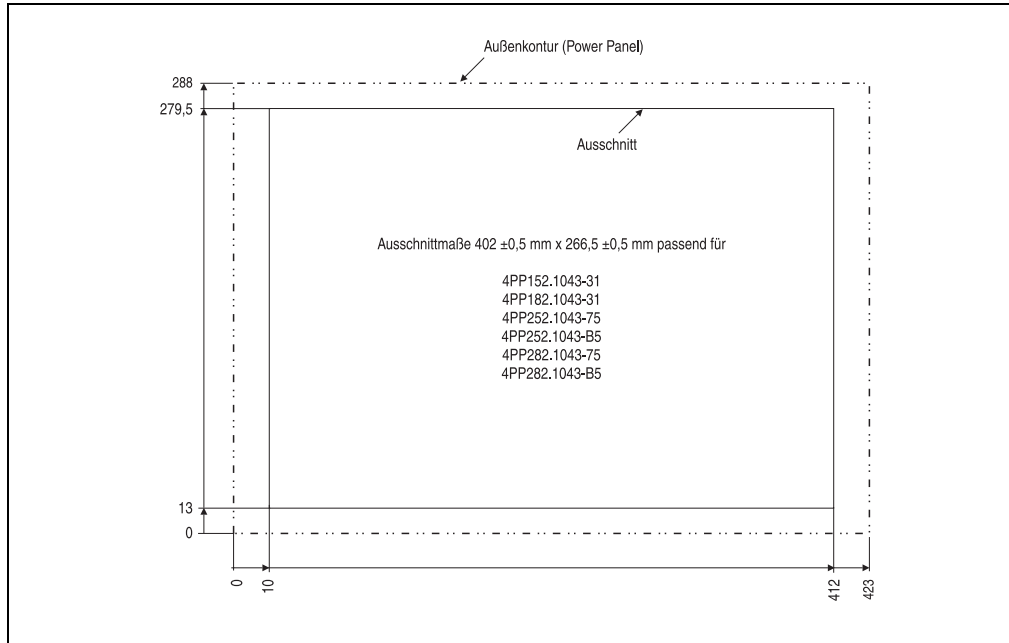


Figure 56: Cutout dimensions

2.13.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 152 TFT VGA 10.4" F MH
12	Retaining clips included
16	Insert strips (inserted in the front)

Table 36: Contents of delivery - 4PP152.1043-31

2.14 Device 4PP180.1043-31

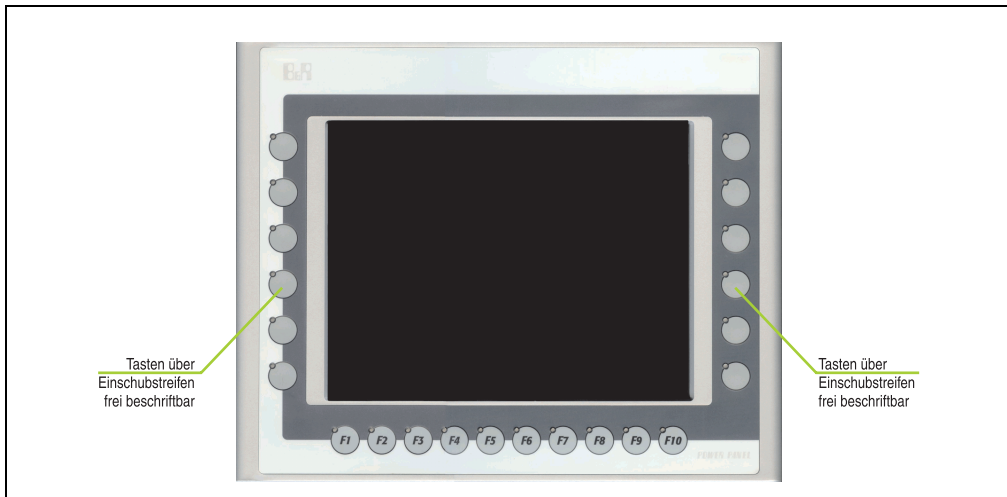


Figure 57: Front view - 4PP180.1043-31

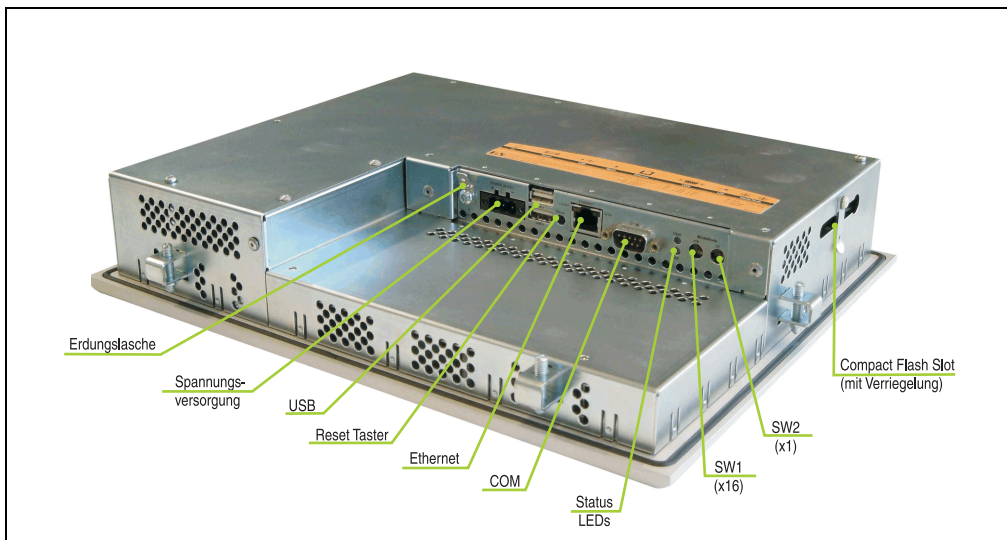


Figure 58: Rear view - 4PP180.1043-31

2.14.1 Technical data

Features	4PP180.1043-31
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 2 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Hold-up time	-
Real-time clock Battery-buffered Precision	- 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	-
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 37: Technical data - 4PP180.1043-31

Technical data • Power Panel 100 with Automation Runtime

Features	4PP180.1043-31
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 70° / 55° 350 cd/m ² 55000 hours
Touch screen Technology Controller Degree of transmission	- Analog, resistive, Elo Hampshire, serial, 12-bit 78 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	12 with LED 10 with LED - - -
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 18 W typical, 23 W max. -
Ground resistance	≤ 24 kOhm

Table 37: Technical data - 4PP180.1043-31 (Forts.)

Mechanical characteristics	4PP180.1043-31
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	323 mm
Height	260 mm
Depth	65.5 mm
Weight	Approx. 3.7 kg
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 70 °C
Transportation	-20 .. 70 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 37: Technical data - 4PP180.1043-31 (Forts.)

2.14.2 Dimensions

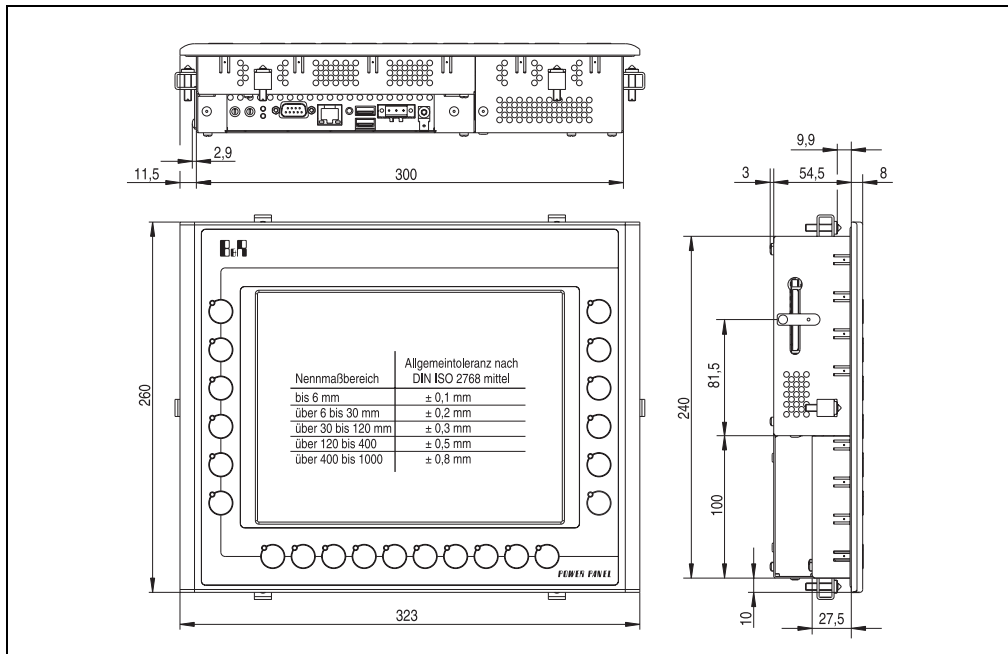


Figure 59: Dimensions - 4PP180.1043-31

2.14.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 59 "Dimensions - 4PP180.1043-31" on page 116) For further information regarding mounting, see section 3 "Installation" on page 421.

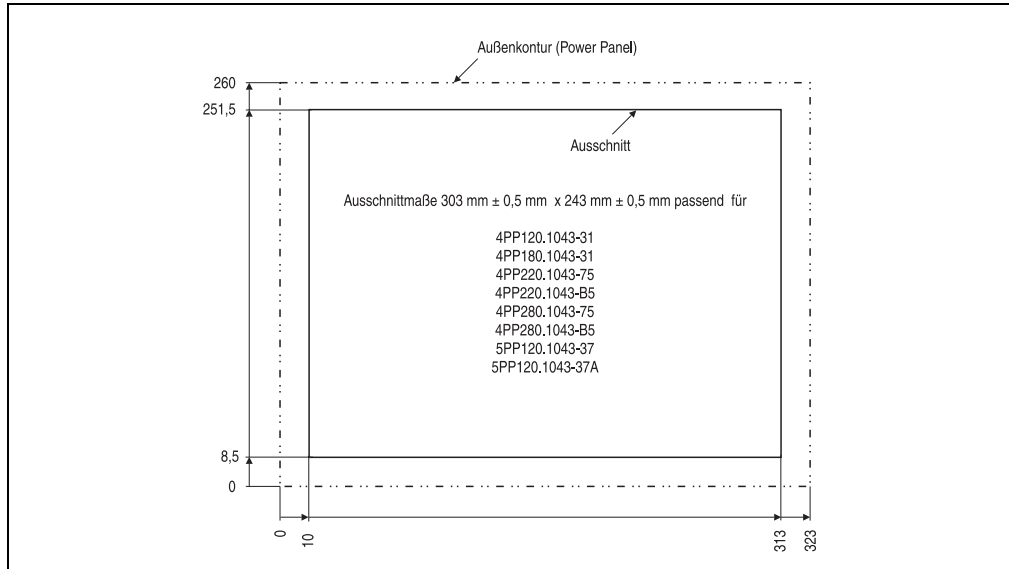


Figure 60: Cutout dimensions

2.14.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 180 TFT VGA 10.4" F T MH
6	Retaining clips included
2	Insert strips (inserted in the front)

Table 38: Contents of delivery - 4PP180.1043-31

2.15 Device 4PP180.1505-31

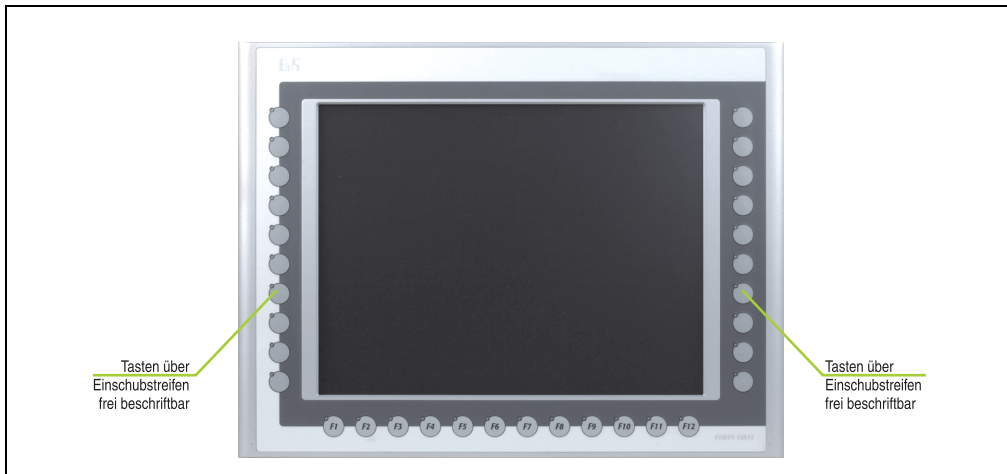


Figure 61: Front view - 4PP180.1505-31

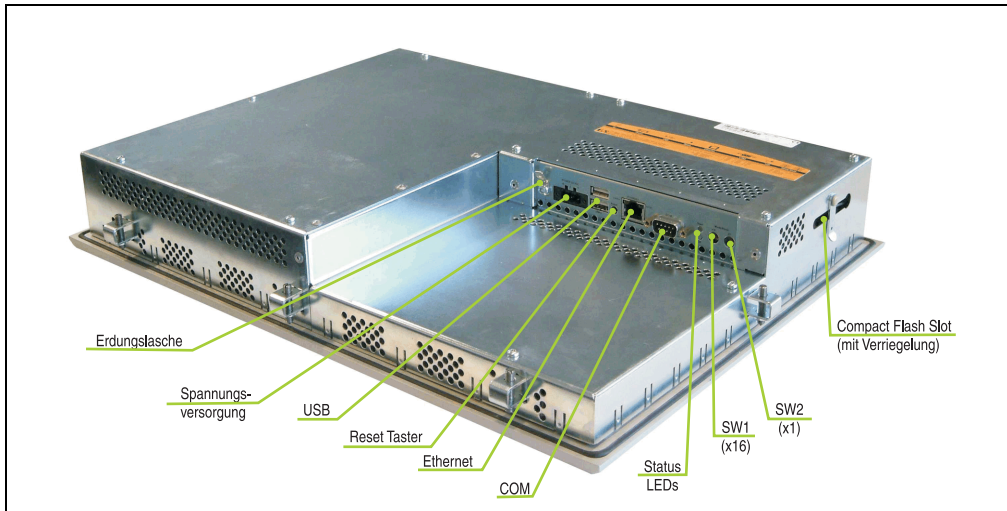


Figure 62: Rear view - 4PP180.1505-31

2.15.1 Technical data

Features	4PP180.1505-31
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 2 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Hold-up time	-
Real-time clock Battery-buffered Precision	- 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	-
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 39: Technical data - 4PP180.1505-31

Technical data • Power Panel 100 with Automation Runtime

Features	4PP180.1505-31
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 15 inch (380 mm) 256 colors XGA, 1024 x 768 pixels 300:1 140° / 115° 330 cd/m² 35000 hours
Touch screen Technology Controller Degree of transmission	- Analog, resistive, Elo Hampshire, serial, 12-bit 78 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	20 with LED 12 with LED - - -
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 33 W typical, 38 W max. Yes
Ground resistance	≤ 24 kOhm

Table 39: Technical data - 4PP180.1505-31 (Forts.)

Mechanical characteristics	4PP180.1505-31
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	435 mm
Height	330 mm
Depth	71.5 mm
Weight	Approx. 6.3 kg
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 60 °C
Transportation	-20 .. 60 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
Transportation	T > 40 °C: < 90 %, non-condensing
	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 39: Technical data - 4PP180.1505-31 (Forts.)

2.15.2 Dimensions

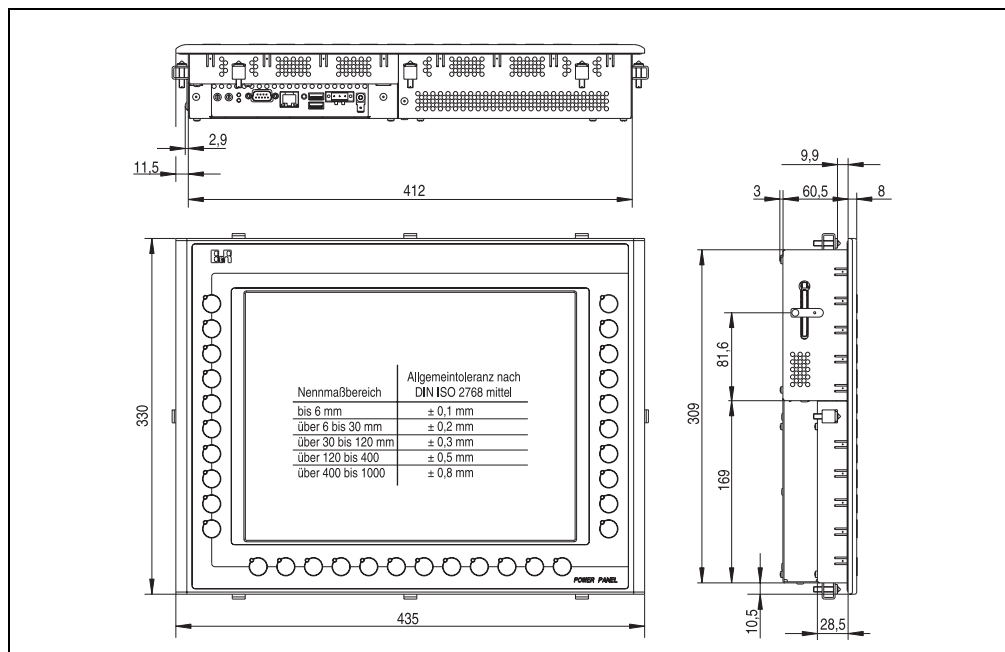


Figure 63: Dimensions - 4PP180.1505-31

2.15.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 63 "Dimensions - 4PP180.1505-31" on page 122) For further information regarding mounting, see section 3 "Installation" on page 421.

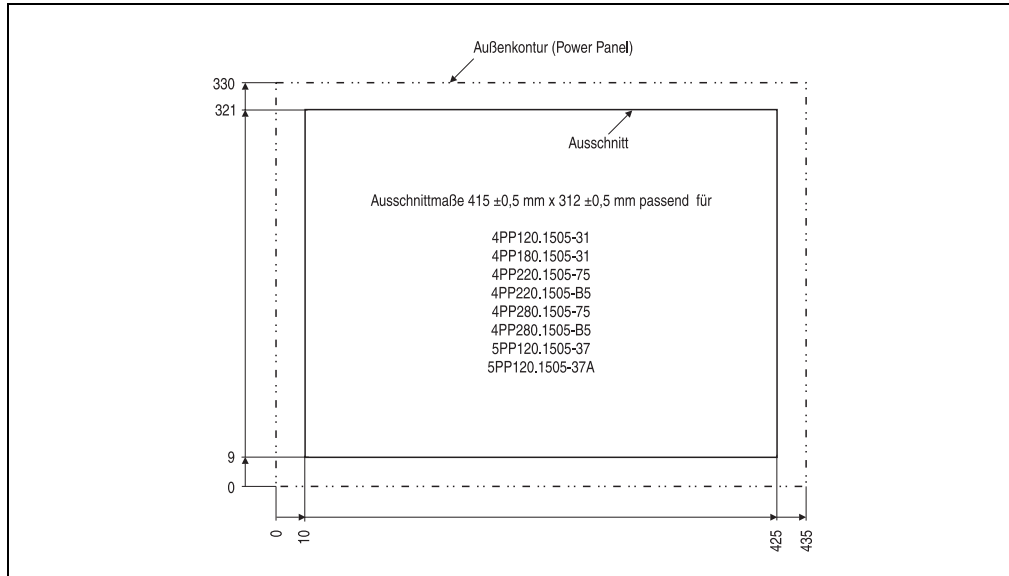


Figure 64: Cutout dimensions

2.15.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 180 TFT VGA 15" F T MH
8	Retaining clips included
2	Insert strips (inserted in the front)

Table 40: Contents of delivery - 4PP180.1505-31

2.16 Device 4PP181.1043-31

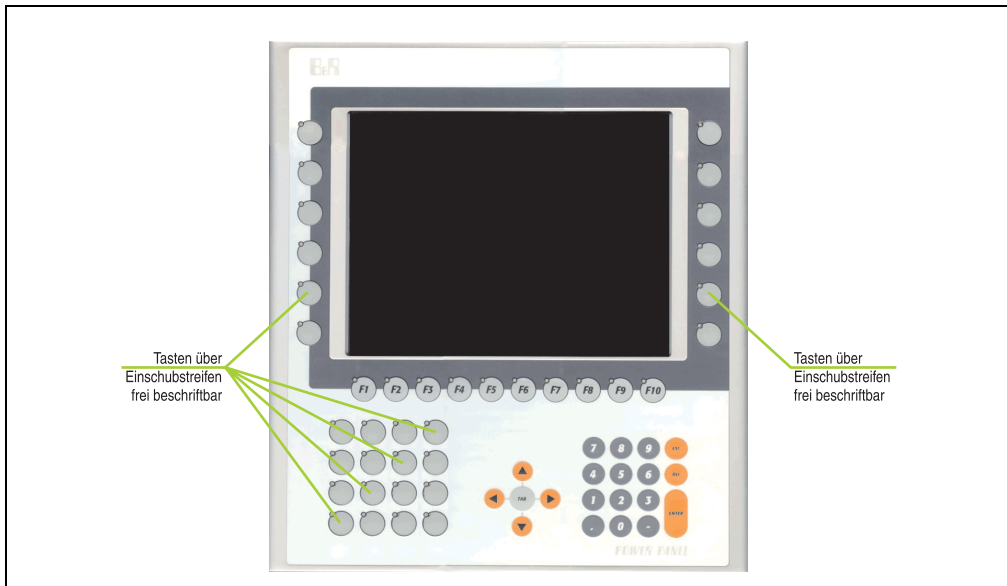


Figure 65: Front view - 4PP181.1043-31

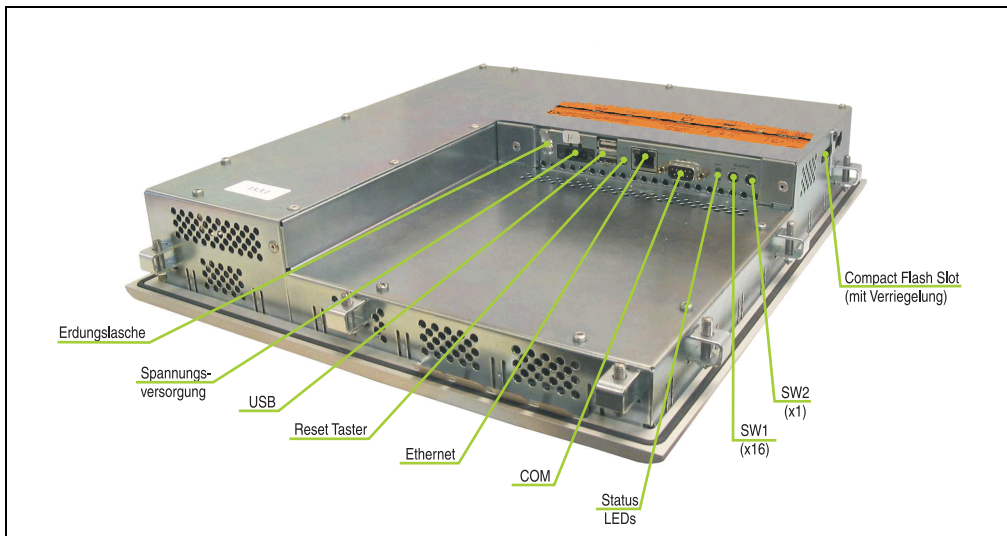


Figure 66: Rear view - 4PP181.1043-31

2.16.1 Technical data

Features	4PP181.1043-31
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 2 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Hold-up time	-
Real-time clock Battery-buffered Precision	- 10 ppm
Battery Type Removable Lifespan Backup capacitor Hold-up time	-
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 41: Technical data - 4PP181.1043-31

Technical data • Power Panel 100 with Automation Runtime

Features	4PP181.1043-31
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 70° / 55° 350 cd/m ² 55000 hours
Touch screen Technology Controller Degree of transmission	Analog, resistive, Elo Hampshire, serial, 12-bit 78 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	28 with LED 10 with LED - 15 without LED 5 without LED
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 17 W typical, 23 W max. -
Ground resistance	≤ 24 kOhm

Table 41: Technical data - 4PP181.1043-31 (Forts.)

Mechanical characteristics	4PP181.1043-31
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Orange keys	Similar to Pantone 151CV
Dark gray keys	Similar to Pantone 431CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	323 mm
Height	358 mm
Depth	65.5 mm
Weight	Approx. 4.6 kg
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 70 °C
Transportation	-20 .. 70 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 41: Technical data - 4PP181.1043-31 (Forts.)

2.16.2 Dimensions

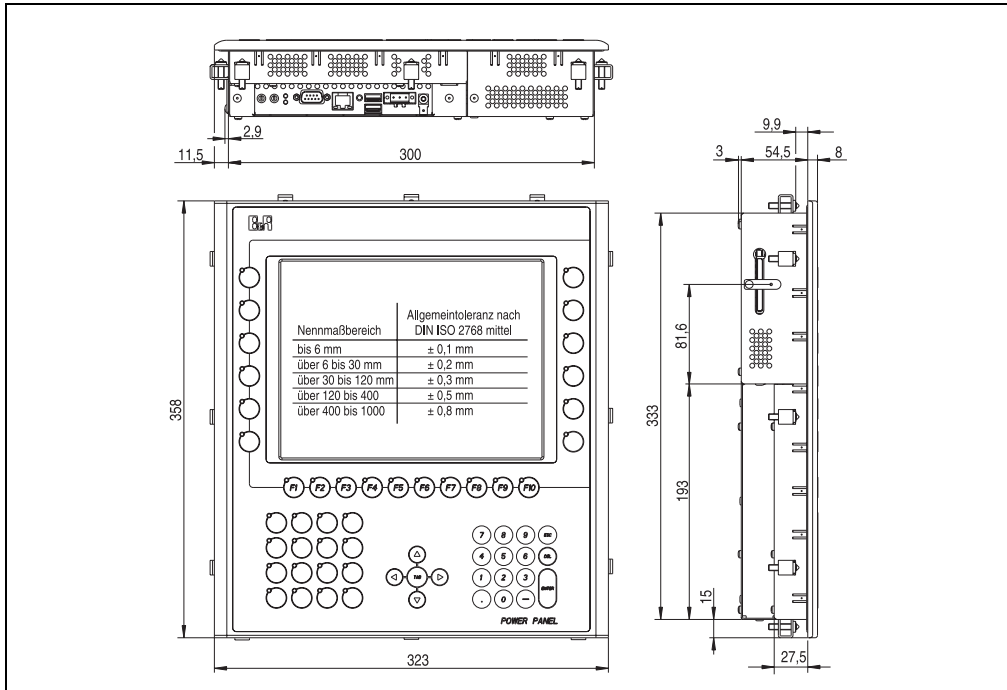


Figure 67: Dimensions - 4PP181.1043-31

2.16.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 67 "Dimensions - 4PP181.1043-31" on page 128) For further information regarding mounting, see section 3 "Installation" on page 421.

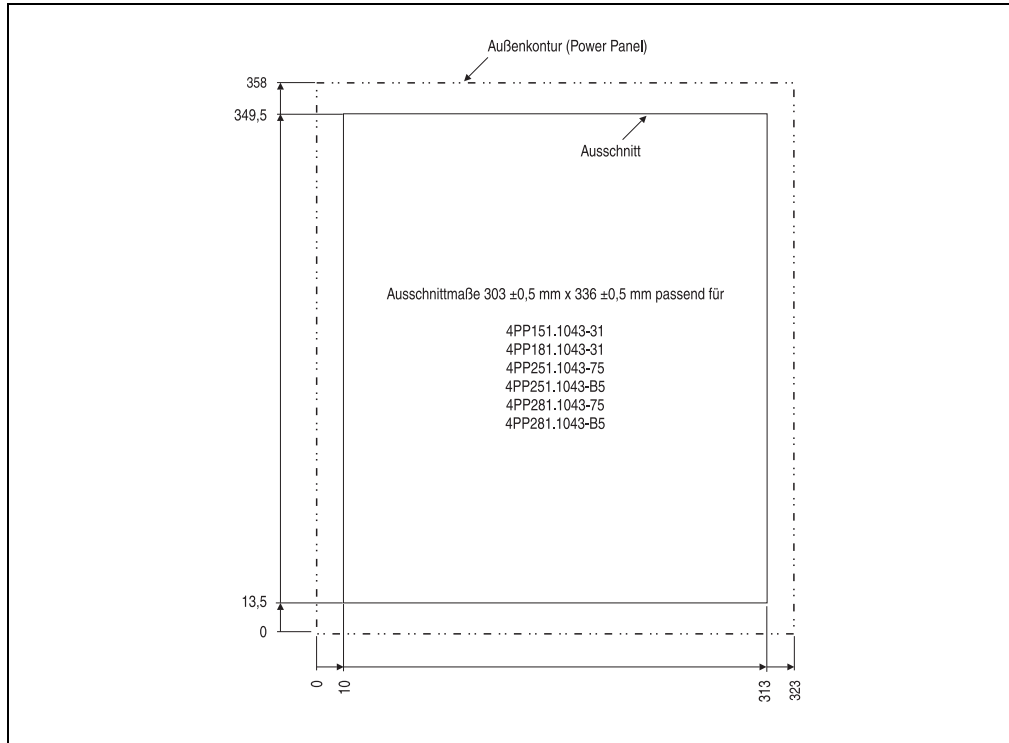


Figure 68: Cutout dimensions

2.16.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 181 TFT C VGA 10.4" F T MH
12	Retaining clips included
6	Insert strips (inserted in the front)

Table 42: Contents of delivery - 4PP181.1043-31

2.17 Device 4PP181.1505-31

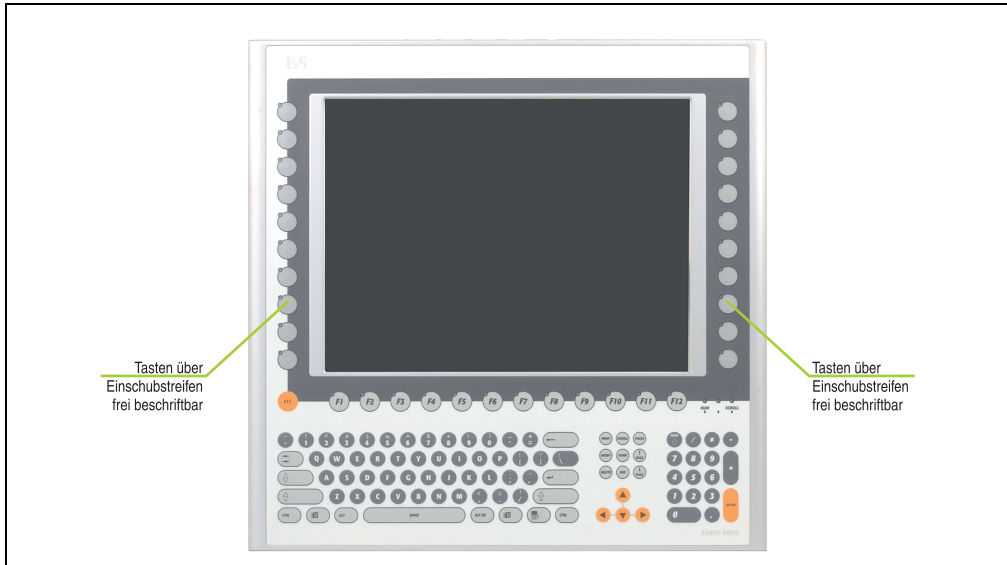


Figure 69: Front view - 4PP181.1505-31

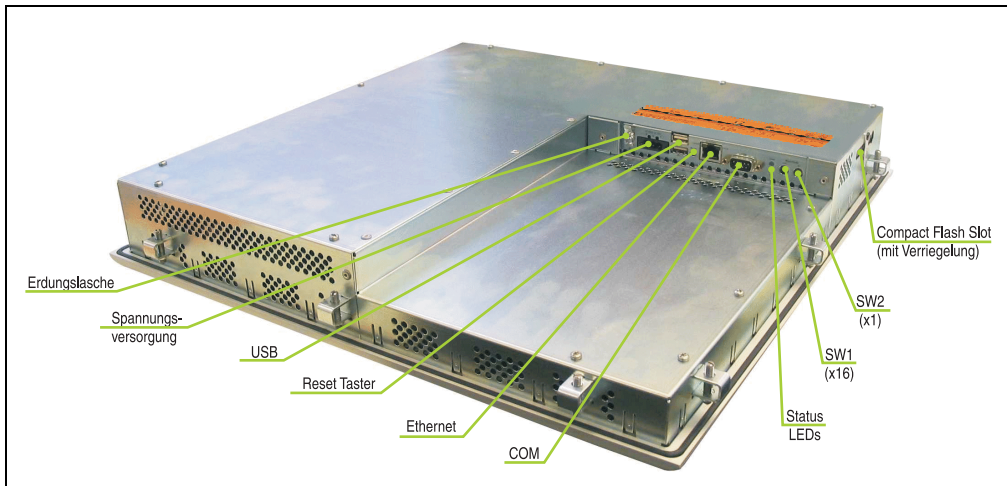


Figure 70: Rear view - 4PP181.1505-31

2.17.1 Technical data

Features	4PP181.1505-31
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 2 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Hold-up time	-
Real-time clock Battery-buffered Precision	- 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	-
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 43: Technical data - 4PP181.1505-31

Technical data • Power Panel 100 with Automation Runtime

Features	4PP181.1505-31
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 15 inch (380 mm) 256 colors XGA, 1024 x 768 pixels 300:1 140° / 115° 330 cd/m² 35000 hours
Touch screen Technology Controller Degree of transmission	Analog, resistive, Elo Hampshire, serial, 12-bit 78 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	20 with LED 12 with LED - 15 without LED 77 without LED
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 33 W typical, 38 W max. Yes
Ground resistance	≤ 24 kOhm

Table 43: Technical data - 4PP181.1505-31 (Forts.)

Mechanical characteristics	4PP181.1505-31
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Orange keys	Similar to Pantone 151CV
Dark gray keys	Similar to Pantone 431CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	435 mm
Height	430 mm
Depth	71.5 mm
Weight	Approx. 7.6 kg
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 60 °C
Transportation	-20 .. 60 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 43: Technical data - 4PP181.1505-31 (Forts.)

2.17.2 Dimensions

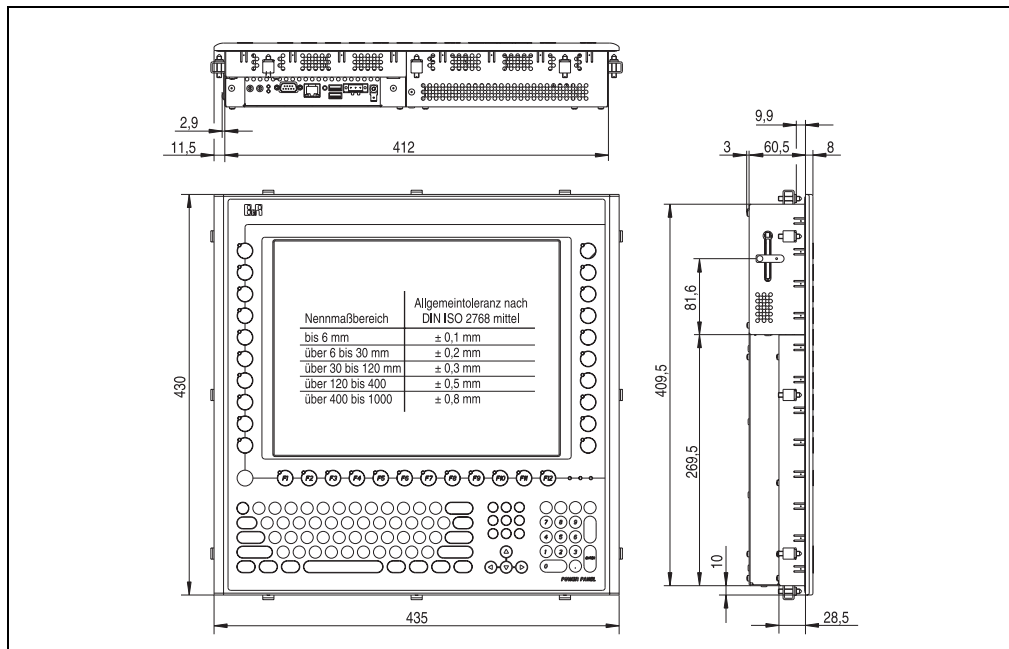


Figure 71: Dimensions - 4PP181.1505-31

2.17.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 71 "Dimensions - 4PP181.1505-31" on page 134) For further information regarding mounting, see section 3 "Installation" on page 421.

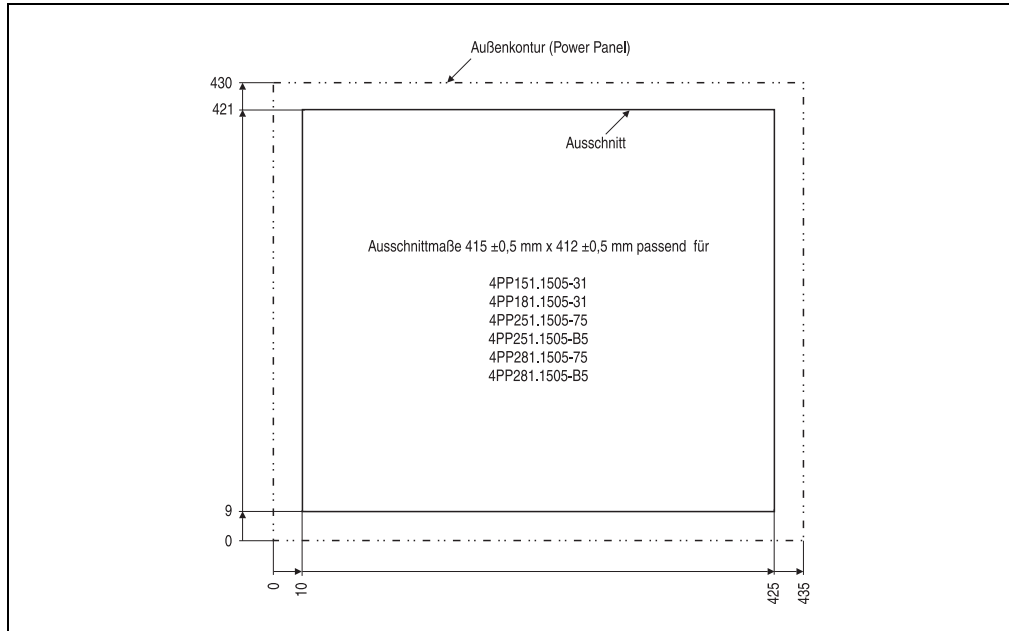


Figure 72: Cutout dimensions

2.17.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 181 TFT VGA 15" F T MH
12	Retaining clips included
6	Insert strips (inserted in the front)

Table 44: Contents of delivery - 4PP181.1505-31

2.18 Device 4PP182.1043-31

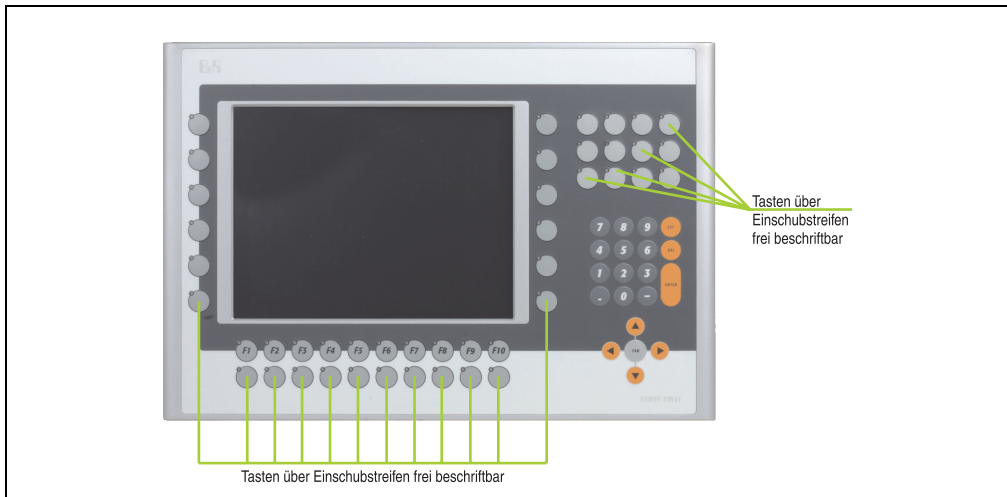


Figure 73: Front view - 4PP182.1043-31

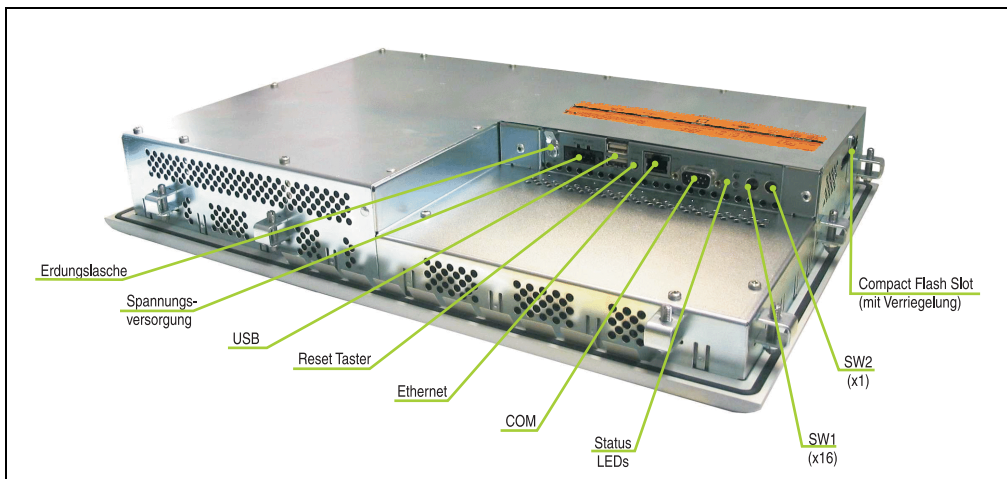


Figure 74: Rear view - 4PP182.1043-31

2.18.1 Technical data

Features	4PP182.1043-31
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 2 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Hold-up time	-
Real-time clock Battery-buffered Precision	- 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	-
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 45: Technical data - 4PP182.1043-31

Technical data • Power Panel 100 with Automation Runtime

Features	4PP182.1043-31
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 70° / 55° 350 cd/m ² 55000 hours
Touch screen Technology Controller Degree of transmission	Analog, resistive, Elo Hampshire, serial, 12-bit 78 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	44 with LED - - 15 without LED 5 without LED
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 18 W typical, 23 W max. -
Ground resistance	≤ 24 kOhm

Table 45: Technical data - 4PP182.1043-31 (Forts.)

Mechanical characteristics	4PP182.1043-31
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Orange keys	Similar to Pantone 151CV
Dark gray keys	Similar to Pantone 431CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	423 mm
Height	288 mm
Depth	65.5 mm
Weight	Approx. 4.8 kg
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 70 °C
Transportation	-20 .. 70 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 45: Technical data - 4PP182.1043-31 (Forts.)

2.18.2 Dimensions

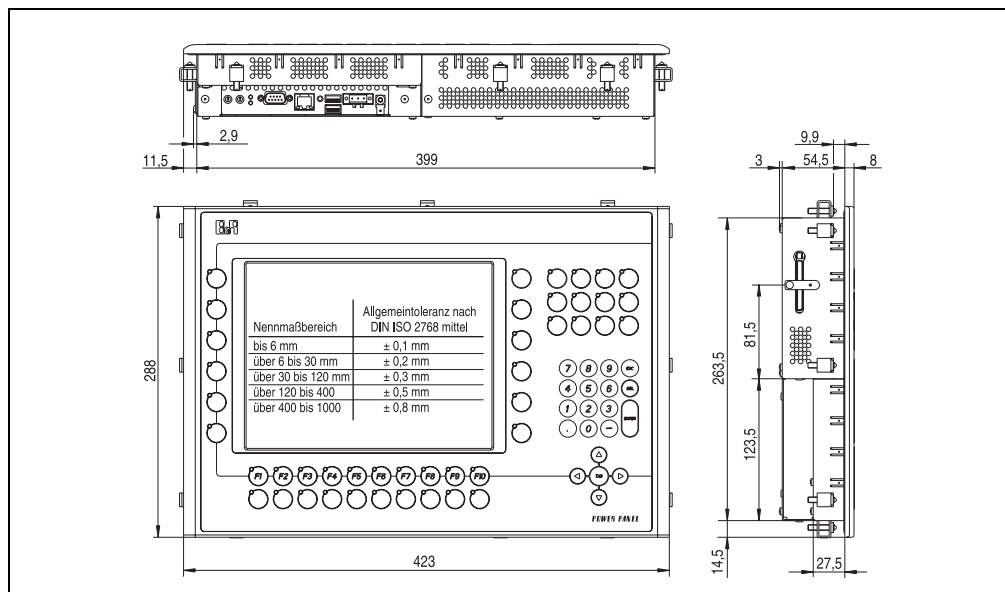


Figure 75: Dimensions - 4PP182.1043-31

2.18.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 67 "Dimensions - 4PP181.1043-31" on page 128) For further information regarding mounting, see section 3 "Installation" on page 421.

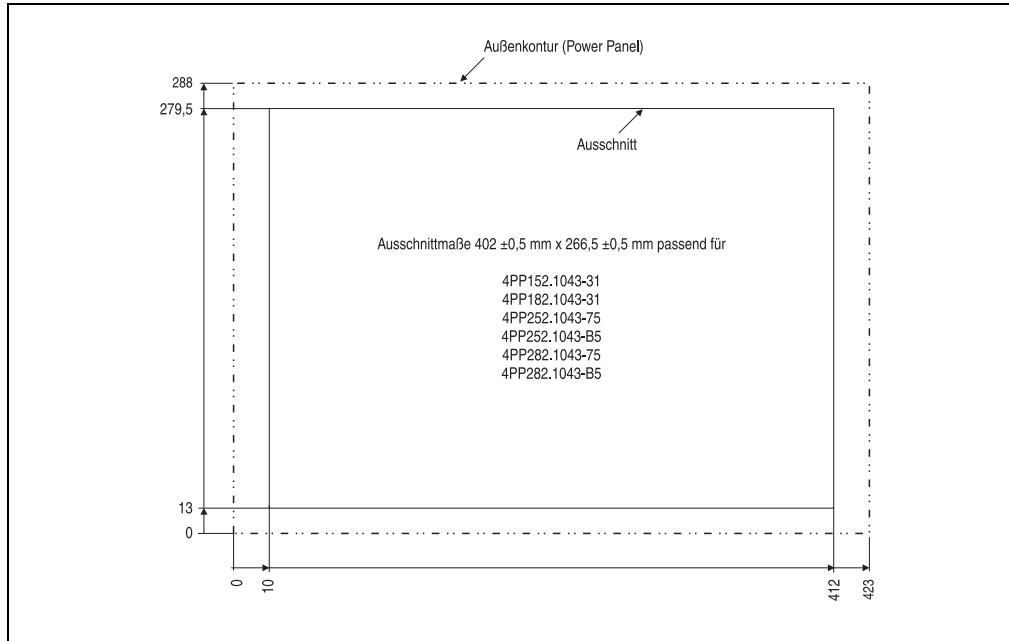


Figure 76: Cutout dimensions

2.18.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 182 TFT VGA 10.4" F T MH
12	Retaining clips included
16	Insert strips (inserted in the front)

Table 46: Contents of delivery - 4PP182.1043-31

3. Power Panel 200 with Automation Runtime

3.1 Interface descriptions

The following section provides a description of all interfaces and plugs possible with a Power Panel 200 device with Automation Runtime.

3.1.1 Supply voltage

Input voltage: 24 VDC $\pm$ 25%

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 OTB103.9 (screw clamps) or OTB103.91 (cage clamps). The cable required for the connection must be supplied by the customer (see also section "TB103 3-pin supply voltage connector" on page 525).

The supply voltage is internally protected so that the device cannot be damaged if there is an overload or if the voltage supply is connected incorrectly.

Pin assignments can be found either in the following table or printed on the Power Panel plate or device label (see section 3.2.2 "Device label" on page 148).

Supply voltage	
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

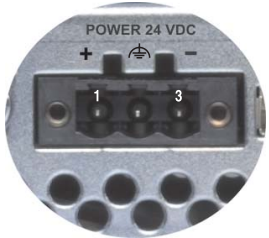


Figure 77: Supply voltage connection

Important!

The pin's connection to the functional ground (pin 2) should be as short as possible.

3.1.2 Grounding clip

Should be connected to ground using the shortest route possible.

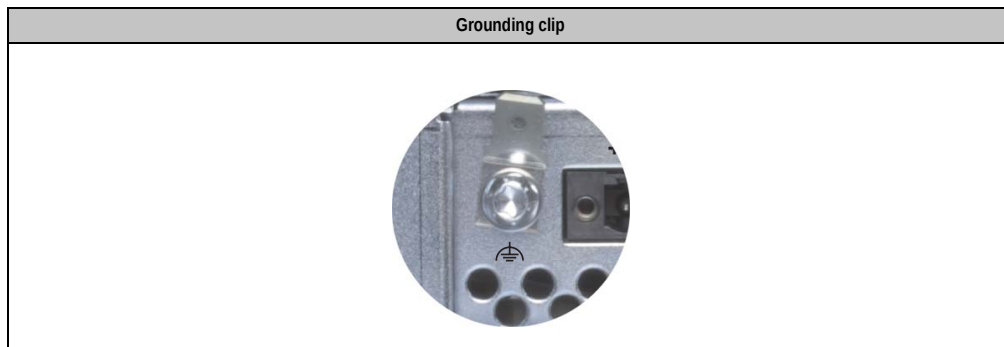


Figure 78: Grounding clip

3.1.3 COM interface

The Power Panel is equipped with a PC-compatible serial interface with a 16 byte FIFO buffer. This non-electrically isolated interface is primarily intended for programming Power Panel devices using Automation Studio.

The RS232 can also be used as a general interface (e.g. third-party connections, barcode reader, etc.).

Serial interface		
RS232 interface Modem-capable, not electrically isolated Up to 115 kBaud		9-pin DSUB connector
Pin	RS232	
1	DCD	
2	RXD	
3	TxD	
4	DTR	
5	GND	
6	DSR	
7	RTS	
8	CTS	
9	RI	

Table 47: COM pin assignment

3.1.4 USB port

The Power Panel is equipped with a USB (Universal Serial Bus) host controller with two USB ports.

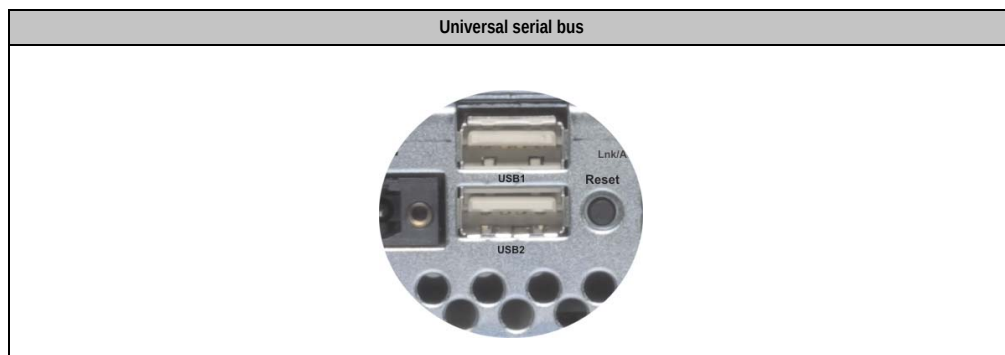


Figure 79: USB port

Technical data for USB port	
Transfer rate	1.5 MBit/s to 12 MBit/s
Power supply	500 mA for each port
Maximum cable length	5 m (can be extended using a USB hub)

Table 48: Technical data for USB connection

Warning!

Only the USB devices tested and verified by B&R and found in the section "Accessories" on page 521 may be connected to the USB interface.

Important!

Because of general PC specifications, this interface should be handled with extreme care with regard to EMC, location of cables, etc.

3.1.5 Mode/Node switches

Power Panel devices are equipped with 2 hex switches that serve as operating mode switches. Switch positions 01 up to FD are available for any purpose in an application and can be evaluated by the application program.

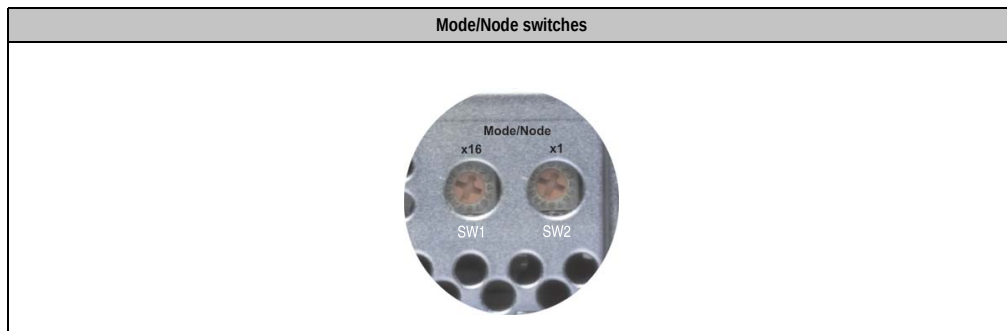


Figure 80: Mode/Node switches

Switch position		Function	Description
SW1 (x16)	SW2 (x1)	Operating mode switch	
0	0	Boot	Automation Runtime boot mode for operating system (firmware) upgrade (default Automation Runtime). In this position, a new or missing operating system can be downloaded.
0 to F	0 to F	Node	Automation Runtime run mode with node 01-FD (CompactFlash Automation Runtime or terminal operation). Freely available for use in an application, e.g. setting the INA2000 node number for the Ethernet interface.
F	E	Dyn. mode	Automation Runtime run mode with node 01-FD (CompactFlash Automation Runtime or terminal operation). Device addresses can be assigned through the software.
F	F	Diagnosis	Automation Runtime diagnostics mode (CompactFlash Automation Runtime or terminal operation).

Table 49: Switch settings for the mode/node switch

3.1.6 Status LEDs

Power Panels are equipped with two status LEDs that are visible on the outside.

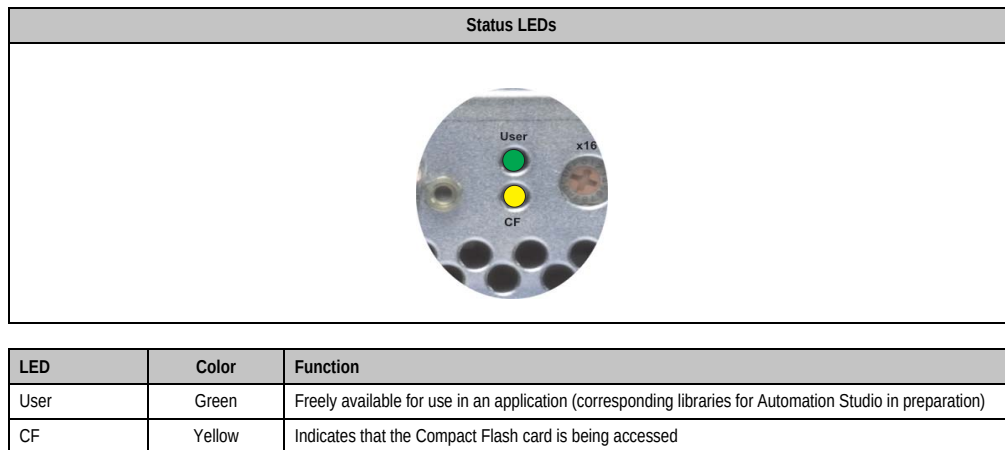


Figure 81: Status LEDs

3.1.7 Ethernet connection

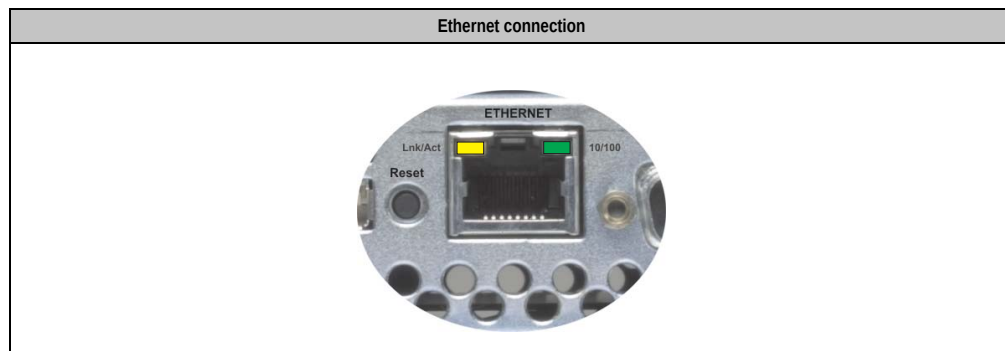


Figure 82: Ethernet connection

Ethernet	10/100 MBit/s ¹⁾
Connection	RJ45 twisted pair (10BaseT/100BaseT)
Controller	MacPhyter DP83815 or DP83816 - depends on the revision
Cabling	S/STP (category 5)

Table 50: Ethernet controller

1) Both operating modes are possible. Switching takes place automatically.

The onboard Ethernet controller for Power Panel devices provides an RJ45 twisted pair connection where 2 LEDs are attached for status checking:

LED	On	Off
Green	100 MBit/s	10 MBit/s
Yellow	Link	Activity (blinking)

Table 51: Status LEDs - Ethernet controller

3.1.8 Reset button

The reset button can be accessed through a small hole between the USB and the Ethernet connection. In order to avoid accidental activation, a reset can only be triggered with a pointed object.



Figure 83: Reset button

3.1.9 CompactFlash slot

Power Panel devices are equipped with a CompactFlash slot that is accessible from the side. CompactFlash cards of type I are supported.



Figure 84: CompactFlash slot

It is possible to protect the CompactFlash slot using a safety clip. By pressing the ejector (using a pointed object is the best way to do this) the CompactFlash card can be changed quickly and safely.

Caution!

Changing the CompactFlash card can only take place without power applied! As a safety measure, a sticker is also attached to Power Panel devices stating this.

3.2 Labels

3.2.1 Safety sticker

A safety sticker is attached over the Compact Flash slot, which advises that the power must be switched off for the Power Panel device (depending on the revision) when inserting or removing a Compact Flash card.

An ESD warning sticker is attached next to the battery compartment. This indicates the components at risk from electrostatic discharge inside the Power Panel devices.



Figure 85: Safety sticker

3.2.2 Device label

The following label is attached to a suitable location on the Power Panel and displays short definitions for all of the interfaces:

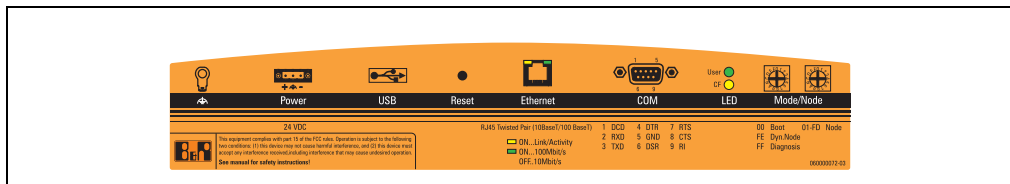


Figure 86: Device label

3.2.3 Serial number sticker

General information

Each B&R device is given a unique serial number sticker with a barcode that allows the device to be clearly identified.

Design/Dimensions

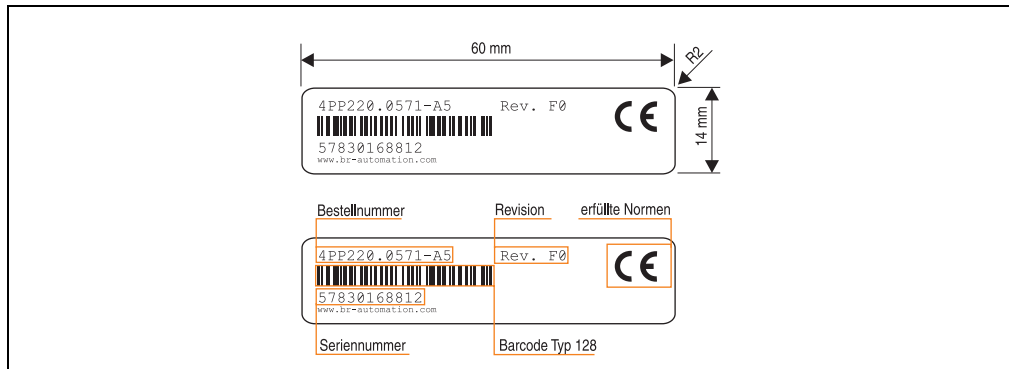


Figure 87: Serial number sticker design/dimensions

3.3 Device 4PP210.0000-95

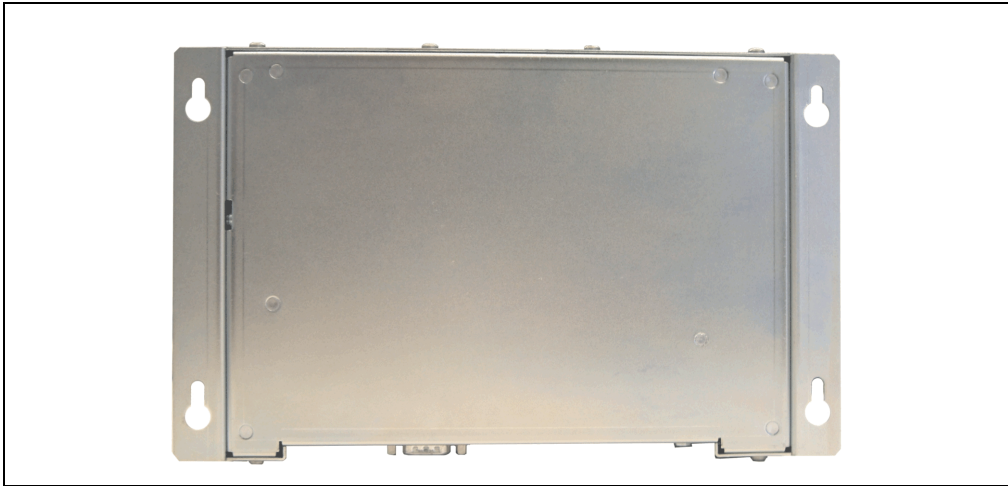


Figure 88: Front view - 4PP210.0000-95

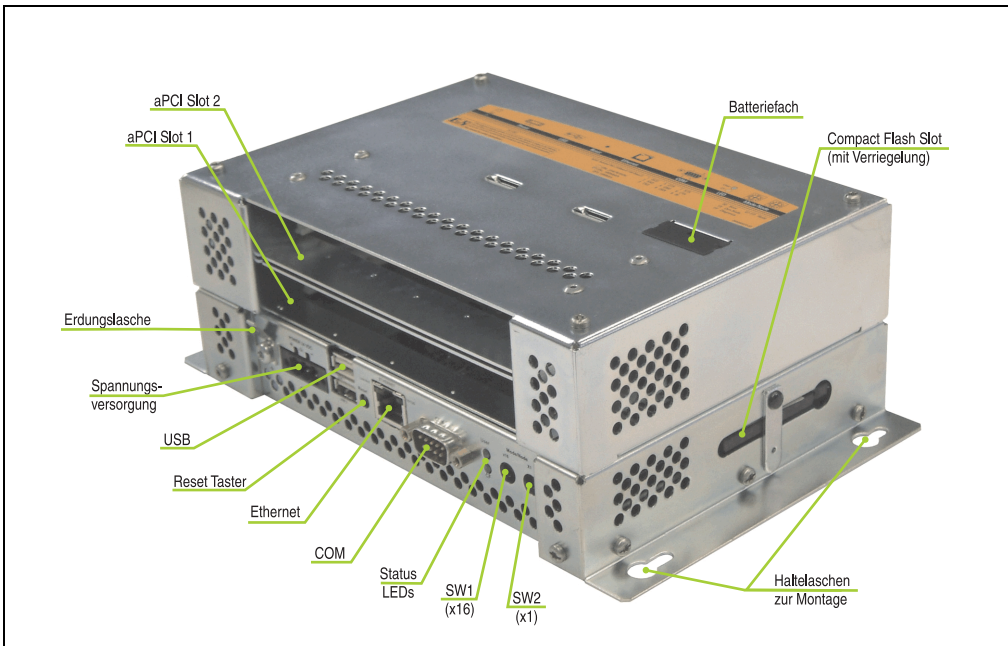


Figure 89: Rear view - 4PP210.0000-95

3.3.1 Technical data

Features	4PP210.0000-95
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	4 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 -
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 (rev. < E0 DP83615) 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 52: Technical data - 4PP210.0000-95

Technical data • Power Panel 200 with Automation Runtime

Features	4PP210.0000-95
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	2 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	-
Touch screen Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	-
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 12 W typical, 17 W max. Yes
Ground resistance	≥ 47 kOhm

Table 52: Technical data - 4PP210.0000-95 (Forts.)

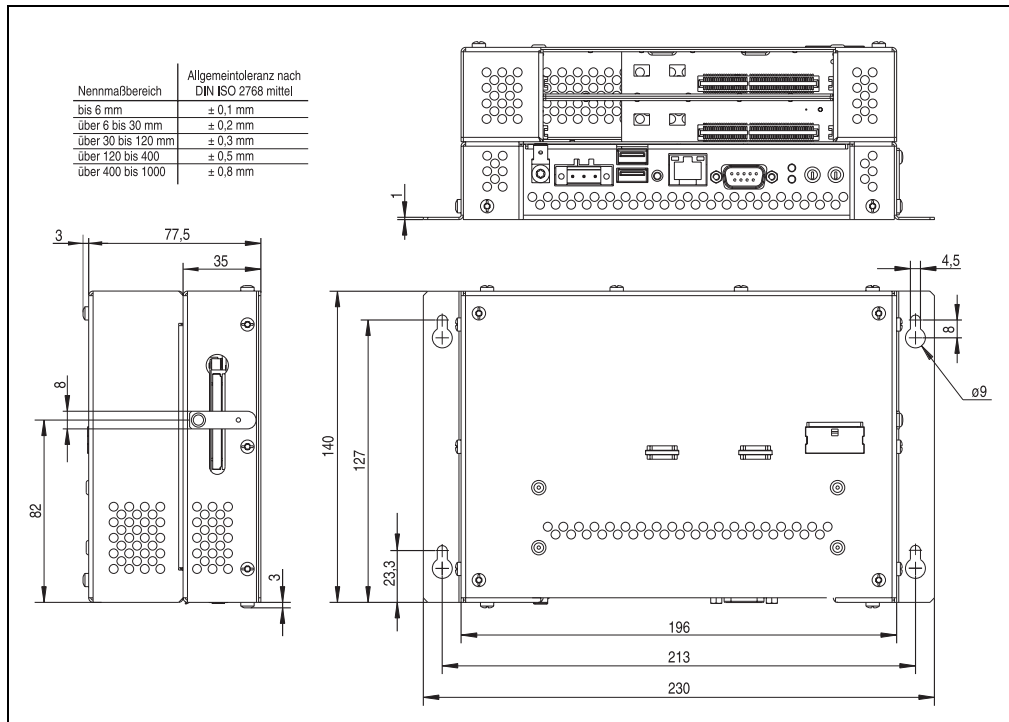
Mechanical characteristics	
Front Frame Membrane Design Gasket	-
Housing	Metal
Mechanical characteristics	4PP210.0000-95
Outer dimensions Width Height Depth	230 mm 146 mm 80.5 mm
Weight	Approx. 1.4 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature Operation Storage Transportation	0 .. 50 °C -20 .. 80 °C -20 .. 80 °C
Relative humidity Operation Storage Transportation	5 .. 85%, non-condensing T ≤ 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing T ≤ 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing
Vibration Operation (continuous) Operation (occasional) Storage Transportation	Max. 9 - 200 Hz and 0.5 g (4.9 m/s ² 0-peak) Max. 9 - 200 Hz and 1 g (9.8 m/s ² 0-peak) Max. 2 - 500 Hz and 4 g (39.2 m/s ² 0-peak) Max. 2 - 500 Hz and 4 g (39.2 m/s ² 0-peak)
Shock Operation Storage Transportation	Max. 15 g (147 m/s ² 0-peak) and 11 ms length Max. 30 g (980 m/s ² 0-peak) and 11 ms length Max. 30 g (980 m/s ² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed aPCI interface modules and Compact Flash card)
Altitude	Max. 3,000 m

Table 52: Technical data - 4PP210.0000-95 (Forts.)

1) System Management Controller

2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.3.2 Dimensions



3.3.3 Drilling template

For mounting, the drillings must be made according to the following diagram. For further information regarding mounting, see section 3 "Installation" on page 421.

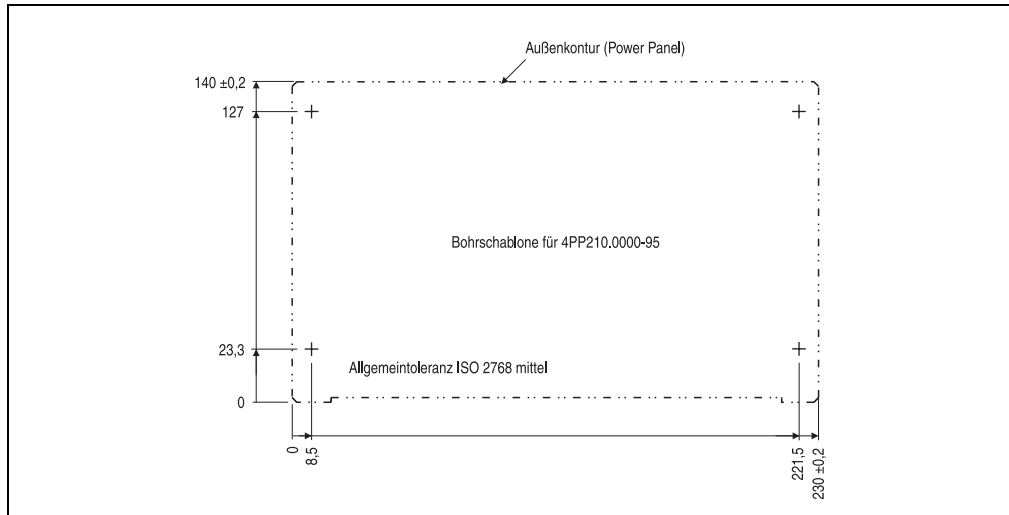


Figure 91: Cutout dimensions

3.3.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 210 Controller MH 2aPCI
1	Lithium battery 3 V / 950 mAh included

Table 53: Contents of delivery - 4PP210.0000-95

3.4 Device 4PP220.0571-45



Figure 92: Front view - 4PP220.0571-45

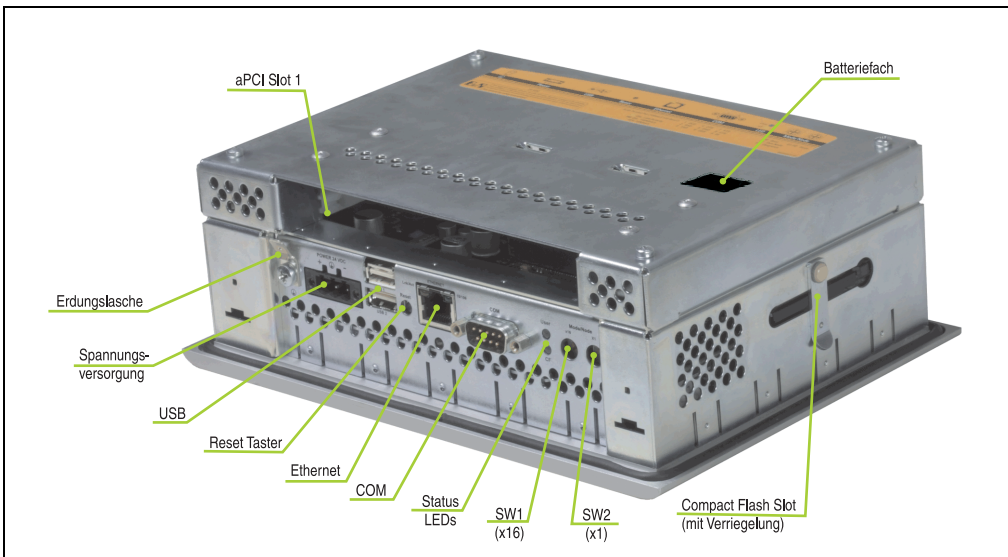


Figure 93: Rear view - 4PP220.0571-45

3.4.1 Technical data

Features	4PP220.0571-45
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 (rev. < G0 DP83615) 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 54: Technical data - 4PP220.0571-45

Technical data • Power Panel 200 with Automation Runtime

Features	4PP220.0571-45
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	1 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	LCD 5.7 in (144 mm) 8 shades of gray QVGA, 320 x 240 pixels 25:1 80° / 80° 140 cd/m ² 50000 hours
Touch screen Technology Controller Degree of transmission	Analog, resistive (Gunze) Hampshire, serial, 12-bit 84 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	-
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 12 W typical, 17 W max. Yes
Ground resistance	≥ 47 kOhm

Table 54: Technical data - 4PP220.0571-45 (Forts.)

Mechanical characteristics	4PP220.0571-45
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	212 mm
Height	156 mm
Depth	76 mm
Weight	Approx. 1.7 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 70 °C
Transportation	-20 .. 70 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s ² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s ² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s ² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s ² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s ² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s ² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s ² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 54: Technical data - 4PP220.0571-45 (Forts.)

1) System Management Controller

2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.4.2 Dimensions

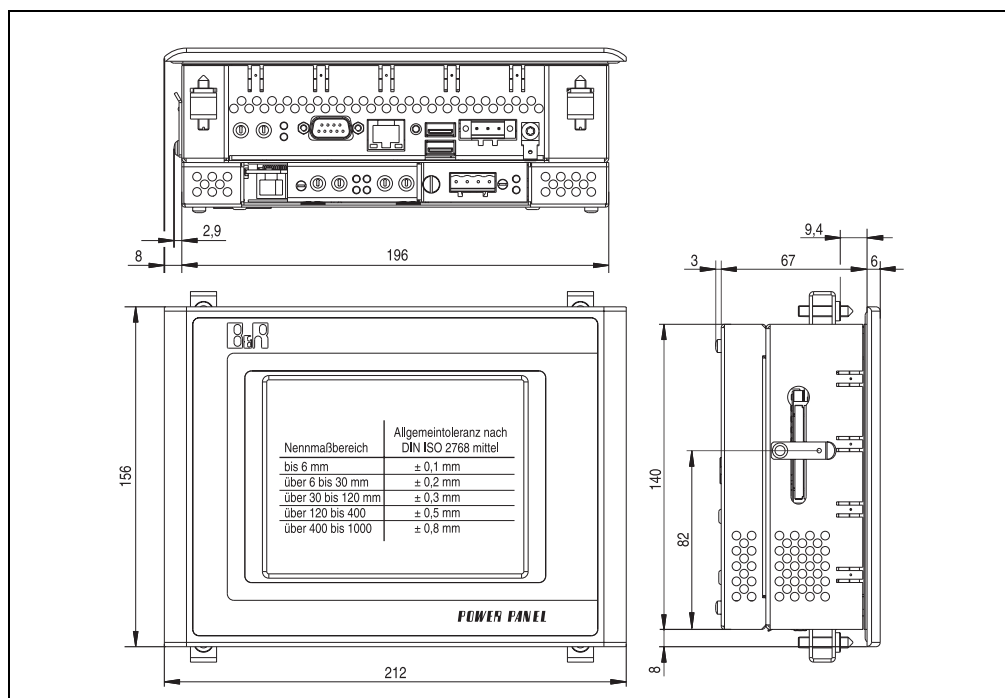


Figure 94: Dimensions - 4PP220.0571-45

3.4.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 94 "Dimensions - 4PP220.0571-45" on page 160) For further information regarding mounting, see section 3 "Installation" on page 421.

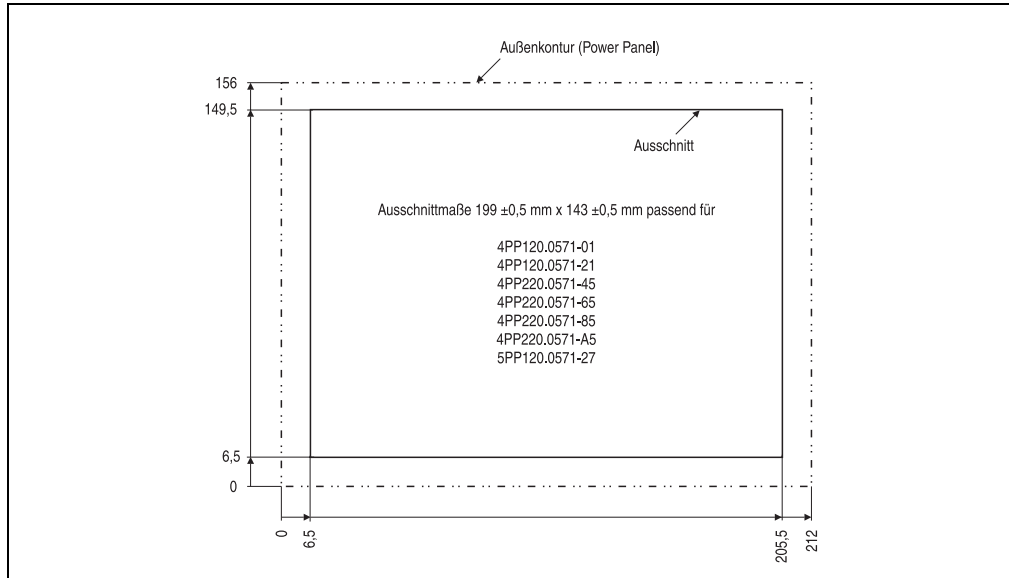


Figure 95: Cutout dimensions

3.4.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 220 LCD B/W QVGA 5.7in T MH 1aPCI
4	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 55: Contents of delivery - 4PP220.0571-45

3.5 Device 4PP220.0571-65



Figure 96: Front view - 4PP220.0571-65

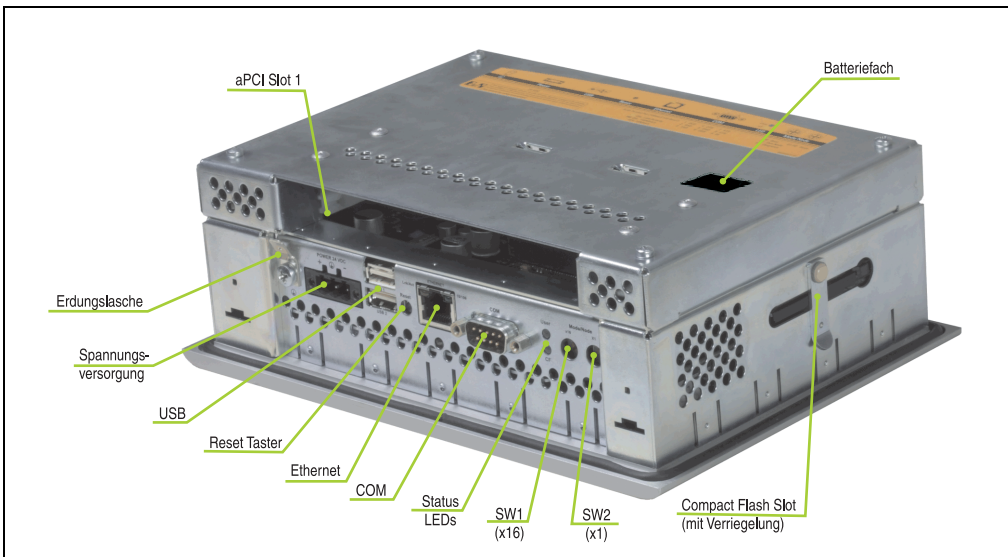


Figure 97: Rear view - 4PP220.0571-65

3.5.1 Technical data

Features	4PP220.0571-65
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 (rev. < G0 DP83615) 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 56: Technical data - 4PP220.0571-65

Technical data • Power Panel 200 with Automation Runtime

Features	4PP220.0571-65
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	1 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	LCD 5.7 in (144 mm) 256 colors QVGA, 320 x 240 pixels 40:1 80° / 90° 150 cd/m ² 50000 hours
Touch screen Technology Controller Degree of transmission	Analog, resistive (Gunze) Hampshire, serial, 12-bit 84 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	-
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 12 W typical, 17 W max. Yes
Ground resistance	≥ 47 kOhm

Table 56: Technical data - 4PP220.0571-65 (Forts.)

Mechanical characteristics	4PP220.0571-65
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	212 mm
Height	156 mm
Depth	76 mm
Weight	Approx. 1.7 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 60 °C
Transportation	-20 .. 60 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s ² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s ² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s ² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s ² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s ² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s ² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s ² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 56: Technical data - 4PP220.0571-65 (Forts.)

1) System Management Controller

2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.5.2 Dimensions

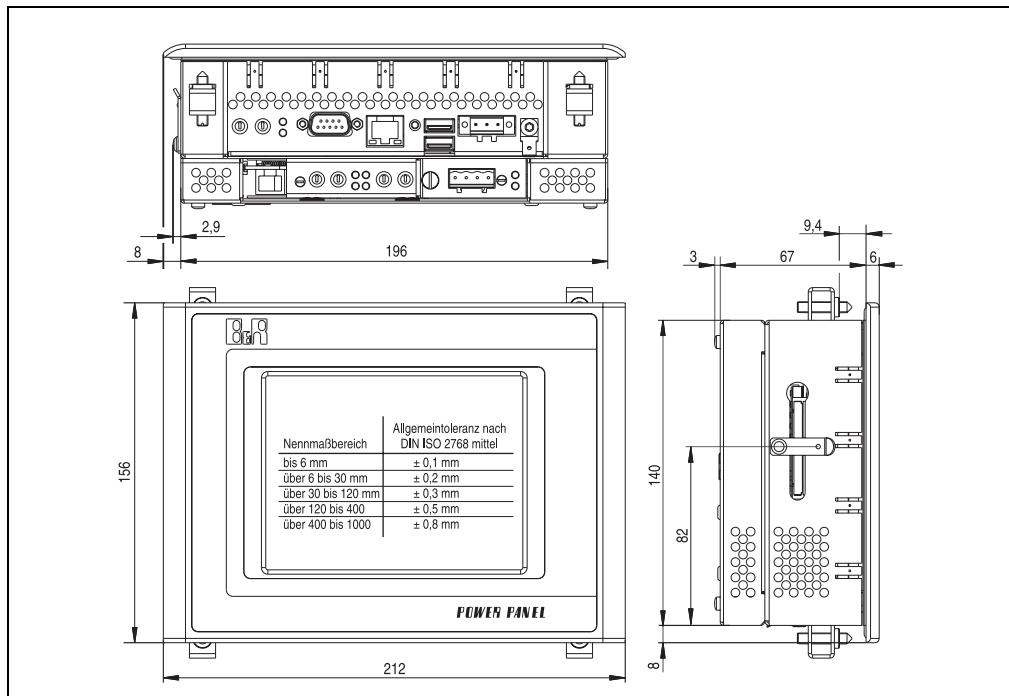


Figure 98: Dimensions - 4PP220.0571-65

3.5.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 98 "Dimensions - 4PP220.0571-65" on page 166) For further information regarding mounting, see section 3 "Installation" on page 421.

