Power Panel 300/400

User's Manual

Version: **2.30 (July 2010)**

Model number: **MAPP300.400-ENG**

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Chapter 1 • General information

Information:

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

1. Manual history

Version	Date	Change
0.10 Preliminary	2006-10-31	- First version
1.00	2006-11-21	- Contents of delivery for individual components expanded. - "Standards and certifications" on page 517 added. - "Touch screen" on page 565 added. - "Décor foil" on page 569 added. - "Glossary" on page 583 added. - 2 GB USB flash drive 5MMUSB.2048-00 from SanDisk added. - Document now includes the chm tag "Filename". - Model numbers for Windows CE, Windows XPe and the HMI Drivers & Utilities DVD added. - Rear view of devices 5PP320.0571-29, 5PP320.0573-39, 5PP320.1043-39 and 5PP320.1214-39 added. - Text changes: General device interfaces on device interfaces. - "Distribution of resources" on page 481 added. - "VESA mode support" on page 512 added. - "Power Panel 300/400 with Automation Runtime" on page 484 added. - aPCI slot cover added. - "Legend strip templates" on page 543 added. - "Mounting orientation" on page 423 added. - "Null modem cable 9A0017.0x" on page 559 added. - "Mounting compatibilities" on page 571 added.

Table 1: Manual history

Version	Date	Change
1.10	2007-02-22	- Rear view of device 5PP320.1505-39 added. - Driver support information modified. - Section "Automation Runtime and SMC" removed. - Images of battery exchange changed. - CompactFlash 8192 MB SSI is enabled. - Image of Ethernet connection changed. - Label description and images changed (there is no longer a safety sticker). - aPCI slot cover section removed. - HMI Drivers and Utilities DVD section removed. - Technical data (L1 cache, L2 cache, Touch Controller, SRAM on BIOS devices) revised. - Figure text added for Figure 149. - Windows CE description updated. - Serial number sticker changed. - "Distribution of resources" on page 481 updated. - "Automation Runtime summary screen - ex. 4PP420.1043-75" on page 484 changed. - Rear views added. - Chapter "Power Panel 300 with BIOS" on page 429 updated.
1.20	2007-04-20	- USB flash drive 5MMUSB.0256-00 and USB flash drive 5MMUSB.1024-00 cancelled - "Automation Runtime summary screen - ex. 4PP420.1043-75" on page 484 updated. - Rear views for devices 4PP420.0571-A5, 4PP451.0571-65 and 4PP481.1043-B5 added. - Section "USB flash drive" on page 554 updated. - Chapter "Power Panel 300 with BIOS" on page 429 updated.
1.30	2007-05-04	- Chapter 4 "Software" on page 429 updated.
1.40	2007-10-22	- 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). - Battery information expanded ("Changing the battery" on page 562). - New model numbers for Windows CE and Windows XPe expanded. - Windows CE and Windows XPe information updated. - Additional temperature humidity diagram information - Section 3 "Preventing after-image effect in LCD/TFT monitors" on page 564 added - Section "Touch screen calibration" on page 425 added - Section 2.6.2 "Environmental conditions - dust, humidity, aggressive gases" on page 27 added - Section "Replacement CMOS batteries" on page 539 updated. - Real-time clock specifications updated in technical data for the individual components (footnote). - Extensive changes
1.50	2008-05-27	- Vibration / shock data revised - Error correction (a touch screen was added in the technical data for 4PP451 and 4PP452). - 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). - Text changed from Compact Flash to CompactFlash - Windows CE 6.0 (5SWWCE.0821-ENG) added as the operating system for PP300 BIOS devices. - File name markers optimized for AS Help. - Information added to the Screen Rotation in every device. - Standards adjustment on page 517.

Table 1: Manual history (Forts.)

Version	Date	Change
1.60	2008-11-05	- Change to Automation Device Interface (ADI) Control Center on page 513. - B&R Key Editor moved from chapter 4 "Software" to chapter "Appendix" on page 579. - Information for battery lifespan changed in chapter 2 "Technical data". - 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). - Block diagrams updated for PP300 and PP400 on page 418. - User ID description expanded. - Temperature/humidity diagrams for PP300 and PP400 updated. - Topology images changed (design updated). - Grounding resistance changed to bleeder resistance. - ADI development kit on page 581 updated. - Error corrected for the 4PP3xx devices - Devices are not battery buffered.
1.70	2009-01-20	- Technical data corrected for devices: 4PP351.0571-01, 4PP351.0571-35, 4PP352.0571-35, 4PP452.1043-75 - these devices have no touch screen. - 4PP451.0571-85 device: Contents of delivery and technical data changed-> incorrect display description. - 4PP451.1043-75 device: Description and technical data changed for device - it only has 1 aPCI slot. - Phantom key information changed. - Model numbers 5SWWCE.0522-ENG, 5SWWCE.0622-ENG, 5SWWCE.0822-ENG, 5SWWXP.0422-ENG added. - Section 2.7 "Environmentally-friendly disposal" in chapter 1 "General information" added. - Temperature and humidity diagrams changed. - Contents of delivery for USB flash drives removed. - Mounting orientation -45° and +45° revised.
1.80	2009-04-01	- Display properties corrected for the device 4PP351.0571-35. - Number of function keys and soft keys corrected for the device 4PP352.0571-35. - Section 4.2 "Differences between the Windows CE 5.0 versions (Pro - PropPlus)" updated. - Section 4.4 "Windows CE 6.0 features" updated. - 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. - Section 7.4 "Creating a bootable USB flash drive", changed on page 479. - B&R CompactFlash card added. - Technical data for Silicon Systems CFs revised.

Table 1: Manual history (Forts.)

Version	Date	Change
1.90	2009-07-02	- Model numbers of the Power Panel 452 compact devices corrected. - Text changed for the Power button on the Automation Runtime devices (page 118 and page 178). - General information concerning Power Panel compact/light devices added (page 392). - Section 3.5 "Creating a DOS boot diskette in Windows XP" on page 497 added - Section 1.6.1 "BIOS Upgrade Disk" on page 488 moved and updated. - Section 1.6.2 "MTCX Firmware Upgrade (MTCX FPGA, MTCX PX32)" on page 491 moved and updated. - Section 1.6.3 "aPCI Firmware Upgrade Disk" on page 493 moved and updated. - Section 1.6.4 "User Boot Logo Upgrade Disk" on page 494 moved and updated. - Section 7.4 "Creating a bootable USB flash drive" updated and moved to page 499. - Section 3.7 "Creating a bootable CompactFlash card for B&R upgrade files" on page 501 added - Section 2 "Power Panel 400 with Automation Runtime" changed to "Power Panel 300/400 with Automation Runtime" on page 484. - Temperature humidity diagrams for the devices corrected. - Temperature humidity diagram and technical data for the Elo Accu touch screen on page 565 updated. - 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. - Section 1.2 "Gunze Touch" on page 567 in "Appendix A" added. - The touch screen type was added to the technical data for the devices.
2.00	2009-12-18	- Technical data for Power Panel devices updated: Information regarding Half-brightness time updated (footnote), holding torque for aPCI module updated. - Section "User tips for increasing the display lifespan" on page 427 added - "Compact Flash" spelling changed to "CompactFlash". - Figure 335 "Temperature humidity diagram - USB flash drive - 5MMUSB.2048-00" on page 556 updated. - Package amount and model number for lithium battery 0AC201.91 changed. - Power Panel device 4PP420.0571-85 added to manual, model number also updated in the figure for cutout installation. - Color depth for 15in devices corrected. - Section "B&R Automation Device Interface (ADI) driver - Control Center" on page 513 and section "B&R Automation Device Interface (ADI) development kit" on page 581 updated. - Section "B&R Key Editor information" on page 579 updated. - Figure 88 "Rear view - 4PP352.0571-35" on page 158 and 93 "Rear view - 4PP381.1043-31" on page 164 updated. - Section "Power Panel with Windows CE" on page 503 updated. - "Information:" for section "Upgrade information" on page 488 updated. - Wording in temperature specifications revised throughout document. - MB specification for memory capacity updated/corrected (pages 164, 170, 330). - Footnote about elevation and temperature (derating) updated in the technical data (removed from Touch Screen).
2.10	2010-04-01	- Description and figure of the Supply voltage changed (Figure Supply voltage connection: page 42, page 110, page 170). - Updated Power Panel 5PP320.1505-3B (page 103). - Updated Windows Embedded Standard 2009 (page 509). - Updated 2.1.6 "BIOS boot mode switch" on page 47, 3.1.6 "BIOS boot mode switch" on page 115 and 4.1.6 "BIOS boot mode switch" on page 175.
2.20	2010-07-13	- Technical data for Power Panel devices updated: Table entry „B&R ID-Code“ added; SRAM information „Remnant variables for AR (Automation Runtime) in Power Fail Mode“ added.
2.30	2010-07-28	- Additional B&R USB flash drive 5MMUSB.2048-01 in section "USB flash drive" on page 554. - Section "B&R Automation Device Interface (ADI) development kit" on page 581 updated. - Section "B&R Automation Device Interface (ADI) driver - Control Center" on page 513 updated.

Table 1: Manual history (Forts.)

2. Safety guidelines

2.1 Intended use

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

2.2 Protection against electrostatic discharges

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

2.2.1 Packaging

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

2.2.2 Guidelines for proper ESD handling

Electrical components with housing

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

Electrical components without housing

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

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

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

Individual components

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

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

2.3 Policy and procedures

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

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

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

2.4 Transport and storage

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

2.5 Installation

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

2.6 Operation

2.6.1 Protection against touching electrical parts

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

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

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

2.6.2 Environmental conditions - dust, humidity, aggressive gases

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

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

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

2.6.3 Programs, viruses and dangerous programs

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

2.7 Environmentally-friendly disposal

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

2.7.1 Separation of materials

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

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

Table 2: Environmentally-friendly separation of materials

Disposal must comply with the respective legal regulations.

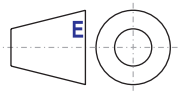
3. Organization of safety notices

The safety notices in this manual are organized as follows:

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

Table 3: Organization of safety notices

4. Guidelines



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	**Power Panel PP320 BIOS 5.7" QVGA, touch screen** 5.7" QVGA color LC display 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 54 *Cancelled since 4/2008*
5PP320.0571-39	**Power Panel PP320 BIOS 5.7" QVGA, touch screen** 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 61
5PP320.0573-39	**Power Panel PP320 BIOS 5.7" VGA, touch screen** 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 68
5PP320.0573-3B	**Power Panel PP320 BIOS 5.7" VGA** 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	**Power Panel PP320 BIOS 10.4" VGA, touch screen** 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 82
5PP320.1214-39	**Power Panel PP320 BIOS 12.1" SVGA, touch screen** 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 89
5PP320.1505-39	**Power Panel PP320 BIOS 15" XGA, touch screen** 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 96

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	**Power Panel PP320 5.7" QVGA, touch screen** 5.7" QVGA monochrome LC display 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 122
4PP320.0571-35	**Power Panel PP320 5.7" QVGA, touch screen** 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 128
4PP320.1043-31	**Power Panel PP320 10.4" VGA, touch screen** 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 134
4PP320.1505-31	**Power Panel PP320 15" XGA, touch screen** 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 140
4PP351.0571-01	**Power Panel PP351 5.7" QVGA** 5.7" QVGA monochrome LC display; 6 softkeys, 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 146
4PP351.0571-35	**Power Panel PP351 5.7" QVGA** 5.7" QVGA color TFT display; 6 softkeys, 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 152
4PP352.0571-35	**Power Panel PP351 5.7" QVGA** 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 158
4PP381.1043-31	**Power Panel PP381 10.4" VGA, touch screen** 10.4" VGA TFT color display with touch screen (resistive); 10 softkeys, 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 164

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	**Power Panel PP420 5.7" QVGA, 1 aPCI, touch screen** 5.7" QVGA monochrome LC 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 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 182
4PP420.0571-65	**Power Panel PP420 5.7" QVGA, 1 aPCI, touch screen** 5.7" QVGA color LC display 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 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 189
4PP420.0571-75	**Power Panel PP420 5.7" QVGA, 1 aPCI, touch screen** 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 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 196
4PP420.0571-85	**Power Panel PP420 5.7" QVGA, 2 aPCI, touch screen** 5.7" QVGA monochrome LC 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). monochrome LC display with	See page 203
4PP420.0571-A5	**Power Panel PP420 5.7" QVGA, 2 aPCI, touch screen** 5.7" QVGA color LC 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 210
4PP420.0571-B5	**Power Panel PP420 5.7" QVGA, 2 aPCI, touch screen** 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 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 217
4PP420.0573-75	**Power Panel PP420 5.7" VGA, 1 aPCI, touch screen** 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 0TB103.9 or cage clamp 0TB103.91 separately.)	See page 224
4PP420.1043-75	**Power Panel PP420 10.4" VGA, 1 aPCI, touch screen** 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 0TB103.9 or cage clamp 0TB103.91 separately.)*	See page 231
4PP420.1043-B5	**Power Panel PP420 10.4" VGA, 2 aPCI, touch screen** 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 0TB103.9 or cage clamp 0TB103.91 separately.)*	See page 238
4PP420.1505-75	**Power Panel PP420 15" XGA, 1 aPCI, touch screen** 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 0TB103.9 screw clamp or 0TB103.91 cage clamp separately).	See page 245

Table 6: Model number overview - Power Panel 400 devices

Model number	Short description	Note
4PP420.1505-B5	**Power Panel PP420 15" XGA, 2 aPCI, touch screen** 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 252
4PP451.0571-45	**Power Panel PP451 5.7" QVGA, 1 aPCI, keys** 5.7" QVGA monochrome LC display; 6 softkeys; 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 259
4PP451.0571-65	**Power Panel PP451 5.7" QVGA, 1 aPCI, keys** 5.7" QVGA color LC display; 6 softkeys; 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 266 *Cancelled since 4/2008*
4PP451.0571-75	**Power Panel PP451 5.7" QVGA, 1 aPCI, keys** 5.7" QVGA color TFT display; 6 softkeys; 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 273
4PP451.0571-85	**Power Panel PP451 5.7" QVGA, 2 aPCI, keys** 5.7" QVGA monochrome LC display; 6 softkeys; 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 280
4PP451.0571-B5	**Power Panel PP451 5.7" QVGA, 2 aPCI, keys** 5.7" QVGA color TFT display; 6 softkeys; 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 287
4PP451.1043-75	**Power Panel PP451 10.4" VGA, 1 aPCI, keys** 10.4" VGA color TFT display; 10 softkeys; 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 294
4PP451.1043-B5	**Power Panel PP451 10.4" VGA, 2 aPCI, keys** 10.4" VGA color TFT display; 10 softkeys; 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 301
4PP452.0571-45	**Power Panel PP452 5.7" QVGA, 1 aPCI, keys** 5.7" QVGA monochrome LC 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 308
4PP452.0571-65	**Power Panel PP452 5.7" QVGA, 1 aPCI, keys** 5.7" QVGA color LC 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 315 *Cancelled since 4/2008*

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

Model number	Short description	Note
4PP452.0571-75	**Power Panel PP452 5.7" QVGA, 1 aPCI, keys** 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 322
4PP452.0571-B5	**Power Panel PP452 5.7" QVGA, 2 aPCI, keys** 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 329
4PP452.1043-75	**Power Panel PP451 10.4" VGA, 1 aPCI, keys** 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 336
4PP480.1043-75	**Power Panel PP480 10.4" VGA, 1 aPCI, touch screen, keys** 10.4" VGA color TFT display with touch screen (resistive); 10 softkeys 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 343
4PP480.1505-75	**Power Panel PP480 15" XGA, 1 aPCI, touch screen, keys** 15" XGA color TFT display with touch screen (resistive); 12 softkeys 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 350
4PP480.1505-B5	**Power Panel PP480 15" XGA, 2 aPCI, touch screen, keys** 15" XGA color TFT display with touch screen (resistive); 12 softkeys 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 357
4PP481.1043-75	**Power Panel PP481 10.4" VGA, 1 aPCI, touch screen, keys** 10.4" VGA TFT color display with touch screen (resistive); 10 softkeys, 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 364
4PP481.1043-B5	**Power Panel PP481 10.4" VGA, 2 aPCI, touch screen, keys** 10.4" VGA TFT color display with touch screen (resistive); 10 softkeys, 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 371
4PP481.1505-75	**Power Panel PP481 15" XGA, 1 aPCI, touch screen, keys** 15" XGA color TFT display with touch screen (resistive); 12 softkeys, 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 378
4PP482.1043-75	**Power Panel PP482 10.4" VGA, 1 aPCI, touch screen, keys** 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 385

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	**Power Panel PP420 light LCD monochrome, CAN, touch screen** Set Power Panel PP420 light CAN; 5.7" QVGA LCD monochrome; 128 MB SDRAM; 512 KB SRAM.	See page 392
4PP420:0571-L45	**Power Panel PP420 light LCD monochrome, X2X, touch screen** Set Power Panel PP420 light X2X; 5.7" QVGA LCD monochrome; 128 MB SDRAM; 512 KB SRAM.	See page 392
4PP420:0571-L25	**Power Panel PP420 light LCD color, CAN, touch screen** Set Power Panel PP420 light CAN; 5.7" QVGA LCD color; 128 MB SDRAM; 512 KB SRAM.	See page 392
4PP420:0571-L65	**Power Panel PP420 light LCD color, X2X, touch screen** Set Power Panel PP420 light X2X; 5.7" QVGA LCD color; 128 MB SDRAM; 512 KB SRAM.	See page 392
4PP420:0571-L35	**Power Panel PP420 light TFT color, CAN, touch screen** Set Power Panel PP420 light CAN; 5.7" QVGA TFT color; 128 MB SDRAM; 512 KB SRAM.	See page 392
4PP420:0571-L75	**Power Panel PP420 light TFT color, X2X, touch screen** Set Power Panel PP420 light X2X; 5.7" QVGA TFT color; 128 MB SDRAM; 512 KB SRAM.	See page 392
4PP420:0571-C05	**Power Panel PP420 compact LCD monochrome, CAN, touch screen** Set Power Panel PP420 compact CAN; 5.7" QVGA LCD monochrome; 128 MB SDRAM; 512 KB SRAM; ETH 10/100.	See page 397
4PP420:0571-C45	**Power Panel PP420 compact LCD monochrome, X2X, touch screen** Set Power Panel PP420 compact X2X; 5.7" QVGA LCD monochrome; 128 MB SDRAM; 512 KB SRAM; ETH 10/100.	See page 397
4PP420:0571-C25	**Power Panel PP420 compact LCD color, CAN, touch screen** Set Power Panel PP420 compact CAN; 5.7" QVGA LCD color; 128 MB SDRAM; 512 KB SRAM; ETH 10/100.	See page 397
4PP420:0571-C65	**Power Panel PP420 compact LCD color, X2X, touch screen** Set Power Panel PP420 compact X2X; 5.7" QVGA LCD color; 128 MB SDRAM; 512 KB SRAM; ETH 10/100.	See page 397
4PP420:0571-C35	**Power Panel PP420 compact TFT color, CAN, touch screen** Set Power Panel PP420 compact CAN; 5.7" QVGA TFT color; 128 MB SDRAM; 512 KB SRAM; ETH 10/100.	See page 397
4PP420:0571-C75	**Power Panel PP420 compact TFT color, X2X, touch screen** Set Power Panel PP420 compact X2X; 5.7" QVGA TFT color; 128 MB SDRAM; 512 KB SRAM; ETH 10/100.	See page 397
4PP451:0571-L25	**Power Panel PP451 light LCD color, CAN, keys** Set Power Panel PP451 light CAN; 5.7" QVGA LCD color; 128 MB SDRAM; 512 KB SRAM.	See page 402
4PP451:0571-L65	**Power Panel PP451 light LCD color, X2X, keys** Set Power Panel PP451 light X2X; 5.7" QVGA LCD color; 128 MB SDRAM; 512 KB SRAM.	See page 402
4PP451:0571-L35	**Power Panel PP451 light TFT color, CAN, keys** Set Power Panel PP451 light CAN; 5.7" QVGA TFT color; 128 MB SDRAM; 512 KB SRAM.	See page 402
4PP451:0571-L75	**Power Panel PP451 light TFT color, X2X, keys** Set Power Panel PP451 light X2X; 5.7" QVGA TFT color; 128 MB SDRAM; 512 KB SRAM.	See page 402

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

Model number	Short description	Note
4PP451:0571-C25	**Power Panel PP451 compact LCD color, CAN, keys** Set Power Panel PP451 compact CAN; 5.7" QVGA LCD color; 128 MB SDRAM; 512 KB SRAM; ETH 10/100.	See page 406
4PP451:0571-C65	**Power Panel PP451 compact LCD color, X2X, keys** Set Power Panel PP451 compact X2X; 5.7" QVGA LCD color; 128 MB SDRAM; 512 KB SRAM; ETH 10/100.	See page 406
4PP451:0571-C35	**Power Panel PP451 compact TFT color, CAN, keys** Set Power Panel PP451 compact CAN; 5.7" QVGA TFT color; 128 MB SDRAM; 512 KB SRAM; ETH 10/100.	See page 406
4PP451:0571-C75	**Power Panel PP451 compact TFT color, X2X, keys** Set Power Panel PP451 compact X2X; 5.7" QVGA TFT color; 128 MB SDRAM; 512 KB SRAM; ETH 10/100.	See page 406
4PP452:0571-L25	**Power Panel PP452 light LCD color, CAN, keys** Set Power Panel PP452 light CAN; 5.7" QVGA LCD color; 64 MB SDRAM; 256 KB SRAM	See page 410
4PP452:0571-L65	**Power Panel PP452 light LCD color, X2X, keys** Set Power Panel PP452 light X2X; 5.7" QVGA LCD color; 128 MB SDRAM; 512 KB SRAM	See page 410
4PP452:0571-L35	**Power Panel PP452 light TFT color, CAN, keys** Set Power Panel PP452 light CAN; 5.7" QVGA TFT color; 64 MB SDRAM; 256 KB SRAM	See page 410
4PP452:0571-L75	**Power Panel PP452 light TFT color, X2X, keys** Set Power Panel PP452 light X2X; 5.7" QVGA TFT color; 128 MB SDRAM; 512 KB SRAM	See page 410
4PP452:0571-C25	**Power Panel PP452 compact LCD color, CAN, keys** Set Power Panel PP452 compact CAN; 5.7" QVGA LCD color; 128 MB SDRAM; 512 KB SRAM; ETH 10/100.	See page 414
4PP452:0571-C65	**Power Panel PP452 compact LCD color, X2X, keys** Set Power Panel PP452 compact X2X; 5.7" QVGA LCD color; 128 MB SDRAM; 512 KB SRAM; ETH 10/100.	See page 414
4PP452:0571-C35	**Power Panel PP452 compact TFT color, CAN, keys** Set Power Panel PP452 compact CAN; 5.7" QVGA TFT color; 128 MB SDRAM; 512 KB SRAM; ETH 10/100.	See page 414
4PP452:0571-C75	**Power Panel PP452 compact TFT color, X2X, keys** Set Power Panel PP452 compact X2X; 5.7" QVGA TFT color; 128 MB SDRAM; 512 KB SRAM; ETH 10/100.	See page 414

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

5.5 Software

Model number	Short description	Note
5SWWCE.0521-ENG	**WinCE5.0 Pro PP300 LX800** 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 503
5SWWCE.0621-ENG	**WinCE5.0 ProPlus PP300 LX800** 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).	See page 503

Table 8: Model number overview - software

Model number	Short description	Note
5SWWCE.0821-ENG	**WinCE6.0 Pro PP300 LX800** 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 503
5SWWXP.0421-ENG	**WinXPe FP2007 PP300 LX800** 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 507
5SWWCE.0522-ENG	**WinCE5.0 Pro PP400 LX800** Microsoft Windows CE 5.0 Professional, English; for Power Panel 400 BIOS; Order CompactFlash separately (min.128 MB).	See page 503
5SWWCE.0622-ENG	**WinCE5.0 ProPlus PP400 LX800** Microsoft Windows CE 5.0 Professional plus, English; for Power Panel 400 BIOS; Order CompactFlash separately (min. 128 MB).	See page 503
5SWWCE.0822-ENG	**WinCE6.0 Pro PP400 LX800** Microsoft Windows CE 6.0 Professional, English; for Power Panel 400 BIOS; Order CompactFlash separately (min. 128 MB).	See page 503
5SWWXP.0422-ENG	**WinXPe FP2007 PP400 LX800** Microsoft Windows XP Embedded Feature Pack 2007, English; for Power Panel 400; Order CompactFlash separately (min. 512 MB).	See page 507
5SWWXP.0721-ENG	**Windows Embedded Standard 2009 PP300 LX800** Microsoft OEM Windows embedded Standard 2009, English; for Power Panel 300; please order CompactFlash separately (minimum 1 GB).	See page 509
5SWWXP.0722-ENG	**Windows Embedded Standard 2009 PP400 LX800** Microsoft OEM Windows embedded Standard 2009, English; for Power Panel 400; please order CompactFlash separately (minimum 1 GB).	See page 509

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

5.6 Accessories

Model number	Short description	Note
0AC201.91	**Lithium batteries, 4 pcs.** Lithium batteries, 4 pcs., 3 V / 950 mAh, button cell	See page 539
4A0006.00-000	**Lithium battery (1x)** Lithium battery, 1 pc., 3 V / 950 mAh, button cell	See page 539
0TB103.9	**Plug 24V 5.08 3-pin screw clamps** 24 VDC 3-pin connector, female. Screw clamps, 3.31 mm², protected against vibration by the screw flange	See page 541
0TB103.91	**Plug 24V 5.08 3-pin cage clamps** 24 VDC 3-pin connector, female. Cage clamps, 3.31 mm², protected against vibration by the screw flange	See page 541
5AC900.057X-00	**Legend strips 3x 5.7" vertical1** Legend strip template for Power Panel 4PP451.0571-65. For 3 devices.	See page 543
5AC900.057X-01	**Legend strips 2x 5.7" Horizontal2** Legend strip template for Power Panel 4PP452.0571-65. For 2 devices.	See page 543
5AC900.104X-00	**Legend strip 1x 10.4" Vertical1** Legend strip template for Power Panel 4PP451.1043-75 and 4PP481.1043-B5. For 1 device.	See page 543

Table 9: Model number overview - accessories

Model number	Short description	Note
5AC900.104X-01	**Legend strip 1x 10.4" Horizontal2** Legend strip template for Power Panel 4PP482.1043-75. For 1 device.	See page 543
5AC900.104X-02	**Legend strips 3x 10.4" Horizontal1** Legend strip template for Power Panel 4PP480.1043-75. For 3 devices.	See page 543
5AC900.150X-00	**Legend strips 4x 15"** Legend strip template for Power Panel 4PP481.1505-75 and 4PP480.1505-75. For 4 devices.	See page 543
5CFCRD.0512-04	**CompactFlash 512 MB B&R** CompactFlash card with 512 MB SLC NAND flash and IDE/ATA interface	See page 545
5CFCRD.1024-04	**CompactFlash 1024 MB B&R** CompactFlash card with 1024 MB SLC NAND flash and IDE/ATA interface	See page 545
5CFCRD.2048-04	**CompactFlash 2048 MB B&R** CompactFlash card with 2048 MB SLC NAND flash and IDE/ATA interface	See page 545
5CFCRD.4096-04	**CompactFlash 4096 MB B&R** CompactFlash card with 4096 MB SLC NAND flash and IDE/ATA interface	See page 545
5CFCRD.8192-04	**CompactFlash 8192 MB B&R** CompactFlash card with 8192 MB SLC NAND flash and IDE/ATA interface	See page 545
5CFCRD.016G-04	**CompactFlash 16 GB B&R** CompactFlash card with 16 GB SLC NAND flash and IDE/ATA interface	See page 545
5CFCRD.0064-03	**CompactFlash 64 MB SSI** CompactFlash card with 64 MB SLC NAND flash and IDE/ATA interface	See page 550
5CFCRD.0128-03	**CompactFlash 128 MB SSI** CompactFlash card with 128 MB SLC NAND flash and IDE/ATA interface	See page 550
5CFCRD.0256-03	**CompactFlash 256 MB SSI** CompactFlash card with 256 MB SLC NAND flash and IDE/ATA interface	See page 550
5CFCRD.0512-03	**CompactFlash 512 MB SSI** CompactFlash card with 512 MB SLC NAND flash and IDE/ATA interface	See page 550
5CFCRD.1024-03	**CompactFlash 1024 MB SSI** CompactFlash card with 1024 MB SLC NAND flash and IDE/ATA interface	See page 550
5CFCRD.2048-03	**CompactFlash 2048 MB SSI** CompactFlash card with 2048 MB SLC NAND flash and IDE/ATA interface	See page 550
5CFCRD.4096-03	**CompactFlash 4096 MB SSI** CompactFlash card with 4096 MB SLC NAND flash and IDE/ATA interface	See page 550
5CFCRD.8192-03	**CompactFlash 8192 MB SSI** CompactFlash card with 8192 MB SLC NAND flash and IDE/ATA interface	See page 550
5MMUSB.2048-00	**USB flash drive 2 GB SanDisk** USB 2.0 flash drive 2 GB	See page 554
5MMUSB.2048-01	**USB flash drive 2 GB B&R** USB 2.0 flash drive 2 GB	See page 554
9A0017.01	**RS232 DB9 null modem cable 0.6 m** Null modem cable RS232 0.6 m to connect UPS and IPC (9-pin DSUB socket - 9-pin DSUB socket)	See page 559
9A0017.02	**RS232 DB9 null modem cable 1.8 m** Null modem cable RS232 1.8 m to connect UPS and IPC (9-pin DSUB socket - 9-pin DSUB socket)	See page 559

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

Chapter 2 • Technical data

1. General information

The new Power Panel 300/400 generation expands upon B&R's proven Power Panel 100/200 line. With more than twice the computing power, the new generation covers a performance range that until recently could only be handled by 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 products are designed to automate complete systems. Integrated control functionality and drive technology act 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 a new combination of 5.7" diagonal and VGA TFT display. It allows a great deal of information to be displayed in a small amount of space and images can be shown is detail. Entries are made either via touch screen or using 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 or both[1)]
- Horizontal and vertical mounting orientations, numeric and alphanumeric keys[1)]
- Maximum 2 aPCI slots (see B&R System 2005 User's Manual for available aPCI interface modules)[1)]
- BIOS (Windows XP Embedded, Windows CE 5.0 or 6.0) or Automation Runtime operating system[1)]
- Real-time clock (battery-buffered)[1)]
- Up to 512 MB SDRAM main memory[1)]

1) Depending on the design of the particular Power Panel device.

1.2 Advantages of Power Panel 300/400 over 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 571) - but connections are not compatible (locations of interfaces, plugs, and keys have changed).

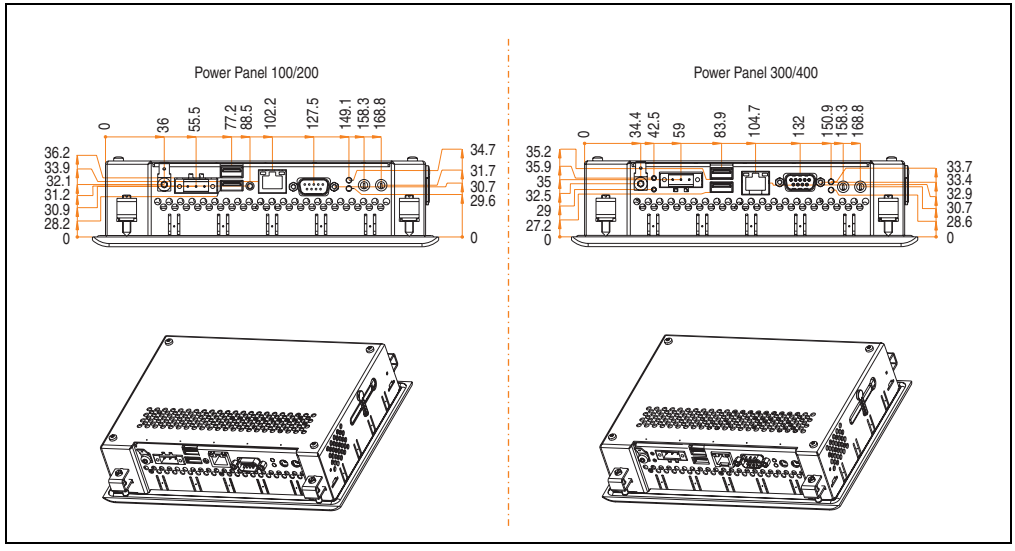


Figure 2: Different plug and key positions (PP100/200 - PP300/400)

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 clamps) or 0TB103.91 (cage clamps).

The pin assignments 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 clamps
0TB103.91	Plug 24 V 5.08 3-pin cage clamps

Figure 3: Supply voltage connection

Ground

Warning!

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

2.1.2 Functional grounding clip

Next to the supply voltage plug there is a functional grounding clip. The grounding clip (functional ground) must be connected with a central grounding point on the switching cabinet using a 6.3 mm blade connector via the shortest distance and with as little resistance as possible (e.g. copper strip, but must be at least 2.5 mm²).

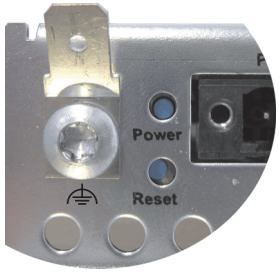
Grounding clip


Figure 4: 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	9-pin DSUB plug
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	

Table 10: Pin assignments - COM

2.1.4 USB port

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[1)]	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[2)]	
Maximum cable length	5 m (not including hub)	

Table 11: USB port

1) The actual value depends on the operating system or diver 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 interfaces. 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, this interface should be handled with extreme care with regard to EMC, location of cables, etc.

2.1.5 Mode / Node switches

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

Mode/Node switch

Table 12: Mode/Node switch

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 479.
x	x	None	No other switch positions have significance.

Table 13: 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.

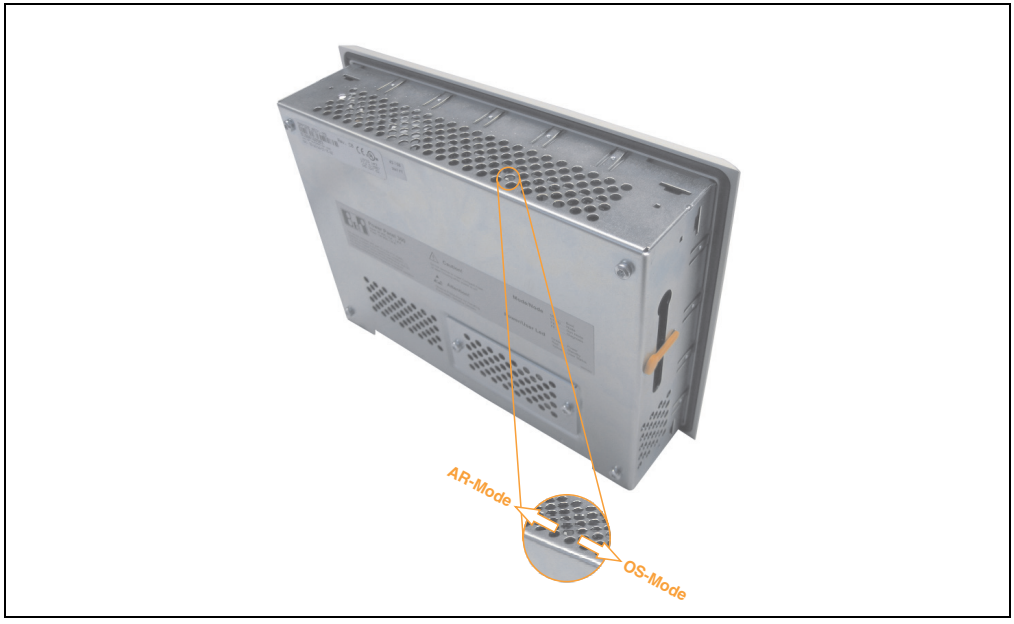


Figure 5: BIOS boot mode switch

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 14: 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 429)
- 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 484)
- USB Boot "Enabled" (only in switch position "00")

2.1.7 Status LEDs

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

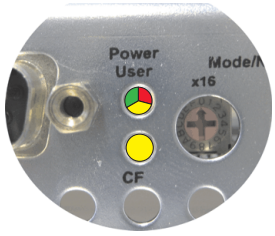
Status LEDs				
LED	**Color**		**Meaning**	
Power	Green	On	Supply voltage OK	1x three-color, 1x one-color 
	Red	On	The system is in standby mode (S5: soft-off mode or S4: hibernate mode - suspend-to-disk)	
User	Yellow	On	Can be used as the user wants (for example, can be turned on/off directly using the ADI library - only possible in S0 state)	
	Green	Off		
CF	Yellow	On	Indicates access to CompactFlash drive (read or write)	

Table 15: Status LEDs

2.1.8 Ethernet connection

Ethernet connection			
Controller	Intel 82551ER		RJ45 twisted pair (10BaseT/100BaseT), female
Cabling	S/STP (category 5)		
Transfer rate	10/100 MBit/s [1]		
LED	**On**	**Off**	
Green	100 MBit/s	10 MBit/s	
Orange	Link (Ethernet network connection available)	Activity (blinking) (Data transfer in progress)	

Table 16: Ethernet connection

1) Both operating modes possible. Change-over 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.

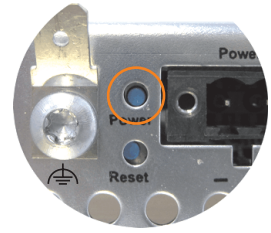
Power button	
The power button can be pressed with a pointed object (i.e. paper clip or tip of a pen). The power button acts like the on/off switch on a normal desktop PC with ATX power supply: **press and release** ... turn on or shut down operating system. **press and hold** ... ATX power supply switches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

Table 17: Power button

2.1.10 Reset button

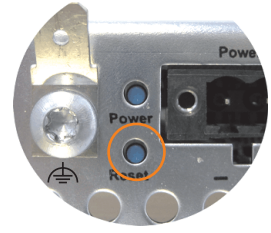
Reset button	
The reset button can be pressed with a pointed object (i.e. paper clip or tip of a pen). Pushing the reset button results in a hardware-reset. The Power Panel restarts. The MTCX processor is not reset when the reset button is pressed.	

Table 18: Reset button

Warning!

A system reset can cause data to be lost!

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.

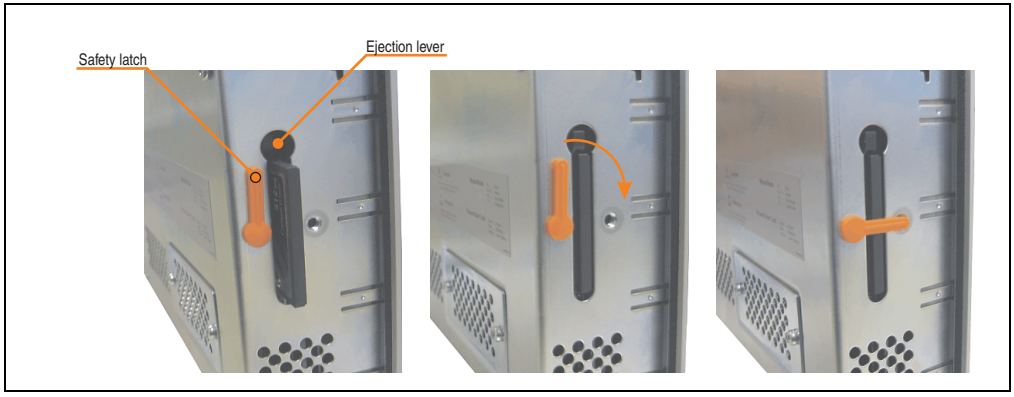


Figure 6: CompactFlash slot

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 7: 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

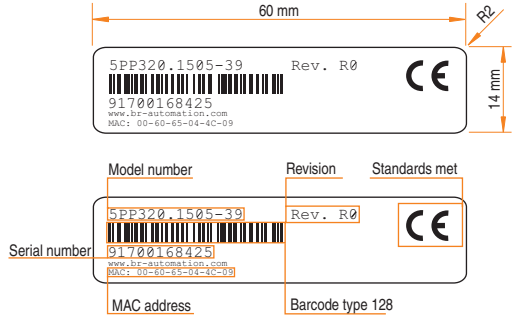


Figure 8: Design / dimensions - Serial number sticker

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**. The search also works if you enter the model number or the material number in the material number search field.

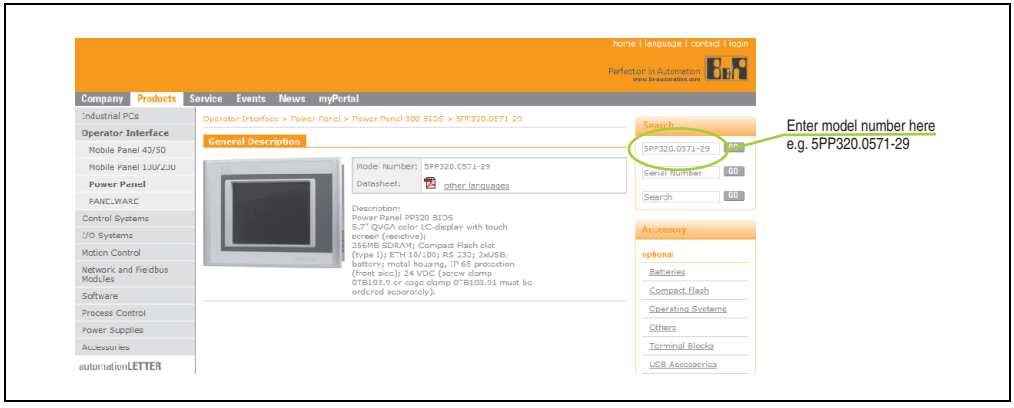


Figure 9: Example - Material number search: 5PP320.0571-29

2.3 Device 5PP320.0571-29

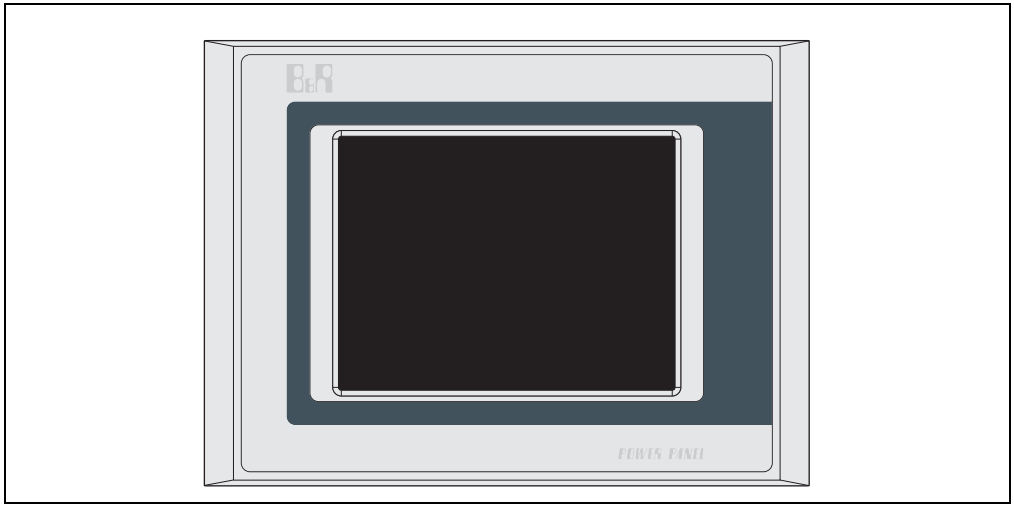


Figure 10: Front view - 5PP320.0571-29

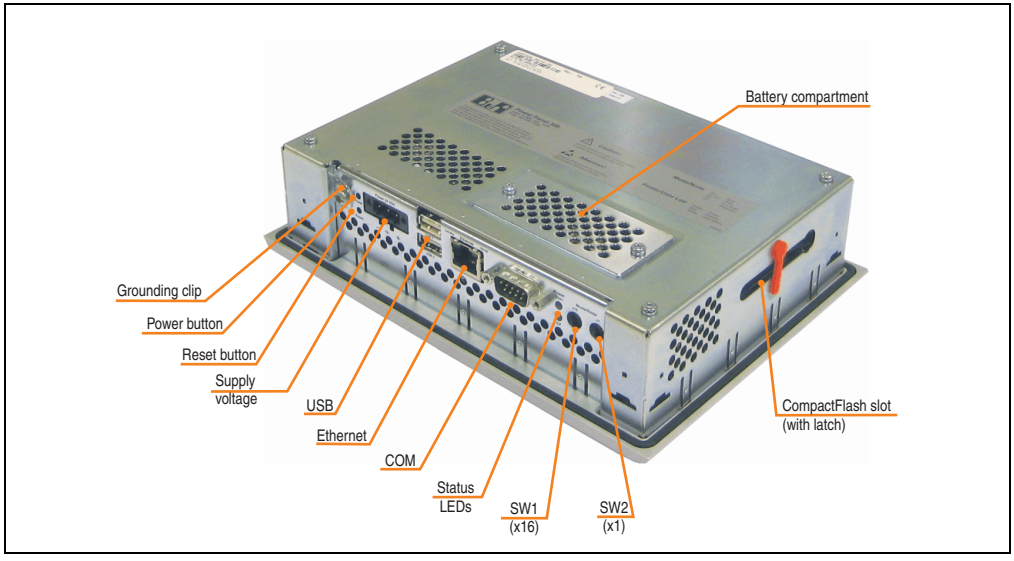


Figure 11: Rear view - 5PP320.0571-29

2.3.1 Technical data

Features	5PP320.0571-29
B&R ID-Code	$23CE
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 256 MB
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	-
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] -
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 4 years [3)] 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 19: Technical data - 5PP320.0571-29

Features	5PP320.0571-29
Serial interface	
Type	RS232, modem-capable, not electrically isolated
UART	16C550 compatible, 16-byte FIFO
Transfer rate	Max. 115 kBaud
Connection	9-pin DSUB
USB interface	
Type	USB 1.1, USB 2.0[4]
Amount	2
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4]
Connection	Type A
Current load	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	Color LCD
Diagonal	5.7 in (144 mm)
Colors	512 colors [4]
Resolution	QVGA, 320 x 240 pixels
Contrast	40:1
Viewing angle (see page 570)	
Horizontal	Direction R / direction L =40°
Vertical	Direction U = 40°/ direction D = 50°
Background lighting	
Brightness	200 cd/m²
Half-brightness time[5]	50,000 hours
Screen rotation	Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen	
Touch screen type	Gunze
Technology	Analog, resistive
Controller	Elo, serial, 12- bit
Degree of transmission	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 19: Technical data - 5PP320.0571-29 (Forts.)

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	Aluminum, naturally anodized[6)]
Design	Gray[6)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[6)]
Light background	Similar to Pantone 427CV[6)]
Gasket	Flat gasket around display front
Housing	Metal
Weight	Approx. 1.4 kg
Environmental characteristics	
Ambient temperature	
Operation	0 to +50°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 2.3.2 "Temperature humidity diagram" on page 58
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[7)]	Max. 3000 m

Table 19: Technical data - 5PP320.0571-29 (Forts.)

1) Maintenance Controller Extended.

2) At max. specified ambient temperature: typ. 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 lifespan in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.
Maximum lifespan when switched off: 2 years at +25°C or 1 year at +50°C.

4) The actual value depends on the operating system or diver 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

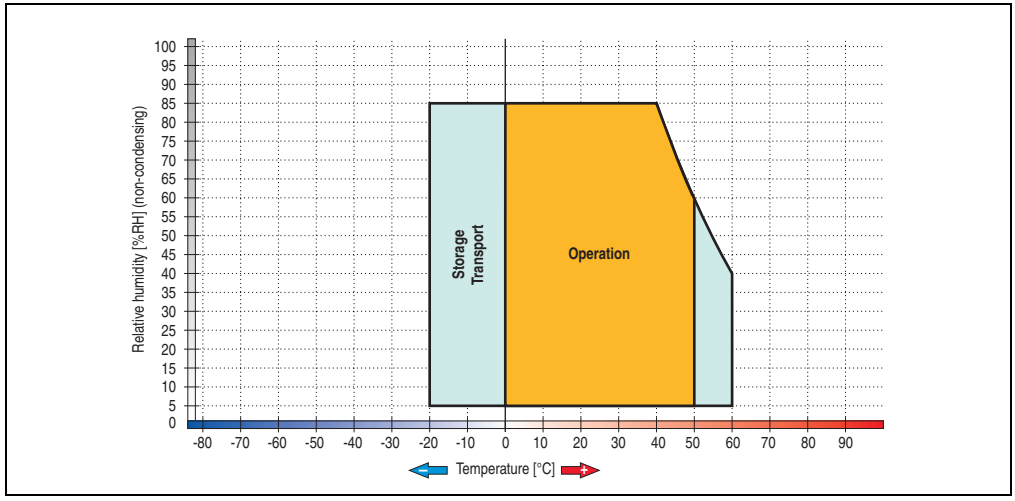


Figure 12: Temperature humidity diagram - 5PP320.0571-29

2.3.3 Dimensions

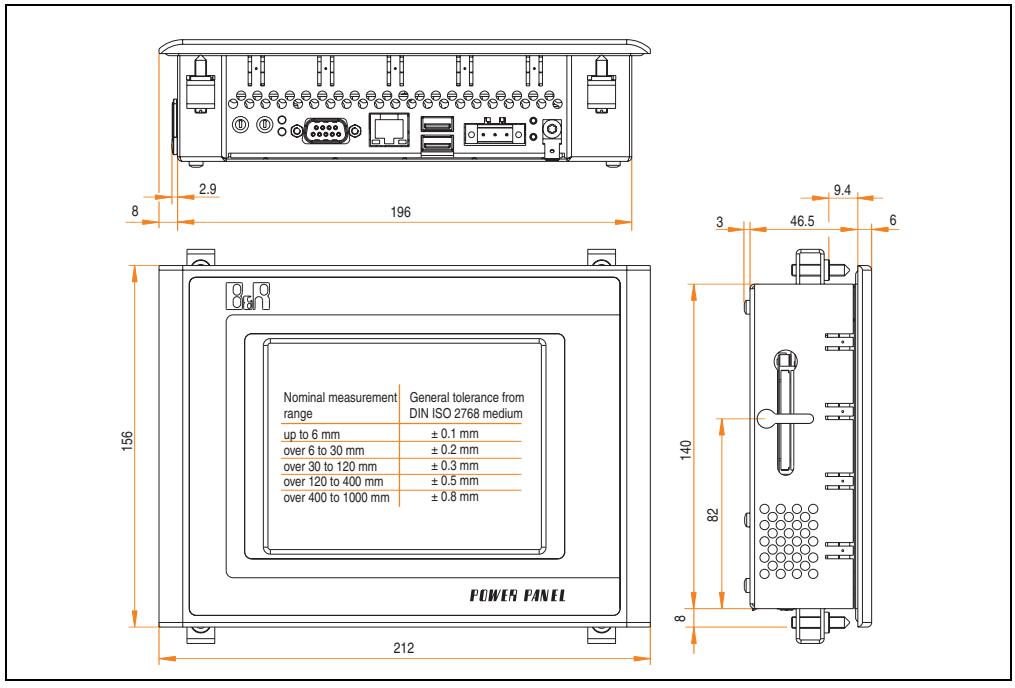


Figure 13: Dimensions - 5PP320.0571-29

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.

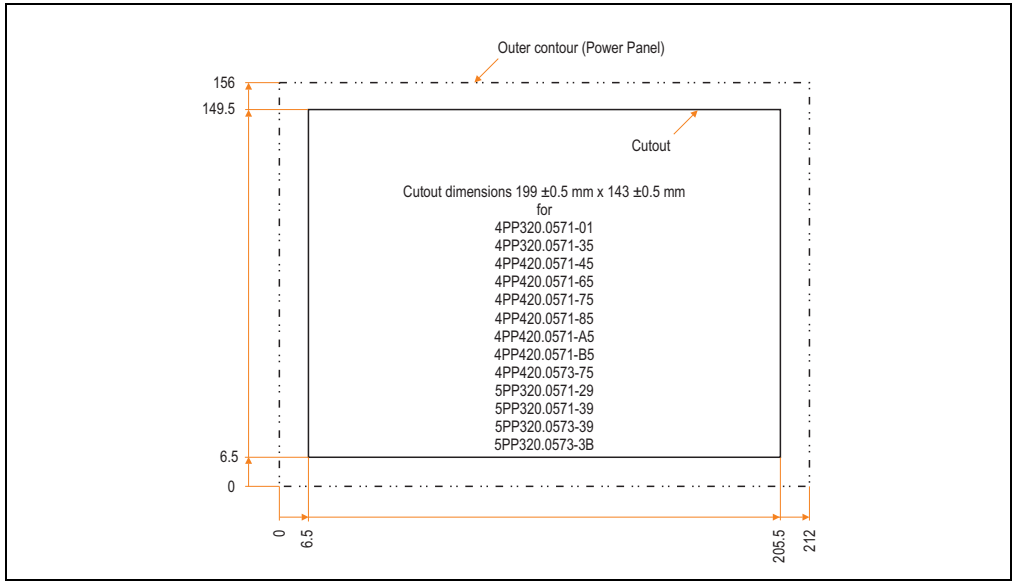


Figure 14: Cutout installation - 5PP320.0571-29

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 5.7" QVGA, touch screen
4	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 20: Contents of delivery - 5PP320.0571-29

2.4 Device 5PP320.0571-39

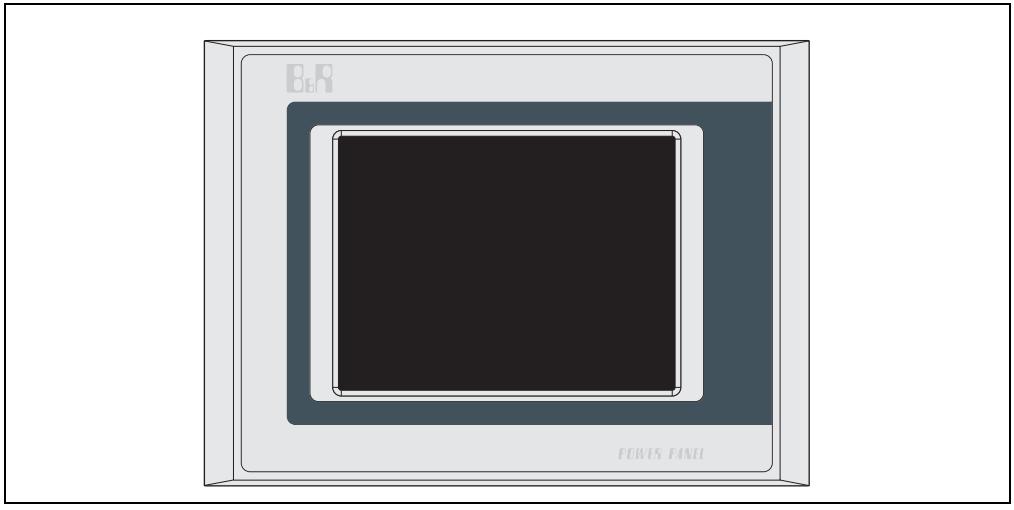


Figure 15: Front view - 5PP320.0571-39

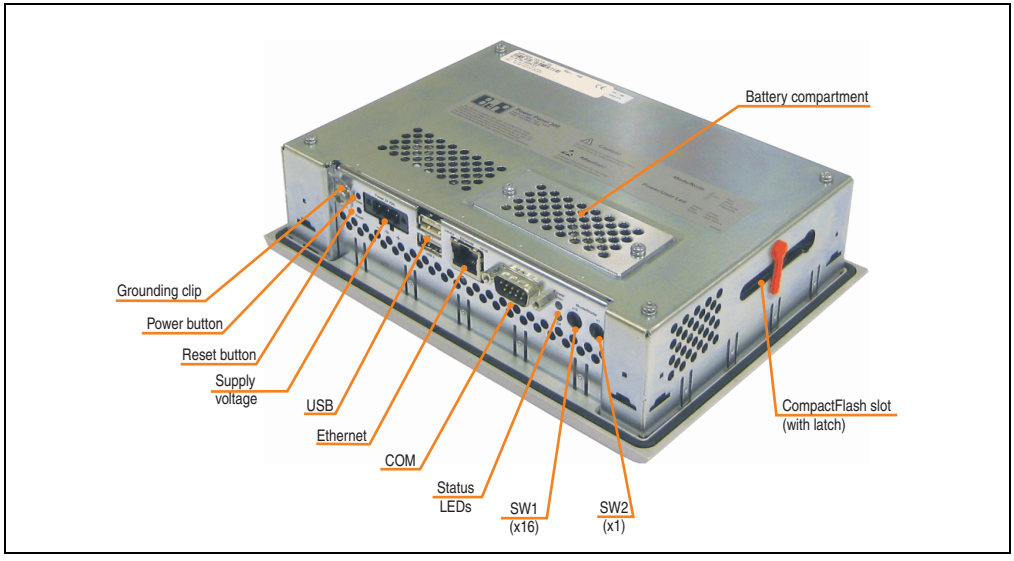


Figure 16: Rear view - 5PP320.0571-39

2.4.1 Technical data

Features	5PP320.0571-39 < Rev. D0	5PP320.0571-39 ≥ Rev. D0
B&R ID-Code	$A15D	
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)	
Flash	2 MB (for firmware)	
Memory Type Quantity	 DDR SDRAM 256 MB	
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)	
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	-	
Watchdog Controller	 MTCX[1)]	
Power failure logic Controller Buffer time	 MTCX[1)] -	
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day	
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 4 years [3)] 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 21: Technical data - 5PP320.0571-39

Features	5PP320.0571-39 < Rev. D0	5PP320.0571-39 ≥ 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[4)] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)] 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 570) Horizontal Vertical Background lighting Brightness Half-brightness time[5)] Screen rotation	 Color TFT 5.7 in (144 mm) 262,144 colors [4)] QVGA, 320 x 240 pixels 400:1 Direction R / direction L =60° Direction U = 40°/ direction D = 50° 500 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426	 Color TFT 5.7 in (144 mm) 262,144 colors [3)] QVGA, 320 x 240 pixels 350:1 Direction R / direction L =65° Direction U = 65°/ direction D = 40° 500 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
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 21: Technical data - 5PP320.0571-39 (Forts.)

Electrical characteristics	5PP320.0571-39 < Rev. D0	5PP320.0571-39 ≥ 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	156 mm	
Depth	55.5 mm	
Front		
Frame	Aluminum, naturally anodized[6)]	
Design	Gray[6)]	
Membrane	Polyester	
Dark gray border around display	Similar to Pantone 432CV[6)]	
Light background	Similar to Pantone 427CV[6)]	
Gasket	Flat gasket around display front	
Housing	Metal	
Weight	Approx. 1.4 kg	
Environmental characteristics		
Ambient temperature		
Operation	0 to +50°C	
Storage	-20 to +60°C	
Transport	-20 to +60°C	
Relative humidity	See 2.4.2 "Temperature humidity diagram" on page 65	
Vibration		
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g	
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g	
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g	
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g	
Shock		
Operation	15 g, 11 ms	
Storage	30 g, 15 ms	
Transport	30 g, 15 ms	
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude[7)]	Max. 3000 m	

Table 21: Technical data - 5PP320.0571-39 (Forts.)

1) Maintenance controller extended.

2) At max. specified ambient temperature: typ. 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 lifespan in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.
Maximum lifespan when switched off: 2 years at +25°C or 1 year at +50°C.

4) The actual value depends on the operating system or diver 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

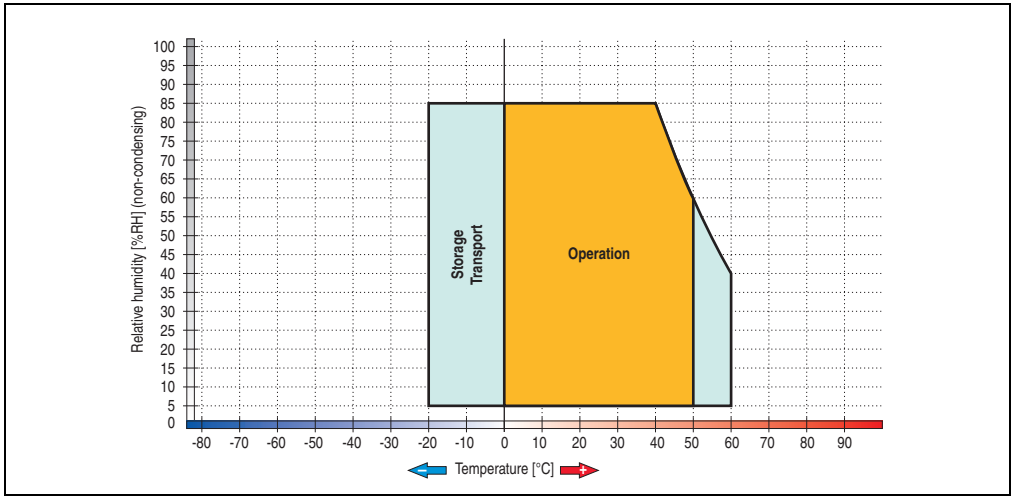


Figure 17: Temperature humidity diagram - 5PP320.0571-39

2.4.3 Dimensions

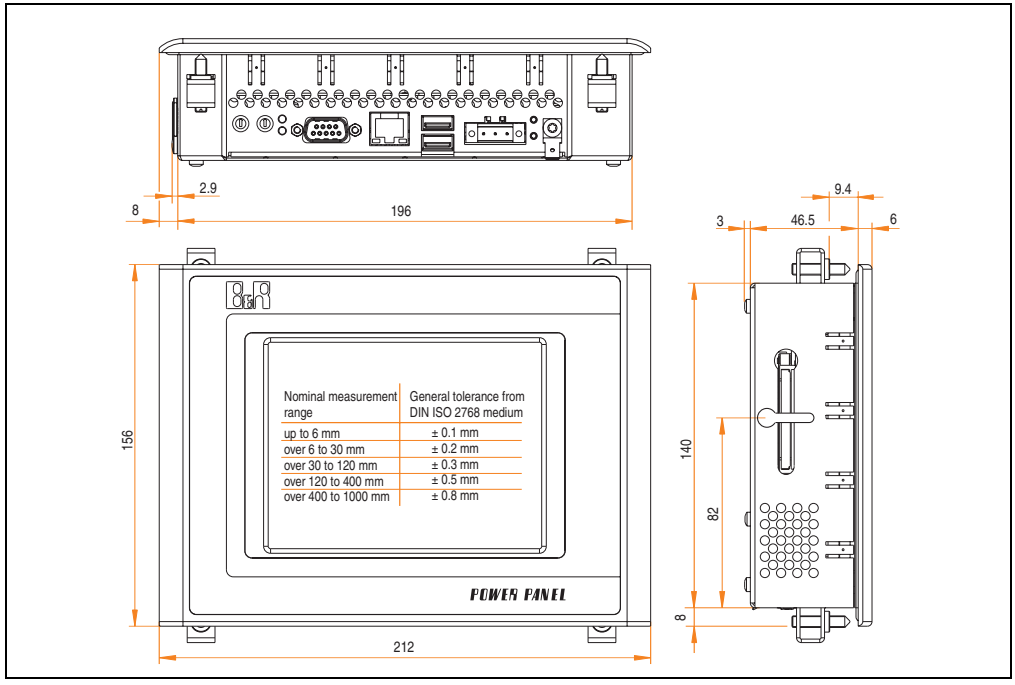


Figure 18: Dimensions - 5PP320.0571-39

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.

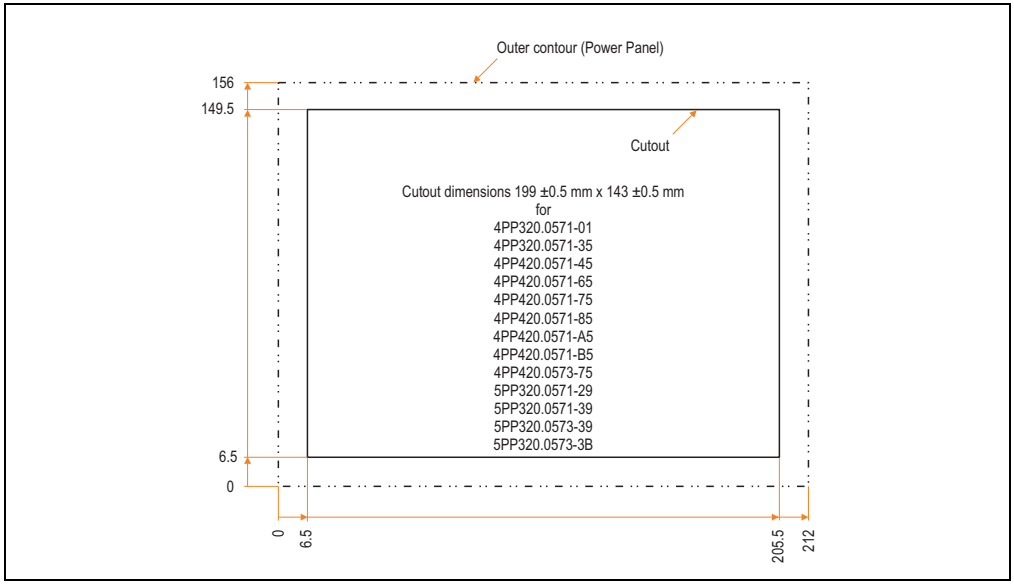


Figure 19: Cutout installation - 5PP320.0571-39

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 5.7" QVGA, touch screen
4	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 22: Contents of delivery - 5PP320.0571-39

2.5 Device 5PP320.0573-39

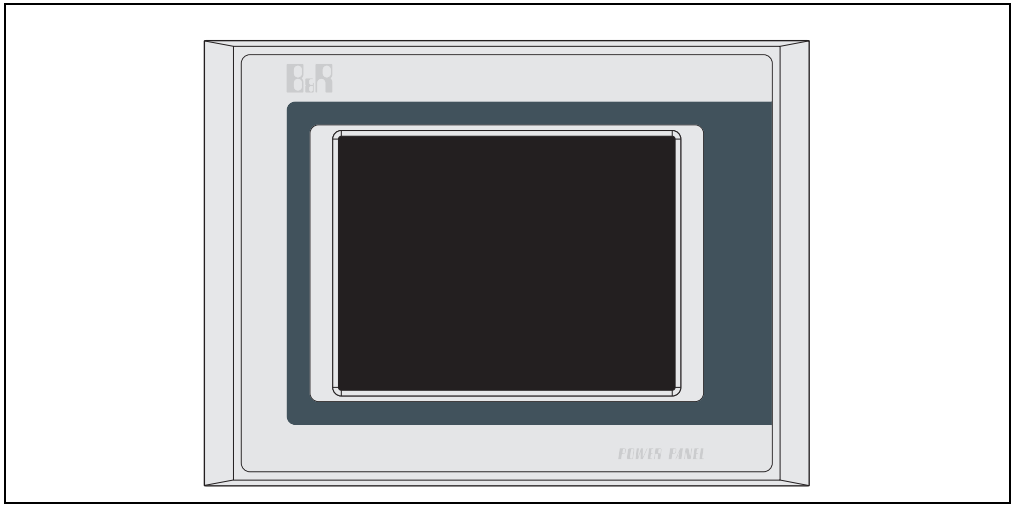


Figure 20: Front view - 5PP320.0573-39

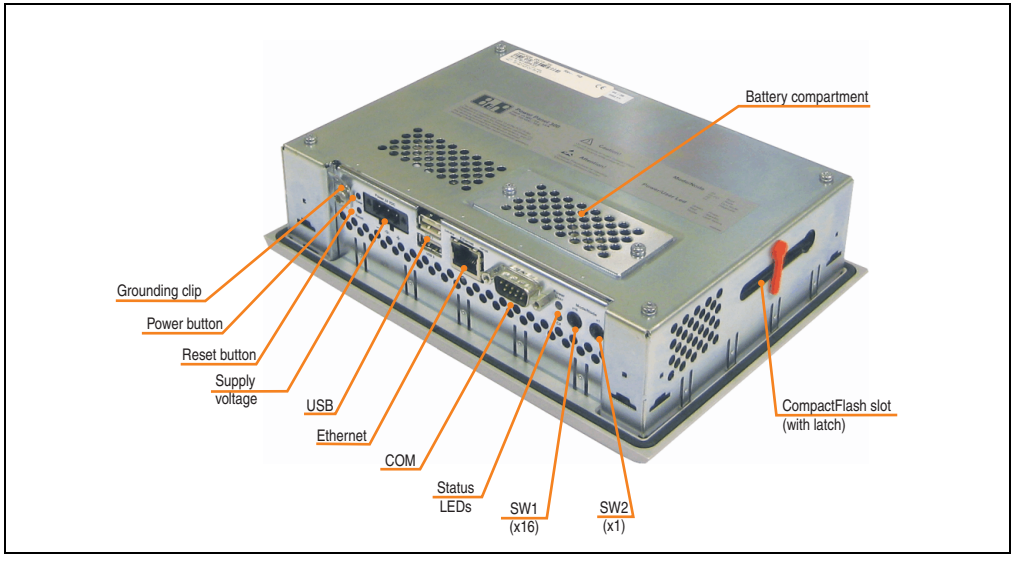


Figure 21: Rear view - 5PP320.0573-39

2.5.1 Technical data

Features	5PP320.0573-39
B&R ID-Code	$23CF
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 256 MB
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	-
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] -
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 4 years [3)] 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 23: Technical data - 5PP320.0573-39

Features	5PP320.0573-39
Serial interface	
Type	RS232, modem-capable, not electrically isolated
UART	16C550 compatible, 16-byte FIFO
Transfer rate	Max. 115 kBaud
Connection	9-pin DSUB
USB interface	
Type	USB 1.1, USB 2.0[4)]
Amount	2
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)]
Connection	Type A
Current load	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	Color TFT
Diagonal	5.7 in (144 mm)
Colors	262,144 colors [4)]
Resolution	VGA, 640 x 480 pixels
Contrast	400:1
Viewing angle (see page 570)	
Horizontal	Direction R / direction L =80°
Vertical	Direction U = 80°/ direction D = 70°
Background lighting	
Brightness	350 cd/m²
Half-brightness time[5)]	75,000 hours
Screen rotation	Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen	
Touch screen type	Gunze
Technology	Analog, resistive
Controller	Elo, serial, 12- bit
Degree of transmission	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 23: Technical data - 5PP320.0573-39 (Forts.)

Electrical characteristics	5PP320.0573-39
Power supply	
Rated voltage	18 - 30 VDC
Rated current	0.54 A
Starting current	Max. 1.2 A
Power consumption	13 W typical
Electrical isolation	Yes
Bleeder resistance	0 Ω
Mechanical characteristics	
Outer dimensions	
Width	212 mm
Height	156 mm
Depth	55.5 mm
Front	
Frame	Aluminum, naturally anodized[6)]
Design	Gray[6)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[6)]
Light background	Similar to Pantone 427CV[6)]
Gasket	Flat gasket around display front
Housing	Metal
Weight	Approx. 1.4 kg
Environmental characteristics	
Ambient temperature	
Operation	0 to +50°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 2.5.2 "Temperature humidity diagram" on page 72
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[7)]	Max. 3000 m

Table 23: Technical data - 5PP320.0573-39 (Forts.)

1) Maintenance controller extended.

2) At max. specified ambient temperature: typ. 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 lifespan in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.
Maximum lifespan when switched off: 2 years at +25°C or 1 year at +50°C.

4) The actual value depends on the operating system or diver 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

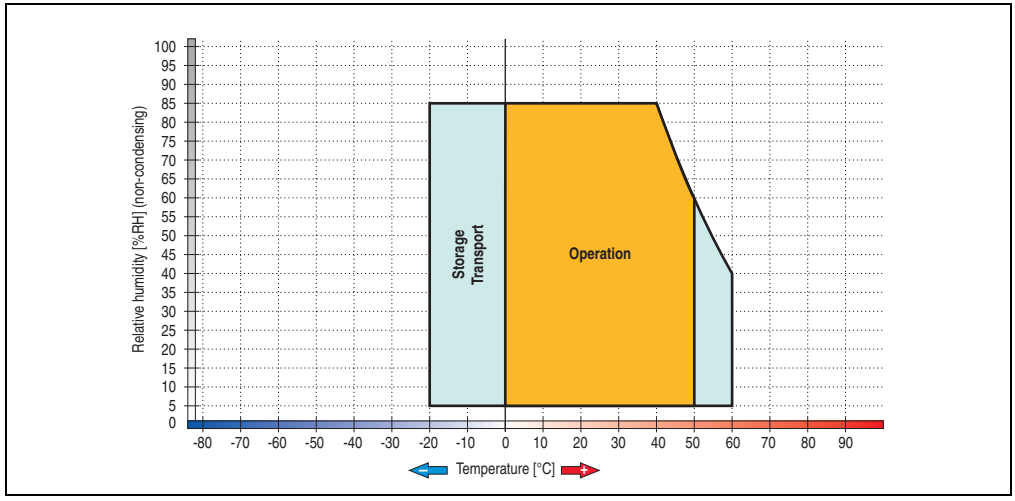


Figure 22: Temperature humidity diagram - 5PP320.0573-39

2.5.3 Dimensions

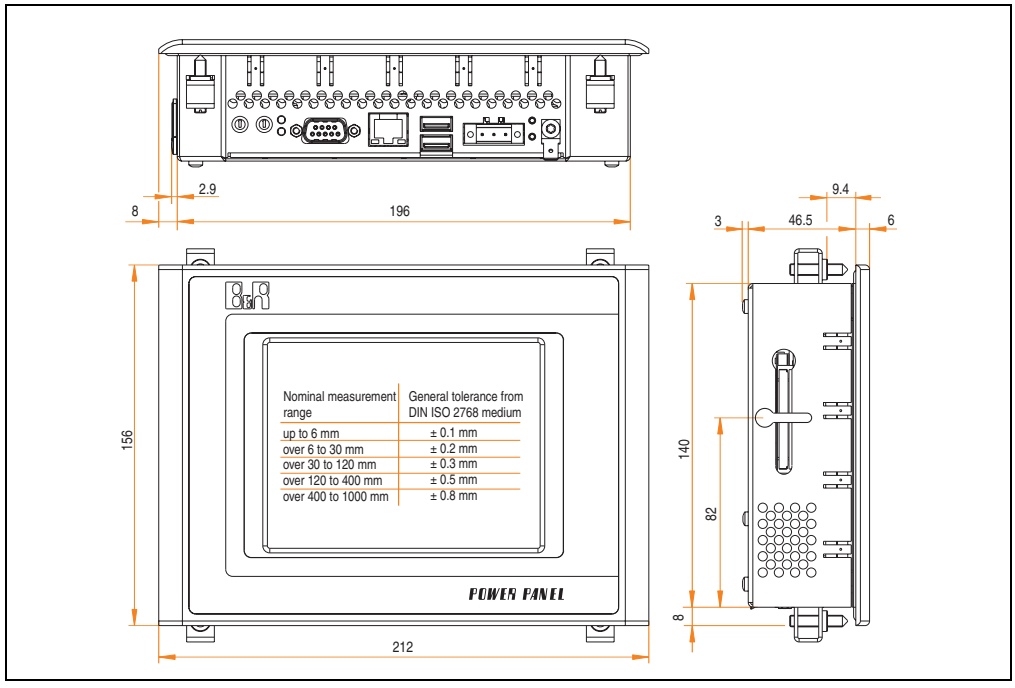


Figure 23: Dimensions - 5PP320.0573-39

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.

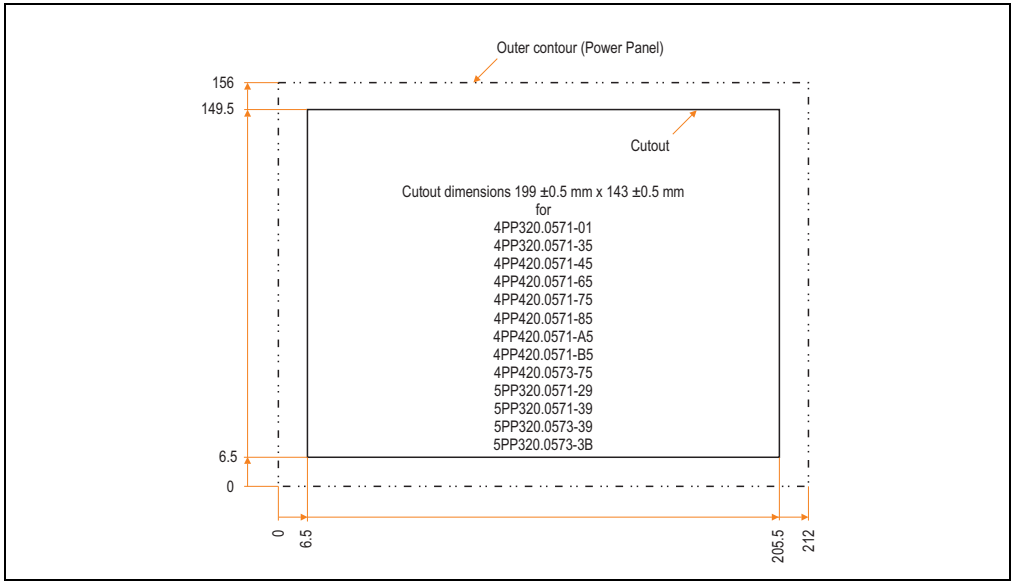


Figure 24: Cutout installation - 5PP320.0573-39

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 24: Contents of delivery - 5PP320.0573-39

2.6 Device 5PP320.0573-3B

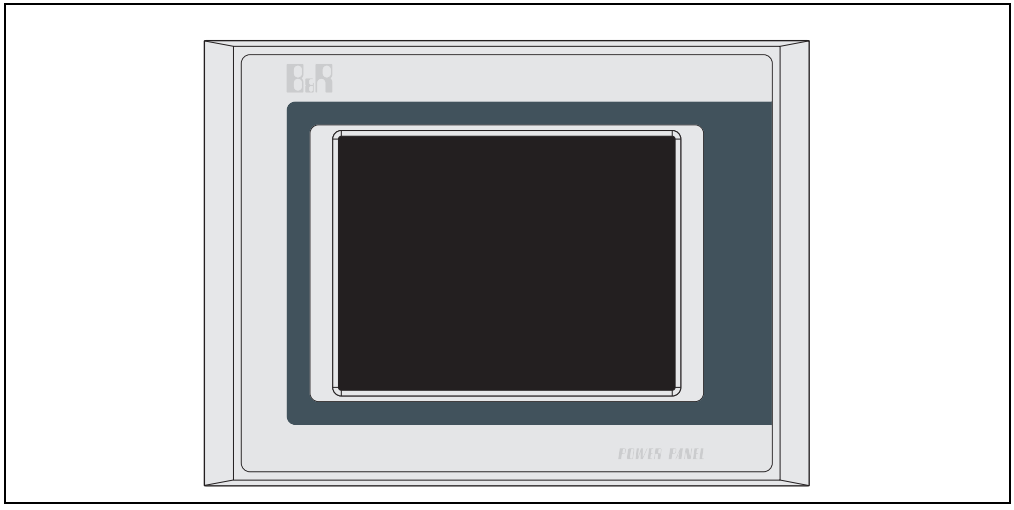


Figure 25: Front view - 5PP320.0573-3B

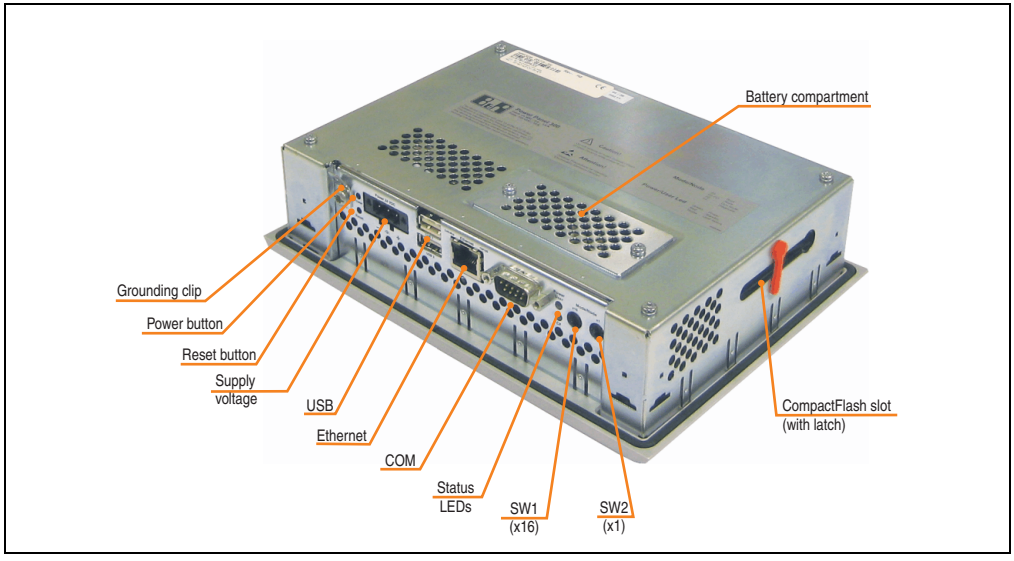


Figure 26: Rear view - 5PP320.0573-3B

2.6.1 Technical data

Features	5PP320.0573-3B
B&R ID-Code	$A5A6
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 512 MB
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	-
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] -
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 4 years [3)] 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 25: Technical data - 5PP320.0573-3B

Features	5PP320.0573-3B
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[4)] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)] 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 570) Horizontal Vertical Background lighting Brightness Half-brightness time[5)] Screen rotation	 Color TFT 5.7 in (144 mm) 262,144 colors [4)] VGA, 640 x 480 pixels 400:1 Direction R / direction L =80° Direction U = 80°/ direction D = 70° 350 cd/m² 75,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
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 25: Technical data - 5PP320.0573-3B (Forts.)

Electrical characteristics	5PP320.0573-3B
Power supply	
Rated voltage	18 - 30 VDC
Rated current	0.54 A
Starting current	Max. 1.2 A
Power consumption	13 W typical
Electrical isolation	Yes
Bleeder resistance	0 Ω
Mechanical characteristics	
Outer dimensions	
Width	212 mm
Height	156 mm
Depth	55.5 mm
Front	
Frame	Aluminum, naturally anodized[6)]
Design	Gray[6)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[6)]
Light background	Similar to Pantone 427CV[6)]
Gasket	Flat gasket around display front
Housing	Metal
Weight	Approx. 1.4 kg
Environmental characteristics	
Ambient temperature	
Operation	0 to +50°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 2.6.2 "Temperature humidity diagram" on page 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
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[7)]	Max. 3000 m

Table 25: Technical data - 5PP320.0573-3B (Forts.)

1) Maintenance controller extended.

2) At max. specified ambient temperature: typ. 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 lifespan in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.
Maximum lifespan when switched off: 2 years at +25°C or 1 year at +50°C.

4) The actual value depends on the operating system or diver 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

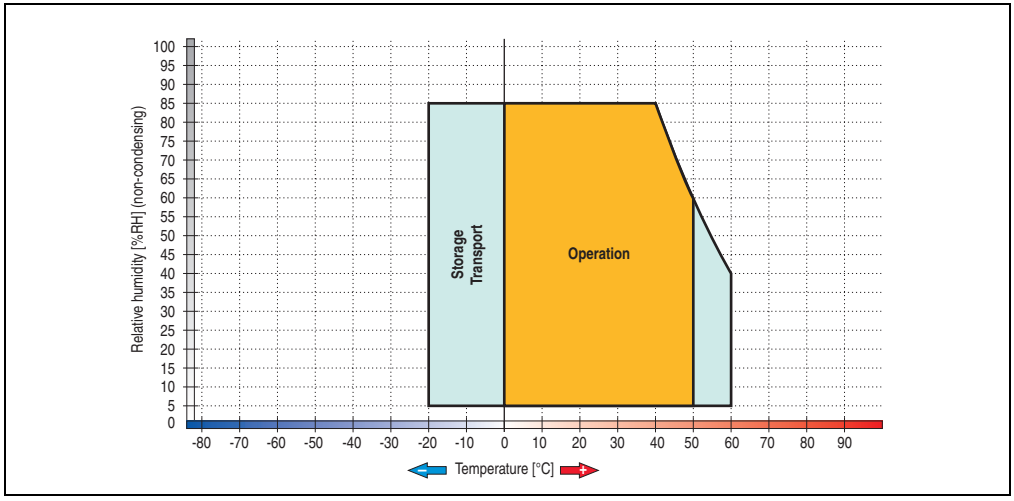


Figure 27: Temperature humidity diagram - 5PP320.0573-3B

2.6.3 Dimensions

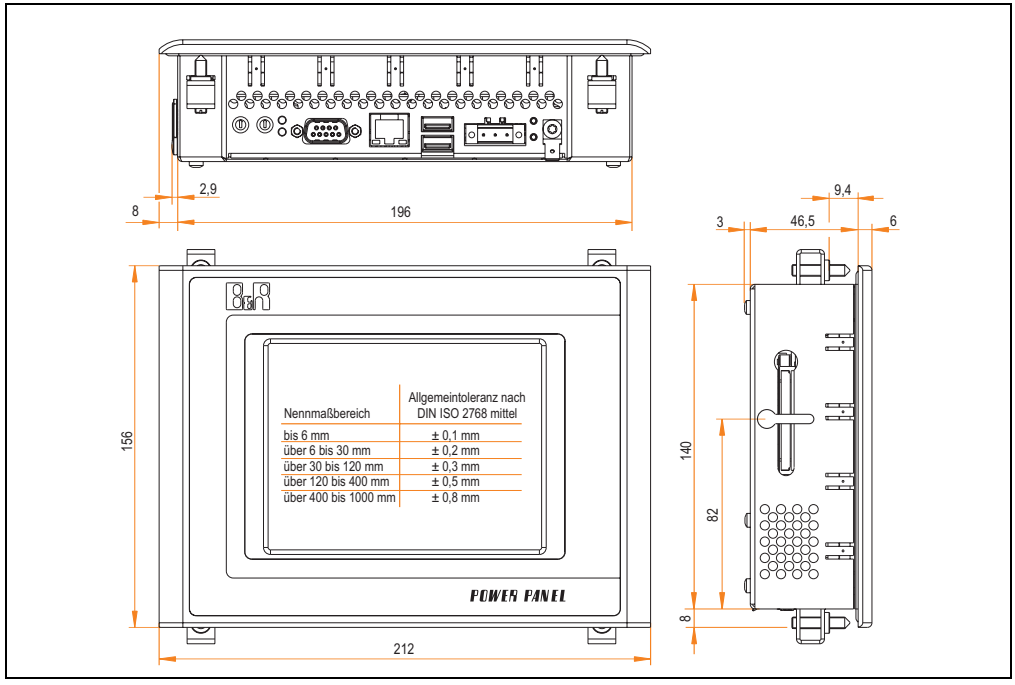


Figure 28: Dimensions - 5PP320.0573-3B

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.

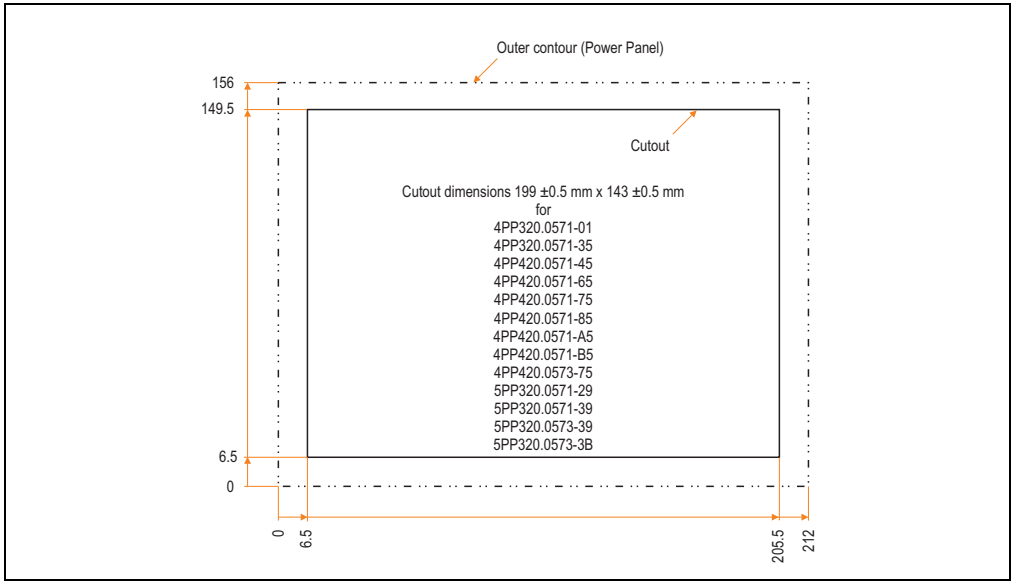


Figure 29: Cutout installation - 5PP320.0573-3B

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 26: Contents of delivery - 5PP320.0573-3B

2.7 Device 5PP320.1043-39

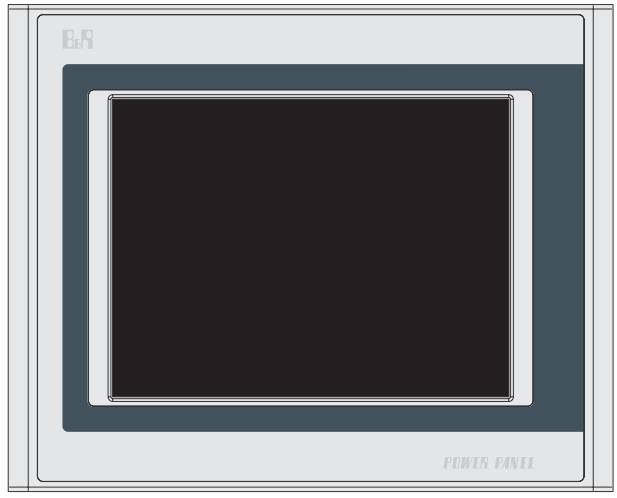


Figure 30: Front view - 5PP320.1043-39

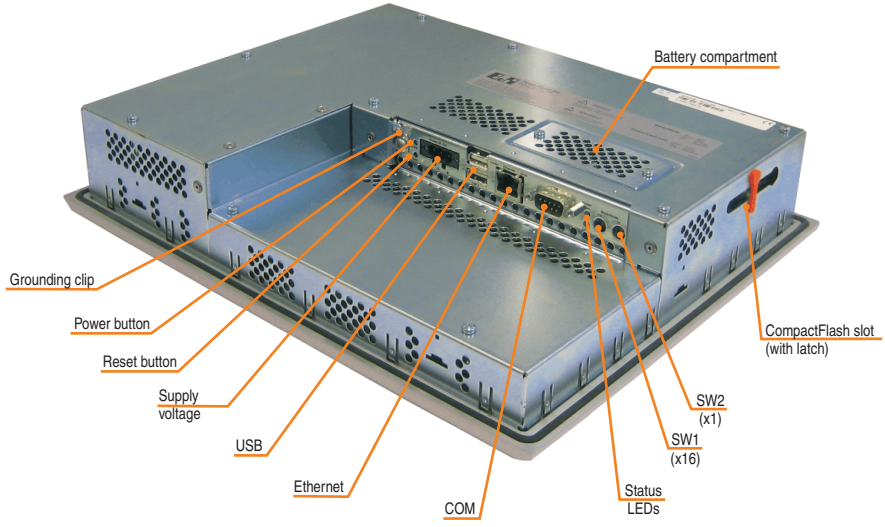


Figure 31: Rear view - 5PP320.1043-39

2.7.1 Technical data

Features	5PP320.1043-39
B&R ID-Code	$23D0
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 256 MB
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	-
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] -
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 4 years [3)] 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 27: Technical data - 5PP320.1043-39

Features	5PP320.1043-39
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[4)] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)] 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 570) Horizontal Vertical Background lighting Brightness Half-brightness time[5)] Screen rotation	 Color TFT 10.4 in (264 mm) 262,144 colors [4)] VGA, 640 x 480 pixels 600:1 Direction R / direction L =70° Direction U = 45°/ direction D = 35° 450 cd/m² 55,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen Touch screen type Technology Controller Degree of transmission	 Elo Accu Touch 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 27: Technical data - 5PP320.1043-39 (Forts.)

Electrical characteristics	5PP320.1043-39
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	Aluminum, naturally anodized[6)]
Design	Gray[6)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[6)]
Light background	Similar to Pantone 427CV[6)]
Gasket	Flat gasket around display front
Housing	Metal
Weight	Approx. 3.7 kg
Environmental characteristics	
Ambient temperature	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 2.7.2 "Temperature humidity diagram" on page 86
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[7)]	Max. 3000 m

Table 27: Technical data - 5PP320.1043-39 (Forts.)

1) Maintenance controller extended.

2) At max. specified ambient temperature: typ. 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 lifespan in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.
Maximum lifespan when switched off: 2 years at +25°C or 1 year at +50°C.

4) The actual value depends on the operating system or diver 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

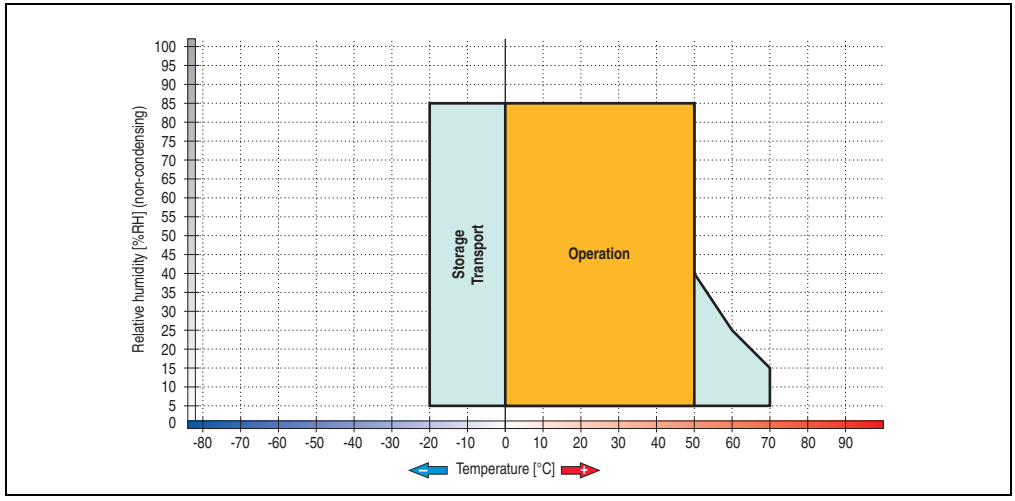


Figure 32: Temperature humidity diagram - 5PP320.1043-39

2.7.3 Dimensions

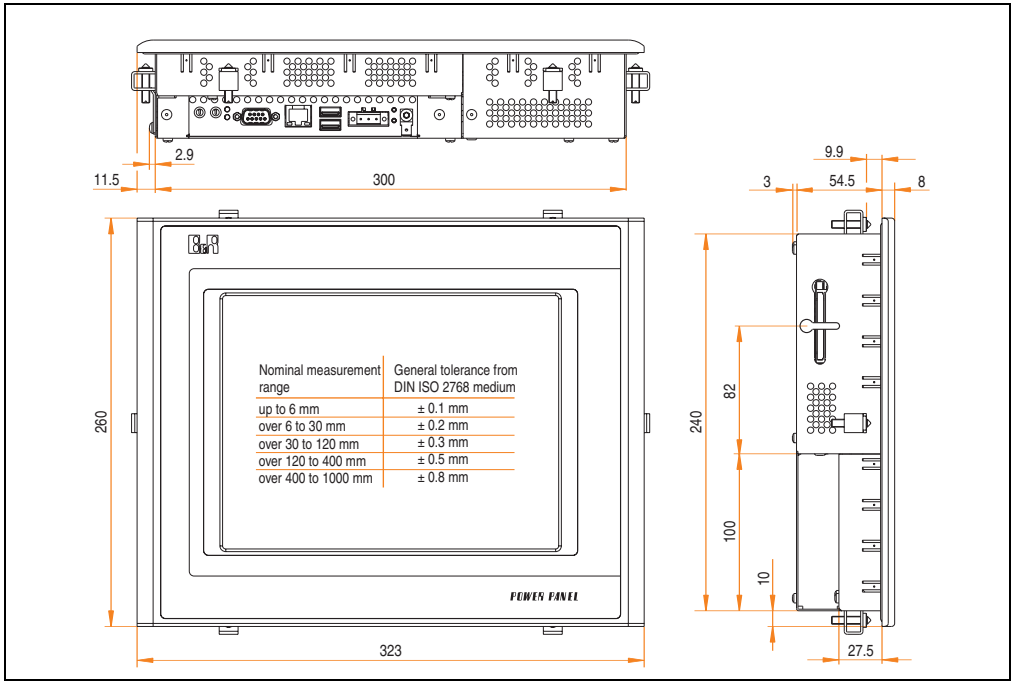


Figure 33: Dimensions - 5PP320.1043-39

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.

