



# Power Panel 100/200

## User's Manual

Version: **2.50 (August 2011)**

Model no.: **MAPP100.200-ENG**

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# Chapter 1 • General information

## Information:

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

## 1. Manual history

Version	Date	Change
1.0	May 2, 2002	- First version
1.1	Aug 20, 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	Oct 30, 2002	- Layout changes
1.3	Dec 6, 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	March 27, 2003	- Description of BIOS revised (table formatting, content)
1.5	April 28, 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	Change
1.6	July 1, 2004	<ul style="list-style-type: none"> <li>- Changeover to a new A5 book template V3.3</li> <li>- Ground resistance information added to the "Technical data" for the individual Power Panel devices</li> <li>- New figure for "Power Panel 100 and Power Panel 200 devices" on page 43.</li> <li>- "Features" on page 44 revised</li> <li>- Chapter 4 "Software", section 2 "Power Panel with BIOS" revised, separate BIOS descriptions for VGA, SVGA and XGA and for QVGA Power Panel devices</li> <li>- Section "BIOS upgrade und utilities" on page 506 regarding the new BIOS Upgrade disk set (3 disks) revised</li> <li>- Section "Power Panel 100 with BIOS and Windows XP Embedded" on page 524 as well as the model number for Windows XP Embedded image added</li> <li>- Device 4PP151.0571-01 added (see section "Device 4PP151.0571-01" on page 78)</li> <li>- Device 4PP151.0571-21 added (see section "Device 4PP151.0571-21" on page 84)</li> <li>- Device 4PP152.0571-01 added (See section "Device 4PP152.0571-01" on page 102)</li> <li>- Device 4PP152.0571-21 added (see section "Device 4PP152.0571-21" on page 108)</li> <li>- Device 4PP251.0571-45 added (see section "Device 4PP251.0571-45" on page 212)</li> <li>- Device 4PP251.0571-85 added (see section "Device 4PP251.0571-85" on page 224)</li> <li>- Device 4PP251.1043-75 added (see section "Device 4PP251.1043-75" on page 236)</li> <li>- Device 4PP251.1043-B5 added (see section "Device 4PP251.1043-B5" on page 242)</li> <li>- Device 4PP252.0571-65 added (see section "Device 4PP252.0571-65" on page 266)</li> <li>- Device 4PP252.0571-85 added (see section "Device 4PP252.0571-85" on page 272)</li> <li>- Device 4PP252.0571-A5 added (see section "Device 4PP252.0571-A5" on page 278)</li> <li>- Device 4PP252.1043-75 added (see section "Device 4PP252.1043-75" on page 284)</li> <li>- Device 4PP252.1043-B5 added (see section "Device 4PP252.1043-B5" on page 290)</li> <li>- Device 4PP280.1043-75 added (see section "Device 4PP280.1043-75" on page 296)</li> <li>- Device 4PP280.1043-B5 added (see section "Device 4PP280.1043-B5" on page 302)</li> <li>- Device 4PP280.1505-75 added (see section "Device 4PP280.1505-75" on page 308)</li> <li>- Device 4PP280.1505-B5 added (see section "Device 4PP280.1505-B5" on page 314)</li> <li>- Device 4PP281.1043-75 added (see section "Device 4PP281.1043-75" on page 320)</li> <li>- Device 4PP281.1043-B5 added (see section "Device 4PP281.1043-B5" on page 326)</li> <li>- Device 4PP281.1505-75 added (see section "Device 4PP281.1505-75" on page 332)</li> <li>- Device 4PP281.1505-B5 added (see section "Device 4PP281.1505-B5" on page 338)</li> <li>- Device 4PP282.1043-75 added (see section "Device 4PP282.1043-75" on page 344)</li> <li>- Device 4PP282.1043-B5 added (see section "Device 4PP282.1043-B5" on page 350)</li> <li>- Device 5PP120.1214-37 added (see section "Device 5PP120.1214-37" on page 382)</li> <li>- aPCI Interface Modules section deleted from the the Accessories chapter and Model Numbers Overview</li> <li>- Weight and dimension specifications for Power Panel devices corrected</li> <li>- Power Panel light / compact device types added (see section "Power Panel light / compact" on page 406)</li> <li>- 2 GB CompactFlash card (5CFCRD.2048-02) added</li> <li>- USB flash drives (5MMUSB.0128-00, 5MMUSB.0256-00, 5MMUSB.0512-00) added</li> <li>- Legend strip templates 5AC900.057X-00, 5AC900.057X-01, 5AC900.104X-00, 5AC900.104X-01, 5AC900.104X-02, 5AC900.150X-00 added</li> </ul>

Table 1: Manual history (Forts.)



Version	Date	Change
1.7	May 17, 2005	<ul style="list-style-type: none"> <li>- Section "Power Panel 100 as an intelligent visualization system" on page 455 added</li> <li>- Section "Power Panel 200 with Power Panel 100 terminals" on page 456 added</li> <li>- Error correction at an ambient temperature for 15" Power Panel devices (all 0-45°C)</li> <li>- Memory of Power Panel 100 devices with Automation Runtime expanded to 64 MB SDRAM</li> <li>- Accessory 4A0006.00-000 lithium battery 1 pc. added</li> <li>- Device 4PP151.1043-31 added (see section "Device 4PP151.1043-31" on page 90)</li> <li>- Device 4PP151.1505-31 added (see section "Device 4PP151.1505-31" on page 96)</li> <li>- Device 4PP152.1043-31 added (see section "Device 4PP152.1043-31" on page 114)</li> <li>- Device 4PP180.1043-31 added (see section "Device 4PP180.1043-31" on page 120)</li> <li>- Device 4PP180.1505-31 added (see section "Device 4PP180.1505-31" on page 126)</li> <li>- Device 4PP181.1505-31 added (see section "Device 4PP181.1043-31" on page 132)</li> <li>- Device 4PP181.1505-31 added (see section "Device 4PP181.1505-31" on page 138)</li> <li>- Device 4PP182.1043-31 added (see section "Device 4PP182.1043-31" on page 144)</li> <li>- Device 4PP251.1505-75 added (see section "Device 4PP251.1505-75" on page 248)</li> <li>- Device 4PP251.1505-B5 added (see section "Device 4PP251.1505-B5" on page 254)</li> <li>- Device 4PP120.1043-37A added (see section "Device 5PP120.1043-37A" on page 376)</li> <li>- Device 4PP120.1214-37A added (see section "Device 5PP120.1214-37A" on page 388)</li> <li>- Device 4PP120.1505-37A added (see section "Device 5PP120.1505-37A" on page 400)</li> <li>- aPCI slot cover 4AC200.1000-00 added (see section "aPCI slot cover" on page 561)</li> <li>- Lifespan calculation (white paper from SanDisk) for CompactFlash cards added (see section "Calculating the lifespan" on page 570)</li> <li>- Automation Runtime and SMC section added (see "Automation Runtime and SMC" on page 457)</li> <li>- Standards and certifications section added (see section 5 "Standards and certifications" on page 531)</li> <li>- Appendix A data (touch screen and mylar properties) added from page 593</li> <li>- BIOS upgrade and utilities section revised for new BIOS version 1.12</li> </ul>
1.8	Jan 31, 2006	<ul style="list-style-type: none"> <li>- Conductor cross section and AWG change for the supply plug.</li> <li>- Safety guidelines revised</li> <li>- IP65 protection specified in more detail</li> <li>- Legend strip position and color specifications added for each display front</li> <li>- Installation diagrams and tolerance information revised for the dimensions sections</li> <li>- Operating environment temperature of 15" Power Panel devices changed to 0 - 50°C</li> <li>- Rear 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</li> <li>- International European (CE) certification symbol changed</li> <li>- Section "Standards and certifications" revised</li> <li>- 1 GB flash drive (mod. no 5MMUSB.1024-00) added, 128 MB flash drive cancelled</li> <li>- Silicon Systems CompactFlash cards 5CFCRD.xxxx-03 added.</li> <li>- Note for pressing several keys simultaneously</li> <li>- Power Panel display contrast and viewing angle specifications added</li> <li>- Null modem cable (9A0017.01 and 9A0017.02) added in the "Accessories" section</li> </ul>
1.90	Sept 13, 2006	<ul style="list-style-type: none"> <li>- Safety guidelines updated to include ESD.</li> <li>- Maximum holding torque for aPCI modules included.</li> <li>- Storage and transport temperature for all 5.7" B/W Power Panel devices increased from -20°C .. +60°C to -20°C .. +70°.</li> <li>- New BIOS function "Auto (+Timing)" described for the video and flat panel configuration resolution settings.</li> <li>- Elo touch screen specification updated (see Appendix A).</li> </ul>

Table 1: Manual history (Forts.)

## General information • Manual history

Version	Date	Change
2.00	Nov 30, 2006	<ul style="list-style-type: none"> <li>- New model number for the PP100/200 documentation MAPP100.200-ENG.</li> <li>- Chapter 3 renamed to "Commissioning".</li> <li>- Document now includes the chm tag "Filename".</li> <li>- 2 GB USB San Disk flash drive 5MMUSB.2048-00 added.</li> <li>- "Viewing angles" on page 600 added.</li> <li>- Perspective information modified</li> <li>- "B&amp;R Key Editor information" on page 609 added.</li> <li>- "Mounting compatibilities" on page 601 added.</li> <li>- "Glossary" on page 615 added.</li> <li>- "Key and LED configurations" on page 439 added.</li> <li>- "Creating a bootable USB flash drive" added on page 575.</li> <li>- Figure 44 "Rear view - 4PP151.1043-31" on page 90 added</li> <li>- New model number for Windows CE</li> <li>- "HMI Drivers &amp; Utilities DVD 5SWHMI.0000-00" on page 584 added.</li> </ul>
2.10	April 25, 2007	<p>Changes / new features</p> <ul style="list-style-type: none"> <li>- USB flash drive 5MMUSB.0256-00 and USB flash drive 5MMUSB.1024-00 cancelled</li> <li>- Section 1.1 "Features" on page 44: "Software compatible with B&amp;R 2000 <b>PCC</b> family" changed to "Software compatible with B&amp;R 2000 <b>PLC</b> family"</li> <li>- Section "USB flash drive" on page 578 updated.</li> </ul>
2.20	Nov 10, 2008	<p>Changes / new features</p> <ul style="list-style-type: none"> <li>- Section "Protection against dust, humidity" on page 30 added</li> <li>- Section "Touch screen calibration" on page 447 added</li> <li>- Section „Preventing after-image effect in LCD/TFT monitors“, on page 582 added</li> <li>- Additional temperature humidity diagram information</li> <li>- Real-time clock specifications updated in technical data of Power Panel devices</li> <li>- Text change from "Compact Flash" to "CompactFlash".</li> <li>- New Windows CE order numbers added.</li> <li>- Section "Power Panel 100 with BIOS and Windows CE" on page 521 and section "Power Panel 100 with BIOS and Windows XP Embedded" on page 524 updated.</li> <li>- Section "Lithium battery" on page 558 updated.</li> <li>- Section "Changing the battery" on page 590 updated.</li> <li>- Vibration / shock specifications for all Power Panel 100/200 devices updated.</li> <li>- USB flash drive 5MMUSB.0512-00 discontinued.</li> <li>- Screen rotation information added for every device / section "Screen rotation" on page 448.</li> <li>- Footnote added to battery lifespan specification in the technical data for the devices: "Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on)".</li> <li>- Term "Grounding resistance" changed to "bleeder resistance".</li> <li>- Note for pressing several keys simultaneously (phantom keys).</li> </ul>
2.30	Feb 13, 2009	<ul style="list-style-type: none"> <li>- Nomenclature and formatting of safety guidelines changed according to specifications.</li> <li>- Topologies (symbol language) updated in chapter "Software" on page 453.</li> <li>- Section "Environmentally-friendly disposal" on page 31 added</li> <li>- Mounting orientation -45° and +45° added on page 438.</li> <li>- CompactFlash image replaced.</li> <li>- Section "USB flash drive" on page 578 updated.</li> <li>- Figure 14 "Rear view - 4PP120.0571-01" on page 54, figure 19 "Rear view - 4PP120.0571-21" on page 60 and updated.</li> <li>- Temperature humidity diagrams added for devices.</li> <li>- B&amp;R Key Editor information revised on page 609.</li> <li>- Section "Screen rotation" on page 448 added.</li> <li>- Section "Differences between the Windows CE 5.0 versions (Pro - PropPlus)" on page 522 added</li> </ul>

Table 1: Manual history (Forts.)

Version	Date	Change
2.40	July 22, 2009	<ul style="list-style-type: none"> <li>- "Key lifespan" added to the "Technical data" tables for the individual components.</li> <li>- "Actuating force" deleted from table 101 "Technical data - 4PP280.1043-B5" on page 303.</li> <li>- Display section in table 30 "Technical data - 4PP151.1505-31" on page 97 and table 137 "Technical data - 5PP120.1505-37A" on page 401 was updated.</li> <li>- Display diagonal for the 15 inch devices corrected from 380 mm to 381 mm (Table: Technical data).</li> <li>- Page 259 - 4PP251.1043-B5 - Mech. char. Depth = 108 mm, Height = 358 mm</li> <li>- Page 253 - 4PP251.1043-75 - Mech. char. Height = 358 mm</li> <li>- Figure 36 "Dimensions - 4PP151.0571-01" on page 82 and figure 41 "Dimensions - 4PP151.0571-21" on page 88 added.</li> <li>- CompactFlash information updated in chapter 6, Accessories (arrangement/order, detailed information concerning 5CFCRD.xxxx-03 changed and/or added)</li> <li>- Information text (Information!) on the décor foil and filter glass in Appendix A changed.</li> <li>- Section "Known problems" was removed from the Software chapter (Power Panel 100 with BIOS and Windows CE).</li> <li>- Information (General) for Windows XP Embedded on page 538 updated.</li> <li>- Information concerning the LED status check (Ethernet connection) on pages 50, 155 and 361 changed.</li> <li>- "Compact Flash" changed to "CompactFlash" in the images (rear view of the devices and CompactFlash slot).</li> <li>- Information for touch screen calibration on page 447 updated.</li> <li>- Temperature humidity diagrams and temperature specifications for the devices updated.</li> <li>- The "Touch screen type" table entry was added to the technical data for the devices.</li> </ul>
2.50	Aug 2, 2011	<ul style="list-style-type: none"> <li>- Sections</li> <li>"User tips for increasing the display lifespan" on page 449,</li> <li>"Pixel error" on page 450,</li> <li>"B&amp;R Automation Device Interface (ADI) - Control Center" on page 527,</li> <li>"B&amp;R Automation Device Interface (ADI) development kit" on page 611,</li> <li>"B&amp;R Automation Device Interface (ADI) .NET SDK" on page 613</li> <li>and "Known problems / issues" on page 451 added.</li> <li>- Section „Preventing after-image effect in LCD/TFT monitors" removed.</li> <li>- Lithium battery OAC201.9 replaced with OAC201.91.</li> <li>- Section "CompactFlash cards 5CFCRD.xxxx-03" on page 564 updated.</li> <li>- Information about derating after temperature humidity diagram removed.</li> <li>- Information about half-brightness time added (footnote in technical data).</li> <li>- Section "HMI Drivers &amp; Utilities DVD 5SWHMI.0000-00" on page 584 moved in chapter appendix A and updated.</li> <li>- Temperature humidity diagram of touch screens added (3M touch, Gunze touch and of USB flash drive updated).</li> <li>- Color information of the 15inch devices in the technical data corrected.</li> <li>- Informations about operating systems updated ("Power Panel 100 with BIOS and Windows CE" on page 521, "Power Panel 100 with BIOS and Windows XP Embedded" on page 524).</li> </ul>

Table 1: Manual history (Forts.)

## 2. Safety guidelines

### 2.1 Intended use

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

### 2.2 Protection against electrostatic discharges

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

#### 2.2.1 Packaging

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

#### 2.2.2 Guidelines for proper ESD handling

##### Electrical components with housing

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

##### Electrical components without housing

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

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

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

### Individual components

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

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

## 2.3 Policy and procedures

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

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

All tasks such as installation, commissioning, and maintenance are only permitted to be carried out by qualified personnel. Qualified personnel are persons who are familiar with the transport, mounting, installation, commissioning, and operation of the product and who have the appropriate qualifications (e.g. IEC 60364). National accident prevention guidelines must be followed.

The safety guidelines, connection descriptions (rating plate and documentation) and limit values listed in the technical data must be read carefully and must be observed before installation and commissioning.

## 2.4 Transport and storage

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

## **2.5 Installation**

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

## **2.6 Operation**

### **2.6.1 Protection against touching electrical parts**

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

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

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

### **2.6.2 Protection against dust, humidity**

For operation in dusty or humid conditions, correctly installed (cutout installation) operating and monitoring devices such as Automation Panel or Power Panel are protected on the front side. IPCs should never be used in very dusty environments as the active cooling fans can clog (bus unit and processor), and can no longer guarantee sufficient cooling.

The rear side of all devices must be protected from dust and humidity and must be cleaned at suitable intervals.

### **2.6.3 Programs, viruses and dangerous programs**

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

## 2.7 Environmentally-friendly disposal

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

### 2.7.1 Separation of materials

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

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

Table 2: Environmentally-friendly separation of materials

Disposal must comply with the respective legal regulations.

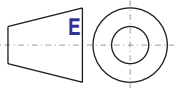
### 3. Organization of safety notices

The safety notices in this manual are organized as follows:

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

Table 3: Organization of safety notices

### 4. Guidelines



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



## 5. Model numbers

### 5.1 Power Panel 100 with Automation Runtime

Model number	Description	Note
4PP120.0571-01	<b>Power Panel 120 LCD B/W QVGA 5.7" T MH</b> Power Panel PP120; 5.7" QVGA b/w LC display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 64 MB SDRAM; metal housing, IP 65 protection (front side); 24 VDC.	See page 54
4PP120.0571-21	<b>Power Panel 120 LCD C QVGA 5.7" T MH</b> Power Panel PP120; 5.7" QVGA color LC display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 64 MB SDRAM; metal housing, IP65 protection (front side); 24 VDC.	See page 60
4PP120.1043-31	<b>Power Panel 120 TFT C VGA 10.4" T MH</b> Power Panel PP120; 10.4" VGA color TFT display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 64 MB SDRAM; metal housing, IP65 protection (front side); 24 VDC.	See page 66
4PP120.1505-31	<b>Power Panel 120 TFT C XGA 15" T MH</b> Power Panel PP120; 15" XGA color TFT display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 64 MB SDRAM; metal housing, IP65 protection (front side); 24 VDC.	See page 72
4PP151.0571-01	<b>Power Panel 151 LCD B/W QVGA 5.7" F MH</b> 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; 2x USB; metal housing, IP65 protection (front side); 24 VDC.	See page 78
4PP151.0571-21	<b>Power Panel 151 LCD C QVGA 5.7" F MH</b> 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; 2x USB; metal housing, IP65 protection (front side); 24 VDC.	See page 84
4PP151.1043-31	<b>Power Panel 151 TFT C VGA 10.4" F MH</b> 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; 2x USB; metal housing, IP65 protection (front side); 24 VDC.	See page 90
4PP151.1505-31	<b>Power Panel 151 TFT C XGA 15" F MH</b> 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; 2x USB; metal housing, IP65 protection (front side); 24 VDC.	See page 96
4PP152.0571-01	<b>Power Panel 152 LCD B/W QVGA 5.7" F MH</b> 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; 2x USB; metal housing, IP65 protection (front side); 24 VDC.	See page 102
4PP152.0571-21	<b>Power Panel 152 LCD C QVGA 5.7" F MH</b> 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; 2x USB; metal housing, IP65 protection (front side); 24 VDC.	See page 108
4PP152.1043-31	<b>Power Panel 152 TFT VGA 10.4" F MH</b> 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; 2x USB; metal housing, IP65 protection (front side); 24 VDC.	See page 114

Table 4: Power Panel 100 with Automation Runtime

## General information • Model numbers

Model number	Description	Note
4PP180.1043-31	<b>Power Panel 180 TFT VGA 10.4" F T MH</b> 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; 2x USB; metal housing, IP65 protection (front side); 24 VDC.	See page 120
4PP180.1505-31	<b>Power Panel 180 TFT VGA 15" F T MH</b> 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; 2x USB; metal housing, IP65 protection (front side); 24 VDC.	See page 126
4PP181.1043-31	<b>Power Panel 181 TFT VGA 10.4" F T MH</b> 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; 2x USB; metal housing, IP65 protection (front side); 24 VDC.	See page 132
4PP181.1505-31	<b>Power Panel 181 TFT VGA 15" F T MH</b> Power Panel PP151; 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; 2x USB; metal housing, IP65 protection (front side); 24 VDC.	See page 138
4PP182.1043-31	<b>Power Panel 182 TFT VGA 10.4" F T MH</b> Power Panel PP152; 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; 2x USB; metal housing, IP65 protection (front side); 24 VDC.	See page 144

Table 4: Power Panel 100 with Automation Runtime (Forts.)

## 5.2 Power Panel 200 with Automation Runtime

Model number	Description	Note
4PP210.0000-95	<b>Power Panel 210 Controller MH 2aPCI</b> Power Panel PP210 controller, CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 64 MB SDRAM; 2 aPCI slots; 256 kB SRAM; battery; metal housing, IP 65 protection (front side); 24 VDC.	See page 158
4PP220.0571-45	<b>Power Panel 220 LCD B/W QVGA 5.7" T MH 1aPCI</b> Power Panel PP220; 5.7" QVGA b/w LC display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 64 MB SDRAM; 1 aPCI Slot; 256 kB SRAM; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 164
4PP220.0571-65	<b>Power Panel 220 LCD C QVGA 5.7" T MH 1aPCI</b> Power Panel PP220; 5.7" QVGA color LC display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 64 MB SDRAM; 1 aPCI slot; 256 kB SRAM; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 170
4PP220.0571-85	<b>Power Panel 220 LCD B/W QVGA 5.7" T MH 2aPCI</b> Power Panel PP220; 5.7" QVGA b/w LC display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 64 MB SDRAM; 2 aPCI slots; 256 kB SRAM; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 176
4PP220.0571-A5	<b>Power Panel 220 LCD C QVGA 5.7" T MH 2aPCI</b> Power Panel PP220; 5.7" QVGA color LC display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 64 MB SDRAM; 2 aPCI slots; 256 kB SRAM; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 182
4PP220.1043-75	<b>Power Panel 220 TFT C VGA 10.4" T MH 1aPCI</b> Power Panel PP220; 10.4" VGA color TFT display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 64 MB SDRAM; 1 aPCI slot; 256 kB SRAM; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 188

Table 5: Power Panel 200 with Automation Runtime

Model number	Description	Note
4PP220.1043-B5	<b>Power Panel 220 TFT C VGA 10.4" T MH 2aPCI</b> Power Panel PP220; 10.4" VGA color TFT display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 64 MB SDRAM; 2 aPCI slots; 256 kB SRAM; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 194
4PP220.1505-75	<b>Power Panel 220 TFT C XGA 15" T MH 1aPCI</b> Power Panel PP220; 15" XGA color TFT display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 64 MB SDRAM; 1 aPCI slot; 256 kB SRAM; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 200
4PP220.1505-B5	<b>Power Panel 220 TFT C XGA 15" T MH 2aPCI</b> Power Panel PP220; 15" XGA color TFT display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 64 MB SDRAM; 2 aPCI slots; 256 kB SRAM; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 206
4PP251.0571-45	<b>Power Panel 251 LCD B/W QVGA 5.7" F MH 1aPCI</b> 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; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 212
4PP251.0571-65	<b>Power Panel 251 LCD C QVGA 5.7" F MH 1aPCI</b> 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; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 218
4PP251.0571-85	<b>Power Panel 251 LCD B/W QVGA 5.7" F MH 2aPCI</b> 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; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 224
4PP251.0571-A5	<b>Power Panel 251 LCD C QVGA 5.7" F MH 2aPCI</b> 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; 2x USB; battery metal housing, IP65 protection (front side); 24 VDC.	See page 230
4PP251.1043-75	<b>Power Panel 251 TFT C VGA 10.4" F MH 1aPCI</b> 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; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 236
4PP251.1043-B5	<b>Power Panel 251 TFT C VGA 10.4" F MH 2aPCI</b> Power Panel PP251; 10" VGA color TFT display; 10 soft keys; 28 function keys and 20 system keys; 2 aPCI slot; 64 MB SDRAM; 256 kB SRAM CompactFlash slot (type I); ETH 10/100; RS 232; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 242
4PP251.1505-75	<b>Power Panel 251 TFT C XGA 15" F MH 1aPCI</b> 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; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 248
4PP251.1505-B5	<b>Power Panel 251 TFT C XGA 15" F MH 2aPCI</b> 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; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 254
4PP252.0571-45	<b>Power Panel 252 LCD B/W QVGA 5.7" F MH 1aPCI</b> 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; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 260
4PP252.0571-65	<b>Power Panel 252 LCD C QVGA 5.7" F MH 1aPCI</b> 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; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 266

Table 5: Power Panel 200 with Automation Runtime (Forts.)

## General information • Model numbers

Model number	Description	Note
4PP252.0571-B5	<b>Power Panel 252 LCD B/W QVGA 5.7" F MH 2aPCI</b> 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; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 272
4PP252.0571-A5	<b>Power Panel 252 LCD C QVGA 5.7" F MH 2aPCI</b> 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; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 278
4PP252.1043-75	<b>Power Panel 252 TFT C VGA 10.4" F MH 1aPCI</b> 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; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 284
4PP252.1043-B5	<b>Power Panel 252 TFT C VGA 10.4" F MH 2aPCI</b> 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; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 290
4PP280.1043-75	<b>Power Panel 280 TFT C VGA 10.4" FT MH 1aPCI</b> 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; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 296
4PP280.1043-B5	<b>Power Panel 280 TFT C VGA 10.4" FT MH 2aPCI</b> 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; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 302
4PP280.1505-75	<b>Power Panel 280 TFT C XGA 15" FT MH 1aPCI</b> 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; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 308
4PP280.1505-B5	<b>Power Panel 280 TFT C XGA 15" FT MH 2aPCI</b> 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; 2x USB; battery; metal housing, IP65 protection (front side); 24VDC.	See page 314
4PP281.1043-75	<b>Power Panel 281 TFT C VGA 10.4" FT MH 1aPCI</b> 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, 2x USB; 64 MB SDRAM; 1 aPCI slot; 256 kB SRAM; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 320
4PP281.1043-B5	<b>Power Panel 281 TFT C VGA 10.4" FT MH 2aPCI</b> 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, 2x USB; 64 MB SDRAM; 2 aPCI slots; 256 kB SRAM; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 326
4PP281.1505-75	<b>Power Panel 281 TFT C XGA 15" FT MH 1aPCI</b> 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; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 332
4PP281.1505-B5	<b>Power Panel 281 TFT C XGA 15" FT MH 2aPCI</b> 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; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 338

Table 5: Power Panel 200 with Automation Runtime (Forts.)

Model number	Description	Note
4PP282.1043-75	<b>Power Panel 282 TFT C VGA 10.4" FT MH 1aPCI</b> 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, 2x USB; 64 MB SDRAM; 1 aPCI slots; 256 kB SRAM; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 344
4PP282.1043-B5	<b>Power Panel 282 TFT C VGA 10.4" FT MH 2aPCI</b> 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, 2x USB; 64 MB SDRAM; 2 aPCI slots; 256 kB SRAM; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 350

Table 5: Power Panel 200 with Automation Runtime (Forts.)

### 5.3 Power Panel 100 with BIOS

Model number	Description	Note
5PP120.0571-27	<b>Power Panel 120 LCD C QVGA 5.7" T MH</b> Power Panel PP120 BIOS; 5.7" QVGA color LC display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 128 MB SDRAM; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 364
5PP120.1043-37	<b>Power Panel 120 TFT C VGA 10.4" T (3M) MH</b> Power Panel PP120 BIOS; 10.4" VGA color TFT display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 128 MB SDRAM; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 370
5PP120.1043-37A	<b>Power Panel 120 TFT C VGA 10.4" T MH</b> Power Panel PP120 BIOS; 10.4" VGA color TFT display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 128 MB SDRAM; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 376
5PP120.1214-37	<b>Power Panel 120 TFT C VGA 12.1" T (3M) MH</b> 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; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 382
5PP120.1214-37A	<b>Power Panel 120 TFT C VGA 12.1" T MH</b> 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; 2x USB; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 388
5PP120.1505-37	<b>Power Panel 120 TFT C XGA 15" T (3M) MH</b> Power Panel PP120 BIOS; 15" XGA color TFT display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 128 MB SDRAM; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 394
5PP120.1505-37A	<b>Power Panel 120 TFT C XGA 15" T MH</b> Power Panel PP120 BIOS; 15" XGA color TFT display with touch screen (resistive), CompactFlash slot (type I), ETH 10/100, RS 232, 2x USB; 128 MB SDRAM; battery; metal housing, IP65 protection (front side); 24 VDC.	See page 400

Table 6: Model numbers - Power Panel 100 with BIOS

## 5.4 Accessories

Model number	Description	Note
0AC201.91	<b>Lithium batteries (4x)</b> Lithium batteries, 4 pcs., 3 V / 950 mAh, button cell	See page 558
4A0006.00-000	<b>Lithium battery (1x)</b> Lithium battery, 1 pc., 3 V / 950 mAh, button cell	See page 558
0TB103.9	<b>Plug 24V 5.08 3-pin screw clamps</b> 24 VDC 3-pin connector, female. Screw clamp, 3.31 mm <sup>2</sup> , protected against vibration by the screw flange.	See page 559
0TB103.91	<b>Plug 24V 5.08 3-pin cage clamps</b> 24 VDC 3-pin connector, female. Cage clamps, 3.31 mm <sup>2</sup> , protected against vibration by the screw flange.	See page 559
4AC200.1000-00	<b>aPCI slot cover, 1 pc.</b> Optional aPCI slot cover for inserting into an available aPCI slot on a Power Panel 200 device	See page 561
5AC900.057X-00	<b>Legend strips 3x 5.7" Vertical1</b> 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.	See page 562
5AC900.057X-01	<b>Legend strips 2x 5.7" Horizontal2</b> 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.	See page 562
5AC900.104X-00	<b>Legend strip 1x 10.4" Vertical1</b> 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.	See page 562
5AC900.104X-01	<b>Legend strip 1x 10.4" Horizontal2</b> 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.	See page 562
5AC900.104X-02	<b>Legend strips 3x 10.4" Horizontal1</b> Legend strip template for Power Panels 4PP180.1043-31, 4PP280.1043-75, 4PP280.1043-B5. For 3 devices.	See page 562
5AC900.150X-00	<b>Legend strips 4x 15"</b> 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.	See page 562
5CFCRD.0032-01	<b>CompactFlash 32 MB TrueIDE SanDisk/R2</b> CompactFlash card with 32 MB flash PROM and True IDE/ATA interface	Cancelled since 11/2003
5CFCRD.0032-02	<b>CompactFlash 32 MB TrueIDE SanDisk/A</b> CompactFlash card with 32 MB flash PROM and True IDE/ATA interface	Cancelled since 12/2005
5CFCRD.0064-01	<b>CompactFlash 64 MB TrueIDE SanDisk/R2</b> CompactFlash card with 64 MB flash PROM and True IDE/ATA interface	Cancelled since 11/2003
5CFCRD.0064-02	<b>CompactFlash 64 MB TrueIDE SanDisk/A</b> CompactFlash card with 64 MB flash PROM and True IDE/ATA interface	Cancelled since 12/2005
5CFCRD.0064-03	<b>CompactFlash 64 MB TrueIDE SSI</b> CompactFlash card with 64 MB SLC NAND flash, and True IDE/ATA interface	See page 564
5CFCRD.0128-01	<b>CompactFlash 128 MB TrueIDE SanDisk/R2</b> CompactFlash card with 128 MB flash PROM and True IDE/ATA interface	Cancelled since 11/2003
5CFCRD.0128-02	<b>CompactFlash 128 MB TrueIDE SanDisk/A</b> CompactFlash card with 128 MB flash PROM and True IDE/ATA interface	Cancelled since 12/2005

Table 7: Model numbers - Accessories

Model number	Description	Note
5CFCRD.0128-03	<b>CompactFlash 128 MB TrueIDE SSI</b> CompactFlash card with 128 MB SLC NAND flash, and True IDE/ATA interface	See page 564
5CFCRD.0128-01	<b>CompactFlash 196 MB TrueIDE SanDisk/R2</b> CompactFlash card with 196 MB flash PROM and True IDE/ATA interface	Cancelled since 07/2003
5CFCRD.0256-01	<b>CompactFlash 256 MB TrueIDE SanDisk/R2</b> CompactFlash card with 256 MB flash PROM and True IDE/ATA interface	Cancelled since 11/2003
5CFCRD.0256-02	<b>CompactFlash 256 MB TrueIDE SanDisk/A</b> CompactFlash card with 256 MB flash PROM and True IDE/ATA interface	Cancelled since 12/2005
5CFCRD.0256-03	<b>CompactFlash 256 MB TrueIDE SSI</b> CompactFlash card with 256 MB SLC NAND flash, and True IDE/ATA interface	See page 564
5CFCRD.0384-01	<b>CompactFlash 384 MB TrueIDE SanDisk/R2</b> CompactFlash card with 384 MB flash PROM and True IDE/ATA interface	Cancelled since 07/2003
5CFCRD.0512-01	<b>CompactFlash 512 MB TrueIDE SanDisk/R2</b> CompactFlash card with 512 MB flash PROM and True IDE/ATA interface	Cancelled since 11/2003
5CFCRD.0512-02	<b>CompactFlash 512 MB TrueIDE SanDisk/A</b> CompactFlash card with 512 MB flash PROM and True IDE/ATA interface	Cancelled since 12/2005
5CFCRD.0512-03	<b>CompactFlash 512 MB TrueIDE SSI</b> CompactFlash card with 512 MB SLC NAND flash, and True IDE/ATA interface	See page 564
5CFCRD.1024-02	<b>CompactFlash 1024 MB TrueIDE SanDisk/A</b> CompactFlash card with 1024 MB flash PROM and True IDE/ATA interface	Cancelled since 12/2005
5CFCRD.1024-03	<b>CompactFlash 1024 MB TrueIDE SSI</b> CompactFlash card with 1024 MB SLC NAND flash, and True IDE/ATA interface	See page 564
5CFCRD.2048-02	<b>CompactFlash 2048 MB TrueIDE SanDisk/A</b> CompactFlash card with 2048 MB flash PROM and True IDE/ATA interface	Cancelled since 12/2005
5CFCRD.2048-03	<b>CompactFlash 2048 MB TrueIDE SSI</b> CompactFlash card with 2048 MB SLC NAND flash, and True IDE/ATA interface	See page 564
5CFCRD.4096-03	<b>CompactFlash 4096 MB TrueIDE SSI</b> CompactFlash card with 4096 MB SLC NAND flash, and True IDE/ATA interface	See page 564
5CFCRD.8192-03	<b>CompactFlash 8192 MB TrueIDE SSI</b> CompactFlash card with 8192 MB SLC NAND flash, and True IDE/ATA interface	See page 564
5MMUSB.0128-00	<b>USB flash drive 128 MB SanDisk</b> USB 2.0 flash drive 128 MB	Cancelled since 03/2007 Replaced by 5MMUSB.2048-00
5MMUSB.0256-00	<b>USB flash drive 256 MB SanDisk</b> USB 2.0 flash drive 256 MB	Cancelled since 07/2007 Replaced by 5MMUSB.2048-00
5MMUSB.0512-00	<b>USB flash drive 512 MB SanDisk</b> USB 2.0 flash drive 512 MB	Cancelled since 03/2007 Replaced by 5MMUSB.2048-00
5MMUSB.1024-00	<b>USB flash drive 1 GB SanDisk</b> USB 2.0 flash drive 1 GB	Cancelled since 03/2007 Replaced by 5MMUSB.2048-00

Table 7: Model numbers - Accessories (Forts.)

## General information • Model numbers

Model number	Description	Note
5MMUSB.2048-00	<b>USB flash drive 2 GB SanDisk</b> USB 2.0 flash drive 2 GB	See page 578
9A0017.01	<b>RS232 DB9 null modem cable 0.6 m</b> Null modem cable RS232 0.6 m to connect UPS and IPC (9-pin DSUB socket - 9-pin DSUB socket).	See page 582
9A0017.02	<b>RS232 DB9 null modem cable 1.8 m</b> Null modem cable RS232, 1.8 m, to connect UPS and IPC (9-pin DSUB socket - 9-pin DSUB socket).	See page 582
9A0013.01	<b>Pen for resistive touch screen</b>	
5SWHMI.0000-00	<b>HMI Drivers &amp; Utilities DVD</b>	See page 584

Table 7: Model numbers - Accessories (Forts.)

## 5.5 Software

Model number	Description	Note
9S0001.13-010	<b>OEM MS Win CE4.1 German</b> Only delivered with a Power Panel BIOS device	
9S0001.13-020	<b>OEM MS Win CE4.1 English</b> Only delivered with a Power Panel BIOS device	
9S0001.17-020	<b>OEM Microsoft Windows CE 4.2 English</b> OEM Microsoft Windows CE 4.2 English license Only delivered with a Power Panel BIOS device	
9S0001.29-020	<b>OEM Microsoft Windows CE 5.0 English</b> OEM Microsoft Windows CE 5.0 English license Only delivered with a Power Panel BIOS device.	Cancelled since 07/2007
5SWWCE.0517-ENG	<b>WinCE5.0 Pro PP100 SCx200</b> Microsoft Windows CE 5.0 Professional, English; for PP100 BIOS units 5PP120.0571-27, 5PP120.1043-37A, 5PP120.1214-37A, 5PP120.1505-37A, order CompactFlash separately (at least 128 MB).	
5SWWCE.0617-ENG	<b>WinCE5.0 ProPlus PP100 SCX200</b> Microsoft Windows CE 5.0 Professional Plus, English; for PP100 BIOS units 5PP120.0571-27, 5PP120.1043-37A, 5PP120.1214-37A, 5PP120.1505-37A, order CompactFlash separately (at least 128 MB).	
5SWWXP.0417-ENG	<b>WinXPe FP2007 PP100 SCx200</b> Microsoft Windows XP embedded English, Feature Pack 2007; for PP100 BIOS units 5PP120.1043-37A, 5PP120.1214-37A, 5PP120.1505-37A, order CompactFlash separately (at least 512 MB). Only delivered with a new PC.	
9S0001.16-020	<b>OEM MS WinXPe PP100/200 w/CF</b> OEM MS WinXP Embedded Runtime PP100 preinstalled on CompactFlash 256 MB; for Power Panel 100 BIOS. Only delivered with a Power Panel BIOS device	Cancelled since 07/2007 Replacement type: 5SWWXP.0417-ENG
9S0001.25-020	<b>OEM MS WinXPe PP100/200 w/CF SP2</b> OEM Microsoft Windows XP embedded SP2 for PP100 BIOS, English; preinstalled on CompactFlash 256 MB. Only delivered with a Power Panel BIOS device	Cancelled since 07/2007 Replacement type: 5SWWXP.0417-ENG

Table 8: Model numbers - Software



## 5.6 Documentation

Model number	Description	Note
MAPP100.200-GER	Power Panel 100 / 200 User's Manual, German	
MAPP100.200-ENG	Power Panel 100 / 200 User's Manual, English	

Table 9: Model numbers - Documentation



## Chapter 2 • Technical data

### 1. General information

B&R offers the B&R Power Panel 100 and Power Panel 200 product ranges 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 operator panels 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 legend 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 both<sup>1)</sup>
- Filter glass (multiple-coated, non-reflective)<sup>1)</sup>
- Horizontal and vertical mounting orientations, numeric and alphanumeric keys<sup>1)</sup>
- 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)<sup>1)</sup>
- BIOS or Automation Runtime operating system<sup>1)</sup>
- Real-time clock (battery-buffered)<sup>1)</sup>
- Up to 128 MB SDRAM main memory<sup>1)</sup>

<sup>1)</sup> 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 559).

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 52).

Supply voltage	
Pin	Description
1	+
2	Functional ground
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

### Warning!

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.

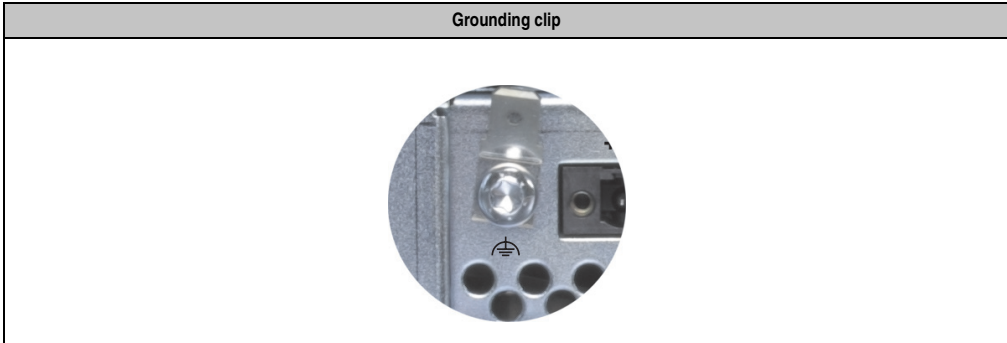


Figure 3: Grounding clip

### 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 COM	
RS232 interface Modem-capable, not electrically isolated Up to 115 kBaud	
Pin	RS232
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

9-pin DSUB plug

Table 10: Pin assignments - COM

### 2.1.4 USB port

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

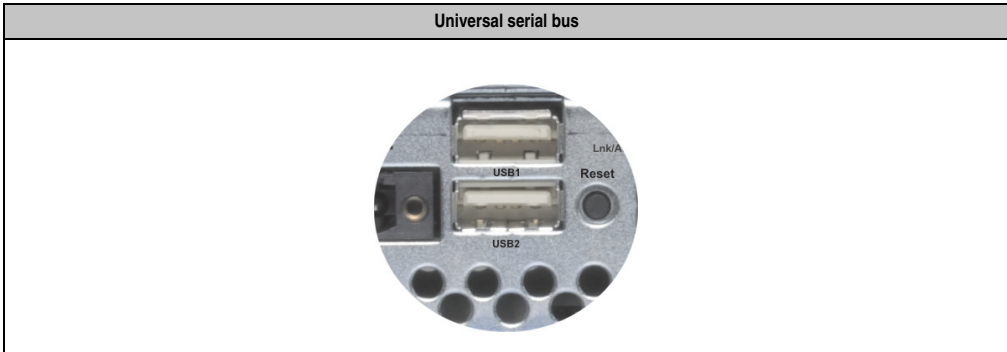


Figure 4: USB port

Technical data - 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 11: Technical data for USB connection

## Warning!

- Only the USB devices tested and verified by B&R and found in the section "Accessories" on page 555 may be connected to the USB interface.
- 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 to FD are available for any purpose in an application and can be evaluated by the application program.

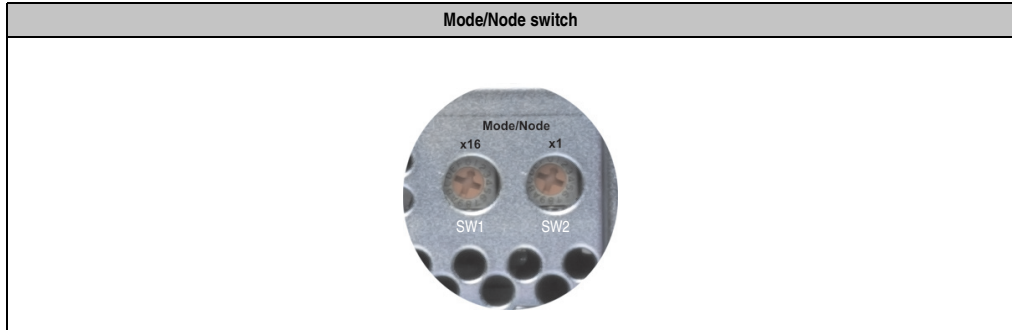


Figure 5: Mode/Node switch

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	Diagnostics	Automation Runtime diagnostics mode (CompactFlash Automation Runtime or terminal operation).

Table 12: 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.

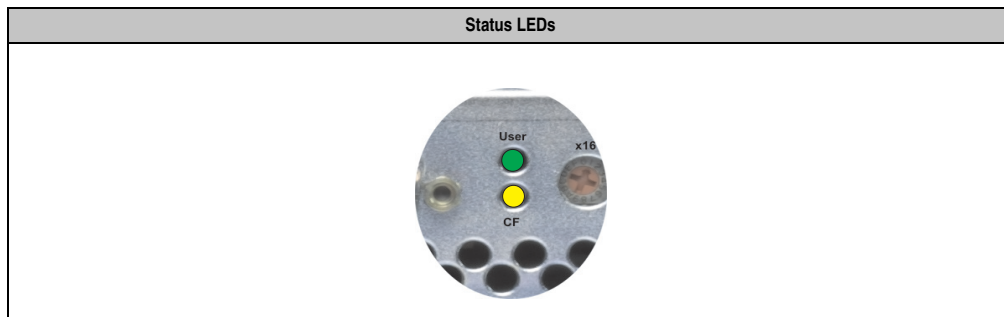


Figure 6: Status LEDs

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 13: Status LEDs

### 2.1.7 Ethernet connection

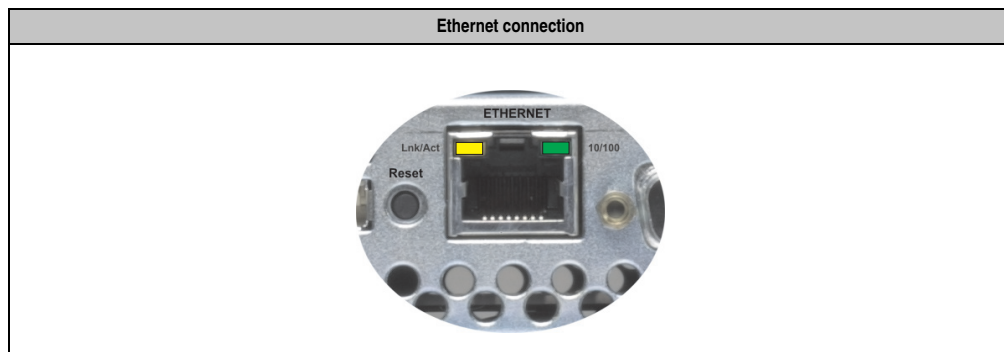


Figure 7: Ethernet connection

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

Table 14: Ethernet controller

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

## Technical data • Power Panel 100 with Automation Runtime

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 (LED blinks during transfer)	No link

Table 15: 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 connections. In order to avoid accidental activation, a reset can only be triggered with a pointed object.

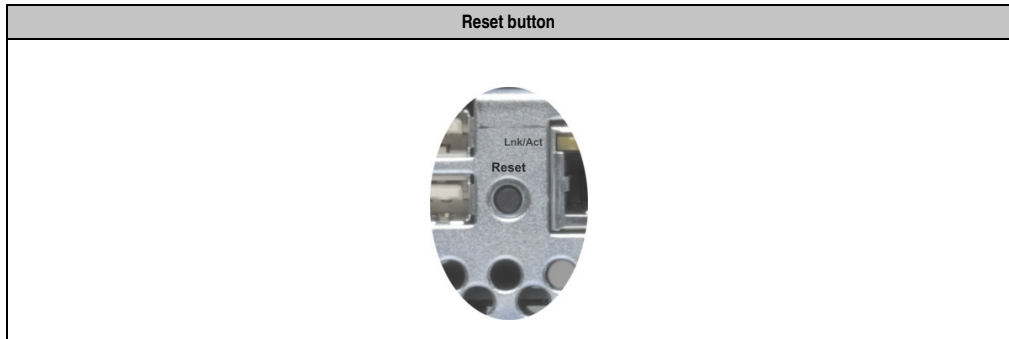


Figure 8: Reset button

### 2.1.9 CompactFlash slot

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

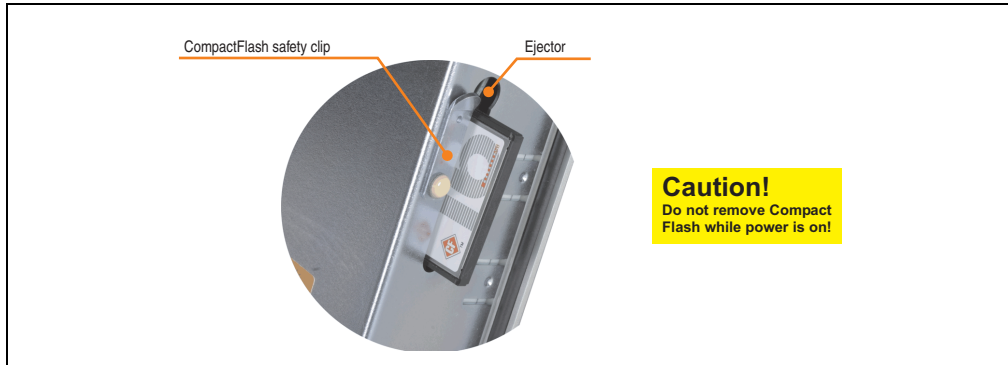


Figure 9: CompactFlash slot

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

## Warning!

**The power must be turned off before inserting or removing the CompactFlash card!**  
As a safety measure, a sticker is also attached to Power Panel devices stating this.

## 2.2 Stickers

### 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 shows brief descriptions for all of the interfaces:

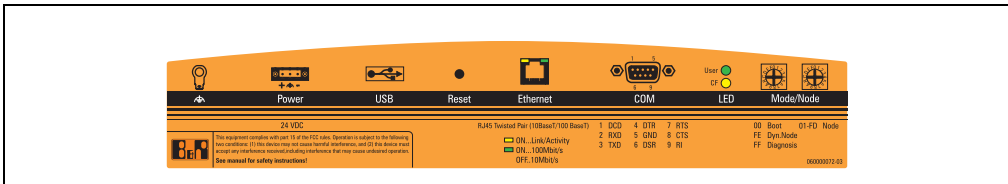


Figure 11: Device label

### 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

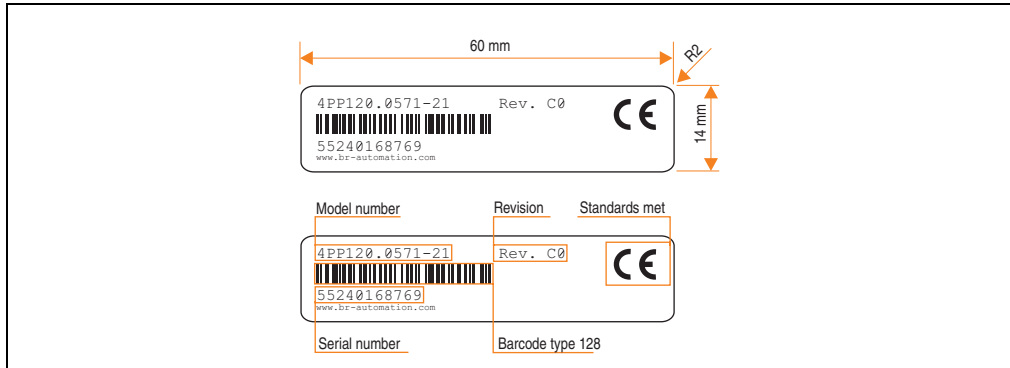


Figure 12: Design / dimensions - Serial number sticker

### 2.3 Device 4PP120.0571-01



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

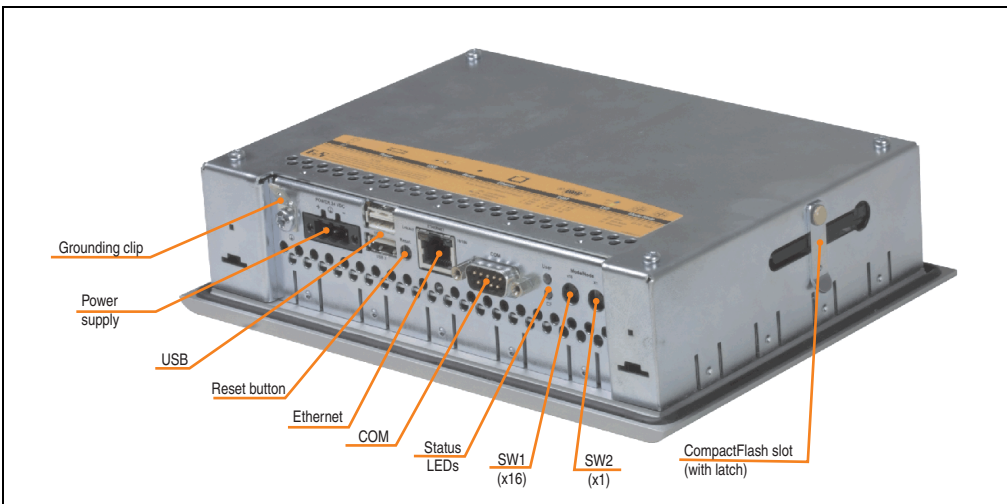


Figure 14: Rear view - 4PP120.0571-01

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB (Rev. < H0: 16 MB) SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 2 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Buffer time	-
Real-time clock Battery-buffered Accuracy	- At 25°C: Typically 10 ppm (1 seconds) per day <sup>1)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	-
Ethernet Controller Transfer rate Connection Cables 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 Amount Connection	Type I 1 slot Primary IDE device

Table 16: Technical data - 4PP120.0571-01

## Technical data • Power Panel 100 with Automation Runtime

Features	4PP120.0571-01
Serial interface COM 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 Amount 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 switch	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>2)</sup>	LCD monochrome 5.7 in (144 mm) 8 shades of gray QVGA, 320 x 240 pixels 25:1 Direction R / direction L = 40° Direction U = 40° / direction D = 50° 140 cd/m <sup>2</sup> 50,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Gunze Analog, resistive Hampshire, serial, 12-bit 84%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys 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. -
Bleeder resistance	0 Ohm

Table 16: 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	
Ambient temperature <sup>3)</sup>	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 2.3.2 "Temperature humidity diagram" on page 58
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 16: Technical data - 4PP120.0571-01 (Forts.)

- 1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 2) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 3) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.3.2 Temperature humidity diagram

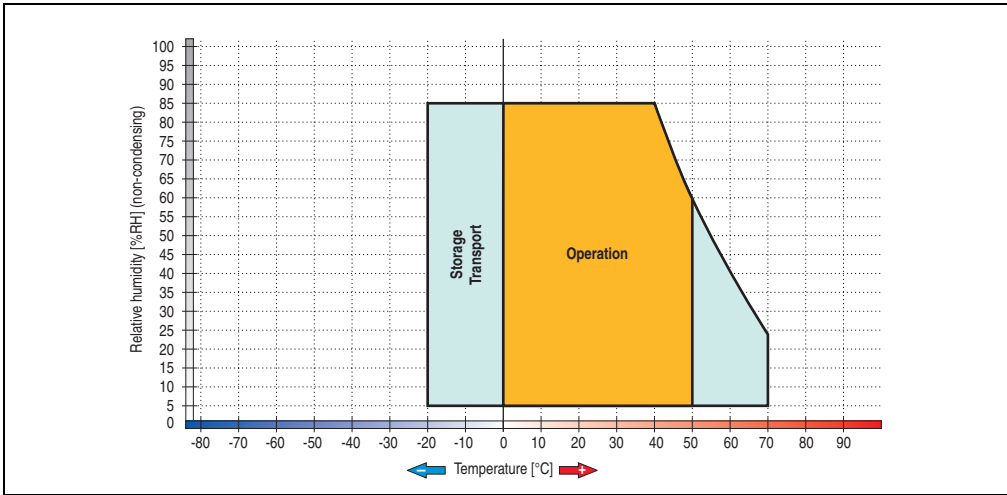


Figure 15: Temperature humidity diagram - 4PP120.0571-01

### 2.3.3 Dimensions

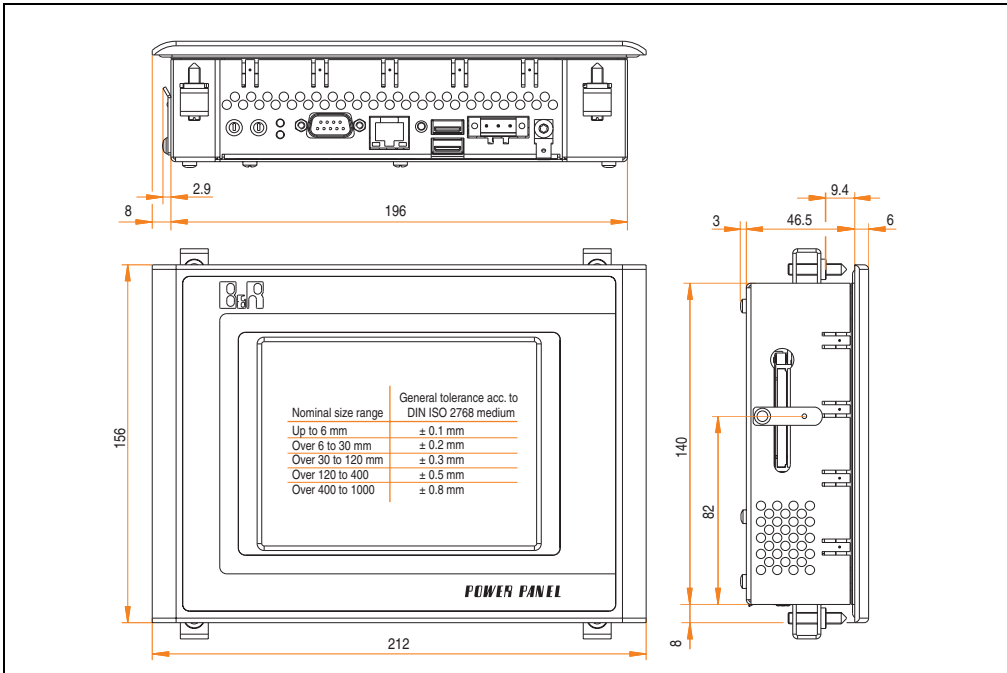


Figure 16: Dimensions - 4PP120.0571-01

### 2.3.4 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 16 "Dimensions - 4PP120.0571-01" on page 58) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

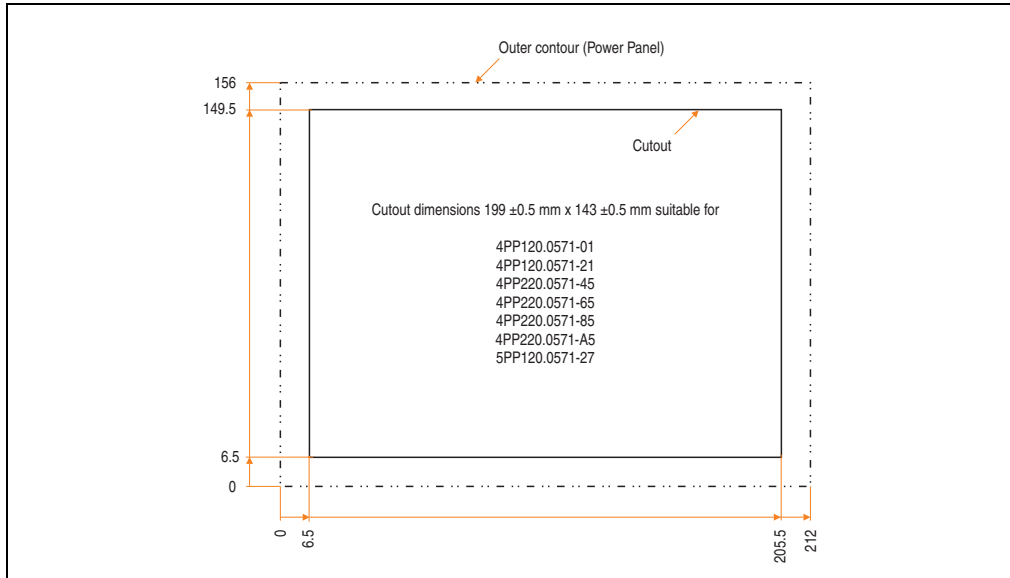


Figure 17: Cutout dimensions

### 2.3.5 Contents of delivery

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

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

Table 17: Contents of delivery - 4PP120.0571-01

## 2.4 Device 4PP120.0571-21



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

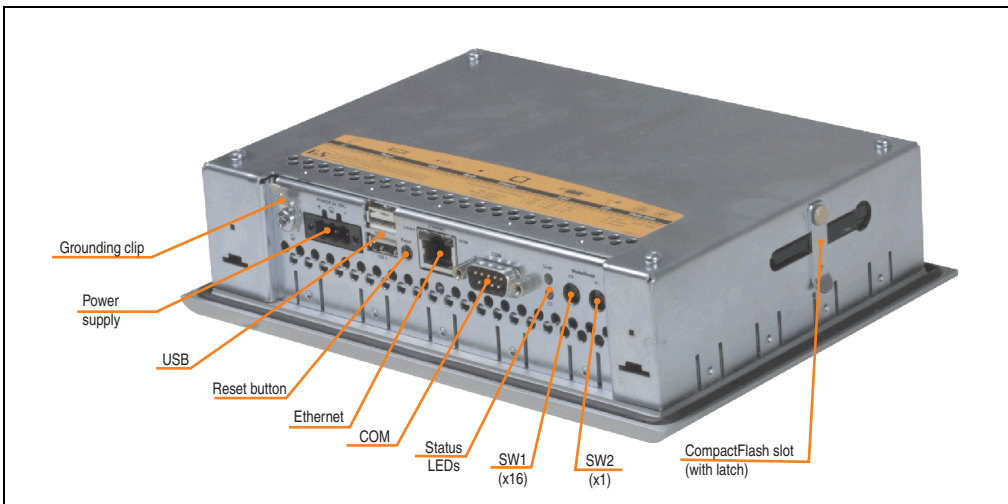


Figure 19: Rear view - 4PP120.0571-21

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB (Rev. < H0: 16 MB) SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 2 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Buffer time	-
Real-time clock Battery-buffered Accuracy	- At 25°C: Typically 10 ppm (1 seconds) per day <sup>1)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	-
Ethernet Controller Transfer rate Connection Cables 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 Amount Connection	Type I 1 slot Primary IDE device

Table 18: Technical data - 4PP120.0571-21

## Technical data • Power Panel 100 with Automation Runtime

Features	4PP120.0571-21
Serial interface COM 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 Amount 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 switch	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>2)</sup>	Color LCD 5.7 in (144 mm) 256 colors QVGA, 320 x 240 pixels 40:1 Direction R / direction L = 40° Direction U = 40° / direction D = 50° 150 cd/m <sup>2</sup> 50,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Gunze Analog, resistive Hampshire, serial, 12-bit 84%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys 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. -
Bleeder resistance	0 Ohm

Table 18: Technical data - 4PP120.0571-21 (Forts.)

<b>Mechanical characteristics</b>	<b>4PP120.0571-21</b>
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
<b>Environmental characteristics</b>	
Ambient temperature <sup>3)</sup>	
Operation	0 to +50°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 2.4.2 "Temperature humidity diagram" on page 64
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 18: Technical data - 4PP120.0571-21 (Forts.)

- 1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 2) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 3) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.4.2 Temperature humidity diagram

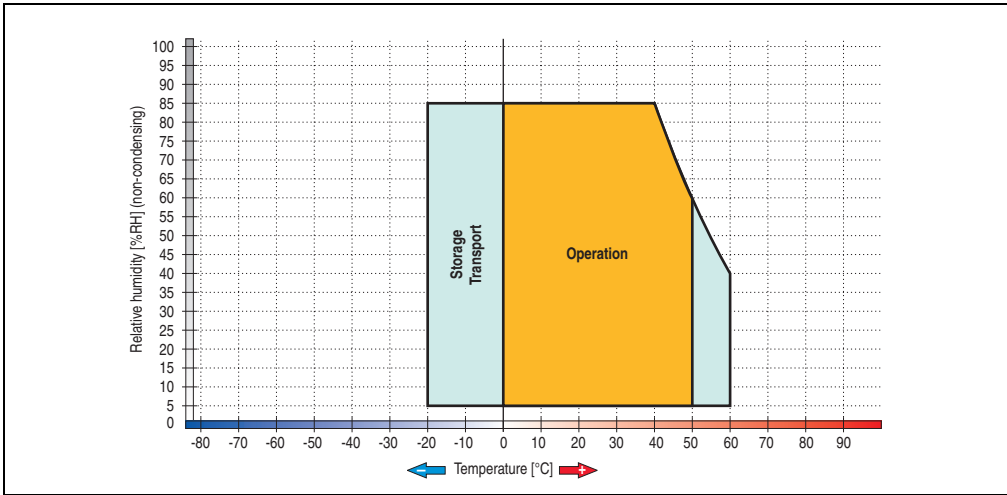


Figure 20: Temperature humidity diagram - 4PP120.0571-21

### 2.4.3 Dimensions

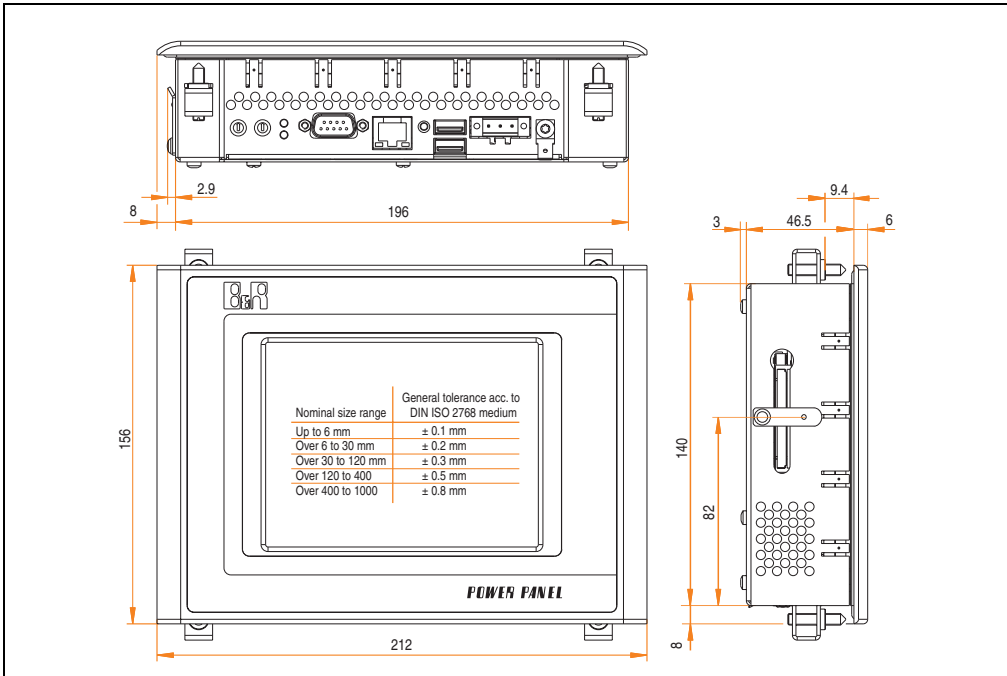


Figure 21: Dimensions - 4PP120.0571-21



### 2.4.4 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 21 "Dimensions - 4PP120.0571-21" on page 64) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

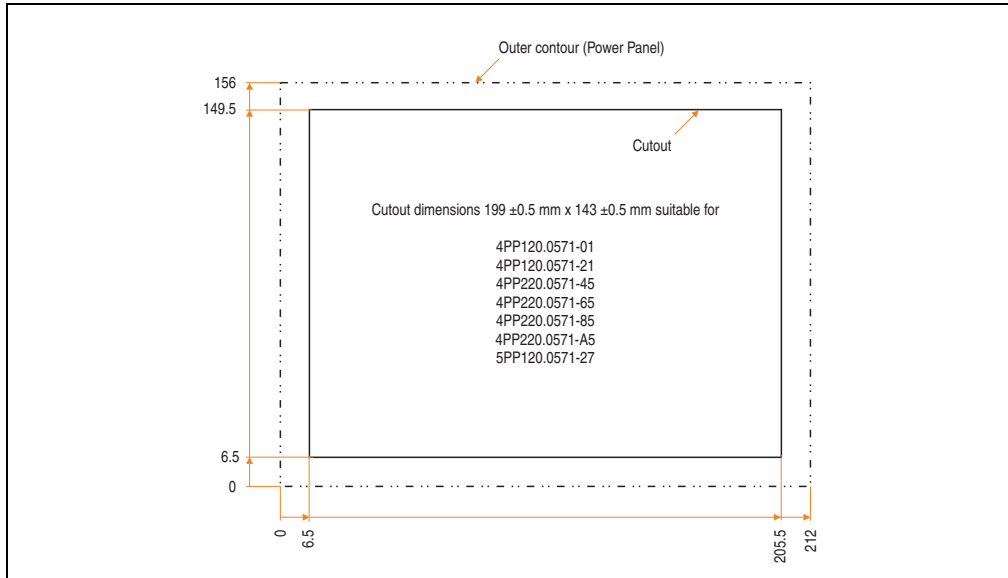


Figure 22: Cutout dimensions

### 2.4.5 Contents of delivery

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

Amount	Component
1	Power Panel 120 LCD C QVGA 5.7" T MH
4	Retaining clips included

Table 19: Contents of delivery - 4PP120.0571-21

## 2.5 Device 4PP120.1043-31

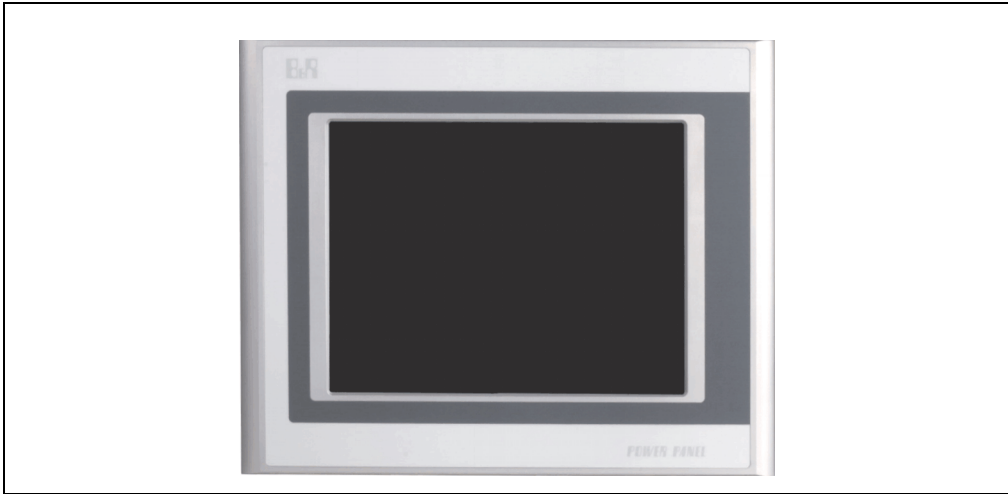


Figure 23: Front view - 4PP120.1043-31

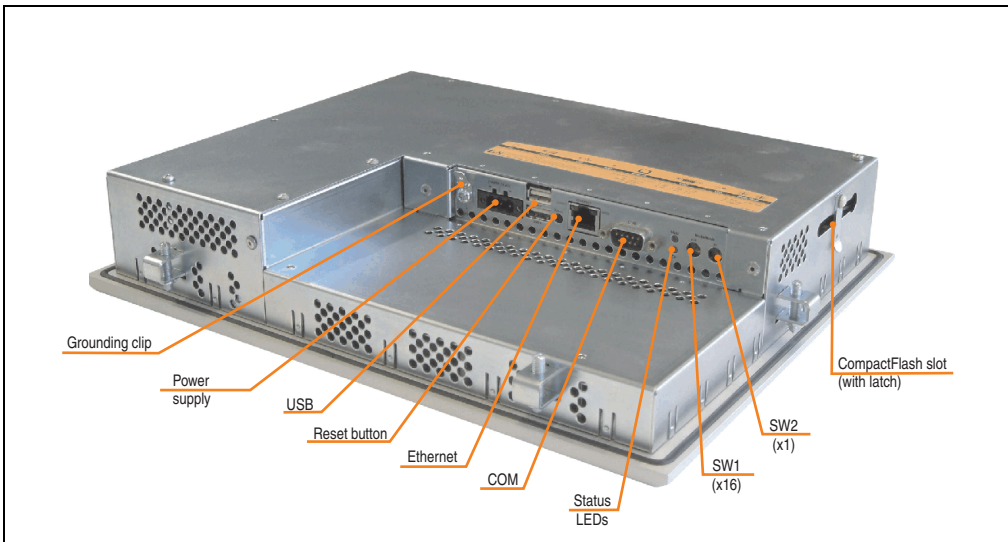


Figure 24: Rear view - 4PP120.1043-31

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB (Rev. < H0: 16 MB) SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 2 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Buffer time	-
Real-time clock Battery-buffered Accuracy	- At 25°C: Typically 10 ppm (1 seconds) per day <sup>1)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	-
Ethernet Controller Transfer rate Connection Cables 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 Amount Connection	Type I 1 slot Primary IDE device

Table 20: Technical data - 4PP120.1043-31

## Technical data • Power Panel 100 with Automation Runtime

Features	4PP120.1043-31
Serial interface COM 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 Amount 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 switch	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>2)</sup>	Color TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 Direction R / direction L = 70° Direction U = 45° / direction D = 55° 350 cd/m <sup>2</sup> 55,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Elo (Rev. < 10: 3M) Analog, resistive Hampshire, serial, 12-bit 78%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys 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. -
Bleeder resistance	≤ 24 kOhm

Table 20: Technical data - 4PP120.1043-31 (Forts.)

<b>Mechanical characteristics</b>	<b>4PP120.1043-31</b>
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
<b>Environmental characteristics</b>	
Ambient temperature <sup>3)</sup>	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 2.5.2 "Temperature humidity diagram" on page 70
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 20: Technical data - 4PP120.1043-31 (Forts.)

- 1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 2) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 3) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.5.2 Temperature humidity diagram

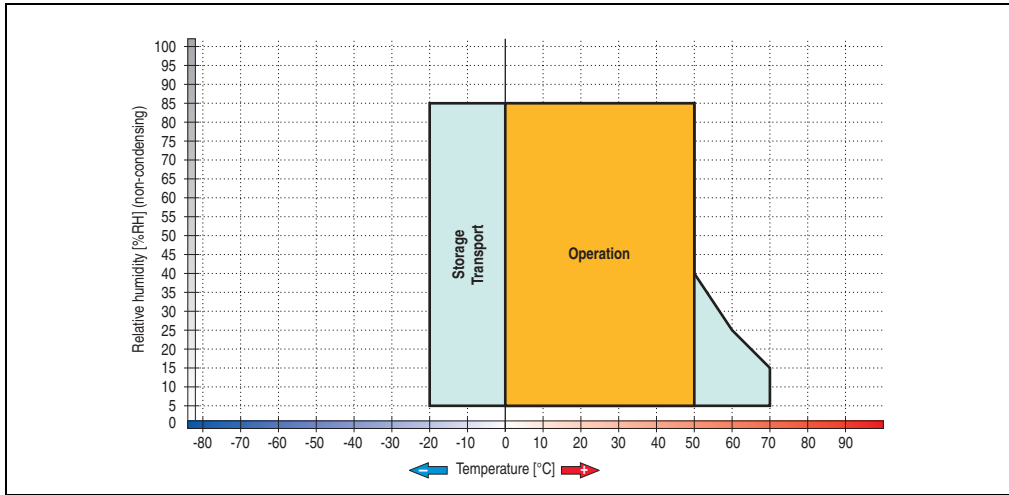


Figure 25: Temperature humidity diagram - 4PP120.1043-31

### 2.5.3 Dimensions

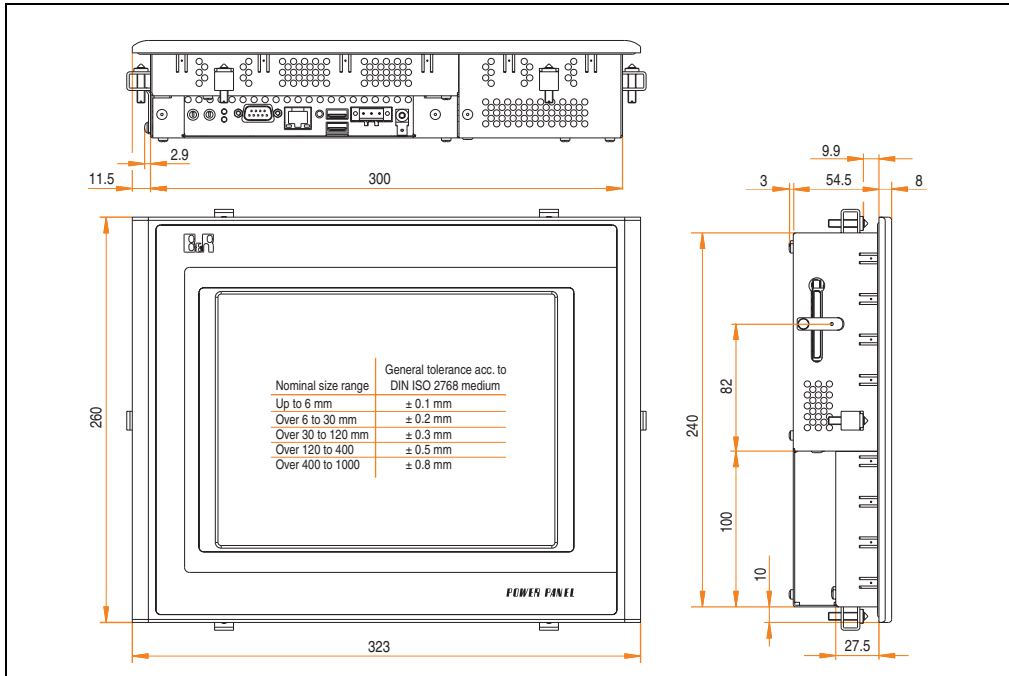


Figure 26: Dimensions - 4PP120.1043-31

### 2.5.4 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 26 "Dimensions - 4PP120.1043-31" on page 70) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

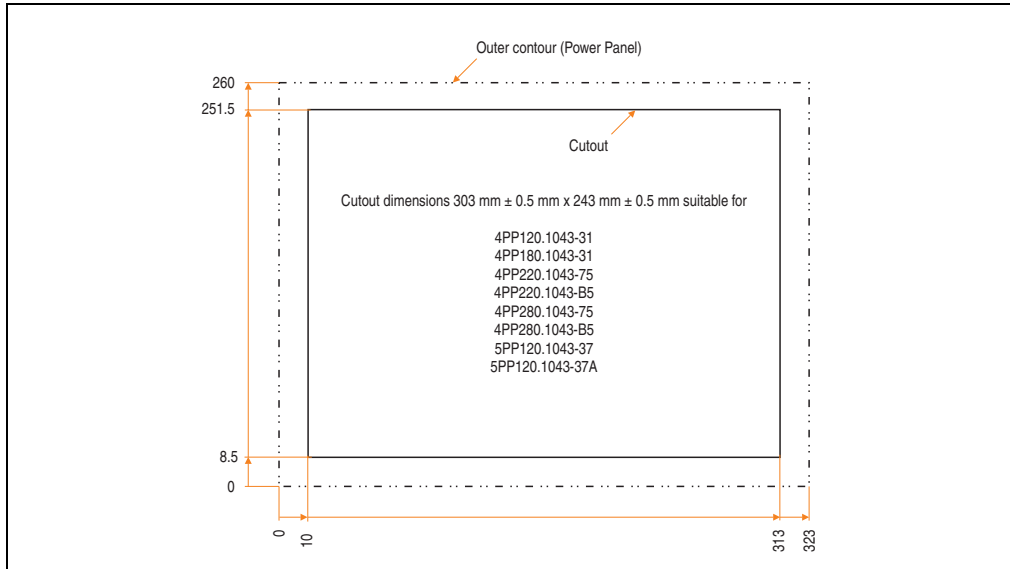


Figure 27: Cutout dimensions

### 2.5.5 Contents of delivery

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

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

Table 21: Contents of delivery - 4PP120.1043-31

## 2.6 Device 4PP120.1505-31



Figure 28: Front view - 4PP120.1505-31

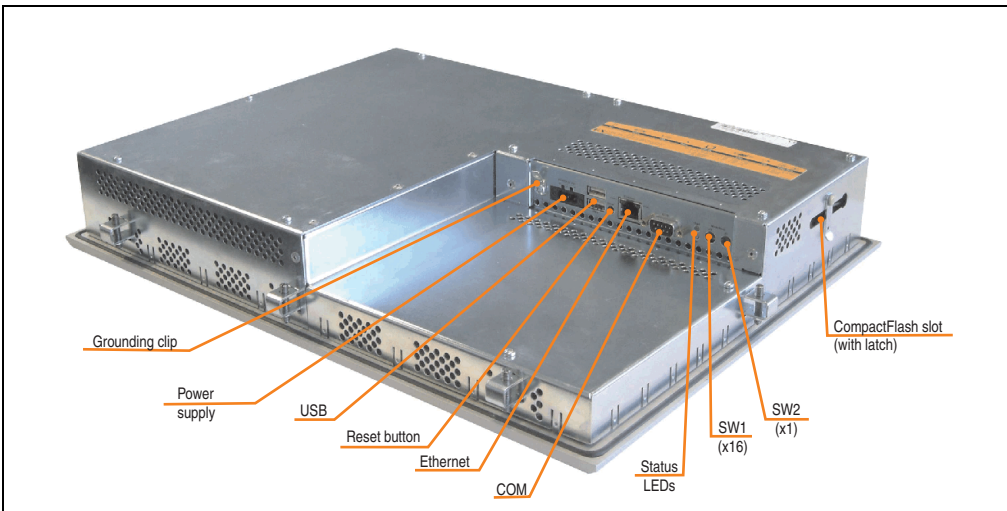


Figure 29: Rear view - 4PP120.1505-31



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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB (Rev. < K0: 16 MB) SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 2 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Buffer time	-
Real-time clock Battery-buffered Accuracy	- At 25°C: Typically 10 ppm (1 seconds) per day <sup>1)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	-
Ethernet Controller Transfer rate Connection Cables 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 Amount Connection	Type I 1 slot Primary IDE device

Table 22: Technical data - 4PP120.1505-31

## Technical data • Power Panel 100 with Automation Runtime

Features	4PP120.1505-31
Serial interface COM 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 Amount 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 switch	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>2)</sup>	Color TFT 15 inch (381 mm) 16.7 million colors XGA, 1024 x 768 pixels 300:1  Direction R / direction L = 65° Direction U = 50° / direction D = 55°  330 cd/m <sup>2</sup> 35,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Elo (Rev. < L0: 3M) Analog, resistive Hampshire, serial, 12-bit 78%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys 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
Bleeder resistance	≤ 24 kOhm

Table 22: 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	
Ambient temperature <sup>3)</sup>	
Operation	0 to +50°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 2.6.2 "Temperature humidity diagram" on page 76
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 22: Technical data - 4PP120.1505-31 (Forts.)

- 1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 2) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 3) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.6.2 Temperature humidity diagram

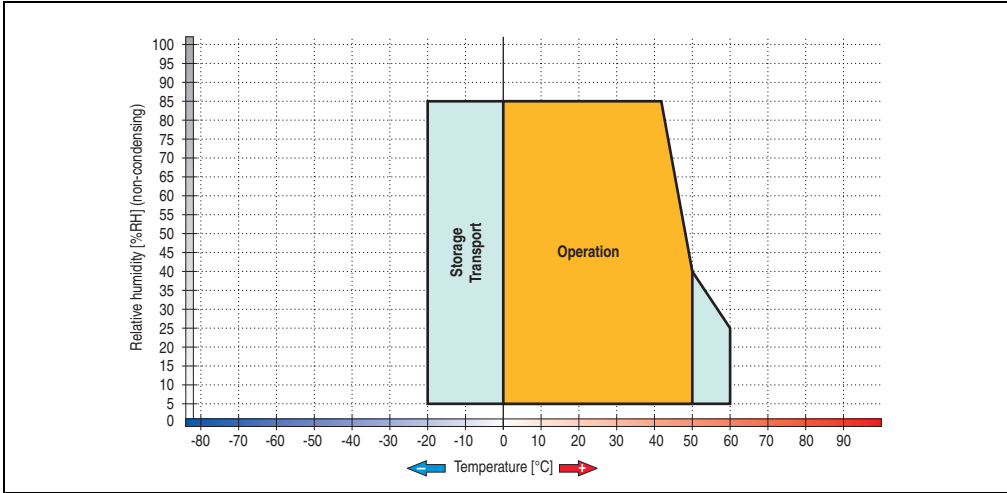


Figure 30: Temperature humidity diagram - 4PP120.1505-31

### 2.6.3 Dimensions

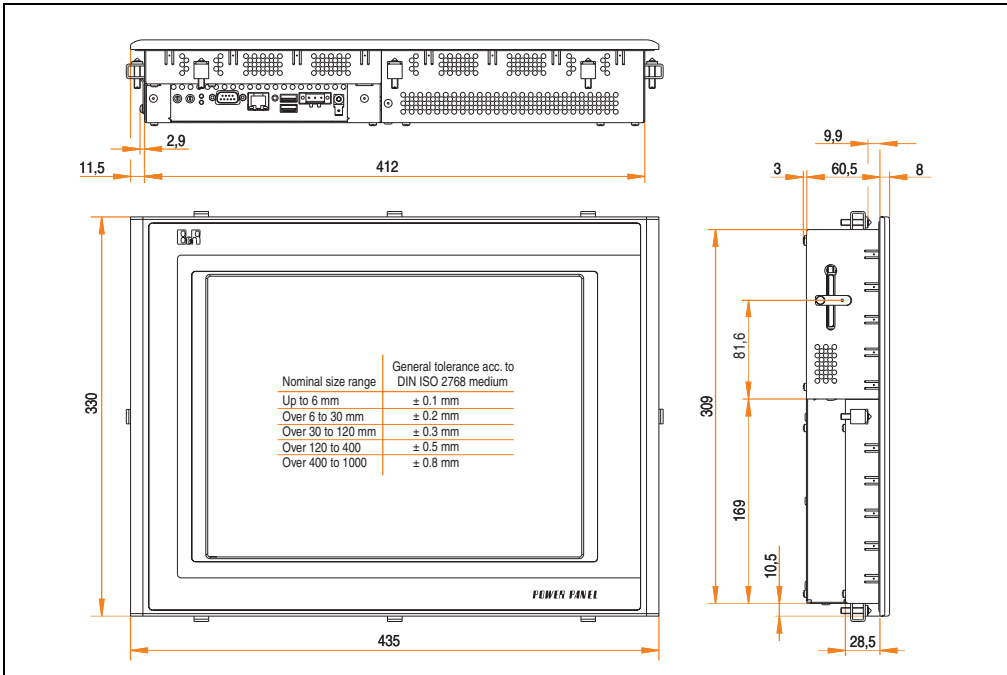


Figure 31: Dimensions - 4PP120.1505-31

### 2.6.4 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 - 4PP120.1505-31" on page 76) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

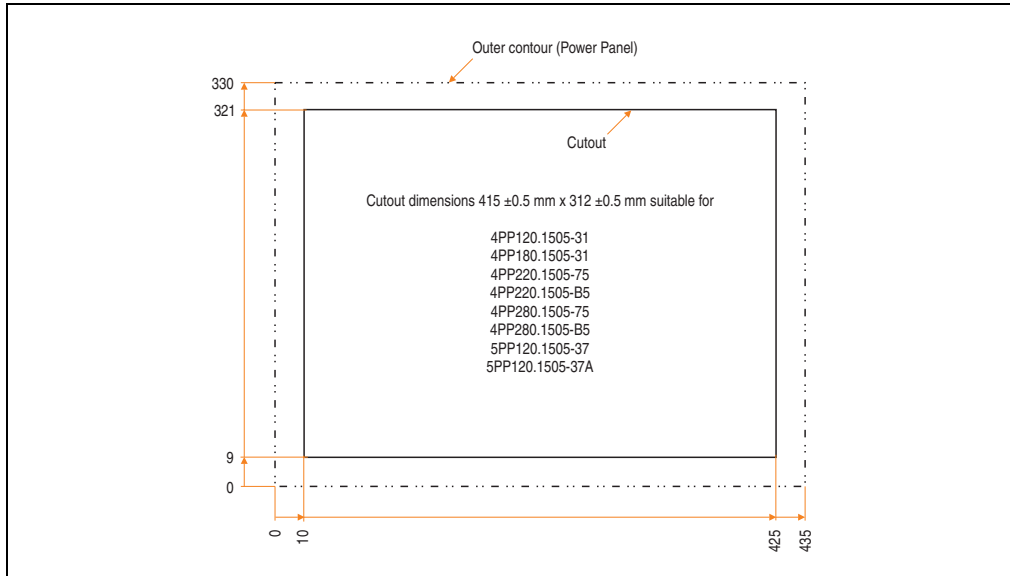


Figure 32: Cutout dimensions

### 2.6.5 Contents of delivery

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

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

Table 23: Contents of delivery - 4PP120.1505-31

## 2.7 Device 4PP151.0571-01

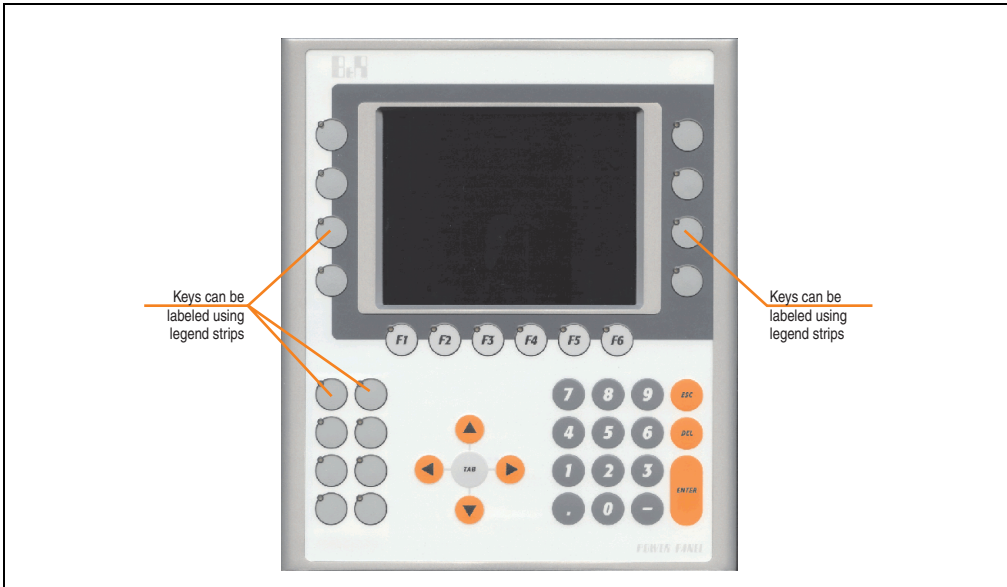


Figure 33: Front view - 4PP151.0571-01

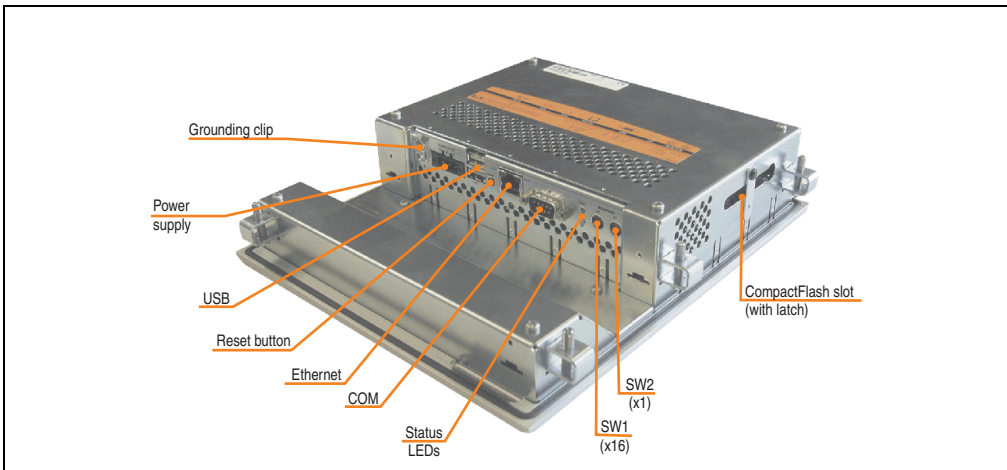


Figure 34: Rear view - 4PP151.0571-01

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB (Rev. < E0: 16 MB) SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 2 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Buffer time	-
Real-time clock Battery-buffered Accuracy	- At 25°C: Typically 10 ppm (1 seconds) per day <sup>1)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	-
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 24: Technical data - 4PP151.0571-01

## Technical data • Power Panel 100 with Automation Runtime

Features	4PP151.0571-01
Serial interface COM 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 Amount 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 switch	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>2)</sup>	LCD monochrome 5.7 in (144 mm) 8 shades of gray QVGA, 320 x 240 pixels 25:1  Direction R / direction L = 40° Direction U = 40° / direction D = 50°  140 cd/m <sup>2</sup> 50,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys/LED Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 activations at 1 ±0.3 to 3 ±0.3 N activating force 16 with LED 6 with LED - 15 without LED 5 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
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. -

Table 24: Technical data - 4PP151.0571-01 (Forts.)



## Technical data • Power Panel 100 with Automation Runtime

Electrical characteristics	4PP151.0571-01
Bleeder resistance	0 Ohm
Mechanical characteristics	
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	
Ambient temperature <sup>3)</sup>	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 2.7.2 "Temperature humidity diagram" on page 82
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 24: Technical data - 4PP151.0571-01 (Forts.)

- 1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 2) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 3) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.7.2 Temperature humidity diagram

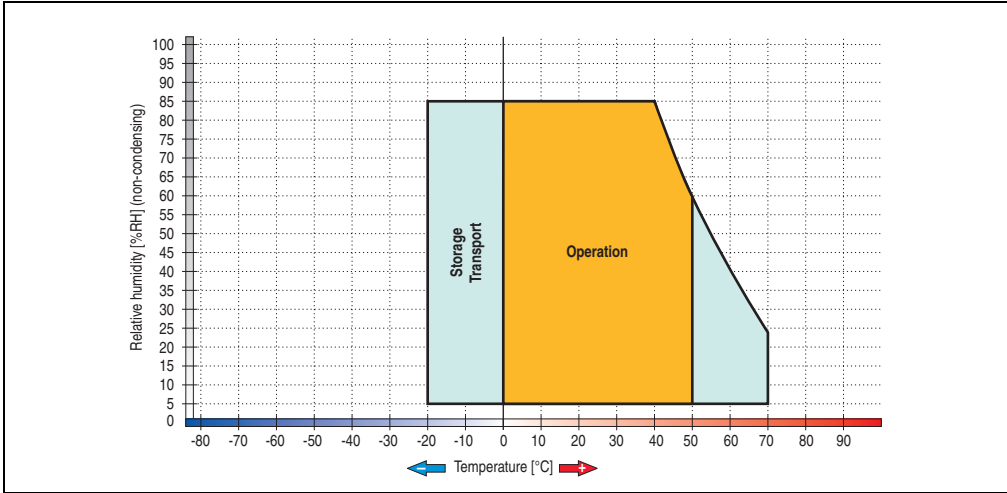


Figure 35: Temperature humidity diagram - 4PP151.0571-01

### 2.7.3 Dimensions

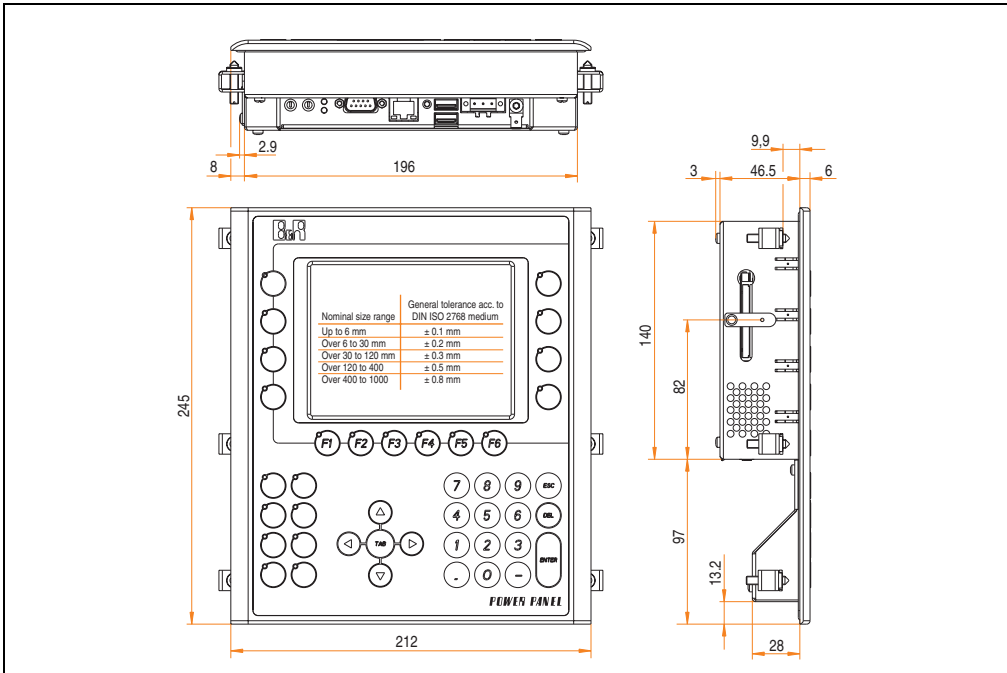


Figure 36: Dimensions - 4PP151.0571-01

### 2.7.4 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 36 "Dimensions - 4PP151.0571-01" on page 82) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

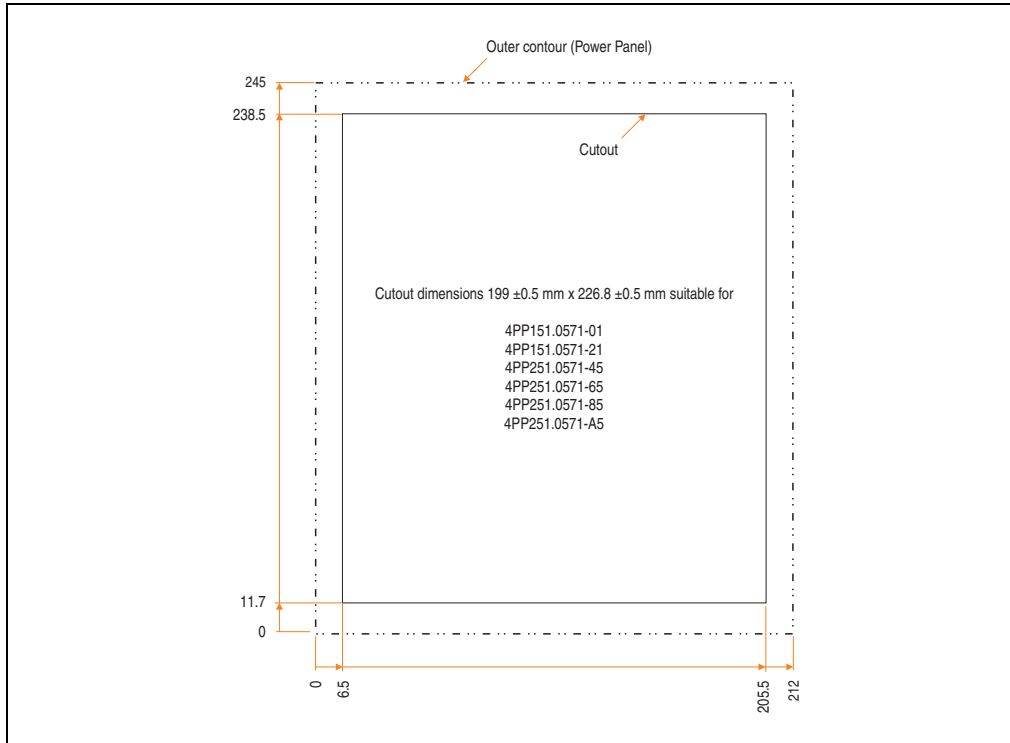


Figure 37: Cutout dimensions

### 2.7.5 Contents of delivery

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

Amount	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 25: Contents of delivery - 4PP151.0571-01

## 2.8 Device 4PP151.0571-21

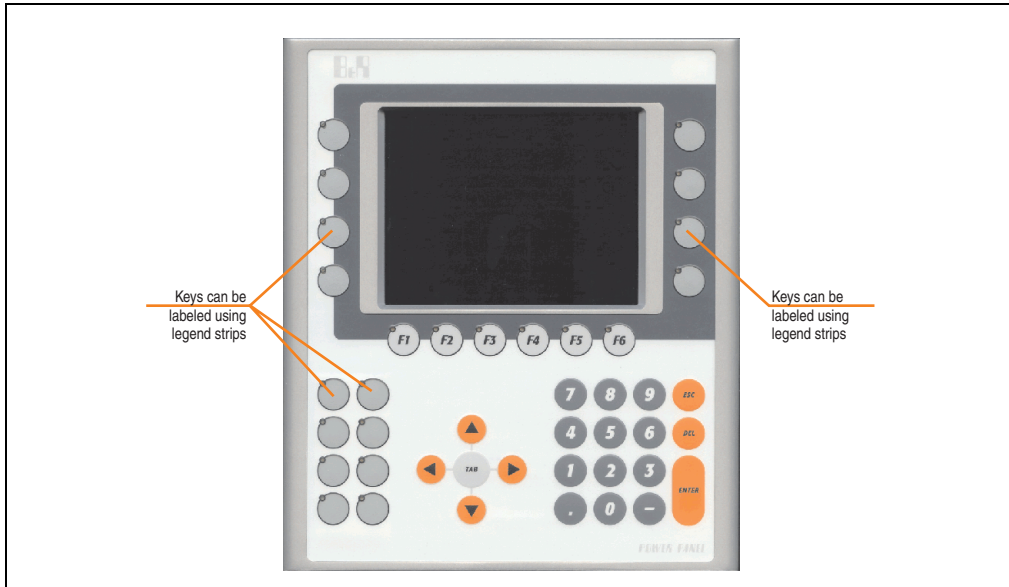


Figure 38: Front view - 4PP151.0571-21

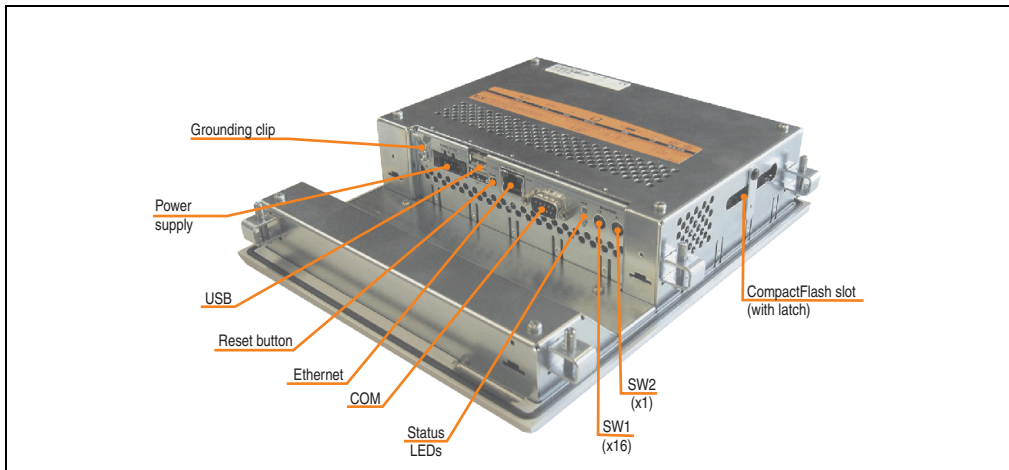


Figure 39: Rear view - 4PP151.0571-21

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB (Rev. < E0: 16 MB) SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 2 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Buffer time	-
Real-time clock Battery-buffered Accuracy	- At 25°C: Typically 10 ppm (1 seconds) per day <sup>1)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	-
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 26: Technical data - 4PP151.0571-21

## Technical data • Power Panel 100 with Automation Runtime

Features	4PP151.0571-21
Serial interface COM 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 Amount 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 switch	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>2)</sup>	Color LCD 5.7 in (144 mm) 256 colors QVGA, 320 x 240 pixels 40:1 Direction R / direction L = 40° Direction U = 40° / direction D = 50° 150 cd/m <sup>2</sup> 50,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 activations at 1 ±0.3 to 3 ±0.3 N activating force 16 with LED 6 with LED - 15 without LED 5 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
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. -

Table 26: Technical data - 4PP151.0571-21 (Forts.)

## Technical data • Power Panel 100 with Automation Runtime

Electrical characteristics	4PP151.0571-21
Bleeder resistance	0 Ohm
Mechanical characteristics	
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	
Ambient temperature <sup>3)</sup>	
Operation	0 to +50°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 2.8.2 "Temperature humidity diagram" on page 88
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 26: Technical data - 4PP151.0571-21 (Forts.)

- 1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 2) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 3) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.8.2 Temperature humidity diagram

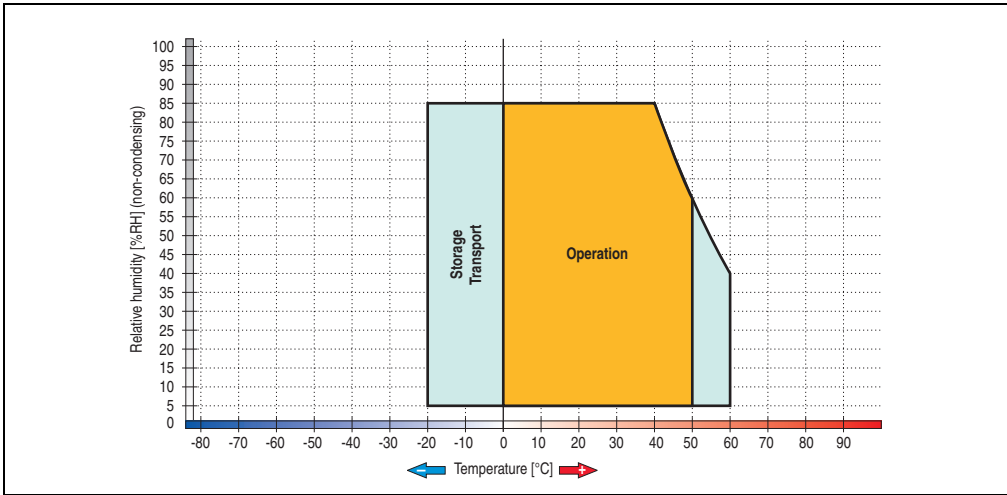


Figure 40: Temperature humidity diagram - 4PP151.0571-21

### 2.8.3 Dimensions

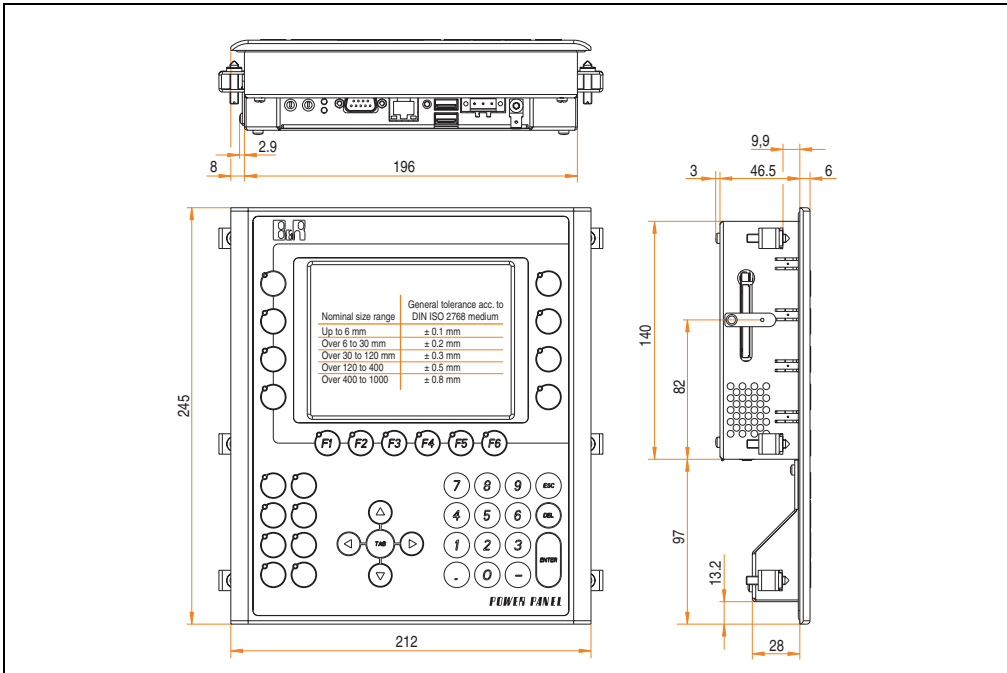


Figure 41: Dimensions - 4PP151.0571-21



### 2.8.4 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 41 "Dimensions - 4PP151.0571-21" on page 88) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

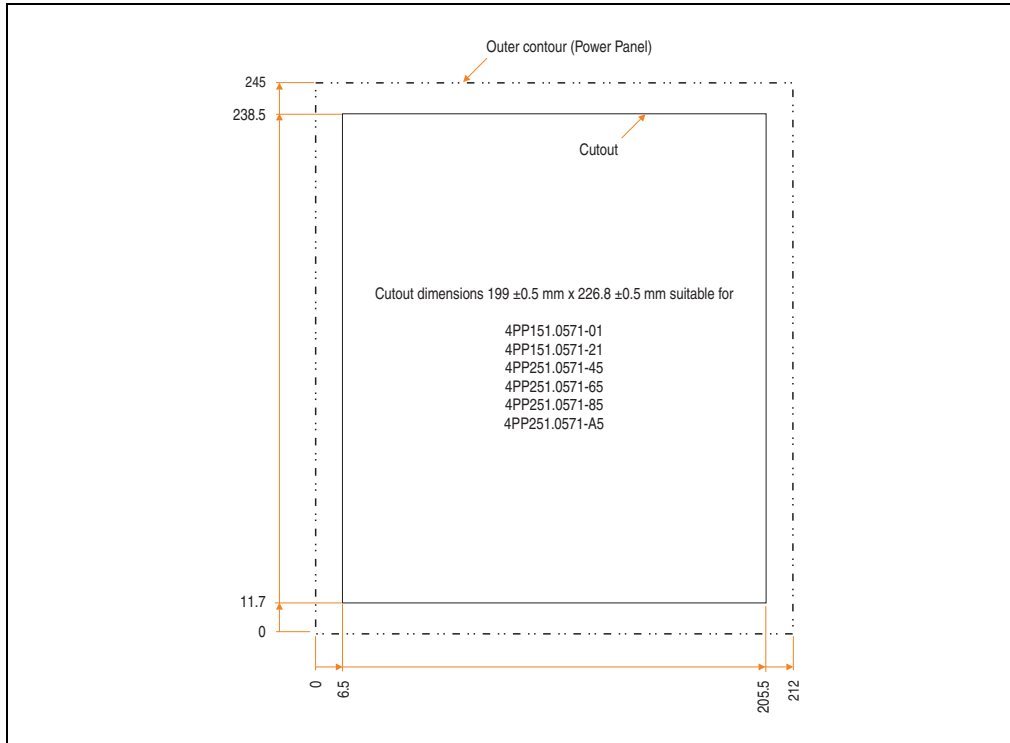


Figure 42: Cutout dimensions

### 2.8.5 Contents of delivery

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

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

Table 27: Contents of delivery - 4PP151.0571-21

## 2.9 Device 4PP151.1043-31

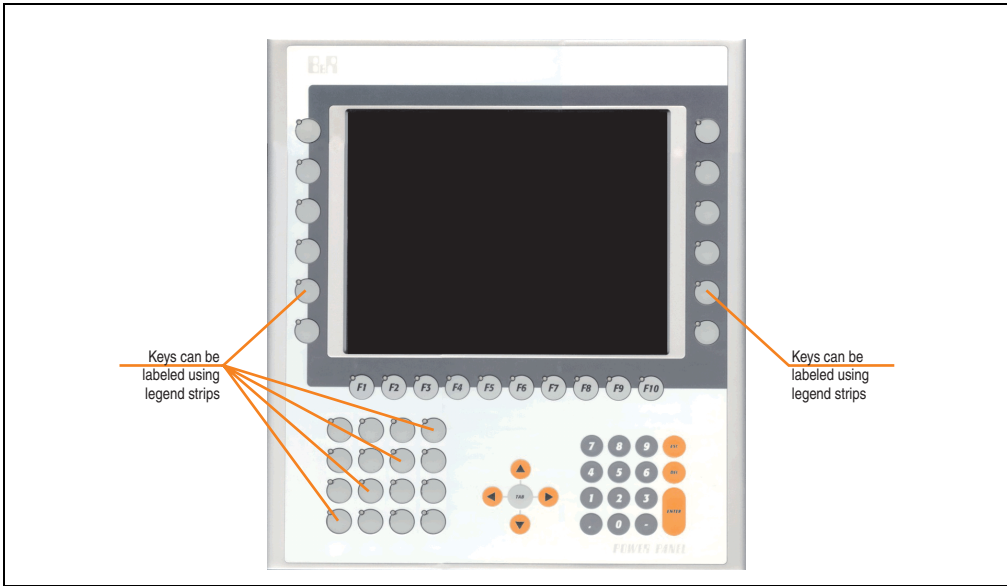


Figure 43: Front view - 4PP151.1043-31

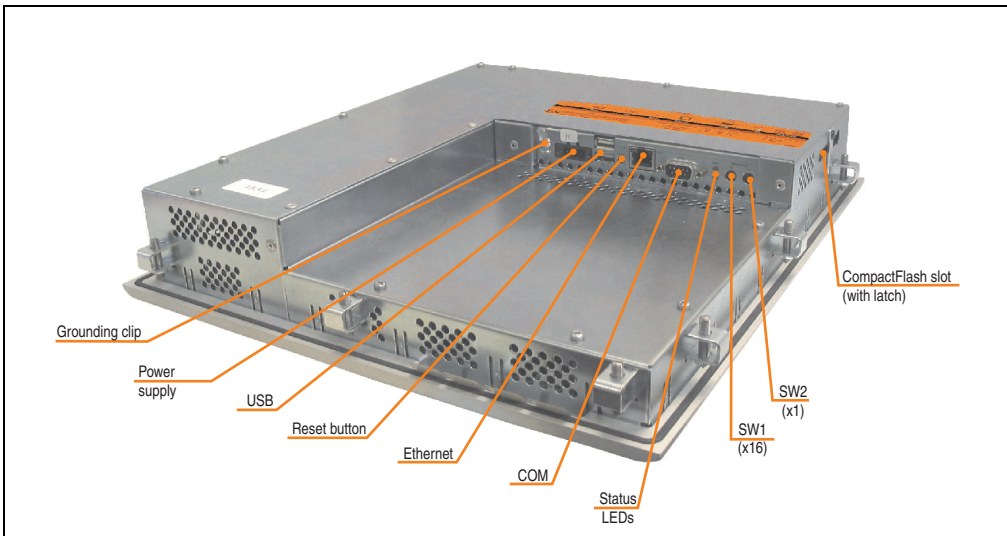


Figure 44: Rear view - 4PP151.1043-31

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 2 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Buffer time	-
Real-time clock Battery-buffered Accuracy	- At 25°C: Typically 10 ppm (1 seconds) per day <sup>1)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	-
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 28: Technical data - 4PP120.1043-31

## Technical data • Power Panel 100 with Automation Runtime

Features	4PP151.1043-31
Serial interface COM 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 Amount 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 switch	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>2)</sup>	Color TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 Direction R / direction L = 70° Direction U = 45° / direction D = 55° 350 cd/m <sup>2</sup> 55,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 activations at 1 ±0.3 to 3 ±0.3 N activating force 28 with LED 10 with LED - 15 without LED 5 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
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. -

Table 28: Technical data - 4PP120.1043-31 (Forts.)

## Technical data • Power Panel 100 with Automation Runtime

Electrical characteristics	4PP151.1043-31
Bleeder resistance	≤ 24 kOhm
Mechanical characteristics	
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	
Ambient temperature <sup>3)</sup>	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 2.9.2 "Temperature humidity diagram" on page 94
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 28: Technical data - 4PP120.1043-31 (Forts.)