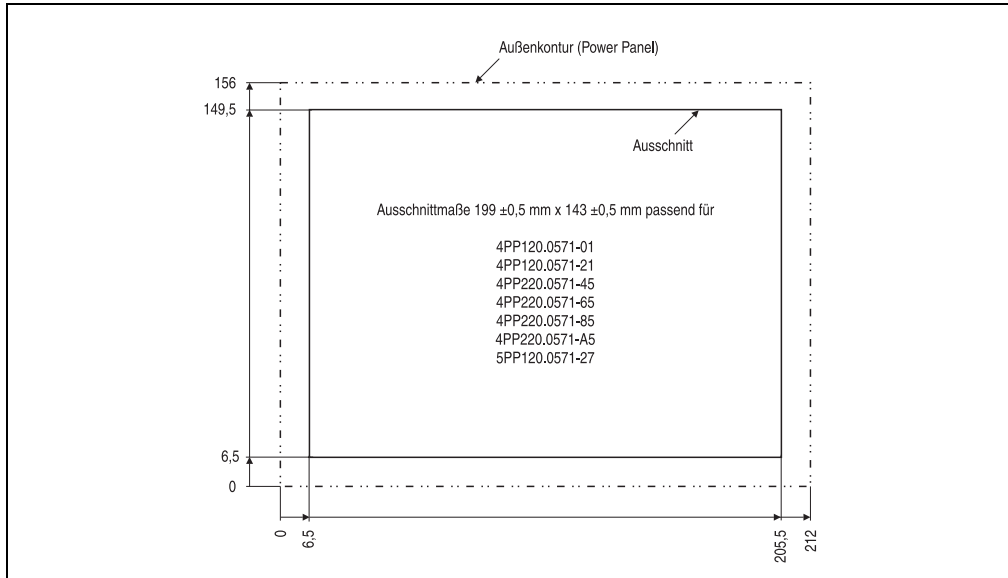


Figure 99: Cutout dimensions

3.5.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 220 LCD C QVGA 5.7in T MH 1aPCI
4	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 57: Contents of delivery - 4PP220.0571-65

3.6 Device 4PP220.0571-85



Figure 100: Front view - 4PP220.0571-85

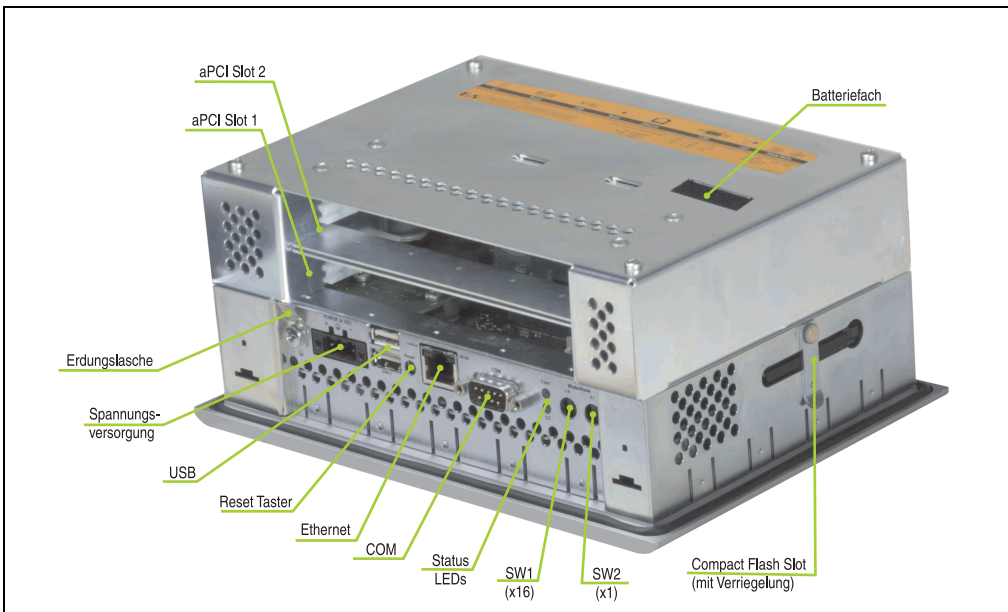


Figure 101: Rear view - 4PP220.0571-85

3.6.1 Technical data

Features	4PP220.0571-85
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 (rev. < G0 DP83615) 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 58: Technical data - 4PP220.0571-85

Technical data • Power Panel 200 with Automation Runtime

Features	4PP220.0571-85
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	2 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	LCD 5.7 in (144 mm) 8 shades of gray QVGA, 320 x 240 pixels 25:1 80° / 80° 140 cd/m ² 50000 hours
Touch screen Technology Controller Degree of transmission	Analog, resistive (Gunze) Hampshire, serial, 12-bit 84 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	-
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 12 W typical, 17 W max. Yes
Ground resistance	≥ 47 kOhm

Table 58: Technical data - 4PP220.0571-85 (Forts.)

Mechanical characteristics	4PP220.0571-85
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	212 mm
Height	156 mm
Depth	98 mm
Weight	Approx. 2 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 70 °C
Transportation	-20 .. 70 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 58: Technical data - 4PP220.0571-85 (Forts.)

1) System Management Controller

2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.6.2 Dimensions

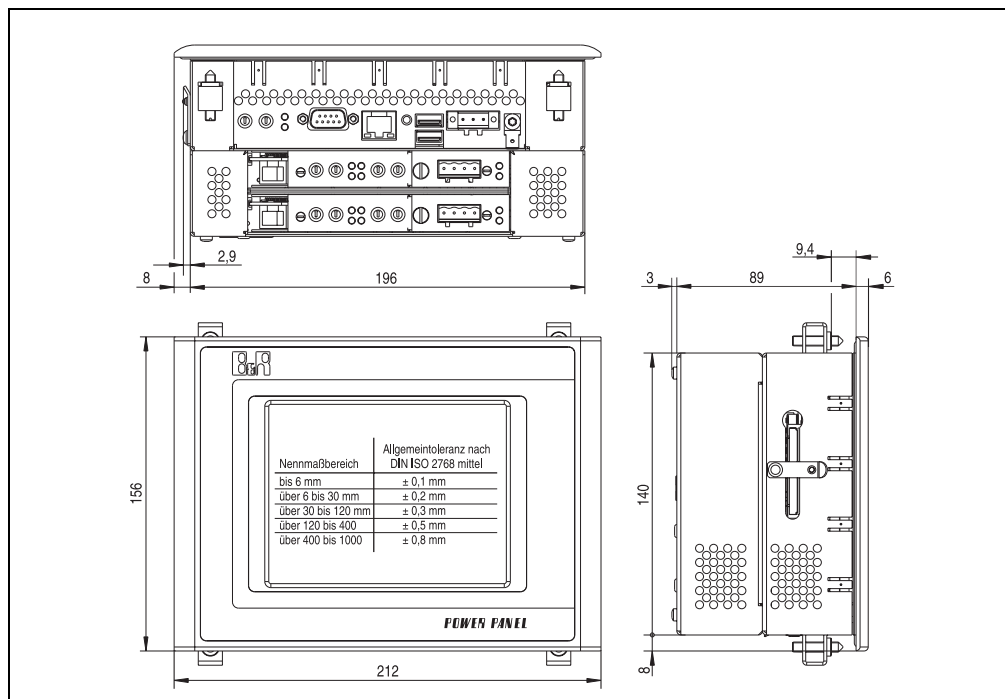


Figure 102: Dimensions - 4PP220.0571-85

3.6.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 102 "Dimensions - 4PP220.0571-85" on page 172) For further information regarding mounting, see section 3 "Installation" on page 421.

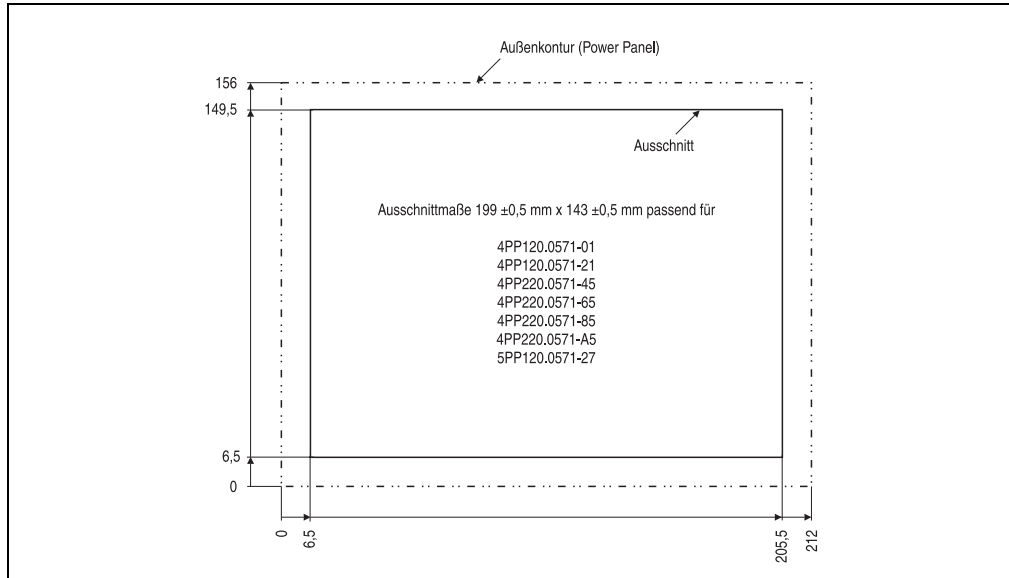


Figure 103: Cutout dimensions

3.6.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 220 LCD B/W QVGA 5.7in T MH 2aPCI
4	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 59: Contents of delivery - 4PP220.0571-85

3.7 Device 4PP220.0571-A5



Figure 104: Front view - 4PP220.0571-A5

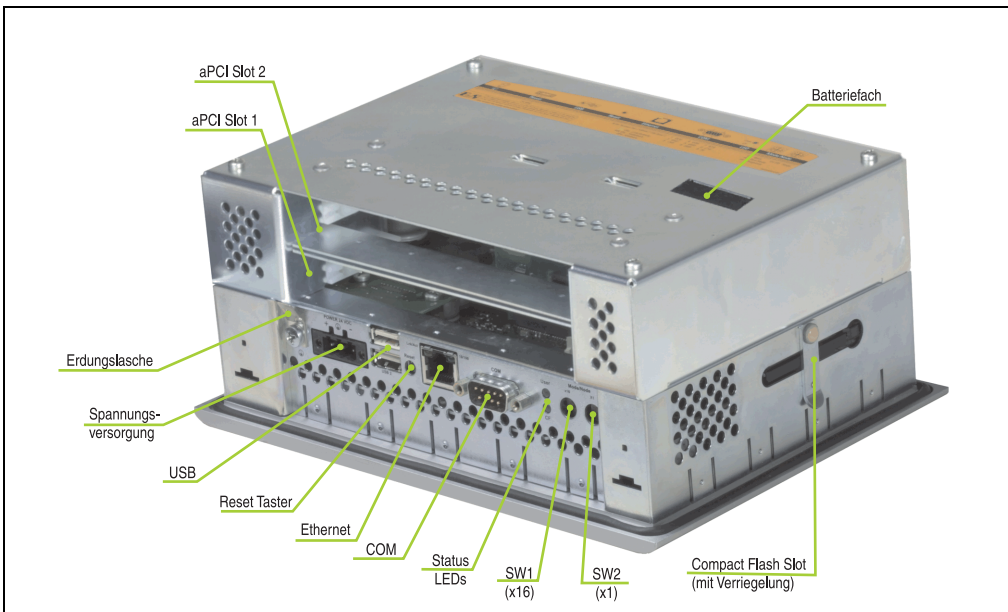


Figure 105: Rear view - 4PP220.0571-A5

3.7.1 Technical data

Features	4PP220.0571-A5
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 (rev. < G0 DP83615) 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 60: Technical data - 4PP220.0571-A5

Technical data • Power Panel 200 with Automation Runtime

Features	4PP220.0571-A5
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	2 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	LCD 5.7 in (144 mm) 256 colors QVGA, 320 x 240 pixels 40:1 80° / 90° 150 cd/m ² 50000 hours
Touch screen Technology Controller Degree of transmission	Analog, resistive (Gunze) Hampshire, serial, 12-bit 84 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	-
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 12 W typical, 17 W max. Yes
Ground resistance	≥ 47 kOhm

Table 60: Technical data - 4PP220.0571-A5 (Forts.)

Mechanical characteristics	4PP220.0571-A5
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	212 mm
Height	156 mm
Depth	98 mm
Weight	Approx. 2 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 60 °C
Transportation	-20 .. 60 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s ² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s ² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s ² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s ² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s ² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s ² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s ² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 60: Technical data - 4PP220.0571-A5 (Forts.)

1) System Management Controller

2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.7.2 Dimensions

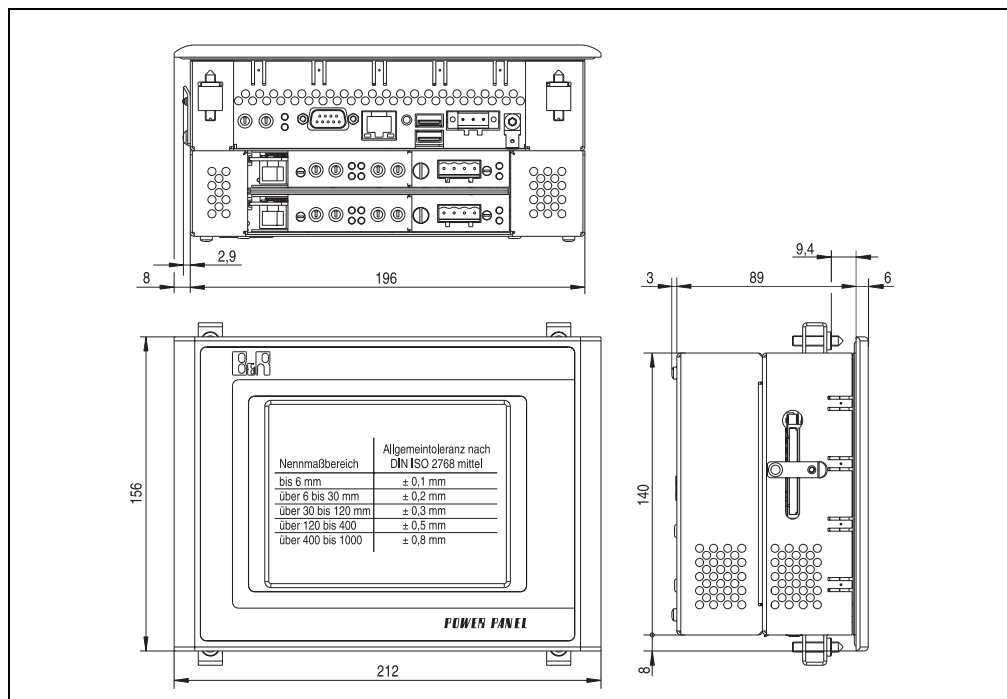


Figure 106: Dimensions - 4PP220.0571-A5

3.7.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 106 "Dimensions - 4PP220.0571-A5" on page 178) For further information regarding mounting, see section 3 "Installation" on page 421.

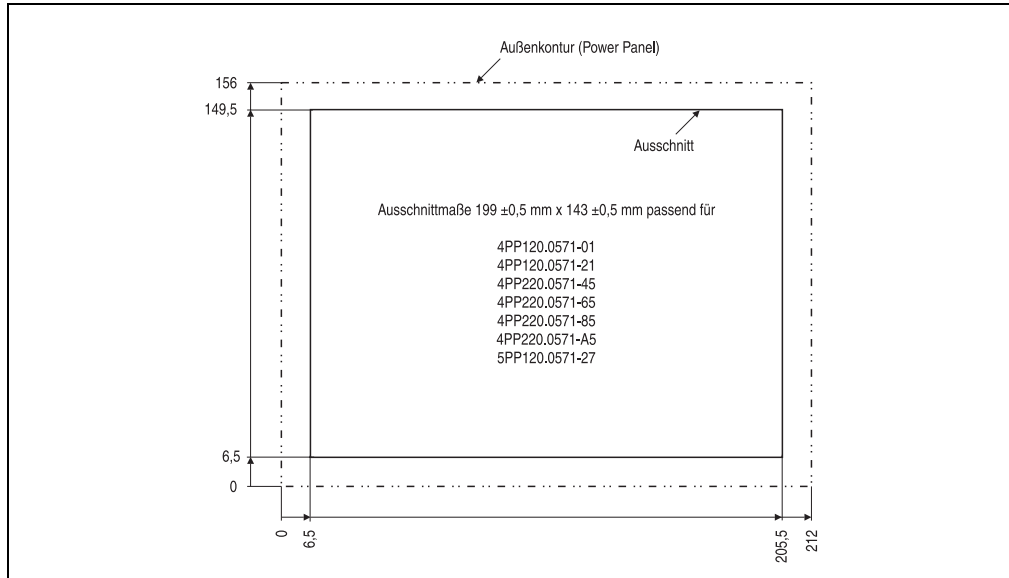


Figure 107: Cutout dimensions

3.7.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 220 LCD C QVGA 5.7in T MH 2aPCI
4	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 61: Contents of delivery - 4PP220.0571-A5

3.8 Device 4PP220.1043-75

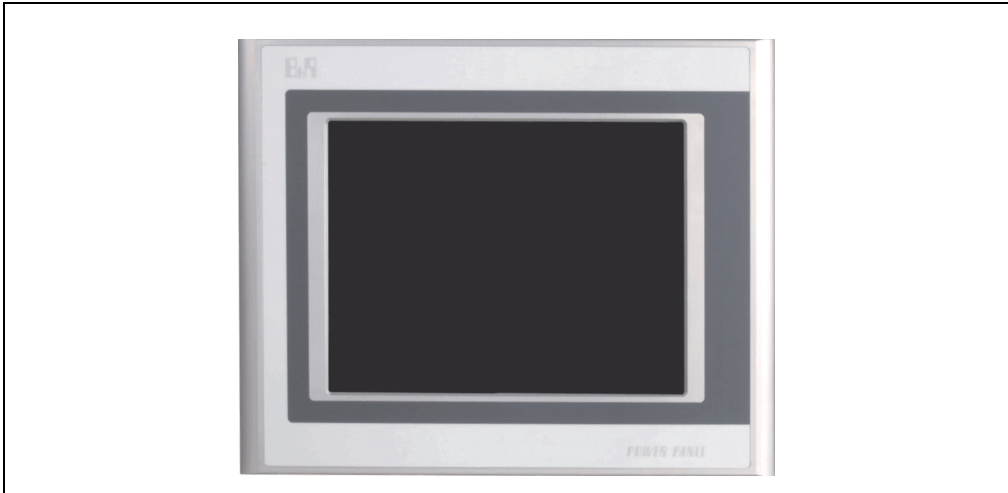


Figure 108: Front view - 4PP220.1043-75

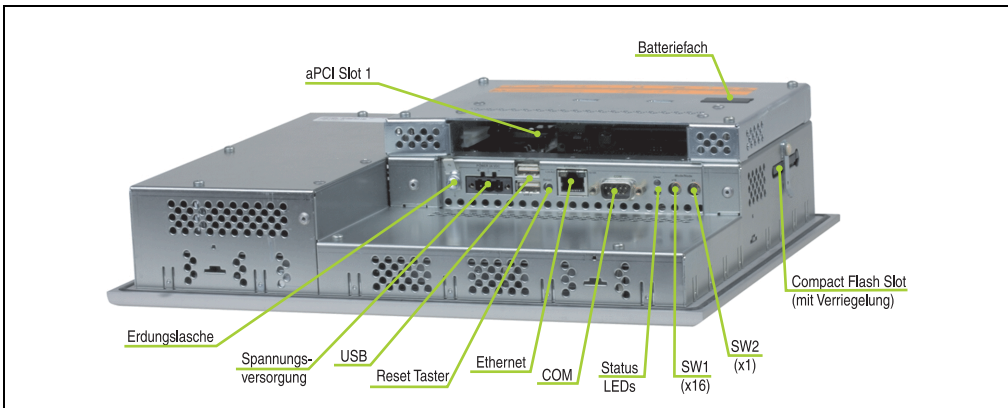


Figure 109: Rear view - 4PP220.1043-75

3.8.1 Technical data

Features	4PP220.1043-75
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 (rev. < F0 DP83615) 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 62: Technical data - 4PP220.1043-75

Technical data • Power Panel 200 with Automation Runtime

Features	4PP220.1043-75
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	1 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 70° / 55° 350 cd/m ² 55000 hours
Touch screen Technology Controller Degree of transmission	Analog, resistive, Elo (rev. < M0: 3M) Hampshire, serial, 12-bit 78 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	-
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 17 W typical, 22 W max. Yes
Ground resistance	≥ 47 kOhm

Table 62: Technical data - 4PP220.1043-75 (Forts.)

Mechanical characteristics	4PP220.1043-75
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	323 mm
Height	260 mm
Depth	86 mm
Weight	Approx. 3.9 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 70 °C
Transportation	-20 .. 70 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3000 m

Table 62: Technical data - 4PP220.1043-75 (Forts.)

1) System Management Controller

2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.8.2 Dimensions

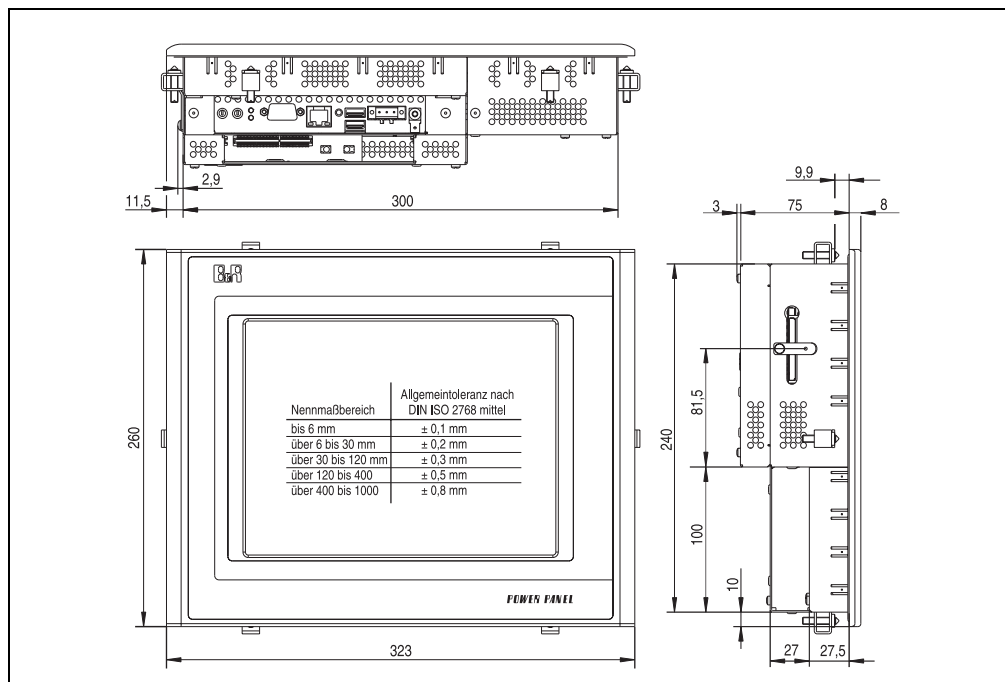


Figure 110: Dimensions - 4PP220.1043-75

3.8.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 110 "Dimensions - 4PP220.1043-75" on page 184) For further information regarding mounting, see section 3 "Installation" on page 421.

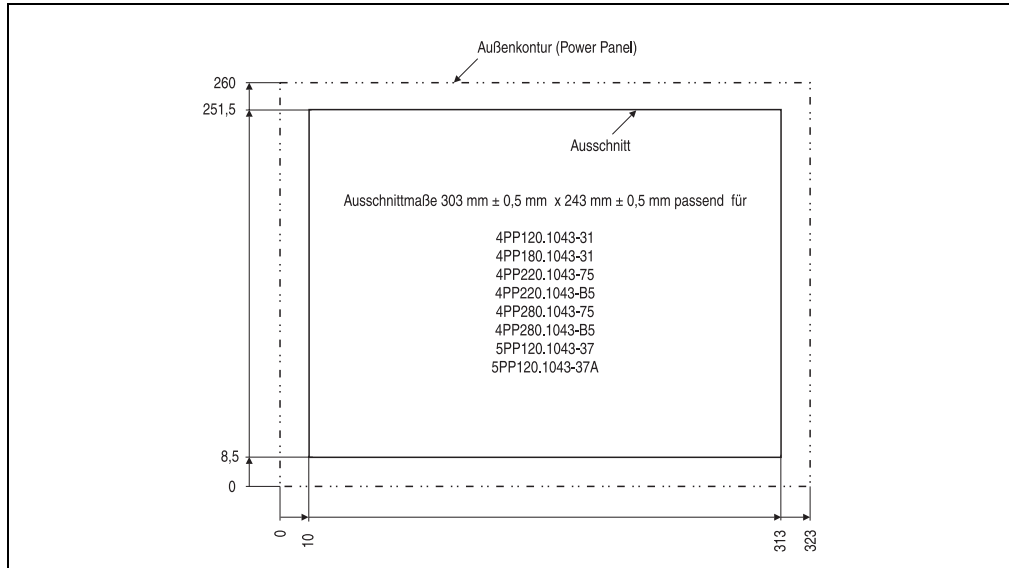


Figure 111: Cutout dimensions

3.8.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 220 TFT C VGA 10.4in T MH 1aPCI
6	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 63: Contents of delivery - 4PP220.1043-75

3.9 Device 4PP220.1043-B5

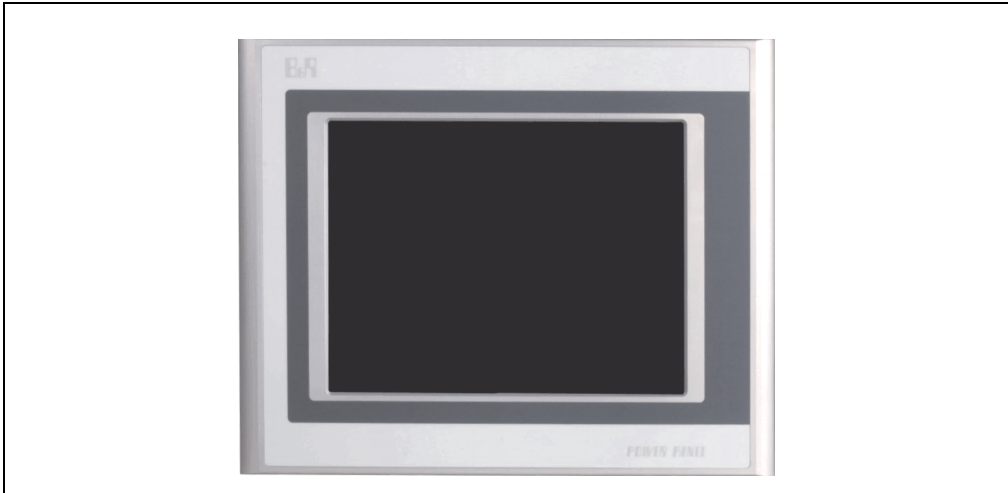


Figure 112: Front view - 4PP220.1043-B5

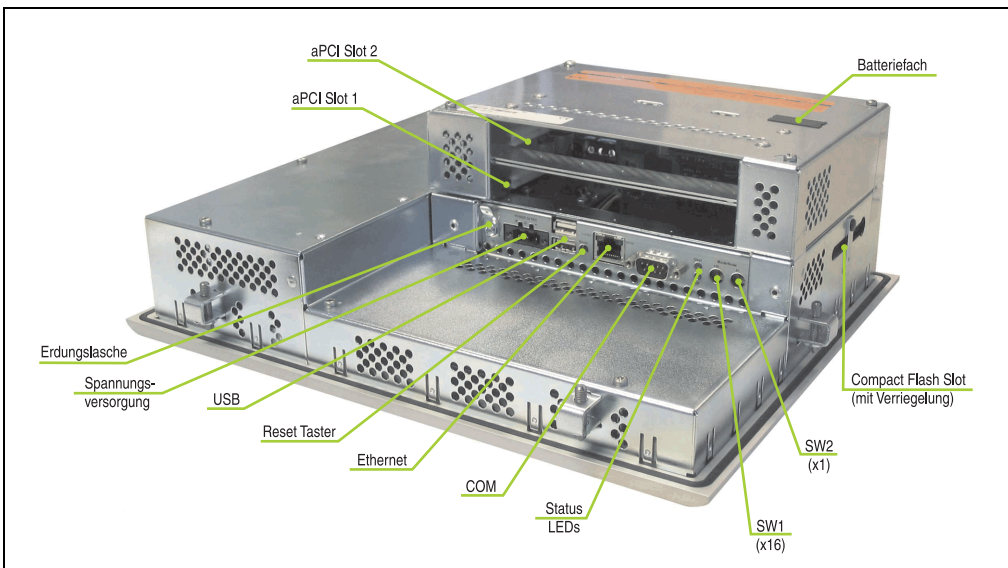


Figure 113: Rear view - 4PP220.1043-B5

3.9.1 Technical data

Features	4PP220.1043-B5
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 (rev. < G0 DP83615) 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 64: Technical data - 4PP220.1043-B5

Technical data • Power Panel 200 with Automation Runtime

Features	4PP220.1043-B5
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	2 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 70° / 55° 350 cd/m ² 55000 hours
Touch screen Technology Controller Degree of transmission	Analog, resistive, Elo (rev. < M0: 3M) Hampshire, serial, 12-bit 78 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	-
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 17 W typical, 22 W max. Yes
Ground resistance	≥ 47 kOhm

Table 64: Technical data - 4PP220.1043-B5 (Forts.)

Mechanical characteristics	4PP220.1043-B5
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	323 mm
Height	260 mm
Depth	108 mm
Weight	Approx. 4.2 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 70 °C
Transportation	-20 .. 70 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3000 m

Table 64: Technical data - 4PP220.1043-B5 (Forts.)

1) System Management Controller

2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.9.2 Dimensions

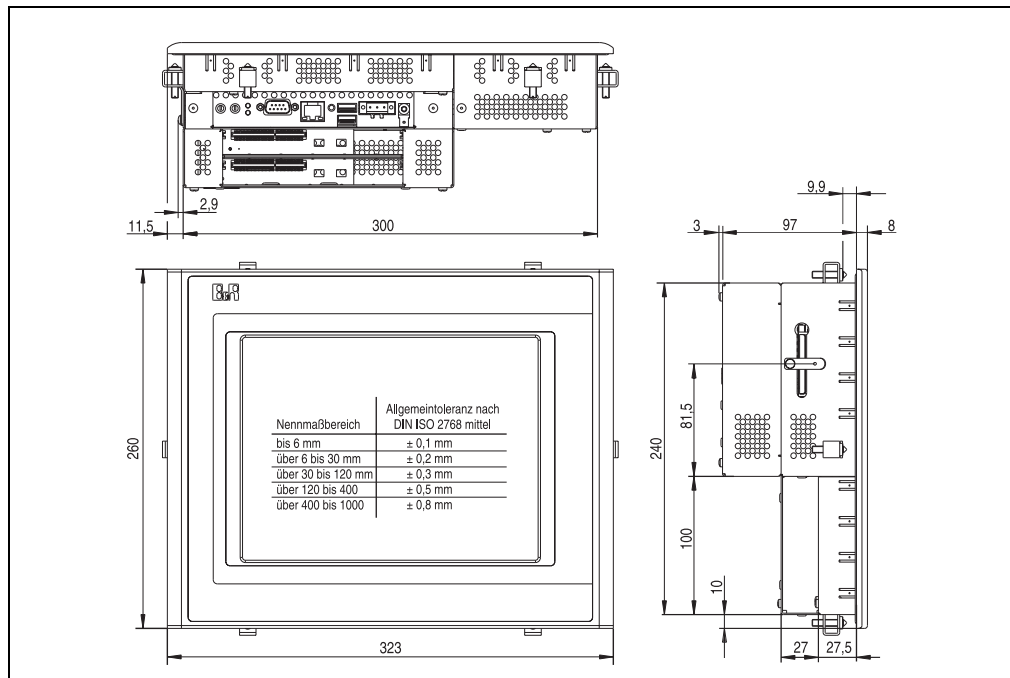


Figure 114: Dimensions - 4PP220.1043-B5

3.9.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 114 "Dimensions - 4PP220.1043-B5" on page 190) For further information regarding mounting, see section 3 "Installation" on page 421.

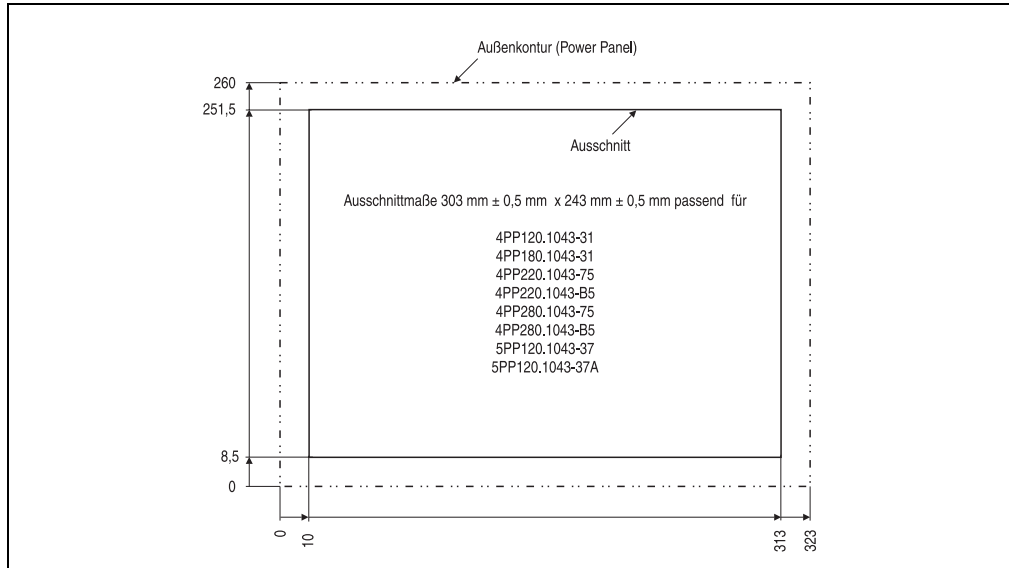


Figure 115: Cutout dimensions

3.9.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 220 TFT C VGA 10.4in T MH 2aPCI
6	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 65: Contents of delivery - 4PP220.1043-B5

3.10 Device 4PP220.1505-75



Figure 116: Front view - 4PP220.1505-75

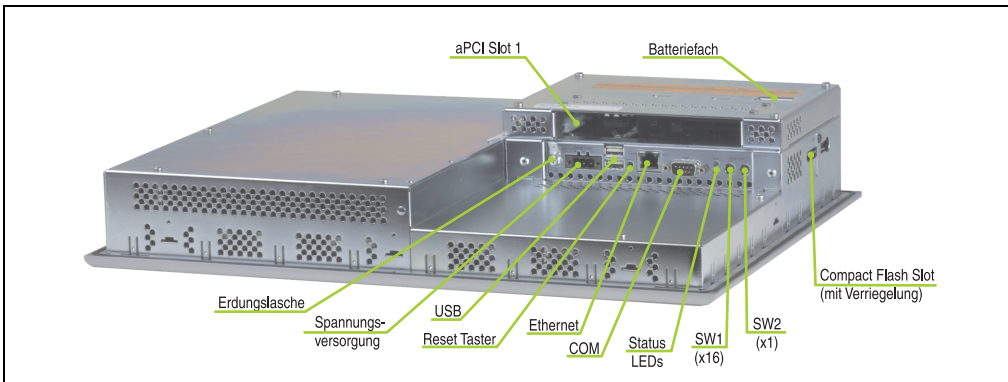


Figure 117: Rear view - 4PP220.1505-75

3.10.1 Technical data

Features	4PP220.1505-75
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 (rev. < G0 DP83615) 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 66: Technical data - 4PP220.1505-75

Technical data • Power Panel 200 with Automation Runtime

Features	4PP220.1505-75
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	1 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 15 inch (380 mm) 256 colors XGA, 1024 x 768 pixels 300:1 140° / 115° 330 cd/m ² 35000 hours
Touch screen Technology Controller Degree of transmission	Analog, resistive, Elo (rev. < N0: 3M) Hampshire, serial, 12-bit 78 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	-
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 30 W typical, 35 W max. Yes
Ground resistance	≥ 47 kOhm

Table 66: Technical data - 4PP220.1505-75 (Forts.)

Mechanical characteristics	4PP220.1505-75
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	435 mm
Height	330 mm
Depth	86 mm
Weight	Approx. 6.7 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 60 °C
Transportation	-20 .. 60 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s ² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s ² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s ² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s ² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s ² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s ² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s ² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 66: Technical data - 4PP220.1505-75 (Forts.)

1) System Management Controller

2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.10.2 Dimensions

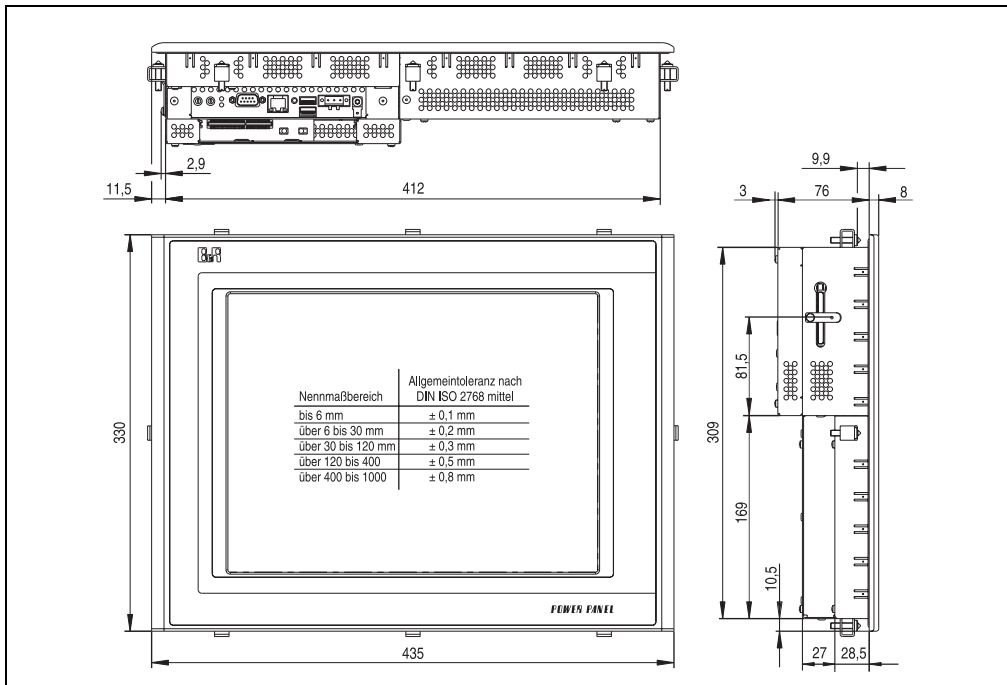


Figure 118: Dimensions - 4PP220.1505-75

3.10.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 118 "Dimensions - 4PP220.1505-75" on page 196) For further information regarding mounting, see section 3 "Installation" on page 421.

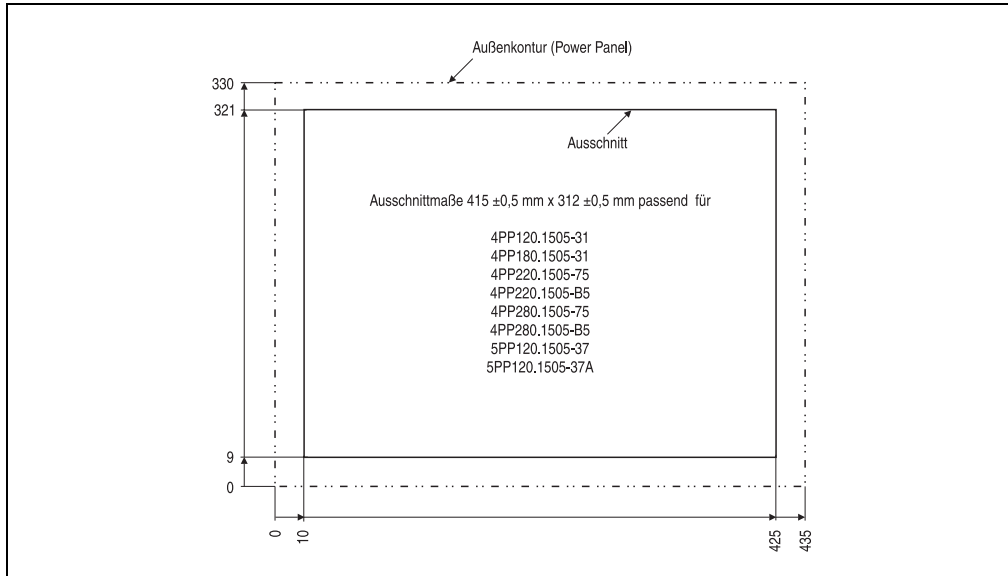


Figure 119: Cutout dimensions

3.10.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 220 TFT C XGA 15in T MH 1aPCI
8	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 67: Contents of delivery - 4PP220.1505-75

3.11 Device 4PP220.1505-B5



Figure 120: Front view - 4PP220.1505-B5

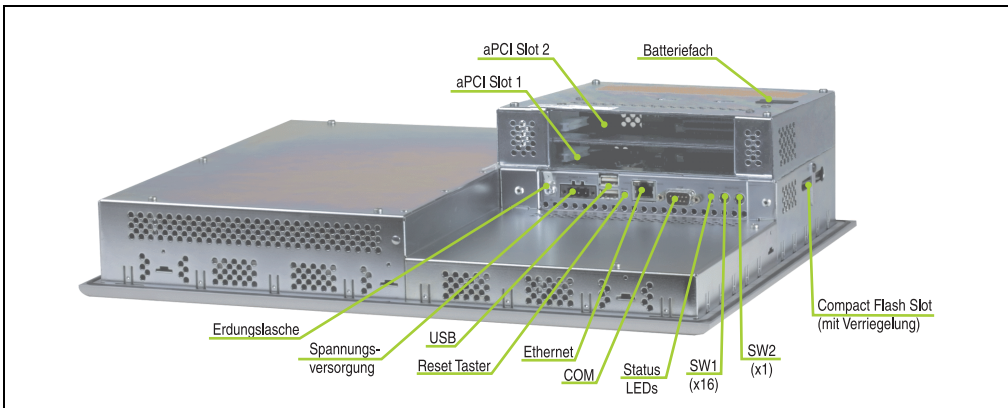


Figure 121: Rear view - 4PP220.1505-B5

3.11.1 Technical data

Features	4PP220.1505-B5
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 (rev. < G0 DP83615) 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 68: Technical data - 4PP220.1505-B5

Technical data • Power Panel 200 with Automation Runtime

Features	4PP220.1505-B5
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	2 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 15 inch (380 mm) 256 colors XGA, 1024 x 768 pixels 300:1 140° / 115° 330 cd/m ² 35000 hours
Touch screen Technology Controller Degree of transmission	Analog, resistive, Elo (rev. < N0: 3M) Hampshire, serial, 12-bit 78 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	-
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 30 W typical, 35 W max. Yes
Ground resistance	≥ 47 kOhm

Table 68: Technical data - 4PP220.1505-B5 (Forts.)

Mechanical characteristics	4PP220.1505-B5
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	435 mm
Height	330 mm
Depth	109 mm
Weight	Approx. 6.8 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 60 °C
Transportation	-20 .. 60 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s ² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s ² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s ² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s ² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s ² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s ² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s ² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 68: Technical data - 4PP220.1505-B5 (Forts.)

1) System Management Controller

2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.11.2 Dimensions

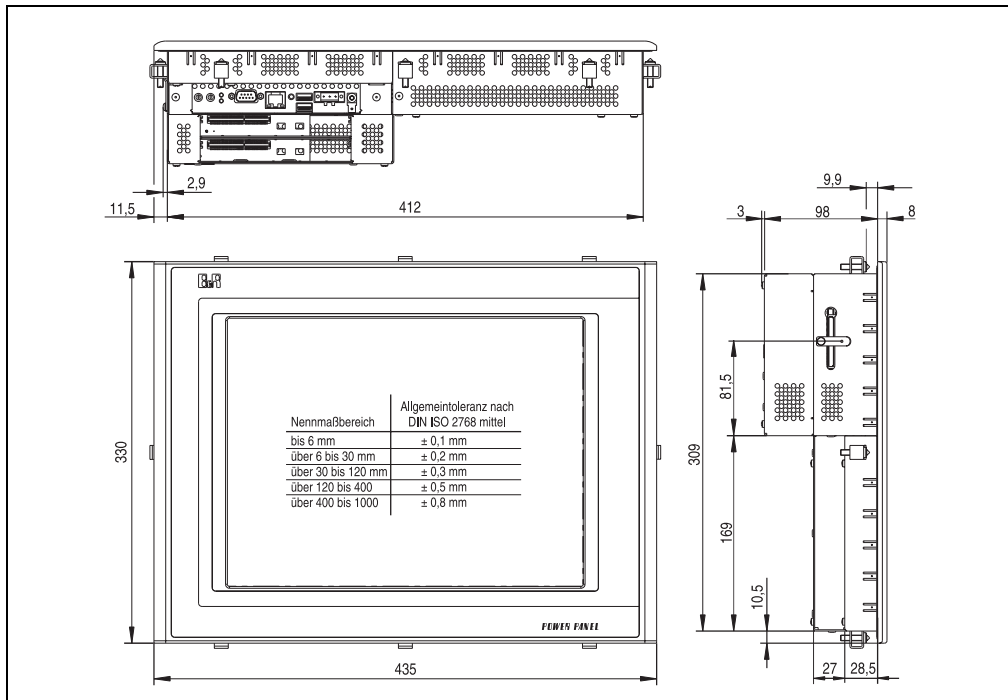


Figure 122: Dimensions - 4PP220.1505-B5

3.11.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 122 "Dimensions - 4PP220.1505-B5" on page 202) For further information regarding mounting, see section 3 "Installation" on page 421.

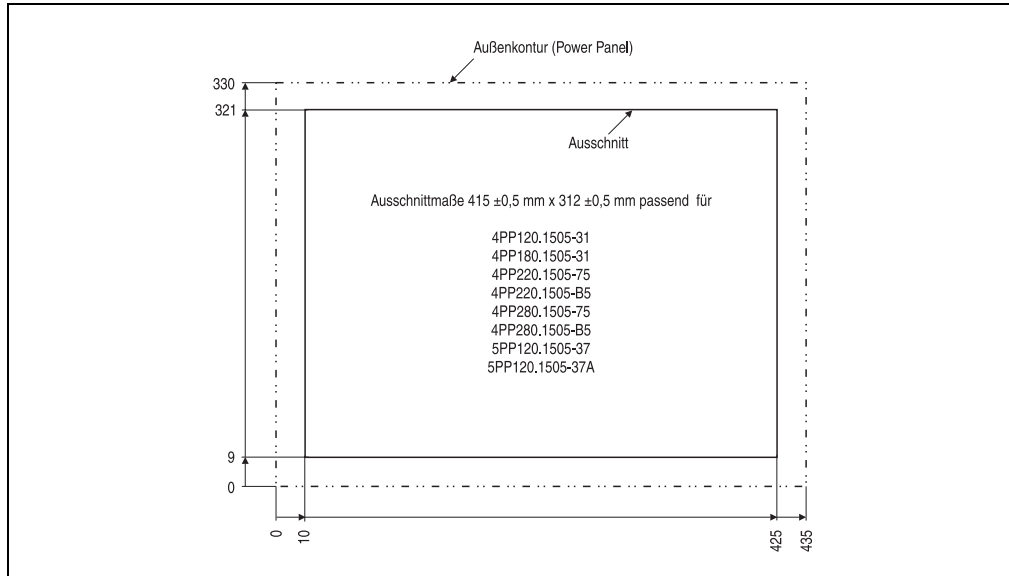


Figure 123: Cutout dimensions

3.11.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 220 TFT C XGA 15in T MH 2aPCI
8	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 69: Contents of delivery - 4PP220.1505-B5

3.12 Device 4PP251.0571-45

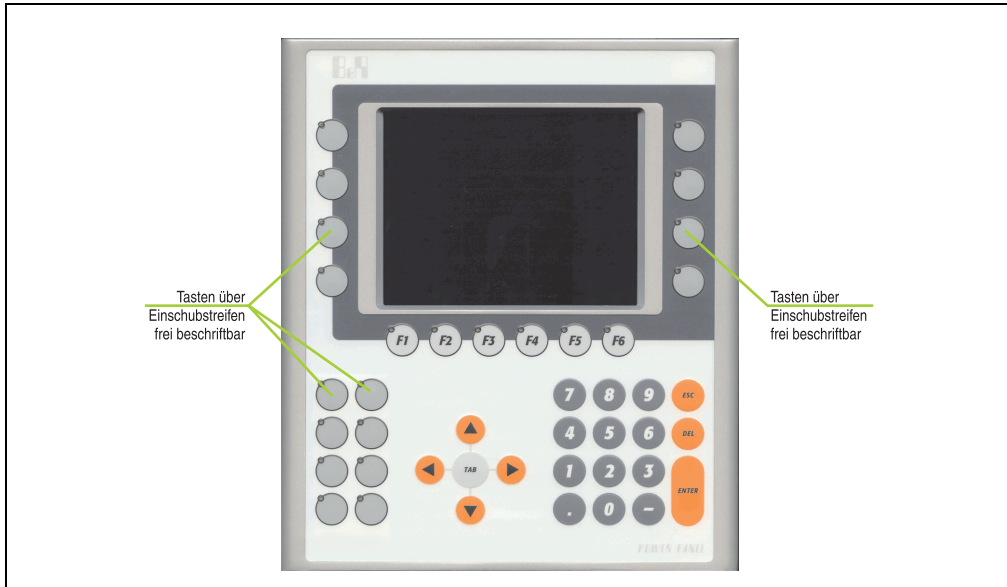


Figure 124: Front view - 4PP251.0571-45

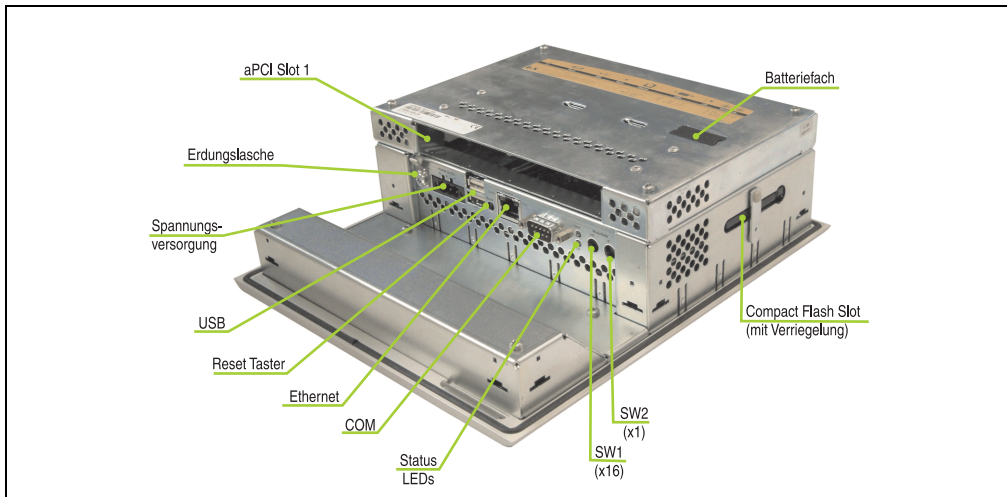


Figure 125: Rear view - 4PP251.0571-45

3.12.1 Technical data

Features	4PP251.0571-45
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 70: Technical data - 4PP251.0571-45

Technical data • Power Panel 200 with Automation Runtime

Features	4PP251.0571-45
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	1 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	LCD 5.7 in (144 mm) 8 shades of gray QVGA, 320 x 240 pixels 25:1 80° / 80° 140 cd/m ² 50000 hours
Touch screen Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Function keys Soft keys Cursor pad Number block Other keys	16 with LED 6 with LED - 15 without LED 5 without LED
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. Yes
Ground resistance	≥ 47 kOhm

Table 70: Technical data - 4PP251.0571-45 (Forts.)

Mechanical characteristics	4PP251.0571-45
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Orange keys	Similar to Pantone 151CV
Dark gray keys	Similar to Pantone 431CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	212 mm
Height	245 mm
Depth	76 mm
Weight	Approx. 2.4 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 70 °C
Transportation	-20 .. 70 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3000 m

Table 70: Technical data - 4PP251.0571-45 (Forts.)

1) System Management Controller

2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.12.2 Dimensions

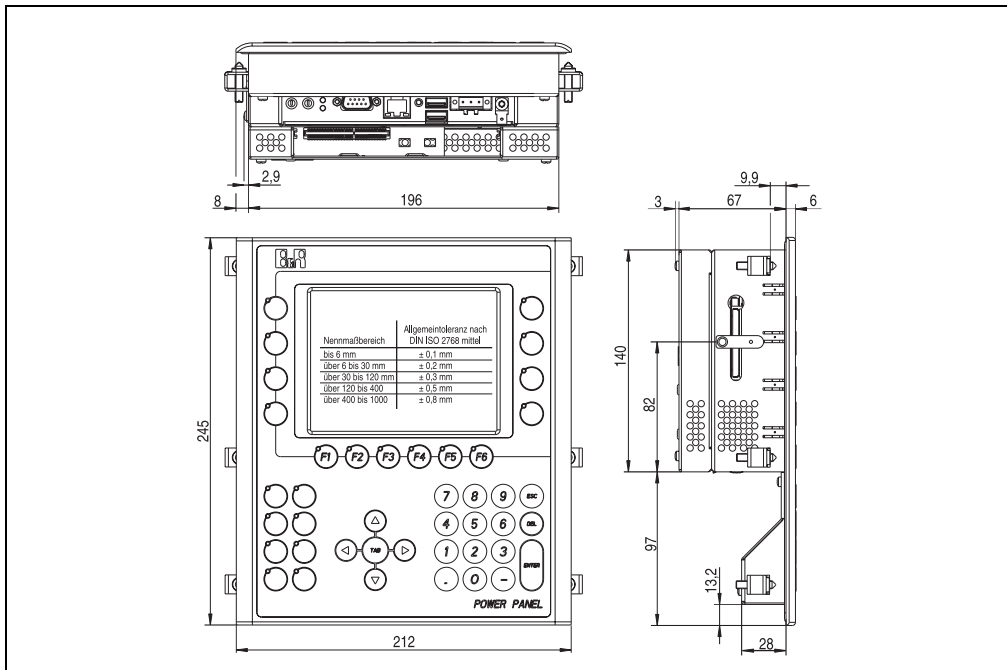


Figure 126: Dimensions - 4PP251.0571-45

3.12.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 126 "Dimensions - 4PP251.0571-45" on page 208) For further information regarding mounting, see section 3 "Installation" on page 421.

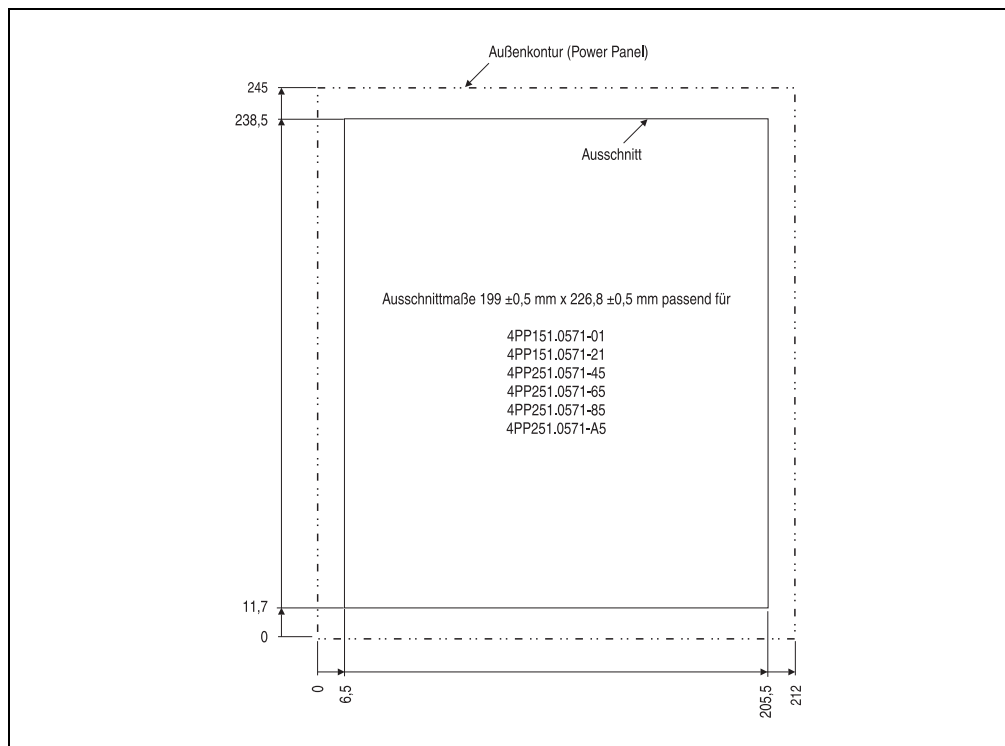


Figure 127: Cutout Dimensions

3.12.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 251 LCD B/W QVGA 5.7" F MH 1aPCI
6	Retaining clips included
1	Lithium battery 3 V / 950 mAh included
4	Insert strips (inserted in the front)

Table 71: Contents of delivery - 4PP251.0571-45

3.13 Device 4PP251.0571-65

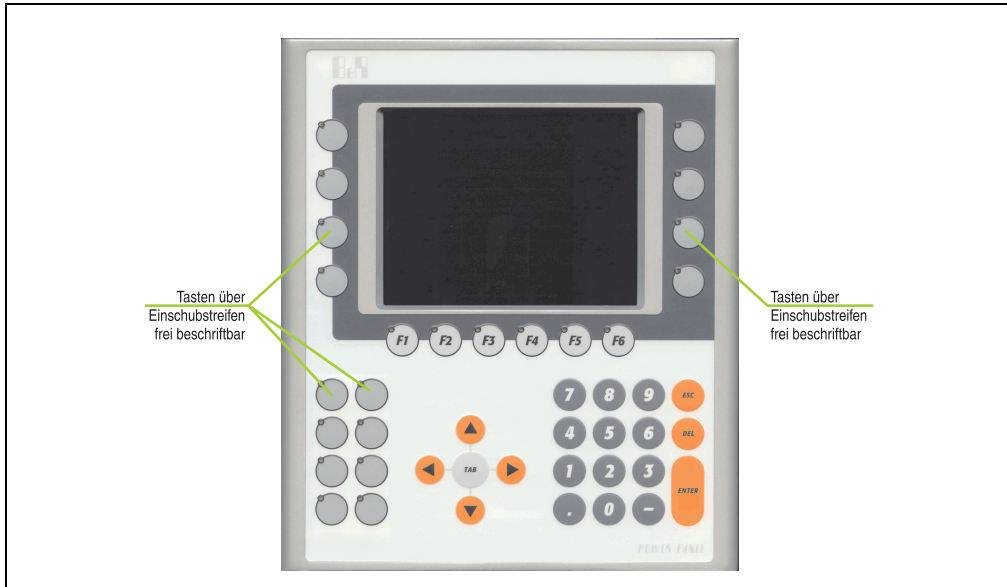


Figure 128: Front view - 4PP251.0571-65

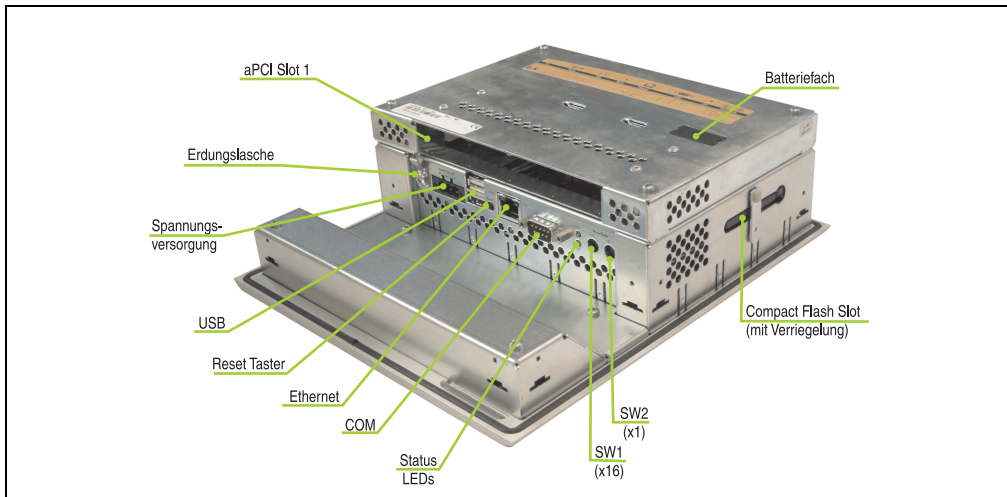


Figure 129: Rear view - 4PP251.0571-65

3.13.1 Technical data

Features	4PP251.0571-65
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 72: Technical data - 4PP251.0571-65

Technical data • Power Panel 200 with Automation Runtime

Features	4PP251.0571-65
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	1 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	LCD 5.7 in (144 mm) 256 colors QVGA, 320 x 240 pixels 40:1 80° / 90° 150 cd/m ² 50000 hours
Touch screen Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95 % On both sides
Keys Function keys Soft keys Cursor pad Number block Other keys	16 with LED 6 with LED - 15 without LED 5 without LED
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. Yes
Ground resistance	≥ 47 kOhm

Table 72: Technical data - 4PP251.0571-65 (Forts.)

Mechanical characteristics	4PP251.0571-65
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Orange keys	Similar to Pantone 151CV
Dark gray keys	Similar to Pantone 431CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	212 mm
Height	245 mm
Depth	76 mm
Weight	Approx. 2.4 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 60 °C
Transportation	-20 .. 60 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3000 m

Table 72: Technical data - 4PP251.0571-65 (Forts.)

1) System Management Controller

2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.13.2 Dimensions

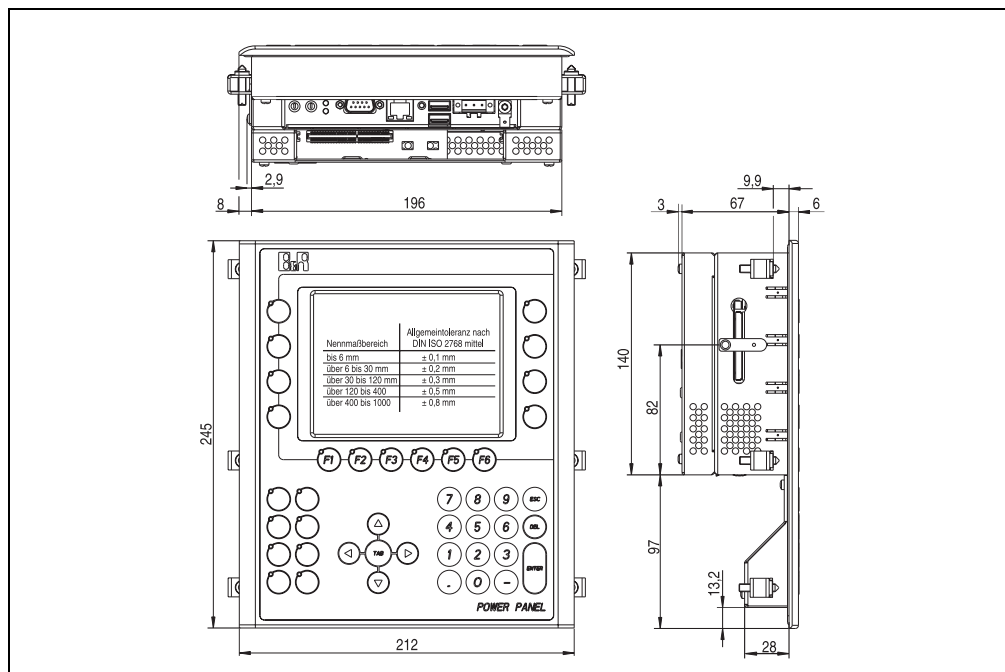


Figure 130: Dimensions - 4PP251.0571-65

3.13.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 130 "Dimensions - 4PP251.0571-65" on page 214) For further information regarding mounting, see section 3 "Installation" on page 421.

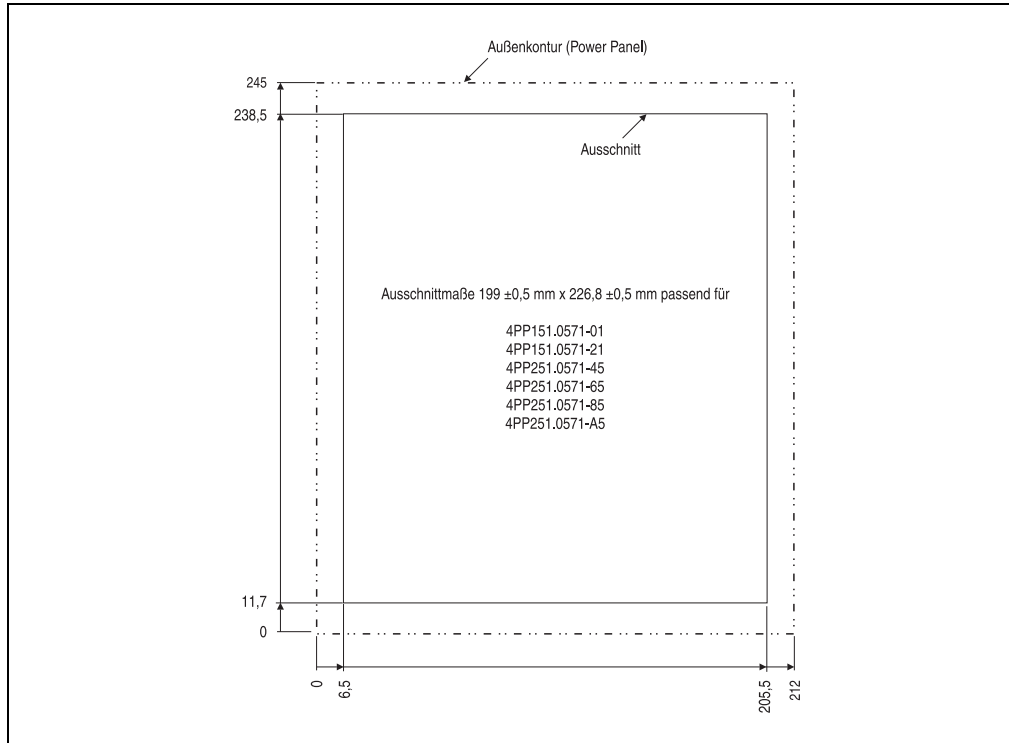


Figure 131: Cutout dimensions

3.13.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 251 LCD C QVGA 5.7in F MH 1aPCI
6	Retaining clips included
1	Lithium battery 3 V / 950 mAh included
4	Insert strips (inserted in the front)

Table 73: Contents of delivery - 4PP251.0571-65

3.14 Device 4PP251.0571-85

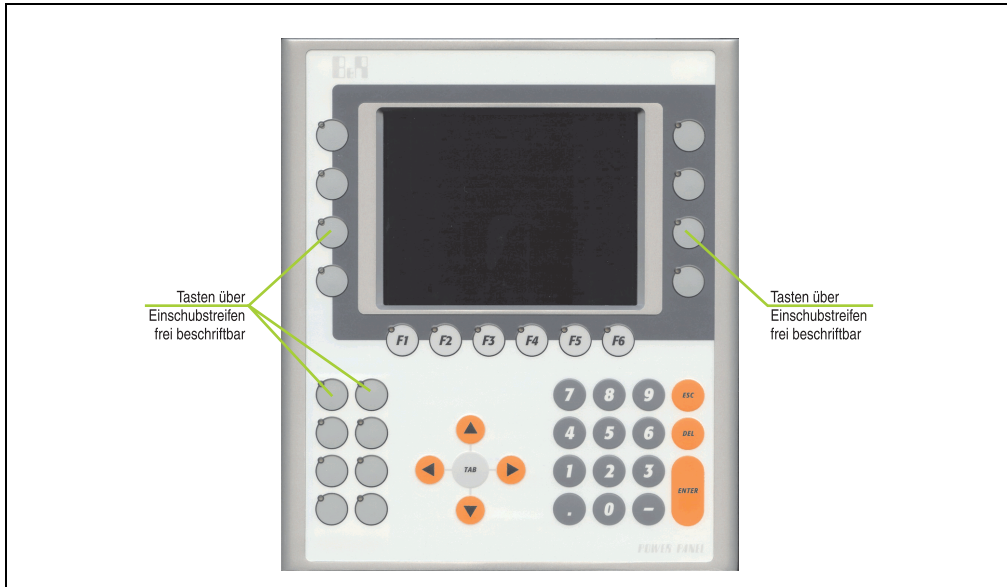


Figure 132: Front view - 4PP251.0571-85

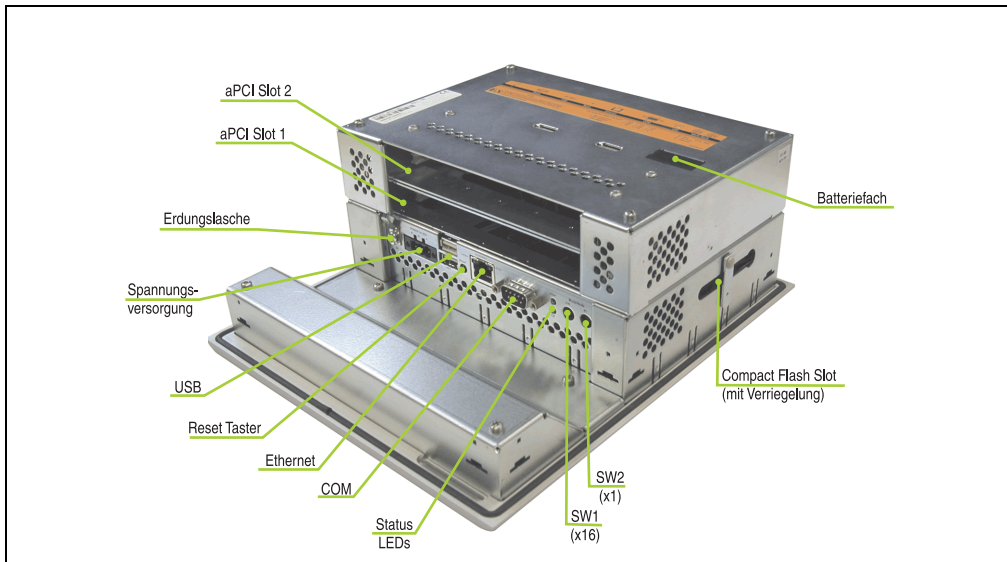


Figure 133: Rear view - 4PP251.0571-85

3.14.1 Technical data

Features	4PP251.0571-85
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 74: Technical data - 4PP251.0571-85

Technical data • Power Panel 200 with Automation Runtime

Features	4PP251.0571-85
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	2 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	LCD 5.7 in (144 mm) 8 shades of gray QVGA, 320 x 240 pixels 25:1 80° / 80° 140 cd/m ² 50000 hours
Touch screen Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Function keys Soft keys Cursor pad Number block Other keys	16 with LED 6 with LED - 15 without LED 5 without LED
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. Yes
Ground resistance	≥ 47 kOhm

Table 74: Technical data - 4PP251.0571-85 (Forts.)

Mechanical characteristics	4PP251.0571-85
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Orange keys	Similar to Pantone 151CV
Dark gray keys	Similar to Pantone 431CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	212 mm
Height	245 mm
Depth	98 mm
Weight	Approx. 2.7 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 70 °C
Transportation	-20 .. 70 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3000 m

Table 74: Technical data - 4PP251.0571-85 (Forts.)

1) System Management Controller

2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.14.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 134 "Dimensions - 4PP251.0571-85" on page 220) For further information regarding mounting, see section 3 "Installation" on page 421.

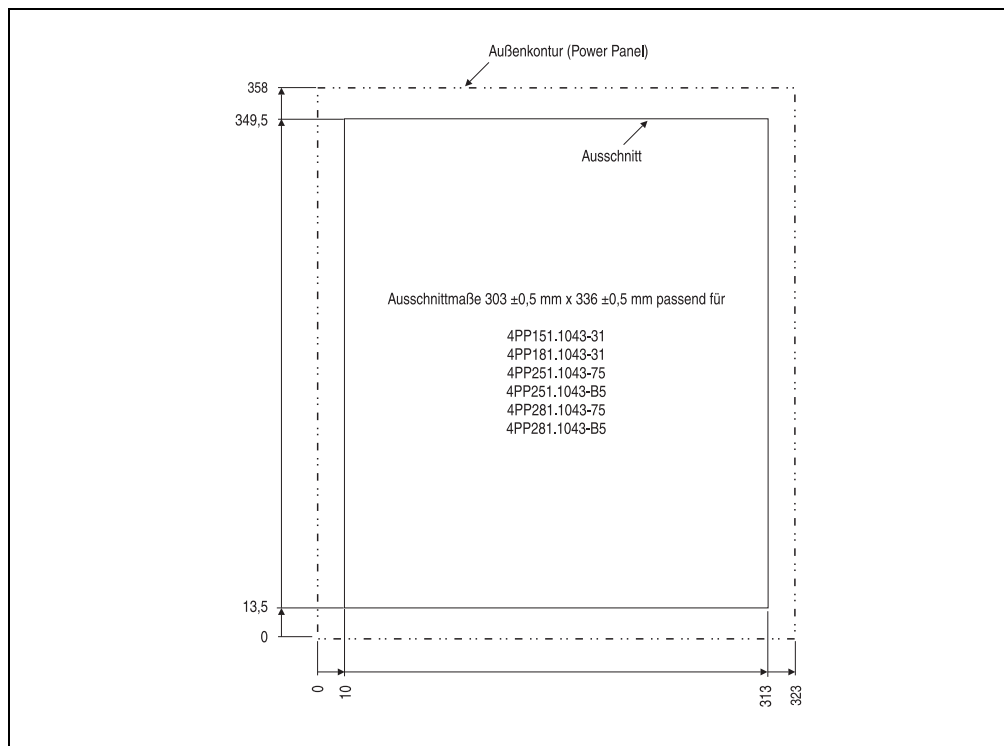


Figure 135: Cutout dimensions

3.14.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 251 LCD B/W QVGA 5.7" F MH 2aPCI
6	Retaining clips included
1	Lithium battery 3 V / 950 mAh included
4	Insert strips (inserted in the front)

Table 75: Contents of delivery - 4PP251.0571-85

3.15 Device 4PP251.0571-A5

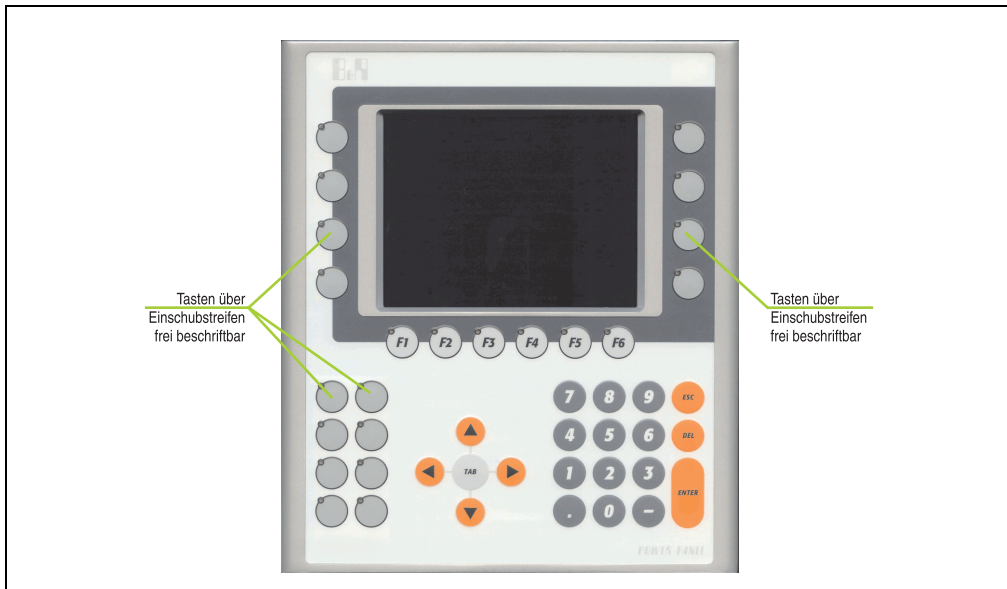


Figure 136: Front view - 4PP251.0571-A5

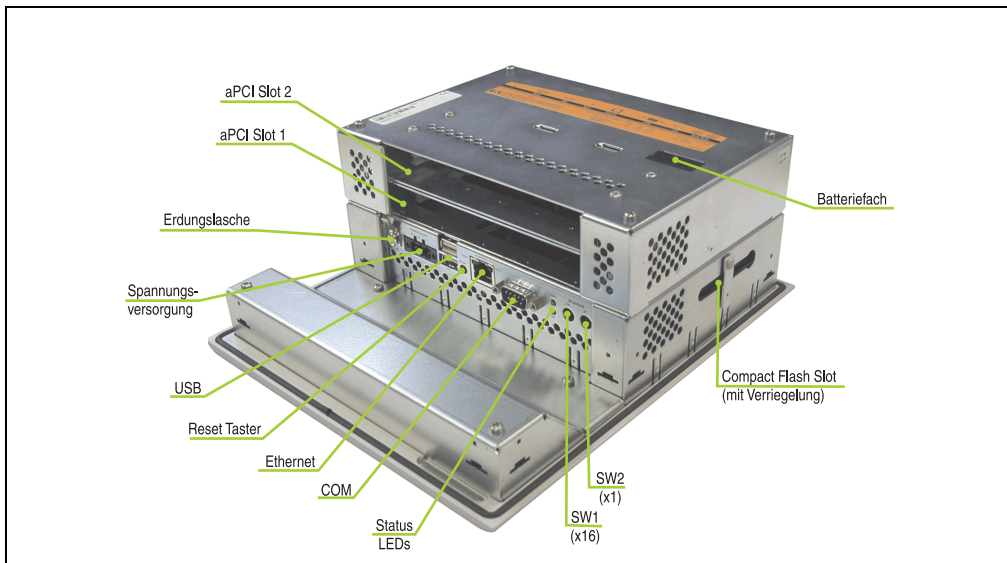


Figure 137: Rear view - 4PP251.0571-A5

3.15.1 Technical data

Features	4PP251.0571-A5
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 76: Technical data - 4PP251.0571-A5

Technical data • Power Panel 200 with Automation Runtime

Features	4PP251.0571-A5
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	2 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	LCD 5.7 in (144 mm) 256 colors QVGA, 320 x 240 pixels 40:1 80° / 90° 150 cd/m ² 50000 hours
Touch screen Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Function keys Soft keys Cursor pad Number block Other keys	16 with LED 6 with LED - 15 without LED 5 without LED
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. Yes
Ground resistance	≥ 47 kOhm

Table 76: Technical data - 4PP251.0571-A5 (Forts.)

Mechanical characteristics	4PP251.0571-A5
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Orange keys	Similar to Pantone 151CV
Dark gray keys	Similar to Pantone 431CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	212 mm
Height	245 mm
Depth	98 mm
Weight	Approx. 2.7 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 60 °C
Transportation	-20 .. 60 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3000 m

Table 76: Technical data - 4PP251.0571-A5 (Forts.)

1) System Management Controller

2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.15.2 Dimensions

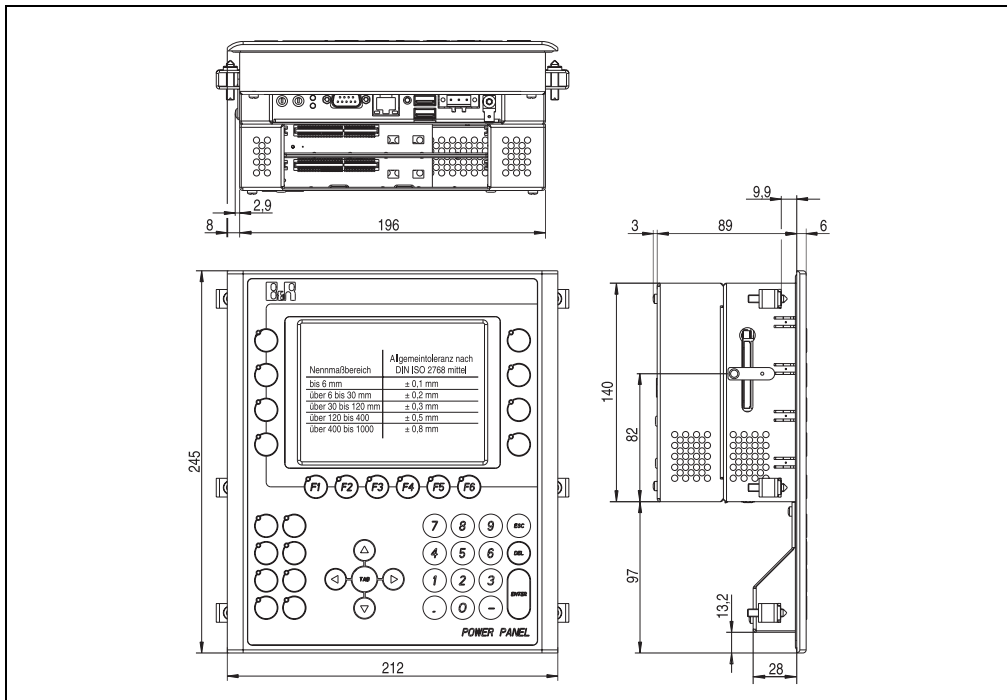


Figure 138: Dimensions - 4PP251.0571-A5

3.15.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 138 "Dimensions - 4PP251.0571-A5" on page 226) For further information regarding mounting, see section 3 "Installation" on page 421.