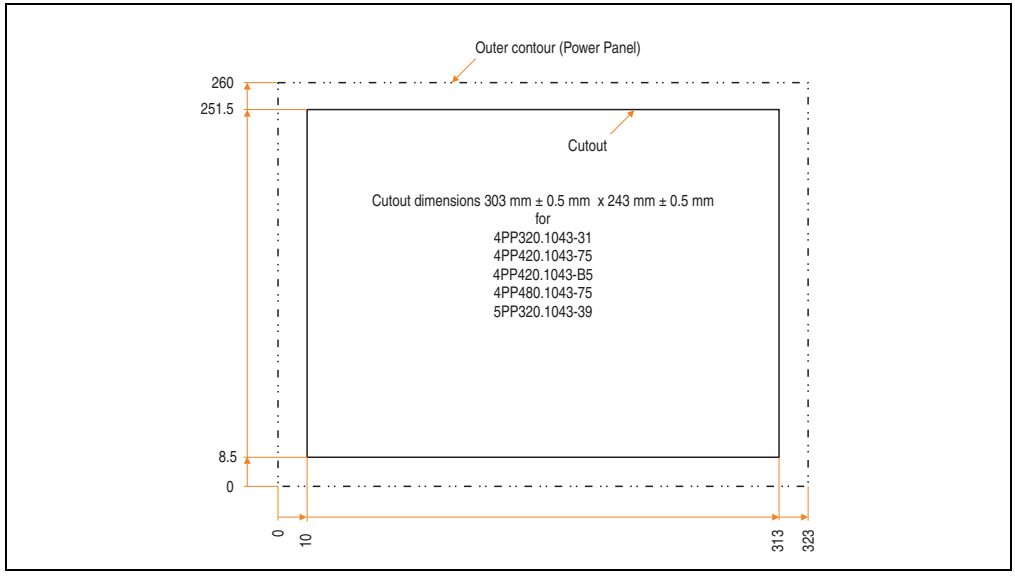


Figure 34: Cutout installation - 5PP320.1043-39

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 10.4" VGA, touch screen
6	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 28: Contents of delivery - 5PP320.1043-39

2.8 Device 5PP320.1214-39

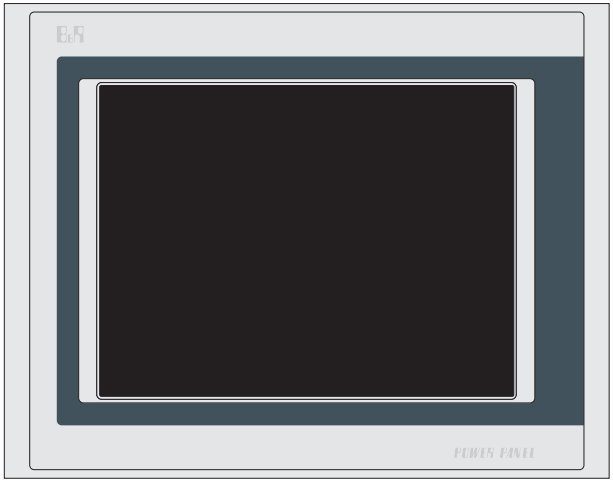


Figure 35: Front view - 5PP320.1214-39

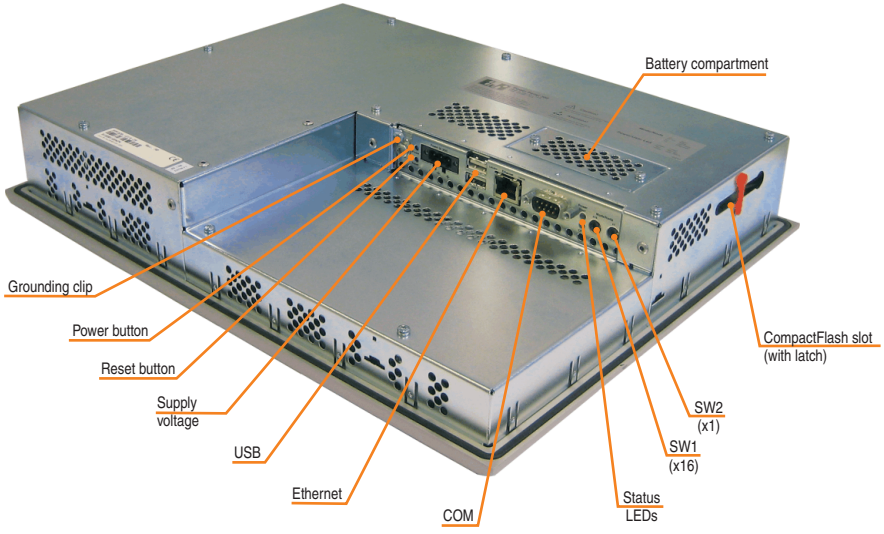


Figure 36: Rear view - 5PP320.1214-39

2.8.1 Technical data

Features	5PP320.1214-39
B&R ID-Code	$23D1
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 256 MB
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	-
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] -
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 4 years [3)] 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 29: Technical data - 5PP320.1214-39

Features	5PP320.1214-39
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[4)] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)] 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 570) Horizontal Vertical Background lighting Brightness Half-brightness time[5)] Screen rotation	 Color TFT 12.1 in (307 mm) 262,144 colors [4)] SVGA, 800 x 600 pixels 300:1 Direction R / direction L =70° Direction U = 50°/ direction D = 60° 350 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen Touch screen type Technology Controller Degree of transmission	 Elo Accu Touch 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 29: Technical data - 5PP320.1214-39 (Forts.)

Electrical characteristics	5PP320.1214-39
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	Aluminum, naturally anodized[6)]
Design	Gray[6)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[6)]
Light background	Similar to Pantone 427CV[6)]
Gasket	Flat gasket around display front
Housing	Metal
Weight	Approx. 4.1 kg
Environmental characteristics	
Ambient temperature	
Operation	0 to +45°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 2.8.2 "Temperature humidity diagram" on page 93
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[7)]	Max. 3000 m

Table 29: Technical data - 5PP320.1214-39 (Forts.)

1) Maintenance controller extended.

2) At max. specified ambient temperature: typ. 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 lifespan in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.
Maximum lifespan when switched off: 2 years at +25°C or 1 year at +50°C.

4) The actual value depends on the operating system or diver 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

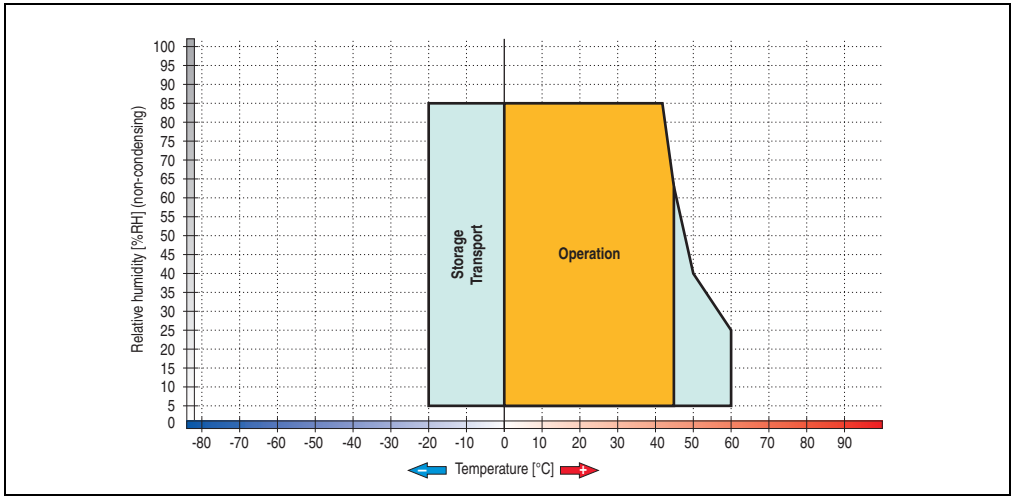


Figure 37: Temperature humidity diagram - 5PP320.1214-39

2.8.3 Dimensions

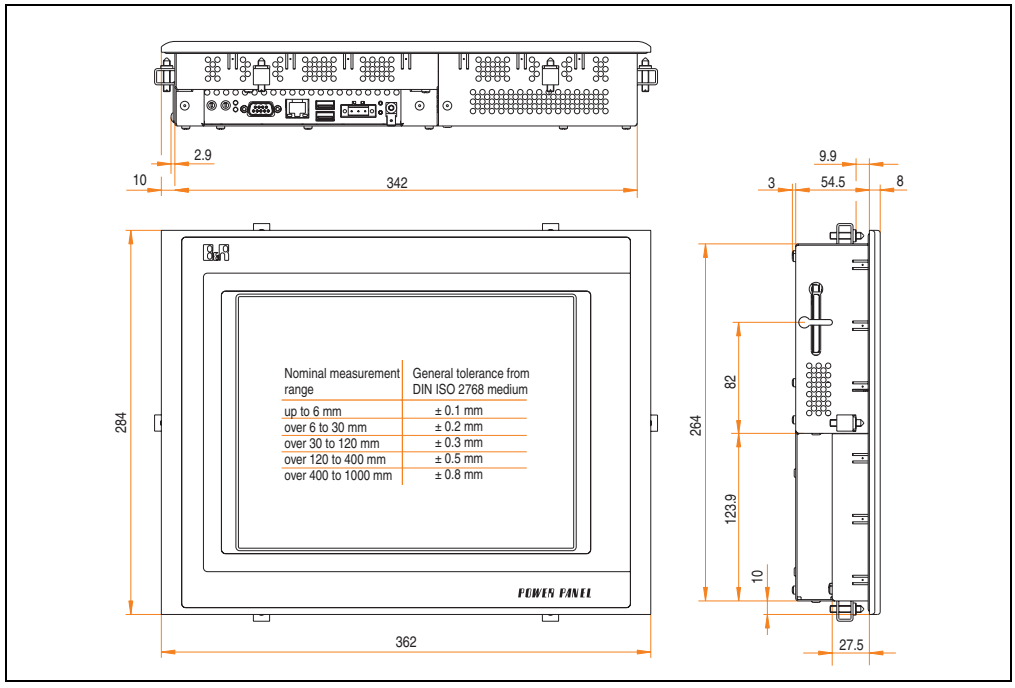


Figure 38: Dimensions - 5PP320.1214-39

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.

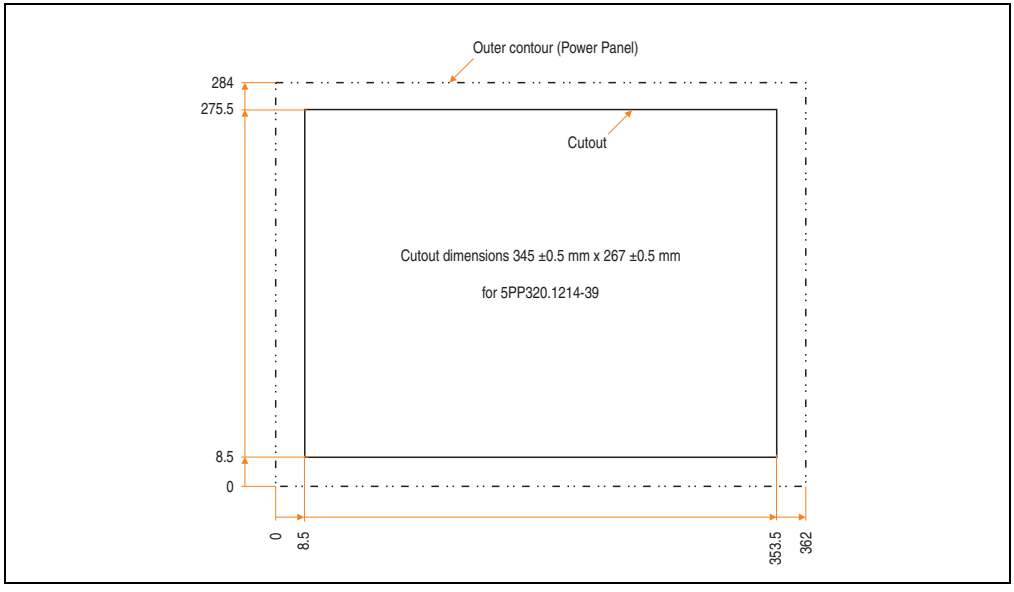


Figure 39: Cutout installation - 5PP320.1214-39

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 12.1" SVGA, touch screen
6	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 30: Contents of delivery - 5PP320.1214-39

2.9 Device 5PP320.1505-39

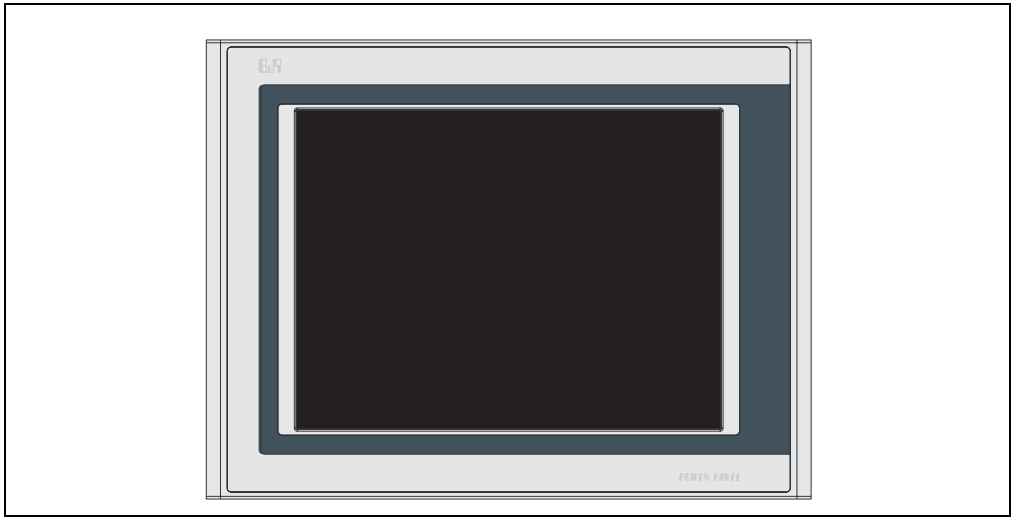


Figure 40: Front view - 5PP320.1505-39

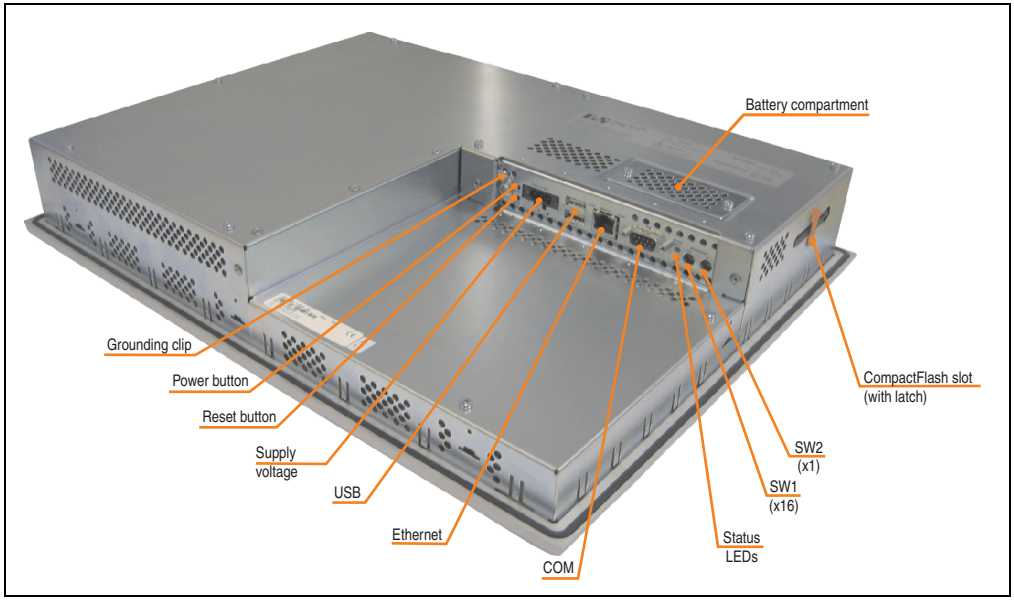


Figure 41: Rear view - 5PP320.1505-39

2.9.1 Technical data

Features	5PP320.1505-39
B&R ID-Code	$23D2
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 256 MB
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	-
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] -
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 4 years [3)] 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 31: Technical data - 5PP320.1505-39

Features	5PP320.1505-39
Serial interface	
Type	RS232, modem-capable, not electrically isolated
UART	16C550 compatible, 16-byte FIFO
Transfer rate	Max. 115 kBaud
Connection	9-pin DSUB
USB interface	
Type	USB 1.1, USB 2.0[4)]
Amount	2
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)]
Connection	Type A
Current load	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	Color TFT
Diagonal	15 in (381 mm)
Colors	16.7 million colors[4)]
Resolution	XGA, 1024 x 768 pixels
Contrast	400:1
Viewing angle (see page 570)	
Horizontal	Direction R / direction L =85°
Vertical	Direction U / direction D = 85°
Background lighting	
Brightness	250 cd/m²
Half-brightness time[5)]	50,000 hours
Screen rotation	Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen	
Touch screen type	Elo Accu Touch
Technology	Analog, resistive
Controller	Elo, serial, 12- bit
Degree of transmission	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 31: Technical data - 5PP320.1505-39 (Forts.)

Electrical characteristics	5PP320.1505-39
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	Aluminum, naturally anodized[6)]
Design	Gray[6)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[6)]
Light background	Similar to Pantone 427CV[6)]
Gasket	Flat gasket around display front
Housing	Metal
Weight	Approx. 6.3 kg
Environmental characteristics	
Ambient temperature	
Operation	0 to +50°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 2.9.2 "Temperature humidity diagram" on page 100
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[7)]	Max. 3000 m

Table 31: Technical data - 5PP320.1505-39 (Forts.)

1) Maintenance controller extended.

2) At max. specified ambient temperature: typ. 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 lifespan in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.
Maximum lifespan when switched off: 2 years at +25°C or 1 year at +50°C.

4) The actual value depends on the operating system or diver 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

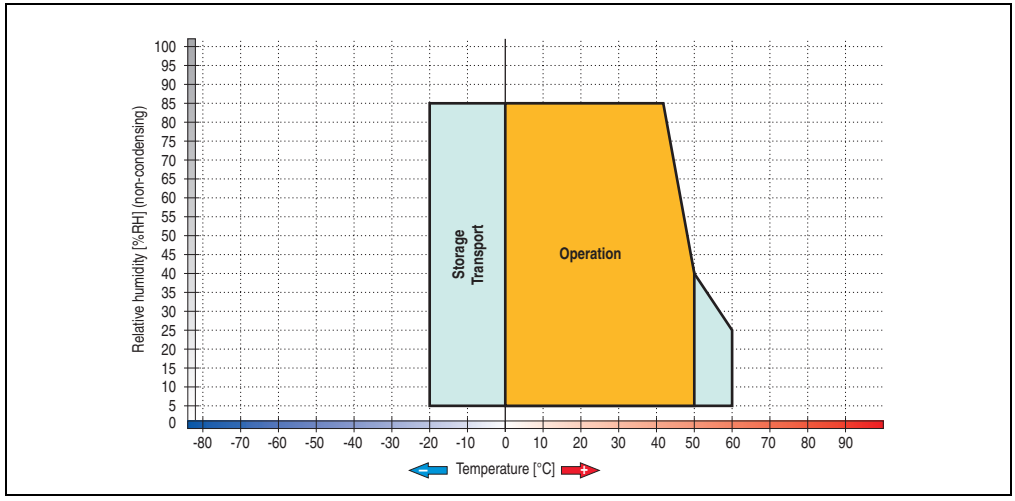


Figure 42: Temperature humidity diagram - 5PP320.1505-39

2.9.3 Dimensions

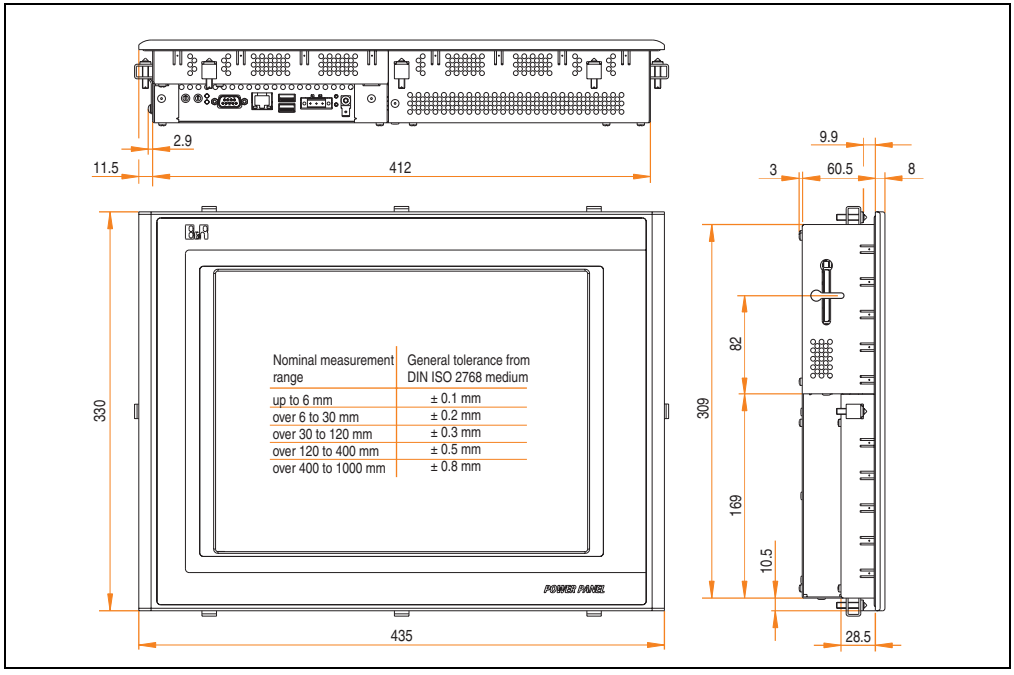


Figure 43: Dimensions - 5PP320.1505-39

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.

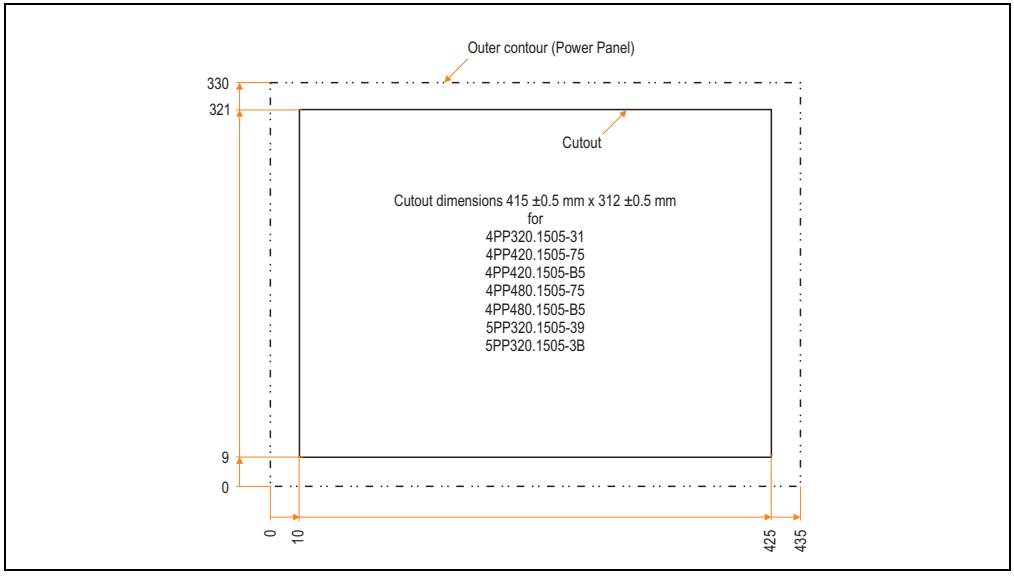


Figure 44: Cutout installation - 5PP320.1505-39

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 15" XGA, touch screen
8	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 32: Contents of delivery - 5PP320.1505-39

2.10 Device 5PP320.1505-3B

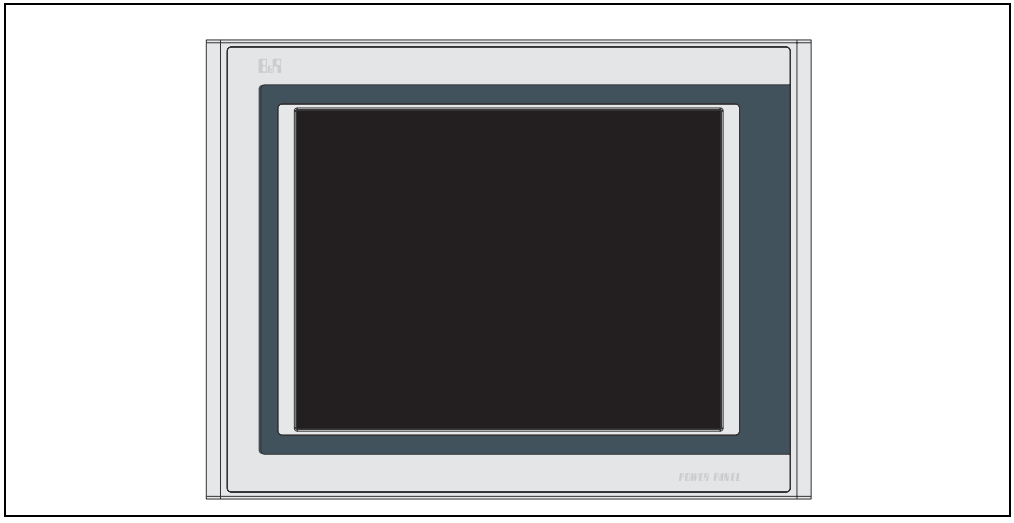


Figure 45: Front view - 5PP320.1505-3B

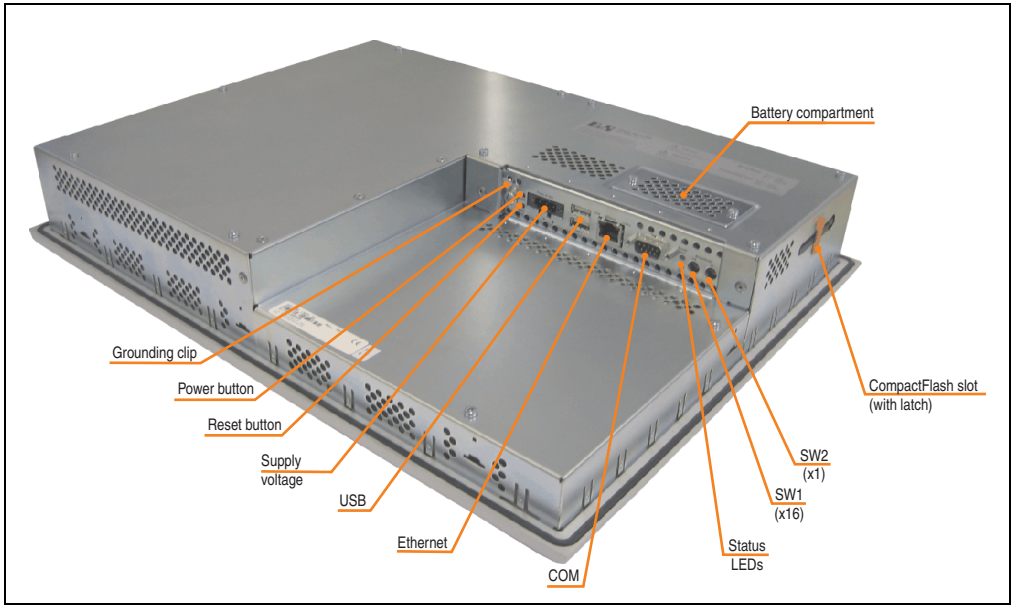


Figure 46: Rear view - 5PP320.1505-3B

2.10.1 Technical data

Features	5PP320.1505-3B
B&R ID-Code	$B2C5
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 Quantity	 DDR SDRAM 512 MB
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	-
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] -
Real-time clock (RTC) Battery-buffered Accuracy	 Yes at +25°C typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 4 years[3)] 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 33: Technical data - 5PP320.1505-3B

Features	5PP320.1505-3B
Serial interface	
Type	RS232, modem-capable, not electrically isolated
UART	16C550 compatible, 16-byte FIFO
Transfer rate	Max. 115 kBaud
Connection	9-pin DSUB
USB interface	
Type	USB 1.1, USB 2.0[4)]
Amount	2
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s)[4)]
Connection	Type A
Current load	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	Color TFT
Diagonal	15 in (381 mm)
Colors	16.7 million colors[4)]
Resolution	XGA, 1024 x 768 pixels
Contrast	400, 1
Viewing angle (see page 570)	
Horizontal	Direction R / direction L = 85°
Vertical	Direction U / direction D = 85°
Background lighting	
Brightness	250 cd/m²
Half-brightness time[5)]	50000 hours
Screen rotation	Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen	
Touch screen type	Elo Accu Touch
Technology	Analog, resistive
Controller	Elo, serial, 12- bit
Degree of transmission	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 33: Technical data - 5PP320.1505-3B (Forts.)

Electrical characteristics	5PP320.1505-3B
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[6)]
Design	Gray[6)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[6)]
Light background	Similar to Pantone 427CV[6)]
Gasket	Flat gasket around display front
Housing	Metal
Weight	Approx. 6.3 kg
Environmental characteristics	
Ambient temperature	
Operation	0 to +50°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 2.9.2 "Temperature humidity diagram" on page 100
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[7)]	Max. 3000 m

Table 33: 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 lifespan in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.
Maximum lifespan when switched off: 2 years at +25°C or 1 year at +50°C.

4) The actual value depends on the operating system or diver 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

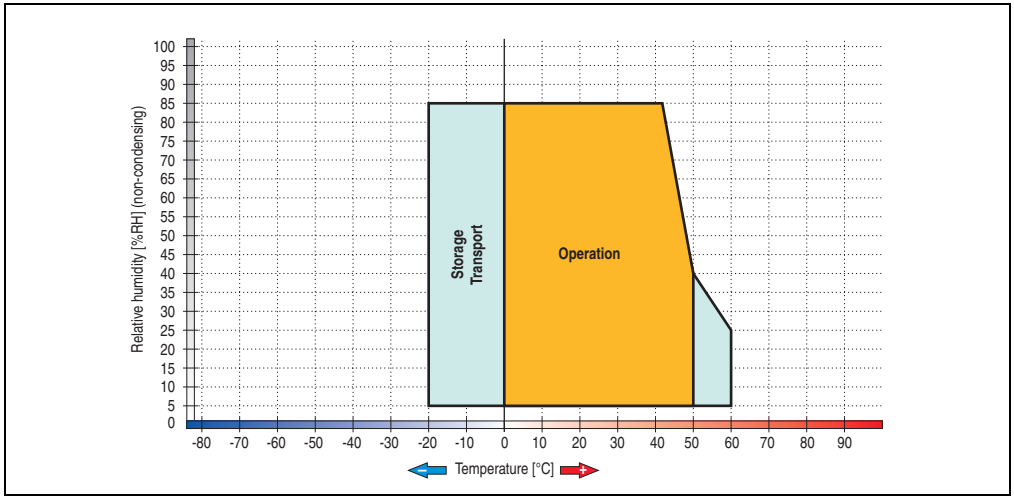


Figure 47: Temperature humidity diagram - 5PP320.1505-3B

2.10.3 Dimensions

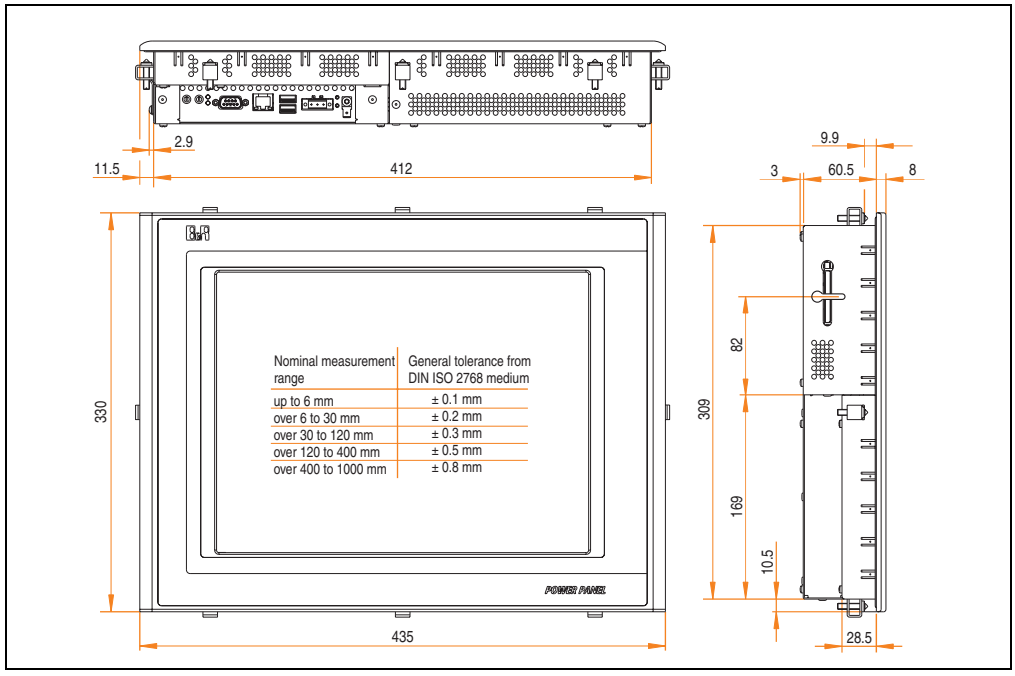


Figure 48: Dimensions - 5PP320.1505-3B

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.

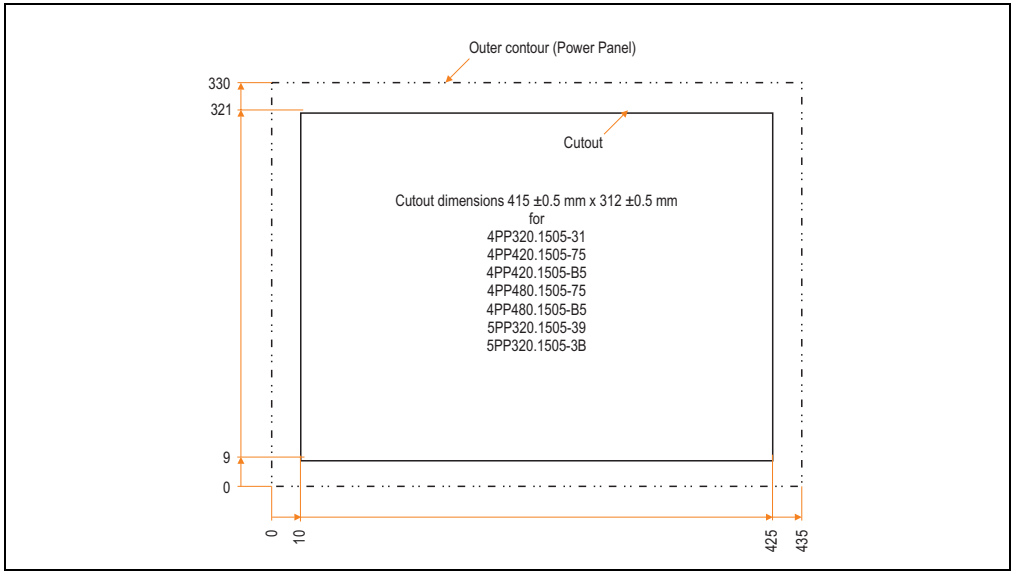


Figure 49: Cutout installation - 5PP320.1505-3B

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 34: 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 clamps) or 0TB103.91 (cage clamps).

The pin assignments 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 50: Supply voltage connection

Ground

Warning!

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

3.1.2 Functional grounding clip

Next to the supply voltage plug there is a functional grounding clip. The grounding clip (functional ground) must be connected with a central grounding point on the switching cabinet using a 6.3 mm blade connector via the shortest distance and with as little resistance as possible (e.g. copper strip, but must be at least 2.5 mm²).

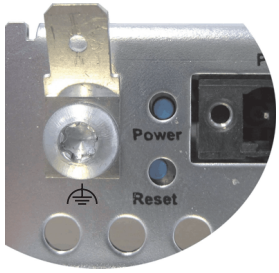
Grounding clip


Figure 51: 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	9-pin DSUB plug
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	

Table 35: Pin assignments - COM

3.1.4 USB port

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[1)]	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[2)]	
Maximum cable length	5 m (not including hub)	

Table 36: USB port

1) The actual value depends on the operating system or diver 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 interfaces. 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, this interface should be handled with extreme care with regard to EMC, location of cables, etc.

3.1.5 Mode / Node switches

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

Mode/Node switch

Table 37: Mode/Node switch

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. **Information:** **For detailed information, see chapter 4 "Software" section3 "Upgrade information" on page 488**
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 38: 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.

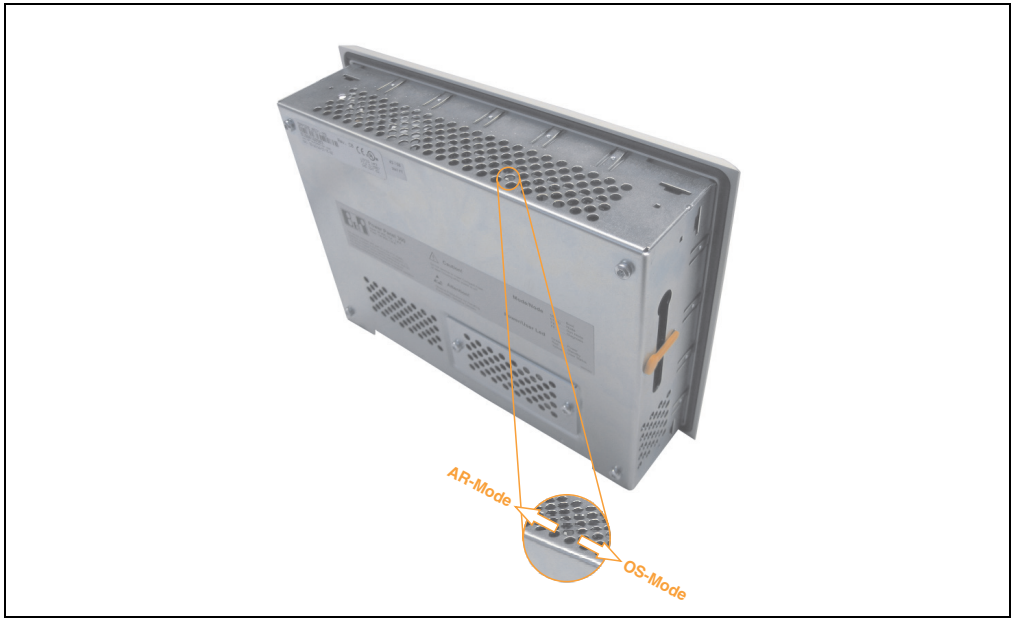


Figure 52: BIOS boot mode switch

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 39: 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 429)
- 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 484)
- USB Boot "Enabled" (only in switch position "00")

3.1.7 Status LEDs

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

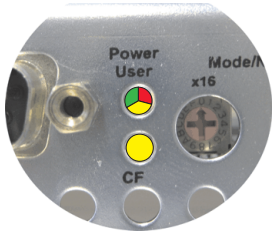
Status LEDs				
LED	**Color**		**Meaning**	
Power	Green	On	Supply voltage OK	1x three-color, 1x one-color 
	Red	On	The system is in standby mode (S5: soft-off mode or S4: hibernate mode - suspend-to-disk)	
User	Yellow	On	Can be used as the user wants (for example, can be turned on/off directly using the ADI library - only possible in S0 state)	
	Green	Off		
CF	Yellow	On	Indicates access to CompactFlash drive (read or write)	

Table 40: Status LEDs

3.1.8 Ethernet connection

Ethernet connection			
Controller	Intel 82551ER		RJ45 twisted pair (10BaseT/100BaseT), female
Cabling	S/STP (category 5)		
Transfer rate	10/100 MBit/s [1]		
LED	**On**	**Off**	
Green	100 MBit/s	10 MBit/s	
Orange	Link (Ethernet network connection available)	Activity (blinking) (Data transfer in progress)	

Table 41: Ethernet connection

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

3.1.9 Power button

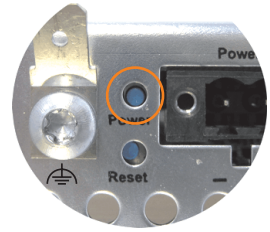
Power button	
The power button can be pressed with a pointed object (i.e. paper clip or tip of a pen). If the Power button is pushed, the Power Panel is switched off and remains in Standby mode.	

Table 42: Power button

3.1.10 Reset button

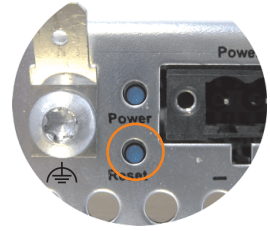
Reset button	
The reset button can be pressed with a pointed object (i.e. paper clip or tip of a pen). Pushing the reset button results in a hardware-reset. The Power Panel restarts. The MTCX processor is not reset when the reset button is pressed.	

Table 43: Reset button

Warning!

A system reset can cause data to be lost!

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.

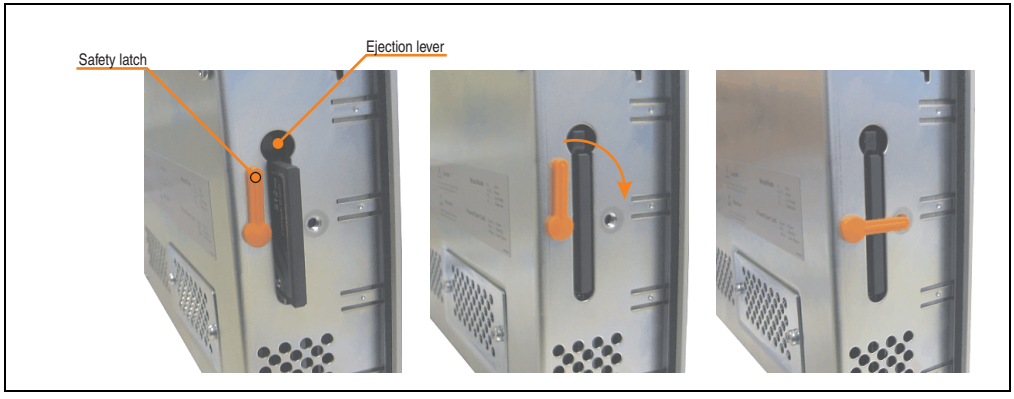


Figure 53: CompactFlash slot

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 54: 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

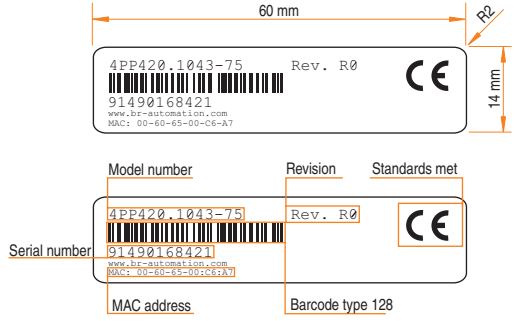


Figure 55: Design / dimensions - Serial number sticker

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**. The search also works if you enter the model number or the material number in the material number search field.

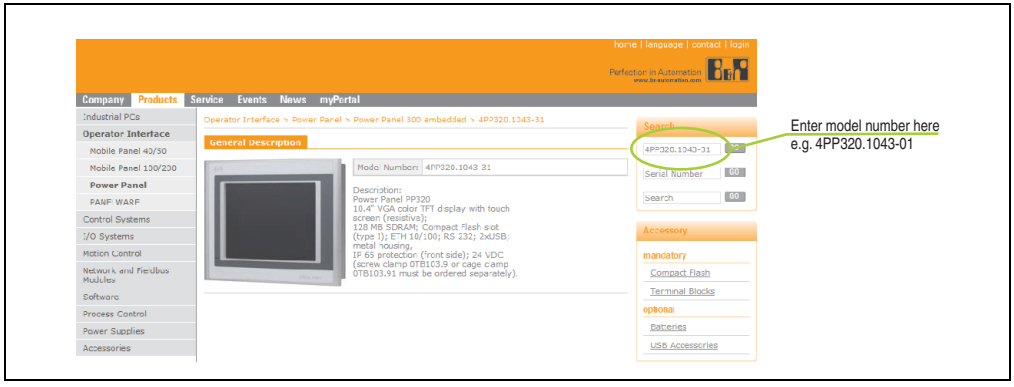


Figure 56: Example - Material number search: 4PP320.1043-01

3.3 Device 4PP320.0571-01

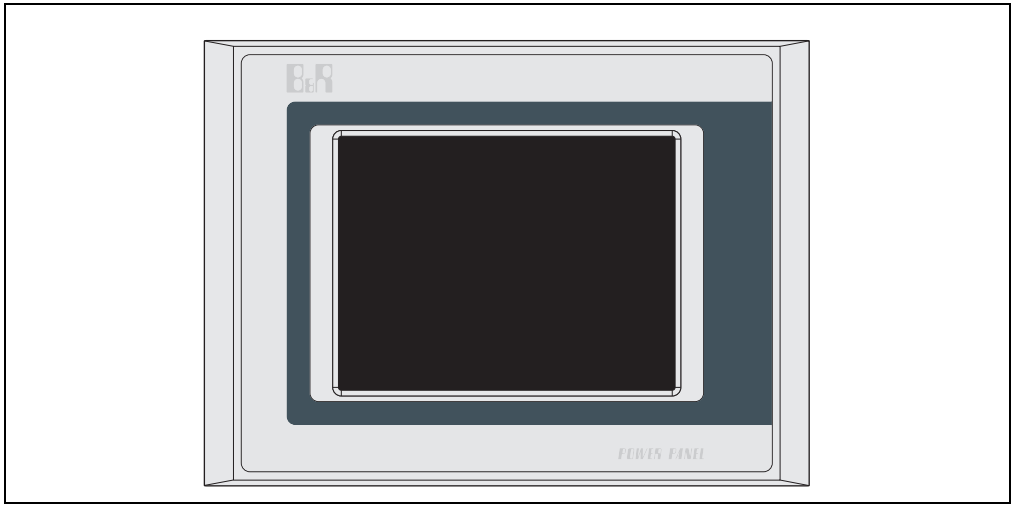


Figure 57: Front view - 4PP320.0571-01

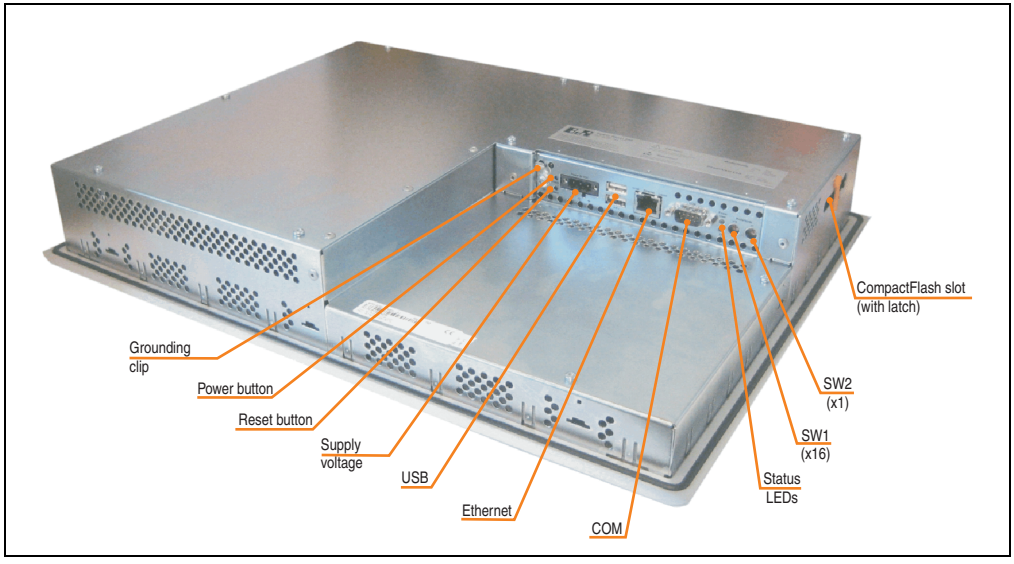


Figure 58: Rear view - 4PP320.0571-01

3.3.1 Technical data

Features	4PP320.0571-01
B&R ID-Code	$A15E
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 128 MB
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	-
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] -
Real-time clock (RTC) Battery-buffered Accuracy	 - At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan 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 44: Technical data - 4PP320.0571-01

Features	4PP320.0571-01
Serial interface	
Type	RS232, modem-capable, not electrically isolated
UART	16C550 compatible, 16-byte FIFO
Transfer rate	Max. 115 kBaud
Connection	9-pin DSUB
USB interface	
Type	USB 1.1, USB 2.0[3)]
Amount	2
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[3)]
Connection	Type A
Current load	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	LCD monochrome
Diagonal	5.7 in (144 mm)
Colors	8 shades of gray[3)]
Resolution	QVGA, 320 x 240 pixels
Contrast	25:1
Viewing angle (see page 570)	
Horizontal	Direction R / direction L =40°
Vertical	Direction U = 40°/ direction D = 50°
Background lighting	
Brightness	220 cd/m²
Half-brightness time[4)]	50,000 hours
Screen rotation	Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen	
Touch screen type	Gunze
Technology	Analog, resistive
Controller	Elo, serial, 12- bit
Degree of transmission	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 44: Technical data - 4PP320.0571-01 (Forts.)

Electrical characteristics	4PP320.0571-01
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	Aluminum, naturally anodized[5)]
Design	Gray[5)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[5)]
Light background	Similar to Pantone 427CV[5)]
Gasket	Flat gasket around display front
Housing	Metal
Weight	Approx. 1.4 kg
Environmental characteristics	
Ambient temperature	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 3.3.2 "Temperature humidity diagram" on page 126
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[6)]	Max. 3000 m

Table 44: Technical data - 4PP320.0571-01 (Forts.)

1) Maintenance controller extended.

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

3) The actual value depends on the operating system or diver 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

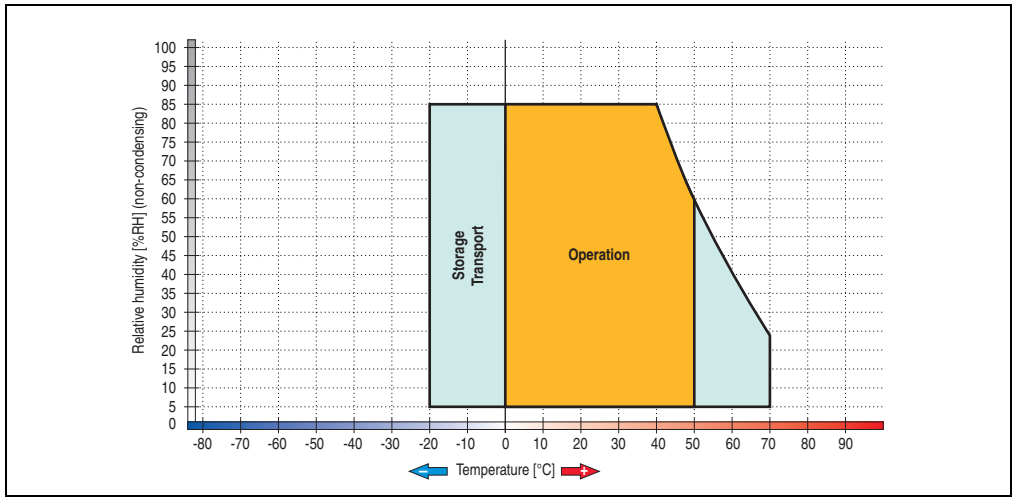


Figure 59: Temperature humidity diagram - 4PP320.0571-01

3.3.3 Dimensions

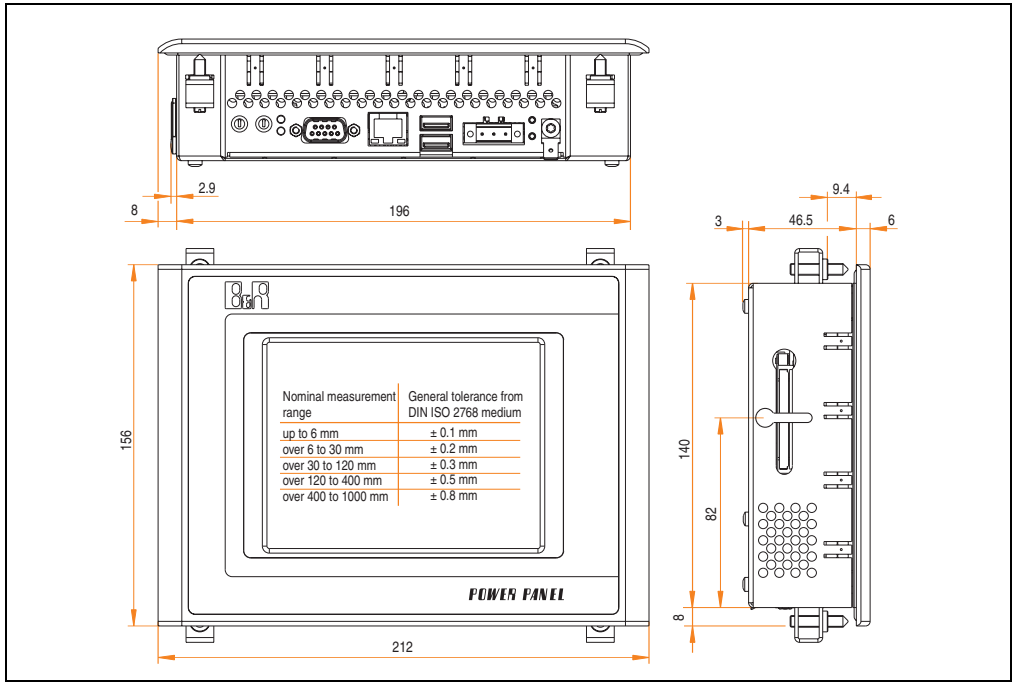


Figure 60: Dimensions 4PP320.0571-01

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.

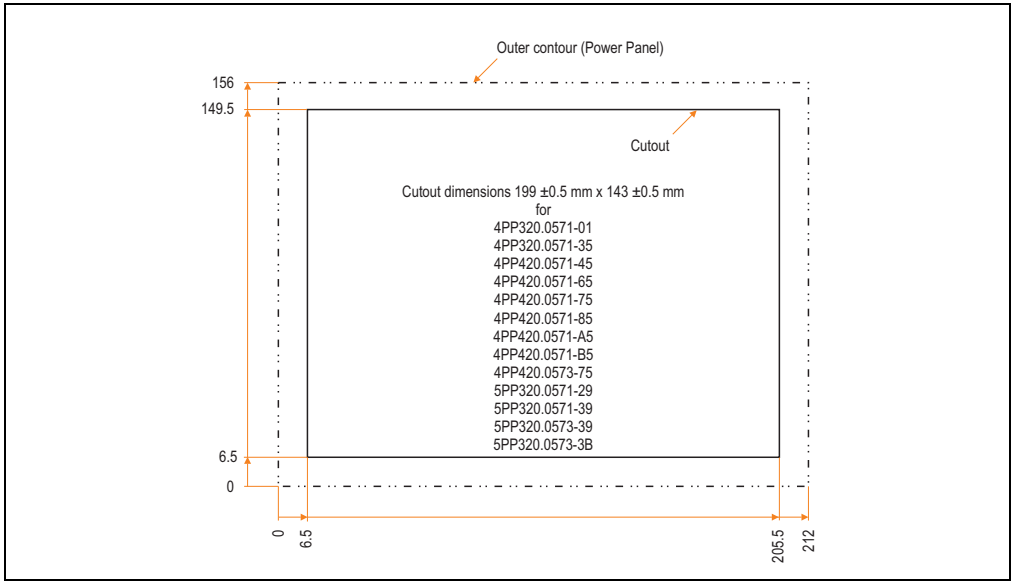


Figure 61: Cutout installation - 4PP320.0571-01

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 BIOS 5.7" QVGA, touch screen
4	Retaining clips included

Table 45: Contents of delivery - 4PP320.0571-01

3.4 Device 4PP320.0571-35

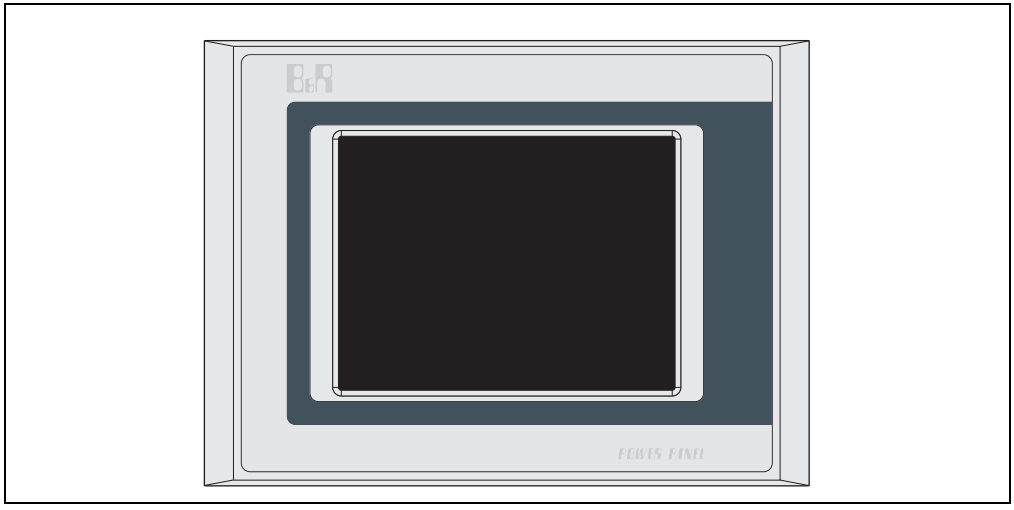


Figure 62: Front view - 4PP320.0571-35

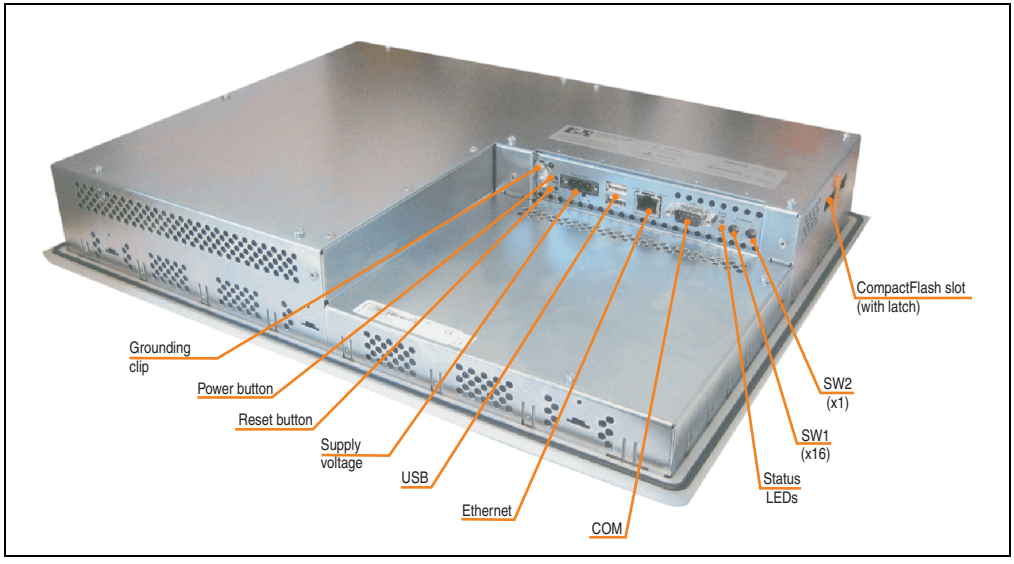


Figure 63: Rear view - 4PP320.0571-35

3.4.1 Technical data

Features	4PP320.0571-35 < D0	4PP320.0571-35 ≥ D0
B&R ID-Code	$A15F	
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)	
Flash	2 MB (for firmware)	
Memory Type Quantity	 DDR SDRAM 128 MB	
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)	
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	-	
Watchdog Controller	 MTCX[1)]	
Power failure logic Controller Buffer time	 MTCX[1)] -	
Real-time clock (RTC) Battery-buffered Accuracy	 - At +25°C: typically 30 ppm (2.5 seconds) [2)] per day	
Battery Type Removable Lifespan 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 46: Technical data - 4PP320.0571-35

Features	4PP320.0571-35 < D0	4PP320.0571-35 ≥ 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[3] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[3] 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 570) Horizontal Vertical Background lighting Brightness Half-brightness time[4] Screen rotation	 Color TFT 5.7 in (144 mm) 262,144 colors [3] QVGA, 320 x 240 pixels 400:1 Direction R / direction L =60° Direction U = 40°/ direction D = 50° 500 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426	 Color TFT 5.7 in (144 mm) 262,144 colors [3] QVGA, 320 x 240 pixels 350:1 Direction R / direction L =65° Direction U = 65°/ direction D = 40° 500 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
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 46: Technical data - 4PP320.0571-35 (Forts.)

Electrical characteristics	4PP320.0571-35 < D0	4PP320.0571-35 ≥ 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	156 mm	
Depth	55.5 mm	
Front		
Frame	Aluminum, naturally anodized[5)]	
Design	Gray[5)]	
Membrane	Polyester	
Dark gray border around display	Similar to Pantone 432CV[5)]	
Light background	Similar to Pantone 427CV[5)]	
Gasket	Flat gasket around display front	
Housing	Metal	
Weight	Approx. 1.4 kg	
Environmental characteristics		
Ambient temperature		
Operation	0 to +50°C	
Storage	-20 to +60°C	
Transport	-20 to +60°C	
Relative humidity	See 3.4.2 "Temperature humidity diagram" on page 132	
Vibration		
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g	
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g	
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g	
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g	
Shock		
Operation	15 g, 11 ms	
Storage	30 g, 15 ms	
Transport	30 g, 15 ms	
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude[6)]	Max. 3000 m	

Table 46: Technical data - 4PP320.0571-35 (Forts.)

1) Maintenance controller extended.

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

3) The actual value depends on the operating system or diver 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

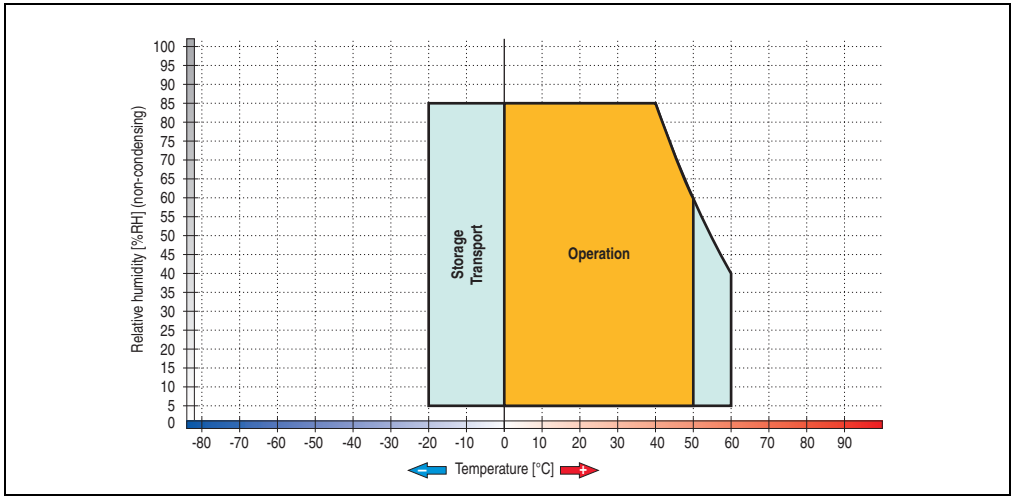


Figure 64: Temperature humidity diagram - 4PP320.0571-35

3.4.3 Dimensions

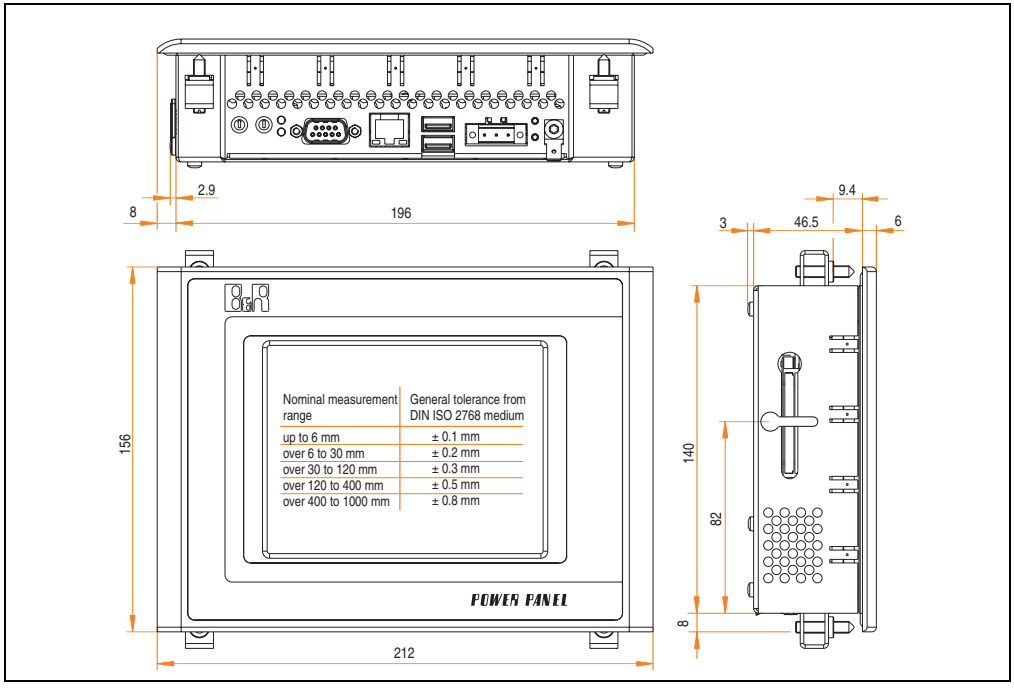


Figure 65: Dimensions 4PP320.0571-35

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.

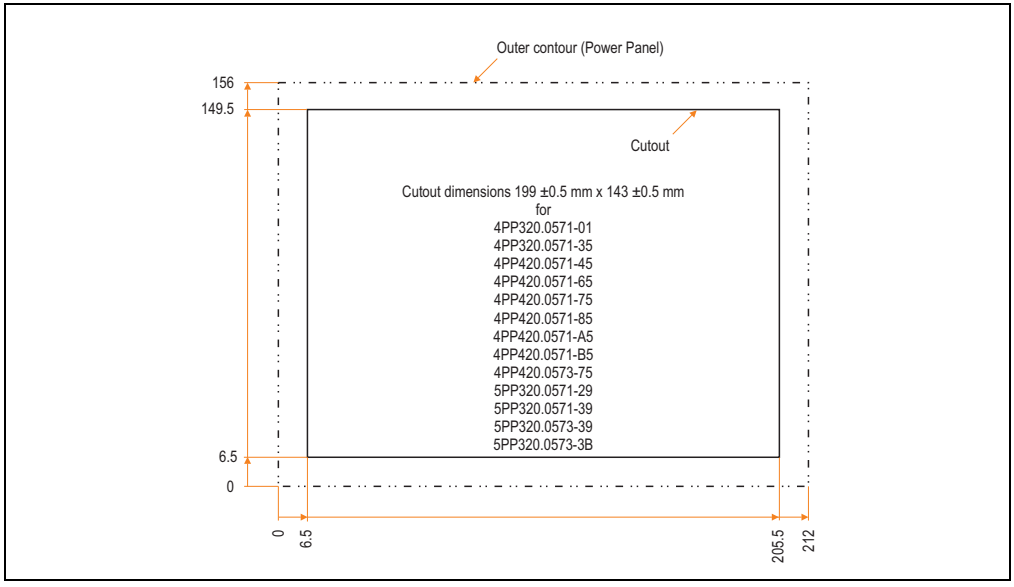


Figure 66: Cutout installation - 5PP320.0571-35

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 BIOS 5.7" QVGA, touch screen
4	Retaining clips included

Table 47: Contents of delivery - 4PP320.0571-35

3.5 Device 4PP320.1043-31

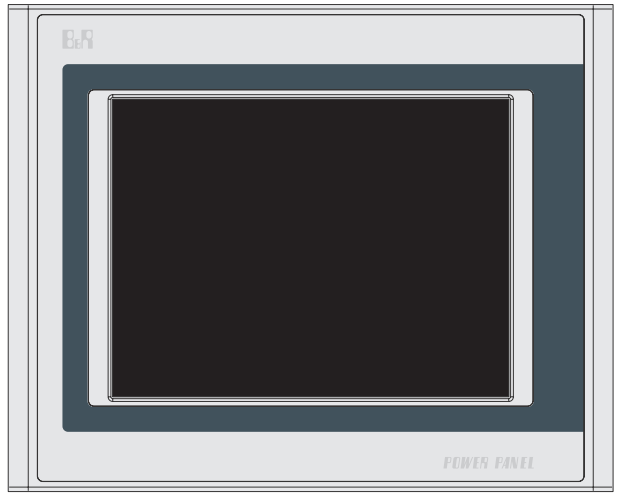


Figure 67: Front view - 4PP320.1043-31

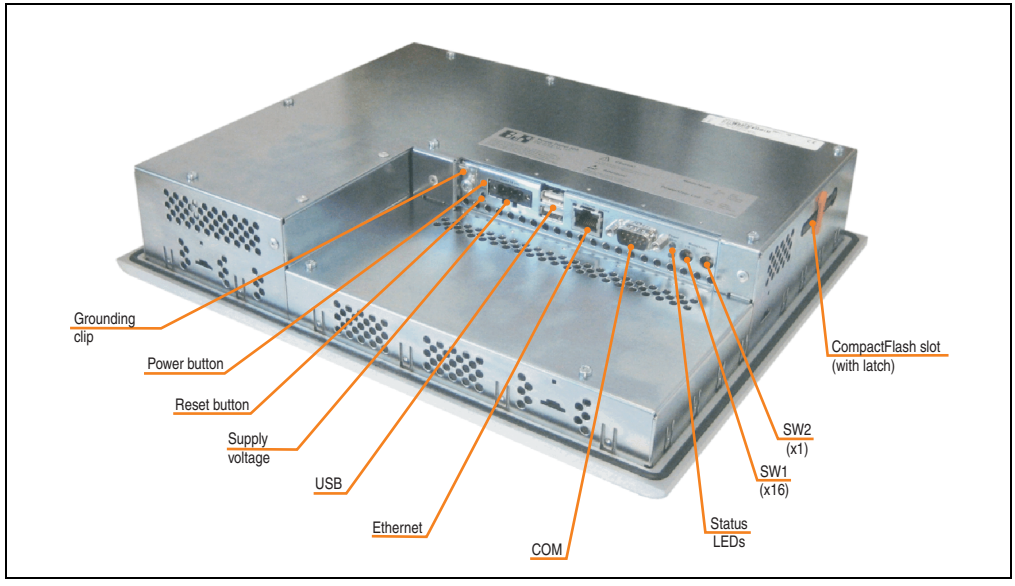


Figure 68: Rear view - 4PP320.1043-31

3.5.1 Technical data

Features	4PP320.1043-31
B&R ID-Code	$A160
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 128 MB
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	-
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] -
Real-time clock (RTC) Battery-buffered Accuracy	 - At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan 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 48: Technical data - 4PP320.1043-31

Features	4PP320.1043-31
Serial interface	
Type	RS232, modem-capable, not electrically isolated
UART	16C550 compatible, 16-byte FIFO
Transfer rate	Max. 115 kBaud
Connection	9-pin DSUB
USB interface	
Type	USB 1.1, USB 2.0[3)]
Amount	2
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[3)]
Connection	Type A
Current load	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	Color TFT
Diagonal	10.4 in (264 mm)
Colors	262,144 colors [3)]
Resolution	VGA, 640 x 480 pixels
Contrast	600:1
Viewing angle (see page 570)	
Horizontal	Direction R / direction L =70°
Vertical	Direction U = 45°/ direction D = 35°
Background lighting	
Brightness	450 cd/m²
Half-brightness time[4)]	55,000 hours
Screen rotation	Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen	
Touch screen type	Elo Accu Touch
Technology	Analog, resistive
Controller	Elo, serial, 12- bit
Degree of transmission	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 48: Technical data - 4PP320.1043-31 (Forts.)

Electrical characteristics	4PP320.1043-31
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	Aluminum, naturally anodized[5)]
Design	Gray[5)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[5)]
Light background	Similar to Pantone 427CV[5)]
Gasket	Flat gasket around display front
Housing	Metal
Weight	Approx. 3.7 kg
Environmental characteristics	
Ambient temperature	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 3.5.2 "Temperature humidity diagram" on page 138
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[6)]	Max. 3000 m

Table 48: Technical data - 4PP320.1043-31 (Forts.)

1) Maintenance controller extended.

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

3) The actual value depends on the operating system or diver 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

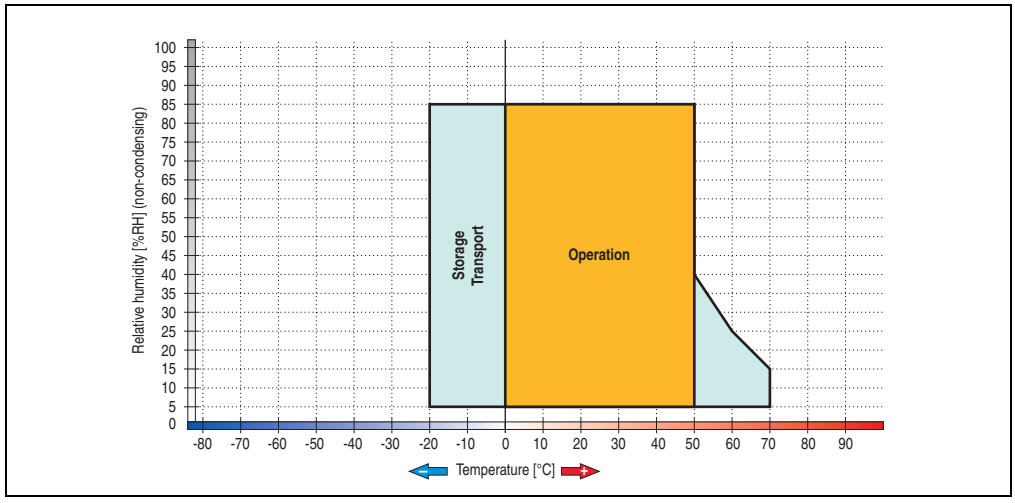


Figure 69: Temperature humidity diagram - 4PP320.1043-31

3.5.3 Dimensions

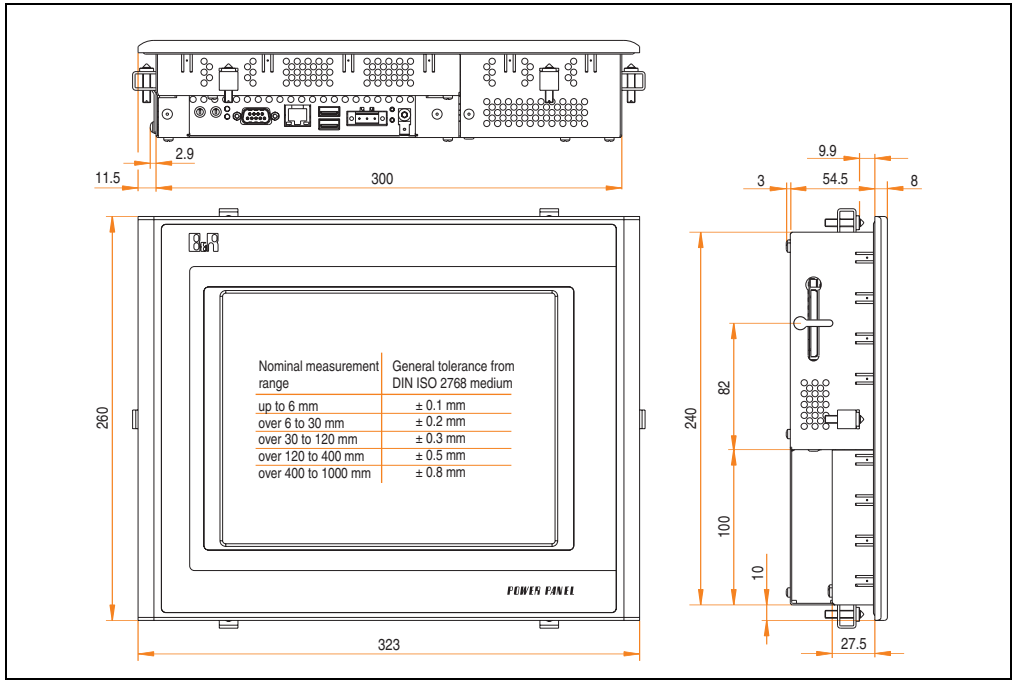


Figure 70: Dimensions 4PP320.1043-31

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.

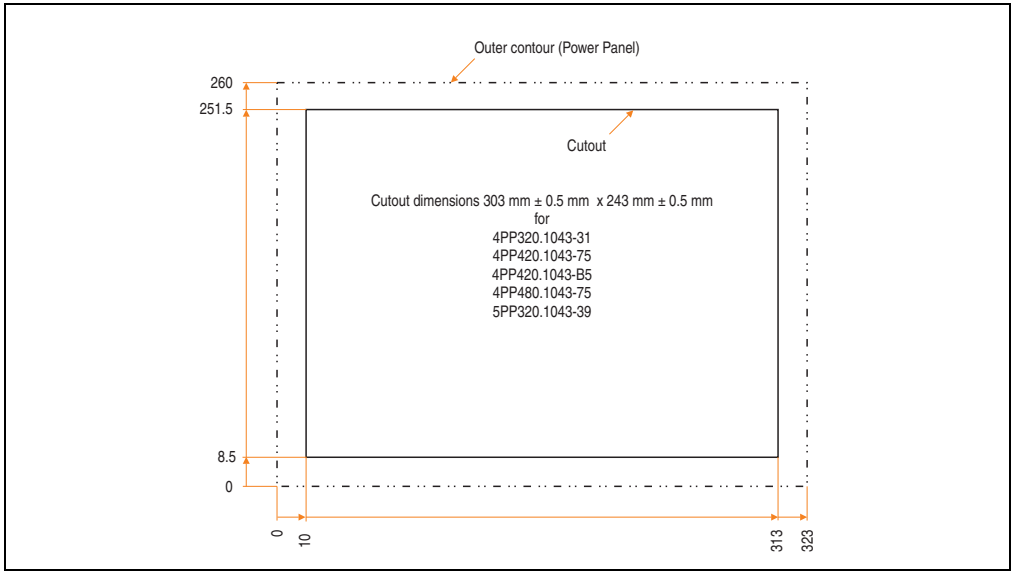


Figure 71: Cutout installation - 4PP320.1043-31

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 BIOS 10.4" VGA, touch screen
6	Retaining clips included

Table 49: Contents of delivery - 4PP320.1043-31

3.6 Device 4PP320.1505-31

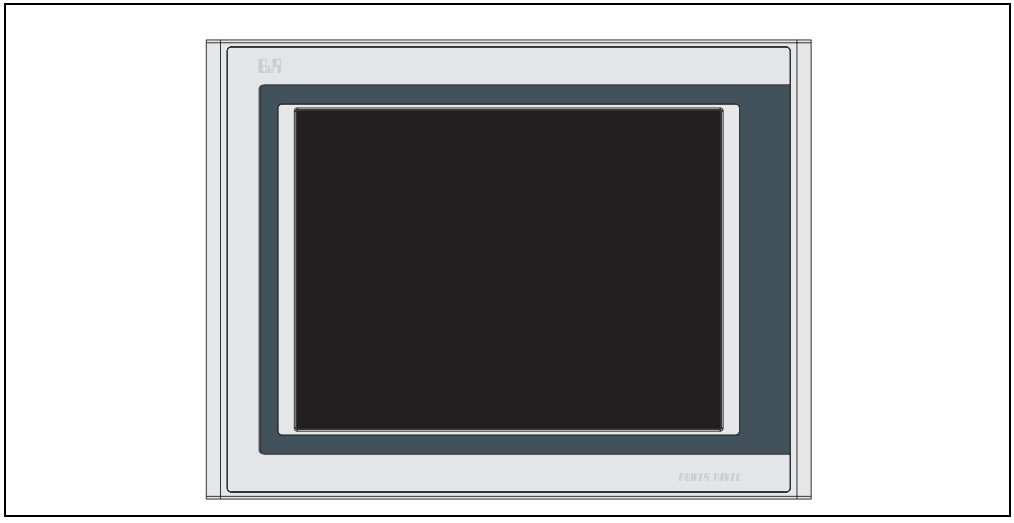


Figure 72: Front view - 4PP320.1505-31

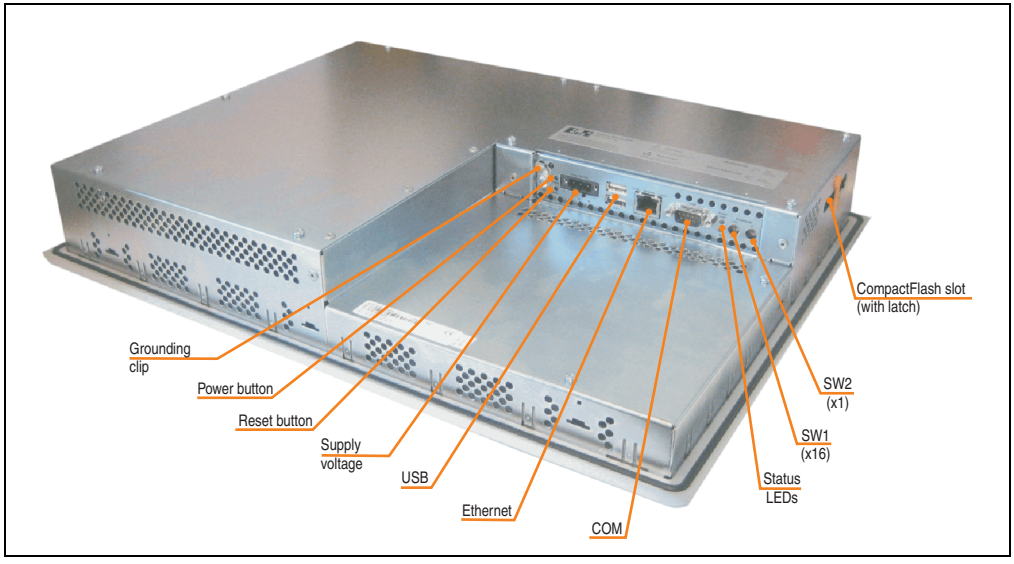


Figure 73: Rear view - 4PP320.1505-31

3.6.1 Technical data

Features	4PP320.1505-31
B&R ID-Code	$A17F
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 128 MB
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	-
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] -
Real-time clock (RTC) Battery-buffered Accuracy	 - At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan 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 50: Technical data - 4PP320.1505-31

Features	4PP320.1505-31
Serial interface	
Type	RS232, modem-capable, not electrically isolated
UART	16C550 compatible, 16-byte FIFO
Transfer rate	Max. 115 kBaud
Connection	9-pin DSUB
USB interface	
Type	USB 1.1, USB 2.0[3)]
Amount	2
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[3)]
Connection	Type A
Current load	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	Color TFT
Diagonal	15 in (381 mm)
Colors	16.7 million colors[3)]
Resolution	XGA, 1024 x 768 pixels
Contrast	400:1
Viewing angle (see page 570)	
Horizontal	Direction R / direction L =85°
Vertical	Direction U / direction D = 85°
Background lighting	
Brightness	250 cd/m²
Half-brightness time[4)]	50,000 hours
Screen rotation	Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen	
Touch screen type	Elo Accu Touch
Technology	Analog, resistive
Controller	Elo, serial, 12- bit
Degree of transmission	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 50: Technical data - 4PP320.1505-31 (Forts.)

Electrical characteristics	4PP320.1505-31
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	Aluminum, naturally anodized[5)]
Design	Gray[5)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[5)]
Light background	Similar to Pantone 427CV[5)]
Gasket	Flat gasket around display front
Housing	Metal
Weight	Approx. 6.3 kg
Environmental characteristics	
Ambient temperature	
Operation	0 to +50°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 3.6.2 "Temperature humidity diagram" on page 144
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[6)]	Max. 3000 m

Table 50: Technical data - 4PP320.1505-31 (Forts.)

1) Maintenance controller extended.

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

3) The actual value depends on the operating system or diver 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

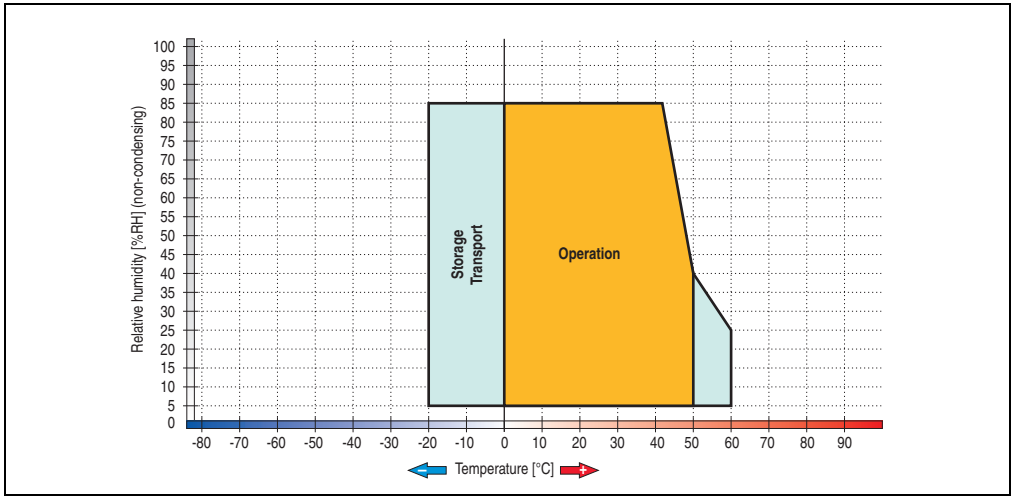


Figure 74: Temperature humidity diagram - 4PP320.1505-31

3.6.3 Dimensions

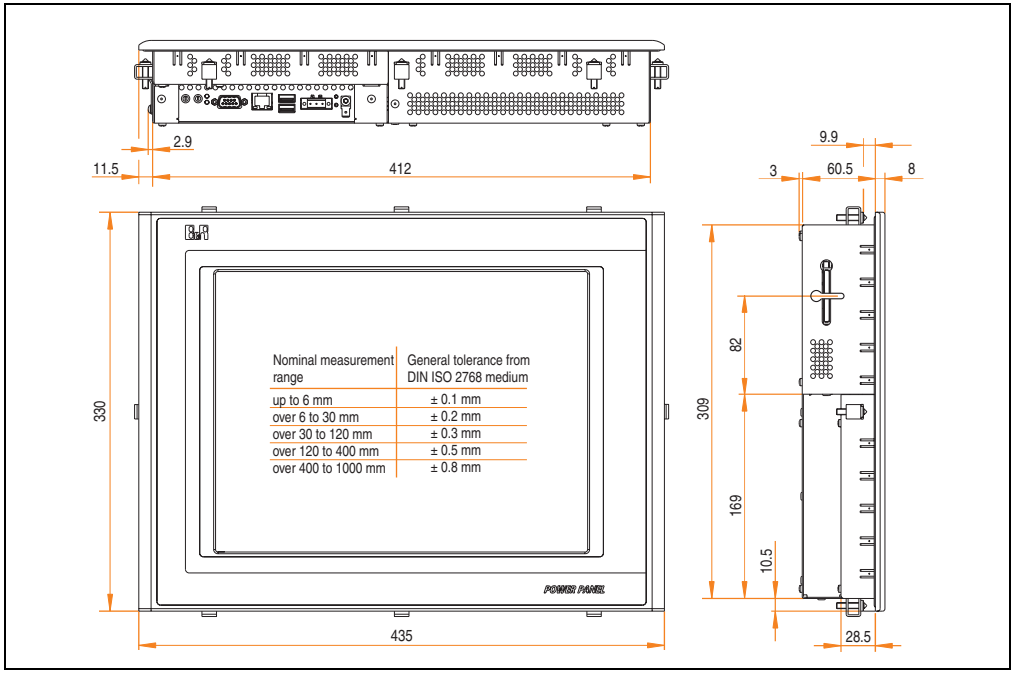


Figure 75: Dimensions 4PP320.1505-31

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.

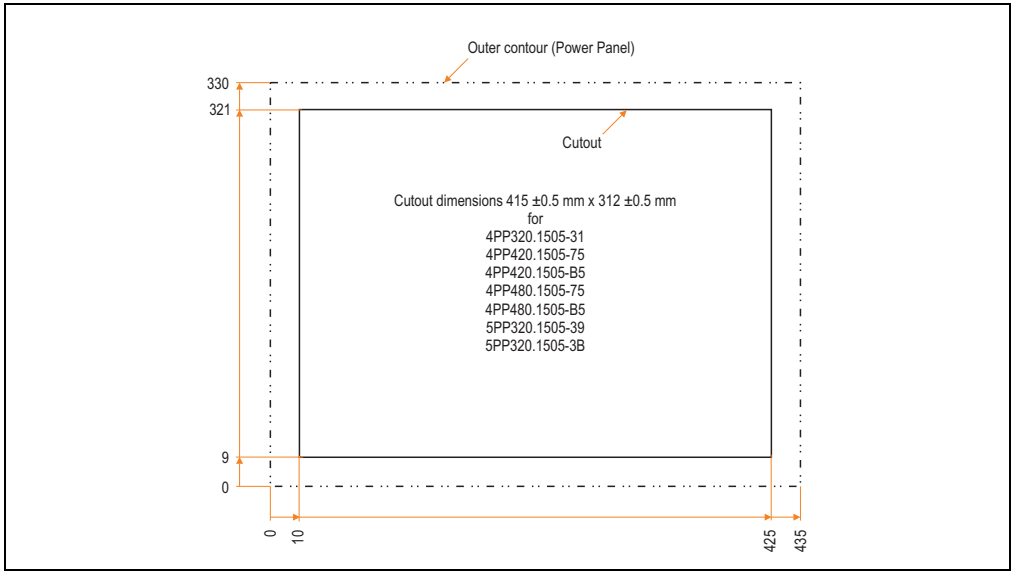


Figure 76: Cutout installation - 4PP320.1505-31

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 BIOS 15" XGA, touch screen
8	Retaining clips included

Table 51: Contents of delivery - 4PP320.1505-31

3.7 Device 4PP351.0571-01

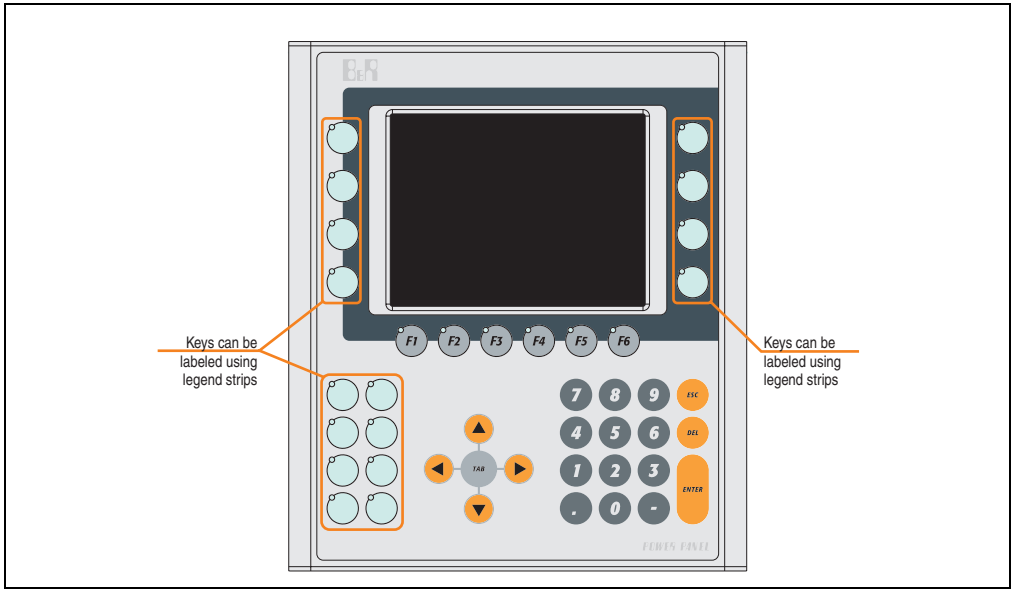


Figure 77: Front view - 4PP351.0571-01

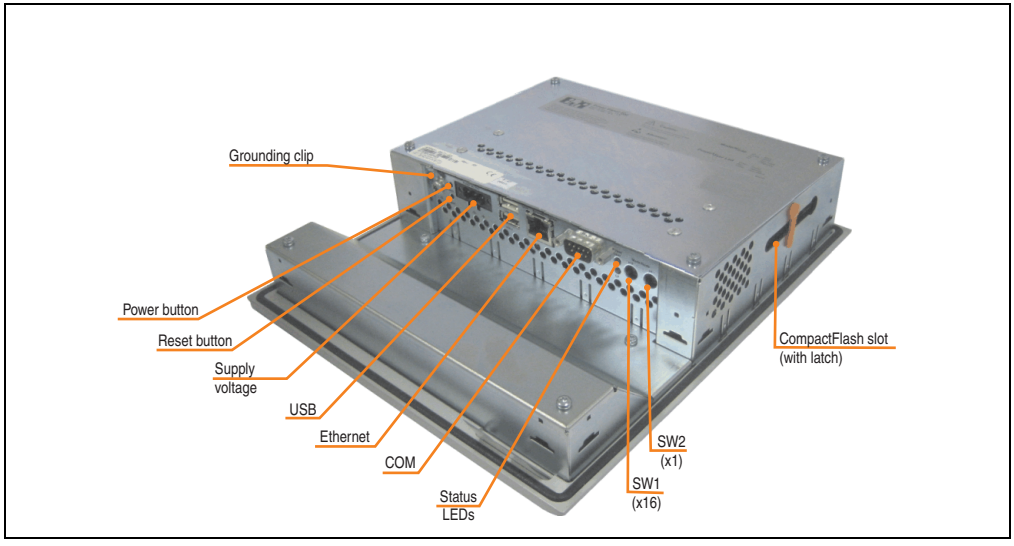


Figure 78: Rear view - 4PP351.0571-01

3.7.1 Technical data

Features	4PP351.0571-01
B&R ID-Code	$A543
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 128 MB
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	-
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] -
Real-time clock (RTC) Battery-buffered Accuracy	 - At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan 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 52: Technical data - 4PP351.0571-01

Features	4PP351.0571-01
Serial interface	
Type	RS232, modem-capable, not electrically isolated
UART	16C550 compatible, 16-byte FIFO
Transfer rate	Max. 115 kBaud
Connection	9-pin DSUB
USB interface	
Type	USB 1.1, USB 2.0[3]
Amount	2
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[3]
Connection	Type A
Current load	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	LCD monochrome
Diagonal	5.7 in (144 mm)
Colors	8 shades of gray[3]
Resolution	QVGA, 320 x 240 pixels
Contrast	25:1
Viewing angle (see page 570)	
Horizontal	Direction R / direction L =40°
Vertical	Direction U = 40°/ direction D = 50°
Background lighting	
Brightness	220 cd/m²
Half-brightness time[4]	50,000 hours
Screen rotation	Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen	-
Touch screen type	
Technology	
Controller	
Degree of transmission	
Filter glass	-
Degree of transmission	
Coating	
Keys/LED	
Function keys	16 with LED (yellow)
Soft keys	6 with LED (yellow)
Cursor keys	5 without LED
Number block	15 without LED
Other keys	-
Key lifespan	> 10^6 actuations with 1 ±0.3 to 3 ±0.3 N operating force
LED brightness	Typ. 12 mcd (yellow) and 20 mcd (green)
	Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.