- 1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 2) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 3) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.9.2 Temperature humidity diagram

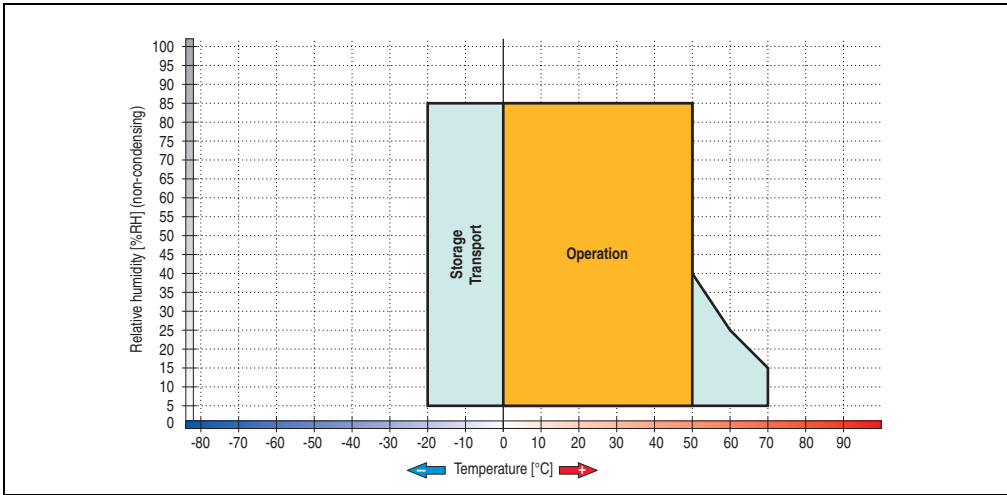


Figure 45: Temperature humidity diagram - 4PP151.1043-31

### 2.9.3 Dimensions

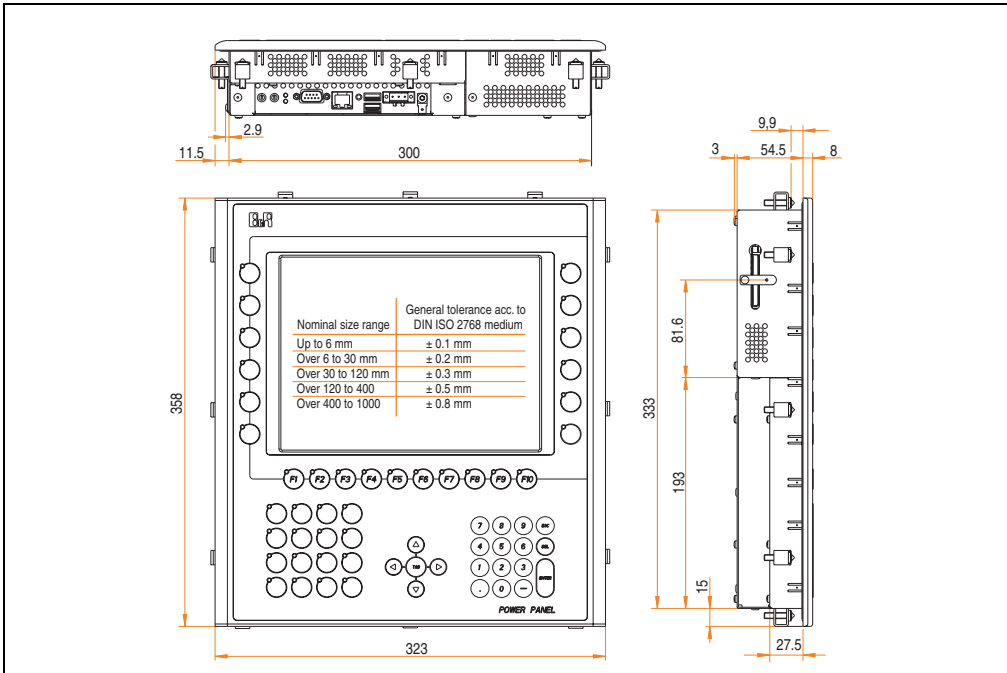


Figure 46: Dimensions - 4PP151.1043-31

### 2.9.4 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 46 "Dimensions - 4PP151.1043-31" on page 94) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

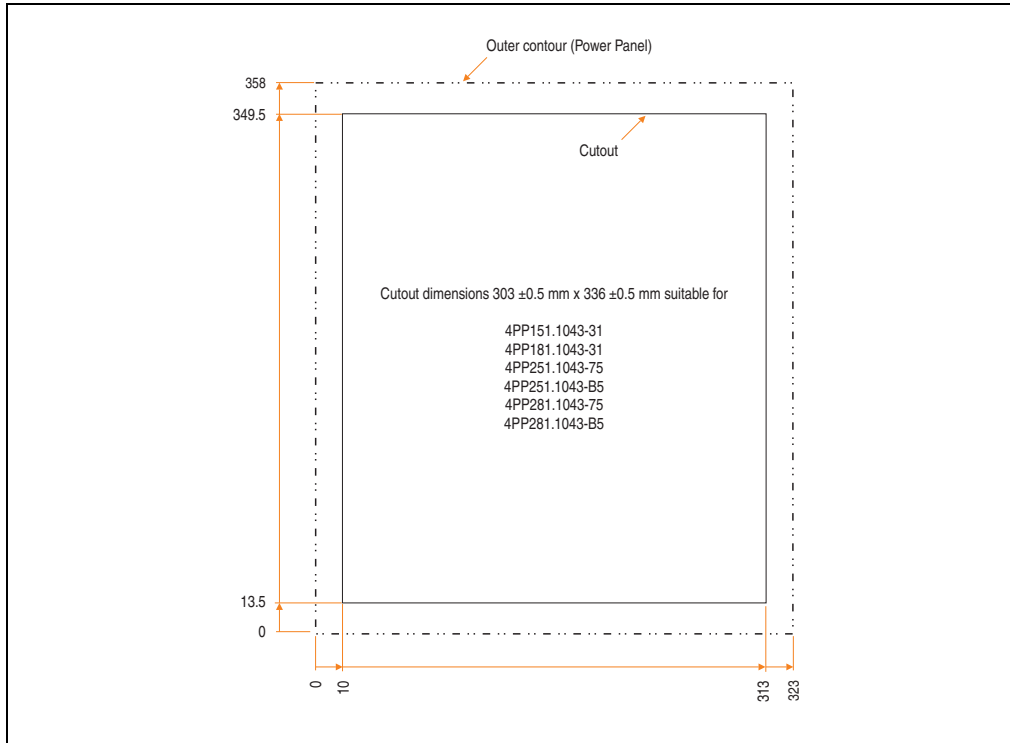


Figure 47: Cutout dimensions

### 2.9.5 Contents of delivery

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

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

Table 29: Contents of delivery - 4PP151.1043-31

## 2.10 Device 4PP151.1505-31

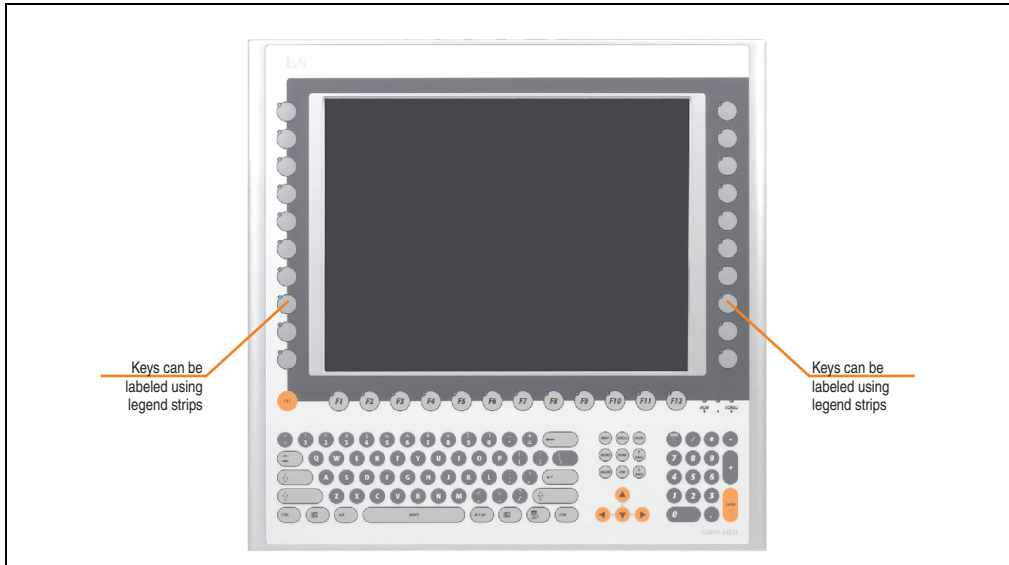


Figure 48: Front view - 4PP151.1505-31

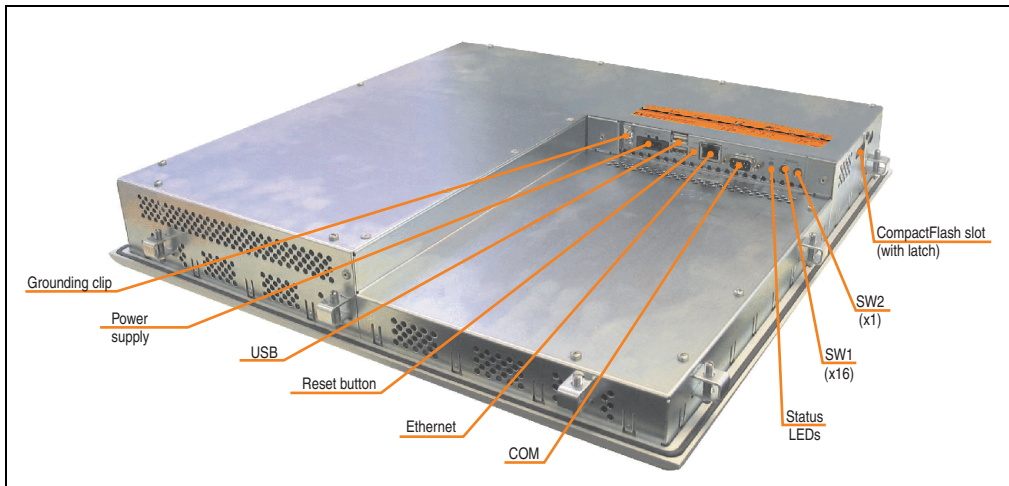


Figure 49: Rear view - 4PP151.1505-31



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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 2 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Buffer time	-
Real-time clock Battery-buffered Accuracy	- At 25°C: Typically 10 ppm (1 seconds) per day <sup>1)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	-
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 30: Technical data - 4PP151.1505-31

## Technical data • Power Panel 100 with Automation Runtime

Features	4PP151.1505-31
Serial interface COM 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 Amount 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 switch	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>2)</sup>	Color TFT 15 inch (381 mm) 16.7 million colors XGA, 1024 x 768 pixels 300:1  Direction R / direction L = 65° Direction U = 50° / direction D = 55°  330 cd/m <sup>2</sup> 35,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 activations at 1 ±0.3 to 3 ±0.3 N activating force 20 with LED 12 with LED - 15 without LED 77 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
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

Table 30: Technical data - 4PP151.1505-31 (Forts.)

## Technical data • Power Panel 100 with Automation Runtime

Electrical characteristics	4PP151.1505-31
Bleeder resistance	≤ 24 kOhm
Mechanical characteristics	
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	
Ambient temperature <sup>3)</sup>	
Operation	0 to +50°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 2.10.2 "Temperature humidity diagram" on page 100
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 30: Technical data - 4PP151.1505-31 (Forts.)

- 1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 2) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 3) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.10.2 Temperature humidity diagram

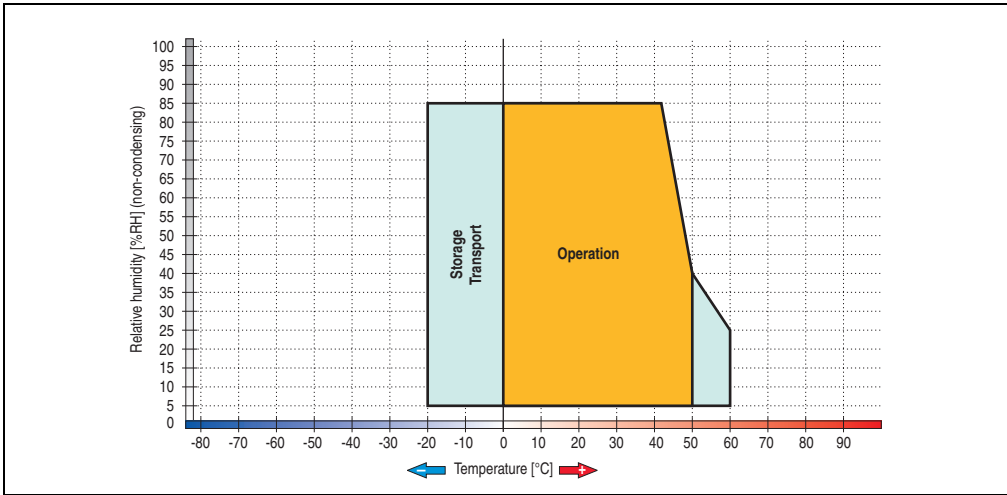


Figure 50: Temperature humidity diagram - 4PP151.1505-31

### 2.10.3 Dimensions

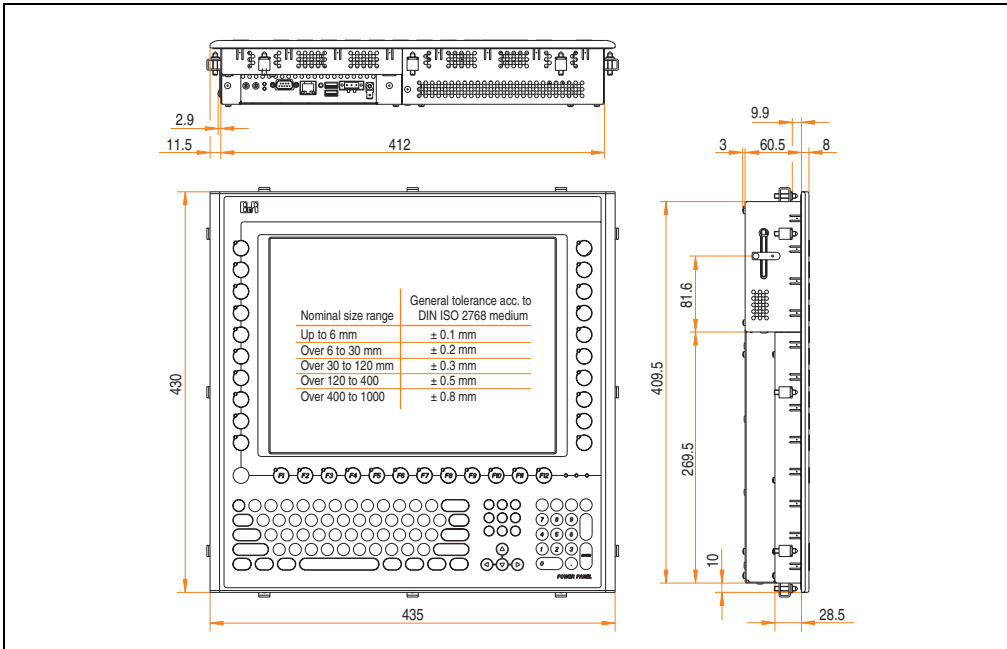


Figure 51: Dimensions - 4PP151.1505-31

### 2.10.4 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 - 4PP151.1505-31" on page 100) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

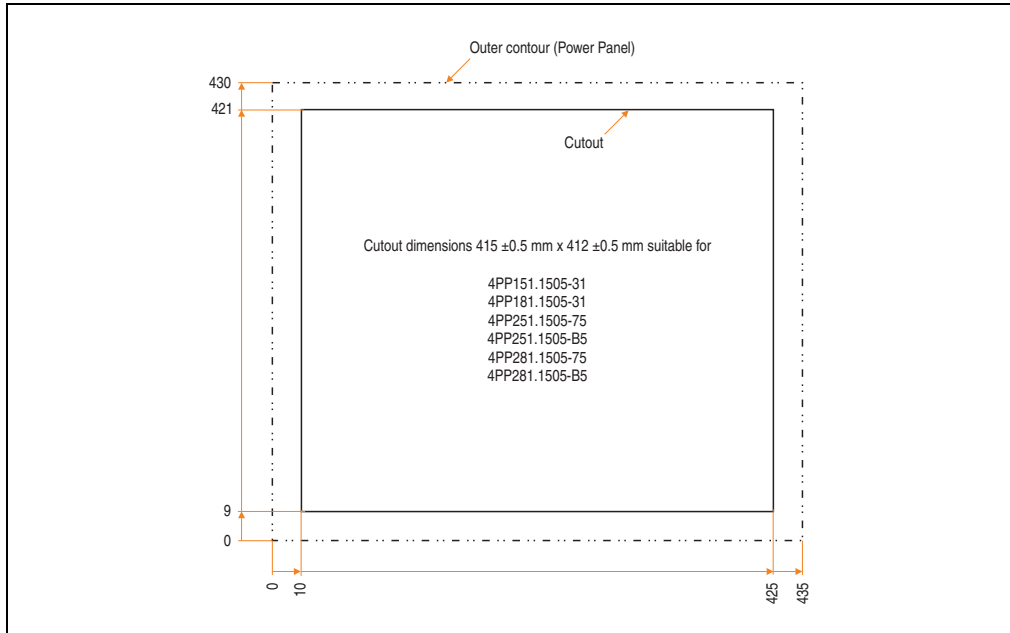


Figure 52: Cutout dimensions

### 2.10.5 Contents of delivery

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

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

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

## 2.11 Device 4PP152.0571-01

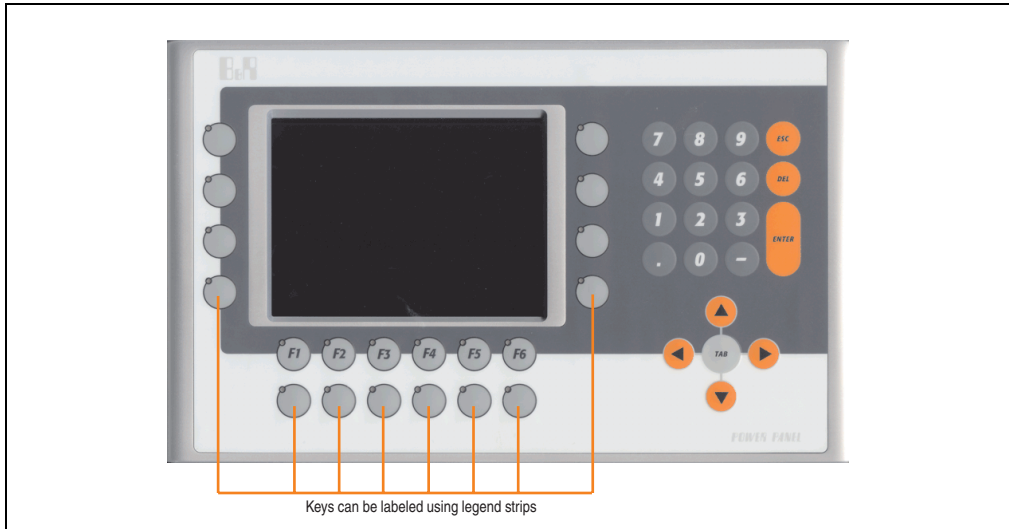


Figure 53: Front view - 4PP152.0571-01

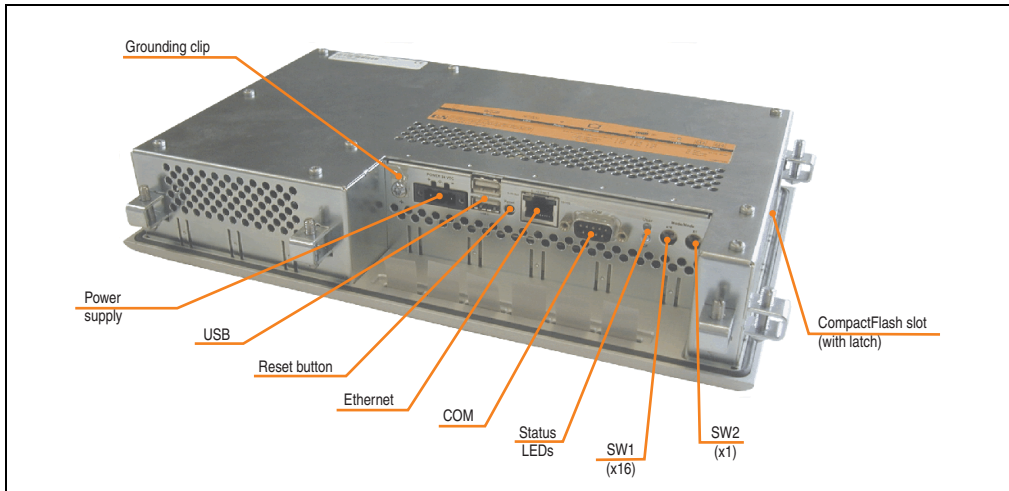


Figure 54: Rear view - 4PP152.0571-01

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB (Rev. < D0: 16 MB) SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 2 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Buffer time	-
Real-time clock Battery-buffered Accuracy	- At 25°C: Typically 10 ppm (1 seconds) per day <sup>1)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	-
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 32: Technical data - 4PP152.0571-01

## Technical data • Power Panel 100 with Automation Runtime

Features	4PP152.0571-01
Serial interface COM 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 Amount 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 switch	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>2)</sup>	LCD monochrome 5.7 in (144 mm) 8 shades of gray QVGA, 320 x 240 pixels 25:1  Direction R / direction L = 40° Direction U = 40° / direction D = 50°  140 cd/m <sup>2</sup> 50,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 activations at 1 ±0.3 to 3 ±0.3 N activating force 20 with LED - - 15 without LED 5 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
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. -

Table 32: Technical data - 4PP152.0571-01 (Forts.)



## Technical data • Power Panel 100 with Automation Runtime

Electrical characteristics	4PP152.0571-01
Bleeder resistance	0 Ohm
Mechanical characteristics	
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	
Ambient temperature <sup>3)</sup>	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 2.11.2 "Temperature humidity diagram" on page 106
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 32: Technical data - 4PP152.0571-01 (Forts.)

- 1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 2) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 3) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.11.2 Temperature humidity diagram

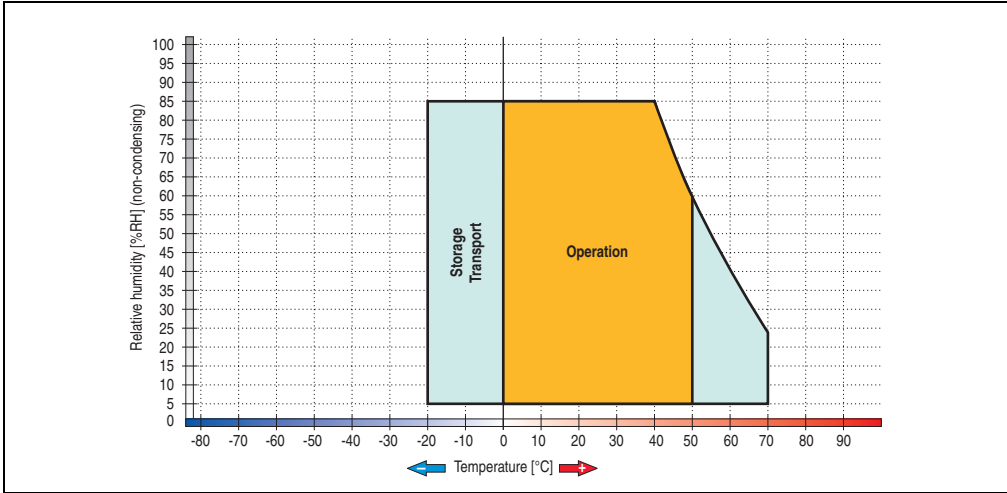


Figure 55: Temperature humidity diagram - 4PP152.0571-01

### 2.11.3 Dimensions

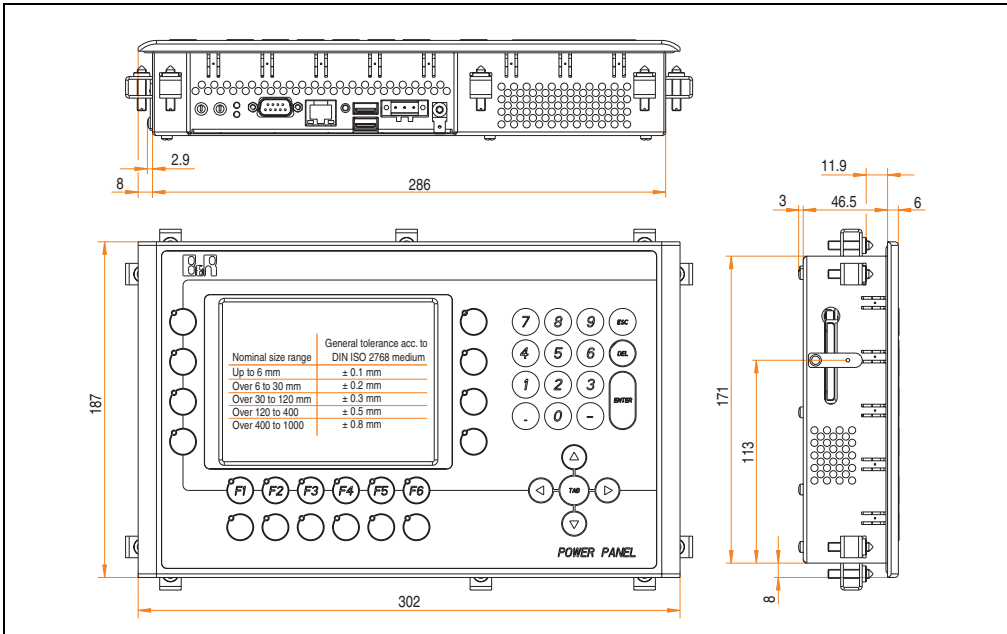


Figure 56: Dimensions - 4PP152.0571-01

### 2.11.4 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 56 "Dimensions - 4PP152.0571-01" on page 106) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

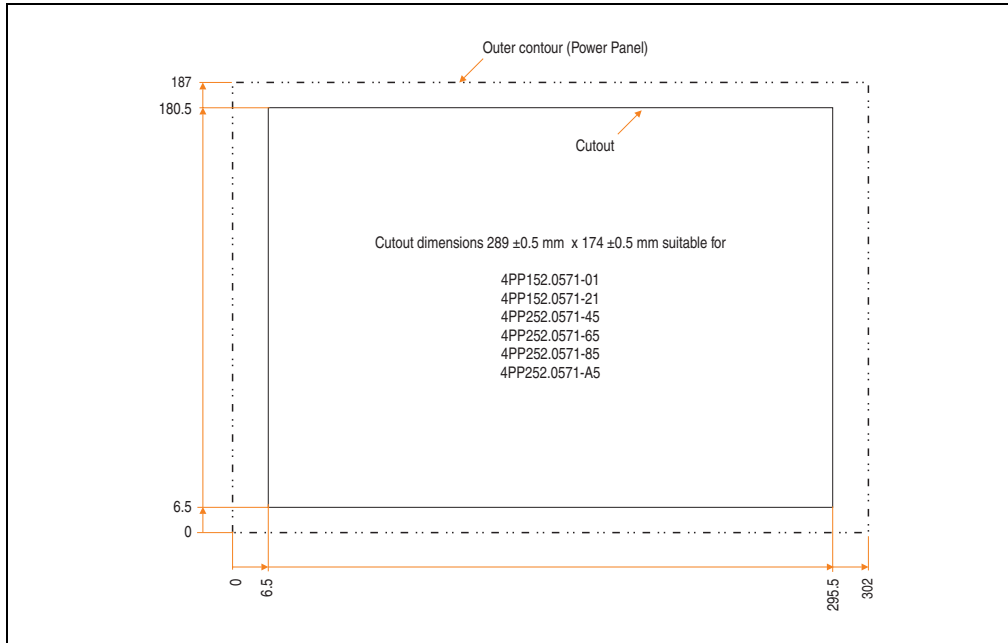


Figure 57: Cutout dimensions

### 2.11.5 Contents of delivery

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

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

Table 33: Contents of delivery - 4PP152.0571-01

## 2.12 Device 4PP152.0571-21

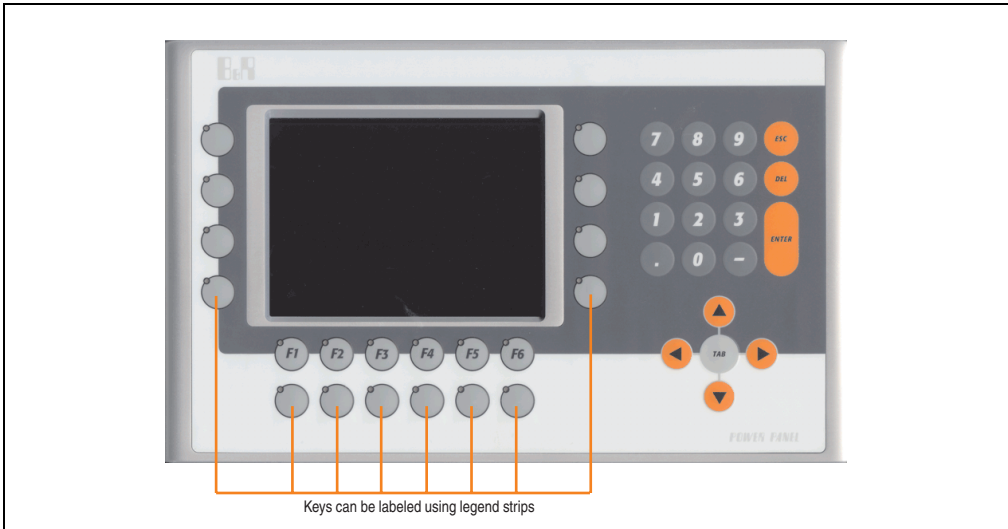


Figure 58: Front view - 4PP152.0571-21

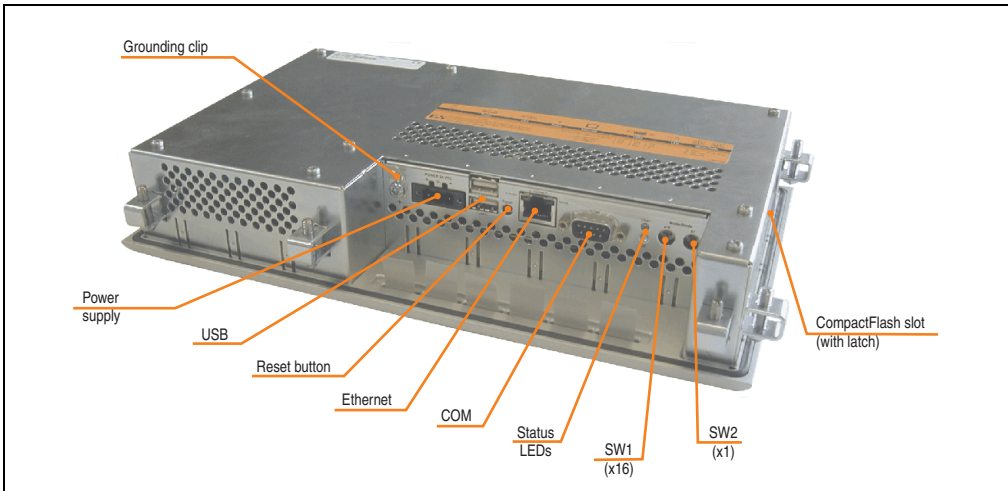


Figure 59: Rear view - 4PP152.0571-21

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB (Rev. < F0: 16 MB) SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 2 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Buffer time	-
Real-time clock Battery-buffered Accuracy	- At 25°C: Typically 10 ppm (1 seconds) per day <sup>1)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	-
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 34: Technical data - 4PP152.0571-21

## Technical data • Power Panel 100 with Automation Runtime

Features	4PP152.0571-21
Serial interface COM 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 Amount 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 switch	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>2)</sup>	Color LCD 5.7 in (144 mm) 256 colors QVGA, 320 x 240 pixels 40:1 Direction R / direction L = 40° Direction U = 40° / direction D = 50° 150 cd/m <sup>2</sup> 50,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 activations at 1 ±0.3 to 3 ±0.3 N activating force 20 with LED - - 15 without LED 5 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
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. -

Table 34: Technical data - 4PP152.0571-21 (Forts.)

## Technical data • Power Panel 100 with Automation Runtime

Electrical characteristics	4PP152.0571-21
Bleeder resistance	0 Ohm
Mechanical characteristics	
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	
Ambient temperature <sup>3)</sup>	
Operation	0 to +50°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 2.12.2 "Temperature humidity diagram" on page 112
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 34: Technical data - 4PP152.0571-21 (Forts.)

- 1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 2) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 3) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.12.2 Temperature humidity diagram

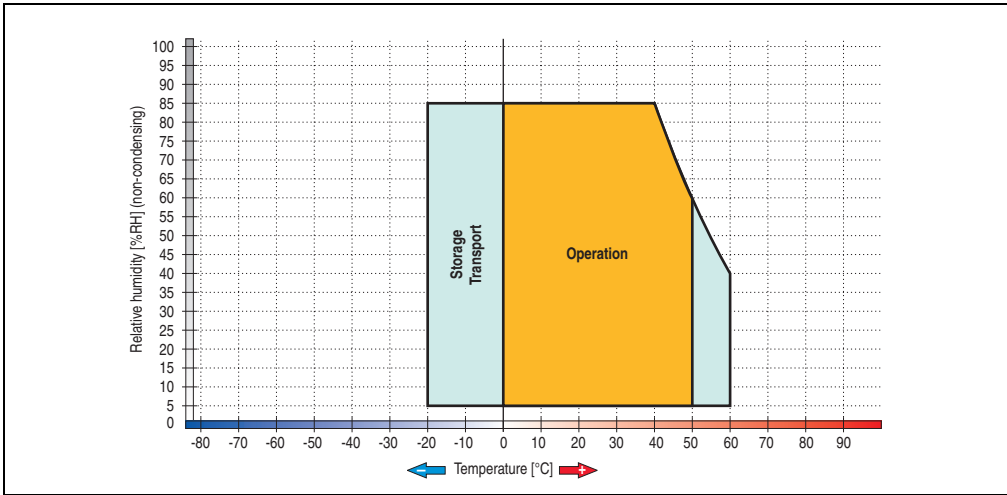


Figure 60: Temperature humidity diagram - 4PP152.0571-21

### 2.12.3 Dimensions

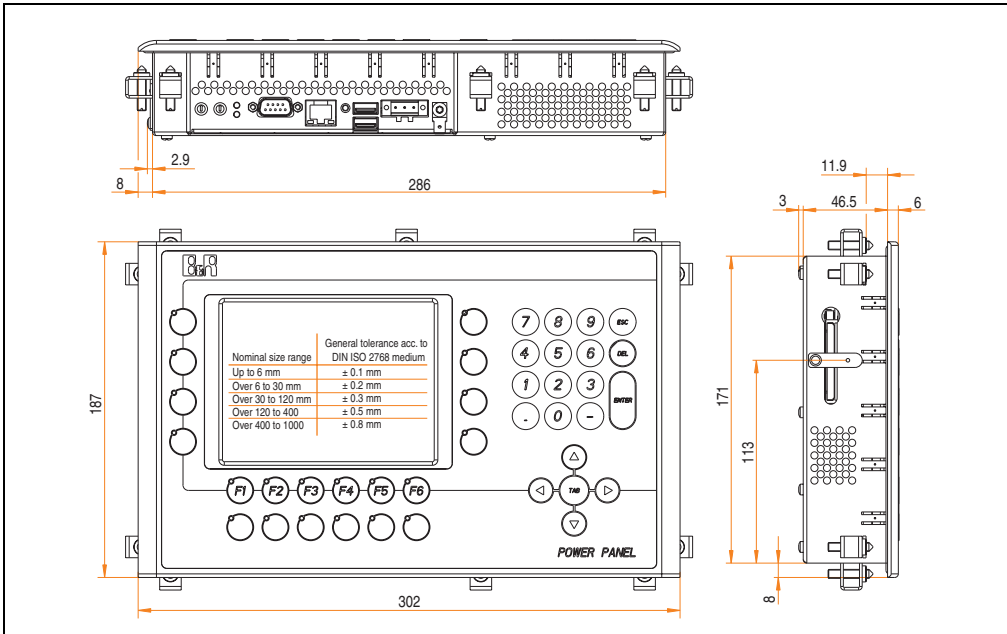


Figure 61: Dimensions - 4PP152.0571-21



### 2.12.4 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 61 "Dimensions - 4PP152.0571-21" on page 112) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

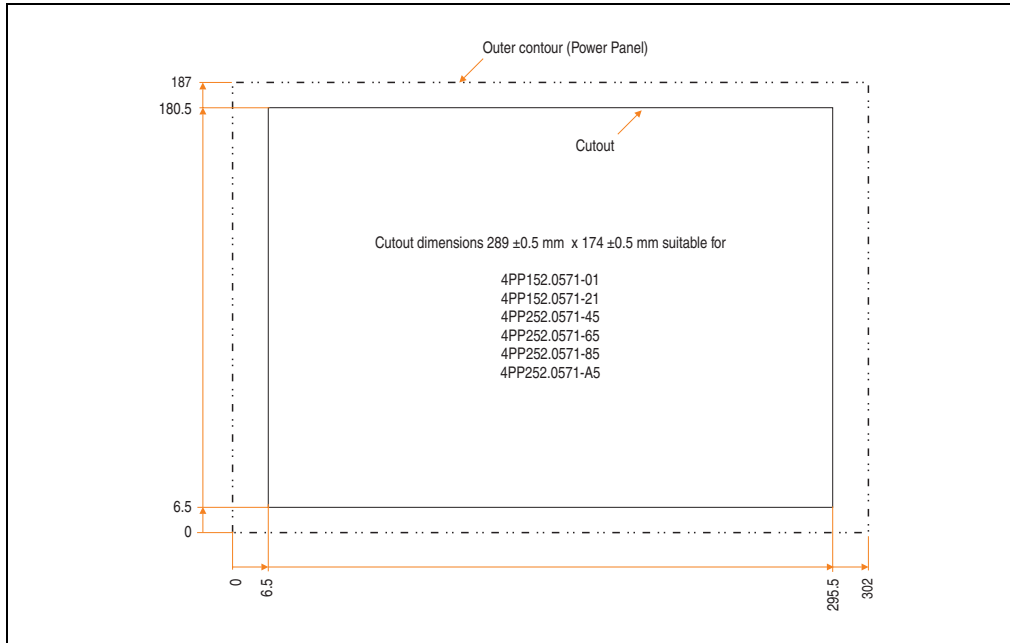


Figure 62: Cutout dimensions

### 2.12.5 Contents of delivery

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

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

Table 35: Contents of delivery - 4PP152.0571-21

### 2.13 Device 4PP152.1043-31

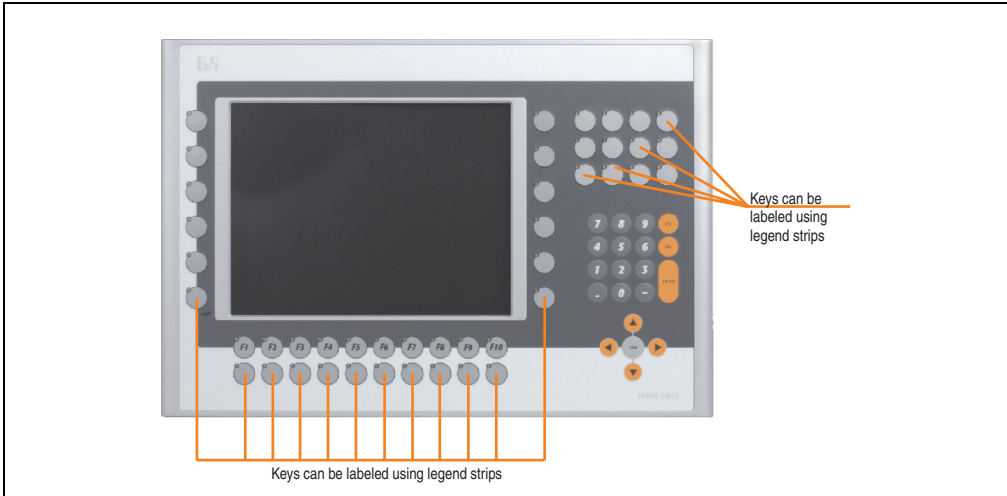


Figure 63: Front view - 4PP152.1043-31

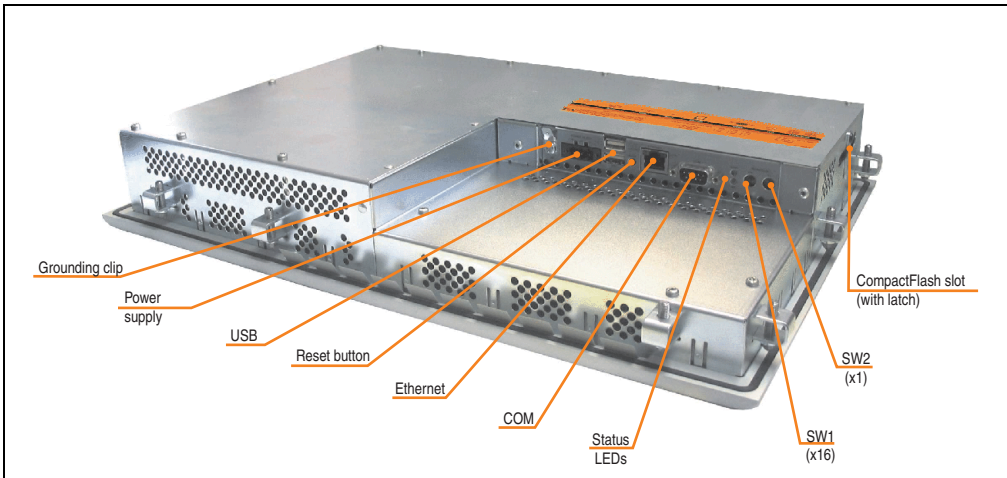


Figure 64: Rear view - 4PP152.1043-31

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 2 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Buffer time	-
Real-time clock Battery-buffered Accuracy	- At 25°C: Typically 10 ppm (1 seconds) per day <sup>1)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	-
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 36: Technical data - 4PP152.1043-31

## Technical data • Power Panel 100 with Automation Runtime

Features	4PP152.1043-31
Serial interface COM 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 Amount 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 switch	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>2)</sup>	Color TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 Direction R / direction L = 70° Direction U = 45° / direction D = 55° 350 cd/m <sup>2</sup> 55,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 activations at 1 ±0.3 to 3 ±0.3 N activating force 44 with LED - - 15 without LED 5 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
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. -

Table 36: Technical data - 4PP152.1043-31 (Forts.)

## Technical data • Power Panel 100 with Automation Runtime

Electrical characteristics	4PP152.1043-31
Bleeder resistance	≤ 24 kOhm
Mechanical characteristics	
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	
Ambient temperature <sup>3)</sup>	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 2.13.2 "Temperature humidity diagram" on page 118
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 36: Technical data - 4PP152.1043-31 (Forts.)

- 1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 2) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 3) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.13.2 Temperature humidity diagram

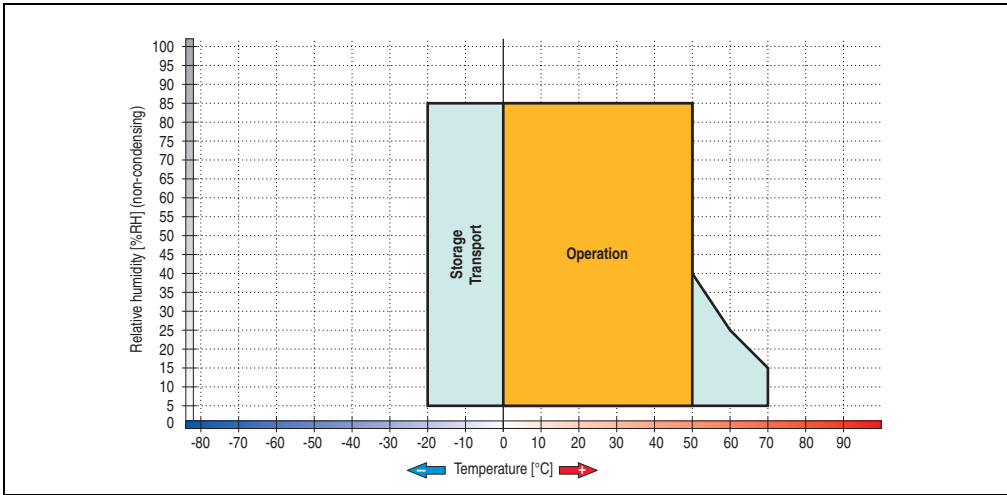


Figure 65: Temperature humidity diagram - 4PP152.1043-31

### 2.13.3 Dimensions

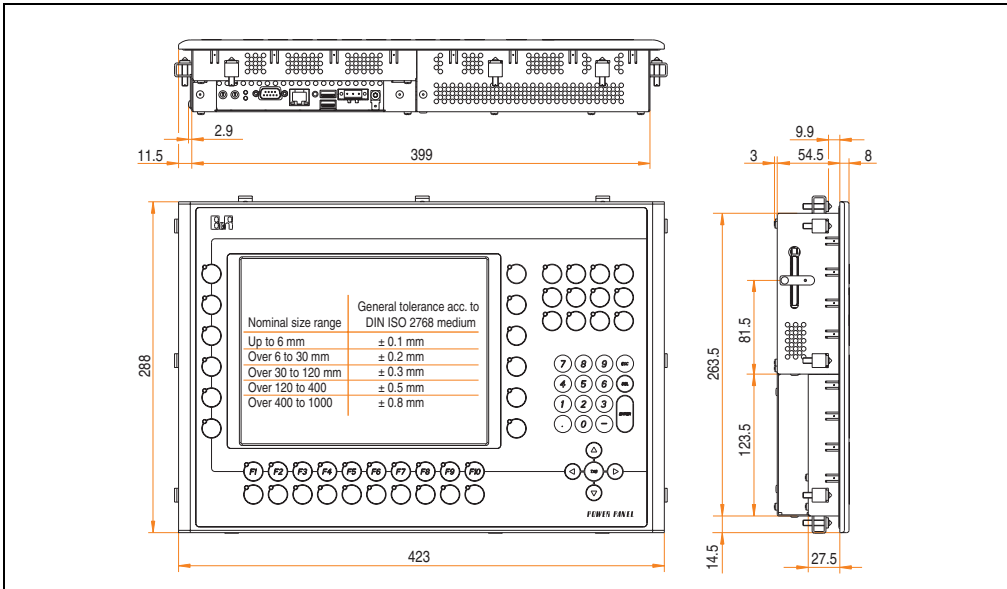


Figure 66: Dimensions - 4PP152.1043-31

### 2.13.4 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 66 "Dimensions - 4PP152.1043-31" on page 118) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

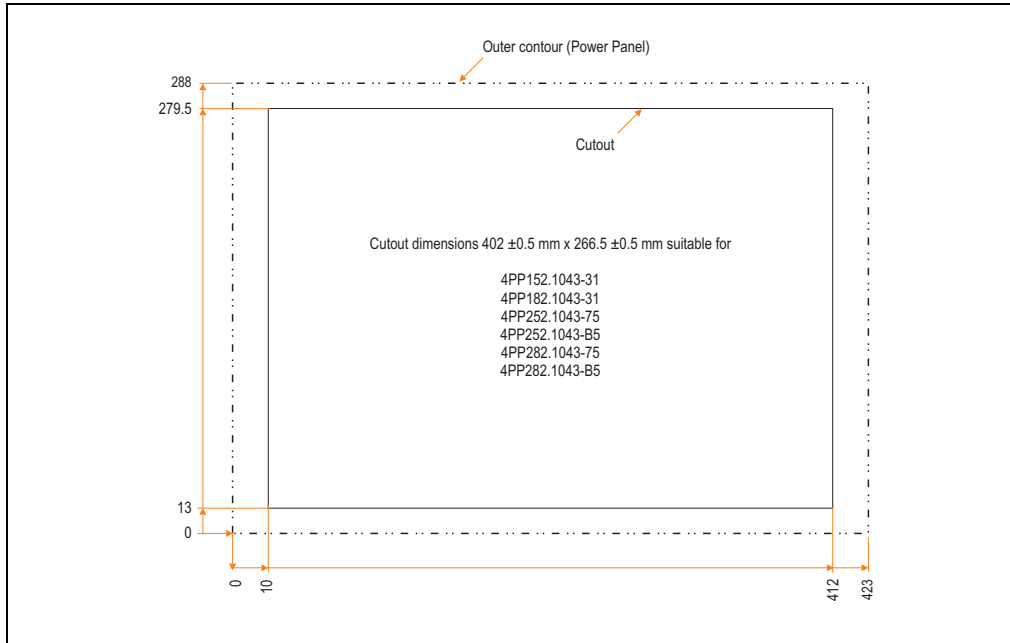


Figure 67: Cutout dimensions

### 2.13.5 Contents of delivery

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

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

Table 37: Contents of delivery - 4PP152.1043-31

## 2.14 Device 4PP180.1043-31

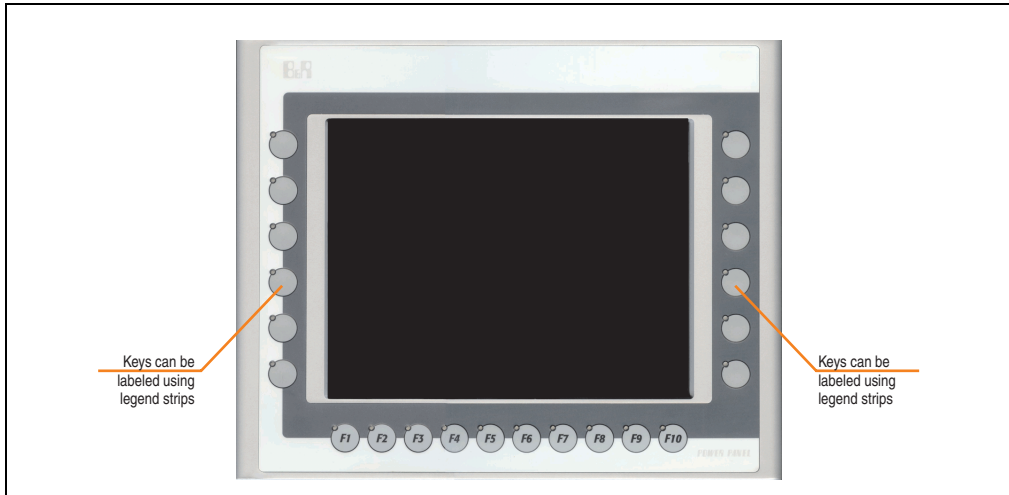


Figure 68: Front view - 4PP180.1043-31

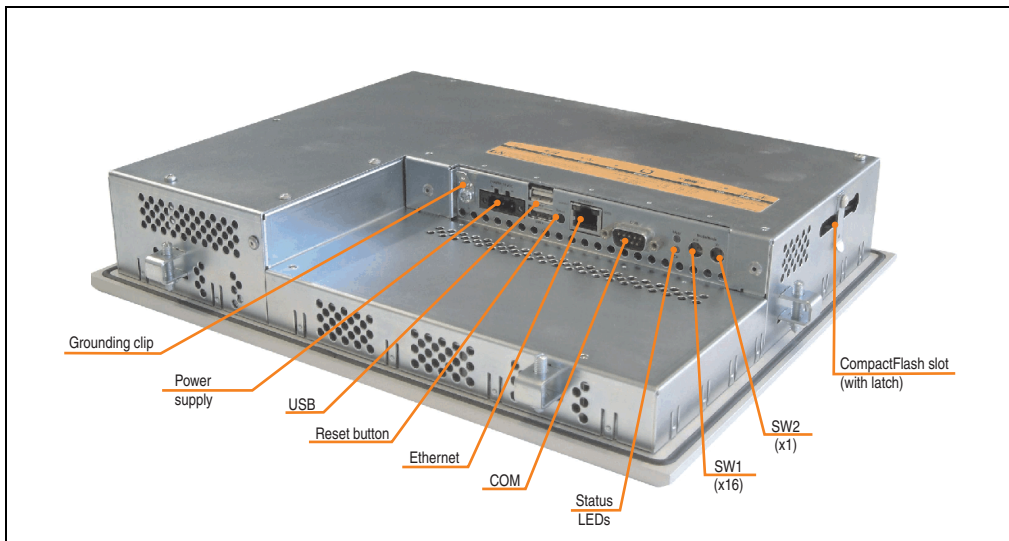


Figure 69: Rear view - 4PP180.1043-31



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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 2 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Buffer time	-
Real-time clock Battery-buffered Accuracy	- At 25°C: Typically 10 ppm (1 seconds) per day <sup>1)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	-
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 38: Technical data - 4PP180.1043-31

## Technical data • Power Panel 100 with Automation Runtime

Features	4PP180.1043-31
Serial interface COM 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 Amount 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 switch	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>2)</sup>	Color TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 Direction R / direction L = 70° Direction U = 45° / direction D = 55° 350 cd/m <sup>2</sup> 55,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Analog, resistive Hampshire, serial, 12-bit 78%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 activations at 1 ±0.3 to 3 ±0.3 N activating force 12 with LED 10 with LED - - - - <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
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. -

Table 38: Technical data - 4PP180.1043-31 (Forts.)

Electrical characteristics	4PP180.1043-31
Bleeder resistance	≤ 24 kOhm
Mechanical characteristics	
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	
Ambient temperature <sup>3)</sup>	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 2.14.2 "Temperature humidity diagram" on page 124
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 38: Technical data - 4PP180.1043-31 (Forts.)

- 1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 2) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 3) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.14.2 Temperature humidity diagram

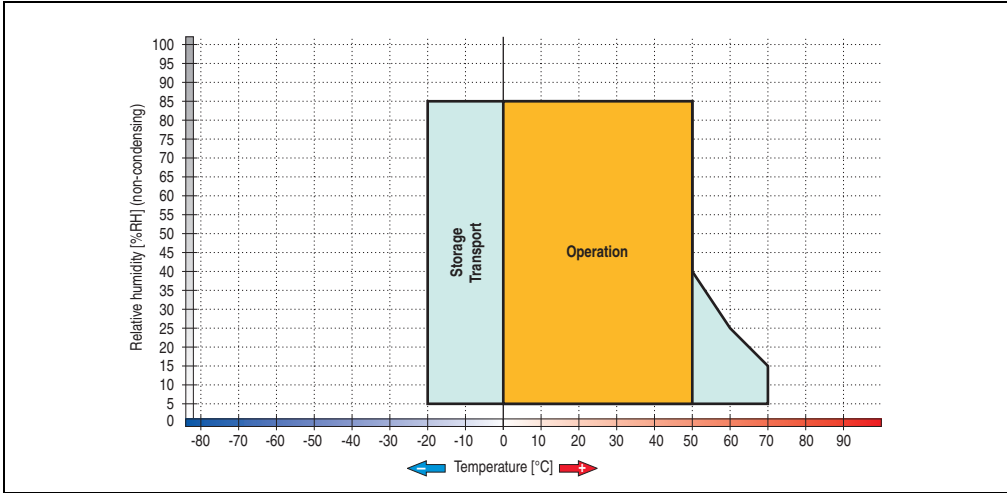


Figure 70: Temperature humidity diagram - 4PP180.1043-31

### 2.14.3 Dimensions

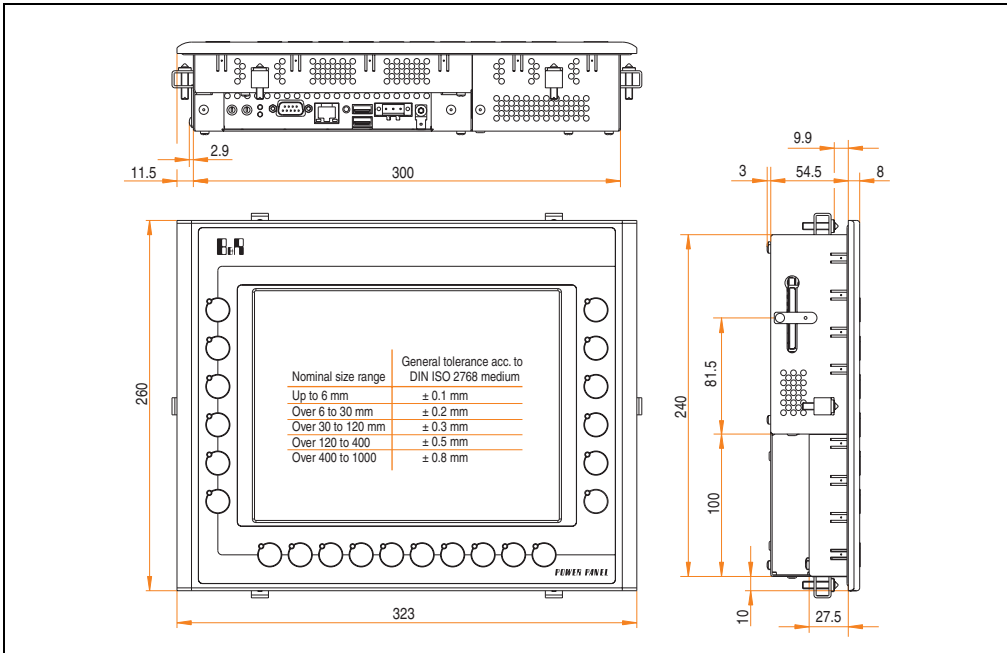


Figure 71: Dimensions - 4PP180.1043-31

### 2.14.4 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 - 4PP180.1043-31" on page 124) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

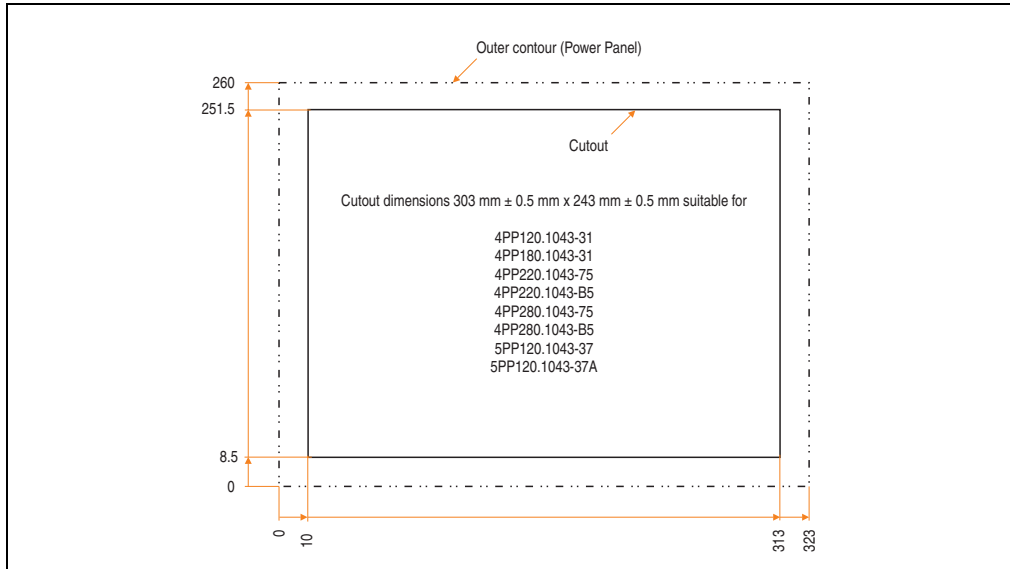


Figure 72: Cutout dimensions

### 2.14.5 Contents of delivery

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

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

Table 39: Contents of delivery - 4PP180.1043-31

## 2.15 Device 4PP180.1505-31

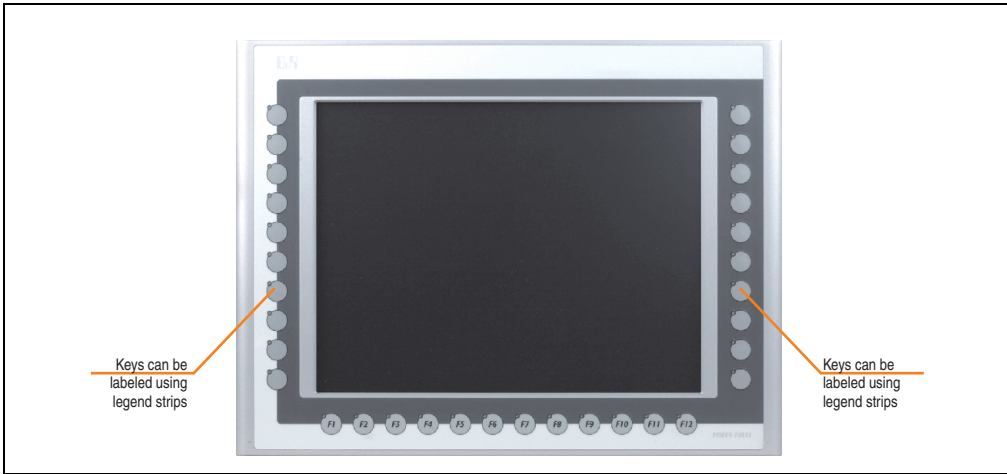


Figure 73: Front view - 4PP180.1505-31

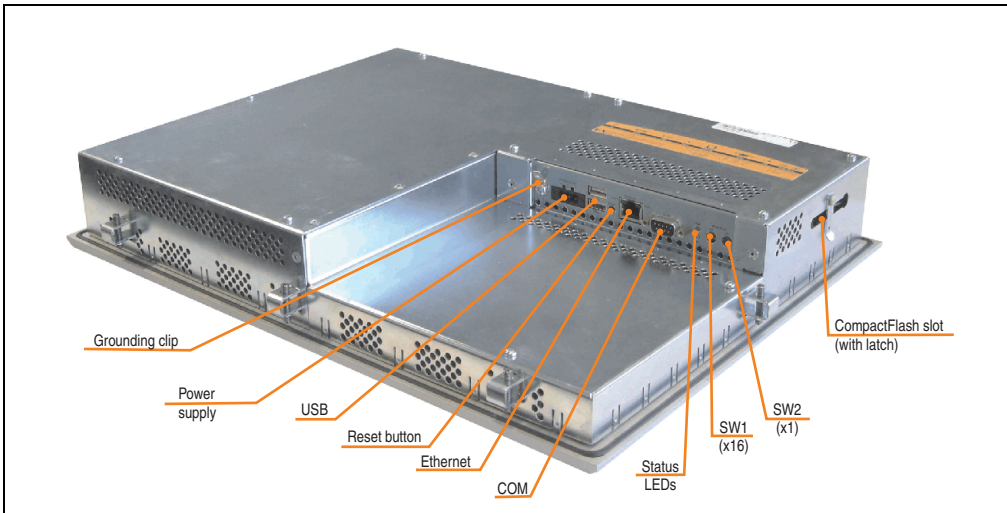


Figure 74: Rear view - 4PP180.1505-31

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 2 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Buffer time	-
Real-time clock Battery-buffered Accuracy	- At 25°C: Typically 10 ppm (1 seconds) per day <sup>1)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	-
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 40: Technical data - 4PP180.1505-31

## Technical data • Power Panel 100 with Automation Runtime

Features	4PP180.1505-31
Serial interface COM 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 Amount 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 switch	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>2)</sup>	Color TFT 15 inch (381 mm) 16.7 million colors XGA, 1024 x 768 pixels 300:1  Direction R / direction L = 65° Direction U = 50° / direction D = 55°  330 cd/m <sup>2</sup> 35,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Analog, resistive Hampshire, serial, 12-bit 78%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 activations at 1 ±0.3 to 3 ±0.3 N activating force 20 with LED 12 with LED - - -  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
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

Table 40: Technical data - 4PP180.1505-31 (Forts.)



Electrical characteristics	4PP180.1505-31
Bleeder resistance	≤ 24 kOhm
Mechanical characteristics	
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	
Ambient temperature <sup>3)</sup>	
Operation	0 to +50°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 2.15.2 "Temperature humidity diagram" on page 130
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 40: Technical data - 4PP180.1505-31 (Forts.)

- 1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 2) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 3) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.15.2 Temperature humidity diagram

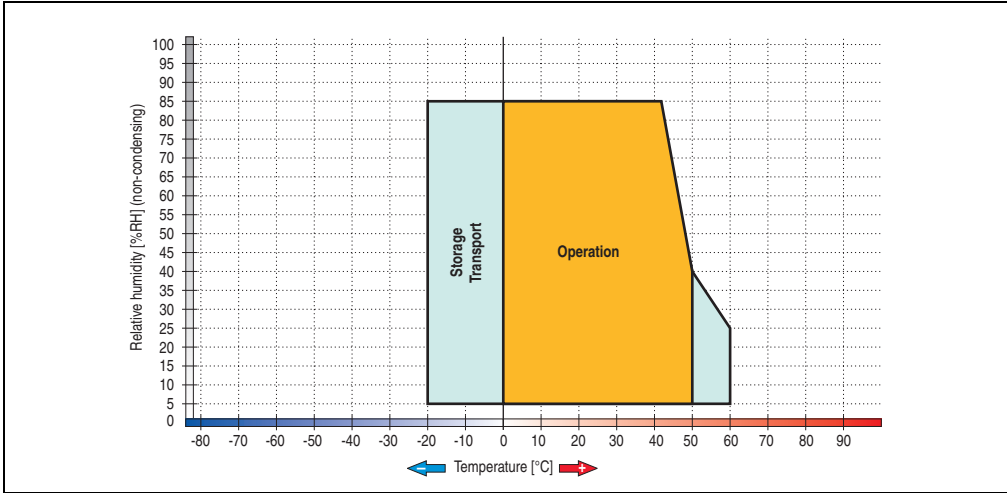


Figure 75: Temperature humidity diagram - 4PP180.1505-31

### 2.15.3 Dimensions

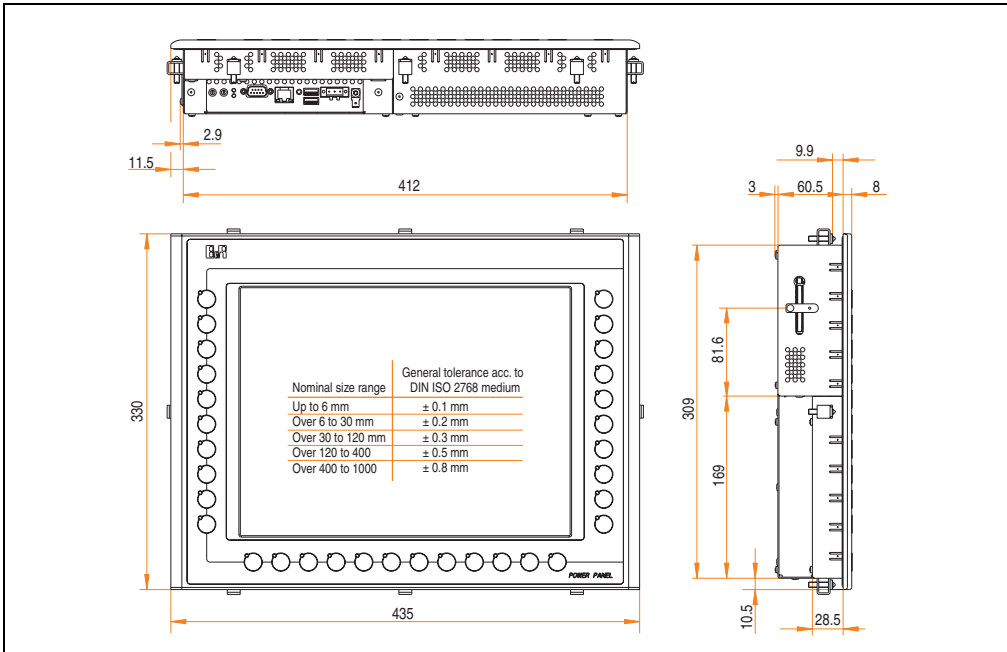


Figure 76: Dimensions - 4PP180.1505-31

### 2.15.4 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 76 "Dimensions - 4PP180.1505-31" on page 130) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

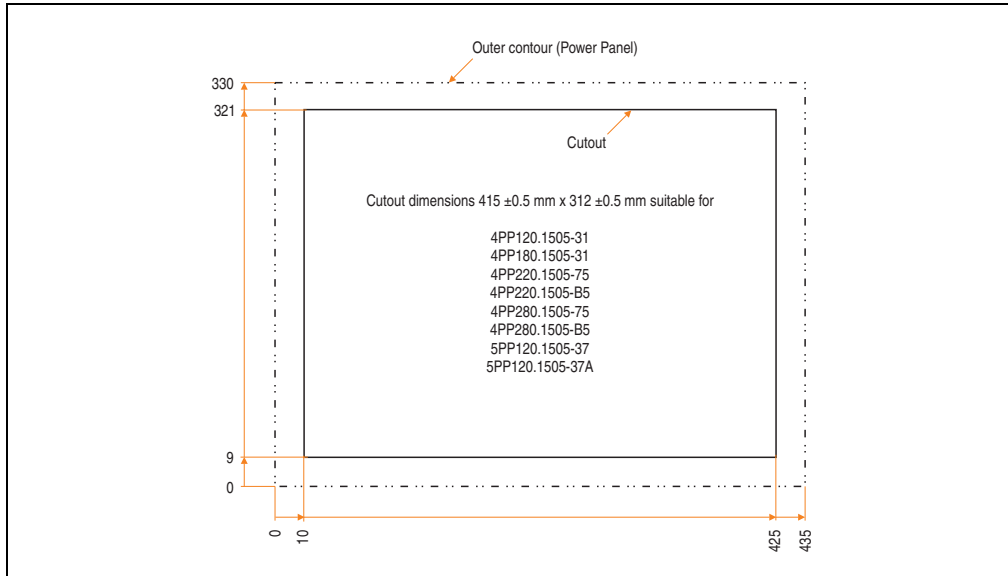


Figure 77: Cutout dimensions

### 2.15.5 Contents of delivery

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

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

Table 41: Contents of delivery - 4PP180.1505-31

## 2.16 Device 4PP181.1043-31

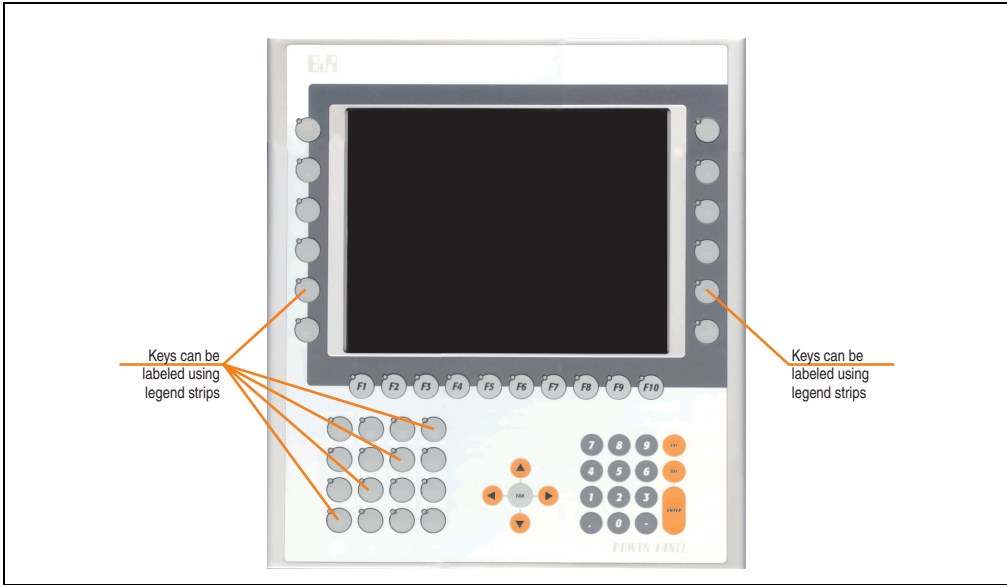


Figure 78: Front view - 4PP181.1043-31

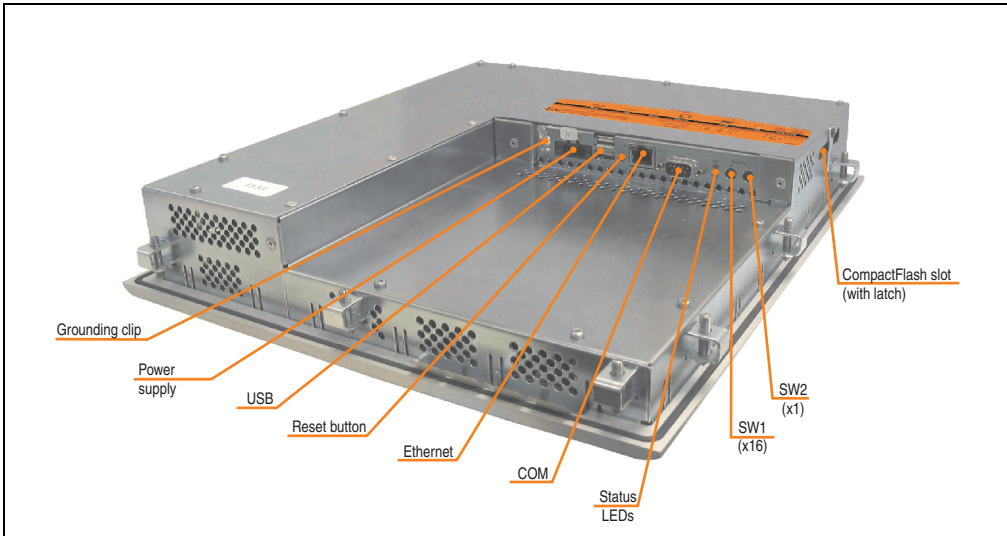


Figure 79: Rear view - 4PP181.1043-31

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 2 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Buffer time	-
Real-time clock Battery-buffered Accuracy	- At 25°C: Typically 10 ppm (1 seconds) per day <sup>1)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	-
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 42: Technical data - 4PP181.1043-31

## Technical data • Power Panel 100 with Automation Runtime

Features	4PP181.1043-31
Serial interface COM 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 Amount 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 switch	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>2)</sup>	Color TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 Direction R / direction L = 70° Direction U = 45° / direction D = 55° 350 cd/m <sup>2</sup> 55,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Analog, resistive Hampshire, serial, 12-bit 78%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 activations at 1 ±0.3 to 3 ±0.3 N activating force 28 with LED 10 with LED - 15 without LED 5 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
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. -

Table 42: Technical data - 4PP181.1043-31 (Forts.)

## Technical data • Power Panel 100 with Automation Runtime

Electrical characteristics	4PP181.1043-31
Bleeder resistance	≤ 24 kOhm
Mechanical characteristics	
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	
Ambient temperature <sup>3)</sup>	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 2.16.2 "Temperature humidity diagram" on page 136
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 42: Technical data - 4PP181.1043-31 (Forts.)

- 1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 2) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 3) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.16.2 Temperature humidity diagram

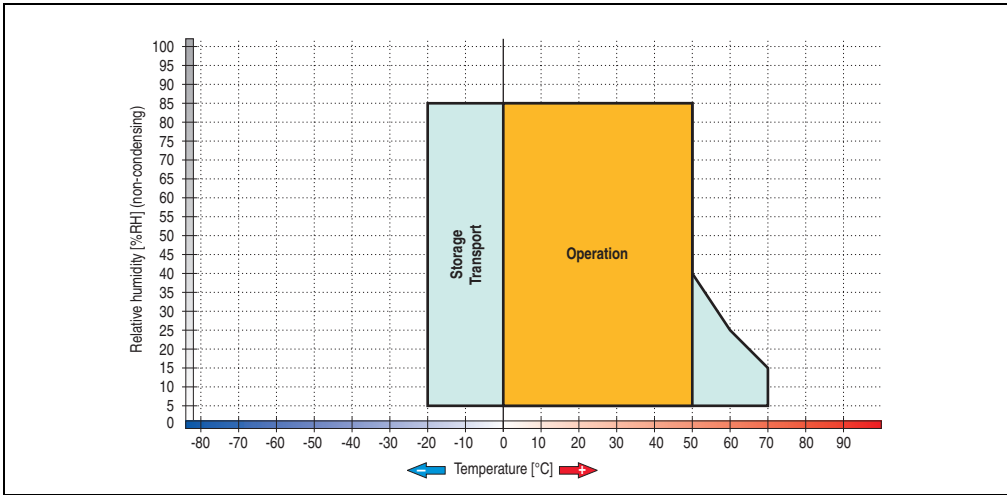


Figure 80: Temperature humidity diagram - 4PP181.1043-31

### 2.16.3 Dimensions

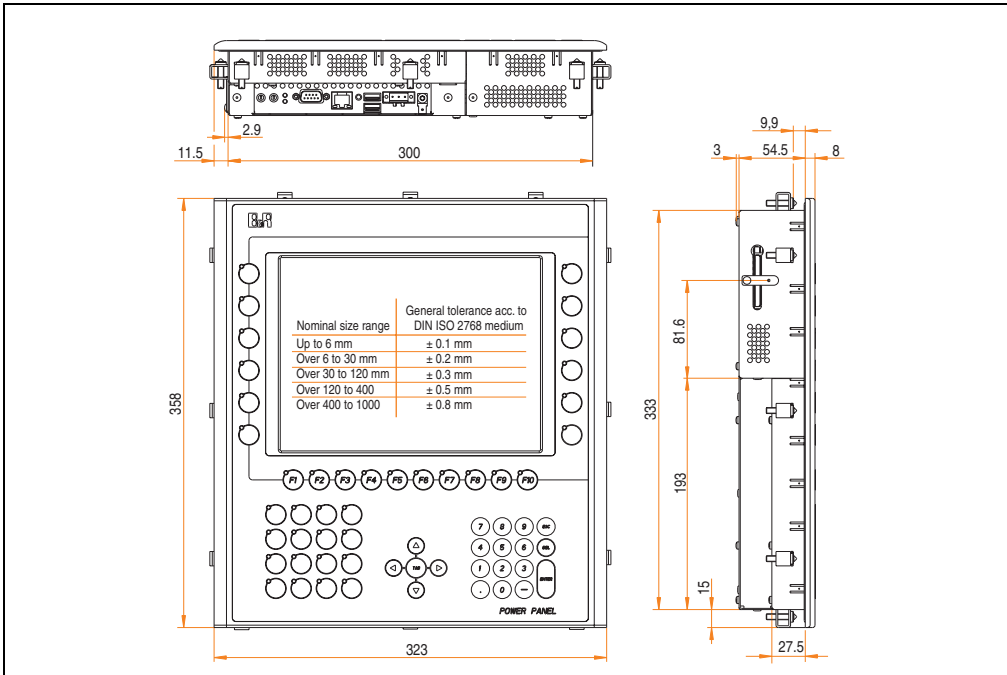


Figure 81: Dimensions - 4PP181.1043-31



### 2.16.4 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 81 "Dimensions - 4PP181.1043-31" on page 136) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

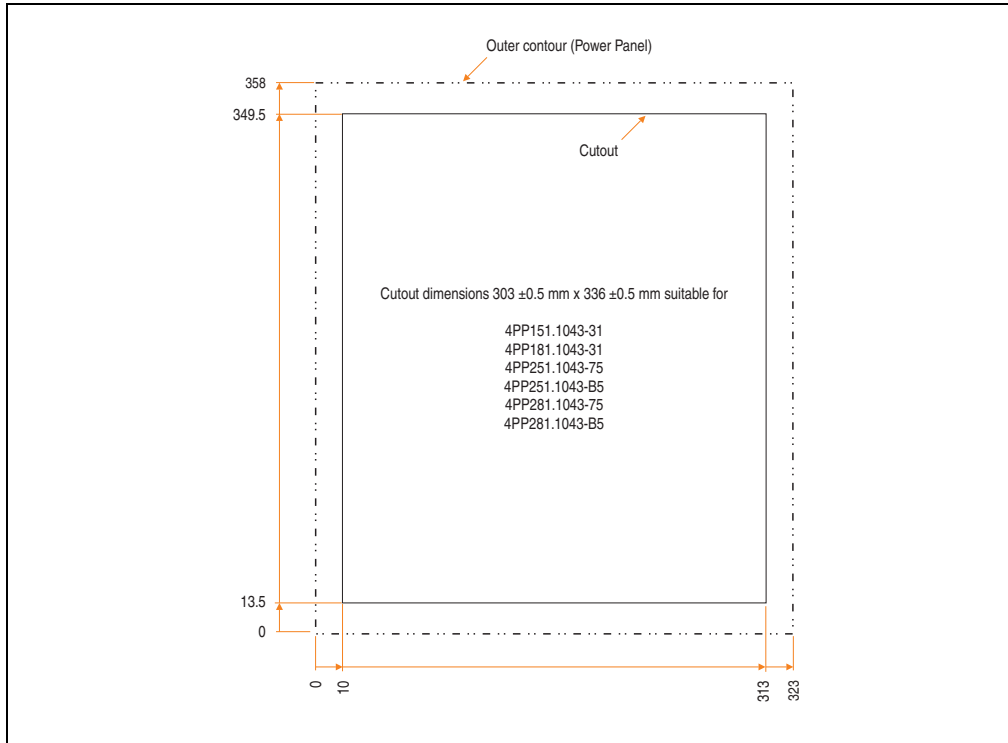


Figure 82: Cutout dimensions

### 2.16.5 Contents of delivery

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

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

Table 43: Contents of delivery - 4PP181.1043-31

## 2.17 Device 4PP181.1505-31

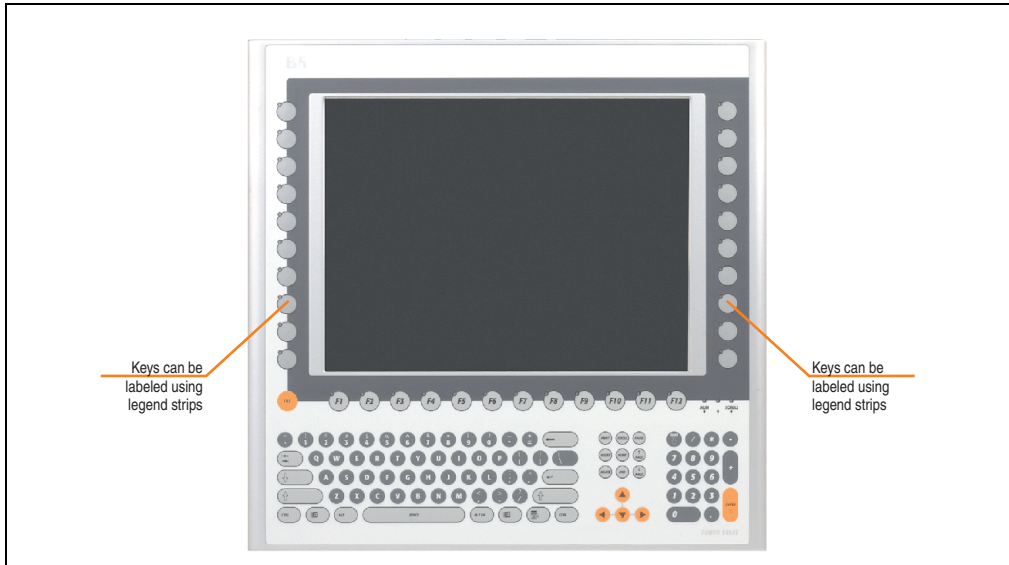


Figure 83: Front view - 4PP181.1505-31

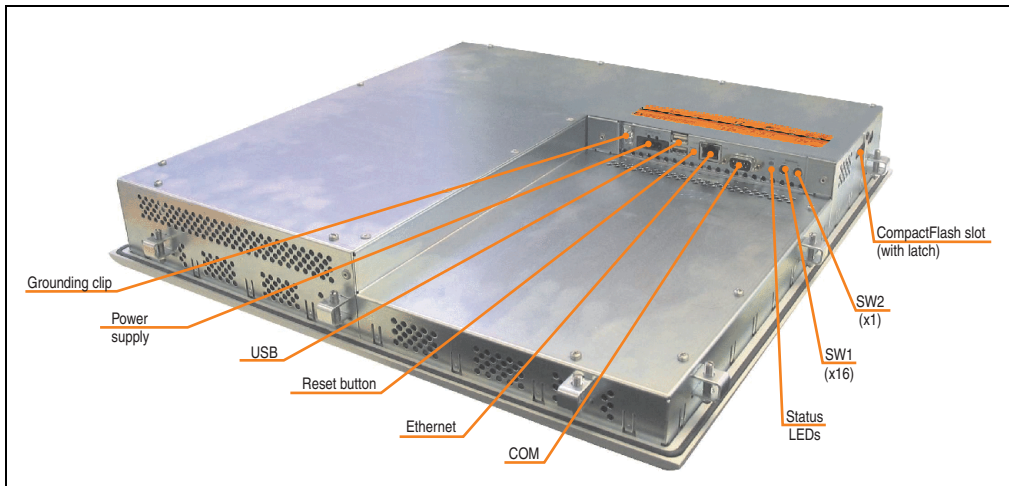


Figure 84: Rear view - 4PP181.1505-31

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 2 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Buffer time	-
Real-time clock Battery-buffered Accuracy	- At 25°C: Typically 10 ppm (1 seconds) per day <sup>1)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	-
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 44: Technical data - 4PP181.1505-31

## Technical data • Power Panel 100 with Automation Runtime

Features	4PP181.1505-31
Serial interface COM 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 Amount 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 switch	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>2)</sup>	Color TFT 15 inch (381 mm) 16.7 million colors XGA, 1024 x 768 pixels 300:1  Direction R / direction L = 65° Direction U = 50° / direction D = 55°  330 cd/m <sup>2</sup> 35,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Analog, resistive Hampshire, serial, 12-bit 78%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 activations at 1 ±0.3 to 3 ±0.3 N activating force 20 with LED 12 with LED - 15 without LED 77 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
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

Table 44: Technical data - 4PP181.1505-31 (Forts.)

## Technical data • Power Panel 100 with Automation Runtime

Electrical characteristics	4PP181.1505-31
Bleeder resistance	≤ 24 kOhm
Mechanical characteristics	
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	
Ambient temperature <sup>3)</sup>	
Operation	0 to +50°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 2.17.2 "Temperature humidity diagram" on page 142
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 44: Technical data - 4PP181.1505-31 (Forts.)

- 1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 2) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 3) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.17.2 Temperature humidity diagram

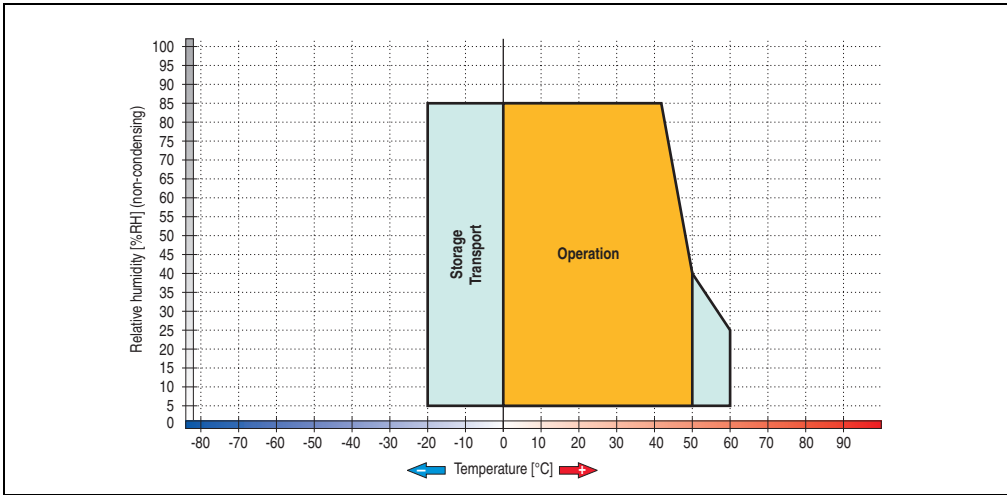


Figure 85: Temperature humidity diagram - 4PP181.1505-31

### 2.17.3 Dimensions

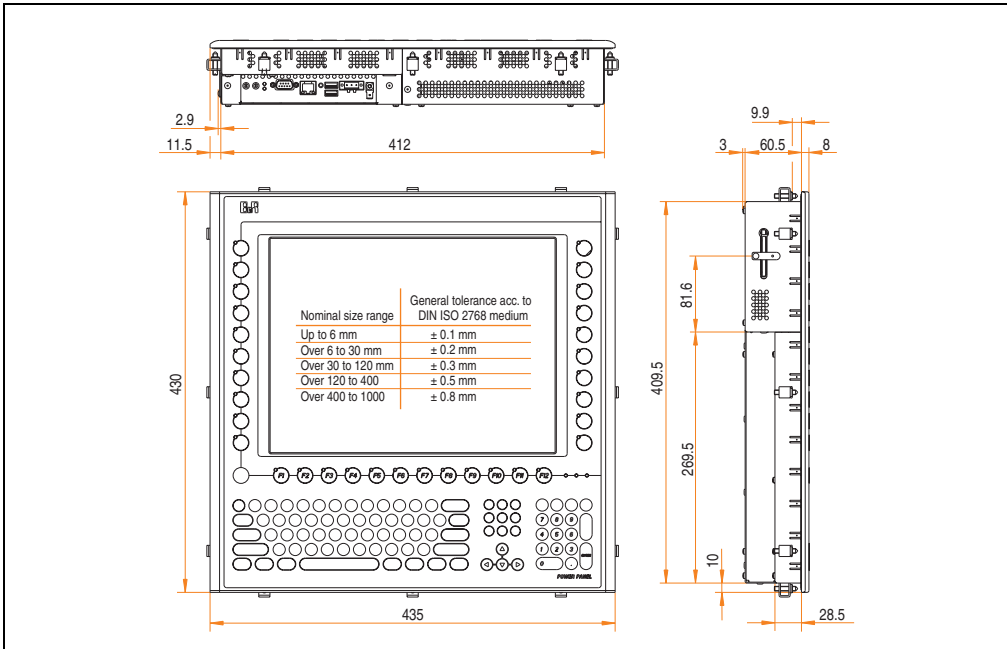


Figure 86: Dimensions - 4PP181.1505-31

### 2.17.4 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 86 "Dimensions - 4PP181.1505-31" on page 142) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

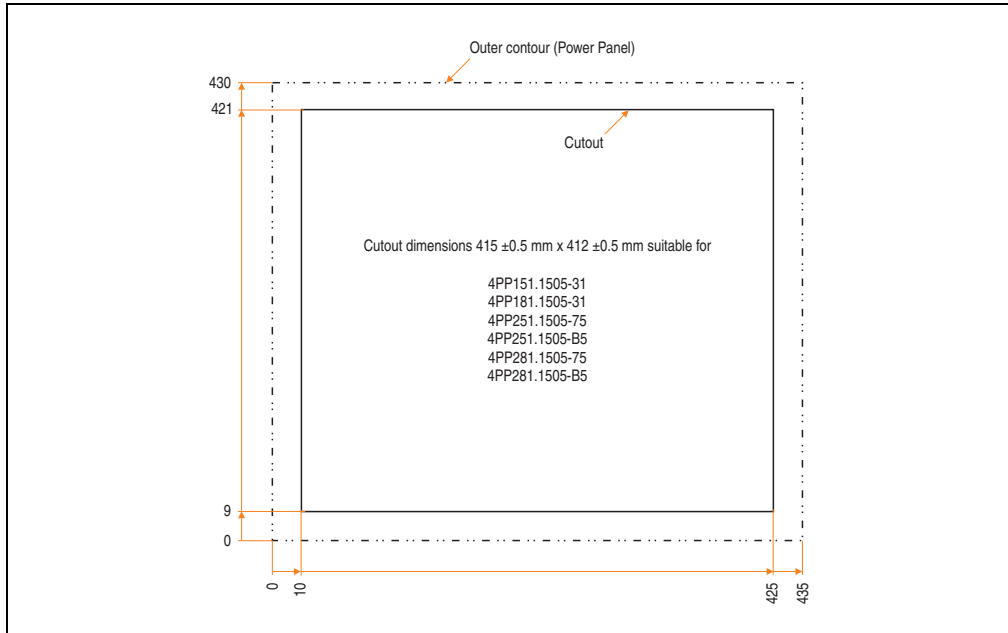


Figure 87: Cutout dimensions

### 2.17.5 Contents of delivery

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

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

Table 45: Contents of delivery - 4PP181.1505-31

## 2.18 Device 4PP182.1043-31

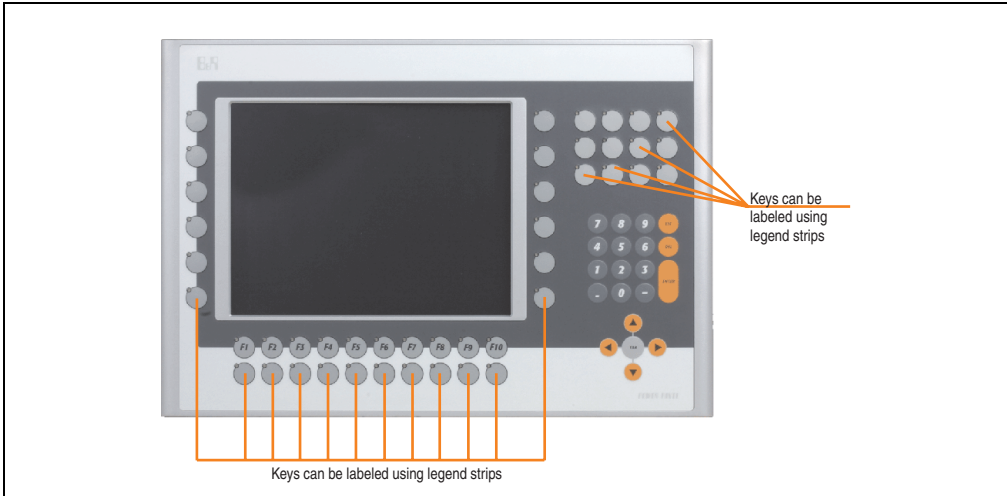


Figure 88: Front view - 4PP182.1043-31

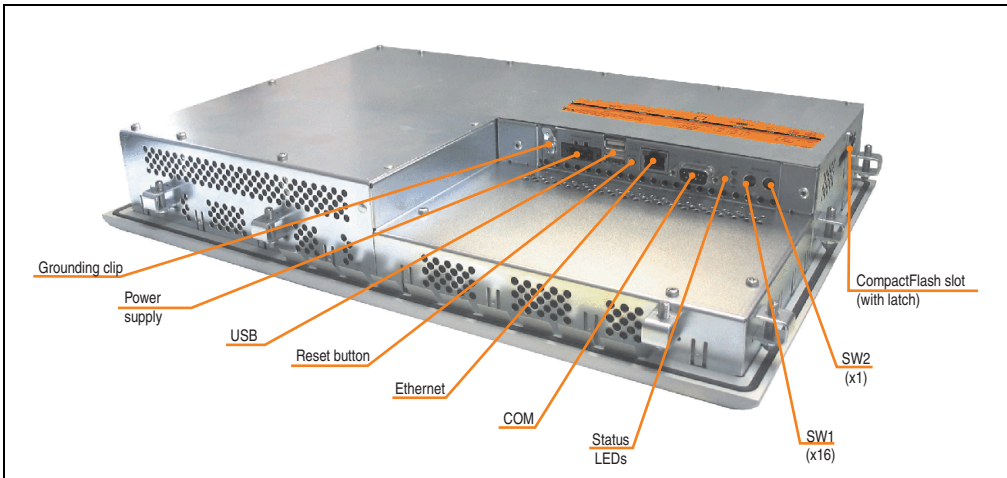


Figure 89: Rear view - 4PP182.1043-31



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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 2 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Buffer time	-
Real-time clock Battery-buffered Accuracy	- At 25°C: Typically 10 ppm (1 seconds) per day <sup>1)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	-
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 46: Technical data - 4PP182.1043-31

## Technical data • Power Panel 100 with Automation Runtime

Features	4PP182.1043-31
Serial interface COM 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 Amount 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 switch	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>2)</sup>	Color TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 Direction R / direction L = 70° Direction U = 45° / direction D = 55° 350 cd/m <sup>2</sup> 55,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Analog, resistive Hampshire, serial, 12-bit 78%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 activations at 1 ±0.3 to 3 ±0.3 N activating force 44 with LED - - 15 without LED 5 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
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. -

Table 46: Technical data - 4PP182.1043-31 (Forts.)

## Technical data • Power Panel 100 with Automation Runtime

Electrical characteristics	4PP182.1043-31
Bleeder resistance	≤ 24 kOhm
Mechanical characteristics	
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	
Ambient temperature <sup>3)</sup>	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 2.18.2 "Temperature humidity diagram" on page 148
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 46: Technical data - 4PP182.1043-31 (Forts.)

- 1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 2) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 3) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.18.2 Temperature humidity diagram

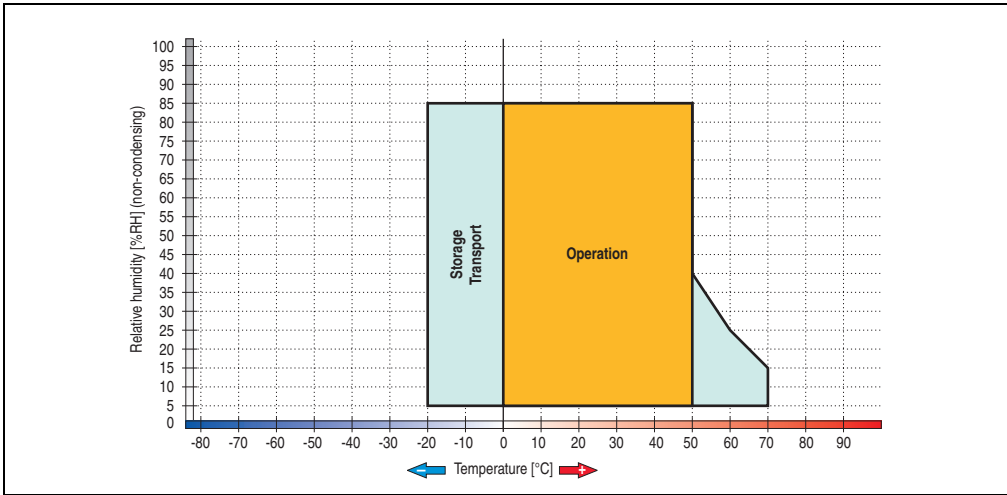


Figure 90: Temperature humidity diagram - 4PP182.1043-31

### 2.18.3 Dimensions

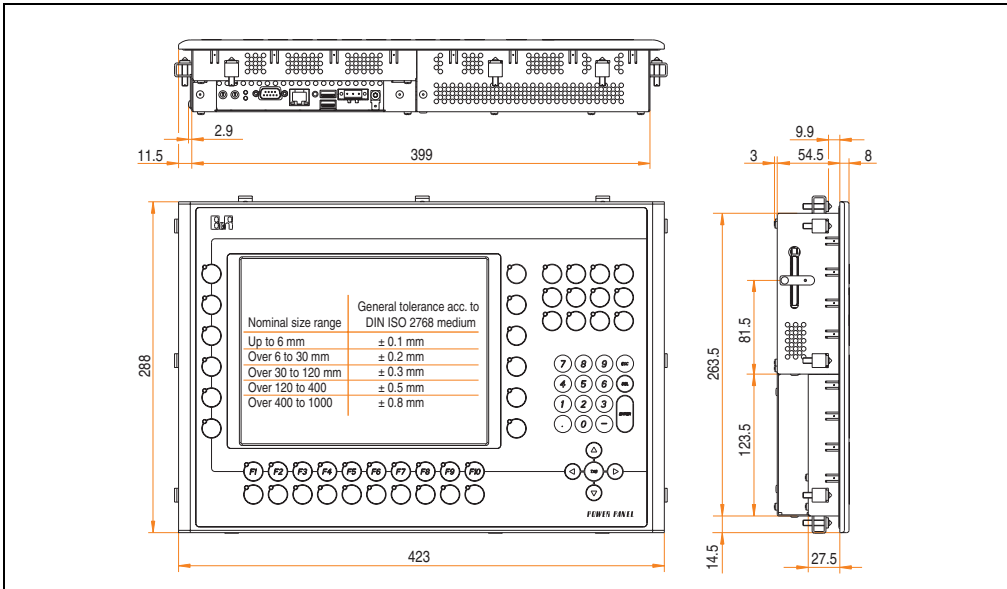


Figure 91: Dimensions - 4PP182.1043-31

### 2.18.4 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 81 "Dimensions - 4PP181.1043-31" on page 136) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

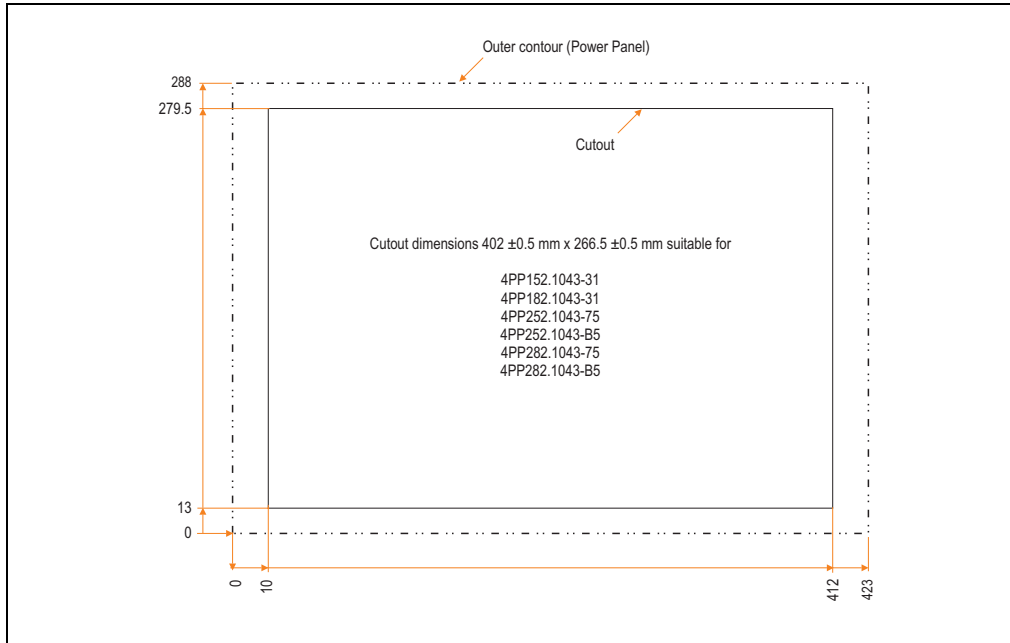


Figure 92: Cutout dimensions

### 2.18.5 Contents of delivery

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

Amount	Component
1	Power Panel 182 TFT VGA 10.4" FT MH
12	Retaining clips included
16	Legend strips (inserted in the front)

Table 47: 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 559).

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 156).

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

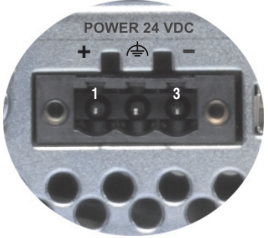


Figure 93: Supply voltage connection

## Warning!

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.

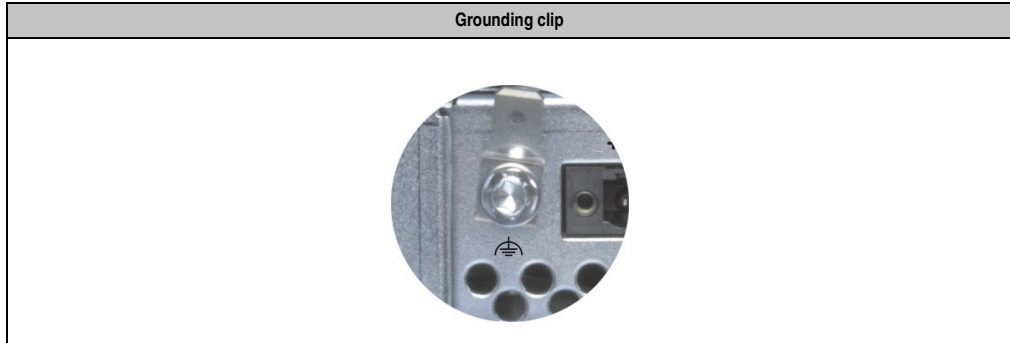


Figure 94: Grounding clip

### 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 COM	
RS232 interface Modem-capable, not electrically isolated Up to 115 kBaud	
Pin	RS232
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

9-pin DSUB plug

Table 48: Pin assignments - COM

### 3.1.4 USB port

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

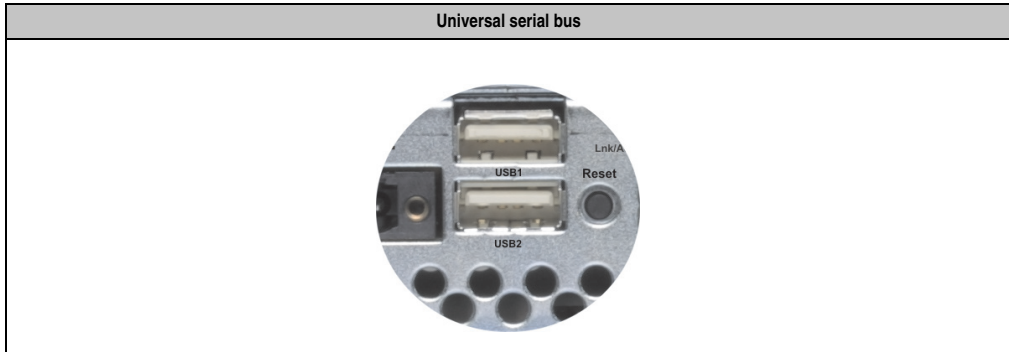


Figure 95: USB port

Technical data - 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 49: Technical data for USB connection

## Warning!

Only the USB devices tested and verified by B&R and found in the section "Accessories" on page 555 may be connected to the USB interface.

## Warning!

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 to FD are available for any purpose in an application and can be evaluated by the application program.

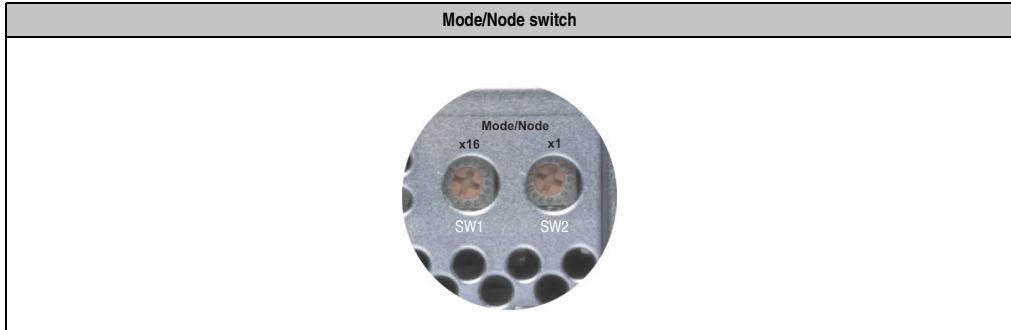


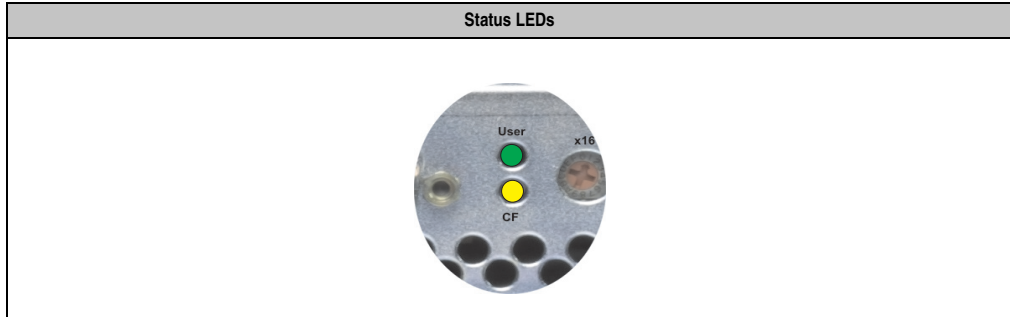
Figure 96: Mode/Node switch

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	Diagnostics	Automation Runtime diagnostics mode (CompactFlash Automation Runtime or terminal operation).

Table 50: 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.



LED	Color	Function
User	Green	Freely available for use in an application (corresponding libraries for Automation Studio in preparation)
CF	Yellow	Indicates that a CompactFlash card is being accessed

Figure 97: Status LEDs

### 3.1.7 Ethernet connection

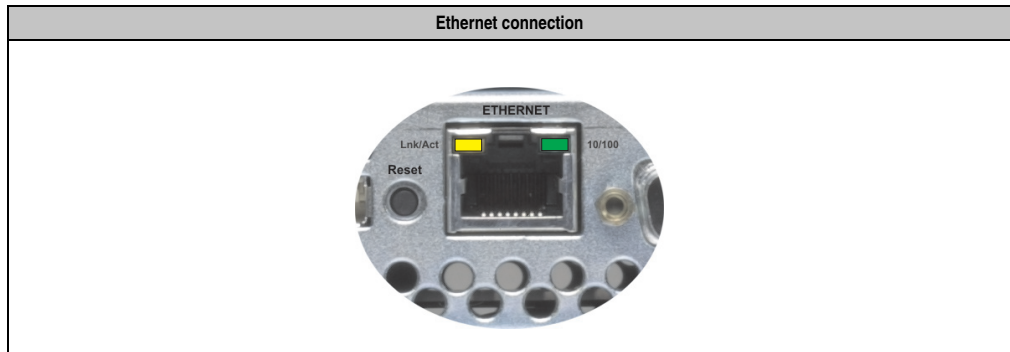


Figure 98: Ethernet connection

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

Table 51: 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 (LED blinks during transfer)	No link

Table 52: 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 connections. In order to avoid accidental activation, a reset can only be triggered with a pointed object.

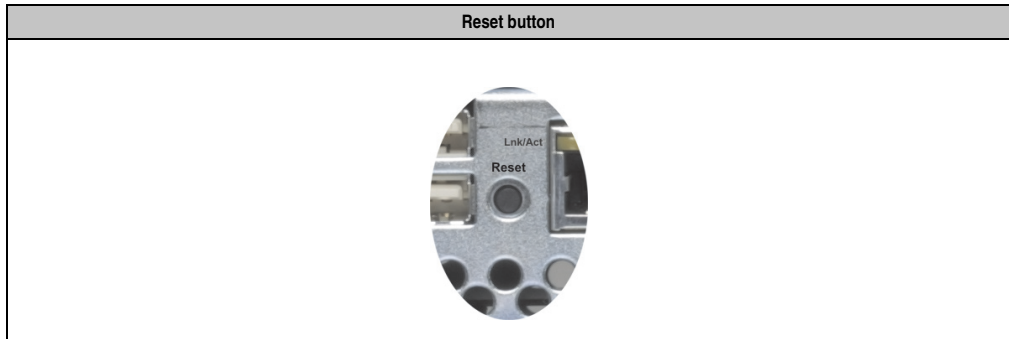


Figure 99: Reset button

### 3.1.9 CompactFlash slot

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

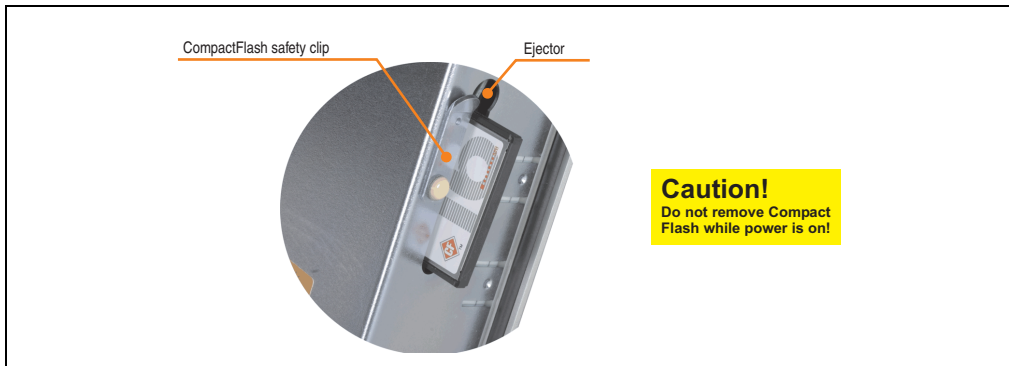


Figure 100: CompactFlash slot

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

## Warning!

The power must be turned off before inserting or removing the CompactFlash card!  
As a safety measure, a sticker is also attached to Power Panel devices stating this.

### 3.2 Stickers

#### 3.2.1 Safety sticker

A safety sticker attached over the CompactFlash slot advises that the power to the Power Panel device (depending on revision) must be switched off when inserting or removing a CompactFlash 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 101: Safety sticker

#### 3.2.2 Device label

The following label is attached to a suitable location on the Power Panel and shows brief descriptions for all of the interfaces:

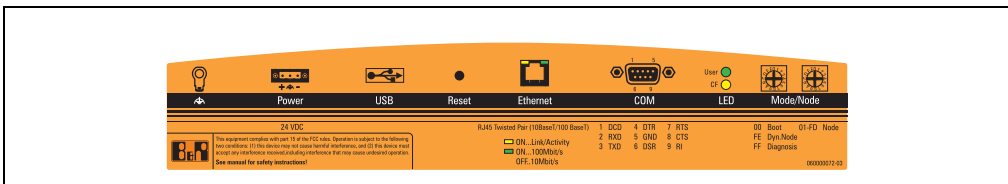


Figure 102: Device label

### 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

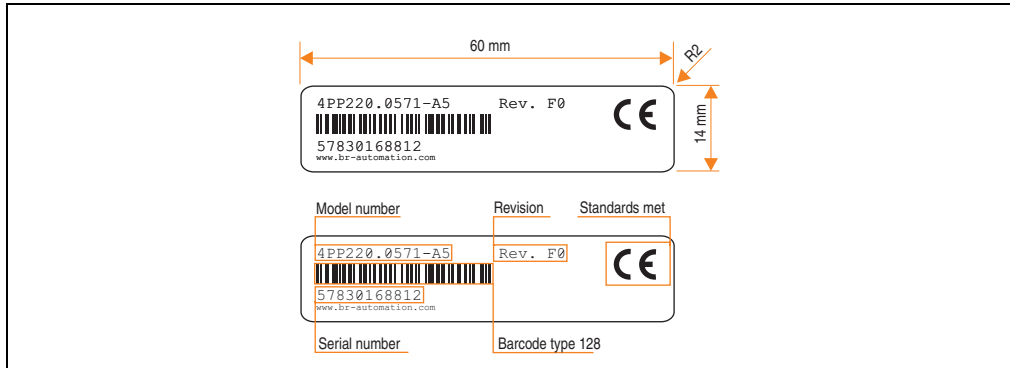


Figure 103: Design / dimensions - Serial number sticker

### 3.3 Device 4PP210.0000-95

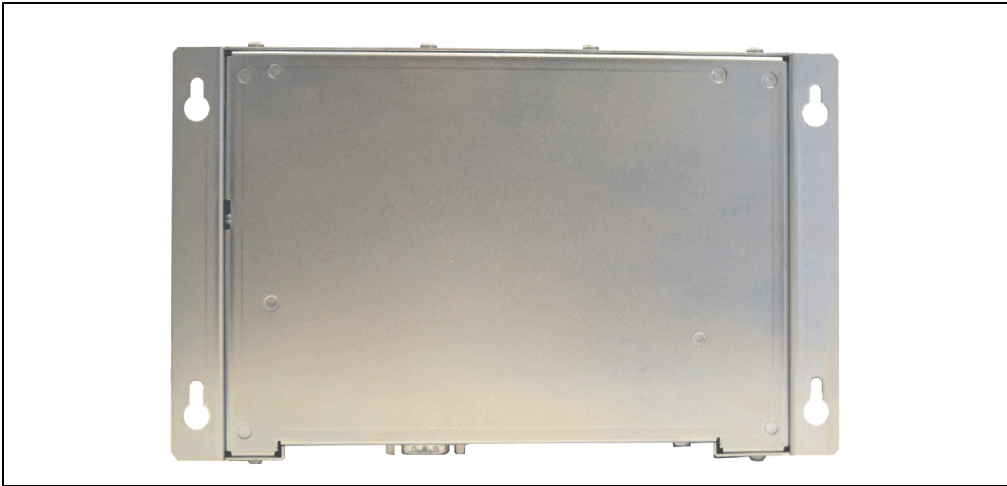


Figure 104: Front view - 4PP210.0000-95

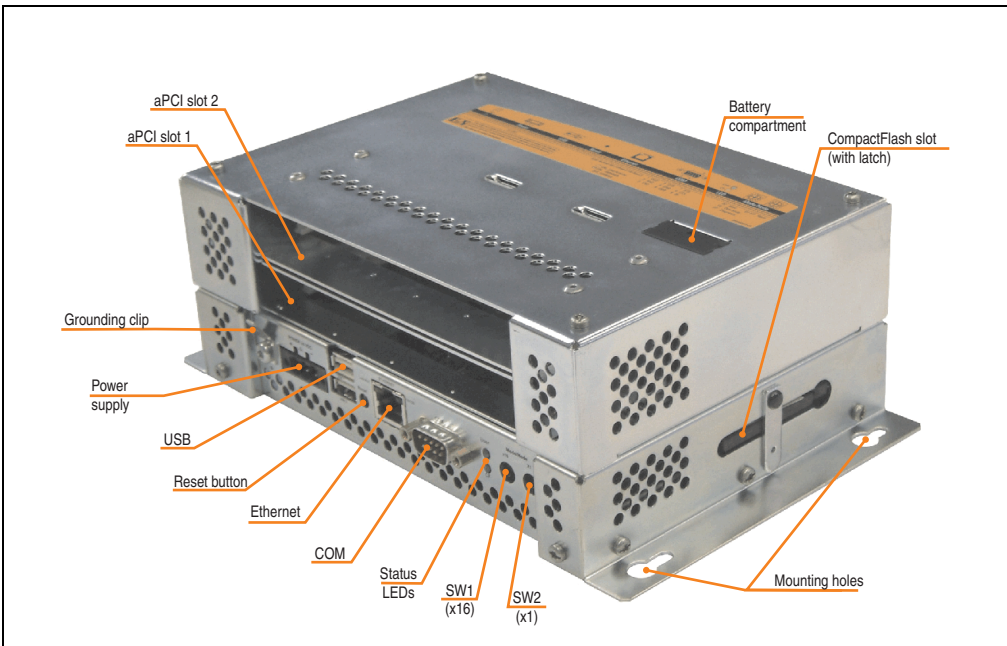


Figure 105: Rear view - 4PP210.0000-95

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	4 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 - -
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables 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 Amount Connection	Type I 1 slot Primary IDE device

Table 53: Technical data - 4PP210.0000-95

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP210.0000-95
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	-
Touch screen Touch screen type Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	-
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 12 W typical, 17 W max. Yes
Bleeder resistance	≥ 47 kOhm

Table 53: Technical data - 4PP210.0000-95 (Forts.)



