

# Power Panel 300/400

## User's Manual

Version: **2.42 (March 2016)**

Model no.: **MAPP300.400-ENG**

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# Chapter 1 • General information

## Information:

B&R works hard 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
0.10 Preliminary	2006-10-31	- First version
1.00	2006-11-21	<ul style="list-style-type: none"> <li>- Contents of delivery for individual components expanded.</li> <li>- "Standards and certifications", on page 499 added.</li> <li>- "Touch screen", on page 553 added.</li> <li>- "Membrane", on page 559 added.</li> <li>- "Glossary", on page 575 added.</li> <li>- 2 GB USB flash drive 5MMUSB.2048-00 from SanDisk added.</li> <li>- Document now includes the chm tag "Filename".</li> <li>- Model numbers for Windows CE, Windows XPe and the HMI Drivers &amp; Utilities DVD added.</li> <li>- Rear view of devices 5PP320.0571-29, 5PP320.0573-39, 5PP320.1043-39 and 5PP320.1214-39 added.</li> <li>- Text changes: General device interfaces on device interfaces.</li> <li>- "Distribution of resources", on page 463 added.</li> <li>- "VESA mode support", on page 494 added.</li> <li>- "Power Panel 300/400 with Automation Runtime", on page 466 added.</li> <li>- aPCI slot cover added.</li> <li>- "Legend strip templates", on page 525 added.</li> <li>- "Mounting orientation", on page 407 added.</li> <li>- "Null modem cable 9A0017.0x", on page 541 added.</li> <li>- "Mounting compatibilities", on page 561 added.</li> </ul>

Table 1: Manual history

## General information • Manual history

Version	Date	Change
1.10	2007-02-22	<ul style="list-style-type: none"> <li>- Rear view of device 5PP320.1505-39 added.</li> <li>- Driver support information modified.</li> <li>- Section "Automation Runtime and SMC" removed.</li> <li>- Images of battery exchange changed.</li> <li>- CompactFlash 8192 MB SSI is enabled.</li> <li>- Image of Ethernet connection changed.</li> <li>- Label description and images changed (there is no longer a safety sticker).</li> <li>- aPCI slot cover section removed.</li> <li>- HMI Drivers and Utilities DVD section removed.</li> <li>- Technical data (L1 cache, L2 cache, Touch Controller, SRAM on BIOS devices) revised.</li> <li>- Figure text added for Figure 149.</li> <li>- Windows CE description updated.</li> <li>- Serial number sticker changed.</li> <li>- "Distribution of resources", on page 463 revised.</li> <li>- "Automation Runtime summary screen - ex. 4PP420.1043-75", on page 466 changed.</li> <li>- Rear views added.</li> <li>- Chapter "Power Panel 300 with BIOS", on page 413 updated.</li> </ul>
1.20	2007-04-20	<ul style="list-style-type: none"> <li>- USB flash drive 5MMUSB.0256-00 and USB flash drive 5MMUSB.1024-00 canceled.</li> <li>- "Automation Runtime summary screen - ex. 4PP420.1043-75", on page 466 revised.</li> <li>- Rear views for devices 4PP420.0571-A5, 4PP451.0571-65 and 4PP481.1043-B5 added.</li> <li>- Section "USB flash drive", on page 536 updated.</li> <li>- Chapter "Power Panel 300 with BIOS", on page 413 updated.</li> </ul>
1.30	2007-05-04	<ul style="list-style-type: none"> <li>- Chapter 4 "Software", on page 413 updated.</li> </ul>
1.40	2007-10-22	<ul style="list-style-type: none"> <li>- New PP300/400 devices added (4PP320.0571-01, 4PP320.0571-35, 4PP320.1043-31, 4PP320.1505-31, 5PP320.0571-39, 4PP420.0571-75, 4PP420.0571-B5, 4PP451.0571-75, 4PP452.0571-75).</li> <li>- Battery information expanded ("Changing the battery", on page 550).</li> <li>- New model numbers for Windows CE and Windows XPe expanded.</li> <li>- Windows CE and Windows XPe information updated.</li> <li>- Additional temperature humidity diagram information</li> <li>- Section 3 "Preventing after-image effect in LCD/TFT monitors", on page 552 added</li> <li>- Section "Touch screen calibration", on page 409 added</li> <li>- Section 2.6.2 "Environmental conditions - dust, humidity, aggressive gases", on page 28 added</li> <li>- Section "Replacement CMOS batteries", on page 521 updated.</li> <li>- Real-time clock specifications updated in technical data for the individual components (footnote).</li> <li>- Extensive changes</li> </ul>
1.50	2008-05-27	<ul style="list-style-type: none"> <li>- Vibration / shock data revised</li> <li>- Error correction (a touch screen was added in the technical data for 4PP451 and 4PP452).</li> <li>- New PP300/400 devices added (5PP320.0573-3B, 4PP351.0571-01, 4PP351.0571-35, 4PP352.0571-35, 4PP381.1043-31, 4PP451.0571-45, 4PP451.0571-85, 4PP451.0571-B5, 4PP451.1043-75, 4PP451.1043-B5, 4PP452.0571-45, 4PP452.0571-B5, 4PP452.1043-75, 4PP480.1505-B5).</li> <li>- Text changed from Compact Flash to CompactFlash</li> <li>- Windows CE 6.0 (5SWWCE.0821-ENG) added as the operating system for PP300 BIOS devices.</li> <li>- File name markers optimized for AS Help.</li> <li>- Information added to the Screen Rotation in every device.</li> <li>- Standards adjustment on page 499.</li> </ul>

Table 1: Manual history (Forts.)

Version	Date	Change
1.60	2008-11-05	<ul style="list-style-type: none"> <li>- Change to Automation Device Interface (ADI) Control Center on page 495.</li> <li>- B&amp;R Key Editor moved from chapter 4 "Software" to chapter "Appendix" on page 569.</li> <li>- Information for battery lifespan changed in chapter 2 "Technical data".</li> <li>- Update of Power Panel compact / light devices (4PP420:0571-L05, 4PP420:0571-L45, 4PP420:0571-L25, 4PP420:0571-L65, 4PP420:0571-L35, 4PP420:0571-L75, 4PP420:0571-C05, 4PP420:0571-C45, 4PP420:0571-C25, 4PP420:0571-C65, 4PP420:0571-C35, 4PP420:0571-C75, 4PP451:0571-L25, 4PP451:0571-L65, 4PP451:0571-L35, 4PP451:0571-L75, 4PP451:0571-C25, 4PP451:0571-C65, 4PP451:0571-C35, 4PP451:0571-C75, 4PP452:0571-L25, 4PP452:0571-L65, 4PP452:0571-L35, 4PP452:0571-L75, 4PP452:0571-L25, 4PP452:0571-L65, 4PP452:0571-L35, 4PP452:0571-L75).</li> <li>- Block diagrams updated for PP300 and PP400 on page 402.</li> <li>- User ID description expanded.</li> <li>- Temperature/humidity diagrams for PP300 and PP400 updated.</li> <li>- Topology images changed (design updated).</li> <li>- Grounding resistance changed to bleeder resistance.</li> <li>- ADI development kit on page 571 updated.</li> <li>- Error corrected for the 4PP3xx devices - Devices are not battery buffered.</li> </ul>
1.70	2009-01-20	<ul style="list-style-type: none"> <li>- Technical data corrected for devices: 4PP351.0571-01, 4PP351.0571-35, 4PP352.0571-35, 4PP452.1043-75 - these devices have no touch screen.</li> <li>- 4PP451.0571-85 device: Contents of delivery and technical data changed-&gt; incorrect display description.</li> <li>- 4PP451.1043-75 device: Description and technical data changed for device - it only has 1 aPCI slot.</li> <li>- Phantom key information changed.</li> <li>- Model numbers 5SWWCE.0522-ENG, 5SWWCE.0622-ENG, 5SWWCE.0822-ENG, 5SWWXP.0422-ENG added.</li> <li>- Section 2.7 "Environmentally-friendly disposal" in chapter 1 "General information" added.</li> <li>- Temperature and humidity diagrams changed.</li> <li>- Contents of delivery for USB flash drives removed.</li> <li>- Mounting orientation -45° and +45° revised.</li> </ul>
1.80	2009-04-01	<ul style="list-style-type: none"> <li>- Display properties corrected for the device 4PP351.0571-35.</li> <li>- Number of function keys and soft keys corrected for the device 4PP352.0571-35.</li> <li>- Section 4.2 "Differences between the Windows CE 5.0 versions (Pro - PropPlus)" updated.</li> <li>- Section 4.4 "Windows CE 6.0 features" updated.</li> <li>- Displays changed on the devices 4PP320.0571-35, 4PP351.0571-35, 4PP352.0571-35, 4PP420.0571-75, 4PP420.0571-B5, 4PP451.0571-75, 4PP451.0571-B5, 4PP452.0571-75, 4PP452.0571-B5 and 5PP320.0571-39 - changes made to the technical data of the displays.</li> <li>- Section 7.4 "Creating a bootable USB flash drive", changed on page 479.</li> <li>- B&amp;R CompactFlash card added.</li> <li>- Technical data for Silicon Systems CFs revised.</li> </ul>

Table 1: Manual history (Forts.)

## General information • Manual history

Version	Date	Change
1.90	2009-07-02	<ul style="list-style-type: none"> <li>- Model numbers of the Power Panel 452 compact devices corrected.</li> <li>- Text changed for the Power button on the Automation Runtime devices (page 113 and page 173).</li> <li>- General information concerning Power Panel compact/light devices added (page 376).</li> <li>- Section 3.5 "Creating a DOS boot diskette in Windows XP", on page 479 added</li> <li>- Section 1.6.1 "BIOS Upgrade Disk" on page 470 moved and updated.</li> <li>- Section 1.6.2 "MTCX Firmware Upgrade (MTCX FPGA, MTCX PX32)" on page 473 moved and updated.</li> <li>- Section 1.6.3 "aPCI Firmware Upgrade Disk" on page 475 moved and updated.</li> <li>- Section 1.6.4 "User Boot Logo Upgrade Disk" on page 476 moved and updated.</li> <li>- Section 7.4 "Creating a bootable USB flash drive" updated and moved to page 481.</li> <li>- Section 3.7 "Creating a bootable CompactFlash card for B&amp;R upgrade files", on page 483 added</li> <li>- Section 2 "Power Panel 400 with Automation Runtime" changed to "Power Panel 300/400 with Automation Runtime", on page 466.</li> <li>- Temperature humidity diagrams for the devices corrected.</li> <li>- Temperature humidity diagram and technical data for the Elo Accu touch screen on page 553 updated.</li> <li>- Temperature values for devices 4PP351.0571-35, 4PP352.0571-35, 4PP451.0571-45, 4PP451.0571-85, 4PP451.1043-75, 4PP451.1043-B5 and 4PP452.0571-45 corrected.</li> <li>- Section 1.2 "Gunze Touch", on page 555 in "Appendix A" added.</li> <li>- The touch screen type was added to the technical data for the devices.</li> </ul>
2.00	2009-12-18	<ul style="list-style-type: none"> <li>- Technical data for Power Panel devices updated: Information regarding Half-brightness time updated (footnote), holding torque for aPCI module updated.</li> <li>- Section "User tips for increasing the display lifespan", on page 411 added</li> <li>- "Compact Flash" spelling changed to "CompactFlash".</li> <li>- Figure 336 "Temperature humidity diagram - USB flash drive - 5MMUSB.2048-00", on page 538 updated.</li> <li>- Package amount and model number for lithium battery OAC201.91 changed.</li> <li>- Power Panel device 4PP420.0571-85 added to manual, model number also updated in the figure for cutout installation.</li> <li>- Color depth for 15" devices corrected.</li> <li>- Section "B&amp;R Automation Device Interface (ADI) - Control Center", on page 495 and section "B&amp;R Automation Device Interface (ADI) development kit", on page 571 updated.</li> <li>- Section "B&amp;R Key Editor information", on page 569 updated.</li> <li>- Figure 89 "Rear view - 4PP352.0571-35", on page 153 and 94 "Rear view - 4PP381.1043-31", on page 159 updated.</li> <li>- Section "Power Panel with Windows CE", on page 485 updated.</li> <li>- "Information" added to section "Upgrade information", on page 470.</li> <li>- Wording in temperature specifications revised throughout document.</li> <li>- MB specification for memory capacity updated/corrected (pages 164, 170, 330).</li> <li>- Footnote about altitude and temperature (derating) updated in the technical data (removed from Touch Screen).</li> </ul>
2.10	2010-04-01	<ul style="list-style-type: none"> <li>- Description and image of supply voltage changed (Figure Supply voltage connection: p.45, p.105, p.165).</li> <li>- Power Panel 5PP320.1505-3B added to manual (p.99).</li> <li>- Windows Embedded Standard 2009 added to manual (p.491).</li> <li>- Sections 2.1.6 "BIOS boot mode switch", on page 50, 3.1.6 "BIOS boot mode switch", on page 110 and 4.1.6 "BIOS boot mode switch", on page 170 added.</li> </ul>
2.20	2010-07-13	<ul style="list-style-type: none"> <li>- Technical data for Power Panel devices updated: Table entry "B&amp;R ID code" added; SRAM information "Remanent variables for AR (Automation Runtime) in power fail mode" added.</li> </ul>
2.30	2010-07-28	<ul style="list-style-type: none"> <li>- B&amp;R flash drive 5MMUSB.2048-01 added to the section "USB flash drive", on page 536.</li> <li>- Section "B&amp;R Automation Device Interface (ADI) development kit", on page 571 updated.</li> <li>- Section "B&amp;R Automation Device Interface (ADI) - Control Center", on page 495 updated.</li> </ul>
2.40	2011-04-08	<ul style="list-style-type: none"> <li>- Chapter 5 "Standards and certifications", on page 499 revised.</li> <li>- Section 1.3 "Temperature sensor locations", on page 44 in chapter 2 "Technical data" added.</li> <li>- Section 6 "Pixel error", on page 412 in chapter 3 "Commissioning" added.</li> </ul>

Table 1: Manual history (Forts.)

Version	Date	Change
2.41	2011-06-15	<ul style="list-style-type: none"> <li>- Sections "B&amp;R Automation Device Interface (ADI) - Control Center", on page 495, "B&amp;R Key Editor information", on page 569 and "B&amp;R Automation Device Interface (ADI) development kit", on page 571 updated.</li> <li>- Sections "HMI Drivers &amp; Utilities DVD 5SWHMI.0000-00", on page 543 and "B&amp;R Automation Device Interface (ADI) .NET SDK", on page 573 added.</li> </ul>
2.42	2016-03-29	<ul style="list-style-type: none"> <li>- The technical data of the following Power Panels have been updated:                      5PP320.0571-39, 5PP320.0573-39, 5PP320.0573-3B, 5PP320.1043-39, 5PP320.1214-39, 5PP320.1505-39, 5PP320.1505-3B, 4PP320.0571-01, 4PP320.1043-31, 4PP320.1505-31, 4PP381.1043-31, 4PP420.0571-45, 4PP420.0571-65, 4PP420.0571-75, 4PP420.0571-85, 4PP420.0571-A5, 4PP420.0571-B5, 4PP420.0573-75, 4PP420.1043-75, 4PP420.1043-B5, 4PP420.1505-75, 4PP420.1505-B5, 4PP451.0571-45, 4PP451.0571-85, 4PP452.0571-45, 4PP480.1505-75, 4PP480.1505-B5, 4PP481.1043-75, 4PP481.1043-B5, 4PP481.1505-75, 4PP482.1043-75, 4PP451.1043-75, 4PP451.1043-B5, 4PP452.1043-75, 4PP480.1043-75</li> </ul>

Table 1: Manual history (Forts.)

## 2. Safety notices

### 2.1 Intended use

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

### 2.2 Protection against electrostatic discharge

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

#### 2.2.1 Packaging

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

#### 2.2.2 Guidelines for proper ESD handling

##### Electrical components with housing

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

##### Electrical components without housing

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

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

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

### Individual components

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

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

## 2.3 Policy and procedures

Electronic devices are never completely failsafe. In the event of a failure on the programmable control system, operating or monitoring device, or uninterruptible power supply, the user is responsible for ensuring that other devices that may be connected, e.g. motors, are in a secure state.

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

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

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

## 2.4 Transport and storage

During transport and storage, devices must be protected against impermissible stress (mechanical loads, 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 by qualified personnel without voltage applied.
- General safety regulations and nationally applicable accident prevention guidelines must be observed.
- Electrical installation must be carried out according to the relevant guidelines (e.g. line cross section, fuse, protective ground connection).

## **2.6 Operation**

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

To operate programmable logic controllers, operating and monitoring devices or uninterruptible power supplies, certain components must carry dangerous voltage levels of over 42 VDC. Touching one of these parts can result in a life-threatening electric shock. This could lead to death, severe injury or damage to equipment.

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, all parts that carry voltage must be securely covered. During operation, all covers must remain closed.

### **2.6.2 Environmental conditions - dust, humidity, aggressive gases**

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

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

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



### 2.6.3 Programs, viruses, and dangerous programs

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

## 2.7 Environmentally-friendly disposal

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

### 2.7.1 Separation of materials

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

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

Table 2: Environmentally-friendly separation of materials

Disposal must comply with the respective legal regulations.

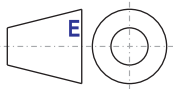
### 3. Organization of safety notices

The safety notices in this manual are organized as follows:

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

Table 3: Organization of safety notices

### 4. Directives



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

## 5. Model numbers

### 5.1 Power Panel 300 with BIOS

Model number	Short description	Note
5PP320.0571-29	<b>Power Panel PP320 BIOS 5.7" QVGA, touch screen</b> 5.7" QVGA color LCD with touch screen (resistive), 256 MB SDRAM; CompactFlash slot (type I), ETH 10/100, RS232, 2x USB; battery; metal housing, IP65 protection (front side); 24VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 57  <i>Cancelled since 4/2008</i>
5PP320.0571-39	<b>Power Panel PP320 BIOS 5.7" QVGA, touch screen</b> 5.7" QVGA color TFT display with touch screen (resistive), 256 MB SDRAM; CompactFlash slot (type I), ETH 10/100, RS 232, 2xUSB; battery; metal housing, IP65 protection (front side); 24VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 63
5PP320.0573-39	<b>Power Panel PP320 BIOS 5.7" VGA, touch screen</b> 5.7" VGA color TFT display with touch screen (resistive), 256 MB SDRAM; CompactFlash slot (type I), ETH 10/100, RS 232, 2xUSB; battery; metal housing, IP65 protection (front side); 24VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 69
5PP320.0573-3B	<b>Power Panel PP320 BIOS 5.7" VGA</b> 5.7" VGA color TFT display with touch screen (resistive), 512 MB SDRAM; CompactFlash slot (type I), ETH 10/100, RS 232, 2xUSB; battery; metal housing, IP65 protection (front side); 24VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 75
5PP320.1043-39	<b>Power Panel PP320 BIOS 10.4" VGA, touch screen</b> 10.4" VGA color TFT display with touch screen (resistive), 256 MB SDRAM; CompactFlash slot (type I), ETH 10/100, RS 232, 2xUSB; battery; metal housing, IP65 protection (front side); 24VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 81
5PP320.1214-39	<b>Power Panel PP320 BIOS 12.1" SVGA, touch screen</b> 12.1" SVGA color TFT display with touch screen (resistive), 256 MB SDRAM; CompactFlash slot (type I), ETH 10/100, RS 232, 2xUSB; battery; metal housing, IP65 protection (front side); 24VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 87
5PP320.1505-39	<b>Power Panel PP320 BIOS 15" XGA, touch screen</b> 15" XGA color TFT display with touch screen (resistive), 256 MB SDRAM; CompactFlash slot (type I), ETH 10/100, RS 232, 2xUSB; battery; metal housing, IP65 protection (front side); 24VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 93
5PP320.1505-3B	<b>Power Panel PP320 BIOS 15" XGA, touch screen</b> 15" XGA color TFT display with touch screen (resistive), 512 MB SDRAM; CompactFlash slot (type I), ETH 10/100, RS 232, 2xUSB; battery; metal housing, IP65 protection (front side); 24VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 99

Table 4: Model number overview - Power Panel 300 devices

## 5.2 Power Panel 300 with Automation Runtime

Model number	Short description	Note
4PP320.0571-01	<b>Power Panel PP320 5.7" QVGA, touch screen</b> 5.7" QVGA monochrome LCD with touch screen (resistive); 128 MB SDRAM; CompactFlash slot (type I); ETH 10/100; RS232; 2xUSB; metal housing, IP65 protection (front side); 24 VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 117
4PP320.0571-35	<b>Power Panel PP320 5.7" QVGA, touch screen</b> 5.7" QVGA color TFT display with touch screen (resistive); 128 MB SDRAM; CompactFlash slot (type I); ETH 10/100, RS 232, 2xUSB; metal housing, IP65 protection (front side); 24VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 123
4PP320.1043-31	<b>Power Panel PP320 10.4" VGA, touch screen</b> 10.4" VGA color TFT display with touch screen (resistive); 128 MB SDRAM; CompactFlash slot (type I); ETH 10/100, RS 232, 2xUSB; metal housing, IP65 protection (front side); 24VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 129
4PP320.1505-31	<b>Power Panel PP320 15" XGA, touch screen</b> 15" XGA color TFT display with touch screen (resistive); 128 MB SDRAM; CompactFlash slot (type I); ETH 10/100, RS 232, 2xUSB; metal housing, IP65 protection (front side); 24VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 135
4PP351.0571-01	<b>Power Panel PP351 5.7" QVGA</b> 5.7" QVGA monochrome LCD; 6 soft keys, 16 function keys and 20 system keys; 128 MB SDRAM; CompactFlash slot (type I); ETH 10/100, RS 232, 2xUSB; metal housing, IP65 protection (front side); 24VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 141
4PP351.0571-35	<b>Power Panel PP351 5.7" QVGA</b> 5.7" QVGA color TFT display; 6 soft keys, 16 function keys and 20 system keys; 128 MB SDRAM; CompactFlash slot (type I); ETH 10/100, RS 232, 2xUSB; metal housing, IP65 protection (front side); 24VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 147
4PP352.0571-35	<b>Power Panel PP351 5.7" QVGA</b> 5.7" QVGA color TFT display; 20 function keys and 20 system keys; 128 MB SDRAM; CompactFlash slot (type I); ETH 10/100, RS 232, 2xUSB; metal housing, IP65 protection (front side); 24VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 153
4PP381.1043-31	<b>Power Panel PP381 10.4" VGA, touch screen</b> 10.4" VGA color TFT display with touch screen (resistive); 10 soft keys, 28 function keys and 20 system keys, 128 MB SDRAM; CompactFlash slot (type I); ETH 10/100; RS232; 2xUSB; metal housing, IP65 protection (front side); 24 VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 159

Table 5: Model number overview - Power Panel 300 devices

### 5.3 Power Panel 400 with Automation Runtime

Model number	Short description	Note
4PP420.0571-45	<b>Power Panel PP420 5.7" QVGA, 1 aPCI, touch screen</b> 5.7" QVGA monochrome LCD with touch screen (resistive), 1 aPCI slot; 128 MB SDRAM; 512 KB SRAM, CompactFlash slot (type I), ETH 10/100, RS232, 2xUSB; battery; metal housing, IP65 protection (front side); 24 VDC (Order screw clamp OTB103.9 or cage clamp OTB103.91 separately.)	See page 177
4PP420.0571-65	<b>Power Panel PP420 5.7" QVGA, 1 aPCI, touch screen</b> 5.7" QVGA color LCD with touch screen (resistive), 1 aPCI slot; 128 MB SDRAM; 512 KB SRAM, CompactFlash (type I), ETH 10/100, RS232, 2xUSB; battery; metal housing, IP65 protection (front side); 24 VDC (Order screw clamp OTB103.9 or cage clamp OTB103.91 separately.)	See page 183
4PP420.0571-75	<b>Power Panel PP420 5.7" QVGA, 1 aPCI, touch screen</b> 5.7" QVGA color TFT display with touch screen (resistive), 1 aPCI slot; 128 MB SDRAM; 512 KB SRAM, CompactFlash slot (type I), ETH 10/100, RS232, 2xUSB; battery; metal housing, IP65 protection (front side); 24 VDC (Order screw clamp OTB103.9 or cage clamp OTB103.91 separately.)	See page 189
4PP420.0571-85	<b>Power Panel PP420 5.7" QVGA, 2 aPCI, touch screen</b> 5.7" QVGA monochrome LCD with touch screen (resistive), 2 aPCI slots; 128 MB SDRAM; 512 KB SRAM, CompactFlash slot (type I), ETH 10/100, RS232, 2xUSB; battery; metal housing, IP65 protection (front side); 24 VDC (Order screw clamp OTB103.9 or cage clamp OTB103.91 separately). monochrome LCD with	See page 195
4PP420.0571-A5	<b>Power Panel PP420 5.7" QVGA, 2 aPCI, touch screen</b> 5.7" QVGA color LCD with touch screen (resistive), 2 aPCI slots; 128 MB SDRAM; 512 KB SRAM, CompactFlash slot (type I), ETH 10/100, RS232, 2xUSB; battery; metal housing, IP65 protection (front side); 24 VDC (Order screw clamp OTB103.9 or cage clamp OTB103.91 separately.)	See page 201
4PP420.0571-B5	<b>Power Panel PP420 5.7" QVGA, 2 aPCI, touch screen</b> 5.7" QVGA color TFT display with touch screen (resistive), 2 aPCI slot; 128 MB SDRAM; 512 KB SRAM, CompactFlash slot (type I), ETH 10/100, RS232, 2xUSB; battery; metal housing, IP65 protection (front side); 24 VDC (Order screw clamp OTB103.9 or cage clamp OTB103.91 separately.)	See page 207
4PP420.0573-75	<b>Power Panel PP420 5.7" VGA, 1 aPCI, touch screen</b> 5.7" VGA color TFT display with touch screen (resistive), 1 aPCI slot; 128 MB SDRAM; 512 KB SRAM, CompactFlash slot (type I), ETH 10/100, RS232, 2xUSB; battery; metal housing, IP65 protection (front side); 24 VDC (Order screw clamp OTB103.9 or cage clamp OTB103.91 separately.)	See page 213
4PP420.1043-75	<b>Power Panel PP420 10.4" VGA, 1 aPCI, touch screen</b> 10.4" VGA color TFT display with touch screen (resistive), 1 aPCI slot; 128 MB SDRAM; 512 KB SRAM, CompactFlash slot (type I), ETH 10/100, RS232, 2xUSB; battery; metal housing, IP65 protection (front side); 24 VDC (Order screw clamp OTB103.9 or cage clamp OTB103.91 separately.)*	See page 219
4PP420.1043-B5	<b>Power Panel PP420 10.4" VGA, 2 aPCI, touch screen</b> 10.4" VGA color TFT display with touch screen (resistive), 2 aPCI slots; 128 MB SDRAM; 512 KB SRAM, CompactFlash slot (type I), ETH 10/100, RS232, 2xUSB; battery; metal housing, IP65 protection (front side); 24 VDC (Order screw clamp OTB103.9 or cage clamp OTB103.91 separately.)*	See page 225
4PP420.1505-75	<b>Power Panel PP420 15" XGA, 1 aPCI, touch screen</b> 15" XGA color TFT display with touch screen (resistive); 1 aPCI slot; 128 MB SDRAM; 512 KB SRAM; CompactFlash slot (Type I); ETH 10/100; RS232; 2xUSB; battery; metal housing, IP65 protection (front side); 24 VDC (Order OTB103.9 screw clamp or OTB103.91 cage clamp separately.)	See page 231

Table 6: Model number overview - Power Panel 400 devices

## General information • Model numbers

Model number	Short description	Note
4PP420.1505-B5	<b>Power Panel PP420 15" XGA, 2 aPCI, touch screen</b> 15" XGA color TFT display with touch screen (resistive), 2 aPCI slots; 128 MB SDRAM; 512 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS232; 2xUSB; battery; metal housing, IP65 protection (front side); 24 VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)*	See page 237
4PP451.0571-45	<b>Power Panel PP451 5.7" QVGA, 1 aPCI, keys</b> 5.7" QVGA monochrome LCD; 6 soft keys; 16 function and 20 system keys; 1 aPCI slot; 128 MB SDRAM; 512 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS232; 2xUSB; battery; metal housing, IP65 protection (front side); 24VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately).	See page 243
4PP451.0571-65	<b>Power Panel PP451 5.7" QVGA, 1 aPCI, keys</b> 5.7" QVGA color LCD; 6 soft keys; 16 function and 20 system keys; 1 aPCI slot; 128 MB SDRAM; 512 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS232; 2xUSB; battery; metal housing, IP65 protection (front side); 24VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 250 <i>Cancelled since 4/2008</i>
4PP451.0571-75	<b>Power Panel PP451 5.7" QVGA, 1 aPCI, keys</b> 5.7" QVGA color TFT display; 6 soft keys; 16 function and 20 system keys; 1 aPCI slot; 128 MB SDRAM; 512 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS232; 2xUSB; battery; metal housing, IP65 protection (front side); 24VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 257
4PP451.0571-85	<b>Power Panel PP451 5.7" QVGA, 2 aPCI, keys</b> 5.7" QVGA monochrome LCD; 6 soft keys; 16 function and 20 system keys; 2 aPCI slots; 128 MB SDRAM; 512 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS232; 2xUSB; battery; metal housing, IP65 protection (front side); 24VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately).	See page 264
4PP451.0571-B5	<b>Power Panel PP451 5.7" QVGA, 2 aPCI, keys</b> 5.7" QVGA color TFT display; 6 soft keys; 16 function and 20 system keys; 2 aPCI slot; 128 MB SDRAM; 512 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS232; 2xUSB; battery; metal housing, IP65 protection (front side); 24VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 271
4PP451.1043-75	<b>Power Panel PP451 10.4" VGA, 1 aPCI, keys</b> 10.4" VGA color TFT display; 10 soft keys; 28 function and 20 system keys; 1 aPCI slot; 128 MB SDRAM; 512 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS232; 2xUSB; battery; metal housing, IP65 protection (front side); 24VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 278
4PP451.1043-B5	<b>Power Panel PP451 10.4" VGA, 2 aPCI, keys</b> 10.4" VGA color TFT display; 10 soft keys; 28 function and 20 system keys; 2 aPCI slot; 128 MB SDRAM; 512 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS232; 2xUSB; battery; metal housing, IP65 protection (front side); 24VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 285
4PP452.0571-45	<b>Power Panel PP452 5.7" QVGA, 1 aPCI, keys</b> 5.7" QVGA monochrome LCD; 20 function and 20 system keys; 1 aPCI slot; 128 MB SDRAM; 512 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS232; 2xUSB; battery; metal housing, IP65 protection (front side); 24VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 292
4PP452.0571-65	<b>Power Panel PP452 5.7" QVGA, 1 aPCI, keys</b> 5.7" QVGA color LCD; 20 function and 20 system keys; 1 aPCI slot; 128 MB SDRAM; 512 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS232; 2xUSB; battery; metal housing, IP65 protection (front side); 24VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 299 <i>Cancelled since 4/2008</i>

Table 6: Model number overview - Power Panel 400 devices (Forts.)

Model number	Short description	Note
4PP452.0571-75	<b>Power Panel PP452 5.7" QVGA, 1 aPCI, keys</b> 5.7" QVGA color TFT display; 20 function and 20 system keys; 1 aPCI slot; 128 MB SDRAM; 512 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS232; 2xUSB; battery; metal housing, IP65 protection (front side); 24VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 306
4PP452.0571-B5	<b>Power Panel PP452 5.7" QVGA, 2 aPCI, keys</b> 5.7" QVGA color TFT display; 20 function and 20 system keys; 2 aPCI slot; 128 MB SDRAM; 512 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS232; 2xUSB; battery; metal housing, IP65 protection (front side); 24VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 313
4PP452.1043-75	<b>Power Panel PP451 10.4" VGA, 1 aPCI, keys</b> 10.4" VGA color TFT display; 44 function and 20 system keys; 1 aPCI slot; 128 MB SDRAM; 512 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS232; 2xUSB; battery; metal housing, IP65 protection (front side); 24VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 320
4PP480.1043-75	<b>Power Panel PP480 10.4" VGA, 1 aPCI, touch screen, keys</b> 10.4" VGA color TFT display with touch screen (resistive); 10 soft keys and 12 function keys; 1 aPCI slot; 128 MB SDRAM; 512 KB SRAM; CompactFlash slot (Type I); ETH 10/100; RS232; 2xUSB; battery; metal housing, IP65 protection (front side); 24 VDC (Order 0TB103.9 screw clamps or 0TB103.91 cage clamps separately).	See page 327
4PP480.1505-75	<b>Power Panel PP480 15" XGA, 1 aPCI, touch screen, keys</b> 15" XGA color TFT display with touch screen (resistive); 12 soft keys and 20 function keys; 1 aPCI slot; 128 MB SDRAM; 512 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS232; 2xUSB; battery; metal housing, IP65 protection (front side); 24 VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 334
4PP480.1505-B5	<b>Power Panel PP480 15" XGA, 2 aPCI, touch screen, keys</b> 15" XGA color TFT display with touch screen (resistive); 12 soft keys and 20 function keys; 2 aPCI slot; 128 MB SDRAM; 512 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS232; 2xUSB; battery; metal housing, IP65 protection (front side); 24 VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 341
4PP481.1043-75	<b>Power Panel PP481 10.4" VGA, 1 aPCI, touch screen, keys</b> 10.4" VGA color TFT display with touch screen (resistive); 10 soft keys, 28 function keys and 20 system keys; 1 aPCI slot; 128 MB SDRAM; 512 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS232; 2xUSB; battery; metal housing, IP65 protection (front side); 24 VDC (Order 0TB103.9 screw clamp or 0TB103.91 cage clamps separately).	See page 348
4PP481.1043-B5	<b>Power Panel PP481 10.4" VGA, 2 aPCI, touch screen, keys</b> 10.4" VGA color TFT display with touch screen (resistive); 10 soft keys, 28 function keys and 20 system keys; 2 aPCI slots; 128 MB SDRAM; 512 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS232; 2xUSB; battery; metal housing, IP65 protection (front side); 24 VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 355
4PP481.1505-75	<b>Power Panel PP481 15" XGA, 1 aPCI, touch screen, keys</b> 15" XGA color TFT display with touch screen (resistive); 12 soft keys, 20 function keys and 92 system keys; 1 aPCI slot; 128 MB SDRAM; 512 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS232; 2xUSB; battery; metal housing, IP65 protection (front side); 24 VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 362
4PP482.1043-75	<b>Power Panel PP482 10.4" VGA, 1 aPCI, touch screen, keys</b> 10.4" VGA color TFT display with touch screen (resistive); 44 function keys and 20 system keys; 1 aPCI slot; 128 MB SDRAM; 512 KB SRAM; CompactFlash slot (type I); ETH 10/100; RS232; 2xUSB; battery; metal housing, IP65 protection (front side); 24 VDC (Order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 369

Table 6: Model number overview - Power Panel 400 devices (Forts.)

## 5.4 Power Panel 400 light / compact

Model number	Short description	Note
4PP420:0571-L05	<b>Power Panel PP420 light monochrome LCD, CAN, touch screen</b> Set Power Panel PP420 light CAN; 5.7" QVGA monochrome LCD; 128 MB SDRAM; 512 KB SRAM.	See page 376
4PP420:0571-L45	<b>Power Panel PP420 light monochrome LCD, X2X, touch screen</b> Set Power Panel PP420 light X2X; 5.7" QVGA monochrome LCD; 128 MB SDRAM; 512 KB SRAM.	See page 376
4PP420:0571-L25	<b>Power Panel PP420 light color LCD, CAN, touch screen</b> Set Power Panel PP420 light CAN; 5.7" QVGA color LCD; 128 MB SDRAM; 512 KB SRAM.	See page 376
4PP420:0571-L65	<b>Power Panel PP420 light color LCD, X2X, touch screen</b> Set Power Panel PP420 light X2X; 5.7" QVGA color LCD; 128 MB SDRAM; 512 KB SRAM.	See page 376
4PP420:0571-L35	<b>Power Panel PP420 light color TFT, CAN, touch screen</b> Set Power Panel PP420 light CAN; 5.7" QVGA color TFT; 128 MB SDRAM; 512 KB SRAM.	See page 376
4PP420:0571-L75	<b>Power Panel PP420 light color TFT, X2X, touch screen</b> Set Power Panel PP420 light X2X; 5.7" QVGA color TFT; 128 MB SDRAM; 512 KB SRAM.	See page 376
4PP420:0571-C05	<b>Power Panel PP420 compact monochrome LCD, CAN, touch screen</b> Set Power Panel PP420 compact CAN; 5.7" QVGA monochrome LCD; 128 MB SDRAM; 512 KB SRAM; ETH 10/100.	See page 381
4PP420:0571-C45	<b>Power Panel PP420 compact monochrome LCD, X2X, touch screen</b> Set Power Panel PP420 compact X2X; 5.7" QVGA monochrome LCD; 128 MB SDRAM; 512 KB SRAM; ETH 10/100.	See page 381
4PP420:0571-C25	<b>Power Panel PP420 compact color LCD, CAN, touch screen</b> Set Power Panel PP420 compact CAN; 5.7" QVGA color LCD; 128 MB SDRAM; 512 KB SRAM; ETH 10/100.	See page 381
4PP420:0571-C65	<b>Power Panel PP420 compact color LCD, X2X, touch screen</b> Set Power Panel PP420 compact X2X; 5.7" QVGA color LCD; 128 MB SDRAM; 512 KB SRAM; ETH 10/100.	See page 381
4PP420:0571-C35	<b>Power Panel PP420 compact color TFT, CAN, touch screen</b> Set Power Panel PP420 compact CAN; 5.7" QVGA color TFT; 128 MB SDRAM; 512 KB SRAM; ETH 10/100.	See page 381
4PP420:0571-C75	<b>Power Panel PP420 compact color TFT, X2X, touch screen</b> Set Power Panel PP420 compact X2X; 5.7" QVGA color TFT; 128 MB SDRAM; 512 KB SRAM; ETH 10/100.	See page 381
4PP451:0571-L25	<b>Power Panel PP451 light color LCD, CAN, keys</b> Set Power Panel PP451 light CAN; 5.7" QVGA color LCD; 128 MB SDRAM; 512 KB SRAM.	See page 386
4PP451:0571-L65	<b>Power Panel PP451 light color LCD, X2X, keys</b> Set Power Panel PP451 light X2X; 5.7" QVGA color LCD; 128 MB SDRAM; 512 KB SRAM.	See page 386
4PP451:0571-L35	<b>Power Panel PP451 light color TFT, CAN, keys</b> Set Power Panel PP451 light CAN; 5.7" QVGA color TFT; 128 MB SDRAM; 512 KB SRAM.	See page 386
4PP451:0571-L75	<b>Power Panel PP451 light color TFT, X2X, keys</b> Set Power Panel PP451 light X2X; 5.7" QVGA color TFT; 128 MB SDRAM; 512 KB SRAM.	See page 386

Table 7: Model number overview - Power Panel light / compact devices



Model number	Short description	Note
4PP451:0571-C25	<b>Power Panel PP451 compact color LCD, CAN, keys</b> Set Power Panel PP451 compact CAN; 5.7" QVGA color LCD; 128 MB SDRAM; 512 KB SRAM; ETH 10/100.	See page 390
4PP451:0571-C65	<b>Power Panel PP451 compact color LCD, X2X, keys</b> Set Power Panel PP451 compact X2X; 5.7" QVGA color LCD; 128 MB SDRAM; 512 KB SRAM; ETH 10/100.	See page 390
4PP451:0571-C35	<b>Power Panel PP451 compact color TFT, CAN, keys</b> Set Power Panel PP451 compact CAN; 5.7" QVGA color TFT; 128 MB SDRAM; 512 KB SRAM; ETH 10/100.	See page 390
4PP451:0571-C75	<b>Power Panel PP451 compact color TFT, X2X, keys</b> Set Power Panel PP451 compact X2X; 5.7" QVGA color TFT; 128 MB SDRAM; 512 KB SRAM; ETH 10/100.	See page 390
4PP452:0571-L25	<b>Power Panel PP452 light color LCD, CAN, keys</b> Set Power Panel PP452 light CAN; 5.7" QVGA color LCD; 64 MB SDRAM; 256 kB SRAM	See page 394
4PP452:0571-L65	<b>Power Panel PP452 light color LCD, X2X, keys</b> Set Power Panel PP452 light X2X; 5.7" QVGA color LCD; 128 MB SDRAM; 512 kB SRAM	See page 394
4PP452:0571-L35	<b>Power Panel PP452 light color TFT, CAN, keys</b> Set Power Panel PP452 light CAN; 5.7" QVGA color TFT; 64 MB SDRAM; 256 kB SRAM	See page 394
4PP452:0571-L75	<b>Power Panel PP452 light color TFT, X2X, keys</b> Set Power Panel PP452 light X2X; 5.7" QVGA color TFT; 128 MB SDRAM; 512 kB SRAM	See page 394
4PP452:0571-C25	<b>Power Panel PP452 compact color LCD, CAN, keys</b> Set Power Panel PP452 compact CAN; 5.7" QVGA color LCD; 128 MB SDRAM; 512 KB SRAM; ETH 10/100.	See page 398
4PP452:0571-C65	<b>Power Panel PP452 compact color LCD, X2X, keys</b> Set Power Panel PP452 compact X2X; 5.7" QVGA color LCD; 128 MB SDRAM; 512 KB SRAM; ETH 10/100.	See page 398
4PP452:0571-C35	<b>Power Panel PP452 compact color TFT, CAN, keys</b> Set Power Panel PP452 compact CAN; 5.7" QVGA color TFT; 128 MB SDRAM; 512 KB SRAM; ETH 10/100.	See page 398
4PP452:0571-C75	<b>Power Panel PP452 compact color TFT, X2X, keys</b> Set Power Panel PP452 compact X2X; 5.7" QVGA color TFT; 128 MB SDRAM; 512 KB SRAM; ETH 10/100.	See page 398

Table 7: Model number overview - Power Panel light / compact devices (Forts.)

## 5.5 Software

Model number	Short description	Note
5SWWCE.0521-ENG	<b>WinCE5.0 Pro PP300 LX800</b> Microsoft Windows CE 5.0 Professional, English; for PP300 BIOS devices 5PP320.0571-29, 5PP320.0571-39, 5PP320.0573-39, 5PP320.1043-39, 5PP320.1214-39, 5PP320.1505-39, order CompactFlash separately (at least 128 MB).	See page 485
5SWWCE.0621-ENG	<b>WinCE5.0 ProPlus PP300 LX800</b> Microsoft Windows CE 5.0 Professional Plus, English; for PP300 BIOS devices 5PP320.0571-39, 5PP320.0571-39, 5PP320.0573-39, 5PP320.1043-39, 5PP320.1214-39, 5PP320.1505-39, order CompactFlash separately (at least 128 MB).	See page 485

Table 8: Model number overview - Software

## General information • Model numbers

Model number	Short description	Note
5SWWCE.0821-ENG	<b>WinCE6.0 Pro PP300 LX800</b> Microsoft Windows CE 6.0 Professional, English, including license; for PP300 BIOS devices 5PP320.0571-29, 5PP320.0571-39, 5PP320.0573-39, 5PP320.1043-39, 5PP320.1214-39, 5PP320.1505-39, order CompactFlash separately (at least 128 MB).	See page 485
5SWWXP.0421-ENG	<b>WinXPe FP2007 PP300 LX800</b> Microsoft Windows XP embedded, English, Feature Pack 2007; for PP300 BIOS devices 5PP320.0571-29, 5PP320.0571-39, 5PP320.0573-39, 5PP320.1043-39, 5PP320.1214-39, 5PP320.1505-39, order CompactFlash separately (at least 512 MB). Only delivered with a new Power Panel.	See page 489
5SWWCE.0522-ENG	<b>WinCE5.0 Pro PP400 LX800</b> Microsoft Windows CE 5.0 Professional, English; for Power Panel 400 BIOS; Order CompactFlash separately (min.128 MB).	See page 485
5SWWCE.0622-ENG	<b>WinCE5.0 ProPlus PP400 LX800</b> Microsoft Windows CE 5.0 Professional plus, English; for Power Panel 400 BIOS; Order CompactFlash separately (min.128 MB).	See page 485
5SWWCE.0822-ENG	<b>WinCE6.0 Pro PP400 LX800</b> Microsoft Windows CE 6.0 Professional, English; for Power Panel 400 BIOS; Order CompactFlash separately (min.128 MB).	See page 485
5SWWXP.0422-ENG	<b>WinXPe FP2007 PP400 LX800</b> Microsoft Windows XP Embedded Feature Pack 2007, English; for Power Panel 400; Order CompactFlash separately (min.512 MB).	See page 489
5SWWXP.0721-ENG	<b>Windows Embedded Standard 2009 PP300 LX800</b> Microsoft OEM Windows Embedded, Standard 2009, English; for Power Panel 300; order CompactFlash separately (at least 1 GB).	See page 491
5SWWXP.0722-ENG	<b>Windows Embedded Standard 2009 PP400 LX800</b> Microsoft OEM Windows Embedded Standard 2009, English; for Power Panel 400; Order CompactFlash separately (min.1 GByte).	See page 491

Table 8: Model number overview - Software (Forts.)

## 5.6 Accessories

Model number	Short description	Note
0AC201.91	<b>Lithium batteries, 4 pcs.</b> Lithium batteries, 4 pcs., 3 V / 950 mAh, button cell	See page 521
4A0006.00-000	<b>Lithium battery, 1 pc.</b> Lithium battery, 1 pc., 3 V / 950 mAh, button cell	See page 521
0TB103.9	<b>Plug 24V 5.08 3-pin screw clamp</b> 24 VDC 3-pin connector, female. Screw clamps, 3.31 mm <sup>2</sup> , protected against vibration by the screw flange	See page 523
0TB103.91	<b>Plug 24V 5.08 3-pin cage clamp</b> 24 VDC 3-pin connector, female. Cage clamps, 3.31 mm <sup>2</sup> , protected against vibration by the screw flange	See page 523
5AC900.057X-00	<b>Legend strips 3x 5.7" vertical1</b> Legend strip template for Power Panel 4PP451.0571-65. For 3 devices.	See page 525
5AC900.057X-01	<b>Legend strips 2x 5.7" Horizontal2</b> Legend strip template for Power Panel 4PP452.0571-65. For 2 devices.	See page 525
5AC900.104X-00	<b>Legend strip 1x 10.4" Vertical1</b> Legend strip template for Power Panel 4PP451.1043-75 and 4PP481.1043-B5. For 1 device.	See page 525

Table 9: Model number overview - Accessories

Model number	Short description	Note
5AC900.104X-01	<b>Legend strip 1x 10.4" Horizontal2</b> Legend strip template for Power Panel 4PP482.1043-75. For 1 device.	See page 525
5AC900.104X-02	<b>Legend strips 3x 10.4" Horizontal1</b> Legend strip template for Power Panel 4PP480.1043-75. For 3 devices.	See page 525
5AC900.150X-00	<b>Legend strips 4x 15"</b> Legend strip template for Power Panel 4PP481.1505-75, 4PP480.1505-75. For 4 devices.	See page 525
5CFCRD.0512-04	<b>CompactFlash 512 MB B&amp;R</b> CompactFlash card with 512 MB SLC NAND flash and IDE/ATA interface	See page 527
5CFCRD.1024-04	<b>CompactFlash 1024 MB B&amp;R</b> CompactFlash card with 1024 MB SLC NAND flash and IDE/ATA interface	See page 527
5CFCRD.2048-04	<b>CompactFlash 2048 MB B&amp;R</b> CompactFlash card with 2048 MB SLC NAND flash and IDE/ATA interface	See page 527
5CFCRD.4096-04	<b>CompactFlash 4096 MB B&amp;R</b> CompactFlash card with 4096 MB SLC NAND flash and IDE/ATA interface	See page 527
5CFCRD.8192-04	<b>CompactFlash 8192 MB B&amp;R</b> CompactFlash card with 8192 MB SLC NAND flash and IDE/ATA interface	See page 527
5CFCRD.016G-04	<b>CompactFlash 16 GB B&amp;R</b> CompactFlash card with 16 GB SLC NAND flash and IDE/ATA interface	See page 527
5CFCRD.0064-03	<b>CompactFlash 64 MB SSI</b> CompactFlash card with 64 MB SLC NAND flash and IDE/ATA interface	See page 532
5CFCRD.0128-03	<b>CompactFlash 128 MB SSI</b> CompactFlash card with 128 MB SLC NAND flash and IDE/ATA interface	See page 532
5CFCRD.0256-03	<b>CompactFlash 256 MB SSI</b> CompactFlash card with 256 MB SLC NAND flash and IDE/ATA interface	See page 532
5CFCRD.0512-03	<b>CompactFlash 512 MB SSI</b> CompactFlash card with 512 MB SLC NAND flash and IDE/ATA interface	See page 532
5CFCRD.1024-03	<b>CompactFlash 1024 MB SSI</b> CompactFlash card with 1024 MB SLC NAND flash and IDE/ATA interface	See page 532
5CFCRD.2048-03	<b>CompactFlash 2048 MB SSI</b> CompactFlash card with 2048 MB SLC NAND flash and IDE/ATA interface	See page 532
5CFCRD.4096-03	<b>CompactFlash 4096 MB SSI</b> CompactFlash card with 4096 MB SLC NAND flash and IDE/ATA interface	See page 532
5CFCRD.8192-03	<b>CompactFlash 8192 MB SSI</b> CompactFlash card with 8192 MB SLC NAND flash and IDE/ATA interface	See page 532
5MMUSB.2048-00	<b>USB flash drive 2 GB SanDisk</b> USB 2.0 flash drive 2 GB	See page 536
5MMUSB.2048-01	<b>USB flash drive 2 GB B&amp;R</b> USB 2.0 flash drive 2 GB	See page 536
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 541
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 541
5SWHMI.0000-00	<b>HMI Drivers &amp; Utilities DVD</b>	See page 543

Table 9: Model number overview - Accessories (Forts.)



## Chapter 2 • Technical data

### 1. General information

The new Power Panel 300/400 generation is an addition to the proven Power Panel 100/200 product line. With more than twice the computing power, the new generation covers a performance range that was previously reserved for industrial PCs.

For the Power Panel 300 and the Power Panel 400, B&R also implements the proven product lines of BIOS devices (Power Panel 300) and embedded devices (Power Panel 300 and Power Panel 400). Power Panel 300 devices can be delivered with the Windows XP embedded and Windows CE operating systems. They cover the entire range of PC systems, from simple thin clients and web terminals to full SCADA systems. Power Panel 300 and Power Panel 400 devices handle the automation of complete systems. This provides integrated control functionality and drive technology together with modular interfaces for connecting peripheral devices for the process. Models ranging from 5.7" QVGA to 15" XGA meet all requirements for series machine manufacturing. There is now a new variant that combines a 5.7" diagonal with a VGA TFT display. It allows a great deal of information to be displayed in a small amount of space and images can be shown in detail. Entries are made using either the touch screen or the function keys.



Figure 1: Power Panel 300 and Power Panel 400 devices

## 1.1 Features

- 24 VDC supply voltage
- 2 USB 2.0 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)
- ATX power supply compatibility
- Power button
- Fan-free operation
- Touch screen (analog resistive), function keys for both<sup>1)</sup>
- Horizontal and vertical mounting orientations, numeric and alphanumeric keys<sup>1)</sup>
- Maximum 2 aPCI slots (see B&R System 2005 User's Manual for available aPCI interface modules)<sup>1)</sup>
- BIOS (Windows XP Embedded, Windows CE 5.0 or 6.0) or Automation Runtime operating system<sup>1)</sup>
- Real-time clock (battery-buffered)<sup>1)</sup>
- Up to 512 MB SDRAM main memory<sup>1)</sup>

<sup>1)</sup> Depending on the design of the Power Panel device version.

## 1.2 Differences between Power Panel 300/400 and Power Panel 100/200

### 1.2.1 Electrical

- More powerful processor (Geode LX800 = more than twice the performance)
- 180° rotated power supply plug
- Insyde BIOS
- Power button
- ATX compatible power supply
- USB 2.0 support
- Different network controller
- MTCX controller
- Lower power consumption

### 1.2.2 Mechanical

- Mechanically mounting compatible (see "Mounting compatibilities", on page 561) - but connections are not compatible (locations of interfaces, plugs, and keys have changed).

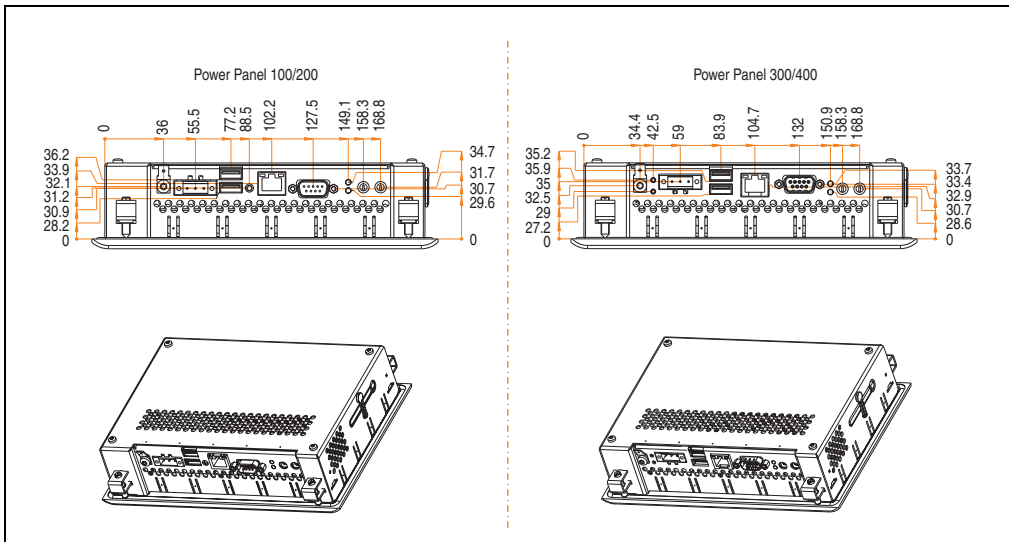


Figure 2: Different plug and key positions (PP100/200 - PP300/400)

### 1.3 Temperature sensor locations

Sensors show temperature values in a variety of locations (USB ports, main memory) in the PP500. The temperatures<sup>1)</sup> can be read in the Microsoft Windows operating systems and Automation Runtime, using B&R Control Center<sup>2)</sup>.

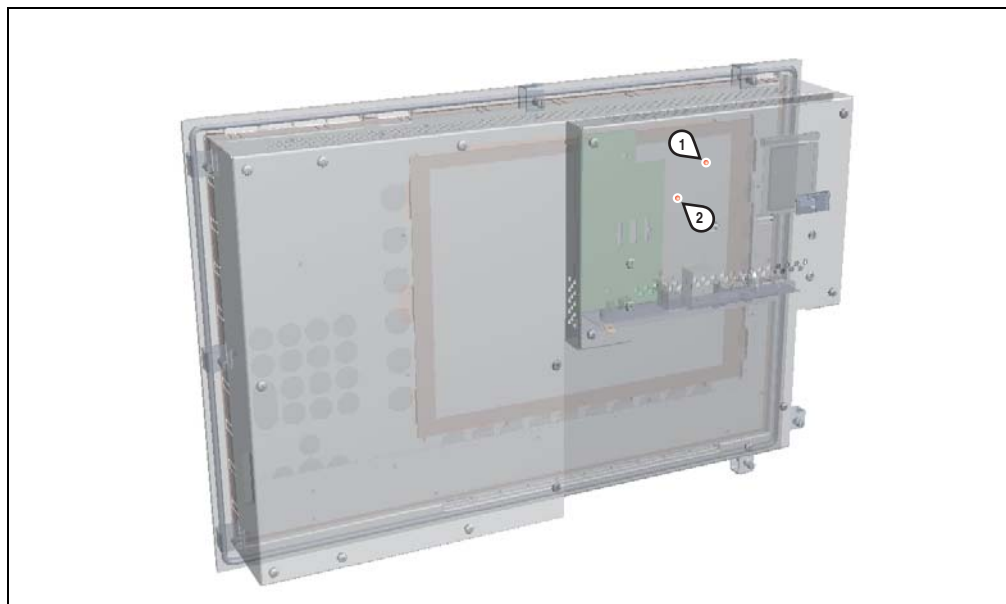


Figure 3: Temperature sensor locations

Position	Measurement point for	Monitoring	Max. specified
1	CPU	Processor temperature (sensor integrated on the processor).	90°C
2	ENV	Baseboard temperature near the MTCX and Ethernet controller.	80°C

Table 10: Temperature sensor locations

1) The measured temperature is a guideline for the immediate ambient temperature, but can be influenced by neighboring components.

2) The B&R Control Center - ADI driver - can be downloaded for free from the download area on the B&R homepage ([www.br-automation.com](http://www.br-automation.com)).



## 2. Power Panel 300 with BIOS

### 2.1 Device interfaces

The following section provides a description of all interfaces and plugs possible with a PowerPanel 300 device with BIOS.

#### 2.1.1 Supply voltage

Input voltage: 18 - 30 VDC

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

Pin assignment information can be found either in the following table or printed on the Power Panel plate. The supply voltage is internally protected so that the device cannot be damaged if there is an overload (fuse replacement necessary) or if the voltage supply is connected incorrectly (reverse polarity protection - fuse replacement not necessary).

Supply voltage	
Protected against reverse polarity	
Pin	Description
1	+
2	Functional ground
3	-
Accessories	
0TB103.9	Plug 24 V 5.08 3-pin screw clamp
0TB103.91	Plug 24 V 5.08 3-pin cage clamp




Figure 4: Supply voltage connection

### Ground

## Warning!

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

## 2.1.2 Functional grounding clip

A functional grounding clip is located next to the supply voltage plug. The grounding clip (functional ground) must be connected with a central grounding point on the control cabinet using a 6.3 mm blade connector via the shortest distance and with as little resistance as possible (e.g. copper strip, but must be at least 2.5 mm<sup>2</sup>).

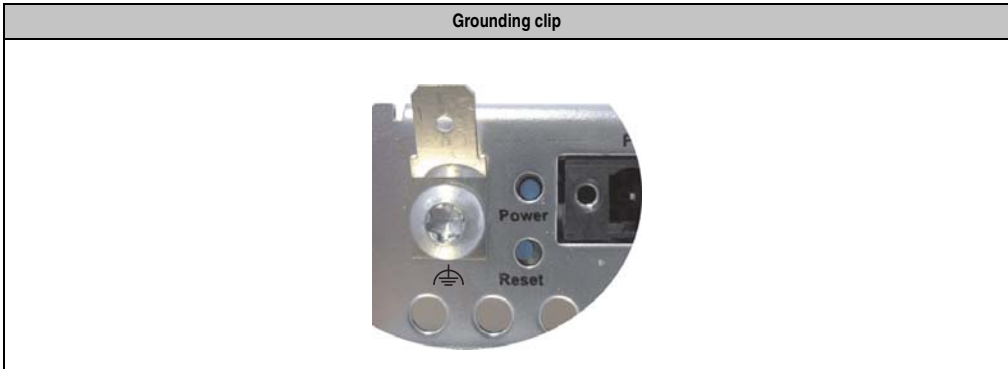



Figure 5: Functional grounding clip

### 2.1.3 Serial interface COM

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	
Type	RS232, modem-capable, not electrically isolated
UART	16C550 compatible, 16-byte FIFO
Transfer rate	Up to 115 kBaud
Pin	Assignment
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI



9-pin DSub plug

Table 11 : Pin assignments - COM

## 2.1.4 USB ports

The Power Panel 300/400 devices have a USB 2.0 (Universal Serial Bus) host controller with multiple USB ports, two of which are on the outside for easy user access.


Universal serial bus		
Transfer rate <sup>1)</sup>	Low speed (1.5 Mbit/s), Full Speed (12 Mbit/s) to high speed (480 Mbit/s)	2x USB Type A, female 
Power supply	Max. 500 mA per port <sup>2)</sup>	
Maximum Cable length	5 m (not including hub)	

Table 12: USB ports

1) The actual value depends on the operating system or driver being used.

2) For safety, every USB port is equipped with a maintenance free "USB current-limiting circuit breaker" (max. 500 mA)

### Warning!

Peripheral USB devices can be connected to the USB ports. Due to the vast number of USB devices available on the market, B&R cannot guarantee their performance. B&R does ensure the performance of all USB devices that they provide.

### Warning!

Because of general PC specifications, these interfaces 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.

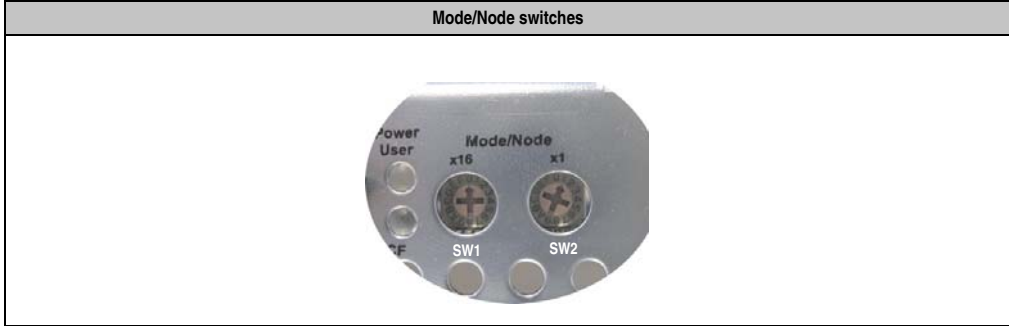


Table 13: Mode/Node switches

Switch position		Function	Description
SW1 (x16)	SW2 (x1)		
0	0	Service mode	Necessary for restoring the default BIOS settings - for more information, see section "Restoring the default BIOS values", on page 461.
x	x	None	No other switch positions have significance.

Table 14: Switch settings for the Mode/Node switch

### 2.1.6 BIOS boot mode switch

Power Panel devices are equipped with a BIOS boot mode switch.

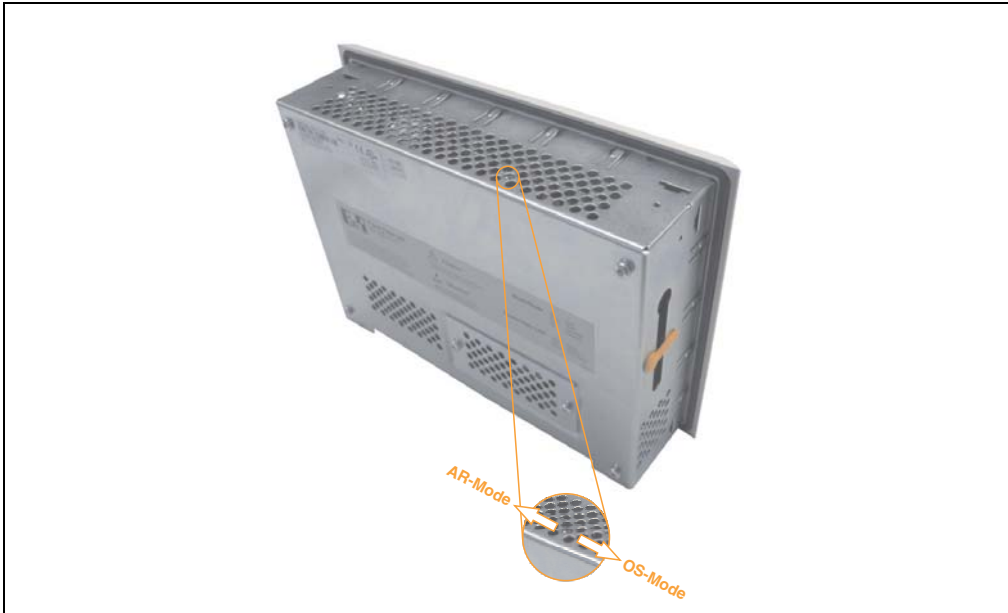


Figure 6: BIOS boot mode switch

Switch position	Function	Description
Right (toward CF slot)	OS mode	The Power Panel will boot in OS mode.
Left	AR mode	The Power Panel will boot in AR mode.

Table 15: BIOS boot mode switch positions (based on the image)

## Warning!

Carefully use a pointed object to change switch position.

**OS mode**

- Standard Boot Screen (see section 1 "Power Panel 300 with BIOS", on page 413)
- BIOS Setup can be started by pressing the "DEL" key.
- When the switch is in the "00" position, the setup default values will be restored after restarting three times.

**AR mode**

The device will be initialized for Automation Runtime when AR mode is enabled.

- Other boot screen (see section 2 "Power Panel 300/400 with Automation Runtime", on page 466)
- USB Boot "Enabled" (only in switch position "00")1)

**2.1.7 Status LEDs**

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

Status LEDs			
LED	Color		Meaning
Power	Green	On	Supply voltage OK
	Red	On	The system is in standby mode (S5: soft-off mode or S4: hibernate mode - suspend-to-disk)
User	Yellow	On	Can be used as desired by the user (for example, can be switched on/off directly using the ADI library - only possible in S0 state)
	Green	Off	
CF	Yellow	On	Indicates access to CompactFlash drive (read or write)

1x three-color, 1x one-color

Table 16: Status LEDs

## 2.1.8 Ethernet interface

Ethernet interface		
Controller	Intel 82551ER	
Cabling	S/STP (category 5)	
Transfer rate	10/100 Mbit/s <sup>1)</sup>	
LED	On	Off
Green	100 Mbit/s	10 Mbit/s
Orange	Link (Ethernet network connection available)	Activity (blinking) (Data transfer in progress)

RJ45 twisted pair (10BaseT/100BaseT), female




Table 17: Ethernet interface

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



### 2.1.9 Power button

Due to the complete ATX power supply support, the power button serves a number of functions, which can be configured in BIOS setup.


Power button	
<p>The power button can be pressed with a pointed object (e.g. paper clip or tip of a pen).</p> <p>The power button acts like the on/off switch on a normal desktop PC with ATX power supply:  <b>press and release</b> ... turn on or shut down operating system.  <b>Press and hold</b> ... ATX power supply switches off without shutting down the Power Panel (<b>data could be lost!</b>).</p> <p>Pressing the power button does not reset the MTCX processor.</p>	

Table 18: Power button

### 2.1.10 Reset button


Reset button	
<p>The reset button can be pressed with a pointed object (e.g. paper clip or tip of a pen).</p> <p>Pushing the reset button results in a hardware-reset. This restarts the Power Panel.</p> <p>The MTCX processor is not reset when the reset button is pressed.</p>	

Table 19: Reset button

## Warning!

**A system reset can result in data loss!**

### 2.1.11 CompactFlash slot

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



Figure 7: 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.

## Caution!

**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 Device label

The following sticker can be found in a suitable location on the Power Panel device:



Figure 8: Device label

### 2.2.2 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

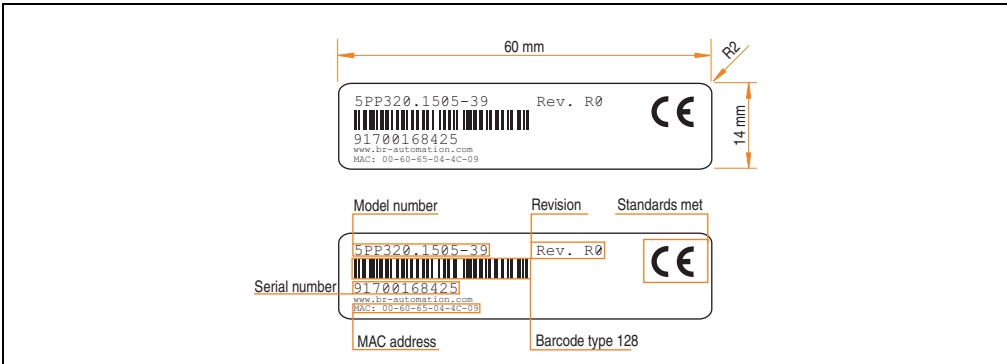


Figure 9: Design/dimensions - Serial number sticker

Information on the Internet

Information about each device can also be found on the B&R homepage. Enter the device's serial number in the serial number search field on the start page [www.br-automation.com](http://www.br-automation.com). The search also works if you enter the model number or the material number in the material number search field.

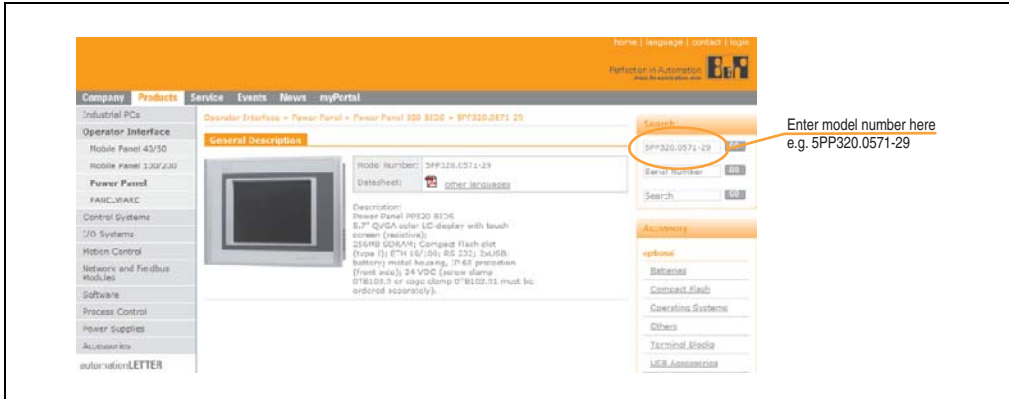


Figure 10: Example - Material number search: 5PP320.0571-29

2.3 Device 5PP320.0571-29

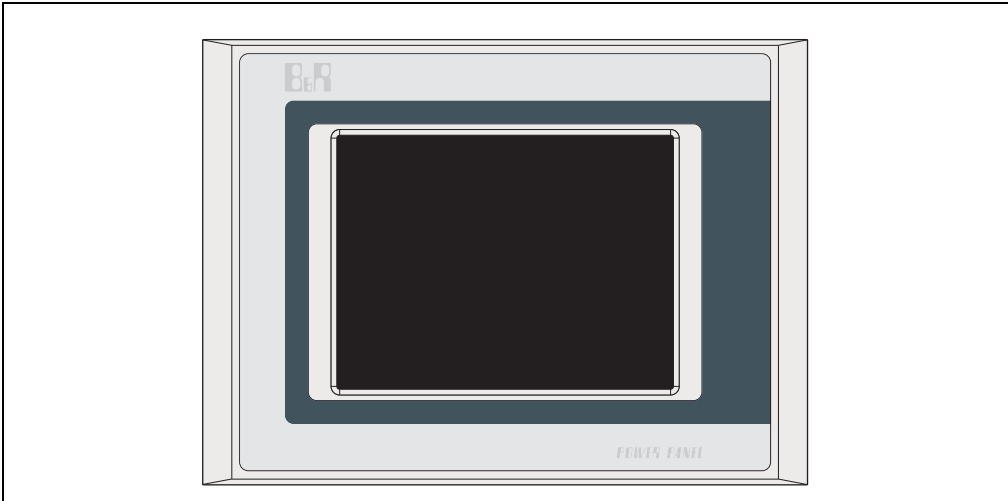


Figure 11: Front view - 5PP320.0571-29

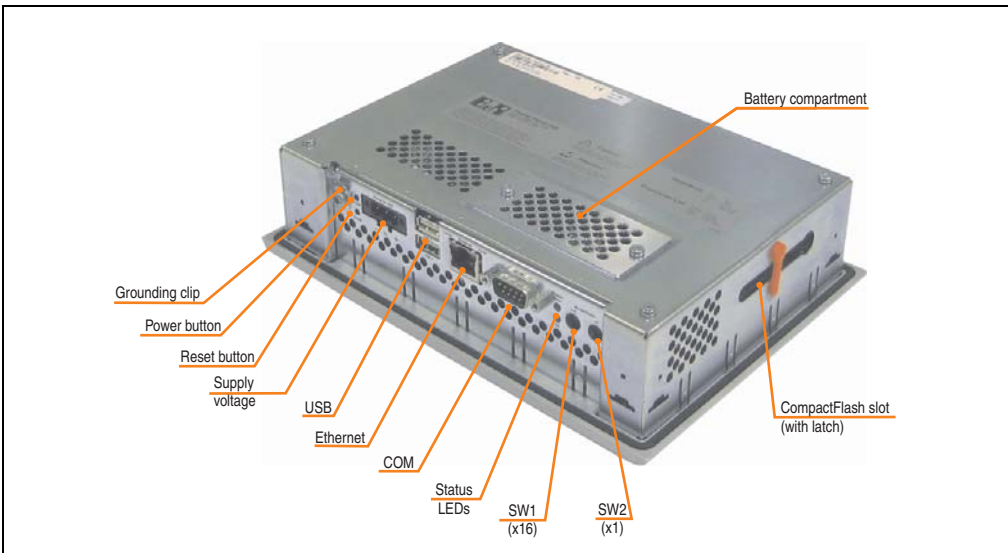


Figure 12: Rear view - 5PP320.0571-29

**2.3.1 Technical data**

Features	5PP320.0571-29
B&R ID code	0x23CE
Boot loader / Operating system	BIOS
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size	DDR SDRAM 256 MB
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	-
Watchdog Controller	MTCX <sup>1)</sup>
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> -
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day
Battery Type Removable Service life 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	Intel 82551ER 10/100 Mbit/s 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 - 5PP320.0571-29

Features	5PP320.0571-29
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
Power button	Yes, accessible from the outside
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)
Mode/Node switch	2, 16 digits each
aPCI slots Holding torque for aPCI module	-
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	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°  CCFL 200 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	Gunze Analog, resistive Elo, serial, 12-bit Up to 80% ±5%
Filter glass Degree of transmission Coating	-
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-

Table 20: Technical data - 5PP320.0571-29 (Forts.)

## Technical data • Power Panel 300 with BIOS

Electrical characteristics	5PP320.0571-29
Power supply	
Rated voltage	18 - 30 VDC
Rated current	0.45 A
Starting current	Max. 1.2 A
Power consumption	Typically 10 W
Electrical isolation	Yes
Bleeder resistance	0 Ω
Mechanical characteristics	
Outer dimensions	
Width	212 mm
Height	156 mm
Depth	55.5 mm
Front	
Frame	Naturally anodized aluminum <sup>6)</sup>
Design	Gray <sup>6)</sup>
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV <sup>6)</sup>
Light background	Similar to Pantone 427CV <sup>6)</sup>
Gasket	Flat gasket around display front
Housing	Metal
Weight	Approx. 1.4 kg
Environmental characteristics	
Ambient temperature	
Operation	0 to +50°C
Bearings	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 2.3.2 "Temperature humidity diagram", on page 61
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
Bearings	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
Bearings	30 g, 15 ms
Transport	30 g, 15 ms
Protection	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude <sup>7)</sup>	Max. 3000 m

Table 20: Technical data - 5PP320.0571-29 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.
- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 7) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).



### 2.3.2 Temperature humidity diagram

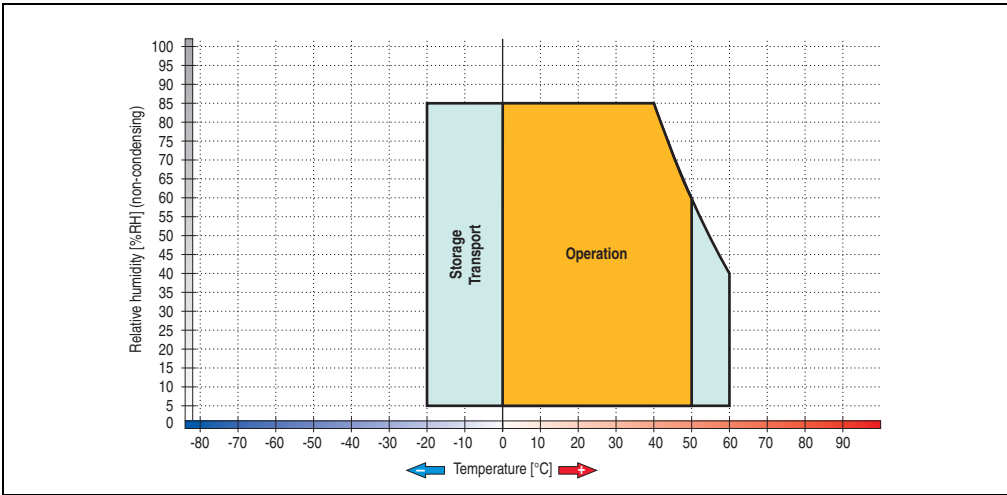


Figure 13: Temperature humidity diagram - 5PP320.0571-29

### 2.3.3 Dimensions

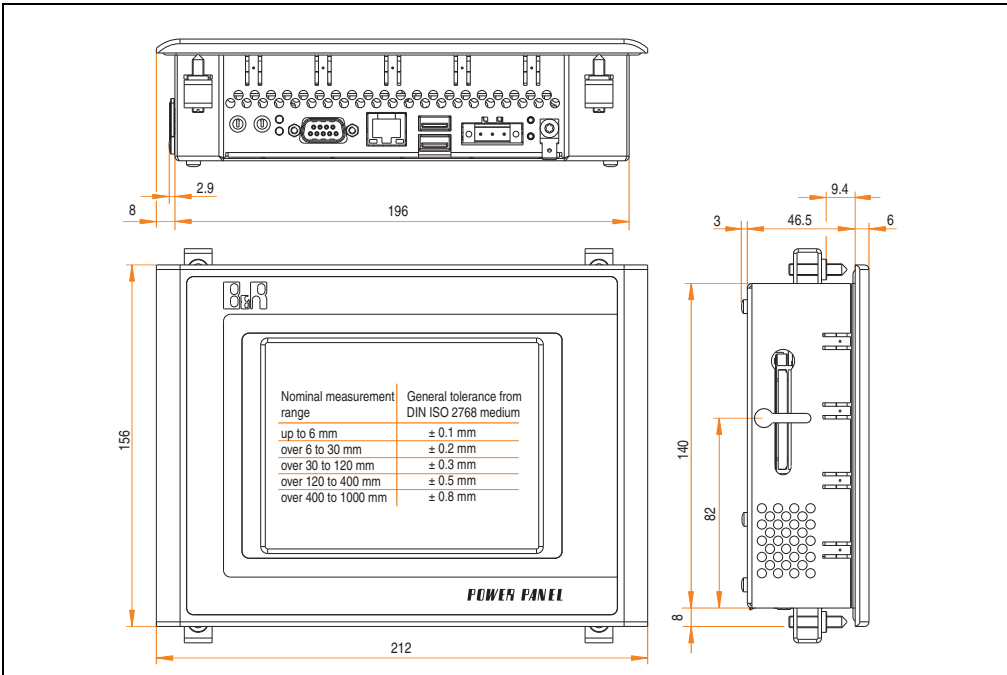


Figure 14: Dimensions - 5PP320.0571-29

### 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.

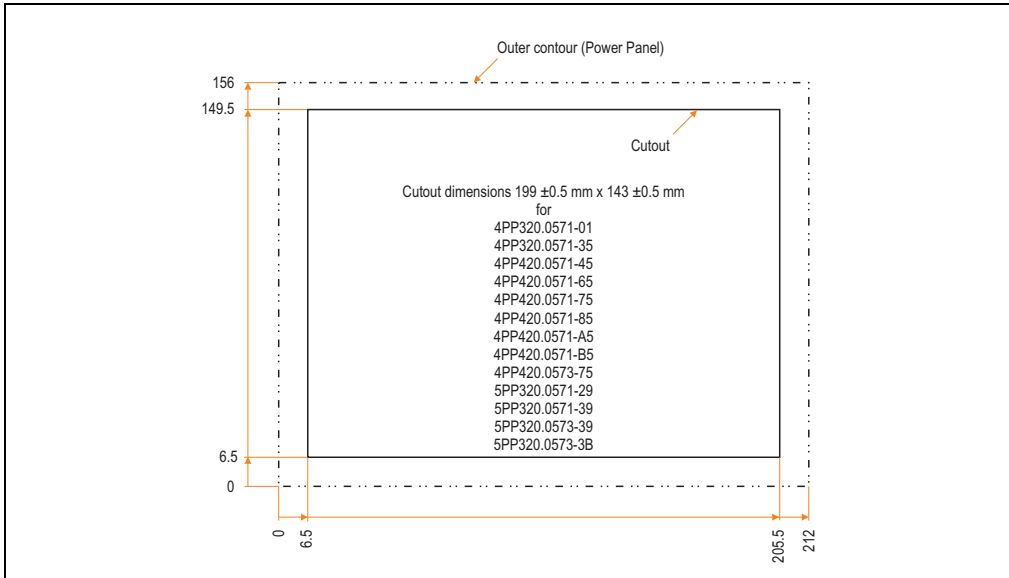


Figure 15: Cutout installation - 5PP320.0571-29

### 2.3.5 Contents of delivery

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

Amount	Component
1	Power Panel PP320 BIOS 5.7in QVGA, touch screen
4	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 21: Contents of delivery - 5PP320.0571-29

2.4 Device 5PP320.0571-39

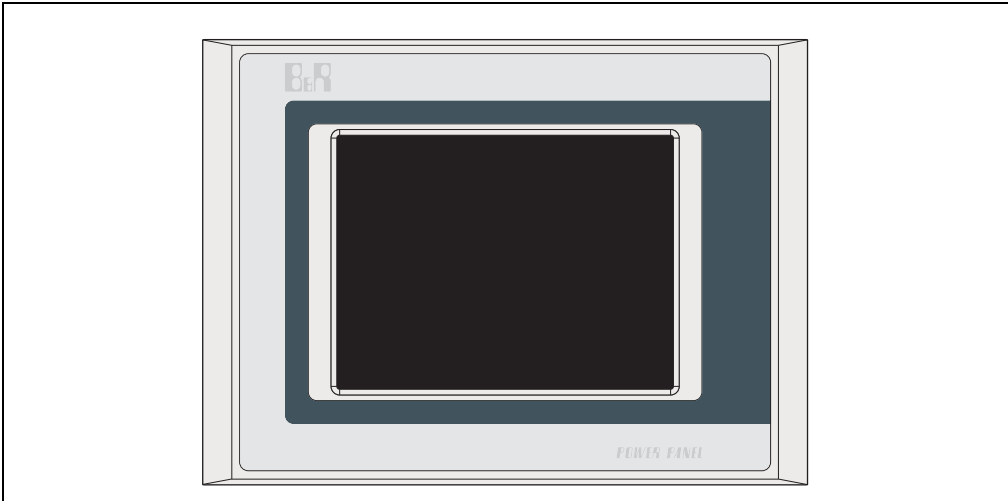


Figure 16: Front view - 5PP320.0571-39

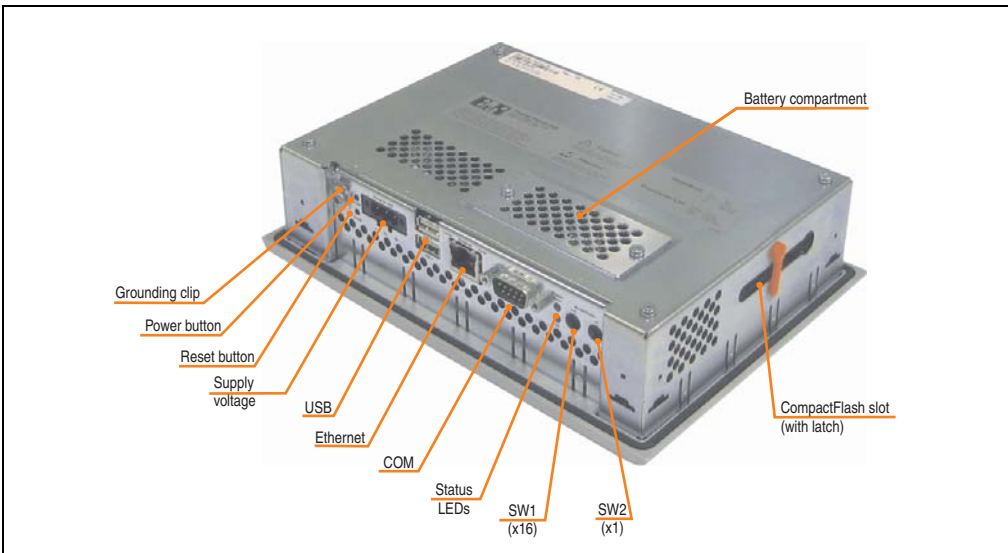


Figure 17: Rear view - 5PP320.0571-39

**2.4.1 Technical data**

Features	5PP320.0571-39 ≤ Rev. C0	5PP320.0571-39 ≥ Rev. D0	5PP320.0571-39 ≥ Rev. F0
B&R ID code	0xA15D		
Boot loader / Operating system	BIOS		
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)		
Flash	2 MB (for firmware)		
Memory Type Size	DDR SDRAM 256 MB		
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)		
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	-		
Watchdog Controller	MTCX <sup>1)</sup>		
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> -		
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day		
Battery Type Removable Service life 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	Intel 82551ER 10/100 Mbit/s 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 - 5PP320.0571-39

## Technical data • Power Panel 300 with BIOS

Features	5PP320.0571-39 ≤ Rev. C0	5PP320.0571-39 ≥ Rev. D0	5PP320.0571-39 ≥ Rev. F0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB		
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection		
Reset button	Yes, accessible from the outside		
Power button	Yes, accessible from the outside		
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)		
Mode/Node switch	2, 16 digits each		
aPCI slots Holding torque for aPCI module	-		
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	<p style="text-align: center;">Color TFT 5.7 in (144 mm) 262144 colors<sup>4)</sup> QVGA, 320 x 240 pixels 400:1</p> <p>Direction R / direction L = 60° Direction U = 40° / direction D = 50°</p> <p style="text-align: center;">CCFL 500 cd/m<sup>2</sup> 50000 hours</p> <p>Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410</p>	<p style="text-align: center;">Color TFT 5.7 in (144 mm) 262144 colors<sup>4)</sup> QVGA, 320 x 240 pixels 350:1</p> <p>Direction R / direction L = 65° Direction U = 65° / direction D = 40°</p> <p style="text-align: center;">CCFL 500 cd/m<sup>2</sup> 50000 hours</p> <p>Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410</p>	
Touch screen Touch screen type Technology Controller Degree of transmission	Gunze Analog, resistive Elo, serial, 12-bit Up to 80% ±5%		AMT Analog, resistive Elo, serial, 12-bit Up to 80% ±5%
Filter glass Degree of transmission Coating	-		
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-		

Table 22: Technical data - 5PP320.0571-39 (Forts.)

## Technical data • Power Panel 300 with BIOS

Electrical characteristics	5PP320.0571-39 ≤ Rev. C0	5PP320.0571-39 ≥ Rev. D0	5PP320.0571-39 ≥ Rev. F0
Power supply			
Rated voltage	18 - 30 VDC		
Rated current	0.45 A		
Starting current	Max. 1.2 A		
Power consumption	Typically 10 W		
Electrical isolation	Yes		
Bleeder resistance	0 Ω		
Mechanical characteristics			
Outer dimensions			
Width	212 mm		
Height	156 mm		
Depth	55.5 mm		
Front			
Frame	Naturally anodized aluminum <sup>6)</sup>		
Design	Gray <sup>6)</sup>		
Membrane	Polyester		
Dark gray border around display	Similar to Pantone 432CV <sup>6)</sup>		
Light background	Similar to Pantone 427CV <sup>6)</sup>		
Gasket	Flat gasket around display front		
Housing	Metal		
Weight	Approx. 1.4 kg		
Environmental characteristics			
Ambient temperature			
Operation	0 to +50°C		
Bearings	-20 to +60°C		
Transport	-20 to +60°C		
Relative humidity	See 2.4.2 "Temperature humidity diagram", on page 67		
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		
Bearings	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		
Bearings	30 g, 15 ms		
Transport	30 g, 15 ms		
Protection	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)		
Altitude <sup>7)</sup>	Max. 3000 m		

Table 22: Technical data - 5PP320.0571-39 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.
- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 7) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.4.2 Temperature humidity diagram

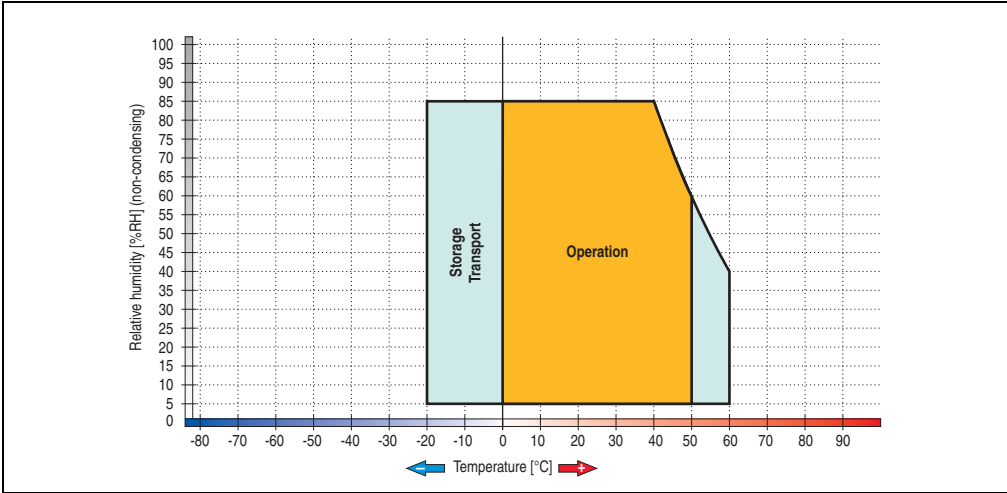


Figure 18: Temperature humidity diagram - 5PP320.0571-39

### 2.4.3 Dimensions

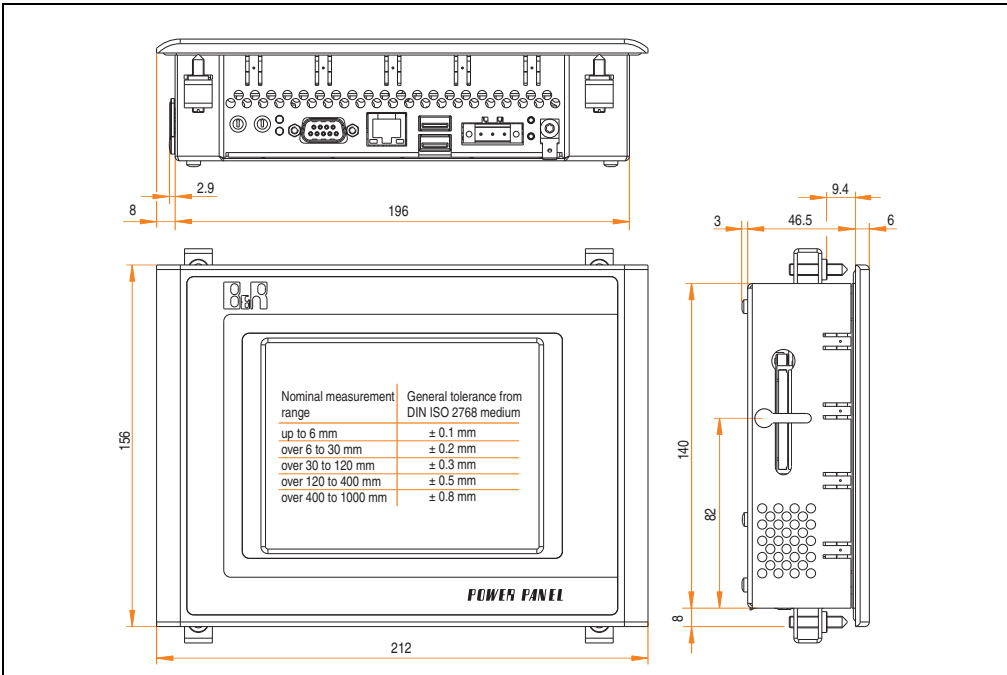


Figure 19: Dimensions - 5PP320.0571-39

### 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.

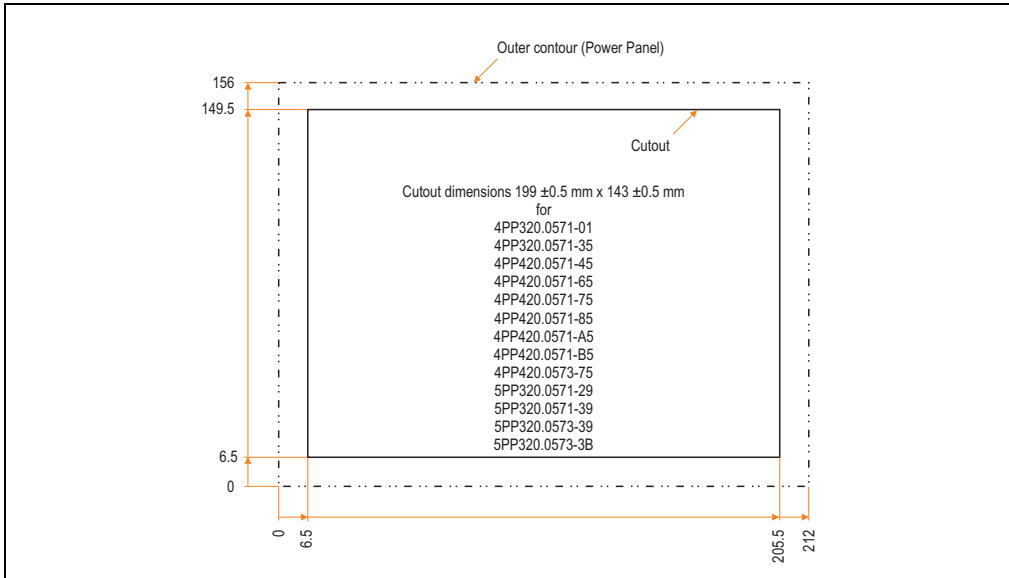


Figure 20: Cutout installation - 5PP320.0571-39

### 2.4.5 Contents of delivery

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

Amount	Component
1	Power Panel PP320 BIOS 5.7in QVGA, touch screen
4	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 23: Contents of delivery - 5PP320.0571-39



2.5 Device 5PP320.0573-39

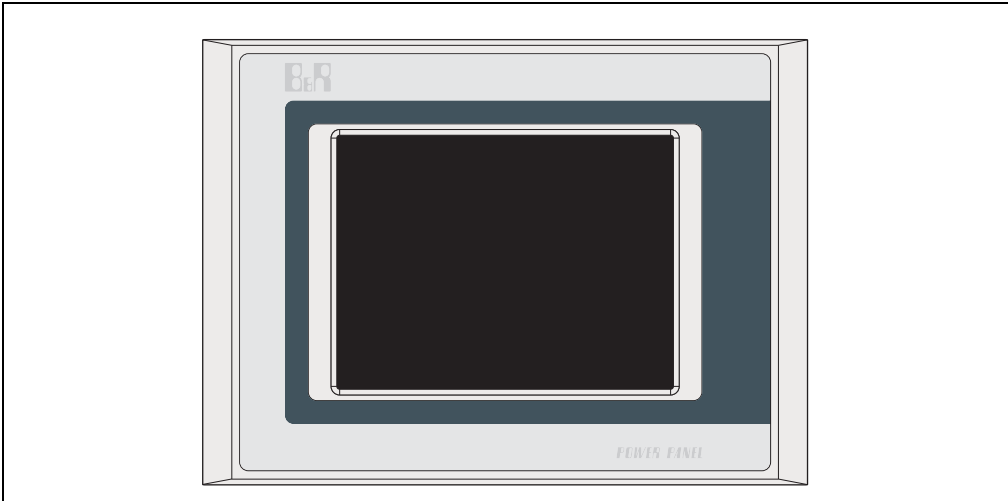


Figure 21: Front view - 5PP320.0573-39

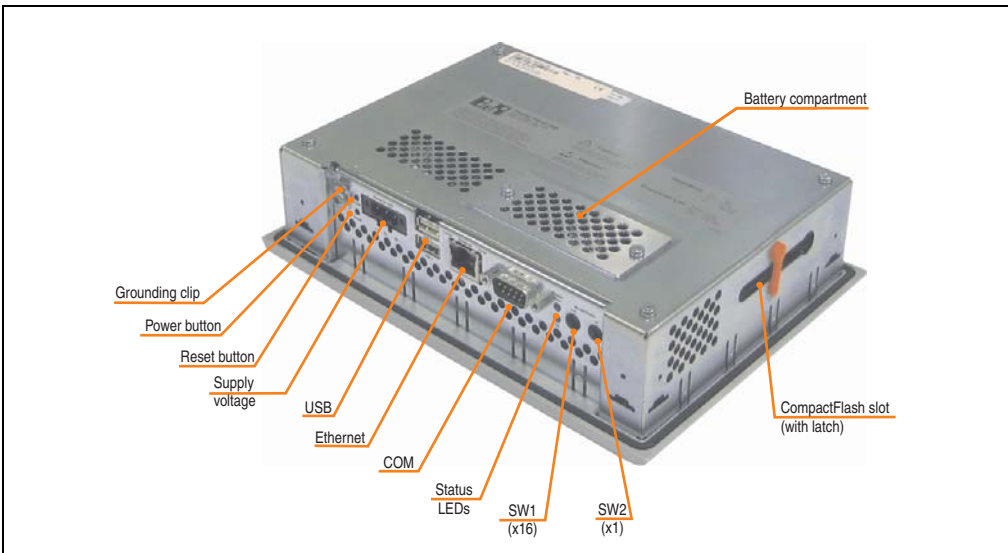


Figure 22: Rear view - 5PP320.0573-39

**2.5.1 Technical data**

Features	5PP320.0573-39 ≤ D0	5PP320.0573-39 ≥ E0
B&R ID code	0x23CF	
Boot loader / Operating system	BIOS	
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)	
Flash	2 MB (for firmware)	
Memory Type Size	DDR SDRAM 256 MB	
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)	
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	-	
Watchdog Controller	MTCX <sup>1)</sup>	
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> -	
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day	
Battery Type Removable Service life 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	Intel 82551ER 10/100 Mbit/s 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 - 5PP320.0573-39

Features	5PP320.0573-39 ≤ D0	5PP320.0573-39 ≥ E0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB	
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection	
Reset button	Yes, accessible from the outside	
Power button	Yes, accessible from the outside	
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)	
Mode/Node switch	2, 16 digits each	
aPCI slots Holding torque for aPCI module	-	
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	Color TFT 5.7 in (144 mm) 262144 colors <sup>4)</sup> VGA, 640 x 480 pixels 400:1  Direction R / direction L = 80° Direction U = 80° / direction D = 70°  CCFL 350 cd/m <sup>2</sup> 75000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410	
Touch screen Touch screen type Technology Controller Degree of transmission	Gunze Analog, resistive Elo, serial, 12-bit Up to 80% ±5%	AMT Analog, resistive Elo, serial, 12-bit Up to 80% ±5%
Filter glass Degree of transmission Coating	-	
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-	

Table 24: Technical data - 5PP320.0573-39 (Forts.)

## Technical data • Power Panel 300 with BIOS

Electrical characteristics	5PP320.0573-39 ≤ D0	5PP320.0573-39 ≥ E0
Power supply		
Rated voltage		18 - 30 VDC
Rated current		0.54 A
Starting current		Max. 1.2 A
Power consumption		Typically 13 W
Electrical isolation		Yes
Bleeder resistance		0 Ω
Mechanical characteristics		
Outer dimensions		
Width		212 mm
Height		156 mm
Depth		55.5 mm
Front		
Frame		Naturally anodized aluminum <sup>6)</sup>
Design		Gray <sup>6)</sup>
Membrane		Polyester
Dark gray border around display		Similar to Pantone 432CV <sup>6)</sup>
Light background		Similar to Pantone 427CV <sup>6)</sup>
Gasket		Flat gasket around display front
Housing		Metal
Weight		Approx. 1.4 kg
Environmental characteristics		
Ambient temperature		
Operation		0 to +50°C
Bearings		-20 to +60°C
Transport		-20 to +60°C
Relative humidity		See 2.5.2 "Temperature humidity diagram", on page 73
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
Bearings		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
Bearings		30 g, 15 ms
Transport		30 g, 15 ms
Protection		IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude <sup>7)</sup>		Max. 3000 m

Table 24: Technical data - 5PP320.0573-39 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.
- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 7) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

## 2.5.2 Temperature humidity diagram

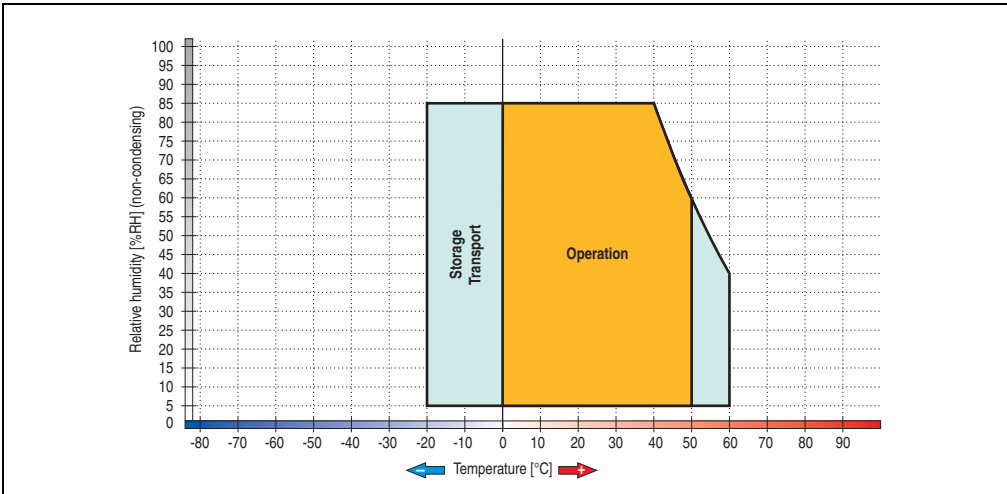


Figure 23: Temperature humidity diagram - 5PP320.0573-39

## 2.5.3 Dimensions

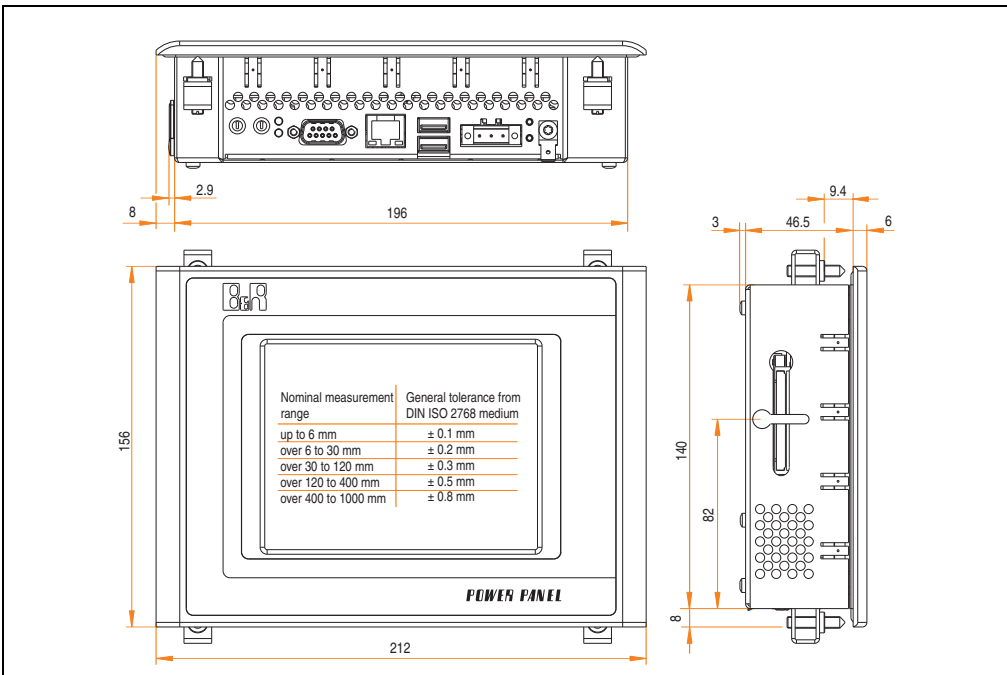


Figure 24: Dimensions - 5PP320.0573-39

### 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.

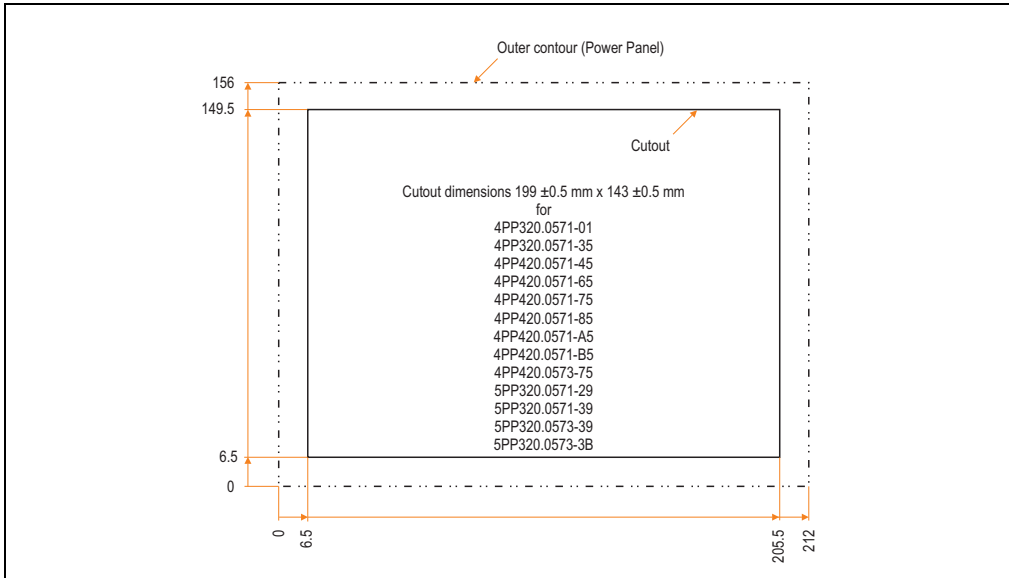


Figure 25: Cutout installation - 5PP320.0573-39

### 2.5.5 Contents of delivery

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

Amount	Component
1	Power Panel PP320 BIOS 5.7" VGA, touch screen
4	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 25: Contents of delivery - 5PP320.0573-39

2.6 Device 5PP320.0573-3B

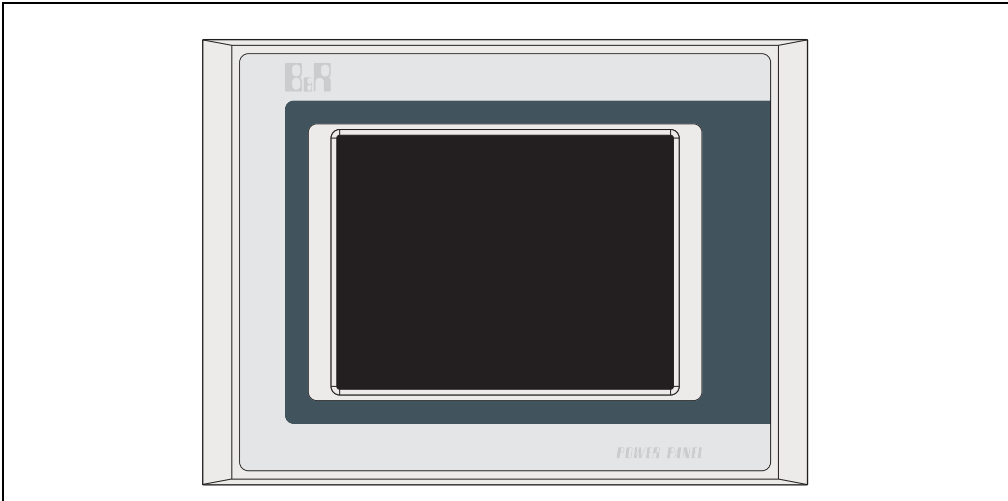


Figure 26: Front view - 5PP320.0573-3B

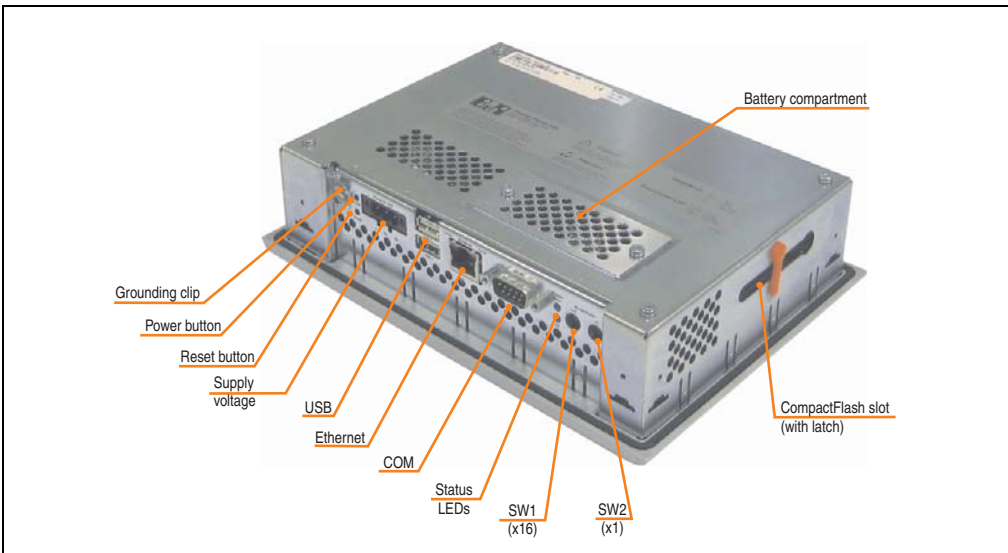


Figure 27: Rear view - 5PP320.0573-3B

**2.6.1 Technical data**

Features	5PP320.0573-3B ≤ D0	5PP320.0573-3B ≥ E0
B&R ID code	0xA5A6	
Boot loader / Operating system	BIOS	
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)	
Flash	2 MB (for firmware)	
Memory Type Size	DDR SDRAM 512 MB	
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)	
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	-	
Watchdog Controller	MTCX <sup>1)</sup>	
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> -	
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day	
Battery Type Removable Service life 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	Intel 82551ER 10/100 Mbit/s 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 - 5PP320.0573-3B



Features	5PP320.0573-3B ≤ D0	5PP320.0573-3B ≥ E0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB	
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection	
Reset button	Yes, accessible from the outside	
Power button	Yes, accessible from the outside	
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)	
Mode/Node switch	2, 16 digits each	
aPCI slots Holding torque for aPCI module	-	
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	Color TFT 5.7 in (144 mm) 262144 colors <sup>4)</sup> VGA, 640 x 480 pixels 400:1  Direction R / direction L = 80° Direction U = 80° / direction D = 70°  CCFL 350 cd/m <sup>2</sup> 75000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410	
Touch screen Touch screen type Technology Controller Degree of transmission	Gunze Analog, resistive Elo, serial, 12-bit Up to 80% ±5%	AMT Analog, resistive Elo, serial, 12-bit Up to 80% ±5%
Filter glass Degree of transmission Coating	-	
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-	

Table 26: Technical data - 5PP320.0573-3B (Forts.)

## Technical data • Power Panel 300 with BIOS

Electrical characteristics	5PP320.0573-3B ≤ D0	5PP320.0573-3B ≥ E0
Power supply		
Rated voltage		18 - 30 VDC
Rated current		0.54 A
Starting current		Max. 1.2 A
Power consumption		Typically 13 W
Electrical isolation		Yes
Bleeder resistance		0 Ω
Mechanical characteristics		
Outer dimensions		
Width		212 mm
Height		156 mm
Depth		55.5 mm
Front		
Frame		Naturally anodized aluminum <sup>6)</sup>
Design		Gray <sup>6)</sup>
Membrane		Polyester
Dark gray border around display		Similar to Pantone 432CV <sup>6)</sup>
Light background		Similar to Pantone 427CV <sup>6)</sup>
Gasket		Flat gasket around display front
Housing		Metal
Weight		Approx. 1.4 kg
Environmental characteristics		
Ambient temperature		
Operation		0 to +50°C
Bearings		-20 to +60°C
Transport		-20 to +60°C
Relative humidity		See 2.6.2 "Temperature humidity diagram", on page 79
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
Bearings		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
Bearings		30 g, 15 ms
Transport		30 g, 15 ms
Protection		IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude <sup>7)</sup>		Max. 3000 m

Table 26: Technical data - 5PP320.0573-3B (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.
- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 7) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

## 2.6.2 Temperature humidity diagram

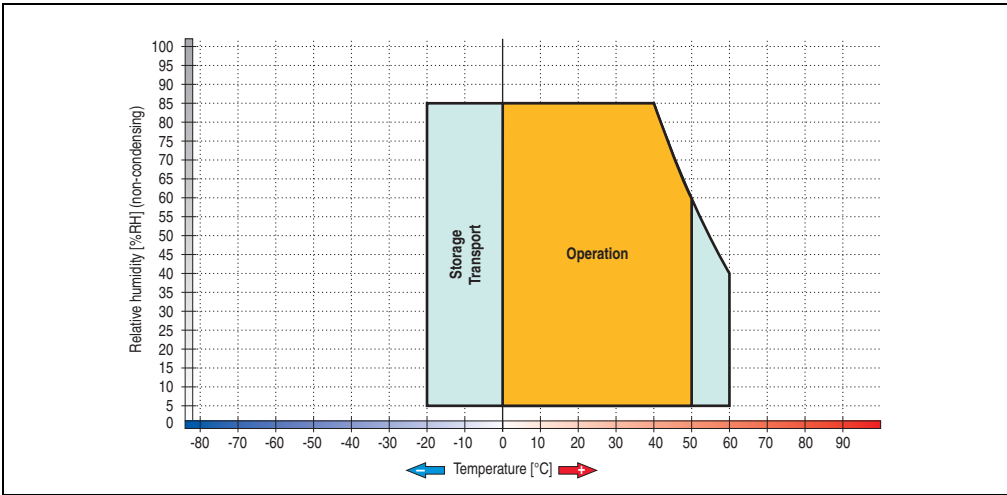


Figure 28: Temperature humidity diagram - 5PP320.0573-3B

## 2.6.3 Dimensions

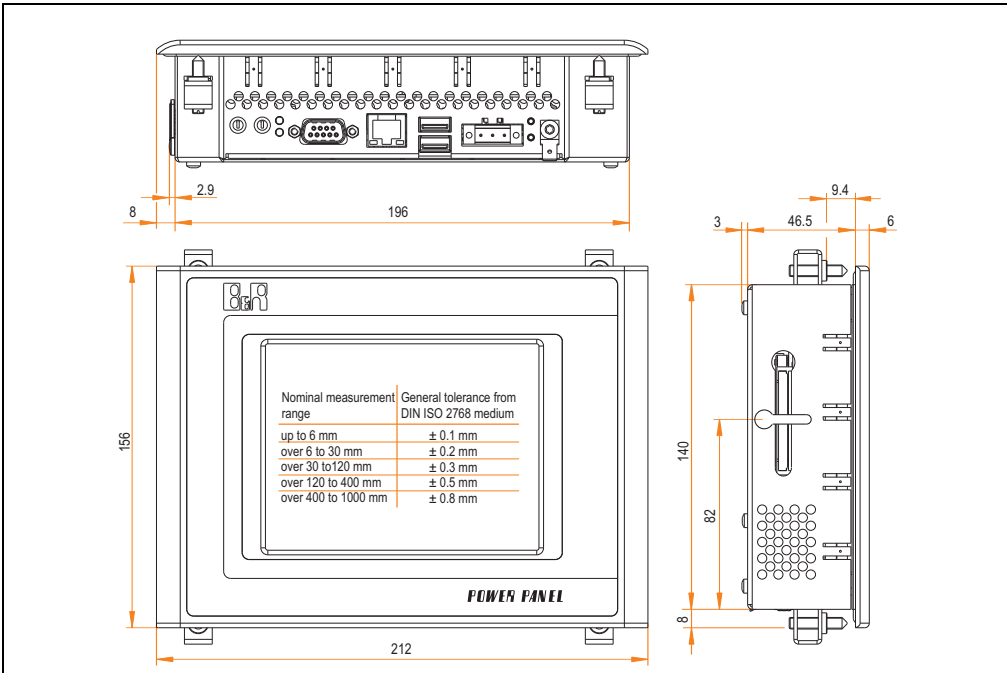


Figure 29: Dimensions - 5PP320.0573-3B

### 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.

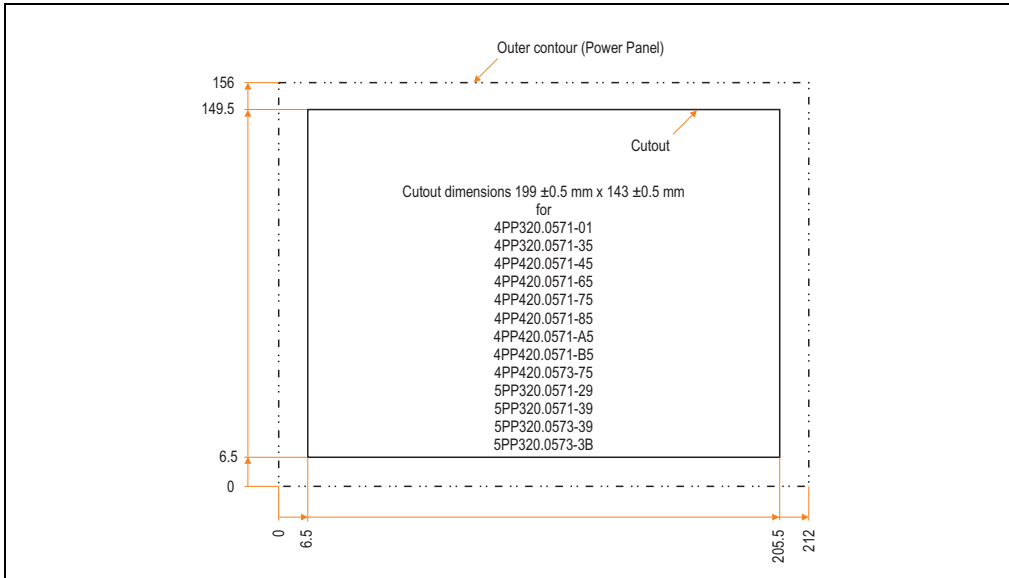


Figure 30: Cutout installation - 5PP320.0573-3B

### 2.6.5 Contents of delivery

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

Amount	Component
1	Power Panel PP320 BIOS 5.7" VGA, touch screen
4	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 27: Contents of delivery - 5PP320.0573-3B

2.7 Device 5PP320.1043-39

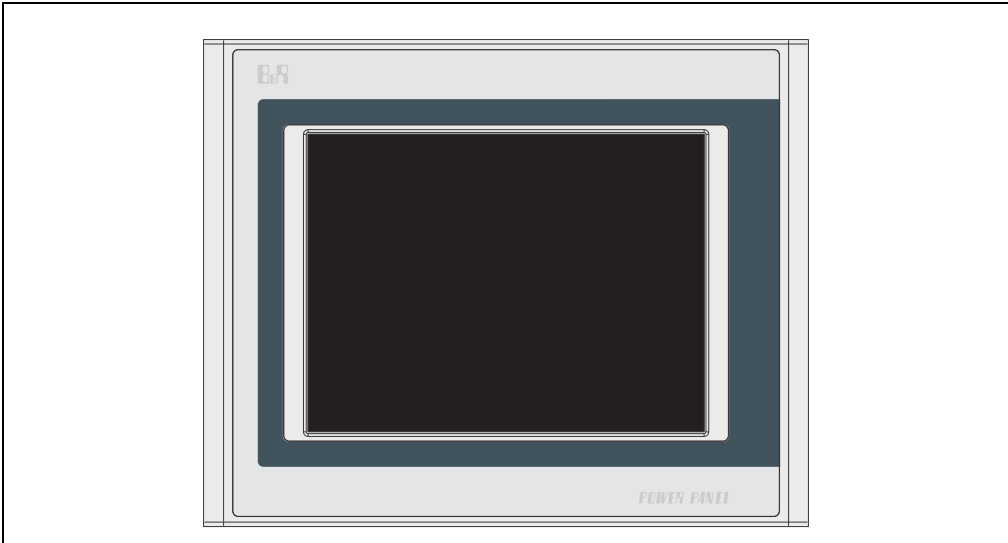


Figure 31: Front view - 5PP320.1043-39

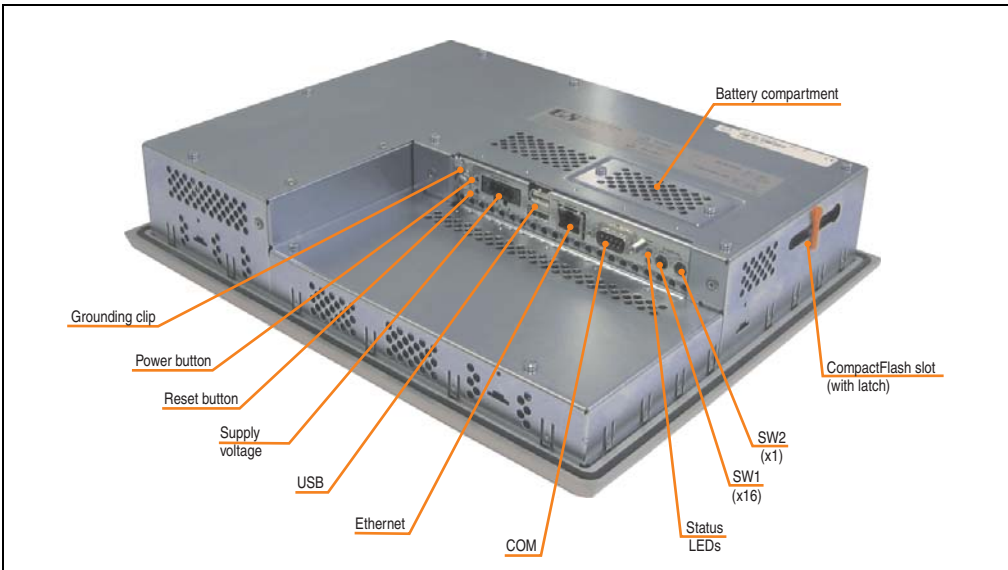


Figure 32: Rear view - 5PP320.1043-39

**2.7.1 Technical data**

Features	5PP320.1043-39 ≤ E0	5PP320.1043-39 ≥ F0	5PP320.1043-39 ≥ I0
B&R ID code	0x23D0		
Boot loader / Operating system	BIOS		
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)		
Flash	2 MB (for firmware)		
Memory Type Size	DDR SDRAM 256 MB		
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)		
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	-		
Watchdog Controller	MTCX <sup>1)</sup>		
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> -		
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day		
Battery Type Removable Service life 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	Intel 82551ER 10/100 Mbit/s 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 - 5PP320.1043-39

## Technical data • Power Panel 300 with BIOS

Features	5PP320.1043-39 ≤ E0	5PP320.1043-39 ≥ F0	5PP320.1043-39 ≥ I0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB		
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection		
Reset button	Yes, accessible from the outside		
Power button	Yes, accessible from the outside		
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)		
Mode/Node switch	2, 16 digits each		
aPCI slots Holding torque for aPCI module	-		
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	Color TFT 10.4 in (264 mm) 262144 colors <sup>4)</sup> VGA, 640 x 480 pixels 600:1  Direction R / direction L = 70° Direction U = 45° / direction D = 35°  CCFL 450 cd/m <sup>2</sup> 55000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410		Color TFT 10.4 in (264 mm) 262144 colors <sup>4)</sup> VGA, 640 x 480 pixels 900:1  Direction R / direction L = 80° Direction U / direction D = 80°  LED 450 cd/m <sup>2</sup> 70000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Accu Touch Analog, resistive Elo, serial, 12- bit Up to 80% ±5%	AMT Analog, resistive Elo, serial, 12- bit Up to 80% ±5%	
Filter glass Degree of transmission Coating	-		
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-		

Table 28: Technical data - 5PP320.1043-39 (Forts.)