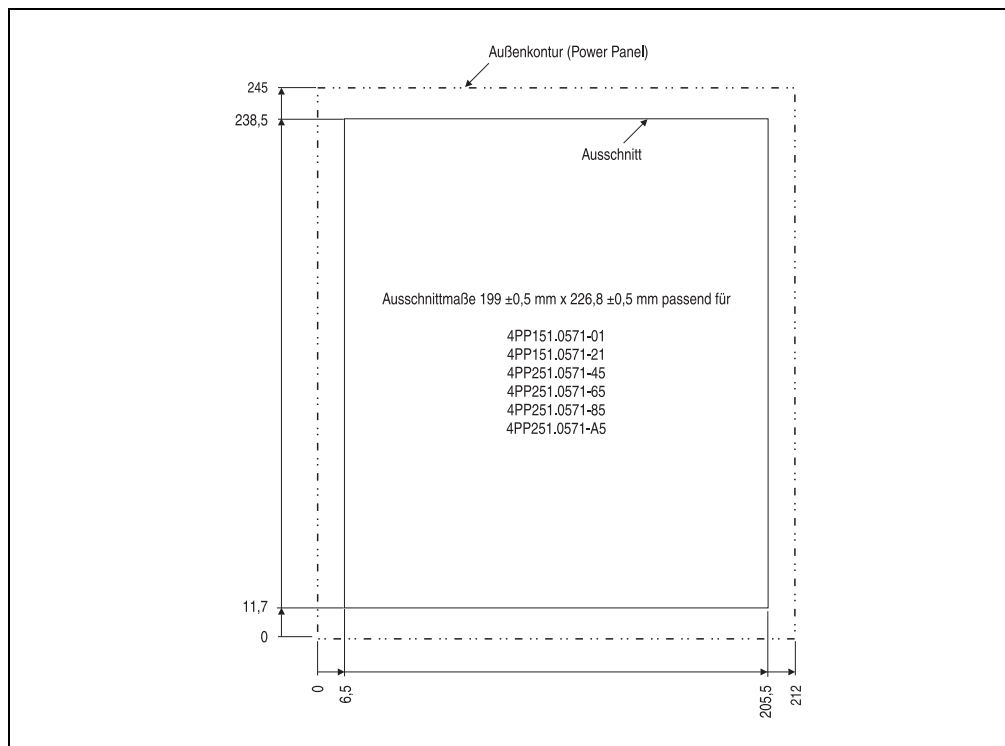


Figure 139: Cutout dimensions

3.15.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 251 LCD C QVGA 5.7in F MH 2aPCI
6	Retaining clips included
1	Lithium battery 3 V / 950 mAh included
4	Insert strips (inserted in the front)

Table 77: Contents of delivery - 4PP251.0571-A5

3.16 Device 4PP251.1043-75

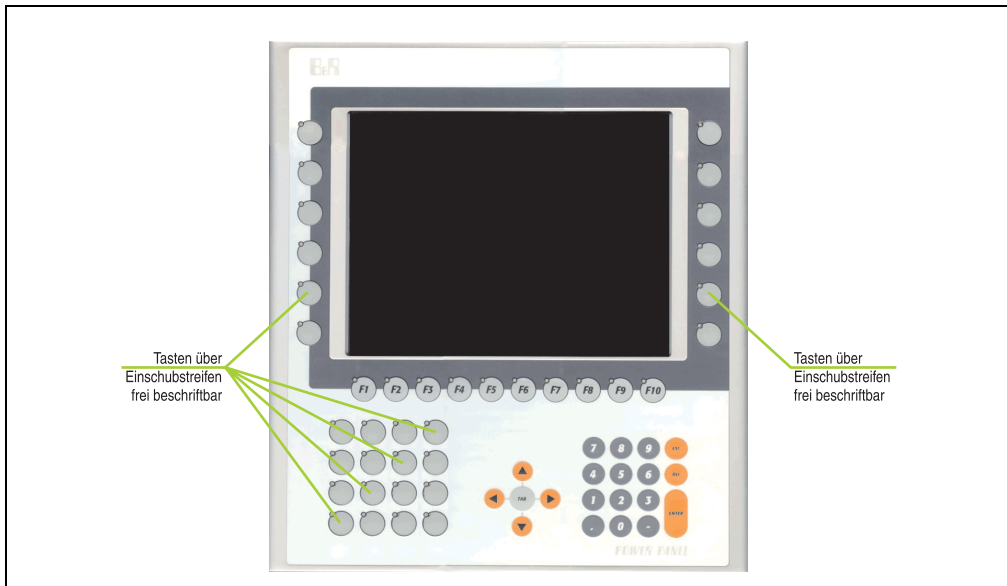


Figure 140: Front view - 4PP251.1043-75

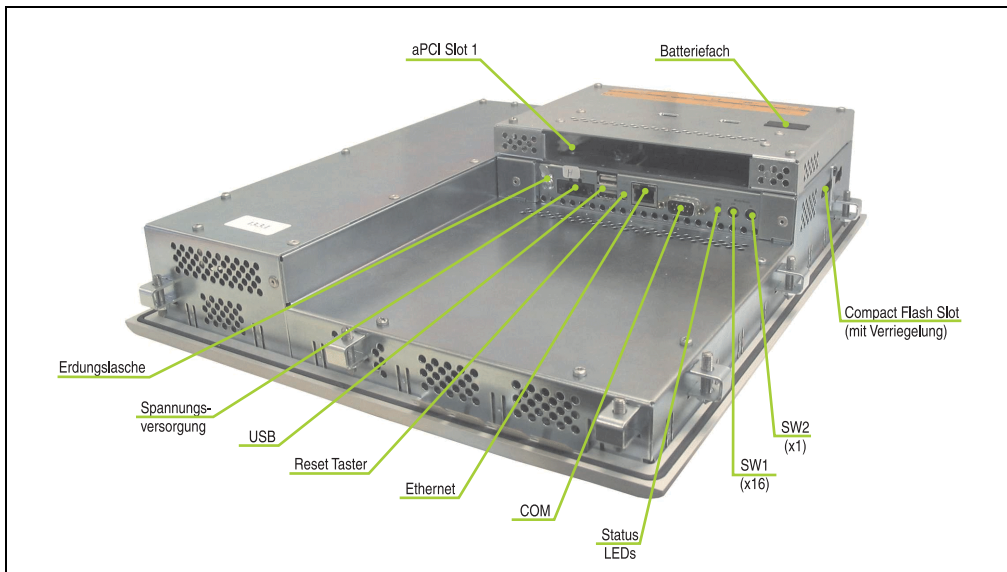


Figure 141: Rear view - 4PP251.1043-75

3.16.1 Technical data

Features	4PP251.1043-75
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 78: Technical data - 4PP251.1043-75

Technical data • Power Panel 200 with Automation Runtime

Features	4PP251.1043-75
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	1 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 70° / 55° 350 cd/m ² 55000 hours
Touch screen Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Function keys Soft keys Cursor pad Number block Other keys	28 with LED 10 with LED - 15 without LED 5 without LED
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 20 W typical, 25 W max. Yes
Ground resistance	≥ 47 kOhm

Table 78: Technical data - 4PP251.1043-75 (Forts.)

Mechanical characteristics	4PP251.1043-75
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Orange keys	Similar to Pantone 151CV
Dark gray keys	Similar to Pantone 431CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	323 mm
Height	260 mm
Depth	86 mm
Weight	Approx. 5 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 70 °C
Transportation	-20 .. 70 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3000 m

Table 78: Technical data - 4PP251.1043-75 (Forts.)

1) System Management Controller

2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.



3.16.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 142 "Dimensions - 4PP251.1043-75" on page 232) For further information regarding mounting, see section 3 "Installation" on page 421.

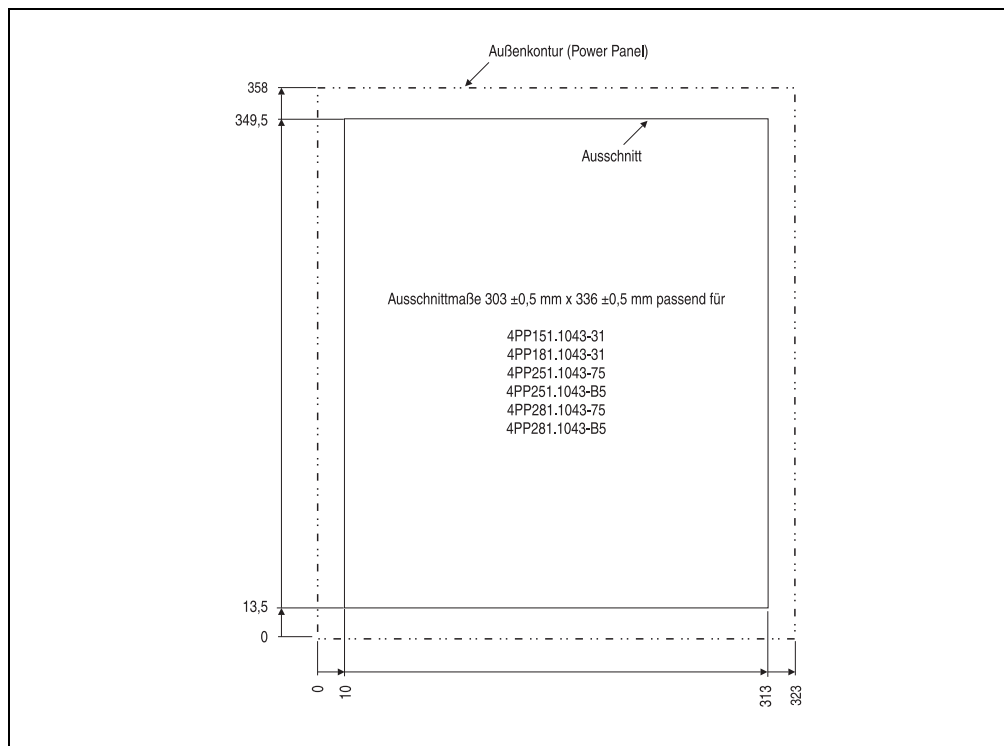


Figure 143: Cutout dimensions

3.16.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 251 TFT C VGA 10.4" F MH 1aPCI
12	Retaining clips included
1	Lithium battery 3 V / 950 mAh included
4	Insert strips (inserted in the front)

Table 79: Contents of delivery - 4PP251.1043-75

3.17 Device 4PP251.1043-B5

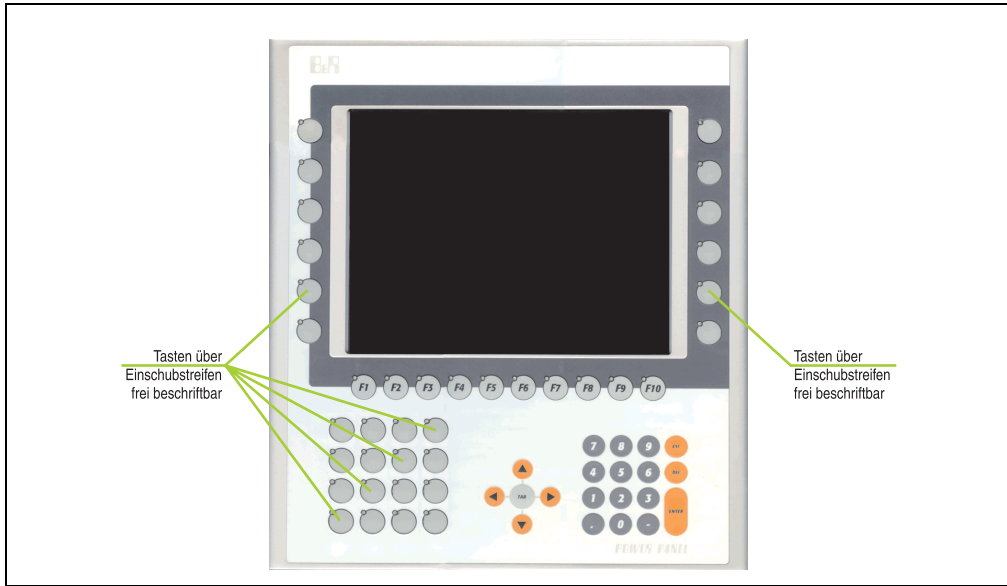


Figure 144: Front view - 4PP251.1043-B5

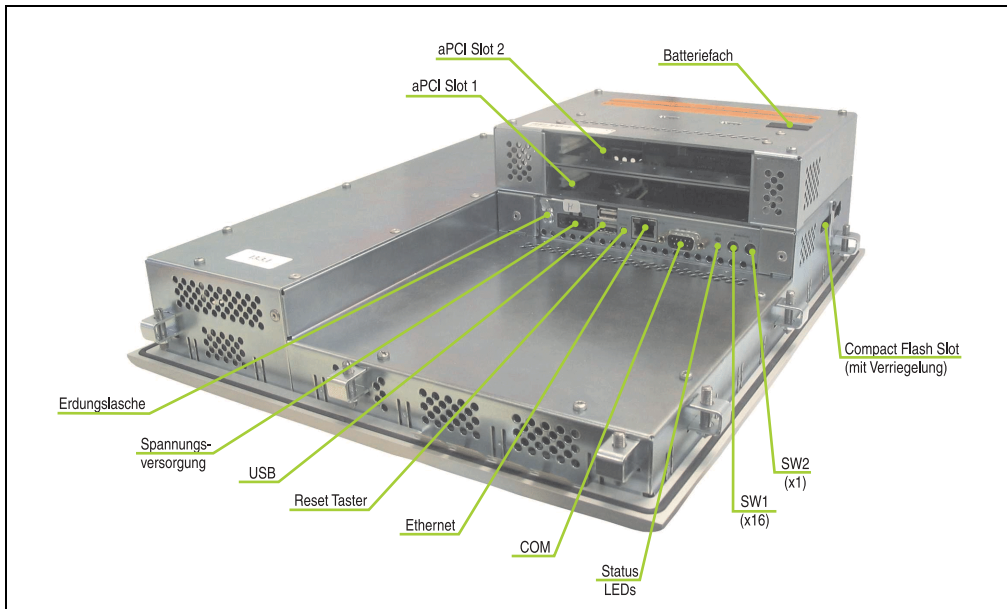


Figure 145: Rear view - 4PP251.1043-B5

3.17.1 Technical data

Features	4PP251.1043-B5
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 80: Technical data - 4PP251.1043-B5

Technical data • Power Panel 200 with Automation Runtime

Features	4PP251.1043-B5
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	2 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 70° / 55° 350 cd/m ² 55000 hours
Touch screen Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Function keys Soft keys Cursor pad Number block Other keys	28 with LED 10 with LED - 15 without LED 5 without LED
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 20 W typical, 25 W max. Yes
Ground resistance	≥ 47 kOhm

Table 80: Technical data - 4PP251.1043-B5 (Forts.)

Mechanical characteristics	4PP251.1043-B5
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Orange keys	Similar to Pantone 151CV
Dark gray keys	Similar to Pantone 431CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	323 mm
Height	260 mm
Depth	86 mm
Weight	Approx. 5.3 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 70 °C
Transportation	-20 .. 70 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
Transportation	T > 40 °C: < 90 %, non-condensing
	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3000 m

Table 80: Technical data - 4PP251.1043-B5 (Forts.)

1) System Management Controller

2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.17.2 Dimensions

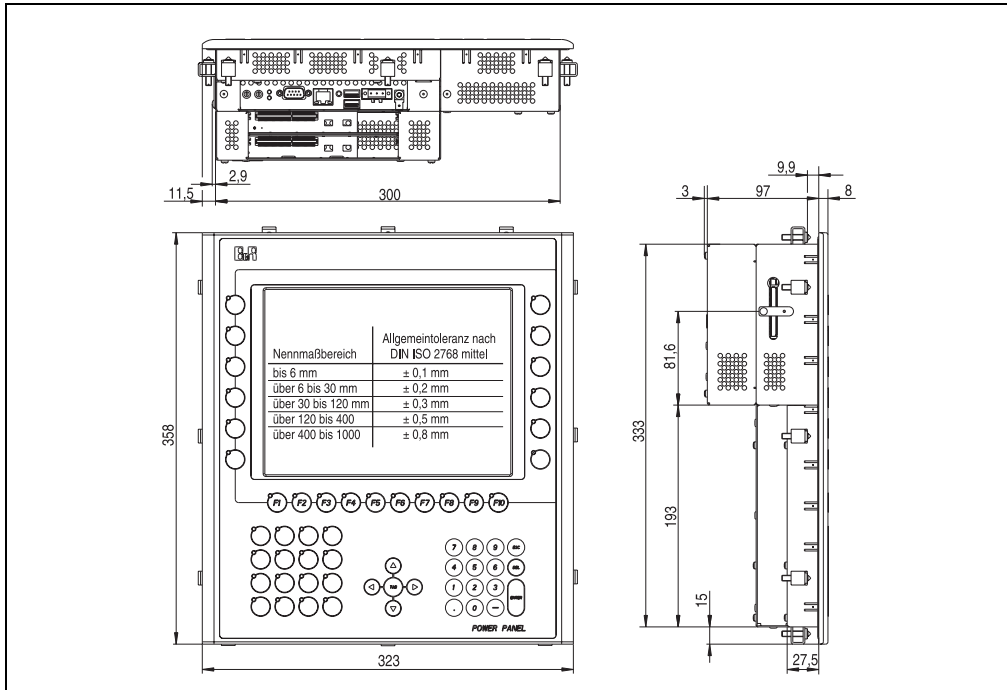


Figure 146: Dimensions - 4PP251.1043-B5

3.17.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 146 "Dimensions - 4PP251.1043-B5" on page 238) For further information regarding mounting, see section 3 "Installation" on page 421.

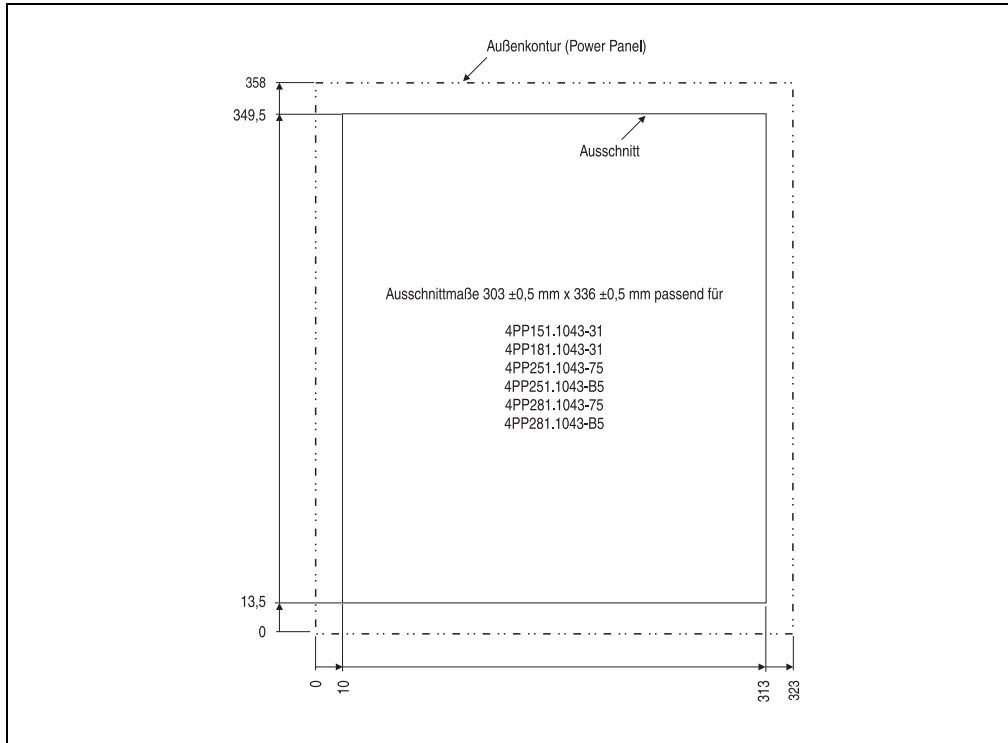


Figure 147: Cutout dimensions

3.17.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 251 TFT C VGA 10.4" F MH 2aPCI
12	Retaining clips included
1	Lithium battery 3 V / 950 mAh included
4	Insert strips (inserted in the front)

Table 81: Contents of delivery - 4PP251.1043-B5

3.18 Device 4PP251.1505-75

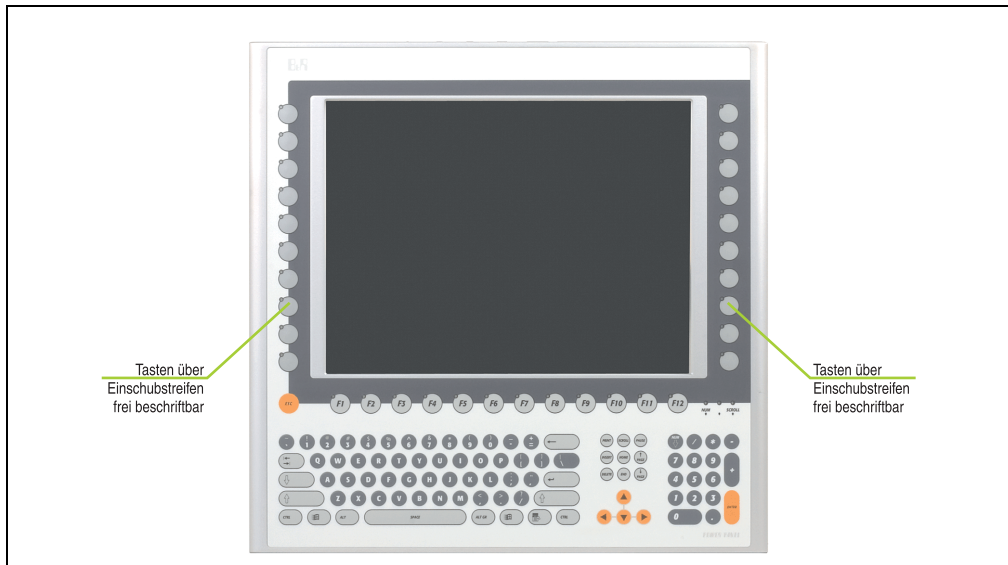


Figure 148: Front view - 4PP251.1505-75

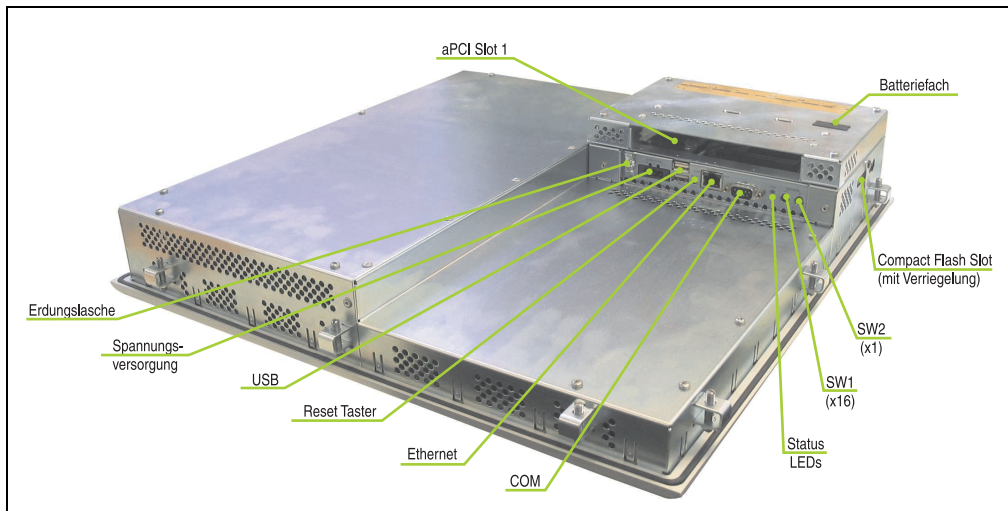


Figure 149: Rear view - 4PP251.1505-75

3.18.1 Technical data

Features	4PP251.1505-75
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 82: Technical data - 4PP251.1505-75

Technical data • Power Panel 200 with Automation Runtime

Features	4PP251.1505-75
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	1 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 15 inch (380 mm) 256 colors XGA, 1024 x 768 pixels 300:1 140° / 115° 330 cd/m² 35000 hours
Touch screen Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Function keys Soft keys Cursor pad Number block Other keys	20 with LED 12 with LED - 15 without LED 77 without LED
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 35 W typical, 40 W max. Yes
Ground resistance	≥ 47 kOhm

Table 82: Technical data - 4PP251.1505-75 (Forts.)

Mechanical characteristics	4PP251.1505-75
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Orange keys	Similar to Pantone 151CV
Dark gray keys	Similar to Pantone 431CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	435 mm
Height	430 mm
Depth	87 mm
Weight	Approx. 8 kg
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 60 °C
Transportation	-20 .. 60 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 82: Technical data - 4PP251.1505-75 (Forts.)

1) System Management Controller

2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.18.2 Dimensions

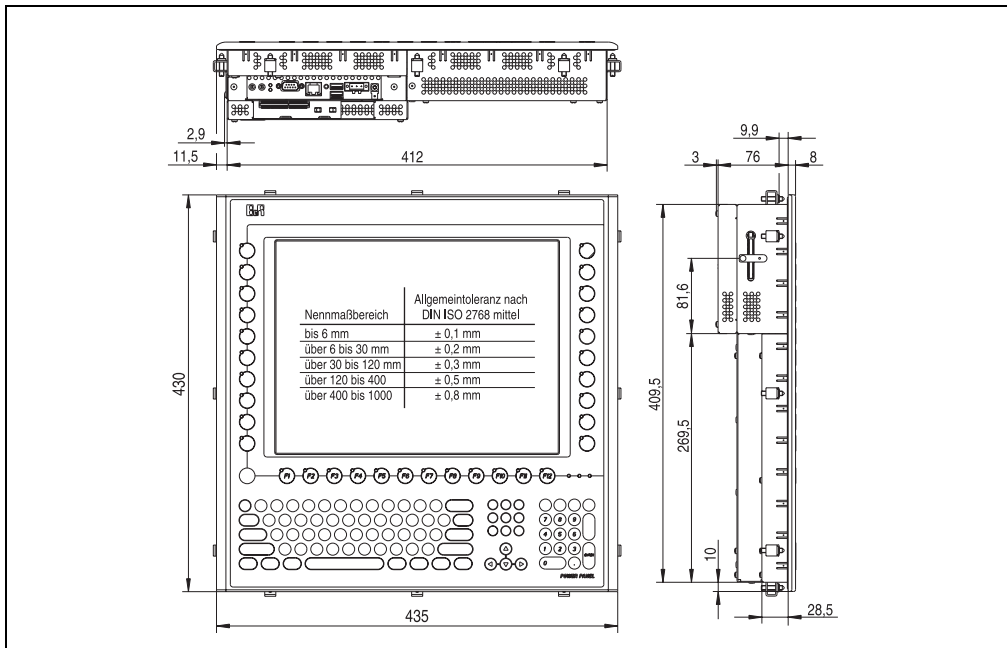


Figure 150: Dimensions - 4PP251.1505-75

3.18.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 150 "Dimensions - 4PP251.1505-75" on page 244) For further information regarding mounting, see section 3 "Installation" on page 421.

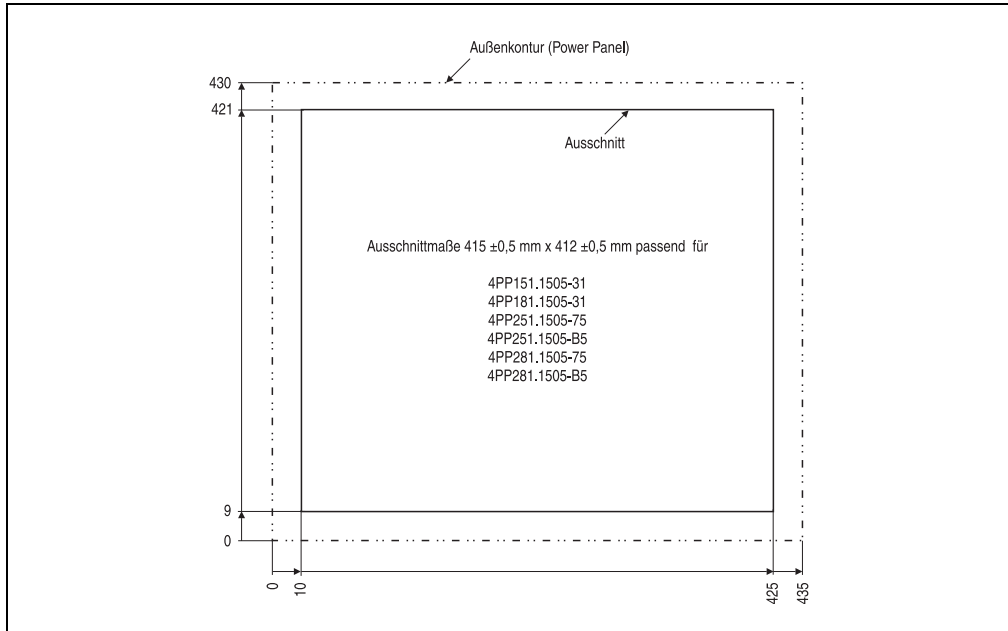


Figure 151: Cutout dimensions

3.18.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 251 TFT C XGA 15" F MH 1aPCI
12	Retaining clips included
1	Lithium battery 3 V / 950 mAh included
2	Insert strips (inserted in the front)

Table 83: Contents of delivery - 4PP251.1505-75

3.19 Device 4PP251.1505-B5

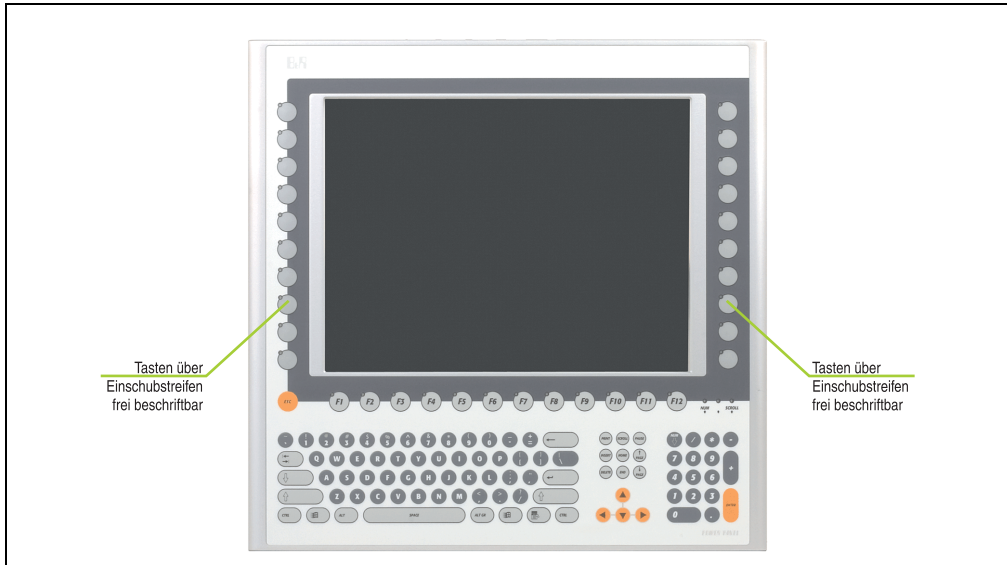


Figure 152: Front view - 4PP251.1505-B5

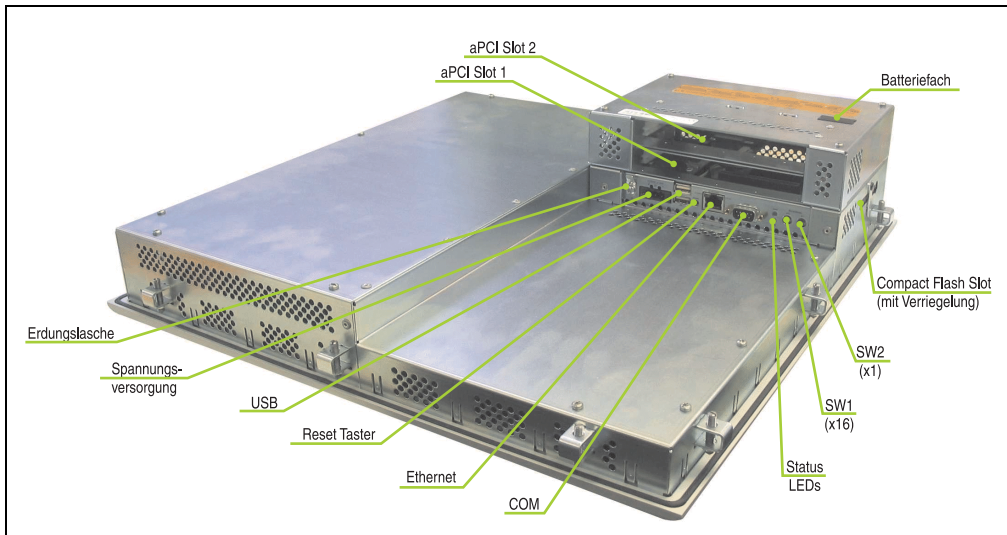


Figure 153: Rear view - 4PP251.1505-B5

3.19.1 Technical data

Features	4PP251.1505-B5
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 84: Technical data - 4PP251.1505-B5

Technical data • Power Panel 200 with Automation Runtime

Features	4PP251.1505-B5
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	2 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 15 inch (380 mm) 256 colors XGA, 1024 x 768 pixels 300:1 140° / 115° 330 cd/m ² 35000 hours
Touch screen Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Function keys Soft keys Cursor pad Number block Other keys	20 with LED 12 with LED - 15 without LED 77 without LED
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 35 W typical, 40 W max. Yes
Ground resistance	≥ 47 kOhm

Table 84: Technical data - 4PP251.1505-B5 (Forts.)

Mechanical characteristics	4PP251.1505-B5
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Orange keys	Similar to Pantone 151CV
Dark gray keys	Similar to Pantone 431CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	435 mm
Height	430 mm
Depth	109 mm
Weight	Approx. 8.3 kg
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 60 °C
Transportation	-20 .. 60 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s ² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s ² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s ² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s ² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s ² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s ² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s ² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 84: Technical data - 4PP251.1505-B5 (Forts.)

1) System Management Controller

2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.19.2 Dimensions

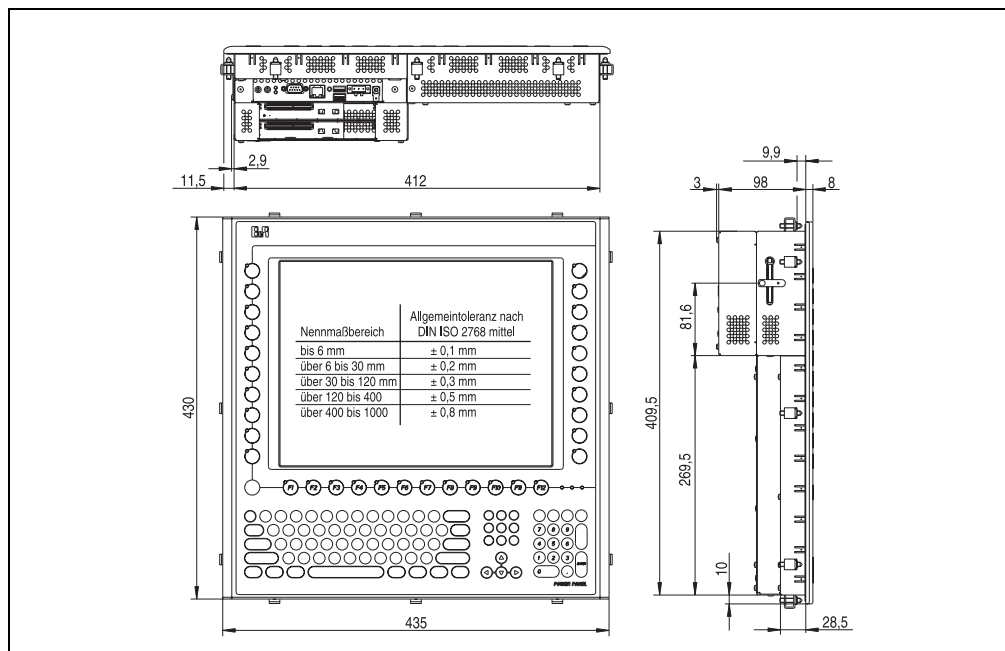


Figure 154: Dimensions - 4PP251.1505-B5

3.19.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 154 "Dimensions - 4PP251.1505-B5" on page 250) For further information regarding mounting, see section 3 "Installation" on page 421.

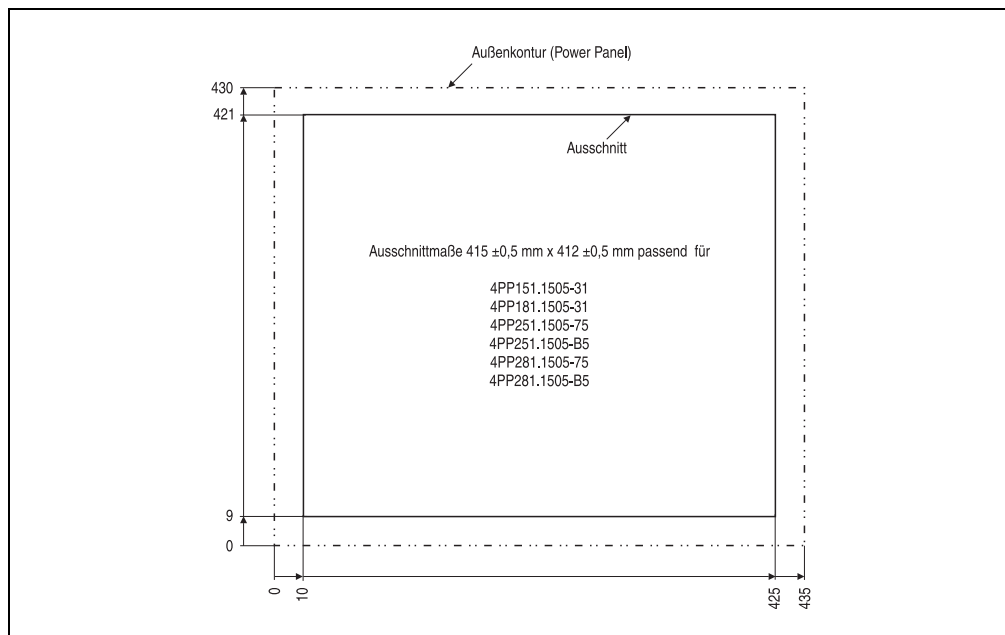


Figure 155: Cutout dimensions

3.19.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 251 TFT C XGA 15" F MH 2aPCI
12	Retaining clips included
1	Lithium battery 3 V / 950 mAh included
2	Insert strips (inserted in the front)

Table 85: Contents of delivery - 4PP251.1505-B5

3.20 Device 4PP252.0571-45

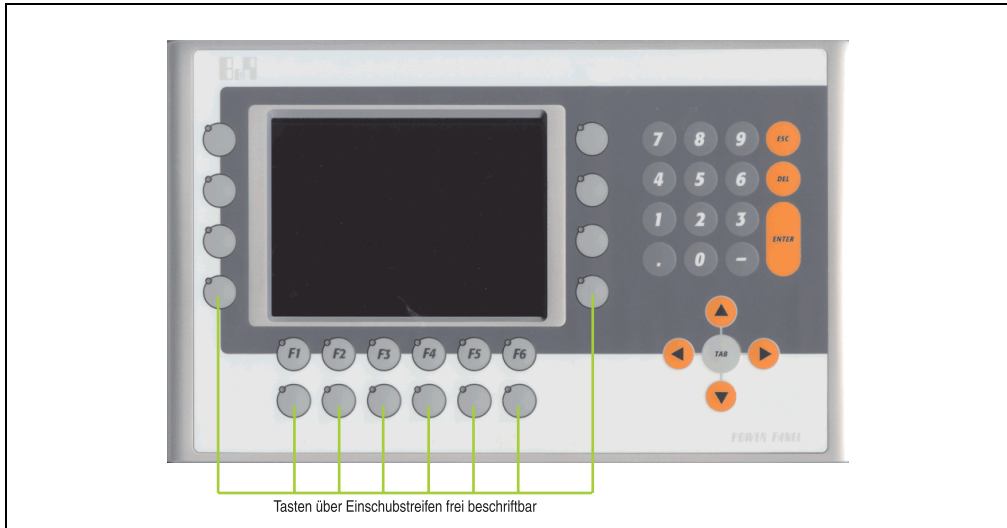


Figure 156: Front view - 4PP252.0571-45

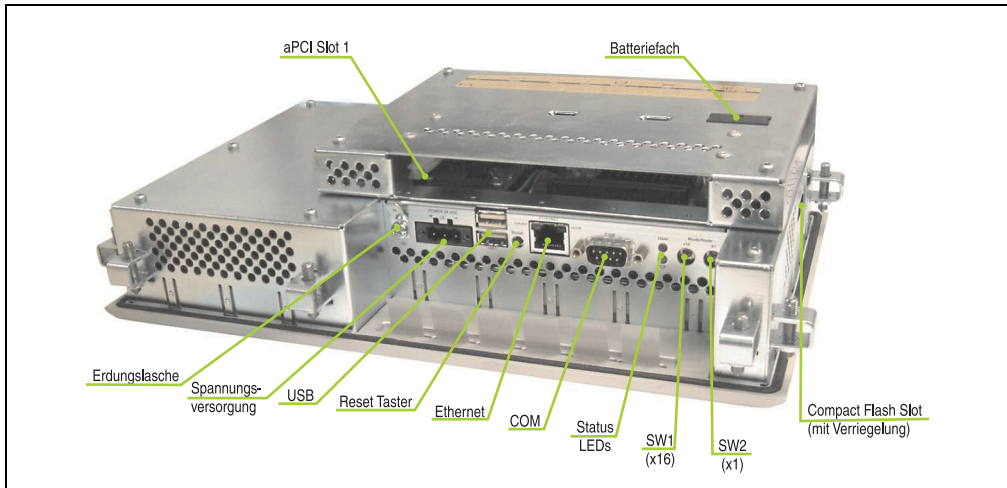


Figure 157: Rear view - 4PP252.0571-45

3.20.1 Technical data

Features	4PP252.0571-45
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 86: Technical data - 4PP252.0571-45

Technical data • Power Panel 200 with Automation Runtime

Features	4PP252.0571-45
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	1 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	LCD 5.7 in (144 mm) 8 shades of gray QVGA, 320 x 240 pixels 25:1 80° / 80° 140 cd/m ² 50000 hours
Touch screen Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Function keys Soft keys Cursor pad Number block Other keys	20 with LED - - 15 without LED 5 without LED
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. Yes
Ground resistance	≥ 47 kOhm

Table 86: Technical data - 4PP252.0571-45 (Forts.)

Mechanical characteristics	4PP252.0571-45
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Orange keys	Similar to Pantone 151CV
Dark gray keys	Similar to Pantone 431CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	302 mm
Height	187 mm
Depth	76 mm
Weight	Approx. 2.6 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 70 °C
Transportation	-20 .. 70 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 86: Technical data - 4PP252.0571-45 (Forts.)

1) System Management Controller

2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.20.2 Dimensions

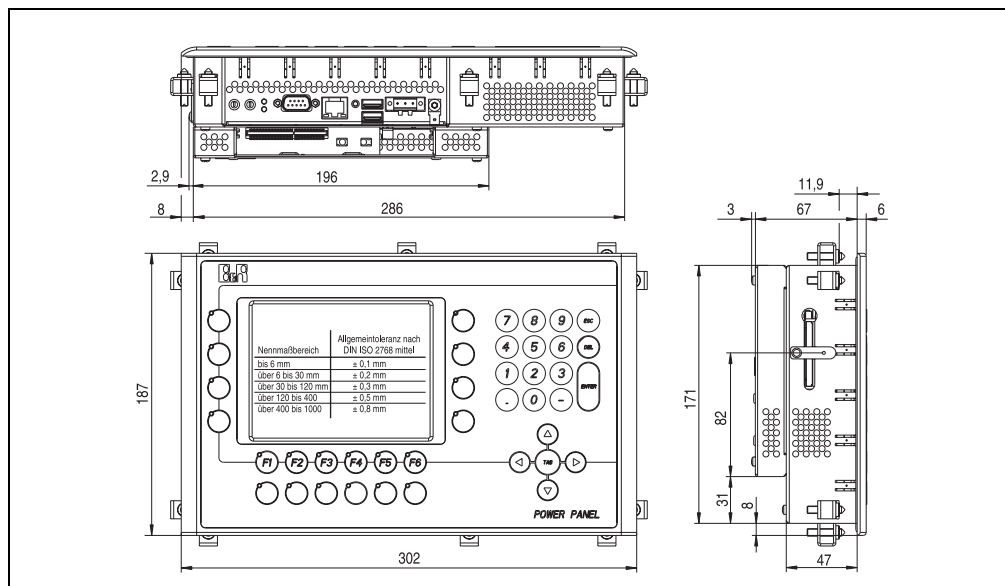


Figure 158: Dimensions - 4PP252.0571-45

3.20.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 158 "Dimensions - 4PP252.0571-45" on page 256) For further information regarding mounting, see section 3 "Installation" on page 421.

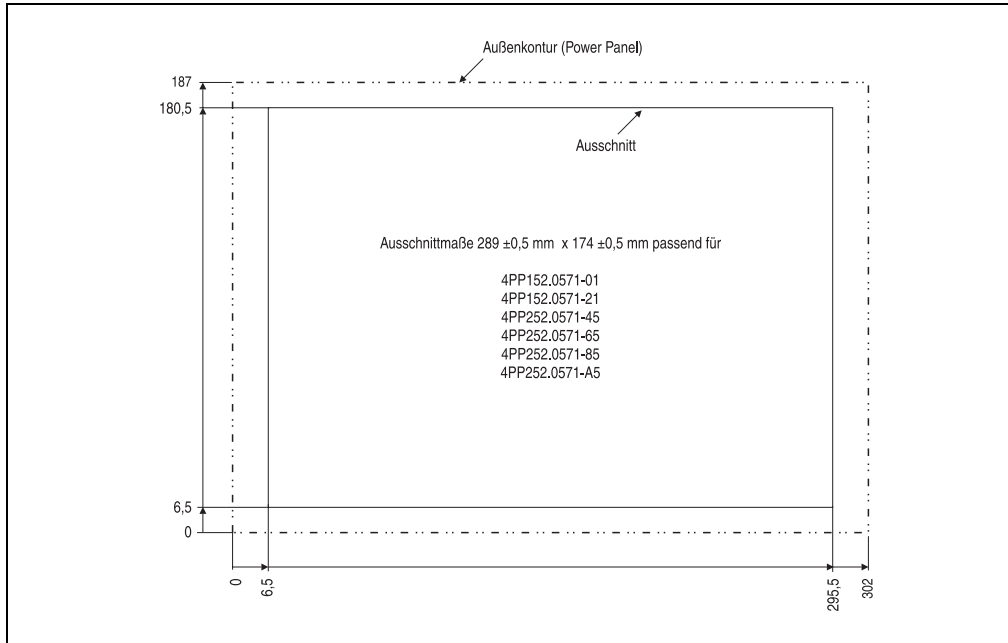


Figure 159: Cutout Dimensions

3.20.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 252 LCD B/W QVGA 5.7" F MH 1aPCI
10	Retaining clips included
1	Lithium battery 3 V / 950 mAh included
8	Insert strips (inserted in the front)

Table 87: Contents of delivery - 4PP252.0571-45

3.21 Device 4PP252.0571-65

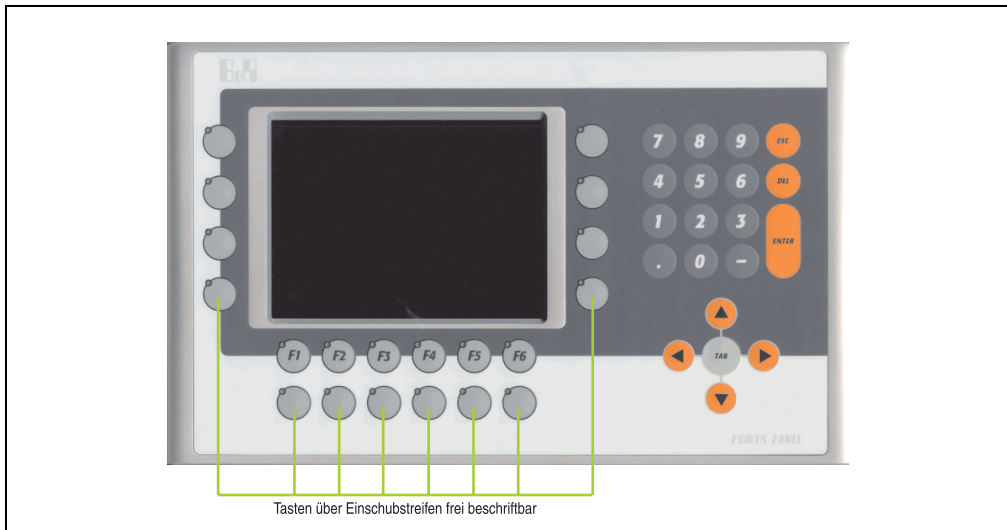


Figure 160: Front view - 4PP252.0571-65

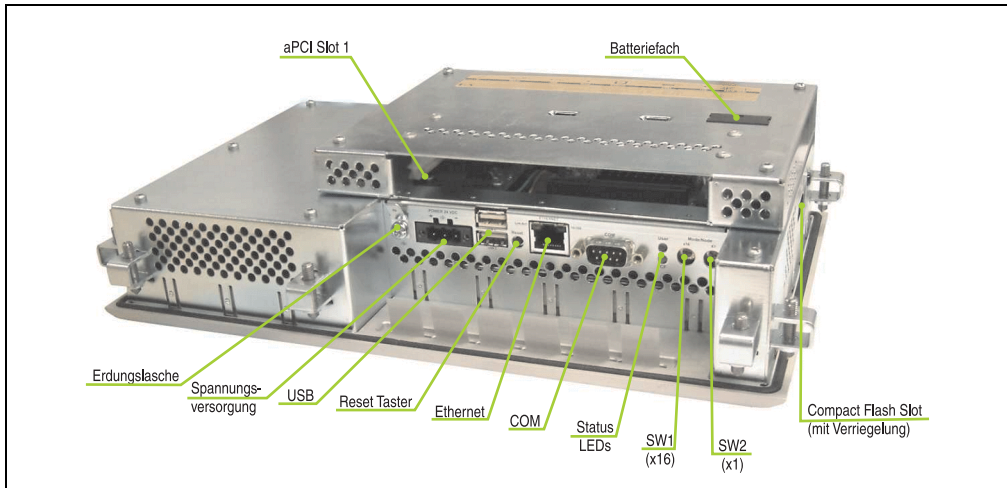


Figure 161: Rear view - 4PP252.0571-65

3.21.1 Technical data

Features	4PP252.0571-65
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 88: Technical data - 4PP252.0571-65

Technical data • Power Panel 200 with Automation Runtime

Features	4PP252.0571-65
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	1 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	LCD 5.7 in (144 mm) 256 colors QVGA, 320 x 240 pixels 40:1 80° / 90° 150 cd/m ² 50000 hours
Touch screen Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Function keys Soft keys Cursor pad Number block Other keys	20 with LED - - 15 without LED 5 without LED
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. Yes
Ground resistance	≥ 47 kOhm

Table 88: Technical data - 4PP252.0571-65 (Forts.)

Mechanical characteristics	4PP252.0571-65
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Orange keys	Similar to Pantone 151CV
Dark gray keys	Similar to Pantone 431CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	302 mm
Height	187 mm
Depth	76 mm
Weight	Approx. 2.6 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 60 °C
Transportation	-20 .. 60 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 88: Technical data - 4PP252.0571-65 (Forts.)

1) System Management Controller

2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.21.2 Dimensions

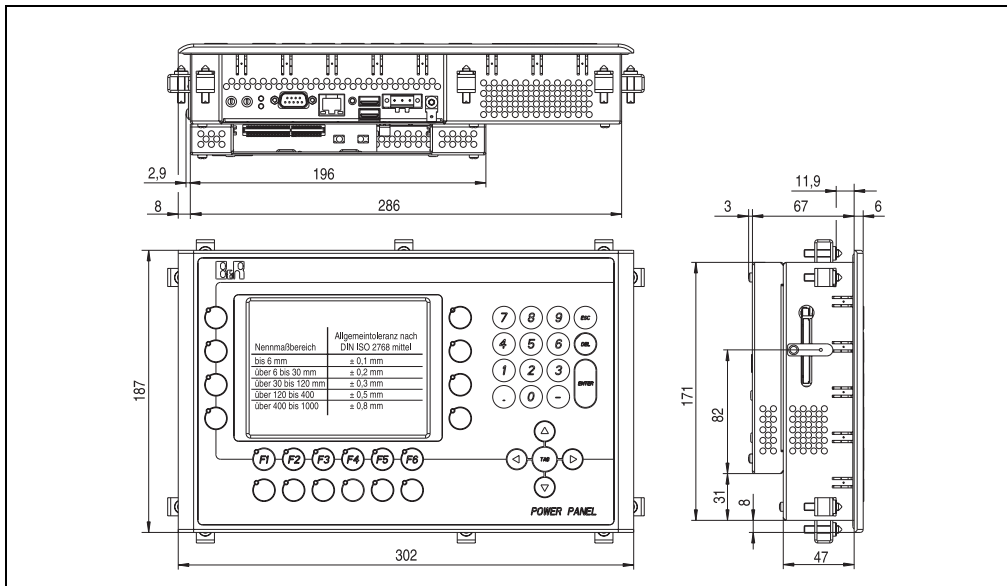


Figure 162: Dimensions - 4PP252.0571-65

3.21.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 162 "Dimensions - 4PP252.0571-65" on page 262) For further information regarding mounting, see section 3 "Installation" on page 421.

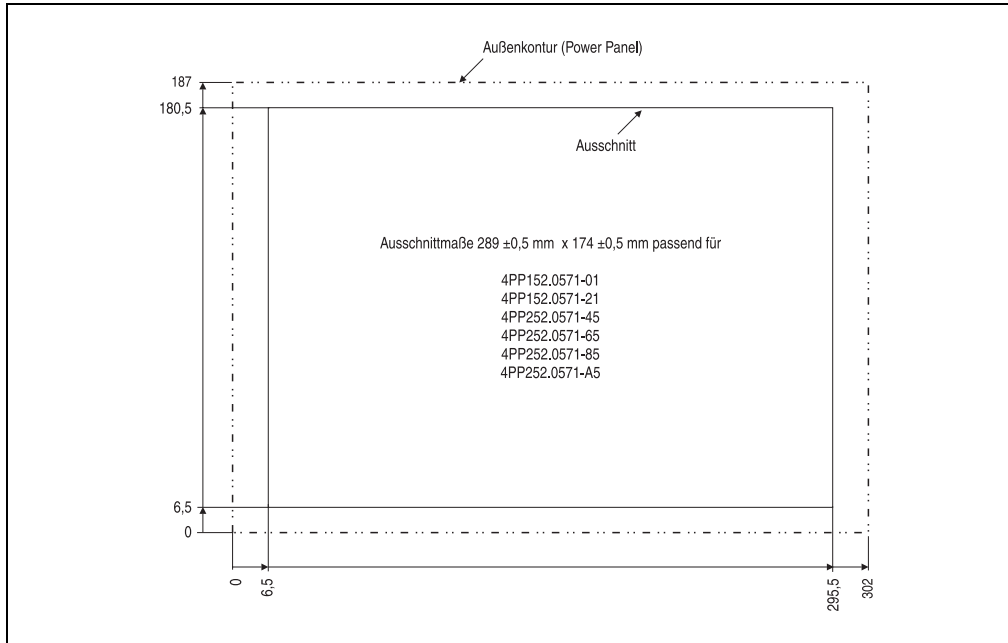


Figure 163: Cutout dimensions

3.21.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 252 LCD C QVGA 5.7in F MH 1aPCI
10	Retaining clips included
1	Lithium battery 3 V / 950 mAh included
8	Insert strips (inserted in the front)

Table 89: Contents of delivery - 4PP252.0571-65

3.22 Device 4PP252.0571-85

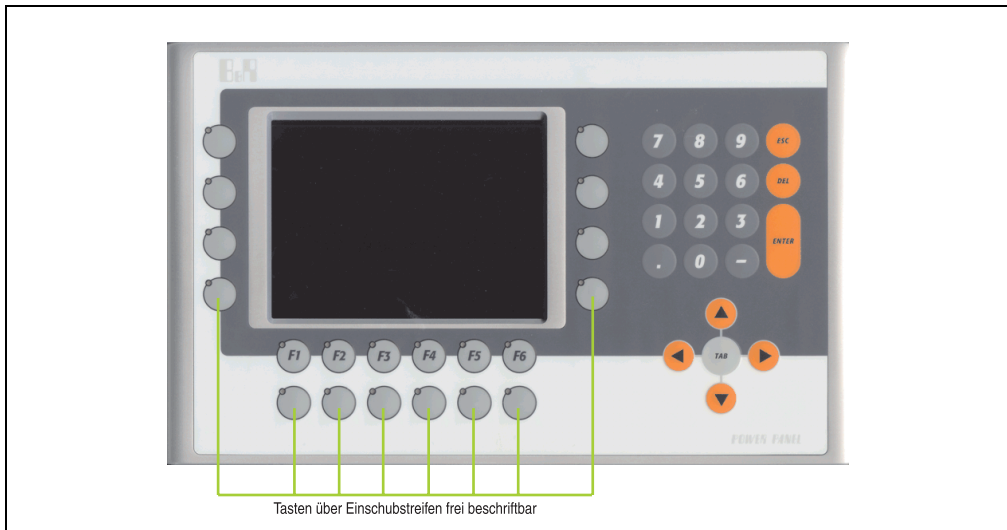


Figure 164: Front view - 4PP252.0571-85

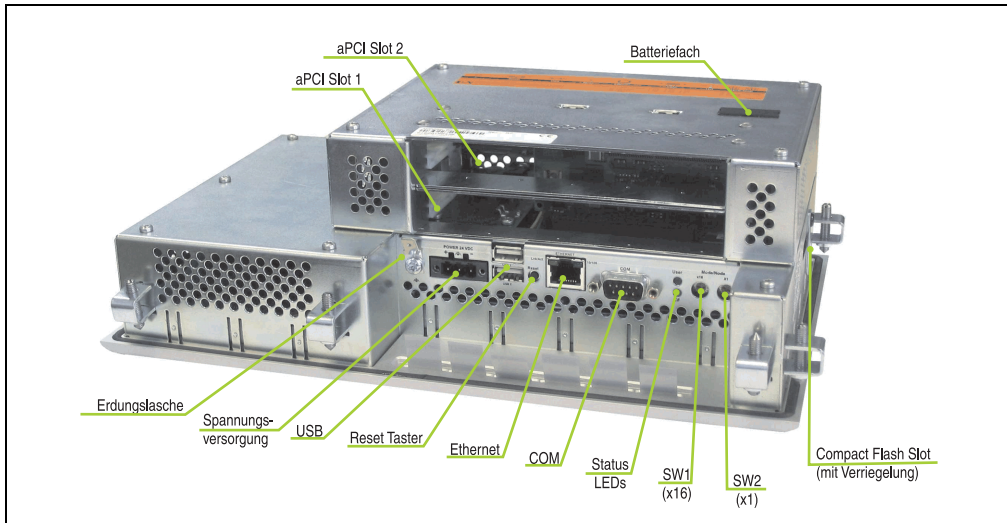


Figure 165: Rear view - 4PP252.0571-85

3.22.1 Technical data

Features	4PP252.0571-85
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 90: Technical data - 4PP252.0571-85

Technical data • Power Panel 200 with Automation Runtime

Features	4PP252.0571-85
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	2 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	LCD 5.7 in (144 mm) 8 shades of gray QVGA, 320 x 240 pixels 25:1 80° / 80° 140 cd/m ² 50000 hours
Touch screen Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Function keys Soft keys Cursor pad Number block Other keys	20 with LED - - 15 without LED 5 without LED
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. Yes
Ground resistance	≥ 47 kOhm

Table 90: Technical data - 4PP252.0571-85 (Forts.)

Mechanical characteristics	4PP252.0571-85
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Orange keys	Similar to Pantone 151CV
Dark gray keys	Similar to Pantone 431CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	302 mm
Height	187 mm
Depth	98 mm
Weight	Approx. 2.9 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 70 °C
Transportation	-20 .. 70 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 90: Technical data - 4PP252.0571-85 (Forts.)

1) System Management Controller

2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.22.2 Dimensions

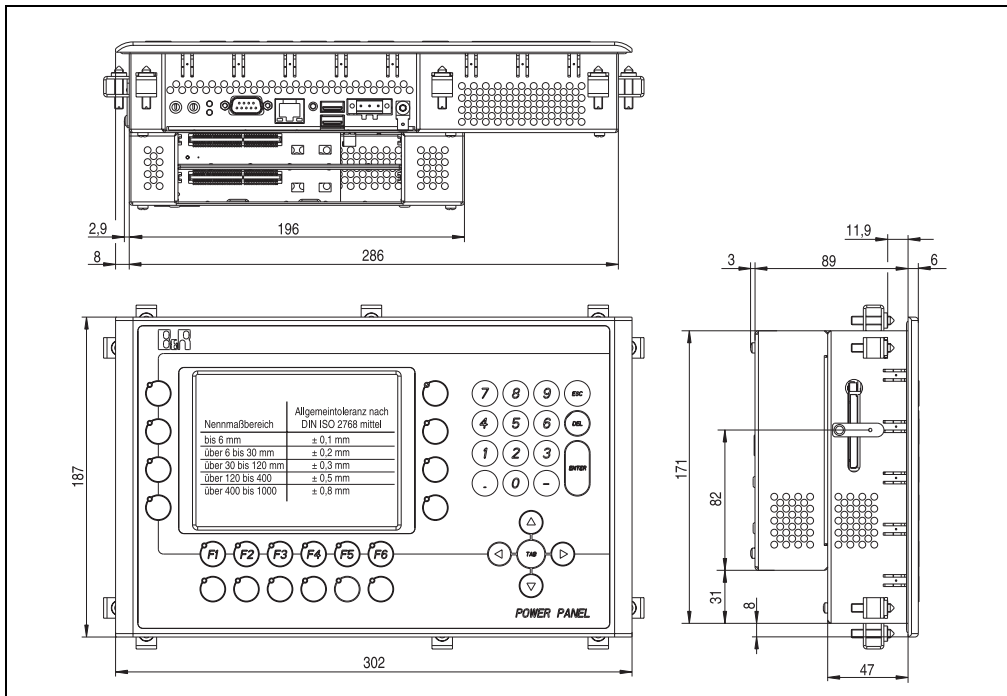


Figure 166: Dimensions - 4PP252.0571-85

3.22.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 166 "Dimensions - 4PP252.0571-85" on page 268) For further information regarding mounting, see section 3 "Installation" on page 421.

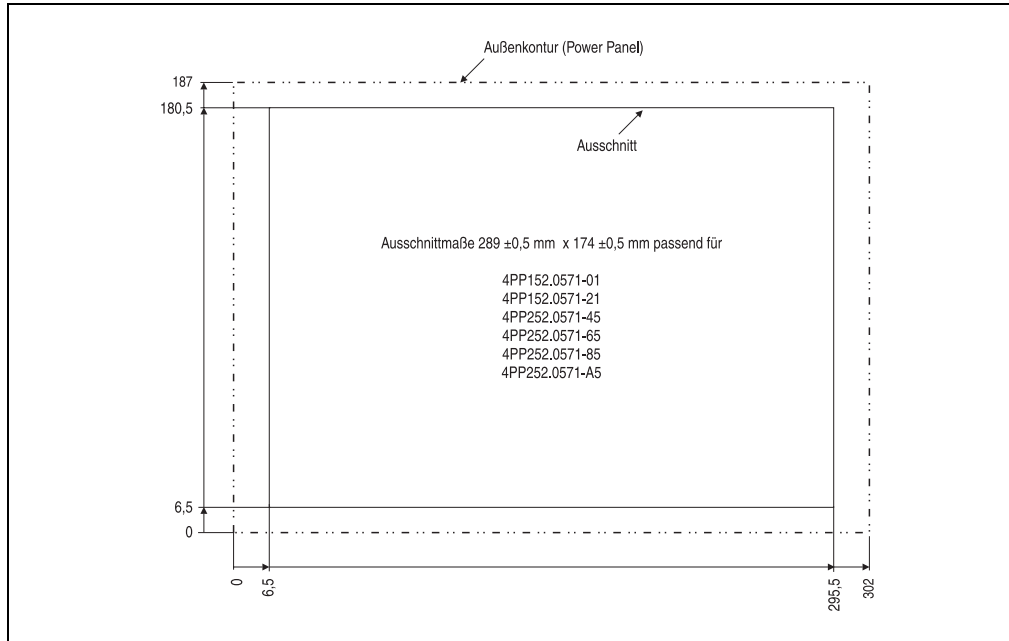


Figure 167: Cutout dimensions

3.22.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 252 LCD B/W QVGA 5.7" F MH 2aPCI
10	Retaining clips included
1	Lithium battery 3 V / 950 mAh included
8	Insert strips (inserted in the front)

Table 91: Contents of delivery - 4PP252.0571-85

3.23 Device 4PP252.0571-A5

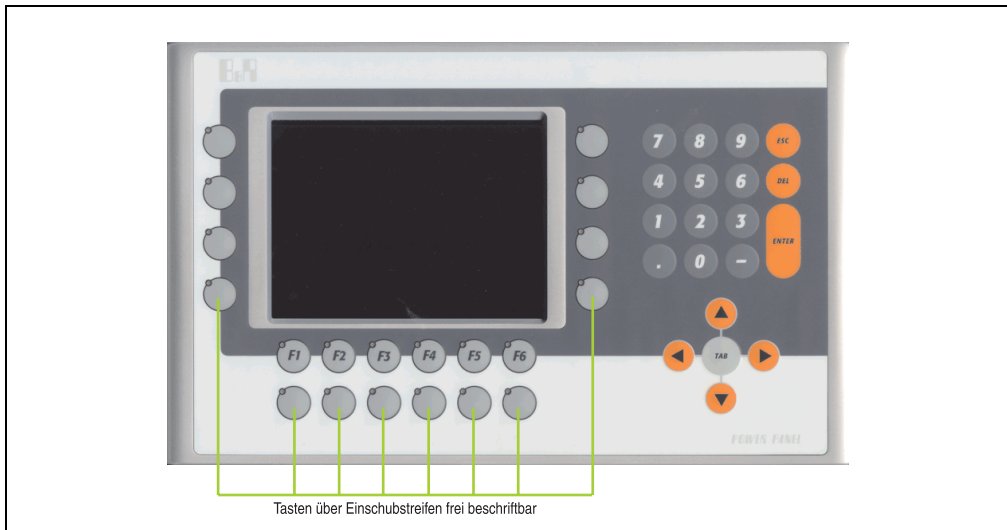


Figure 168: Front view - 4PP252.0571-A5

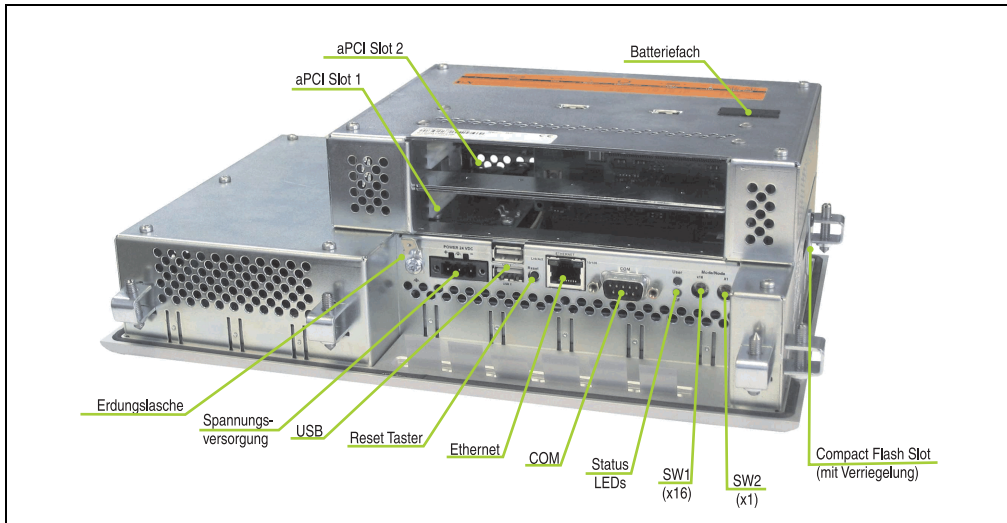


Figure 169: Rear view - 4PP252.0571-A5

3.23.1 Technical data

Features	4PP252.0571-A5
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 92: Technical data - 4PP252.0571-A5

Technical data • Power Panel 200 with Automation Runtime

Features	4PP252.0571-A5
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	2 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	LCD 5.7 in (144 mm) 256 colors QVGA, 320 x 240 pixels 40:1 80° / 90° 150 cd/m ² 50000 hours
Touch screen Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Function keys Soft keys Cursor pad Number block Other keys	20 with LED - - 15 without LED 5 without LED
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. Yes
Ground resistance	≥ 47 kOhm

Table 92: Technical data - 4PP252.0571-A5 (Forts.)

Mechanical characteristics	4PP252.0571-A5
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Orange keys	Similar to Pantone 151CV
Dark gray keys	Similar to Pantone 431CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	302 mm
Height	187 mm
Depth	98 mm
Weight	Approx. 2.9 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 60 °C
Transportation	-20 .. 60 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 92: Technical data - 4PP252.0571-A5 (Forts.)

1) System Management Controller

2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.23.2 Dimensions

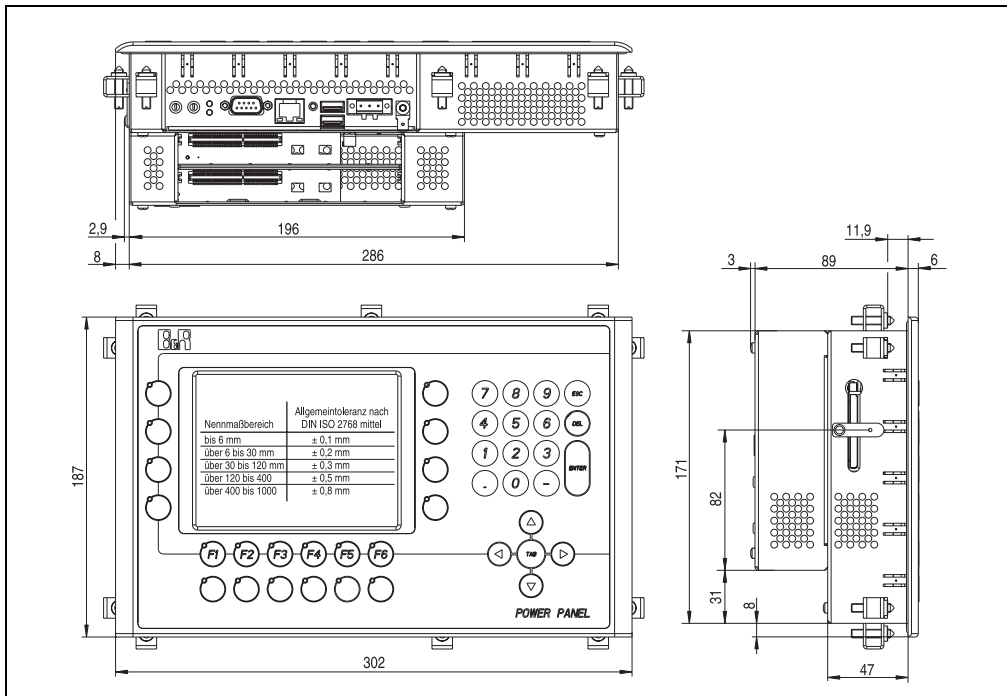


Figure 170: Dimensions - 4PP252.0571-A5

3.23.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 170 "Dimensions - 4PP252.0571-A5" on page 274) For further information regarding mounting, see section 3 "Installation" on page 421.

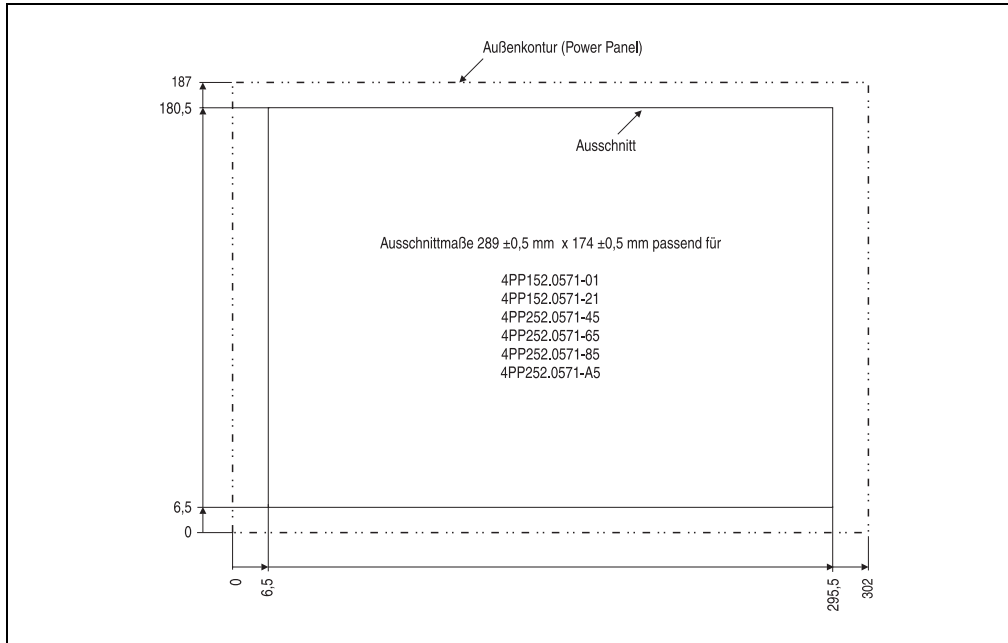


Figure 171: Cutout dimensions

3.23.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 252 LCD C QVGA 5.7in F MH 2aPCI
10	Retaining clips included
1	Lithium battery 3 V / 950 mAh included
8	Insert strips (inserted in the front)

Table 93: Contents of delivery - 4PP252.0571-A5

3.24 Device 4PP252.1043-75

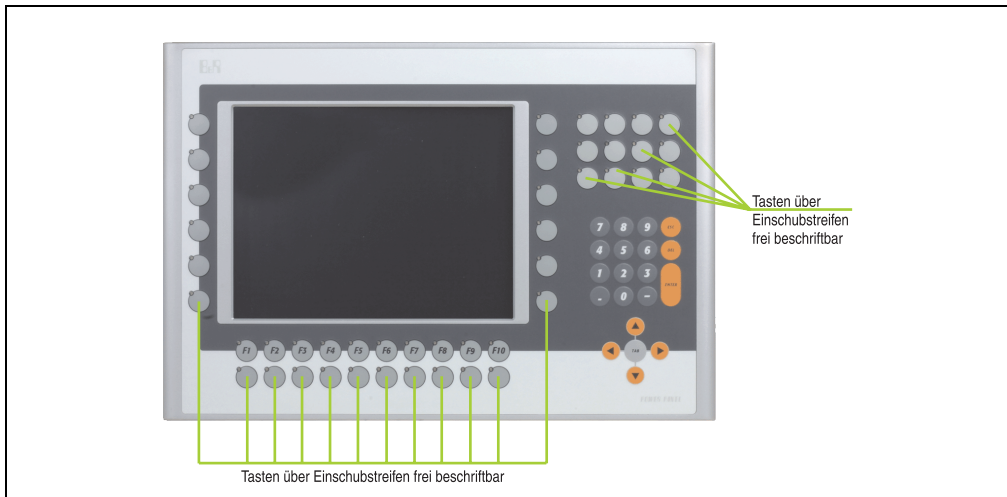


Figure 172: Front view - 4PP252.1043-75

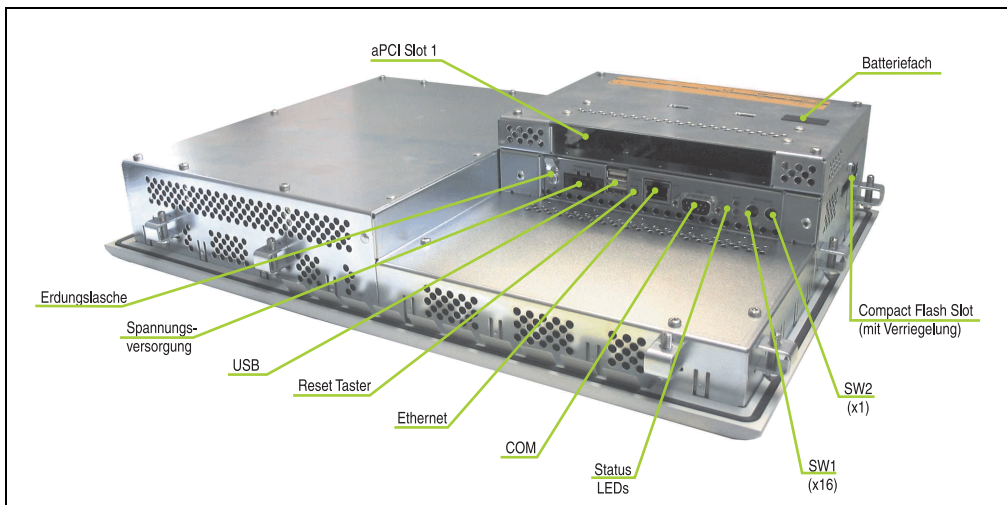


Figure 173: Rear view - 4PP252.1043-75

3.24.1 Technical data

Features	4PP252.1043-75
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 94: Technical data - 4PP252.1043-75

Technical data • Power Panel 200 with Automation Runtime

Features	4PP252.1043-75
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	1 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 70° / 55° 350 cd/m ² 55000 hours
Touch screen Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Function keys Soft keys Cursor pad Number block Other keys	44 with LED - - 15 without LED 5 without LED
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 20 W typical, 25 W max. Yes
Ground resistance	≥ 47 kOhm

Table 94: Technical data - 4PP252.1043-75 (Forts.)

Mechanical characteristics	4PP252.1043-75
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Orange keys	Similar to Pantone 151CV
Dark gray keys	Similar to Pantone 431CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	423 mm
Height	288 mm
Depth	86 mm
Weight	Approx. 5.2 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 70 °C
Transportation	-20 .. 70 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 94: Technical data - 4PP252.1043-75 (Forts.)

1) System Management Controller

2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.24.2 Dimensions

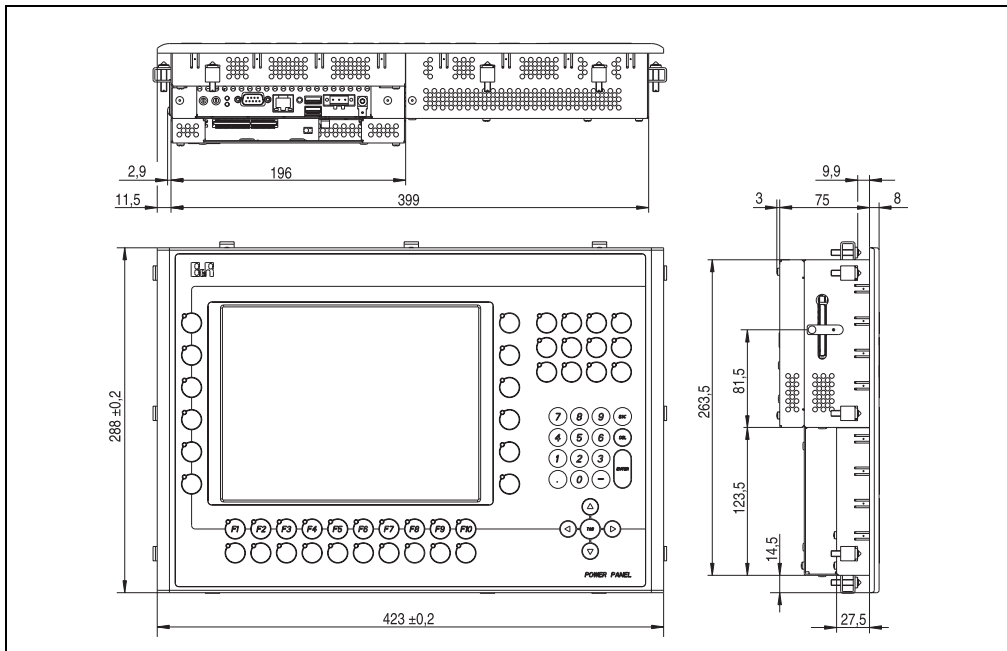


Figure 174: Dimensions - 4PP252.1043-75

3.24.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 174 "Dimensions - 4PP252.1043-75" on page 280) For further information regarding mounting, see section 3 "Installation" on page 421.

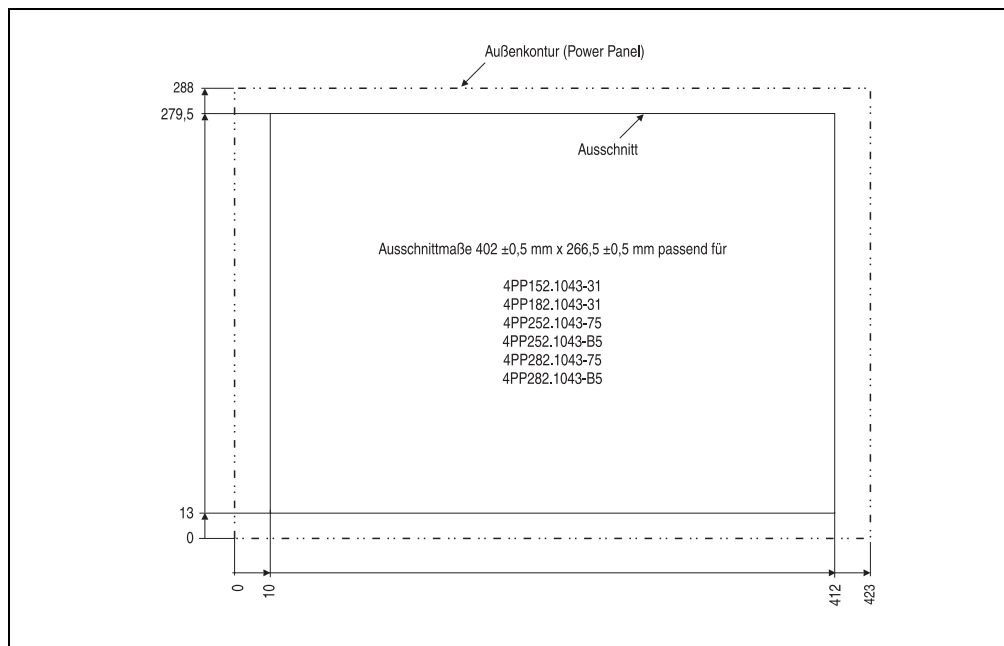


Figure 175: Cutout dimensions

3.24.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 252 TFT C VGA 10.4" F MH 1aPCI
12	Retaining clips included
1	Lithium battery 3 V / 950 mAh included
16	Insert strips (inserted in the front)

Table 95: Contents of delivery - 4PP252.1043-75

3.25 Device 4PP252.1043-B5

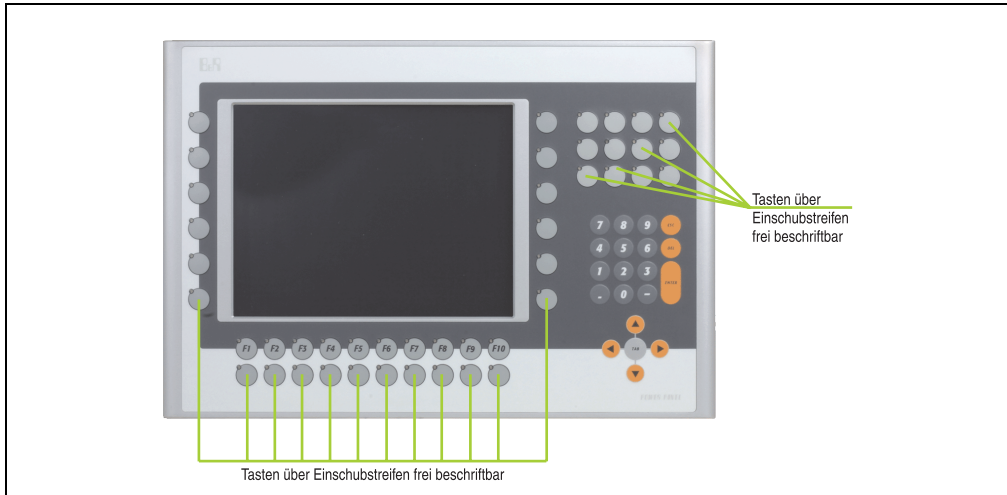


Figure 176: Front view - 4PP252.1043-B5

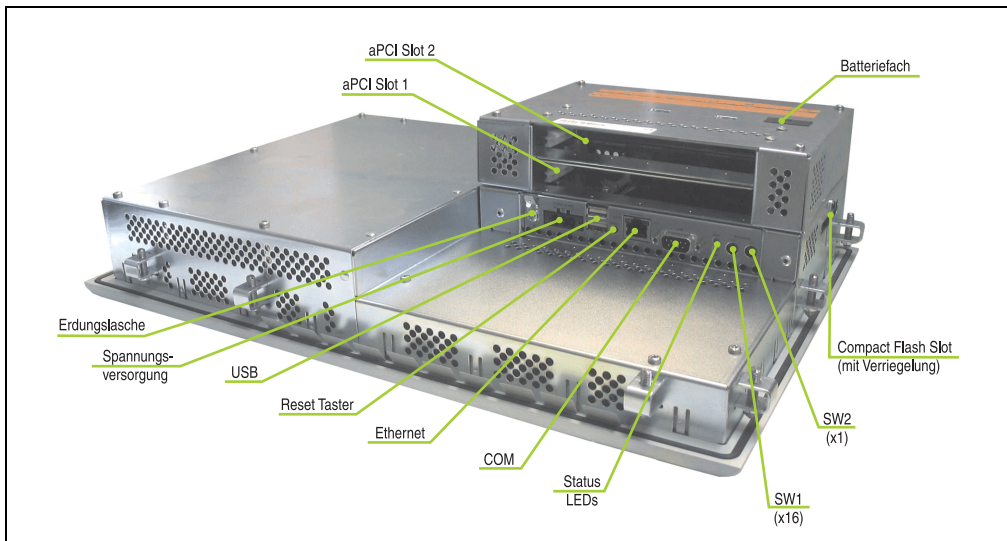


Figure 177: Rear view - 4PP252.1043-B5

3.25.1 Technical data

Features	4PP252.1043-B5
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 96: Technical data - 4PP252.1043-B5

Technical data • Power Panel 200 with Automation Runtime

Features	4PP252.1043-B5
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	2 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 70° / 55° 350 cd/m ² 55000 hours
Touch screen Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Function keys Soft keys Cursor pad Number block Other keys	44 with LED - - 15 without LED 5 without LED
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 20 W typical, 25 W max. Yes
Ground resistance	≥ 47 kOhm

Table 96: Technical data - 4PP252.1043-B5 (Forts.)