Table 52: Technical data - 4PP351.0571-01 (Forts.)

Electrical characteristics	4PP351.0571-01
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	Aluminum, naturally anodized[5)]
Design	Gray[7)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[7)]
Light background	Similar to Pantone 427CV[7)]
Orange keys	Similar to Pantone 151CV[7)]
Dark gray keys	Similar to Pantone 431CV[7)]
Legend strips (gray)	Similar to Pantone 429CV[7)]
Gasket	Flat gasket around display front
Housing	Metal
Weight	Approx. 2 kg
Environmental characteristics	
Ambient temperature	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 3.7.2 "Temperature humidity diagram" on page 150
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[6)]	Max. 3000 m

Table 52: Technical data - 4PP351.0571-01 (Forts.)

1) Maintenance controller extended.

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

3) The actual value depends on the operating system or diver 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

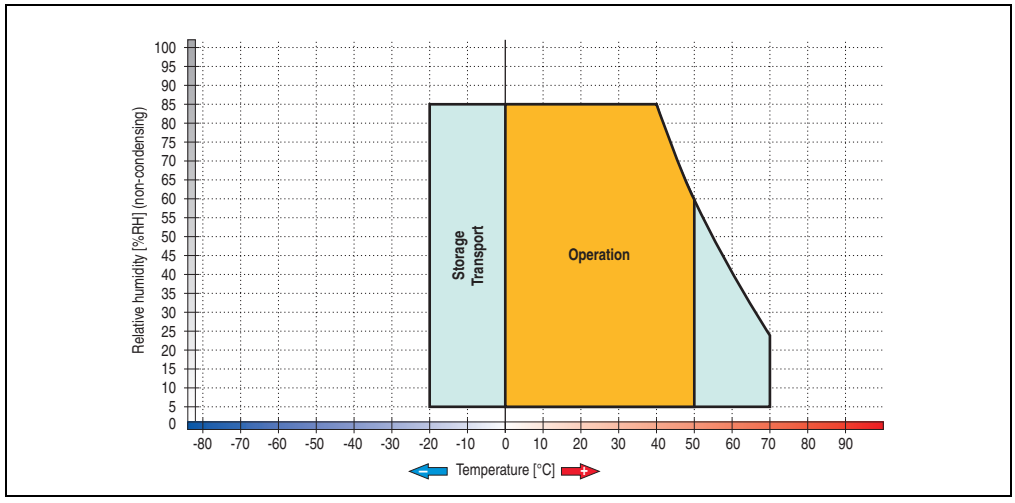


Figure 79: Temperature humidity diagram - 4PP351.0571-01

3.7.3 Dimensions

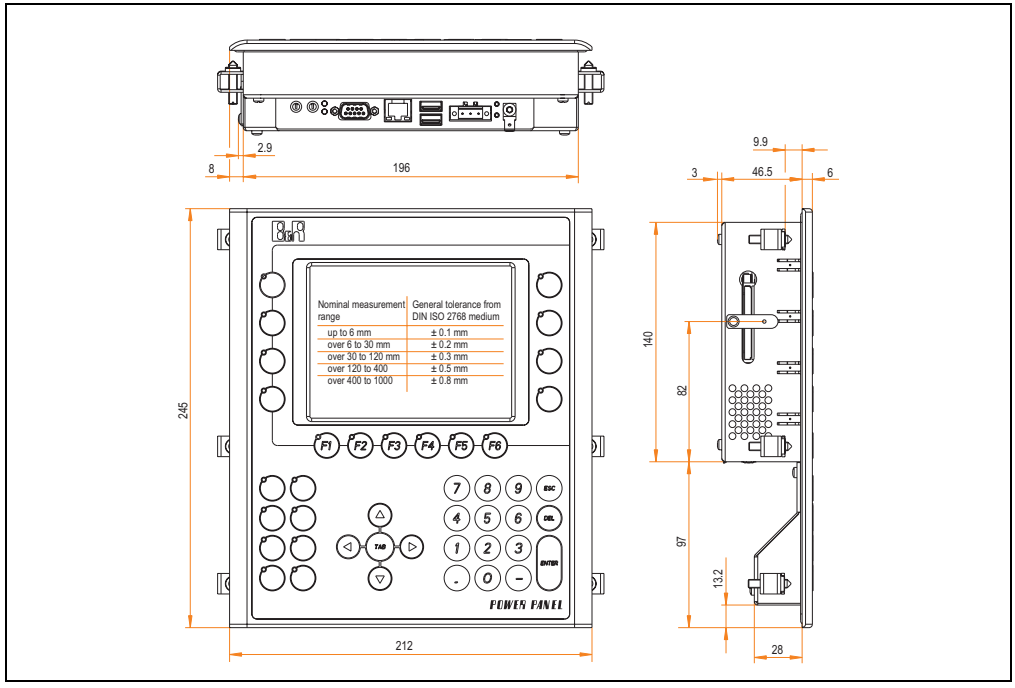


Figure 80: Dimensions - 4PP351.0571-01

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.

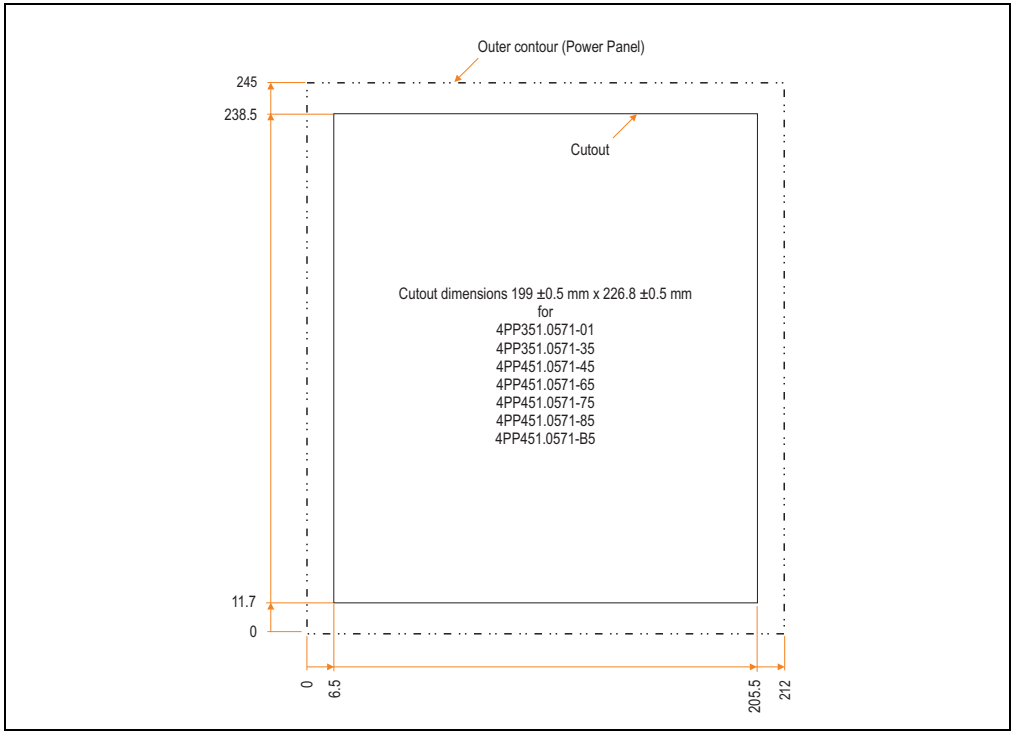


Figure 81: Cutout installation - 4PP351.0571-01

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 BIOS 5.7" QVGA
4	Retaining clips included

Table 53: Contents of delivery - 4PP351.0571-01

3.8 Device 4PP351.0571-35

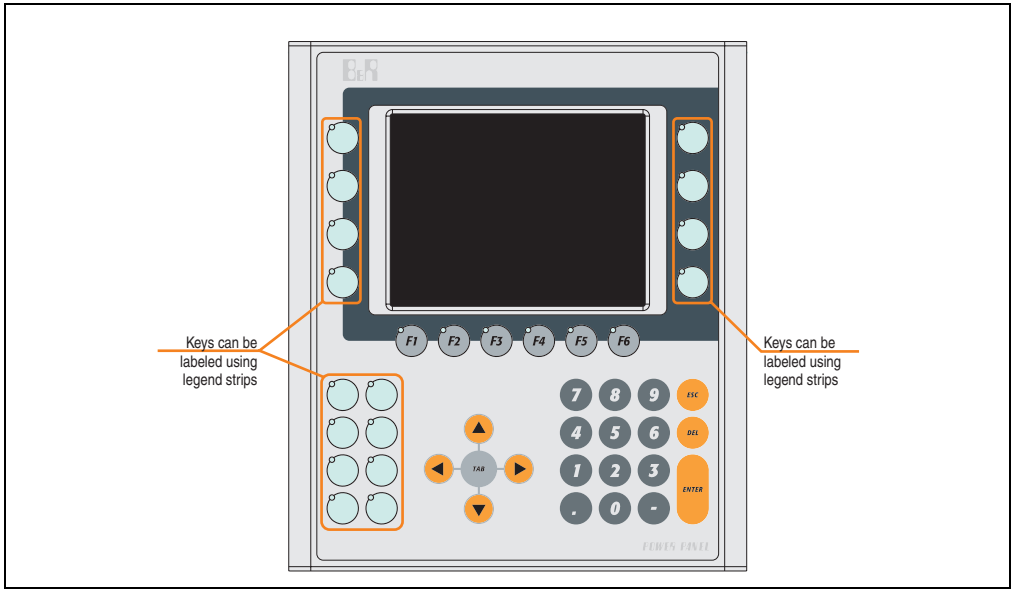


Figure 82: Front view - 4PP351.0571-35

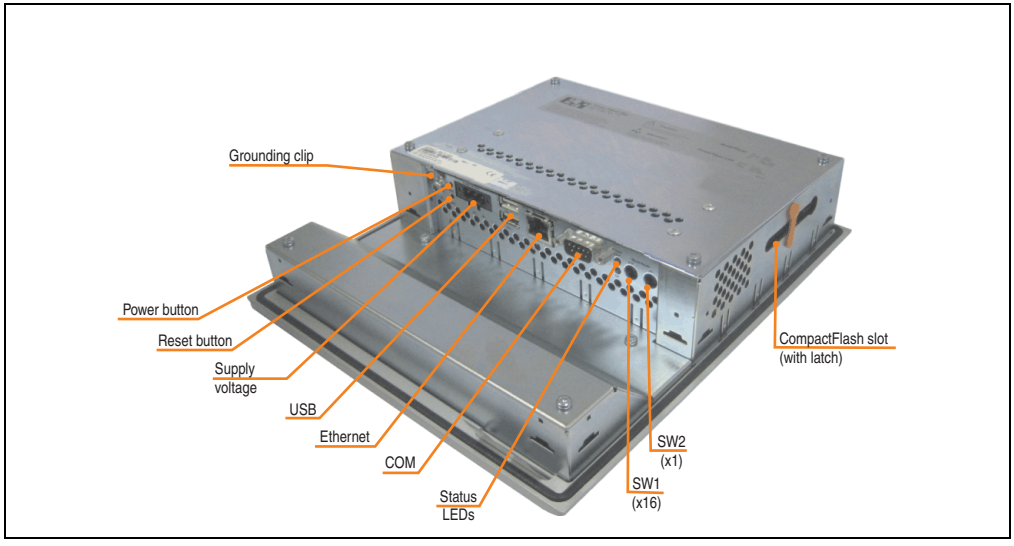


Figure 83: Rear view - 4PP351.0571-35

3.8.1 Technical data

Features	4PP351.0571-35 < Rev. D0	4PP351.0571-35 ≥ Rev. D0
B&R ID-Code	$A541	
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)	
Flash	2 MB (for firmware)	
Memory Type Quantity	 DDR SDRAM 128 MB	
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)	
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	-	
Watchdog Controller	 MTCX[1)]	
Power failure logic Controller Buffer time	 MTCX[1)] -	
Real-time clock (RTC) Battery-buffered Accuracy	 - At +25°C: typically 30 ppm (2.5 seconds) [2)] per day	
Battery Type Removable Lifespan 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 54: Technical data - 4PP351.0571-35

Features	4PP351.0571-35 < Rev. D0	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[3)] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[3)] 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 570) Horizontal Vertical Background lighting Brightness Half-brightness time[4)] Screen rotation	 Color TFT 5.7 in (144 mm) 262,144[3)] QVGA, 320 x 240 pixels 400:1 Direction R / direction L =60° Direction U = 40°/ direction D = 50° 500 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426	 Color TFT 5.7 in (144 mm) 262,144 colors [3)] QVGA, 320 x 240 pixels 350:1 Direction R / direction L =65° Direction U = 65°/ direction D = 40° 500 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
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 - > 10^6 actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green) **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.**	

Table 54: Technical data - 4PP351.0571-35 (Forts.)

Electrical characteristics	4PP351.0571-35 < Rev. D0	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	Aluminum, naturally anodized[5)]	
Design	Gray[7)]	
Membrane	Polyester	
Dark gray border around display	Similar to Pantone 432CV[7)]	
Light background	Similar to Pantone 427CV[7)]	
Orange keys	Similar to Pantone 151CV[7)]	
Dark gray keys	Similar to Pantone 431CV[7)]	
Legend strips (gray)	Similar to Pantone 429CV[7)]	
Gasket	Flat gasket around display front	
Housing	Metal	
Weight	Approx. 2 kg	
Environmental characteristics		
Ambient temperature		
Operation	0 to +50°C	
Storage	-20 to +60°C	
Transport	-20 to +60°C	
Relative humidity	See 3.8.2 "Temperature humidity diagram" on page 156	
Vibration		
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g	
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g	
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g	
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g	
Shock		
Operation	15 g, 11 ms	
Storage	30 g, 15 ms	
Transport	30 g, 15 ms	
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude[6)]	Max. 3000 m	

Table 54: Technical data - 4PP351.0571-35 (Forts.)

1) Maintenance controller extended.

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

3) The actual value depends on the operating system or diver 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

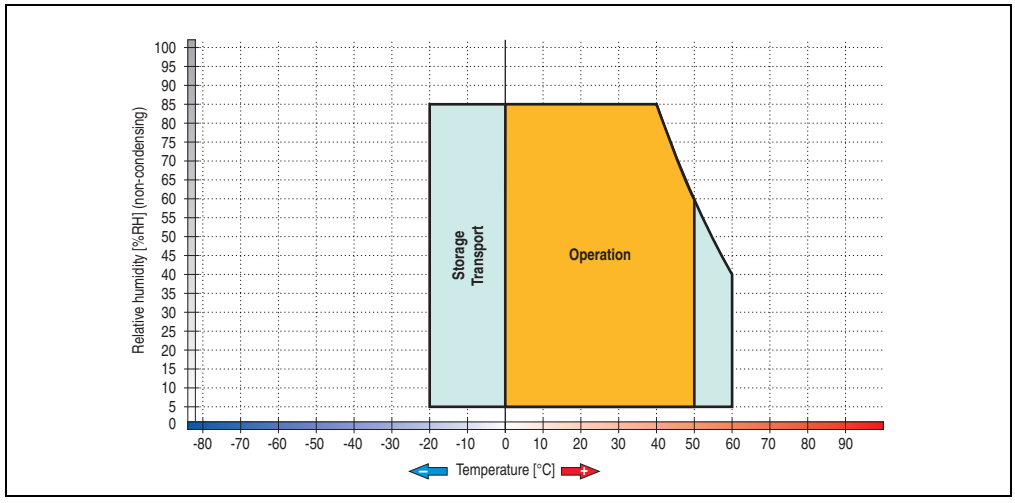


Figure 84: Temperature humidity diagram - 4PP351.0571-35

3.8.3 Dimensions

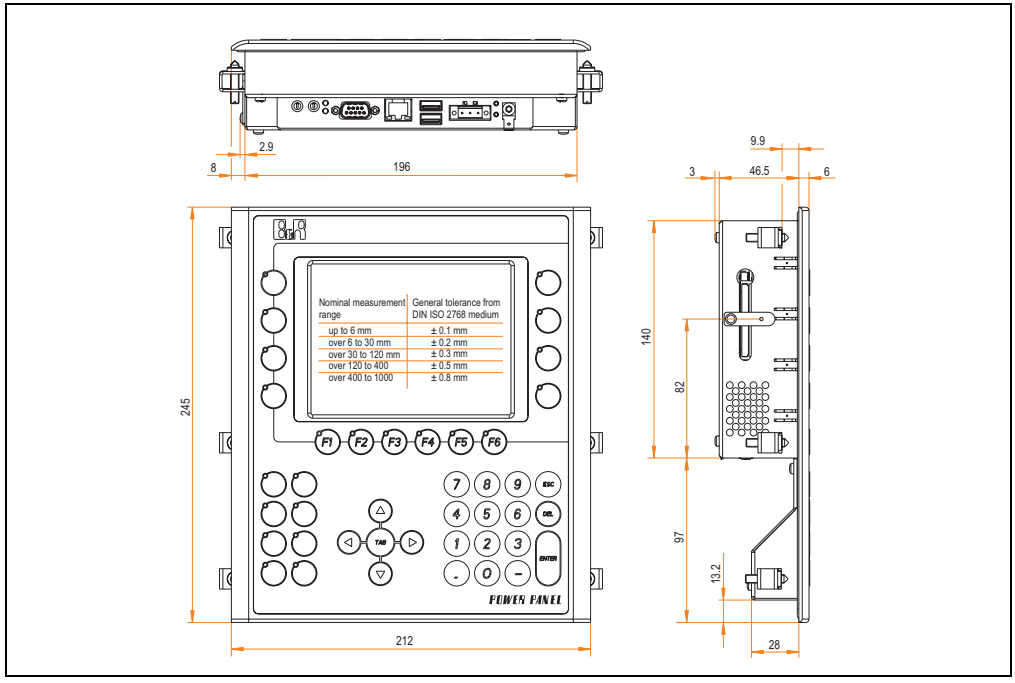


Figure 85: Dimensions - 4PP351.0571-35

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.

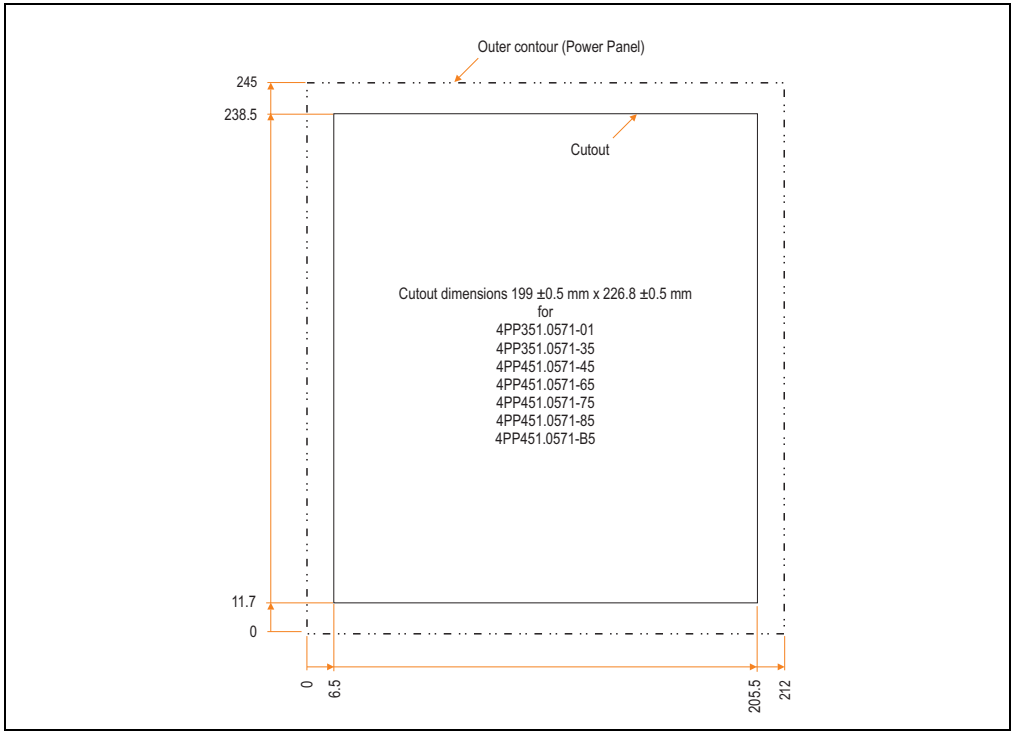


Figure 86: Cutout installation - 5PP351.0571-35

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 BIOS 5.7" QVGA
4	Retaining clips included

Table 55: Contents of delivery - 4PP351.0571-35

3.9 Device 4PP352.0571-35

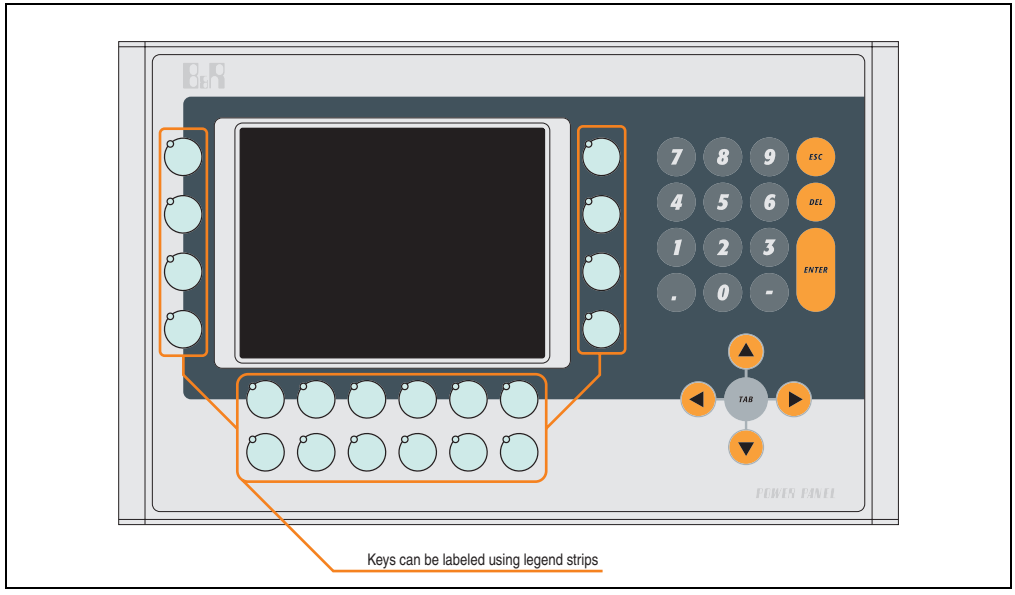


Figure 87: Front view - 4PP352.0571-35

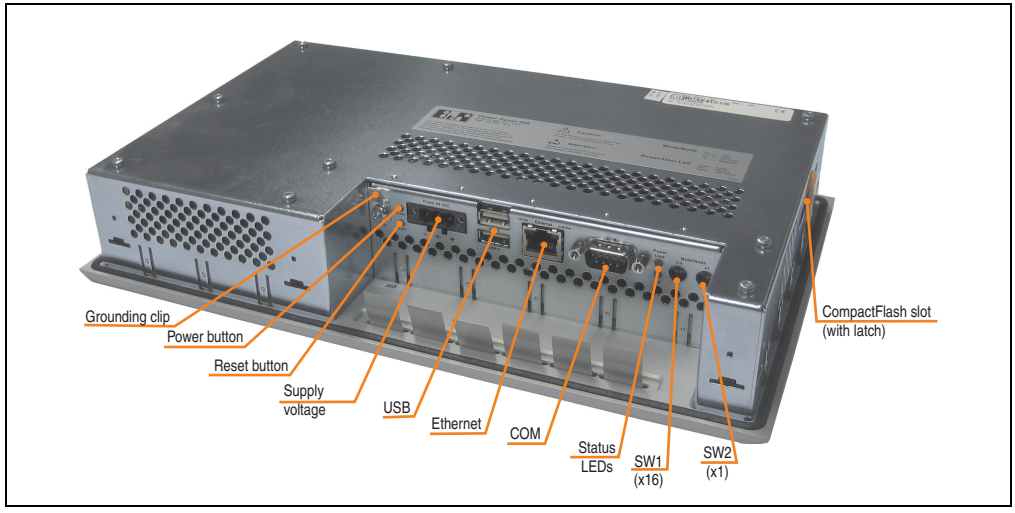


Figure 88: Rear view - 4PP352.0571-35

3.9.1 Technical data

Features	4PP352.0571-35 < Rev. D0	4PP352.0571-35 ≥ Rev. D0
B&R ID-Code	$A542	
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)	
Flash	2 MB (for firmware)	
Memory Type Quantity	 DDR SDRAM 128 MB	
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)	
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	-	
Watchdog Controller	 MTCX[1)]	
Power failure logic Controller Buffer time	 MTCX[1)] -	
Real-time clock (RTC) Battery-buffered Accuracy	 - At +25°C: typically 30 ppm (2.5 seconds) [2)] per day	
Battery Type Removable Lifespan 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 56: Technical data - 4PP352.0571-35

Features	4PP352.0571-35 < Rev. D0	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[3] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[3] 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 570) Horizontal Vertical Background lighting Brightness Half-brightness time[4] Screen rotation	Color TFT 5.7 in (144 mm) 262,144 colors [4] QVGA, 320 x 240 pixels 400:1 Direction R / direction L =60° Direction U = 40°/ direction D = 50° 500 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426	Color TFT 5.7 in (144 mm) 262,144 colors [3] QVGA, 320 x 240 pixels 350:1 Direction R / direction L =65° Direction U = 65°/ direction D = 40° 500 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
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 - > 10^6 actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green) **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.**	

Table 56: Technical data - 4PP352.0571-35 (Forts.)

Electrical characteristics	4PP352.0571-35 < Rev. D0	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	Aluminum, naturally anodized[5)]	
Design	Gray[7)]	
Membrane	Polyester	
Dark gray border around display	Similar to Pantone 432CV[7)]	
Light background	Similar to Pantone 427CV[7)]	
Orange keys	Similar to Pantone 151CV[7)]	
Dark gray keys	Similar to Pantone 431CV[7)]	
Legend strips (gray)	Similar to Pantone 429CV[7)]	
Gasket	Flat gasket around display front	
Housing	Metal	
Weight	Approx. 2.2 kg	
Environmental characteristics		
Ambient temperature		
Operation	0 to +50°C	
Storage	-20 to +60°C	
Transport	-20 to +60°C	
Relative humidity	See 3.9.2 "Temperature humidity diagram" on page 162	
Vibration		
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g	
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g	
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g	
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g	
Shock		
Operation	15 g, 11 ms	
Storage	30 g, 15 ms	
Transport	30 g, 15 ms	
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude[6)]	Max. 3000 m	

Table 56: Technical data - 4PP352.0571-35 (Forts.)

1) Maintenance controller extended.

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

3) The actual value depends on the operating system or diver 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

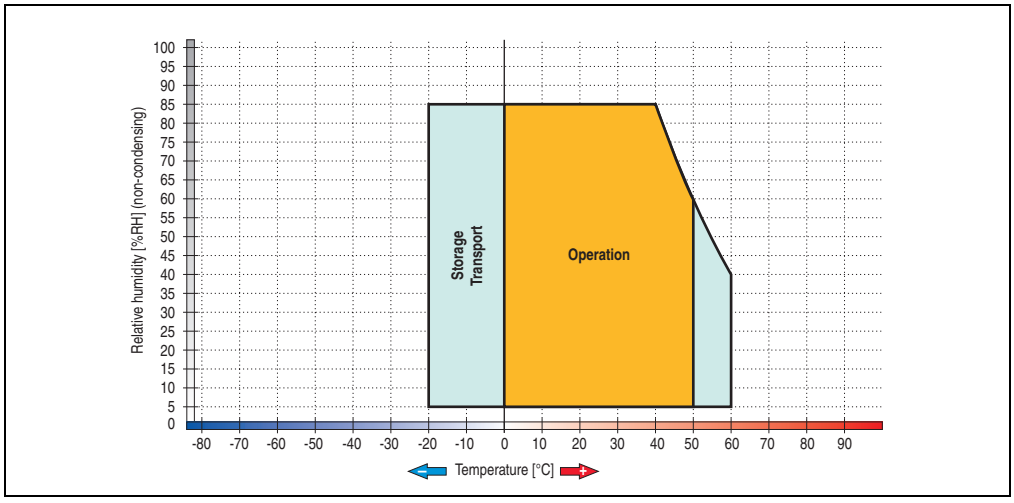


Figure 89: Temperature humidity diagram - 4PP352.0571-35

3.9.3 Dimensions

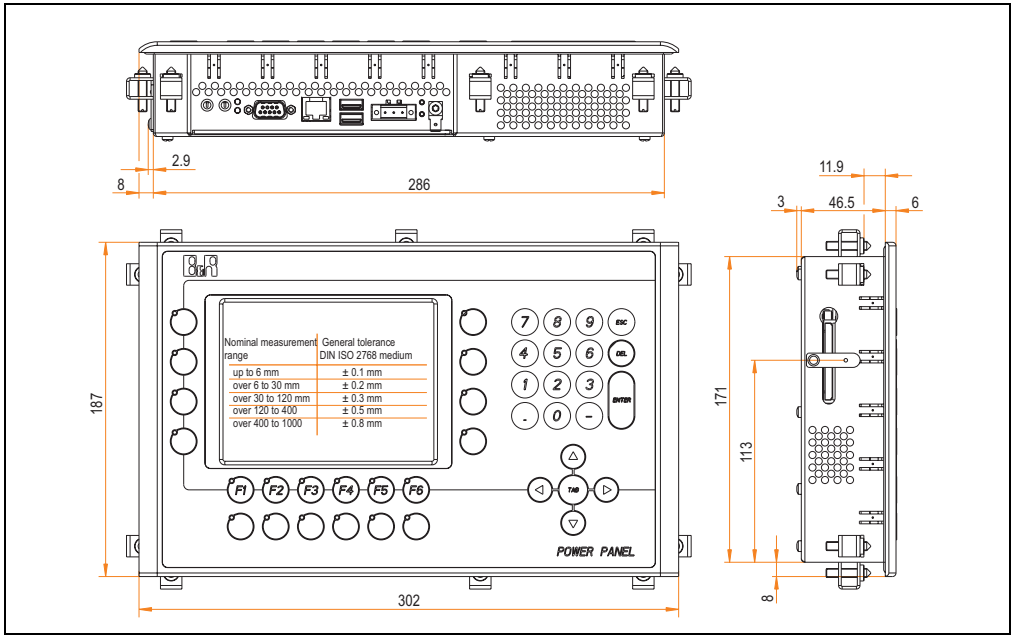


Figure 90: Dimensions - 4PP352.0571-35

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.

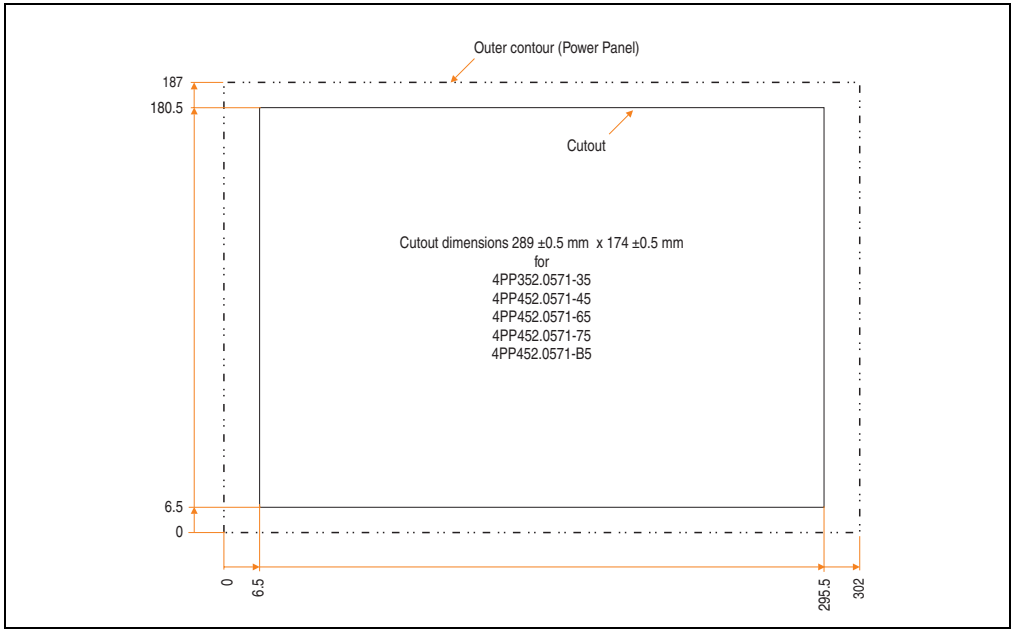


Figure 91: Cutout installation - 5PP352.0571-35

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 57: Contents of delivery - 4PP352.0571-35

3.10 Device 4PP381.1043-31

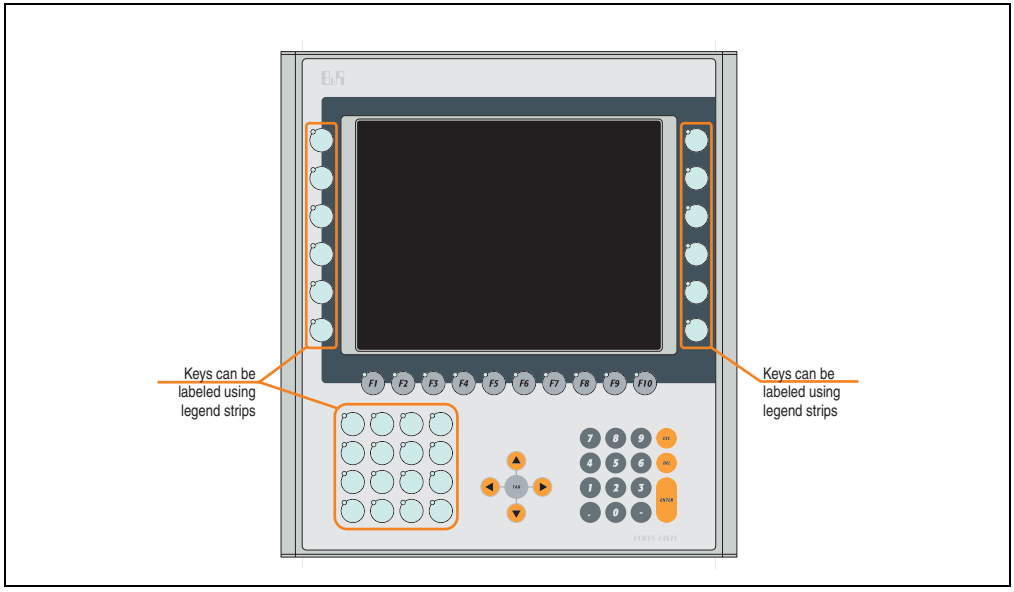


Figure 92: Front view - 4PP381.1043-31

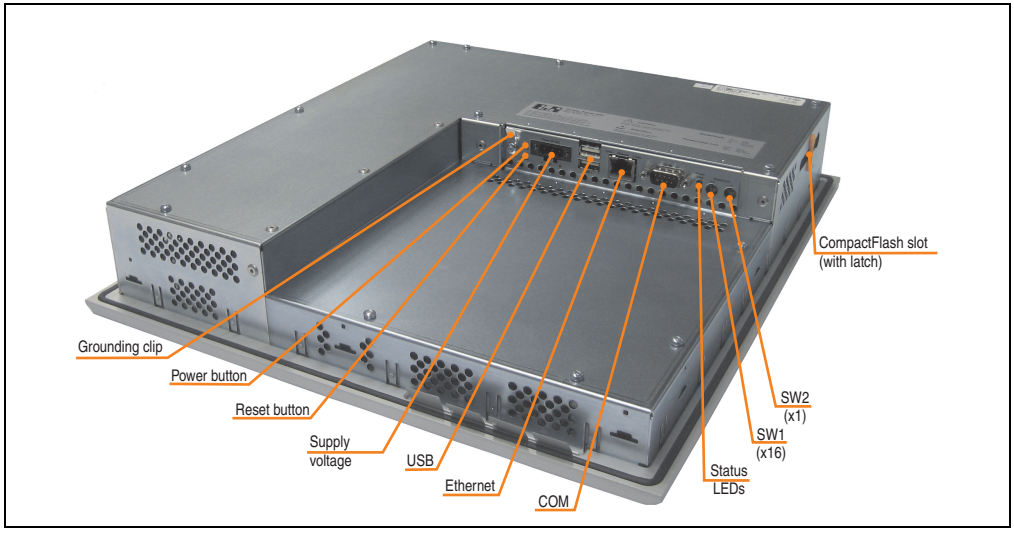


Figure 93: Rear view - 4PP381.1043-31

3.10.1 Technical data

Features	4PP381.1043-31
B&R ID-Code	$A544
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 128 MB
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	-
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] -
Real-time clock (RTC) Battery-buffered Accuracy	 - At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan 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 58: Technical data - 4PP381.1043-31

Features	4PP381.1043-31
Serial interface	
Type	RS232, modem-capable, not electrically isolated
UART	16C550 compatible, 16-byte FIFO
Transfer rate	Max. 115 kBaud
Connection	9-pin DSUB
USB interface	
Type	USB 1.1, USB 2.0[3]
Amount	2
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[3]
Connection	Type A
Current load	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	Color TFT
Diagonal	10.4 in (264 mm)
Colors	262,144 colors
Resolution	VGA, 640 x 480 pixels
Contrast	600:1
Viewing angle (see page 570)	
Horizontal	Direction R / direction L =70°
Vertical	Direction U = 45°/ direction D = 35°
Background lighting	
Brightness	450 cd/m²
Half-brightness time[4]	55,000 hours
Screen rotation	Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen	
Touch screen type	Elo Accu Touch
Technology	Analog, resistive
Controller	Elo, serial, 12- bit
Degree of transmission	Up to 80% ±5%
Filter glass	-
Degree of transmission	
Coating	
Keys/LED	
Function keys	28 with LED (yellow)
Soft keys	10 with LED (yellow)
Cursor keys	5 without LED
Number block	15 without LED
Other keys	-
Key lifespan	> 10^6 actuations with 1 ±0.3 to 3 ±0.3 N operating force
LED brightness	Typ. 12 mcd (yellow) and 20 mcd (green)
	Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.

Table 58: Technical data - 4PP381.1043-31 (Forts.)

Electrical characteristics	4PP381.1043-31
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	Aluminum, naturally anodized[5)]
Design	Gray[7)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[7)]
Light background	Similar to Pantone 427CV[7)]
Orange keys	Similar to Pantone 151CV[7)]
Dark gray keys	Similar to Pantone 431CV[7)]
Legend strips (gray)	Similar to Pantone 429CV[7)]
Gasket	Flat gasket around display front
Housing	Metal
Weight	Approx. 4.6 kg
Environmental characteristics	
Ambient temperature	
Operation	0 to +50°C
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 3.10.2 "Temperature humidity diagram" on page 168
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[6)]	Max. 3000 m

Table 58: Technical data - 4PP381.1043-31 (Forts.)

1) Maintenance controller extended.

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

3) The actual value depends on the operating system or diver 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

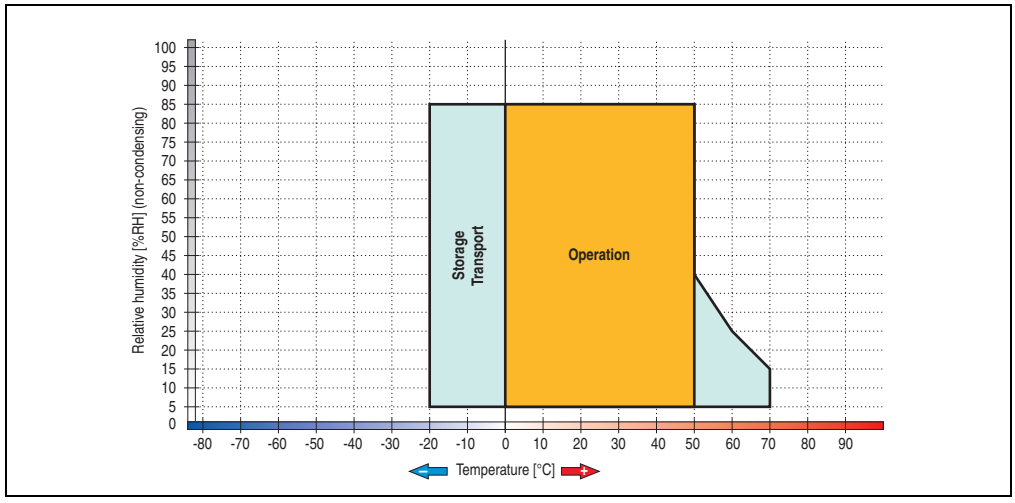


Figure 94: Temperature humidity diagram - 4PP381.1043-31

3.10.3 Dimensions

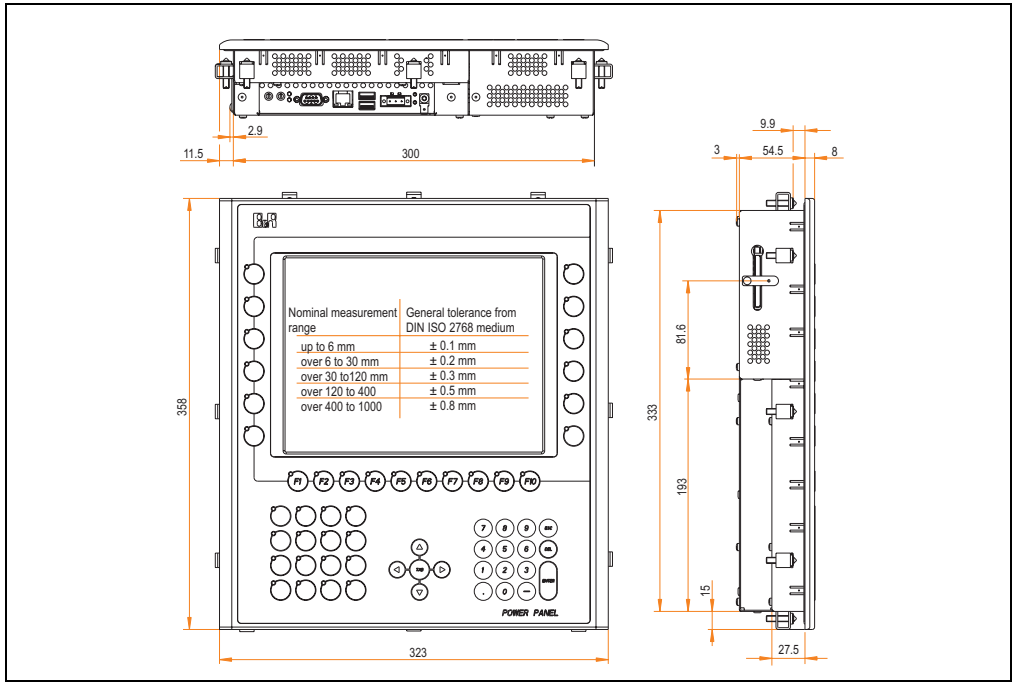


Figure 95: Dimensions - 4PP381.1043-31

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.

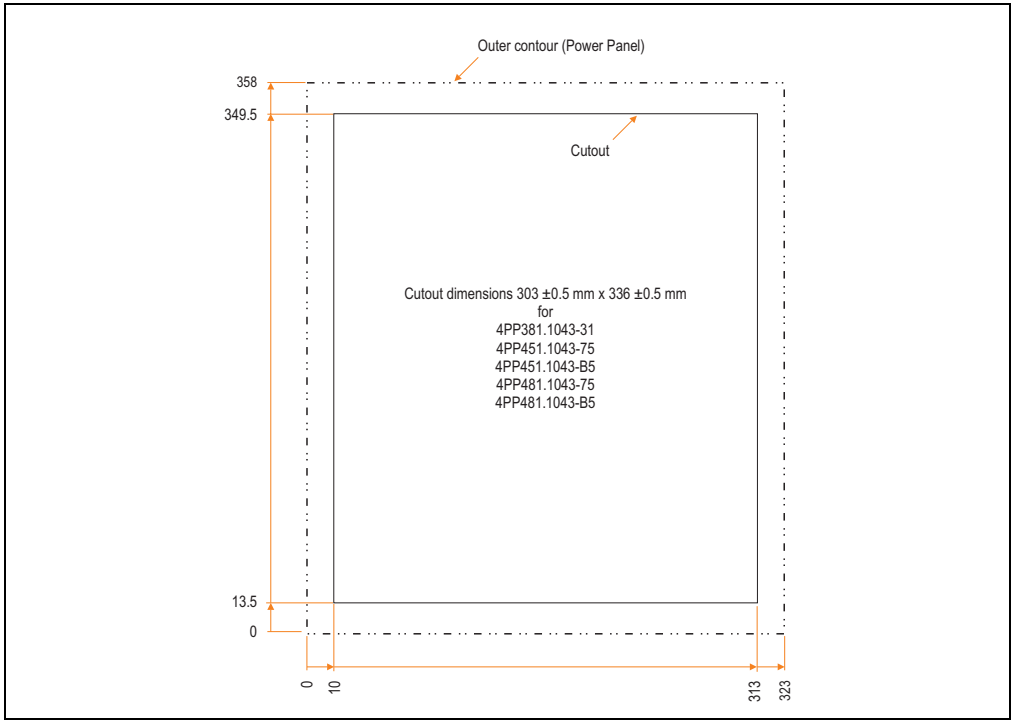


Figure 96: Cutout installation - 4PP381.1043-31

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 BIOS 10.4" QVGA, touch screen
6	Retaining clips included

Table 59: 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 clamps) or 0TB103.91 (cage clamps).

The pin assignments 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 97: Supply voltage connection

Ground

Warning!

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

4.1.2 Functional grounding clip

Next to the supply voltage plug there is a functional grounding clip. The grounding clip (functional ground) must be connected with a central grounding point on the switching cabinet using a 6.3 mm blade connector via the shortest distance and with as little resistance as possible (e.g. copper strip, but must be at least 2.5 mm²).

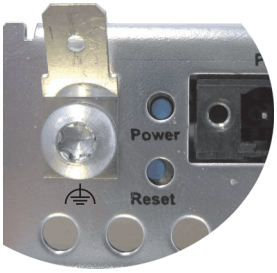
Grounding clip


Figure 98: 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	9-pin DSUB plug
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	

Table 60: Pin assignments - COM

4.1.4 USB port

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[1)]	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[2)]	
Maximum cable length	5 m (not including hub)	

Table 61: USB port

1) The actual value depends on the operating system or diver 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 interfaces. 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, this interface should be handled with extreme care with regard to EMC, location of cables, etc.

4.1.5 Mode / Node switches

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

Mode/Node switch

Table 62: Mode/Node switch

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. **Information:** **For detailed information, see chapter 4 "Software" section3 "Upgrade information" on page 488.**
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 63: 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.

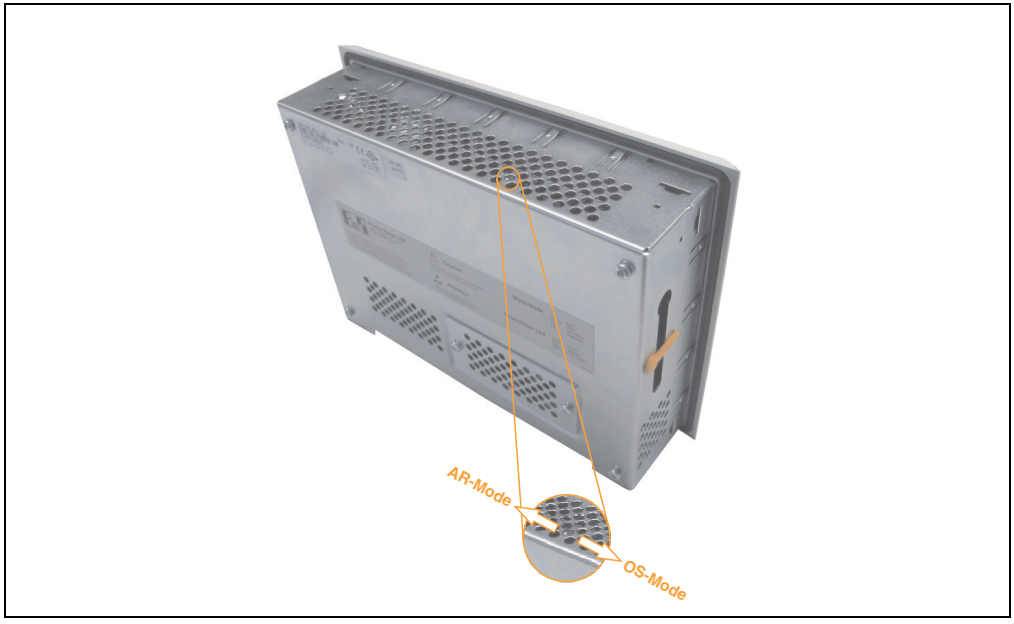


Figure 99: BIOS boot mode switch

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 64: 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 429)
- 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 484)
- USB Boot "Enabled" (only in switch position "00")

4.1.7 Status LEDs

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

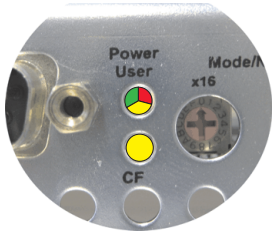
Status LEDs				
LED	**Color**		**Meaning**	
Power	Green	On	Supply voltage OK	1x three-color, 1x one-color 
	Red	On	The system is in standby mode (S5: soft-off mode or S4: hibernate mode - suspend-to-disk)	
User	Yellow	On	Can be used as the user wants (for example, can be turned on/off directly using the ADI library - only possible in S0 state)	
	Green	Off		
CF	Yellow	On	Indicates access to CompactFlash drive (read or write)	

Table 65: Status LEDs

4.1.8 Ethernet connection

Ethernet connection			
Controller	Intel 82551ER		RJ45 twisted pair (10BaseT/100BaseT), female
Cabling	S/STP (category 5)		
Transfer rate	10/100 MBit/s [1]		
LED	**On**	**Off**	
Green	100 MBit/s	10 MBit/s	
Orange	Link (Ethernet network connection available)	Activity (blinking) (Data transfer in progress)	

Table 66: Ethernet connection

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

4.1.9 Power button

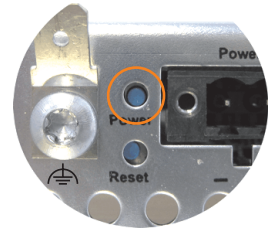
Power button	
The power button can be pressed with a pointed object (i.e. paper clip or tip of a pen). If the Power button is pushed, the Power Panel is switched off and remains in Standby mode.	

Table 67: Power button

4.1.10 Reset button

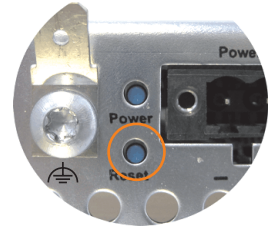
Reset button	
The reset button can be pressed with a pointed object (i.e. paper clip or tip of a pen). Pushing the reset button results in a hardware-reset. The Power Panel restarts. The MTCX processor is not reset when the reset button is pressed.	

Table 68: Reset button

Warning!

A system reset can cause data to be lost!

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 100: CompactFlash slot

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

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 101: 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 102: 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

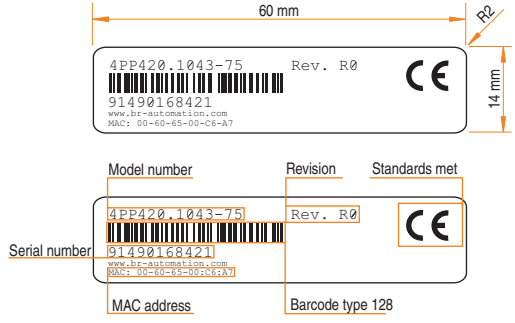


Figure 103: Design / dimensions - Serial number sticker

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**. The search also works if you enter the model number or the material number in the material number search field.

Figure 104: Example - Material number search: 4PP420.0571-45

4.3 Device 4PP420.0571-45

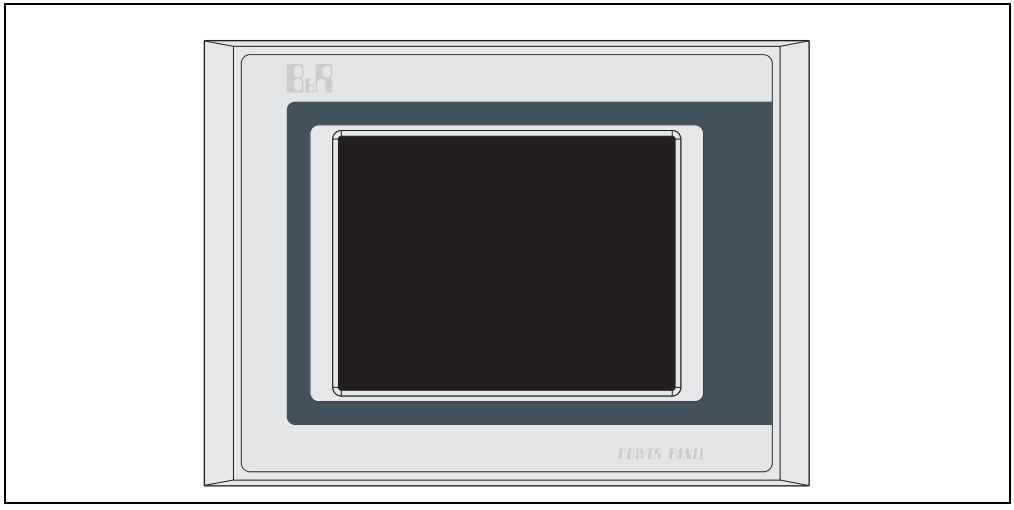


Figure 105: Front view - 4PP420.0571-45

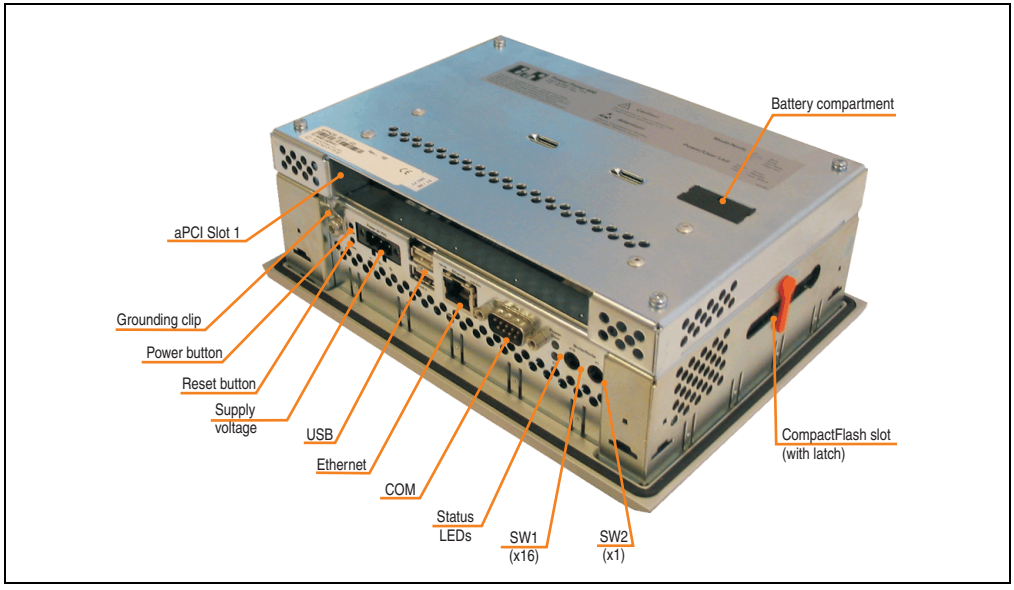


Figure 106: Rear view - 4PP420.0571-45

4.3.1 Technical data

Features	4PP420.0571-45
B&R ID-Code	$23B9
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 128 MB (64 MB < Rev. C0)
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	 512 KB Yes 256 kB
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 69: Technical data - 4PP420.0571-45

Features	4PP420.0571-45
Serial interface	
Type	RS232, modem-capable, not electrically isolated
UART	16C550 compatible, 16-byte FIFO
Transfer rate	Max. 115 kBaud
Connection	9-pin DSUB
USB interface	
Type	USB 1.1, USB 2.0[4]
Amount	2
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4]
Connection	Type A
Current load	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 (see B&R System 2005 manual for available aPCI interface modules)
Holding torque for aPCI module	Max. 0.7 Nm
Display	
Type	LCD monochrome
Diagonal	5.7 in (144 mm)
Colors	8 shades of gray[4]
Resolution	QVGA, 320 x 240 pixels
Contrast	25:1
Viewing angle (see page 570)	
Horizontal	Direction R / direction L =40°
Vertical	Direction U = 40°/ direction D = 50°
Background lighting	
Brightness	220 cd/m²
Half-brightness time[5]	50,000 hours
Screen rotation	Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen	
Touch screen type	Gunze
Technology	Analog, resistive
Controller	Elo, serial, 12- bit
Degree of transmission	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 69: Technical data - 4PP420.0571-45 (Forts.)

Electrical characteristics	4PP420.0571-45
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	Aluminum, naturally anodized[6)]
Design	Gray[6)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[6)]
Light background	Similar to Pantone 427CV[6)]
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
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 4.3.2 "Temperature humidity diagram" on page 186
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[7)]	Max. 3000 m

Table 69: Technical data - 4PP420.0571-45 (Forts.)

1) Maintenance controller extended.

2) At max. specified ambient temperature: typ. 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 lifespan in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.
Maximum lifespan when switched off: 2 years at +25°C or 1 year at +50°C.

4) The actual value depends on the operating system or diver 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

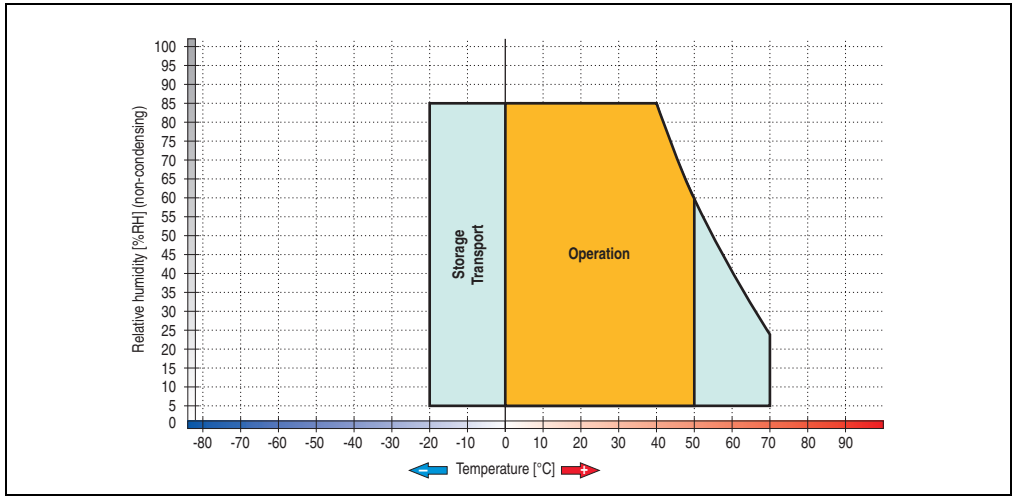


Figure 107: Temperature humidity diagram - 4PP420.0571-45

4.3.3 Dimensions

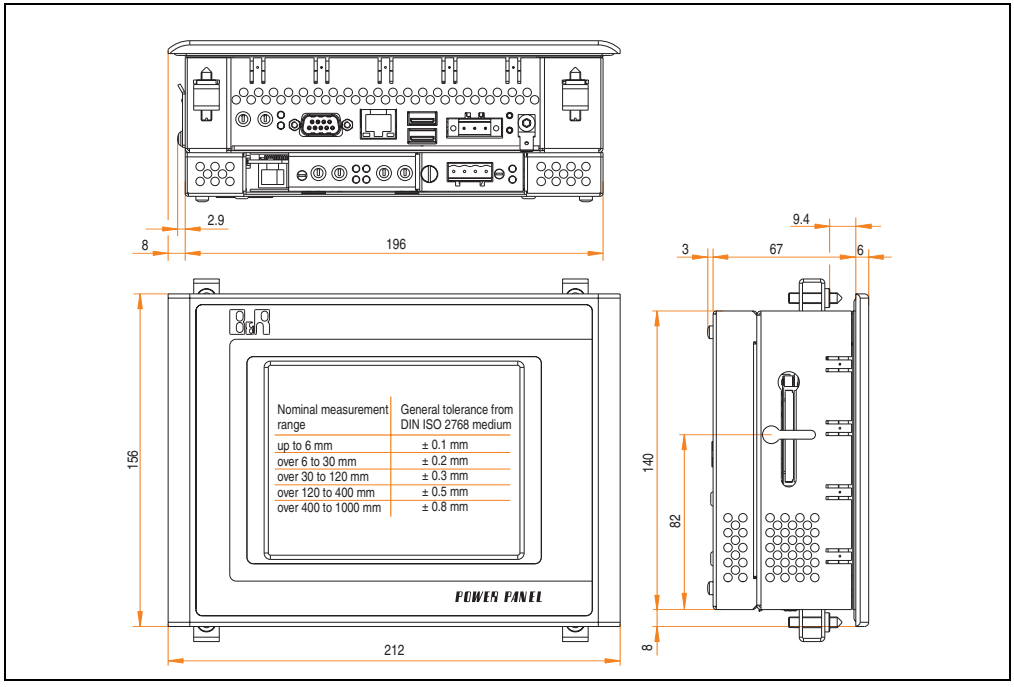


Figure 108: Dimensions - 4PP420.0571-45

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.

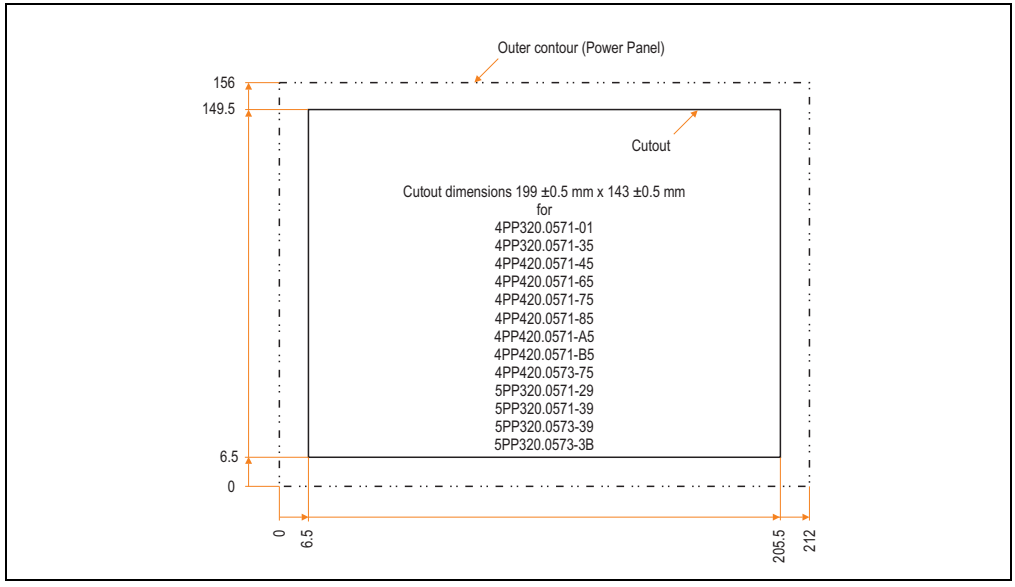


Figure 109: Cutout installation - 4PP420.0571-45

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 5.7" QVGA, 1 aPCI, touch screen
4	Retaining clips included
1	Lithium battery 3 V / 950 mAh included

Table 70: Contents of delivery - 4PP420.0571-45

4.4 Device 4PP420.0571-65

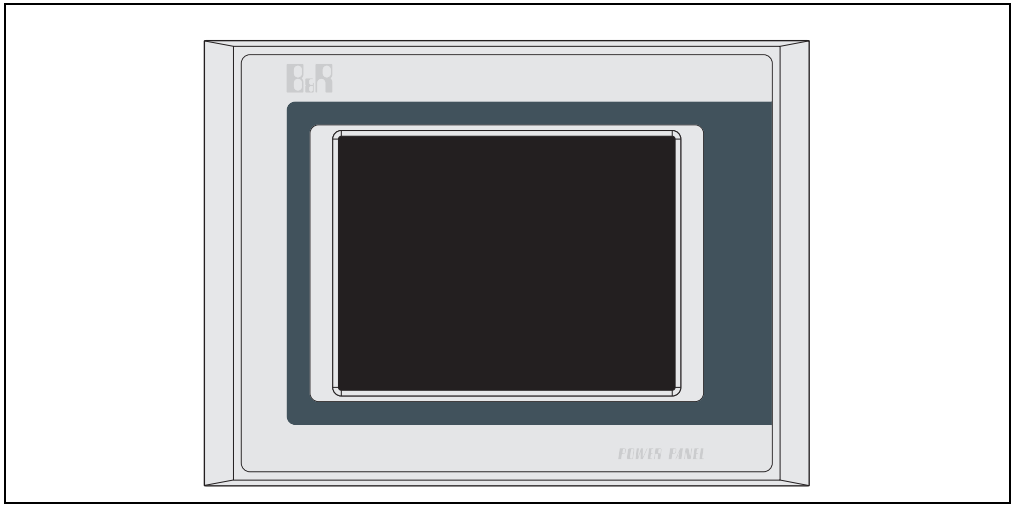


Figure 110: Front view - 4PP420.0571-65

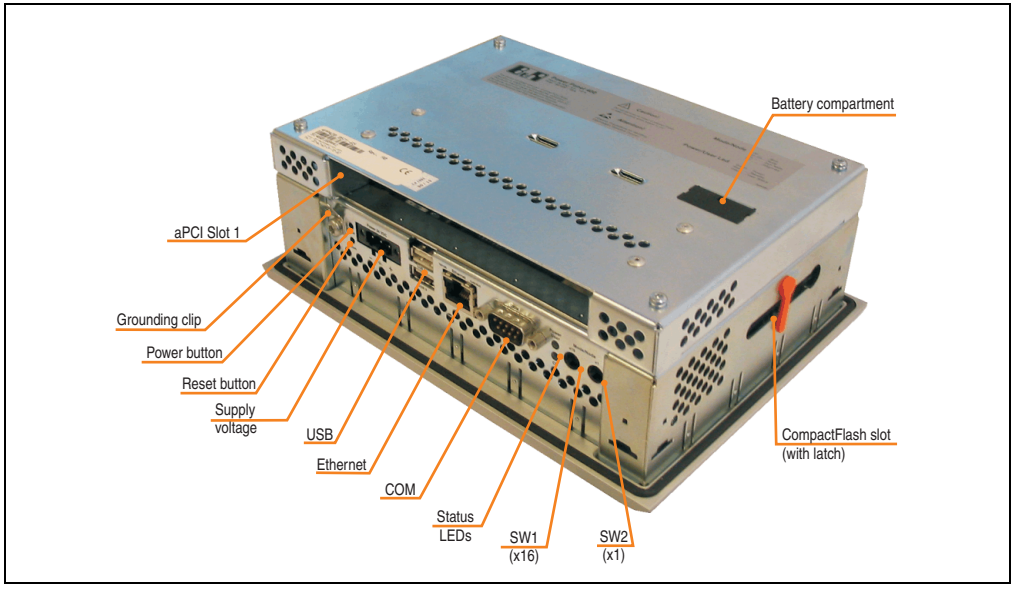


Figure 111: Rear view - 4PP420.0571-65

4.4.1 Technical data

Features	4PP420.0571-65
B&R ID-Code	$23BA
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 128 MB (64 MB < Rev. C0)
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	 512 KB Yes 256 kB
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 71: Technical data - 4PP420.0571-65

Features	4PP420.0571-65
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[4)] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)] 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 570) Horizontal Vertical Background lighting Brightness Half-brightness time[5)] Screen rotation	 Color LCD 5.7 in (144 mm) 512 colors [4)] QVGA, 320 x 240 pixels 40:1 Direction R / direction L =40° Direction U = 40°/ direction D = 50° 200 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
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 71: Technical data - 4PP420.0571-65 (Forts.)

Electrical characteristics	4PP420.0571-65
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	Aluminum, naturally anodized[6)]
Design	Gray[6)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[6)]
Light background	Similar to Pantone 427CV[6)]
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
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 4.4.2 "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
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[7)]	Max. 3000 m

Table 71: Technical data - 4PP420.0571-65 (Forts.)

1) Maintenance Controller Extended.

2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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

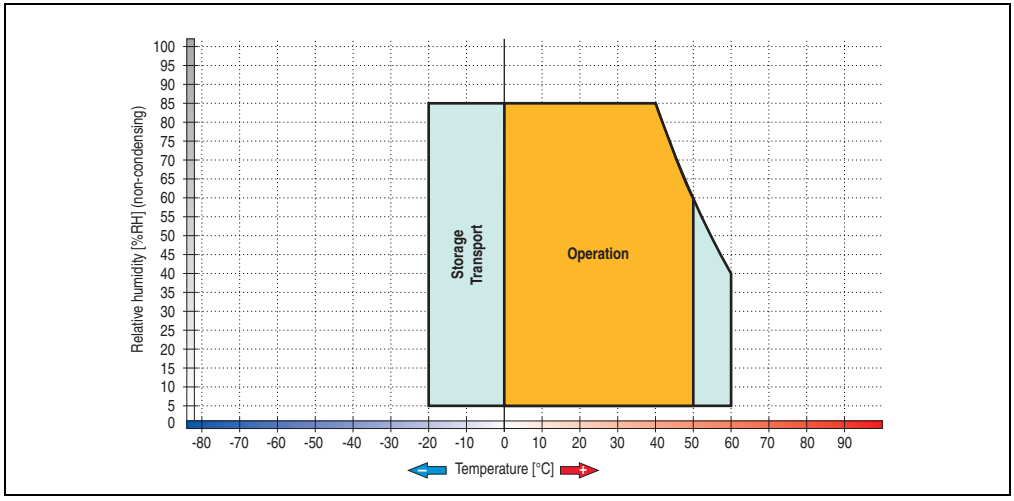


Figure 112: Temperature humidity diagram - 4PP420.0571-65

4.4.3 Dimensions

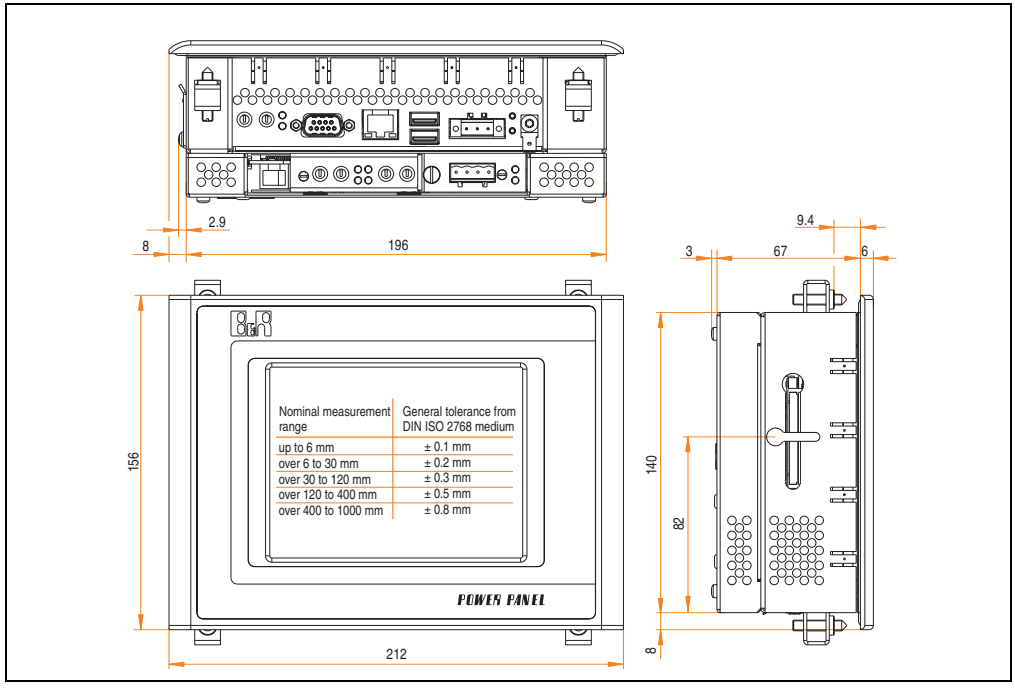


Figure 113: Dimensions - 4PP420.0571-65

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.

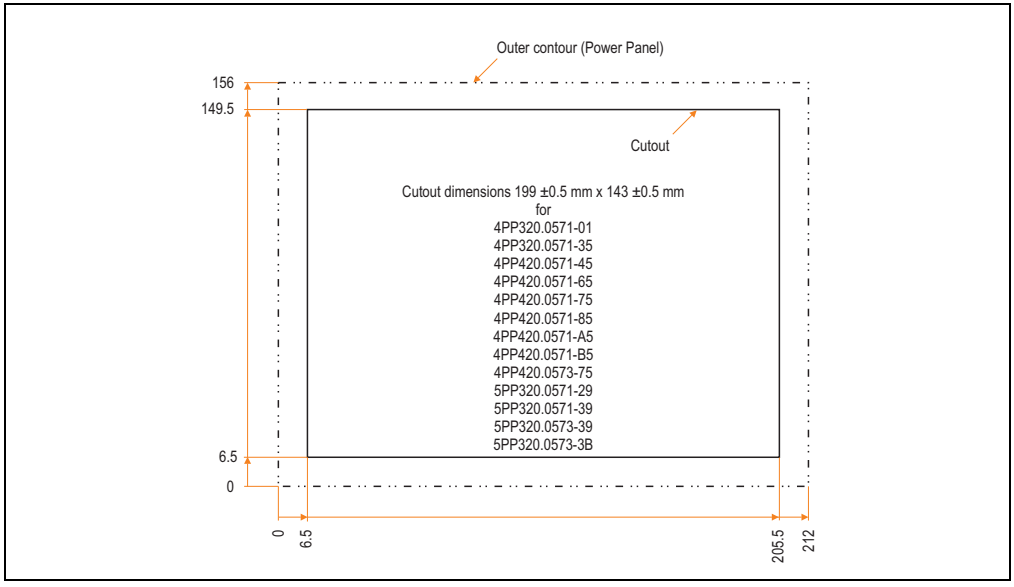


Figure 114: Cutout installation - 4PP420.0571-65

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 72: Contents of delivery - 4PP420.0571-65

4.5 Device 4PP420.0571-75

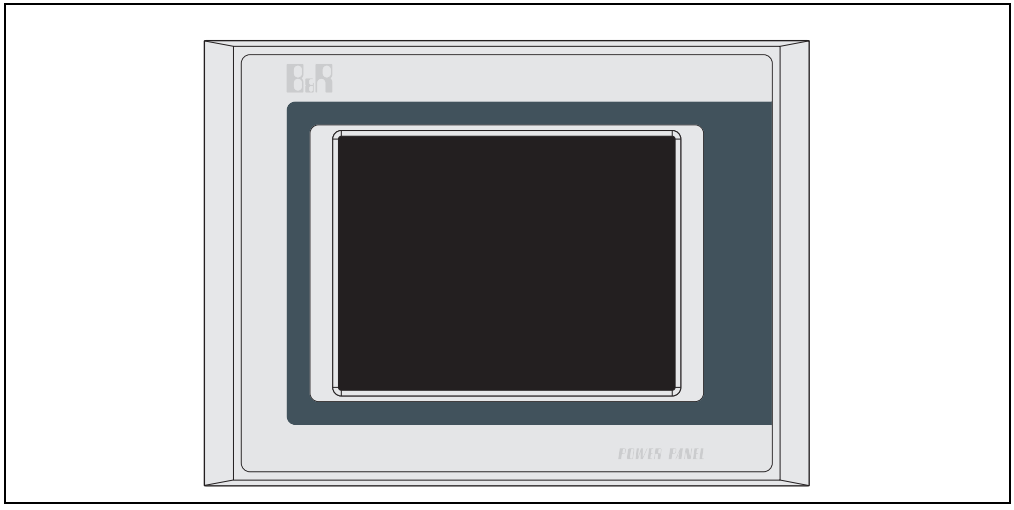


Figure 115: Front view - 4PP420.0571-75

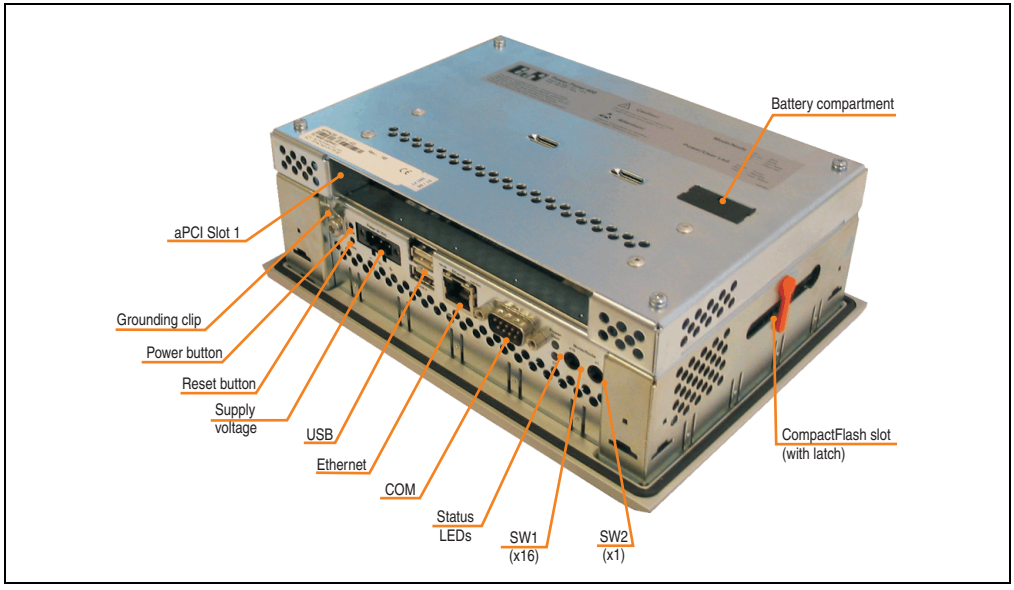


Figure 116: Rear view - 4PP420.0571-75

4.5.1 Technical data

Features	4PP420.0571-75 < Rev. D0	4PP420.0571-75 ≥ Rev. D0
B&R ID-Code	$A159	
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)	
Flash	2 MB (for firmware)	
Memory Type Quantity	 DDR SDRAM 128 MB	
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)	
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	 512 KB Yes 256 kB	
Watchdog Controller	 MTCX[1)]	
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms	
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day	
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 73: Technical data - 4PP420.0571-75

Features	4PP420.0571-75 < Rev. D0	4PP420.0571-75 ≥ 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[4)] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)] 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 570) Horizontal Vertical Background lighting Brightness Half-brightness time[5)] Screen rotation	 Color TFT 5.7 in (144 mm) 262,144 colors [4)] QVGA, 320 x 240 pixels 400:1 Direction R / direction L =60° Direction U = 40°/ direction D = 50° 500 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426	 Color TFT 5.7 in (144 mm) 262,144 colors [3)] QVGA, 320 x 240 pixels 350:1 Direction R / direction L =65° Direction U = 65°/ direction D = 40° 500 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
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 73: Technical data - 4PP420.0571-75 (Forts.)

Electrical characteristics	4PP420.0571-75 < Rev. D0	4PP420.0571-75 ≥ Rev. D0
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	Aluminum, naturally anodized[6)]	
Design	Gray[6)]	
Membrane	Polyester	
Dark gray border around display	Similar to Pantone 432CV[6)]	
Light background	Similar to Pantone 427CV[6)]	
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	
Storage	-20 to +60°C	
Transport	-20 to +60°C	
Relative humidity	See 4.5.2 "Temperature humidity diagram" on page 200	
Vibration		
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g	
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g	
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g	
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g	
Shock		
Operation	15 g, 11 ms	
Storage	30 g, 15 ms	
Transport	30 g, 15 ms	
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude[7)]	Max. 3000 m	

Table 73: Technical data - 4PP420.0571-75 (Forts.)

1) Maintenance controller extended.

2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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).

4.5.2 Temperature humidity diagram

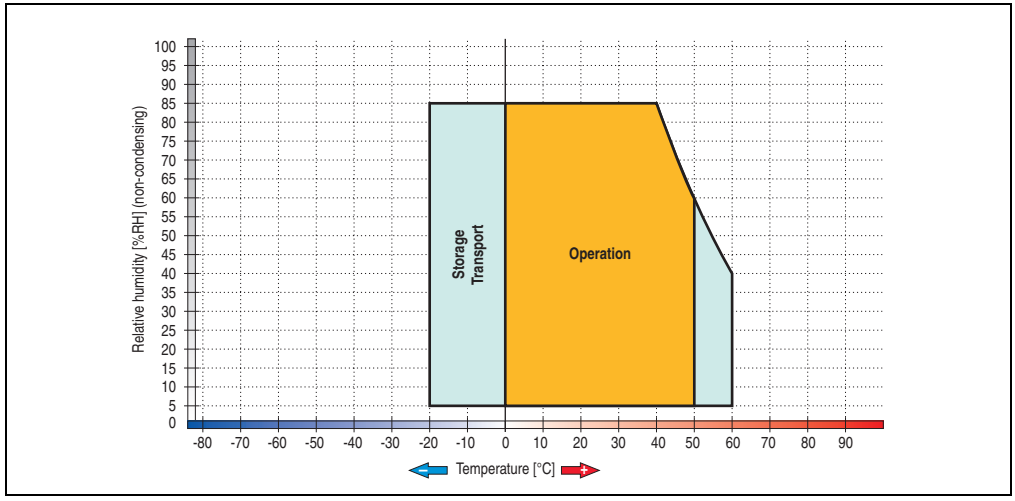


Figure 117: Temperature humidity diagram - 4PP420.0571-75

4.5.3 Dimensions

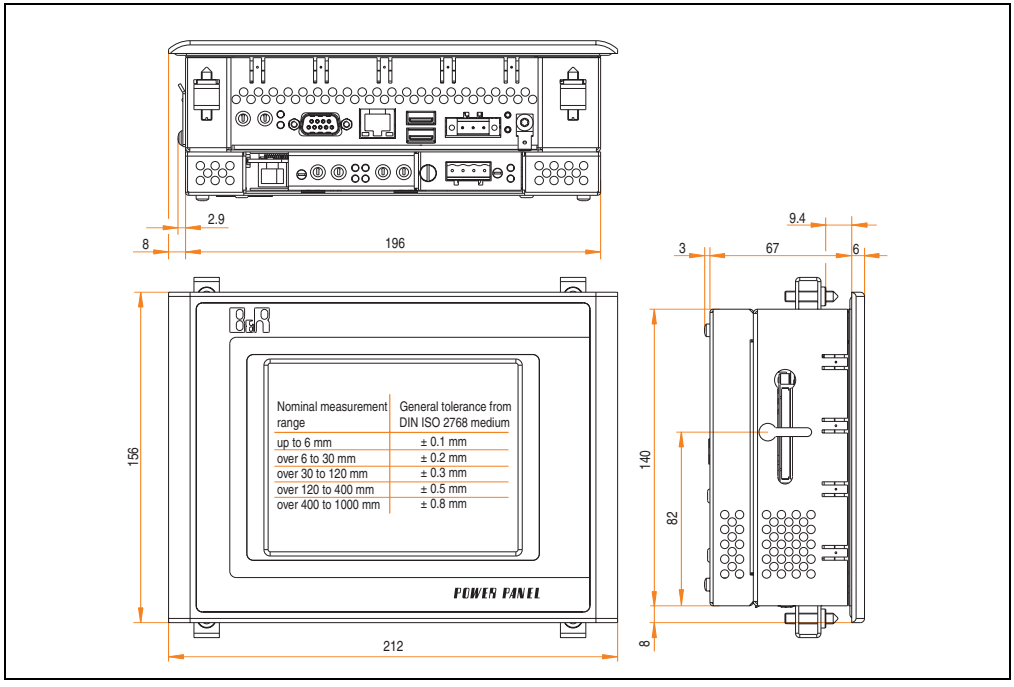


Figure 118: Dimensions - 4PP420.0571-75

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.

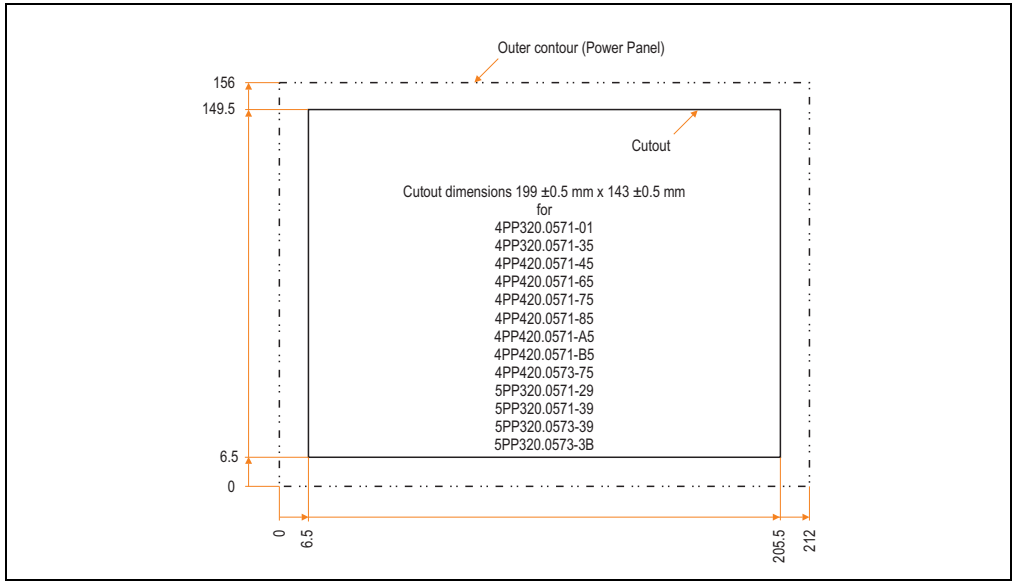


Figure 119: Cutout installation - 4PP420.0571-75

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

4.6 Device 4PP420.0571-85

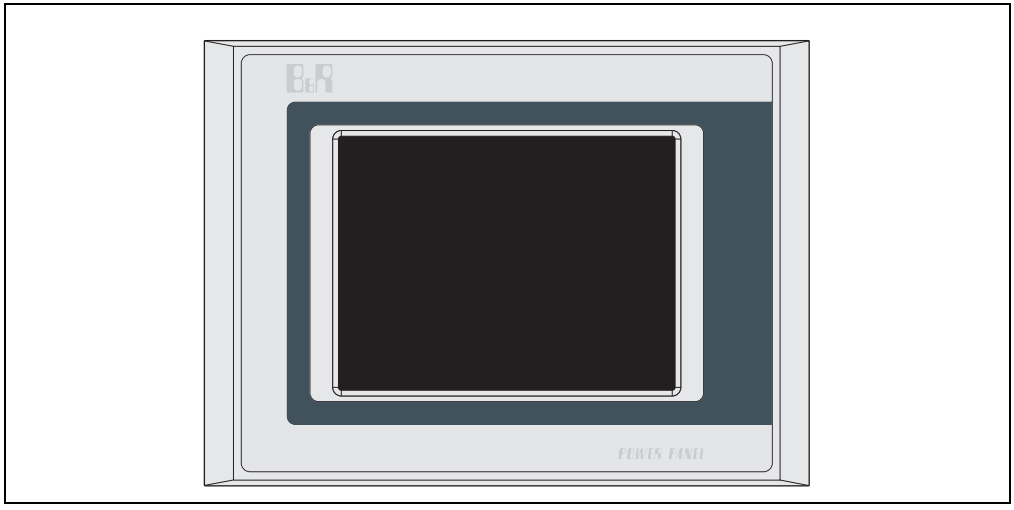


Figure 120: Front view - 4PP420.0571-85

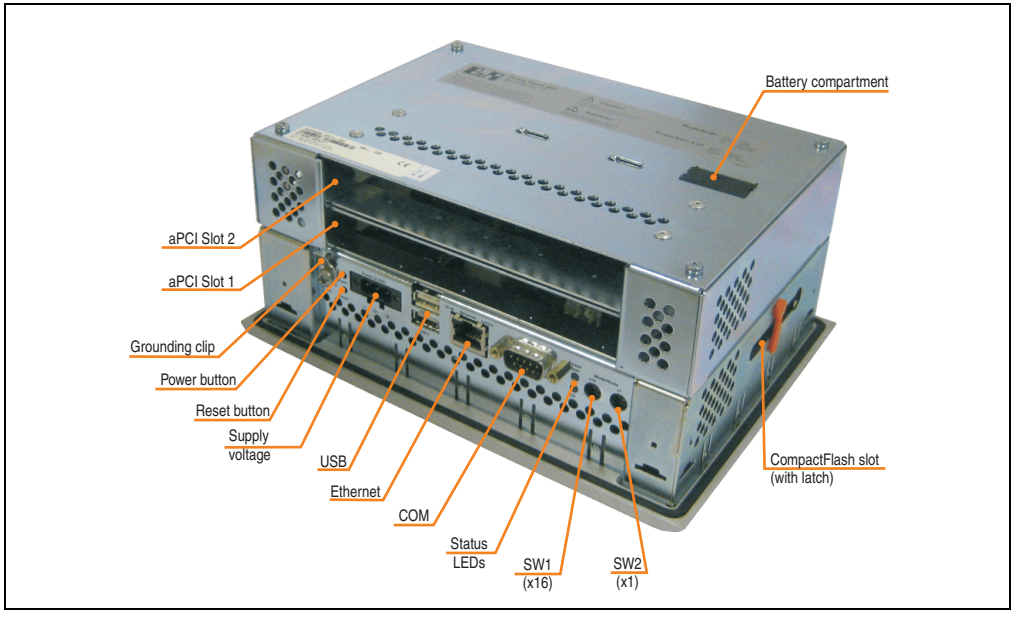


Figure 121: Rear view - 4PP420.0571-85

4.6.1 Technical data

Features	4PP420.0571-85
B&R ID-Code	$A52E
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 128 MB (64 MB < Rev. C0)
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	 512 KB Yes 256 kB
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 75: Technical data - 4PP420.0571-85

Features	4PP420.0571-85
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[4)] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)] 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 570) Horizontal Vertical Background lighting Brightness Half-brightness time[5)] Screen rotation	 LCD monochrome 5.7 in (144 mm) 8 shades of gray[4)] QVGA, 320 x 240 pixels 25:1 Direction R / direction L =40° Direction U = 40°/ direction D = 50° 220 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
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 75: Technical data - 4PP420.0571-85 (Forts.)

Electrical characteristics	4PP420.0571-85
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	Aluminum, naturally anodized[6)]
Design	Gray[6)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[6)]
Light background	Similar to Pantone 427CV[6)]
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
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 4.3.2 "Temperature humidity diagram" on page 186
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[7)]	Max. 3000 m

Table 75: Technical data - 4PP420.0571-85 (Forts.)

1) Maintenance controller extended.

2) At max. specified ambient temperature: typ. 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 lifespan in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.
Maximum lifespan when switched off: 2 years at +25°C or 1 year at +50°C.