## Technical data • Power Panel 300 with BIOS

Electrical characteristics	5PP320.1043-39 ≤ E0	5PP320.1043-39 ≥ F0	5PP320.1043-39 ≥ I0
Power supply			
Rated voltage	18 - 30 VDC		
Rated current	0.63 A		
Starting current	Max. 2.8 A		
Power consumption	Typically 15 W		
Electrical isolation	Yes		
Bleeder resistance	0 Ω		
Mechanical characteristics			
Outer dimensions			
Width	323 mm		
Height	260 mm		
Depth	65.5 mm		
Front			
Frame	Naturally anodized aluminum <sup>6)</sup>		
Design	Gray <sup>6)</sup>		
Membrane	Polyester		
Dark gray border around display	Similar to Pantone 432CV <sup>6)</sup>		
Light background	Similar to Pantone 427CV <sup>6)</sup>		
Gasket	Flat gasket around display front		
Housing	Metal		
Weight	Approx. 3.7 kg		
Environmental characteristics			
Ambient temperature			
Operation	0 to +50°C		
Bearings	-20 to +70°C		
Transport	-20 to +70°C		
Relative humidity	See 2.7.2 "Temperature humidity diagram", on page 85		
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		
Bearings	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		
Bearings	30 g, 15 ms		
Transport	30 g, 15 ms		
Protection	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)		
Altitude <sup>7)</sup>	Max. 3000 m		

Table 28: Technical data - 5PP320.1043-39 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.
- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 7) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).



## 2.7.2 Temperature humidity diagram

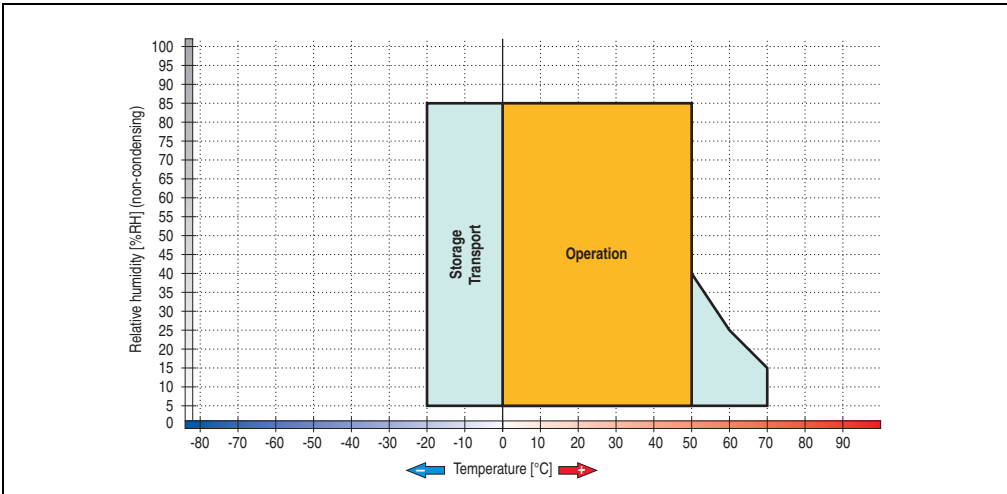


Figure 33: Temperature humidity diagram - 5PP320.1043-39

## 2.7.3 Dimensions

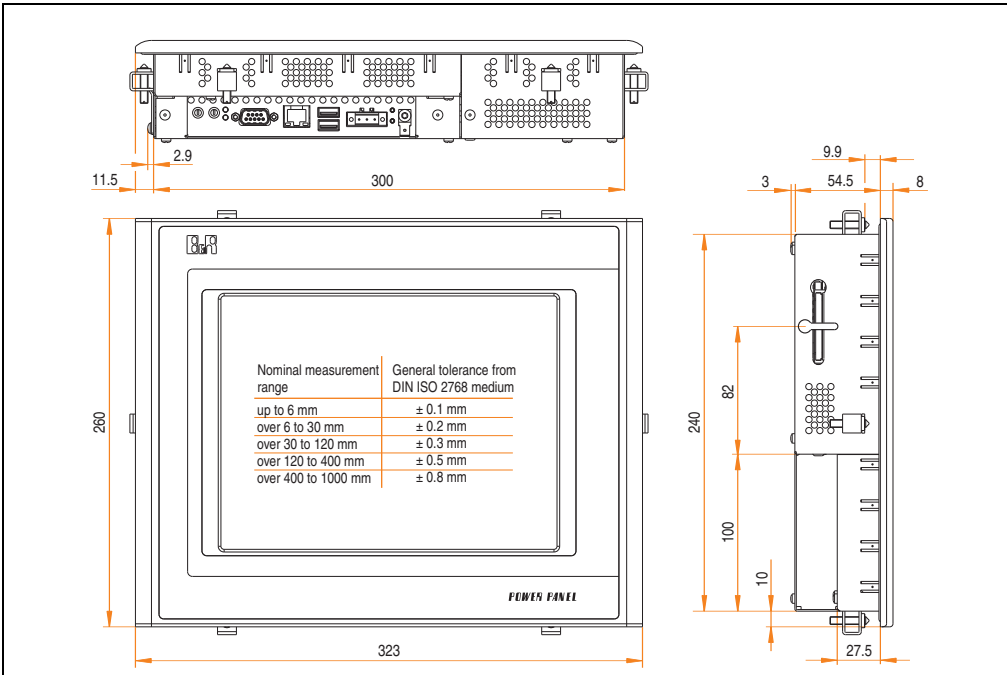


Figure 34: Dimensions - 5PP320.1043-39

### 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.

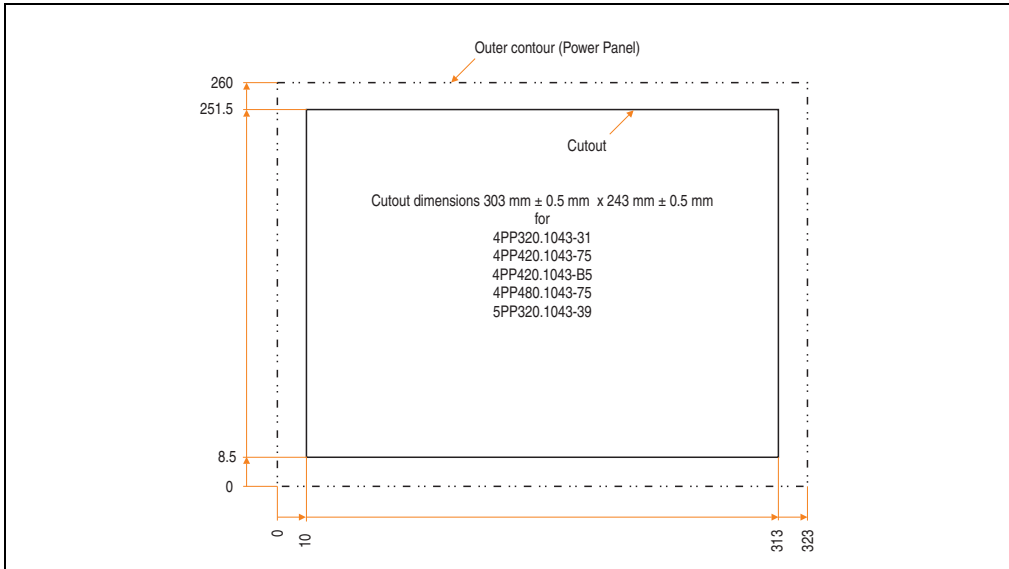


Figure 35: Cutout installation - 5PP320.1043-39

### 2.7.5 Contents of delivery

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

Amount	Component
1	Power Panel PP320 BIOS 10.4in VGA, touch screen
6	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 29: Contents of delivery - 5PP320.1043-39

2.8 Device 5PP320.1214-39

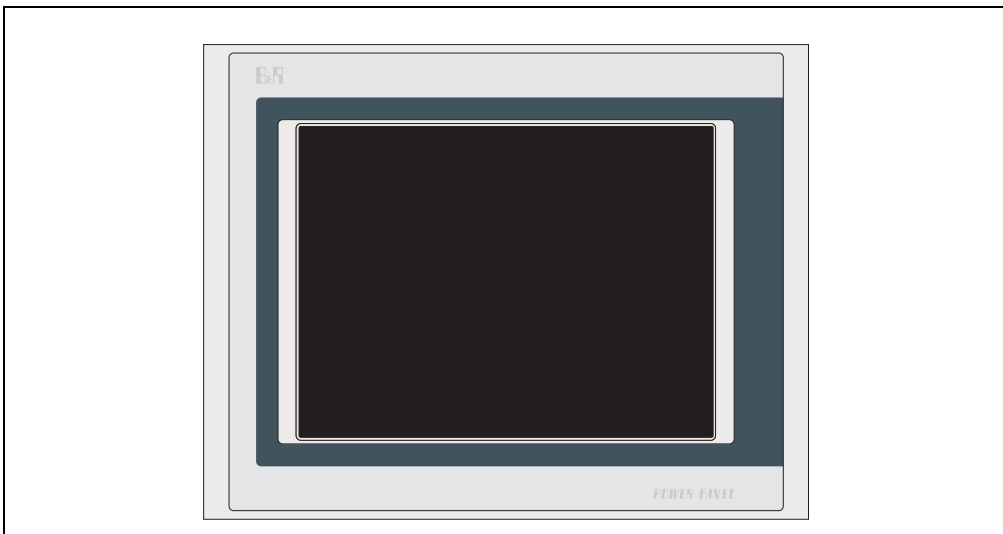


Figure 36: Front view - 5PP320.1214-39

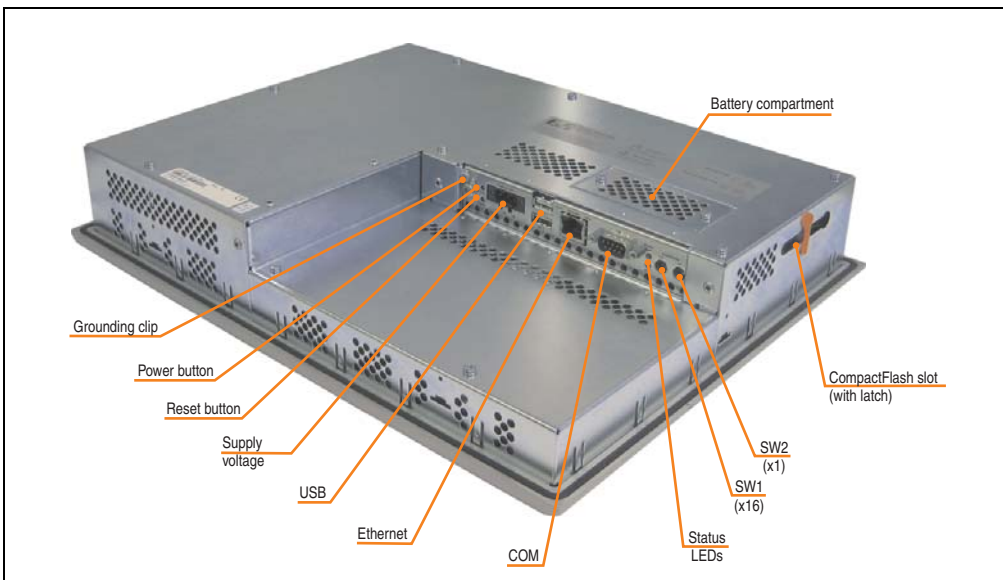


Figure 37: Rear view - 5PP320.1214-39

**2.8.1 Technical data**

Features	5PP320.1214-39 ≤ F0	5PP320.1214-39 ≥ G0	5PP320.1214-39 ≥ H0
B&R ID code	0x23D1		
Boot loader / Operating system	BIOS		
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)		
Flash	2 MB (for firmware)		
Memory Type Size	DDR SDRAM 256 MB		
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)		
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	-		
Watchdog Controller	MTCX <sup>1)</sup>		
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> -		
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day		
Battery Type Removable Service life 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	Intel 82551ER 10/100 Mbit/s 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 - 5PP320.1214-39

## Technical data • Power Panel 300 with BIOS

Features	5PP320.1214-39 ≤ F0	5PP320.1214-39 ≥ G0	5PP320.1214-39 ≥ H0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB		
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection		
Reset button	Yes, accessible from the outside		
Power button	Yes, accessible from the outside		
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)		
Mode/Node switch	2, 16 digits each		
aPCI slots Holding torque for aPCI module	-		
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 560) Horizontal Vertical  Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	Color TFT 12.1 in (307 mm) 262144 colors <sup>4)</sup> SVGA, 800 x 600 pixels 300:1  Direction R / direction L = 70° Direction U = 50° / direction D = 60°  CCFL 350 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410		Color TFT 12.1 in (307 mm) 262144 colors <sup>4)</sup> SVGA, 800 x 600 pixels 800:1  Direction R / direction L = 80° Direction U = 60° / direction D = 80°  LED 450 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Accu Touch Analog, resistive Elo, serial, 12-bit Up to 80% ±5%	AMT Analog, resistive Elo, serial, 12-bit Up to 80% ±5%	
Filter glass Degree of transmission Coating	-		
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-		

Table 30: Technical data - 5PP320.1214-39 (Forts.)

## Technical data • Power Panel 300 with BIOS

Electrical characteristics	5PP320.1214-39 ≤ F0	5PP320.1214-39 ≥ G0	5PP320.1214-39 ≥ H0
Power supply			
Rated voltage		18 - 30 VDC	
Rated current		0.63 A	
Starting current		Max. 2.8 A	
Power consumption		Typically 15 W	
Electrical isolation		Yes	
Bleeder resistance		0 Ω	
Mechanical characteristics			
Outer dimensions			
Width		362 mm	
Height		284 mm	
Depth		65.5 mm	
Front			
Frame		Naturally anodized aluminum <sup>6)</sup>	
Design		Gray <sup>6)</sup>	
Membrane		Polyester	
Dark gray border around display		Similar to Pantone 432CV <sup>6)</sup>	
Light background		Similar to Pantone 427CV <sup>6)</sup>	
Gasket		Flat gasket around display front	
Housing		Metal	
Weight		Approx. 4.1 kg	
Environmental characteristics			
Ambient temperature			
Operation		0 to +45°C	
Bearings		-20 to +60°C	
Transport		-20 to +60°C	
Relative humidity		See 2.8.2 "Temperature humidity diagram", on page 91	
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	
Bearings		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	
Bearings		30 g, 15 ms	
Transport		30 g, 15 ms	
Protection		IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude <sup>7)</sup>		Max. 3000 m	

Table 30: Technical data - 5PP320.1214-39 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.
- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 7) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.8.2 Temperature humidity diagram

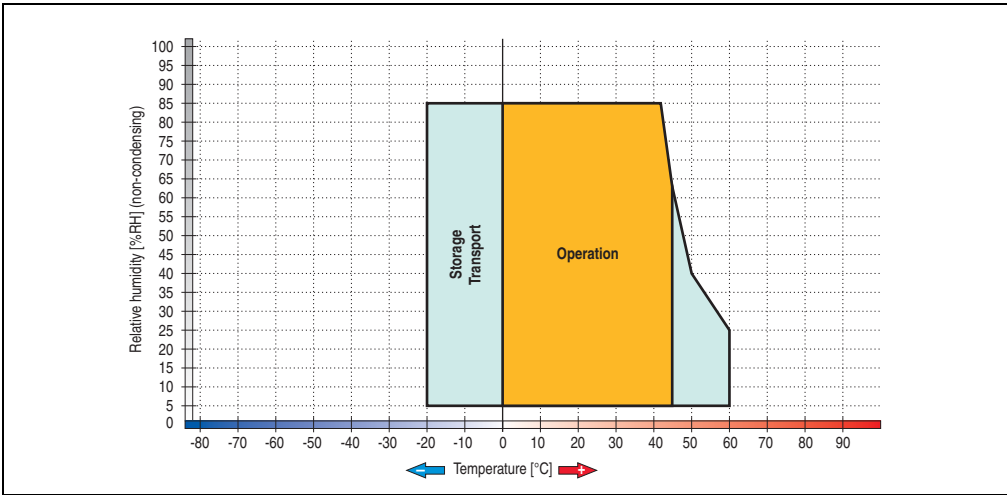


Figure 38: Temperature humidity diagram - 5PP320.1214-39

### 2.8.3 Dimensions

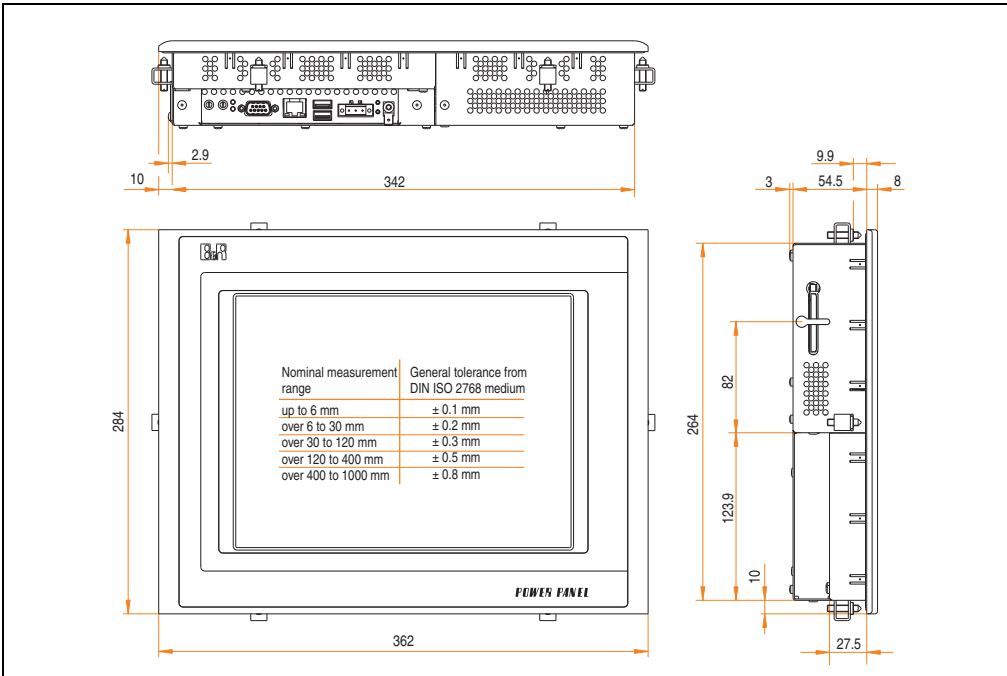


Figure 39: Dimensions - 5PP320.1214-39

### 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.

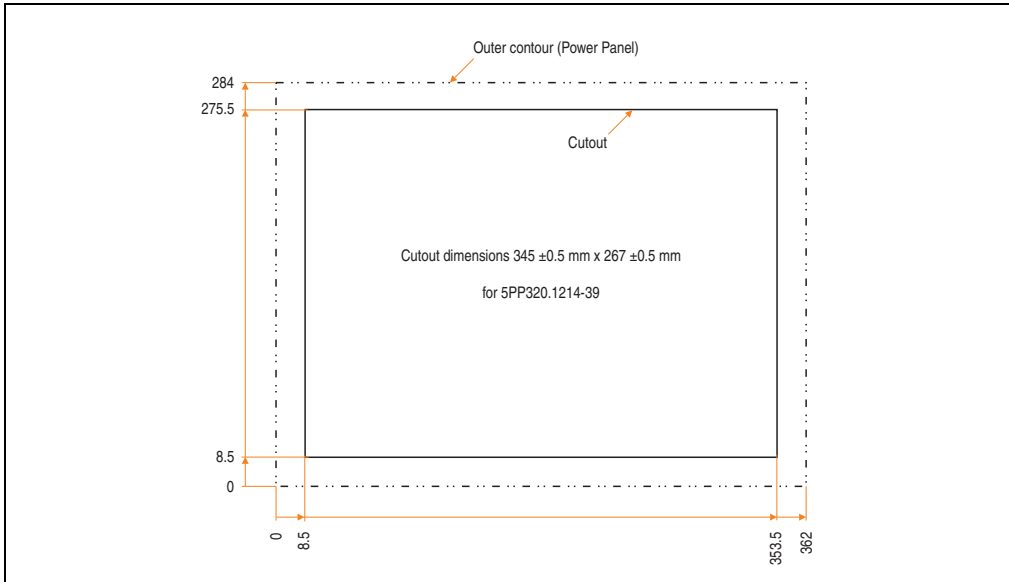


Figure 40: Cutout installation - 5PP320.1214-39

### 2.8.5 Contents of delivery

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

Amount	Component
1	Power Panel PP320 BIOS 12.1in SVGA, touch screen
6	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 31: Contents of delivery - 5PP320.1214-39



2.9 Device 5PP320.1505-39

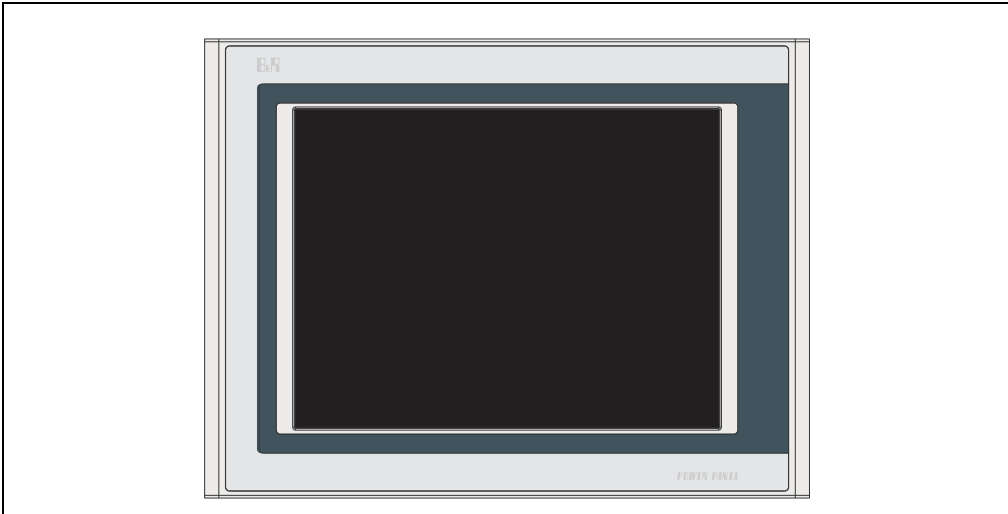


Figure 41: Front view - 5PP320.1505-39

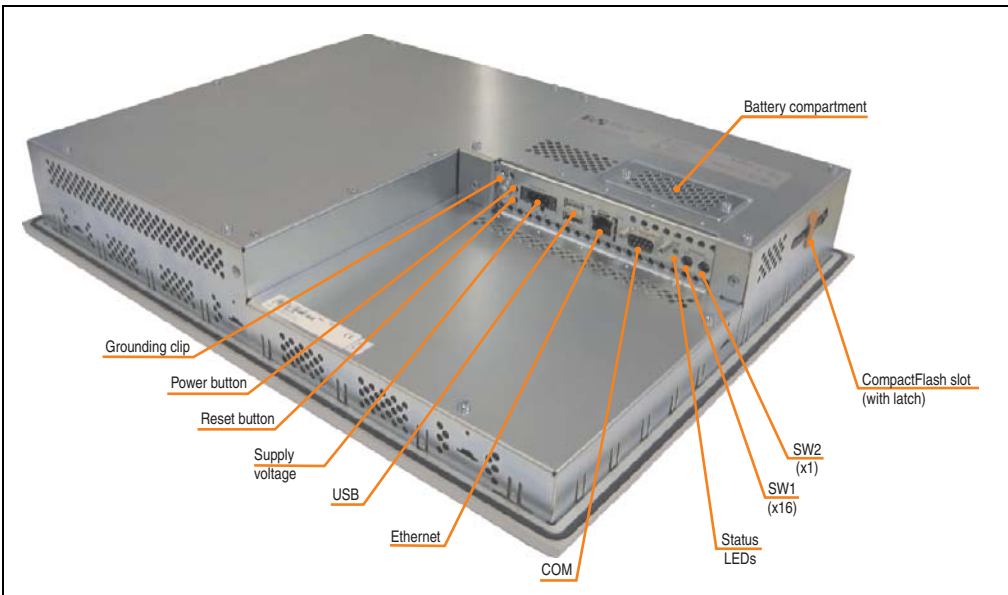


Figure 42: Rear view - 5PP320.1505-39

**2.9.1 Technical data**

Features	5PP320.1505-39 ≤ F0	5PP320.1505-39 ≥ G0	5PP320.1505-39 ≥ I0
B&R ID code	0x23D2		
Boot loader / Operating system	BIOS		
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)		
Flash	2 MB (for firmware)		
Memory Type Size	DDR SDRAM 256 MB		
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)		
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	-		
Watchdog Controller	MTCX <sup>1)</sup>		
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> -		
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day		
Battery Type Removable Service life 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	Intel 82551ER 10/100 Mbit/s 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 - 5PP320.1505-39

Features	5PP320.1505-39 ≤ F0	5PP320.1505-39 ≥ G0	5PP320.1505-39 ≥ I0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB		
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection		
Reset button	Yes, accessible from the outside		
Power button	Yes, accessible from the outside		
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)		
Mode/Node switch	2, 16 digits each		
aPCI slots Holding torque for aPCI module	-		
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	Color TFT 15 in (381 mm) 16.7 million colors <sup>4)</sup> XGA, 1024 x 768 pixels 400:1  Direction R / direction L = 85° Direction U / direction D = 85°  CCFL 250 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410		Color TFT 15 in (381 mm) 16.2 million colors <sup>4)</sup> XGA, 1024 x 768 pixels 1000:1  Direction R / direction L = 85° Direction U / direction D = 85°  LED 350 cd/m <sup>2</sup> 70000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Accu Touch Analog, resistive Elo, serial, 12- bit Up to 80% ±5%	AMT Analog, resistive Elo, serial, 12- bit Up to 80% ±5%	
Filter glass Degree of transmission Coating	-		
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-		

Table 32: Technical data - 5PP320.1505-39 (Forts.)

## Technical data • Power Panel 300 with BIOS

Electrical characteristics	5PP320.1505-39 ≤ F0	5PP320.1505-39 ≥ G0	5PP320.1505-39 ≥ I0
Power supply			
Rated voltage		18 - 30 VDC	
Rated current		1.25 A	
Starting current		Max. 2 A	
Power consumption		Typically 30 W	
Electrical isolation		Yes	
Bleeder resistance		0 Ω	
Mechanical characteristics			
Outer dimensions			
Width		435 mm	
Height		330 mm	
Depth		71.5 mm	
Front			
Frame		Naturally anodized aluminum <sup>6)</sup>	
Design		Gray <sup>6)</sup>	
Membrane		Polyester	
Dark gray border around display		Similar to Pantone 432CV <sup>6)</sup>	
Light background		Similar to Pantone 427CV <sup>6)</sup>	
Gasket		Flat gasket around display front	
Housing		Metal	
Weight		Approx. 6.3 kg	
Environmental characteristics			
Ambient temperature			
Operation		0 to +50°C	
Bearings		-20 to +60°C	
Transport		-20 to +60°C	
Relative humidity		See 2.9.2 "Temperature humidity diagram", on page 97	
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	
Bearings		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	
Bearings		30 g, 15 ms	
Transport		30 g, 15 ms	
Protection		IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude <sup>7)</sup>		Max. 3000 m	

Table 32: Technical data - 5PP320.1505-39 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.
- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 7) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.9.2 Temperature humidity diagram

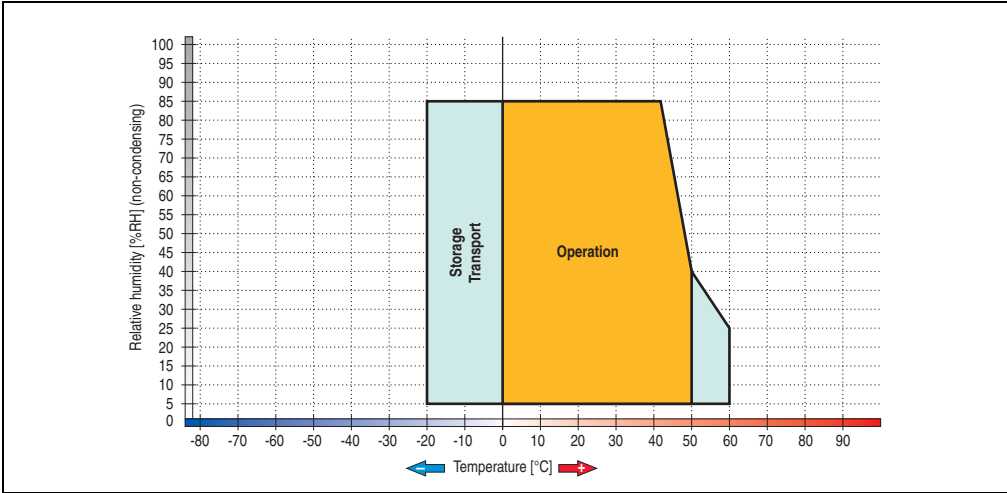


Figure 43: Temperature humidity diagram - 5PP320.1505-39

### 2.9.3 Dimensions

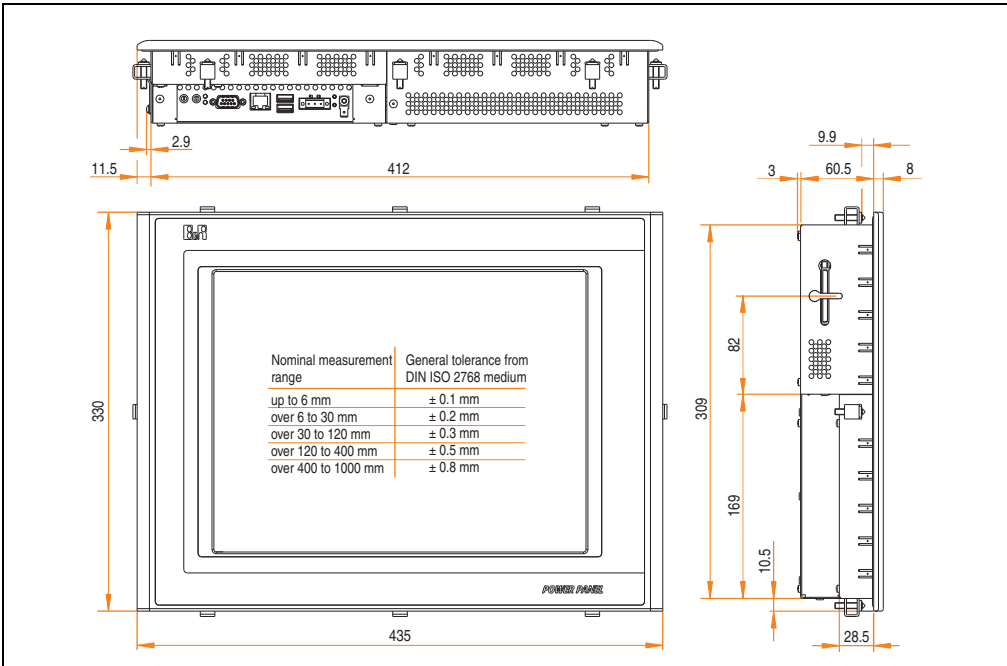


Figure 44: Dimensions - 5PP320.1505-39

### 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.

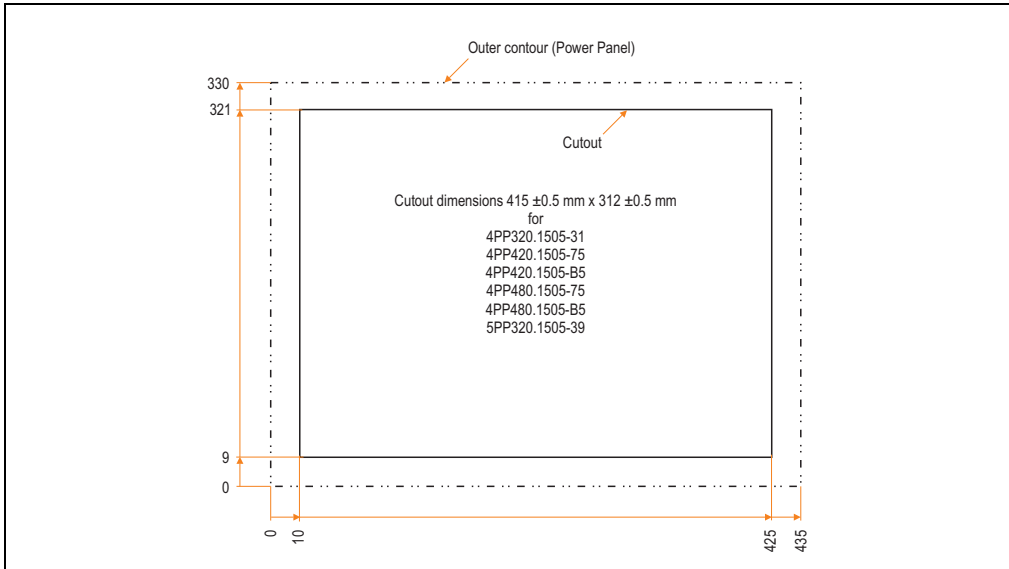


Figure 45: Cutout installation - 5PP320.1505-39

### 2.9.5 Contents of delivery

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

Amount	Component
1	Power Panel PP320 BIOS 15in XGA, touch screen
8	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 33: Contents of delivery - 5PP320.1505-39

2.10 Device 5PP320.1505-3B

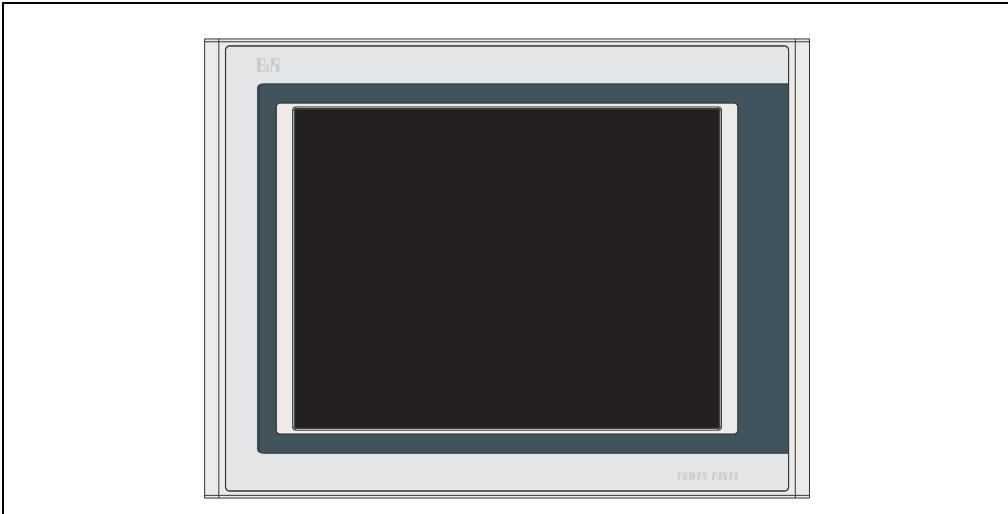


Figure 46: Front view - 5PP320.1505-3B

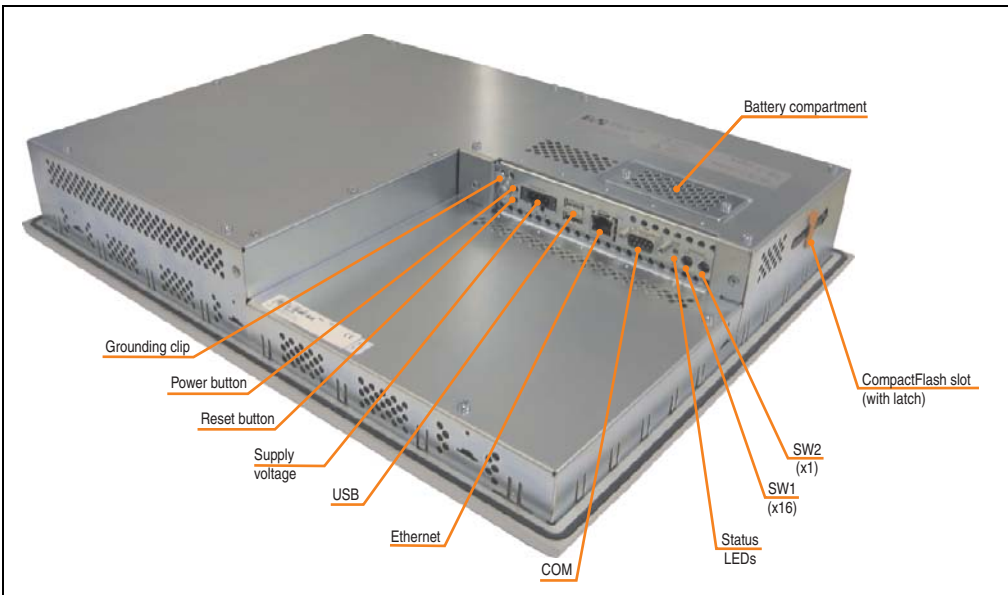


Figure 47: Rear view - 5PP320.1505-3B

**2.10.1 Technical data**

Features	5PP320.1505-3B ≤ D0	5PP320.1505-3B ≥ E0	5PP320.1505-3B ≥ F0
B&R ID code	0xB2C5		
Boot loader / Operating system	BIOS		
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)		
Flash	2 MB (for firmware)		
Memory Type Size	DDR SDRAM 512 MB		
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)		
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	-		
Watchdog Controller	MTCX <sup>1)</sup>		
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> -		
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day		
Battery Type Removable Service life 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	Intel 82551ER 10/100 Mbit/s 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 - 5PP320.1505-3B



Features	5PP320.1505-3B ≤ D0	5PP320.1505-3B ≥ E0	5PP320.1505-3B ≥ F0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB		
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection		
Reset button	Yes, accessible from the outside		
Power button	Yes, accessible from the outside		
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)		
Mode/Node switch	2, 16 digits each		
aPCI slots Holding torque for aPCI module	-		
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	Color TFT 15 in (381 mm) 16.7 million colors <sup>4)</sup> XGA, 1024 x 768 pixels 400:1  Direction R / direction L = 85° Direction U / direction D = 85°  CCFL 250 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410		Color TFT 15 in (381 mm) 16.2 million colors <sup>4)</sup> XGA, 1024 x 768 pixels 1000:1  Direction R / direction L = 85° Direction U / direction D = 85°  LED 350 cd/m <sup>2</sup> 70000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Accu Touch Analog, resistive Elo, serial, 12- bit Up to 80% ±5%	AMT Analog, resistive Elo, serial, 12- bit Up to 80% ±5%	
Filter glass Degree of transmission Coating	-		
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-		

Table 34: Technical data - 5PP320.1505-3B (Forts.)

## Technical data • Power Panel 300 with BIOS

Electrical characteristics	5PP320.1505-3B ≤ D0	5PP320.1505-3B ≥ E0	5PP320.1505-3B ≥ F0
Power supply Rated voltage Rated current Starting current Power consumption Electrical isolation		18 - 30 VDC 1.25 A Max. 2 A Typically 30 W Yes	
Bleeder resistance		0 Ω	
Mechanical characteristics			
Outer dimensions Width Height Depth		435 mm 330 mm 71.5 mm	
Front Frame Design Membrane Dark gray border around display Light background Gasket		Naturally anodized aluminum <sup>6)</sup> Gray <sup>6)</sup> Polyester Similar to Pantone 432CV <sup>6)</sup> Similar to Pantone 427CV <sup>6)</sup> Flat gasket around display front	
Housing		Metal	
Weight		Approx. 6.3 kg	
Environmental characteristics			
Ambient temperature Operation Bearings Transport		0 to +50°C -20 to +60°C -20 to +60°C	
Relative humidity		See 2.9.2 "Temperature humidity diagram", on page 97	
Vibration Operation (continuous) Operation (occasional) Bearings Transport		2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g	
Shock Operation Bearings Transport		15 g, 11 ms 30 g, 15 ms 30 g, 15 ms	
Protection		IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude <sup>7)</sup>		Max. 3000 m	

Table 34: Technical data - 5PP320.1505-3B (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.
- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 7) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 2.10.2 Temperature humidity diagram

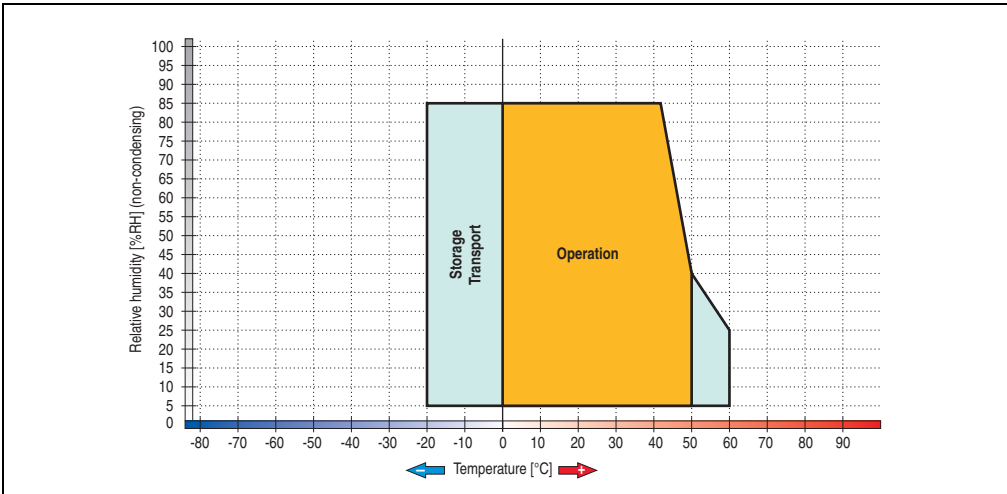


Figure 48: Temperature humidity diagram - 5PP320.1505-3B

### 2.10.3 Dimensions

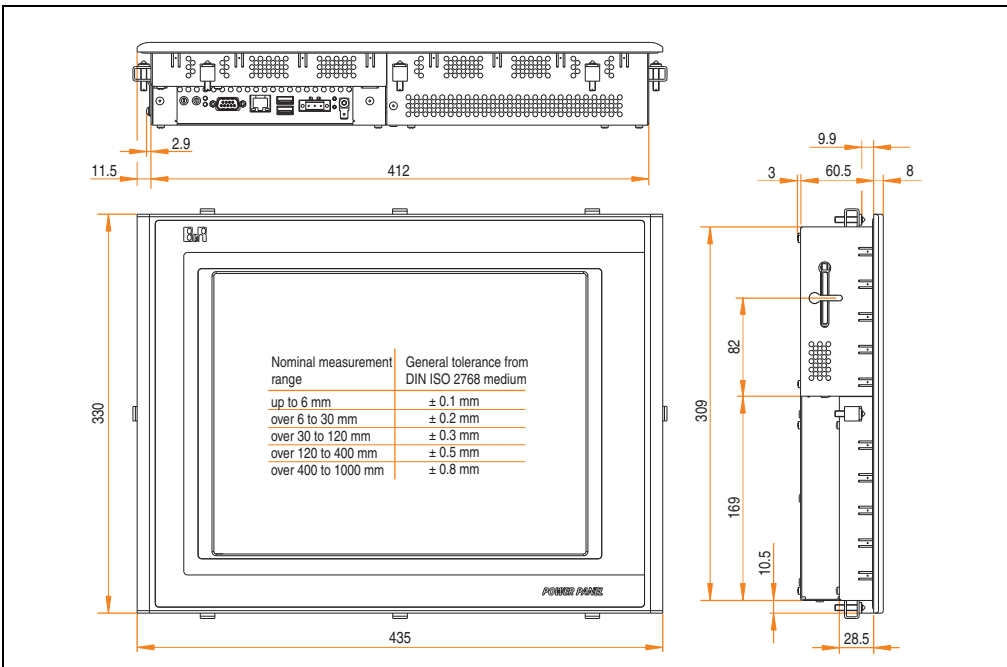


Figure 49: Dimensions - 5PP320.1505-3B

### 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.

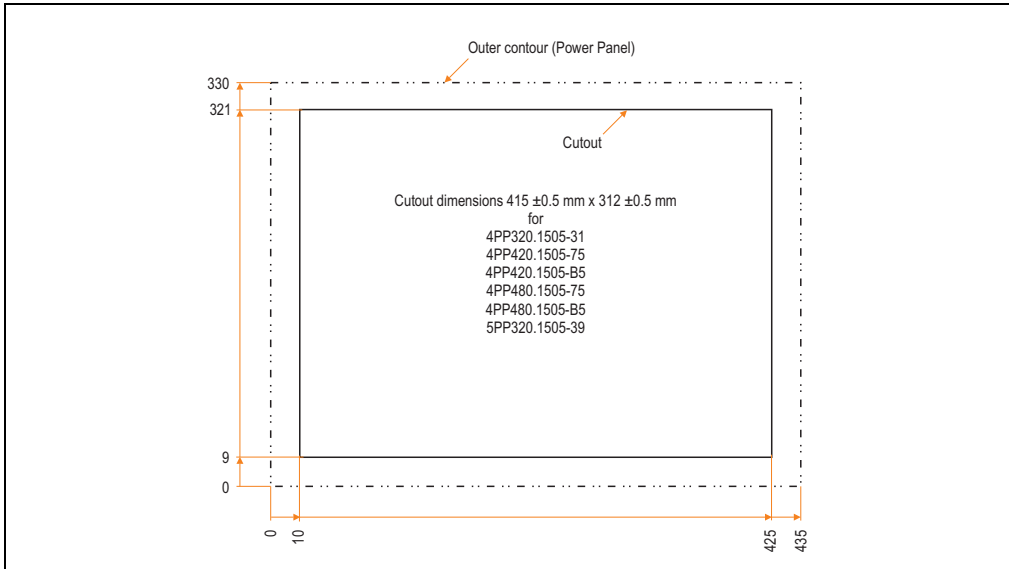


Figure 50: Cutout installation - 5PP320.1505-3B

### 2.10.5 Contents of delivery

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

Amount	Component
1	Power Panel PP320 BIOS 15in XGA, touch screen
8	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 35: Contents of delivery - 5PP320.1505-3B

## 3. Power Panel 300 with Automation Runtime

### 3.1 Device interfaces

The following section provides a description of all interfaces and plugs possible with a Power Panel 300 device with Automation Runtime.

#### 3.1.1 Supply voltage

Input voltage: 18 - 30 VDC

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

Pin assignment information can be found either in the following table or printed on the Power Panel plate. The supply voltage is internally protected so that the device cannot be damaged if there is an overload (fuse replacement necessary) or if the voltage supply is connected incorrectly (reverse polarity protection - fuse replacement not necessary).

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




Figure 51: Supply voltage connection

### Ground

## Warning!

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

### 3.1.2 Functional grounding clip

A functional grounding clip is located next to the supply voltage plug. The grounding clip (functional ground) must be connected with a central grounding point on the control cabinet using a 6.3 mm blade connector via the shortest distance and with as little resistance as possible (e.g. copper strip, but must be at least 2.5 mm<sup>2</sup>).

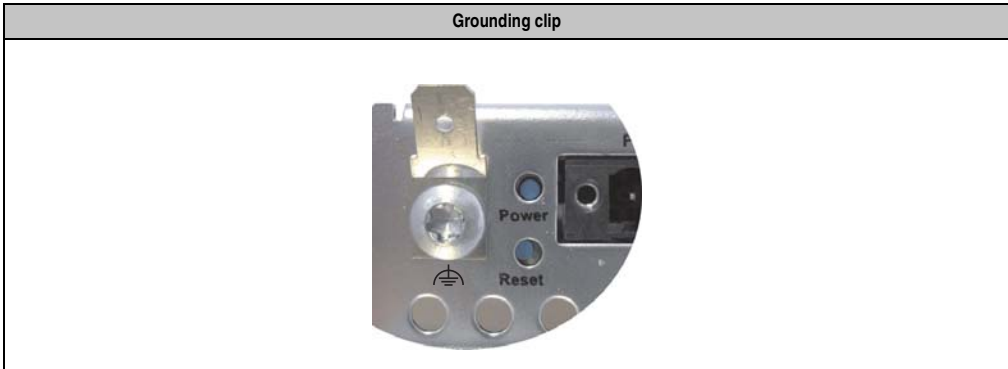



Figure 52: Functional grounding clip

### 3.1.3 Serial interface COM

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	
Type	RS232, modem-capable, not electrically isolated
UART	16C550 compatible, 16-byte FIFO
Transfer rate	Up to 115 kBaud
Pin	Assignment
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI



9-pin DSUB plug

Table 36 : Pin assignments - COM

### 3.1.4 USB ports

The Power Panel 300/400 devices have a USB 2.0 (Universal Serial Bus) host controller with multiple USB ports, two of which are on the outside for easy user access.


Universal serial bus		
Transfer rate <sup>1)</sup>	Low speed (1.5 Mbit/s), Full Speed (12 Mbit/s) to high speed (480 Mbit/s)	2x USB Type A, female 
Power supply	Max. 500 mA per port <sup>2)</sup>	
Maximum Cable length	5 m (not including hub)	

Table 37: USB ports

1) The actual value depends on the operating system or driver being used.

2) For safety, every USB port is equipped with a maintenance free "USB current-limiting circuit breaker" (max. 500 mA)

## Warning!

Peripheral USB devices can be connected to the USB ports. Due to the vast number of USB devices available on the market, B&R cannot guarantee their performance. B&R does ensure the performance of all USB devices that they provide.

## Warning!

Because of general PC specifications, these interfaces 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.

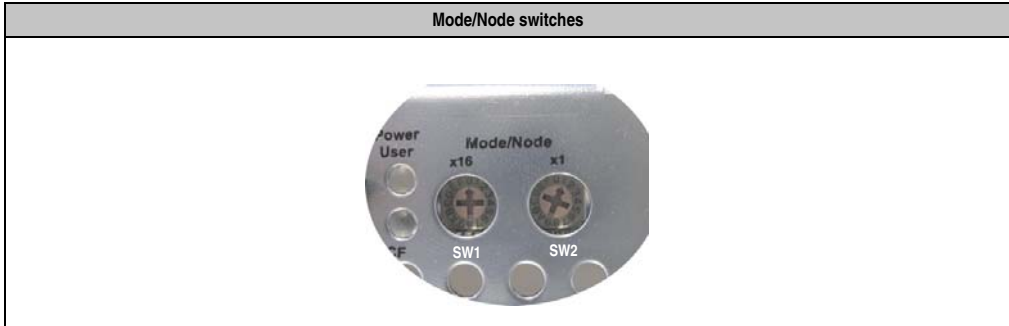


Table 38: Mode/Node switches

Chapter 2  
Technical data

Switch position		Function	Description
SW1 (x16)	SW2 (x1)		
0	0	Boot	Automation Runtime boot mode for operating system (firmware, BIOS) upgrade (default: Automation Runtime). In this position, a new or missing operating system can be downloaded.  <b>Information:</b> For detailed information, see chapter 4 "Software" section. 3 "Upgrade information", on page 470
0 ... F	0 ... D	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 39: Switch settings for the Mode/Node switch

### 3.1.6 BIOS boot mode switch

Power Panel devices are equipped with a BIOS boot mode switch.

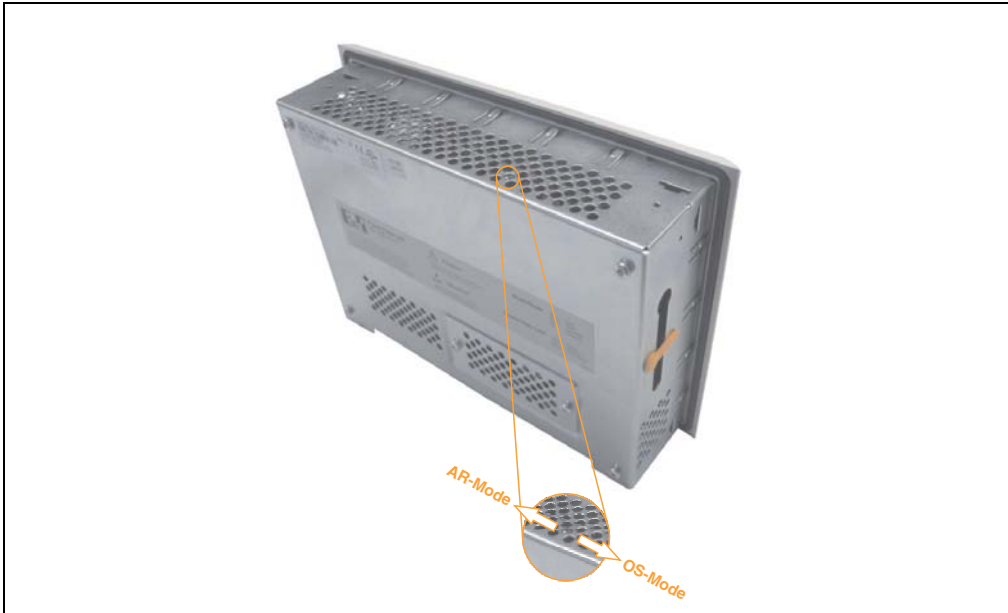


Figure 53: BIOS boot mode switch

Switch position	Function	Description
Right (toward CF slot)	OS mode	The Power Panel will boot in OS mode.
Left	AR mode	The Power Panel will boot in AR mode.

Table 40: BIOS boot mode switch positions (based on the image)

## Warning!

Carefully use a pointed object to change switch position.

**OS mode**

- Standard Boot Screen (see section 1 "Power Panel 300 with BIOS", on page 413)
- BIOS Setup can be started by pressing the "DEL" key.
- When the switch is in the "00" position, the setup default values will be restored after restarting three times.

**AR mode**

The device will be initialized for Automation Runtime when AR mode is enabled.

- Other boot screen (see section 2 "Power Panel 300/400 with Automation Runtime", on page 466)
- USB Boot "Enabled" (only in switch position "00")1)

### 3.1.7 Status LEDs

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

Status LEDs			
LED	Color		Meaning
Power	Green	On	Supply voltage OK
	Red	On	The system is in standby mode (S5: soft-off mode or S4: hibernate mode - suspend-to-disk)
User	Yellow	On	Can be used as desired by the user (for example, can be switched on/off directly using the ADI library - only possible in S0 state)
	Green	Off	
CF	Yellow	On	Indicates access to CompactFlash drive (read or write)

1x three-color, 1x one-color




Table 41: Status LEDs

### 3.1.8 Ethernet interface

Ethernet interface		
Controller	Intel 82551ER	
Cabling	S/STP (category 5)	
Transfer rate	10/100 Mbit/s <sup>1)</sup>	
LED	On	Off
Green	100 Mbit/s	10 Mbit/s
Orange	Link (Ethernet network connection available)	Activity (blinking) (Data transfer in progress)

RJ45 twisted pair (10BaseT/100BaseT), female




Table 42: Ethernet interface

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

### 3.1.9 Power button


Power button	
<p>The power button can be pressed with a pointed object (e.g. paper clip or tip of a pen).</p> <p>If the Power button is pushed, the Power Panel is switched off and remains in Standby mode.</p>	

Table 43: Power button

### 3.1.10 Reset button

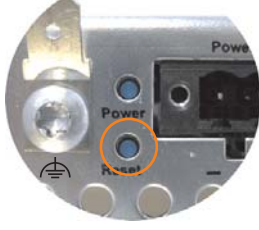
Reset button	
<p>The reset button can be pressed with a pointed object (e.g. paper clip or tip of a pen).</p> <p>Pushing the reset button results in a hardware-reset. This restarts the Power Panel.</p> <p>The MTCX processor is not reset when the reset button is pressed.</p>	

Table 44: Reset button

## Warning!

**A system reset can result in data loss!**

### 3.1.11 CompactFlash slot

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



Figure 54: 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.

## Caution!

**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 Device label

The following sticker can be found in a suitable location on the Power Panel device:



Figure 55: Device label

#### 3.2.2 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

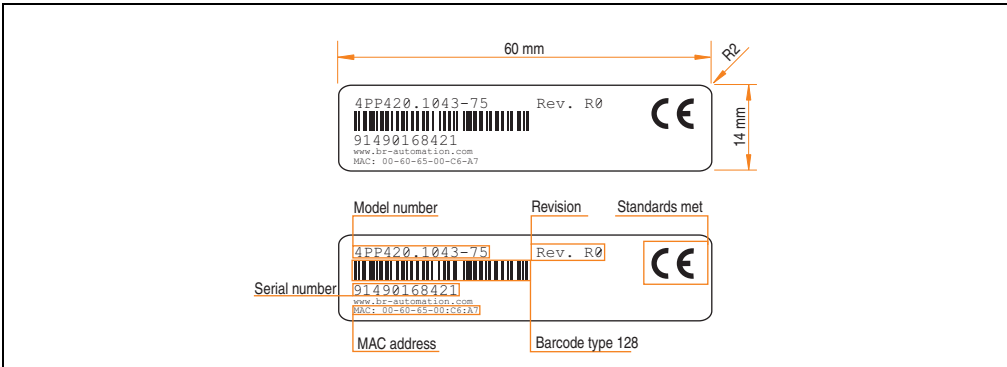


Figure 56: Design/dimensions - Serial number sticker

## Information on the Internet

Information about each device can also be found on the B&R homepage. Enter the device's serial number in the serial number search field on the start page [www.br-automation.com](http://www.br-automation.com). The search also works if you enter the model number or the material number in the material number search field.

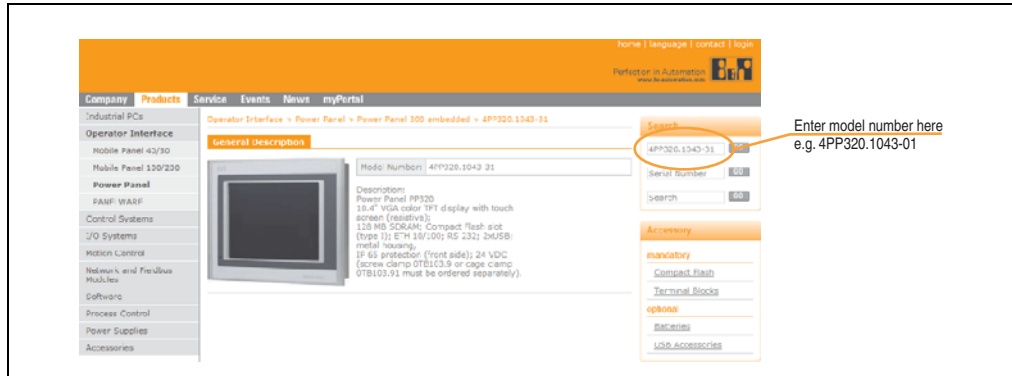


Figure 57: Example - Material number search: 4PP320.1043-01



### 3.3 Device 4PP320.0571-01

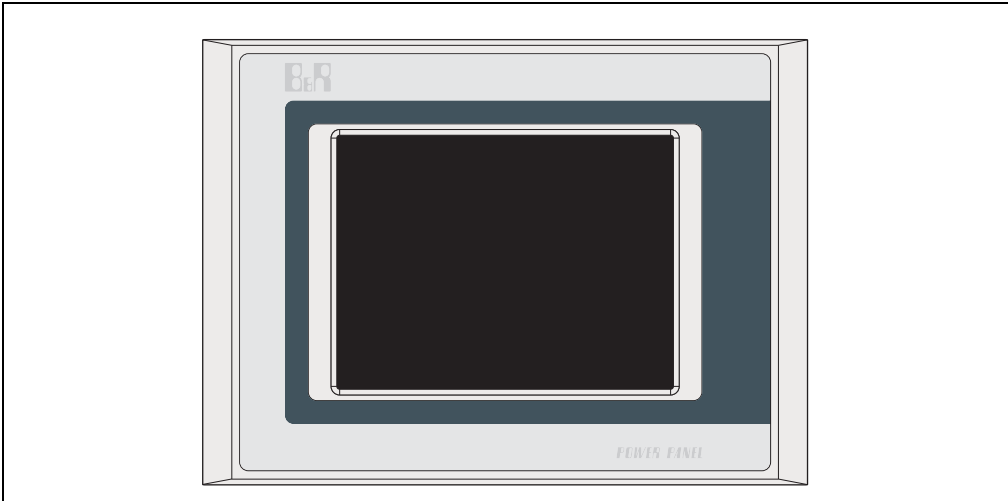


Figure 58: Front view - 4PP320.0571-01

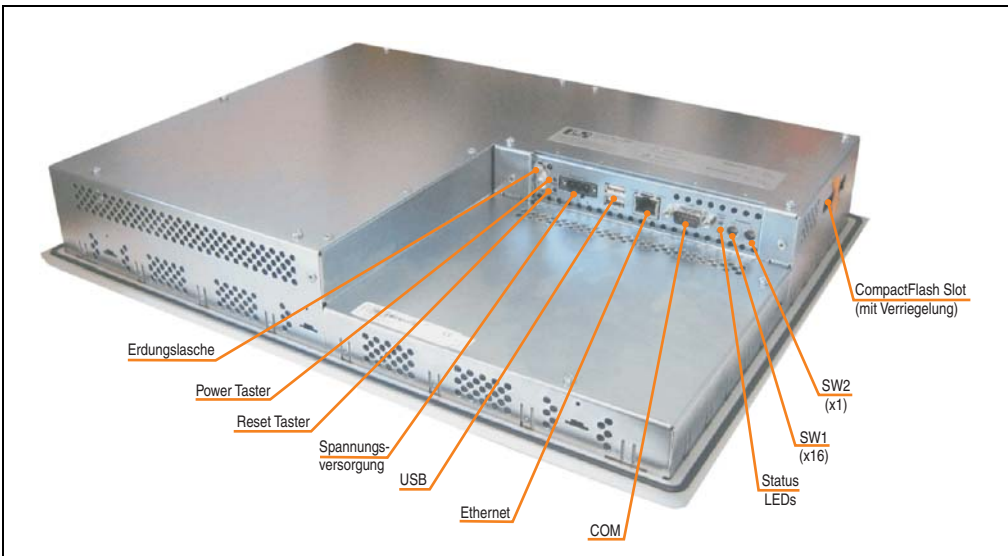


Figure 59: Rear view - 4PP320.0571-01

**3.3.1 Technical data**

Features	4PP320.0571-01 ≤ Rev. E0	4PP320.0571-01 ≥ Rev. F0	4PP320.0571-01 ≥ Rev. I0
B&R ID code	0xA15E		
Boot loader / Operating system	Automation Runtime		
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)		
Flash	2 MB (for firmware)		
Memory Type Size	DDR SDRAM 128 MB		
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)		
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	-		
Watchdog Controller	MTCX <sup>1)</sup>		
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> -		
Real-time clock (RTC) Battery-buffered Accuracy	- at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day		
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	-		
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 45: Technical data - 4PP320.0571-01

## Technical data • Power Panel 300 with Automation Runtime

Features	4PP320.0571-01 ≤ Rev. E0	4PP320.0571-01 ≥ Rev. F0	4PP320.0571-01 ≥ Rev. I0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB		
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>3)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>3)</sup> Type A Max. 500 mA per connection		
Reset button	Yes, accessible from the outside		
Power button	Yes, accessible from the outside		
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)		
Mode/Node switch	2, 16 digits each		
aPCI slots Holding torque for aPCI module	-		
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 560) Horizontal Vertical  Background lighting Type Brightness Half-brightness time <sup>4)</sup> Screen rotation	Monochrome LCD 5.7 in (144 mm) 8 shades of gray <sup>3)</sup> QVGA, 320 x 240 pixels 25:1  Direction R / direction L = 40° Direction U = 40° / direction D = 50°  CCFL 220 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410		Monochrome LCD 5.7 in (144 mm) 8 shades of gray <sup>3)</sup> QVGA, 320 x 240 pixels 25:1  Direction R / direction L = 80° Direction U / direction D = 80°  LED 150 cd/m <sup>2</sup> 40000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	Gunze Analog, resistive Elo, serial, 12- bit Up to 80% ±5%	AMT Analog, resistive Elo, serial, 12- bit Up to 80% ±5%	
Filter glass Degree of transmission Coating	-		
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-		

Table 45: Technical data - 4PP320.0571-01 (Forts.)

## Technical data • Power Panel 300 with Automation Runtime

Electrical characteristics	4PP320.0571-01 ≤ Rev. E0	4PP320.0571-01 ≥ Rev. F0	4PP320.0571-01 ≥ Rev. I0
Power supply			
Rated voltage	18 - 30 VDC		
Rated current	0.45 A		
Starting current	Max. 1.2 A		
Power consumption	Typically 10 W		
Electrical isolation	Yes		
Bleeder resistance	0 Ω		
Mechanical characteristics			
Outer dimensions			
Width	212 mm		
Height	156 mm		
Depth	55.5 mm		
Front			
Frame	Naturally anodized aluminum <sup>5)</sup>		
Design	Gray <sup>5)</sup>		
Membrane	Polyester		
Dark gray border around display	Similar to Pantone 432CV <sup>5)</sup>		
Light background	Similar to Pantone 427CV <sup>5)</sup>		
Gasket	Flat gasket around display front		
Housing	Metal		
Weight	Approx. 1.4 kg		
Environmental characteristics			
Ambient temperature			
Operation	0 to +50°C		
Bearings	-20 to +70°C		
Transport	-20 to +70°C		
Relative humidity	See 3.3.2 "Temperature humidity diagram", on page 121		
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		
Bearings	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		
Bearings	30 g, 15 ms		
Transport	30 g, 15 ms		
Protection	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)		
Altitude <sup>6)</sup>	Max. 3000 m		

Table 45: Technical data - 4PP320.0571-01 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) The actual value depends on the operating system or driver being used.
- 4) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 6) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.3.2 Temperature humidity diagram

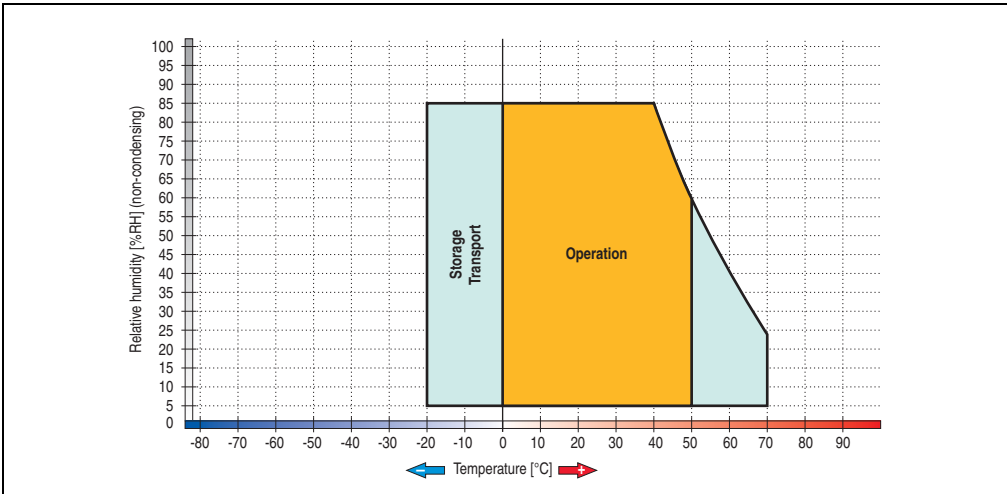


Figure 60: Temperature humidity diagram - 4PP320.0571-01

### 3.3.3 Dimensions

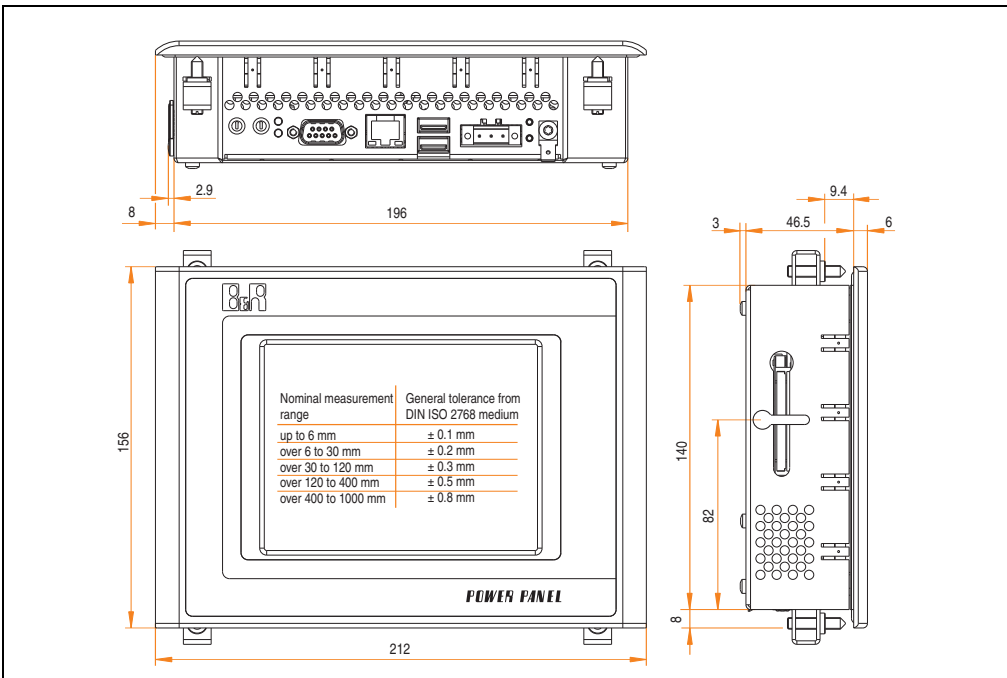


Figure 61: Dimensions - 4PP320.0571-01

### 3.3.4 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.

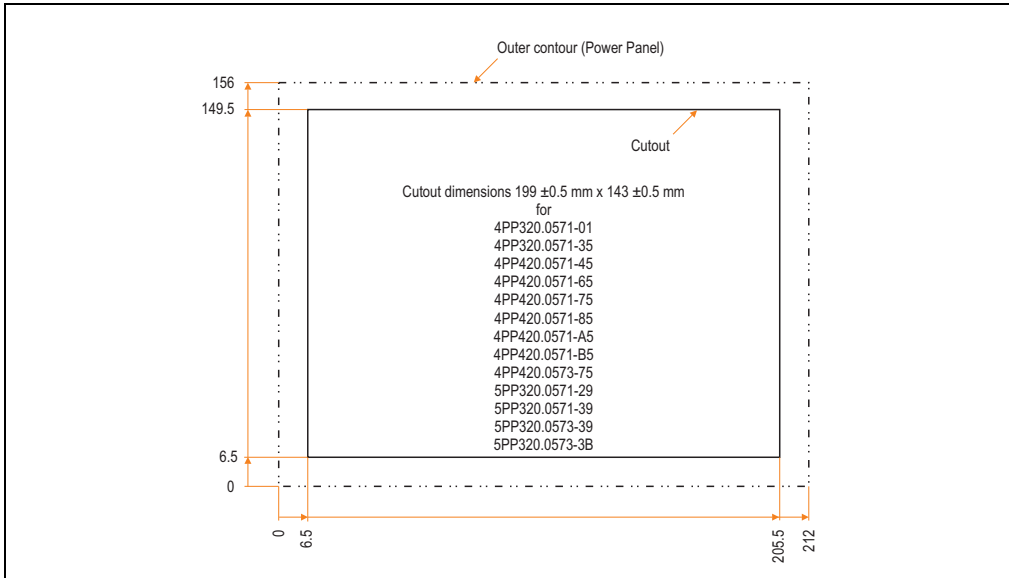


Figure 62: Cutout installation - 4PP320.0571-01

### 3.3.5 Contents of delivery

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

Amount	Component
1	Power Panel PP320 5.7in QVGA, touch screen
4	Retaining clips included

Table 46: Contents of delivery - 4PP320.0571-01

### 3.4 Device 4PP320.0571-35

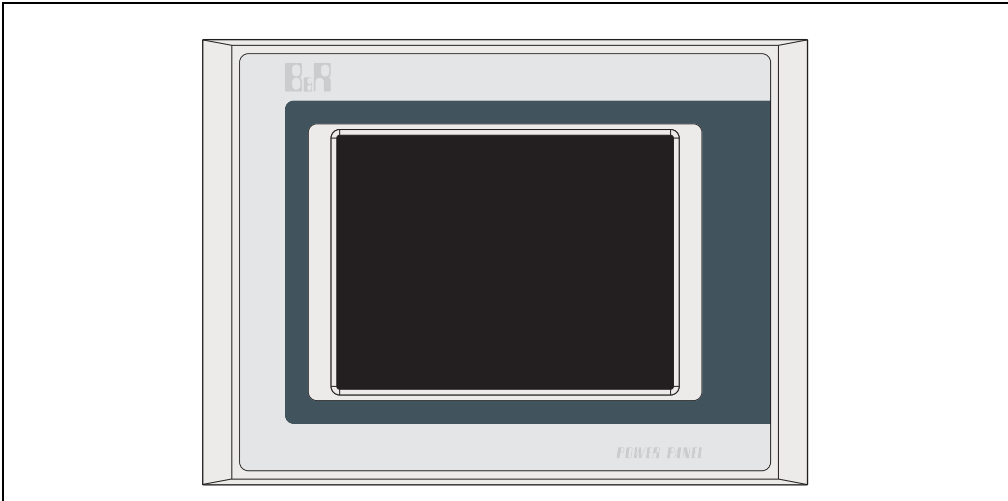


Figure 63: Front view - 4PP320.0571-35

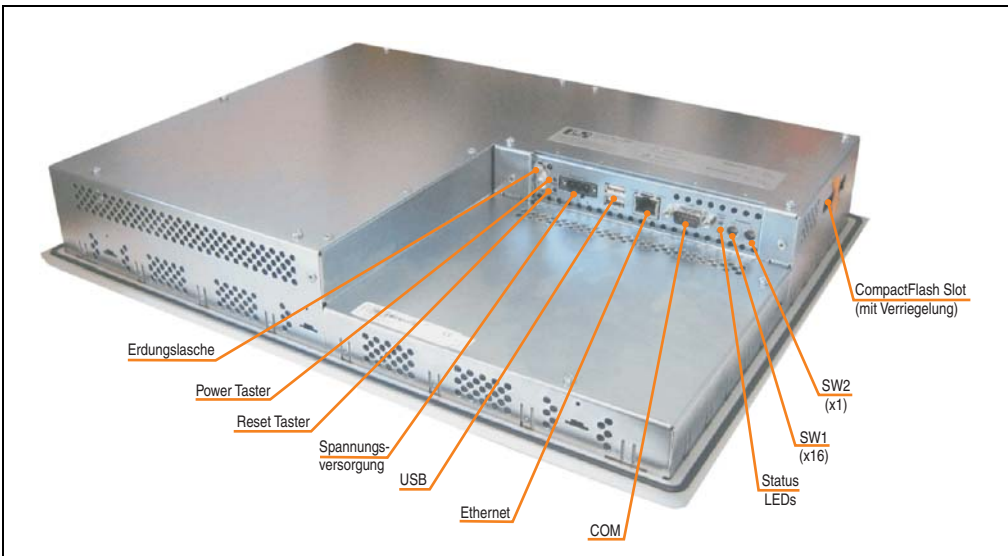


Figure 64: Rear view - 4PP320.0571-35

**3.4.1 Technical data**

Features	4PP320.0571-35 ≤ C0	4PP320.0571-35 ≥ F0
B&R ID code	0xA15F	
Boot loader / Operating system	Automation Runtime	
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)	
Flash	2 MB (for firmware)	
Memory Type Size	DDR SDRAM 128 MB	
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)	
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	-	
Watchdog Controller	MTCX <sup>1)</sup>	
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> -	
Real-time clock (RTC) Battery-buffered Accuracy	- at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day	
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	-	
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 47: Technical data - 4PP320.0571-35



## Technical data • Power Panel 300 with Automation Runtime

Features	4PP320.0571-35 ≤ C0	4PP320.0571-35 ≥ F0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB	
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>3)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>3)</sup> Type A Max. 500 mA per connection	
Reset button	Yes, accessible from the outside	
Power button	Yes, accessible from the outside	
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)	
Mode/Node switch	2, 16 digits each	
aPCI slots Holding torque for aPCI module	-	
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 560) Horizontal Vertical  Background lighting Type Brightness Half-brightness time <sup>4)</sup> Screen rotation	Color TFT 5.7 in (144 mm) 262144 colors <sup>3)</sup> QVGA, 320 x 240 pixels 400:1  Direction R / direction L = 60° Direction U = 40° / direction D = 50°  CCFL 500 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410	
Touch screen Touch screen type Technology Controller Degree of transmission	Gunze Analog, resistive Elo, serial, 12- bit Up to 80% ±5%	AMT Analog, resistive Elo, serial, 12- bit Up to 80% ±5%
Filter glass Degree of transmission Coating	-	
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-	

Table 47: Technical data - 4PP320.0571-35 (Forts.)

## Technical data • Power Panel 300 with Automation Runtime

Electrical characteristics	4PP320.0571-35 ≤ C0	4PP320.0571-35 ≥ F0
Power supply		
Rated voltage		18 - 30 VDC
Rated current		0.45 A
Starting current		Max. 1.2 A
Power consumption		Typically 10 W
Electrical isolation		Yes
Bleeder resistance		0 Ω
Mechanical characteristics		
Outer dimensions		
Width		212 mm
Height		156 mm
Depth		55.5 mm
Front		
Frame		Naturally anodized aluminum <sup>5)</sup>
Design		Gray <sup>5)</sup>
Membrane		Polyester
Dark gray border around display		Similar to Pantone 432CV <sup>5)</sup>
Light background		Similar to Pantone 427CV <sup>5)</sup>
Gasket		Flat gasket around display front
Housing		Metal
Weight		Approx. 1.4 kg
Environmental characteristics		
Ambient temperature		
Operation		0 to +50°C
Bearings		-20 to +60°C
Transport		-20 to +60°C
Relative humidity		See 3.4.2 "Temperature humidity diagram", on page 127
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
Bearings		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
Bearings		30 g, 15 ms
Transport		30 g, 15 ms
Protection		IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude <sup>6)</sup>		Max. 3000 m

Table 47: Technical data - 4PP320.0571-35 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) The actual value depends on the operating system or driver being used.
- 4) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 6) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.4.2 Temperature humidity diagram

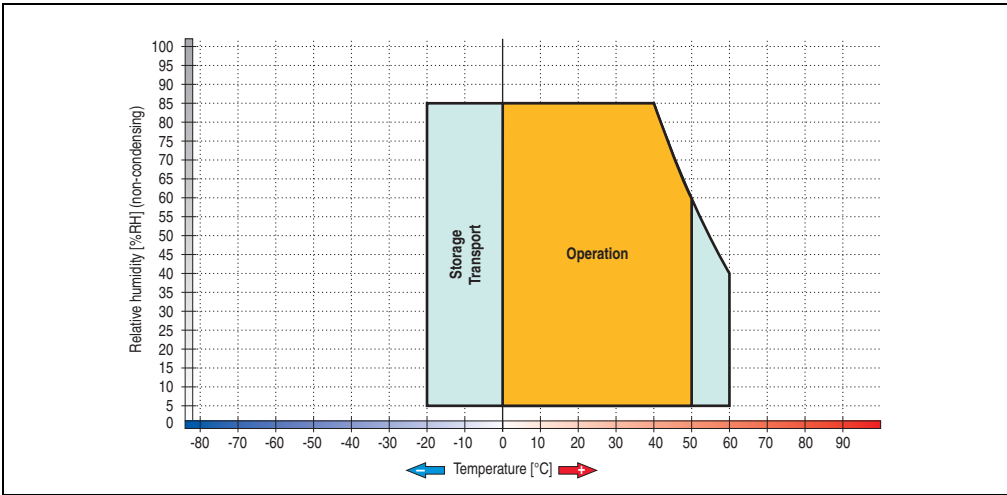


Figure 65: Temperature humidity diagram - 4PP320.0571-35

### 3.4.3 Dimensions

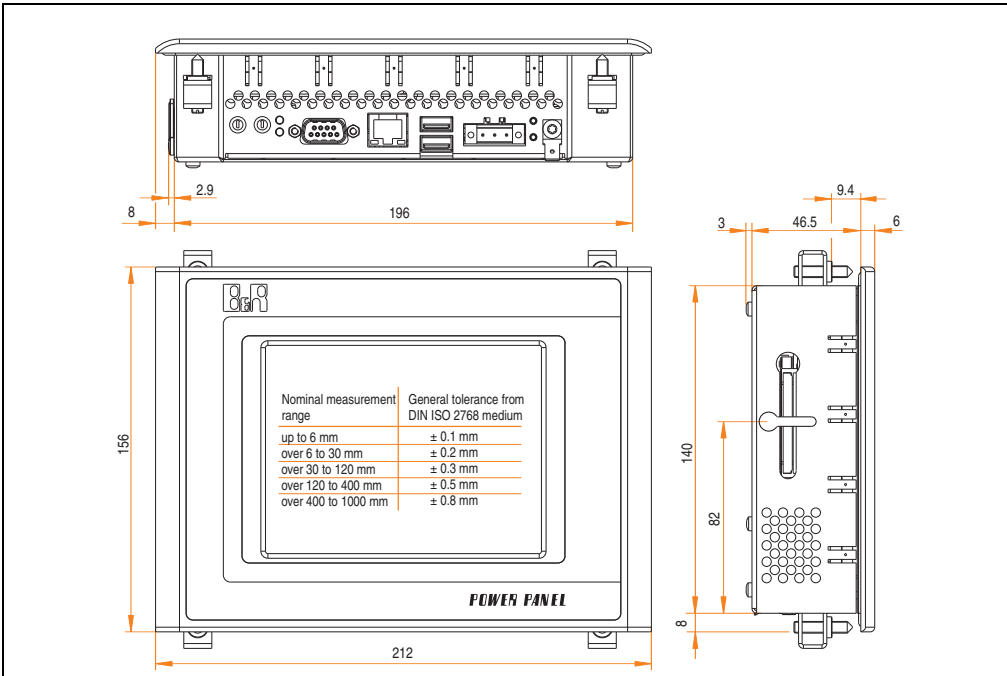


Figure 66: Dimensions - 4PP320.0571-35

### 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.

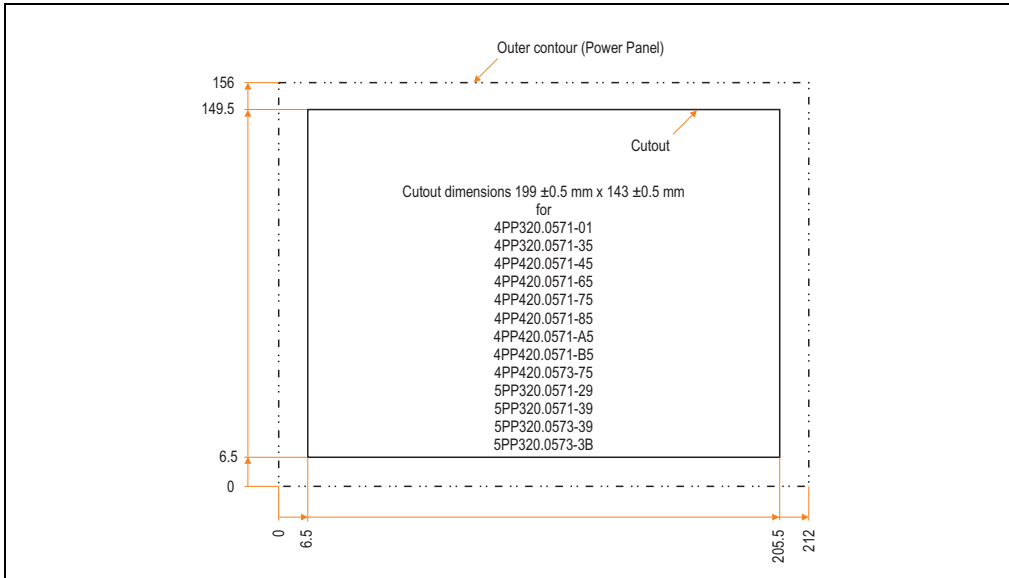


Figure 67: Cutout installation - 5PP320.0571-35

### 3.4.5 Contents of delivery

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

Amount	Component
1	Power Panel PP320 5.7in QVGA, touch screen
4	Retaining clips included

Table 48: Contents of delivery - 4PP320.0571-35

### 3.5 Device 4PP320.1043-31

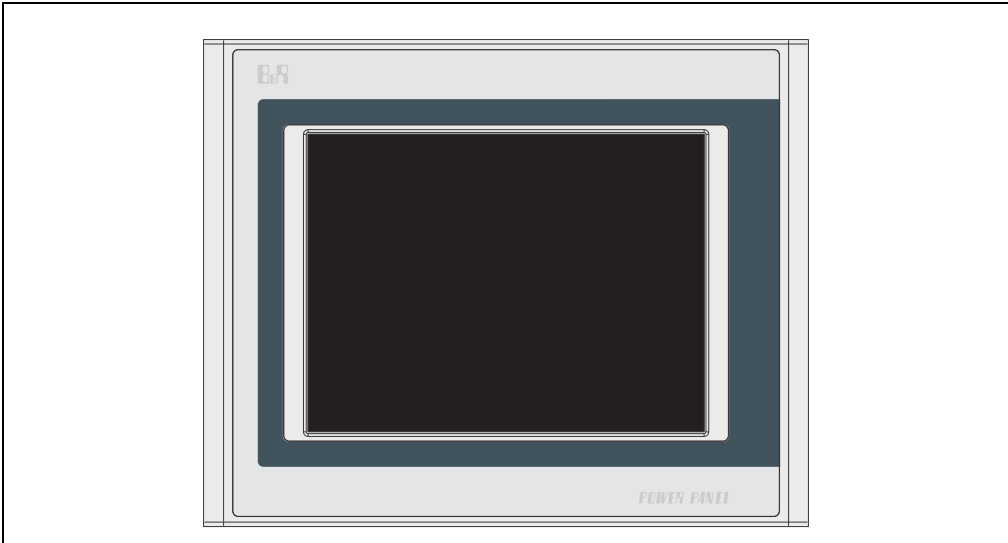


Figure 68: Front view - 4PP320.1043-31

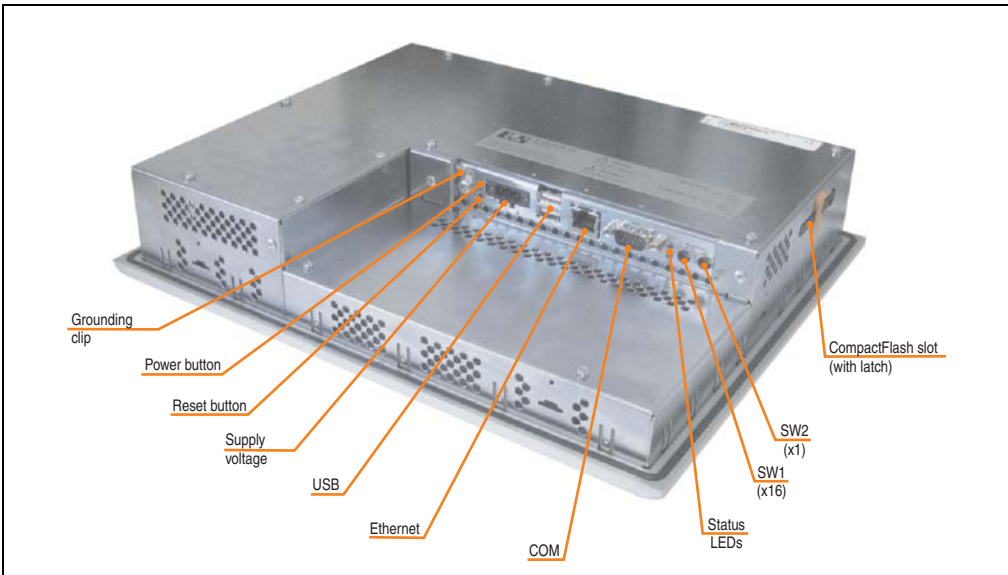


Figure 69: Rear view - 4PP320.1043-31

**3.5.1 Technical data**

Features	4PP320.1043-31 ≤ E0	4PP320.1043-31 ≥ F0	4PP320.1043-31 ≥ I0
B&R ID code	0xA160		
Boot loader / Operating system	Automation Runtime		
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)		
Flash	2 MB (for firmware)		
Memory Type Size	DDR SDRAM 128 MB		
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)		
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	-		
Watchdog Controller	MTCX <sup>1)</sup>		
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> -		
Real-time clock (RTC) Battery-buffered Accuracy	- at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day		
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	-		
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 49: Technical data - 4PP320.1043-31

## Technical data • Power Panel 300 with Automation Runtime

Features	4PP320.1043-31 ≤ E0	4PP320.1043-31 ≥ F0	4PP320.1043-31 ≥ I0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB		
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>3)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>3)</sup> Type A Max. 500 mA per connection		
Reset button	Yes, accessible from the outside		
Power button	Yes, accessible from the outside		
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)		
Mode/Node switch	2, 16 digits each		
aPCI slots Holding torque for aPCI module	-		
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>4)</sup> Screen rotation	Color TFT 10.4 in (264 mm) 262144 colors <sup>3)</sup> VGA, 640 x 480 pixels 600:1  Direction R / direction L = 70° Direction U = 45° / direction D = 35°  CCFL 450 cd/m <sup>2</sup> 55000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410		Color TFT 10.4 in (264 mm) 262144 colors <sup>3)</sup> VGA, 640 x 480 pixels 900:1  Direction R / direction L = 80° Direction U / direction D = 80°  LED 450 cd/m <sup>2</sup> 70000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Accu Touch Analog, resistive Elo, serial, 12- bit Up to 80% ±5%	AMT Analog, resistive Elo, serial, 12- bit Up to 80% ±5%	
Filter glass Degree of transmission Coating	-		
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-		

Table 49: Technical data - 4PP320.1043-31 (Forts.)

## Technical data • Power Panel 300 with Automation Runtime

Electrical characteristics	4PP320.1043-31 ≤ E0	4PP320.1043-31 ≥ F0	4PP320.1043-31 ≥ I0
Power supply			
Rated voltage	18 - 30 VDC		
Rated current	0.63 A		
Starting current	Max. 2.8 A		
Power consumption	Typically 15 W		
Electrical isolation	Yes		
Bleeder resistance	0 Ω		
Mechanical characteristics			
Outer dimensions			
Width	323 mm		
Height	260 mm		
Depth	65.5 mm		
Front			
Frame	Naturally anodized aluminum <sup>5)</sup>		
Design	Gray <sup>5)</sup>		
Membrane	Polyester		
Dark gray border around display	Similar to Pantone 432CV <sup>5)</sup>		
Light background	Similar to Pantone 427CV <sup>5)</sup>		
Gasket	Flat gasket around display front		
Housing	Metal		
Weight	Approx. 3.7 kg		
Environmental characteristics			
Ambient temperature			
Operation	0 to +50°C		
Bearings	-20 to +70°C		
Transport	-20 to +70°C		
Relative humidity	See 3.5.2 "Temperature humidity diagram", on page 133		
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		
Bearings	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		
Bearings	30 g, 15 ms		
Transport	30 g, 15 ms		
Protection	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)		
Altitude <sup>6)</sup>	Max. 3000 m		

Table 49: Technical data - 4PP320.1043-31 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) The actual value depends on the operating system or driver being used.
- 4) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 6) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).



### 3.5.2 Temperature humidity diagram

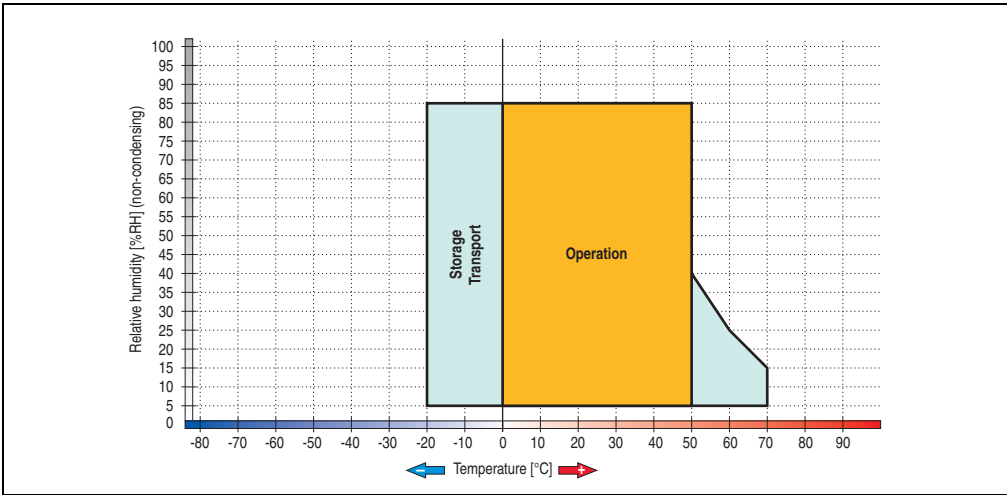


Figure 70: Temperature humidity diagram - 4PP320.1043-31

### 3.5.3 Dimensions

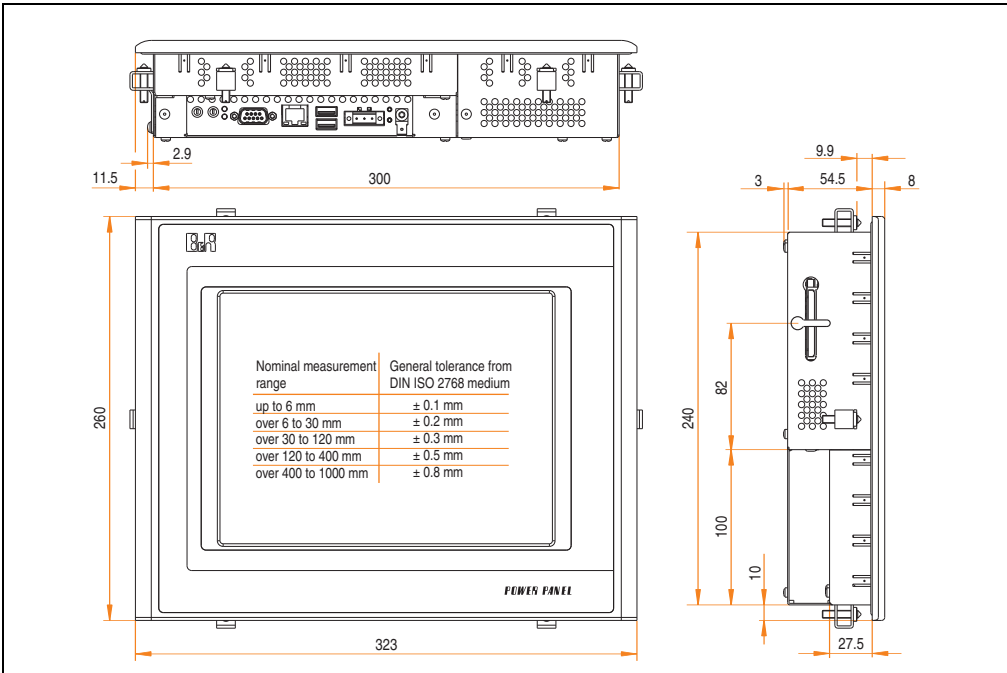


Figure 71: Dimensions - 4PP320.1043-31

### 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.

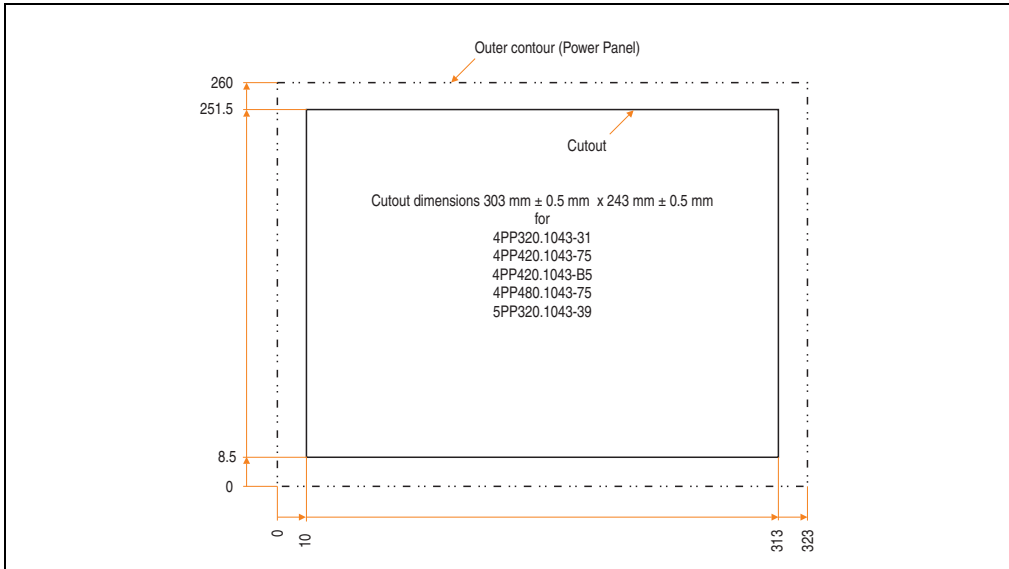


Figure 72: Cutout installation - 4PP320.1043-31

### 3.5.5 Contents of delivery

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

Amount	Component
1	Power Panel PP320 10.4in VGA, touch screen
6	Retaining clips included

Table 50: Contents of delivery - 4PP320.1043-31

### 3.6 Device 4PP320.1505-31

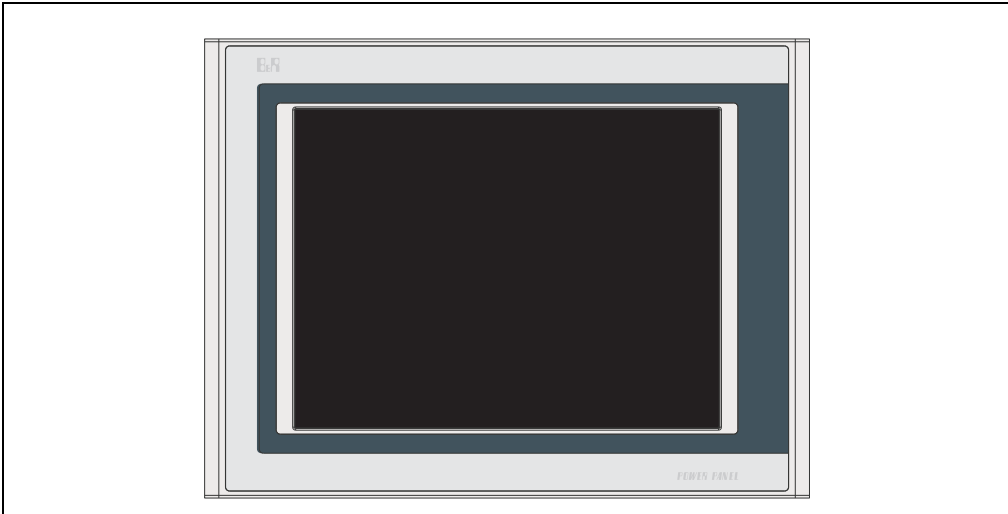


Figure 73: Front view - 4PP320.1505-31

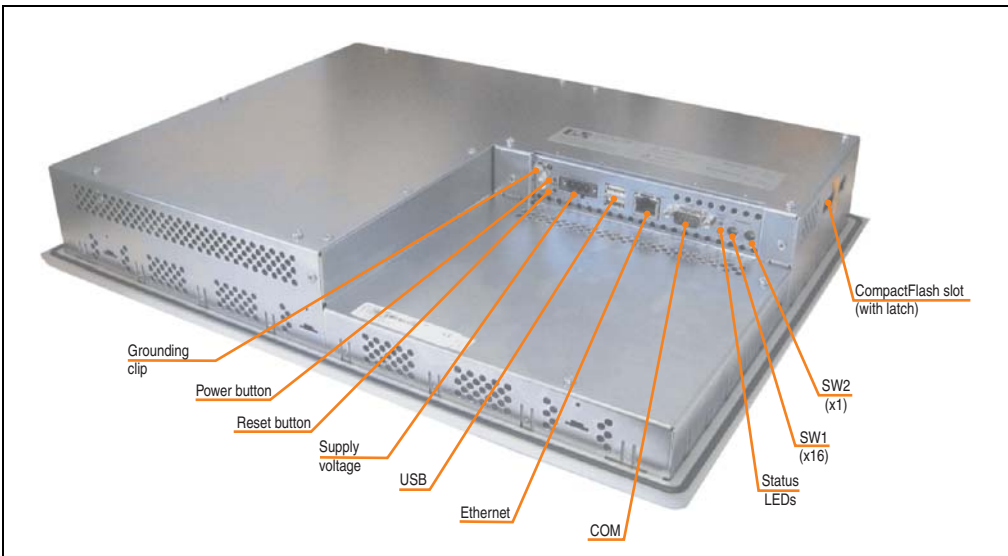


Figure 74: Rear view - 4PP320.1505-31

**3.6.1 Technical data**

Features	4PP320.1505-31 ≤ F0	4PP320.1505-31 ≥ G0	4PP320.1505-31 ≥ I0
B&R ID code	0xA17F		
Boot loader / Operating system	Automation Runtime		
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)		
Flash	2 MB (for firmware)		
Memory Type Size	DDR SDRAM 128 MB		
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)		
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	-		
Watchdog Controller	MTCX <sup>1)</sup>		
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> -		
Real-time clock (RTC) Battery-buffered Accuracy	- at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day		
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	-		
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 51: Technical data - 4PP320.1505-31

## Technical data • Power Panel 300 with Automation Runtime

Features	4PP320.1505-31 ≤ F0	4PP320.1505-31 ≥ G0	4PP320.1505-31 ≥ I0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB		
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>3)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>3)</sup> Type A Max. 500 mA per connection		
Reset button	Yes, accessible from the outside		
Power button	Yes, accessible from the outside		
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)		
Mode/Node switch	2, 16 digits each		
aPCI slots Holding torque for aPCI module	-		
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>4)</sup> Screen rotation	Color TFT 15 in (381 mm) 16.7 million colors <sup>3)</sup> XGA, 1024 x 768 pixels 400:1  Direction R / direction L = 85° Direction U / direction D = 85°  CCFL 250 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410		Color TFT 15 in (381 mm) 16.2 million colors <sup>3)</sup> XGA, 1024 x 768 pixels 1000:1  Direction R / direction L = 85° Direction U / direction D = 85°  LED 350 cd/m <sup>2</sup> 70000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Accu Touch Analog, resistive Elo, serial, 12- bit Up to 80% ±5%	AMT Analog, resistive Elo, serial, 12- bit Up to 80% ±5%	
Filter glass Degree of transmission Coating	-		
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-		

Table 51: Technical data - 4PP320.1505-31 (Forts.)

## Technical data • Power Panel 300 with Automation Runtime

Electrical characteristics	4PP320.1505-31 ≤ F0	4PP320.1505-31 ≥ G0	4PP320.1505-31 ≥ I0
Power supply			
Rated voltage	18 - 30 VDC		
Rated current	1.25 A		
Starting current	Max. 2 A		
Power consumption	Typically 30 W		
Electrical isolation	Yes		
Bleeder resistance	0 Ω		
Mechanical characteristics			
Outer dimensions			
Width	435 mm		
Height	330 mm		
Depth	71.5 mm		
Front			
Frame	Naturally anodized aluminum <sup>5)</sup>		
Design	Gray <sup>5)</sup>		
Membrane	Polyester		
Dark gray border around display	Similar to Pantone 432CV <sup>5)</sup>		
Light background	Similar to Pantone 427CV <sup>5)</sup>		
Gasket	Flat gasket around display front		
Housing	Metal		
Weight	Approx. 6.3 kg		
Environmental characteristics			
Ambient temperature			
Operation	0 to +50°C		
Bearings	-20 to +60°C		
Transport	-20 to +60°C		
Relative humidity	See 3.6.2 "Temperature humidity diagram", on page 139		
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		
Bearings	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		
Bearings	30 g, 15 ms		
Transport	30 g, 15 ms		
Protection	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)		
Altitude <sup>6)</sup>	Max. 3000 m		

Table 51: Technical data - 4PP320.1505-31 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) The actual value depends on the operating system or driver being used.
- 4) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 6) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.6.2 Temperature humidity diagram

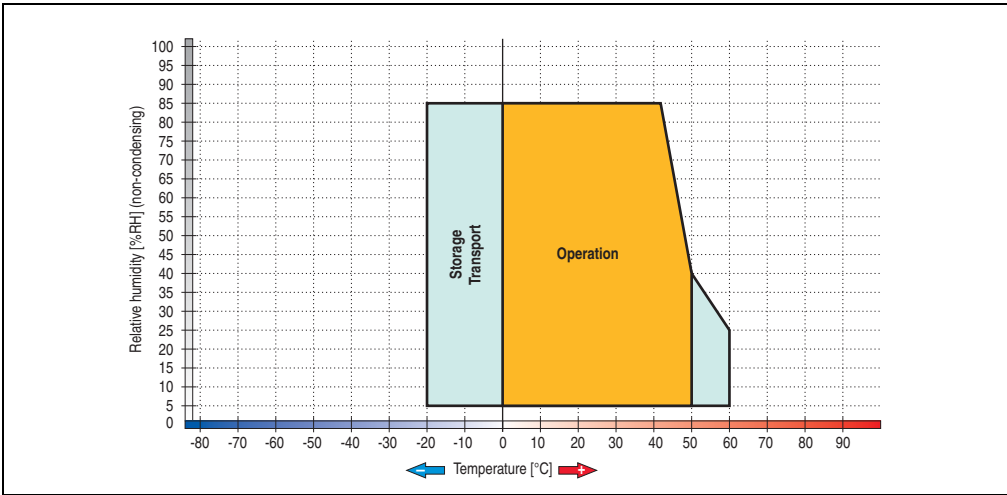


Figure 75: Temperature humidity diagram - 4PP320.1505-31

### 3.6.3 Dimensions

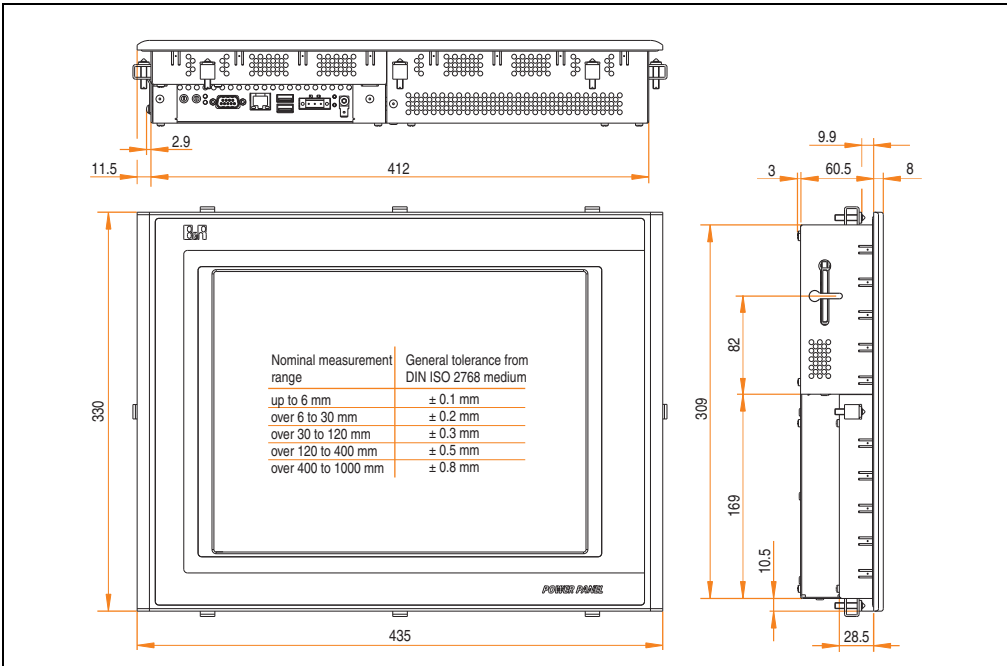


Figure 76: Dimensions - 4PP320.1505-31

### 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.

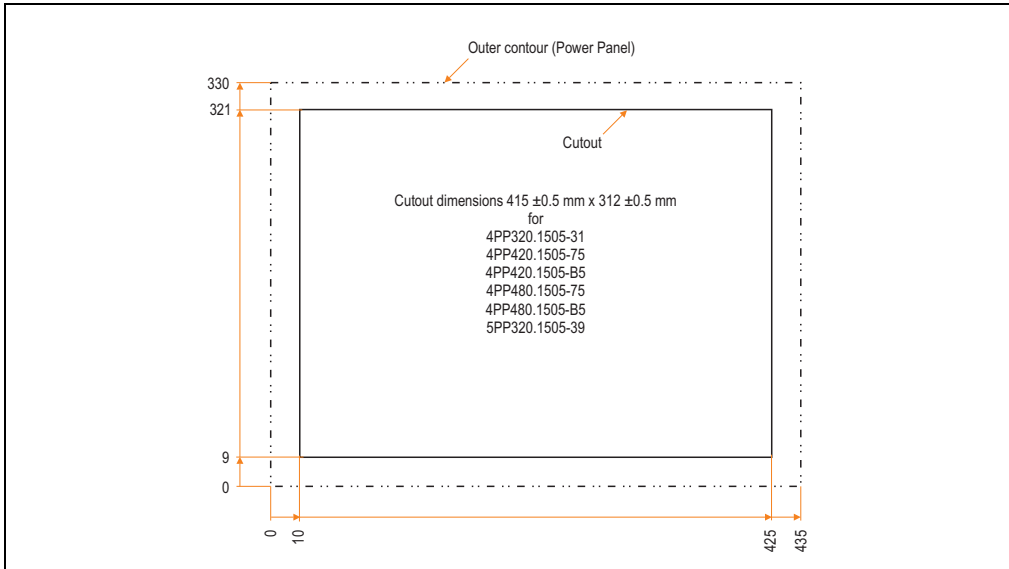


Figure 77: Cutout installation - 4PP320.1505-31

### 3.6.5 Contents of delivery

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

Amount	Component
1	Power Panel PP320 15in XGA, touch screen
8	Retaining clips included

Table 52: Contents of delivery - 4PP320.1505-31



### 3.7 Device 4PP351.0571-01

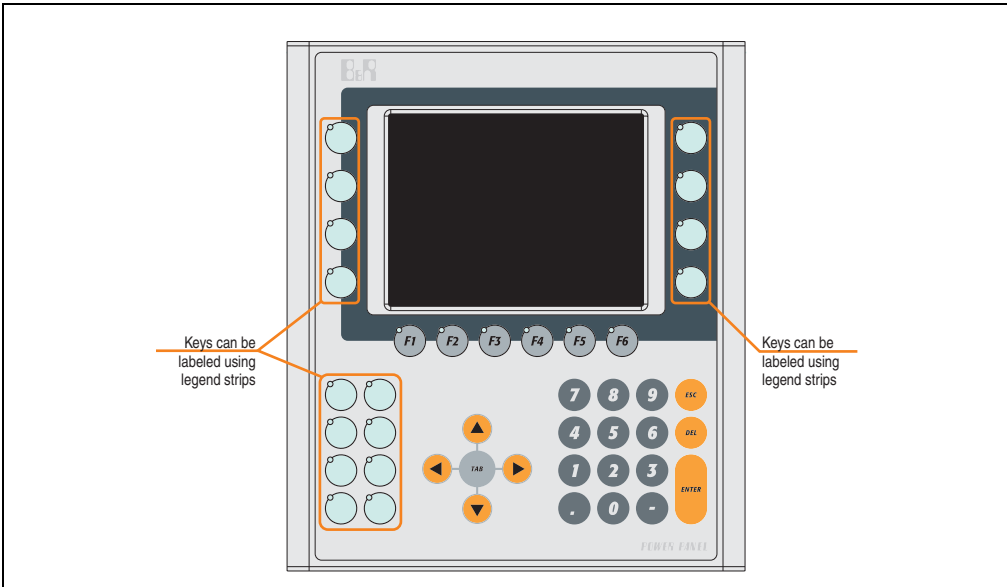


Figure 78: Front view - 4PP351.0571-01

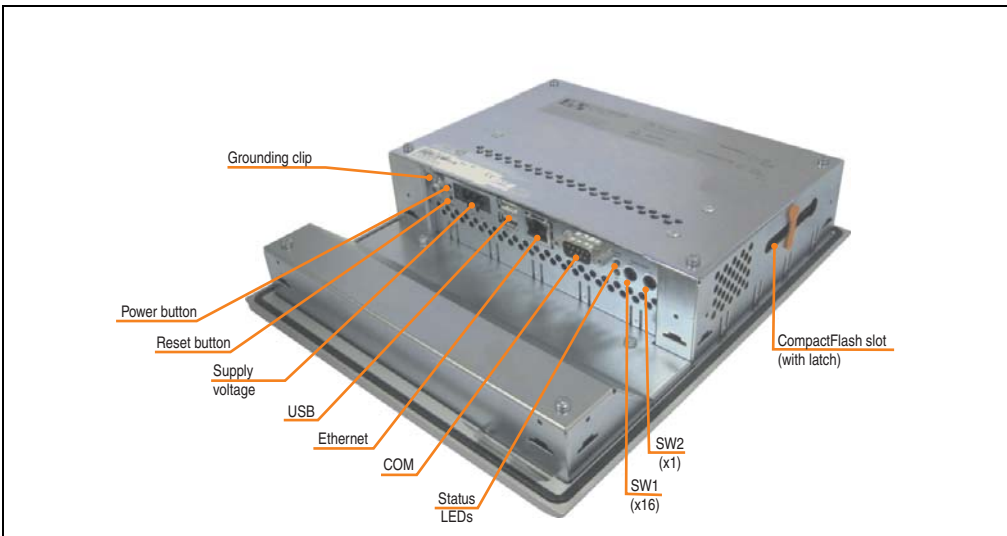


Figure 79: Rear view - 4PP351.0571-01

**3.7.1 Technical data**

Features	4PP351.0571-01 ≤ Rev. I0	4PP351.0571-01 ≥ Rev. H0
B&R ID code	0xA543	
Boot loader / Operating system	Automation Runtime	
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)	
Flash	2 MB (for firmware)	
Memory Type Size	DDR SDRAM 128 MB	
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)	
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	-	
Watchdog Controller	MTCX <sup>1)</sup>	
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> -	
Real-time clock (RTC) Battery-buffered Accuracy	- at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day	
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	-	
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 - 4PP351.0571-01

## Technical data • Power Panel 300 with Automation Runtime

Features	4PP351.0571-01 ≤ Rev. I0	4PP351.0571-01 ≥ Rev. H0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB	
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>3)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>3)</sup> Type A Max. 500 mA per connection	
Reset button	Yes, accessible from the outside	
Power button	Yes, accessible from the outside	
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)	
Mode/Node switch	2, 16 digits each	
aPCI slots Holding torque for aPCI module	-	
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 560) Horizontal Vertical Background lighting  Brightness Half-brightness time <sup>4)</sup> Screen rotation	Monochrome LCD 5.7 in (144 mm) 8 shades of gray <sup>3)</sup> QVGA, 320 x 240 pixels 25:1  Direction R / direction L = 40° Direction U = 40° / direction D = 50°  CCFL 220 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410	Monochrome LCD 5.7 in (144 mm) 8 shades of gray <sup>3)</sup> QVGA, 320 x 240 pixels 25:1  Direction R / direction L = 80° Direction U / direction D = 80°  LED 150 cd/m <sup>2</sup> 40000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	-	
Filter glass Degree of transmission Coating	-	
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	16 with LED (yellow) 6 with LED (yellow) 5 without LED 15 without LED - > 10 <sup>6</sup> actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green)  <b>Pressing more than one key at a time may result in so-called phantom keys,                      and may trigger unintended actions.</b>	

Table 53: Technical data - 4PP351.0571-01 (Forts.)