Mechanical characteristics	4PP210.0000-95
Front Frame Membrane Design Gasket	-
Housing	Metal
Outer dimensions Width Height Depth	230 mm 146 mm 80.5 mm
Weight	Approx. 1.4 kg (without aPCI interface modules)
Environmental characteristics	
Ambient temperature <sup>6)</sup> Operation Storage Transport	0 to +50°C -20 to +80°C -20 to +80°C
Relative humidity	See 3.3.2 "Temperature humidity diagram" on page 162
Vibration Operation (continuous) Operation (occasional) Storage Transport	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock Operation Storage Transport	15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Protection type	IP20 back side (only with installed aPCI interface modules and Compact Flash card)
Altitude	Max. 3000 m

Table 53: Technical data - 4PP210.0000-95 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.3.2 Temperature humidity diagram

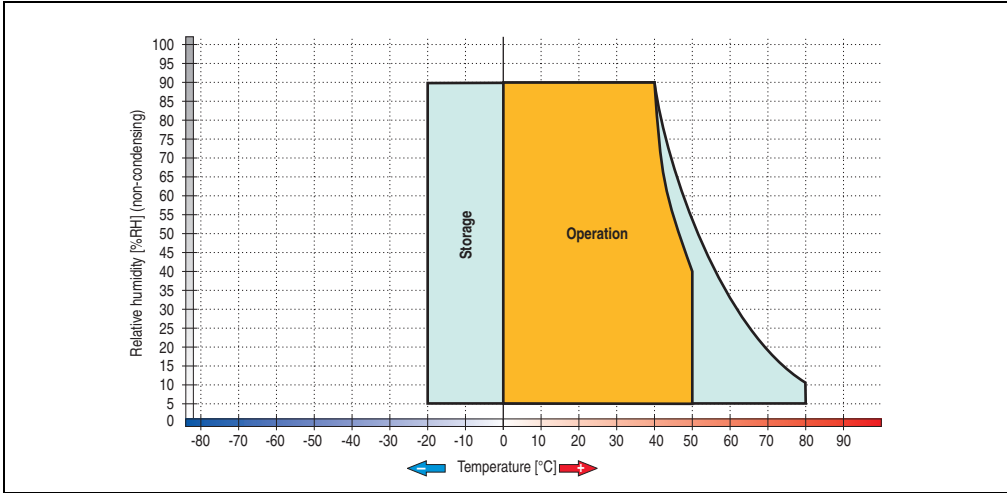


Figure 106: Temperature humidity diagram - 4PP210.0000-95

### 3.3.3 Dimensions

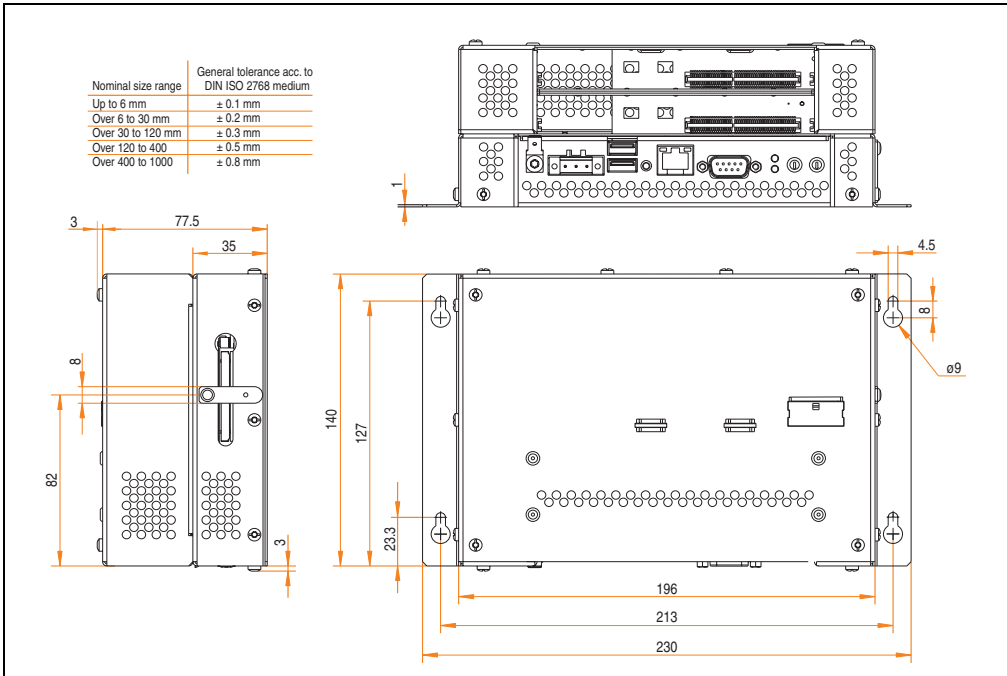


Figure 107: Dimensions - 4PP210.0000-95

### 3.3.4 Drilling template

For mounting, the drillings must be made according to the following diagram. For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

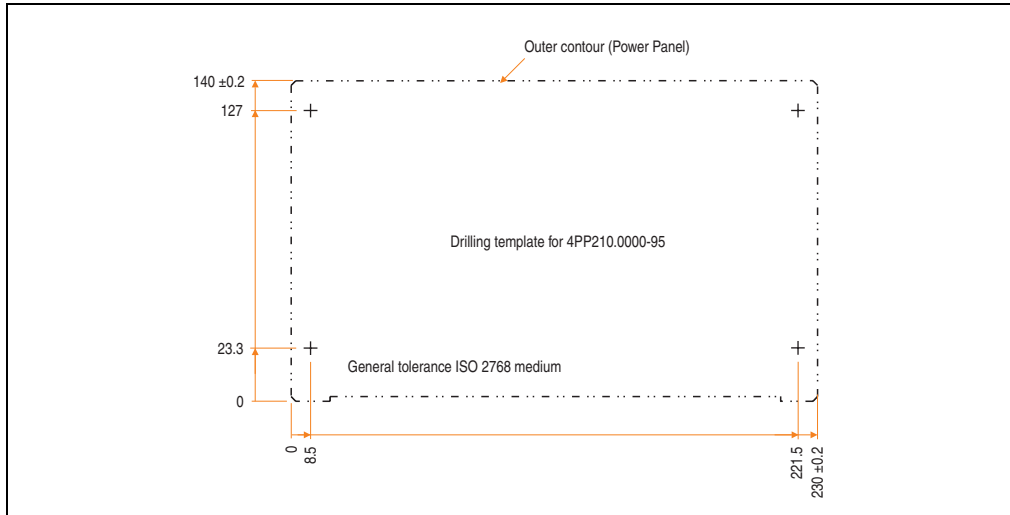


Figure 108: Cutout dimensions

### 3.3.5 Contents of delivery

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

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

Table 54: Contents of delivery - 4PP210.0000-95

### 3.4 Device 4PP220.0571-45



Figure 109: Front view - 4PP220.0571-45

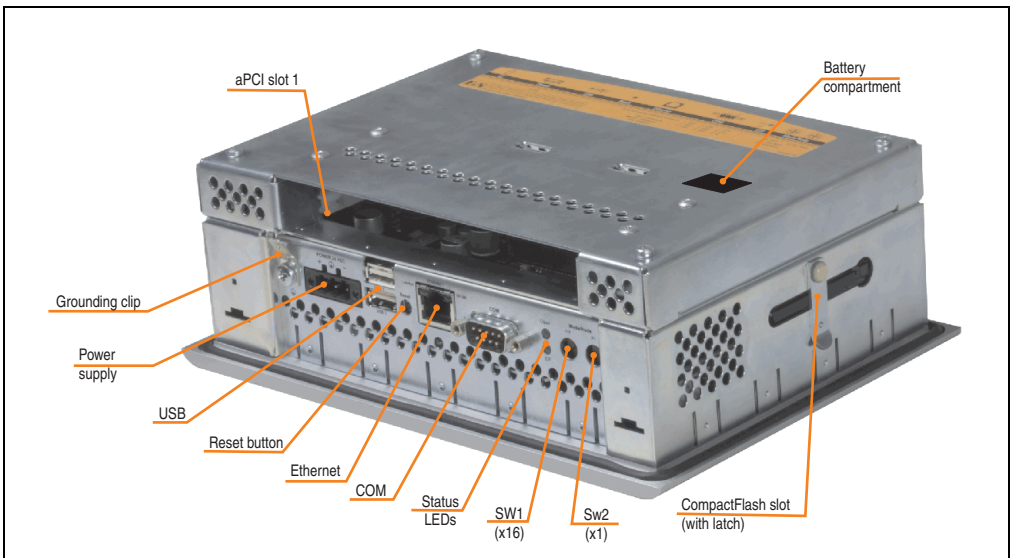


Figure 110: Rear view - 4PP220.0571-45

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables 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 Amount Connection	Type I 1 slot Primary IDE device

Table 55: Technical data - 4PP220.0571-45

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP220.0571-45
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	LCD monochrome 5.7 in (144 mm) 8 shades of gray QVGA, 320 x 240 pixels 25:1  Direction R / direction L = 40° Direction U = 40° / direction D = 50°  140 cd/m <sup>2</sup> 50,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Gunze Analog, resistive Hampshire, serial, 12-bit 84%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	-
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 12 W typical, 17 W max. Yes
Bleeder resistance	≥ 47 kOhm

Table 55: 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	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 3.4.2 "Temperature humidity diagram" on page 168
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 55: Technical data - 4PP220.0571-45 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.4.2 Temperature humidity diagram

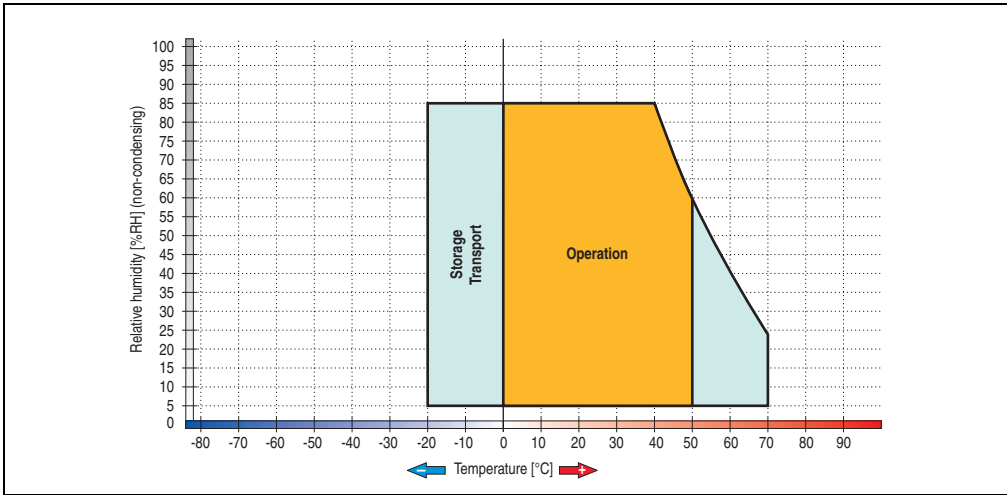


Figure 111: Temperature humidity diagram - 4PP220.0571-45

### 3.4.3 Dimensions

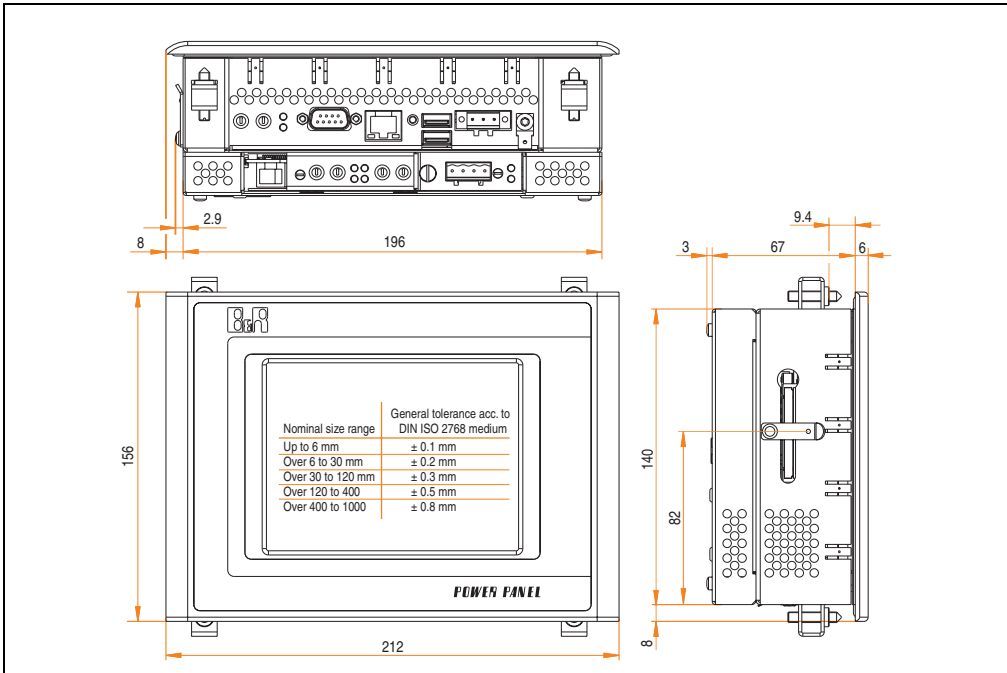


Figure 112: Dimensions - 4PP220.0571-45



### 3.4.4 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 112 "Dimensions - 4PP220.0571-45" on page 168) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

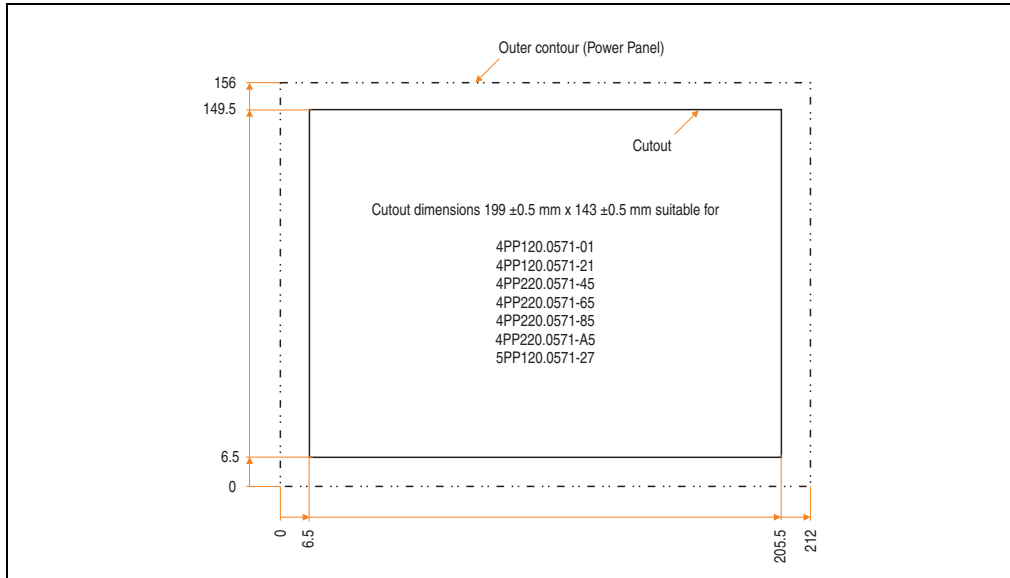


Figure 113: Cutout dimensions

### 3.4.5 Contents of delivery

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

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

Table 56: Contents of delivery - 4PP220.0571-45

### 3.5 Device 4PP220.0571-65



Figure 114: Front view - 4PP220.0571-65

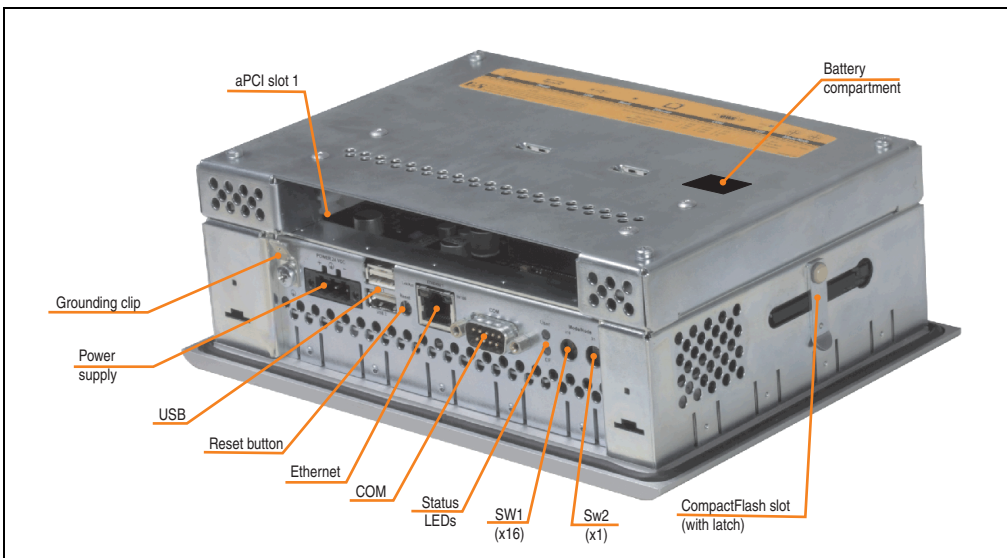


Figure 115: Rear view - 4PP220.0571-65

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables 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 Amount Connection	Type I 1 slot Primary IDE device

Table 57: Technical data - 4PP220.0571-65

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP220.0571-65
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	Color LCD 5.7 in (144 mm) 256 colors QVGA, 320 x 240 pixels 40:1 Direction R / direction L = 40° Direction U = 40° / direction D = 50° 150 cd/m <sup>2</sup> 50,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Gunze Analog, resistive Hampshire, serial, 12-bit 84%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	-
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 12 W typical, 17 W max. Yes
Bleeder resistance	≥ 47 kOhm

Table 57: 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	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 3.5.2 "Temperature humidity diagram" on page 174
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 57: Technical data - 4PP220.0571-65 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.5.2 Temperature humidity diagram

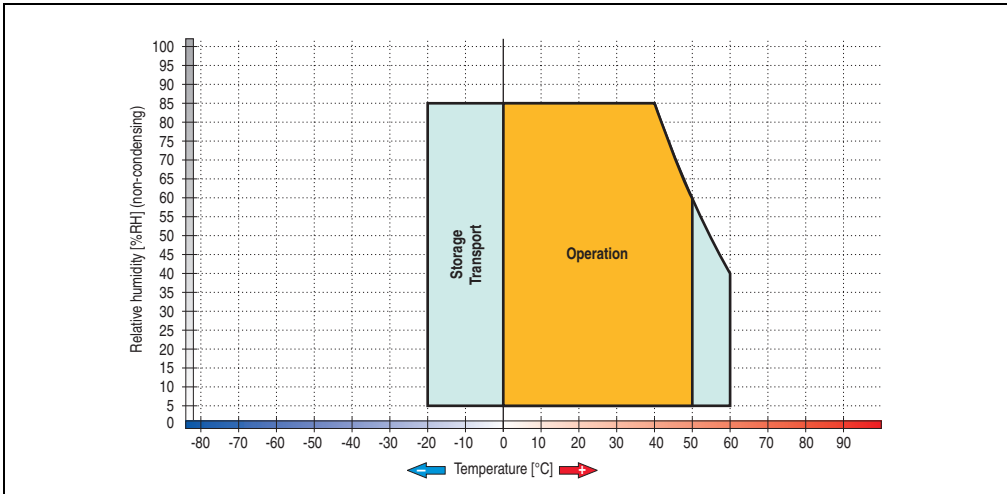


Figure 116: Temperature humidity diagram - 4PP220.0571-65

### 3.5.3 Dimensions

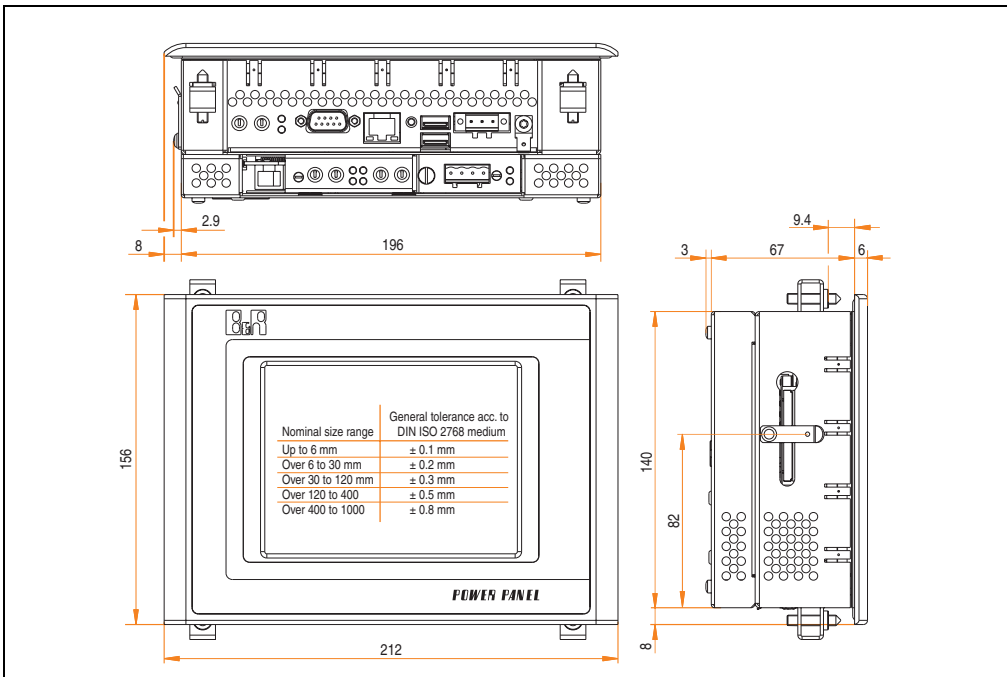


Figure 117: Dimensions - 4PP220.0571-65

### 3.5.4 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 117 "Dimensions - 4PP220.0571-65" on page 174) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

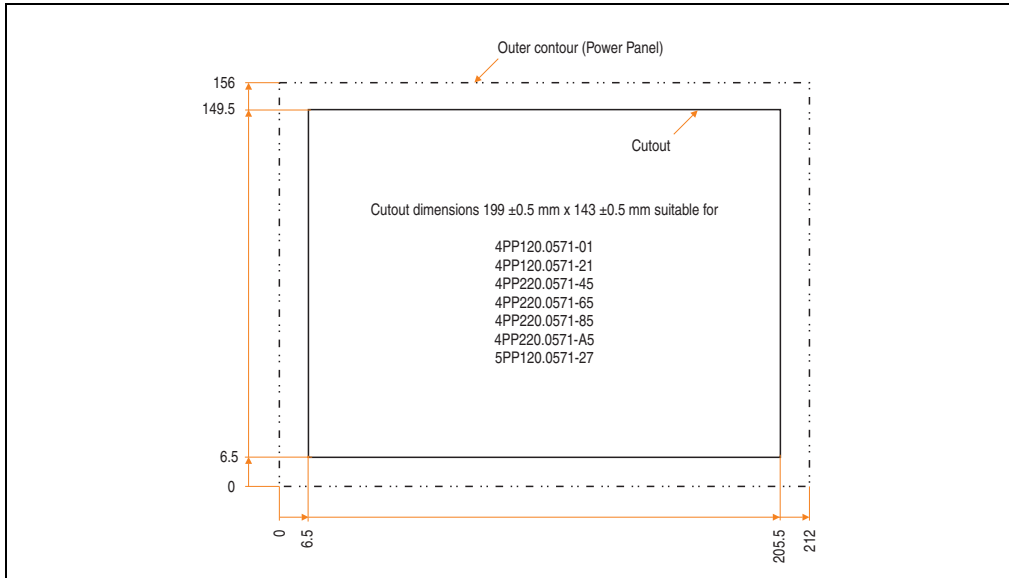


Figure 118: Cutout dimensions

### 3.5.5 Contents of delivery

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

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

Table 58: Contents of delivery - 4PP220.0571-65

### 3.6 Device 4PP220.0571-85



Figure 119: Front view - 4PP220.0571-85

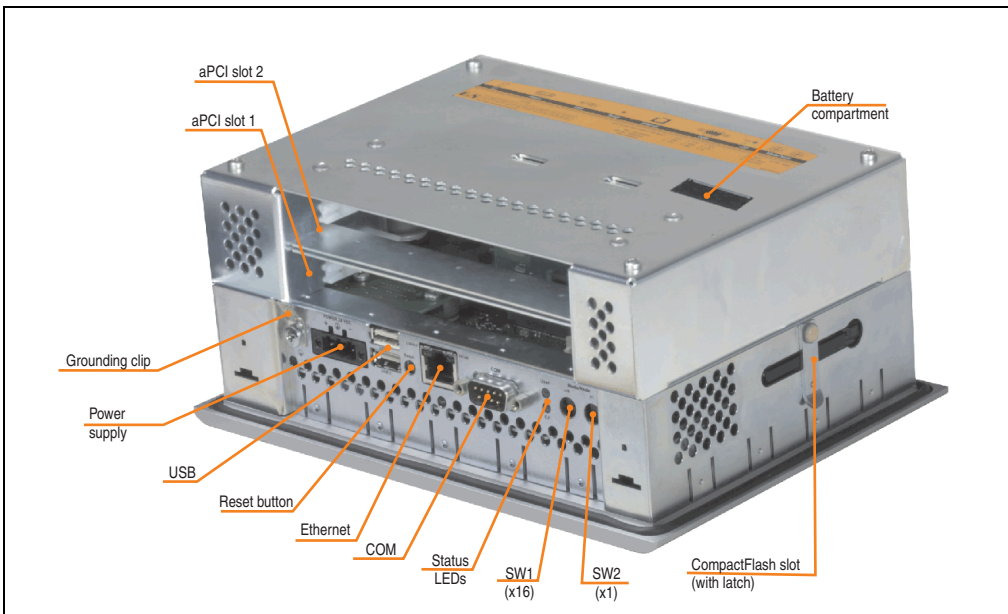


Figure 120: Rear view - 4PP220.0571-85



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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables 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 Amount Connection	Type I 1 slot Primary IDE device

Table 59: Technical data - 4PP220.0571-85

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP220.0571-85
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	LCD monochrome 5.7 in (144 mm) 8 shades of gray QVGA, 320 x 240 pixels 25:1 Direction R / direction L = 40° Direction U = 40° / direction D = 50° 140 cd/m <sup>2</sup> 50,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Gunze Analog, resistive Hampshire, serial, 12-bit 84%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	-
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 12 W typical, 17 W max. Yes
Bleeder resistance	≥ 47 kOhm

Table 59: 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	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 3.6.2 "Temperature humidity diagram" on page 180
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 59: Technical data - 4PP220.0571-85 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.6.2 Temperature humidity diagram

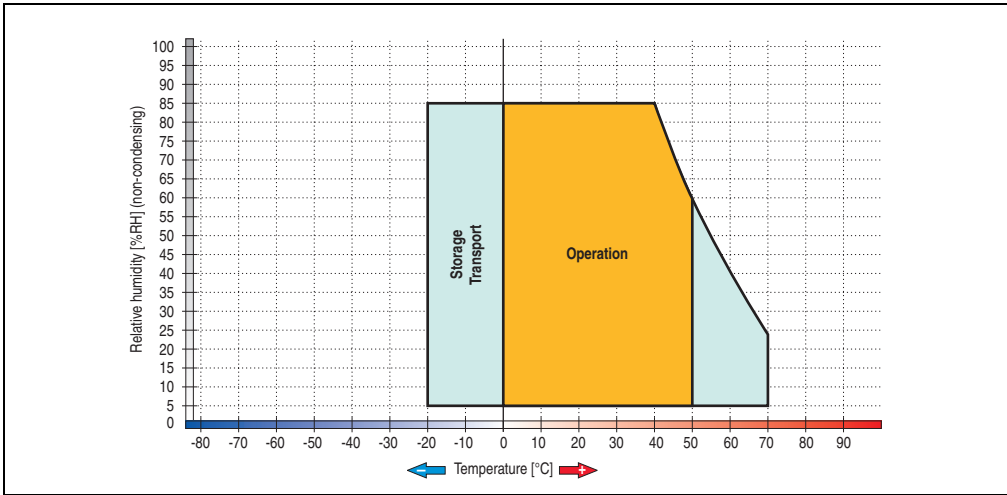


Figure 121: Temperature humidity diagram - 4PP220.0571-85

### 3.6.3 Dimensions

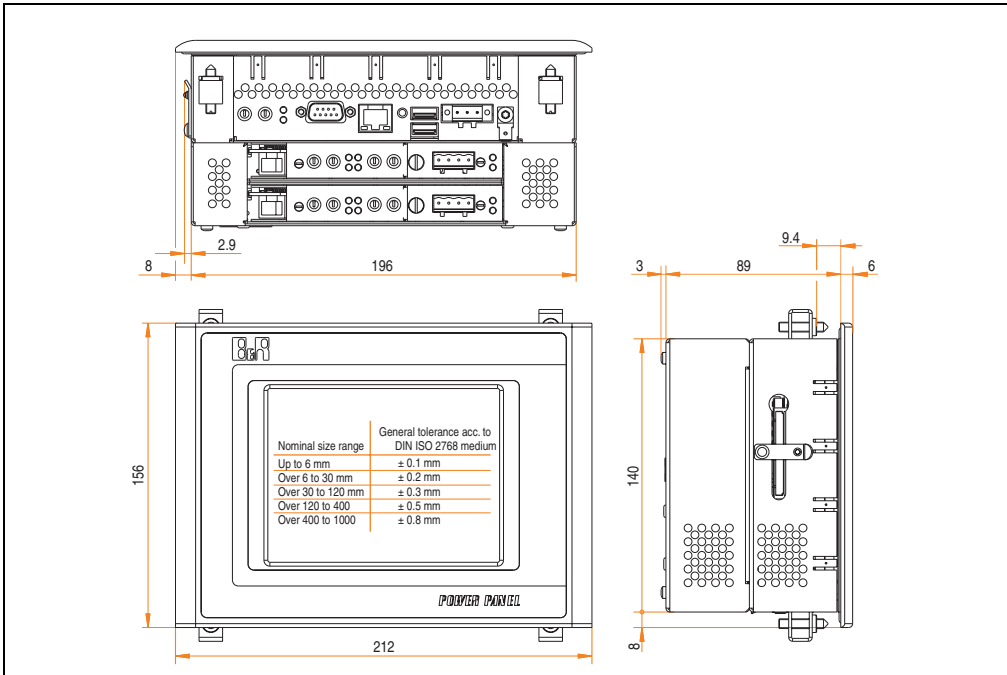


Figure 122: Dimensions - 4PP220.0571-85

### 3.6.4 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 - 4PP220.0571-85" on page 180) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

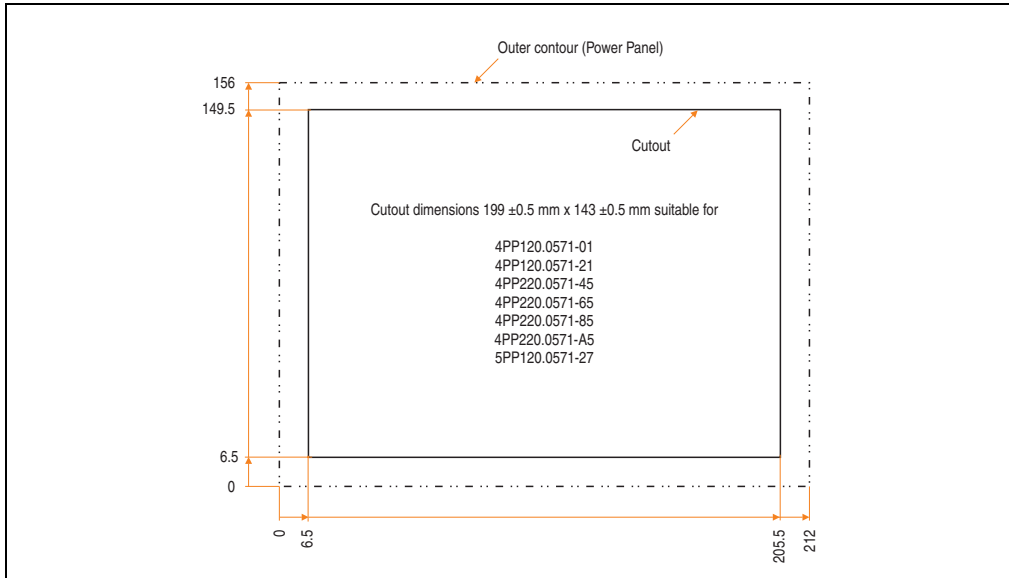


Figure 123: Cutout dimensions

### 3.6.5 Contents of delivery

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

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

Table 60: Contents of delivery - 4PP220.0571-85

### 3.7 Device 4PP220.0571-A5



Figure 124: Front view - 4PP220.0571-A5

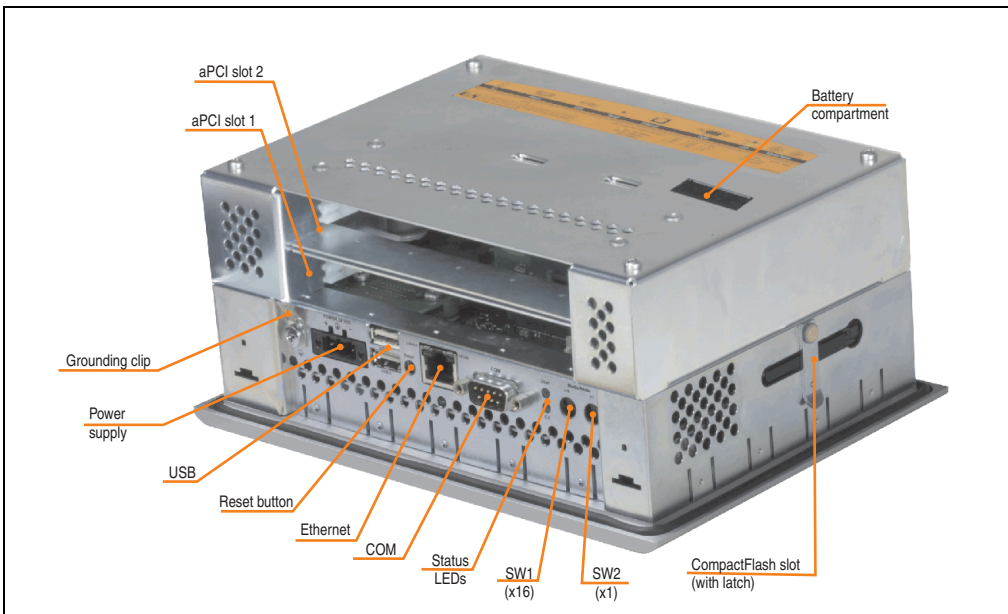


Figure 125: Rear view - 4PP220.0571-A5

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables 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 Amount Connection	Type I 1 slot Primary IDE device

Table 61: Technical data - 4PP220.0571-A5

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP220.0571-A5
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	Color LCD 5.7 in (144 mm) 256 colors QVGA, 320 x 240 pixels 40:1 Direction R / direction L = 40° Direction U = 40° / direction D = 50° 150 cd/m <sup>2</sup> 50,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Gunze Analog, resistive Hampshire, serial, 12-bit 84%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	-
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 12 W typical, 17 W max. Yes
Bleeder resistance	≥ 47 kOhm

Table 61: 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	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 3.7.2 "Temperature humidity diagram" on page 186
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 61: Technical data - 4PP220.0571-A5 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.7.2 Temperature humidity diagram

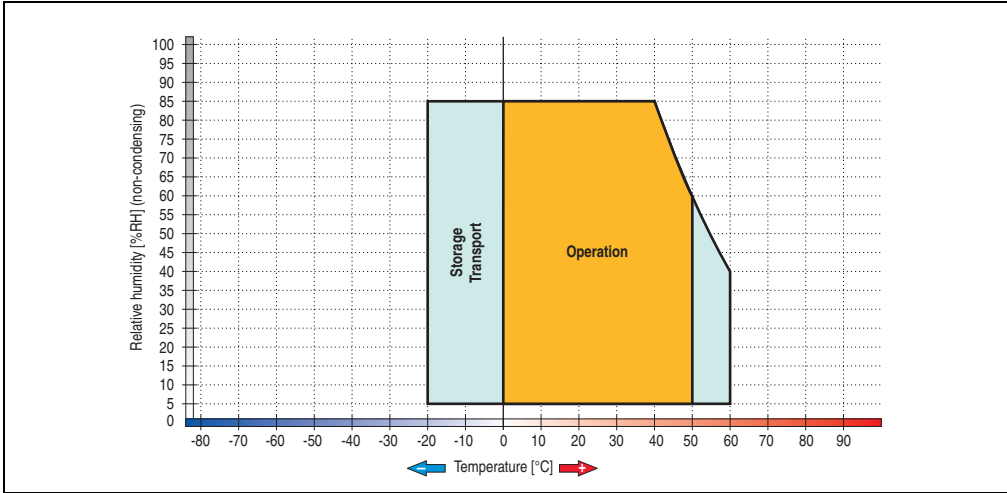


Figure 126: Temperature humidity diagram - 4PP220.0571-A5

### 3.7.3 Dimensions

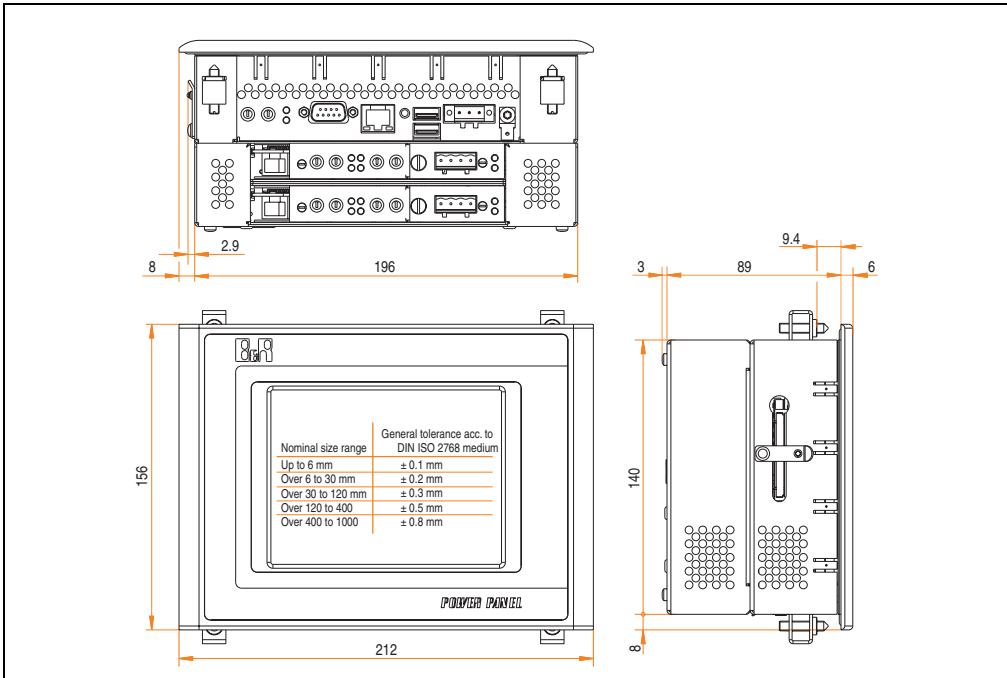


Figure 127: Dimensions - 4PP220.0571-A5

### 3.7.4 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 127 "Dimensions - 4PP220.0571-A5" on page 186) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

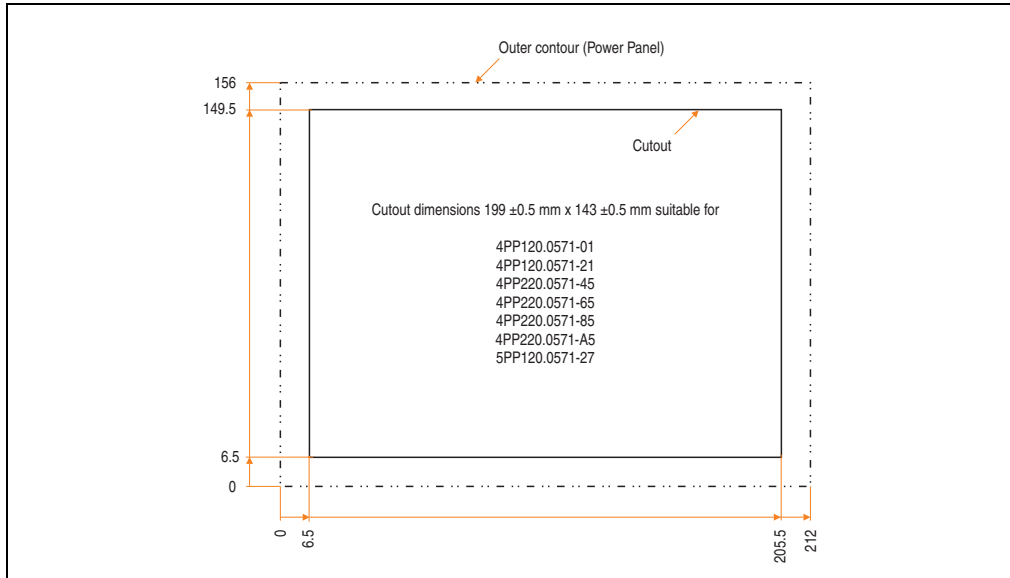


Figure 128: Cutout dimensions

### 3.7.5 Contents of delivery

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

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

Table 62: Contents of delivery - 4PP220.0571-A5

### 3.8 Device 4PP220.1043-75

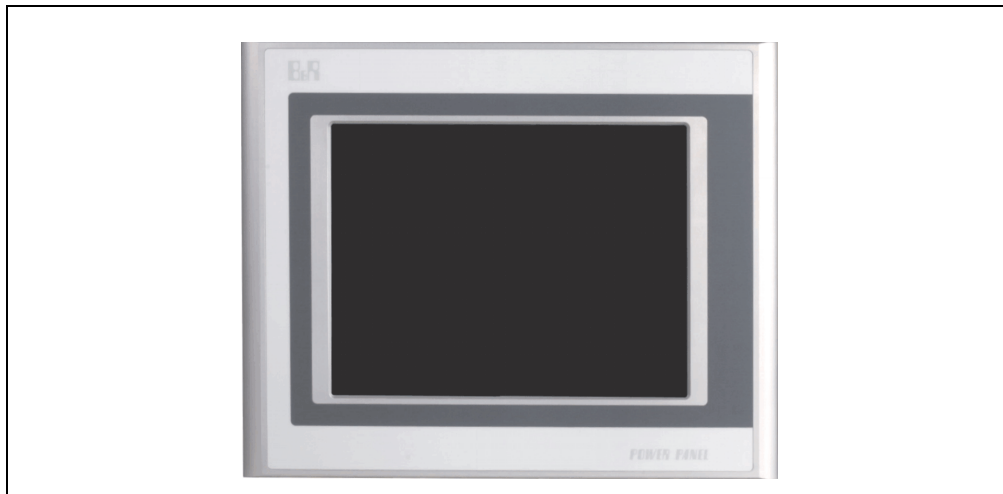


Figure 129: Front view - 4PP220.1043-75

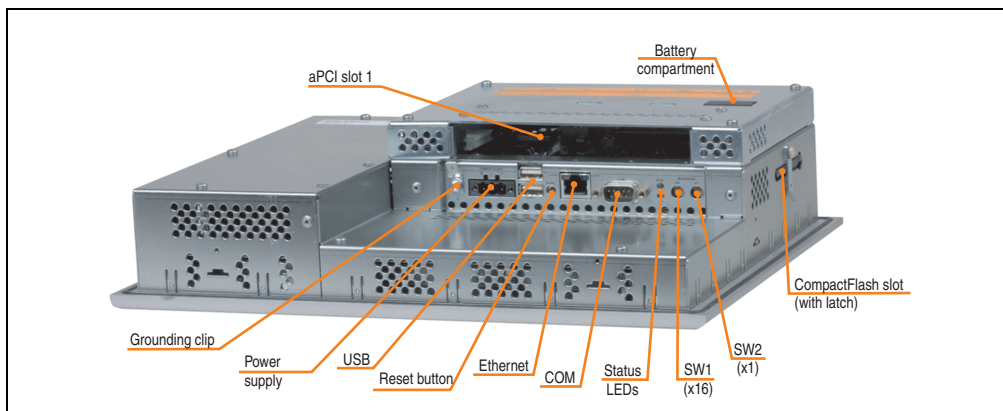


Figure 130: Rear view - 4PP220.1043-75

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables 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 Amount Connection	Type I 1 slot Primary IDE device

Table 63: Technical data - 4PP220.1043-75

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP220.1043-75
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	Color TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 Direction R / direction L = 70° Direction U = 45° / direction D = 55° 350 cd/m <sup>2</sup> 55,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Elo (Rev. < M0: 3M) Analog, resistive Hampshire, serial, 12-bit 78%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	-
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 17 W typical, 22 W max. Yes
Bleeder resistance	≥ 47 kOhm

Table 63: 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	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 3.8.2 "Temperature humidity diagram" on page 192
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 63: Technical data - 4PP220.1043-75 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.8.2 Temperature humidity diagram

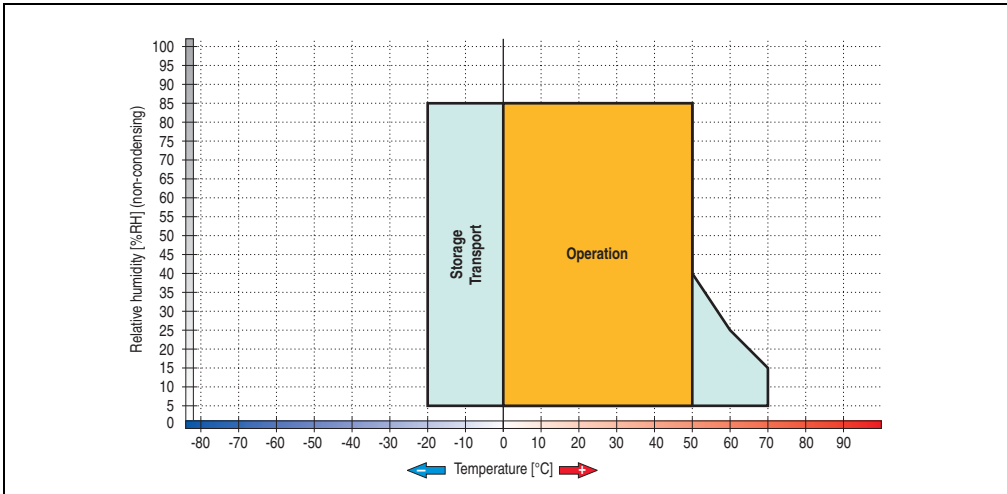


Figure 131: Temperature humidity diagram - 4PP220.1043-75

### 3.8.3 Dimensions

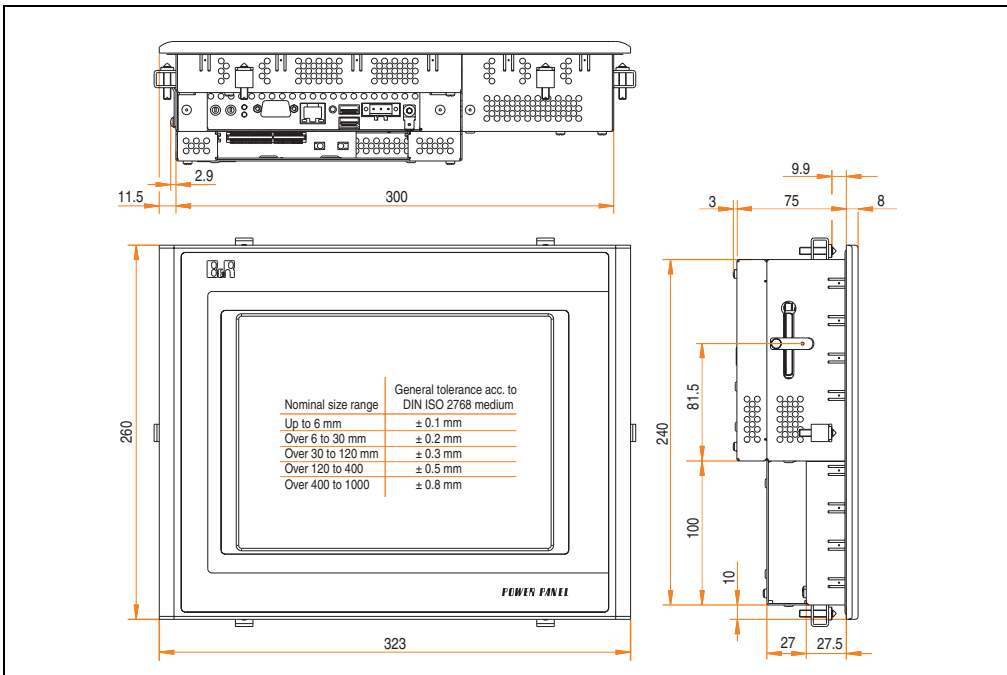


Figure 132: Dimensions - 4PP220.1043-75



### 3.8.4 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 132 "Dimensions - 4PP220.1043-75" on page 192) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

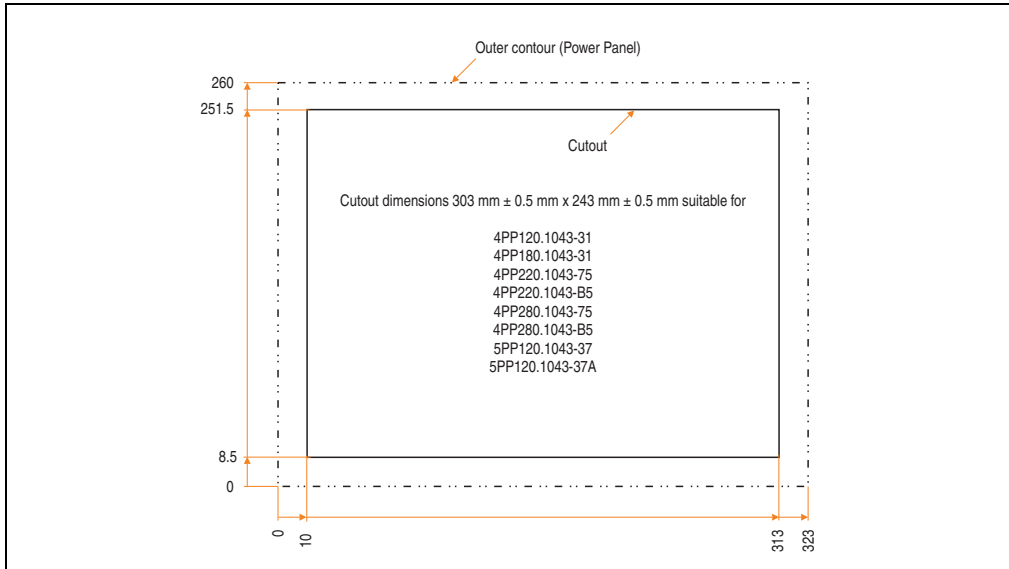


Figure 133: Cutout dimensions

### 3.8.5 Contents of delivery

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

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

Table 64: Contents of delivery - 4PP220.1043-75

### 3.9 Device 4PP220.1043-B5

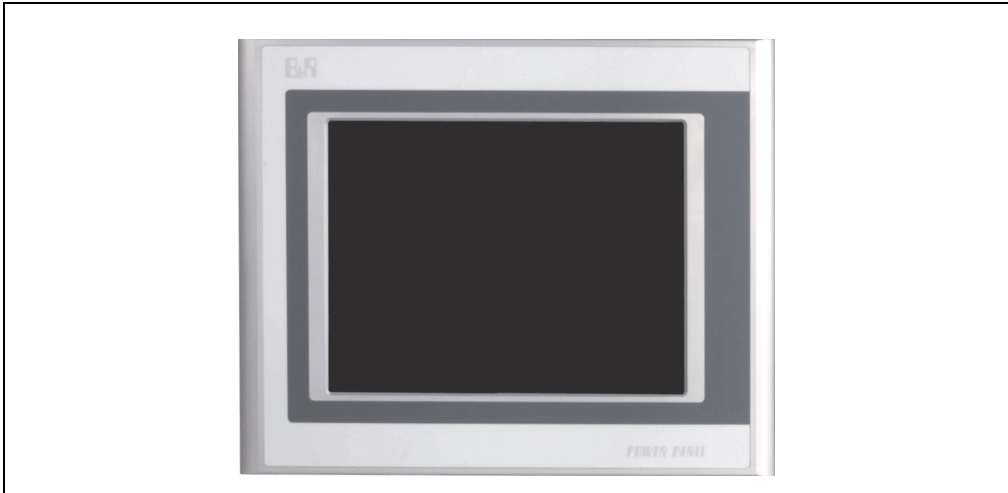


Figure 134: Front view - 4PP220.1043-B5

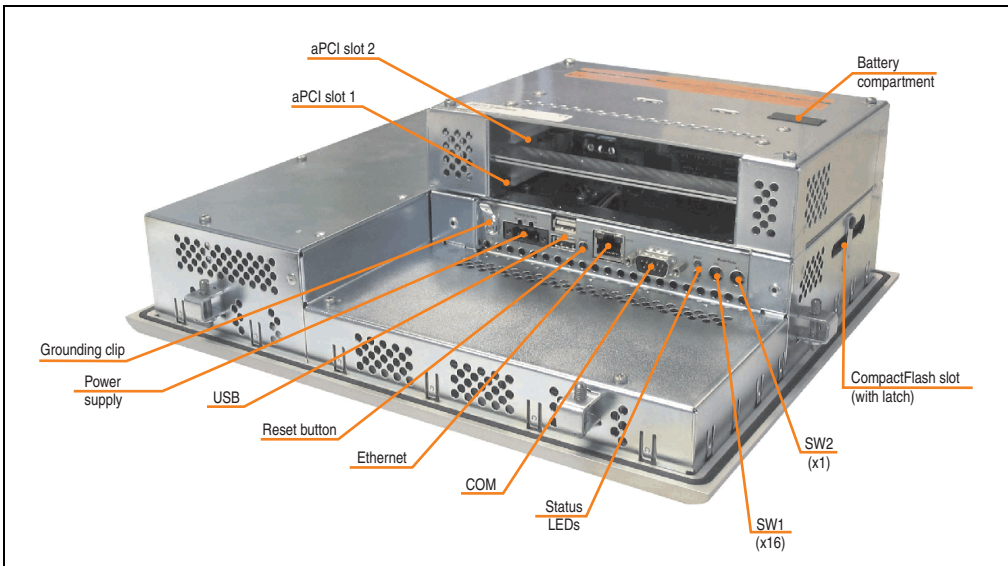


Figure 135: Rear view - 4PP220.1043-B5

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables 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 Amount Connection	Type I 1 slot Primary IDE device

Table 65: Technical data - 4PP220.1043-B5

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP220.1043-B5
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	Color TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 Direction R / direction L = 70° Direction U = 45° / direction D = 55° 350 cd/m <sup>2</sup> 55,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Elo (Rev. < 00: 3M) Analog, resistive Hampshire, serial, 12-bit 78%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	-
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 17 W typical, 22 W max. Yes
Bleeder resistance	≥ 47 kOhm

Table 65: 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	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 3.9.2 "Temperature humidity diagram" on page 198
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 65: Technical data - 4PP220.1043-B5 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.9.2 Temperature humidity diagram

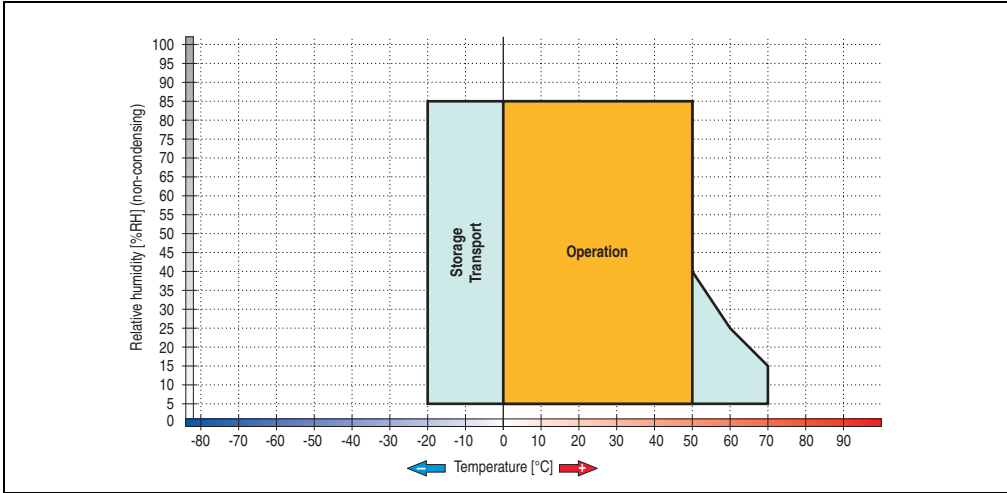


Figure 136: Temperature humidity diagram - 4PP220.1043-B5

### 3.9.3 Dimensions

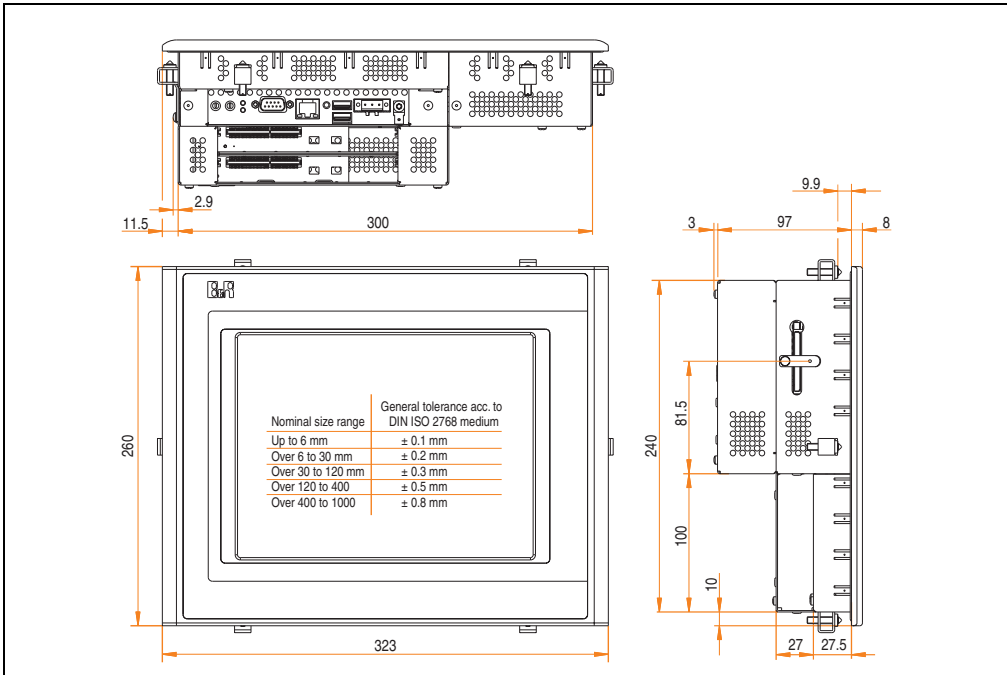


Figure 137: Dimensions - 4PP220.1043-B5

### 3.9.4 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 137 "Dimensions - 4PP220.1043-B5" on page 198) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

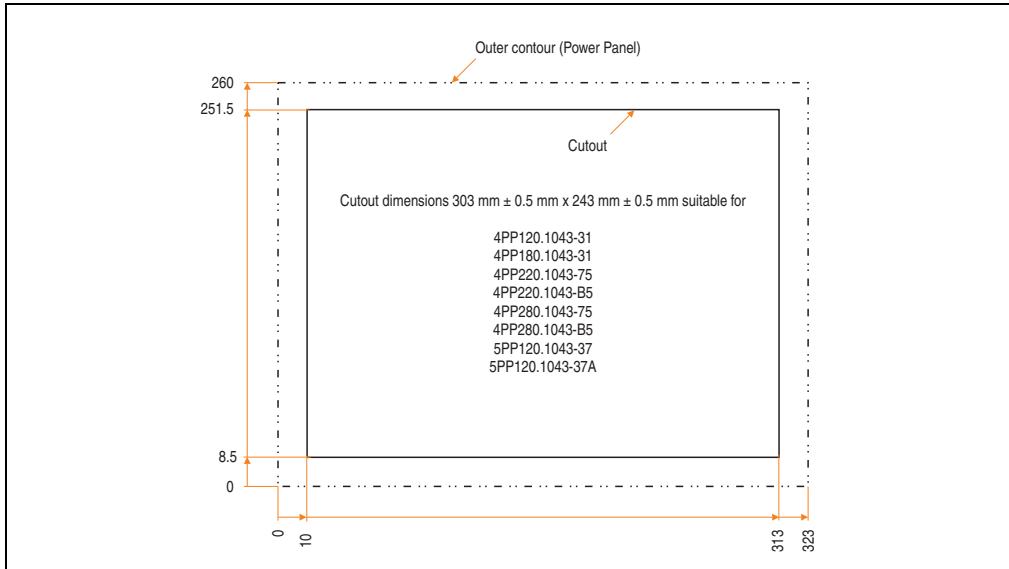


Figure 138: Cutout dimensions

### 3.9.5 Contents of delivery

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

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

Table 66: Contents of delivery - 4PP220.1043-B5

### 3.10 Device 4PP220.1505-75



Figure 139: Front view - 4PP220.1505-75

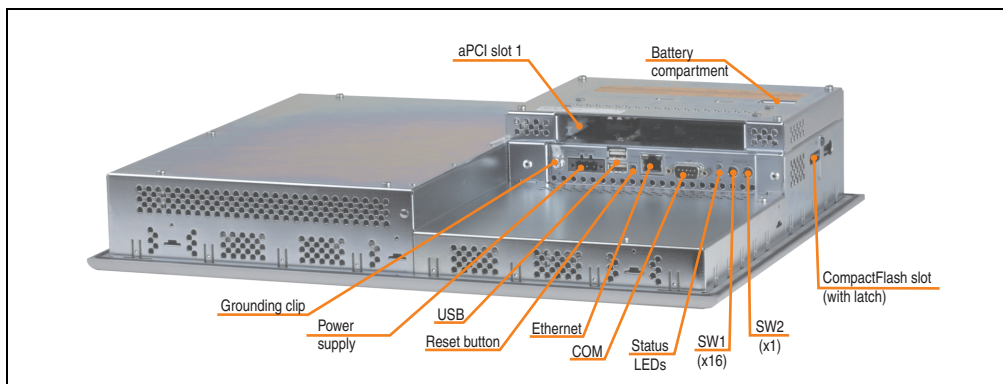


Figure 140: Rear view - 4PP220.1505-75



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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables 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 Amount Connection	Type I 1 slot Primary IDE device

Table 67: Technical data - 4PP220.1505-75

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP220.1505-75
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	Color TFT 15 inch (381 mm) 16.7 million colors XGA, 1024 x 768 pixels 300:1  Direction R / direction L = 65° Direction U = 50° / direction D = 55°  330 cd/m <sup>2</sup> 35,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Elo (Rev. < N0: 3M) Analog, resistive Hampshire, serial, 12-bit 78%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	-
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 30 W typical, 35 W max. Yes
Bleeder resistance	≥ 47 kOhm

Table 67: 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	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 3.10.2 "Temperature humidity diagram" on page 204
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 67: Technical data - 4PP220.1505-75 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.10.2 Temperature humidity diagram

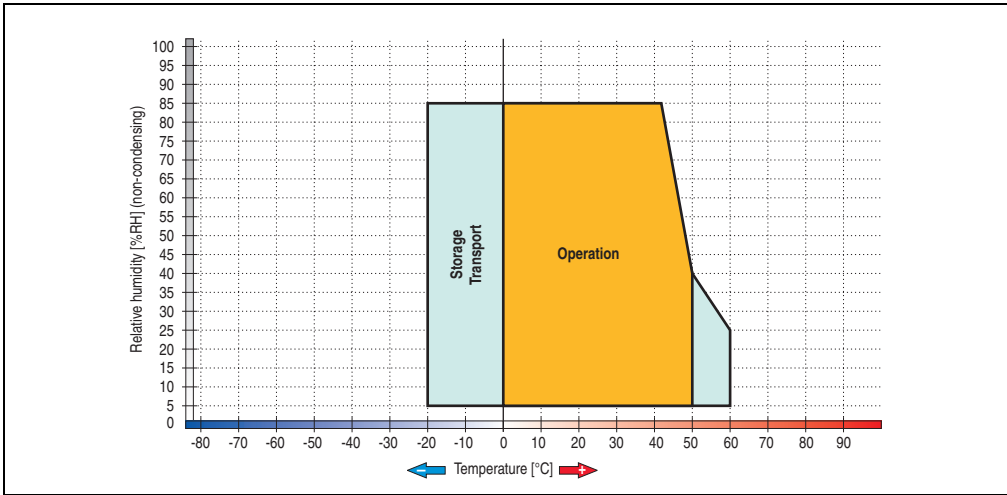


Figure 141: Temperature humidity diagram - 4PP220.1505-75

### 3.10.3 Dimensions

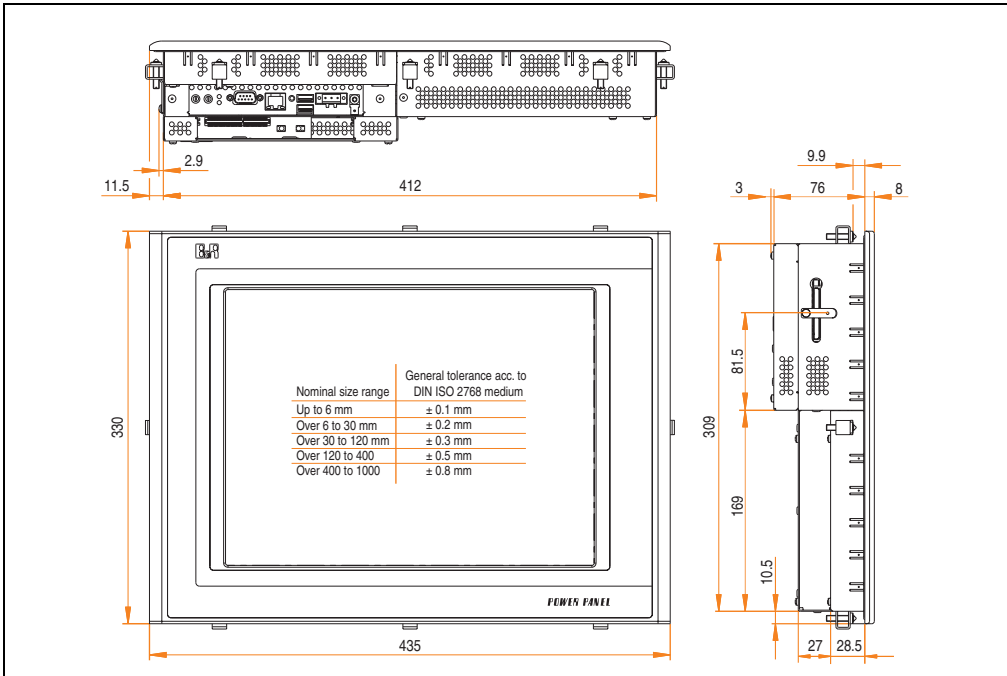


Figure 142: Dimensions - 4PP220.1505-75

### 3.10.4 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 - 4PP220.1505-75" on page 204) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

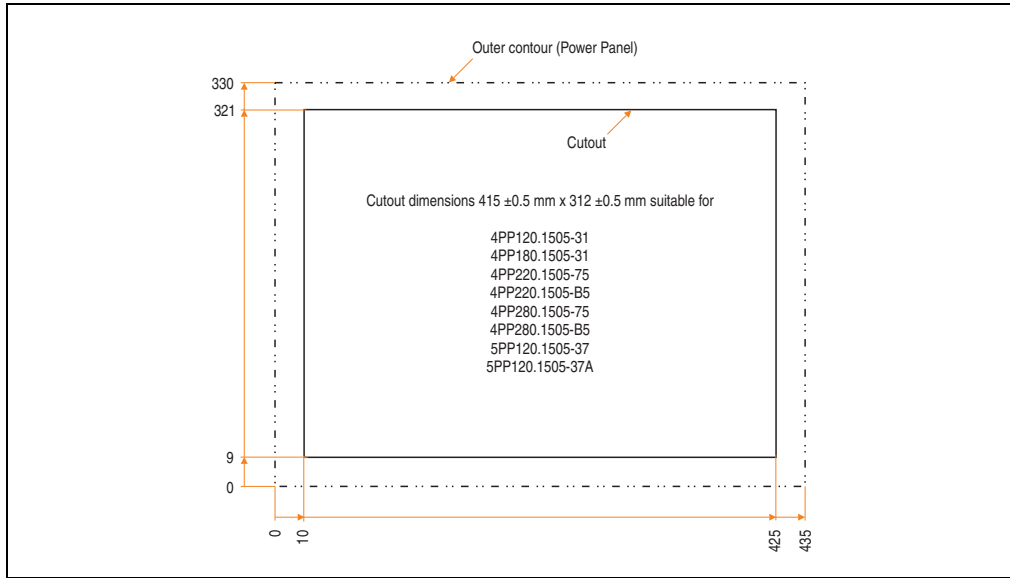


Figure 143: Cutout dimensions

### 3.10.5 Contents of delivery

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

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

Table 68: Contents of delivery - 4PP220.1505-75

### 3.11 Device 4PP220.1505-B5



Figure 144: Front view - 4PP220.1505-B5

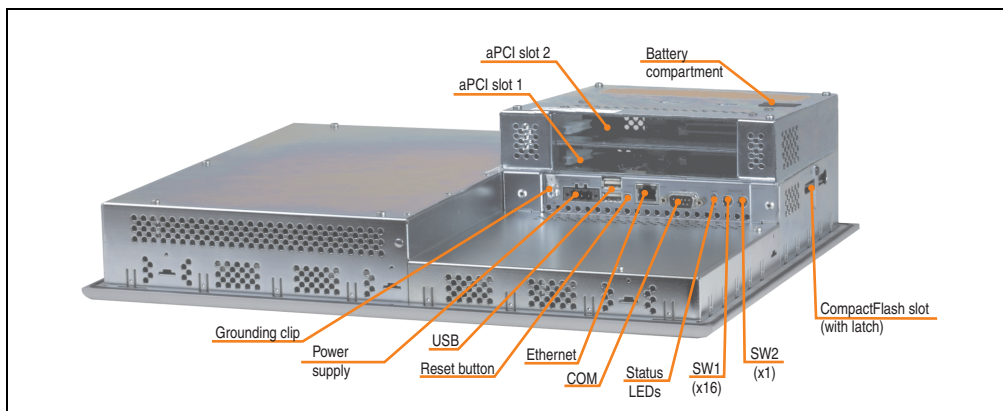


Figure 145: Rear view - 4PP220.1505-B5

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables 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 Amount Connection	Type I 1 slot Primary IDE device

Table 69: Technical data - 4PP220.1505-B5

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP220.1505-B5
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	Color TFT 15 inch (381 mm) 16.7 million colors XGA, 1024 x 768 pixels 300:1  Direction R / direction L = 65° Direction U = 50° / direction D = 55°  330 cd/m <sup>2</sup> 35,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Elo (Rev. < N0: 3M) Analog, resistive Hampshire, serial, 12-bit 78%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	-
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 30 W typical, 35 W max. Yes
Bleeder resistance	≥ 47 kOhm

Table 69: 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	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 3.11.2 "Temperature humidity diagram" on page 210
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 69: Technical data - 4PP220.1505-B5 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.11.2 Temperature humidity diagram

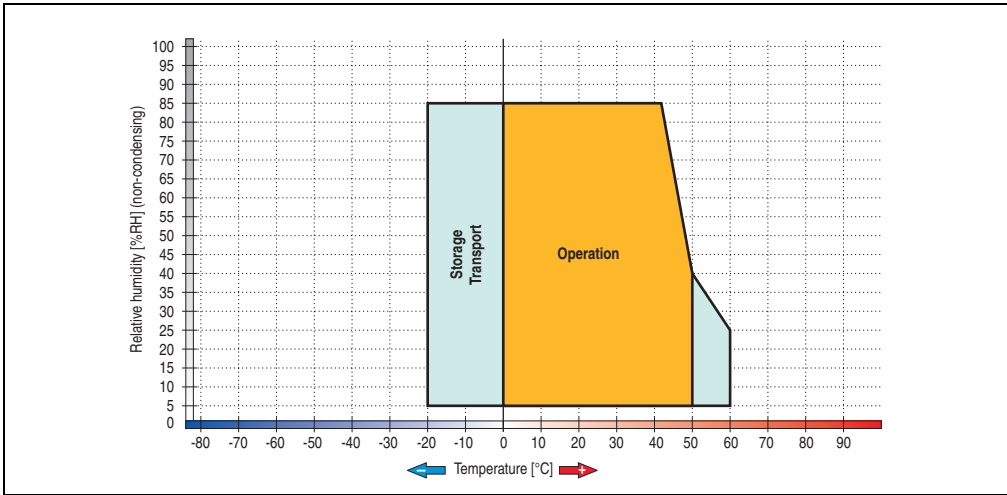


Figure 146: Temperature humidity diagram - 4PP220.1505-B5

### 3.11.3 Dimensions

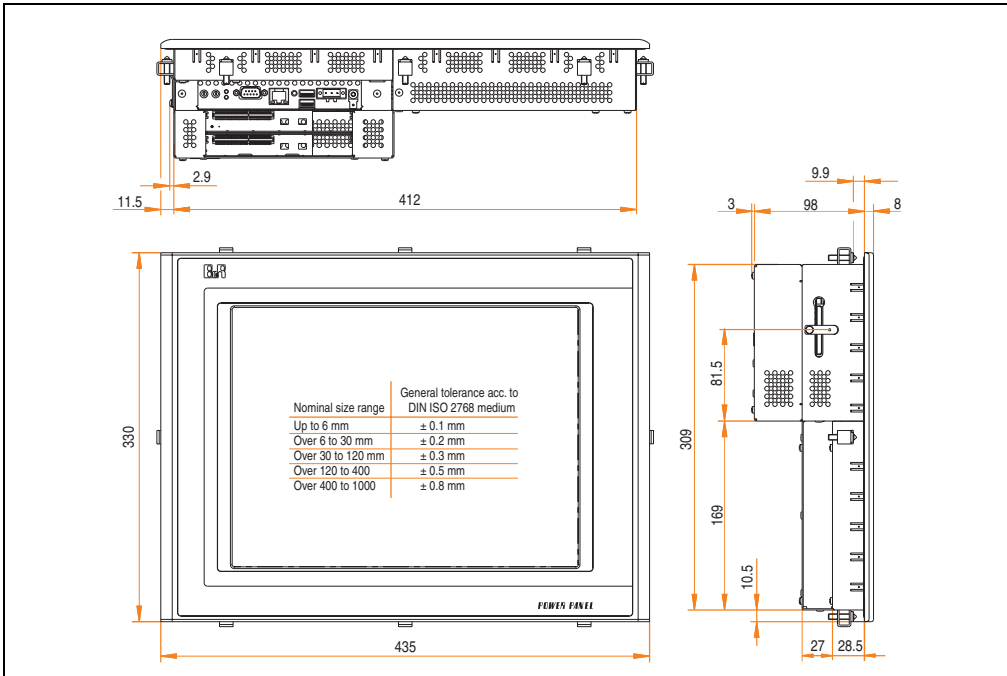


Figure 147: Dimensions - 4PP220.1505-B5

### 3.11.4 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 147 "Dimensions - 4PP220.1505-B5" on page 210) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

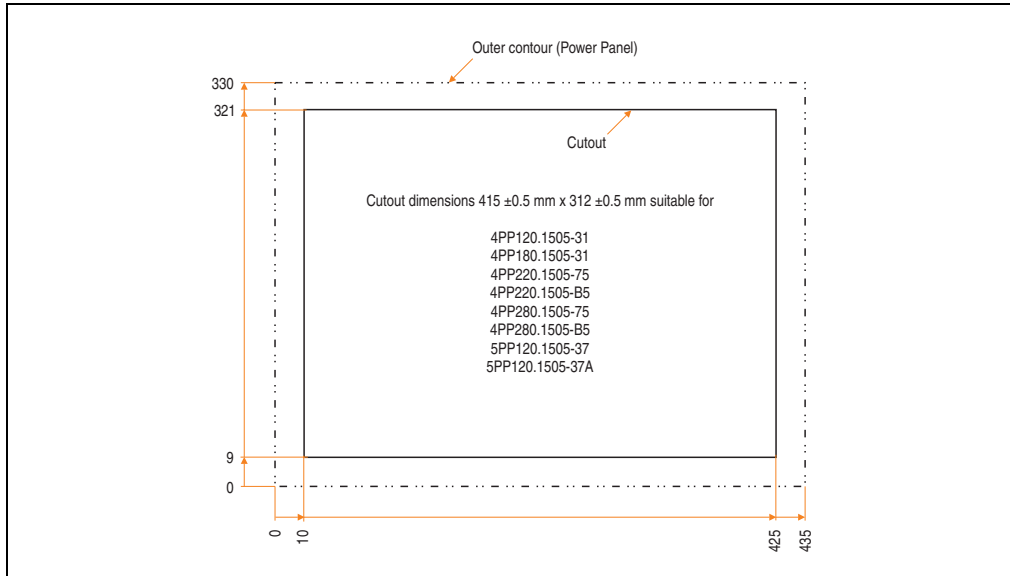


Figure 148: Cutout dimensions

### 3.11.5 Contents of delivery

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

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

Table 70: Contents of delivery - 4PP220.1505-B5

### 3.12 Device 4PP251.0571-45

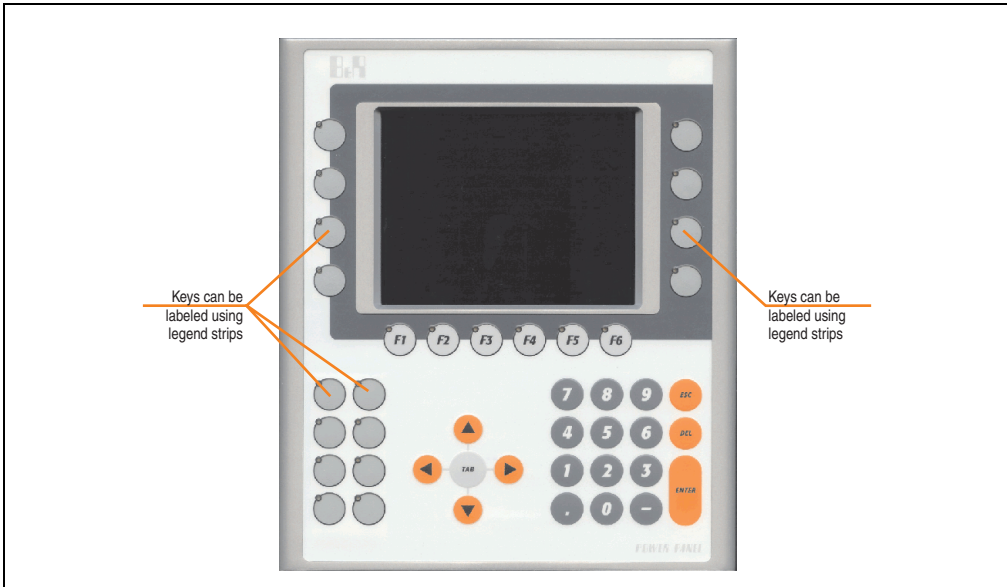


Figure 149: Front view - 4PP251.0571-45

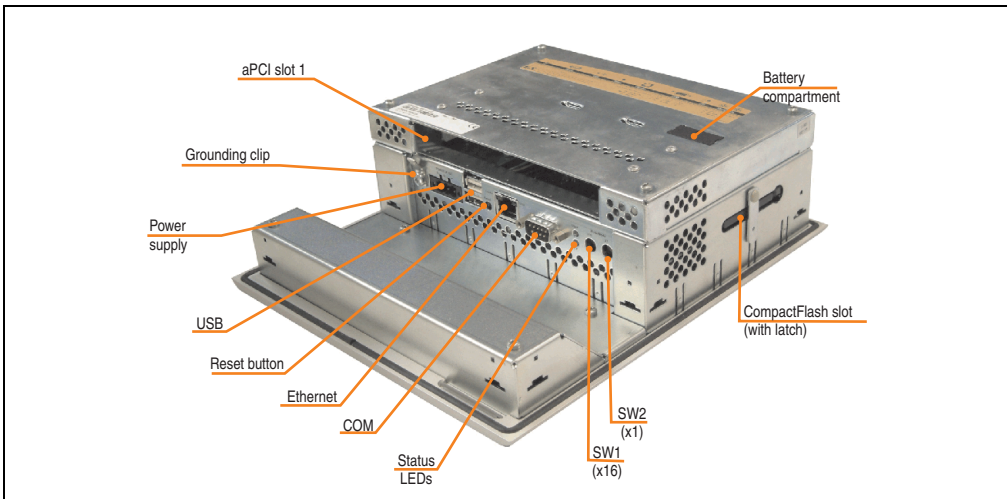


Figure 150: Rear view - 4PP251.0571-45

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 71: Technical data - 4PP251.0571-45

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP251.0571-45
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	LCD monochrome 5.7 in (144 mm) 8 shades of gray QVGA, 320 x 240 pixels 25:1 Direction R / direction L = 40° Direction U = 40° / direction D = 50° 140 cd/m <sup>2</sup> 50,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force 16 with LED 6 with LED - 15 without LED 5 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. Yes

Table 71: Technical data - 4PP251.0571-45 (Forts.)

## Technical data • Power Panel 200 with Automation Runtime

Electrical characteristics	4PP251.0571-45
Bleeder resistance	≥ 47 kOhm
Mechanical characteristics	
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	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 3.12.2 "Temperature humidity diagram" on page 216
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 71: Technical data - 4PP251.0571-45 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.12.2 Temperature humidity diagram

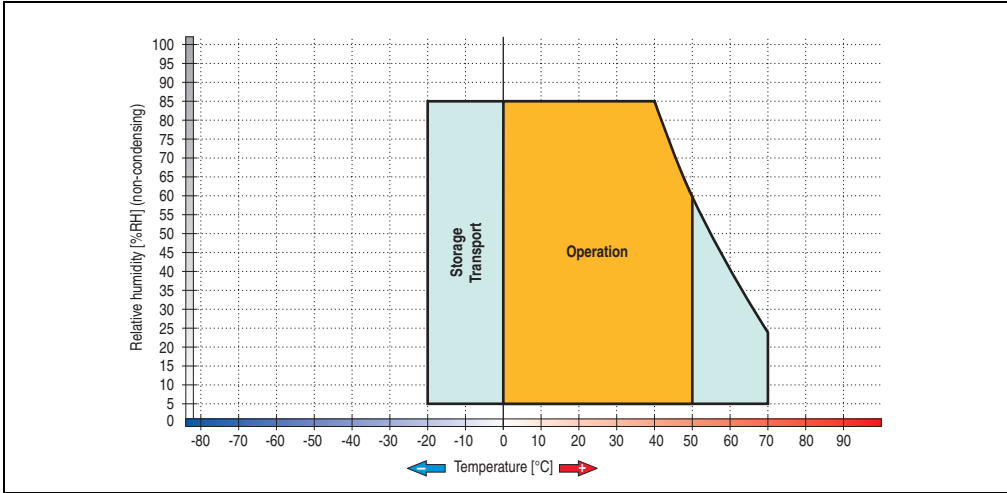


Figure 151: Temperature humidity diagram - 4PP251.0571-45

### 3.12.3 Dimensions

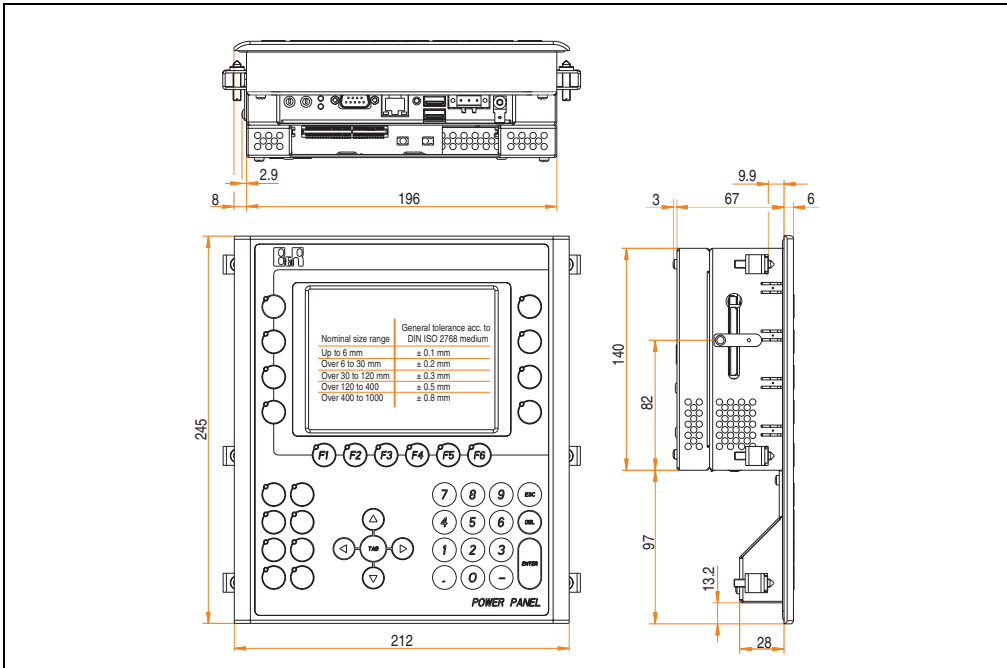


Figure 152: Dimensions - 4PP251.0571-45



### 3.12.4 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 152 "Dimensions - 4PP251.0571-45" on page 216) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

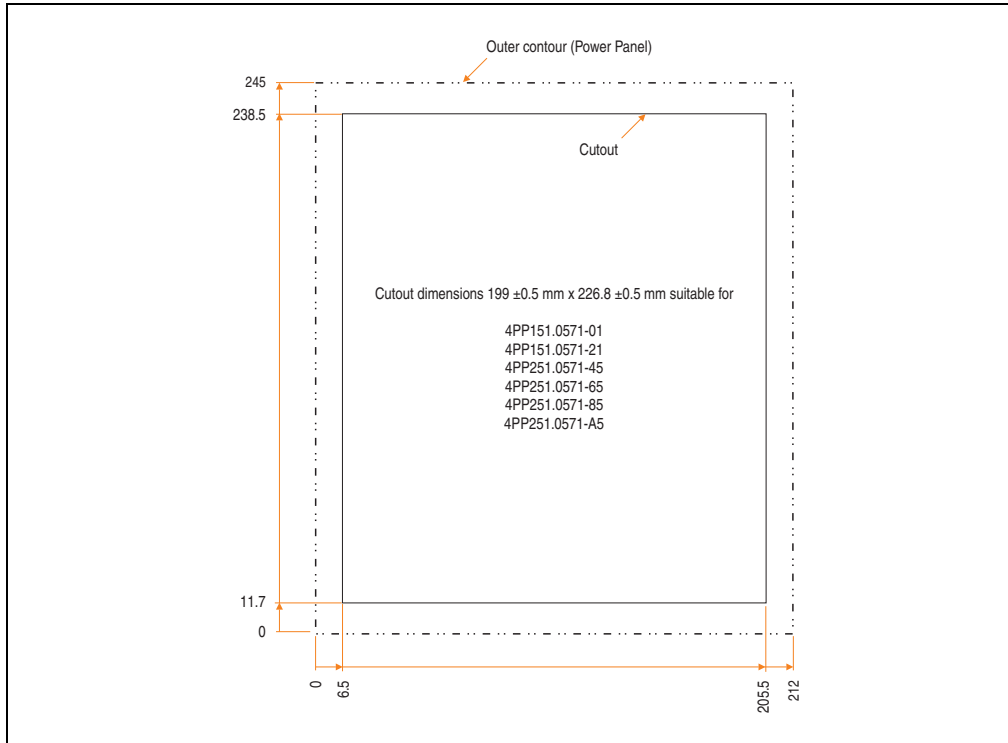


Figure 153: Cutout dimensions

### 3.12.5 Contents of delivery

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

Amount	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	Legend strips (inserted in the front)

Table 72: Contents of delivery - 4PP251.0571-45

### 3.13 Device 4PP251.0571-65

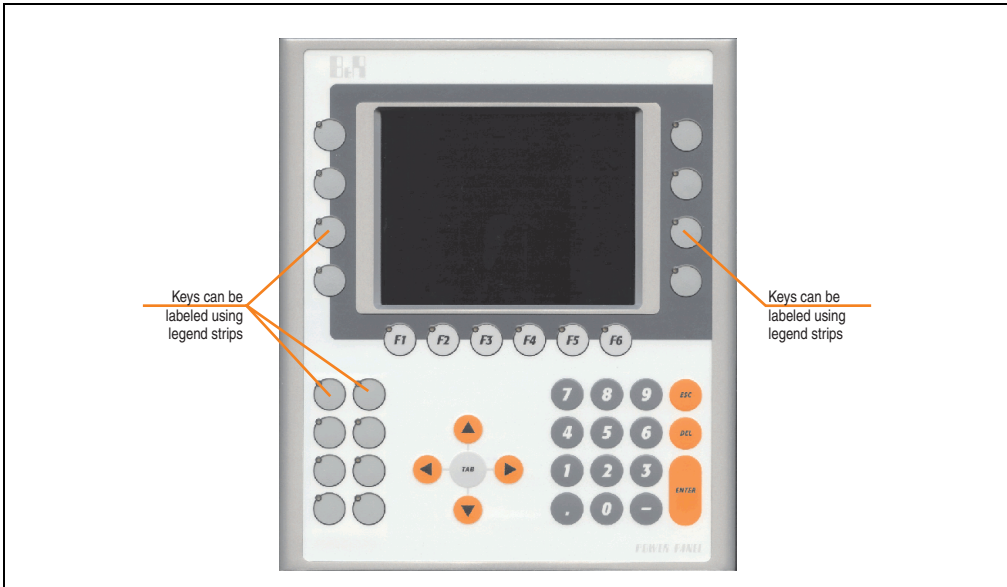


Figure 154: Front view - 4PP251.0571-65

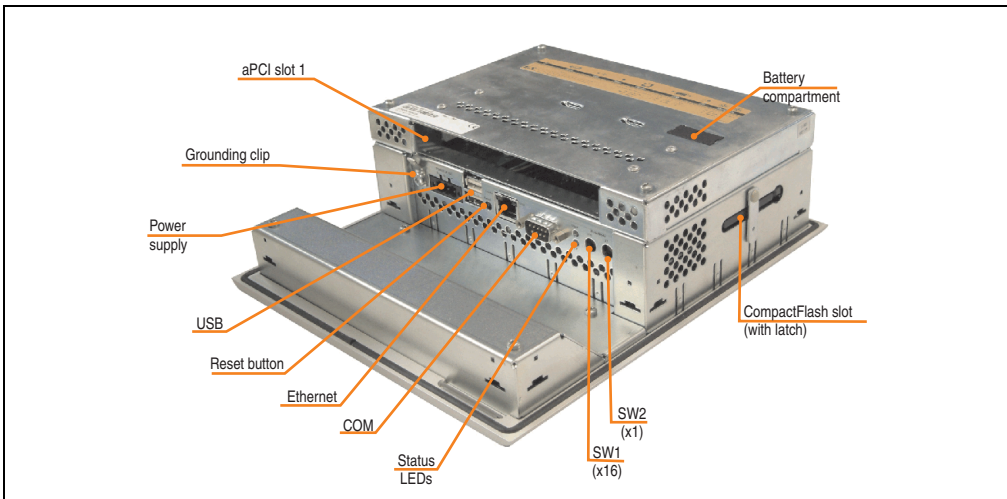


Figure 155: Rear view - 4PP251.0571-65

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 73: Technical data - 4PP251.0571-65

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP251.0571-65
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	Color LCD 5.7 in (144 mm) 256 colors QVGA, 320 x 240 pixels 40:1 Direction R / direction L = 40° Direction U = 40° / direction D = 50° 150 cd/m <sup>2</sup> 50,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force 16 with LED 6 with LED - 15 without LED 5 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. Yes

Table 73: Technical data - 4PP251.0571-65 (Forts.)

Electrical characteristics	4PP251.0571-65
Bleeder resistance	≥ 47 kOhm
Mechanical characteristics	
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	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 3.13.2 "Temperature humidity diagram" on page 222
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 73: Technical data - 4PP251.0571-65 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.13.2 Temperature humidity diagram

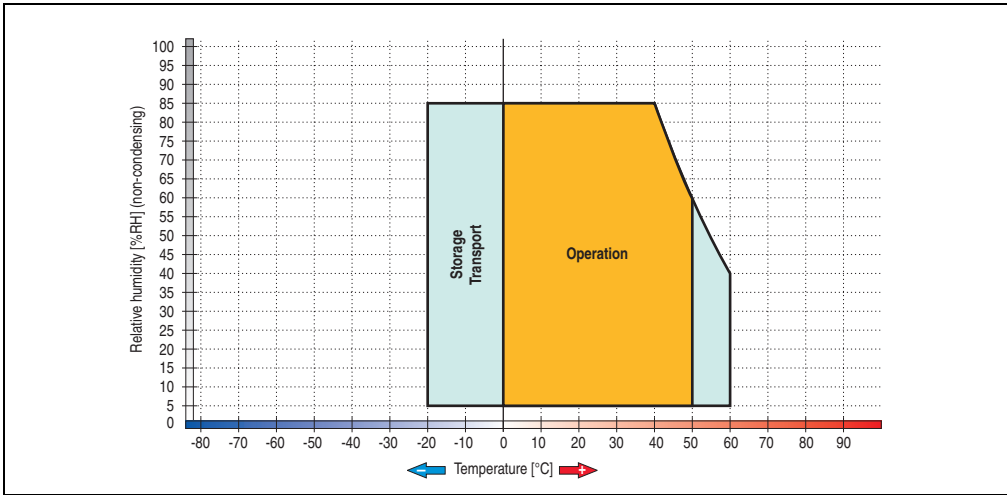


Figure 156: Temperature humidity diagram - 4PP251.0571-65

### 3.13.3 Dimensions

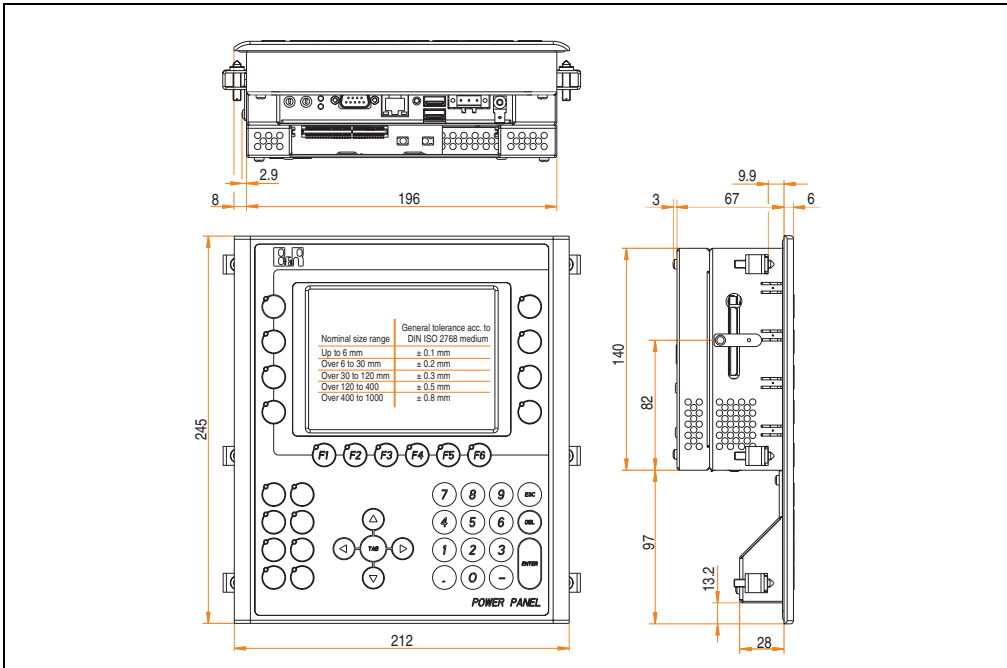


Figure 157: Dimensions - 4PP251.0571-65

### 3.13.4 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 157 "Dimensions - 4PP251.0571-65" on page 222) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

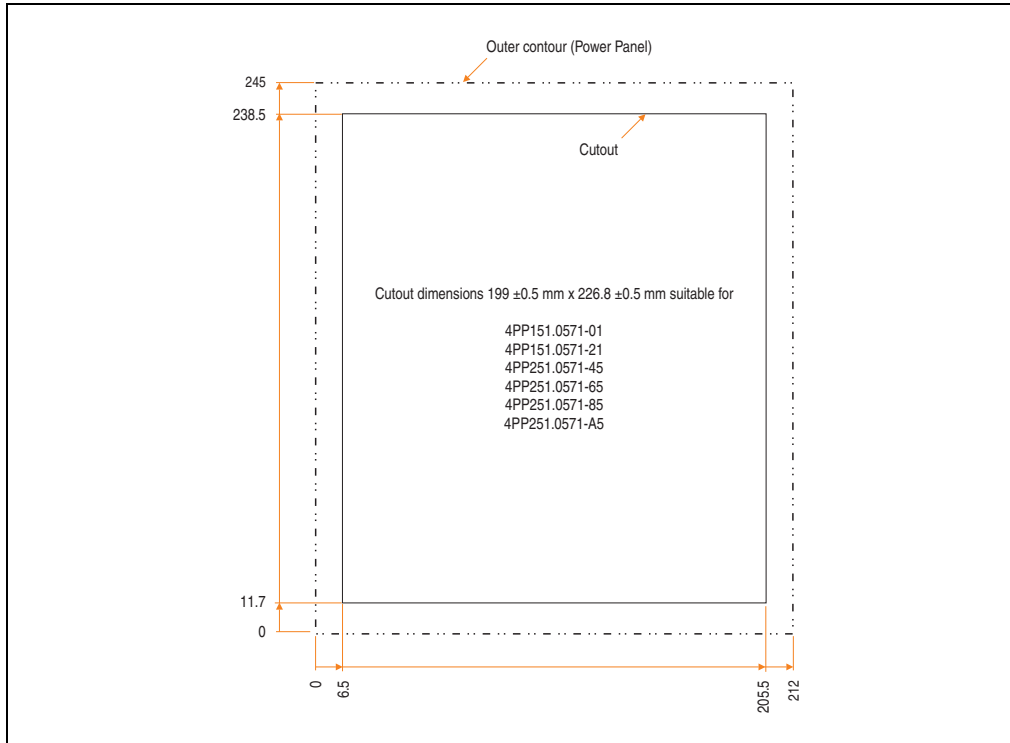


Figure 158: Cutout dimensions

### 3.13.5 Contents of delivery

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

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

Table 74: Contents of delivery - 4PP251.0571-65

### 3.14 Device 4PP251.0571-85

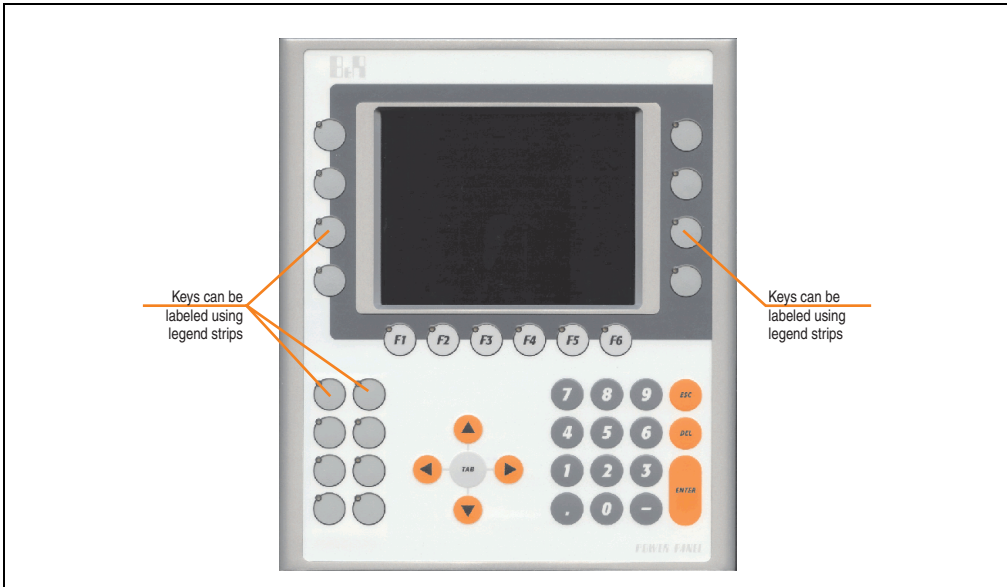


Figure 159: Front view - 4PP251.0571-85

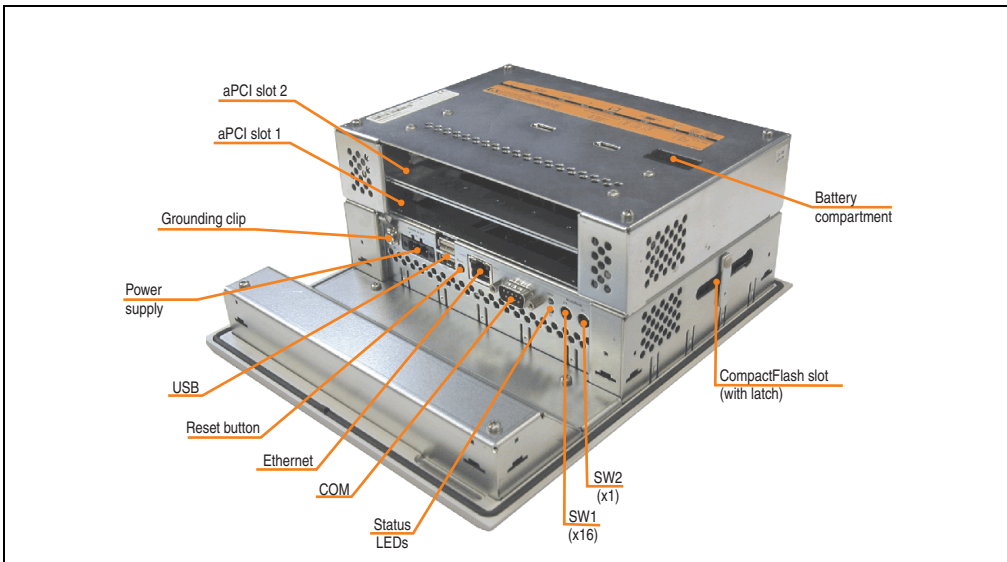


Figure 160: Rear view - 4PP251.0571-85



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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 75: Technical data - 4PP251.0571-85

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP251.0571-85
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	LCD monochrome 5.7 in (144 mm) 8 shades of gray QVGA, 320 x 240 pixels 25:1 Direction R / direction L = 40° Direction U = 40° / direction D = 50° 140 cd/m <sup>2</sup> 50,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force 16 with LED 6 with LED - 15 without LED 5 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. Yes

Table 75: Technical data - 4PP251.0571-85 (Forts.)

<b>Electrical characteristics</b>	<b>4PP251.0571-85</b>
Bleeder resistance	≥ 47 kOhm
<b>Mechanical characteristics</b>	
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)
<b>Environmental characteristics</b>	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 3.14.2 "Temperature humidity diagram" on page 228
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 75: Technical data - 4PP251.0571-85 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.14.2 Temperature humidity diagram

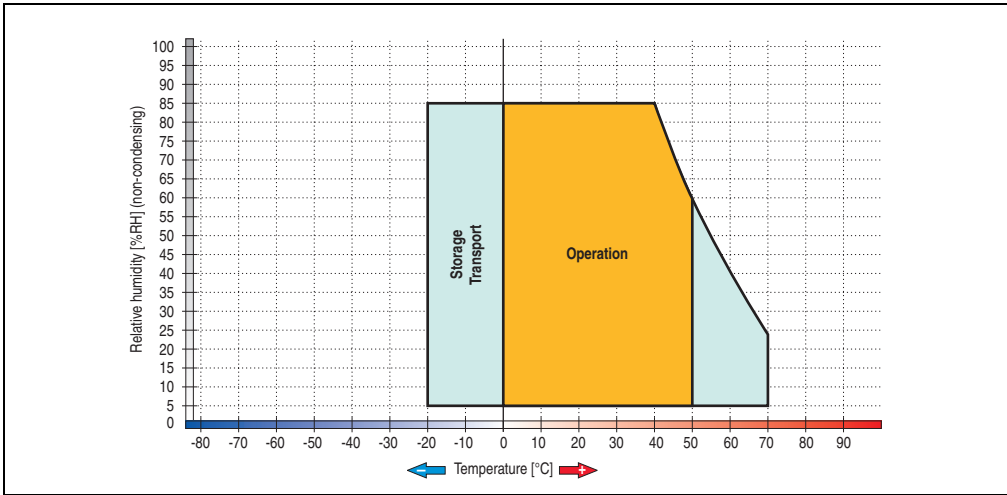


Figure 161: Temperature humidity diagram - 4PP251.0571-85

### 3.14.3 Dimensions

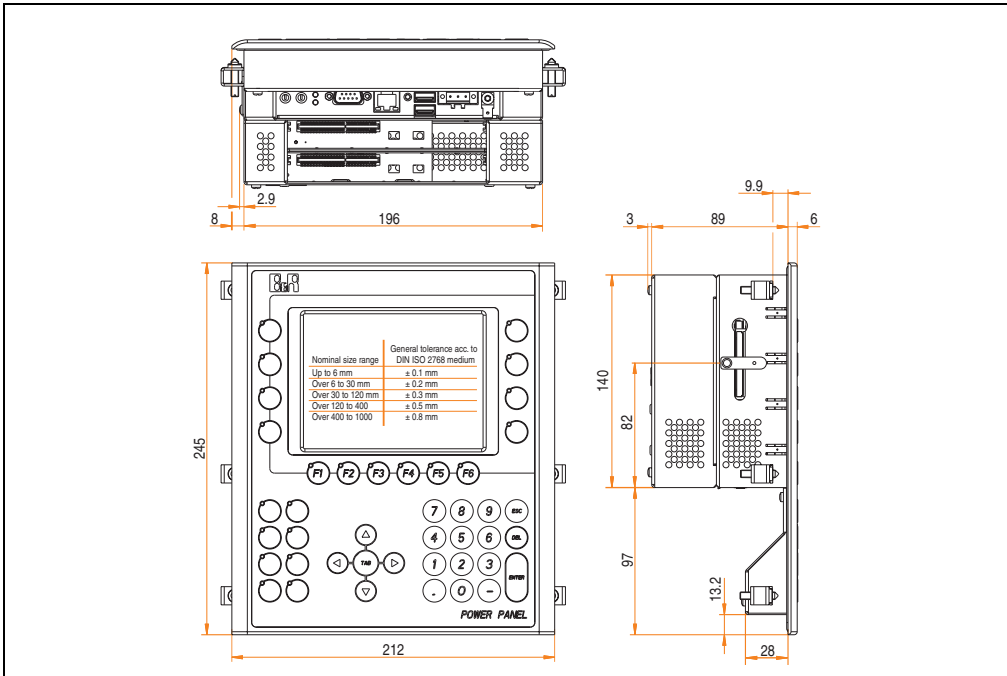


Figure 162: Dimensions - 4PP251.0571-85

### 3.14.4 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 - 4PP251.0571-85" on page 228) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

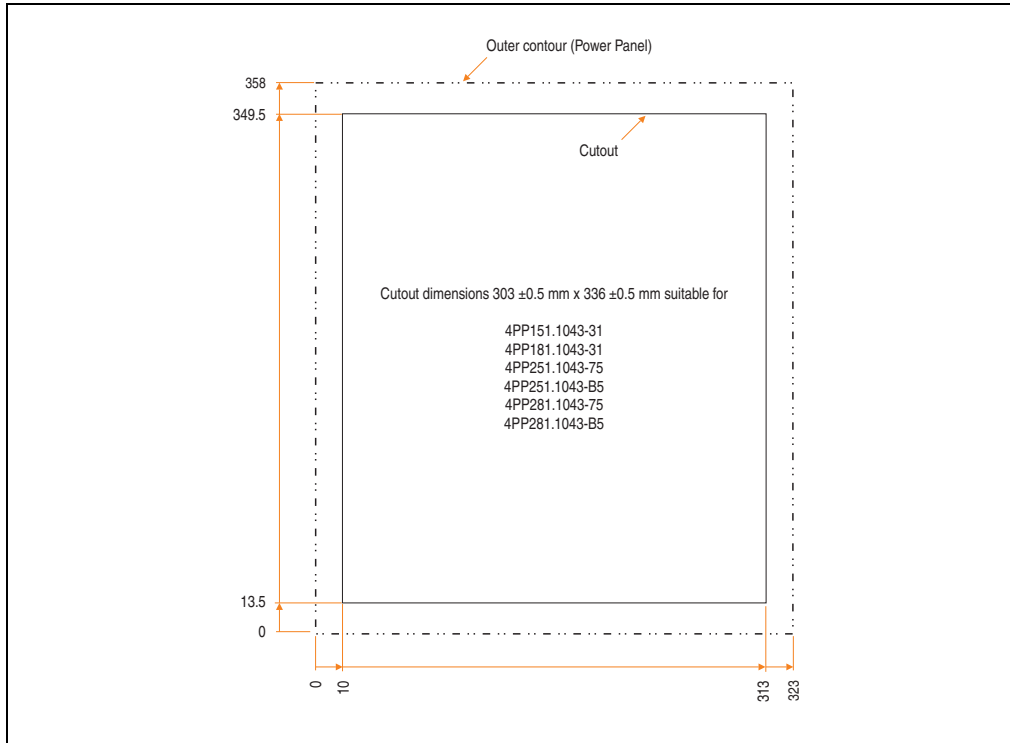


Figure 163: Cutout dimensions

### 3.14.5 Contents of delivery

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

Amount	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	Legend strips (inserted in the front)

Table 76: Contents of delivery - 4PP251.0571-85

### 3.15 Device 4PP251.0571-A5

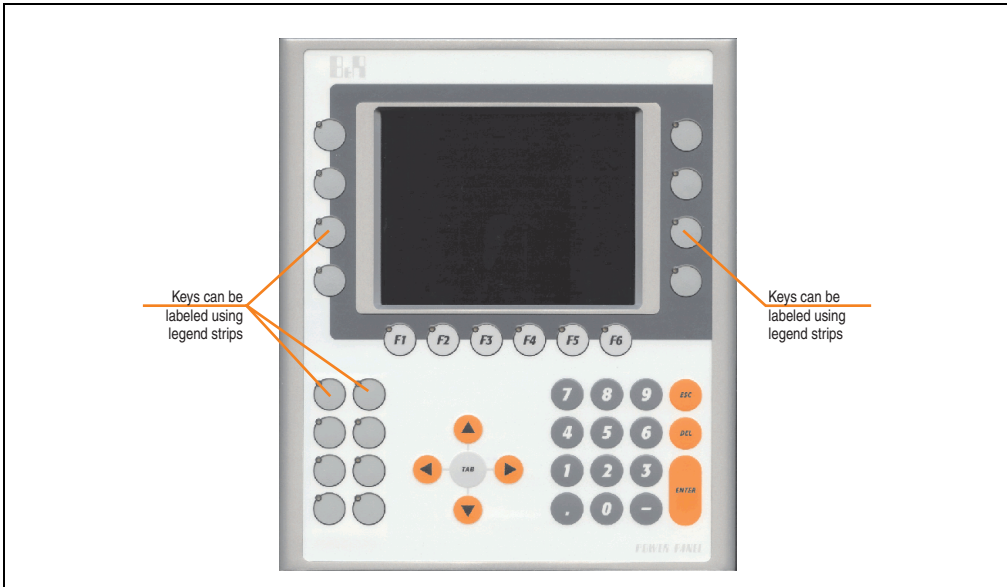


Figure 164: Front view - 4PP251.0571-A5

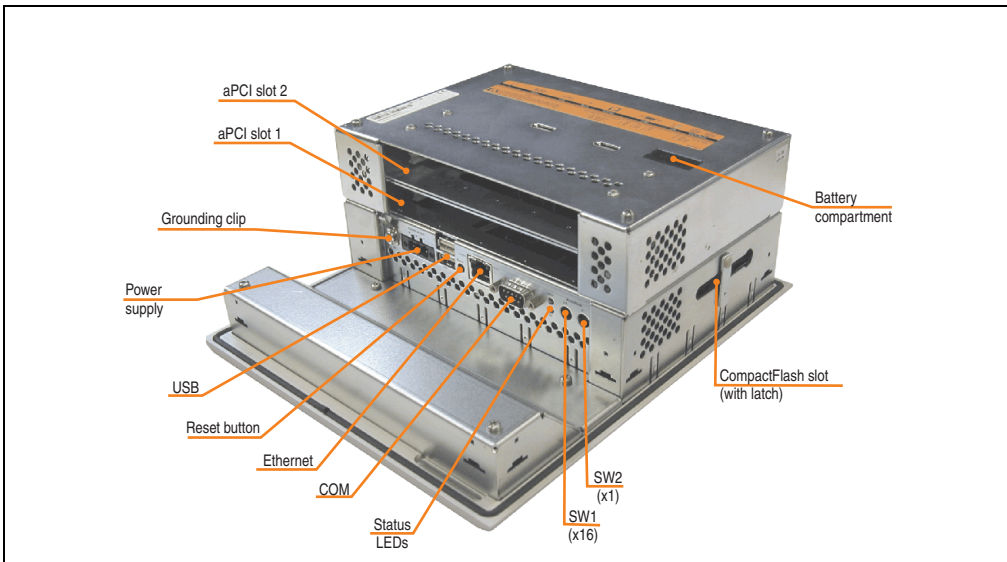


Figure 165: Rear view - 4PP251.0571-A5

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 77: Technical data - 4PP251.0571-A5

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP251.0571-A5
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	Color LCD 5.7 in (144 mm) 256 colors QVGA, 320 x 240 pixels 40:1 Direction R / direction L = 40° Direction U = 40° / direction D = 50° 150 cd/m <sup>2</sup> 50,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force 16 with LED 6 with LED - 15 without LED 5 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. Yes

Table 77: Technical data - 4PP251.0571-A5 (Forts.)



<b>Electrical characteristics</b>	<b>4PP251.0571-A5</b>
Bleeder resistance	≥ 47 kOhm
<b>Mechanical characteristics</b>	
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)
<b>Environmental characteristics</b>	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 3.15.2 "Temperature humidity diagram" on page 234
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 77: Technical data - 4PP251.0571-A5 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.15.2 Temperature humidity diagram

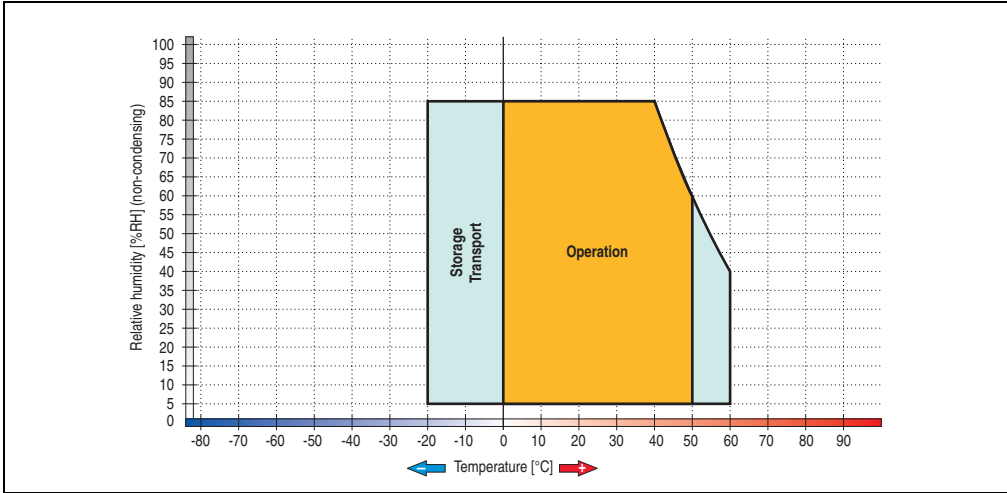


Figure 166: Temperature humidity diagram - 4PP251.0571-A5

### 3.15.3 Dimensions

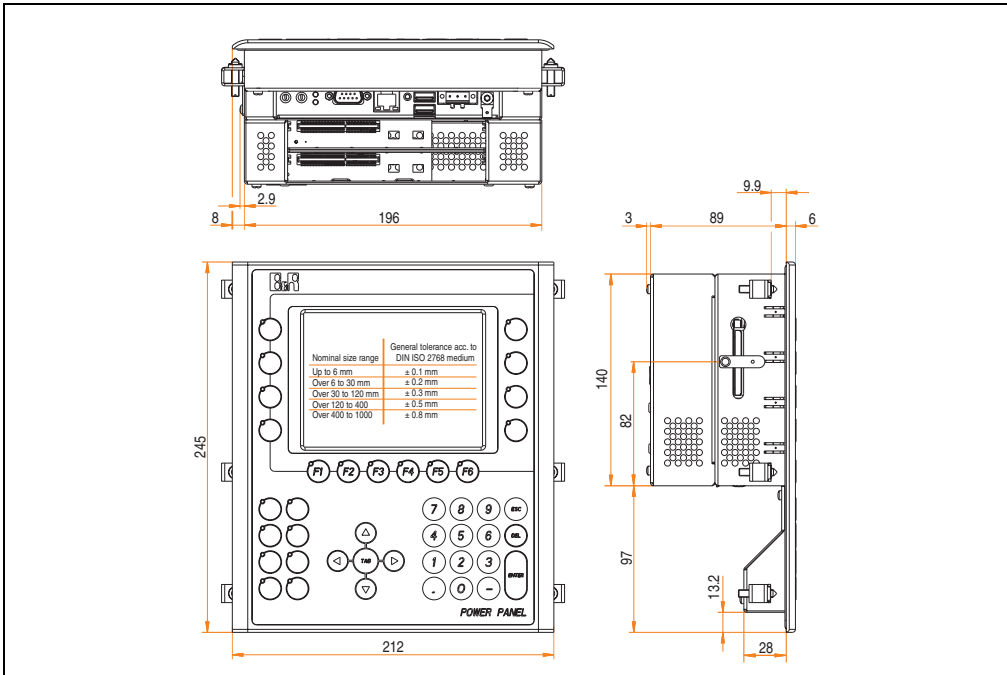


Figure 167: Dimensions - 4PP251.0571-A5

### 3.15.4 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 167 "Dimensions - 4PP251.0571-A5" on page 234) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

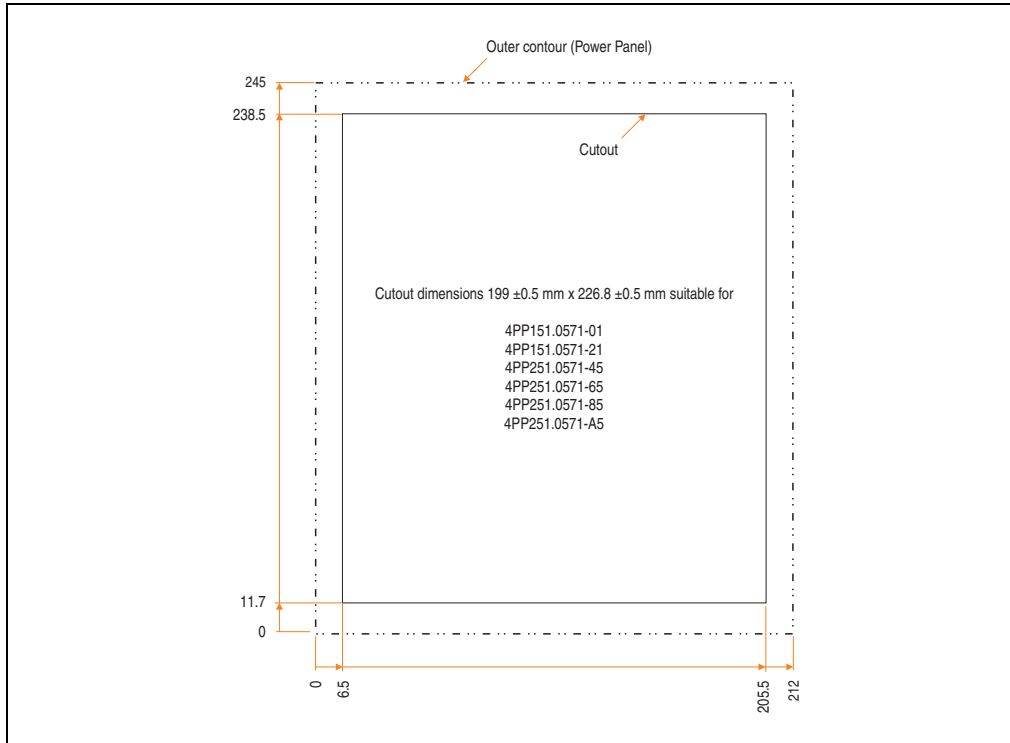


Figure 168: Cutout dimensions

### 3.15.5 Contents of delivery

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

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

Table 78: Contents of delivery - 4PP251.0571-A5

### 3.16 Device 4PP251.1043-75

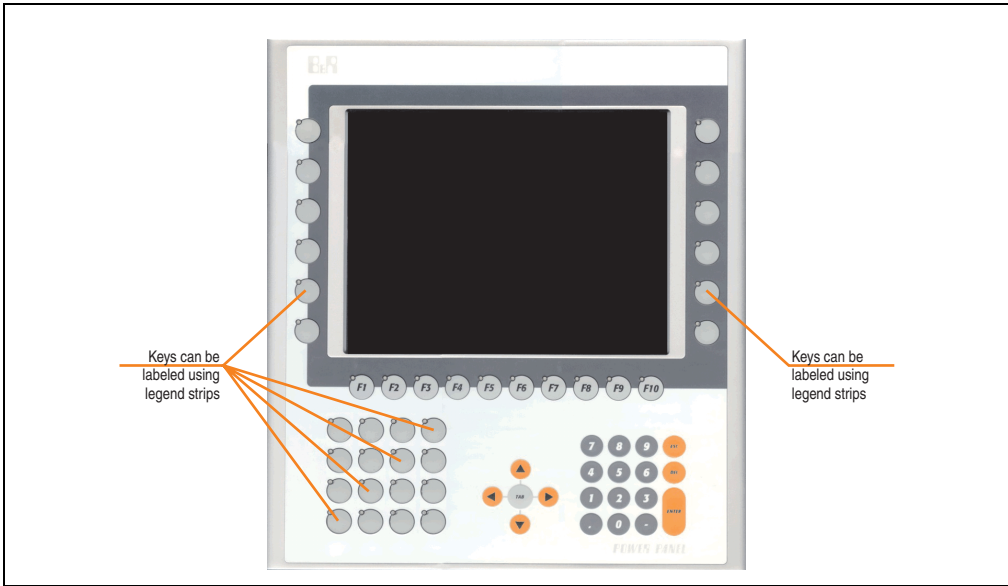


Figure 169: Front view - 4PP251.1043-75

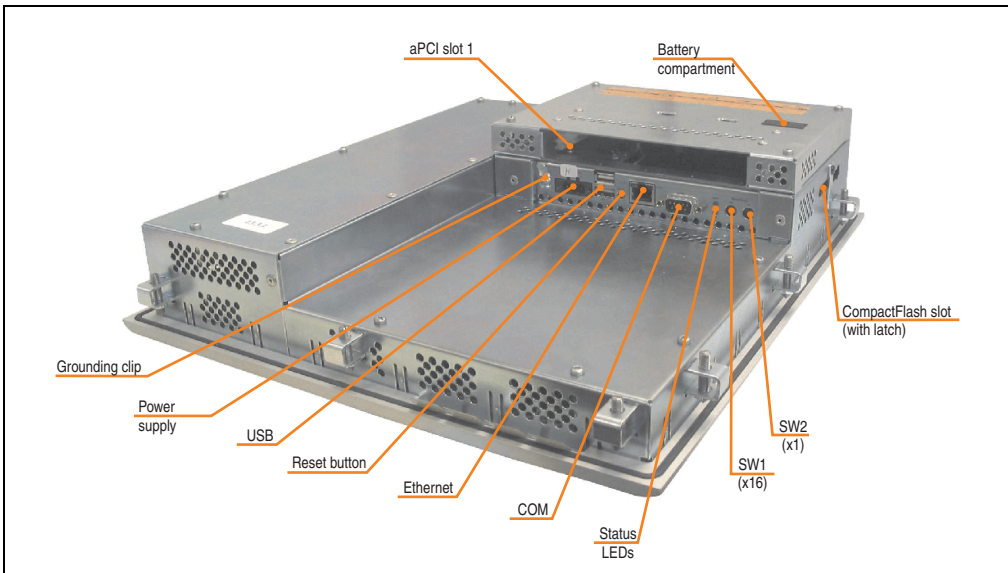


Figure 170: Rear view - 4PP251.1043-75

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 79: Technical data - 4PP251.1043-75

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP251.1043-75
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	Color TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 Direction R / direction L = 70° Direction U = 45° / direction D = 55° 350 cd/m <sup>2</sup> 55,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force 28 with LED 10 with LED - 15 without LED 5 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 20 W typical, 25 W max. Yes

Table 79: Technical data - 4PP251.1043-75 (Forts.)