4) The actual value depends on the operating system or diver 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

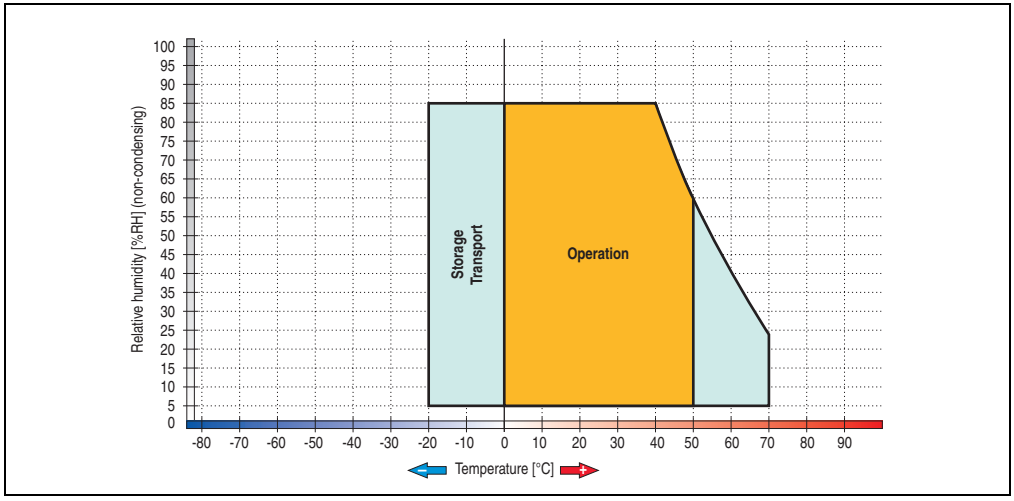


Figure 122: Temperature humidity diagram - 4PP420.0571-85

4.6.3 Dimensions

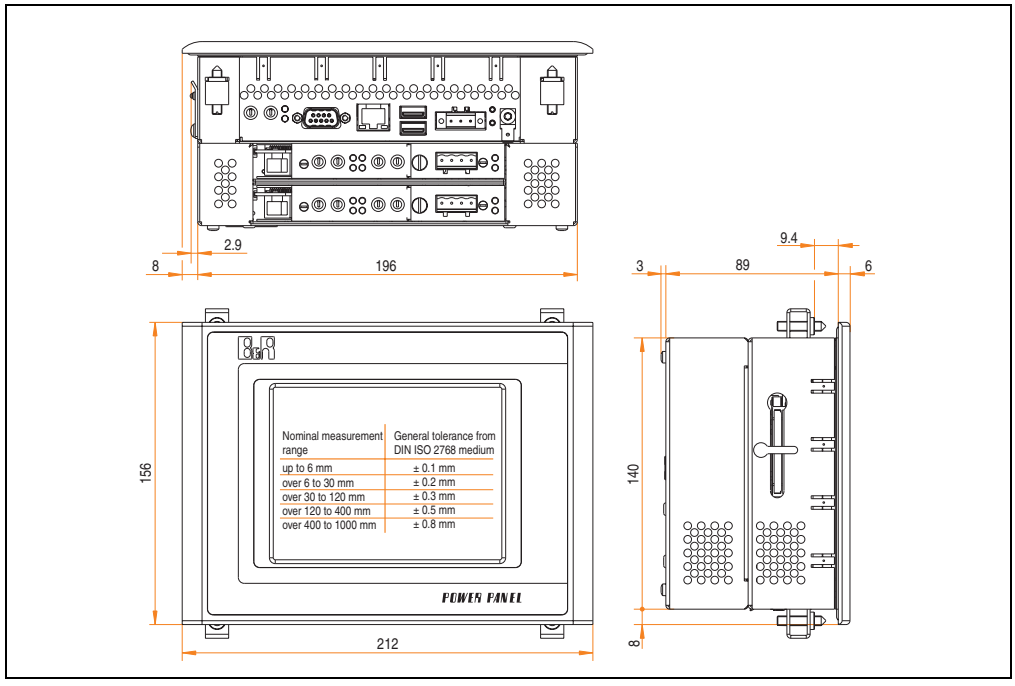


Figure 123: Dimensions - 4PP420.0571-85

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.

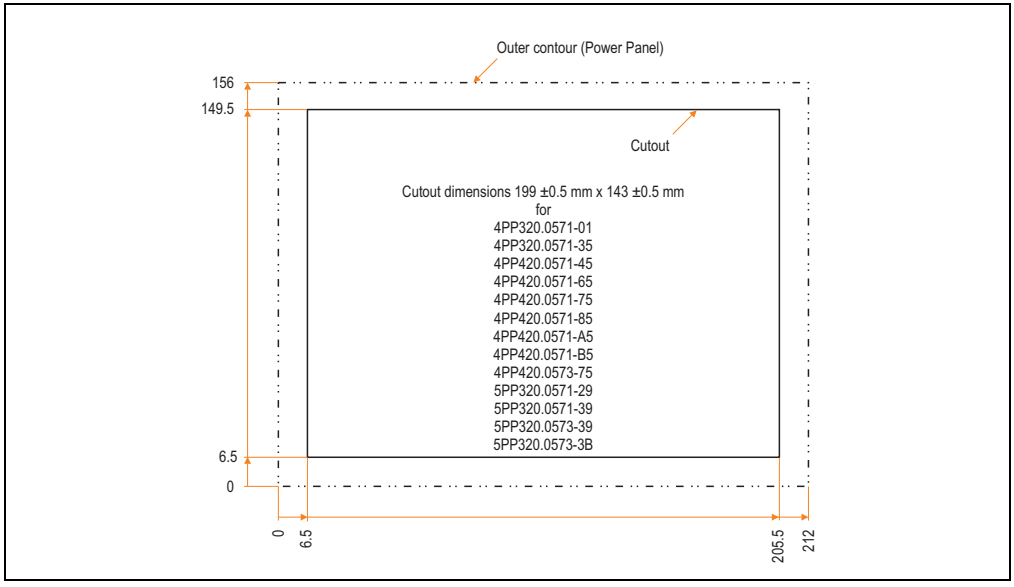


Figure 124: Cutout installation - 4PP420.0571-85

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 76: Contents of delivery - 4PP420.0571-85

4.7 Device 4PP420.0571-A5

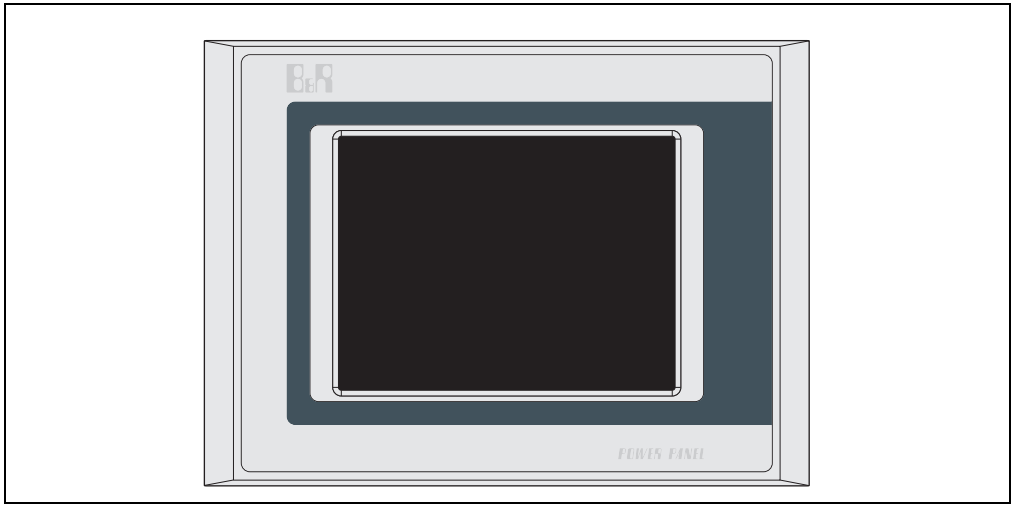


Figure 125: Front view - 4PP420.0571-A5

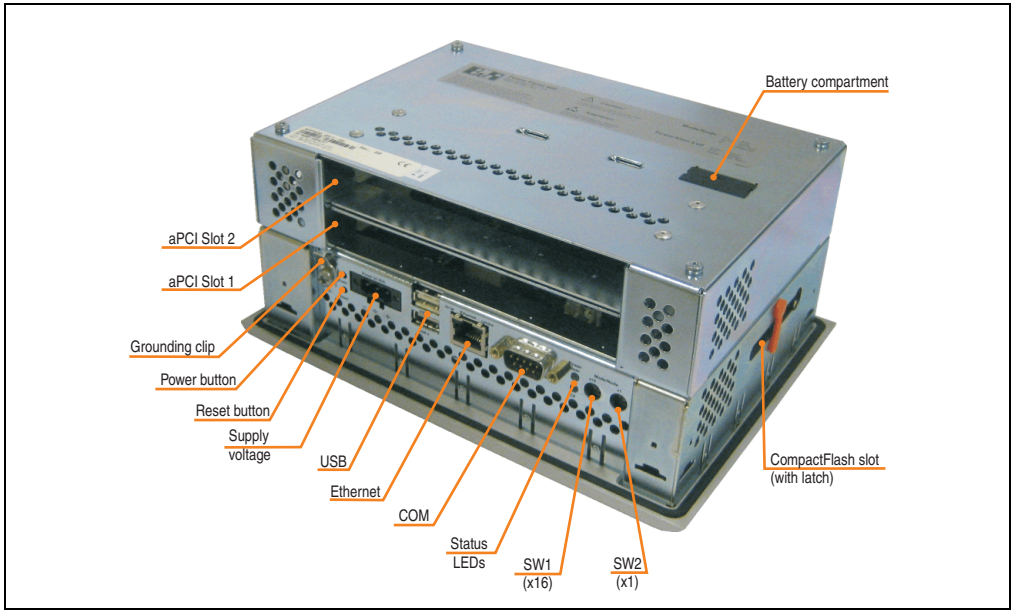


Figure 126: Rear view - 4PP420.0571-A5

4.7.1 Technical data

Features	4PP420.0571-A5
B&R ID-Code	$23BC
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 128 MB (64 MB < Rev. C0)
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	 512 KB Yes 256 kB
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 77: Technical data - 4PP420.0571-A5

Features	4PP420.0571-A5
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[4)] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)] 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 570) Horizontal Vertical Background lighting Brightness Half-brightness time[5)] Screen rotation	 Color LCD 5.7 in (144 mm) 512 colors [4)] QVGA, 320 x 240 pixels 40:1 Direction R / direction L =40° Direction U = 40°/ direction D = 50° 200 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
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 77: Technical data - 4PP420.0571-A5 (Forts.)

Electrical characteristics	4PP420.0571-A5
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	Aluminum, naturally anodized[6)]
Design	Gray[6)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[6)]
Light background	Similar to Pantone 427CV[6)]
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
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 4.7.2 "Temperature humidity diagram" on page 214
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[7)]	Max. 3000 m

Table 77: Technical data - 4PP420.0571-A5 (Forts.)

1) Maintenance Controller Extended.

2) At max. specified ambient temperature: typ. 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 lifespan in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.
Maximum lifespan when switched off: 2 years at +25°C or 1 year at +50°C.

4) The actual value depends on the operating system or diver 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

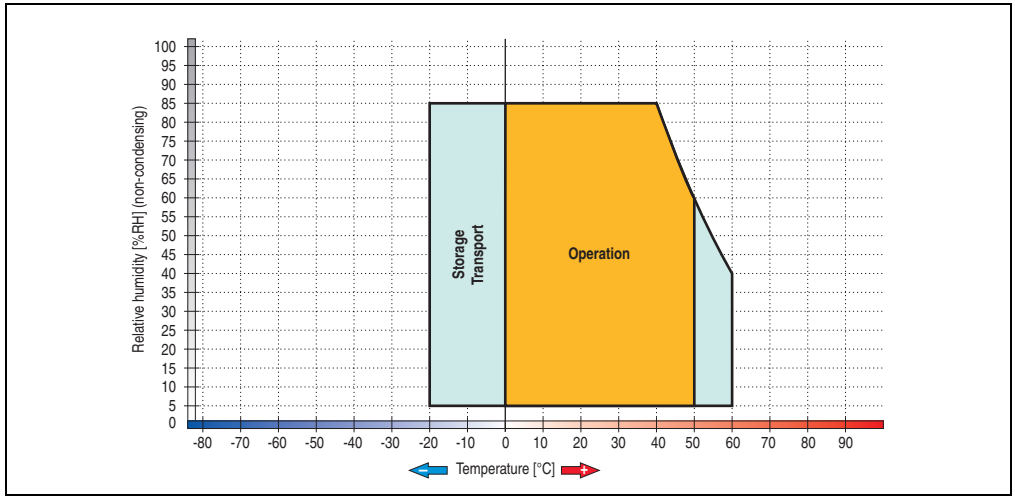


Figure 127: Temperature humidity diagram - 4PP420.0571-A5

4.7.3 Dimensions

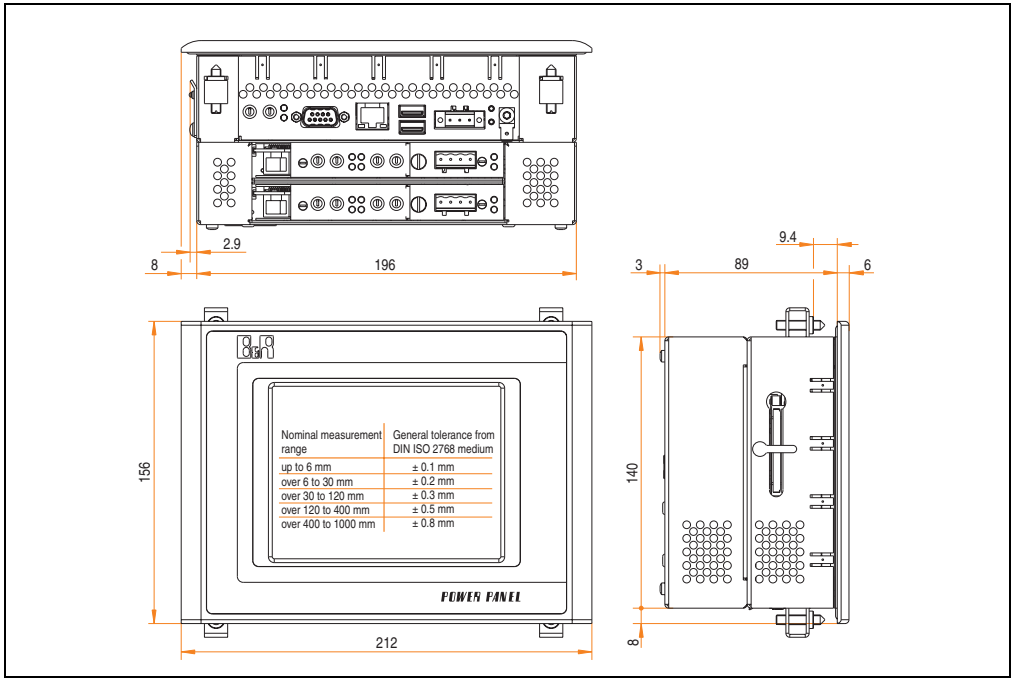


Figure 128: Dimensions - 4PP420.0571-A5

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.

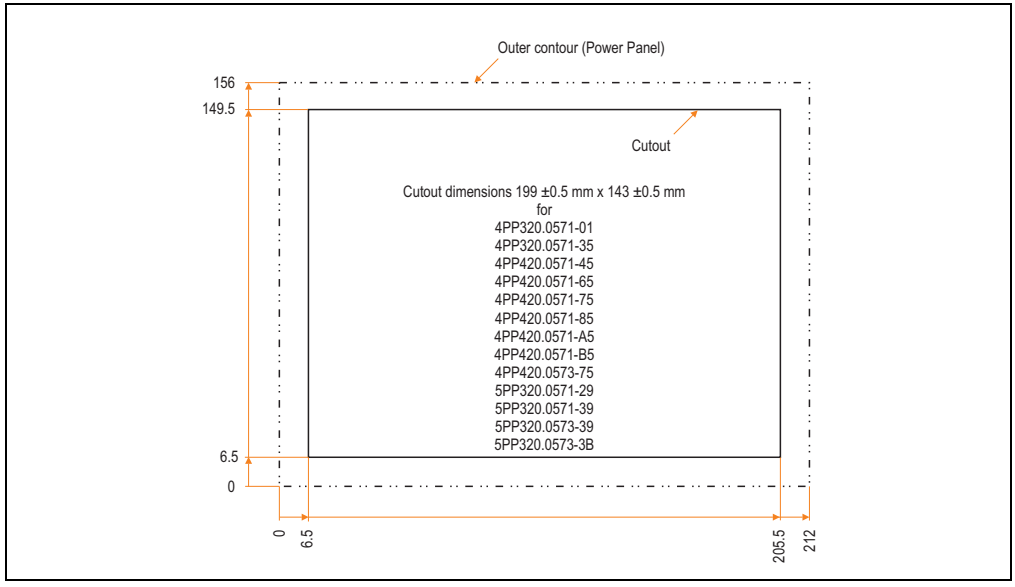


Figure 129: Cutout installation - 4PP420.0571-A5

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 78: Contents of delivery - 4PP420.0571-A5

4.8 Device 4PP420.0571-B5

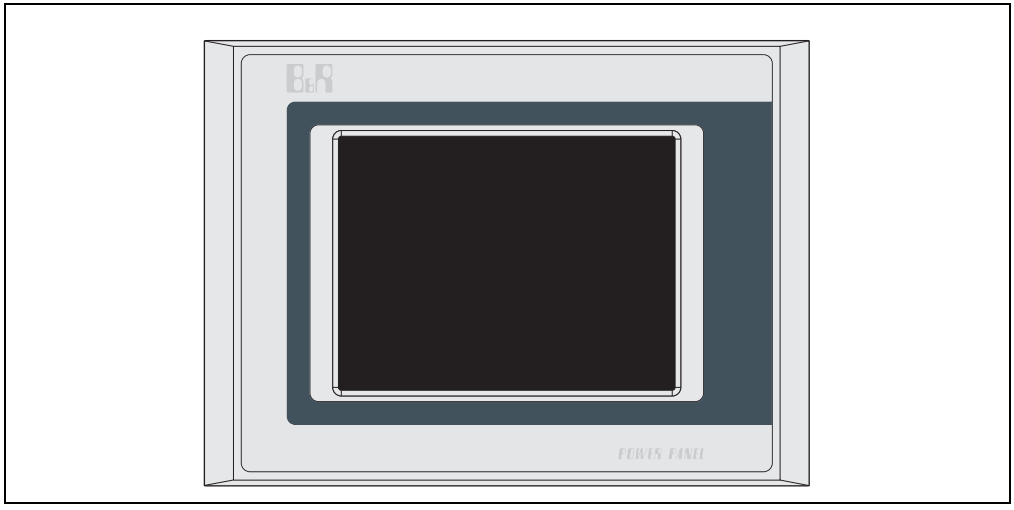


Figure 130: Front view - 4PP420.0571-B5

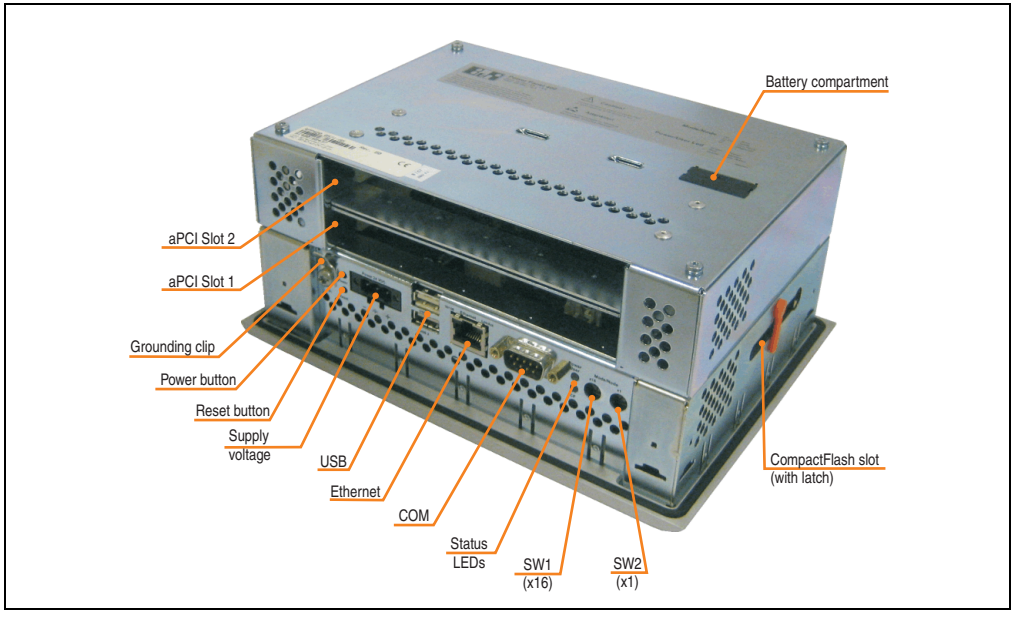


Figure 131: Rear view - 4PP420.0571-B5

4.8.1 Technical data

Features	4PP420.0571-B5 < Rev. D0	4PP420.0571-B5 ≥ Rev. D0
B&R ID-Code	$A15A	
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)	
Flash	2 MB (for firmware)	
Memory Type Quantity	 DDR SDRAM 128 MB	
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)	
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	 512 KB Yes 256 kB	
Watchdog Controller	 MTCX[1)]	
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms	
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day	
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 79: Technical data - 4PP420.0571-B5

Features	4PP420.0571-B5 < Rev. D0	4PP420.0571-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[4)] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)] 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 570) Horizontal Vertical Background lighting Brightness Half-brightness time[5)] Screen rotation	 Color TFT 5.7 in (144 mm) 262,144 colors [4)] QVGA, 320 x 240 pixels 400:1 Direction R / direction L =60° Direction U = 40°/ direction D = 50° 500 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426	 Color TFT 5.7 in (144 mm) 262,144 colors [3)] QVGA, 320 x 240 pixels 350:1 Direction R / direction L =65° Direction U = 65°/ direction D = 40° 500 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
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 79: Technical data - 4PP420.0571-B5 (Forts.)

Electrical characteristics	4PP420.0571-B5 < Rev. D0	4PP420.0571-B5 ≥ Rev. D0
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	Aluminum, naturally anodized[6)]	
Design	Gray[6)]	
Membrane	Polyester	
Dark gray border around display	Similar to Pantone 432CV[6)]	
Light background	Similar to Pantone 427CV[6)]	
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	
Storage	-20 to +60°C	
Transport	-20 to +60°C	
Relative humidity	See 4.8.2 "Temperature humidity diagram" on page 221	
Vibration		
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g	
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g	
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g	
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g	
Shock		
Operation	15 g, 11 ms	
Storage	30 g, 15 ms	
Transport	30 g, 15 ms	
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude[7)]	Max. 3000 m	

Table 79: Technical data - 4PP420.0571-B5 (Forts.)

1) Maintenance Controller Extended.

2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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

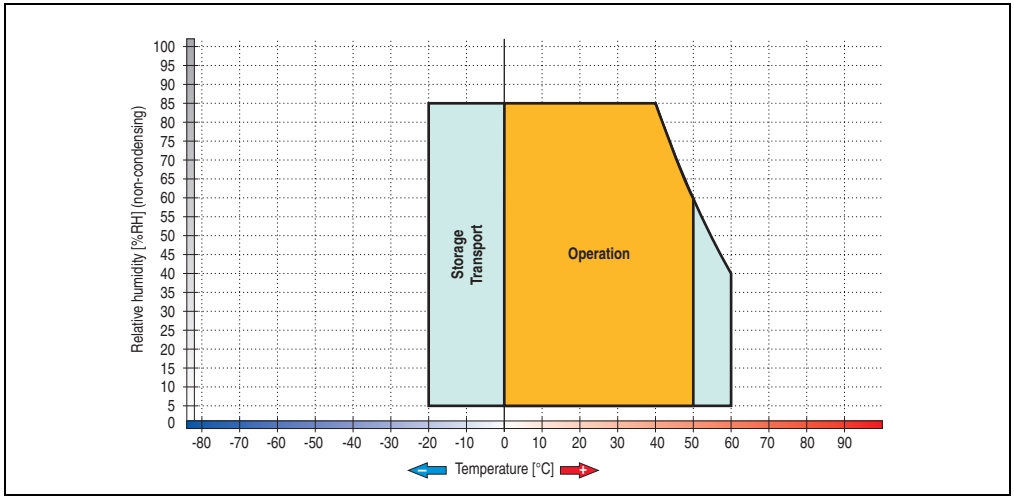


Figure 132: Temperature humidity diagram - 4PP420.0571-B5

4.8.3 Dimensions

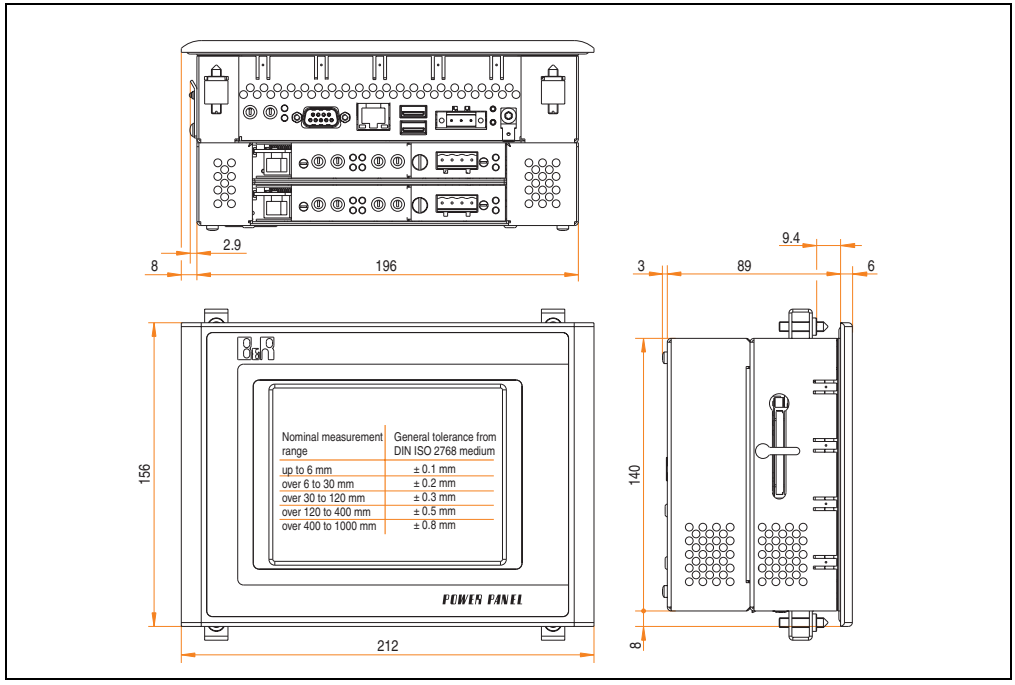


Figure 133: Dimensions - 4PP420.0571-B5

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.

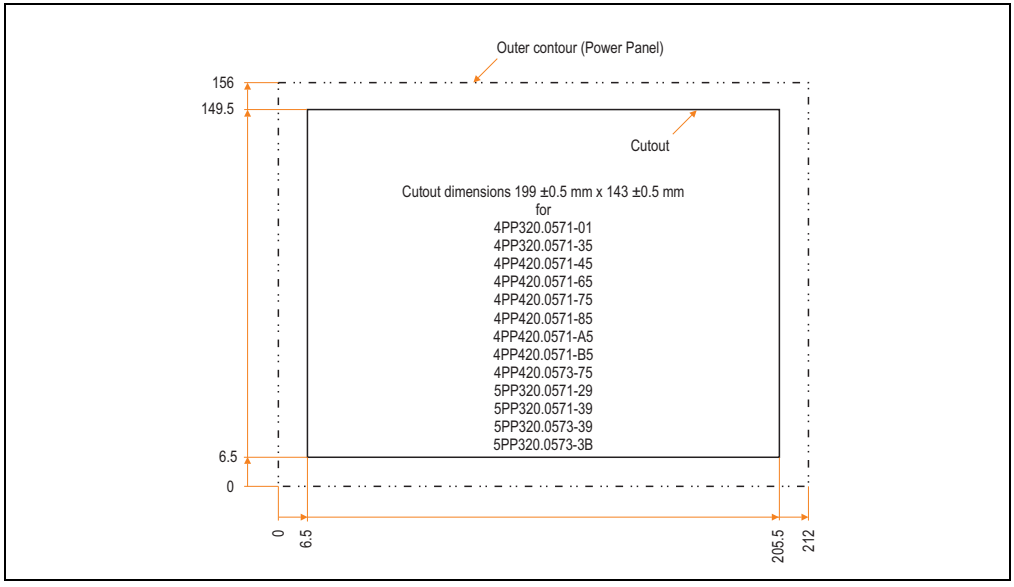


Figure 134: Cutout installation - 4PP420.0571-B5

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 80: Contents of delivery - 4PP420.0571-B5

4.9 Device 4PP420.0573-75

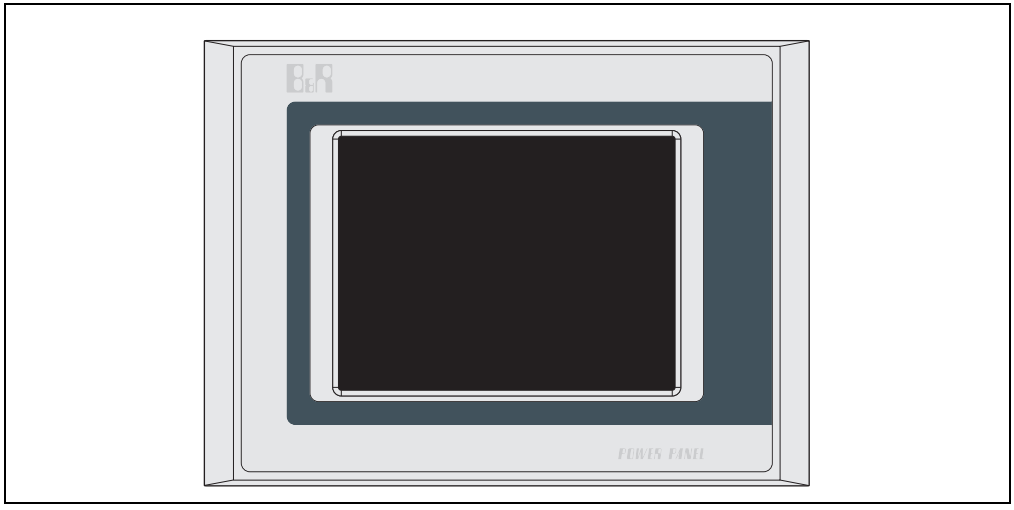


Figure 135: Front view - 4PP420.0573-75

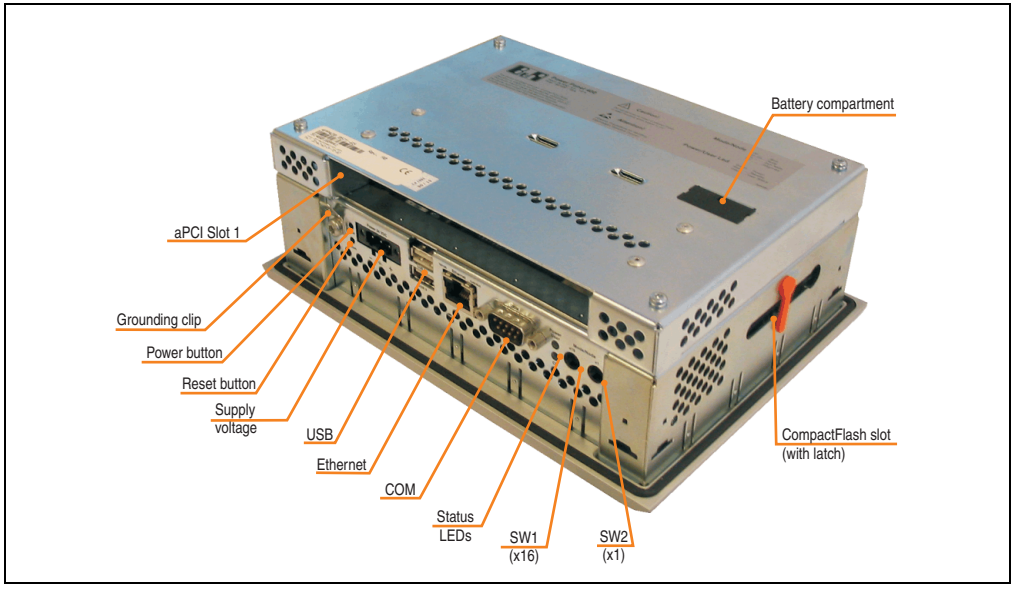


Figure 136: Rear view - 4PP420.0573-75

4.9.1 Technical data

Features	4PP420.0573-75
B&R ID-Code	$23BB
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 128 MB (64 MB < Rev. C0)
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	 512 KB Yes 256 kB
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 81: Technical data - 4PP420.0573-75

Features	4PP420.0573-75
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[4)] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)] 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 570) Horizontal Vertical Background lighting Brightness Half-brightness time[5)] Screen rotation	 Color TFT 5.7 in (144 mm) 262,144 colors [4)] VGA, 640 x 480 pixels 400:1 Direction R / direction L =80° Direction U = 80°/ direction D = 70° 350 cd/m² 75,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
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 81: Technical data - 4PP420.0573-75 (Forts.)

Electrical characteristics	4PP420.0573-75
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	Aluminum, naturally anodized[6)]
Design	Gray[6)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[6)]
Light background	Similar to Pantone 427CV[6)]
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
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 4.9.2 "Temperature humidity diagram" on page 228
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[7)]	Max. 3000 m

Table 81: Technical data - 4PP420.0573-75 (Forts.)

1) Maintenance Controller Extended.

2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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

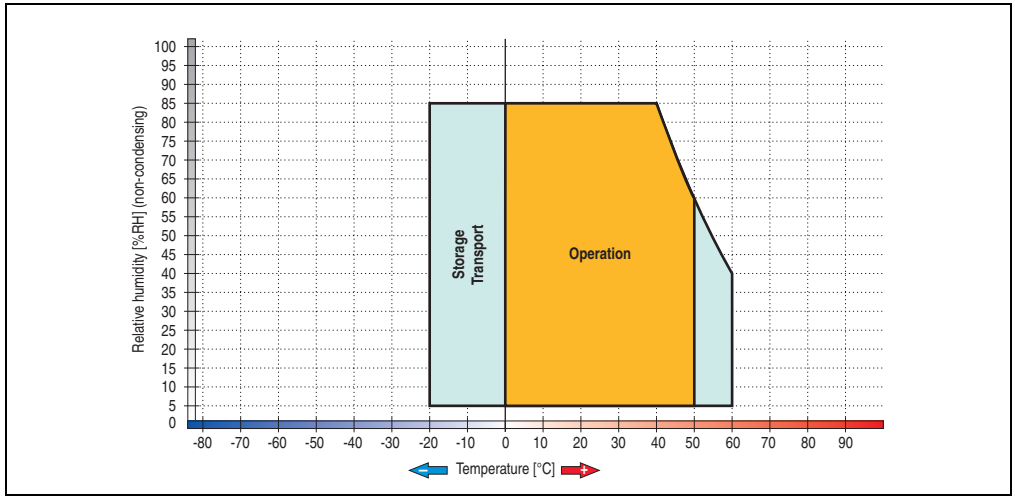


Figure 137: Temperature humidity diagram - 4PP420.0573-75

4.9.3 Dimensions

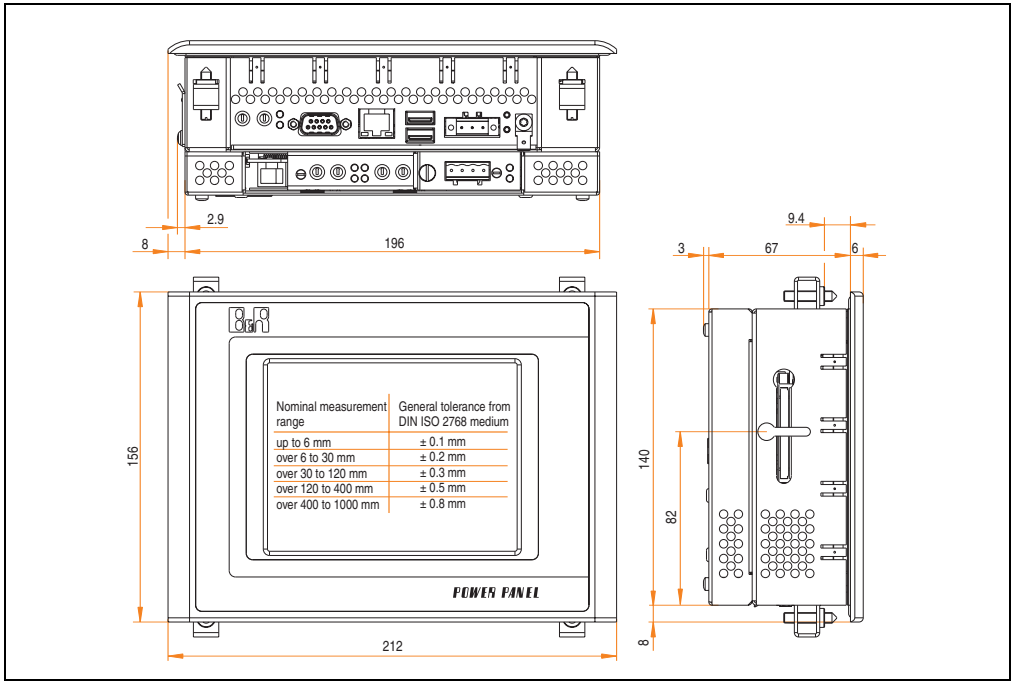


Figure 138: Dimensions - 4PP420.0573-75

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.

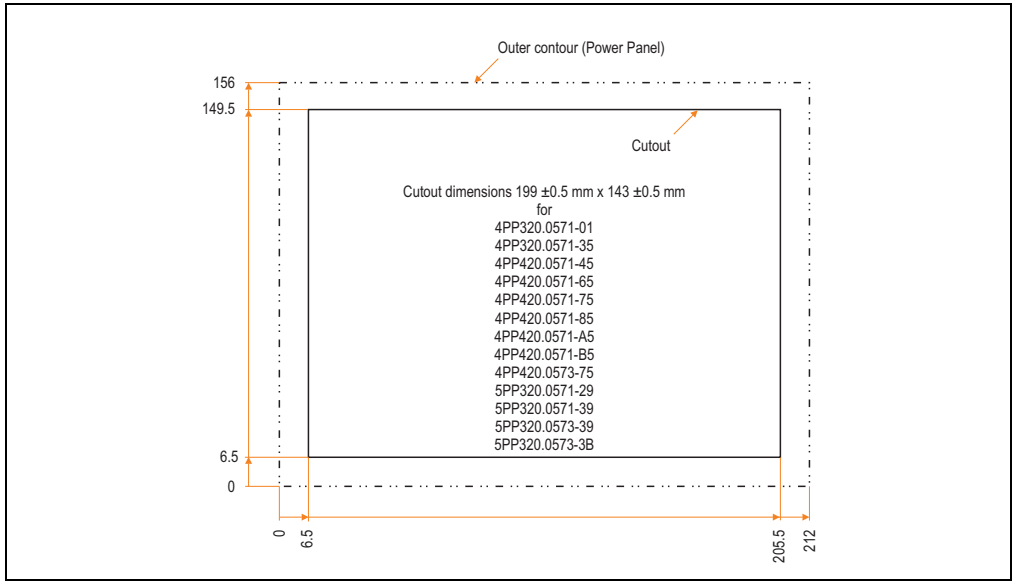


Figure 139: Cutout installation - 4PP420.0573-75

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 82: Contents of delivery - 4PP420.0573-75

4.10 Device 4PP420.1043-75

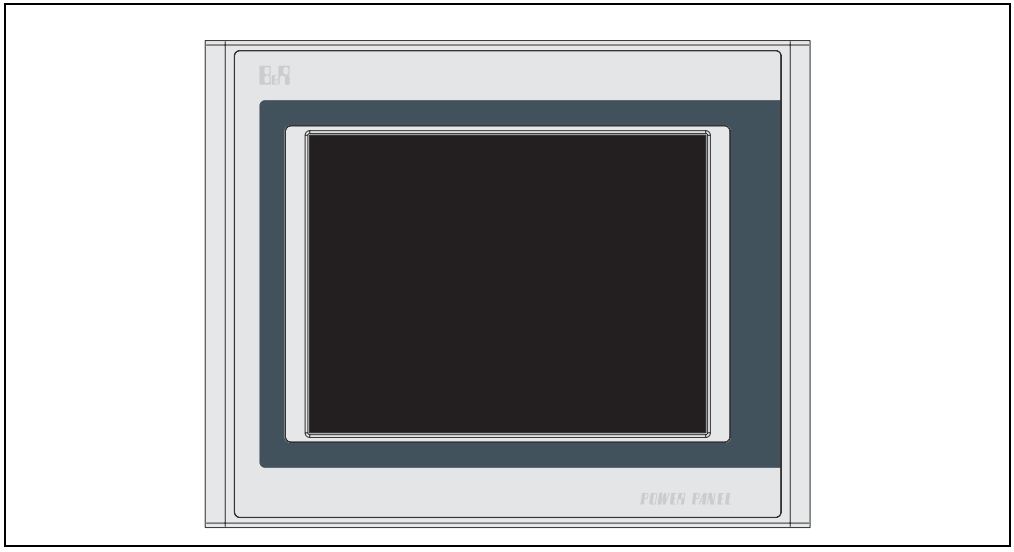


Figure 140: Front view - 4PP420.1043-75

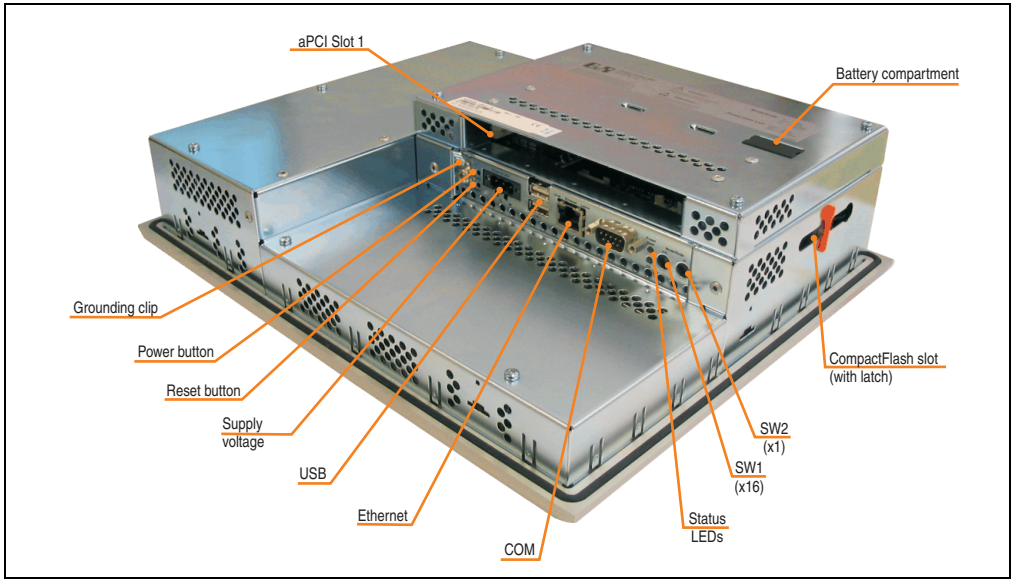


Figure 141: Rear view - 4PP420.1043-75

4.10.1 Technical data

Features	4PP420.1043-75
B&R ID-Code	$23BD
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 128 MB (64 MB < Rev. D0)
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	 512 KB Yes 256 kB
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 83: Technical data - 4PP420.1043-75

Features	4PP420.1043-75
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[4)] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)] 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 570) Horizontal Vertical Background lighting Brightness Half-brightness time[5)] Screen rotation	 Color TFT 10.4 in (264 mm) 262,144 colors VGA, 640 x 480 pixels 600:1 Direction R / direction L =70° Direction U = 45°/ direction D = 35° 450 cd/m² 55,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen Touch screen type Technology Controller Degree of transmission	 Elo Accu Touch 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 83: Technical data - 4PP420.1043-75 (Forts.)

Electrical characteristics	4PP420.1043-75
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	Aluminum, naturally anodized[6)]
Design	Gray[6)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[6)]
Light background	Similar to Pantone 427CV[6)]
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
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 4.10.2 "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
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[7)]	Max. 3000 m

Table 83: Technical data - 4PP420.1043-75 (Forts.)

1) Maintenance Controller Extended.

2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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

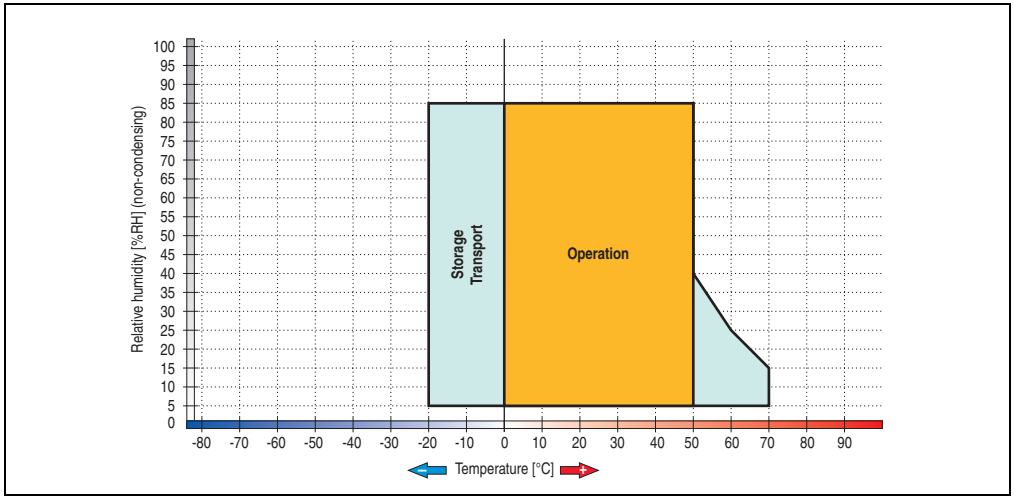


Figure 142: Temperature humidity diagram - 4PP420.1043-75

4.10.3 Dimensions

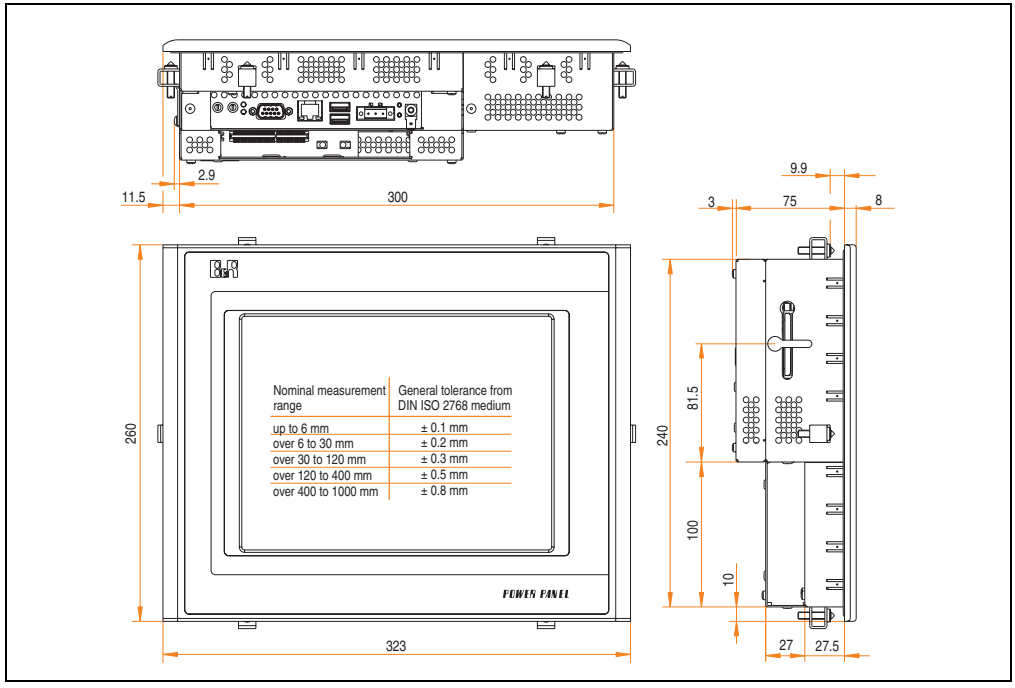


Figure 143: Dimensions - 4PP420.1043-75

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.

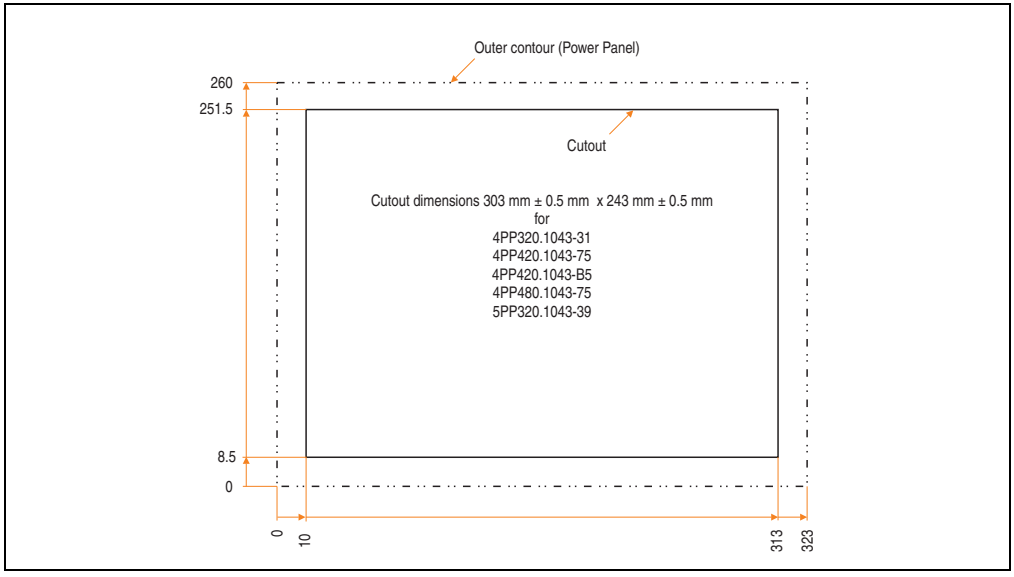


Figure 144: Cutout installation - 4PP420.1043-75

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 84: Contents of delivery - 4PP420.1043-75

4.11 Device 4PP420.1043-B5

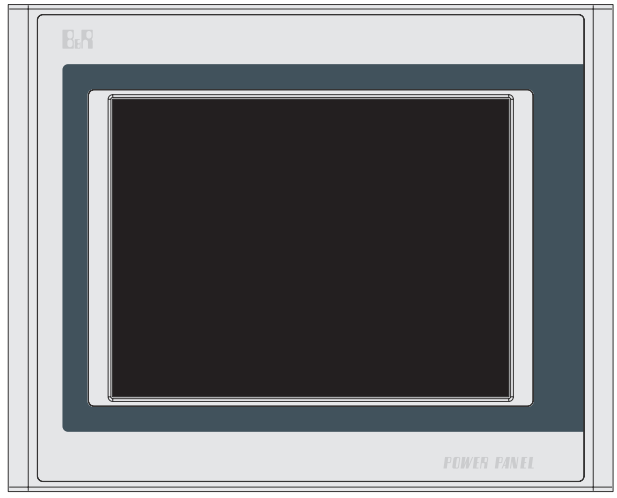


Figure 145: Front view - 4PP420.1043-B5

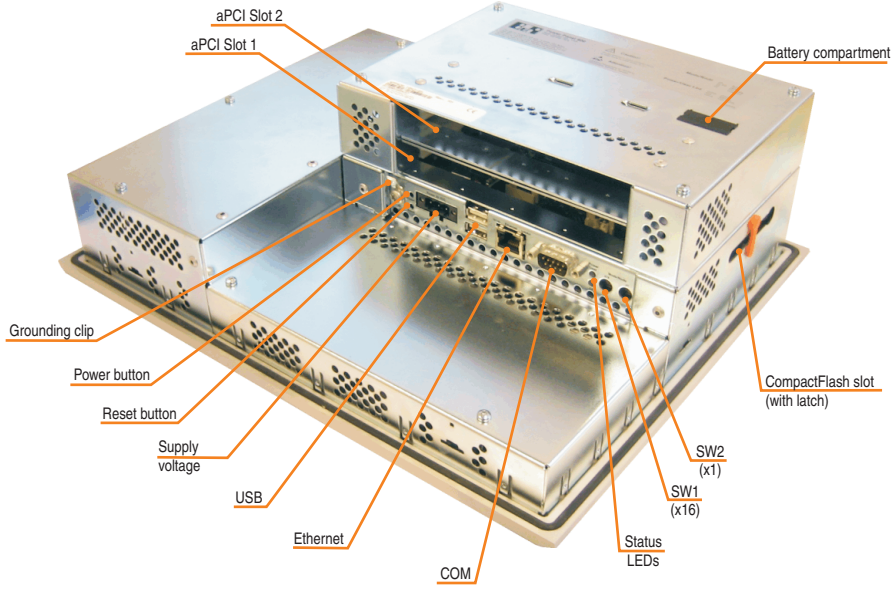


Figure 146: Rear view - 4PP420.1043-B5

4.11.1 Technical data

Features	4PP420.1043-B5
B&R ID-Code	$23BE
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 128 MB (64 MB < Rev. D0)
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	 512 KB Yes 256 kB
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 85: Technical data - 4PP420.1043-B5

Features	4PP420.1043-B5
Serial interface	
Type	RS232, modem-capable, not electrically isolated
UART	16C550 compatible, 16-byte FIFO
Transfer rate	Max. 115 kBaud
Connection	9-pin DSUB
USB interface	
Type	USB 1.1, USB 2.0[4]
Amount	2
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4]
Connection	Type A
Current load	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	2 (see B&R System 2005 manual for available aPCI interface modules)
Holding torque for aPCI module	Max. 0.7 Nm
Display	
Type	Color TFT
Diagonal	10.4 in (264 mm)
Colors	262,144 colors [4]
Resolution	VGA, 640 x 480 pixels
Contrast	600:1
Viewing angle (see page 570)	
Horizontal	Direction R / direction L =70°
Vertical	Direction U = 45°/ direction D = 35°
Background lighting	
Brightness	450 cd/m²
Half-brightness time[5]	55,000 hours
Screen rotation	Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen	
Touch screen type	Elo Accu Touch
Technology	Analog, resistive
Controller	Elo, serial, 12- bit
Degree of transmission	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 85: Technical data - 4PP420.1043-B5 (Forts.)

Electrical characteristics	4PP420.1043-B5
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	Aluminum, naturally anodized[6)]
Design	Gray[6)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[6)]
Light background	Similar to Pantone 427CV[6)]
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
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 4.11.2 "Temperature humidity diagram" on page 242
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[7)]	Max. 3000 m

Table 85: Technical data - 4PP420.1043-B5 (Forts.)

1) Maintenance Controller Extended.

2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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

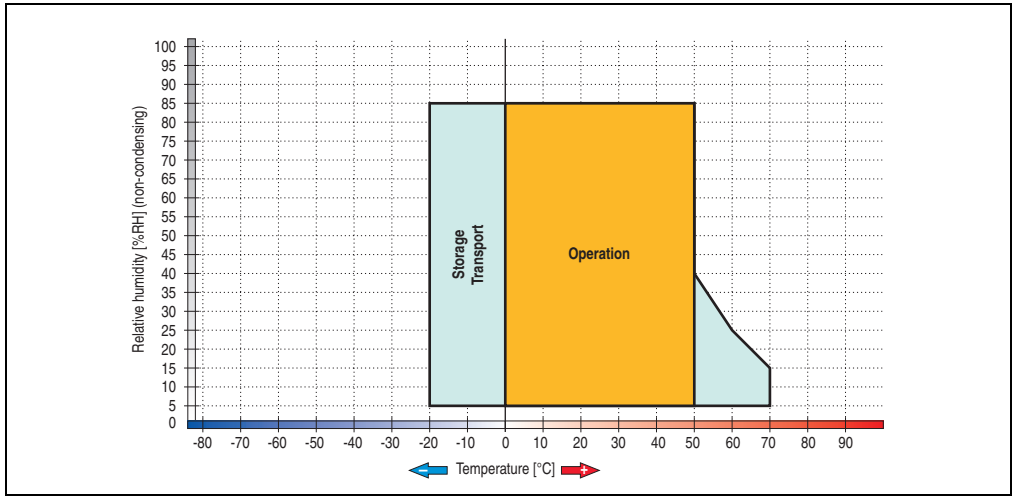


Figure 147: Temperature humidity diagram - 4PP420.1043-B5

4.11.3 Dimensions

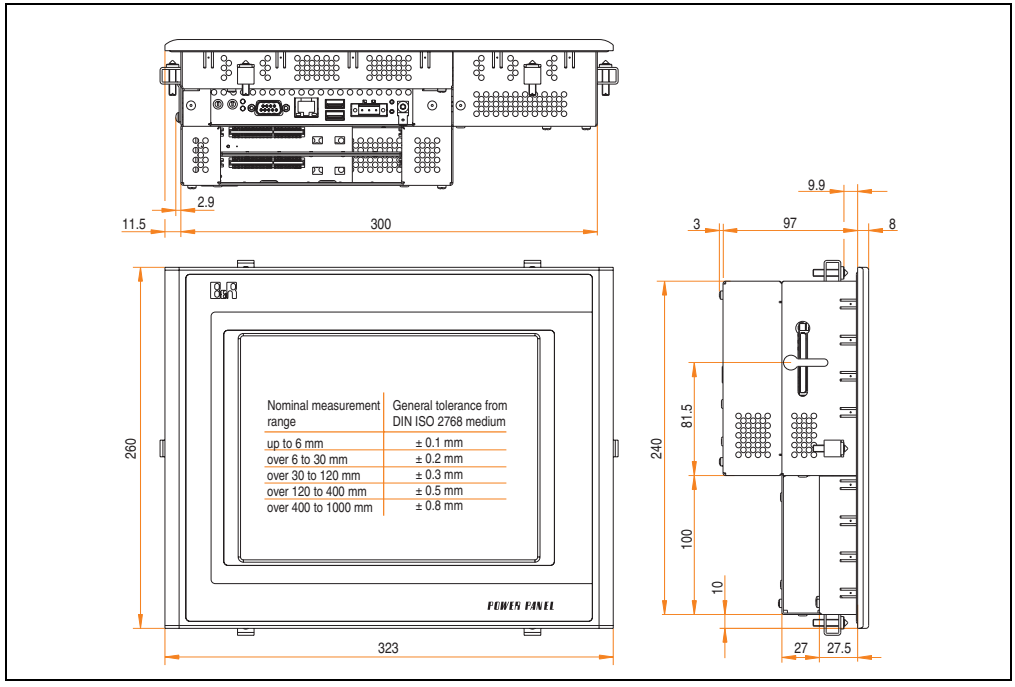


Figure 148: Dimensions - 4PP420.1043-B5

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.

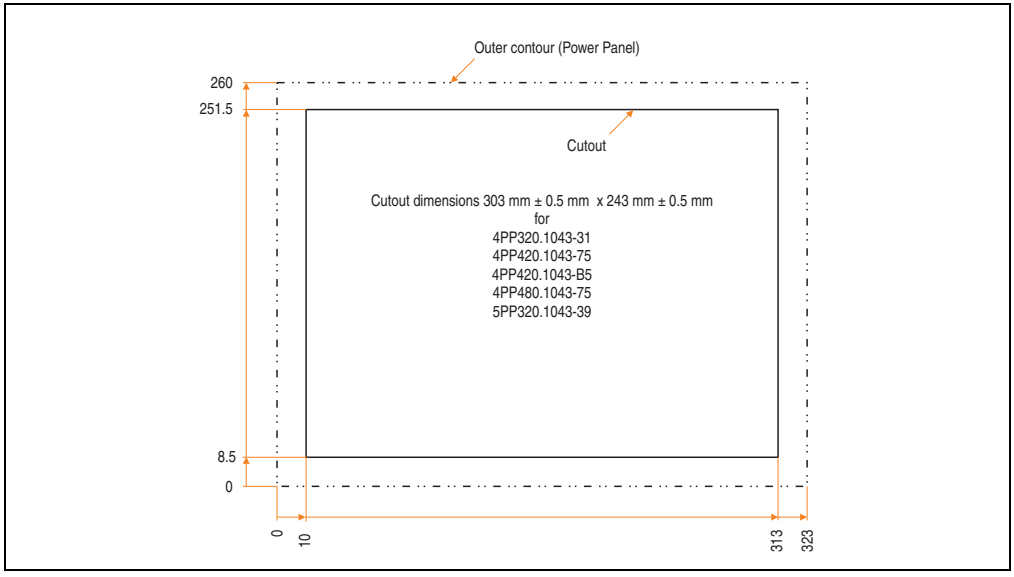


Figure 149: Cutout installation - 4PP420.1043-B5

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 86: Contents of delivery - 4PP420.1043-B5

4.12 Device 4PP420.1505-75

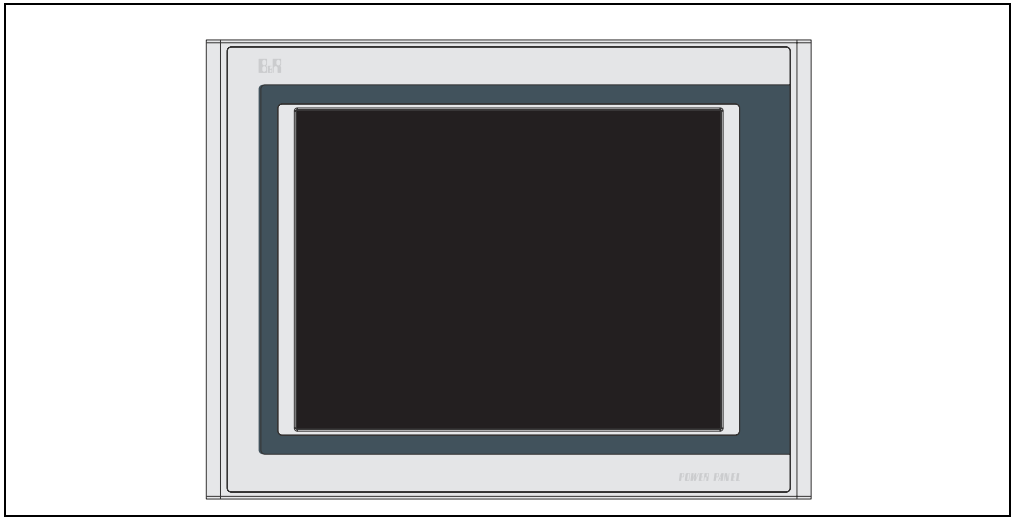


Figure 150: Front view - 4PP420.1505-75

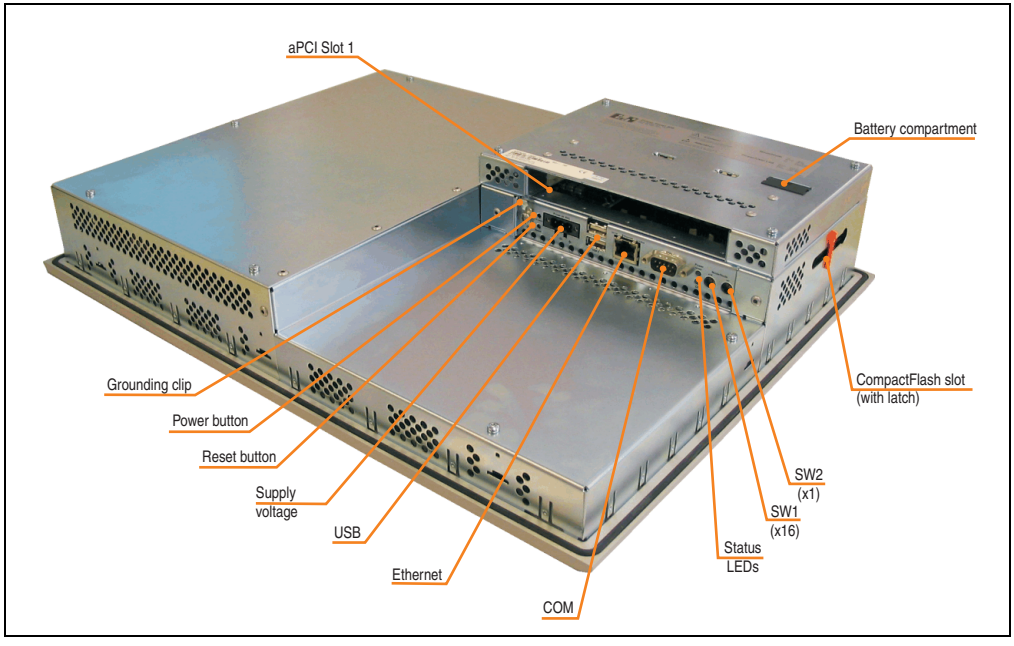


Figure 151: Rear view - 4PP420.1505-75

4.12.1 Technical data

Features	4PP420.1505-75
B&R ID-Code	$23BF
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 128 MB (64 MB < Rev. C0)
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	 512 KB Yes 256 kB
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 87: Technical data - 4PP420.1505-75

Features	4PP420.1505-75
Serial interface	
Type	RS232, modem-capable, not electrically isolated
UART	16C550 compatible, 16-byte FIFO
Transfer rate	Max. 115 kBaud
Connection	9-pin DSUB
USB interface	
Type	USB 1.1, USB 2.0[4)]
Amount	2
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)]
Connection	Type A
Current load	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 (see B&R System 2005 manual for available aPCI interface modules)
Holding torque for aPCI module	Max. 0.7 Nm
Display	
Type	Color TFT
Diagonal	15 in (381 mm)
Colors	16.7 million colors[4)]
Resolution	XGA, 1024 x 768 pixels
Contrast	400:1
Viewing angle (see page 570)	
Horizontal	Direction R / direction L =85°
Vertical	Direction U / direction D = 85°
Background lighting	
Brightness	250 cd/m²
Half-brightness time[5)]	50,000 hours
Screen rotation	Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen	
Touch screen type	Elo Accu Touch
Technology	Analog, resistive
Controller	Elo, serial, 12- bit
Degree of transmission	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 87: Technical data - 4PP420.1505-75 (Forts.)

Electrical characteristics	4PP420.1505-75
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	Aluminum, naturally anodized[6)]
Design	Gray[6)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[6)]
Light background	Similar to Pantone 427CV[6)]
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
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 4.12.2 "Temperature humidity diagram" on page 249
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[7)]	Max. 3000 m

Table 87: Technical data - 4PP420.1505-75 (Forts.)

1) Maintenance Controller Extended.

2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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

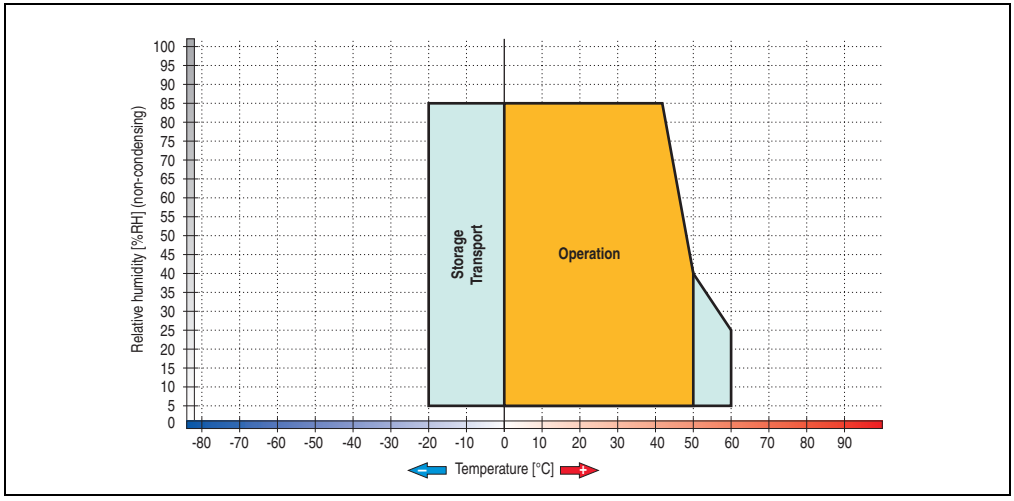


Figure 152: Temperature humidity diagram - 4PP420.1505-75

4.12.3 Dimensions

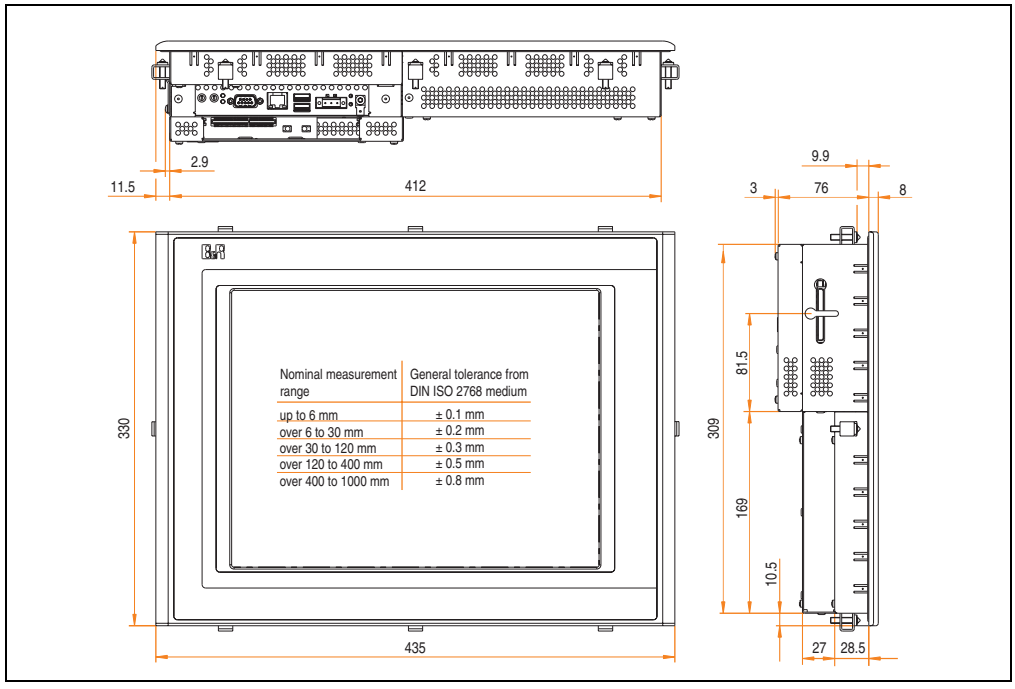


Figure 153: Dimensions - 4PP420.1505-75

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.

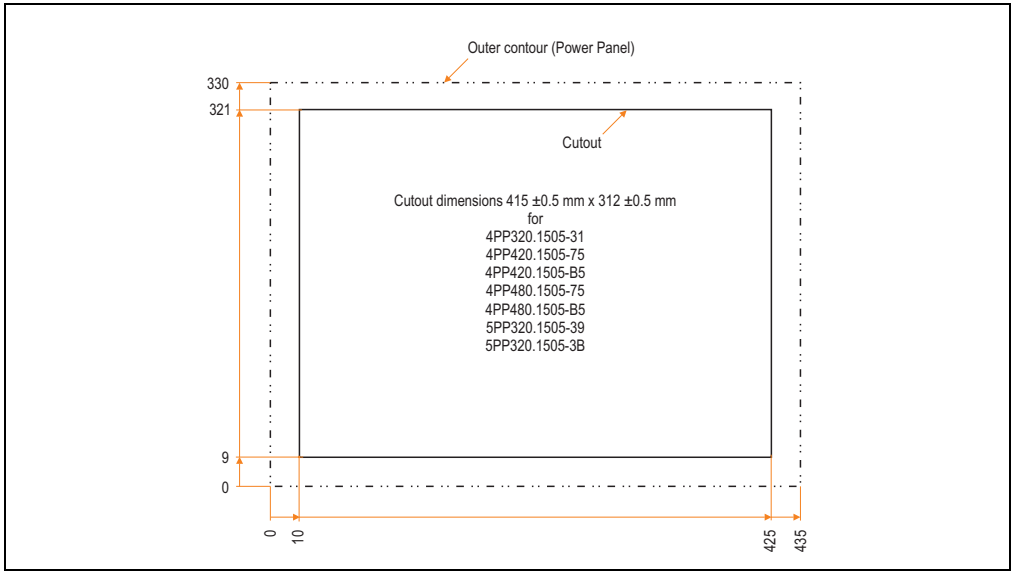


Figure 154: Cutout installation - 4PP420.1505-75

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 88: Contents of delivery - 4PP420.1505-75

4.13 Device 4PP420.1505-B5

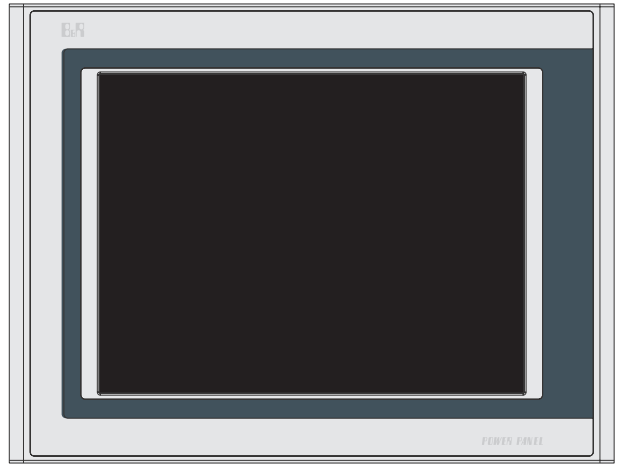


Figure 155: Front view - 4PP420.1505-B5

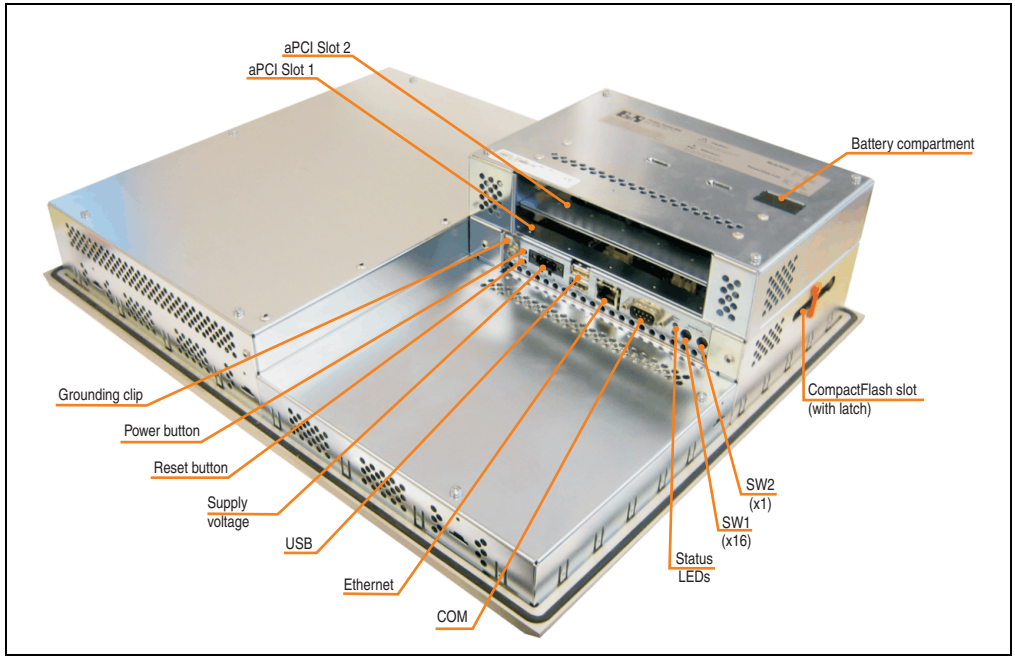


Figure 156: Rear view - 4PP420.1505-B5

4.13.1 Technical data

Features	4PP420.1505-B5
B&R ID-Code	$23C0
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 128 MB (64 MB < C0)
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	 512 KB Yes 256 kB
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 89: Technical data - 4PP420.1505-B5

Features	4PP420.1505-B5
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[4)] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)] 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 570) Horizontal Vertical Background lighting Brightness Half-brightness time[5)] Screen rotation	 Color TFT 15 in (381 mm) 16.7 million colors[4)] XGA, 1024 x 768 pixels 400:1 Direction R / direction L =85° Direction U / direction D = 85° 250 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen Touch screen type Technology Controller Degree of transmission	 Elo Accu Touch 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 89: Technical data - 4PP420.1505-B5 (Forts.)

Electrical characteristics	4PP420.1505-B5
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	Aluminum, naturally anodized[6)]
Design	Gray[6)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[6)]
Light background	Similar to Pantone 427CV[6)]
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
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 4.13.2 "Temperature humidity diagram" on page 256
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[7)]	Max. 3000 m

Table 89: Technical data - 4PP420.1505-B5 (Forts.)

1) Maintenance controller extended.

2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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

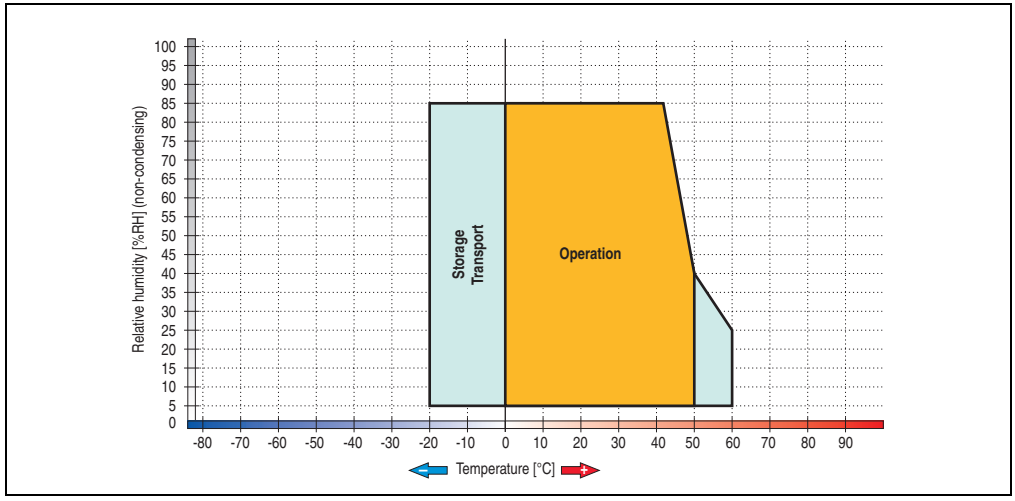


Figure 157: Temperature humidity diagram - 4PP420.1505-B5

4.13.3 Dimensions

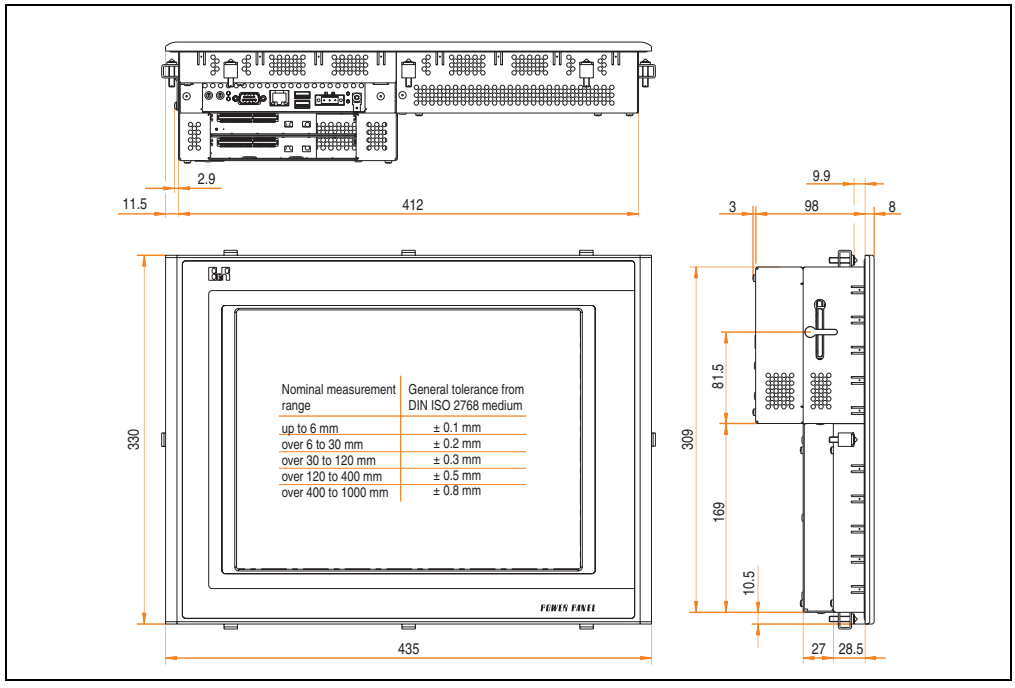


Figure 158: Dimensions - 4PP420.1505-B5

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.

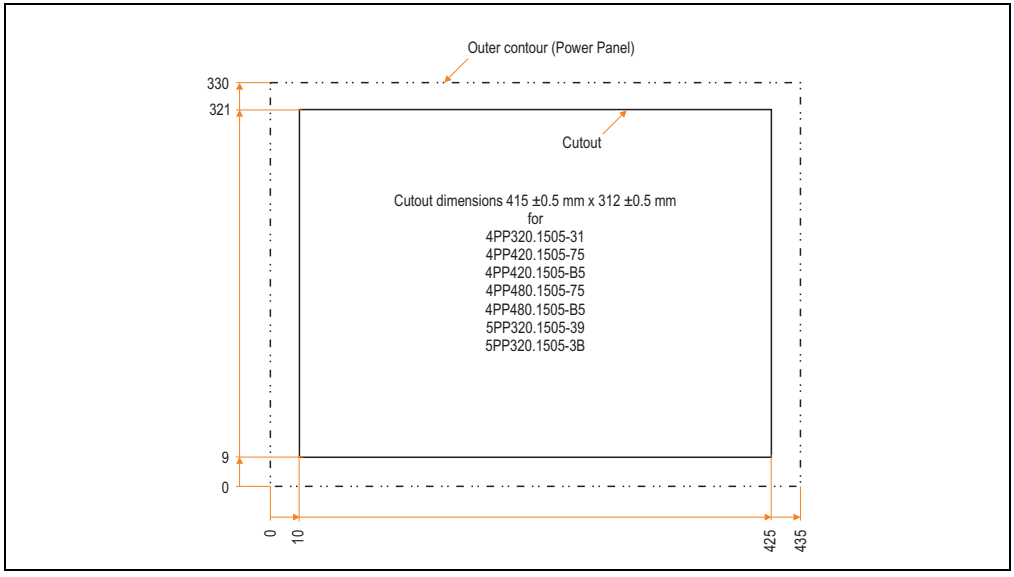


Figure 159: Cutout installation - 4PP420.1505-B5

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 90: Contents of delivery - 4PP420.1505-B5

4.14 Device 4PP451.0571-45

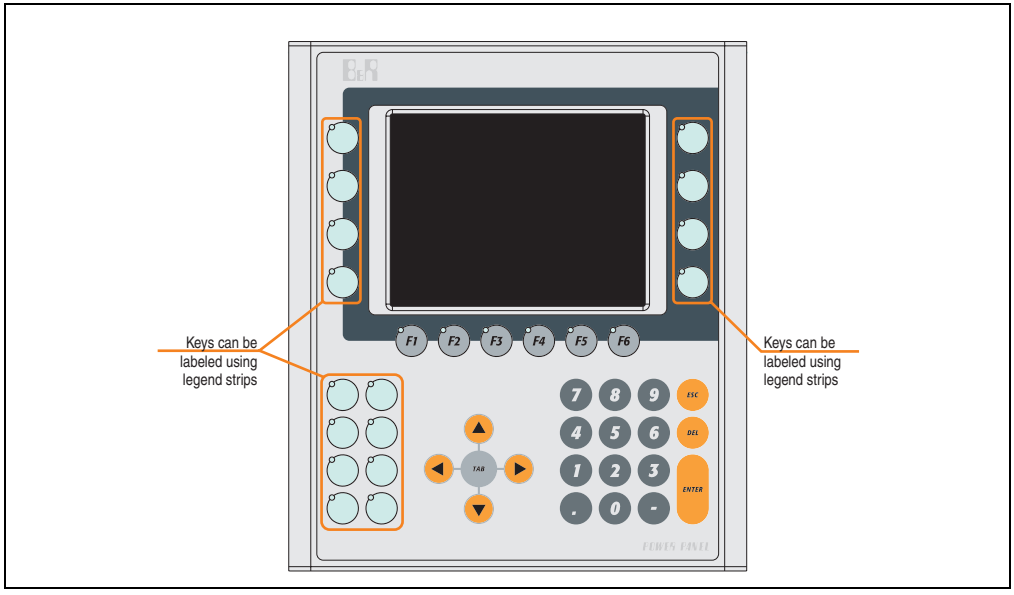


Figure 160: Front view - 4PP451.0571-45

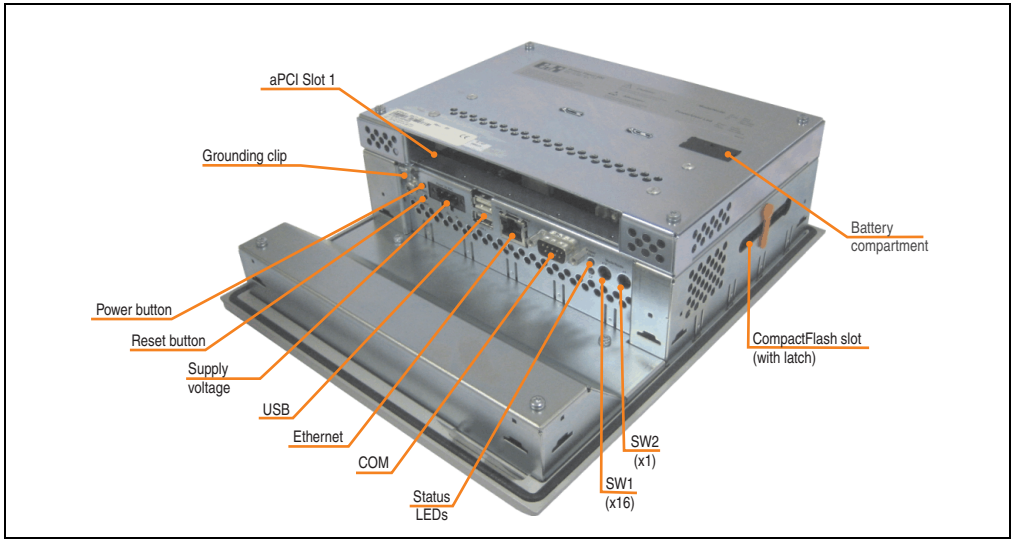


Figure 161: Rear view - 4PP451.0571-45

4.14.1 Technical data

Features	4PP451.0571-45
B&R ID-Code	$A530
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 128 MB
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	 512 KB Yes 256 kB
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 91: Technical data - 4PP451.0571-45

Features	4PP451.0571-45
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[4)] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)] 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 570) Horizontal Vertical Background lighting Brightness Half-brightness time[5)] Screen rotation	 LCD monochrome 5.7 in (144 mm) 8 shades of gray[3)] QVGA, 320 x 240 pixels 25:1 Direction R / direction L =40° Direction U = 40°/ direction D = 50° 220 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen Touch screen type Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	 95% On both sides
Keys/LED[6)] 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 - > 10^6 actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green) **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.**

Table 91: Technical data - 4PP451.0571-45 (Forts.)

Electrical characteristics	4PP451.0571-45
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	Aluminum, naturally anodized[7)]
Design	Gray[7)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[7)]
Light background	Similar to Pantone 427CV[7)]
Orange keys	Similar to Pantone 151CV[7)]
Dark gray keys	Similar to Pantone 431CV[7)]
Legend strips (gray)	Similar to Pantone 429CV[7)]
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
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 4.14.2 "Temperature humidity diagram" on page 263
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[8)]	Max. 3000 m

Table 91: Technical data - 4PP451.0571-45 (Forts.)

1) Maintenance controller extended.

2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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 B&R Automation Studio - Visual Components.

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

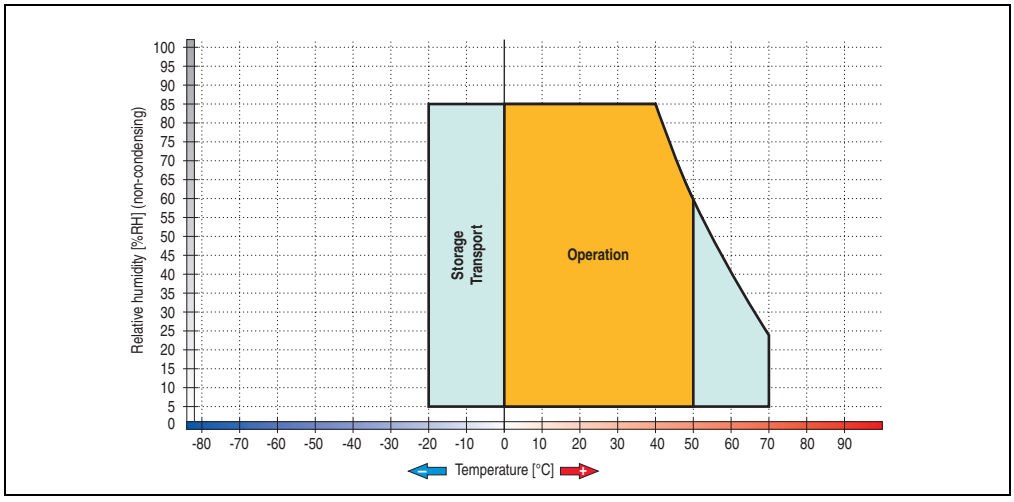


Figure 162: Temperature humidity diagram - 4PP451.0571-45

4.14.3 Dimensions

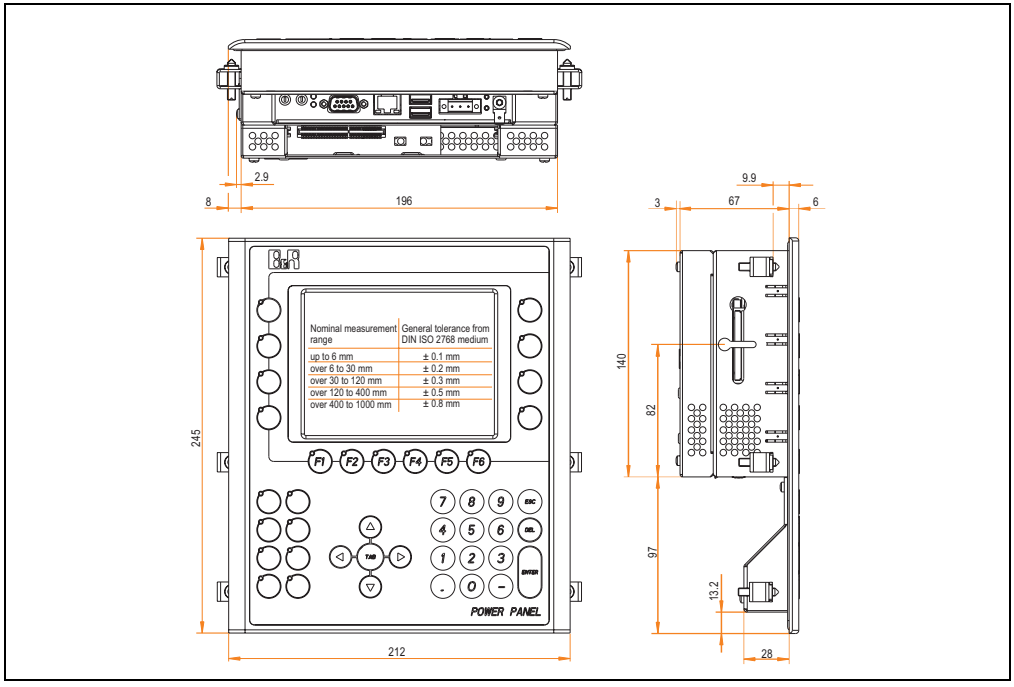


Figure 163: Dimensions - 4PP451.0571-45

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.