## Technical data • Power Panel 300 with Automation Runtime

Electrical characteristics	4PP351.0571-01 ≤ Rev. I0	4PP351.0571-01 ≥ Rev. H0
Power supply		
Rated voltage		18 - 30 VDC
Rated current		0.45 A
Starting current		Max. 1.2 A
Power consumption		Typically 10 W
Electrical isolation		Yes
Bleeder resistance		0 Ω
Mechanical characteristics		
Outer dimensions		
Width		212 mm
Height		245 mm
Depth		55.5 mm
Front		
Frame		Naturally anodized aluminum <sup>5)</sup>
Design		Gray <sup>7)</sup>
Membrane		Polyester
Dark gray border around display		Similar to Pantone 432CV <sup>7)</sup>
Light background		Similar to Pantone 427CV <sup>7)</sup>
Orange keys		Similar to Pantone 151CV <sup>7)</sup>
Dark gray keys		Similar to Pantone 431CV <sup>7)</sup>
Legend strips (gray)		Similar to Pantone 429CV <sup>7)</sup>
Gasket		Flat gasket around display front
Housing		Metal
Weight		Approx. 2 kg
Environmental characteristics		
Ambient temperature		
Operation		0 to +50°C
Bearings		-20 to +70°C
Transport		-20 to +70°C
Relative humidity		See 3.7.2 "Temperature humidity diagram", on page 145
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
Bearings		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
Bearings		30 g, 15 ms
Transport		30 g, 15 ms
Protection		IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude <sup>6)</sup>		Max. 3000 m

Table 53: Technical data - 4PP351.0571-01 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) The actual value depends on the operating system or driver being used.
- 4) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 6) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.7.2 Temperature humidity diagram

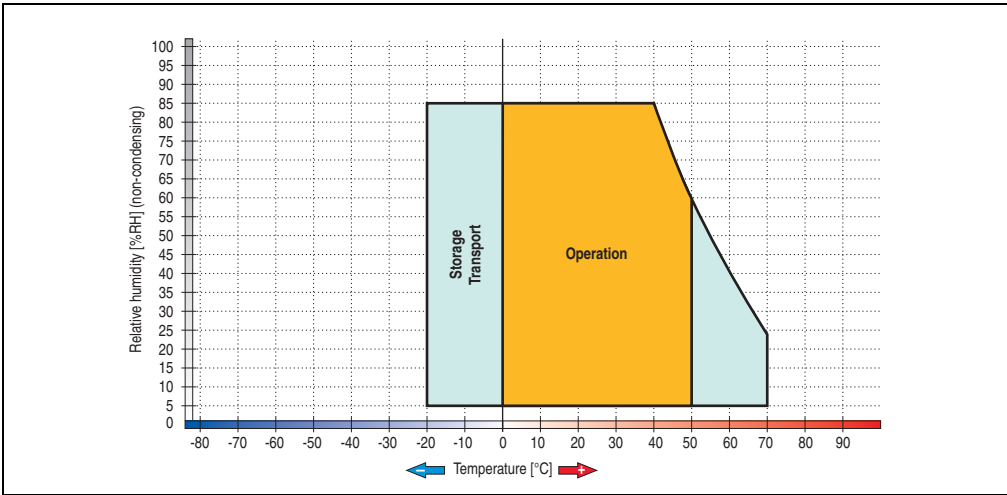


Figure 80: Temperature humidity diagram - 4PP351.0571-01

### 3.7.3 Dimensions

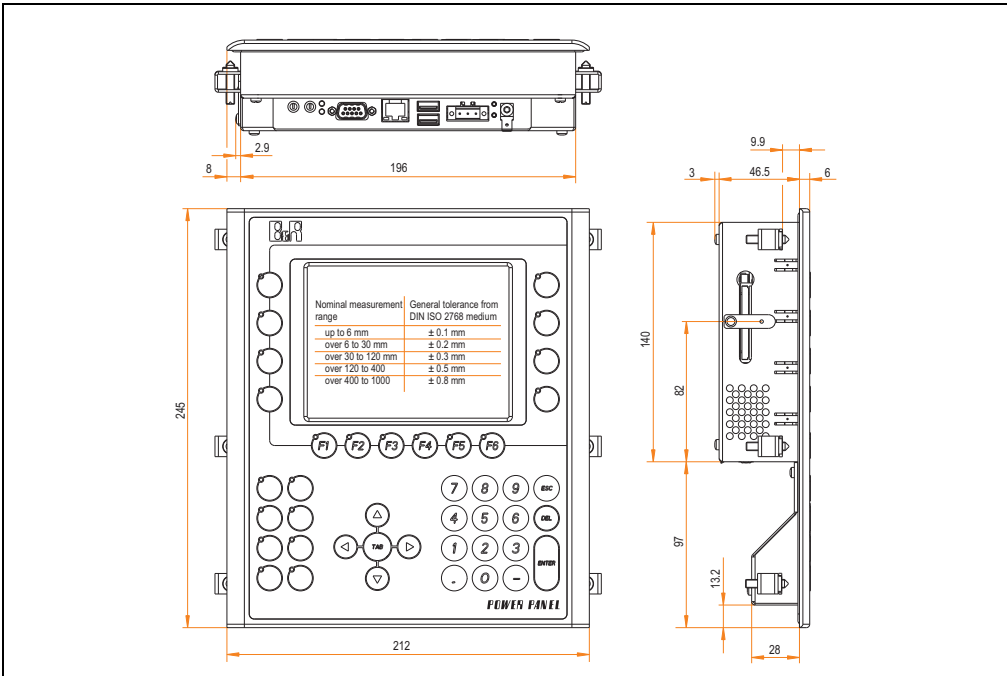


Figure 81: Dimensions - 4PP351.0571-01

### 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.

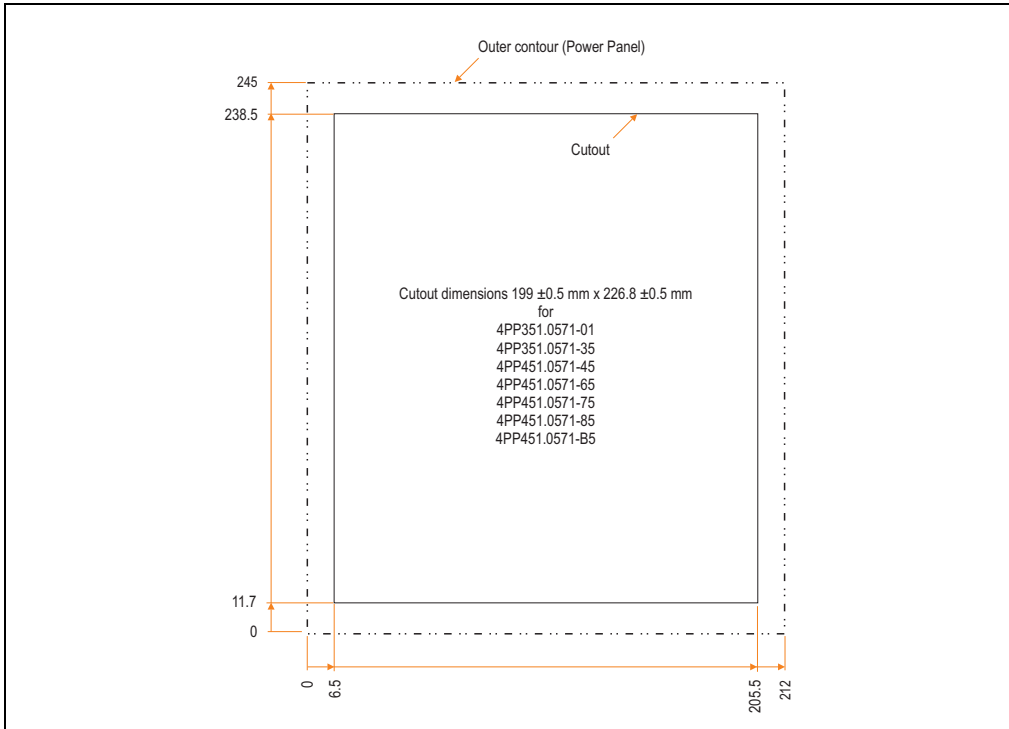


Figure 82: Cutout installation - 4PP351.0571-01

### 3.7.5 Contents of delivery

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

Amount	Component
1	Power Panel PP351 5.7in QVGA
4	Retaining clips included

Table 54: Contents of delivery - 4PP351.0571-01

### 3.8 Device 4PP351.0571-35

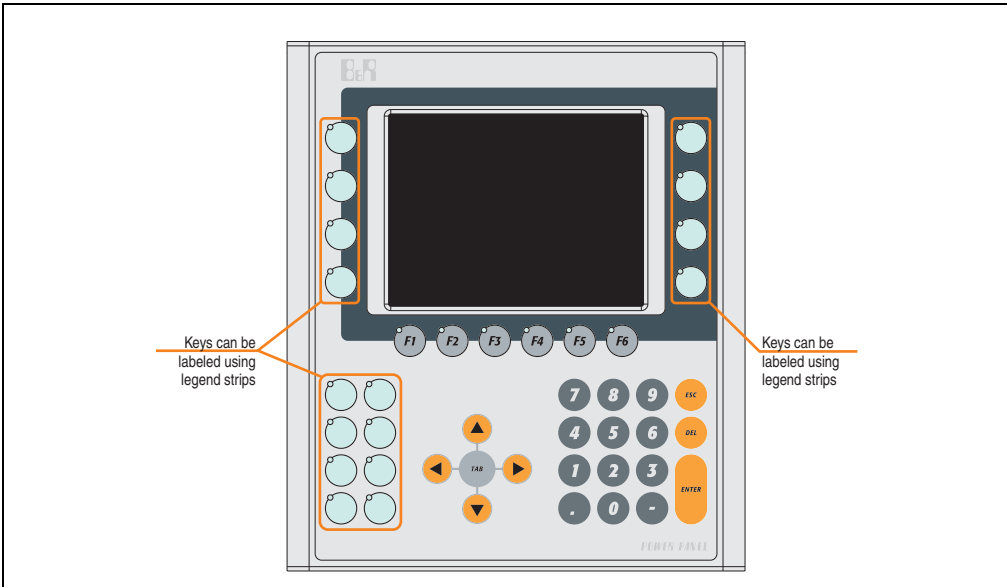


Figure 83: Front view - 4PP351.0571-35

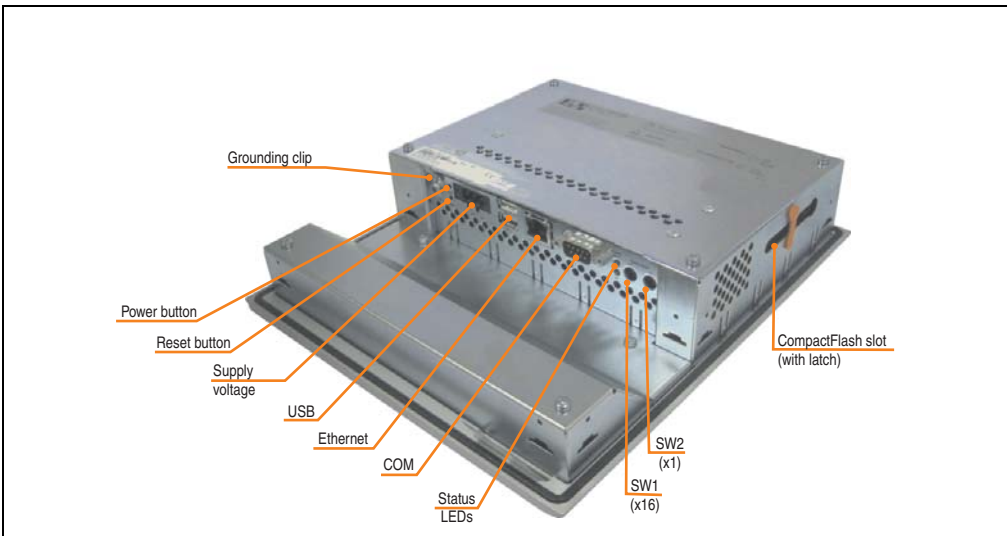


Figure 84: Rear view - 4PP351.0571-35

**3.8.1 Technical data**

Features	4PP351.0571-35 ≤ Rev. C0	4PP351.0571-35 ≥ Rev. D0
B&R ID code	0xA541	
Boot loader / Operating system	Automation Runtime	
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)	
Flash	2 MB (for firmware)	
Memory Type Size	DDR SDRAM 128 MB	
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)	
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	-	
Watchdog Controller	MTCX <sup>1)</sup>	
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> -	
Real-time clock (RTC) Battery-buffered Accuracy	- at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day	
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	-	
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 - 4PP351.0571-35



## Technical data • Power Panel 300 with Automation Runtime

Features	4PP351.0571-35 ≤ Rev. C0	4PP351.0571-35 ≥ Rev. D0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB	
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>3)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>3)</sup> Type A Max. 500 mA per connection	
Reset button	Yes, accessible from the outside	
Power button	Yes, accessible from the outside	
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)	
Mode/Node switch	2, 16 digits each	
aPCI slots Holding torque for aPCI module	-	
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>4)</sup> Screen rotation	Color TFT 5.7 in (144 mm) 262144 <sup>3)</sup> QVGA, 320 x 240 pixels 400:1  Direction R / direction L = 60° Direction U = 40° / direction D = 50°  CCFL 500 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410	Color TFT 5.7 in (144 mm) 262144 colors <sup>3)</sup> QVGA, 320 x 240 pixels 350:1  Direction R / direction L = 65° Direction U = 65° / direction D = 40°  CCFL 500 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	-	
Filter glass Degree of transmission Coating	-	
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	16 with LED (yellow) 6 with LED (yellow) 5 without LED 15 without LED  -  > 10 <sup>6</sup> actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green)  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>	

Table 55: Technical data - 4PP351.0571-35 (Forts.)

## Technical data • Power Panel 300 with Automation Runtime

Electrical characteristics	4PP351.0571-35 ≤ Rev. C0	4PP351.0571-35 ≥ Rev. D0
Power supply		
Rated voltage		18 - 30 VDC
Rated current		0.45 A
Starting current		Max. 1.2 A
Power consumption		Typically 10 W
Electrical isolation		Yes
Bleeder resistance		0 Ω
Mechanical characteristics		
Outer dimensions		
Width		212 mm
Height		245 mm
Depth		55.5 mm
Front		
Frame		Naturally anodized aluminum <sup>5)</sup>
Design		Gray <sup>7)</sup>
Membrane		Polyester
Dark gray border around display		Similar to Pantone 432CV <sup>7)</sup>
Light background		Similar to Pantone 427CV <sup>7)</sup>
Orange keys		Similar to Pantone 151CV <sup>7)</sup>
Dark gray keys		Similar to Pantone 431CV <sup>7)</sup>
Legend strips (gray)		Similar to Pantone 429CV <sup>7)</sup>
Gasket		Flat gasket around display front
Housing		Metal
Weight		Approx. 2 kg
Environmental characteristics		
Ambient temperature		
Operation		0 to +50°C
Bearings		-20 to +60°C
Transport		-20 to +60°C
Relative humidity		See 3.8.2 "Temperature humidity diagram", on page 151
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
Bearings		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
Bearings		30 g, 15 ms
Transport		30 g, 15 ms
Protection		IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude <sup>6)</sup>		Max. 3000 m

Table 55: Technical data - 4PP351.0571-35 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) The actual value depends on the operating system or driver being used.
- 4) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 6) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.8.2 Temperature humidity diagram

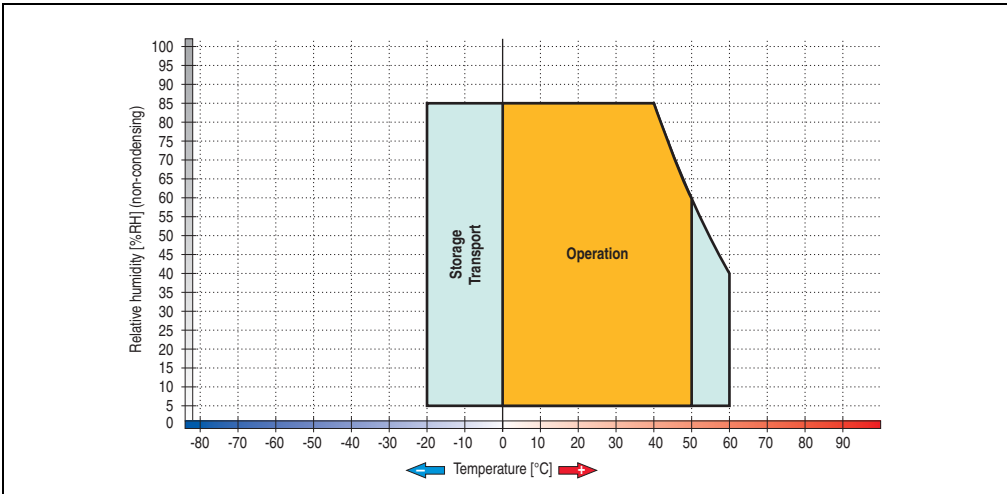


Figure 85: Temperature humidity diagram - 4PP351.0571-35

### 3.8.3 Dimensions

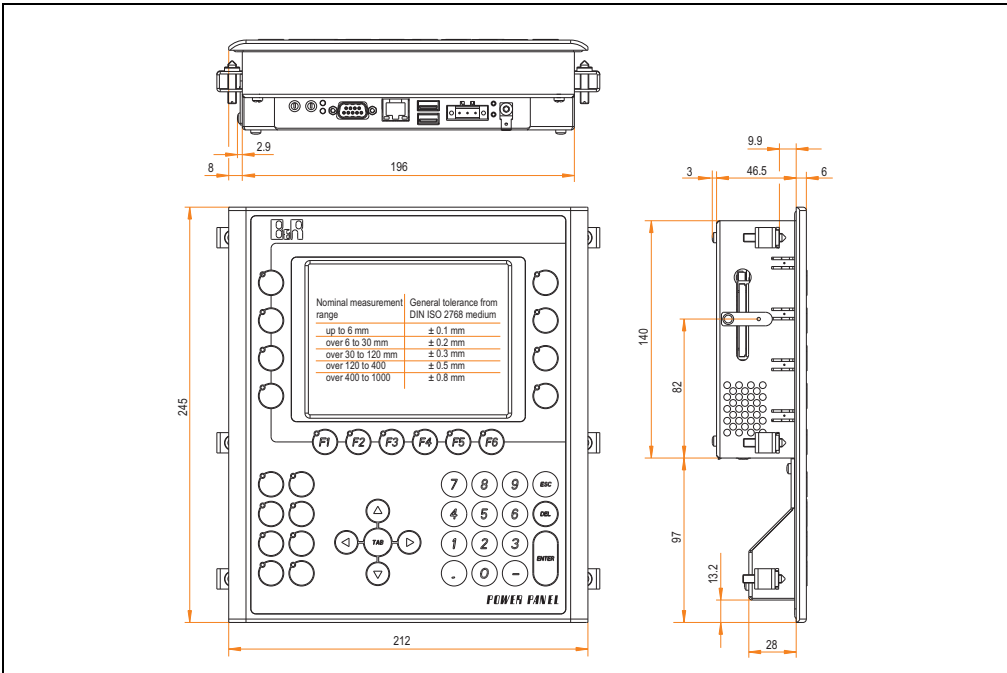


Figure 86: Dimensions - 4PP351.0571-35

### 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.

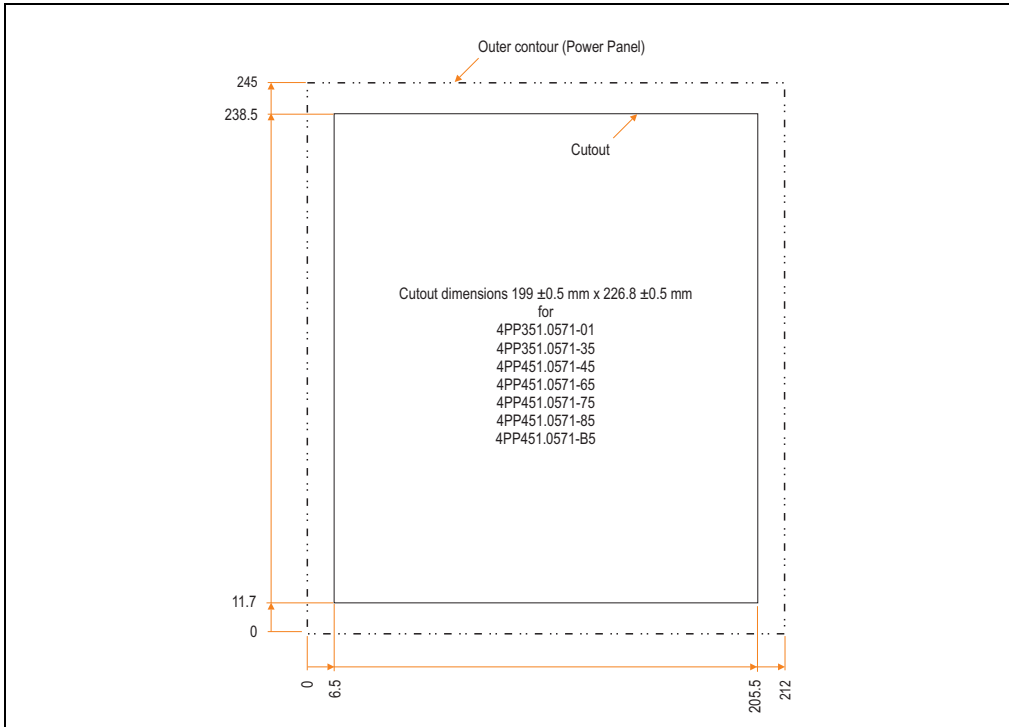


Figure 87: Cutout installation - 5PP351.0571-35

### 3.8.5 Contents of delivery

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

Amount	Component
1	Power Panel PP351 5.7in QVGA
4	Retaining clips included

Table 56: Contents of delivery - 4PP351.0571-35

### 3.9 Device 4PP352.0571-35

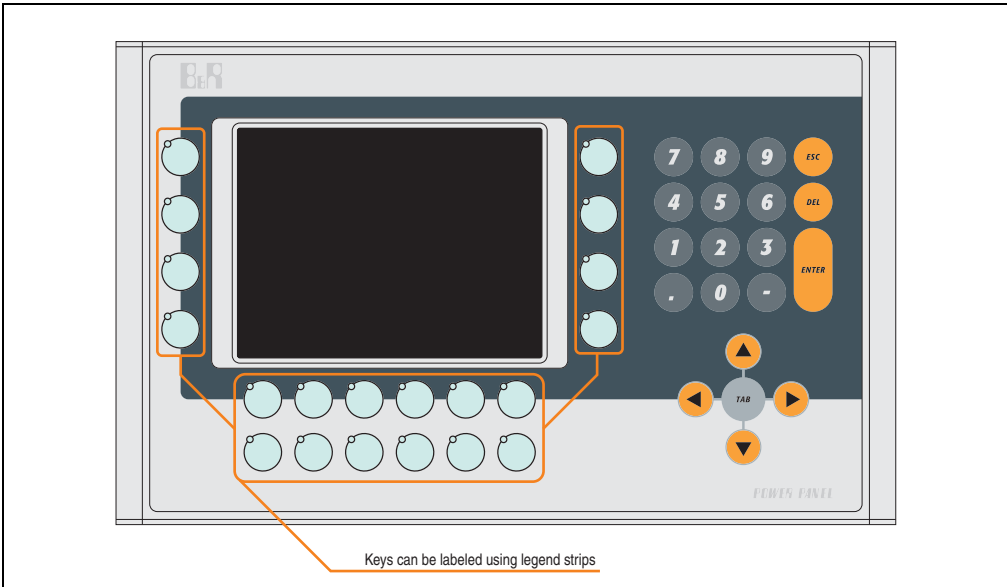


Figure 88: Front view - 4PP352.0571-35

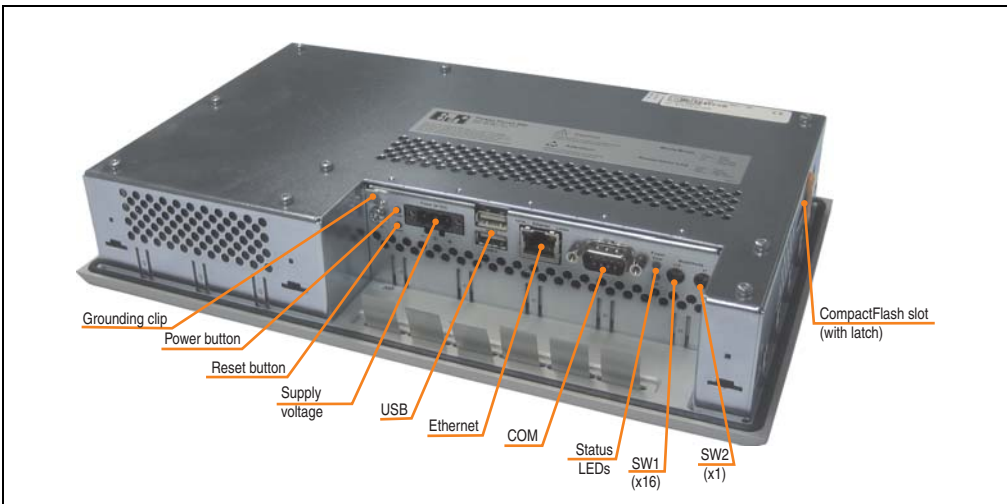


Figure 89: Rear view - 4PP352.0571-35

**3.9.1 Technical data**

Features	4PP352.0571-35 ≤ Rev. C0	4PP352.0571-35 ≥ Rev. D0
B&R ID code	0xA542	
Boot loader / Operating system	Automation Runtime	
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)	
Flash	2 MB (for firmware)	
Memory Type Size	DDR SDRAM 128 MB	
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)	
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	-	
Watchdog Controller	MTCX <sup>1)</sup>	
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> -	
Real-time clock (RTC) Battery-buffered Accuracy	- at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day	
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	-	
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 - 4PP352.0571-35

## Technical data • Power Panel 300 with Automation Runtime

Features	4PP352.0571-35 ≤ Rev. C0	4PP352.0571-35 ≥ Rev. D0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB	
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>3)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>3)</sup> Type A Max. 500 mA per connection	
Reset button	Yes, accessible from the outside	
Power button	Yes, accessible from the outside	
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)	
Mode/Node switch	2, 16 digits each	
aPCI slots Holding torque for aPCI module	-	
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>4)</sup> Screen rotation	Color TFT 5.7 in (144 mm) 262144 colors <sup>4)</sup> QVGA, 320 x 240 pixels 400:1  Direction R / direction L = 60° Direction U = 40° / direction D = 50°  CCFL 500 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410	Color TFT 5.7 in (144 mm) 262144 colors <sup>3)</sup> QVGA, 320 x 240 pixels 350:1  Direction R / direction L = 65° Direction U = 65° / direction D = 40°  CCFL 500 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	-	
Filter glass Degree of transmission Coating	-	
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	20 with LED (yellow) - 5 without LED 15 without LED - > 10 <sup>6</sup> actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green)  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>	

Table 57: Technical data - 4PP352.0571-35 (Forts.)

## Technical data • Power Panel 300 with Automation Runtime

Electrical characteristics	4PP352.0571-35 ≤ Rev. C0	4PP352.0571-35 ≥ Rev. D0
Power supply		
Rated voltage		18 - 30 VDC
Rated current		0.45 A
Starting current		Max. 1.2 A
Power consumption		Typically 10 W
Electrical isolation		Yes
Bleeder resistance		0 Ω
Mechanical characteristics		
Outer dimensions		
Width		302 mm
Height		187 mm
Depth		55.5 mm
Front		
Frame		Naturally anodized aluminum <sup>5)</sup>
Design		Gray <sup>7)</sup>
Membrane		Polyester
Dark gray border around display		Similar to Pantone 432CV <sup>7)</sup>
Light background		Similar to Pantone 427CV <sup>7)</sup>
Orange keys		Similar to Pantone 151CV <sup>7)</sup>
Dark gray keys		Similar to Pantone 431CV <sup>7)</sup>
Legend strips (gray)		Similar to Pantone 429CV <sup>7)</sup>
Gasket		Flat gasket around display front
Housing		Metal
Weight		Approx. 2.2 kg
Environmental characteristics		
Ambient temperature		
Operation		0 to +50°C
Bearings		-20 to +60°C
Transport		-20 to +60°C
Relative humidity		See 3.9.2 "Temperature humidity diagram", on page 157
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
Bearings		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
Bearings		30 g, 15 ms
Transport		30 g, 15 ms
Protection		IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude <sup>6)</sup>		Max. 3000 m

Table 57: Technical data - 4PP352.0571-35 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) The actual value depends on the operating system or driver being used.
- 4) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 6) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).



### 3.9.2 Temperature humidity diagram

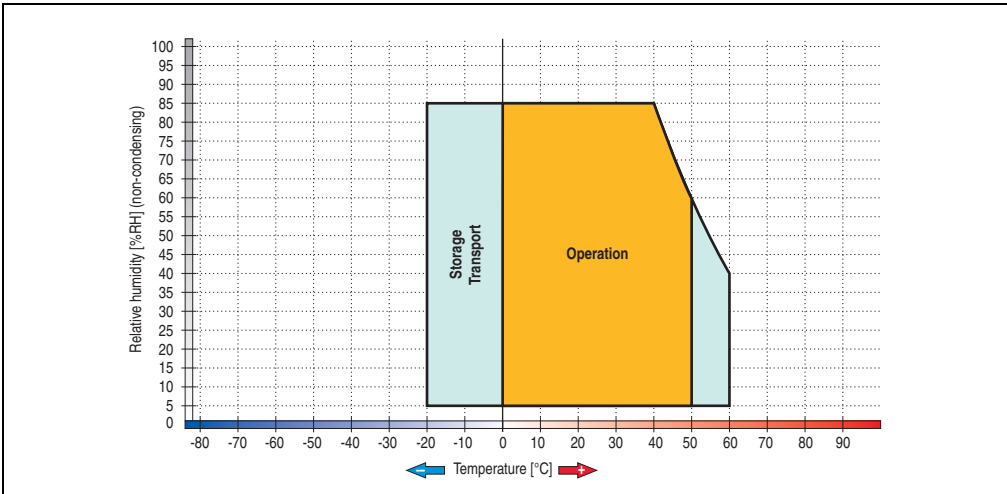


Figure 90: Temperature humidity diagram - 4PP352.0571-35

### 3.9.3 Dimensions

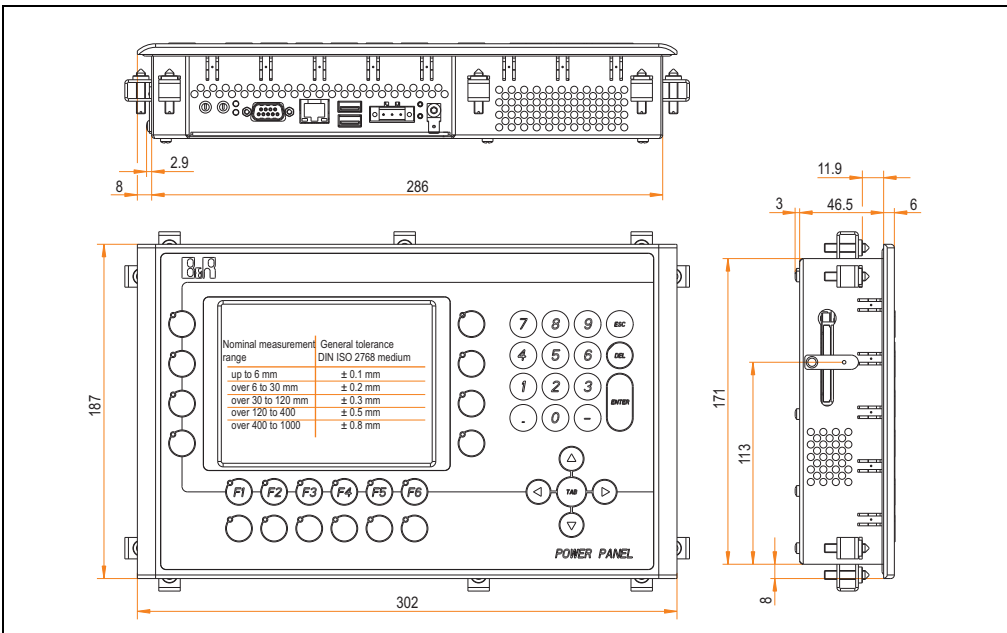


Figure 91: Dimensions - 4PP352.0571-35

### 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.

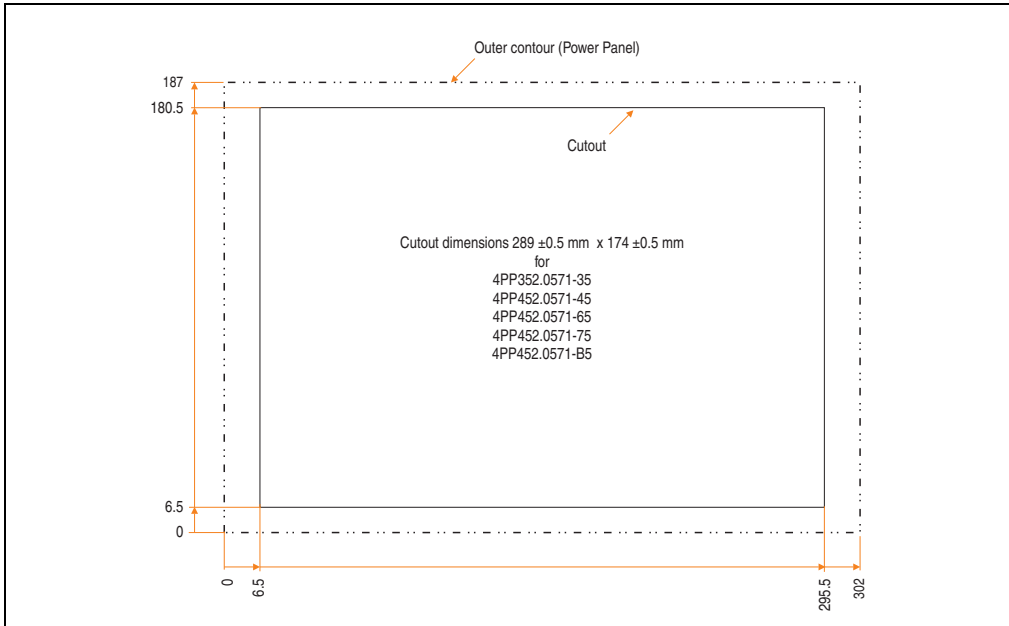


Figure 92: Cutout installation - 5PP352.0571-35

### 3.9.5 Contents of delivery

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

Amount	Component
1	Power Panel PP352 5.7in QVGA
4	Retaining clips included

Table 58: Contents of delivery - 4PP352.0571-35

3.10 Device 4PP381.1043-31

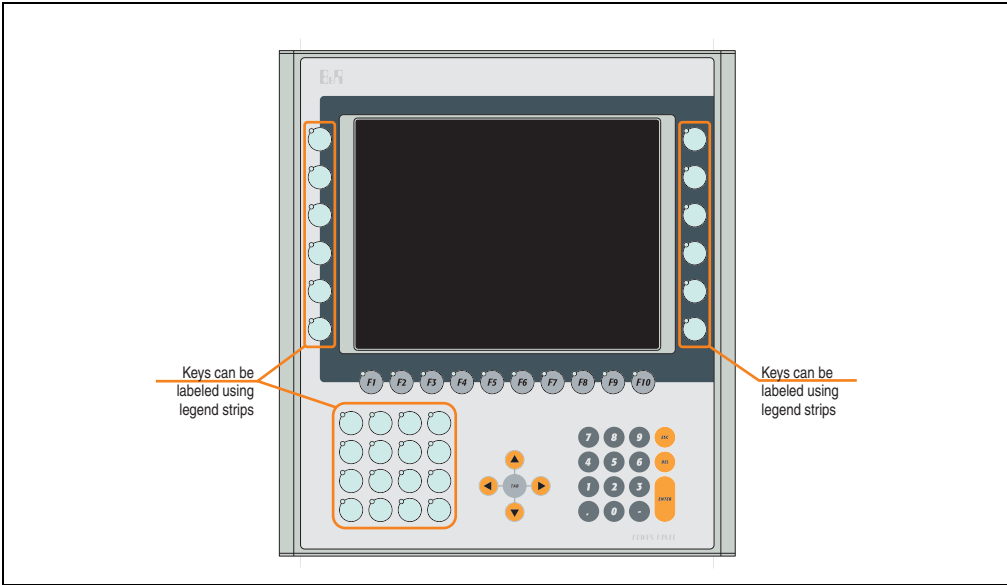


Figure 93: Front view - 4PP381.1043-31

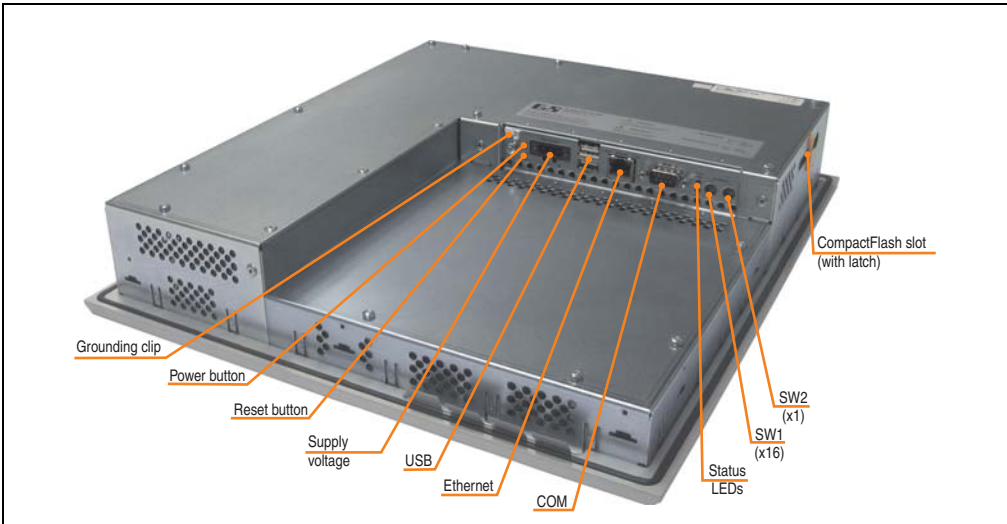


Figure 94: Rear view - 4PP381.1043-31

**3.10.1 Technical data**

Features	4PP381.1043-31 ≤ F0	4PP381.1043-31 ≥ G0	4PP381.1043-31 ≥ J0
B&R ID code	0xA544		
Boot loader / Operating system	Automation Runtime		
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)		
Flash	2 MB (for firmware)		
Memory Type Size	DDR SDRAM 128 MB		
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)		
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	-		
Watchdog Controller	MTCX <sup>1)</sup>		
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> -		
Real-time clock (RTC) Battery-buffered Accuracy	- at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day		
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	-		
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 - 4PP381.1043-31

## Technical data • Power Panel 300 with Automation Runtime

Features	4PP381.1043-31 ≤ F0	4PP381.1043-31 ≥ G0	4PP381.1043-31 ≥ J0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB		
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>3)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>3)</sup> Type A Max. 500 mA per connection		
Reset button	Yes, accessible from the outside		
Power button	Yes, accessible from the outside		
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)		
Mode/Node switch	2, 16 digits each		
aPCI slots Holding torque for aPCI module	-		
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>4)</sup> Screen rotation	Color TFT 10.4 in (264 mm) 262144 colors VGA, 640 x 480 pixels 600:1  Direction R / direction L = 70° Direction U = 45° / direction D = 35°  CCFL 450 cd/m <sup>2</sup> 55000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410		Color TFT 10.4 in (264 mm) 262144 colors VGA, 640 x 480 pixels 900:1  Direction R / direction L = 80° Direction U / direction D = 80°  LED 450 cd/m <sup>2</sup> 70000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Accu Touch Analog, resistive Elo, serial, 12- bit Up to 80% ±5%	AMT Analog, resistive Elo, serial, 12- bit Up to 80% ±5%	
Filter glass Degree of transmission Coating	-		
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	28 with LED (yellow) 10 with LED (yellow) 5 without LED 15 without LED - > 10 <sup>6</sup> actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green)  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>		

Table 59: Technical data - 4PP381.1043-31 (Forts.)

## Technical data • Power Panel 300 with Automation Runtime

Electrical characteristics	4PP381.1043-31 ≤ F0	4PP381.1043-31 ≥ G0	4PP381.1043-31 ≥ J0
Power supply			
Rated voltage		18 - 30 VDC	
Rated current		0.45 A	
Starting current		Max. 1.2 A	
Power consumption		Typically 10 W	
Electrical isolation		Yes	
Bleeder resistance		0 Ω	
Mechanical characteristics			
Outer dimensions			
Width		323 mm	
Height		358 mm	
Depth		65.5 mm	
Front			
Frame		Naturally anodized aluminum <sup>5)</sup>	
Design		Gray <sup>7)</sup>	
Membrane		Polyester	
Dark gray border around display		Similar to Pantone 432CV <sup>7)</sup>	
Light background		Similar to Pantone 427CV <sup>7)</sup>	
Orange keys		Similar to Pantone 151CV <sup>7)</sup>	
Dark gray keys		Similar to Pantone 431CV <sup>7)</sup>	
Legend strips (gray)		Similar to Pantone 429CV <sup>7)</sup>	
Gasket		Flat gasket around display front	
Housing		Metal	
Weight		Approx. 4.6 kg	
Environmental characteristics			
Ambient temperature			
Operation		0 to +50°C	
Bearings		-20 to +70°C	
Transport		-20 to +70°C	
Relative humidity		See 3.10.2 "Temperature humidity diagram", on page 163	
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	
Bearings		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	
Bearings		30 g, 15 ms	
Transport		30 g, 15 ms	
Protection		IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude <sup>6)</sup>		Max. 3000 m	

Table 59: Technical data - 4PP381.1043-31 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) The actual value depends on the operating system or driver being used.
- 4) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 6) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 3.10.2 Temperature humidity diagram

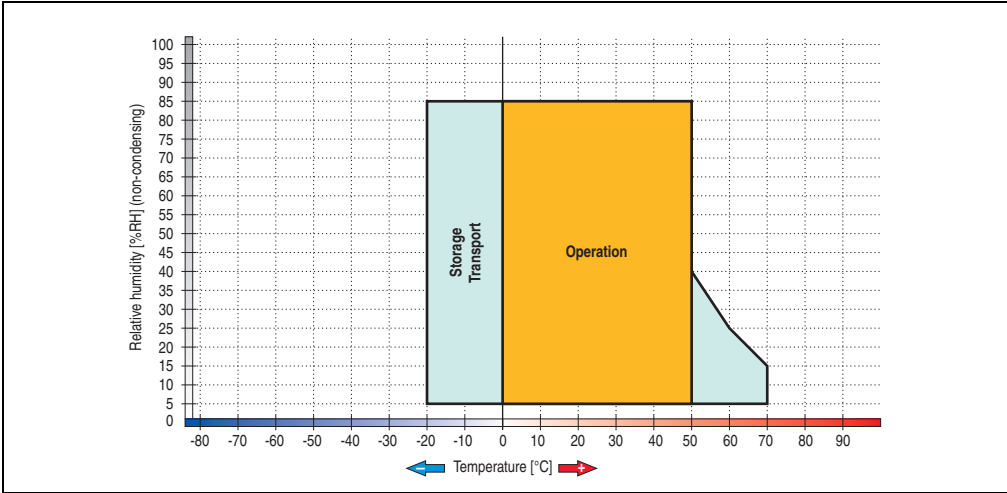


Figure 95: Temperature humidity diagram - 4PP381.1043-31

### 3.10.3 Dimensions

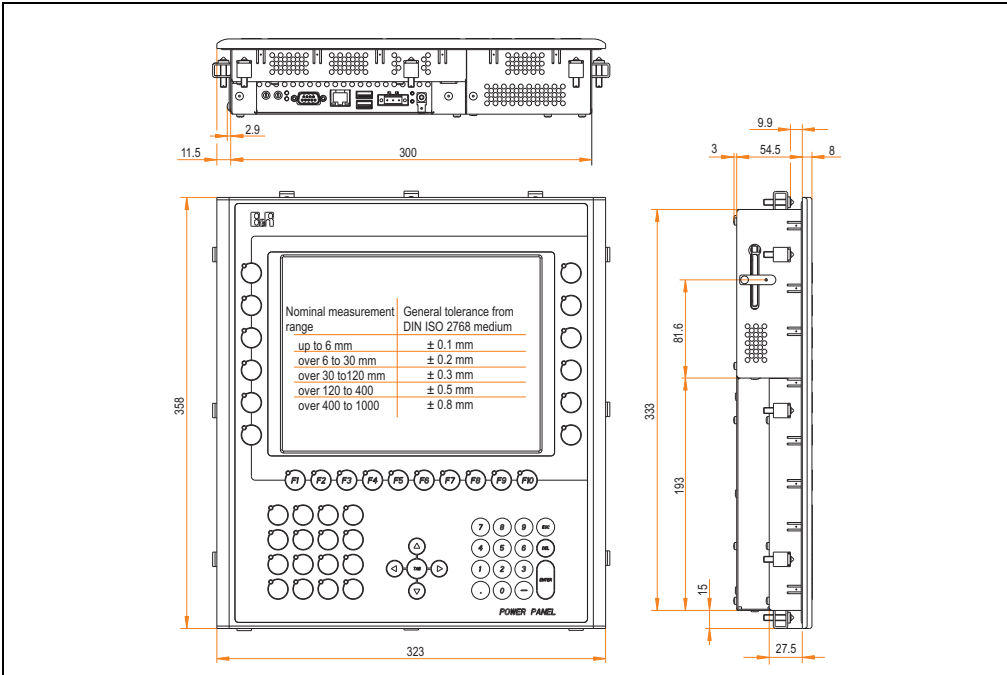


Figure 96: Dimensions - 4PP381.1043-31

### 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.

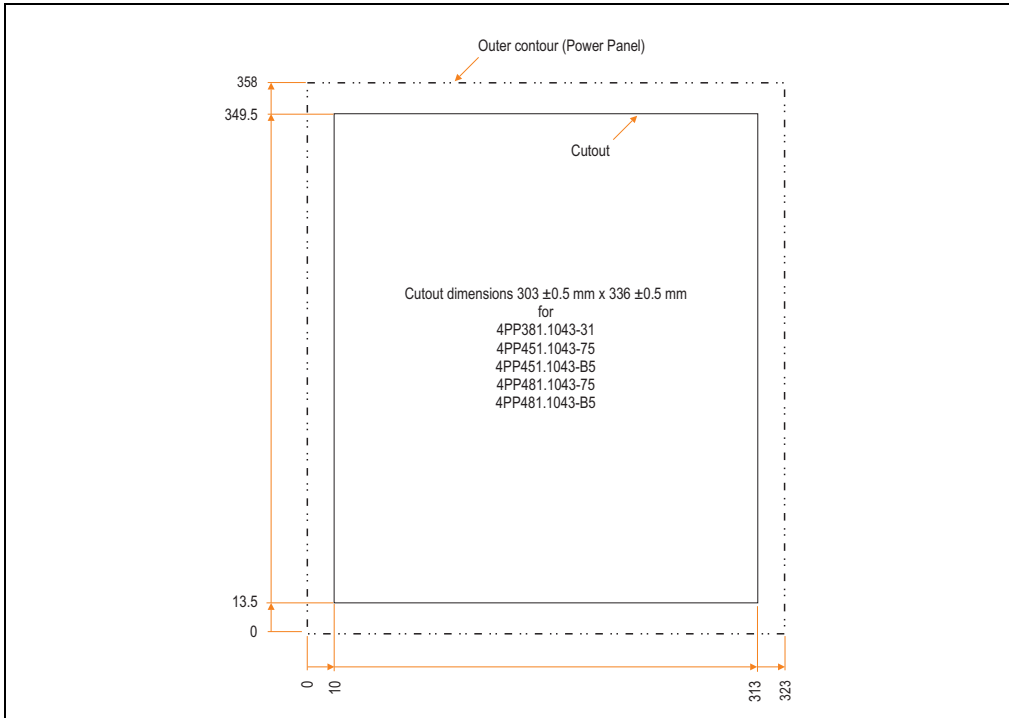


Figure 97: Cutout installation - 4PP381.1043-31

### 3.10.5 Contents of delivery

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

Amount	Component
1	Power Panel PP381 10.4in QVGA, touch screen
6	Retaining clips included

Table 60: Contents of delivery - 4PP381.1043-31



## 4. Power Panel 400 with Automation Runtime

### 4.1 Device interfaces

The following section provides a description of all interfaces and plugs possible with a Power Panel 400 device with Automation Runtime.

#### 4.1.1 Supply voltage

Input voltage: 18 - 30 VDC

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

Pin assignment information can be found either in the following table or printed on the Power Panel plate. The supply voltage is internally protected so that the device cannot be damaged if there is an overload (fuse replacement necessary) or if the voltage supply is connected incorrectly (reverse polarity protection - fuse replacement not necessary).

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




Figure 98: Supply voltage connection

### Ground

## Warning!

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

### 4.1.2 Functional grounding clip

A functional grounding clip is located next to the supply voltage plug. The grounding clip (functional ground) must be connected with a central grounding point on the control cabinet using a 6.3 mm blade connector via the shortest distance and with as little resistance as possible (e.g. copper strip, but must be at least 2.5 mm<sup>2</sup>).

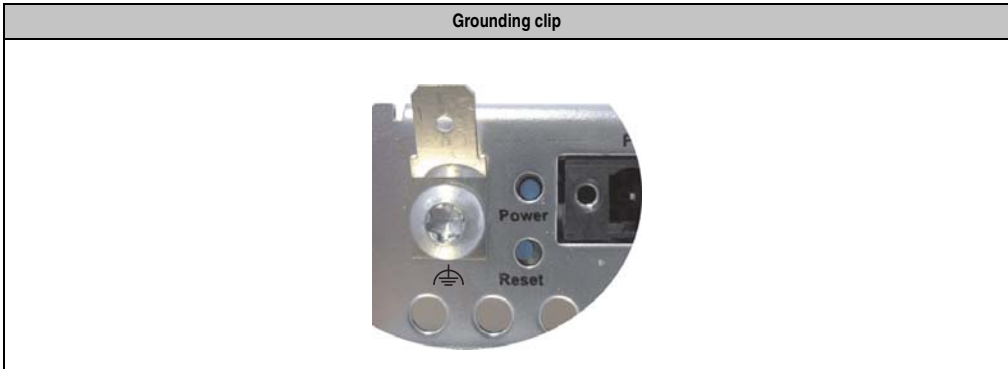


Figure 99: Functional grounding clip

### 4.1.3 Serial interface COM

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	
Type	RS232, modem-capable, not electrically isolated
UART	16C550 compatible, 16-byte FIFO
Transfer rate	Up to 115 kBaud
Pin	Assignment
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

9-pin DSUB plug




Table 61 : Pin assignments - COM

### 4.1.4 USB ports

The Power Panel 300/400 devices have a USB 2.0 (Universal Serial Bus) host controller with multiple USB ports, two of which are on the outside for easy user access.


Universal serial bus		
Transfer rate <sup>1)</sup>	Low speed (1.5 Mbit/s), Full Speed (12 Mbit/s) to high speed (480 Mbit/s)	2x USB Type A, female 
Power supply	Max. 500 mA per port <sup>2)</sup>	
Maximum Cable length	5 m (not including hub)	

Table 62: USB ports

1) The actual value depends on the operating system or driver being used.

2) For safety, every USB port is equipped with a maintenance free "USB current-limiting circuit breaker" (max. 500 mA)

## Warning!

Peripheral USB devices can be connected to the USB ports. Due to the vast number of USB devices available on the market, B&R cannot guarantee their performance. B&R does ensure the performance of all USB devices that they provide.

## Warning!

Because of general PC specifications, these interfaces 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 to FD are available for any purpose in an application and can be evaluated by the application program.

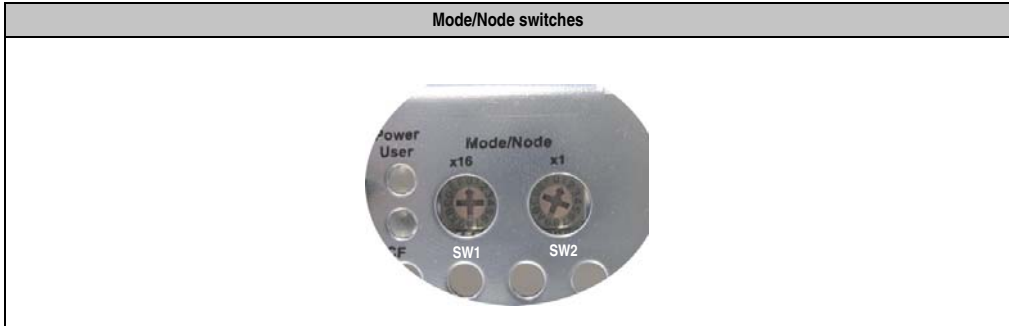


Table 63: Mode/Node switches

Chapter 2  
Technical data

Switch position		Function	Description
SW1 (x16)	SW2 (x1)		
0	0	Boot	Automation Runtime boot mode for operating system (firmware, BIOS) upgrade (default: Automation Runtime). In this position, a new or missing operating system can be downloaded.  <b>Information:</b> <b>For detailed information, see chapter 4 "Software" section3 "Upgrade information", on page 470.</b>
0 ... F	0 ... D	Node	Automation Runtime run mode with node 01-FD (CompactFlash Automation Runtime or terminal operation). Freely available for CompactFlash users, 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 64: Switch settings for the Mode/Node switch

#### 4.1.6 BIOS boot mode switch

Power Panel devices are equipped with a BIOS boot mode switch.

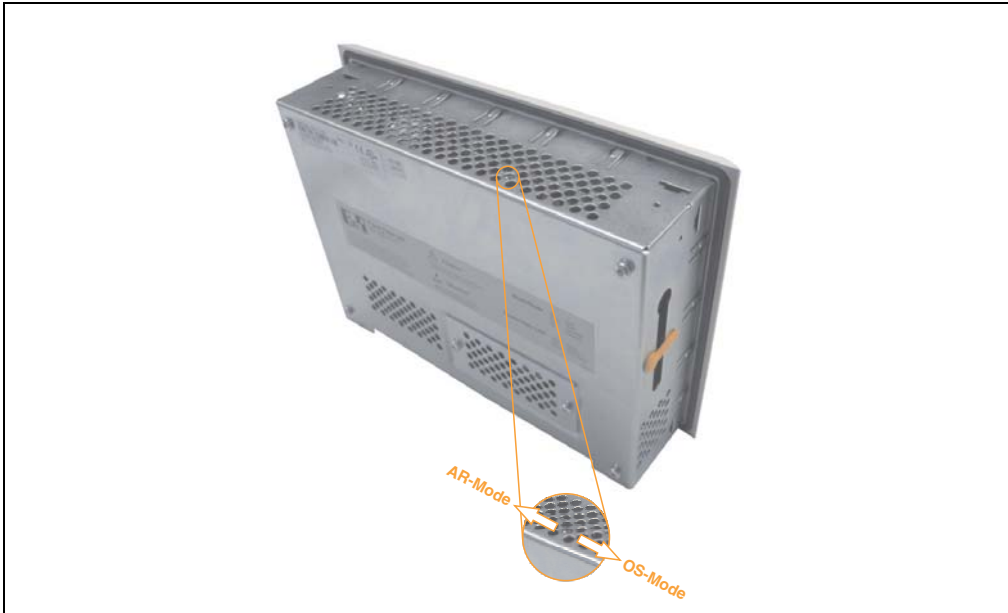


Figure 100: BIOS boot mode switch

Switch position	Function	Description
Right (toward CF slot)	OS mode	The Power Panel will boot in OS mode.
Left	AR mode	The Power Panel will boot in AR mode.

Table 65: BIOS boot mode switch positions (based on the image)

## Warning!

Carefully use a pointed object to change switch position.

## OS mode

- Standard Boot Screen (see section 1 "Power Panel 300 with BIOS", on page 413)
- BIOS Setup can be started by pressing the "DEL" key.
- When the switch is in the "00" position, the setup default values will be restored after restarting three times.

## AR mode

The device will be initialized for Automation Runtime when AR mode is enabled.

- Other boot screen (see section 2 "Power Panel 300/400 with Automation Runtime", on page 466)
- USB Boot "Enabled" (only in switch position "00")1)

### 4.1.7 Status LEDs

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

Status LEDs			
LED	Color		Meaning
Power	Green	On	Supply voltage OK
	Red	On	The system is in standby mode (S5: soft-off mode or S4: hibernate mode - suspend-to-disk)
User	Yellow	On	Can be used as desired by the user (for example, can be switched on/off directly using the ADI library - only possible in S0 state)
	Green	Off	
CF	Yellow	On	Indicates access to CompactFlash drive (read or write)

1x three-color, 1x one-color




Table 66: Status LEDs

### 4.1.8 Ethernet interface

Ethernet interface		
Controller	Intel 82551ER	
Cabling	S/STP (category 5)	
Transfer rate	10/100 Mbit/s <sup>1)</sup>	
LED	On	Off
Green	100 Mbit/s	10 Mbit/s
Orange	Link (Ethernet network connection available)	Activity (blinking) (Data transfer in progress)

RJ45 twisted pair (10BaseT/100BaseT), female




Table 67: Ethernet interface

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



### 4.1.9 Power button


Power button	
<p>The power button can be pressed with a pointed object (e.g. paper clip or tip of a pen).</p> <p>If the Power button is pushed, the Power Panel is switched off and remains in Standby mode.</p>	

Table 68: Power button

### 4.1.10 Reset button

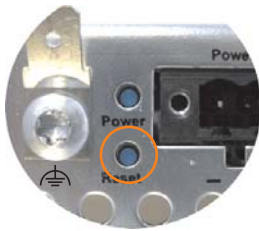
Reset button	
<p>The reset button can be pressed with a pointed object (e.g. paper clip or tip of a pen).</p> <p>Pushing the reset button results in a hardware-reset. This restarts the Power Panel.</p> <p>The MTCX processor is not reset when the reset button is pressed.</p>	

Table 69: Reset button

## Warning!

**A system reset can result in data loss!**

### 4.1.11 CompactFlash slot

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



Figure 101: 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.

## Caution!

**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.**

### 4.1.12 aPCI Slot(s)

Either 1 or 2 aPCI slots are available depending on the Power Panel variant. B&R System 2005 aPCI interface modules can be inserted (available aPCI interface modules - see B&R homepage - Products - Control systems - System 2005 - Communication modules).

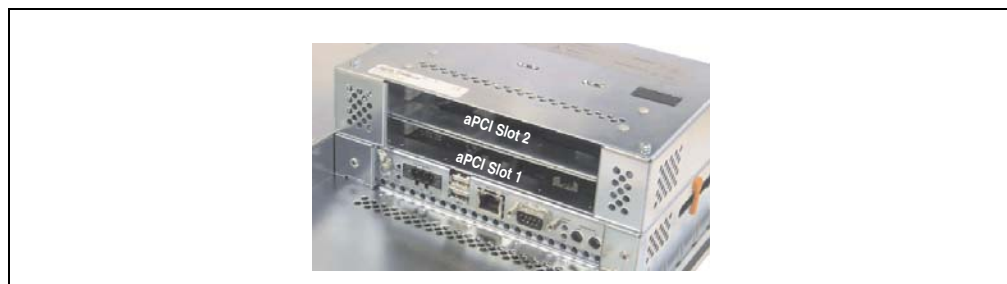


Figure 102: aPCI Slot(s)

## 4.2 Stickers

### 4.2.1 Device label

The following sticker can be found in a suitable location on the Power Panel device:

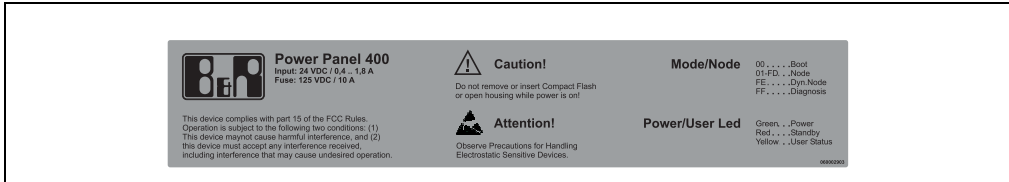


Figure 103: Device label

### 4.2.2 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

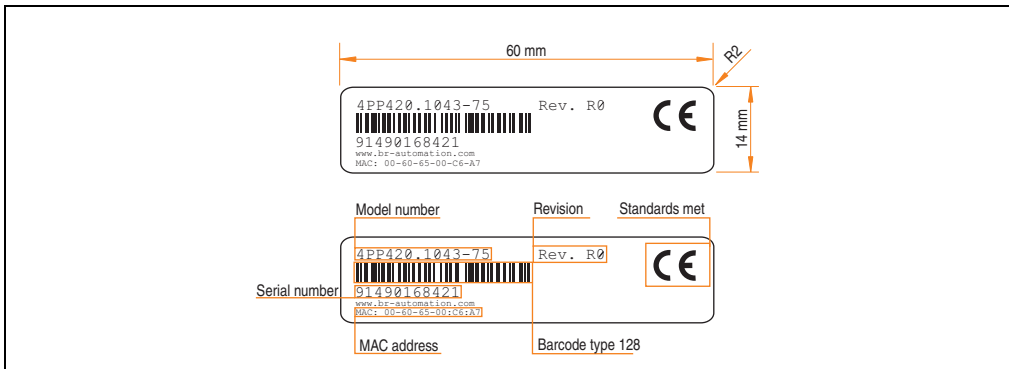


Figure 104: Design/dimensions - Serial number sticker

Information on the Internet

Information about each device can also be found on the B&R homepage. Enter the device's serial number in the serial number search field on the start page [www.br-automation.com](http://www.br-automation.com). The search also works if you enter the model number or the material number in the material number search field.



Figure 105: Example - Material number search: 4PP420.0571-45

### 4.3 Device 4PP420.0571-45

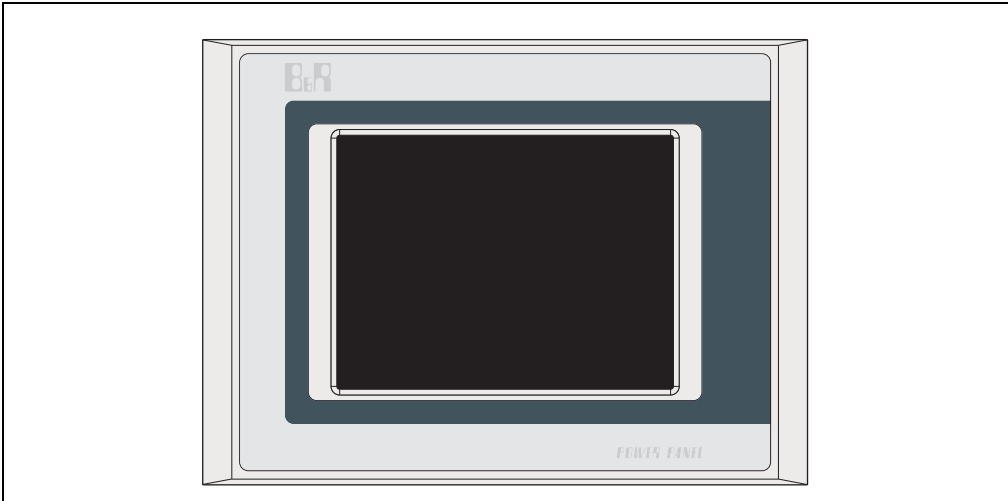


Figure 106: Front view - 4PP420.0571-45

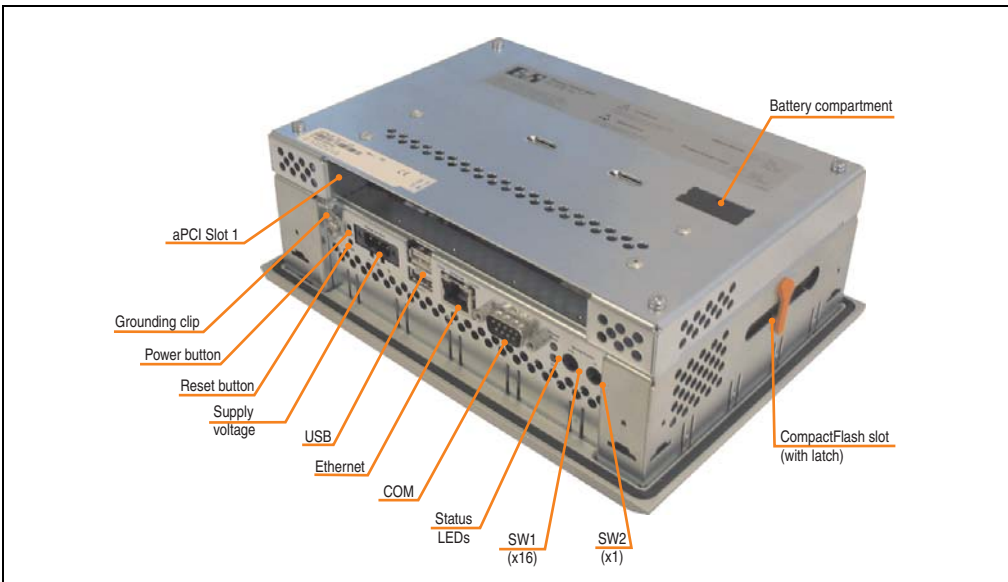


Figure 107: Rear view - 4PP420.0571-45

**4.3.1 Technical data**

Features	4PP420.0571-45 ≤ Rev. F0	4PP420.0571-45 ≥ Rev. G0	4PP420.0571-45 ≥ Rev. J0
B&R ID code	0x23B9		
Boot loader / Operating system	Automation Runtime		
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)		
Flash	2 MB (for firmware)		
Memory Type Size	DDR SDRAM 128 MB (64 MB < Rev. C0)		
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)		
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB		
Watchdog Controller	MTCX <sup>1)</sup>		
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms		
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day		
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes		
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 70: Technical data - 4PP420.0571-45

## Technical data • Power Panel 400 with Automation Runtime

Features	4PP420.0571-45 ≤ Rev. F0	4PP420.0571-45 ≥ Rev. G0	4PP420.0571-45 ≥ Rev. J0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB		
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection		
Reset button	Yes, accessible from the outside		
Power button	Yes, accessible from the outside		
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)		
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 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	Monochrome LCD 5.7 in (144 mm) 8 shades of gray <sup>4)</sup> QVGA, 320 x 240 pixels 25:1  Direction R / direction L = 40° Direction U = 40° / direction D = 50°  CCFL 220 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410		Monochrome LCD 5.7 in (144 mm) 8 shades of gray <sup>4)</sup> QVGA, 320 x 240 pixels 25:1  Direction R / direction L = 80° Direction U / direction D = 80°  LED 150 cd/m <sup>2</sup> 40000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	Gunze Analog, resistive Elo, serial, 12- bit Up to 80% ±5%	AMT Analog, resistive Elo, serial, 12- bit Up to 80% ±5%	
Filter glass Degree of transmission Coating	-		
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-		

Table 70: Technical data - 4PP420.0571-45 (Forts.)

## Technical data • Power Panel 400 with Automation Runtime

Electrical characteristics	4PP420.0571-45 ≤ Rev. F0	4PP420.0571-45 ≥ Rev. G0	4PP420.0571-45 ≥ Rev. J0
Power supply			
Rated voltage		18 - 30 VDC	
Rated current		0.5 A	
Starting current		Max. 1.2 A	
Power consumption		Typically 12 W	
Electrical isolation		Yes	
Bleeder resistance		0 Ω	
Mechanical characteristics			
Outer dimensions			
Width		212 mm	
Height		156 mm	
Depth		76 mm	
Front			
Frame		Naturally anodized aluminum <sup>6)</sup>	
Design		Gray <sup>6)</sup>	
Membrane		Polyester	
Dark gray border around display		Similar to Pantone 432CV <sup>6)</sup>	
Light background		Similar to Pantone 427CV <sup>6)</sup>	
Gasket		Flat gasket around display front	
Housing		Metal	
Weight		Approx. 1.7 kg (without aPCI interface modules)	
Environmental characteristics			
Ambient temperature			
Operation		0 to +50°C	
Bearings		-20 to +70°C	
Transport		-20 to +70°C	
Relative humidity		See 4.3.2 "Temperature humidity diagram", on page 181	
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	
Bearings		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	
Bearings		30 g, 15 ms	
Transport		30 g, 15 ms	
Protection		IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover)	
		IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude <sup>7)</sup>		Max. 3000 m	

Table 70: Technical data - 4PP420.0571-45 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.
- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 7) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).



### 4.3.2 Temperature humidity diagram

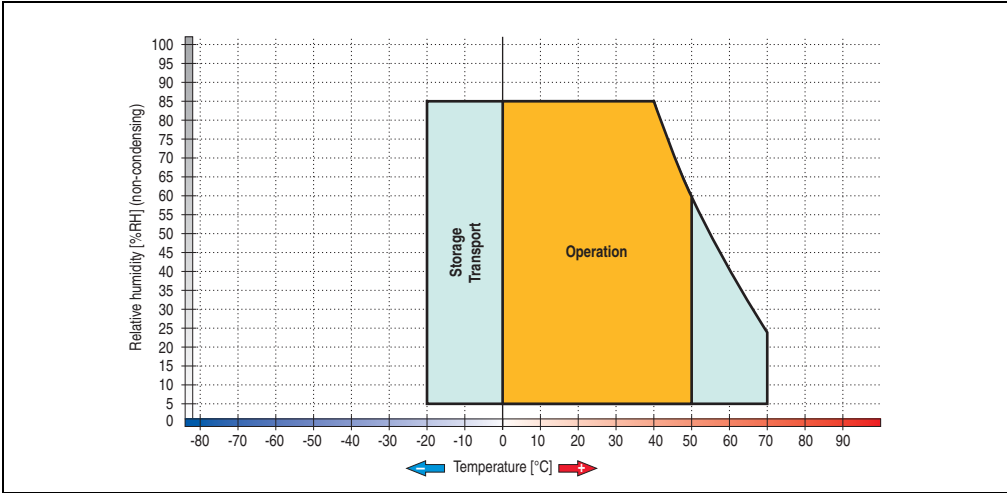


Figure 108: Temperature humidity diagram - 4PP420.0571-45

### 4.3.3 Dimensions

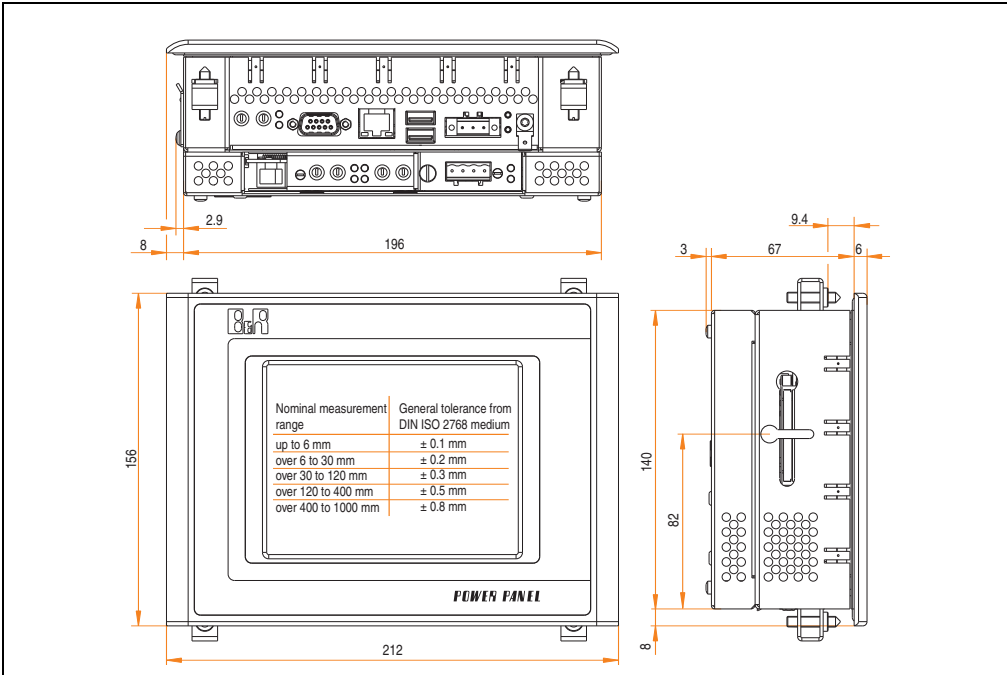


Figure 109: Dimensions - 4PP420.0571-45

### 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.

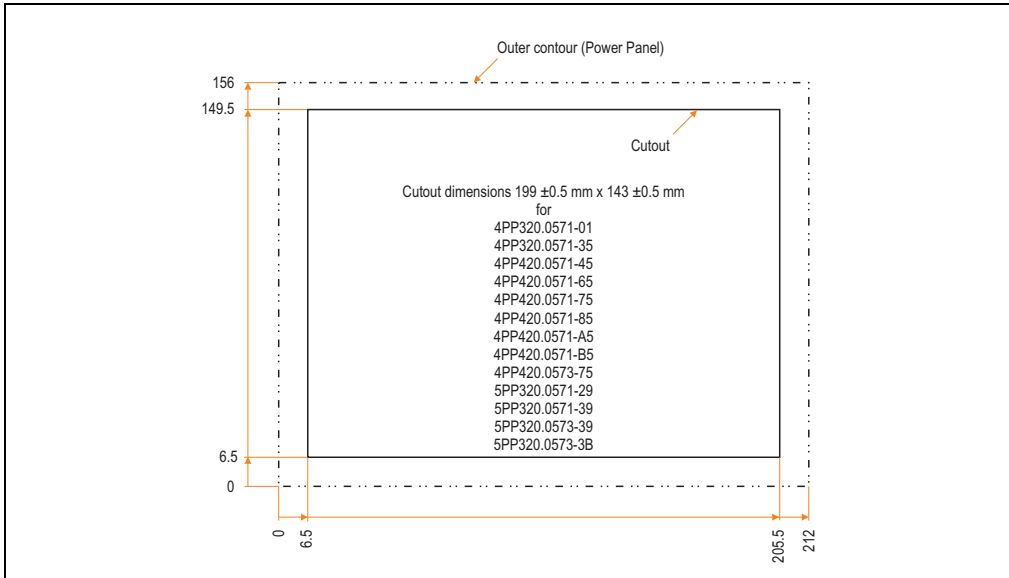


Figure 110: Cutout installation - 4PP420.0571-45

### 4.3.5 Contents of delivery

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

Amount	Component
1	Power Panel PP420 5.7in QVGA, 1 aPCI, touch screen
4	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 71: Contents of delivery - 4PP420.0571-45

## 4.4 Device 4PP420.0571-65

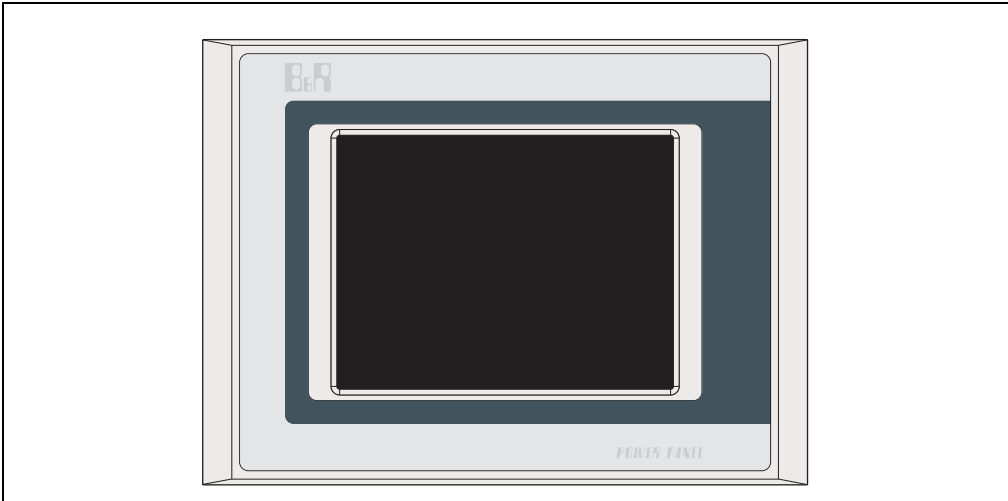


Figure 111: Front view - 4PP420.0571-65

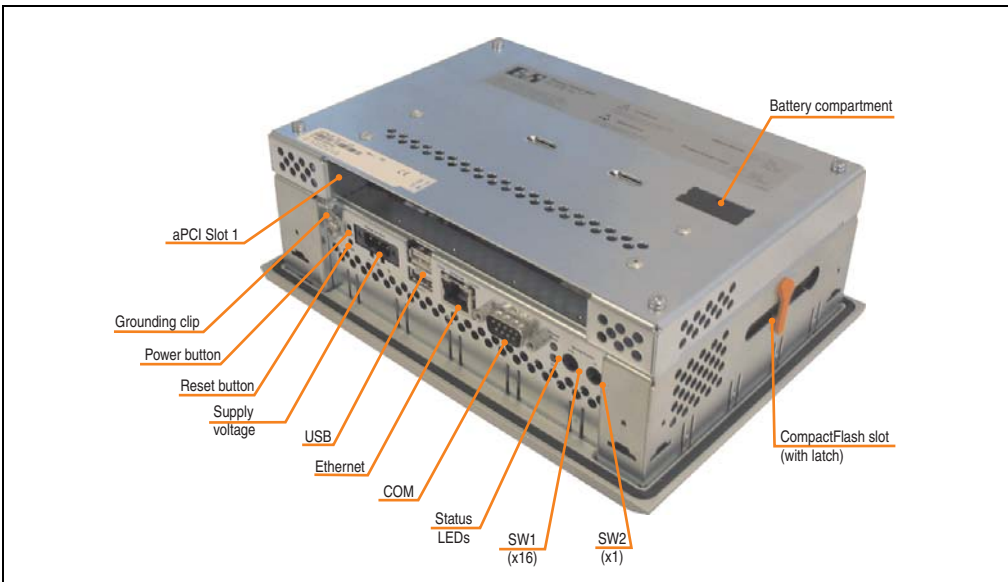


Figure 112: Rear view - 4PP420.0571-65

**4.4.1 Technical data**

Features	4PP420.0571-65 ≤ E0	4PP420.0571-65 ≥ F0
B&R ID code	0x23BA	
Boot loader / Operating system	Automation Runtime	
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)	
Flash	2 MB (for firmware)	
Memory Type Size	DDR SDRAM 128 MB (64 MB < Rev. C0)	
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)	
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB	
Watchdog Controller	MTCX <sup>1)</sup>	
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms	
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day	
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes	
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 72: Technical data - 4PP420.0571-65

## Technical data • Power Panel 400 with Automation Runtime

Features	4PP420.0571-65 ≤ E0	4PP420.0571-65 ≥ F0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB	
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection	
Reset button	Yes, accessible from the outside	
Power button	Yes, accessible from the outside	
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)	
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 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	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°  CCFL 200 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410	
Touch screen Touch screen type Technology Controller Degree of transmission	Gunze Analog, resistive Elo, serial, 12-bit Up to 80% ±5%	AMT Analog, resistive Elo, serial, 12-bit Up to 80% ±5%
Filter glass Degree of transmission Coating	-	
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-	

Table 72: Technical data - 4PP420.0571-65 (Forts.)

## Technical data • Power Panel 400 with Automation Runtime

Electrical characteristics	4PP420.0571-65 ≤ E0	4PP420.0571-65 ≥ F0
Power supply		
Rated voltage		18 - 30 VDC
Rated current		0.5 A
Starting current		Max. 1.2 A
Power consumption		Typically 12 W
Electrical isolation		Yes
Bleeder resistance		0 Ω
Mechanical characteristics		
Outer dimensions		
Width		212 mm
Height		156 mm
Depth		76 mm
Front		
Frame		Naturally anodized aluminum <sup>6)</sup>
Design		Gray <sup>6)</sup>
Membrane		Polyester
Dark gray border around display		Similar to Pantone 432CV <sup>6)</sup>
Light background		Similar to Pantone 427CV <sup>6)</sup>
Gasket		Flat gasket around display front
Housing		Metal
Weight		Approx. 1.7 kg (without aPCI interface modules)
Environmental characteristics		
Ambient temperature		
Operation		0 to +50°C
Bearings		-20 to +60°C
Transport		-20 to +60°C
Relative humidity		See 4.4.2 "Temperature humidity diagram", on page 187
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
Bearings		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
Bearings		30 g, 15 ms
Transport		30 g, 15 ms
Protection		IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude <sup>7)</sup>		Max. 3000 m

Table 72: Technical data - 4PP420.0571-65 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.
- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 7) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.4.2 Temperature humidity diagram

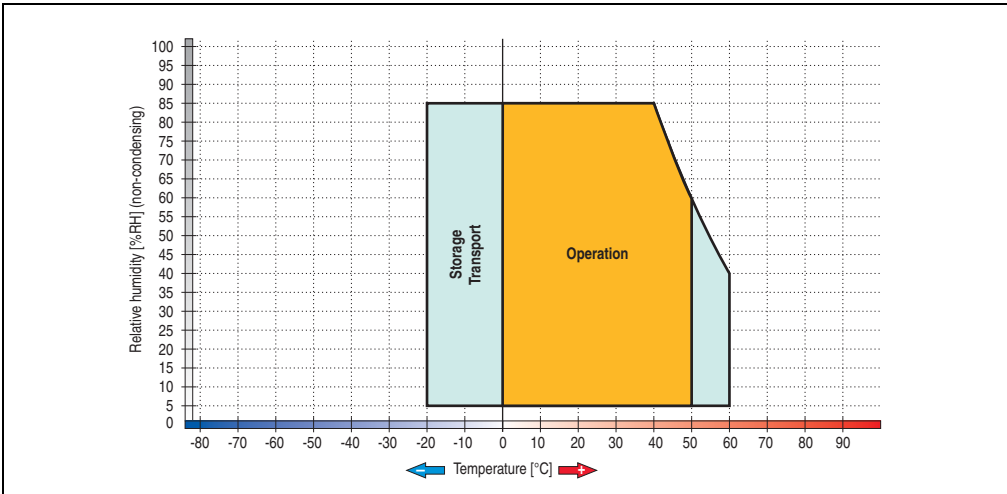


Figure 113: Temperature humidity diagram - 4PP420.0571-65

### 4.4.3 Dimensions

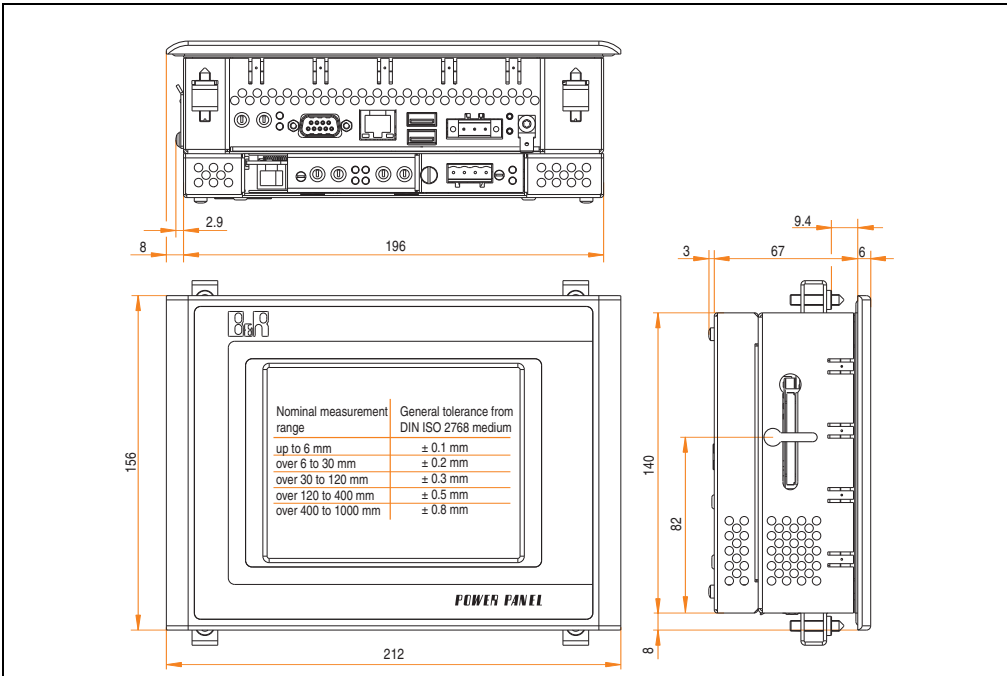


Figure 114: Dimensions - 4PP420.0571-65

#### 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.

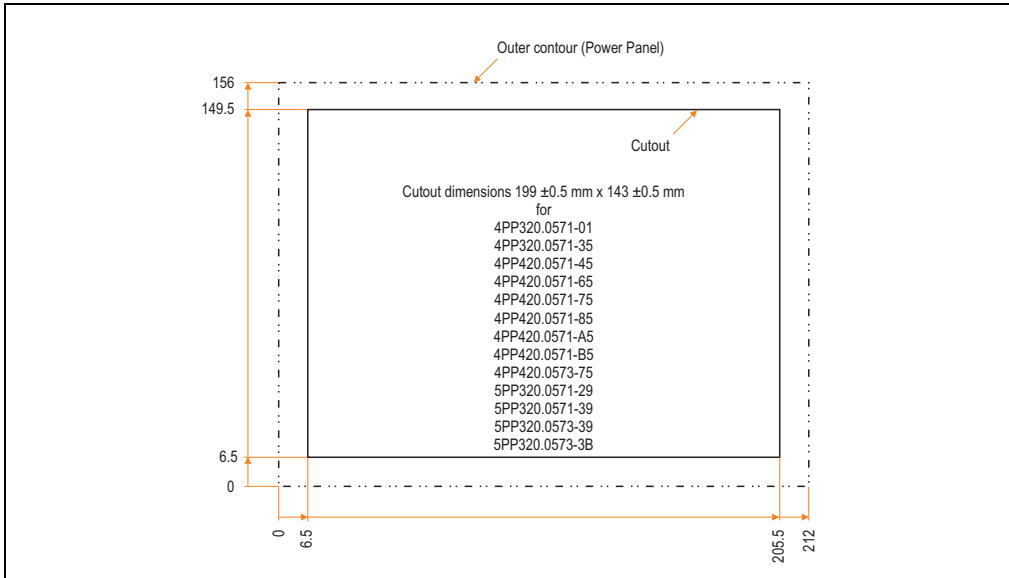


Figure 115: Cutout installation - 4PP420.0571-65

#### 4.4.5 Contents of delivery

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

Amount	Component
1	Power Panel PP420, 5.7" QVGA, 1 aPCI, touch screen
4	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 73: Contents of delivery - 4PP420.0571-65



4.5 Device 4PP420.0571-75

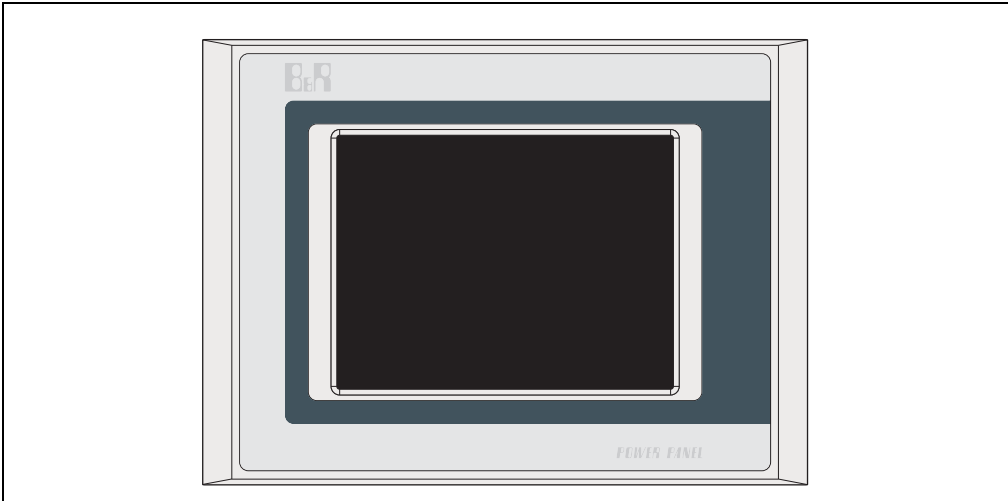


Figure 116: Front view - 4PP420.0571-75

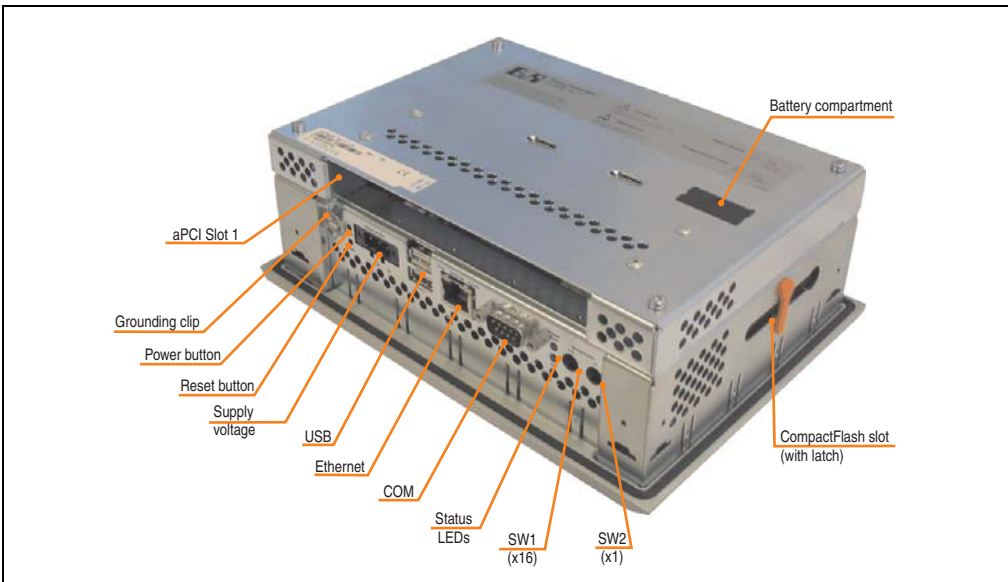


Figure 117: Rear view - 4PP420.0571-75

**4.5.1 Technical data**

Features	4PP420.0571-75 ≤ Rev. C0	4PP420.0571-75 ≥ Rev. D0	4PP420.0571-75 ≥ Rev. F0
B&R ID code	0xA159		
Boot loader / Operating system	Automation Runtime		
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)		
Flash	2 MB (for firmware)		
Memory Type Size	DDR SDRAM 128 MB		
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)		
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB		
Watchdog Controller	MTCX <sup>1)</sup>		
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms		
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day		
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes		
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 74: Technical data - 4PP420.0571-75

## Technical data • Power Panel 400 with Automation Runtime

Features	4PP420.0571-75 ≤ Rev. C0	4PP420.0571-75 ≥ Rev. D0	4PP420.0571-75 ≥ Rev. F0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB		
Reset button	Yes, accessible from the outside		
Power button	Yes, accessible from the outside		
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)		
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 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>4)</sup> Screen rotation	Color TFT 5.7 in (144 mm) 262144 colors <sup>4)</sup> QVGA, 320 x 240 pixels 400:1  Direction R / direction L = 60° Direction U = 40°/ direction D = 50°  CCFL 500 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410	Color TFT 5.7 in (144 mm) 262144 colors <sup>3)</sup> QVGA, 320 x 240 pixels 350:1  Direction R / direction L = 65° Direction U = 65°/ direction D = 40°  CCFL 500 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410	
Touch screen Touch screen type Technology Controller Degree of transmission	Gunze Analog, resistive Elo, serial, 12- bit Up to 80% ±5%		AMT Analog, resistive Elo, serial, 12- bit Up to 80% ±5%
Filter glass Degree of transmission Coating	-		
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-		

Table 74: Technical data - 4PP420.0571-75 (Forts.)

## Technical data • Power Panel 400 with Automation Runtime

Electrical characteristics	4PP420.0571-75 ≤ Rev. C0	4PP420.0571-75 ≥ Rev. D0	4PP420.0571-75 ≥ Rev. F0
Power supply			
Rated voltage		18 - 30 VDC	
Rated current		0.5 A	
Starting current		Max. 1.2 A	
Power consumption		Typically 12 W	
Electrical isolation		Yes	
Bleeder resistance		0 Ω	
Mechanical characteristics			
Outer dimensions			
Width		212 mm	
Height		156 mm	
Depth		76 mm	
Front			
Frame		Naturally anodized aluminum <sup>5)</sup>	
Design		Gray <sup>5)</sup>	
Membrane		Polyester	
Dark gray border around display		Similar to Pantone 432CV <sup>5)</sup>	
Light background		Similar to Pantone 427CV <sup>5)</sup>	
Gasket		Flat gasket around display front	
Housing		Metal	
Weight		Approx. 1.7 kg (without aPCI interface modules)	
Environmental characteristics			
Ambient temperature			
Operation		0 to +50°C	
Bearings		-20 to +60°C	
Transport		-20 to +60°C	
Relative humidity		See 4.5.2 "Temperature humidity diagram", on page 193	
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	
Bearings		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	
Bearings		30 g, 15 ms	
Transport		30 g, 15 ms	
Protection		IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover)	
		IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude <sup>6)</sup>		Max. 3000 m	

Table 74: Technical data - 4PP420.0571-75 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 5) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 6) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.5.2 Temperature humidity diagram

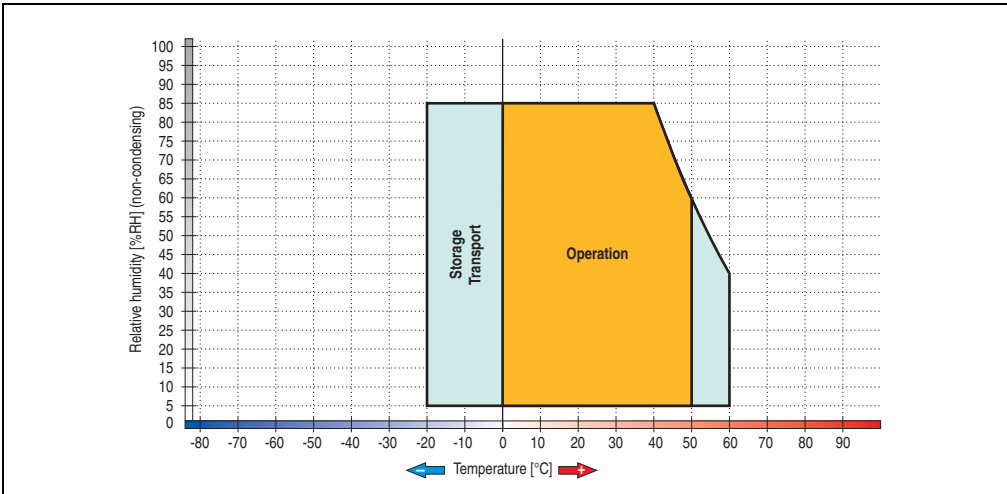


Figure 118: Temperature humidity diagram - 4PP420.0571-75

### 4.5.3 Dimensions

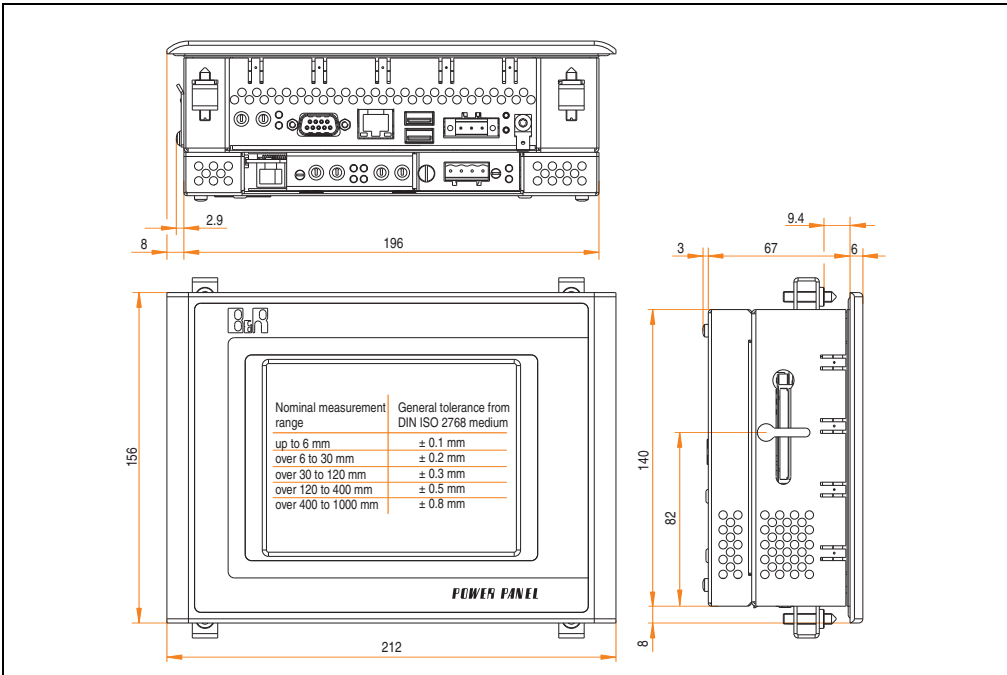


Figure 119: Dimensions - 4PP420.0571-75

### 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.

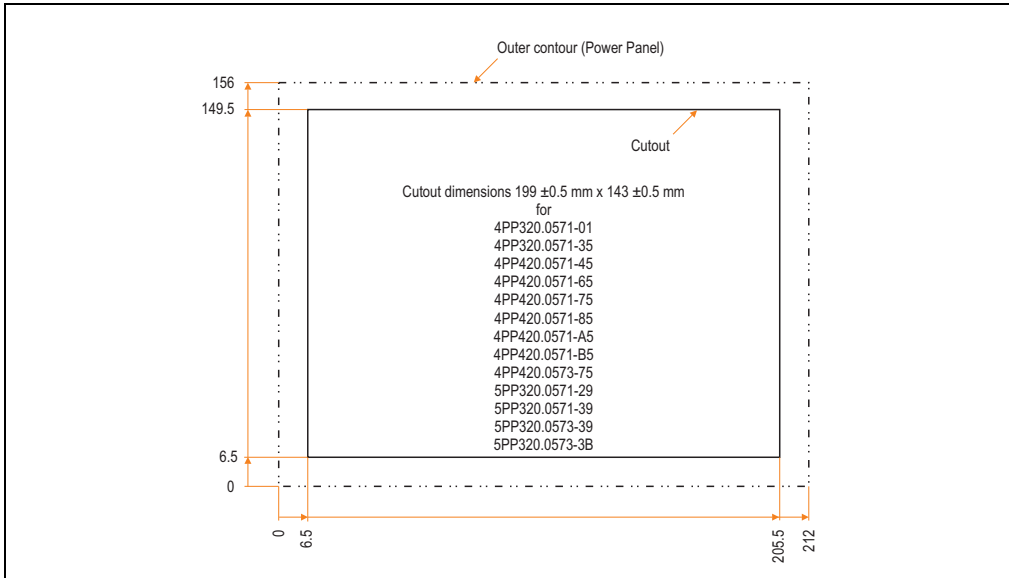


Figure 120: Cutout installation - 4PP420.0571-75

### 4.5.5 Contents of delivery

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

Amount	Component
1	Power Panel PP420, 5.7" QVGA, 1 aPCI, touch screen
4	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 75: Contents of delivery - 4PP420.0571-75

## 4.6 Device 4PP420.0571-85

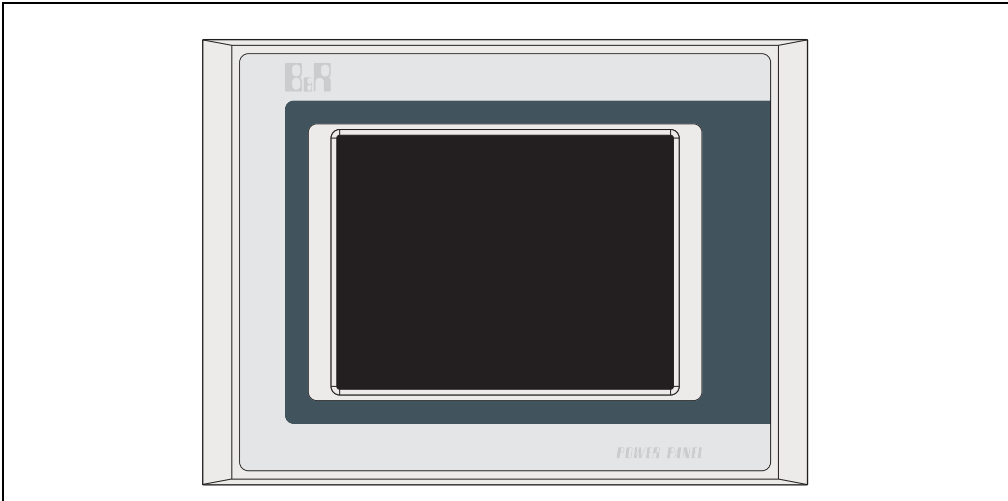


Figure 121: Front view - 4PP420.0571-85

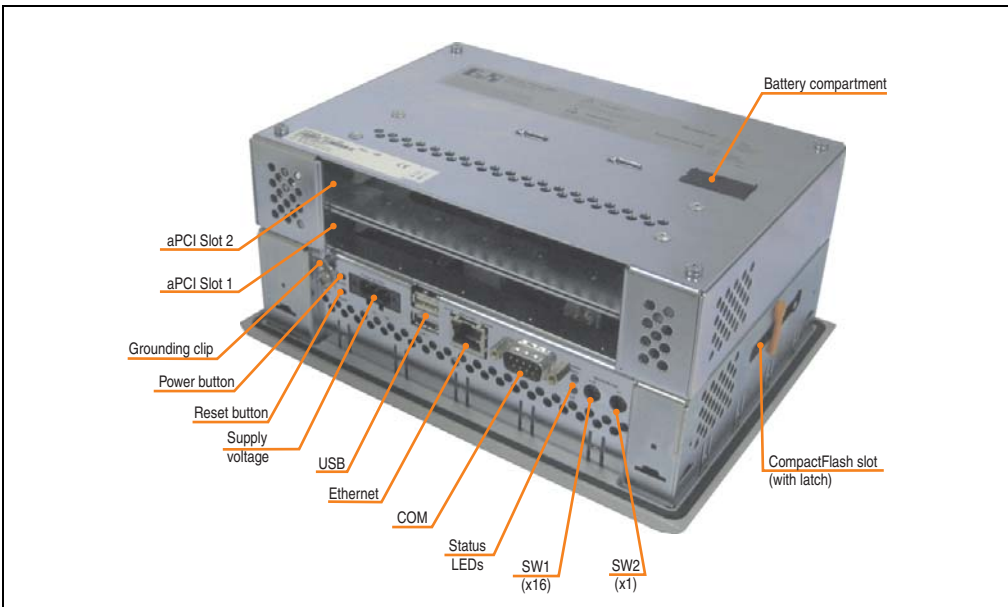


Figure 122: Rear view - 4PP420.0571-85

**4.6.1 Technical data**

Features	4PP420.0571-85 ≤ Rev. E0	4PP420.0571-85 ≥ Rev. F0	4PP420.0571-85 ≥ Rev. I0
B&R ID code	0xA52E		
Boot loader / Operating system	Automation Runtime		
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)		
Flash	2 MB (for firmware)		
Memory Type Size	DDR SDRAM 128 MB (64 MB < Rev. C0)		
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)		
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB		
Watchdog Controller	MTCX <sup>1)</sup>		
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms		
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day		
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes		
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 76: Technical data - 4PP420.0571-85



## Technical data • Power Panel 400 with Automation Runtime

Features	4PP420.0571-85 ≤ Rev. E0	4PP420.0571-85 ≥ Rev. F0	4PP420.0571-85 ≥ Rev. I0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB		
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection		
Reset button	Yes, accessible from the outside		
Power button	Yes, accessible from the outside		
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)		
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 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	Monochrome LCD 5.7 in (144 mm) 8 shades of gray <sup>4)</sup> QVGA, 320 x 240 pixels 25:1  Direction R / direction L = 40° Direction U = 40° / direction D = 50°  CCFL 220 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410		Monochrome LCD 5.7 in (144 mm) 8 shades of gray <sup>4)</sup> QVGA, 320 x 240 pixels 25:1  Direction R / direction L = 80° Direction U / direction D = 80°  LED 150 cd/m <sup>2</sup> 40000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	Gunze Analog, resistive Elo, serial, 12- bit Up to 80% ±5%	AMT Analog, resistive Elo, serial, 12- bit Up to 80% ±5%	
Filter glass Degree of transmission Coating	-		
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-		

Table 76: Technical data - 4PP420.0571-85 (Forts.)

## Technical data • Power Panel 400 with Automation Runtime

Electrical characteristics	4PP420.0571-85 ≤ Rev. E0	4PP420.0571-85 ≥ Rev. F0	4PP420.0571-85 ≥ Rev. I0
Power supply			
Rated voltage		18 - 30 VDC	
Rated current		0.5 A	
Starting current		Max. 1.2 A	
Power consumption		Typically 12 W	
Electrical isolation		Yes	
Bleeder resistance		0 Ω	
Mechanical characteristics			
Outer dimensions			
Width		212 mm	
Height		156 mm	
Depth		98 mm	
Front			
Frame		Naturally anodized aluminum <sup>6)</sup>	
Design		Gray <sup>6)</sup>	
Membrane		Polyester	
Dark gray border around display		Similar to Pantone 432CV <sup>6)</sup>	
Light background		Similar to Pantone 427CV <sup>6)</sup>	
Gasket		Flat gasket around display front	
Housing		Metal	
Weight		Approx. 2 kg (without aPCI interface modules)	
Environmental characteristics			
Ambient temperature			
Operation		0 to +50°C	
Bearings		-20 to +70°C	
Transport		-20 to +70°C	
Relative humidity		See 4.3.2 "Temperature humidity diagram", on page 181	
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	
Bearings		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	
Bearings		30 g, 15 ms	
Transport		30 g, 15 ms	
Protection		IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover)	
		IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude <sup>7)</sup>		Max. 3000 m	

Table 76: Technical data - 4PP420.0571-85 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.
- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 7) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.6.2 Temperature humidity diagram

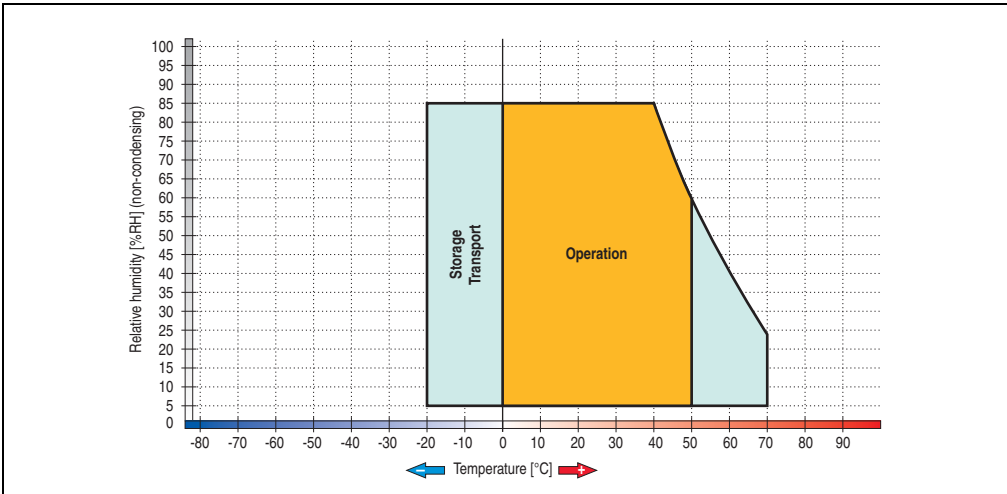


Figure 123: Temperature humidity diagram - 4PP420.0571-85

### 4.6.3 Dimensions

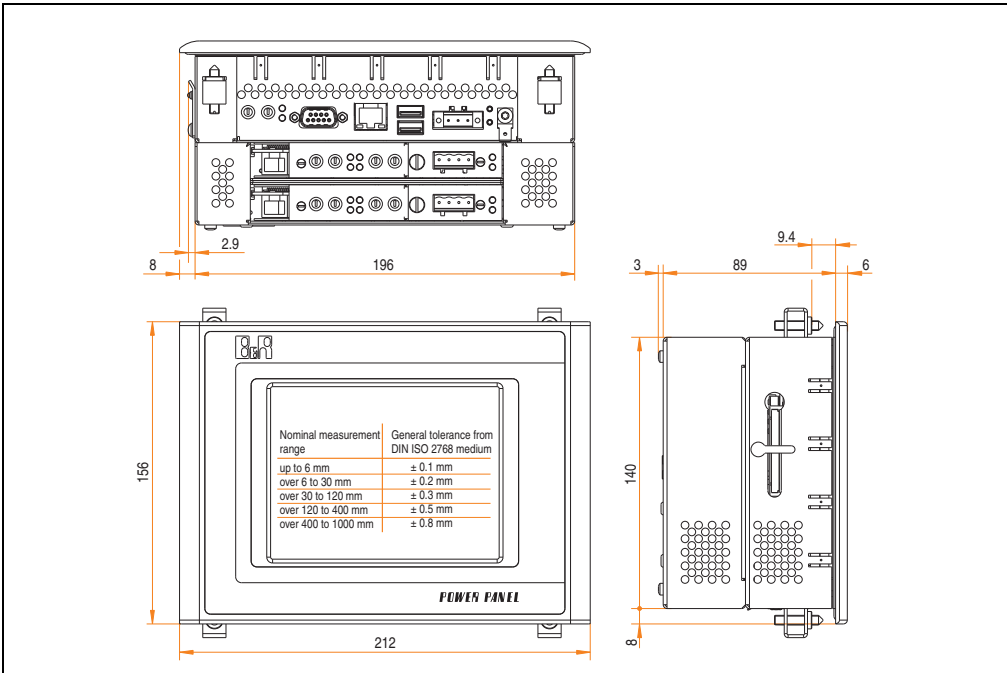


Figure 124: Dimensions - 4PP420.0571-85

### 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.

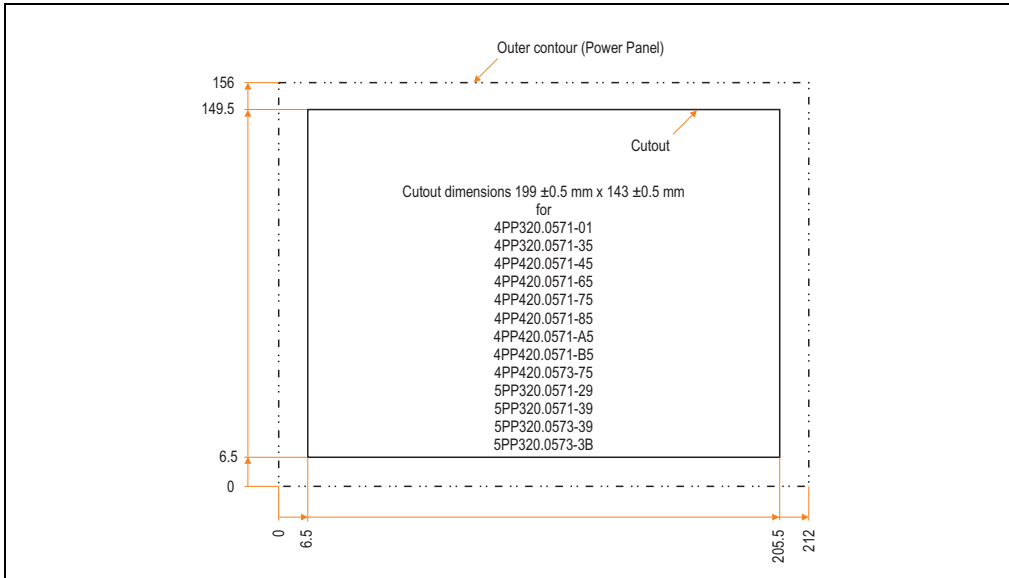


Figure 125: Cutout installation - 4PP420.0571-85

### 4.6.5 Contents of delivery

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

Amount	Component
1	Power Panel PP420, 5.7" QVGA, 1 aPCI, touch screen
4	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 77: Contents of delivery - 4PP420.0571-85

## 4.7 Device 4PP420.0571-A5

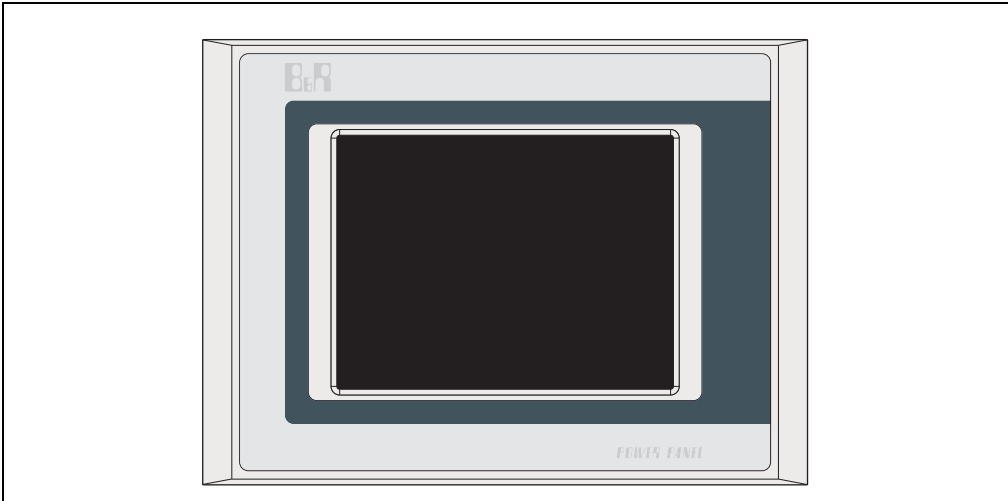


Figure 126: Front view - 4PP420.0571-A5

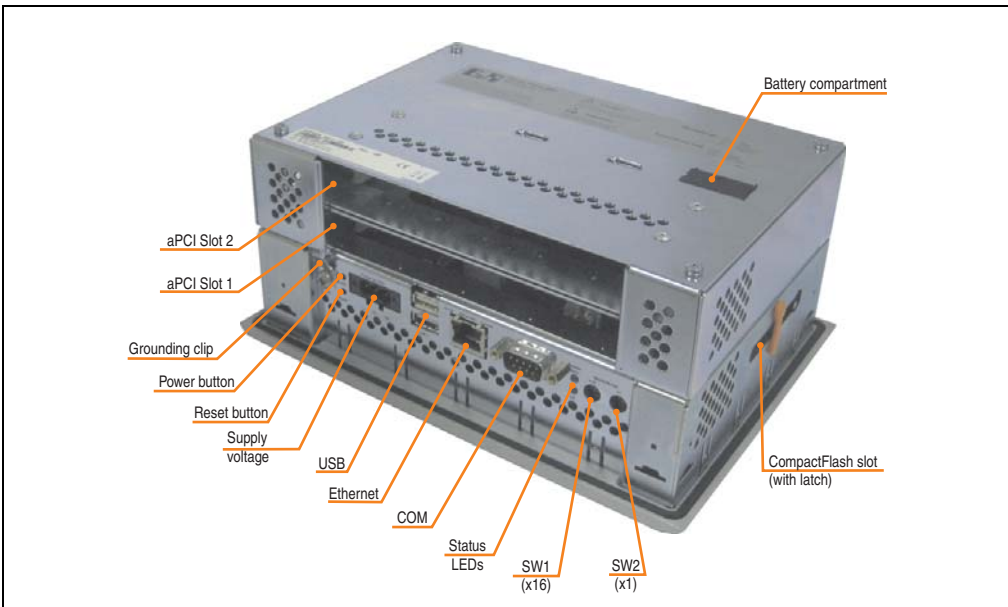


Figure 127: Rear view - 4PP420.0571-A5

**4.7.1 Technical data**

Features	4PP420.0571-A5 ≤ D0	4PP420.0571-A5 ≥ E0
B&R ID code	0x23BC	
Boot loader / Operating system	Automation Runtime	
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)	
Flash	2 MB (for firmware)	
Memory Type Size	DDR SDRAM 128 MB (64 MB < Rev. C0)	
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)	
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB	
Watchdog Controller	MTCX <sup>1)</sup>	
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms	
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day	
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes	
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 78: Technical data - 4PP420.0571-A5

## Technical data • Power Panel 400 with Automation Runtime

Features	4PP420.0571-A5 ≤ D0	4PP420.0571-A5 ≥ E0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB	
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection	
Reset button	Yes, accessible from the outside	
Power button	Yes, accessible from the outside	
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)	
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 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	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°  CCFL 200 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410	
Touch screen Touch screen type Technology Controller Degree of transmission	Gunze Analog, resistive Elo, serial, 12-bit Up to 80% ±5%	AMT Analog, resistive Elo, serial, 12-bit Up to 80% ±5%
Filter glass Degree of transmission Coating	-	
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-	

Table 78: Technical data - 4PP420.0571-A5 (Forts.)

## Technical data • Power Panel 400 with Automation Runtime

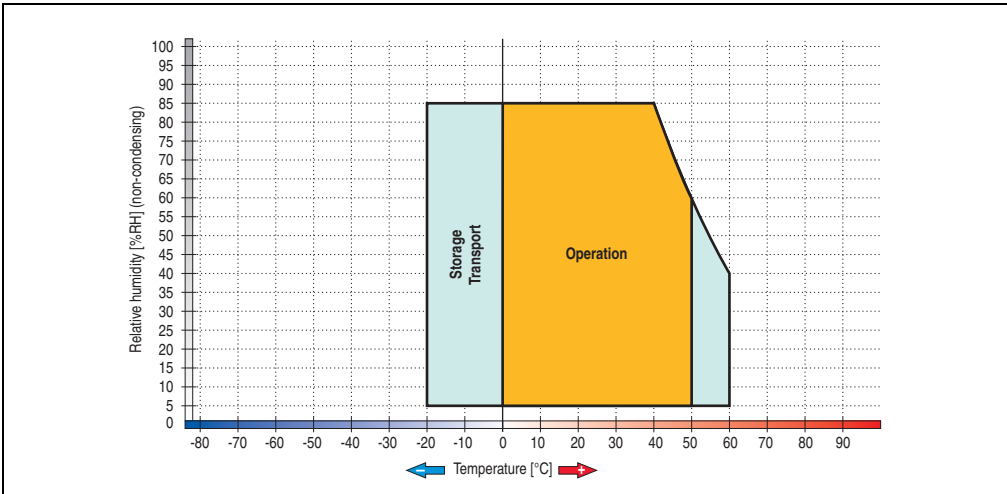
Electrical characteristics	4PP420.0571-A5 ≤ D0	4PP420.0571-A5 ≥ E0
Power supply		
Rated voltage		18 - 30 VDC
Rated current		0.5 A
Starting current		Max. 1.2 A
Power consumption		Typically 12 W
Electrical isolation		Yes
Bleeder resistance		0 Ω
Mechanical characteristics		
Outer dimensions		
Width		212 mm
Height		156 mm
Depth		98 mm
Front		
Frame		Naturally anodized aluminum <sup>6)</sup>
Design		Gray <sup>6)</sup>
Membrane		Polyester
Dark gray border around display		Similar to Pantone 432CV <sup>6)</sup>
Light background		Similar to Pantone 427CV <sup>6)</sup>
Gasket		Flat gasket around display front
Housing		Metal
Weight		Approx. 2 kg (without aPCI interface modules)
Environmental characteristics		
Ambient temperature		
Operation		0 to +50°C
Bearings		-20 to +60°C
Transport		-20 to +60°C
Relative humidity		See 4.7.2 "Temperature humidity diagram", on page 205
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
Bearings		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
Bearings		30 g, 15 ms
Transport		30 g, 15 ms
Protection		IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude <sup>7)</sup>		Max. 3000 m

Table 78: Technical data - 4PP420.0571-A5 (Forts.)

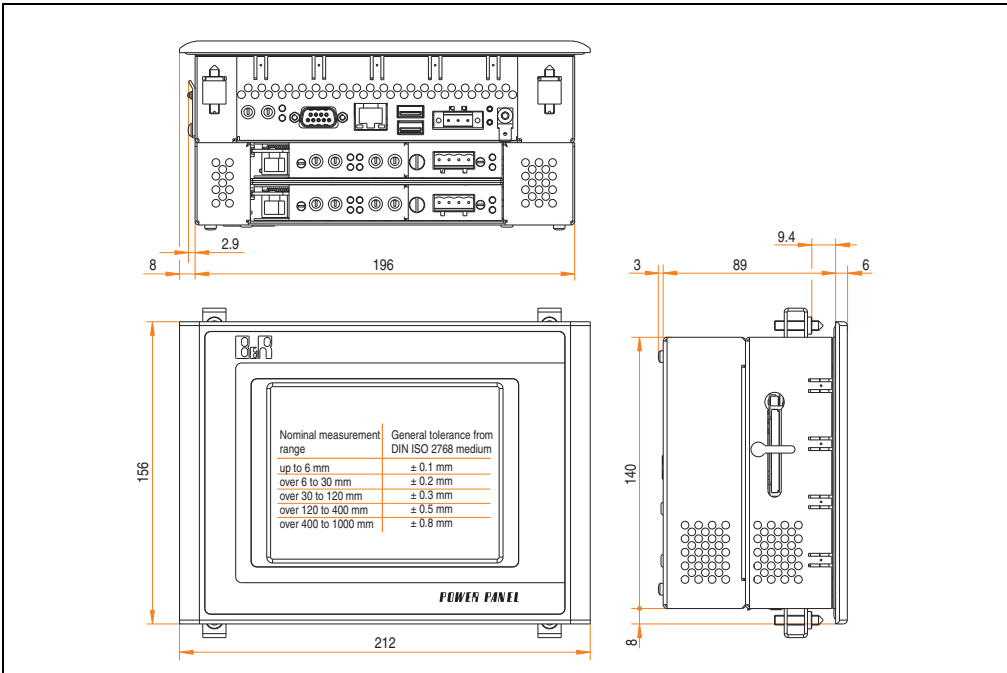
- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.
- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 7) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).