<b>Electrical characteristics</b>	<b>4PP251.1043-75</b>
Bleeder resistance	≥ 47 kOhm
<b>Mechanical characteristics</b>	
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)
<b>Environmental characteristics</b>	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 3.16.2 "Temperature humidity diagram" on page 240
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 79: Technical data - 4PP251.1043-75 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.16.2 Temperature humidity diagram

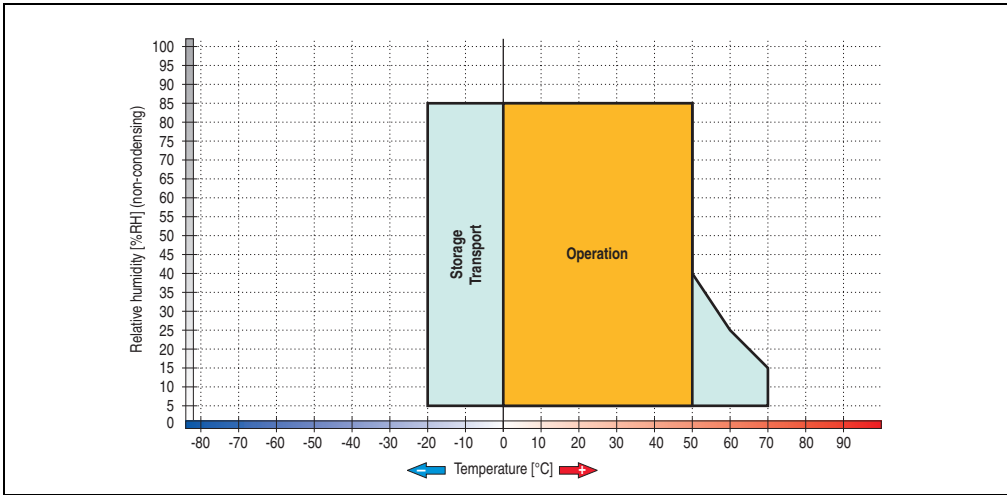


Figure 171: Temperature humidity diagram - 4PP251.1043-75

### 3.16.3 Dimensions

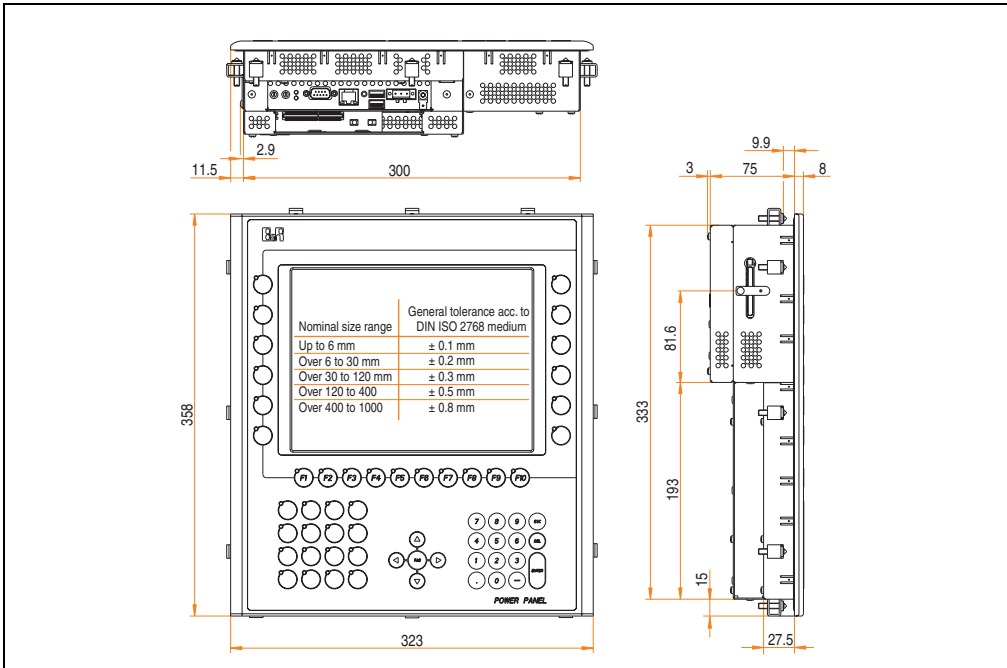


Figure 172: Dimensions - 4PP251.1043-75



### 3.16.4 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 172 "Dimensions - 4PP251.1043-75" on page 240) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

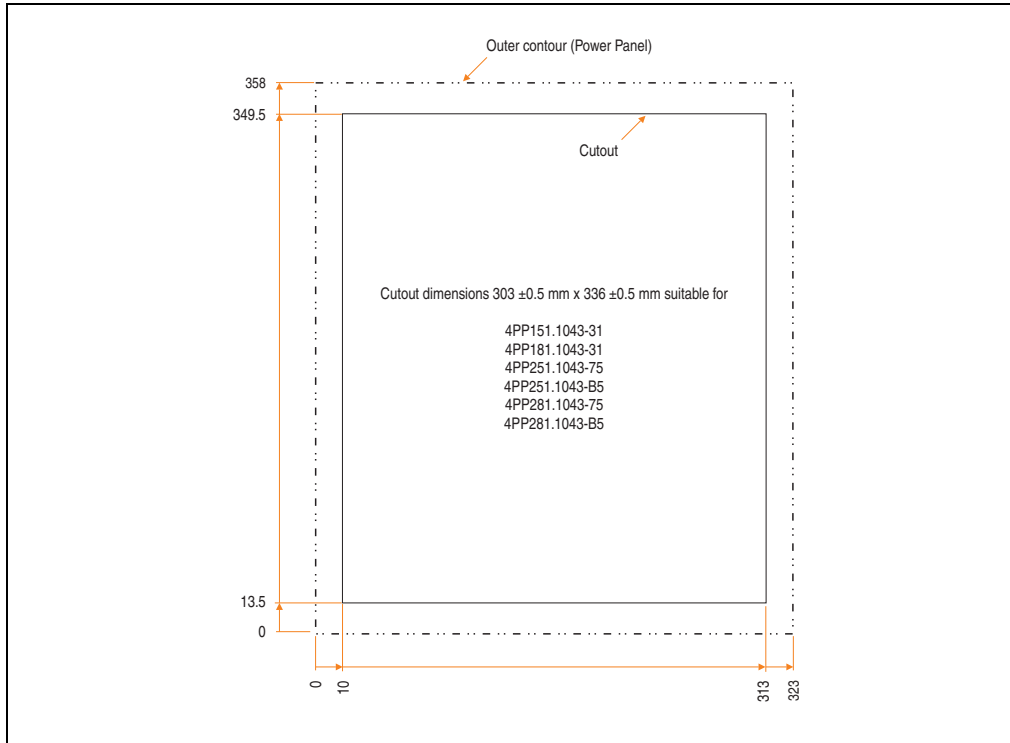


Figure 173: Cutout dimensions

### 3.16.5 Contents of delivery

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

Amount	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	Legend strips (inserted in the front)

Table 80: Contents of delivery - 4PP251.1043-75

### 3.17 Device 4PP251.1043-B5

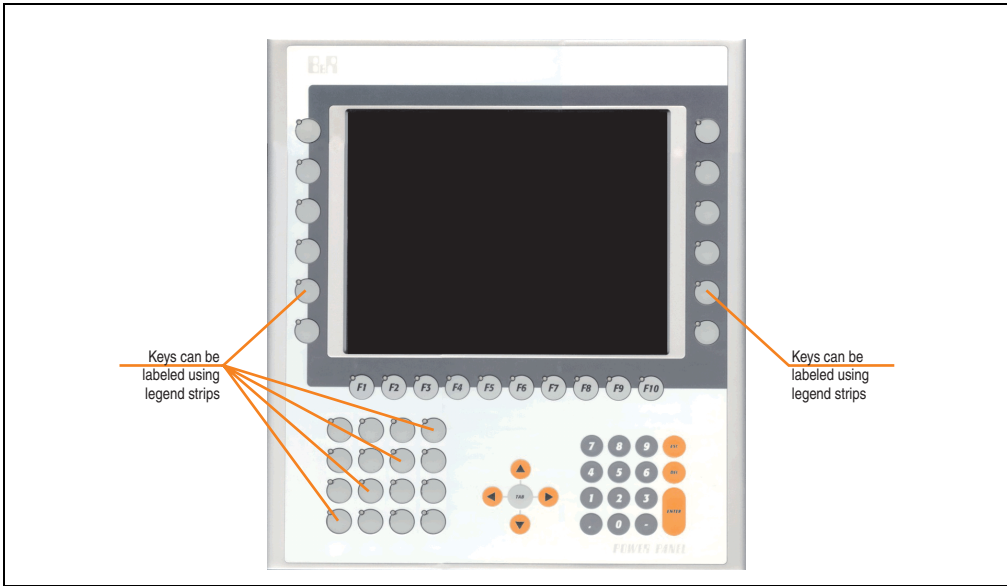


Figure 174: Front view - 4PP251.1043-B5

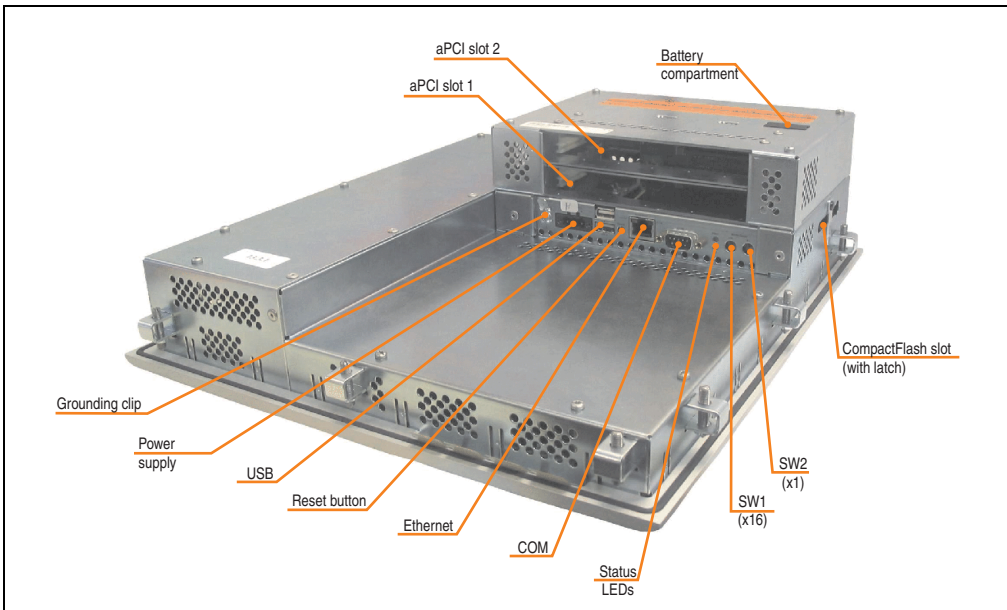


Figure 175: Rear view - 4PP251.1043-B5

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 81: Technical data - 4PP251.1043-B5

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP251.1043-B5
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	Color TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 Direction R / direction L = 70° Direction U = 45° / direction D = 55° 350 cd/m <sup>2</sup> 55,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force 28 with LED 10 with LED - 15 without LED 5 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 20 W typical, 25 W max. Yes

Table 81: Technical data - 4PP251.1043-B5 (Forts.)

<b>Electrical characteristics</b>	<b>4PP251.1043-B5</b>
Bleeder resistance	≥ 47 kOhm
<b>Mechanical characteristics</b>	
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)
<b>Environmental characteristics</b>	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 3.17.2 "Temperature humidity diagram" on page 246
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 81: Technical data - 4PP251.1043-B5 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.17.2 Temperature humidity diagram

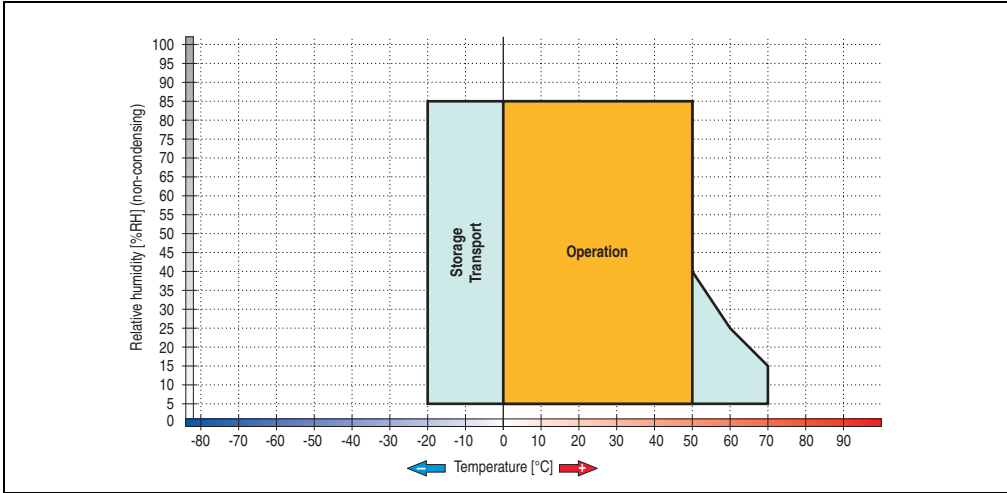


Figure 176: Temperature humidity diagram - 4PP251.1043-B5

### 3.17.3 Dimensions

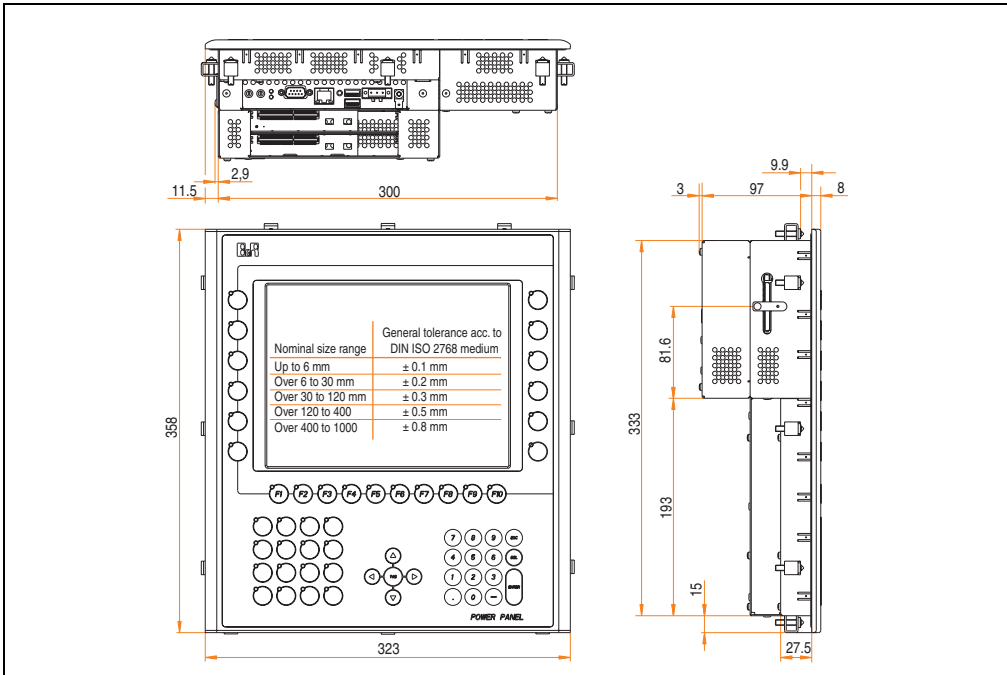


Figure 177: Dimensions - 4PP251.1043-B5

### 3.17.4 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 177 "Dimensions - 4PP251.1043-B5" on page 246) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

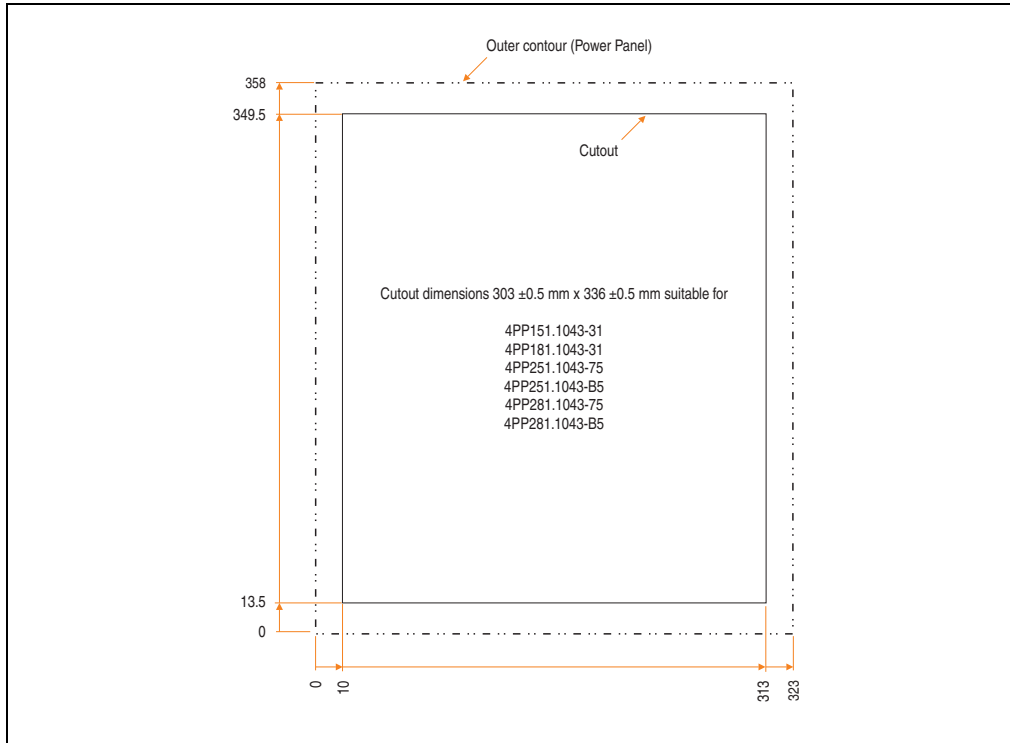


Figure 178: Cutout dimensions

### 3.17.5 Contents of delivery

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

Amount	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	Legend strips (inserted in the front)

Table 82: Contents of delivery - 4PP251.1043-B5

### 3.18 Device 4PP251.1505-75

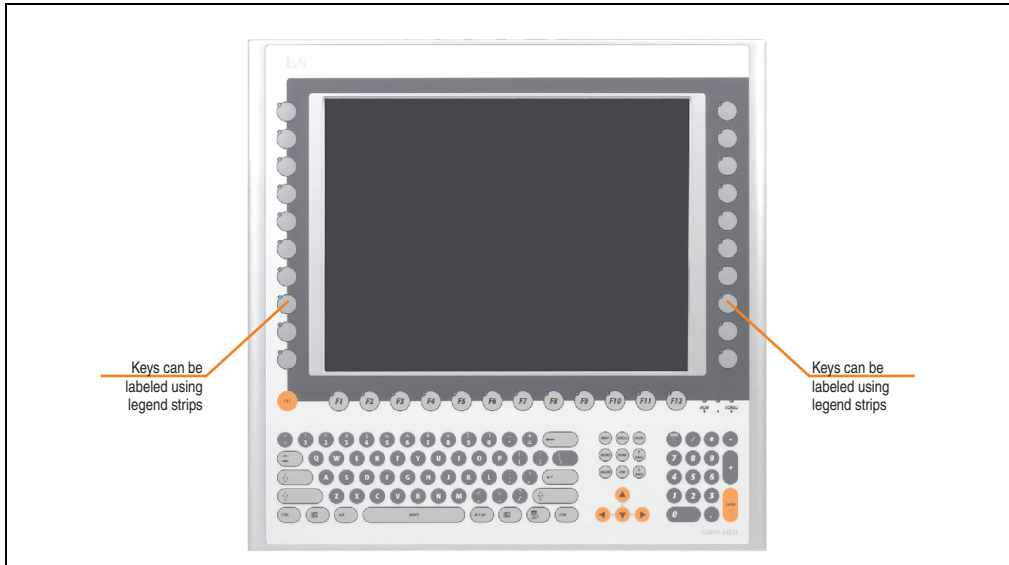


Figure 179: Front view - 4PP251.1505-75

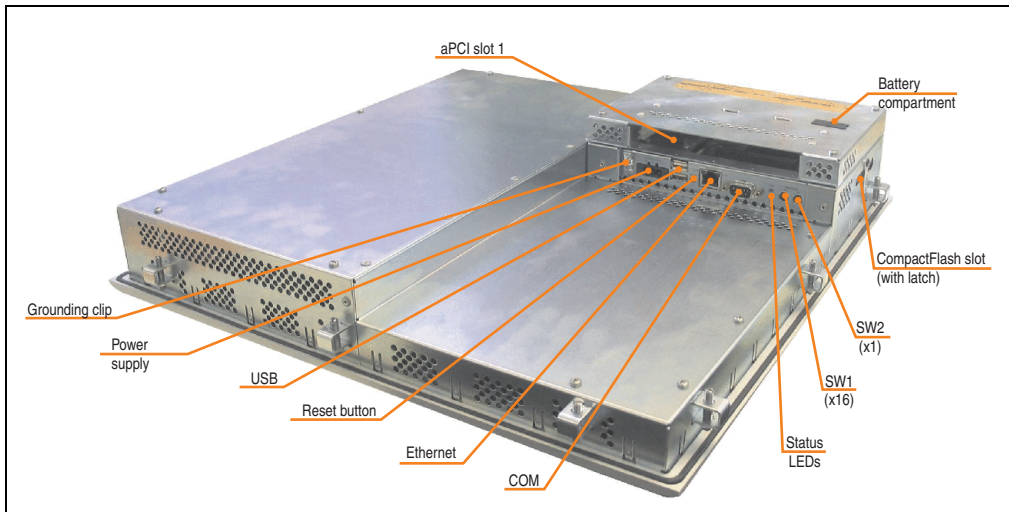


Figure 180: Rear view - 4PP251.1505-75



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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 83: Technical data - 4PP251.1505-75

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP251.1505-75
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	Color TFT 15 inch (381 mm) 16.7 million colors XGA, 1024 x 768 pixels 300:1  Direction R / direction L = 65° Direction U = 45° / direction D = 55°  330 cd/m <sup>2</sup> 35,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force 20 with LED 12 with LED - 15 without LED 77 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 35 W typical, 40 W max. Yes

Table 83: Technical data - 4PP251.1505-75 (Forts.)

Electrical characteristics	4PP251.1505-75
Bleeder resistance	≥ 47 kOhm
Mechanical characteristics	
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	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 3.18.2 "Temperature humidity diagram" on page 252
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 83: Technical data - 4PP251.1505-75 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.18.2 Temperature humidity diagram

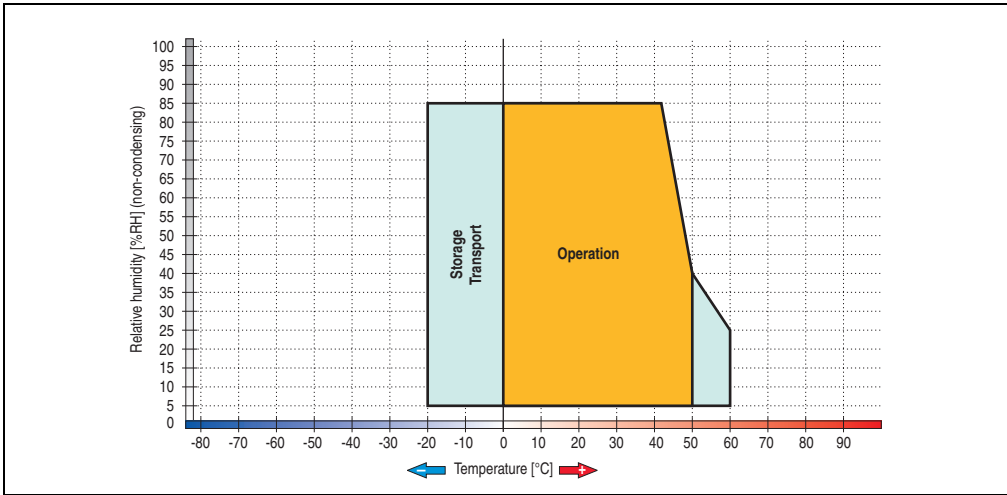


Figure 181: Temperature humidity diagram - 4PP251.1505-75

### 3.18.3 Dimensions

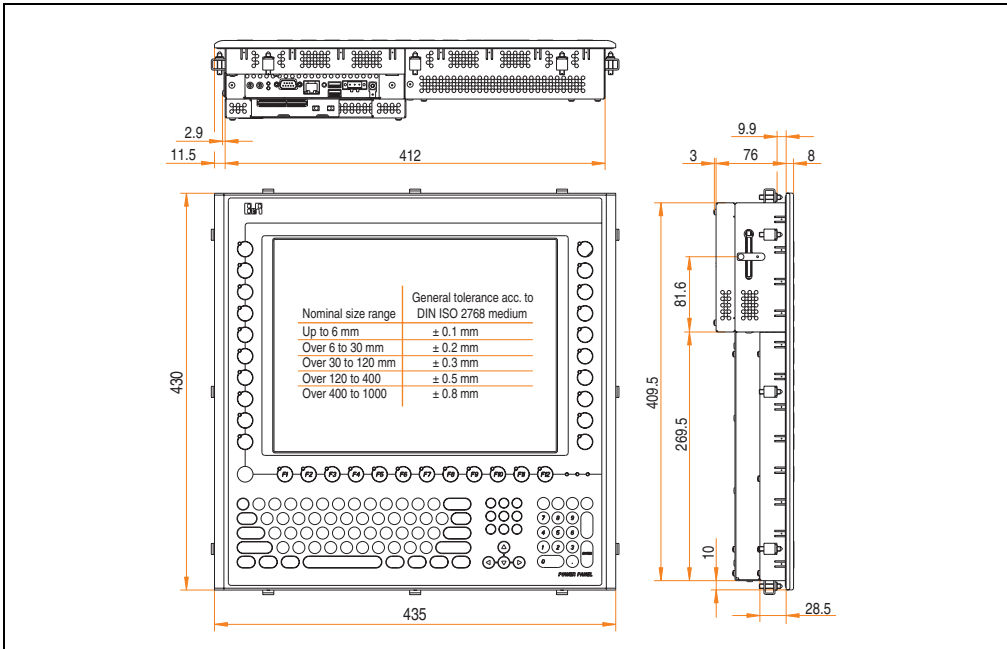


Figure 182: Dimensions - 4PP251.1505-75

### 3.18.4 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 - 4PP251.1505-75" on page 252) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

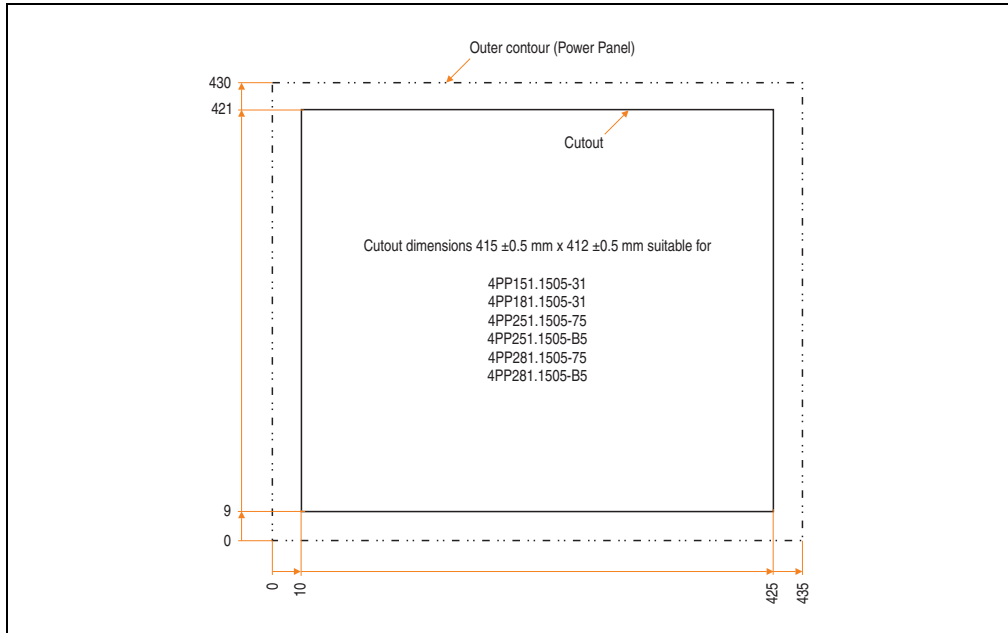


Figure 183: Cutout dimensions

### 3.18.5 Contents of delivery

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

Amount	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	Legend strips (inserted in the front)

Table 84: Contents of delivery - 4PP251.1505-75

### 3.19 Device 4PP251.1505-B5

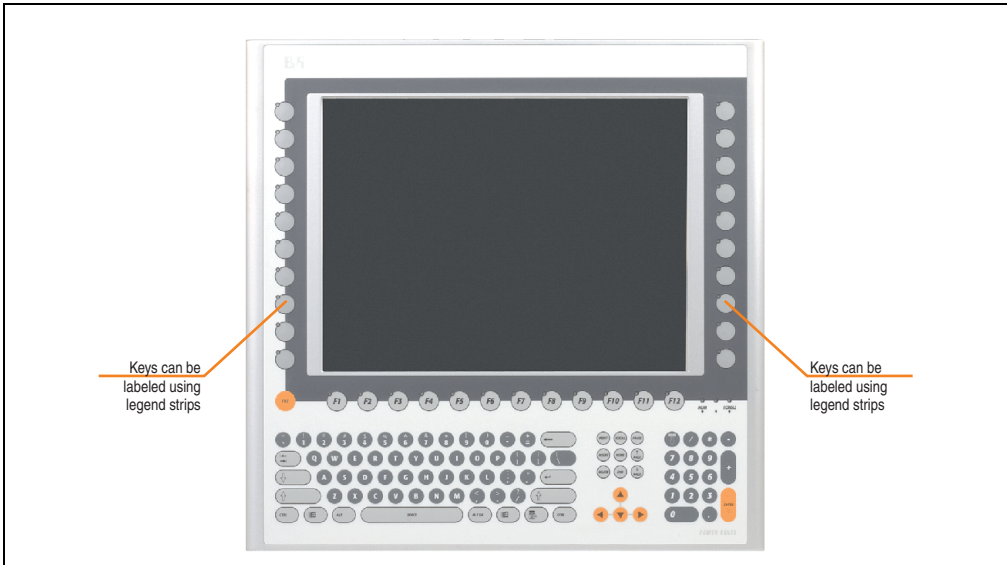


Figure 184: Front view - 4PP251.1505-B5

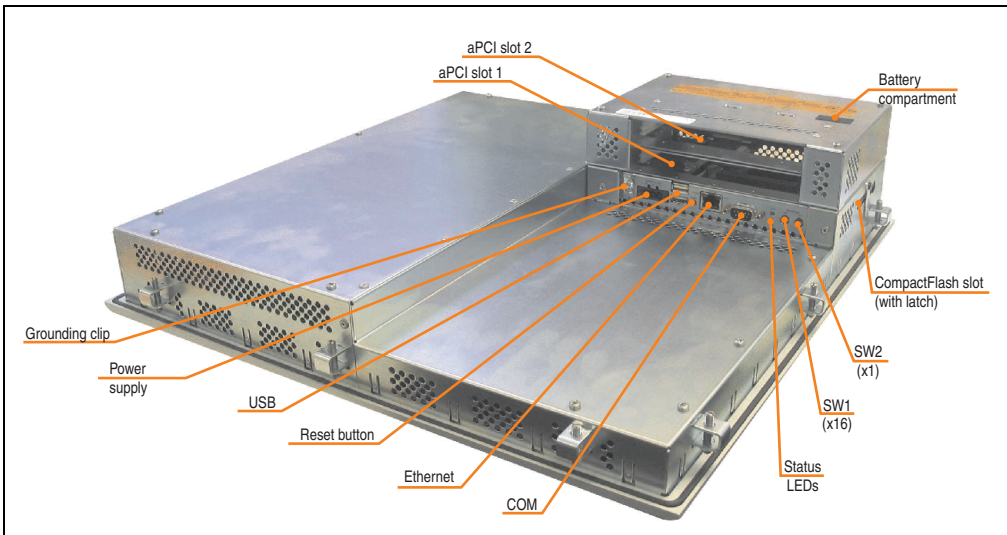


Figure 185: Rear view - 4PP251.1505-B5

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 85: Technical data - 4PP251.1505-B5

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP251.1505-B5
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	Color TFT 15 inch (381 mm) 16.7 million colors XGA, 1024 x 768 pixels 300:1  Direction R / direction L = 65° Direction U = 50° / direction D = 55°  330 cd/m <sup>2</sup> 35,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force 20 with LED 12 with LED - 15 without LED 77 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 35 W typical, 40 W max. Yes

Table 85: Technical data - 4PP251.1505-B5 (Forts.)



## Technical data • Power Panel 200 with Automation Runtime

Electrical characteristics	4PP251.1505-B5
Bleeder resistance	≥ 47 kOhm
Mechanical characteristics	
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	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 3.19.2 "Temperature humidity diagram" on page 258
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 85: Technical data - 4PP251.1505-B5 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.19.2 Temperature humidity diagram

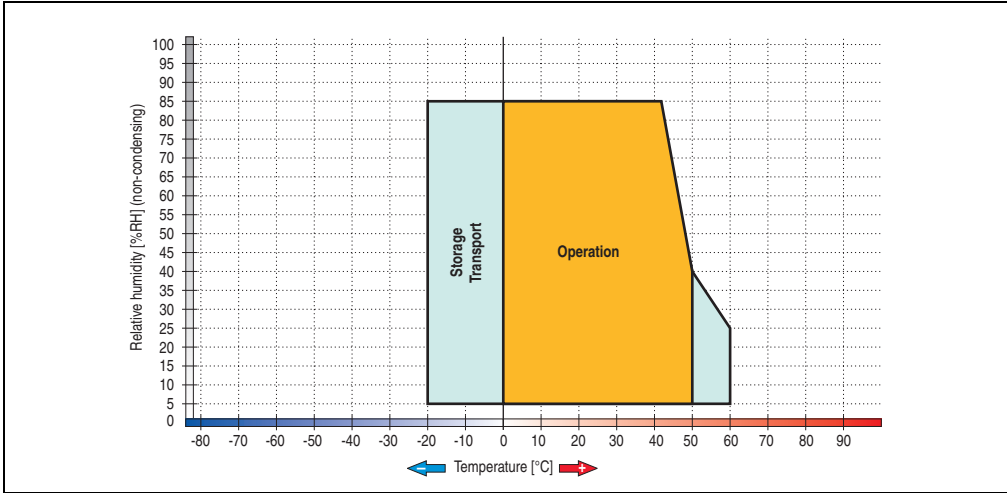


Figure 186: Temperature humidity diagram - 4PP251.1505-B5

### 3.19.3 Dimensions

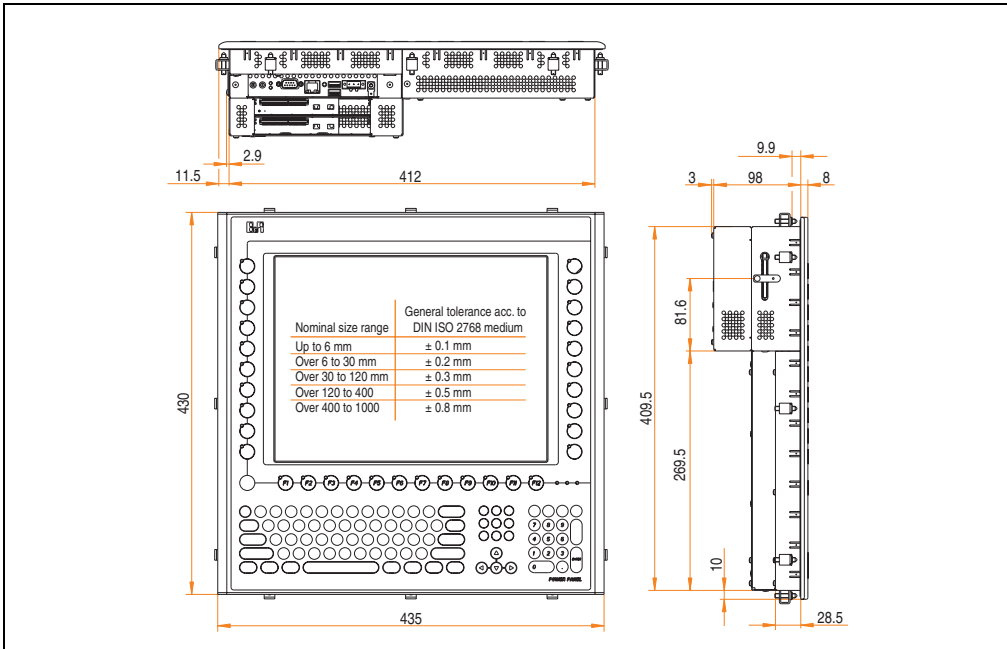


Figure 187: Dimensions - 4PP251.1505-B5

### 3.19.4 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 187 "Dimensions - 4PP251.1505-B5" on page 258) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

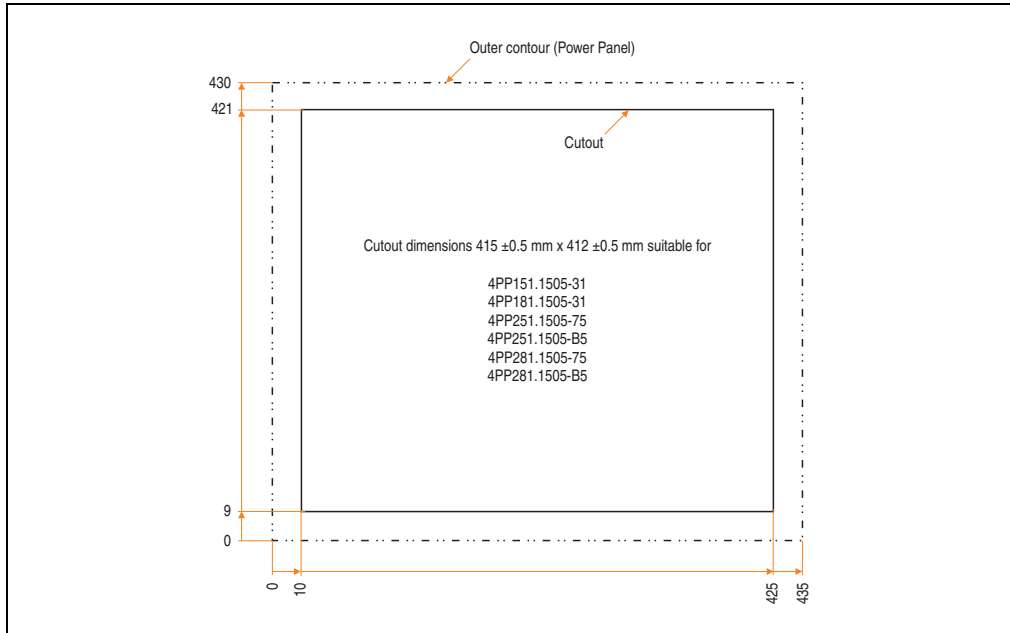


Figure 188: Cutout dimensions

### 3.19.5 Contents of delivery

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

Amount	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	Legend strips (inserted in the front)

Table 86: Contents of delivery - 4PP251.1505-B5

### 3.20 Device 4PP252.0571-45

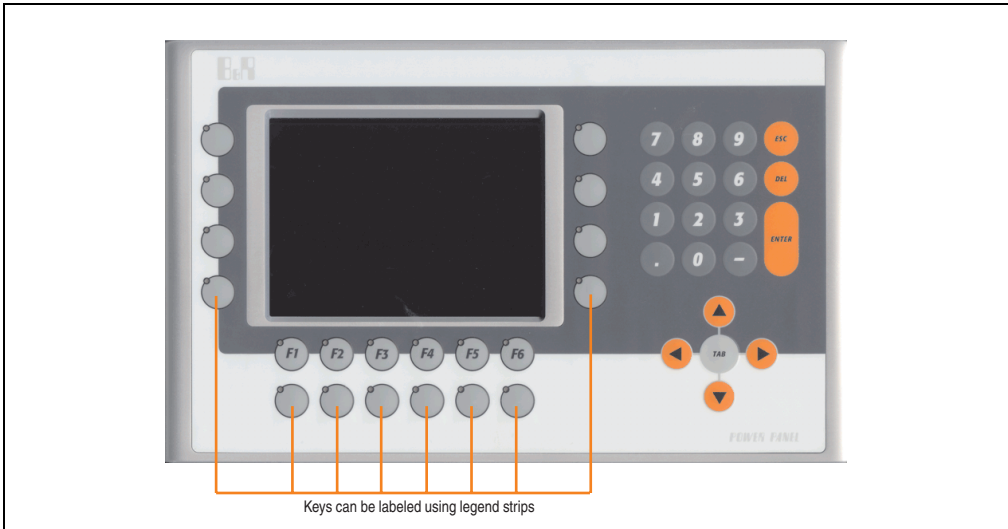


Figure 189: Front view - 4PP252.0571-45

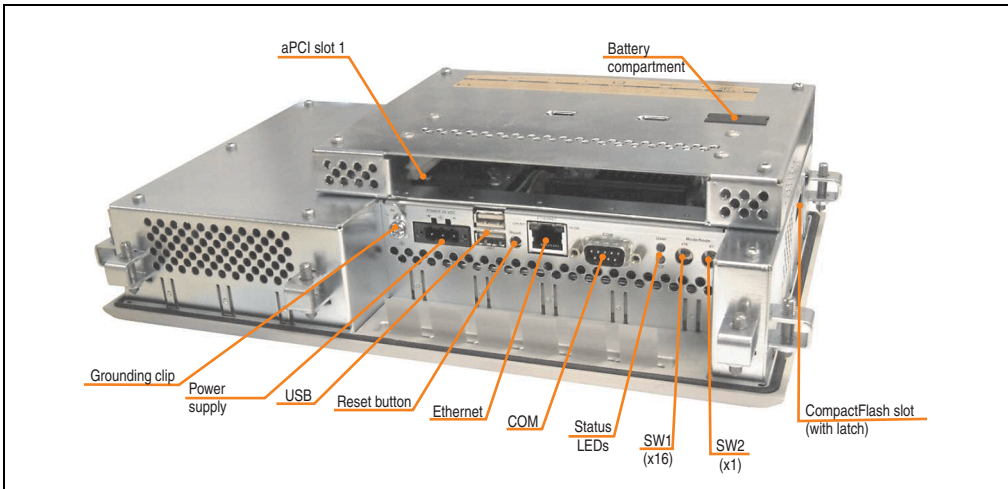


Figure 190: Rear view - 4PP252.0571-45

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 87: Technical data - 4PP252.0571-45

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP252.0571-45
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	LCD monochrome 5.7 in (144 mm) 8 shades of gray QVGA, 320 x 240 pixels 25:1 Direction R / direction L = 40° Direction U = 40° / direction D = 50° 140 cd/m <sup>2</sup> 50,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force 20 with LED - - 15 without LED 5 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. Yes

Table 87: Technical data - 4PP252.0571-45 (Forts.)

<b>Electrical characteristics</b>	<b>4PP252.0571-45</b>
Bleeder resistance	≥ 47 kOhm
<b>Mechanical characteristics</b>	
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)
<b>Environmental characteristics</b>	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 3.20.2 "Temperature humidity diagram" on page 264
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 87: Technical data - 4PP252.0571-45 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.20.2 Temperature humidity diagram

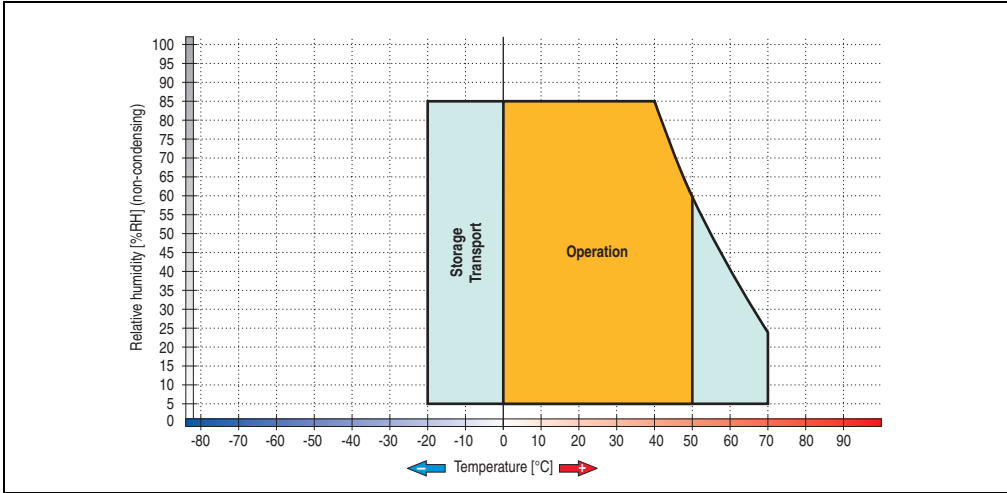


Figure 191: Temperature humidity diagram - 4PP252.0571-45

### 3.20.3 Dimensions

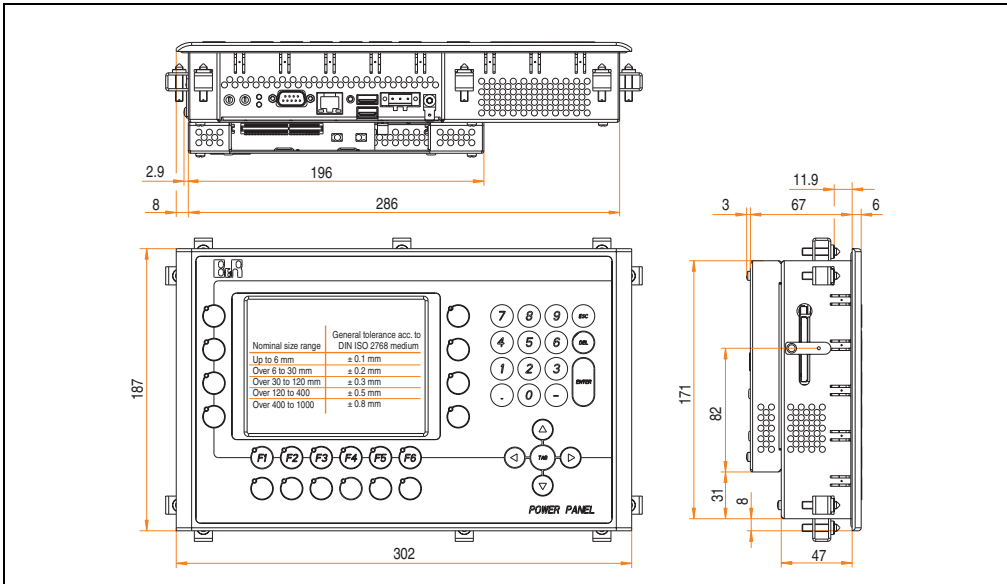


Figure 192: Dimensions - 4PP252.0571-45



### 3.20.4 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 192 "Dimensions - 4PP252.0571-45" on page 264) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

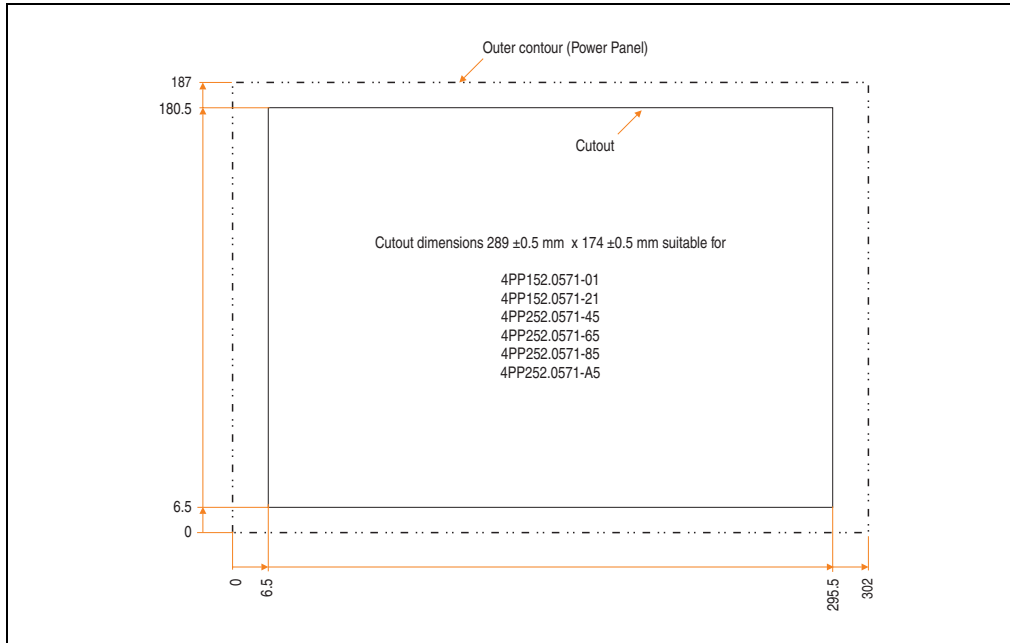


Figure 193: Cutout dimensions

### 3.20.5 Contents of delivery

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

Amount	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	Legend strips (inserted in the front)

Table 88: Contents of delivery - 4PP252.0571-45

### 3.21 Device 4PP252.0571-65

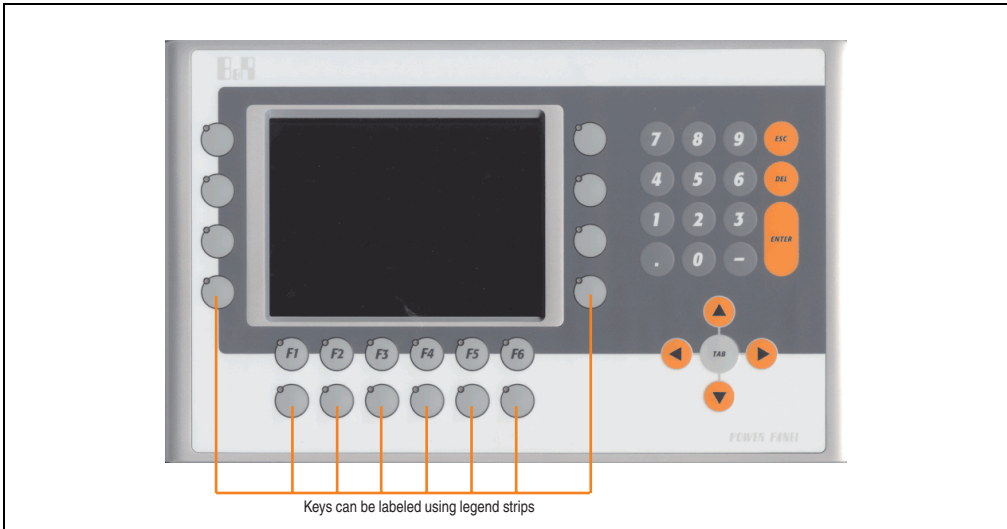


Figure 194: Front view - 4PP252.0571-65

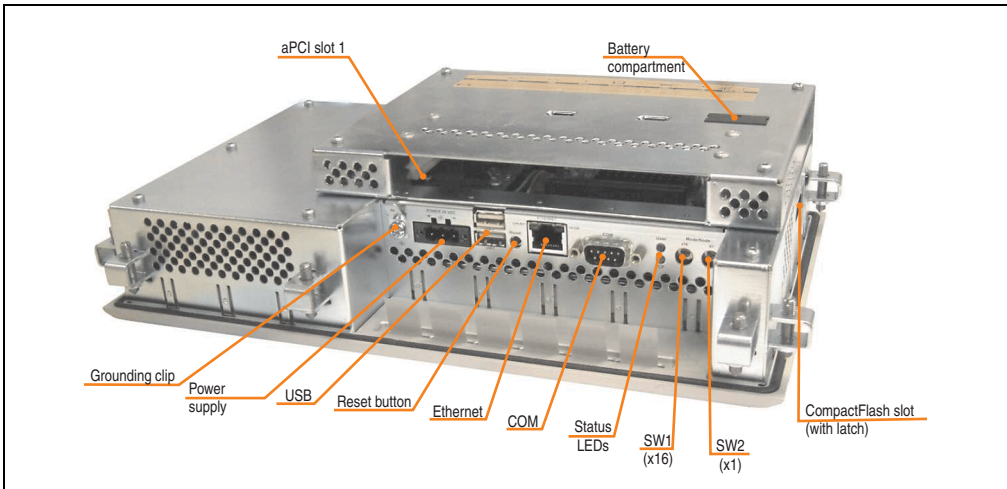


Figure 195: Rear view - 4PP252.0571-65

3.2.1.1 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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 89: Technical data - 4PP252.0571-65

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP252.0571-65
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	Color LCD 5.7 in (144 mm) 256 colors QVGA, 320 x 240 pixels 40:1 Direction R / direction L = 40° Direction U = 40° / direction D = 50° 150 cd/m <sup>2</sup> 50,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force 20 with LED - - 15 without LED 5 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. Yes

Table 89: Technical data - 4PP252.0571-65 (Forts.)

Electrical characteristics	4PP252.0571-65
Bleeder resistance	≥ 47 kOhm
Mechanical characteristics	
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	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 3.21.2 "Temperature humidity diagram" on page 270
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 89: Technical data - 4PP252.0571-65 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.21.2 Temperature humidity diagram

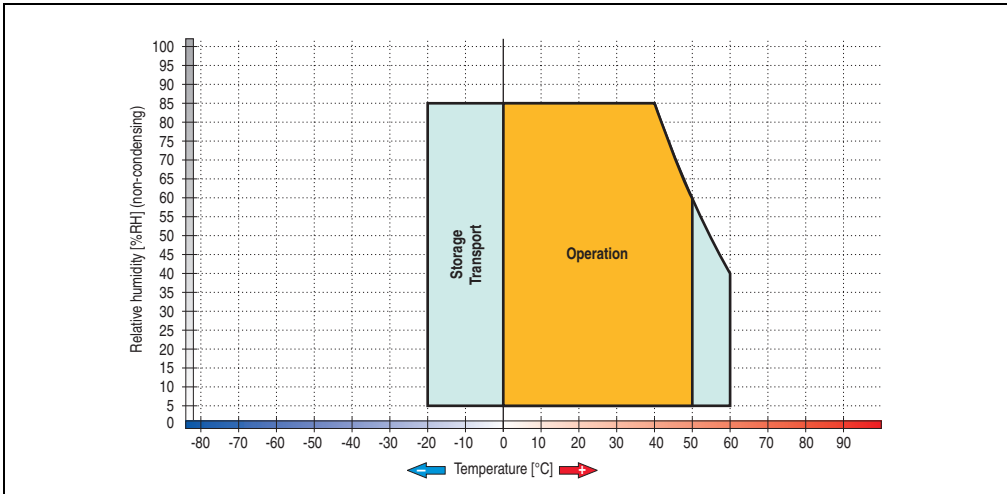


Figure 196: Temperature humidity diagram - 4PP252.0571-65

### 3.21.3 Dimensions

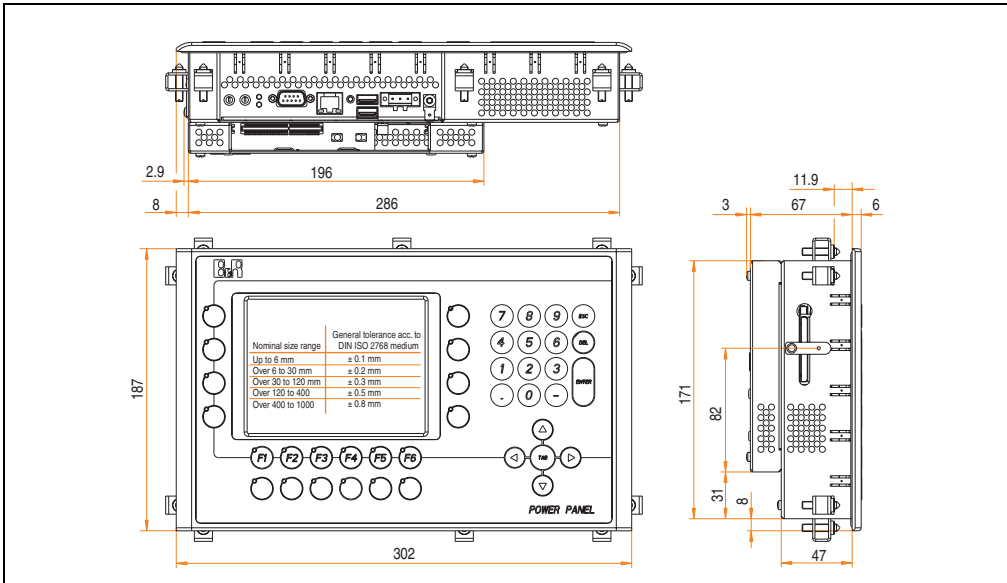


Figure 197: Dimensions - 4PP252.0571-65

### 3.21.4 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 197 "Dimensions - 4PP252.0571-65" on page 270) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

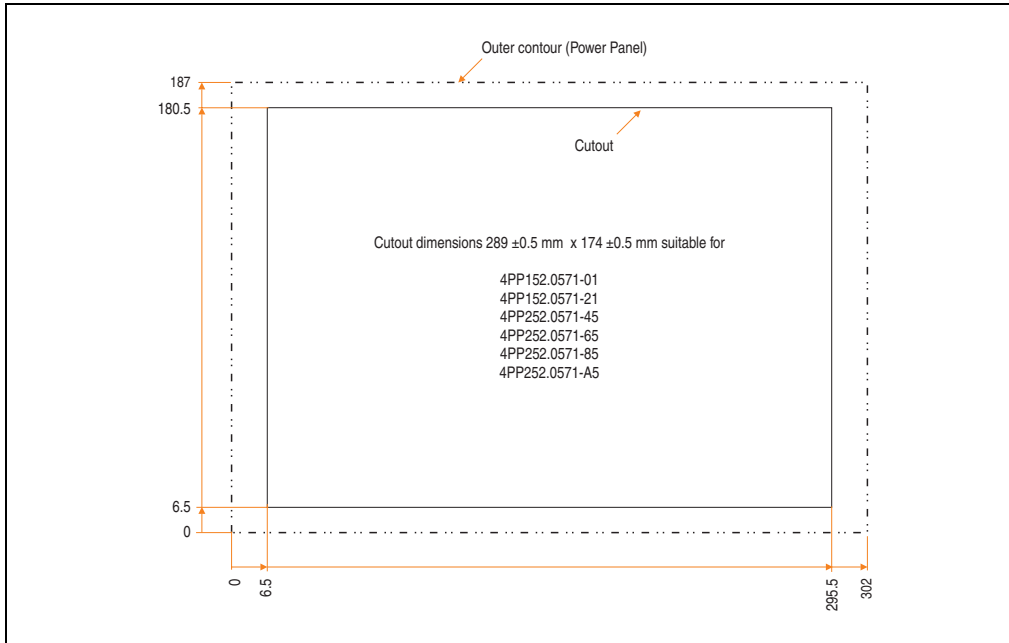


Figure 198: Cutout dimensions

### 3.21.5 Contents of delivery

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

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

Table 90: Contents of delivery - 4PP252.0571-65

### 3.22 Device 4PP252.0571-85

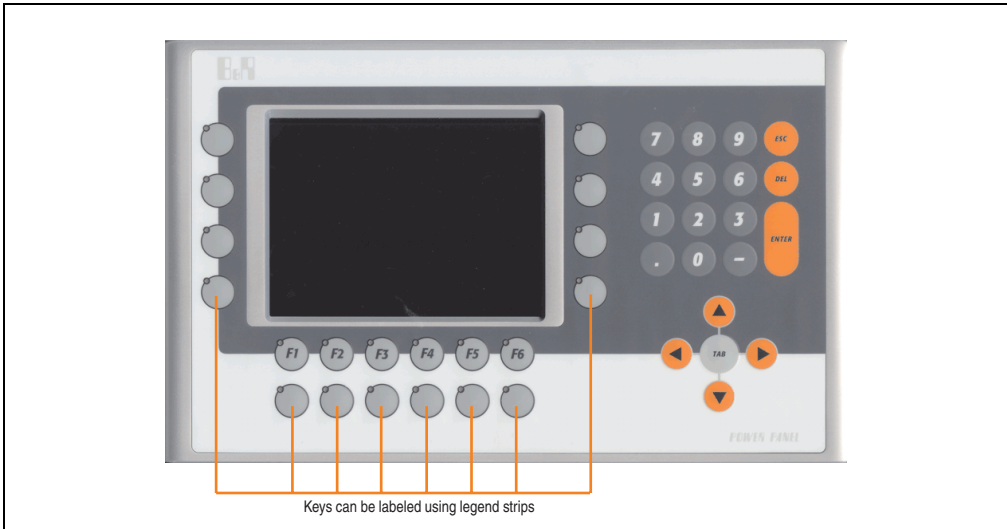


Figure 199: Front view - 4PP252.0571-85

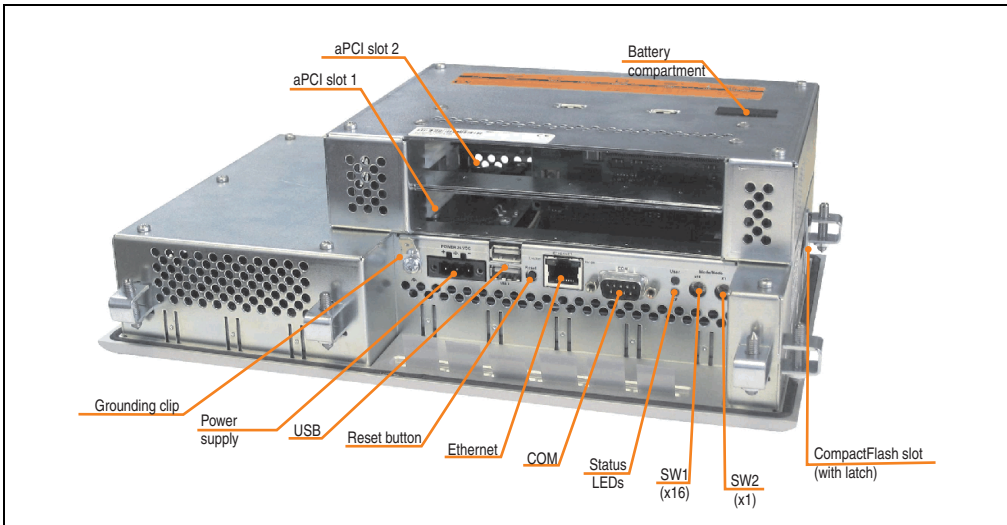


Figure 200: Rear view - 4PP252.0571-85



3.2.2.1 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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 91: Technical data - 4PP252.0571-85

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP252.0571-85
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	LCD monochrome 5.7 in (144 mm) 8 shades of gray QVGA, 320 x 240 pixels 25:1 Direction R / direction L = 40° Direction U = 40° / direction D = 50° 140 cd/m <sup>2</sup> 50,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force 20 with LED - - 15 without LED 5 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. Yes

Table 91: Technical data - 4PP252.0571-85 (Forts.)

Electrical characteristics	4PP252.0571-85
Bleeder resistance	≥ 47 kOhm
Mechanical characteristics	
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	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 3.22.2 "Temperature humidity diagram" on page 276
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 91: Technical data - 4PP252.0571-85 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.2.2.2 Temperature humidity diagram

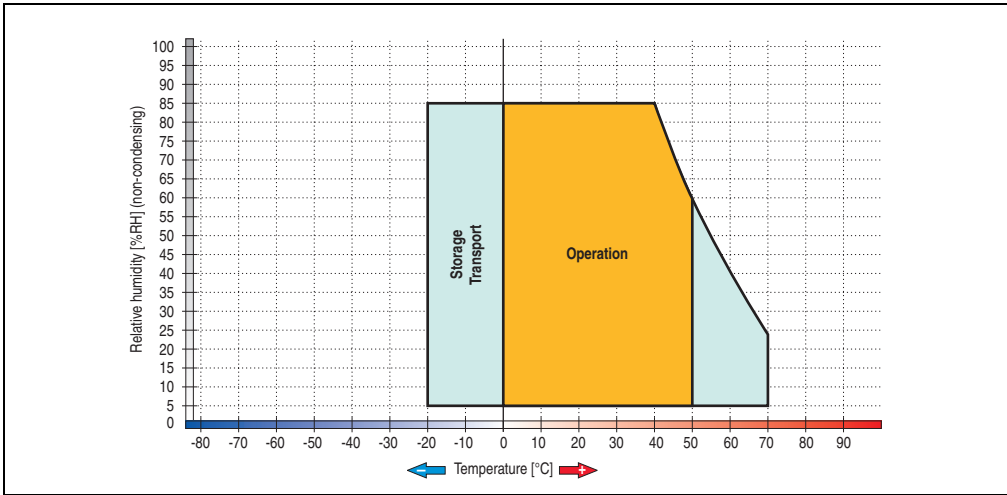


Figure 201: Temperature humidity diagram - 4PP252.0571-85

### 3.2.2.3 Dimensions

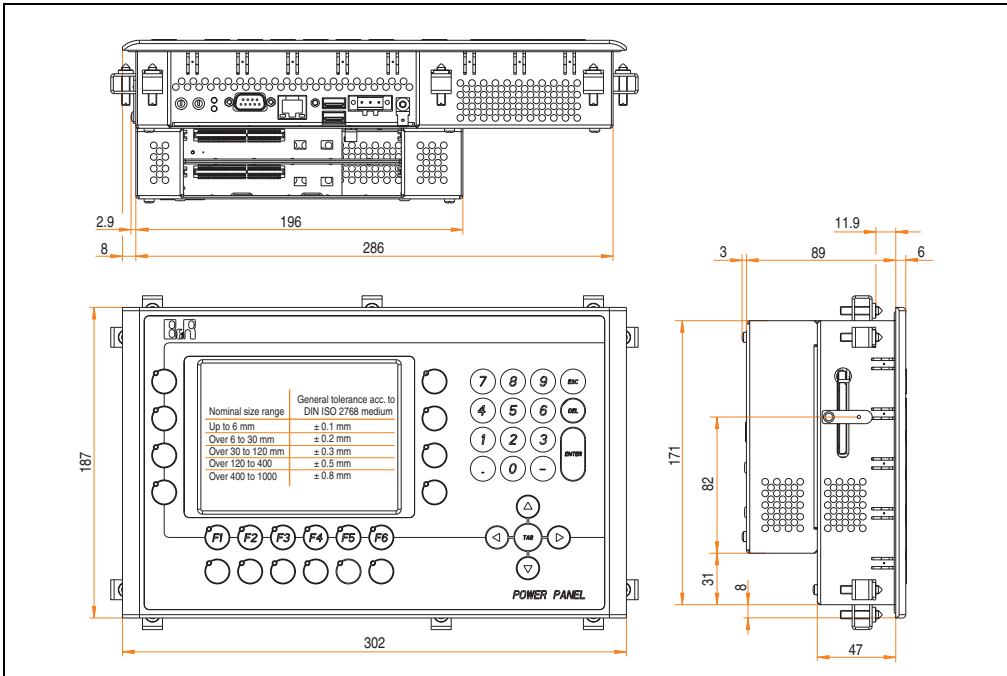


Figure 202: Dimensions - 4PP252.0571-85

### 3.22.4 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 - 4PP252.0571-85" on page 276) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

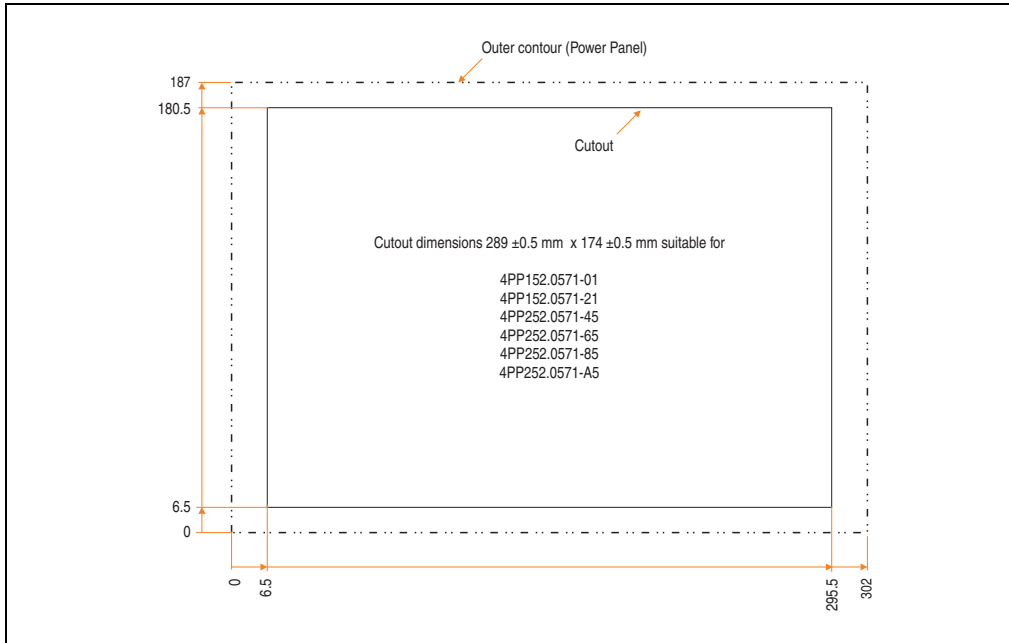


Figure 203: Cutout dimensions

### 3.22.5 Contents of delivery

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

Amount	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	Legend strips (inserted in the front)

Table 92: Contents of delivery - 4PP252.0571-85

### 3.23 Device 4PP252.0571-A5

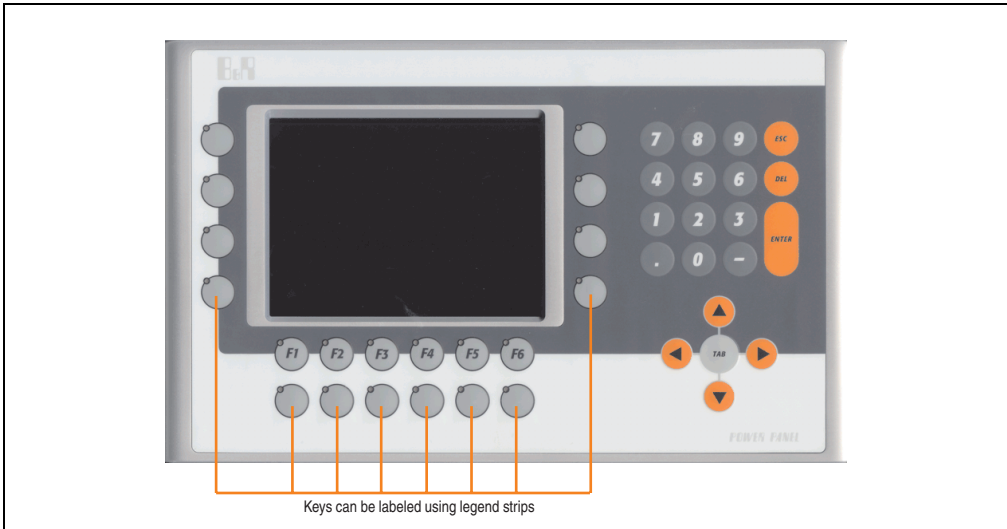


Figure 204: Front view - 4PP252.0571-A5

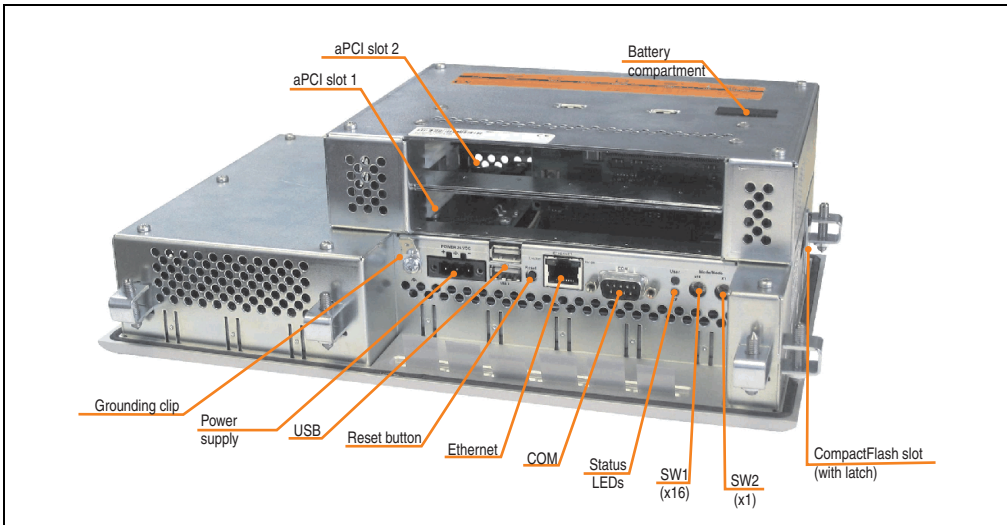


Figure 205: Rear view - 4PP252.0571-A5

3.2.3.1 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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 93: Technical data - 4PP252.0571-A5

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP252.0571-A5
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	Color LCD 5.7 in (144 mm) 256 colors QVGA, 320 x 240 pixels 40:1 Direction R / direction L = 40° Direction U = 40° / direction D = 50° 150 cd/m <sup>2</sup> 50,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force 20 with LED - - 15 without LED 5 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. Yes

Table 93: Technical data - 4PP252.0571-A5 (Forts.)



<b>Electrical characteristics</b>	<b>4PP252.0571-A5</b>
Bleeder resistance	≥ 47 kOhm
<b>Mechanical characteristics</b>	
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)
<b>Environmental characteristics</b>	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 3.23.2 "Temperature humidity diagram" on page 282
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 93: Technical data - 4PP252.0571-A5 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.23.2 Temperature humidity diagram

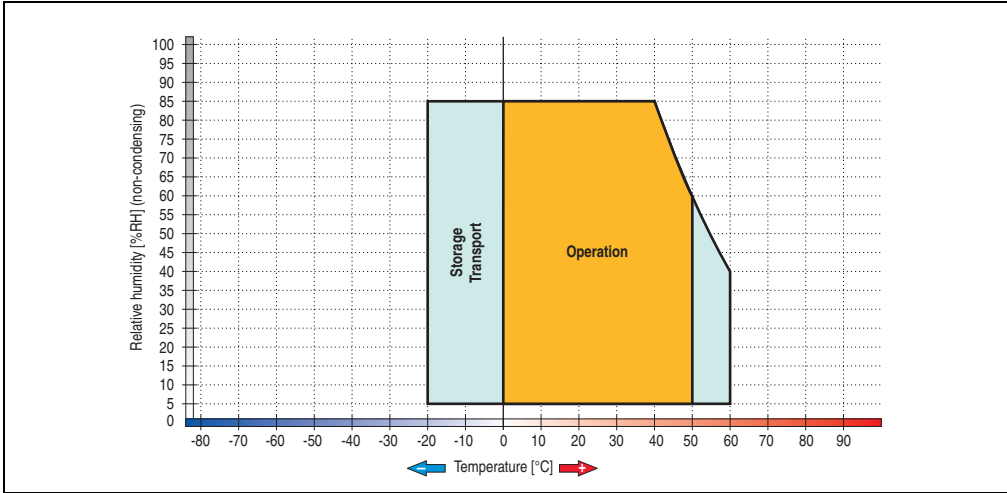


Figure 206: Temperature humidity diagram - 4PP252.0571-A5

### 3.23.3 Dimensions

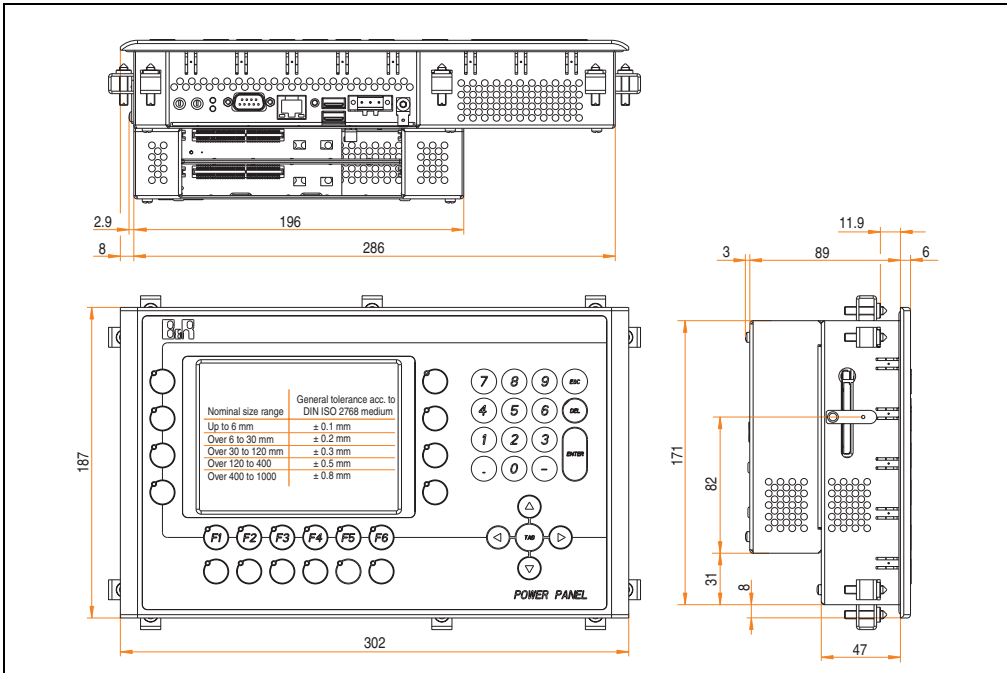


Figure 207: Dimensions - 4PP252.0571-A5

### 3.23.4 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 207 "Dimensions - 4PP252.0571-A5" on page 282) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

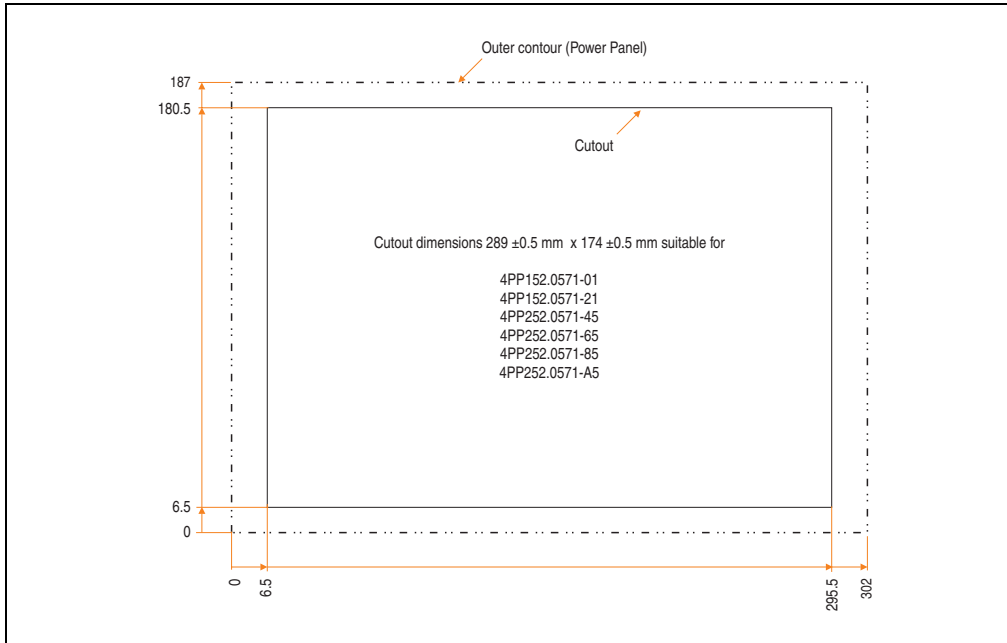


Figure 208: Cutout dimensions

### 3.23.5 Contents of delivery

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

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

Table 94: Contents of delivery - 4PP252.0571-A5

### 3.24 Device 4PP252.1043-75

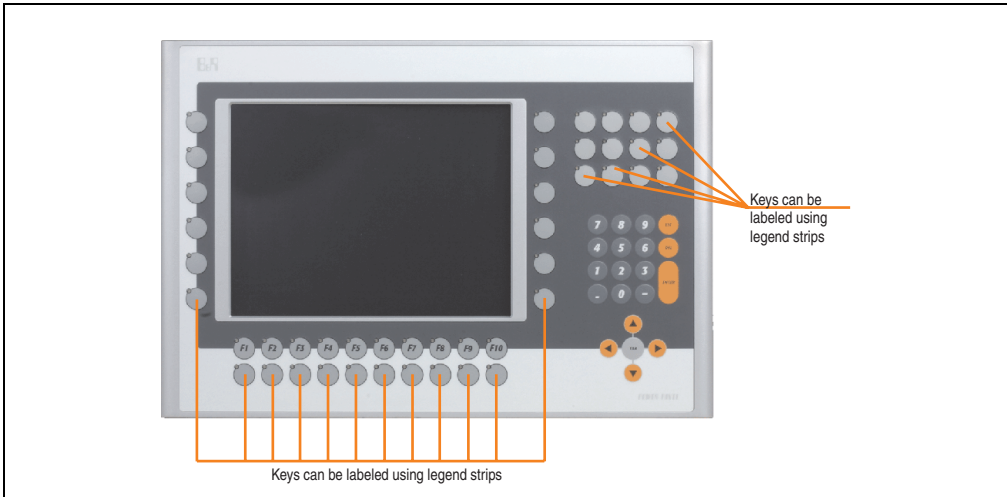


Figure 209: Front view - 4PP252.1043-75

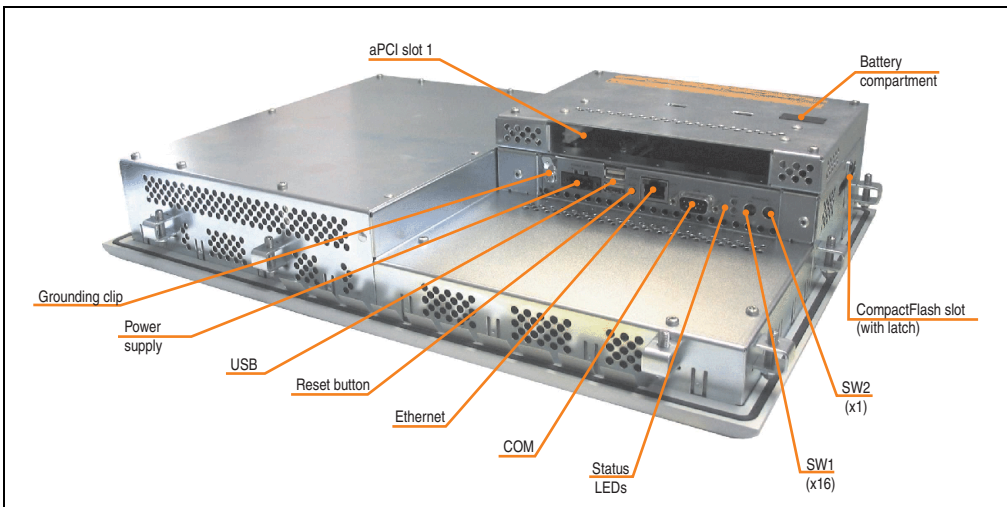


Figure 210: Rear view - 4PP252.1043-75

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 95: Technical data - 4PP252.1043-75

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP252.1043-75
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	Color TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 Direction R / direction L = 70° Direction U = 45° / direction D = 55° 350 cd/m <sup>2</sup> 55,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force 44 with LED - - 15 without LED 5 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 20 W typical, 25 W max. Yes

Table 95: Technical data - 4PP252.1043-75 (Forts.)

<b>Electrical characteristics</b>	<b>4PP252.1043-75</b>
Bleeder resistance	≥ 47 kOhm
<b>Mechanical characteristics</b>	
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)
<b>Environmental characteristics</b>	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 3.24.2 "Temperature humidity diagram" on page 288
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 95: Technical data - 4PP252.1043-75 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.24.2 Temperature humidity diagram

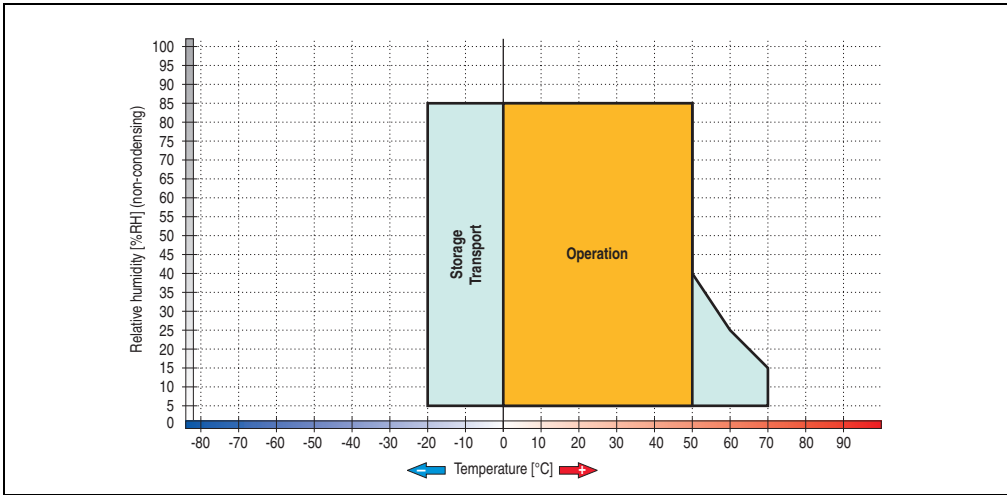


Figure 211: Temperature humidity diagram - 4PP252.1043-75

### 3.24.3 Dimensions

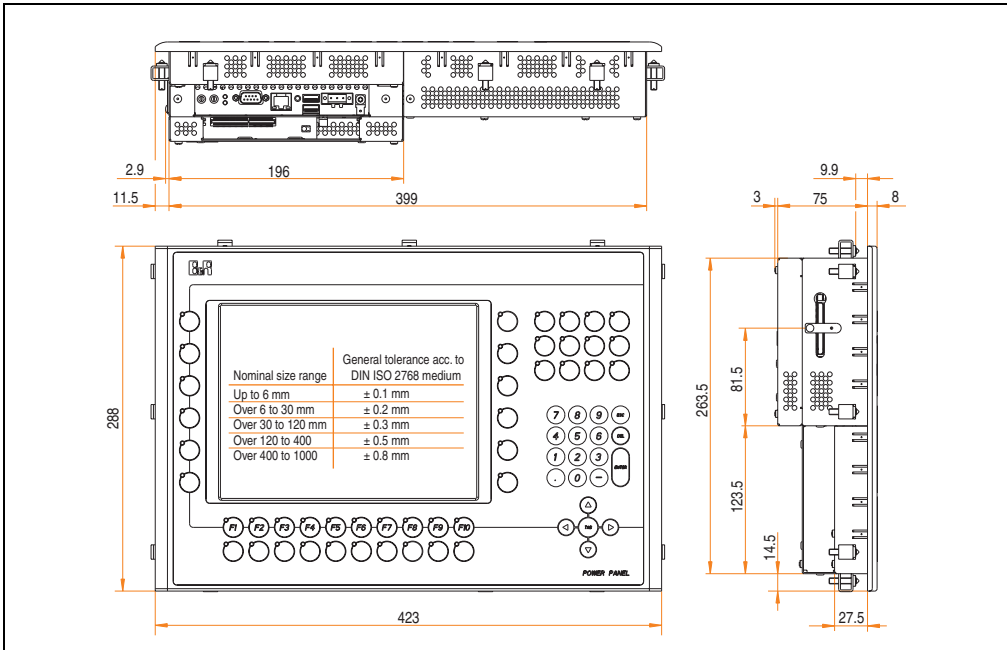


Figure 212: Dimensions - 4PP252.1043-75



### 3.24.4 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 212 "Dimensions - 4PP252.1043-75" on page 288) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

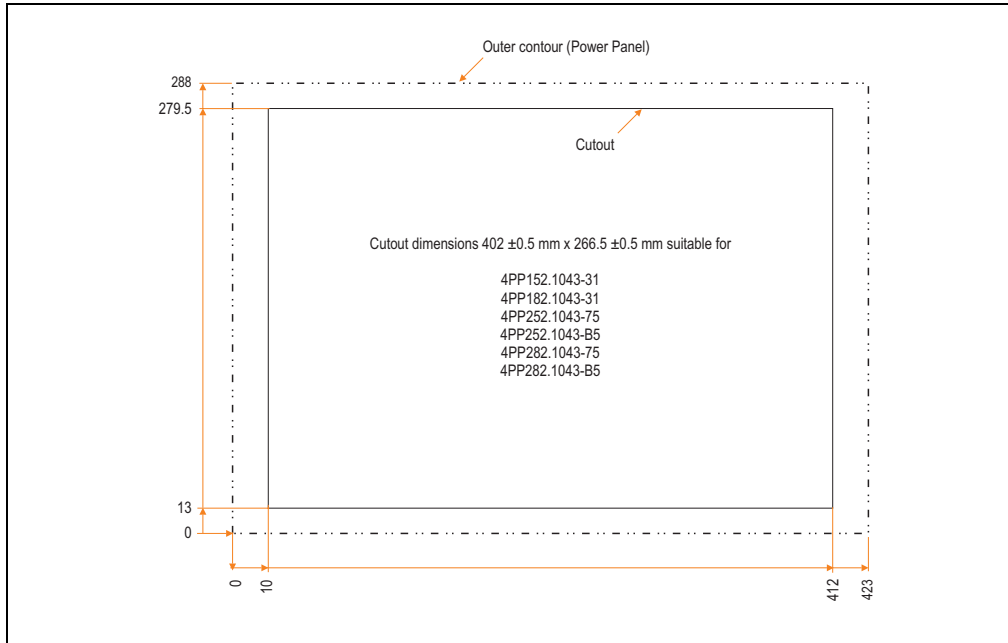


Figure 213: Cutout dimensions

### 3.24.5 Contents of delivery

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

Amount	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	Legend strips (inserted in the front)

Table 96: Contents of delivery - 4PP252.1043-75

### 3.25 Device 4PP252.1043-B5

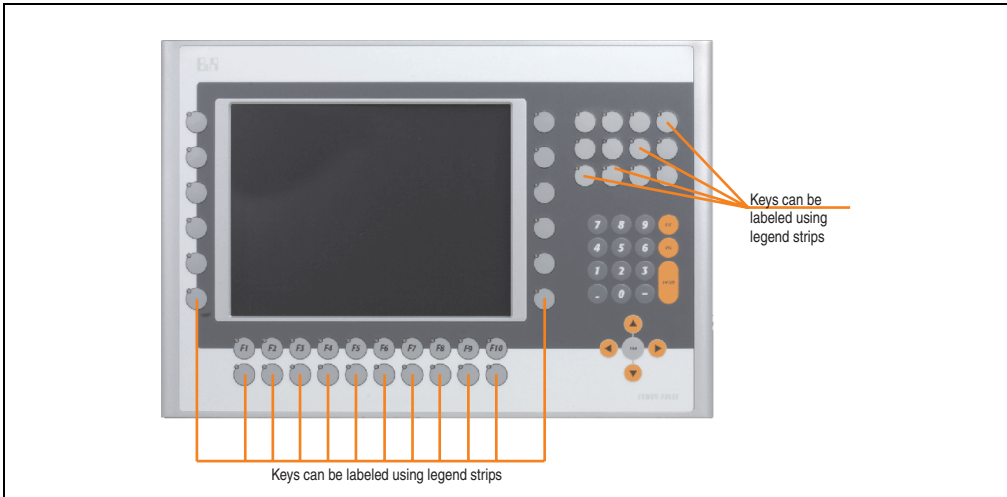


Figure 214: Front view - 4PP252.1043-B5

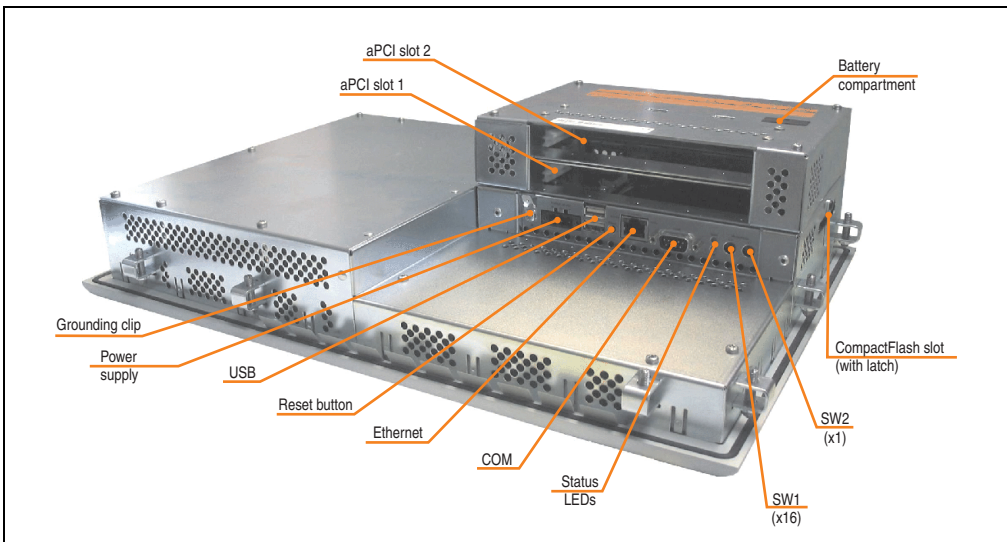


Figure 215: Rear view - 4PP252.1043-B5

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 97: Technical data - 4PP252.1043-B5

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP252.1043-B5
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	Color TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 Direction R / direction L = 70° Direction U = 45° / direction D = 55° 350 cd/m <sup>2</sup> 55,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force 44 with LED - - 15 without LED 5 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 20 W typical, 25 W max. Yes

Table 97: Technical data - 4PP252.1043-B5 (Forts.)

<b>Electrical characteristics</b>	<b>4PP252.1043-B5</b>
Bleeder resistance	≥ 47 kOhm
<b>Mechanical characteristics</b>	
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)
<b>Environmental characteristics</b>	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 3.25.2 "Temperature humidity diagram" on page 294
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 97: Technical data - 4PP252.1043-B5 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.25.2 Temperature humidity diagram

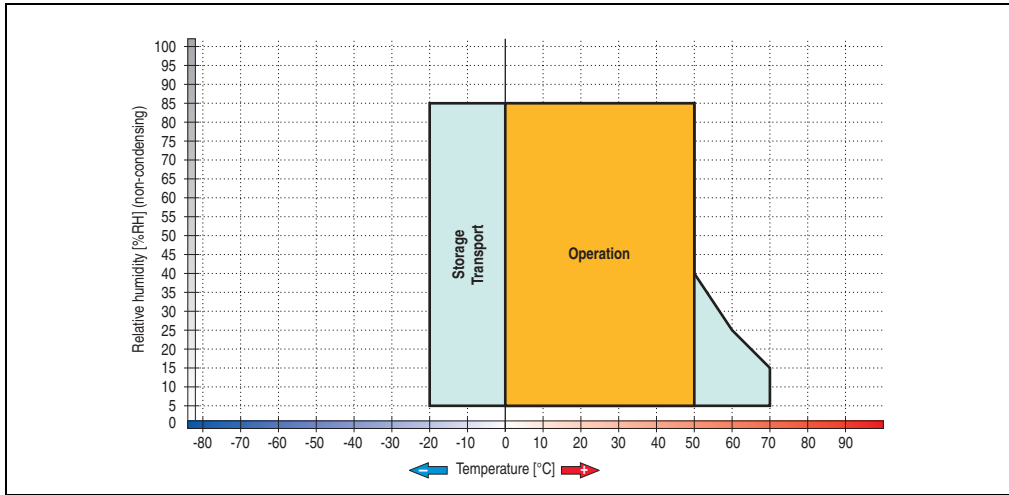


Figure 216: Temperature humidity diagram - 4PP252.1043-B5

### 3.25.3 Dimensions

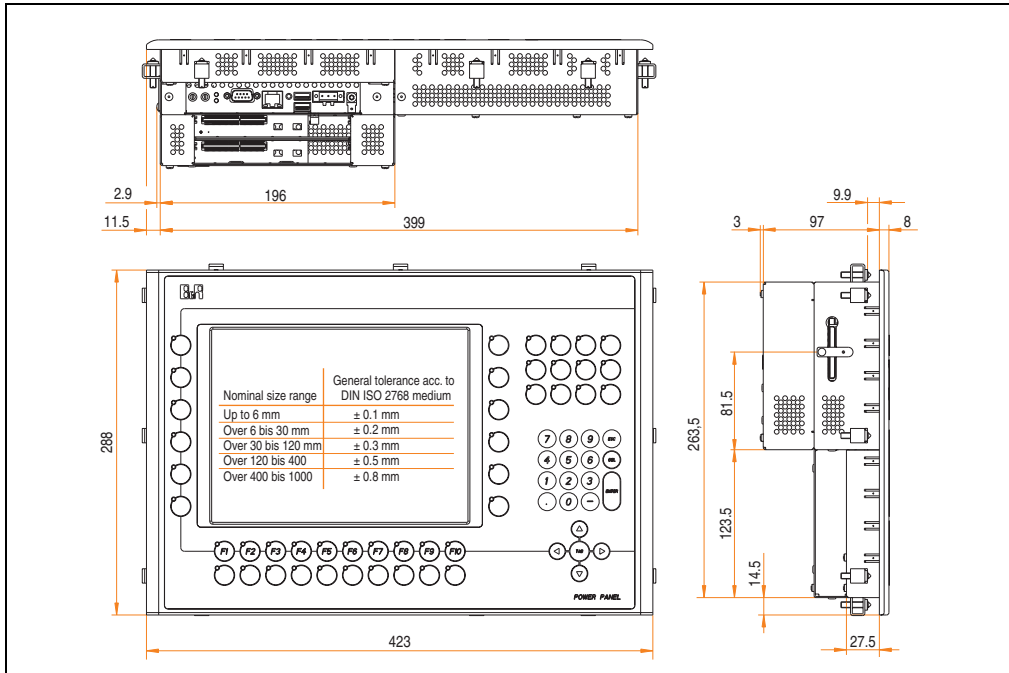


Figure 217: Dimensions - 4PP252.1043-B5

### 3.25.4 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 217 "Dimensions - 4PP252.1043-B5" on page 294) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

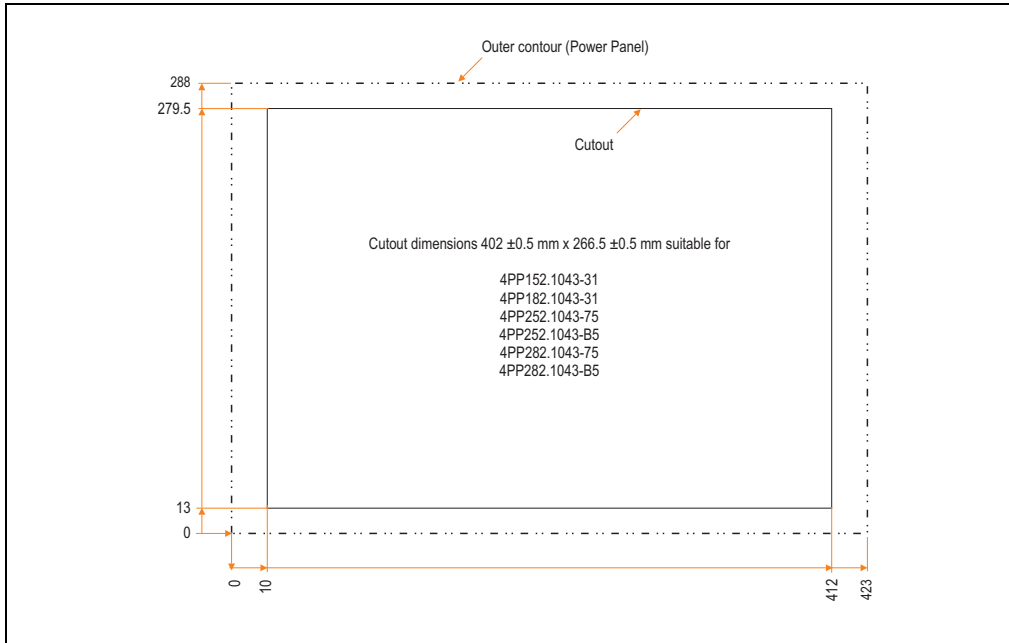


Figure 218: Cutout dimensions

### 3.25.5 Contents of delivery

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

Amount	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	Legend strips (inserted in the front)

Table 98: Contents of delivery - 4PP252.1043-B5

### 3.26 Device 4PP280.1043-75

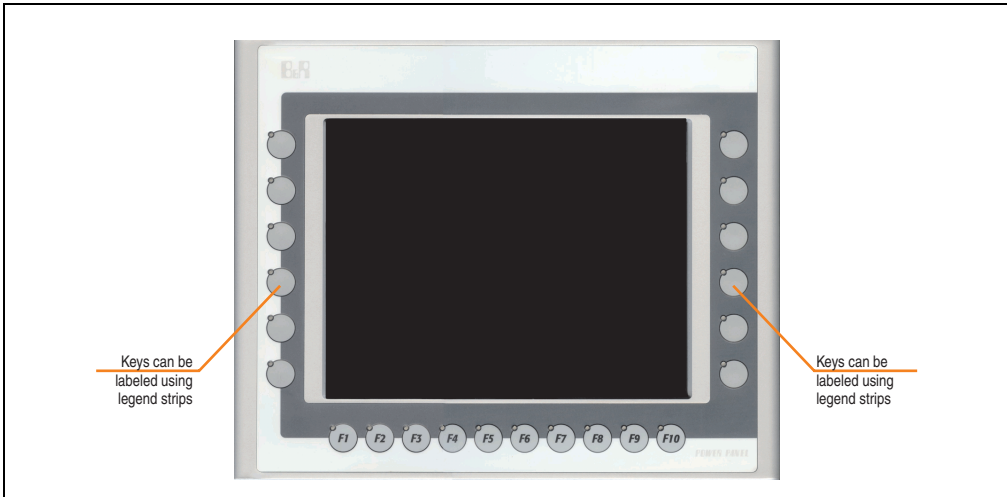


Figure 219: Front view - 4PP280.1043-75

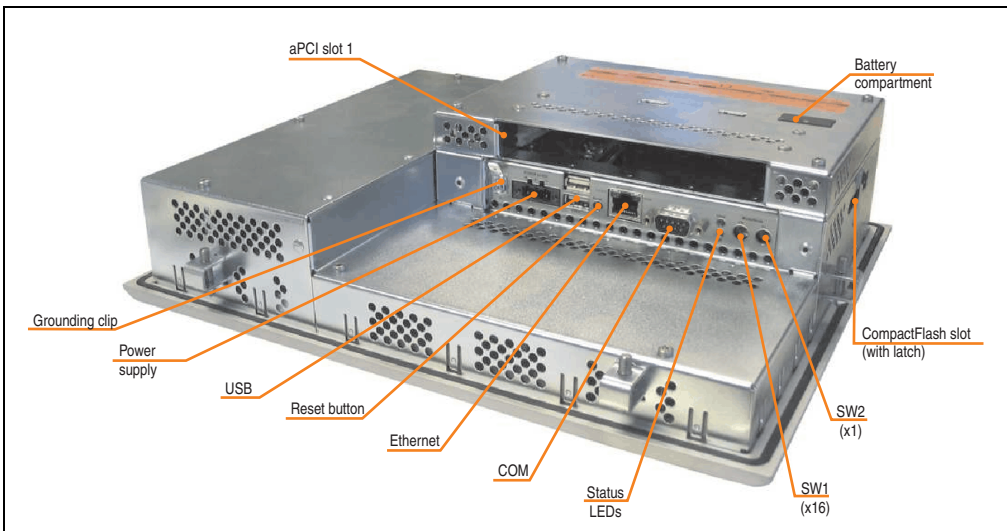


Figure 220: Rear view - 4PP280.1043-75



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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 99: Technical data - 4PP280.1043-75

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP280.1043-75
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	Color TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 Direction R / direction L = 70° Direction U = 45° / direction D = 55° 350 cd/m <sup>2</sup> 55,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Analog, resistive Hampshire, serial, 12-bit 78%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force 12 with LED 10 with LED - - - - <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 20 W typical, 25 W max. -

Table 99: Technical data - 4PP280.1043-75 (Forts.)

## Technical data • Power Panel 200 with Automation Runtime

Electrical characteristics	4PP280.1043-75
Bleeder resistance	≥ 47 kOhm
Mechanical characteristics	
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	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 3.26.2 "Temperature humidity diagram" on page 300
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 99: Technical data - 4PP280.1043-75 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.26.2 Temperature humidity diagram

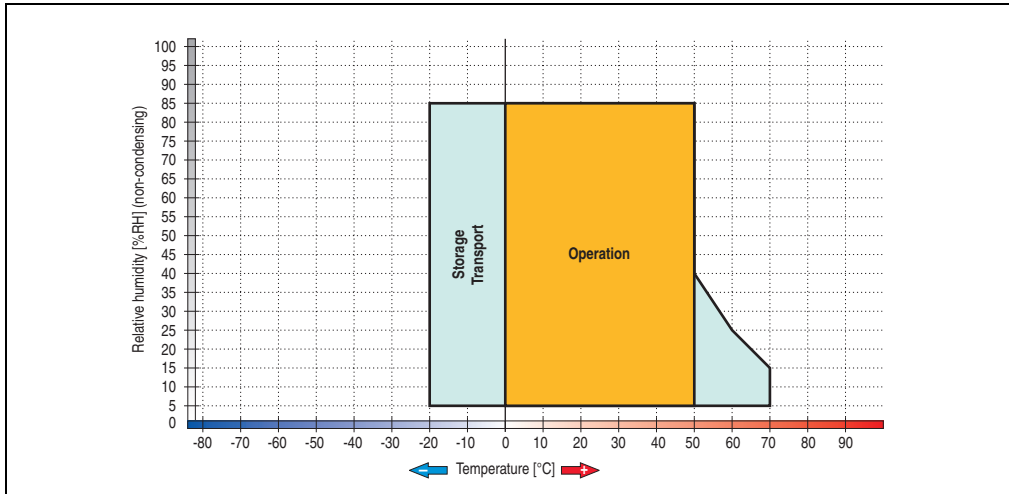


Figure 221: Temperature humidity diagram - 4PP280.1043-75

### 3.26.3 Dimensions

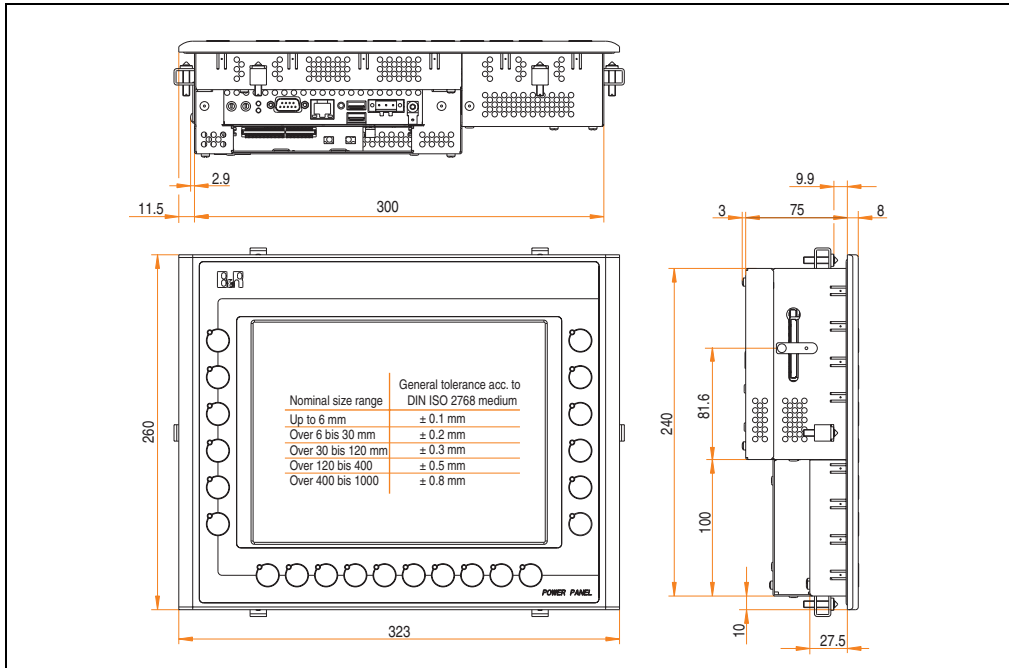


Figure 222: Dimensions - 4PP280.1043-75

### 3.2.6.4 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 222 "Dimensions - 4PP280.1043-75" on page 300) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

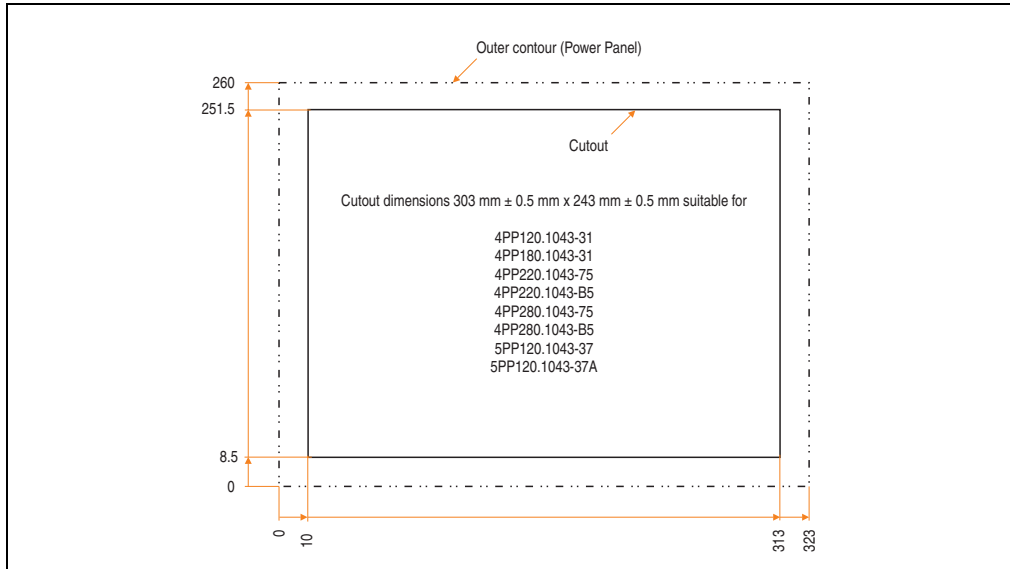


Figure 223: Cutout dimensions

### 3.2.6.5 Contents of delivery

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

Amount	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	Legend strips (inserted in the front)

Table 100: Contents of delivery - 4PP280.1043-75

### 3.2.7 Device 4PP280.1043-B5

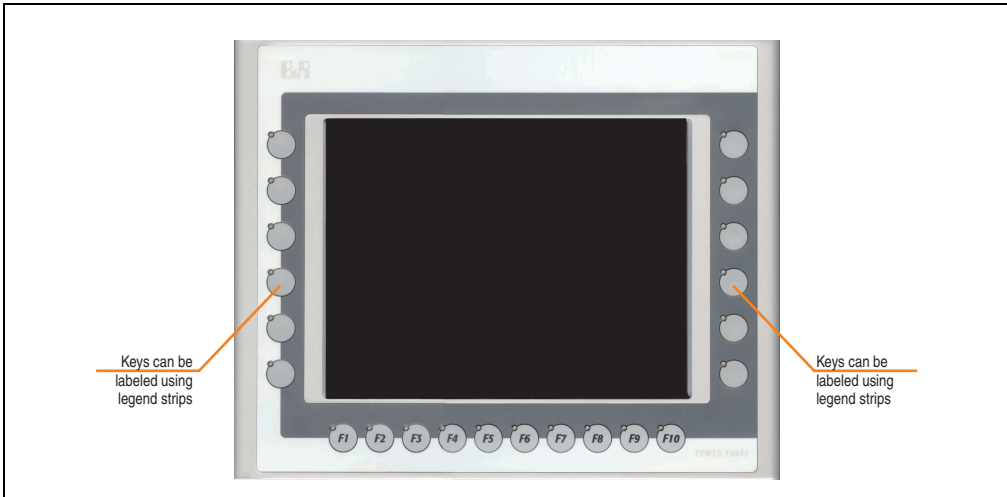


Figure 224: Front view - 4PP280.1043-B5

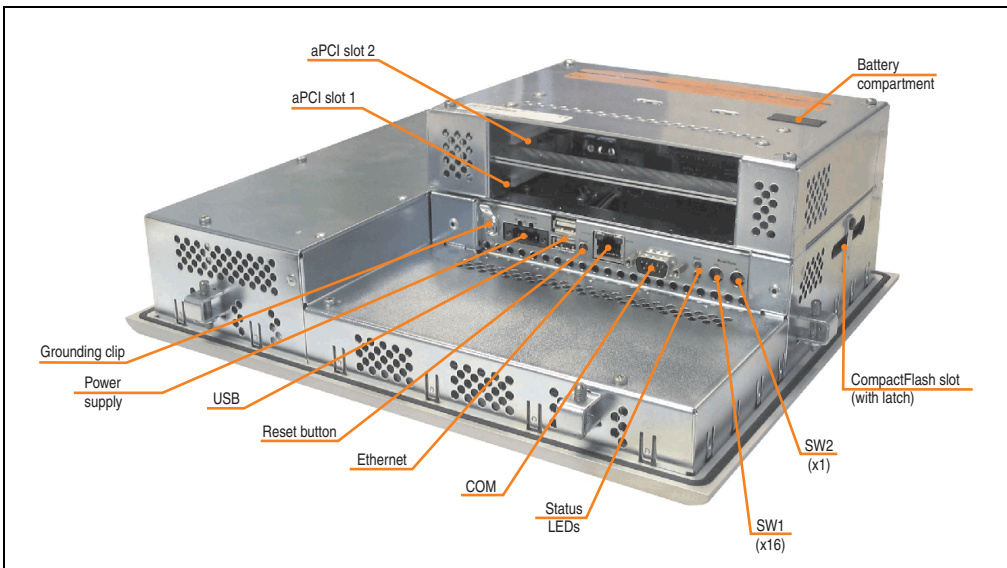


Figure 225: Rear view - 4PP280.1043-B5

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 101: Technical data - 4PP280.1043-B5

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP280.1043-B5
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	Color TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 Direction R / direction L = 70° Direction U = 45° / direction D = 55° 350 cd/m <sup>2</sup> 55,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Analog, resistive Hampshire, serial, 12-bit 78%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 operations at 1±0.3 to 3±0.3 N operating force 12 with LED 10 with LED - - - <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 20 W typical, 25 W max. -

Table 101: Technical data - 4PP280.1043-B5 (Forts.)