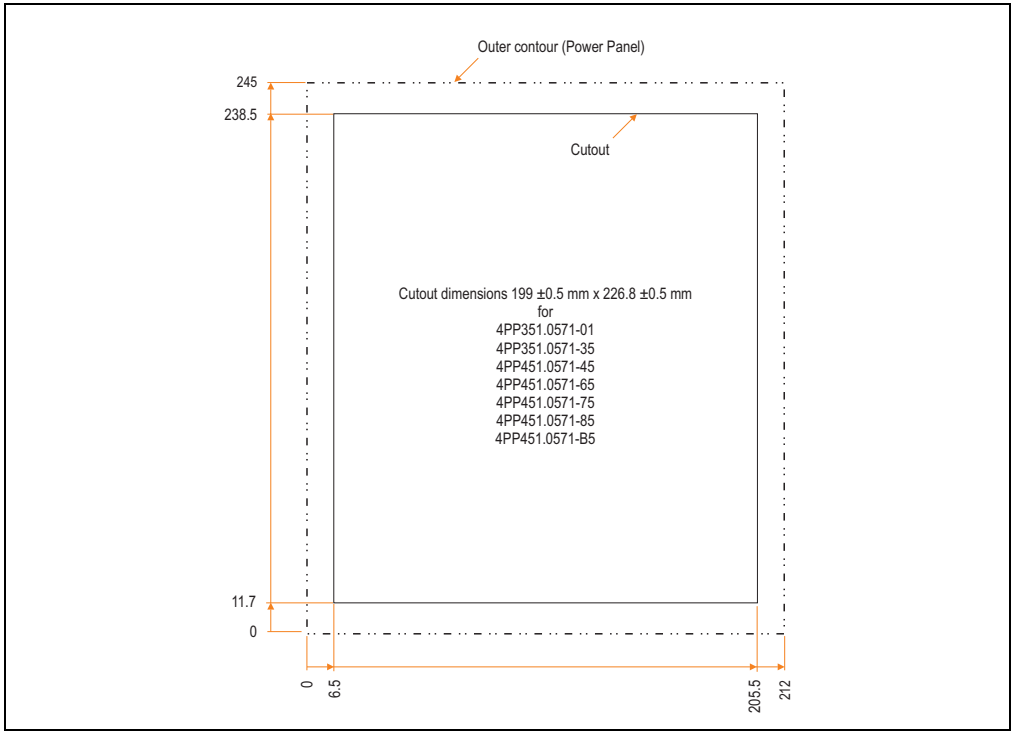


Figure 164: Cutout installation - 4PP451.0571-45

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 92: Contents of delivery - 4PP451.0571-45

4.15 Device 4PP451.0571-65

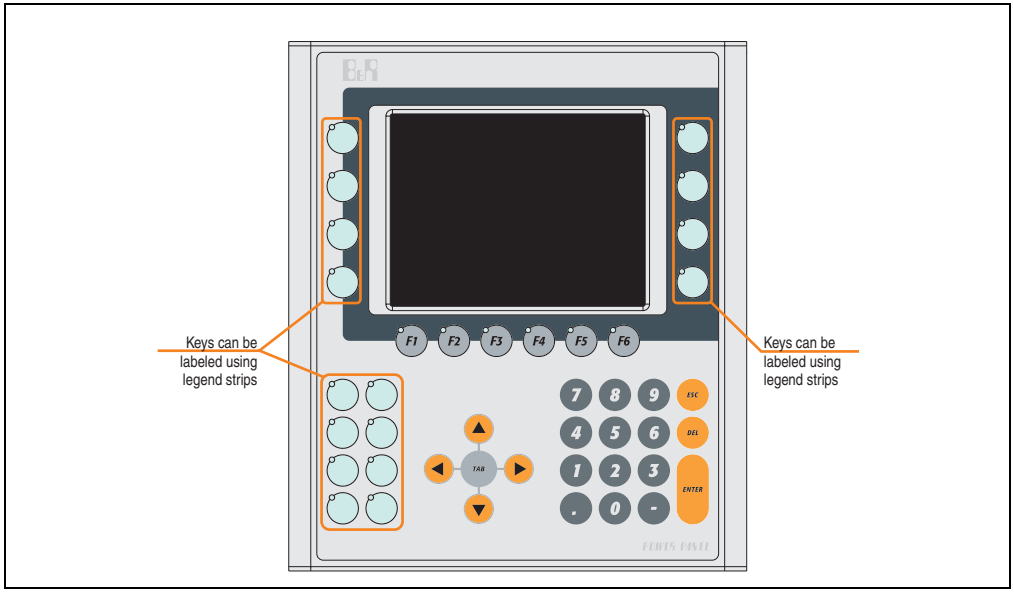


Figure 165: Front view - 4PP451.0571-65

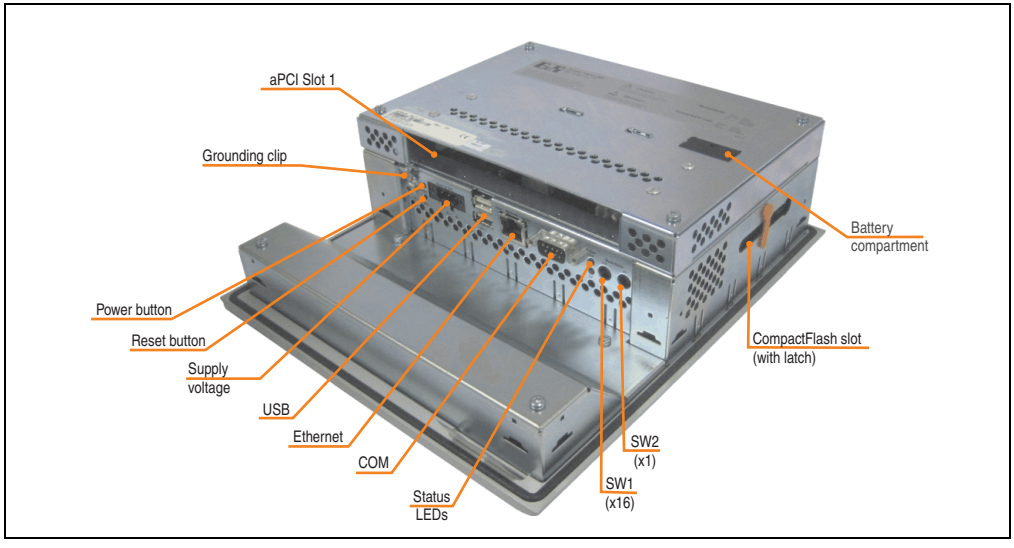


Figure 166: Rear view - 4PP451.0571-65

4.15.1 Technical data

Features	4PP451.0571-65
B&R ID-Code	$23C1
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 128 MB (64 MB < C0)
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	 512 KB Yes 256 kB
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 93: Technical data - 4PP451.0571-65

Features	4PP451.0571-65
Serial interface	
Type	RS232, modem-capable, not electrically isolated
UART	16C550 compatible, 16-byte FIFO
Transfer rate	Max. 115 kBaud
Connection	9-pin DSUB
USB interface	
Type	USB 1.1, USB 2.0[4]
Amount	2
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4]
Connection	Type A
Current load	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 (see B&R System 2005 manual for available aPCI interface modules)
Holding torque for aPCI module	Max. 0.7 Nm
Display	
Type	Color LCD
Diagonal	5.7 in (144 mm)
Colors	512 colors [4]
Resolution	QVGA, 320 x 240 pixels
Contrast	40:1
Viewing angle (see page 570)	
Horizontal	Direction R / direction L =40°
Vertical	Direction U = 40°/ direction D = 50°
Background lighting	
Brightness	200 cd/m²
Half-brightness time[5]	50,000 hours
Screen rotation	Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen	-
Touch screen type	
Technology	
Controller	
Degree of transmission	
Filter glass	
Degree of transmission	95%
Coating	On both sides
Keys/LED[6]	
Function keys	16 with LED (yellow)
Soft keys	6 with LED (yellow)
Cursor keys	5 without LED
Number block	15 without LED
Other keys	-
Key lifespan	> 10^6 actuations with 1 ±0.3 to 3 ±0.3 N operating force
LED brightness	Typ. 12 mcd (yellow) and 20 mcd (green)
	Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.

Table 93: Technical data - 4PP451.0571-65 (Forts.)

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	Aluminum, naturally anodized[7)]
Design	Gray[7)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[7)]
Light background	Similar to Pantone 427CV[7)]
Orange keys	Similar to Pantone 151CV[7)]
Dark gray keys	Similar to Pantone 431CV[7)]
Legend strips (gray)	Similar to Pantone 429CV[7)]
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
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 4.15.2 "Temperature humidity diagram" on page 270
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[8)]	Max. 3000 m

Table 93: Technical data - 4PP451.0571-65 (Forts.)

1) Maintenance Controller Extended.

2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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 B&R Automation Studio - Visual Components.

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

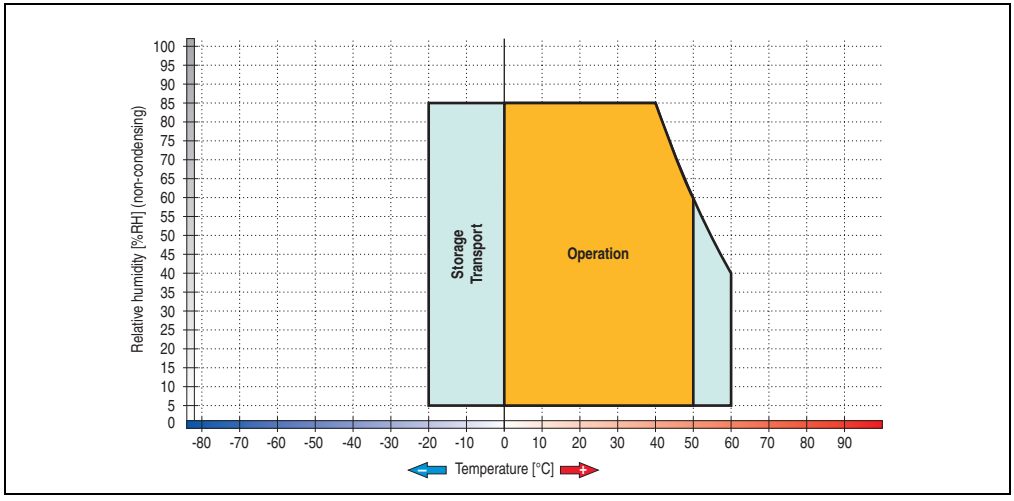


Figure 167: Temperature humidity diagram - 4PP451.0571-65

4.15.3 Dimensions

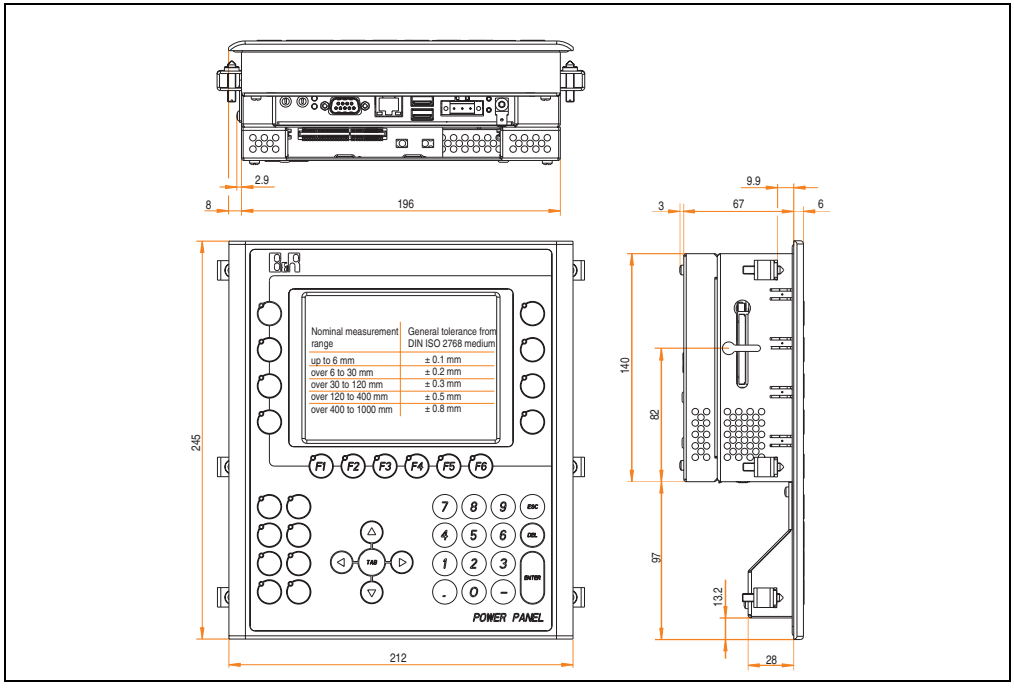


Figure 168: Dimensions - 4PP451.0571-65

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.

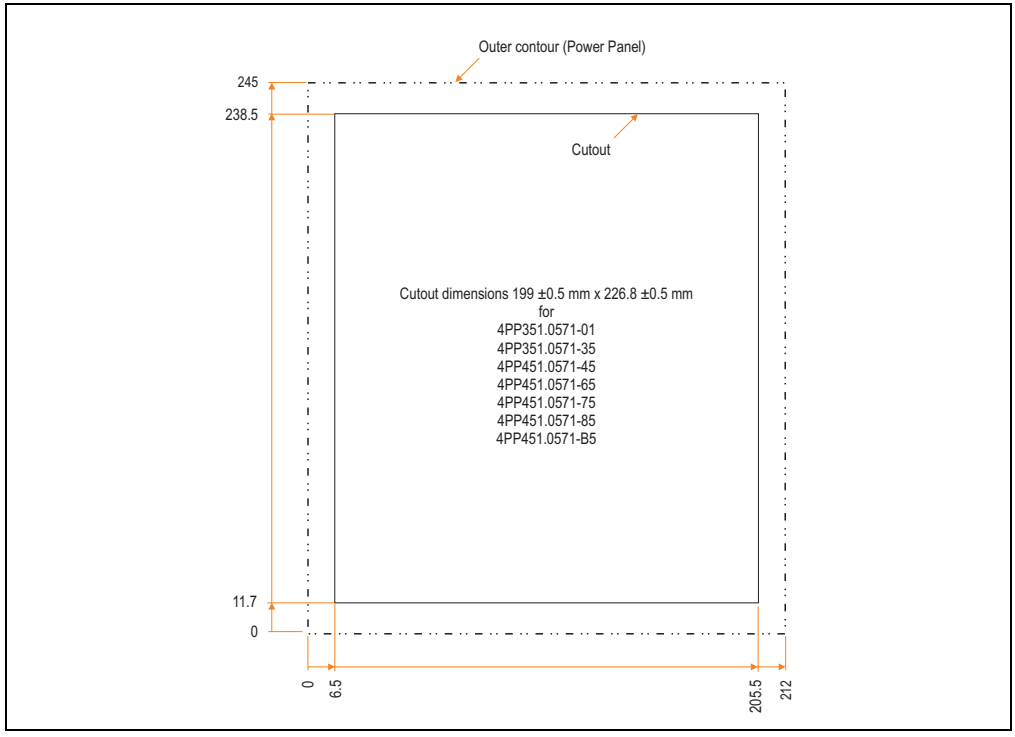


Figure 169: Cutout installation - 4PP451.0571-65

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 94: Contents of delivery - 4PP451.0571-65

4.16 Device 4PP451.0571-75

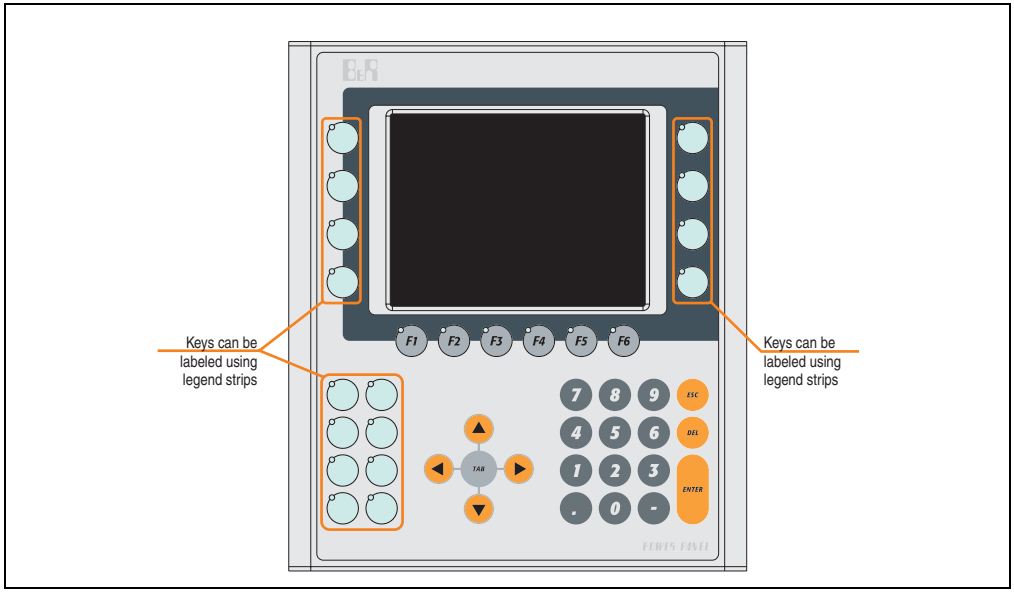


Figure 170: Front view - 4PP451.0571-75

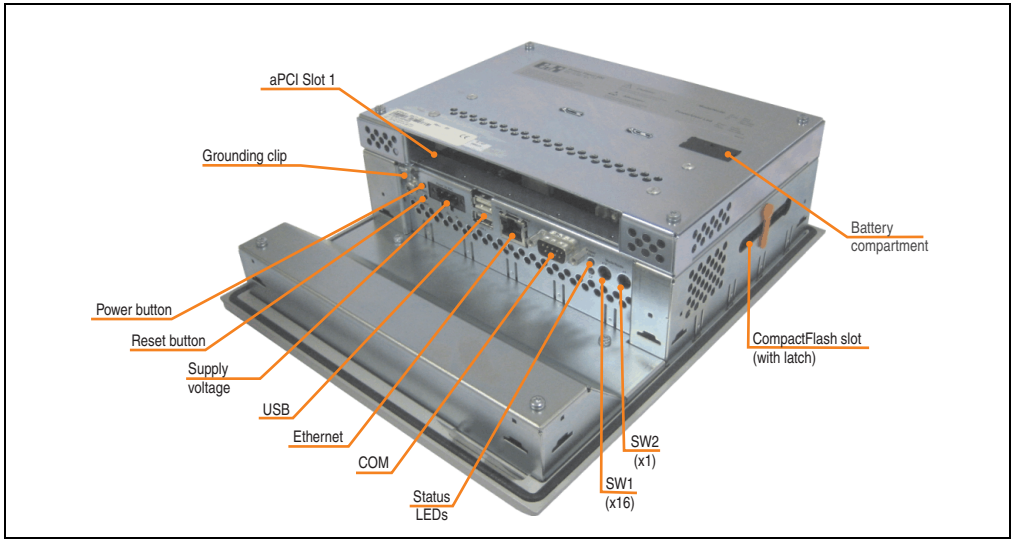


Figure 171: Rear view - 4PP451.0571-75

4.16.1 Technical data

Features	4PP451.0571-75 < Rev. D0	4PP451.0571-75 ≥ Rev. D0
B&R ID-Code	$A15B	
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)	
Flash	2 MB (for firmware)	
Memory Type Quantity	 DDR SDRAM 128 MB	
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)	
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	 512 KB Yes 256 kB	
Watchdog Controller	 MTCX[1)]	
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms	
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day	
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 95: Technical data - 4PP451.0571-75

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[4)] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)] 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 570) Horizontal Vertical Background lighting Brightness Half-brightness time[5)] Screen rotation	 Color TFT 5.7 in (144 mm) 262,144 colors [4)] QVGA, 320 x 240 pixels 400:1 Direction R / direction L =60° Direction U = 40°/ direction D = 50° 500 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426	 Color TFT 5.7 in (144 mm) 262,144 colors [3)] QVGA, 320 x 240 pixels 350:1 Direction R / direction L =65° Direction U = 65°/ direction D = 40° 500 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen Touch screen type Technology Controller Degree of transmission	-	
Filter glass Degree of transmission Coating	 95% On both sides	
Keys/LED[6)] 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 - > 10^6 actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green) **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.**	

Table 95: Technical data - 4PP451.0571-75 (Forts.)

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	Aluminum, naturally anodized[7)]	
Design	Gray[7)]	
Membrane	Polyester	
Dark gray border around display	Similar to Pantone 432CV[7)]	
Light background	Similar to Pantone 427CV[7)]	
Orange keys	Similar to Pantone 151CV[7)]	
Dark gray keys	Similar to Pantone 431CV[7)]	
Legend strips (gray)	Similar to Pantone 429CV[7)]	
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	
Storage	-20 to +60°C	
Transport	-20 to +60°C	
Relative humidity	See 4.16.2 "Temperature humidity diagram" on page 277	
Vibration		
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g	
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g	
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g	
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g	
Shock		
Operation	15 g, 11 ms	
Storage	30 g, 15 ms	
Transport	30 g, 15 ms	
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude[8)]	Max. 3000 m	

Table 95: Technical data - 4PP451.0571-75 (Forts.)

1) Maintenance Controller Extended.

2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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 B&R Automation Studio - Visual Components.

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

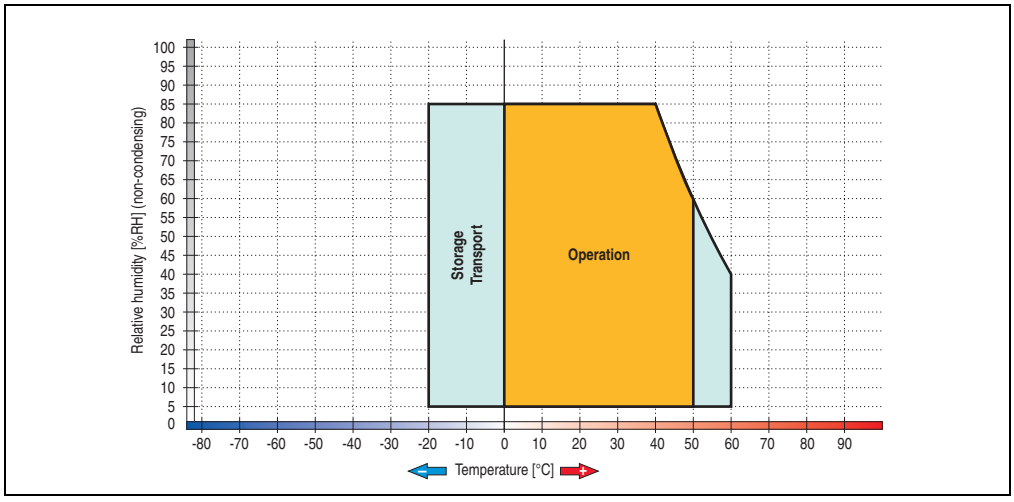


Figure 172: Temperature humidity diagram - 4PP451.0571-75

4.16.3 Dimensions

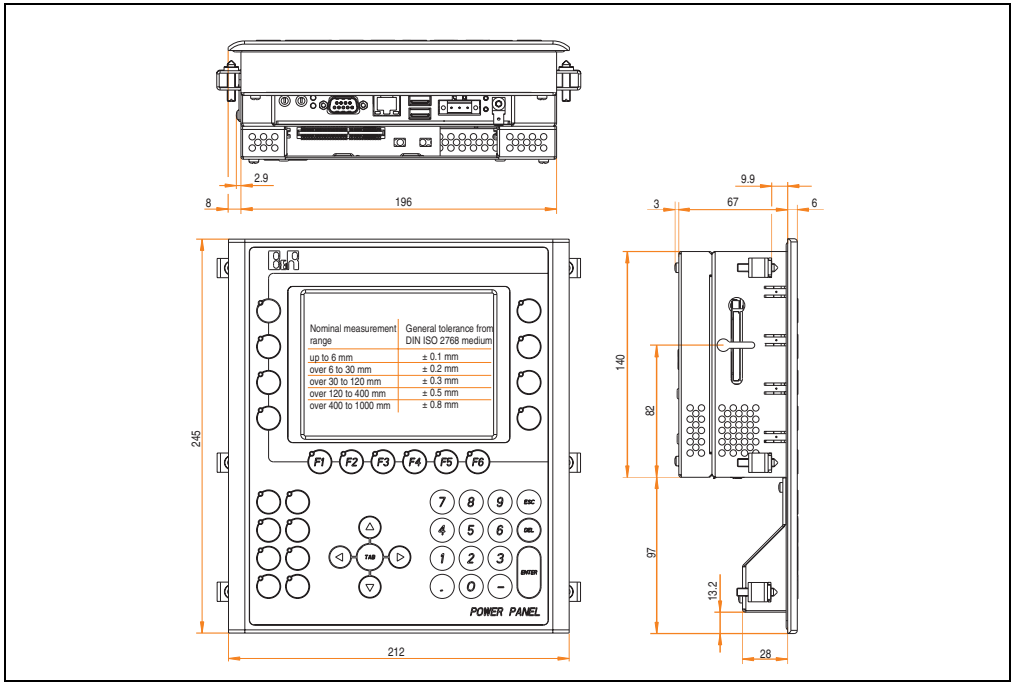


Figure 173: Dimensions - 4PP451.0571-75

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.

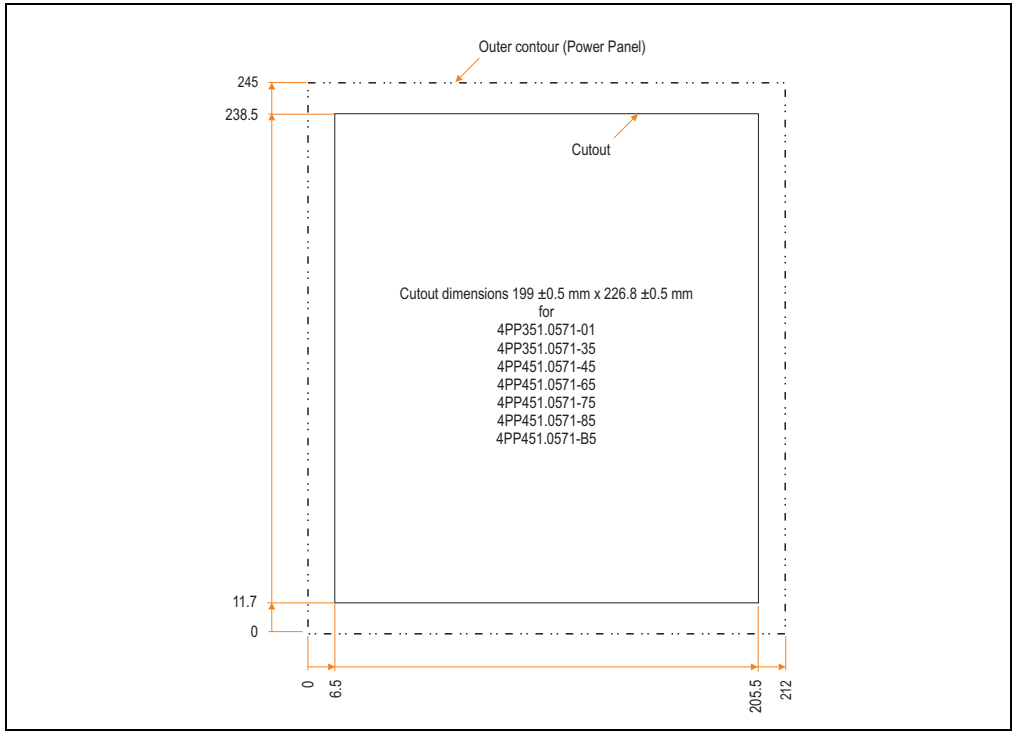


Figure 174: Cutout installation - 4PP451.0571-75

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 96: Contents of delivery - 4PP451.0571-75

4.17 Device 4PP451.0571-85

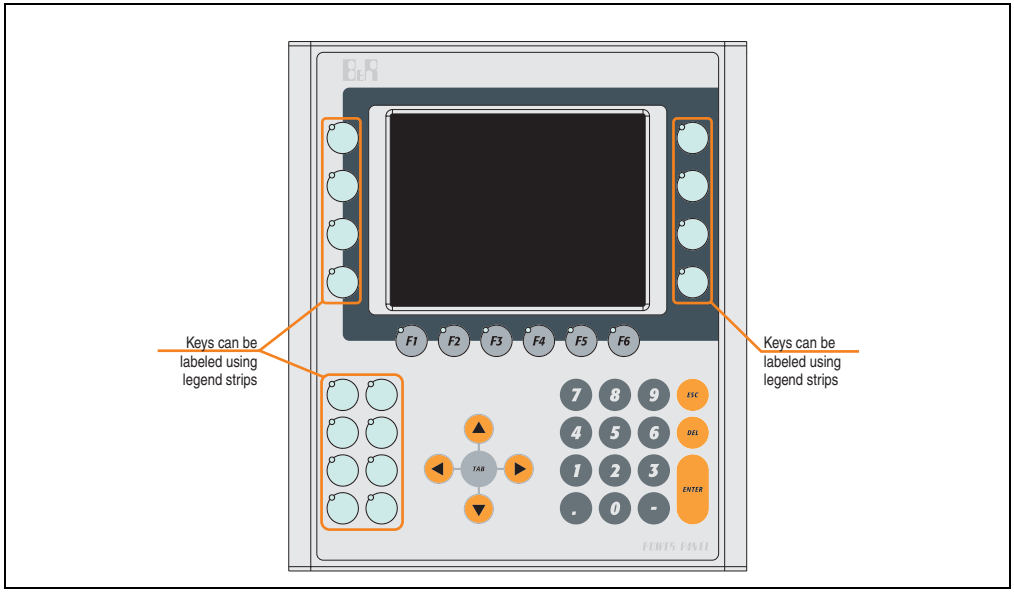


Figure 175: Front view - 4PP451.0571-85

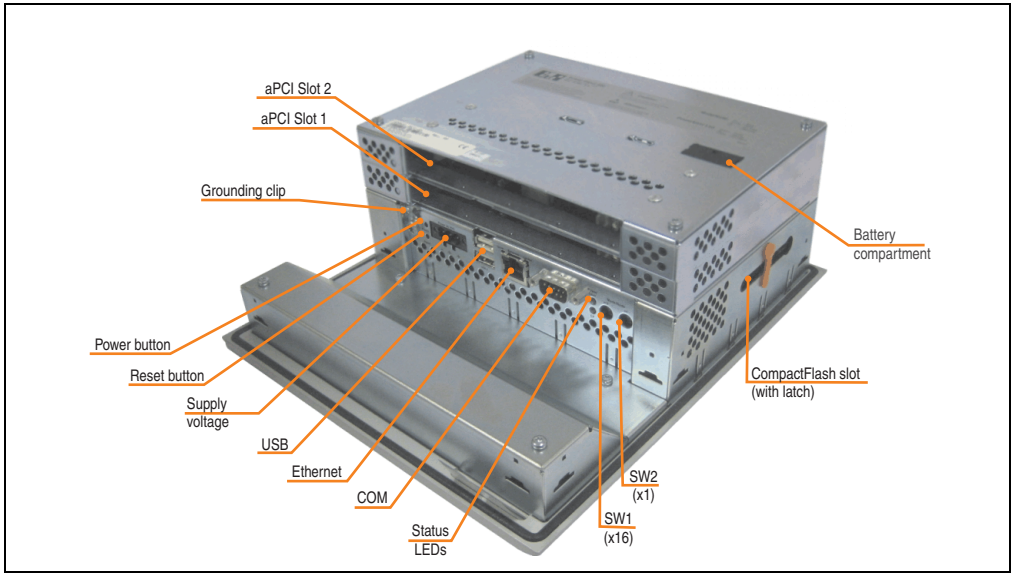


Figure 176: Rear view - 4PP451.0571-85

4.17.1 Technical data

Features	4PP451.0571-85
B&R ID-Code	$A540
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 128 MB
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	 512 KB Yes 256 kB
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 97: Technical data - 4PP451.0571-85

Features	4PP451.0571-85
Serial interface	
Type	RS232, modem-capable, not electrically isolated
UART	16C550 compatible, 16-byte FIFO
Transfer rate	Max. 115 kBaud
Connection	9-pin DSUB
USB interface	
Type	USB 1.1, USB 2.0[4]
Amount	2
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4]
Connection	Type A
Current load	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	2 (see B&R System 2005 manual for available aPCI interface modules)
Holding torque for aPCI module	Max. 0.7 Nm
Display	
Type	LCD monochrome
Diagonal	5.7 in (144 mm)
Colors	8 shades of gray[4]
Resolution	QVGA, 320 x 240 pixels
Contrast	25:1
Viewing angle (see page 570)	
Horizontal	Direction R / direction L =40°
Vertical	Direction U = 40°/ direction D = 50°
Background lighting	
Brightness	220 cd/m²
Half-brightness time[5]	50,000 hours
Screen rotation	Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen	-
Touch screen type	
Technology	
Controller	
Degree of transmission	
Filter glass	
Degree of transmission	95%
Coating	On both sides
Keys/LED[6]	
Function keys	16 with LED (yellow)
Soft keys	6 with LED (yellow)
Cursor keys	5 without LED
Number block	15 without LED
Other keys	-
Key lifespan	> 10^6 actuations with 1 ±0.3 to 3 ±0.3 N operating force
LED brightness	Typ. 12 mcd (yellow) and 20 mcd (green)
	Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.

Table 97: Technical data - 4PP451.0571-85 (Forts.)

Electrical characteristics	4PP451.0571-85
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	Aluminum, naturally anodized[7)]
Design	Gray[7)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[7)]
Light background	Similar to Pantone 427CV[7)]
Orange keys	Similar to Pantone 151CV[7)]
Dark gray keys	Similar to Pantone 431CV[7)]
Legend strips (gray)	Similar to Pantone 429CV[7)]
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
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 4.17.2 "Temperature humidity diagram" on page 284
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[8)]	Max. 3000 m

Table 97: Technical data - 4PP451.0571-85 (Forts.)

1) Maintenance controller extended.

2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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 B&R Automation Studio - Visual Components.

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

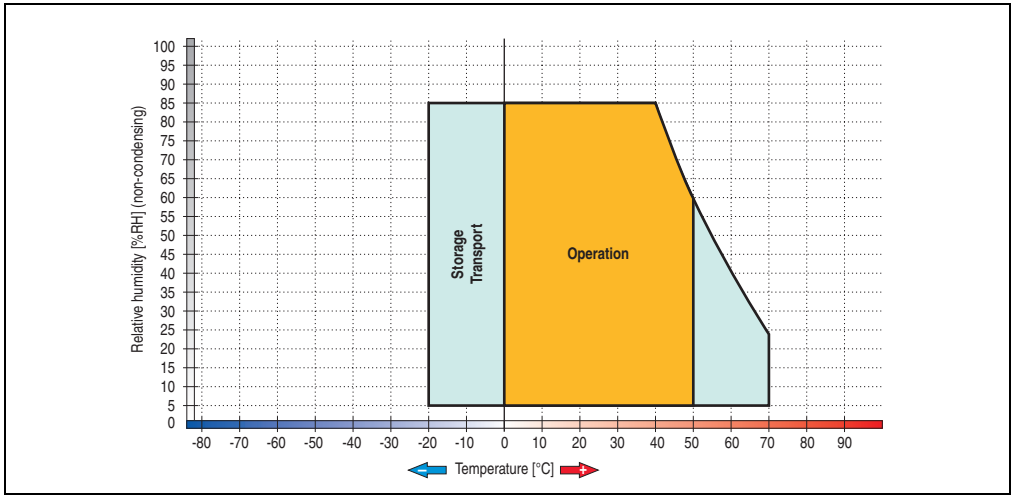


Figure 177: Temperature humidity diagram - 4PP451.0571-85

4.17.3 Dimensions

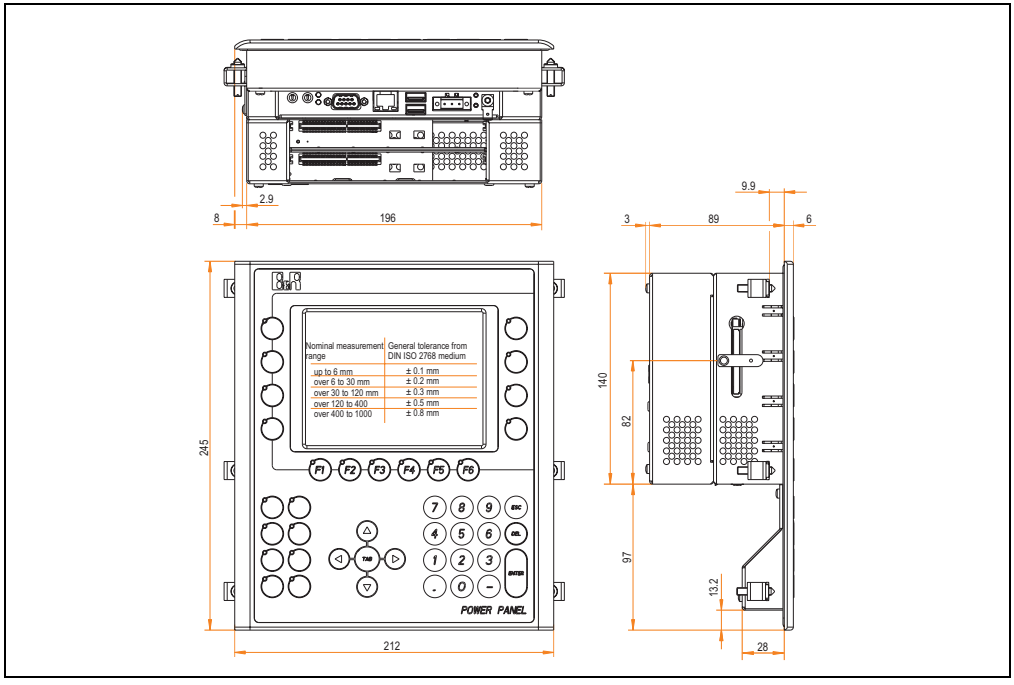


Figure 178: Dimensions - 4PP451.0571-85

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.

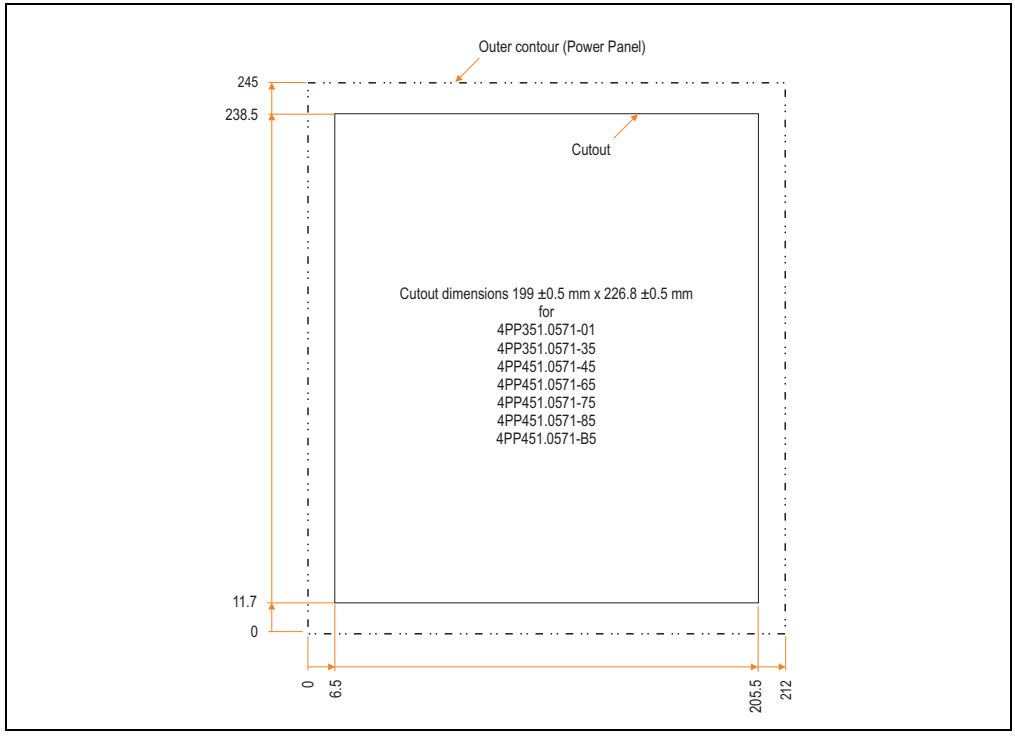


Figure 179: Cutout installation - 4PP451.0571-85

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 98: Contents of delivery - 4PP451.0571-85

4.18 Device 4PP451.0571-B5

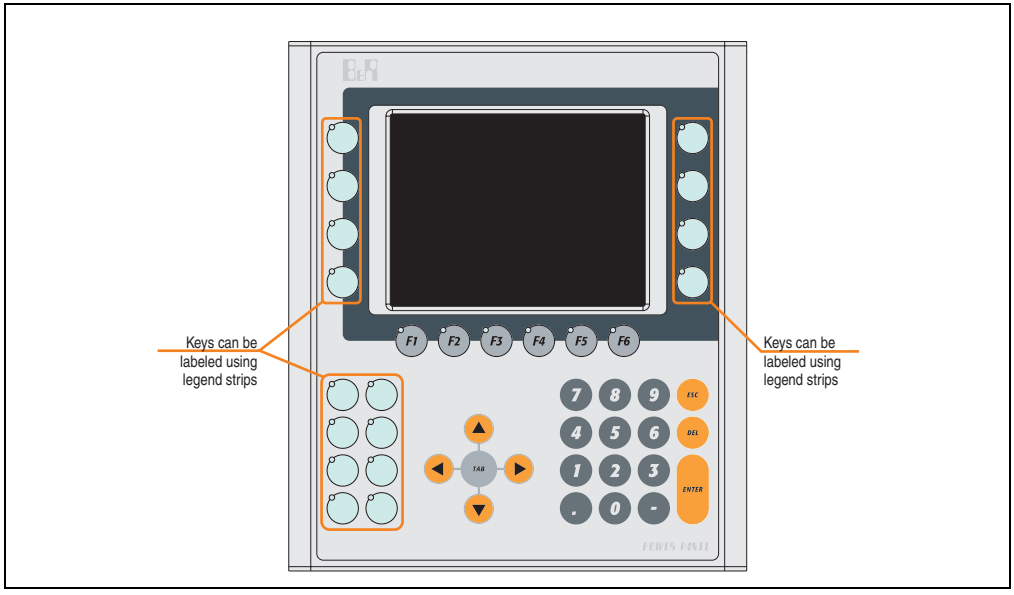


Figure 180: Front view - 4PP451.0571-B5

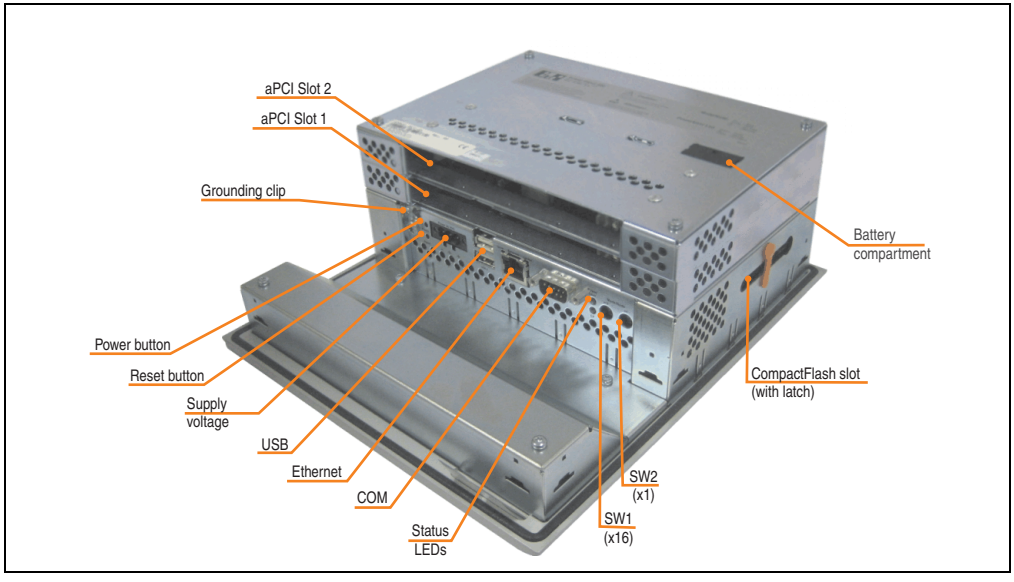


Figure 181: Back view - 4PP451.0571-B5

4.18.1 Technical data

Features	4PP451.0571-B5 < Rev. D0	4PP451.0571-B5 ≥ Rev. D0
B&R ID-Code	$A531	
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)	
Flash	2 MB (for firmware)	
Memory Type Quantity	 DDR SDRAM 128 MB	
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)	
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	 512 KB Yes 256 kB	
Watchdog Controller	 MTCX[1)]	
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms	
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day	
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 99: Technical data - 4PP451.0571-B5

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[4)] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)] 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 570) Horizontal Vertical Background lighting Brightness Half-brightness time[5)] Screen rotation	 Color TFT 5.7 in (144 mm) 262,144 colors [4)] QVGA, 320 x 240 pixels 400:1 Direction R / direction L =60° Direction U = 40°/ direction D = 50° 500 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426	 Color TFT 5.7 in (144 mm) 262,144 colors [3)] QVGA, 320 x 240 pixels 350:1 Direction R / direction L =65° Direction U = 65°/ direction D = 40° 500 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen Touch screen type Technology Controller Degree of transmission	-	
Filter glass Degree of transmission Coating	 95% On both sides	
Keys/LED[6)] 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 - > 10^6 actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green) **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.**	

Table 99: Technical data - 4PP451.0571-B5 (Forts.)

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	Aluminum, naturally anodized[7)]	
Design	Gray[7)]	
Membrane	Polyester	
Dark gray border around display	Similar to Pantone 432CV[7)]	
Light background	Similar to Pantone 427CV[7)]	
Orange keys	Similar to Pantone 151CV[7)]	
Dark gray keys	Similar to Pantone 431CV[7)]	
Legend strips (gray)	Similar to Pantone 429CV[7)]	
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	
Storage	-20 to +60°C	
Transport	-20 to +60°C	
Relative humidity	See 4.18.2 "Temperature humidity diagram" on page 291	
Vibration		
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g	
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g	
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g	
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g	
Shock		
Operation	15 g, 11 ms	
Storage	30 g, 15 ms	
Transport	30 g, 15 ms	
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude[8)]	Max. 3000 m	

Table 99: Technical data - 4PP451.0571-B5 (Forts.)

1) Maintenance controller extended.

2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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 B&R Automation Studio - Visual Components.

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

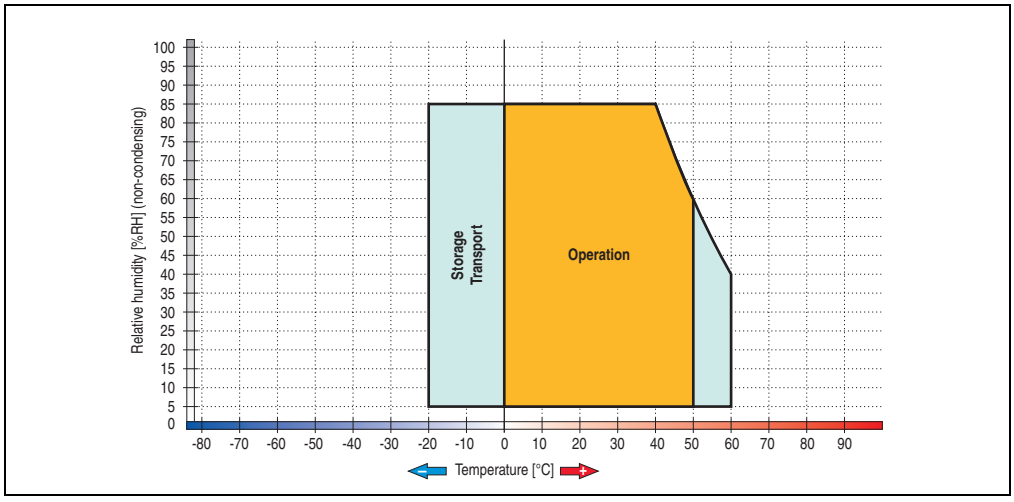


Figure 182: Temperature humidity diagram - 4PP451.0571-B5

4.18.3 Dimensions

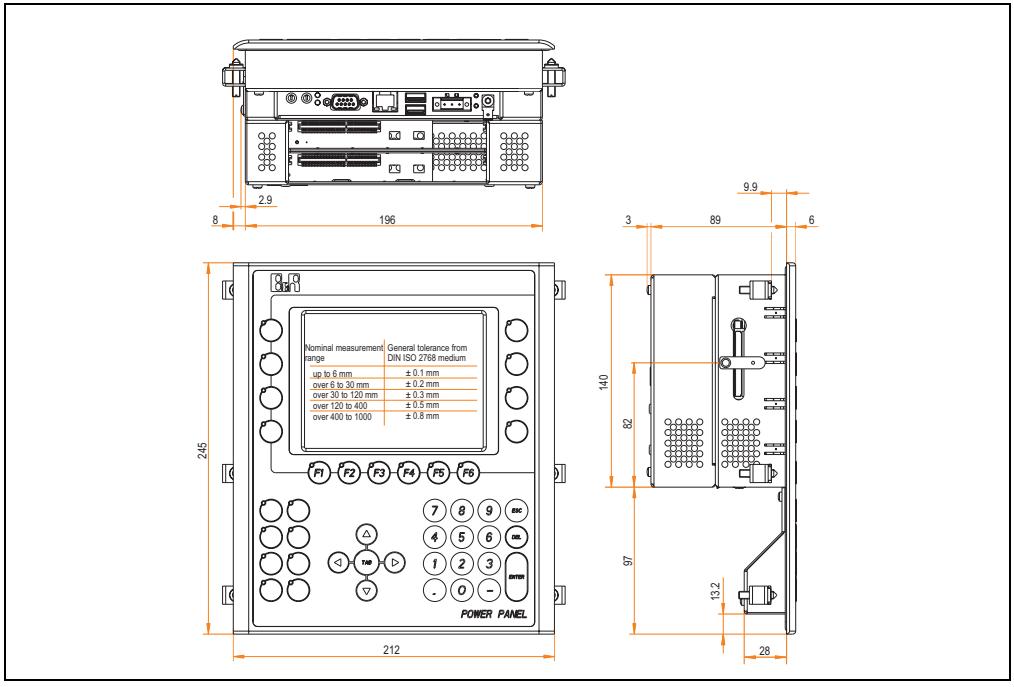


Figure 183: Dimensions - 4PP451.0571-B5

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.

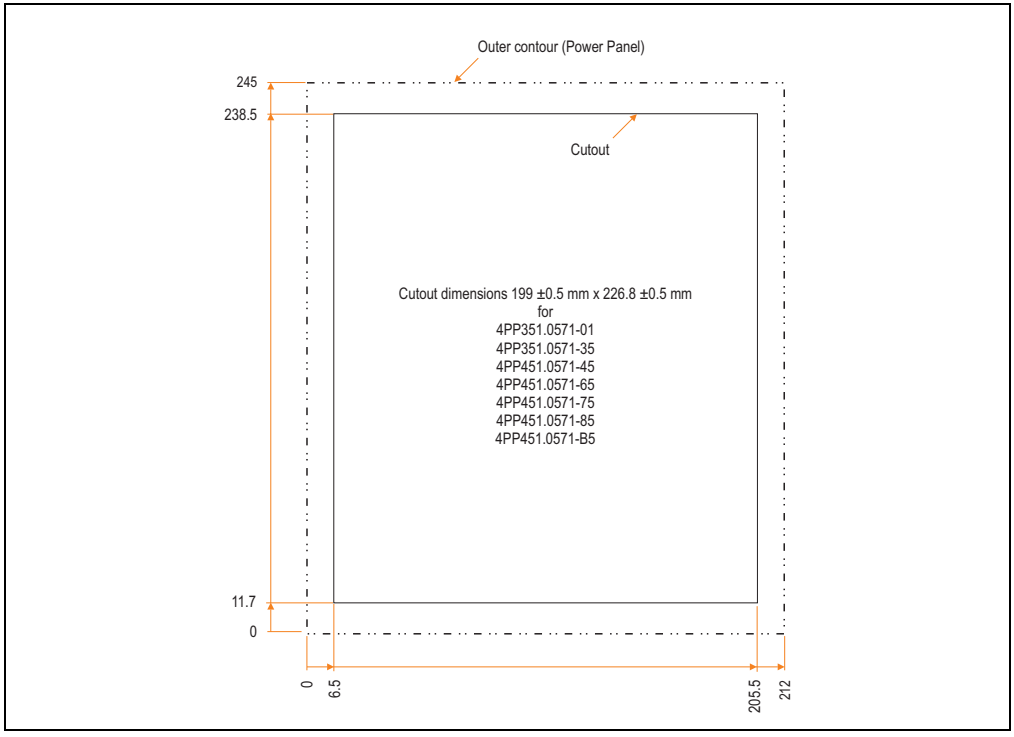


Figure 184: Cutout installation - 4PP451.0571-B5

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 100: Delivery contents - 4PP451.0571-B5

4.19 Device 4PP451.1043-75

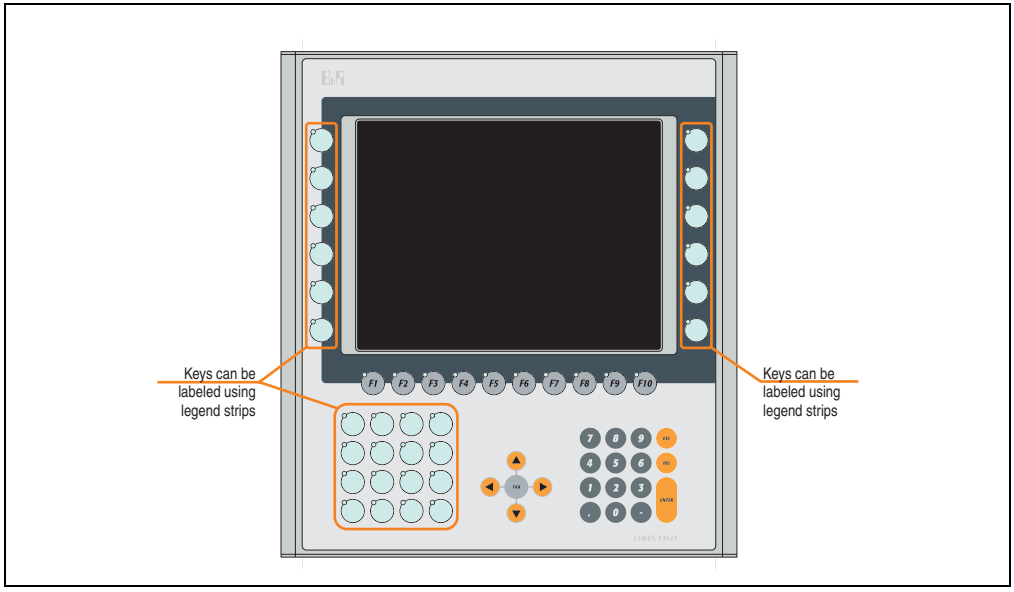


Figure 185: Front view - 4PP451.1043-75

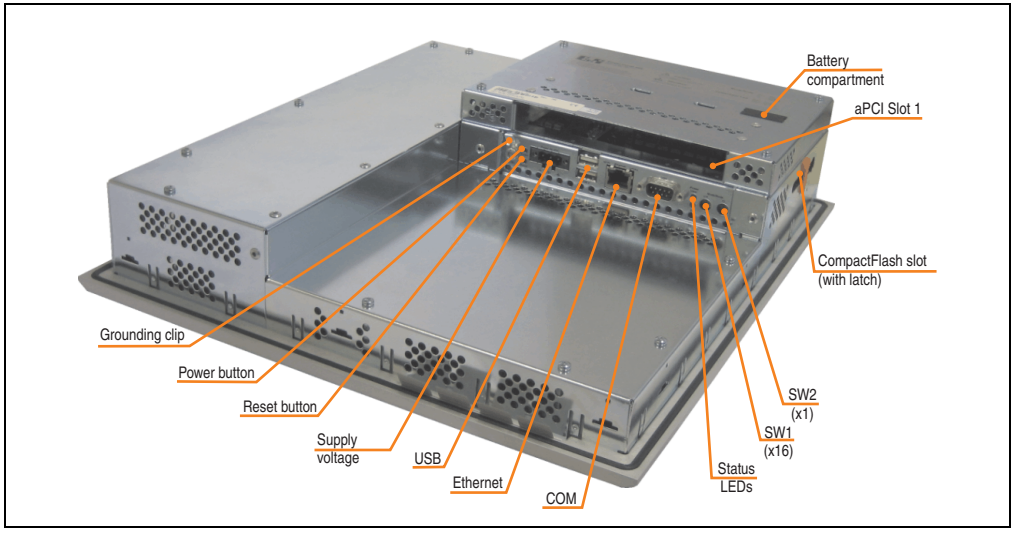


Figure 186: Rear view - 4PP451.1043-75

4.19.1 Technical data

Features	4PP451.1043-75
B&R ID-Code	$A52F
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 128 MB
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	 512 KB Yes 256 kB
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 101: Technical data - 4PP451.1043-75

Features	4PP451.1043-75
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[4)] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)] 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 570) Horizontal Vertical Background lighting Brightness Half-brightness time[5)] Screen rotation	 Color TFT 10.4 in (264 mm) 262,144 colors VGA, 640 x 480 pixels 600:1 Direction R / direction L =70° Direction U = 45°/ direction D = 35° 450 cd/m² 55,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen Touch screen type Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	 95% On both sides
Keys/LED[6)] 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 - > 10^6 actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green) **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.**

Table 101: Technical data - 4PP451.1043-75 (Forts.)

Electrical characteristics	4PP451.1043-75
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	Aluminum, naturally anodized[7)]
Design	Gray[7)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[7)]
Light background	Similar to Pantone 427CV[7)]
Orange keys	Similar to Pantone 151CV[7)]
Dark gray keys	Similar to Pantone 431CV[7)]
Legend strips (gray)	Similar to Pantone 429CV[7)]
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
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 4.19.2 "Temperature humidity diagram" on page 298
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[8)]	Max. 3000 m

Table 101: Technical data - 4PP451.1043-75 (Forts.)

1) Maintenance controller extended.

2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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 B&R Automation Studio - Visual Components.

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

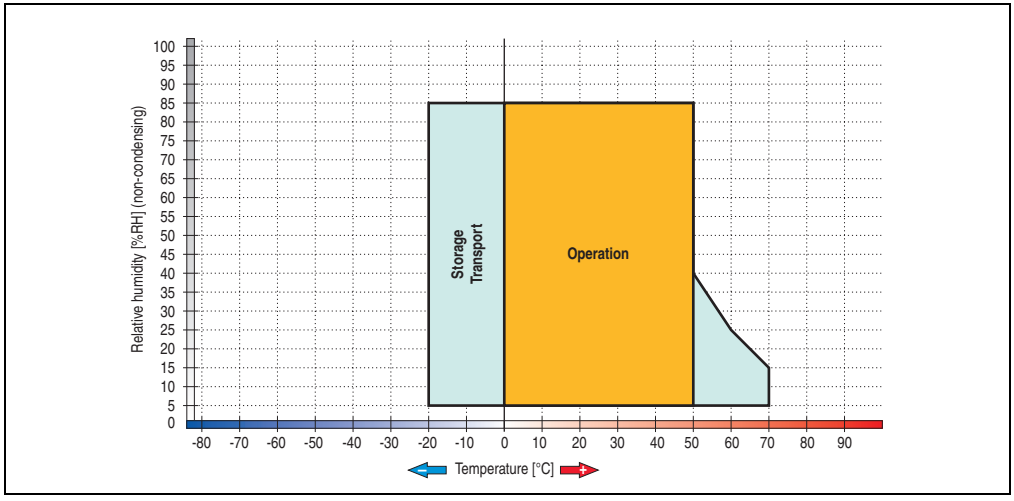


Figure 187: Temperature humidity diagram - 4PP451.1043-75

4.19.3 Dimensions

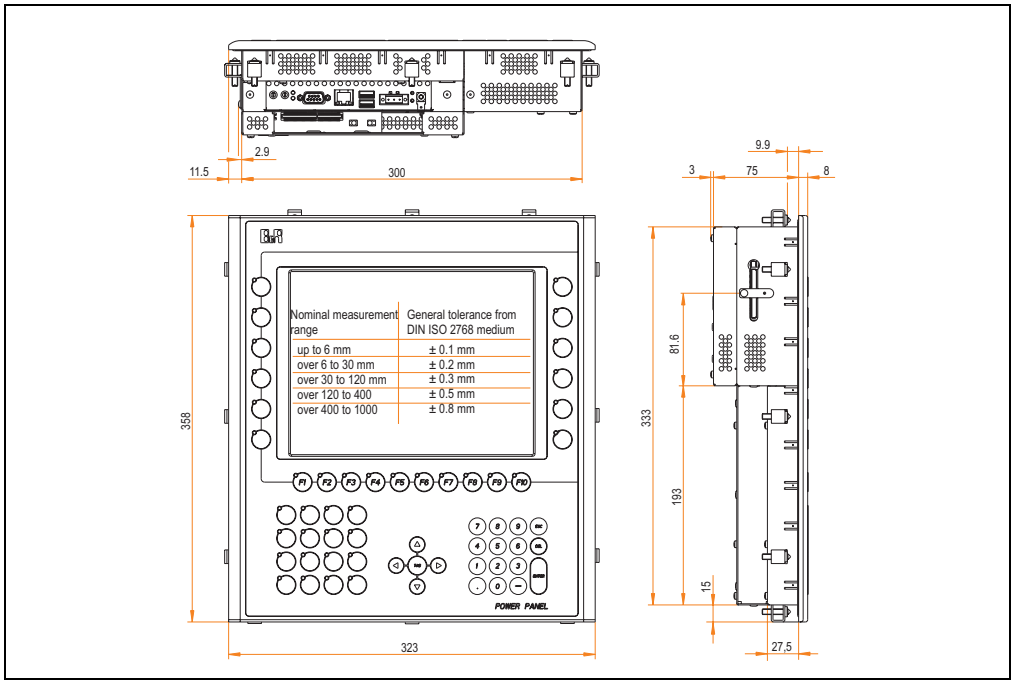


Figure 188: Dimensions - 4PP451.1043-75

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.

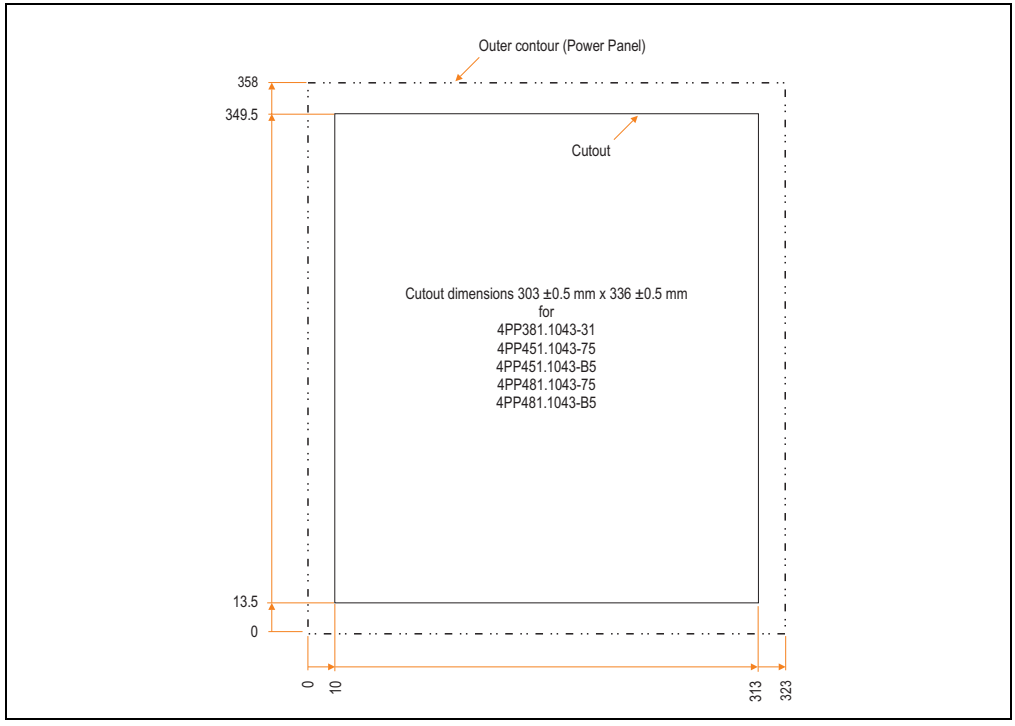


Figure 189: Cutout installation - 4PP451.1043-75

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 102: Contents of delivery - 4PP451.1043-75

4.20 Device 4PP451.1043-B5

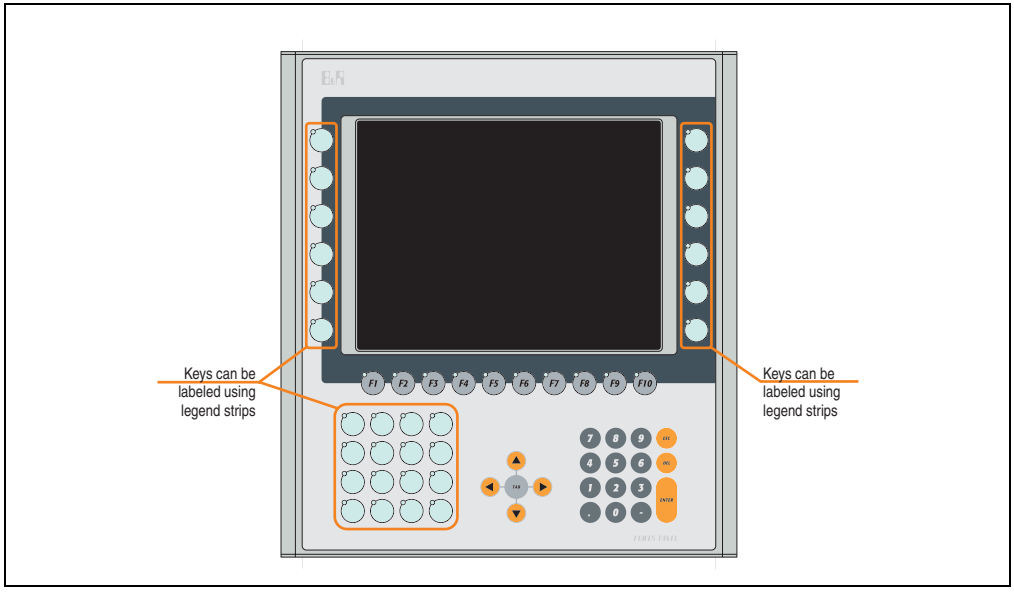


Figure 190: Front view - 4PP451.1043-B5

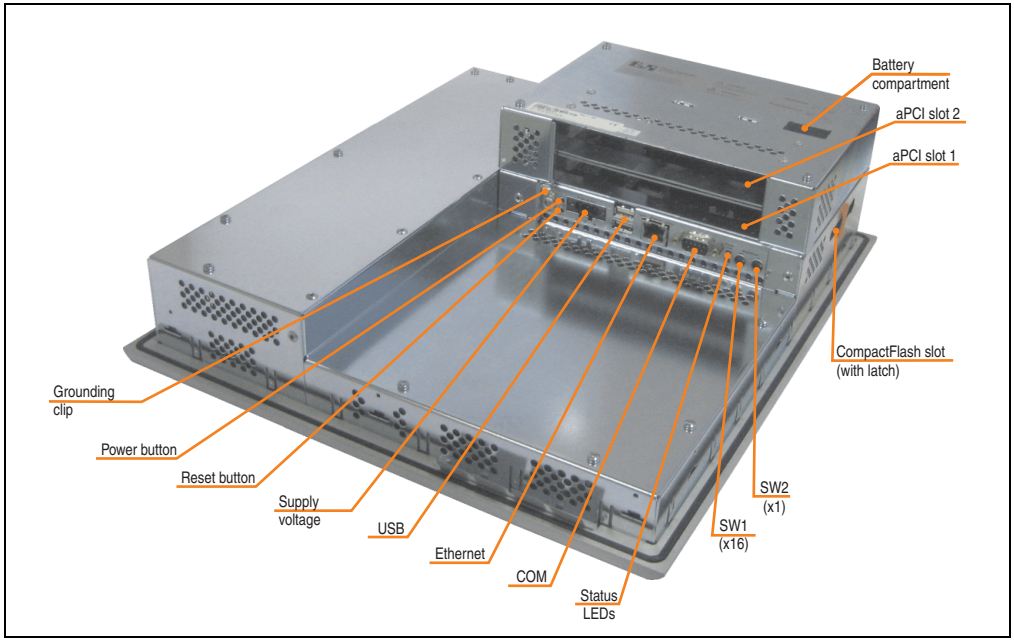


Figure 191: Rear view - 4PP451.1043-B5

4.20.1 Technical data

Features	4PP451.1043-B5
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 128 MB
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	 512 KB Yes 256 kB
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 103: Technical data - 4PP451.1043-B5

Features	4PP451.1043-B5
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[4)] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)] 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 570) Horizontal Vertical Background lighting Brightness Half-brightness time[5)] Screen rotation	 Color TFT 10.4 in (264 mm) 262,144 colors VGA, 640 x 480 pixels 600:1 Direction R / direction L =70° Direction U = 45°/ direction D = 35° 450 cd/m² 55,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen Touch screen type Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	 95% On both sides
Keys/LED[6)] 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 - > 10^6 actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green) **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.**

Table 103: Technical data - 4PP451.1043-B5 (Forts.)

Electrical characteristics	4PP451.1043-B5
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	Aluminum, naturally anodized[7)]
Design	Gray[7)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[7)]
Light background	Similar to Pantone 427CV[7)]
Orange keys	Similar to Pantone 151CV[7)]
Dark gray keys	Similar to Pantone 431CV[7)]
Legend strips (gray)	Similar to Pantone 429CV[7)]
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
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 4.20.2 "Temperature humidity diagram" on page 305
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[8)]	Max. 3000 m

Table 103: Technical data - 4PP451.1043-B5 (Forts.)

1) Maintenance controller extended.

2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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 B&R Automation Studio - Visual Components.

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).

4.20.2 Temperature humidity diagram

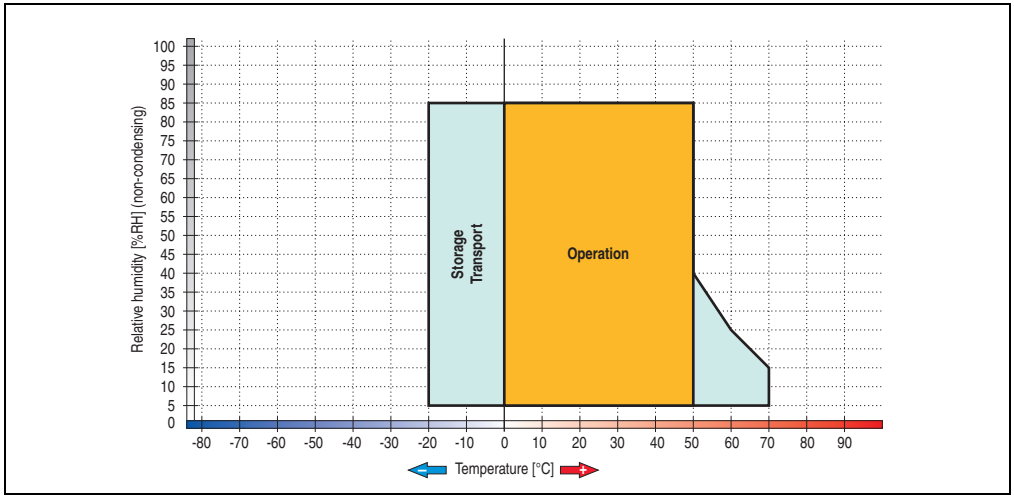


Figure 192: Temperature humidity diagram - 4PP451.1043-B5

4.20.3 Dimensions

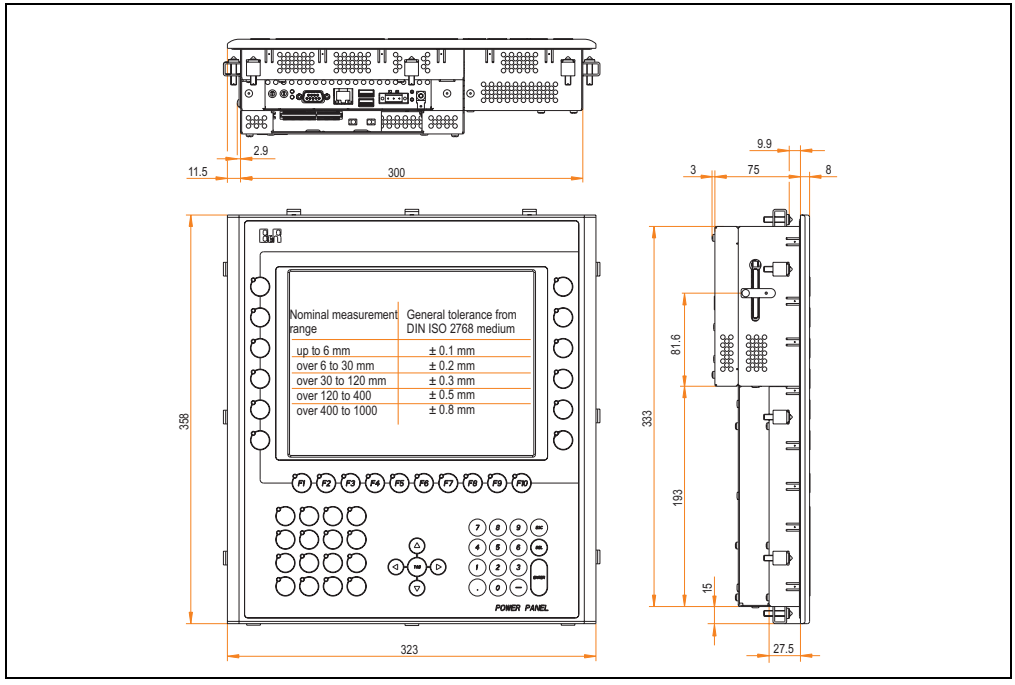


Figure 193: Dimensions - 4PP451.1043-B5

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.

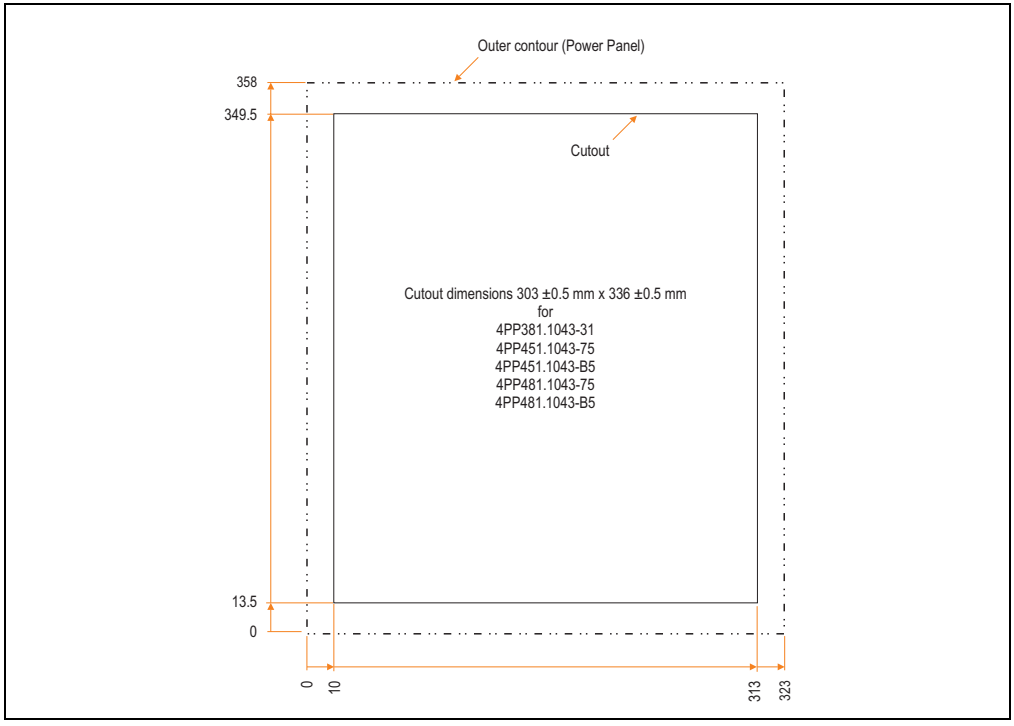


Figure 194: Cutout installation - 4PP451.1043-B5

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 104: Contents of delivery - 4PP451.1043-B5

4.21 Device 4PP452.0571-45

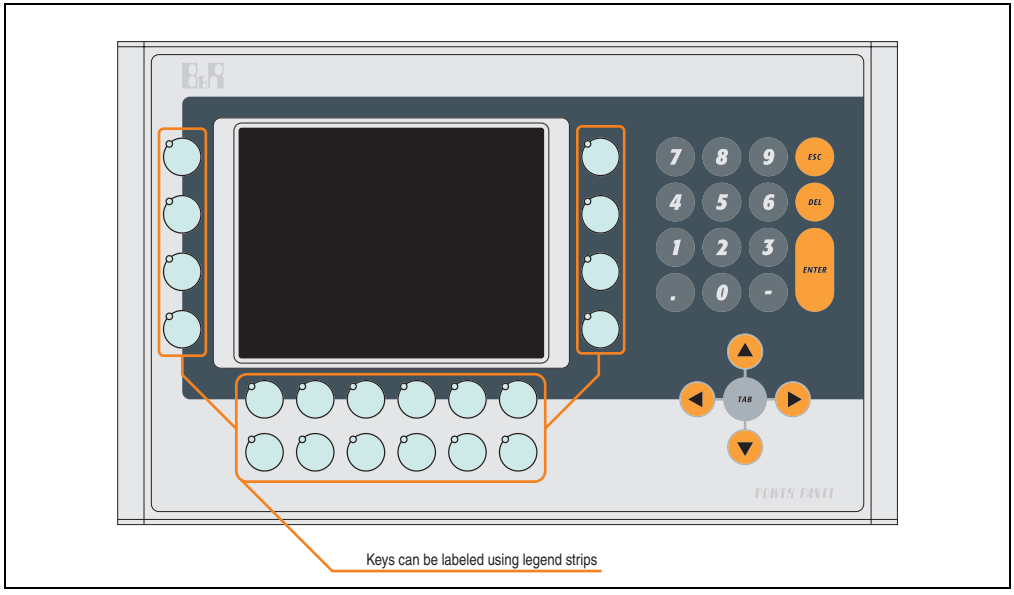


Figure 195: Front view - 4PP452.0571-45

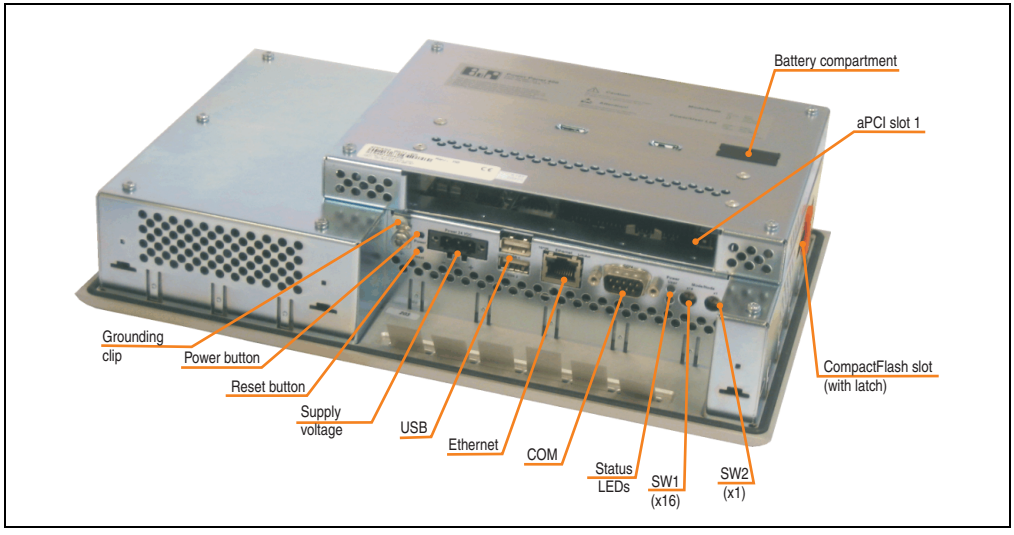


Figure 196: Rear view - 4PP452.0571-45

4.21.1 Technical data

Features	4PP452.0571-45
B&R ID-Code	$A534
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 128 MB (64 MB < Rev. C0)
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	 512 KB Yes 256 kB
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 105: Technical data - 4PP452.0571-45

Features	4PP452.0571-45
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[4)] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)] 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 570) Horizontal Vertical Background lighting Brightness Half-brightness time[5)] Screen rotation	 LCD monochrome 5.7 in (144 mm) 8 shades of gray[3)] QVGA, 320 x 240 pixels 25:1 Direction R / direction L =40° Direction U = 40°/ direction D = 50° 220 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen Touch screen type Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	 95% On both sides
Keys/LED[6)] Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	 20 with LED (yellow) - 5 without LED 15 without LED - > 10^6 actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green) **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.**

Table 105: Technical data - 4PP452.0571-45 (Forts.)

Electrical characteristics	4PP452.0571-45
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	Aluminum, naturally anodized[7)]
Design	Gray[7)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[7)]
Light background	Similar to Pantone 427CV[7)]
Orange keys	Similar to Pantone 151CV[7)]
Dark gray keys	Similar to Pantone 431CV[7)]
Legend strips (gray)	Similar to Pantone 429CV[7)]
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
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 4.21.2 "Temperature humidity diagram" on page 312
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[8)]	Max. 3000 m

Table 105: Technical data - 4PP452.0571-45 (Forts.)

1) Maintenance controller extended.

2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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 B&R Automation Studio - Visual Components.

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

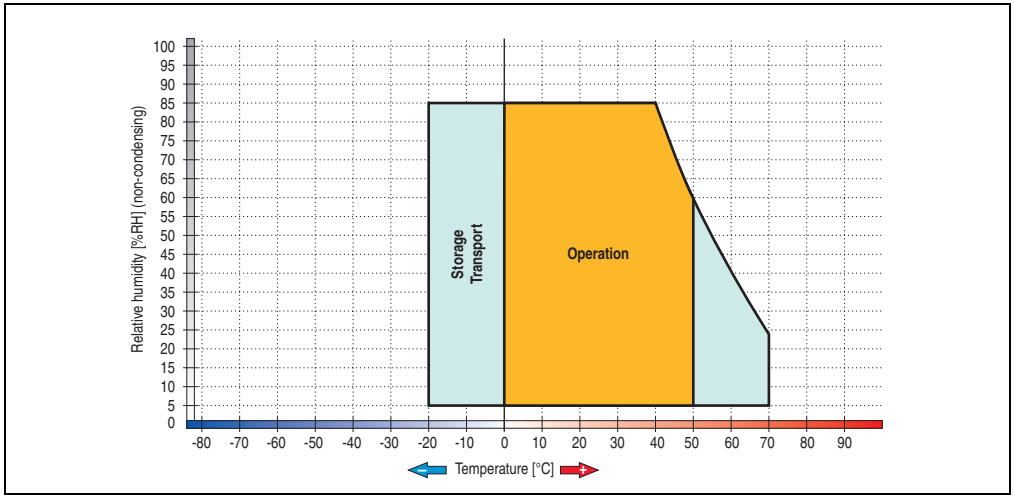


Figure 197: Temperature humidity diagram - 4PP452.0571-45

4.21.3 Dimensions

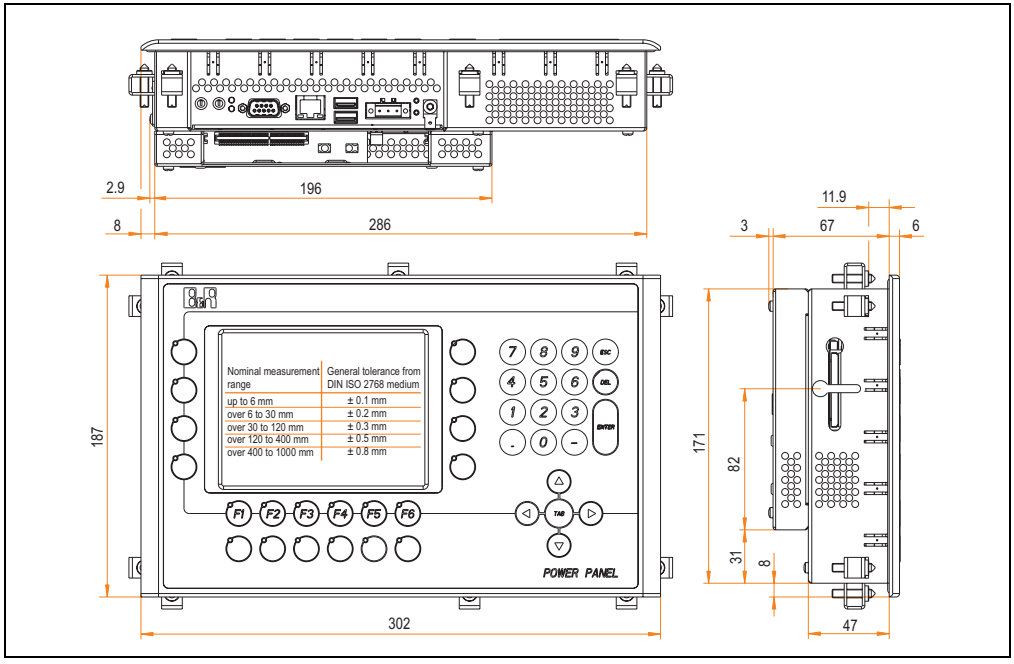


Figure 198: Dimensions - 4PP452.0571-45

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.

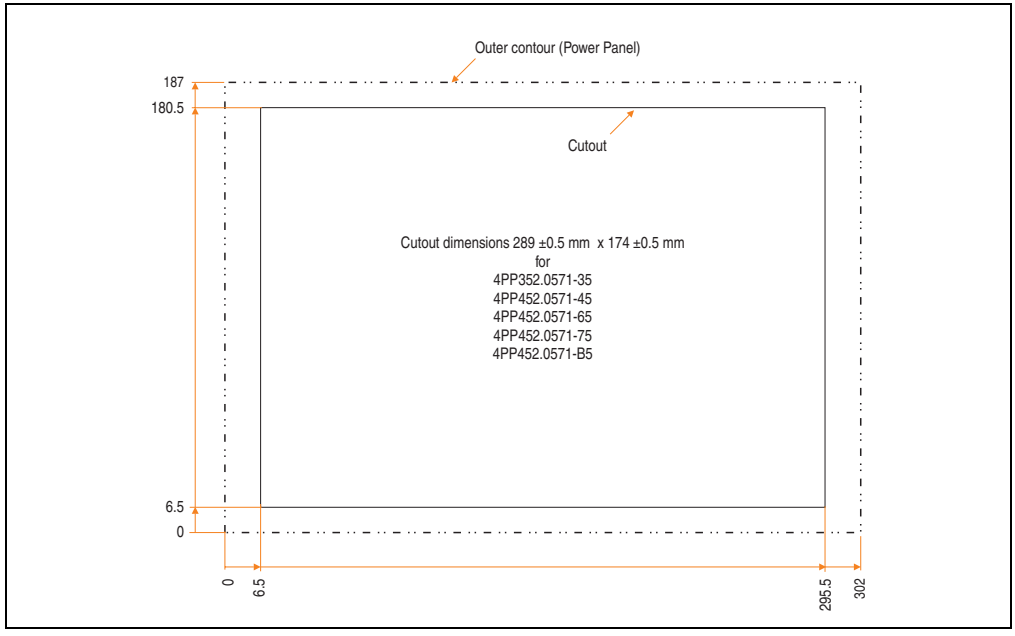


Figure 199: Cutout installation - 4PP452.0571-45

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 106: Contents of delivery - 4PP452.0571-45

4.22 Device 4PP452.0571-65

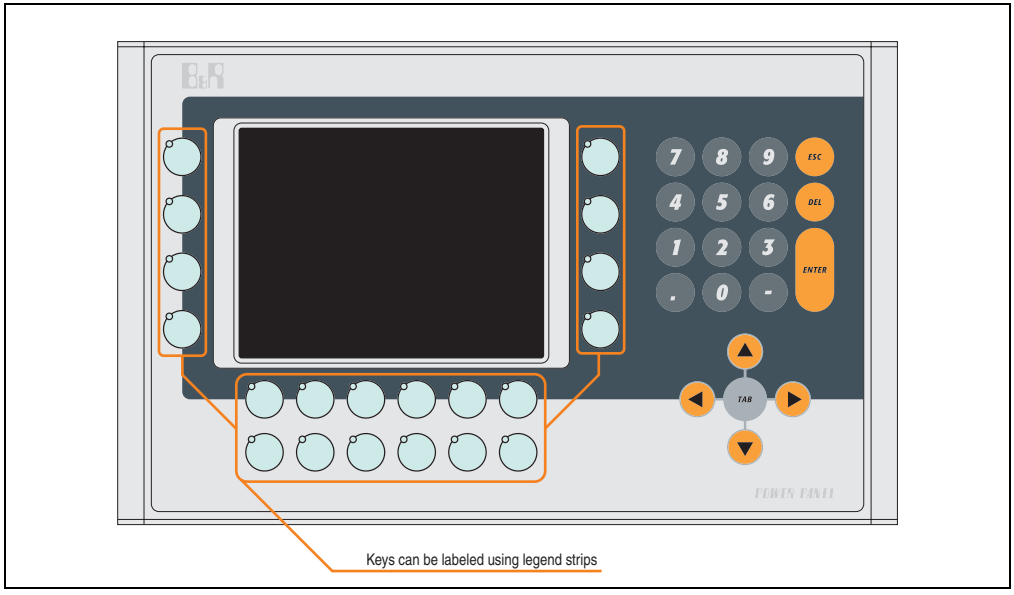


Figure 200: Front view - 4PP452.0571-65

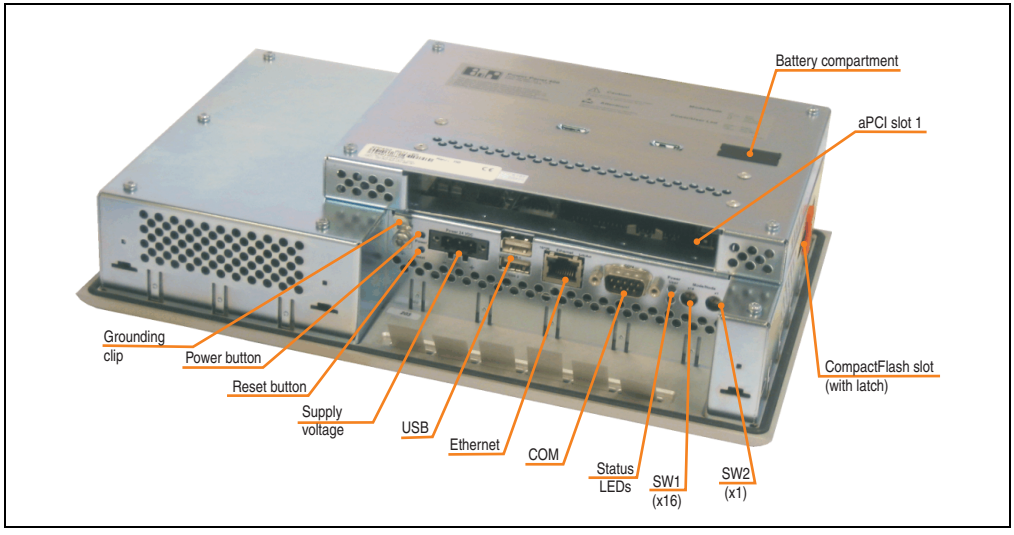


Figure 201: Rear view - 4PP452.0571-65

4.22.1 Technical data

Features	4PP452.0571-65
B&R ID-Code	$23C2
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 128 MB (64 MB < Rev. C0)
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	 512 KB Yes 256 kB
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 107: 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[4)] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)] 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 570) Horizontal Vertical Background lighting Brightness Half-brightness time[5)] Screen rotation	 Color LCD 5.7 in (144 mm) 512 colors [4)] QVGA, 320 x 240 pixels 40:1 Direction R / direction L =40° Direction U = 40°/ direction D = 50° 200 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen Touch screen type Technology Controller Degree of transmission	-
Filter glass Degree of transmission Coating	 95% On both sides
Keys/LED[6)] Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	 20 with LED (yellow) - 5 without LED 15 without LED - > 10^6 actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green) **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.**

Table 107: Technical data - 4PP452.0571-65 (Forts.)

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	Aluminum, naturally anodized[7)]
Design	Gray[7)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[7)]
Light background	Similar to Pantone 427CV[7)]
Orange keys	Similar to Pantone 151CV[7)]
Dark gray keys	Similar to Pantone 431CV[7)]
Legend strips (gray)	Similar to Pantone 429CV[7)]
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
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 4.22.2 "Temperature humidity diagram" on page 319
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[8)]	Max. 3000 m

Table 107: Technical data - 4PP452.0571-65 (Forts.)

1) Maintenance Controller Extended.

2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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 B&R Automation Studio - Visual Components.

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

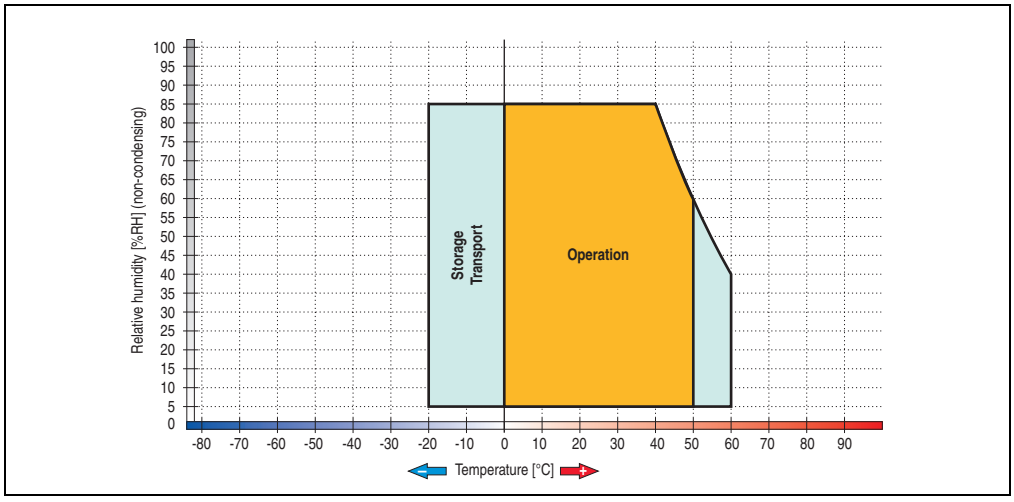


Figure 202: Temperature humidity diagram - 4PP452.0571-65

4.22.3 Dimensions

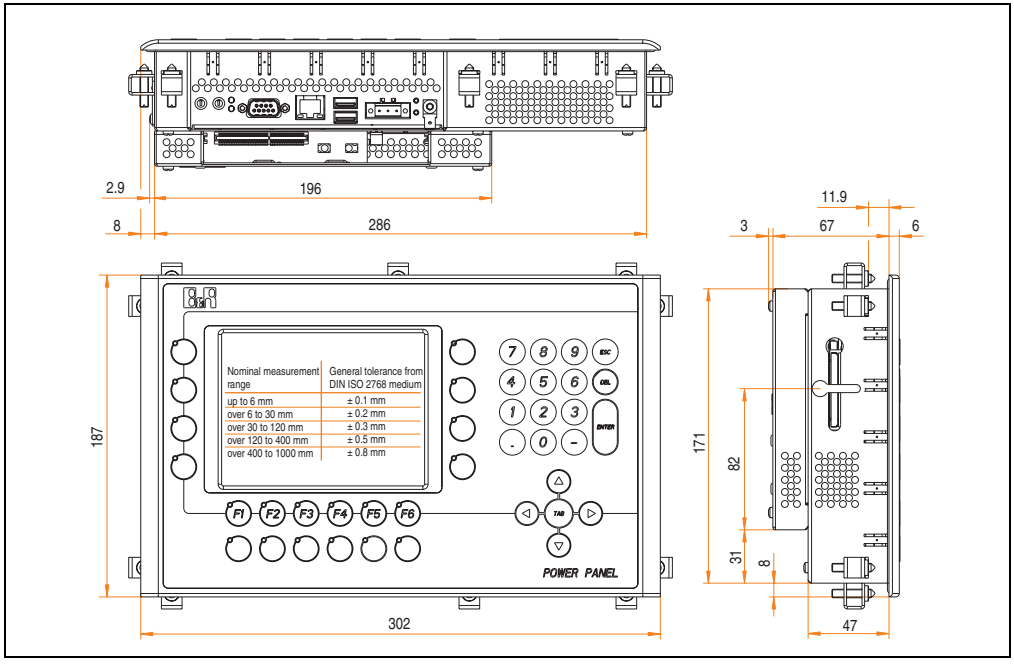


Figure 203: Dimensions - 4PP452.0571-65

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.