### 4.7.2 Temperature humidity diagram



### 4.7.3 Dimensions



### 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.

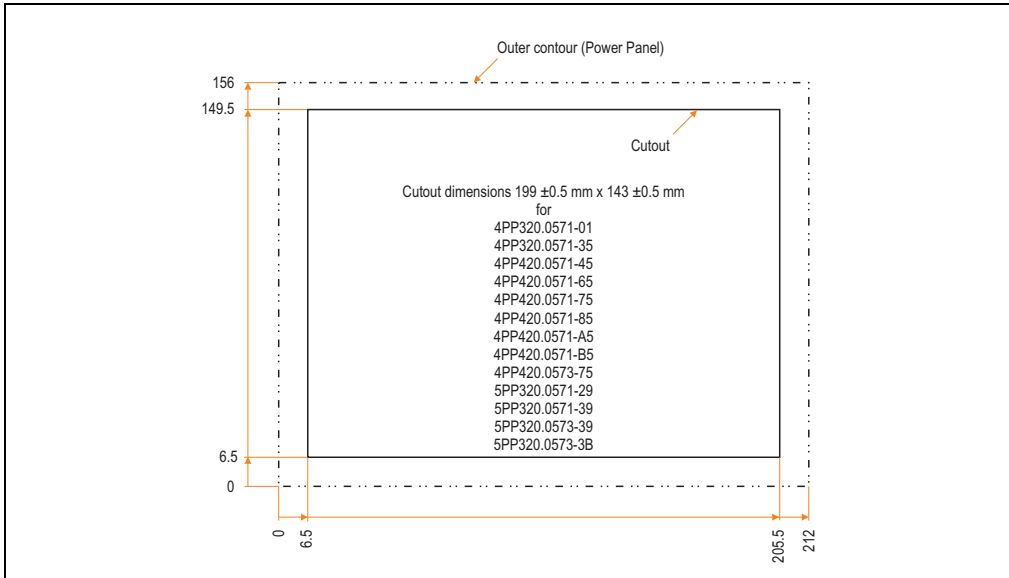


Figure 130: Cutout installation - 4PP420.0571-A5

### 4.7.5 Contents of delivery

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

Amount	Component
1	Power Panel PP420, 5.7" QVGA, 2 aPCI, touch screen
4	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 79: Contents of delivery - 4PP420.0571-A5

## 4.8 Device 4PP420.0571-B5

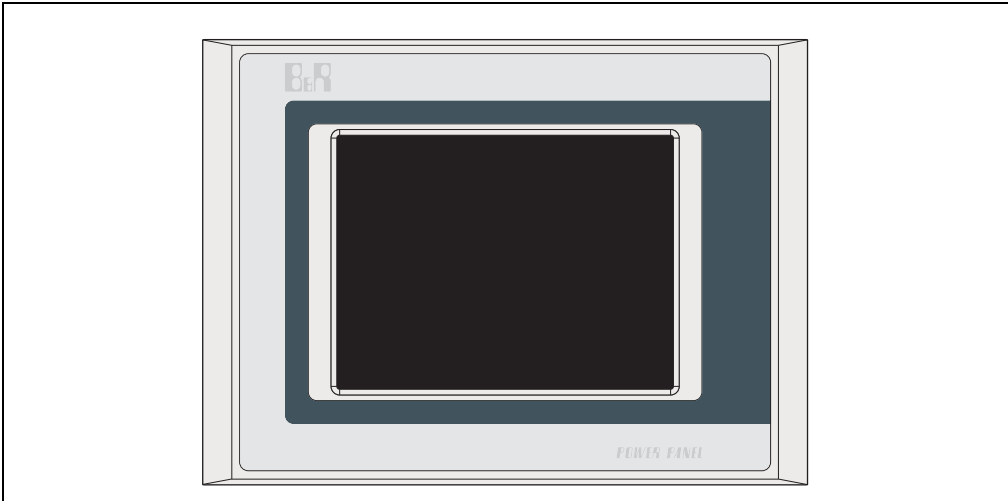


Figure 131: Front view - 4PP420.0571-B5

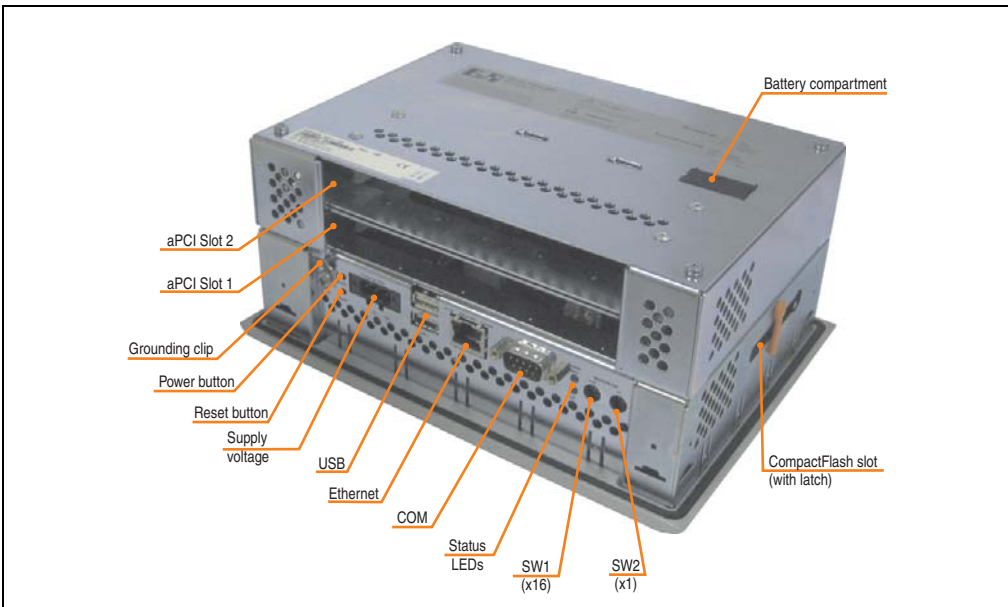


Figure 132: Rear view - 4PP420.0571-B5

**4.8.1 Technical data**

Features	4PP420.0571-B5 ≤ Rev. C0	4PP420.0571-B5 ≥ Rev. D0	4PP420.0571-B5 ≥ Rev. F0
B&R ID code	0xA15A		
Processor	Geode LX800 500 MHz, 32-bit x86		
Type	MMX technology, 3D Now		
Expanded command set	128 kB (64 kB I-Cache / 64 kB D-Cache)		
L1 cache	128 kB		
L2 cache	Yes		
Floating point unit (FPU)	Passive (heat sink)		
Cooling			
Method			
Flash	2 MB (for firmware)		
Memory	DDR SDRAM		
Type	128 MB		
Size			
Graphics	Geode LX800		
Controller	8 MB shared memory (reserved by main memory)		
Memory			
SRAM	512 kB		
Size	Yes		
Battery-buffered	256 kB		
Remanent variables for AR (Automation Runtime) in power fail mode			
Watchdog	MTCX <sup>1)</sup>		
Controller			
Power failure logic	MTCX <sup>1)</sup>		
Controller	10 ms		
Buffer time			
Real-time clock (RTC)	Yes		
Battery-buffered	at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day		
Accuracy			
Battery	Renata 950 mAh		
Type	Yes, accessible from the outside		
Removable	3 years <sup>3)</sup>		
Service life			
Backup capacitor (for changing battery)	10 minutes		
Buffer time			
Ethernet	Intel 82551ER		
Controller	10/100 Mbit/s		
Transfer rate	RJ45 twisted pair (10 Base T / 100 Base T)		
Connection	S/STP (category 5)		
Cables	-		
NE2000-compatible			
CompactFlash	Type I		
Type	1 slot		
Amount	Primary IDE device		
Connection			

Table 80: Technical data - 4PP420.0571-B5

## Technical data • Power Panel 400 with Automation Runtime

Features	4PP420.0571-B5 ≤ Rev. C0	4PP420.0571-B5 ≥ Rev. D0	4PP420.0571-B5 ≥ Rev. F0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB		
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection		
Reset button	Yes, accessible from the outside		
Power button	Yes, accessible from the outside		
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)		
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 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	Color TFT 5.7 in (144 mm) 262144 colors <sup>4)</sup> QVGA, 320 x 240 pixels 400:1  Direction R / direction L = 60° Direction U = 40°/ direction D = 50°  CCFL 500 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410	Color TFT 5.7 in (144 mm) 262144 colors <sup>3)</sup> QVGA, 320 x 240 pixels 350:1  Direction R / direction L = 65° Direction U = 65°/ direction D = 40°  CCFL 500 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410	
Touch screen Touch screen type Technology Controller Degree of transmission	Gunze Analog, resistive Elo, serial, 12-bit Up to 80% ±5%	AMT Analog, resistive Elo, serial, 12-bit Up to 80% ±5%	
Filter glass Degree of transmission Coating	-		
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-		

Table 80: Technical data - 4PP420.0571-B5 (Forts.)

## Technical data • Power Panel 400 with Automation Runtime

Electrical characteristics	4PP420.0571-B5 ≤ Rev. C0	4PP420.0571-B5 ≥ Rev. D0	4PP420.0571-B5 ≥ Rev. F0
Power supply			
Rated voltage		18 - 30 VDC	
Rated current		0.5 A	
Starting current		Max. 1.2 A	
Power consumption		Typically 12 W	
Electrical isolation		Yes	
Bleeder resistance		0 Ω	
Mechanical characteristics			
Outer dimensions			
Width		212 mm	
Height		156 mm	
Depth		98 mm	
Front			
Frame		Naturally anodized aluminum <sup>6)</sup>	
Design		Gray <sup>6)</sup>	
Membrane		Polyester	
Dark gray border around display		Similar to Pantone 432CV <sup>6)</sup>	
Light background		Similar to Pantone 427CV <sup>6)</sup>	
Gasket		Flat gasket around display front	
Housing		Metal	
Weight		Approx. 2 kg (without aPCI interface modules)	
Environmental characteristics			
Ambient temperature			
Operation		0 to +50°C	
Bearings		-20 to +60°C	
Transport		-20 to +60°C	
Relative humidity		See 4.8.2 "Temperature humidity diagram", on page 211	
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	
Bearings		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	
Bearings		30 g, 15 ms	
Transport		30 g, 15 ms	
Protection		IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover)	
		IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude <sup>7)</sup>		Max. 3000 m	

Table 80: Technical data - 4PP420.0571-B5 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.
- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 7) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.8.2 Temperature humidity diagram

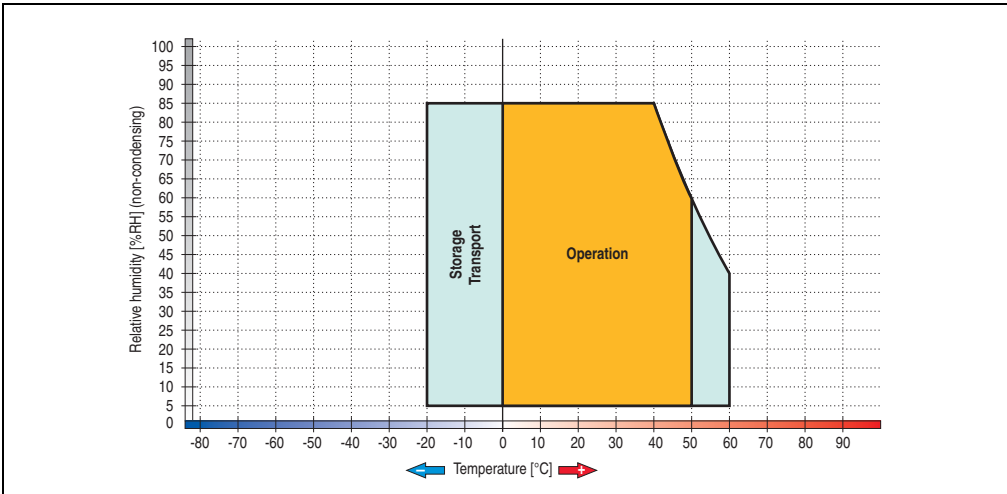


Figure 133: Temperature humidity diagram - 4PP420.0571-B5

### 4.8.3 Dimensions

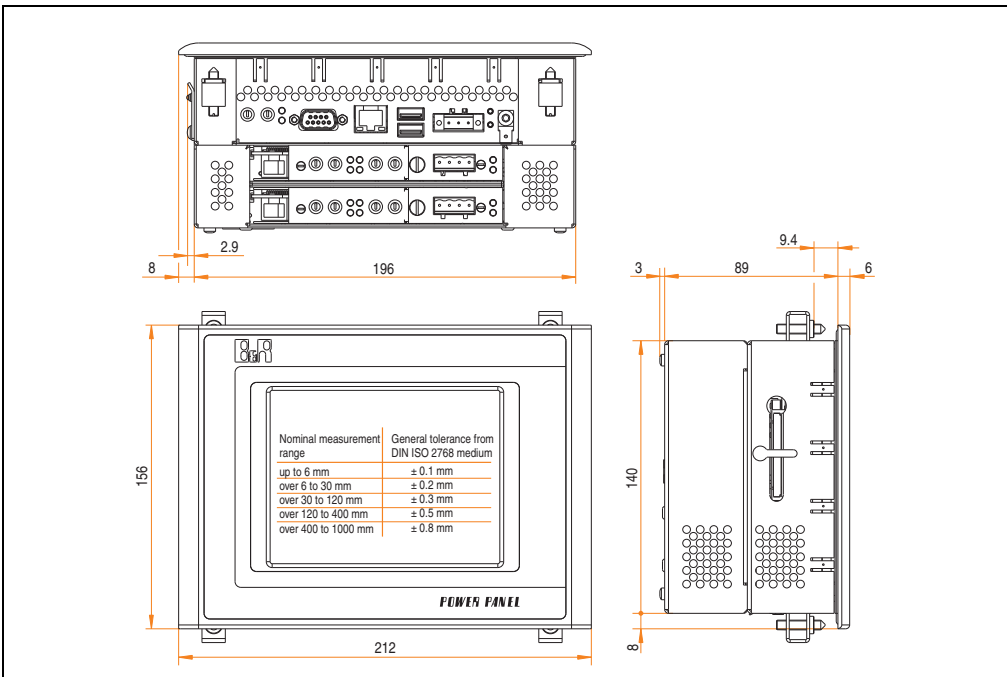


Figure 134: Dimensions - 4PP420.0571-B5

### 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.

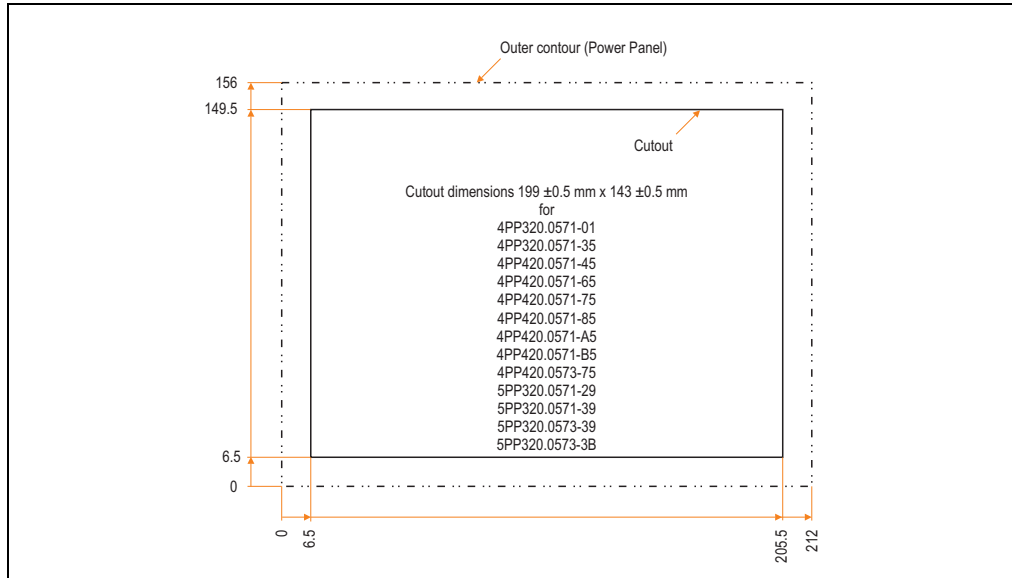


Figure 135: Cutout installation - 4PP420.0571-B5

### 4.8.5 Contents of delivery

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

Amount	Component
1	Power Panel PP420, 5.7" QVGA, 2 aPCI, touch screen
4	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 81: Contents of delivery - 4PP420.0571-B5



4.9 Device 4PP420.0573-75

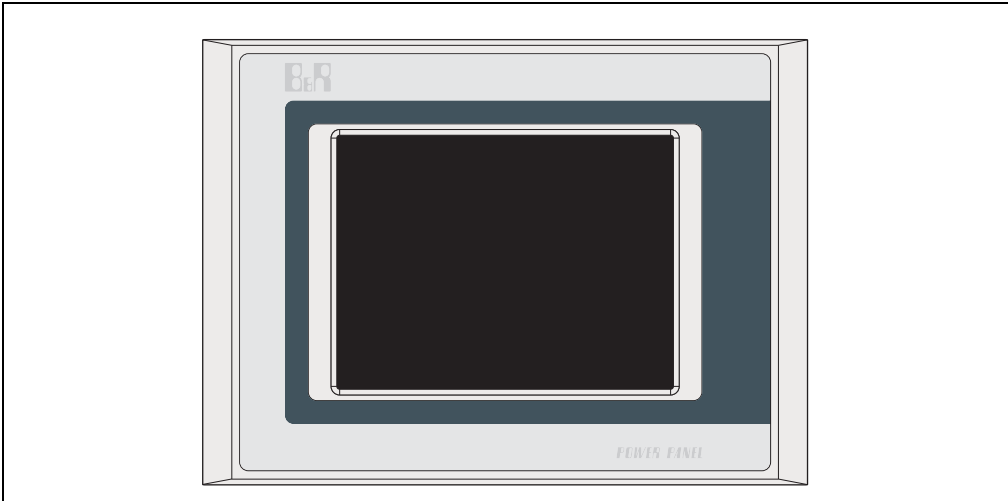


Figure 136: Front view - 4PP420.0573-75

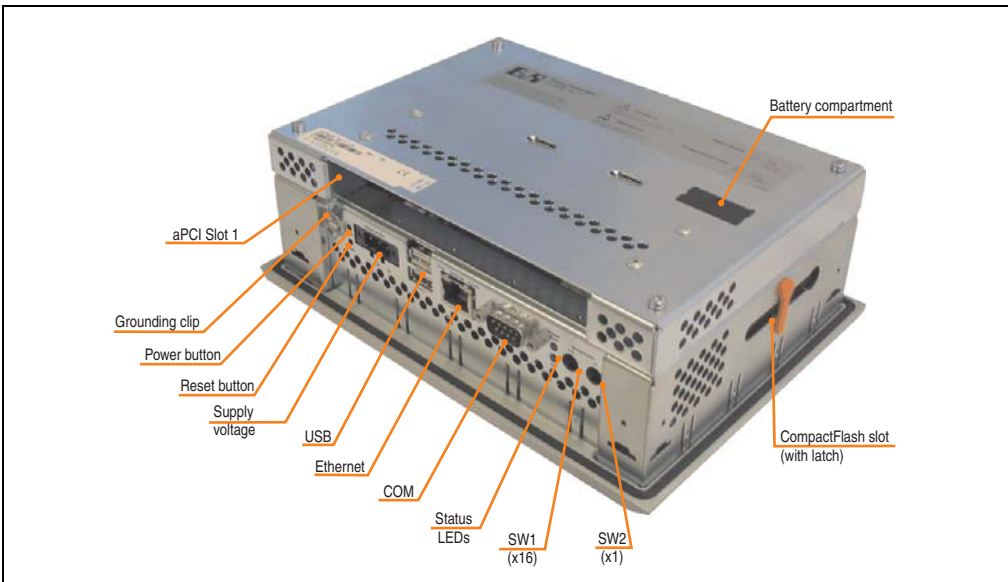


Figure 137: Rear view - 4PP420.0573-75

**4.9.1 Technical data**

Features	4PP420.0573-75 ≤ E0	4PP420.0573-75 ≥ F0
B&R ID code	0x23BB	
Boot loader / Operating system	Automation Runtime	
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)	
Flash	2 MB (for firmware)	
Memory Type Size	DDR SDRAM 128 MB (64 MB < Rev. C0)	
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)	
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB	
Watchdog Controller	MTCX <sup>1)</sup>	
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms	
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day	
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes	
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 82: Technical data - 4PP420.0573-75

## Technical data • Power Panel 400 with Automation Runtime

Features	4PP420.0573-75 ≤ E0	4PP420.0573-75 ≥ F0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB	
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection	
Reset button	Yes, accessible from the outside	
Power button	Yes, accessible from the outside	
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)	
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 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	Color TFT 5.7 in (144 mm) 262144 colors <sup>4)</sup> VGA, 640 x 480 pixels 400:1  Direction R / direction L = 80° Direction U = 80° / direction D = 70°  CCFL 350 cd/m <sup>2</sup> 75000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410	
Touch screen Touch screen type Technology Controller Degree of transmission	Gunze Analog, resistive Elo, serial, 12-bit Up to 80% ±5%	AMT Analog, resistive Elo, serial, 12-bit Up to 80% ±5%
Filter glass Degree of transmission Coating	-	
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-	

Table 82: Technical data - 4PP420.0573-75 (Forts.)

## Technical data • Power Panel 400 with Automation Runtime

Electrical characteristics	4PP420.0573-75 ≤ E0	4PP420.0573-75 ≥ F0
Power supply		
Rated voltage		18 - 30 VDC
Rated current		0.5 A
Starting current		Max. 1.2 A
Power consumption		Typically 12 W
Electrical isolation		Yes
Bleeder resistance		0 Ω
Mechanical characteristics		
Outer dimensions		
Width		212 mm
Height		156 mm
Depth		76 mm
Front		
Frame		Naturally anodized aluminum <sup>6)</sup>
Design		Gray <sup>6)</sup>
Membrane		Polyester
Dark gray border around display		Similar to Pantone 432CV <sup>6)</sup>
Light background		Similar to Pantone 427CV <sup>6)</sup>
Gasket		Flat gasket around display front
Housing		Metal
Weight		Approx. 1.7 kg (without aPCI interface modules)
Environmental characteristics		
Ambient temperature		
Operation		0 to +50°C
Bearings		-20 to +60°C
Transport		-20 to +60°C
Relative humidity		See 4.9.2 "Temperature humidity diagram", on page 217
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
Bearings		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
Bearings		30 g, 15 ms
Transport		30 g, 15 ms
Protection		IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude <sup>7)</sup>		Max. 3000 m

Table 82: Technical data - 4PP420.0573-75 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.
- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 7) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.9.2 Temperature humidity diagram

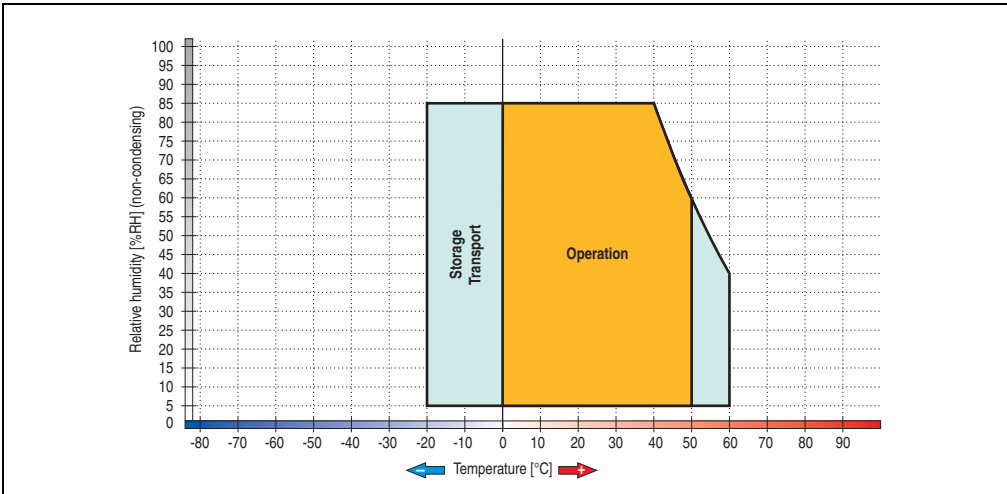


Figure 138: Temperature humidity diagram - 4PP420.0573-75

### 4.9.3 Dimensions

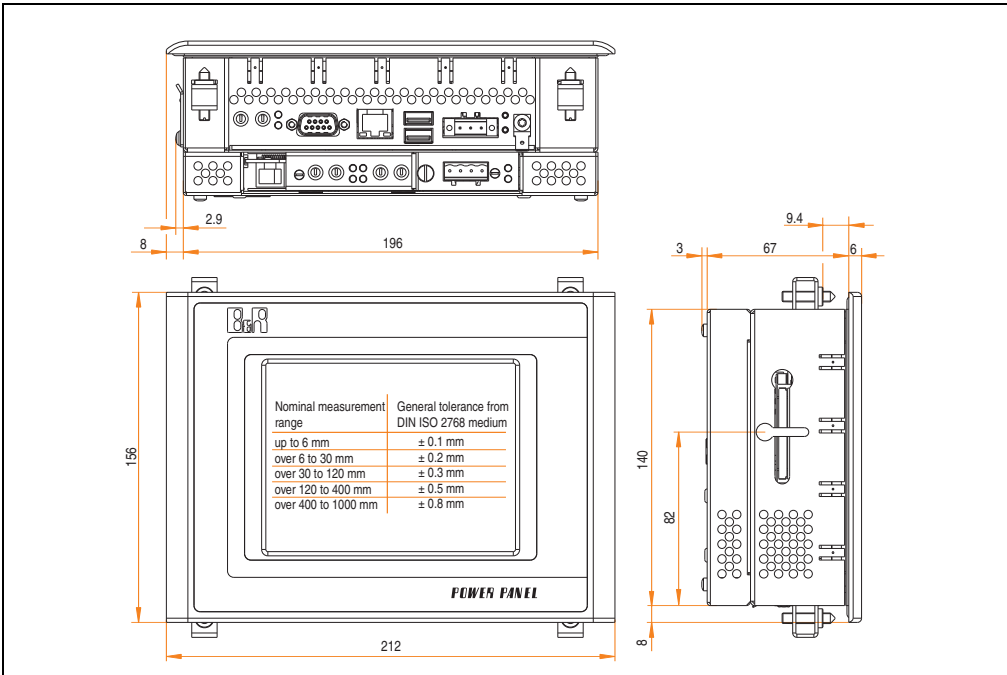


Figure 139: Dimensions - 4PP420.0573-75

### 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.

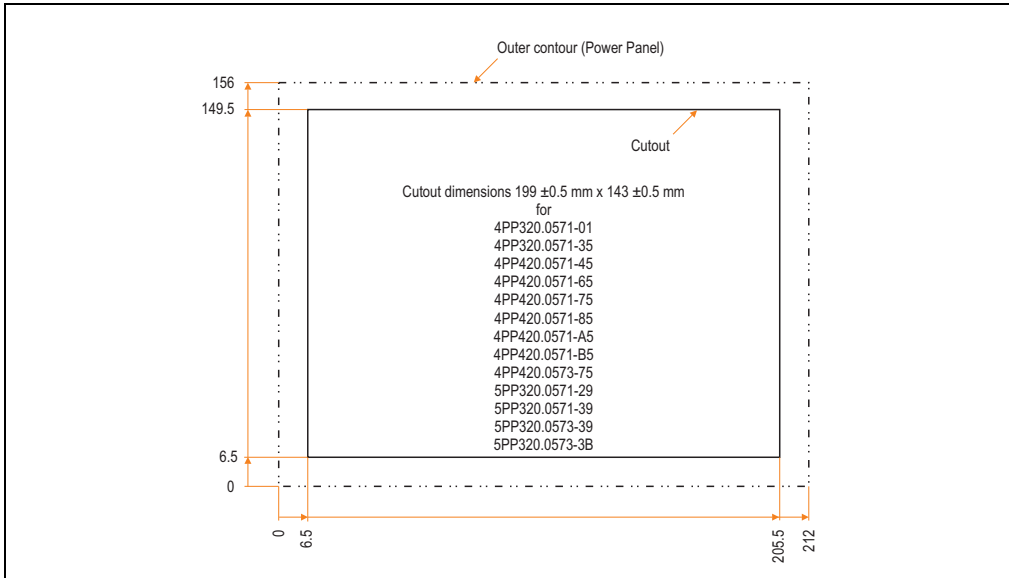


Figure 140: Cutout installation - 4PP420.0573-75

### 4.9.5 Contents of delivery

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

Amount	Component
1	Power Panel PP420 5.7" VGA, 1 aPCI, touch screen
4	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 83: Contents of delivery - 4PP420.0573-75

## 4.10 Device 4PP420.1043-75

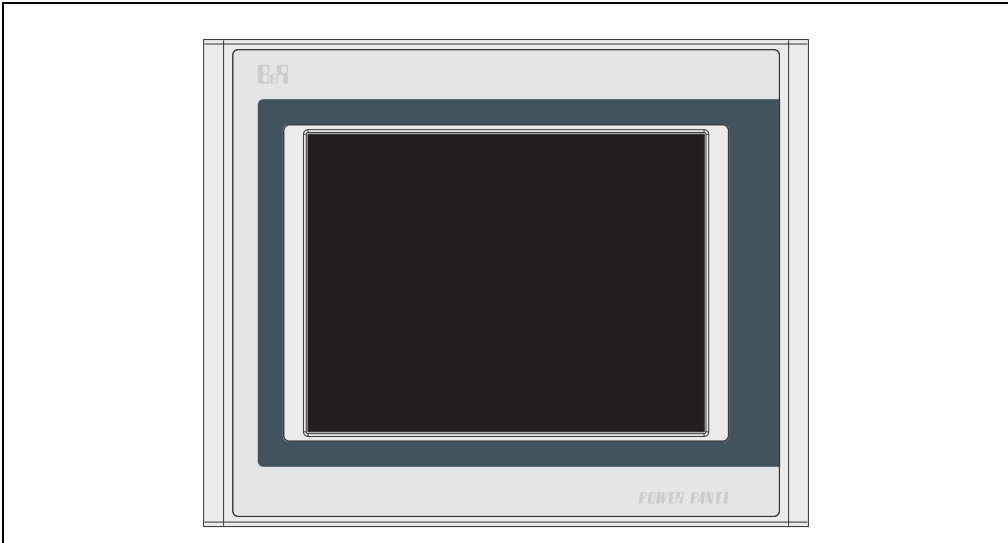


Figure 141: Front view - 4PP420.1043-75

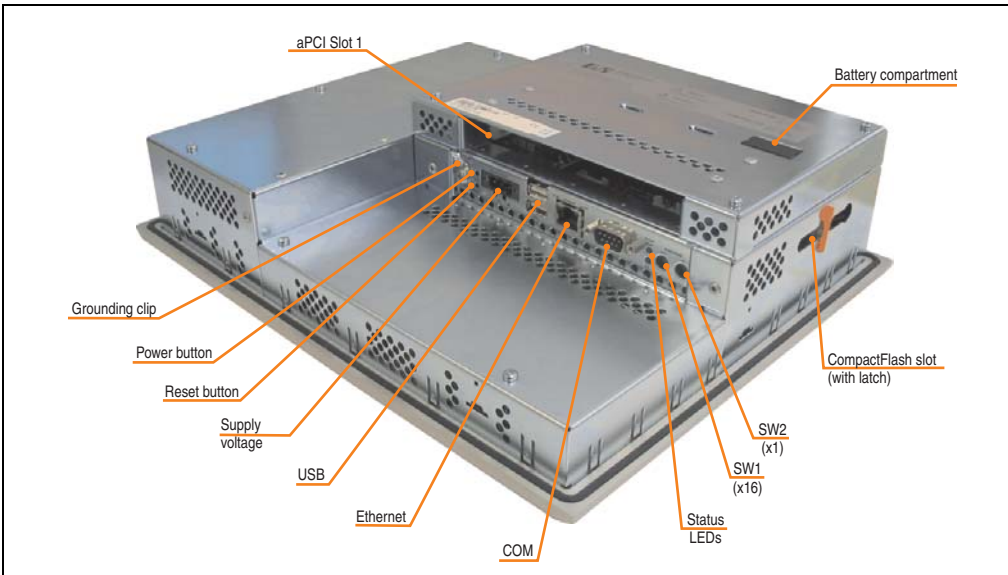


Figure 142: Rear view - 4PP420.1043-75

**4.10.1 Technical data**

Features	4PP420.1043-75 ≤ F0	4PP420.1043-75 ≥ G0	4PP420.1043-75 ≥ J0
B&R ID code	0x23BD		
Boot loader / Operating system	Automation Runtime		
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)		
Flash	2 MB (for firmware)		
Memory Type Size	DDR SDRAM 128 MB (64 MB < Rev. D0)		
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)		
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB		
Watchdog Controller	MTCX <sup>1)</sup>		
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms		
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day		
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes		
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 84: Technical data - 4PP420.1043-75



## Technical data • Power Panel 400 with Automation Runtime

Features	4PP420.1043-75 ≤ F0	4PP420.1043-75 ≥ G0	4PP420.1043-75 ≥ J0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB		
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection		
Reset button	Yes, accessible from the outside		
Power button	Yes, accessible from the outside		
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)		
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 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	Color TFT 10.4 in (264 mm) 262144 colors VGA, 640 x 480 pixels 600:1  Direction R / direction L = 70° Direction U = 45° / direction D = 35°  CCFL 450 cd/m <sup>2</sup> 55000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410		Color TFT 10.4 in (264 mm) 262144 colors VGA, 640 x 480 pixels 900:1  Direction R / direction L = 80° Direction U / direction D = 80°  LED 450 cd/m <sup>2</sup> 70000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Accu Touch Analog, resistive Elo, serial, 12-bit Up to 80% ±5%	AMT Analog, resistive Elo, serial, 12-bit Up to 80% ±5%	
Filter glass Degree of transmission Coating	-		
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-		

Table 84: Technical data - 4PP420.1043-75 (Forts.)

## Technical data • Power Panel 400 with Automation Runtime

Electrical characteristics	4PP420.1043-75 ≤ F0	4PP420.1043-75 ≥ G0	4PP420.1043-75 ≥ J0
Power supply			
Rated voltage		18 - 30 VDC	
Rated current		0.71 A	
Starting current		Max. 2.8 A	
Power consumption		Typically 17 W	
Electrical isolation		Yes	
Bleeder resistance		0 Ω	
Mechanical characteristics			
Outer dimensions			
Width		323 mm	
Height		260 mm	
Depth		86 mm	
Front			
Frame		Naturally anodized aluminum <sup>6)</sup>	
Design		Gray <sup>6)</sup>	
Membrane		Polyester	
Dark gray border around display		Similar to Pantone 432CV <sup>6)</sup>	
Light background		Similar to Pantone 427CV <sup>6)</sup>	
Gasket		Flat gasket around display front	
Housing		Metal	
Weight		Approx. 3.9 kg (without aPCI interface modules)	
Environmental characteristics			
Ambient temperature			
Operation		0 to +50°C	
Bearings		-20 to +70°C	
Transport		-20 to +70°C	
Relative humidity		See 4.10.2 "Temperature humidity diagram", on page 223	
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	
Bearings		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	
Bearings		30 g, 15 ms	
Transport		30 g, 15 ms	
Protection		IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover)	
		IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude <sup>7)</sup>		Max. 3000 m	

Table 84: Technical data - 4PP420.1043-75 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.
- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 7) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.10.2 Temperature humidity diagram

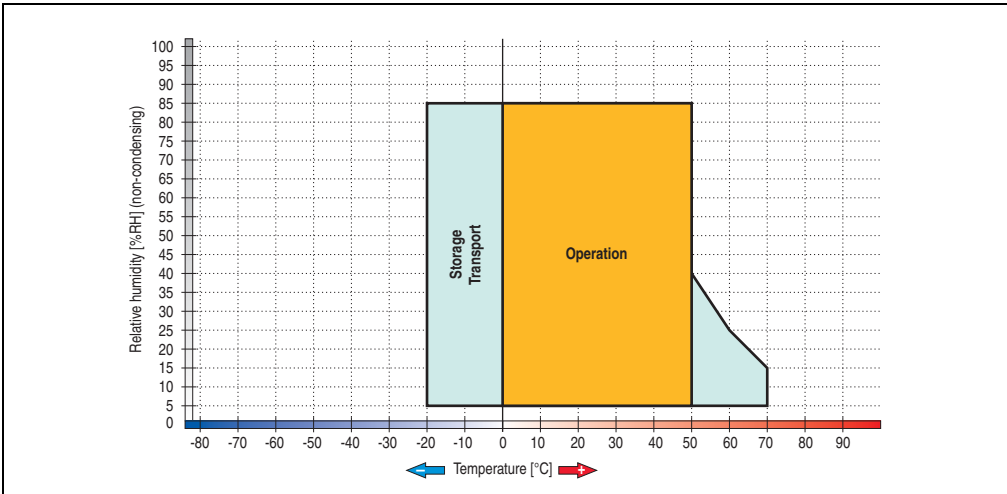


Figure 143: Temperature humidity diagram - 4PP420.1043-75

### 4.10.3 Dimensions

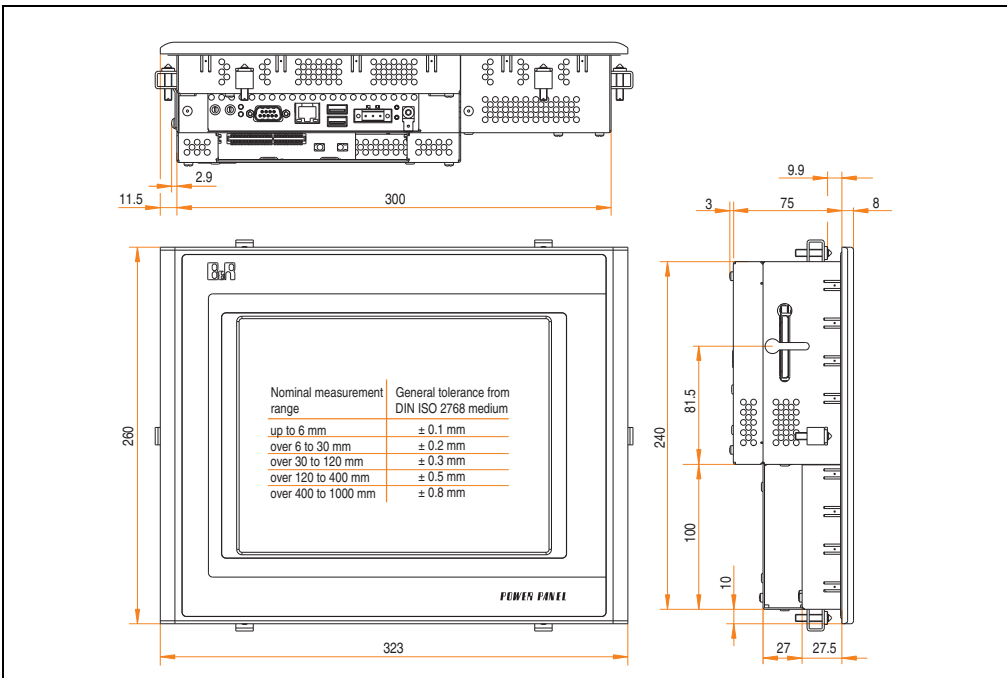


Figure 144: Dimensions - 4PP420.1043-75

#### 4.10.4 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.

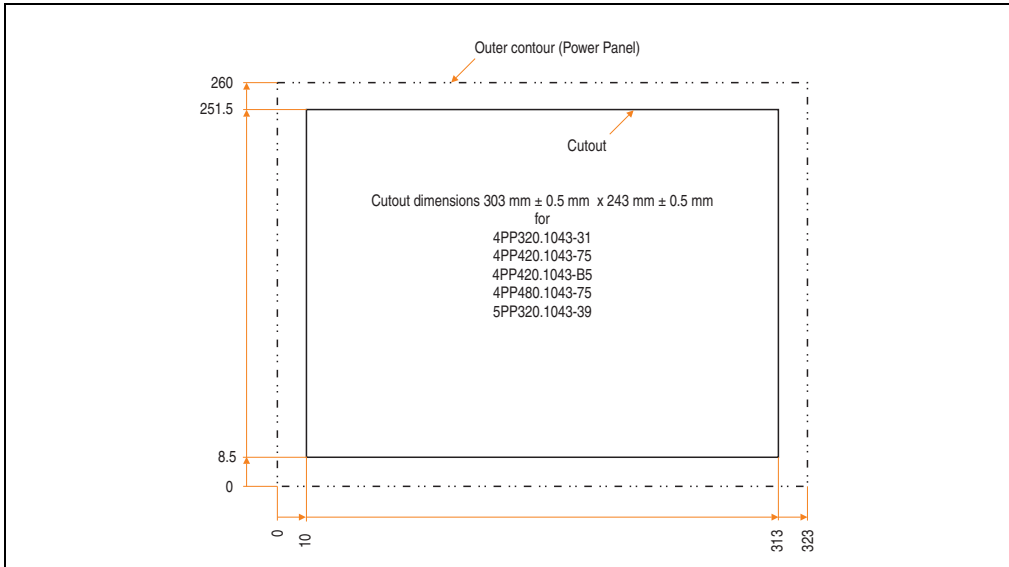


Figure 145: Cutout installation - 4PP420.1043-75

#### 4.10.5 Contents of delivery

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

Amount	Component
1	Power Panel PP420 10.4" VGA, 1 aPCI, touch screen
6	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 85: Contents of delivery - 4PP420.1043-75

4.11 Device 4PP420.1043-B5

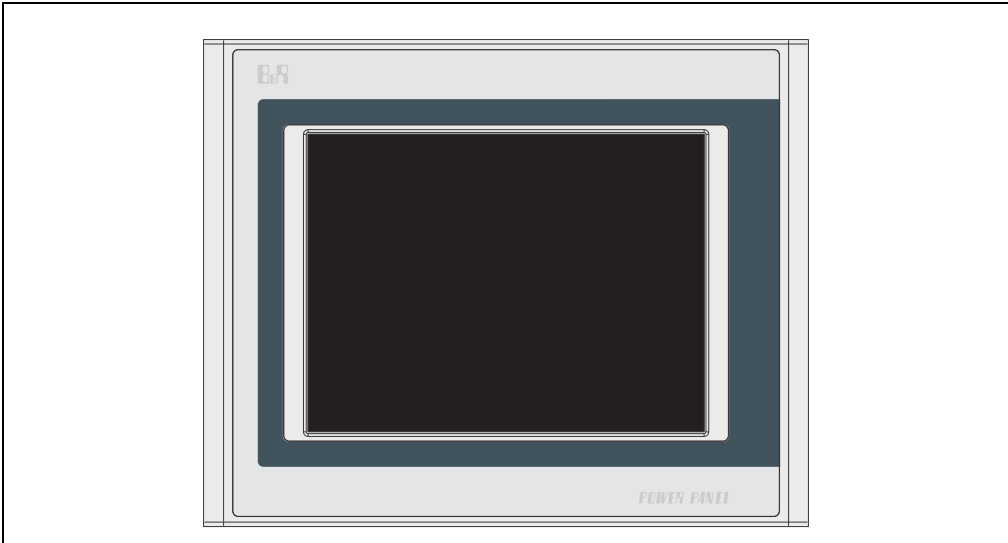


Figure 146: Front view - 4PP420.1043-B5

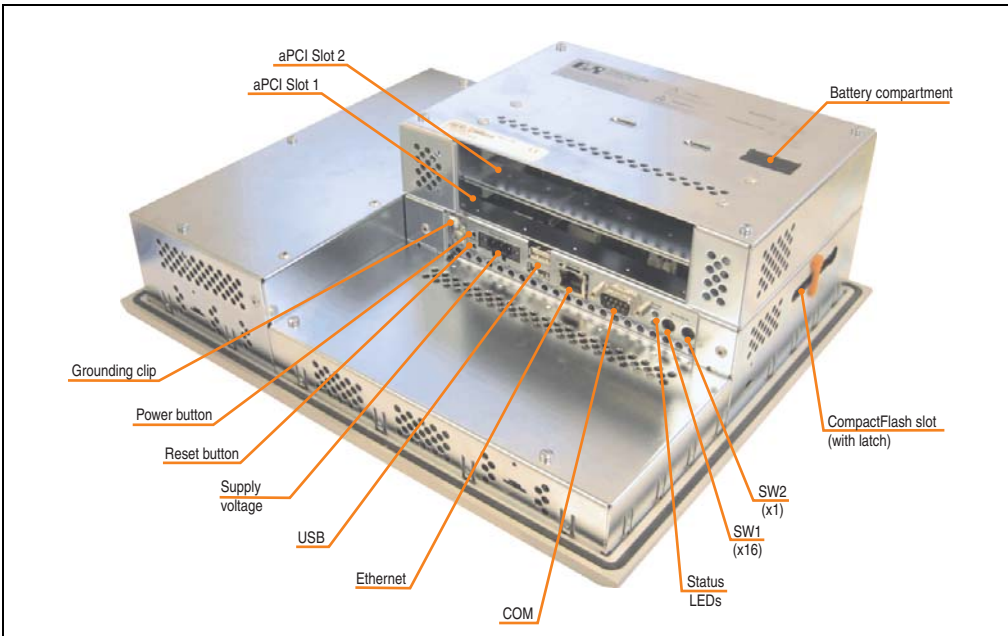


Figure 147: Rear view - 4PP420.1043-B5

**4.11.1 Technical data**

Features	4PP420.1043-B5 ≤ F0	4PP420.1043-B5 ≥ G0	4PP420.1043-B5 ≥ J0
B&R ID code	0x23BE		
Boot loader / Operating system	Automation Runtime		
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)		
Flash	2 MB (for firmware)		
Memory Type Size	DDR SDRAM 128 MB (64 MB < Rev. D0)		
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)		
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB		
Watchdog Controller	MTCX <sup>1)</sup>		
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms		
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day		
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes		
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 86: Technical data - 4PP420.1043-B5

## Technical data • Power Panel 400 with Automation Runtime

Features	4PP420.1043-B5 ≤ F0	4PP420.1043-B5 ≥ G0	4PP420.1043-B5 ≥ J0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB		
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection		
Reset button	Yes, accessible from the outside		
Power button	Yes, accessible from the outside		
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)		
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 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	Color TFT 10.4 in (264 mm) 262144 colors <sup>4)</sup> VGA, 640 x 480 pixels 600:1  Direction R / direction L = 70° Direction U = 45° / direction D = 35°  CCFL 450 cd/m <sup>2</sup> 55000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410		Color TFT 10.4 in (264 mm) 262144 colors <sup>4)</sup> VGA, 640 x 480 pixels 900:1  Direction R / direction L = 80° Direction U / direction D = 80°  LED 450 cd/m <sup>2</sup> 70000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Accu Touch Analog, resistive Elo, serial, 12- bit Up to 80% ±5%	AMT Analog, resistive Elo, serial, 12- bit Up to 80% ±5%	
Filter glass Degree of transmission Coating	-		
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-		

Table 86: Technical data - 4PP420.1043-B5 (Forts.)

## Technical data • Power Panel 400 with Automation Runtime

Electrical characteristics	4PP420.1043-B5 ≤ F0	4PP420.1043-B5 ≥ G0	4PP420.1043-B5 ≥ J0
Power supply			
Rated voltage		18 - 30 VDC	
Rated current		0.71 A	
Starting current		Max. 2.8 A	
Power consumption		Typically 17 W	
Electrical isolation		Yes	
Bleeder resistance		0 Ω	
Mechanical characteristics			
Outer dimensions			
Width		323 mm	
Height		260 mm	
Depth		108 mm	
Front			
Frame		Naturally anodized aluminum <sup>6)</sup>	
Design		Gray <sup>6)</sup>	
Membrane		Polyester	
Dark gray border around display		Similar to Pantone 432CV <sup>6)</sup>	
Light background		Similar to Pantone 427CV <sup>6)</sup>	
Gasket		Flat gasket around display front	
Housing		Metal	
Weight		Approx. 4.2 kg (without aPCI interface modules)	
Environmental characteristics			
Ambient temperature			
Operation		0 to +50°C	
Bearings		-20 to +70°C	
Transport		-20 to +70°C	
Relative humidity		See 4.11.2 "Temperature humidity diagram", on page 229	
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	
Bearings		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	
Bearings		30 g, 15 ms	
Transport		30 g, 15 ms	
Protection		IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover)	
		IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude <sup>7)</sup>		Max. 3000 m	

Table 86: Technical data - 4PP420.1043-B5 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.
- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 7) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).



### 4.11.2 Temperature humidity diagram

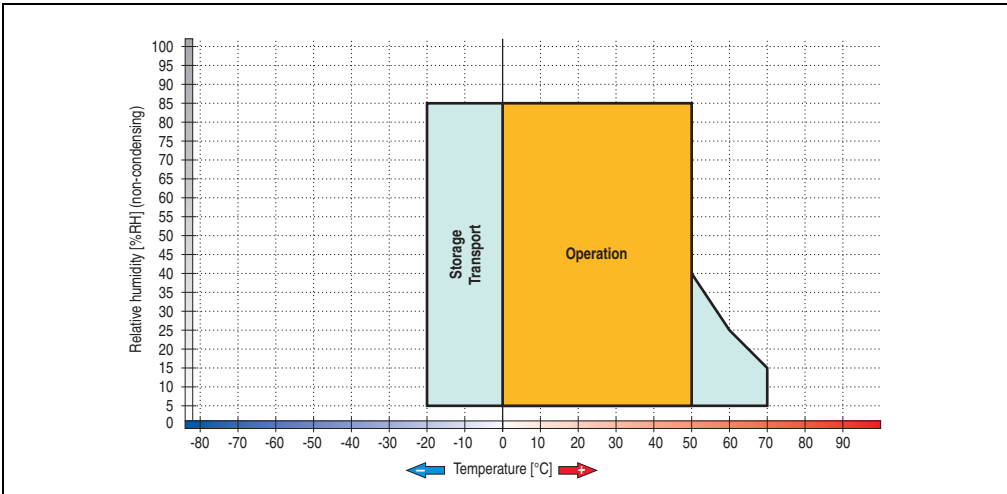


Figure 148: Temperature humidity diagram - 4PP420.1043-B5

### 4.11.3 Dimensions

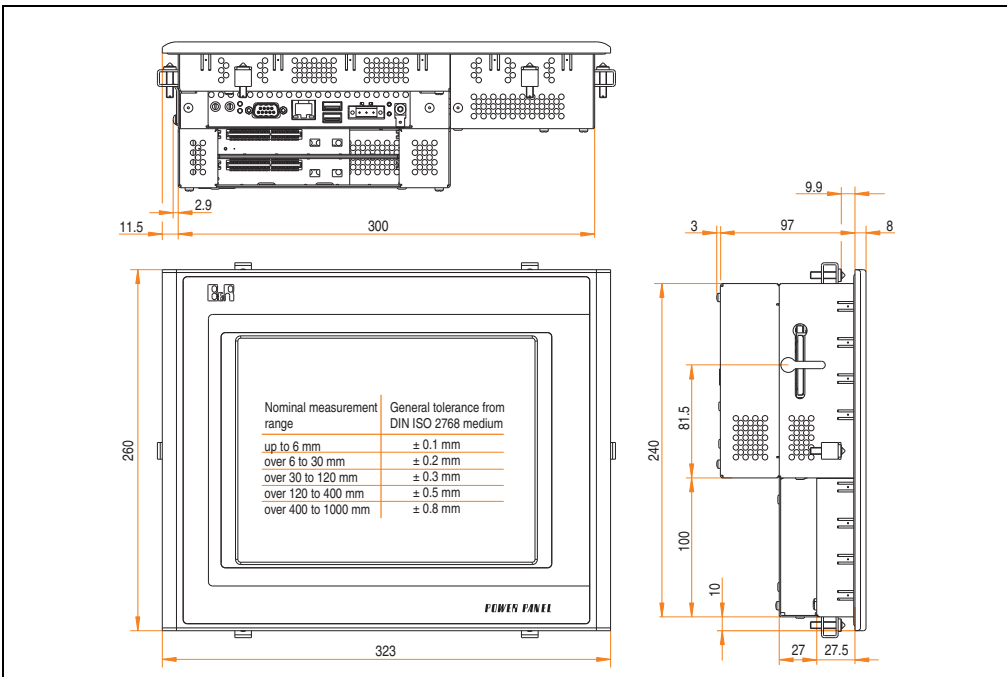


Figure 149: Dimensions - 4PP420.1043-B5

#### 4.11.4 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.

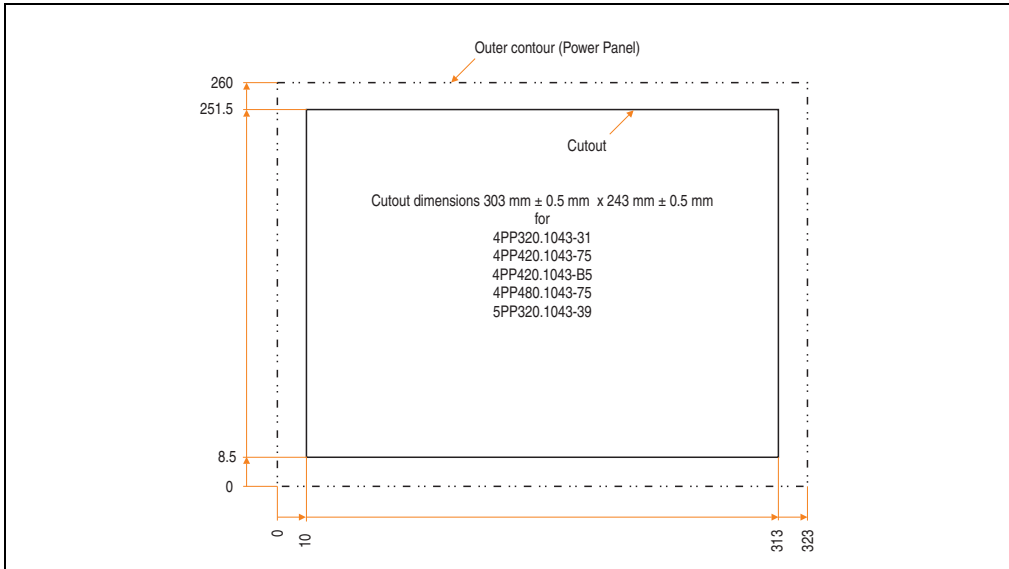


Figure 150: Cutout installation - 4PP420.1043-B5

#### 4.11.5 Contents of delivery

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

Amount	Component
1	Power Panel PP420 10.4" VGA, 2 aPCI, touch screen
6	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 87: Contents of delivery - 4PP420.1043-B5

## 4.12 Device 4PP420.1505-75

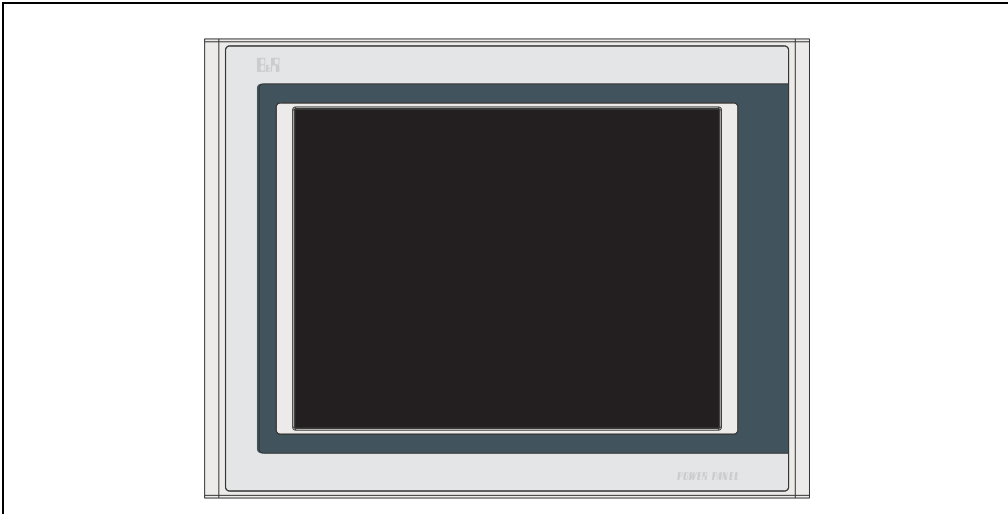


Figure 151: Front view - 4PP420.1505-75

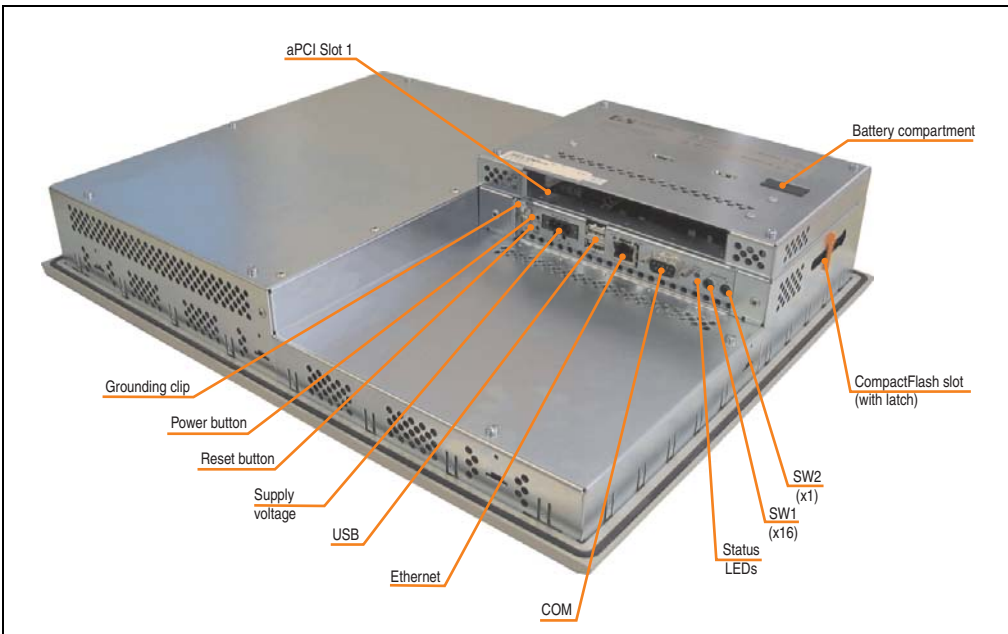


Figure 152: Rear view - 4PP420.1505-75

**4.12.1 Technical data**

Features	4PP420.1505-75 ≤ G0	4PP420.1505-75 ≥ H0	4PP420.1505-75 ≥ J0
B&R ID code	0x23BF		
Boot loader / Operating system	Automation Runtime		
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)		
Flash	2 MB (for firmware)		
Memory Type Size	DDR SDRAM 128 MB (64 MB < Rev. C0)		
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)		
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB		
Watchdog Controller	MTCX <sup>1)</sup>		
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms		
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day		
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes		
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 88: Technical data - 4PP420.1505-75

## Technical data • Power Panel 400 with Automation Runtime

Features	4PP420.1505-75 ≤ G0	4PP420.1505-75 ≥ H0	4PP420.1505-75 ≥ J0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB		
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection		
Reset button	Yes, accessible from the outside		
Power button	Yes, accessible from the outside		
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)		
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 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	Color TFT 15 in (381 mm) 16.7 million colors <sup>4)</sup> XGA, 1024 x 768 pixels 400:1  Direction R / direction L = 85° Direction U / direction D = 85°  CCFL 250 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", on page 410		Color TFT 15 in (381 mm) 16.2 million colors <sup>4)</sup> XGA, 1024 x 768 pixels 1000:1  Direction R / direction L = 85° Direction U / direction D = 85°  LED 350 cd/m <sup>2</sup> 70000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Accu Touch Analog, resistive Elo, serial, 12- bit Up to 80% ±5%	AMT Analog, resistive Elo, serial, 12- bit Up to 80% ±5%	
Filter glass Degree of transmission Coating	-		
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-		

Table 88: Technical data - 4PP420.1505-75 (Forts.)

## Technical data • Power Panel 400 with Automation Runtime

Electrical characteristics	4PP420.1505-75 ≤ G0	4PP420.1505-75 ≥ H0	4PP420.1505-75 ≥ J0
Power supply			
Rated voltage		18 - 30 VDC	
Rated current		1.25 A	
Starting current		Max. 2 A	
Power consumption		Typically 30 W	
Electrical isolation		Yes	
Bleeder resistance		0 Ω	
Mechanical characteristics			
Outer dimensions			
Width		435 mm	
Height		330 mm	
Depth		86 mm	
Front			
Frame		Naturally anodized aluminum <sup>6)</sup>	
Design		Gray <sup>6)</sup>	
Membrane		Polyester	
Dark gray border around display		Similar to Pantone 432CV <sup>6)</sup>	
Light background		Similar to Pantone 427CV <sup>6)</sup>	
Gasket		Flat gasket around display front	
Housing		Metal	
Weight		Approx. 6.7 kg (without aPCI interface modules)	
Environmental characteristics			
Ambient temperature			
Operation		0 to +50°C	
Bearings		-20 to +60°C	
Transport		-20 to +60°C	
Relative humidity		See 4.12.2 "Temperature humidity diagram", on page 235	
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	
Bearings		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	
Bearings		30 g, 15 ms	
Transport		30 g, 15 ms	
Protection		IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover)	
		IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude <sup>7)</sup>		Max. 3000 m	

Table 88: Technical data - 4PP420.1505-75 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.
- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 7) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.12.2 Temperature humidity diagram

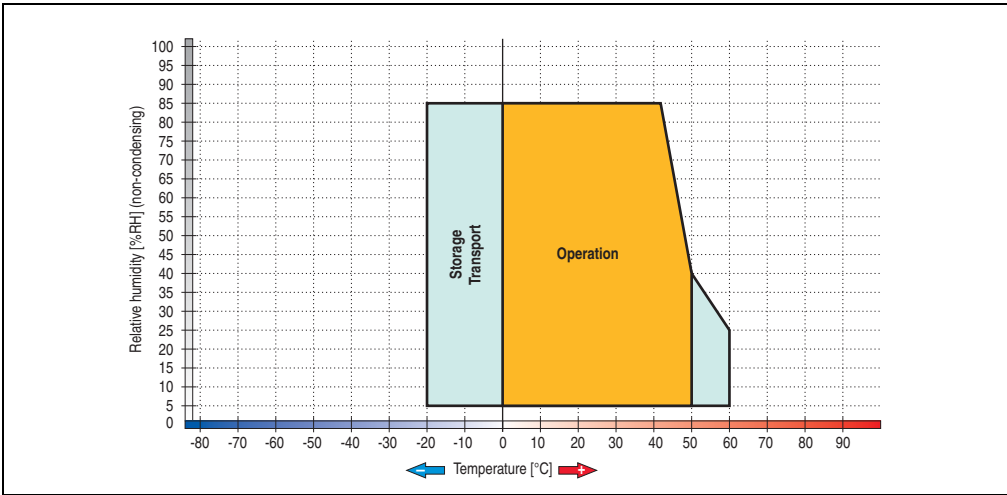


Figure 153: Temperature humidity diagram - 4PP420.1505-75

### 4.12.3 Dimensions

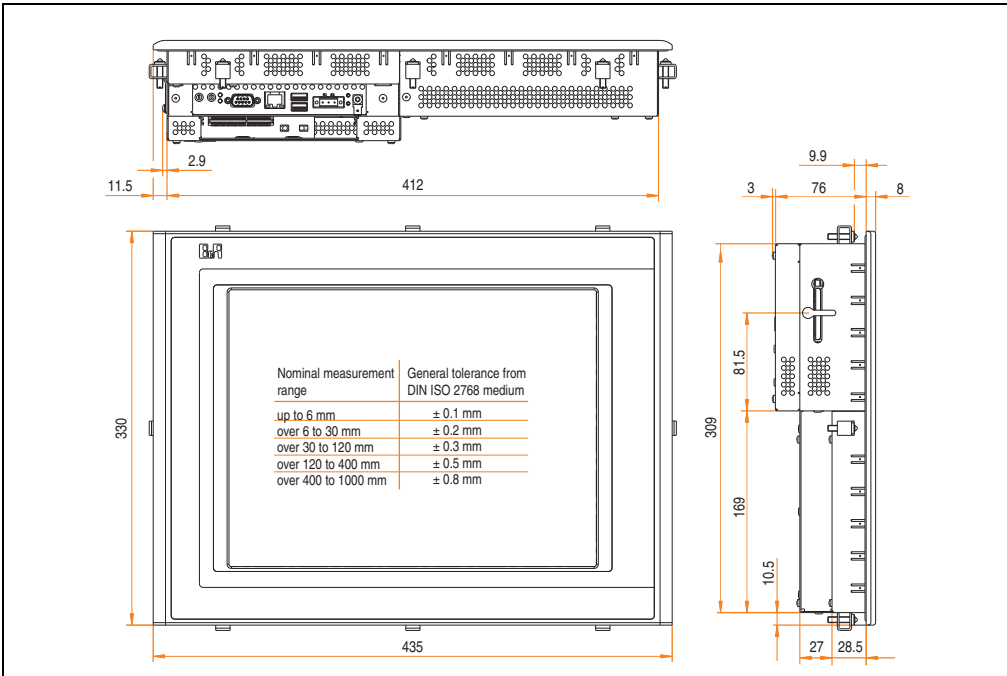


Figure 154: Dimensions - 4PP420.1505-75

#### 4.12.4 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.

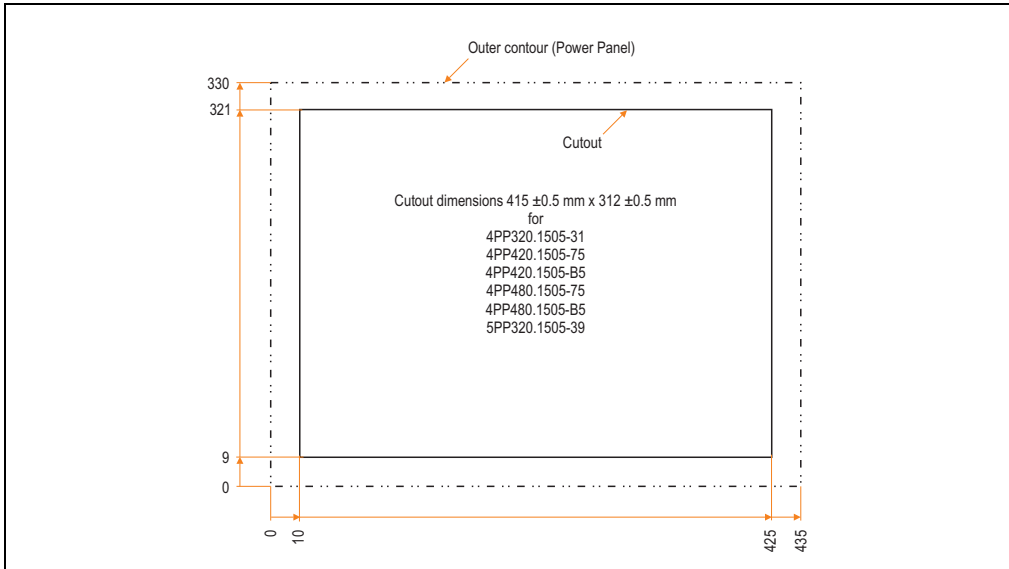


Figure 155: Cutout installation - 4PP420.1505-75

#### 4.12.5 Contents of delivery

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

Amount	Component
1	Power Panel PP420 15" XGA, 1 aPCI, touch screen
8	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 89: Contents of delivery - 4PP420.1505-75



4.13 Device 4PP420.1505-B5

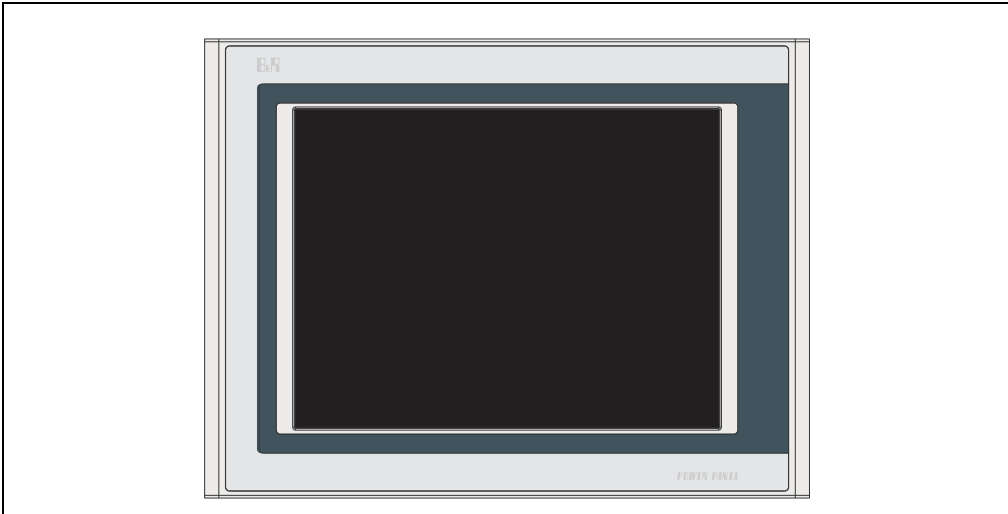


Figure 156: Front view - 4PP420.1505-B5

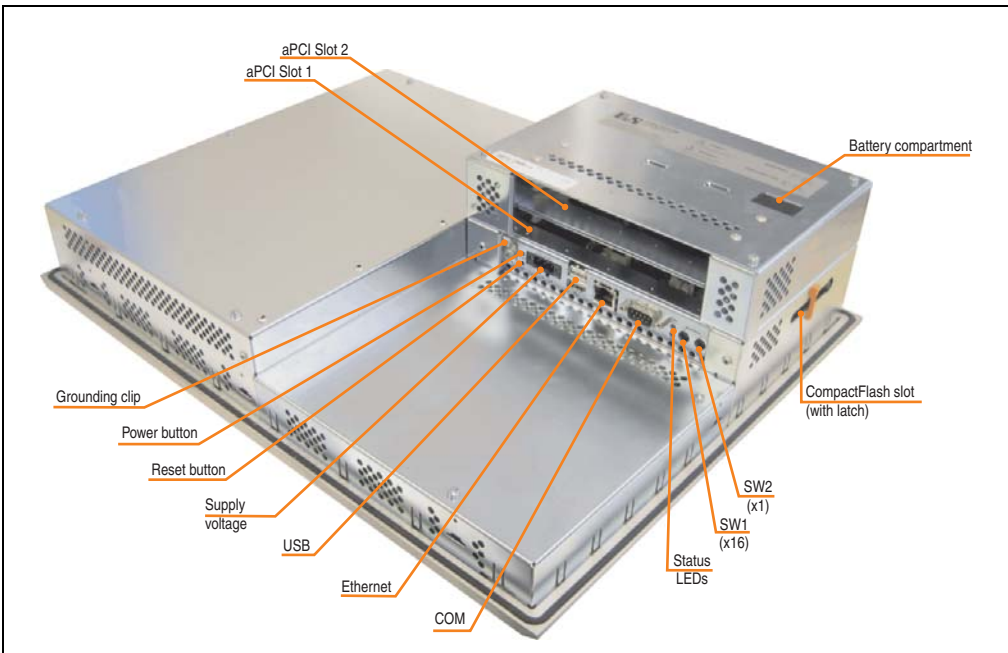


Figure 157: Rear view - 4PP420.1505-B5

**4.13.1 Technical data**

Features	4PP420.1505-B5 ≤ F0	4PP420.1505-B5 ≥ G0	4PP420.1505-B5 ≥ I0
B&R ID code	0x23C0		
Boot loader / Operating system	Automation Runtime		
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)		
Flash	2 MB (for firmware)		
Memory Type Size	DDR SDRAM 128 MB (64 MB < C0)		
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)		
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB		
Watchdog Controller	MTCX <sup>1)</sup>		
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms		
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day		
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes		
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 90: Technical data - 4PP420.1505-B5

## Technical data • Power Panel 400 with Automation Runtime

Features	4PP420.1505-B5 ≤ F0	4PP420.1505-B5 ≥ G0	4PP420.1505-B5 ≥ I0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB		
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection		
Reset button	Yes, accessible from the outside		
Power button	Yes, accessible from the outside		
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)		
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 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	Color TFT 15 in (381 mm) 16.7 million colors <sup>4)</sup> XGA, 1024 x 768 pixels 400:1  Direction R / direction L = 85° Direction U / direction D = 85°  CCFL 250 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410		Color TFT 15 in (381 mm) 16.2 million colors <sup>4)</sup> XGA, 1024 x 768 pixels 1000:1  Direction R / direction L = 85° Direction U / direction D = 85°  LED 350 cd/m <sup>2</sup> 70000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Accu Touch Analog, resistive Elo, serial, 12- bit Up to 80% ±5%	AMT Analog, resistive Elo, serial, 12- bit Up to 80% ±5%	
Filter glass Degree of transmission Coating	-		
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-		

Table 90: Technical data - 4PP420.1505-B5 (Forts.)

## Technical data • Power Panel 400 with Automation Runtime

Electrical characteristics	4PP420.1505-B5 ≤ F0	4PP420.1505-B5 ≥ G0	4PP420.1505-B5 ≥ I0
Power supply			
Rated voltage		18 - 30 VDC	
Rated current		1.25 A	
Starting current		Max. 2 A	
Power consumption		Typically 30 W	
Electrical isolation		Yes	
Bleeder resistance		0 Ω	
Mechanical characteristics			
Outer dimensions			
Width		435 mm	
Height		330 mm	
Depth		109 mm	
Front			
Frame		Naturally anodized aluminum <sup>6)</sup>	
Design		Gray <sup>6)</sup>	
Membrane		Polyester	
Dark gray border around display		Similar to Pantone 432CV <sup>6)</sup>	
Light background		Similar to Pantone 427CV <sup>6)</sup>	
Gasket		Flat gasket around display front	
Housing		Metal	
Weight		Approx. 6.8 kg (without aPCI interface modules)	
Environmental characteristics			
Ambient temperature			
Operation		0 to +50°C	
Bearings		-20 to +60°C	
Transport		-20 to +60°C	
Relative humidity		See 4.13.2 "Temperature humidity diagram", on page 241	
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	
Bearings		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	
Bearings		30 g, 15 ms	
Transport		30 g, 15 ms	
Protection		IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover)	
		IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude <sup>7)</sup>		Max. 3000 m	

Table 90: Technical data - 4PP420.1505-B5 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.
- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 7) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.13.2 Temperature humidity diagram

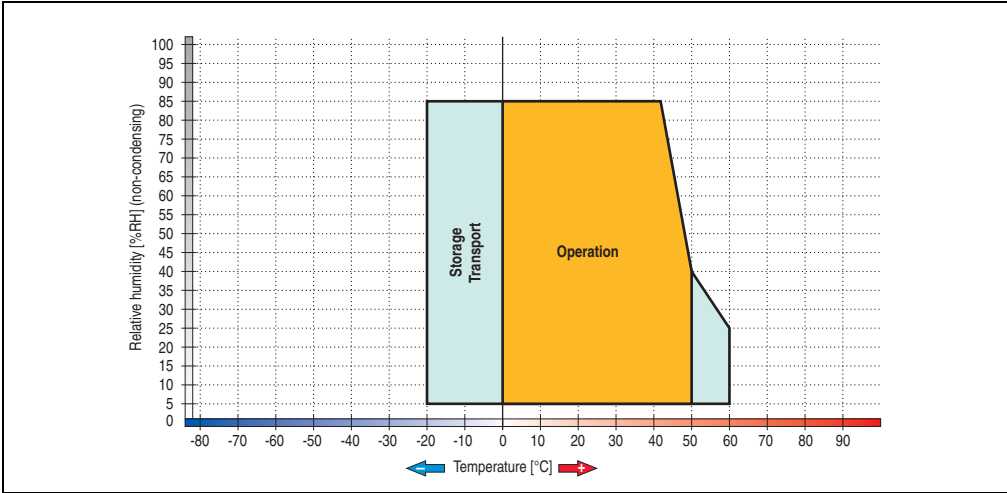


Figure 158: Temperature humidity diagram - 4PP420.1505-B5

### 4.13.3 Dimensions

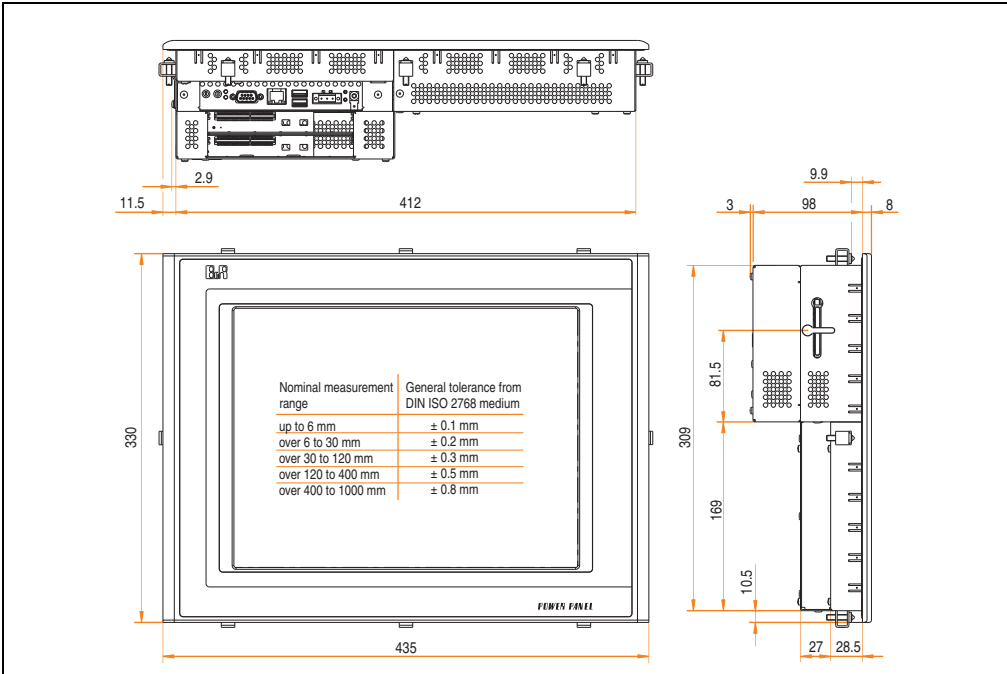


Figure 159: Dimensions - 4PP420.1505-B5

### 4.13.4 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.

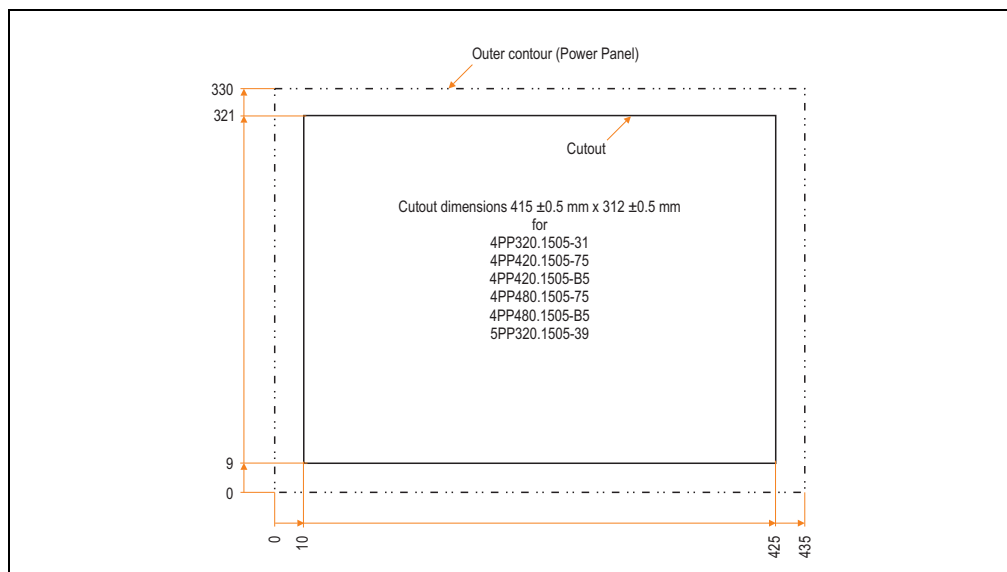


Figure 160: Cutout installation - 4PP420.1505-B5

### 4.13.5 Contents of delivery

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

Amount	Component
1	Power Panel PP420 15" XGA, 2 aPCI, touch screen
8	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 91: Contents of delivery - 4PP420.1505-B5

4.14 Device 4PP451.0571-45

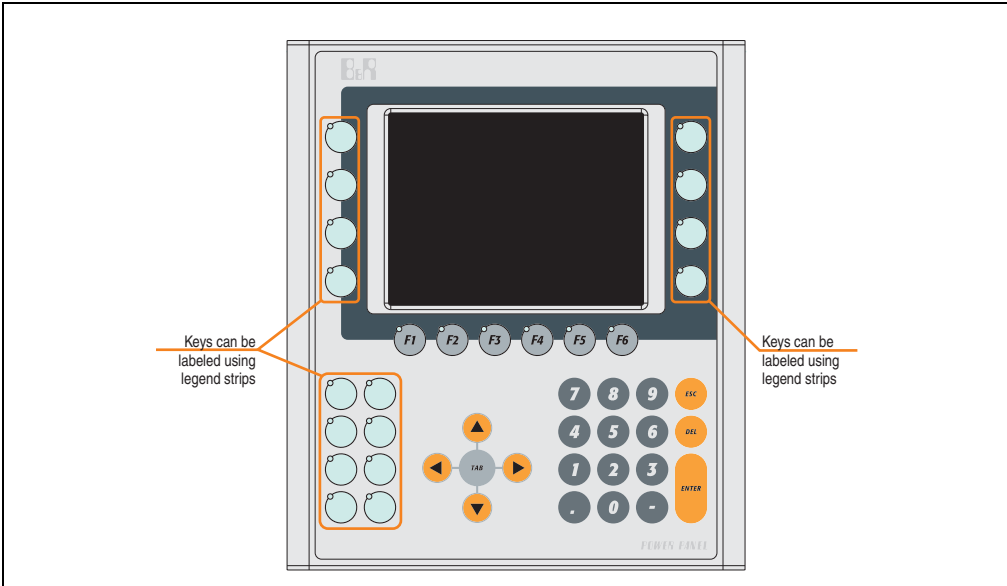


Figure 161: Front view - 4PP451.0571-45

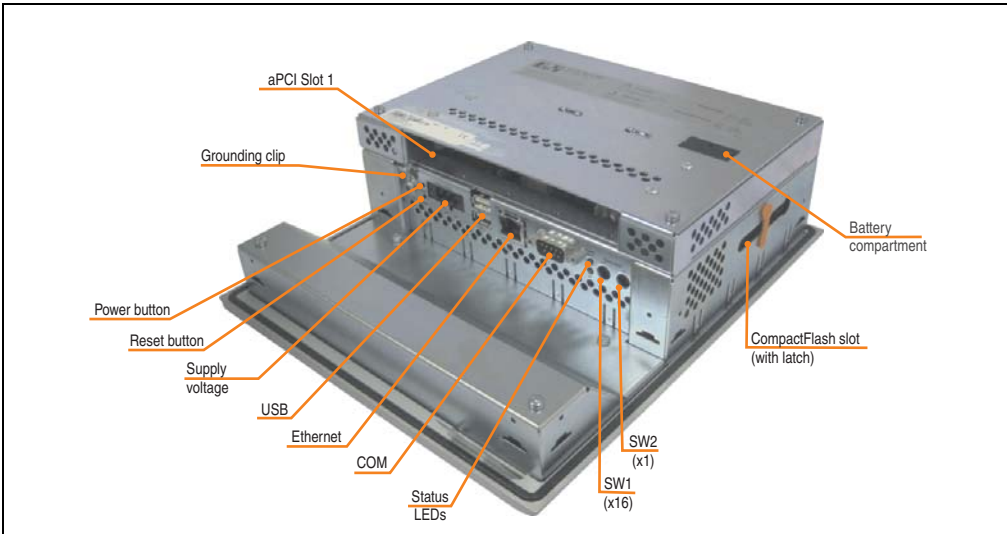


Figure 162: Rear view - 4PP451.0571-45

**4.14.1 Technical data**

Features	4PP451.0571-45 < Rev. H0	4PP451.0571-45 ≥ Rev. H0
B&R ID code	0xA530	
Boot loader / Operating system	Automation Runtime	
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)	
Flash	2 MB (for firmware)	
Memory Type Size	DDR SDRAM 128 MB	
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)	
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB	
Watchdog Controller	MTCX <sup>1)</sup>	
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms	
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day	
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes	
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 92: Technical data - 4PP451.0571-45



## Technical data • Power Panel 400 with Automation Runtime

Features	4PP451.0571-45 < Rev. H0	4PP451.0571-45 ≥ Rev. H0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB	
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection	
Reset button	Yes, accessible from the outside	
Power button	Yes, accessible from the outside	
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)	
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 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	Monochrome LCD 5.7 in (144 mm) 8 shades of gray <sup>3)</sup> QVGA, 320 x 240 pixels 25:1  Direction R / direction L = 40° Direction U = 40° / direction D = 50°  CCFL 220 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410	Monochrome LCD 5.7 in (144 mm) 8 shades of gray <sup>3)</sup> QVGA, 320 x 240 pixels 25:1  Direction R / direction L = 80° Direction U / direction D = 80°  LED 150 cd/m <sup>2</sup> 40000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	-	
Filter glass Degree of transmission Coating	95% On both sides	
Keys/LED <sup>6)</sup> Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	16 with LED (yellow) 6 with LED (yellow) 5 without LED 15 without LED - > 10 <sup>6</sup> actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green)  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>	

Table 92: Technical data - 4PP451.0571-45 (Forts.)

## Technical data • Power Panel 400 with Automation Runtime

Electrical characteristics	4PP451.0571-45 < Rev. H0	4PP451.0571-45 ≥ Rev. H0
Power supply		
Rated voltage		18 - 30 VDC
Rated current		0.63 A
Starting current		Max. 1.2 A
Power consumption		Typically 15 W
Electrical isolation		Yes
Bleeder resistance		0 Ω
Mechanical characteristics		
Outer dimensions		
Width		212 mm
Height		245 mm
Depth		76 mm
Front		
Frame		Naturally anodized aluminum <sup>7)</sup>
Design		Gray <sup>7)</sup>
Membrane		Polyester
Dark gray border around display		Similar to Pantone 432CV <sup>7)</sup>
Light background		Similar to Pantone 427CV <sup>7)</sup>
Orange keys		Similar to Pantone 151CV <sup>7)</sup>
Dark gray keys		Similar to Pantone 431CV <sup>7)</sup>
Legend strips (gray)		Similar to Pantone 429CV <sup>7)</sup>
Gasket		Flat gasket around display front
Housing		Metal
Weight		Approx. 2.4 kg (without aPCI interface modules)
Environmental characteristics		
Ambient temperature		
Operation		0 to +50°C
Bearings		-20 to +70°C
Transport		-20 to +70°C
Relative humidity		See 4.14.2 "Temperature humidity diagram", on page 247
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
Bearings		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
Bearings		30 g, 15 ms
Transport		30 g, 15 ms
Protection		IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude <sup>8)</sup>		Max. 3000 m

Table 92: Technical data - 4PP451.0571-45 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.

- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) The functions of the keys and the LEDs can be configured using Visual Components in B&R Automation Studio.
- 7) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 8) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

#### 4.14.2 Temperature humidity diagram

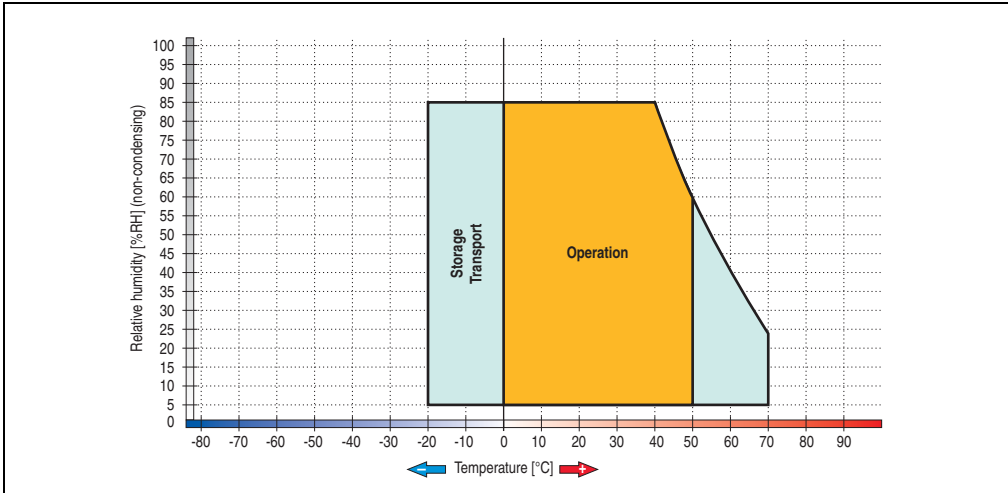


Figure 163: Temperature humidity diagram - 4PP451.0571-45

### 4.14.3 Dimensions

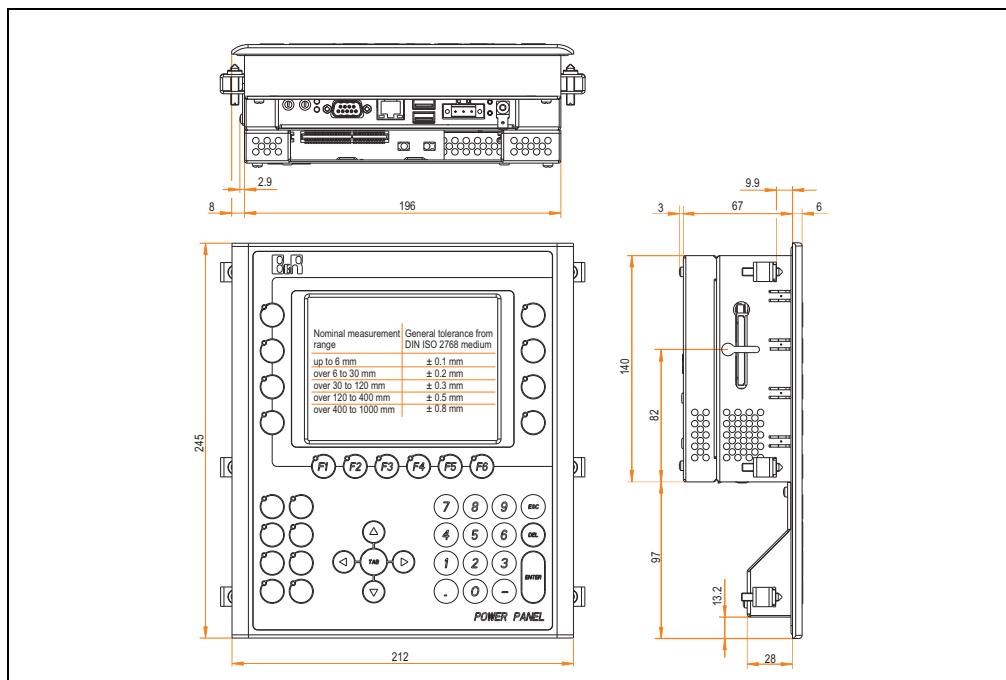


Figure 164: Dimensions - 4PP451.0571-45

### 4.14.4 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.

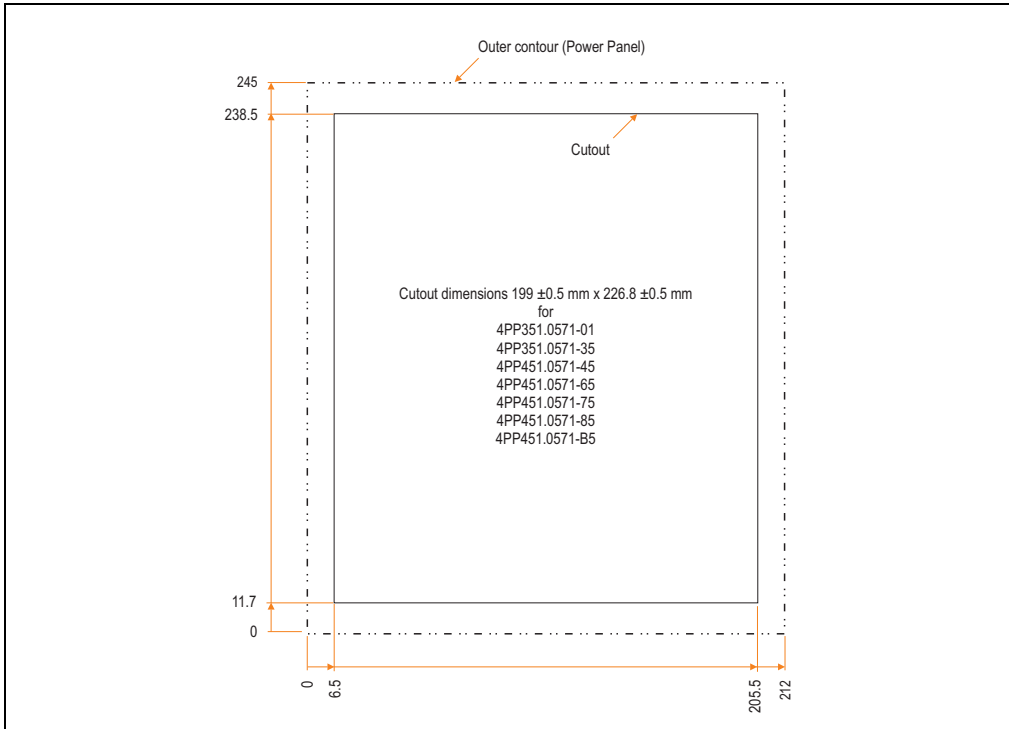


Figure 165: Cutout installation - 4PP451.0571-45

### 4.14.5 Contents of delivery

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

Amount	Component
1	Power Panel PP451 5.7" QVGA, 1 aPCI, keys
6	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 93: Contents of delivery - 4PP451.0571-45

### 4.15 Device 4PP451.0571-65

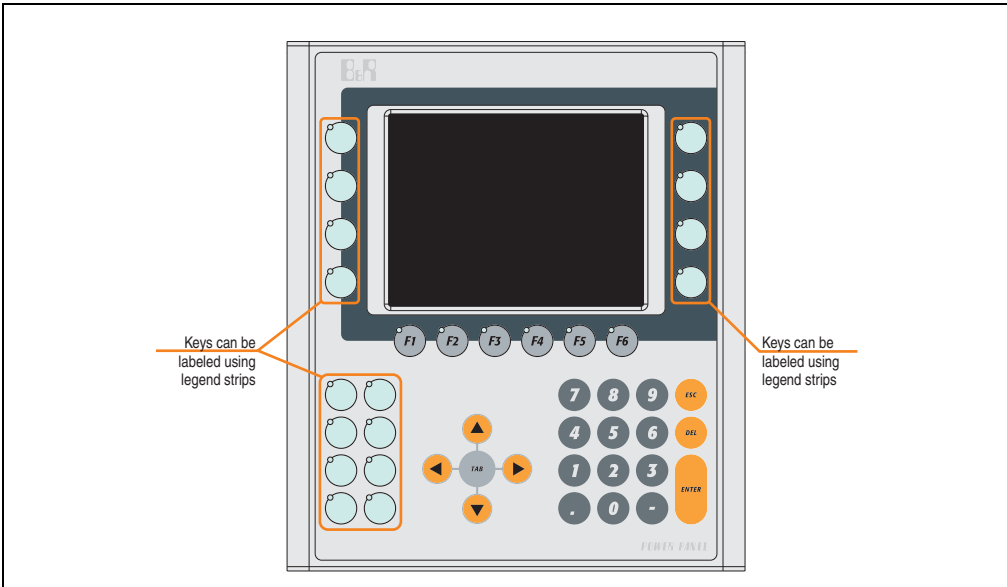


Figure 166: Front view - 4PP451.0571-65

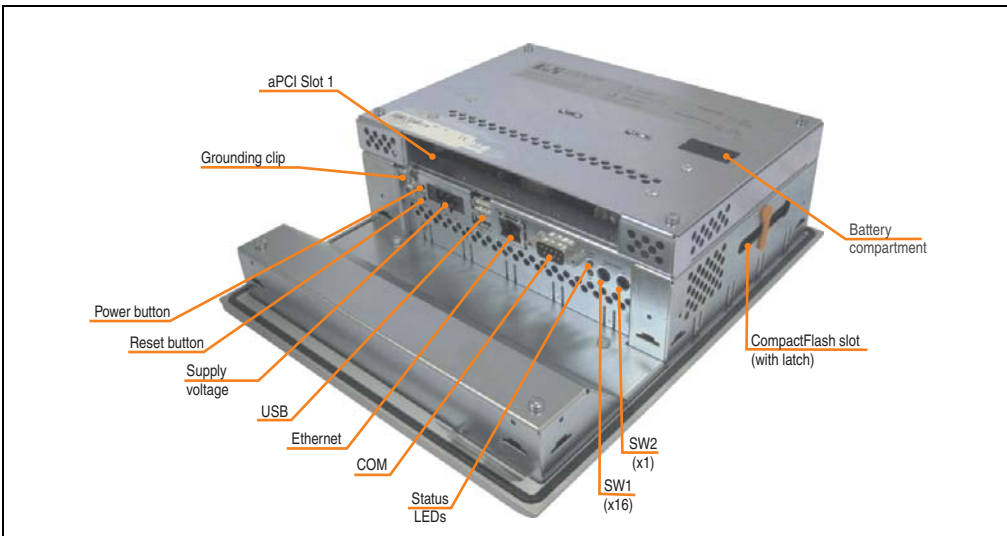


Figure 167: Rear view - 4PP451.0571-65

## 4.15.1 Technical data

Features	4PP451.0571-65
B&R ID code	0x23C1
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size	DDR SDRAM 128 MB (64 MB < C0)
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB
Watchdog Controller	MTCX <sup>1)</sup>
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 94: Technical data - 4PP451.0571-65

## Technical data • Power Panel 400 with Automation Runtime

Features	4PP451.0571-65
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
Power button	Yes, accessible from the outside
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)
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 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	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°  CCFL 200 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys/LED <sup>6)</sup> Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	16 with LED (yellow) 6 with LED (yellow) 5 without LED 15 without LED - > 10 <sup>6</sup> actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green)  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>

Table 94: Technical data - 4PP451.0571-65 (Forts.)



## Technical data • Power Panel 400 with Automation Runtime

Electrical characteristics	4PP451.0571-65
Power supply	
Rated voltage	18 - 30 VDC
Rated current	0.63 A
Starting current	Max. 1.2 A
Power consumption	Typically 15 W
Electrical isolation	Yes
Bleeder resistance	0 Ω
Mechanical characteristics	
Outer dimensions	
Width	212 mm
Height	245 mm
Depth	76 mm
Front	
Frame	Naturally anodized aluminum <sup>7)</sup>
Design	Gray <sup>7)</sup>
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV <sup>7)</sup>
Light background	Similar to Pantone 427CV <sup>7)</sup>
Orange keys	Similar to Pantone 151CV <sup>7)</sup>
Dark gray keys	Similar to Pantone 431CV <sup>7)</sup>
Legend strips (gray)	Similar to Pantone 429CV <sup>7)</sup>
Gasket	Flat gasket around display front
Housing	Metal
Weight	Approx. 2.4 kg (without aPCI interface modules)
Environmental characteristics	
Ambient temperature	
Operation	0 to +50°C
Bearings	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 4.15.2 "Temperature humidity diagram", on page 254
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
Bearings	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
Bearings	30 g, 15 ms
Transport	30 g, 15 ms
Protection	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude <sup>8)</sup>	Max. 3000 m

Table 94: Technical data - 4PP451.0571-65 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.

- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) The functions of the keys and the LEDs can be configured using Visual Components in B&R Automation Studio.
- 7) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 8) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.15.2 Temperature humidity diagram

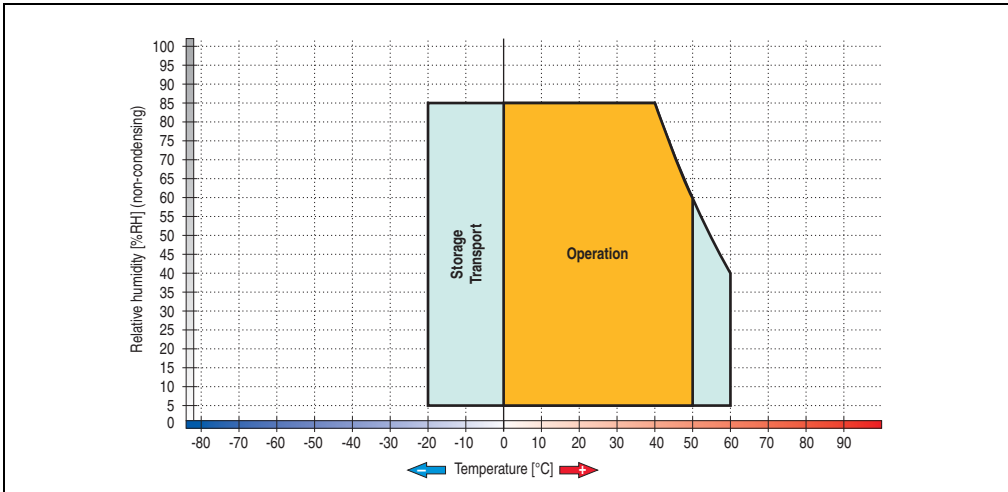


Figure 168: Temperature humidity diagram - 4PP451.0571-65

4.15.3 Dimensions

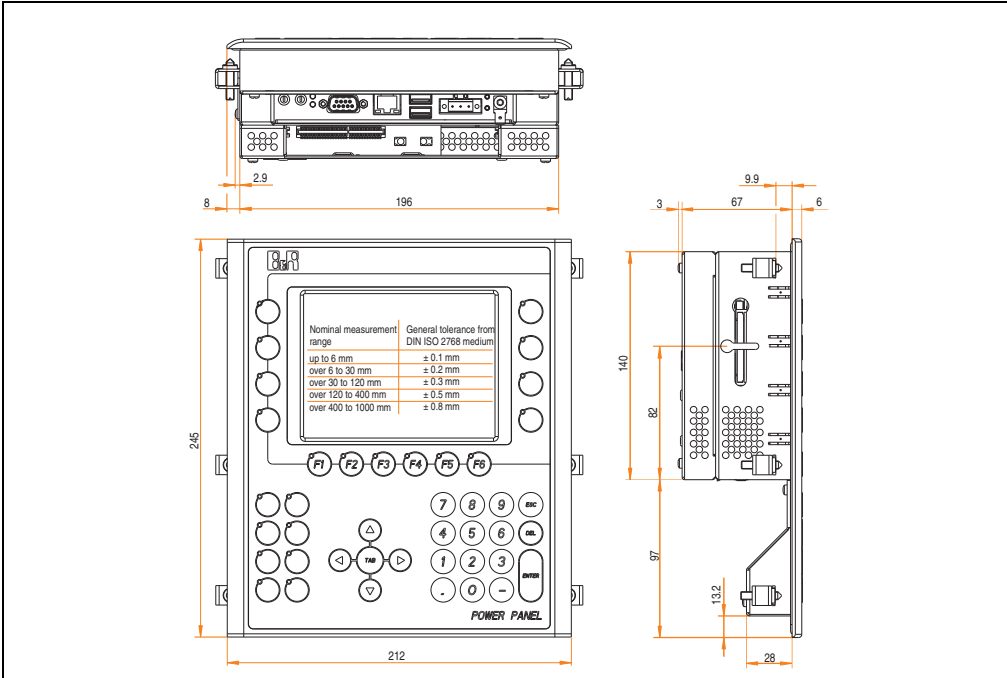


Figure 169: Dimensions - 4PP451.0571-65

### 4.15.4 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.

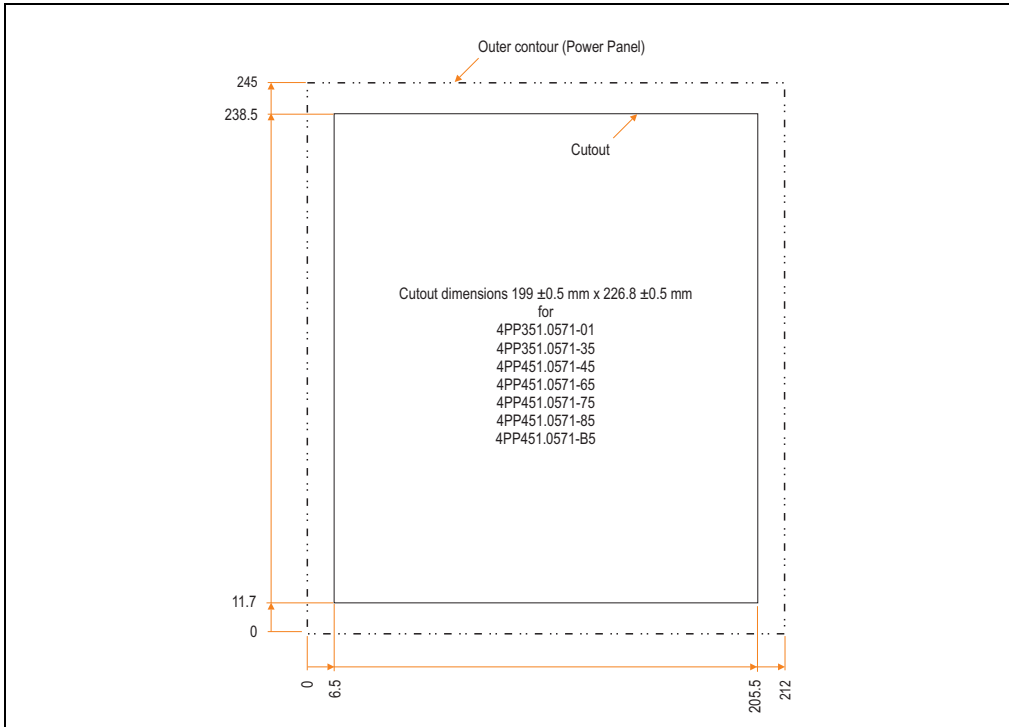


Figure 170: Cutout installation - 4PP451.0571-65

### 4.15.5 Contents of delivery

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

Amount	Component
1	Power Panel PP451 5.7" QVGA, 1 aPCI, keys
6	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 95: Contents of delivery - 4PP451.0571-65

4.16 Device 4PP451.0571-75

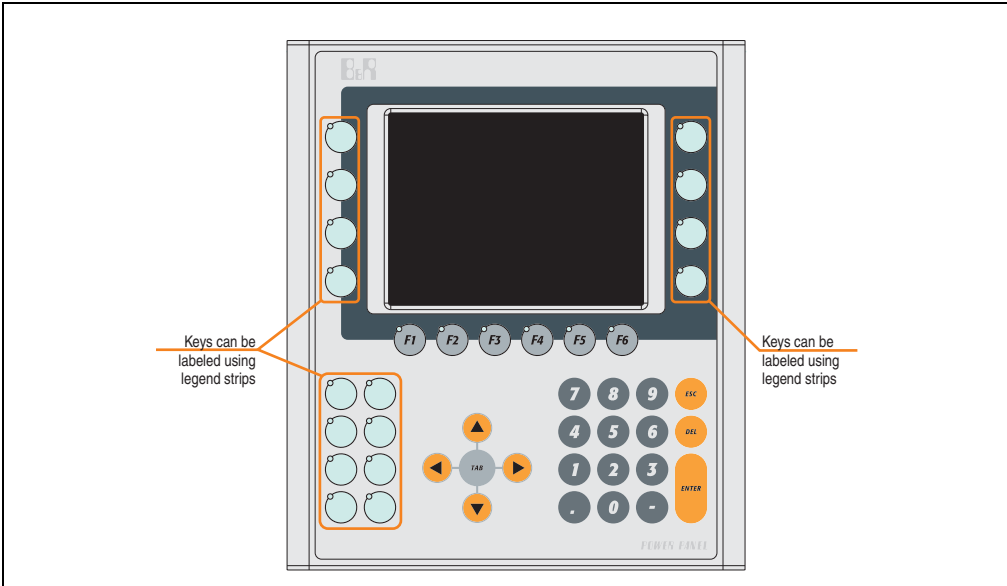


Figure 171: Front view - 4PP451.0571-75

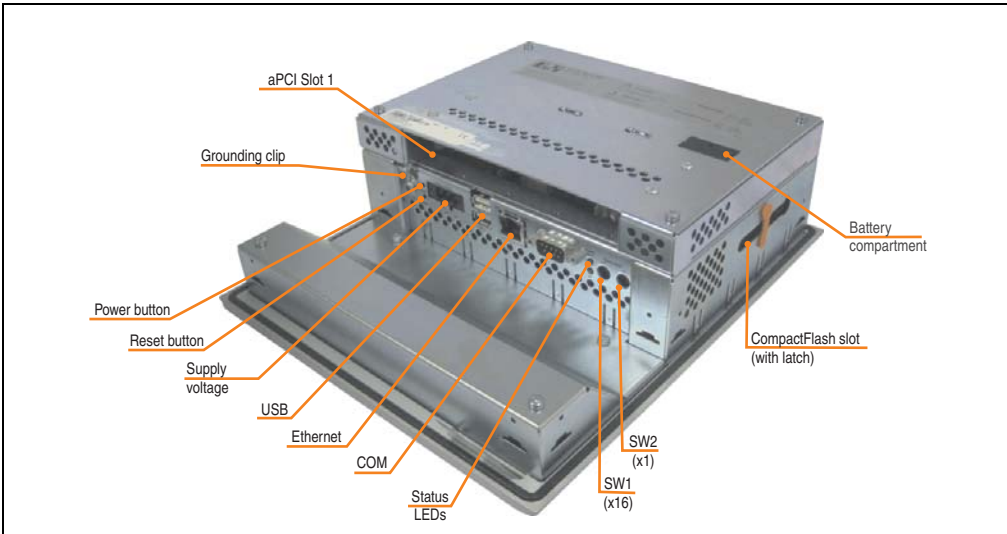


Figure 172: Rear view - 4PP451.0571-75

**4.16.1 Technical data**

Features	4PP451.0571-75 < Rev. D0	4PP451.0571-75 ≥ Rev. D0
B&R ID code	0xA15B	
Boot loader / Operating system	Automation Runtime	
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)	
Flash	2 MB (for firmware)	
Memory Type Size	DDR SDRAM 128 MB	
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)	
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB	
Watchdog Controller	MTCX <sup>1)</sup>	
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms	
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day	
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes	
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 96: Technical data - 4PP451.0571-75

## Technical data • Power Panel 400 with Automation Runtime

Features	4PP451.0571-75 < Rev. D0	4PP451.0571-75 ≥ Rev. D0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB	
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection	
Reset button	Yes, accessible from the outside	
Power button	Yes, accessible from the outside	
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)	
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 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	Color TFT 5.7 in (144 mm) 262144 colors <sup>4)</sup> QVGA, 320 x 240 pixels 400:1  Direction R / direction L = 60° Direction U = 40° / direction D = 50°  CCFL 500 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410	Color TFT 5.7 in (144 mm) 262144 colors <sup>3)</sup> QVGA, 320 x 240 pixels 350:1  Direction R / direction L = 65° Direction U = 65° / direction D = 40°  CCFL 500 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	-	
Filter glass Degree of transmission Coating	95% On both sides	
Keys/LED <sup>6)</sup> Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	16 with LED (yellow) 6 with LED (yellow) 5 without LED 15 without LED  -  > 10 <sup>6</sup> actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green)  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>	

Table 96: Technical data - 4PP451.0571-75 (Forts.)

## Technical data • Power Panel 400 with Automation Runtime

Electrical characteristics	4PP451.0571-75 < Rev. D0	4PP451.0571-75 Rev. D0
Power supply		
Rated voltage		18 - 30 VDC
Rated current		0.63 A
Starting current		Max. 1.2 A
Power consumption		Typically 15 W
Electrical isolation		Yes
Bleeder resistance		0 Ω
Mechanical characteristics		
Outer dimensions		
Width		212 mm
Height		245 mm
Depth		76 mm
Front		
Frame		Naturally anodized aluminum <sup>7)</sup>
Design		Gray <sup>7)</sup>
Membrane		Polyester
Dark gray border around display		Similar to Pantone 432CV <sup>7)</sup>
Light background		Similar to Pantone 427CV <sup>7)</sup>
Orange keys		Similar to Pantone 151CV <sup>7)</sup>
Dark gray keys		Similar to Pantone 431CV <sup>7)</sup>
Legend strips (gray)		Similar to Pantone 429CV <sup>7)</sup>
Gasket		Flat gasket around display front
Housing		Metal
Weight		Approx. 2.4 kg (without aPCI interface modules)
Environmental characteristics		
Ambient temperature		
Operation		0 to +50°C
Bearings		-20 to +60°C
Transport		-20 to +60°C
Relative humidity		See 4.16.2 "Temperature humidity diagram", on page 261
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
Bearings		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
Bearings		30 g, 15 ms
Transport		30 g, 15 ms
Protection		IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude <sup>8)</sup>		Max. 3000 m

Table 96: Technical data - 4PP451.0571-75 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.



- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) The functions of the keys and the LEDs can be configured using Visual Components in B&R Automation Studio.
- 7) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 8) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

#### 4.16.2 Temperature humidity diagram

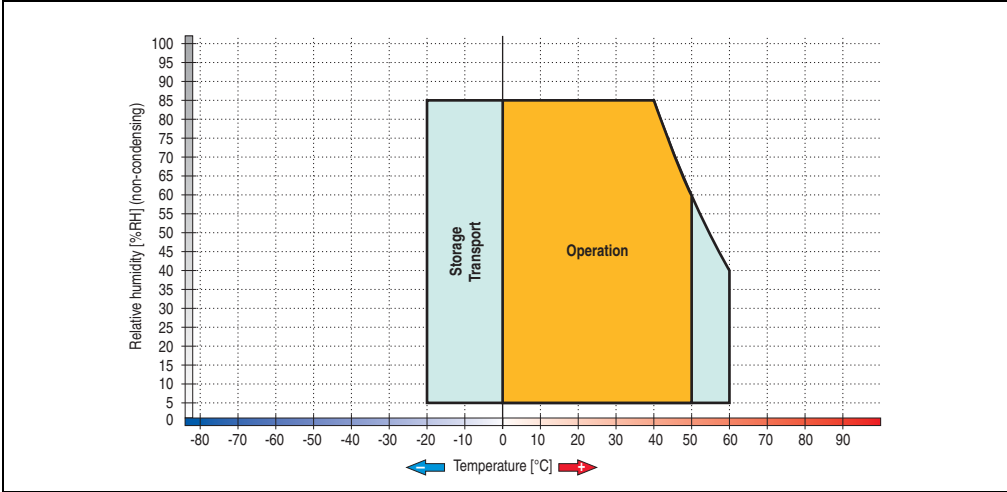


Figure 173: Temperature humidity diagram - 4PP451.0571-75

4.16.3 Dimensions

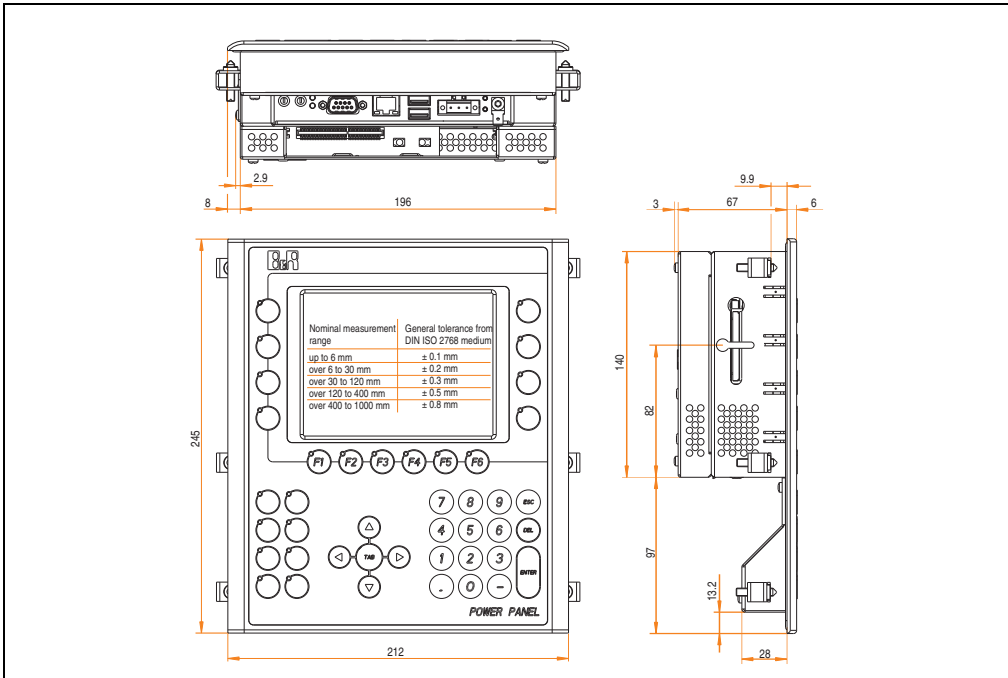


Figure 174: Dimensions - 4PP451.0571-75

### 4.16.4 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.

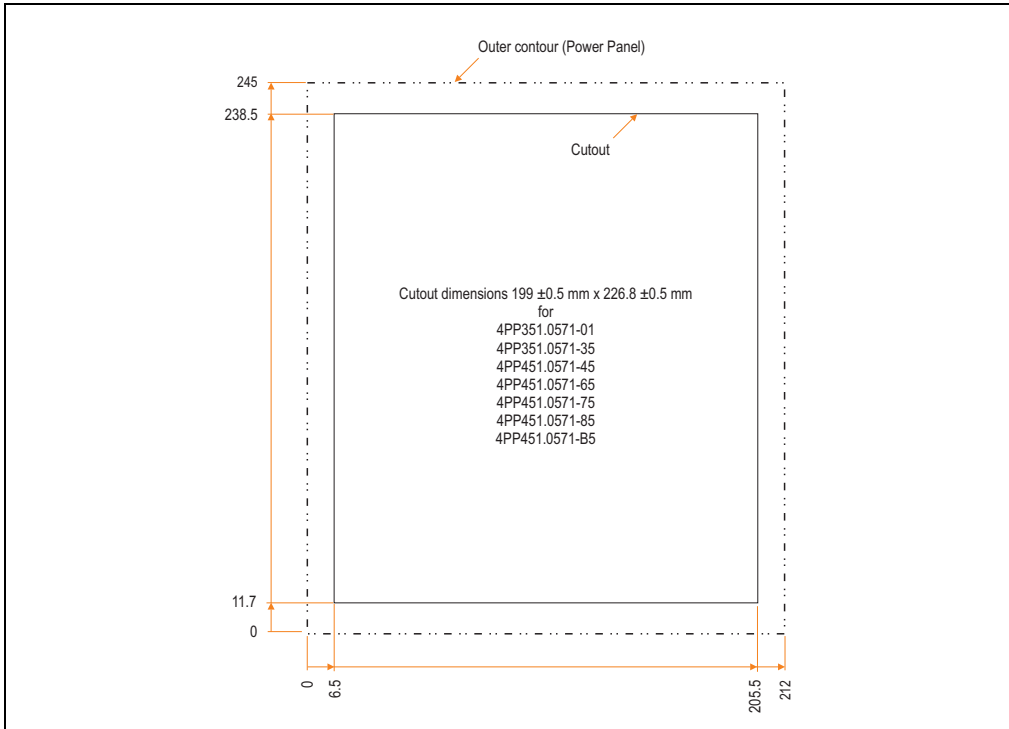


Figure 175: Cutout installation - 4PP451.0571-75

### 4.16.5 Contents of delivery

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

Amount	Component
1	Power Panel PP451 5.7" QVGA, 1 aPCI, keys
6	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 97: Contents of delivery - 4PP451.0571-75

### 4.17 Device 4PP451.0571-85

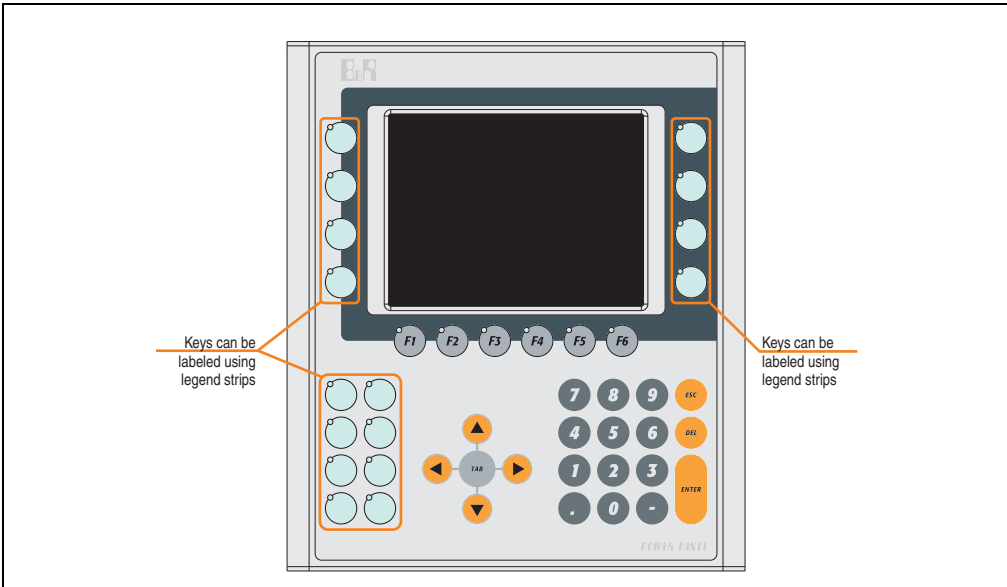


Figure 176: Front view - 4PP451.0571-85

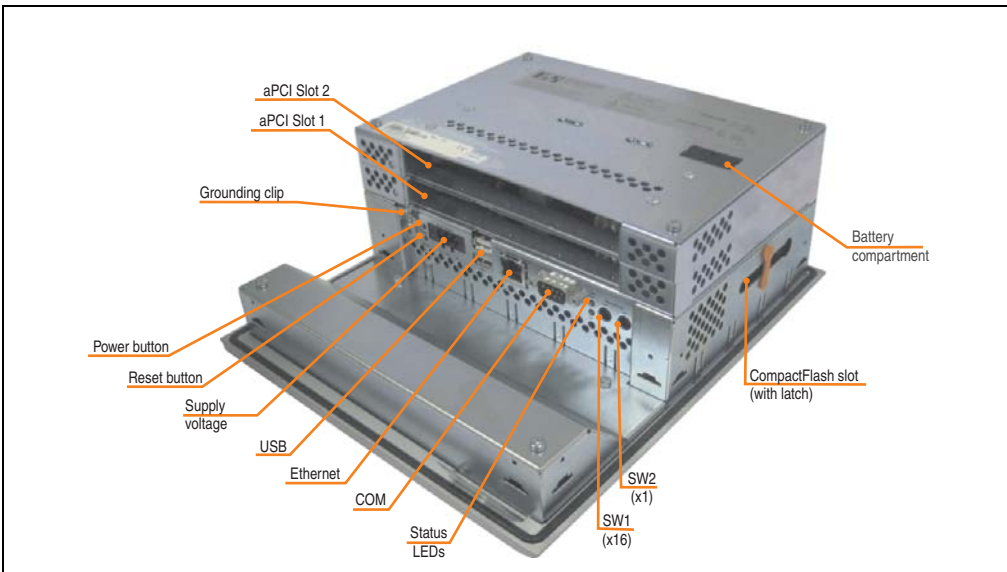


Figure 177: Rear view - 4PP451.0571-85

## 4.17.1 Technical data

Features	4PP451.0571-85 < Rev. H0	4PP451.0571-85 ≥ Rev. H0
B&R ID code	0xA540	
Boot loader / Operating system	Automation Runtime	
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)	
Flash	2 MB (for firmware)	
Memory Type Size	DDR SDRAM 128 MB	
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)	
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB	
Watchdog Controller	MTCX <sup>1)</sup>	
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms	
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day	
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes	
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 98: Technical data - 4PP451.0571-85

## Technical data • Power Panel 400 with Automation Runtime

Features	4PP451.0571-85 < Rev. H0	4PP451.0571-85 ≥ Rev. H0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB	
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection	
Reset button	Yes, accessible from the outside	
Power button	Yes, accessible from the outside	
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)	
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 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	Monochrome LCD 5.7 in (144 mm) 8 shades of gray <sup>4)</sup> QVGA, 320 x 240 pixels 25:1  Direction R / direction L = 40° Direction U = 40°/ direction D = 50°  CCFL 220 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410	Monochrome LCD 5.7 in (144 mm) 8 shades of gray <sup>4)</sup> QVGA, 320 x 240 pixels 25:1  Direction R / direction L = 80° Direction U / direction D = 80°  LED 150 cd/m <sup>2</sup> 40000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	-	
Filter glass Degree of transmission Coating	95% On both sides	
Keys/LED <sup>6)</sup> Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	16 with LED (yellow) 6 with LED (yellow) 5 without LED 15 without LED - > 10 <sup>6</sup> actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green)  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>	

Table 98: Technical data - 4PP451.0571-85 (Forts.)