<b>Electrical characteristics</b>	<b>4PP280.1043-B5</b>
Bleeder resistance	≥ 47 kOhm
<b>Mechanical characteristics</b>	
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)
<b>Environmental characteristics</b>	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 3.27.2 "Temperature humidity diagram" on page 306
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 101: Technical data - 4PP280.1043-B5 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.27.2 Temperature humidity diagram

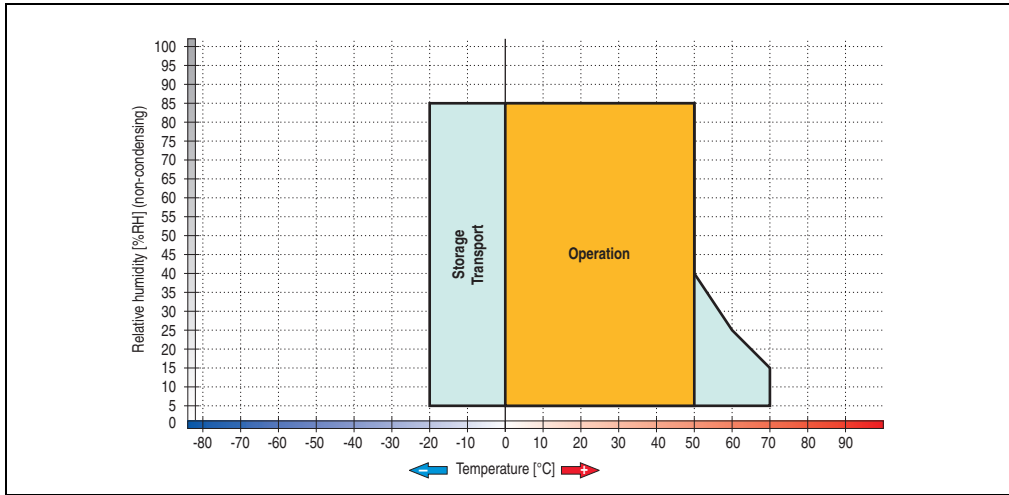


Figure 226: Temperature humidity diagram - 4PP280.1043-B5

### 3.27.3 Dimensions

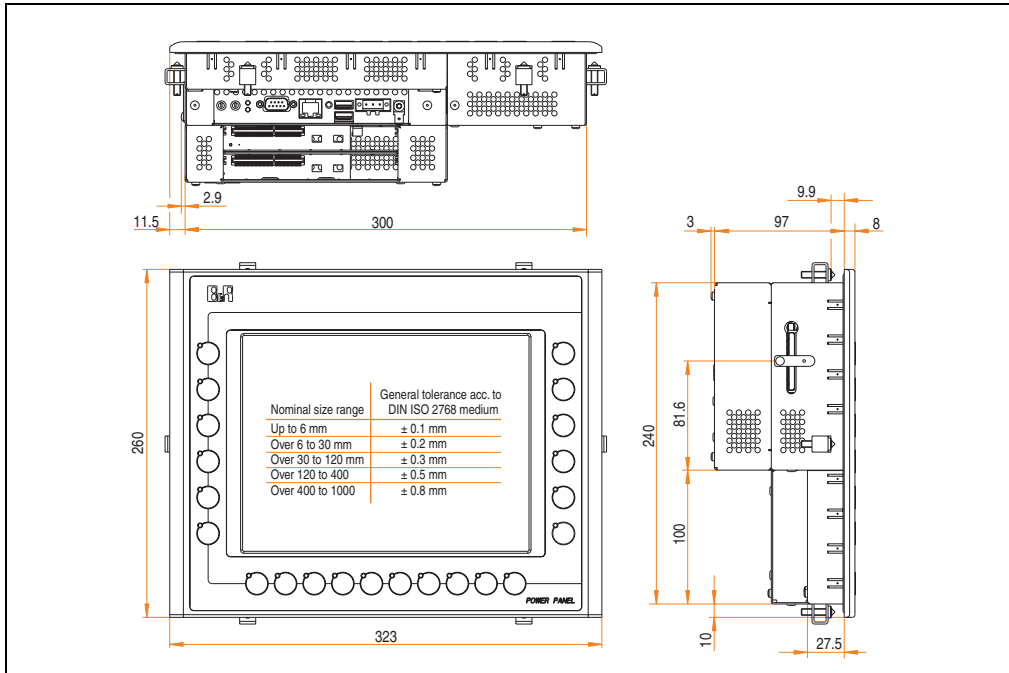


Figure 227: Dimensions - 4PP280.1043-B5

### 3.27.4 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 227 "Dimensions - 4PP280.1043-B5" on page 306) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

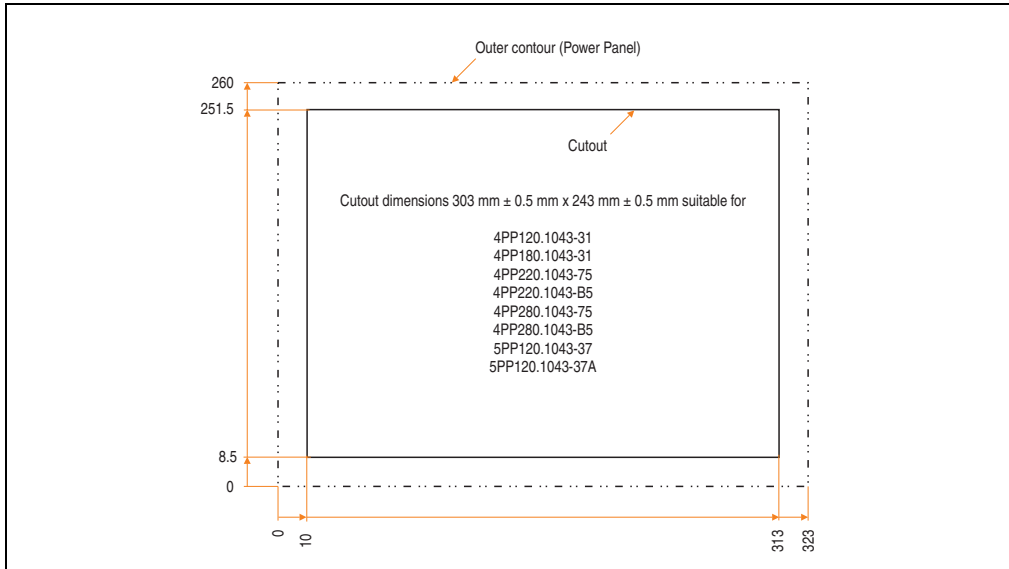


Figure 228: Cutout dimensions

### 3.27.5 Contents of delivery

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

Amount	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	Legend strips (inserted in the front)

Table 102: Contents of delivery - 4PP280.1043-B5

### 3.28 Device 4PP280.1505-75

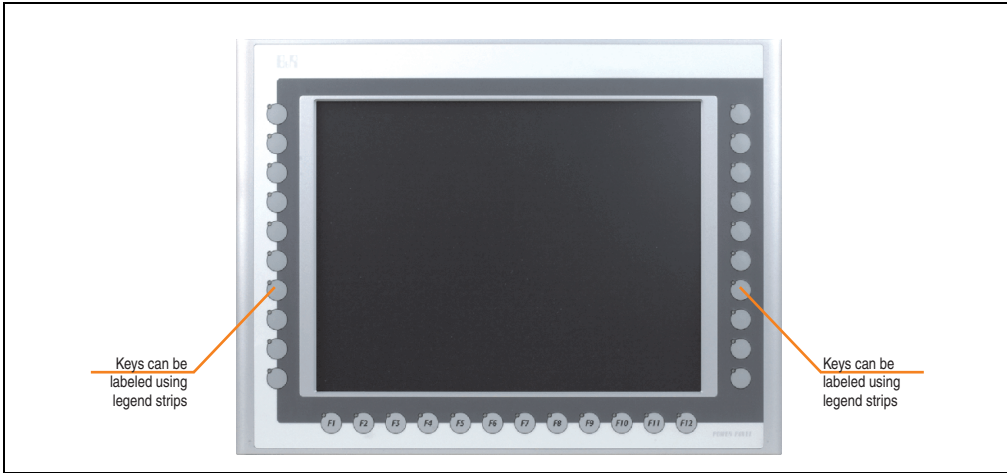


Figure 229: Front view - 4PP280.1505-75

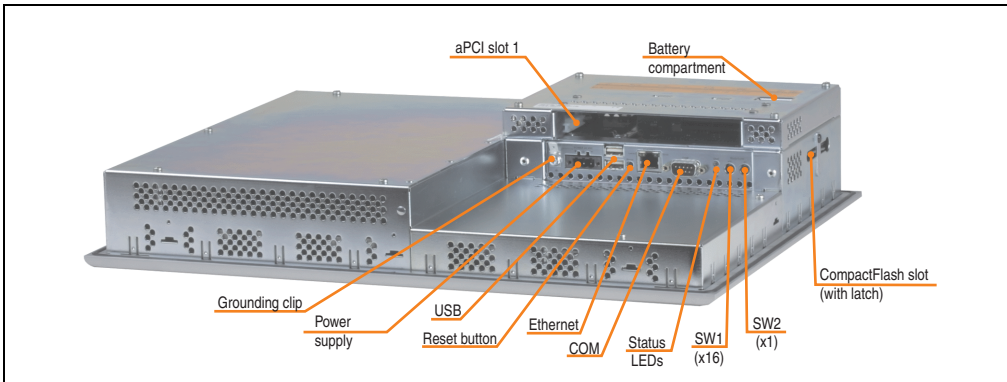


Figure 230: Rear view - 4PP280.1505-75

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 103: Technical data - 4PP280.1505-75

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP280.1505-75
Serial interface COM 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 Amount 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 switch	2, 16 digits each
aPCI slots Holding torque for aPCI module	1 (see B&R System 2005 manual for available aPCI interface modules) Max. 0.7Nm
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	Color TFT 15 inch (381 mm) 16.7 million colors XGA, 1024 x 768 pixels 300:1  Direction R / direction L = 65° Direction U = 50° / direction D = 55°  330 cd/m <sup>2</sup> 35,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Analog, resistive Hampshire, serial, 12-bit 78%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force 20 with LED 12 with LED - - -  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 35 W typical, 40 W max. -

Table 103: Technical data - 4PP280.1505-75 (Forts.)

Electrical characteristics	4PP280.1505-75
Bleeder resistance	≥ 47 kOhm
Mechanical characteristics	
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	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 3.28.2 "Temperature humidity diagram" on page 312
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 103: Technical data - 4PP280.1505-75 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.28.2 Temperature humidity diagram

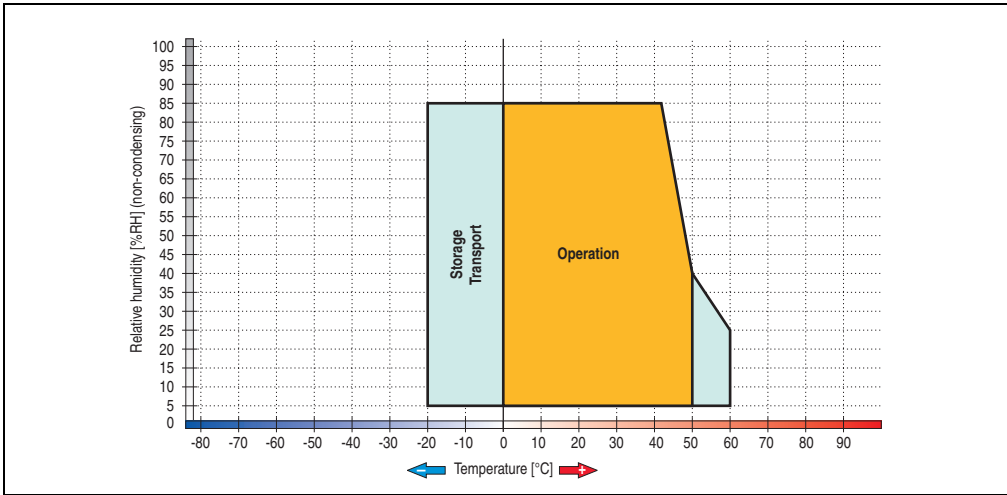


Figure 231: Temperature humidity diagram - 4PP280.1505-75

### 3.28.3 Dimensions

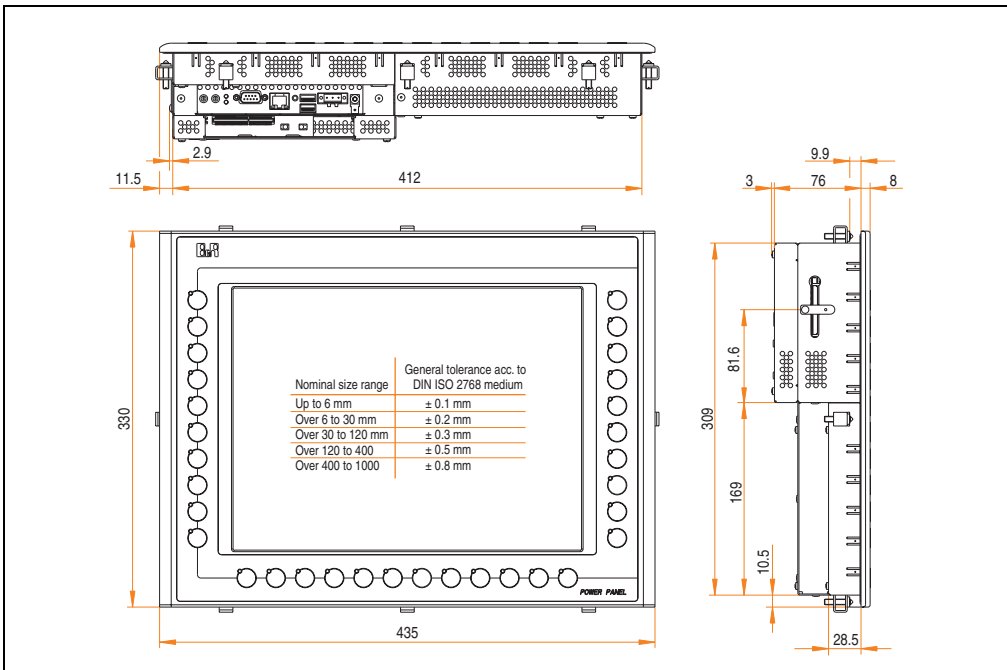


Figure 232: Dimensions - 4PP280.1505-75



### 3.28.4 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 - 4PP280.1505-75" on page 312) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

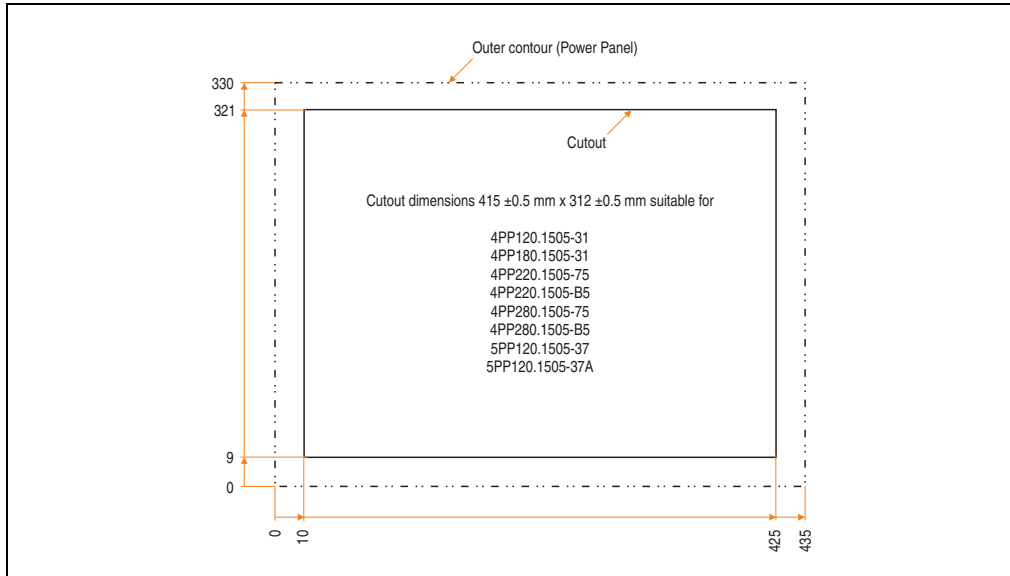


Figure 233: Cutout dimensions

### 3.28.5 Contents of delivery

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

Amount	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	Legend strips (inserted in the front)

Table 104: Contents of delivery - 4PP280.1505-75

### 3.29 Device 4PP280.1505-B5

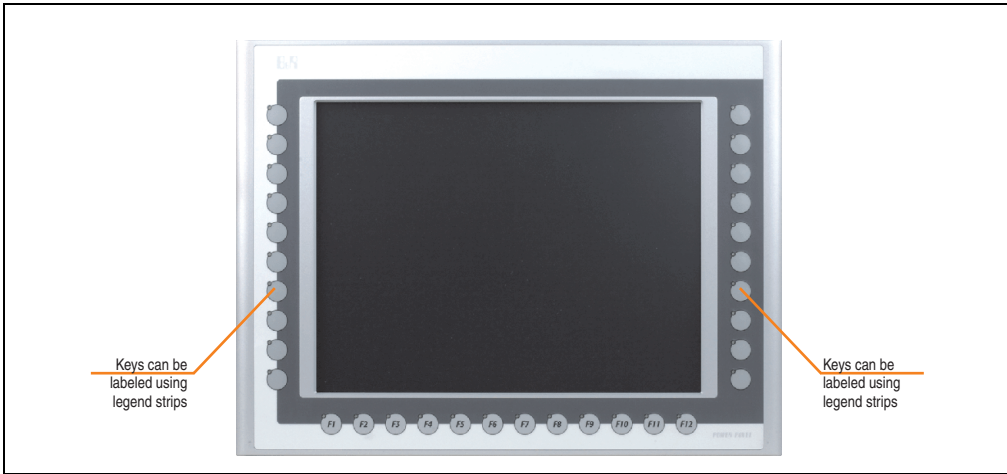


Figure 234: Front view - 4PP280.1505-B5

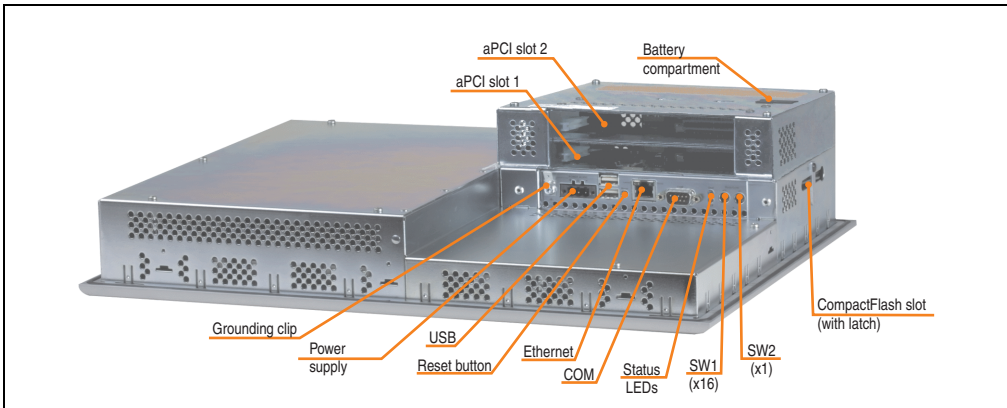


Figure 235: Rear view - 4PP280.1505-B5

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 105: Technical data - 4PP280.1505-B5

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP280.1505-B5
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	Color TFT 15 inch (381 mm) 16.7 million colors XGA, 1024 x 768 pixels 300:1  Direction R / direction L = 65° Direction U = 50° / direction D = 55°  330 cd/m <sup>2</sup> 35,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Analog, resistive Hampshire, serial, 12-bit 78%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force 20 with LED 12 with LED - - -  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 35 W typical, 40 W max. -

Table 105: Technical data - 4PP280.1505-B5 (Forts.)

## Technical data • Power Panel 200 with Automation Runtime

Electrical characteristics	4PP280.1505-B5
Bleeder resistance	≥ 47 kOhm
Mechanical characteristics	
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	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 3.29.2 "Temperature humidity diagram" on page 318
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 105: Technical data - 4PP280.1505-B5 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.29.2 Temperature humidity diagram

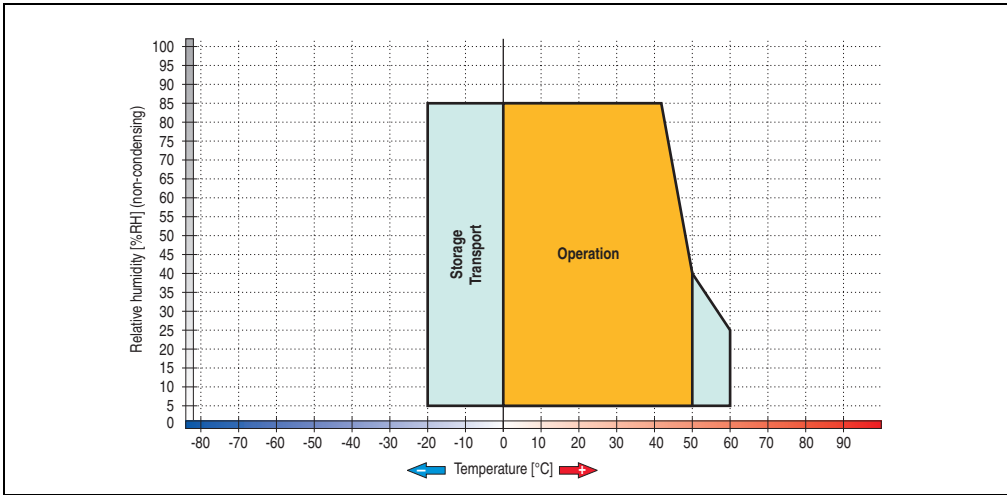


Figure 236: Temperature humidity diagram - 4PP280.1505-B5

### 3.29.3 Dimensions

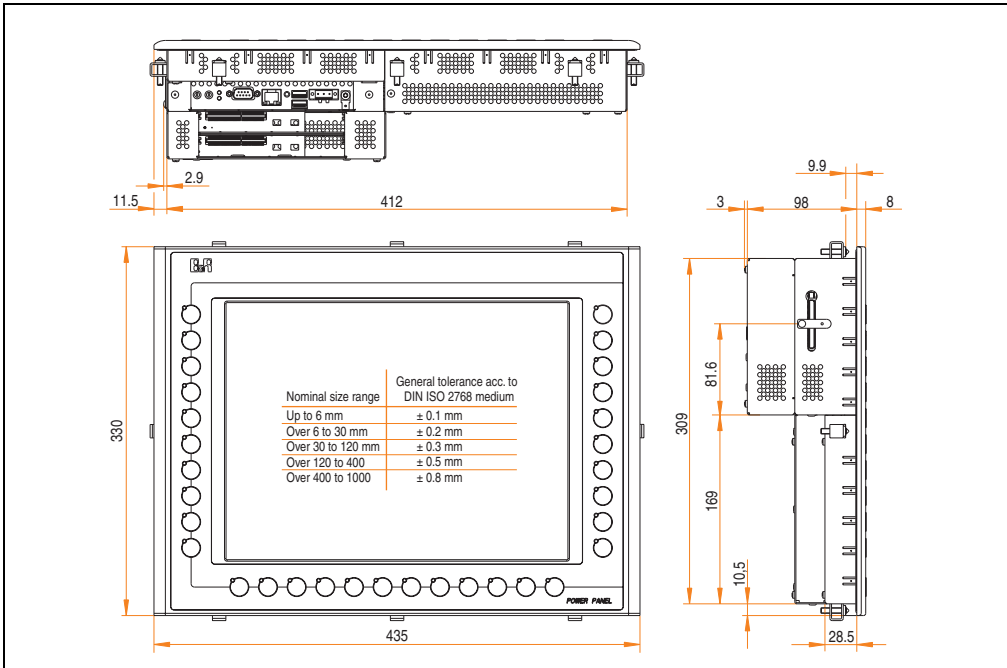


Figure 237: Dimensions - 4PP280.1505-B5

### 3.29.4 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 237 "Dimensions - 4PP280.1505-B5" on page 318) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

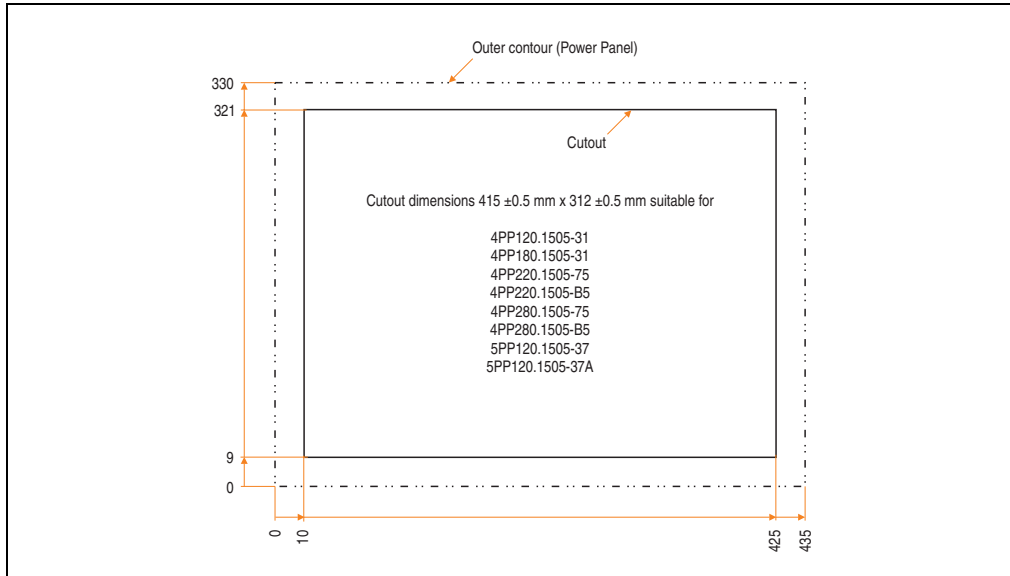


Figure 238: Cutout dimensions

### 3.29.5 Contents of delivery

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

Amount	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	Legend strips (inserted in the front)

Table 106: Contents of delivery - 4PP280.1505-B5

### 3.30 Device 4PP281.1043-75

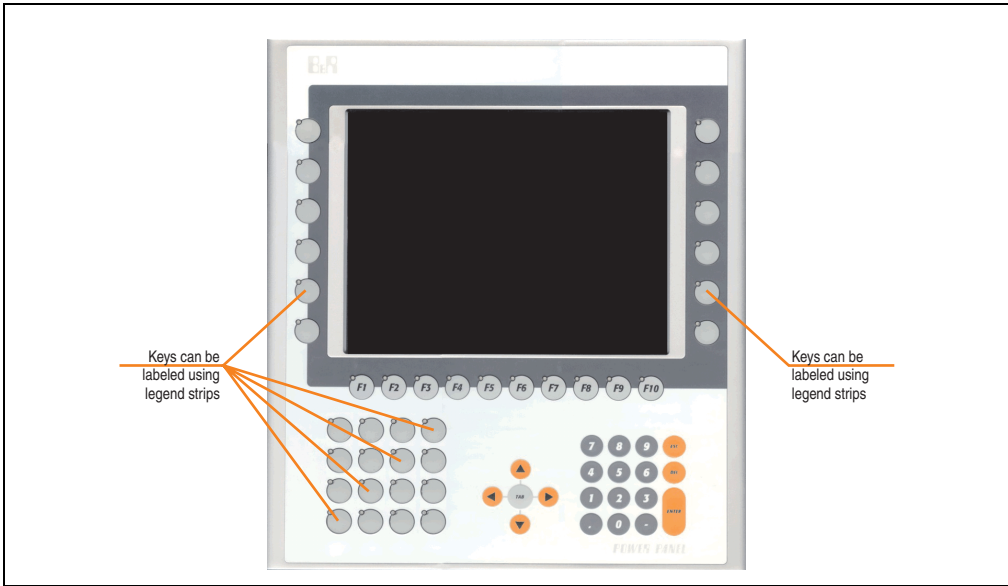


Figure 239: Front view - 4PP281.1043-75

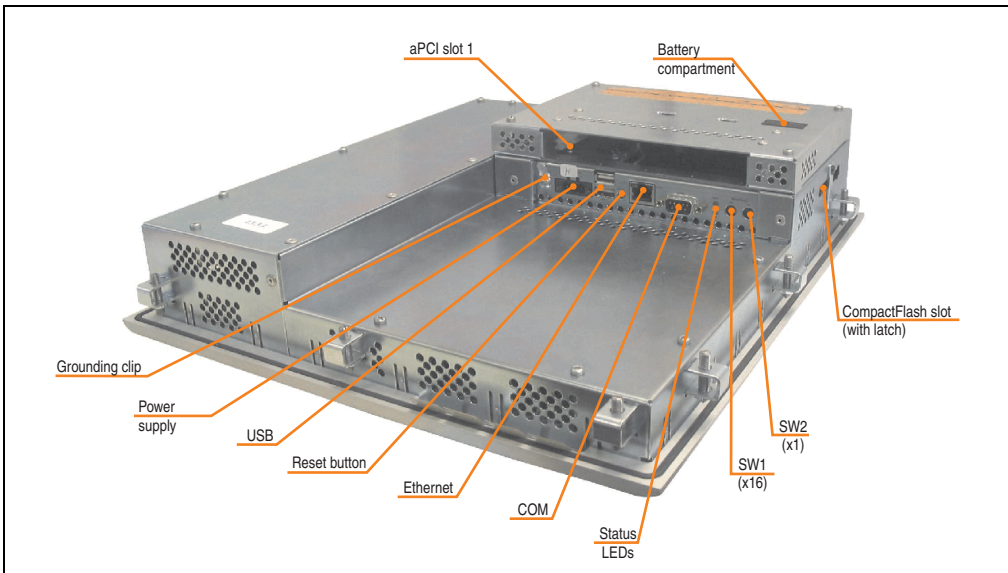


Figure 240: Rear view - 4PP281.1043-75



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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 107: Technical data - 4PP281.1043-75

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP281.1043-75
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	Color TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 Direction R / direction L = 70° Direction U = 45° / direction D = 55° 350 cd/m <sup>2</sup> 55,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Analog, resistive Hampshire, serial, 12-bit 78%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force 28 with LED 10 with LED - 15 without LED 5 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 20 W typical, 25 W max. -

Table 107: Technical data - 4PP281.1043-75 (Forts.)

Electrical characteristics	4PP281.1043-75
Bleeder resistance	≥ 47 kOhm
Mechanical characteristics	
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	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 3.30.2 "Temperature humidity diagram" on page 324
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 107: Technical data - 4PP281.1043-75 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.3.0.2 Temperature humidity diagram

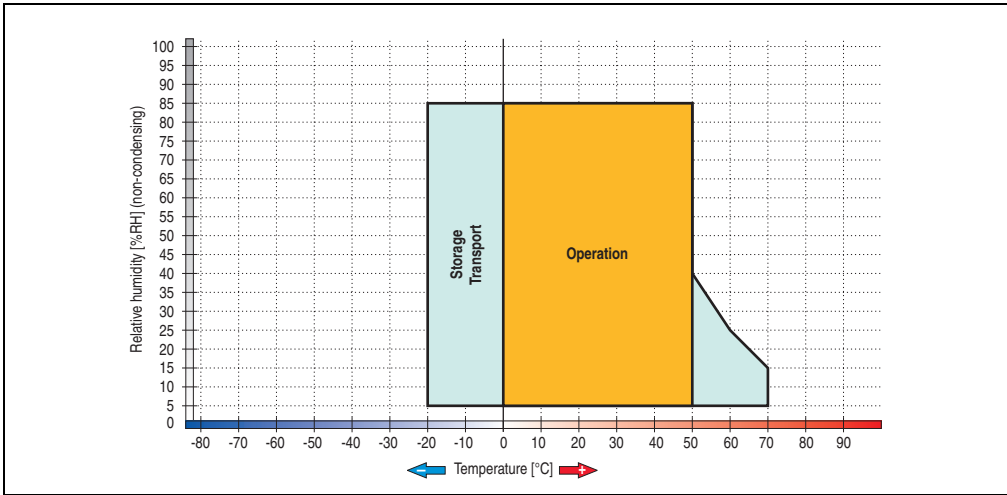


Figure 241: Temperature humidity diagram - 4PP281.1043-75

### 3.3.0.3 Dimensions

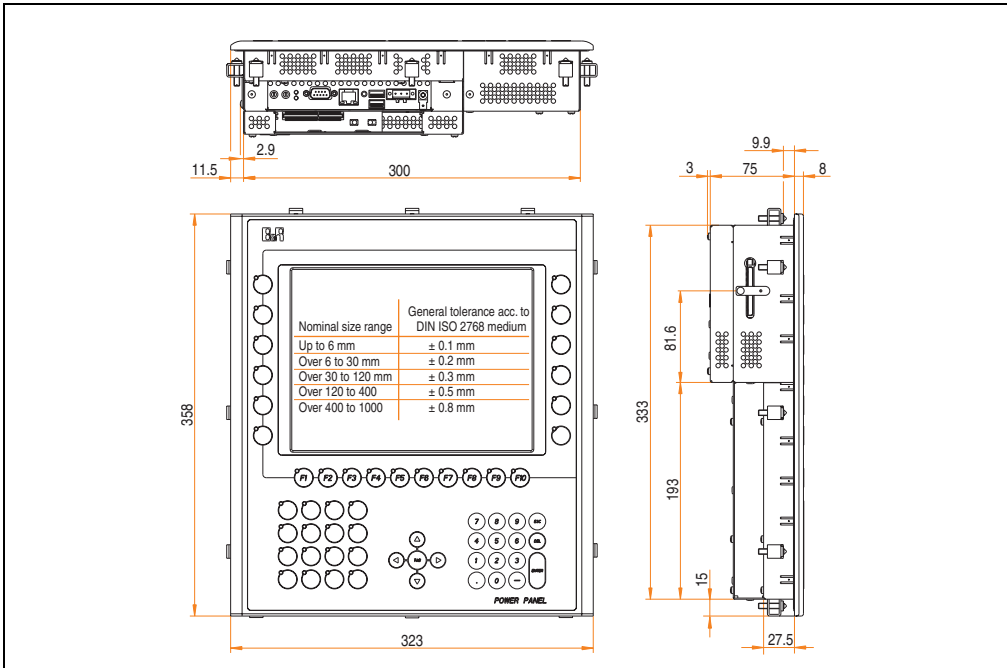


Figure 242: Dimensions - 4PP281.1043-75

### 3.3.0.4 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 242 "Dimensions - 4PP281.1043-75" on page 324) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

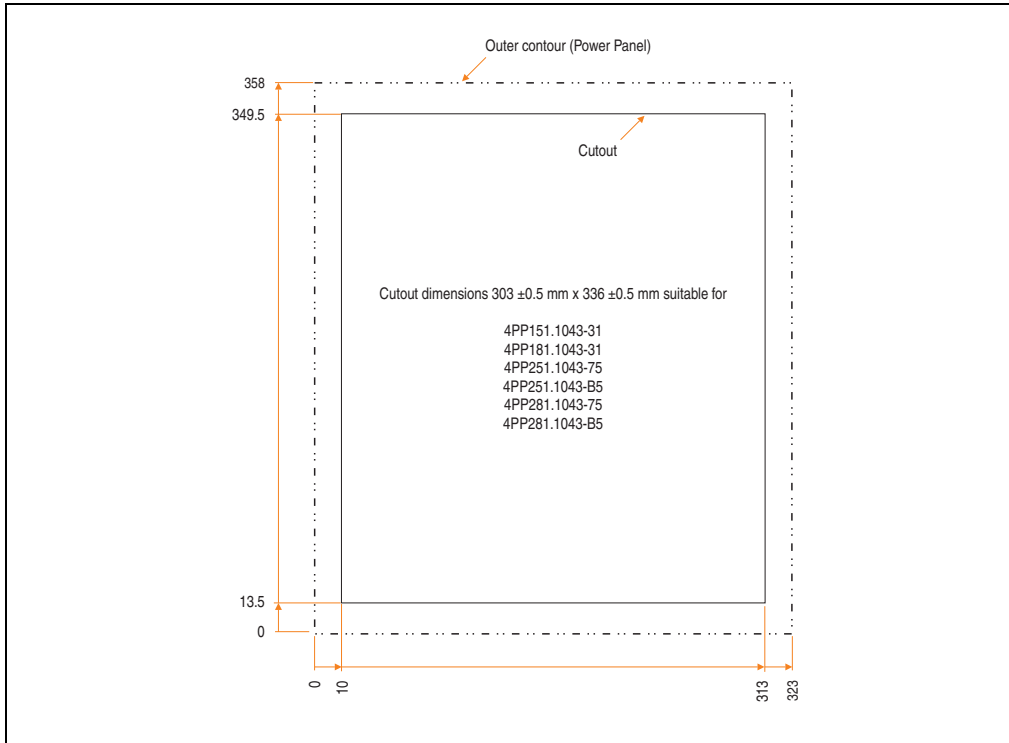


Figure 243: Cutout dimensions

### 3.3.0.5 Contents of delivery

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

Amount	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	Legend strips (inserted in the front)

Table 108: Contents of delivery - 4PP281.1043-75

### 3.31 Device 4PP281.1043-B5

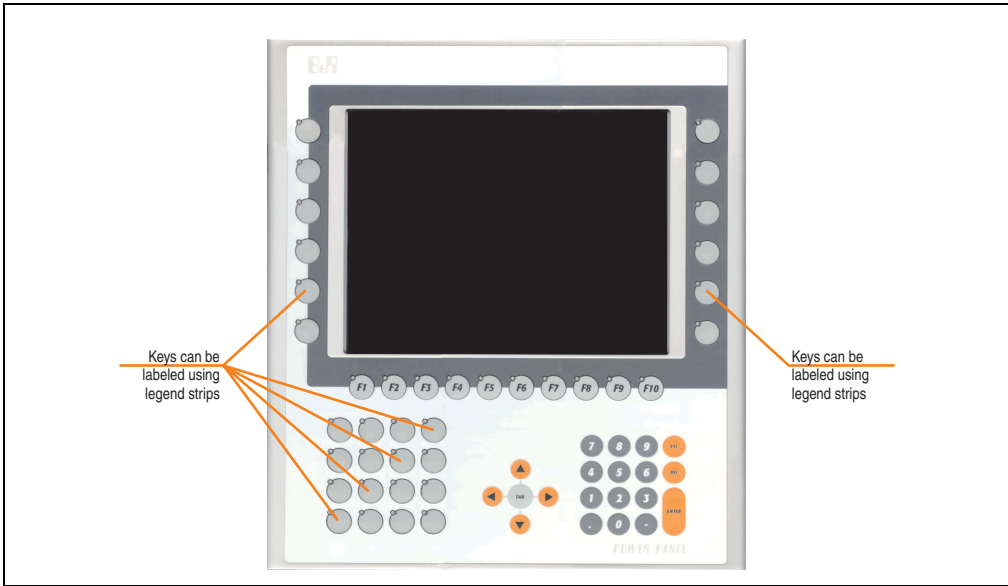


Figure 244: Front view - 4PP281.1043-B5

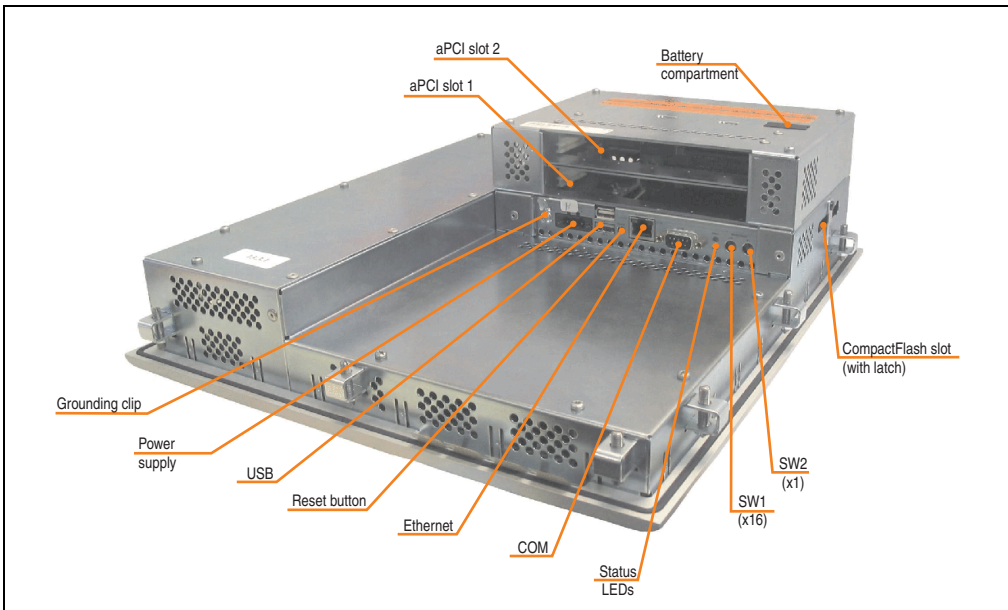


Figure 245: Rear view - 4PP281.1043-B5

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 109: Technical data - 4PP281.1043-B5

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP281.1043-B5
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	Color TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 Direction R / direction L = 70° Direction U = 45° / direction D = 55° 350 cd/m <sup>2</sup> 55,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Analog, resistive Hampshire, serial, 12-bit 78%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force 28 with LED 10 with LED - 15 without LED 5 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 20 W typical, 25 W max. -

Table 109: Technical data - 4PP281.1043-B5 (Forts.)



<b>Electrical characteristics</b>	<b>4PP281.1043-B5</b>
Bleeder resistance	≥ 47 kOhm
<b>Mechanical characteristics</b>	
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)
<b>Environmental characteristics</b>	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 3.31.2 "Temperature humidity diagram" on page 330
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 109: Technical data - 4PP281.1043-B5 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.31.2 Temperature humidity diagram

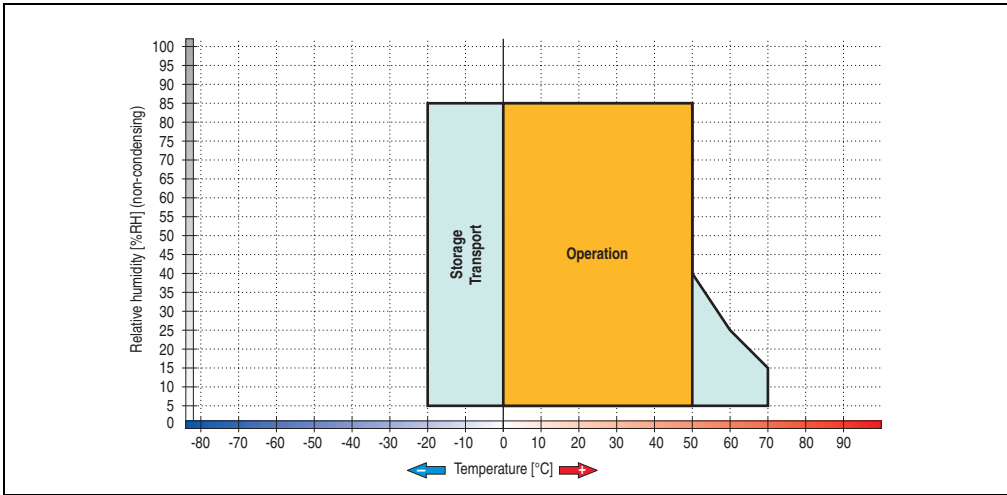


Figure 246: Temperature humidity diagram - 4PP281.1043-B5

### 3.31.3 Dimensions

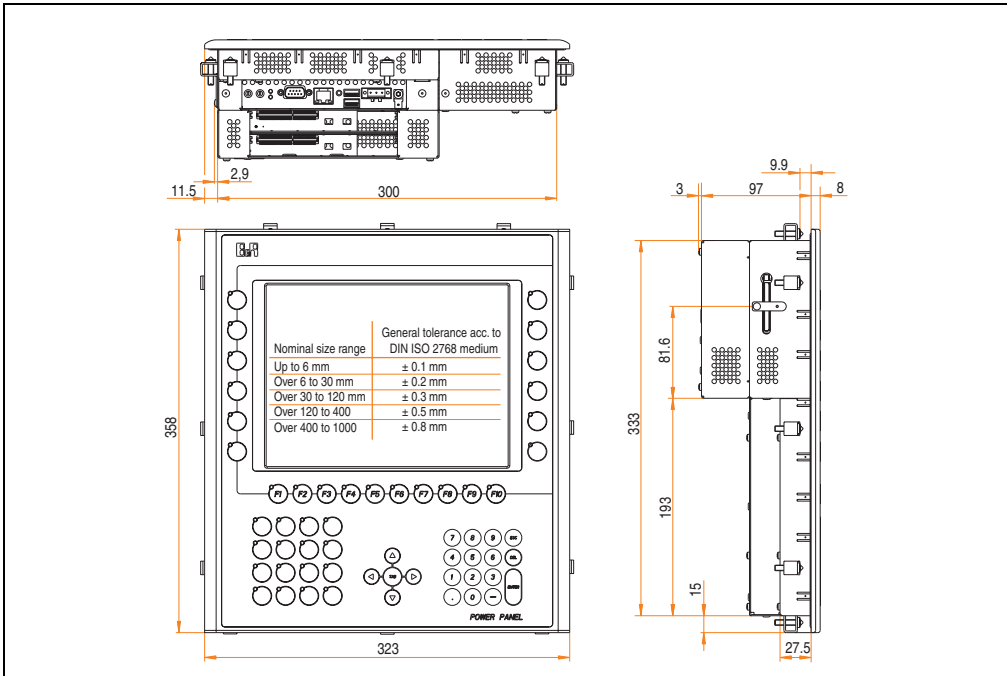


Figure 247: Dimensions - 4PP281.1043-B5

### 3.31.4 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 247 "Dimensions - 4PP281.1043-B5" on page 330) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

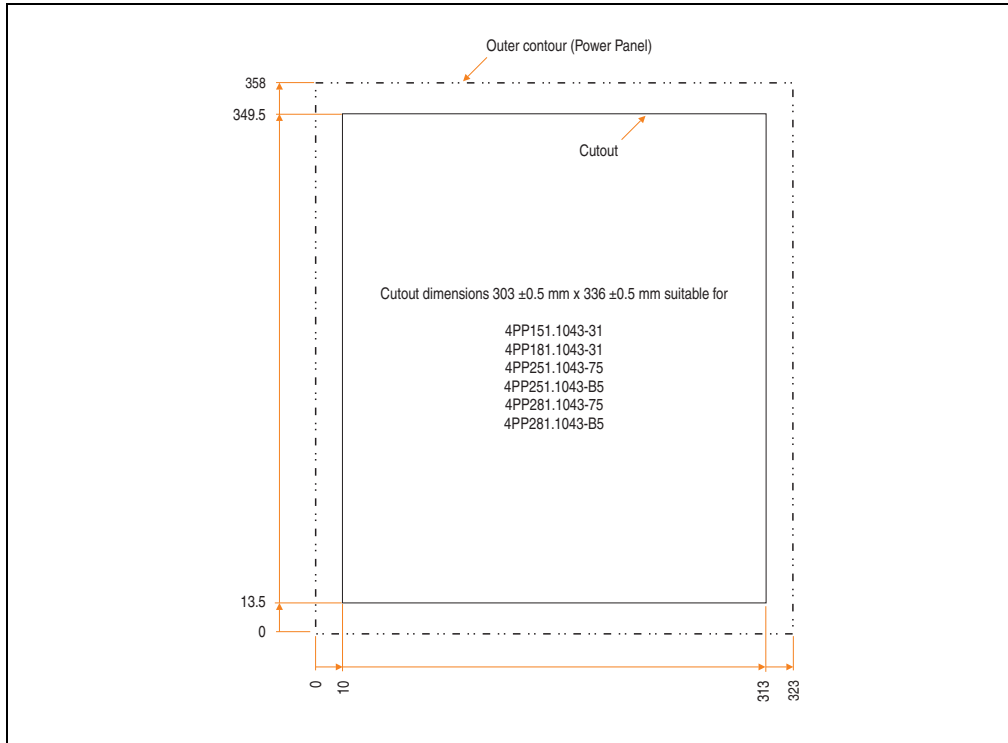


Figure 248: Cutout dimensions

### 3.31.5 Contents of delivery

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

Amount	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	Legend strips (inserted in the front)

Table 110: Contents of delivery - 4PP281.1043-B5

### 3.32 Device 4PP281.1505-75

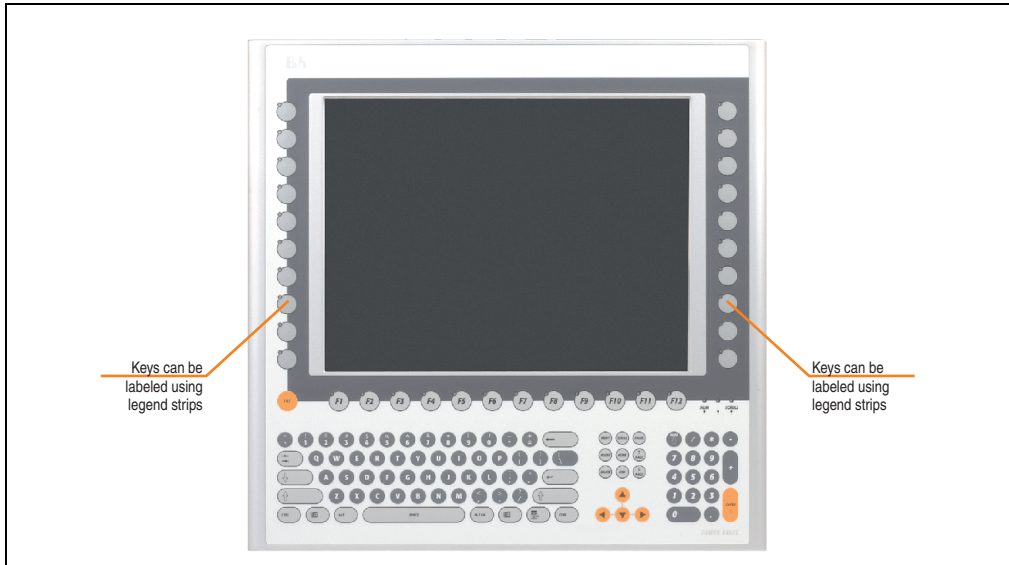


Figure 249: Front view - 4PP281.1505-75

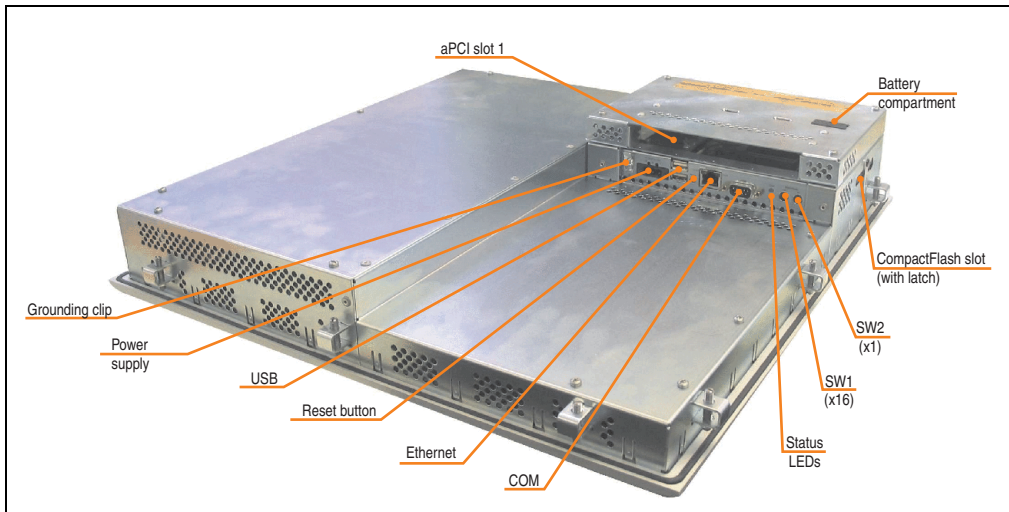


Figure 250: Rear view - 4PP281.1505-75

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 111: Technical data - 4PP281.1505-75

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP281.1505-75
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	Color TFT 15 inch (381 mm) 16.7 million colors XGA, 1024 x 768 pixels 300:1  Direction R / direction L = 65° Direction U = 50° / direction D = 55°  330 cd/m <sup>2</sup> 35,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Analog, resistive Hampshire, serial, 12-bit 78%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force 20 with LED 12 with LED - 15 without LED 77 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 35 W typical, 40 W max. Yes

Table 111: Technical data - 4PP281.1505-75 (Forts.)

Electrical characteristics	4PP281.1505-75
Bleeder resistance	≥ 47 kOhm
Mechanical characteristics	
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	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 3.32.2 "Temperature humidity diagram" on page 336
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 111: Technical data - 4PP281.1505-75 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.32.2 Temperature humidity diagram

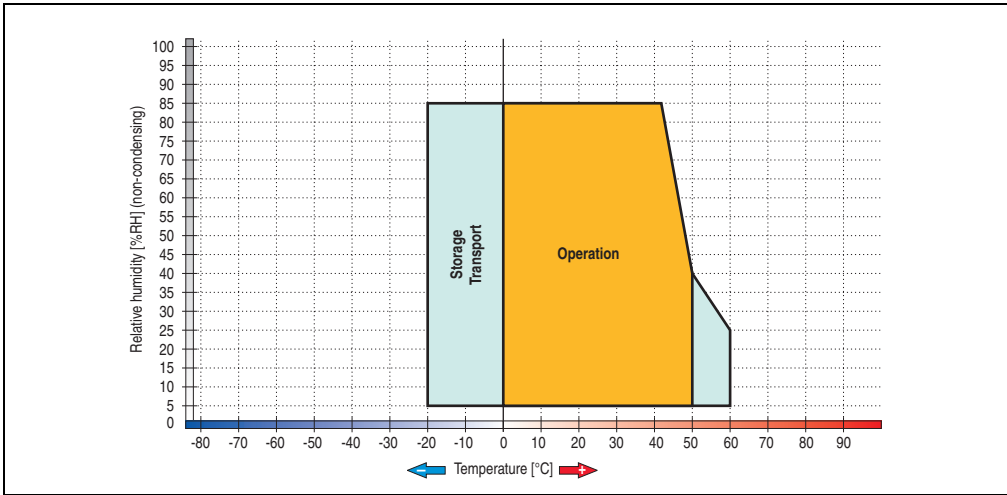


Figure 251: Temperature humidity diagram - 4PP281.1505-75

### 3.32.3 Dimensions

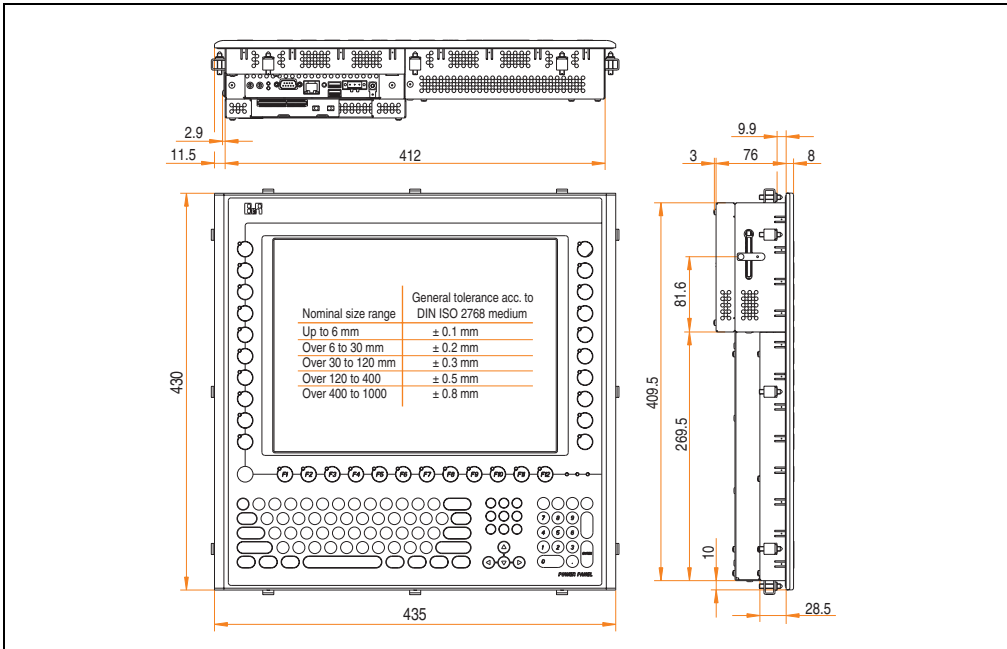


Figure 252: Dimensions - 4PP281.1505-75



### 3.32.4 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 - 4PP281.1505-75" on page 336) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

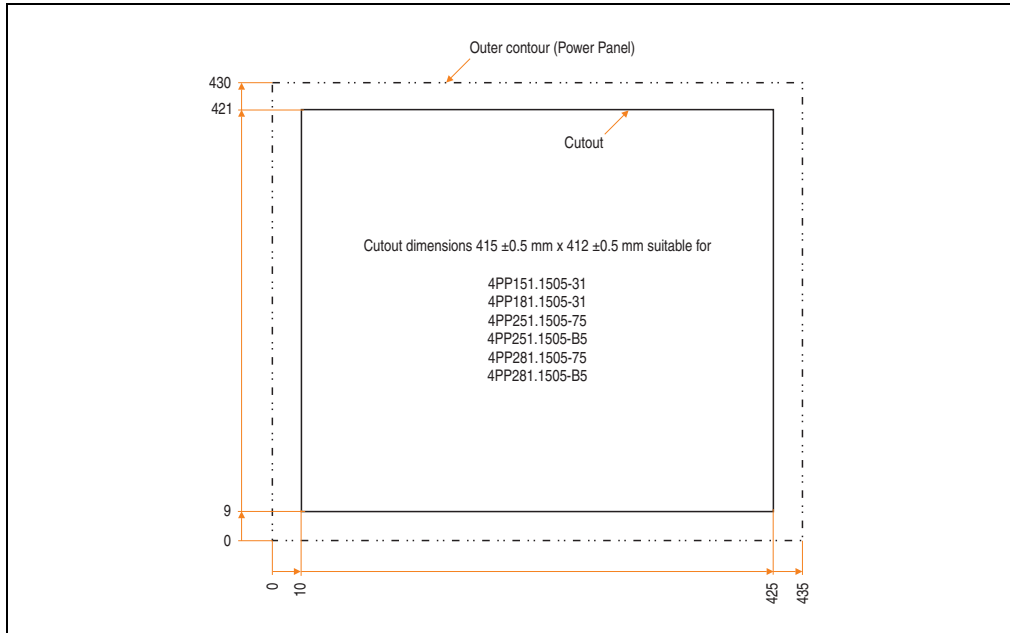


Figure 253: Cutout dimensions

### 3.32.5 Contents of delivery

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

Amount	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	Legend strips (inserted in the front)

Table 112: Contents of delivery - 4PP281.1505-75

### 3.33 Device 4PP281.1505-B5

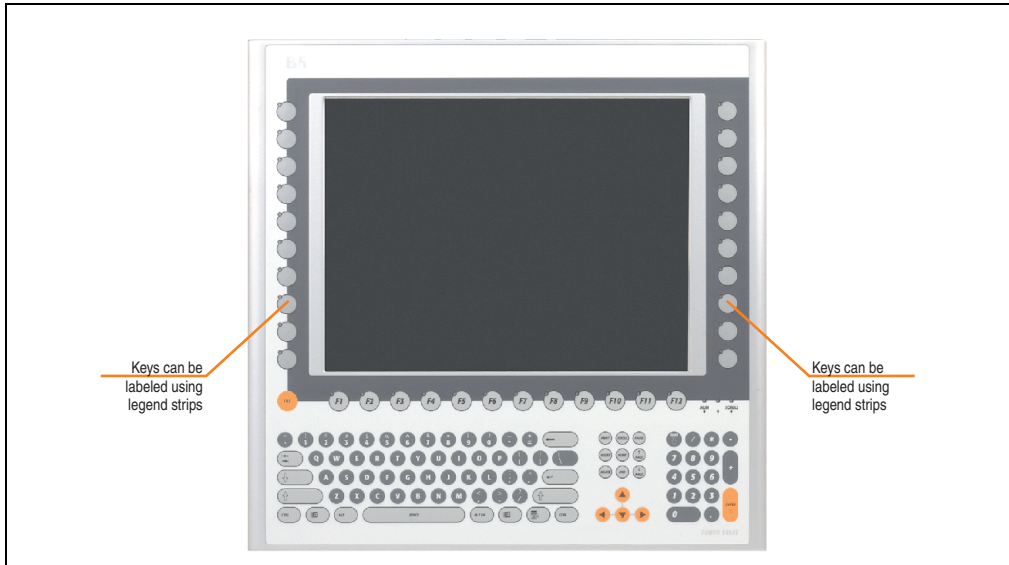


Figure 254: Front view - 4PP281.1505-B5

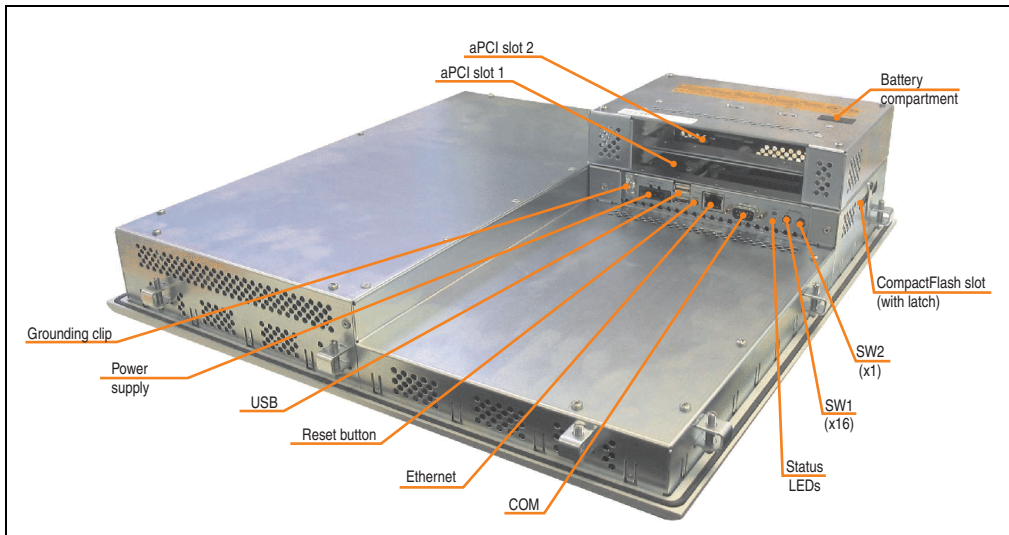


Figure 255: Rear view - 4PP281.1505-B5

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 113: Technical data - 4PP281.1505-B5

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP281.1505-B5
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	Color TFT 15 inch (381 mm) 16.7 million colors XGA, 1024 x 768 pixels 300:1  Direction R / direction L = 65° Direction U = 50° / direction D = 55°  330 cd/m <sup>2</sup> 35,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Analog, resistive Hampshire, serial, 12-bit 78%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force 20 with LED 12 with LED - 15 without LED 77 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 35 W typical, 40 W max. Yes

Table 113: Technical data - 4PP281.1505-B5 (Forts.)

Electrical characteristics	4PP281.1505-B5
Bleeder resistance	≥ 47 kOhm
Mechanical characteristics	
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	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 3.33.2 "Temperature humidity diagram" on page 342
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 113: Technical data - 4PP281.1505-B5 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.33.2 Temperature humidity diagram

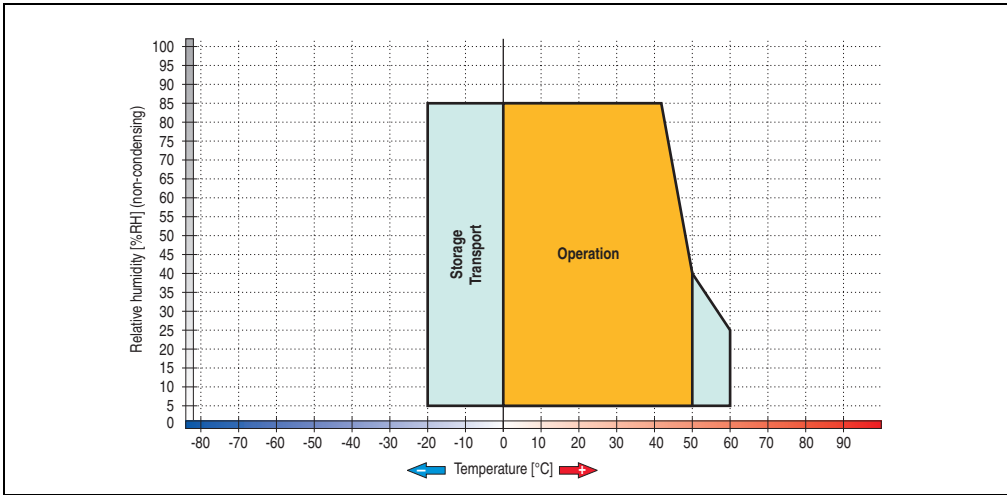


Figure 256: Temperature humidity diagram - 4PP281.1505-B5

### 3.33.3 Dimensions

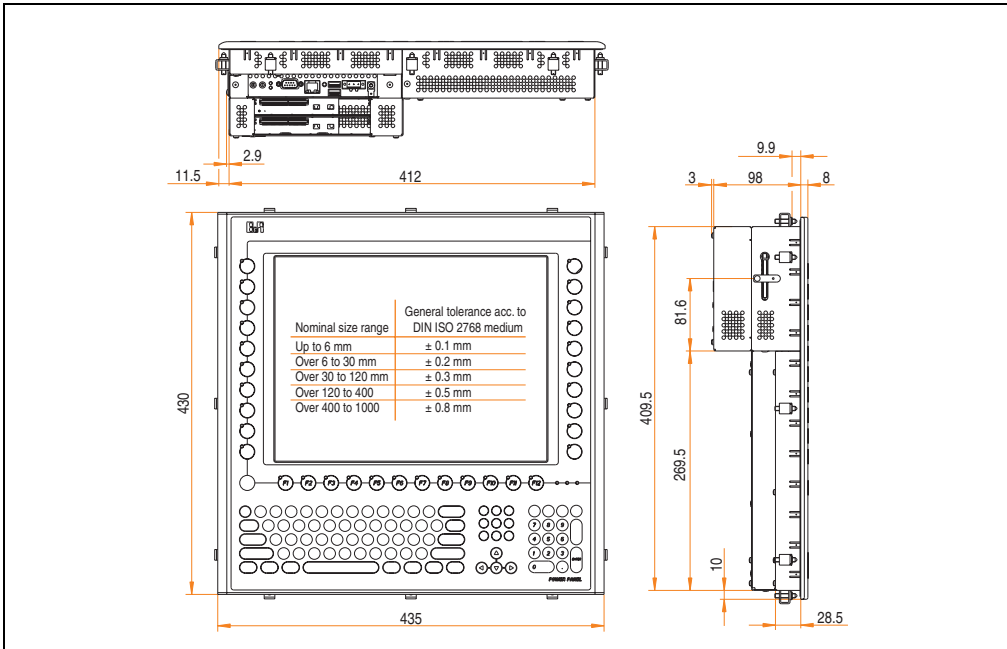


Figure 257: Dimensions - 4PP281.1505-B5

### 3.33.4 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 257 "Dimensions - 4PP281.1505-B5" on page 342) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

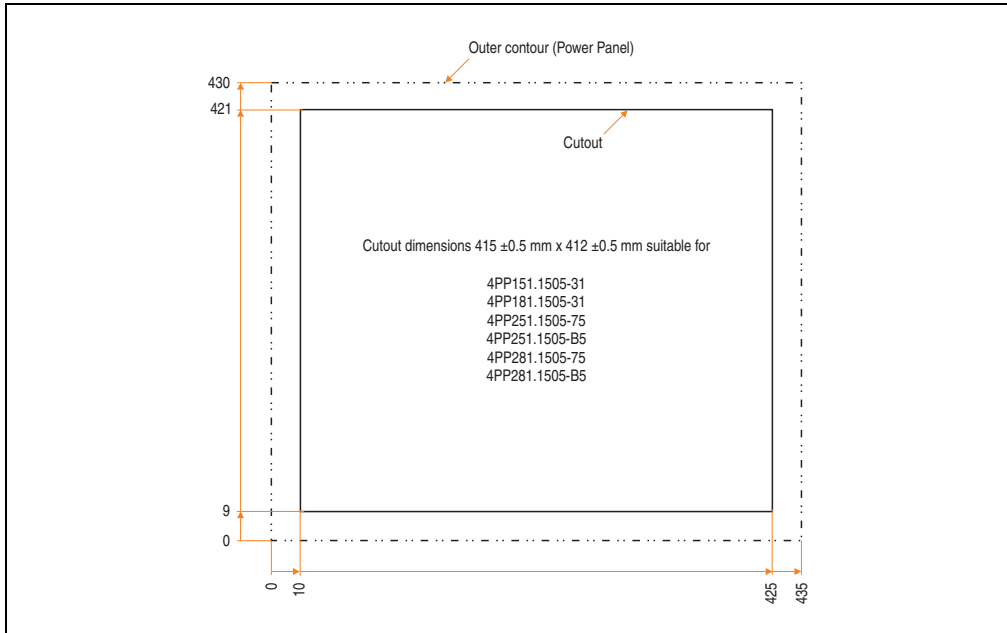


Figure 258: Cutout dimensions

### 3.33.5 Contents of delivery

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

Amount	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	Legend strips (inserted in the front)

Table 114: Contents of delivery - 4PP281.1505-B5

### 3.34 Device 4PP282.1043-75

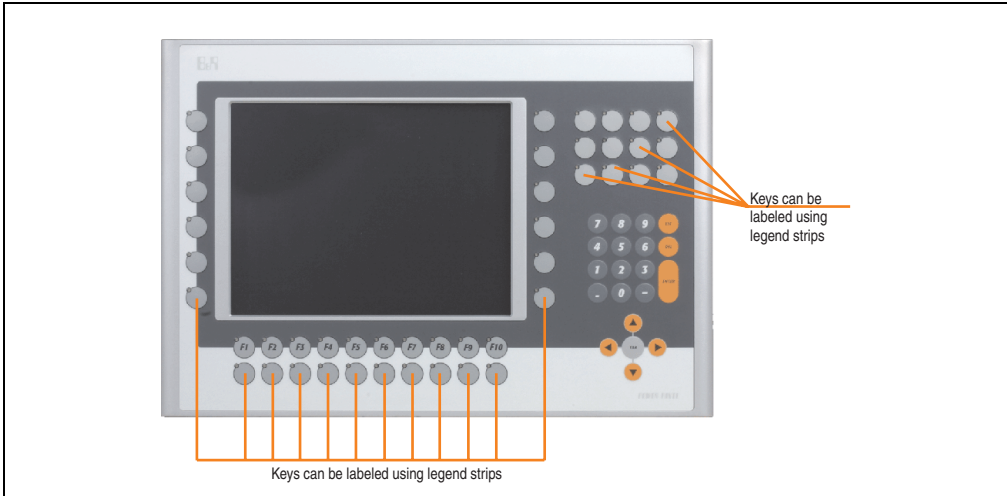


Figure 259: Front view - 4PP282.1043-75

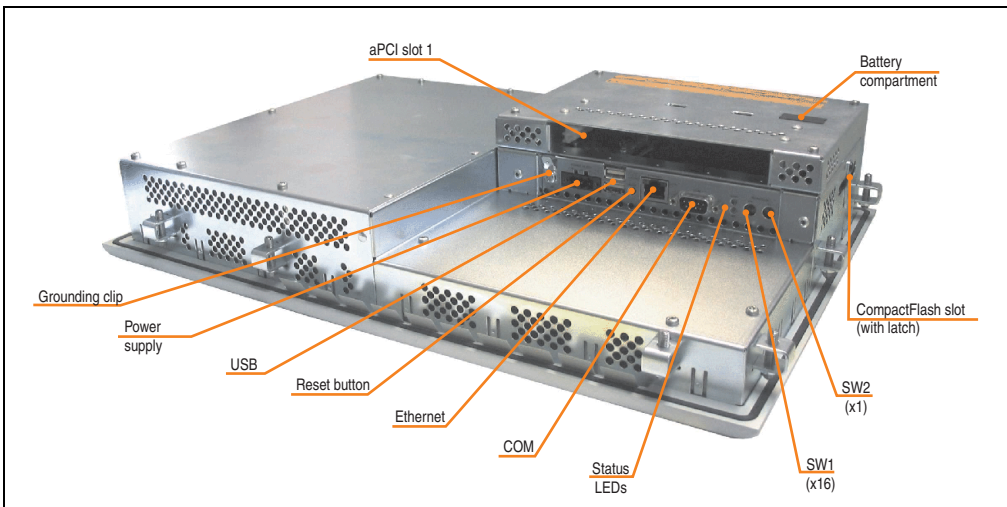


Figure 260: Rear view - 4PP282.1043-75



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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 115: Technical data - 4PP282.1043-75

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP282.1043-75
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	Color TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 Direction R / direction L = 70° Direction U = 45° / direction D = 55° 350 cd/m <sup>2</sup> 55,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Analog, resistive Hampshire, serial, 12-bit 78%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force 44 with LED - - 15 without LED 5 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 20 W typical, 35 W max. Yes

Table 115: Technical data - 4PP282.1043-75 (Forts.)

<b>Electrical characteristics</b>	<b>4PP282.1043-75</b>
Bleeder resistance	≥ 47 kOhm
<b>Mechanical characteristics</b>	
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)
<b>Environmental characteristics</b>	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 3.34.2 "Temperature humidity diagram" on page 348
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 115: Technical data - 4PP282.1043-75 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.34.2 Temperature humidity diagram

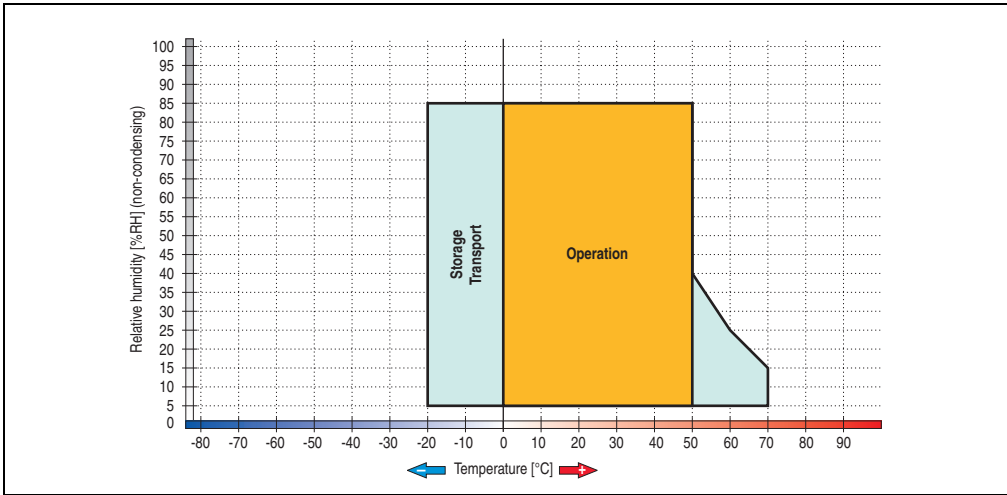


Figure 261: Temperature humidity diagram - 4PP282.1043-75

### 3.34.3 Dimensions

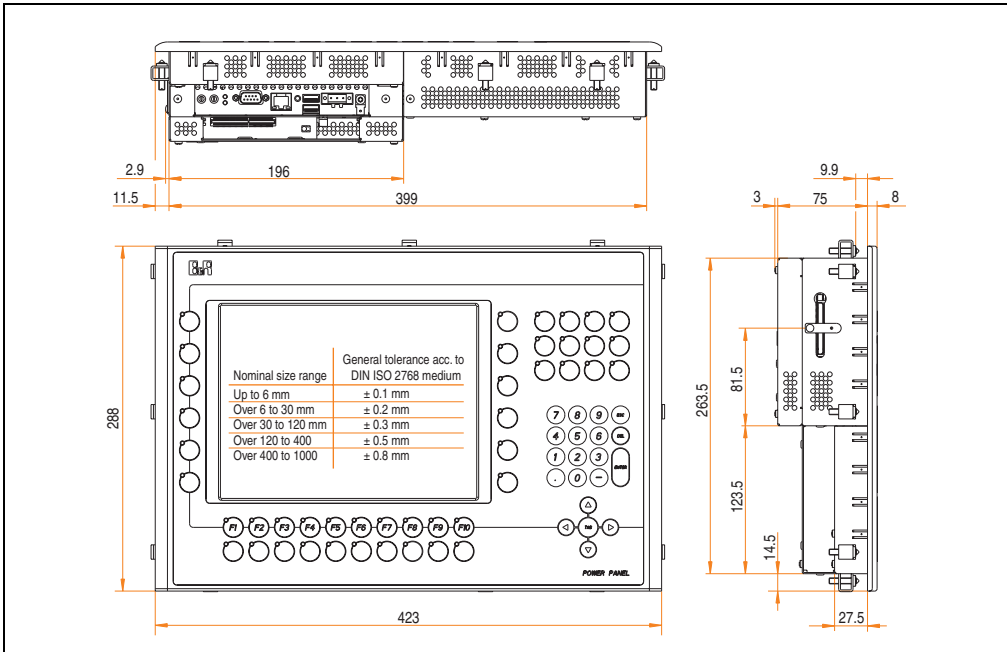


Figure 262: Dimensions - 4PP282.1043-75

### 3.34.4 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 262 "Dimensions - 4PP282.1043-75" on page 348) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

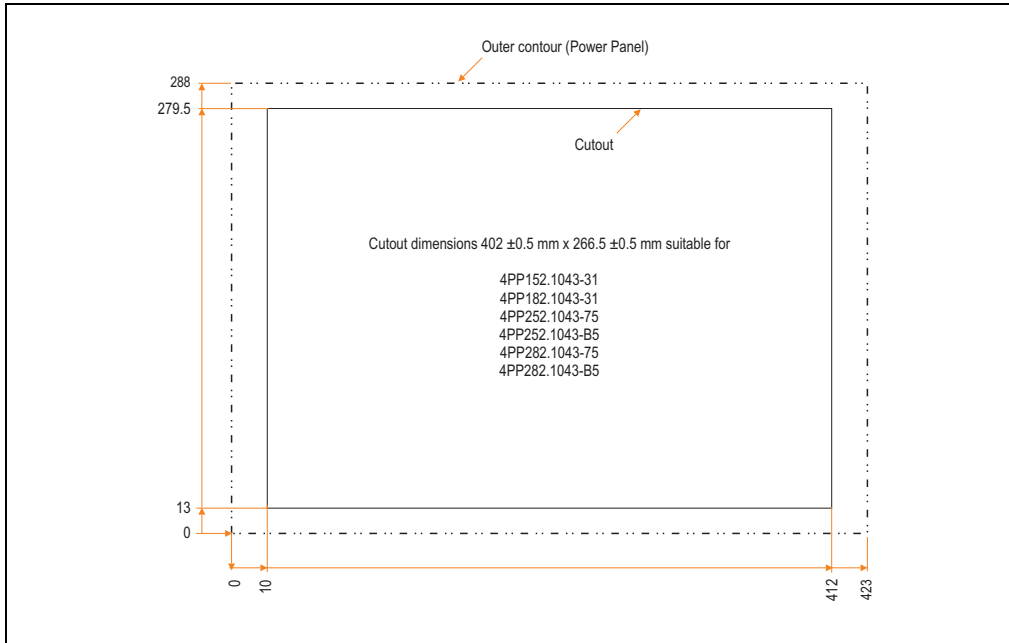


Figure 263: Cutout dimensions

### 3.34.5 Contents of delivery

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

Amount	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	Legend strips (inserted in the front)

Table 116: Contents of delivery - 4PP282.1043-75

### 3.35 Device 4PP282.1043-B5

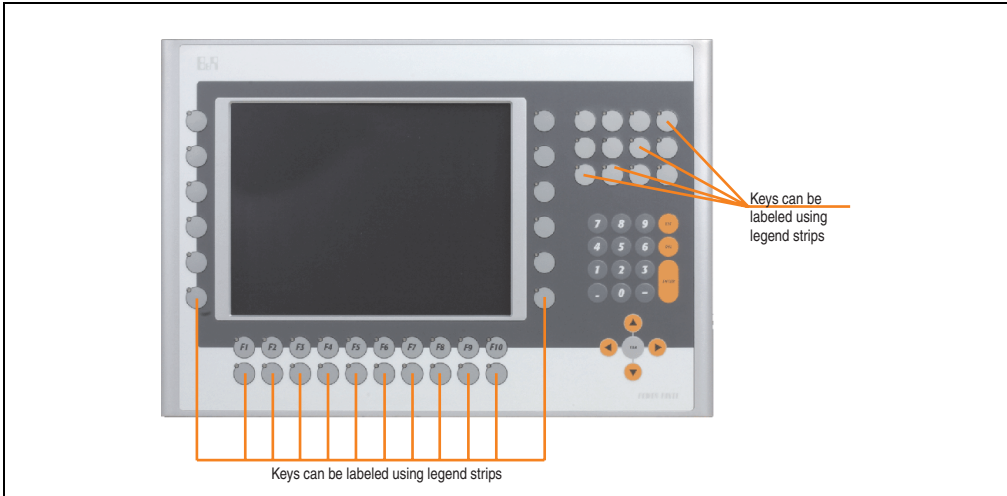


Figure 264: Front view - 4PP282.1043-B5

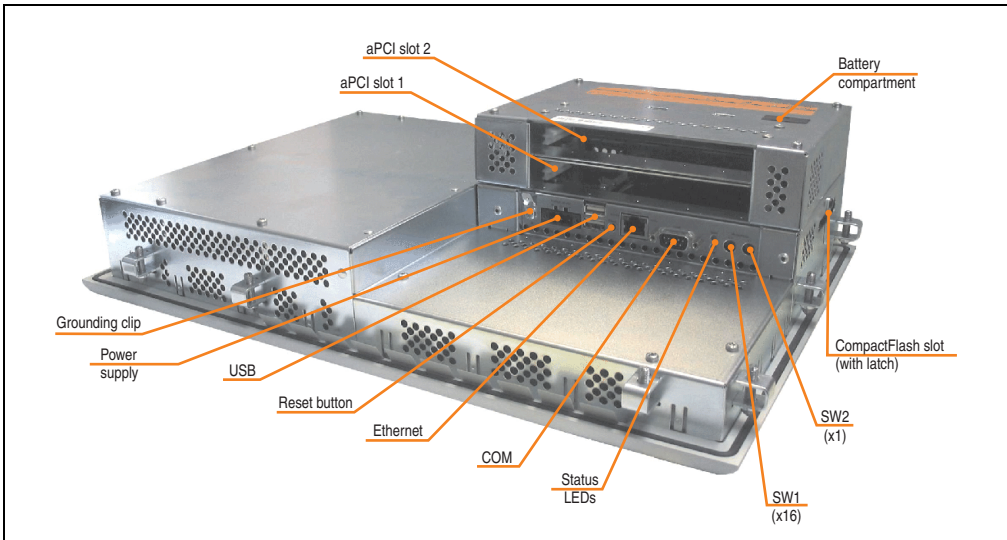


Figure 265: Rear view - 4PP282.1043-B5

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 64 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	256 KB Yes
Watchdog Controller	SMC <sup>1)</sup>
Power failure logic Controller Buffer time	SMC <sup>1)</sup> 10 ms
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 117: Technical data - 4PP282.1043-B5

## Technical data • Power Panel 200 with Automation Runtime

Features	4PP282.1043-B5
Serial interface COM 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 Amount 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 switch	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 (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	Color TFT 10.4 inch (264 mm) 256 colors VGA, 640 x 480 pixels 600:1 Direction R / direction L = 70° Direction U = 45° / direction D = 55° 350 cd/m <sup>2</sup> 55,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Analog, resistive Hampshire, serial, 12-bit 78%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force 44 with LED - - 15 without LED 5 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>
Electrical characteristics	
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 20 W typical, 35 W max. Yes

Table 117: Technical data - 4PP282.1043-B5 (Forts.)



## Technical data • Power Panel 200 with Automation Runtime

Electrical characteristics	4PP282.1043-B5
Bleeder resistance	≥ 47 kOhm
Mechanical characteristics	
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	
Ambient temperature <sup>6)</sup>	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 3.35.2 "Temperature humidity diagram" on page 354
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 117: Technical data - 4PP282.1043-B5 (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values without inserted aPCI interface modules. An aPCI interface module may use a max. of 3 watts per aPCI slot.
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.35.2 Temperature humidity diagram

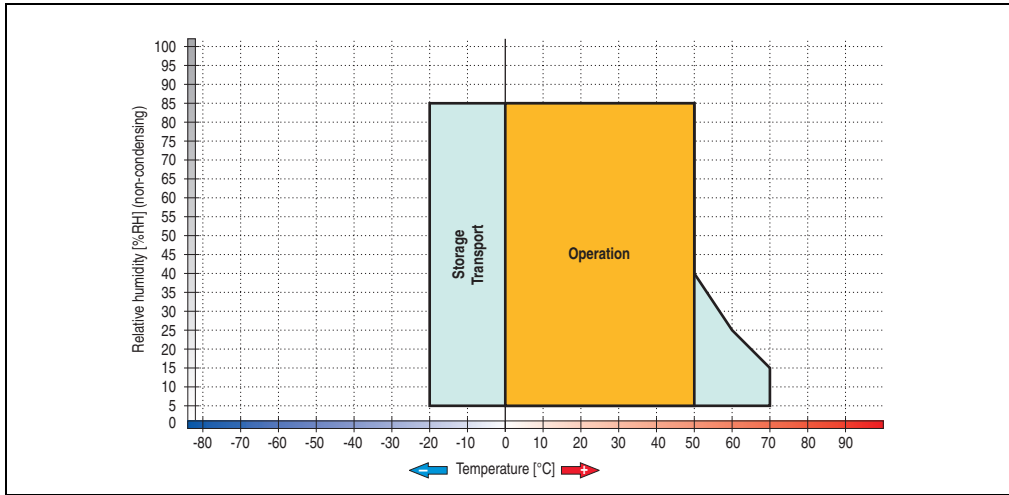


Figure 266: Temperature humidity diagram - 4PP282.1043-B5

### 3.35.3 Dimensions

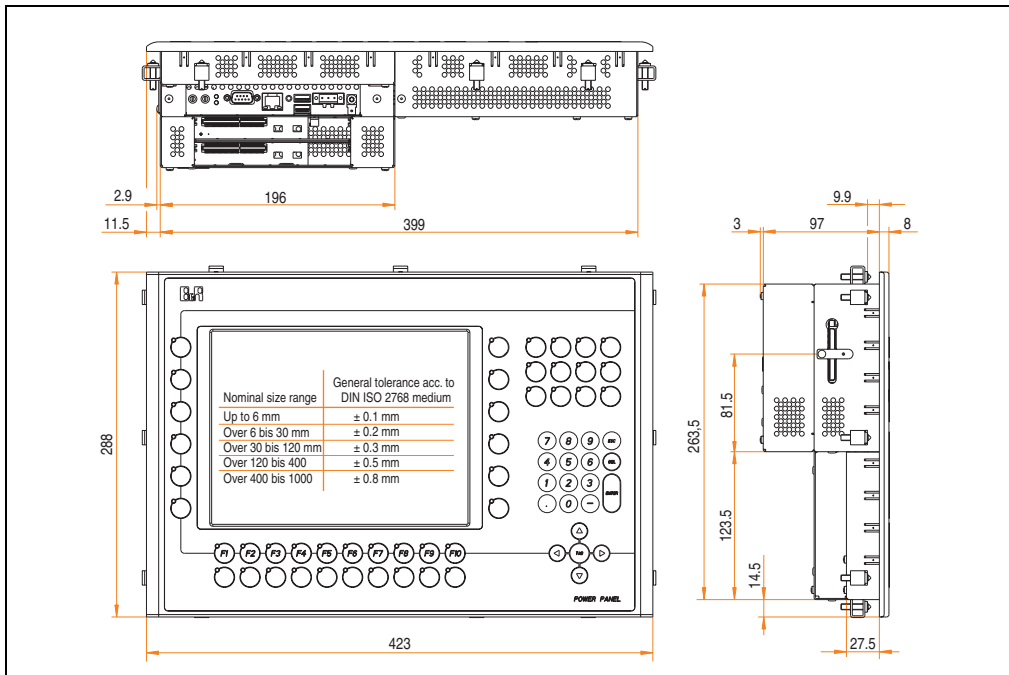


Figure 267: Dimensions - 4PP282.1043-B5

### 3.35.4 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 267 "Dimensions - 4PP282.1043-B5" on page 354) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

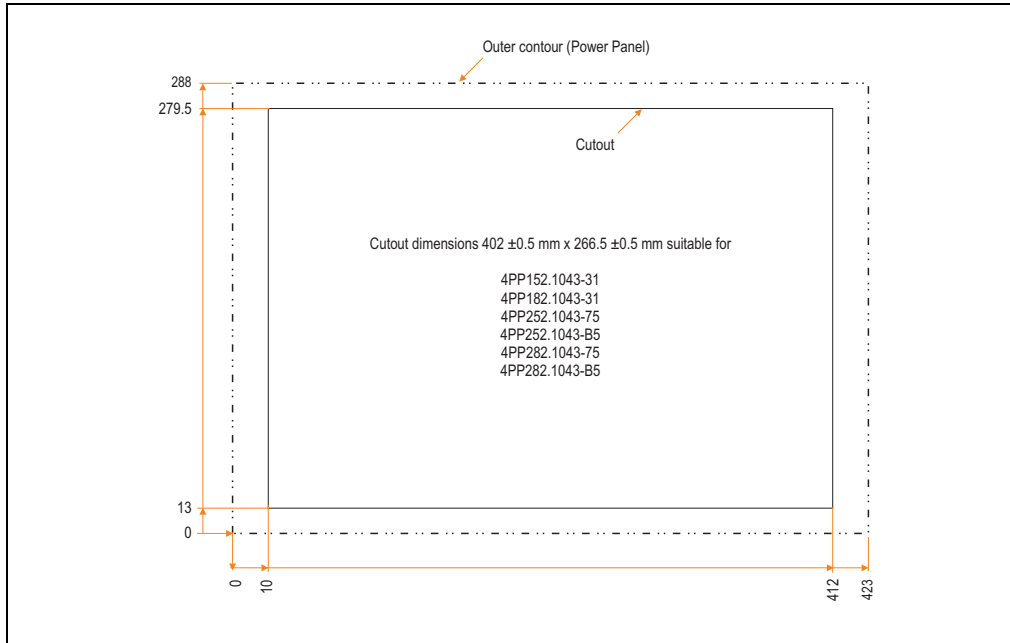


Figure 268: Cutout dimensions

### 3.35.5 Contents of delivery

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

Amount	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	Legend strips (inserted in the front)

Table 118: Contents of delivery - 4PP282.1043-B5

## 4. Power Panel 100 with BIOS

### 4.1 Interface descriptions

The following pages provide information about all interfaces and connectors present on the Power Panel.

#### 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 559).

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 362).

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

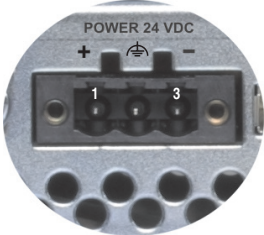


Figure 269: Supply voltage connection

## Warning!

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.

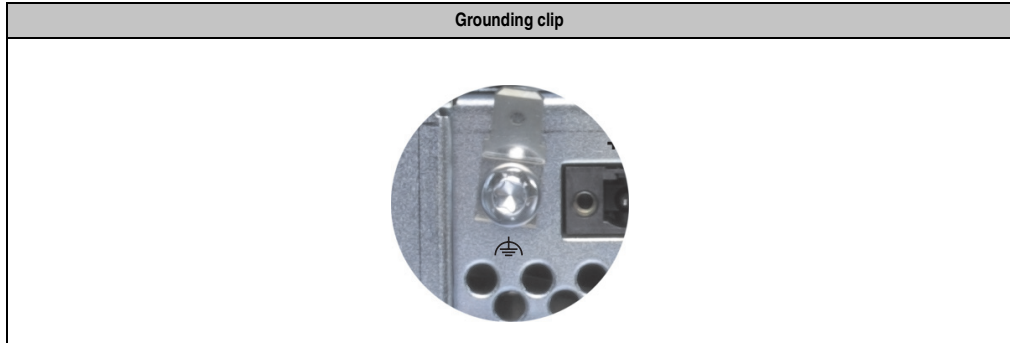


Figure 270: Grounding clip

### 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 COM	
RS232 interface Modem-capable, not electrically isolated Up to 115 kBaud	
Pin	RS232
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

9-pin DSUB plug

Table 119: Pin assignments - COM

#### 4.1.4 USB port

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

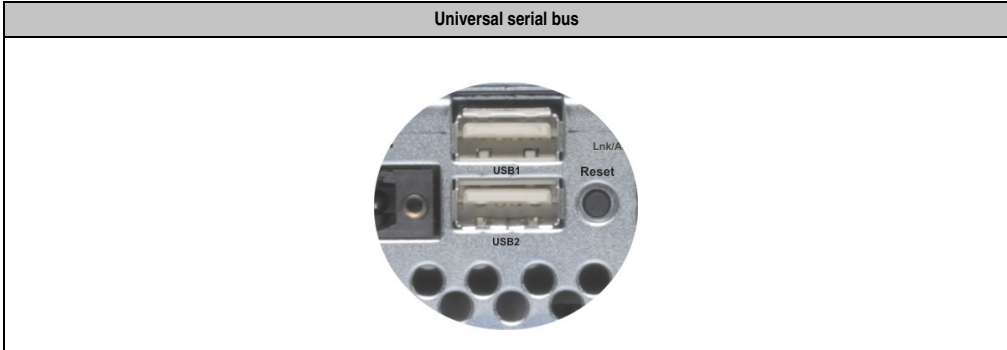


Figure 271: USB port connection

Technical data - 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 120: Technical data for USB connection

### Warning!

Only the USB devices tested and verified by B&R and found in the section "Accessories" on page 555 may be connected to the USB interface.

### Warning!

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.

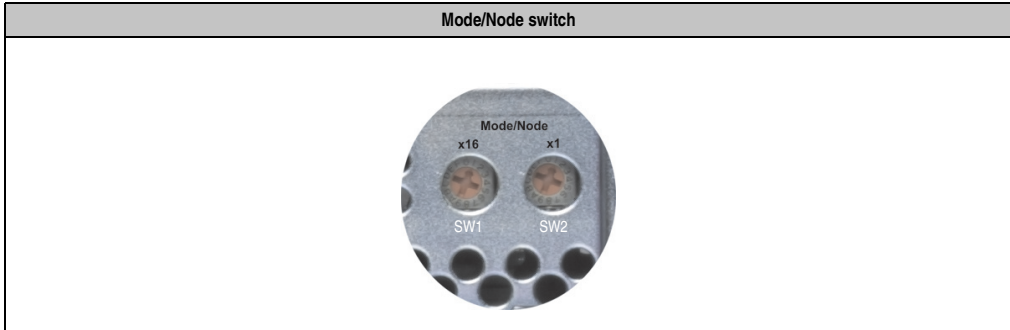


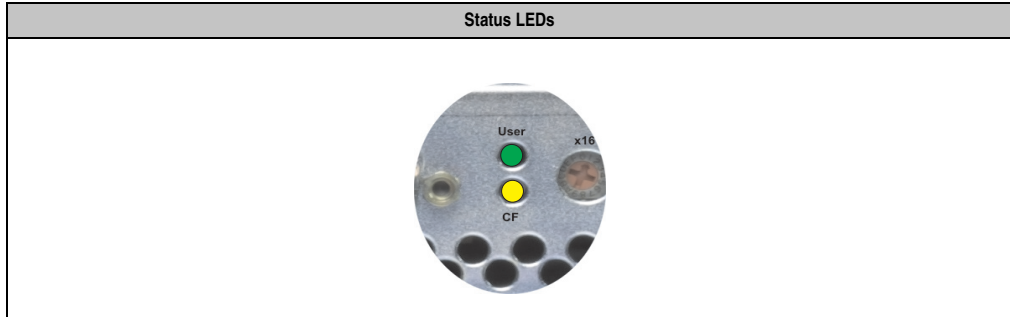
Figure 272: Mode / Node switches

Switch position		Function	Description
SW1 (x16)	SW2 (x1)	Operating mode switch	
0	0	Service mode	<ul style="list-style-type: none"> <li>The resolution for the display used is automatically set (see also section "Video and flat panel configuration" on page 468).</li> <li>Contrast and brightness settings for the display are set to default values (see also section "Video and flat panel configuration" on page 468).</li> <li>Legacy USB support is always set to "enabled" regardless of the BIOS setting (see section "Advanced BIOS features" on page 473).</li> <li>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 <b>lighting of the user LED</b>. Video output is then only possible using the REMHOST utility (see section "REMHOST utility disk" on page 513).</li> <li>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 text mode only for video output. This means that output from programs that write directly to the video memory is not displayed correctly.</li> <li>The Power Panel attempts to establish a connection to the REMHOST utility (a "ping" is sent to the serial interface).</li> </ul>
x	x	Other switch positions have no significance.	

Table 121: 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 a CompactFlash card is being accessed

Table 122: Status LEDs

### 4.1.7 Ethernet connection

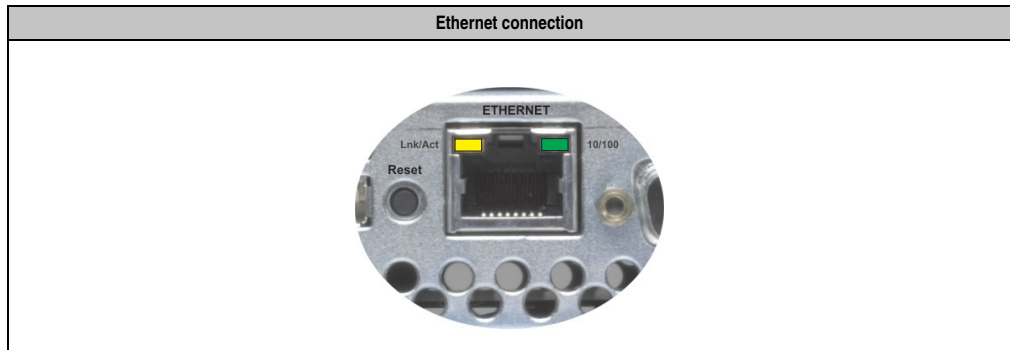


Figure 273: Ethernet connection

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

Table 123: 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 (LED blinks during transfer)	No link

Table 124: 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 connections. In order to avoid accidental activation, a reset can only be triggered with a pointed object.

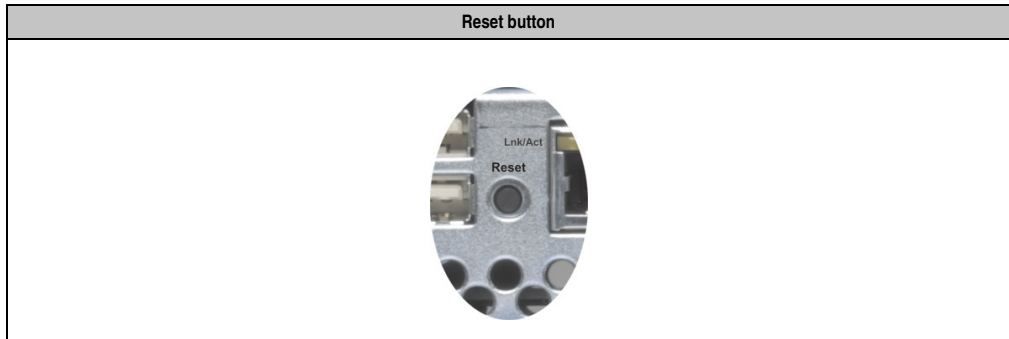


Figure 274: Reset button

#### 4.1.9 CompactFlash slot

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

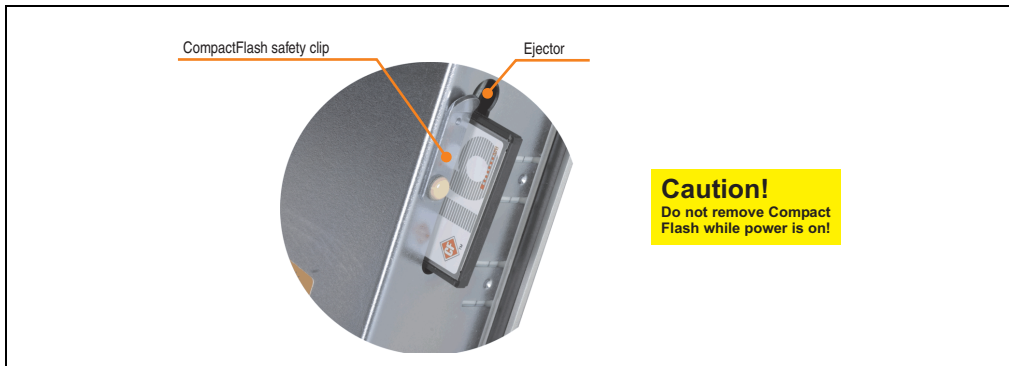


Figure 275: CompactFlash slot

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

## Warning!

The power must be turned off before inserting or removing the CompactFlash card!  
As a safety measure, a sticker is also attached to Power Panel devices stating this.

### 4.2 Stickers

#### 4.2.1 Safety sticker

A safety sticker attached over the CompactFlash slot advises that the power to the Power Panel device (depending on revision) must be switched off when inserting or removing a CompactFlash 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 276: Safety sticker

#### 4.2.2 Device label

The following label is attached to a suitable location on the Power Panel and shows brief descriptions for all of the interfaces:

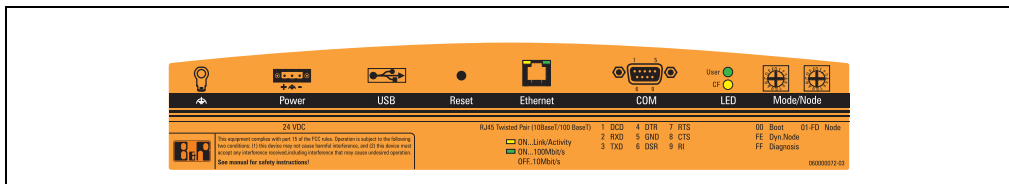


Figure 277: Device label

### 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

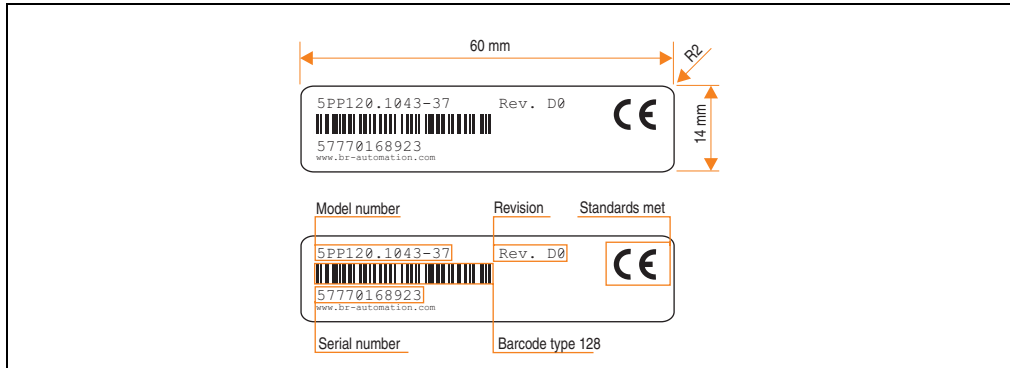


Figure 278: Design / dimensions - Serial number sticker

### 4.3 Device 5PP120.0571-27

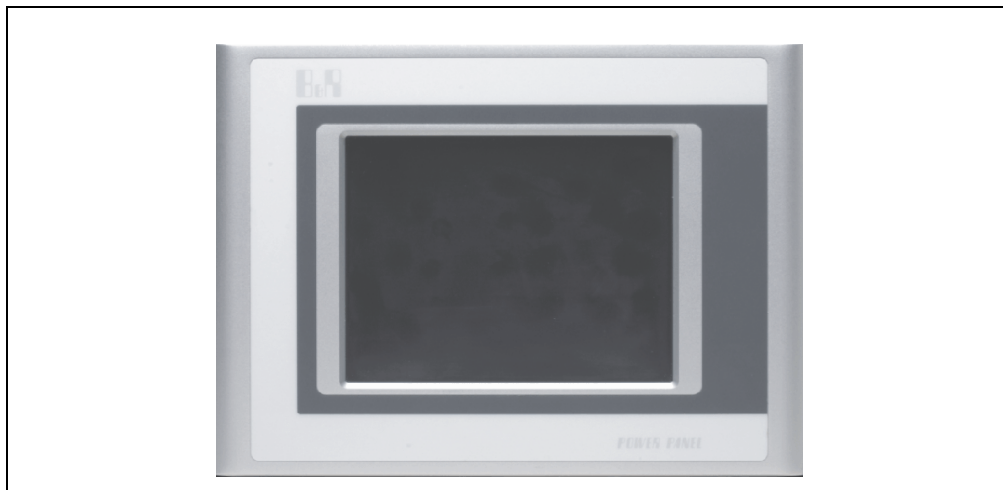


Figure 279: Front view - 5PP120.0571-27

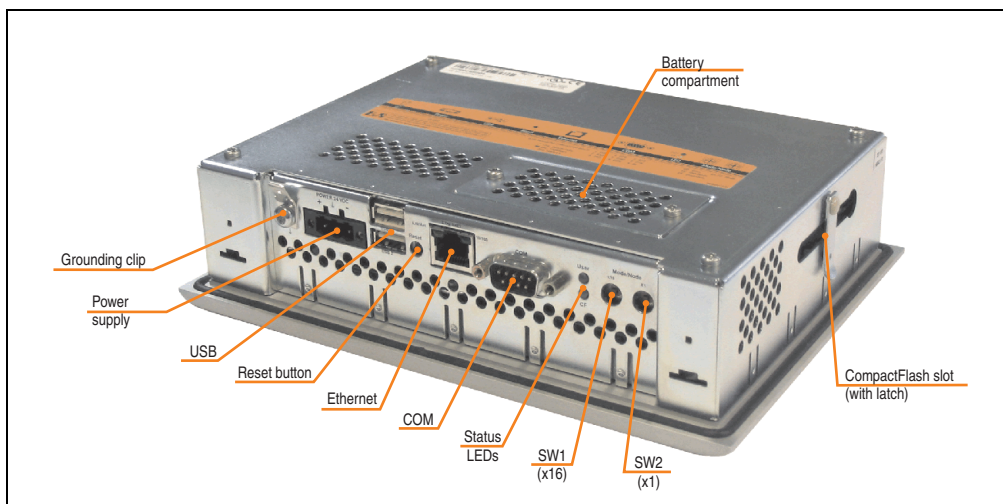


Figure 280: Rear view - 5PP120.0571-27

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 128 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Buffer time	-
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>1)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>2)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables 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 Amount Connection	Type I 1 slot Primary IDE device

Table 125: Technical data - 5PP120.0571-27

## Technical data • Power Panel 100 with BIOS

Features	5PP120.0571-27
Serial interface COM 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 Amount 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 switch	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>3)</sup>	Color LCD 5.7 in (144 mm) 512 colors <sup>4)</sup> QVGA, 320 x 240 pixels 40:1 Direction R / direction L = 40° Direction U = 40° / direction D = 50° 150 cd/m <sup>2</sup> 50,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Gunze Analog, resistive Hampshire, serial, 12-bit 84%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys 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. -
Bleeder resistance	0 Ohm

Table 125: Technical data - 5PP120.0571-27 (Forts.)

Mechanical characteristics	5PP120.0571-27
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
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	
Ambient temperature <sup>5)</sup>	
Operation	0 to +50°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 4.3.2 "Temperature humidity diagram" on page 368
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 125: Technical data - 5PP120.0571-27 (Forts.)

- 1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 2) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 3) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 4) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.
- 5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.3.2 Temperature humidity diagram

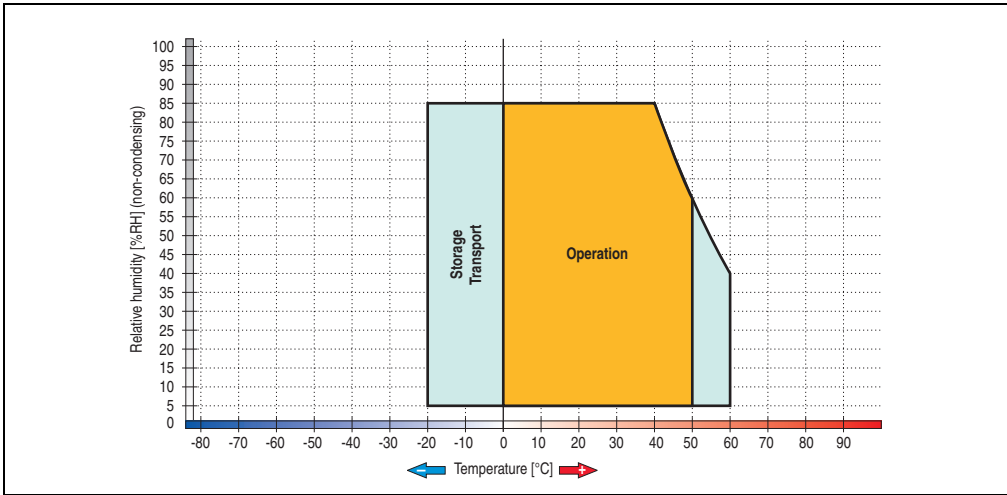


Figure 281: Temperature humidity diagram - 5PP120.0571-27

### 4.3.3 Dimensions

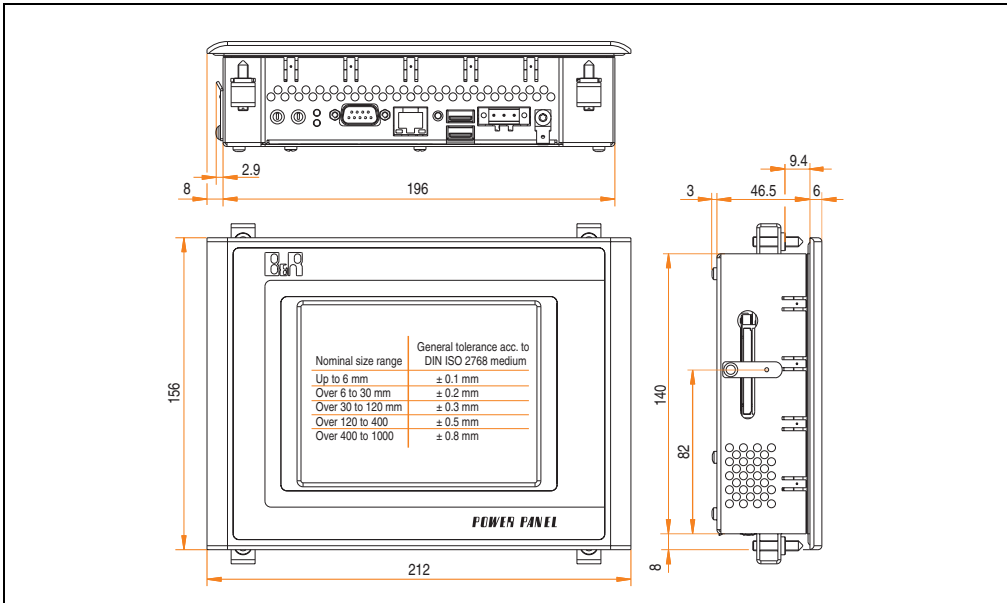


Figure 282: Dimensions - 5PP120.0571-27



### 4.3.4 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 282 "Dimensions - 5PP120.0571-27" on page 368) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

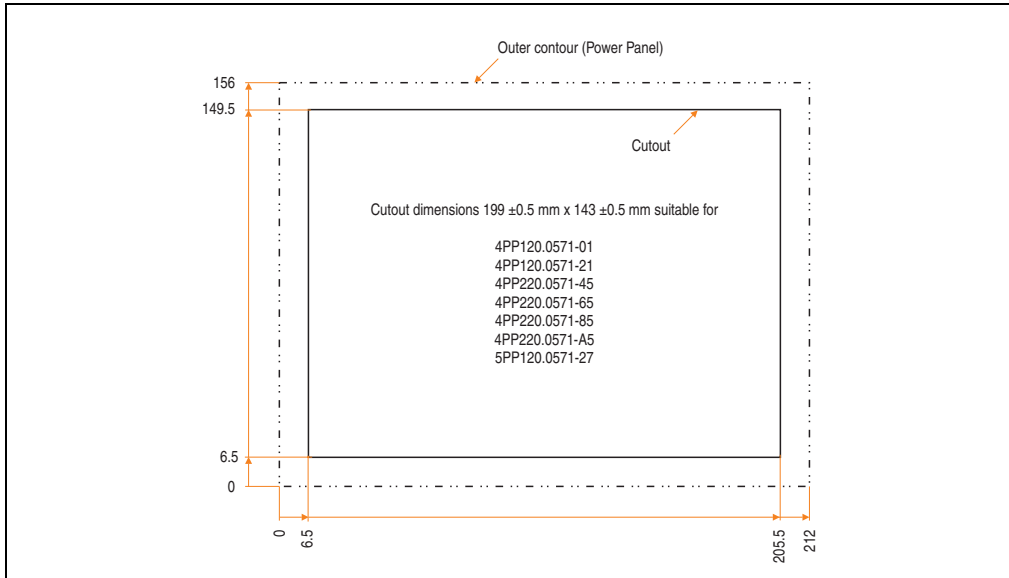


Figure 283: Cutout dimensions

### 4.3.5 Contents of delivery

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

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

Table 126: Contents of delivery - 5PP120.0571-27

#### 4.4 Device 5PP120.1043-37

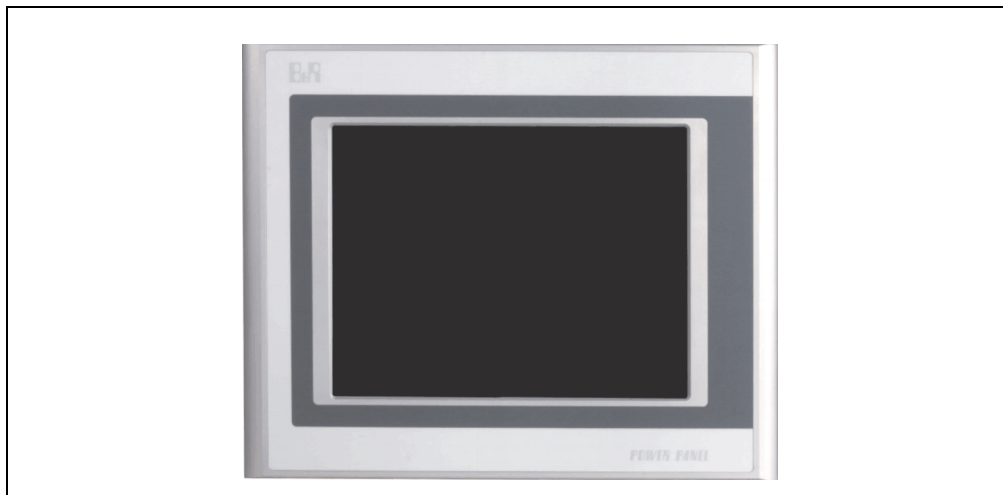


Figure 284: Front view - 5PP120.1043-37

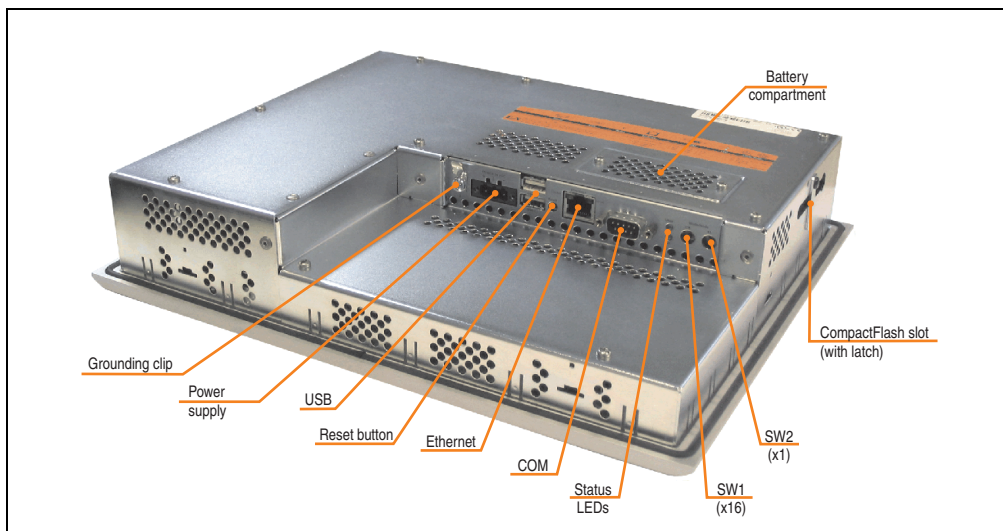


Figure 285: Rear view - 5PP120.1043-37

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 128 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Buffer time	-
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>1)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>2)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 127: Technical data - 5PP120.1043-37

## Technical data • Power Panel 100 with BIOS

Features	5PP120.1043-37
Serial interface COM 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 Amount 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 switch	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>3)</sup>	Color TFT 10.4 inch (264 mm) 262144 colors <sup>4)</sup> VGA, 640 x 480 pixels 600:1 Direction R / direction L = 70° Direction U = 45° / direction D = 55° 350 cd/m <sup>2</sup> 55,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	3M Analog, resistive Hampshire, serial, 12-bit 78%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys 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. -
Bleeder resistance	≤ 24 kOhm

Table 127: 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	
Ambient temperature <sup>5)</sup> Operation Storage Transport	0 to +50°C -20 to +70°C -20 to +70°C
Relative humidity	See 4.4.2 "Temperature humidity diagram" on page 374
Vibration Operation (continuous) Operation (occasional) Storage Transport	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock Operation Storage Transport	15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
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 127: Technical data - 5PP120.1043-37 (Forts.)

- 1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 2) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 3) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 4) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.
- 5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.4.2 Temperature humidity diagram

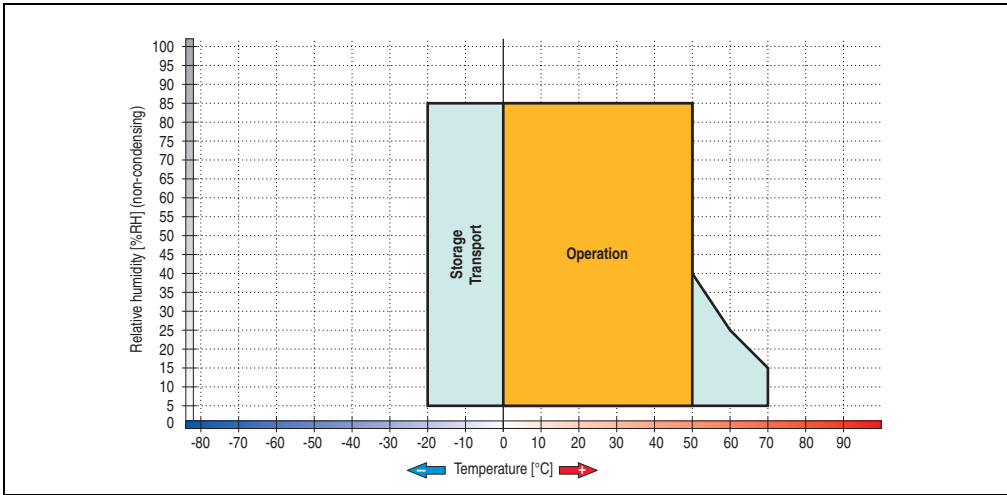


Figure 286: Temperature humidity diagram - 5PP120.1043-37

### 4.4.3 Dimensions

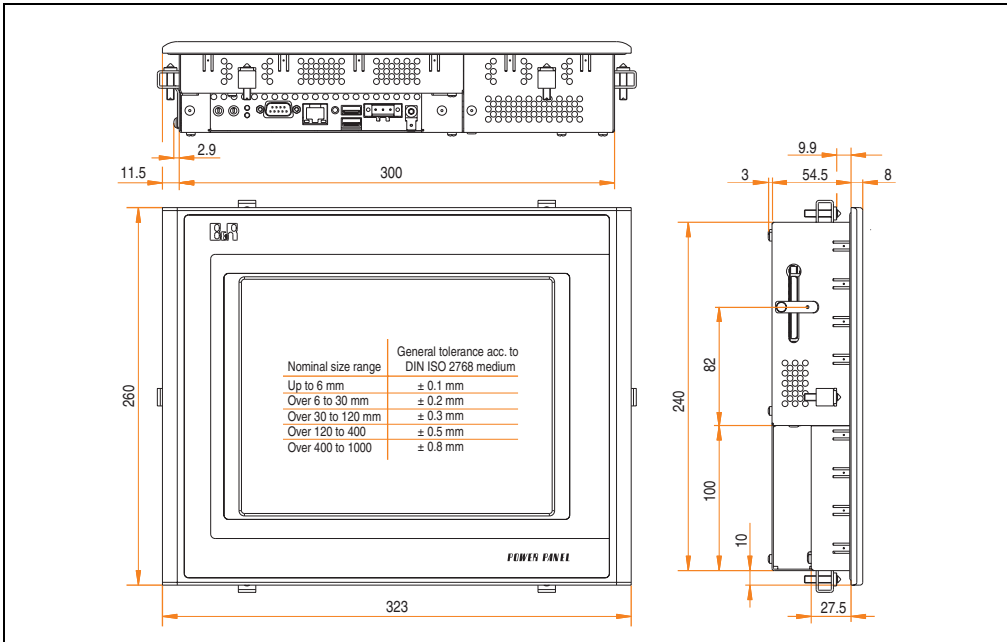


Figure 287: Dimensions - 5PP120.1043-37

### 4.4.4 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 287 "Dimensions - 5PP120.1043-37" on page 374) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

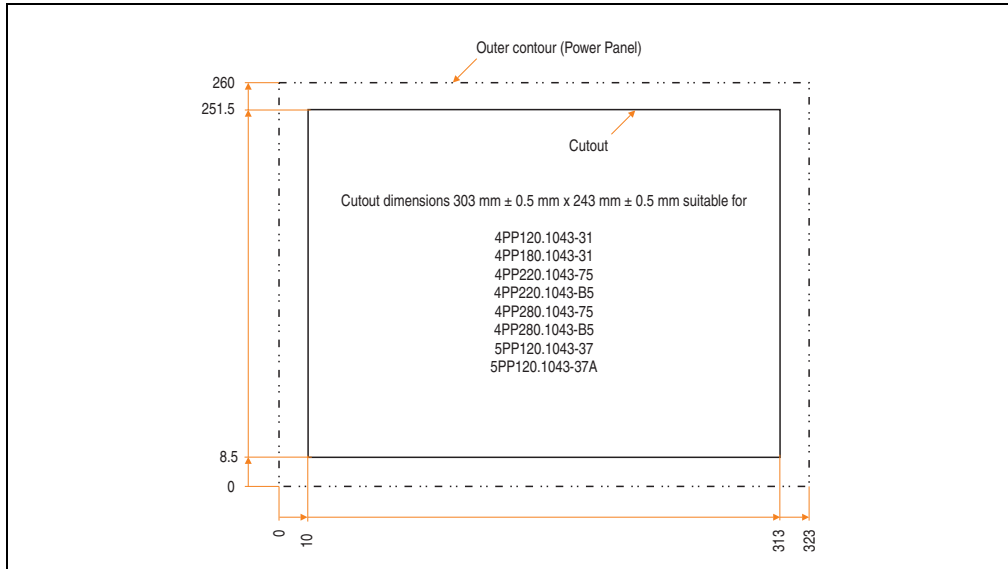


Figure 288: Cutout dimensions

### 4.4.5 Contents of delivery

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

Amount	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 128: Contents of delivery - 5PP120.1043-37

## 4.5 Device 5PP120.1043-37A

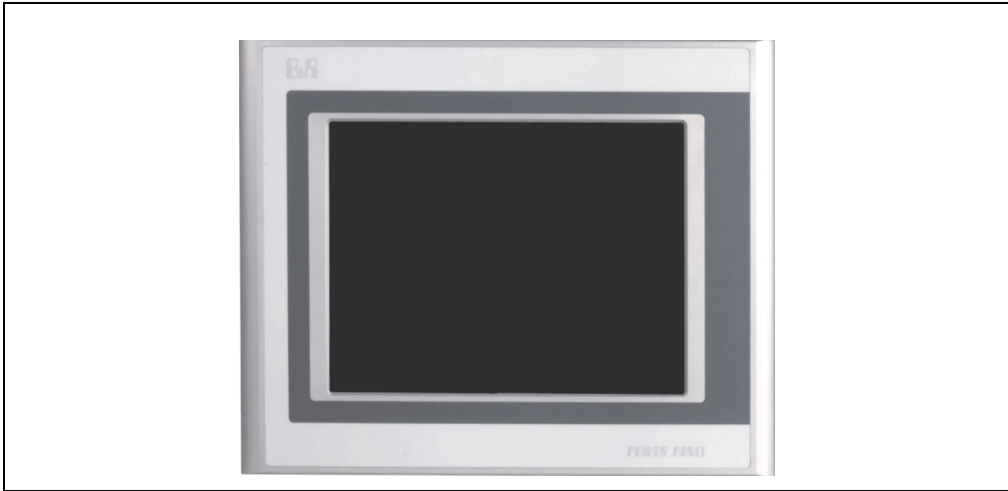


Figure 289: Front view - 5PP120.1043-37A

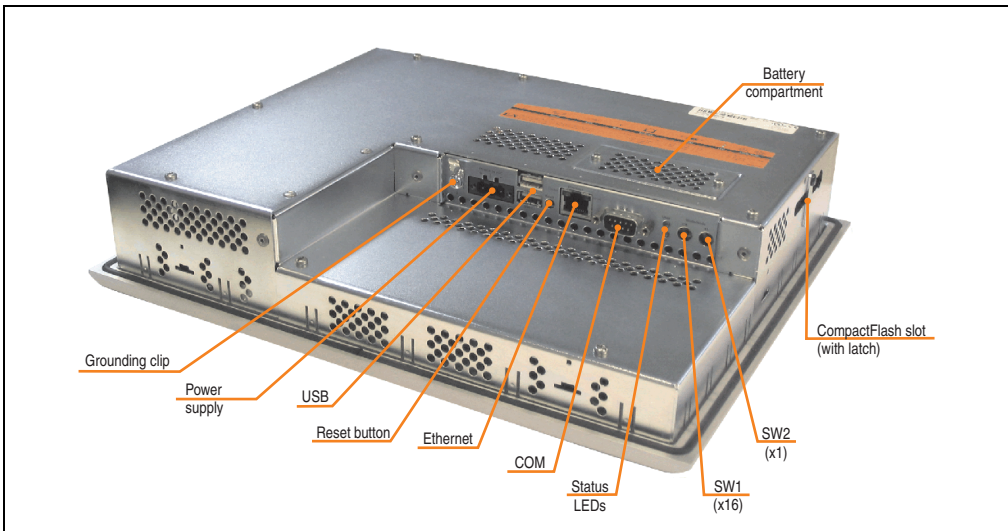


Figure 290: Rear view - 5PP120.1043-37A



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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 128 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Buffer time	-
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>1)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>2)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 129: Technical data - 5PP120.1043-37A

## Technical data • Power Panel 100 with BIOS

Features	5PP120.1043-37A
Serial interface COM Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 k baud 9-pin DSUB
USB interface Type Amount 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 switch	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>3)</sup>	Color TFT 10.4 inch (264 mm) 262144 colors <sup>4)</sup> VGA, 640 x 480 pixels 600:1  Direction R / direction L = 70° Direction U = 45° / direction D = 55°  350 cd/m <sup>2</sup> 55,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Analog, resistive Hampshire, serial, 12-bit 78%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys 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. -
Bleeder resistance	≤ 24 kOhm

Table 129: Technical data - 5PP120.1043-37A (Forts.)