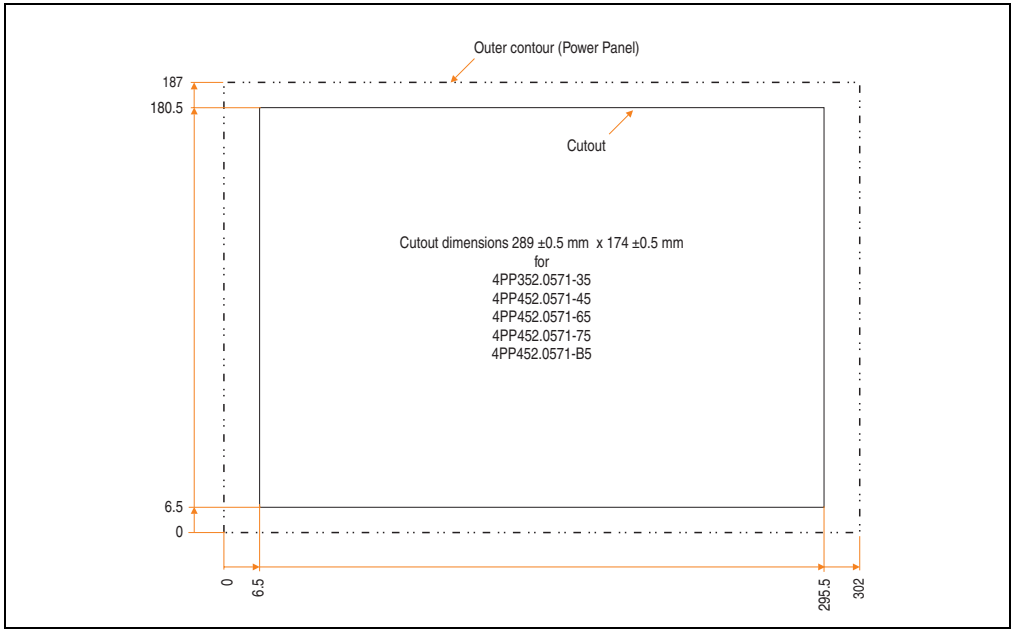


Figure 204: Cutout installation - 4PP452.0571-65

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 108: Contents of delivery - 4PP452.0571-65

4.23 Device 4PP452.0571-75

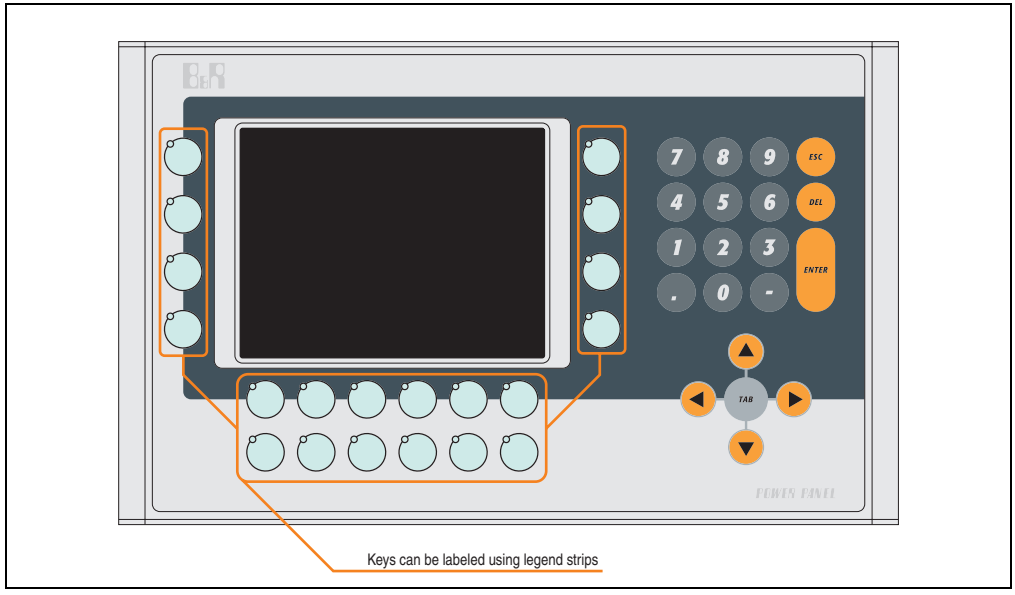


Figure 205: Front view - 4PP452.0571-75

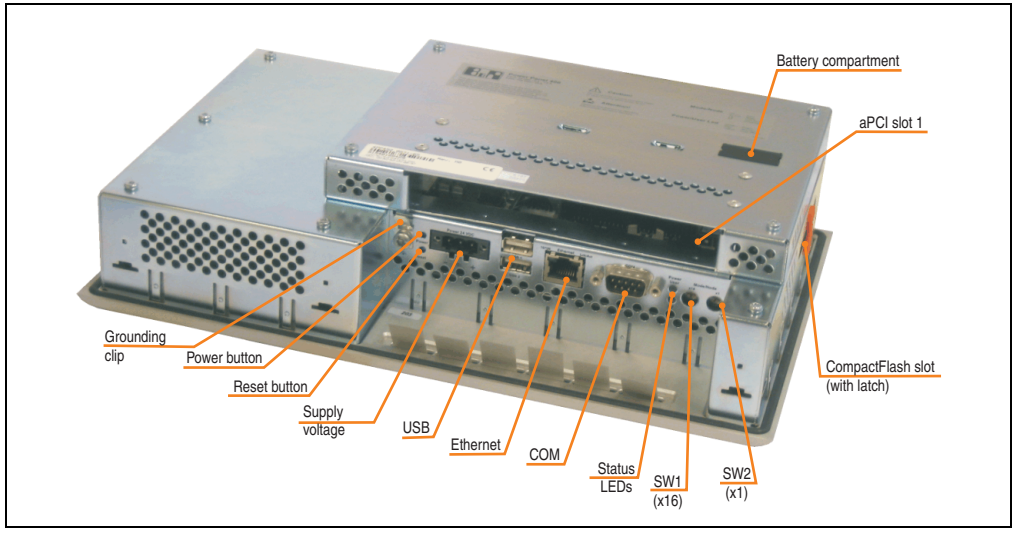


Figure 206: Rear view - 4PP452.0571-75

4.23.1 Technical data

Features	4PP452.0571-75 < Rev. D0	4PP452.0571-75 ≥ Rev. D0
B&R ID-Code	$A15C	
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)	
Flash	2 MB (for firmware)	
Memory Type Quantity	 DDR SDRAM 128 MB	
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)	
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	 512 KB Yes 256 kB	
Watchdog Controller	 MTCX[1)]	
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms	
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day	
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 109: Technical data - 4PP452.0571-75

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[4)] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)] 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 570) Horizontal Vertical Background lighting Brightness Half-brightness time[5)] Screen rotation	 Color TFT 5.7 in (144 mm) 262,144 colors [4)] QVGA, 320 x 240 pixels 400:1 Direction R / direction L =60° Direction U = 40°/ direction D = 50° 500 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426	 Color TFT 5.7 in (144 mm) 262,144 colors [3)] QVGA, 320 x 240 pixels 350:1 Direction R / direction L =65° Direction U = 65°/ direction D = 40° 500 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen Touch screen type Technology Controller Degree of transmission	-	
Filter glass Degree of transmission Coating	 95% On both sides	
Keys/LED[6)] Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	 20 with LED (yellow) - 5 without LED 15 without LED - > 10^6 actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green) **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.**	

Table 109: Technical data - 4PP452.0571-75 (Forts.)

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	Aluminum, naturally anodized[7)]	
Design	Gray[7)]	
Membrane	Polyester	
Dark gray border around display	Similar to Pantone 432CV[7)]	
Light background	Similar to Pantone 427CV[7)]	
Orange keys	Similar to Pantone 151CV[7)]	
Dark gray keys	Similar to Pantone 431CV[7)]	
Legend strips (gray)	Similar to Pantone 429CV[7)]	
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	
Storage	-20 to +60°C	
Transport	-20 to +60°C	
Relative humidity	See 4.23.2 "Temperature humidity diagram" on page 326	
Vibration		
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g	
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g	
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g	
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g	
Shock		
Operation	15 g, 11 ms	
Storage	30 g, 15 ms	
Transport	30 g, 15 ms	
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude[8)]	Max. 3000 m	

Table 109: Technical data - 4PP452.0571-75 (Forts.)

1) Maintenance Controller Extended.

2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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 B&R Automation Studio - Visual Components.

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

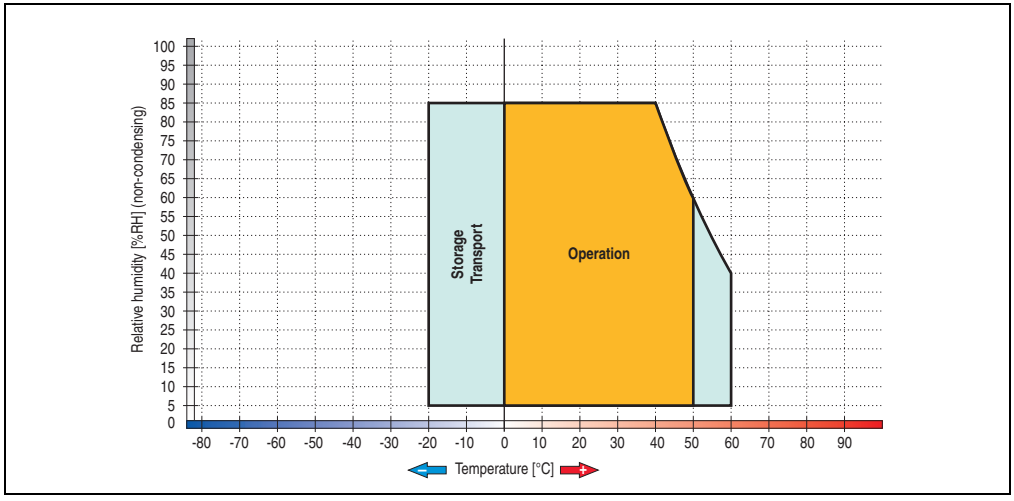


Figure 207: Temperature humidity diagram - 4PP452.0571-75

4.23.3 Dimensions

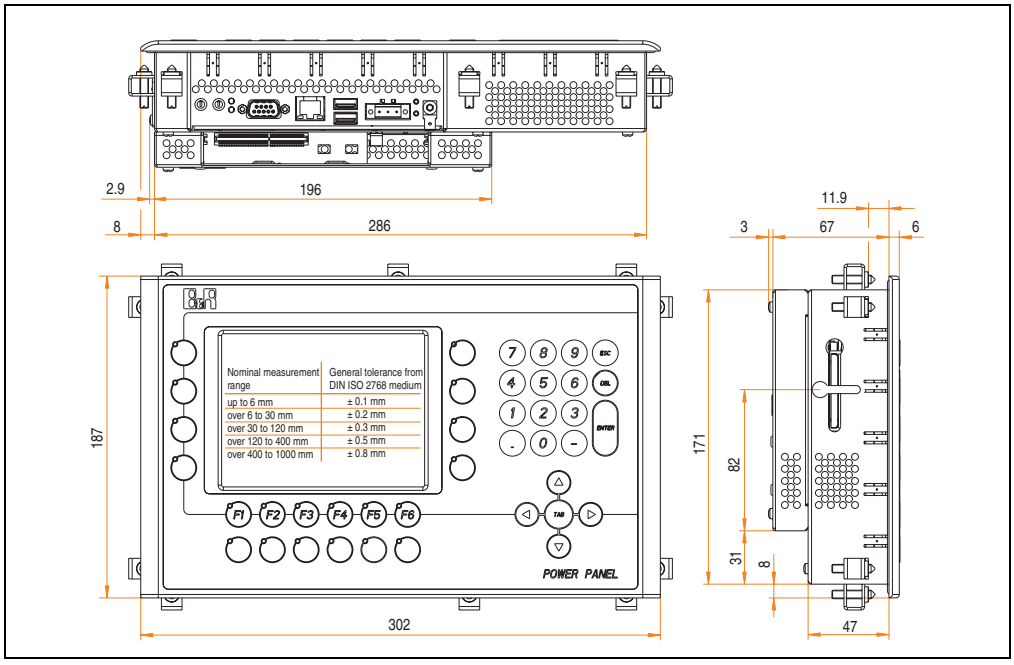


Figure 208: Dimensions - 4PP452.0571-75

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.

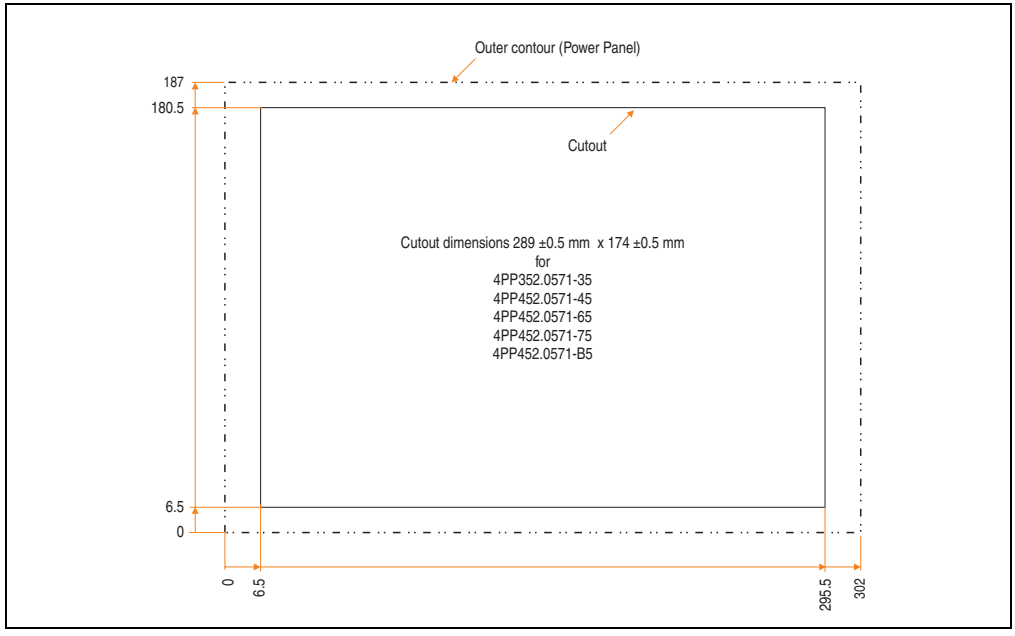


Figure 209: Cutout installation - 4PP452.0571-75

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 110: Contents of delivery - 4PP452.0571-75

4.24 Device 4PP452.0571-B5

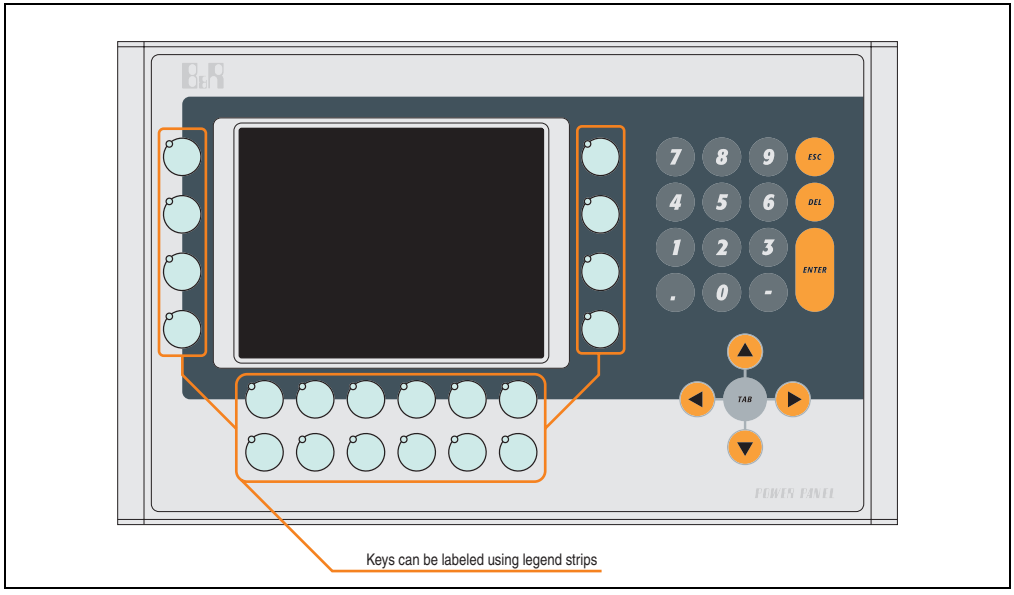


Figure 210: Front view - 4PP452.0571-B5

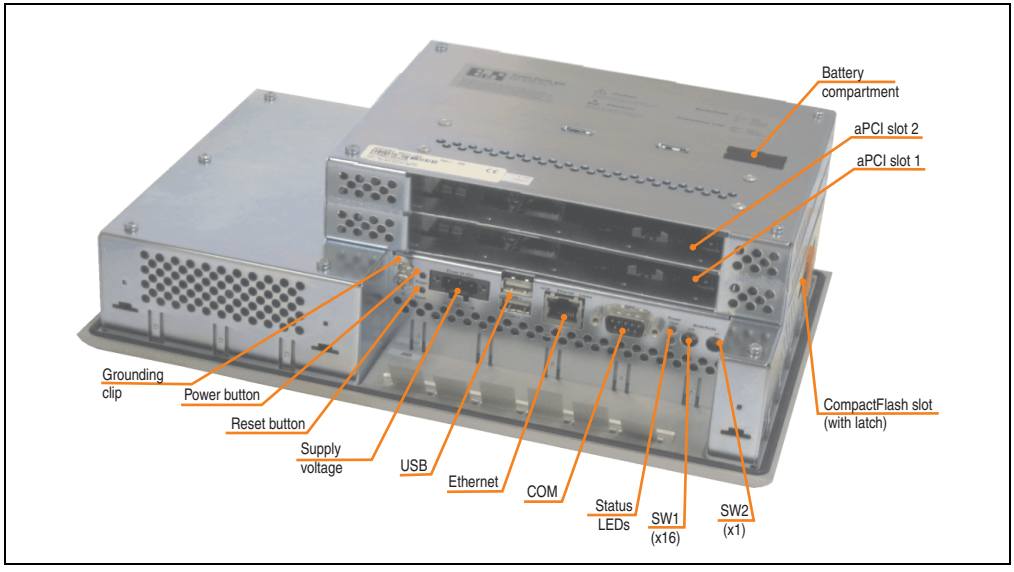


Figure 211: Rear view - 4PP452.0571-B5

4.24.1 Technical data

Features	4PP452.0571-B5 < Rev. D0	4PP452.0571-B5 ≥ Rev. D0
B&R ID-Code	$A532	
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)	
Flash	2 MB (for firmware)	
Memory Type Quantity	 DDR SDRAM 128 MB	
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)	
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	 512 KB Yes 256 kB	
Watchdog Controller	 MTCX[1)]	
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms	
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day	
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 111: Technical data - 4PP452.0571-B5

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[4)] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)] 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 570) Horizontal Vertical Background lighting Brightness Half-brightness time[5)] Screen rotation	 Color TFT 5.7 in (144 mm) 262,144 colors [4)] QVGA, 320 x 240 pixels 400:1 Direction R / direction L =60° Direction U = 40°/ direction D = 50° 500 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426	 Color TFT 5.7 in (144 mm) 262,144 colors [3)] QVGA, 320 x 240 pixels 350:1 Direction R / direction L =65° Direction U = 65°/ direction D = 40° 500 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen Touch screen type Technology Controller Degree of transmission	-	
Filter glass Degree of transmission Coating	 95% On both sides	
Keys/LED[6)] Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	 20 with LED (yellow) - 5 without LED 15 without LED - > 10^6 actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green) **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.**	

Table 111: Technical data - 4PP452.0571-B5 (Forts.)

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	Aluminum, naturally anodized[7)]	
Design	Gray[7)]	
Membrane	Polyester	
Dark gray border around display	Similar to Pantone 432CV[7)]	
Light background	Similar to Pantone 427CV[7)]	
Orange keys	Similar to Pantone 151CV[7)]	
Dark gray keys	Similar to Pantone 431CV[7)]	
Legend strips (gray)	Similar to Pantone 429CV[7)]	
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	
Storage	-20 to +60°C	
Transport	-20 to +60°C	
Relative humidity	See 4.24.2 "Temperature humidity diagram" on page 333	
Vibration		
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g	
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g	
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g	
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g	
Shock		
Operation	15 g, 11 ms	
Storage	30 g, 15 ms	
Transport	30 g, 15 ms	
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude[8)]	Max. 3000 m	

Table 111: Technical data - 4PP452.0571-B5 (Forts.)

1) Maintenance controller extended.

2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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 B&R Automation Studio - Visual Components.

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

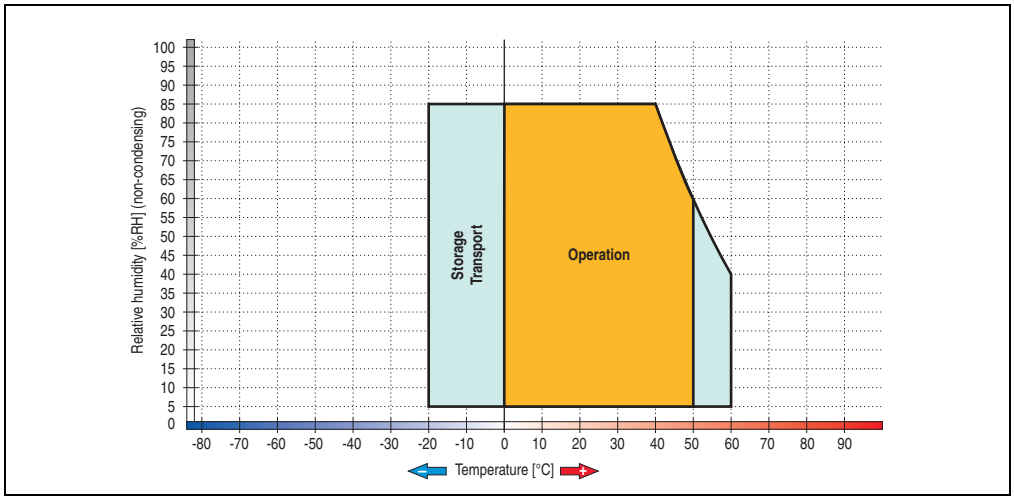


Figure 212: Temperature humidity diagram - 4PP452.0571-B5

4.24.3 Dimensions

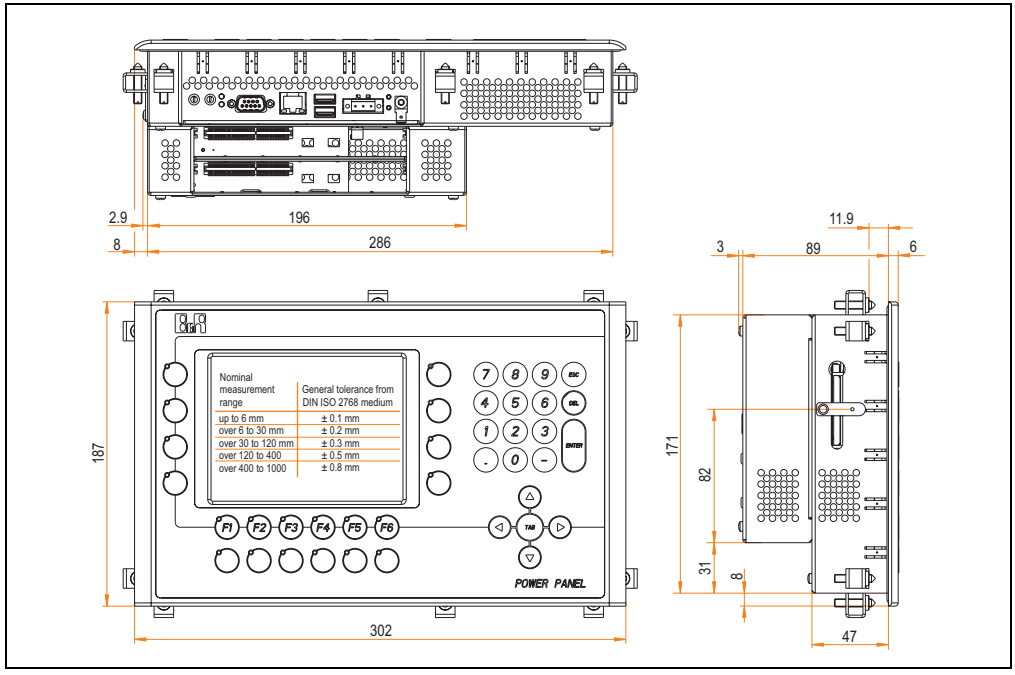


Figure 213: Dimensions - 4PP452.0571-B5

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.

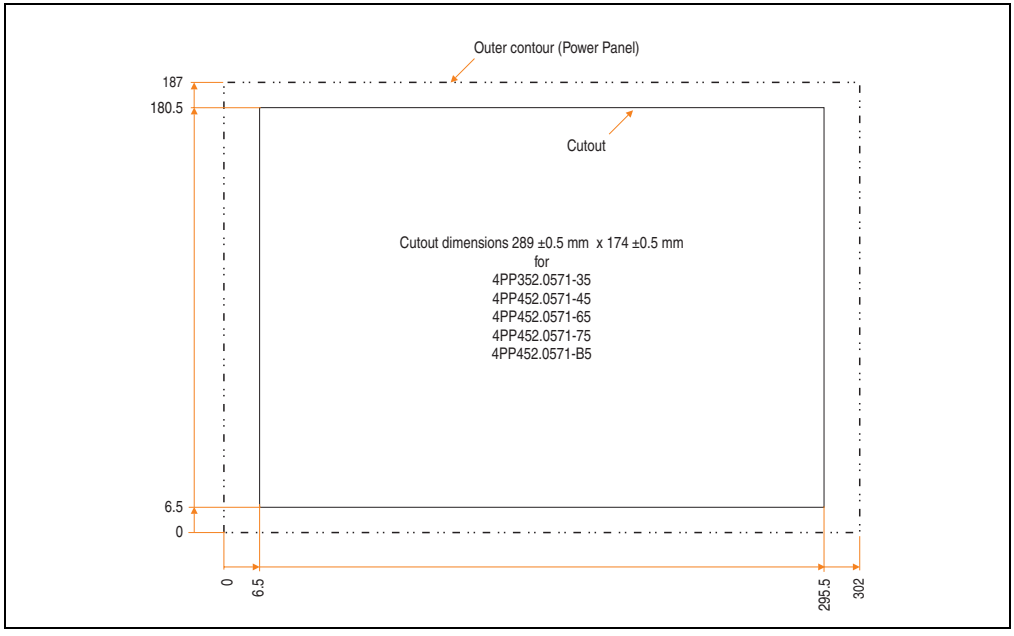


Figure 214: Cutout installation - 4PP452.0571-B5

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 112: Contents of delivery - 4PP452.0571-B5

4.25 Device 4PP452.1043-75

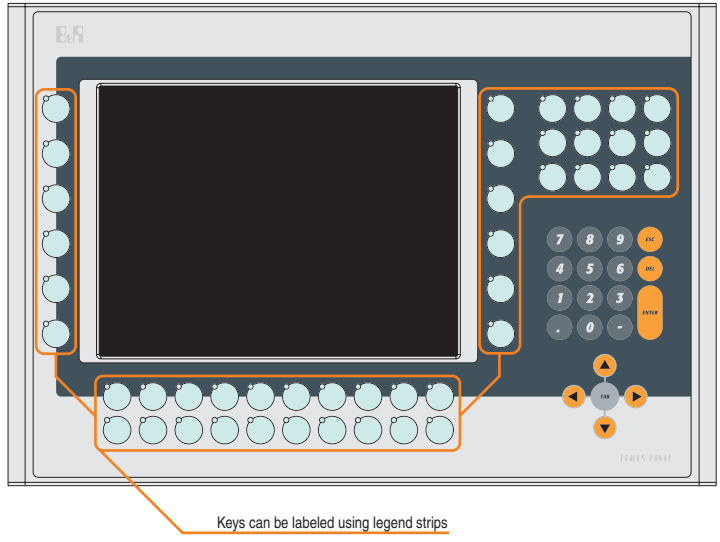


Figure 215: Front view - 4PP452.1043-75

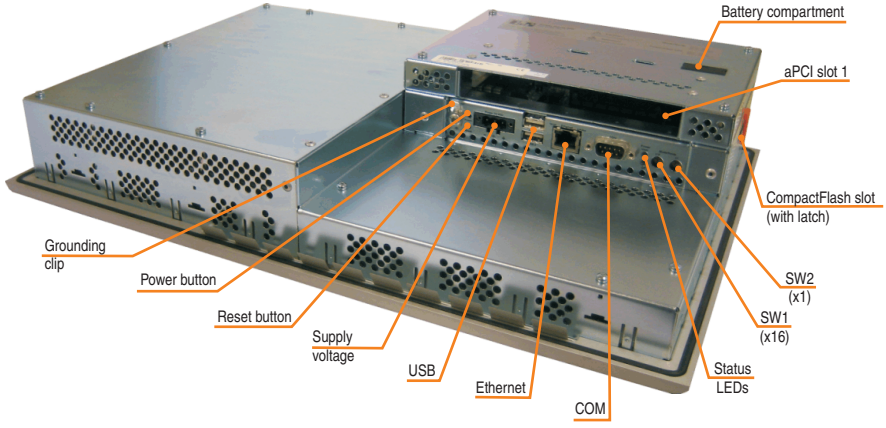


Figure 216: Rear view - 4PP452.1043-75

4.25.1 Technical data

Features	4PP452.1043-75
B&R ID-Code	$A533
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 128 MB (64 MB < Rev. C0)
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	 512 KB Yes 256 kB
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 113: Technical data - 4PP452.1043-75

Features	4PP452.1043-75
Serial interface	
Type	RS232, modem-capable, not electrically isolated
UART	16C550 compatible, 16-byte FIFO
Transfer rate	Max. 115 kBaud
Connection	9-pin DSUB
USB interface	
Type	USB 1.1, USB 2.0[4]
Amount	2
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4]
Connection	Type A
Current load	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 (see B&R System 2005 manual for available aPCI interface modules)
Holding torque for aPCI module	Max. 0.7 Nm
Display	
Type	Color TFT
Diagonal	10.4 inch (264 mm)
Colors	262,144 colors [4]
Resolution	VGA, 640 x 480 pixels
Contrast	600:1
Viewing angle (see page 570)	
Horizontal	Direction R / direction L =70°
Vertical	Direction U = 45°/ direction D = 35°
Background lighting	
Brightness	450 cd/m²
Half-brightness time[5]	55,000 hours
Screen rotation	Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen	-
Touch screen type	
Technology	
Controller	
Degree of transmission	
Filter glass	-
Degree of transmission	
Coating	
Keys/LED[6]	
Function keys	44 with LED (yellow)
Soft keys	-
Cursor keys	5 without LED
Number block	15 without LED
Other keys	-
Key lifespan	> 1,000,000 actuations with 1 ±0.3 to 3 ±0.3 N operating force
LED brightness	Typ. 12 mcd (yellow) and 20 mcd (green)
	Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.

Table 113: Technical data - 4PP452.1043-75 (Forts.)

Electrical characteristics	4PP452.1043-75
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	Aluminum, naturally anodized[7)]
Design	Gray[7)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[7)]
Light background	Similar to Pantone 427CV[7)]
Orange keys	Similar to Pantone 151CV[7)]
Dark gray keys	Similar to Pantone 431CV[7)]
Legend strips (gray)	Similar to Pantone 429CV[7)]
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
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 4.25.2 "Temperature humidity diagram" on page 340
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[8)]	Max. 3000 m

Table 113: Technical data - 4PP452.1043-75 (Forts.)

1) Maintenance controller extended.

2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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 B&R Automation Studio - Visual Components.

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

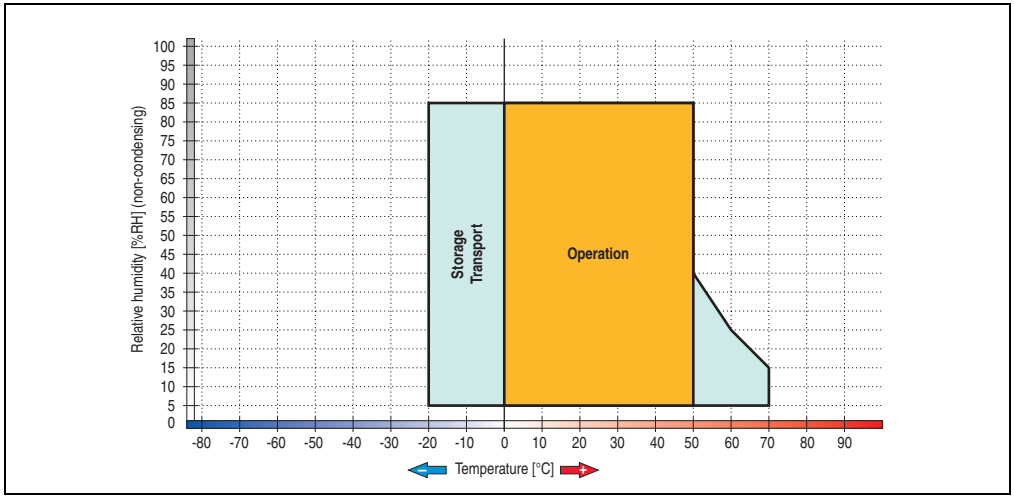


Figure 217: Temperature humidity diagram - 4PP452.1043-75

4.25.3 Dimensions

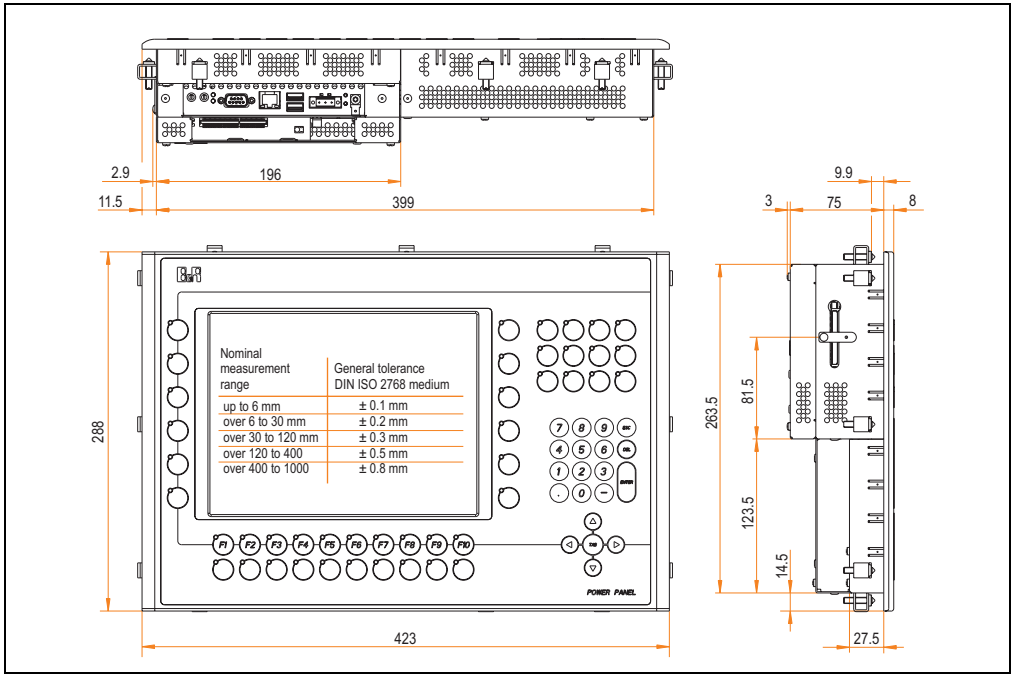


Figure 218: Dimensions - 4PP452.1043-75

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.

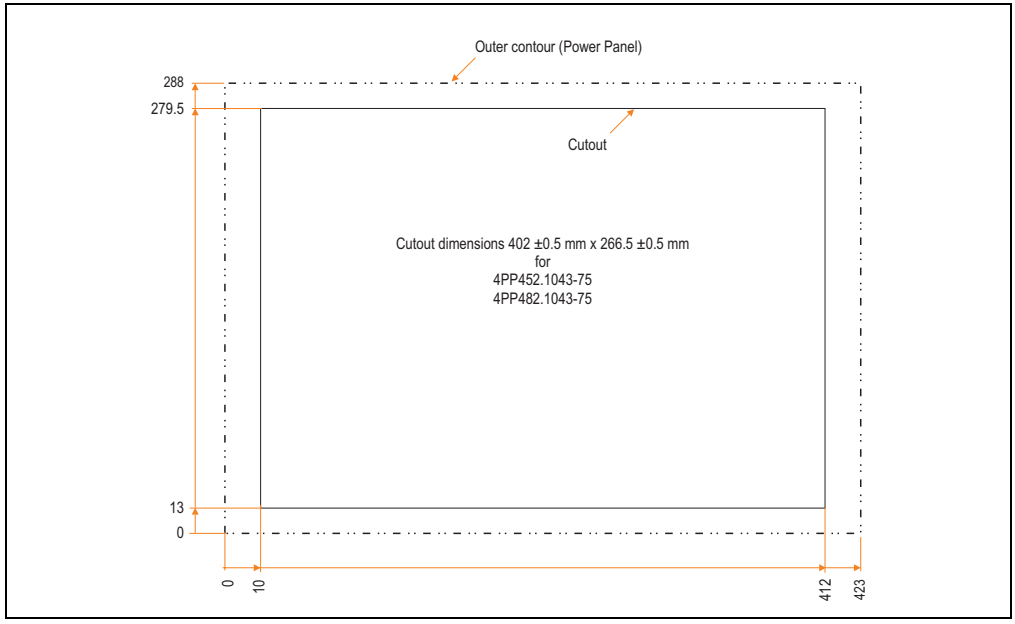


Figure 219: Cutout installation - 4PP452.1043-75

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 114: Contents of delivery - 4PP452.1043-75

4.26 Device 4PP480.1043-75

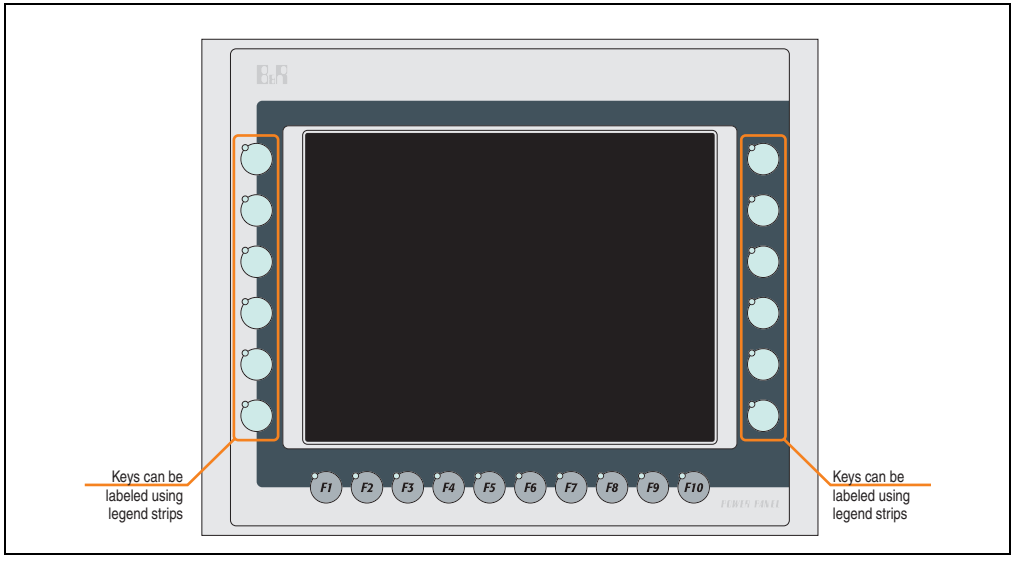


Figure 220: Front view - 4PP480.1043-75

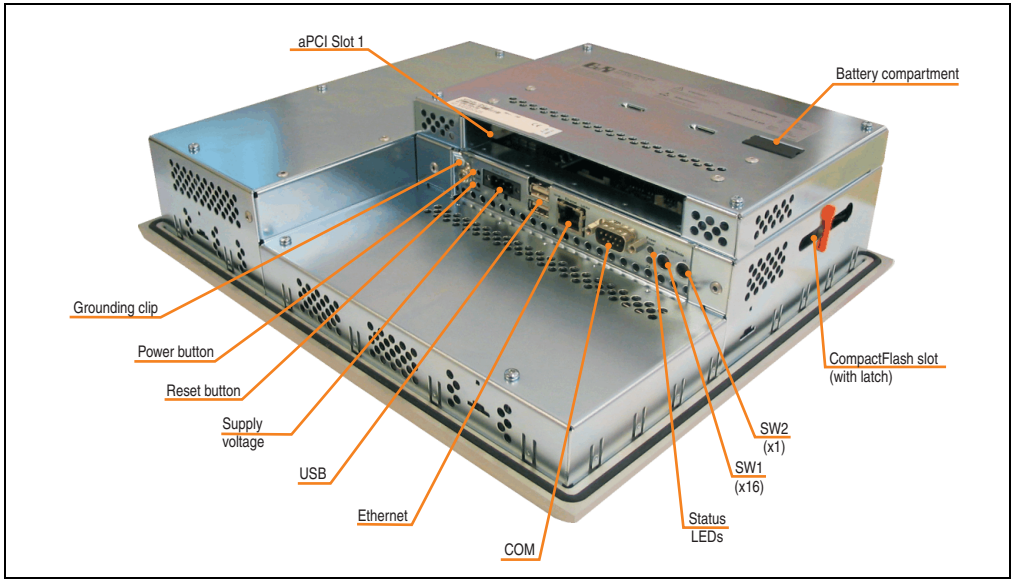


Figure 221: Rear view - 4PP480.1043-75

4.26.1 Technical data

Features	4PP480.1043-75
B&R ID-Code	$23C3
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 128 MB (64 MB < Rev. C0)
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	 512 KB Yes 256 kB
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 115: Technical data - 4PP480.1043-75

Features	4PP480.1043-75
Serial interface	
Type	RS232, modem-capable, not electrically isolated
UART	16C550 compatible, 16-byte FIFO
Transfer rate	Max. 115 kBaud
Connection	9-pin DSUB
USB interface	
Type	USB 1.1, USB 2.0[4)]
Amount	2
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)]
Connection	Type A
Current load	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 (see B&R System 2005 manual for available aPCI interface modules)
Holding torque for aPCI module	Max. 0.7 Nm
Display	
Type	Color TFT
Diagonal	10.4 inch (264 mm)
Colors	262,144 colors [4)]
Resolution	VGA, 640 x 480 pixels
Contrast	600:1
Viewing angle (see page 570)	
Horizontal	Direction R / direction L =70°
Vertical	Direction U = 45°/ direction D = 35°
Background lighting	
Brightness	450 cd/m²
Half-brightness time[5)]	55,000 hours
Screen rotation	Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen	
Touch screen type	Elo Accu Touch
Technology	Analog, resistive
Controller	Elo, serial, 12- bit
Degree of transmission	Up to 80% ±5%
Filter glass	-
Degree of transmission	
Coating	
Keys/LED[6)]	
Function keys	12 with LED (yellow)
Soft keys	10 with LED (yellow)
Cursor keys	-
Number block	-
Other keys	-
Key lifespan	> 10^6 actuations with 1 ±0.3 to 3 ±0.3 N operating force
LED brightness	Typ. 12 mcd (yellow) and 20 mcd (green)
	Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.

Table 115: Technical data - 4PP480.1043-75 (Forts.)

Electrical characteristics	4PP480.1043-75
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	Aluminum, naturally anodized[7)]
Design	Gray[7)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[7)]
Light background	Similar to Pantone 427CV[7)]
Legend strips (gray)	Similar to Pantone 429CV[7)]
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
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 4.26.2 "Temperature humidity diagram" on page 347
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[8)]	Max. 3000 m

Table 115: Technical data - 4PP480.1043-75 (Forts.)

1) Maintenance Controller Extended.

2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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 B&R Automation Studio - Visual Components.
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

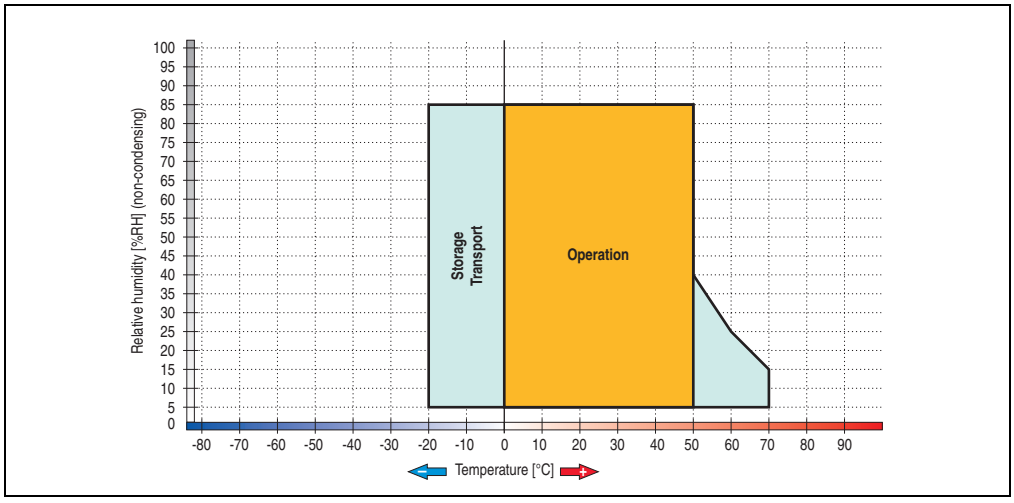


Figure 222: Temperature humidity diagram - 4PP480.1043-75

4.26.3 Dimensions

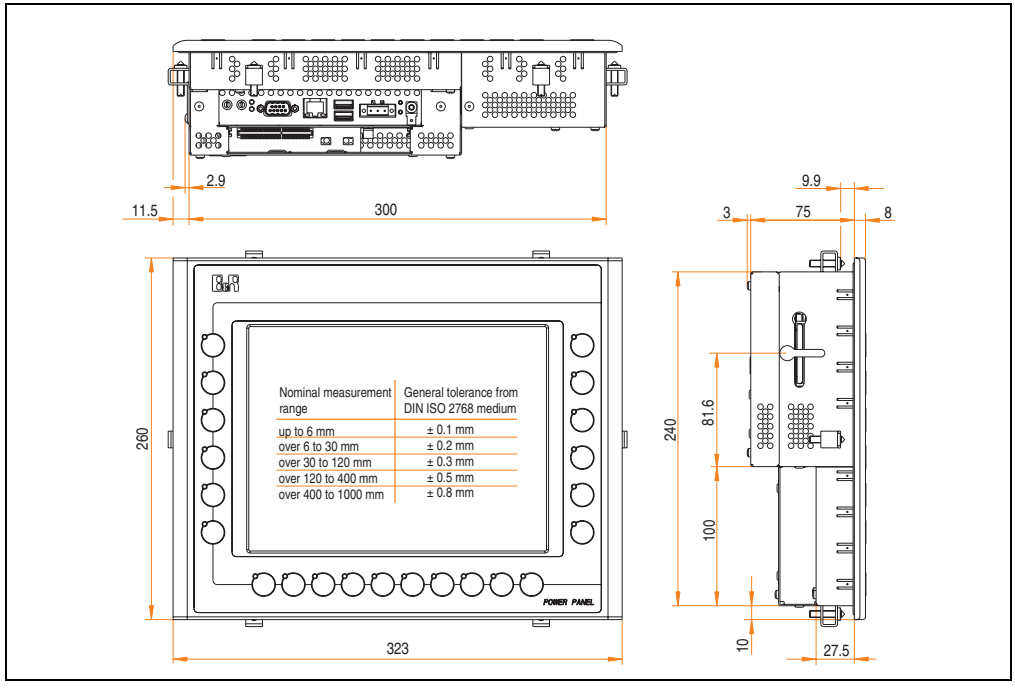


Figure 223: Dimensions - 4PP480.1043-75

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.

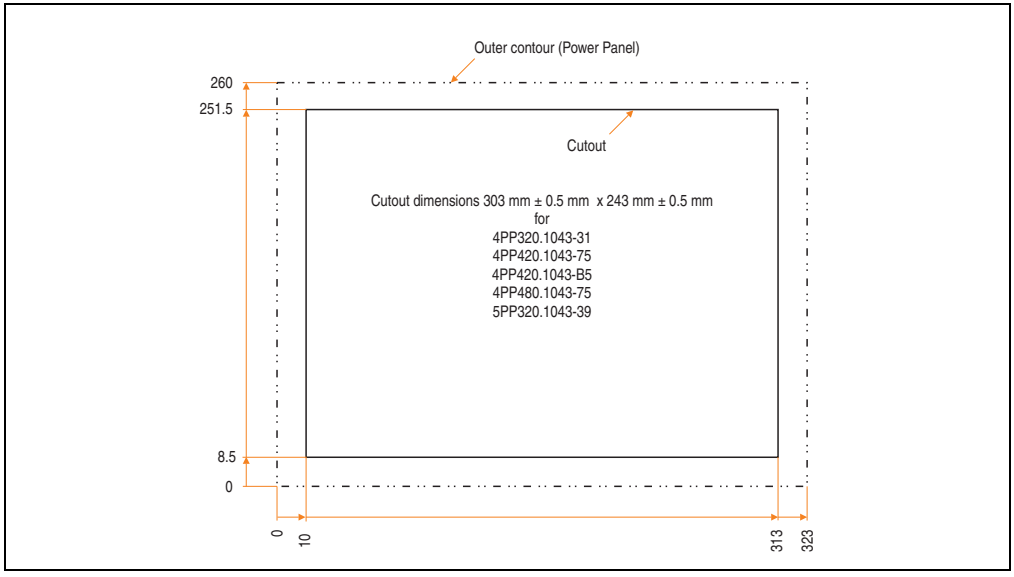


Figure 224: Cutout installation - 4PP480.1043-75

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 116: Contents of delivery - 4PP480.1043-75

4.27 Device 4PP480.1505-75

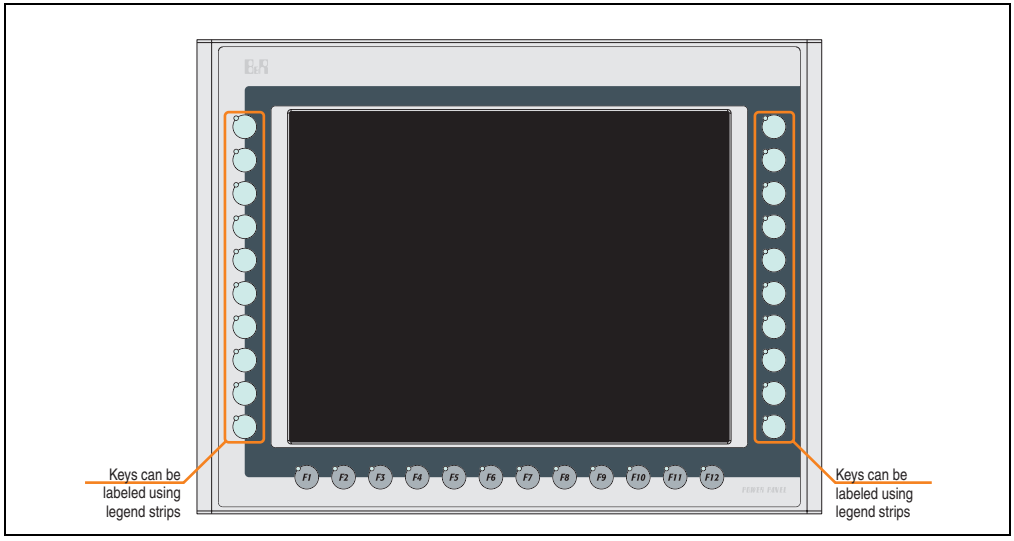


Figure 225: Front view - 4PP480.1505-75

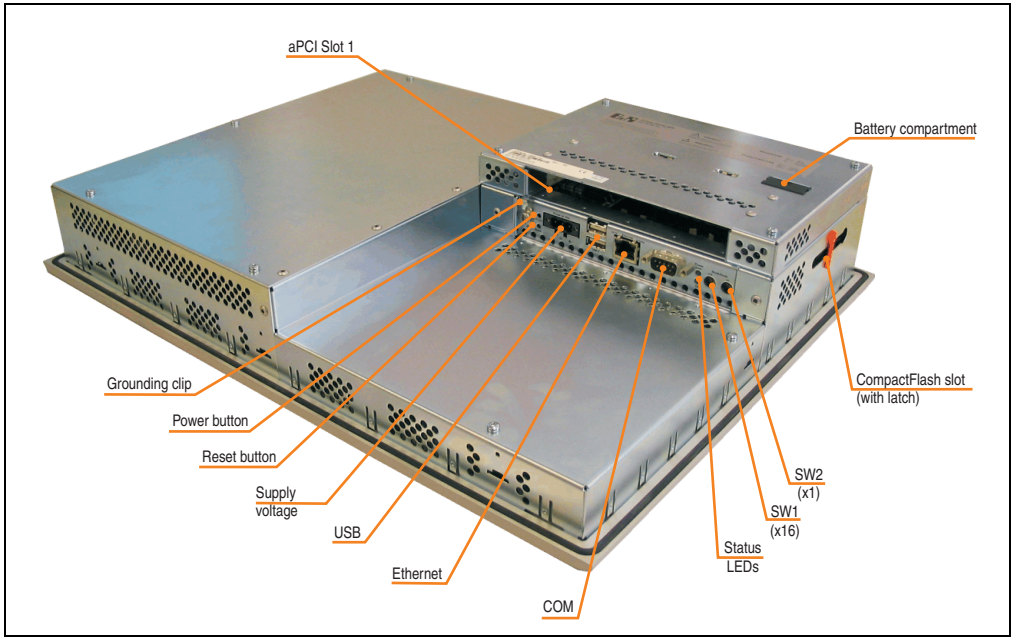


Figure 226: Rear view - 4PP480.1505-75

4.27.1 Technical data

Features	4PP480.1505-75
B&R ID-Code	$23C4
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 128 MB (64 MB < Rev. C0)
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	 512 KB Yes 256 kB
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 117: Technical data - 4PP480.1505-75

Features	4PP480.1505-75
Serial interface	
Type	RS232, modem-capable, not electrically isolated
UART	16C550 compatible, 16-byte FIFO
Transfer rate	Max. 115 kBaud
Connection	9-pin DSUB
USB interface	
Type	USB 1.1, USB 2.0[4)]
Amount	2
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)]
Connection	Type A
Current load	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 (see B&R System 2005 manual for available aPCI interface modules)
Holding torque for aPCI module	Max. 0.7 Nm
Display	
Type	Color TFT
Diagonal	38.10 cm (380 mm)
Colors	16.7 million colors[4)]
Resolution	XGA, 1024 x 768 pixels
Contrast	400:1
Viewing angle (see page 570)	
Horizontal	Direction R / direction L =85°
Vertical	Direction U / direction D = 85°
Background lighting	
Brightness	250 cd/m²
Half-brightness time[5)]	50,000 hours
Screen rotation	Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen	
Touch screen type	Elo Accu Touch
Technology	Analog, resistive
Controller	Elo, serial, 12- bit
Degree of transmission	Up to 80% ±5%
Filter glass	-
Degree of transmission	
Coating	
Keys/LED[6)]	
Function keys	20 with LED (yellow)
Soft keys	12 with LED (yellow)
Cursor keys	-
Number block	-
Other keys	-
Key lifespan	> 10^6 actuations with 1 ±0.3 to 3 ±0.3 N operating force
LED brightness	Typ. 12 mcd (yellow) and 20 mcd (green)
	Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.

Table 117: Technical data - 4PP480.1505-75 (Forts.)

Electrical characteristics	4PP480.1505-75
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	Aluminum, naturally anodized[7)]
Design	Gray[7)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[7)]
Light background	Similar to Pantone 427CV[7)]
Legend strips (gray)	Similar to Pantone 429CV[7)]
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
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 4.27.2 "Temperature humidity diagram" on page 354
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[8)]	Max. 3000 m

Table 117: Technical data - 4PP480.1505-75 (Forts.)

1) Maintenance controller extended.

2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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 B&R Automation Studio - Visual Components.
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

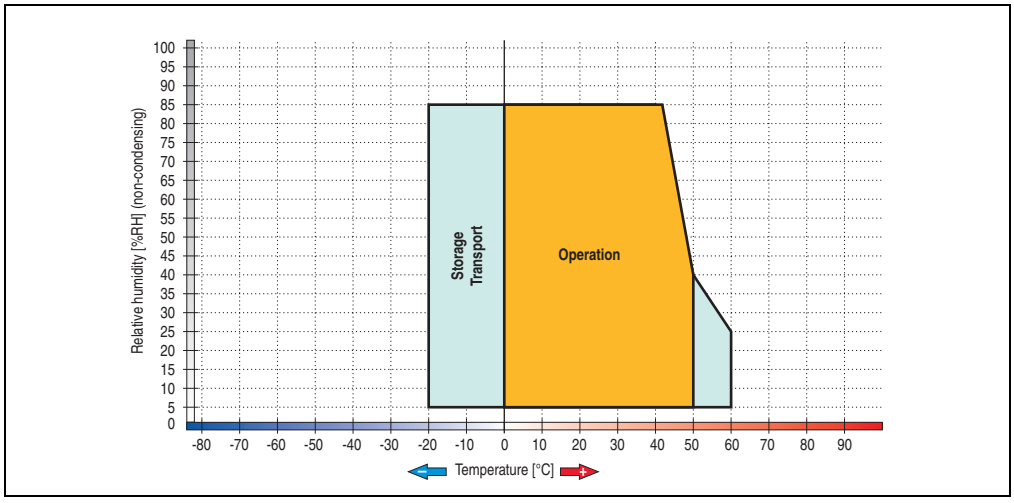


Figure 227: Temperature humidity diagram - 4PP480.1505-75

4.27.3 Dimensions

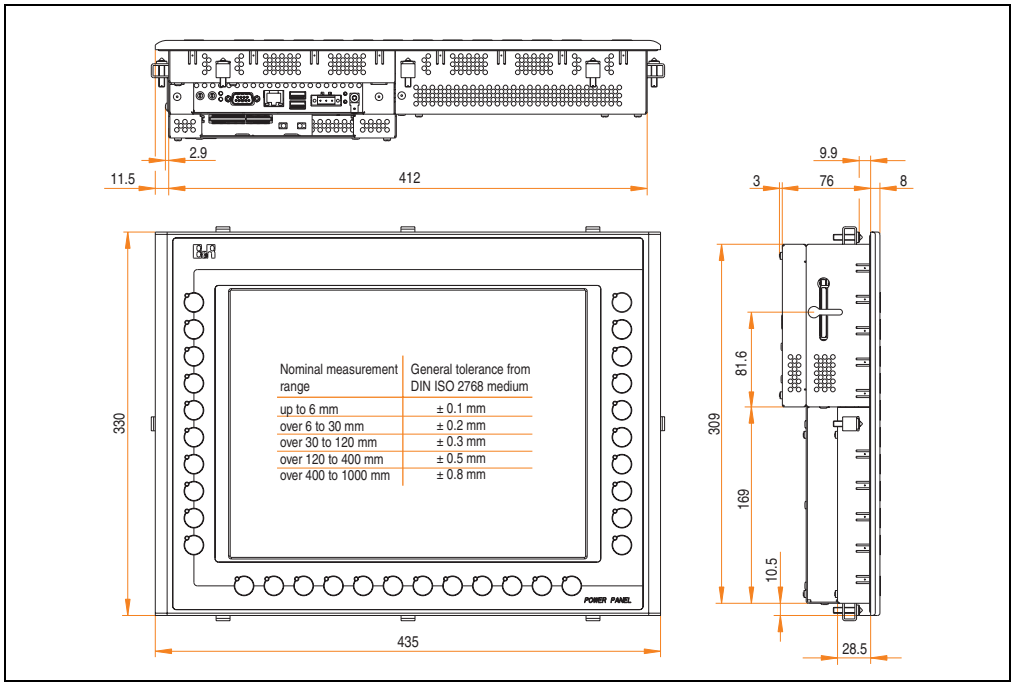


Figure 228: Dimensions - 4PP480.1505-75

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.

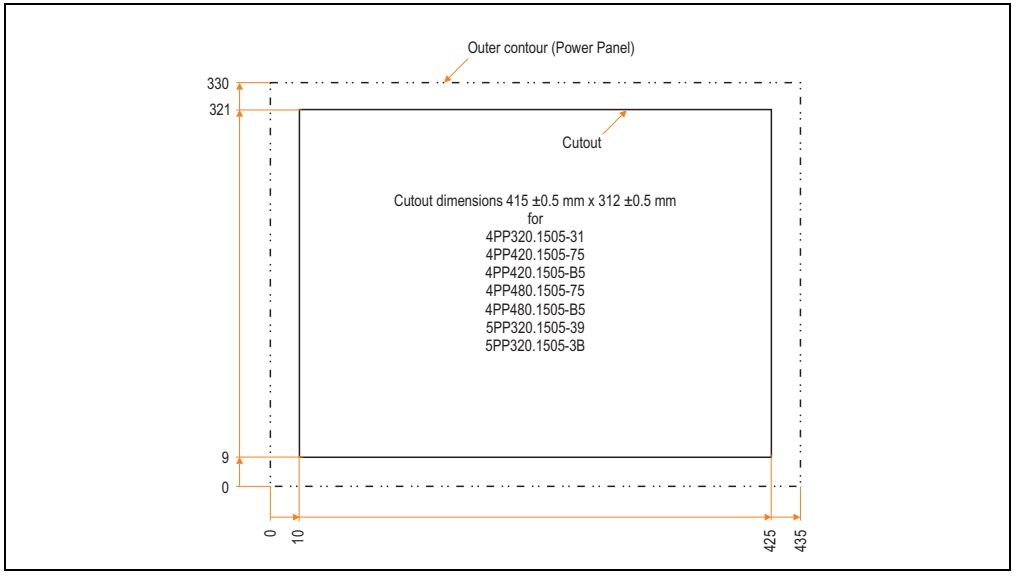


Figure 229: Cutout installation - 4PP480.1505-75

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 118: Contents of delivery - 4PP480.1505-75

4.28 Device 4PP480.1505-B5

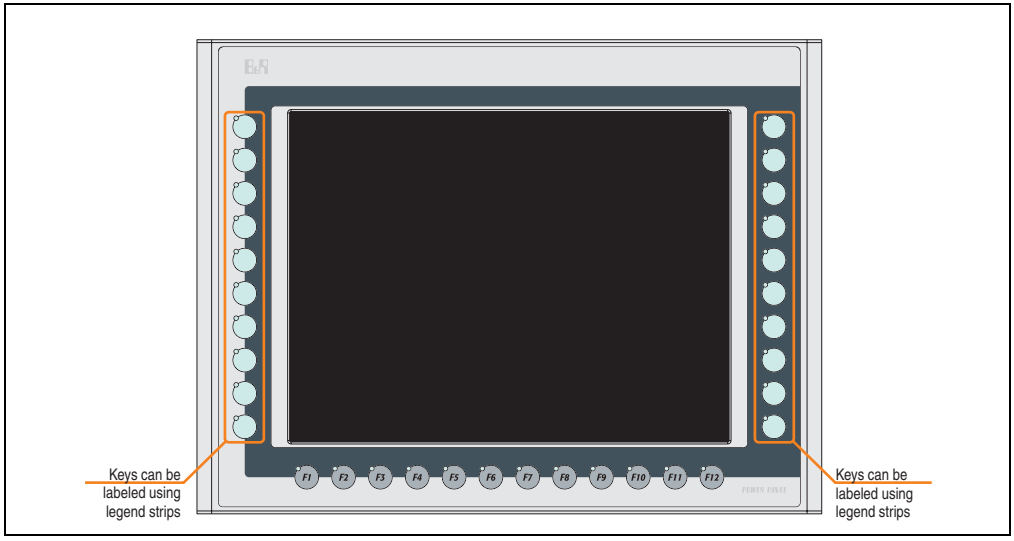


Figure 230: Front view - 4PP480.1505-B5

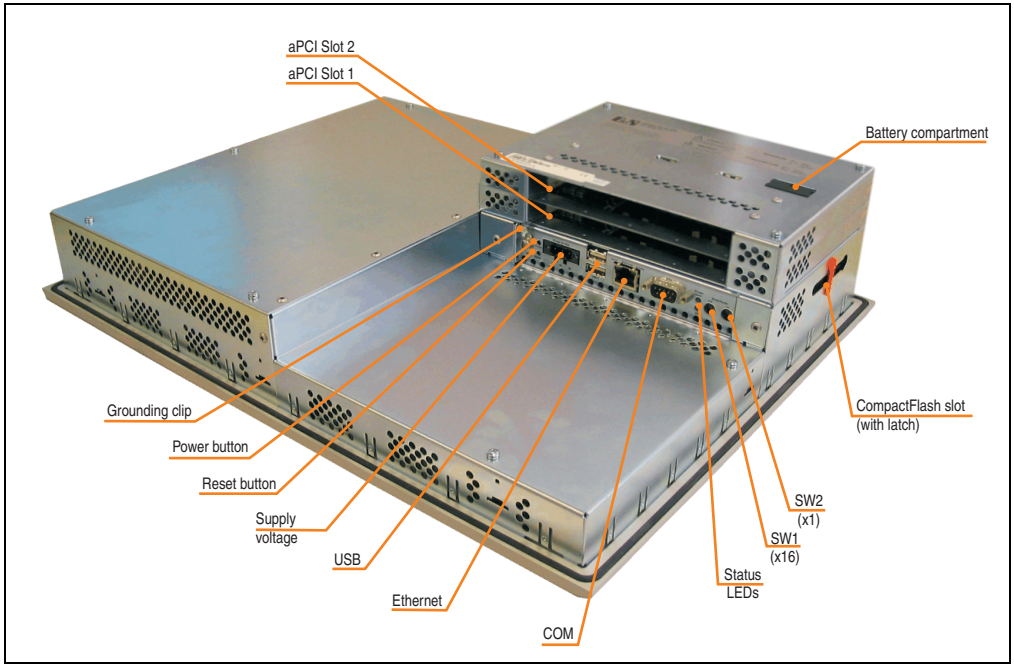


Figure 231: Rear view - 4PP480.1505-B5

4.28.1 Technical data

Features	4PP480.1505-B5
B&R ID-Code	$A52D
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 128 MB (64 MB < Rev. C0)
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	 512 KB Yes 256 kB
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 119: Technical data - 4PP480.1505-B5

Features	4PP480.1505-B5
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[4)] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)] 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 570) Horizontal Vertical Background lighting Brightness Half-brightness time[5)] Screen rotation	 Color TFT 38.10 cm (380 mm) 16.7 million colors[4)] XGA, 1024 x 768 pixels 400:1 Direction R / direction L =85° Direction U / direction D = 85° 250 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen Touch screen type Technology Controller Degree of transmission	 Elo Accu Touch Analog, resistive Elo, serial, 12- bit Up to 80% ±5%
Filter glass Degree of transmission Coating	-
Keys/LED[6)] Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	 20 with LED (yellow) 12 with LED (yellow) - - - > 10^6 actuations with 1 ±0.3 to 3 ±0.3 N operating force Typ. 12 mcd (yellow) and 20 mcd (green) **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.**

Table 119: Technical data - 4PP480.1505-B5 (Forts.)

Electrical characteristics	4PP480.1505-B5
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	Aluminum, naturally anodized[7)]
Design	Gray[7)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[7)]
Light background	Similar to Pantone 427CV[7)]
Legend strips (gray)	Similar to Pantone 429CV[7)]
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
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 4.28.2 "Temperature humidity diagram" on page 361
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[8)]	Max. 3000 m

Table 119: Technical data - 4PP480.1505-B5 (Forts.)

1) Maintenance controller extended.

2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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 B&R Automation Studio - Visual Components.
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

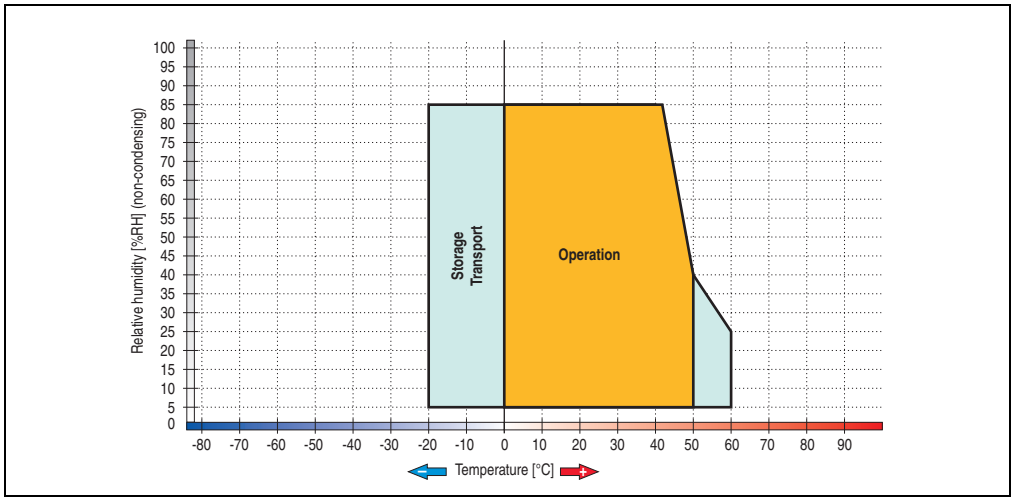


Figure 232: Temperature humidity diagram - 4PP480.1505-B5

4.28.3 Dimensions

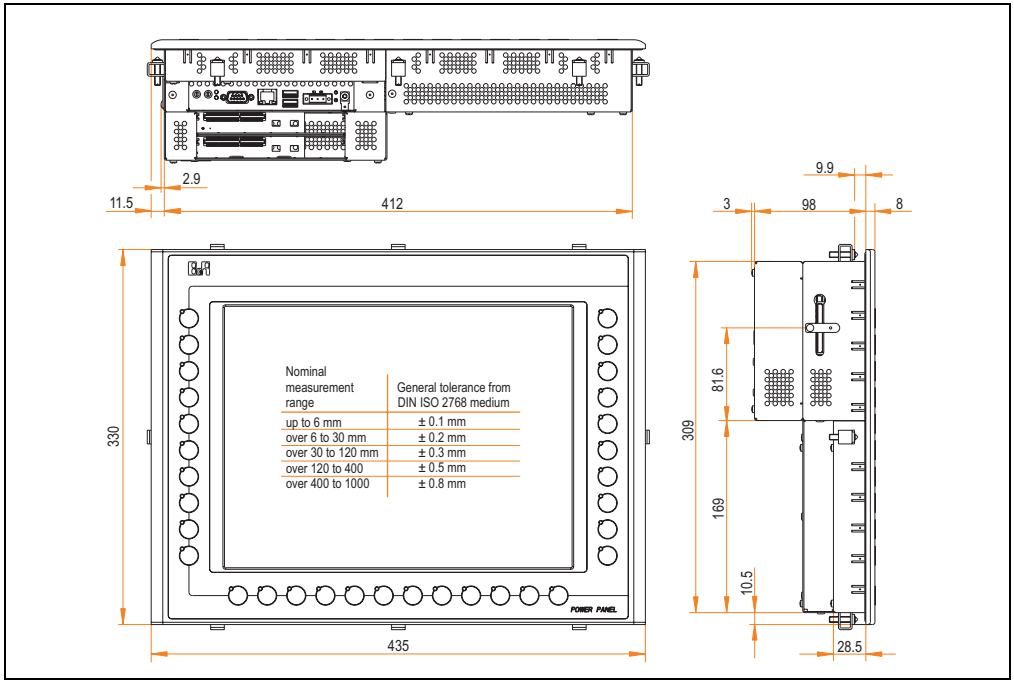


Figure 233: Dimensions - 4PP480.1505-B5

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.

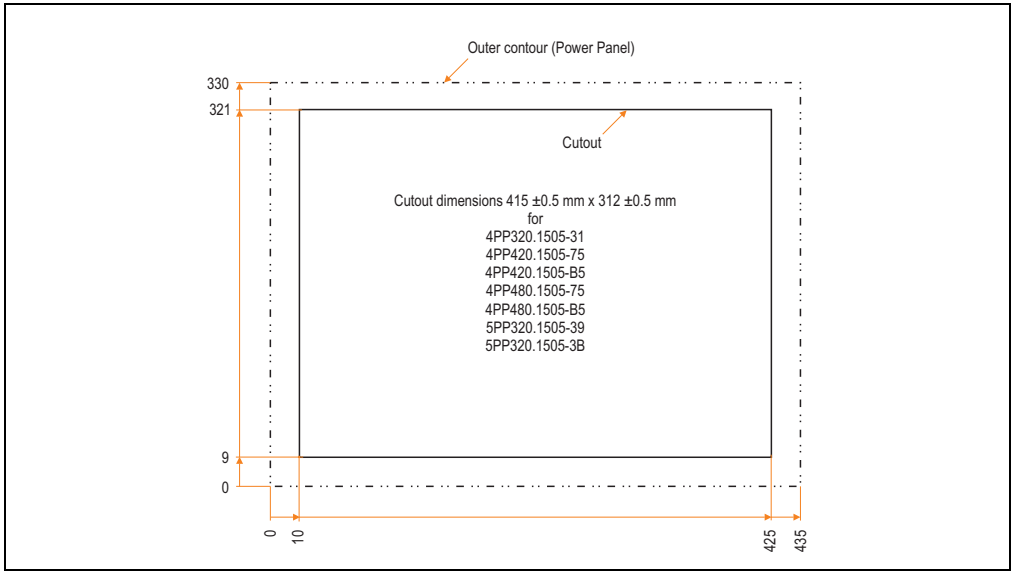


Figure 234: Cutout installation - 4PP480.1505-B5

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 120: Contents of delivery - 4PP480.1505-B5

4.29 Device 4PP481.1043-75

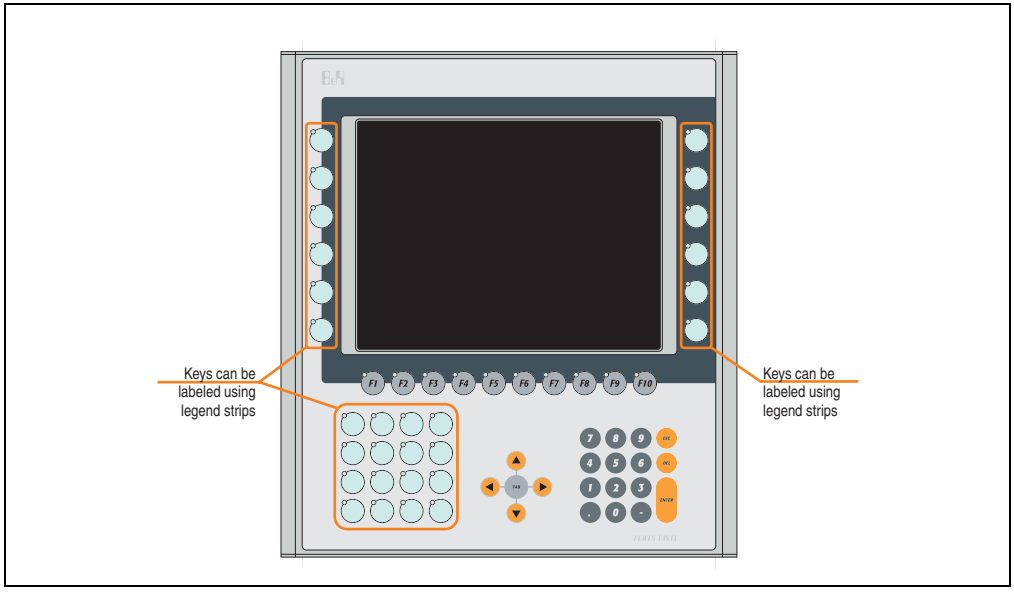


Figure 235: Front view - 4PP481.1043-75

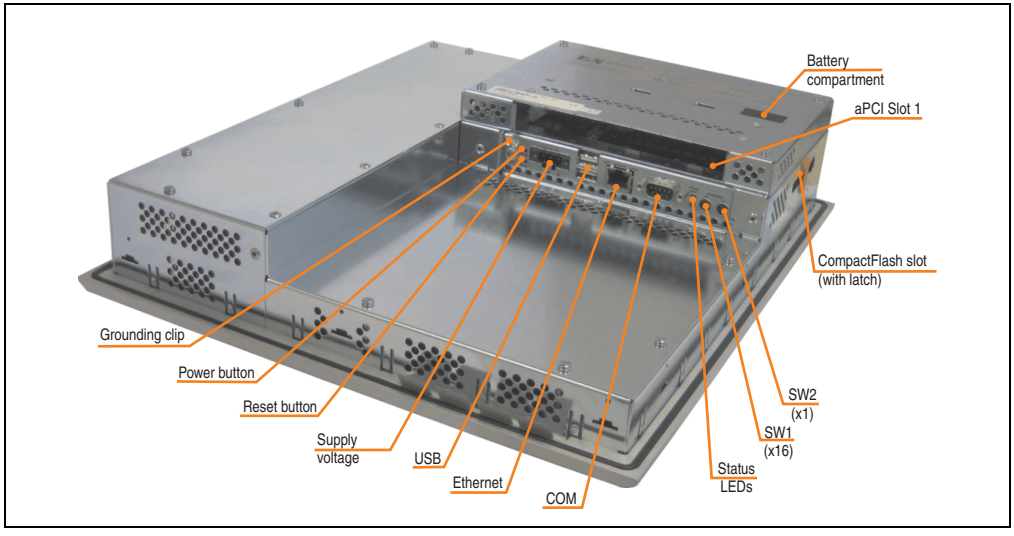


Figure 236: Rear view - 4PP481.1043-75

4.29.1 Technical data

Features	4PP481.1043-75
B&R ID-Code	$23C5
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 128 MB (64 MB < Rev. C0)
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	 512 KB Yes 256 kB
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 121: Technical data - 4PP481.1043-75

Features	4PP481.1043-75
Serial interface	
Type	RS232, modem-capable, not electrically isolated
UART	16C550 compatible, 16-byte FIFO
Transfer rate	Max. 115 kBaud
Connection	9-pin DSUB
USB interface	
Type	USB 1.1, USB 2.0[4)]
Amount	2
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)]
Connection	Type A
Current load	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 (see B&R System 2005 manual for available aPCI interface modules)
Holding torque for aPCI module	Max. 0.7 Nm
Display	
Type	Color TFT
Diagonal	10.4 inch (264 mm)
Colors	262,144 colors [4)]
Resolution	VGA, 640 x 480 pixels
Contrast	600:1
Viewing angle (see page 570)	
Horizontal	Direction R / direction L =70°
Vertical	Direction U = 45°/ direction D = 35°
Background lighting	
Brightness	450 cd/m²
Half-brightness time[5)]	55,000 hours
Screen rotation	Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen	
Touch screen type	Elo Accu Touch
Technology	Analog, resistive
Controller	Elo, serial, 12- bit
Degree of transmission	Up to 80% ±5%
Filter glass	-
Degree of transmission	
Coating	
Keys/LED[6)]	
Function keys	28 with LED (yellow)
Soft keys	10 with LED (yellow)
Cursor keys	5 without LED
Number block	15 without LED
Other keys	-
Key lifespan	> 10^6 actuations with 1 ±0.3 to 3 ±0.3 N operating force
LED brightness	Typ. 12 mcd (yellow) and 20 mcd (green)
	Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.

Table 121: Technical data - 4PP481.1043-75 (Forts.)

Electrical characteristics	4PP481.1043-75
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	86 mm
Front	
Frame	Aluminum, naturally anodized[7)]
Design	Gray[7)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[7)]
Light background	Similar to Pantone 427CV[7)]
Orange keys	Similar to Pantone 151CV[7)]
Dark gray keys	Similar to Pantone 431CV[7)]
Legend strips (gray)	Similar to Pantone 429CV[7)]
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
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 4.29.2 "Temperature humidity diagram" on page 368
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[8)]	Max. 3000 m

Table 121: Technical data - 4PP481.1043-75 (Forts.)

1) Maintenance Controller Extended.

2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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 B&R Automation Studio - Visual Components.

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

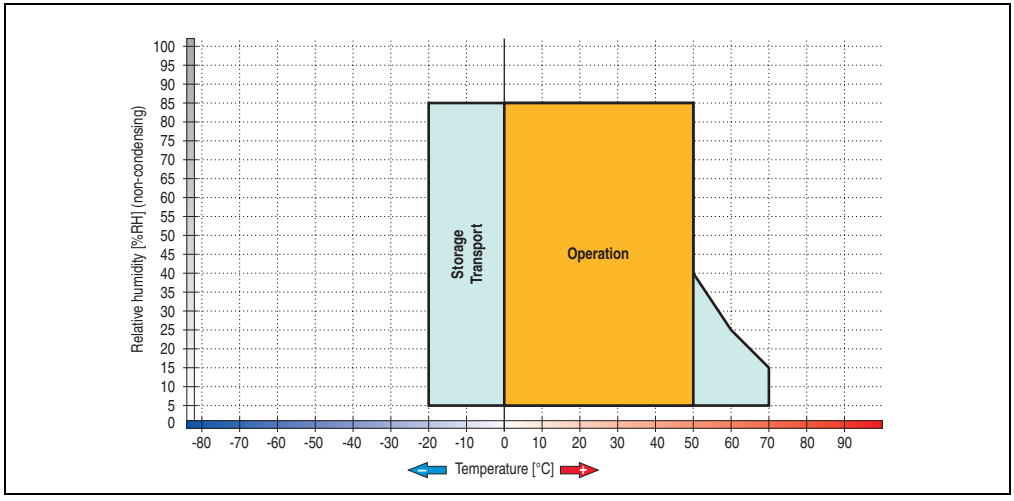


Figure 237: Temperature humidity diagram - 4PP481.1043-75

4.29.3 Dimensions

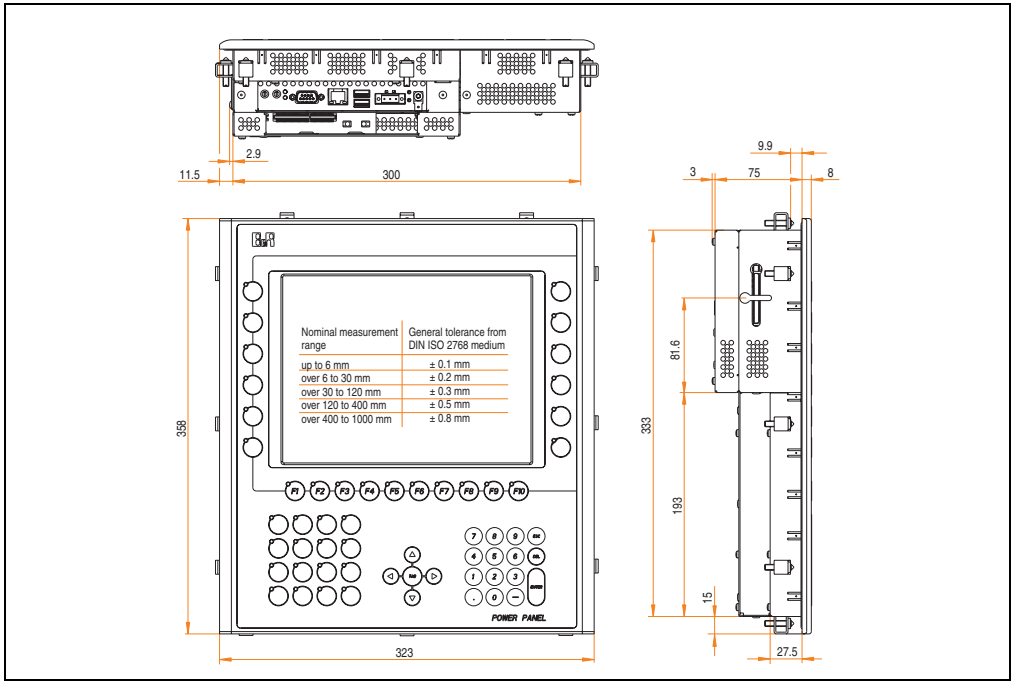


Figure 238: Dimensions - 4PP481.1043-75

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.

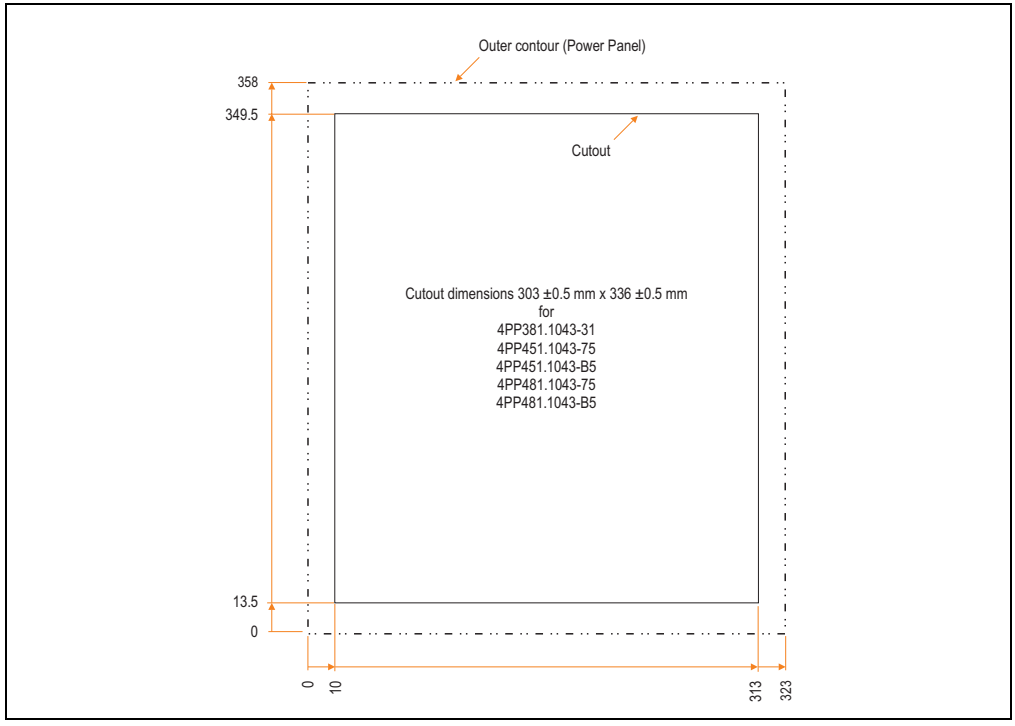


Figure 239: Cutout installation - 4PP481.1043-75

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 122: Contents of delivery - 4PP481.1043-75

4.30 Device 4PP481.1043-B5

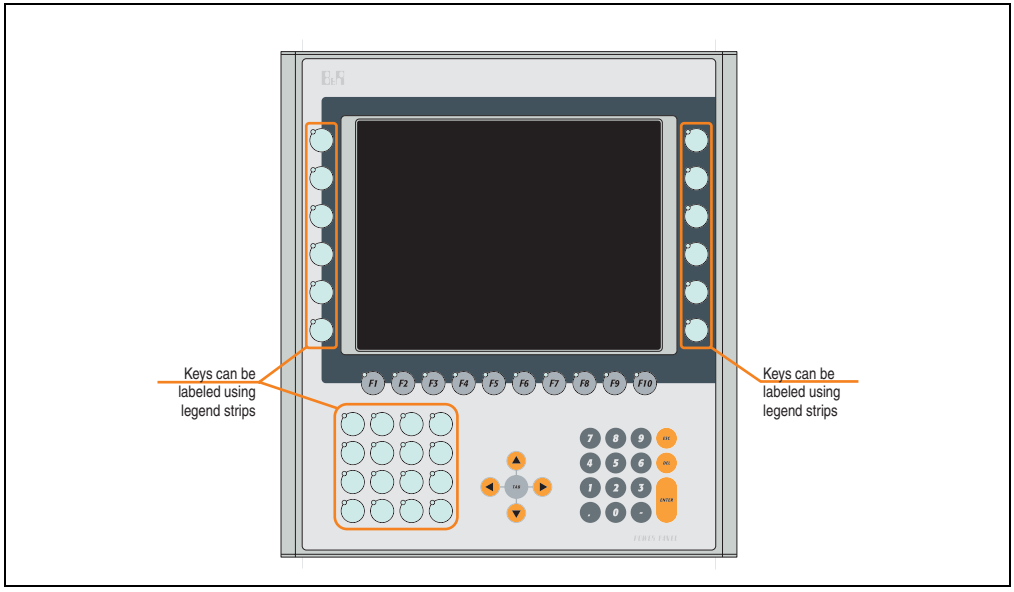


Figure 240: Front view - 4PP481.1043-B5

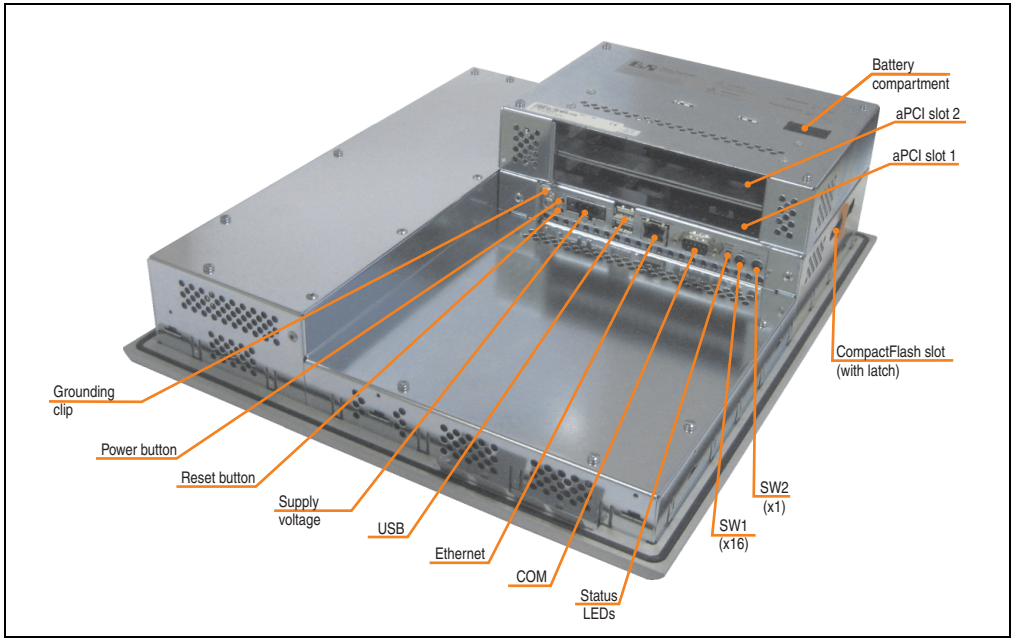


Figure 241: Rear view - 4PP481.1043-B5

4.30.1 Technical data

Features	4PP481.1043-B5
B&R ID-Code	$23C6
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 128 MB (64 MB < Rev. C0)
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	 512 KB Yes 256 kB
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 123: Technical data - 4PP481.1043-B5

Features	4PP481.1043-B5
Serial interface	
Type	RS232, modem-capable, not electrically isolated
UART	16C550 compatible, 16-byte FIFO
Transfer rate	Max. 115 kBaud
Connection	9-pin DSUB
USB interface	
Type	USB 1.1, USB 2.0[4)]
Amount	2
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)]
Connection	Type A
Current load	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	2 (see B&R System 2005 manual for available aPCI interface modules)
Holding torque for aPCI module	Max. 0.7 Nm
Display	
Type	Color TFT
Diagonal	10.4 inch (264 mm)
Colors	262,144 colors [4)]
Resolution	VGA, 640 x 480 pixels
Contrast	600:1
Viewing angle (see page 570)	
Horizontal	Direction R / direction L =70°
Vertical	Direction U = 45°/ direction D = 35°
Background lighting	
Brightness	450 cd/m²
Half-brightness time[5)]	55,000 hours
Screen rotation	Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen	
Touch screen type	Elo Accu Touch
Technology	Analog, resistive
Controller	Elo, serial, 12- bit
Degree of transmission	Up to 80% ±5%
Filter glass	-
Degree of transmission	
Coating	
Keys/LED[6)]	
Function keys	28 with LED (yellow)
Soft keys	10 with LED (yellow)
Cursor keys	5 without LED
Number block	15 without LED
Other keys	-
Key lifespan	> 10^6 actuations with 1 ±0.3 to 3 ±0.3 N operating force
LED brightness	Typ. 12 mcd (yellow) and 20 mcd (green)
	Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.

Table 123: Technical data - 4PP481.1043-B5 (Forts.)

Electrical characteristics	4PP481.1043-B5
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	Aluminum, naturally anodized[7)]
Design	Gray[7)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[7)]
Light background	Similar to Pantone 427CV[7)]
Orange keys	Similar to Pantone 151CV[7)]
Dark gray keys	Similar to Pantone 431CV[7)]
Legend strips (gray)	Similar to Pantone 429CV[7)]
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
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 4.30.2 "Temperature humidity diagram" on page 375
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[8)]	Max. 3000 m

Table 123: Technical data - 4PP481.1043-B5 (Forts.)

1) Maintenance Controller Extended.

2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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 B&R Automation Studio - Visual Components.

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

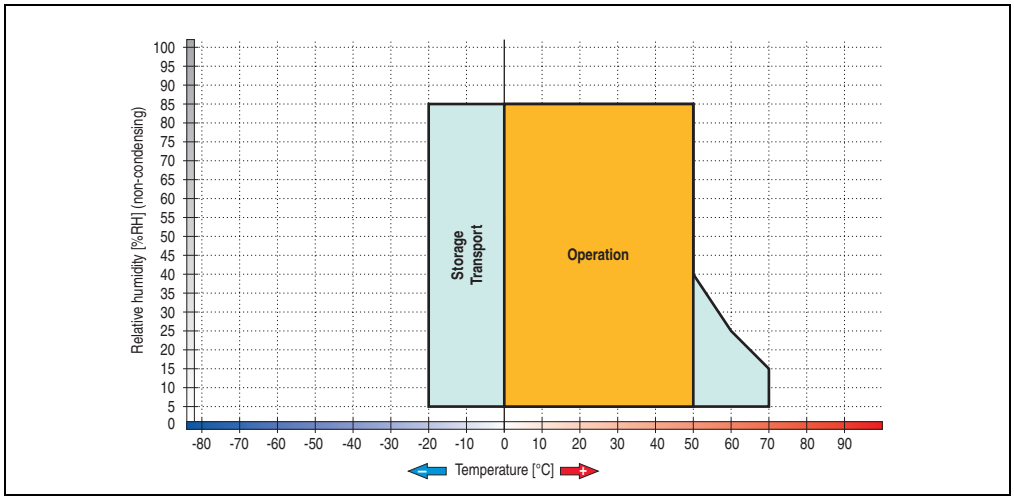


Figure 242: Temperature humidity diagram - 4PP481.1043-B5

4.30.3 Dimensions

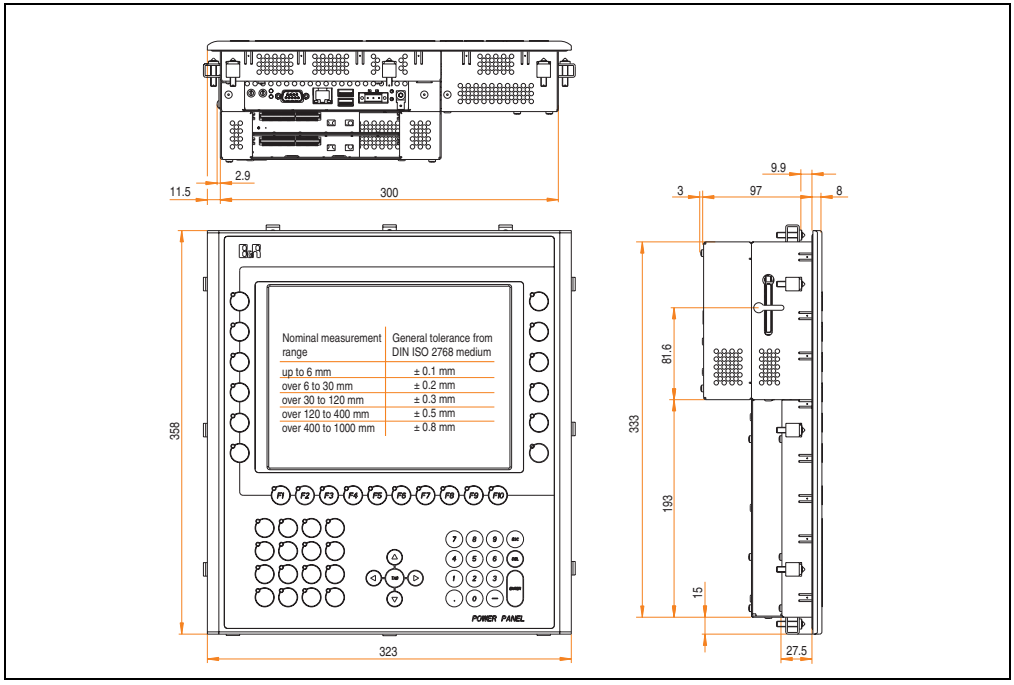


Figure 243: Dimensions - 4PP481.1043-B5

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.