Mechanical characteristics	4PP252.1043-B5
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Orange keys	Similar to Pantone 151CV
Dark gray keys	Similar to Pantone 431CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	423 mm
Height	288 mm
Depth	108 mm
Weight	Approx. 5.5 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 70 °C
Transportation	-20 .. 70 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 96: Technical data - 4PP252.1043-B5 (Forts.)

1) System Management Controller

2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.25.2 Dimensions

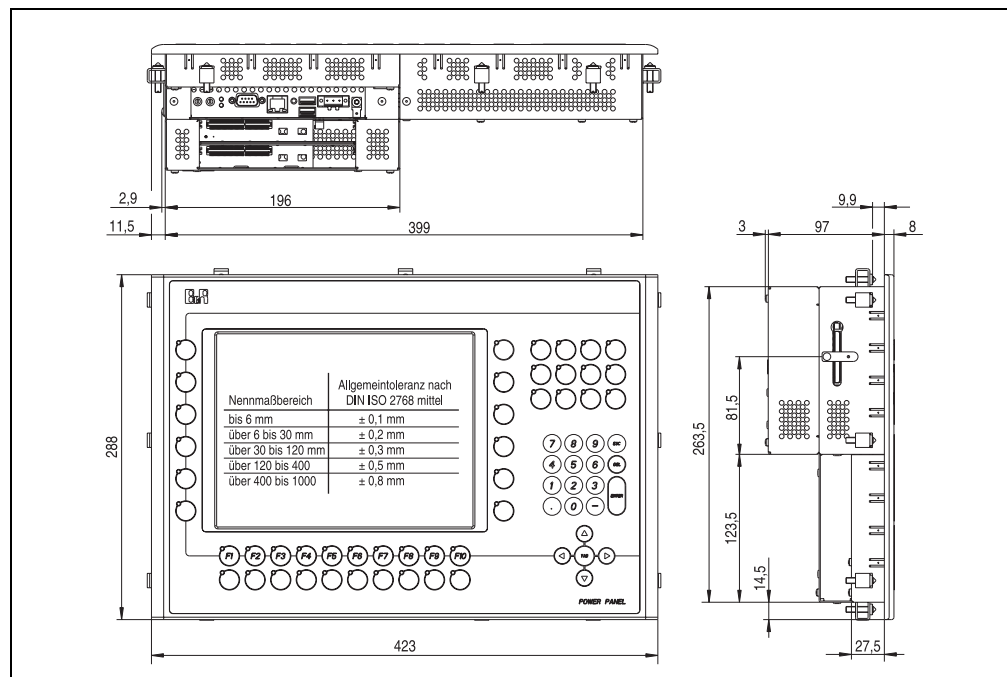


Figure 178: Dimensions - 4PP252.1043-B5

3.25.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 178 "Dimensions - 4PP252.1043-B5" on page 286) For further information regarding mounting, see section 3 "Installation" on page 421.

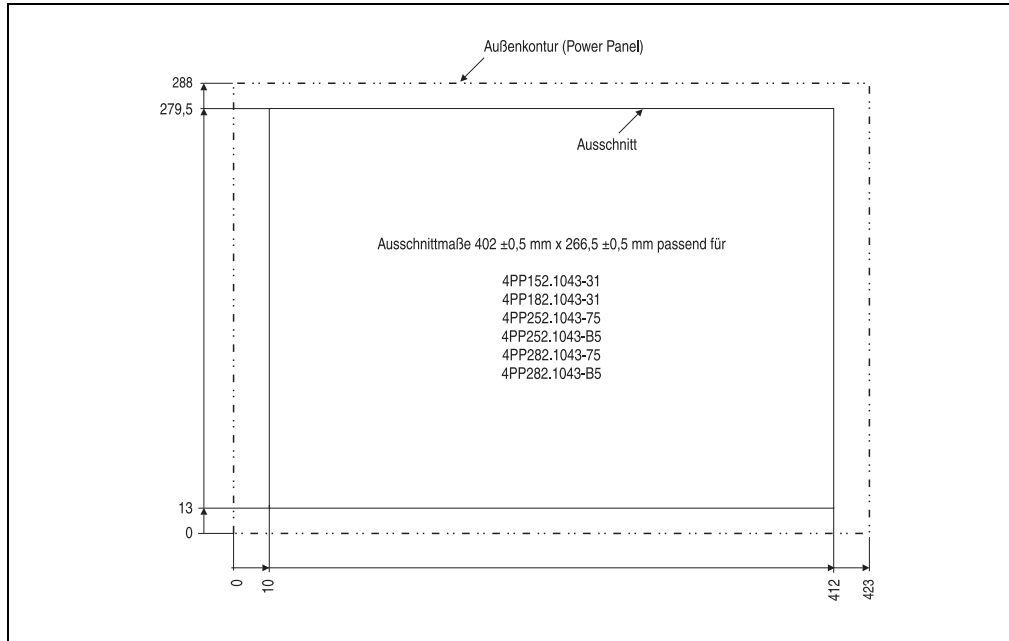


Figure 179: Cutout dimensions

3.25.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 252 TFT C VGA 10.4" F MH 2aPCI
12	Retaining clips included
1	Lithium battery 3 V / 950 mAh included
16	Insert strips (inserted in the front)

Table 97: Contents of delivery - 4PP252.1043-B5

3.26 Device 4PP280.1043-75

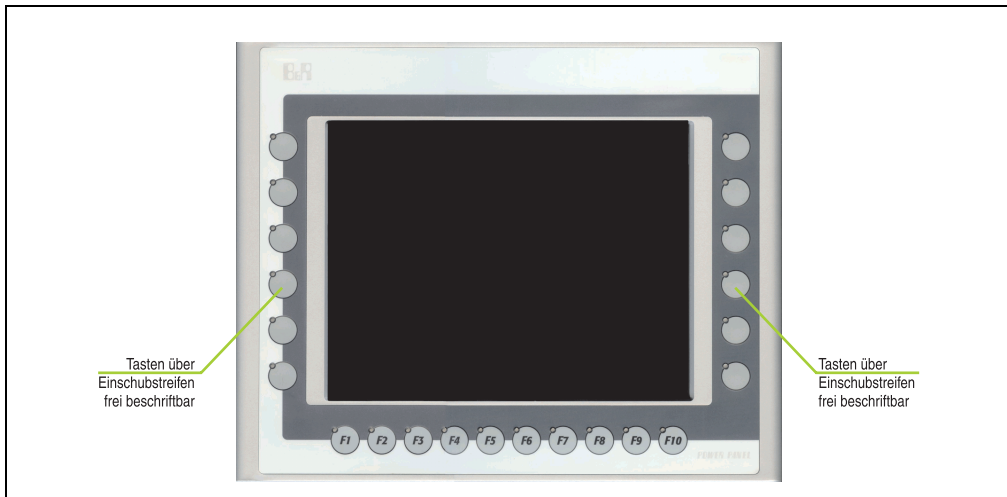


Figure 180: Front view - 4PP280.1043-75

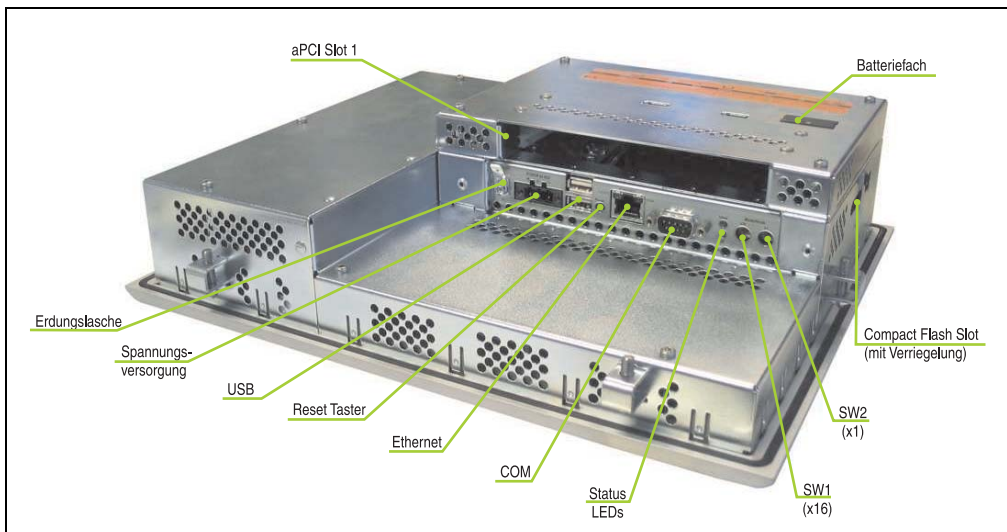


Figure 181: Rear view - 4PP280.1043-75

3.26.1 Technical data

Features	4PP280.1043-75
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 98: Technical data - 4PP280.1043-75

Technical data • Power Panel 200 with Automation Runtime

Features	4PP280.1043-75
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	1 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 70° / 55° 350 cd/m ² 55000 hours
Touch screen Technology Controller Degree of transmission	- Analog, resistive, Elo Hampshire, serial, 12-bit 78 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	12 with LED 10 with LED - - -
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 20 W typical, 25 W max. -
Ground resistance	≥ 47 kOhm

Table 98: Technical data - 4PP280.1043-75 (Forts.)

Mechanical characteristics	4PP280.1043-75
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	323 mm
Height	260 mm
Depth	86 mm
Weight	Approx. 3.9 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 70 °C
Transportation	-20 .. 70 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T <= 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T <= 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 98: Technical data - 4PP280.1043-75 (Forts.)

- 1) System Management Controller
- 2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.26.2 Dimensions

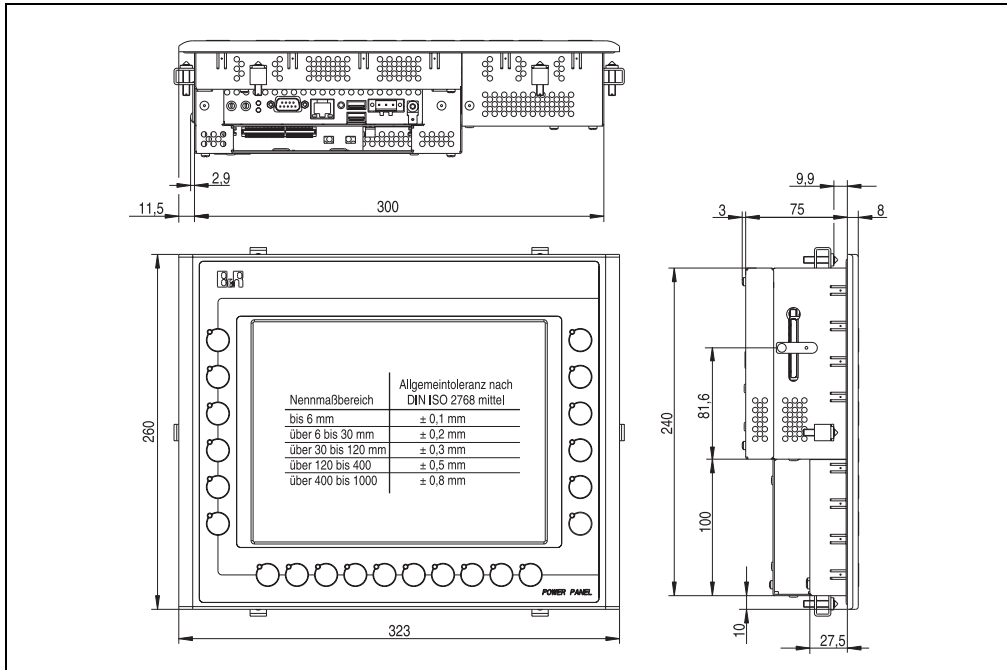


Figure 182: Dimensions - 4PP280.1043-75

3.26.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 182 "Dimensions - 4PP280.1043-75" on page 292) For further information regarding mounting, see section 3 "Installation" on page 421.

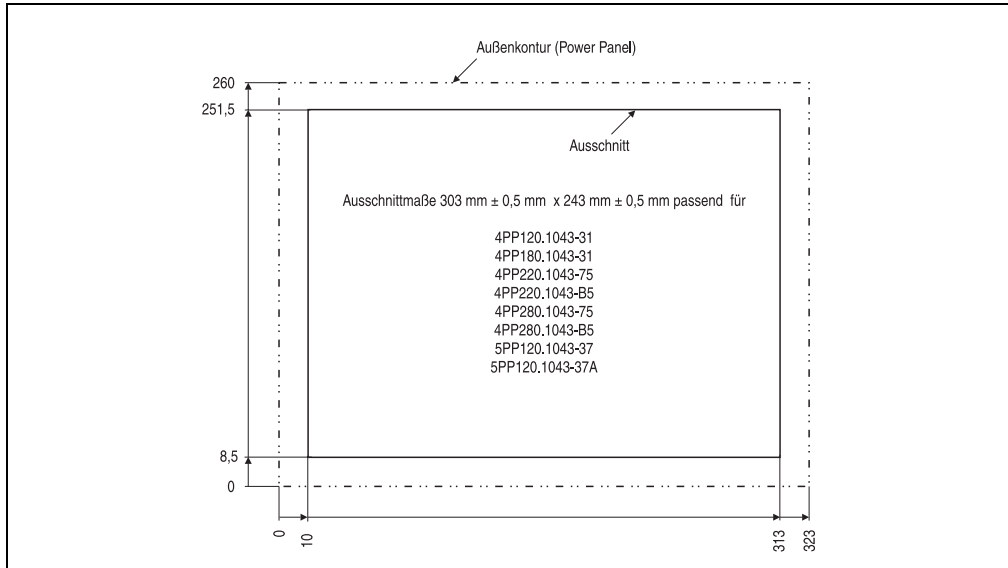


Figure 183: Cutout dimensions

3.26.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 280 TFT C VGA 10.4" FT MH 1aPCI
6	Retaining clips included
1	Lithium battery 3 V / 950 mAh included
2	Insert strips (inserted in the front)

Table 99: Contents of delivery - 4PP280.1043-75

3.27 Device 4PP280.1043-B5

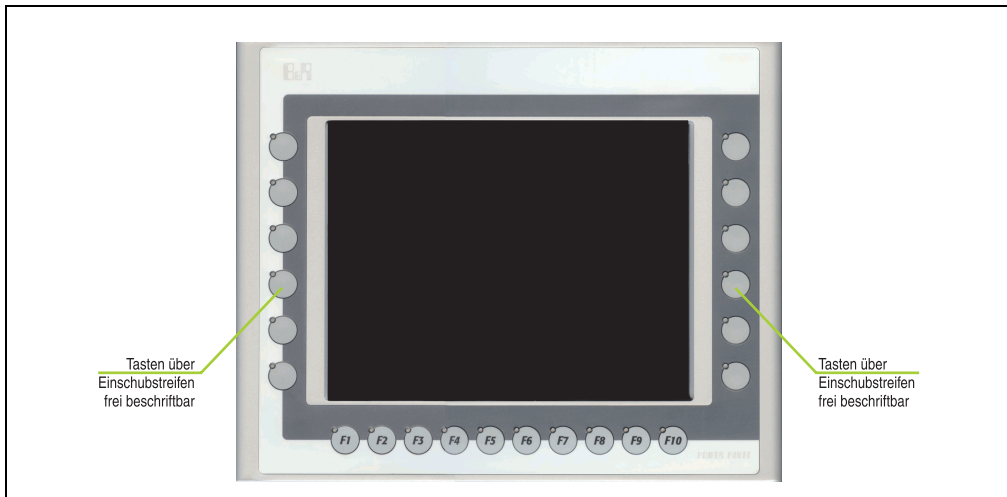


Figure 184: Front view - 4PP280.1043-B5

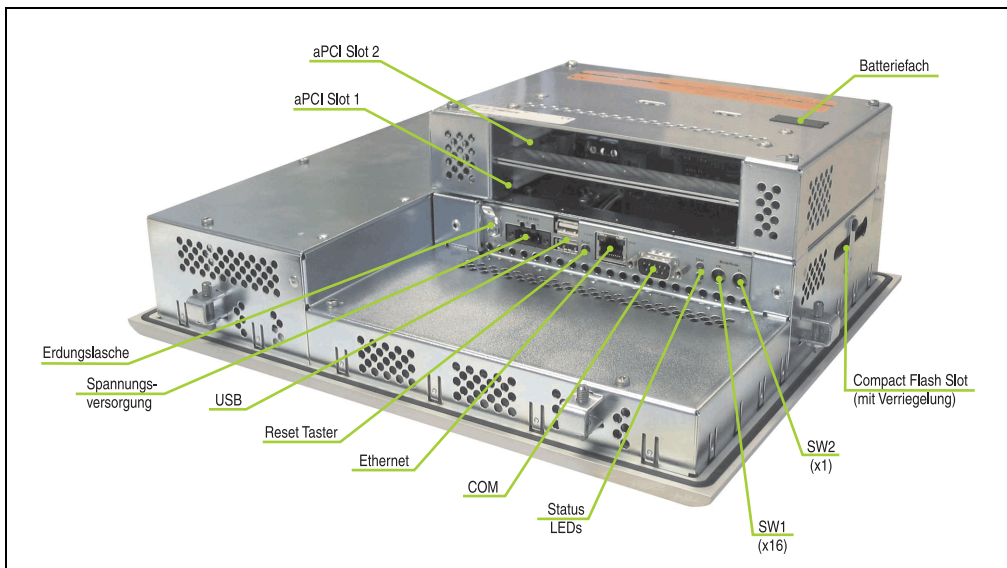


Figure 185: Rear view - 4PP280.1043-B5

3.27.1 Technical data

Features	4PP280.1043-B5
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 100: Technical data - 4PP280.1043-B5

Technical data • Power Panel 200 with Automation Runtime

Features	4PP280.1043-B5
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	2 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 70° / 55° 350 cd/m² 55000 hours
Touch screen Technology Controller Degree of transmission	- Analog, resistive, Elo Hampshire, serial, 12-bit 78 %
Filter glass Degree of transmission Coating	-
Keys Key lifespan Operating force (min./max.) Function keys Soft keys Cursor pad Number block Other keys	> 1000000 operations at 1±0.3 to 3±0.3 N operating force 12 with LED 10 with LED - - -
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 20 W typical, 25 W max. -
Ground resistance	≥ 47 kOhm

Table 100: Technical data - 4PP280.1043-B5 (Forts.)

Mechanical characteristics	4PP280.1043-B5
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	323 mm
Height	260 mm
Depth	108 mm
Weight	Approx. 4.2 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 70 °C
Transportation	-20 .. 70 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 100: Technical data - 4PP280.1043-B5 (Forts.)

- 1) System Management Controller
- 2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.27.2 Dimensions

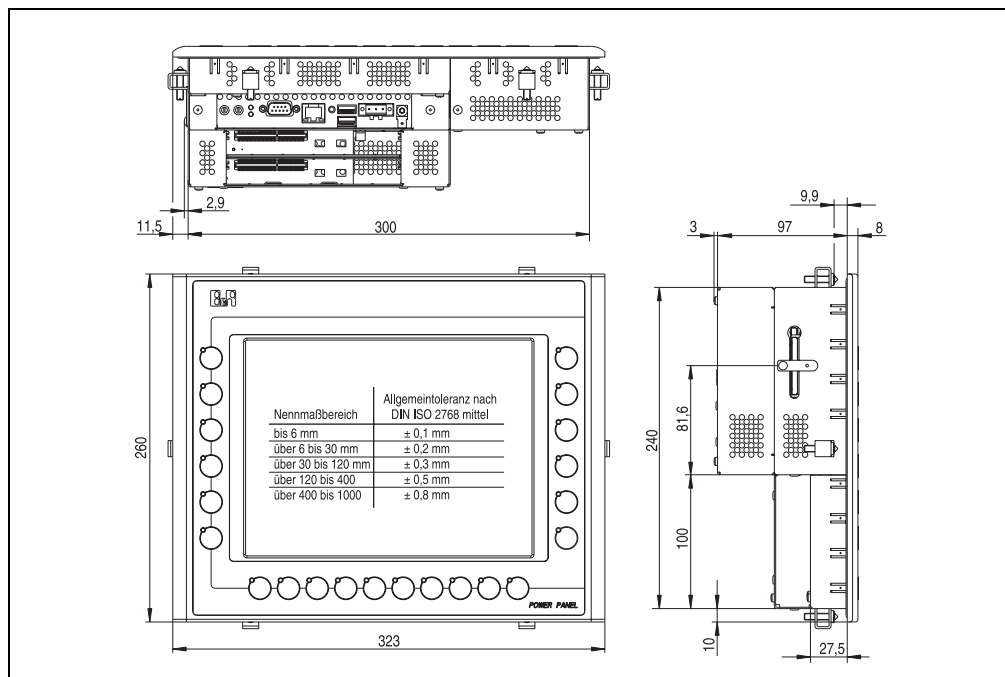


Figure 186: Dimensions - 4PP280.1043-B5

3.27.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 186 "Dimensions - 4PP280.1043-B5" on page 298) For further information regarding mounting, see section 3 "Installation" on page 421.

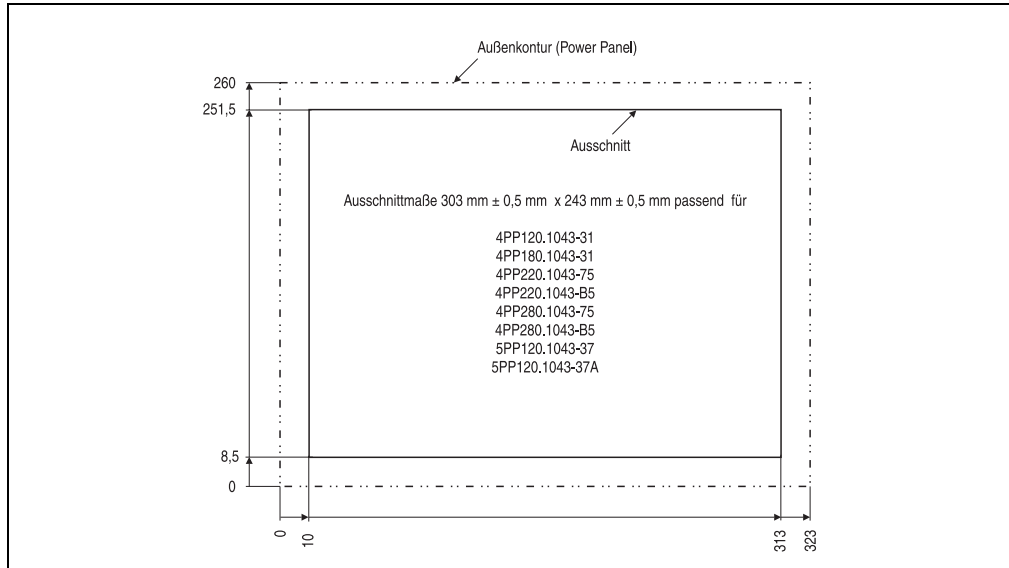


Figure 187: Cutout dimensions

3.27.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 280 TFT C VGA 10.4" FT MH 2aPCI
6	Retaining clips included
1	Lithium battery 3 V / 950 mAh included
2	Insert strips (inserted in the front)

Table 101: Contents of delivery - 4PP280.1043-B5

3.28 Device 4PP280.1505-75

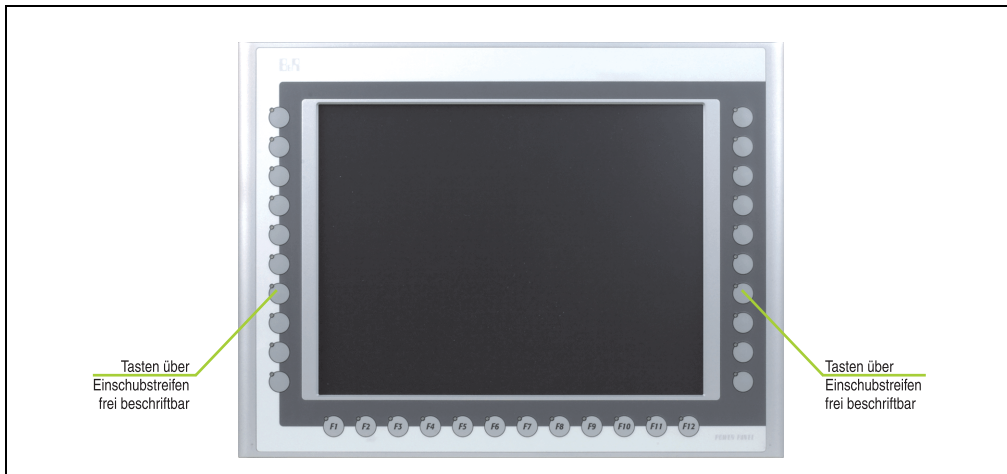


Figure 188: Front view - 4PP280.1505-75

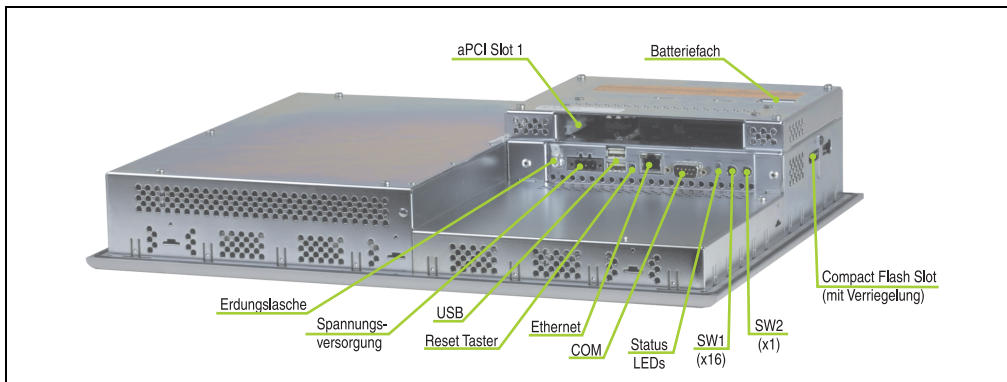


Figure 189: Rear view - 4PP280.1505-75

3.28.1 Technical data

Features	4PP280.1505-75
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 102: Technical data - 4PP280.1505-75

Technical data • Power Panel 200 with Automation Runtime

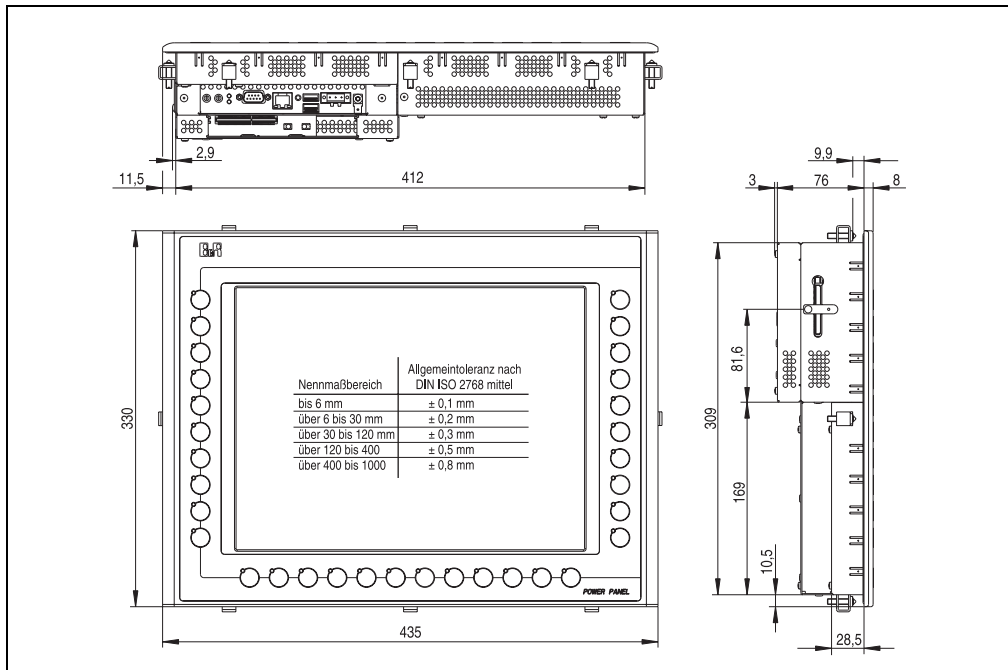
Features	4PP280.1505-75
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	1 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 15 inch (380 mm) 256 colors XGA, 1024 x 768 pixels 300:1 140° / 115° 330 cd/m² 35000 hours
Touch screen Technology Controller Degree of transmission	- Analog, resistive, Elo Hampshire, serial, 12-bit 78 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	20 with LED 12 with LED - - -
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 35 W typical, 40 W max. -
Ground resistance	≥ 47 kOhm

Table 102: Technical data - 4PP280.1505-75 (Forts.)

Mechanical characteristics	4PP280.1505-75
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	435 mm
Height	330 mm
Depth	87 mm
Weight	Approx. 6.5 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 60 °C
Transportation	-20 .. 60 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T <= 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T <= 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 102: Technical data - 4PP280.1505-75 (Forts.)

- 1) System Management Controller
- 2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.



3.28.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 190 "Dimensions - 4PP280.1505-75" on page 304) For further information regarding mounting, see section 3 "Installation" on page 421.

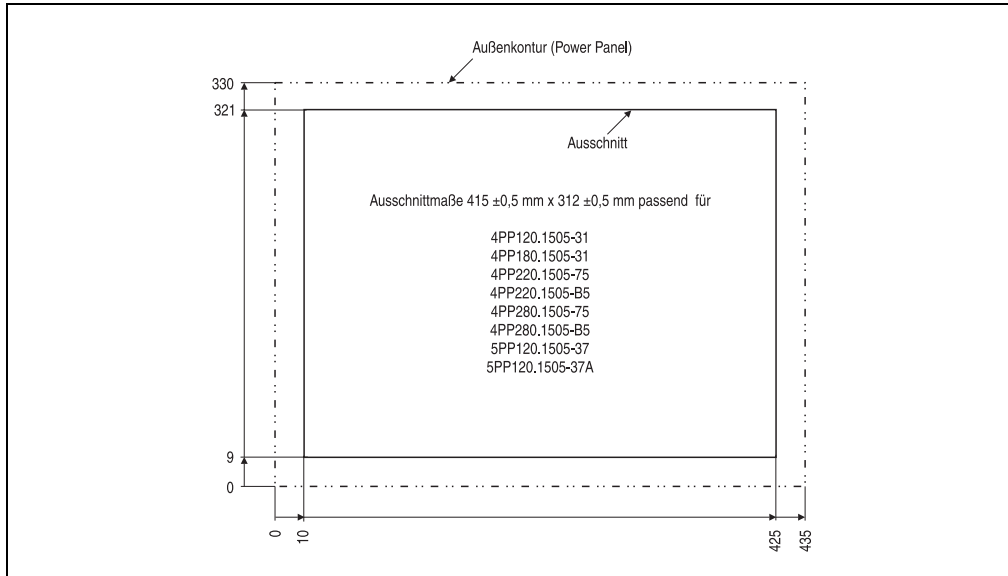


Figure 191: Cutout dimensions

3.28.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 280 TFT C XGA 15" FT MH 1aPCI
8	Retaining clips included
1	Lithium battery 3 V / 950 mAh included
2	Insert strips (inserted in the front)

Table 103: Contents of delivery - 4PP280.1505-75

3.29 Device 4PP280.1505-B5

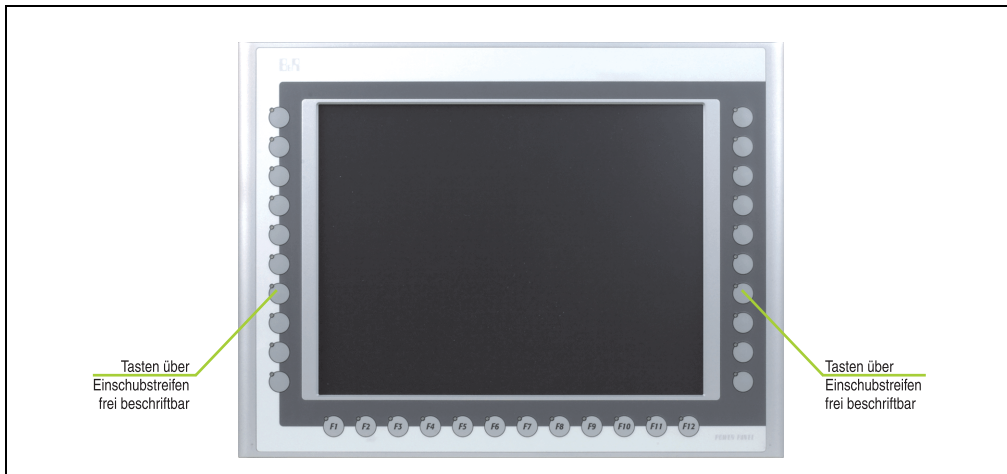


Figure 192: Front view - 4PP280.1505-B5

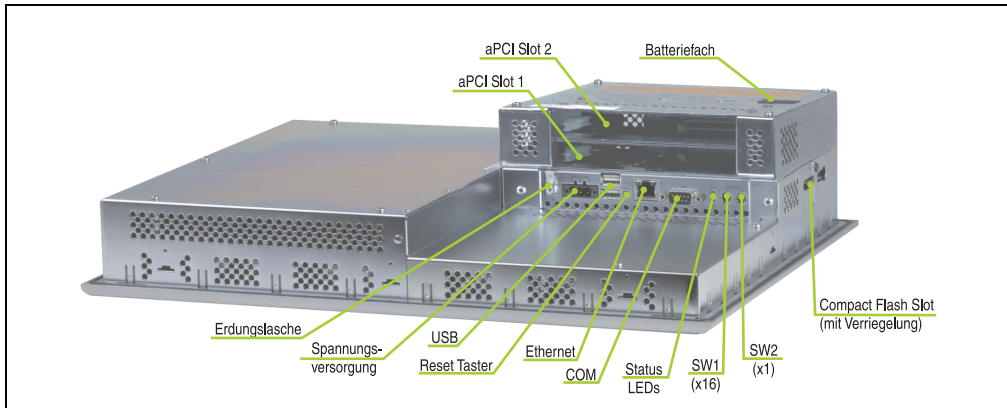


Figure 193: Rear view - 4PP280.1505-B5

3.29.1 Technical data

Features	4PP280.1505-B5
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 104: Technical data - 4PP280.1505-B5

Technical data • Power Panel 200 with Automation Runtime

Features	4PP280.1505-B5
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	2 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 15 inch (380 mm) 256 colors XGA, 1024 x 768 pixels 300:1 140° / 115° 330 cd/m² 35000 hours
Touch screen Technology Controller Degree of transmission	- Analog, resistive, Elo Hampshire, serial, 12-bit 78 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	20 with LED 12 with LED - - -
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 35 W typical, 40 W max. -
Ground resistance	≥ 47 kOhm

Table 104: Technical data - 4PP280.1505-B5 (Forts.)

Mechanical characteristics	4PP280.1505-B5
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	435 mm
Height	330 mm
Depth	109 mm
Weight	Approx. 6.8 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 60 °C
Transportation	-20 .. 60 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T <= 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T <= 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 104: Technical data - 4PP280.1505-B5 (Forts.)

- 1) System Management Controller
- 2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.29.2 Dimensions

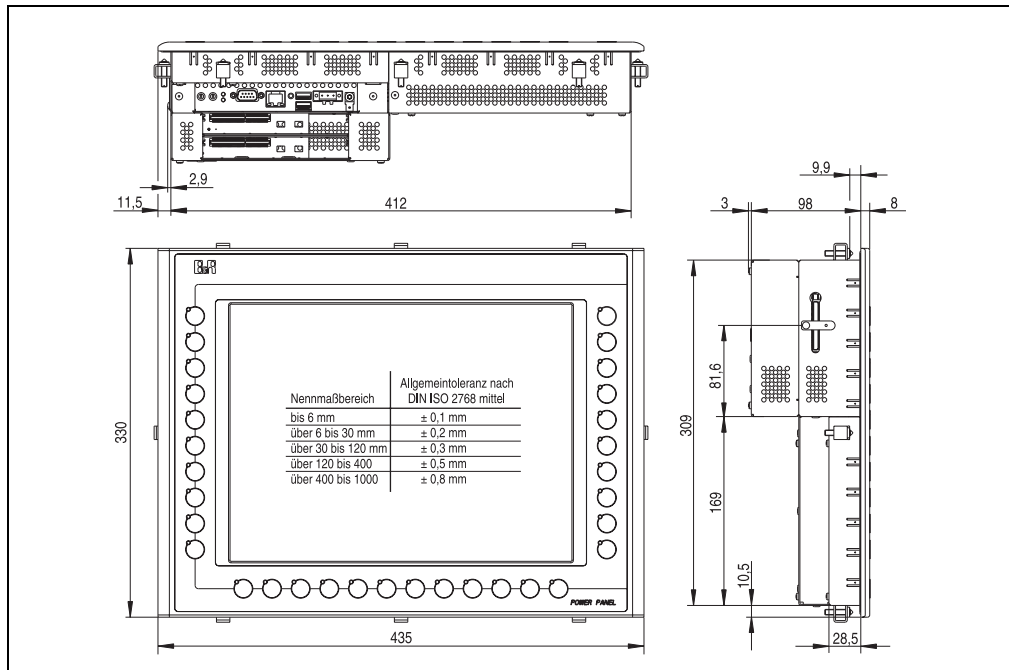


Figure 194: Dimensions - 4PP280.1505-B5

3.29.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 194 "Dimensions - 4PP280.1505-B5" on page 310) For further information regarding mounting, see section 3 "Installation" on page 421.

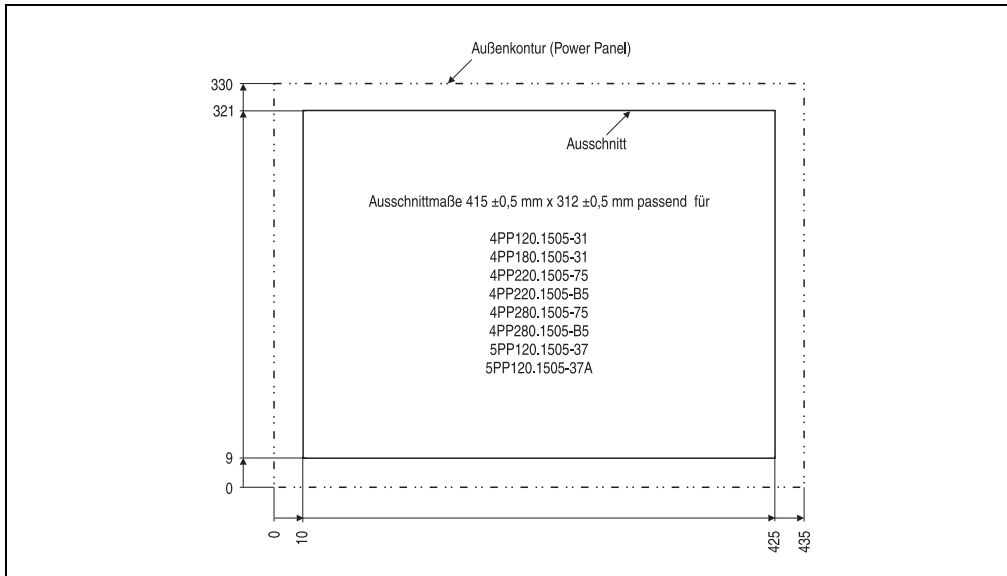


Figure 195: Cutout dimensions

3.29.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 280 TFT C XGA 15" FT MH 2aPCI
8	Retaining clips included
1	Lithium battery 3 V / 950 mAh included
2	Insert strips (inserted in the front)

Table 105: Contents of delivery - 4PP280.1505-B5

3.30 Device 4PP281.1043-75

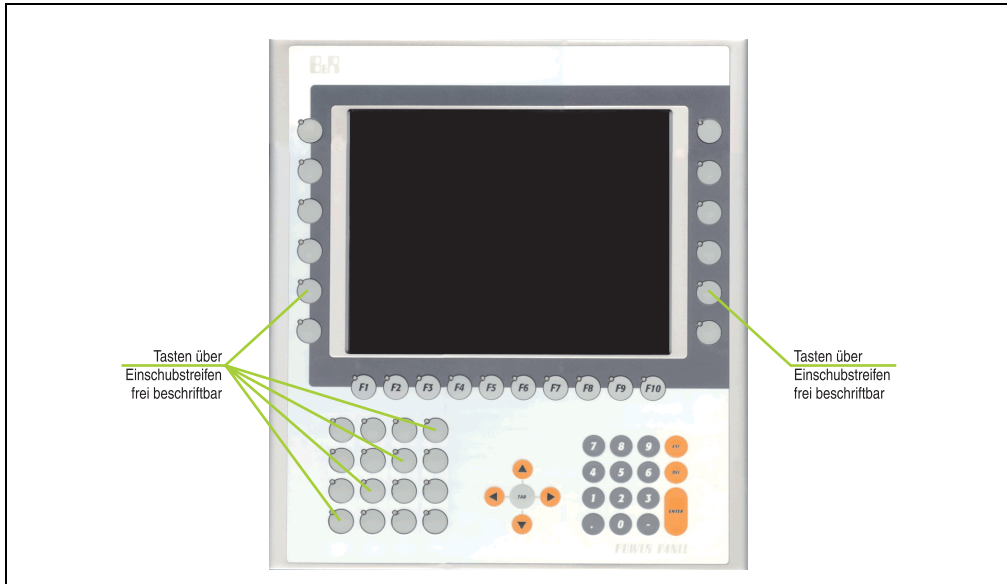


Figure 196: Front view - 4PP281.1043-75

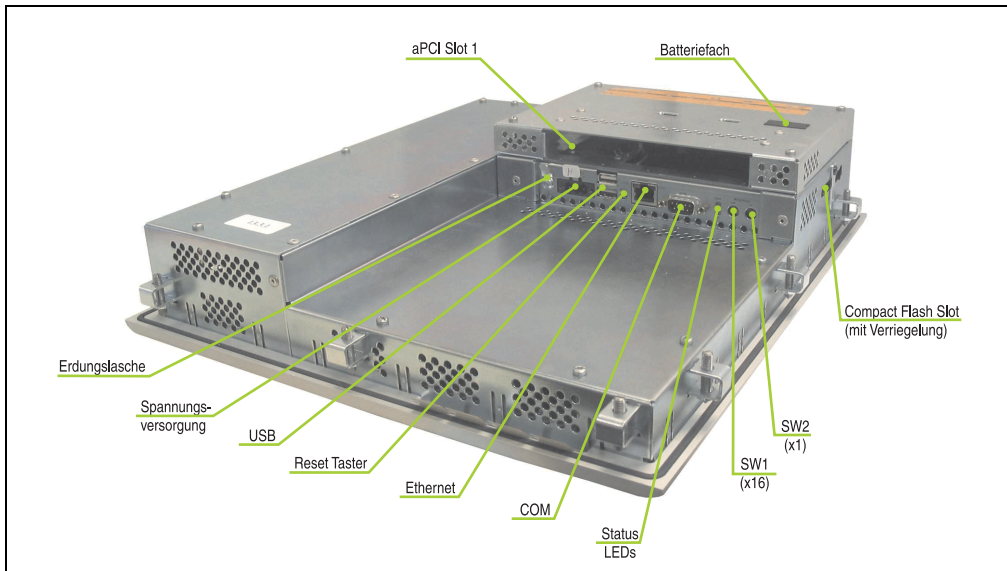


Figure 197: Rear view - 4PP281.1043-75

3.30.1 Technical data

Features	4PP281.1043-75
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 106: Technical data - 4PP281.1043-75

Technical data • Power Panel 200 with Automation Runtime

Features	4PP281.1043-75
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	1 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 70° / 55° 350 cd/m² 55000 hours
Touch screen Technology Controller Degree of transmission	Analog, resistive, Elo Hampshire, serial, 12-bit 78 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	28 with LED 10 with LED - 15 without LED 5 without LED
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 20 W typical, 25 W max. -
Ground resistance	≥ 47 kOhm

Table 106: Technical data - 4PP281.1043-75 (Forts.)

Mechanical characteristics	4PP281.1043-75
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Orange keys	Similar to Pantone 151CV
Dark gray keys	Similar to Pantone 431CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	323 mm
Height	358 mm
Depth	86 mm
Weight	Approx. 5 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 70 °C
Transportation	-20 .. 70 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 106: Technical data - 4PP281.1043-75 (Forts.)

1) System Management Controller

2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.30.2 Dimensions

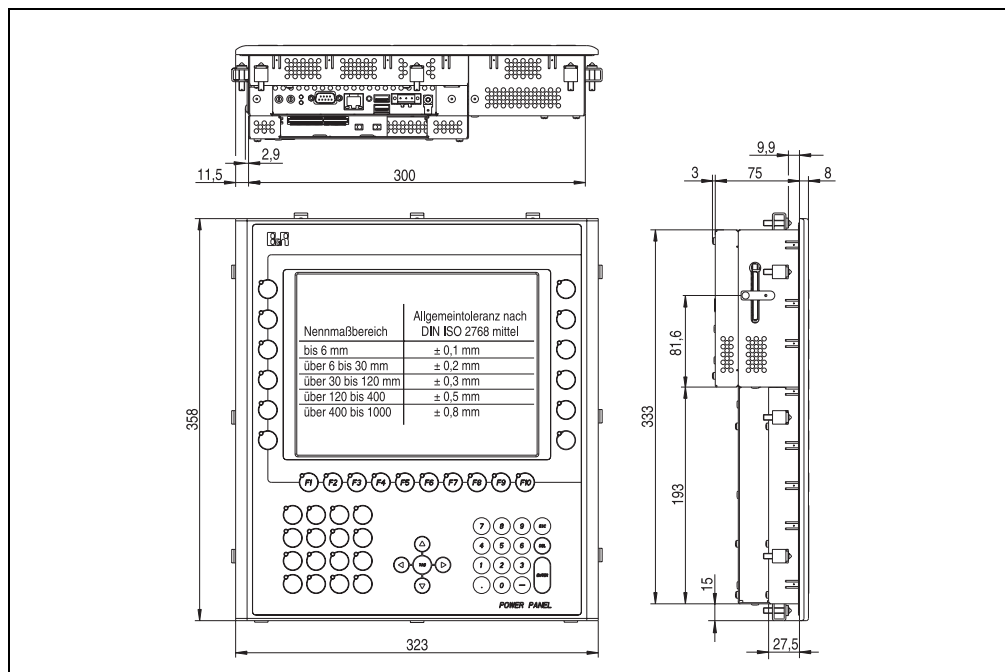


Figure 198: Dimensions - 4PP281.1043-75

3.30.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 198 "Dimensions - 4PP281.1043-75" on page 316) For further information regarding mounting, see section 3 "Installation" on page 421.

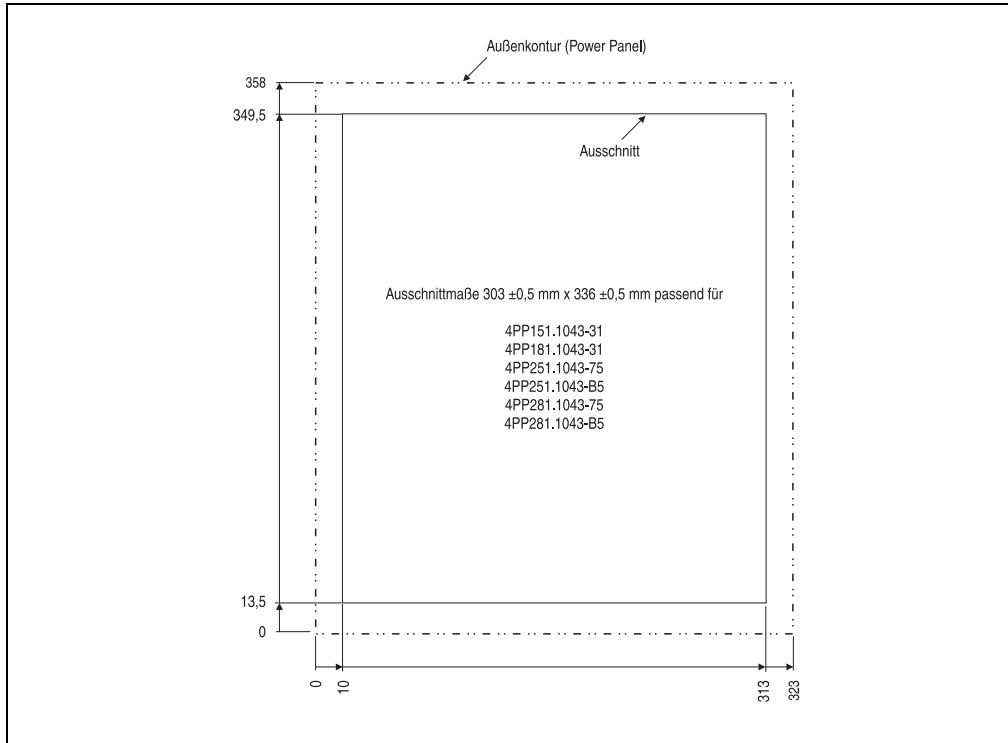


Figure 199: Cutout dimensions

3.30.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 281 TFT C VGA 10.4" FT MH 1aPCI
12	Retaining clips included
1	Lithium battery 3 V / 950 mAh included
2	Insert strips (inserted in the front)

Table 107: Contents of delivery - 4PP281.1043-75

3.31 Device 4PP281.1043-B5

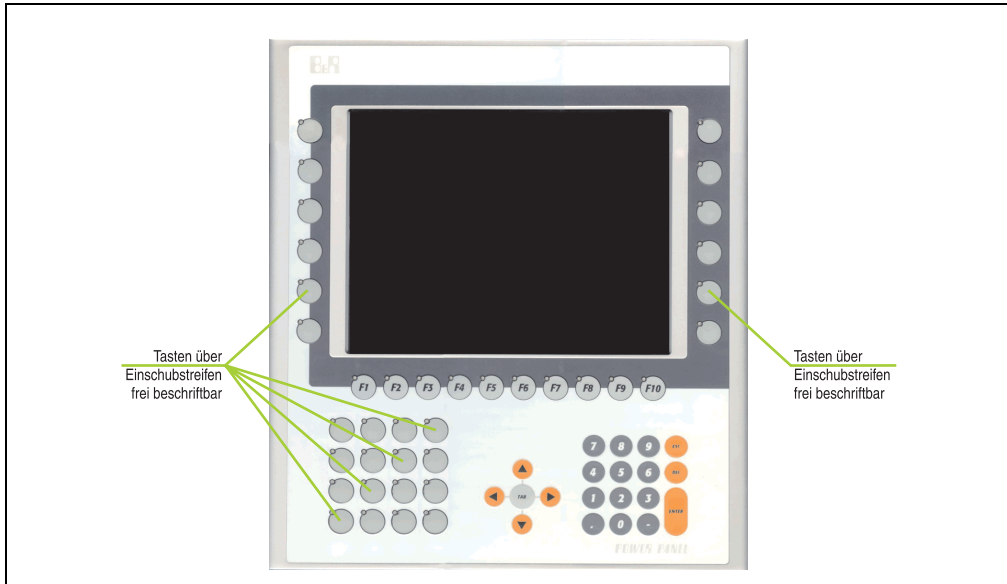


Figure 200: Front view - 4PP281.1043-B5

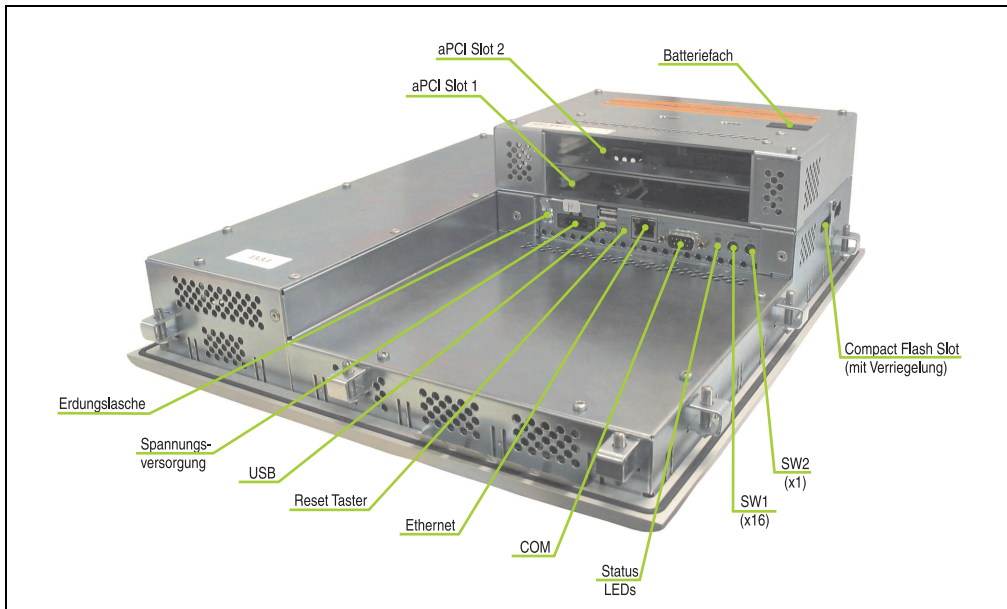


Figure 201: Rear view - 4PP281.1043-B5

3.31.1 Technical data

Features	4PP281.1043-B5
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 108: Technical data - 4PP281.1043-B5

Technical data • Power Panel 200 with Automation Runtime

Features	4PP281.1043-B5
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	2 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 70° / 55° 350 cd/m ² 55000 hours
Touch screen Technology Controller Degree of transmission	Analog, resistive, Elo Hampshire, serial, 12-bit 78 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	28 with LED 10 with LED - 15 without LED 5 without LED
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 20 W typical, 25 W max. -
Ground resistance	≥ 47 kOhm

Table 108: Technical data - 4PP281.1043-B5 (Forts.)

Mechanical characteristics	4PP281.1043-B5
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Orange keys	Similar to Pantone 151CV
Dark gray keys	Similar to Pantone 431CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	323 mm
Height	358 mm
Depth	108 mm
Weight	Approx. 5.3 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 70 °C
Transportation	-20 .. 70 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 108: Technical data - 4PP281.1043-B5 (Forts.)

1) System Management Controller

2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.31.2 Dimensions

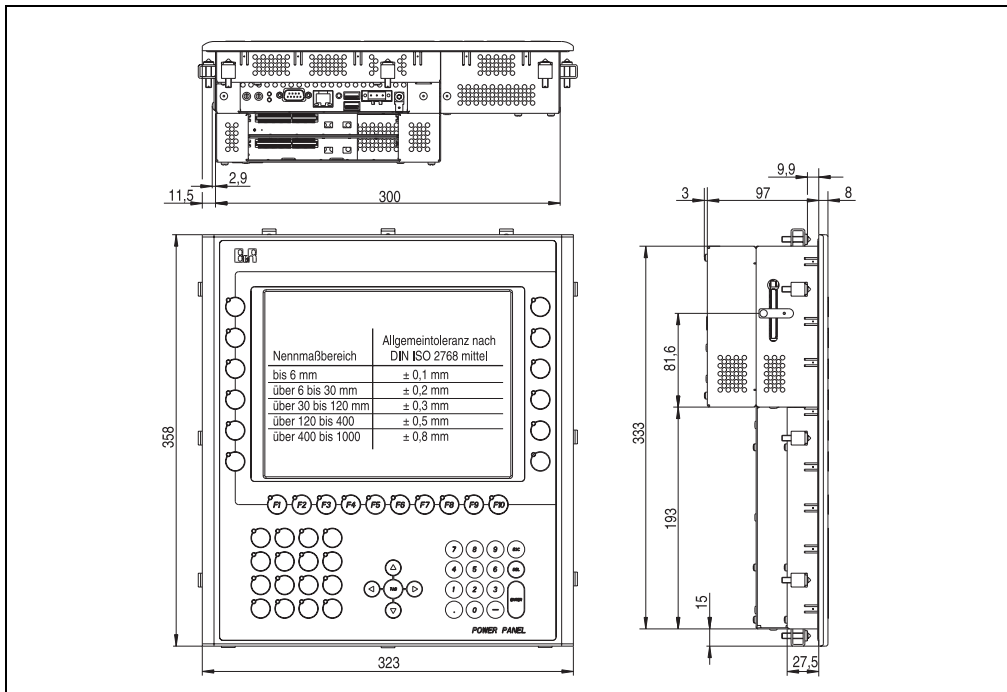


Figure 202: Dimensions - 4PP281.1043-B5

3.31.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 202 "Dimensions - 4PP281.1043-B5" on page 322) For further information regarding mounting, see section 3 "Installation" on page 421.

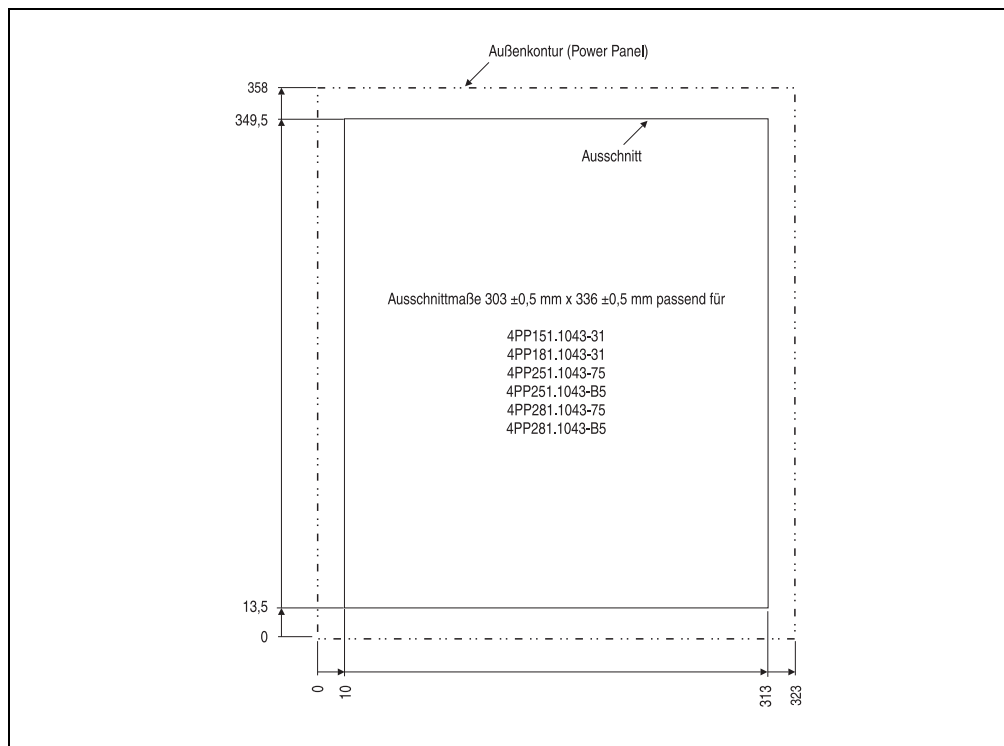


Figure 203: Cutout dimensions

3.31.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 281 TFT C VGA 10.4" FT MH 2aPCI
12	Retaining clips included
1	Lithium battery 3 V / 950 mAh included
2	Insert strips (inserted in the front)

Table 109: Contents of delivery - 4PP281.1043-B5

3.32 Device 4PP281.1505-75

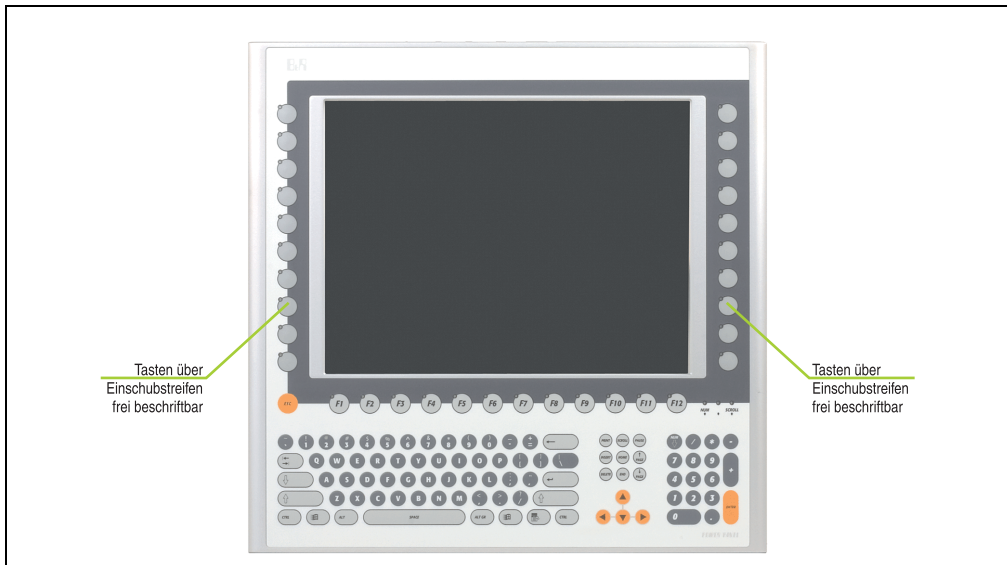


Figure 204: Front view - 4PP281.1505-75

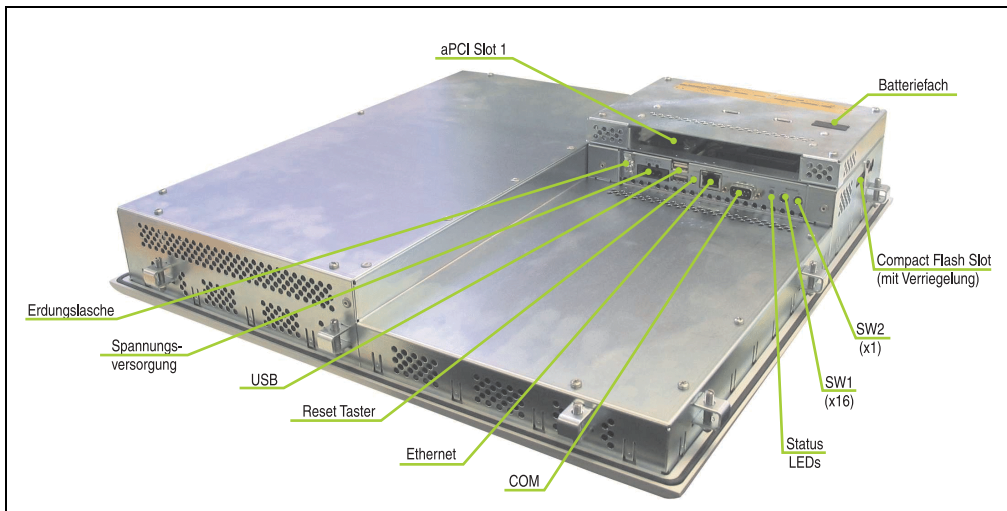


Figure 205: Rear view - 4PP281.1505-75

3.32.1 Technical data

Features	4PP281.1505-75
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 110: Technical data - 4PP281.1505-75

Technical data • Power Panel 200 with Automation Runtime

Features	4PP281.1505-75
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	1 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 15 inch (380 mm) 256 colors XGA, 1024 x 768 pixels 300:1 140° / 115° 330 cd/m² 35000 hours
Touch screen Technology Controller Degree of transmission	Analog, resistive, Elo Hampshire, serial, 12-bit 78 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	20 with LED 12 with LED - 15 without LED 77 without LED
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 35 W typical, 40 W max. Yes
Ground resistance	≥ 47 kOhm

Table 110: Technical data - 4PP281.1505-75 (Forts.)

Mechanical characteristics	4PP281.1505-75
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Orange keys	Similar to Pantone 151CV
Dark gray keys	Similar to Pantone 431CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	435 mm
Height	430 mm
Depth	87 mm
Weight	Approx. 8 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 60 °C
Transportation	-20 .. 60 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 110: Technical data - 4PP281.1505-75 (Forts.)

1) System Management Controller

2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.32.2 Dimensions

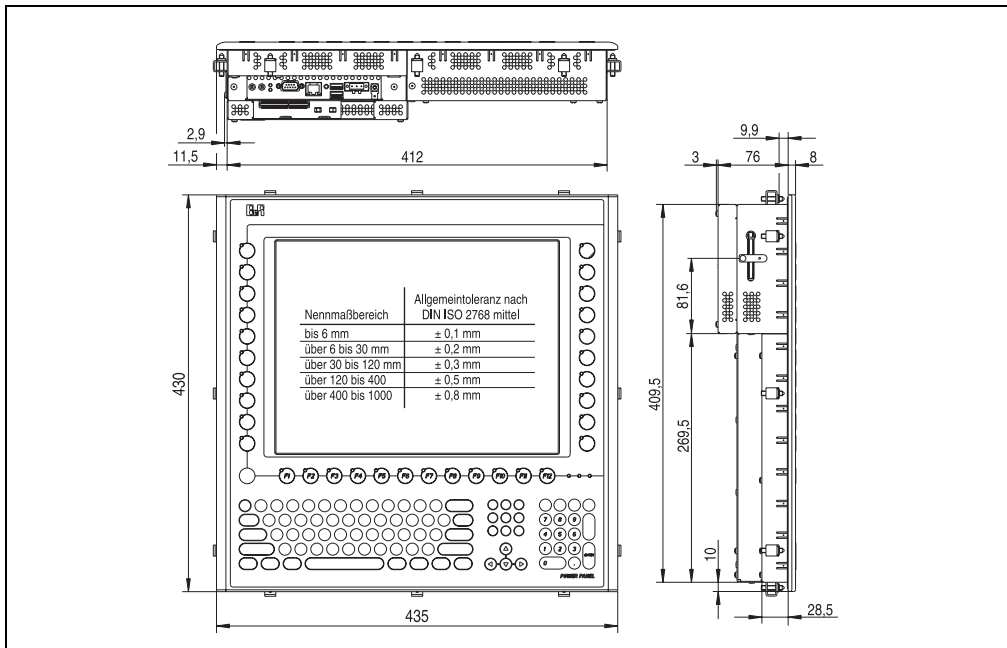


Figure 206: Dimensions - 4PP281.1505-75

3.32.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 206 "Dimensions - 4PP281.1505-75" on page 328) For further information regarding mounting, see section 3 "Installation" on page 421.

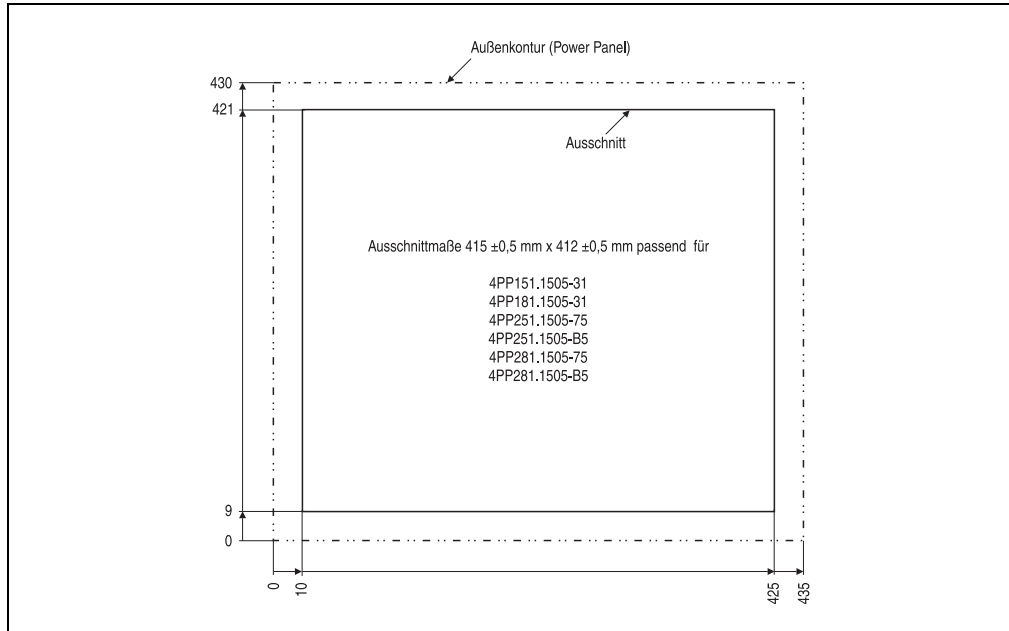


Figure 207: Cutout dimensions

3.32.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 281 TFT C XGA 15" FT MH 1aPCI
12	Retaining clips included
1	Lithium battery 3 V / 950 mAh included
2	Insert strips (inserted in the front)

Table 111: Contents of delivery - 4PP281.1505-75

3.33 Device 4PP281.1505-B5

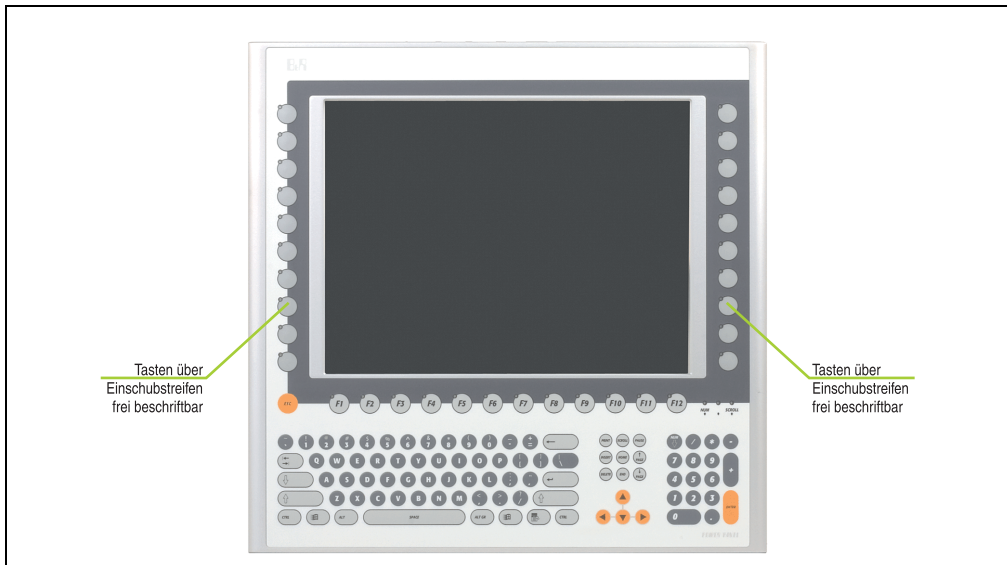


Figure 208: Front view - 4PP281.1505-B5

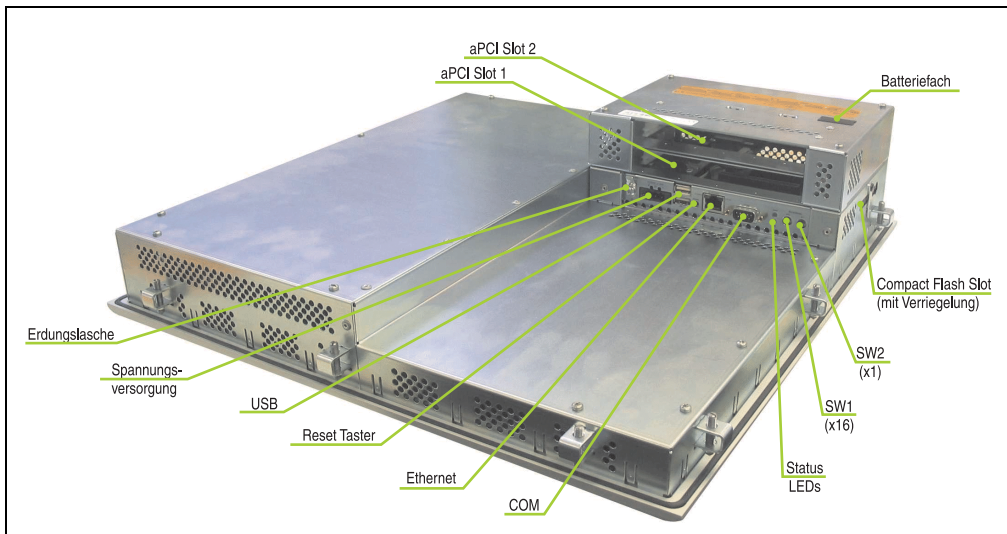


Figure 209: Rear view - 4PP281.1505-B5

3.33.1 Technical data

Features	4PP281.1505-B5
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 112: Technical data - 4PP281.1505-B5

Technical data • Power Panel 200 with Automation Runtime

Features	4PP281.1505-B5
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	2 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 15 inch (380 mm) 256 colors XGA, 1024 x 768 pixels 300:1 140° / 115° 330 cd/m² 35000 hours
Touch screen Technology Controller Degree of transmission	Analog, resistive, Elo Hampshire, serial, 12-bit 78 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	20 with LED 12 with LED - 15 without LED 77 without LED
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 35 W typical, 40 W max. Yes
Ground resistance	≥ 47 kOhm

Table 112: Technical data - 4PP281.1505-B5 (Forts.)

Mechanical characteristics	4PP281.1505-B5
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Orange keys	Similar to Pantone 151CV
Dark gray keys	Similar to Pantone 431CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	435 mm
Height	430 mm
Depth	109 mm
Weight	Approx. 8.3 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 60 °C
Transportation	-20 .. 60 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 112: Technical data - 4PP281.1505-B5 (Forts.)

1) System Management Controller

2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.33.2 Dimensions

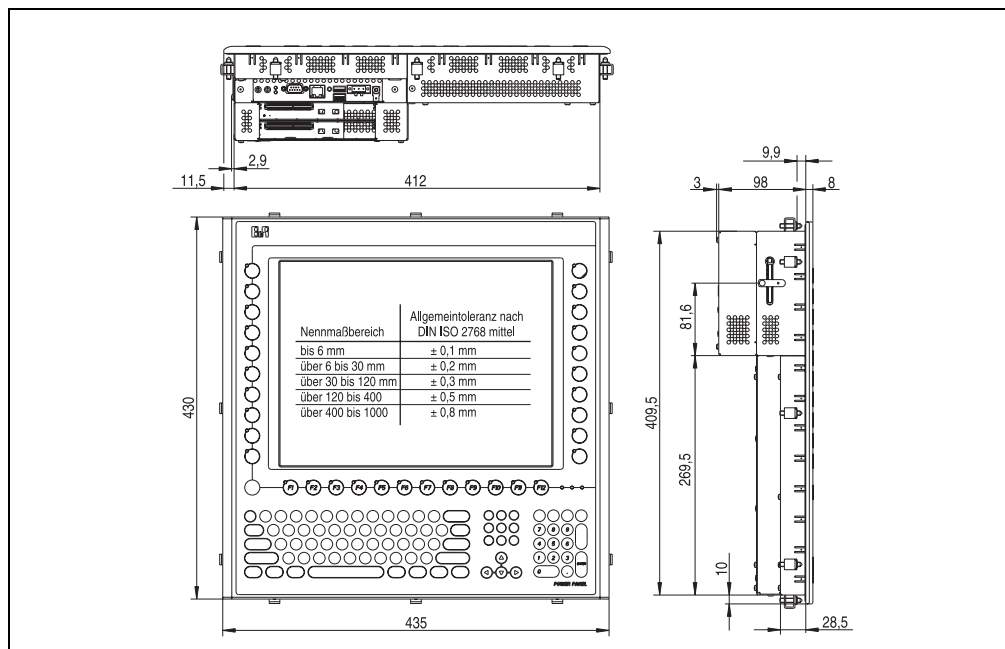


Figure 210: Dimensions - 4PP281.1505-B5

3.33.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 210 "Dimensions - 4PP281.1505-B5" on page 334) For further information regarding mounting, see section 3 "Installation" on page 421.

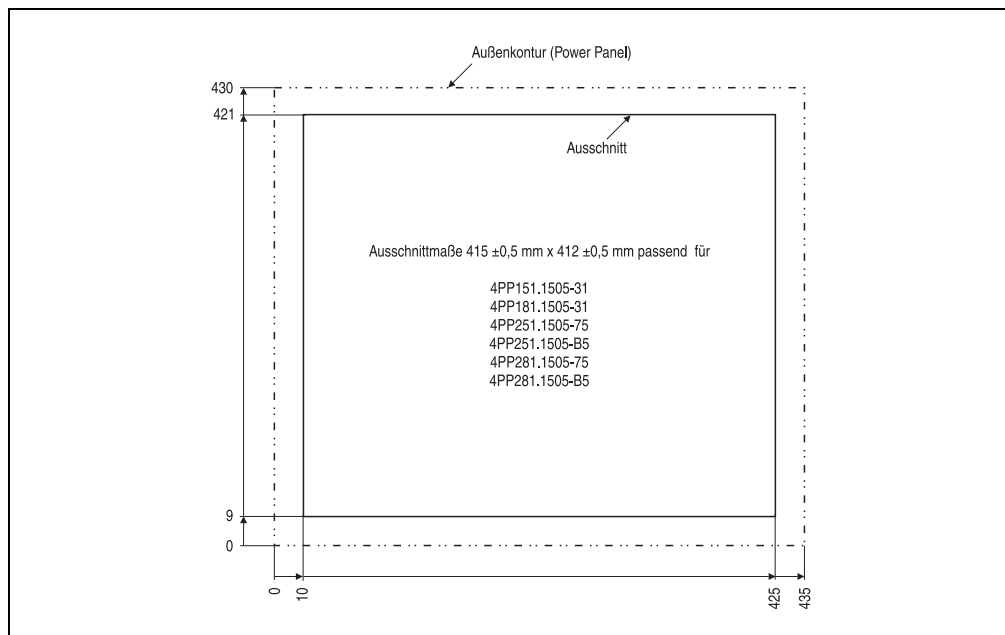


Figure 211: Cutout dimensions

3.33.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 281 TFT C XGA 15" FT MH 2aPCI
12	Retaining clips included
1	Lithium battery 3 V / 950 mAh included
2	Insert strips (inserted in the front)

Table 113: Contents of delivery - 4PP281.1505-B5

3.34 Device 4PP282.1043-75

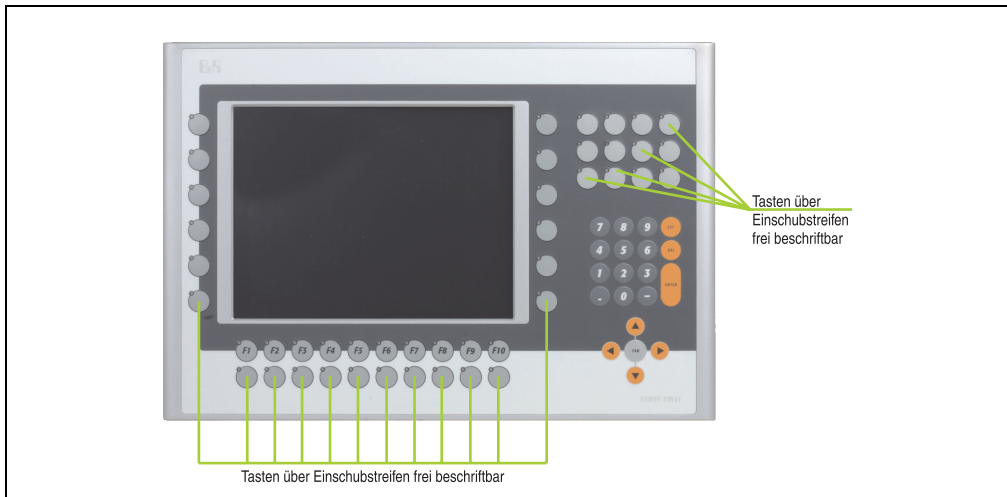


Figure 212: Front view - 4PP282.1043-75

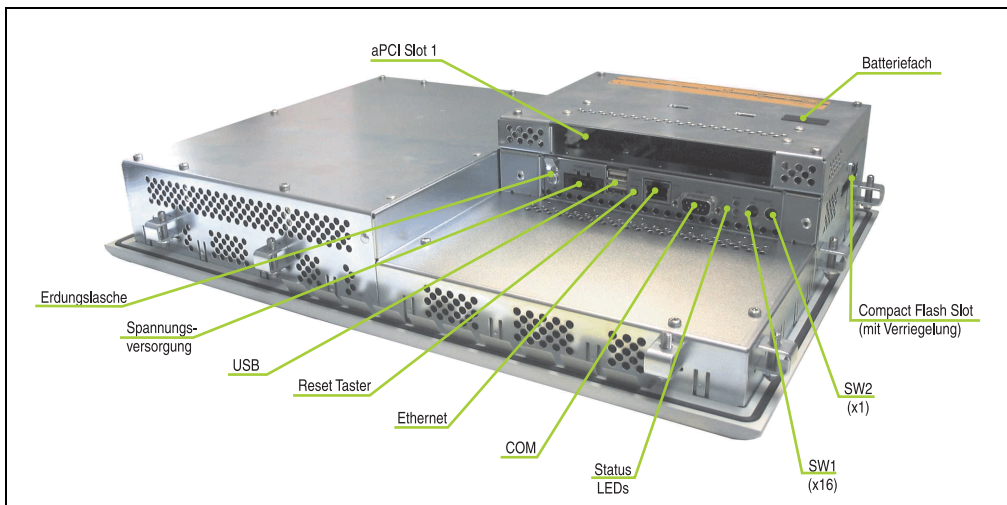


Figure 213: Rear view - 4PP282.1043-75

3.34.1 Technical data

Features	4PP282.1043-75
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 114: Technical data - 4PP282.1043-75

Technical data • Power Panel 200 with Automation Runtime

Features	4PP282.1043-75
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	1 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 70° / 55° 350 cd/m ² 55000 hours
Touch screen Technology Controller Degree of transmission	Analog, resistive, Elo Hampshire, serial, 12-bit 78 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	44 with LED - - 15 without LED 5 without LED
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 20 W typical, 35 W max. Yes
Ground resistance	≥ 47 kOhm

Table 114: Technical data - 4PP282.1043-75 (Forts.)