Mechanical characteristics	5PP120.1043-37A
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
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	
Ambient temperature <sup>5)</sup>	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 4.5.2 "Temperature humidity diagram" on page 380
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 129: Technical data - 5PP120.1043-37A (Forts.)

- 1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 2) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 3) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 4) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.
- 5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.5.2 Temperature humidity diagram

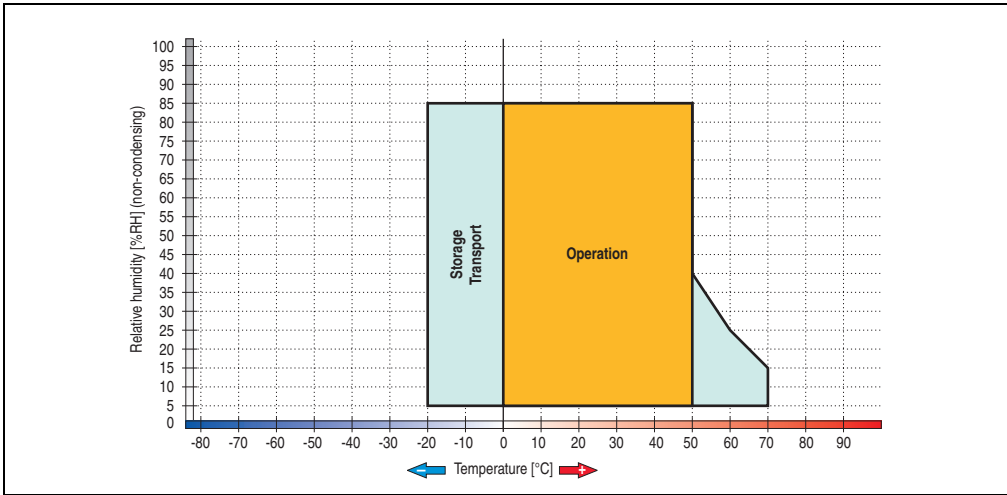


Figure 291: Temperature humidity diagram - 5PP120.1043-37A

### 4.5.3 Dimensions

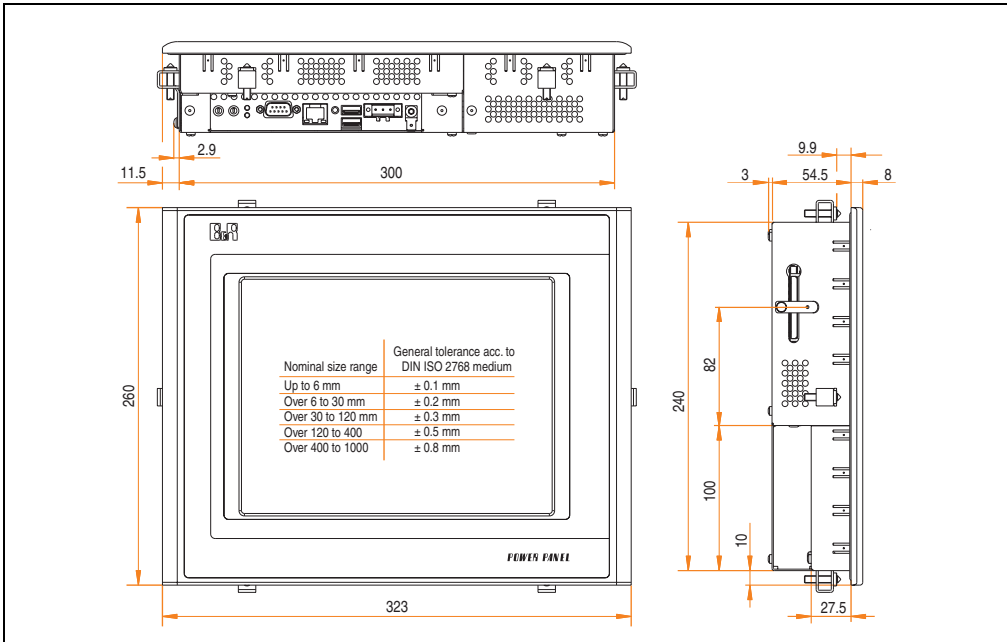


Figure 292: Dimensions - 5PP120.1043-37A

### 4.5.4 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 292 "Dimensions - 5PP120.1043-37A" on page 380) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

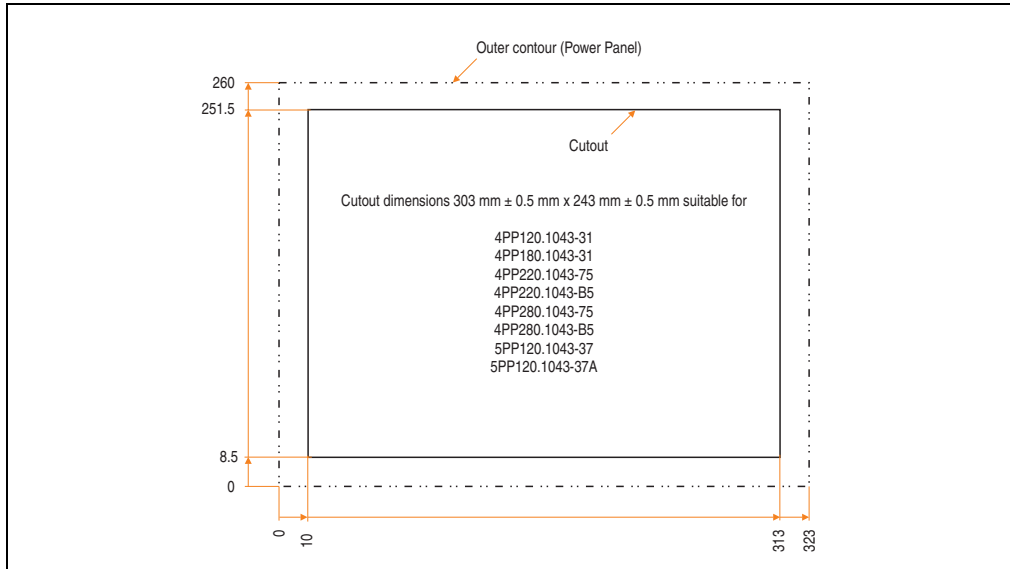


Figure 293: Cutout dimensions

### 4.5.5 Contents of delivery

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

Amount	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 130: Contents of delivery - 5PP120.1043-37A

#### 4.6 Device 5PP120.1214-37

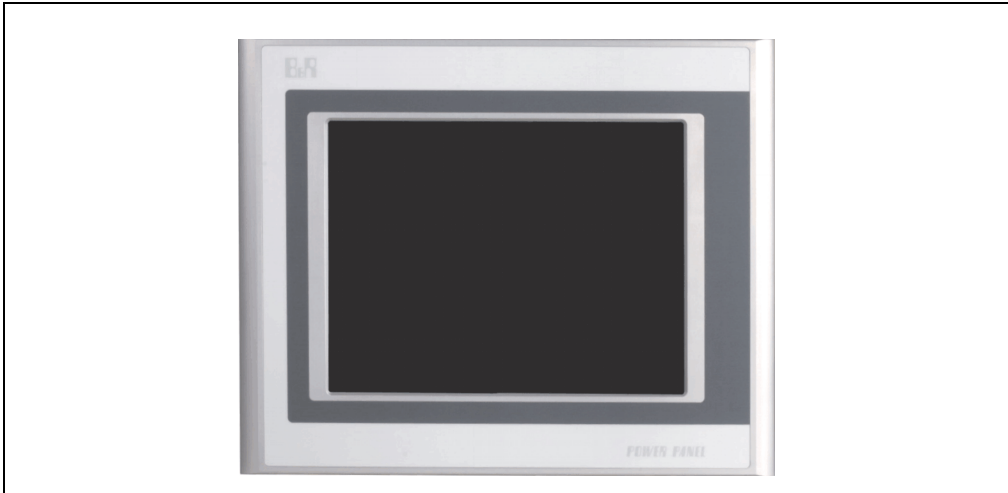


Figure 294: Front view - 5PP120.1214-37

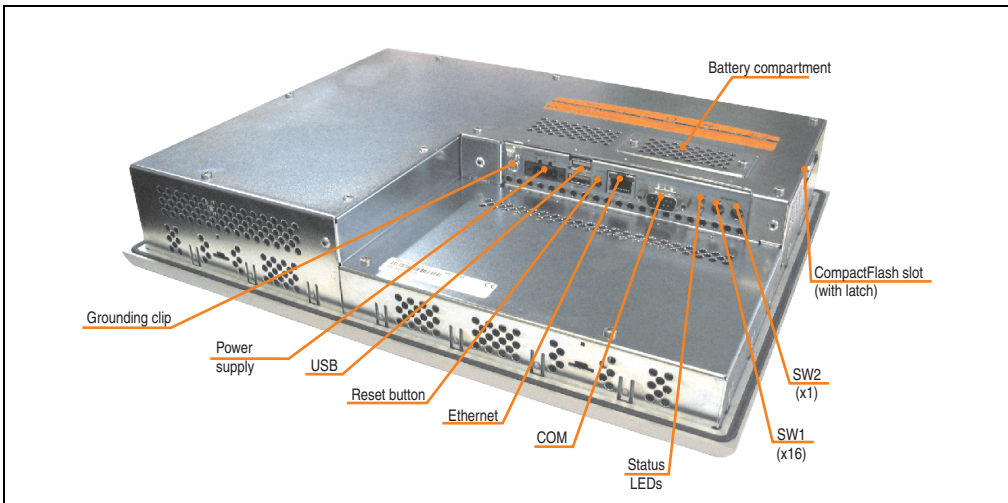


Figure 295: Rear view - 5PP120.1214-37

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 128 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Buffer time	-
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>1)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>2)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 131: Technical data - 5PP120.1214-37

**Technical data • Power Panel 100 with BIOS**

Features	5PP120.1214-37
Serial interface COM 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 Amount 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 switch	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>3)</sup>	Color TFT 12.1 inch (307 mm) 262144 colors <sup>4)</sup> VGA, 800 x 600 pixels 300:1  Direction R / direction L = 70° Direction U = 50° / direction D = 60°  350 cd/m <sup>2</sup> 55,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	3M Analog, resistive Hampshire, serial, 12-bit 78%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys 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. -
Bleeder resistance	≤ 24 kOhm

Table 131: 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	
Ambient temperature <sup>5)</sup> Operation Storage Transport	0 to +45°C -20 to +60°C -20 to +60°C
Relative humidity	See 4.6.2 "Temperature humidity diagram" on page 386
Vibration Operation (continuous) Operation (occasional) Storage Transport	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock Operation Storage Transport	15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
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 131: Technical data - 5PP120.1214-37 (Forts.)

- 1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 2) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 3) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 4) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.
- 5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.6.2 Temperature humidity diagram

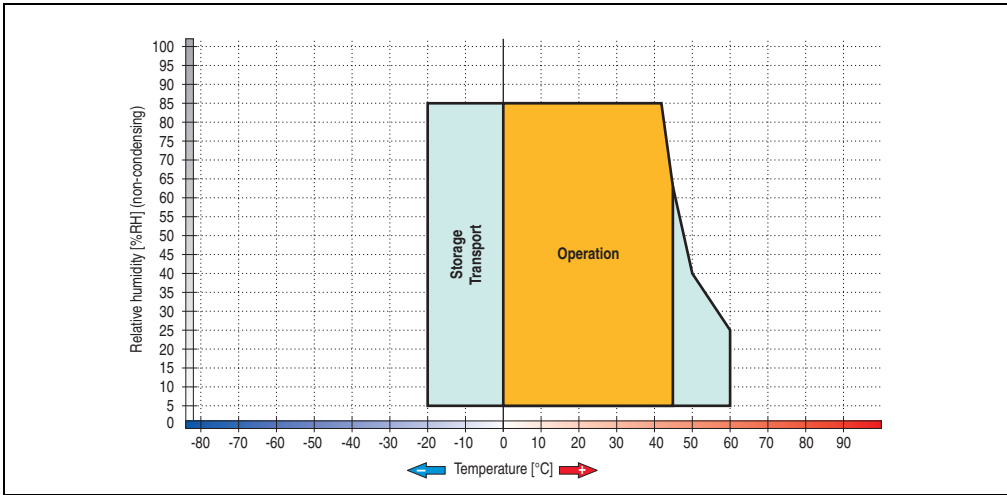


Figure 296: Temperature humidity diagram - 5PP120.1214-37

### 4.6.3 Dimensions

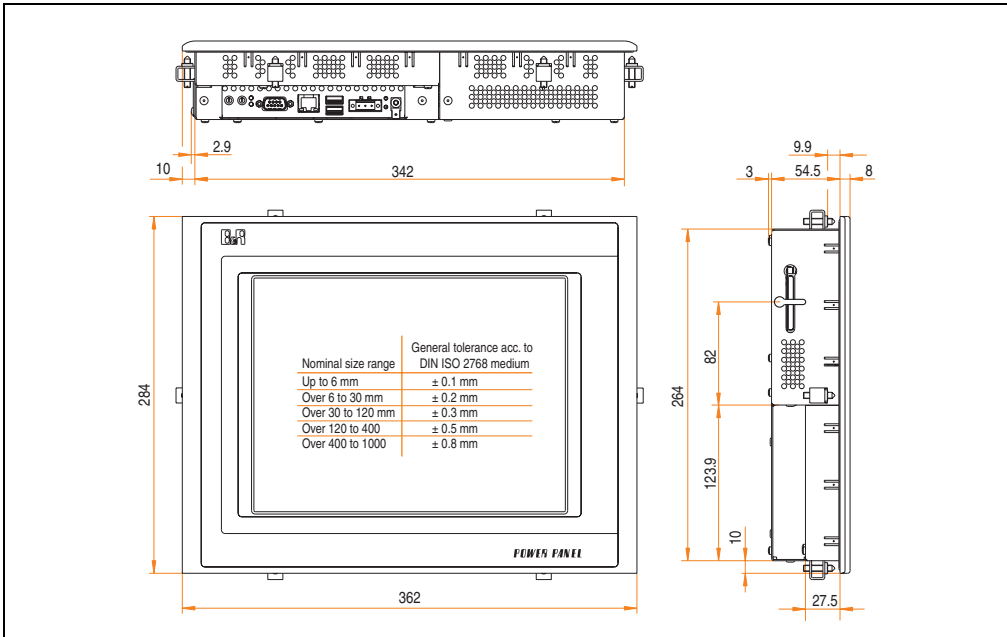


Figure 297: Dimensions - 5PP120.1214-37

### 4.6.4 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 297 "Dimensions - 5PP120.1214-37" on page 386) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

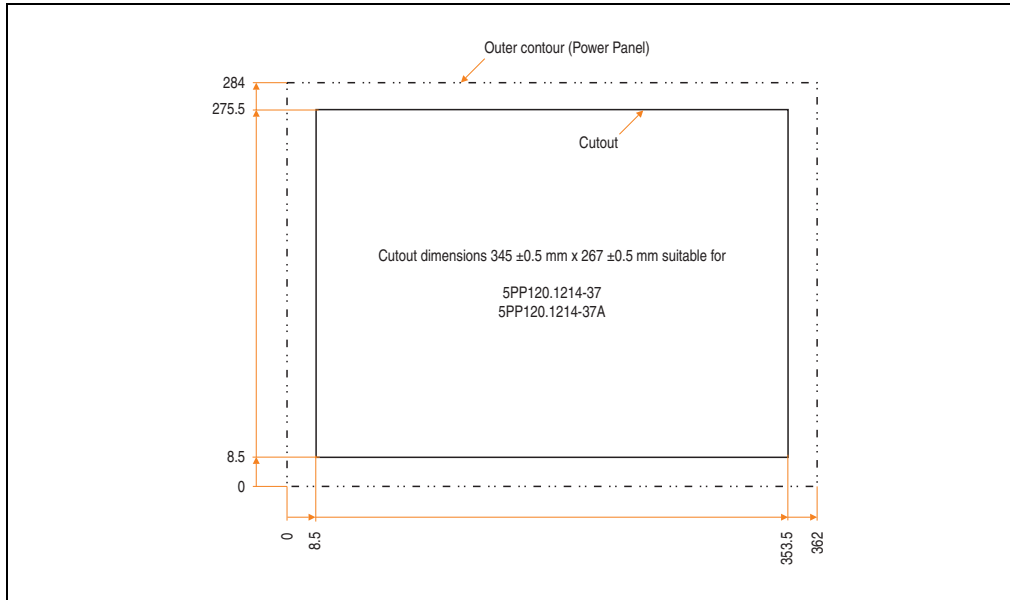


Figure 298: Cutout dimensions

### 4.6.5 Contents of delivery

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

Amount	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 132: Contents of delivery - 5PP120.1214-37

## 4.7 Device 5PP120.1214-37A

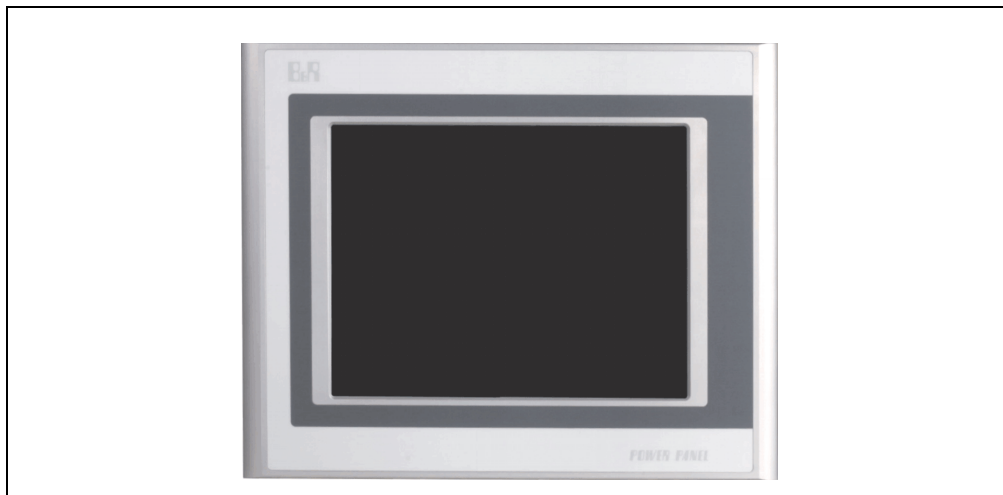


Figure 299: Front view - 5PP120.1214-37A

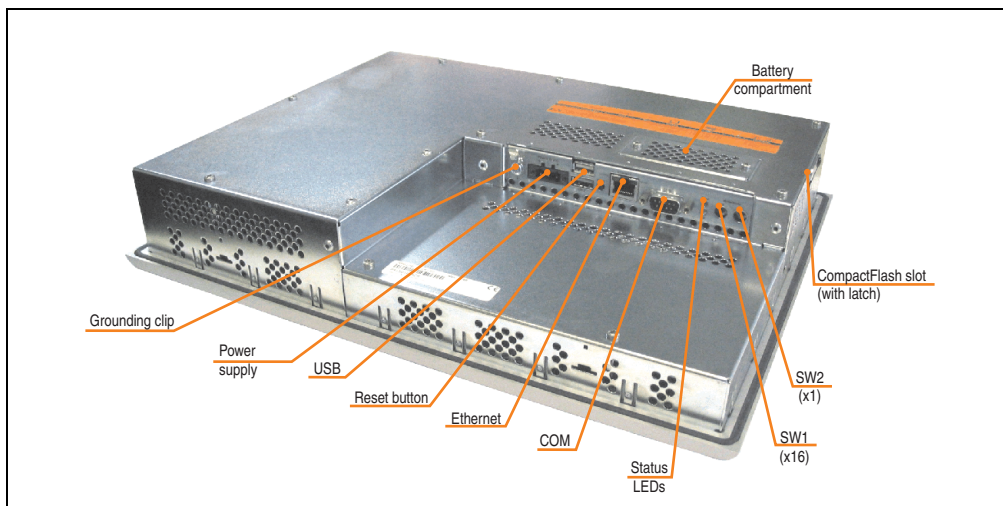


Figure 300: Rear view - 5PP120.1214-37A

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 128 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Buffer time	-
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>1)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>2)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 133: Technical data - 5PP120.1214-37A

## Technical data • Power Panel 100 with BIOS

Features	5PP120.1214-37A
Serial interface COM 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 Amount 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 switch	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>3)</sup>	Color TFT 12.1 inch (307 mm) 262144 colors <sup>4)</sup> VGA, 800 x 600 pixels 300:1  Direction R / direction L = 70° Direction U = 50° / direction D = 60°  350 cd/m <sup>2</sup> 55,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Analog, resistive Hampshire, serial, 12-bit 78%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys 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. -
Bleeder resistance	≤ 24 kOhm

Table 133: 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	
Ambient temperature <sup>5)</sup> Operation Storage Transport	0 to +45°C -20 to +60°C -20 to +60°C
Relative humidity	See 4.7.2 "Temperature humidity diagram" on page 392
Vibration Operation (continuous) Operation (occasional) Storage Transport	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock Operation Storage Transport	15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
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 133: Technical data - 5PP120.1214-37A (Forts.)

- 1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 2) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 3) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 4) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.
- 5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.7.2 Temperature humidity diagram

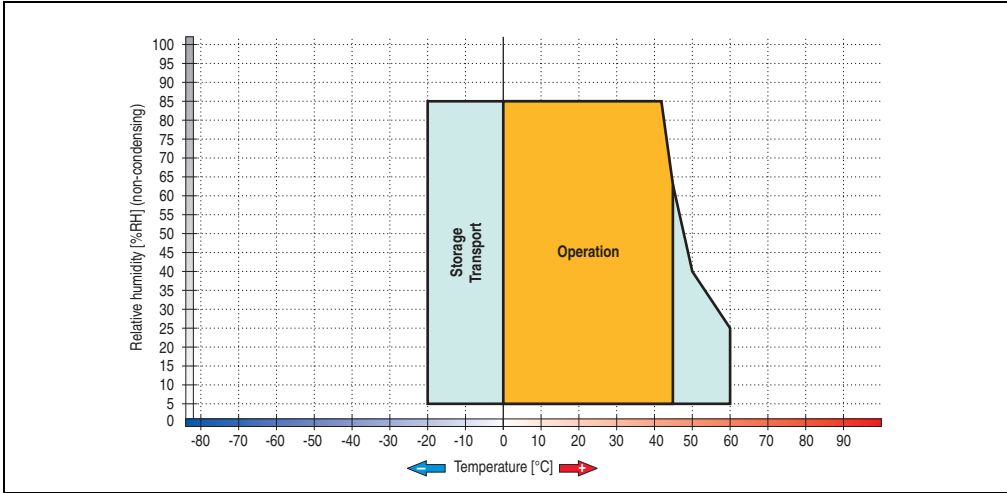


Figure 301: Temperature humidity diagram - 5PP120.1214-37A

### 4.7.3 Dimensions

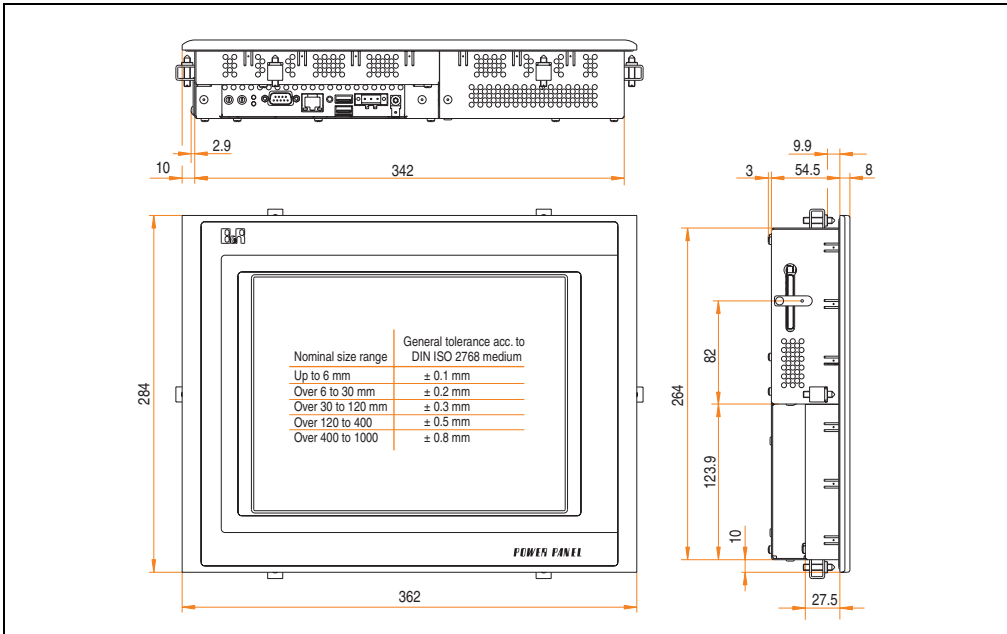


Figure 302: Dimensions - 5PP120.1214-37A



### 4.7.4 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 302 "Dimensions - 5PP120.1214-37A" on page 392) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

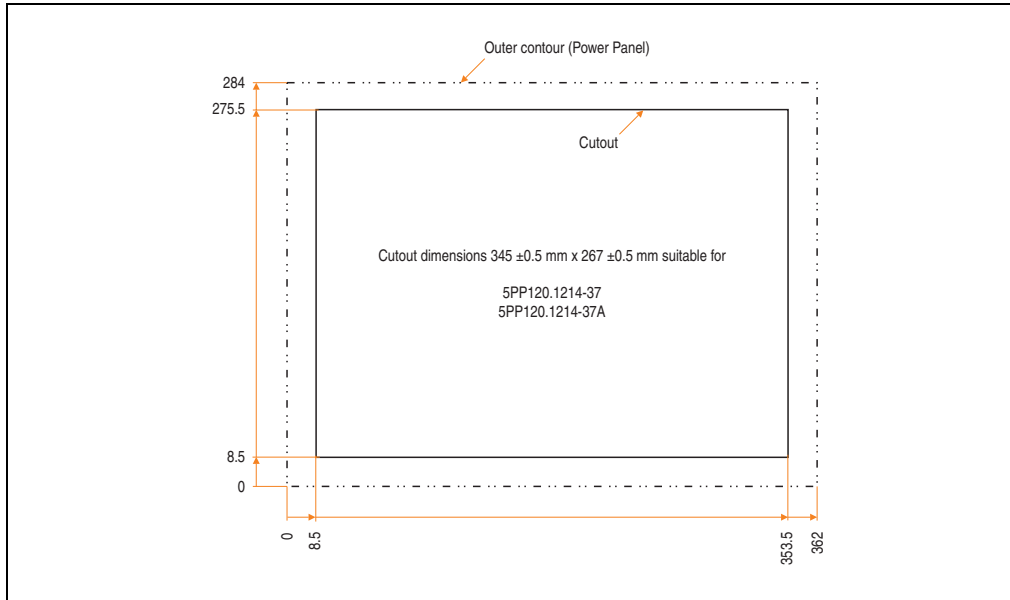


Figure 303: Cutout dimensions

### 4.7.5 Contents of delivery

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

Amount	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 134: Contents of delivery - 5PP120.1214-37A

## 4.8 Device 5PP120.1505-37

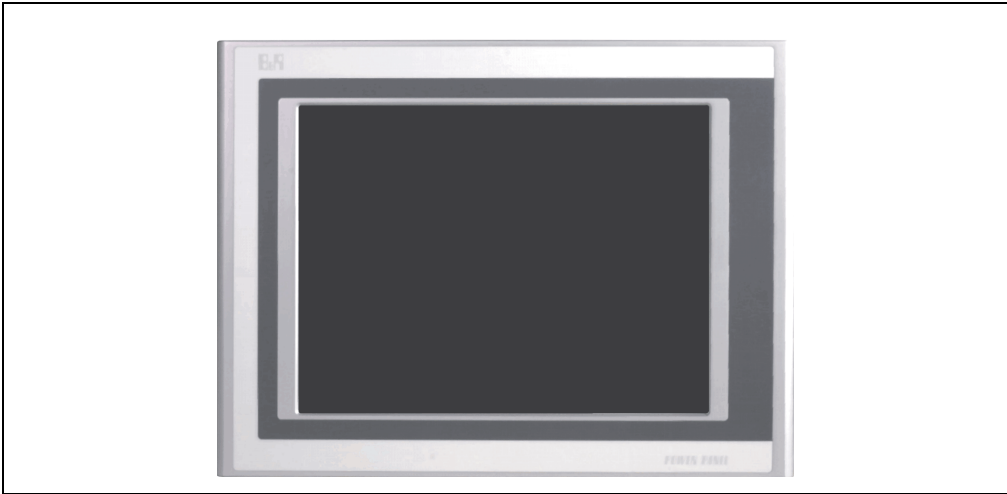


Figure 304: Front view - 5PP120.1505-37

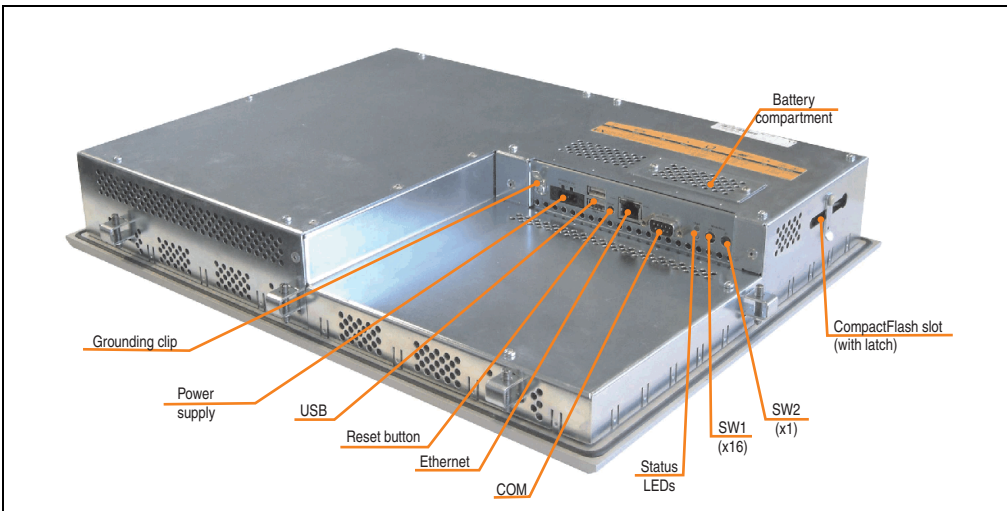


Figure 305: Rear view - 5PP120.1505-37

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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 128 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Buffer time	-
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>1)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>2)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 135: Technical data - 5PP120.1505-37

**Technical data • Power Panel 100 with BIOS**

Features	5PP120.1505-37
Serial interface COM 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 Amount 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 switch	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>3)</sup>	Color TFT 15 inch (381 mm) 262144 colors <sup>4)</sup> XGA, 1024 x 768 pixels 300:1  Direction R / direction L = 65° Direction U = 50° / direction D = 55°  330 cd/m <sup>2</sup> 35,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	3M Analog, resistive Hampshire, serial, 12-bit 78%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys 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
Bleeder resistance	≤ 24 kOhm

Table 135: Technical data - 5PP120.1505-37 (Forts.)

Mechanical characteristics	5PP120.1505-37
Front	
Frame	Naturally anodized aluminum
Membrane	Polyester
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	
Ambient temperature <sup>5)</sup>	
Operation	0 to +50°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 4.8.2 "Temperature humidity diagram" on page 398
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
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 135: Technical data - 5PP120.1505-37 (Forts.)

- 1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 2) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 3) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 4) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.
- 5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.8.2 Temperature humidity diagram

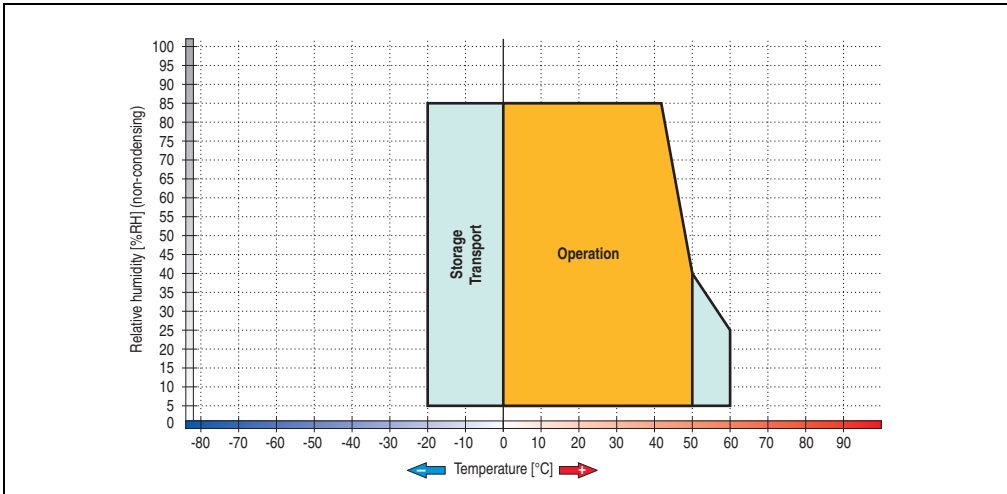


Figure 306: Temperature humidity diagram - 5PP120.1505-37

### 4.8.3 Dimensions

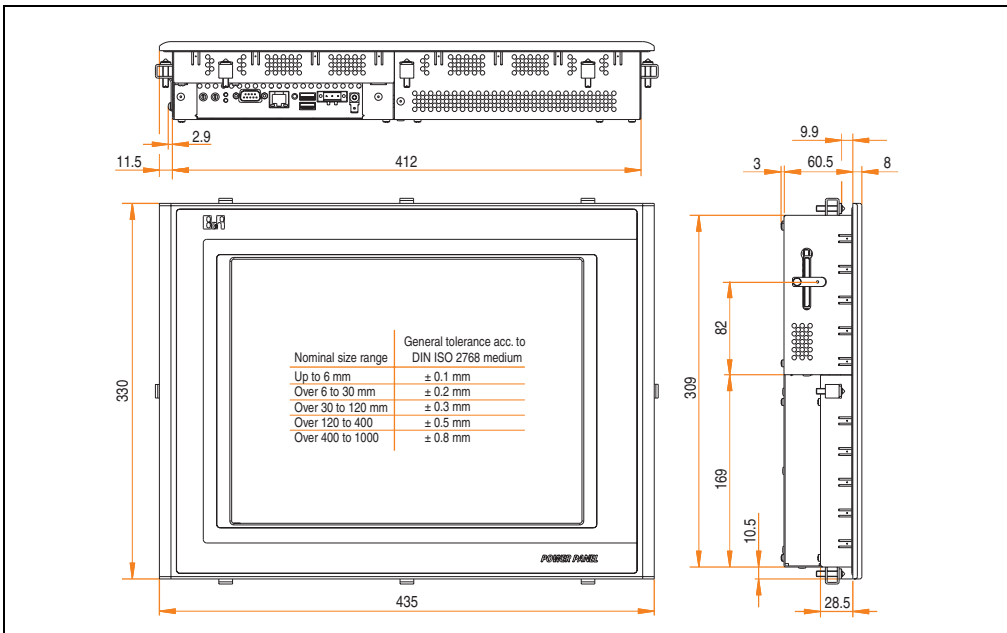


Figure 307: Dimensions - 5PP120.1505-37

### 4.8.4 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 307 "Dimensions - 5PP120.1505-37" on page 398) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

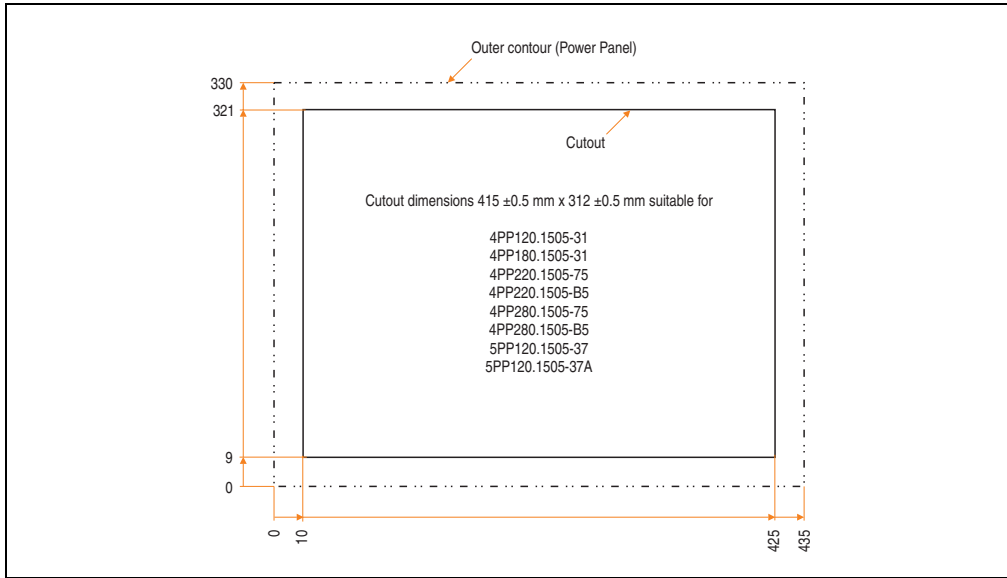


Figure 308: Cutout dimensions

### 4.8.5 Contents of delivery

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

Amount	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 136: Contents of delivery - 5PP120.1505-37

## 4.9 Device 5PP120.1505-37A



Figure 309: Front view - 5PP120.1505-37A

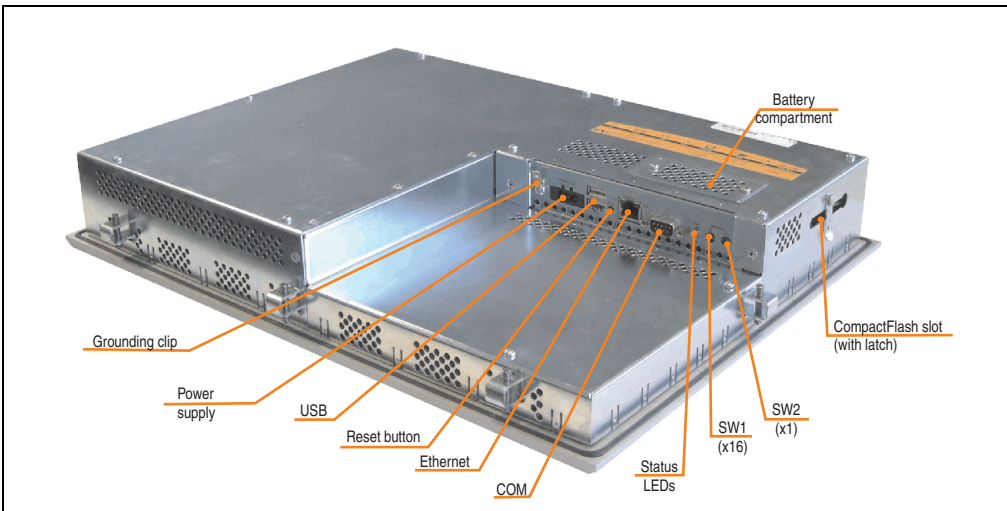


Figure 310: Rear view - 5PP120.1505-37A



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 Method	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension 16 KB - Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity Socket	DRAM 128 MB SO-DIMM 144-pin
Graphics Controller Memory Screen rotation	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)
SRAM Quantity Battery-buffered	-
Watchdog Controller	-
Power failure logic Controller Buffer time	-
Real-time clock Battery-buffered Accuracy	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>1)</sup>
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 4 years <sup>2)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5) -
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device

Table 137: Technical data - 5PP120.1505-37A

## Technical data • Power Panel 100 with BIOS

Features	5PP120.1505-37A
Serial interface COM 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 Amount 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 switch	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>3)</sup>	Color TFT 15 inch (381 mm) 16.7 million colors <sup>4)</sup> XGA, 1024 x 768 pixels 300:1  Direction R / direction L = 65° Direction U = 50° / direction D = 55°  330 cd/m <sup>2</sup> 35,000 hours
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Analog, resistive Hampshire, serial, 12-bit 78%
Filter glass Degree of transmission Coating	-
Keys Key lifespan Function keys Soft keys Cursor keys 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
Bleeder resistance	≤ 24 kOhm

Table 137: 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	
Ambient temperature <sup>5)</sup> Operation Storage Transport	0 to +50°C -20 to +60°C -20 to +60°C
Relative humidity	See 4.9.2 "Temperature humidity diagram" on page 404
Vibration Operation (continuous) Operation (occasional) Storage Transport	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock Operation Storage Transport	15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
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 137: Technical data - 5PP120.1505-37A (Forts.)

- 1) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 2) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 3) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 4) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.
- 5) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.9.2 Temperature humidity diagram

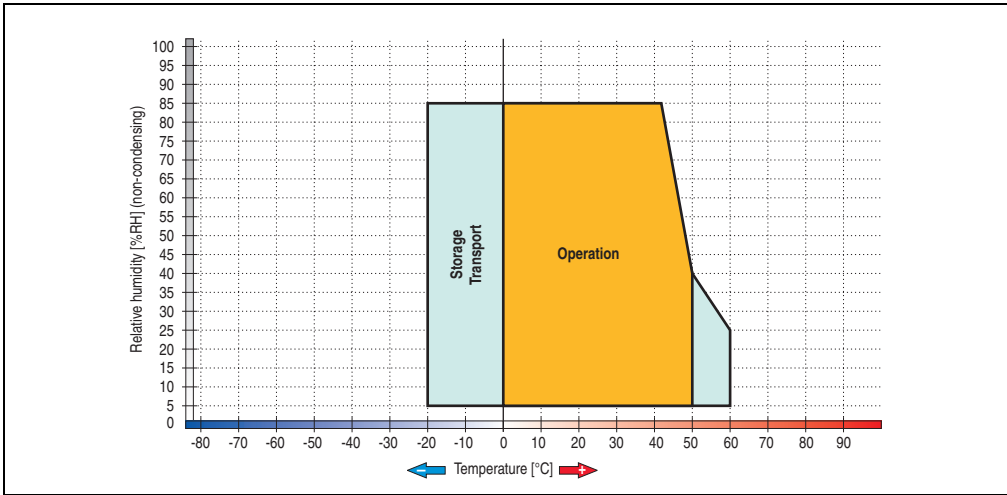


Figure 311: Temperature humidity diagram - 5PP120.1505-37A

### 4.9.3 Dimensions

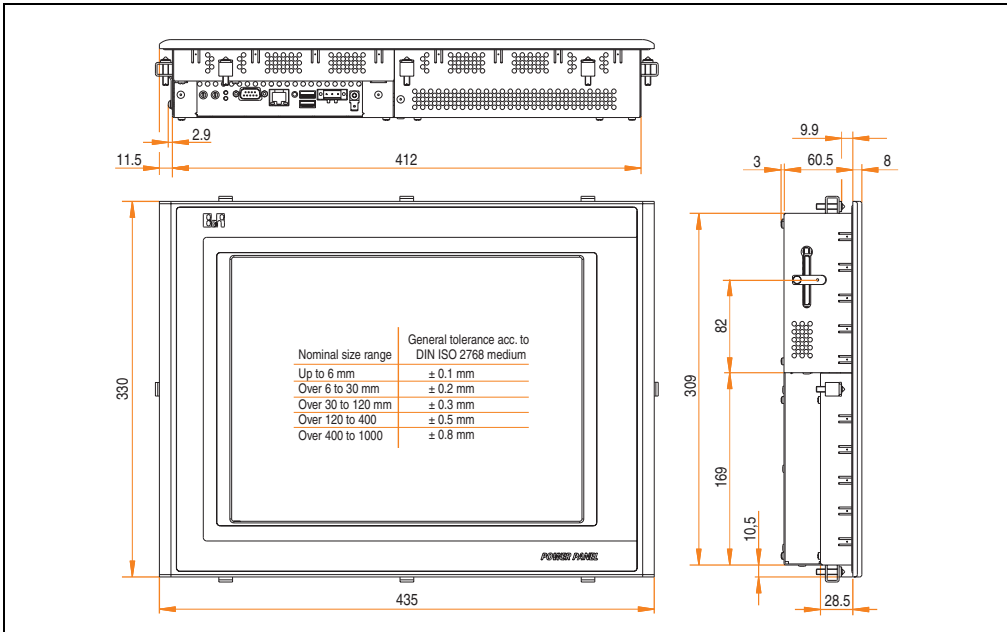


Figure 312: Dimensions - 5PP120.1505-37A

### 4.9.4 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 312 "Dimensions - 5PP120.1505-37A" on page 404) For further information regarding mounting, see Chapter 3 "Commissioning" on page 435.

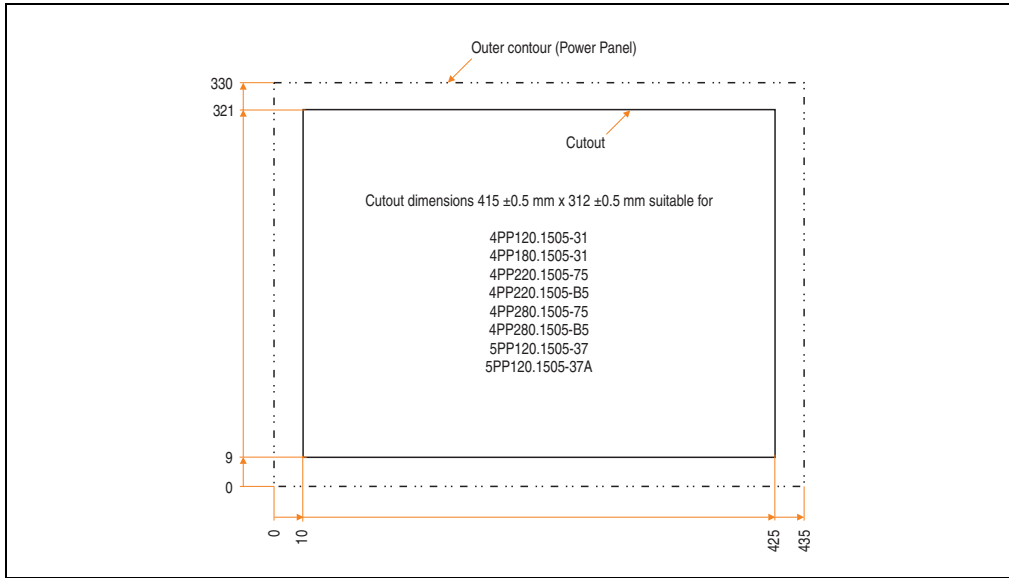


Figure 313: Cutout dimensions

### 4.9.5 Contents of delivery

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

Amount	Component
1	Power Panel 120 TFT C XGA 15" T MH
8	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 138: Contents of delivery - 5PP120.1505-37A

## 5. Power Panel light / compact

Power Panel 200 light / compact series devices have QVGA operator panels 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 also equipped with a 10/100 Ethernet interface, making them the ideal choice anywhere 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:

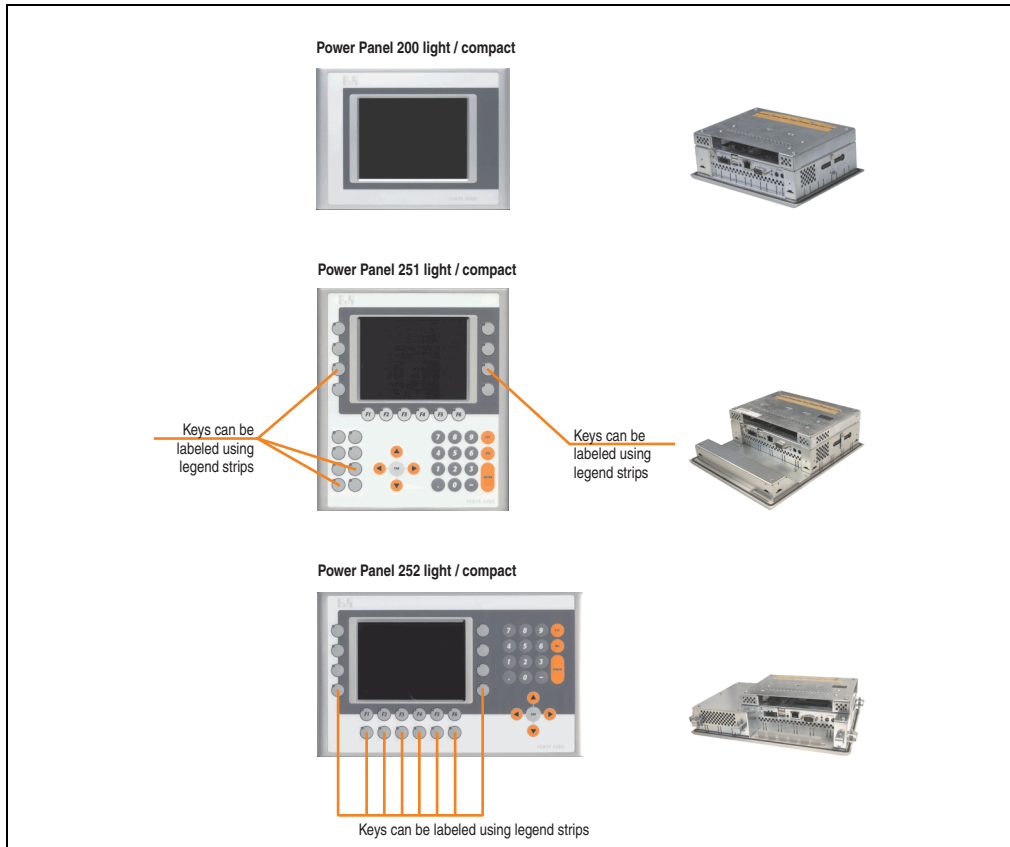


Figure 314: Power Panel light / compact overview

## 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	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension			
Type	16 KB			
Expanded command set	-			
L1 cache	Yes			
L2 cache	Passive (heat sink)			
Floating point unit (FPU)	2 MB (for firmware)			
Cooling	Memory			
Method	Type DRAM			
Flash	Quantity 64 MB			
Memory	Socket SO-DIMM 144-pin			
Graphics	Controller Geode SC2200			
Controller	Memory 4 MB shared memory (reserved from the main memory)			
Memory	Screen rotation Yes (See also Section "Screen rotation" on page 448)			
Screen rotation	SRAM			
Quantity	Quantity 256 KB			
Battery-buffered	Yes			
Watchdog	Controller SMC <sup>1)</sup>			
Controller	Power failure logic			
Controller	Controller SMC <sup>1)</sup>			
Buffer time	10 ms			
Real-time clock	Battery-buffered			
Battery-buffered	Accuracy Yes			
Accuracy	At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>			
Battery	Type Renata 950 mAh			
Type	Removable Yes, accessible from the outside			
Removable	Lifespan 4 years <sup>3)</sup>			
Lifespan	Backup capacitor (for changing battery)			
Backup capacitor (for changing battery)	Buffer time 10 minutes			
Buffer time	Ethernet			
Ethernet	Controller -			
Controller	Transfer rate			
Transfer rate	Connection			
Connection	Cables			
Cables	NE2000-compatible			
NE2000-compatible	CompactFlash			
CompactFlash	Type Type I			
Type	Amount 1 slot			
Amount	Connection Primary IDE device			
Connection				

Table 139: 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 COM 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 Amount 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 switch	2, 16 digits each			
aPCI slots	1 pcs. CAN aPCI module (31F771.9) inserted	1 pcs. X2X aPCI module (31F791.9) inserted	1 pcs. CAN aPCI module (31F771.9) inserted	1 pcs. X2X aPCI module (31F791.9) inserted
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	LCD monochrome 5.7 in (144 mm) 8 shades of gray QVGA, 320 x 240 pixels 25:1  Direction R / direction L = 40° Direction U = 40° / direction D = 50°  140 cd/m <sup>2</sup> 50,000 hours		Color LCD 5.7 in (144 mm) 256 colors QVGA, 320 x 240 pixels 40:1  Direction R / direction L = 40° Direction U = 40° / direction D = 50°  150 cd/m <sup>2</sup> 50,000 hours	
Touch screen Touch screen type Technology Controller Degree of transmission	Gunze Analog, resistive Hampshire, serial, 12-bit 84%			
Filter glass Degree of transmission Coating	-			
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	-			
<b>Electrical characteristics</b>				
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. Yes			
Bleeder resistance	≥ 47 kOhm			

Table 139: Technical data - Power Panel 200 light (Forts.)



## Technical data • Power Panel light / compact

Mechanics	4PP220:0571-L05	4PP220:0571-L45	4PP220:0571-L25	4PP220:0571-L65
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)			
<b>Environmental characteristics</b>				
Ambient temperature <sup>6)</sup>				
Operation	0 to +50°C		0 to +50°C	
Storage	-20 to +70°C		-20 to +60°C	
Transport	-20 to +70°C		-20 to +60°C	
Relative humidity	See temperature humidity diagram, on page 410			
Vibration				
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g			
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g			
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g			
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g			
Shock				
Operation	15 g, 11 ms			
Storage	30 g, 15 ms			
Transport	30 g, 15 ms			
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 139: Technical data - Power Panel 200 light (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values with inserted aPCI interface module
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 5.1.2 Temperature humidity diagram - Power Panel 200 light - Monochrome LCD

The following diagram is valid for the devices 4PP220:0571-L05 and 4PP220:0571-L45.

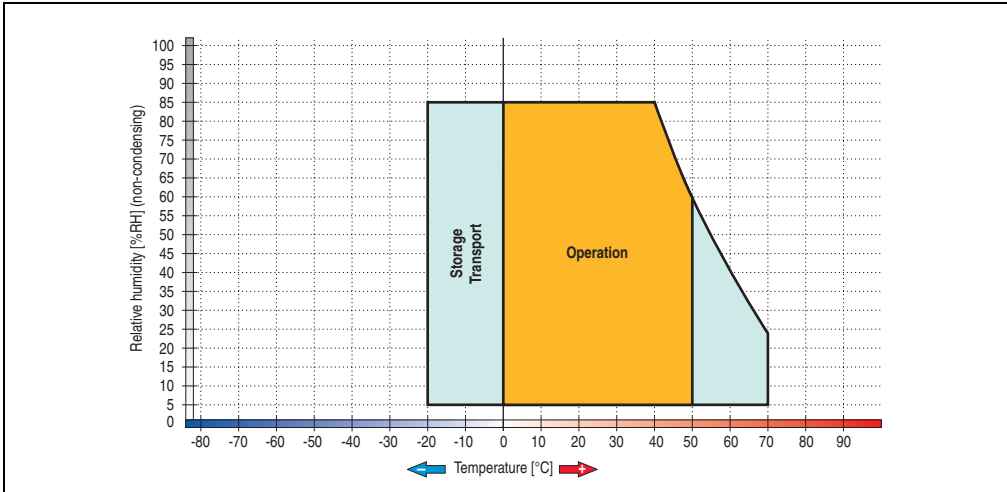


Figure 315: Temperature humidity diagram - Power Panel 200 light - Monochrome LCD

### 5.1.3 Temperature humidity diagram - Power Panel 200 light - Color LCD

The following diagram is valid for the devices 4PP220:0571-L25 and 4PP220:0571-L25.

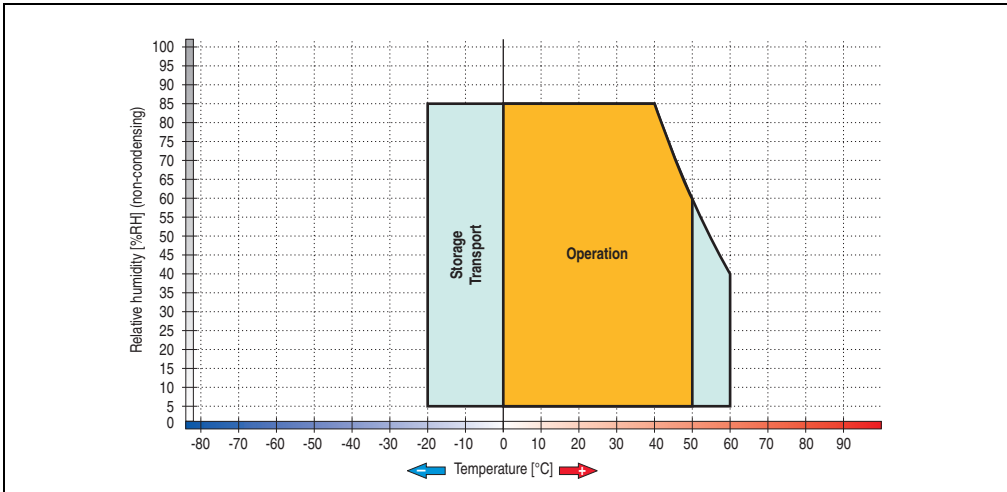


Figure 316: Temperature humidity diagram - Power Panel 200 light - Color LCD

5.1.4 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	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension			
Type	16 KB			
Expanded command set	-			
L1 cache	Yes			
L2 cache	Passive (heat sink)			
Floating point unit (FPU)	2 MB (for firmware)			
Cooling	Memory			
Method	Type DRAM Quantity 64 MB Socket SO-DIMM 144-pin			
Flash	Graphics			
Memory	Controller Geode SC2200 Memory 4 MB shared memory (reserved from the main memory) Screen rotation Yes (See also Section "Screen rotation" on page 448)			
SRAM	Quantity 256 KB Battery-buffered Yes			
Watchdog	Controller SMC <sup>1)</sup>			
Power failure logic	Controller SMC <sup>1)</sup> Buffer time 10 ms			
Real-time clock	Battery-buffered Yes Accuracy At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>			
Battery	Type Renata 950 mAh Removable Yes, accessible from the outside Lifespan 4 years <sup>3)</sup>			
Backup capacitor (for changing battery)	Buffer time 10 minutes			
Ethernet	Controller MacPhyter DP83816 Transfer rate 10/100 Mbps Connection RJ45 twisted pair (10 Base T / 100 Base T) Cables S/STP (category 5) NE2000-compatible -			
CompactFlash	Type Type I Amount 1 slot Connection Primary IDE device			

Table 140: Technical data - Power Panel 200 compact

## Technical data • Power Panel light / compact

Features	4PP220:0571-C05	4PP220:0571-C45	4PP220:0571-C25	4PP220:0571-C65
Serial interface COM 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 Amount 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 switch	2, 16 digits each			
aPCI slots	1 pcs. CAN aPCI module (31F771.9) inserted	1 pcs. X2X aPCI module (31F791.9) inserted	1 pcs. CAN aPCI module (31F771.9) inserted	1 pcs. X2X aPCI module (31F791.9) inserted
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	LCD monochrome 5.7 in (144 mm) 8 shades of gray QVGA, 320 x 240 pixels 25:1  Direction R / direction L = 40° Direction U = 40° / direction D = 50°  140 cd/m <sup>2</sup> 50,000 hours		Color LCD 5.7 in (144 mm) 256 colors QVGA, 320 x 240 pixels 40:1  Direction R / direction L = 40° Direction U = 40° / direction D = 50°  150 cd/m <sup>2</sup> 50,000 hours	
Touch screen Touch screen type Technology Controller Degree of transmission	Gunze Analog, resistive Hampshire, serial, 12-bit 84%			
Filter glass Degree of transmission Coating	-			
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	-			
<b>Electrical characteristics</b>				
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. Yes			
Bleeder resistance	≥ 47 kOhm			

Table 140: 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				
Ambient temperature <sup>6)</sup>				
Operation	0 to +50°C		0 to +50°C	
Storage	-20 to +70°C		-20 to +60°C	
Transport	-20 to +70°C		-20 to +60°C	
Relative humidity	See temperature humidity diagram, on page 414			
Vibration				
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g			
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g			
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g			
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g			
Shock				
Operation	15 g, 11 ms			
Storage	30 g, 15 ms			
Transport	30 g, 15 ms			
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 140: Technical data - Power Panel 200 compact (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values with inserted aPCI interface module
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 5.1.5 Temperature humidity diagram - Power Panel 200 compact - Monochrome LCD

The following diagram is valid for the devices 4PP220:0571-C05 and 4PP220:0571-C45.

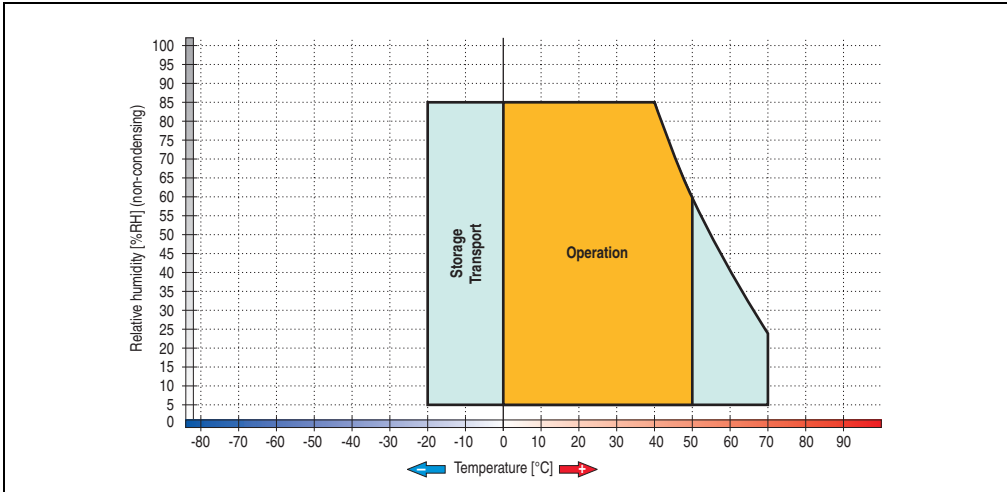


Figure 317: Temperature humidity diagram - Power Panel 200 compact - Monochrome LCD

### 5.1.6 Temperature humidity diagram - Power Panel 200 compact - Color LCD

The following diagram is valid for the devices 4PP220:0571-C25 and 4PP220:0571-C25.

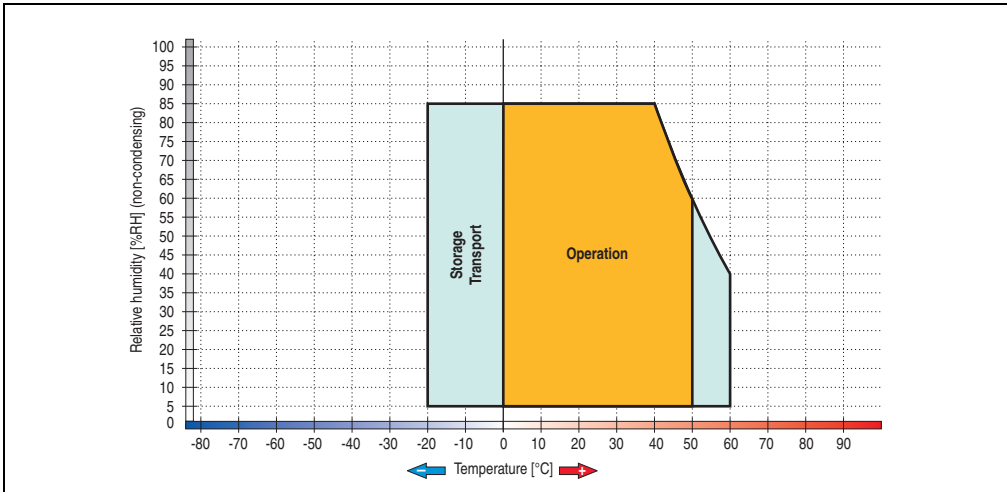


Figure 318: Temperature humidity diagram - Power Panel 200 compact - Color LCD

### 5.1.7 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 diagram 112 "Dimensions - 4PP220.0571-45" on page 168.

### 5.1.8 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 diagram 113 "Cutout dimensions" on page 169.

### 5.1.9 Contents of delivery

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

Amount	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 141: 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	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension			
Type	16 KB			
Expanded command set	-			
L1 cache	Yes			
L2 cache	Passive (heat sink)			
Floating point unit (FPU)	2 MB (for firmware)			
Cooling	Memory			
Method	Type DRAM Quantity 64 MB Socket SO-DIMM 144-pin			
Flash	Graphics			
Memory	Controller Geode SC2200 Memory 4 MB shared memory (reserved from the main memory) Screen rotation Yes (See also Section "Screen rotation" on page 448)			
SRAM	Quantity 256 KB Battery-buffered Yes			
Watchdog	Controller SMC <sup>1)</sup>			
Power failure logic	Controller SMC <sup>1)</sup> Buffer time 10 ms			
Real-time clock	Battery-buffered Yes Accuracy At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>			
Battery	Type Renata 950 mAh Removable Yes, accessible from the outside Lifespan 4 years <sup>3)</sup>			
Backup capacitor (for changing battery)	Buffer time 10 minutes			
Ethernet	Controller - Transfer rate Connection Cables NE2000-compatible			
CompactFlash	Type Type I Amount 1 slot Connection Primary IDE device			

Table 142: Technical data - Power Panel 251 light



## Technical data • Power Panel light / compact

Features	4PP251:0571-L05	4PP251:0571-L45	4PP251:0571-L25	4PP251:0571-L65
Serial interface COM 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 Amount 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 switch	2, 16 digits each			
aPCI slots	1 pcs. CAN aPCI module (31F771.9) inserted	1 pcs. X2X aPCI module (31F791.9) inserted	1 pcs. CAN aPCI module (31F771.9) inserted	1 pcs. X2X aPCI module (31F791.9) inserted
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	LCD monochrome 5.7 in (144 mm) 8 shades of gray QVGA, 320 x 240 pixels 25:1  Direction R / direction L = 40° Direction U = 40°/ direction D = 50°  140 cd/m <sup>2</sup> 50,000 hours		Color LCD 5.7 in (144 mm) 256 colors QVGA, 320 x 240 pixels 40:1  Direction R / direction L = 40° Direction U = 40°/ direction D = 50°  150 cd/m <sup>2</sup> 50,000 hours	
Touch screen Touch screen type Technology Controller Degree of transmission	-			
Filter glass Degree of transmission Coating	95% On both sides			
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force 16 with LED 6 with LED - 15 without LED 5 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>			

Table 142: Technical data - Power Panel 251 light (Forts.)

## Technical data • Power Panel light / compact

Electrical characteristics	4PP251:0571-L05	4PP251:0571-L45	4PP251:0571-L25	4PP251:0571-L65
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. Yes			
Bleeder resistance	≥ 47 kOhm			
Mechanical characteristics				
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	212 mm 245 mm 76 mm			
Weight	Approx. 2.6 kg (with aPCI interface module)			
Environmental characteristics				
Ambient temperature <sup>6)</sup> Operation Storage Transport	0 to +50°C -20 to +70°C -20 to +70°C		0 to +50°C -20 to +60°C -20 to +60°C	
Relative humidity	See temperature humidity diagram, on page 419			
Vibration Operation (continuous) Operation (occasional) Storage Transport	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g			
Shock Operation Storage Transport	15 g, 11 ms 30 g, 15 ms 30 g, 15 ms			
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 light (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values with inserted aPCI interface module
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 5.2.2 Temperature humidity diagram - Power Panel 251 light - Monochrome LCD

The following diagram is valid for the devices 4PP251:0571-L05 and 4PP251:0571-L45.

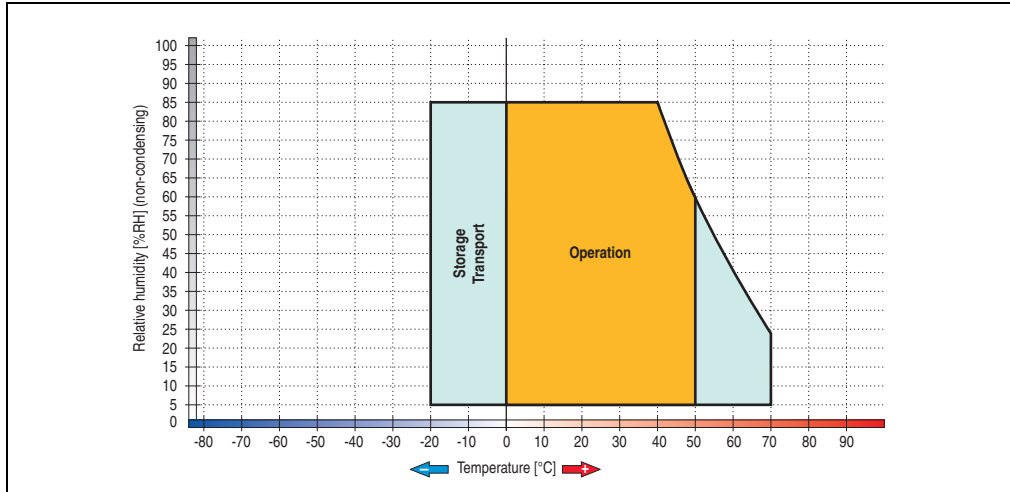


Figure 319: Temperature humidity diagram - Power Panel 251 light - Monochrome LCD

### 5.2.3 Temperature humidity diagram - Power Panel 251 light - Color LCD

The following diagram is valid for the devices 4PP251:0571-L25 and 4PP251:0571-L65.

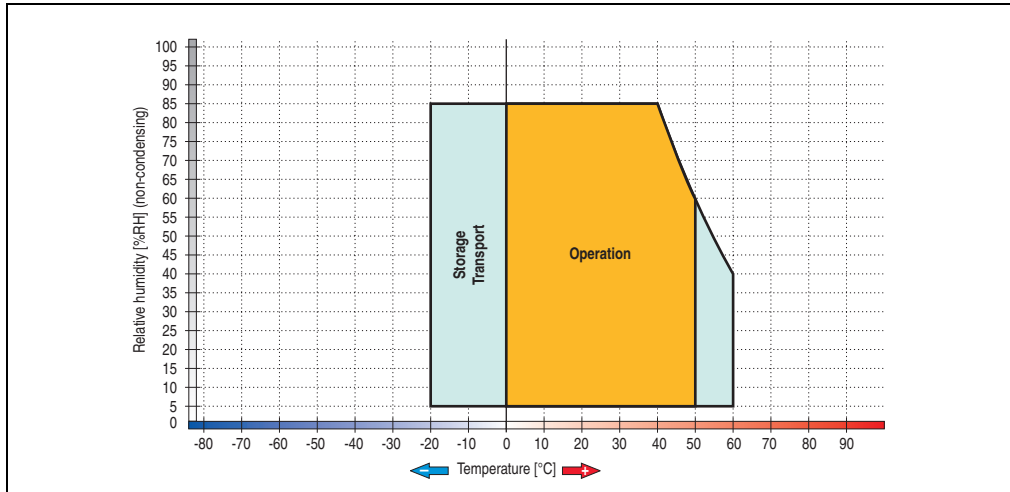


Figure 320: Temperature humidity diagram - Power Panel 251 light - Color LCD

**5.2.4 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	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension			
Type	16 KB			
Expanded command set	-			
L1 cache	Yes			
L2 cache	Passive (heat sink)			
Floating point unit (FPU)	2 MB (for firmware)			
Cooling	Memory			
Method	Type Quantity Socket			
Flash	DRAM 64 MB SO-DIMM 144-pin			
Memory	Graphics			
Type	Controller Memory Screen rotation			
Quantity	Geode SC2200 4 MB shared memory (reserved from the main memory) Yes (See also Section "Screen rotation" on page 448)			
Socket	SRAM			
SO-DIMM 144-pin	Quantity Battery-buffered			
4 MB shared memory (reserved from the main memory)	256 KB Yes			
Yes (See also Section "Screen rotation" on page 448)	Watchdog			
Yes	Controller			
Typically 10 ppm (1 seconds) per day <sup>2)</sup>	SMC <sup>1)</sup>			
4 years <sup>3)</sup>	Power failure logic			
10 minutes	Controller Buffer time			
10 minutes	SMC <sup>1)</sup> 10 ms			
10/100 Mbps	Real-time clock			
100 Base T / 100 Base T)	Battery-buffered Accuracy			
S/STP (category 5)	Yes At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>			
-	Battery			
-	Type Removable Lifespan			
-	Renata 950 mAh Yes, accessible from the outside 4 years <sup>3)</sup>			
-	Backup capacitor (for changing battery) Buffer time			
-	10 minutes			
-	Ethernet			
-	Controller Transfer rate Connection Cables NE2000-compatible			
-	MacPhyter DP83816 10/100 Mbps RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5)			
-	CompactFlash			
-	Type Amount Connection			
-	Type I 1 slot Primary IDE device			

Table 143: 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 COM 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 Amount 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 switch	2, 16 digits each			
aPCI slots	1 pcs. CAN aPCI module (31F771.9) inserted	1 pcs. X2X aPCI module (31F791.9) inserted	1 pcs. CAN aPCI module (31F771.9) inserted	1 pcs. X2X aPCI module (31F791.9) inserted
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	LCD monochrome 5.7 in (144 mm) 8 shades of gray QVGA, 320 x 240 pixels 25:1  Direction R / direction L = 40° Direction U = 40° / direction D = 50°  140 cd/m <sup>2</sup> 50,000 hours		Color LCD 5.7 in (144 mm) 256 colors QVGA, 320 x 240 pixels 40:1  Direction R / direction L = 40° Direction U = 40° / direction D = 50°  150 cd/m <sup>2</sup> 50,000 hours	
Touch screen Touch screen type Technology Controller Degree of transmission	-			
Filter glass Degree of transmission Coating	95% On both sides			
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force 16 with LED 6 with LED - 15 without LED 5 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>			
<b>Electrical characteristics</b>				
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. Yes			

Table 143: Technical data - Power Panel 251 compact (Forts.)

## Technical data • Power Panel light / compact

Electrical characteristics	4PP251:0571-C05	4PP251:0571-C45	4PP251:0571-C25	4PP251:0571-C65
Bleeder resistance	≥ 47 kOhm			
<b>Mechanical characteristics</b>				
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)			
<b>Environmental characteristics</b>				
Ambient temperature <sup>6)</sup>				
Operation	0 to +50°C		0 to +50°C	
Storage	-20 to +70°C		-20 to +60°C	
Transport	-20 to +70°C		-20 to +60°C	
Relative humidity	See temperature humidity diagram, on page 423			
Vibration				
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g			
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g			
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g			
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g			
Shock				
Operation	15 g, 11 ms			
Storage	30 g, 15 ms			
Transport	30 g, 15 ms			
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 143: Technical data - Power Panel 251 compact (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values with inserted aPCI interface module
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 5.2.5 Temperature humidity diagram - Power Panel 251 compact - Monochrome LCD

The following diagram is valid for the devices 4PP251:0571-C05 and 4PP251:0571-C45.

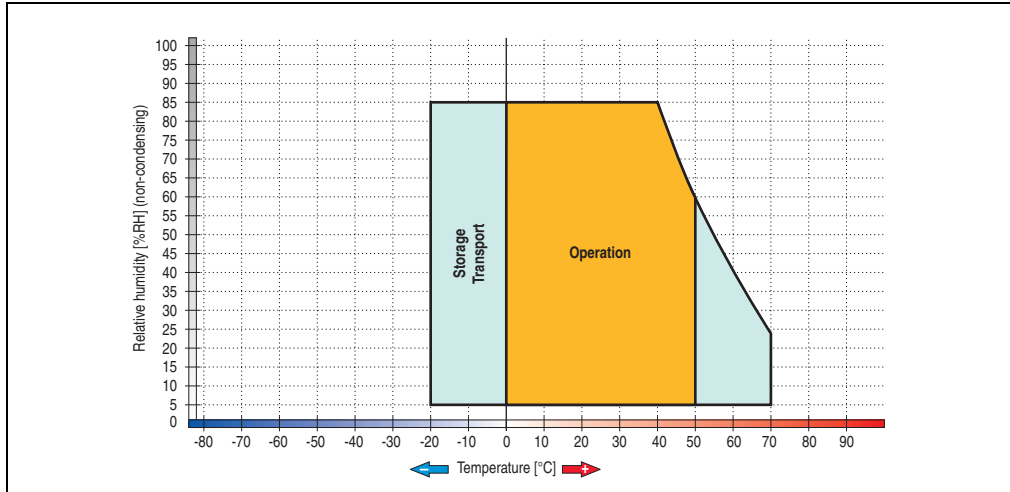


Figure 321: Temperature humidity diagram - Power Panel 251 compact - Monochrome LCD

### 5.2.6 Temperature humidity diagram - Power Panel 251 compact - Color LCD

The following diagram is valid for the devices 4PP251:0571-C25 and 4PP251:0571-C25.

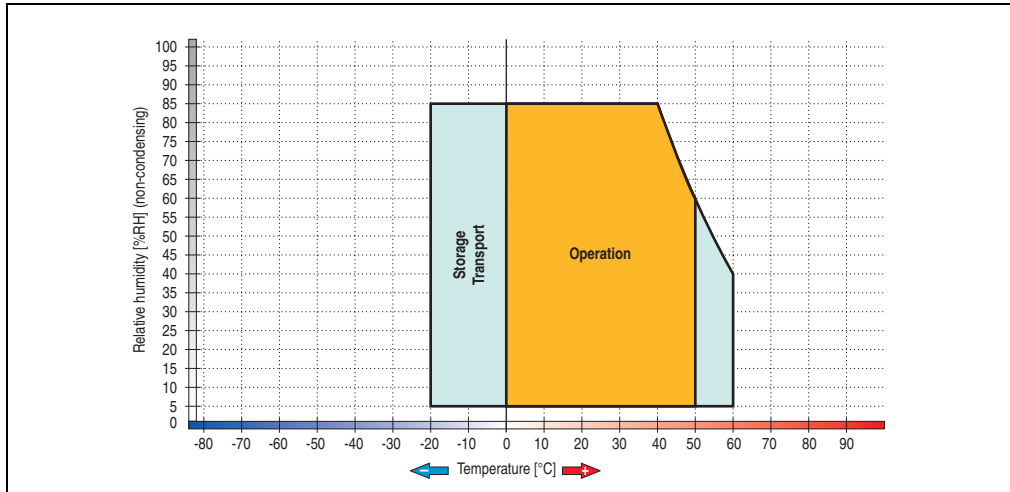


Figure 322: Temperature humidity diagram - Power Panel 251 compact - Color LCD

### 5.2.7 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 diagram 152 "Dimensions - 4PP251.0571-45" on page 216.

### 5.2.8 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 diagram 153 "Cutout dimensions" on page 217.

### 5.2.9 Contents of delivery

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

Amount	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	Legend strips (inserted in the front)
1	aPCI interface module (31F771.9 - aPCI interface 1x CAN or 31F791.9 - aPCI interface 1x X2X Link)

Table 144: 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 MMX technology, streaming SIMD extension			
Type	16 KB			
Expanded command set	-			
L1 cache	Yes			
L2 cache	Passive (heat sink)			
Floating point unit (FPU)	2 MB (for firmware)			
Cooling	Memory			
Method	Type DRAM			
Flash	Quantity 64 MB			
Memory	Socket SO-DIMM 144-pin			
Graphics	Controller Geode SC2200			
Controller	Memory 4 MB shared memory (reserved from the main memory)			
Memory	Screen rotation Yes (See also Section "Screen rotation" on page 448)			
Screen rotation	SRAM			
Quantity	Quantity 256 KB			
Battery-buffered	Yes			
Watchdog	Controller SMC <sup>1)</sup>			
Controller	Power failure logic			
Controller	Controller SMC <sup>1)</sup>			
Buffer time	10 ms			
Real-time clock	Battery-buffered			
Battery-buffered	Accuracy Yes			
Accuracy	At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>			
Battery	Type Renata 950 mAh			
Type	Removable Yes, accessible from the outside			
Removable	Lifespan 4 years <sup>3)</sup>			
Lifespan	Backup capacitor (for changing battery)			
Backup capacitor (for changing battery)	Buffer time 10 minutes			
Buffer time	Ethernet			
Ethernet	Controller -			
Controller	Transfer rate			
Transfer rate	Connection			
Connection	Cables			
Cables	NE2000-compatible			
NE2000-compatible	CompactFlash			
CompactFlash	Type Type I			
Type	Amount 1 slot			
Amount	Connection Primary IDE device			
Connection				

Table 145: Technical data - Power Panel 252 light

## Technical data • Power Panel light / compact

Features	4PP252:0571-L05	4PP252:0571-L45	4PP252:0571-L25	4PP252:0571-L65
Serial interface COM 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 Amount 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 switch	2, 16 digits each			
aPCI slots	1 pcs. CAN aPCI module (31F771.9) inserted	1 pcs. X2X aPCI module (31F791.9) inserted	1 pcs. CAN aPCI module (31F771.9) inserted	1 pcs. X2X aPCI module (31F791.9) inserted
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	LCD monochrome 5.7 in (144 mm) 8 shades of gray QVGA, 320 x 240 pixels 25:1  Direction R / direction L = 40° Direction U = 40° / direction D = 50°  140 cd/m <sup>2</sup> 50,000 hours		Color LCD 5.7 in (144 mm) 256 colors QVGA, 320 x 240 pixels 40:1  Direction R / direction L = 40° Direction U = 40° / direction D = 50°  150 cd/m <sup>2</sup> 50,000 hours	
Touch screen Touch screen type Technology Controller Degree of transmission	-			
Filter glass Degree of transmission Coating	95% On both sides			
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force 20 with LED - - 15 without LED 5 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>			
<b>Electrical characteristics</b>				
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. Yes			

Table 145: Technical data - Power Panel 252 light (Forts.)

## Technical data • Power Panel light / compact

Electrical characteristics	4PP252:0571-L05	4PP252:0571-L45	4PP252:0571-L25	4PP252:0571-L65
Bleeder resistance	≥ 47 kOhm			
Mechanical characteristics				
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				
Ambient temperature <sup>6)</sup>				
Operation	0 to +50°C		0 to +50°C	
Storage	-20 to +70°C		-20 to +60°C	
Transport	-20 to +70°C		-20 to +60°C	
Relative humidity	See temperature humidity diagram, on page 428			
Vibration				
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g			
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g			
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g			
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g			
Shock				
Operation	15 g, 11 ms			
Storage	30 g, 15 ms			
Transport	30 g, 15 ms			
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 light (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values with inserted aPCI interface module
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 5.3.2 Temperature humidity diagram - Power Panel 252 light - Monochrome LCD

The following diagram is valid for the devices 4PP252:0571-L05 and 4PP252:0571-L45.

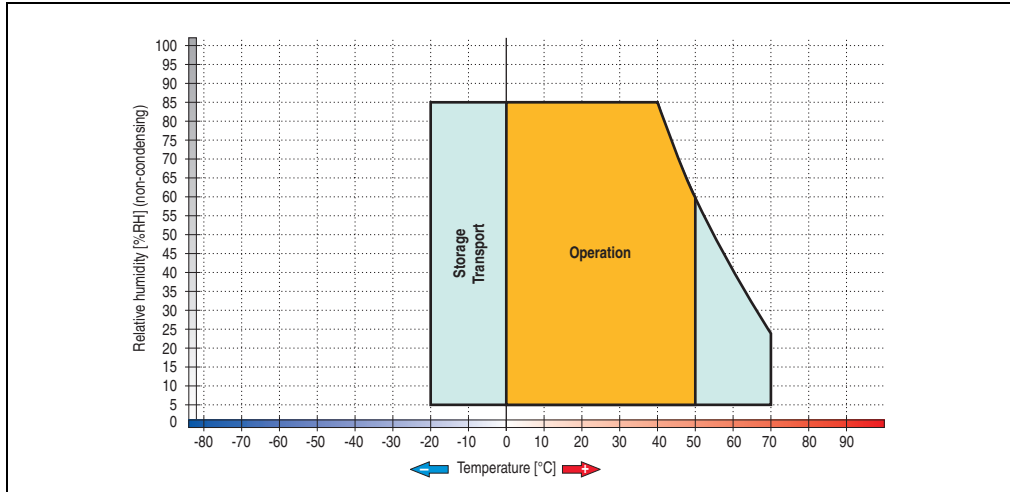


Figure 323: Temperature humidity diagram - Power Panel 251 light - Monochrome LCD

### 5.3.3 Temperature humidity diagram - Power Panel 252 light - Color LCD

The following diagram is valid for the devices 4PP252:0571-L25 and 4PP252:0571-L65.

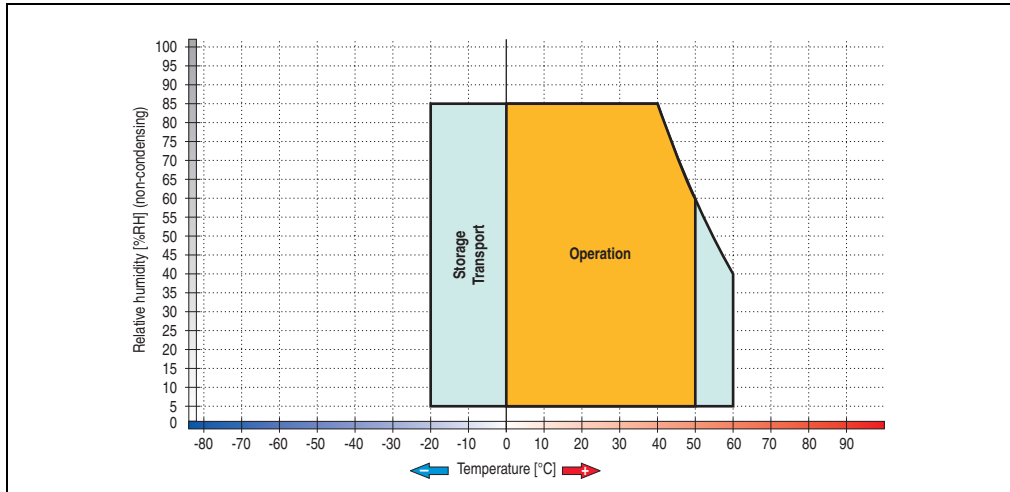


Figure 324: Temperature humidity diagram - Power Panel 251 light - Color LCD

5.3.4 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	Geode SC2200 266MHz, 32-bit x86 MMX technology, streaming SIMD extension			
Type	16 KB			
Expanded command set	-			
L1 cache	Yes			
L2 cache	Passive (heat sink)			
Floating point unit (FPU)	2 MB (for firmware)			
Cooling	Memory			
Method	Type DRAM			
Flash	Quantity 64 MB			
Memory	Socket SO-DIMM 144-pin			
Graphics	Controller Geode SC2200			
Controller	Memory 4 MB shared memory (reserved from the main memory)			
Memory	Screen rotation Yes (See also Section "Screen rotation" on page 448)			
Screen rotation	SRAM			
SRAM	Quantity 256 KB			
Quantity	Battery-buffered Yes			
Battery-buffered	Watchdog			
Watchdog	Controller SMC <sup>1)</sup>			
Controller	Power failure logic			
Power failure logic	Controller SMC <sup>1)</sup>			
Controller	Buffer time 10 ms			
Buffer time	Real-time clock			
Real-time clock	Battery-buffered Yes			
Battery-buffered	Accuracy At 25°C: Typically 10 ppm (1 seconds) per day <sup>2)</sup>			
Accuracy	Battery			
Battery	Type Renata 950 mAh			
Type	Removable Yes, accessible from the outside			
Removable	Lifespan 4 years <sup>3)</sup>			
Lifespan	Backup capacitor (for changing battery)			
Backup capacitor (for changing battery)	Buffer time 10 minutes			
Buffer time	Ethernet			
Ethernet	Controller MacPhyter DP83816			
Controller	Transfer rate 10/100 Mbps			
Transfer rate	Connection RJ45 twisted pair (10 Base T / 100 Base T)			
Connection	Cables S/STP (category 5)			
Cables	NE2000-compatible -			
NE2000-compatible	CompactFlash			
CompactFlash	Type Type I			
Type	Amount 1 slot			
Amount	Connection Primary IDE device			
Connection				

Table 146: Technical data - Power Panel 252 compact

## Technical data • Power Panel light / compact

Features	4PP252:0571-C05	4PP252:0571-C45	4PP252:0571-C25	4PP252:0571-C65
Serial interface COM 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 Amount 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 switch	2, 16 digits each			
aPCI slots	1 pcs. CAN aPCI module (31F771.9) inserted	1 pcs. X2X aPCI module (31F791.9) inserted	1 pcs. CAN aPCI module (31F771.9) inserted	1 pcs. X2X aPCI module (31F791.9) inserted
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 600) Horizontal Vertical Background lighting Brightness Half-brightness time <sup>4)</sup>	LCD monochrome 5.7 in (144 mm) 8 shades of gray QVGA, 320 x 240 pixels 25:1  Direction R / direction L = 40° Direction U = 40° / direction D = 50°  140 cd/m <sup>2</sup> 50,000 hours		Color LCD 5.7 in (144 mm) 256 colors QVGA, 320 x 240 pixels 40:1  Direction R / direction L = 40° Direction U = 40° / direction D = 50°  150 cd/m <sup>2</sup> 50,000 hours	
Touch screen Touch screen type Technology Controller Degree of transmission	-			
Filter glass Degree of transmission Coating	95% On both sides			
Keys Key lifespan Function keys Soft keys Cursor keys Number block Other keys	> 1,000,000 actuations at 1±0.3 to 3±0.3 N actuating force 20 with LED - - 15 without LED 5 without LED  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>			
<b>Electrical characteristics</b>				
Power supply Rated voltage Starting current Power consumption <sup>5)</sup> Electrical isolation	24 VDC ±25% Max. 20 A for < 1 ms 15 W typical, 20 W max. Yes			

Table 146: Technical data - Power Panel 252 compact (Forts.)

## Technical data • Power Panel light / compact

Electrical characteristics	4PP252:0571-C05	4PP252:0571-C45	4PP252:0571-C25	4PP252:0571-C65
Bleeder resistance	≥ 47 kOhm			
Mechanical characteristics				
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				
Ambient temperature <sup>6)</sup>				
Operation	0 to +50°C		0 to +50°C	
Storage	-20 to +70°C		-20 to +60°C	
Transport	-20 to +70°C		-20 to +60°C	
Relative humidity	See temperature humidity diagram, on page 432			
Vibration				
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g			
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g			
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g			
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g			
Shock				
Operation	15 g, 11 ms			
Storage	30 g, 15 ms			
Transport	30 g, 15 ms			
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 146: Technical data - Power Panel 252 compact (Forts.)

- 1) System Management Controller
- 2) At max. specified ambient temperature: typ. 25 ppm (2 seconds) - worst-case 60 ppm (5 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
- 4) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Values with inserted aPCI interface module
- 6) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 5.3.5 Temperature humidity diagram - Power Panel 252 compact - Monochrome LCD

The following diagram is valid for the devices 4PP252:0571-C05 and 4PP252:0571-C45.

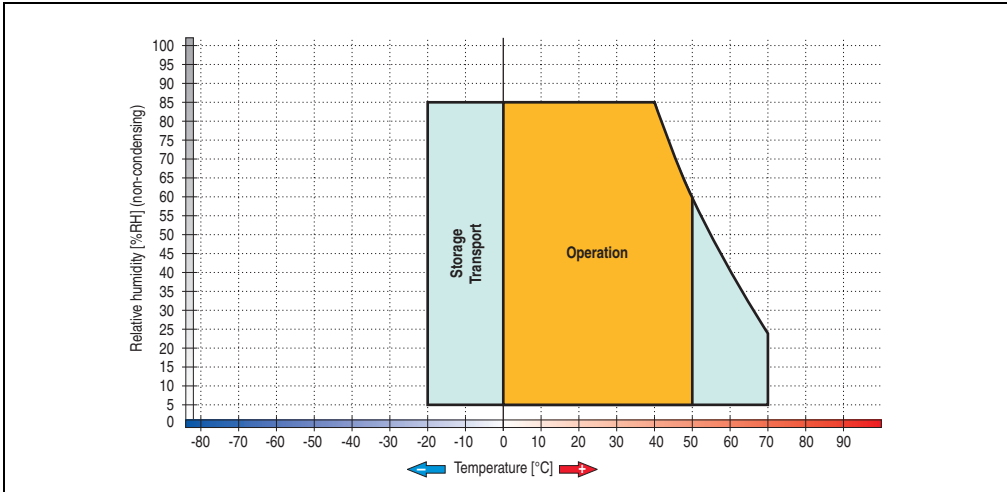


Figure 325: Temperature humidity diagram - Power Panel 252 compact - Monochrome LCD

### 5.3.6 Temperature humidity diagram - Power Panel 252 compact - Color LCD

The following diagram is valid for the devices 4PP252:0571-C25 and 4PP252:0571-C25.

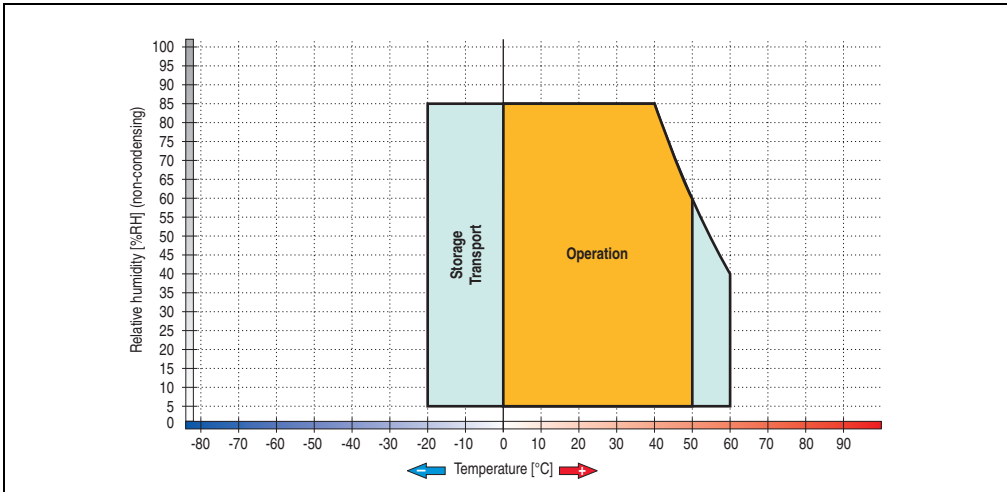


Figure 326: Temperature humidity diagram - Power Panel 252 compact - Color LCD



### 5.3.7 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 diagram 192 "Dimensions - 4PP252.0571-45" on page 264.

### 5.3.8 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 diagram 193 "Cutout dimensions" on page 265.

### 5.3.9 Contents of delivery

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

Amount	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	Legend strips (inserted in the front)
1	aPCI interface module (31F771.9 - aPCI interface 1x CAN or 31F791.9 - aPCI interface 1x X2X Link)

Table 147: Contents of delivery - Power Panel 252 light / compact



## Chapter 3 • Commissioning

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### 1. Mounting instructions

- The Power Panel must be mounted using the retaining clips included in delivery. Depending on the Power Panel version, a corresponding number of retaining clips are included.



Figure 327: 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 diagram below. Free space specifications apply to all Power Panel versions (with/without aPCI slots and keys).

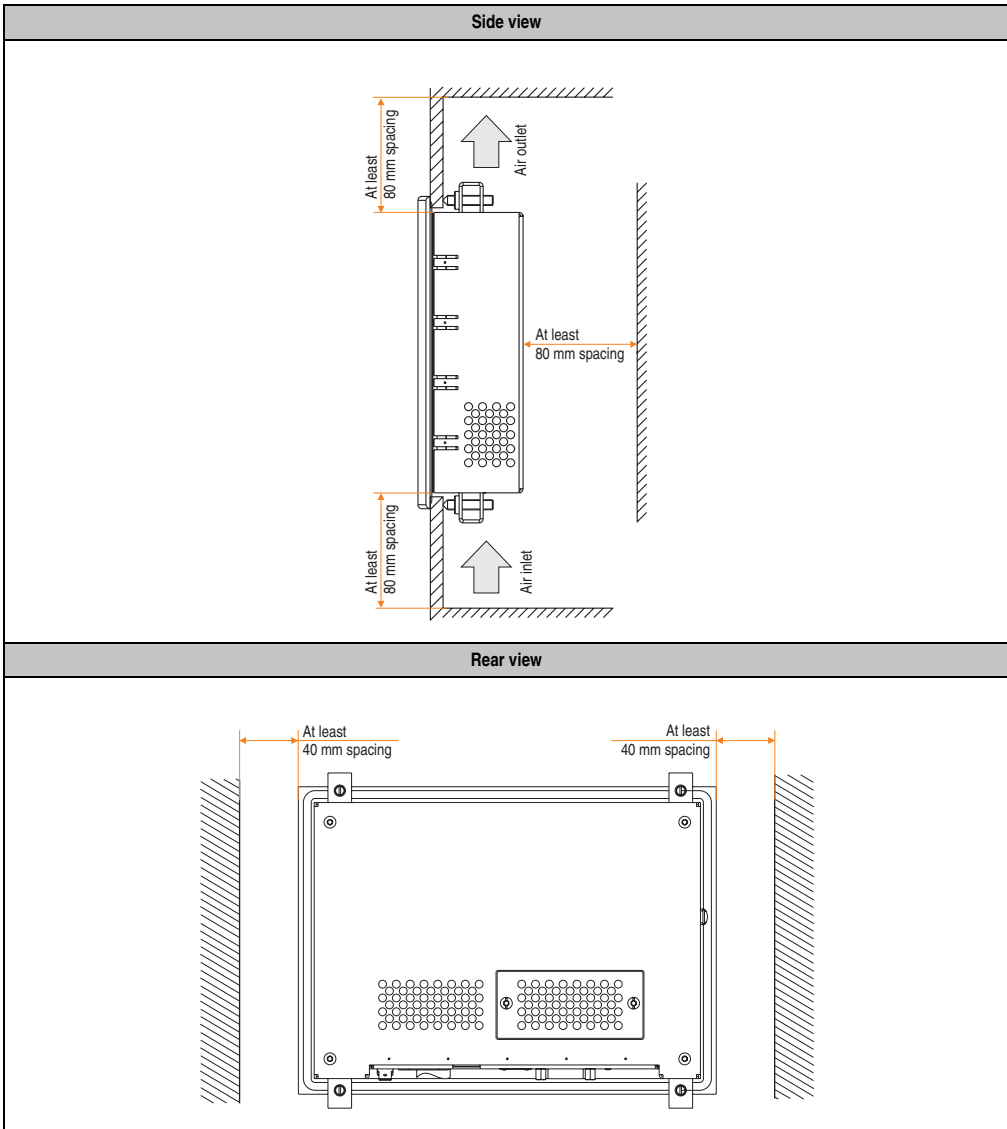


Figure 328: Space for air circulation

## 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).

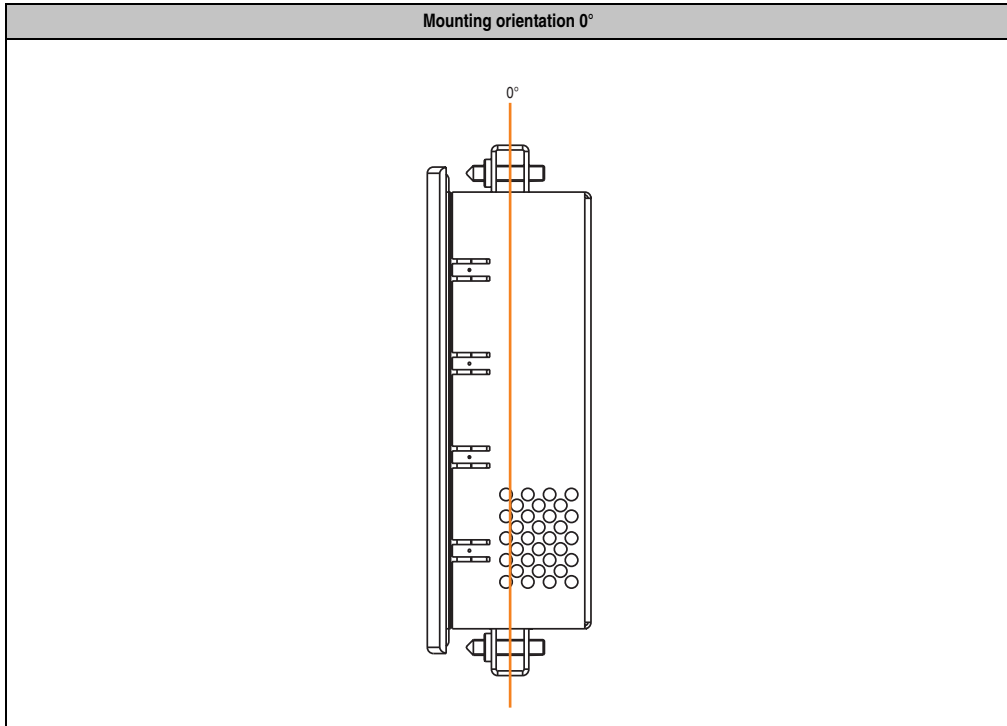


Table 148: Mounting orientation 0°

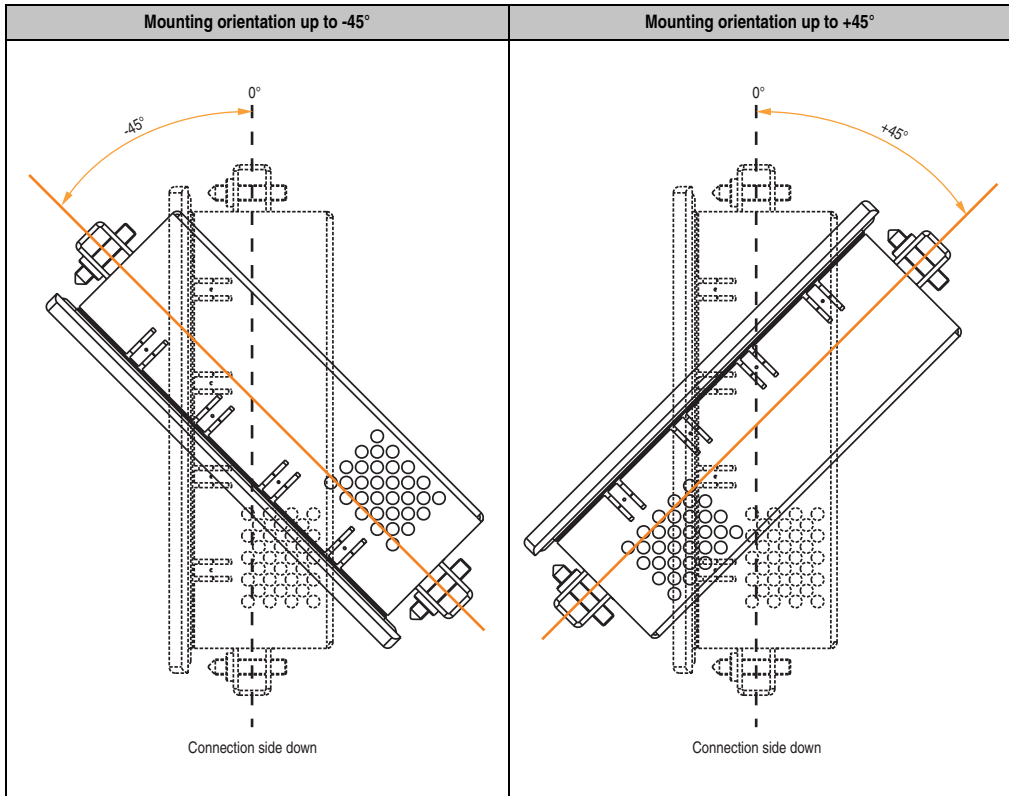


Table 149: Mounting orientation  $-45^\circ$  and  $+45^\circ$ .

## Caution!

The maximum permitted ambient temperature can be found in the technical data for the respective Power Panel device.

### 3. Key and LED configurations

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

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

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

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

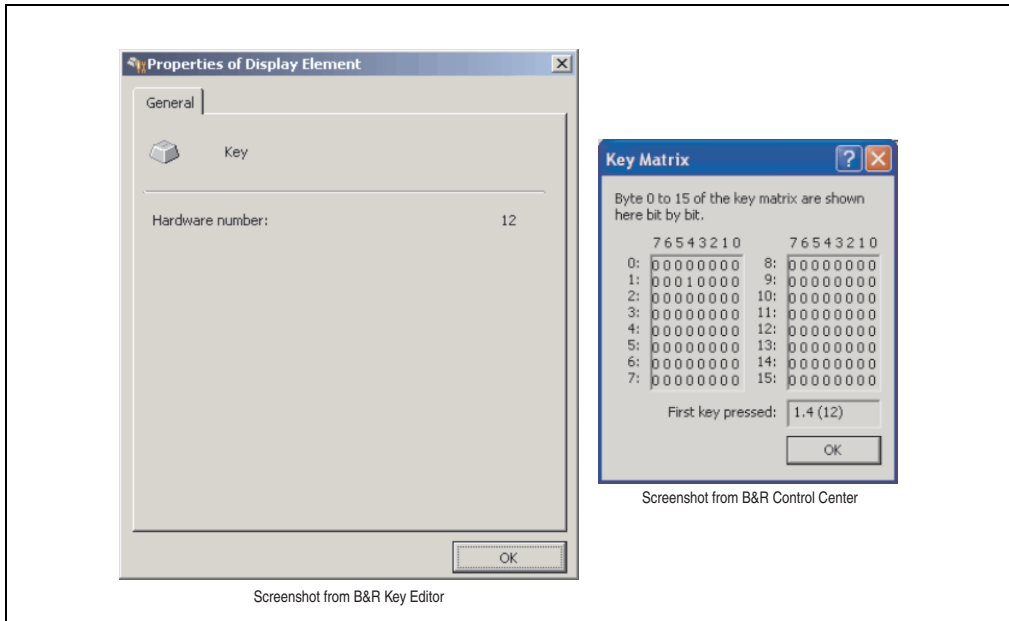


Figure 329: Example - Hardware number in the B&R Key Editor or in the B&R Control Center

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

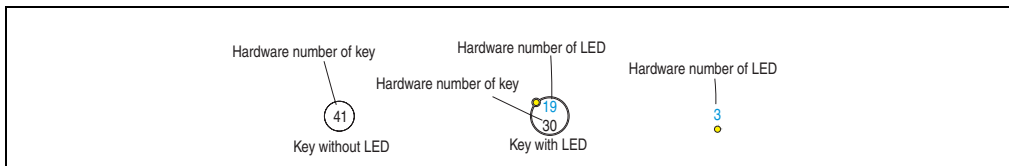


Figure 330: Display - Keys and LEDs in the matrix

### 3.1 Power Panel 5.7" QVGA

#### 3.1.1 Format - Vertical1

Hardware numbers for 4PP151.0571-01, 4PP151.0571-21, 4PP251.0571-45, 4PP251.0571-65, 4PP251.0571-85 and 4PP251.0571-A5.

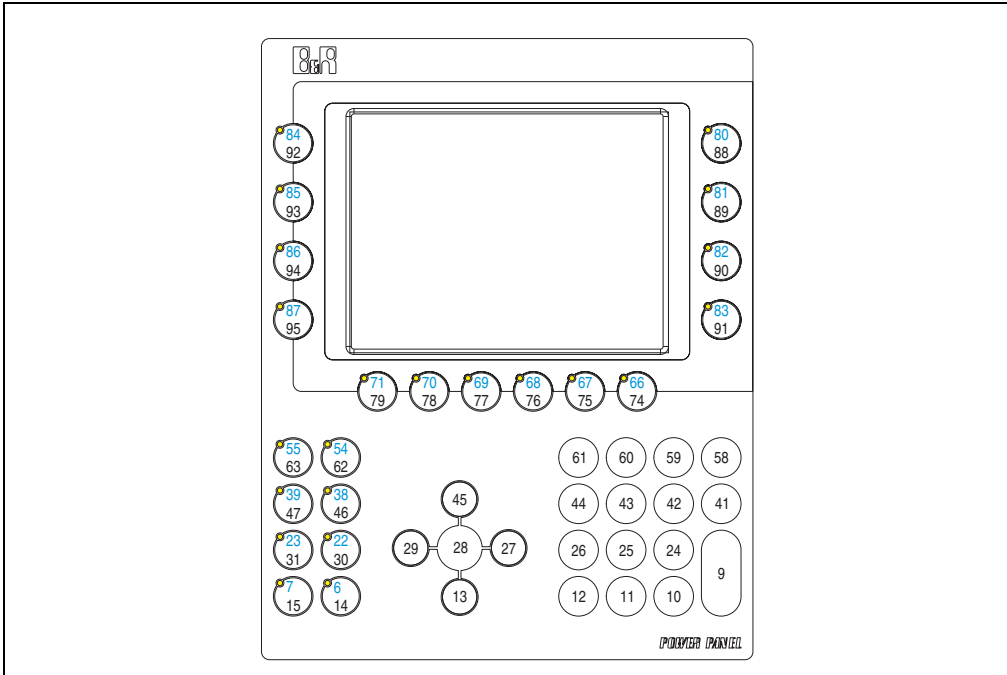


Figure 331: Hardware numbers - 5.7" device format - Vertical1



### 3.1.2 Format - Horizontal2

Hardware numbers for 4PP152.0571-01, 4PP152.0571-21, 4PP252.0571-45, 4PP252.0571-65, 4PP2520571-85 and 4PP252.0571-A5.

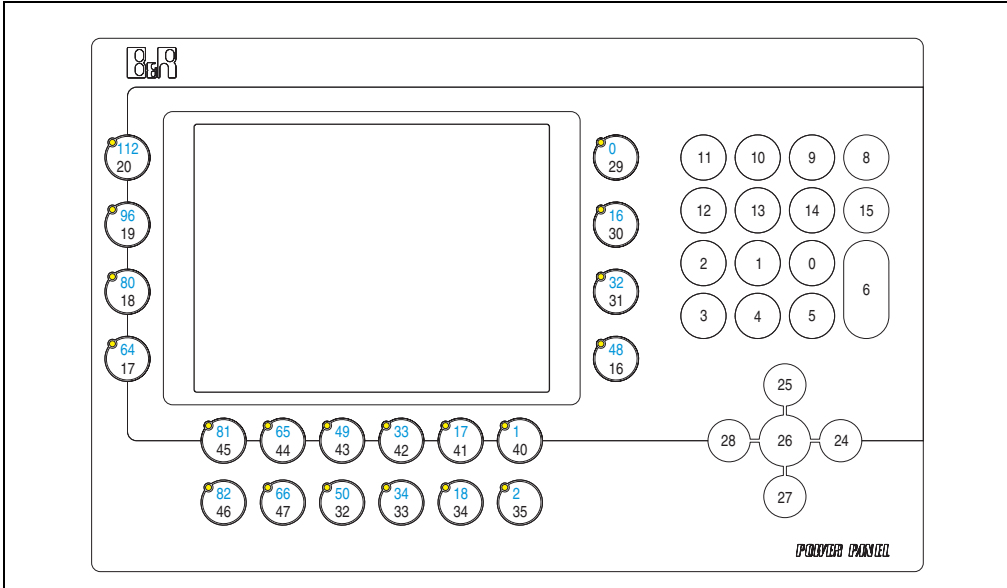


Figure 332: Hardware numbers - 5.7" device format - Horizontal2

### 3.2 Power Panel 10.4" VGA

#### 3.2.1 Format - Horizontal1

Hardware numbers for 4PP180.1043-31, 4PP280.1043-75 and 4PP280.1043-B5.

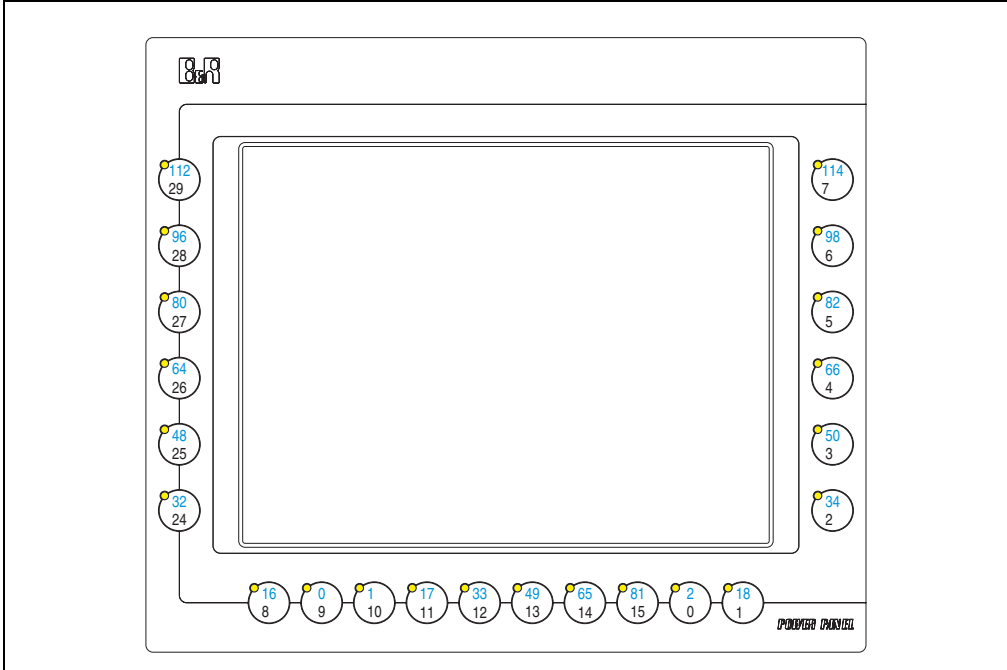


Figure 333: Hardware numbers - 10.4" device format - Horizontal1

### 3.2.2 Format - Vertical1

Hardware numbers for 4PP151.1043-31, 4PP181.1043-31, 4PP281.1043-75 and 4PP281.1043-B5.

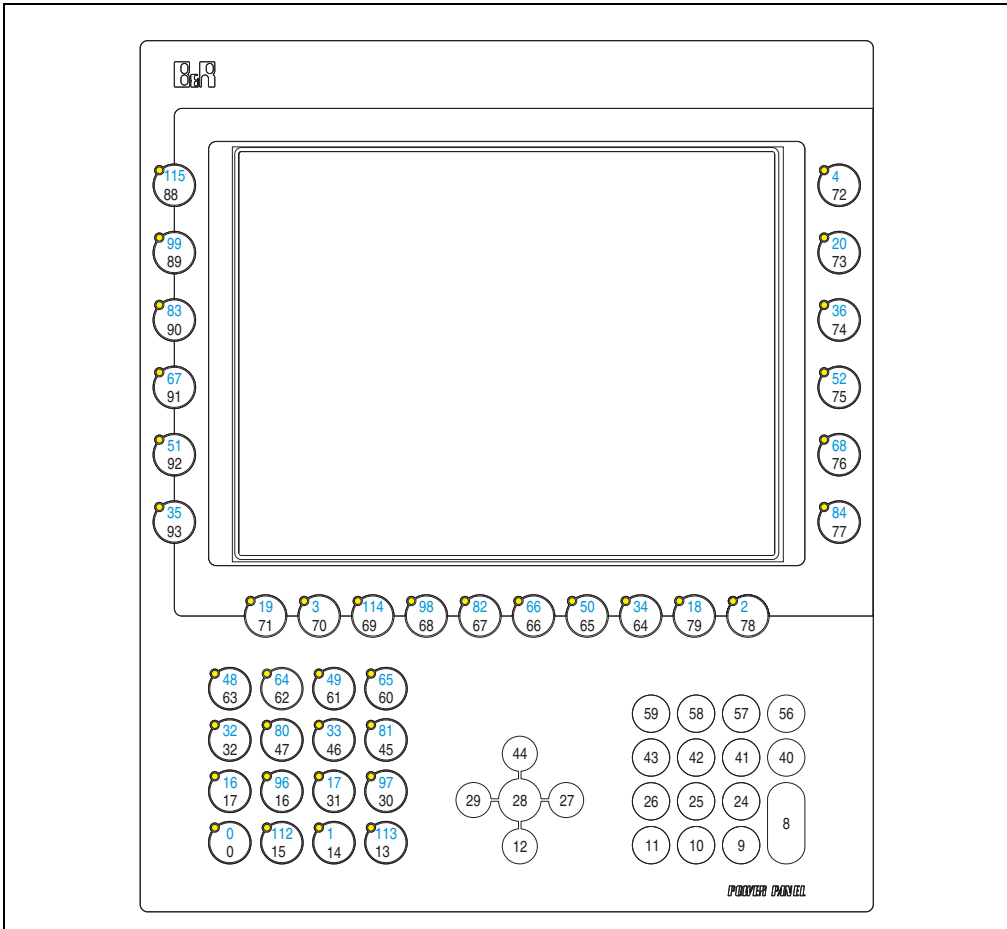


Figure 334: Hardware numbers - 10.4" device format - Vertical1

3.2.3 Format - Horizontal2

Hardware numbers for 4PP152.1043-3.1, 4PP182.1043-31, 4PP252.1043-75, 4PP252.1043-B5, 4PP282.1043-75 and 4PP282.1043-B5

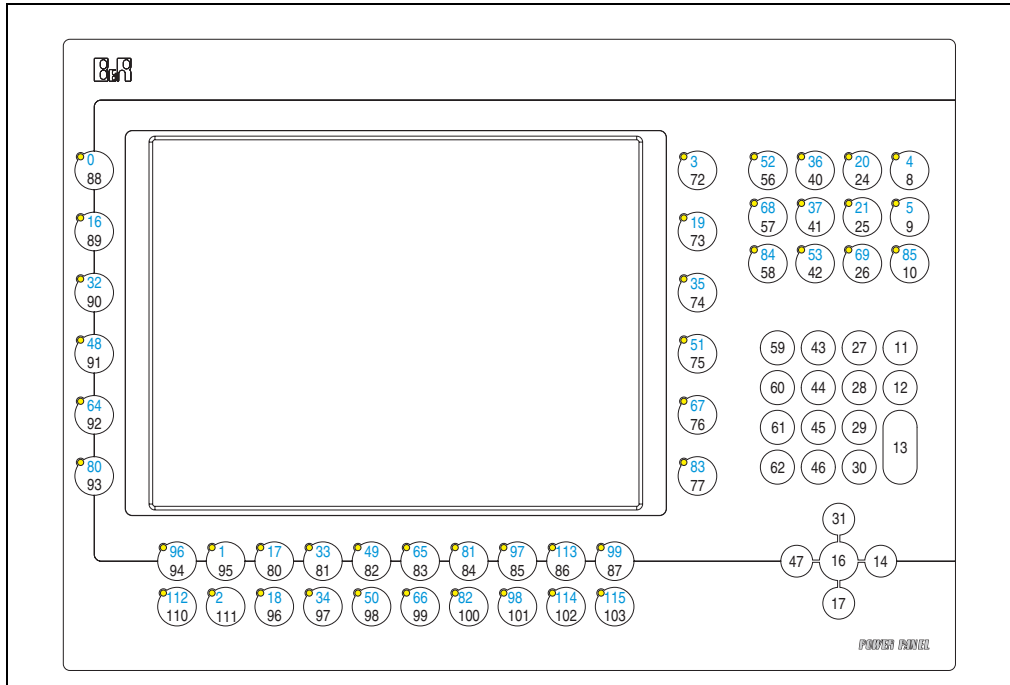


Figure 335: Hardware numbers - 10.4" device format - Horizontal2

### 3.3 Power Panel 15" XGA

#### 3.3.1 Format - Horizontal1

Hardware numbers for 4PP180.1505-31, 4PP280.1505-75 and 4PP280.1505-B5.