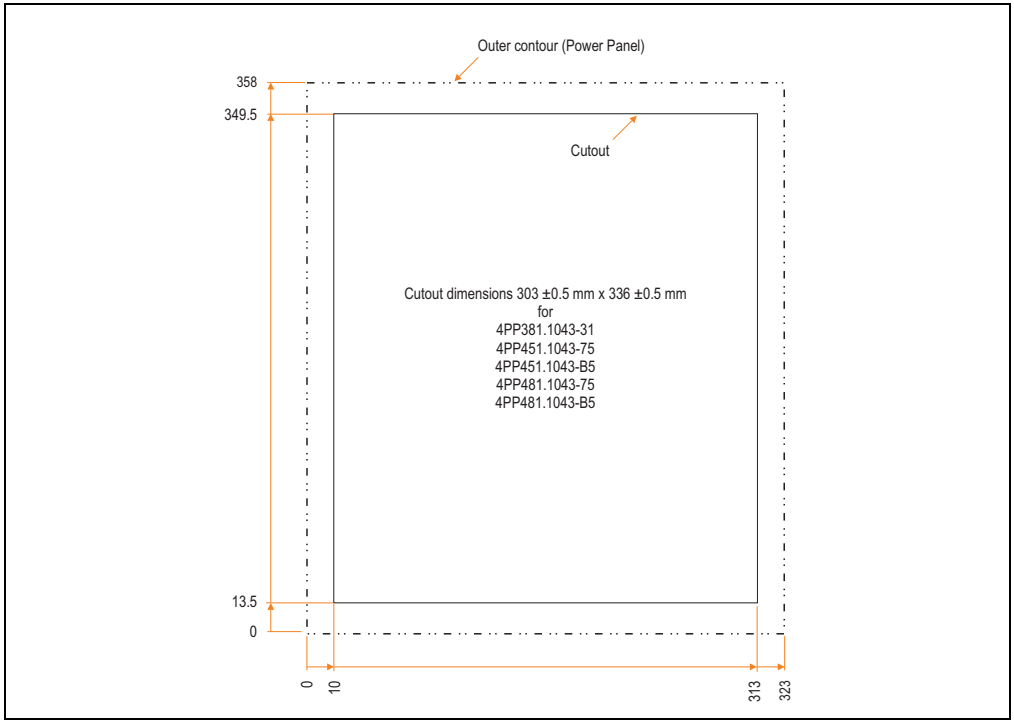


Figure 244: Cutout installation - 4PP481.1043-B5

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 124: Contents of delivery - 4PP481.1043-B5

4.31 Device 4PP481.1505-75

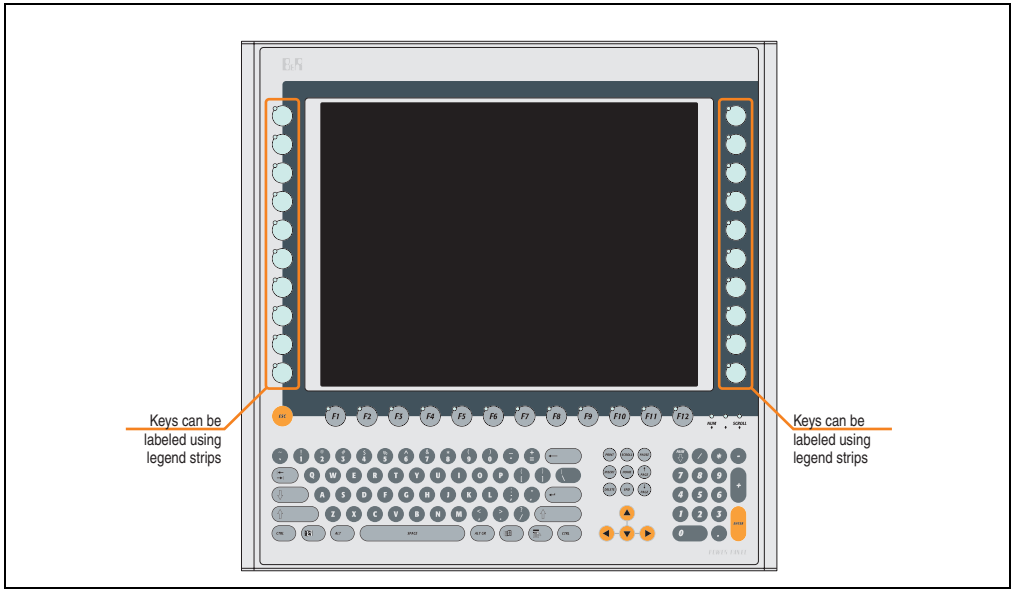


Figure 245: Front view - 4PP481.1505-75

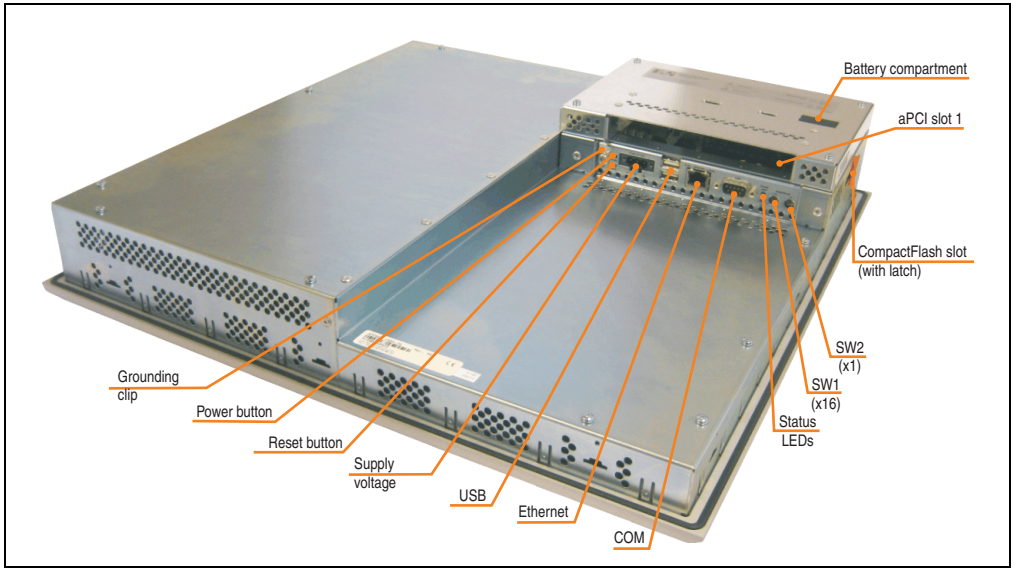


Figure 246: Rear view - 4PP481.1505-75

4.31.1 Technical data

Features	4PP481.1505-75
B&R ID-Code	$23C7
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 128 MB (64 MB Rev. < C0)
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	 512 KB Yes 256 kB
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 125: Technical data - 4PP481.1505-75

Features	4PP481.1505-75
Serial interface	
Type	RS232, modem-capable, not electrically isolated
UART	16C550 compatible, 16-byte FIFO
Transfer rate	Max. 115 kBaud
Connection	9-pin DSUB
USB interface	
Type	USB 1.1, USB 2.0[4]
Amount	2
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4]
Connection	Type A
Current load	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 (see B&R System 2005 manual for available aPCI interface modules)
Holding torque for aPCI module	Max. 0.7 Nm
Display	
Type	Color TFT
Diagonal	38.10 cm (380 mm)
Colors	16.7 million colors[4]
Resolution	XGA, 1024 x 768 pixels
Contrast	400:1
Viewing angle (see page 570)	
Horizontal	Direction R / direction L =85°
Vertical	Direction U / direction D = 85°
Background lighting	
Brightness	250 cd/m²
Half-brightness time[5]	50,000 hours
Screen rotation	Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen	
Touch screen type	Elo Accu Touch
Technology	Analog, resistive
Controller	Elo, serial, 12- bit
Degree of transmission	Up to 80% ±5%
Filter glass	-
Degree of transmission	
Coating	
Keys/LED[6]	
Function keys	20 with LED (yellow)
Soft keys	12 with LED (yellow)
Cursor keys	4 without LED
Number block	15 without LED
Other keys	73 without LED
Key lifespan	> 10^6 actuations with 1 ±0.3 to 3 ±0.3 N operating force
LED brightness	Typ. 12 mcd (yellow) and 20 mcd (green)
	Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.

Table 125: Technical data - 4PP481.1505-75 (Forts.)

Electrical characteristics	4PP481.1505-75
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	435 mm
Height	430 mm
Depth	87 mm
Front	
Frame	Aluminum, naturally anodized[7)]
Design	Gray[7)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[7)]
Light background	Similar to Pantone 427CV[7)]
Orange keys	Similar to Pantone 151CV[7)]
Dark gray keys	Similar to Pantone 431CV[7)]
Legend strips (gray)	Similar to Pantone 429CV[7)]
Gasket	Flat gasket around display front
Housing	Metal
Weight	Approx. 8 kg (without aPCI interface modules)
Environmental characteristics	
Ambient temperature	
Operation	0 to +50°C
Storage	-20 to +60°C
Transport	-20 to +60°C
Relative humidity	See 4.31.2 "Temperature humidity diagram" on page 382
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[8)]	Max. 3000 m

Table 125: Technical data - 4PP481.1505-75 (Forts.)

1) Maintenance Controller Extended.

2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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 B&R Automation Studio - Visual Components.

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

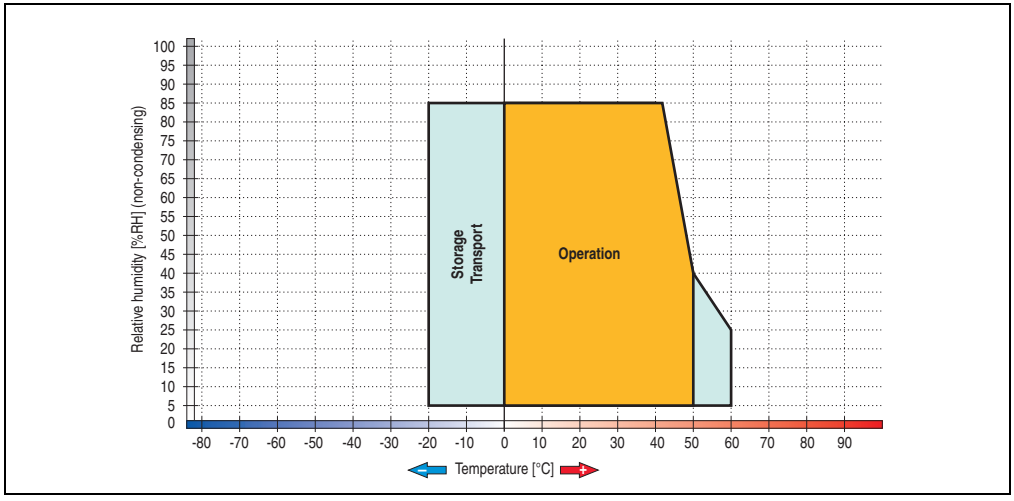


Figure 247: Temperature humidity diagram - 4PP481.1505-75

4.31.3 Dimensions

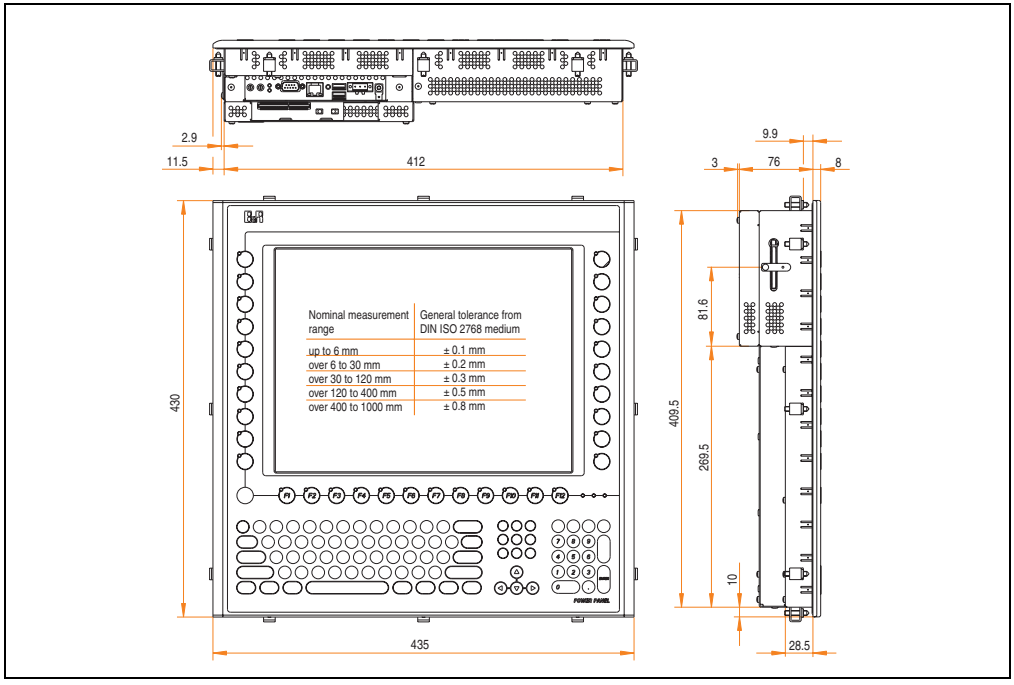


Figure 248: Dimensions - 4PP481.1505-75

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.

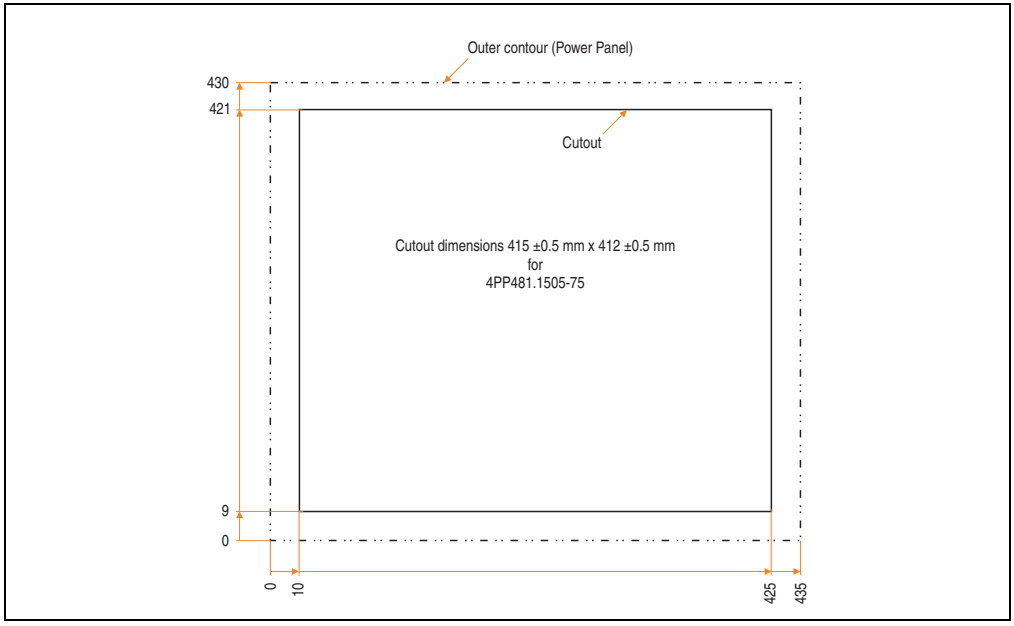


Figure 249: Cutout installation - 4PP481.1505-75

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 126: Contents of delivery - 4PP481.1505-75

4.32 Device 4PP482.1043-75

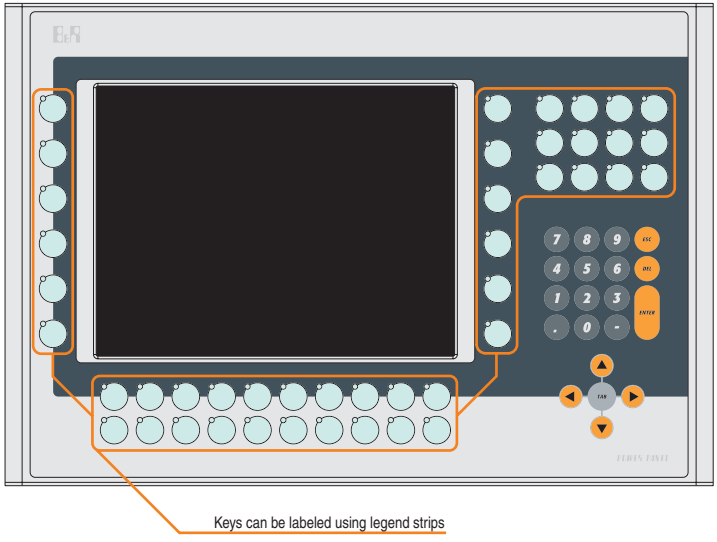


Figure 250: Front view - 4PP482.1043-75

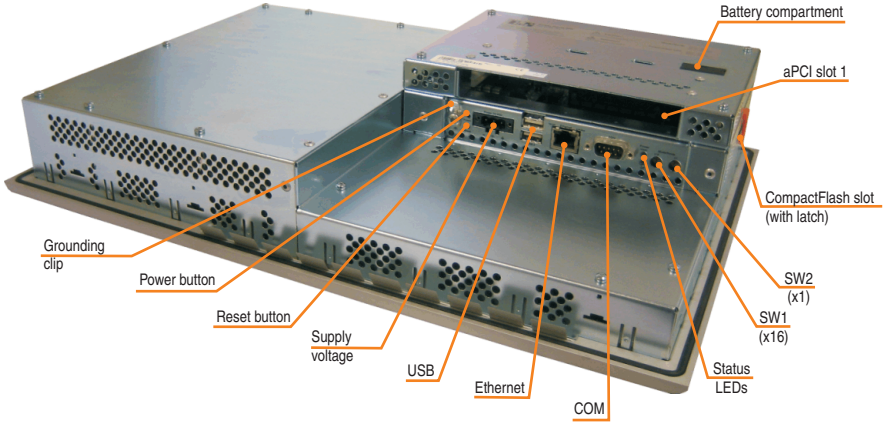


Figure 251: Rear view - 4PP482.1043-75

4.32.1 Technical data

Features	4PP482.1043-75
B&R ID-Code	$23C8
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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)
Flash	2 MB (for firmware)
Memory Type Quantity	 DDR SDRAM 128 MB (64 MB < Rev. C0)
Graphics Controller Memory	 Geode LX800 8 MB shared memory (reserved by main memory)
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	 512 KB Yes 256 kB
Watchdog Controller	 MTCX[1)]
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	 Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 127: Technical data - 4PP482.1043-75

Features	4PP482.1043-75
Serial interface	
Type	RS232, modem-capable, not electrically isolated
UART	16C550 compatible, 16-byte FIFO
Transfer rate	Max. 115 kBaud
Connection	9-pin DSUB
USB interface	
Type	USB 1.1, USB 2.0[4)]
Amount	2
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)]
Connection	Type A
Current load	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 (see B&R System 2005 manual for available aPCI interface modules)
Holding torque for aPCI module	Max. 0.7 Nm
Display	
Type	Color TFT
Diagonal	10.4 inch (264 mm)
Colors	262,144 colors [4)]
Resolution	VGA, 640 x 480 pixels
Contrast	600:1
Viewing angle (see page 570)	
Horizontal	Direction R / direction L =70°
Vertical	Direction U = 45°/ direction D = 35°
Background lighting	
Brightness	450 cd/m²
Half-brightness time[5)]	55,000 hours
Screen rotation	Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426
Touch screen	
Touch screen type	Elo Accu Touch
Technology	Analog, resistive
Controller	Elo, serial, 12- bit
Degree of transmission	Up to 80% ±5%
Filter glass	-
Degree of transmission	
Coating	
Keys/LED[6)]	
Function keys	44 with LED (yellow)
Soft keys	-
Cursor keys	5 without LED
Number block	15 without LED
Other keys	-
Key lifespan	> 1,000,000 actuations with 1 ±0.3 to 3 ±0.3 N operating force
LED brightness	Typ. 12 mcd (yellow) and 20 mcd (green)
	Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.

Table 127: Technical data - 4PP482.1043-75 (Forts.)

Electrical characteristics	4PP482.1043-75
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	Aluminum, naturally anodized[7)]
Design	Gray[7)]
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV[7)]
Light background	Similar to Pantone 427CV[7)]
Orange keys	Similar to Pantone 151CV[7)]
Dark gray keys	Similar to Pantone 431CV[7)]
Legend strips (gray)	Similar to Pantone 429CV[7)]
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
Storage	-20 to +70°C
Transport	-20 to +70°C
Relative humidity	See 4.32.2 "Temperature humidity diagram" on page 389
Vibration	
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude[8)]	Max. 3000 m

Table 127: Technical data - 4PP482.1043-75 (Forts.)

1) Maintenance Controller Extended.

2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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 B&R Automation Studio - Visual Components.

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

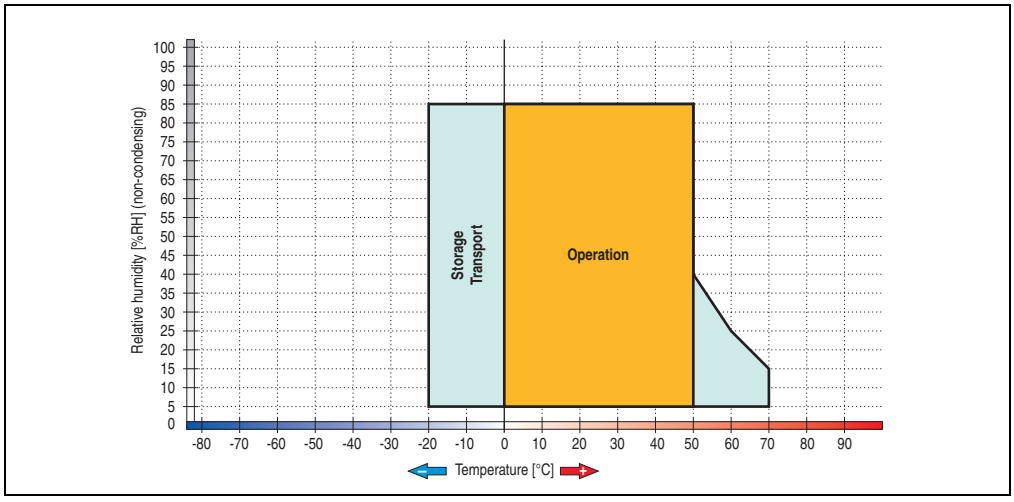


Figure 252: Temperature humidity diagram - 4PP482.1043-75

4.32.3 Dimensions

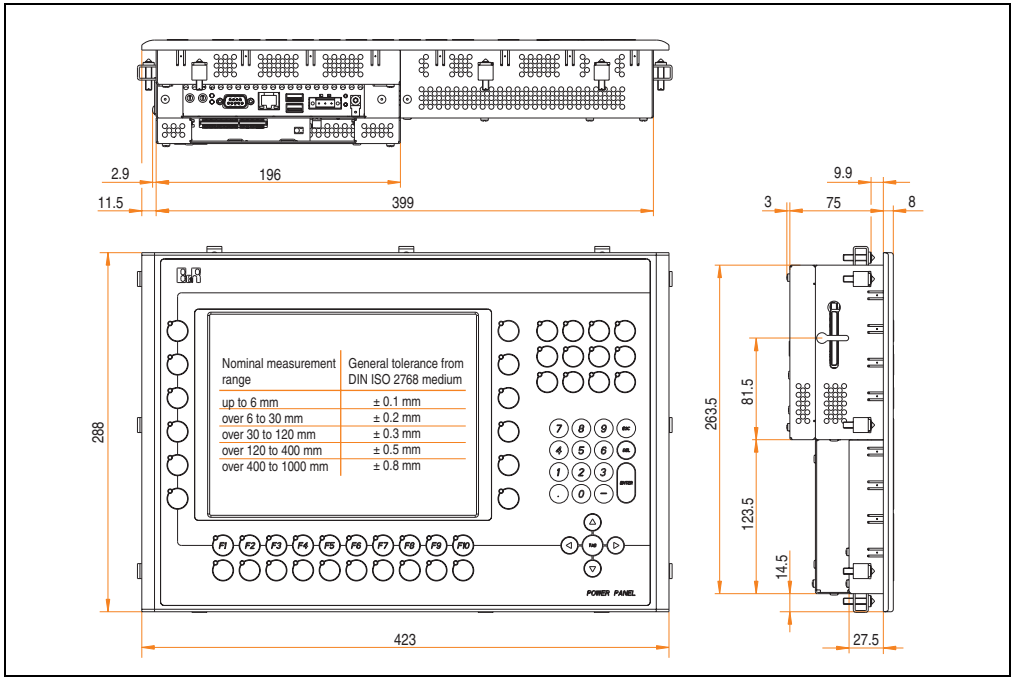


Figure 253: Dimensions - 4PP482.1043-75

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.

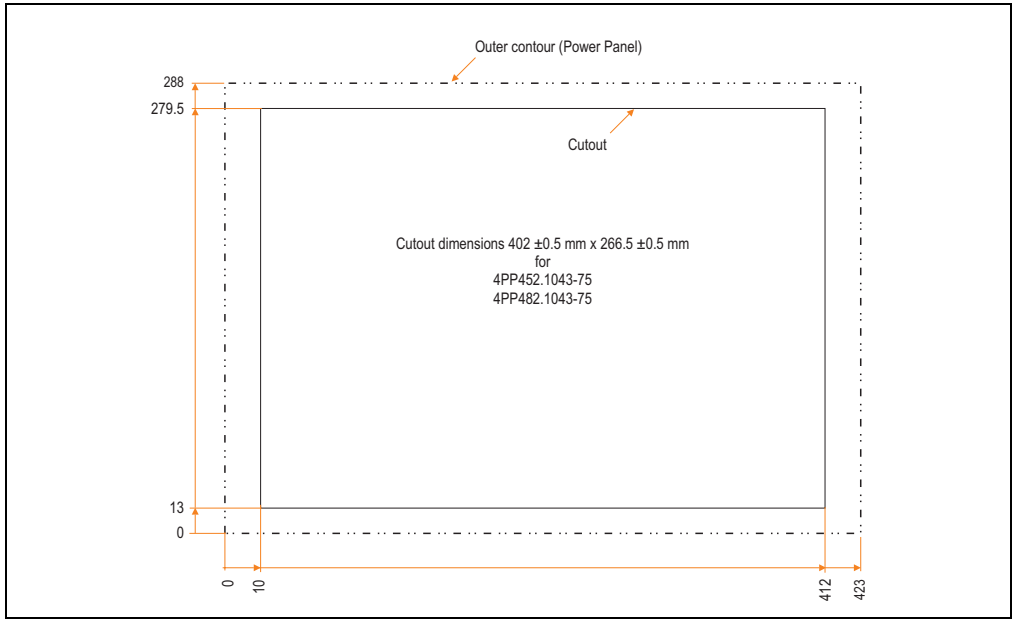


Figure 254: Cutout installation - 4PP482.1043-75

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 128: 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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)					
Flash	2 MB (for firmware)					
Memory Type Quantity	DDR SDRAM 128 MB (64 MB < Rev. C0)					
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)					
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	512 KB Yes 256 kB					
Watchdog Controller	MTCX[1)]					
Power failure logic Controller Buffer time	MTCX[1)] 10 ms					
Real-time clock (RTC) Battery-buffered Accuracy	Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day					

Table 129: 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
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years [3] 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[4] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4] 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 (3IF771.9) inserted	1 pcs. X2X aPCI module (3IF791.9) inserted	1 pcs. CAN aPCI module (3IF771.9) inserted	1 pcs. X2X aPCI module (3IF791.9) inserted	1 pcs. CAN aPCI module (3IF771.9) inserted	1 pcs. X2X aPCI module (3IF791.9) inserted
Holding torque for aPCI module	Max. 0.7 Nm					

Table 129: 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
Display						
Type	LCD monochrome		Color LCD		Color TFT	
Diagonal	5.7 in (144 mm)		5.7 in (144 mm)		5.7 in (144 mm)	
Colors	8 shades of gray[4]		512 colors [4]		262,144 colors [4]	
Resolution	QVGA, 320 x 240 pixels		QVGA, 320 x 240 pixels		QVGA, 320 x 240 pixels	
Contrast	25:1		40:1		400:1	
Viewing angle (see page 570)						
Horizontal	Direction R / direction L =40°		Direction R / direction L =40°		Direction R / direction L =60°	
Vertical	Direction U = 40°/ direction D = 50°		Direction U = 40°/ direction D = 50°		Direction U = 40°/ direction D = 50°	
Background lighting						
Brightness	220 cd/m²		200 cd/m²		500 cd/m²	
Half-brightness time[5]	50,000 hours		50,000 hours		50,000 hours	
Screen rotation	Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426		Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426		Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426	
Touch screen						
Touch screen type	Gunze					
Technology	Analog, resistive					
Controller	Elo, serial, 12- bit					
Degree of transmission	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						
Electrical characteristics						
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	Aluminum, naturally anodized[6]					
Design	Gray[5]					
Membrane	Polyester					
Dark gray border around display	Similar to Pantone 432CV[6]					
Light background	Similar to Pantone 427CV[6]					
Gasket	Flat gasket around display front					

Table 129: Technical data - Power Panel 420 light

Mechanical characteristics	4PP420:0571 -L05	4PP420:0571 -L45	4PP420:0571 -L25	4PP420:0571 -L65	4PP420:0571 -L35	4PP420:0571 -L75
Housing	Metal					
Weight	Approx. 1.7 kg (without aPCI interface modules)					
Environmental characteristics						
Ambient temperature Operation Storage Transport	0 to +50°C -20 to +70°C -20 to +70°C		0 to +50°C -20 to +60°C -20 to +60°C			
Relative humidity	See 5.1.2 "Temperature humidity diagram - PP420 light LCD monochrome" on page 396		See 5.1.3 "Temperature humidity diagram - PP420 light LCD color and TFT color" on page 396			
Vibration Operation (continuous) Operation (occasional) Storage Transport	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g					
Shock Operation Storage Transport	15 g, 11 ms 30 g, 15 ms 30 g, 15 ms					
Protection type	IP20 back side (only with installed CompactFlash card, inserted aPCI module or with an optional aPCI cover) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)					
Altitude[7)]	Max. 3000 m					

Table 129: Technical data - Power Panel 420 light

1) Maintenance Controller Extended.

2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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 LCD monochrome

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

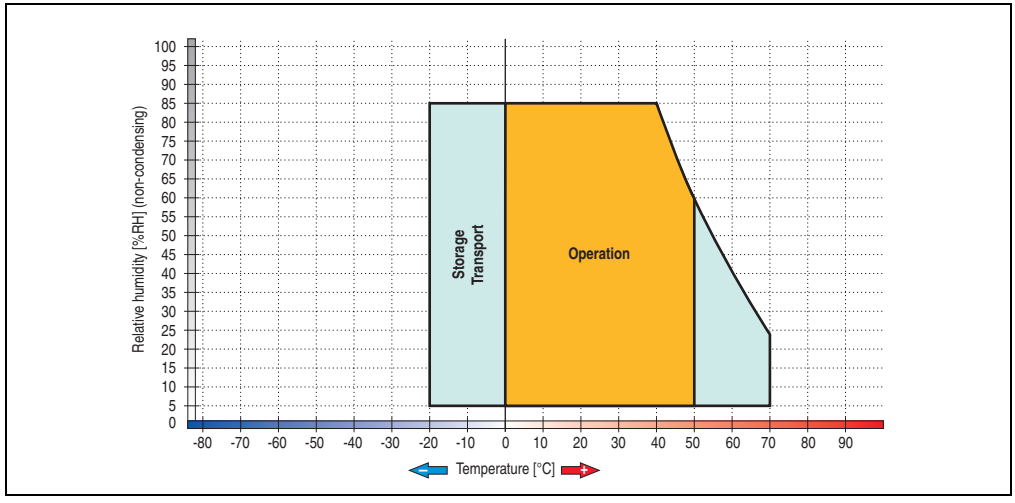


Figure 255: Temperature humidity diagram - PP420 light LCD monochrome

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

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

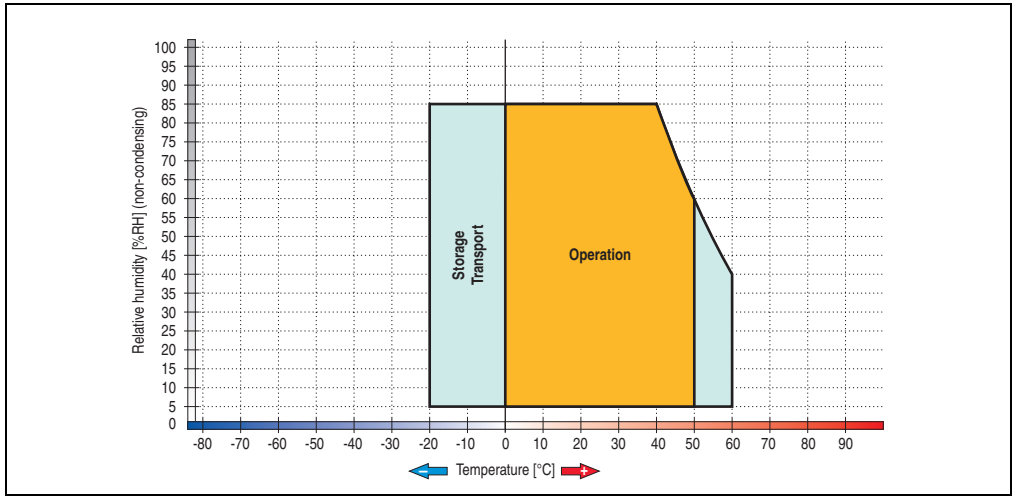


Figure 256: Temperature humidity diagram - PP420 light LCD color and TFT color

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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)					
Flash	2 MB (for firmware)					
Memory Type Quantity	DDR SDRAM 128 MB (64 MB < Rev. C0)					
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)					
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	512 KB Yes 256 kB					
Watchdog Controller	MTCX[1)]					
Power failure logic Controller Buffer time	MTCX[1)] 10 ms					
Real-time clock (RTC) Battery-buffered Accuracy	Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day					
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 130: 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
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[4] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4] 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 (3IF771.9) inserted	1 pcs. X2X aPCI module (3IF791.9) inserted	1 pcs. CAN aPCI module (3IF771.9) inserted	1 pcs. X2X aPCI module (3IF791.9) inserted	1 pcs. CAN aPCI module (3IF771.9) inserted	1 pcs. X2X aPCI module (3IF791.9) inserted
Holding torque for aPCI module	Max. 0.7 Nm					
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 570) Horizontal Vertical Background lighting Brightness Half-brightness time[5] Screen rotation	LCD monochrome 5.7 in (144 mm) 8 shades of gray[4] QVGA, 320 x 240 pixels 25:1 Direction R / direction L =40° Direction U = 40°/ direction D = 50° 220 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426		Color LCD 5.7 in (144 mm) 512 colors [4] QVGA, 320 x 240 pixels 40:1 Direction R / direction L =40° Direction U = 40°/ direction D = 50° 200 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426		Color TFT 5.7 in (144 mm) 262,144 colors [4] QVGA, 320 x 240 pixels 400:1 Direction R / direction L =60° Direction U = 40°/ direction D = 50° 500 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426	
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 130: 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
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-					
Electrical characteristics						
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					
Mechanical characteristics						
Outer dimensions Width Height Depth	212 mm 156 mm 76 mm					
Front Frame Design Membrane Dark gray border around display Light background Gasket	Aluminum, naturally anodized[6)] Gray[6)] Polyester Similar to Pantone 432CV[6)] Similar to Pantone 427CV[6)] Flat gasket around display front					
Housing	Metal					
Weight	Approx. 1.7 kg (without aPCI interface modules)					
Environmental characteristics						
Ambient temperature Operation Storage Transport	0 to +50°C -20 to +70°C -20 to +70°C		0 to +50°C -20 to +60°C -20 to +60°C			
Relative humidity	See 5.1.5 "Temperature humidity diagram - PP420 compact LCD monochrome" on page 400		5.1.6 "Temperature humidity diagram - PP420 compact LCD color and TFT color" on page 401			
Vibration Operation (continuous) Operation (occasional) Storage Transport	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g					
Shock Operation Storage Transport	15 g, 11 ms 30 g, 15 ms 30 g, 15 ms					

Table 130: Technical data - Power Panel 420 compact

Environmental characteristics	4PP420:0571 -C05	4PP420:0571 -C45	4PP420:0571 -C25	4PP420:0571 -C65	4PP420:0571 -C35	4PP420:0571 -C75
Protection type	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[7)]	Max. 3000 m					

Table 130: Technical data - Power Panel 420 compact

1) Maintenance Controller Extended.
2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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 LCD monochrome

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

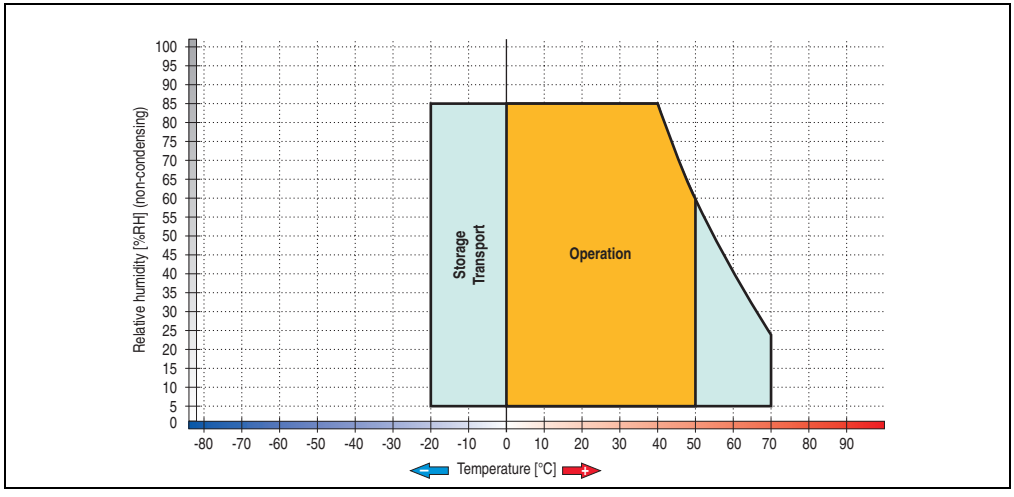


Figure 257: Temperature humidity diagram - PP420 compact LCD monochrome

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

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

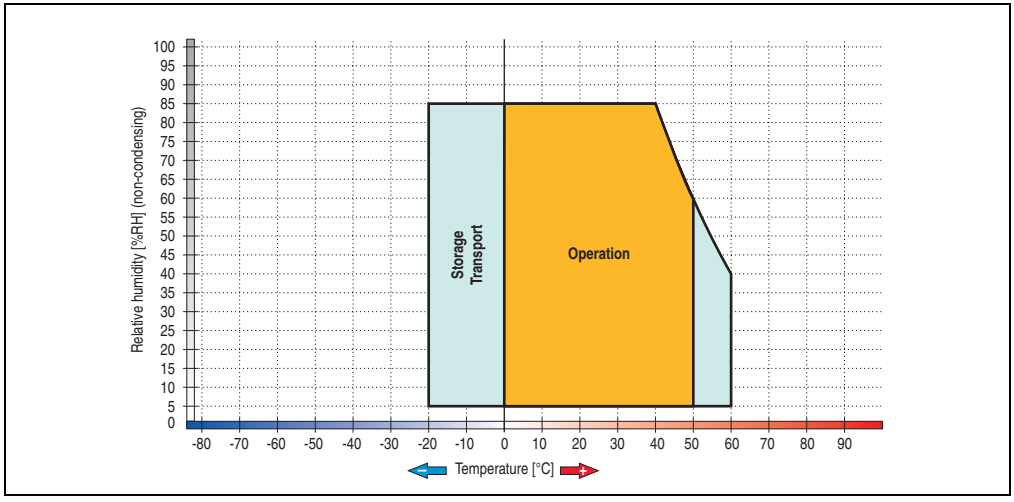


Figure 258: Temperature humidity diagram - PP420 compact LCD color and TFT color

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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)			
Flash	2 MB (for firmware)			
Memory Type Quantity	DDR SDRAM 128 MB			
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)			
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	512 KB Yes 256 kB			
Watchdog Controller	MTCX[1)]			
Power failure logic Controller Buffer time	MTCX[1)] 10 ms			
Real-time clock (RTC) Battery-buffered Accuracy	Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day			
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years [3)] 10 minutes			
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	-			
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device			

Table 131: Technical data - Power Panel 451 light

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[4)] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)] 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 (3IF771.9) inserted	1 pcs. X2X aPCI module (3IF791.9) inserted	1 pcs. CAN aPCI module (3IF771.9) inserted	1 pcs. X2X aPCI module (3IF791.9) inserted
Holding torque for aPCI module	Max. 0.7 Nm			
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 570) Horizontal Vertical Background lighting Brightness Half-brightness time[5)] Screen rotation	Color LCD 5.7 in (144 mm) 512 colors [4)] QVGA, 320 x 240 pixels 40:1 Direction R / direction L =40° Direction U = 40°/ direction D = 50° 220 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426		Color TFT 5.7 in (144 mm) 262,144 colors [4)] QVGA, 320 x 240 pixels 400:1 Direction R / direction L =60° Direction U = 40°/ direction D = 50° 500 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426	
Touch screen Touch screen type Technology Controller Degree of transmission	-			
Filter glass Degree of transmission Coating	95% On both sides			

Table 131: Technical data - Power Panel 451 light

Features	4PP451:0571-L25	4PP451:0571-L65	4PP451:0571-L35	4PP451:0571-L75
Keys/LED[6)]				
Function keys	16 with LED (yellow)			
Soft keys	6 with LED (yellow)			
Cursor keys	5 without LED			
Number block	15 without LED			
Other keys	-			
Key lifespan	> 10^6 actuations with 1 ±0.3 to 3 ±0.3 N operating force			
LED brightness	Typ. 12 mcd (yellow) and 20 mcd (green)			
	Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.			
Electrical characteristics				
Power supply				
Rated voltage	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	Aluminum, naturally anodized[7)]			
Design	Gray[7)]			
Membrane	Polyester			
Dark gray border around display	Similar to Pantone 432CV[7)]			
Light background	Similar to Pantone 427CV[7)]			
Orange keys	Similar to Pantone 151CV[7)]			
Dark gray keys	Similar to Pantone 431CV[7)]			
Legend strips (gray)	Similar to Pantone 429CV[7)]			
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			
Storage	-20 to +60°C			
Transport	-20 to +60°C			
Relative humidity	See 5.2.2 "Temperature humidity diagram" on page 405			
Vibration				
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g			
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g			
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g			
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g			
Shock				
Operation	15 g, 11 ms			
Storage	30 g, 15 ms			
Transport	30 g, 15 ms			

Table 131: Technical data - Power Panel 451 light

Environmental characteristics	4PP451:0571-L25	4PP451:0571-L65	4PP451:0571-L35	4PP451:0571-L75
Protection type	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[8)]	Max. 3000 m			

Table 131: Technical data - Power Panel 451 light

1) Maintenance Controller Extended.
2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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 B&R Automation Studio - Visual Components.
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

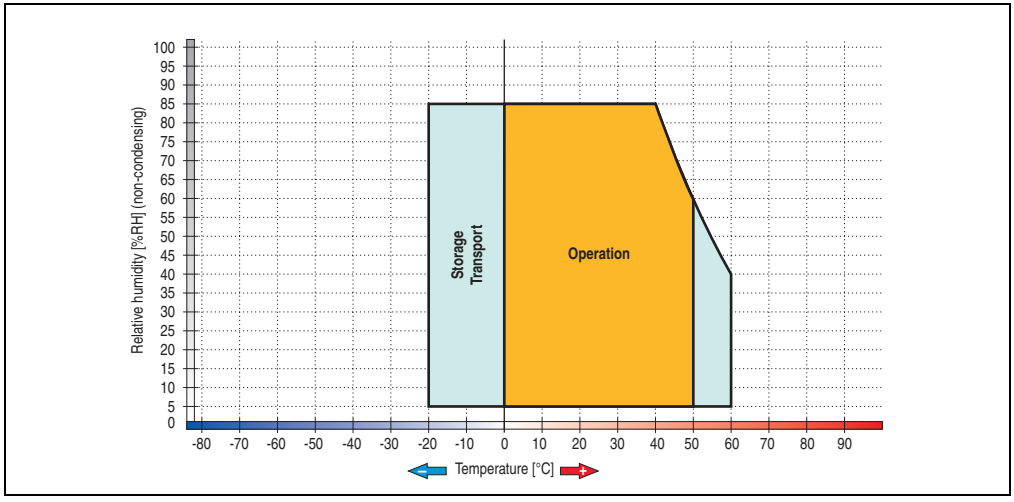


Figure 259: Temperature humidity diagram - PP451 light

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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)			
Flash	2 MB (for firmware)			
Memory Type Quantity	DDR SDRAM 128 MB			
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)			
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	512 KB Yes 256 kB			
Watchdog Controller	MTCX[1)]			
Power failure logic Controller Buffer time	MTCX[1)] 10 ms			
Real-time clock (RTC) Battery-buffered Accuracy	Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day			
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 132: Technical data - Power Panel 451 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[4)] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)] 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 (3IF771.9) inserted	1 pcs. X2X aPCI module (3IF791.9) inserted	1 pcs. CAN aPCI module (3IF771.9) inserted	1 pcs. X2X aPCI module (3IF791.9) inserted
Holding torque for aPCI module	Max. 0.7 Nm			
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 570) Horizontal Vertical Background lighting Brightness Half-brightness time[5)] Screen rotation	Color LCD 5.7 in (144 mm) 512 colors [4)] QVGA, 320 x 240 pixels 40:1 Direction R / direction L =40° Direction U = 40°/ direction D = 50° 220 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426		Color TFT 5.7 in (144 mm) 262,144 colors [4)] QVGA, 320 x 240 pixels 400:1 Direction R / direction L =60° Direction U = 40°/ direction D = 50° 500 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426	
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 compact

Features	4PP451:0571-C25	4PP451:0571-C65	4PP451:0571-C35	4PP451:0571-C75
Keys/LED[6]				
Function keys	16 with LED (yellow)			
Soft keys	6 with LED (yellow)			
Cursor keys	5 without LED			
Number block	15 without LED			
Other keys	-			
Key lifespan	> 10^6 actuations with 1 ±0.3 to 3 ±0.3 N operating force			
LED brightness	Typ. 12 mcd (yellow) and 20 mcd (green)			
	Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.			
Electrical characteristics				
Power supply				
Rated voltage	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	Aluminum, naturally anodized[7]			
Design	Gray[7]			
Membrane	Polyester			
Dark gray border around display	Similar to Pantone 432CV[7]			
Light background	Similar to Pantone 427CV[7]			
Orange keys	Similar to Pantone 151CV[7]			
Dark gray keys	Similar to Pantone 431CV[7]			
Legend strips (gray)	Similar to Pantone 429CV[7]			
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			
Storage	-20 to +60°C			
Transport	-20 to +60°C			
Relative humidity	See 5.2.4 "Temperature humidity diagram" on page 409			
Vibration				
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g			
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g			
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g			
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g			
Shock				
Operation	15 g, 11 ms			
Storage	30 g, 15 ms			
Transport	30 g, 15 ms			

Table 132: Technical data - Power Panel 451 compact

Environmental characteristics	4PP451:0571-C25	4PP451:0571-C65	4PP451:0571-C35	4PP451:0571-C75
Protection type	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[8)]	Max. 3000 m			

Table 132: Technical data - Power Panel 451 compact

1) Maintenance controller extended.
2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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 B&R Automation Studio - Visual Components.
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

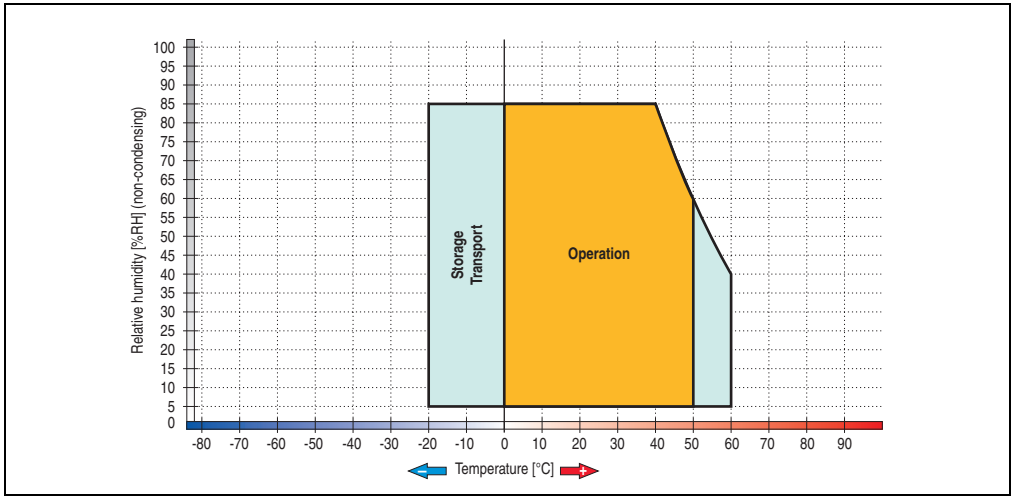


Figure 260: Temperature humidity diagram - PP451 compact

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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)			
Flash	2 MB (for firmware)			
Memory Type Quantity	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 Quantity Battery-buffered Remnant 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[1)]			
Power failure logic Controller Buffer time	MTCX[1)] 10 ms			
Real-time clock (RTC) Battery-buffered Accuracy	Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day			
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years [3)] 10 minutes			
Ethernet Controller Transfer rate Connection Cables NE2000-compatible	-			
CompactFlash Type Amount Connection	Type I 1 slot Primary IDE device			

Table 133: Technical data - Power Panel 452 light

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[4)] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)] 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 (3IF771.9) inserted	1 pcs. X2X aPCI module (3IF791.9) inserted	1 pcs. CAN aPCI module (3IF771.9) inserted	1 pcs. X2X aPCI module (3IF791.9) inserted
Holding torque for aPCI module	Max. 0.7 Nm			
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 570) Horizontal Vertical Background lighting Brightness Half-brightness time[5)] Screen rotation	Color LCD 5.7 in (144 mm) 512 colors [4)] QVGA, 320 x 240 pixels 40:1 Direction R / direction L =40° Direction U = 45°/ direction D = 50° 200 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426		Color TFT 5.7 in (144 mm) 262,144 colors [4)] QVGA, 320 x 240 pixels 400:1 Direction R / direction L =60° Direction U = 45°/ direction D = 50° 500 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426	
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 452 light

Features	4PP452:0571-L25	4PP452:0571-L65	4PP452:0571-L35	4PP452:0571-L75
Keys/LED[6]				
Function keys	28 with LED (yellow)			
Soft keys	10 with LED (yellow)			
Cursor keys	5 without LED			
Number block	15 without LED			
Other keys	-			
Key lifespan	> 10^6 actuations with 1 ±0.3 to 3 ±0.3 N operating force			
LED brightness	Typ. 12 mcd (yellow) and 20 mcd (green)			
	Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.			
Electrical characteristics				
Power supply				
Rated voltage	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	Aluminum, naturally anodized[7]			
Design	Gray[7]			
Membrane	Polyester			
Dark gray border around display	Similar to Pantone 432CV[7]			
Light background	Similar to Pantone 427CV[7]			
Orange keys	Similar to Pantone 151CV[7]			
Dark gray keys	Similar to Pantone 431CV[7]			
Legend strips (gray)	Similar to Pantone 429CV[7]			
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			
Storage	-20 to +60°C			
Transport	-20 to +60°C			
Relative humidity	See 5.3.2 "Temperature humidity diagram" on page 413			
Vibration				
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g			
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g			
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g			
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g			
Shock				
Operation	15 g, 11 ms			
Storage	30 g, 15 ms			
Transport	30 g, 15 ms			

Table 133: Technical data - Power Panel 452 light

Environmental characteristics	4PP452:0571-L25	4PP452:0571-L65	4PP452:0571-L35	4PP452:0571-L75
Protection type	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[8)]	Max. 3000 m			

Table 133: Technical data - Power Panel 452 light

1) Maintenance Controller Extended.
2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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 B&R Automation Studio - Visual Components.
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

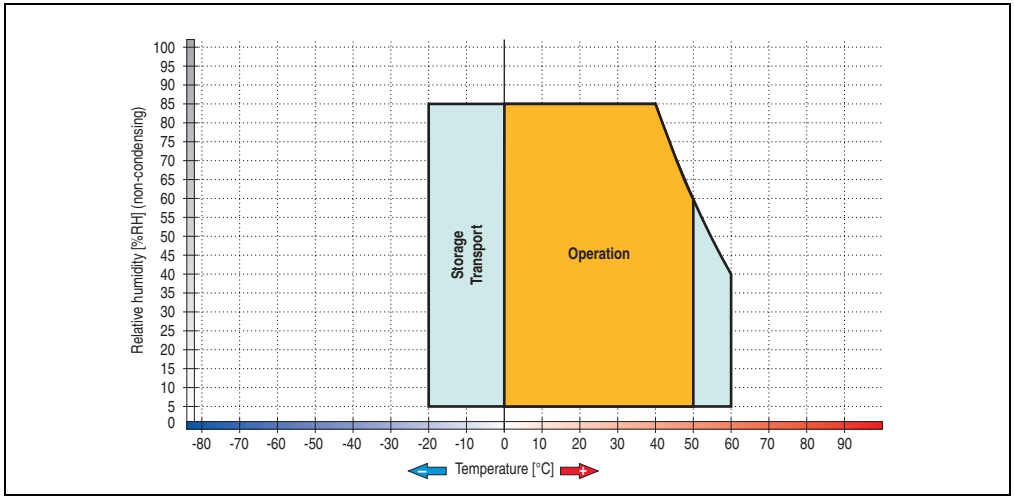


Figure 261: Temperature humidity diagram - PP452 light

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 L cache / 64 KB D cache) 128 KB Yes Passive (heat sink)			
Flash	2 MB (for firmware)			
Memory Type Quantity	DDR SDRAM 128 MB			
Graphics Controller Memory	Geode LX800 8 MB shared memory (reserved by main memory)			
SRAM Quantity Battery-buffered Remnant variables for AR (Automation Runtime) in Power Fail Mode	512 KB Yes 256 kB			
Watchdog Controller	MTCX[1)]			
Power failure logic Controller Buffer time	MTCX[1)] 10 ms			
Real-time clock (RTC) Battery-buffered Accuracy	Yes At +25°C: typically 30 ppm (2.5 seconds) [2)] per day			
Battery Type Removable Lifespan Backup capacitor (for changing battery) Buffer time	Renata 950 mAh Yes, accessible from the outside 3 years [3)] 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 134: Technical data - Power Panel 452 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[4)] 2 Low speed (1.5 MBit/s), full speed (12 MBit/s) to high speed (480 MBit/s)[4)] 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 (3IF771.9) inserted	1 pcs. X2X aPCI module (3IF791.9) inserted	1 pcs. CAN aPCI module (3IF771.9) inserted	1 pcs. X2X aPCI module (3IF791.9) inserted
Holding torque for aPCI module	Max. 0.7 Nm			
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 570) Horizontal Vertical Background lighting Brightness Half-brightness time[5)] Screen rotation	Color LCD 5.7 in (144 mm) 512 colors [4)] QVGA, 320 x 240 pixels 40:1 Direction R / direction L =40° Direction U = 45°/ direction D = 50° 200 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426		Color TFT 5.7 in (144 mm) 262,144 colors [4)] QVGA, 320 x 240 pixels 400:1 Direction R / direction L =60° Direction U = 45°/ direction D = 50° 500 cd/m² 50,000 hours Yes, see chapter 3 "Commissioning", section "Screen rotation" on page 426	
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 compact

Features	4PP452:0571-C25	4PP452:0571-C65	4PP452:0571-C35	4PP452:0571-C75
Keys/LED[6]				
Function keys	28 with LED (yellow)			
Soft keys	10 with LED (yellow)			
Cursor keys	5 without LED			
Number block	15 without LED			
Other keys	-			
Key lifespan	> 10^6 actuations with 1 ±0.3 to 3 ±0.3 N operating force			
LED brightness	Typ. 12 mcd (yellow) and 20 mcd (green)			
	Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.			
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	Aluminum, naturally anodized[7]			
Design	Gray[7]			
Membrane	Polyester			
Dark gray border around display	Similar to Pantone 432CV[7]			
Light background	Similar to Pantone 427CV[7]			
Orange keys	Similar to Pantone 151CV[7]			
Dark gray keys	Similar to Pantone 431CV[7]			
Legend strips (gray)	Similar to Pantone 429CV[7]			
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			
Storage	-20 to +60°C			
Transport	-20 to +60°C			
Relative humidity	See 5.3.4 "Temperature humidity diagram" on page 417			
Vibration				
Operation (continuous)	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g			
Operation (occasional)	2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g			
Storage	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g			
Transport	2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g			
Shock				
Operation	15 g, 11 ms			
Storage	30 g, 15 ms			
Transport	30 g, 15 ms			

Table 134: Technical data - Power Panel 452 compact

Environmental characteristics	4PP452:0571-C25	4PP452:0571-C65	4PP452:0571-C35	4PP452:0571-C75
Protection type	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[8)]	Max. 3000 m			

Table 134: Technical data - Power Panel 452 compact

1) Maintenance Controller Extended.
2) At max. specified ambient temperature: typ. 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 lifespan 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 diver 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 B&R Automation Studio - Visual Components.
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

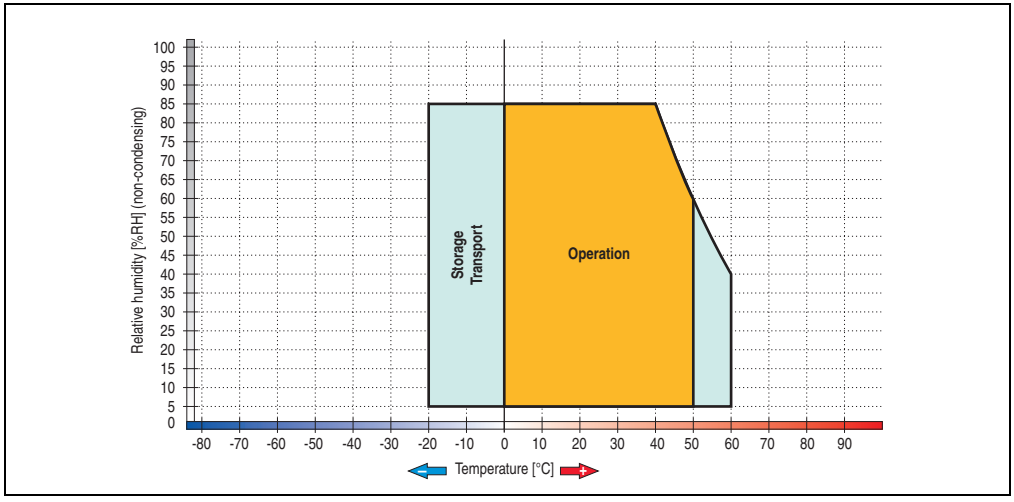


Figure 262: Temperature humidity diagram - PP452 compact

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)

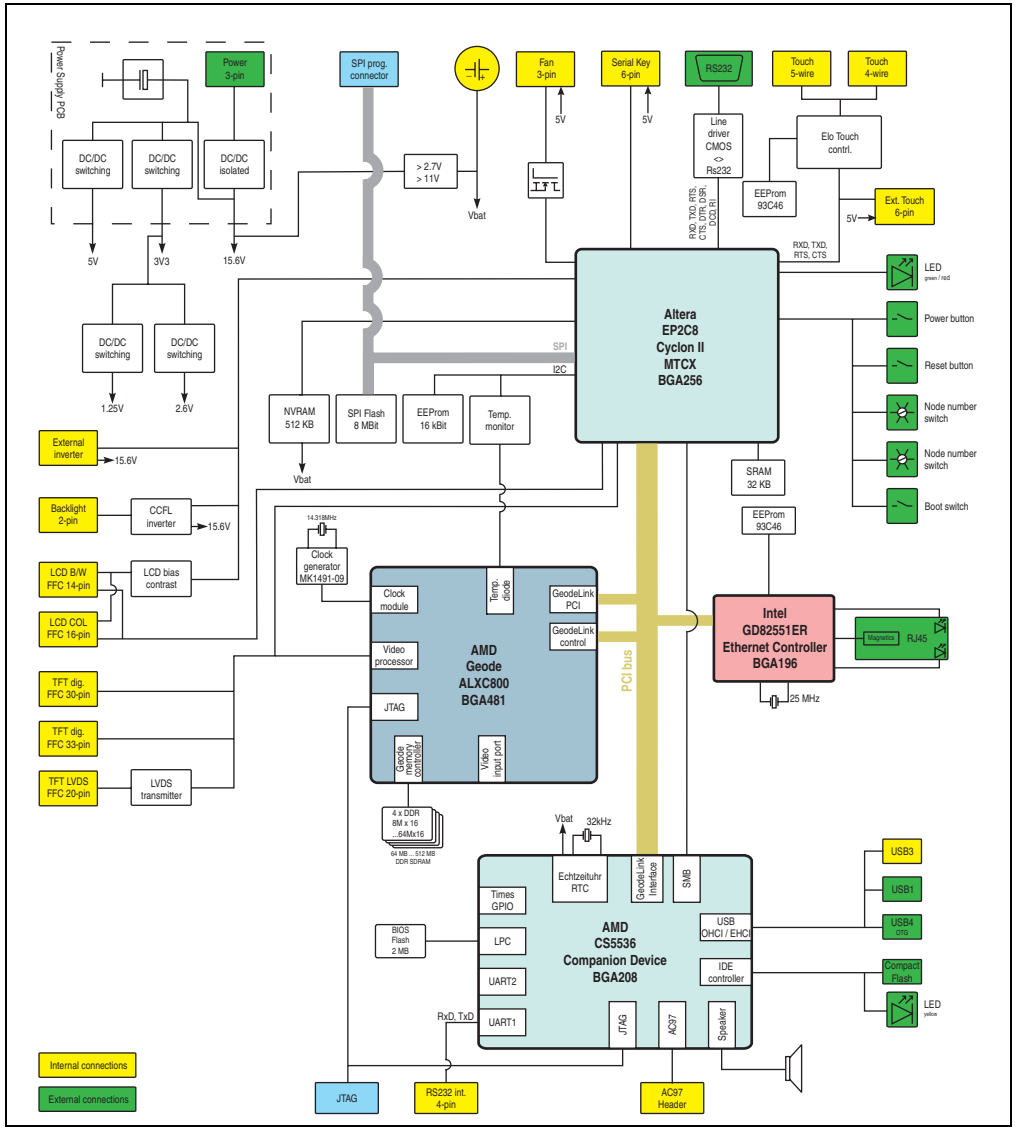


Figure 263: Block diagram - Power Panel 300

6.2 Power Panel 400 with 1 aPCI slot

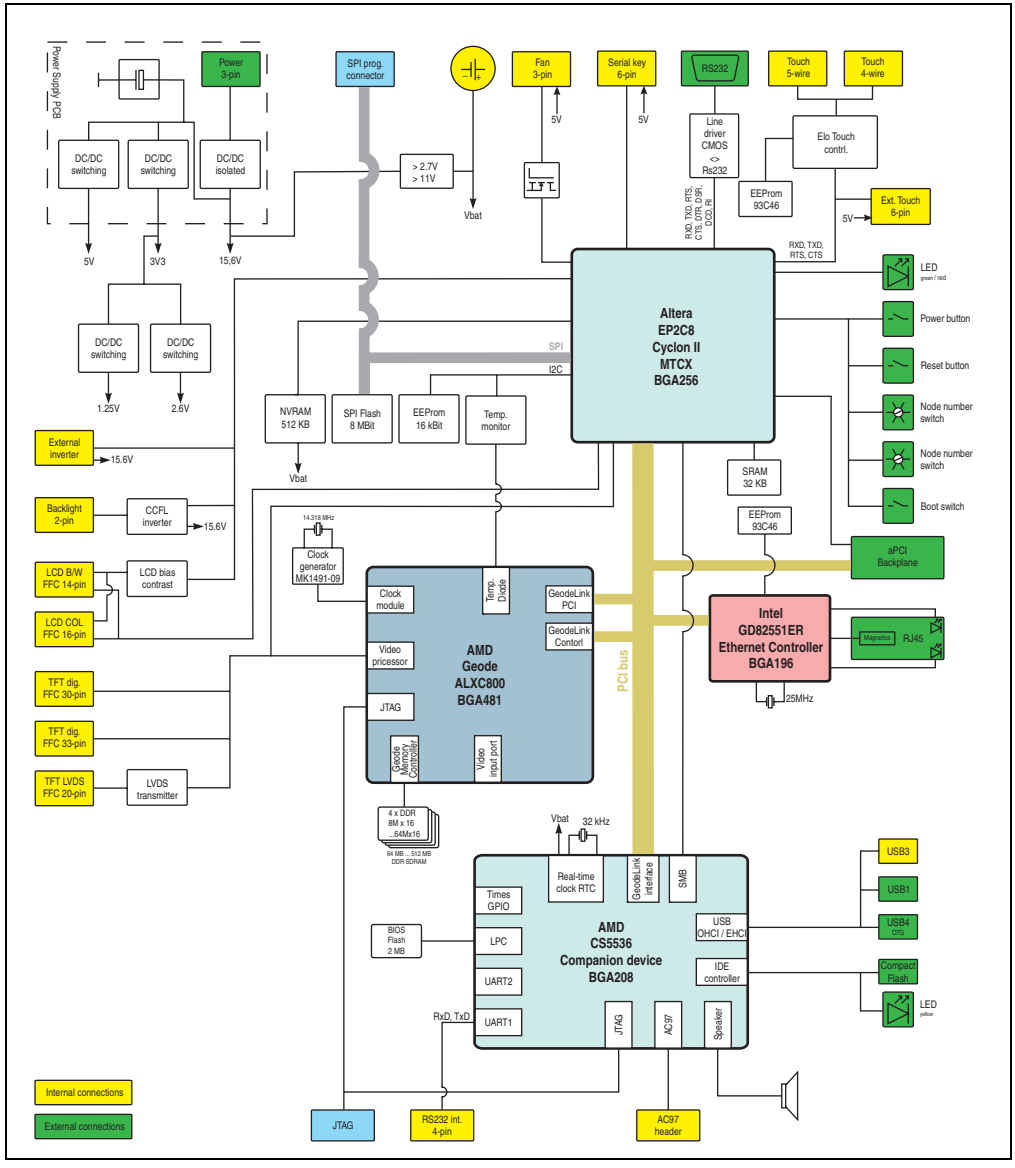


Figure 264: Block diagram - Power Panel 400 with 1 aPCI slot

6.3 Power Panel 400 with 2 aPCI slots

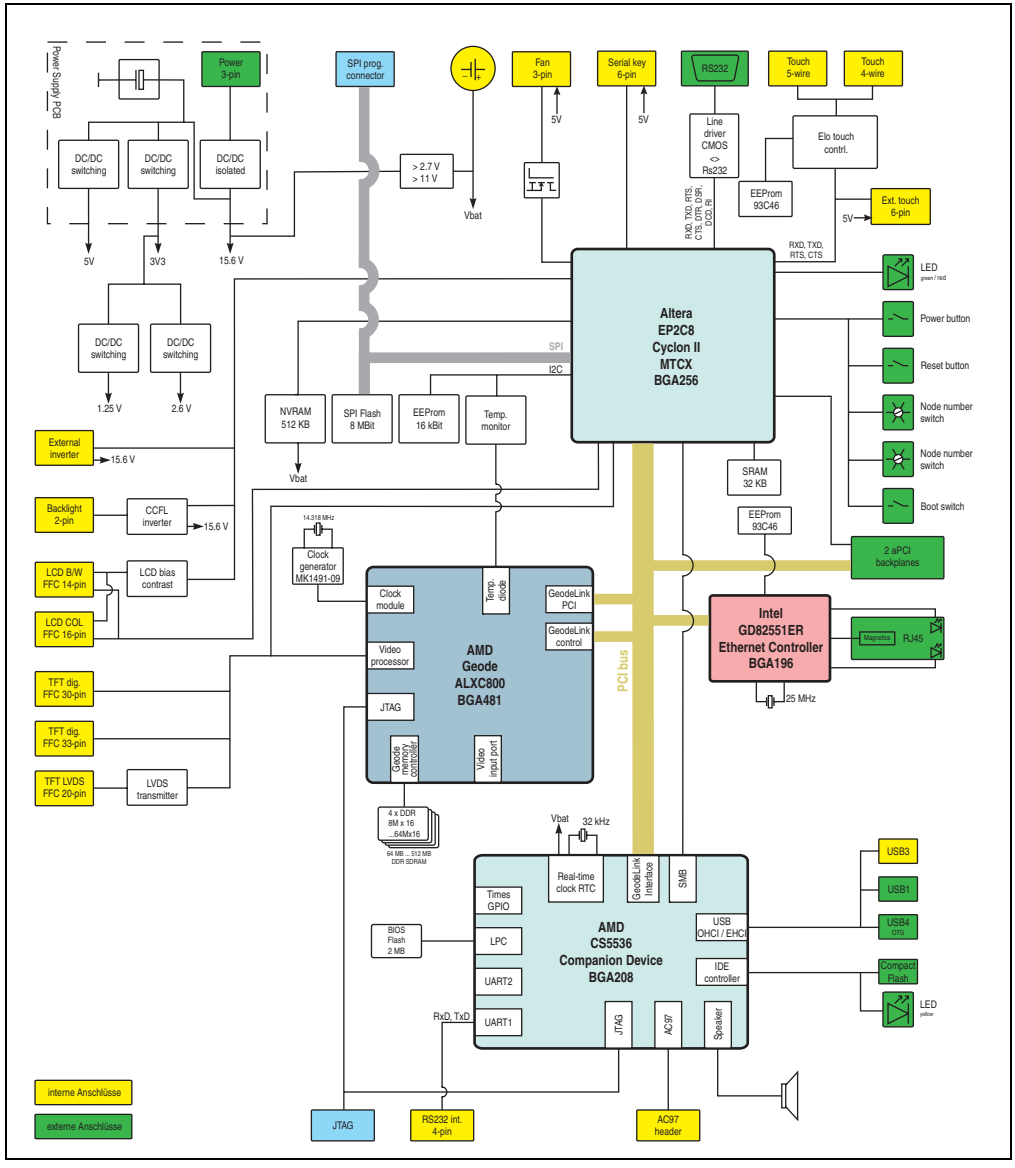


Figure 265: Block diagram - Power Panel 400 with 2 aPCI slots

Chapter 3 • Commissioning

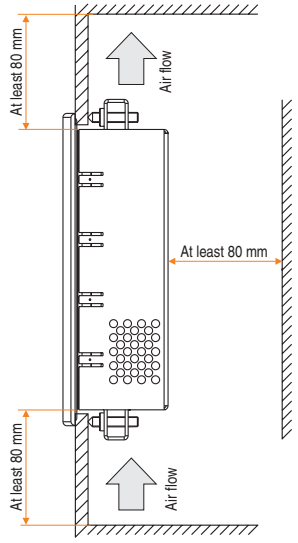
1. Mounting instructions

- 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 266: 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).

Side view



Rear view

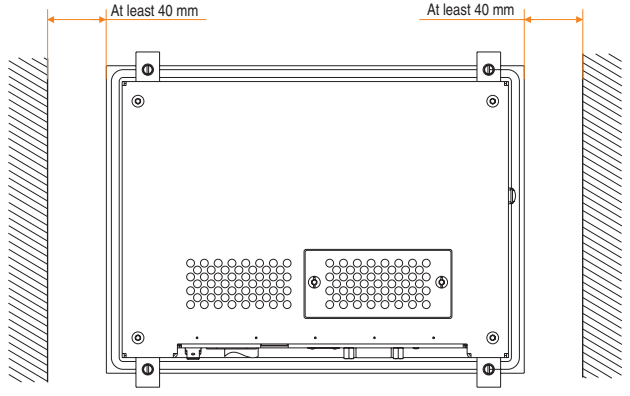


Table 135: Space for air circulation

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).

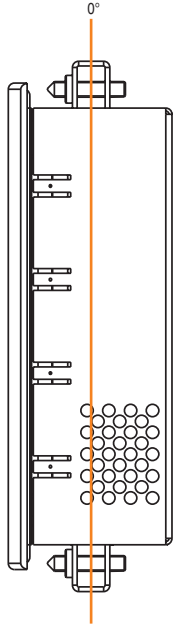
Mounting orientation 0°


Table 136: Mounting orientation 0°

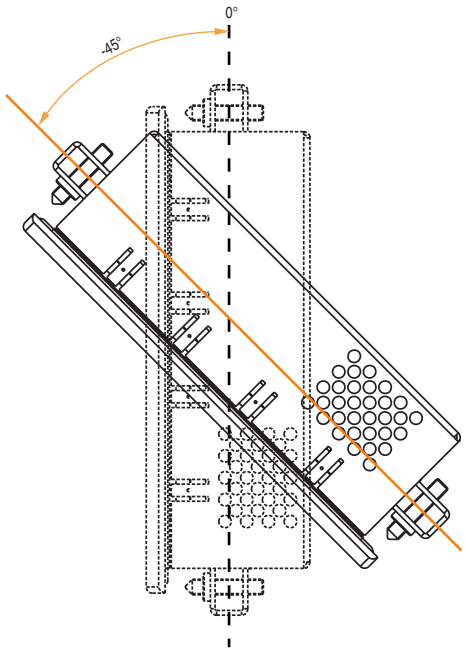
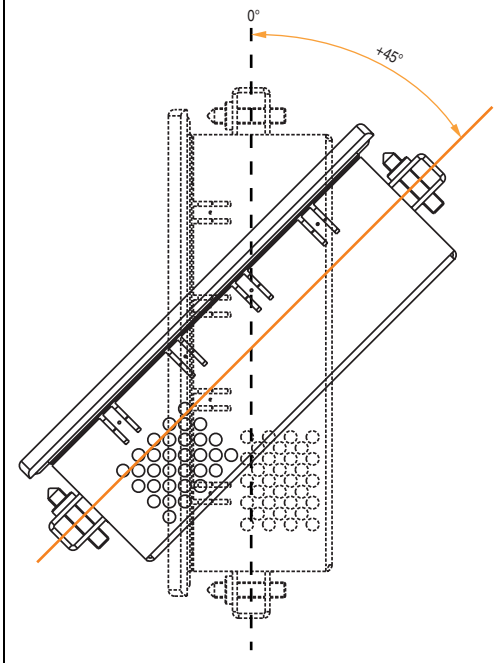
Mounting orientation -45°	Mounting orientation +45°
	

Table 137: 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, which supports hardware calibration. This means that the devices are pre-calibrated from stock (pre-calibration). This feature proves advantageous in the case of a replacement part because a new calibration is no longer required when exchanging devices (identical model / type). Nevertheless, we recommend calibrating the device in order to achieve the best results and to better readjust the touch screen to the user's preferences.

Regardless of this, the touch screen driver requires calibration following installation.

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). The touch screen should be calibrated while installing the driver.

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

Chapter 4 • Software

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

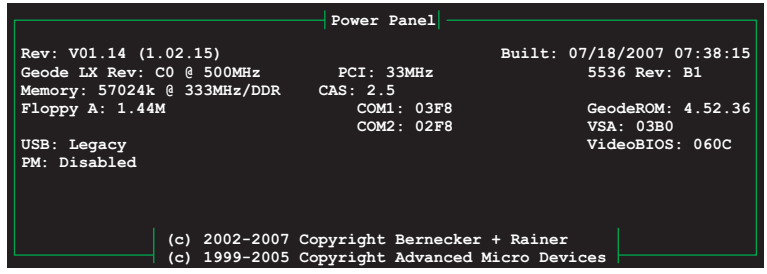


Figure 267: BIOS summary screen for VGA, SVGA and XGA Power Panel devices

To deactivate this summary screen for VGA, SVGA and XGA variants, see "Miscellaneous configuration" on page 448.

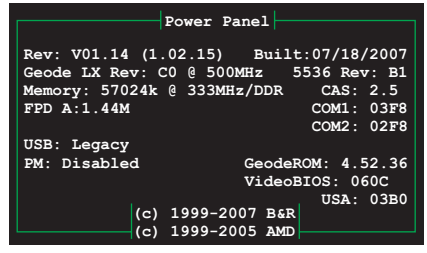


Figure 268: BIOS summary screen for QVGA Power Panel devices

To deactivate this summary screen for QVGA variants, see "Miscellaneous configuration" on page 470.

To make changes in the BIOS setup, the DEL key must be pressed when booting the Power Panel device as soon as the following message appears in the upper margin of the display (during the POST):

Figure 269: Press DEL for setup

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

Warning!

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

Information:

The settings recommended by B&R can be loaded with "Load defaults". For a list of the default values, see Section 1.5 "BIOS default values" on page 477.

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

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

Table 138: 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 138: 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 477.

1.3.1 Main menu

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

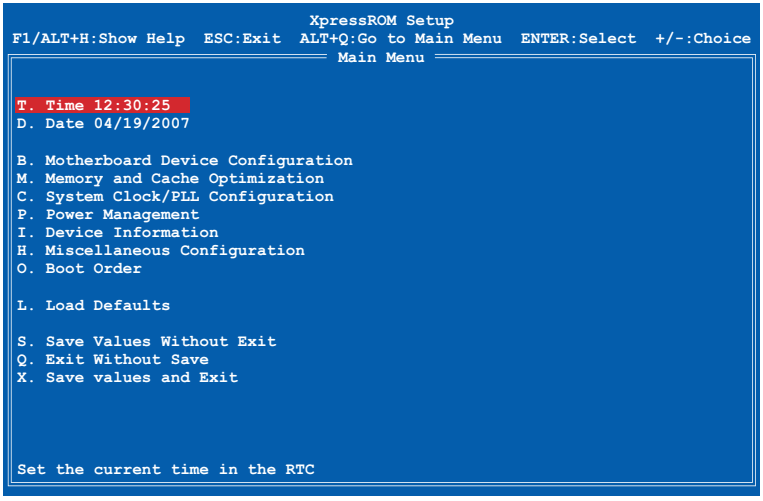


Figure 270: Main menu

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

Shortcut	BIOS setup menu	Function
T	Time 09:56:12 PM	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.

Table 139: Overview of BIOS main menu functions

Shortcut	BIOS setup menu	Function
I	Device information	Important parameters (e.g. temperature, mode/node position, etc.) for a Power Panel device are displayed here.
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 139: Overview of BIOS main menu functions (Forts.)

1.3.2 Time

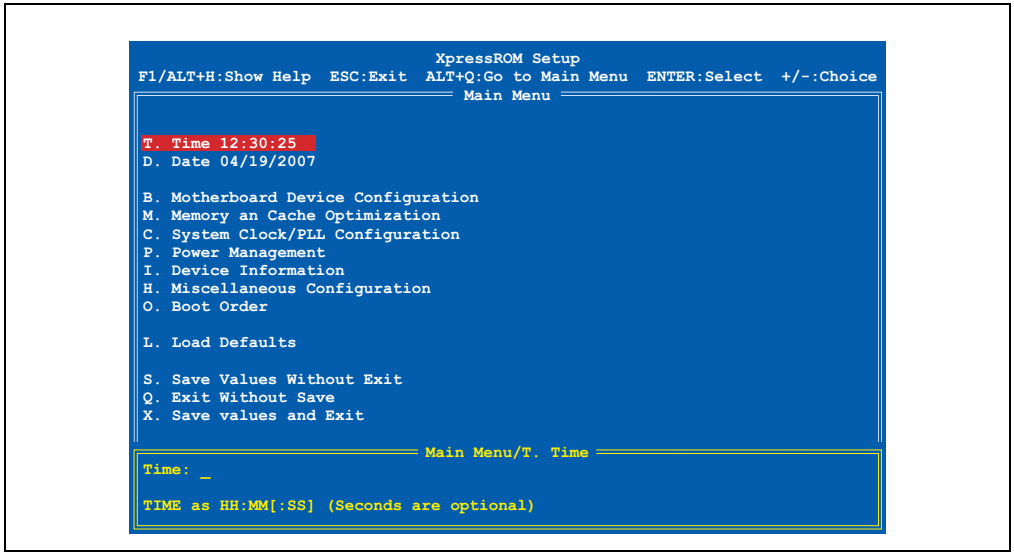


Figure 271: Time

The currently configured system time is displayed here. The time is buffered by a battery (CMOS battery) after the Power Panel device has been switched off.

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

Example: Set time to 13:00:00.

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

- 13:00:00 - Confirm with Enter
- 01:00:00 PM - Confirm with Enter
- 13: - Confirm with Enter

Information:

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

1.3.3 Date

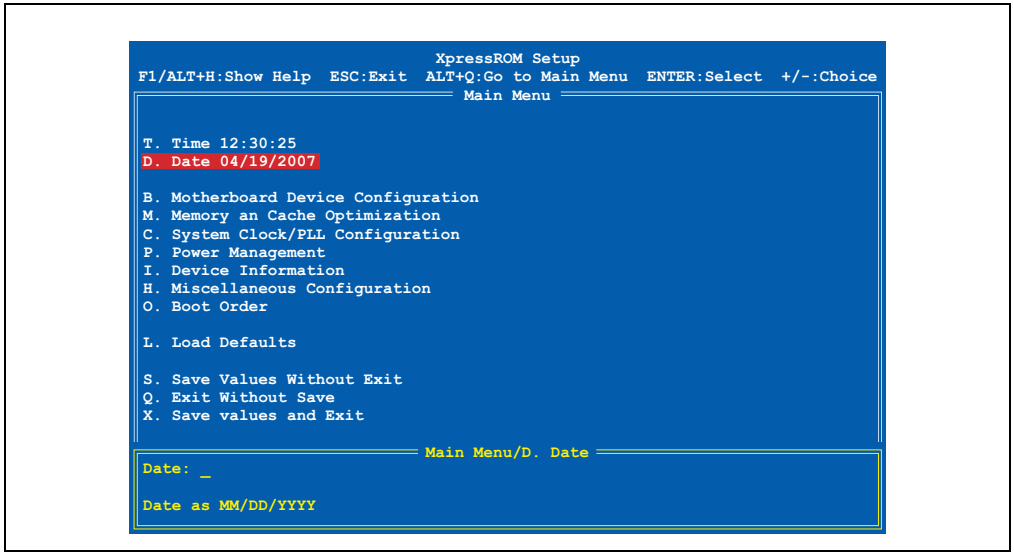


Figure 272: Date

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

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

Example: Set date to 2.12.2003.

Entry using keyboard:

- 02/12/2003 - Confirm with Enter

Information:

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

1.3.4 Motherboard device configuration

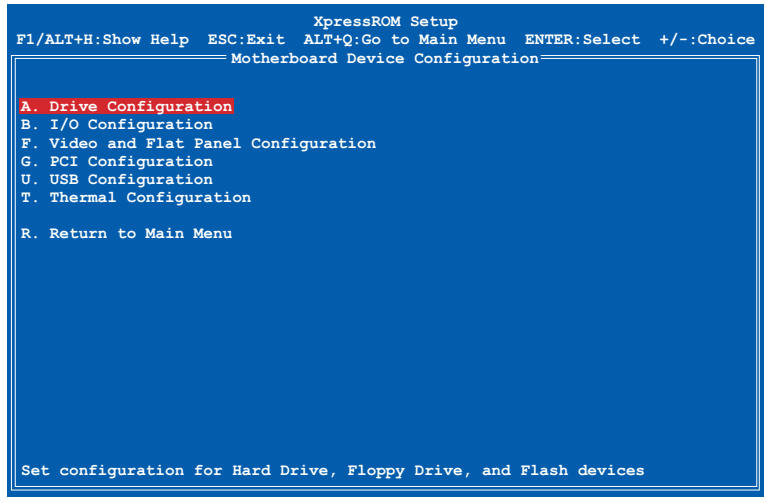


Figure 273: Motherboard device configuration

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

Table 140: BIOS motherboard device configuration menu

Motherboard device configuration - drive configuration

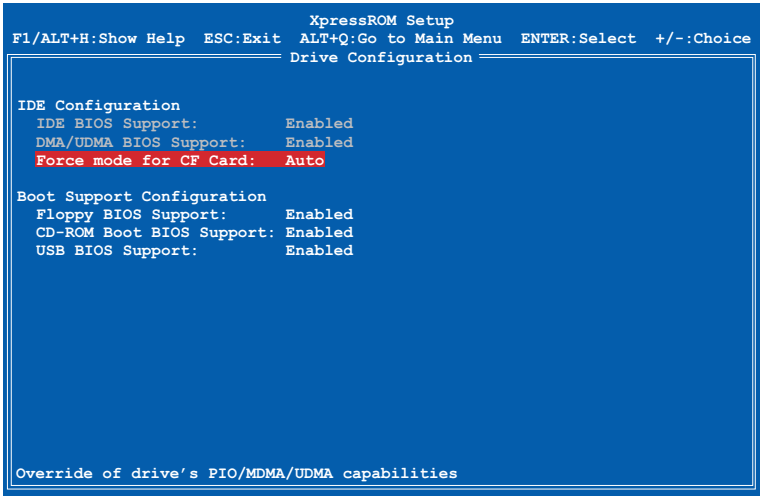


Figure 274: Motherboard device configuration - drive configuration

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. **Information:** **If a mode is configured that is not supported by the CompactFlash card, then the fastest supported mode is configured.**	Auto	Configures the fastest mode supported by the inserted CompactFlash card.
		PIO 0 to PIO 4	Manual configuration option for PIO mode.
		MDMA 0 to MDMA 2	Manual configuration option for MDMA mode.
		UDMA 0 to UDMA 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 141: BIOS drive configuration menu

Motherboard device configuration - I/O configuration

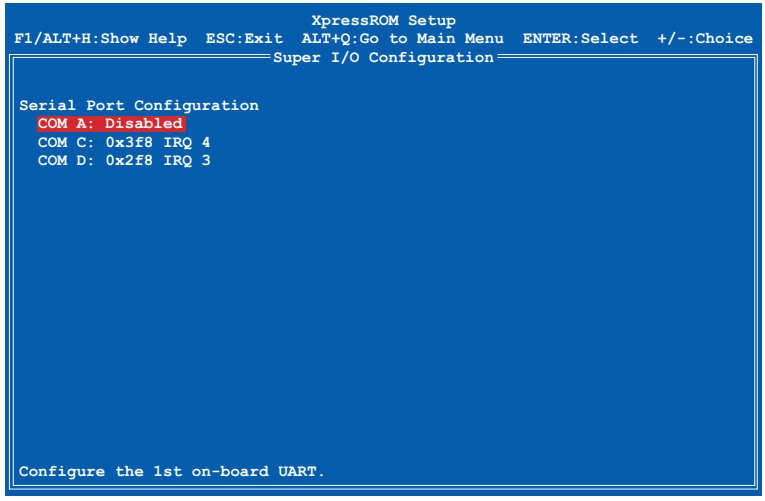


Figure 275: Motherboard device configuration - I/O configuration

BIOS setting	Meaning	Setting options	Effect
COM A	Configures the UART address range and the corresponding interrupt for the optional internal interface. **Information:** **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. **Information:** **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 142: 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. **Information:** **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 142: BIOS super I/O configuration menu (Forts.)

Motherboard device configuration - video and flat panel

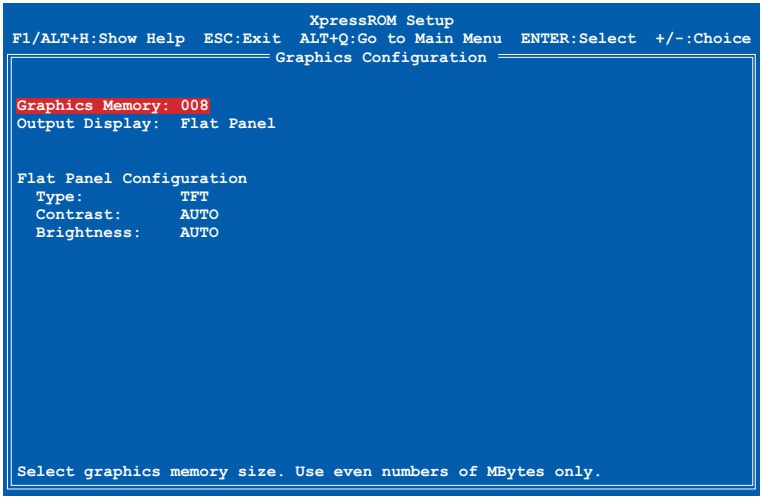


Figure 276: Motherboard device configuration - video and flat panel configuration

BIOS setting	Meaning	Setting options	Effect
Graphics memory	Setting for the amount of graphics memory reserved by the main memory.	2-254	Manually setting the value.
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 143: 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 143: BIOS video configuration menu (Forts.)

Motherboard device configuration - PCI configuration

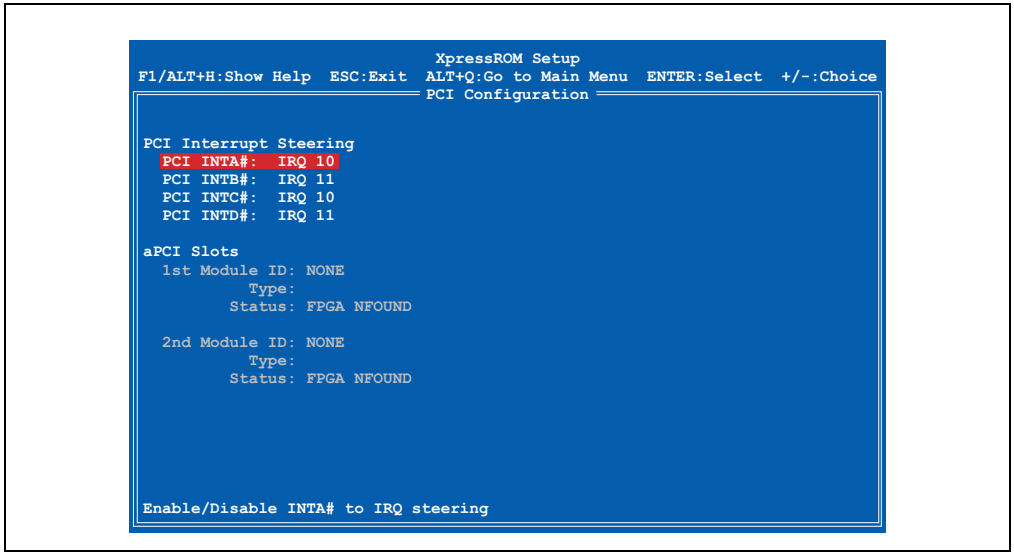


Figure 277: Motherboard device configuration - PCI configuration

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 144: BIOS PCI configuration menu

BIOS setting	Meaning	Setting options	Effect
PCI INTD#	IRQ setting for the USB interface.	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 144: BIOS PCI configuration menu (Forts.)

Motherboard device configuration - USB configuration

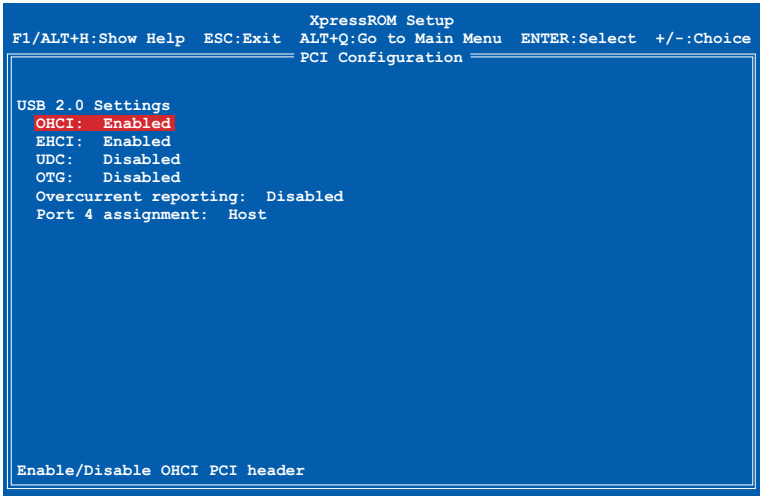


Figure 278: Motherboard device configuration - USB configuration

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 145: 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 145: BIOS USB configuration menu (Forts.)

Motherboard device configuration - thermal configuration

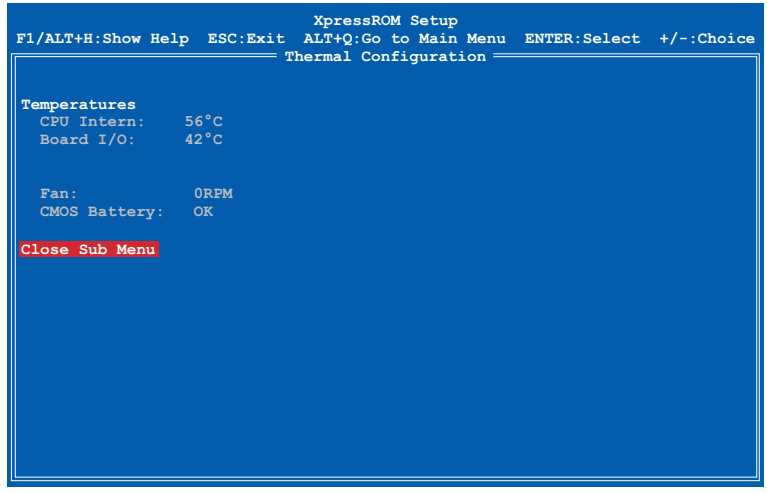


Figure 279: Motherboard device configuration - thermal configuration

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: **OK** - Battery is ok, **Bad** - Battery must be replaced.	None	-

Table 146: BIOS thermal configuration menu

BIOS setting	Meaning	Setting options	Effect
Close submenu	Close submenu	Enter	Closes the submenu.

Table 146: 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 479).

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.