Mechanical characteristics	4PP282.1043-75
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Orange keys	Similar to Pantone 151CV
Dark gray keys	Similar to Pantone 431CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	423 mm
Height	288 mm
Depth	86 mm
Weight	Approx. 5.2 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 70 °C
Transportation	-20 .. 70 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 114: Technical data - 4PP282.1043-75 (Forts.)

1) System Management Controller

2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.34.2 Dimensions

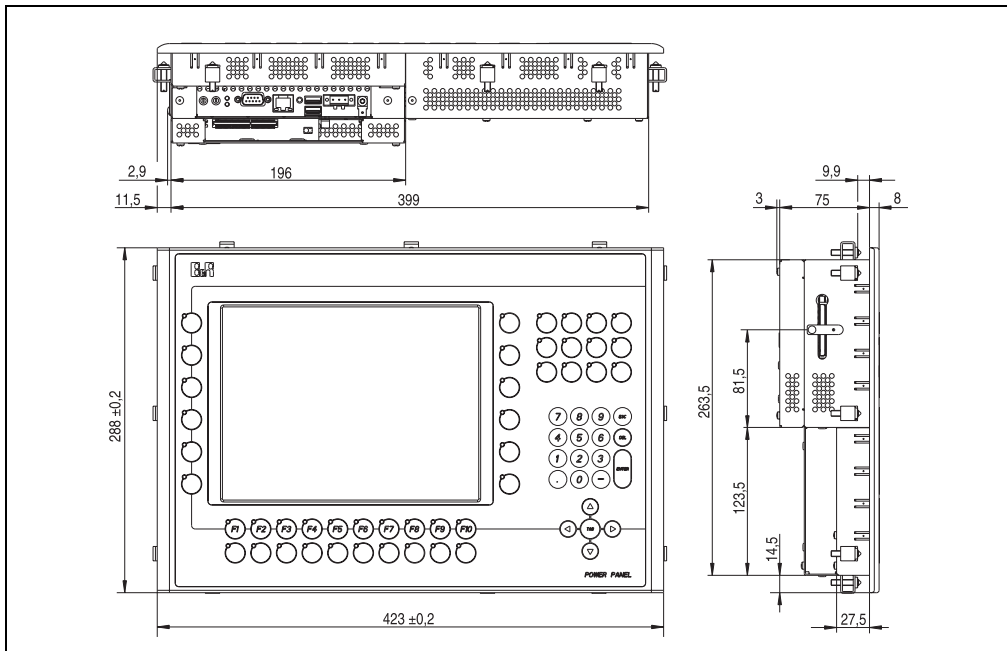


Figure 214: Dimensions - 4PP282.1043-75

3.34.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 214 "Dimensions - 4PP282.1043-75" on page 340) For further information regarding mounting, see section 3 "Installation" on page 421.

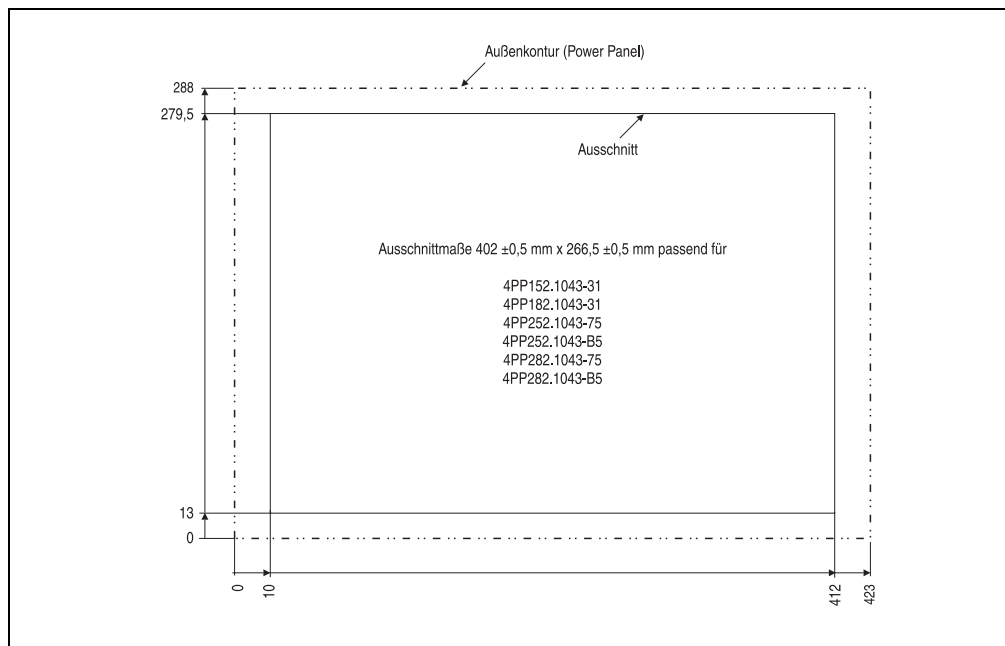


Figure 215: Cutout dimensions

3.34.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 282 TFT C VGA 10.4" FT MH 1aPCI
12	Retaining clips included
1	Lithium battery 3 V / 950 mAh included
16	Insert strips (inserted in the front)

Table 115: Contents of delivery - 4PP282.1043-75

3.35 Device 4PP282.1043-B5

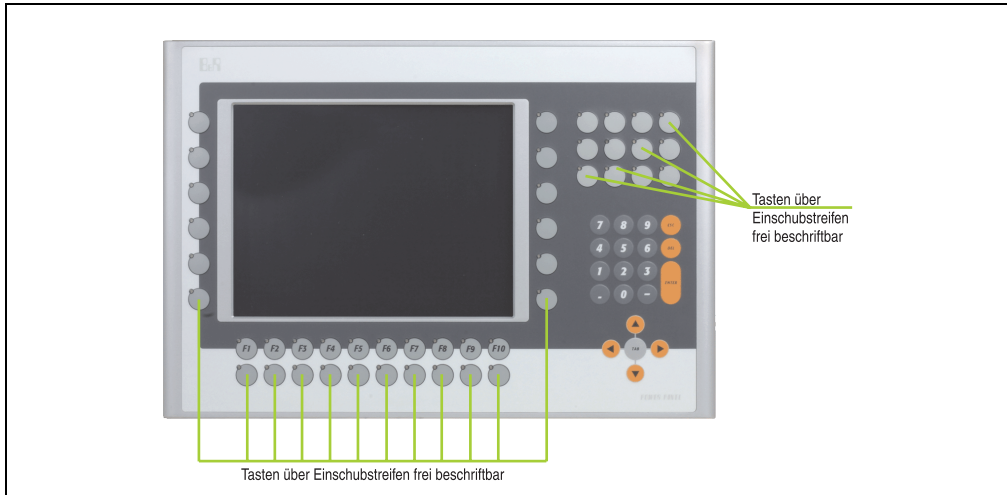


Figure 216: Front view - 4PP282.1043-B5

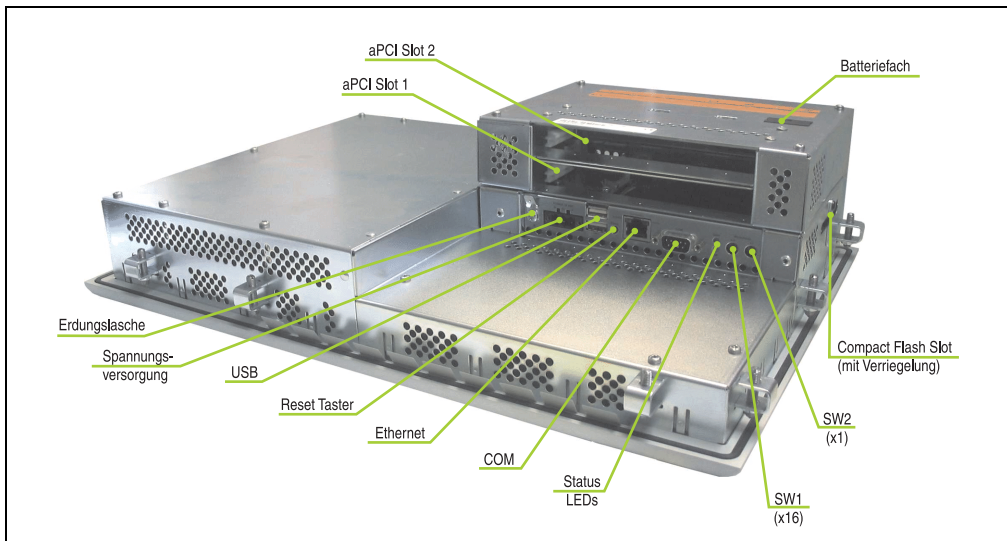


Figure 217: Rear view - 4PP282.1043-B5

3.35.1 Technical data

Features	4PP282.1043-B5
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	256 KB Yes
Watchdog Controller	SMC ¹⁾
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 116: Technical data - 4PP282.1043-B5

Technical data • Power Panel 200 with Automation Runtime

Features	4PP282.1043-B5
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	2 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7 Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 70° / 55° 350 cd/m ² 55000 hours
Touch screen Technology Controller Degree of transmission	Analog, resistive, Elo Hampshire, serial, 12-bit 78 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	44 with LED - - 15 without LED 5 without LED
Caution! Pressing several keys at the same time may trigger unintended actions.	
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 20 W typical, 35 W max. Yes
Ground resistance	≥ 47 kOhm

Table 116: Technical data - 4PP282.1043-B5 (Forts.)

Mechanical characteristics	4PP282.1043-B5
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV
Light background	Similar to Pantone 427CV
Orange keys	Similar to Pantone 151CV
Dark gray keys	Similar to Pantone 431CV
Legend strips (gray)	Similar to Pantone 429CV
Design	Gray
Gasket	Flat gasket around display front
Housing	Metal
Outer dimensions	
Width	423 mm
Height	288 mm
Depth	108 mm
Weight	Approx. 5.5 kg (without aPCI interface modules)
Environmental characteristics	
Environmental temperature	
Operation	0 .. 50 °C
Storage	-20 .. 70 °C
Transportation	-20 .. 70 °C
Relative humidity	
Operation	5 .. 85%, non-condensing
Storage	T <= 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Transportation	T <= 40 °C: 5 % to 90 %, non-condensing
	T > 40 °C: < 90 %, non-condensing
Vibration	
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock	
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 116: Technical data - 4PP282.1043-B5 (Forts.)

1) System Management Controller

2) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.

3.35.2 Dimensions

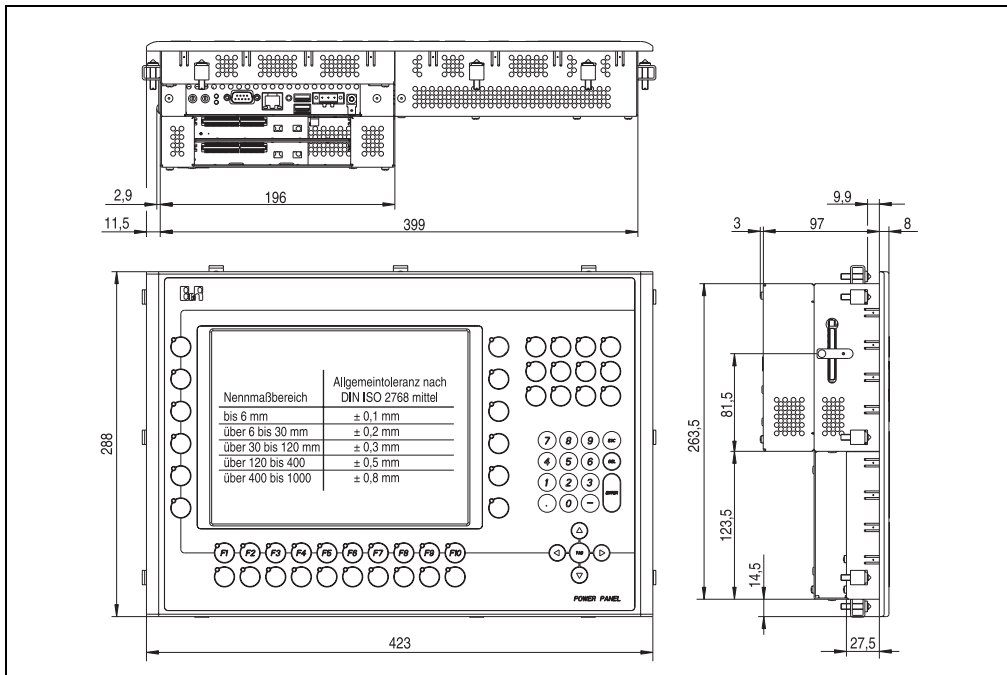


Figure 218: Dimensions - 4PP282.1043-B5

3.35.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 218 "Dimensions - 4PP282.1043-B5" on page 346) For further information regarding mounting, see section 3 "Installation" on page 421.

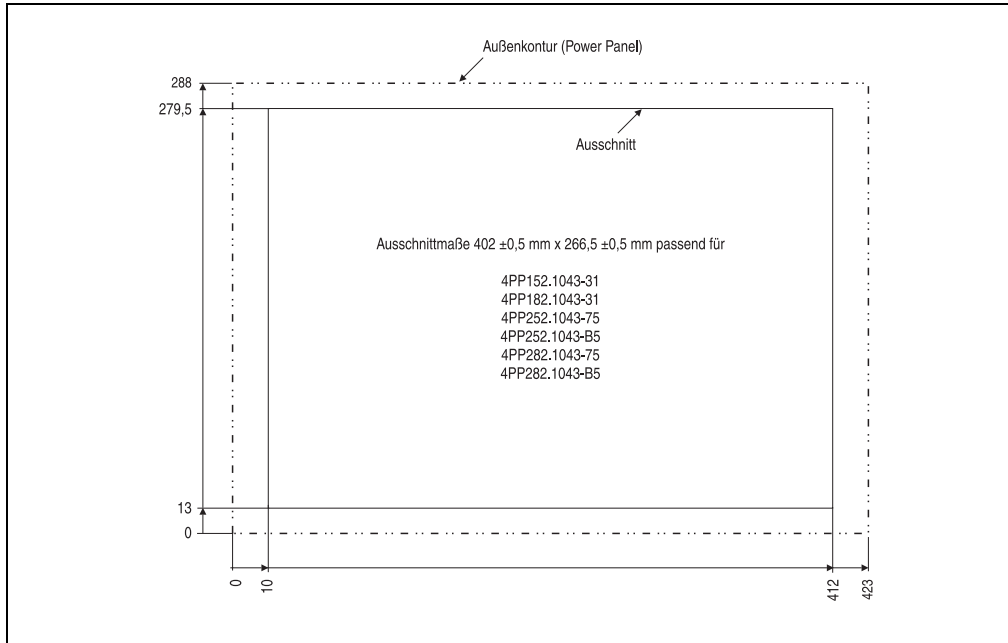


Figure 219: Cutout dimensions

3.35.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 282 TFT C VGA 10.4" FT MH 2aPCI
12	Retaining clips included
1	Lithium battery 3 V / 950 mAh included
16	Insert strips (inserted in the front)

Table 117: Contents of delivery - 4PP282.1043-B5

4. Power Panel 100 with BIOS

4.1 Interface descriptions

In the following section, a description is given for all interfaces and plugs which a Power Panel can have.

4.1.1 Supply voltage

Input voltage: 24 VDC $\pm$ 25%

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 OTB103.9 (screw clamps) or OTB103.91 (cage clamps). The cable required for the connection must be supplied by the customer (see also section "TB103 3-pin supply voltage connector" on page 525).

The supply voltage is internally protected so that the device cannot be damaged if there is an overload or if the voltage supply is connected incorrectly.

Pin assignments can be found either in the following table or printed on the Power Panel plate or device label (see section 4.2.2 "Device label" on page 354).

Supply voltage	
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

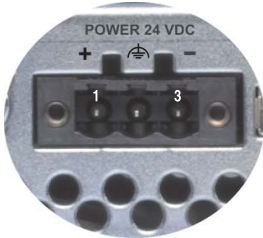


Figure 220: Supply voltage connection

Important!

The pin's connection to the functional ground (pin 2) should be as short as possible.

4.1.2 Grounding clip

Should be connected to ground using the shortest route possible.



Figure 221: Grounding clip

4.1.3 COM interface

The Power Panel is equipped with a PC-compatible serial interface with a 16 byte FIFO buffer.

The RS232 can also be used as a general interface (e.g. third-party connection, bar code reader, etc.).

Serial interface		
RS232 interface Modem-capable, not electrically isolated Up to 115 kBaud		9-pin DSUB connector
Pin	RS232	
1	DCD	
2	RXD	
3	TxD	
4	DTR	
5	GND	
6	DSR	
7	RTS	
8	CTS	
9	RI	

Table 118: COM pin assignment

4.1.4 USB port

The Power Panel is equipped with a USB (Universal Serial Bus) host controller with two USB ports.

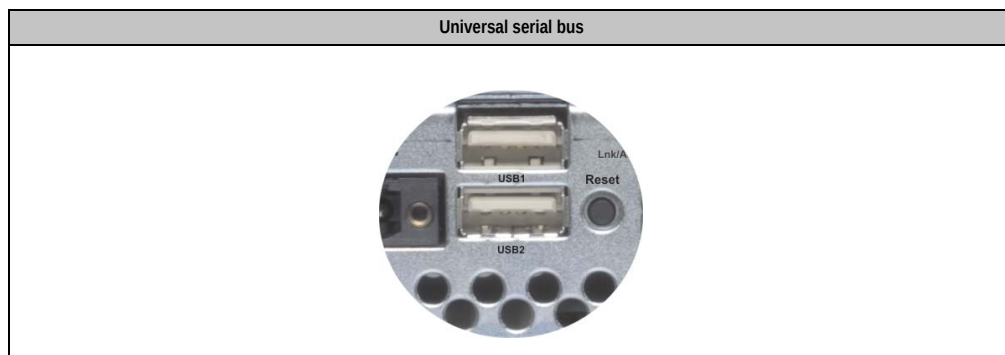


Figure 222: USB Port Connection

Technical data for USB port	
Transfer rate	1.5 MBit/s to 12 MBit/s
Power supply	500 mA for each port
Maximum cable length	5 m (can be extended using a USB hub)

Table 119: Technical data for USB connection

Warning!

Only the USB devices tested and verified by B&R and found in the section "Accessories" on page 521 may be connected to the USB interface.

Important!

Because of general PC specifications, this interface should be handled with extreme care with regard to EMC, location of cables, etc.

4.1.5 Mode/Node switches

Power Panel devices are equipped with 2 hex switches that serve as operating mode switches. Switch positions 01 up to FF are available for any purpose in an application. The switch's position can be evaluated from an application program.

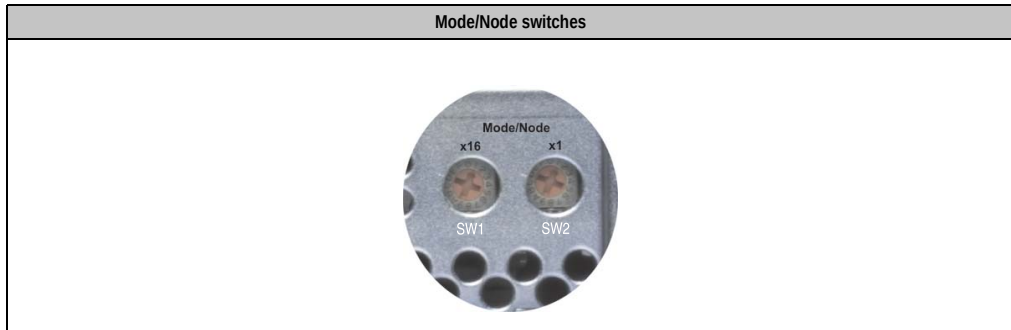


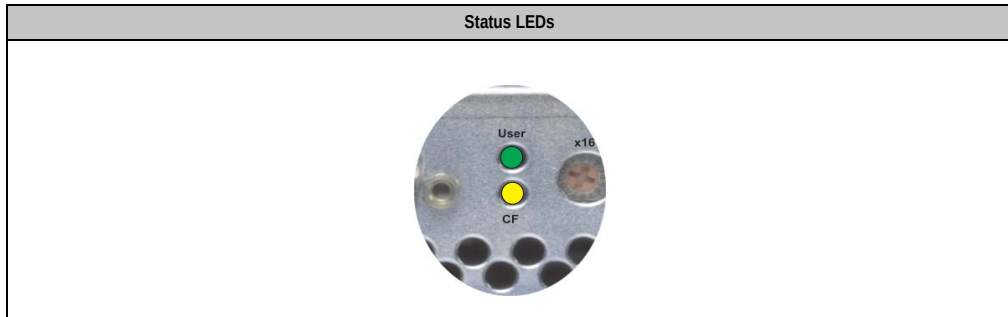
Figure 223: Mode/Node switches

Switch position		Function	Description
SW1 (x16)	SW2 (x1)	Operating mode switch	
0	0	Service Mode	- The resolution for the display used is automatically set (see also section "Video and flat panel configuration" on page 440). - Contrast and brightness settings for the display are set to default values (see also section "Video and flat panel configuration" on page 440). - Legacy USB support is always set to "enabled", independent of the BIOS setting (see section "Advanced BIOS features" on page 445). - With incorrect factory settings (e.g. if the checksum is wrong), the Power Panel boots but the display is not initialized. This error is signaled by a continuous lighting of the user LED. Video output is then only possible using the REMHOST utility (see section "REMHOST utility disk" on page 484). - When switching on the Power Panel, the Power Panel can be controlled by the user using a serial connection to a PC and the REMHOST tool, e.g. to make changes in the BIOS. REMHOST supports only text mode for video output. This means that the output of programs, which are directly recorded in the video memory are not correctly displayed. - The Power Panel attempts to establish a connection to the REMHOST utility (a "ping" is sent to the serial interface).
x	x	Other switch positions have no significance	

Table 120: Switch settings for the mode/node switch

4.1.6 Status LEDs

Power Panels are equipped with two status LEDs that are visible on the outside.



LED	Color	Function
User	Green	Freely available for use in an application
CF	Yellow	Indicates that the Compact Flash card is being accessed

Table 121: Status LEDs

4.1.7 Ethernet connection

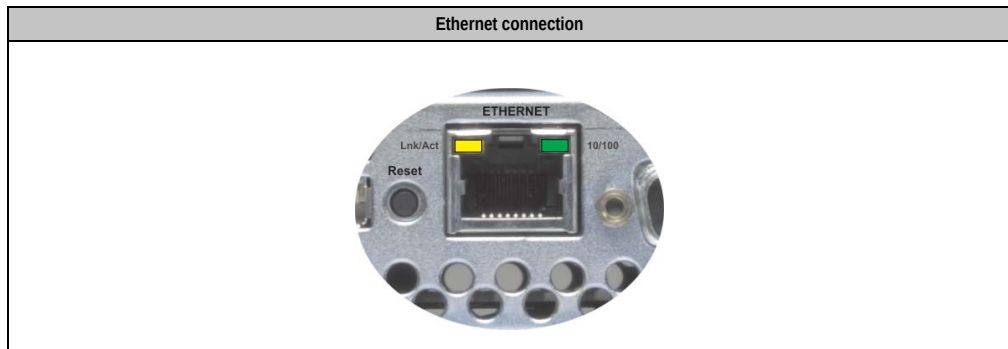


Figure 224: Ethernet connection

Ethernet	10/100 MBit/s ¹⁾
Connection	RJ45 twisted pair (10BaseT/100BaseT)
Controller	MacPhyter DP83815 or DP83816 - depends on the revision
Cabling	S/STP (category 5)

Table 122: Ethernet controller

1) Both operating modes are possible. Switching takes place automatically.

The onboard Ethernet controller for Power Panel devices provides an RJ45 twisted pair connection where 2 LEDs are attached for status checking:

LED	On	Off
Green	100 MBit/s	10 MBit/s
Yellow	Link	Activity (blinking)

Table 123: Status LEDs - Ethernet controller

4.1.8 Reset button

The reset button can be accessed through a small hole between the USB and the Ethernet connection. In order to avoid accidental activation, a reset can only be triggered with a pointed object.

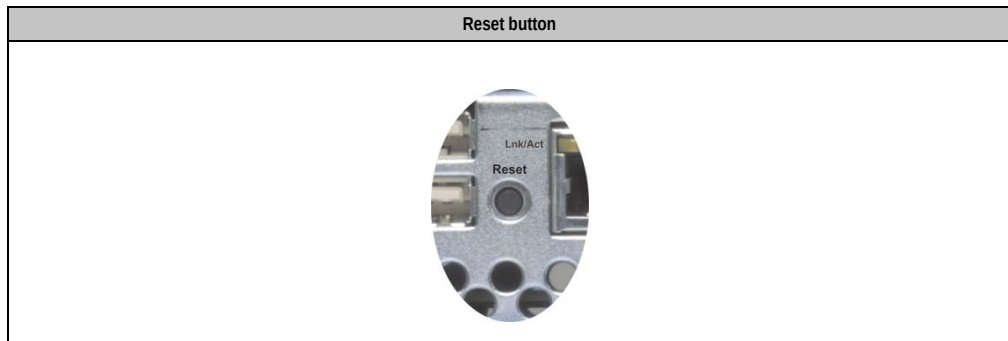


Figure 225: Reset button

4.1.9 CompactFlash slot

Power Panel devices are equipped with a CompactFlash slot that is accessible from the side. CompactFlash cards of type I are supported.



Figure 226: CompactFlash slot

It is possible to protect the CompactFlash slot using a safety clip. By pressing the ejector (using a pointed object is the best way to do this) the CompactFlash card can be changed quickly and safely.

Caution!

Changing the CompactFlash card can only take place without power applied! As a safety measure, a sticker is also attached to Power Panel devices stating this.

4.2 Labels

4.2.1 Safety sticker

A safety sticker is attached over the Compact Flash slot, which advises that the power must be switched off for the Power Panel device (depending on the revision) when inserting or removing a Compact Flash card.

An ESD warning sticker is attached next to the battery compartment. This indicates the components at risk from electrostatic discharge inside the Power Panel devices.



Figure 227: Safety sticker

4.2.2 Device label

The following label is attached to a suitable location on the Power Panel and displays short definitions for all of the interfaces:

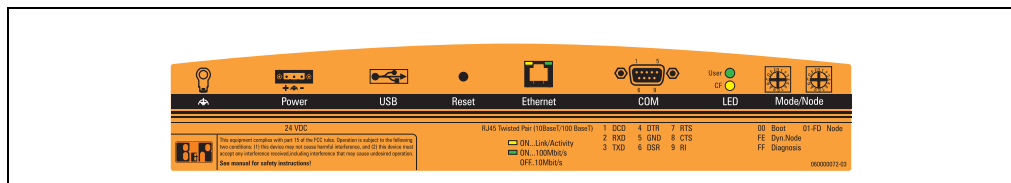


Figure 228: Device label

4.2.3 Serial number sticker

General information

Each B&R device is given a unique serial number sticker with a barcode that allows the device to be clearly identified.

Design/Dimensions

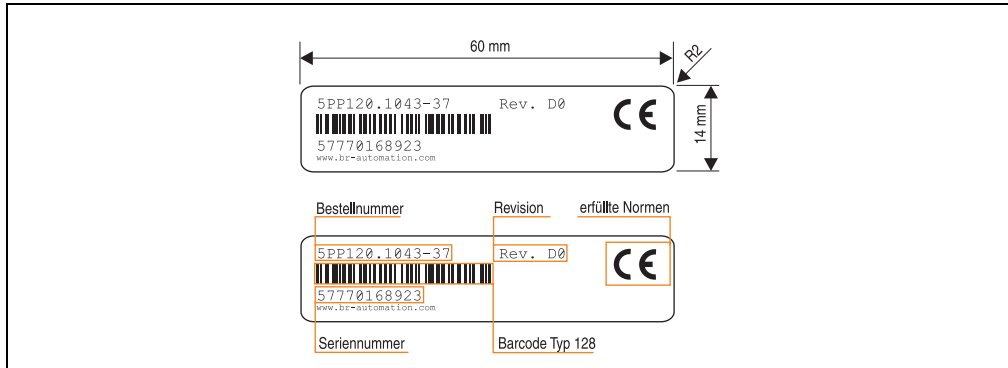


Figure 229: Serial number sticker design/dimensions

4.3 Device 5PP120.0571-27



Figure 230: Front view - 5PP120.0571-27

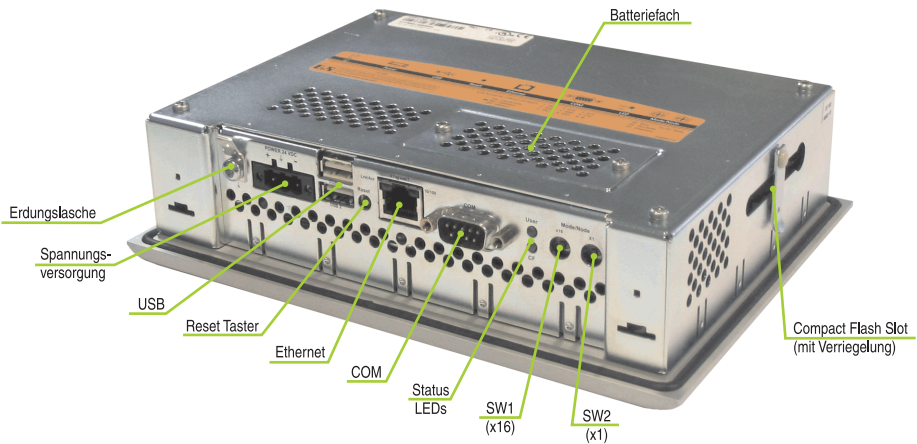


Figure 231: Rear view - 5PP120.0571-27

4.3.1 Technical data

Features	5PP120.0571-27
Boot loader / Operating system	BIOS
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 128 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Hold-up time	-
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 (rev. < D0 DP83615) 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 124: Technical data - 5PP120.0571-27

Technical data • Power Panel 100 with BIOS

Features	5PP120.0571-27
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	LCD 5.7 in (144 mm) 512 colors ¹⁾ QVGA, 320 x 240 pixels 40:1 80° / 90° 150 cd/m ² 50000 hours
Touch screen Technology Controller Degree of transmission	Analog, resistive (Gunze) Hampshire, serial, 12-bit 84 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	-
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 10 W typical, 15 W max. -
Ground resistance	0 Ohm

Table 124: Technical data - 5PP120.0571-27 (Forts.)

Mechanical characteristics	5PP120.0571-27
Front Frame Membrane Design Gasket	Naturally anodized aluminum Polyester Gray Flat gasket around display front
Housing	Metal
Outer dimensions Width Height Depth	212 mm 156 mm 55.5 mm
Weight	Approx. 1.4 kg
Environmental characteristics	
Environmental temperature Operation Storage Transportation	0 .. 50 °C -20 .. 60 °C -20 .. 60 °C
Relative humidity Operation Storage Transportation	5 .. 85%, non-condensing T ≤ 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing T ≤ 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing
Vibration Operation (continuous) Operation (occasional) Storage Transportation	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak) Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak) Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak) Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock Operation Storage Transportation	Max. 15 g (147 m/s² 0-peak) and 11 ms length Max. 30 g (980 m/s² 0-peak) and 11 ms length Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 124: Technical data - 5PP120.0571-27 (Forts.)

1) The actual number of colors depends on the graphic memory, the graphics mode set and the graphic driver used.

4.3.2 Dimensions

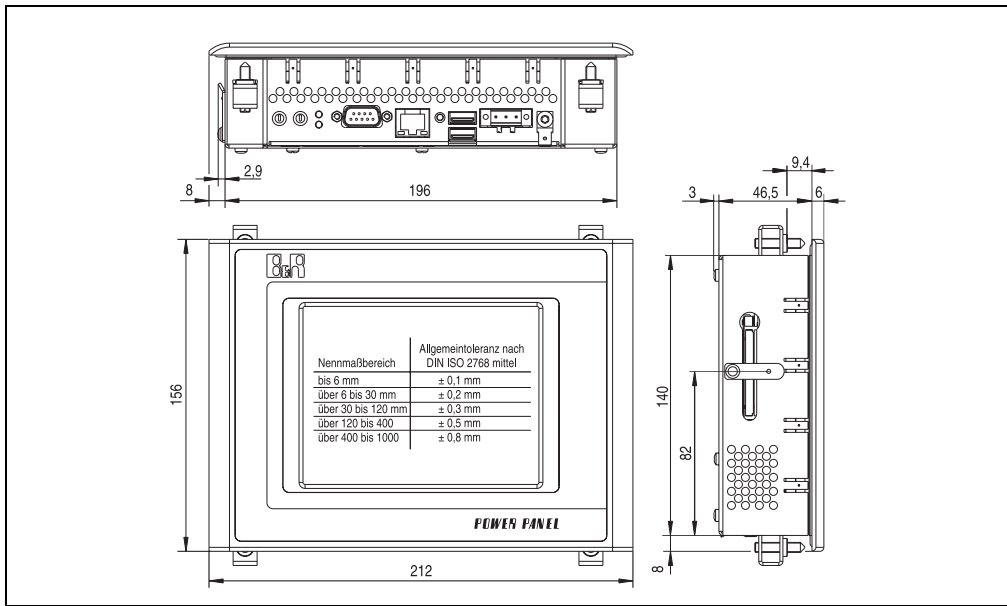


Figure 232: Dimensions - 5PP120.0571-27

4.3.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 232 "Dimensions - 5PP120.0571-27" on page 360) For further information regarding mounting, see section 3 "Installation" on page 421.

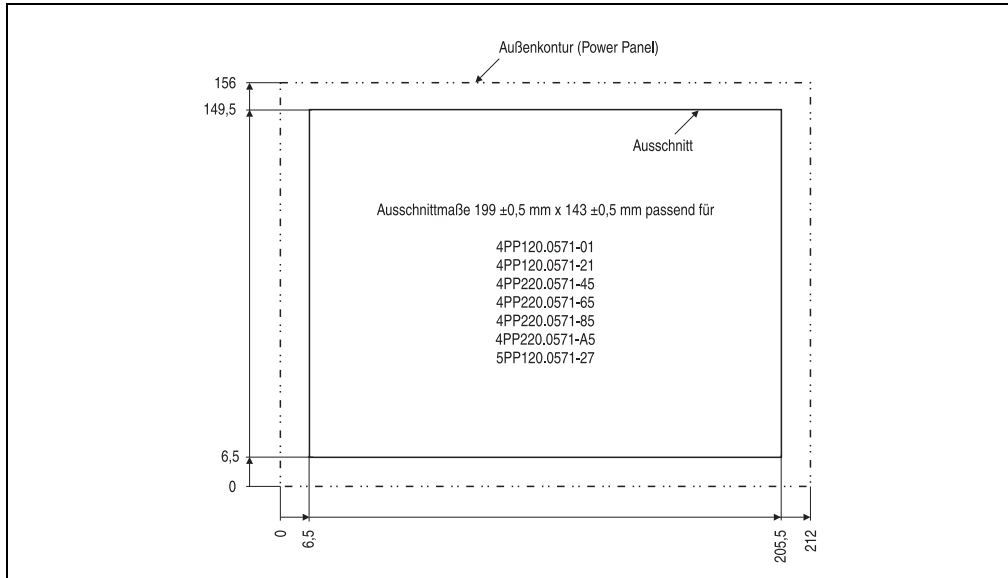


Figure 233: Cutout dimensions

4.3.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 120 LCD C QVGA 5.7in T MH
4	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 125: Contents of delivery - 5PP120.0571-27

4.4 Device 5PP120.1043-37

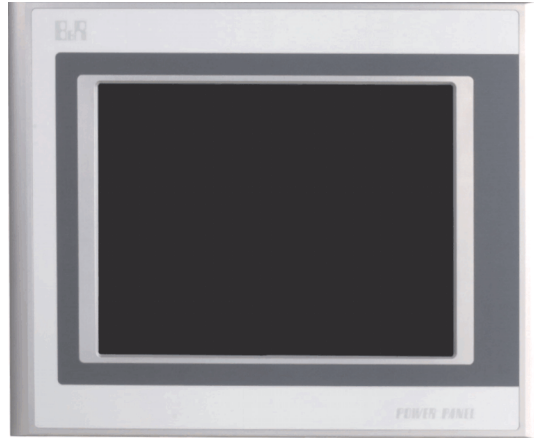


Figure 234: Front view - 5PP120.1043-37

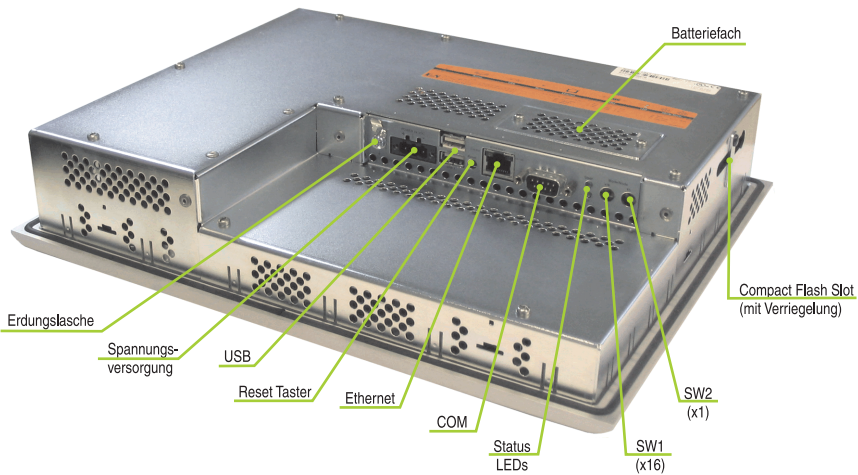


Figure 235: Rear view - 5PP120.1043-37

4.4.1 Technical data

Features	5PP120.1043-37
Boot loader / Operating system	BIOS
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 128 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Hold-up time	-
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 126: Technical data - 5PP120.1043-37

Features	5PP120.1043-37
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 10.4 inch (264 mm) 262144 colors ¹⁾ VGA, 640 x 480 pixels 600:1 70° / 55° 350 cd/m ² 55000 hours
Touch screen Technology Controller Degree of transmission	Analog, resistive, 3M Hampshire, serial, 12-bit 78 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	-
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. -
Ground resistance	≤ 24 kOhm

Table 126: Technical data - 5PP120.1043-37 (Forts.)

Mechanical characteristics	5PP120.1043-37
Front Frame Membrane Design Gasket	Naturally anodized aluminum Polyester Gray Flat gasket around display front
Housing	Metal
Outer dimensions Width Height Depth	323 mm 260 mm 65.5 mm
Weight	Approx. 3.7 kg
Environmental characteristics	
Environmental temperature Operation Storage Transportation	0 .. 50 °C -20 .. 70 °C -20 .. 70 °C
Relative humidity Operation Storage Transportation	5 .. 85%, non-condensing T ≤ 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing T ≤ 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing
Vibration Operation (continuous) Operation (occasional) Storage Transportation	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak) Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak) Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak) Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock Operation Storage Transportation	Max. 15 g (147 m/s² 0-peak) and 11 ms length Max. 30 g (980 m/s² 0-peak) and 11 ms length Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 126: Technical data - 5PP120.1043-37 (Forts.)

1) The actual number of colors depends on the graphic memory, the graphics mode set and the graphic driver used.

4.4.2 Dimensions

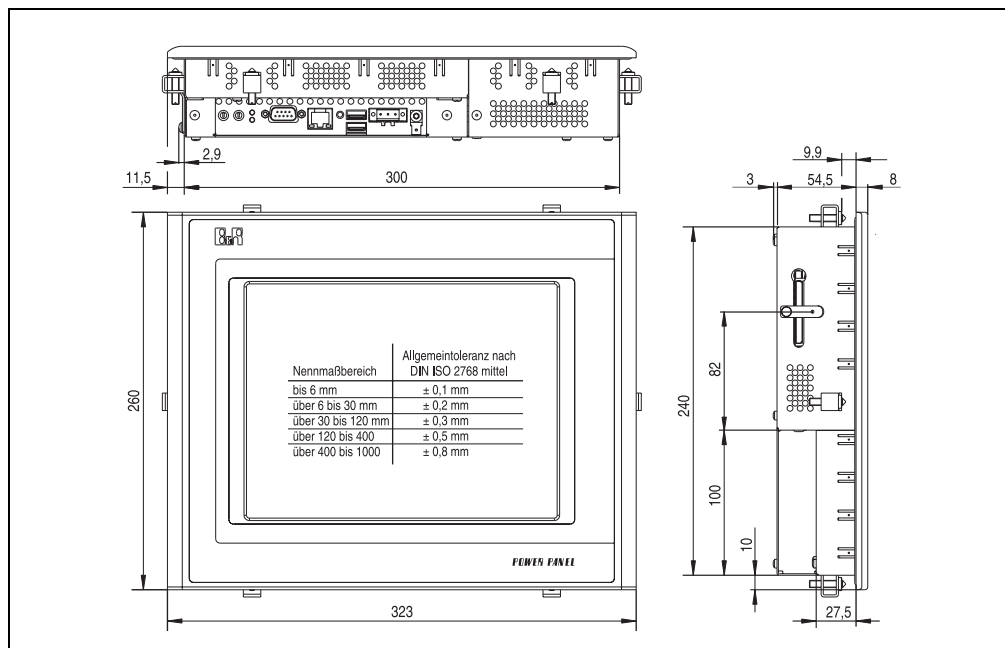


Figure 236: Dimensions - 5PP120.1043-37

4.4.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 236 "Dimensions - 5PP120.1043-37" on page 366) For further information regarding mounting, see section 3 "Installation" on page 421.

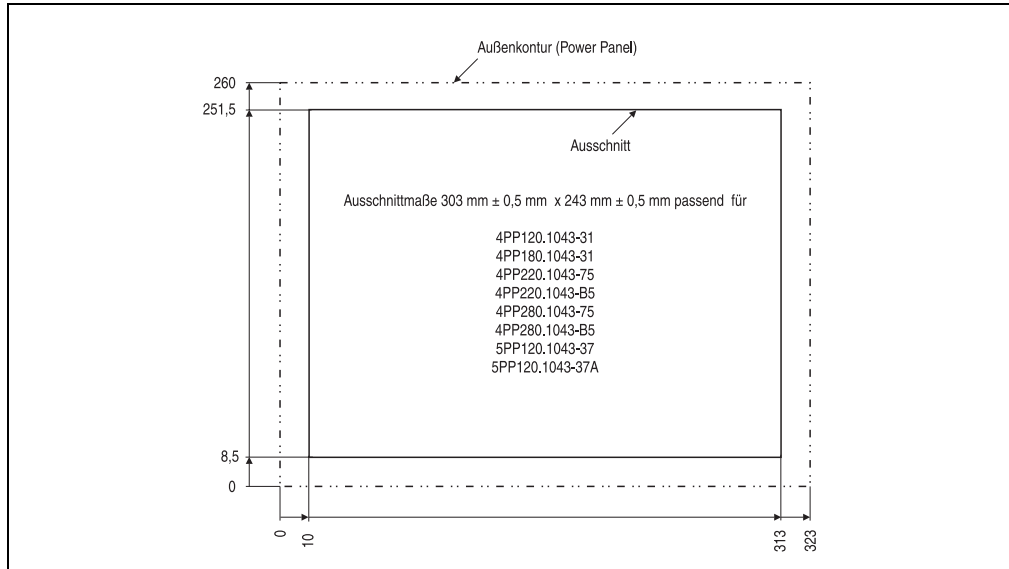


Figure 237: Cutout dimensions

4.4.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 120 TFT C VGA 10.4" T (3M) MH
6	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 127: Contents of delivery - 5PP120.1043-37

4.5 Device 5PP120.1043-37A

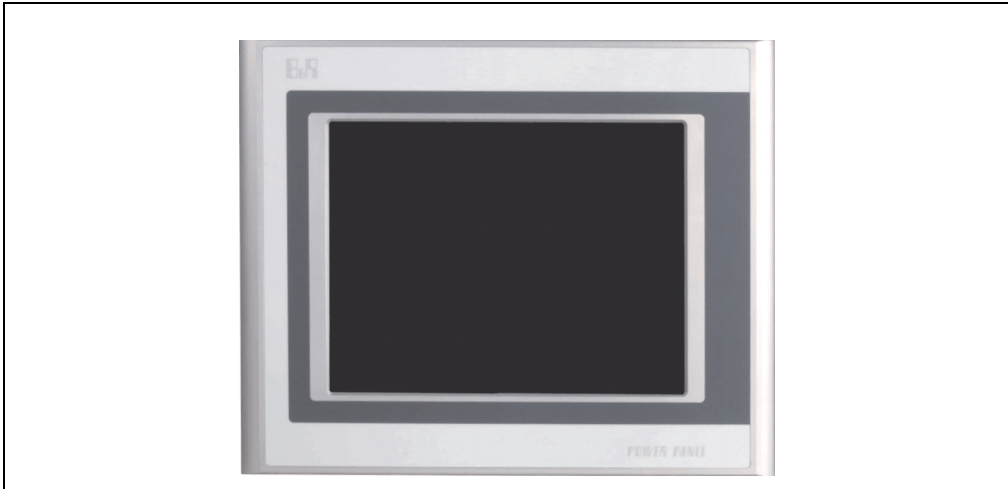


Figure 238: Front view - 5PP120.1043-37A

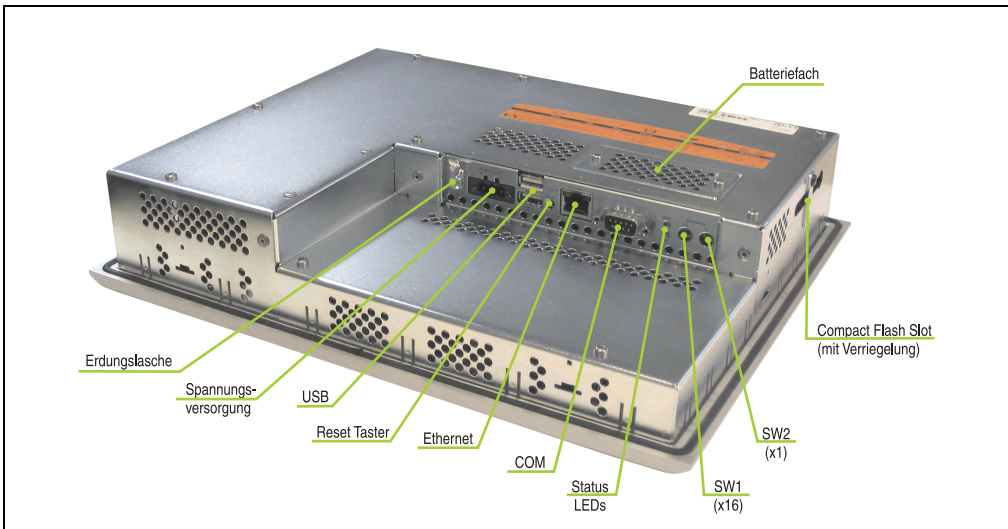


Figure 239: Rear view - 5PP120.1043-37A

4.5.1 Technical data

Features	5PP120.1043-37A
Boot loader / Operating system	BIOS
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 128 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Hold-up time	-
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 128: Technical data - 5PP120.1043-37A

Technical data • Power Panel 100 with BIOS

Features	5PP120.1043-37A
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 10.4 inch (264 mm) 262144 colors ¹⁾ VGA, 640 x 480 pixels 600:1 70° / 55° 350 cd/m ² 55000 hours
Touch screen Technology Controller Degree of transmission	Analog, resistive, Elo Hampshire, serial, 12-bit 78 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	-
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. -
Ground resistance	≤ 24 kOhm

Table 128: Technical data - 5PP120.1043-37A (Forts.)

Mechanical characteristics	5PP120.1043-37A
Front Frame Membrane Design Gasket	Naturally anodized aluminum Polyester Gray Flat gasket around display front
Housing	Metal
Outer dimensions Width Height Depth	323 mm 260 mm 65.5 mm
Weight	Approx. 3.7 kg
Environmental characteristics	
Environmental temperature Operation Storage Transportation	0 .. 50 °C -20 .. 70 °C -20 .. 70 °C
Relative humidity Operation Storage Transportation	5 .. 85%, non-condensing T ≤ 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing T ≤ 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing
Vibration Operation (continuous) Operation (occasional) Storage Transportation	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak) Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak) Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak) Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock Operation Storage Transportation	Max. 15 g (147 m/s² 0-peak) and 11 ms length Max. 30 g (980 m/s² 0-peak) and 11 ms length Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 128: Technical data - 5PP120.1043-37A (Forts.)

1) The actual number of colors depends on the graphic memory, the graphics mode set and the graphic driver used.

4.5.2 Dimensions

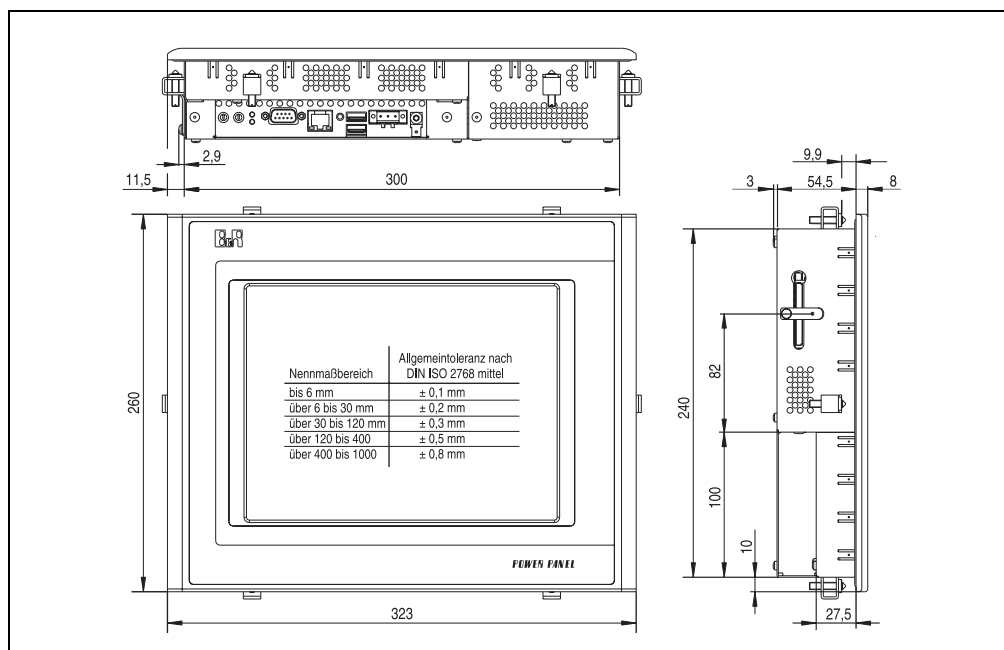


Figure 240: Dimensions - 5PP120.1043-37A

4.5.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 240 "Dimensions - 5PP120.1043-37A" on page 372) For further information regarding mounting, see section 3 "Installation" on page 421.

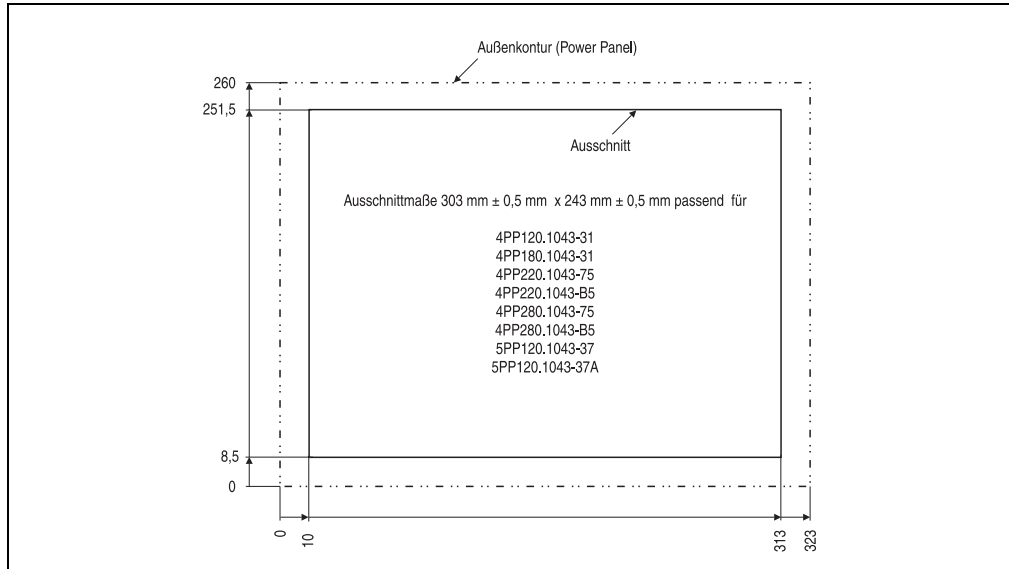


Figure 241: Cutout dimensions

4.5.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 120 TFT C VGA 10.4" T MH
6	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 129: Contents of delivery - 5PP120.1043-37A

4.6 Device 5PP120.1214-37

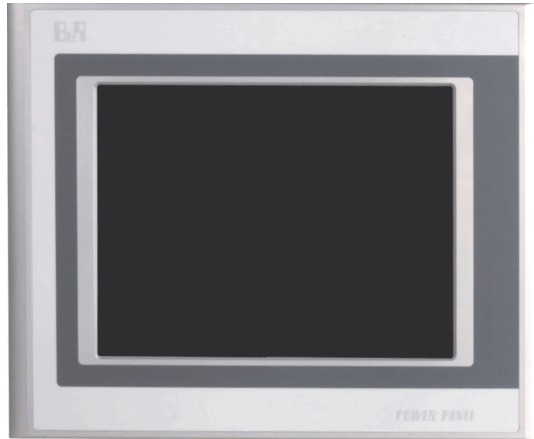


Figure 242: Front view - 5PP120.1214-37

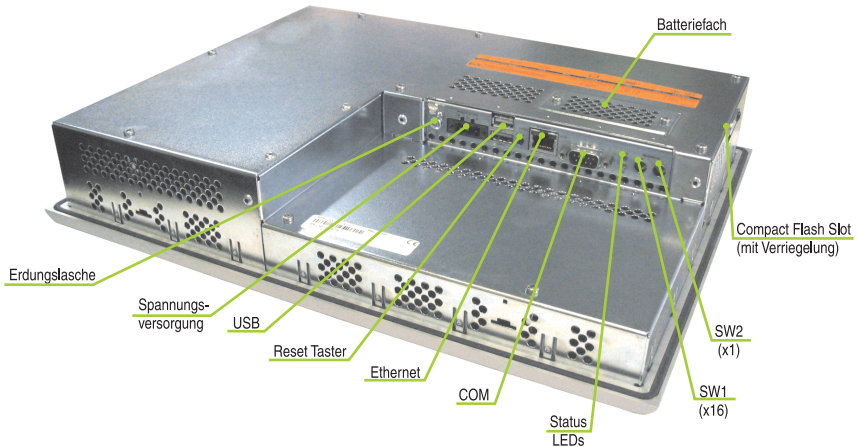


Figure 243: Rear view - 5PP120.1214-37

4.6.1 Technical data

Features	5PP120.1214-37
Boot loader / Operating system	BIOS
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 128 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Hold-up time	-
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 130: Technical data - 5PP120.1214-37

Technical data • Power Panel 100 with BIOS

Features	5PP120.1214-37
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 12.1 inch (307 mm) 262144 colors ¹⁾ VGA, 800 x 600 pixels 300:1 70° / 60° 350 cd/m ² 55000 hours
Touch screen Technology Controller Degree of transmission	Analog, resistive, 3M Hampshire, serial, 12-bit 78 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	-
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. -
Ground resistance	≤ 24 kOhm

Table 130: Technical data - 5PP120.1214-37 (Forts.)

Mechanical characteristics	5PP120.1214-37
Front Frame Membrane Design Gasket	Naturally anodized aluminum Polyester Gray Flat gasket around display front
Housing	Metal
Outer dimensions Width Height Depth	362 mm 284 mm 65.5 mm
Weight	Approx. 4.1 kg
Environmental characteristics	
Environmental temperature Operation Storage Transportation	0 .. 45 °C -20 .. 60 °C -20 .. 60 °C
Relative humidity Operation Storage Transportation	5 .. 85%, non-condensing T ≤ 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing T ≤ 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing
Vibration Operation (continuous) Operation (occasional) Storage Transportation	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak) Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak) Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak) Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock Operation Storage Transportation	Max. 15 g (147 m/s² 0-peak) and 11 ms length Max. 30 g (980 m/s² 0-peak) and 11 ms length Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 130: Technical data - 5PP120.1214-37 (Forts.)

1) The actual number of colors depends on the graphic memory, the graphics mode set and the graphic driver used.

4.6.2 Dimensions

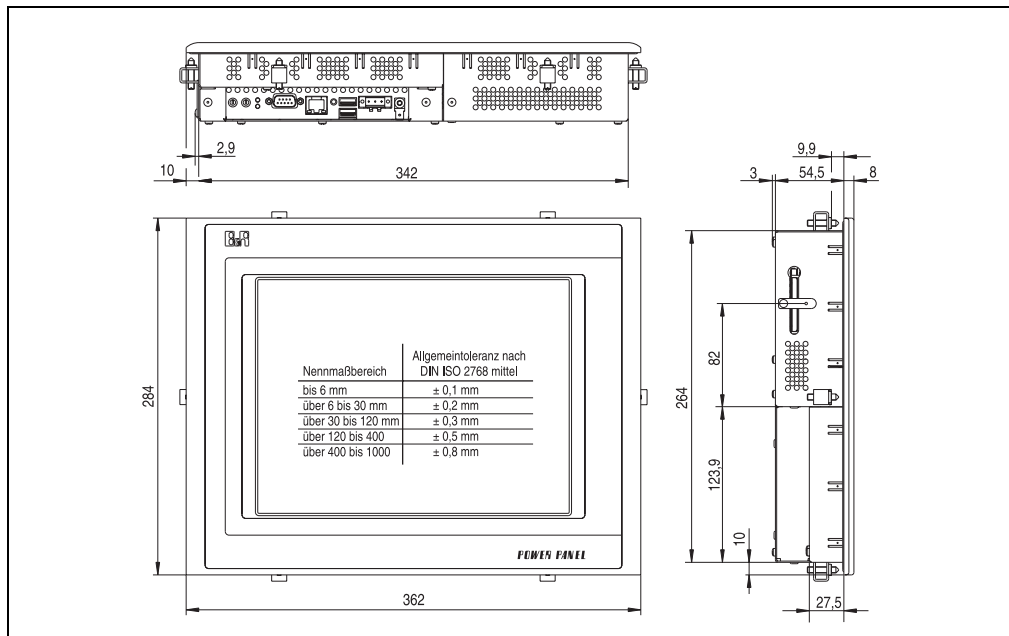


Figure 244: Dimensions - 5PP120.1214-37

4.6.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 244 "Dimensions - 5PP120.1214-37" on page 378) For further information regarding mounting, see section 3 "Installation" on page 421.

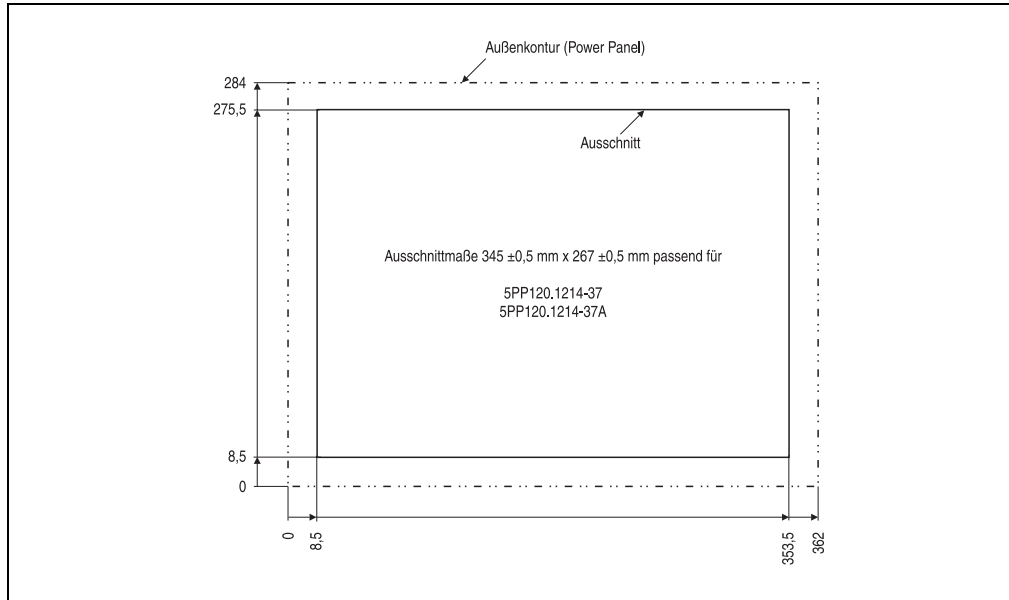


Figure 245: Cutout dimensions

4.6.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 120 TFT C VGA 12.1" T (3M) MH
6	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 131: Contents of delivery - 5PP120.1214-37

4.7 Device 5PP120.1214-37A

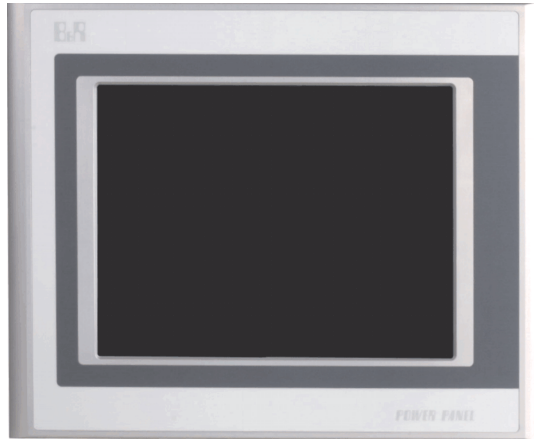


Figure 246: Front view - 5PP120.1214-37A

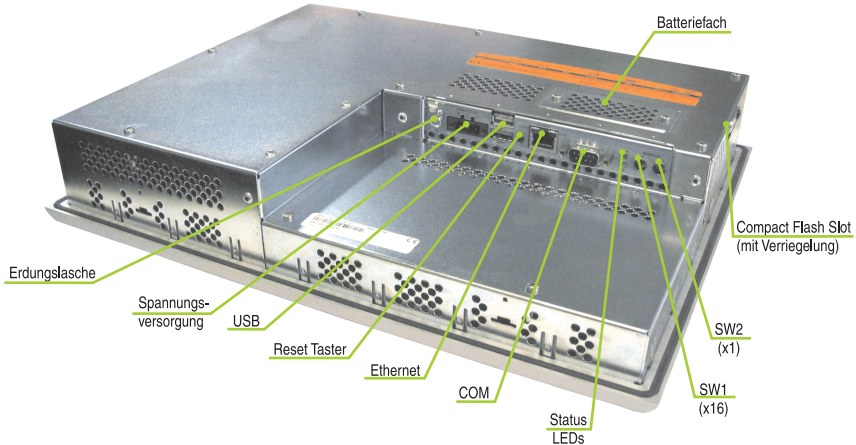


Figure 247: Rear view - 5PP120.1214-37A

4.7.1 Technical data

Features	5PP120.1214-37A
Boot loader / Operating system	BIOS
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 128 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Hold-up time	-
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 132: Technical data - 5PP120.1214-37A

Technical data • Power Panel 100 with BIOS

Features	5PP120.1214-37A
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 12.1 inch (307 mm) 262144 colors ¹⁾ VGA, 800 x 600 pixels 300:1 70° / 60° 350 cd/m ² 55000 hours
Touch screen Technology Controller Degree of transmission	Analog, resistive, Elo Hampshire, serial, 12-bit 78 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	-
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. -
Ground resistance	≤ 24 kOhm

Table 132: Technical data - 5PP120.1214-37A (Forts.)

Mechanical characteristics	5PP120.1214-37A
Front Frame Membrane Design Gasket	Naturally anodized aluminum Polyester Gray Flat gasket around display front
Housing	Metal
Outer dimensions Width Height Depth	362 mm 284 mm 65.5 mm
Weight	Approx. 4.1 kg
Environmental characteristics	
Environmental temperature Operation Storage Transportation	0 .. 45 °C -20 .. 60 °C -20 .. 60 °C
Relative humidity Operation Storage Transportation	5 .. 85%, non-condensing T ≤ 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing T ≤ 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing
Vibration Operation (continuous) Operation (occasional) Storage Transportation	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak) Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak) Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak) Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock Operation Storage Transportation	Max. 15 g (147 m/s² 0-peak) and 11 ms length Max. 30 g (980 m/s² 0-peak) and 11 ms length Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 132: Technical data - 5PP120.1214-37A (Forts.)

1) The actual number of colors depends on the graphic memory, the graphics mode set and the graphic driver used.

4.7.2 Dimensions

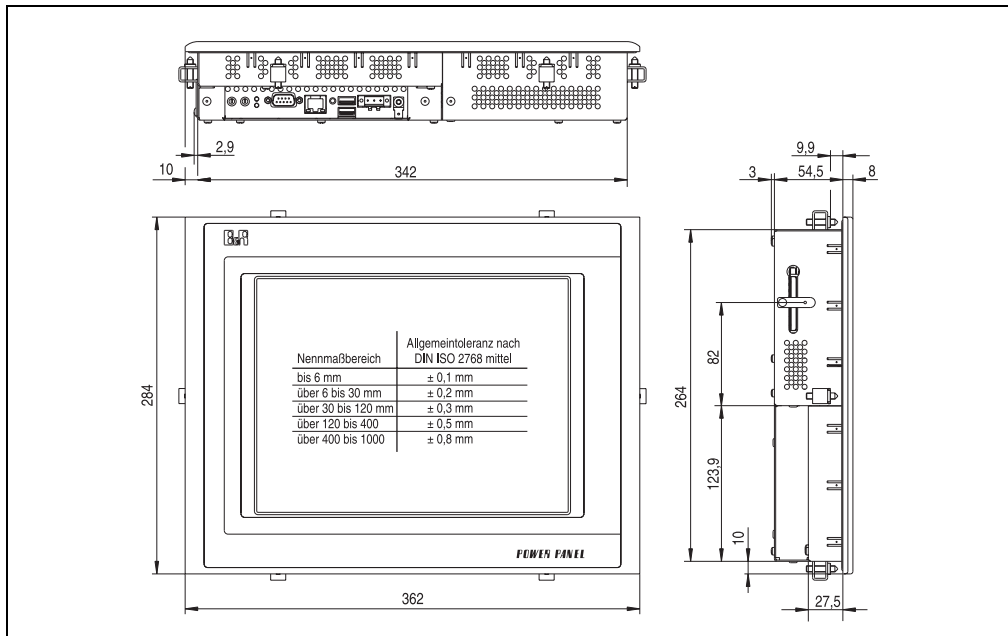


Figure 248: Dimensions - 5PP120.1214-37A

4.7.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 248 "Dimensions - 5PP120.1214-37A" on page 384) For further information regarding mounting, see section 3 "Installation" on page 421.

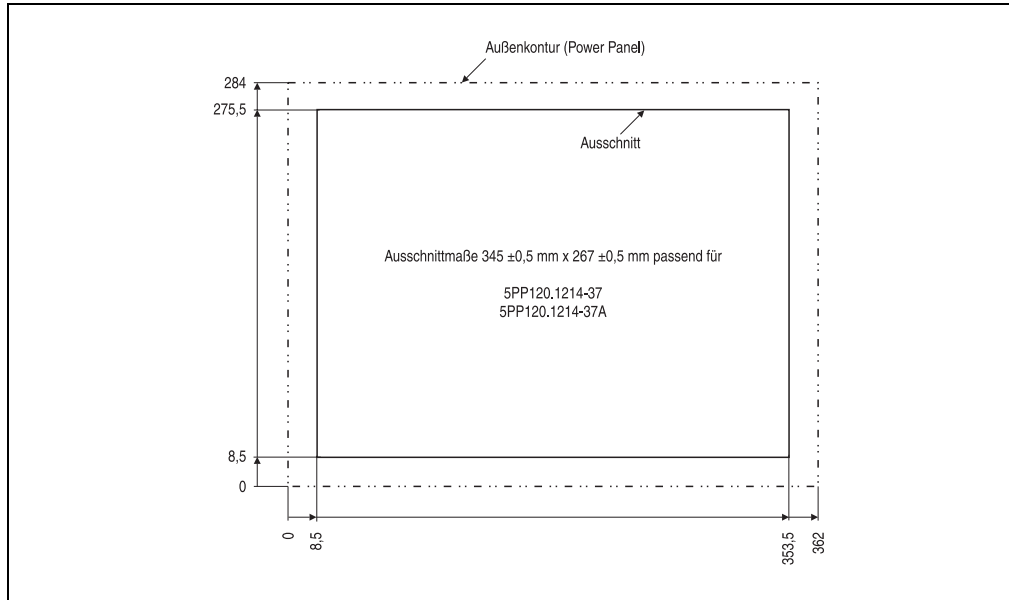


Figure 249: Cutout dimensions

4.7.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 120 TFT C VGA 12.1" T MH
6	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 133: Contents of delivery - 5PP120.1214-37A

4.8 Device 5PP120.1505-37



Figure 250: Front view - 5PP120.1505-37

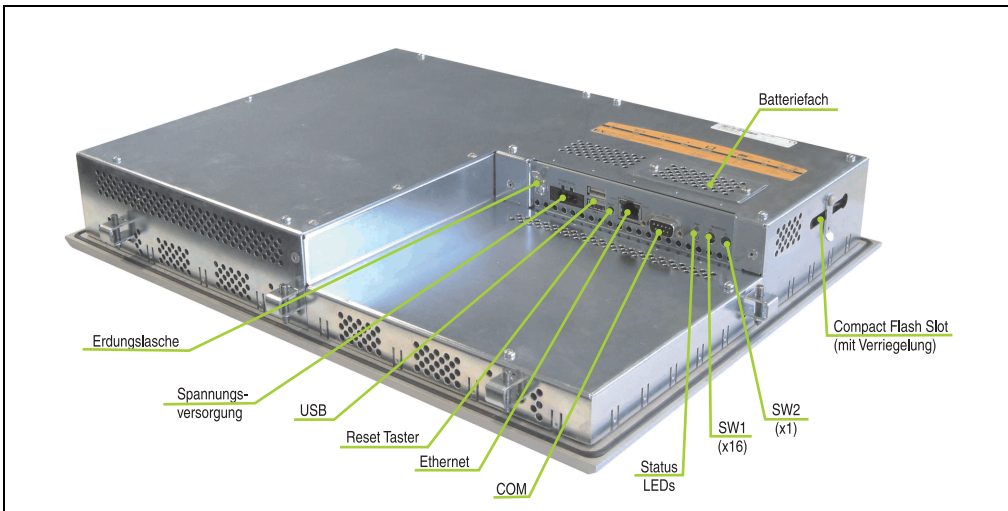


Figure 251: Rear view - 5PP120.1505-37

4.8.1 Technical data

Features	5PP120.1505-37
Boot loader / Operating system	BIOS
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 128 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Hold-up time	-
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 134: Technical data - 5PP120.1505-37

Technical data • Power Panel 100 with BIOS

Features	5PP120.1505-37
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 15 inch (381 mm) 262144 colors ¹⁾ XGA, 1024 x 768 pixels 300:1 140° / 115° 330 cd/m ² 35000 hours
Touch screen Technology Controller Degree of transmission	Analog, resistive, 3M Hampshire, serial, 12-bit 78 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	-
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 30 W typical, 35 W max. Yes
Ground resistance	≤ 24 kOhm

Table 134: Technical data - 5PP120.1505-37 (Forts.)

Mechanical characteristics	5PP120.1505-37
Front Frame Membrane Design Gasket	Naturally anodized aluminum Polyester Gray Flat gasket around display front
Housing	Metal
Outer dimensions Width Height Depth	435 mm 330 mm 71.5 mm
Weight	Approx. 6.3 kg
Environmental characteristics	
Environmental temperature Operation Storage Transportation	0 .. 45 °C -20 .. 60 °C -20 .. 60 °C
Relative humidity Operation Storage Transportation	5 .. 85%, non-condensing T ≤ 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing T ≤ 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing
Vibration Operation (continuous) Operation (occasional) Storage Transportation	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak) Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak) Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak) Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)
Shock Operation Storage Transportation	Max. 15 g (147 m/s² 0-peak) and 11 ms length Max. 30 g (980 m/s² 0-peak) and 11 ms length Max. 30 g (980 m/s² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 134: Technical data - 5PP120.1505-37 (Forts.)

1) The actual number of colors depends on the graphic memory, the graphics mode set and the graphic driver used.

4.8.2 Dimensions

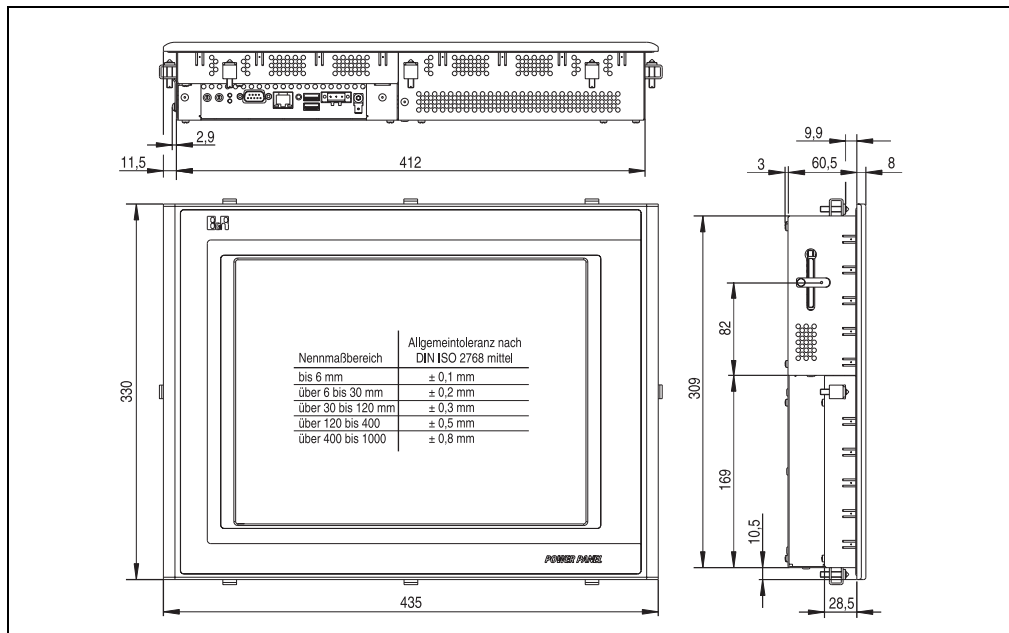


Figure 252: Dimensions - 5PP120.1505-37

4.8.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 252 "Dimensions - 5PP120.1505-37" on page 390) For further information regarding mounting, see section 3 "Installation" on page 421.

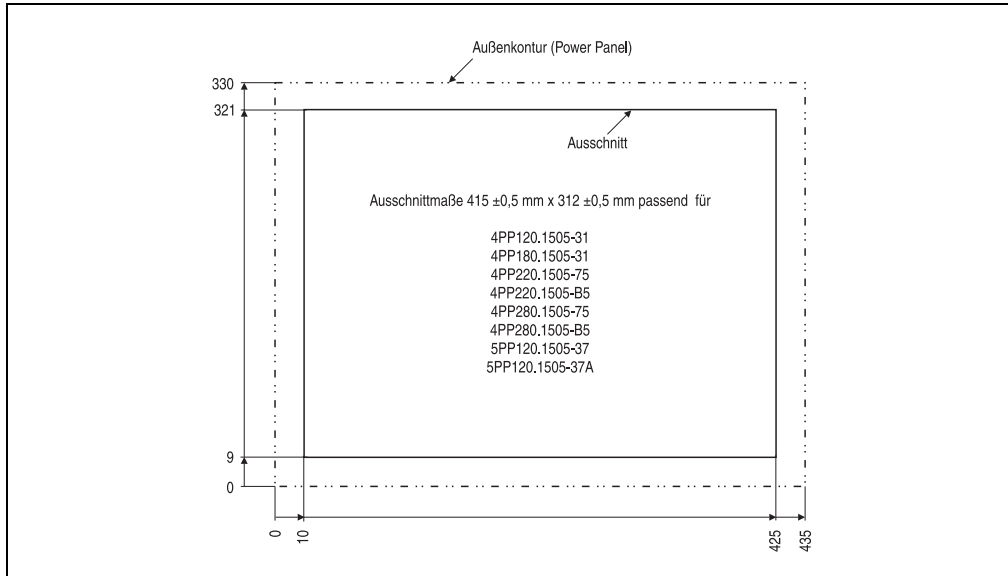


Figure 253: Cutout dimensions

4.8.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 120 TFT C XGA 15" T (3M) MH
8	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 135: Contents of delivery - 5PP120.1505-37

4.9 Device 5PP120.1505-37A



Figure 254: Front view - 5PP120.1505-37A

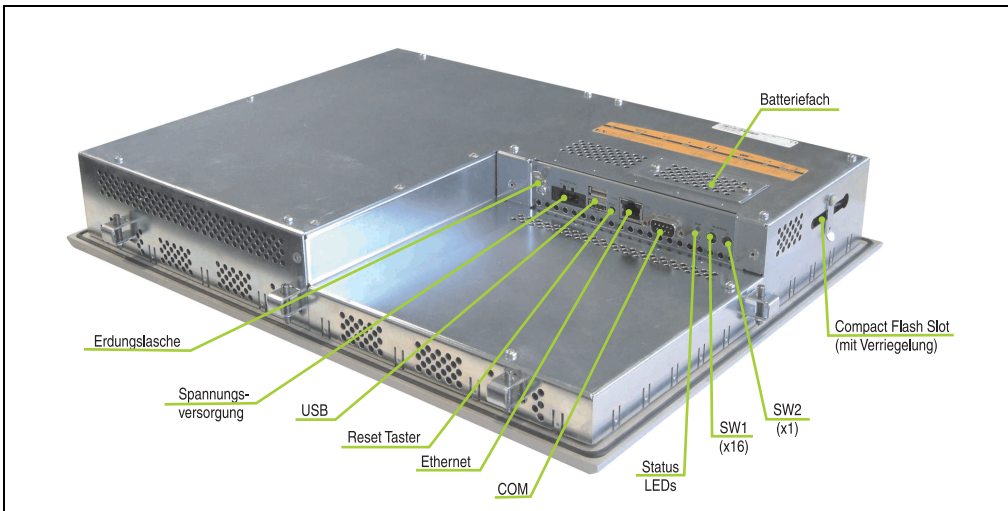


Figure 255: Rear view - 5PP120.1505-37A

4.9.1 Technical data

Features	5PP120.1505-37A
Boot loader / Operating system	BIOS
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size Socket	DRAM 128 MB SO-DIMM 144-pin
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Hold-up time	-
Real-time clock Battery-buffered Precision	Yes 10 ppm
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device

Table 136: Technical data - 5PP120.1505-37A

Technical data • Power Panel 100 with BIOS

Features	5PP120.1505-37A
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
LEDs	1x user (green), 1x CF (yellow)
Mode/Node switches	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	TFT 15 inch (381 mm) 262144 colors ¹⁾ XGA, 1024 x 768 pixels 300:1 140° / 115° 330 cd/m ² 35000 hours
Touch screen Technology Controller Degree of transmission	Analog, resistive, Elo Hampshire, serial, 12-bit 78 %
Filter glass Degree of transmission Coating	-
Keys Function keys Soft keys Cursor pad Number block Other keys	-
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 30 W typical, 35 W max. Yes
Ground resistance	≤ 24 kOhm

Table 136: Technical data - 5PP120.1505-37A (Forts.)

Mechanical characteristics	5PP120.1505-37A
Front Frame Membrane Design Gasket	Naturally anodized aluminum Polyester Gray Flat gasket around display front
Housing	Metal
Outer dimensions Width Height Depth	435 mm 330 mm 71.5 mm
Weight	Approx. 6.3 kg
Environmental characteristics	
Environmental temperature Operation Storage Transportation	0 .. 50 °C -20 .. 60 °C -20 .. 60 °C
Relative humidity Operation Storage Transportation	5 .. 85%, non-condensing T ≤ 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing T ≤ 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing
Vibration Operation (continuous) Operation (occasional) Storage Transportation	Max. 9 - 200 Hz and 0.5 g (4.9 m/s ² 0-peak) Max. 9 - 200 Hz and 1 g (9.8 m/s ² 0-peak) Max. 2 - 500 Hz and 4 g (39.2 m/s ² 0-peak) Max. 2 - 500 Hz and 4 g (39.2 m/s ² 0-peak)
Shock Operation Storage Transportation	Max. 15 g (147 m/s ² 0-peak) and 11 ms length Max. 30 g (980 m/s ² 0-peak) and 11 ms length Max. 30 g (980 m/s ² 0-peak) and 11 ms length
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3,000 m

Table 136: Technical data - 5PP120.1505-37A (Forts.)

1) The actual number of colors depends on the graphic memory, the graphics mode set and the graphic driver used.

4.9.2 Dimensions

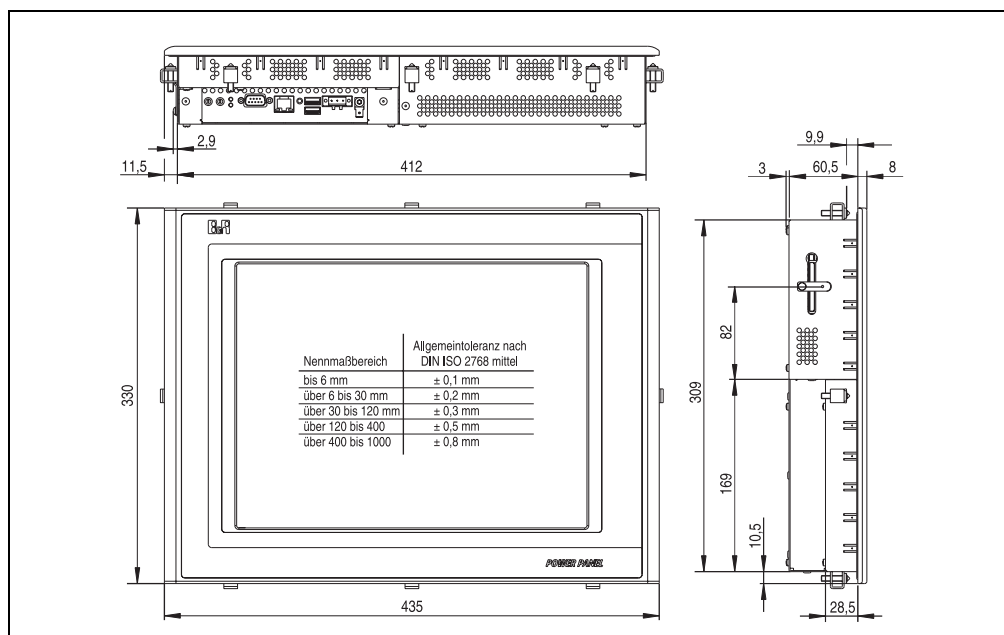


Figure 256: Dimensions - 5PP120.1505-37A

4.9.3 Cutout installation

The cutout hole is to be made according to the following dimensions for cutout installation. The device must be mounted using the retaining clips included in delivery. The defined position for mounting the retaining clips can be seen in the dimension diagram (see figure 256 "Dimensions - 5PP120.1505-37A" on page 396) For further information regarding mounting, see section 3 "Installation" on page 421.