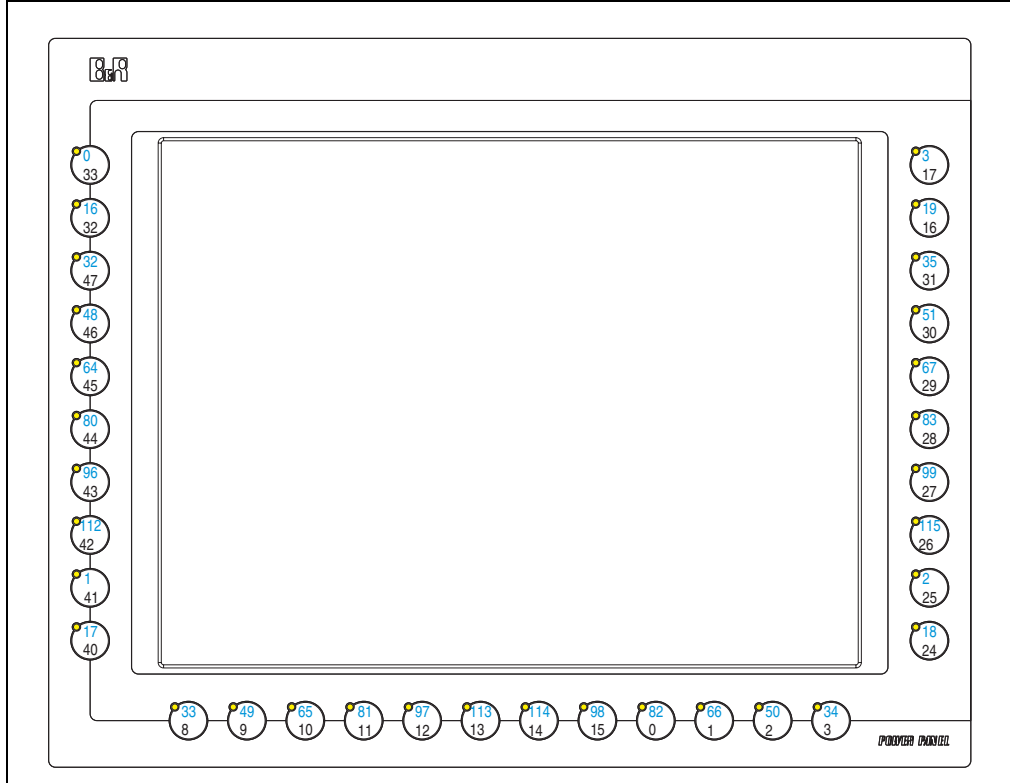


Figure 336: Hardware numbers - 15" device format - Horizontal1

3.3.2 Format - Vertical1

Hardware numbers for 4PP151.1505-31, 4PP181.1505-31, 4PP251.1505-75, 4PP251.1505-B5, 4PP281.1505-75 and 4PP281.1505-B5.

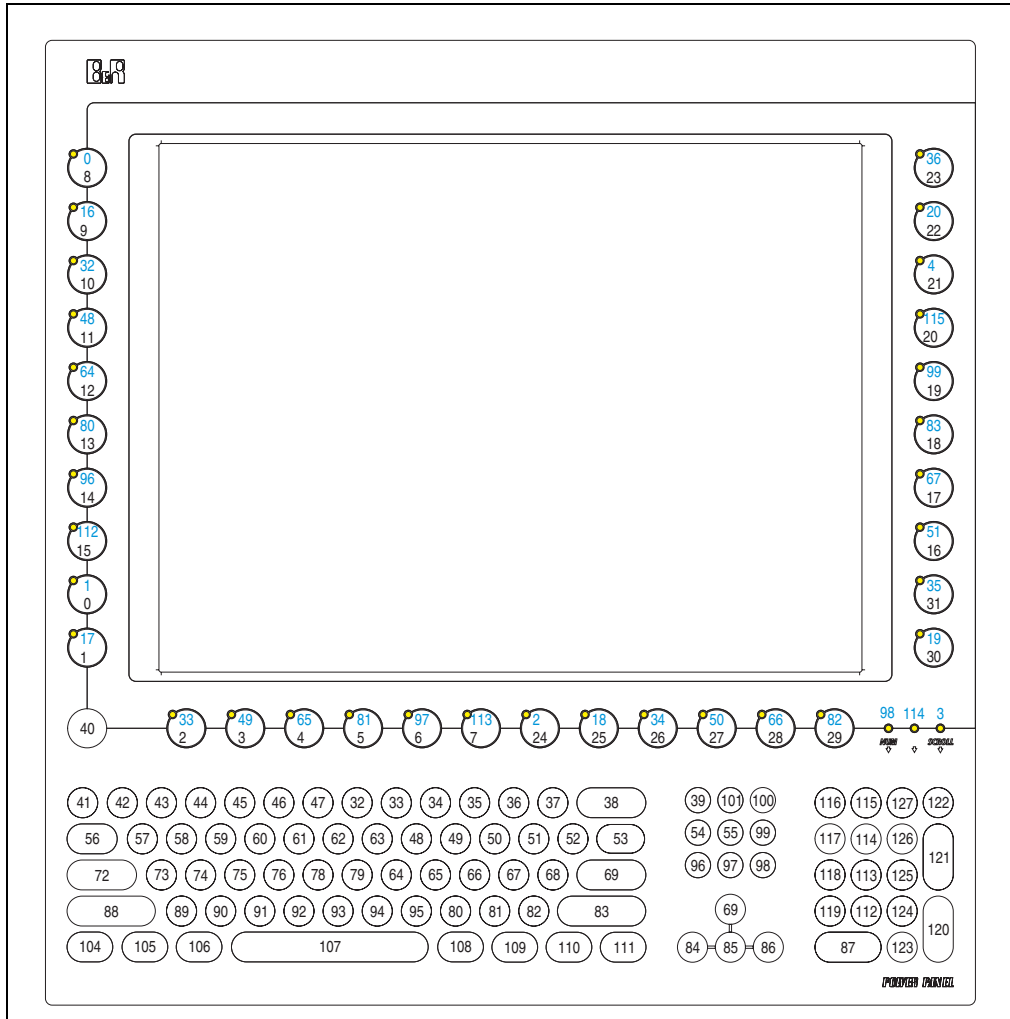


Figure 337: Hardware numbers - 15" device format - Vertical1

## 4. Touch screen calibration

### 4.1 Windows CE

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

### 4.2 Windows XP Embedded

After first starting Windows XP embedded (First Boot Agent), the touch screen driver must be installed in the device in order to operate the touch screen. The corresponding drivers can be downloaded from the download area on the B&R homepage ([www.br-automation.com](http://www.br-automation.com)). The touch screen should be calibrated while installing the driver.

### 4.3 Automation Runtime / Visual Components

The devices are already set up at the plant (pre-calibration). This feature proves advantageous in the case of a replacement part because a new calibration is no longer required when exchanging devices (identical model / type). Nevertheless, we recommend calibrating the device in order to achieve the best results and to better readjust the touch screen to the user's preferences.

If the touch screen is calibrated manually, the pre-calibrated settings are overwritten.

## 5. Screen rotation

It is possible to rotate the image content by 90° using the graphic driver's screen rotation function (must support the function).

### 5.1 Power Panel 100 BIOS

#### 5.1.1 Windows XP embedded

The graphics driver does not support the screen rotation function.

#### 5.1.2 Windows CE

The graphics driver supports the screen rotation function. The touch screen must be recalibrated after rotation 1 (manual restart or when prompted by the operating system).

### 5.2 PowerPanel 100/200 Automation Runtime

#### 5.2.1 Automation Runtime / Visual Components

Automation Runtime supports the screen rotation function. When developing a project using Automation Studio 2.7.x or 3.0.x, you can select the orientation of the display before getting started.

### 5.3 Power Panel light / compact Automation Runtime

#### 5.3.1 Automation Runtime / Visual Components

Automation Runtime supports the screen rotation function. When developing a project using Automation Studio 2.7.x or 3.0.x, you can select the orientation of the display before getting started.



## 6. User tips for increasing the display lifespan

### 6.1 Backlight

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

### 6.2 How can the lifespan of backlights be extended?

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

### 6.3 Image sticking

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

There are 2 types of this:

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

### 6.4 What causes image sticking?

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

## 6.5 How can image sticking be avoided?

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

## 7. Pixel error

### **Information:**

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

## 8. Known problems / issues

The following issues for the PP100/200 devices are known:

- Using two different types of CompactFlash cards can cause problems in Automation PCs and Panel PCs. This can result in one of the two cards not being detected during system startup. This is caused by varying startup speeds. CompactFlash cards with older technology require significantly more time during system startup than CompactFlash cards with newer technology. This behavior occurs near the limits of the time frame provided for startup. The problem described above can occur because the startup time for the CompactFlash cards fluctuates due to the variance of the components being used. Depending on the CompactFlash cards being used, this error might never, sometimes or always occur.



# Chapter 4 • Software

## 1. Power Panel 100/200 with Automation Runtime

### 1.1 General information

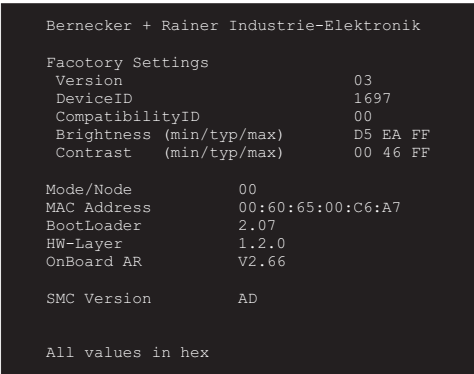
B&R Automation Runtime guarantees a uniform runtime environment for Automation Studio programs on all target systems. This ensures uniform programming and operation on all devices.

Automation Runtime possesses a multitasking operating system adapted specially 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 "Booting, please wait..." message. 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 338: Automation Runtime summary screen

## Software • Power Panel 100/200 with Automation Runtime

Information	Example value	Meaning
Version	03	Displays the factory settings version. These factory settings determine the device ID, display ID, display-specific initialization sequences, and other important parameters.  <b>Information:</b> <b>Factory settings are set by B&amp;R and cannot be changed by the user!</b>
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 150: 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.

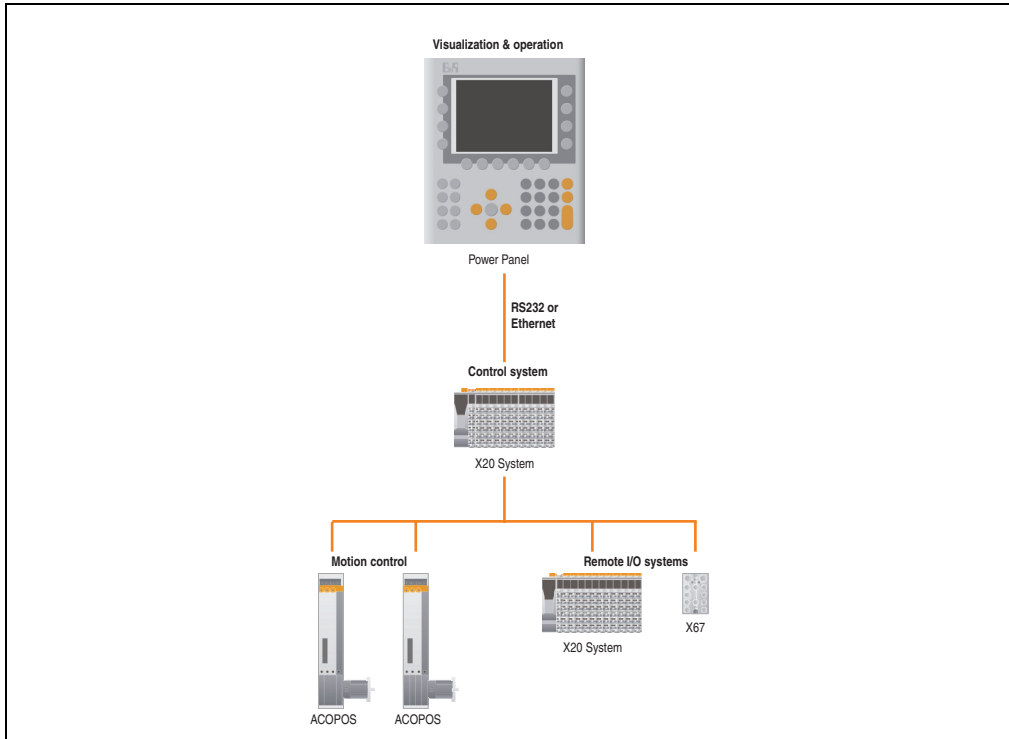


Figure 339: Power Panel 100 as an intelligent visualization system

### 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.

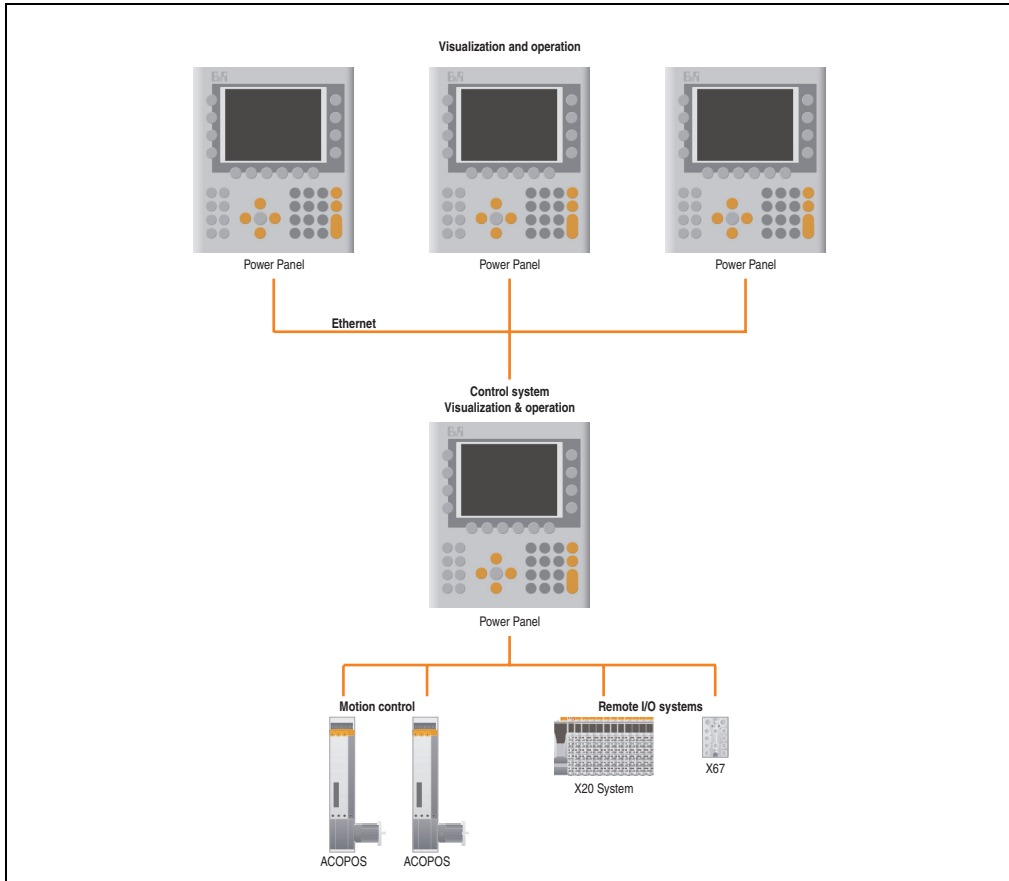


Figure 340: Power Panel 200 with Power Panel 100 terminals



## 1.4 Automation Runtime and SMC

The SMC (system management controller) monitors the following events on a Power Panel device.

- Voltage dips (power failures)
- Watchdog events
- Reset button
- Overtemperature
- Software reset

Data communication between the SMC and the Geode processor takes place over the serial I<sup>2</sup>C bus.

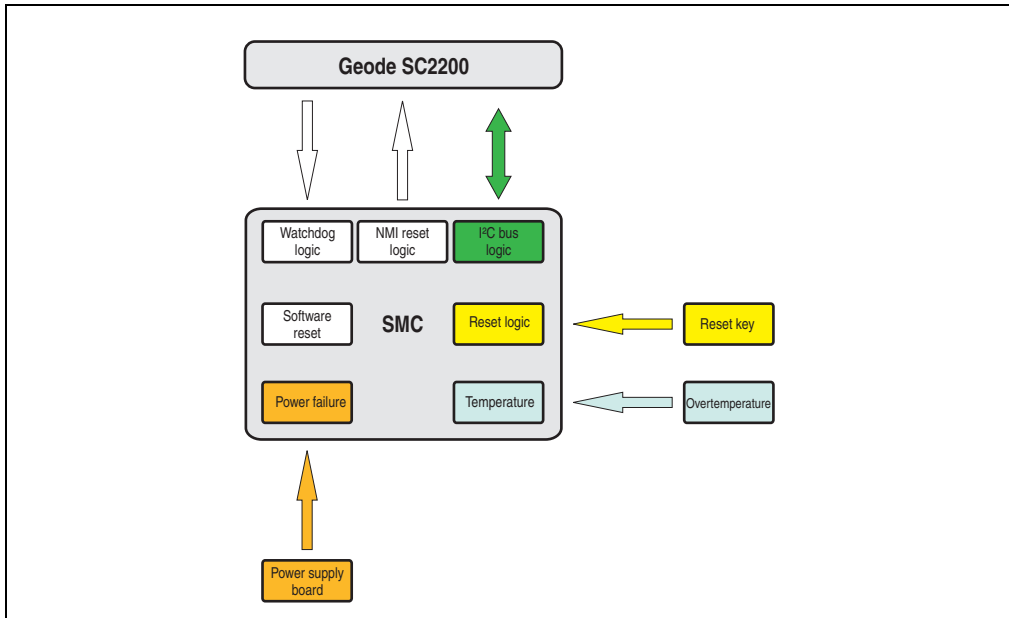


Figure 341: Block diagram of SMC and Geode processor data communication

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 failures)

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.

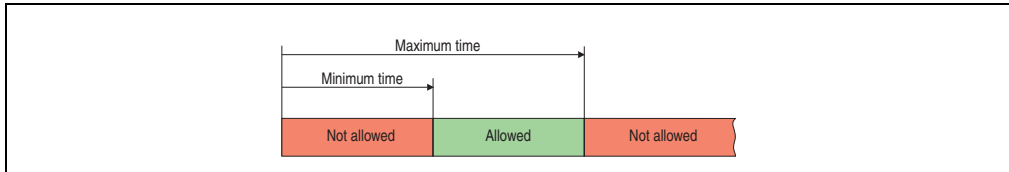


Figure 342: Watchdog events

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 Over-temperature

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 338 "Automation Runtime summary screen" on page 453).

	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 151: 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**nput 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 the POST. This displays the following information depending on the Power Panel display diagonal:

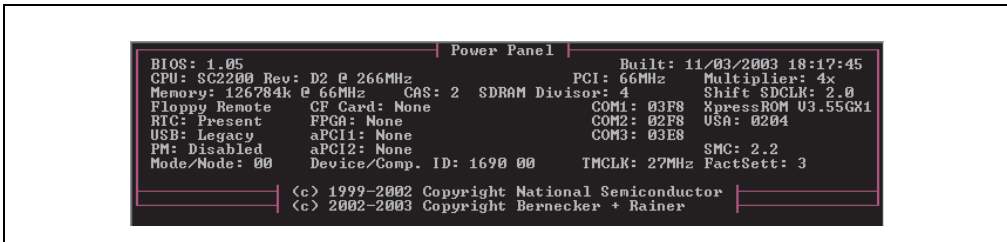


Figure 343: BIOS summary screen for VGA, SVGA, XGA Power Panel devices

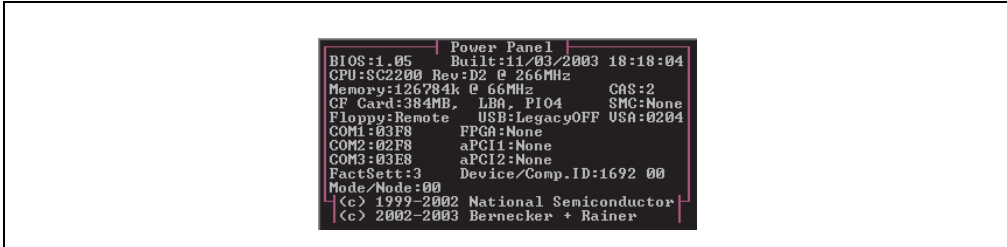


Figure 344: BIOS summary screen for QVGA Power Panel devices

To disable this summary screen, see the section "Advanced BIOS features" on page 473 for VGA, SVGA and XGA Power Panel devices and the section 2.3.4 "Advanced BIOS features" on page 496 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 in the upper margin of the display (during the POST):



Figure 345: Press DEL for setup

If the message disappears before DEL has been pressed<sup>1)</sup>, then the Power Panel must be booted again in order to enter BIOS setup.

## Information:

**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 keys<sup>1)</sup> help you navigate in BIOS setup:

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

Table 152: 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

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

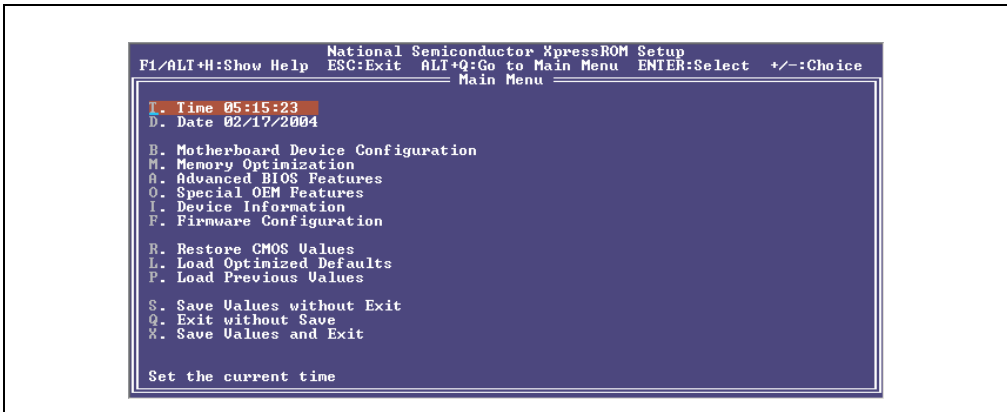


Figure 346: BIOS setup main menu

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

Shortcut	BIOS setup menu	Function
T	Time 05:15:23 AM	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 (boot logo, summary screen, cache areas) 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.

Table 153: Overview of BIOS main menu functions

Shortcut	BIOS setup menu	Function
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 values configured when BIOS setup was opened. All changes are lost.
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 153: Overview of BIOS main menu functions (Forts.)

## Information:

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

### 2.2.2 Time

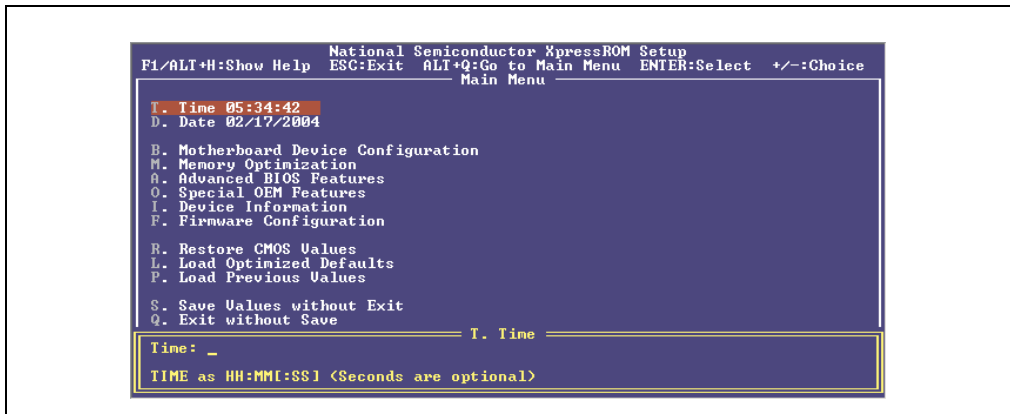


Figure 347: BIOS time menu

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.

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

Example: Set time to 13:00:00.

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

- 13:00:00 - Confirm with Enter
- 01:00:00 PM - Confirm with Enter
- 13 - Confirm with Enter

## Information:

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

### 2.2.3 Date

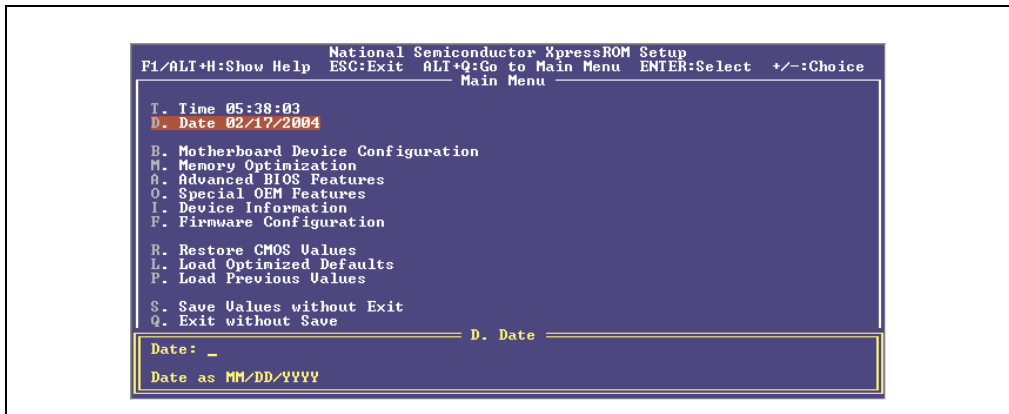


Figure 348: BIOS date menu

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.

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

Example: Set date to 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

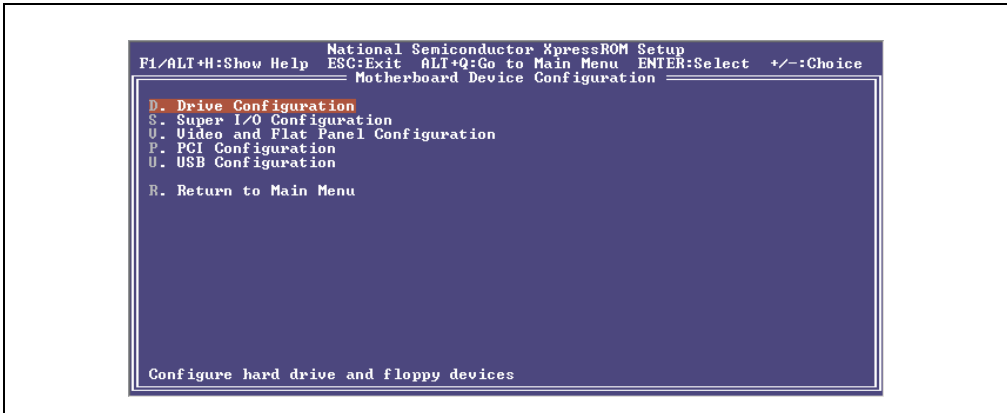


Figure 349: BIOS motherboard device configuration menu

Shortcut	BIOS setup menu	Function
D	Drive configuration	Settings for the 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 154: BIOS motherboard device configuration menu

## Drive configuration

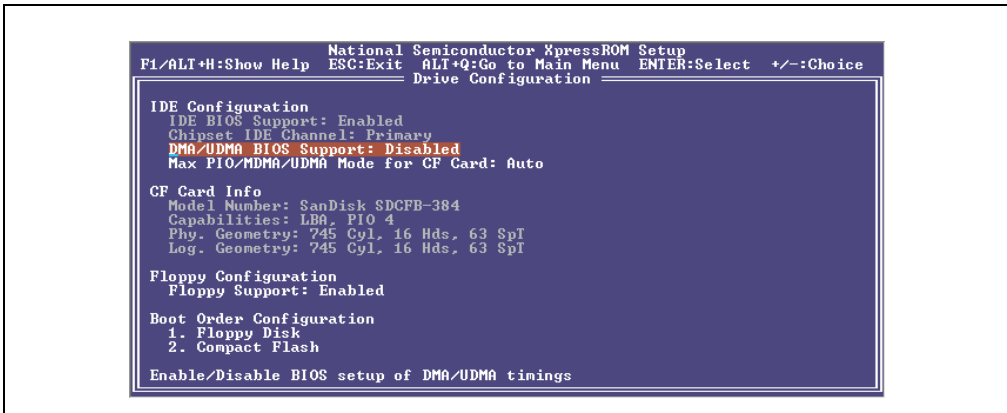


Figure 350: BIOS drive configuration menu

## Software • Power Panel with BIOS

BIOS setting	Meaning	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.  <b>Information:</b> <b>If a mode is configured that is not supported by the CompactFlash card, then the fastest supported mode is configured.</b>	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 513).	Enabled	Enables USB floppy support.	
		Disabled	Disables USB floppy support.	
Boot order configuration	Configures the order in which memory media is booted.  <b>Information:</b> <b>If two identical devices are selected, a conflict warning is displayed.</b>	1	Floppy disk <sup>1)</sup>	The device attempts to boot from this drive first.
			CompactFlash	
			NONE	
		2	Floppy disk <sup>1)</sup>	The device attempts to boot from this drive second.
			CompactFlash	
			NONE	

Table 155: BIOS drive configuration menu

1) Only HD diskettes (1.44 MB) are supported by BIOS.

Super I/O configuration

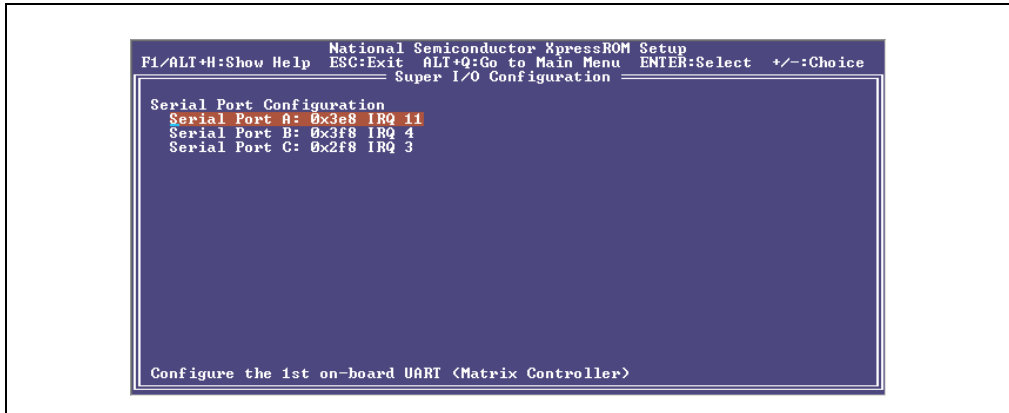


Figure 351: BIOS super I/O configuration menu

BIOS setting	Meaning	Setting options	Effect
Serial port A:	Configures the first UART address range and the corresponding interrupt for the matrix controller. <b>BIOS default setting: 0x3e8 IRQ 11.</b>  <b>Information:</b>  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	
Serial port B:	Configures the second UART address range and the corresponding interrupt for the serial interface. <b>BIOS default setting: 0x3f8 IRQ 4.</b>  <b>Information:</b>  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	
Serial port C:	Configures the third UART address range and the corresponding interrupt for the touch controller. <b>BIOS default setting: 0x2f8 IRQ 3.</b>  <b>Information:</b>  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 156: BIOS super I/O configuration menu

Video and flat panel configuration

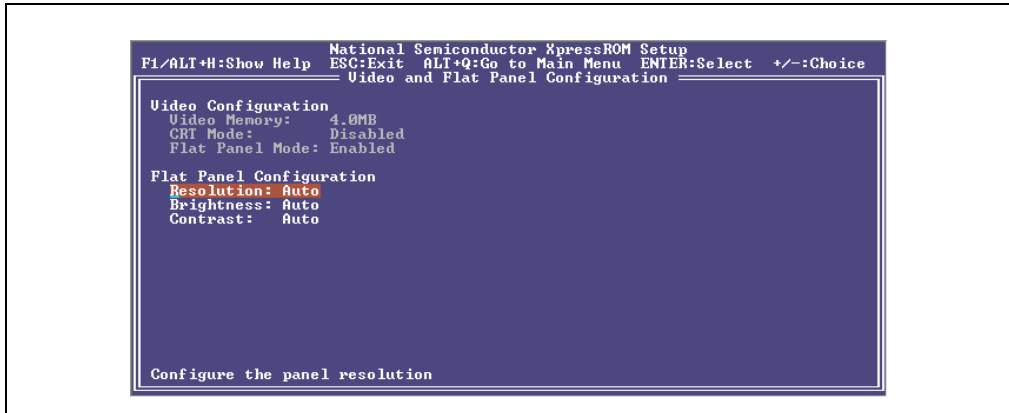


Figure 352: BIOS video configuration menu

BIOS setting	Meaning	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.  <b>Information:</b>  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.  <b>Information:</b>  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 value between 100% and 0% is set.
		0% to 100%	Manual setting of the desired brightness within factory settings limits.

Table 157: BIOS video configuration menu

BIOS setting	Meaning	Setting options	Effect
Contrast	Setting for the contrast of the display.  <b>Information:</b>  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 157: BIOS video configuration menu (Forts.)

PCI configuration

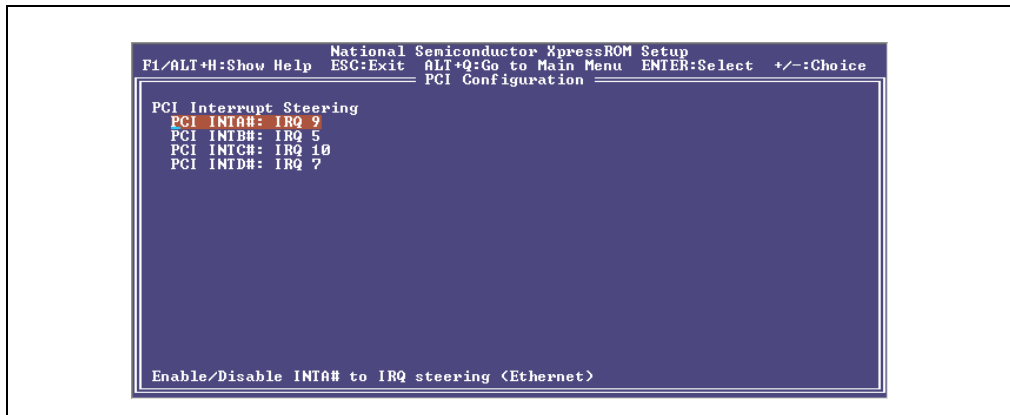


Figure 353: BIOS PCI configuration menu

BIOS setting	Meaning	Setting options	Effect
PCI INTA#	Activates the IRQ for the Ethernet controller. <b>BIOS default setting: IRQ 9.</b>	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. <b>BIOS default setting: IRQ 5.</b> 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. <b>BIOS default setting: IRQ 10.</b> 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. <b>BIOS default setting: IRQ 7.</b> 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 158: BIOS PCI configuration menu

## USB configuration

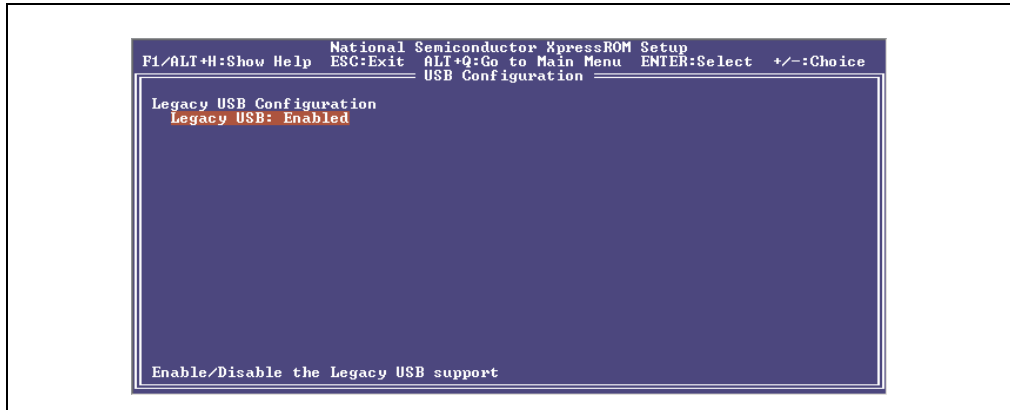


Figure 354: BIOS USB configuration menu

BIOS setting	Meaning	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.  <b>Information:</b> 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.  <b>Information:</b> After deactivating this support, booting from a USB floppy drive is no longer possible.

Table 159: 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.

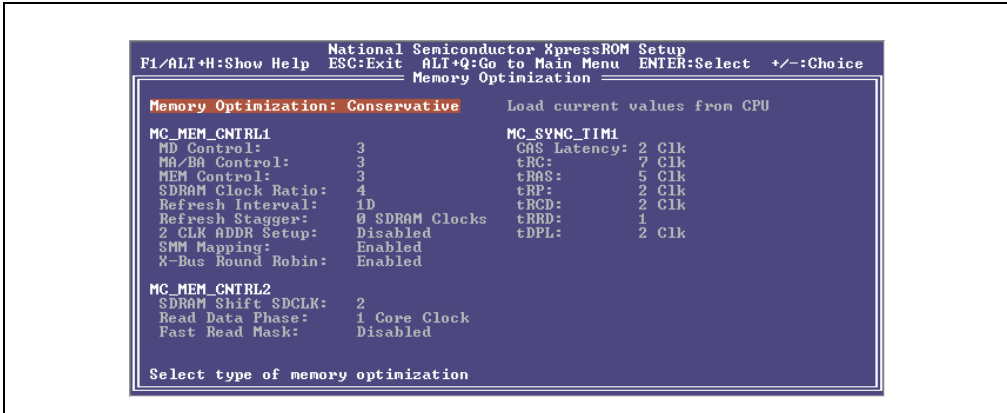


Figure 355: BIOS memory optimization menu

BIOS setting	Meaning	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.  <b>Information:</b> <b>Aggressive memory settings can cause stability problems for the system.</b>
		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 160: BIOS memory optimization menu

BIOS setting	Meaning	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 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 160: BIOS memory optimization menu (Forts.)



## 2.2.6 Advanced BIOS features

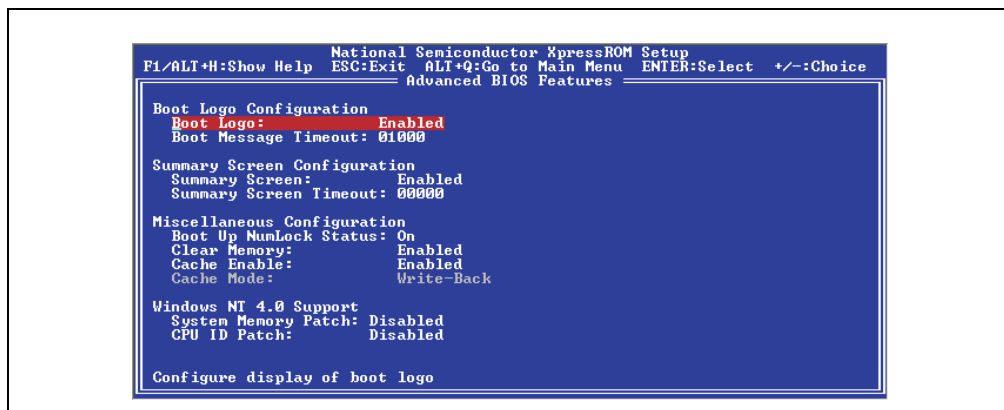


Figure 356: Advanced BIOS features menu

BIOS setting	Meaning	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.  <b>Information:</b> <b>Can be resumed before the timeout expires by pressing any button.</b>	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.  <b>Information:</b> <b>Can be resumed before the timeout expires by pressing any button.</b>	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.  <b>Information:</b> <b>Clearing e.g. 256 MB RAM takes approximately 3 seconds.</b>	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.

Table 161: Advanced BIOS features menu

BIOS setting	Meaning	Setting options	Effect
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	-
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 sub-function 20h (Get system memory map).  <b>Information:</b> <b>This function should be activated only when using the Windows NT 4.0 operating system.</b>	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.  <b>Information:</b> <b>This function should be activated only when using the Windows NT 4.0 operating system.</b>	Enabled	Enables this function.
		Disabled	Disables this function.

Table 161: Advanced BIOS features menu (Forts.)

## 2.2.7 Special OEM features

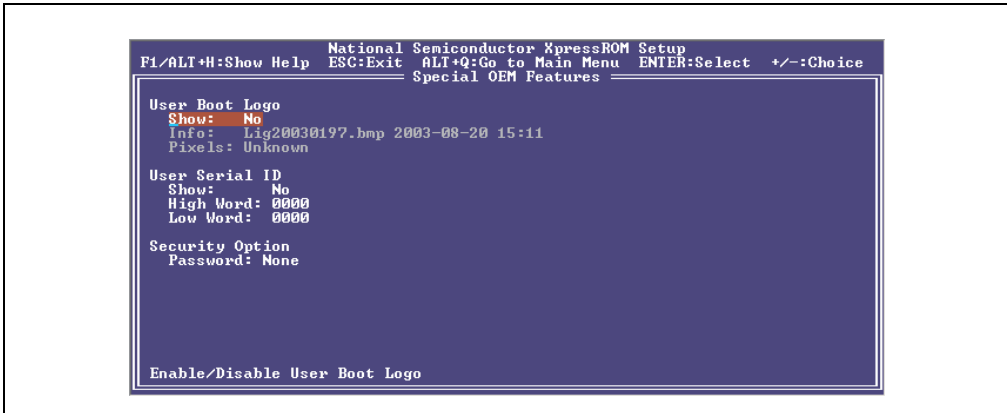


Figure 357: BIOS special OEM features menu

BIOS setting	Meaning	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. <sup>1)</sup>	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).  <b>Information:</b> The password is also saved in the CMOS backup and is impossible to delete.

Table 162: BIOS special functions menu

1) See section 2.4.3 "User boot logo upgrade disk" on page 511 regarding guidelines for creating a user boot logo.

2.2.8 Device information

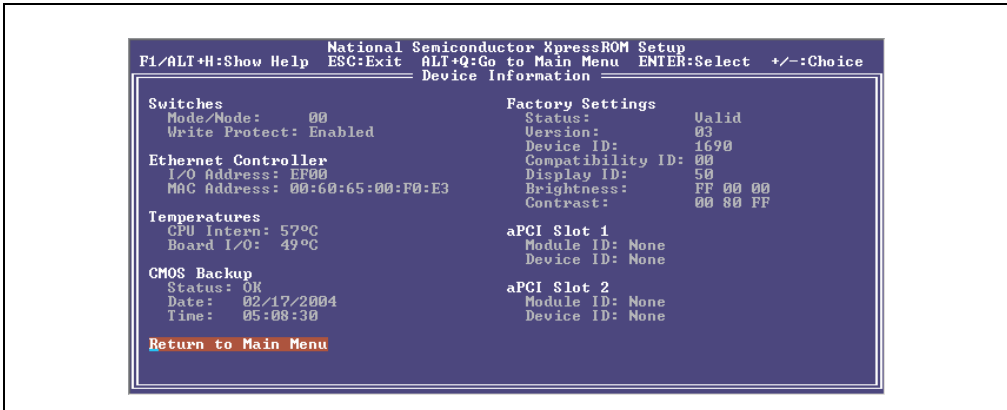


Figure 358: BIOS device information menu

BIOS setting	Meaning	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 163: BIOS device information menu

BIOS setting	Meaning	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 163: BIOS device information menu (Forts.)

## 2.2.9 Firmware configuration

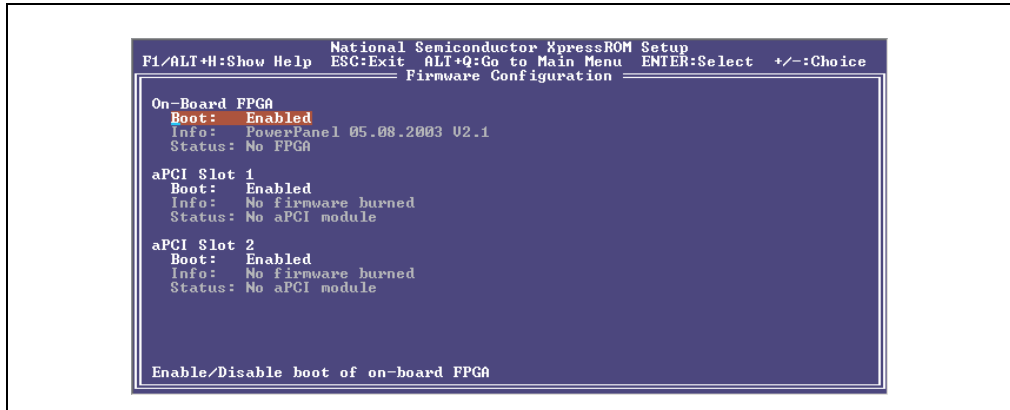


Figure 359: BIOS firmware configuration menu

BIOS setting	Meaning	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 513).
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 164: BIOS firmware configuration menu

## 2.2.10 Restore CMOS values

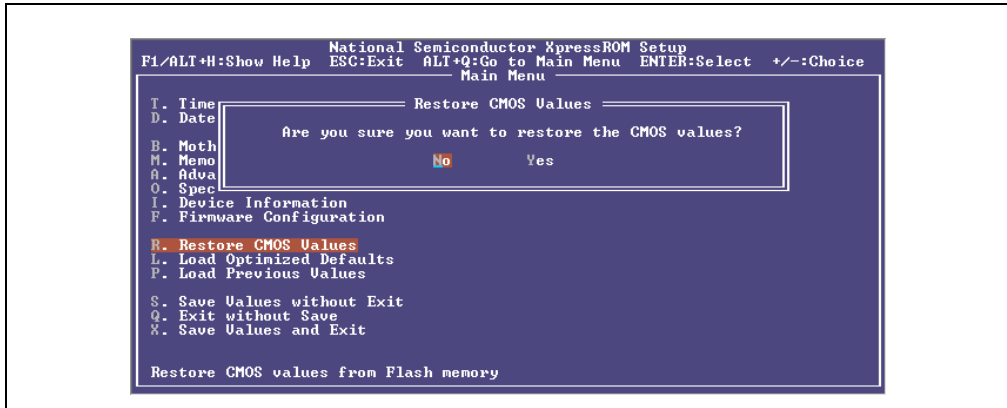


Figure 360: BIOS restore CMOS values menu

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 dead) 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

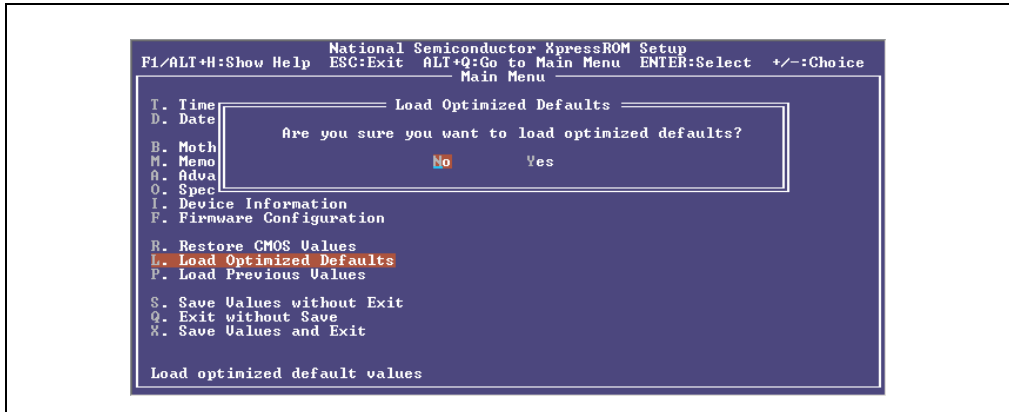


Figure 361: BIOS load optimized defaults menu

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

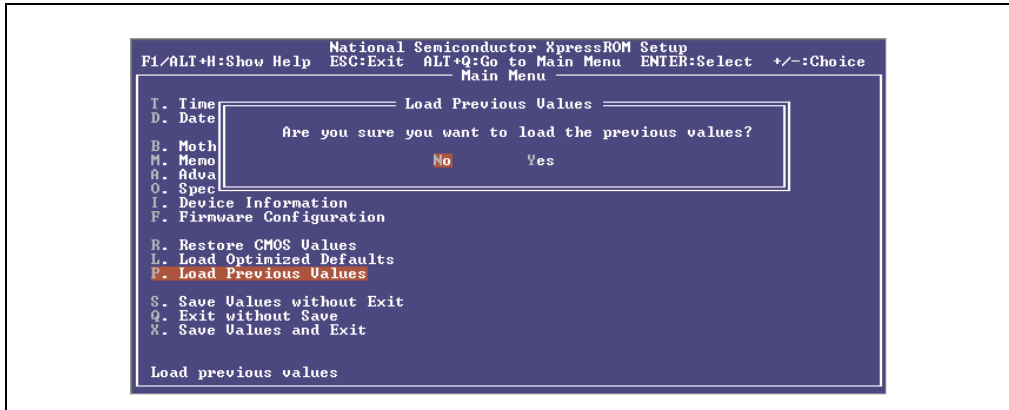


Figure 362: BIOS load previous values menu

Selecting "yes" under this BIOS menu item (P shortcut) reloads the values at the point when BIOS setup was opened. All changes are lost.

### Information:

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

## 2.2.13 Save values without exit

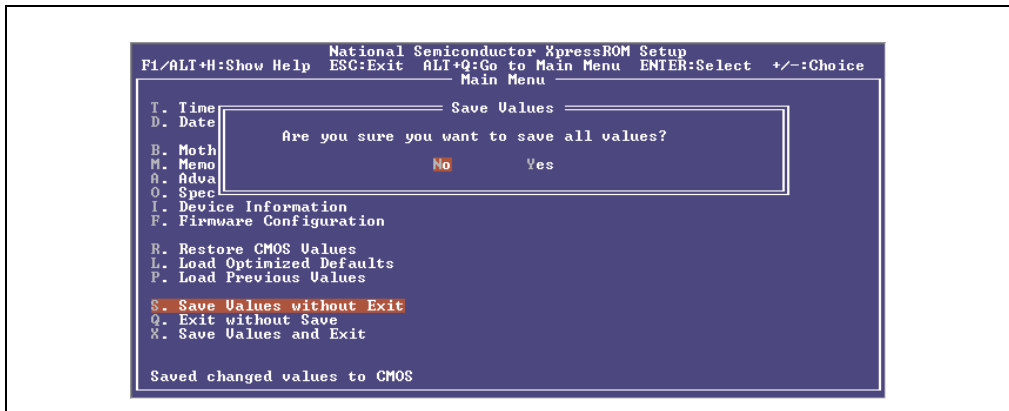


Figure 363: BIOS save values without exit menu

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

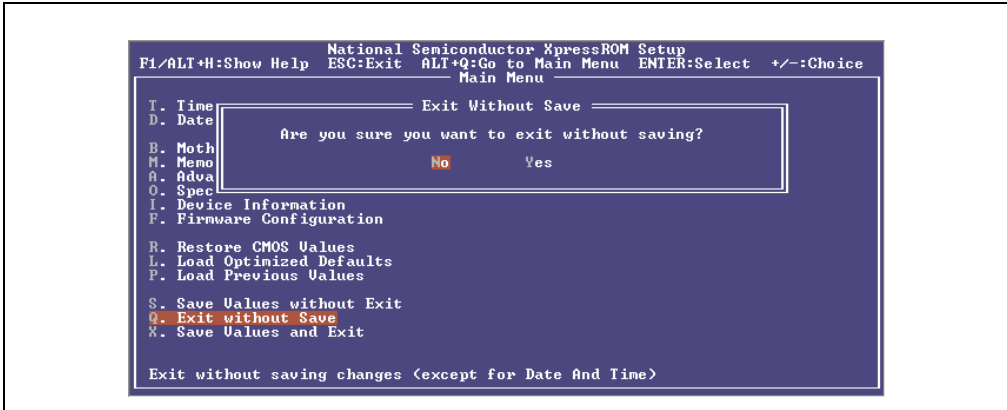


Figure 364: BIOS exit without save menu

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

## Information:

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

## 2.2.15 Save values and exit

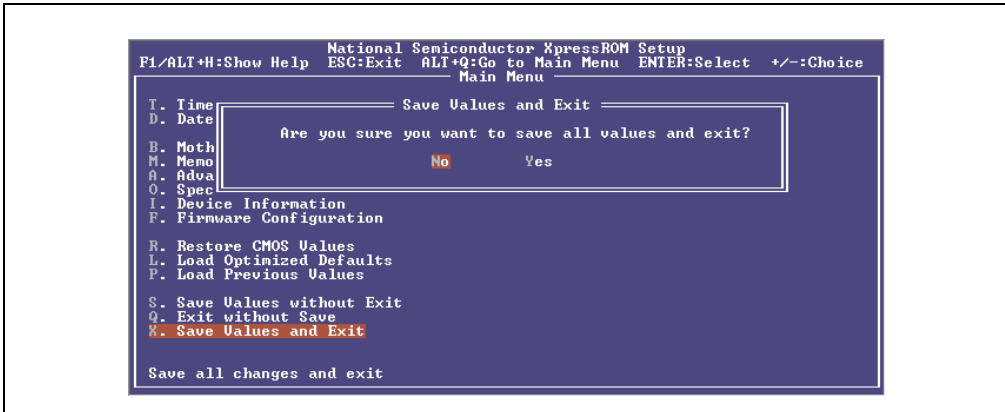


Figure 365: BIOS save values and exit menu

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

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

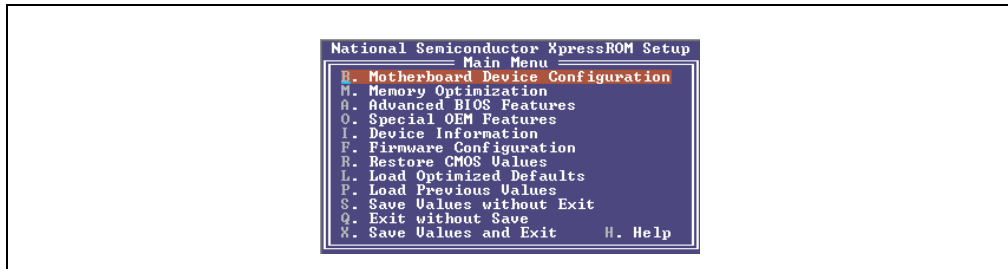


Figure 366: BIOS setup main menu

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 (boot logo, summary screen, cache areas) 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 values configured when BIOS setup was opened. All changes are lost.
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 165: Overview of BIOS main menu functions

## Information:

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

### 2.3.2 Motherboard device configuration

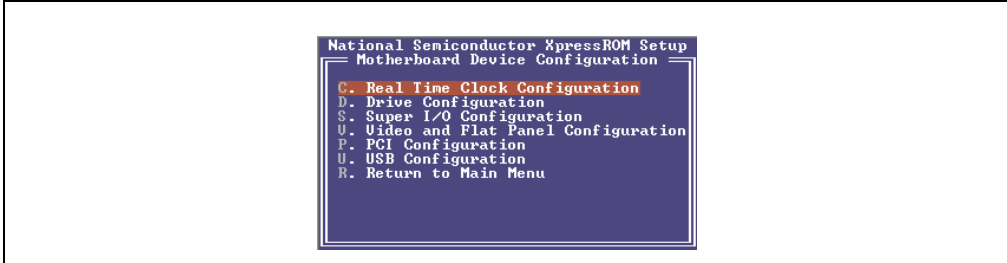


Figure 367: BIOS motherboard device configuration

Shortcut	BIOS setup menu	Function
C	Real-time clock configuration	Sets the system date and the system time.
D	Drive configuration	Settings for the 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 166: BIOS motherboard device configuration menu

Real-time clock configuration

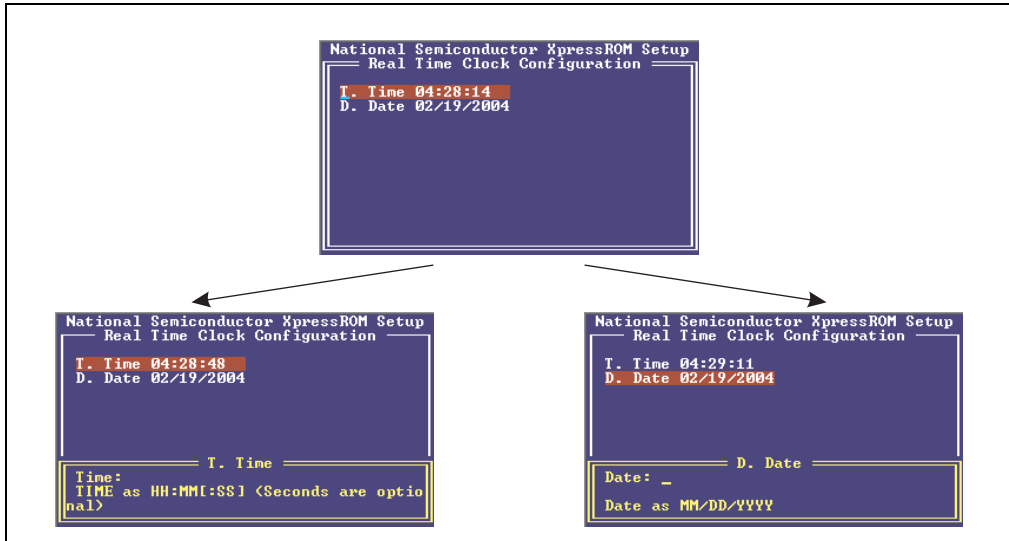


Figure 368: BIOS real-time clock configuration

Shortcut	BIOS setup menu	Function
T	Time	Sets the system time.
D	Date	Sets the system date.

Table 167: 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.

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

Example: Set time to 13:00:00.

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

- 13:00:00 - Confirm with Enter
- 01:00:00 PM - Confirm with Enter
- 13: - Confirm with Enter

**Information:**

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

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

Example: Set date to 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**

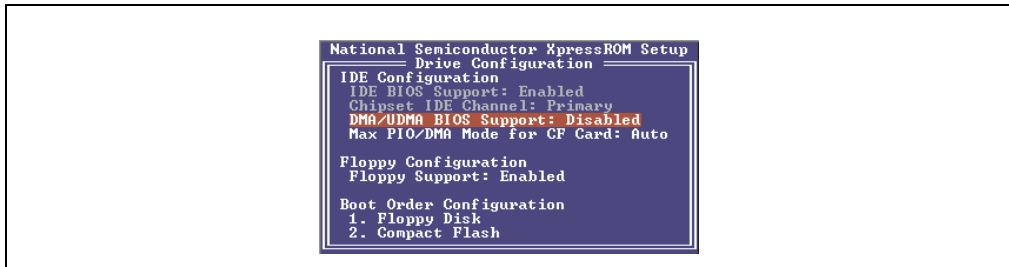


Figure 369: BIOS drive configuration menu

BIOS setting	Meaning	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 168: BIOS drive configuration menu

BIOS setting	Meaning	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.  <b>Information:</b> <b>If a mode is configured that is not supported by the CompactFlash card, then the fastest supported mode is configured.</b>	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 513).	Enabled	Enables USB floppy support.	
		Disabled	Disables USB floppy support.	
Boot order configuration	Configures the order in which memory media is booted.  <b>Information:</b> <b>If two identical devices are selected, a conflict warning is displayed.</b>	1	Floppy disk <sup>1)</sup>	The device attempts to boot from this drive first.
			CompactFlash	
			NONE	
		2	Floppy disk <sup>1)</sup>	The device attempts to boot from this drive second.
			CompactFlash	
			NONE	

Table 168: BIOS drive configuration menu (Forts.)

1) Only HD diskettes (1.44 MB) are supported by BIOS.

## Super I/O configuration

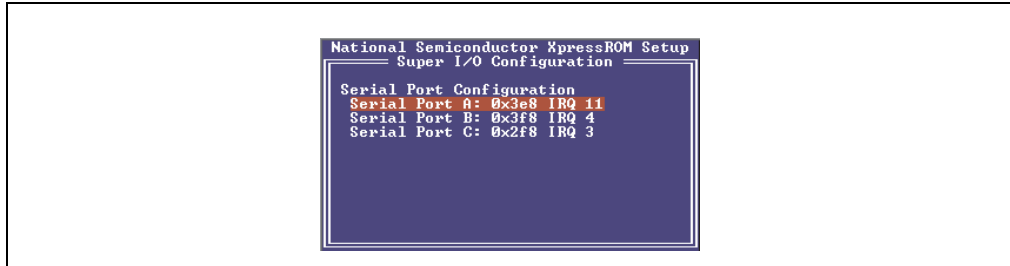


Figure 370: BIOS super I/O configuration menu



BIOS setting	Meaning	Setting options	Effect
Serial port A:	Configures the first UART address range and the corresponding interrupt for the matrix controller. <b>BIOS default setting: 0x3e8 IRQ 11.</b>  <b>Information:</b> <b>Two ports cannot use the same address range and interrupt.</b>	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. <b>BIOS default setting: 0x3f8 IRQ 4.</b>  <b>Information:</b> <b>Two ports cannot use the same address range and interrupt.</b>	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. <b>BIOS default setting: 0x2f8 IRQ 3.</b>  <b>Information:</b> <b>Two ports cannot use the same address range and interrupt.</b>	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 169: BIOS super I/O configuration menu

### Video and flat panel configuration

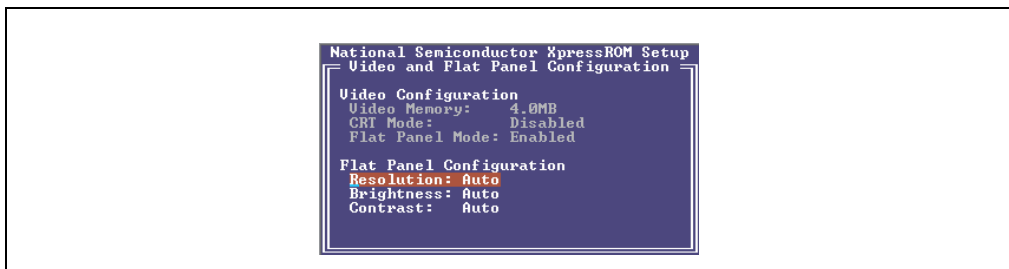


Figure 371: BIOS video configuration menu

BIOS setting	Meaning	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 170: BIOS video configuration menu

BIOS setting	Meaning	Setting options	Effect
Flat panel mode	Displays on a Power Panel display.	None	-
Resolution	<p>Setting for the maximum resolution for the display.</p> <p><b>Information:</b></p> <p>Only the resolution specified for the Power Panel device should be configured! Otherwise, the display can be damaged by incorrect timing values.</p> <p>If the mode/node switch is set to 0/0, then the resolution is automatically reset every time the Power Panel device is restarted.</p>	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	<p>Setting for the background lighting of the display.</p> <p><b>Information:</b></p> <p>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.</p>	Auto	The optimal brightness is automatically configured using the factory settings. A brightness value between 100% and 0% is set.
		0% to 100%	Manual setting of the desired brightness within factory settings limits.
Contrast	<p>Setting for the contrast of the display.</p> <p><b>Information:</b></p> <p>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.</p>	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 170: BIOS video configuration menu (Forts.)

PCI configuration

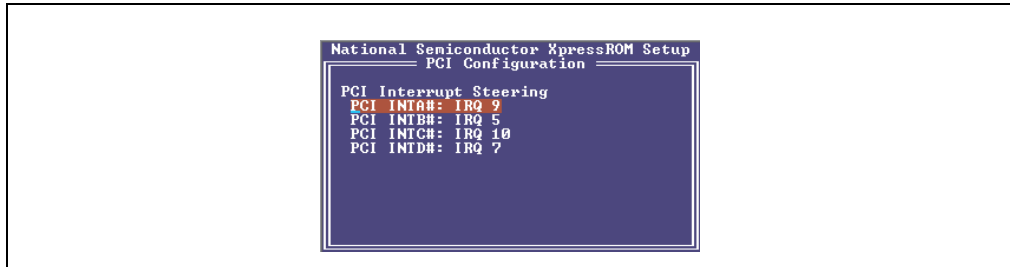


Figure 372: BIOS PCI configuration menu

BIOS setting	Meaning	Setting options	Effect
PCI INTA#	Activates the IRQ for the Ethernet controller. <b>BIOS default setting: IRQ 9.</b>	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. <b>BIOS default setting: IRQ 5.</b> 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. <b>BIOS default setting: IRQ 10.</b> 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. <b>BIOS default setting: IRQ 7.</b> 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 171: BIOS PCI configuration menu

## USB configuration



Figure 373: BIOS USB configuration menu

BIOS setting	Meaning	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.  <b>Information:</b> 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.  <b>Information:</b> After deactivating this support, booting from a USB floppy drive is no longer possible.

Table 172: 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.

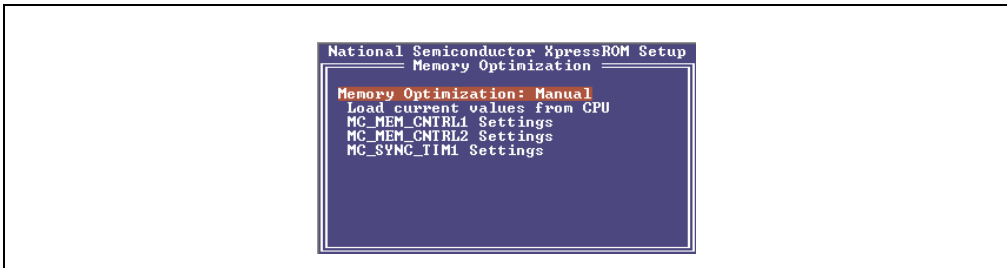


Figure 374: BIOS memory optimization menu

BIOS setting	Meaning	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.  <b>Information.</b> <b>Aggressive memory settings can cause stability problems for the system.</b>
		Manual	If "Manual" is selected then the remaining 3 submenus are active, in order to be able to make the changes.

Table 173: BIOS memory optimization menu

BIOS setting	Meaning	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 493.	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 494.	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 495.	None	-

Table 173: BIOS memory optimization menu (Forts.)

### MC\_MEM\_CNTRL1 settings

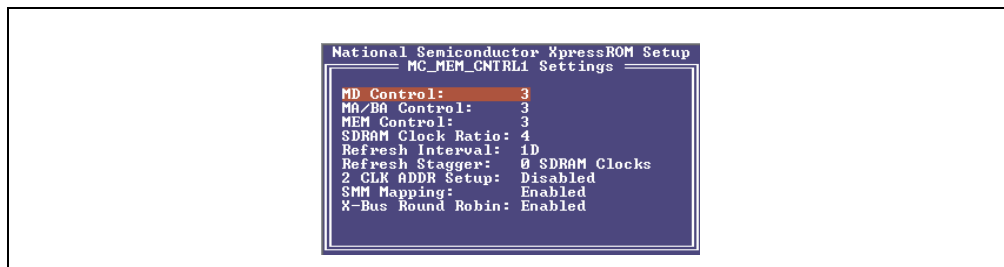


Figure 375: MC\_MEM\_CNTRL1 settings

BIOS setting	Meaning	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 174: BIOS MC\_MEM\_CNTRL1 settings menu

BIOS setting	Meaning	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 174: BIOS MC\_MEM\_CNTRL1 settings menu (Forts.)

**MC\_MEM\_CNTRL2 settings**

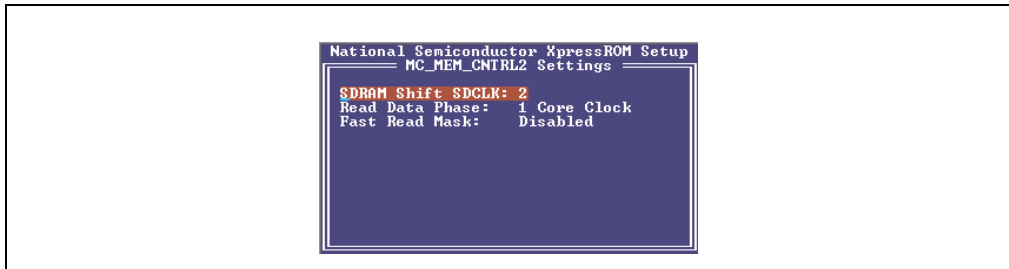


Figure 376: MC\_MEM\_CNTRL2 settings

BIOS setting	Meaning	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 175: BIOS MC\_MEM\_CNTRL2 settings menu

MC\_SYNC\_TIM1 Settings

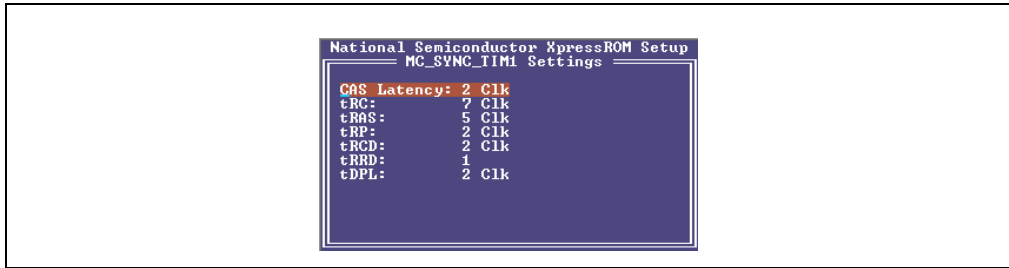


Figure 377: MC\_SYNC\_TIM1 settings

BIOS setting	Meaning	Setting options	Effect
CAS latency	Column Address Strobe (CAS) latency describes the time it takes between addressing in a RAM 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 176: BIOS MC\_SYNC\_TIM1 settings menu

2.3.4 Advanced BIOS features

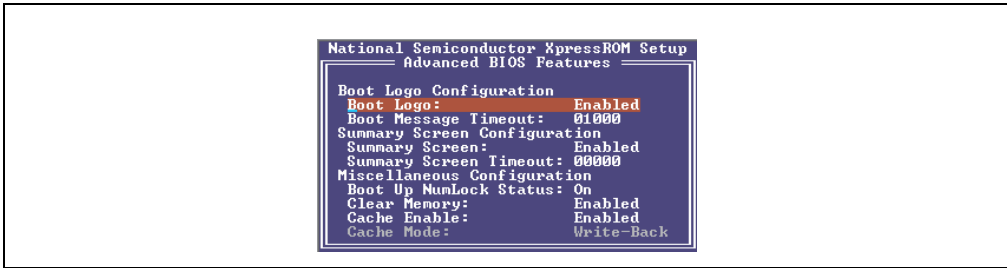


Figure 378: Advanced BIOS features menu

BIOS setting	Meaning	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.  <b>Information:</b> 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.  <b>Information:</b> 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.  <b>Information:</b> 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 177: Advanced BIOS features menu



BIOS setting	Meaning	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	-

Table 177: Advanced BIOS features menu (Forts.)

### 2.3.5 Special OEM features

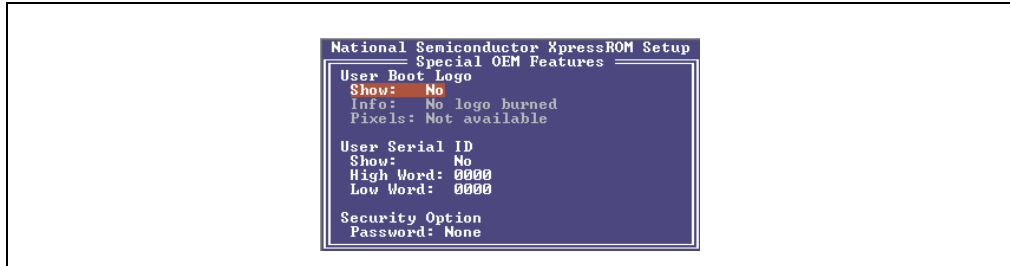


Figure 379: BIOS special OEM features menu

BIOS setting	Meaning	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. <sup>1)</sup>	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).  <b>Information:</b>  The password is also saved in the CMOS backup and is impossible to delete.

Table 178: BIOS special functions menu

1) See section 2.4.3 "User boot logo upgrade disk" on page 511 regarding guidelines for creating a user boot logo.

### 2.3.6 Device information

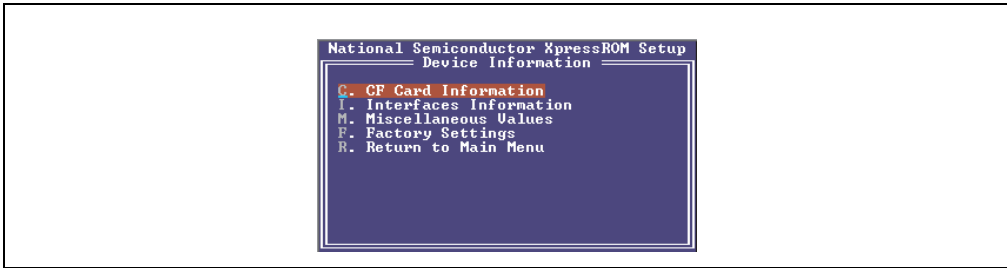


Figure 380: BIOS device information menu

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 179: BIOS real-time clock configuration menu

### CF card information

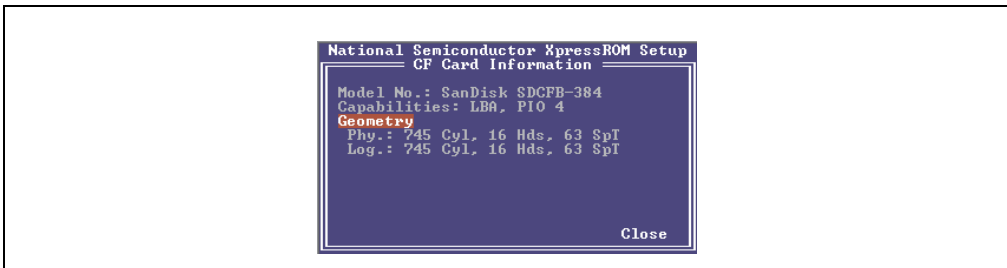


Figure 381: BIOS CF card information menu

BIOS setting	Meaning	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 180: BIOS CF card information menu

BIOS setting	Meaning	Setting options	Effect
Log. geometry	Displays the logical geometry of the inserted CompactFlash card in cylinders, heads and sectors.	None	-

Table 180: BIOS CF card information menu (Forts.)

Interface information

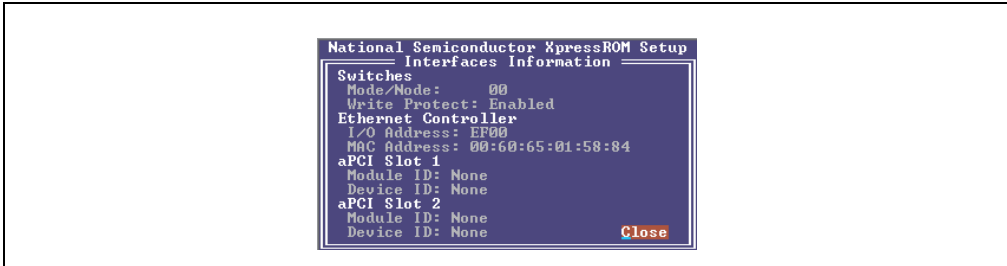


Figure 382: BIOS interface information menu

BIOS setting	Meaning	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 181: BIOS interface information menu

Miscellaneous values

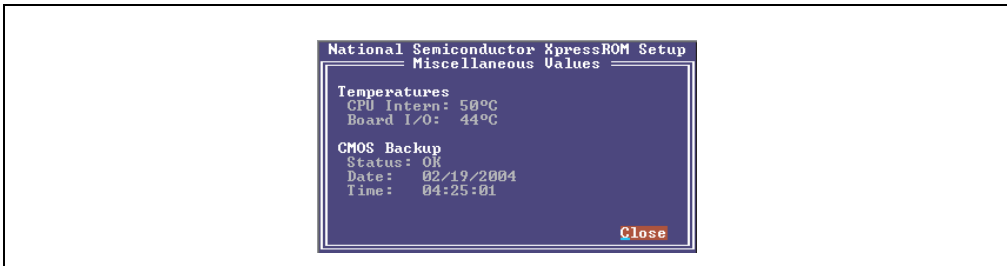


Figure 383: BIOS miscellaneous values menu

## Software • Power Panel with BIOS

BIOS setting	Meaning	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 182: BIOS miscellaneous values menu

## Factory settings

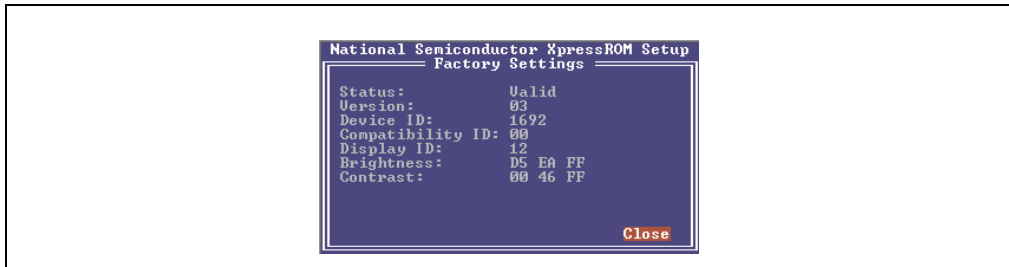


Figure 384: BIOS factory settings menu

BIOS setting	Meaning	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 183: BIOS factory settings menu

BIOS setting	Meaning	Setting options	Effect
Contrast	The defined contrast values (minimum, default, maximum) for the display used are shown here as hex values.	None	-

Table 183: BIOS factory settings menu (Forts.)

### 2.3.7 Firmware configuration

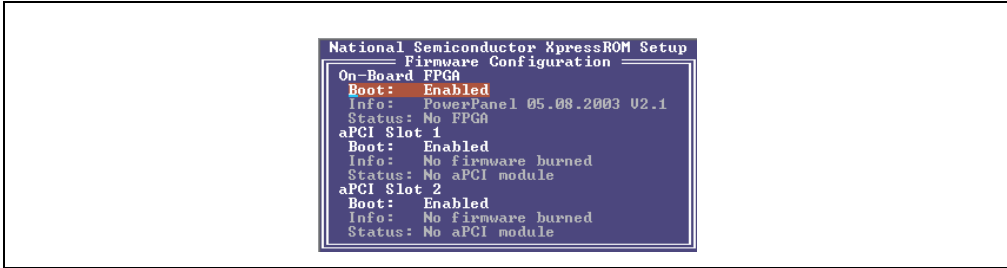


Figure 385: BIOS firmware configuration menu

BIOS setting	Meaning	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 513).
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 184: BIOS firmware configuration menu

### 2.3.8 Restore CMOS values

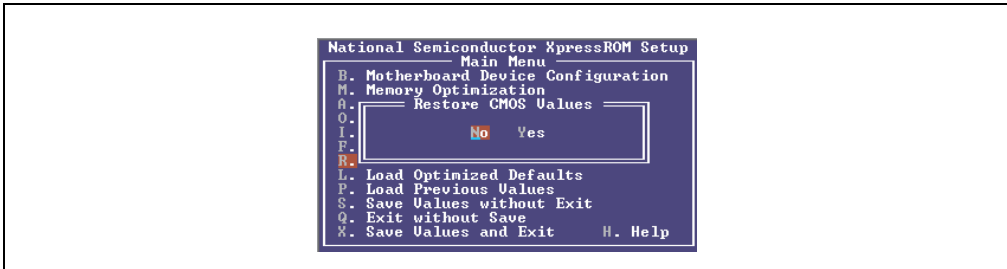


Figure 386: BIOS restore CMOS values menu

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 dead) 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

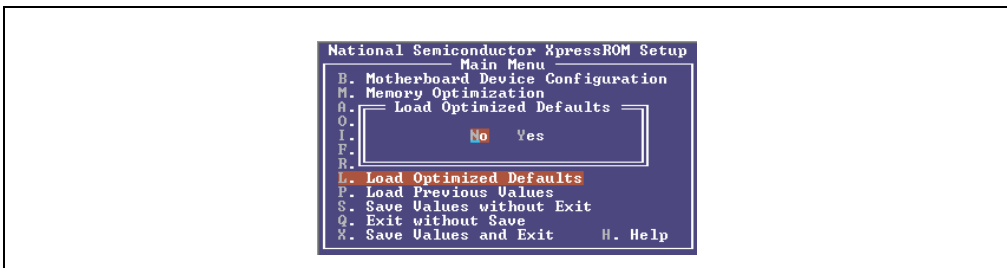


Figure 387: BIOS load optimized defaults menu

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

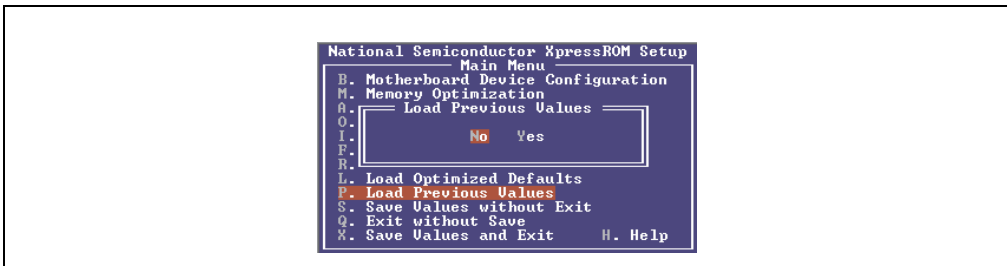


Figure 388: BIOS load previous values menu

Selecting "yes" under this BIOS menu item (P shortcut) reloads the values at the point when BIOS setup was opened. All changes are lost.

## Information:

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

### 2.3.11 Save values without exit

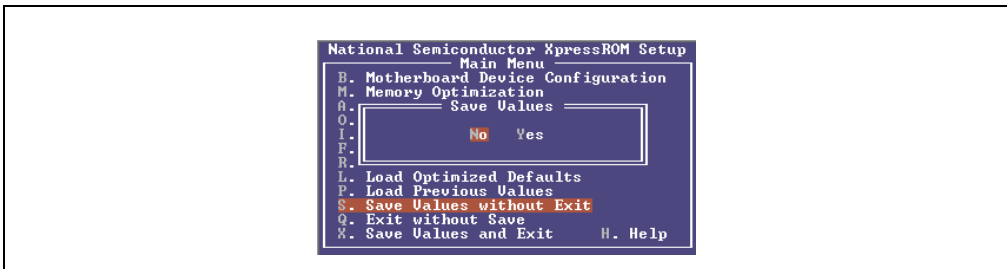


Figure 389: BIOS save values without exit menu

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

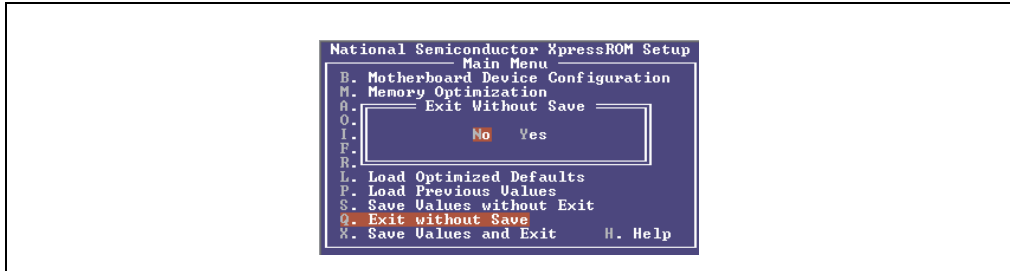


Figure 390: BIOS exit without save menu

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

## Information:

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

### 2.3.13 Save values and exit

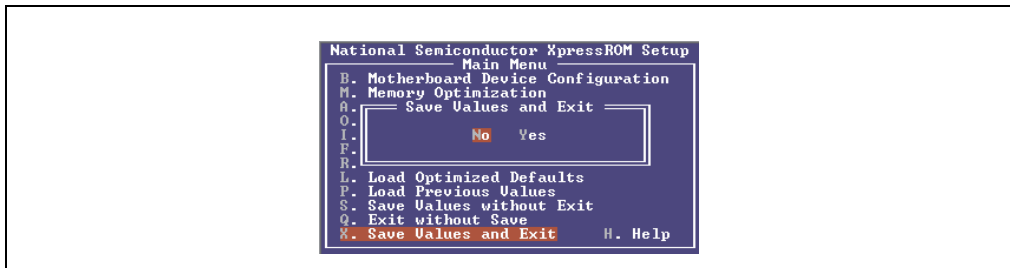


Figure 391: BIOS save values and exit menu

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

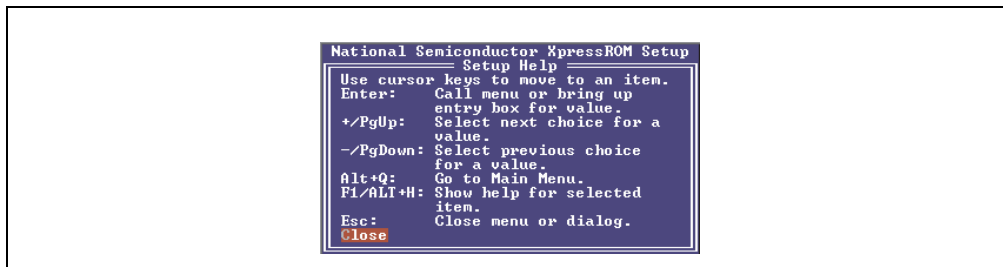


Figure 392: BIOS help menu

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 and BIOS menu items including 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 & Utilities consists 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](http://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"). 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 contents 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 513). For more on the settings required for the Power Panel device when booting from a disk, please refer to section "Drive configuration" on page 465 for VGA, SVGA and XGA Power Panel devices and section "Drive configuration" on page 487 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 393: 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. <b>Information:</b> It's necessary to have up to 448 KB of free space on the disk.
5	Save XpressROM BIOS only	Only the XpressROM BIOS is automatically protected. <b>Information:</b> It's necessary to have approximately 256 KB of free space on the disk.
6	Save FPGA firmware only	Only the FPGA firmware is automatically protected. <b>Information:</b> It's necessary to have up to 192 KB of free space on the disk.
7	Exit	Returns to the shell (MS-DOS).

Table 185: 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](http://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"). 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 contents 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 513). For more on the settings required for the Power Panel device when booting from a disk, please refer to section "Drive configuration" on page 465 for VGA, SVGA and XGA Power Panel devices and section "Drive configuration" on page 487 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 394: 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.
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. <b>Information:</b> It's necessary to have up to 384 KB of free space on the disk.
5	Save firmware of aPCI slot 1	Only firmware from aPCI slot 1 is saved. <b>Information:</b> It's necessary to have up to 192 KB of free space on the disk.
6	Save firmware of aPCI slot 2	Only firmware from aPCI slot 2 is saved. <b>Information:</b> It's necessary to have up to 192 KB of free space on the disk.
7	Exit	Returns to the shell (MS-DOS).

Table 186: aPCI firmware upgrade menu description

## 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](http://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"). 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 contents of the \*.zip file to this diskette.
- Create the user boot logo according to section "Guidelines for creating a user boot logo" on page 512 and copy 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 513). For more on the settings required for the Power Panel device when booting from a disk, please refer to section "Drive configuration" on page 465 for VGA, SVGA and XGA Power Panel devices and section "Drive configuration" on page 487 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 395: 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).

Table 187: User boot logo upgrade menu description

Item	Menu item	Description
2	Save user boot logo	The user boot logo is automatically saved in the file USERLOGO.SAV.  <b>Information:</b> It's necessary to have up to 192 KB of free space on the disk.
3	Delete user boot logo	An existing user boot logo is deleted in the flash.  <b>Information:</b> The B&R boot logo is then automatically displayed again by BIOS.
4	Exit	Returns to the shell (MS-DOS).

Table 187: User boot logo upgrade menu description (Forts.)

## 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 475 for VGA, SVGA and XGA Power Panel devices and also section 2.3.5 "Special OEM features" on page 497 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](http://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.

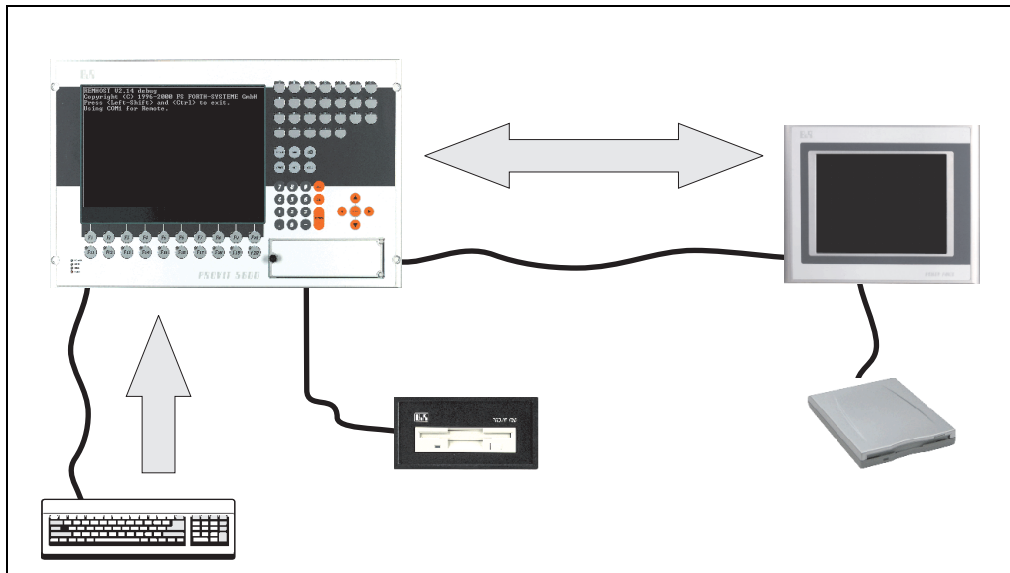


Figure 396: REMHOST communication model

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 display<sup>1)</sup>.
- There is no USB floppy present and the BIOS for the Power Panel device should be updated.

1) With BIOS versions earlier than V1.04

## 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 516 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 396 "REMHOST communication model"). The mode/node switch for the Power Panel device must be set to 00 (service mode) see figure 272 "Mode / Node switches" on page 359.

## 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, an MS-DOS start diskette must be used when booting the Power Panel using REMHOST. If a Windows start diskette is used, 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).

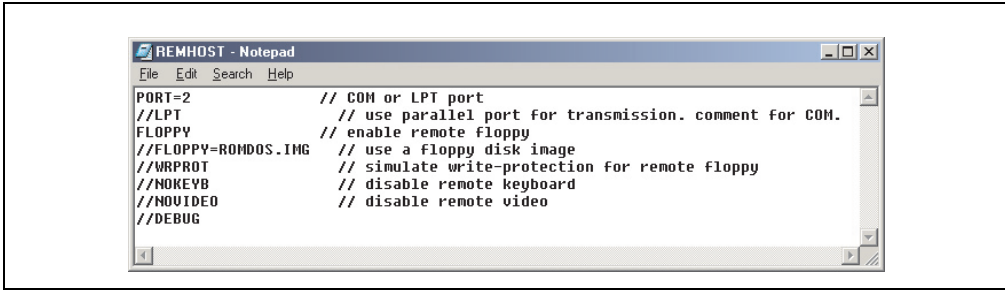


Figure 397: Example of REMHOST.INI

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 <a href="http://www.winimage.com">www.winimage.com</a> ). 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 188: 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.

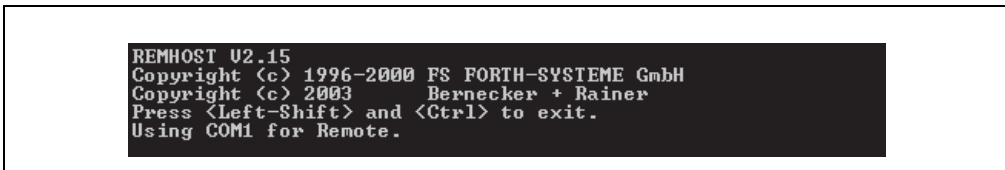


Figure 398: REMHOST program start

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.

### Pin assignments - Connection cable

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:

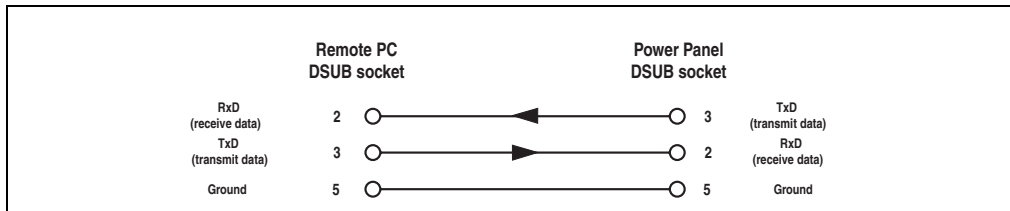


Figure 399: REMHOST pin assignment - Power Panel connection cable

## 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 483 for VGA, SVGA and XGA Power Panel devices and also section 2.3.13 "Save values and exit" on page 504 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 dead) 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 189: RAM address assignment

### 2.6.2 DMA channel assignment

DMA channel	Resource
0	Freely available
1	Freely available
2	Disk drive
3	Freely available
4	Freely available
5	Freely available
6	Freely available
7	Freely available

Table 190: DMA channel assignment

### 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

Table 191: I/O address assignment

I/O address	Resource
03C0 - 03DF	Video controller
03E8 - 03EF	COM3
03F0 - 03F5	Floppy controller (emulated by Legacy USB)
03F6 - 03F7	Primary IDE
03F8 - 03FF	COM1
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 191: I/O address assignment (Forts.)

## 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 <sup>1)</sup>
IRQ 4	COM1 <sup>1)</sup>
IRQ 5	USB and aPCI slot 1 (first interrupt) <sup>1)</sup>
IRQ 6	Disk drive
IRQ 7	aPCI slot 2 <sup>1)</sup> (second interrupt)
IRQ 8	RTC (real-time clock)
IRQ 9	Ethernet (MacPhyter) <sup>1)</sup>
IRQ 10	aPCI slot 2 (first interrupt) and aPCI slot 1 (second interrupt) <sup>1)</sup>

Table 192: Interrupt assignment

<b>Interrupt</b>	<b>Resource</b>
IRQ 11	COM3 <sup>1)</sup>
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 192: Interrupt assignment (Forts.)

1) BIOS setup default setting



### 3. Power Panel 100 with BIOS and Windows CE



Model number	Short description	Note
9S0001.13-010	<b>OEM MS Win CE4.1 German</b> Only delivered with a Power Panel BIOS device	
9S0001.13-020	<b>OEM MS Win CE4.1 English</b> Only delivered with a Power Panel BIOS device	
9S0001.17-020	<b>OEM Microsoft Windows CE 4.2 English</b> OEM Microsoft Windows CE 4.2 English license Only delivered with a Power Panel BIOS device	
9S0001.29-020	<b>OEM Microsoft Windows CE 5.0 English</b> OEM Microsoft Windows CE 5.0 English license Only delivered with a Power Panel BIOS device.	Cancelled since 07/2007
5SWWCE.0517-ENG	<b>WinCE5.0 Pro PP100 SCx200</b> Microsoft Windows CE 5.0 Professional, English; for PP100 BIOS units 5PP120.0571-27, 5PP120.1043-37A, 5PP120.1214-37A, 5PP120.1505-37A, order CompactFlash separately (at least 128 MB).	
5SWWCE.0617-ENG	<b>WinCE5.0 ProPlus PP100 SCX200</b> Microsoft Windows CE 5.0 Professional Plus, English; for PP100 BIOS units 5PP120.0571-27, 5PP120.1043-37A, 5PP120.1214-37A, 5PP120.1505-37A, order CompactFlash separately (at least 128 MB).	

Table 193: Model numbers - Windows CE

#### 3.1 General information

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

### 3.2 Differences between the Windows CE 5.0 versions (Pro - PropPlus)

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

Features	Windows CE 5.0
Screen resolution	QVGA (LCD), QVGA (TFT), VGA (TFT), SVGA (TFT), XGA (TFT)
Color depth <sup>1)</sup>	16-bit / 65,536 colors
Graphics card driver	AMD Geode SC1200/SC2200 graphics card driver with screen rotation without DirectX
RAM	Automatic detection and use of up to 512 MB RAM
Boot time	Approx. 20 seconds
Screen rotation	The desktop can be turned in 90° intervals
Web browser	Internet Explorer 6.0 for Windows CE
.NET	Compact Framework 1.0 with SP3
Image size	Pro: approx. 26 MB uncompressed ProPlus: approx. 28 MB uncompressed <sup>2)</sup>
Custom keys	Supported
PVI	Supported
Automation Device Interface	Supported
Remote Desktop Protocol for thin clients	Supported
B&R VNC Viewer	Supported
B&R Task Manager	Supported
B&R Picture Viewer	Supported
Compatible with zenOn	Yes
Compatible with Wonderware	Yes
Serial interfaces	1 available for use

Table 194: Differences between the Windows CE versions (Pro - PropPlus)

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

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

### 3.3 Requirements

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

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

### 3.4 Installation

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

### 3.4.1 B&R Embedded OS Installer

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

The B&R embedded OS Installer can be downloaded from the download area on the B&R homepage ([www.br-automation.com](http://www.br-automation.com)). Further information is available in the online help for the B&R embedded OS Installer.

## 4. Power Panel 100 with BIOS and Windows XP Embedded



Model number	Short description	Note
5SWWXP.0417-ENG	<b>WinXPe FP2007 PP100 SCx200</b> Microsoft Windows XP embedded English, Feature Pack 2007; for PP100 BIOS units 5PP120.1043-37A, 5PP120.1214-37A, 5PP120.1505-37A, order CompactFlash separately (at least 512 MB). Only delivered with a new PC.	
9S0001.16-020	<b>OEM MS WinXPe PP100/200 w/CF</b> OEM MS WinXP Embedded Runtime PP100 preinstalled on CompactFlash 256 MB; for Power Panel 100 BIOS. Only delivered with a Power Panel BIOS device	Cancelled since 07/2007 Replacement type: 5SWWXP.0417-ENG
9S0001.25-020	<b>OEM MS WinXPe PP100/200 w/CF SP2</b> OEM Microsoft Windows XP embedded SP2 for PP100 BIOS, English; preinstalled on CompactFlash 256 MB. Only delivered with a Power Panel BIOS device	Cancelled since 07/2007 Replacement type: 5SWWXP.0417-ENG

Table 195: Model numbers - Windows XP Embedded

### 4.1 General information

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

### 4.2 Features with FP2007 (Feature Pack 2007)

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

Function	Present
Enhanced write filter (EWF)	✓
File Based Write Filter	✓
Page file	configurable
Administrator account	✓
User account	configurable

Table 196: Device functions in Windows XP embedded with FP2007

Function	Present
Explorer shell	✓
Registry Filter	✓
Internet Explorer 6.0 + SP2	✓
Internet information service (IIS)	-
Terminal service	✓
Windows Firewall	✓
MSN-Explorer	-
Outlook Express	-
Administrative Tools	✓
Remote Desktop	✓
Remote Assistance	-
.NET Framework	-
ASP.NET	-
Codepages/User Locale/Keyboard	✓
Disk Management Service	✓
Windows Installer Service	✓
Class Installer	✓
CoDevice Installer	✓
Media Player	-
DirectX	-
Accessories	✓
Number of fonts	89

Table 196: Device functions in Windows XP embedded with FP2007

### 4.3 Installation

Windows XP embedded is usually preinstalled at B&R Austria on a suitable CompactFlash card (at least 512 MB - must be specified when placing order). The system is then automatically configured after it has been switched on for the first time. This procedure takes approximately 30 minutes, and the device will be rebooted a number of times.

Brief instructions for creating your own Windows XP embedded images or a suitable Target Designer export file can be downloaded from the download area on the B&R homepage ([www.br-automation.com](http://www.br-automation.com)).

### 4.4 Drivers

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

## **Information:**

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

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

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

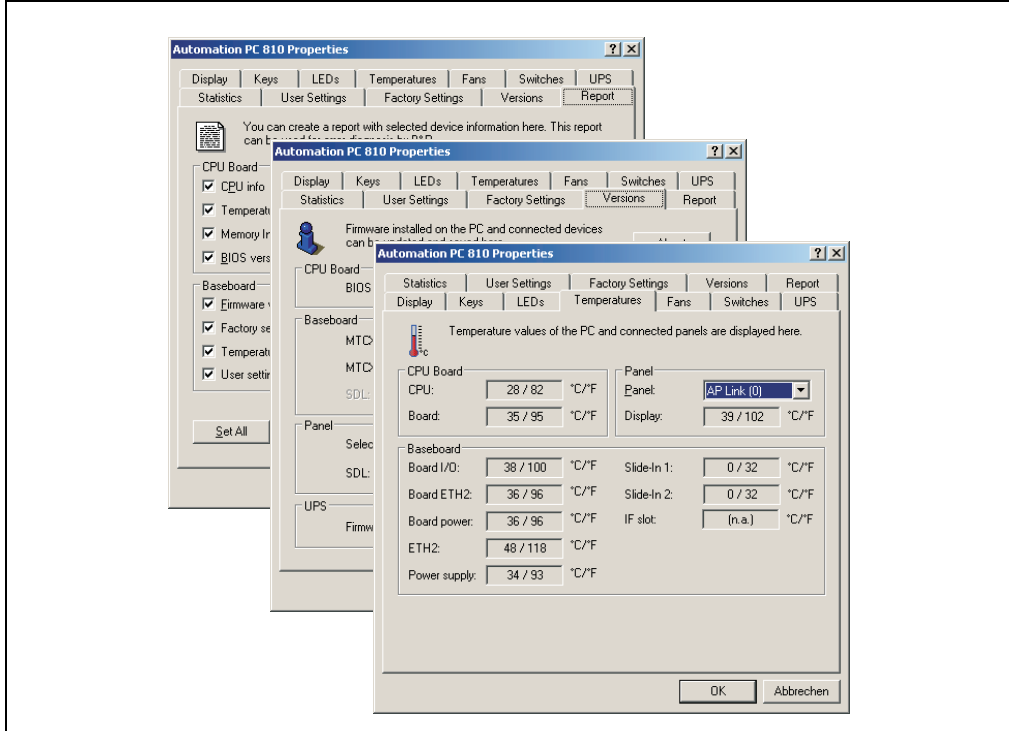


Figure 400: ADI Control Center screenshots - Examples (symbol photo)

### Information:

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

## 5.1 Functions

### Information:

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

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

Supports following systems:

- Automation PC 620
- Automation PC 810
- Automation PC 820
- Panel PC 300
- Panel PC 700
- Panel PC 725
- Panel PC 800
- Power Panel 100/200
- Power Panel 300/400
- Power Panel 500
- Mobile Panel 40/50
- Mobile Panel 100/200
- Automation Panel 800 (in connection with Automation PCs and Panel PCs)
- Automation Panel 900 (in connection with Automation PCs and Panel PCs)



## 5.2 Installation

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

1. Download and unzip the ZIP archive
2. Close all applications
3. Run BrSetup.exe (e.g. double-click on it in Explorer).

- or -

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

### Information:

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

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



## Chapter 5 • Standards and certifications

### 1. Applicable European guidelines

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

### 2. Overview of standards

Standard	Description
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 60068-2-2	Environmental testing - part 2: Tests; test B: Dry heat
EN 60068-2-3	Environmental testing - part 2: Tests; test and guidance: Damp heat, constant
EN 60068-2-6	Environmental testing - part 2: Tests; test: Vibration (sinusoidal)
EN 60068-2-14	Environmental testing - part 2: Tests; test N: Change of temperature
EN 60068-2-27	Environmental testing - part 2: Tests; test and guidance: Shock
EN 60068-2-30	Environmental testing - part 2: Tests; test and guidance: Damp heat, cyclic
EN 60068-2-31	Environmental testing - part 2: Tests; test: Drop and topple, primarily for equipment-type specimens
EN 60068-2-32	Environmental testing - part 2: Tests; test: Free fall
EN 60204-1	Safety of machinery, electrical equipment on machines - part 1: General requirements
EN 60529	Degrees of protection provided by enclosures (IP code)

Table 197: Overview of standards

## Standards and certifications • Overview of standards

Standard	Description
EN 60664-1	Insulation coordination for equipment within low-voltage systems - part 1: Principles, requirements and tests
EN 60721-1	Classification of environmental conditions - part 1: Environmental parameters and their severities
EN 60721-3-2	Classification of environmental conditions - part 3: Classification of groups of environmental parameters and their severities, section 2: Transport
EN 60721-3-3	Classification of environmental conditions - part 3: Classification of groups of environmental parameters and their severities, section 3: Stationary use at weather-protected locations
EN 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 $\leq 75$ 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 $\leq 16$ 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 $\leq 16$ 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
EN 61000-6-1	Electromagnetic compatibility (EMC), generic immunity standard - part 1: Residential, business and commercial areas
EN 61000-6-2	Electromagnetic compatibility (EMC), generic immunity standard - part 2: industrial environment
EN 61000-6-3	Electromagnetic compatibility (EMC), generic emission standard - part 1: Residential, business and commercial areas
EN 61000-6-4	Electromagnetic compatibility (EMC), generic emission standard - part 2: industrial environment
EN 61131-2 IEC 61131-2	Product standard, programmable logic controllers - part 2: Equipment requirements and tests

Table 197: Overview of standards (Forts.)

## Standards and certifications • Emission requirements

Standard	Description
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 197: Overview of standards (Forts.)

### 3. Emission requirements

Emissions	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 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
		47 CFR Part 15 Subpart B Class A (FCC)
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 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
		47 CFR Part 15 Subpart B Class A (FCC)
Harmonic currents for devices with an input current of $\leq 16$ A per line	EN 61000-3-2	EN 61000-3-2: Limits for harmonic current emissions (equipment input current $\leq 16$ A per phase)

Table 198: Overview of limits and testing guidelines for emissions

## Standards and certifications • Emission requirements

Emissions	Test carried out according to	Limits according to
Voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current less than or equal to $\leq 16$ 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 $\leq 16$ 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 $\leq 75$ 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 $\leq 75$ A per phase and subject to conditional connection, class A/D

Table 198: 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 <sup>1)</sup> 150 kHz - 500 kHz	66 - 56 dB ( $\mu$ V) Quasi-peak value 56 - 46 dB ( $\mu$ V) Average	66 - 56 dB ( $\mu$ V) Quasi-peak value 56 - 46 dB ( $\mu$ V) Average	66 - 56 dB ( $\mu$ V) Quasi-peak value 56 - 46 dB ( $\mu$ V) Average
Power mains connections 500 kHz - 5 MHz	56 dB ( $\mu$ V) Quasi-peak value 46 dB ( $\mu$ V) Average	56 dB ( $\mu$ V) Quasi-peak value 46 dB ( $\mu$ V) Average	56 dB ( $\mu$ V) Quasi-peak value 46 dB ( $\mu$ V) Average
Power mains connections 5 MHz - 30 MHz	60 dB ( $\mu$ V) Quasi-peak value 50 dB ( $\mu$ V) Average	60 dB ( $\mu$ V) Quasi-peak value 50 dB ( $\mu$ V) Average	60 dB ( $\mu$ V) Quasi-peak value 50 dB ( $\mu$ V) Average
Other connections <sup>2)</sup> 150 kHz - 500 kHz	40 - 30 dB ( $\mu$ A) Quasi-peak value 30 - 20 dB ( $\mu$ A) Average	-	84 - 74 dB ( $\mu$ V) and 40 - 30 dB ( $\mu$ A) Quasi-peak value 74 - 64 dB ( $\mu$ V) and 30 - 20 ( $\mu$ A) Average
Other connections 500 kHz - 30 MHz	74 dB ( $\mu$ V) and 30 dB ( $\mu$ A) Quasi-peak value 64 dB ( $\mu$ V) and 20 dB ( $\mu$ A) Average	-	74 dB ( $\mu$ V) and 30 dB ( $\mu$ A) Quasi-peak value 64 dB ( $\mu$ V) and 20 dB ( $\mu$ A) Average

Table 199: Test requirements - Network-related emissions for residential areas

1) AC network connections only with EN 61000-6-3

2) DC voltage inputs and outputs as well for EN 61000-6-3.

## Standards and certifications • Emission requirements

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
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 47 CFR Part 15 Subpart B class A	
Power mains connections <sup>1)</sup> 150 kHz - 500 kHz	79 dB (μV) Quasi-peak value 66 dB (μV) Average	79 dB (μV) Quasi-peak value 66 dB (μV) Average	
Power mains connections 500 kHz - 30 MHz	73 dB (μV) Quasi-peak value 60 dB (μV) Average	73 dB (μV) Quasi-peak value 60 dB (μV) Average	
Other connections 150 kHz - 500 kHz	-		
Other connections 500 kHz - 30 MHz	-		

Table 200: Test requirements - Network-related emissions for industrial areas

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 at a distance of 10 m	< 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 at a distance of 10 m	< 37 dB (μV/m) Quasi-peak value	< 37 dB (μV/m) Quasi-peak value	< 37 dB (μV/m) Quasi-peak value

Table 201: : Test requirements - Electromagnetic emissions for residential areas

## Standards and certifications • Emission requirements

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 at a distance of 10 m	< 40 dB (µV/m) Quasi-peak value	< 40 dB (µV/m) Quasi-peak value	< 40 dB (µV/m) Quasi-peak value
230 MHz - 1 GHz measured at a distance of 10 m	< 47 dB (µV/m) Quasi-peak value	< 47 dB (µV/m) Quasi-peak value	< 47 dB (µV/m) Quasi-peak value
Test carried out according to EN 55011 / EN 55022	Limits according to EN 61131-2		
30 MHz - 230 MHz measured at a distance of 10 m	< 40 dB (µV/m) Quasi-peak value		
230 MHz - 1 GHz measured at a distance of 10 m	< 47 dB (µV/m) Quasi-peak value		
Test carried out	Limits according to 47 CFR Part 15 Subpart B class A		
30 MHz - 88 MHz measured at a distance of 10 m	< 90 dB (µV/m) Quasi-peak value		
88 MHz - 216 MHz measured at a distance of 10 m	< 150 dB (µV/m) Quasi-peak value		
216 MHz - 960 MHz measured at a distance of 10 m	< 210 dB (µV/m) Quasi-peak value		
>960 MHz measured at a distance of 10 m	< 300 dB (µV/m) Quasi-peak value		

Table 202: : Test requirements - Electromagnetic emissions for industrial areas

### 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 ≤ n ≤ 39	3.85/n	0.15 x 15/n		

Table 203: : Test requirement - harmonic currents for devices with an input current ≤ 16 A



### 3.4 Voltage fluctuations and flickering $\leq 16$ A

Test carried out according to EN 61000-3-3	Limits according to EN 61000-3-3		
	$P_{st} \leq 1.0$ $P_{Tf} \leq 0.65$ $d(t): 3.3\%$ for max. 500 ms $d_c \leq 3.3\%$ $d_{max} \leq 4\%$		

Table 204: : Test requirements - Voltage fluctuations and flickering in low-voltage systems  $\leq 16$  A

### 3.5 Voltage fluctuations and flickering $\leq 75$ A

Test carried out according to EN 61000-3-11	Limits according to EN 61000-3-11		
	TBD		

Table 205: : Test requirements - Voltage fluctuations and flickering in low-voltage systems  $\leq 75$  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 206: 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 207: Test requirements - Electrostatic discharge (ESD)

**4.2 High-frequency electromagnetic fields (HF field)**

Test carried out according to EN 61000-4-3	Limits according to EN 61000-6-2	Limits according to EN 61131-2	Limits according to EN 55024
Housing, completely wired	80 MHz - 1 GHz, 10 V/m, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	80 MHz - 1 GHz, 1.4 - 2 GHz, 10 V/m, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A 800-960 MHz (GSM), 10 V/m, pulse modulation with 50% duty cycle, criteria A	80 MHz - 1 GHz, 1.4 - 2 GHz, 3 V/m, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A

Table 208: Test requirements - High-frequency electromagnetic fields (HF field)

### 4.3 High-speed transient electrical disturbances (burst)

Test carried out according to EN 61000-4-4	Limits according to EN 61000-6-2	Limits according to EN 61131-2	Limits according to EN 55024
AC power I/O	±2 kV, criteria B	-	±1 kV, criteria B
AC power inputs	-	±2 kV, criteria B	-
AC power outputs	-	±1 kV, criteria B	-
DC power I/O >10 m <sup>1)</sup>	±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 209: Test requirements - High-speed transient electrical disturbances (burst)

1) For EN 55024 without length limitation.

### 4.4 Surges

Test carried out according to EN 61000-4-5	Limits according to EN 61000-6-2	Limits according to EN 61131-2	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 210: Test requirements - Surge voltages

### 4.5 Conducted disturbances

Test carried out according to EN 61000-4-6	Limits according to EN 61000-6-2	Limits according to EN 61131-2	Limits according to EN 55024
AC power I/O	150 kHz - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, criteria A

Table 211: Test requirements - 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 211: Test requirements - Conducted disturbances (Forts.)

### 4.6 Magnetic fields with electrical frequencies

Test carried out according to EN 61000-4-8	Limits according to EN 61000-6-2	Limits according to EN 61131-2	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 212: Test requirements - Magnetic fields with electrical frequencies

### 4.7 Voltage dips, fluctuations, and short-term interruptions

Test carried out according to EN 61000-4-11	Limits according to EN 61000-6-2	Limits according to EN 61131-2	Limits according to EN 55024
AC power inputs	Voltage dip 70% (30% reduction), 0.5 periods, criteria B	-	Voltage dip < 5% (> 95% reduction), 0.5 half-oscillations, criteria B
AC power inputs	Voltage dip 40% (60% reduction), 5 periods, criteria C	-	Voltage dip 70% (30% reduction), 25 half-oscillations, criteria C
AC power inputs	Voltage dip 40% (60% reduction), 50 periods, criteria C	-	-
AC power inputs	Voltage interruptions < 5% (> 95% reduction), 250 periods, criteria C	-	Voltage interruptions < 5% (> 95% reduction), 250 half-oscillations, criteria C
AC power inputs	-	20 interruptions, 0.5 periods, criteria A	-
DC power inputs	-	20 interruptions for 10 ms < UN - 15%, criteria A	-

Table 213: Test requirements - Voltage dips, fluctuations, and short-term interruptions

## 4.8 Damped vibration

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

Table 214: Test requirements - Damped vibration

## 5. Mechanical conditions

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

Table 215: 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		
	Frequency	Limit value	Frequency	Limit value	
Vibration during operation: Uninterrupted duty with moveable frequency in all 3 axes (x, y, z), 1 octave per minute	10 sweeps for each axis		10 sweeps for each axis		
	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 216: Test requirements - Vibration during operation

## 5.2 Vibration during transport (packaged)

Test carried out according to EN 60068-2-6	Limits according to EN 60721-3-2 class 2M1		Limits according to EN 60721-3-2 class 2M2		Limits according to EN 60721-3-2 class 2M3	
Vibration during transport: Uninterrupted duty with moveable frequency in all 3 axes (x, y, z)	10 sweeps for each axis, packaged		10 sweeps for each axis, packaged		10 sweeps for each axis, packaged	
	Frequency	Limit value	Frequency	Limit value	Frequency	Limit value
	2 - 9 Hz	Amplitude 3.5 mm	2 - 9 Hz	Amplitude 3.5 mm	2 - 8 Hz	Amplitude 7.5 mm
	9 - 200 Hz	Acceleration 1 g	9 - 200 Hz	Acceleration 1 g	8 - 200 Hz	Acceleration 2 g
	200 - 500 Hz	Acceleration 1.5 g	200 - 500 Hz	Acceleration 1.5 g	200 - 500 Hz	Acceleration 4 g
	Limit values according to B&R					
	10 sweeps per axis, <u>not packaged</u>					
	2 - 8 Hz	Amplitude 7.5 mm				
	8 - 200 Hz	Acceleration 2 g				
	200 - 500 Hz	Acceleration 4 g				

Table 217: Test requirements - Vibration during transport (packaged)

## 5.3 Shock during operation

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

Table 218: Test requirements - Shock during operation

## 5.4 Shock during transport (packaged)

Test carried out according to EN 60068-2-27	Limits according to EN 60721-3-2 class 2M1	Limits according to EN 60721-3-2 class 2M2	Limits according to EN 60721-3-2 class 2M3
Pulse (half-sine) stress in all 3 axes (x, y, z)	Acceleration 10 g, Length 11 ms, each 3 shocks, packaged	Acceleration 30 g, Length 6 ms, each 3 shocks, packaged	Acceleration 100 g, Length 6 ms, each 3 shocks, packaged
	<b>Limits according to B&amp;R</b>		
	Acceleration 30 g, Length 11 ms, each 3 shocks, <u>not packaged</u>		

Table 219: Test requirements - Shock during transport



## 5.5 Toppling

Test carried out according to EN 60068-2-31	Limits according to EN 60721-3-2 class 2M1		Limits according to EN 60721-3-2 class 2M2		Limits according to EN 60721-3-2 class 2M3	
Drop and topple	Devices: Drop/topple on each edge		Devices: Drop/topple on each edge		Devices: Drop/topple on each edge	
	<b>Weight</b>	<b>Required</b>	<b>Weight</b>	<b>Required</b>	<b>Weight</b>	<b>Required</b>
	<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 220: Test requirements - Toppling

## 5.6 Free fall (packaged)

Test carried out according to EN 60068-2-32	Limits according to EN 61131-2		Limits according to EN 60721-3-2 class 2M1		Limits according to EN 60721-3-2 class 2M2		Limits according to EN 60721-3-2 class 2M3	
Free fall	Devices with delivery packaging each with 5 fall tests		Devices packaged		Devices packaged		Devices packaged	
	<b>Weight</b>	<b>Height</b>	<b>Weight</b>	<b>Height</b>	<b>Weight</b>	<b>Height</b>	<b>Weight</b>	<b>Height</b>
	<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							
	<b>Weight</b>	<b>Height</b>						
	<10 kg	0.3 m						
	10 - 40 kg	0.3 m						
	>40 kg	0.25 m						
	<b>Limits according to B&amp;R</b>							
	Devices packaged							
	<b>Weight</b>	<b>Height</b>						
	<40 kg	1 m						

Table 221: Test requirements - Toppling

## 6. Climate conditions

Temperature / humidity	Test carried out according to	Limits according to
Worst case operation	UL 508	UL 508: Industrial control equipment EN 61131-2: Programmable logic controllers
Dry heat	EN 60068-2-2	EN 61131-2: Programmable logic controllers
Dry cold	EN 60068-2-1	EN 61131-2: Programmable logic controllers
Large temperature fluctuations	EN 60068-2-14	EN 61131-2: Programmable logic controllers
Temperature fluctuations in operation	EN 60068-2-14	EN 61131-2: Programmable logic controllers
Humid heat, cyclic	EN 60068-2-30	EN 61131-2: Programmable logic controllers
Humid heat, constant (storage)	EN 60068-2-3	EN 61131-2: Programmable logic controllers
Sprayed water (from front)	NEMA 250 Type 4X	UL 50 - NEMA 250 4X: Degree of protection provided by housing

Table 222: Overview of limits and testing guidelines for temperature and humidity

### 6.1 Worst case operation

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

Table 223: Test requirements - Worst case during operation

### 6.2 Dry heat

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

Table 224: Test requirements - Dry heat

### 6.3 Dry cold

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

Table 225: Test requirements - Dry cold

## 6.4 Large temperature fluctuations

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

Table 226: Test requirements - Large temperature fluctuations

## 6.5 Temperature fluctuations in operation

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

Table 227: Test requirements - Temperature fluctuations in operation

## 6.6 Humid heat, cyclic

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

Table 228: Test requirements - Humid heat, cyclic

## 6.7 Humid heat, constant (storage)

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

Table 229: Test requirements - 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 230: Test requirements - 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 231: 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 <sup>1)</sup>		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 <sup>2</sup>	3.3 V	
	1.5 mm <sup>2</sup>	2.6 V	
	2.5 mm <sup>2</sup>	1.9 V	
	4.0 mm <sup>2</sup>	1.4 V	
	> 6.0 mm <sup>2</sup>	1.0 V	

Table 232: Test requirements - 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 <sup>1)</sup>		
Insulation resistance: main circuits to protective ground conductor	> 1 MOhm at 500 VDC voltage		

Table 233: Test requirements - 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 <sup>1)</sup>			Limits according to UL 508			
	Input voltage	Test voltage		Input voltage	Test voltage		
1.2/50 $\mu$ s voltage surge peak		AC, 1 min	DC, 1 min		AC, 1 min	DC, 1 min	
High voltage: Primary circuit to secondary circuit and to protective ground circuit (transformers, coils, varistors, capacitors and components used to protect against over-voltage can be removed before the test)	0 - 50 VAC 0 - 60 VDC	850 V	510 V	720 V	$\leq 50$ V	500 V	707 V
	50 - 100 VAC 60 - 100 VDC	1360 V	740 V	1050 V	$> 50$ V	$1000 \text{ V} + 2 \times U_N$	$(1000 \text{ V} + 2 \times U_N) \times 1.414$
	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 234: Test requirements - 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 235: Test requirements - 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 236: Test requirements - 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 <sub>N</sub> , 1 sec on / 9 sec off	50 switches, 1.5 I <sub>N</sub> , 1 sec on / 9 sec off	

Table 237: Test requirements - 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 238: Test requirements - 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 239: Test requirements - 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 240: Overview of limits and testing guidelines for other tests

### 8.1 Impact resistance

Test carried out according to	Limits according to		
	TBD		

Table 241: Test requirements - 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	IP.6 Protection against large solid foreign bodies: dust-proof	
Protection of personnel	IP2. Protection against touching dangerous parts with finger	IP.6 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 242: Test requirements - Protection

### 8.3 Degree of pollution

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

Table 243: Test requirements - Degree of pollution



## 9. International certifications

B&R products and services comply with applicable standards. They are international standards from organizations such as ISO, IEC and CENELEC, as well as national standards from organizations such as UL, CSA, FCC, VDE, ÖVE, etc. We give special consideration to the reliability of our products in an industrial environment.