## Technical data • Power Panel 400 with Automation Runtime

Electrical characteristics	4PP451.0571-85 < Rev. H0	4PP451.0571-85 ≥ Rev. H0
Power supply		
Rated voltage	18 - 30 VDC	
Rated current	0.63 A	
Starting current	Max. 1.2 A	
Power consumption	Typically 15 W	
Electrical isolation	Yes	
Bleeder resistance	0 Ω	
Mechanical characteristics		
Outer dimensions		
Width	212 mm	
Height	245 mm	
Depth	98 mm	
Front		
Frame	Naturally anodized aluminum <sup>7)</sup>	
Design	Gray <sup>7)</sup>	
Membrane	Polyester	
Dark gray border around display	Similar to Pantone 432CV <sup>7)</sup>	
Light background	Similar to Pantone 427CV <sup>7)</sup>	
Orange keys	Similar to Pantone 151CV <sup>7)</sup>	
Dark gray keys	Similar to Pantone 431CV <sup>7)</sup>	
Legend strips (gray)	Similar to Pantone 429CV <sup>7)</sup>	
Gasket	Flat gasket around display front	
Housing	Metal	
Weight	Approx. 2.7 kg (without aPCI interface modules)	
Environmental characteristics		
Ambient temperature		
Operation	0 to +50°C	
Bearings	-20 to +70°C	
Transport	-20 to +70°C	
Relative humidity	See 4.17.2 "Temperature humidity diagram", on page 268	
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	
Bearings	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	
Bearings	30 g, 15 ms	
Transport	30 g, 15 ms	
Protection	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude <sup>8)</sup>	Max. 3000 m	

Table 98: Technical data - 4PP451.0571-85 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.

- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) The functions of the keys and the LEDs can be configured using Visual Components in B&R Automation Studio.
- 7) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 8) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.17.2 Temperature humidity diagram

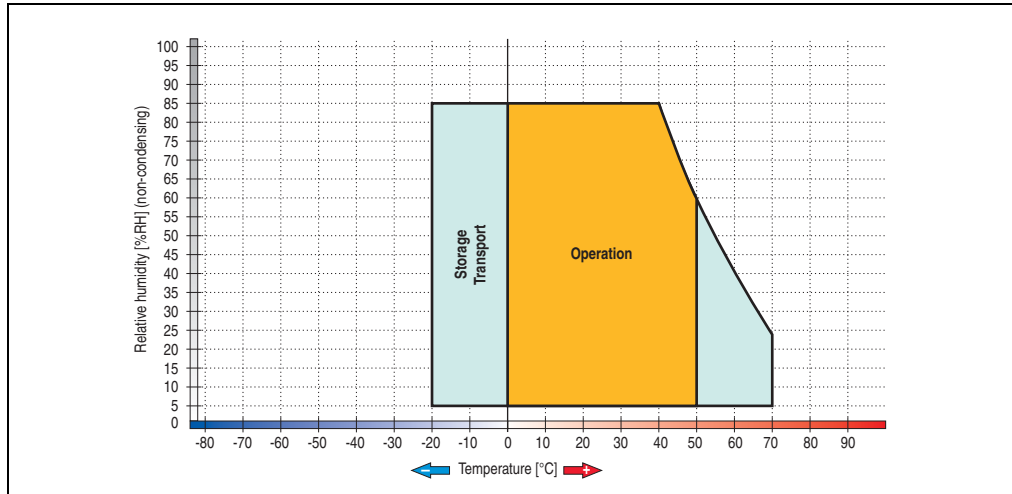


Figure 178: Temperature humidity diagram - 4PP451.0571-85



4.17.3 Dimensions

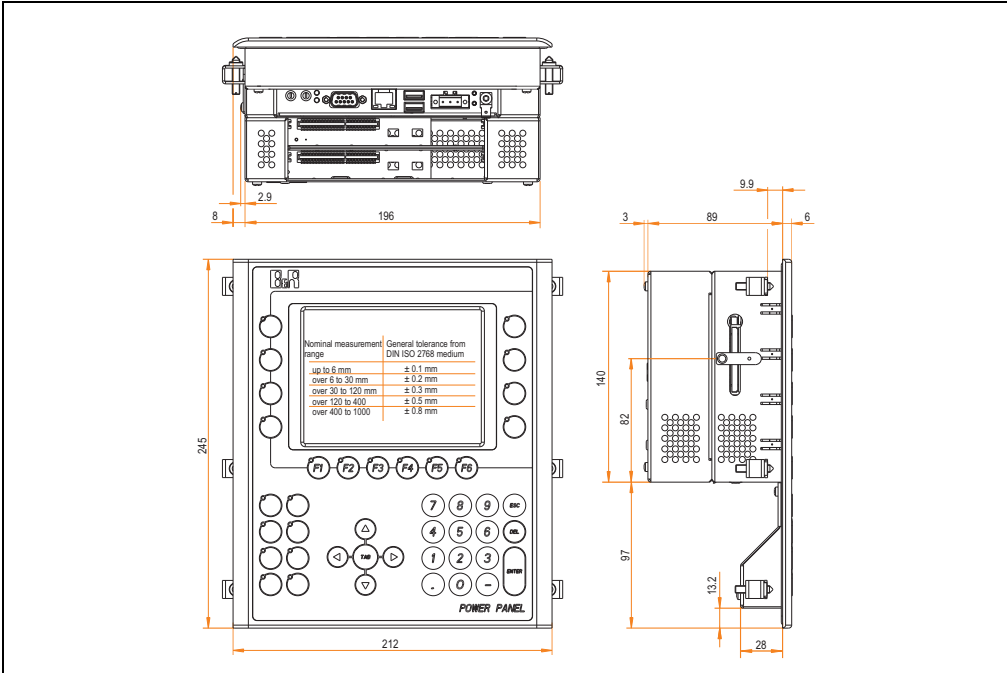


Figure 179: Dimensions - 4PP451.0571-85

### 4.17.4 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.

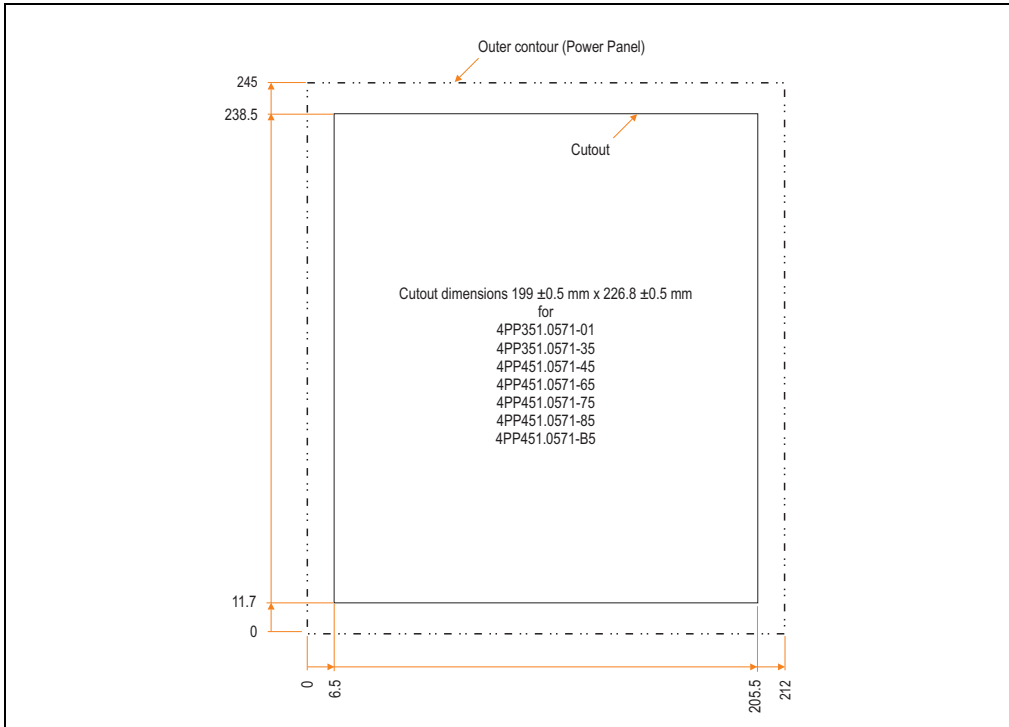


Figure 180: Cutout installation - 4PP451.0571-85

### 4.17.5 Contents of delivery

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

Amount	Component
1	Power Panel PP451 5.7" QVGA, 1 aPCI, keys
6	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 99: Contents of delivery - 4PP451.0571-85

4.18 Device 4PP451.0571-B5

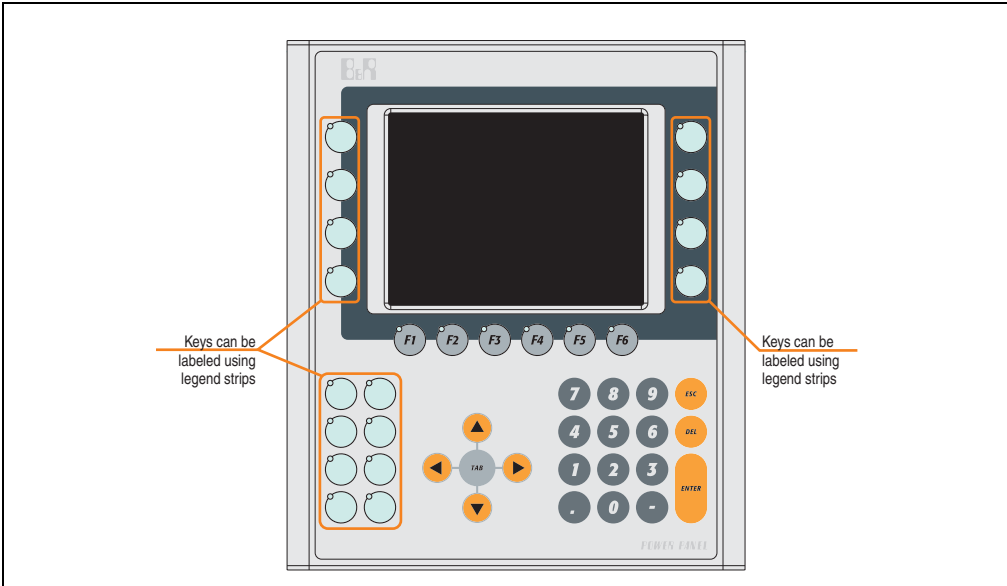


Figure 181: Front view - 4PP451.0571-B5

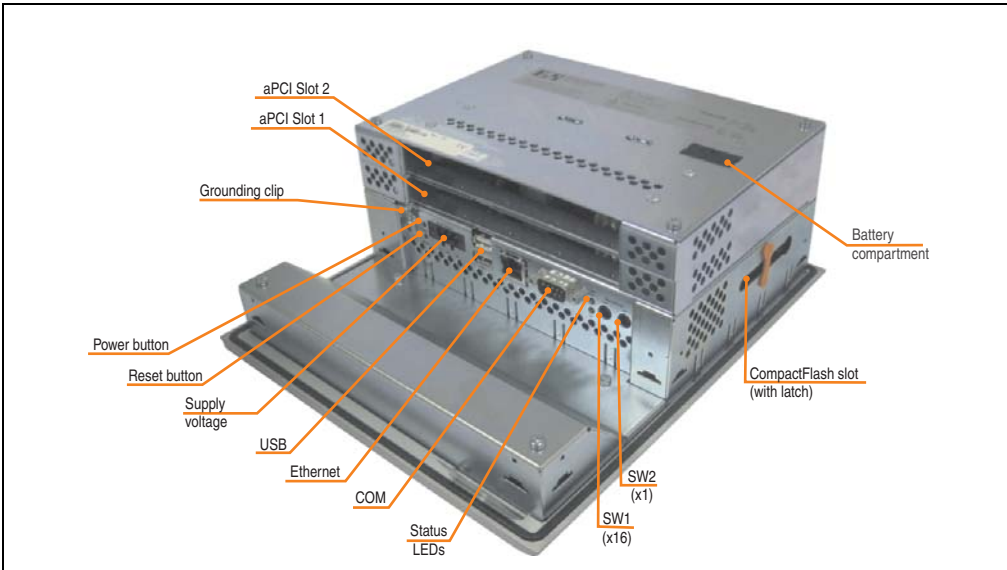


Figure 182: Rear view - 4PP451.0571-B5

**4.18.1 Technical data**

Features	4PP451.0571-B5 < Rev. D0	4PP451.0571-B5 ≥ Rev. D0
B&R ID code	0xA531	
Boot loader / Operating system	Automation Runtime	
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)	
Flash	2 MB (for firmware)	
Memory Type Size	DDR SDRAM 128 MB	
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)	
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB	
Watchdog Controller	MTCX <sup>1)</sup>	
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms	
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day	
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes	
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 100: Technical data - 4PP451.0571-B5

## Technical data • Power Panel 400 with Automation Runtime

Features	4PP451.0571-B5 < Rev. D0	4PP451.0571-B5 ≥ Rev. D0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB	
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection	
Reset button	Yes, accessible from the outside	
Power button	Yes, accessible from the outside	
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)	
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 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	Color TFT 5.7 in (144 mm) 262144 colors <sup>4)</sup> QVGA, 320 x 240 pixels 400:1  Direction R / direction L = 60° Direction U = 40° / direction D = 50°  CCFL 500 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410	Color TFT 5.7 in (144 mm) 262144 colors <sup>3)</sup> QVGA, 320 x 240 pixels 350:1  Direction R / direction L = 65° Direction U = 65° / direction D = 40°  CCFL 500 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	-	
Filter glass Degree of transmission Coating	95% On both sides	
Keys/LED <sup>6)</sup> Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	16 with LED (yellow) 6 with LED (yellow) 5 without LED 15 without LED  -  > 10 <sup>6</sup> actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green)  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>	

Table 100: Technical data - 4PP451.0571-B5 (Forts.)

## Technical data • Power Panel 400 with Automation Runtime

Electrical characteristics	4PP451.0571-B5 < Rev. D0	4PP451.0571-B5 Rev. D0
Power supply		
Rated voltage		18 - 30 VDC
Rated current		0.63 A
Starting current		Max. 1.2 A
Power consumption		Typically 15 W
Electrical isolation		Yes
Bleeder resistance		0 Ω
Mechanical characteristics		
Outer dimensions		
Width		212 mm
Height		245 mm
Depth		98 mm
Front		
Frame		Naturally anodized aluminum <sup>7)</sup>
Design		Gray <sup>7)</sup>
Membrane		Polyester
Dark gray border around display		Similar to Pantone 432CV <sup>7)</sup>
Light background		Similar to Pantone 427CV <sup>7)</sup>
Orange keys		Similar to Pantone 151CV <sup>7)</sup>
Dark gray keys		Similar to Pantone 431CV <sup>7)</sup>
Legend strips (gray)		Similar to Pantone 429CV <sup>7)</sup>
Gasket		Flat gasket around display front
Housing		Metal
Weight		Approx. 2.7 kg (without aPCI interface modules)
Environmental characteristics		
Ambient temperature		
Operation		0 to +50°C
Bearings		-20 to +60°C
Transport		-20 to +60°C
Relative humidity		See 4.18.2 "Temperature humidity diagram", on page 275
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
Bearings		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
Bearings		30 g, 15 ms
Transport		30 g, 15 ms
Protection		IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude <sup>8)</sup>		Max. 3000 m

Table 100: Technical data - 4PP451.0571-B5 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.

- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) The functions of the keys and the LEDs can be configured using Visual Components in B&R Automation Studio.
- 7) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 8) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.18.2 Temperature humidity diagram

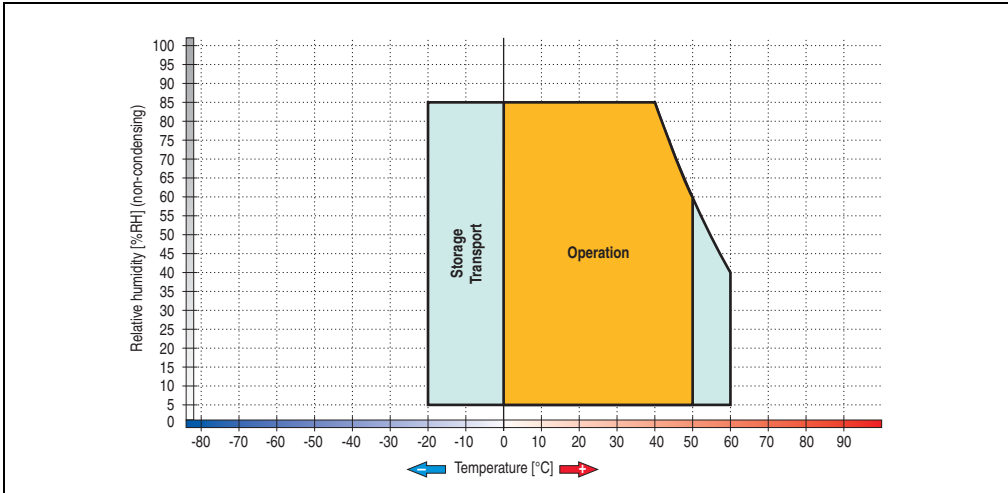


Figure 183: Temperature humidity diagram - 4PP451.0571-B5

### 4.18.3 Dimensions

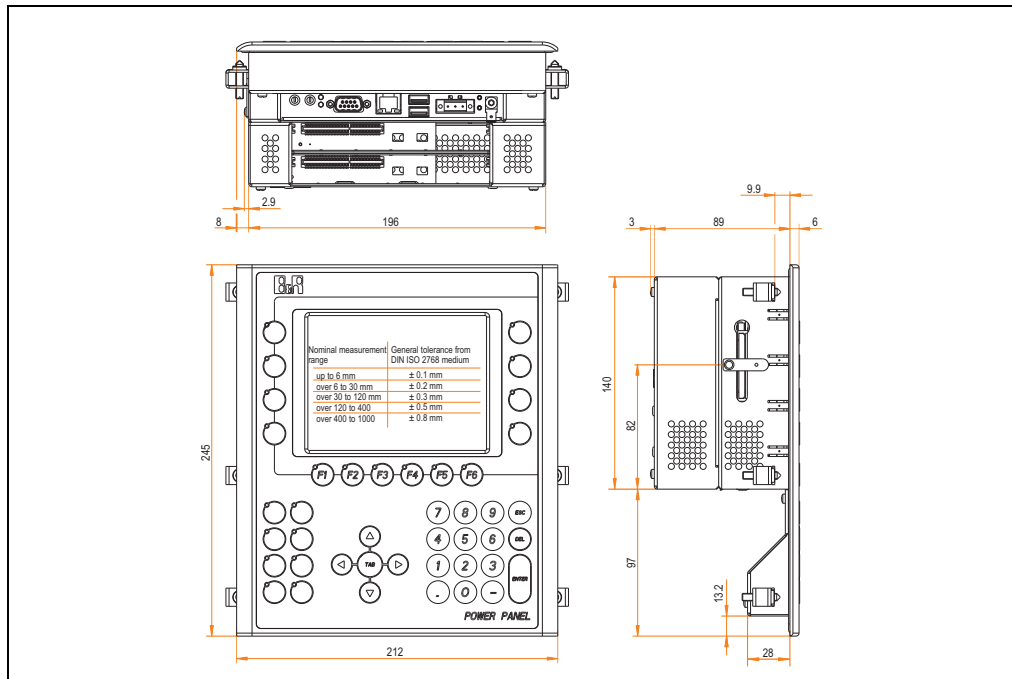


Figure 184: Dimensions - 4PP451.0571-B5



### 4.18.4 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.

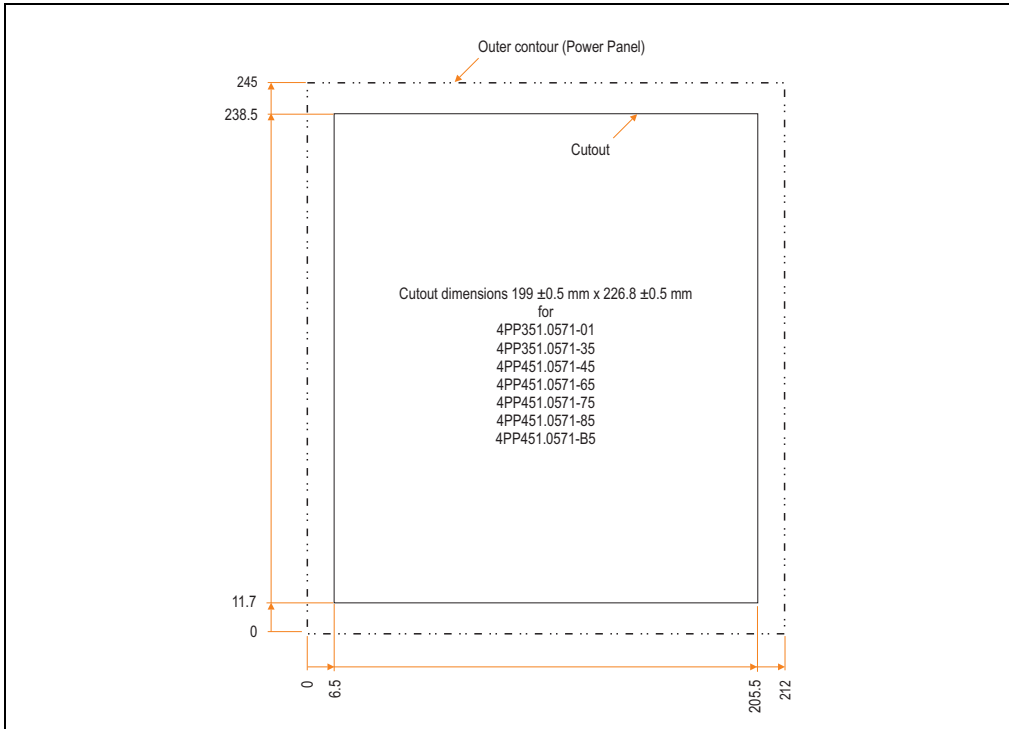


Figure 185: Cutout installation - 4PP451.0571-B5

### 4.18.5 Contents of delivery

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

Amount	Component
1	Power Panel PP451 5.7" QVGA, 1 aPCI, keys
6	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 101: Delivery contents - 4PP451.0571-B5

### 4.19 Device 4PP451.1043-75

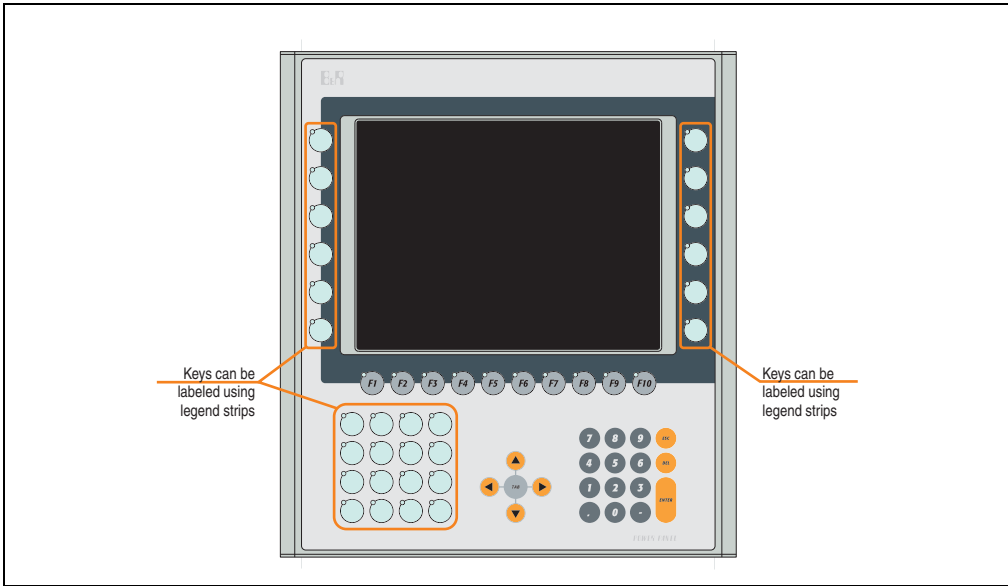


Figure 186: Front view - 4PP451.1043-75

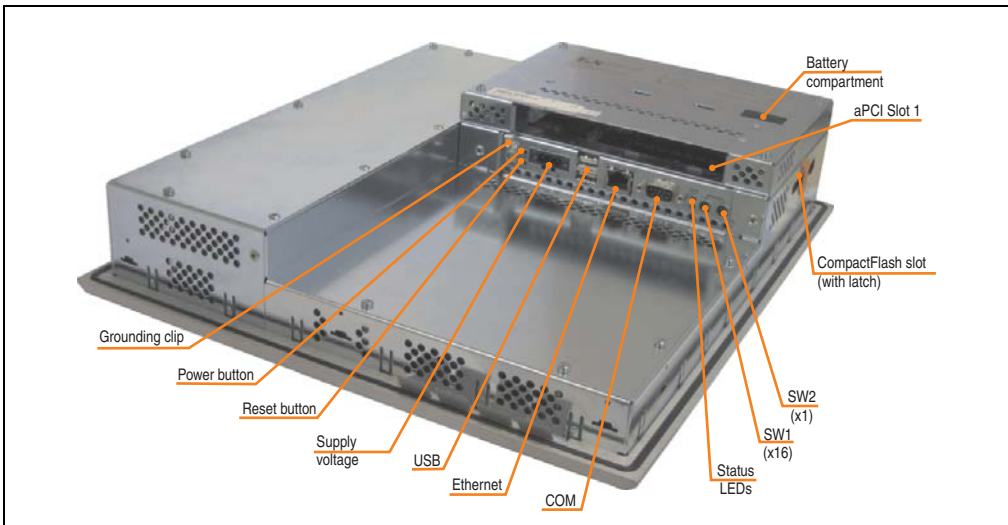


Figure 187: Rear view - 4PP451.1043-75

## 4.19.1 Technical data

Features	4PP451.1043-75 < G0	4PP451.1043-75 ≥ G0
B&R ID code	0xA52F	
Boot loader / Operating system	Automation Runtime	
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)	
Flash	2 MB (for firmware)	
Memory Type Size	DDR SDRAM 128 MB	
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)	
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB	
Watchdog Controller	MTCX <sup>1)</sup>	
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms	
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day	
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes	
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 102: Technical data - 4PP451.1043-75

## Technical data • Power Panel 400 with Automation Runtime

Features	4PP451.1043-75 < G0	4PP451.1043-75 ≥ G0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB	
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection	
Reset button	Yes, accessible from the outside	
Power button	Yes, accessible from the outside	
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)	
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 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	Color TFT 10.4 in (264 mm) 262144 colors VGA, 640 x 480 pixels 600:1  Direction R / direction L = 70° Direction U = 45° / direction D = 35°  CCFL 450 cd/m <sup>2</sup> 55000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410	Color TFT 10.4 in (264 mm) 262144 colors VGA, 640 x 480 pixels 900:1  Direction R / direction L = 80° Direction U / direction D = 80°  LED 450 cd/m <sup>2</sup> 70000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	-	
Filter glass Degree of transmission Coating	95% On both sides	
Keys/LED <sup>6)</sup> Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	28 with LED (yellow) 10 with LED (yellow) 5 without LED 15 without LED - > 10 <sup>6</sup> actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green)  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>	

Table 102: Technical data - 4PP451.1043-75 (Forts.)

## Technical data • Power Panel 400 with Automation Runtime

Electrical characteristics	4PP451.1043-75 < G0	4PP451.1043-75 ≥ G0
Power supply		
Rated voltage		18 - 30 VDC
Rated current		0.63 A
Starting current		Max. 1.2 A
Power consumption		Typically 15 W
Electrical isolation		Yes
Bleeder resistance		0 Ω
Mechanical characteristics		
Outer dimensions		
Width		323 mm
Height		358 mm
Depth		86 mm
Front		
Frame		Naturally anodized aluminum <sup>7)</sup>
Design		Gray <sup>7)</sup>
Membrane		Polyester
Dark gray border around display		Similar to Pantone 432CV <sup>7)</sup>
Light background		Similar to Pantone 427CV <sup>7)</sup>
Orange keys		Similar to Pantone 151CV <sup>7)</sup>
Dark gray keys		Similar to Pantone 431CV <sup>7)</sup>
Legend strips (gray)		Similar to Pantone 429CV <sup>7)</sup>
Gasket		Flat gasket around display front
Housing		Metal
Weight		Approx. 5 kg (without aPCI interface modules)
Environmental characteristics		
Ambient temperature		
Operation		0 to +50°C
Bearings		-20 to +70°C
Transport		-20 to +70°C
Relative humidity		See 4.19.2 "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
Bearings		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
Bearings		30 g, 15 ms
Transport		30 g, 15 ms
Protection		IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude <sup>8)</sup>		Max. 3000 m

Table 102: Technical data - 4PP451.1043-75 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.

- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) The functions of the keys and the LEDs can be configured using Visual Components in B&R Automation Studio.
- 7) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 8) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.19.2 Temperature humidity diagram

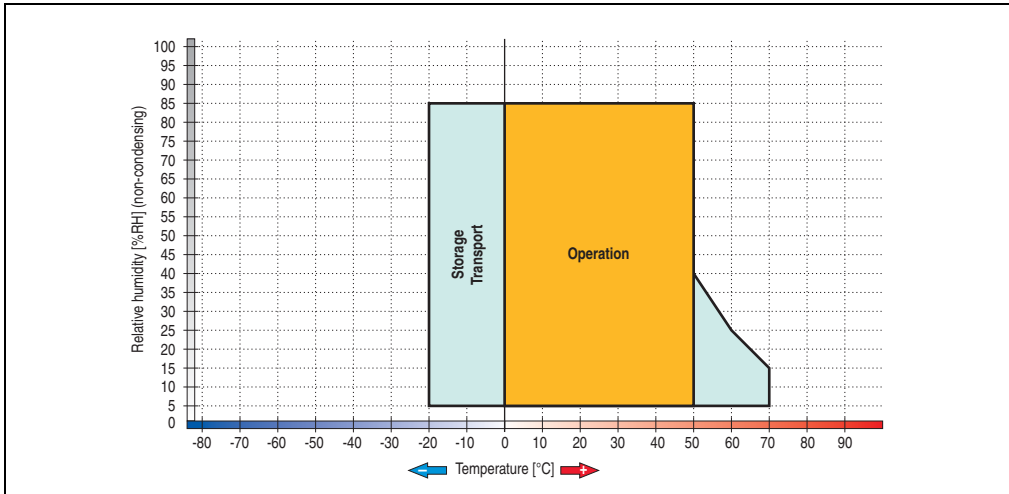


Figure 188: Temperature humidity diagram - 4PP451.1043-75

4.19.3 Dimensions

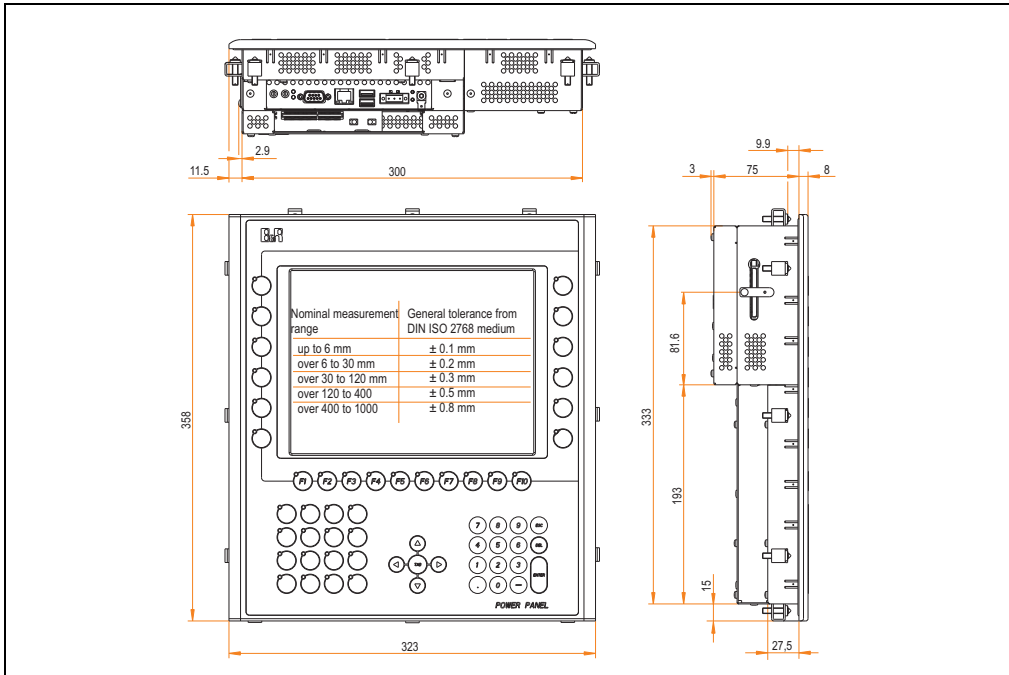


Figure 189: Dimensions - 4PP451.1043-75

#### 4.19.4 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.

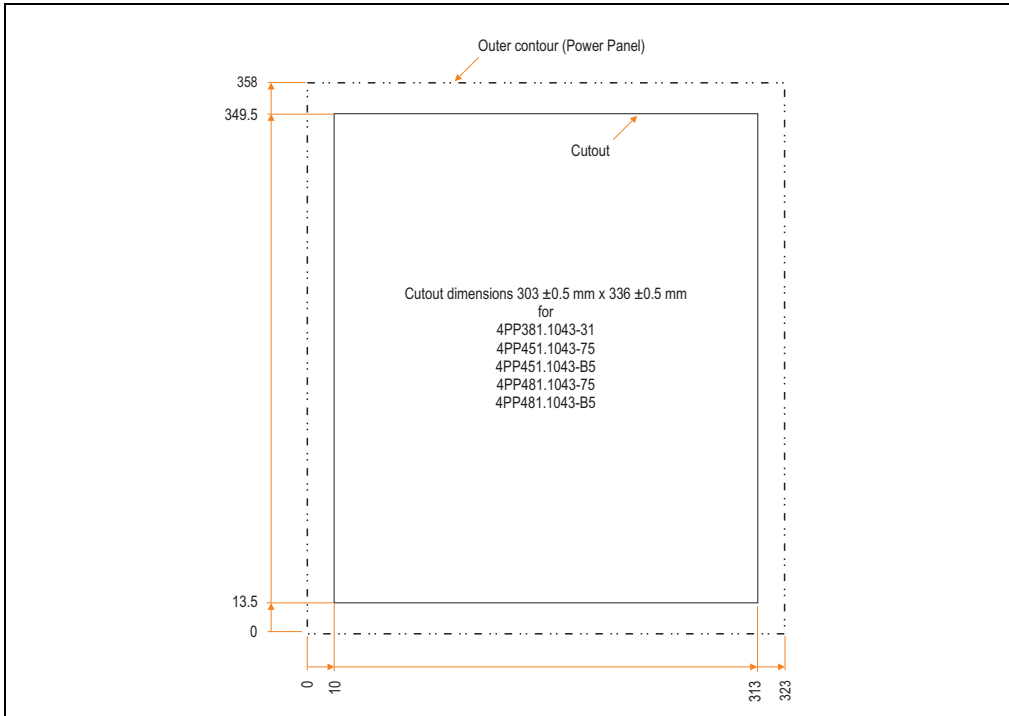


Figure 190: Cutout installation - 4PP451.1043-75

#### 4.19.5 Contents of delivery

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

Amount	Component
1	Power Panel PP451 5.7" QVGA, 1 aPCI, keys
6	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 103: Contents of delivery - 4PP451.1043-75



4.20 Device 4PP451.1043-B5

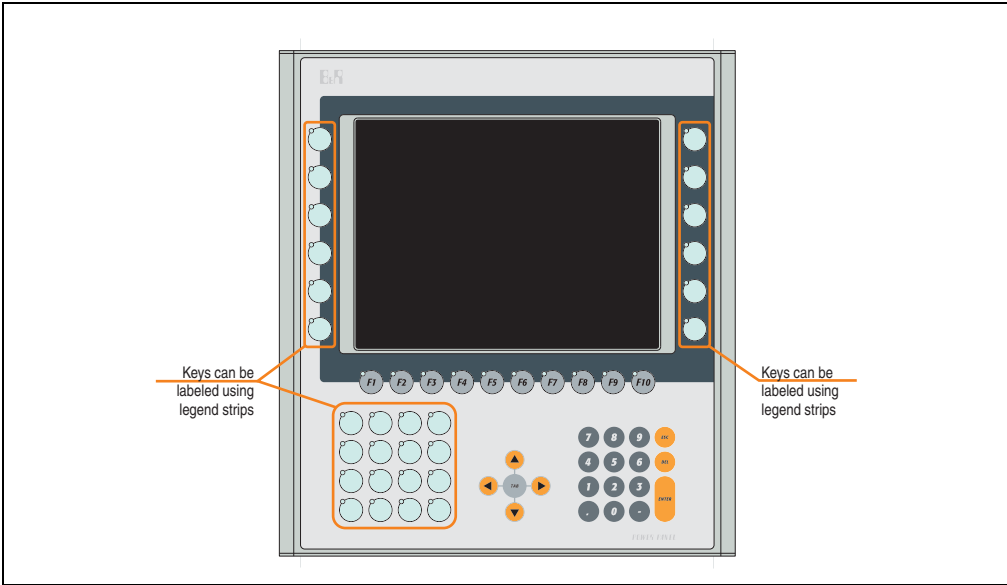


Figure 191: Front view - 4PP451.1043-B5

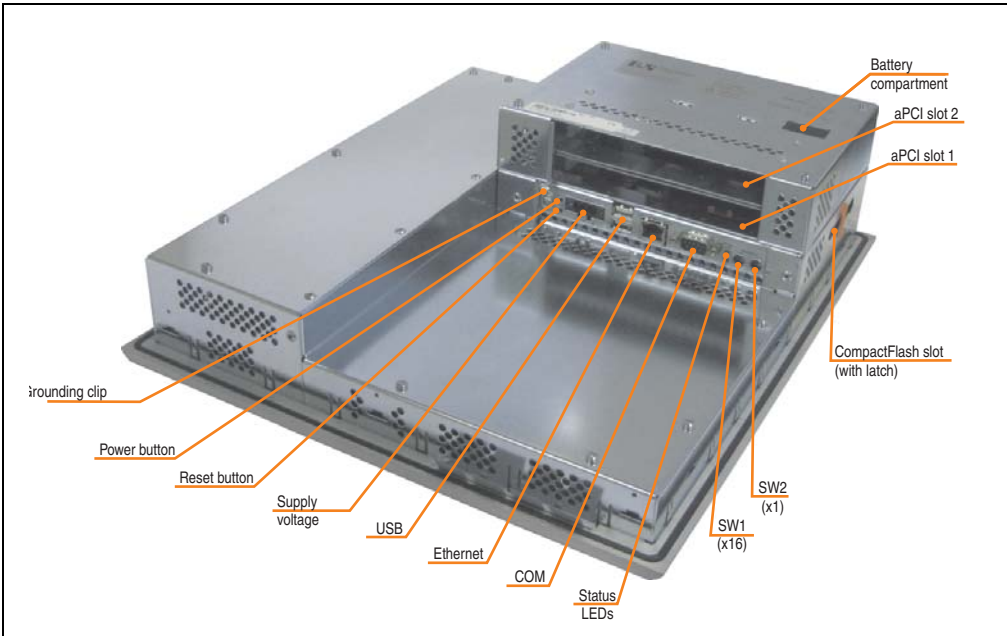


Figure 192: Rear view - 4PP451.1043-B5

**4.20.1 Technical data**

Features	4PP451.1043-B5 < G0	4PP451.1043-B5 ≥ G0
B&R ID code	0xA53F	
Boot loader / Operating system	Automation Runtime	
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)	
Flash	2 MB (for firmware)	
Memory Type Size	DDR SDRAM 128 MB	
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)	
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB	
Watchdog Controller	MTCX <sup>1)</sup>	
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms	
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day	
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes	
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 104: Technical data - 4PP451.1043-B5

## Technical data • Power Panel 400 with Automation Runtime

Features	4PP451.1043-B5 < G0	4PP451.1043-B5 ≥ G0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB	
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection	
Reset button	Yes, accessible from the outside	
Power button	Yes, accessible from the outside	
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)	
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 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	Color TFT 10.4 in (264 mm) 262144 colors VGA, 640 x 480 pixels 600:1  Direction R / direction L = 70° Direction U = 45° / direction D = 35°  CCFL 450 cd/m <sup>2</sup> 55000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410	Color TFT 10.4 in (264 mm) 262144 colors VGA, 640 x 480 pixels 900:1  Direction R / direction L = 80° Direction U / direction D = 80°  LED 450 cd/m <sup>2</sup> 70000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	-	
Filter glass Degree of transmission Coating	95% On both sides	
Keys/LED <sup>6)</sup> Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	28 with LED (yellow) 10 with LED (yellow) 5 without LED 15 without LED - > 10 <sup>6</sup> actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green)  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>	

Table 104: Technical data - 4PP451.1043-B5 (Forts.)

## Technical data • Power Panel 400 with Automation Runtime

Electrical characteristics	4PP451.1043-B5 < G0	4PP451.1043-B5 ≥ G0
Power supply		
Rated voltage		18 - 30 VDC
Rated current		0.63 A
Starting current		Max. 1.2 A
Power consumption		Typically 15 W
Electrical isolation		Yes
Bleeder resistance		0 Ω
Mechanical characteristics		
Outer dimensions		
Width		323 mm
Height		358 mm
Depth		108 mm
Front		
Frame		Naturally anodized aluminum <sup>7)</sup>
Design		Gray <sup>7)</sup>
Membrane		Polyester
Dark gray border around display		Similar to Pantone 432CV <sup>7)</sup>
Light background		Similar to Pantone 427CV <sup>7)</sup>
Orange keys		Similar to Pantone 151CV <sup>7)</sup>
Dark gray keys		Similar to Pantone 431CV <sup>7)</sup>
Legend strips (gray)		Similar to Pantone 429CV <sup>7)</sup>
Gasket		Flat gasket around display front
Housing		Metal
Weight		Approx. 5.3 kg (without aPCI interface modules)
Environmental characteristics		
Ambient temperature		
Operation		0 to +50°C
Bearings		-20 to +70°C
Transport		-20 to +70°C
Relative humidity		See 4.20.2 "Temperature humidity diagram", on page 289
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
Bearings		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
Bearings		30 g, 15 ms
Transport		30 g, 15 ms
Protection		IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude <sup>8)</sup>		Max. 3000 m

Table 104: Technical data - 4PP451.1043-B5 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.

- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) The functions of the keys and the LEDs can be configured using Visual Components in B&R Automation Studio.
- 7) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 8) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.2.0.2 Temperature humidity diagram

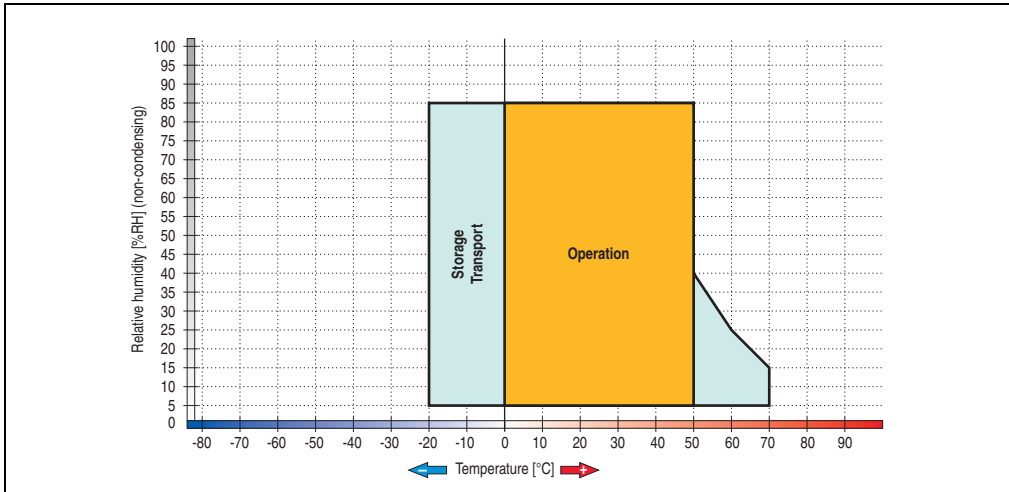


Figure 193: Temperature humidity diagram - 4PP451.1043-B5

4.20.3 Dimensions

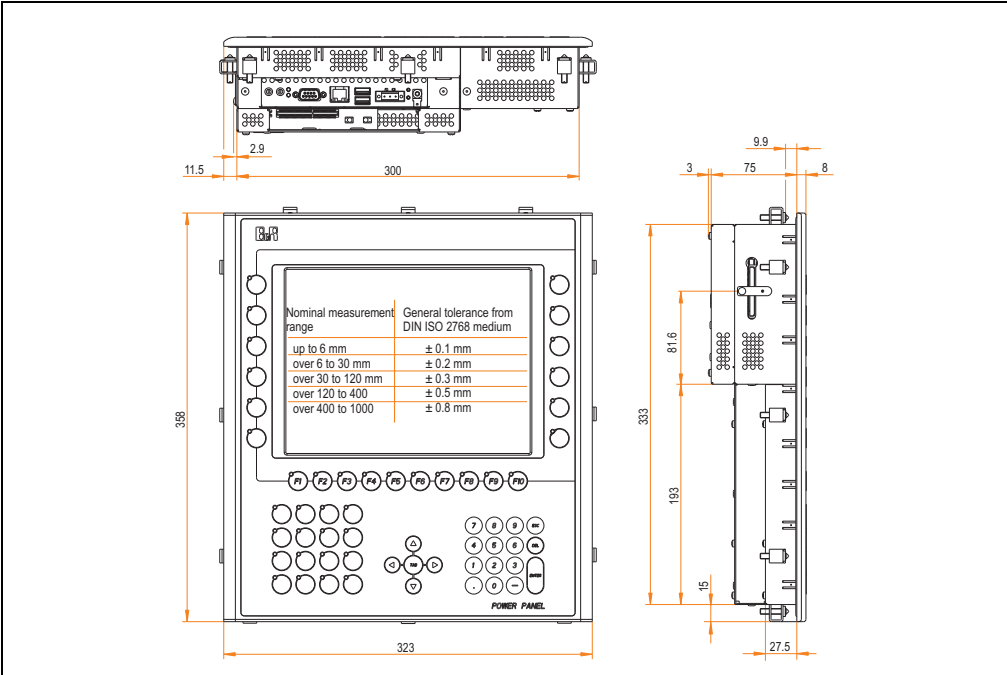


Figure 194: Dimensions - 4PP451.1043-B5

#### 4.20.4 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.

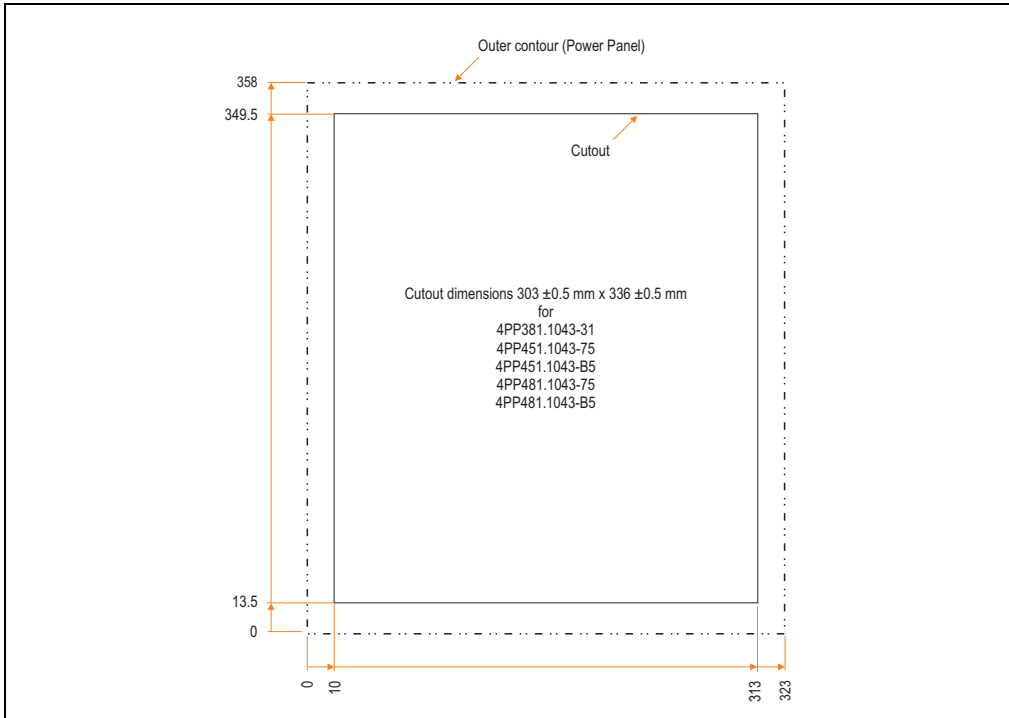


Figure 195: Cutout installation - 4PP451.1043-B5

#### 4.20.5 Contents of delivery

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

Amount	Component
1	Power Panel PP451 5.7" QVGA, 1 aPCI, keys
6	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 105: Contents of delivery - 4PP451.1043-B5

### 4.21 Device 4PP452.0571-45

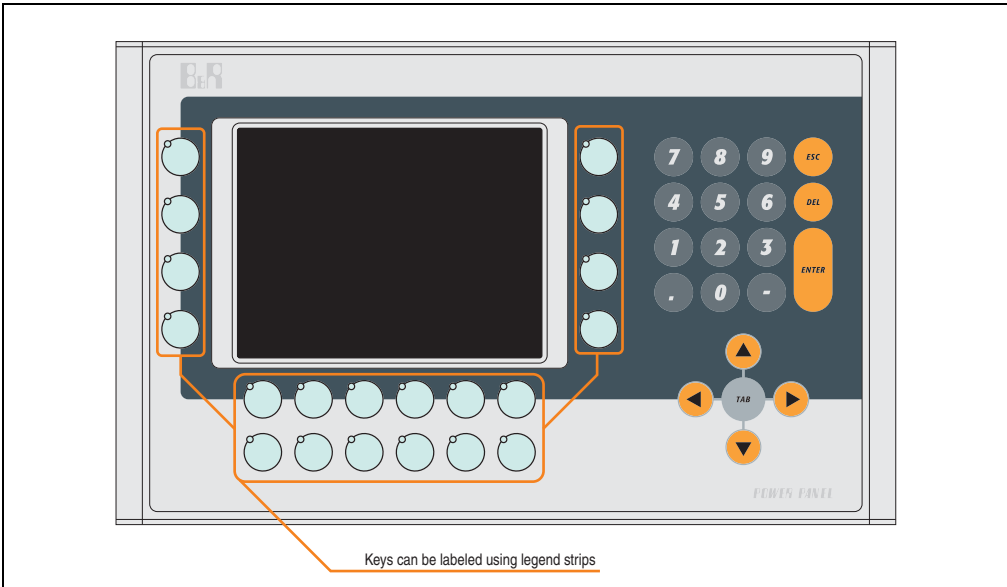


Figure 196: Front view - 4PP452.0571-45

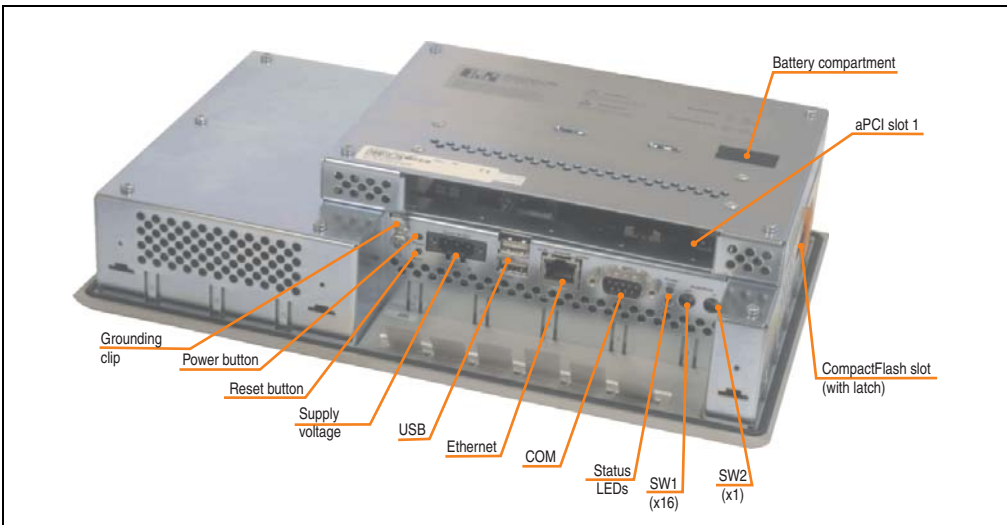


Figure 197: Rear view - 4PP452.0571-45



## 4.21.1 Technical data

Features	4PP452.0571-45 < Rev. H0	4PP452.0571-45 ≥ Rev. H0
B&R ID code	0xA534	
Boot loader / Operating system	Automation Runtime	
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)	
Flash	2 MB (for firmware)	
Memory Type Size	DDR SDRAM 128 MB (64 MB < Rev. C0)	
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)	
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB	
Watchdog Controller	MTCX <sup>1)</sup>	
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms	
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day	
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes	
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 106: Technical data - 4PP452.0571-45

## Technical data • Power Panel 400 with Automation Runtime

Features	4PP452.0571-45 < Rev. H0	4PP452.0571-45 ≥ Rev. H0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB	
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection	
Reset button	Yes, accessible from the outside	
Power button	Yes, accessible from the outside	
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)	
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 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	Monochrome LCD 5.7 in (144 mm) 8 shades of gray <sup>3)</sup> QVGA, 320 x 240 pixels 25:1  Direction R / direction L = 40° Direction U = 40°/ direction D = 50°  CCFL 220 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410	Monochrome LCD 5.7 in (144 mm) 8 shades of gray <sup>3)</sup> QVGA, 320 x 240 pixels 25:1  Direction R / direction L = 80° Direction U / direction D = 80°  LED 150 cd/m <sup>2</sup> 40000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	-	
Filter glass Degree of transmission Coating	95% On both sides	
Keys/LED <sup>6)</sup> Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	20 with LED (yellow) - 5 without LED 15 without LED - > 10 <sup>6</sup> actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green)  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>	

Table 106: Technical data - 4PP452.0571-45 (Forts.)

## Technical data • Power Panel 400 with Automation Runtime

Electrical characteristics	4PP452.0571-45 < Rev. H0	4PP452.0571-45 ≥ Rev. H0
Power supply		
Rated voltage	18 - 30 VDC	
Rated current	0.63 A	
Starting current	Max. 1.2 A	
Power consumption	Typically 15 W	
Electrical isolation	Yes	
Bleeder resistance	0 Ω	
Mechanical characteristics		
Outer dimensions		
Width	302 mm	
Height	187 mm	
Depth	76 mm	
Front		
Frame	Naturally anodized aluminum <sup>7)</sup>	
Design	Gray <sup>7)</sup>	
Membrane	Polyester	
Dark gray border around display	Similar to Pantone 432CV <sup>7)</sup>	
Light background	Similar to Pantone 427CV <sup>7)</sup>	
Orange keys	Similar to Pantone 151CV <sup>7)</sup>	
Dark gray keys	Similar to Pantone 431CV <sup>7)</sup>	
Legend strips (gray)	Similar to Pantone 429CV <sup>7)</sup>	
Gasket	Flat gasket around display front	
Housing	Metal	
Weight	Approx. 2.6 kg (without aPCI interface modules)	
Environmental characteristics		
Ambient temperature		
Operation	0 to +50°C	
Bearings	-20 to +70°C	
Transport	-20 to +70°C	
Relative humidity	See 4.21.2 "Temperature humidity diagram", on page 296	
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	
Bearings	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	
Bearings	30 g, 15 ms	
Transport	30 g, 15 ms	
Protection	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude <sup>8)</sup>	Max. 3000 m	

Table 106: Technical data - 4PP452.0571-45 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.

- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) The functions of the keys and the LEDs can be configured using Visual Components in B&R Automation Studio.
- 7) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 8) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.21.2 Temperature humidity diagram

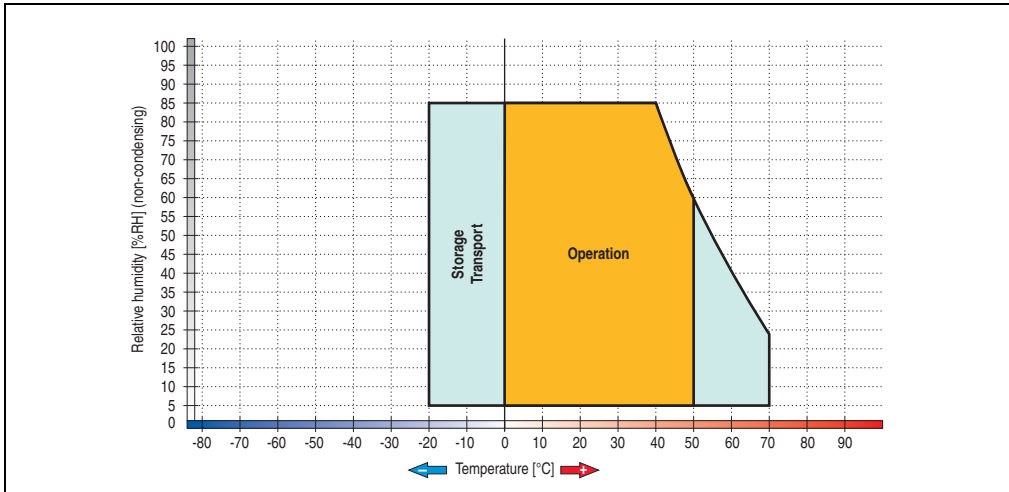


Figure 198: Temperature humidity diagram - 4PP452.0571-45

4.21.3 Dimensions

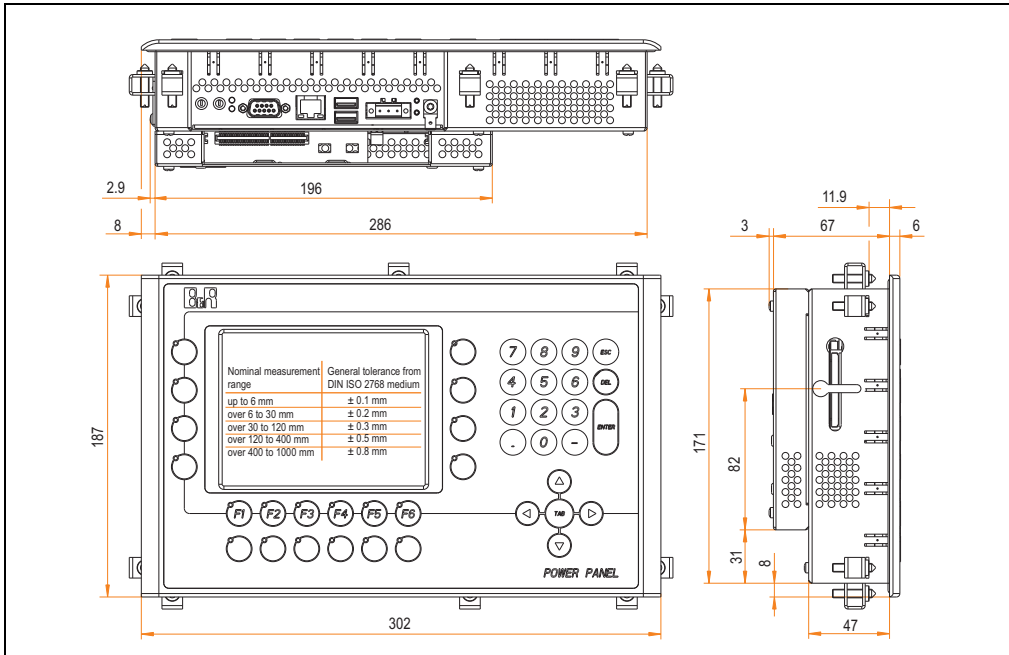


Figure 199: Dimensions - 4PP452.0571-45

#### 4.21.4 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.

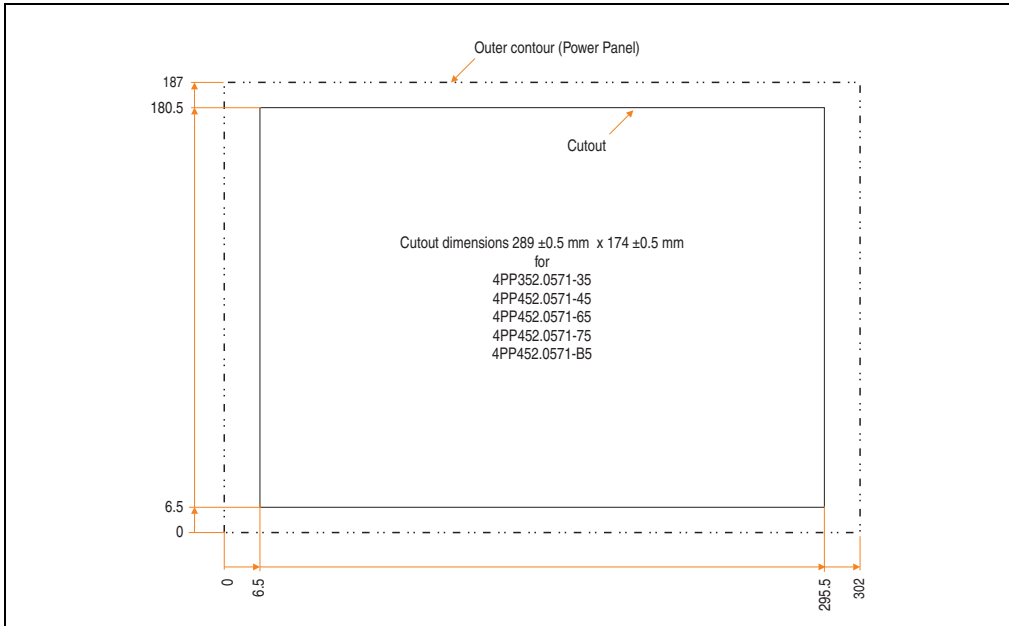


Figure 200: Cutout installation - 4PP452.0571-45

#### 4.21.5 Contents of delivery

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

Amount	Component
1	Power Panel PP452 5.7" QVGA, 1 aPCI, keys
10	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 107: Contents of delivery - 4PP452.0571-45

4.22 Device 4PP452.0571-65

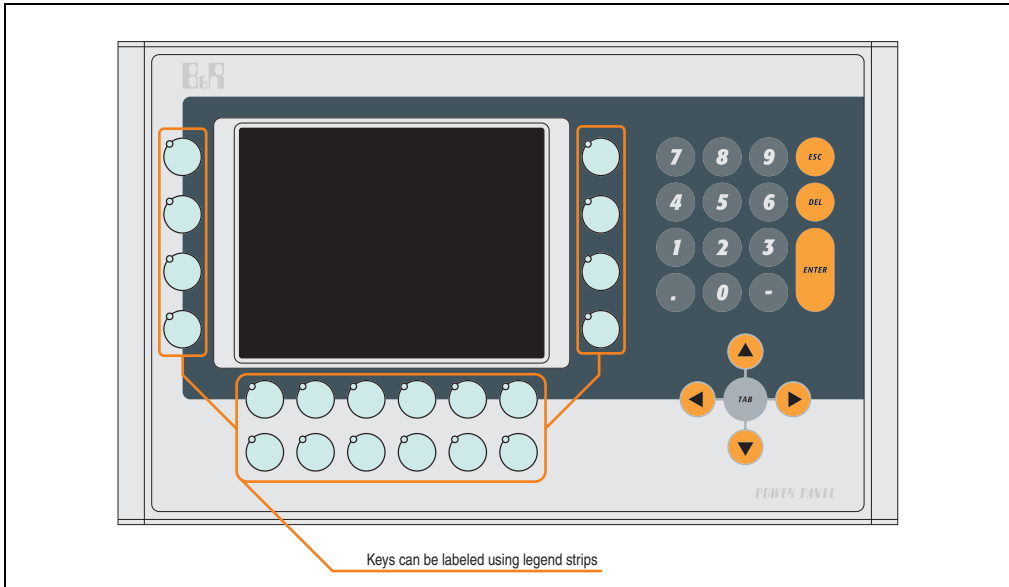


Figure 201: Front view - 4PP452.0571-65

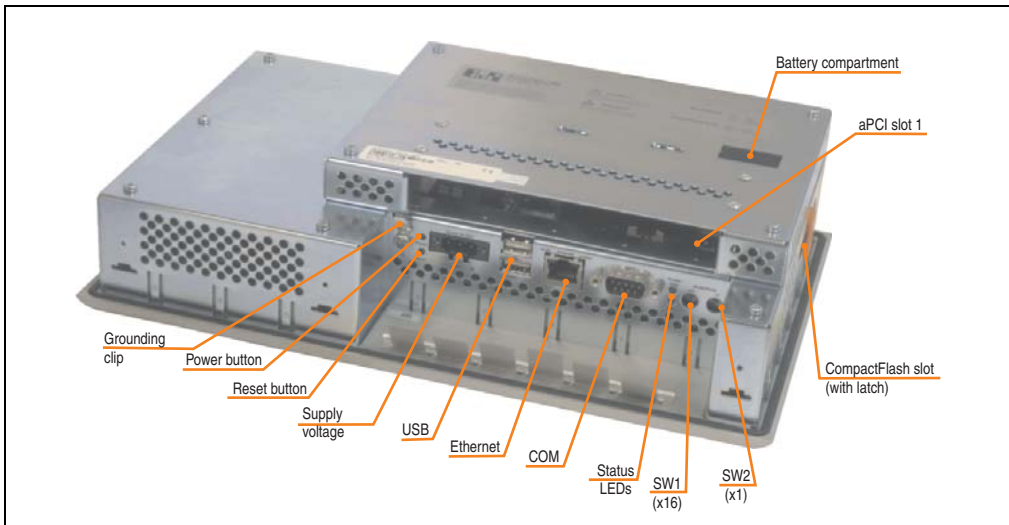


Figure 202: Rear view - 4PP452.0571-65

**4.22.1 Technical data**

Features	4PP452.0571-65
B&R ID code	0x23C2
Boot loader / Operating system	Automation Runtime
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Size	DDR SDRAM 128 MB (64 MB < Rev. C0)
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB
Watchdog Controller	MTCX <sup>1)</sup>
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 108: Technical data - 4PP452.0571-65



Features	4PP452.0571-65
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection
Reset button	Yes, accessible from the outside
Power button	Yes, accessible from the outside
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)
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 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	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° CCFL 200 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	95% On both sides
Keys/LED <sup>6)</sup> Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	20 with LED (yellow) - 5 without LED 15 without LED - > 10 <sup>6</sup> actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green)  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>

Table 108: Technical data - 4PP452.0571-65 (Forts.)

## Technical data • Power Panel 400 with Automation Runtime

Electrical characteristics	4PP452.0571-65
Power supply	
Rated voltage	18 - 30 VDC
Rated current	0.63 A
Starting current	Max. 1.2 A
Power consumption	Typically 15 W
Electrical isolation	Yes
Bleeder resistance	0 Ω
Mechanical characteristics	
Outer dimensions	
Width	302 mm
Height	187 mm
Depth	76 mm
Front	
Frame	Naturally anodized aluminum <sup>7)</sup>
Design	Gray <sup>7)</sup>
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV <sup>7)</sup>
Light background	Similar to Pantone 427CV <sup>7)</sup>
Orange keys	Similar to Pantone 151CV <sup>7)</sup>
Dark gray keys	Similar to Pantone 431CV <sup>7)</sup>
Legend strips (gray)	Similar to Pantone 429CV <sup>7)</sup>
Gasket	Flat gasket around display front
Housing	Metal
Weight	Approx. 2.6 kg (without aPCI interface modules)
Environmental characteristics	
Ambient temperature	
Operation	0 to +50°C
Bearings	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 4.22.2 "Temperature humidity diagram", on page 303
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
Bearings	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
Bearings	30 g, 15 ms
Transport	30 g, 15 ms
Protection	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude <sup>8)</sup>	Max. 3000 m

Table 108: Technical data - 4PP452.0571-65 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.

- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) The functions of the keys and the LEDs can be configured using Visual Components in B&R Automation Studio.
- 7) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 8) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.22.2 Temperature humidity diagram

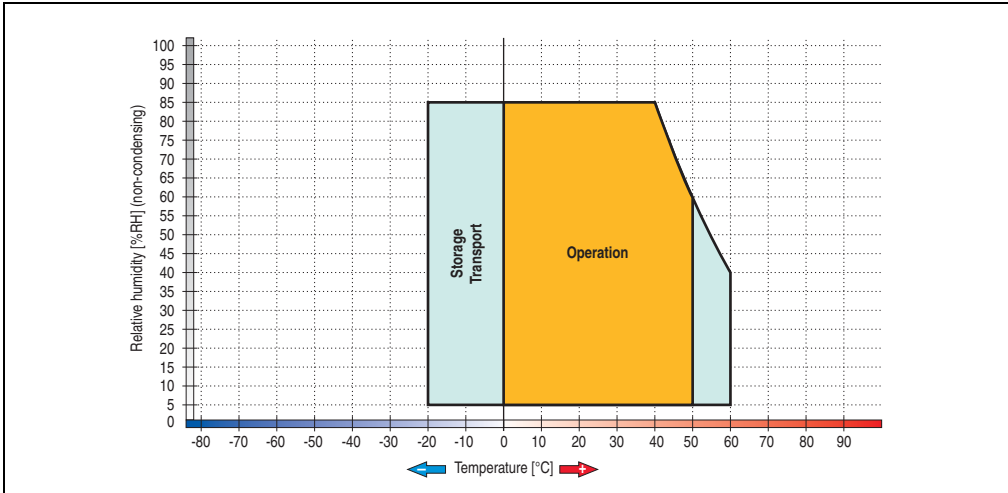


Figure 203: Temperature humidity diagram - 4PP452.0571-65

### 4.22.3 Dimensions

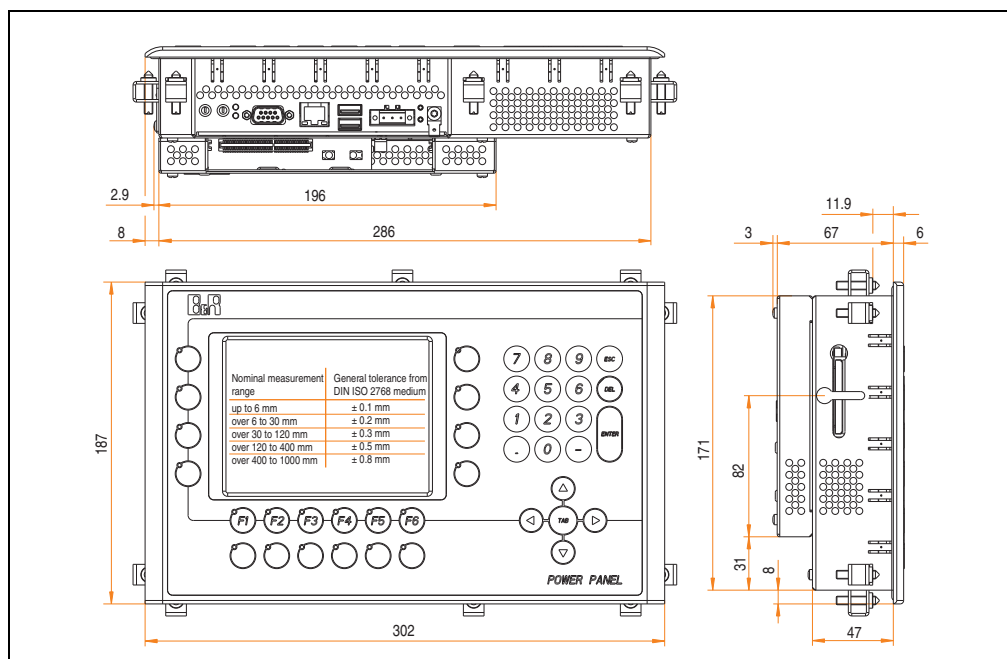


Figure 204: Dimensions - 4PP452.0571-65

### 4.22.4 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.

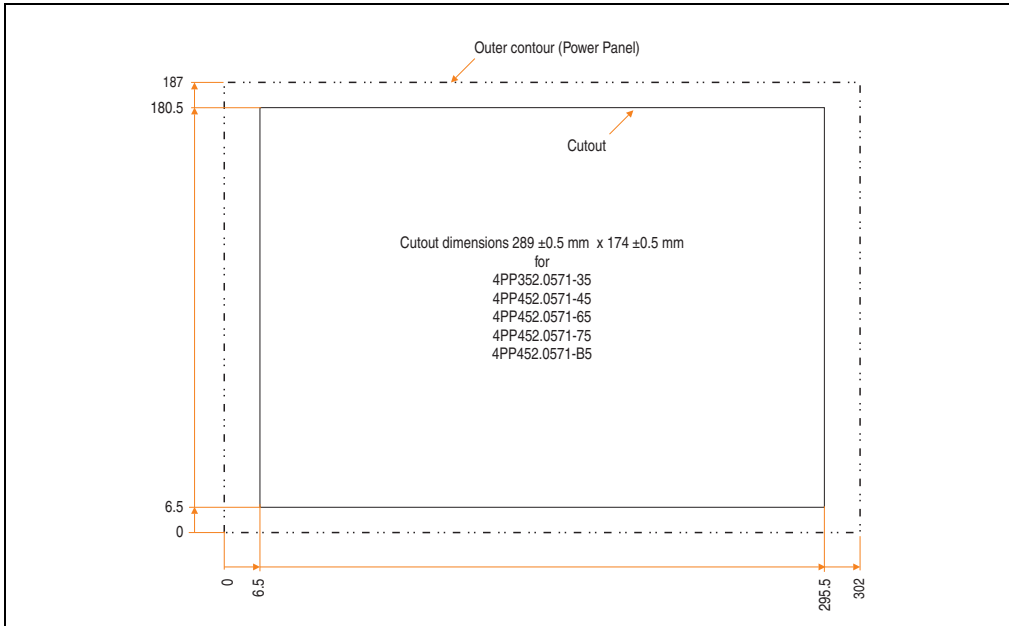


Figure 205: Cutout installation - 4PP452.0571-65

### 4.22.5 Contents of delivery

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

Amount	Component
1	Power Panel PP452 5.7" QVGA, 1 aPCI, keys
10	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 109: Contents of delivery - 4PP452.0571-65

### 4.23 Device 4PP452.0571-75

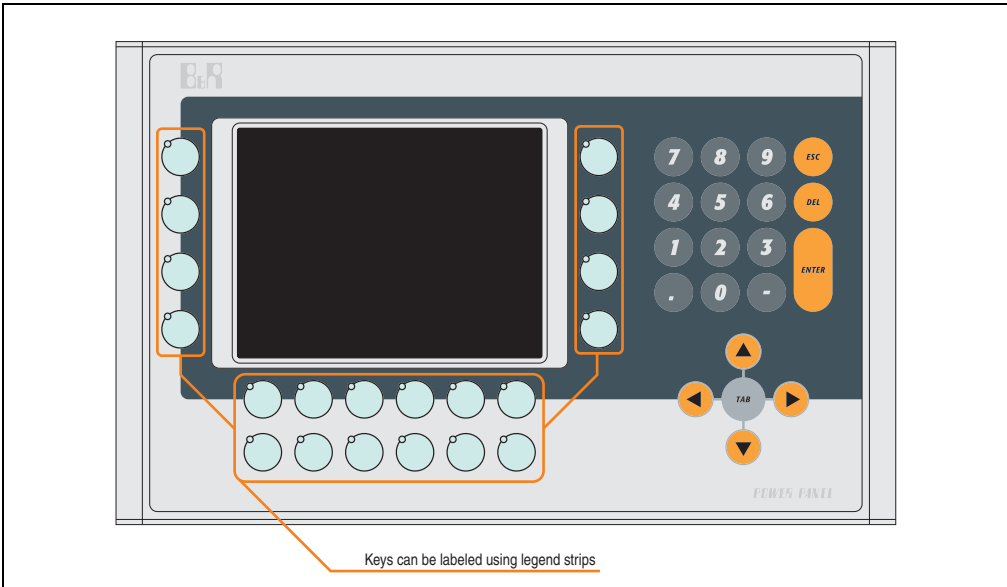


Figure 206: Front view - 4PP452.0571-75

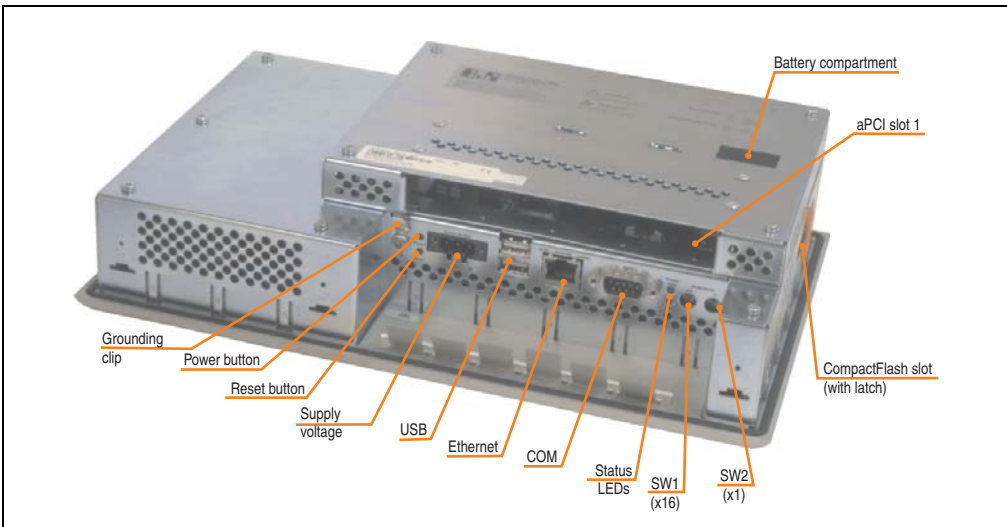


Figure 207: Rear view - 4PP452.0571-75

## 4.23.1 Technical data

Features	4PP452.0571-75 < Rev. D0	4PP452.0571-75 ≥ Rev. D0
B&R ID code	0xA15C	
Boot loader / Operating system	Automation Runtime	
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)	
Flash	2 MB (for firmware)	
Memory Type Size	DDR SDRAM 128 MB	
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)	
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB	
Watchdog Controller	MTCX <sup>1)</sup>	
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms	
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day	
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes	
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 110: Technical data - 4PP452.0571-75

## Technical data • Power Panel 400 with Automation Runtime

Features	4PP452.0571-75 < Rev. D0	4PP452.0571-75 ≥ Rev. D0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB	
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection	
Reset button	Yes, accessible from the outside	
Power button	Yes, accessible from the outside	
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)	
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 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	Color TFT 5.7 in (144 mm) 262144 colors <sup>4)</sup> QVGA, 320 x 240 pixels 400:1  Direction R / direction L = 60° Direction U = 40° / direction D = 50°  CCFL 500 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410	Color TFT 5.7 in (144 mm) 262144 colors <sup>4)</sup> QVGA, 320 x 240 pixels 350:1  Direction R / direction L = 65° Direction U = 65° / direction D = 40°  CCFL 500 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	-	
Filter glass Degree of transmission Coating	95% On both sides	
Keys/LED <sup>6)</sup> Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	20 with LED (yellow) - 5 without LED 15 without LED - > 10 <sup>6</sup> actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green)  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>	

Table 110: Technical data - 4PP452.0571-75 (Forts.)



## Technical data • Power Panel 400 with Automation Runtime

Electrical characteristics	4PP452.0571-75 < Rev. D0	4PP452.0571-75 ≥ Rev. D0
Power supply		
Rated voltage	18 - 30 VDC	
Rated current	0.63 A	
Starting current	Max. 1.2 A	
Power consumption	Typically 15 W	
Electrical isolation	Yes	
Bleeder resistance	0 Ω	
Mechanical characteristics		
Outer dimensions		
Width	302 mm	
Height	187 mm	
Depth	76 mm	
Front		
Frame	Naturally anodized aluminum <sup>7)</sup>	
Design	Gray <sup>7)</sup>	
Membrane	Polyester	
Dark gray border around display	Similar to Pantone 432CV <sup>7)</sup>	
Light background	Similar to Pantone 427CV <sup>7)</sup>	
Orange keys	Similar to Pantone 151CV <sup>7)</sup>	
Dark gray keys	Similar to Pantone 431CV <sup>7)</sup>	
Legend strips (gray)	Similar to Pantone 429CV <sup>7)</sup>	
Gasket	Flat gasket around display front	
Housing	Metal	
Weight	Approx. 2.6 kg (without aPCI interface modules)	
Environmental characteristics		
Ambient temperature		
Operation	0 to +50°C	
Bearings	-20 to +60°C	
Transport	-20 to +60°C	
Relative humidity	See 4.23.2 "Temperature humidity diagram", on page 310	
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	
Bearings	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	
Bearings	30 g, 15 ms	
Transport	30 g, 15 ms	
Protection	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude <sup>8)</sup>	Max. 3000 m	

Table 110: Technical data - 4PP452.0571-75 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.

- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) The functions of the keys and the LEDs can be configured using Visual Components in B&R Automation Studio.
- 7) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 8) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.23.2 Temperature humidity diagram

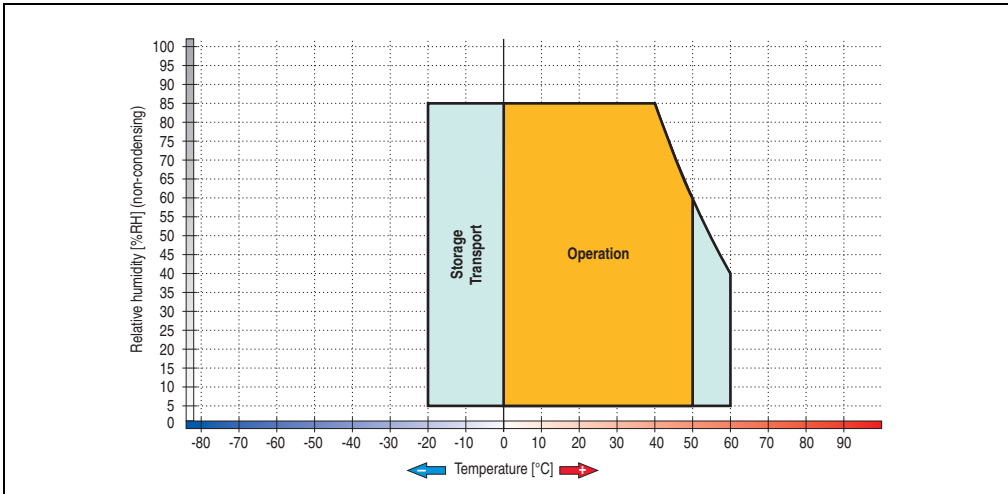


Figure 208: Temperature humidity diagram - 4PP452.0571-75

4.23.3 Dimensions

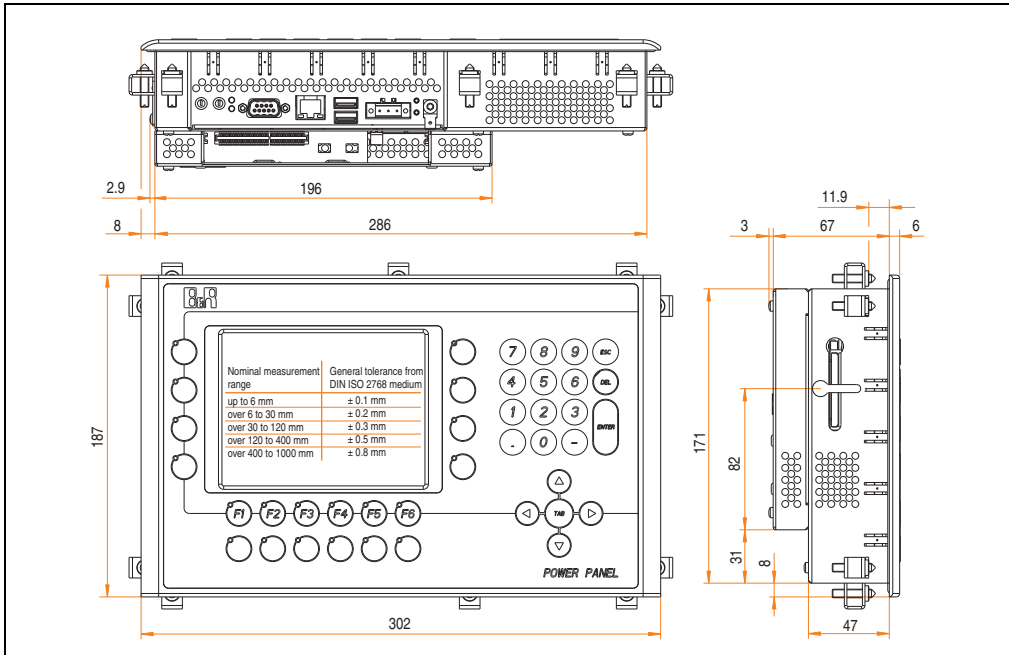


Figure 209: Dimensions - 4PP452.0571-75

#### 4.23.4 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.

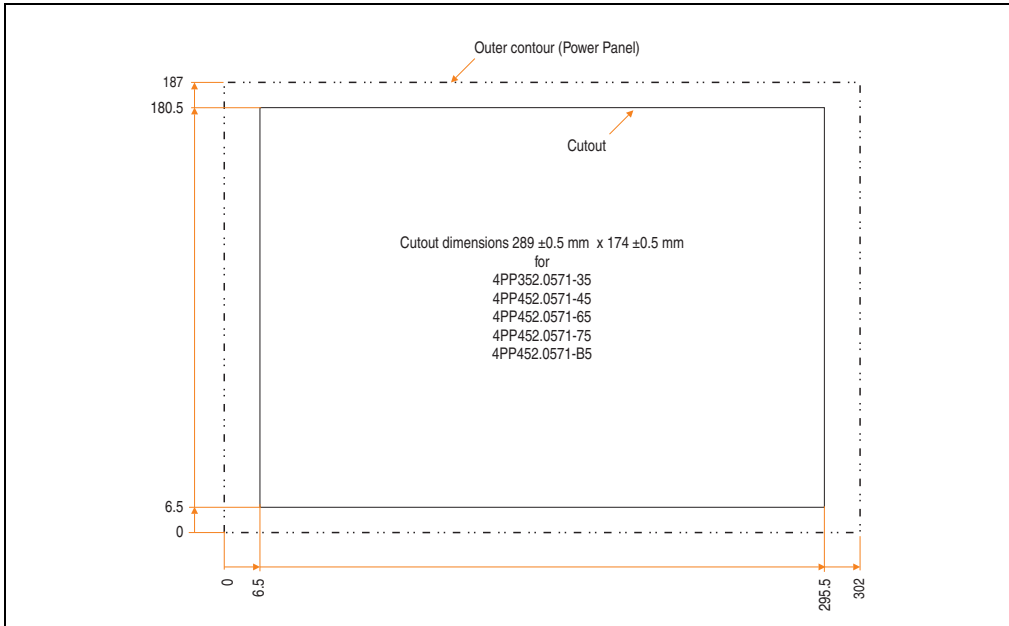


Figure 210: Cutout installation - 4PP452.0571-75

#### 4.23.5 Contents of delivery

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

Amount	Component
1	Power Panel PP452 5.7" QVGA, 1 aPCI, keys
10	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 111: Contents of delivery - 4PP452.0571-75

4.24 Device 4PP452.0571-B5

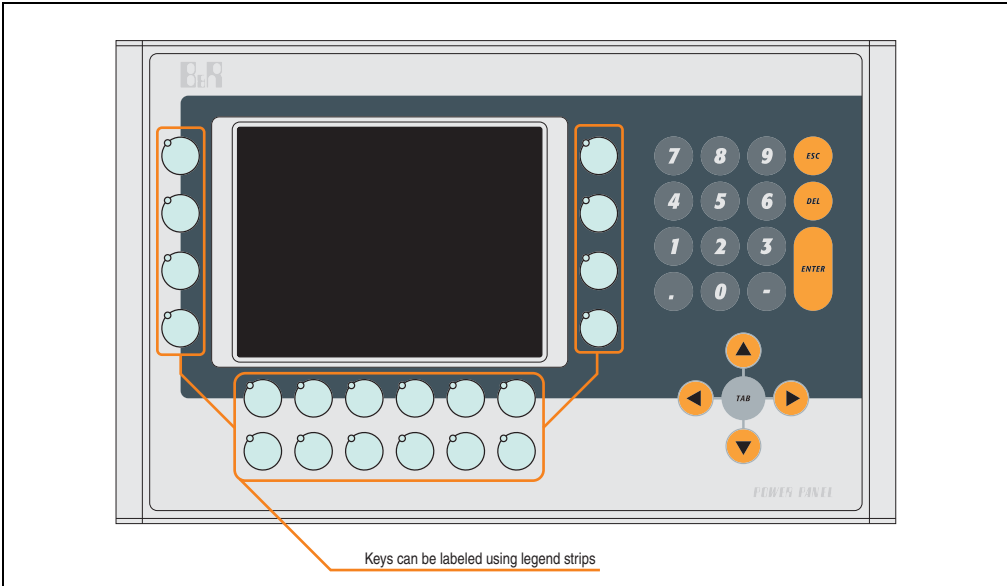


Figure 211: Front view - 4PP452.0571-B5

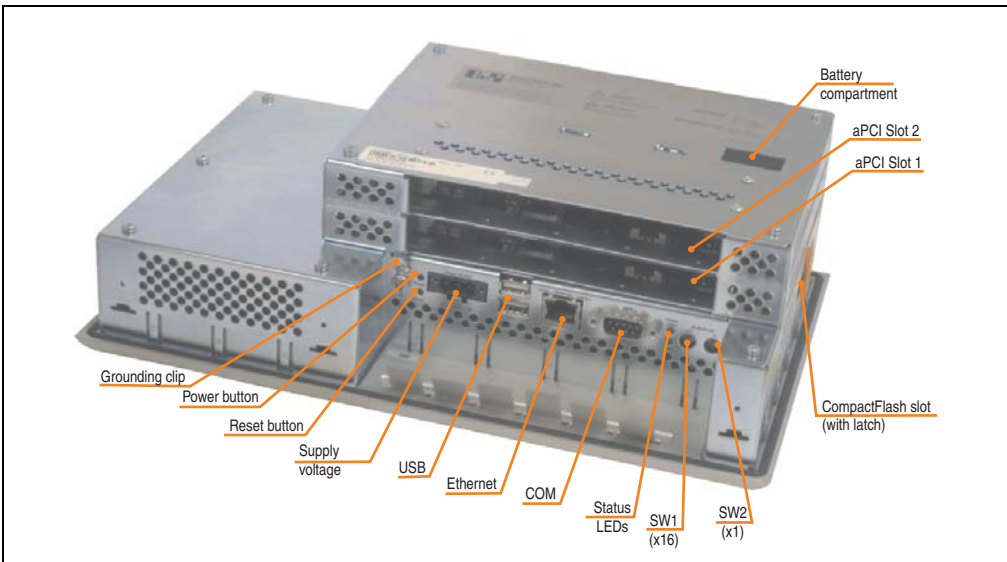


Figure 212: Rear view - 4PP452.0571-B5

**4.24.1 Technical data**

Features	4PP452.0571-B5 < Rev. D0	4PP452.0571-B5 ≥ Rev. D0
B&R ID code	0xA532	
Boot loader / Operating system	Automation Runtime	
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)	
Flash	2 MB (for firmware)	
Memory Type Size	DDR SDRAM 128 MB	
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)	
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB	
Watchdog Controller	MTCX <sup>1)</sup>	
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms	
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day	
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes	
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 112: Technical data - 4PP452.0571-B5

## Technical data • Power Panel 400 with Automation Runtime

Features	4PP452.0571-B5 < Rev. D0	4PP452.0571-B5 ≥ Rev. D0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB	
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection	
Reset button	Yes, accessible from the outside	
Power button	Yes, accessible from the outside	
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)	
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 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	Color TFT 5.7 in (144 mm) 262144 colors <sup>4)</sup> QVGA, 320 x 240 pixels 400:1  Direction R / direction L = 60° Direction U = 40° / direction D = 50°  CCFL 500 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410	Color TFT 5.7 in (144 mm) 262144 colors <sup>4)</sup> QVGA, 320 x 240 pixels 350:1  Direction R / direction L = 65° Direction U = 65° / direction D = 40°  CCFL 500 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	-	
Filter glass Degree of transmission Coating	95% On both sides	
Keys/LED <sup>6)</sup> Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	20 with LED (yellow) - 5 without LED 15 without LED - > 10 <sup>6</sup> actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green)  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>	

Table 112: Technical data - 4PP452.0571-B5 (Forts.)

## Technical data • Power Panel 400 with Automation Runtime

Electrical characteristics	4PP452.0571-B5 < Rev. D0	4PP452.0571-B5 ≥ Rev. D0
Power supply		
Rated voltage		18 - 30 VDC
Rated current		0.63 A
Starting current		Max. 1.2 A
Power consumption		Typically 15 W
Electrical isolation		Yes
Bleeder resistance		0 Ω
Mechanical characteristics		
Outer dimensions		
Width		302 mm
Height		187 mm
Depth		98 mm
Front		
Frame		Naturally anodized aluminum <sup>7)</sup>
Design		Gray <sup>7)</sup>
Membrane		Polyester
Dark gray border around display		Similar to Pantone 432CV <sup>7)</sup>
Light background		Similar to Pantone 427CV <sup>7)</sup>
Orange keys		Similar to Pantone 151CV <sup>7)</sup>
Dark gray keys		Similar to Pantone 431CV <sup>7)</sup>
Legend strips (gray)		Similar to Pantone 429CV <sup>7)</sup>
Gasket		Flat gasket around display front
Housing		Metal
Weight		Approx. 2.9 kg (without aPCI interface modules)
Environmental characteristics		
Ambient temperature		
Operation		0 to +50°C
Bearings		-20 to +60°C
Transport		-20 to +60°C
Relative humidity		See 4.24.2 "Temperature humidity diagram", on page 317
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
Bearings		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
Bearings		30 g, 15 ms
Transport		30 g, 15 ms
Protection		IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude <sup>8)</sup>		Max. 3000 m

Table 112: Technical data - 4PP452.0571-B5 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.



- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) The functions of the keys and the LEDs can be configured using Visual Components in B&R Automation Studio.
- 7) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 8) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

#### 4.24.2 Temperature humidity diagram

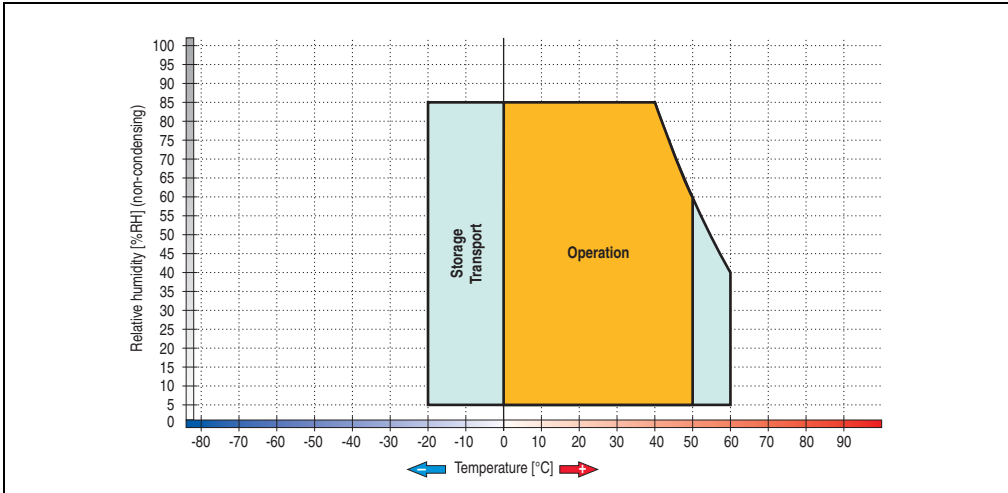


Figure 213: Temperature humidity diagram - 4PP452.0571-B5

### 4.24.3 Dimensions

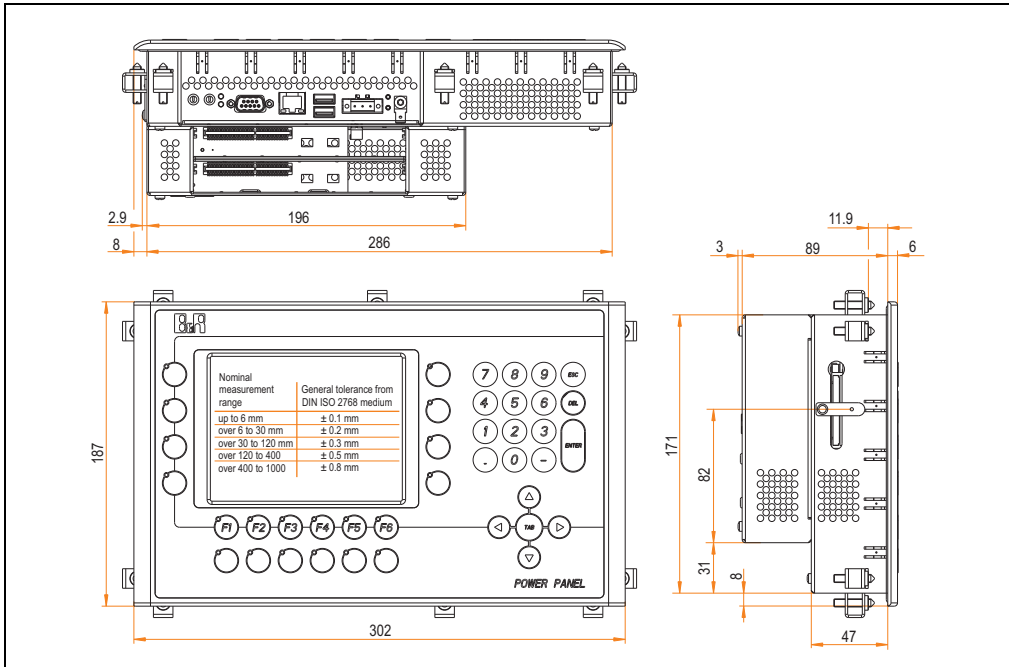


Figure 214: Dimensions - 4PP452.0571-B5

#### 4.24.4 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.

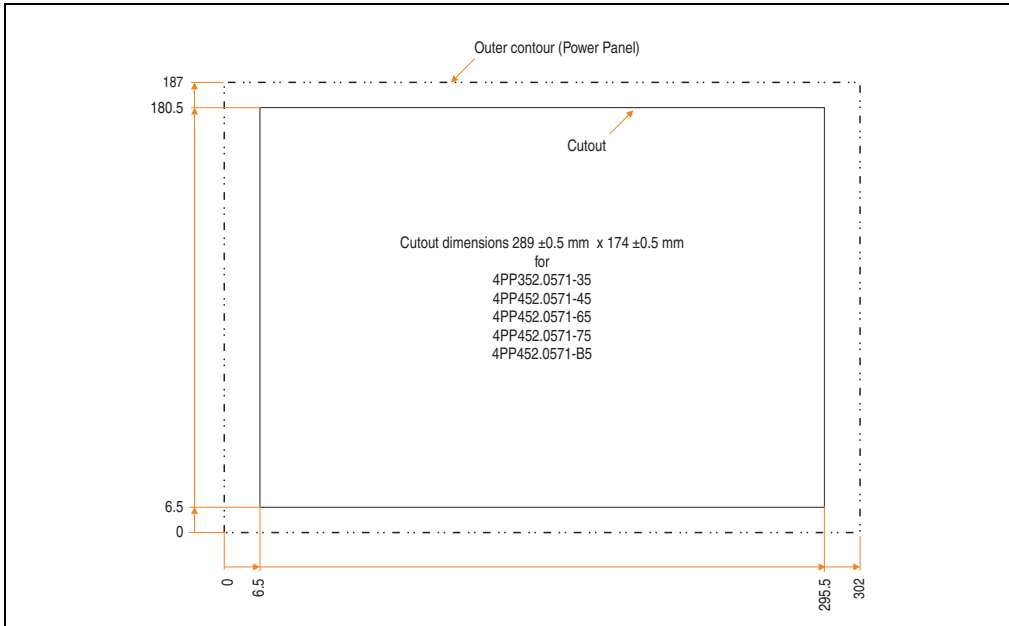


Figure 215: Cutout installation - 4PP452.0571-B5

#### 4.24.5 Contents of delivery

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

Amount	Component
1	Power Panel PP452 5.7" QVGA, 1 aPCI, keys
10	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 113: Contents of delivery - 4PP452.0571-B5

### 4.25 Device 4PP452.1043-75

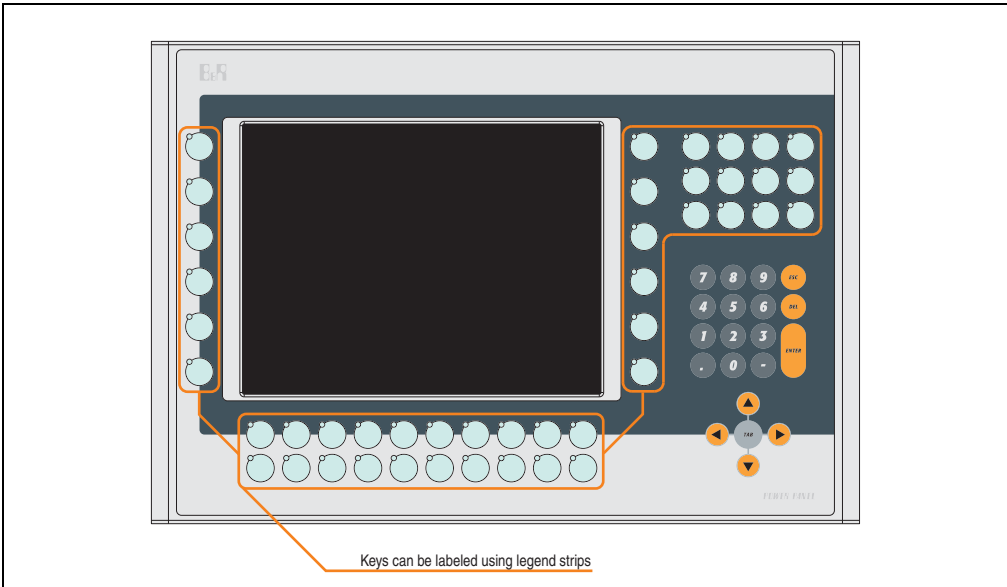


Figure 216: Front view - 4PP452.1043-75

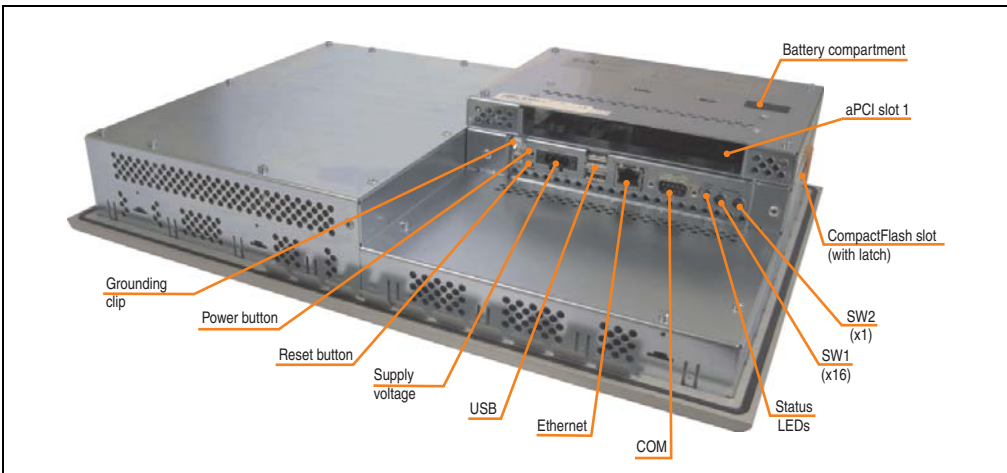


Figure 217: Rear view - 4PP452.1043-75

## 4.25.1 Technical data

Features	4PP452.1043-75 < G0	4PP452.1043-75 ≥ G0
B&R ID code	0xA533	
Boot loader / Operating system	Automation Runtime	
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)	
Flash	2 MB (for firmware)	
Memory Type Size	DDR SDRAM 128 MB (64 MB < Rev. C0)	
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)	
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB	
Watchdog Controller	MTCX <sup>1)</sup>	
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms	
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day	
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes	
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 114: Technical data - 4PP452.1043-75

## Technical data • Power Panel 400 with Automation Runtime

Features	4PP452.1043-75 < G0	4PP452.1043-75 ≥ G0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB	
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection	
Reset button	Yes, accessible from the outside	
Power button	Yes, accessible from the outside	
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)	
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 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	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 = 35°  CCFL 450 cd/m <sup>2</sup> 55000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410	Color TFT 10.4 inch (264 mm) 262144 colors <sup>4)</sup> VGA, 640 x 480 pixels 900:1  Direction R / direction L = 80° Direction U / direction D = 80°  LED 450 cd/m <sup>2</sup> 70000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	-	
Filter glass Degree of transmission Coating	-	
Keys/LED <sup>6)</sup> Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	44 with LED (yellow) - 5 without LED 15 without LED - > 1,000,000 actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green)  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>	

Table 114: Technical data - 4PP452.1043-75 (Forts.)

## Technical data • Power Panel 400 with Automation Runtime

Electrical characteristics	4PP452.1043-75 < G0	4PP452.1043-75 ≥ G0
Power supply		
Rated voltage	18 - 30 VDC	
Rated current	1.38 A	
Starting current	Max. 2 A	
Power consumption	Typically 23 W	
Electrical isolation	Yes	
Bleeder resistance	0 Ω	
Mechanical characteristics		
Outer dimensions		
Width	423 mm	
Height	288 mm	
Depth	86 mm	
Front		
Frame	Naturally anodized aluminum <sup>7)</sup>	
Design	Gray <sup>7)</sup>	
Membrane	Polyester	
Dark gray border around display	Similar to Pantone 432CV <sup>7)</sup>	
Light background	Similar to Pantone 427CV <sup>7)</sup>	
Orange keys	Similar to Pantone 151CV <sup>7)</sup>	
Dark gray keys	Similar to Pantone 431CV <sup>7)</sup>	
Legend strips (gray)	Similar to Pantone 429CV <sup>7)</sup>	
Gasket	Flat gasket around display front	
Housing	Metal	
Weight	Approx. 5.2 kg (without aPCI interface modules)	
Environmental characteristics		
Ambient temperature		
Operation	0 to +50°C	
Bearings	-20 to +70°C	
Transport	-20 to +70°C	
Relative humidity	See 4.25.2 "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	
Bearings	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	
Bearings	30 g, 15 ms	
Transport	30 g, 15 ms	
Protection	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude <sup>8)</sup>	Max. 3000 m	

Table 114: Technical data - 4PP452.1043-75 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.

- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) The functions of the keys and the LEDs can be configured using Visual Components in B&R Automation Studio.
- 7) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 8) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.25.2 Temperature humidity diagram

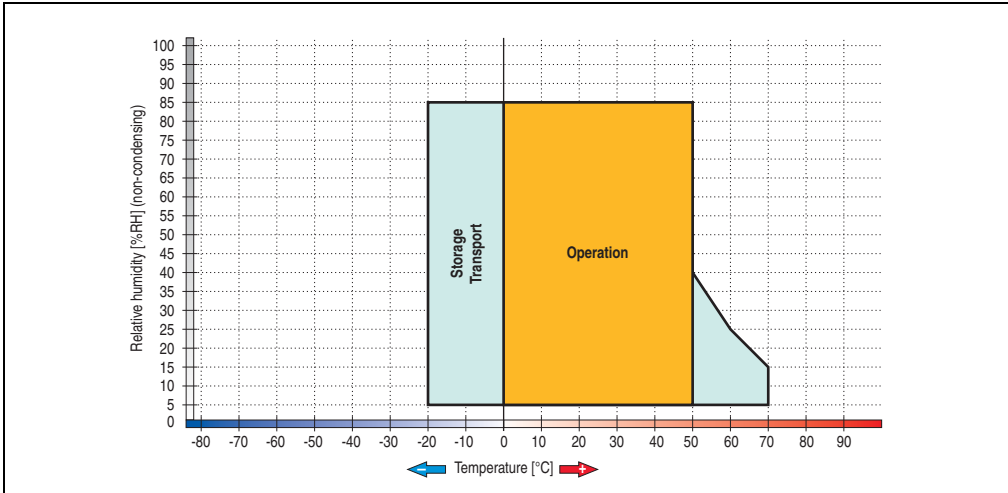


Figure 218: Temperature humidity diagram - 4PP452.1043-75



4.25.3 Dimensions

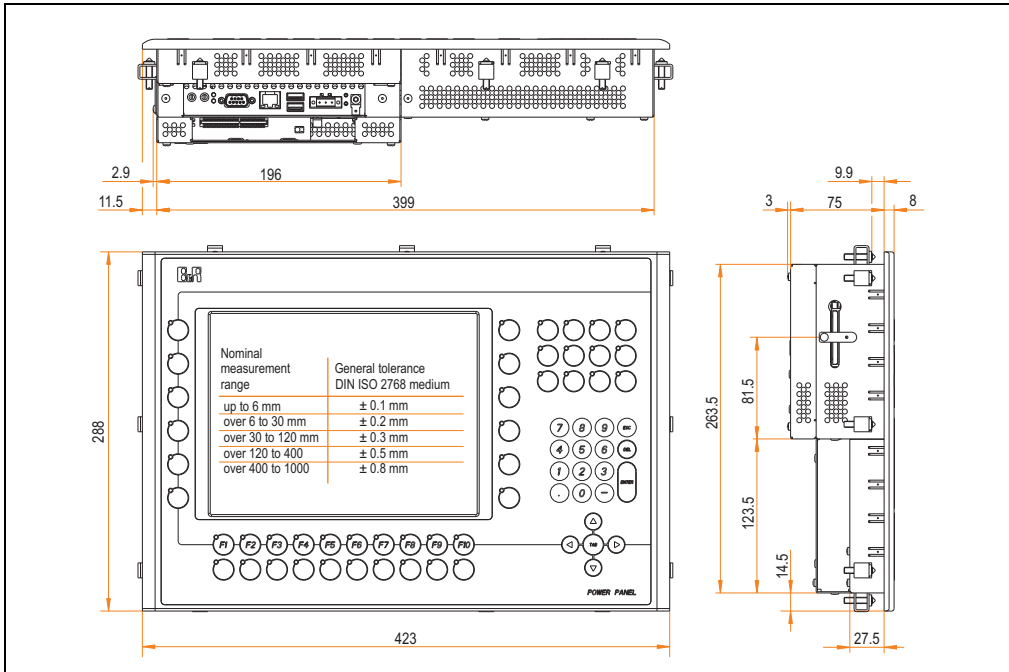


Figure 219: Dimensions - 4PP452.1043-75

#### 4.25.4 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.

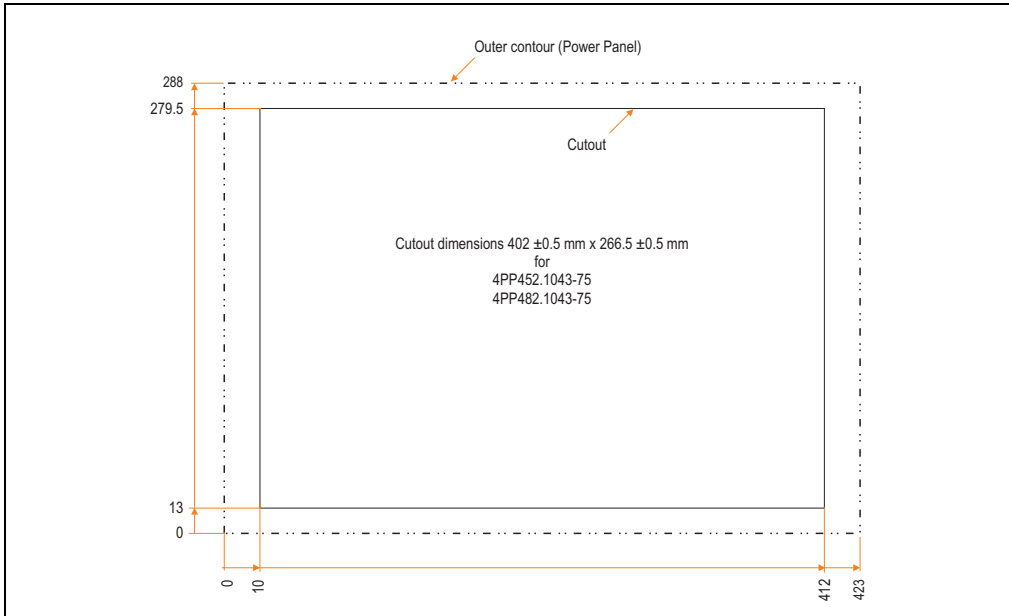


Figure 220: Cutout installation - 4PP452.1043-75

#### 4.25.5 Contents of delivery

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

Amount	Component
1	Power Panel PP482 10.4" VGA, 1 aPCI, keys
12	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 115: Contents of delivery - 4PP452.1043-75

## 4.26 Device 4PP480.1043-75

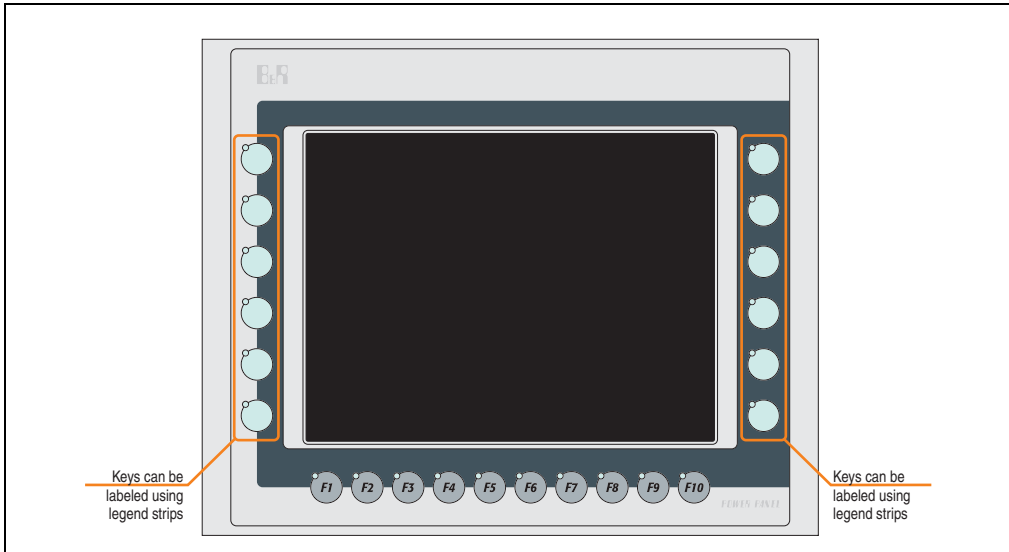


Figure 221: Front view - 4PP480.1043-75

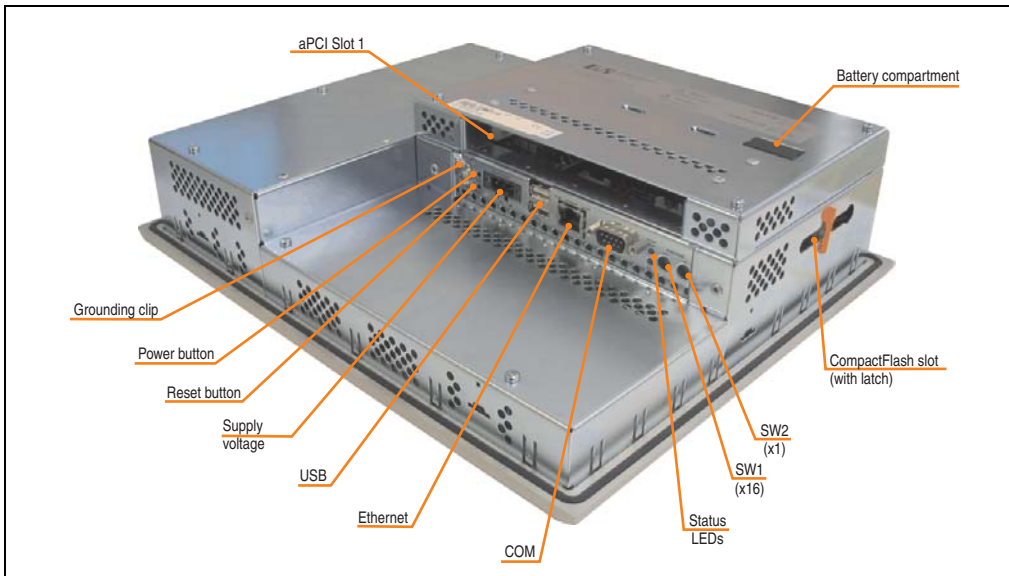


Figure 222: Rear view - 4PP480.1043-75

**4.26.1 Technical data**

Features	4PP480.1043-75 ≤ G0	4PP480.1043-75 ≥ H0	4PP480.1043-75 ≥ K0
B&R ID code	0x23C3		
Boot loader / Operating system	Automation Runtime		
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)		
Flash	2 MB (for firmware)		
Memory Type Size	DDR SDRAM 128 MB (64 MB < Rev. C0)		
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)		
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB		
Watchdog Controller	MTCX <sup>1)</sup>		
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms		
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day		
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes		
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 116: Technical data - 4PP480.1043-75

## Technical data • Power Panel 400 with Automation Runtime

Features	4PP480.1043-75 ≤ G0	4PP480.1043-75 ≥ H0	4PP480.1043-75 ≥ K0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB		
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection		
Reset button	Yes, accessible from the outside		
Power button	Yes, accessible from the outside		
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)		
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 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	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 = 35°  CCFL 450 cd/m <sup>2</sup> 55000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410		Color TFT 10.4 inch (264 mm) 262144 colors <sup>4)</sup> VGA, 640 x 480 pixels 900:1  Direction R / direction L = 80° Direction U / direction D = 80°  LED 450 cd/m <sup>2</sup> 70000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Accu Touch Analog, resistive Elo, serial, 12-bit Up to 80% ±5%	AMT Analog, resistive Elo, serial, 12-bit Up to 80% ±5%	
Filter glass Degree of transmission Coating	-		
Keys/LED <sup>6)</sup> Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	12 with LED (yellow) 10 with LED (yellow) - - - - > 10 <sup>6</sup> actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green)  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>		

Table 116: Technical data - 4PP480.1043-75 (Forts.)

## Technical data • Power Panel 400 with Automation Runtime

Electrical characteristics	4PP480.1043-75 ≤ G0	4PP480.1043-75 ≥ H0	4PP480.1043-75 ≥ K0
Power supply			
Rated voltage	18 - 30 VDC		
Rated current	0.84 A		
Starting current	Max. 2.8 A		
Power consumption	Typically 20 W		
Electrical isolation	Yes		
Bleeder resistance	0 Ω		
Mechanical characteristics			
Outer dimensions			
Width	323 mm		
Height	260 mm		
Depth	86 mm		
Front			
Frame	Naturally anodized aluminum <sup>7)</sup>		
Design	Gray <sup>7)</sup>		
Membrane	Polyester		
Dark gray border around display	Similar to Pantone 432CV <sup>7)</sup>		
Light background	Similar to Pantone 427CV <sup>7)</sup>		
Legend strips (gray)	Similar to Pantone 429CV <sup>7)</sup>		
Gasket	Flat gasket around display front		
Housing	Metal		
Weight	Approx. 3.9 kg (without aPCI interface modules)		
Environmental characteristics			
Ambient temperature			
Operation	0 to +50°C		
Bearings	-20 to +70°C		
Transport	-20 to +70°C		
Relative humidity	See 4.26.2 "Temperature humidity diagram", on page 331		
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		
Bearings	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		
Bearings	30 g, 15 ms		
Transport	30 g, 15 ms		
Protection	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)		
Altitude <sup>B)</sup>	Max. 3000 m		

Table 116: Technical data - 4PP480.1043-75 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.
- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) The functions of the keys and the LEDs can be configured using Visual Components in B&R Automation Studio.