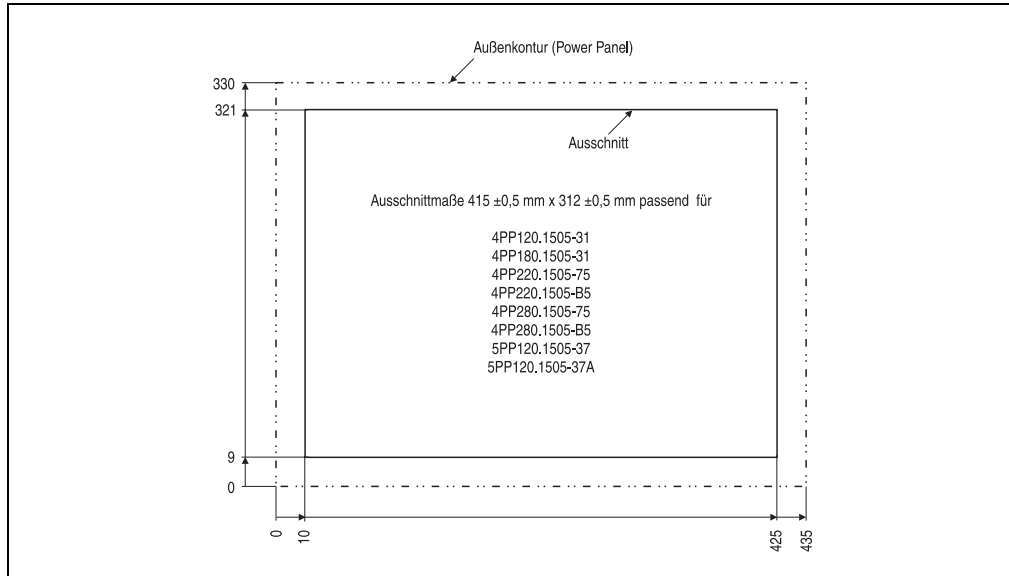


Figure 257: Cutout dimensions

4.9.4 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel 120 TFT C XGA 15" T MH
8	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 137: Contents of delivery - 5PP120.1505-37A

5. Power Panel light / compact

Power Panel 200 light / compact series devices have QVGA operating units with an integrated controller.

Power Panel 200 light devices are primarily intended for applications which rely on CAN bus or X2X interfaces for connecting peripherals without requiring Ethernet.

Devices from the compact series are equipped additionally with a 10/100 Ethernet interface, making themselves available anywhere where a network connection to a higher-level computer is required.

Power Panel devices are delivered as B&R Sets, i.e. already with an inserted aPCI module. The following QVGA Power Panel light / compact versions are available:

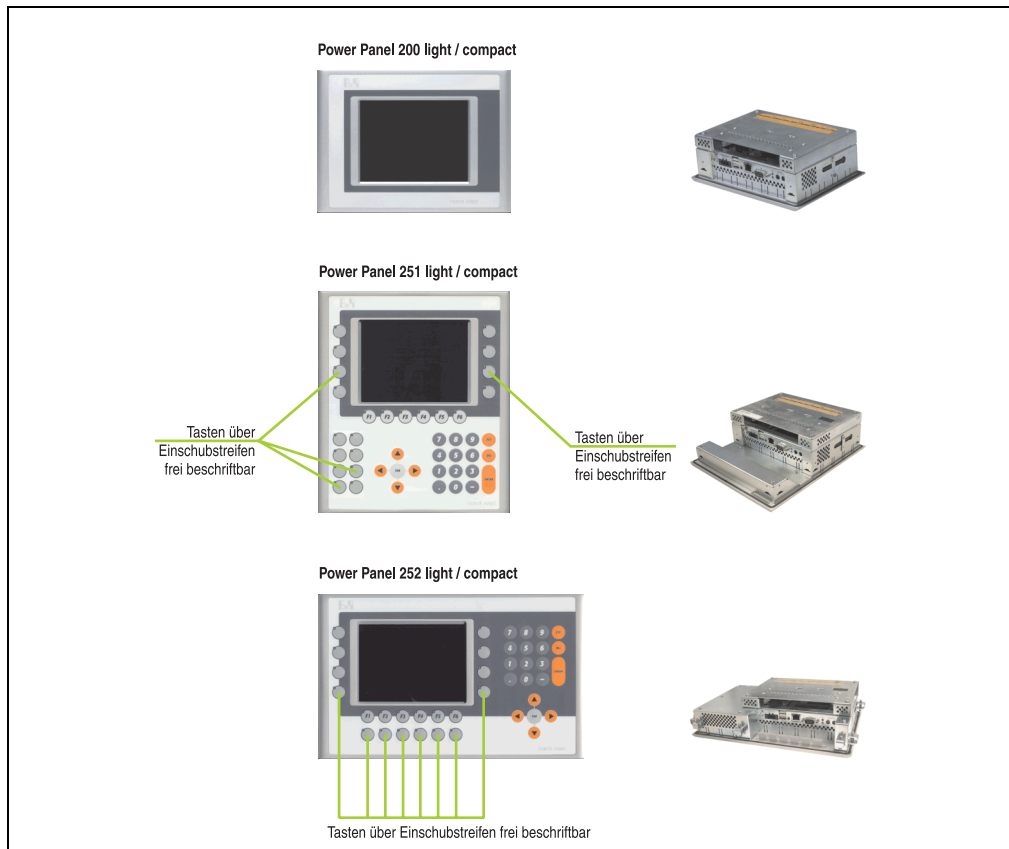


Figure 258: Power Panel light / compact overview

5.1 Power Panel 200 light / compact

5.1.1 Technical data - Power Panel 200 light

Features	4PP220:0571-L05	4PP220:0571-L45	4PP220:0571-L25	4PP220:0571-L65
Boot loader / Operating system	Automation Runtime			
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)			
Flash	2 MB (for firmware)			
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin			
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)			
SRAM Size Battery-buffered	256 KB Yes			
Watchdog Controller	SMC ¹⁾			
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms			
Real-time clock Battery-buffered Precision	Yes 10 ppm			
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes			
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	-			
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device			

Table 138: Technical data - Power Panel 200 light

Technical data • Power Panel light / compact

Features	4PP220:0571-L05	4PP220:0571-L45	4PP220:0571-L25	4PP220:0571-L65
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB			
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection			
Reset button	Yes, accessible from the outside			
LEDs	1x user (green), 1x CF (yellow)			
Mode/Node switches	2, 16 digits each			
aPCI slots	1 piece CAN aPCI module (3IF771.9) inserted	1 piece X2X aPCI module (3IF791.9) inserted	1 piece CAN aPCI module (3IF771.9) inserted	1 piece X2X aPCI module (3IF791.9) inserted
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	LCD 5.7 in (144 mm) 8 shades of gray QVGA, 320 x 240 pixels 25:1 80° / 80° 140 cd/m² 50000 hours		LCD 5.7 in (144 mm) 256 colors QVGA, 320 x 240 pixels 40:1 80° / 90° 150 cd/m² 50000 hours	
Touch screen Technology Controller Degree of transmission	Analog, resistive (Gunze) Hampshire, serial, 12-bit 84 %			
Filter glass Degree of transmission Coating	-			
Keys Function keys Soft keys Cursor pad Number block Other keys	-			
Electrical characteristics				
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. Yes			
Ground resistance	≥ 47 kOhm			

Table 138: Technical data - Power Panel 200 light (Forts.)

Mechanics	4PP220:0571-L05	4PP220:0571-L45	4PP220:0571-L25	4PP220:0571-L65
Front Frame Membrane Dark gray border around display Light background Design Gasket	Naturally anodized aluminum Polyester Similar to Pantone 432CV Similar to Pantone 427CV Gray Flat gasket around display front			
Housing	Metal			
Outer dimensions Width Height Depth	212 mm 156 mm 76 mm			
Weight	Approx. 1.9 kg (with aPCI interface module)			
Environmental characteristics				
Environmental temperature Operation Storage Transportation	0 .. 50 °C -20 .. 60 °C -20 .. 60 °C			
Relative humidity Operation Storage Transportation	5 .. 85%, non-condensing T <= 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing T <= 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing			
Vibration Operation (continuous) Operation (occasional) Storage Transportation	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak) Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak) Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak) Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)			
Shock Operation Storage Transportation	Max. 15 g (147 m/s² 0-peak) and 11 ms length Max. 30 g (980 m/s² 0-peak) and 11 ms length Max. 30 g (980 m/s² 0-peak) and 11 ms length			
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)			
Altitude	Max. 3,000 m			

Table 138: Technical data - Power Panel 200 light (Forts.)

- 1) System Management Controller
- 2) Values with inserted aPCI interface module

5.1.2 Technical data - Power Panel 200 compact

Features	4PP220:0571-C05	4PP220:0571-C45	4PP220:0571-C25	4PP220:0571-C65
Boot loader / Operating system	Automation Runtime			
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)			
Flash	2 MB (for firmware)			
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin			
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)			
SRAM Size Battery-buffered	256 KB Yes			
Watchdog Controller	SMC ¹⁾			
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms			
Real-time clock Battery-buffered Precision	Yes 10 ppm			
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes			
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -			
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device			

Table 139: Technical data - Power Panel 200 compact

Features	4PP220:0571-C05	4PP220:0571-C45	4PP220:0571-C25	4PP220:0571-C65
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB			
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection			
Reset button	Yes, accessible from the outside			
LEDs	1x user (green), 1x CF (yellow)			
Mode/Node switches	2, 16 digits each			
aPCI slots	1 piece CAN aPCI module (3IF771.9) inserted	1 piece X2X aPCI module (3IF791.9) inserted	1 piece CAN aPCI module (3IF771.9) inserted	1 piece X2X aPCI module (3IF791.9) inserted
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	LCD 5.7 in (144 mm) 8 shades of gray QVGA, 320 x 240 pixels 25:1 80° / 80° 140 cd/m² 50000 hours		LCD 5.7 in (144 mm) 256 colors QVGA, 320 x 240 pixels 40:1 80° / 90° 150 cd/m² 50000 hours	
Touch screen Technology Controller Degree of transmission	Analog, resistive (Gunze) Hampshire, serial, 12-bit 84 %			
Filter glass Degree of transmission Coating	-			
Keys Function keys Soft keys Cursor pad Number block Other keys	-			
Electrical characteristics				
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. Yes			
Ground resistance	≥ 47 kOhm			

Table 139: Technical data - Power Panel 200 compact (Forts.)

Technical data • Power Panel light / compact

Mechanics	4PP220:0571-C05	4PP220:0571-C45	4PP220:0571-C25	4PP220:0571-C65
Front				
Frame	Naturally anodized aluminum			
Membrane	Polyester			
Dark gray border around display	Similar to Pantone 432CV			
Light background	Similar to Pantone 427CV			
Design	Gray			
Gasket	Flat gasket around display front			
Housing	Metal			
Outer dimensions				
Width	212 mm			
Height	156 mm			
Depth	76 mm			
Weight	Approx. 1.9 kg (with aPCI interface module)			
Environmental characteristics				
Environmental temperature				
Operation	0 .. 50 °C		0 .. 50 °C	
Storage	-20 .. 70 °C		-20 .. 60 °C	
Transportation	-20 .. 70 °C		-20 .. 60 °C	
Relative humidity				
Operation	5 .. 85%, non-condensing			
Storage	T <= 40 °C: 5 % to 90 %, non-condensing			
	T > 40 °C: < 90 %, non-condensing			
Transportation	T <= 40 °C: 5 % to 90 %, non-condensing			
	T > 40 °C: < 90 %, non-condensing			
Vibration				
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)			
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)			
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)			
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)			
Shock				
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length			
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length			
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length			
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)			
Altitude	Max. 3,000 m			

Table 139: Technical data - Power Panel 200 compact (Forts.)

- 1) System Management Controller
- 2) Values with inserted aPCI interface module

5.1.3 Dimensions

These Power Panel versions are the same size as a Power Panel 220 device with an aPCI interface module. The dimensions can be found in the diagram 94 "Dimensions - 4PP220.0571-45" on page 160.

5.1.4 Cutout installation

These Power Panel versions are the same size as a Power Panel 220 device with an aPCI interface module. The dimensions can be found in the diagram 95 "Cutout dimensions" on page 161.

5.1.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel device (Power Panel 220 LCD B/W QVGA 5.7" T MH 1aPCI or Power Panel 220 LCD C QVGA 5.7" T MH 1aPCI)
4	Retaining clips included
1	Lithium battery 3 V / 950 mAh included
1	aPCI interface module (3IF771.9 - aPCI interface 1x CAN or 3IF791.9 - aPCI interface 1x X2X Link)

Table 140: Contents of delivery - Power Panel 200 light / compact

5.2 Power Panel 251 light / compact

5.2.1 Technical data - Power Panel 251 light

Features	4PP251:0571-L05	4PP251:0571-L45	4PP251:0571-L25	4PP251:0571-L65
Boot loader / Operating system	Automation Runtime			
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)			
Flash	2 MB (for firmware)			
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin			
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)			
SRAM Size Battery-buffered	256 KB Yes			
Watchdog Controller	SMC ¹⁾			
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms			
Real-time clock Battery-buffered Precision	Yes 10 ppm			
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes			
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	-			
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device			

Table 141: Technical data - Power Panel 251 light

Features	4PP251:0571-L05	4PP251:0571-L45	4PP251:0571-L25	4PP251:0571-L65
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB			
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection			
Reset button	Yes, accessible from the outside			
LEDs	1x user (green), 1x CF (yellow)			
Mode/Node switches	2, 16 digits each			
aPCI slots	1 piece CAN aPCI module (3IF771.9) inserted	1 piece X2X aPCI module (3IF791.9) inserted	1 piece CAN aPCI module (3IF771.9) inserted	1 piece X2X aPCI module (3IF791.9) inserted
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	LCD 5.7 in (144 mm) 8 shades of gray QVGA, 320 x 240 pixels 25:1 80° / 80° 140 cd/m² 50000 hours		LCD 5.7 in (144 mm) 256 colors QVGA, 320 x 240 pixels 40:1 80° / 90° 150 cd/m² 50000 hours	
Touch screen Technology Controller Degree of transmission	-			
Filter glass Degree of transmission Coating	95% On both sides			
Keys Function keys Soft keys Cursor pad Number block Other keys	16 with LED 6 with LED - 15 without LED 5 without LED			
Caution!				
Pressing several keys at the same time may trigger unintended actions.				
Electrical characteristics				
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. Yes			
Ground resistance	≥ 47 kOhm			

Table 141: Technical data - Power Panel 251 light (Forts.)

Technical data • Power Panel light / compact

Mechanical characteristics	4PP251:0571-L05	4PP251:0571-L45	4PP251:0571-L25	4PP251:0571-L65
Front				
Frame	Naturally anodized aluminum			
Membrane	Polyester			
Dark gray border around display	Similar to Pantone 432CV			
Light background	Similar to Pantone 427CV			
Orange keys	Similar to Pantone 151CV			
Dark gray keys	Similar to Pantone 431CV			
Legend strips (gray)	Similar to Pantone 429CV			
Design	Gray			
Gasket	Flat gasket around display front			
Housing	Metal			
Outer dimensions				
Width	212 mm			
Height	245 mm			
Depth	76 mm			
Weight	Approx. 2.6 kg (with aPCI interface module)			
Environmental characteristics				
Environmental temperature				
Operation	0 .. 50 °C			
Storage	-20 .. 70 °C			
Transportation	-20 .. 70 °C			
Relative humidity				
Operation	5 .. 85%, non-condensing			
Storage	T ≤ 40 °C: 5 % to 90 %, non-condensing			
	T > 40 °C: < 90 %, non-condensing			
Transportation	T ≤ 40 °C: 5 % to 90 %, non-condensing			
	T > 40 °C: < 90 %, non-condensing			
Vibration				
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)			
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)			
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)			
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)			
Shock				
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length			
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length			
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length			
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)			
Altitude	Max. 3000 m			

Table 141: Technical data - Power Panel 251 light (Forts.)

- 1) System Management Controller
- 2) Values with inserted aPCI interface module

5.2.2 Technical data - Power Panel 251 compact

Features	4PP251:0571-C05	4PP251:0571-C45	4PP251:0571-C25	4PP251:0571-C65
Boot loader / Operating system	Automation Runtime			
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)			
Flash	2 MB (for firmware)			
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin			
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)			
SRAM Size Battery-buffered	256 KB Yes			
Watchdog Controller	SMC ¹⁾			
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms			
Real-time clock Battery-buffered Precision	Yes 10 ppm			
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes			
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -			
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device			

Table 142: Technical data - Power Panel 251 compact

Technical data • Power Panel light / compact

Features	4PP251:0571-C05	4PP251:0571-C45	4PP251:0571-C25	4PP251:0571-C65
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB			
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection			
Reset button	Yes, accessible from the outside			
LEDs	1x user (green), 1x CF (yellow)			
Mode/Node switches	2, 16 digits each			
aPCI slots	1 piece CAN aPCI module (3IF771.9) inserted	1 piece X2X aPCI module (3IF791.9) inserted	1 piece CAN aPCI module (3IF771.9) inserted	1 piece X2X aPCI module (3IF791.9) inserted
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	LCD 5.7 in (144 mm) 8 shades of gray QVGA, 320 x 240 pixels 25:1 80° / 80° 140 cd/m² 50000 hours		LCD 5.7 in (144 mm) 256 colors QVGA, 320 x 240 pixels 40:1 80° / 90° 150 cd/m² 50000 hours	
Touch screen Technology Controller Degree of transmission	-			
Filter glass Degree of transmission Coating	95% On both sides			
Keys Function keys Soft keys Cursor pad Number block Other keys	16 with LED 6 with LED - 15 without LED 5 without LED			
Caution!				
Pressing several keys at the same time may trigger unintended actions.				
Electrical characteristics				
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. Yes			
Ground resistance	≥ 47 kOhm			

Table 142: Technical data - Power Panel 251 compact (Forts.)

Mechanical characteristics	4PP251:0571-C05	4PP251:0571-C45	4PP251:0571-C25	4PP251:0571-C65
Front	Naturally anodized aluminum Polyester Similar to Pantone 432CV Similar to Pantone 427CV Similar to Pantone 151CV Similar to Pantone 431CV Similar to Pantone 429CV Gray Flat gasket around display front			
Frame				
Membrane				
Dark gray border around display				
Light background				
Orange keys				
Dark gray keys				
Legend strips (gray)				
Design				
Gasket				
Housing	Metal			
Outer dimensions	212 mm 245 mm 76 mm			
Width				
Height				
Depth				
Weight	Approx. 2.6 kg (with aPCI interface module)			
Environmental characteristics				
Environmental temperature	0 .. 50 °C -20 .. 70 °C -20 .. 70 °C		0 .. 50 °C -20 .. 60 °C -20 .. 60 °C	
Operation				
Storage				
Transportation				
Relative humidity	5 .. 85%, non-condensing T <= 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing T <= 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing			
Operation				
Storage				
Transportation				
Vibration	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak) Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak) Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak) Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)			
Operation (continuous)				
Operation (occasional)				
Storage				
Transportation				
Shock	Max. 15 g (147 m/s² 0-peak) and 11 ms length Max. 30 g (980 m/s² 0-peak) and 11 ms length Max. 30 g (980 m/s² 0-peak) and 11 ms length			
Operation				
Storage				
Transportation				
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)			
Altitude	Max. 3000 m			

Table 142: Technical data - Power Panel 251 compact (Forts.)

- 1) System Management Controller
- 2) Values with inserted aPCI interface module

5.2.3 Dimensions

These Power Panel versions are the same size as a Power Panel 220 device with an aPCI interface module. The dimensions can be found in the diagram 126 "Dimensions - 4PP251.0571-45" on page 208.

5.2.4 Cutout installation

These Power Panel versions are the same size as a Power Panel 220 device with an aPCI interface module. The dimensions can be found in the diagram 127 "Cutout Dimensions" on page 209.

5.2.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel device (Power Panel 251 LCD B/W QVGA 5.7" F MH 1aPCI or Power Panel 251 LCD C QVGA 5.7" F MH 1aPCI)
6	Retaining clips included
1	Lithium battery 3 V / 950 mAh included
4	Insert strips (inserted in the front)
1	aPCI interface module (3IF771.9 - aPCI interface 1x CAN or 3IF791.9 - aPCI interface 1x X2X Link)

Table 143: Contents of delivery - Power Panel 251 light / compact

5.3 Power Panel 252 light / compact

5.3.1 Technical data - Power Panel 252 light

Features	4PP252:0571-L05	4PP252:0571-L45	4PP252:0571-L25	4PP252:0571-L65
Boot loader / Operating system	Automation Runtime			
Processor	Geode SC2200 266MHz, 32-bit x86			
Type	MMX technology, streaming SIMD extension			
Expanded command set	16 KB			
L1 cache	-			
L2 cache	Yes			
Floating point unit (FPU)	Passive (heat sink)			
Cooling	2 MB (for firmware)			
Type	Flash			
Memory	DRAM			
Type	64 MB			
Size	SO-DIMM 144-pin			
Socket	Geode SC2200			
Graphics	4 MB shared memory (reserved by main memory)			
Controller	SRAM			
Memory	256 KB			
	Yes			
SRAM	Watchdog			
Size	Controller			
Battery-buffered	SMC ¹⁾			
Watchdog	Power failure logic			
Controller	Controller			
SMC ¹⁾	Hold-up time			
10 ms	Real-time clock			
	Battery-buffered			
Yes	Precision			
10 ppm	Battery			
	Type			
Renata 950 mAh	Removable			
Yes, accessible from the outside	Lifespan			
4 years	Backup capacitor (for changing battery)			
10 minutes	Hold-up time			
	Ethernet			
-	Controller			
	Transfer rate			
	Connection			
	Cable			
	NE2000-compatible			
	CompactFlash			
	Type I			
	1 slot			
	Primary IDE device			

Table 144: Technical data - Power Panel 252 light

Technical data • Power Panel light / compact

Features	4PP252:0571-L05	4APP252:0571-L45	4APP252:0571-L25	4APP252:0571-L65
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB			
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection			
Reset button	Yes, accessible from the outside			
LEDs	1x user (green), 1x CF (yellow)			
Mode/Node switches	2, 16 digits each			
aPCI slots	1 piece CAN aPCI module (3IF771.9) inserted	1 piece X2X aPCI module (3IF791.9) inserted	1 piece CAN aPCI module (3IF771.9) inserted	1 piece X2X aPCI module (3IF791.9) inserted
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	LCD 5.7 in (144 mm) 8 shades of gray QVGA, 320 x 240 pixels 25:1 80° / 80° 140 cd/m² 50000 hours		LCD 5.7 in (144 mm) 256 colors QVGA, 320 x 240 pixels 40:1 80° / 90° 150 cd/m² 50000 hours	
Touch screen Technology Controller Degree of transmission	-			
Filter glass Degree of transmission Coating	95% On both sides			
Keys Function keys Soft keys Cursor pad Number block Other keys	20 with LED - - 15 without LED 5 without LED			
Caution!				
Pressing several keys at the same time may trigger unintended actions.				
Electrical characteristics				
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. Yes			
Ground resistance	≥ 47 kOhm			

Table 144: Technical data - Power Panel 252 light (Forts.)

Mechanical characteristics	4PP252:0571-L05	4PP252:0571-L45	4PP252:0571-L25	4PP252:0571-L65
Front Frame Membrane Dark gray border around display Light background Orange keys Dark gray keys Legend strips (gray) Design Gasket	Naturally anodized aluminum Polyester Similar to Pantone 432CV Similar to Pantone 427CV Similar to Pantone 151CV Similar to Pantone 431CV Similar to Pantone 429CV Gray Flat gasket around display front			
Housing	Metal			
Outer dimensions Width Height Depth	302 mm 187 mm 76 mm			
Weight	Approx. 2.8 kg (with aPCI interface module)			
Environmental characteristics				
Environmental temperature Operation Storage Transportation	0 .. 50 °C -20 .. 70 °C -20 .. 70 °C			
Relative humidity Operation Storage Transportation	5 .. 85%, non-condensing T <= 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing T <= 40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing			
Vibration Operation (continuous) Operation (occasional) Storage Transportation	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak) Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak) Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak) Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)			
Shock Operation Storage Transportation	Max. 15 g (147 m/s² 0-peak) and 11 ms length Max. 30 g (980 m/s² 0-peak) and 11 ms length Max. 30 g (980 m/s² 0-peak) and 11 ms length			
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)			
Altitude	Max. 3000 m			

Table 144: Technical data - Power Panel 252 light (Forts.)

- 1) System Management Controller
- 2) Values with inserted aPCI interface module

5.3.2 Technical data - Power Panel 252 compact

Features	4PP252:0571-C05	4PP252:0571-C45	4PP252:0571-C25	4PP252:0571-C65
Boot loader / Operating system	Automation Runtime			
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Type	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)			
Flash	2 MB (for firmware)			
Memory Type Size Socket	DRAM 64 MB SO-DIMM 144-pin			
Graphics Controller Memory	Geode SC2200 4 MB shared memory (reserved by main memory)			
SRAM Size Battery-buffered	256 KB Yes			
Watchdog Controller	SMC ¹⁾			
Power failure logic Controller Hold-up time	SMC ¹⁾ 10 ms			
Real-time clock Battery-buffered Precision	Yes 10 ppm			
Battery Type Removable Lifespan Backup capacitor (for changing battery) Hold-up time	Renata 950 mAh Yes, accessible from the outside 4 years 10 minutes			
Ethernet Controller Transfer rate Connection Cable NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -			
CompactFlash Type Number Connection	Type I 1 slot Primary IDE device			

Table 145: Technical data - Power Panel 252 compact

Features	4PP252:0571-C05	4PP252:0571-C45	4PP252:0571-C25	4PP252:0571-C65
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB			
USB interface Type Number Transfer rate Connection Current load	USB 1.1 2 1.5 Mbit/s (low speed), 12 Mbit/s (full speed) Type A Max. 500 mA per connection			
Reset button	Yes, accessible from the outside			
LEDs	1x user (green), 1x CF (yellow)			
Mode/Node switches	2, 16 digits each			
aPCI slots	1 piece CAN aPCI module (3IF771.9) inserted	1 piece X2X aPCI module (3IF791.9) inserted	1 piece CAN aPCI module (3IF771.9) inserted	1 piece X2X aPCI module (3IF791.9) inserted
Display Type Diagonal Colors Resolution Contrast Viewing angle horizontal / vertical Background lighting Brightness Half-brightness time	LCD 5.7 in (144 mm) 8 shades of gray QVGA, 320 x 240 pixels 25:1 80° / 80° 140 cd/m² 50000 hours		LCD 5.7 in (144 mm) 256 colors QVGA, 320 x 240 pixels 40:1 80° / 90° 150 cd/m² 50000 hours	
Touch screen Technology Controller Degree of transmission	-			
Filter glass Degree of transmission Coating	95% On both sides			
Keys Function keys Soft keys Cursor pad Number block Other keys	20 with LED - - 15 without LED 5 without LED			
Caution!				
Pressing several keys at the same time may trigger unintended actions.				
Electrical characteristics				
Power supply Rated voltage Starting current Power consumption ²⁾ Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. Yes			
Ground resistance	≥ 47 kOhm			

Table 145: Technical data - Power Panel 252 compact (Forts.)

Technical data • Power Panel light / compact

Mechanical characteristics	4PP252:0571-C05	4PP252:0571-C45	4PP252:0571-C25	4PP252:0571-C65
Front				
Frame	Naturally anodized aluminum			
Membrane	Polyester			
Dark gray border around display	Similar to Pantone 432CV			
Light background	Similar to Pantone 427CV			
Orange keys	Similar to Pantone 151CV			
Dark gray keys	Similar to Pantone 431CV			
Legend strips (gray)	Similar to Pantone 429CV			
Design	Gray			
Gasket	Flat gasket around display front			
Housing	Metal			
Outer dimensions				
Width	302 mm			
Height	187 mm			
Depth	76 mm			
Weight	Approx. 2.8 kg (with aPCI interface module)			
Environmental characteristics				
Environmental temperature				
Operation	0 .. 50 °C		0 .. 50 °C	
Storage	-20 .. 70 °C		-20 .. 60 °C	
Transportation	-20 .. 70 °C		-20 .. 60 °C	
Relative humidity				
Operation	5 .. 85%, non-condensing			
Storage	T <= 40 °C: 5 % to 90 %, non-condensing			
	T > 40 °C: < 90 %, non-condensing			
Transportation	T <= 40 °C: 5 % to 90 %, non-condensing			
	T > 40 °C: < 90 %, non-condensing			
Vibration				
Operation (continuous)	Max. 9 - 200 Hz and 0.5 g (4.9 m/s² 0-peak)			
Operation (occasional)	Max. 9 - 200 Hz and 1 g (9.8 m/s² 0-peak)			
Storage	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)			
Transportation	Max. 2 - 500 Hz and 4 g (39.2 m/s² 0-peak)			
Shock				
Operation	Max. 15 g (147 m/s² 0-peak) and 11 ms length			
Storage	Max. 30 g (980 m/s² 0-peak) and 11 ms length			
Transportation	Max. 30 g (980 m/s² 0-peak) and 11 ms length			
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)			
Altitude	Max. 3000 m			

Table 145: Technical data - Power Panel 252 compact (Forts.)

- 1) System Management Controller
- 2) Values with inserted aPCI interface module

5.3.3 Dimensions

These Power Panel versions are the same size as a Power Panel 220 device with an aPCI interface module. The dimensions can be found in the diagram 158 "Dimensions - 4PP252.0571-45" on page 256.

5.3.4 Cutout installation

These Power Panel versions are the same size as a Power Panel 220 device with an aPCI interface module. The dimensions can be found in the diagram 159 "Cutout Dimensions" on page 257.

5.3.5 Contents of delivery

The following components are included in the delivery of the Power Panel device:

Number	Component
1	Power Panel device (Power Panel 252 LCD B/W QVGA 5.7" F MH 1aPCI or Power Panel 252 LCD C QVGA 5.7" F MH 1aPCI)
6	Retaining clips included
1	Lithium battery 3 V / 950 mAh included
8	Insert strips (inserted in the front)
1	aPCI interface module (3IF771.9 - aPCI interface 1x CAN or 3IF791.9 - aPCI interface 1x X2X Link)

Table 146: Contents of delivery - Power Panel 252 light / compact

Chapter 3 • Installation

1. Mounting instructions

- The Power Panel must be mounted using retaining clips included in the delivery. Depending on the Power Panel version, a corresponding number of retaining clips are included.



Figure 259: Retaining clip

- In order to guarantee proper air circulation, allow a sufficient amount of space above, below, to the side and behind the Power Panel device. The minimum specified free space can be found in the subsequent diagram. Free space specifications apply to all Power Panel versions (with/without aPCI slots and keys).

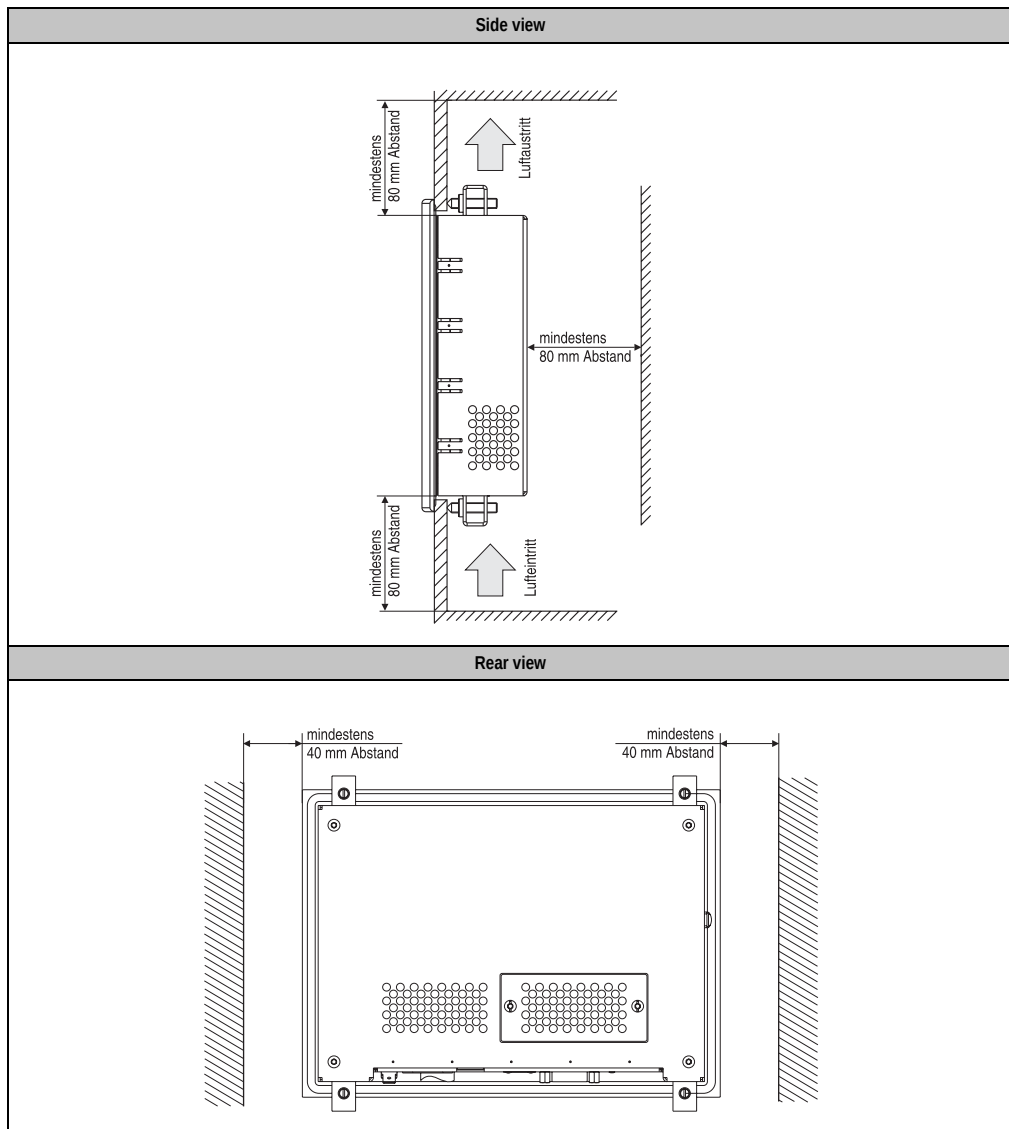


Figure 260: Spacing for air circulation

2. Mounting orientation

The following diagram displays the specified mounting orientation for the Power Panel device. The mounting orientation applies to all Power Panel versions (with/without aPCI slots and keys).

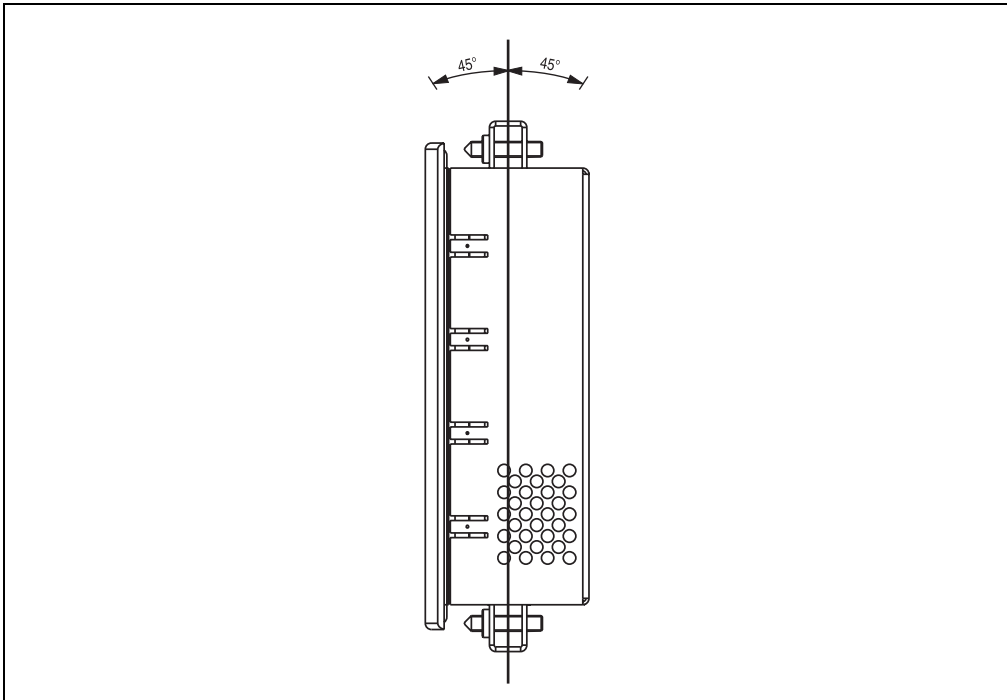


Figure 261: Mounting orientation for the Power Panel

Caution!

The maximum permitted environmental temperature can be found in the technical data for the respective Power Panel device.

Chapter 4 • Software

1. Power Panel 100/200 with Automation Runtime

1.1 General information

B&R Automation Runtime guarantees a uniform runtime environment for Automation Studio programs on all target systems. This assures uniform programming and operation on all devices.

Automation Runtime possesses a multitasking operating system adapted especially for use with control technology. The cycle time for your application can be separated among several task classes. Automation Runtime ensures that all application programs are executed within defined time periods, proving itself to be a configurable, deterministic real-time multitasking system.

An extensive project can be divided into small individual tasks. This way of working increases modularity and makes it much easier to maintain projects.

1.1.1 Summary screen

When switching on a Power Panel 100 or Power Panel 200 device, a summary screen appears after the message "Booting, please wait..."; it displays the most important parameters of an Automation Runtime Power Panel device:

```

Bernecker + Rainer Industrie-Elektronik

Factory Settings
Version                03
DeviceID              1697
CompatibilityID        00
Brightness (min/typ/max) D5 EA FF
Contrast (min/typ/max)  00 46 FF

Mode/Node              00
MAC Address            00:60:65:00:C6:A7
BootLoader             2.07
HW-Layer               1.2.0
OnBoard AR             V2.66

SMC Version            AD

All values in hex
  
```

Figure 262: Automation Runtime summary screen

Information	Example value	Description
Version	03	Displays the factory settings version. These factory settings determine the device ID, display ID, display-specific initialization sequences, and other important parameters. Information: Factory settings are set by B&R and cannot be changed by the user!
Device ID	1697	Displays the hexadecimal value of the hardware device number.
Compatibility ID	00	Displays the hardware device revision.
Brightness (min / typ / max)	D5 EA FF	Indicates the minimum, typical and maximum value as a hex value for the brightness settings of the display.
Contrast (min / typ / max)	00 46 FF	Indicates the minimum, typical and maximum value as a hex value for the contrast settings of the display.
Mode/Node	00	Displays the current operating mode switch positions.
MAC address	00:60:65:00:C6:A7	Displays the assigned media access control (MAC) address.
Boot loader	2.07	Displays the version of the boot loader.
HW layer	1.2.0	Displays the version of the hardware layer.
Onboard AR	V2.66	Displays the current onboard Automation Runtime version.
SMC version	AD	Displays the current SMC (system management controller) software version.

Table 147: Automation Runtime summary screen

1.2 Power Panel 100 as an intelligent visualization system

The visualization project runs on the Power Panel 100. Serial RS232 or Ethernet TCP/IP provides the communication to the controller system. Flexible programming with frame drivers or Ethernet socket services allows a connection to be made to any control system. I/O peripherals and drives are connected to the controller.

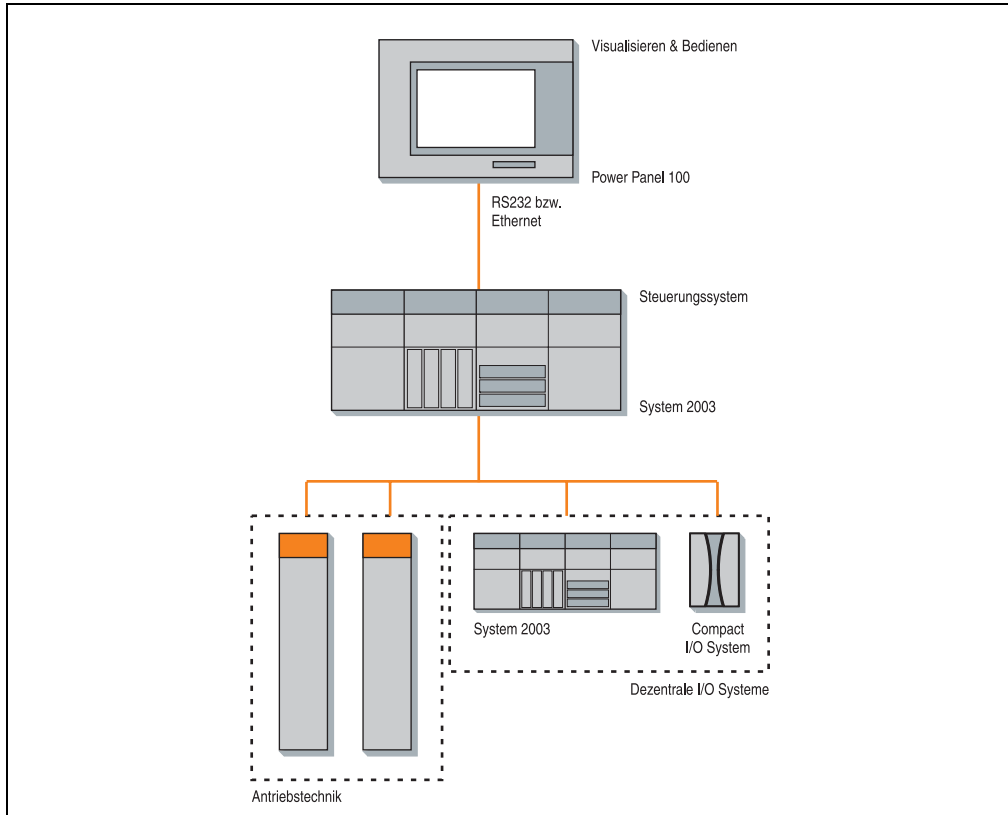


Figure 263: Power Panel 100 as an intelligent visualization system

1.3 Power Panel 200 with Power Panel 100 terminals

The control program and visualization run on the Power Panel 200. I/O peripherals and drives are connected via CAN, X2X and ETHERNET Powerlink. Other Power Panel 100 units are connected as terminals via Ethernet TCP/IP. The central data storage occurs on the Power Panel 200.

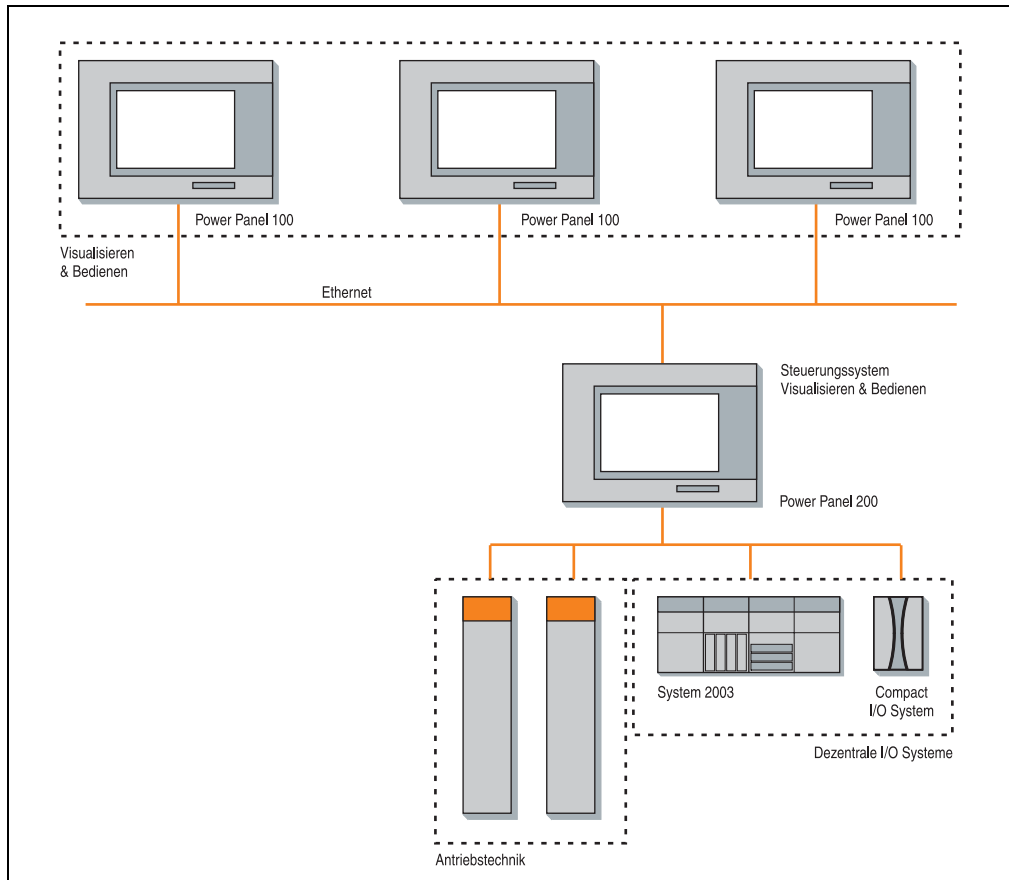


Figure 264: Power Panel 200 with Power Panel 100 terminals

1.4 Automation Runtime and SMC

The SMC (System Management Controller) monitors the following events on a Power Panel device.

- Voltage dips (power failure)
- Watchdog events
- Reset button
- Overtemperature
- Software reset

Data communication between the SMC and the Geode processor takes place over the serial I²C bus.

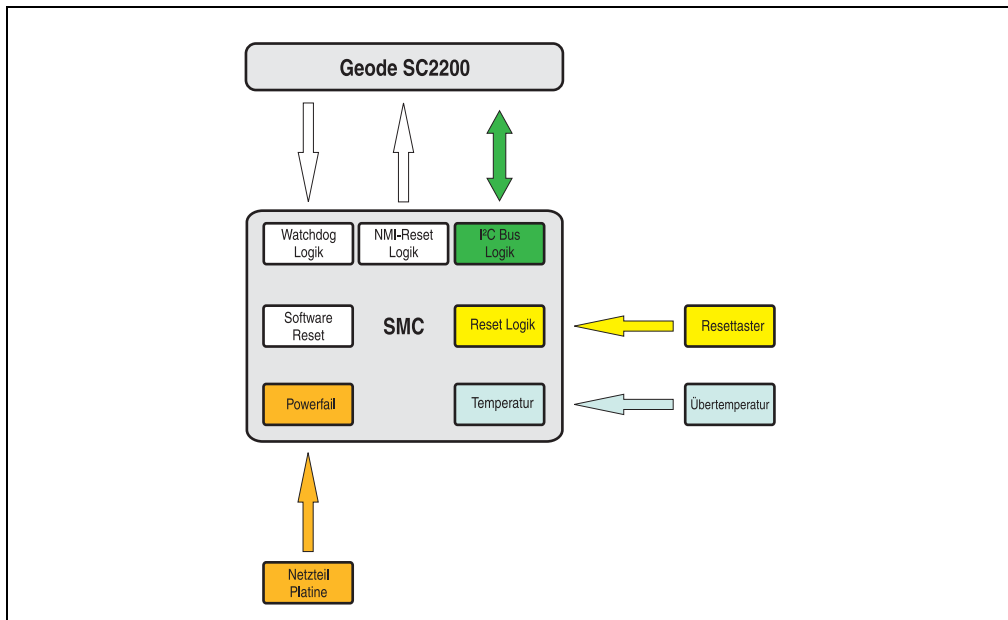


Figure 265: Block diagram of SMC and Geode processor data communication

If one of these events occurs, the SMC triggers the Automation Runtime NMI (non-maskable interrupt) ISR (interrupt service routine). In 10 ms, the NMI ISR saves 64 KB of remanent PVs (process variables) from the DRAM on the Power Panel device to the battery-buffered SRAM. When the 10 ms elapse, the Power Panel device is reset.

The reason for an NMI is logged in the error logbook. The error logbook can be read with either the B&R Automation Studio programming system or with standard functions (see SYS_Lib library in the Automation Studio help).

1.4.1 Voltage dips (power failure)

An NMI is triggered if the supply voltage falls below 18 VDC.

1.4.2 Watchdog events

Watchdog events are monitored by the SMC. Automation Runtime triggers the watchdog every 20 ms. An NMI is triggered if a signal is not detected by the SMC after 100 ms.

The watchdog window is made up of the minimum and maximum time. The minimum time must be less than the maximum time. If the watchdog is disabled, the minimum and maximum times are defined as 0000h. The watchdog is active starting with the first toggle event. The watchdog is disabled after a reset. It is configured using a library (ADI library).

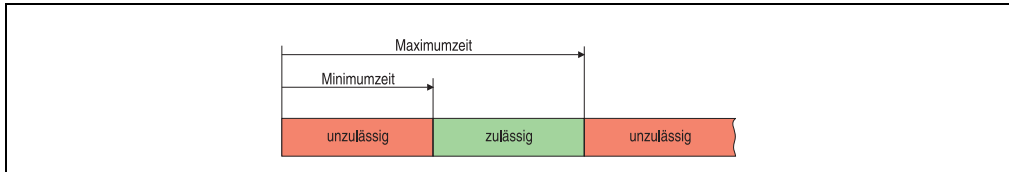


Figure 266: Watchdog events

The watchdog function is not implemented for Power Panel BIOS devices.

1.4.3 Reset button

An NMI is triggered if the reset button is pressed by the user.

1.4.4 Overtemperature

Two internal temperature values (processor and I/O) in the Power Panel device are measured cyclically (every second). An NMI / reset is triggered if overtemperature is detected three times in a row. The Power Panel remains reset until the temperature that reached the alarm limit is reduced by 5 °C.

The various temperature alarm limits depend on the boot loader version being used (see figure 262 "Automation Runtime summary screen" on page 425).

	Alarm limit until boot loader version 3.12	Alarm limit starting with boot loader version 3.12
Processor (diode line in Geode processor)	95 °C	125 °C
I/O (sensor on the circuit board near the processor)	80 °C	80 °C

Table 148: Differences in the boot loader temperature alarm limits

1.4.5 Software reset

The Power Panel device can also be reset with a software command. This also triggers an NMI.

2. Power Panel with BIOS

Information:

The following diagrams and BIOS menu items including descriptions refer to BIOS version 1.05. It is therefore possible that these diagrams and BIOS descriptions do not correspond with the installed BIOS version.

2.1 General information

BIOS is an abbreviation for "**B**asic **I**nter and **O**utput **S**ystem". It is the most basic standardized communication between the user and the system (hardware). A B&R-modified BIOS from Insyde is used in the Power Panel 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 Power Panel.

BIOS is immediately activated when switching on the power supply of the Power Panel.

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

Information:

After 3 unsuccessful attempts at booting the Power Panel device, BIOS overwrites the current CMOS settings with the CMOS backup values. If there is no valid CMOS backup present, then CMOS settings are set to their default values (as with "Load optimized defaults").

When these preliminaries are finished, the BIOS seeks an operating system in the data storage devices available (CompactFlash card, drive, floppy drive). BIOS launches the operating system and hands over control of system operations to it.

Optionally, a BIOS summary screen can be displayed at the end of POST. This displays the following information depending to the Power Panel display diagonal:

```

Power Panel
BIOS: 1.05          Built: 11/03/2003 18:17:45
CPU: SC2200 Rev: D2 @ 266MHz      PCI: 66MHz      Multiplier: 4x
Memory: 126784k @ 66MHz      CAS: 2      SDRAM Divisor: 4      Shift SDRAM: 2.0
Floppy Remote      CF Card: None      COM1: 03F8      XpressROM V3.55GK1
RTC: Present      FPGA: None      COM2: 02F8      USB: 0204
USB: Legacy      aPCI 1: None      COM3: 03E8
PM: Disabled      aPCI 2: None      SMC: 2.2
Mode/Node: 00      Device/Comp. ID: 1690 00      TMCLK: 27MHz      FactSett: 3

<c> 1999-2002 Copyright National Semiconductor
<c> 2002-2003 Copyright Bernecker + Rainer

```

Figure 267: BIOS summary screen for VGA, SVGA, XGA Power Panel devices

```

Power Panel
BIOS:1.05          Built:11/03/2003 18:18:04
CPU:SC2200 Rev:D2 @ 266MHz
Memory:126784k @ 66MHz      CAS:2
CF Card:384MB,      LBA, PIO4      SMC:None
Floppy Remote      USB:LegacyOFF      USB:0204
COM1:03F8      FPGA:None
COM2:02F8      aPCI1:None
COM3:03E8      aPCI2:None
FactSett:3      Device/Comp.ID:1692 00
Mode/Node:00
<c> 1999-2002 National Semiconductor
<c> 2002-2003 Bernecker + Rainer

```

Figure 268: BIOS summary screen for QVGA Power Panel devices

To disable this summary screen, see the section "Advanced BIOS features" on page 445 for VGA, SVGA and XGA Power Panel devices and the section 2.3.4 "Advanced BIOS features" on page 468 for QVGA Power Panel devices.

To make changes in the BIOS setup, the DEL key must be pressed when booting the Power Panel device as soon as the following message appears on the upper margin of the display (during POST):

```
Press DEL for Setup _
```

Figure 269: Press DEL for setup

If the message disappears before DEL has been pressed¹⁾, then the Power Panel 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.

1) A USB keyboard or the REMHOST program is required to enter characters and operate BIOS setup pages.

Information:

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

The following keys¹⁾ help you navigate in BIOS setup:

Key	Function
Cursor ↑	Moves to previous item.
Cursor ↓	Moves to next item.
Cursor ←	Moves to previous item.
Cursor →	Moves to next item.
ESC	Exits the submenu.
Enter or press highlighted character shortcut	Change into the selected menu.
F1 and ALT+H	A help window opens up 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 149: BIOS-relevant keys

1) A USB keyboard or the REMHOST program is required to enter characters and operate BIOS setup pages.

2.2 BIOS settings for VGA, SVGA and XGA Power Panel devices

Information:

The following diagrams and BIOS menu items including descriptions refer to BIOS version 1.05. It is therefore possible that these diagrams and BIOS descriptions do not correspond with the installed BIOS version.

The individual BIOS setup pages for a VGA, SVGA and XGA Power Panel device are described on the following pages.

2.2.1 BIOS setup main menu

The BIOS setup main menu appears immediately after pressing the DEL button when the system is started:

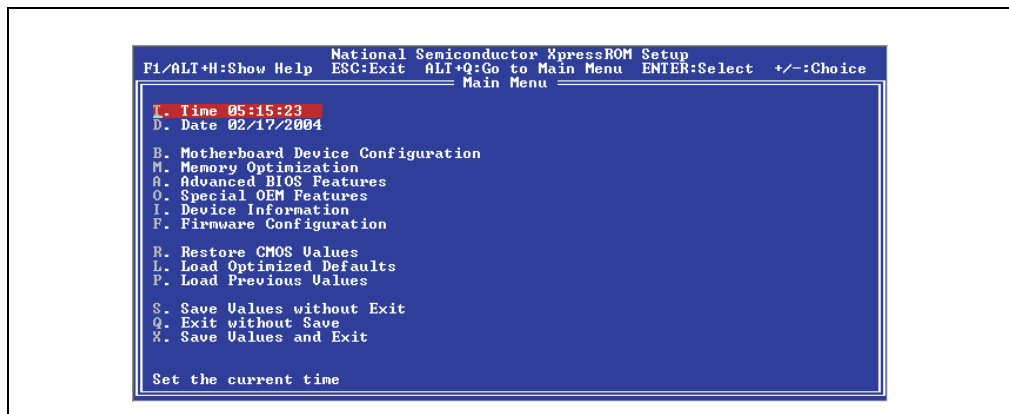


Figure 270: BIOS setup main menu

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

Shortcut	BIOS setup menu	Function
T	Time 05:15:23	The system time can be configured here.
D	Date 02/17/2004	The system date can be configured here.
B	Motherboard device configuration	Motherboard resources can be configured here.
M	Memory optimization	The settings for memory management can be made here.
A	Advanced BIOS features	Advanced BIOS options such as boot logo, summary screen, cache areas, etc. can be configured here.
O	Special OEM features	Specific B&R settings can be made here.
I	Device information	Important parameters (e.g. temperature, mode/node position, etc.) for a Power Panel device are displayed here.

Table 150: Overview of BIOS main menu functions

Shortcut	BIOS setup menu	Function
F	Firmware configuration	Onboard firmware for FPGA and aPCI modules can be configured here.
R	Restore CMOS values	Restores the last saved CMOS values from flash memory.
L	Load optimized defaults	Load the optimal BIOS settings for best performance.
P	Load previous values	Reloads the values configured when BIOS setup was opened. All changes which had been made up to that point are lost as a result.
S	Save values without exit	Saves BIOS values without exiting BIOS setup.
Q	Exit without save	Exits BIOS setup without saving any changes.
X	Save values and exit	Saves settings and exits BIOS setup.

Table 150: Overview of BIOS main menu functions (Cont.)

Information:

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

2.2.2 Time

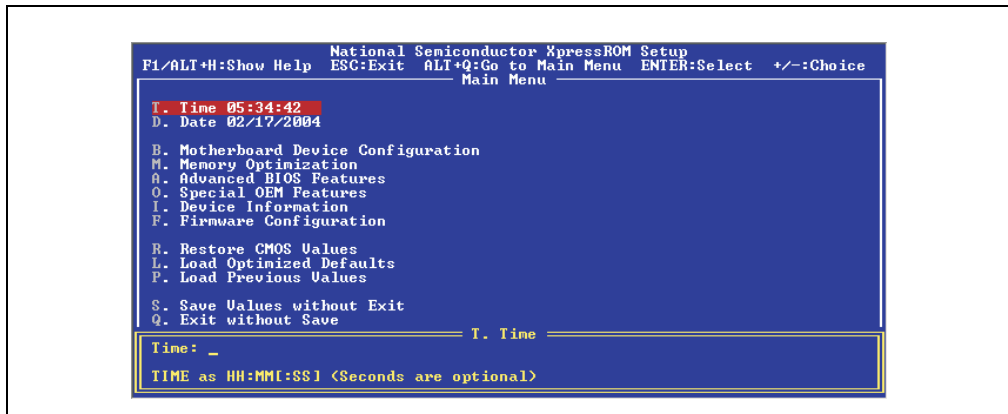


Figure 271: BIOS time menu

The currently configured system time is displayed here. The time is buffered by a battery (CMOS battery) after the Power Panel device has been switched off.

A new system time can be entered with the shortcut "A" or by selecting "Time" and then confirming with Enter. The format HH:MM[:SS] must be entered as shown in the following example:

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 ":".

2.2.3 Date

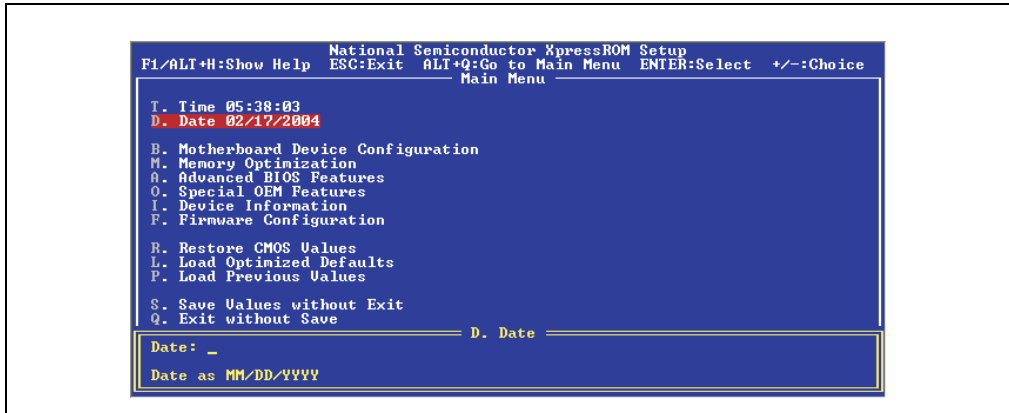


Figure 272: BIOS date menu

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

A new system date can be entered with the shortcut "B" 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 2/12/2003.

Entry using keyboard:

- 02/12/2003 - Confirm with Enter

Information:

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

2.2.4 Motherboard device configuration

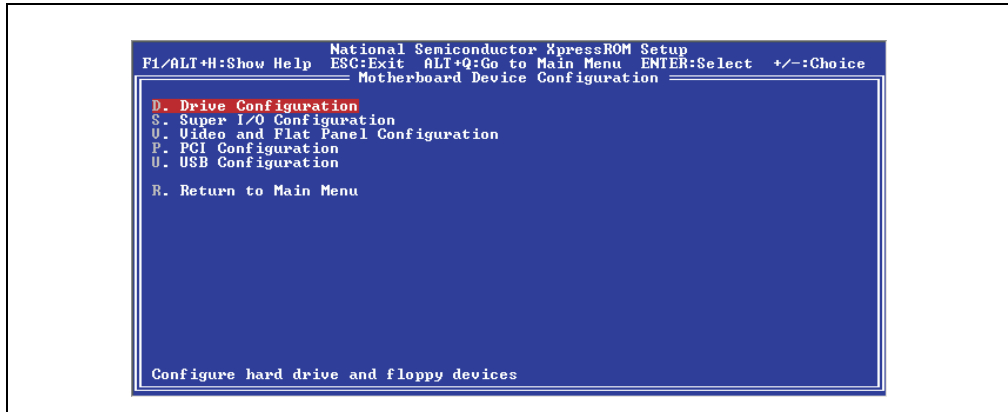


Figure 273: BIOS motherboard device configuration menu

Shortcut	BIOS setup menu	Function
D	Drive configuration	Settings for floppy drive and CompactFlash card.
S	Super I/O configuration	Configures the super I/O device.
V	Video and flat panel configuration	Displays the video settings and configuration for resolution, brightness, and contrast display parameters.
P	PCI configuration	Configures PCI bus settings.
U	USB configuration	Configures USB settings.
R	Return to main menu	Exits the current page and returns to the BIOS main menu.

Table 151: BIOS motherboard device configuration menu

Drive configuration

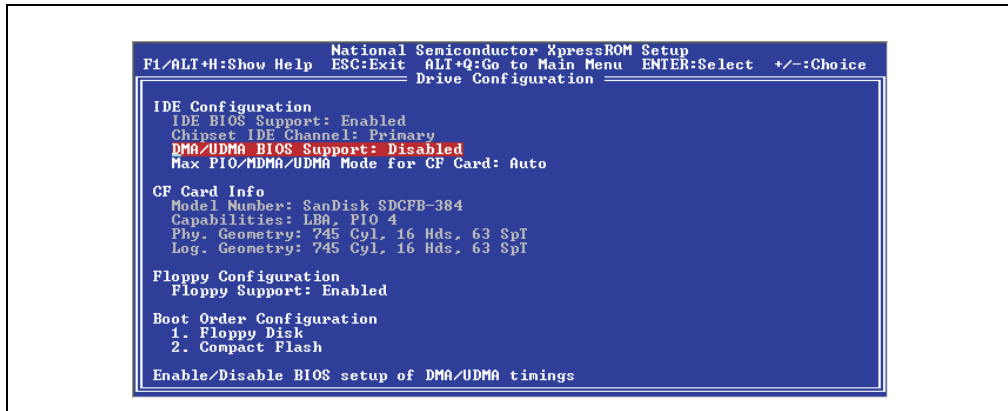


Figure 274: BIOS drive configuration menu

BIOS setting	Description	Setting options		Effect
IDE BIOS support	Displays the IDE configuration for the Power Panel device.	None		-
Chipset IDE channel	Displays the IDE channel used.	None		-
DMA/UDMA BIOS support	DMA/UDMA BIOS support can be configured here.	Enabled		Enables this function.
		Disabled		Only PIO modes for data transfer to and from CompactFlash cards are used.
Max PIO/MDMA/UDMA 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		Configures the fastest mode supported by the inserted CompactFlash card.
		PIO 0 to PIO 4		Manual configuration option for PIO mode.
		MDMA 0 to MDMA 2		Manual configuration option for MDMA mode.
		UDMA 0 to UDMA 2		Manual configuration option for UDMA mode.
Model number	Displays the CompactFlash model ID.	None		-
Capabilities	Displays the possible data transfer mode speeds to and from an inserted CompactFlash card.	None		-
Phy. geometry	Displays the physical geometry of the inserted CompactFlash card in cylinders, heads and sectors.	None		-
Log. geometry	Displays the logical geometry of the inserted CompactFlash card in cylinders, heads and sectors.	None		-
Floppy configuration	Floppy support (USB) can be enabled here. It is also possible to access a remote floppy drive and e.g. upgrade BIOS using the REMHOST program (see section "REMHOST utility disk" on page 484).	Enabled		Enables USB floppy support.
		Disabled		Disables USB floppy support.
Boot order configuration	Configures the order in which memory media is booted. If two identical devices are selected, a conflict warning is displayed.	1	Floppy disk ¹⁾	An attempt is made to boot from this configured drive first.
			CompactFlash	
			NONE	
		2	Floppy disk ¹⁾	An attempt is made to boot from this configured drive second.
			CompactFlash	
			NONE	

Table 152: BIOS drive configuration menu

1) Only HD diskettes (1.44 MB) are still supported by BIOS.

Super I/O configuration

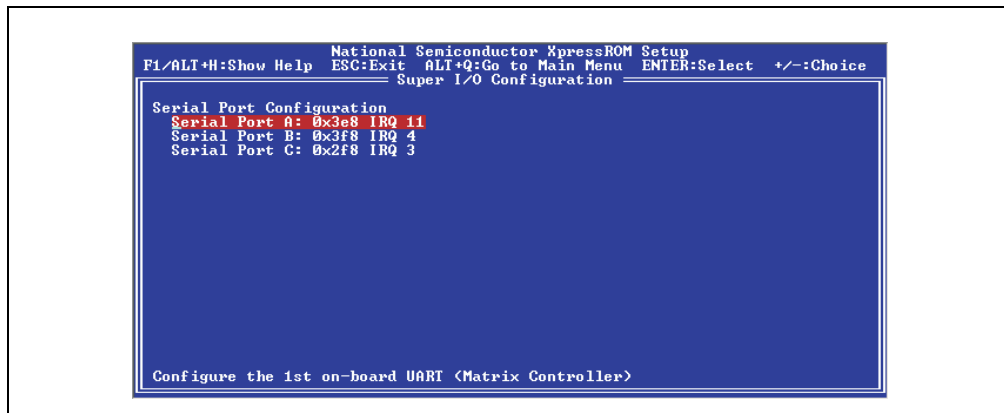


Figure 275: BIOS super I/O configuration menu

BIOS setting	Description	Setting options	Effect
Serial port A:	Configures the first UART address range and the corresponding interrupt for the matrix controller. BIOS default setting: 0x3e8 IRQ 11. Information: Two ports cannot use the same address range and interrupt.	Disabled	No assignment.
		0x3e8 IRQ 11	Use this address range and interrupt.
		0x3f8 IRQ 4	
		0x2f8 IRQ 3	
		0x3e8 IRQ 4	
		0x2f8 IRQ 3	
		0x2f8 IRQ 11	
Serial port B:	Configures the second UART address range and the corresponding interrupt for the serial interface. BIOS default setting: 0x3f8 IRQ 4. Information: Two ports cannot use the same address range and interrupt.	Disabled	No assignment.
		0x3f8 IRQ 4	Use this address range and interrupt.
		0x2f8 IRQ 3	
		0x3e8 IRQ 4	
		0x2f8 IRQ 3	
		0x3e8 IRQ 11	
		0x2f8 IRQ 11	
Serial port C:	Configures the third UART address range and the corresponding interrupt for the touch controller. BIOS default setting: 0x2f8 IRQ 3. Information: Two ports cannot use the same address range and interrupt.	Disabled	No assignment.
		0x2f8 IRQ 3	Use this address range and interrupt.
		0x3f8 IRQ 4	
		0x2f8 IRQ 3	
		0x3e8 IRQ 4	
		0x3e8 IRQ 11	
		0x2f8 IRQ 11	

Table 153: BIOS super I/O configuration menu

Video and flat panel configuration

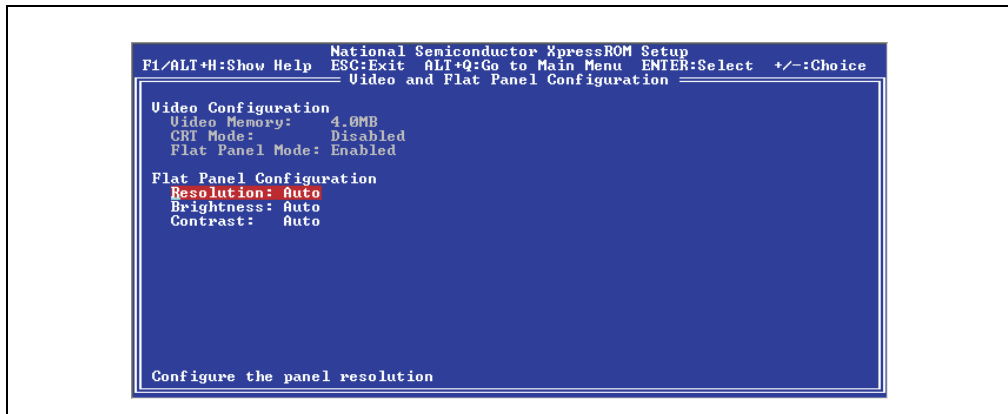


Figure 276: BIOS video configuration menu

BIOS setting	Description	Setting options	Effect
Video memory	Displays the current video memory reserved by the main memory.	None	-
CRT mode	Displays on an external screen.	None	-
Flat panel mode	Displays on a Power Panel display.	None	-
Resolution	Setting for the maximum resolution for the display. Note: Only the resolution specified for the Power Panel device should be configured! Otherwise, the display can be damaged by incorrect timing values. If the mode/node switch is set to 0/0, then the resolution is automatically reset every time the Power Panel device is restarted.	Auto	The maximum resolution is read from the factory settings and correctly configured automatically.
		Auto (+Timing)	The maximum resolution and display timing are read from the factory settings and correctly configured automatically. If the display timing cannot be set, the internal default values are used.
		QVGA(320x240) LCD	Optimal setting for a QVGA LCD Power Panel.
		QVGA(320x240) TFT	Optimal setting for a QVGA TFT Power Panel.
		VGA (640x480)	Optimal setting for a VGA Power Panel.
		SVGA (800x600)	Optimal setting for a SVGA Power Panel.
		XGA(1024x768)	Optimal setting for a XGA Power Panel.
Brightness	Setting for the background lighting of the display. Note: If the mode/node switch is set to 0/0, then brightness settings are automatically set to the default values from the factory settings every time the Power Panel device is restarted.	Auto	The optimal brightness is automatically configured using the factory settings. A brightness setting between 100% and 0% is set.
		0% to 100%	Manual setting of the desired brightness within factory settings limits.

Table 154: BIOS video configuration menu

BIOS setting	Description	Setting options	Effect
Contrast	Setting for the contrast of the display. Note: Contrast settings can only be configured for passive displays. If the mode/node switch is set to 0/0, then contrast settings are automatically set to the default factory settings every time the Power Panel device is restarted.	Auto	The optimal contrast is automatically configured using the factory settings. A contrast value between 100% and 0% is set.
		0% to 100%	Manual setting of the desired contrast within factory settings limits.

Table 154: BIOS video configuration menu (Cont.)

PCI configuration

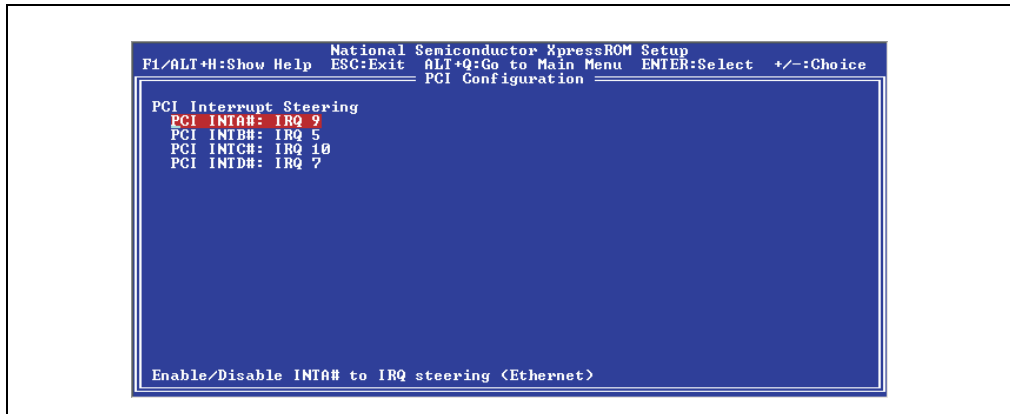


Figure 277: BIOS PCI configuration menu

BIOS setting	Description	Setting options	Effect
PCI INTA#	Activates the IRQ for the Ethernet controller. BIOS default setting: IRQ 9.	Disabled	No IRQ is reserved.
		3, 4, 5, 6, 7, 9, 10, 11, 12, 14 or 15	Assigns these IRQs.
PCI INTB#	Activates IRQ for aPCI slot 1. BIOS default setting: IRQ 5. First IRQ for aPCI Slot 1 and IRQ for USB controller.	Disabled	No IRQ is reserved.
		3, 4, 5, 6, 7, 9, 10, 11, 12, 14 or 15	Assigns these IRQs.
PCI INTC#	Activates IRQ for aPCI slot 2. BIOS default setting: IRQ 10. First IRQ for aPCI slot 2 and second IRQ for aPCI slot 1.	Disabled	No IRQ is reserved.
		3, 4, 5, 6, 7, 9, 10, 11, 12, 14 or 15	Assigns these IRQs.
PCI INTD#	Activates IRQ for the USB controller. BIOS default setting: IRQ 7. Second IRQ for aPCI slot 2.	Disabled	No IRQ is reserved.
		3, 4, 5, 6, 7, 9, 10, 11, 12, 14 or 15	Assigns these IRQs.

Table 155: BIOS PCI configuration menu

USB configuration

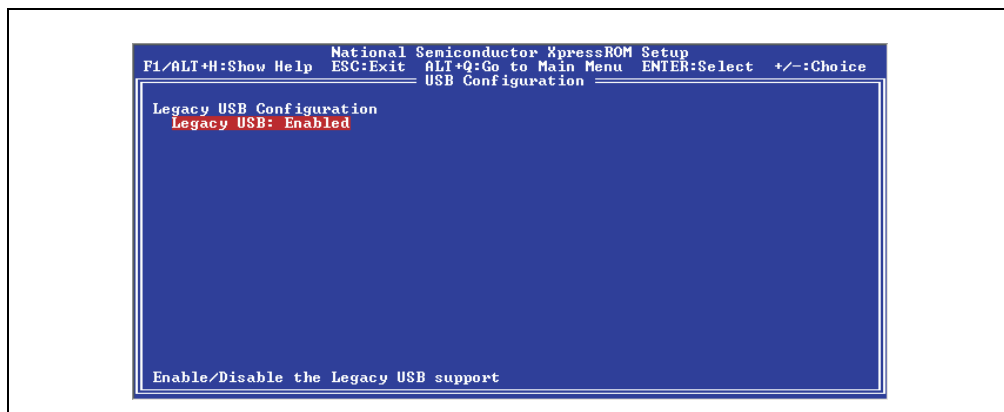


Figure 278: BIOS USB configuration menu

BIOS setting	Description	Setting options	Effect
Legacy USB	This function enables USB support in order to make BIOS settings, e.g. using a USB keyboard, even before the operating system with USB support is loaded. Note: If the mode/node switch is set to 0/0, then Legacy USB support is always set to "enabled".	Enabled	Enables USB Legacy support.
		Disabled	Disables USB Legacy support. Note: After deactivating this support, booting from a USB floppy drive is no longer possible.

Table 156: BIOS USB configuration menu

2.2.5 Memory 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 Power Panel device can no longer be booted, then the default values can be restored by restarting three times.

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.

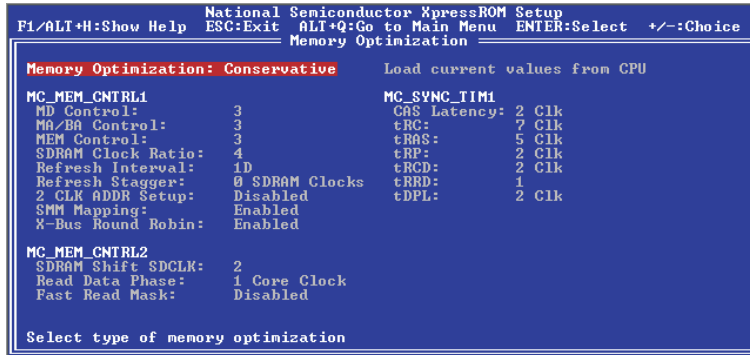


Figure 279: BIOS memory optimization menu

BIOS setting	Description	Setting options	Effect
Memory Optimization	Defines how memory optimization is handled. With this option, it is recommended that the user upload the current base values being used by the system from the CPU to this BIOS page when setting values manually for the first time.	Conservative	The BIOS automatically uses PC66 timing.
		Optimized	BIOS uses optimized memory settings for the memory chips used. This allows faster timing.
		Aggressive	BIOS uses "aggressive" memory settings based on the SPD and CPU speed. Important! Aggressive memory settings can cause stability problems for the system.
		Manual	If "Manual" is selected, then the remaining values can be configured on this BIOS menu page. Values only become active when the user saves them before exiting BIOS and the Power Panel is rebooted.
Load current values from CPU	All the specified values are configured on this BIOS setup page with the current configured values.	None	The memory timing values currently used are uploaded by the CPU. It is recommended that when using this option, the user uploads optimal base values (that the system uses) from the CPU to this BIOS page when setting the values manually for the first time.
MD control	Configures MD[63:0] drive strength.	0 to 3	0 = weakest, 3 = strongest
MA/BA control	Configures MA[12:0] and BA[1:0] drive strength.	0 to 3	0 = weakest, 3 = strongest
MEM control	Configures RASA#, CASA#, WEA#, CS[1:0]#, CKEA, DQM[7:0] drive strength.	0 to 3	0 = weakest, 3 = strongest
SDRAM clock ratio	Configures SDRAM timing.	2; 2.5; 3; 3.5; 4; 4.5; 5	Sets DRAM clock timing.
Refresh interval	This parameter defines the number of processor core clocks that are multiplied by 64 between refresh cycles of the DRAM memory.	00 to FF	

Table 157: BIOS memory optimization menu

BIOS setting	Description	Setting options	Effect
Refresh stagger	This parameter defines the number of cycles between the RFSH command and each of the four rows.	0 SDRAM clocks to 3 SDRAM clocks	
2 CLK ADDR setup	Enables the two-clock address setup function.	Enabled	Enables this function.
		Disabled	Disables this function.
SMM mapping	Maps the SMM memory area from GX_BASE+400000 to the physical address A0000 to BFFFF in SDRAM.	Enabled	Enables this function.
		Disabled	Disables this function.
X-bus round robin	Configures the priority levels for processor, graphic and display controller requests.	Enabled	Processor, graphic and display controller requests are treated with the same priority level.
		Disabled	Processor requests are given a higher priority level. Display controller requests always have the highest priority.
SDRAM shift SDCLK	This function makes switching possible for SDCLK SDRAM hold time requests.	0.5, 1, 1.5, 2, 2.5, or 3	
		No shift	No switching.
Read data phase	Configures the read data phase. Regulates whether read data is latched to one or two core clocks for the rising edges of the SDCLK.	1 core clock	After one core clock.
		2 core clocks	After two core clocks.
Fast read mask	Prevents the bypassing of FIFO requests via the core.	Enabled	Enables this function.
		Disabled	Disables this function.
CAS latency	Column Address Strobe (CAS) latency describes the time it takes between addressing in a RAM function block and preparing the data stored at this address. The higher the subsequent value, the greater the delay.	2, 3, 4, 5, 6, or 7 clk	Sets the desired cycle time.
tRC	Sets the minimum number of SDRAM cycles between RFSH and RFSH/ACT commands.	2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 13; 14; 15 or 16 Clk	Sets the desired cycle time.
tRAS	Sets the minimum number of SDRAM cycles between ACT and PRE commands.	2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 13; 14; 15 or 16 Clk	Sets the desired cycle time.
tRP	Sets the minimum number of SDRAM cycles between PRE and ACT commands.	1; 2; 3; 4; 5; 6 or 7 Clk	Sets the desired cycle time.
tRCD	Configures the delay between the ACT and READ/WRITE command. (tRCD) Sets the minimum number of SDRAM cycles between ACT and READ/WRITE commands.	1; 2; 3; 4; 5; 6 or 7 Clk	Sets the desired cycle time.
tRRD	Configures the time between ACT(0) to ACT(1) command period.	0-7	
tDPL	Sets the minimum number of SDRAM cycles between the time for the last record date until the memory area is reloaded.	1; 2; 3; 4; 5; 6; 7 Clk	Sets the desired cycle time.

Table 157: BIOS memory optimization menu (Cont.)

2.2.6 Advanced BIOS features

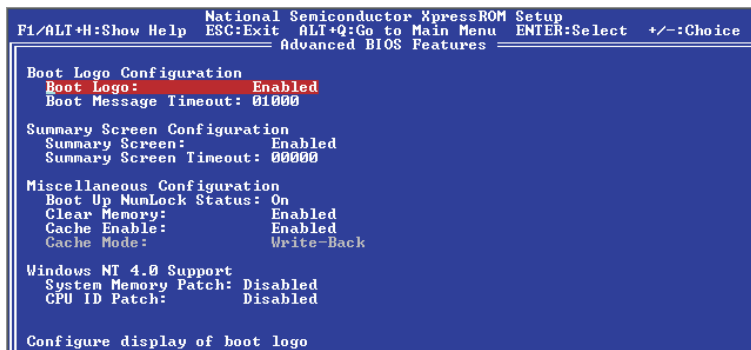


Figure 280: Advanced BIOS features menu

BIOS setting	Description	Setting options	Effect
Boot logo	Displays a boot logo while the Power Panel is starting.	Disabled	No boot logo displayed during booting.
		Enabled	A B&R boot logo is displayed during booting as long as a bitmap created by a user has not been added.
Boot message timeout	Defines the duration of the "Press DEL for Setup" message on the display and how much time the user has to change to the BIOS configuration. Can be resumed before the timeout expires by pressing any button.	0	No waiting.
		1-65535 [milliseconds]	The system waits for the manually set value in milliseconds and then resumes the boot procedure.
Summary screen	Displays information about BIOS, VGA, VSA versions, devices found, etc.	Enabled	Shows the summary screen.
		Disabled	Hides the summary screen.
Summary screen timeout	Defines how long the summary screen is displayed. Can be resumed before the timeout expires by pressing any button.	0	No waiting.
		1-65535 [milliseconds]	The manually set value in milliseconds that must pass.
Boot up NumLock status	Defines the status of an existing numeric keypad when the system is booted.	On	Enables the numeric keypad.
		Off	Disables the numeric keypad.
Clear memory	After starting, the BIOS automatically clears the entire main memory. Note: Clearing e.g. 256 MB RAM takes approximately 3 seconds.	Enabled	The entire main memory is cleared. This makes sense, e.g. when the system to be booted requires initialized main memory when booting.
		Disabled	Disables this function.
Cache enable	The processor has a 16 KB fast L1 cache. The data for fast access is provided in this memory.	Enabled	Recurring commands are processed in the fast L1 cache.
		Disabled	Disables this function.