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

Table 244: International certifications



# Chapter 6 • Accessories

## 1. Overview

Model number	Description	Note
0AC201.91	<b>Lithium batteries (4x)</b> Lithium batteries, 4 pcs., 3 V / 950 mAh, button cell	
0TB103.9	<b>Plug 24V 5.08 3-pin screw clamps</b> 24 VDC 3-pin connector, female. Screw clamps, 3.31 mm <sup>2</sup> , protected against vibration by the screw flange	
0TB103.91	<b>Plug 24V 5.08 3-pin cage clamps</b> 24 VDC 3-pin connector, female. Cage clamps, 3.31 mm <sup>2</sup> , protected against vibration by the screw flange	
4A0006.00-000	<b>Lithium battery (1x)</b> Lithium battery, 1 pc., 3 V / 950 mAh, button cell	
4AC200.1000-00	<b>aPCI slot cover, 1 pc.</b> Optional aPCI slot cover for inserting into an available aPCI slot on a Power Panel 200 device	
5AC900.057X-00	<b>Legend strips 3x 5.7" Vertical1</b> 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	<b>Legend strips 2x 5.7" Horizontal2</b> 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	<b>Legend strip 1x 10.4" Vertical1</b> 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	<b>Legend strip 1x 10.4" Horizontal2</b> 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	<b>Legend strips 3x 10.4" Horizontal1</b> Legend strip template for 4PP180.1043-31, 4PP280.1043-75, 4PP280.1043-B5	
5AC900.150X-00	<b>Legend strips 4x 15"</b> Legend strip template for 4PP280.1505-75, 4PP280.1505-B5, 4PP281.1505-75, 4PP281.1505-B5	
5CFCRD.0032-01	<b>CompactFlash 32 MB TrueIDE SanDisk/R2</b> CompactFlash card with 32 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 11/2003</i>
5CFCRD.0032-02	<b>CompactFlash 32 MB TrueIDE SanDisk/A</b> CompactFlash card with 32 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 12/2005</i>
5CFCRD.0064-01	<b>CompactFlash 64 MB TrueIDE SanDisk/R2</b> CompactFlash card with 64 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 11/2003</i>
5CFCRD.0064-02	<b>CompactFlash 64 MB TrueIDE SanDisk/A</b> CompactFlash card with 64 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 12/2005</i>

Table 245: Model numbers - Accessories

## Accessories • Overview

Model number	Description	Note
5CFCRD.0064-03	<b>CompactFlash 64 MB TrueIDE SSI</b> CompactFlash card with 64 MB SLC NAND flash and True IDE/ATA interface	
5CFCRD.0128-01	<b>CompactFlash 128 MB TrueIDE SanDisk/R2</b> CompactFlash card with 128 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 11/2003</i>
5CFCRD.0128-02	<b>CompactFlash 128 MB TrueIDE SanDisk/A</b> CompactFlash card with 128 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 12/2005</i>
5CFCRD.0128-03	<b>CompactFlash 128 MB TrueIDE SSI</b> CompactFlash card with 128 MB SLC NAND flash and True IDE/ATA interface	
5CFCRD.0192-01	<b>CompactFlash 196 MB TrueIDE SanDisk/R2</b> CompactFlash card with 196 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 07/2003</i>
5CFCRD.0256-01	<b>CompactFlash 256 MB TrueIDE SanDisk/R2</b> CompactFlash card with 256 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 11/2003</i>
5CFCRD.0256-02	<b>CompactFlash 256 MB TrueIDE SanDisk/A</b> CompactFlash card with 256 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 12/2005</i>
5CFCRD.0256-03	<b>CompactFlash 256 MB TrueIDE SSI</b> CompactFlash card with 256 MB SLC NAND flash and True IDE/ATA interface	
5CFCRD.0384-01	<b>CompactFlash 384 MB TrueIDE SanDisk/R2</b> CompactFlash card with 384 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 07/2003</i>
5CFCRD.0512-01	<b>CompactFlash 512 MB TrueIDE SanDisk/R2</b> CompactFlash card with 512 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 11/2003</i>
5CFCRD.0512-02	<b>CompactFlash 512 MB TrueIDE SanDisk/A</b> CompactFlash card with 512 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 12/2005</i>
5CFCRD.0512-03	<b>CompactFlash 512 MB TrueIDE SSI</b> CompactFlash card with 512 MB SLC NAND flash and True IDE/ATA interface	
5CFCRD.1024-02	<b>CompactFlash 1024 MB TrueIDE SanDisk/A</b> CompactFlash card with 1024 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 12/2005</i>
5CFCRD.1024-03	<b>CompactFlash 1024 MB TrueIDE SSI</b> CompactFlash card with 1024 MB SLC NAND flash and True IDE/ATA interface	
5CFCRD.2048-02	<b>CompactFlash 2024 MB TrueIDE SanDisk/A</b> CompactFlash card with 2048 MB flash PROM and True IDE/ATA interface	<i>Cancelled since 12/2005</i>
5CFCRD.2048-03	<b>CompactFlash 2048 MB TrueIDE SSI</b> CompactFlash card with 2048 MB SLC NAND flash and True IDE/ATA interface	
5CFCRD.4096-03	<b>CompactFlash 4096 MB TrueIDE SSI</b> CompactFlash card with 4096 MB SLC NAND flash and True IDE/ATA interface	
5CFCRD.8192-03	<b>CompactFlash 8192 MB TrueIDE SSI</b> CompactFlash card with 8192 MB SLC NAND flash and True IDE/ATA interface	<i>In preparation</i>
5MMUSB.0128-00	<b>USB flash drive 128 MB SanDisk</b> USB 2.0 flash drive 128 MB	<i>Cancelled since 12/2005</i>
5MMUSB.0256-00	<b>USB flash drive 256 MB SanDisk</b> USB 2.0 flash drive 256 MB	<i>Cancelled since 03/2007</i>
5MMUSB.0512-00	<b>USB flash drive 512 MB SanDisk</b> USB 2.0 flash drive 512 MB	

Table 245: Model numbers - Accessories (Forts.)

Model number	Description	Note
5MMUSB.1024-00	<b>USB flash drive 1 GB SanDisk</b> USB 2.0 flash drive 1 GB	<i>Cancelled since 03/2007</i>
5MMUSB.2048-00	<b>USB flash drive 2 GB SanDisk</b> USB 2.0 flash drive 2 GB	
9A0017.01	<b>RS232 DB9 null modem cable 0.6 m</b> Null modem cable RS232 0.6 m to connect UPS and IPC (9-pin DSUB socket - 9-pin DSUB socket).	
9A0017.02	<b>RS232 DB9 null modem cable 1.8 m</b> Null modem cable RS232 1.8 m to connect UPS and IPC (9-pin DSUB socket - 9-pin DSUB socket).	
5SWHMI.0000-00	<b>HMI Drivers &amp; Utilities DVD</b>	

Table 245: Model numbers - Accessories (Forts.)

## 2. Lithium battery

### 2.1 General information

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

The battery is subject to wear and must be replaced when the battery power ("Bad" status) is insufficient (see "Changing the battery" on page 590).

### 2.2 Order data


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

Table 246: Order data - Lithium batteries

### 2.3 Technical data

#### Information:

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

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

Table 247: Technical data - 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.

#### 3.2 Order data



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

Table 248: Order data - TB103

### Information:

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

Name	0TB103.9	0TB103.91
Number of pins	3	
Type of terminal	Screw clamps	Cage clamps
Distance between contacts	5.08 mm	
Resistance between contacts	≤5 mΩ	

Table 249: Technical data - TB103

**Accessories • TB103 3-pin supply voltage connector**

Name	0TB103.9	0TB103.91
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 <sup>2</sup> - 3.31 mm <sup>2</sup>	
Cable type	Copper wires only (no aluminum wires!)	

Table 249: Technical data - TB103 (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.

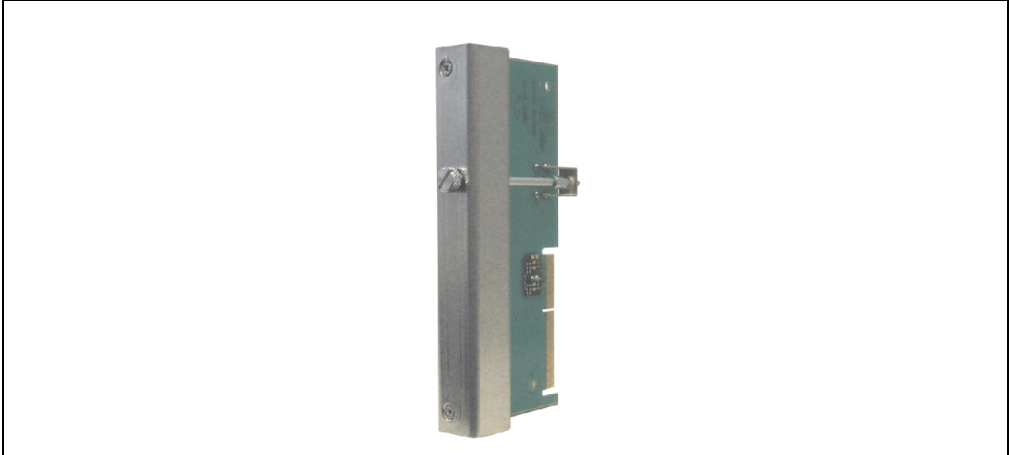


Figure 401: aPCI slot cover 4AC200.1000-00

### 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.

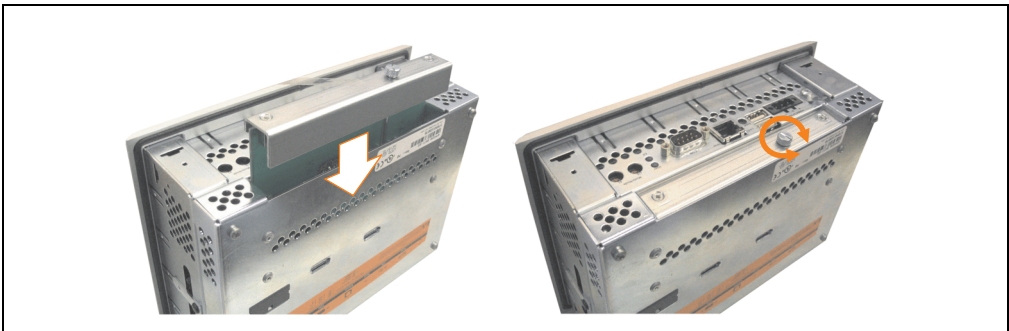


Figure 402: aPCI slot cover installation

## 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).

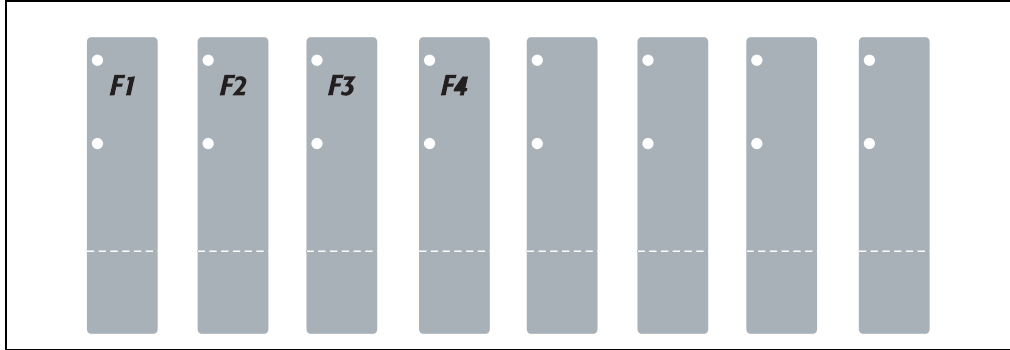


Figure 403: Legend strip templates

Printable legend strips (A4 format) can be ordered from B&R (see table 250 "Order data - Legend strip templates" on page 563). They can be printed using a standard laser printer (b/w or color) in a temperature range from -40 to +125°C. A print template (available for Corel Draw versions 7, 9 and 10) for the respective legend strip template can be downloaded from the B&R homepage at [www.br-automation.com](http://www.br-automation.com).

5.1 Order data

Model number	Description	Figure
5AC900.057X-00	<b>Legend strips 3x 5.7" Vertical1</b> 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.	<p>Examples of legend strip templates</p>
5AC900.057X-01	<b>Legend strips 2x 5.7" Horizontal2</b> 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	<b>Legend strip 1x 10.4" Vertical1</b> 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	<b>Legend strip 1x 10.4" Horizontal2</b> 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	<b>Legend strips 3x 10.4" Horizontal1</b> Legend strip template for Power Panels 4PP180.1043-31, 4PP280.1043-75, 4PP280.1043-B5. For 3 devices.	
5AC900.150X-00	<b>Legend strips 4x 15"</b> 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 250: Order data - Legend strip templates

## 6. CompactFlash cards 5CFCRD.xxxx-03

### 6.1 General information

#### Information:

Silicon Systems CompactFlash cards 5CFCRD.xxxx-03 and CompactFlash cards from a different manufacturer cannot be used in the same system at the same time. Due to differences in technology (older vs. newer technologies), problems can occur during system startup that are caused by the different boot times.

See chapter 3 "Commissioning", section 8 "Known problems / issues" on page 451.

#### Information:

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

### 6.2 Order data


Model number	Description	Figure
5CFCRD.0064-03	CompactFlash 64 MB SSI	 <p>CompactFlash card</p>
5CFCRD.0128-03	CompactFlash 128 MB SSI	
5CFCRD.0256-03	CompactFlash 256 MB SSI	
5CFCRD.0512-03	CompactFlash 512 MB SSI	
5CFCRD.1024-03	CompactFlash 1024 MB SSI	
5CFCRD.2048-03	CompactFlash 2048 MB SSI	
5CFCRD.4096-03	CompactFlash 4096 MB SSI	
5CFCRD.8192-03	CompactFlash 8192 MB SSI	

Table 251: Order data - CompactFlash cards

## 6.3 Technical data

### Caution!

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

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

### Information:

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

Features	5CFCRD. 0064-03	5CFCRD. 0128-03	5CFCRD. 0256-03	5CFCRD. 0512-03	5CFCRD. 1024-03	5CFCRD. 2048-03	5CFCRD. 4096-03	5CFCRD. 8192-03
MTBF (at 25°C)	> 4,000,000 hours							
Maintenance	None							
Data reliability	< 1 unrecoverable error in 10 <sup>14</sup> bit read accesses							
Data retention	10 years							
Lifetime monitoring	Yes							
Supported operating modes	PIO Mode 0-4, Multiword DMA Mode 0-2							
Continuous reading	Typically 8 MB/s							
Continuous writing	Typically 6 MB/s							
<b>Endurance</b>								
Clear/write cycles Typical	> 2,000,000							
SLC flash	Yes							
Wear leveling	Static							
Error Correction Coding (ECC)	Yes							
<b>Support</b>								
Hardware	MP100/200, PP100/200, PP300/400, PPC700, PPC300, Provit 2000, Provit 5000, APC620, APC680, APC810, APC820							
Windows XP Professional	-	-	-	-	-	-	Yes	Yes
Windows XP Embedded	-	-	-	Yes	Yes	Yes	Yes	Yes
Windows CE 6.0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes <sup>1)</sup>
Windows CE 5.0	Yes	Yes	Yes	Yes	Yes	-	-	-

Table 252: Technical data - CompactFlash cards 5CFCRD.xxxx-03

## Accessories • CompactFlash cards 5CFCRD.xxxx-03

Support	5CFCRD. 0064-03	5CFCRD. 0128-03	5CFCRD. 0256-03	5CFCRD. 0512-03	5CFCRD. 1024-03	5CFCRD. 2048-03	5CFCRD. 4096-03	5CFCRD. 8192-03
PVI Transfer Tool	≥ V2.57 (part of PVI Development Setup ≥ V2.5.3.3005)							
B&R Embedded OS Installer	≥ V2.21							
<b>Mechanical characteristics</b>								
Dimensions								
Length	36.4 ±0.15 mm							
Width	42.8 ±0.10 mm							
Thickness	3.3 ±0.10 mm							
Weight	11.4 g							
<b>Environmental characteristics</b>								
Ambient temperature								
Operation	0 to +70°C							
Storage	-50 to +100°C							
Transport	-50 to +100°C							
Relative humidity								
Operation / Storage / Transport	8 to 95%, non-condensing							
Vibration								
Operation	max. 16.3 g (159 m/s <sup>2</sup> 0-peak)							
Storage / Transport	max. 30 g (294 m/s <sup>2</sup> 0-peak)							
Shock								
Operation	max. 1000 g (9810 m/s <sup>2</sup> 0-peak)							
Storage / Transport	max. 3000 g (29430 m/s <sup>2</sup> 0-peak)							
Altitude	Maximum 80,000 feet (24,383 meters)							

Table 252: Technical data - CompactFlash cards 5CFCRD.xxxx-03 (Forts.)

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

### 6.3.1 Temperature humidity diagram - Operation and storage

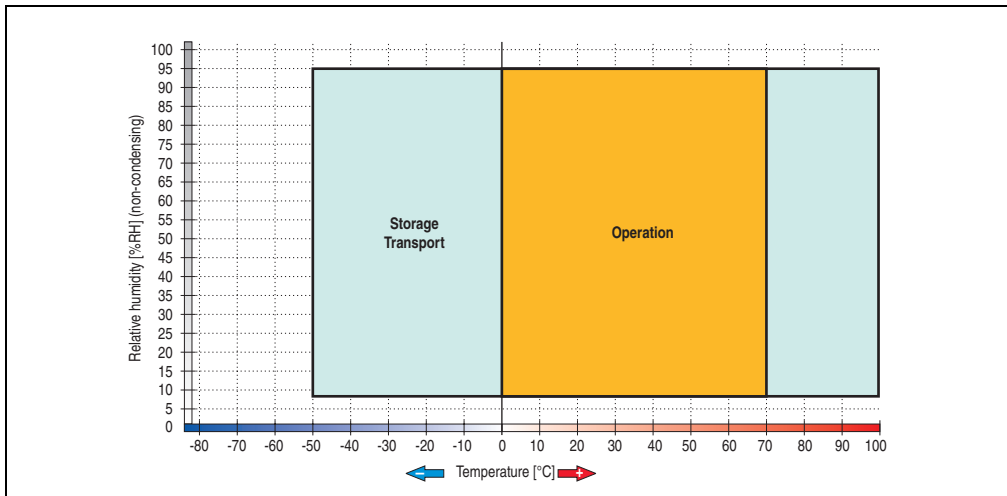


Figure 404: Temperature humidity diagram - CompactFlash cards 5CFCRD.xxxx-03

## 6.4 Dimensions

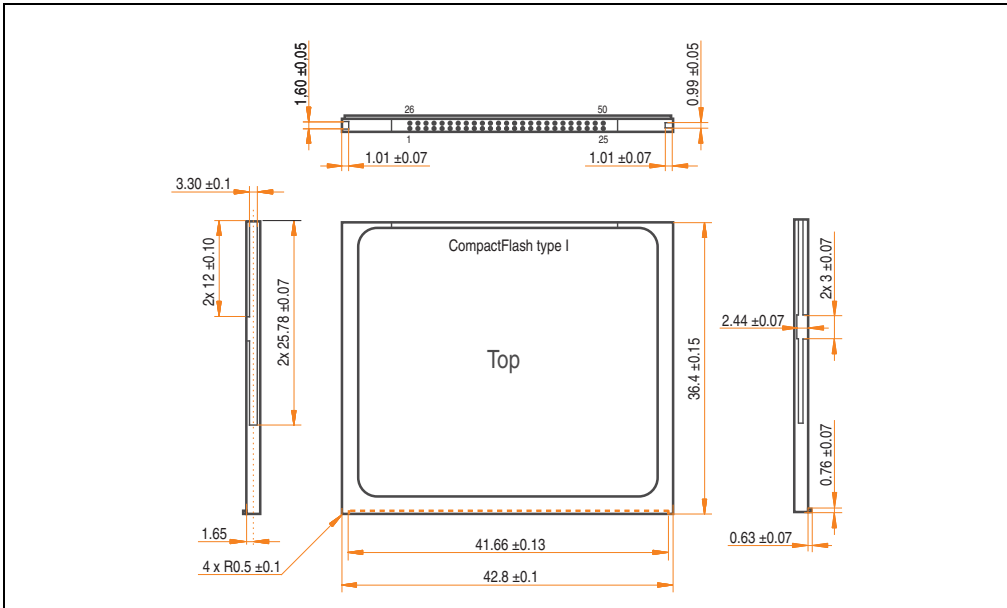


Figure 405: Dimensions - CompactFlash card Type I

## 7. CompactFlash cards 5CFCRD.xxxx-02

### 7.1 General information

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

### 7.2 Order data


Model number	Description	Figure
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 253: Order data - CompactFlash cards 5CFCRD.xxxx-02

### 7.3 Technical data

#### Information:

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

Features	5CFCRD.xxxx-02
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	> 2,000,000 times

Table 254: Technical data - CompactFlash cards 5CFCRD.xxxx-02



Mechanics	5CFCRD.xxxx-02
Dimensions	
Length	36.4 ±0.15 mm
Width	42.8 ±0.10 mm
Thickness	3.3 ±0.10 mm
Weight	11.4 g
Environment	
Ambient temperature	
Operation	0 to +70°C
Storage	-25 to +85°C
Transport	-25 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
Altitude	24000 meters

Table 254: Technical data - CompactFlash cards 5CFCRD.xxxx-02 (Forts.)

## 7.4 Dimensions

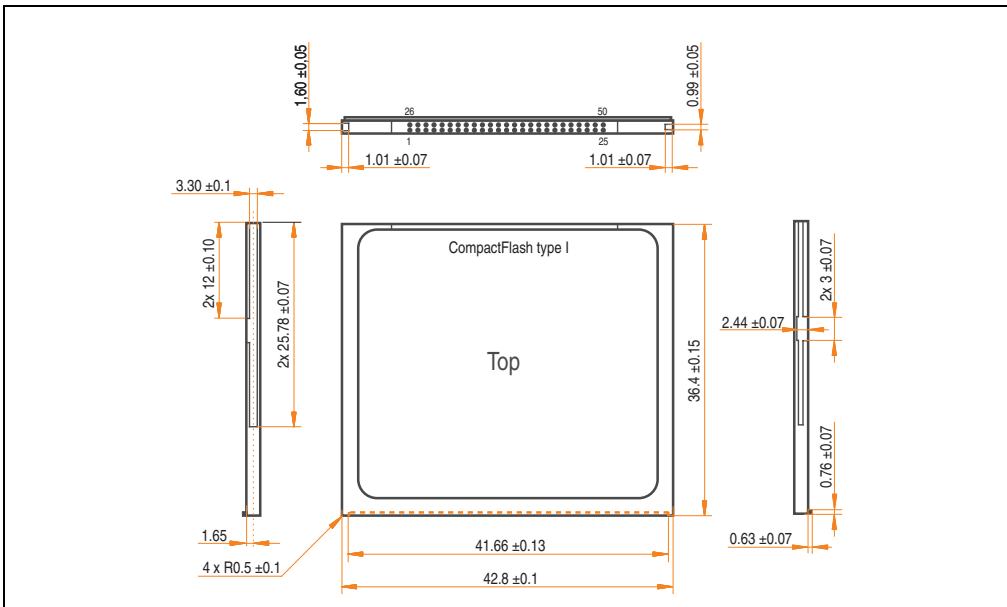


Figure 406: Dimensions - CompactFlash card Type I

## 7.5 Calculating the lifespan

SanDisk provides a 6-page "white paper" for the lifespan calculation of CompactFlash cards (see following pages). This document can also be found on the SanDisk homepage.

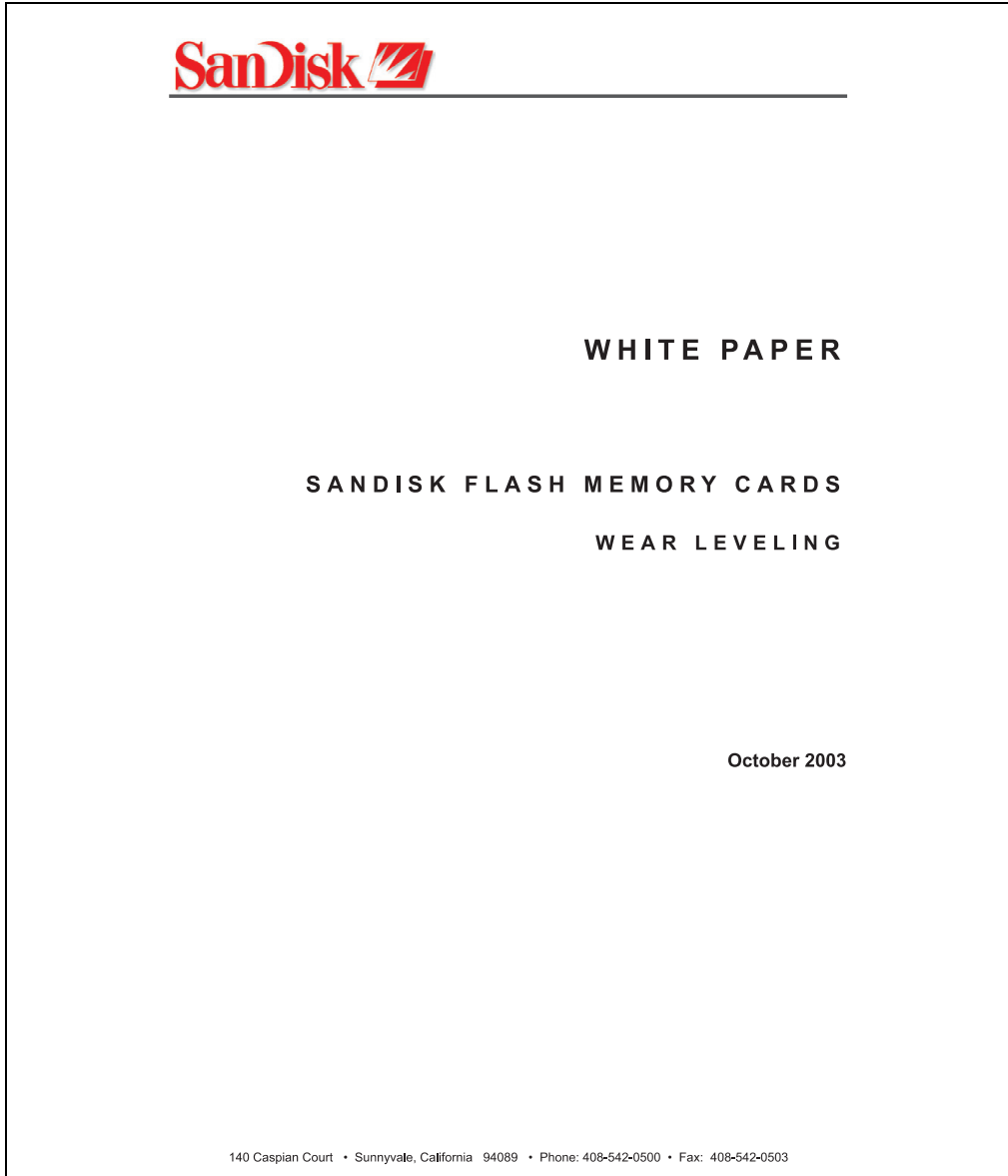


Figure 407: SanDisk white paper - Page 1

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**SanDisk Corporation**

Doc No. 80-36-00278

SanDisk Flash Memory Cards Wear Leveling

Page 2

Figure 408: 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 Corporation**

Doc No. 80-36-00278

SanDisk Flash Memory Cards Wear Leveling

Page 3

Figure 409: 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 Corporation

Figure 410: 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:

$$lifetime = 2,000,000 \times \frac{(C_{zone} - C_{fixed}) \times \left(1 - k_r \times \frac{32 - N_{cluster}}{32}\right)}{FS_{typ}} \times \frac{1}{f_w}$$

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.

$$lifetime = 2,000,000 \times \frac{(4000 - 500) \times (1 - 0)}{128} \times \frac{1}{1/day}$$

$$lifetime = 149828 \text{ years}$$

#### 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.

$$lifetime = 2,000,000 \times \frac{4000}{4} \times \frac{1}{1/5 \text{ sec}}$$

$$lifetime = 317 \text{ years}$$

Figure 411: 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](http://www.sandisk.com)

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Figure 412: SanDisk white paper - Page 6

## 8. CompactFlash cards 5CFCRD.0xxx-01

### 8.1 General information

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

### 8.2 Order data


Model number	Description	Figure
5CFCRD.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 255: Order data - CompactFlash cards 5CFCRD.0xxx-01

### 8.3 Technical data

#### Information:

The specified limits listed here, such as temperature, relative humidity, shock and vibration, only apply to his accessory and do not automatically apply to the whole terminal.

Features	5CFCRD.xxxx-01
Temperature Operation Storage	0 to 60°C -25 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 256: Technical data - CompactFlash cards 5CFCRD.xxxx-01



Features	5CFCRD.xxxx-01
Altitude	24000 meters
MTBF (@ 25°C)	> 3,000,000 hours
Maintenance	None
Data reliability	<1 unrecoverable error in 10 <sup>14</sup> bit read accesses <1 faulty correction in 10 <sup>20</sup> bit read accesses
Write/erase procedures	> 2,000,000 times
Weight	11.4 grams
Dimensions	
Length	36.4 ±0.15 mm
Width	42.8 ±0.10 mm
Thickness	3.3 ±0.10 mm

Table 256: Technical data - CompactFlash cards 5CFCRD.xxxx-01 (Forts.)

## 9. USB flash drive

### Information:

We reserve the right to supply alternative products due to the vast quantity of flash drives available on the market and their corresponding short product lifecycle. As a result, the following measures may be necessary (e.g. using the SanDisk Cruzer Micro flash drive with 512 MB) to take the following measures in order to boot from these flash drives:

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

### 9.1 General information

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

### 9.2 Order data


Model number	Description	Figure
5MMUSB.0128-00	USB flash drive 128 MB SanDisk Cruzer Mini	 <p>SanDisk Cruzer® Mini</p> <p>SanDisk Cruzer® Micro</p>
5MMUSB.0256-00	USB flash drive 256 MB SanDisk Cruzer Mini	
5MMUSB.0512-00	USB flash drive 512 MB SanDisk Cruzer Mini up to Rev. E0 or Cruzer Micro starting with Rev. E0	
5MMUSB.1024-00	USB flash drive 1 GB SanDisk Cruzer Mini up to Rev. C0 or Cruzer Micro starting with Rev. C0	
5MMUSB.2048-00	USB flash drive 2 GB SanDisk Cruzer Micro	

Table 257: Order data - USB flash drives

### 9.3 Technical data

## Information:

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

Features	5MMUSB.0128-00	5MMUSB.0256-00	5MMUSB.0512-00	5MMUSB.1024-00	5MMUSB.2048-00
LED Cruzer Mini / Cruzer Micro	1 LED (green), signals data transfer (send and receive)				
Power supply Current requirements Cruzer Mini / Cruzer Micro	Via the USB port 650 µA sleep mode, 150 mA read/write				
Interface Cruzer Mini / Cruzer Micro Type Transfer rate Sequential reading Sequential writing Connection	USB specification 2.0 high speed device, mass storage class, USB-IF and WHQL certified USB 1.1 and 2.0 compatible Up to 480 MBit (high speed) Max. 8.7 MB/second Max. 1.7 MB/second To each USB type A interface				
MTBF (at 25°C) Cruzer Mini / Cruzer Micro	100,000 hours				
Data retention Cruzer Mini / Cruzer Micro	10 years				
Maintenance Cruzer Mini / Cruzer Micro	None				
Operating system support Cruzer Mini Cruzer Micro	Windows CE 4.1, CE 4.2, 98SE <sup>1)</sup> , ME, 2000, XP, Mac OS 9.1.x and Mac OS X 10.1.2 Windows CE 4.2, CE 5.0, ME, 2000, XP and Mac OS 9.1.x+, OS X v10.1.2+				
<b>Mechanical characteristics</b>					
Dimensions Height - Cruzer Mini / Cruzer Micro Width - Cruzer Mini / Cruzer Micro Depth - Cruzer Mini / Cruzer Micro	62 mm / 52.2 mm 19 mm / 19 mm 11 mm / 7.9 mm				
<b>Environmental characteristics</b>					
Environmental temperature Cruzer Mini / Cruzer Micro Operation Storage Transport	0 to +45°C -20 to +60°C -20 to +60°C				
Humidity Cruzer Mini / Cruzer Micro Operation Storage Transport	10 to 90%, non-condensing 5 to 90%, non-condensing 5 to 90%, non-condensing				

Table 258: Technical data - USB flash drive 5MMUSB.xxxx-00

## Accessories • USB flash drive

Features	5MMUSB.0128-00	5MMUSB.0256-00	5MMUSB.0512-00	5MMUSB.1024-00	5MMUSB.2048-00
Vibration Cruiser Mini / Cruiser Micro Operation Storage Transport	At 10 - 500 Hz: 2 g (19.6 m/s <sup>2</sup> 0 peak), oscillation rate 1/minute At 10 - 500 Hz: 4 g (39.2 m/s <sup>2</sup> 0 peak), oscillation rate 1/minute At 10 - 500 Hz: 4 g (39.2 m/s <sup>2</sup> 0 peak), oscillation rate 1/minute				
Shock Cruiser Mini / Cruiser Micro Operation Storage Transport	Max. 40 g (392 m/s <sup>2</sup> 0-peak) and 11 ms length Max. 80 g (784 m/s <sup>2</sup> 0-peak) and 11 ms length Max. 80 g (784 m/s <sup>2</sup> 0-peak) and 11 ms length				
Altitude Cruiser Mini / Cruiser Micro Operation Storage Transport	3048 meters 12192 meters 12192 meters				

Table 258: Technical data - USB flash drive 5MMUSB.xxxx-00 (Forts.)

1) For Win 98SE, a driver can be downloaded from the [SanDisk](#) homepage.

### 9.3.1 Temperature humidity diagram - Operation and storage

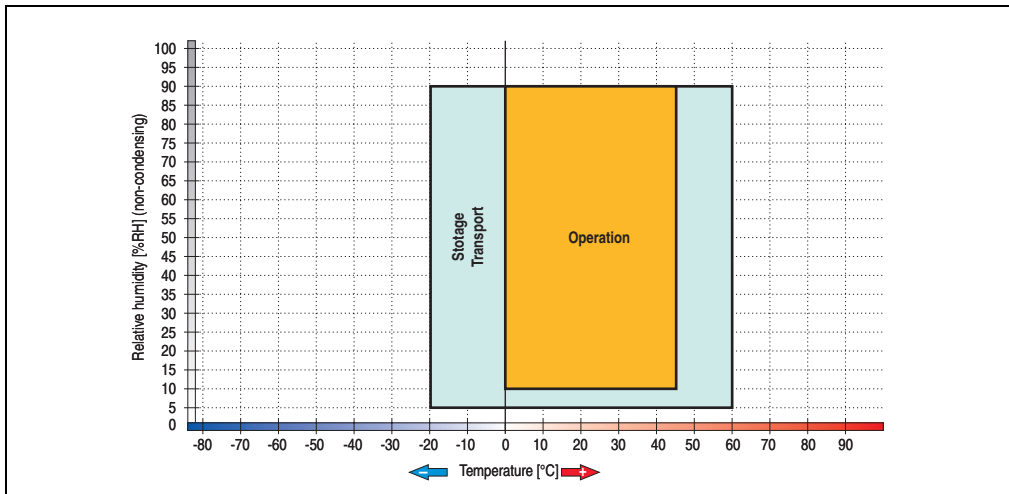


Figure 413: Temperature humidity diagram - USB flash drive - 5MMUSB.xxxx-00

## 9.4 Creating a bootable USB flash drive

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

### 9.4.1 Requirements

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

- B&R USB flash drive
- B&R Industrial PC
- USB floppy drive (external)
- USB keyboard
- A start disk created using MS-DOS 6.22 or Windows 98 - 1.44MB HDD (Windows Millennium, NT4.0, 2000, XP start disks cannot be used).  
The tools "format.com" and "fdisk.exe" must be located on the diskette!

### 9.4.2 Procedure

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

## 10. Null modem cable

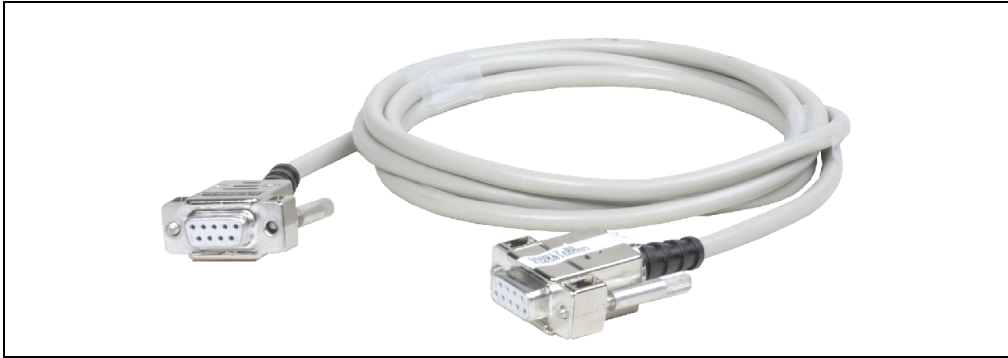


Figure 414: Null modem cable 9A0017.0x

### 10.1 Order data

Model number	Description	Note
9A0017.01	<b>RS232 DB9 null modem cable 0.6 m</b> Null modem cable RS232 0.6 m to connect UPS and IPC (9-pin DSUB socket - 9-pin DSUB socket).	
9A0017.02	<b>RS232 DB9 null modem cable 1.8 m</b> Null modem cable RS232 1.8 m to connect UPS and IPC (9-pin DSUB socket - 9-pin DSUB socket).	

Table 259: Model numbers - USB cables

### 10.2 Technical data

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 260: Technical data - Null modem cable

### 10.3 Cable specifications

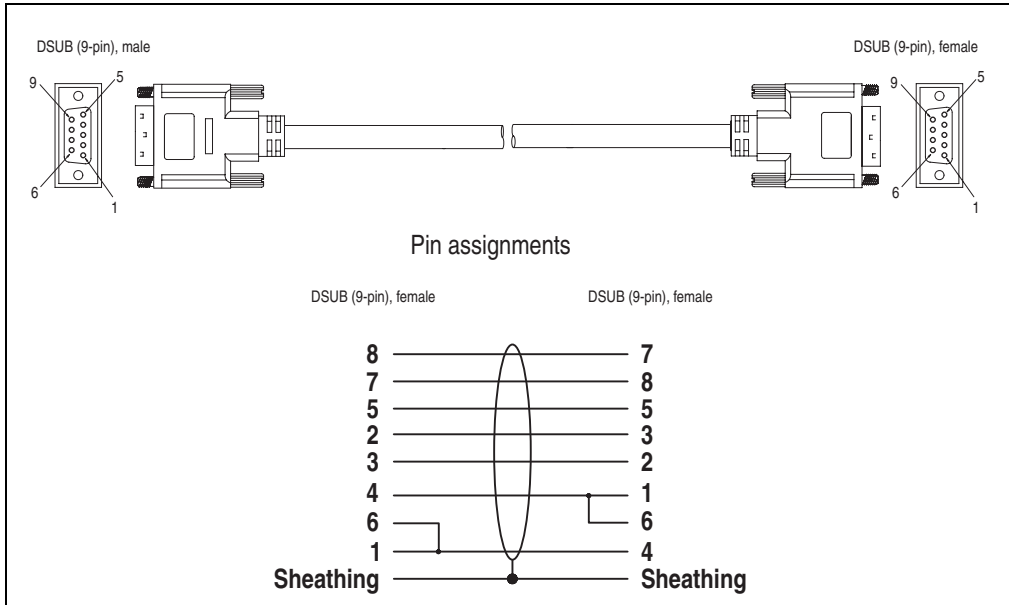


Figure 415: Pin assignments - Null modem cable

## 11. HMI Drivers & Utilities DVD 5SWHMI.0000-00



Figure 416: HMI Drivers & Utilities DVD 5SWHMI.0000-00

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

Table 261: Model number - HMI Drivers & Utilities DVD

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

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

### BIOS upgrades for the products

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



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

### **Drivers for the devices**

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

### **Firmware Upgrades**

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

## Utilities / Tools

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

## Windows

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

## MCAD templates for

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

## ECAD templates for

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

## Documentation for

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

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

### **Service tools**

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

## Chapter 7 • Maintenance / Servicing

The following section describes service/maintenance work that can be performed 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 <sup>1)</sup>	For the lifespan, see the technical data for the individual devices.

Table 262: Maintenance work

<sup>1)</sup> Change intervals are recommended by B&R and refer to average life span and operating conditions.

### 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 section "Technical data" on page 43 for Power Panel devices).

The lithium battery buffers the internal real-time clock (RTC), SRAM data, and individually saved BIOS settings. The battery status (good or bad) can be queried using software.

#### Battery check

The battery status (good or bad) is checked every time the device is turned on, as well as every 24 hours. The check involves applying a load to the battery for a short time (approx. 1 second), followed by an evaluation. The evaluated battery status is displayed in the BIOS Setup pages and in the B&R Control Center (ADI driver), but can also be read in a customer application via the ADI Library.

Battery status	Meaning
OK	Data buffering is guaranteed
Bad	Data buffering is guaranteed for approx. another 500 hours from the point in time that the battery capacity is determined to be BAD (insufficient).

Table 263: Meaning of battery status OK - Bad

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.

## Information:

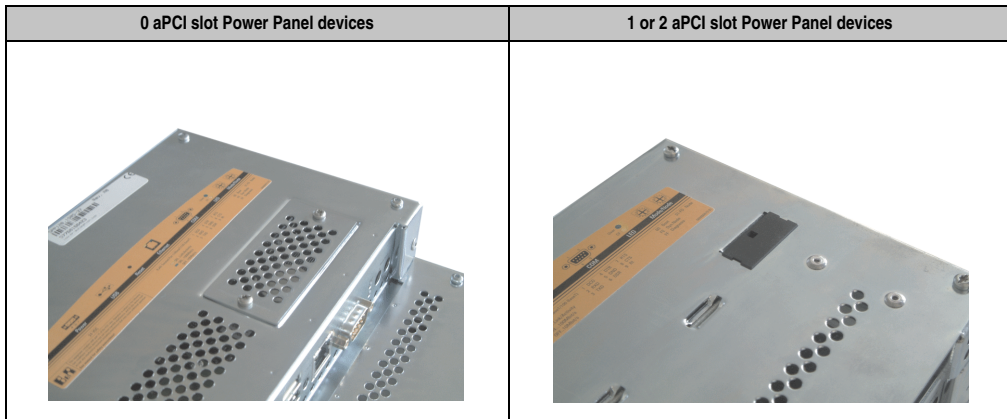
**The battery should only be changed by qualified personnel.**

#### Technical data

See section 2 "Lithium battery" on page 558.

#### 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.



- 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.

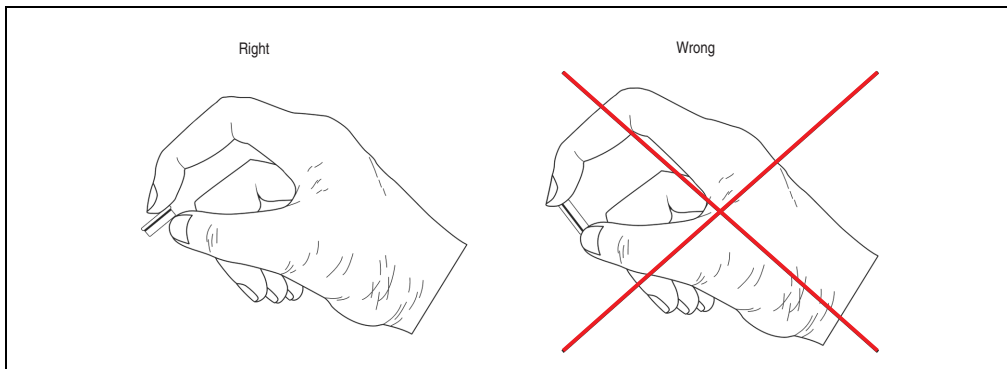


Figure 417: Battery handling

- 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 459).

## Warning!

**Lithium batteries are considered hazardous waste. Used batteries should be disposed of accordingly.**





# Appendix A

The following characteristics, features, and limit values only apply to the individual components used on a Power Panel device and do not apply to the Power Panel device as a whole. The specifications in Chapter 2 "Technical data" beginning on Page 43 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 only apply to this individual component and can deviate from those specified for the entire device. For the entire device in which this individual component is used, refer to the data given specifically for the entire device.**

Elo Accu touch screen	Specifications
Manufacturer	<a href="#">Elo</a>
Accuracy For < 18" diagonals For > 18" diagonals	Typically < than 0.080 inches (2.032 mm) Maximum error in all directions 0.180 inches (4.752 mm) Maximum 1% of the diagonal for the active area of the touch screens
Response time	<10 ms
Release pressure	< 113 grams
Resolution	4096 x 4096 touch points
Light permeability	up to 80% ± 5%
Temperature Operation Storage Transport	- 10 to + 50°C - 40 to + 71°C - 40 to + 71°C
Relative humidity Operation Storage Transport	Max. 90% at max. +50°C Max. 90% at max. 50°C for 240 hours, non-condensing Max. 90% at max. 50°C for 240 hours, non-condensing

Table 264: Technical data - Elo Accu touch screen 5-wire

## Touch screen

Elo Accu touch screen	Specifications
Waterproofing	IP65
Lifespan	35 million touch operations on the same point
Chemical resistance <sup>1)</sup>	Acetone, ammonia-based glass cleaner, normal food and drinks, hexane, methylene chloride, methylethylketone, mineral spirits, turpentine, isopropyl alcohol
Activation	Finger, pointer, credit card, glove
Drivers	Touch screen drivers can be downloaded from the download area on the B&R homepage ( <a href="http://www.br-automation.com">www.br-automation.com</a> ). Additionally, they can also be found on the B&R HMI Driver and Utilities DVD (Mod. No. 5SWHMI.0000-00).

Table 264: Technical data - Elo Accu touch screen 5-wire (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

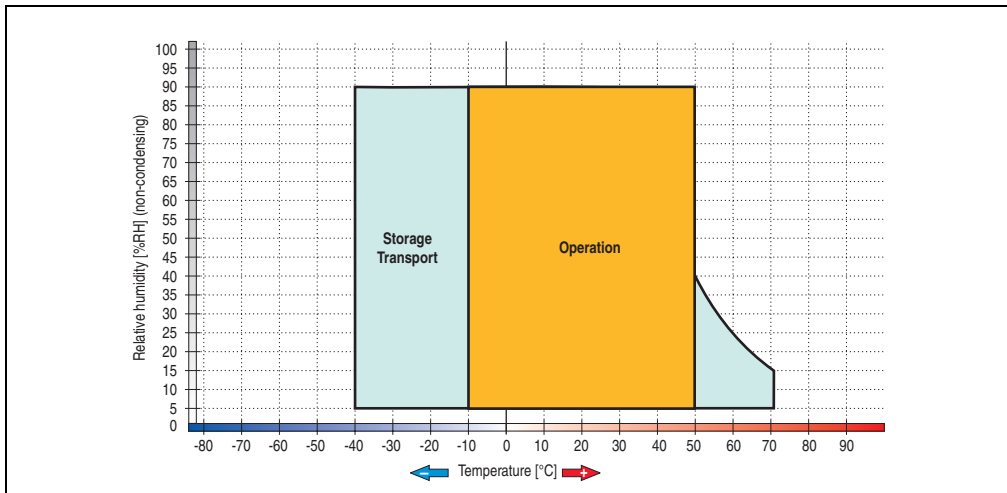


Figure 418: Temperature humidity diagram - Elo Accu touch screen 5-wire

### 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 only apply to this individual component and can deviate from those specified for the entire device. For the entire device in which this individual component is used, refer to the data given specifically for the entire device.

3M touch	Specifications
Manufacturer	<a href="#">3M</a>
Accuracy	-
Response time	-
Release pressure	10 to 80 grams
Resolution	-
Light permeability	Up to 85%
Temperature Operation	-20 to +50°C
Storage	-40 to +70°C
Transport	-40 to +70°C
Waterproofing	-
Lifespan	35 million touch operations on the same point
Chemical resistance <sup>1)</sup>	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 265: 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 Temperature humidity diagram

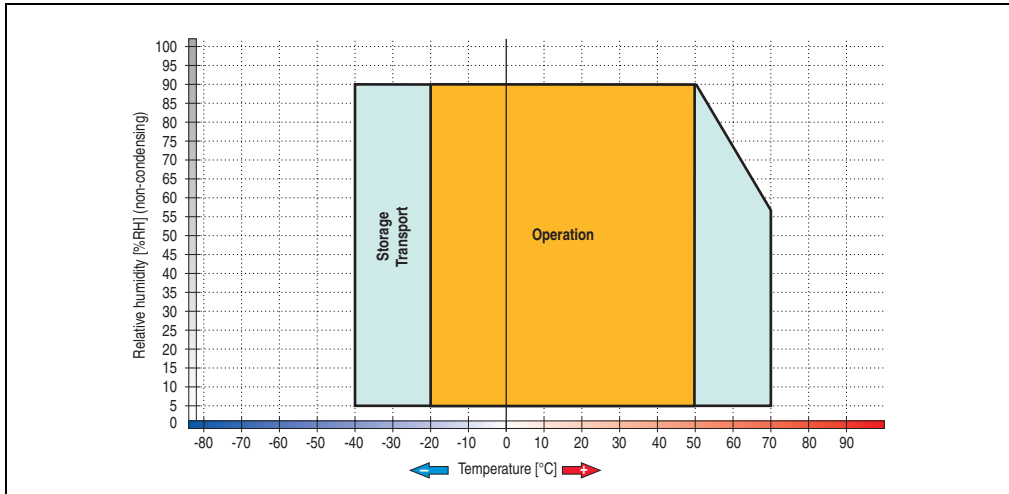


Figure 419: Temperature humidity diagram - 3M touch

### 1.2.2 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.

### 1.3 Gunze touch

This touch screen is used in 5.7" Power Panel designs.

#### Information:

The following characteristics, features, and limit values only apply to this individual component and can deviate from those specified for the entire device. For the entire device in which this individual component is used, refer to the data given specifically for the entire device.

Gunze touch	Specifications
Manufacturer	<a href="#">Gunze</a>
Accuracy	-
Response time	-

Table 266: Gunze touch

Gunze touch	Specifications
Release pressure	< 50 grams (with finger)
Resolution	-
Light permeability	Up to 84%
Temperature Operation Storage Transport	-10 to +60°C -20 to +70°C -20 to +70°C
Waterproofing	-
Lifespan	1 million touch operations on the same point
Chemical resistance	Alcoholic-based compound, such as ethanol.
Activation	Finger, pointer, credit card, glove

Table 266: Gunze touch (Forts.)

### 1.3.1 Temperature humidity diagram

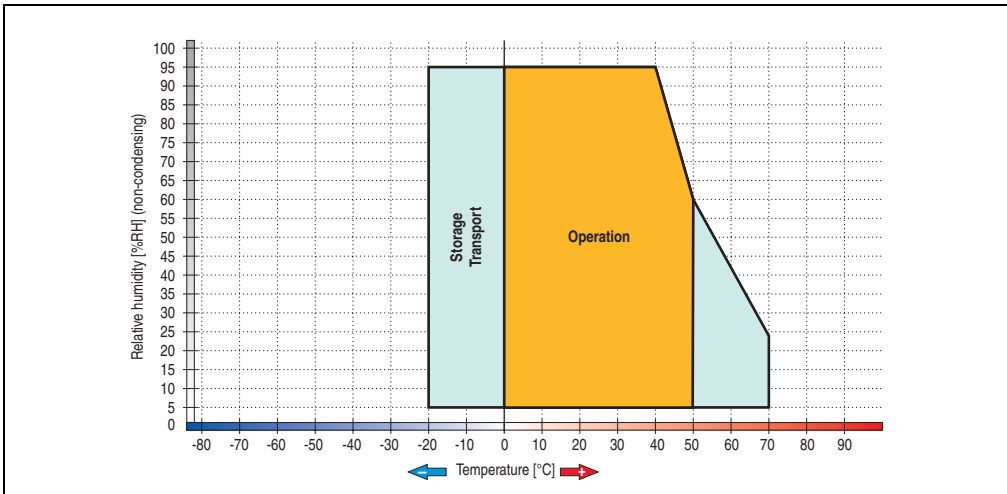


Figure 420: Temperature humidity diagram - Gunze touch

### 1.3.2 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.

## 2. Décor foil

### Information:

The following characteristics, features, and limit values only apply to this individual component and can deviate from those specified for the entire device.

The décor foil conforms to DIN 42115 (section 2). This means it is resistant to exposure to the following chemicals for a 24-hour period with no visible signs of damage:

Ethanol Cyclohexanol Diacetone alcohol Glycol Isopropanol Glycerine Methanol Triacetin Dowandol DRM/PM	Formaldehyde 37%-42% Acetaldehyde Aliphatic hydrocarbons Toluene Xylene White spirits	1.1.1.Trichloroethane Ethyl acetate Diethyl ether N-Butyl acetate Amyl acetate Butylcellosolve Ether
Acetone Methyl ethyl ketone Dioxan Cyclohexanone MIBK Isophorone	Formic acid <50% Acetic acid <50% Phosphoric acid <30% Hydrochloric acid <36% Nitric acid <10% Trichloroacetic acid <50% Sulphuric acid <10%	Sodium hypochlorite <20% Hydrogen peroxide <25% Potassium carbonate Washing agents Fabric conditioner Ferric chloride Ferrous chloride (FeCl <sub>2</sub> ) Ferrous chloride (FeCl <sub>3</sub> ) Dibutyl phthalate Dioctyl phthalate Sodium carbonate
Ammonia <40% Caustic soda <40% Potassium hydroxide Alkali carbonate Bichromate Potassium Acetonitrile Sodium bisulphate	Cutting oil Diesel oil Linseed oil Paraffin oil Blown castor oil Silicon oil Turpentine oil substitute Universal brake fluid Aviation fuel Gasoline Water Sea water Decon	

Table 267: Chemical resistance of the décor foil

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

### 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 only apply to this individual component and can deviate from those specified 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

## 4. Viewing angles

The viewing angle information of the display types (R, L, U, D) can be seen in the technical data for the individual components.

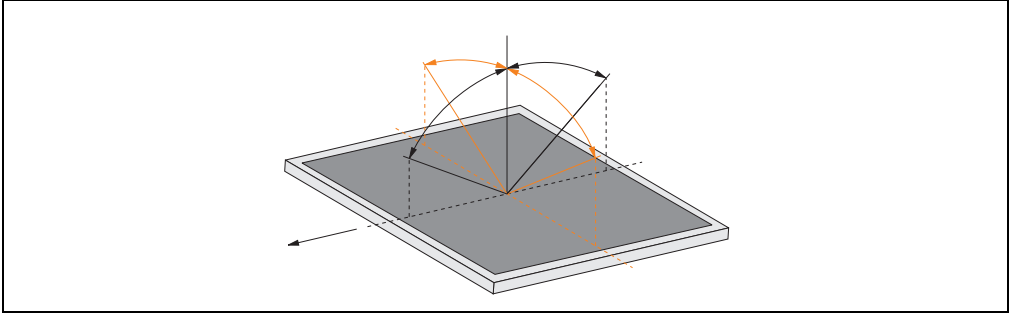


Figure 421: Viewing angles



## 5. Mounting compatibilities

This section describes the compatibility of the installation dimensions for the Power Panel 100/200, Power Panel 300/400, Automation Panel 900 and Panel PC 700 units according to the respective device diagonals.

The outer dimensions of the device types are identical for the respective diagonals. The different device types are abbreviated as follows:

Device type	Abbreviation
Power Panel 100/200	PP100/200
Power Panel 300/400	PP300/400
Automation Panel 900	AP900
Panel PC 700	PPC700

Table 268: Product abbreviations

### 5.1 Compatibility overview

The following table offers a brief overview of the devices PP100/200, PP300/400, AP900 and PPC700. Detailed information can be found in the section "Compatibility details" on page 603.

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




Quantity	Format	Image	Compatible	PP100/200	PP300/400	AP900	PPC700
5.7"	Horizontal1		Outer dimensions	■	■	-	-
			Installation dimensions	●	●	-	-
	Horizontal2		Outer dimensions	■	■	-	-
			Installation dimensions	●	●	-	-
	Vertical1		Outer dimensions	■	■	-	-
			Installation dimensions	●	●	-	-

Table 269: Device compatibility overview

## Mounting compatibilities

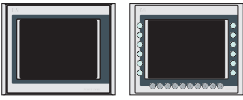
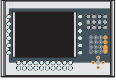
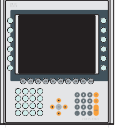
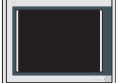
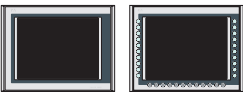

Quantity	Format	Image	Compatible	PP100/200	PP300/400	AP900	PPC700
10.4"	Horizontal1		Outer dimensions	■	■	■	■
			Installation dimensions	●	●	●	●
	Horizontal2		Outer dimensions	■	■	■	■
			Installation dimensions	●	●	▲	▲
	Vertical1		Outer dimensions	■	■	■	■
			Installation dimensions	●	●	▲	▲
12.1"	Horizontal1		Outer dimensions	■	■	■	■
			Installation dimensions	●	●	▲	▲
15"	Horizontal1		Outer dimensions	■	■	■	■
			Installation dimensions	●	●	●	●
	Vertical1		Outer dimensions	■	■	■	■
			Installation dimensions	●	●	●	●

Table 269: Device compatibility overview

## 5.2 Compatibility details

The measurement values (all in mm) in the following figures have the following meaning.

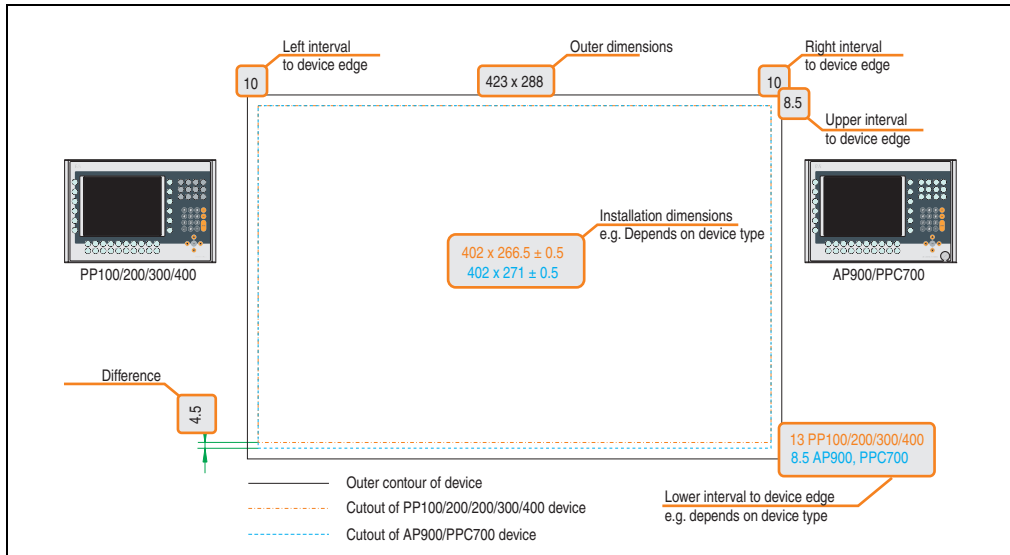


Figure 422: Compatibility details - figure structure

### 5.2.1 5.7" devices

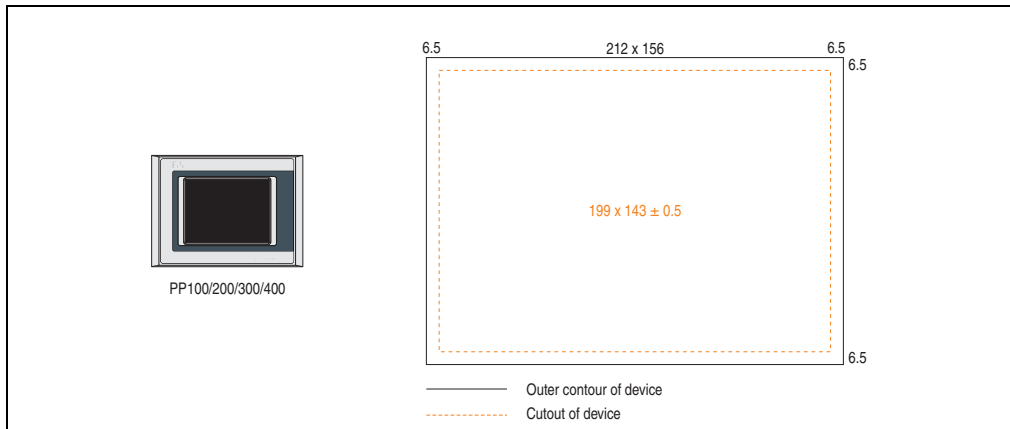


Figure 423: Mounting compatibility - 5.7" device format - Horizontal1

5.7" Power Panel 100/200 and Power Panel 300/400 devices in **Horizontal1** format are 100% mounting compatible.

## Mounting compatibilities

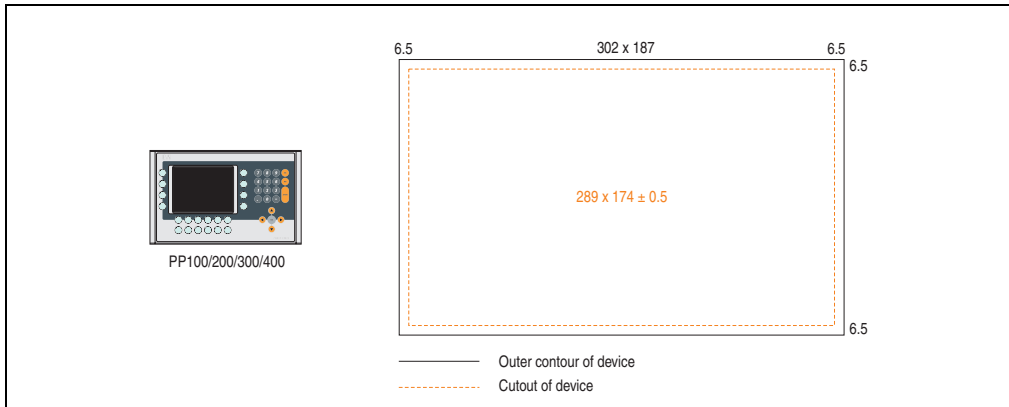


Figure 424: Mounting compatibility - 5.7" device format - Horizontal2

5.7" Power Panel 100/200 and Power Panel 300/400 devices in **Vertical1** format are 100% mounting compatible.

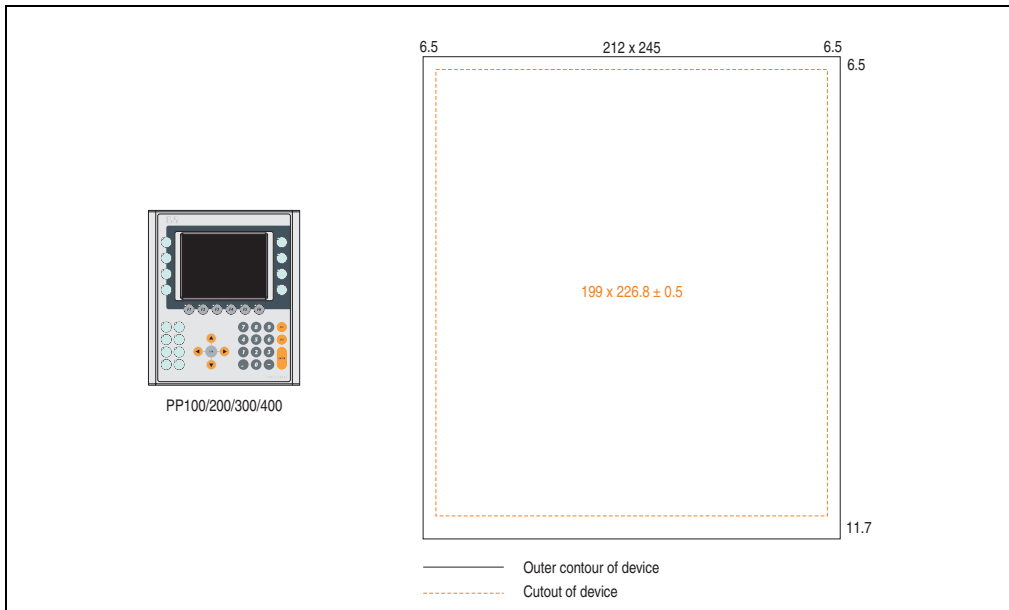


Figure 425: Mounting compatibility - 5.7" device format - Vertical1

5.7" Power Panel 100/200 and Power Panel 300/400 devices in **Vertical1** format are 100% mounting compatible.

5.2.2 10.4" devices

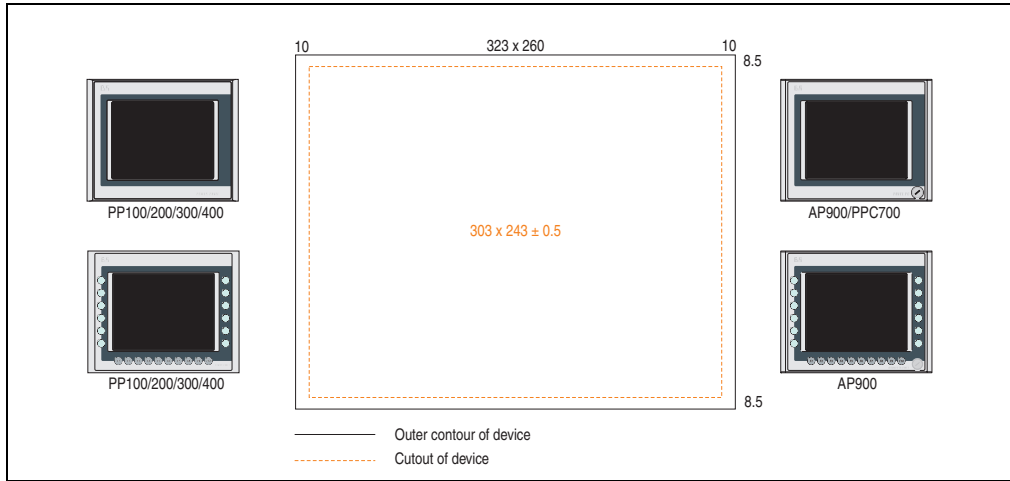


Figure 426: Mounting compatibility - 10.4" device format - Horizontal1

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

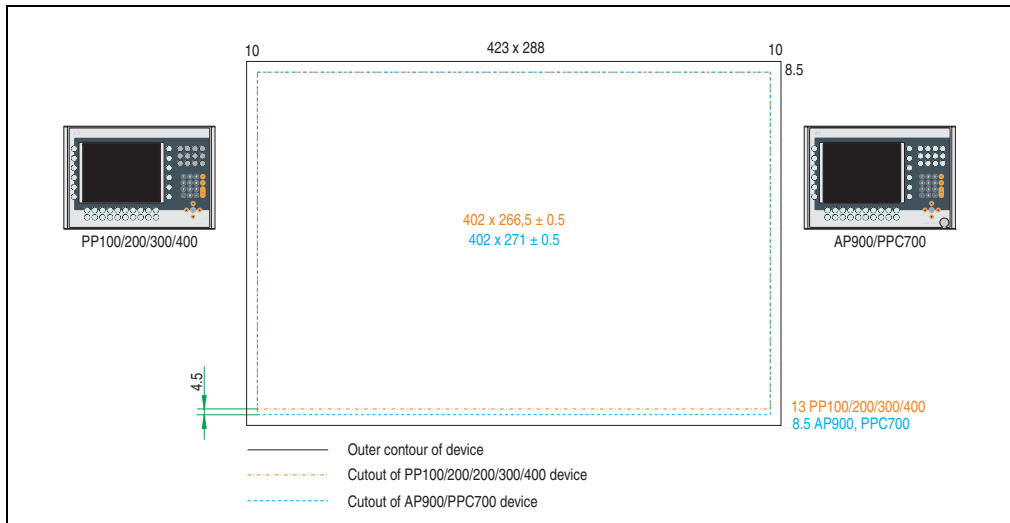


Figure 427: Mounting compatibility - 10.4" device format - Horizontal2

10.4" Power Panel 100/200 and Power Panel 300/400 are *not 100% mounting compatible* with the **Horizontal2** format Automation Panel 900 and Panel PC 700 devices. The Automation Panel 900 and Panel PC 700 devices require a cutout that is 4.5 mm larger vertically (lower edge).

## Mounting compatibilities

The larger cutout can be conditionally used for all devices:

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

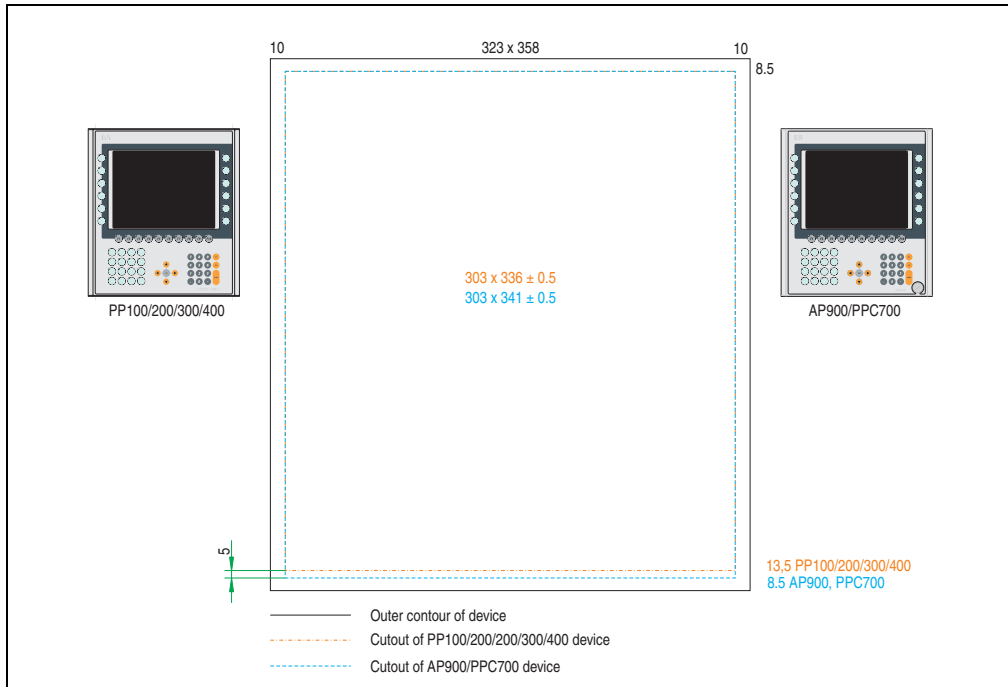


Figure 428: Mounting compatibility - 10.4" device format - Vertical1

10.4" Power Panel 100/200 and Power Panel 300/400 are *not 100% mounting compatible* with the **Vertical1** format for the Automation Panel 900 and Panel PC 700 devices. The Automation Panel 900 and Panel PC 700 devices require a cutout that is 5 mm larger vertically (lower edge).

The larger cutout can be conditionally used for all devices:

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

## 5.2.3 12.1" devices

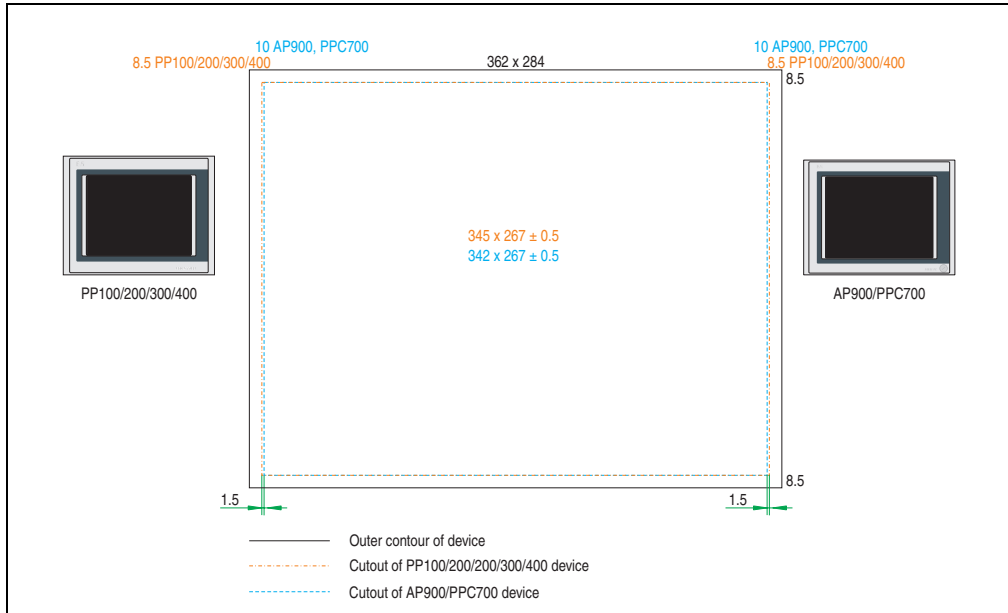


Figure 429: Mounting compatibility - 12.1" device format - Horizontal1

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

The larger cutout can be conditionally used for all devices:

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

5.2.4 15" devices

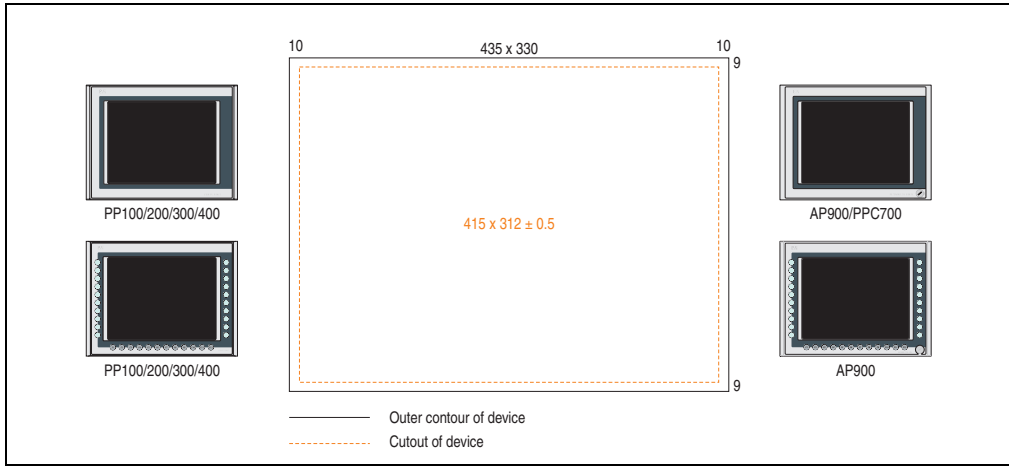


Figure 430: Mounting compatibility - 15" device format - Horizontal1

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

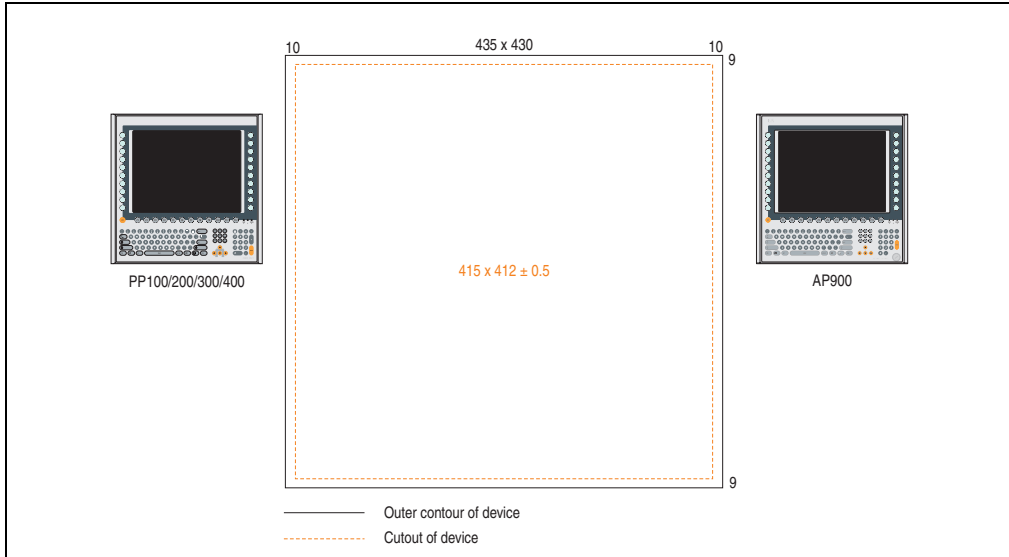


Figure 431: Mounting compatibility - 15" device format - Vertical1

15" Power Panel 100/200, Power Panel 300/400, Automation Panel 900 and Panel PC 700 devices in **Vertical1** format are 100% mounting compatible.



## 6. B&R Key Editor information

On display units, it is often necessary to adjust the function keys and LEDs for the application software being used. With the B&R Key Editor, it is possible to quickly and easily set up the application individually.

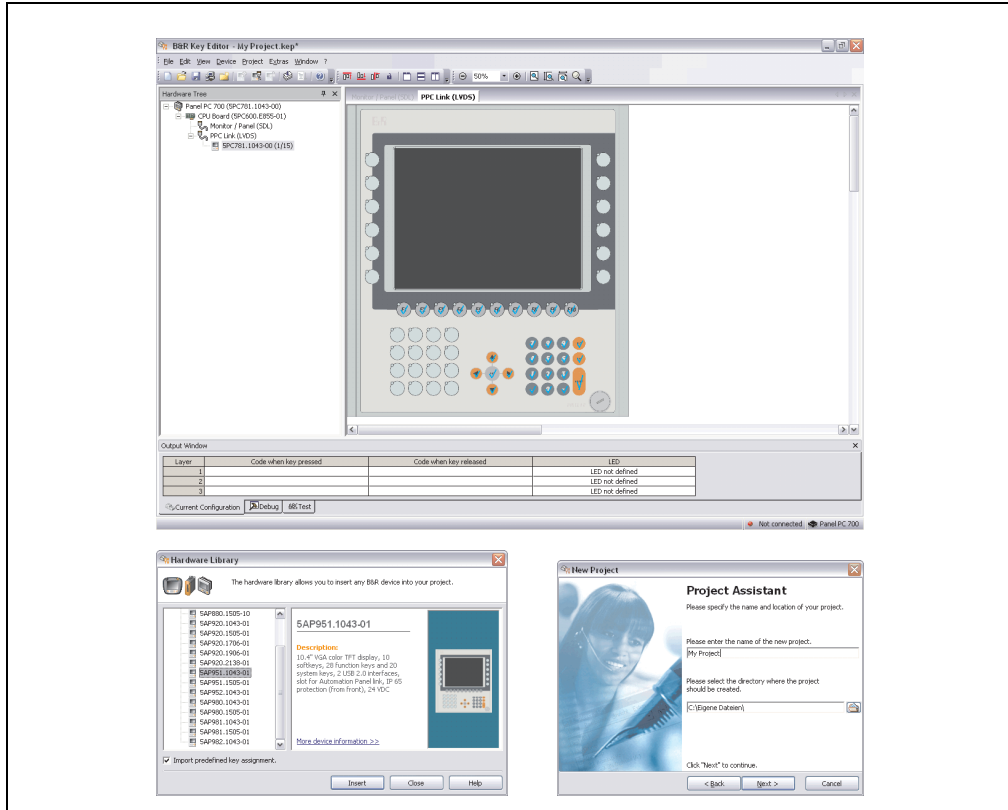


Figure 432: B&R Key Editor screenshots Version 3.10 (representation picture)

### Features:

- Configuration of normal keys like on a keyboard (A, B, C, etc.)
- Keyboard shortcuts (CTRL+C, SHIFT+DEL, etc.) on one key
- Special key functions (change brightness, etc.)
- Assign functions to LEDs (HDD access, power, etc.)
- 4 assignments per key possible (using layer function)
- Configuration of panel locking time when multiple Automation Panel 900 devices are connected to Automation PC 620 and Panel PC 700 devices

Supports following systems (Version 3.10):

- Automation PC 620
- Automation PC 810
- Automation PC 820
- Automation Panel 800
- Automation Panel 900
- IPC2000, IPC2001, IPC2002
- IPC5000, IPC5600
- IPC5000C, IPC5600C
- Mobile Panel 40/50
- Mobile Panel 100/200
- Panel PC 300
- Panel PC 700
- Panel PC 800
- Power Panel 100/200
- Power Panel 300/400
- Power Panel 500 (the Key Editor device file must be downloaded separately from the B&R homepage)

A detailed guide for configuring keys and LEDs can be found in the B&R Key Editor's online help.

The B&R Key Editor can be downloaded for free from the download area on the B&R homepage ([www.br-automation.com](http://www.br-automation.com)). Additionally, it can also be found on the B&R HMI Drivers & Utilities DVD (model number 5SWHMI.0000-00).

## 7. B&R Automation Device Interface (ADI) development kit

This software can be used to activate functions of the B&R Automation Device Interface (ADI) from Windows applications, which, for example, were created using the following development tools:

- Microsoft Visual C++ 6.0
- Microsoft Visual Basic 6.0
- Microsoft Embedded Visual C++ 4.0
- Microsoft Visual Studio 2005 (or newer)

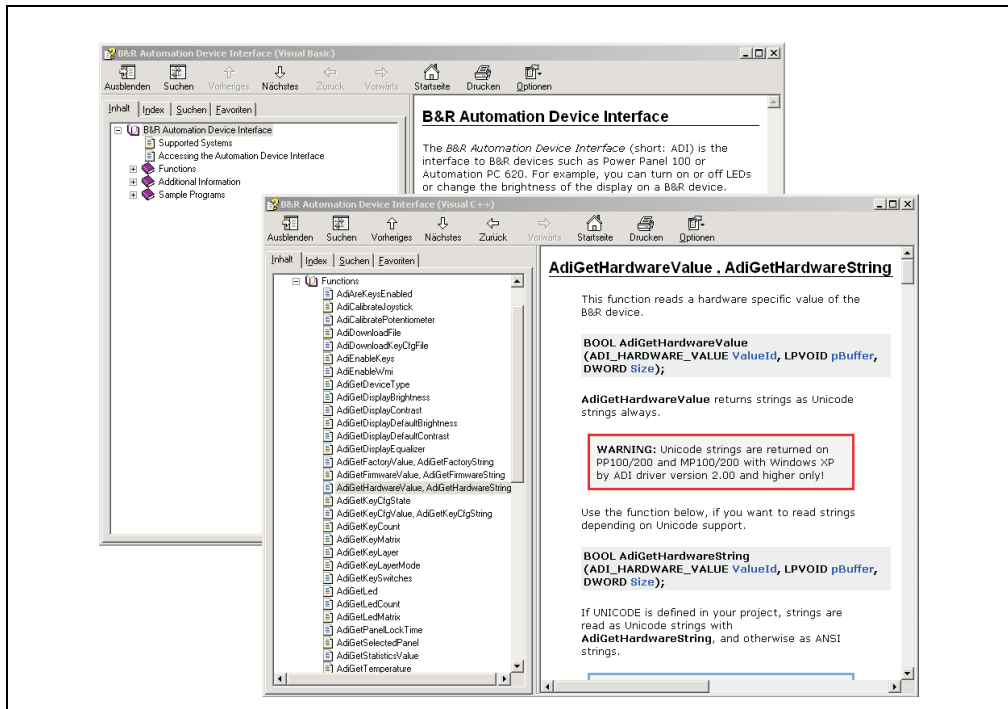


Figure 433: ADI development kit screenshots (Version 3.10)

### Features:

- One Microsoft Visual Basic module with declarations for the ADI functions.
- Header files and import libraries for Microsoft Visual C++.
- Help files for Visual Basic and Visual C++.
- Sample projects for Visual Basic and Visual C++.
- ADI DLL (for testing the applications, if no ADI driver is installed).

Supports following systems (Version 3.10 and higher):

- Automation PC 620
- Automation PC 810
- Automation PC 820
- Mobile Panel 40/50
- Mobile Panel 100/200
- Panel PC 300
- Panel PC 700
- Panel PC 800
- Power Panel 100/200
- Power Panel 300/400
- Power Panel 500

The ADI driver suitable for the device must be installed on the stated product series. The ADI driver is already included in the B&R images of embedded operating systems.

A detailed description of using the ADI functions can be found in the integrated online help.

The B&R Automation Device Interface (ADI) development kit can be downloaded for free from the download area on the B&R homepage ([www.br-automation.com](http://www.br-automation.com)).

## 8. B&R Automation Device Interface (ADI) .NET SDK

This software can be used to activate functions of the B&R Automation Device Interface (ADI) from .NET applications, which were created using Microsoft Visual Studio 2005 (or newer).

Supported programming languages:

- Visual Basic
- Visual C++
- Visual C#
- Visual J#

System requirements:

- Developingsystem: PC with Windows XP/7 with
  - Microsoft Visual Studio 2005 or newer
  - Microsoft .NET Framework 2.0 and / or Microsoft .NET Compact Framework 2.0 or newer

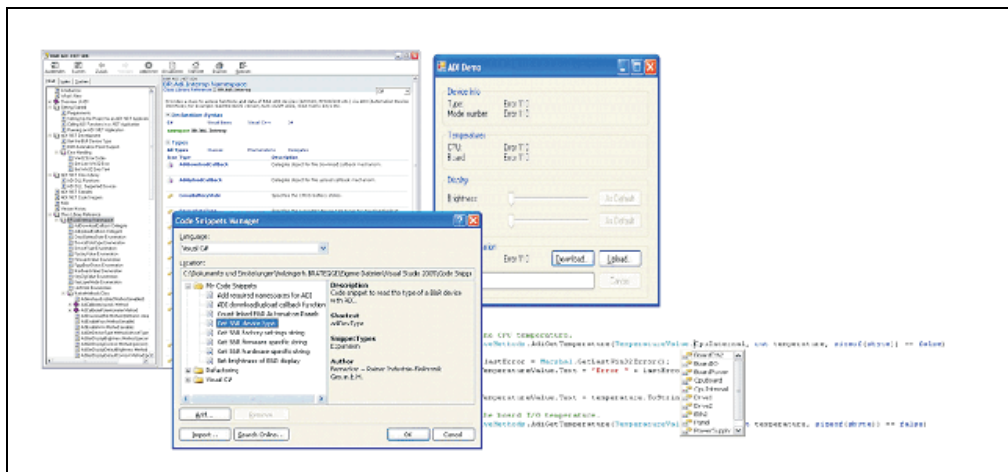


Figure 434: ADI .NET SDK Screenshots (Version 1.50)

### Features:

- ADI .NET Class Library.
- Help files in HTML Help 1.0 format (.chm file) and MS Help 2.0 format (.HxS file).
- Sample projects and code snippets for Visual Basic, Visual C++, Visual C# and Visual J#.
- ADI DLL (for testing the applications, if no ADI driver is installed).

### Supports following systems (Version 1.30 and higher):

- Automation PC 620
- Automation PC 810
- Automation PC 820
- Mobile Panel 40/50
- Mobile Panel 100/200
- Panel PC 300
- Panel PC 700
- Panel PC 800
- Power Panel 100/200
- Power Panel 300/400
- Power Panel 500

The ADI driver suitable for the device must be installed on the stated product series. The ADI driver is already included in the B&R images of embedded operating systems.

A detailed description of using the ADI functions can be found in the integrated online help.

The ADI .NET SDK can be downloaded for free from the download area on the B&R homepage ([www.br-automation.com](http://www.br-automation.com)).

## 9. Glossary

### A

#### ACPI

Abbreviation for "**A**dvanced **C**onfiguration and **P**ower **I**nterface". Configuration interface that enables the operating system to control the power supply for each device connected to the PC. With ACPI, the computer's BIOS is only responsible for the details of communication with the hardware.

#### APC

Abbreviation for "**A**utomation **P**C".

#### API

Abbreviation for "**A**pplication **P**rogram **I**nterface" The interface, which allows applications to communicate with other applications or with the operating system.

#### Automation Runtime

A uniform runtime system for all B&R automation components.

### B

#### BIOS

An abbreviation for "**B**asic **I**nput/**O**utput **S**ystem". Core software for computer systems with essential routines for controlling input and output processes on hardware components, for performing tests after system start, and for loading the operating system. Although BIOS is used to configure a system's performance, the user does not usually come into contact with it.

#### Bit

Binary digit > binary position, binary character, smallest discrete unit of information. A bit can have the value 0 or 1.

#### Bit rate

The number of bits that can be transferred within a specified time unit. 1 bit/sec = 1 baud.

#### Bootstrap loader

A program that automatically runs when the computer is switched on or restarted. After some basic hardware tests have been carried out, the bootstrap loader starts a larger loader and hands over control to it, which in turn boots the operating system. The bootstrap loader is typically found in ROM on the computer.

### Byte

Data format [1 byte = 8 bits] and a unit for characterizing information amounts and memory capacity. The following units are the commonly used units of progression: KB, MB, GB.

### B&R Automation Runtime

Windows-based program for creating installation disks to install B&R Automation Runtime™ on the target system.

## C

### Cache

Background memory, also known as non-addressable memory or fast buffer memory. It is used to relieve the fast main memory of a computer. For example, data that should be output to slower components by the working memory (e.g. disk storage, printers) is stored temporarily in cache memory and output from there at an appropriate speed for the target devices.

### CAN

An abbreviation for "**C**ontroller **A**rea **N**etwork" (serial bus system). Structure according to ISO 11898. Bus medium: twisted pair. Good transfer properties in short distances less than 40 m with a 1 MBit/sec data transfer rate. Maximum number of stations: unlimited in theory, up to 64 with real-time capability in practice, i.e. defined maximum delay times for messages with high priority. High reliability using error detection, error handling, troubleshooting. Hamming distance.

### CD-ROM

Abbreviation for "**C**ompact **D**isc **R**ead-**O**nly **M**emory". A removable data medium with a capacity of ~700 MB. CD-ROMs are optically scanned.

### CE mark

A CE mark for a product. It consists of the letters "CE" and indicates conformity to all EU guidelines for the labeled product. It indicates that the individual or corporate body who has performed or attached the label assures that the product conforms to all EU guidelines for complete harmonization. It also indicates that all mandatory conformity evaluation procedures have taken place.

### CMOS

"CMOS" is a battery powered memory area where fundamental parameters of an IBM (or compatible) personal computer are stored. Information such as the type of hard drive, size of the working memory and the current date and time are required when booting the computer. As the name suggests, the memory is based on CMOS technology standards.

### COM

A device name used to access serial ports in MS-DOS. The first serial port can be accessed under COM1, the second under COM2, etc. A modem, mouse, or serial printer is typically connected to a serial port.



## COM1

Device name for the first serial port in a PC system. The input/output area for COM1 is usually found at address 03F8H. Generally, the COM1 port is assigned to IRQ 4. In many systems, an RS232 serial mouse is connected to COM1.

## COM2

Device name for the second serial port in a PC system. The input/output area for COM2 is usually found at address 02F8H. Generally, the COM2 port is assigned to IRQ 3. In many systems, a modem is connected to COM2.

## COM3

Device name for a serial port in a PC system. The input/output area for COM3 is usually found at address 03E8H. Generally, the COM3 port is assigned to IRQ 4. In many systems, COM3 is used as an alternative for COM1 or COM2 if peripheral devices are already connected to COM1 and COM2.

## CompactFlash®

CompactFlash memory cards [CF cards] are exchangeable nonvolatile mass memory systems with very small dimensions [43 x 36 x 3.3 mm, approximately half the size of a credit card]. In addition to the flash memory chips, the controller is also present on the cards. CF cards provide complete PC card / ATA functionality and compatibility. A 50-pin CF card can be simply inserted in a passive 68-pin type II adapter card. It conforms to all electrical and mechanical PC card interface specifications. CF cards were launched by SanDisk back in 1994. Currently, memory capacities reach up to 8 GB per unit. Since 1995, CompactFlash Association [CFA] has been looking after standardization and the worldwide distribution of CF technology

## Controller

A device component which allows access to other devices on a computer subsystem. A disk controller, for example, allows access to hard disks and disk drives and is responsible both for physical and logic drive access.

## CPU

An abbreviation for "**C**entral **P**rocessing **U**nit". Interprets and executes commands. It is also known as a "microprocessor" or "processor" for short. A processor is able to receive, decode and execute commands, as well as transfer information to and from other resources via the computer bus.

## CRT

An abbreviation for "**C**athode **R**ay **T**ube". The main component of a television set or a standard computer screen. A cathode ray tube consists of a vacuum tube that contains one or more electron guns. Each electron gun creates a horizontal electron beam that appears on the front of the tube (the screen). The inner surface of the screen is coated with phosphor, which is lit when hit by the electrons. Each of the electron beams move in a line from top to bottom. In order to prevent flickering, the screen content is updated at least 25 times per second. The sharpness of the picture is determined by the number of pixels on the screen.

### CTS

An abbreviation for "**C**lear **T**o **S**end". A signal used when transferring serial data from modem to computer, indicating its readiness to send the data. CTS is a hardware signal which is transferred via line number 5 in compliance with the RS-232-C standard.

## D

### DCD

An abbreviation for "**D**ata **C**arrier **D**etected". A signal used in serial communication that is sent by the modem to the computer it is connected to, indicating that it is ready for transfer.

### Dial-up

Data is transferred over the telephone network using a modem or an ISDN adapter.

### DIMM

"Double In-line Memory Module" consisting of one or more RAM chips on a small circuit board that is connected with the motherboard of a computer.

### DMA

**D**irect **M**emory **A**ccess >. Accelerated direct access to a computer's RAM by bypassing the CPU.

### DRAM

An abbreviation for "**D**ynamic **R**andom **A**ccess **M**emory". Dynamic RAM consists of an integrated semiconductor circuit that stores information based on the capacitor principle. Capacitors lose their charge in a relatively short time. Therefore, dynamic RAM circuit boards must contain a logic that allows continual recharging of RAM chips. Since the processor cannot access dynamic RAM while it is being recharged, one or more waiting states can occur when reading or writing data. Although it is slower, dynamic RAM is used more often than static RAM since the simple design of the circuits means that it can store four times more data than static RAM.

### DSR

An abbreviation for "**D**ata **S**et **R**eady". A signal used in serial data transfer that is sent by the modem to the computer it is connected to, indicating its readiness for processing. DSR is a hardware signal which is sent via line number 6 in compliance with the RS-232-C standard.

### DTR

An abbreviation for "**D**ata **T**erminal **R**eady". A signal used in serial data transfer that is sent by the computer to the modem it is connected to, indicating the computer's readiness to accept incoming signals.

## DVD

An abbreviation for "**D**igital **V**ersatile **D**isc". The next generation of optical data carrier technology. Using this technology it is possible to encode video, audio and computer data on CD. DVDs can store a higher volume of data than conventional CDs. Standard DVDs, which have a single layer, can hold 4.7 GB. Dual-layer DVDs can hold 8.5 GB. Double-sided DVDs can therefore hold up to 17 GB. A special drive is needed for DVDs. Conventional CDs can also be played on DVD drives.

## E

### EDID data

Abbreviation for "**E**xtended **D**isplay **I**dentification **D**ata". EDID data contains the characteristics of monitors / TFT displays transferred as 128 KB data blocks to the graphics card via the Display Data Channel (DDC). This EDID data can be used to set the graphics card to the monitor properties.

### EDO-RAM

An abbreviation for "**E**xtended **D**ata **O**ut **R**andom **A**ccess **M**emory". Dynamic RAM that provides data for the CPU while the next memory access is being initialized. This increases speed.

### EIDE

An abbreviation for "**E**nhanced **I**ntegrated **D**rive **E**lectronics". An expansion of the IDE standard. Enhanced IDE is considered the standard for hardware interfaces. This interface is designed for drives with an integrated drive controller.

### EMC

"**E**lectromagnetic **C**ompatibility". The ability of a device or a system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment [IEV 161-01-07].

### Encode, encoding

When processing information, it is often necessary to change the information from one form of representation to another. This conversion process is called encoding, and the rules used to assign one character set to another are referred to as encoding rules. A differentiation is made between ambiguous and unambiguous encoding depending on if one set is a direct reflection of the other. Most codes use unambiguous encoding with one set directly reflecting the other. A differentiation is also made between redundant and non-redundant encoding. With non-redundant encoding, the full range of the available character set is used, i.e. each code is defined. With redundant encoding, the available character set also contains codes that are not used. This differentiation is important during data transfer when detecting and, if necessary, correcting data transfer errors.

### EPROM

Erasable **P**ROM >(completely with ultraviolet light).

### Ethernet

An IEEE 802.3 standard for networks. Ethernet uses bus or star topology and controls the traffic on communication lines using the access procedure CSMA/CD (Carrier Sense Multiple Access with Collision Detection). Network nodes are connected using coaxial cables, fiber optic cables or twisted pair cabling. Data transfer on an Ethernet network takes place in frames of variable lengths that consist of supply and controller information as well as 1500 bytes of data. The Ethernet standard provides base band transfers at 10 megabit and 100 megabit per second.

### Ethernet POWERLINK

An enhancement of standard Ethernet. It enables data exchange under strict real-time conditions with cycle times down to 200  $\mu$ s and jitter under 1  $\mu$ s. This makes Ethernet power available on all communication levels of automation technology – from control levels to I/O. Ethernet POWERLINK was initiated by the company B&R Industrie-Elektronik and is now managed by the open end user and vendor association, EPSG - Ethernet POWERLINK Standardization Group ([www.ethernet-powerlink.org](http://www.ethernet-powerlink.org)).

## F

### FDD

Abbreviation for "**F**loppy **D**isk **D**rive". Reading device for removable magnetic memory from the early days of PC technology. Due to their sensitivity and moving components, FDDs have been almost completely replaced by CompactFlash memory in modern automation solutions.

### FIFO

An abbreviation for "**F**irst **I**n **F**irst **O**ut". A queuing organization method whereby elements are removed in the same order as they were inserted. The first element inserted is the first one removed. Such an organization method is typical for a list of documents that are waiting to be printed.

### Firmware

Programs stored permanently in read-only memory. Firmware is software used to operate computer-controlled devices that generally stays in the device throughout its lifespan or over a long period of time. Such software includes operating systems for CPUs and application programs for industrial PCs as well as programmable logic controllers (e.g. the software in a washing machine controller). This software is written in read-only memory (ROM, PROM, EPROM) and cannot be easily replaced.

### Floppy

Also known as a diskette. A round plastic disk with an iron oxide coating that can store a magnetic field. When the floppy disk is inserted in a disk drive, it rotates so that the different areas (or sectors) of the disk's surface are moved under the read/write head. This allows the magnetic orientation of the particle to be modified and recorded. Orientation in one direction represents binary 1, while the reverse orientation represents binary 0.

## FPC

An abbreviation for "**F**lat **P**anel **C**ontroller".

## FPD

An abbreviation for "**F**lat **P**anel **D**isplay".

## FTP

"**F**ile **T**ransfer **P**rotocol". Rules for transferring data over a network from one computer to another computer. This protocol is based on TCP/IP, which has established itself as the standard for transferring data over Ethernet networks. FTP is one of the most used protocols on the Internet. It is defined in RFC 959 in the official regulations for Internet communication.

## G

## GB

Gigabyte (1 GB = 230 or 1,073,741,824 bytes)

## H

## Handshake

Method of synchronization for data transfer when data is sent at irregular intervals. The sender signals that data can be sent, and the receiver signals when new data can be received.

## HDD

An abbreviation for "**H**ard **D**isk **D**rive". Fixed magnetic mass memory with high capacities, e.g. 120 GB.

## I

## IDE

An abbreviation for "**I**ntegrated **D**rive **E**lectronics". A drive interface where the controller electronics are integrated in the drive.

## Interface

From the hardware point of view, an interface is the connection point between two modules/devices/systems. The units on both sides of the interface are connected by the interface lines so that data, addresses, and control signals can be exchanged. The term interface includes all functional, electrical and constructive conditions [encoding, signal level, pin assignments] that characterize the connection point between the modules, devices, or systems. Depending on the type of data transfer, a differentiation is made between parallel [e.g. Centronics, IEEE 488] and serial interfaces [e.g. V.24, TTY, RS232, RS422, RS485], which are

## Glossary

set up for different transfer speeds and transfer distances. From the point of view of software, the term "interface" describes the transfer point between program modules using specified rules for transferring the program data.

IPC

An abbreviation for "**I**ndustrial **P**C".

ISA

An abbreviation for "**I**ndustry **S**tandard **A**rchitecture". A term given for the bus design which allows expansion of the system with plug-in cards that can be inserted in PC expansion slots.

ISO

International Organization for Standardization > Worldwide federation of national standardization institutions from over 130 countries. ISO is not an acronym for the name of the organization; it is derived from the Greek word "isos", meaning "equal" ([www.iso.ch](http://www.iso.ch)).

## J

Jumper

A small plug or wire link for adapting the hardware configuration used to connect the different points of an electronic circuit.

## K

Keypad modules

Keypad modules are divided into two groups: **standard keypad modules** (can be cascaded to a controller) and **special keypad modules** (must be connected by an electrician according to function, e.g. E-stop).

## L

LCD

An abbreviation for "**L**iquid **C**rystal **D**isplay". A display type, based on liquid crystals that have a polarized molecular structure and are enclosed between two transparent electrodes as a thin layer. If an electrical field is applied to the electrodes, the molecules align themselves with the field and form crystalline arrangements that polarize the light passing through. A polarization filter, which is arranged using lamellar electrodes, blocks the polarized light. In this way, a cell (pixel) containing liquid crystals can be switched on using electrode gates, thus coloring this pixel black. Some LCD displays have an electroluminescent plate behind the LCD screen for lighting. Other types of LCD displays can use color.

## LED

An abbreviation for "**L**ight **E**mitting **D**iode". A semiconductor diode which converts electrical energy into light. LEDs work on the principle of electroluminescence. They are highly efficient because they do not produce much heat in spite of the amount of light they emit. For example, "operational status indicators" on floppy disk drives are LEDs.

## LPT

Logical device name for line printers. In MS-DOS, names are reserved for up to three parallel printer ports with the names LPT1, LPT2 and LPT3. The first parallel port (LPT1) is usually identical to the primary parallel output device PRN (in MS-DOS the logical device name for the printer). The abbreviation LPT stands for "Line Printer Terminal".

## M

### MB

Megabyte (1 MB = 220 or 1,048,576 bytes).

### Microprocessor

Highly integrated circuit with the functionality of a CPU, normally housed on a single chip. It comprises a control unit, arithmetic and logic unit, several registers and a link system for connecting memory and peripheral components. The main performance features are the internal and external data bus and address bus widths, the command set and the clock frequency. Additionally, a choice can be made between CISC and RISC processors. The first commercially available worldwide microprocessor was the Intel 4004. It came on the market in 1971.

### MIPS

Million instructions per second > Measurement for the computing speed of computers.

### Mkey

An abbreviation for "**M**odule **key**block". A common term given to keys found on Provit display units. They can be freely configured with Mkey utilities.

### Modem

Modulator/demodulator. > Modulation/demodulation device, add-on card, or external device that allows information to be exchanged between computers over the telephone network using digital/analog or analog/digital signal conversion.

### Motherboard

A circuit board that houses the main components of a computer such as the CPU switching circuit, co-processors, RAM, ROM for firmware, interface circuits, and expansion slots for hardware expansions.

## Glossary

### MTBF

An abbreviation for "**M**ean **t**ime **b**etween **f**ailure". The average time which passes before a hardware component fails and repair is needed. This time is usually expressed in thousands or ten thousands of hours, sometimes known as power-on hours (POH).

### MTC

An abbreviation for "**M**aintenance **C**ontroller". The MTC is an independent processor system that provides additional functions for a B&R industrial PC that are not available with a normal PC. The MTC communicates with the B&R industrial PC via the ISA bus (using a couple register).

### MTCX

Abbreviation for "**M**ain**T**enance **C**ontroller **E**Xtended".

### Multitasking

Multitasking is an operating mode in an operating system that allows several computer tasks to be executed virtually simultaneously.

## N

### .NET

DOTNET, Microsoft's new development platform that provides a common runtime library and type system for all programming languages. DOTNET is the umbrella term for the following products, strategies and technologies: .NET Framework, a new software platform, Visual Studio .NET, a new development environment that supports several .NET programming languages (e.g. C# or VB.NET, specially created for .NET), .NET My Services, a group of services taking over functions such as authentication, .NET Enterprise Server, which, apart from its name, is independent of the other technologies and includes the products Exchange Server 2000, Application Center 2000, and SQL Server 2000. .NET devices, supported by a slimmed down version of .NET Framework (.NET Compact Framework).

### Node

Branching point in a network.

## O

### OEM

**Original Equipment Manufacturer.** A company that integrates third-party and in-house manufactured components into their own product range and then distributes these products under its own name.

### OPC

OLE for Process Control > A communication standard for components in the area of automation. The goal of OPC development is to provide an open interface that builds on Windows-based technologies such as OLE, COM and DCOM. It allows problem-free standardized data transfer



between controllers, operating and monitoring systems, field devices and office applications from different manufacturers. This development is promoted by the OPC Foundation, which is made up of over 200 companies from around the world, including Microsoft and other leading companies. Lately, OPC is interpreted as a synonym for "openness, productivity, and connectivity", symbolizing the new possibilities that this standard opens up.

#### OPC server

The missing link between connection modules for the Interbus and the visualization application. It communicates serially with the connection modules via the ISA or PCI bus or Ethernet.

## P

#### Panel

A common term for B&R display units (with or without keys).

#### Panelware

A generic term given for standard and special keypad modules offered by B&R.

#### PC card

Registered trademark of PCMCIA for add-on cards conforming to PCMCIA specifications.

#### PCI bus

**Peripheral Component Interconnect bus.** Developed by Intel as an intermediary/local bus for the latest PC generations. It is basically a synchronous bus. The main clock of the CPU is used for synchronization. The PCI bus is microprocessor-independent, 32-bit and 64-bit compatible, and supports both 3.3 V and 5 V cards and devices.

#### PCMCIA

An abbreviation for "**Personal Computer Memory Card International Association**". An association of manufacturers and dealers who are dedicated to the cultivation and further development of common standards for peripheral devices based on PC cards with a slot for such cards. PC cards are mainly used for laptops, palmtops (and other portable computers), and intelligent electronic devices. Version 1 of the PCMCIA standard was introduced in 1990.

#### PICMG

PCI Industrial Computers Manufacturers Group. Goal: Use of commercial PCI bus for industrial environments, especially CompactPCI bus ([www.picmg.org](http://www.picmg.org)).

#### PnP

An abbreviation for "**Plug and Play**". Specifications developed by Intel. Using Plug and Play allows a PC to automatically configure itself so that it can communicate with peripheral devices (e.g. monitors, modems, and printers). Users can connect a peripheral device (plug) and it immediately runs (play) without having to manually configure the system. A Plug and Play PC requires a BIOS that supports Plug and Play and a respective expansion card.

### POH

An abbreviation for "**Power On Hours**". See MTBF.

### POST

An abbreviation for "**Power-On Self Test**". A set of routines that are stored in ROM on the computer and that test different system components, e.g. RAM, disk drive and the keyboard in order to determine that the connection is operating correctly and ready for operation. POST routines notify the user of problems that occur. This is done using several signal tones or by displaying a message that frequently accompanies a diagnosis value on the standard output or standard error devices (generally the monitor). If the POST runs successfully, control is transferred over to the system's bootstrap loader.

### Power Panel

Power Panel is part of the B&R product family and is a combination of an operator panel and controller in one device. This covers the PP21 and PP41 products.

### POWERLINK

See "Ethernet POWERLINK".

### PP21

B&R Power Panel type. It is equipped with an RS232 interface, a CAN interface, a PCMCIA slot and integrated digital input/output channels. Additionally, up to six B&R SYSTEM 2003 screw-in modules can be connected. LCD 4 x 20 characters.

### PP41

B&R Power Panel type. It is equipped with an RS232 interface, a CAN interface, a PCMCIA slot and integrated digital input/output channels. Additionally, up to six B&R SYSTEM 2003 screw-in modules can be connected. 5.7" QVGA b/w LCD.

### PROFIBUS DP

PROFIBUS for "decentralized peripherals". PROFIBUS DP can be used to allow simple digital and analog I/O modules as well as intelligent signal and data processing units to be installed in the machine room, which among other things can significantly reduce cabling costs. Often used for time-critical factory automation applications.

### PV

Process variable. Logical storage location for values and states in a program.

## Q

### QVGA

Abbreviation for **Quarter Video Graphics Array**. Usually a screen resolution of 320 × 240 pixels.

## R

## RAM

An abbreviation for "**R**andom **A**ccess **M**emory". Semiconductor memory which can be read or written to by the microprocessor or other hardware components. Memory locations can be accessed in any order. The various ROM memory types do allow random access, but they cannot be written to. The term RAM refers to a more temporary memory that can be written to as well as read.

## Real time

A system is operating in real time or has real-time capability if the input sizes (e.g. signals, data) are received and processed in a defined time period, and the results are made available in real time for a partner system or the system environment. See also "real-time demands" and "real-time system".

## ROM

An abbreviation for "**R**ead-**O**nly **M**emory". Semiconductor memory where programs or data were permanently stored during the production process.

## RS232

**Recommended Standard Number 232**. Oldest and most widespread interface standard, also called a V.24 interface. All signals are referenced to ground making this an unbalanced interface. High level: -3 ... -30 V, low level: +3 ... +30 V. Cable lengths up to 15 m, transfer rates up to 20 kBit/s. For point-to-point connections between 2 participants.

## RS422

**Recommended Standard Number 422**. Interface standard, balanced operation, increased immunity to disturbances. High level: 2 ... -6 V, low level: +2 ... +6 V. 4-wire connection [inverted/not inverted], cable lengths up to 1200 m, transfer rates up to 10 Mbit/s, 1 sender can carry out simplex communication with up to 10 receivers.

## RS485

**Recommended Standard Number 485**. Interface standard upgraded from RS422. High level: 1.5 ... -6 V, low level: +1.5 ... +6 V; 2-wire connection [half duplex operation] or 4-wire connection [full duplex operation]. Cable lengths up to 1200 m, transfer rates up to 10 Mbit/s. Up to 32 participants can be connected to an RS485 bus [sender/receiver].

## RTS

An abbreviation for "**R**esult **T**o **S**end". A signal used in serial data transfer for requesting send permission. For example, it is sent from a computer to the modem connected to it. The RTS signal is assigned to pin 4 according to the hardware specifications of the RS-232-C standard.

## Glossary

### RXD

An abbreviation for "Receive (**RX**) Data". A line for transferring serial data received from one device to another, e.g. from a modem to a computer. For connections complying with the RS-232-C standard, the RXD is connected to pin 3 of the plug.

## S

### SCADA

**S**upervision, **C**ontrol **A**nd **D**ata **A**cquisition. SCADA systems are used to control, monitor, and log industrial processes. A high degree of configurability allows customization for various processes.

### SDRAM

An abbreviation for "**S**ynchronous **D**ynamic **R**andom **A**ccess **M**emory". A construction of dynamic semiconductor components (DRAM) that can operate with higher clock rates than conventional DRAM switching circuits. This is made possible using block access. For each access, the DRAM determines the next memory addresses to be accessed.

### SFC

Sequential function chart > Graphic input language for PLCs used to represent sequential control.

### SRAM

An abbreviation for "**S**tatic **R**andom **A**ccess **M**emory". A semiconductor memory (RAM) made up of certain logic circuits (flip-flop) that only keeps stored information while powered. In computers, static RAM is generally only used for cache memory.

### Switch

Device similar to a hub that takes data packets received in a network and, unlike a hub, passes them only to the respective addressee, not to all network nodes. Unlike a hub, a switch provides targeted communication within a network that only takes place between sender and receiver. Other network nodes are not involved.

## T

### Task

Program unit that is assigned a specific priority by the real-time operating system. It contains a complete process and can consist of several modules.

### TCP/IP

Transmission Control Protocol/Internet Suit of Protocols. Network protocol that has become the generally accepted standard for data exchange in heterogeneous networks. TCP/IP is used both in local networks for communication between various computer and also for LAN to WAN access.

## TFT display

LCD (Liquid Crystal Display) technology where the display consists of a large grid of LCD cells. Each pixel is represented by a cell, whereby electrical fields produced in the cells are supported by thin film transistors (TFT) that result in an active matrix. In its simplest form, there is exactly one thin film transistor per cell. Displays with an active matrix are generally used in laptops and notebooks because they are thin, offer high-quality color displays and can be viewed from all angles.

## Touch screen

Screen with touch sensors for activating an item with the finger.

## TXD

An abbreviation for "Transmit (**TX**) Data". A line for the transfer of serial data sent from one device to another, e.g. from a computer to a modem. For connections complying with the RS-232-C standard, the TXD is connected to pin 2 of the plug.

## U

### UART

An abbreviation for "**U**niversal **A**synchronous **R**eceiver-**T**ransmitter". A module generally consisting of a single integrated circuit that combines the circuits required for asynchronous serial communication for both sending and receiving. UART represents the most common type of circuit in modems for connecting to a personal computer.

### UDMA

An abbreviation for "**U**ltra **D**irect **M**emory **A**ccess". A special IDE data transfer mode that allows high data transfer rates for drives. There have been many variations in recent times.

UDMA33 mode transfers 33 megabytes per second.

UDMA66 mode transfers 66 megabytes per second.

UDMA100 mode transfers 100 megabytes per second.

Both the mainboard and the hard drive must support the specification to implement modifications.

### UPS

Abbreviation for "**U**ninterruptible **P**ower **S**upply". See "UPS".

### USB

An abbreviation for "**U**niversal **S**erial **B**us". A serial bus with a bandwidth of up to 12 megabits per second (Mbit/s) for connecting a peripheral device to a microcomputer. Up to 127 devices can be connected to the system using a single multipurpose connection, the USB bus (e.g. external CD drives, printers, modems as well as the mouse and keyboard). This is done by connecting the devices in a row. USB allows devices to be changed when the power supply is switched on (hot plugging) and multi-layered data flow.

## Glossary

### UPS

An abbreviation for "**U**ninterruptible **P**ower **S**upply". The UPS supplies power to systems that cannot be connected directly to the power mains for safety reasons because a power failure could lead to loss of data. The UPS allows the PC to be shut down securely without losing data if a power failure occurs.

## V

### Visual Components

Integrated in B&R Automation Studio. Visual Components can be used to configure visualization projects that use text and graphics.

### VGA

An abbreviation for "**V**ideo **G**raphics **A**dapter". A video adapter which can handle all EGA (Enhanced Graphics Adapter) video modes and adds several new modes.

## W

### Windows CE

Compact 32-bit operating system with multitasking and multithreading that Microsoft developed especially for the OEM market. It can be ported for various processor types and has a high degree of real-time capability. The development environment uses proven, well-established development tools. It is an open and scalable Windows operating system platform for many different devices. Examples of such devices are handheld PCs, digital wireless receivers, intelligent mobile phones, multimedia consoles, etc. In embedded systems, Windows CE is also an excellent choice for automation technology.

## X

### XGA

An abbreviation for "**EX**tended **G**raphics **A**rray". An expanded standard for graphics controllers and monitors that was introduced by IBM in 1990. This standard supports 640x480 resolution with 65,536 colors or 1024x768 resolution with 256 colors. This standard is generally used in workstation systems.

### XML

eXtensible Markup Language > Corresponds to: expandable display language. This new language was officially recommended in 1998 by the World Wide Web Consortium W3C as a standard for Web publishing and document management in client/server environments. Further development of the SGML standard. Unlike SGML documents, XML documents do not require a schema description in the form of a DTD file. XML is already supported completely in the newer versions of many ERP und MES systems. XML is accepted as an industrial standard thanks to

its simple notation. Information is represented using the ASCII character set. This makes XML easy to read and transparent, and its portability of text is usually superior to binary structures ([www.xml.com](http://www.xml.com)).





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