- 7) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 8) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.26.2 Temperature humidity diagram

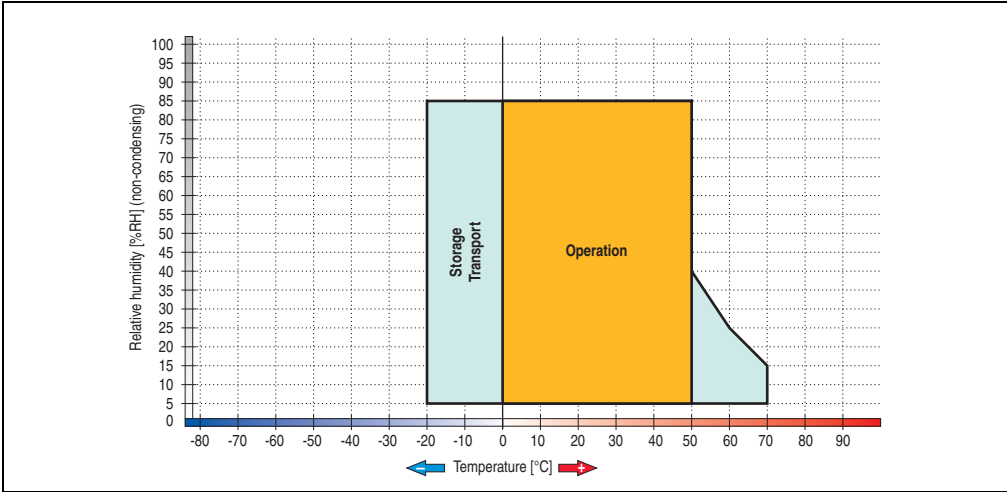


Figure 223: Temperature humidity diagram - 4PP480.1043-75

### 4.26.3 Dimensions

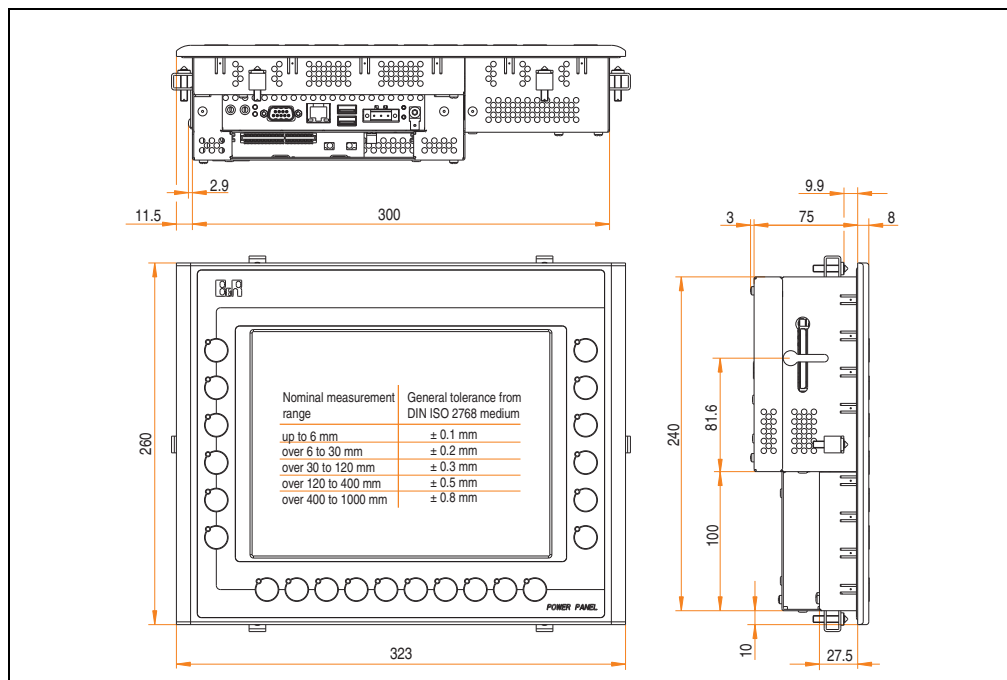


Figure 224: Dimensions - 4PP480.1043-75



### 4.26.4 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.

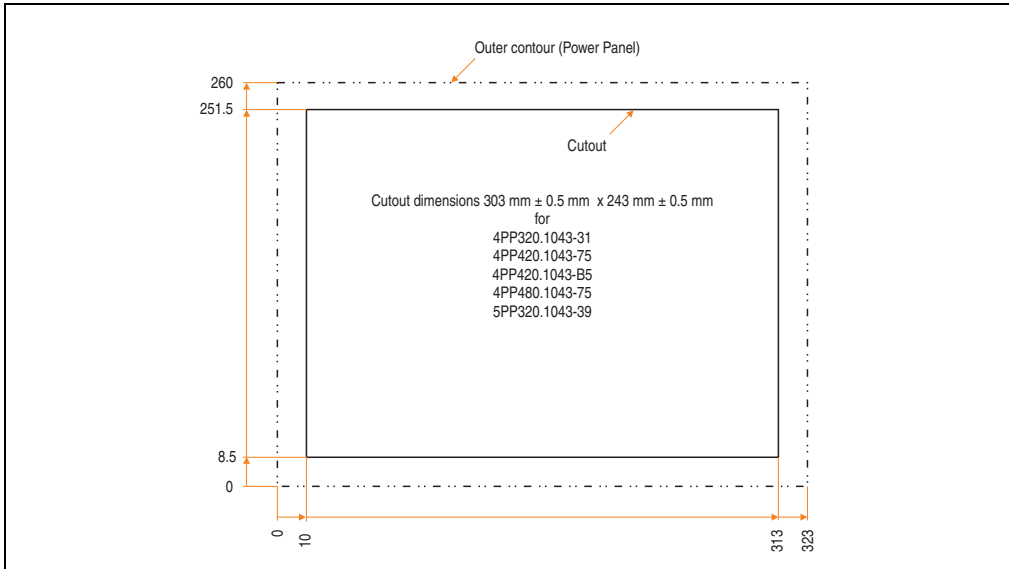


Figure 225: Cutout installation - 4PP480.1043-75

### 4.26.5 Contents of delivery

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

Amount	Component
1	Power Panel PP480 10.4" VGA, 1 aPCI, touch screen, keys
6	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 117: Contents of delivery - 4PP480.1043-75

4.27 Device 4PP480.1505-75

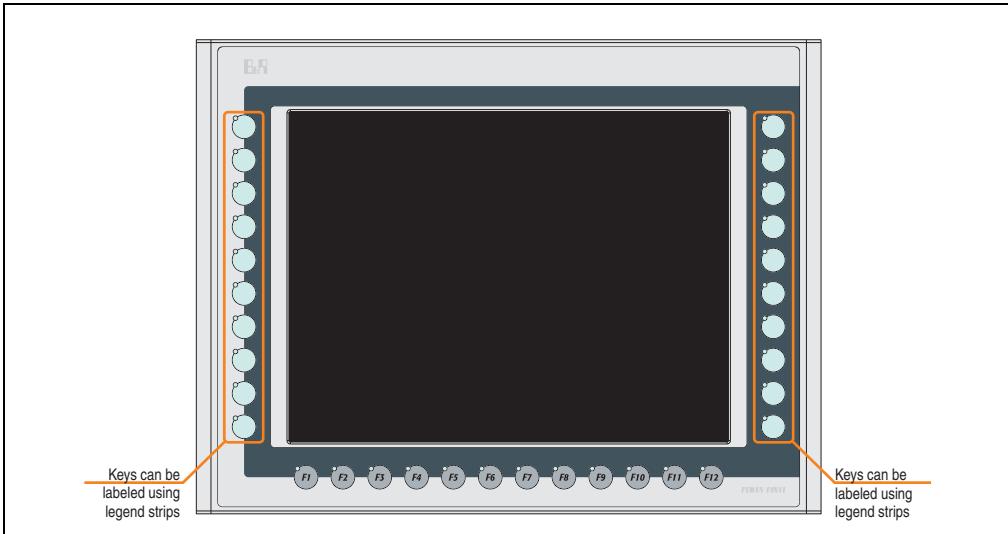


Figure 226: Front view - 4PP480.1505-75

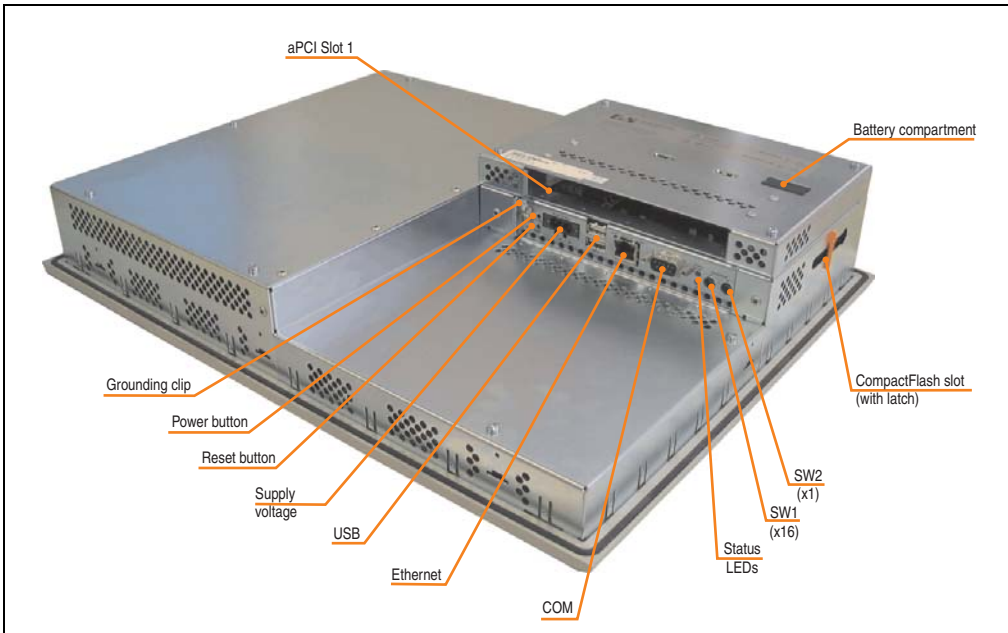


Figure 227: Rear view - 4PP480.1505-75

## 4.27.1 Technical data

Features	4PP480.1505-75 ≤ H0	4PP480.1505-75 ≥ I0	4PP480.1505-75 ≥ K0
B&R ID code	0x23C4		
Boot loader / Operating system	Automation Runtime		
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)		
Flash	2 MB (for firmware)		
Memory Type Size	DDR SDRAM 128 MB (64 MB < Rev. C0)		
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)		
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB		
Watchdog Controller	MTCX <sup>1)</sup>		
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms		
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day		
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes		
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 118: Technical data - 4PP480.1505-75

## Technical data • Power Panel 400 with Automation Runtime

Features	4PP480.1505-75 ≤ H0	4PP480.1505-75 ≥ I0	4PP480.1505-75 ≥ K0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB		
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection		
Reset button	Yes, accessible from the outside		
Power button	Yes, accessible from the outside		
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)		
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 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	Color TFT 15 inch (380 mm) 16.7 million colors <sup>4)</sup> XGA, 1024 x 768 pixels 400:1  Direction R / direction L = 85° Direction U / direction D = 85°  CCFL 250 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410		Color TFT 15 inch (380 mm) 16.2 million colors <sup>4)</sup> XGA, 1024 x 768 pixels 1000:1  Direction R / direction L = 85° Direction U / direction D = 85°  LED 350 cd/m <sup>2</sup> 70000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Accu Touch Analog, resistive Elo, serial, 12-bit Up to 80% ±5%	AMT Analog, resistive Elo, serial, 12-bit Up to 80% ±5%	
Filter glass Degree of transmission Coating	-		
Keys/LED <sup>6)</sup> Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	20 with LED (yellow) 12 with LED (yellow) - - - - > 10 <sup>6</sup> actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green)  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>		

Table 118: Technical data - 4PP480.1505-75 (Forts.)

## Technical data • Power Panel 400 with Automation Runtime

Electrical characteristics	4PP480.1505-75 ≤ I0	4PP480.1505-75 ≥ I0	4PP480.1505-75 ≥ K0
Power supply			
Rated voltage	18 - 30 VDC		
Rated current	0.84 A		
Starting current	Max. 2.8 A		
Power consumption	Typically 20 W		
Electrical isolation	Yes		
Bleeder resistance	0 Ω		
Mechanical characteristics			
Outer dimensions			
Width	435 mm		
Height	330 mm		
Depth	87 mm		
Front			
Frame	Naturally anodized aluminum <sup>7)</sup>		
Design	Gray <sup>7)</sup>		
Membrane	Polyester		
Dark gray border around display	Similar to Pantone 432CV <sup>7)</sup>		
Light background	Similar to Pantone 427CV <sup>7)</sup>		
Legend strips (gray)	Similar to Pantone 429CV <sup>7)</sup>		
Gasket	Flat gasket around display front		
Housing	Metal		
Weight	Approx. 6.5 kg (without aPCI interface modules)		
Environmental characteristics			
Ambient temperature			
Operation	0 to +50°C		
Bearings	-20 to +60°C		
Transport	-20 to +60°C		
Relative humidity	See 4.27.2 "Temperature humidity diagram", on page 338		
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		
Bearings	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		
Bearings	30 g, 15 ms		
Transport	30 g, 15 ms		
Protection	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)		
Altitude <sup>B)</sup>	Max. 3000 m		

Table 118: Technical data - 4PP480.1505-75 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.
- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) The functions of the keys and the LEDs can be configured using Visual Components in B&R Automation Studio.

- 7) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 8) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.27.2 Temperature humidity diagram

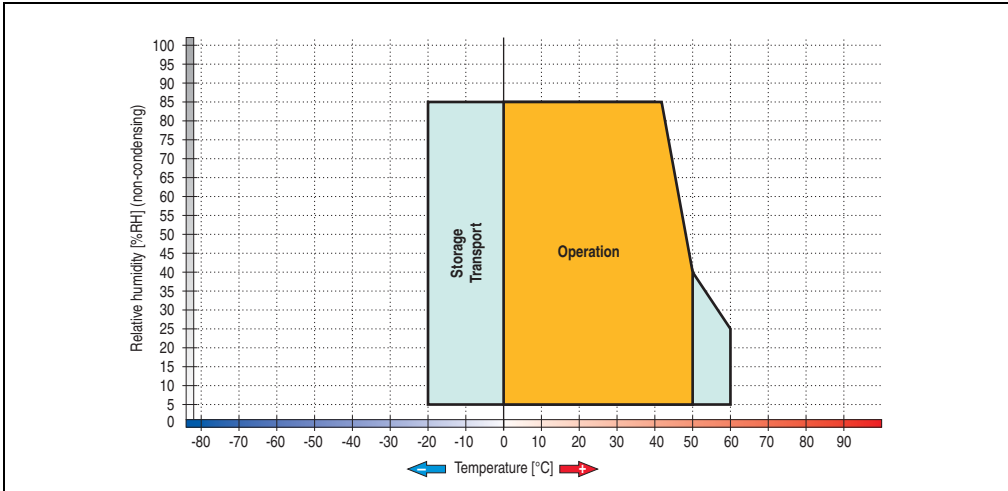


Figure 228: Temperature humidity diagram - 4PP480.1505-75

4.27.3 Dimensions

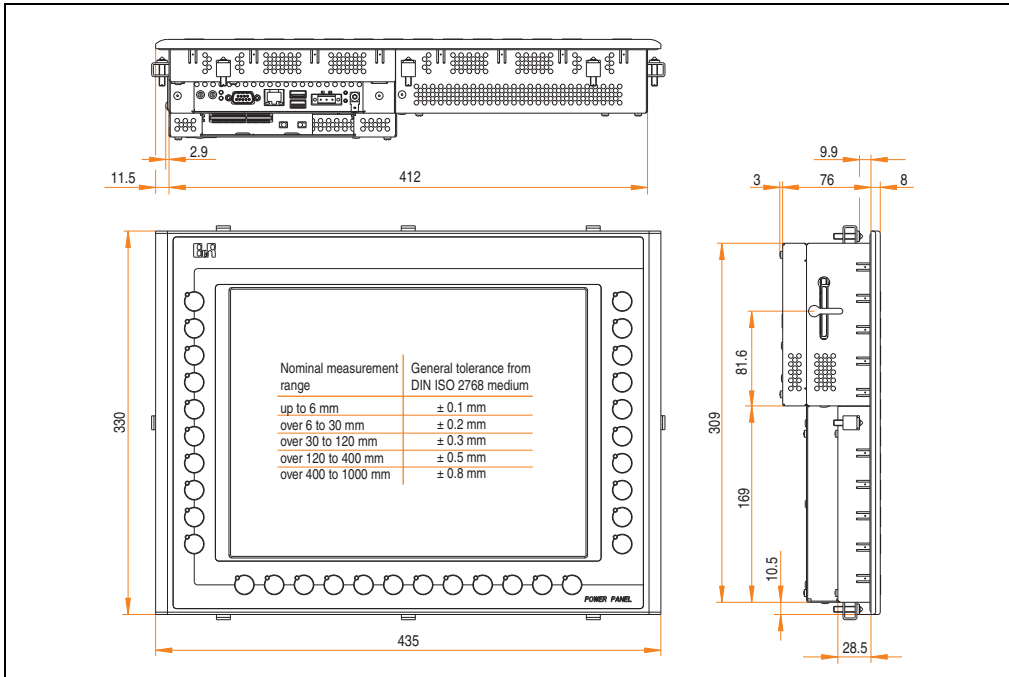


Figure 229: Dimensions - 4PP480.1505-75

#### 4.27.4 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.

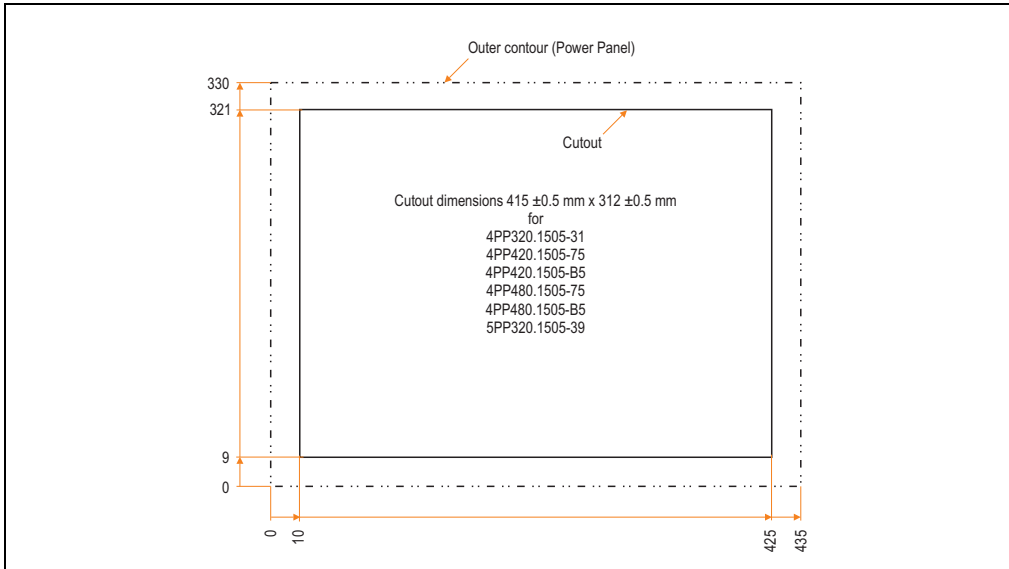


Figure 230: Cutout installation - 4PP480.1505-75

#### 4.27.5 Contents of delivery

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

Amount	Component
1	Power Panel PP480 15" XGA, 1 aPCI, touch screen, keys
8	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 119: Contents of delivery - 4PP480.1505-75



### 4.28 Device 4PP480.1505-B5

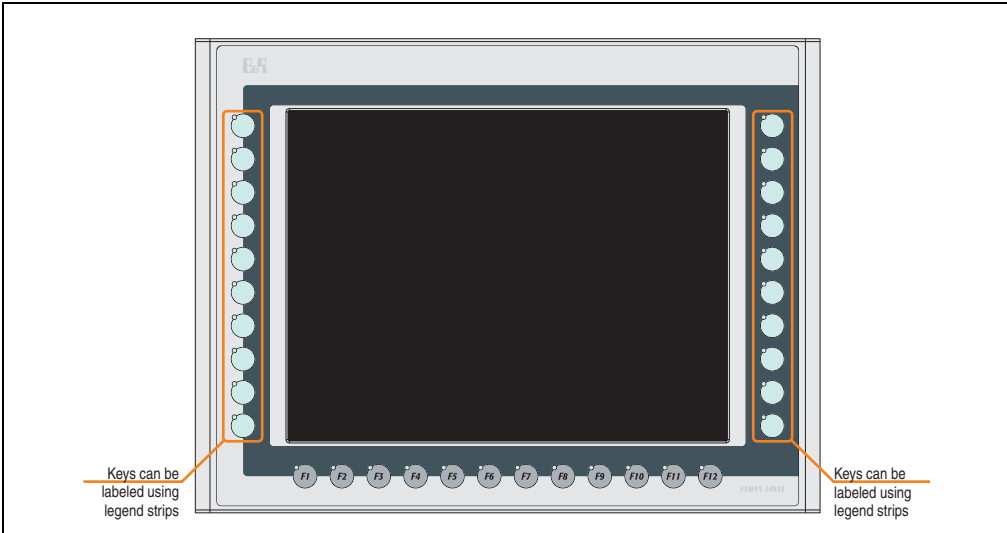


Figure 231: Front view - 4PP480.1505-B5

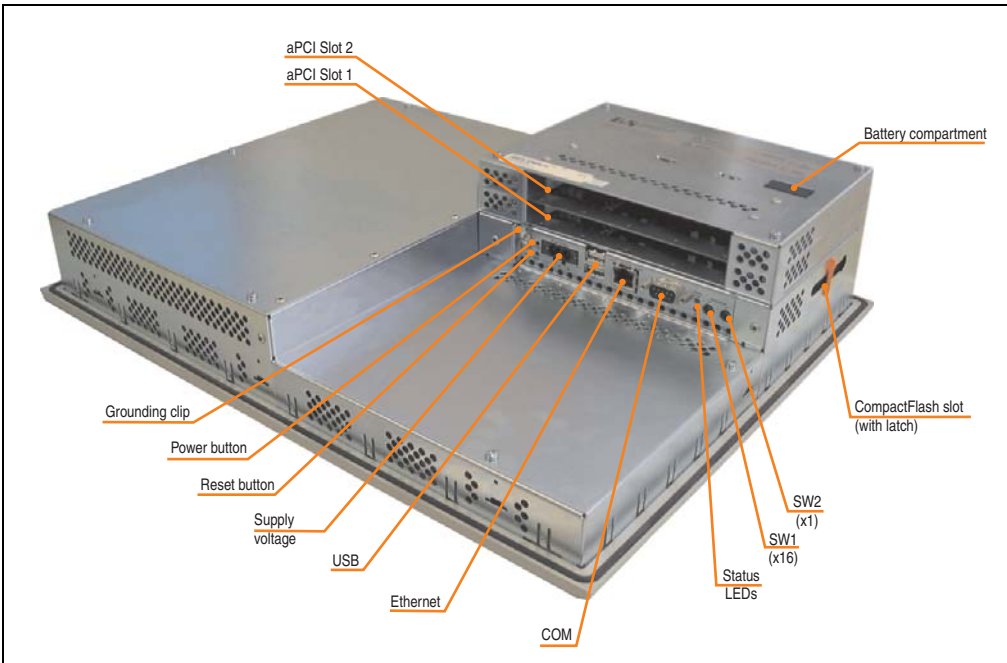


Figure 232: Rear view - 4PP480.1505-B5

**4.28.1 Technical data**

Features	4PP480.1505-B5 ≤ F0	4PP480.1505-B5 ≥ G0	4PP480.1505-B5 ≥ I0
B&R ID code	0xA52D		
Boot loader / Operating system	Automation Runtime		
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)		
Flash	2 MB (for firmware)		
Memory Type Size	DDR SDRAM 128 MB (64 MB < Rev. C0)		
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)		
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB		
Watchdog Controller	MTCX <sup>1)</sup>		
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms		
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day		
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes		
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 120: Technical data - 4PP480.1505-B5

## Technical data • Power Panel 400 with Automation Runtime

Features	4PP480.1505-B5 ≤ F0	4PP480.1505-B5 ≥ G0	4PP480.1505-B5 ≥ I0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB		
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection		
Reset button	Yes, accessible from the outside		
Power button	Yes, accessible from the outside		
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)		
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 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	Color TFT 15 inch (380 mm) 16.7 million colors <sup>4)</sup> XGA, 1024 x 768 pixels 400:1  Direction R / direction L = 85° Direction U / direction D = 85°  CCFL 250 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410		Color TFT 15 inch (380 mm) 16.2 million colors <sup>4)</sup> XGA, 1024 x 768 pixels 1000:1  Direction R / direction L = 85° Direction U / direction D = 85°  LED 350 cd/m <sup>2</sup> 70000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Accu Touch Analog, resistive Elo, serial, 12- bit Up to 80% ±5%	AMT Analog, resistive Elo, serial, 12- bit Up to 80% ±5%	
Filter glass Degree of transmission Coating	-		
Keys/LED <sup>6)</sup> Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	20 with LED (yellow) 12 with LED (yellow) - - - > 10 <sup>6</sup> actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green)  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>		

Table 120: Technical data - 4PP480.1505-B5 (Forts.)

## Technical data • Power Panel 400 with Automation Runtime

Electrical characteristics	4PP480.1505-B5 ≤ F0	4PP480.1505-B5 ≥ G0	4PP480.1505-B5 ≥ I0
Power supply			
Rated voltage		18 - 30 VDC	
Rated current		0.84 A	
Starting current		Max. 2.8 A	
Power consumption		Typically 20 W	
Electrical isolation		Yes	
Bleeder resistance		0 Ω	
Mechanical characteristics			
Outer dimensions			
Width		435 mm	
Height		330 mm	
Depth		109 mm	
Front			
Frame		Naturally anodized aluminum <sup>7)</sup>	
Design		Gray <sup>7)</sup>	
Membrane		Polyester	
Dark gray border around display		Similar to Pantone 432CV <sup>7)</sup>	
Light background		Similar to Pantone 427CV <sup>7)</sup>	
Legend strips (gray)		Similar to Pantone 429CV <sup>7)</sup>	
Gasket		Flat gasket around display front	
Housing		Metal	
Weight		Approx. 6.8 kg (without aPCI interface modules)	
Environmental characteristics			
Ambient temperature			
Operation		0 to +50°C	
Bearings		-20 to +60°C	
Transport		-20 to +60°C	
Relative humidity		See 4.28.2 "Temperature humidity diagram", on page 345	
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	
Bearings		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	
Bearings		30 g, 15 ms	
Transport		30 g, 15 ms	
Protection		IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude <sup>B)</sup>		Max. 3000 m	

Table 120: Technical data - 4PP480.1505-B5 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.
- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) The functions of the keys and the LEDs can be configured using Visual Components in B&R Automation Studio.

- 7) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 8) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.28.2 Temperature humidity diagram

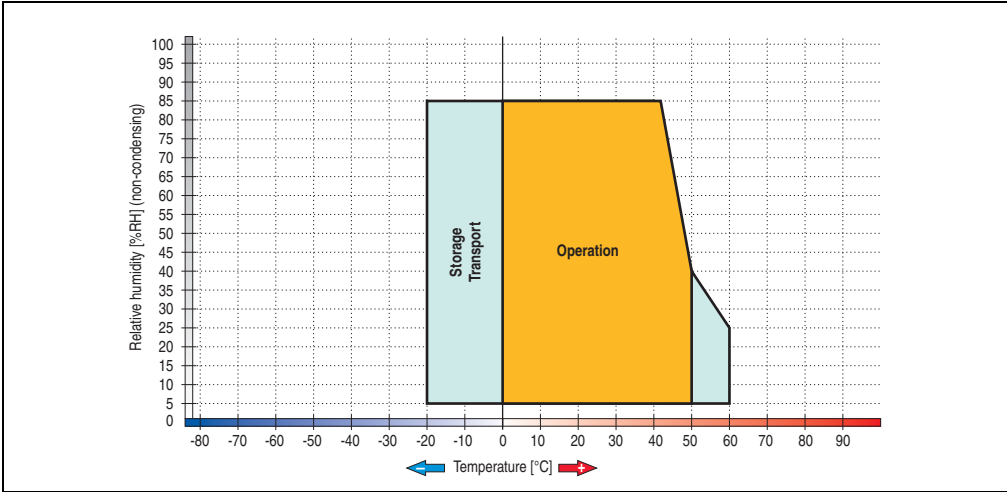


Figure 233: Temperature humidity diagram - 4PP480.1505-B5

### 4.28.3 Dimensions

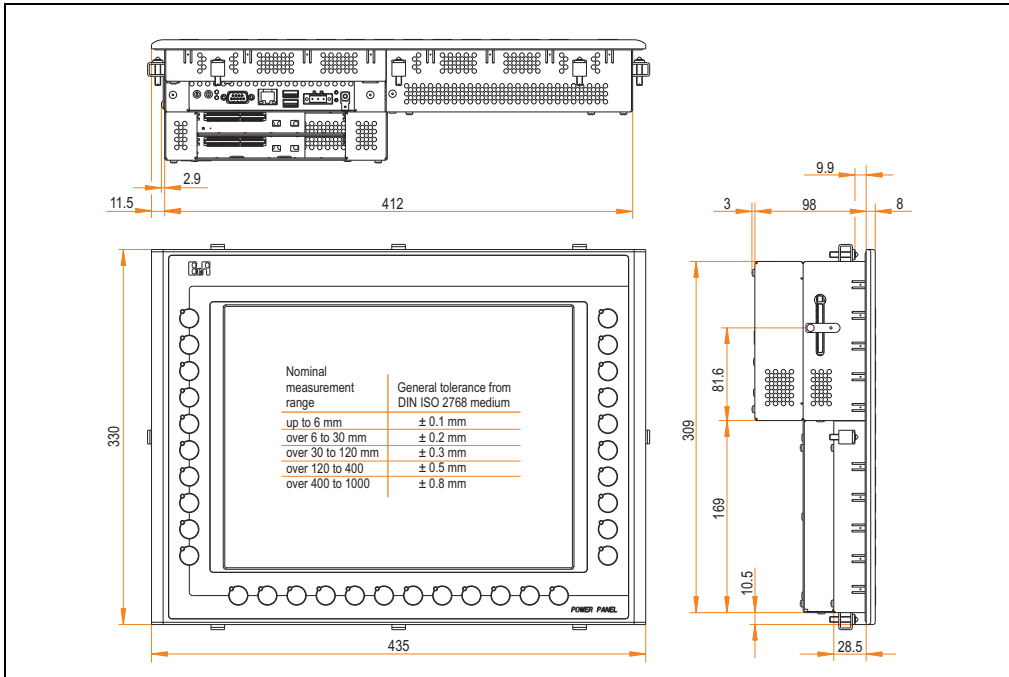


Figure 234: Dimensions - 4PP480.1505-B5

### 4.28.4 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.

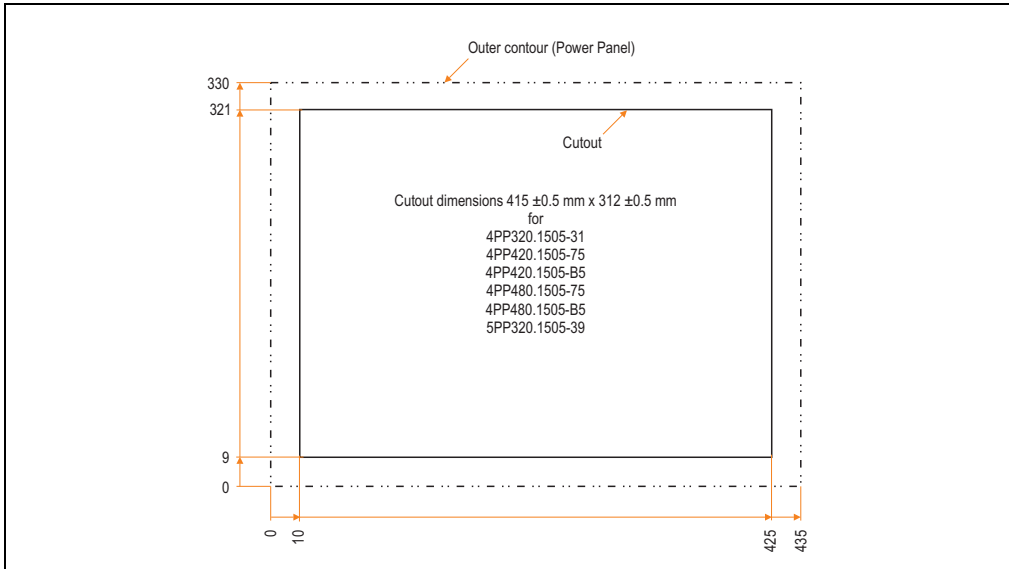


Figure 235: Cutout installation - 4PP480.1505-B5

### 4.28.5 Contents of delivery

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

Amount	Component
1	Power Panel PP480 15" XGA, 1 aPCI, touch screen, keys
8	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 121: Contents of delivery - 4PP480.1505-B5

### 4.29 Device 4PP481.1043-75

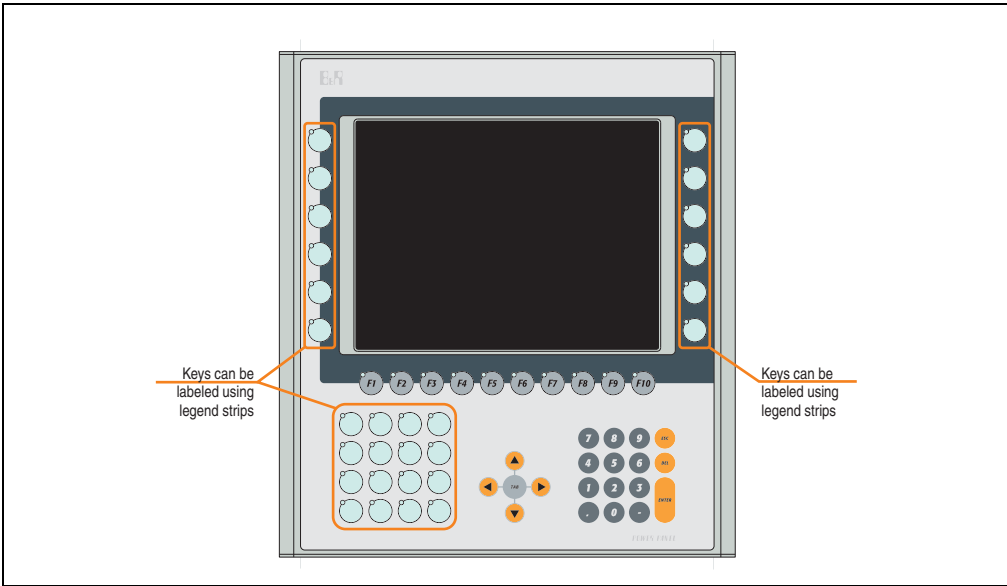


Figure 236: Front view - 4PP481.1043-75

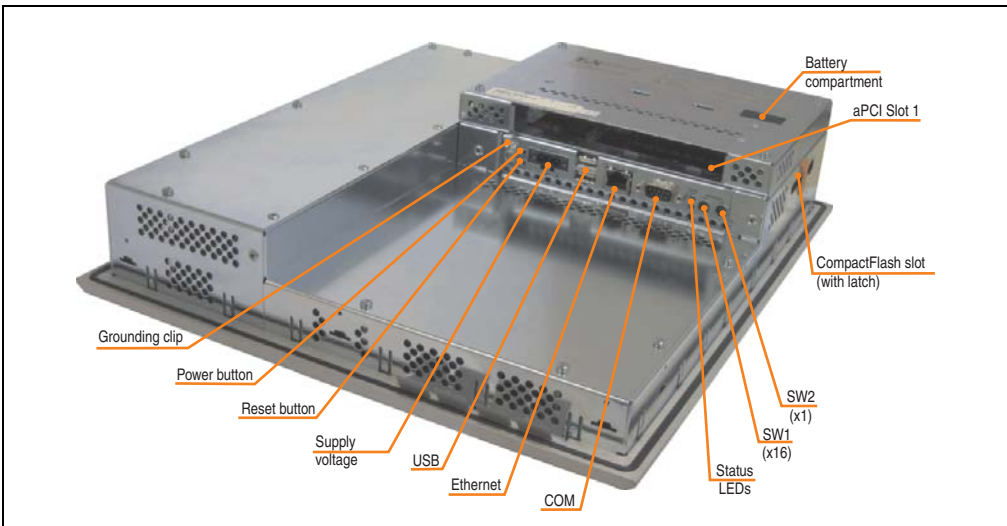


Figure 237: Rear view - 4PP481.1043-75



## 4.29.1 Technical data

Features	4PP481.1043-75 ≤ G0	4PP481.1043-75 ≥ H0	4PP481.1043-75 ≥ K0
B&R ID code	0x23C5		
Boot loader / Operating system	Automation Runtime		
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)		
Flash	2 MB (for firmware)		
Memory Type Size	DDR SDRAM 128 MB (64 MB < Rev. C0)		
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)		
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB		
Watchdog Controller	MTCX <sup>1)</sup>		
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms		
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day		
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes		
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 122: Technical data - 4PP481.1043-75

## Technical data • Power Panel 400 with Automation Runtime

Features	4PP481.1043-75 ≤ G0	4PP481.1043-75 ≥ H0	4PP481.1043-75 ≥ K0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB		
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection		
Reset button	Yes, accessible from the outside		
Power button	Yes, accessible from the outside		
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)		
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 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	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 = 35°  CCFL 450 cd/m <sup>2</sup> 55000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410		Color TFT 10.4 inch (264 mm) 262144 colors <sup>4)</sup> VGA, 640 x 480 pixels 900:1  Direction R / direction L = 80° Direction U / direction D = 80°  LED 450 cd/m <sup>2</sup> 70000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Accu Touch Analog, resistive Elo, serial, 12-bit Up to 80% ±5%	AMT Analog, resistive Elo, serial, 12-bit Up to 80% ±5%	
Filter glass Degree of transmission Coating	-		
Keys/LED <sup>6)</sup> Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	28 with LED (yellow) 10 with LED (yellow) 5 without LED 15 without LED - > 10 <sup>6</sup> actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green)  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>		

Table 122: Technical data - 4PP481.1043-75 (Forts.)

## Technical data • Power Panel 400 with Automation Runtime

Electrical characteristics	4PP481.1043-75 ≤ G0	4PP481.1043-75 ≥ H0	4PP481.1043-75 ≥ K0
Power supply Rated voltage Rated current Starting current Power consumption Electrical isolation		18 - 30 VDC 0.84 A Max. 2.8 A Typically 20 W Yes	
Bleeder resistance		0 Ω	
Mechanical characteristics			
Outer dimensions Width Height Depth		323 mm 358 mm 86 mm	
Front Frame Design Membrane Dark gray border around display Light background Orange keys Dark gray keys Legend strips (gray) Gasket		Naturally anodized aluminum <sup>7)</sup> Gray <sup>7)</sup> Polyester Similar to Pantone 432CV <sup>7)</sup> Similar to Pantone 427CV <sup>7)</sup> Similar to Pantone 151CV <sup>7)</sup> Similar to Pantone 431CV <sup>7)</sup> Similar to Pantone 429CV <sup>7)</sup> Flat gasket around display front	
Housing		Metal	
Weight		Approx. 5 kg (without aPCI interface modules)	
Environmental characteristics			
Ambient temperature Operation Bearings Transport		0 to +50°C -20 to +70°C -20 to +70°C	
Relative humidity		See 4.29.2 "Temperature humidity diagram", on page 352	
Vibration Operation (continuous) Operation (occasional) Bearings Transport		2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g	
Shock Operation Bearings Transport		15 g, 11 ms 30 g, 15 ms 30 g, 15 ms	
Protection		IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude <sup>8)</sup>		Max. 3000 m	

Table 122: Technical data - 4PP481.1043-75 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.

- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) The functions of the keys and the LEDs can be configured using Visual Components in B&R Automation Studio.
- 7) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 8) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.29.2 Temperature humidity diagram

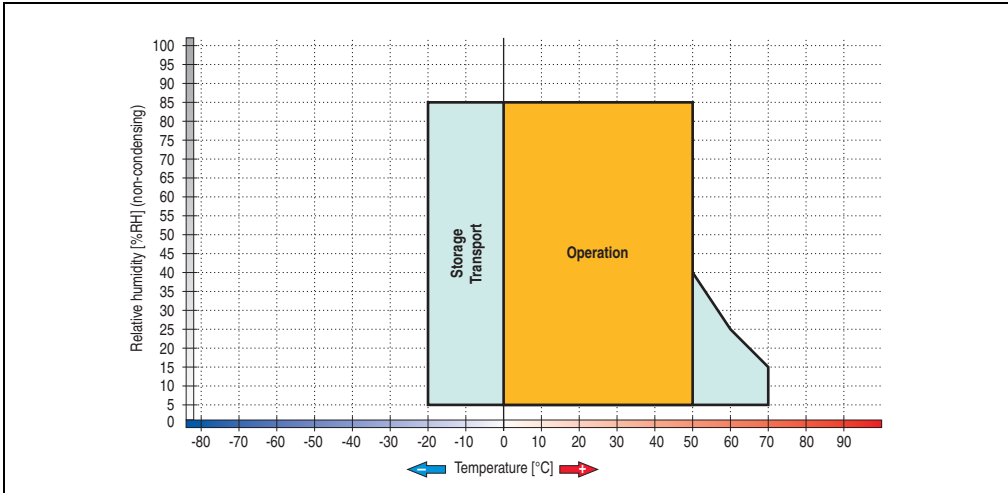


Figure 238: Temperature humidity diagram - 4PP481.1043-75

4.29.3 Dimensions

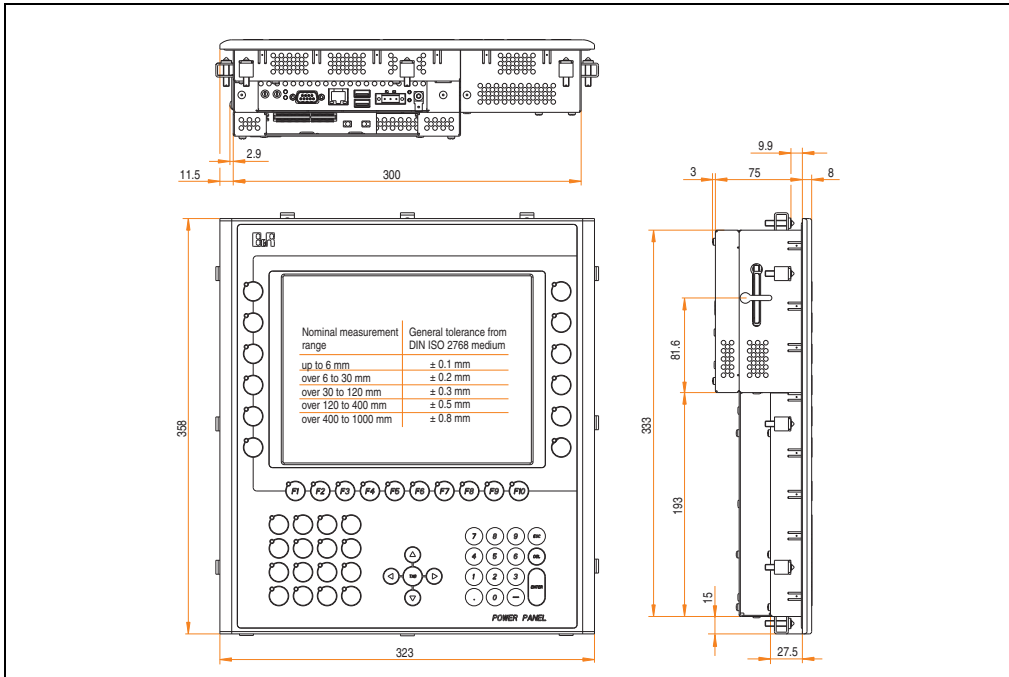


Figure 239: Dimensions - 4PP481.1043-75

#### 4.29.4 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.

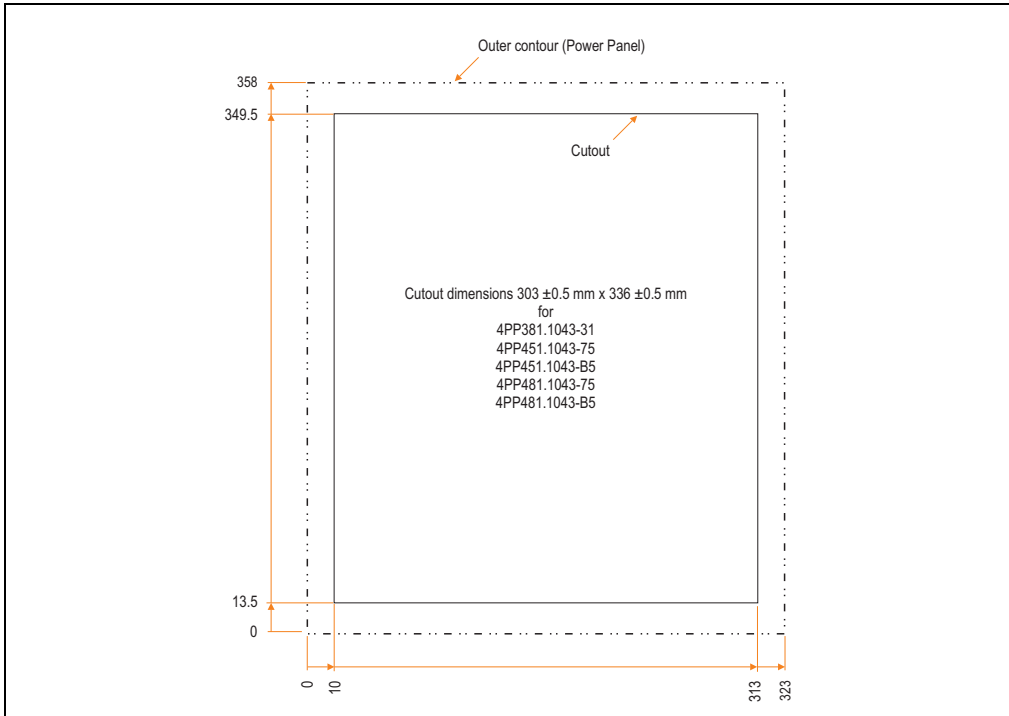


Figure 240: Cutout installation - 4PP481.1043-75

#### 4.29.5 Contents of delivery

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

Amount	Component
1	Power Panel PP481 10.4" VGA, 1 aPCI, touch screen, keys
12	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 123: Contents of delivery - 4PP481.1043-75

4.30 Device 4PP481.1043-B5

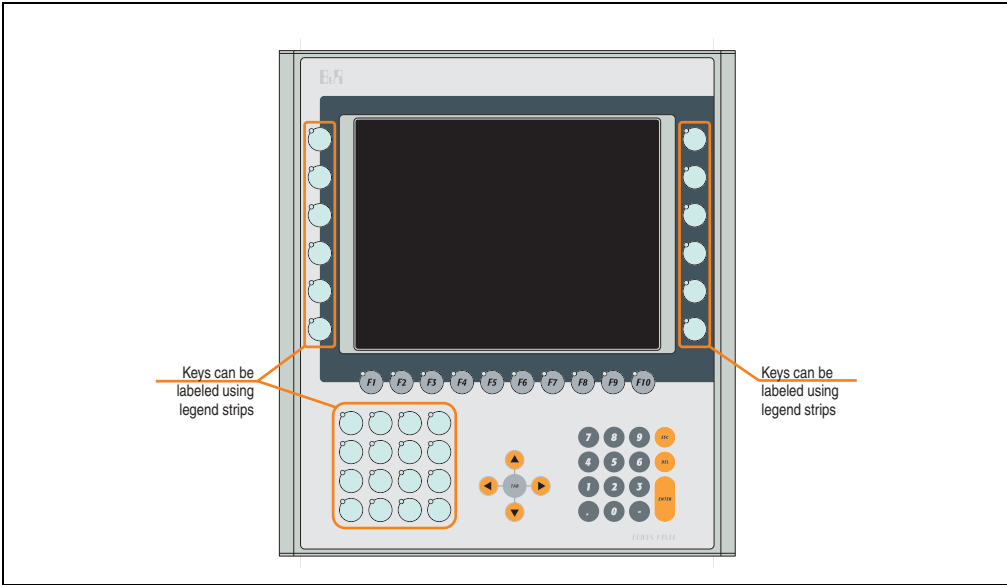


Figure 241: Front view - 4PP481.1043-B5

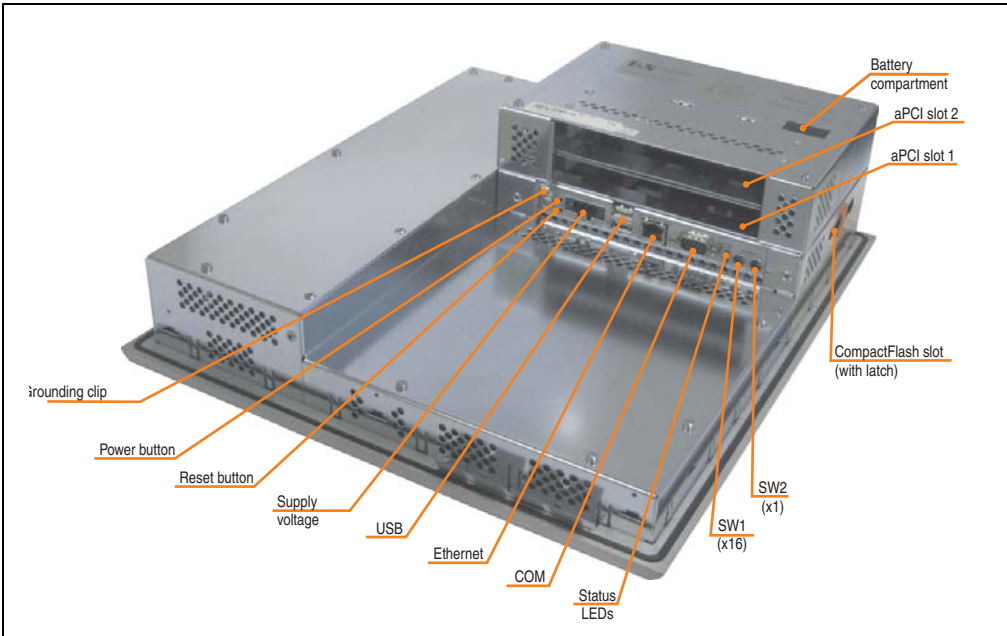


Figure 242: Rear view - 4PP481.1043-B5

**4.30.1 Technical data**

Features	4PP481.1043-B5 ≤ F0	4PP481.1043-B5 ≥ G0	4PP481.1043-B5 ≥ J0
B&R ID code	0x23C6		
Boot loader / Operating system	Automation Runtime		
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)		
Flash	2 MB (for firmware)		
Memory Type Size	DDR SDRAM 128 MB (64 MB < Rev. C0)		
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)		
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB		
Watchdog Controller	MTCX <sup>1)</sup>		
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms		
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day		
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes		
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 124: Technical data - 4PP481.1043-B5



## Technical data • Power Panel 400 with Automation Runtime

Features	4PP481.1043-B5 ≤ F0	4PP481.1043-B5 ≥ G0	4PP481.1043-B5 ≥ J0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB		
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection		
Reset button	Yes, accessible from the outside		
Power button	Yes, accessible from the outside		
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)		
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 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	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 = 35°  CCFL 450 cd/m <sup>2</sup> 55000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410		Color TFT 10.4 inch (264 mm) 262144 colors <sup>4)</sup> VGA, 640 x 480 pixels 900:1  Direction R / direction L = 80° Direction U / direction D = 80°  LED 450 cd/m <sup>2</sup> 70000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Accu Touch Analog, resistive Elo, serial, 12-bit Up to 80% ±5%	AMT Analog, resistive Elo, serial, 12-bit Up to 80% ±5%	
Filter glass Degree of transmission Coating	-		
Keys/LED <sup>6)</sup> Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	28 with LED (yellow) 10 with LED (yellow) 5 without LED 15 without LED - > 10 <sup>6</sup> actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green)  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>		

Table 124: Technical data - 4PP481.1043-B5 (Forts.)

## Technical data • Power Panel 400 with Automation Runtime

Electrical characteristics	4PP481.1043-B5 ≤ F0	4PP481.1043-B5 ≥ G0	4PP481.1043-B5 ≥ J0
Power supply			
Rated voltage		18 - 30 VDC	
Rated current		0.84 A	
Starting current		Max. 2.8 A	
Power consumption		Typically 20 W	
Electrical isolation		Yes	
Bleeder resistance		0 Ω	
Mechanical characteristics			
Outer dimensions			
Width		323 mm	
Height		358 mm	
Depth		108 mm	
Front			
Frame		Naturally anodized aluminum <sup>7)</sup>	
Design		Gray <sup>7)</sup>	
Membrane		Polyester	
Dark gray border around display		Similar to Pantone 432CV <sup>7)</sup>	
Light background		Similar to Pantone 427CV <sup>7)</sup>	
Orange keys		Similar to Pantone 151CV <sup>7)</sup>	
Dark gray keys		Similar to Pantone 431CV <sup>7)</sup>	
Legend strips (gray)		Similar to Pantone 429CV <sup>7)</sup>	
Gasket		Flat gasket around display front	
Housing		Metal	
Weight		Approx. 5.3 kg (without aPCI interface modules)	
Environmental characteristics			
Ambient temperature			
Operation		0 to +50°C	
Bearings		-20 to +70°C	
Transport		-20 to +70°C	
Relative humidity		See 4.30.2 "Temperature humidity diagram", on page 359	
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	
Bearings		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	
Bearings		30 g, 15 ms	
Transport		30 g, 15 ms	
Protection		IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover)	
		IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude <sup>8)</sup>		Max. 3000 m	

Table 124: Technical data - 4PP481.1043-B5 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.

- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) The functions of the keys and the LEDs can be configured using Visual Components in B&R Automation Studio.
- 7) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 8) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.30.2 Temperature humidity diagram

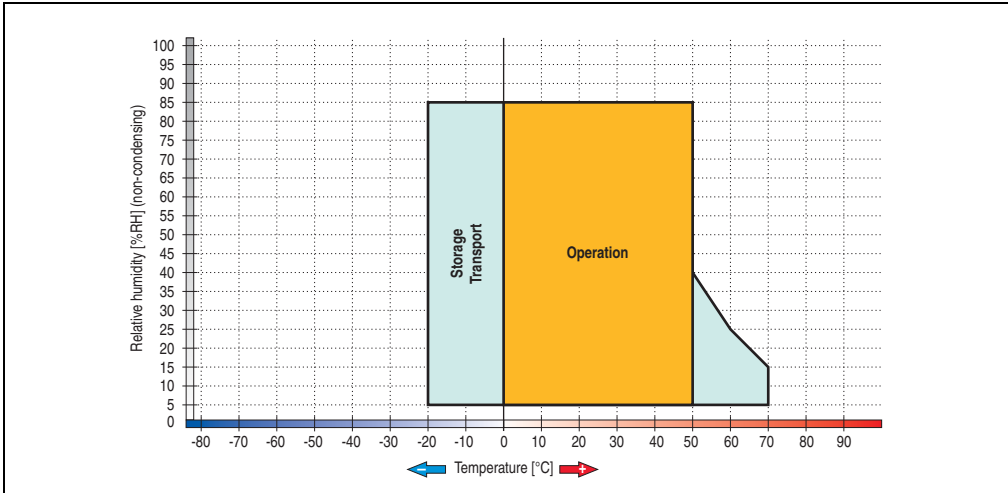


Figure 243: Temperature humidity diagram - 4PP481.1043-B5

### 4.30.3 Dimensions

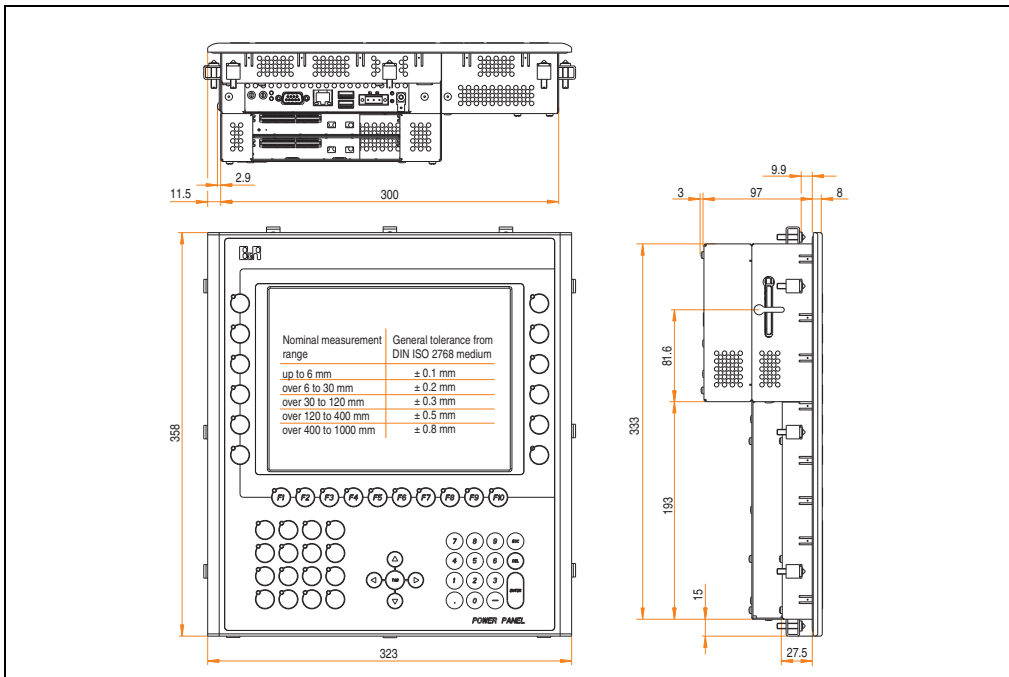


Figure 244: Dimensions - 4PP481.1043-B5

### 4.30.4 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.

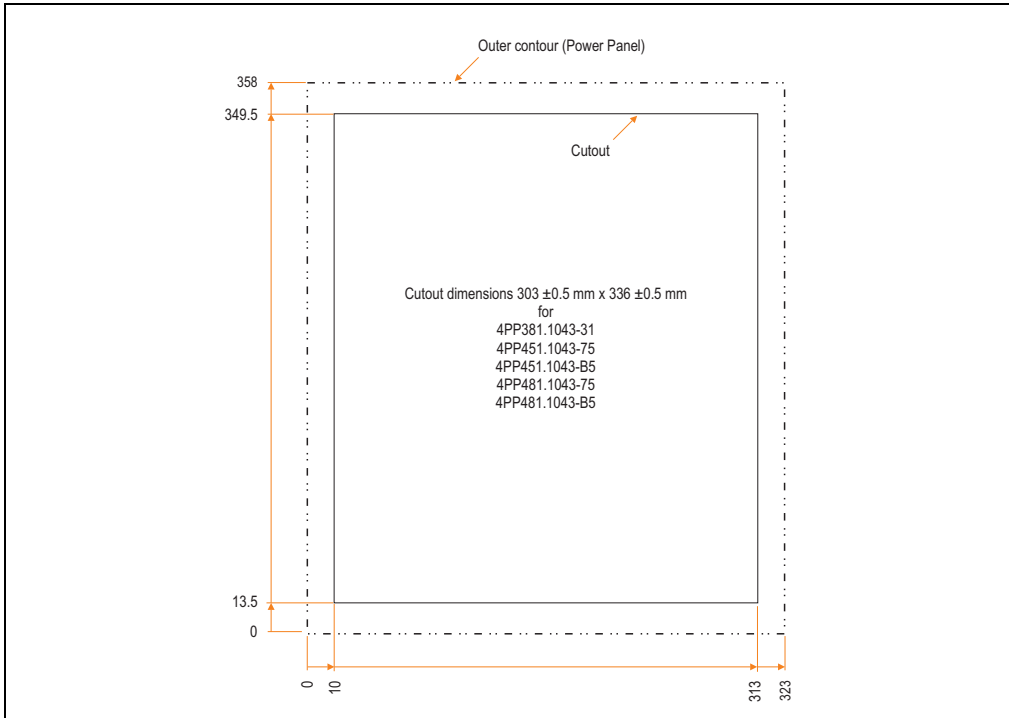


Figure 245: Cutout installation - 4PP481.1043-B5

### 4.30.5 Contents of delivery

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

Amount	Component
1	Power Panel PP481 10.4" VGA, 2 aPCI, touch screen, keys
12	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 125: Contents of delivery - 4PP481.1043-B5

### 4.31 Device 4PP481.1505-75

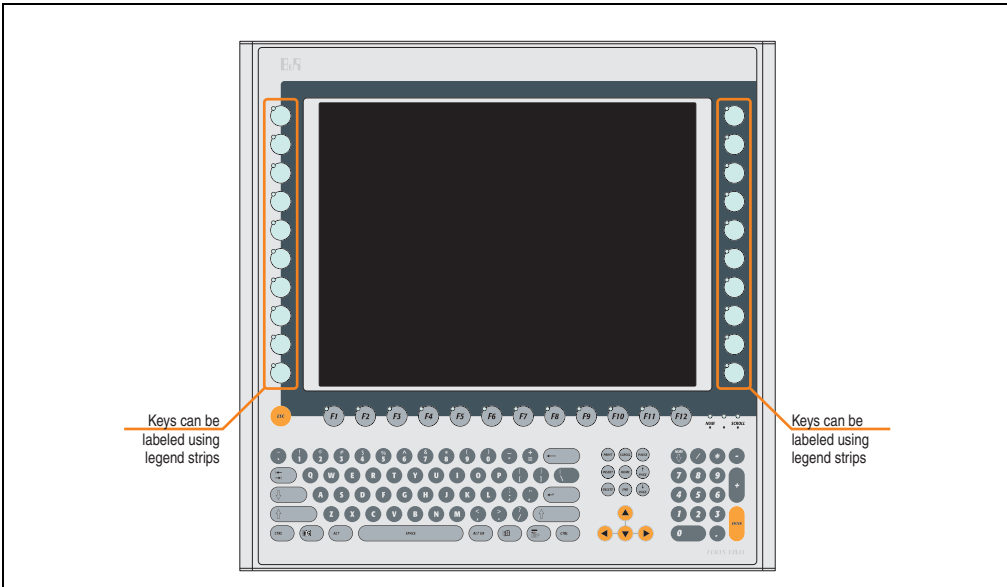


Figure 246: Front view - 4PP481.1505-75

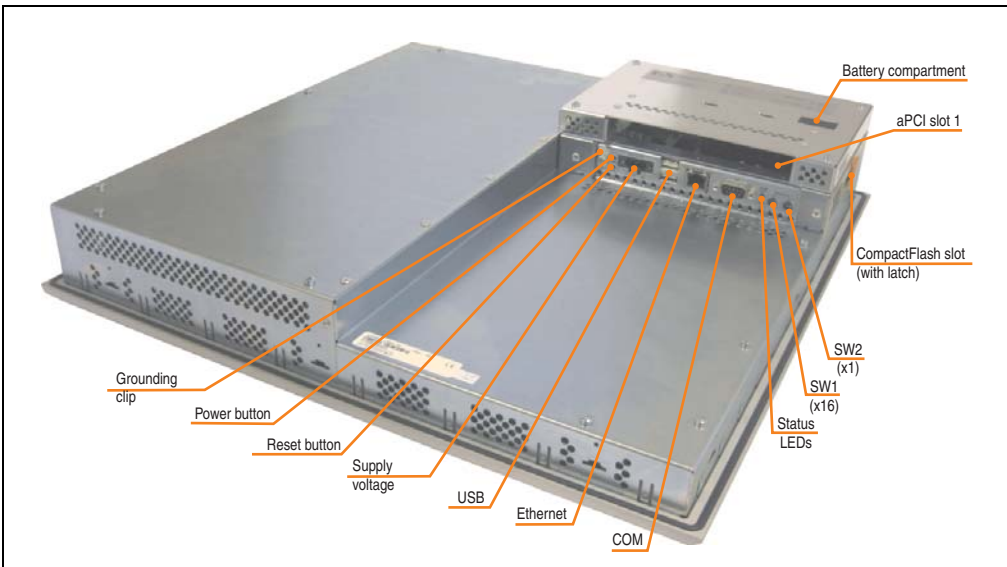


Figure 247: Rear view - 4PP481.1505-75

## 4.31.1 Technical data

Features	4PP481.1505-75 ≤ H0	4PP481.1505-75 ≥ I0	4PP481.1505-75 ≥ K0
B&R ID code	0x23C7		
Boot loader / Operating system	Automation Runtime		
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)		
Flash	2 MB (for firmware)		
Memory Type Size	DDR SDRAM 128 MB (64 MB Rev. < C0)		
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)		
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB		
Watchdog Controller	MTCX <sup>1)</sup>		
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms		
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day		
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes		
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 126: Technical data - 4PP481.1505-75

## Technical data • Power Panel 400 with Automation Runtime

Features	4PP481.1505-75 ≤ H0	4PP481.1505-75 ≥ I0	4PP481.1505-75 ≥ K0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB		
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection		
Reset button	Yes, accessible from the outside		
Power button	Yes, accessible from the outside		
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)		
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 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	Color TFT 15 inch (380 mm) 16.7 million colors <sup>4)</sup> XGA, 1024 x 768 pixels 400:1  Direction R / direction L = 85° Direction U / direction D = 85°  CCFL 250 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410		Color TFT 15 inch (380 mm) 16.2 million colors <sup>4)</sup> XGA, 1024 x 768 pixels 1000:1  Direction R / direction L = 85° Direction U / direction D = 85°  LED 350 cd/m <sup>2</sup> 70000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Accu Touch Analog, resistive Elo, serial, 12-bit Up to 80% ±5%	AMT Analog, resistive Elo, serial, 12-bit Up to 80% ±5%	
Filter glass Degree of transmission Coating	-		
Keys/LED <sup>6)</sup> Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	20 with LED (yellow) 12 with LED (yellow) 4 without LED 15 without LED 73 without LED  > 10 <sup>6</sup> actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green)  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>		

Table 126: Technical data - 4PP481.1505-75 (Forts.)



## Technical data • Power Panel 400 with Automation Runtime

Electrical characteristics	4PP481.1505-75 ≤ H0	4PP481.1505-75 ≥ I0	4PP481.1505-75 ≥ K0
Power supply Rated voltage Rated current Starting current Power consumption Electrical isolation	18 - 30 VDC 1.38 A Max. 2 A Typically 23 W Yes		
Bleeder resistance	0 Ω		
Mechanical characteristics			
Outer dimensions Width Height Depth	435 mm 430 mm 87 mm		
Front Frame Design Membrane Dark gray border around display Light background Orange keys Dark gray keys Legend strips (gray) Gasket	Naturally anodized aluminum <sup>7)</sup> Gray <sup>7)</sup> Polyester Similar to Pantone 432CV <sup>7)</sup> Similar to Pantone 427CV <sup>7)</sup> Similar to Pantone 151CV <sup>7)</sup> Similar to Pantone 431CV <sup>7)</sup> Similar to Pantone 429CV <sup>7)</sup> Flat gasket around display front		
Housing	Metal		
Weight	Approx. 8 kg (without aPCI interface modules)		
Environmental characteristics			
Ambient temperature Operation Bearings Transport	0 to +50°C -20 to +60°C -20 to +60°C		
Relative humidity	See 4.31.2 "Temperature humidity diagram", on page 366		
Vibration Operation (continuous) Operation (occasional) Bearings Transport	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g		
Shock Operation Bearings Transport	15 g, 11 ms 30 g, 15 ms 30 g, 15 ms		
Protection	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)		
Altitude <sup>8)</sup>	Max. 3000 m		

Table 126: Technical data - 4PP481.1505-75 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.

- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) The functions of the keys and the LEDs can be configured using Visual Components in B&R Automation Studio.
- 7) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 8) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.31.2 Temperature humidity diagram

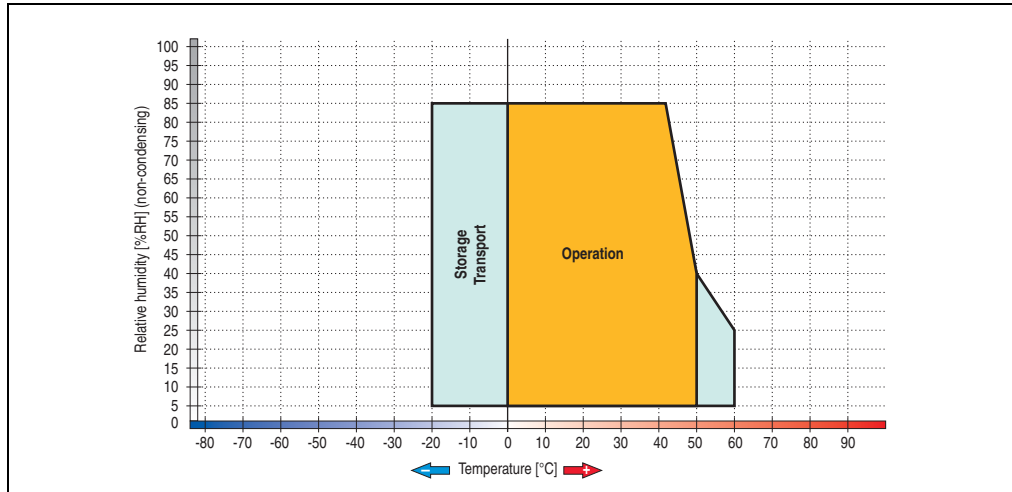


Figure 248: Temperature humidity diagram - 4PP481.1505-75

4.31.3 Dimensions

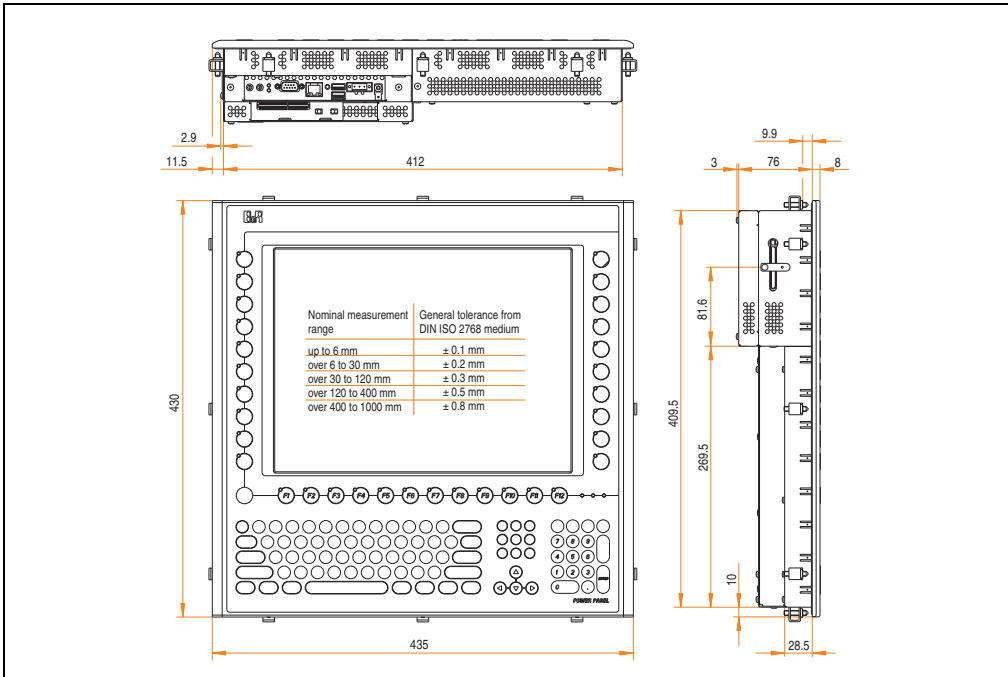


Figure 249: Dimensions - 4PP481.1505-75

#### 4.31.4 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.

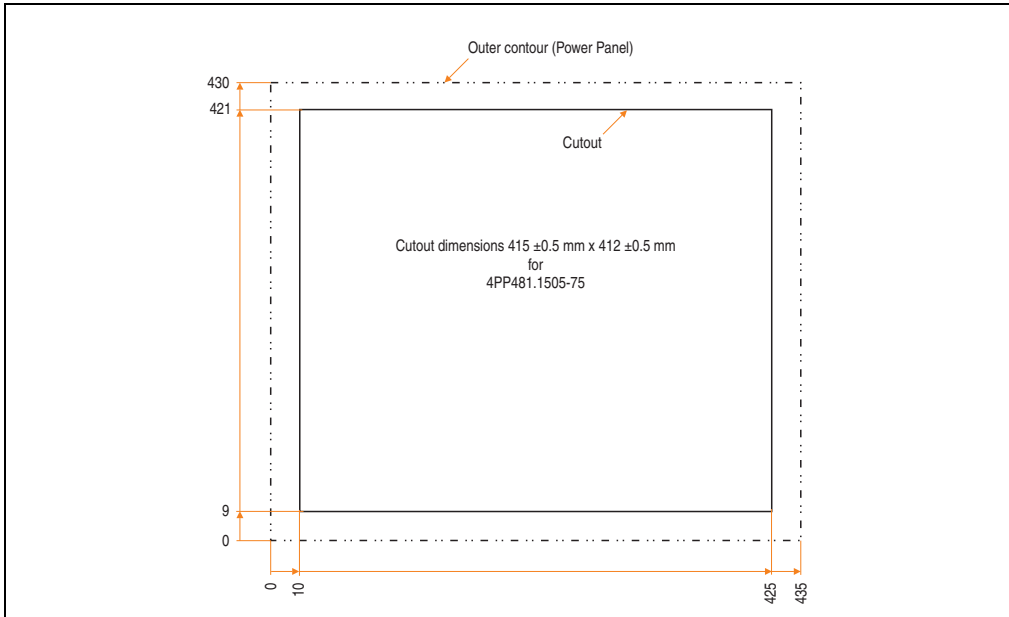


Figure 250: Cutout installation - 4PP481.1505-75

#### 4.31.5 Contents of delivery

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

Amount	Component
1	Power Panel PP481 15" XGA, 1 aPCI, touch screen, keys
12	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 127: Contents of delivery - 4PP481.1505-75

4.32 Device 4PP482.1043-75

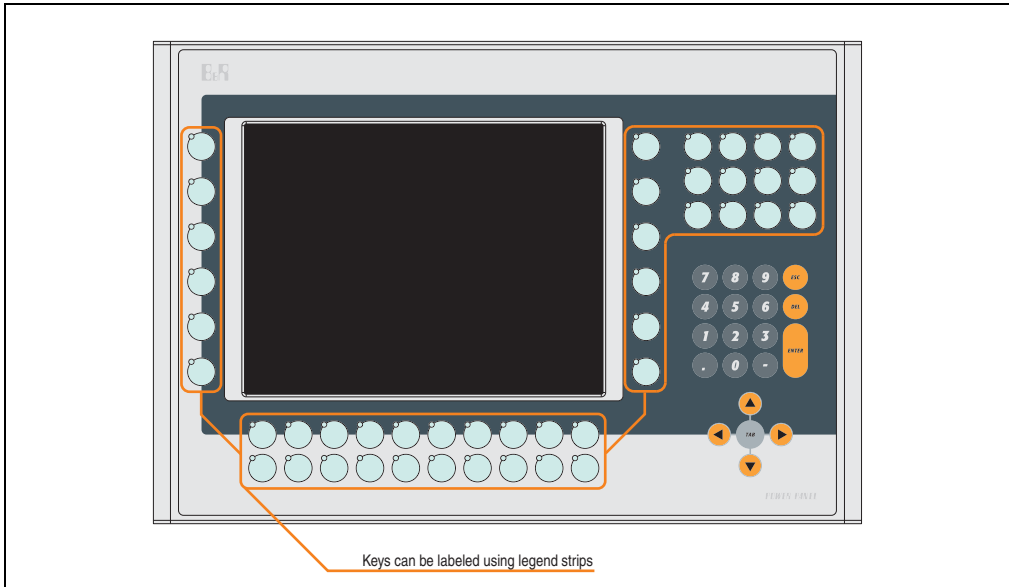


Figure 251: Front view - 4PP482.1043-75

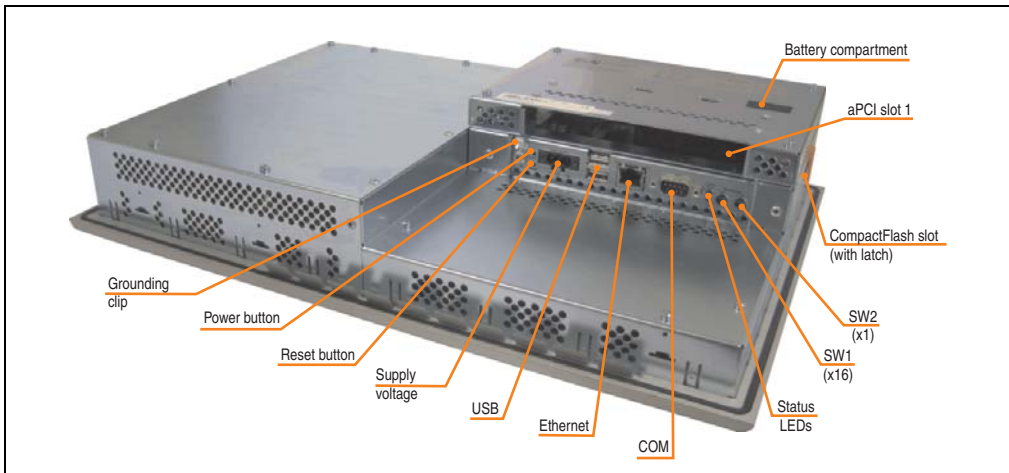


Figure 252: Rear view - 4PP482.1043-75

**4.32.1 Technical data**

Features	4PP482.1043-75 ≤ G0	4PP482.1043-75 ≥ H0	4PP482.1043-75 ≥ K0
B&R ID code	0x23C8		
Boot loader / Operating system	Automation Runtime		
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)		
Flash	2 MB (for firmware)		
Memory Type Size	DDR SDRAM 128 MB (64 MB < Rev. C0)		
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)		
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB		
Watchdog Controller	MTCX <sup>1)</sup>		
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms		
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day		
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes		
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 128: Technical data - 4PP482.1043-75

## Technical data • Power Panel 400 with Automation Runtime

Features	4PP482.1043-75 ≤ G0	4PP482.1043-75 ≥ H0	4PP482.1043-75 ≥ K0
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB		
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection		
Reset button	Yes, accessible from the outside		
Power button	Yes, accessible from the outside		
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)		
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 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	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 = 35°  CCFL 450 cd/m <sup>2</sup> 55000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410		Color TFT 10.4 inch (264 mm) 262144 colors <sup>4)</sup> VGA, 640 x 480 pixels 900:1  Direction R / direction L = 80° Direction U / direction D = 80°  LED 450 cd/m <sup>2</sup> 70000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410
Touch screen Touch screen type Technology Controller Degree of transmission	Elo Accu Touch Analog, resistive Elo, serial, 12-bit Up to 80% ±5%	AMT Analog, resistive Elo, serial, 12-bit Up to 80% ±5%	
Filter glass Degree of transmission Coating	-		
Keys/LED <sup>6)</sup> Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	44 with LED (yellow) - 5 without LED 15 without LED - > 1,000,000 actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green)  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>		

Table 128: Technical data - 4PP482.1043-75 (Forts.)

## Technical data • Power Panel 400 with Automation Runtime

Electrical characteristics	4PP482.1043-75 ≤ G0	4PP482.1043-75 ≥ H0	4PP482.1043-75 ≥ K0
Power supply			
Rated voltage		18 - 30 VDC	
Rated current		1.38 A	
Starting current		Max. 2 A	
Power consumption		Typically 23 W	
Electrical isolation		Yes	
Bleeder resistance		0 Ω	
Mechanical characteristics			
Outer dimensions			
Width		423 mm	
Height		288 mm	
Depth		86 mm	
Front			
Frame		Naturally anodized aluminum <sup>7)</sup>	
Design		Gray <sup>7)</sup>	
Membrane		Polyester	
Dark gray border around display		Similar to Pantone 432CV <sup>7)</sup>	
Light background		Similar to Pantone 427CV <sup>7)</sup>	
Orange keys		Similar to Pantone 151CV <sup>7)</sup>	
Dark gray keys		Similar to Pantone 431CV <sup>7)</sup>	
Legend strips (gray)		Similar to Pantone 429CV <sup>7)</sup>	
Gasket		Flat gasket around display front	
Housing		Metal	
Weight		Approx. 5.2 kg (without aPCI interface modules)	
Environmental characteristics			
Ambient temperature			
Operation		0 to +50°C	
Bearings		-20 to +70°C	
Transport		-20 to +70°C	
Relative humidity		See 4.32.2 "Temperature humidity diagram", on page 373	
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	
Bearings		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	
Bearings		30 g, 15 ms	
Transport		30 g, 15 ms	
Protection		IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover)	
		IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude <sup>8)</sup>		Max. 3000 m	

Table 128: Technical data - 4PP482.1043-75 (Forts.)

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.



- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) The functions of the keys and the LEDs can be configured using Visual Components in B&R Automation Studio.
- 7) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 8) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 4.32.2 Temperature humidity diagram

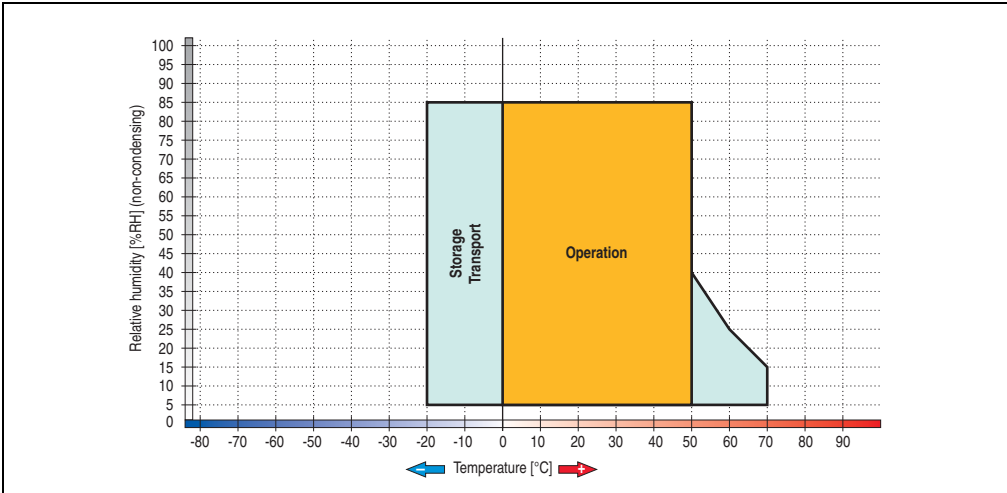


Figure 253: Temperature humidity diagram - 4PP482.1043-75

4.32.3 Dimensions

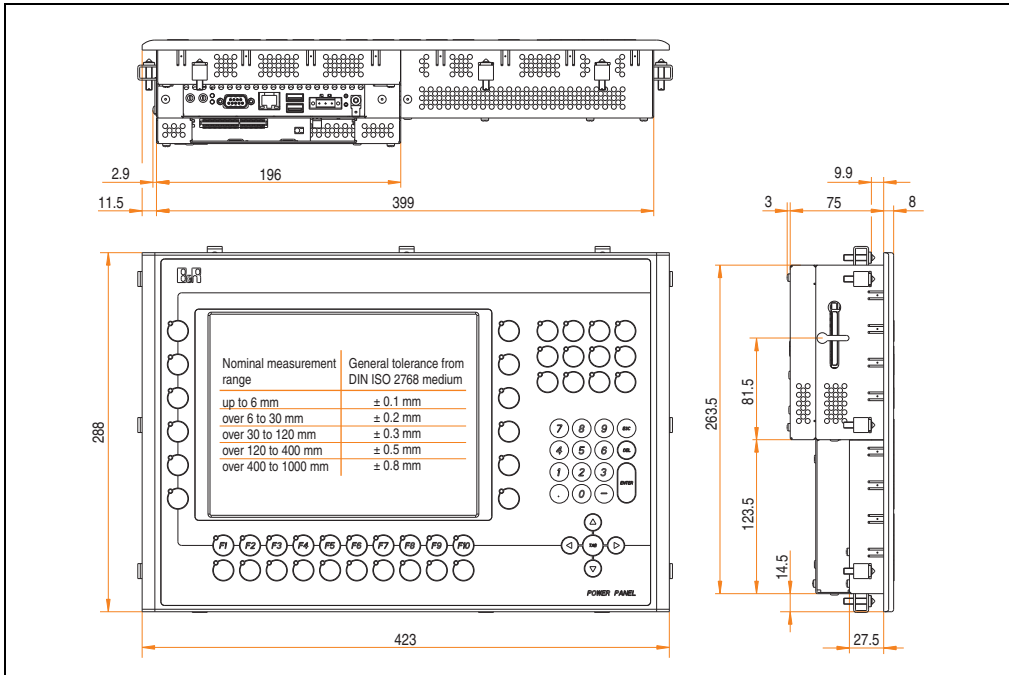


Figure 254: Dimensions - 4PP482.1043-75

### 4.32.4 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.

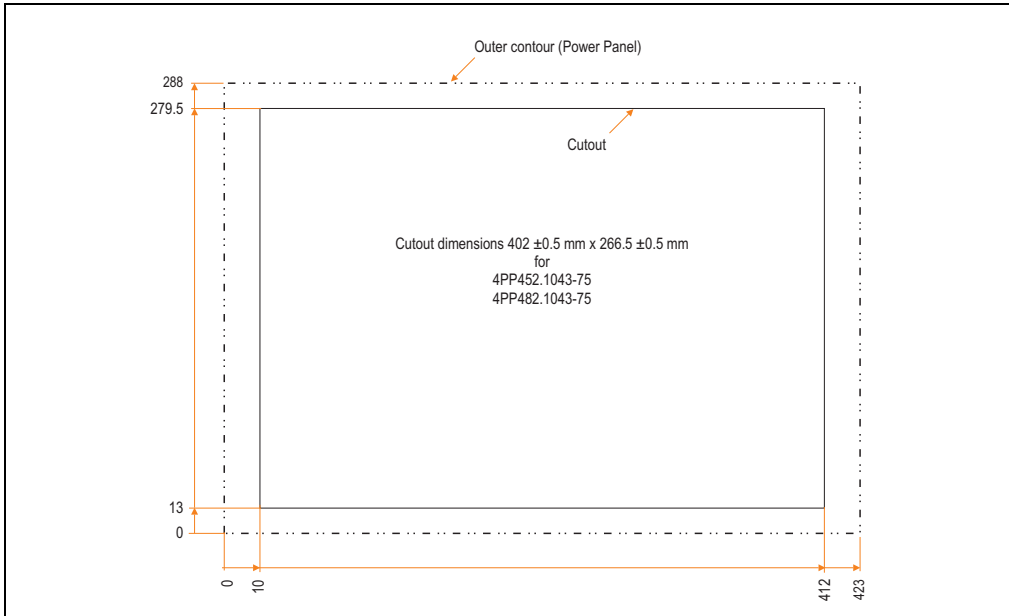


Figure 255: Cutout installation - 4PP482.1043-75

### 4.32.5 Contents of delivery

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

Amount	Component
1	Power Panel PP482 10.4" VGA, 1 aPCI, touch screen, keys
12	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 129: Contents of delivery - 4PP482.1043-75

## 5. Power Panel light / compact

Power Panel 400 light / compact series devices have QVGA operator panels with an integrated controller.

Power Panel 400 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:

### 5.1 Power Panel 420 light / compact

#### 5.1.1 Technical data - Power Panel 420 light

Features	4PP420:0571 -L05	4PP420:0571 -L45	4PP420:0571 -L25	4PP420:0571 -L65	4PP420:0571 -L35	4PP420:0571 -L75
Boot loader / Operating system	Automation Runtime					
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)					
Flash	2 MB (for firmware)					
Memory Type Size	DDR SDRAM 128 MB (64 MB < Rev. C0)					
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)					
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB					
Watchdog Controller	MTCX <sup>1)</sup>					
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms					

Table 130: Technical data - Power Panel 420 light

## Technical data • Power Panel light / compact

Features	4PP420:0571 -L05	4PP420:0571 -L45	4PP420:0571 -L25	4PP420:0571 -L65	4PP420:0571 -L35	4PP420:0571 -L75
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day					
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup>  10 minutes					
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	-					
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device					
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB					
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection					
Reset button	Yes, accessible from the outside					
Power button	Yes, accessible from the outside					
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)					
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	1 pcs. CAN aPCI module (31F771.9) inserted	1 pcs. X2X aPCI module (31F791.9) inserted
Holding torque for aPCI module	Max. 0.7 Nm					

Table 130: Technical data - Power Panel 420 light

## Technical data • Power Panel light / compact

Features	4PP420:0571 -L05	4PP420:0571 -L45	4PP420:0571 -L25	4PP420:0571 -L65	4PP420:0571 -L35	4PP420:0571 -L75
<b>Display</b> Type Diagonal Colors Resolution Contrast Viewing angle (see page 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	Monochrome LCD 5.7 in (144 mm) 8 shades of gray <sup>4)</sup> QVGA, 320 x 240 pixels 25:1 Direction R / direction L = 40° Direction U = 40°/ direction D = 50°		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°		Color TFT 5.7 in (144 mm) 262144 colors <sup>4)</sup> QVGA, 320 x 240 pixels 400:1 Direction R / direction L = 60° Direction U = 40°/ direction D = 50°	
Touch screen Touch screen type Technology Controller Degree of transmission	Gunze Analog, resistive Elo, serial, 12- bit Up to 80% ±5%					
Filter glass Degree of transmission Coating	-					
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-					
<b>Electrical characteristics</b>						
Power supply Rated voltage Rated current Starting current Power consumption Electrical isolation	18 - 30 VDC 0.5 A Max. 1.2 A Typically 12 W Yes					
Bleeder resistance	0 Ω					
<b>Mechanical characteristics</b>						
Outer dimensions Width Height Depth	212 mm 156 mm 76 mm					

Table 130: Technical data - Power Panel 420 light

Front Frame Design Membrane Dark gray border around display Light background Gasket	Naturally anodized aluminum <sup>6)</sup> Gray <sup>6)</sup> Polyester Similar to Pantone 432CV <sup>6)</sup> Similar to Pantone 427CV <sup>6)</sup> Flat gasket around display front					
<b>Mechanical characteristics</b>	<b>4PP420:0571</b> <b>-L05</b>	<b>4PP420:0571</b> <b>-L45</b>	<b>4PP420:0571</b> <b>-L25</b>	<b>4PP420:0571</b> <b>-L65</b>	<b>4PP420:0571</b> <b>-L35</b>	<b>4PP420:0571</b> <b>-L75</b>
Housing	Metal					
Weight	Approx. 1.7 kg (without aPCI interface modules)					
<b>Environmental characteristics</b>						
Ambient temperature Operation Bearings 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 5.1.2 "Temperature humidity diagram - PP420 light, monochrome LCD", on page 380			See 5.1.3 "Temperature humidity diagram - PP420 light color LCD and color TFT", on page 380		
Vibration Operation (continuous) Operation (occasional) Bearings Transport	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g					
Shock Operation Bearings Transport	15 g, 11 ms 30 g, 15 ms 30 g, 15 ms					
Protection	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)					
Altitude <sup>7)</sup>	Max. 3000 m					

Table 130: Technical data - Power Panel 420 light

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.
- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 7) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 5.1.2 Temperature humidity diagram - PP420 light, monochrome LCD

The following diagram is valid for the devices 4PP420:0571-L05 and 4PP420:0571-L45.

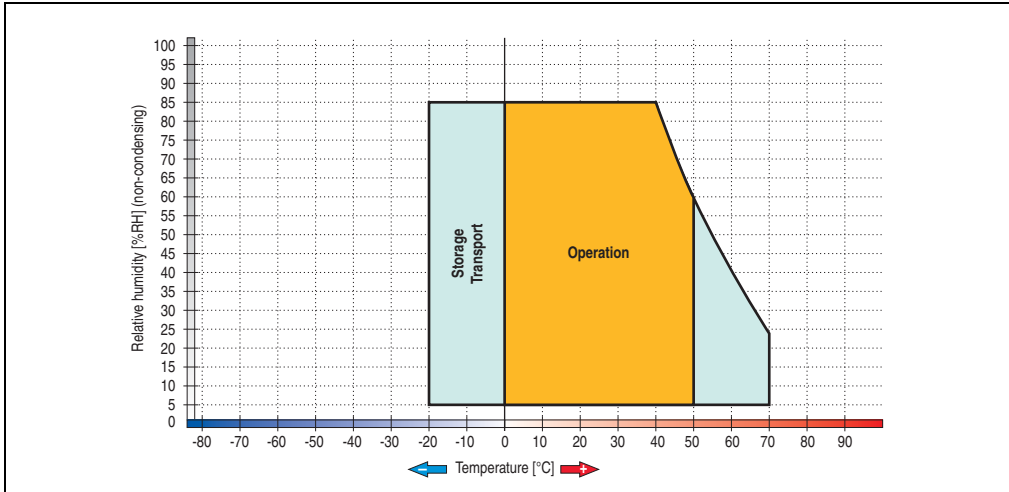


Figure 256: Temperature humidity diagram - PP420 light, monochrome LCD

### 5.1.3 Temperature humidity diagram - PP420 light color LCD and color TFT

The following diagram is valid for the devices 4PP420:0571-L25, 4PP420:0571-L65, 4PP420:0571-L35 and 4PP420:0571-L75.

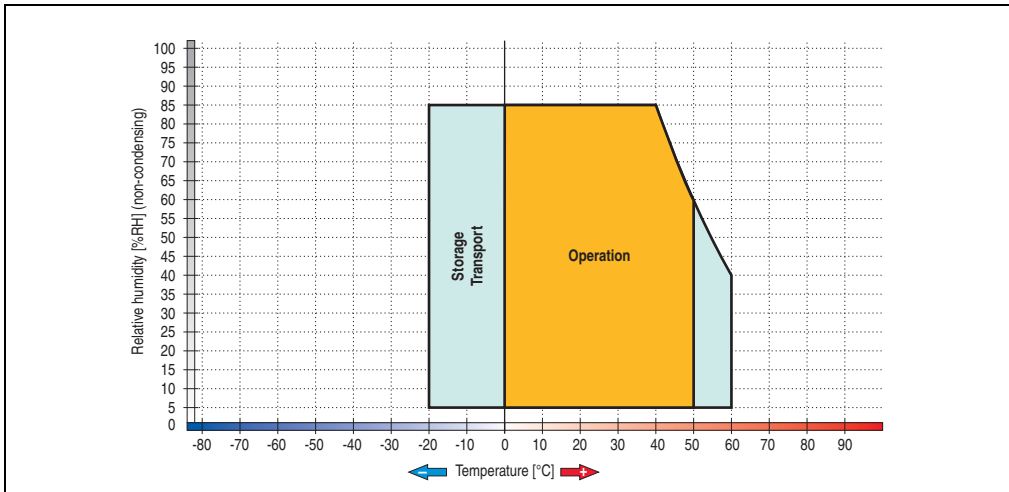


Figure 257: Temperature humidity diagram - PP420 light color LCD and color TFT



## 5.1.4 Technical data - Power Panel 420 compact

Features	4PP420:0571 -C05	4PP420:0571 -C45	4PP420:0571 -C25	4PP420:0571 -C65	4PP420:0571 -C35	4PP420:0571 -C75
Boot loader / Operating system	Automation Runtime					
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)					
Flash	2 MB (for firmware)					
Memory Type Size	DDR SDRAM 128 MB (64 MB < Rev. C0)					
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)					
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB					
Watchdog Controller	MTCX <sup>1)</sup>					
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms					
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day					
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes					
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 - Power Panel 420 compact

## Technical data • Power Panel light / compact

Features	4PP420:0571 -C05	4PP420:0571 -C45	4PP420:0571 -C25	4PP420:0571 -C65	4PP420:0571 -C35	4PP420:0571 -C75
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB					
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection					
Reset button	Yes, accessible from the outside					
Power button	Yes, accessible from the outside					
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)					
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	1 pcs. CAN aPCI module (31F771.9) inserted	1 pcs. X2X aPCI module (31F791.9) inserted
Holding torque for aPCI module	Max. 0.7 Nm					
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	Monochrome LCD 5.7 in (144 mm) 8 shades of gray <sup>4)</sup> QVGA, 320 x 240 pixels 25:1 Direction R / direction L = 40° Direction U = 40°/ direction D = 50°		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°		Color TFT 5.7 in (144 mm) 262144 colors <sup>4)</sup> QVGA, 320 x 240 pixels 400:1 Direction R / direction L = 60° Direction U = 40°/ direction D = 50°	
Touch screen Touch screen type Technology Controller Degree of transmission	Gunze Analog, resistive Elo, serial, 12-bit Up to 80% ±5%					
Filter glass Degree of transmission Coating	-					

Table 131: Technical data - Power Panel 420 compact

## Technical data • Power Panel light / compact

Features	4PP420:0571 -C05	4PP420:0571 -C45	4PP420:0571 -C25	4PP420:0571 -C65	4PP420:0571 -C35	4PP420:0571 -C75
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-					
<b>Electrical characteristics</b>						
Power supply Rated voltage Rated current Starting current Power consumption Electrical isolation	18 - 30 VDC 0.5 A Max. 1.2 A Typically 12 W Yes					
Bleeder resistance	0 Ω					
<b>Mechanical characteristics</b>						
Outer dimensions Width Height Depth	212 mm 156 mm 76 mm					
Front Frame Design Membrane Dark gray border around display Light background Gasket	Naturally anodized aluminum <sup>6)</sup> Gray <sup>6)</sup> Polyester Similar to Pantone 432CV <sup>6)</sup> Similar to Pantone 427CV <sup>6)</sup> Flat gasket around display front					
Housing	Metal					
Weight	Approx. 1.7 kg (without aPCI interface modules)					
<b>Environmental characteristics</b>						
Ambient temperature Operation Bearings 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 5.1.5 "Temperature humidity diagram - PP420 compact, monochrome LCD", on page 384		5.1.6 "Temperature humidity diagram - PP420 compact color LCD and color TFT", on page 385			
Vibration Operation (continuous) Operation (occasional) Bearings Transport	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g					
Shock Operation Bearings Transport	15 g, 11 ms 30 g, 15 ms 30 g, 15 ms					

Table 131: Technical data - Power Panel 420 compact

## Technical data • Power Panel light / compact

Environmental characteristics	4PP420:0571 -C05	4PP420:0571 -C45	4PP420:0571 -C25	4PP420:0571 -C65	4PP420:0571 -C35	4PP420:0571 -C75
Protection	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)					
Altitude <sup>7)</sup>	Max. 3000 m					

Table 131: Technical data - Power Panel 420 compact

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.
- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 7) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 5.1.5 Temperature humidity diagram - PP420 compact, monochrome LCD

The following diagram is valid for the devices 4PP420:0571-C05 and 4PP420:0571-C45.

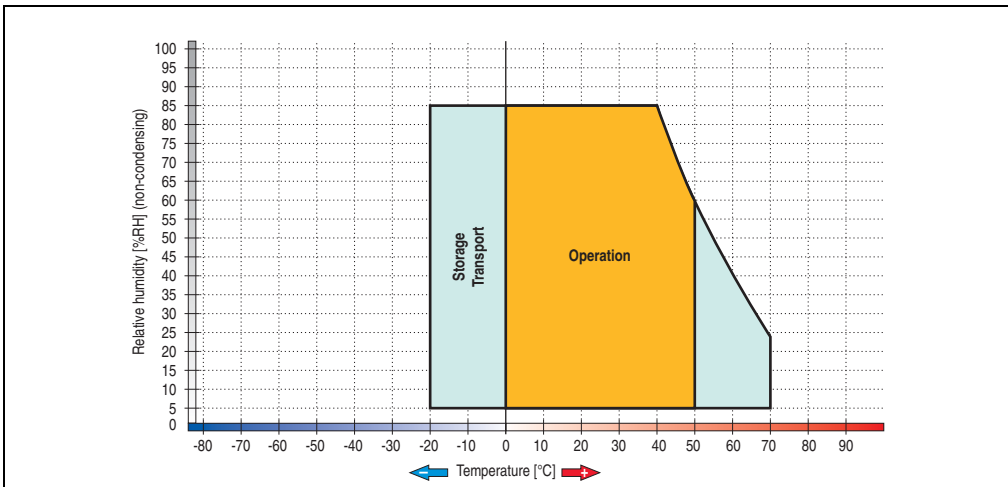


Figure 258: Temperature humidity diagram - PP420 compact, monochrome LCD

### 5.1.6 Temperature humidity diagram - PP420 compact color LCD and color TFT

The following diagram is valid for the devices 4PP420:0571-C25, 4PP420:0571-C65, 4PP420:0571-C35 and 4PP420:0571-C75.

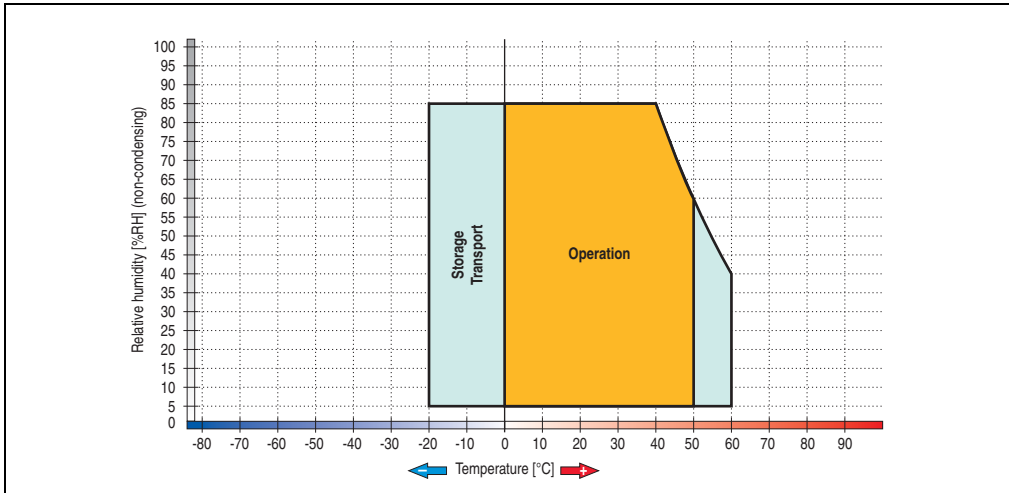


Figure 259: Temperature humidity diagram - PP420 compact color LCD and color TFT

## 5.2 Power Panel 451 light / compact

### 5.2.1 Technical data - Power Panel 451 light

Features	4PP451:0571-L25	4PP451:0571-L65	4PP451:0571-L35	4PP451:0571-L75
Boot loader / Operating system	Automation Runtime			
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)			
Flash	2 MB (for firmware)			
Memory Type Size	DDR SDRAM 128 MB			
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)			
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB			
Watchdog Controller	MTCX <sup>1)</sup>			
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms			
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day			
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes			
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	-			
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device			

Table 132: Technical data - Power Panel 451 light

## Technical data • Power Panel light / compact

Features	4PP451:0571-L25	4PP451:0571-L65	4PP451:0571-L35	4PP451:0571-L75
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB			
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection			
Reset button	Yes, accessible from the outside			
Power button	Yes, accessible from the outside			
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)			
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
Holding torque for aPCI module	Max. 0.7 Nm			
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	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°		Color TFT 5.7 in (144 mm) 262144 colors <sup>4)</sup> QVGA, 320 x 240 pixels 400:1  Direction R / direction L = 60° Direction U = 40° / direction D = 50°	
Touch screen Touch screen type Technology Controller Degree of transmission	-			
Filter glass Degree of transmission Coating	95% On both sides			

Table 132: Technical data - Power Panel 451 light

## Technical data • Power Panel light / compact

Features	4PP451:0571-L25	4PP451:0571-L65	4PP451:0571-L35	4PP451:0571-L75
Keys/LED <sup>6)</sup> Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	16 with LED (yellow) 6 with LED (yellow) 5 without LED 15 without LED - > 10 <sup>6</sup> actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green)  <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 Rated current Starting current Power consumption Electrical isolation	18 - 30 VDC 0.63 A Max. 1.2 A Typically 15 W Yes			
Bleeder resistance	0 Ω			
Mechanical characteristics				
Outer dimensions Width Height Depth	212 mm 245 mm 76 mm			
Front Frame Design Membrane Dark gray border around display Light background Orange keys Dark gray keys Legend strips (gray) Gasket	Naturally anodized aluminum <sup>7)</sup> Gray <sup>7)</sup> Polyester Similar to Pantone 432CV <sup>7)</sup> Similar to Pantone 427CV <sup>7)</sup> Similar to Pantone 151CV <sup>7)</sup> Similar to Pantone 431CV <sup>7)</sup> Similar to Pantone 429CV <sup>7)</sup> Flat gasket around display front			
Housing	Metal			
Weight	Approx. 2.4 kg (without aPCI interface modules)			
Environmental characteristics				
Ambient temperature Operation Bearings Transport	0 to +50°C -20 to +60°C -20 to +60°C			
Relative humidity	See 5.2.2 "Temperature humidity diagram", on page 389			
Vibration Operation (continuous) Operation (occasional) Bearings Transport	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g			
Shock Operation Bearings Transport	15 g, 11 ms 30 g, 15 ms 30 g, 15 ms			

Table 132: Technical data - Power Panel 451 light



Environmental characteristics	4PP451:0571-L25	4PP451:0571-L65	4PP451:0571-L35	4PP451:0571-L75
Protection	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)			
Altitude <sup>8)</sup>	Max. 3000 m			

Table 132: Technical data - Power Panel 451 light

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.
- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) The functions of the keys and the LEDs can be configured using Visual Components in B&R Automation Studio.
- 7) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 8) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 5.2.2 Temperature humidity diagram

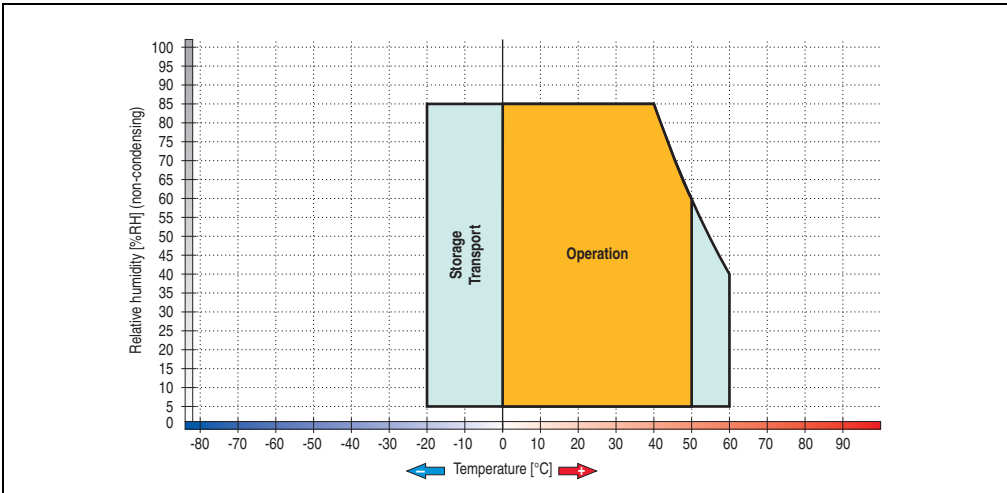


Figure 260: Temperature humidity diagram - PP451 light

**5.2.3 Technical data - Power Panel 451 compact**

Features	4PP451:0571-C25	4PP451:0571-C65	4PP451:0571-C35	4PP451:0571-C75
Boot loader / Operating system	Automation Runtime			
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)			
Flash	2 MB (for firmware)			
Memory Type Size	DDR SDRAM 128 MB			
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)			
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB			
Watchdog Controller	MTCX <sup>1)</sup>			
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms			
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day			
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes			
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 - Power Panel 451 compact

## Technical data • Power Panel light / compact

Features	4PP451:0571-C25	4PP451:0571-C65	4PP451:0571-C35	4PP451:0571-C75
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB			
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection			
Reset button	Yes, accessible from the outside			
Power button	Yes, accessible from the outside			
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)			
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
Holding torque for aPCI module	Max. 0.7 Nm			
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	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°		Color TFT 5.7 in (144 mm) 262144 colors <sup>4)</sup> QVGA, 320 x 240 pixels 400:1  Direction R / direction L = 60° Direction U = 40° / direction D = 50°	
Touch screen Touch screen type Technology Controller Degree of transmission	-			
Filter glass Degree of transmission Coating	95% On both sides			

Table 133: Technical data - Power Panel 451 compact

## Technical data • Power Panel light / compact

Features	4PP451:0571-C25	4PP451:0571-C65	4PP451:0571-C35	4PP451:0571-C75
Keys/LED <sup>6)</sup> Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	16 with LED (yellow) 6 with LED (yellow) 5 without LED 15 without LED - > 10 <sup>6</sup> actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green)  <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 Rated current Starting current Power consumption Electrical isolation	18 - 30 VDC 0.63 A Max. 1.2 A Typically 15 W Yes			
Bleeder resistance	0 Ω			
Mechanical characteristics				
Outer dimensions Width Height Depth	212 mm 245 mm 76 mm			
Front Frame Design Membrane Dark gray border around display Light background Orange keys Dark gray keys Legend strips (gray) Gasket	Naturally anodized aluminum <sup>7)</sup> Gray <sup>7)</sup> Polyester Similar to Pantone 432CV <sup>7)</sup> Similar to Pantone 427CV <sup>7)</sup> Similar to Pantone 151CV <sup>7)</sup> Similar to Pantone 431CV <sup>7)</sup> Similar to Pantone 429CV <sup>7)</sup> Flat gasket around display front			
Housing	Metal			
Weight	Approx. 2.4 kg (without aPCI interface modules)			
Environmental characteristics				
Ambient temperature Operation Bearings Transport	0 to +50°C -20 to +60°C -20 to +60°C			
Relative humidity	See 5.2.4 "Temperature humidity diagram", on page 393			
Vibration Operation (continuous) Operation (occasional) Bearings Transport	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g			
Shock Operation Bearings Transport	15 g, 11 ms 30 g, 15 ms 30 g, 15 ms			

Table 133: Technical data - Power Panel 451 compact

Environmental characteristics	4PP451:0571-C25	4PP451:0571-C65	4PP451:0571-C35	4PP451:0571-C75
Protection	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)			
Altitude <sup>8)</sup>	Max. 3000 m			

Table 133: Technical data - Power Panel 451 compact

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.
- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) The functions of the keys and the LEDs can be configured using Visual Components in B&R Automation Studio.
- 7) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 8) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 5.2.4 Temperature humidity diagram

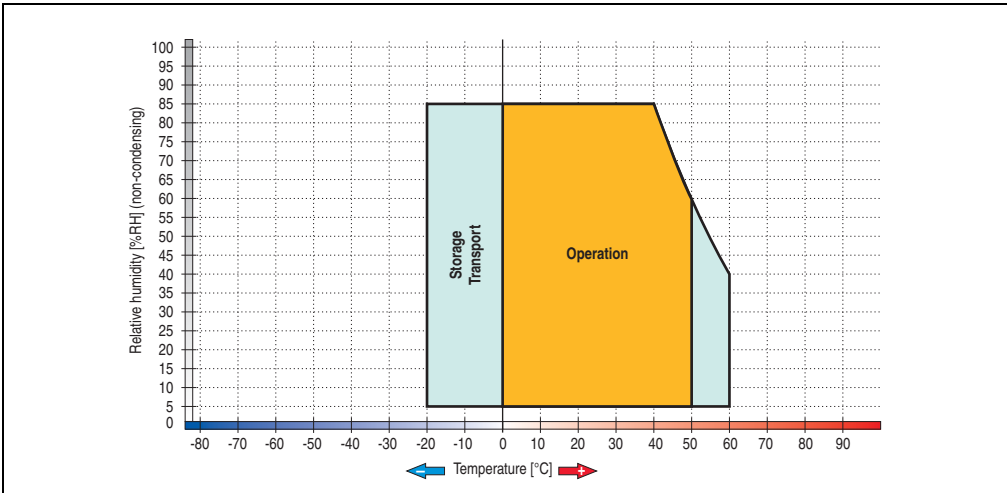


Figure 261: Temperature humidity diagram - PP451 compact

## 5.3 Power Panel 452 light / compact

### 5.3.1 Technical data - Power Panel 452 light

Features	4PP452:0571-L25	4PP452:0571-L65	4PP452:0571-L35	4PP452:0571-L75
Boot loader / Operating system	Automation Runtime			
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)			
Flash	2 MB (for firmware)			
Memory Type Size	DDR SDRAM 64 MB	DDR SDRAM 128 MB	DDR SDRAM 64 MB	DDR SDRAM 128 MB
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)			
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	256 kB Yes 256 kB	512 kB Yes 256 kB	256 kB Yes 256 kB	512 kB Yes 256 kB
Watchdog Controller	MTCX <sup>1)</sup>			
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms			
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day			
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes			
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	-			
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device			

Table 134: Technical data - Power Panel 452 light

## Technical data • Power Panel light / compact

Features	4PP452:0571-L25	4PP452:0571-L65	4PP452:0571-L35	4PP452:0571-L75
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB			
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection			
Reset button	Yes, accessible from the outside			
Power button	Yes, accessible from the outside			
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)			
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
Holding torque for aPCI module	Max. 0.7 Nm			
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	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 = 45° / direction D = 50°  CCFL 200 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410		Color TFT 5.7 in (144 mm) 262144 colors <sup>4)</sup> QVGA, 320 x 240 pixels 400:1  Direction R / direction L = 60° Direction U = 45° / direction D = 50°  CCFL 500 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410	
Touch screen Touch screen type Technology Controller Degree of transmission	-			
Filter glass Degree of transmission Coating	95% On both sides			

Table 134: Technical data - Power Panel 452 light

## Technical data • Power Panel light / compact

Features	4PP452:0571-L25	4PP452:0571-L65	4PP452:0571-L35	4PP452:0571-L75
Keys/LED <sup>6)</sup> Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	28 with LED (yellow) 10 with LED (yellow) 5 without LED 15 without LED - > 10 <sup>6</sup> actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green)  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>			
<b>Electrical properties</b>				
Power supply Rated voltage Rated current Starting current Power consumption Electrical isolation	18 - 30 VDC 0.63 A Max. 1.2 A Typically 15 W Yes			
Bleeder resistance	0 Ω			
<b>Mechanical characteristics</b>				
Outer dimensions Width Height Depth	323 mm 358 mm 108 mm			
Front Frame Design Membrane Dark gray border around display Light background Orange keys Dark gray keys Legend strips (gray) Gasket	Naturally anodized aluminum <sup>7)</sup> Gray <sup>7)</sup> Polyester Similar to Pantone 432CV <sup>7)</sup> Similar to Pantone 427CV <sup>7)</sup> Similar to Pantone 151CV <sup>7)</sup> Similar to Pantone 431CV <sup>7)</sup> Similar to Pantone 429CV <sup>7)</sup> Flat gasket around display front			
Housing	Metal			
Weight	Approx. 5.3 kg (without aPCI interface modules)			
<b>Environmental characteristics</b>				
Ambient temperature Operation Bearings Transport	0 to +50°C -20 to +60°C -20 to +60°C			
Relative humidity	See 5.3.2 "Temperature humidity diagram", on page 397			
Vibration Operation (continuous) Operation (occasional) Bearings Transport	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g			
Shock Operation Bearings Transport	15 g, 11 ms 30 g, 15 ms 30 g, 15 ms			

Table 134: Technical data - Power Panel 452 light



Environmental characteristics	4PP452:0571-L25	4PP452:0571-L65	4PP452:0571-L35	4PP452:0571-L75
Protection	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)			
Altitude <sup>8)</sup>	Max. 3000 m			

Table 134: Technical data - Power Panel 452 light

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.
- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) The functions of the keys and the LEDs can be configured using Visual Components in B&R Automation Studio.
- 7) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 8) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 5.3.2 Temperature humidity diagram

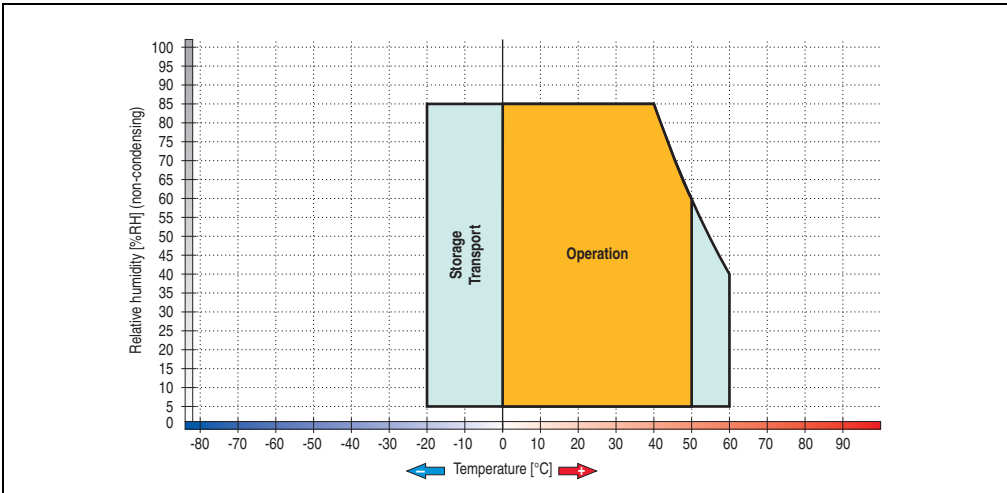


Figure 262: Temperature humidity diagram - PP452 light

**5.3.3 Technical data - Power Panel 452 compact**

Features	4PP452:0571-C25	4PP452:0571-C65	4PP452:0571-C35	4PP452:0571-C75
Boot loader / Operating system	Automation Runtime			
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)			
Flash	2 MB (for firmware)			
Memory Type Size	DDR SDRAM 128 MB			
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)			
SRAM Size Battery-buffered Remanent variables for AR (Automation Runtime) in power fail mode	512 kB Yes 256 kB			
Watchdog Controller	MTCX <sup>1)</sup>			
Power failure logic Controller Buffer time	MTCX <sup>1)</sup> 10 ms			
Real-time clock (RTC) Battery-buffered Accuracy	Yes at +25°C typically 30 ppm (2.5 seconds) <sup>2)</sup> per day			
Battery Type Removable Service life Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years <sup>3)</sup> 10 minutes			
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	Intel 82551ER 10/100 Mbit/s 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 - Power Panel 452 compact

## Technical data • Power Panel light / compact

Features	4PP452:0571-C25	4PP452:0571-C65	4PP452:0571-C35	4PP452:0571-C75
Serial interface Type UART Transfer rate Connection	RS232, modem-capable, not electrically isolated 16C550 compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB			
USB interface Type Amount Transfer rate Connection Current load	USB 1.1, USB 2.0 <sup>4)</sup> 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) <sup>4)</sup> Type A Max. 500 mA per connection			
Reset button	Yes, accessible from the outside			
Power button	Yes, accessible from the outside			
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow)			
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
Holding torque for aPCI module	Max. 0.7 Nm			
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 560) Horizontal Vertical Background lighting Type Brightness Half-brightness time <sup>5)</sup> Screen rotation	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 = 45° / direction D = 50°  CCFL 200 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410		Color TFT 5.7 in (144 mm) 262144 colors <sup>4)</sup> QVGA, 320 x 240 pixels 400:1  Direction R / direction L = 60° Direction U = 45° / direction D = 50°  CCFL 500 cd/m <sup>2</sup> 50000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation", on page 410	
Touch screen Touch screen type Technology Controller Degree of transmission	-			
Filter glass Degree of transmission Coating	95% On both sides			

Table 135: Technical data - Power Panel 452 compact

## Technical data • Power Panel light / compact

Features	4PP452:0571-C25	4PP452:0571-C65	4PP452:0571-C35	4PP452:0571-C75
Keys/LED <sup>6)</sup> Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	28 with LED (yellow) 10 with LED (yellow) 5 without LED 15 without LED - > 10 <sup>6</sup> actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green)  <b>Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.</b>			
Power supply Rated voltage Rated current Starting current Power consumption Electrical isolation	18 - 30 VDC 0.63 A Max. 1.2 A Typically 15 W Yes			
Bleeder resistance	0 Ω			
<b>Mechanical characteristics</b>				
Outer dimensions Width Height Depth	323 mm 358 mm 108 mm			
Front Frame Design Membrane Dark gray border around display Light background Orange keys Dark gray keys Legend strips (gray) Gasket	Naturally anodized aluminum <sup>7)</sup> Gray <sup>7)</sup> Polyester Similar to Pantone 432CV <sup>7)</sup> Similar to Pantone 427CV <sup>7)</sup> Similar to Pantone 151CV <sup>7)</sup> Similar to Pantone 431CV <sup>7)</sup> Similar to Pantone 429CV <sup>7)</sup> Flat gasket around display front			
Housing	Metal			
Weight	Approx. 5.3 kg (without aPCI interface modules)			
<b>Environmental characteristics</b>				
Ambient temperature Operation Bearings Transport	0 to +50°C -20 to +60°C -20 to +60°C			
Relative humidity	See 5.3.4 "Temperature humidity diagram", on page 401			
Vibration Operation (continuous) Operation (occasional) Bearings Transport	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g			
Shock Operation Bearings Transport	15 g, 11 ms 30 g, 15 ms 30 g, 15 ms			

Table 135: Technical data - Power Panel 452 compact

Environmental characteristics	4PP452:0571-C25	4PP452:0571-C65	4PP452:0571-C35	4PP452:0571-C75
Protection	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)			
Altitude <sup>8)</sup>	Max. 3000 m			

Table 135: Technical data - Power Panel 452 compact

- 1) Maintenance controller extended.
- 2) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).
- 3) Typical lifespan (at 50% buffer operation, temperature +25°C when off, +50°C when on).  
Maximum life cycle in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.  
Maximum lifespan switched off: 2 years at +25°C or 1 year at +50°C.
- 4) The actual value depends on the operating system or driver being used.
- 5) At +25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 6) The functions of the keys and the LEDs can be configured using Visual Components in B&R Automation Studio.
- 7) Depending on the process or batch, there may be visible deviations in the color and surface structure.
- 8) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

### 5.3.4 Temperature humidity diagram

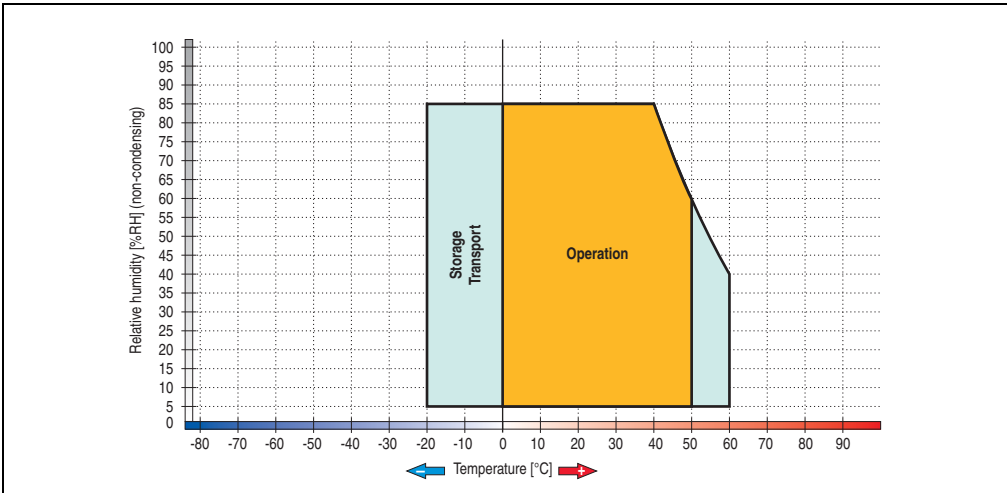


Figure 263: Temperature humidity diagram - PP452 compact

## 6. Block diagram

The following block diagrams show the simplified system unit structure with a CPU board.