Table 158: Advanced BIOS features menu

BIOS setting	Description	Setting options	Effect
Cache mode	Using cache mode, write accesses are determined on the cache. This option is permanently set to "Write back". The information is only written in the main memory if necessary (main memory and cache do not have the same information content).	None	-
System memory patch	When activated, the buffer address length is not returned as zero from the national specific software interrupt 15h, the system service function E8h and the subfunction 20h (Get system memory map). This function should be activated only when using the Windows NT 4.0 operating system.	Enabled	Enables this function.
		Disabled	Disables this function.
CPU ID patch	If Windows NT 4.0 checks the CPU ID and recognizes a Geode CPU, it will not be able to be operated with it. Recognition is implemented starting from Service Pack 6. For this reason, this function must be enabled during installation of Windows NT 4.0 until Service Pack 6 has been installed. This function should be activated only when using the Windows NT 4.0 operating system.	Enabled	Enables this function.
		Disabled	Disables this function.

Table 158: Advanced BIOS features menu (Cont.)

2.2.7 Special OEM features

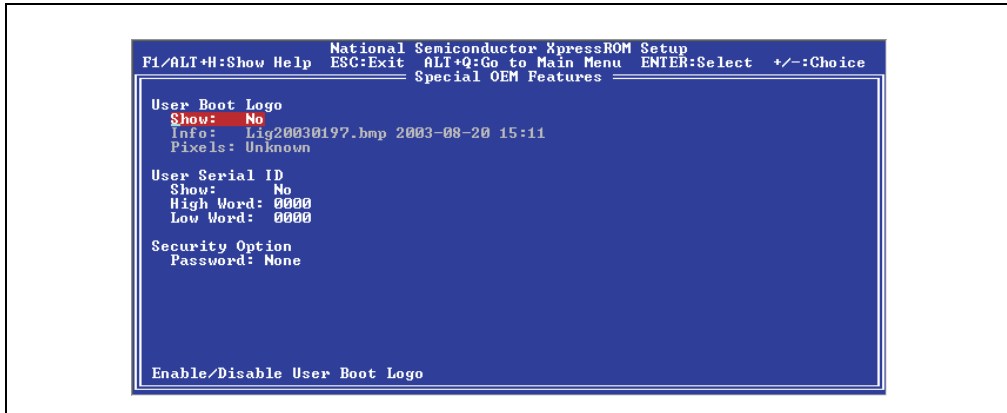


Figure 281: BIOS special OEM features menu

BIOS setting	Description	Setting options	Effect
Show (user boot logo)	A boot logo that has been created by a user can be displayed here instead of the B&R boot logo. ¹⁾	Yes	Display
		No	
Info	Displays the name and the creation date of the user boot logo.	None	-
Pixels	Displays the resolution of the user boot logo.	None	-
User serial ID show	A user serial number can be displayed in the summary screen using this function when the system is started.	Yes	Displays the assigned user serial ID.
		No	Hides the assigned user serial ID.
High word	Input possibilities for the first 4 bytes for the user serial number.	0000-FFFF	The hexadecimal value entered defines the first 4 positions of the user serial ID.
Low word	Input possibilities for the second 4 bytes of the user serial number.	0000-FFFF	The hexadecimal value entered defines the second 4 positions of the user serial ID.
Password	A password can be defined here which must be entered by the user when the BIOS setup is opened.	Max. 8 characters	The password must be confirmed by being entered a second time. The password can be removed again by entering a blank password (just pressing Enter). Important: The password is also saved in the CMOS backup and is impossible to delete.

Table 159: BIOS special functions menu

1) See section 2.4.3 "User boot logo upgrade disk" on page 482 regarding guidelines for creating a user boot logo.

2.2.8 Device information

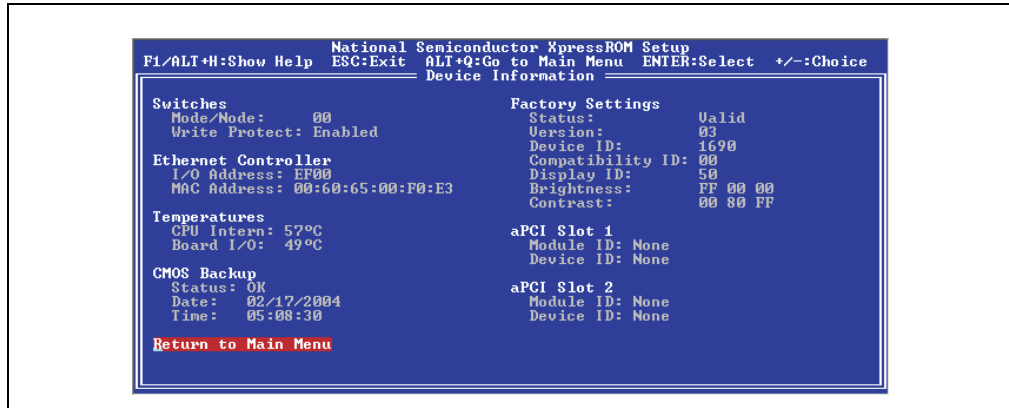


Figure 282: BIOS device information menu

BIOS setting	Description	Setting options	Effect
Mode/Node	Displays the current mode/node switch position.	None	-
Write protect	Displays the switch position for the "write protect" switch.	None	-
I/O address	Displays the Ethernet I/O address.	None	-
MAC address	Displays the assigned MAC address.	None	-
CPU intern	Displays the current internal processor temperature.	None	-
Board I/O	Indicates the current board I/O temperature.	None	-
Status	The status for the last automatically saved CMOS backup is displayed here.	None	If the boot procedure is successful, then the CMOS values are automatically saved by BIOS in flash memory. Values are therefore only saved in flash memory if the backup is not equal to the current CMOS, the backup is not available, or the backup checksum is incorrect.
Date	Date of the last automatically saved CMOS backup.	None	
Time	Time of the last automatically created CMOS backup.	None	
Status	Status display for factory settings.	None	-
Version	Version display for factory settings.	None	-
Device ID	Hex value for the device code of the Power Panel device.	None	-
Compatibility ID	The compatibility code of the Power Panel device is displayed here.	None	-

Table 160: BIOS device information menu

BIOS setting	Description	Setting options	Effect
Display ID	Shows the display ID used. Possible display IDs are: 00h - Unknown 10h - Passive displays (STN) 11h - LCD B/W QVGA 12h - LCD COL QVGA 20h - Active displays (TFT) with QVGA 30h - Active displays (TFT) with VGA 40h - Active displays (TFT) with SVGA 50h - Active displays (TFT) with XVGA	None	-
Brightness	The defined brightness values (minimum, default, maximum) for the display used are shown here as hex values.	None	-
Contrast	The defined contrast values (minimum, default, maximum) for the display used are shown here as hex values.	None	-
aPCI slot 1 Module ID Device ID	Information about an installed aPCI module in aPCI slot 1 of the Power Panel device is displayed here.	None	-
aPCI slot 1 Module ID Device ID	Information about an installed aPCI module in aPCI slot 2 of the Power Panel device is displayed here.	None	-

Table 160: BIOS device information menu (Cont.)

2.2.9 Firmware configuration

```

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

On-Board FPGA
  Boot: Enabled
  Info: PowerPanel 05.08.2003 V2.1
  Status: No FPGA

aPCI Slot 1
  Boot: Enabled
  Info: No firmware burned
  Status: No aPCI module

aPCI Slot 2
  Boot: Enabled
  Info: No firmware burned
  Status: No aPCI module

Enable/Disable boot of on-board FPGA

```

Figure 283: BIOS firmware configuration menu

BIOS setting	Description	Setting options	Effect
Onboard FPGA Boot	The onboard FPGA controls the image output for Power Panel 200 devices with BIOS.	Enabled	The onboard FPGA is enabled and initialized.
		Disabled	Deactivates the FPGA. If this function is deactivated, then no picture is output on Power Panel 200 devices. This function can only be re-enabled using the program "REMHOST" (see section "REMHOST utility disk" on page 484).
Info	Information about the FPGA firmware.	None	-
Status	Status display for the onboard FPGA.	None	-
aPCI slot 1 Boot	A connected aPCI module in the aPCI slot 1 is initialized and booted as long as valid firmware is available.	Enabled	The aPCI module is booted if a corresponding firmware file is burned in flash memory of the Power Panel.
		Disabled	The aPCI module is not booted by BIOS.
Info	Information about a stored boot file for the aPCI slot 1 in flash memory.	None	-
Status	Status display for aPCI slot 1 modules.	None	-
aPCI slot 2 Boot	A connected aPCI module in the aPCI slot 2 is initialized and booted as long as valid firmware is available.	Enabled	The aPCI module is booted if a corresponding firmware file is burned in flash memory of the Power Panel.
		Disabled	The aPCI module is not booted by BIOS.
Info	Information about a stored boot file for the aPCI slot 2 in flash memory.	None	-
Status	Status display for aPCI slot 2 modules.	None	-

Table 161: BIOS firmware configuration menu

2.2.10 Restore CMOS values

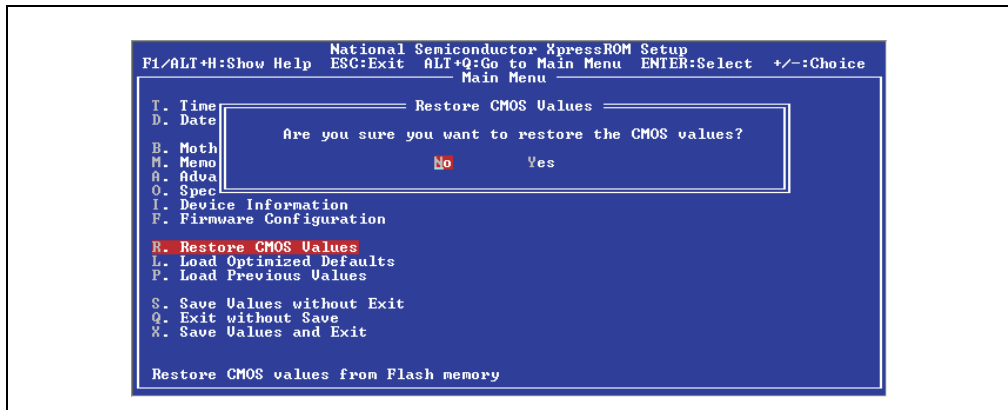


Figure 284: BIOS restore CMOS values menu

Selecting "Yes" under this BIOS menu (R shortcut) restores the last CMOS values stored in flash memory. All configurable CMOS values (besides date and time) are restored again in the BIOS setup.

Information:

If the boot procedure is successful, then the CMOS values are automatically saved by BIOS in flash memory. Values are therefore only saved in flash memory if the backup is not equal to the current CMOS, the backup is not available, or the backup checksum is incorrect.

To protect CMOS data, a CMOS backup was integrated into BIOS. If the BIOS setup was ended using "Save values and exit" and the Power Panel device was correctly restarted, then the CMOS data is burned to flash memory. If the CMOS checksum is incorrect during startup (battery empty) or the Power Panel device cannot be booted correctly three times consecutively, then the salvaged data from flash memory is copied again to CMOS. Setup is back to its original state, except for the time.

Information:

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

2.2.11 Load optimized defaults

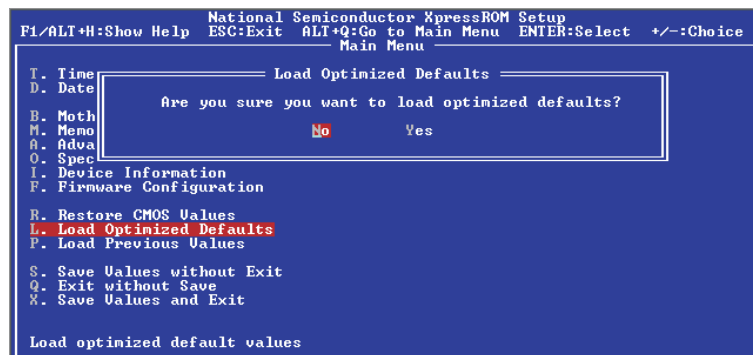


Figure 285: BIOS load optimized defaults menu

By clicking on "Yes", optimal BIOS settings for best performance can be loaded using this BIOS menu item (L shortcut).

Information:

These settings are also recommended by B&R.

Information:

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

2.2.12 Load previous values

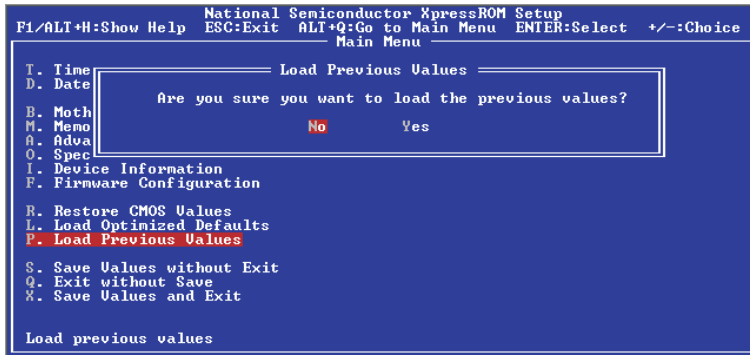


Figure 286: BIOS load previous values menu

Selecting "yes" under this BIOS menu item (P shortcut) reloads the values set at the point when BIOS setup was opened. All changes which had been made up to that point are lost as a result.

Information:

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

2.2.13 Save values without exit

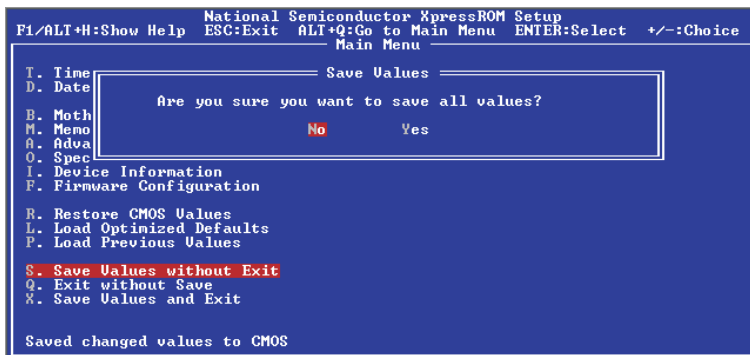


Figure 287: BIOS save values without exit menu

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

Information:

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

2.2.14 Exit without save

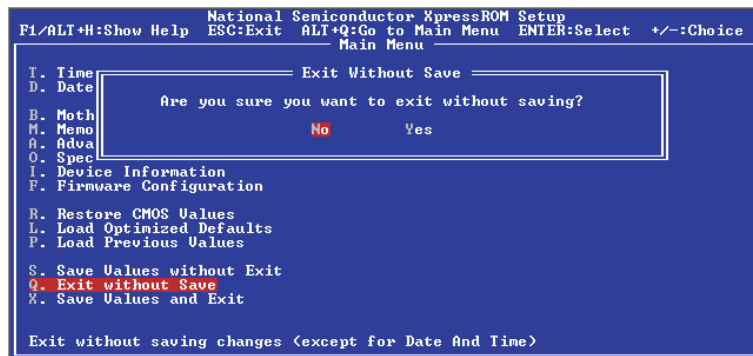


Figure 288: BIOS exit without save menu

BIOS setup can be exited by selecting "Yes" under this menu item (Q shortcut) 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".

2.2.15 Save values and exit

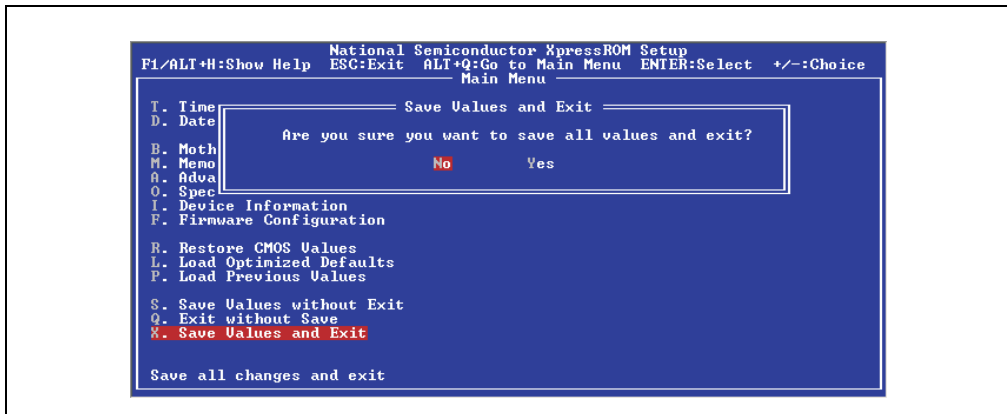


Figure 289: BIOS save values and exit menu

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

For more information about the CMOS backup, see the section 2.5 "CMOS backup".

Information:

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

2.3 BIOS settings for QVGA Power Panel devices

Information:

The following diagrams and BIOS menu items including descriptions refer to BIOS version 1.05. It is therefore possible that these diagrams and BIOS descriptions do not correspond with the installed BIOS version.

In the following pages, the individual BIOS setup pages for a QVGA Power Panel device will be described in more detail.

2.3.1 BIOS setup main menu

The BIOS setup main menu appears immediately after pressing the DEL button when the system is started:



Figure 290: BIOS setup main menu

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

Shortcut	BIOS setup menu	Function
B	Motherboard device configuration	Motherboard resources such as date, time, USB, PCI, etc. can be configured here.
M	Memory optimization	The settings for memory management can be made here.
A	Advanced BIOS features	Advanced BIOS options such as boot logo, summary screen, cache areas, etc. can be configured here.
O	Special OEM features	Specific B&R settings can be made here.
I	Device information	Important parameters (e.g. temperature, mode/node position, etc.) for a Power Panel device are displayed here.
F	Firmware configuration	Onboard firmware for FPGA and aPCI modules can be configured here.
R	Restore CMOS values	Restores the last saved CMOS values from flash memory.
L	Load optimized defaults	Load the optimal BIOS settings for best performance.
P	Load previous values	Reloads the values configured when BIOS setup was opened. All changes which had been made up to that point are lost as a result.
S	Save values without exit	Saves BIOS values without exiting BIOS setup.

Table 162: Overview of BIOS main menu functions

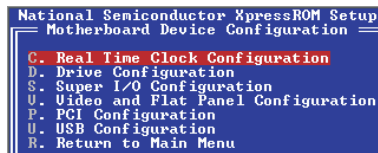
Shortcut	BIOS setup menu	Function
Q	Exit without save	Exits BIOS setup without saving any changes.
X	Save values and exit	Saves settings and exits BIOS setup.

Table 162: Overview of BIOS main menu functions (Cont.)

Information:

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

2.3.2 Motherboard device configuration



```

National Semiconductor XpressROM Setup
Motherboard Device Configuration

C. Real Time Clock Configuration
D. Drive Configuration
S. Super I/O Configuration
V. Video and Flat Panel Configuration
P. PCI Configuration
U. USB Configuration
R. Return to Main Menu

```

Figure 291: BIOS motherboard device configuration

Shortcut	BIOS setup menu	Function
C	Real-time clock configuration	Sets the system date and the system time.
D	Drive configuration	Settings for floppy drive and CompactFlash card.
S	Super I/O configuration	Configures the super I/O device.
V	Video and flat panel configuration	Displays the video settings and configuration for resolution, brightness, and contrast display parameters.
P	PCI configuration	Configures PCI bus settings.
U	USB configuration	Configures USB settings.
R	Return to main menu	Exits the current page and returns to the BIOS main menu.

Table 163: BIOS motherboard device configuration menu

Real-time clock configuration

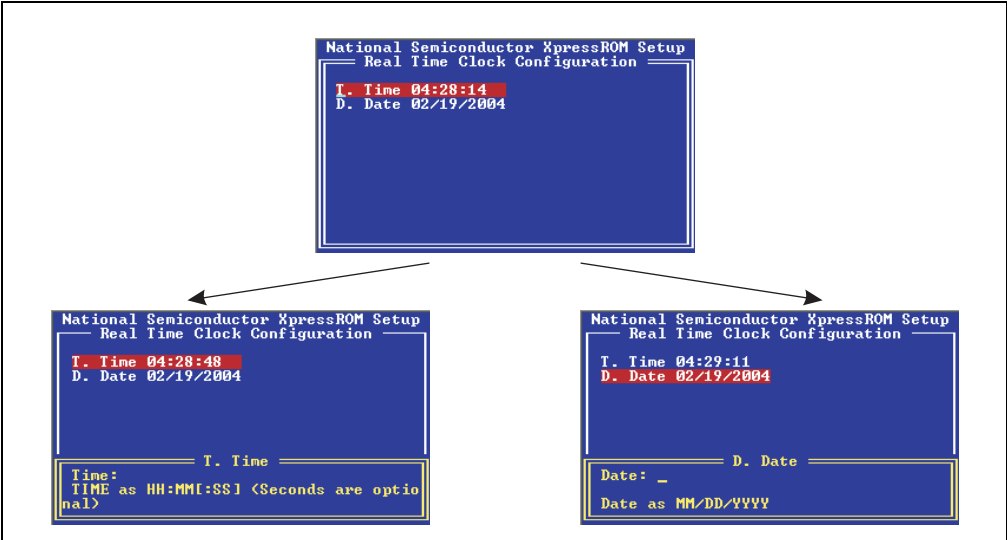


Figure 292: BIOS real-time clock configuration

Shortcut	BIOS setup menu	Function
T	Time	Sets the system time.
D	Date	Sets the system date.

Table 164: BIOS real-time clock configuration menu

Time

The currently configured system time is displayed here. The time is buffered by a battery (CMOS battery) after the Power Panel device has been switched off.

A new system time can be entered with the shortcut "A" or by selecting "Time" and then confirming with Enter. The format HH:MM[:SS] must be entered as shown in the following example:

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 ":".

Date

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

A new system date can be entered with the shortcut "B" 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 2/12/2003.

Entry using keyboard:

- 02/12/2003 - Confirm with Enter

Information:

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

Drive configuration

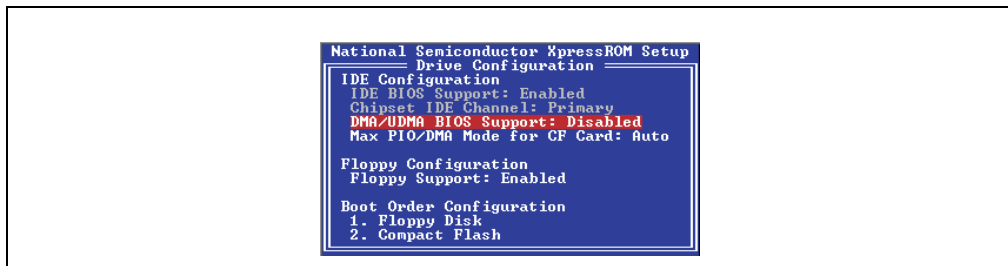


Figure 293: BIOS drive configuration menu

BIOS setting	Description	Setting options	Effect
IDE BIOS support	Displays the IDE configuration of the Power Panel.	None	-
Chipset IDE channel	Displays the IDE channel used.	None	-
DMA/UDMA BIOS support	DMA/UDMA BIOS support can be configured here.	Enabled	Enables this function.
		Disabled	Only PIO modes for data transfer to and from CompactFlash cards are used.

Table 165: BIOS drive configuration menu

BIOS setting	Description	Setting options	Effect	
Max PIO/MDMA/UDMA 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	Configures the fastest mode supported by the inserted CompactFlash card.	
		PIO 0 to PIO 4	Manual configuration option for PIO mode.	
		MDMA 0 to MDMA 2	Manual configuration option for MDMA mode.	
		UDMA 0 to UDMA 2	Manual configuration option for UDMA mode.	
Floppy configuration	Floppy support (USB) can be enabled here. It is also possible to access a remote floppy drive and e.g. upgrade BIOS using the REMHOST program (see section "REMHOST utility disk" on page 484).	Enabled	Enables USB floppy support.	
		Disabled	Disables USB floppy support.	
Boot order configuration	Configures the order in which memory media is booted. If two identical devices are selected, a conflict warning is displayed.	1	Floppy disk ¹⁾	An attempt is made to boot from this configured drive first.
			CompactFlash	
			NONE	
		2	Floppy disk ¹⁾	An attempt is made to boot from this configured drive second.
			CompactFlash	
			NONE	

Table 165: BIOS drive configuration menu (Cont.)

1) Only HD diskettes (1.44 MB) are still supported by BIOS.

Super I/O configuration

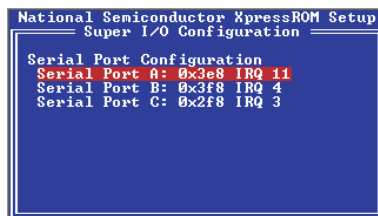


Figure 294: BIOS super I/O configuration menu

BIOS setting	Description	Setting options	Effect
Serial port A:	Configures the first UART address range and the corresponding interrupt for the matrix controller. BIOS default setting: 0x3e8 IRQ 11. Information: Two ports cannot use the same address range and interrupt.	Disabled	No assignment.
		0x3e8 IRQ 11	Use this address range and interrupt.
		0x3f8 IRQ 4	
		0x2f8 IRQ 3	
		0x3e8 IRQ 4	
		0x2f8 IRQ 3	
		0x2f8 IRQ 11	
Serial port B:	Configures the second UART address range and the corresponding interrupt for the serial interface. BIOS default setting: 0x3f8 IRQ 4. Information: Two ports cannot use the same address range and interrupt.	Disabled	No assignment.
		0x3f8 IRQ 4	Use this address range and interrupt.
		0x2f8 IRQ 3	
		0x3e8 IRQ 4	
		0x2f8 IRQ 3	
		0x3e8 IRQ 11	
		0x2f8 IRQ 11	
Serial port C:	Configures the third UART address range and the corresponding interrupt for the touch controller. BIOS default setting: 0x2f8 IRQ 3. Information: Two ports cannot use the same address range and interrupt.	Disabled	No assignment.
		0x2f8 IRQ 3	Use this address range and interrupt.
		0x3f8 IRQ 4	
		0x2f8 IRQ 3	
		0x3e8 IRQ 4	
		0x3e8 IRQ 11	
		0x2f8 IRQ 11	

Table 166: BIOS super I/O configuration menu

Video and flat panel configuration

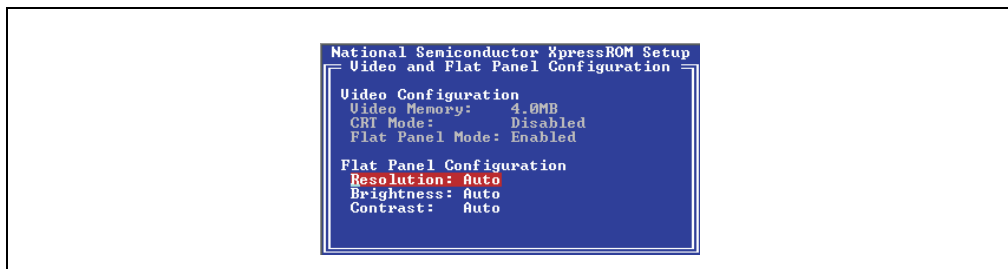


Figure 295: BIOS video configuration menu

BIOS setting	Description	Setting options	Effect
Video memory	Displays the current video memory reserved by the main memory.	None	-
CRT mode	Displays on an external screen.	None	-

Table 167: BIOS video configuration menu

BIOS setting	Description	Setting options	Effect
Flat panel mode	Displays on a Power Panel display.	None	-
Resolution	Setting for the maximum resolution for the display. Note: Only the resolution specified for the Power Panel device should be configured! Otherwise, the display can be damaged by incorrect timing values. If the mode/node switch is set to 0/0, then the resolution is automatically reset every time the Power Panel device is restarted.	Auto	The maximum resolution is read from the factory settings and correctly configured automatically.
		Auto (+Timing)	The maximum resolution and display timing are read from the factory settings and correctly configured automatically. If the display timing cannot be set, the internal default values are used.
		QVGA(320x240) LCD	Optimal setting for a QVGA LCD Power Panel.
		QVGA(320x240) TFT	Optimal setting for a QVGA TFT Power Panel.
		VGA (640x480)	Optimal setting for a VGA Power Panel.
		SVGA (800x600)	Optimal setting for a SVGA Power Panel.
Brightness	Setting for the background lighting of the display. Note: If the mode/node switch is set to 0/0, then brightness settings are automatically set to the default values from the factory settings every time the Power Panel device is restarted.	Auto	The optimal brightness is automatically configured using the factory settings. A brightness setting between 100% and 0% is set.
		0% to 100%	Manual setting of the desired brightness within factory settings limits.
Contrast	Setting for the contrast of the display. Note: Contrast settings can only be configured for passive displays. If the mode/node switch is set to 0/0, then contrast settings are automatically set to the default factory settings every time the Power Panel device is restarted.	Auto	The optimal contrast is automatically configured using the factory settings. A contrast value between 100% and 0% is set.
		0% to 100%	Manual setting of the desired contrast within factory settings limits.

Table 167: BIOS video configuration menu (Cont.)

PCI configuration

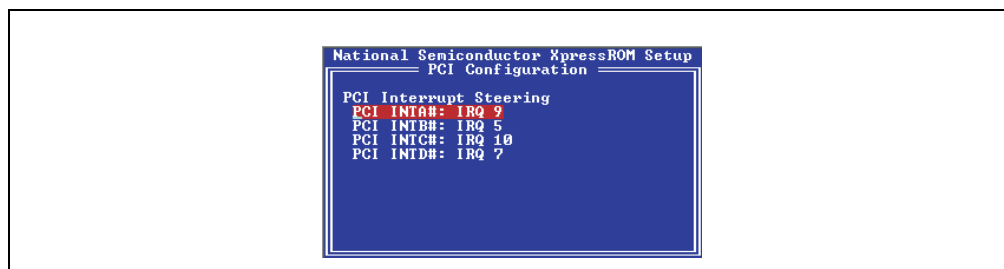


Figure 296: BIOS PCI configuration menu

BIOS setting	Description	Setting options	Effect
PCI INTA#	Activates the IRQ for the Ethernet controller. BIOS default setting: IRQ 9.	Disabled	No IRQ is reserved.
		3, 4, 5, 6, 7, 9, 10, 11, 12, 14 or 15	Assigns these IRQs.

Table 168: BIOS PCI configuration menu

BIOS setting	Description	Setting options	Effect
PCI INTB#	Activates IRQ for aPCI slot 1. BIOS default setting: IRQ 5. First IRQ for aPCI Slot 1 and IRQ for USB controller.	Disabled	No IRQ is reserved.
		3, 4, 5, 6, 7, 9, 10, 11, 12, 14 or 15	Assigns these IRQs.
PCI INTC#	Activates IRQ for aPCI slot 2. BIOS default setting: IRQ 10. First IRQ for aPCI slot 2 and second IRQ for aPCI slot 1.	Disabled	No IRQ is reserved.
		3, 4, 5, 6, 7, 9, 10, 11, 12, 14 or 15	Assigns these IRQs.
PCI INTD#	Activates IRQ for the USB controller. BIOS default setting: IRQ 7. Second IRQ for aPCI slot 2.	Disabled	No IRQ is reserved.
		3, 4, 5, 6, 7, 9, 10, 11, 12, 14 or 15	Assigns these IRQs.

Table 168: BIOS PCI configuration menu (Cont.)

USB configuration

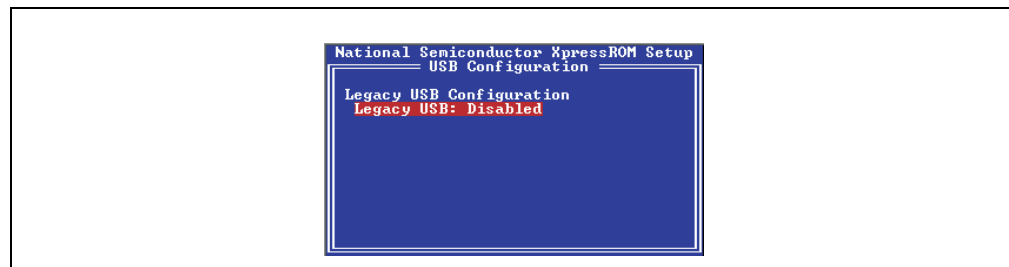


Figure 297: BIOS USB configuration menu

BIOS setting	Description	Setting options	Effect
Legacy USB	This function enables USB support in order to make BIOS settings, e.g. using a USB keyboard, even before the operating system with USB support is loaded. Note: If the mode/node switch is set to 0/0, then Legacy USB support is always set to "enabled".	Enabled	Enables USB Legacy support.
		Disabled	Disables USB Legacy support. Note: After deactivating this support, booting from a USB floppy drive is no longer possible.

Table 169: BIOS USB configuration menu

2.3.3 Memory 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 Power Panel device can no longer be booted, then the default values can be restored by restarting three times.

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.

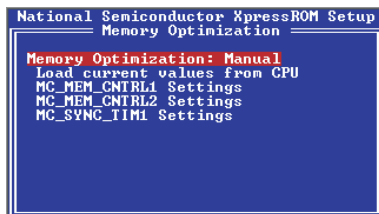


Figure 298: BIOS memory optimization menu

BIOS setting	Description	Setting options	Effect
Memory Optimization	Defines how memory optimization is handled. With this option, it is recommended that the user upload the current base values being used by the system from the CPU to this BIOS page when setting values manually for the first time.	Conservative	The BIOS automatically uses PC66 timing.
		Optimized	BIOS uses optimized memory settings for the memory chips used. This allows faster timing.
		Aggressive	BIOS uses "aggressive" memory settings based on the SPD and CPU speed. Important! Aggressive memory settings can cause stability problems for the system.
		Manual	If "Manual" is selected then the remaining 3 submenus are active, in order to be able to make the changes.

Table 170: BIOS memory optimization menu

BIOS setting	Description	Setting options	Effect
Load current values from CPU	All the specified values are configured on this BIOS setup page with the current configured values.	None	The memory timing values currently used are uploaded by the CPU. It is recommended that when using this option, the user uploads optimal base values (that the system uses) from the CPU to this BIOS page when setting the values manually for the first time.
MC_MEM_CNTRL1 settings	The memory control register MC_MEM_CNTRL1 can be configured here. Only active if "Memory optimization" is set to "Manual". See section "MC_MEM_CNTRL1 settings" on page 465.	None	-
MC_MEM_CNTRL2 settings	The memory control register MC_MEM_CNTRL2 can be configured here. Only active if "Memory optimization" is set to "Manual". See section "MC_MEM_CNTRL2 settings" on page 466.	None	-
MC_SYNC_TIM1 settings	The memory control register MC_SYNC_TIM1 can be configured here. Only active if "Memory optimization" is set to "Manual". See section "MC_SYNC_TIM1 Settings" on page 467.	None	-

Table 170: BIOS memory optimization menu (Cont.)

MC_MEM_CNTRL1 settings

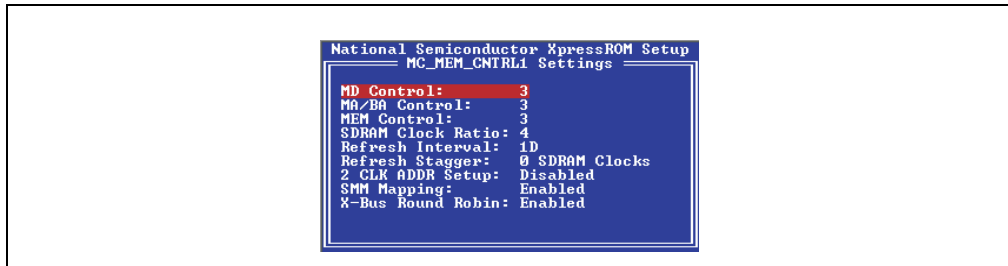


Figure 299: MC_MEM_CNTRL1 settings

BIOS setting	Description	Setting options	Effect
MD control	Configures MD[63:0] drive strength.	0 to 3	0 = weakest, 3 = strongest
MA/BA control	Configures MA[12:0] and BA[1:0] drive strength.	0 to 3	0 = weakest, 3 = strongest
MEM control	Configures RASA#, CASA#, WEA#, CS[1:0]#, CKEA, DQM[7:0] drive strength.	0 to 3	0 = weakest, 3 = strongest
SDRAM clock ratio	Configures SDRAM timing.	2; 2.5; 3; 3.5; 4; 4.5; 5	Sets DRAM clock timing.

Table 171: BIOS MC_MEM_CNTRL1 settings menu

BIOS setting	Description	Setting options	Effect
Refresh interval	This parameter defines the number of processor core clocks that are multiplied by 64 between refresh cycles of the DRAM memory.	00 to FF	
Refresh stagger	This parameter defines the number of cycles between the RFSH command and each of the four rows.	0 SDRAM clocks to 3 SDRAM clocks	
2 CLK ADDR setup	Enables the two-clock address setup function.	Enabled	Enables this function.
		Disabled	Disables this function.
SMM mapping	Maps the SMM memory area from GX_BASE+400000 to the physical address A0000 to BFFFF in SDRAM.	Enabled	Enables this function.
		Disabled	Disables this function.
X-bus round robin	Configures the priority levels for processor, graphic and display controller requests.	Enabled	Processor, graphic and display controller requests are treated with the same priority level.
		Disabled	Processor requests are given a higher priority level. Display controller requests always have the highest priority.

Table 171: BIOS MC_MEM_CNTRL1 settings menu (Cont.)

MC_MEM_CNTRL2 settings

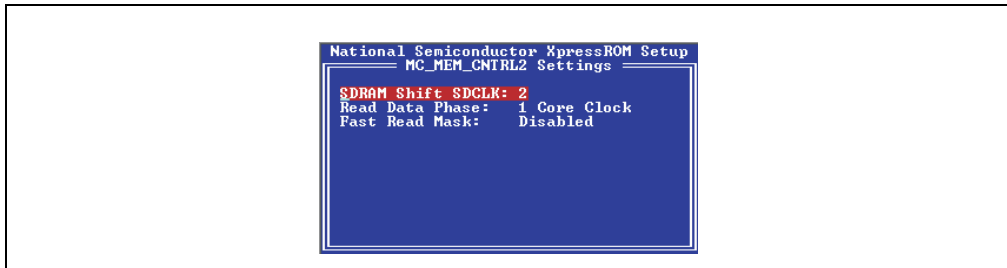


Figure 300: MC_MEM_CNTRL2 settings

BIOS setting	Description	Setting options	Effect
SDRAM shift SDCLK	This function makes switching possible for SDCLK SDRAM hold time requests.	0.5, 1, 1.5, 2, 2.5, or 3	
		No shift	No switching.
Read data phase	Configures the read data phase. Regulates whether read data is latched to one or two core clocks for the rising edges of the SDCLK.	1 core clock	After one core clock.
		2 core clocks	After two core clocks.
Fast read mask	Prevents the bypassing of FIFO requests via the core.	Enabled	Enables this function.
		Disabled	Disables this function.

Table 172: BIOS MC_MEM_CNTRL2 settings menu

MC_SYNC_TIM1 Settings

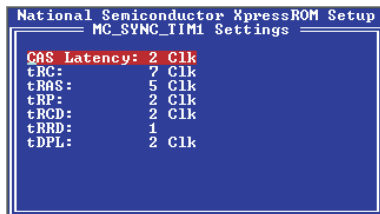


Figure 301: MC_SYNC_TIM1 settings

BIOS setting	Description	Setting options	Effect
CAS latency	Column Address Strobe (CAS) latency describes the time it takes between addressing in a RAM function block and preparing the data stored at this address. The higher the subsequent value, the greater the delay.	2, 3, 4, 5, 6, or 7 clk	Sets the desired cycle time.
tRC	Sets the minimum number of SDRAM cycles between RFSH and RFSH/ACT commands.	2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 13; 14; 15 or 16 Clk	Sets the desired cycle time.
tRAS	Sets the minimum number of SDRAM cycles between ACT and PRE commands.	2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 13; 14; 15 or 16 Clk	Sets the desired cycle time.
tRP	Sets the minimum number of SDRAM cycles between PRE and ACT commands.	1; 2; 3; 4; 5; 6 or 7 Clk	Sets the desired cycle time.
tRCD	Configures the delay between the ACT and READ/WRITE command. (tRCD) Sets the minimum number of SDRAM cycles between ACT and READ/WRITE commands.	1; 2; 3; 4; 5; 6 or 7 Clk	Sets the desired cycle time.
tRRD	Configures the time between ACT(0) to ACT(1) command period.	0-7	
tDPL	Sets the minimum number of SDRAM cycles between the time for the last record date until the memory area is reloaded.	1; 2; 3; 4; 5; 6; 7 Clk	Sets the desired cycle time.

Table 173: BIOS MC_SYNC_TIM1 settings menu

2.3.4 Advanced BIOS features

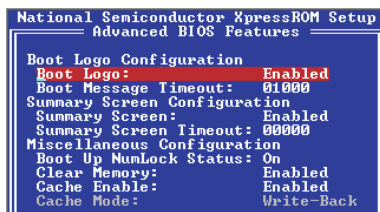


Figure 302: Advanced BIOS features menu

BIOS setting	Description	Setting options	Effect
Boot logo	Displays a boot logo while the Power Panel is starting.	Disabled	No boot logo displayed during booting.
		Enabled	A B&R boot logo is displayed during booting as long as a bitmap created by a user has not been added.
Boot message timeout	Defines the duration of the "Press DEL for Setup" message on the display and how much time the user has to change to the BIOS configuration. Can be resumed before the timeout expires by pressing any button.	0	No waiting.
		1-65535 [milliseconds]	The system waits for the manually set value in milliseconds and then resumes the boot procedure.
Summary screen	Displays information about BIOS, VGA, VSA versions, devices found, etc.	Enabled	Shows the summary screen.
		Disabled	Hides the summary screen.
Summary screen timeout	Defines how long the summary screen is displayed. Can be resumed before the timeout expires by pressing any button.	0	No waiting.
		1-65535 [milliseconds]	The manually set value in milliseconds that must pass.
Boot up NumLock status	Defines the status of an existing numeric keypad when the system is booted.	On	Enables the numeric keypad.
		Off	Disables the numeric keypad.
Clear memory	After starting, the BIOS automatically clears the entire main memory. Note: Clearing e.g. 256 MB RAM takes approximately 3 seconds.	Enabled	The entire main memory is cleared. This makes sense, e.g. when the system to be booted requires initialized main memory when booting.
		Disabled	Disables this function.
Cache enable	The processor has a 16 KB fast L1 cache. The data for fast access is provided in this memory.	Enabled	Recurring commands are processed in the fast L1 cache.
		Disabled	Disables this function.
Cache mode	Using cache mode, write accesses are determined on the cache. This option is permanently set to "Write back". The information is only written in the main memory if necessary (main memory and cache do not have the same information content).	None	-

Table 174: Advanced BIOS features menu

2.3.5 Special OEM features

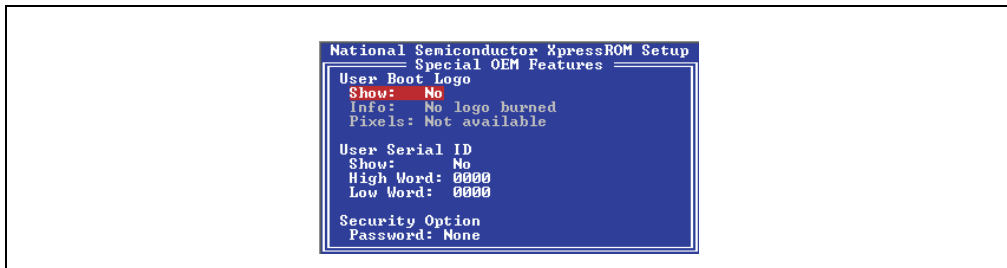


Figure 303: BIOS special OEM features menu

BIOS setting	Description	Setting options	Effect
Show (user boot logo)	A boot logo that has been created by a user can be displayed here instead of the B&R boot logo. ¹⁾	Yes	Display
		No	
Info	Displays the name and the creation date of the user boot logo.	None	-
Pixels	Displays the resolution of the user boot logo.	None	-
User serial ID show	A user serial number can be displayed in the summary screen using this function when the system is started.	Yes	Displays the assigned user serial ID.
		No	Hides the assigned user serial ID.
High word	Input possibilities for the first 4 bytes for the user serial number.	0000-FFFF	The hexadecimal value entered defines the first 4 positions of the user serial ID.
Low word	Input possibilities for the second 4 bytes of the user serial number.	0000-FFFF	The hexadecimal value entered defines the second 4 positions of the user serial ID.
Password	A password can be defined here which must be entered by the user when the BIOS setup is opened.	Max. 8 characters	The password must be confirmed by being entered a second time. The password can be removed again by entering a blank password (just pressing Enter). Important: The password is also saved in the CMOS backup and is impossible to delete.

Table 175: BIOS special functions menu

1) See section 2.4.3 "User boot logo upgrade disk" on page 482 regarding guidelines for creating a user boot logo.

2.3.6 Device information

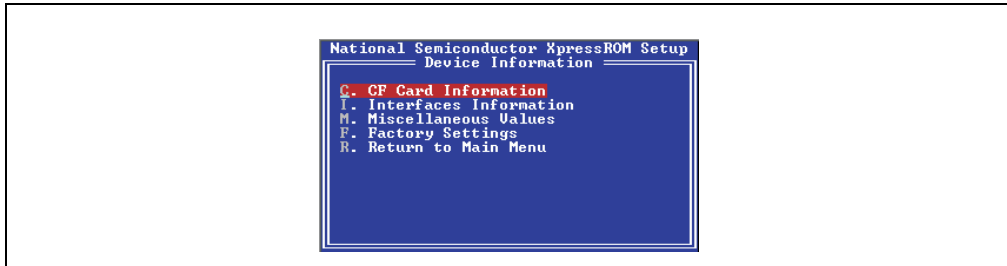


Figure 304: BIOS device information menu

Shortcut	BIOS setup menu	Function
C	CF card information	Information about the inserted CompactFlash card is displayed here.
T	Interface information	Information about the mode/node switch position, the Ethernet controller and available aPCI modules is displayed here.
M	Miscellaneous values	Displays CPU and board I/O temperature and information about the last CMOS backup.
F	Factory settings	Information for factory settings.
R	Return to main menu	Exits current page and return to Main Menu.

Table 176: BIOS real-time clock configuration menu

CF card information

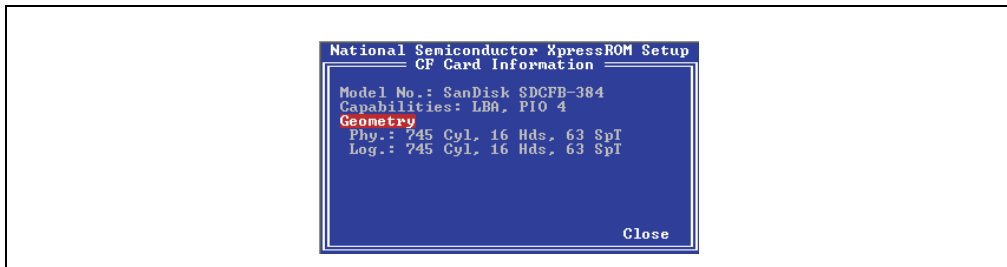


Figure 305: BIOS CF card information menu

BIOS setting	Description	Setting options	Effect
Model number	Displays the CompactFlash model ID.	None	-
Capabilities	Displays the possible data transfer mode speeds to and from an inserted CompactFlash card.	None	-
Phy. geometry	Displays the physical geometry of the inserted CompactFlash card in cylinders, heads and sectors.	None	-

Table 177: BIOS CF card information menu

BIOS setting	Description	Setting options	Effect
Log. geometry	Displays the logical geometry of the inserted CompactFlash card in cylinders, heads and sectors.	None	-

Table 177: BIOS CF card information menu (Cont.)

Interface information

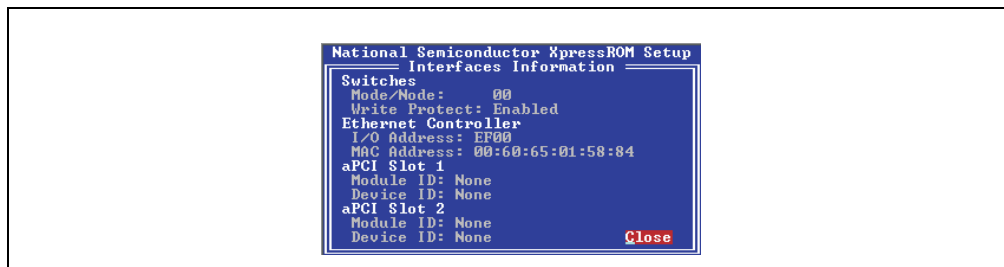


Figure 306: BIOS interface information menu

BIOS setting	Description	Setting options	Effect
Mode/Node	Displays the current mode/node switch position.	None	-
Write protect	Displays the switch position for the "write protect" switch.	None	-
I/O address	Displays the Ethernet I/O address.	None	-
MAC address	Displays the assigned MAC address.	None	-
aPCI slot 1 Module ID Device ID	Information about an installed aPCI module in aPCI slot 1 of the Power Panel device is displayed here.	None	-
aPCI slot 2 Module ID Device ID	Information about an installed aPCI module in aPCI slot 2 of the Power Panel device is displayed here.	None	-

Table 178: BIOS interface information menu

Miscellaneous values

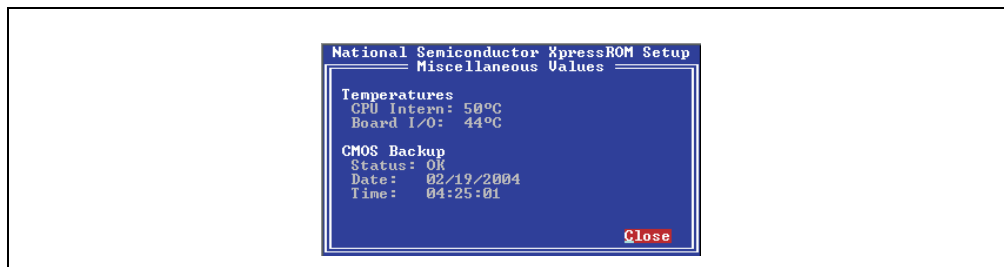


Figure 307: BIOS miscellaneous values menu

BIOS setting	Description	Setting options	Effect
CPU intern	Displays the current internal processor temperature.	None	-
Board I/O	Indicates the current board I/O temperature.	None	-
Status	The status for the last automatically saved CMOS backup is displayed here.	None	If the boot procedure is successful, then the CMOS values are automatically saved by BIOS in flash memory. Values are therefore only saved in flash memory if the backup is not equal to the current CMOS, the backup is not available, or the backup checksum is incorrect.
Date	Date of the last automatically saved CMOS backup.	None	
Time	Time of the last automatically created CMOS backup.	None	

Table 179: BIOS miscellaneous values menu

Factory settings

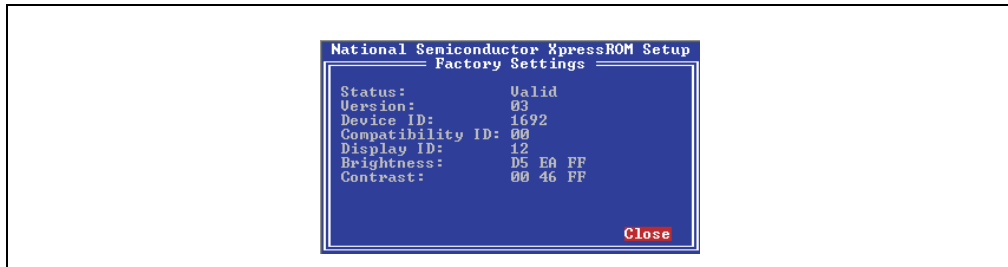


Figure 308: BIOS factory settings menu

BIOS setting	Description	Setting options	Effect
Status	Status display for factory settings.	None	Status
Version	Version display for factory settings.	None	Version
Device ID	Hex value for the device code of the Power Panel device.	None	Device ID
Compatibility ID	The compatibility code of the Power Panel device is displayed here.	None	Compatibility ID
Display ID	Shows the display ID used. Possible display IDs are: 00h - Unknown 10h - Passive displays (STN) 11h - LCD B/W QVGA 12h - LCD COL QVGA 20h - Active displays (TFT) with QVGA 30h - Active displays (TFT) with VGA 40h - Active displays (TFT) with SVGA 50h - Active displays (TFT) with XVGA	None	-
Brightness	The defined brightness values (minimum, default, maximum) for the display used are shown here as hex values.	None	-

Table 180: BIOS factory settings menu

BIOS setting	Description	Setting options	Effect
Contrast	The defined contrast values (minimum, default, maximum) for the display used are shown here as hex values.	None	-

Table 180: BIOS factory settings menu (Cont.)

2.3.7 Firmware configuration

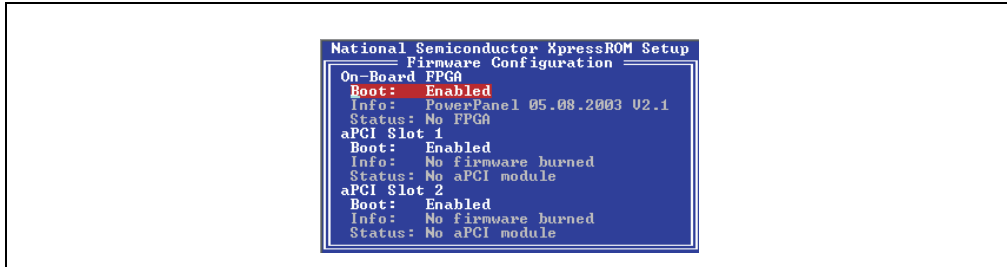


Figure 309: BIOS firmware configuration menu

BIOS setting	Description	Setting options	Effect
Onboard FPGA Boot	The onboard FPGA controls the image output for Power Panel 200 devices with BIOS.	Enabled	The onboard FPGA is enabled and initialized.
		Disabled	Deactivates the FPGA. If this function is deactivated, then no picture is output on Power Panel 200 devices. This function can only be re-enabled using the program "REMHOST" (see section "REMHOST utility disk" on page 484).
Info	Information about the FPGA firmware.	None	-
Status	Status display for the onboard FPGA.	None	-
aPCI slot 1 Boot	A connected aPCI module in the aPCI slot 1 is initialized and booted as long as valid firmware is available.	Enabled	The aPCI module is booted if a corresponding firmware file is burned in flash memory of the Power Panel.
		Disabled	The aPCI module is not booted by BIOS.
Info	Information about a stored boot file for the aPCI slot 1 in flash memory.	None	-
Status	Status display for aPCI slot 1 modules.	None	-
aPCI slot 2 Boot	A connected aPCI module in the aPCI slot 2 is initialized and booted as long as valid firmware is available.	Enabled	The aPCI module is booted if a corresponding firmware file is burned in flash memory of the Power Panel.
		Disabled	The aPCI module is not booted by BIOS.
Info	Information about a stored boot file for the aPCI slot 2 in flash memory.	None	-
Status	Status display for aPCI slot 2 modules.	None	-

Table 181: BIOS firmware configuration menu

2.3.8 Restore CMOS values

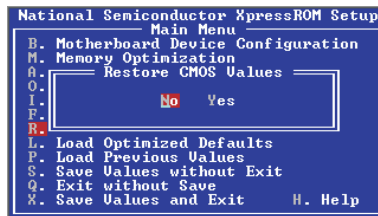


Figure 310: BIOS restore CMOS values menu

Selecting "Yes" under this BIOS menu (R shortcut) restores the last CMOS values stored in flash memory. All configurable CMOS values (besides date and time) are restored again in the BIOS setup.

Information:

If the boot procedure is successful, then the CMOS values are automatically saved by BIOS in flash memory. Values are therefore only saved in flash memory if the backup is not equal to the current CMOS, the backup is not available, or the backup checksum is incorrect.

To protect CMOS data, a CMOS backup was integrated into BIOS. If the BIOS setup was ended using "Save values and exit" and the Power Panel device was correctly restarted, then the CMOS data is burned to flash memory. If the CMOS checksum is incorrect during startup (battery empty) or the Power Panel device cannot be booted correctly three times consecutively, then the salvaged data from flash memory is copied again to CMOS. Setup is back to its original state, except for the time.

2.3.9 Load optimized defaults

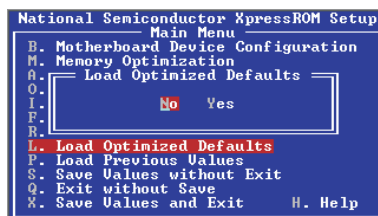


Figure 311: BIOS load optimized defaults menu

By clicking on "Yes", optimal BIOS settings for best performance can be loaded using this BIOS menu item (L shortcut).

Information:

These settings are also recommended by B&R.

Information:

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

2.3.10 Load previous values

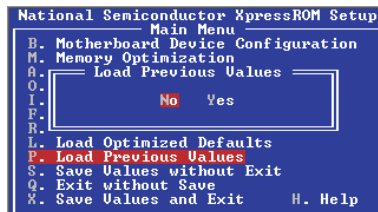


Figure 312: BIOS load previous values menu

Selecting "yes" under this BIOS menu item (P shortcut) reloads the values set at the point when BIOS setup was opened. All changes which had been made up to that point are lost as a result.

Information:

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

2.3.11 Save values without exit



Figure 313: BIOS save values without exit menu

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

Information:

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

2.3.12 Exit without save

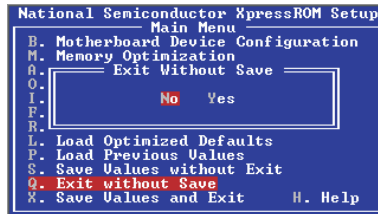


Figure 314: BIOS exit without save menu

BIOS setup can be exited by selecting "Yes" under this menu item (Q shortcut) 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".

2.3.13 Save values and exit

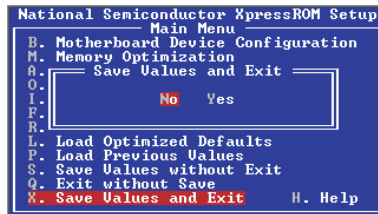


Figure 315: BIOS save values and exit menu

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

For more information about the CMOS backup, see the section 2.5 "CMOS backup".

Information:

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

2.3.14 Help

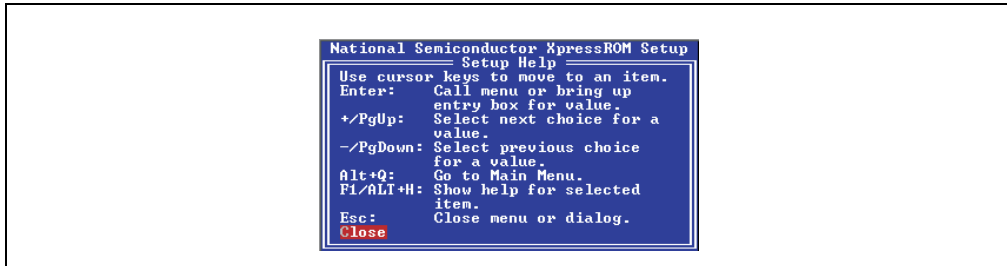


Figure 316: BIOS help menu

This menu item (H shortcut) displays a help page containing the most important key assignments.

2.4 BIOS upgrade und utilities

Information:

The following diagrams, BIOS menu items, and descriptions refer to BIOS version 1.12. It is therefore possible that these diagrams and BIOS descriptions do not correspond with the installed BIOS version.

BIOS upgrade und utilities consist of the following parts:

- BIOS upgrade disk
- aPCI firmware upgrade disk
- User boot logo upgrade disk
- REMHOST utility disk

2.4.1 BIOS upgrade disk

An upgrade might be necessary for the following reason:

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

A current BIOS upgrade can be found on the HMI Drivers & Utilities CD-ROM (model number 5S0000.01-090 starting from version 1.49) or directly downloaded from the download area on the B&R homepage (www.br-automation.com).

Procedure

The following steps should be carried out to upgrade or save BIOS:

- First, a blank HD disk must be made bootable (command line "sys a:" or "format a: /s")

Information:

For the upgrade, a boot disk must be created (or a bootable CompactFlash card) with Windows ME, Windows XP or MS-DOS 6.22.

MS-DOS boot disks function with BIOS versions earlier than 1.02 only with REMHOST.

- Copy the content of the *.zip file to this diskette.
- Insert diskette in the USB floppy disk drive and reboot the Power Panel device (possibly from the floppy disk drive of a remote PCs using REMHOST, see also section 2.4.4 "REMHOST utility disk" on page 484). For more on the settings required for the Power Panel device when booting from a disk, please refer to section "Drive configuration" on page 437 for VGA, SVGA and XGA Power Panel devices and section "Drive configuration" on page 459 for QVGA Power Panel devices.
- After booting from the diskette, the following start menu opens up:

```

Microsoft Windows Startup Menu
=====

1. Upgrade complete System (BIOS,FPGA)
2. Upgrade XpressROM BIOS
3. Upgrade FPGA Firmware
4. Save complete System (BIOS, FPGA)
5. Save XpressROM BIOS
6. Save FPGA Firmware
7. Exit

Enter a choice:_

```

Figure 317: BIOS upgrade start menu

Item	Menu item	Description
1	Upgrade complete system (BIOS, FPGA)	All BIOS areas (XpressROM and FPGA firmware) are automatically updated (default after 5 sec).
2	Upgrade XpressROM BIOS only	Only the XpressROM BIOS is automatically updated.
3	Upgrade FPGA firmware only	Only the FPGA firmware is automatically updated.
4	Save complete system	All BIOS areas (XpressROM and FPGA firmware) are automatically protected. Information: There must be up to 448 KB free space on the disk.
5	Save XpressROM BIOS only	Only the XpressROM BIOS is automatically protected. Information: There must be approximately 256 KB free space on the disk.
6	Save FPGA firmware only	Only the FPGA firmware is automatically protected. Information: There must be up to 192 KB free space on the disk.
7	Exit	Returns to the shell (MS-DOS).

Table 182: BIOS upgrade menu description

Information:

If you do not press a button within 5 seconds, then step 1 "Upgrade complete system" (BIOS, FPGA) is automatically carried out and the Power Panel is independently updated.

If you want to individually upgrade the XpressROM or the FPGA firmware, then these options can be selected in the start menu (2 or 3). It is also possible to protect the existing BIOS or individual components. For this, there must be approximately 448 KB free space on the disk. Otherwise, "Save..." functions might not be able to be executed.

- The system must be rebooted after a successful upgrade.

2.4.2 aPCI firmware upgrade disk

A software tool for backing up or upgrading aPCI firmware can be downloaded directly from the service portal of the B&R homepage (www.br-automation.com).

Procedure

The following steps should be taken to upgrade or save the firmware for aPCI modules:

- First, a blank HD disk must be made bootable (command line "sys a:" or "format a: /s")

Information:

For the upgrade, a boot disk must be created (or a bootable CompactFlash card) with Windows ME, Windows XP or MS-DOS 6.22.

MS-DOS boot disks function with BIOS versions earlier than 1.02 only with REMHOST.

- Copy the content of the *.zip file to this diskette.
- If a user wants to upgrade the aPCI firmware, then aPCI firmware files (FPGA files) for aPCI modules must be copied to this disk. If there are already aPCI modules connected to the Power Panel and BIOS V1.04 is installed, then the file name can be determined automatically by XFLASH.EXE. Otherwise, the filename is queried by XFLASH.EXE or a default file name is used: "apci1.rom" for aPCI slot 1, "apci2.rom" for aPCI slot 2 -> the aPCI firmware file must be renamed beforehand!

Information:

The appropriate aPCI firmware files are available from B&R.

- Insert diskette in the USB floppy disk drive and reboot the Power Panel device (possibly from the floppy disk drive of a remote PCs using REMHOST, see also section 2.4.4 "REMHOST utility disk" on page 484). For more on the settings required for the Power Panel device when booting from a disk, please refer to section "Drive configuration" on page 437 for VGA, SVGA and XGA Power Panel devices and section "Drive configuration" on page 459 for QVGA Power Panel devices.
- After booting from the diskette, the following start menu opens up:

```

Microsoft Windows Startup Menu
=====

1. Upgrade Firmware of both aPCI Slots
2. Upgrade Firmware of aPCI Slot 1
3. Upgrade Firmware of aPCI Slot 2
4. Save Firmware of both aPCI Slots
5. Save Firmware of aPCI Slot 1
6. Save Firmware of aPCI Slot 2
7. Exit

Enter a choice:_

```

Figure 318: aPCI firmware upgrade start menu

Item	Menu item	Description
1	Upgrade firmware of both aPCI slots	The firmware for both aPCI slots is automatically updated (default after 5 seconds).
2	Upgrade firmware of aPCI slot 1	Only firmware from aPCI slot 1 is updated.

Table 183: aPCI firmware upgrade menu description

Item	Menu item	Description
3	Upgrade firmware of aPCI slot 2	Only firmware from aPCI slot 2 is updated.
4	Save firmware of both aPCI slots	Firmware for both aPCI slots are automatically saved. Information: There must be up to 384 KB free space on the disk.
5	Save firmware of aPCI slot 1	Only firmware from aPCI slot 1 is saved. Information: There must be up to 192 KB free space on the disk.
6	Save firmware of aPCI slot 2	Only firmware from aPCI slot 2 is saved. Information: There must be up to 192 KB free space on the disk.
7	Exit	Returns to the shell (MS-DOS).

Table 183: aPCI firmware upgrade menu description (Cont.)

Information:

If you do not press a button within 5 seconds, then step 1 "Upgrade firmware of both aPCI Slots" is automatically carried out and the Power Panel is independently updated.

- The system must be rebooted after a successful upgrade.

2.4.3 User boot logo upgrade disk

A software tool for updating, backing up, or deleting the user boot logo can be downloaded directly from the service portal of the B&R homepage (www.br-automation.com).

Procedure

The following steps should be taken to update, save or delete a user boot:

- First, a blank HD disk must be made bootable (command line "sys a:" or "format a: /s")

Information:

For the upgrade, a boot disk must be created (or a bootable CompactFlash card) with Windows ME, Windows XP or MS-DOS 6.22.

MS-DOS boot disks function with BIOS versions earlier than 1.02 only with REMHOST.

- Copy the content of the *.zip file to this diskette.
- Creates the user boot logo according to section "Guidelines for creating a user boot logo" on page 484 and copies to the disk.
- Insert diskette in the USB floppy disk drive and reboot the Power Panel device (possibly from the floppy disk drive of a remote PCs using REMHOST, see also section 2.4.4 "REMHOST utility disk" on page 484). For more on the settings required for the Power Panel device when booting from a disk, please refer to section "Drive configuration" on page 437 for VGA, SVGA and XGA Power Panel devices and section "Drive configuration" on page 459 for QVGA Power Panel devices.
- After booting from the diskette, the following start menu opens up:

```

Microsoft Windows Startup Menu
=====

1. Update User Boot Logo
2. Save User Boot Logo
3. Delete User Boot Logo
4. Exit

Enter a choice:_

```

Figure 319: User boot logo upgrade start menu

Item	Menu item	Description
1	Update user boot logo	The user boot logo is automatically updated with the file USERLOGO.ROM (default after 5 seconds).
2	Save user boot logo	The user boot logo is automatically saved in the file USERLOGO.SAV. Information: There must be up to 192 KB free space on the disk.
3	Delete user boot logo	An existing user boot logo is deleted in the flash. Information: The B&R boot logo is then automatically displayed again by BIOS.
4	Exit	Returns to the shell (MS-DOS).

Table 184: User boot logo upgrade menu description

Information:

If you do not press a button within 5 seconds, then step 1 "Update User Boot Logo" is automatically carried out and the Power Panel is independently updated.

- The system must be rebooted after a successful upgrade.
- In the CMOS setup for BIOS, the display for the boot logo must be set from "No" to "Yes" (for more on this, see section 2.2.7 "Special OEM features" on page 447 for VGA, SVGA and XGA Power Panel devices and also section 2.3.5 "Special OEM features" on

page 469 for QVGA Power Panel devices.

Guidelines for creating a user boot logo

To update the user boot logo, a bitmap must be created according to the following guidelines and then copied to the user boot logo upgrade disk:

- 1) A Windows bitmap with a maximum of 256 colors must be created with the appropriate resolution for the Power Panel: 320x240 (QVGA), 640x480 (VGA), 800x600 (SVGA) or 1024x768 (XGA). The bitmap is not allowed to be compressed.
- 2) Since status messages are output on the top of the display when booting the Power Panel, there should not be any user boot logo pixels positioned here in the bitmap (approximately 10 pixel stripes), as these will be cross-faded. These status messages use bitmap palette index 0 as the background color and index 7 as the foreground color (starting from BIOS V1.05; index 63 with older versions).
- 3) Using the utility USERLOGO.EXE, the bitmap file must then be converted into a ROM file that can be read by BIOS (please refer to the online help for the utility for more instructions about this).
- 4) The userlogo.rom file created by the utility is only permitted to have a maximum size of 192 KB. If this size is exceeded, a warning appears. The user can e.g. reduce the details in the Windows bitmap in order not to exceed the maximum byte size.
- 5) After this, the userlogo.rom file should be copied to the disk.

2.4.4 REMHOST utility disk

The REMHOST (remote host) software tool can be downloaded directly from the service portal on the B&R homepage (www.br-automation.com).

General information

REMHOST is an MS-DOS program (REMHOST.EXE) that can be used by a remote PC to operate a BIOS Power Panel device. The Power Panel receives keyboard entries from a remote PC using REMHOST. Screen outputs for the Power Panel device are redirected to the screen of the remote PC. The Power Panel can access the floppy drive (internal or external) of the remote PC or an individual floppy drive (USB) and boot from this as well.

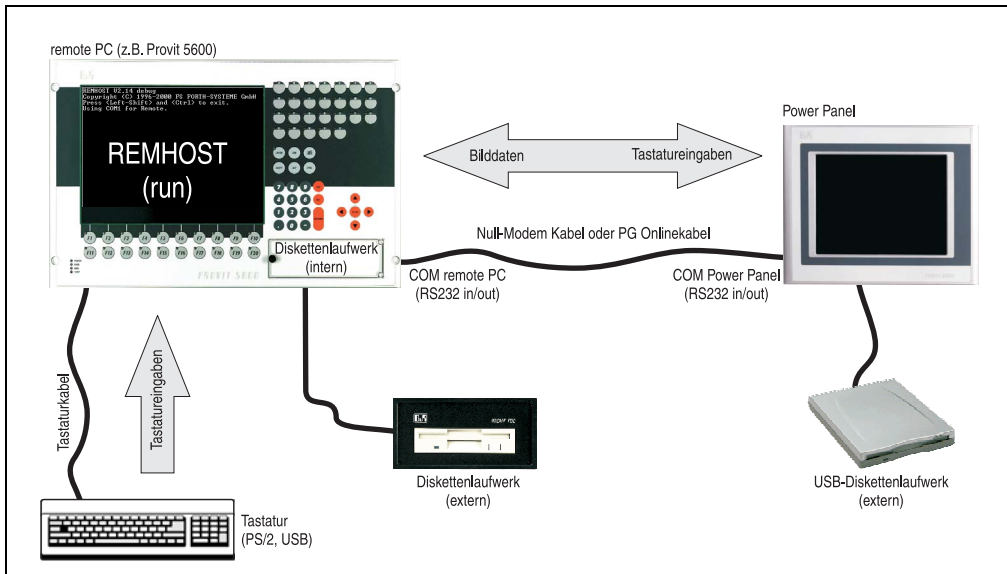


Figure 320: REMHOST communication model

REMHOST can be used if :

- The display for the Power Panel device is not functioning.
- Brightness and contrast settings for the Power Panel display are adjusted in such a way that outputs can no longer be detected.
- BIOS setup settings must be made for a Power Panel with a QVGA display¹⁾.
- There is no USB floppy present and the BIOS for the Power Panel device should be updated.

Requirements

The Power Panel must be connected to the remote PC using a serial cable (e.g. a null modem cable or PG online cable, see figure "REMHOST pin assignment - Power Panel connection cable" on page 488 for the necessary assignment). The serial cable must be connected to a COM interface for the remote PC and to the COM interface for the Power Panel device (see figure 320 "REMHOST communication model"). The mode/node switch for the Power Panel device must be set to 00 (service mode) see figure 223 "Mode/Node switches" on page 351.

1) With BIOS versions earlier than V1.04.

Important notes

Information:

- REMHOST only functions when the "diverted" functions for the Power Panel device are operated using BIOS calls. For example, that means if a program writes directly to the video memory on the Power Panel, then these outputs cannot be redirected to the screen of a remote PC. Generally, only programs which work in text mode should be used. Therefore, a MS-DOS start diskette must be used when booting the Power Panel using REMHOST. If booting is made with a Windows start diskette, illegible symbols are output on the remote screen and the user's inputs are not correctly displayed.
- REMHOST must be run from MS-DOS. In the MS-DOS command prompt in Windows, error free operation of REMHOST is not guaranteed: e.g. very slow screen outputs (in Windows NT4.0 and 2000), errors with write accesses to the remote floppy, etc.

Warning!

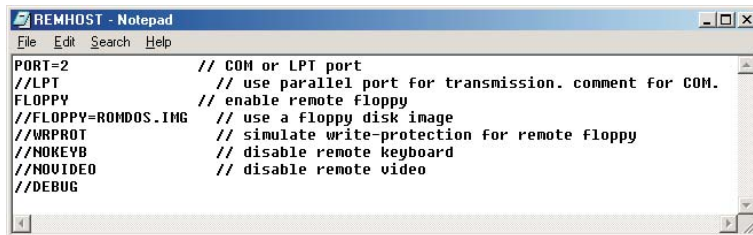
When upgrading BIOS using REMHOST, note that the Power Panel, the remote PC and the serial connection are all connected to each other for the whole period while the upgrade is taking place.

Caution!

The Power Panel can no longer be started if the BIOS upgrade is aborted. Therefore, when upgrading BIOS with REMHOST, REMHOST should be started in MS-DOS (not in the MS-DOS command prompt from Windows).

REMHOST configuration

The function of REMHOST is controlled by a REMHOST.INI configuration file. REMHOST.INI is an ASCII text file that can be opened and edited with any text editor (e.g. Notepad).



```

REMHOST - Notepad
File Edit Search Help
PORT=2           // COM or LPT port
//LPT            // use parallel port for transmission. comment for COM.
FLOPPY           // enable remote floppy
//FLOPPY=ROMDOS.IMG // use a floppy disk image
//WRPROT         // simulate write-protection for remote floppy
//NOKEYB         // disable remote keyboard
//NOVIDEO        // disable remote video
//DEBUG

```

Figure 321: Example of REMHOST.INI

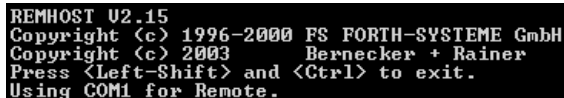
The following table lists all commands supported by REMHOST. If the commands begin with consecutive slash symbols ("/"), then these are evaluated as the beginning of a comment. This can be used to disable individual parameters.

Setting option	Description
PORT=x	Specifies the COM interface on the remote PC that's being used for the serial connection to the Power Panel. "x" stands for the COM number, e.g. COM2 is used for PORT=2.
LPT	The parallel interface is used for communication. This option cannot be used with the Power Panel.
FLOPPY	The floppy disk drive for the remote PC is used as the floppy disk drive for the Power Panel. Therefore, a connected USB floppy disk drive on the Power Panel cannot be used.
FLOPPY=ROMDOS.IMG	A floppy image file can be used for the simulation of a floppy disk drive on the hard disk of the remote PC. A floppy image can be created with the program WINIMAGE (a shareware version can be downloaded from www.winimage.com). In this way, several versions of BIOS upgrades can be easily stored on the hard disk of the remote PC.
WRPROT	Write protection for the floppy disk drive can be simulated using this parameter.
NOKEYB	If this parameter is activated, then the keyboard of the remote PC is not used by REMHOST. Input must then take place on the Power Panel, e.g. using a USB keyboard.
NOVIDEO	If this parameter is activated, then the screen output is not made on the remote PC. Outputs take place on the display of the Power Panel device.
DEBUG	REMHOST outputs debug information.

Table 185: Description of REMHOST.INI configuration options

Program start

The name of the configuration file can be specified when starting the program. If no name is specified, then the REMHOST.INI file is used by default.



```

REMHOST U2.15
Copyright (c) 1996-2000 FS FORTH-SYSTEME GmbH
Copyright (c) 2003 Bernecker + Rainer
Press <Left-Shift> and <Ctrl> to exit.
Using COM1 for Remote.

```

Figure 322: REMHOST program start

After the program is started, REMHOST displays the current version as well as the COM interface used for communication with the Power Panel of the remote PC.

The connection is established using a Power Panel device, if this is rebooted and the mode/node switch is set to 00h on the Power Panel.

Information:

If the Power Panel is already started, then NO connection can be established using a subsequent REMHOST start.

Program end

REMHOST can be ended by pressing the left SHIFT key and the CTRL key simultaneously.

Information:

The Power Panel must be restarted in order to undo the redirections for keyboard, floppy disk drive and display.

Connection cable assignment

The connection cable required for REMHOST must have two 9-pin DSUB sockets. The appropriate cable can be ordered directly from B&R using model number 9A0017.01 (length = 0.6 m) and 9A0017.02 (length = 1.8 m).

The cable can also be made by the user. A self-made cable can have a maximum length of 15 meters. The pins must be connected as follows:

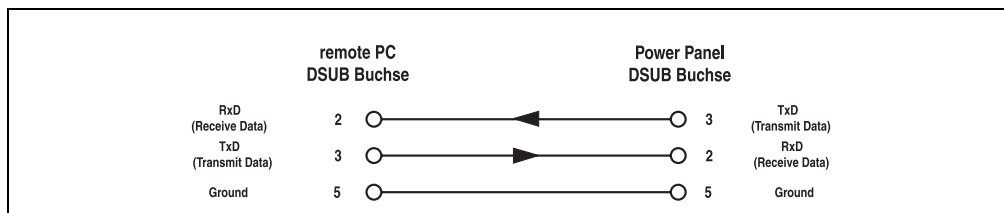


Figure 323: REMHOST pin assignment - Power Panel connection cable

2.5 CMOS backup

To protect CMOS data, a CMOS backup has been integrated into BIOS. If BIOS setup was exited with "Save values and exit" (see section 2.2.15 "Save values and exit" on page 455 for VGA, SVGA and XGA Power Panel devices and also section 2.3.13 "Save values and exit" on page 476 for QVGA Power Panel devices) and the Power Panel devices was correctly restarted, then the CMOS data is burned to flash memory. If the CMOS checksum is incorrect during

startup (battery empty) or the Power Panel device cannot be booted correctly three times consecutively, then the salvaged data from flash memory is copied again to CMOS. Setup is back to its original state, except for the time.

2.6 Distribution of resources

2.6.1 RAM address assignment

RAM address	Resource
00000000 - 000003FF	Interrupt vectors
00000400 - 000004FF	BIOS Data Area
00000500 - 0009FBFF	Freely available for the operating system (MS-DOS program area)
0009FC00 - 0009FFFF	Advanced BIOS data area
000A0000 - 000BFFFF	VGA memory
000C0000 - 000C7FFF	VGA BIOS
000C8000 - 000CBFFF	Reserved
000CC000 - 000EFFFF	XpressROM expansion ROMS. Unused areas can be used for HMA.
000F0000 - 000FFFFFF	XpressROM BIOS
00100000 - BC_RAM_TOP	Remaining DRAM
40000000	GX_Base register (defined by BIOS, can also be 40000000, 80000000 or C0000000)
40000000 - 40000BFF	L1 scratchpad
40008000 - 400080FF	Internal BUS IF unit registers
40008100 - 400082FF	Graphics pipeline registers
40008300 - 400083FF	Display controller registers
40008400 - 400084FF	Memory controller registers
40009000 - 403FFFFFF	PCI Accessible
40010000 - 40010FFF	Video configuration registers
40011000 - 40011FFF	Audio configuration registers
40015000 - 40015FFF	VIP interface registers
40800000 - 40BFFFFFF	VGA frame buffer
D0000000 - FBFFFFFF	PCI memory and PCI ROM (are dynamically assigned during POST)
FFE00000 - FFFFFFFF	High BIOS area (flash memory)

Table 186: RAM address assignment

2.6.2 DMA channel assignment

DMA channel	Resource
0	Free
1	Free
2	Disk drive

Table 187: DMA channel assignment

DMA channel	Resource
3	Free
4	Free
5	Free
6	Free
7	Free

Table 187: DMA channel assignment (Cont.)

2.6.3 I/O address assignment

I/O address	Resource
0000 - 000F	DMA controller channels 0-3
0020 - 0021	Master programmable interrupt controller
0022 - 0023	CPU configuration registers
0040 - 0043	Programmable interval timer
0060 - 0066	Keyboard controller (emulated by Legacy USB)
0070 - 0071	RTC (real-time clock)
0072 - 0073	Extended RTC (real-time clock)
0080	BIOS POST debug output port
0081 - 0083	DMA channel low page registers
0084	VSA debug output port
0085 - 008F	DMA channel low page registers
0092	Port A control register
00A0 - 00A1	Slave programmable interrupt controller
00C0 - 00CF	DMA controller channels 4-7
00D0 - 00DF	DMA status/control/mode registers channel 0-7
00F0 - 00F1	Co-processor error register
015C - 015D	On-chip SIO configuration
0170 - 0177	Primary IDE
01F0 - 01F7	Primary IDE
0220 - 022F	Audio (not supported)
02F8 - 02FF	COM2
0376 - 0377	Secondary IDE channel
03B0 - 03BB	Video controller
03C0 - 03DF	Video controller
03E8 - 03EF	COM3
03F0 - 03F5	Floppy controller (emulated by Legacy USB)
03F6 - 03F7	Primary IDE
03F8 - 03FF	COM1

Table 188: I/O address assignment

I/O address	Resource
0480 - 048F	DMA channel high page registers
04D0 - 04D1	Interrupt edge/level registers
0CF8 - 0CFF	PCI configuration registers
5000 - 500F	IDE controller configuration registers (F2BAR4)
6000 - 60FF	SMI status and aPCI registers (F1BAR0)
6200 - 623F	X-Bus expansion support registers (F5BAR0)
6400 - 643F	GPIO runtime and configuration registers (F0BAR0)
6600 - 663F	LPC support registers (F0BAR1)
9000 - 903F	CPU configuration registers
AC00 - ACFF	aCPI registers (F1BAR1)
AD00 - AFFF	PCI assignment (dynamically assigned during POST)
B000 - BFFF	PCI assignment (dynamically assigned during POST)
C000 - CFFF	PCI assignment (dynamically assigned during POST)
D000 - DFFF	PCI assignment (dynamically assigned during POST)
E000 - EFFF	PCI assignment (dynamically assigned during POST)
F000 - FFFF	Reserved

Table 188: I/O address assignment (Cont.)