### 6.1 Power Panel 300 (with no aPCI slots)

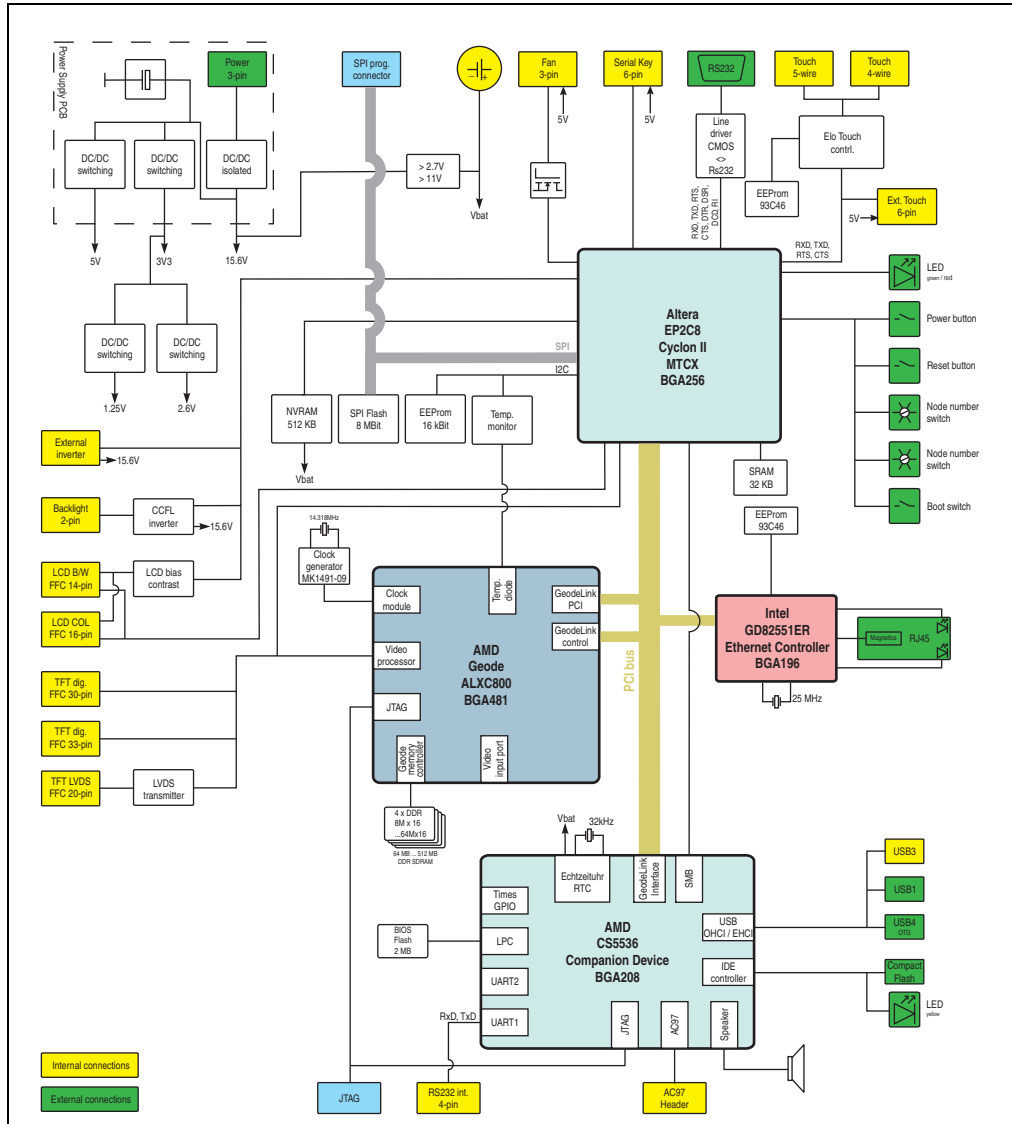


Figure 264: Block diagram - Power Panel 300

## 6.2 Power Panel 400 with 1 aPCI slot

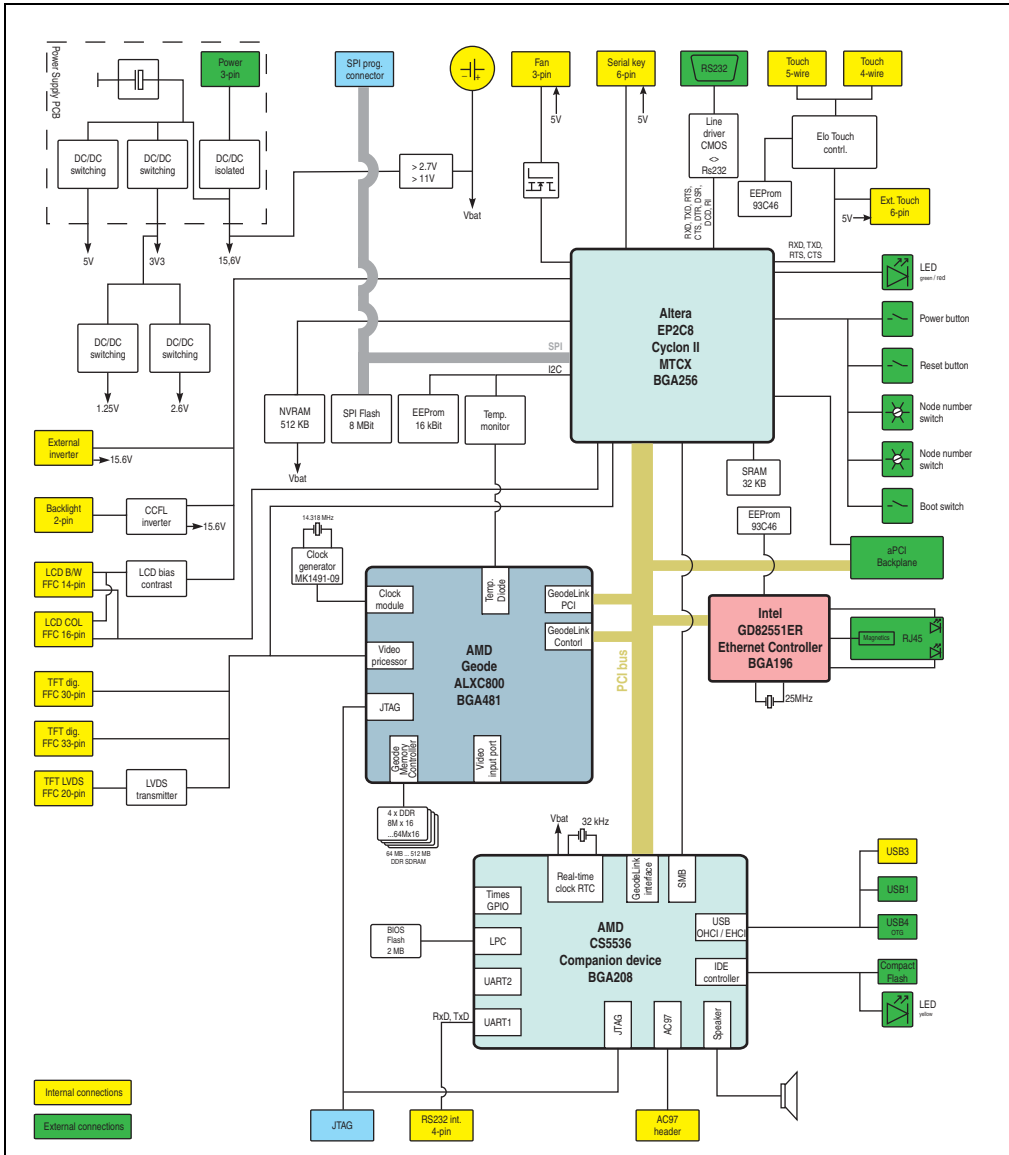


Figure 265: Block diagram - Power Panel 400 with 1 aPCI slot

### 6.3 Power Panel 400 with 2 aPCI slots

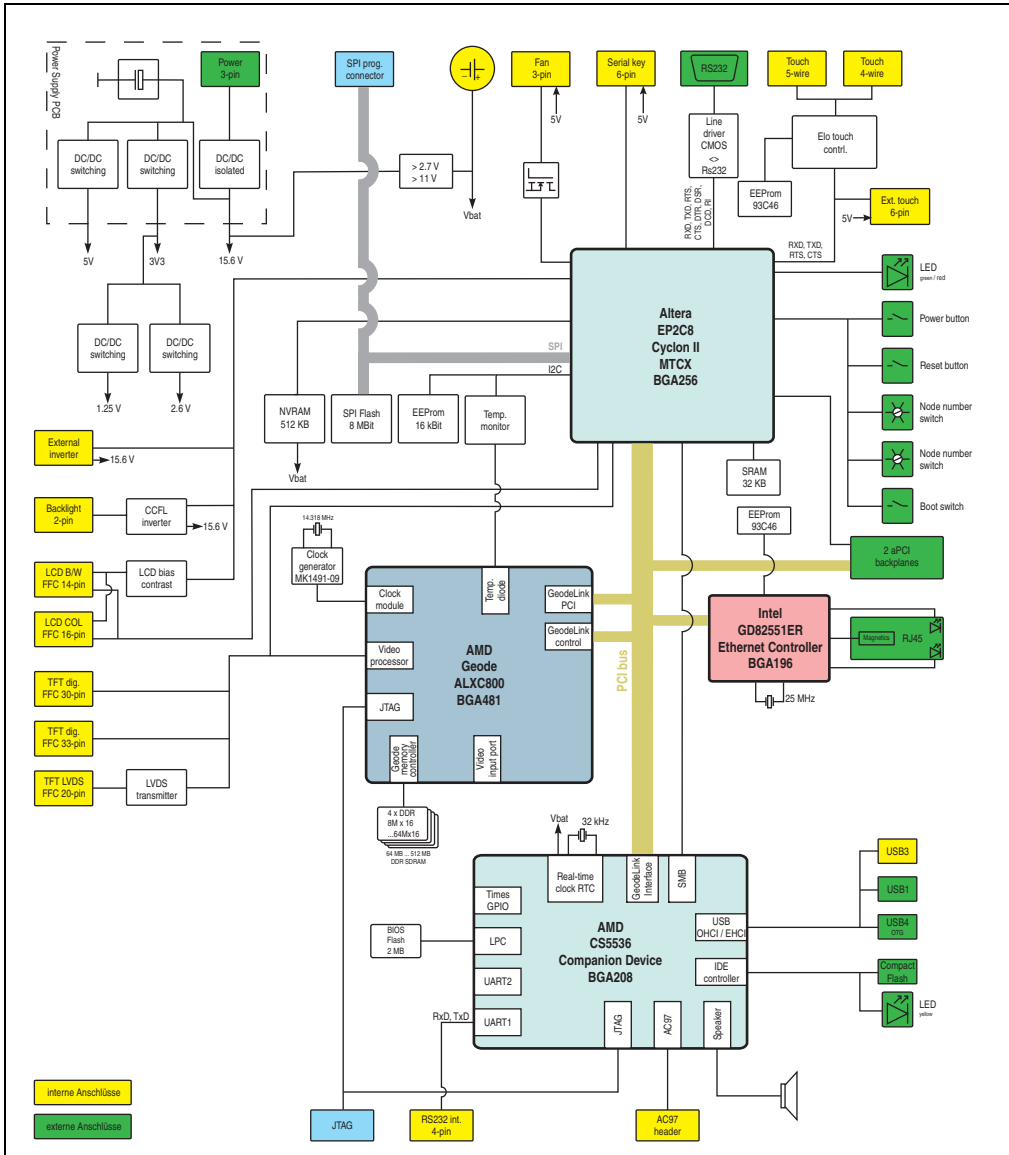


Figure 266: Block diagram - Power Panel 400 with 2 aPCI slots



## 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 267: 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).

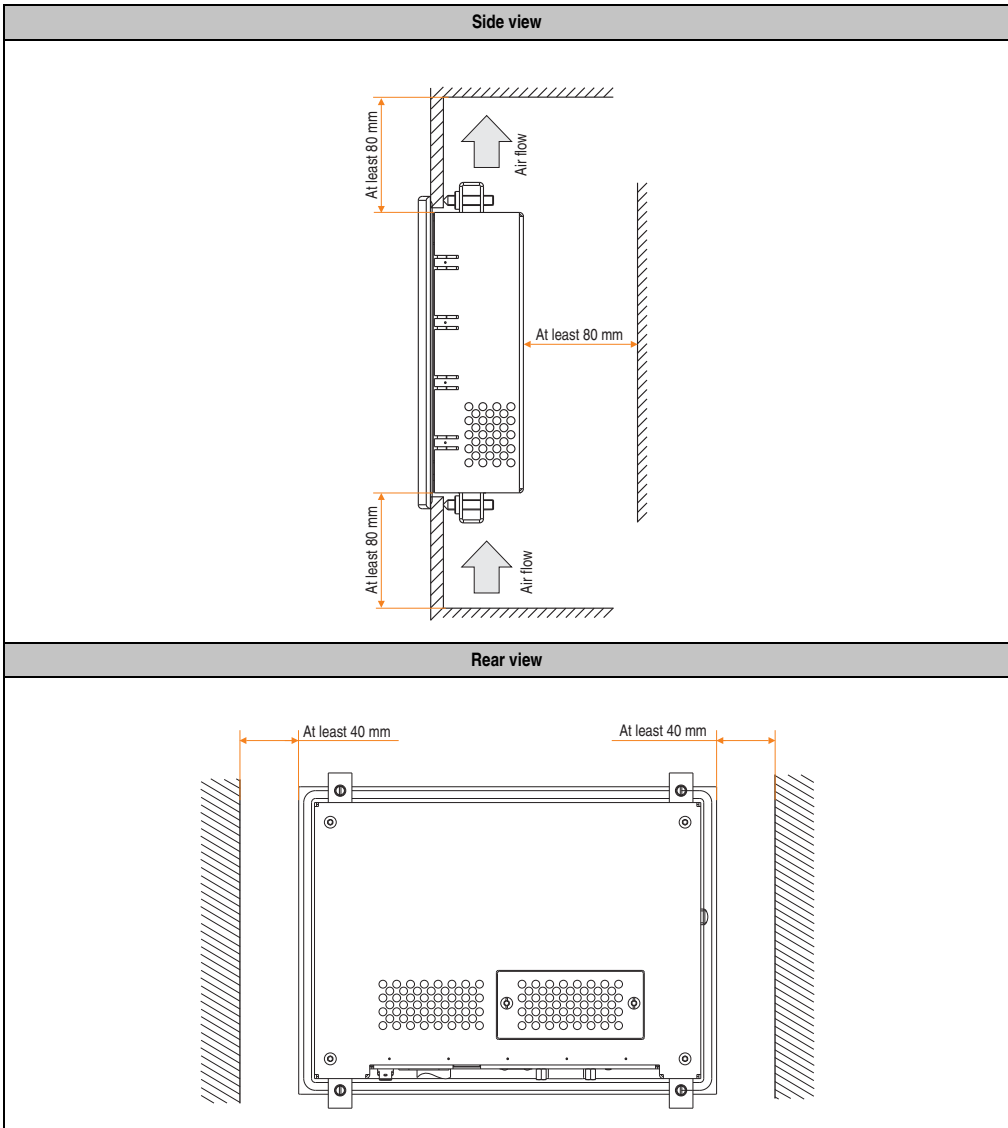


Table 136: Space for air circulation

## 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).

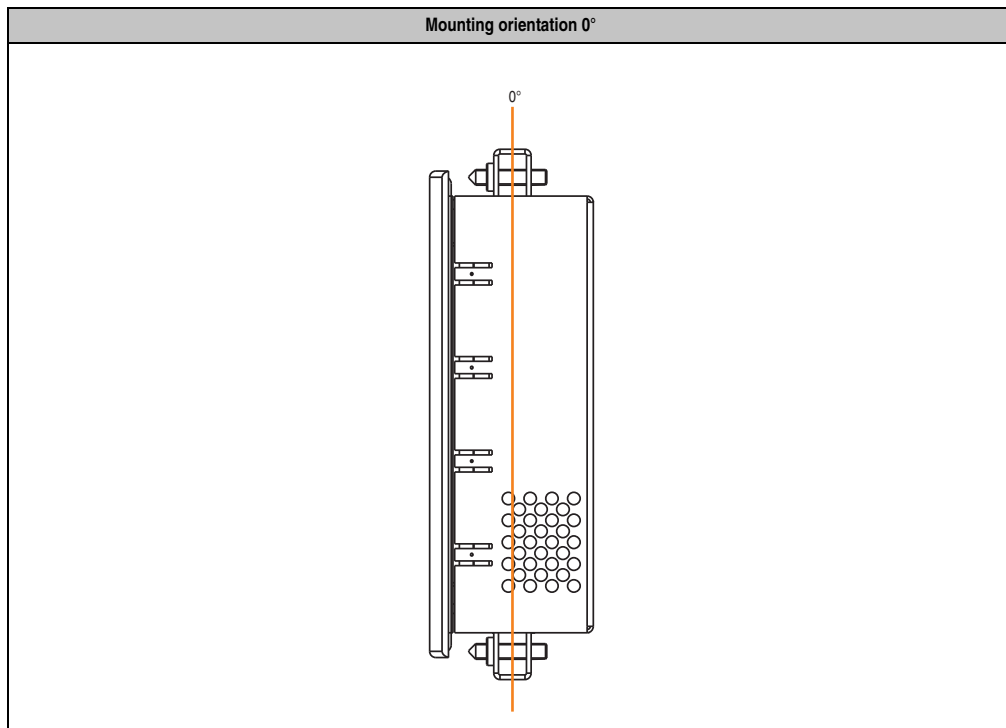


Table 137: Mounting orientation 0°

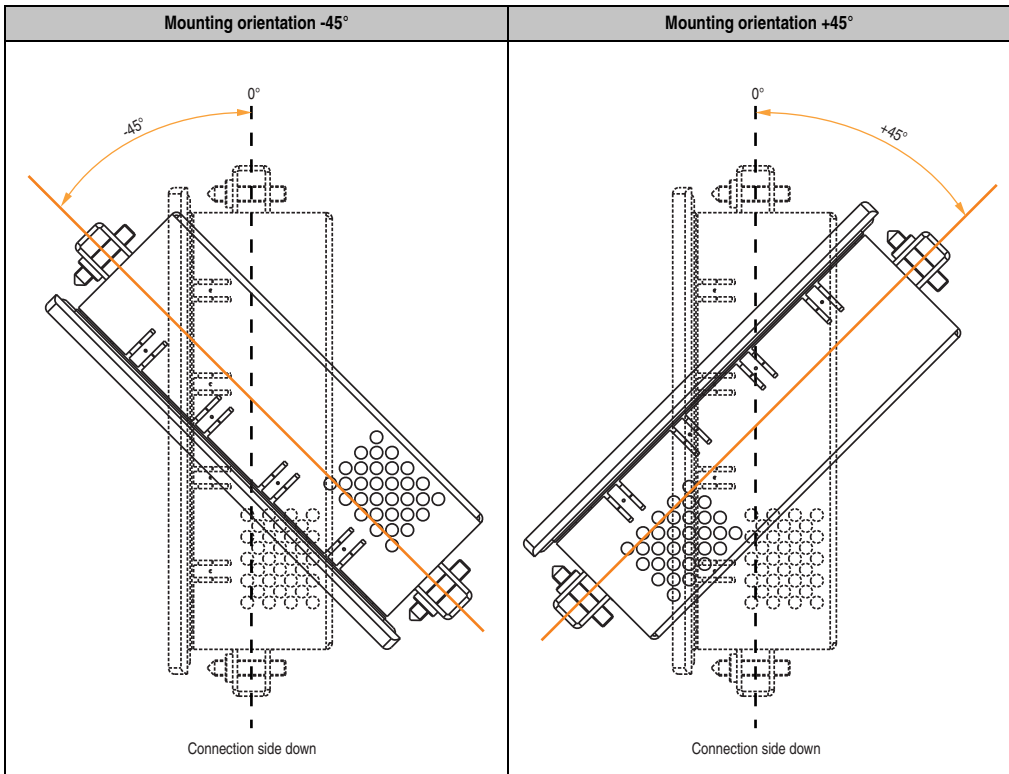


Table 138: Mounting orientation -45° and +45°.

## Caution!

The maximum permitted ambient temperature can be found in the technical data for the respective Power Panel device.

## 3. Touch screen calibration

B&R touch screen devices are equipped with a touch controller that supports hardware calibration. This means that the devices are pre-calibrated from stock. This feature proves advantageous in the case of a replacement part because a new calibration is no longer required when exchanging devices (identical model / type). Nevertheless, we recommend calibrating the device in order to achieve the best results and to better readjust the touch screen to the user's preferences.

Regardless of this, the touch screen driver requires calibration following installation.

### 3.1 Windows CE

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

### 3.2 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 during driver installation.

### 3.3 Automation Runtime / Visual Components

The first time the touch screen is used, it must be calibrated once in the customer application for the existing device and project.

## 4. Screen rotation

It is possible to rotate the image content by 90° using the graphic driver's screen rotation function (must support the function).

### 4.1 Windows XP embedded

The graphics driver does not support the screen rotation function.

### 4.2 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).

### 4.3 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. User tips for increasing the display lifespan

### 5.1 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.

### 5.2 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.

### 5.3 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.

### 5.4 What causes image sticking?

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

## 5.5 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

## 6. Pixel error

### **Information:**

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



# Chapter 4 • Software

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## 1. Power Panel 300 with BIOS

### Information:

The following diagrams and BIOS menu items including descriptions refer to BIOS version 1.14. It is therefore possible that these diagrams and BIOS descriptions do not correspond with the installed BIOS version.

### 1.1 General information

BIOS stands for "Basic Input Output System". It is the most basic standardized communication between the user and the system (hardware). A 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).

## 1.2 Summary screen

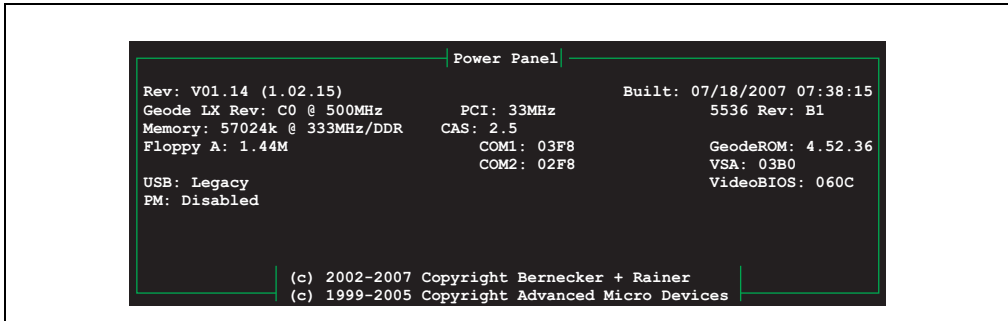


Figure 268: BIOS summary screen for VGA, SVGA and XGA Power Panel devices

To deactivate this summary screen for VGA, SVGA and XGA variants, see "Miscellaneous configuration", on page 432.

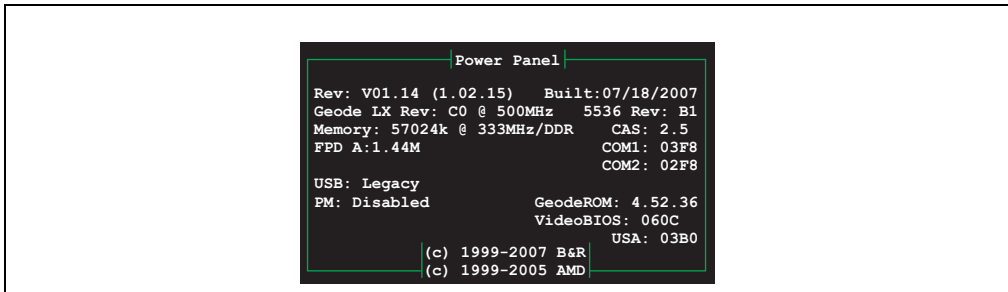


Figure 269: BIOS summary screen for QVGA Power Panel devices

To deactivate this summary screen for QVGA variants, see "Miscellaneous configuration", on page 453.

To make changes in BIOS setup: while the Power Panel device is booting, press the DEL key as soon as the following message appears in the upper margin of the display (during POST):



Figure 270: Press DEL for setup

If the message disappears before DEL has been pressed<sup>1)</sup>, the Power Panel must be rebooted in order to enter BIOS setup.

## Warning!

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

## Information:

**The settings recommended by B&R can be loaded with "Load defaults". For a list of the default values, see Section 1.5 "BIOS default values", on page 459.**

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.

Table 139: BIOS-relevant keys

1) A USB keyboard is required to enter characters and operate BIOS setup pages.

Key	Function
- (Minus)	Decreases the numerical value or selects the previous parameter value.
+ (Plus)	Increases the numerical value or selects the next parameter value.

Table 139: BIOS-relevant keys (Forts.)

## 1.3 BIOS settings for VGA, SVGA and XGA Power Panel devices

### Information:

The BIOS default values can be found in the section 1.5 "BIOS default values", on page 459.

#### 1.3.1 Main menu

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

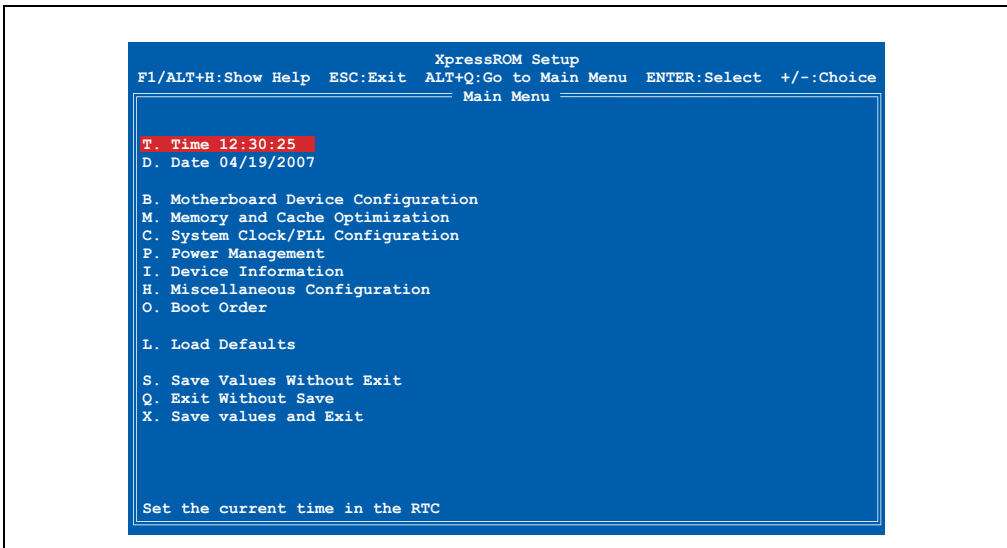


Figure 271: Main menu

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

Shortcut	BIOS setup menu	Function
T	Time 21:56:12	The system time can be configured here.
D	Date 04/19/2007	The system date can be configured here.
B	Motherboard device configuration	Motherboard resources can be configured here.
M	Memory and cache optimization	The settings for memory management can be made here.
C	System clock/PLL configuration	The timing settings can be made here.
P	Power management	Setup of various APM (Advanced Power Management) options.
I	Device information	Important parameters (temp., mode/node position, etc.) for the Power Panel device.

Table 140: Overview of BIOS main menu functions

Shortcut	BIOS setup menu	Function
H	Miscellaneous configuration	The various BIOS settings can be configured here (Summary screen, Halt on errors, etc.)
O	Boot order	The boot order can be set here.
L	Load defaults	Load the optimal BIOS settings for best performance.
S	Save values without exit	Saves BIOS values without exiting BIOS setup.
Q	Exit without save	Exits BIOS setup without saving any changes.
X	Save values and exit	Saves settings and exits BIOS setup.

Table 140: Overview of BIOS main menu functions (Forts.)

### 1.3.2 Time

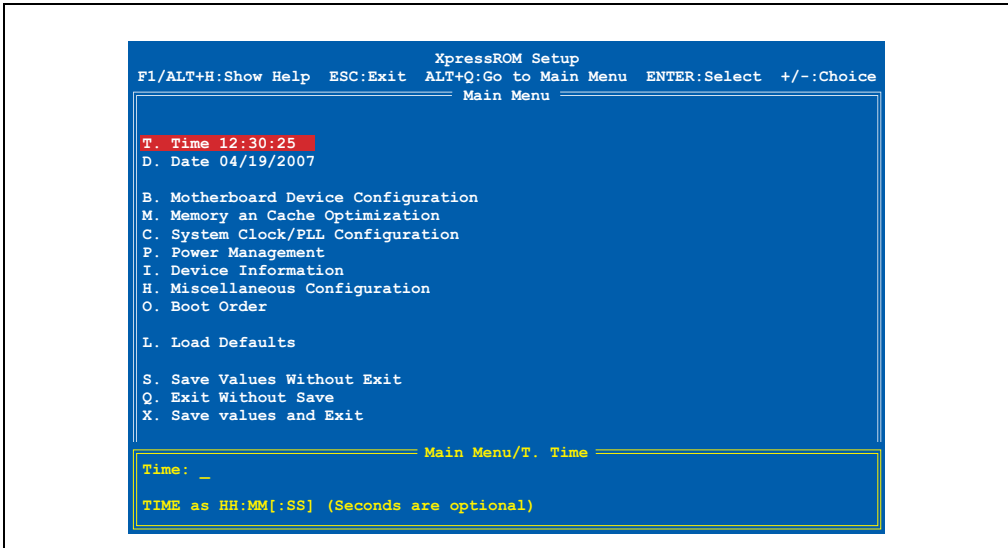


Figure 272: Time

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

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

## Information:

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

### 1.3.3 Date

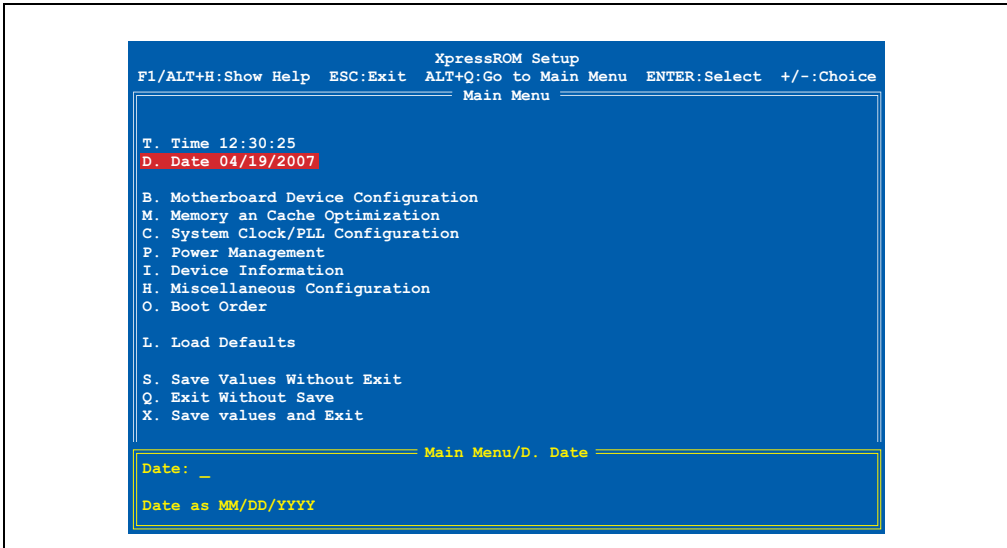


Figure 273: Date

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 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 "/".

### 1.3.4 Motherboard device configuration

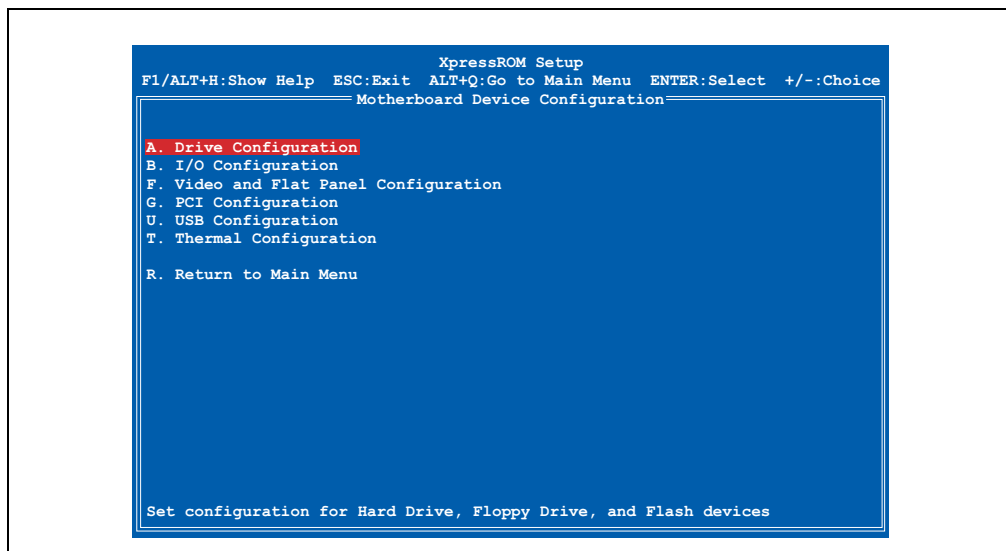


Figure 274: Motherboard device configuration

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

Table 141: BIOS motherboard device configuration menu



Motherboard device configuration - drive configuration

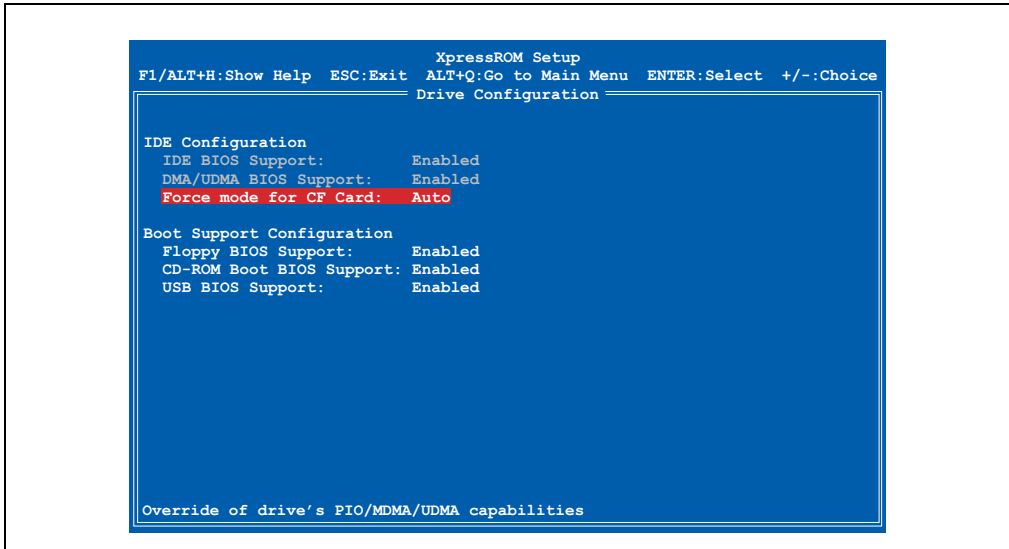


Figure 275: Motherboard device configuration - drive configuration

BIOS setting	Meaning	Setting options	Effect
IDE BIOS support	Displays the IDE configuration of the inserted CompactFlash card.	None	-
DMA/UDMA BIOS support	Display of the DMA/UDMA BIOS support for the inserted CompactFlash card.	None	-
Force mode for CF card	The maximum data transfer mode to and from a CompactFlash card can be configured here.  <b>Information:</b>  If a mode is configured that is not supported by the CompactFlash card, then the fastest supported mode is configured.	Auto	Configures the fastest mode supported by the inserted CompactFlash card.
		PIO 0 to PIO 4	Manual configuration option for PIO mode.
		MDMA 0 to MDMA 2	Manual configuration option for MDMA mode.
		UDMA 0 to UDMA 5	Manual configuration option for UDMA mode.
Floppy BIOS support	Floppy support (USB) can be activated/deactivated here.	Enabled	Floppy support activated.
		Disabled	Floppy support deactivated.
CD-ROM boot BIOS support	The CD-ROM boot BIOS support can be activated/deactivated here.	Enabled	CD-ROM boot support activated. Booting a connected USB CD-ROM drive is possible.
		Disabled	CD-ROM boot support deactivated.
USB BIOS support	USB BIOS support can be activated/deactivated here.	Enabled	USB BIOS support activated.
		Disabled	USB BIOS support deactivated.

Table 142: BIOS drive configuration menu

Motherboard device configuration - I/O configuration

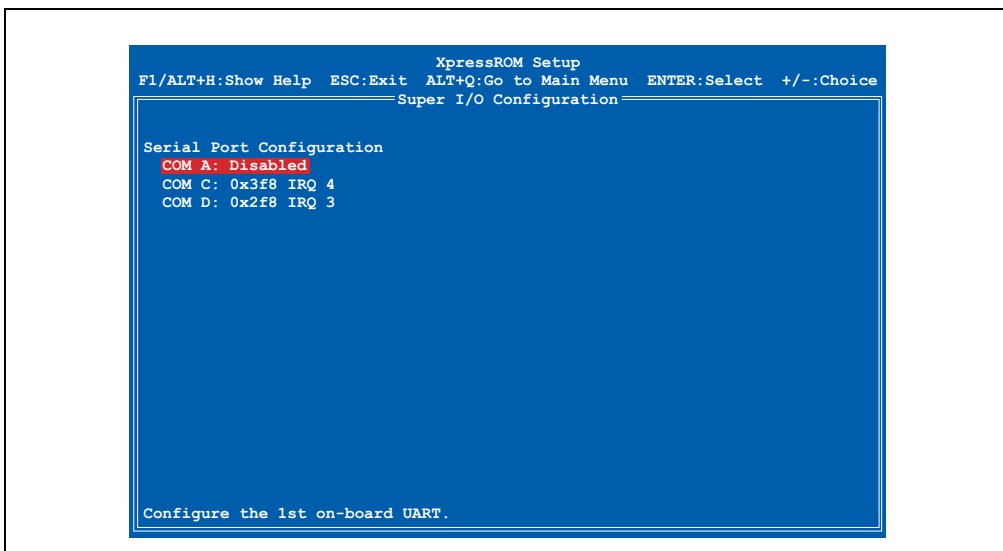


Figure 276: Motherboard device configuration - I/O configuration

BIOS setting	Meaning	Setting options	Effect
COM A	Configures the UART address range and the corresponding interrupt for the optional internal interface.  <b>Information:</b> Two ports cannot use the same address range and interrupt.	Disabled	No assignment. The interface is disabled.
		0x3f8 IRQ 4	Use this address range and interrupt.
		0x2f8 IRQ 3	
		0x3e8 IRQ 4	
		0x2e8 IRQ 3	
COM C	Configures the UART address range and the corresponding interrupt for the external serial interface.  <b>Information:</b> Two ports cannot use the same address range and interrupt.	Disabled	No assignment. The serial interface is disabled.
		0x3f8 IRQ 4	Use this address range and interrupt.
		0x2f8 IRQ 3	
		0x3e8 IRQ 4	
		0x2e8 IRQ 3	
		0x3f8 IRQ 12	
		0x2f8 IRQ 11	
		0x3e8 IRQ 12	
		0x2e8 IRO 11	

Table 143: BIOS super I/O configuration menu

BIOS setting	Meaning	Setting options	Effect
COM D	Configures the UART address range and the corresponding interrupt for the touch controller.  <b>Information:</b>  Two ports cannot use the same address range and interrupt.	Disabled	No assignment. The touch screen is disabled and does not function.
		0x3f8 IRQ 4	Use this address range and interrupt.
		0x2f8 IRQ 3	
		0x3e8 IRQ 4	
		0x2e8 IRQ 3	
		0x3f8 IRQ 12	
		0x2f8 IRQ 11	
		0x3e8 IRQ 12	
		0x2e8 IRQ 11	

Table 143: BIOS super I/O configuration menu (Forts.)

### Motherboard device configuration - video and flat panel

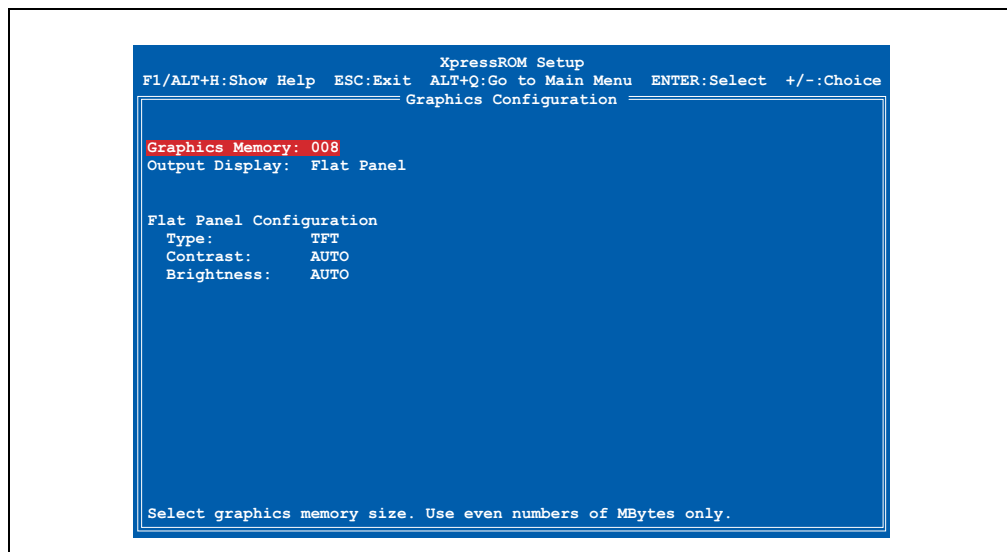


Figure 277: Motherboard device configuration - video and flat panel configuration

BIOS setting	Meaning	Setting options	Effect
Graphics memory	Setting for the amount of graphics memory reserved by the main memory.	2-254	Value set manually.
Output display	Selection of display mode	Flat panel	Displays on a Power Panel display.
		Panel and CRT	Displays on an external monitor and Power Panel display.
Type	Displays the Power Panel display type.	None	-

Table 144: BIOS video configuration menu

BIOS setting	Meaning	Setting options	Effect
Contrast	Setting for the contrast of the display.	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.
Brightness	Setting for the background lighting of the display.	Auto	The optimal brightness is automatically configured using the factory settings. A brightness value between 100% and 0% is set.
		0% to 100%	Manual setting of the desired brightness within factory settings limits.

Table 144: BIOS video configuration menu (Forts.)

**Motherboard device configuration - PCI configuration**

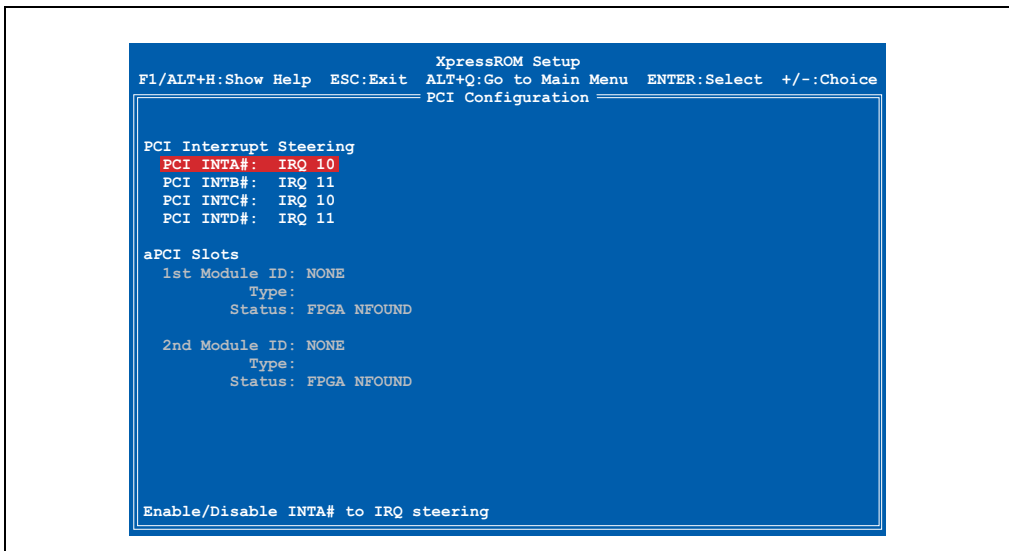


Figure 278: Motherboard device configuration - PCI configuration

BIOS setting	Meaning	Setting options	Effect
PCI INTA#	IRQ setting for the VGA controller.	Disabled	No IRQ is reserved.
		3, 4, 5, 6, 7, 9, 10, 11, 12, 14 or 15	Manual configuration of the IRQ.
PCI INTB#	IRQ setting for the audio controller.	Disabled	No IRQ is reserved.
		3, 4, 5, 6, 7, 9, 10, 11, 12, 14 or 15	Manual configuration of the IRQ.
PCI INTC#	Activates IRQ for aPCI slot 2. 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	Manual configuration of the IRQ.

Table 145: BIOS PCI configuration menu

BIOS setting	Meaning	Setting options	Effect
PCI INTD#	IRQ setting for the USB port.	Disabled	No IRQ is reserved.
		3, 4, 5, 6, 7, 9, 10, 11, 12, 14 or 15	Manual configuration of the IRQ.
aPCI slots	Information about aPCI modules located in the aPCI slots of the Power Panel device.	None	-

Table 145: BIOS PCI configuration menu (Forts.)

## Motherboard device configuration - USB configuration

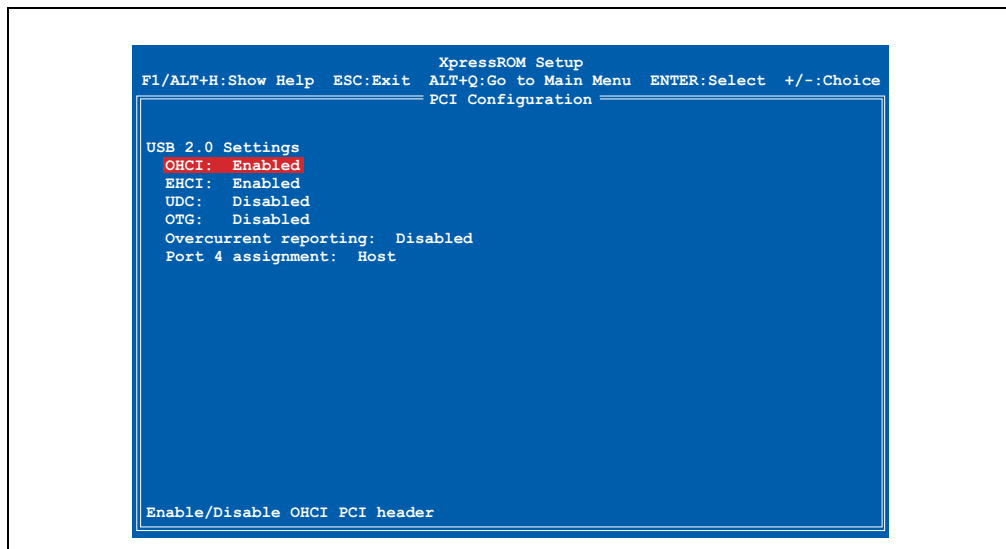


Figure 279: Motherboard device configuration - USB configuration

BIOS setting	Meaning	Setting options	Effect
OHCI	Turns USB 1.0/1.1 support on/off (OHCI - Open Host Controller Interface).	Enabled	Activates the USB port.
		Disabled	Deactivates the USB port.
EHCI	Turns USB 2.0 support on/off (EHCI - Enhanced Host Controller Interface).	Enabled	Enables this function.
		Disabled	Disables this function.
UDC	Turns the USB device controller on/off. When on, only the PCI config space is activated in BIOS.	Enabled	Enables this function.
		Disabled	Disables this function.
OTG	Turns the On-to-Go device on/off. Only the PCI config space is activated in BIOS.	Enabled	Enables this function.
		Disabled	Disables this function.

Table 146: BIOS USB configuration menu

BIOS setting	Meaning	Setting options	Effect
Overcurrent reporting	This function enables an automatic message This function enables an automatic error message to be sent to the system when the USB hub is overloaded (e.g. in Windows XP embedded).	Enabled	Enables this function.
		Disabled	Disables this function.
Port 4 assignment	With this option, USB port 4 can be configured.	Host	Functions as host.
		Device	Functions as device (two computers can be connected via port 4 - Master -> Slave).
		Not used	In BIOS, the default value (=Host) is assigned.

Table 146: BIOS USB configuration menu (Forts.)

### Motherboard device configuration - thermal configuration

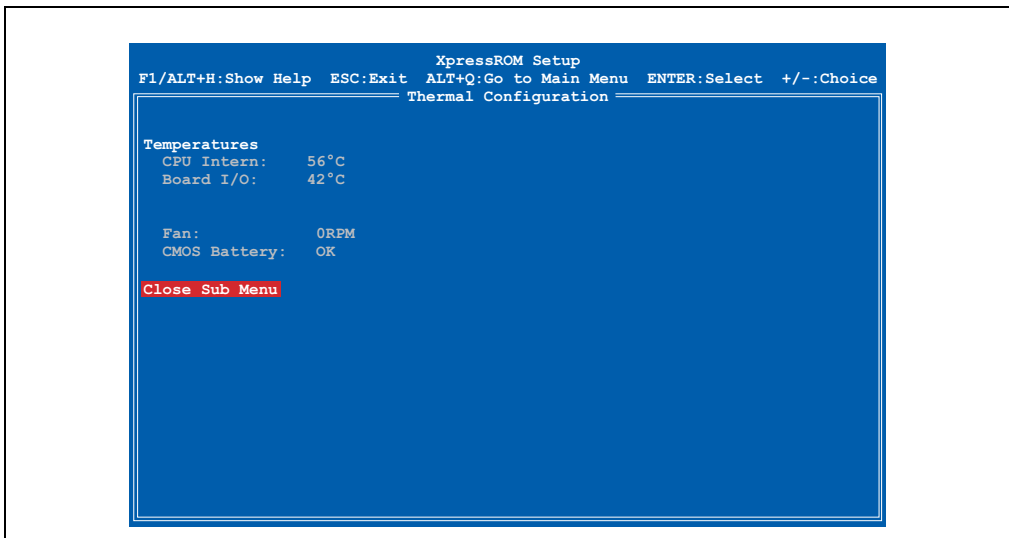


Figure 280: Motherboard device configuration - thermal configuration

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

Table 147: BIOS thermal configuration menu

BIOS setting	Meaning	Setting options	Effect
Close submenu	Close submenu	Enter	Closes the submenu.

Table 147: BIOS thermal configuration menu (Forts.)

### 1.3.5 Memory and cache optimization

## Warning!

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

Incorrectly setting "Memory optimization" values can cause instability and even cause the entire system not to boot. If the PPC300 can no longer be booted, then the mode/node switch must be set to 0-0 and the default BIOS values can be restored by pushing the reset button three times (see section 1.5.8 "Restoring the default BIOS values", on page 461).

## 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.

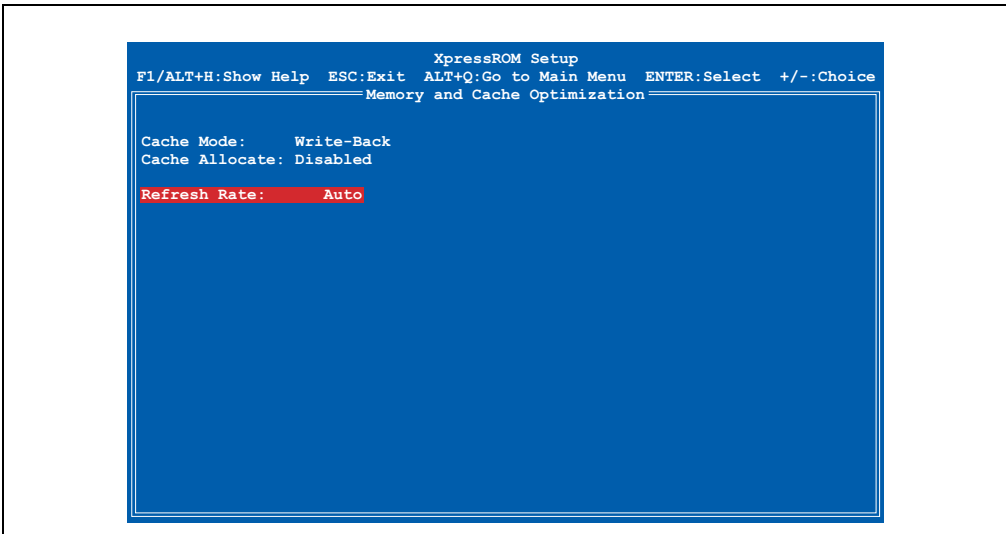


Figure 281: Memory and cache optimization

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

Table 148: BIOS memory and cache optimization menu

### 1.3.6 System clock/PLL configuration

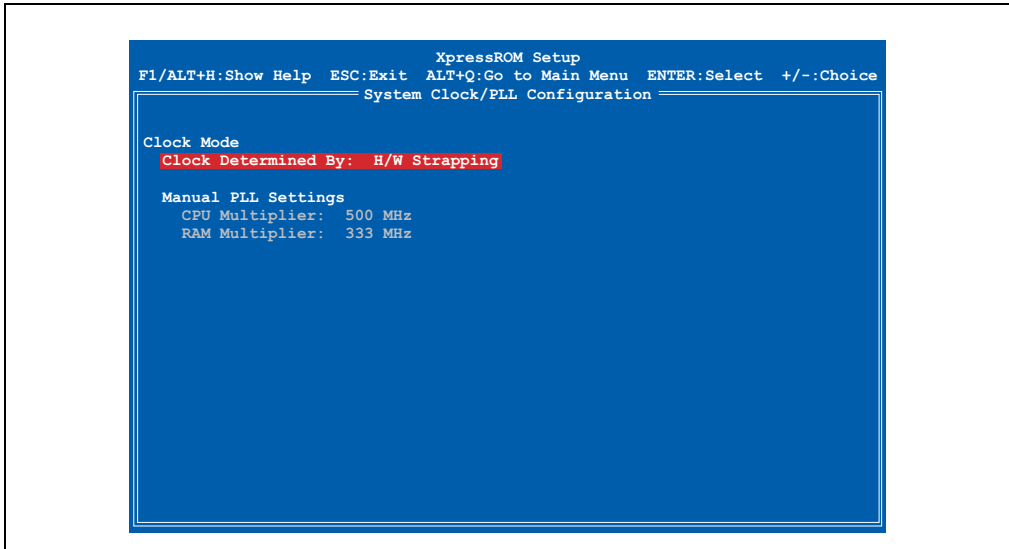


Figure 282: System clock/PLL configuration

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

Table 149: System clock/PLL configuration



BIOS setting	Meaning	Setting options	Effect
CPU multiplier	The CPU multiplier can be selected with this option.  <b>Information:</b> This value can only be set if the BIOS setting "Clock determined by" is set to <i>Manual</i> .	None	-
		233 MHz, 266 MHz, 300 MHz, 333 MHz, 366 MHz, 400 MHz, 433 MHz, 466 MHz, 500 MHz	Value set manually.
RAM multiplier	The RAM multiplier can be selected with this option.  <b>Information:</b> This value can only be set if the BIOS setting "Clock determined by" is set to <i>Manual</i> .	None	-
		233 MHz, 266 MHz, 300 MHz, 333 MHz, 366 MHz, 400 MHz, 433 MHz, 466 MHz, 500 MHz	Value set manually.

Table 149: System clock/PLL configuration

### 1.3.7 Power management

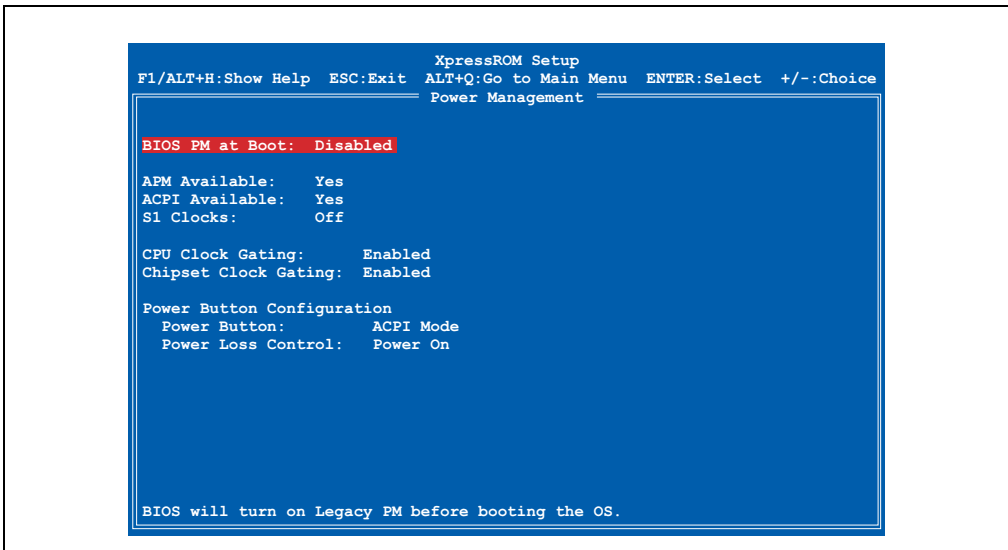


Figure 283: Power management

BIOS setting	Meaning	Setting options	Effect
BIOS PM at boot	Power Management is already enabled in the boot phase.	Enabled	Enables this function.
		Disabled	Disables this function.
APM available	Under this option you can set whether the operating system is allowed to change the BIOS power management settings.	Yes	Enables this function.
		No	Disables this function.

Table 150: BIOS power management menu

BIOS setting	Meaning	Setting options	Effect
ACPI available	The ACPI (Advanced Configuration and Power Interface) option is an extended PnP and power management function.	Yes	Enables this function.
		No	Disables this function.
S1 clocks	The processor can be "stopped" with this option.	Off	Disables this function.
		On	Enables this function.
CPU clock gating	During power management, the clock lines are turned off for devices connected to the CPU.	Enabled	Enables this function.
		Disabled	Disables this function.
Chipset clock gating	During power management, the clock lines are turned off for devices connected to the chipset.	Enabled	Enables this function.
		Disabled	Disables this function.
Power button	This option determines how the Power button will function.	ACPI mode	When the power button is pressed and held for 4 seconds, the Power Panel is switched off without shutting down the operating system.
		Instant off	Turns off immediately.
Power Loss Control	This option determines what should occur after a power failure.	Power-on	The device turns back on.
		Stay off	Device remains off.

Table 150: BIOS power management menu (Forts.)

### 1.3.8 Device information

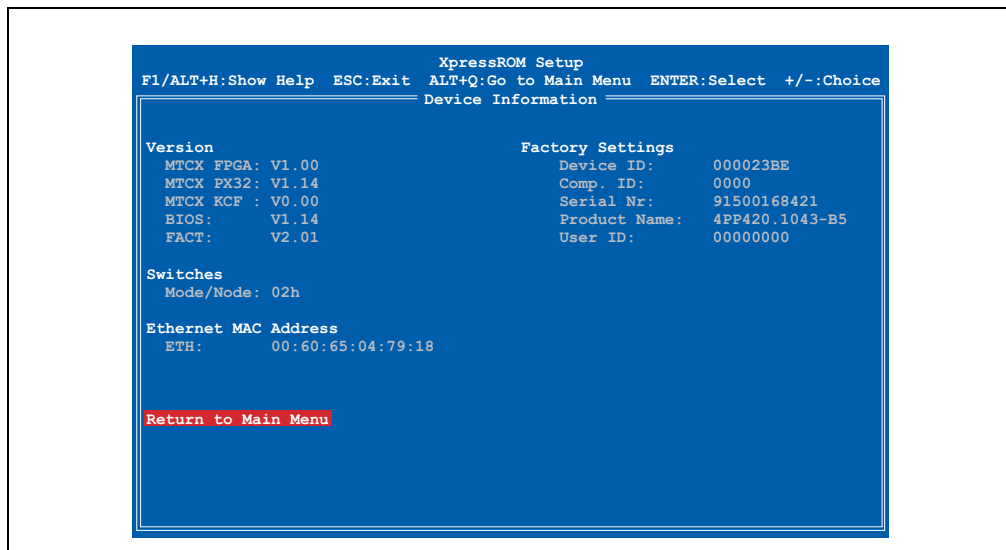


Figure 284: Device information

BIOS setting	Meaning	Setting options	Effect
MTXC FPGA	The FPGA firmware version is displayed here.	None	-

Table 151: BIOS device information menu

BIOS setting	Meaning	Setting options	Effect
MTCX PX32	The MTCX firmware version is displayed here.	None	-
MTCX KCF	The KCF (Key Configuration File) version is displayed here.	None	-
BIOS	The BIOS version is displayed here.	None	-
FACT	The version of the factory settings is displayed here.	None	-
Mode/Node	Displays the current mode/node switch position.	None	-
ETH	The MAC address of the Ethernet interface is displayed here.	None	-
Device ID	Hex value for the device code of the Power Panel device.	None	-
Comp. ID	The compatibility code of the Power Panel device is displayed here.	None	-
Serial no.	The serial number of the Power Panel device is displayed here.	None	-
Product name	The product name of the Power Panel device is displayed here.	None	-
User ID	Displays the User ID. This 8 digit hex value can be freely assigned by the user (e.g. to give the device a unique ID) and can only be changed with using the "B&R Control Center" via the ADI driver.	None	-

Table 151: BIOS device information menu (Forts.)

### 1.3.9 Miscellaneous configuration

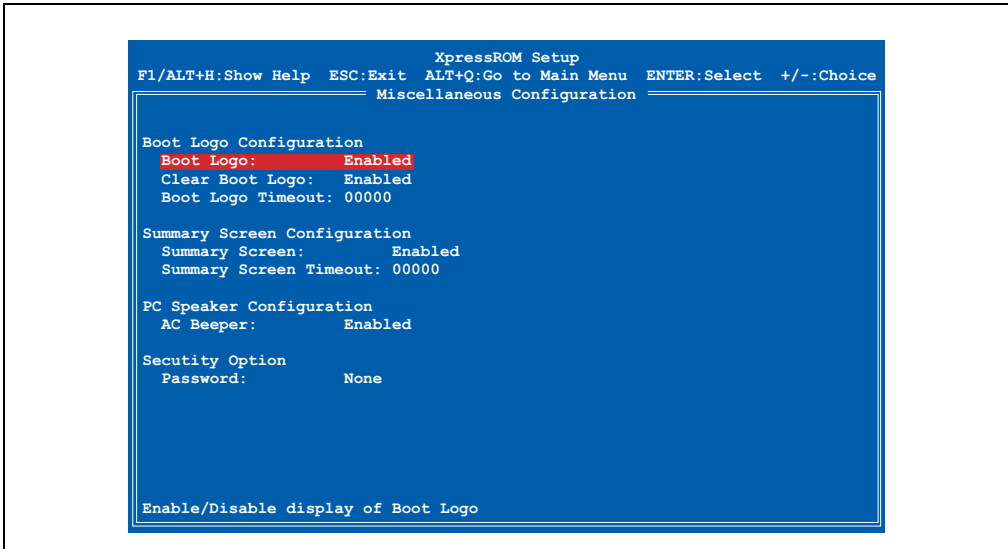


Figure 285: Miscellaneous configuration

BIOS setting	Meaning	Setting options	Effect
Boot logo <sup>1)</sup>	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 no customized bitmap is shown.
Clear boot logo	BIOS clears the boot logo after startup in order to reduce the boot time.	Disabled	The boot logo is removed.
		Enabled	Disables this function.
Boot logo 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.	Disabled	Shows the summary screen.
		Enabled	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 system waits for the manually set value in milliseconds and then resumes the boot procedure.

Table 152: BIOS miscellaneous configuration menu

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

Table 152: BIOS miscellaneous configuration menu (Forts.)

1) The standard B&R boot logo is pre-configured upon delivery.

### 1.3.10 Boot order

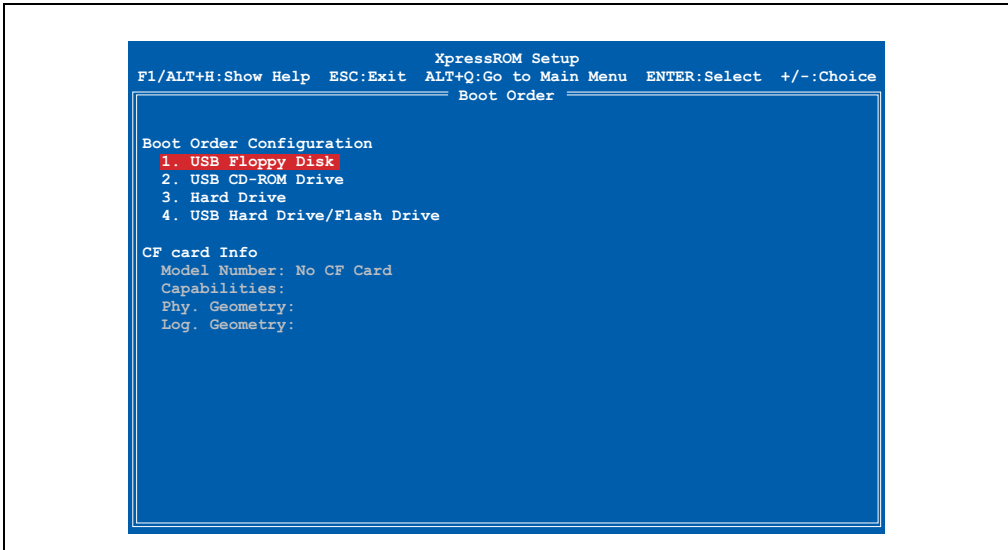


Figure 286: Boot order

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

Table 153: BIOS drive configuration menu

### 1.3.11 Load defaults

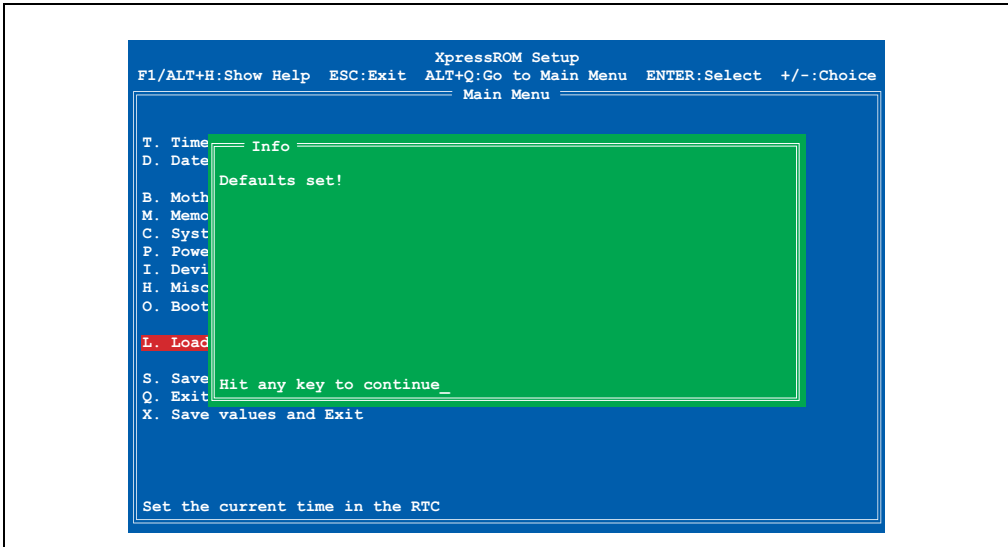


Figure 287: Load defaults

Under this BIOS menu item (shortcut "L"), by pressing any key you can load the values that were set at the time BIOS setup was opened. All changes made up to that point are lost as a result.

#### Restoring the default BIOS values

The BIOS default values can also be restored without entering the BIOS setup. For procedure, see Section 1.5.8 "Restoring the default BIOS values", on page 461.

### 1.3.12 Save values without exit

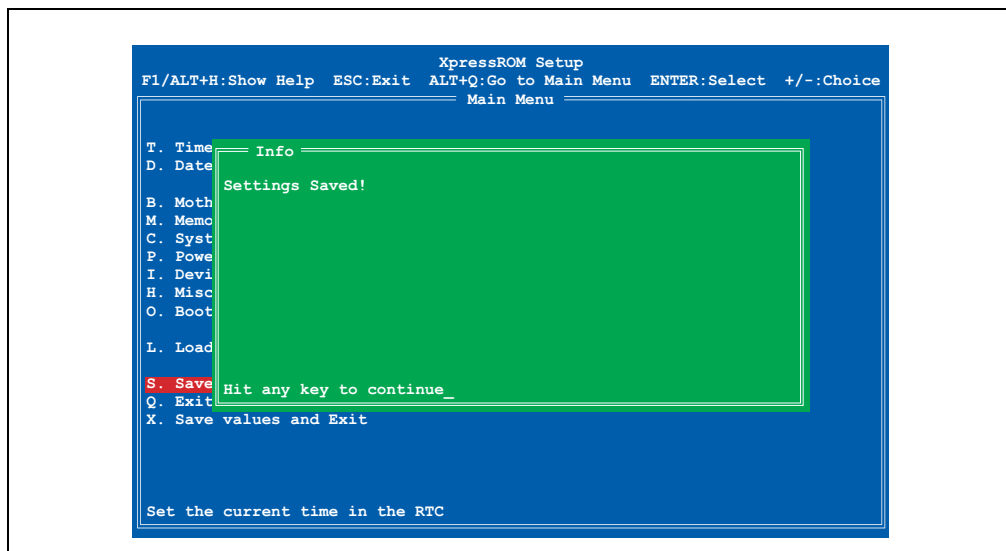


Figure 288: Save values without exit

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



### 1.3.13 Exit without save

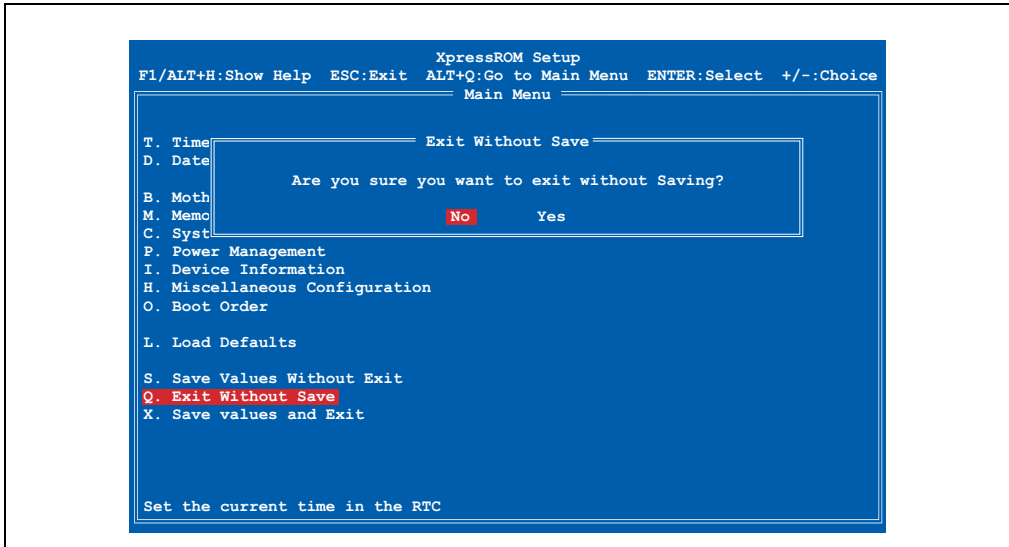


Figure 289: Exit without save

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

#### Information:

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

### 1.3.14 Save values and exit

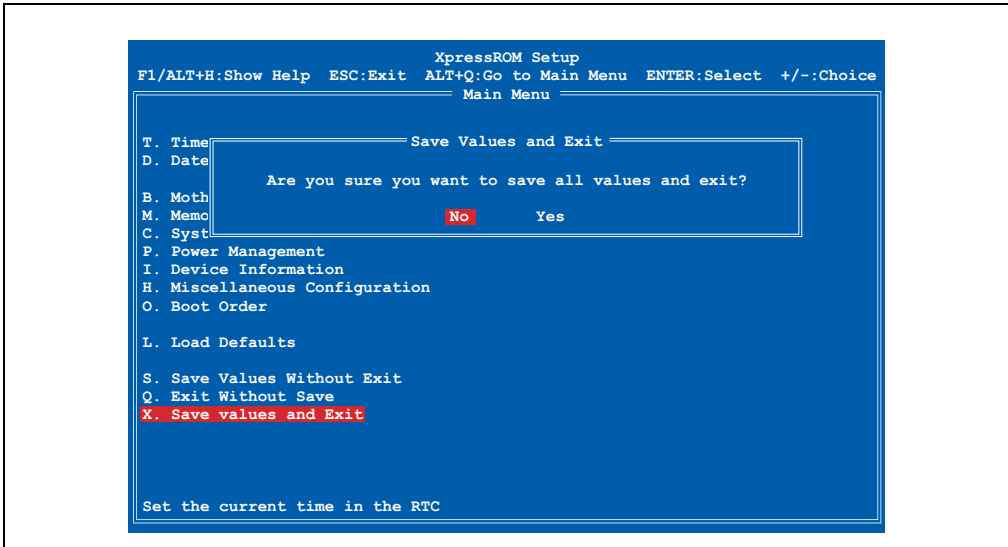


Figure 290: Save values and exit

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

## Information:

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

## 1.4 BIOS settings for QVGA Power Panel devices

### Information:

The BIOS default values can be found in the section 1.5 "BIOS default values", on page 459.

#### 1.4.1 Main menu

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

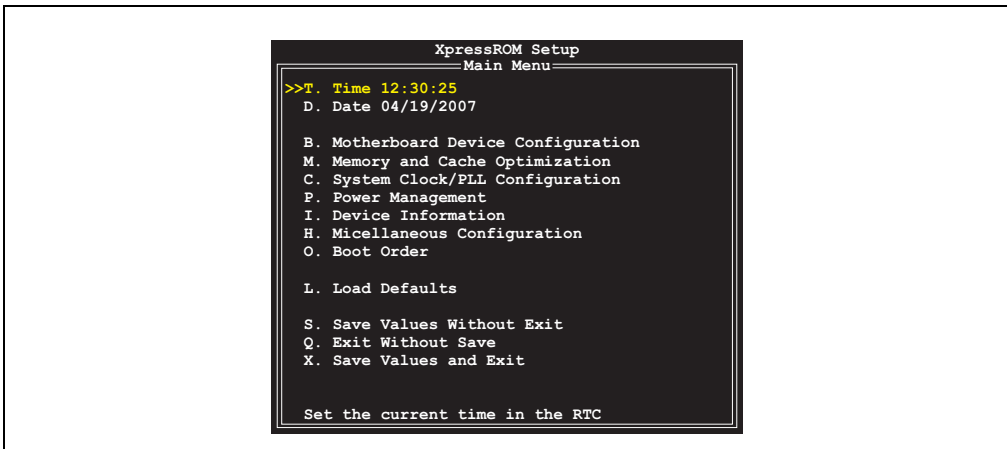


Figure 291: Main menu

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

Shortcut	BIOS setup menu	Function
T	Time 00:02:56	The system time can be configured here.
D	Date 03/12/2007	The system date can be configured here.
B	Motherboard device configuration	Motherboard resources can be configured here.
M	Memory and cache optimization	The settings for memory management can be made here.
C	System clock/PLL configuration	The timing settings can be made here.
P	Power management	Setup of various APM (Advanced Power Management) options.
I	Device information	Important parameters (temp., mode/node position, etc.) for the Power Panel device.
H	Miscellaneous configuration	The various BIOS settings can be configured here (Summary screen, Halt on errors, etc.)
O	Boot order	The boot order can be set here.
L	Load defaults	Load the optimal BIOS settings for best performance.

Table 154: Overview of BIOS main menu functions

Shortcut	BIOS setup menu	Function
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 154: Overview of BIOS main menu functions (Forts.)

### 1.4.2 Time

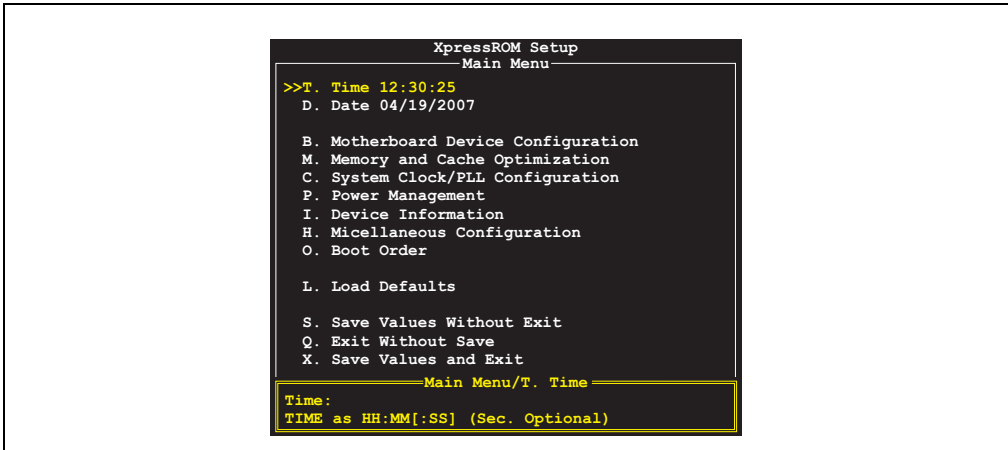


Figure 292: Time

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

### Information:

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

### 1.4.3 Date

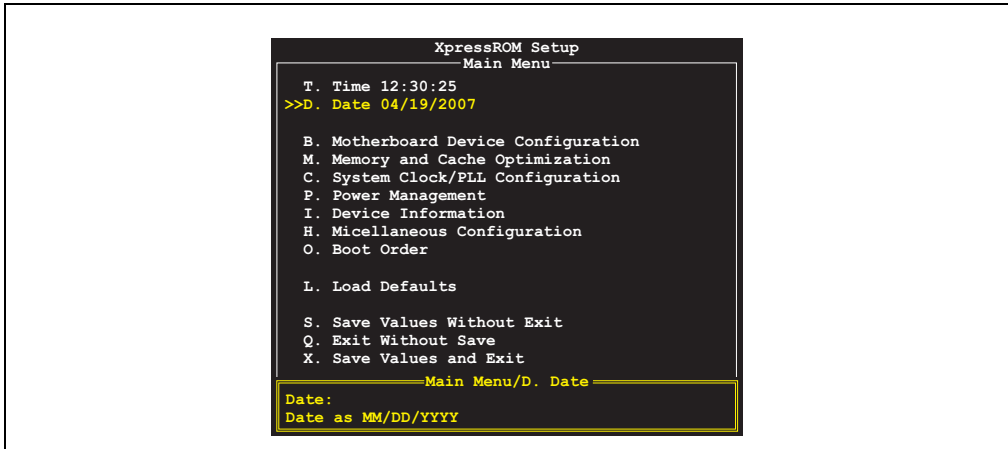


Figure 293: Date

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 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 "/".

## 1.4.4 Motherboard device configuration

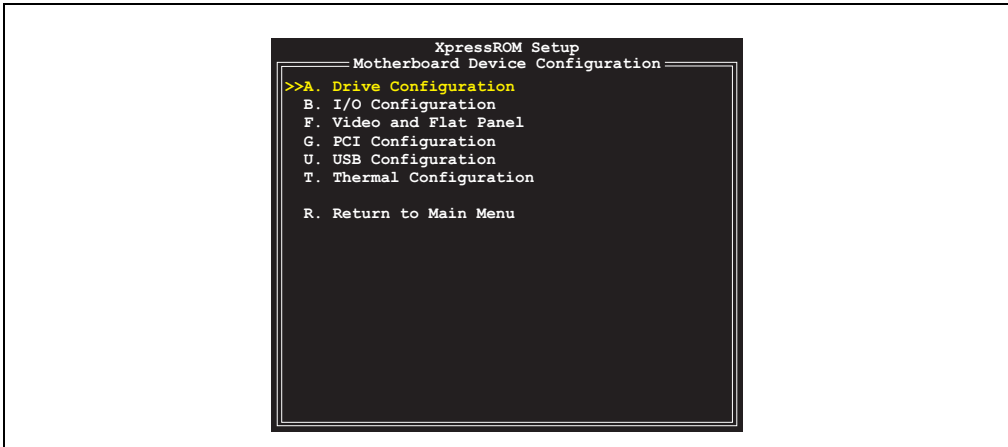


Figure 294: Motherboard device configuration

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

Table 155: BIOS motherboard device configuration menu

Motherboard device configuration - drive configuration

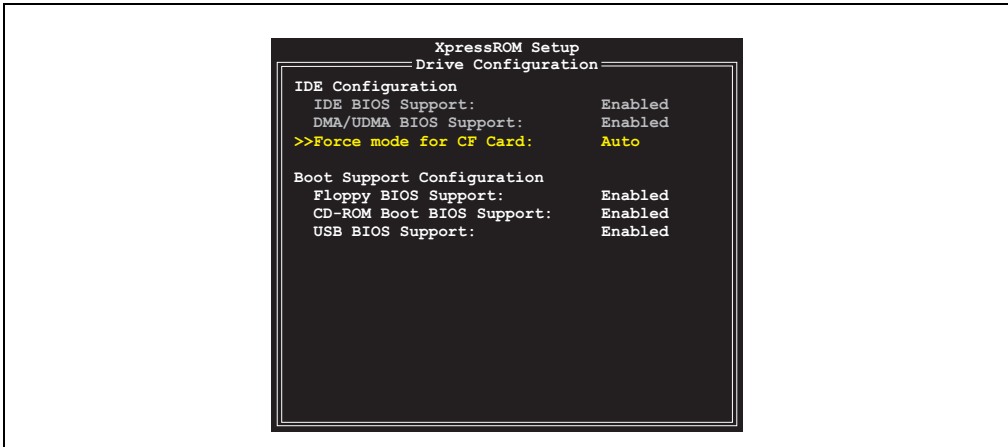


Figure 295: Motherboard device configuration - drive configuration

BIOS setting	Meaning	Setting options	Effect
IDE BIOS support	Displays the IDE configuration of the inserted CompactFlash card.	None	-
DMA/UDMA BIOS support	Display of the DMA/UDMA BIOS support for the inserted CompactFlash card.	None	-
Force mode for CF card	The maximum data transfer mode to and from a CompactFlash card can be configured here.  <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 5	Manual configuration option for UDMA mode.
Floppy BIOS support	Floppy support (USB) can be activated/deactivated here.	Enabled	Floppy support activated.
		Disabled	Floppy support deactivated.
CD-ROM boot BIOS support	The CD-ROM boot BIOS support can be activated/deactivated here.	Enabled	CD-ROM boot support activated. Booting a connected USB CD-ROM drive is possible.
		Disabled	CD-ROM boot support deactivated.
USB BIOS support	USB BIOS support can be activated/deactivated here.	Enabled	USB BIOS support activated.
		Disabled	USB BIOS support deactivated.

Table 156: BIOS drive configuration menu

Motherboard device configuration - I/O configuration

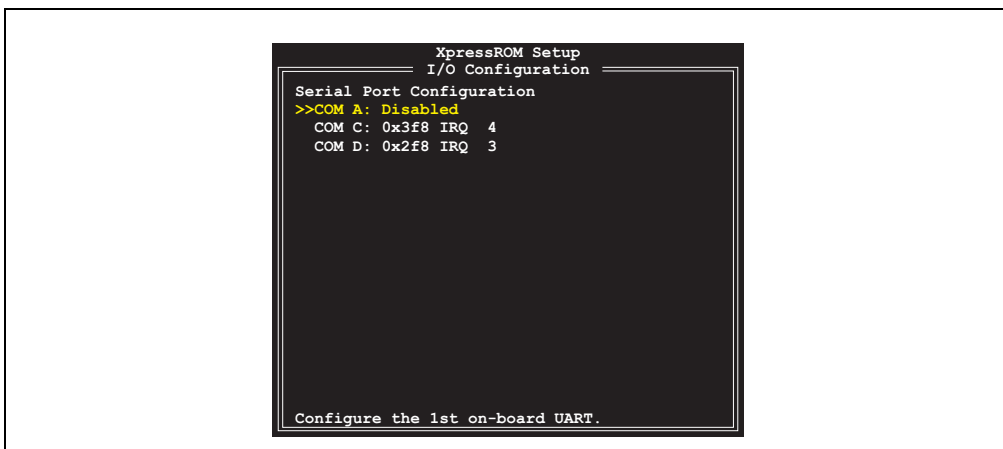


Figure 296: Motherboard device configuration - I/O configuration

BIOS setting	Meaning	Setting options	Effect
COM A	Configures the UART address range and the corresponding interrupt for the optional internal interface.  <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	
		0x2e8 IRQ 3	
COM C	Configures the UART address range and the corresponding interrupt for the external serial interface.  <b>Information:</b> Two ports cannot use the same address range and interrupt.	Disabled	No assignment. The serial interface is disabled.
		0x3f8 IRQ 4	Use this address range and interrupt.
		0x2f8 IRQ 3	
		0x3e8 IRQ 4	
		0x2e8 IRQ 3	
		0x3f8 IRQ 12	
		0x2f8 IRQ 11	
		0x3e8 IRQ 12	
		0x2e8 IRO 11	

Table 157: BIOS super I/O configuration menu



BIOS setting	Meaning	Setting options	Effect
COM D	Configures the UART address range and the corresponding interrupt for the touch controller.  <b>Information:</b>  Two ports cannot use the same address range and interrupt.	Disabled	No assignment. The touch screen is disabled and does not function.
		0x3f8 IRQ 4	Use this address range and interrupt.
		0x2f8 IRQ 3	
		0x3e8 IRQ 4	
		0x2e8 IRQ 3	
		0x3f8 IRQ 12	
		0x2f8 IRQ 11	
		0x3e8 IRQ 12	
		0x2e8 IRQ 11	

Table 157: BIOS super I/O configuration menu (Forts.)

**Motherboard device configuration - video and flat panel**

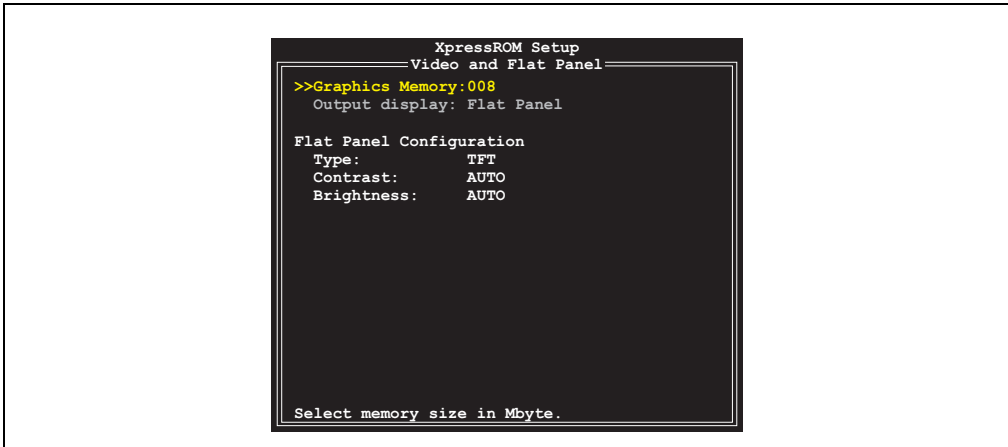


Figure 297: Motherboard device configuration - video and flat panel configuration

BIOS setting	Meaning	Setting options	Effect
Graphics memory	Setting for the amount of graphics memory reserved by the main memory.	2-254	Value set manually.
Output display	Selection of display mode	Flat panel	Displays on a Power Panel display.
		Panel and CRT	Displays on an external monitor and Power Panel display.
Type	Displays the Power Panel display type.	None	-

Table 158: 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 switches are 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.
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 158: BIOS video configuration menu (Forts.)

**Motherboard device configuration - PCI configuration**

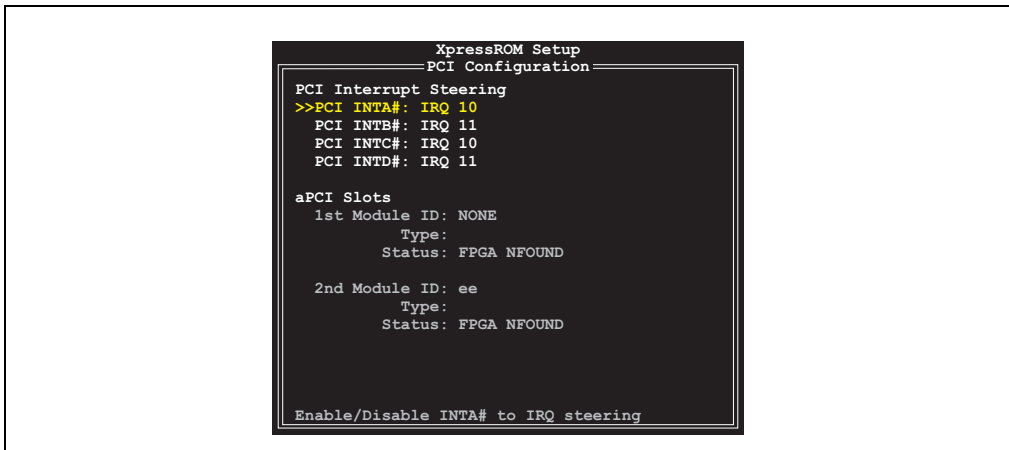


Figure 298: Motherboard device configuration - PCI configuration

BIOS setting	Meaning	Setting options	Effect
PCI INTA#	Activates the IRQ for the Ethernet controller.	Disabled	No IRQ is reserved.
		3, 4, 5, 6, 7, 9, 10, 11, 12, 14 or 15	Manual configuration of the IRQ.
PCI INTB#	Activates IRQ for aPCI slot 1. 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	Manual configuration of the IRQ.

Table 159: BIOS PCI configuration menu

BIOS setting	Meaning	Setting options	Effect
PCI INTC#	Activates IRQ for aPCI slot 2. First IRQ for aPCI slot 2 and IRQ for IRQ for aPCI slot 1.	Disabled	No IRQ is reserved.
		3, 4, 5, 6, 7, 9, 10, 11, 12, 14 or 15	Manual configuration of the IRQ.
PCI INTD#	Activates IRQ for the USB controller. Second IRQ for aPCI slot 2.	Disabled	No IRQ is reserved.
		3, 4, 5, 6, 7, 9, 10, 11, 12, 14 or 15	Manual configuration of the IRQ.
aPCI slots	Information about aPCI modules located in the aPCI slots of the Power Panel device are displayed here.	None	-

Table 159: BIOS PCI configuration menu (Forts.)

### Motherboard device configuration - USB configuration

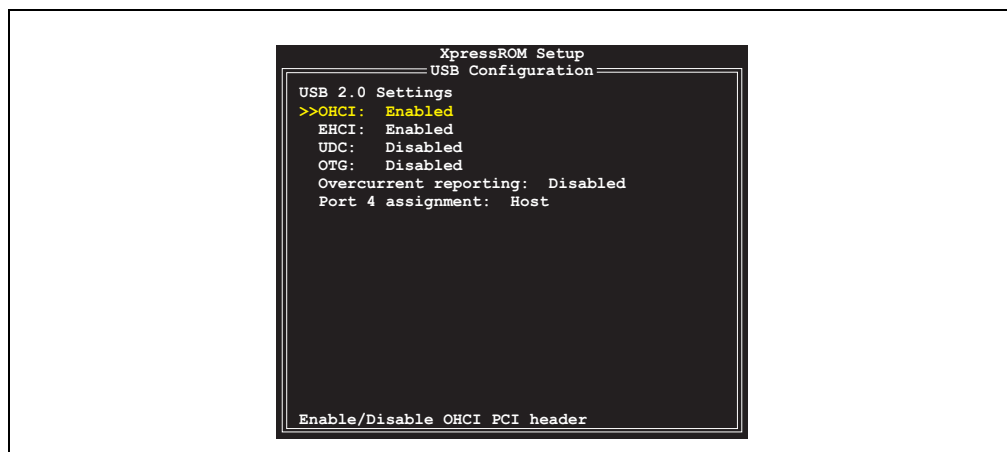


Figure 299: Motherboard device configuration - USB configuration

BIOS setting	Meaning	Setting options	Effect
OHCI	Turns USB 1.0/1.1 support on/off (OHCI - Open Host Controller Interface).	Enabled	Activates the USB port.
		Disabled	Deactivates the USB port.
EHCI	Turns USB 2.0 support on/off (EHCI - Enhanced Host Controller Interface).	Enabled	Enables this function.
		Disabled	Disables this function.
UDC	Turns the USB device controller on/off. When on, only the PCI config space is activated in BIOS.	Enabled	Enables this function.
		Disabled	Disables this function.
OTG	Turns the On-to-Go device on/off. Only the PCI config space is activated in BIOS.	Enabled	Enables this function.
		Disabled	Disables this function.

Table 160: BIOS USB configuration menu

BIOS setting	Meaning	Setting options	Effect
Overcurrent reporting	This function enables an automatic message This function enables an automatic error message to be sent to the system when the USB hub is overloaded (e.g. in Windows XP embedded).	Enabled	Enables this function.
		Disabled	Disables this function.
Port 4 assignment	With this option, USB port 4 can be configured.	Host	Functions as host.
		Device	Functions as device (two computers can be connected via port 4 - Master -> Slave).
		Not used	In BIOS, the default value (=Host) is assigned.

Table 160: BIOS USB configuration menu

### Motherboard device configuration - thermal configuration

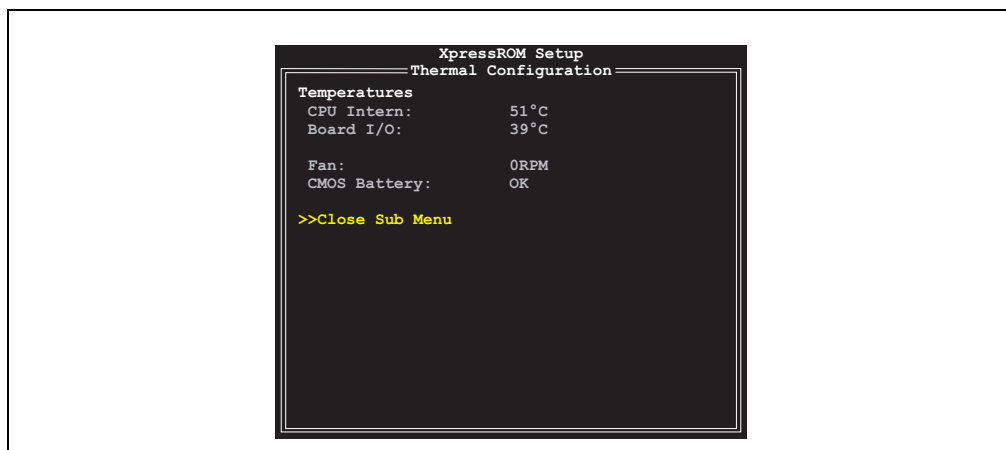


Figure 300: Motherboard device configuration - thermal configuration

BIOS setting	Meaning	Setting options	Effect
CPU internal	Displays the current internal processor temperature.	None	-
Board I/O	Indicates the current board I/O temperature.	None	-
Fan	Displays fan speed for the selected panel (depending on features).	None	-
CMOS battery	The status of the built-in CMOS battery is displayed here. Possible displays: <b>OK</b> - Battery is ok, <b>Bad</b> - Battery must be replaced.	None	-
Close submenu	Close submenu	Enter	Closes the submenu.

Table 161: BIOS thermal configuration menu

### 1.4.5 Memory and cache optimization

## Warning!

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

Incorrectly setting "Memory optimization" values can cause instability and even cause the entire system not to boot. If the Power Panel can no longer be booted, then the default BIOS values can be restored by pushing the reset button three times (see section 1.5.8 "Restoring the default BIOS values", on page 461).

## 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.

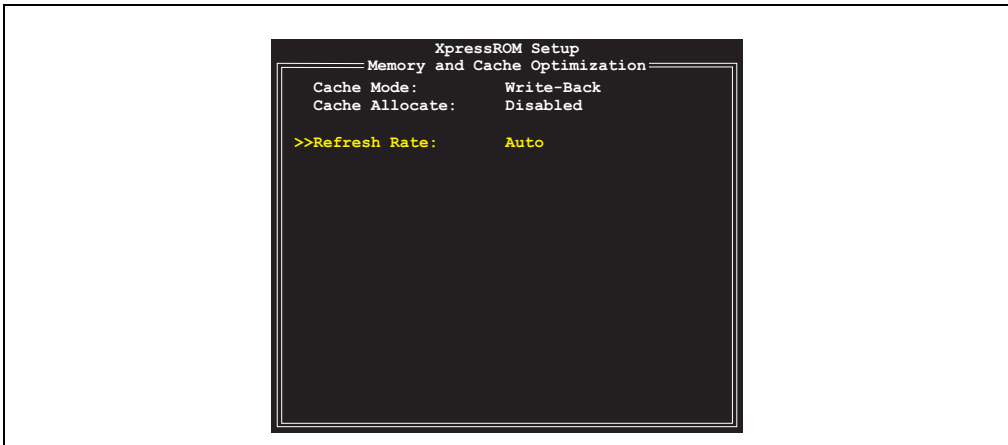


Figure 301: Memory and cache optimization

BIOS setting	Meaning	Setting options	Effect
Cache mode	Using cache mode, write accesses are determined on the cache.	Write back	The data is only written in the main memory if necessary (main memory and cache do not have the same information content).
		Write through	Data is written to the cache and to the main memory.
Cache allocate	The cache is divided into memory levels.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 162: BIOS memory and cache optimization menu

BIOS setting	Meaning	Setting options	Effect
Refresh rate	The refresh cycle can be set here.  <b>Information:</b> Enter the clock frequency, the chipset does the rest.	Auto	Value selected automatically.
		15µs, 3µs, 7µs, 31µs, 62µs or 125µs	Value set manually.

Table 162: BIOS memory and cache optimization menu (Forts.)

### 1.4.6 System clock/PLL configuration

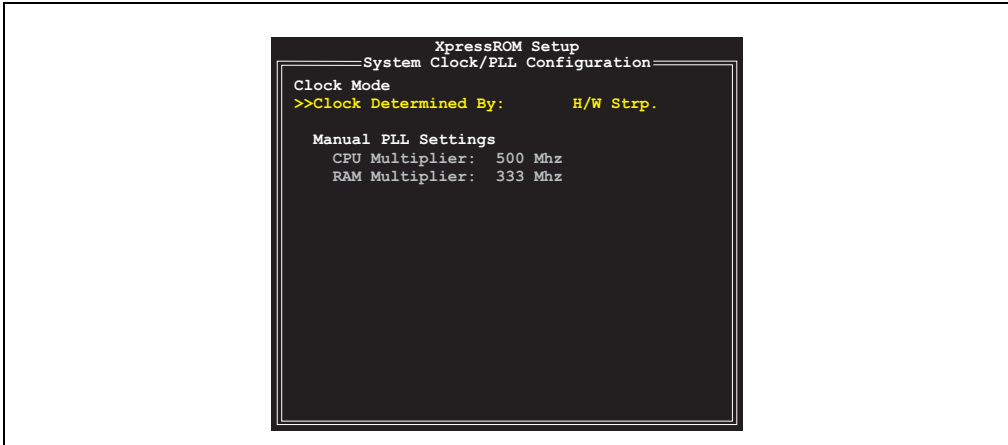


Figure 302: System clock/PLL configuration

BIOS setting	Meaning	Setting options	Effect
Clock determined by	The processor clock can be set with this option.	H/W strapping	Value is set automatically.
		Manual	Value must be set manually (CPU multiplier, RAM multiplier).
CPU multiplier	The CPU multiplier can be selected with this option.  <b>Information:</b> This value can only be set if the BIOS setting "Clock determined by" is set to <i>Manual</i> .	None	-
		233 MHz, 266 MHz, 300 MHz, 333 MHz, 366 MHz, 400 MHz, 433 MHz, 466 MHz, 500 MHz	Value set manually.
RAM multiplier	The RAM multiplier can be selected with this option.  <b>Information:</b> This value can only be set if the BIOS setting "Clock determined by" is set to <i>Manual</i> .	None	-
		233 MHz, 266 MHz, 300 MHz, 333 MHz, 366 MHz, 400 MHz, 433 MHz, 466 MHz, 500 MHz	Value set manually.

Table 163: System clock/PLL configuration

### 1.4.7 Power management

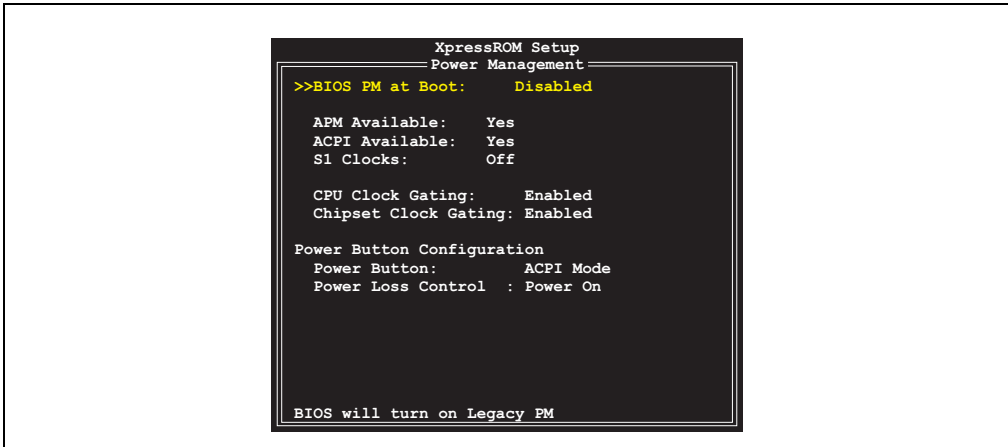


Figure 303: Power management

BIOS setting	Meaning	Setting options	Effect
BIOS PM at boot	Power Management is already enabled in the boot phase.	Enabled	Enables this function.
		Disabled	Disables this function.
APM available	Under this option you can set whether the operating system is allowed to change the BIOS power management settings.	Yes	Enables this function.
		No	Disables this function.
ACPI available	The ACPI (Advanced Configuration and Power Interface) option is an extended PnP and power management function.	Yes	Enables this function.
		No	Disables this function.
S1 clocks	The processor can be "stopped" with this option.	Off	Disables this function.
		On	Enables this function.
CPU clock gating	During power management, the clock lines are turned off for devices connected to the CPU.	Enabled	Enables this function.
		Disabled	Disables this function.
Chipset clock gating	During power management, the clock lines are turned off for devices connected to the chipset.	Enabled	Enables this function.
		Disabled	Disables this function.
Power button	This option determines how the Power button will function.	ACPI mode	When the power button is pressed and held for 4 seconds, the Power Panel is switched off without shutting down the operating system.
		Instant off	Turns off immediately.
Power Loss Control	This option determines what should occur after a power failure.	Power-on	The device turns back on.
		Stay off	Device remains off.

Table 164: BIOS power management menu

1.4.8 Device information

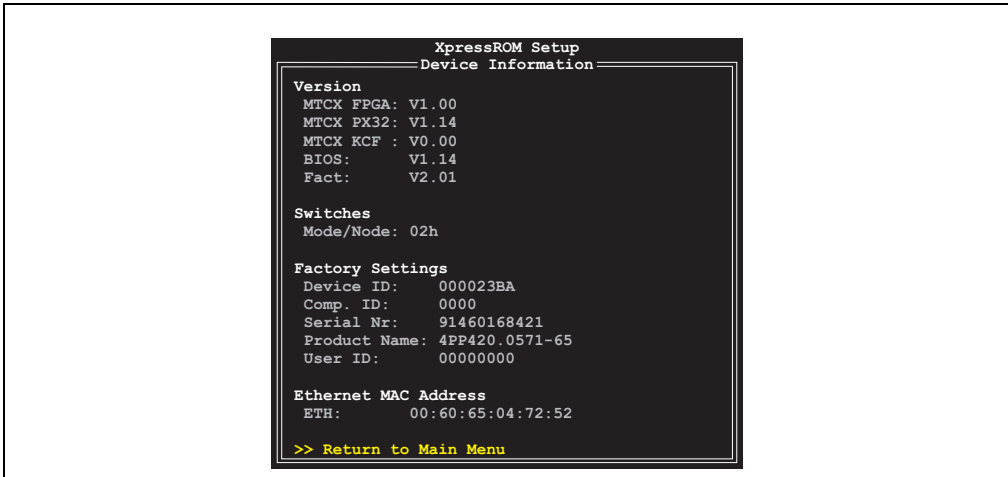


Figure 304: Device information

BIOS setting	Meaning	Setting options	Effect
MTXC FPGA	The FPGA firmware version is displayed here.	None	-
MTCX PX32	The MTCX firmware version is displayed here.	None	-
MTCX KCF	The KCF (Key Configuration File) version is displayed here.	None	-
BIOS	The BIOS version is displayed here.	None	-
Fact	The version of the factory settings is displayed here.	None	-
Mode/Node	Displays the current mode/node switch position.	None	-
Device ID	Hex value for the device code of the Power Panel device.	None	-
Comp. ID	The compatibility code of the Power Panel device is displayed here.	None	-
Serial no.	The serial number of the Power Panel device is displayed here.	None	-
Product name	The product name of the Power Panel device is displayed here.	None	-
User ID	Displays the User ID. This 8 digit hex value can be freely assigned by the user (e.g. to give the device a unique ID) and can only be changed with using the "B&R Control Center" via the ADI driver.	None	-

Table 165: BIOS device information menu



BIOS setting	Meaning	Setting options	Effect
ETH	The MAC address of the Ethernet interface is displayed here.	None	-

Table 165: BIOS device information menu (Forts.)

### 1.4.9 Miscellaneous configuration

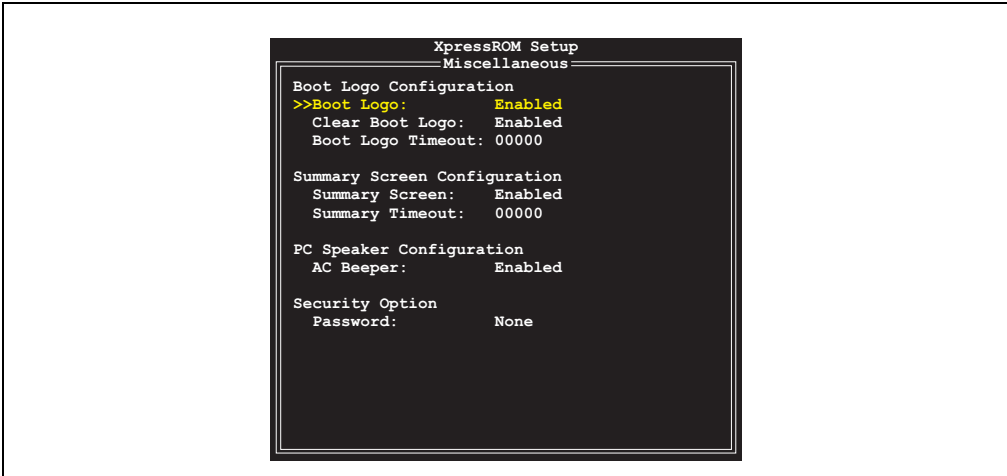


Figure 305: Miscellaneous configuration

BIOS setting	Meaning	Setting options	Effect
Boot logo <sup>1)</sup>	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 no customized bitmap is shown.
Clear boot logo	BIOS automatically clears the boot logo after starting in order to reduce the boot time.	Disabled	The boot logo is removed.
		Enabled	Disables this function.
Boot logo timeout	Defines the 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 manually set value in milliseconds that must pass before the boot process continues. -
Summary screen	Displays information about BIOS, VGA, VSA versions, devices found, etc.	Disabled	Shows the summary screen.
		Enabled	Hides the summary screen.

Table 166: BIOS miscellaneous configuration menu

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

Table 166: BIOS miscellaneous configuration menu (Forts.)

1) The standard B&R boot logo is pre-configured upon delivery.

### 1.4.10 Boot order

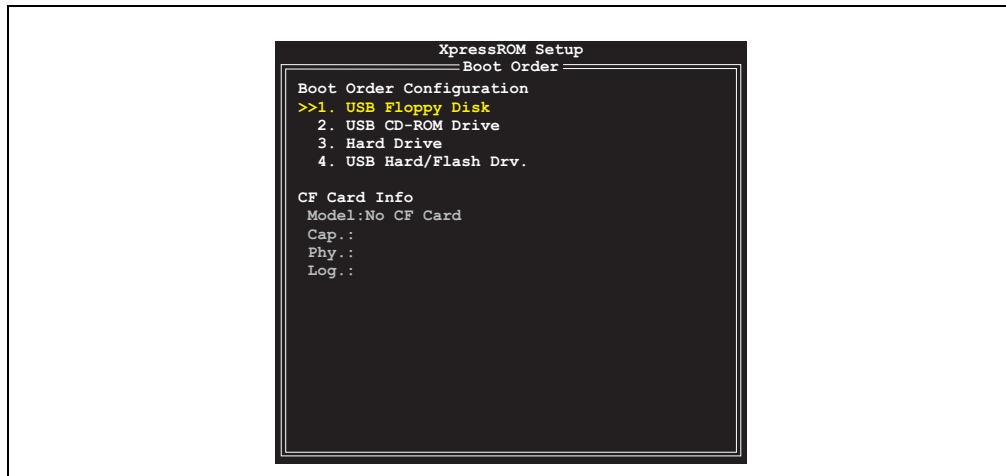


Figure 306: Boot order

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

Table 167: BIOS drive configuration menu

### 1.4.11 Load defaults

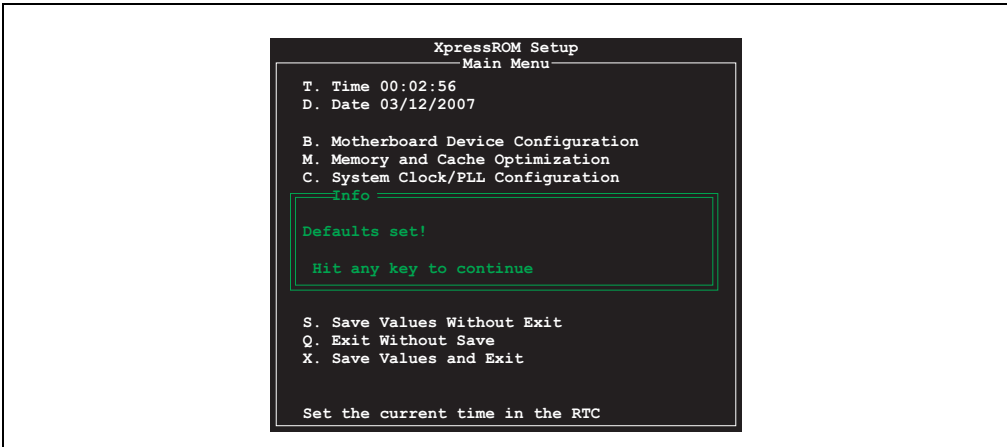


Figure 307: Load defaults

Under this BIOS menu item (shortcut "L"), by pressing any key you can load the values that were set at the time BIOS setup was opened. All changes made up to that point are lost as a result.

### Restoring the default BIOS values

The BIOS default values can also be restored without entering the BIOS setup. For procedure, see Section 1.5.8 "Restoring the default BIOS values", on page 461.

### 1.4.12 Save values without exit

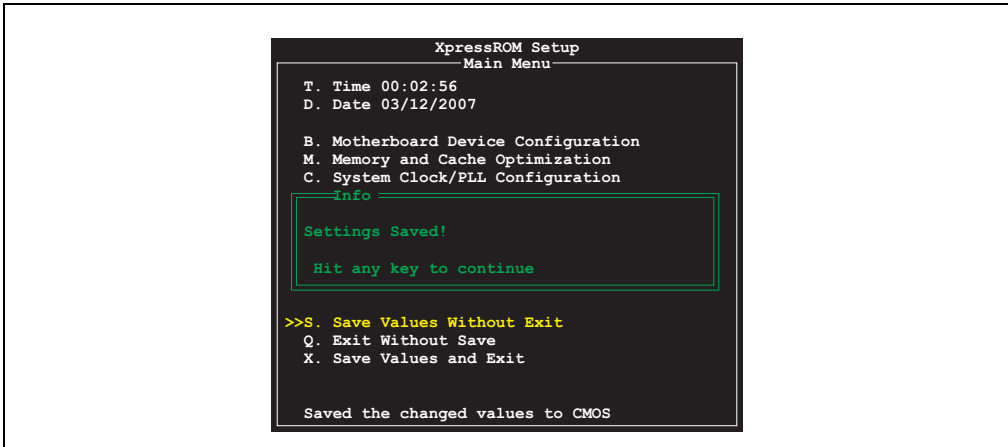


Figure 308: Save values without exit

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

### 1.4.13 Exit without save

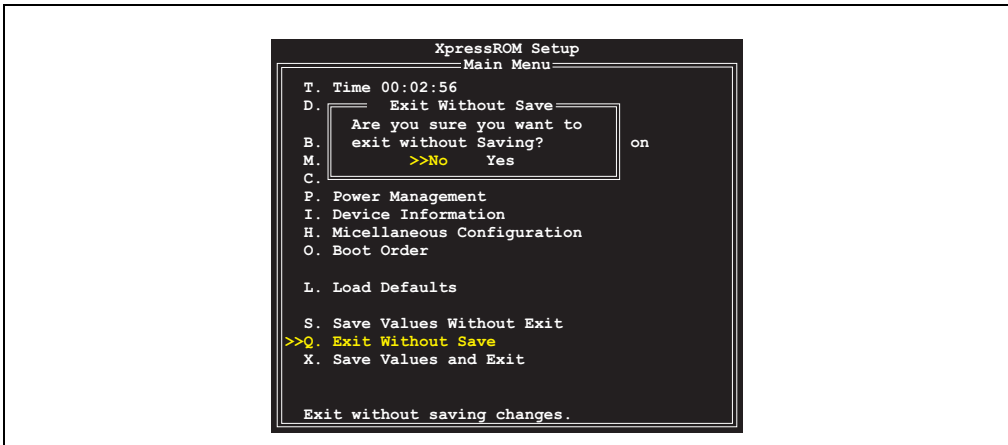


Figure 309: Exit without save

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

## Information:

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

### 1.4.14 Save values and exit

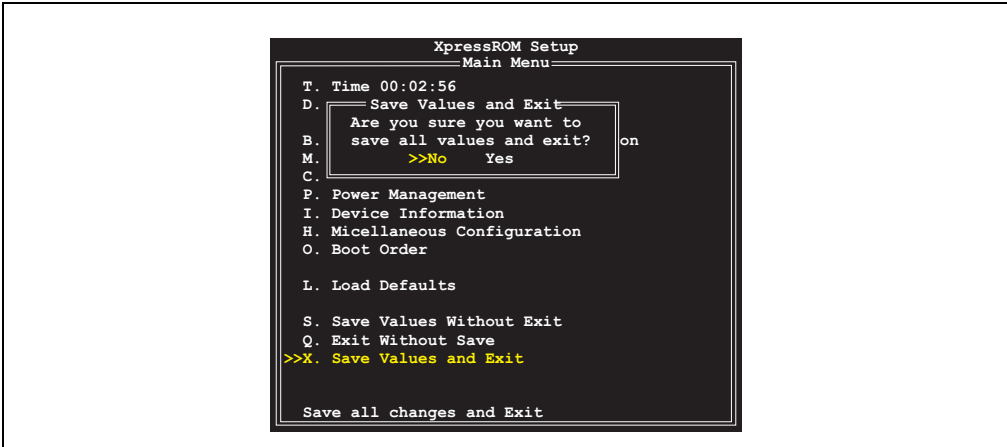


Figure 310: Save values and exit

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

## Information:

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

## 1.5 BIOS default values

The BIOS default values are the BIOS settings that were already configured when the PPC300 was delivered. The BIOS default values are identical in all variants (QVGA, VGA, SVGA and XGA).

### 1.5.1 Motherboard device configuration

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

Table 168: Motherboard device configuration default values

Drive configuration	Default value
Fan	-
Battery	-

Table 168: Motherboard device configuration default values (Forts.)

### 1.5.2 Memory and cache optimization

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

Table 169: Memory and cache optimization default values

### 1.5.3 System clock/PLL configuration

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

Table 170: System clock/PLL configuration default values

### 1.5.4 Power management

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

Table 171: Power management default values

### 1.5.5 Device information

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



### 1.5.6 Miscellaneous configuration

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

Table 172: Miscellaneous configuration default values

### 1.5.7 Boot order

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

Table 173: Boot order default values

### 1.5.8 Restoring the default BIOS values

In the event that the BIOS settings become incorrectly defined (e.g. USB Keyboard Support disabled, crash during operating system startup), the BIOS default values can be restored using the following procedure.

Procedure:

- Switch mode/node switches to 0-0.
- Press the reset button three times (procedure: press - wait for beep - press - wait for beep - press - wait for beep).

## 1.6 Software updates

The following Power Panel device software and firmware can be updated:

- BIOS (see page 470)
- MTCX firmware (see page 473)
- aPCI firmware (see page 475)
- User Boot Logo (see page 476)

Current software can be downloaded directly from the service portal on the B&R homepage ([www.br-automation.com](http://www.br-automation.com)).

The version information can be found in the corresponding BIOS setup pages, or via ADI "Control Center" (included in Windows XP embedded and Windows CE).

## 1.7 CMOS backup

To protect CMOS data, a CMOS backup has been integrated into BIOS. If the BIOS setup was ended using "Save values and exit" and the Power Panel device was successfully restarted, then the CMOS data is burned to flash memory. If the CMOS checksum is incorrect during startup (battery empty) or the Power Panel device cannot be booted correctly on three consecutive attempts, then the salvaged data from flash memory is copied again to CMOS. Setup is back to its original state, except for the time.

## 1.8 Distribution of resources

### 1.8.1 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 - 000FFFFF	XpressROM BIOS
00100000 - BC_RAM_TOP	Remaining DRAM and VGA memory
D0000000 - FBFFFFFF	PCI memory and PCI ROM (are dynamically assigned during POST)
FFE00000 - FFFFFFFF	High BIOS area (flash memory)

Table 174: RAM address assignment

### 1.8.2 DMA channel assignment

DMA channel	Resource
0	Freely available
1	Freely available
2	Freely available
3	Freely available
4	Freely available
5	Freely available
6	Freely available
7	Freely available

Table 175: DMA channel assignment

### 1.8.3 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 - 02E8	Audio (not supported)
02EF - 02FF	COM2
0376 - 0377	Secondary IDE channel
03B0 - 03BB	Video controller
03C0 - 03DF	Video controller
03E8 - 03EF	COM3
03F0 - 03F5	Floppy controller (emulated by Legacy USB)
03F6 - 03F7	Primary IDE
03F8 - 03FF	COM1
0480 - 048F	DMA channel high page registers
04D0 - 04D1	Interrupt edge/level registers
0CF8 - 0CFF	PCI configuration registers

Table 176: I/O address assignment

In addition, the I/O addresses that were selected for additional functions (COM, etc.) are assigned.