2.6.4 Interrupt assignment

Interrupt	Resource
IRQ 0	System timer
IRQ 1	Keyboard (Legacy USB emulation)
IRQ 2	2nd PIC IRQ cascade
IRQ 3	COM2 ¹⁾
IRQ 4	COM1 ¹⁾
IRQ 5	USB and aPCI slot 1 (first interrupt) ¹⁾
IRQ 6	Disk drive
IRQ 7	aPCI slot 2 ¹⁾ (second interrupt)
IRQ 8	RTC (real-time clock)
IRQ 9	Ethernet (MacPhyter) ¹⁾
IRQ 10	aPCI slot 2 (first interrupt) and aPCI slot 1 (second interrupt) ¹⁾
IRQ 11	COM3 ¹⁾
IRQ 12	PS/2 mouse (Legacy USB emulation)
IRQ 13	FPU (co-processor)
IRQ 14	Primary IDE (primary hard disk)
IRQ 15	Secondary IDE (secondary hard disk)

Table 189: Interrupt assignment

1) BIOS setup default setting

3. Power Panel 100 with BIOS and Windows CE



3.1 General information

Windows CE is an operating system that is optimally tailored to the hardware used. This means that only the functions and modules required by the respective device are included. This makes this operating system extremely robust and stable.

Advantages

- Windows CE is a 32-bit operating system with multitasking and multithreading capabilities.
- In addition to being compact, it even offers high performance for configurations with limited RAM.
- Windows CE is best suited for integrated automation used in industrial systems.
- Windows CE is also less expensive than other Windows licenses.

The Windows CE available from B&R (see section "Software" on page 33 for model number) was developed for Power Panel BIOS devices, and is only available with a Power Panel BIOS device.

3.2 Requirements

The Power Panel must meet the following criteria to be able run the Windows CE operating system.

- Power Panel device with BIOS (see the overview "Power Panel 100 with BIOS" on page 30)
- BIOS version ≥ 1.00
- At least 64 MB RAM

3.3 Installation procedures

Windows CE is usually preinstalled at B&R Austria. After switching on the device, only the touch screen needs to be calibrated.

More detailed instructions for manual installation can be found in the Windows CE help file. This help file is found on the HMI Drivers & Utilities CD-Rom (model number 5S0000.01-090 from version 1.49) or downloaded directly from the download area of the B&R homepage (www.br-automation.com).

4. Power Panel 100 with BIOS and Windows XP Embedded



4.1 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.

The Windows XP Embedded version available from B&R (see section "Software" on page 33 for model number) was developed for Power Panel BIOS devices, and is only available with a Power Panel BIOS device.

4.2 Requirements

The Power Panel must meet the following criteria to be able run the Windows XP Embedded operating system.

- Power Panel device with BIOS (see the overview "Power Panel 100 with BIOS" on page 30)
- BIOS version ≥ 1.04
- At least 128 MB RAM

4.3 Installation procedures

Windows XP Embedded is usually preinstalled at B&R Austria on a suitable CompactFlash card (256 MB). The Power Panel device is 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.

A short guide to creating individual Windows XP Embedded Images as well as a suitable target designer export file for Power Panel BIOS devices can be found on the HMI Drivers & Utilities CD-ROM (model number 5S0000.01-090, for version 1.49 or higher) or downloaded directly from B&R's homepage (www.br-automation.com).

Chapter 5 • Standards and certifications

1. Valid European guidelines

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

2. Overview of standards

Standard	Description
EN 50081-1	Electromagnetic compatibility (EMC), generic emission standard - part 1: Residential, commercial, and light industrial environments (EN 50081-1 has been replaced by EN 61000-6-3)
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 50082-1	Electromagnetic compatibility (EMC), generic immunity standard - part 1: Residential, commercial, and light industrial environments (EN 50082-1 has been replaced by EN 61000-6-1)
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 50091-2	Uninterruptible power systems (UPS) - part 2: EMC requirements
EN 55011 Class A, B	Electromagnetic compatibility (EMC), radio disturbance product standard, industrial, scientific, and medical high-frequency devices (ISM devices), limit values and measurement procedure; group 1 (devices that do not create HF during material processing) and group 2 (devices that create HF during material processing)
EN 55014-1	Electromagnetic compatibility (EMC), requirements for household appliances, electric tools, and similar apparatus - part 1: Emissions
EN 55014-2	Electromagnetic compatibility (EMC), requirements for household appliances, electric tools, and similar apparatus - part 2: Immunity; product family standard
EN 55022 Class A, B	Electromagnetic compatibility (EMC), radio disturbance characteristics, information technology equipment (ITE devices), limits and methods of measurement
EN 55024 Class A or B	Electromagnetic compatibility (EMC), immunity characteristics, information technology equipment (ITE devices), limits and methods of measurement
EN 60060-2	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)

Table 190: Overview of standards

Standards and certifications • Overview of standards

Standard	Description
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 60204-1	Safety of machinery, electrical equipment on machines - part 1: General requirements
EN 60529	Degrees of protection provided by enclosures (IP code)
EN 60664-1	Insulation coordination for equipment within low-voltage systems - part 1: Principles, requirements and tests
EN 60721-1	Classification of environmental conditions - part 1: Environmental parameters and their severities
EN 60721-3-2	Classification of environmental conditions - part 3: Classification of groups of environmental parameters and their severities, section 2: Transportation
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 60950	Information technology equipment - safety
EN 61000-3-11	Electromagnetic compatibility (EMC) - part 3-11: Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, equipment with rated current ≤ 75 A and subject to conditional connection
EN 61000-3-2 Class A, B, C, D	Electromagnetic compatibility (EMC) - part 3-2: Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
EN 61000-3-3	Electromagnetic compatibility (EMC) - part 3-3: Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection
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 61000-4-17	Electromagnetic compatibility (EMC) - part 4-12: Testing and measuring techniques; ripple on DC input power port immunity test
EN 61000-4-29	Electromagnetic compatibility (EMC) - part 4-29: Testing and measuring techniques; voltage dips, short interruptions and voltage variations on DC input power port immunity tests

Table 190: Overview of standards (Forts.)

Standard	Description
EN 61000-6-1 (EN 50082-1)	Electromagnetic compatibility (EMC), generic immunity standard - part 1: residential, commercial, and light industrial environments (EN 50082-1 has been replaced by EN 61000-6-1)
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 61000-6-3 (EN 50081-1)	Electromagnetic compatibility (EMC), generic emission standard - part 1: residential, commercial, and light industrial environments (EN 50081-1 has been replaced by EN 61000-6-3)
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 61508-1	Functional safety of electrical/electronic/programmable electronic safety-related systems - part 1: General requirements
EN 61508-2	Functional safety of electrical/electronic/programmable electronic safety-related systems - part 2: Requirements for electrical/electronic/programmable electronic safety-related systems
NEMA 250 Type 4X	UL protection against sprayed water
UL 508	Industrial control equipment (UL = Underwriters Laboratories)
VDE 0701-1	Service, modification, and testing of electrical devices - part 1: General requirements
VDE 0801	Principles for computers in systems with safety tasks
47 CFR	Federal Communications Commission (FCC), 47 CFR Part 15 Subpart B Class A

Table 190: Overview of standards (Forts.)

3. Emission requirements

Emission	Test carried out according to	Limits according to
Network-related emissions	EN 55011 / EN 55022	EN 61000-6-3: Generic standard (residential areas)
		EN 55011: Industrial, scientific, and medical (ISM) radio-frequency equipment, class B (residential areas)
		EN 55022: Information technology equipment (ITE devices), class B (residential areas)
		EN 50091-2: Uninterruptible power systems (UPS), class B
		EN 61000-6-4: Generic standard (industrial areas)
		EN 55011: Industrial, scientific, and medical (ISM) radio-frequency equipment, class A (industrial areas)
		EN 55022: Information technology equipment (ITE devices), class A (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 50091-2: Uninterruptible power systems (UPS), class A
		47 CFR Part 15 Subpart B Class A (FCC)

Table 191: Overview of limits and testing guidelines for emissions

Standards and certifications • Emission requirements

Emission	Test carried out according to	Limits according to
Emissions, electromagnetic emissions	EN 55011 / EN 55022	EN 61000-6-3: Generic standard (residential areas)
		EN 55011: Industrial, scientific, and medical (ISM) radio-frequency equipment, class B (residential areas)
		EN 55022: Information technology equipment (ITE devices), class B (residential areas)
		EN 50091-2: Uninterruptible power systems (UPS), class B
		EN 61000-6-4: Generic standard (industrial areas)
		EN 55011: Industrial, scientific, and medical (ISM) radio-frequency equipment, class A (industrial areas)
		EN 55022: Information technology equipment (ITE devices), class A (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 50091-2: Uninterruptible power systems (UPS), class A
		47 CFR Part 15 Subpart B Class A (FCC)
Harmonic currents for devices with an input current of ≤ 16 A per line	EN 61000-3-2	EN 61000-3-2: Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
Voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current less than or equal to ≤ 16 A per phase and not subject to conditional connection	EN 61000-3-3	EN 61000-3-3: Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current less than or equal to ≤ 16 A per phase and not subject to conditional connection, class A/D
Voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 75 A per phase and subject to conditional connection	EN 61000-3-11	EN 61000-3-11: Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 75 A per phase and subject to conditional connection, class A/D

Table 191: Overview of limits and testing guidelines for emissions (Forts.)

3.1 Network-related emissions

Test carried out according to EN 55011 / EN 55022	Limits according to EN 61000-6-3	Limits according to EN 55011 class B	Limits according to EN 55022 class B
Power mains connections ¹⁾ 150 kHz - 500 kHz	66 - 56 dB (μV) quasi-peak value 56 - 46 dB (μV) average	66 - 56 dB (μV) quasi-peak value 56 - 46 dB (μV) average	66 - 56 dB (μV) quasi-peak value 56 - 46 dB (μV) average
Power mains connections 500 kHz - 5 MHz	56 dB (μV) quasi-peak value 46 dB (μV) average	56 dB (μV) quasi-peak value 46 dB (μV) average	56 dB (μV) quasi-peak value 46 dB (μV) average
Power mains connections 5 MHz - 30 MHz	60 dB (μV) quasi-peak value 50 dB (μV) average	60 dB (μV) quasi-peak value 50 dB (μV) average	60 dB (μV) quasi-peak value 50 dB (μV) average

Table 192: Test requirement - network-related emissions for residential areas

Other connections ²⁾ 150 kHz - 500 kHz	40 - 30 dB (μA) quasi-peak value 30 - 20 dB (μA) average	-	84 - 74 dB (μV) and 40 - 30 dB (μA) quasi-peak value 74 - 64 dB (μV) and 30 - 20 (μA) average
Other connections 500 kHz - 30 MHz	74 dB (μV) and 30 dB (μA) quasi-peak value 64 dB (μV) and 20 dB (μA) average	-	74 dB (μV) and 30 dB (μA) quasi-peak value 64 dB (μV) and 20 dB (μA) average
Test carried out according to EN 55011 / EN 55022	Limits according to EN 50091-2 class B ³⁾		
Power mains connections 150 kHz - 500 kHz	66 - 56 dB (μV) quasi-peak value 56 - 46 dB (μV) average		
Power mains connections 500 kHz - 5 MHz	56 dB (μV) quasi-peak value 46 dB (μV) average		
Power mains connections 5 MHz - 30 MHz	60 dB (μV) quasi-peak value 50 dB (μV) average		
Other connections 150 kHz - 500 kHz	-		
Other connections 500 kHz - 30 MHz	-		

Table 192: Test requirement - network-related emissions for residential areas (Forts.)

1) AC network connections only with EN 61000-6-3

2) DC voltage inputs and outputs as well for EN 61000-6-3.

3) UPS for unrestricted sales

Test carried out according to EN 55011 / EN 55022	Limits according to EN 61000-6-4	Limits according to EN 55011 class A	Limits according to EN 55022 class A
Power 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	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	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

Table 193: Test requirement - network-related emissions for industrial areas

Standards and certifications • Emission requirements

Other connections 500 kHz - 30 MHz	-	-	87 dB (μV) and 43 dB (μA) quasi-peak value 74 dB (μV) and 30 dB (μA) average
Test carried out according to EN 55011 / EN 55022	Limits according to EN 61131-2	Limits according to EN 50091-2 class A	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	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	73 dB (μV) quasi-peak value 60 dB (μV) average
Other connections 150 kHz - 500 kHz	-	-	
Other connections 500 kHz - 30 MHz	-	-	

Table 193: Test requirement - network-related emissions for industrial areas (Forts.)

1) AC network connections only with EN 61131-2

3.2 Emissions, electromagnetic emissions

Test carried out according to EN 55011 / EN 55022	Limits according to EN 61000-6-3	Limits according to EN 55011 class B	Limits according to EN 55022 class B
30 MHz - 230 MHz measured in 10 m distances	< 30 dB (μV/m) quasi-peak value	< 30 dB (μV/m) quasi-peak value	< 30 dB (μV/m) quasi-peak value
230 MHz - 1 GHz measured in 10 m distances	< 37 dB (μV/m) quasi-peak value	< 37 dB (μV/m) quasi-peak value	< 37 dB (μV/m) quasi-peak value
Test carried out according to EN 55011 / EN 55022	Limits according to EN 50091-2 class B		
30 MHz - 230 MHz measured in 10 m distances	< 30 dB (μV/m) quasi-peak value		
230 MHz - 1 GHz measured in 10 m distances	< 37 dB (μV/m) quasi-peak value		

Table 194: : Test requirement - electromagnetic emissions for residential areas

Test carried out according to EN 55011 / EN 55022	Limits according to EN 61000-6-4	Limits according to EN 55011 class A	Limits according to EN 55022 class A
30 MHz - 230 MHz measured in 10 m distances	< 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 in 10 m distances	< 47 dB (μV/m) quasi-peak value	< 47 dB (μV/m) quasi-peak value	< 47 dB (μV/m) quasi-peak value
Test carried out according to EN 55011 / EN 55022	Limits according to EN 61131-2		

Table 195: : Test requirement - electromagnetic emissions for industrial areas

30 MHz - 230 MHz measured in 10 m distances	< 40 dB (μV/m) quasi-peak value		
230 MHz - 1 GHz measured in 10 m distances	< 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 in 10 m distances	< 90 dB (μV/m) quasi-peak value		
88 MHz - 216 MHz measured in 10 m distances	< 150 dB (μV/m) quasi-peak value		
216 MHz - 960 MHz measured in 10 m distances	< 210 dB (μV/m) quasi-peak value		
>960 MHz measured in 10 m distances	< 300 dB (μV/m) quasi-peak value		

Table 195: : Test requirement - electromagnetic emissions for industrial areas (Forts.)

3.3 Harmonic currents for devices ≤ 16 A

Test carried out according to EN 61000-3-2	Limits according to EN 61000-3-2			
Largest permissible value of harmonic current according to the order (n)	Only odd harmonics			
	n	mA/W	A	
	3	3.4	2.30	
	5	1.9	1.14	
	7	1.0	0.77	
	9	0.5	0.40	
	11	0.35	0.33	
	$13 \leq n \leq 39$	$3.85/n$	$0.15 \times 15/n$	

Table 196: : Test requirement - harmonic currents for devices with an input current ≤ 16 A

3.4 Voltage fluctuations and flickering ≤ 16 A

Test carried out according to EN 61000-3-3	Limits according to EN 61000-3-3		
	$P_{st} \leq 1.0$ $P_{lt} \leq 0.65$ $d(t): 3.3 \% \text{ for max. } 500 \text{ ms}$ $d_c \leq 3.3 \%$ $d_{max} \leq 4 \%$		

Table 197: : Test requirement - voltage fluctuations and flickering in low-voltage systems ≤ 16 A

3.5 Voltage fluctuations and flickering ≤ 75 A

Test carried out according to EN 61000-3-11	Limits according to EN 61000-3-11		
	TBD		

Table 198: : Test requirement - voltage fluctuations and flickering in low-voltage systems ≤ 75 A

4. Requirements for immunity to disturbances

Immunity	Test carried out according to	Limits according to
Electrostatic discharge (ESD)	EN 61000-4-2	EN 61000-6-1: Generic standard (residential areas)
		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 61000-6-1: Generic standard (residential areas)
		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 61000-6-1: Generic standard (residential areas)
		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 61000-6-1: Generic standard (residential areas)
		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 61000-6-1: Generic standard (residential areas)
		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 61000-6-1: Generic standard (residential areas)
		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 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 55024: Information technology equipment (ITE devices)

Table 199: 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.

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 200: Test requirement - 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 201: Test requirement - 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	-
Analog I/O	± 1 kV, criteria B	± 1 kV, criteria B	-

Table 202: Test requirement - high-speed transient electrical disturbances (burst)

1) For EN 55024 without length limitation.

4.4 Surge voltages (Surge)

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 203: Test requirement - 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

Table 204: Test requirement - conducted disturbances

Standards and certifications • Requirements for immunity to 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
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 204: Test requirement - conducted disturbances (Forts.)

4.6 Magnetic fields with electrical frequencies

Test carried out according to EN 61000-4-8	Limits according to EN 61000-6-2	Limits according to EN 61131-2	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 205: Test requirement - 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 206: Test requirement - 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 207: Test requirement - 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 transport (packed)	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 transport (packed)	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 (packed)	EN 60068-2-31	EN 60721-3-2 class 2M1
		EN 60721-3-2 class 2M2
		EN 60721-3-2 class 2M3
Free fall (packed)	EN 60068-2-32	EN 61131-2: Programmable logic controllers
		B&R

Table 208: 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 209: Test requirement - vibration operation

5.2 Vibration transport (packed)

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 transport: Uninterrupted duty with moveable frequency in all 3 axes (x, y, z)	10 sweeps for each axis, packed		10 sweeps for each axis, packed		10 sweeps for each axis, packed	
	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, <u>not packed</u>					
	2 - 8 Hz	Amplitude 7.5 mm				
	8 - 200 Hz	Acceleration 2 g				
	200 - 500 Hz	Acceleration 4 g				

Table 210: Test requirement - vibration transport (packed)

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 shaped (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 211: Test requirement - shock operation

5.4 Shock transport (packed)

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 shaped (half-sine) stress in all 3 axes (x, y, z)	Acceleration 10 g, Length 11 ms, each 3 shocks, packed	Acceleration 30 g, Length 6 ms, each 3 shocks, packed	Acceleration 100 g, Length 6 ms, each 3 shocks, packed
	Limits according to B&R		
	Acceleration 30 g, Length 11 ms, each 3 shocks, <u>not packed</u>		

Table 212: Test requirement - 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 213: Test requirement - toppling

5.6 Free fall (packed)

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 packed		Devices packed		Devices packed	
	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 packed							
	Weight	Height						
	<40 kg	1 m						

Table 214: Test requirement - 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
Sprayed water (from front)	NEMA 250 Type 4X	UL 50 - NEMA 250 4X: Degree of protection provided by housing

Table 215: Overview of limits and test guideline standards 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. environmental temperature specified in the data sheet at the max. specified load	3 hours at max. environmental temperature (min. +40 °C) duration approx. 5 hours	3 hours at max. environmental temperature (min. +40 °C) duration approx. 5 hours	

Table 216: Test requirement - 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 217: Test requirement - 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 218: Test requirement - 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 219: Test requirement - 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 an 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 220: Test requirement - 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 221: Test requirement - 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 222: Test requirement - humid heat, constant (storage)

6.8 Sprayed water (front side)

Test carried out according to UL 50	Limits according to NEMA 250 Type 4X		
Sprayed water (front side)	Spraying using a 25.4 mm (diameter) water jet nozzle Distance: 3 to 3.7 meters (all angles) Water flow: 246 liters/minute Duration: 48 seconds, 5 seconds minimum		

Table 223: Test requirement - sprayed water (front side)

7. Safety

Safety	Test carried out according to	Limits according to
Ground resistance	EN 61131-2	EN 60204-1: Electrical equipment of machines
		EN 61131-2: Programmable logic controllers
Insulation resistance		EN 60204-1: Electrical equipment of machines
High voltage	EN 60060-1	EN 61131-2: Programmable logic controllers
		UL 508: Industrial control equipment
Residual voltage	EN 61131-2	EN 60204-1: Electrical equipment of machines
		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 224: Overview of limits and testing guidelines for safety

7.1 Ground resistance

Test carried out according to EN 61131-2	Limits according to EN 60204-1 ¹⁾		Limits according to EN 61131-2
Ground resistance: housing (from any metal part to the ground terminal)	Smallest effective cross section of the protective ground conductor for the branch being tested	Maximum measured voltage drop at a test current of 10 A	Test current 30 A for 2 min, < 0.1 Ohm
	1.0 mm ²	3.3 V	
	1.5 mm ²	2.6 V	
	2.5 mm ²	1.9 V	
	4.0 mm ²	1.4 V	
	> 6.0 mm ²	1.0 V	

Table 225: Test requirement - ground resistance

1) See EN 60204-1:1997 page 62, table 9.

7.2 Insulation resistance

Test carried out	Limits according to EN 60204-1 ¹⁾		
Insulation resistance: main circuits to protective ground conductor	> 1 MOhm at 500 VDC voltage		

Table 226: Test requirement - insulation resistance

1) See EN 60204-1:1997 page 62, table 9.

7.3 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 overvoltage can be removed before the test)	Input voltage	Test voltage			Input voltage	Test voltage	
		1.2/50 μ s 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 227: Test requirement - high voltage

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

7.4 Residual voltage

Test carried out according to EN 61131-2	Limits according to EN 60204-1	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)	< 60 V after 5 sec (active parts) < 60 V after 1 sec (plug pins)	

Table 228: Test requirement - residual voltage

7.5 Leakage current

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

Table 229: Test requirement - leakage current

7.6 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 230: Test requirement - overload

7.7 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 231: Test requirement - defective component

7.8 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 232: Test requirement - voltage range

8. Other tests

Other tests	Test carried out according to	Limits according to
Function test	-	-
Optical test	-	-
Hot spot measurement	-	-
Impact resistance	-	-
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 233: Overview of limits and testing guidelines for other tests

8.1 Impact resistance

Test carried out according to	Limits according to		
	TBD		

Table 234: Test requirement - impact resistance

8.2 Protection type

Test carried out according to	Limits according to EN 60529	Limits according to EN 60529	
Protection of the operating equipment	IP2. Protection against large solid foreign bodies ≈ 12.5 mm diameter	IP6. Protection against large solid foreign bodies: dust-proof	
Protection of personnel	IP2. Protection against touching dangerous parts with finger	IP6. Protection against touching dangerous parts with conductor	
Protection against water permeation with damaging consequences	IP.0 Not protected	IP.5 Protected against sprayed water	

Table 235: Test requirement - protection

8.3 Degree of pollution

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

Table 236: Test requirement - degree of pollution

9. International certifications

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

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

Table 237: International certifications

Chapter 6 • Accessories

1. Overview

Model number	Description	Note
0AC201.9	Lithium batteries (5x) Lithium batteries, 5 pcs., 3 V / 950 mAh, button cell	
0TB103.9	Plug 24V 5.08 3p screw clamps 24 VDC 3-pin connector, female. Screw clamps, 3.31 mm ² , protected against vibration by the screw flange	
0TB103.91	Plug 24V 5.08 3p cage clamps 24 VDC 3-pin connector, female. Cage clamps, 3.31 mm ² , protected against vibration by the screw flange	
4A0006.00-000	Lithium battery (1x) Lithium battery, 1 pc., 3 V / 950 mAh, button cell	
4AC200.1000-00	aPCI slot cover, 1 pc. Optional aPCI slot cover for inserting into an available aPCI slot on a Power Panel 200 device	
5AC900.057X-00	Legend strips 3x 5.7" high1 Legend strip template for 4PP151.0571-01, 4PP151.0571-21, 4PP251.0571-45, 4PP251.0571-65, 4PP251.0571-85, 4PP251.0571-A5	
5AC900.057X-01	Legend strips 2x 5.7" diagonal2 Legend strip template for 4PP152.0571-01, 4PP152.0571-21, 4PP252.0571-45, 4PP252.0571-65, 4PP252.0571-85, 4PP252.0571-A5	
5AC900.104X-00	Legend strip 1x 10.4" portrait1 Legend strip template for 4PP151.1043-31, 4PP181.1043-31, 4PP251.1043-75, 4PP251.1043-B5, 4PP281.1043-75, 4PP281.1043-B5	
5AC900.104X-01	Legend strip 1x 10.4" landscape2 Legend strip template for 4PP152.1043-31, 4PP182.1043-31, 4PP252.1043-75, 4PP252.1043-B5, 4PP282.1043-75, 4PP282.1043-B5	
5AC900.104X-02	Legend strips 3x 10.4" landscape1 Legend strip template for 4PP180.1043-31, 4PP280.1043-75, 4PP280.1043-B5	
5AC900.150X-00	Legend strips 4x 15" Legend strip template for 4PP280.1505-75, 4PP280.1505-B5, 4PP281.1505-75, 4PP281.1505-B5	
5CFCRD.0032-01	CompactFlash 32 MB True IDE SanDisk/R2 CompactFlash card with 32 MB flash PROM and True IDE/ATA interface	Cancelled since 11/2003
5CFCRD.0032-02	CompactFlash 32 MB TrueIDE SanDisk/A CompactFlash card with 32 MB flash PROM and True IDE/ATA interface	Cancelled since 12/2005
5CFCRD.0064-01	CompactFlash 64 MB True IDE SanDisk/R2 CompactFlash card with 64 MB flash PROM and True IDE/ATA interface	Cancelled since 11/2003
5CFCRD.0064-02	CompactFlash 64 MB TrueIDE SanDisk/A CompactFlash card with 64 MB flash PROM and True IDE/ATA interface	Cancelled since 12/2005

Table 238: Model numbers - accessories

Accessories • Overview

Model number	Description	Note
5CFCRD.0064-03	CompactFlash 64 MB TrueIDE SSI CompactFlash card with 64 MB SLC NAND Flash and True IDE/ATA interface	
5CFCRD.0128-01	CompactFlash 128 MB True IDE SanDisk/R2 CompactFlash card with 128 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 11/2003</i>
5CFCRD.0128-02	CompactFlash 128 MB TrueIDE SanDisk/A CompactFlash card with 128 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 12/2005</i>
5CFCRD.0128-03	CompactFlash 128 MB TrueIDE SSI CompactFlash card with 128 MB SLC NAND flash and True IDE/ATA interface	
5CFCRD.0192-01	CompactFlash 196 MB True IDE SanDisk/R2 CompactFlash card with 196 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 07/2003</i>
5CFCRD.0256-01	CompactFlash 256 MB True IDE SanDisk/R2 CompactFlash card with 256 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 11/2003</i>
5CFCRD.0256-02	CompactFlash 256 MB TrueIDE SanDisk/A CompactFlash card with 256 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 12/2005</i>
5CFCRD.0256-03	CompactFlash 256 MB TrueIDE SSI CompactFlash card with 256 MB SLC NAND flash and True IDE/ATA interface	
5CFCRD.0384-01	CompactFlash 384 MB True IDE SanDisk/R2 CompactFlash card with 384 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 07/2003</i>
5CFCRD.0512-01	CompactFlash 512 MB True IDE SanDisk/R2 CompactFlash card with 512 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 11/2003</i>
5CFCRD.0512-02	CompactFlash 512 MB TrueIDE SanDisk/A CompactFlash card with 512 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 12/2005</i>
5CFCRD.0512-03	CompactFlash 512 MB TrueIDE SSI CompactFlash card with 512 MB SLC NAND flash and True IDE/ATA interface	
5CFCRD.1024-02	CompactFlash 1024 MB TrueIDE SanDisk/A CompactFlash card with 1024 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 12/2005</i>
5CFCRD.1024-03	CompactFlash 1024 MB TrueIDE SSI CompactFlash card with 1024 MB SLC NAND flash and True IDE/ATA interface	
5CFCRD.2048-02	CompactFlash 2048 MB TrueIDE SanDisk/A CompactFlash card with 2048 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 12/2005</i>
5CFCRD.2048-03	CompactFlash 2048 MB TrueIDE SSI CompactFlash card with 2048 MB SLC NAND flash and True IDE/ATA interface	
5CFCRD.4096-03	CompactFlash 4096 MB TrueIDE SSI CompactFlash card with 4096 MB SLC NAND flash and True IDE/ATA interface	
5CFCRD.8192-03	CompactFlash 8192 MB TrueIDE SSI CompactFlash card with 8192 MB SLC NAND flash and True IDE/ATA interface	<i>In preparation</i>
5MMUSB.0128-00	USB flash drive 128 MB SanDisk USB 2.0 flash drive 128 MB	<i>Cancelled since 12/2005</i>

Table 238: Model numbers - accessories (Forts.)

Model number	Description	Note
5MMUSB.0256-00	USB flash drive 256 MB SanDisk USB 2.0 flash drive 256 MB	
5MMUSB.0512-00	USB flash drive 512 MB SanDisk USB 2.0 flash drive 512 MB	
5MMUSB.1024-00	USB flash drive 1 GB SanDisk USB 2.0 flash drive 1 GB	
9A0017.01	RS232 DB9 null modem cable 0.6 m Null modem cable RS232 0.6 m to connect UPS and IPC (9-pin DSUB socket - 9-pin DSUB socket).	
9A0017.02	RS232 DB9 null modem cable 1.8 m Null modem cable RS232 1.8 m to connect UPS and IPC (9-pin DSUB socket - 9-pin DSUB socket).	

Table 238: Model numbers - accessories (Forts.)

2. Lithium battery

2.1 General information

The lithium battery guarantees buffering of the internal real-time clock (RTC), SRAM data, and individually saved BIOS settings. The battery status (good or bad) can be queried using software. Data buffering is guaranteed for approx. another 500 hours from the point in time that the battery capacity is determined to be insufficient. When changing the battery, data is buffered for approximately another 10 minutes by a gold leaf capacitor.

2.2 Order data

Model number	Description	Image
0AC201.9	Lithium batteries, 5 pcs., 3 V / 950 mAh, button cell	
4A0006.00-000	Lithium battery, 1 pc., 3 V / 950 mAh, button cell	

Table 239: Order data for lithium battery

2.3 Technical data

Information:

The following defined characteristics, features and limit values are only valid for 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.

The technical data is current as of when this manual was printed. We reserve the right to make changes.

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	
Environment		
Storage temperature	-20 °C to +60 °C	
Relative humidity	0 to 95 % (non-condensing)	

Table 240: Technical data for lithium batteries

3. TB103 3-pin supply voltage connector

3.1 General information

This single row 3-pin terminal block is mainly used to connect the supply voltage terminal block for all Power Panel 100/200 devices.

3.2 Order data

Model number	Description	Image
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 241: TB103 order data

Information:

The following defined characteristics, features and limit values are only valid for 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.

The technical data is current as of when this manual was printed. We reserve the right to make changes.

Description	0TB103.9	0TB103.91
Number of pins	3	
Type of terminal	Screw clamps	Cage clamps

Table 242: TB103 technical data

Accessories • TB103 3-pin supply voltage connector

Description	0TB103.9	0TB103.91
Distance between contacts	5.08 mm	
Resistance between contacts	$\leq 5 \text{ m}\Omega$	
Nominal voltage according to VDE / UL, CSA	250 V / 300 V	
Current load according to VDE / UL, CSA	14.5 A / 10 A per contact	
Terminal size	0.08 mm ² - 3.31 mm ²	
Cable type	Copper wires only (no aluminum wires!)	

Table 242: TB103 technical data (Forts.)

4. aPCI slot cover

The aPCI slot cover can be installed when an aPCI slot on a Power Panel 200 device is not in use for whatever reason. This can also be necessary e.g. for EMC reasons.



Figure 324: aPCI slot cover 4AC200.1000-00

4.1 Installation

Because it has the same mechanical dimensions as a B&R aPCI module, it can easily be inserted into a free aPCI slot and tightly fastened to the Power Panel using a knurled screw.

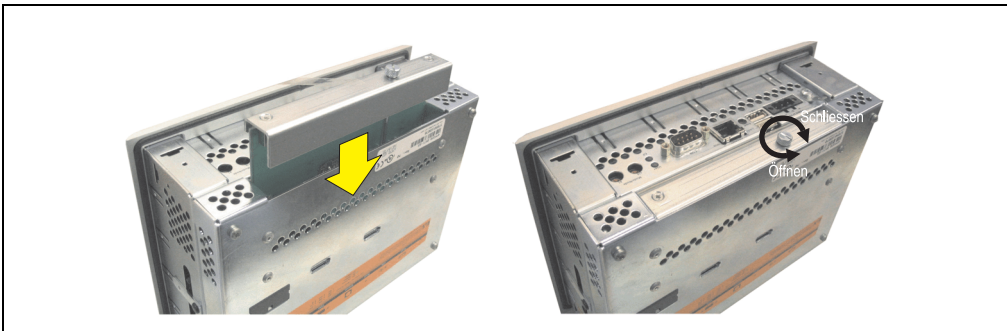


Figure 325: aPCI slot cover installation

5. Legend strip templates

Power 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 Power Panel device (above and below).

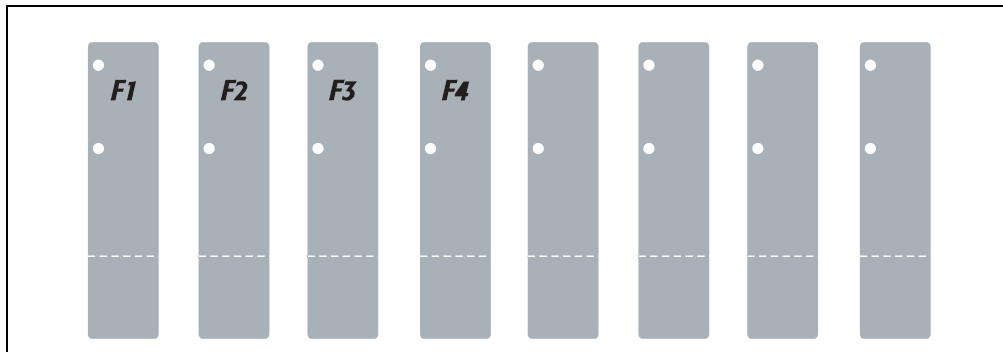


Figure 326: Legend strip samples

Printable legend strips (A4 format) can be ordered from B&R (see table 243 "Legend strip template order data" on page 529). This can be printed using a standard laser printer (b/w or color) in a temperature range from -40 °C to +125 °C. A print template (available for Corel Draw version 7, 9 and 10) for the respective legend strip template can be downloaded from the B&R homepage www.br-automation.com.

5.1 Order data

Model number	Description	Image
5AC900.057X-00	Legend strips 3x 5.7" high1 Legend strip template for Power Panels 4PP151.0571-01, 4PP151.0571-21, 4PP251.0571-45, 4PP251.0571-65, 4PP251.0571-85, 4PP251.0571-A5. For 2 devices.	Examples of legend strip templates
5AC900.057X-01	Legend strips 2x 5.7" diagonal2 Legend strip template for Power Panels 4PP152.0571-01, 4PP152.0571-21, 4PP252.0571-45, 4PP252.0571-65, 4PP252.0571-85, 4PP252.0571-A5. For 2 devices.	
5AC900.104X-00	Legend strip 1x 10.4" portrait1 Legend strip template for Power Panels 4PP151.1043-31, 4PP181.1043-31, 4PP251.1043-75, 4PP251.1043-B5, 4PP281.1043-75, 4PP281.1043-B5. For 1 device.	
5AC900.104X-01	Legend strip 1x 10.4" landscape2 Legend strip template for Power Panels 4PP152.1043-31, 4PP182.1043-31, 4PP252.1043-75, 4PP252.1043-B5, 4PP282.1043-75, 4PP282.1043-B5. For 1 device.	
5AC900.104X-02	Legend strips 3x 10.4" landscape1 Legend strip template for Power Panels 4PP180.1043-31, 4PP280.1043-75, 4PP280.1043-B5. For 3 devices.	
5AC900.150X-00	Legend strips 4x 15" Legend strip template for Power Panels 4PP151.1505-31, 4PP180.1505-31, 4PP181.1505-31, 4PP251.1505-75, 4PP251.1505-B5, 4PP280.1505-75, 4PP280.1505-B5, 4PP281.1505-75, 4PP281.1505-B5. For 4 devices.	

Table 243: Legend strip template order data

6. CompactFlash cards 5CFCRD.0xxx-01

6.1 General information

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

6.2 Order data

Model number	Description	Image
5CFCRD.0032-01	CompactFlash 32 MB ATA/True IDE	
5CFCRD.0064-01	CompactFlash 64 MB ATA/True IDE	
5CFCRD.0128-01	CompactFlash 128 MB ATA/True IDE	
5CFCRD.0128-01	CompactFlash 196 MB ATA/True IDE	
5CFCRD.0256-01	CompactFlash 256 MB ATA/True IDE	
5CFCRD.0384-01	CompactFlash 384 MB ATA/True IDE	
5CFCRD.0512-01	CompactFlash 512 MB ATA/True IDE	

Table 244: CompactFlash cards 5CFCRD.xxxx-01 order data

6.3 Technical data

Information:

The specified limits listed here like for example, temperature, relative humidity, shock and vibration, only apply to his accessory and do not also automatically apply to the whole terminal.

Features	5CFCRD.xxxx-01
Temperature Operation Storage	0 °C to 60 °C -25 °C to 85 °C
Relative humidity Operation/Storage	8 % to 95 %, non-condensing
Vibration Operation/Storage	Maximum 30 G point-to-point
Shock Operation/Storage	Maximum 3,000 G

Table 245: CompactFlash cards 5CFCRD.xxxx-01 technical data

Features	5CFCRD.xxxx-01
Altitude	24000 meters
MTBF (@ 25°C)	> 3,000,000 hours
Maintenance	None
Data reliability	<1 unrecoverable error in 10^{14} bit read accesses <1 faulty correction in 10^{20} bit read accesses
Write/erase procedures	> 2000000 times
Weight	11.4 grams
Dimensions	
Length	36.4 ± 0.15 mm
Width	42.8 ± 0.10 mm
Thickness	3.3 mm ± 0.10 mm

Table 245: CompactFlash cards 5CFCRD.xxxx-01 technical data (Forts.)

7. CompactFlash cards 5CFCRD.xxxx-02

7.1 General information

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

7.2 Order data

Model number	Description	Image
5CFCRD.0032-02	CompactFlash 32 MB TrueIDE SanDisk/A	
5CFCRD.0064-02	CompactFlash 64 MB TrueIDE SanDisk/A	
5CFCRD.0128-02	CompactFlash 128 MB TrueIDE SanDisk/A	
5CFCRD.0256-02	CompactFlash 256 MB TrueIDE SanDisk/A	
5CFCRD.0512-02	CompactFlash 512 MB TrueIDE SanDisk/A	
5CFCRD.1024-02	CompactFlash 1024 MB TrueIDE SanDisk/A	
5CFCRD.2048-02	CompactFlash 2048 MB TrueIDE SanDisk/A	

Table 246: CompactFlash cards 5CFCRD.xxxx-02 order data

7.3 Technical data

Information:

The following defined characteristics, features and limit values are only valid for 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-02
MTBF (@ 25°C)	> 3000000 hours
Maintenance	None
Data reliability	< 1 unrecoverable error in 10^{14} bit read accesses < 1 faulty correction in 10^{20} bit read accesses
Write/erase procedures	> 2,000,000 times
Mechanics	5CFCRD.xxxx-02

Table 247: CompactFlash cards 5CFCRD.xxxx-02 technical data

Dimensions	
Length	36.4 ± 0.15 mm
Width	42.8 ± 0.10 mm
Thickness	$3.3 \text{ mm} \pm 0.10 \text{ mm}$
Weight	11.4 g
Environment	
Environmental temperature	
Operation	0°C to $+70^{\circ}\text{C}$
Storage	-25°C to $+85^{\circ}\text{C}$
Transportation	-25°C to $+85^{\circ}\text{C}$
Relative humidity	
Operation/Storage	8% to 95%, non-condensing
Vibration	
Operation/Storage	Maximum 30 G (point to point)
Shock	
Operation/Storage	Maximum 3,000 G
Altitude	24000 meters

Table 247: CompactFlash cards 5CFCRD.xxxx-02 technical data (Forts.)

7.4 Dimensions

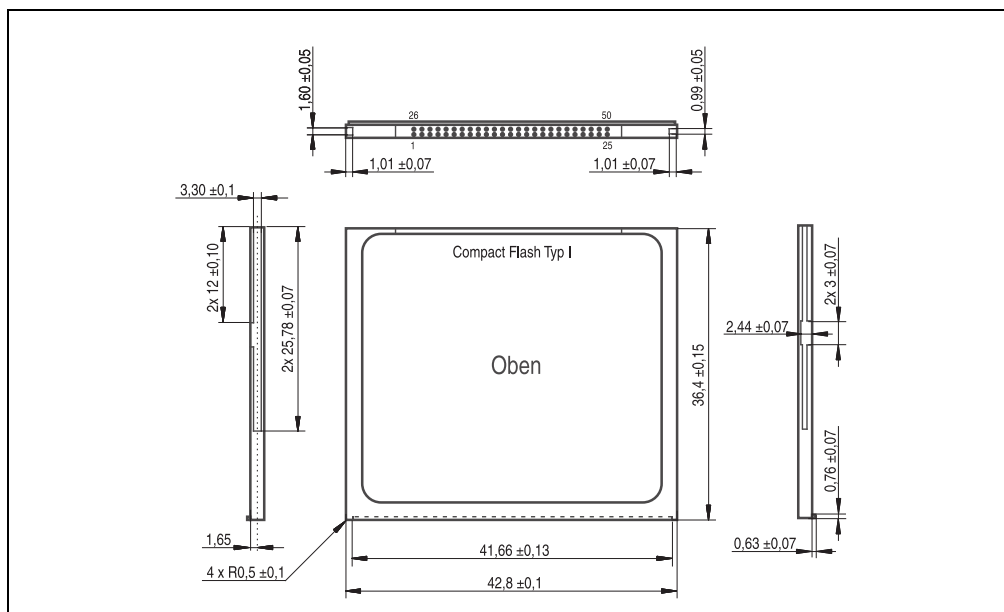


Figure 327: Dimensions for CompactFlash card type I

7.5 Calculating the lifespan

SanDisk provides a 6-page "white paper" for the lifespan calculation for CompactFlash cards (see following pages). This document can also be found on the SanDisk homepage.

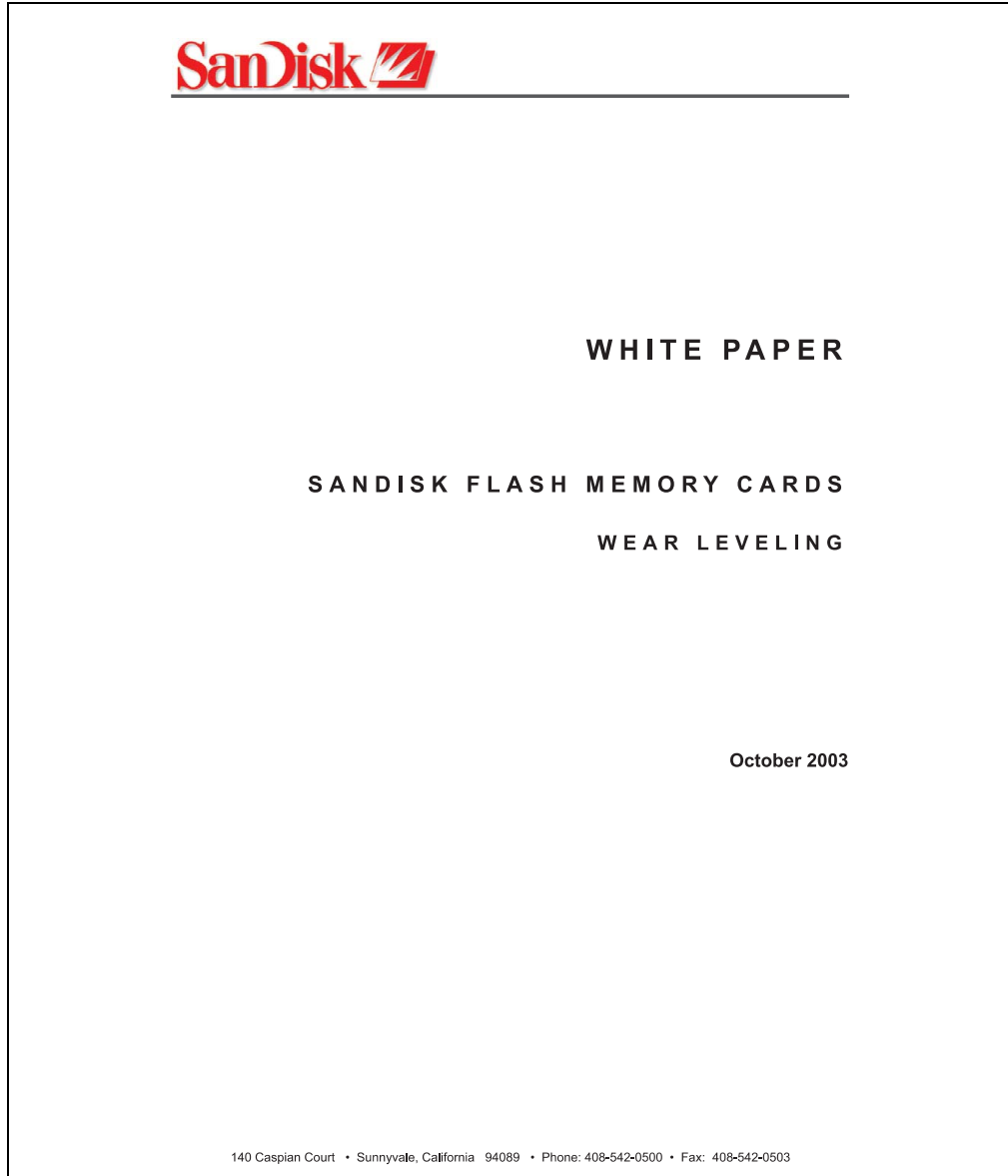


Figure 328: SanDisk white paper - page 1

SanDisk® Corporation general policy does not recommend the use of its products in life support applications where in a failure or malfunction of the product may directly threaten life or injury. Per SanDisk Terms and Conditions of Sale, the user of SanDisk products in life support applications assumes all risk of such use and indemnifies SanDisk against all damages.

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SanDisk Corporation

Doc No. 80-36-00278

SanDisk Flash Memory Cards Wear Leveling

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Figure 329: SanDisk white paper - page 2

OVERVIEW

This purpose of this white paper is to help SanDisk customers understand the benefits of wear leveling and to assist customers in calculating life expectancy of SanDisk cards in specific applications.

Flash memory is susceptible to wear as a result of the repeated program and erase cycles that are inherent in typical data storage applications. Applications in which this is a major concern include hard disk replacement applications where write operations occur frequently. How a storage system manages the wear of the memory is key to understanding the extended reliability of the host that relies on these storage systems.

WEAR LEVELING METHODOLOGY

Current products available in the industrial channel use NAND flash memory. It is important to understand the NAND memory architecture to gain insight into the wear leveling mechanism.

Each memory chip is divided into blocks. A block is an array of memory cells organized as sectors. The number of blocks and sectors vary from product to product. The minimum unit for a write or read operation is a page (or sector). The minimum unit for an erase operation is a block. Physical blocks are logically grouped into zones. For the current technology, a typical zone size is 4 MB. However, this may change from product to product. Wear leveling is done within a zone. The current firmware does not spread the wear across the capacity of the card. Each zone has about 3% additional "spare blocks" beyond what is assigned to meet the logical capacity of the flash card. This group of blocks is commonly referred to as the "Erase Pool".

With the introduction of SanDisk's Write-before-Erase architecture, each time a host writes data to the same logical address (CHS or LBA), data is written into a newly assigned, empty physical block from the "Erase Pool". The intrinsic nature of writing to a new physical location each time a logical address is written to is the basis for wear leveling found in SanDisk cards. This action spreads the writes over the zone, thus greatly extending the overall life of the card. The methodology of using a large number of physical addresses to manage a smaller logical address table allows for rotation of the physical addresses among the entire group of physical blocks within a zone. The resulting wear leveling optimizes the effective life of the media and avoids prematurely reaching the end of life on frequently written to host addresses.

When a card detects that a block has reached the end of its useful life, it removes that block from the blocks that are available for write operations. The result is a reduction of the size of the erase pool. This does not affect the capacity of the card as seen by the host. When the pool of blocks available for write operations has been exhausted due to wear, the card will reach the end of its useful life for write operations.

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SanDisk Flash Memory Cards Wear Leveling

Page 3

Figure 330: SanDisk white paper - page 3

Current SanDisk products do not preempt wear leveling events during normal operation of the card. Applications typically don't require such management beyond the natural wear leveling that occurs during normal host operations. As a result, the effectiveness of wear leveling in current SanDisk products is dependent upon host usage. It is important for customers whose applications do not fall into this typical usage pattern to understand how their applications will affect the lifetime of the card.

LIFE EXPECTANCY SCENARIOS

► best case analysis

In a typical application, large data files are written to the card occupying contiguous sequential logical address space. This results in optimal wear leveling and provides card life exceeding the specification for card endurance. This increased endurance is achieved as follows: The 2,000,000 endurance cycles specification (I-Grade only) is a result of large amounts of test data collected from a very large sample set that accounts for the extreme limits of the test population. With the 3% additional erase pool being used in an ideal fashion, the distribution is narrowed and the card will survive beyond its specified lifetime.

► worst case analysis

In the worst-case application, data will be written as single sectors to random addresses across the card. These single sector writes will exercise the erase pool more rapidly, requiring the system to perform a "garbage collection" operation to free up new blocks for subsequent write operations. At the extreme, each single sector write would cause one block to be programmed and erased. As a typical block size is 16kB or 32 sectors, the amount of wear is increased by a factor of 31 since 32 physical sectors are written and erased for each sector the host writes. Spreading this wear across the erase pool results in an effective 1/30 usable lifetime. This case is an extreme example and is only included to show the range of application dependence. This result is comparable to other vendor's cards based on memory with a 16kB erase block.

► analysis of host dependence

In assessing the life expectancy of a card in a given system several factors need to be understood. These factors include the types of files and their corresponding sizes, frequency of card write operations and file system behavior (including data structures). The types of files must be considered since some files, such as operating systems or executable files, typically remain in fixed locations once they are stored in the card. This limits the number of physical blocks available for circulation into the erase pool. The remaining capacity after these files have been accounted for can then be divided by the typical size of files that will be updated over the lifetime of the card. Related to this calculation is how the file system overwrites existing files. Typical operating system behavior, such as DOS, will allocate new blocks from the file allocation table, or FAT, and so repeated file writes will occupy a new set of addresses on the card. This is very beneficial in spreading wear across the card since it forces the card to cycle the entire physical

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SanDisk Flash Memory Cards Wear Leveling

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Figure 331: SanDisk white paper - page 4

area being used for such files. Special cases to consider include those where the files being updated are very small. Typically an operating system uses a minimum number of sectors to store a file, referred to as a cluster. Typical cluster sizes range from 8 to 64 sectors in size. The cluster size is important for files that are the same or smaller than the 32-sector block since these may trigger garbage collection operations. If these updates happen in a random fashion (sequential updates would not be affected by cluster size) lifetime may be reduced as a result. Finally, the frequency of such updates is then used to determine how long it will take before the card reaches its statistical limit for endurance. These factors can be combined in an equation that can be used to calculate the minimum time a card will function in that application:

$$lifetime = 2,000,000 \times \frac{(C_{zone} - C_{fixed}) \times \left(1 - k_r \times \frac{32 - N_{cluster}}{32}\right)}{F_{S_{typ}}} \times \frac{1}{f_w}$$

where Czone is the total capacity of the zone, Cfixed is the capacity used by fixed files, Ncluster is the cluster size, FStyp is the average file size and fw is the average frequency at which files are updated. kr is a factor that is 0 for file sizes that are typically over 16kB or for applications that are not random in the order in which such files are updated.

Example 1

In this example 128 KB of data is updated once a day. The zone has 500 KB worth of fixed files. A 4 MB zone size is assumed.

$$lifetime = 2,000,000 \times \frac{(4000 - 500) \times (1 - 0)}{128} \times \frac{1}{1/day}$$

$$lifetime = 149828 years$$

Example 2

This example is a data logging operation using a 1GB card where a 4kB file is updated every five seconds. This would result in sequential address being written.

$$lifetime = 2,000,000 \times \frac{4000}{4} \times \frac{1}{1/5 \text{ sec}}$$

$$lifetime = 317 years$$

Figure 332: SanDisk white paper - page 5

Example 3

This example is a data logging operation using the same 1GB card where a new 4kB file is written every five seconds. But in this case the cluster size is 4kB and it is expected that, due to file system fragmentation, the logical addresses will be written randomly.

$$lifetime = 2,000,000 \times \frac{4 \times \left(1 - 1 \times \frac{32-8}{32}\right)}{.004} \times \frac{1}{1/5 \text{ sec}}$$

$$lifetime = 79.3 \text{ years}$$

CONCLUSION

These examples are general in nature but show how the equation can be used as a guideline for calculating card lifetime in different applications. They also demonstrate that SanDisk card architecture exceeds reasonable life expectancy in typical applications. If a particular applications behaves in such a way that this equation cannot be applied, the SanDisk Applications Engineering group can assist in performing card lifetime analysis.

For more information, please visit the SanDisk Web site at: www.sandisk.com

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URL: <http://www.sandisk.com>

SanDisk Corporation

Figure 333: SanDisk white paper - page 6

8. CompactFlash cards 5CFCRD.xxxx-03

8.1 General information

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

8.2 Order data

Model number	Description	Image
5CFCRD.0064-03	CompactFlash 64 MB TrueIDE SSI	 Example: 256 MB CompactFlash card
5CFCRD.0128-03	CompactFlash 128 MB TrueIDE SSI	
5CFCRD.0256-03	CompactFlash 256 MB TrueIDE SSI	
5CFCRD.0512-03	CompactFlash 512 MB TrueIDE SSI	
5CFCRD.1024-03	CompactFlash 1024 MB TrueIDE SSI	
5CFCRD.2048-03	CompactFlash 2048 MB TrueIDE SSI	
5CFCRD.4096-03	CompactFlash 4096 MB TrueIDE SSI	
5CFCRD.8192-03	CompactFlash 8192 MB TrueIDE SSI	

Table 248: CompactFlash cards order data

8.3 Technical data

Information:

The following defined characteristics, features and limit values are only valid for 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.

The technical data is current as of when this manual was printed. We reserve the right to make changes.

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	> 2,000,000 times
Data retention	10 years
Mechanics	

Table 249: CompactFlash cards 5CFCRD.xxxx-03 technical data

Dimensions	
Length	36.4 ± 0.15 mm
Width	42.8 ± 0.10 mm
Thickness	3.3 ± 0.10 mm
Weight	11.4 grams
Environment	
Environmental temperature	
Operation	0 °C to +70 °C
Storage	-50 °C to +100 °C
Transportation	-50 °C to +100 °C
Relative humidity	
Operation/Storage	8% to 95%, non-condensing
Vibration	
Operation	Maximum 16.3 g (point to point)
Storage / Transport	Maximum 30 g (point to point)
Shock	
Operation	Maximum 1000 g
Storage / Transport	Maximum 3,000 g
Altitude	Maximum 80,000 feet (24,383 meters)

Table 249: CompactFlash cards 5CFCRD.xxxx-03 technical data (Forts.)

8.4 Dimensions

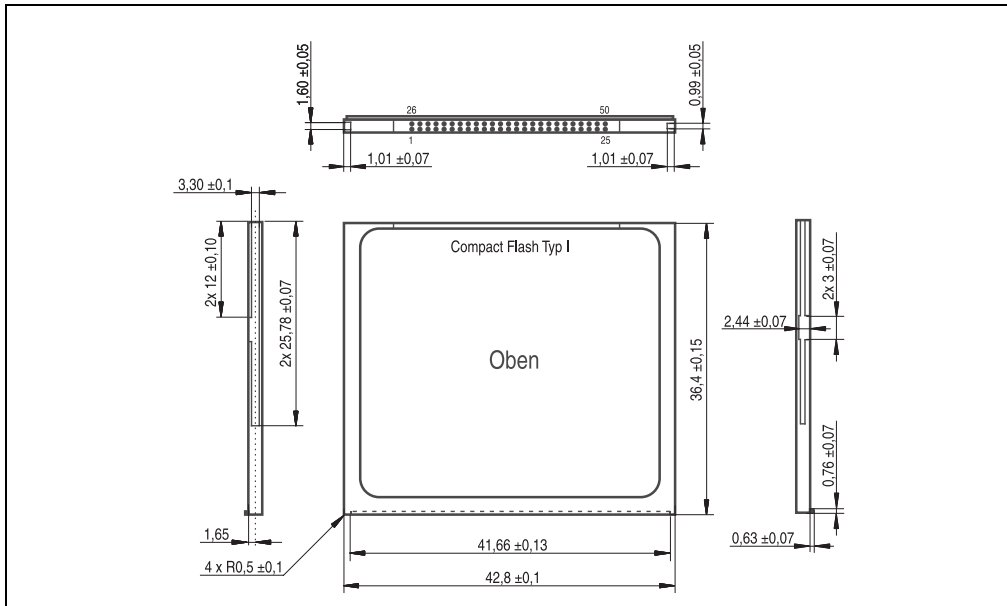


Figure 334: Dimensions for CompactFlash card type I

8.5 Calculating the lifespan

Silicon Systems provides a 10-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).



"...cutting-edge solid-state storage solutions"



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ENDURANCE CONSIDERATIONS

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WP401
Revision B
March 2005

SILICONSYSTEMS, INC.

Figure 335: Silicon Systems white paper - Page 1 of 10



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INTRODUCTION

SiliconSystems' SiliconDrive™ technology is specifically designed to meet the high performance, high reliability and multi-year product lifecycle 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. Endurance is defined as the number of write/erase cycles that can be performed before the storage product "wears out."

BACKGROUND

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.

(NOTE: This is just an example of how a controller, if it is well designed, can compensate for the deficiencies of the media. It is a completely different discussion to compare the mechanical reliability of rotating hard drives to solid-state storage that has no moving parts.)

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:

- Storage Media
- Wear-Leveling Algorithm
- 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 are much lower than the three parameters listed above. Each of these factors will be examined individually, assuming ten-year data retention.

The final section of this white paper provides a calculator to assist in the understanding of the effects of each of these parameters on the overall endurance in an application.

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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 cell phone and other chip-on-board applications. For these applications, NOR provides execute-in-place, boot and data storage functionality in a single chip. The economies of scale and component densities of NAND relative to NOR make NAND the ideal solution for non-volatile solid-state storage systems.

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.

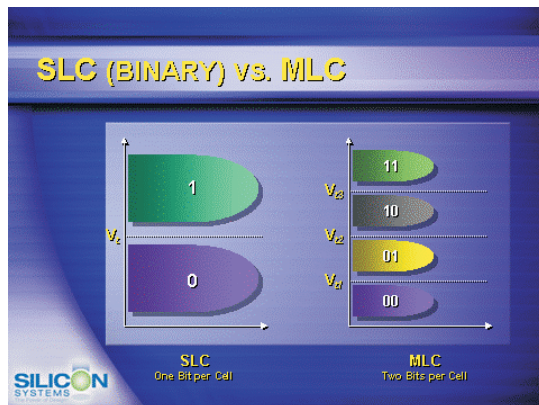


Figure 1

SLC NAND is generally specified at 100,000 write/erase cycles per block with 1-bit ECC (ECC is explained in greater detail in this white paper). MLC is generally specified at 10,000 cycles with ECC. While the datasheet for the MLC device does not specify the level of ECC required, the MLC manufacturers recommend 4-bit ECC when using this technology. Therefore, when using the same controller, a storage device using SLC will have an endurance value roughly 10 times that of a similar MLC-based product. A more thorough discussion of SLC versus MLC



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components can be found on the respective websites of various NAND flash component manufacturers on their respective websites.

WEAR LEVELING

Wear leveling allows data writes to be evenly distributed over the storage media. 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 memory 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 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 does not move.

To illustrate the effects of wear leveling on overall endurance, assume three different storage devices with the following characteristics:

- Flash Card with no wear leveling
- Flash Card with dynamic wear leveling
- SiliconDrive with static wear leveling

In addition, assume that all three storage devices use the same solid-state storage technology (SLC or MLC – for purposes of this discussion, it doesn't matter). All three devices will have 75 percent of their capacity as static data, which is defined as any data on a solid-state storage device that does not change. Examples of static data 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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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, 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 not recommended for Enterprise System OEM applications.

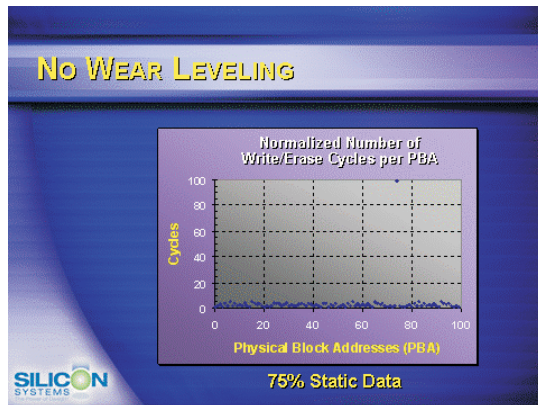


Figure 2



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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 percent of the flash card is used for static data, only 25 percent of the card is available for wear leveling. The endurance of the card is calculated to be 25 times greater than the card with no wear leveling, but only one-fourth that of static wear leveling.

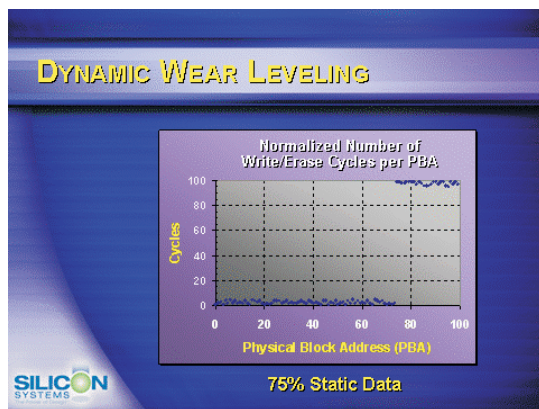


Figure 3



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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 those locations. If these locations are empty, the write occurs normally. If they contain 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 the card with no wear leveling and, in the example discussed here, four times the endurance of the card that uses dynamic wear leveling.

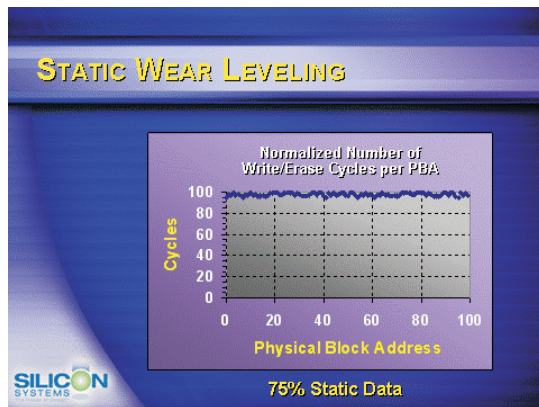


Figure 4



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ERROR CORRECTION

Part of a solid-state memory component 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 is based on the Company's industry-leading six-bit correction.

The term six-bit correction may be slightly confusing. Six-bit correction 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 true for two-bit and four-bit correction.

The relationship between the number of bytes per sector the controller can correct is not directly proportional to the overall endurance, since the bit error rate of NAND flash is not linear. To state it another way, six-bit error correction is more than three times better than two-bit ECC since the probability of getting a three-bit error is significantly greater than the probability of a seven-bit error.

SUMMARY OF MEDIA, WEAR LEVELING AND ECC

There is much confusion about the definition of "industrial grade." Many companies are seeking to only define industrial grade in terms of the solid-state memory components in the storage device – namely SLC vs. MLC NAND. While this is an important issue, the capability of the controller to compensate for the media is even more significant. Use of wear leveling and error correction technologies can dramatically affect the reliability and enhance the usable life of the storage device in an Enterprise System OEM application.

The matrix below summarizes the effects of the different items discussed throughout this white paper. In the table, a "1" indicates the best possible endurance scenario, and a "10" indicates the least desirable configuration. Values 2-9 are a bit more subjective, but their relative positioning makes sense in the context of most types of data transfers.

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	7
4-bit	5	4	2	9	8	6
6-bit	4	3	1*	8	7	5

* = SiliconSystems' SiliconDrive Configuration

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Wear leveling is important as it allows data writes to be evenly distributed over the entire storage device. A device with no wear leveling wears out faster because data is written to the same physical block. Flash cards that use dynamic wear leveling algorithm only write across dynamic or free data areas. By far the best endurance is provided by static wear leveling, where the data is written equally to all blocks of the storage device.

Equally important is the error correction capability. Most flash cards use error correction algorithms ranging from two-bit to four-bit correction. Industrial grade solutions should in general use more robust algorithms. SiliconSystems has designed an industry-leading six-bit error correction into its entire product family of SiliconDrives.

SiliconSystems' SiliconDrive technology provides the optimum mix of controller and storage component technology to maximize endurance. SiliconDrives use the powerful combination of the most reliable solid-state memory components currently available, static wear leveling and industry-leading six-bit ECC to deliver highly reliable industrial-grade solid-state storage solutions for Enterprise Systems OEMs.

Figure 343: Silicon Systems white paper - Page 9 of 10



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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:

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

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 = Block Level 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:

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

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 = Block Level 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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9. USB flash drive

9.1 General information

USB flash drives are easy-to-exchange memory media. Because of the fast data transfer provided by USB 2.0, 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 being used.

9.2 Order data

Model number	Description	Image
5MMUSB.0128-00	USB flash drive 128 MB SanDisk	
5MMUSB.0256-00	USB flash drive 256 MB SanDisk	
5MMUSB.0512-00	USB flash drive 512 MB SanDisk	
5MMUSB.1024-00	USB flash drive 1 GB SanDisk	

Table 250: USB flash drive order data

9.3 Technical data

Information:

The following defined characteristics, features and limit values are only valid for 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.

The technical data is current as of when this manual was printed. We reserve the right to make changes.

Features	5MMUSB.0128-00 / 5MMUSB.0256-00 / 5MMUSB.0512-00 / 5MMUSB.1024-00
LED	1 LED (green), signals data transfer (send and receive)
Power supply Current requirements	via the USB port < 650 μ A in sleep mode, < 150 mA read/write

Table 251: USB flash drive 5MMUSB.0xxx-00 technical data

Accessories • USB flash drive

Features	5MMUSB.0128-00 / 5MMUSB.0256-00 / 5MMUSB.0512-00 / 5MMUSB.1024-00
Interface	USB specification 2.0 high speed device, mass storage class, USB-IF and WHQL certified
Type	USB 1.1 and 2.0-compatible
Transfer rate	Up to 480 MBit (high speed)
Sequential reading	Max. 8.7 MB/second
Sequential writing	Max. 1.7 MB/second
Connection	To each USB type A interface
MTBF (@ 25°C)	> 100,000 hours
Data retention	10 years
Maintenance	None
Operating system support	Windows CE 4.1, CE 4.2, 98SE ¹⁾ , ME, 2000, XP Mac OS 9.x and Mac OS X
Mechanics	
Dimensions	
Length	62 mm
Width	19 mm
Thickness	11 mm
Environment	
Environmental temperature	
Operation	0 °C to +45 °C
Storage	-20 °C to +60 °C
Transportation	-20 °C to +60 °C
Relative humidity	
Operation	10 % to 90 %, non-condensing
Storage	5 % to 90 %, non-condensing
Transportation	5 % to 90 %, non-condensing
Vibration	
Operation	2 G (10 to 500 Hz), oscillation rate 1/minute
Storage	4 G (10 to 500 Hz), oscillation rate 1/minute
Transportation	4 G (10 to 500 Hz), oscillation rate 1/minute
Shock	
Operation	40 G and 11 ms duration (all axes)
Storage	80 G and 11 ms duration (all axes)
Transportation	80 G and 11 ms duration (all axes)
Altitude	
Operation	3048 meters
Storage	12192 meters
Transportation	12192 meters

Table 251: USB flash drive 5MMUSB.0xxx-00 technical data (Forts.)

1) For Win 98SE, a driver can be downloaded from the [SanDisk](#) homepage.

10. Null modem cable

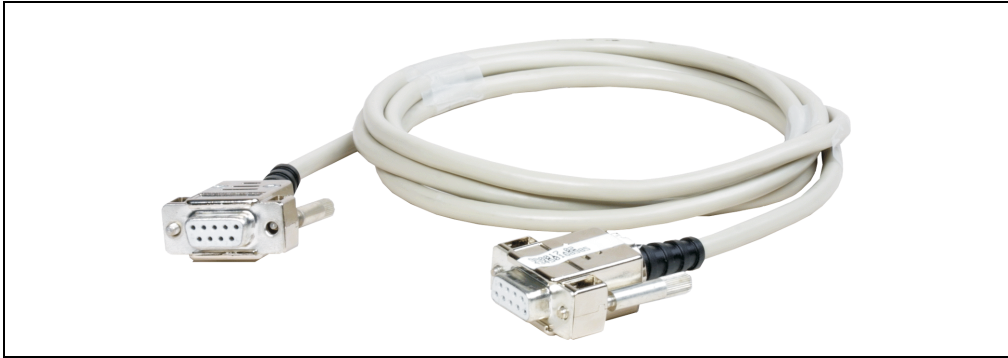


Figure 345: Null modem cable 9A0017.0x

10.1 Order data

Model number	Description	Note
9A0017.01	RS232 DB9 null modem cable 0.6 m Null modem cable RS232 0.6 m to connect UPS and IPC (9-pin DSUB socket - 9-pin DSUB socket).	
9A0017.02	RS232 DB9 null modem cable 1.8 m Null modem cable RS232 1.8 m to connect UPS and IPC (9-pin DSUB socket - 9-pin DSUB socket).	

Table 252: Model numbers - USB cables

10.2 Technical data

Information:

The technical data is current as of when this manual was printed. We reserve the right to make changes.

Features	9A0017.01	9A0017.02
Length	0.6 m ± 10 mm	1.8 m ± 30 mm
Outer diameter	Max. 5 mm	
Shielding	Entire cable	
Connector type	2 9-pin DSUB sockets - female	
Wire cross section	AWG 22,	
Flexibility	Flexible	
Flex radius	Min. 100 mm	

Table 253: Null modem cable technical data

10.3 Cable specifications

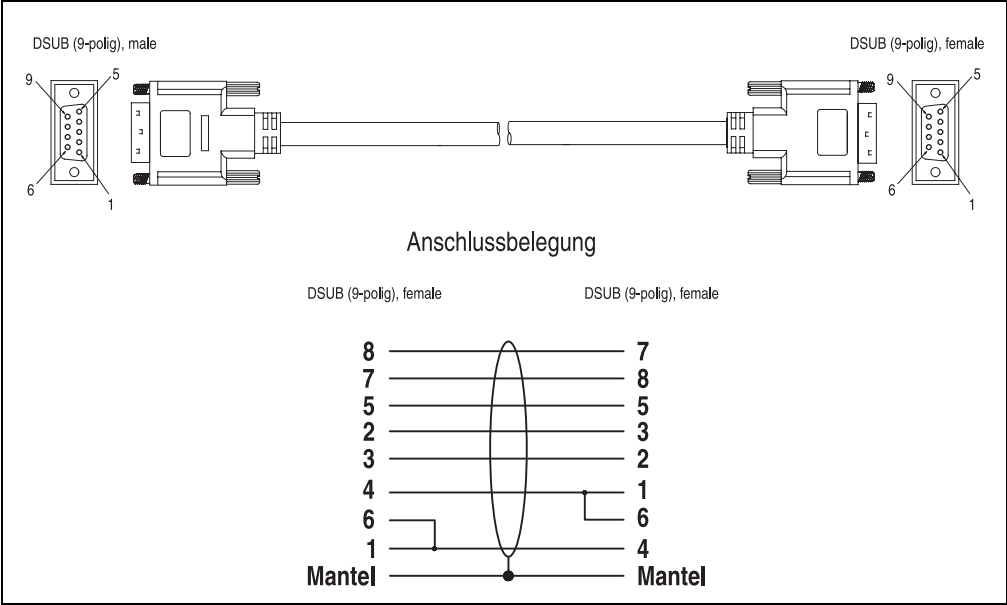


Figure 346: Null modem cable pin assignments

Chapter 7 • Maintenance / servicing

The following section describes service/maintenance work which can be carried out by the user.

Maintenance Work On	Maintenance Work	Change interval
Power Panel	Cleaning the touch screen	Depends on how dirty the touch membrane is Approximately once a week
	Changing the battery ¹⁾	2 years with SRAM ²⁾ component parts
		3 years without SRAM component parts

Table 254: Maintenance Work

1) Change intervals are recommended by B&R and refer to average life span and operating conditions.

2) Whether 256 KB of battery-buffered SRAM is available can be found in chapter 2 "Technical data" on page 35 for each individual Power Panel variant.

1. Operating Guidelines for the Touch Screen

- Do not use pointed objects such as pens, knives, etc. A specially designed pen for the touch screen is optional and can be ordered from B&R (model no. 9A0013.01).
- Do not place any heavy objects on the touch screen.

2. Cleaning the touch screen

Displays with touch screens should be cleaned at regular intervals.

2.1 Cleaning agents

A damp cloth should be used for cleaning the touch screen. 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, or scouring agents.

Information:

Only clean the device when it has been switched off, as touching the screen will trigger unintended functions to be executed.

3. Changing the battery

Changing the battery is only necessary for devices with a lithium battery (see chapter "Technical data" on page 35 for Power Panel devices).

The lithium battery guarantees buffering of the internal real-time clock (RTC), SRAM data, and individually saved BIOS settings. The battery status (good or bad) can be queried using software. From this point, starting from when battery capacity is recognized as insufficient, data buffering is guaranteed for approximately another 500 hours. When changing the battery, data is buffered for approximately another 10 minutes by a gold leaf capacitor.

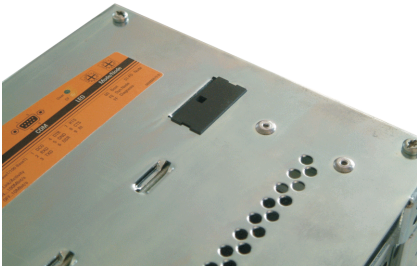
Under normal operating conditions, the battery has a typical lifespan of approximately 2 years.

Information:

The battery should only be changed by qualified personnel.

3.1 Procedure for changing the battery

- Disconnect the power supply to the Power Panel
- Touch the housing or earth connection (not the power supply!) in order to discharge any electrostatic charge from your body
- Remove the battery cover: The battery cover is found on the rear side of the Power Panel device.

0 aPCI Slot Power Panel Devices	1 or 2 aPCI Slot Power Panel Devices
	

- Remove the battery from the holder (don't use uninsulated tools >- risk of short circuiting). The battery should not be held by its edges. **Insulated** tweezers may also be used for removing the battery.

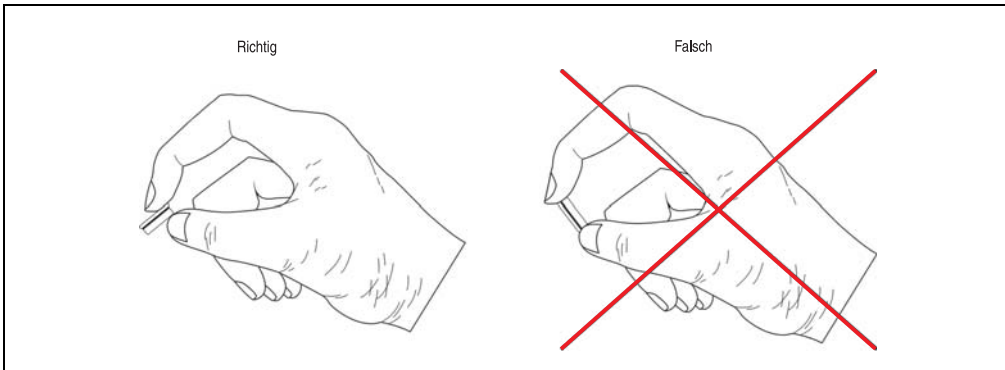


Figure 347: Battery handling

- After removing the battery, the data is buffered for at least another 10 minutes by a gold leaf capacitor so that data is not lost.
- Insert the new battery with correct polarity.
- Put on the battery cover and fasten the screws.
- Reconnect the power supply to the Power Panel.
- The data and time in BIOS may have to be set again (see section "Power Panel with BIOS" on page 431).

Warning!

Lithium batteries are considered hazardous waste. Used batteries should be disposed of accordingly.

Appendix A

The following defined characteristics, features, and limit values are only valid for the individual components used on a Power Panel device and are not to be regarded in light of the entire Power Panel device. The specifications in Chapter 2 "Technical data" beginning on Page 35 apply.

1. Touch screen

1.1 Elo

This touch screen is used in the 10.4", 12.1" and 15" Power Panel designs (depending on the revision).

Information:

The following characteristics, features and limit values are only valid for these individual components and can deviate from those for the entire device. For the entire device in which these individual components are used, refer to the data given specifically for the entire device.

Elo Accu touch screen	Specifications
Manufacturer	Elo (www.elotouch.com)
Precision For diagonals < 18" For diagonals > 18"	< 0.080 inches (2.032 mm) Maximum error on both sides 0.180 inches (4.752 mm) Maximum 1% of the diagonal for the active area of the touch screens
Reaction time	< 10 ms
Release pressure	< 100 grams
Resolution	4096 x 4096 touch points
Light permeability	Up to 78 %
Temperature Operation Storage Transportation	- 10 °C to + 50 °C - 40 °C to + 71 °C - 40 °C to + 71 °C

Table 255: Technical data for the Elo Accu touch screen

Touch screen

Elo Accu touch screen	Specifications
Relative humidity Operation Storage Transportation	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⁾	Aceton, ammonia-based glass cleaner, normal food and drinks, hexane, methylene chloride, methyl ethyl ketone, mineral spirits, terpentine, 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 255: Technical data for the Elo Accu touch screen (Forts.)

1) The active area of the touch screen is resistant to these chemicals for a timeframe of one hour at 21°C.

1.1.1 Temperature humidity diagram for operation and storage

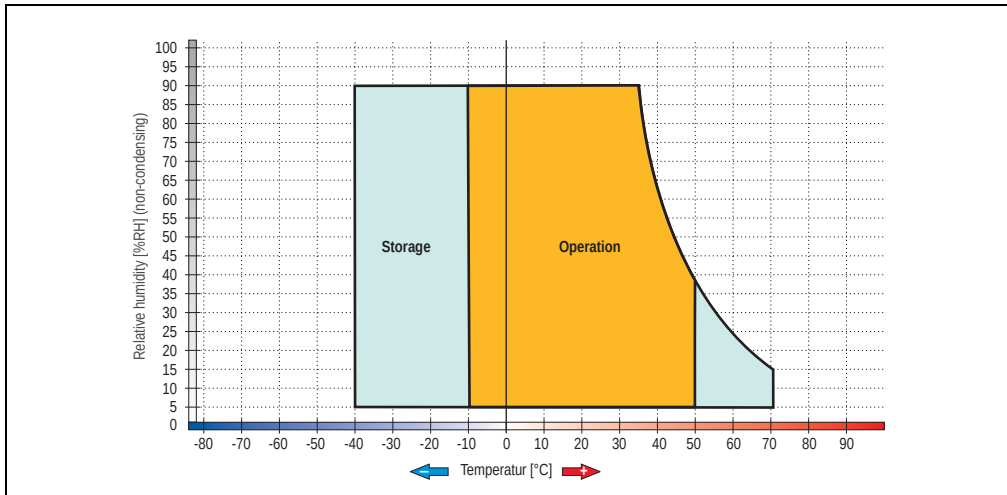


Figure 348: Temperature humidity diagram Elo Accu Touch Screen 5 wire

1.1.2 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, or scouring agents.

1.2 3M touch

This touch screen is used in the 10.4", 12.1" and 15" Power Panel designs (depending on the revision).

Information:

The following characteristics, features and limit values are only valid for these individual components and can deviate from those for the entire device. For the entire device in which these individual components are used, refer to the data given specifically for the entire device.

3M touch	Specifications
Manufacturer	3M (www.3M.com)
Precision	-
Reaction time	-
Release pressure	10 to 80 grams
Resolution	-
Light permeability	Up to 85 %
Temperature	
Operation	- 20 °C to + 50 °C
Storage	- 40 °C to + 70 °C
Transportation	- 40 °C to + 70 °C
Waterproofing	-
Lifespan	35 million contacts on the same point
Chemical resistance ¹⁾	Tea, coffee, ketchup, mustard, vinegar, beer, cola, red wine, cooking oil, whiskey, universal cleaning agents, washing detergent, bleach (5.25 %), hydrogen peroxide (3 %), Lysol, ethyl, alcohol, isopropyl alcohol, acetone, methyl ethyl ketone (MEK), toluene, concentrated hydrochloric acid, naphtha, mineral oil, motor oil, diesel, gear fluid, brake fluid, antifreeze, hydraulic oil
Activation	Finger, pointer, credit card, glove

Table 256: 3M touch

1) The active area of the touch screen is resistant to these chemicals for one hour at 22 °C and 45 % relative humidity.

1.2.1 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, or scouring agents.

1.3 Gunze touch

This touch screen is used in 5.7" Power Panel designs.

Information:

The following characteristics, features and limit values are only valid for these individual components and can deviate from those for the entire device. For the entire device in which these individual components are used, refer to the data given specifically for the entire device.

Gunze touch	Specifications
Manufacturer	Gunze (www.gunzeusa.com)
Precision	-
Reaction time	-
Release pressure	< 50 grams (with finger)
Resolution	-
Light permeability	Up to 84 %
Temperature	
Operation	- 10 °C to + 60 °C
Storage	- 20 °C to + 70 °C
Transportation	- 20 °C to + 70 °C
Waterproofing	-
Lifespan	1 million contacts on the same point
Chemical resistance	Alcoholic-based compound, such as ethanol.
Activation	Finger, pointer, credit card, glove

Table 257: Gunze touch

1.3.1 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, or scouring agents.

2. Mylar

Information:

The following characteristics, features and limit values are only valid for these individual components and can deviate from those for the entire device. For the entire device in which these individual components are used, refer to the data given specifically for the entire device.

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:

Alcohol Cyclohexanol Diacetone alcohol Glycol Isopropanol Glycerin 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% Trichloroacetic acid <50% Sulphuric acid <10%	Sodium hypochlorite <20% Hydrogen peroxide <25% Potassium carbonate Washing powders Fabric conditioner Ferric chloride Ferrous chloride (FeCl ₂) Ferrous chloride (FeCl ₃) Dibutyl phthalate Diocetyl 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 258: 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. Filter glass

If the Power Panel is not equipped with a touch screen, then a filter glass with the following properties is used.

Information:

The following characteristics, features and limit values are only valid for these individual components and can deviate from those for the entire device. For the entire device in which these individual components are used, refer to the data given specifically for the entire device.

3.1 Mechanical characteristics

Abrasion-resistant according to DIN 52347

Adhesive strength according to DIN 58 196-K2 (section 6)

3.2 Chemical properties

Durability according to DIN 50021 - CASS

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