## 1.8.4 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	PCI configuration space
IRQ 6	Disk drive
IRQ 7	PCI configuration space
IRQ 8	RTC (real-time clock)
IRQ 9	PCI configuration space
IRQ 10	PCI configuration space
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	PCI configuration space

Table 177: Interrupt assignment

1) BIOS setup default setting.

## 2. Power Panel 300/400 with Automation Runtime

### 2.1 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 especially for use with control technology. The cycle time for your application can be separated among several task classes. Automation Runtime ensures that all application programs are executed within defined time periods, proving itself to be a configurable, deterministic real-time multitasking system.

An extensive project can be divided into small individual tasks. This way of working increases modularity and makes it much easier to maintain projects.

#### 2.1.1 Summary screen

When switching on a Power Panel 300/400 device, a summary screen displays the most important parameters of an Automation Runtime Power Panel device:

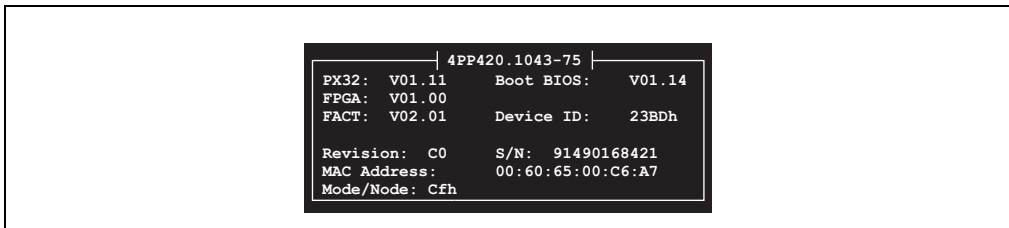


Figure 311: Automation Runtime summary screen - ex. 4PP420.1043-75

Information	Example value	Meaning
PX32	V01.11	Displays the MTCX PX32 firmware version.
FPGA	V01.00	Displays the MTCX FPGA firmware version.
FACT	V02.01	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>
Boot BIOS	V01.14	Displays the BIOS boot version.
Device ID	23BDh	Displays the hexadecimal value of the hardware device number.
Revision	C0	Hardware revision of the Power Panel.
S/N	91270168459	Displays the Power Panel device series number.
MAC address	00:60:65:00:C6:A7	Displays the assigned media access control (MAC) address.
Mode/Node	Cfh	Displays the current operating mode switch positions.

Table 178: Automation Runtime summary screen

## 2.2 Control and visualization with the Power Panel 300 device

The visualization project runs on the Power Panel 300. 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.

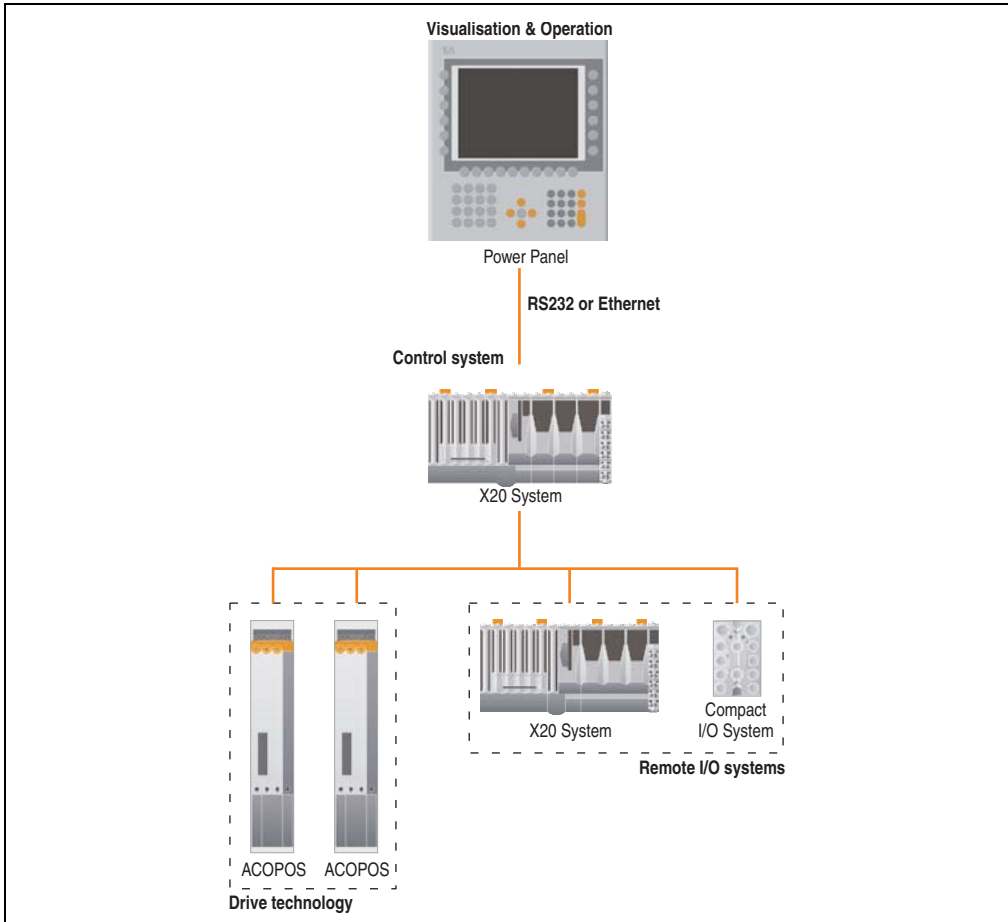


Figure 312: Power Panel 300 as an intelligent visualization system

### 2.3 Power Panel 400 with Power Panel 300 terminals

The control program and the visualization run on the Power Panel 400. I/O peripherals and drives are connected via CAN X2X or POWERLINK. Other Power Panel 300 units are connected as terminals via Ethernet TCP/IP. Central data storage takes place on the Power Panel 400.

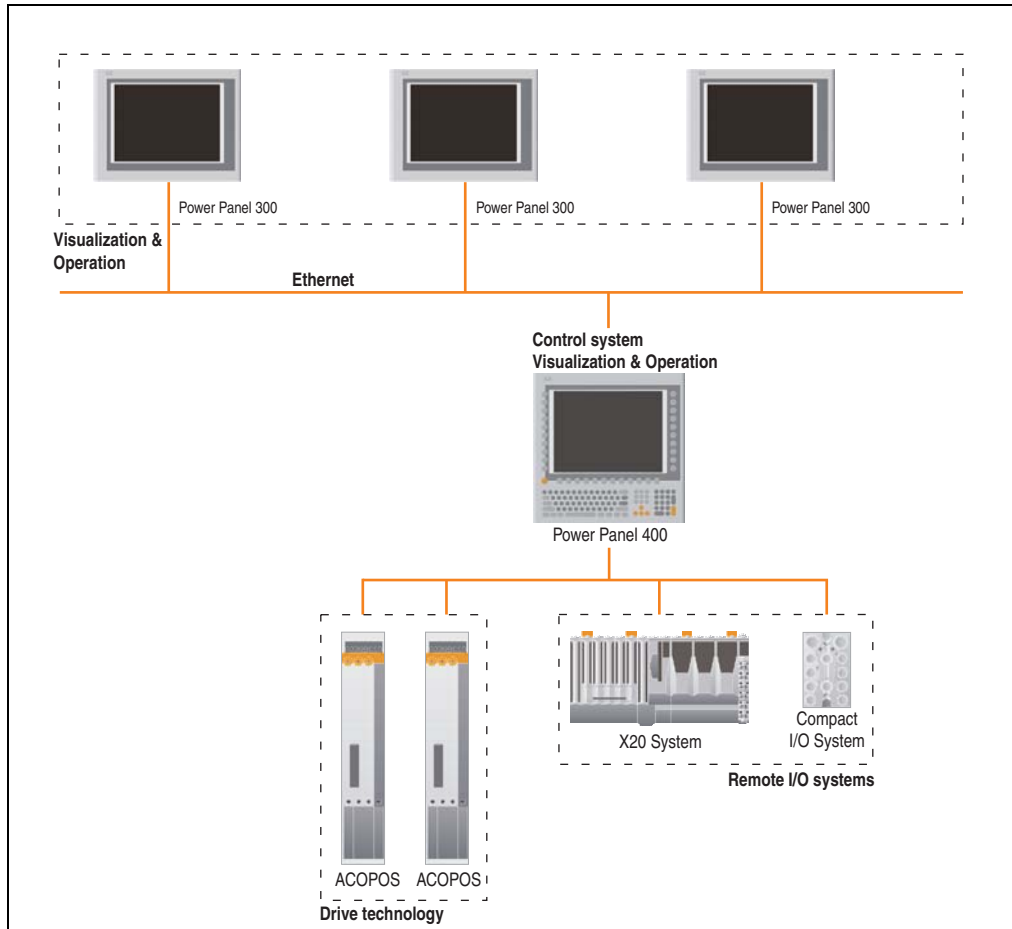


Figure 313: Power Panel 400 with, e.g. Power Panel 300 terminals

A CompactFlash is required in the Power Panel 300 and Power Panel 400 terminal devices.



## 2.4 Software updates

The following Power Panel Automation Runtime device software and firmware can be updated:

- BIOS (see page 470)
- MTCX firmware (see page 473)

Current software can be downloaded directly from the service portal on the B&R homepage ([www.br-automation.com](http://www.br-automation.com)).

The version information can be found in the corresponding BIOS setup pages, or via ADI "Control Center" (included in Windows XP embedded and Windows CE).

## 3. Upgrade information

### Information:

Starting with BIOS Version V1.16, Automation Runtime devices can boot using bootable USB media (USB floppy drives, USB flash drives, etc.) in Mode/Node switch setting "00".

Otherwise the upgrade must be done using a CompactFlash card.

### Information:

The upgrade can be made using a bootable medium or via the B&R control center. See the B&R ADI help for more information about upgrading via the B&R Control Center.

### 3.1 BIOS upgrade

An upgrade might be necessary for the following reason:

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

A current BIOS upgrade can be downloaded directly from the service portal on the B&R homepage ([www.br-automation.com](http://www.br-automation.com)).

#### 3.1.1 What information do I need?

### Information:

Individually saved BIOS settings are deleted when upgrading the BIOS.

### 3.1.2 Procedure

The following steps should be carried out to upgrade or save BIOS:

- Create bootable media.

#### Information:

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

Information concerning creating a bootable diskette in Windows XP can be found on page 479.

Information concerning creating a USB flash drive for a B&R upgrade can be found on page 481.

Information concerning creating a CompactFlash card for a B&R upgrade can be found on page 483.

- Copy the contents of the \*.zip file to the bootable media. If the B&R upgrade was already added when the bootable media was created using the B&R Embedded OS Installer, then this step is not necessary.
- Connect the bootable media to the Power Panel and reboot the device. See section "Motherboard device configuration - drive configuration", on page 421 for the necessary settings for the Power Panel device when booting from a diskette.
- The following start menu will be shown after booting.

```
Microsoft Windows Startup Menu
=====

1. Update BIOS
2. Save BIOS
3. Exit

Enter a choice: _
```

Figure 314: BIOS upgrade start menu

Item	Menu item	Description
1	Update BIOS	<p>All areas of BIOS are automatically upgraded (default after 5 seconds).</p> <p><b>Information:</b></p> <p>Settings that have been changed in BIOS setup must be set again after the update.</p> <p>The update process may not be interrupted, as the Power Panel could no longer be started, and would have to be sent to B&amp;R for repair. Try to repeat an interrupted update process WITHOUT restarting the Power Panel, e.g. by starting the batch file UPDBIOS.BAT directly.</p>
2	Save BIOS	<p>BIOS is automatically saved in the SAVED directory.</p> <p><b>Information:</b></p> <p>It's necessary to have up to 256 kB of free space on the disk.</p>
3	Exit	Returns to the shell (MS-DOS).

Table 179: BIOS upgrade menu description

### Information:

If you do not press a button within 5 seconds, then step 1 "Update BIOS" is automatically carried out and the Power Panel is automatically updated.

- The system must be rebooted after a successful upgrade.

## 3.2 MTCX Firmware upgrade (MTCX FPGA, MTCX PX32)

A current MTCX Firmware (MTCX FPGA and MTCX PX32) upgrade can be downloaded directly from the service portal on the B&R homepage ([www.br-automation.com](http://www.br-automation.com)).

### 3.2.1 Procedure

To carry out a firmware upgrade, the following steps should be taken:

- Create bootable media.

#### Information:

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

Information concerning creating a bootable diskette in Windows XP can be found on page 479.

Information concerning creating a USB flash drive for a B&R upgrade can be found on page 481.

Information concerning creating a CompactFlash card for a B&R upgrade can be found on page 483.

- Copy the contents of the \*.zip file to the bootable media. If the B&R upgrade was already added when the bootable media was created using the B&R Embedded OS Installer, then this step is not necessary.
- Connect the bootable media to the Power Panel and reboot the device.
- A boot menu with the following options is displayed after booting:

```

Microsoft Windows Startup Menu
=====

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

Enter a choice: _

```

Figure 315: MTCX upgrade start menu

Concerning item 1:

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

### **Warning!**

**The upgrade procedure must not be interrupted! Otherwise, the Power Panel may no longer restart, and must be sent to B&R for repair. Try to repeat an interrupted upgrade process WITHOUT restarting the Power Panel, e.g. by starting the batch file UPDMTCX.BAT directly.**

Concerning item 2:

Returns to the shell (MS-DOS).

- Select the desired action.
- Remove the bootable media and reboot the device (only after a successful update!).

### 3.3 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)).

#### 3.3.1 Procedure

The following steps should be taken to upgrade the aPCI module firmware:

- Create bootable media.

#### Information:

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

Information concerning creating a bootable diskette in Windows XP can be found on page 479.

Information concerning creating a USB flash drive for a B&R upgrade can be found on page 481.

Information concerning creating a CompactFlash card for a B&R upgrade can be found on page 483.

- Copy the contents of the \*.zip file to the bootable media. If the B&R upgrade was already added when the bootable media was created using the B&R Embedded OS Installer, then this step is not necessary.
- 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.

- Connect the bootable media to the Power Panel and reboot the device. See section "Motherboard device configuration - drive configuration", on page 421 for Power Panel devices for the necessary settings for the Power Panel device when booting from a diskette.
- The following start menu will be shown after booting:

```

Microsoft Windows Startup Menu
=====

1. Update FPGA firmware automatically
2. Update FPGA firmware of aPCI slot 1
3. Update FPGA firmware of aPCI slot 2
4. Save FPGA firmware of both aPCI slots
5. Exit

Enter a choice: _
    
```

Figure 316: aPCI firmware upgrade start menu

Item	Menu item	Description
1	Update FPGA firmware automatically	The firmware for both aPCI slots is automatically updated (default after 5 seconds). <b>Information:</b> According to the inserted modules, the aPCI FPGA firmware files are searched for automatically.
2	Update FPGA firmware of aPCI slot 1	Only firmware from aPCI slot 1 is updated. <b>Information:</b> If no aPCI module is present, the aPCI FPGA firmware file must be renamed "apci1.pci" (for aPCI slot 1) before updating.
3	Update FPGA firmware of aPCI slot 2	Only firmware from aPCI slot 2 is updated. <b>Information:</b> If no aPCI module is present, the aPCI FPGA firmware file must be renamed "apci2.pci" (for aPCI slot 2) before updating.
4	Save FPGA firmware of both aPCI slots	Firmware for both aPCI slots are automatically saved. <b>Information:</b> It's necessary to have up to 640 kB of free space on the disk.
5	Exit	Returns to the shell (MS-DOS).

Table 180: aPCI firmware upgrade menu description

## Information:

If you do not press a button within 5 seconds, then step 1 "Update FPGA firmware automatically" is automatically carried out and the Power Panel is automatically updated.

- The system must be rebooted after a successful upgrade.

### 3.4 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)).



### 3.4.1 Procedure

The following steps should be taken to update, save or delete a user boot logo:

- Create bootable media.

## Information:

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

Information concerning creating a bootable diskette in Windows XP can be found on page 479.

Information concerning creating a USB flash drive for a B&R upgrade can be found on page 481.

Information concerning creating a CompactFlash card for a B&R upgrade can be found on page 483.

- Copy the contents of the \*.zip file to the bootable media. If the B&R upgrade was already added when the bootable media was created using the B&R Embedded OS Installer, then this step is not necessary.
- Create the user boot logo according to section 3.4.2 "Guidelines for creating a user boot logo", on page 478 and copy to the bootable media.
- Connect the bootable media to the Power Panel and reboot the device. See section "Motherboard device configuration - drive configuration", on page 421 for the necessary settings for the Power Panel device when booting from a diskette.
- The following start menu will be shown after booting.

```

Microsoft Windows Startup Menu
=====

1. Update BIOS User Boot Logo
2. Update BIOS Default Boot Logo
3. Save BIOS Boot Logo
4. Delete BIOS Boot Logo
5. Exit

Enter a choice:_

```

Figure 317: User boot logo upgrade start menu

Item	Menu item	Description
1	Update BIOS user boot logo	The user boot logo is automatically updated with the file USERLOGO.ROM (default after 5 seconds).
2	Update BIOS default boot logo	The BIOS default boot logo for the device is automatically updated with the correct resolution.

Table 181: User boot logo upgrade menu description

Item	Menu item	Description
3	Save BIOS boot logo	The user boot logo is automatically saved in the file BOOTLOGO.SAV.  <b>Information:</b> <b>It's necessary to have up to 192 kB of free space on the disk.</b>
4	Delete BIOS boot logo	An existing user boot logo is deleted in the flash.
5	Exit	Returns to the shell (MS-DOS).

Table 181: User boot logo upgrade menu description (Forts.)

### Information:

**If you do not press a button within 5 seconds, then step 1 "Update BIOS User Boot Logo" is automatically carried out and the Power Panel is automatically updated.**

- The system must be rebooted after a successful upgrade.
- In the BIOS CMOS setup, the display of the boot logo must be set from "No" to "Yes" (see section 1.3.9 "Miscellaneous configuration", on page 432).

#### 3.4.2 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 rows of pixels), as these would be covered up. 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.

### 3.5 Creating a DOS boot diskette in Windows XP

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

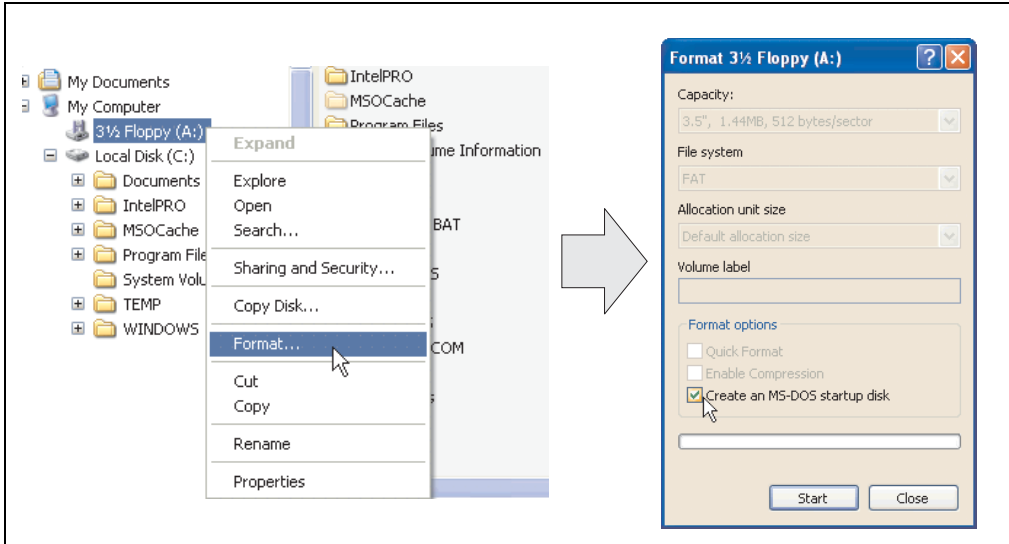


Figure 318: Creating a bootable diskette in Windows XP - step 1

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

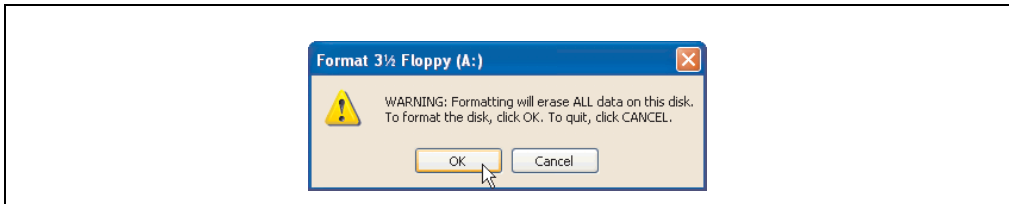


Figure 319: Creating a bootable diskette in Windows XP - step 2

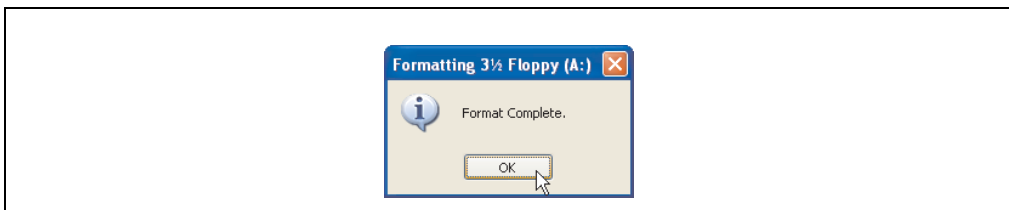


Figure 320: Creating a bootable diskette in Windows XP - step 3

## Software • Upgrade information

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

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

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

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

Figure 321: Creating a bootable diskette in Windows XP - step 4

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

Figure 322: Creating a bootable diskette in Windows XP - step 5

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

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

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

### 3.6.1 Requirements

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

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

### 3.6.2 Procedure

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

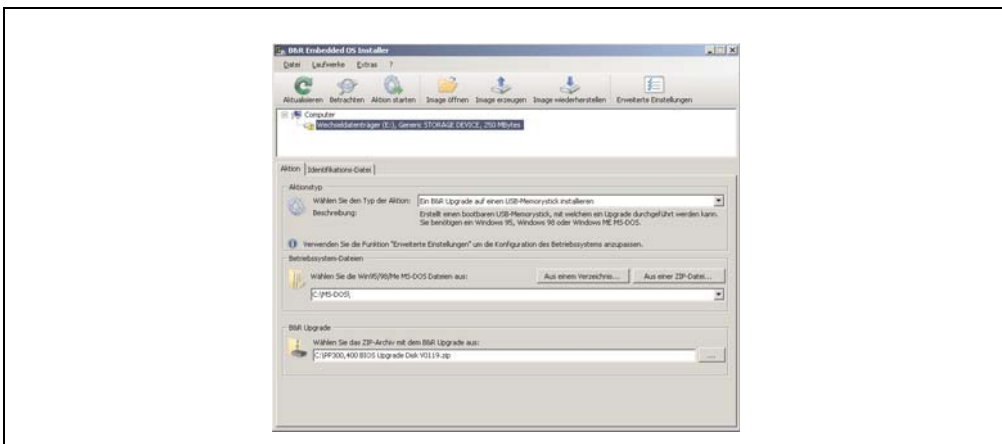


Figure 323: Creating a USB flash drive for B&R upgrade files

### 3.6.3 Where do I get MS-DOS?

Information concerning creating an MS-DOS boot diskette can be found in section 3.5 "Creating a DOS boot diskette in Windows XP", on page 479. Then the files from the diskette are to be copied to your hard drive.

### 3.7 Creating a bootable CompactFlash card for B&R upgrade files

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

#### 3.7.1 Requirements

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

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

#### 3.7.2 Procedure

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

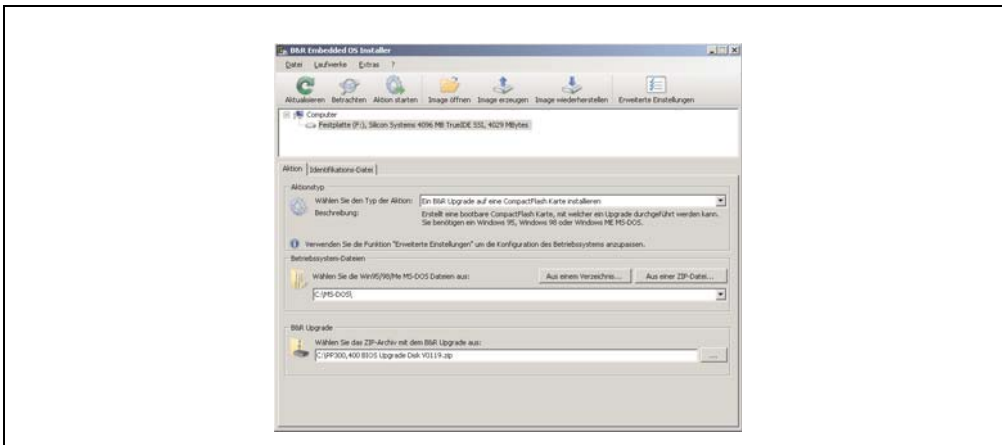


Figure 324: Creating a CompactFlash card for B&R upgrade files

### 3.7.3 Where do I get MS-DOS?

Information concerning creating an MS-DOS boot diskette can be found in section 3.5 "Creating a DOS boot diskette in Windows XP", on page 479. Then the files from the diskette are to be copied to your hard drive.



## 4. Power Panel with Windows CE



Figure 325: Windows CE logo

Model number	Short description	Note
5SWWCE.0521-ENG	<b>WinCE5.0 Pro PP300 LX800</b> Microsoft Windows CE 5.0 Professional, English; for PP300 BIOS devices 5PP320.0571-29, 5PP320.0571-39, 5PP320.0573-39, 5PP320.1043-39, 5PP320.1214-39, 5PP320.1505-39, order CompactFlash separately (at least 128 MB).	
5SWWCE.0522-ENG	<b>WinCE5.0 Pro PP400 LX800</b> Microsoft Windows CE 5.0 Professional, English; for Power Panel 400 BIOS; Order CompactFlash separately (min.128 MB).	
5SWWCE.0621-ENG	<b>WinCE5.0 ProPlus PP300 LX800</b> Microsoft Windows CE 5.0 Professional Plus, English; for PP300 BIOS devices 5PP320.0571-29, 5PP320.0571-39, 5PP320.0573-39, 5PP320.1043-39, 5PP320.1214-39, 5PP320.1505-39, order CompactFlash separately (at least 128 MB).	
5SWWCE.0622-ENG	<b>WinCE5.0 ProPlus PP400 LX800</b> Microsoft Windows CE 5.0 Professional plus, English; for Power Panel 400 BIOS; Order CompactFlash separately (min.128 MB).	
5SWWCE.0821-ENG	<b>WinCE6.0 Pro PP300 LX800</b> Microsoft Windows CE 6.0 Professional, English, including license; for PP300 BIOS devices 5PP320.0571-29, 5PP320.0571-39, 5PP320.0573-39, 5PP320.1043-39, 5PP320.1214-39, 5PP320.1505-39, order CompactFlash separately (at least 128 MB).	
5SWWCE.0822-ENG	<b>WinCE6.0 Pro PP400 LX800</b> Microsoft Windows CE 6.0 Professional, English; for Power Panel 400 BIOS; Order CompactFlash separately (min.128 MB).	

Table 182: Model numbers - Windows CE

### 4.1 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.

## 4.2 Windows CE 5.0 features

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

Features	Windows CE 5.0
Supported screen resolutions	QVGA (LCD), VGA (TFT), SVGA (TFT), XGA (TFT)
Color depth	16-bit / 65,536 colors <sup>1)</sup>
Graphics card driver	AMD Geode LX graphics card driver with screen rotation without DirectX
Main memory	Automatic detection and use of up to 512 MB RAM
Boot time / Startup time	Approx. 20 seconds
Screen rotation	The desktop can be turned in 90° intervals
Web browser	Internet Explorer 6.0 for Windows CE
.NET	Compact Framework 2.0 with SP1
Image size	Pro: Approx. 28 MB uncompressed ProPlus: Approx. 30 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 for any use	1

Table 183: Windows CE 5.0 features

1) The color depth depends on the display used.

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

### 4.3 Windows CE 6.0 features

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

Features	Windows CE 6.0
Supported screen resolutions	QVGA (LCD), VGA (TFT), SVGA (TFT), XGA (TFT)
Color depth	Default: 16-bit / 65,536 colors (can be changed to 32-bit using the B&R Control Center) <sup>1)</sup>
Graphics card driver	AMD Geode LX graphics card driver with screen rotation without DirectX
Main memory	Automatic detection and use of up to 512 MB RAM
Boot time / Startup time	Approx. 25 seconds
Screen rotation	The desktop can be turned in 90° intervals
Web browser	Internet Explorer 6.0 for Windows CE
.NET	Compact Framework 3.5
Image size	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 for any use	1

Table 184: Windows CE 6.0 features

1) The color depth depends on the display used.

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

### 4.4 Differences between Windows CE 6.0 and Windows CE 5.0

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

## 4.5 Requirements

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

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

## 4.6 Installation

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

### 4.6.1 B&R Embedded OS Installer

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

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

## 5. Power Panel with Windows XP embedded



Figure 326: Windows XP embedded Logo

Model number	Short description	Note
5SWWXP.0421-ENG	<b>WinXPe FP2007 PP300 LX800</b> Microsoft Windows XP embedded, English, Feature Pack 2007; for PP300 BIOS devices 5PP320.0571-29, 5PP320.0571-39, 5PP320.0573-39, 5PP320.1043-39, 5PP320.1214-39, 5PP320.1505-39, order CompactFlash separately (at least 512 MB). Only delivered with a new Power Panel.	
5SWWXP.0422-ENG	<b>WinXPe FP2007 PP400 LX800</b> Microsoft Windows XP Embedded Feature Pack 2007, English; for Power Panel 400; Order CompactFlash separately (min.512 MB).	

Table 185: Model number overview - Windows XP embedded

### 5.1 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.

### 5.2 Features with FP2007 (Feature Pack 2007)

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

Function	Present
Enhanced write filter (EWF)	✓
File Based Write Filter	✓
Page file	Configurable
Administrator account	✓
User account	Configurable
Explorer shell	✓

Table 186: Device functions in Windows XP embedded with FP2007

Function	Present
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 186: Device functions in Windows XP embedded with FP2007 (Forts.)

## 5.3 Installation

Windows XP embedded is generally preinstalled at B&R Austria on a suitable CompactFlash card (min. 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)).

## 6. Power Panel with Windows Embedded Standard 2009



Figure 327: Windows Embedded Standard 2009 Logo

Model number	Short description	Note
5SWWXP.0721-ENG	<b>Windows Embedded Standard 2009 PP300 LX800</b> Microsoft OEM Windows Embedded, Standard 2009, English; for Power Panel 300; order CompactFlash separately (at least 1 GB).	
5SWWXP.0722-ENG	<b>Windows Embedded Standard 2009 PP400 LX800</b> Microsoft OEM Windows Embedded Standard 2009, English; for Power Panel 400; Order CompactFlash separately (min.1 GByte).	

Table 187: Model numbers - Windows Embedded Standard 2009

### 6.1 General information

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

## 6.2 Features with WES2009 (Windows Embedded Standard 2009)

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

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

Table 188: Device functions in Windows Embedded Standard 2009



## 6.3 Installation

Upon request, Windows Embedded Standard 2009 can be preinstalled at B&R Austria on a suitable CompactFlash card (min. 1GB). The PP300/400 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.

## 6.4 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.

### 6.4.1 Touch screen driver

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

### Information:

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

## 7. VESA mode support

The following VESA standards (see [www.vesa.org](http://www.vesa.org)) are supported.

VESA mode	Resolution
101h	640 x 480 x 8
103h	800 x 600 x 8
105h	1024 x 768 x 8
107h	1280 x 1024 x 8
110h	640 x 480 x 15
111h	640 x 480 x 16
112h	640 x 480 x 24
113h	800 x 600 x 15
114h	800 x 600 x 16
115h	800 x 600 x 24
116h	1024 x 768 x 15
117h	1024 x 768 x 16
118h	1024 x 768 x 24
119h	1280 x 1024 x 15
11Ah	1280 x 1024 x 16
11Bh	1280 x 1024 x 24
<hr/>	
121h	320 x 240 x 8
122h	320 x 240 x 15
123h	320 x 240 x 16
124h	320 x 240 x 24
125h	1152 x 864 x 8
126h	1152 x 864 x 15
127h	1152 x 864 x 16
128h	1152 x 864 x 24
131h	1600 x 1200 x 8
132h	1600 x 1200 x 15
133h	1600 x 1200 x 16
134h	1600 x 1200 x 24
135h	1920 x 1440 x 8
136h	1920 x 1440 x 15
137h	1920 x 1440 x 16
138h	1920 x 1440 x 24

Table 189: Setting options - VESA mode

## 8. 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.

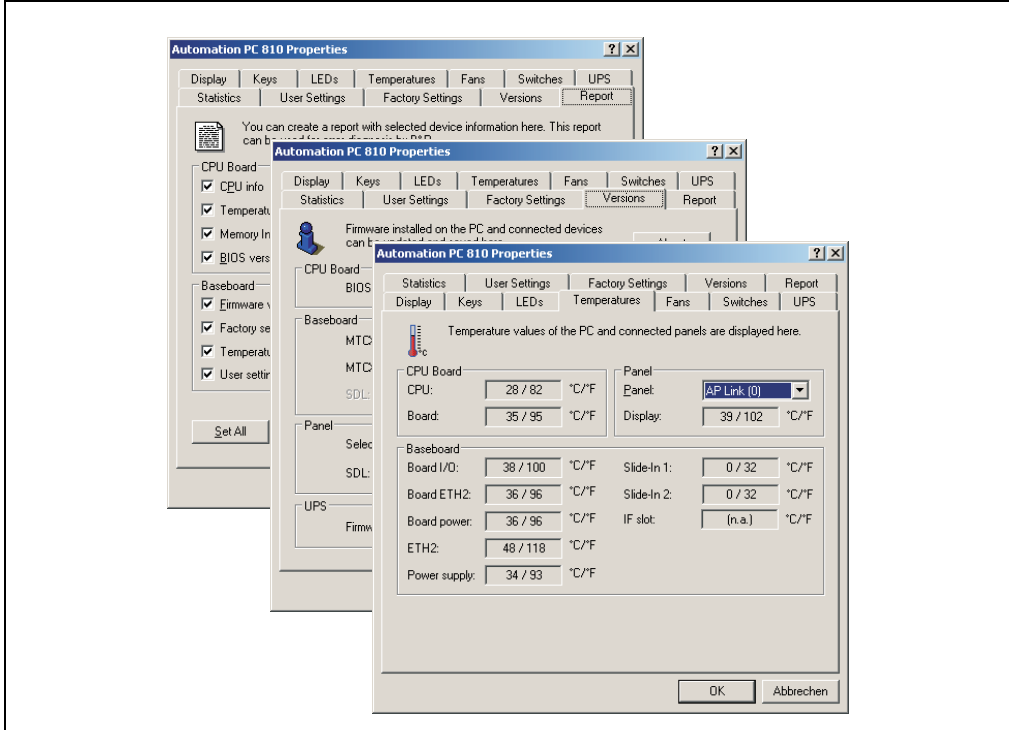


Figure 328: ADI Control Center screenshots - Examples (symbol photo)

### 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.

## 8.1 Functions

### Information:

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

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

Supports following systems:

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

## 8.2 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 directives

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

## 2. Overview of standards

Standard	Description
EN 55011 Class A	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 55022 Class A	Electromagnetic compatibility (EMC), radio disturbance 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)
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

Table 190: Overview of standards

## Standards and certifications • Overview of standards

Standard	Description
EN 61000-4-5	Electromagnetic compatibility (EMC) - part 4-5: Testing and measuring techniques; surge immunity test
EN 61000-4-6	Electromagnetic compatibility (EMC) - part 4-6: Testing and measuring techniques; immunity to conducted disturbances, induced by radio-frequency fields
EN 61000-4-8	Electromagnetic compatibility (EMC) - part 4-8: Testing and measuring techniques; power frequency magnetic field immunity test
EN 61000-4-11	Electromagnetic compatibility (EMC) - part 4-11: Testing and measuring techniques; voltage dips, short interruptions and voltage variations immunity tests
EN 61000-4-12	Electromagnetic compatibility (EMC) - part 4-12: Testing and measuring techniques; oscillatory waves immunity test
EN 61000-6-2	Electromagnetic compatibility (EMC), generic immunity standard - part 2: Industrial environment
EN 61000-6-4	Electromagnetic compatibility (EMC), generic emission standard - part 2: Industrial environment
EN 61131-2 IEC 61131-2	Product standard, programmable logic controllers - part 2: Equipment requirements and tests
NEMA 250 Type 4X	UL protection against sprayed water
UL 508	Industrial control equipment (UL = Underwriters Laboratories)
47 CFR	Federal Communications Commission (FCC), 47 CFR Part 15 Subpart B Class A

Table 190: Overview of standards (Forts.)



### 3. Emission requirements

Emissions	Test carried out according to	Limits according to
Network-related emissions	EN 55011 / EN 55022	EN 61000-6-4: 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 61000-6-4: 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)

Table 191: Overview of limits and testing guidelines for emissions

#### 3.1 Network-related emissions

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) und 53 - 43 dB (µA) Quasi-peak value 84 - 74 dB (µV) und 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

Table 192: Test requirements - Network-related emissions for industrial areas

## Standards and certifications • Emission requirements

Test carried out according to EN 55011 / EN 55022	Limit value in accordance with IEC 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 192: Test requirements - Network-related emissions for industrial areas (Forts.)

1) AC network connections only with EN 61131-2

### 3.2 Emissions, electromagnetic emissions

Test carried out according to EN 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 193: Test requirements - Electromagnetic emissions for industrial areas

## 4. Requirements for immunity to disturbances

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

Table 194: Overview of limits and testing guidelines for immunity

Evaluation criteria in accordance with EN 61000-6-2

### Criteria A:

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

### Criteria B:

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

### Criteria C:

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

### Criteria D:

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

## 4.1 Electrostatic discharge (ESD)

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

Table 195: Test requirements - Electrostatic discharge (ESD)

## 4.2 High-frequency electromagnetic fields (HF field)

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

Table 196: Test requirements - High-frequency electromagnetic fields (HF field)

### 4.3 High-speed transient electrical disturbances (burst)

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

Table 197: Test requirements - High-speed transient electrical disturbances (burst)

1) For EN 55024 without length limitation.

### 4.4 Surges

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

Table 198: Test requirements - Surge voltages

### 4.5 Conducted disturbances

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

Table 199: 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	
DC mains inputs/outputs	150 kHz - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	
Functional ground connections	0.15 - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, Length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	
Signal connections >3 m	0.15 - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, Length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	

Table 199: Test requirements - Conducted disturbances (Forts.)

### 4.6 Magnetic fields with electrical frequencies

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

Table 200: Test requirements - Magnetic fields with electrical frequencies

### 4.7 Voltage dips, fluctuations, and short-term interruptions

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

Table 201: 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		
Mains inputs/outputs, 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 202: Test requirements - Damped vibration

## 5. Mechanical conditions

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

Table 203: 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 204: Test requirements - Vibration during operation



## 5.2 Vibration during transport (packaged)

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

Table 205: 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, Duration 11 ms	

Table 206: 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	
Pulse (half-sine) stress in all 3 axes (x, y, z)	Acceleration 10 g, Duration 11 ms, each 3 shocks, packaged	Acceleration 30 g, Duration 6 ms, each 3 shocks, packaged	

Table 207: Test requirements - Shock during transport

## 5.5 Toppling

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

Table 208: 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						

Table 209: 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 210: 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 211: 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 212: 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 213: Test requirements - Dry cold

## 6.4 Large temperature fluctuations

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

Table 214: 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 control cabinets	3 hours at +5°C and 3 hours at +55°C, 2 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 215: Test requirements - Temperature fluctuations during operation

## 6.6 Humid heat, cyclic

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

Table 216: 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 217: 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 218: 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

Table 219: 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 Ω
	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 220: 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 MΩ at 500 V DC voltage		

Table 221: Test requirements - Insulation resistance

1) See EN 60204-1:1997 page 62, table 9.

## 7.3 High voltage

Test carried out according to EN 60660-1	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 overvoltage 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 222: Test requirements - High voltage

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

## 7.4 Voltage range

Test carried out according to	Limits according to EN 61131-2			
	Measurement value	Tolerance min/max		
Supply voltage	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 223: Test requirements - Voltage range

## 8. Other tests

Other tests	Test carried out according to	Limits according to
Function test	-	-
Optical test	-	-
Hot spot measurement	-	-
Protection	-	EN 60529: Degrees of protection provided by enclosures (IP code)
Mounting dimensions	-	B&R

Table 224: Overview of limits and testing guidelines for other tests

### 8.1 Protection

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 225: Test requirements - Protection



## 9. International certifications

B&R products and services comply with applicable standards. They are international standards from organizations such as ISO, IEC and CENELEC, as well as national standards from organizations such as UL, CSA, FCC, VDE, ÖVE, etc. We give special consideration to the reliability of our products in an industrial environment.



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

Table 226: International certifications



# Chapter 6 • Accessories

## 1. Overview

Model number	Product ID	Note
0AC201.91	<b>Lithium batteries, 4 pcs.</b> Lithium batteries, 4 pcs., 3 V / 950 mAh, button cell	
4A0006.00-000	<b>Lithium battery, 1 pc.</b> Lithium battery, 1 pc., 3 V / 950 mAh, button cell	
0TB103.9	<b>Plug 24V 5.08 3-pin screw clamp</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 clamp</b> 24 VDC 3-pin connector, female. Cage clamps, 3.31 mm <sup>2</sup> , protected against vibration by the screw flange	
5AC900.057X-00	<b>Legend strips 3x 5.7" vertical1</b> Legend strip template for Power Panel 4PP451.0571-65. For 3 devices.	
5AC900.057X-01	<b>Legend strips 2x 5.7" Horizontal2</b> Legend strip template for Power Panel 4PP452.0571-65. For 2 devices.	
5AC900.104X-00	<b>Legend strip 1x 10.4" Vertical1</b> Legend strip template for Power Panel 4PP451.1043-75 and 4PP481.1043-B5. For 1 device.	
5AC900.104X-01	<b>Legend strip 1x 10.4" Horizontal2</b> Legend strip template for Power Panel 4PP482.1043-75. For 1 device.	
5AC900.104X-02	<b>Legend strips 3x 10.4" Horizontal1</b> Legend strip template for Power Panel 4PP480.1043-75. For 3 devices.	
5AC900.150X-00	<b>Legend strips 4x 15"</b> Legend strip template for Power Panel 4PP481.1505-75, 4PP480.1505-75. For 4 devices.	
5CFCRD.0512-04	<b>CompactFlash 512 MB B&amp;R</b> CompactFlash card with 512 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.1024-04	<b>CompactFlash 1024 MB B&amp;R</b> CompactFlash card with 1024 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.2048-04	<b>CompactFlash 2048 MB B&amp;R</b> CompactFlash card with 2048 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.4096-04	<b>CompactFlash 4096 MB B&amp;R</b> CompactFlash card with 4096 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.8192-04	<b>CompactFlash 8192 MB B&amp;R</b> CompactFlash card with 8192 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.016G-04	<b>CompactFlash 16 GB B&amp;R</b> CompactFlash card with 16 GB SLC NAND flash and IDE/ATA interface	
5CFCRD.0064-03	<b>CompactFlash 64 MB SSI</b> CompactFlash card with 64 MB SLC NAND flash and IDE/ATA interface	

Table 227: Model numbers - Accessories

## Accessories • Overview

Model number	Product ID	Note
5CFCRD.0128-03	<b>CompactFlash 128 MB SSI</b> CompactFlash card with 128 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.0256-03	<b>CompactFlash 256 MB SSI</b> CompactFlash card with 256 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.0512-03	<b>CompactFlash 512 MB SSI</b> CompactFlash card with 512 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.1024-03	<b>CompactFlash 1024 MB SSI</b> CompactFlash card with 1024 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.2048-03	<b>CompactFlash 2048 MB SSI</b> CompactFlash card with 2048 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.4096-03	<b>CompactFlash 4096 MB SSI</b> CompactFlash card with 4096 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.8192-03	<b>CompactFlash 8192 MB SSI</b> CompactFlash card with 8192 MB SLC NAND flash and IDE/ATA interface	
5MMUSB.2048-00	<b>USB flash drive 2 GB SanDisk</b> USB 2.0 flash drive 2 GB	
5MMUSB.2048-01	<b>USB flash drive 2 GB B&amp;R</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 227: Model numbers - Accessories

## 2. Replacement CMOS batteries

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 (status "Bad") is insufficient (see "Changing the battery", on page 550).

### 2.1 Order data


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

Table 228: Order data - Lithium batteries

### 2.2 Technical data

#### Information:

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

The technical data is current as of when this manual was printed. We reserve the right to make changes.

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>Environmental characteristics</b>		
Storage temperature	-20 to +60°C	
Relative humidity	0 to 95% (non-condensing)	

Table 229: Technical data - Lithium batteries

## 2.3 Contents of delivery

Amount	Component
1 or 4	Lithium batteries

Table 230: Contents of delivery - 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	Image
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 231: Order data - TB103 supply plug

### 3.3 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.

The technical data is current as of when this manual was printed. We reserve the right to make changes.

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	$\leq 5 \text{ m}\Omega$	
Nominal voltage according to VDE / UL,CSA	250 V / 300 V	
Current load according to VDE / UL,CSA	14.5 A / 10 A per contact	
Terminal size	0.08 mm <sup>2</sup> - 3.31 mm <sup>2</sup>	
Cable type	Copper wires only (no aluminum wires!)	

Table 232: Technical data - TB103 supply plug

### 3.4 Contents of delivery

Amount	Component
1	Supply plug in desired design.

Table 233: Contents of delivery - TB103 supply plug



## 4. 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).

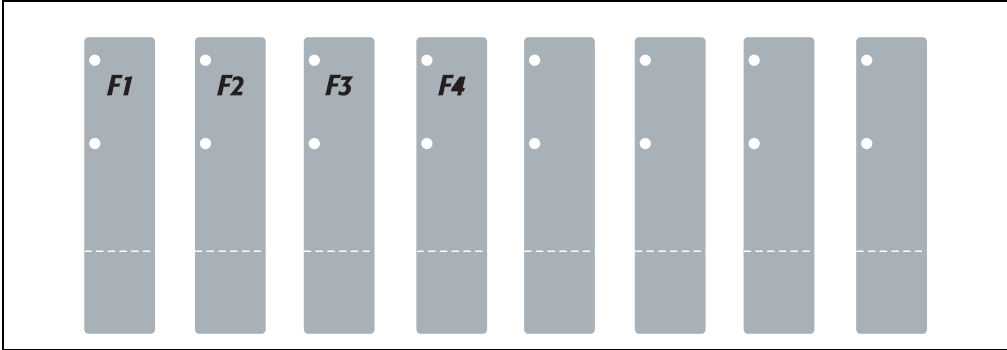


Figure 329: Legend strip templates

Printable legend strips (A4 format) can be ordered from B&R (see table 234 "Order data - Legend strip templates", on page 526). 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 version 7, 9 and 10) for the respective legend strip template can be downloaded from the B&R homepage [www.br-automation.com](http://www.br-automation.com)

### 4.1 Order data

Model number	Description	Image
5AC900.057X-00	<b>Legend strips 3x 5.7" vertical1</b> Legend strip template for Power Panel 4PP451.0571-65. 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 Panel 4PP452.0571-65. For 2 devices.	
5AC900.104X-00	<b>Legend strip 1x 10.4" Vertical1</b> Legend strip template for Power Panel 4PP451.1043-75 and 4PP481.1043-B5. For 1 device.	
5AC900.104X-01	<b>Legend strip 1x 10.4" Horizontal2</b> Legend strip template for Power Panel 4PP482.1043-75. For 1 device.	
5AC900.104X-02	<b>Legend strips 3x 10.4" Horizontal1</b> Legend strip template for Power Panel 4PP480.1043-75. For 3 devices.	
5AC900.150X-00	<b>Legend strips 4x 15"</b> Legend strip template for Power Panel 4PP481.1505-75, 4PP480.1505-75. For 4 devices.	

Table 234: Order data - Legend strip templates

## 5. CompactFlash cards 5CFCRD.xxxx-04

### 5.1 General information

#### Information:

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

### 5.2 Order data


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

Table 235: Order data - CompactFlash cards

### 5.3 Technical data

## Caution!

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

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

## Information:

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

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

Table 236: Technical data - CompactFlash cards 5CFCRD.xxxx-04

## Accessories • CompactFlash cards 5CFCRD.xxxx-04

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

Table 236: Technical data - CompactFlash cards 5CFCRD.xxxx-04 (Forts.)

- 1) Speed specification with 1X = 150 KB/s. All specifications refer to the Samsung Flash chips, CompactFlash cards in UDMA mode 4, 30 ns cycle time in True-IDE mode with sequential write/read test.
- 2) The file is written/read sequentially in True IDE mode with the DOS program Thruput.exe.
- 3) Endurance of B&R CF cards (linear written block size with 128 kB)
- 4) Depending on the average file size.
- 5) Not supported by B&R Embedded OS installer.

### 5.3.1 Temperature humidity diagram - Operation and storage

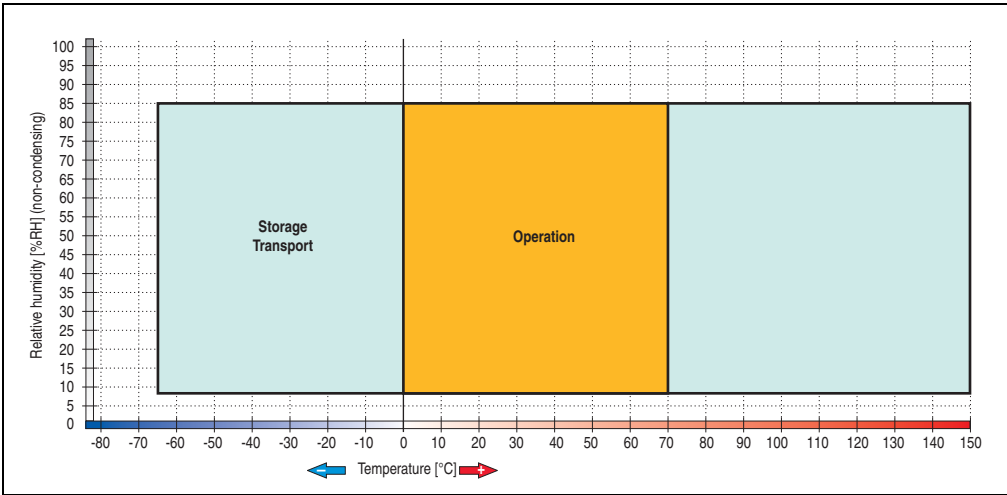


Figure 330: Temperature humidity diagram - CompactFlash cards 5CFCRD.xxxx-04

### 5.4 Dimensions

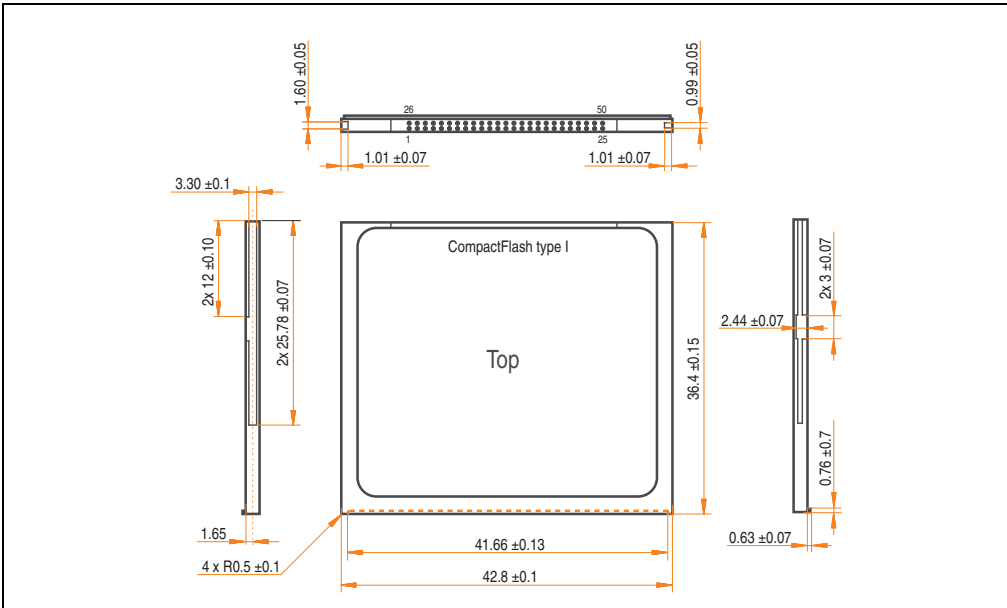


Figure 331: Dimensions - CompactFlash card Type I

## 5.5 Benchmark

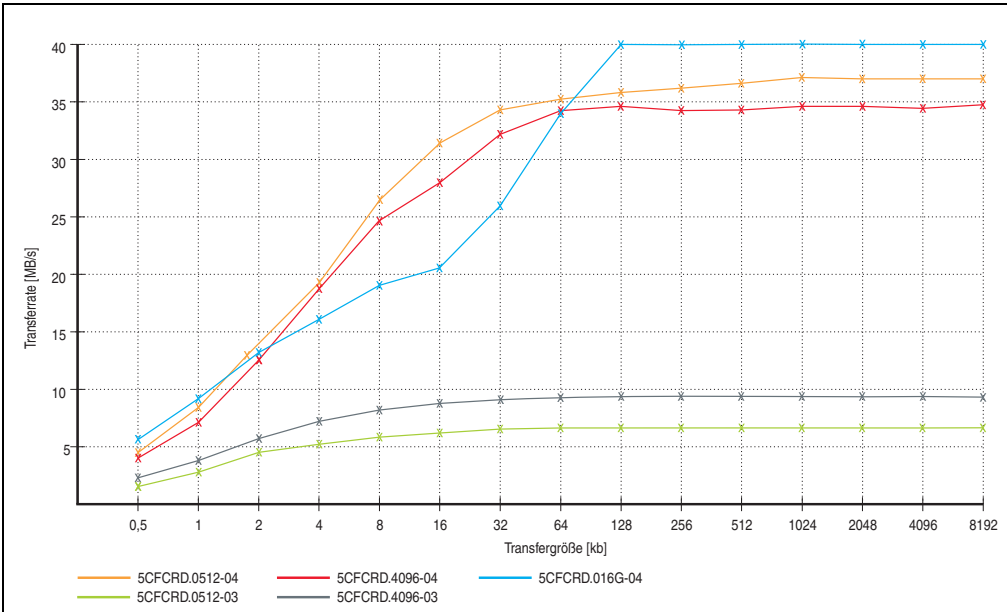


Figure 332: ATTO disk benchmark v2.34 comparison (reading)

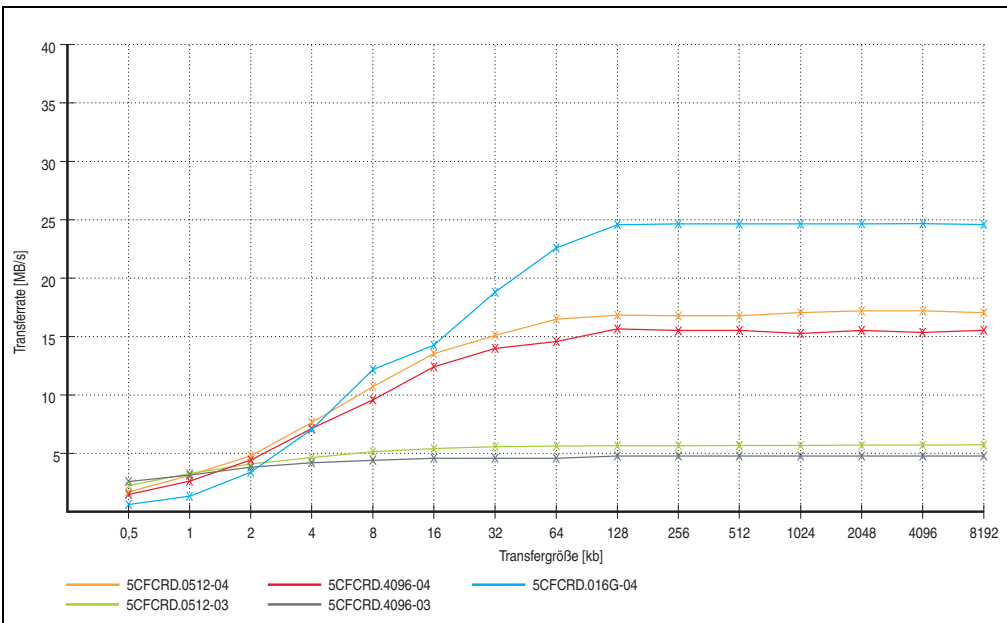


Figure 333: ATTO disk benchmark v2.34 comparison (writing)

## 6. CompactFlash cards - 5CFCRD.xxxx-03

### 6.1 General information

#### Information:

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

### 6.2 Order data


Model number	Description	Image
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 237: 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 238: 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 238: 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

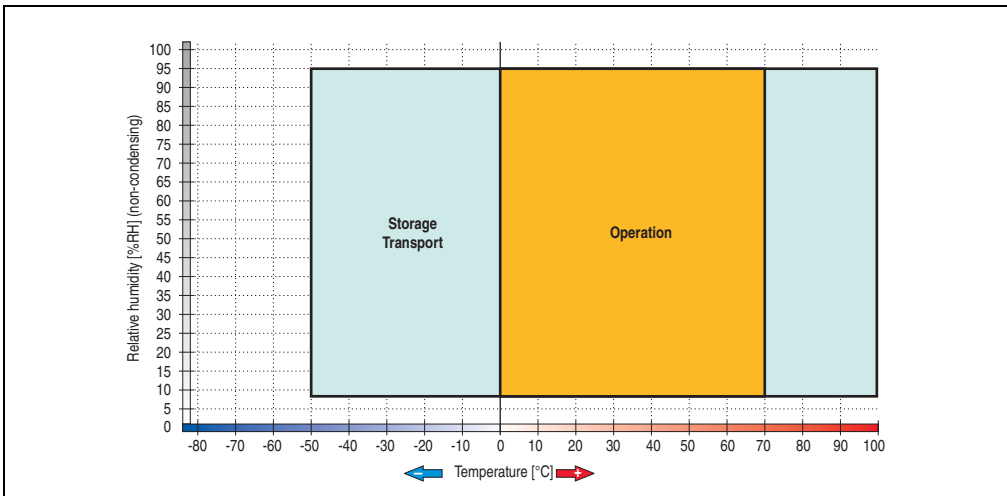


Figure 334: Temperature humidity diagram - CompactFlash cards 5CFCRD.xxxx-03

## 6.4 Dimensions

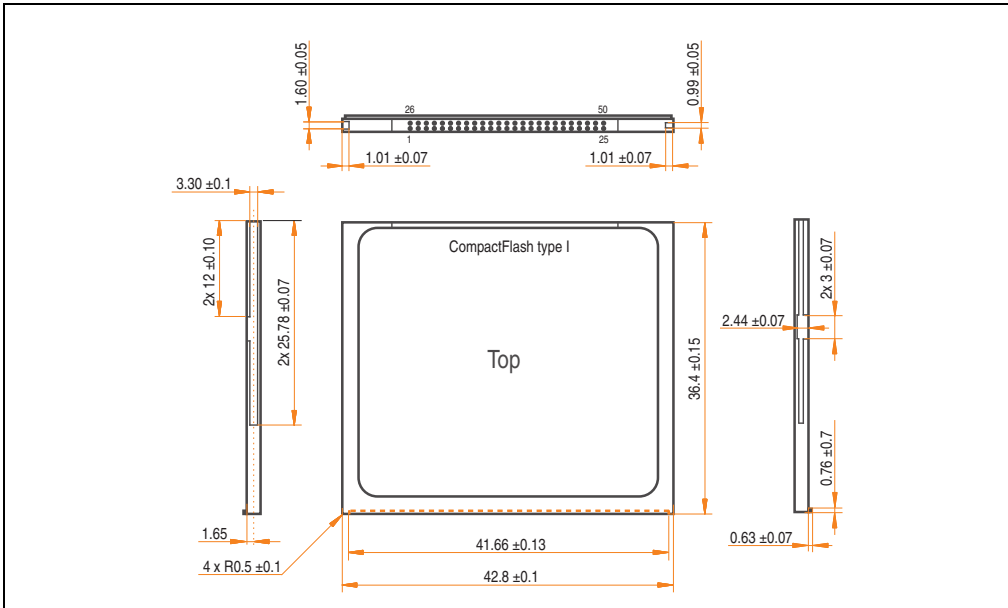


Figure 335: Dimensions - CompactFlash card Type I

## 7. USB flash drive

### Information:

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

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

### 7.1 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.

### 7.2 Order data

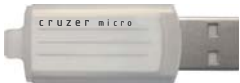

Model number	Description	Image
5MMUSB.2048-00	USB flash drive 2 GB SanDisk Cruzer Micro	
5MMUSB.2048-01	USB flash drive 2 GB B&R	

Table 239: Order data - USB flash drives

### 7.3 Technical data - 5MMUSB.2048-00

#### Information:

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

The technical data is current as of when this manual was printed. We reserve the right to make changes.

Features	5MMUSB.2048-00
LED	1 LED (green), signals data transfer (send and receive)
Power supply Power consumption	Via the USB port 650 µA in sleep mode, 150 mA read/write
Interface Type Transfer rate Sequential reading Sequential writing Connection	USB specification 2.0 high speed device, mass storage class, USB-IF and WHQL certified USB 1.1 and 2.0 compatible Up to 480 Mbit (high speed) Max. 8.7 MB/second Max. 1.7 MB/second To each USB type A interface
MTBF (at +25°C)	100000 hours
Data retention	10 years
Maintenance	None
Operating system support	Windows CE 5.0 and Windows XP embedded
Mechanical characteristics	
Dimensions Length Width Thickness	52.2 mm 19 mm 7.9 mm
Environmental characteristics	
Ambient temperature Operation Storage Transport	0 to +45°C -20 to +60°C -20 to +60°C
Relative humidity Operation Storage Transport	10 to 90%, non-condensing 5 to 90%, non-condensing 5 to 90%, non-condensing
Vibration Operation Storage Transport	2 g (10 to 500 Hz), oscillation rate 1/minute 4 g (10 to 500 Hz), oscillation rate 1/minute 4 g (10 to 500 Hz), oscillation rate 1/minute

Table 240: Technical data - USB flash drive 5MMUSB.2048-00

## Accessories • USB flash drive

Environmental characteristics	5MMUSB.2048-00
Shock	
Operation	40 g and 11 ms duration (all axes)
Storage	80 g and 11 ms duration (all axes)
Transport	80 g and 11 ms duration (all axes)
Altitude	
Operation	3,048 meters
Storage	12,192 meters
Transport	12,192 meters

Table 240: Technical data - USB flash drive 5MMUSB.2048-00 (Forts.)

### 7.3.1 Temperature humidity diagram - Operation and storage

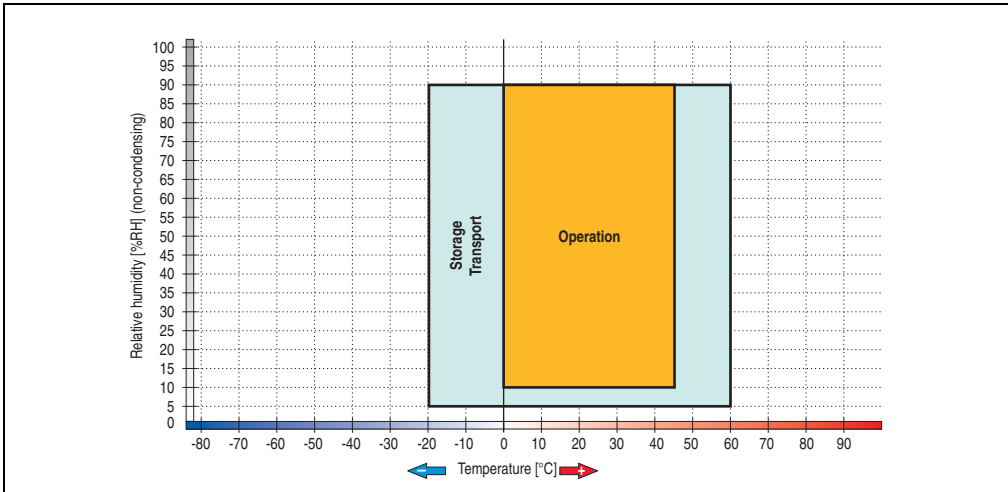


Figure 336: Temperature humidity diagram - USB flash drive - 5MMUSB.2048-00

## 7.4 Technical data - 5MMUSB.2048-01

### Information:

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

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

Table 241: Technical data - USB flash drive 5MMUSB.2048-01

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

Table 241: Technical data - USB flash drive 5MMUSB.2048-01 (Forts.)

### 7.4.1 Temperature humidity diagram

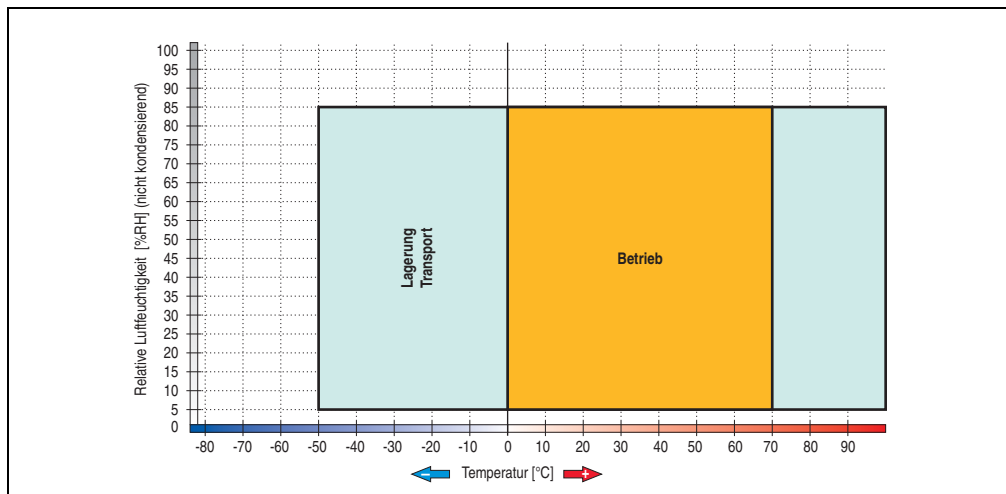


Figure 337: Temperature humidity diagram - USB flash drive - 5MMUSB.2048-01



## 8. Null modem cable 9A0017.0x

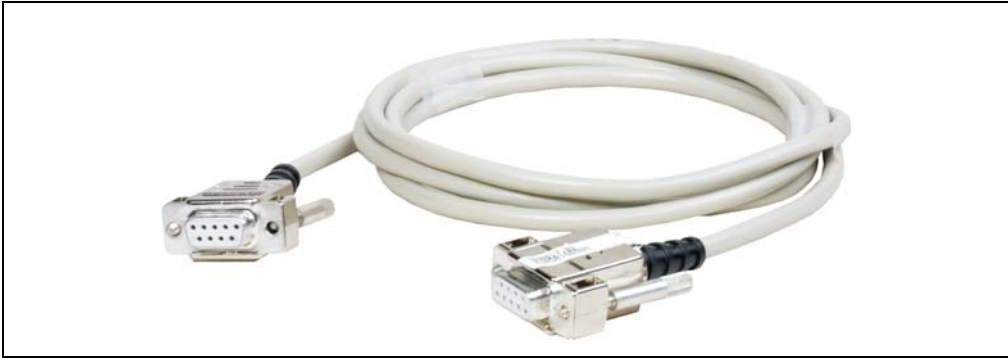


Figure 338: Null modem cable 9A0017.0x

### 8.1 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 242: Model numbers - Null modem cables

### 8.2 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 243: Technical data - Null modem cable

### 8.3 Cable specifications

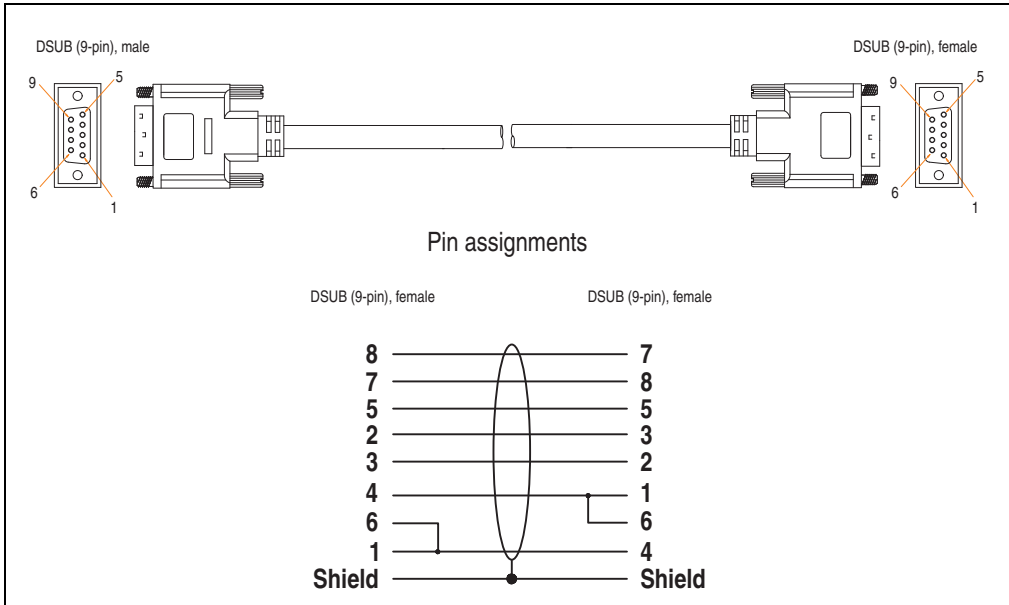


Figure 339: Pin assignments - null modem cable

## 9. HMI Drivers & Utilities DVD 5SWHMI.0000-00



Figure 340: HMI Drivers & Utilities DVD 5SWHMI.0000-00

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

Table 244: Order data - HMI Drivers & Utilities DVD

This DVD contains drivers, utilities, software upgrades and user's manuals for B&R Panel system products (see B&R homepage [www.br-automation.com](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

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## 1. Cleaning

### **Danger!**

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

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

### **Information:**

Displays with touch screens should be cleaned at regular intervals.

## 2. Changing the battery

### 2.1 General Information

The battery guarantees buffering of the internal real-time clock (RTC), SRAM data, and individually saved BIOS settings. For more information about the batteries for each device, see chapter 2 "Technical data", on page 41.

Changing the battery is only necessary for devices with a lithium battery (see section "Technical data", on page 41 for Power Panel devices).

#### 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 245: Meaning of battery status OK - Bad

From the point when battery capacity is recognized as insufficient, data buffering is guaranteed for approximately another 500 hours.

### Information:

**The battery should only be changed by qualified personnel.**

#### Technical data

See section 2 "Replacement CMOS batteries", on page 521.

### 2.2 Procedure for changing the battery

- Disconnect the power supply to the Power Panel
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Remove the battery cover: The battery cover is found on the rear side of the Power Panel device.



0 aPCI slot Power Panel devices	1 or 2 aPCI slot Power Panel devices
	

Table 246: Changing the battery

- Carefully remove the used battery from the holder by pulling the removal strip.
- Do not touch the new battery with pliers or uninsulated tweezers ->risk of short circuiting. The battery should not be held by its edges.

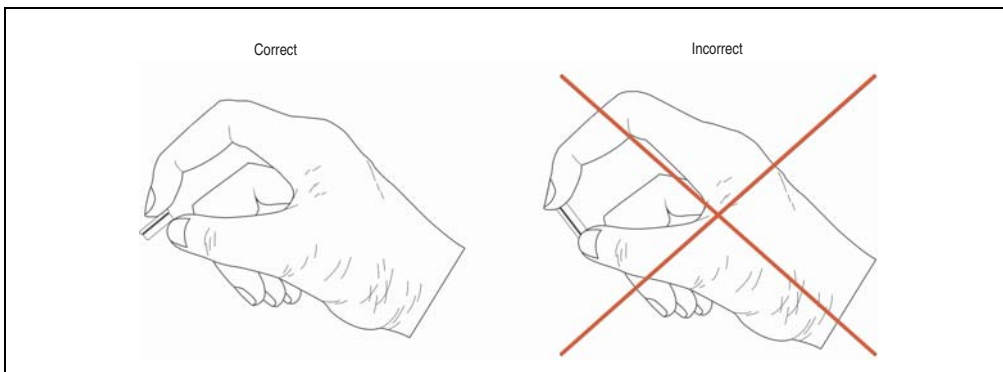


Figure 341: Battery handling

- Insert the new battery with correct polarity. The correct positioning of the removal strip must be taken into consideration.
- 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 300 with BIOS", on page 413).

## Warning!

**Lithium batteries are considered hazardous waste. Used batteries should be disposed of appropriately.**

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

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

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

#### 3.1 What measures can be taken against this?

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

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

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

# Appendix A

## 1. Touch screen

### 1.1 Elo Accu Touch

#### Information:

The following characteristics, features, and limit values only apply to this individual component and can deviate from those specified for the entire device. For the entire device in which this individual component is used, refer to the data given specifically for the entire device.

Elo Accu touch screen	Specifications
Manufacturer	<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 (4.572 mm) Maximum 1% of the diagonal for the active area of the touch screens
Release pressure	< 113 g
Resolution	4096 x 4096 touch points
Light permeability	Up to 80% ±5%
Temperature Operation Storage Transport	-10 to +50°C -40 to +70°C -40 to +70°C
Relative humidity	See 1.1.1 "Temperature humidity diagram", on page 554
Service life	35 million touch operations on the same point
Chemical resistance <sup>1)</sup>	acetone, methylene chloride, methyl ethyl ketone , isopropyl alcohol, hexane, turpentine, mineral spirits, unleaded gasoline, diesel , motor oil, gear lubricating oil, antifreeze, normal food and drinks
Activation	Finger, pointer, credit card, glove

Table 247: Technical data - Elo Accu touch screen 5-wire

1) The active area of the touch screen is resistant to these chemicals for a timeframe of one hour at +21°C.

1.1.1 Temperature humidity diagram

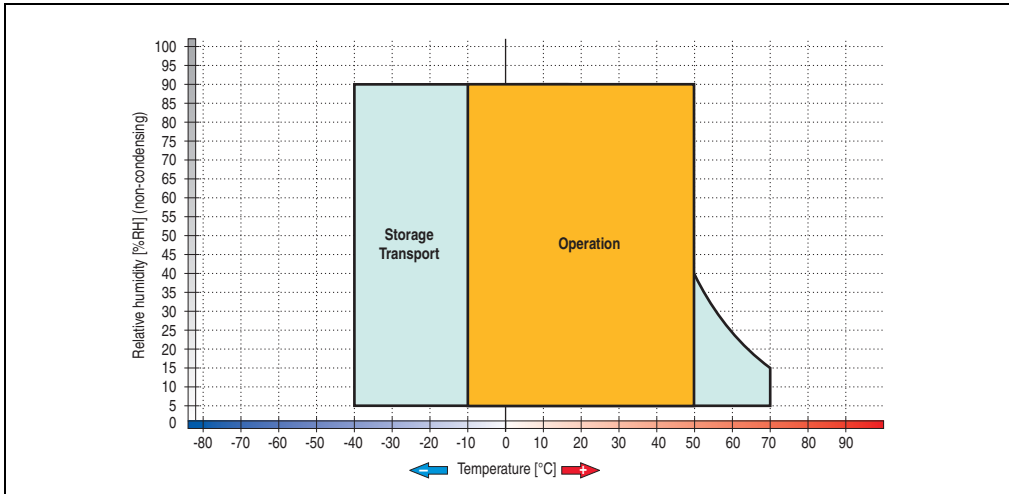


Figure 342: Temperature humidity diagram - Elo Accu touch screen

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, scouring agents, pressurized air or steam jet.

## 1.2 Gunze Touch

### Information:

The following characteristics, features, and limit values only apply to this individual component and can deviate from those specified for the entire device. For the entire device in which this individual component is used, refer to the data given specifically for the entire device.

Elo Accu touch screen	Specifications
Manufacturer	<a href="#">Gunze</a>
Release pressure	10 to 80 g
Light permeability	79%
Temperature Operation Storage Transport	0 to +50°C -20 to +70°C -20 to +70°C
Relative humidity	See 1.2.1 "Temperature humidity diagram", on page 556
Service life	1 million touch operations
Chemical resistance <sup>1)</sup>	Acetone, ammonia-based glass cleaner, normal food and drinks, hexane, methylene chloride, methyl ethyl ketone, mineral spirits, turpentine, isopropyl alcohol
Activation	Finger, pencil

Table 248: Technical data - Gunze touch screen stylus pen

1) The active area of the touch screen is resistant to these chemicals for a timeframe of one hour at +21°C.

### 1.2.1 Temperature humidity diagram

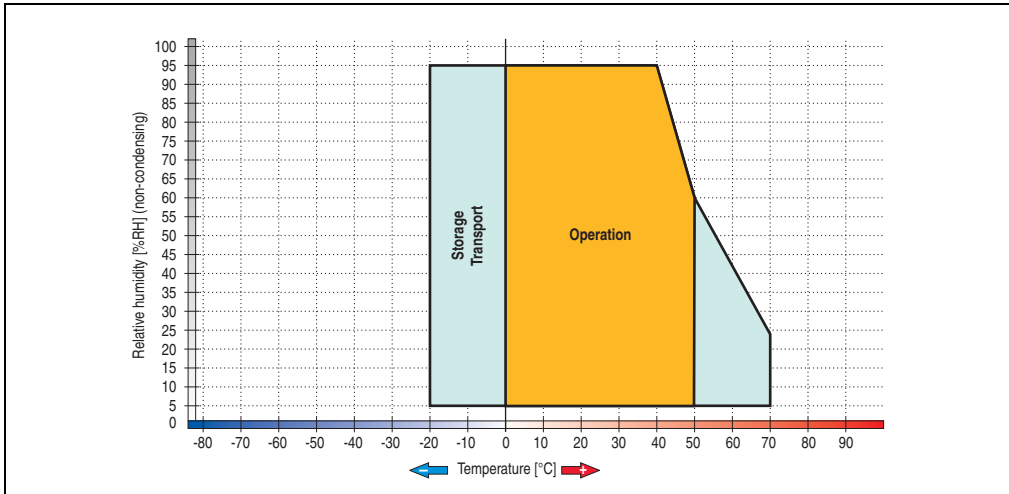


Figure 343: Temperature humidity diagram - Gunze touch screen

### 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, scouring agents, pressurized air or steam jet.



## 1.3 Touch Screen - AMT

### 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	AMT
Release pressure	< 1 N
Light permeability	Up to 81% ±3%
Temperature	
Operation	-20 to 70°C
Bearings	-40 to 80°C
Transport	-40 to 80°C
Relative humidity	
Operation	Max. 90% at max. 50°C
Bearings	Max. 90% at max. 60°C for 504 hours, non-condensing
Transport	Max. 90% at max. 60°C for 504 hours, non-condensing
Lifespan	36 million touch operations at the same position (release pressure: 250 g, interval: 2x per second)
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> ).

Table 249: Technical data - AMT Touch

### 1.3.1 Temperature humidity diagram

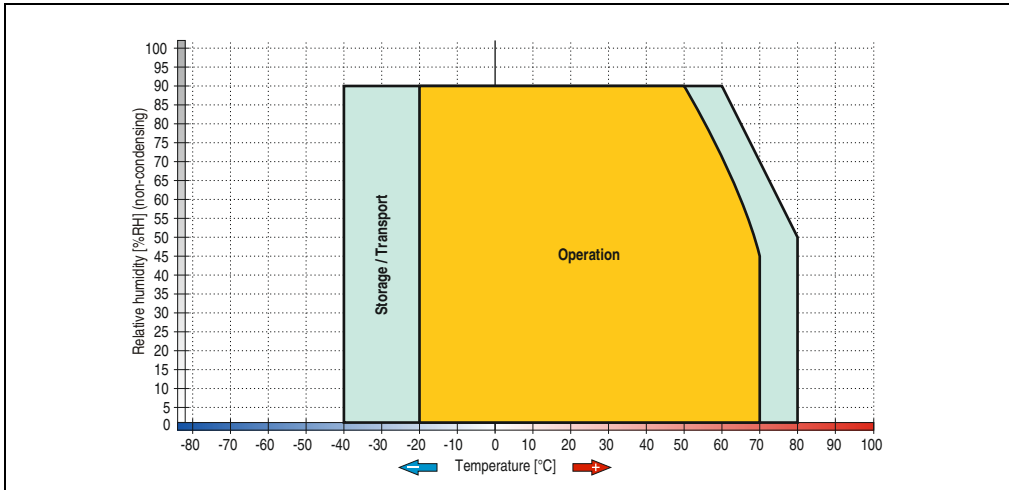


Figure 344: Temperature humidity diagram - AMT touch screen

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).

### 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. Membrane

The décor foil conforms to DIN 42115 (section 2). This means it is resistant to exposure to the following chemicals for a 24-hour period with no visible signs of damage:

### Information:

The following characteristics, features, and limit values only apply to this individual component and can deviate from those specified for the entire device.

Ethanol Cyclohexanol Diacetone alcohol Glycol Isopropanol Glycerine Methanol Triacetin Dowandol DRM/PM	Formaldehyde 37%-42% Acetaldehyde Aliphatic hydrocarbons Toluene Xylene White spirits	1.1.1. Trichloroethane Ethyl acetate Diethyl ether N-Butyl acetate Amyl acetate Butylcellosolve Ether
Acetone Methyl ethyl ketone Dioxan Cyclohexanone MIBK Isophorone	Formic acid <50% Acetic acid <50% Phosphoric acid <30% Hydrochloric acid <36% Nitric acid <10% Trichloroacetic acid <50% Sulphuric acid <10%	Sodium hypochlorite <20% Hydrogen peroxide <25% Potassium carbonate Washing agents Tenside Fabric conditioner 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 250: 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. Viewing angles

The perspective information (R,L,U,D) can be seen in the technical data for the individual components.

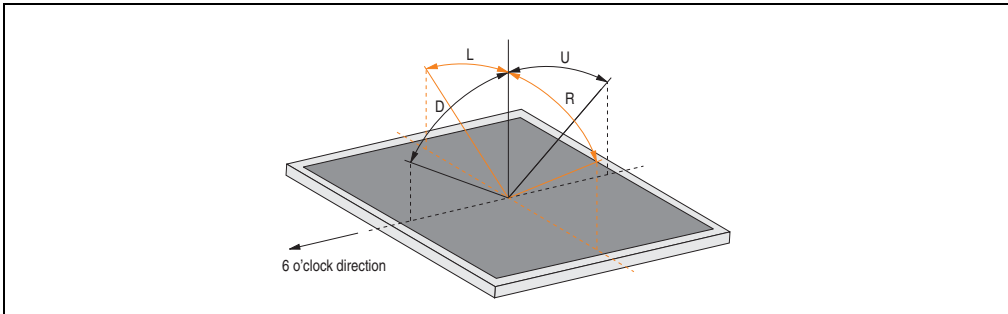


Figure 345: Viewing angles

## 4. 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 251: Product abbreviations

### 4.1 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 563.

Compatibility between the device types is represented on each line by matching symbols.




Size	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 252: Device compatibility overview

## Appendix A • Mounting compatibilities

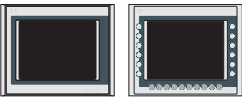
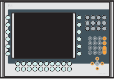
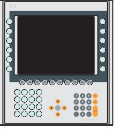
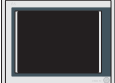
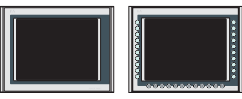

Size	Format	Image	Compatible	PP100/200	PP300/400	AP900	PPC700
10.4"	Horizontal1		Outer dimensions	■	■	■	■
			Installation dimensions	●	●	●	●
	Horizontal2		Outer dimensions	■	■	■	■
			Installation dimensions	●	●	▲	▲
	Vertical1		Outer dimensions	■	■	■	■
			Installation dimensions	●	●	▲	▲
12.1"	Horizontal1		Outer dimensions	■	■	■	■
			Installation dimensions	●	●	▲	▲
15"	Horizontal1		Outer dimensions	■	■	■	■
			Installation dimensions	●	●	●	●
	Vertical1		Outer dimensions	■	■	■	■
			Installation dimensions	●	●	●	●

Table 252: Device compatibility overview

## 4.2 Compatibility details

The measurement values (all in mm) in the following figures have the following meaning.

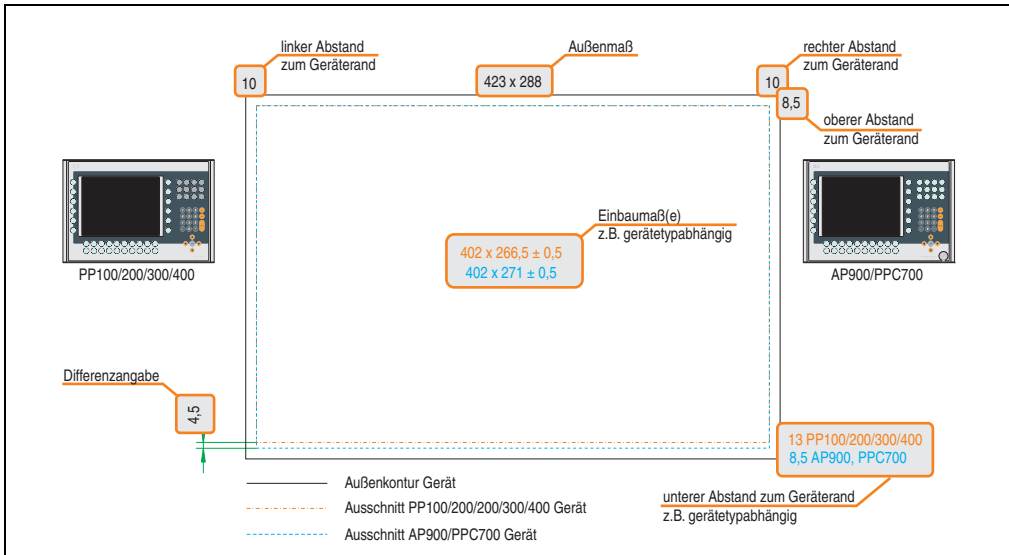


Figure 346: Compatibility details - figure structure

### 4.2.1 5,7" devices

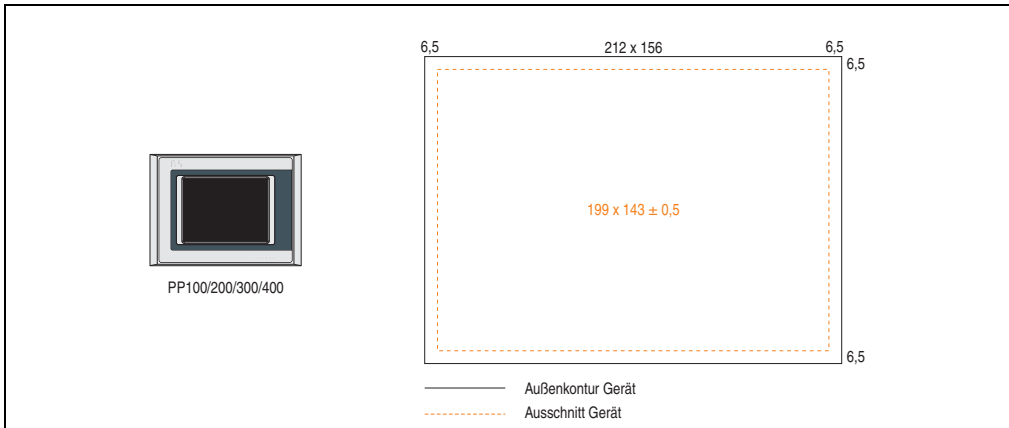


Figure 347: Mounting compatibility - 5.7" device format - Horizontal1

5.7" Power Panel 100/200 and Power Panel 300/400 devices in **Horizontal1** format are 100% mounting compatible.

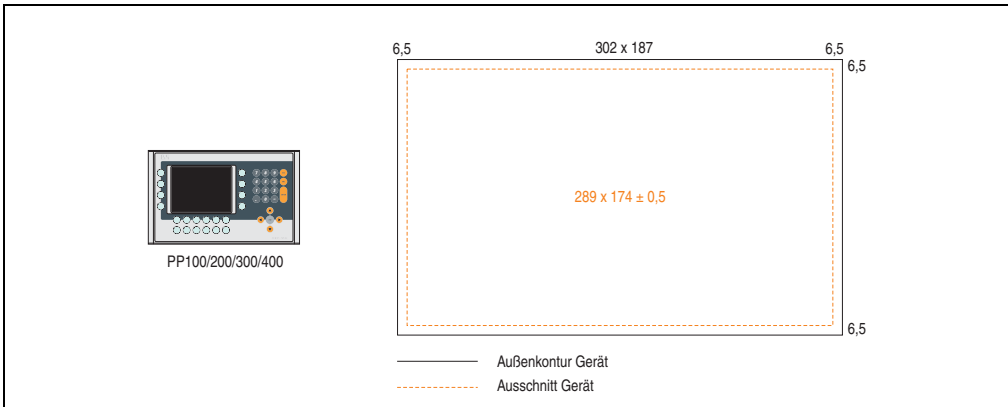


Figure 348: Mounting compatibility - 5.7" device format - Horizontal2

5.7" Power Panel 100/200 and Power Panel 300/400 devices in **Horizontal2 format** are 100% mounting compatible.

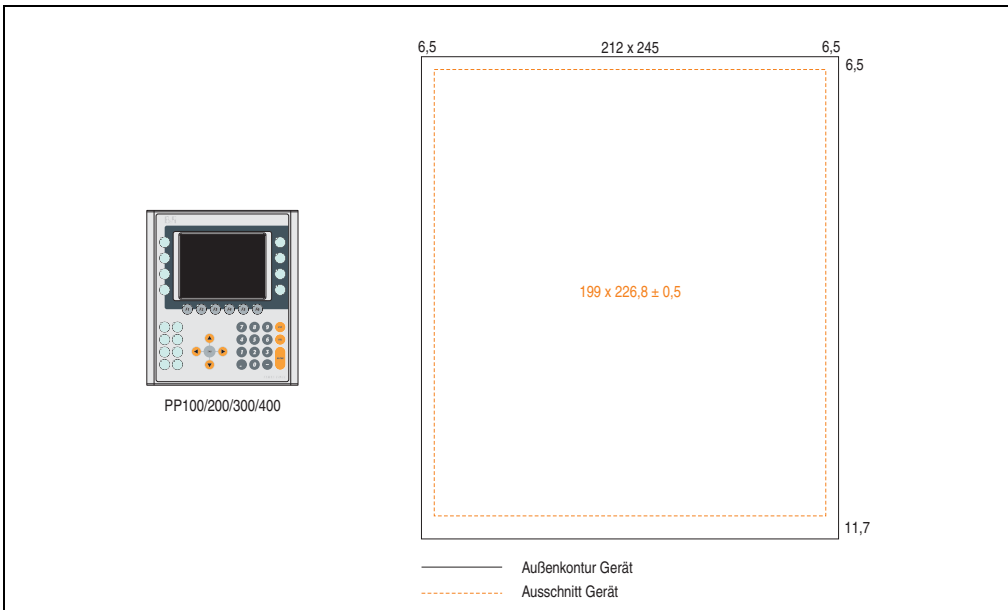


Figure 349: Mounting compatibility - 5.7" device format - Vertical1

5.7" Power Panel 100/200 and Power Panel 300/400 devices in **Vertical1 format** are 100% mounting compatible.



4.2.2 10,4" devices

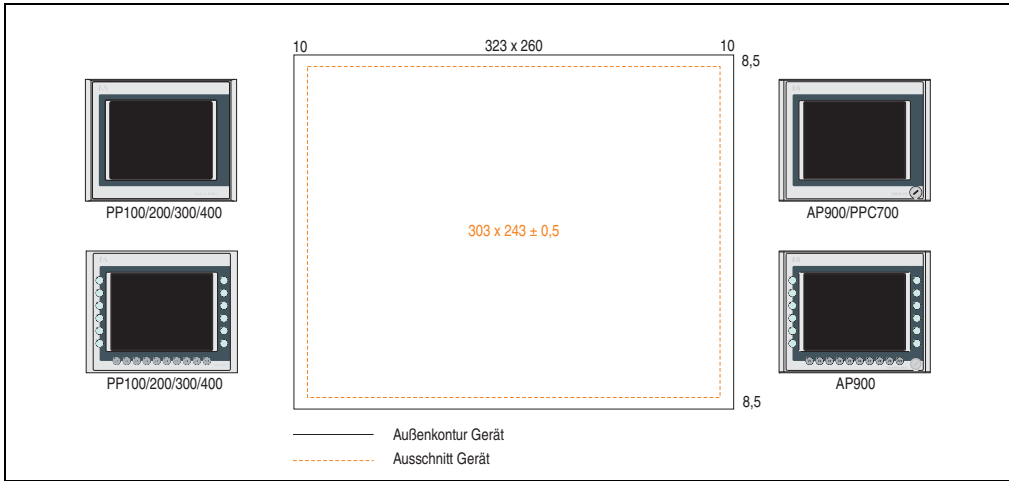


Figure 350: Mounting compatibility - 10.4" device format - Horizontal1

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.

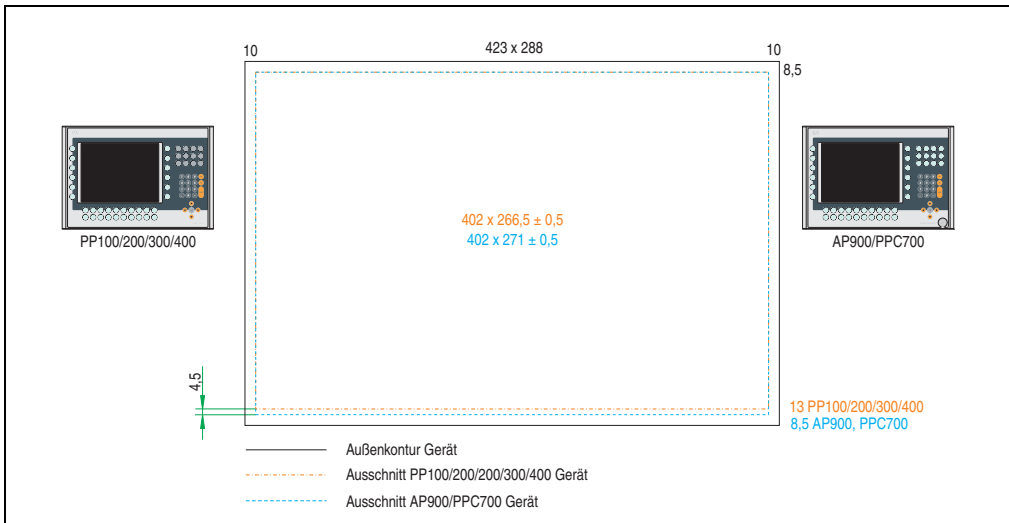


Figure 351: Mounting compatibility - 10.4" device format - Horizontal2

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).

## Appendix A • 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).

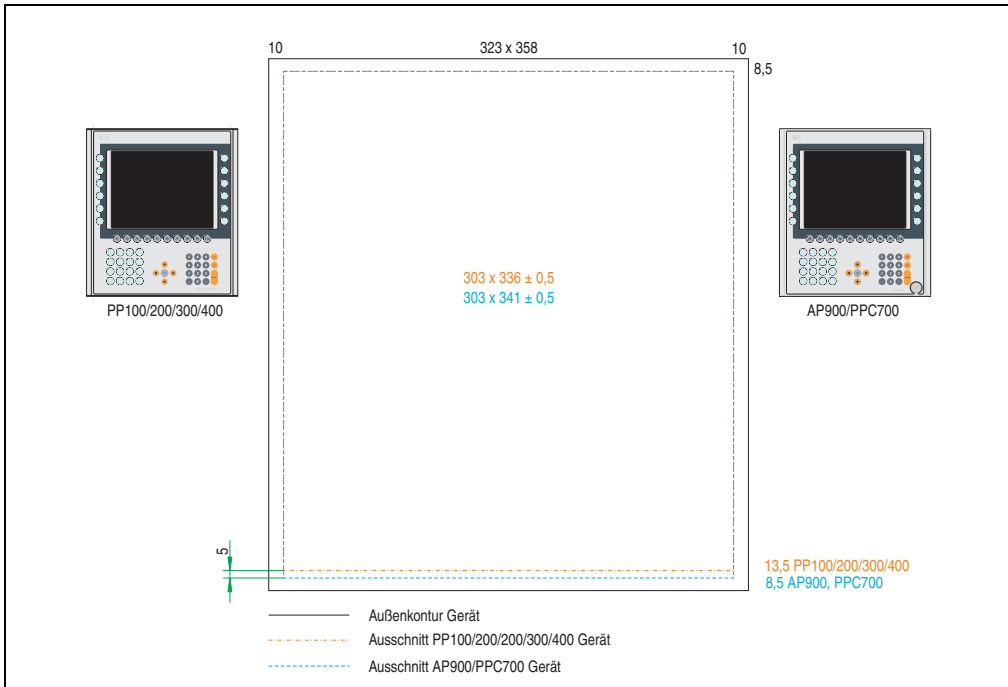


Figure 352: Mounting compatibility - 10.4" device format - Vertical1

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).

## 4.2.3 12,1" devices

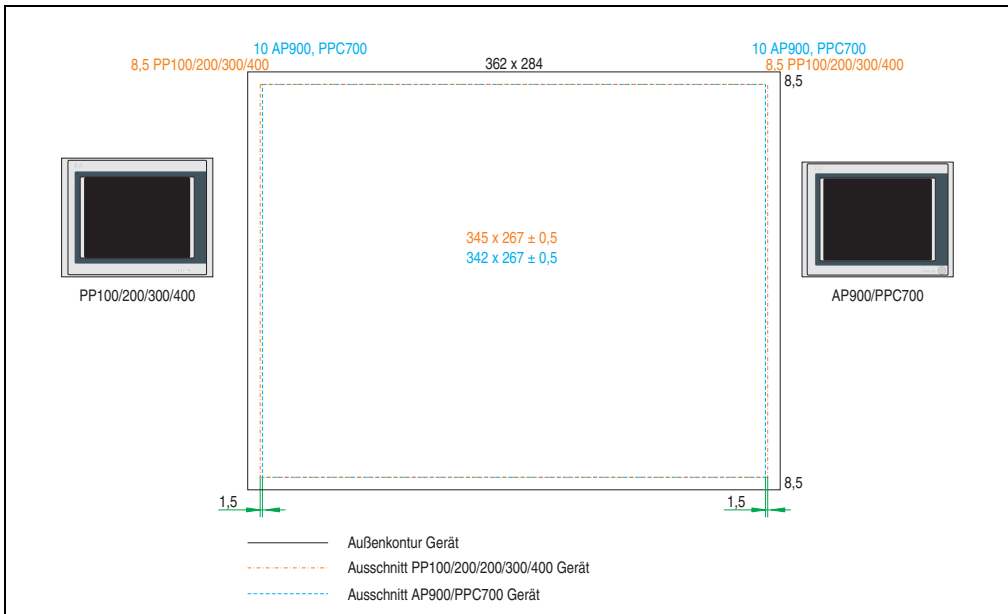


Figure 353: Mounting compatibility - 12.1" device format - Horizontal1

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.

4.2.4 15" devices

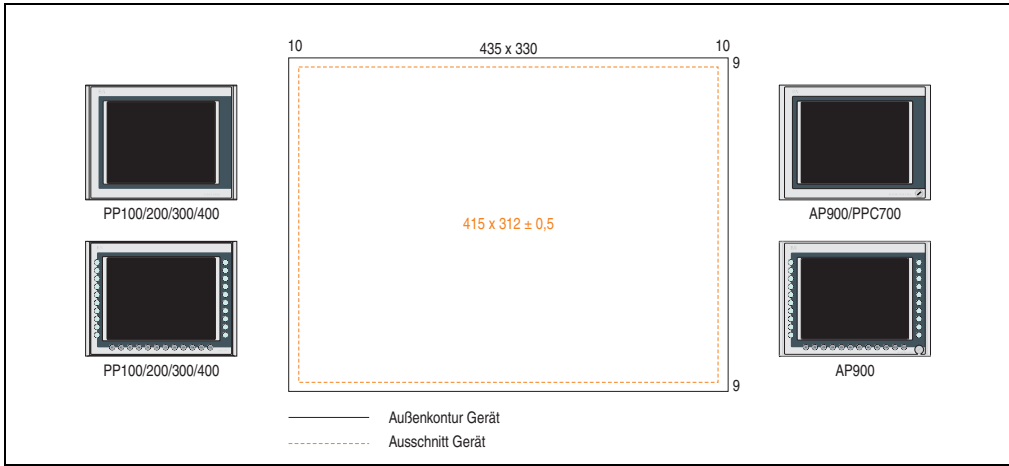


Figure 354: Mounting compatibility - 15" device format - Horizontal1

15" Power Panel 100/200, Power Panel 300/400, Automation Panel 900 and Panel PC 700 devices in **Horizontal1** format are 100% mounting compatible.

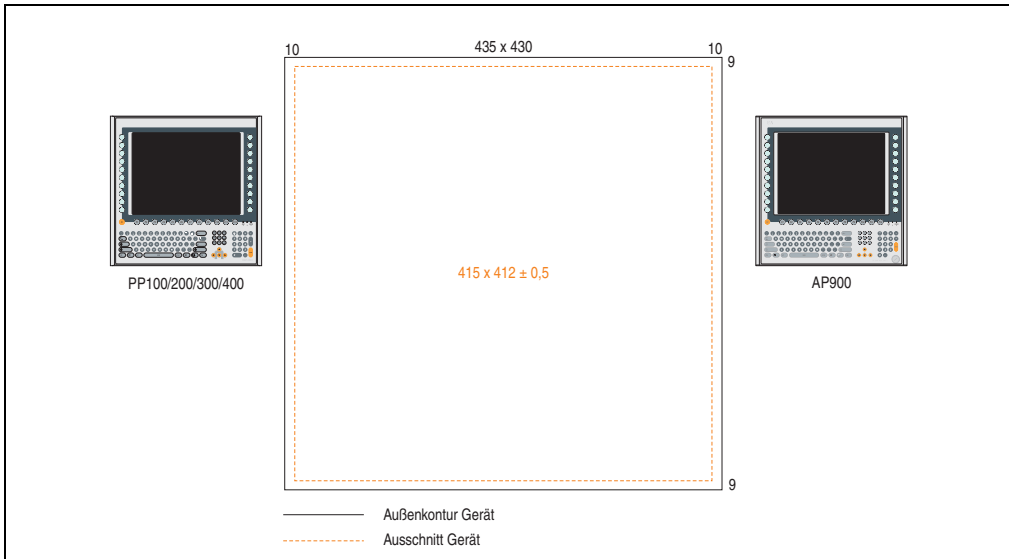


Figure 355: Mounting compatibility - 15" device format - Vertical1

15" Power Panel 100/200, Power Panel 300/400, Automation Panel 900 and Panel PC 700 devices in **Vertical1** format are 100% mounting compatible.

## 5. 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. The B&R Key Editor makes it quick and easy to adapt the application to a unique configuration.

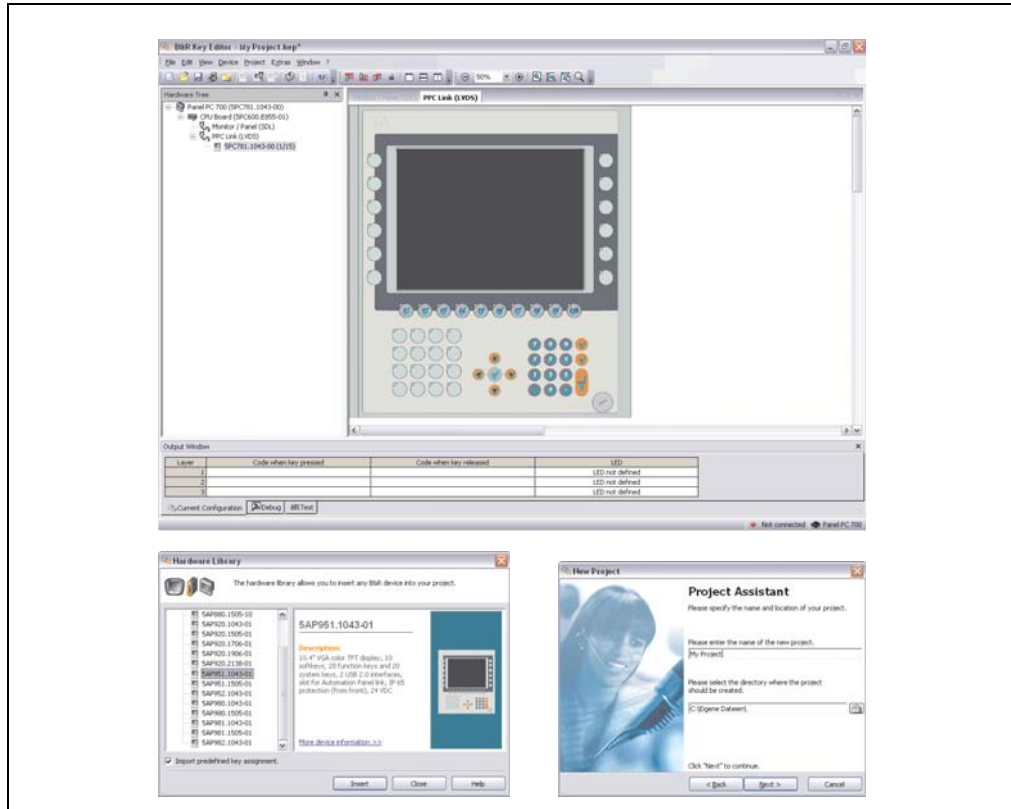


Figure 356: B&R Key Editor screenshots Version 3.10 (representation picture)

### Features:

- Configuration of normal keys like on a keyboard (A, B, C, etc.)
- Keyboard shortcuts (CTRL+C, SHIFT+DEL, etc.) on one key
- Special key functions (change brightness, etc.)
- Assign functions to LEDs (HDD access, power, etc.)
- 4 assignments per key possible (using layer function)
- Configuration of panel locking time when multiple Automation Panel 900 devices are connected to Automation PCs and Panel PCs devices.

Supports following systems (Version 3.10):

- Automation PC 620
- Automation PC 810
- Automation PC 820
- Automation Panel 800
- Automation Panel 900
- IPC2000, IPC2001, IPC2002
- IPC5000, IPC5600
- IPC5000C, IPC5600C
- Mobile Panel 40/50
- Mobile Panel 100/200
- Panel PC 300
- Panel PC 700
- Panel PC 800
- Power Panel 100/200
- Power Panel 300/400
- Power Panel 500 (the Key Editor device file must be downloaded separately from the B&R homepage)

A detailed guide for configuring keys and LEDs can be found in the B&R Key Editor's online help.

The B&R Key Editor can be downloaded for free from the download area on the B&R homepage ([www.br-automation.com](http://www.br-automation.com)). Additionally, it can also be found on the B&R HMI Drivers & Utilities DVD (model number 5SWHMI.0000-00).

## 6. B&R Automation Device Interface (ADI) development kit

This software can be used to activate functions of the B&R Automation Device Interface (ADI) from Windows applications, which, for example, were created using the following development tools:

- Microsoft Visual C++ 6.0
- Microsoft Visual Basic 6.0
- Microsoft eMbedded Visual C++ 4.0
- Microsoft Visual Studio 2005 (or newer)

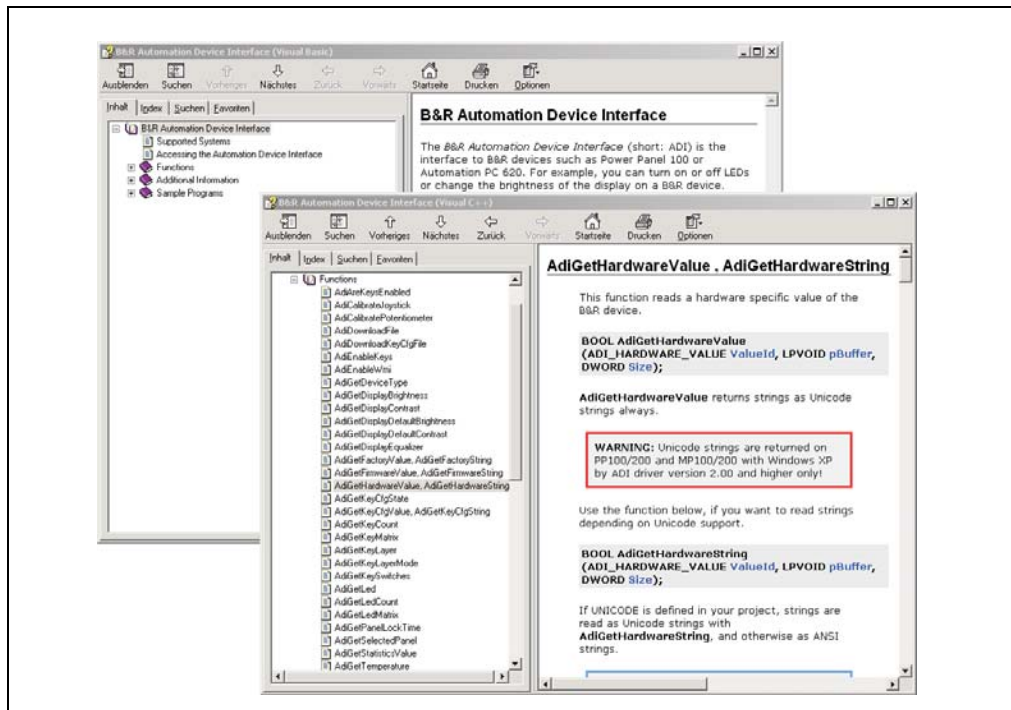


Figure 357: ADI development kit screenshots (Version 3.10)

Features:

- One Microsoft Visual Basic module with declarations for the ADI functions.
- Header files and import libraries for Microsoft Visual C++ 6.0 and Microsoft eMbedded Visual C++ 4.0.
- Help files for Visual Basic and Visual C++.
- Sample projects for Visual Basic and Visual C++.
- ADI DLL (for testing the applications, if no ADI driver is installed).

Supports following systems (Version 3.10 and higher):

- Automation PC 620
- Automation PC 810
- Automation PC 820
- Mobile Panel 40/50
- Mobile Panel 100/200
- Panel PC 300
- Panel PC 700
- Panel PC 800
- Power Panel 100/200
- Power Panel 300/400
- Power Panel 500

The ADI driver suitable for the device must be installed on the stated product series. The ADI driver is already included in the B&R images of embedded operating systems.

A detailed description of using the ADI functions can be found in the integrated online help.

The B&R Automation Device Interface (ADI) development kit can be downloaded for free from the download area on the B&R homepage ([www.br-automation.com](http://www.br-automation.com)).



## 7. B&R Automation Device Interface (ADI) .NET SDK

This software can be used to activate functions of the B&R Automation Device Interface (ADI) from .NET applications, which were created using Microsoft Visual Studio 2005 (or newer).

Supported programming languages:

- Visual Basic
- Visual C++
- Visual C#
- Visual J#

System requirements:

- Developmentssystem: PC with Windows XP/7 with
  - Microsoft Visual Studio 2005 or newer
  - Microsoft .NET Framework 2.0 and / or Microsoft .NET Compact Framework 2.0 or newer
  - Optional for Windows CE Systems: B&R Windows CE SDK

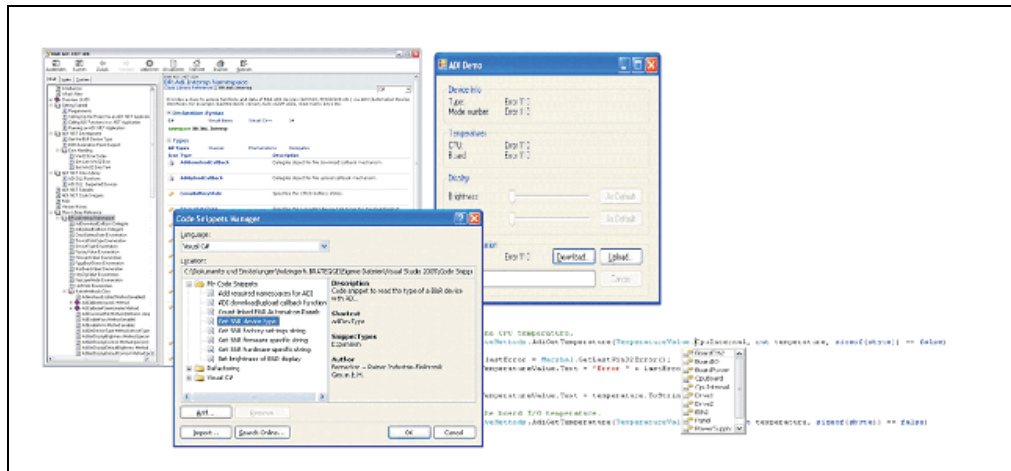


Figure 358: ADI .NET SDK Screenshots (Version 1.30)

Features:

- ADI .NET Class Library.
- Help files in HTML Help 1.0 format (.chm file) and MS Help 2.0 format (.HxS file).
- Sample projects and code snippets for Visual Basic, Visual C++, Visual C# and Visual J#.
- ADI DLL (for testing the applications, if no ADI driver is installed).

Supports following systems (Version 1.30 and higher):

- Automation PC 620
- Automation PC 810
- Automation PC 820
- Mobile Panel 40/50
- Mobile Panel 100/200
- Panel PC 300
- Panel PC 700
- Panel PC 800
- Power Panel 100/200
- Power Panel 300/400

The ADI driver suitable for the device must be installed on the stated product series. The ADI driver is already included in the B&R images of embedded operating systems.

A detailed description of using the ADI functions can be found in the integrated online help.

The ADI .NET SDK can be downloaded for free from the download area on the B&R homepage ([www.br-automation.com](http://www.br-automation.com)).

## 8. Glossary

### A

#### ACPI

Abbreviation for "**A**dvanced **C**onfiguration and **P**ower Interface". 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.

#### 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.

**CE mark**

A CE mark for a product. It consists of the letters "CE" and indicates conformity to all EU guidelines for the labeled product. It indicates that the individual or corporate body who has performed or attached the label assures that the product conforms to all EU guidelines for complete harmonization. It also indicates that all mandatory conformity evaluation procedures have taken place.

**CMOS**

"CMOS" is a battery powered memory area where fundamental parameters of an IBM (or compatible) personal computer are stored. Information such as the type of hard drive, size of the working memory and the current date and time are required when booting the computer. As the name suggests, the memory is based on CMOS technology standards.

**COM**

A device name used to access serial ports in MS-DOS. The first serial port can be accessed under COM1, the second under COM2, etc. A modem, mouse, or serial printer is typically connected to a serial port.

**CompactFlash®**

CompactFlash memory cards [CF cards] are exchangeable nonvolatile mass memory systems with very small dimensions [43 x 36 x 3.3 mm, approximately half the size of a credit card]. In addition to the flash memory chips, the controller is also present on the cards. CF cards provide complete PC card / ATA functionality and compatibility. A 50-pin CF card can be simply inserted in a passive 68-pin type II adapter card. It conforms to all electrical and mechanical PC card interface specifications. CF cards were launched by SanDisk back in 1994. Currently, memory capacities reach up to 8 GB per unit. Since 1995, CompactFlash Association [CFA] has been looking after standardization and the worldwide distribution of CF technology

**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.

**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.

**DDR SDRAM**

An abbreviation for "**D**ouble **D**ata **R**ate **S**ynchronous **D**ynamic **R**andom **A**ccess **M**emory".

**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, which is sent by the modem to the computer it is connected to, indicating its readiness for processing. DSR is a hardware signal which is sent via line number 6 in compliance with the RS-232-C standard.

**DTR**

An abbreviation for "**D**ata **T**erminal **R**eady". A signal used in serial data transfer that is sent by the computer to the modem it is connected to, indicating the computer's readiness to accept incoming signals.

### E

#### EDID data

Abbreviation for "**Extended Display Identification Data**". EDID data contains the characteristics of monitors / TFT displays transferred as 128 KB data blocks to the graphics card via the Display Data Channel (DDC). This EDID data can be used to set the graphics card to the monitor properties.

#### EMC

"**Electromagnetic Compatibility**" 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 PROM** > (completely with ultraviolet light).

#### Ethernet

An IEEE 802.3 standard for networks. Ethernet uses bus or star topology and controls the traffic on communication lines using the access procedure CSMA/CD (Carrier Sense Multiple Access with Collision Detection). Network nodes are connected using coaxial cables, fiber optic cables or twisted pair cabling. Data transfer on an Ethernet network takes place in frames of variable lengths that consist of supply and controller information as well as 1500 bytes of data. The Ethernet standard provides base band transfers at 10 megabit and 100 megabit per second.

### F

#### FIFO

An abbreviation for "**First In First Out**". 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.

## G

### GB

Gigabyte (1 GB = 230 or 1,073,741,824 bytes)

## H

### Handshake

Method of synchronization for data transfer when data is sent at irregular intervals. The sender signals that data can be sent, and the receiver signals when new data can be received.

## I

### IDE

An abbreviation for "Integrated Drive Electronics". A drive interface where the controller electronics are integrated in the drive.

### Interface

From the hardware point of view, an interface is the connection point between two modules/devices/systems. The units on both sides of the interface are connected by the interface lines so that data, addresses, and control signals can be exchanged. The term interface includes all functional, electrical and constructive conditions [encoding, signal level, pin assignments] that characterize the connection point between the modules, devices, or systems. Depending on the type of data transfer, a differentiation is made between parallel [e.g. Centronics, IEEE 488] and serial interfaces [e.g. V.24, TTY, RS232, RS422, RS485], which are set up for different transfer speeds and transfer distances. From the point of view of software, the term "interface" describes the transfer point between program modules using specified rules for transferring the program data.

### 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)).

### L

#### LCD

An abbreviation for "**Liquid Crystal Display**". 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 "**Light Emitting Diode**". A semiconductor diode which converts electrical energy into light. LEDs work on the principle of electroluminescence. They are highly efficient because they do not produce much heat in spite of the amount of light they emit. For example, "operational status indicators" on floppy disk drives are LEDs.

### M

#### MB

Megabyte (1 MB = 220 or 1,048,576 bytes).

#### Microprocessor

Highly integrated circuit with the functionality of a CPU, normally housed on a single chip. It comprises a control unit, arithmetic and logic unit, several registers and a link system for connecting memory and peripheral components. The main performance features are the internal and external data bus and address bus widths, the command set and the clock frequency. Additionally, a choice can be made between CISC and RISC processors. The first commercially available worldwide microprocessor was the Intel 4004. It came on the market in 1971.

#### MTBF

An abbreviation for "**Mean time between failure**". 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).

#### Multitasking

Multitasking is an operating mode in an operating system that allows several computer tasks to be executed virtually simultaneously.

### N

#### Node

Branching point in a network.



## P

## 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.

## 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.

## 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 to -30 V, low level: +3 to +30 V; cable lengths up to 15 m, transfer rates up to 20 kbit/s; for point-to-point connections between 2 stations.

### RTS

An abbreviation for "**Request To Send**". 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.

### 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

### SDRAM

An abbreviation for "**Synchronous Dynamic Random Access Memory**". 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.

### SRAM

An abbreviation for "**Static Random Access Memory**". 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.

### SVGA

Abbreviation for "**Super Video Graphics Array**"; Graphics standard with a resolution of at least 800x600 pixels and at least 256 colors.

## T

### TCP/IP

Transmission Control Protocol/Internet Suit of Protocols. Network protocol that has become the generally accepted standard for data exchange in heterogeneous networks. TCP/IP is used both in local networks for communication between various computer and also for LAN to WAN access.

## TFT display

LCD (Liquid Crystal Display) technology where the display consists of a large grid of LCD cells. Each pixel is represented by a cell, whereby electrical fields produced in the cells are supported by thin film transistors (TFT) that result in an active matrix. In its simplest form, there is exactly one thin film transistor per cell. Displays with an active matrix are generally used in laptops and notebooks because they are thin, offer high-quality color displays and can be viewed from all angles.

## Touch screen

Screen with touch sensors for selecting options in a displayed menu using the tip of the finger.

## TXD

An abbreviation for "Transmit (**TX**) 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.

### 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.

### V

#### VGA

An abbreviation for "**V**ideo **G**raphics **A**dapter". A video adapter which can handle all EGA (Enhanced Graphics Adapter) video modes and adds several new modes.

#### Visual Components

Integrated in B&R Automation Studio. Visual Components can be used to configure visualization projects that use text and graphics.

### W

#### Windows CE

Compact 32-bit operating system with multitasking and multithreading that Microsoft developed especially for the OEM market. It can be ported for various processor types and has a high degree of real-time capability. The development environment uses proven, well-established development tools. It is an open and scalable Windows operating system platform for many different devices. Examples of such devices are handheld PCs, digital wireless receivers, intelligent mobile phones, multimedia consoles, etc. In embedded systems, Windows CE is also an excellent choice for automation technology.

### X

#### XGA

An abbreviation for "**E**Xtended **G**raphics **A**rray". An expanded standard for graphics controllers and monitors that was introduced by IBM in 1990. This standard supports 640x480 resolution with 65,536 colors or 1024x768 resolution with 256 colors. This standard is generally used in workstation systems.

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