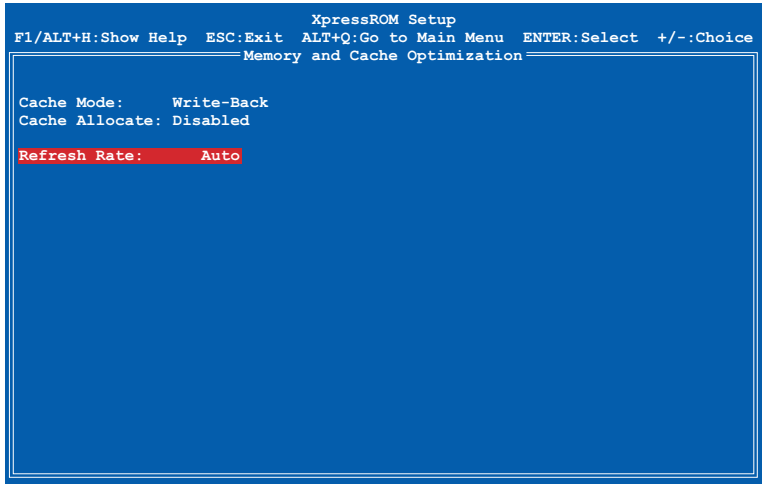


Figure 280: Memory and cache optimization

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

Table 147: BIOS memory and cache optimization menu

1.3.6 System clock/PLL configuration

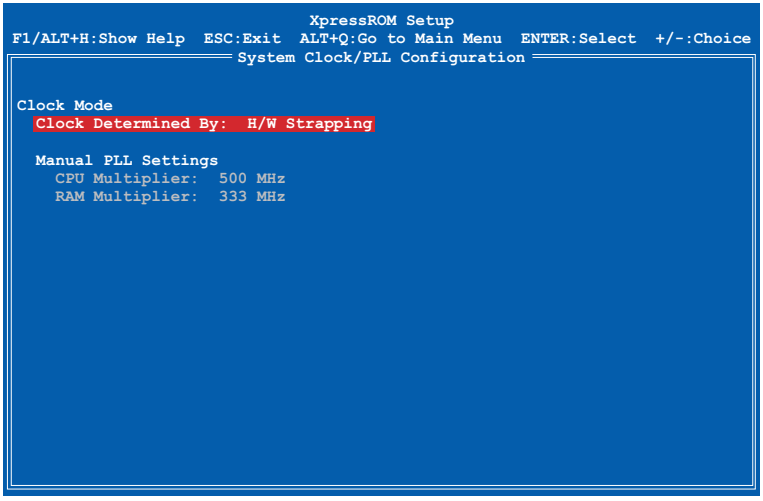


Figure 281: System clock/PLL configuration

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).
CPU multiplier	The CPU multiplier can be selected with this option. **Information:** **This value can only be set if the BIOS setting "Clock determined by" is set to *Manual*.**	None	-
		233 MHz, 266 MHz, 300 MHz, 333 MHz, 366 MHz, 400 MHz, 433 MHz, 466 MHz, 500 MHz	Manually setting the value.
RAM multiplier	The RAM multiplier can be selected with this option. **Information:** **This value can only be set if the BIOS setting "Clock determined by" is set to *Manual*.**	None	-
		233 MHz, 266 MHz, 300 MHz, 333 MHz, 366 MHz, 400 MHz, 433 MHz, 466 MHz, 500 MHz	Manually setting the value.

Table 148: System clock/PLL configuration

1.3.7 Power management

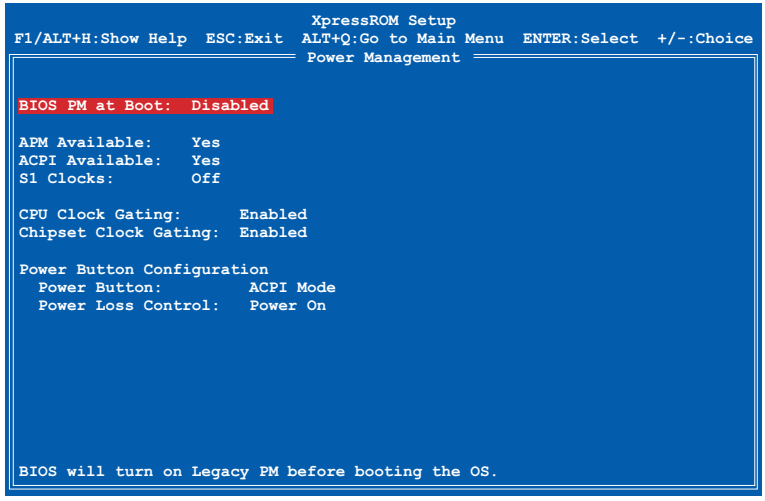


Figure 282: Power management

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 149: BIOS power management menu

1.3.8 Device information

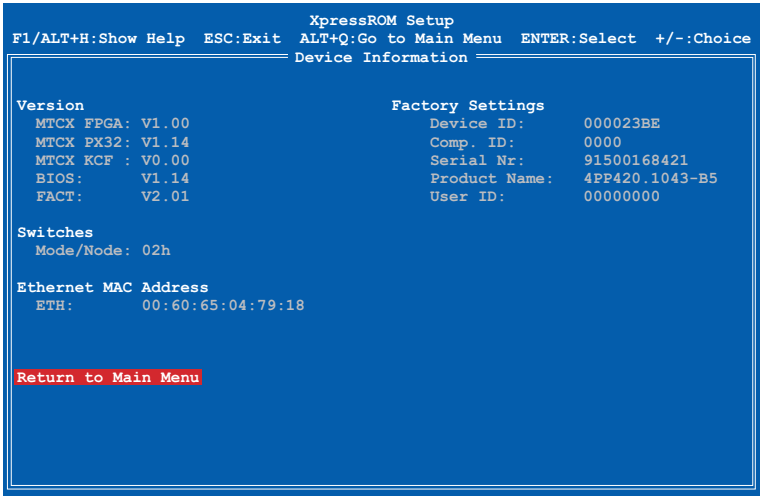


Figure 283: Device information

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	-
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	-

Table 150: BIOS device information menu

BIOS setting	Meaning	Setting options	Effect
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 150: BIOS device information menu (Forts.)

1.3.9 Miscellaneous configuration

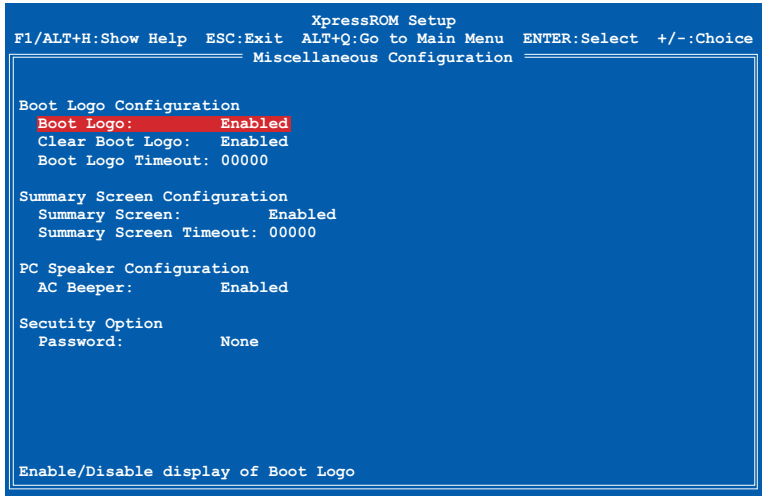


Figure 284: Miscellaneous configuration

BIOS setting	Meaning	Setting options	Effect
Boot logo[1)]	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.

Table 151: BIOS miscellaneous configuration menu

BIOS setting	Meaning	Setting options	Effect
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. **Information:** **By pressing any key the boot can be continued before the timeout has expired.**	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. **Information:** **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.
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 151: BIOS miscellaneous configuration menu (Forts.)

1) The standard B&R boot logo is pre-configured upon delivery.

1.3.10 Boot order

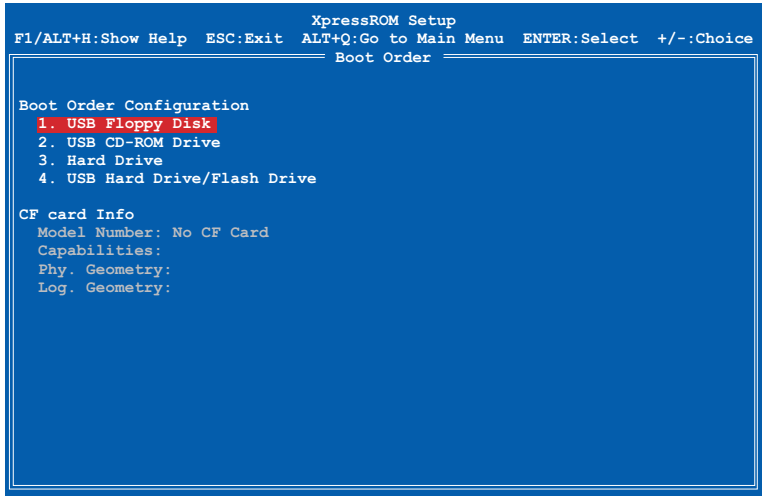


Figure 285: Boot order

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 152: BIOS drive configuration menu

1.3.11 Load defaults

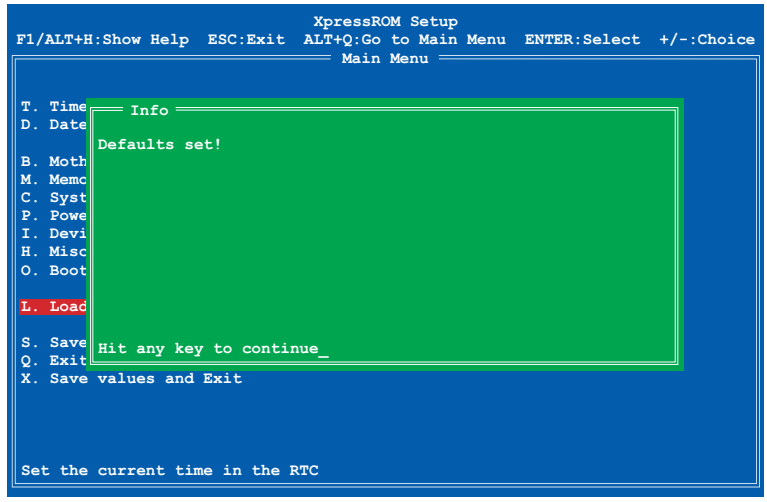


Figure 286: Load defaults

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 479.

1.3.12 Save values without exit

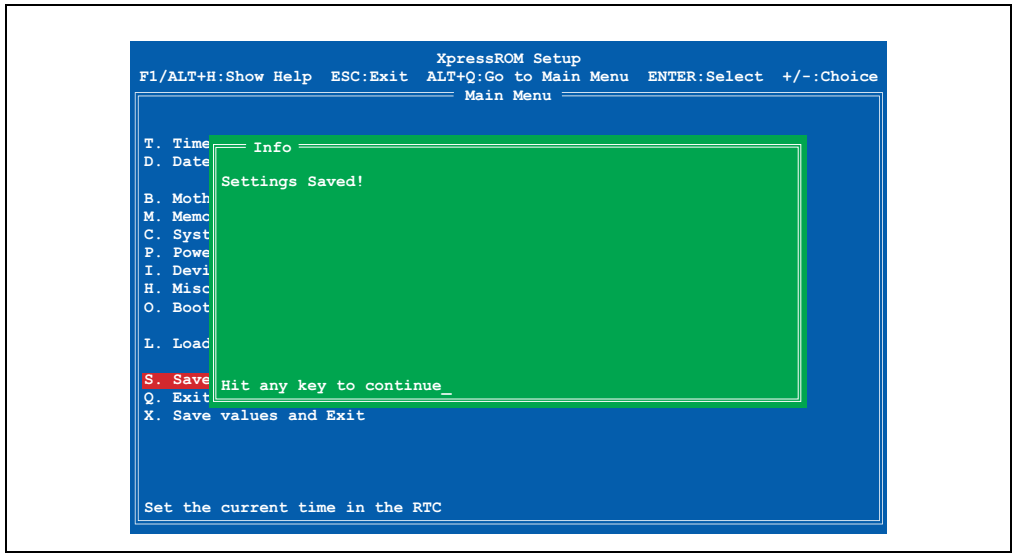


Figure 287: Save values without exit

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

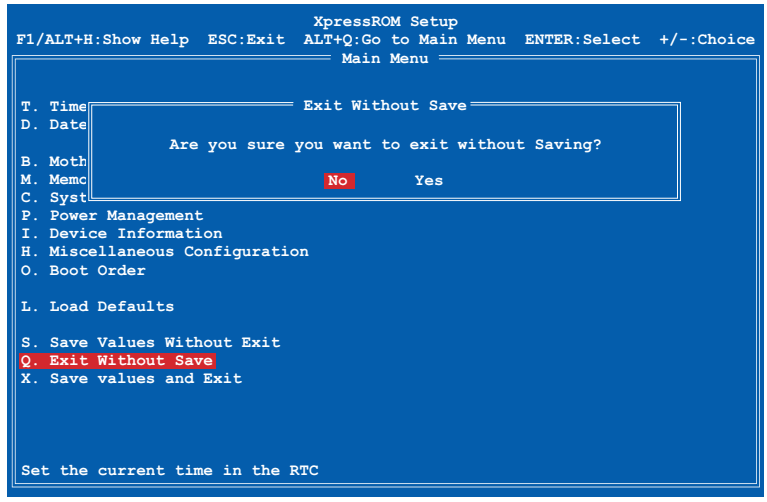


Figure 288: Exit without save

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

Information:

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

1.3.14 Save values and exit

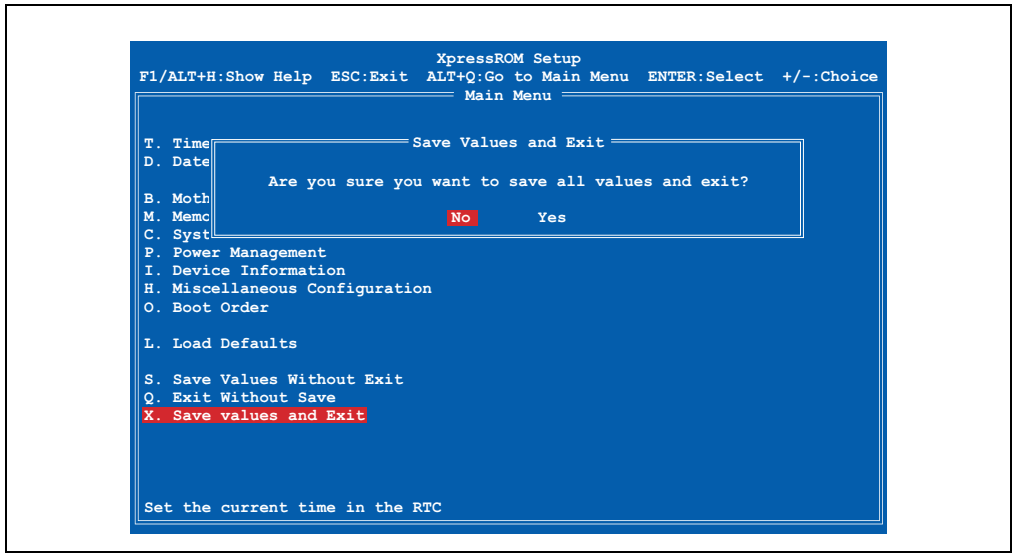


Figure 289: Save values and exit

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

Information:

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

1.4 BIOS settings for QVGA Power Panel devices

Information:

The BIOS default values can be found in the section 1.5 "BIOS default values" on page 477.

1.4.1 Main menu

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

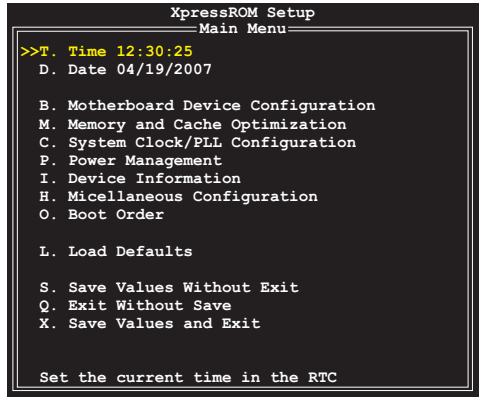


Figure 290: Main menu

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 (e.g. temperature, mode/node position, etc.) for a Power Panel device are displayed here.
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.

Table 153: Overview of BIOS main menu functions

Shortcut	BIOS setup menu	Function
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 153: Overview of BIOS main menu functions (Forts.)

1.4.2 Time

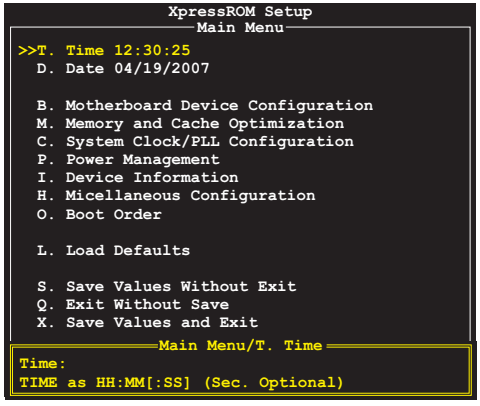


Figure 291: Time

The currently configured system time is displayed here. The time is buffered by a battery (CMOS battery) after the Power Panel device has been switched off.

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

Example: Set time to 13:00:00.

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

- 13:00:00 - Confirm with Enter
- 01:00:00 PM - Confirm with Enter
- 13: - Confirm with Enter

Information:

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

1.4.3 Date

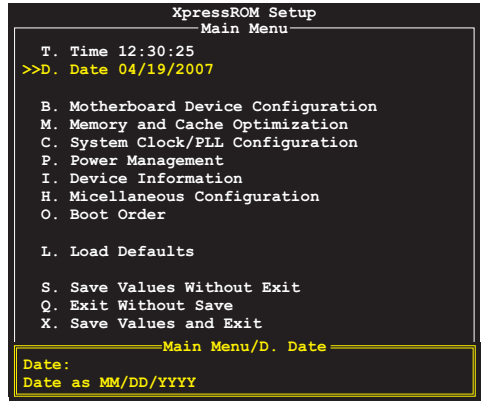


Figure 292: Date

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

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

Example: Set date to 2.12.2003.

Entry using keyboard:

- 02/12/2003 - Confirm with Enter

Information:

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

1.4.4 Motherboard device configuration

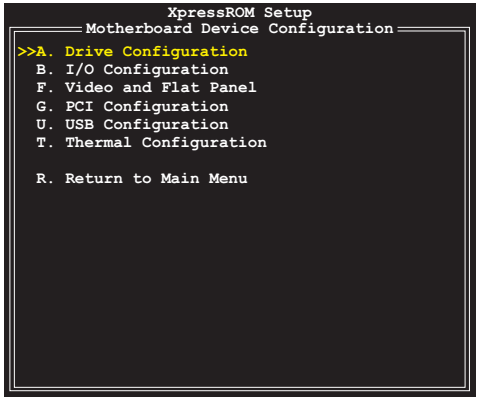


Figure 293: Motherboard device configuration

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 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 154: BIOS motherboard device configuration menu

Motherboard device configuration - drive configuration

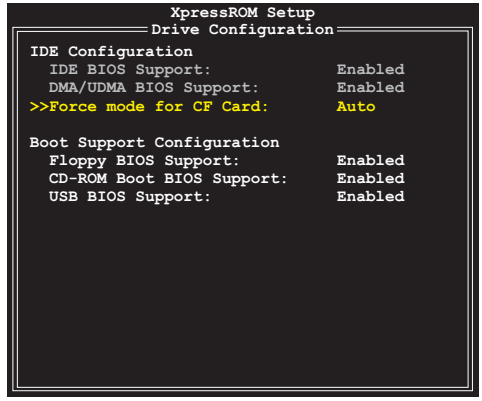


Figure 294: Motherboard device configuration - drive configuration

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. **Information:** **If a mode is configured that is not supported by the CompactFlash card, then the fastest supported mode is configured.**	Auto	Configures the fastest mode supported by the inserted CompactFlash card.
		PIO 0 to PIO 4	Manual configuration option for PIO mode.
		MDMA 0 to MDMA 2	Manual configuration option for MDMA mode.
		UDMA 0 to UDMA 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 155: BIOS drive configuration menu

Motherboard device configuration - I/O configuration

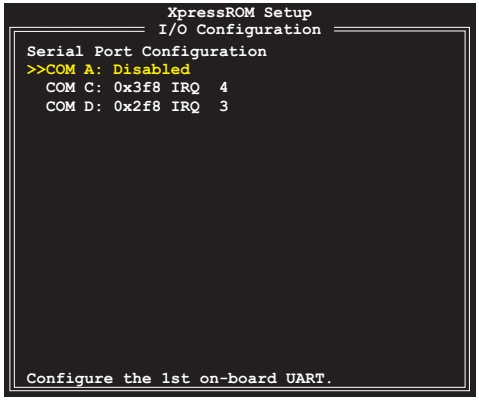


Figure 295: Motherboard device configuration - I/O configuration

BIOS setting	Meaning	Setting options	Effect
COM A	Configures the UART address range and the corresponding interrupt for the optional internal interface. **Information:** **Two ports cannot use the same address range and interrupt.**	Disabled	No assignment.
		0x3f8 IRQ 4	Use this address range and interrupt.
		0x2f8 IRQ 3	
		0x3e8 IRQ 4	
		0x2e8 IRQ 3	
COM C	Configures the UART address range and the corresponding interrupt for the external serial interface. **Information:** **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 156: 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. **Information:** **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 156: BIOS super I/O configuration menu (Forts.)

Motherboard device configuration - video and flat panel

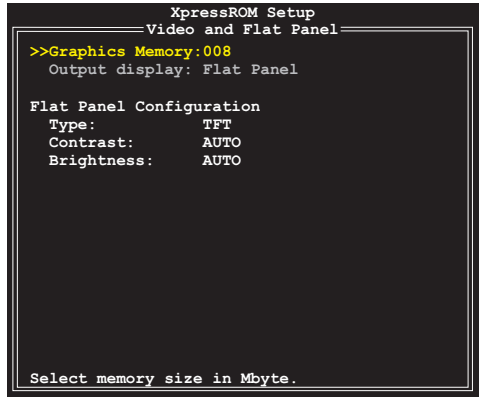


Figure 296: Motherboard device configuration - video and flat panel configuration

BIOS setting	Meaning	Setting options	Effect
Graphics memory	Setting for the amount of graphics memory reserved by the main memory.	2-254	Manually setting the value.
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 157: BIOS video configuration menu

BIOS setting	Meaning	Setting options	Effect
Contrast	Setting for the contrast of the display. **Information:** **Contrast settings can only be configured for passive displays. If the mode/node switch is set to 0/0, then contrast settings are automatically set to the default factory settings every time the Power Panel device is restarted.**	Auto	The optimal contrast is automatically configured using the factory settings. A contrast value between 100% and 0% is set.
		0% to 100%	Manual setting of the desired contrast within factory settings limits.
Brightness	Setting for the background lighting of the display. **Information:** **If the mode/node switch is set to 0/0, then brightness settings are automatically set to the default values from the factory settings every time the Power Panel device is restarted.**	Auto	The optimal brightness is automatically configured using the factory settings. A brightness value between 100% and 0% is set.
		0% to 100%	Manual setting of the desired brightness within factory settings limits.

Table 157: BIOS video configuration menu (Forts.)

Motherboard device configuration - PCI configuration

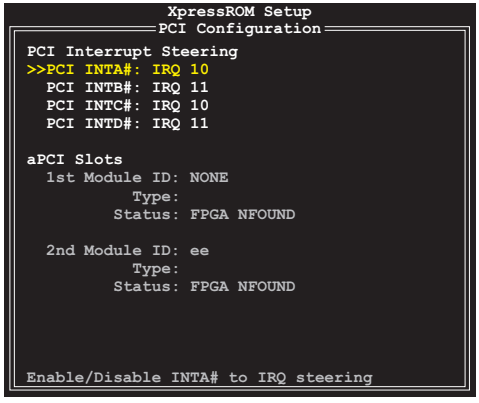


Figure 297: Motherboard device configuration - PCI configuration

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 158: 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 158: BIOS PCI configuration menu (Forts.)

Motherboard device configuration - USB configuration

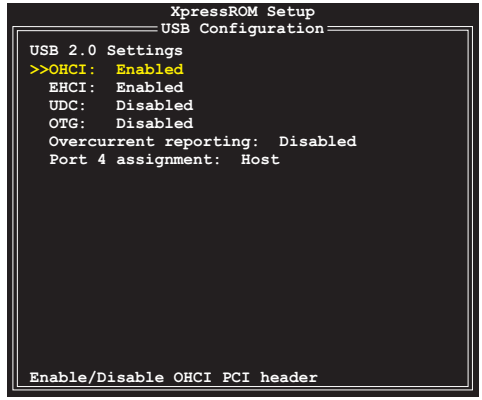


Figure 298: Motherboard device configuration - USB configuration

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 159: 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 159: BIOS USB configuration menu

Motherboard device configuration - thermal configuration

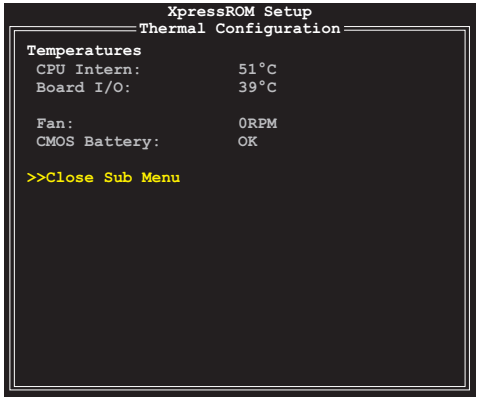


Figure 299: Motherboard device configuration - thermal configuration

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: **OK** - Battery is ok, **Bad** - Battery must be replaced.	None	-
Close submenu	Close submenu	Enter	Closes the submenu.

Table 160: 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 479).

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.

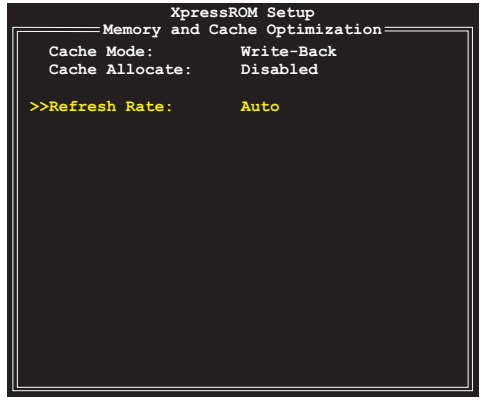


Figure 300: Memory and cache optimization

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 161: BIOS memory and cache optimization menu

BIOS setting	Meaning	Setting options	Effect
Refresh rate	The refresh cycle can be set here. **Information:** **Enter the clock frequency, the chipset does the rest.**	Auto	Value selected automatically.
		15µs, 3µs, 7µs, 31µs, 62µs or 125µs	Manually setting the value.

Table 161: BIOS memory and cache optimization menu (Forts.)

1.4.6 System clock/PLL configuration

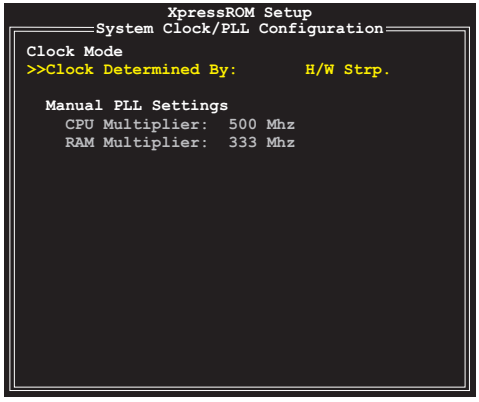


Figure 301: System clock/PLL configuration

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. **Information:** **This value can only be set if the BIOS setting "Clock determined by" is set to *Manual*.**	None	-
		233 MHz, 266 MHz, 300 MHz, 333 MHz, 366 MHz, 400 MHz, 433 MHz, 466 MHz, 500 MHz	Manually setting the value.
RAM multiplier	The RAM multiplier can be selected with this option. **Information:** **This value can only be set if the BIOS setting "Clock determined by" is set to *Manual*.**	None	-
		233 MHz, 266 MHz, 300 MHz, 333 MHz, 366 MHz, 400 MHz, 433 MHz, 466 MHz, 500 MHz	Manually setting the value.

Table 162: System clock/PLL configuration

1.4.7 Power management

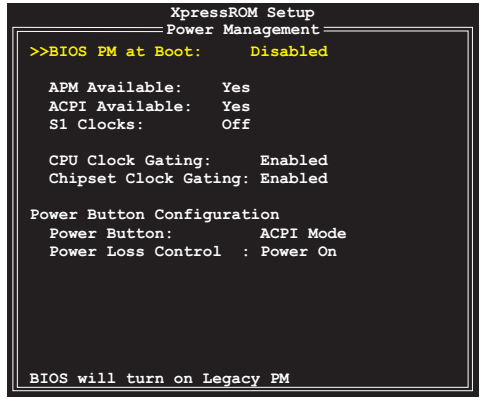


Figure 302: Power management

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 163: BIOS power management menu

1.4.8 Device information

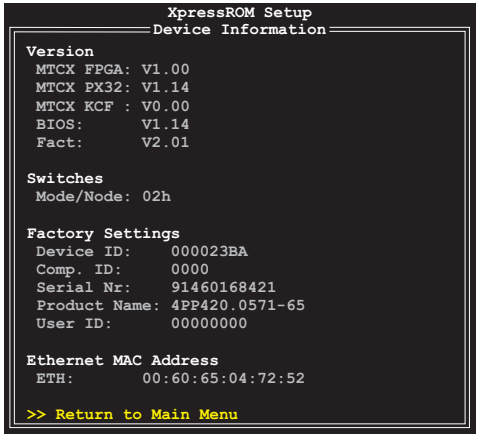


Figure 303: Device information

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 164: BIOS device information menu

BIOS setting	Meaning	Setting options	Effect
ETH	The MAC address of the Ethernet interface is displayed here.	None	-

Table 164: BIOS device information menu (Forts.)

1.4.9 Miscellaneous configuration

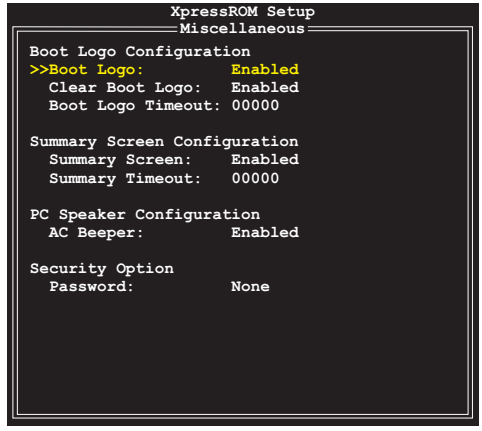


Figure 304: Miscellaneous configuration

BIOS setting	Meaning	Setting options	Effect
Boot logo[1)]	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. **Information:** **Can be resumed before the timeout expires by pressing any button.**	0	No waiting.
		1-65535 [milliseconds]	The manually set value in milliseconds that must pass before the boot process continues.
Summary screen	Displays information about BIOS, VGA, VSA versions, devices found, etc.	Disabled	Shows the summary screen.
		Enabled	Hides the summary screen.

Table 165: BIOS miscellaneous configuration menu

BIOS setting	Meaning	Setting options	Effect
Summary timeout	Defines how long the summary screen is displayed. **Information:** **Can be resumed before the timeout expires by pressing any button.**	0	No waiting.
		1-65535 [milliseconds]	The manually set value in milliseconds that must pass before the boot process continues.
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 165: BIOS miscellaneous configuration menu (Forts.)

1) The standard B&R boot logo is pre-configured upon delivery.

1.4.10 Boot order

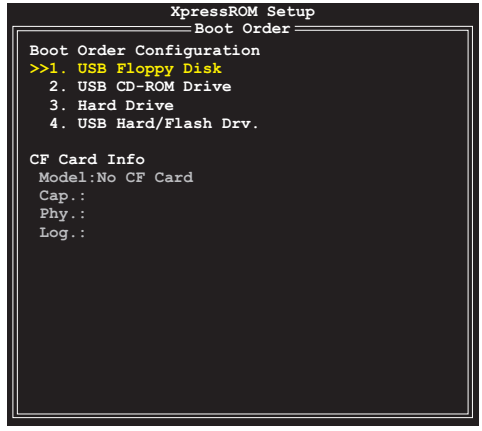


Figure 305: Boot order

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 166: BIOS drive configuration menu

1.4.11 Load defaults

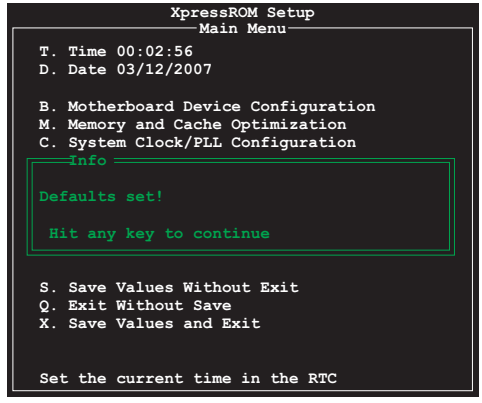


Figure 306: Load defaults

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 479.

1.4.12 Save values without exit

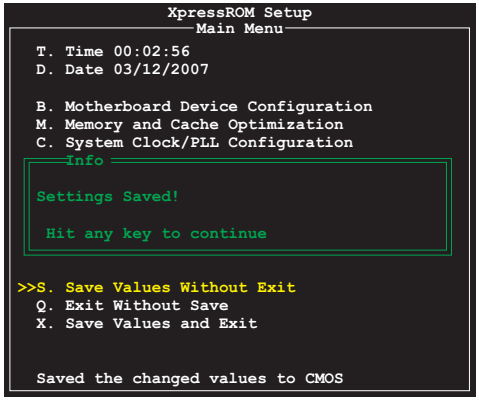


Figure 307: Save values without exit

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

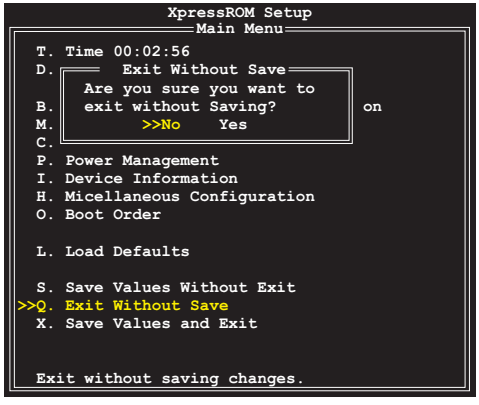


Figure 308: Exit without save

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

Information:

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

1.4.14 Save values and exit

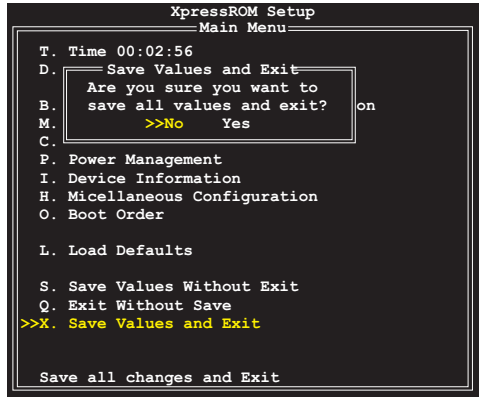


Figure 309: Save values and exit

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

Information:

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

1.5 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
I/O configuration	
COM A	Disabled
COM C	0x3f8 IRQ 4
COM D	0x2f8 IRQ 3
Video and flat panel configuration	
Graphics memory	008
Output display	-
Type	-
Contrast	Auto
Brightness	Auto
PCI Configuration	
PCI INTA#	IRQ 10
PCI INTB#	IRQ 11
PCI INTC#	IRQ 10
PCI INTD#	IRQ 11
USB configuration	
OHCI	Enabled
EHCI	Enabled
UDC	Disabled
OTG	Disabled
Overcurrent reporting	Disabled
Port 4 assignment	Host
Thermal configuration	
CPU internal	-
Board I/O	-

Table 167: Motherboard device configuration default values

Drive configuration	Default value
Fan	-
Battery	-

Table 167: 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 168: 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 169: 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 170: 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 171: 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 172: 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 488)
- MTCX firmware (see page 491)
- aPCI firmware (see page 493)
- User Boot Logo (see page 494)

Current software can be downloaded directly from the service portal on the B&R homepage (**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 dead) or the Power Panel device cannot be booted correctly three times consecutively, then the salvaged data from flash memory is copied again to CMOS. Setup is back to its original state, except for the time.

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 173: 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 174: 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 175: 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 1)
IRQ 4	COM1 1)
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 1)
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 176: 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 specially for use with control technology. The cycle time for your application can be separated among several task classes. Automation Runtime ensures that all application programs are executed within defined time periods, proving itself to be a configurable, deterministic real-time multitasking system.

An extensive project can be divided into small individual tasks. This way of working increases modularity and makes it much easier to maintain projects.

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:

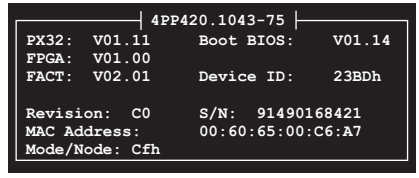


Figure 310: Automation Runtime summary screen - ex. 4PP420.1043-75

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. **Information:** **Factory settings are set by B&R and cannot be changed by the user.**
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 177: 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.

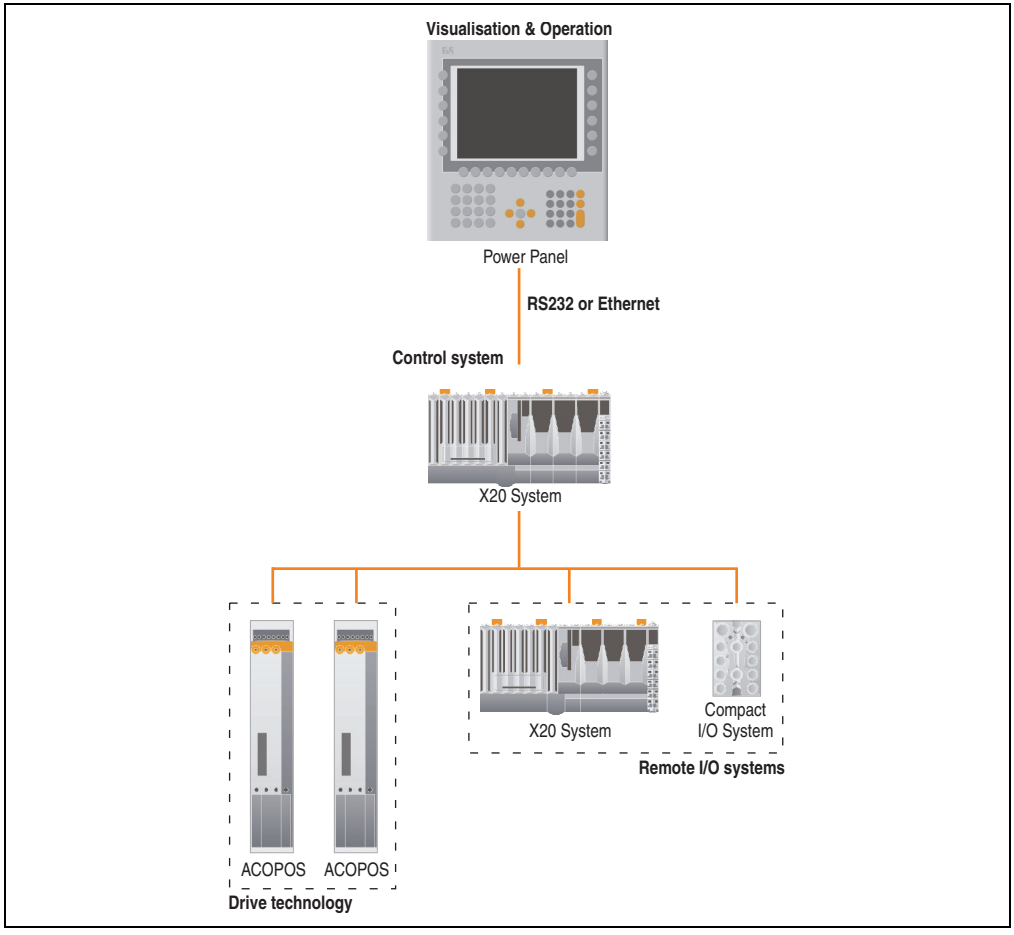


Figure 311: Power Panel 300 as an intelligent visualization system

2.3 Power Panel 400 with Power Panel 300 terminals

Control program and visualization run on the Power Panel 400. I/O peripherals and drives are connected via CAN, X2X and POWERLINK. Other Power Panel 300 units are connected as terminals via Ethernet TCP/IP. The central data storage occurs on the Power Panel 400.

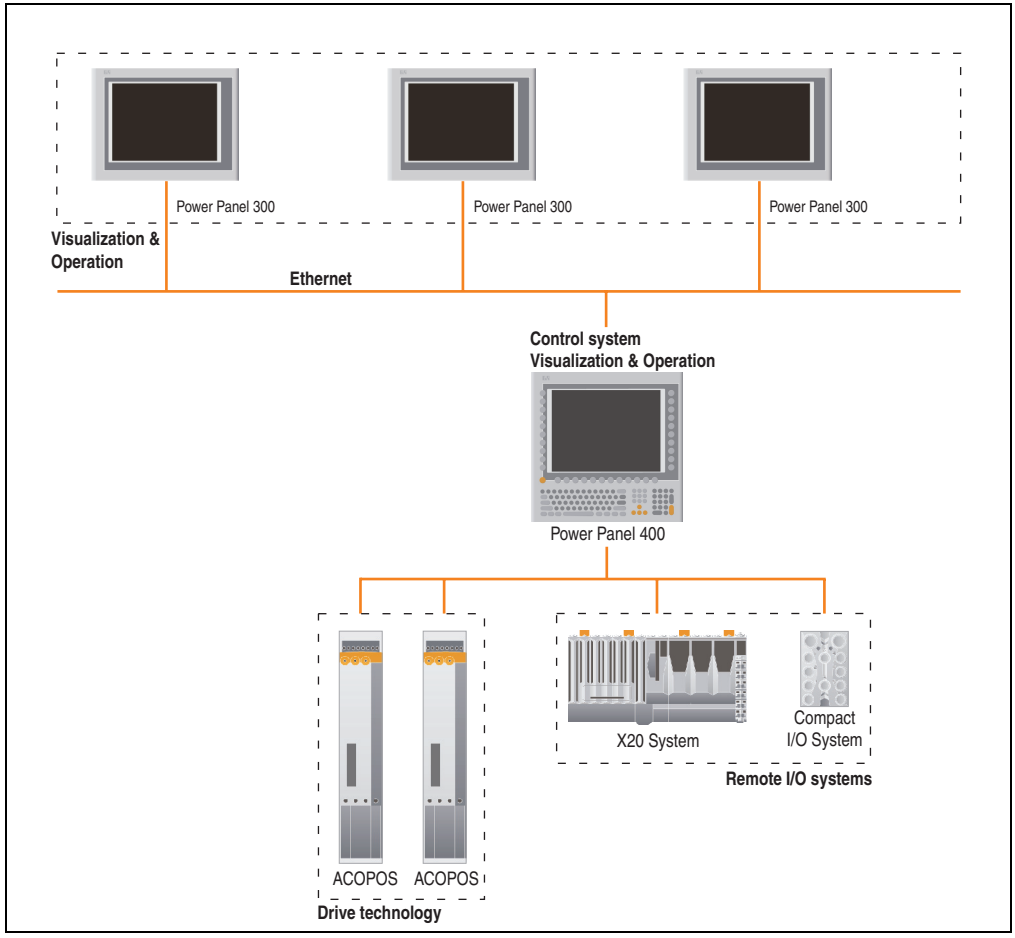


Figure 312: Power Panel 400 with, e.g. Power Panel 300 terminals

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 488)
- MTCX firmware (see page 491)

Current software can be downloaded directly from the service portal on the B&R homepage (**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**).

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 cab be found on page 497.

Information concerning creating a USB flash drive for a B&R upgrade can be found on page 499.

Information concerning creating a CompactFlash card for a B&R upgrade can be found on page 501.

- 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 437 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 313: BIOS upgrade start menu

Item	Menu item	Description
1	Update BIOS	All areas of BIOS are automatically upgraded (default after 5 seconds). **Information:** **Settings that have been changed in BIOS setup must be set again after the update.** **The update process may not be interrupted, as the Power Panel could no longer be started, and would have to be sent to B&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.**
2	Save BIOS	BIOS is automatically saved in the SAVED directory. **Information:** **It's necessary to have up to 256 KB of free space on the disk.**
3	Exit	Returns to the shell (MS-DOS).

Table 178: 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**).

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 cab be found on page 497.

Information concerning creating a USB flash drive for a B&R upgrade can be found on page 499.

Information concerning creating a CompactFlash card for a B&R upgrade can be found on page 501.

- 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 314: MTCX upgrade start menu

Concerning point 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 point 2:
Return 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**).

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 cab be found on page 497.

Information concerning creating a USB flash drive for a B&R upgrade can be found on page 499.

Information concerning creating a CompactFlash card for a B&R upgrade can be found on page 501.

- 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 437 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:

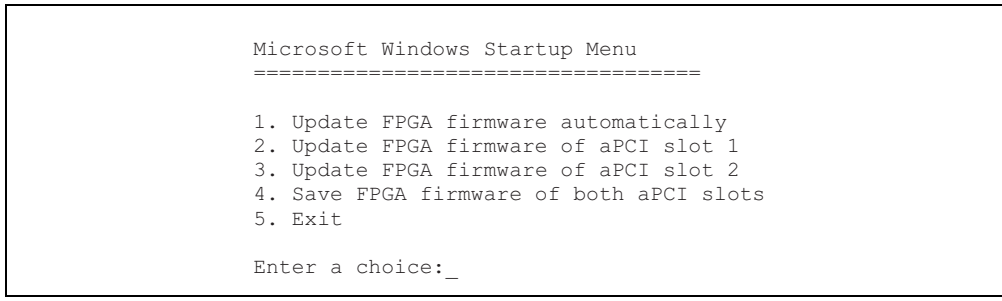


Figure 315: aPCI firmware upgrade start menu

Item	Menu item	Description
1	Update FPGA firmware automatically	The firmware for both aPCI slots is automatically updated (default after 5 seconds). **Information:** **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. **Information:** **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. **Information:** **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. **Information:** **It's necessary to have up to 640 KB of free space on the disk.**
5	Exit	Returns to the shell (MS-DOS).

Table 179: 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).

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 cab be found on page 497.

Information concerning creating a USB flash drive for a B&R upgrade can be found on page 499.

Information concerning creating a CompactFlash card for a B&R upgrade can be found on page 501.

- 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 496 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 437 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 316: 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 180: 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. **Information:** **It's necessary to have up to 192 KB of free space on the disk.**
4	Delete BIOS boot logo	An existing user boot logo is deleted in the flash.
5	Exit	Returns to the shell (MS-DOS).

Table 180: 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 448).

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 pixel stripes), as these will be cross-faded. These status messages use bitmap palette index 0 as the background color and index 7 as the foreground color (starting from BIOS V1.05; index 63 with older versions).

3) Using the utility USERLOGO.EXE, the bitmap file must then be converted into a ROM file that can be read by BIOS (please refer to the online help for the utility for more instructions about this).

4) The userlogo.rom file created by the utility is only permitted to have a maximum size of 192 KB. If this size is exceeded, a warning appears. The user can e.g. reduce the details in the Windows bitmap in order not to exceed the maximum byte size.

5) After this, the userlogo.rom file should be copied to the disk.

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..."**.

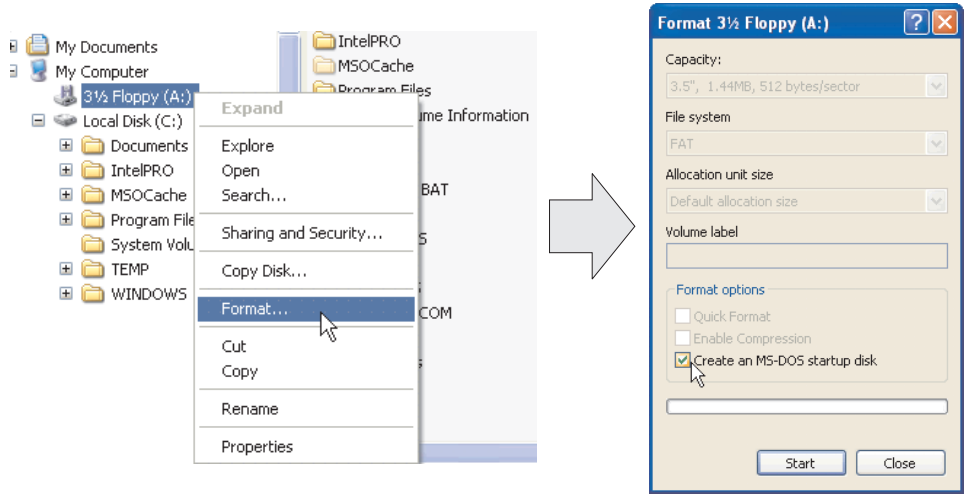


Figure 317: Creating a bootable diskette in Windows XP - step 1

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

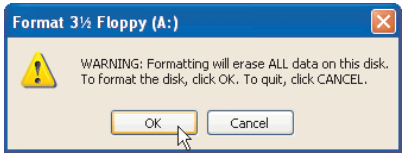


Figure 318: Creating a bootable diskette in Windows XP - step 2

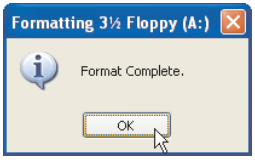
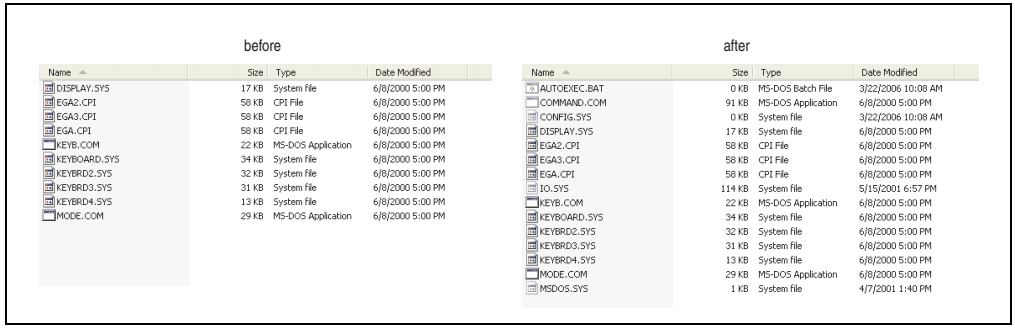


Figure 319: Creating a bootable diskette in Windows XP - step 3

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

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

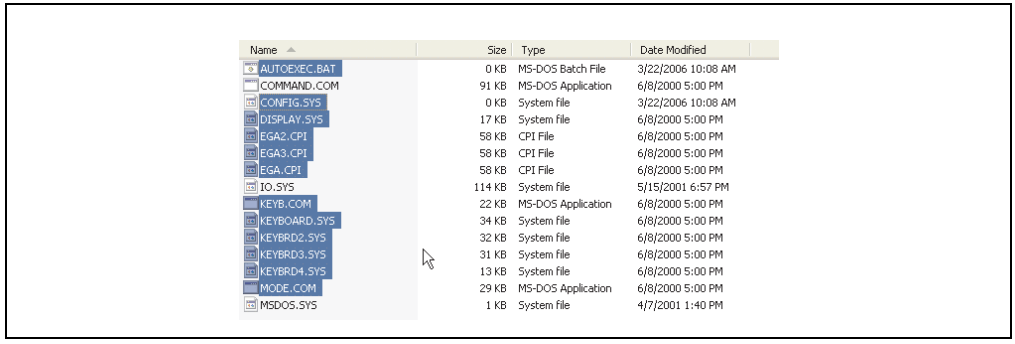
In Explorer, go to the "tools" menu, select "folder options..." and open the "view" tab - now deactivate the option "hide protected operating system files (recommended)" (activated as default) and deactivate the option "show hidden files and folders".



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

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 320: 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 321: 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**).

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.

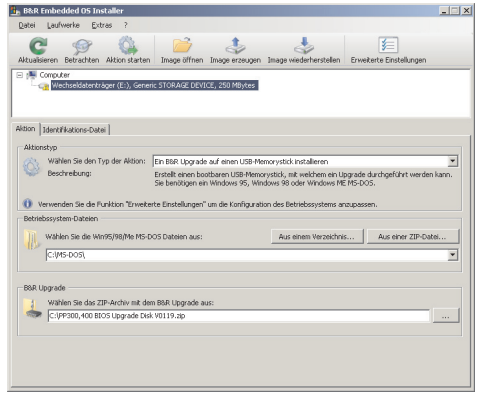


Figure 322: Creating a USB flash drive for B&R upgrade files

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 497. 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**).

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.

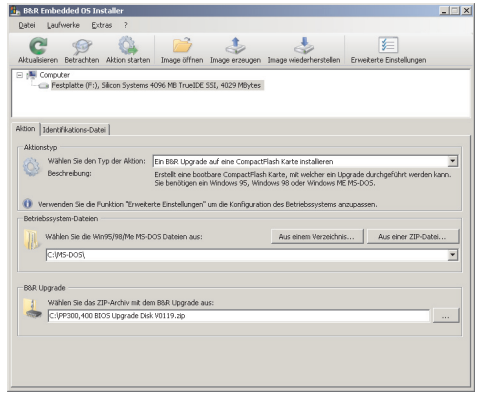


Figure 323: Creating a CompactFlash card for B&R upgrade files

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 497. Then the files from the diskette are to be copied to your hard drive.

4. Power Panel with Windows CE

Figure 324: Windows CE logo

Model number	Short description	Note
5SWWCE.0521-ENG	**WinCE5.0 Pro PP300 LX800** 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	**WinCE5.0 Pro PP400 LX800** Microsoft Windows CE 5.0 Professional, English; for Power Panel 400 BIOS; Order CompactFlash separately (min. 128 MB).	
5SWWCE.0621-ENG	**WinCE5.0 ProPlus PP300 LX800** 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	**WinCE5.0 ProPlus PP400 LX800** Microsoft Windows CE 5.0 Professional plus, English; for Power Panel 400 BIOS; Order CompactFlash separately (min. 128 MB).	
5SWWCE.0821-ENG	**WinCE6.0 Pro PP300 LX800** 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	**WinCE6.0 Pro PP400 LX800** Microsoft Windows CE 6.0 Professional, English; for Power Panel 400 BIOS; Order CompactFlash separately (min. 128 MB).	

Table 181: 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**).

Features	Windows CE 5.0
Supported screen resolutions	QVGA (LCD), VGA (TFT), SVGA (TFT), XGA (TFT)
Color depth	16-bit / 65,536 colors[1)]
Graphics card driver	AMD Geode LX graphics card driver with screen rotation without DirectX
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[2)]
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 182: 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).

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)[1)]
Graphics card driver	AMD Geode LX graphics card driver with screen rotation without DirectX
Main memory	Automatic detection and use of up to 512 MB RAM
Boot time / Startup time	Approx. 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[2)]
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 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**). Further information is available in the online help for the B&R Embedded OS Installer.

5. Power Panel with Windows XP Embedded

Figure 325: Windows XP embedded Logo

Model number	Short description	Note
5SWWXP.0421-ENG	**WinXPe FP2007 PP300 LX800** 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	**WinXPe FP2007 PP400 LX800** Microsoft Windows XP Embedded Feature Pack 2007, English; for Power Panel 400; Order CompactFlash separately (min. 512 MB).	

Table 184: 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 185: 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 185: Device functions in Windows XP Embedded with FP2007 (Forts.)

5.3 Installation

Windows XP Embedded is usually preinstalled at B&R Austria on a suitable CompactFlash card (at least 512 MB - must be specified when placing order). The system is then automatically configured after it has been switched on for the first time. This procedure takes approximately 30 minutes, and the device will be rebooted a number of times.

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

6. Power Panel with Windows Embedded Standard 2009

Figure 326: Windows Embedded Standard 2009 Logo

Model number	Short description	Note
5SWWXP.0721-ENG	**Windows Embedded Standard 2009 PP300 LX800** Microsoft OEM Windows embedded Standard 2009, English; for Power Panel 300; please order CompactFlash separately (minimum 1 GB).	
5SWWXP.0722-ENG	**Windows Embedded Standard 2009 PP400 LX800** Microsoft OEM Windows embedded Standard 2009, English; for Power Panel 400; please order CompactFlash separately (minimum 1 GB).	

Table 186: 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 XP Embedded Standard 2009 is based on the same binary files as Windows XP Professional with Service Pack 3 and is optimally tailored to the hardware being used. In other words, only the functions and modules required by the respective device are included. Windows XP Embedded Standard 2009 is also based on the same reliable code as Windows XP Professional with SP3. It provides industry with leading reliability, improvements in security and performance, and the latest technology for Web browsing and extensive device support.

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 187: 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**) 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**). 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**) 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
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 188: Setting options - VESA mode

8. B&R Automation Device Interface (ADI) driver - 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.

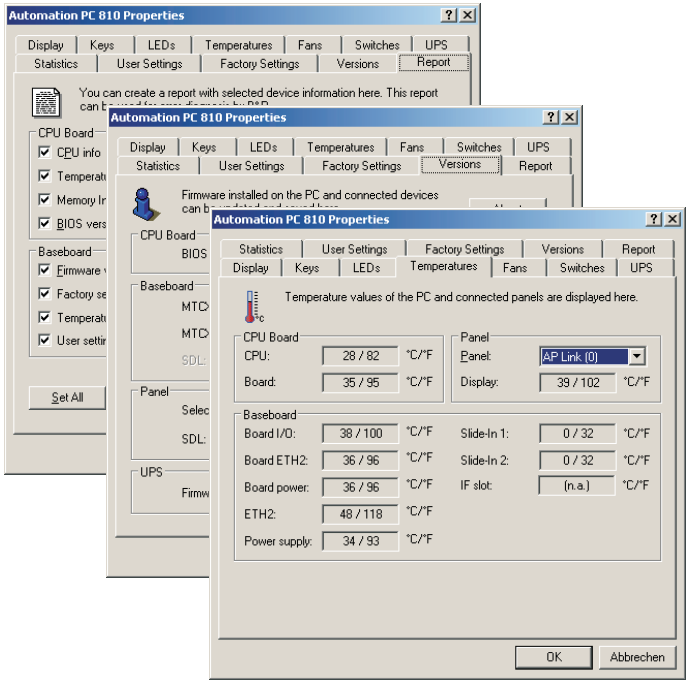


Figure 327: ADI Control Center screenshots - example (symbolic figure)

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 made available by the Automation Device Interface (ADI) - Control Center are dependent on the device family.

- 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:

System	Operating system	Note
Automation PC 820	Windows XP Professional	Installation using its own setup
	Windows XP Embedded	Content of B&R Windows XP Embedded image
	Windows Embedded Standard 2009	Content of B&R Windows Embedded Standard 2009 image
Automation PC 810	Windows XP Professional	Installation using its own setup
	Windows XP Embedded	Content of B&R Windows XP Embedded image
	Windows Embedded Standard 2009	Content of B&R Windows Embedded Standard 2009 image
Automation PC 620	Windows XP Professional	Installation using its own setup
	Windows XP Embedded	Content of B&R Windows XP Embedded image
	Windows CE	Content of B&R Windows CE image
	Windows Embedded Standard 2009	Content of B&R Windows Embedded Standard 2009 image
Panel PC 700	Windows XP Professional	Installation using its own setup
	Windows XP Embedded	Content of B&R Windows XP Embedded image
	Windows CE	Content of B&R Windows CE image
	Windows Embedded Standard 2009	Content of B&R Windows Embedded Standard 2009 image

Table 189: System support - ADI driver

System	Operating system	Note
Panel PC 725	Windows XP Professional	Installation using its own setup
	Windows CE	Content of B&R Windows CE image
	Windows Embedded Standard 2009	Content of B&R Windows Embedded Standard 2009 image
Panel PC 800	Windows XP Professional	Installation using its own setup
	Windows XP Embedded	Content of B&R Windows XP Embedded image
	Windows Embedded Standard 2009	Content of B&R Windows Embedded Standard 2009 image
Power Panel BIOS Geräte	Windows XP Embedded	Content of B&R Windows XP Embedded image
	Windows CE	Content of B&R Windows CE image
	Windows Embedded Standard 2009	Content of B&R Windows Embedded Standard 2009 image
Mobile Panel BIOS Geräte	Windows XP Embedded	Content of B&R Windows XP Embedded image
	Windows CE	Content of B&R Windows CE image
Automation Panel 800	-	Together with Automation PC 620 / Automation PC 800 and Panel PC 700
Automation Panel 900	-	Together with Automation PC 620 / Automation PC 800 and Panel PC 700

Table 189: System support - ADI driver

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**).

8.2 Installation

The latest version of the ADI driver for the existing target system can be found in the download area (Service - Material Related Downloads - BIOS / Drivers / Updates) on the B&R homepage (**www.br-automation.com**).

1) Download and unzip the ZIP archive

2) Close all applications

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

- or -

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

Information:

The ADI driver and B&R control center are already included in the Windows XP Embedded operating system.

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

Chapter 5 • Standards and certifications

1. Applicable European guidelines

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

2. Overview of standards

The Power Panel 300/400 devices collectively meet the following standards:

Standard	Description
EN 55011 Class A, B	Electromagnetic compatibility (EMC), radio disturbance product standard, industrial, scientific, and medical high-frequency devices (ISM devices), limit values and measurement procedure; group 1 (devices that do not create HF during material processing) and group 2 (devices that create HF during material processing)
EN 55022 Class A, B	Electromagnetic compatibility (EMC), radio disturbance characteristics, information technology equipment (ITE devices), limits and methods of measurement
EN 55024 Class A or B	Electromagnetic compatibility (EMC), immunity characteristics, information technology equipment (ITE devices), limits and methods of measurement
EN 60060-2	High-voltage test techniques - part 2: Measuring systems
EN 60068-2-1	Environmental testing - part 2: Tests; test A: Cold
EN 68068-2-2	Environmental testing - part 2: Tests; test B: Dry heat
EN 60068-2-3	Environmental testing - part 2: Tests; test and guidance: Damp heat, constant
EN 60068-2-6	Environmental testing - part 2: Tests; test: Vibration (sinusoidal)
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

Table 190: Overview of standards

Standard	Description
EN 61000-4-3	Electromagnetic compatibility (EMC) - part 4-3: Testing and measuring techniques; radiated radio-frequency electromagnetic field immunity test
EN 61000-4-4	Electromagnetic compatibility (EMC) - part 4-4: Testing and measuring techniques; electrical fast transient/burst immunity test
EN 61000-4-5	Electromagnetic compatibility (EMC) - part 4-5: Testing and measuring techniques; surge immunity test
EN 61000-4-6	Electromagnetic compatibility (EMC) - part 4-6: Testing and measuring techniques; immunity to conducted disturbances, induced by radio-frequency fields
EN 61000-4-8	Electromagnetic compatibility (EMC) - part 4-8: Testing and measuring techniques; power frequency magnetic field immunity test
EN 61000-4-11	Electromagnetic compatibility (EMC) - part 4-11: Testing and measuring techniques; voltage dips, short interruptions and voltage variations immunity tests
EN 61000-4-12	Electromagnetic compatibility (EMC) - part 4-12: Testing and measuring techniques; oscillatory waves immunity test
EN 61000-6-2 (EN 50082-2)	Electromagnetic compatibility (EMC), generic immunity standard - part 2: industrial environments (EN 50082-2 has been replaced by EN 61000-6-2)
EN 61000-6-4 (EN 50081-2)	Electromagnetic compatibility (EMC), generic emission standard - part 2: industrial environments (EN 50081-2 has been replaced by EN 61000-6-4)
EN 61131-2 IEC 61131-2	Product standard, programmable logic controllers - part 2: Equipment requirements and tests
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) and 53 - 43 dB (µA) Quasi-peak value 84 - 74 dB (µV) and 40 - 30 dB (µA) Average
Other connections 500 kHz - 30 MHz	-	-	87 dB (µV) and 43 dB (µA) Quasi-peak value 74 dB (µV) and 30 dB (µA) Average

Table 192: Test requirements - Network-related emissions for industrial areas

Test carried out according to EN 55011 / EN 55022	Limits according to EN 61131-2	Limits according to 47 CFR Part 15 Subpart B class A	
Power mains connections [1)] 150 kHz - 500 kHz	79 dB (µV) Quasi-peak value 66 dB (µV) Average	79 dB (µV) Quasi-peak value 66 dB (µV) Average	
Power mains connections 500 kHz - 30 MHz	73 dB (µV) Quasi-peak value 60 dB (µV) Average	73 dB (µV) Quasi-peak value 60 dB (µV) Average	
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
		EN 55024: Information technology equipment (ITE devices)
Immunity against high-frequency electromagnetic fields (HF field)	EN 61000-4-3	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 55024: Information technology equipment (ITE devices)
Immunity to high-speed transient electrical disturbances (burst)	EN 61000-4-4	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 55024: Information technology equipment (ITE devices)
Immunity to surge voltages	EN 61000-4-5	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 55024: Information technology equipment (ITE devices)
Immunity to conducted disturbances	EN 61000-4-6	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 55024: Information technology equipment (ITE devices)
Immunity against magnetic fields with electrical frequencies	EN 61000-4-8	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 55024: Information technology equipment (ITE devices)
Immunity to voltage dips, short-term interruptions and voltage fluctuations	EN 61000-4-11	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 55024: Information technology equipment (ITE devices)
Immunity to damped vibration	EN 61000-4-12	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers

Table 194: Overview of limits and testing guidelines for immunity

Evaluation criteria according to EN 61000-6-2

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

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

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

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

4.1 Electrostatic discharge (ESD)

Test carried out according to EN 61000-4-2	Limits according to EN 61000-6-2	Limits according to EN 61131-2	Limits according to EN 55024
Contact discharge to powder-coated and bare metal housing parts	±4 kV, 10 discharges, criteria B	±4 kV, 10 discharges, criteria B	±4 kV, 10 discharges, criteria B
Discharge through the air to plastic housing parts	±8 kV, 10 discharges, criteria B	±8 kV, 10 discharges, criteria B	±8 kV, 10 discharges, criteria B

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

Table 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	Limits according to EN 55024
AC power I/O	±2 kV, criteria B	-	±1 kV, criteria B
AC power inputs	-	±2 kV, criteria B	-
AC power outputs	-	±1 kV, criteria B	-
DC power I/O >10 m [1)]	±2 kV, criteria B	-	±0.5 kV, criteria B
DC power inputs >10 m	-	±2 kV, criteria B	-
DC power outputs >10 m	-	±1 kV, criteria B	-
Functional ground connections, signal lines and I/Os >3 m	±1 kV, criteria B	±1 kV, criteria B	±0.5 kV, criteria B
Unshielded AC I/O >3 m	-	±2 kV, criteria B	-
Analog I/O	±1 kV, criteria B	±1 kV, criteria B	-

Table 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	Limits according to EN 55024
AC power I/O, L to L	±1 kV, criteria B	±1 kV, criteria B	±1 kV, criteria B
AC power I/O, L to PE	±2 kV, criteria B	±2 kV, criteria B	±2 kV, criteria B
DC power I/O, L+ to L-, >10 m	±0.5 kV, criteria B	-	-
DC power I/O, L to PE, >10 m	±0.5 kV, criteria B	-	±0.5 kV, criteria B
DC power inputs, L+ to L-	-	±0.5 kV, criteria B	-
DC power inputs, L to PE	-	±1 kV, criteria B	-
DC power outputs, L+ to L-	-	±0.5 kV, criteria B	-
DC power outputs, L to PE	-	±0.5 kV, criteria B	-
Signal connections >30 m	±1 kV, criteria B	±1 kV, criteria B	±1 kV, criteria B
All shielded cables	-	±1 kV, criteria B	-

Table 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	Limits according to EN 55024
AC power I/O	150 kHz - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, criteria A

Table 199: Test requirements - Conducted disturbances

Test carried out according to EN 61000-4-6	Limits according to EN 61000-6-2	Limits according to EN 61131-2	Limits according to EN 55024
DC power I/O	150 kHz - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, criteria A
Functional ground connections	0.15 - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, Length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	-
Signal connections >3 m	0.15 - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, Length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, criteria A

Table 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	Limits according to EN 55024
Test direction x, test in the field of an induction coil 1 m x 1 m	30 A/m, criteria A	30 A/m, criteria A	50 Hz, 1 A/m, criteria A
Test direction y, test in the field of an induction coil 1 m x 1 m	30 A/m, criteria A	30 A/m, criteria A	50 Hz, 1 A/m, criteria A
Test direction z, test in the field of an induction coil 1 m x 1 m	30 A/m, criteria A	30 A/m, criteria A	50 Hz, 1 A/m, criteria A

Table 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		
Power I/O, L to L	±1 kV, 1 MHz, repeat rate 400/seconds, length 2 seconds, connection lengths 2 m, criteria B		
Power I/O, L to PE	±2.5 kV, 1 MHz, repeat rate 400/seconds, length 2 seconds, connection lengths 2 m, criteria B		

Table 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
		B&R
Toppling (packaged)	EN 60068-2-31	EN 60721-3-2 class 2M1
		EN 60721-3-2 class 2M2
		EN 60721-3-2 class 2M3
Free fall (packaged)	EN 60068-2-32	EN 61131-2: Programmable logic controllers
		B&R

Table 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		
Vibration during operation: Uninterrupted duty with moveable frequency in all 3 axes (x, y, z), 1 octave per minute	10 sweeps for each axis		10 sweeps for each axis		
	Frequency	**Limit value**	**Frequency**	**Limit value**	
	5 - 9 Hz	Amplitude 3.5 mm	2 - 9 Hz	Amplitude 3 mm	
	9 - 150 Hz	Acceleration 1 g	9 - 200 Hz	Acceleration 1 g	

Table 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, length 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	Limits according to B&R
Pulse (half-sine) stress in all 3 axes (x, y, z)	Acceleration 10 g, Length 11 ms, each 3 shocks, packaged	Acceleration 30 g, Length 6 ms, each 3 shocks, packaged	Acceleration 30 g, Length 11 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	
	Weight	**Height**	**Weight**	**Height**	**Weight**	**Height**	**Weight**	**Height**
	<10 kg	1.0 m	<20 kg	0.25 m	<20 kg	1.2 m	<20 kg	1.5 m
	10 - 40 kg	0.5 m	20 - 100 kg	0.25 m	20 - 100 kg	1.0 m	20 - 100 kg	1.2 m
	>40 kg	0.25 m	>100 kg	0.1 m	>100 kg	0.25 m	>100 kg	0.5 m
	Devices with product packaging each with 5 fall tests							
	Weight	**Height**						
	<10 kg	0.3 m						
	10 - 40 kg	0.3 m						
	>40 kg	0.25 m						
	Limits according to B&R							
	Devices packaged							
	Weight	**Height**						
	<40 kg	1 m						

Table 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, 2 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 switching cabinets	3 hours at +5° C and 3 hours at +55°C, 5 cycles, temperature gradient 3°C / min, the unit is occasionally supplied with voltage during testing, duration approximately 30 hours		
Closed devices: These are devices whose data sheet specifies a surrounding housing (enclosure) with the corresponding safety precautions	3 hours at +5°C and 3 hours at +55°C, 5 cycles, temperature gradient 3°C / min, the unit is occasionally supplied with voltage during testing, duration approximately 30 hours		

Table 215: Test requirements - Temperature fluctuations in operation

6.6 Humid heat, cyclic

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

Table 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[1)]		Limits according to EN 61131-2
Ground resistance: housing (from any metal part to the ground terminal)	Smallest effective cross section of the protective ground conductor for the branch being tested	Maximum measured voltage drop at a test current of 10 A	Test current 30 A for 2 min, <0.1 Ω
	1.0 mm²	3.3 V	
	1.5 mm²	2.6 V	
	2.5 mm²	1.9 V	
	4.0 mm²	1.4 V	
	> 6.0 mm²	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[1)]		
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 60060-1	Limits according to EN 61131-2[1)]				Limits according to UL 508		
High voltage: Primary circuit to secondary circuit and to protective ground circuit (transformers, coils, varistors, capacitors and components used to protect against over-voltage can be removed before the test)	Input voltage	Test voltage			Input voltage	Test voltage	
		1.2/50 µs voltage surge peak	**AC, 1 min**	**DC, 1 min**		**AC, 1 min**	**DC, 1 min**
	0 - 50 VAC 0 - 60 VDC	850 V	510 V	720 V	≤ 50 V	500 V	707 V
	50 - 100 VAC 60 - 100 VDC	1360 V	740 V	1050 V	> 50 V	1000 V + 2 x U_N	(1000 V + 2 x U_N) x 1.414
	100 - 150 VAC 100 - 150 VDC	2550 V	1400 V	1950 V			
	150 - 300 VAC 150 - 300 VDC	4250 V	2300 V	3250 V			
	300 - 600 VAC 300 - 600 VDC	6800 V	3700 V	5250 V			
	600 - 1000 VAC 600 - 1000 VDC	10200 V	5550 V	7850 V			

Table 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			
Supply voltage	Measurement value	Tolerance min/max		
	24 VDC 48 VDC 125 VDC	-15% +20%		
	24 VAC 48 VAC 100 VAC 110 VAC 120 VAC 200 VAC 230 VAC 240 VAC 400 VAC	15% +10%		

Table 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 type	-	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 type

Test carried out according to	Limits according to EN 60529	Limits according to EN 60529	
Protection of the operating equipment	IP2. Protection against large solid foreign bodies =12.5 mm diameter	IP.6 Protection against large solid foreign bodies: dust-proof	
Protection of personnel	IP2. Protection against touching dangerous parts with finger	IP.6 Protection against touching dangerous parts with conductor	
Protection against water permeation with damaging consequences	IP.0 Not protected	IP.5 Protected against sprayed water	

Table 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 guidelines are met.

Table 226: International certifications

Chapter 6 • Accessories

1. Overview

Model number	Product ID	Note
0AC201.91	**Lithium batteries, 4 pcs.** Lithium batteries, 4 pcs., 3 V / 950 mAh, button cell	
4A0006.00-000	**Lithium battery (1x)** Lithium battery, 1 pc., 3 V / 950 mAh, button cell	
0TB103.9	**Plug 24V 5.08 3-pin screw clamps** 24 VDC 3-pin connector, female. Screw clamps, 3.31 mm², protected against vibration by the screw flange	
0TB103.91	**Plug 24V 5.08 3-pin cage clamps** 24 VDC 3-pin connector, female. Cage clamps, 3.31 mm², protected against vibration by the screw flange	
5AC900.057X-00	**Legend strips 3x 5.7" vertical1** Legend strip template for Power Panel 4PP451.0571-65. For 3 devices.	
5AC900.057X-01	**Legend strips 2x 5.7" Horizontal2** Legend strip template for Power Panel 4PP452.0571-65. For 2 devices.	
5AC900.104X-00	**Legend strip 1x 10.4" Vertical1** Legend strip template for Power Panel 4PP451.1043-75 and 4PP481.1043-B5. For 1 device.	
5AC900.104X-01	**Legend strip 1x 10.4" Horizontal2** Legend strip template for Power Panel 4PP482.1043-75. For 1 device.	
5AC900.104X-02	**Legend strips 3x 10.4" Horizontal1** Legend strip template for Power Panel 4PP480.1043-75. For 3 devices.	
5AC900.150X-00	**Legend strips 4x 15"** Legend strip template for Power Panel 4PP481.1505-75 and 4PP480.1505-75. For 4 devices.	
5CFCRD.0512-04	**CompactFlash 512 MB B&R** CompactFlash card with 512 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.1024-04	**CompactFlash 1024 MB B&R** CompactFlash card with 1024 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.2048-04	**CompactFlash 2048 MB B&R** CompactFlash card with 2048 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.4096-04	**CompactFlash 4096 MB B&R** CompactFlash card with 4096 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.8192-04	**CompactFlash 8192 MB B&R** CompactFlash card with 8192 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.016G-04	**CompactFlash 16 GB B&R** CompactFlash card with 16 GB SLC NAND flash and IDE/ATA interface	
5CFCRD.0064-03	**CompactFlash 64 MB SSI** CompactFlash card with 64 MB SLC NAND flash and IDE/ATA interface	

Table 227: Model numbers - Accessories

Model number	Product ID	Note
5CFCRD.0128-03	**CompactFlash 128 MB SSI** CompactFlash card with 128 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.0256-03	**CompactFlash 256 MB SSI** CompactFlash card with 256 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.0512-03	**CompactFlash 512 MB SSI** CompactFlash card with 512 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.1024-03	**CompactFlash 1024 MB SSI** CompactFlash card with 1024 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.2048-03	**CompactFlash 2048 MB SSI** CompactFlash card with 2048 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.4096-03	**CompactFlash 4096 MB SSI** CompactFlash card with 4096 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.8192-03	**CompactFlash 8192 MB SSI** CompactFlash card with 8192 MB SLC NAND flash and IDE/ATA interface	
5MMUSB.2048-00	**USB flash drive 2 GB SanDisk** USB 2.0 flash drive 2 GB	
5MMUSB.2048-01	**USB flash drive 2 GB B&R** USB 2.0 flash drive 2 GB	
9A0017.01	**RS232 DB9 null modem cable 0.6 m** Null modem cable RS232 0.6 m to connect UPS and IPC (9-pin DSUB socket - 9-pin DSUB socket)	
9A0017.02	**RS232 DB9 null modem cable 1.8 m** Null modem cable RS232 1.8 m to connect UPS and IPC (9-pin DSUB socket - 9-pin DSUB socket)	

Table 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 ("Bad" status) is insufficient (see "Changing the battery" on page 562).

2.1 Order data

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

Table 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	
Environmental characteristics		
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	Figure
0TB103.9	Plug for the 24 V supply voltage (screw clamps)	0TB103.9
0TB103.91	Plug for the 24 V supply voltage (cage clamps)	0TB103.91

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	≤ 5 mΩ	
Nominal voltage according to VDE / UL,CSA	250 V / 300 V	
Current load according to VDE / UL,CSA	14.5 A / 10 A per contact	
Terminal size	0.08 mm² - 3.31 mm²	
Cable type	Copper wires only (no aluminum wires!)	

Table 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).

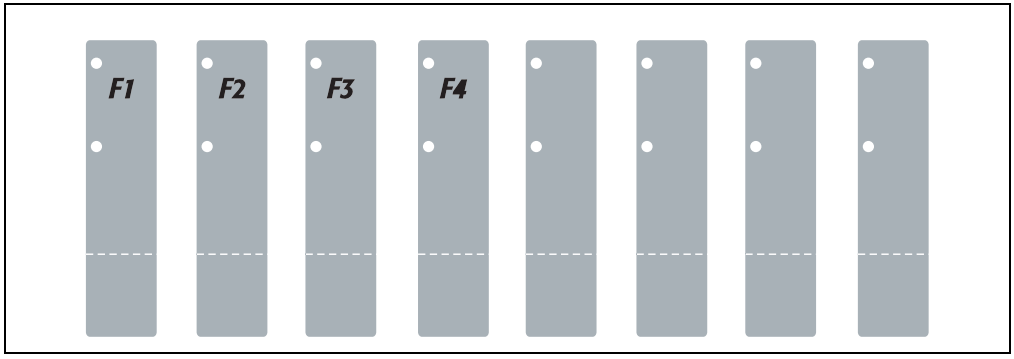


Figure 328: Legend strip templates

Printable legend strips (A4 format) can be ordered from B&R (see table 234 "Order data - Legend strip templates" on page 544). 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.

4.1 Order data

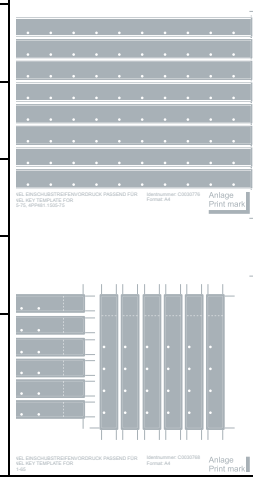
Model number	Description	Figure
5AC900.057X-00	**Legend strips 3x 5.7" vertical1** Legend strip template for Power Panel 4PP451.0571-65. For 3 devices.	Examples of legend strip templates 
5AC900.057X-01	**Legend strips 2x 5.7" Horizontal2** Legend strip template for Power Panel 4PP452.0571-65. For 2 devices.	
5AC900.104X-00	**Legend strip 1x 10.4" Vertical1** Legend strip template for Power Panel 4PP451.1043-75 and 4PP481.1043-B5. For 1 device.	
5AC900.104X-01	**Legend strip 1x 10.4" Horizontal2** Legend strip template for Power Panel 4PP482.1043-75. For 1 device.	
5AC900.104X-02	**Legend strips 3x 10.4" Horizontal1** Legend strip template for Power Panel 4PP480.1043-75. For 3 devices.	
5AC900.150X-00	**Legend strips 4x 15"** Legend strip template for Power Panel 4PP481.1505-75 and 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	Figure
5CFCRD.0512-04	512 MB B&R CompactFlash card	CompactFlash card
5CFCRD.1024-04	1024 MB B&R CompactFlash card	
5CFCRD.2048-04	2048 MB B&R CompactFlash card	
5CFCRD.4096-04	4096 MB B&R CompactFlash card	
5CFCRD.8192-04	8192 MB B&R CompactFlash card	
5CFCRD.016G-04	16 GB B&R CompactFlash card	

Table 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^{14} bit read accesses					
Data retention	10 years					
Lifetime monitoring	Yes					
Supported operating modes	PIO Mode 0-6, Multiword DMA Mode 0-4, Ultra DMA Mode 0-4					
Continuous reading	Typically 35 MB/s(240X)[1)2)] Max. 37 MB/s (260X)[1) 2)]	Typically 35 MB/s (240X)[1) 2)] Max. 37 MB/s (260X)[1) 2)]	Typically 35 MB/s (240X)[1) 2)] Max. 37 MB/s (260X)[1) 2)]	Typically 33 MB/s (220X)[1) 2)] Max. 34 MB/s (226X)[1) 2)]	Typically 27 MB/s (180X)[1) 2)] Max. 28 MB/s (186X)[1) 2)]	Typically 36 MB/s (240X)[1) 2)] Max. 37 MB/s (247X)[1) 2)]
Continuous writing	Typically 17 MB/s (110X) Max. 20 MB/s (133X)	Typically 17 MB/s (110X) Max. 20 MB/s (133X)	Typically 17 MB/s (110X) Max. 20 MB/s (133X)	Typically 16 MB/s (106X) Max. 18 MB/s (120X)	Typically 15 MB/s (100X) Max. 17 MB/s (110X)	Typically 18 MB/s (120X) Max. 19 MB/s (126X)
Endurance						
Guaranteed amount of data [3)] Results in 5 years [3)]	50 TB 27.40 GB/day	100 TB 54.79 GB/day	200 TB 109.59 GB/day	400 TB 219.18 GB/day	800 TB 438.36 GB/day	1600 TB 876.72 GB/day
Clear/write cycles Guaranteed Typical[4)]	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

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

Table 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

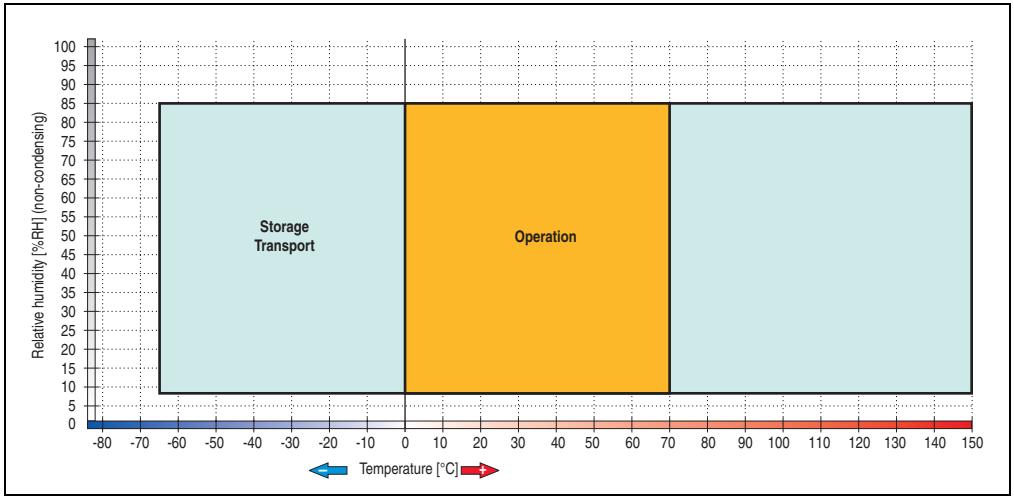


Figure 329: Temperature humidity diagram - CompactFlash cards 5CFCRD.xxxx-04

5.4 Dimensions

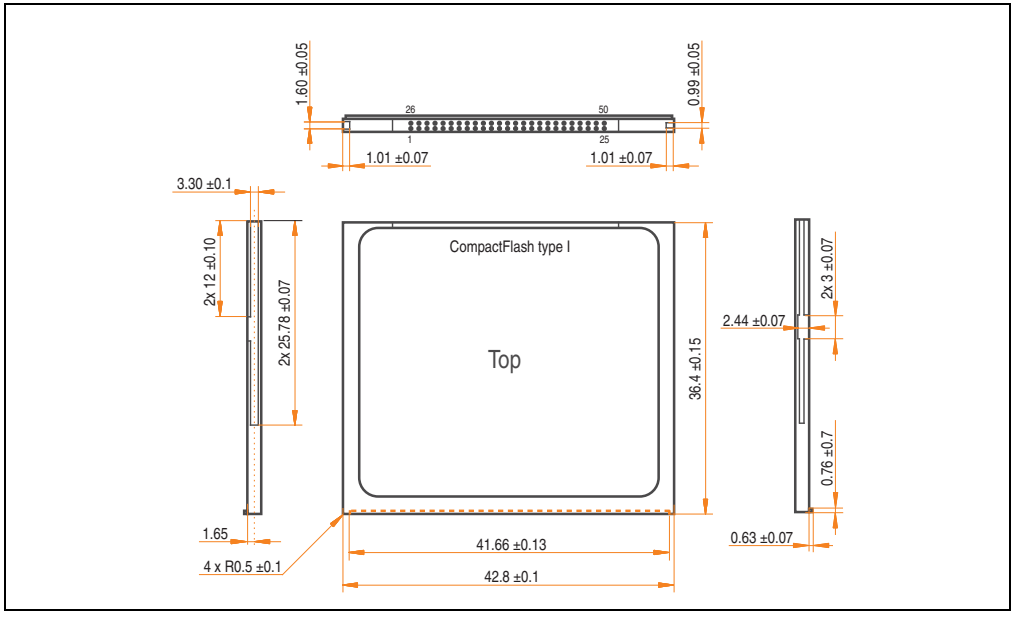


Figure 330: Dimensions - CompactFlash card Type I

5.5 Benchmark

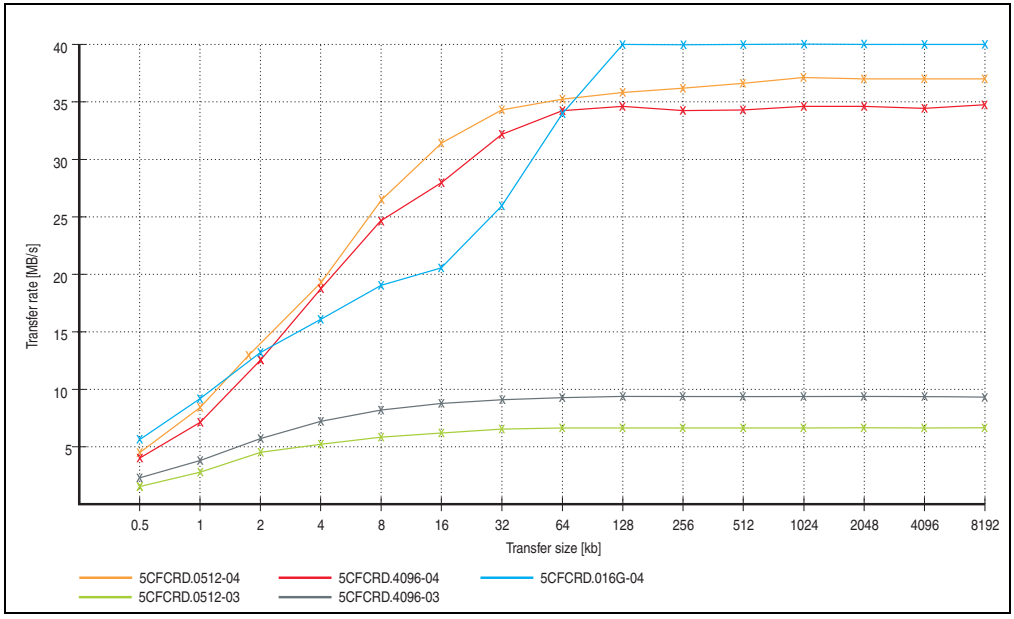


Figure 331: ATTO disk benchmark v2.34 comparison (reading)

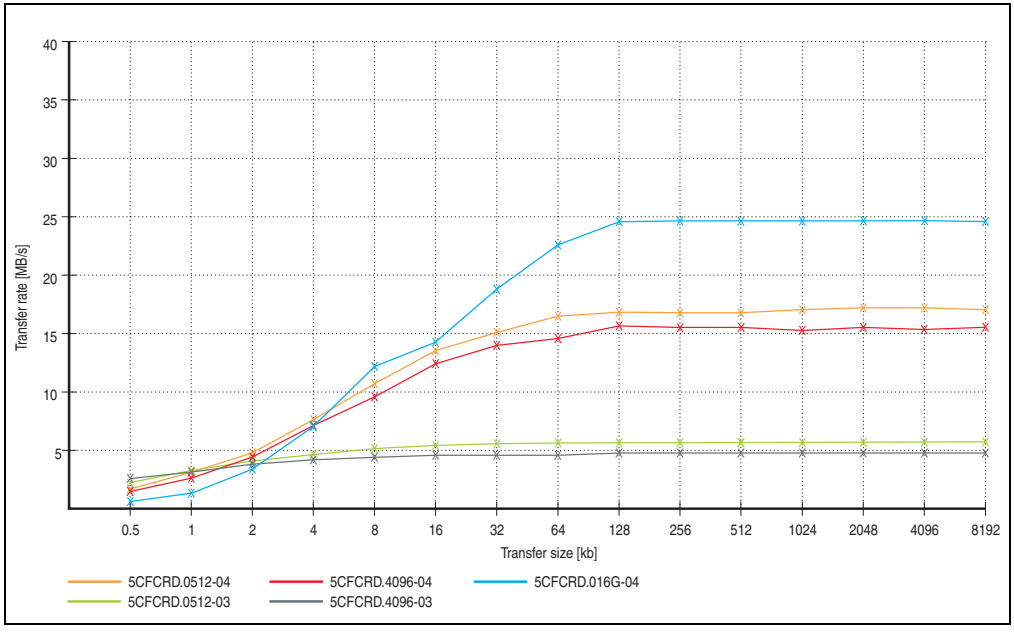


Figure 332: ATTO disk benchmark v2.34 comparison (writing)

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	Figure
5CFCRD.0064-03	CompactFlash 64 MB SSI	CompactFlash card
5CFCRD.0128-03	CompactFlash 128 MB SSI	
5CFCRD.0256-03	CompactFlash 256 MB SSI	
5CFCRD.0512-03	CompactFlash 512 MB SSI	
5CFCRD.1024-03	CompactFlash 1024 MB SSI	
5CFCRD.2048-03	CompactFlash 2048 MB SSI	
5CFCRD.4096-03	CompactFlash 4096 MB SSI	
5CFCRD.8192-03	CompactFlash 8192 MB SSI	

Table 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^{14} bit read accesses							
Data retention	10 years							
Lifetime monitoring	Yes							
Supported operating modes	PIO Mode 0-4, Multiword DMA Mode 0-2							
Continuous reading	Typically 8 MB/s							
Continuous writing	Typically 6 MB/s							
Endurance								
Clear/write cycles Typical	> 2,000,000							
SLC flash	Yes							
Wear leveling	Static							
Error Correction Coding (ECC)	Yes							
Support								
Hardware	MP100/200, PP100/200, PP300/400, PPC700, PPC300, Provit 2000, Provit 5000, APC620, APC680, APC810, APC820							
Windows XP Professional	-	-	-	-	-	-	Yes	Yes
Windows XP Embedded	-	-	-	Yes	Yes	Yes	Yes	Yes
Windows CE 6.0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes [1)]
Windows CE 5.0	Yes	Yes	Yes	Yes	Yes	-	-	-

Table 238: Technical data - CompactFlash cards 5CFCRD.xxxx-03

Support	5CFCRD.0064-03	5CFCRD.0128-03	5CFCRD.0256-03	5CFCRD.0512-03	5CFCRD.1024-03	5CFCRD.2048-03	5CFCRD.4096-03	5CFCRD.8192-03
PVI Transfer Tool	≥ V2.57 (part of PVI Development Setup ≥ V2.5.3.3005)							
B&R Embedded OS Installer	≥ V2.21							
Mechanical characteristics								
Dimensions Length Width Thickness	36.4 ±0.15 mm 42.8 ±0.10 mm 3.3 ±0.10 mm							
Weight	11.4 g							
Environmental characteristics								
Ambient temperature Operation Bearings Transport	0 to +70°C -50 to +100°C -50 to +100°C							
Relative humidity Operation / Storage / Transport	8 to 95%, non-condensing							
Vibration Operation Storage / Transport	max. 16.3 g (159 m/s^2 0-peak) max. 30 g (294 m/s^2 0-peak)							
Shock Operation Storage / Transport	max. 1000 g (9810 m/s^2 0-peak) max. 3000 g (29,430 m/s^2 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

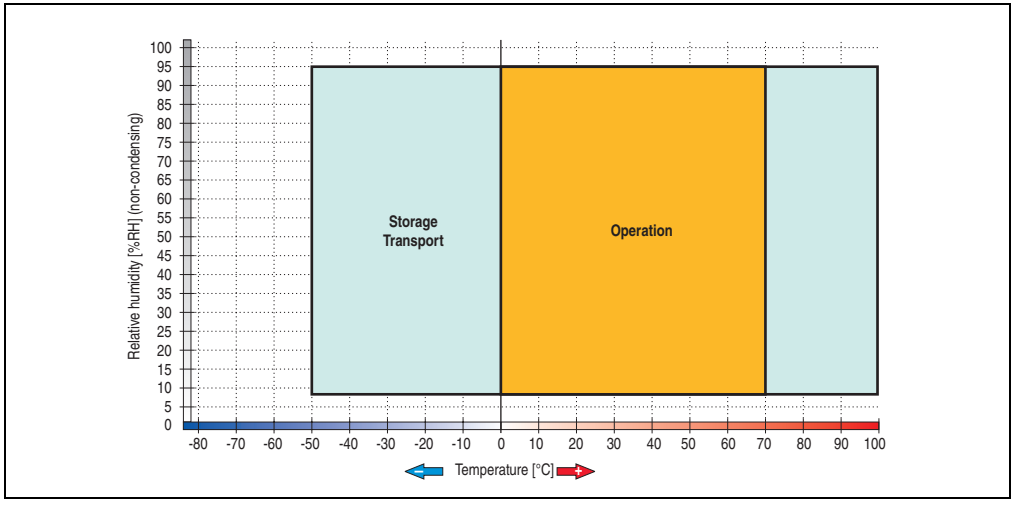


Figure 333: Temperature humidity diagram - CompactFlash cards 5CFCRD.xxxx-03

6.4 Dimensions

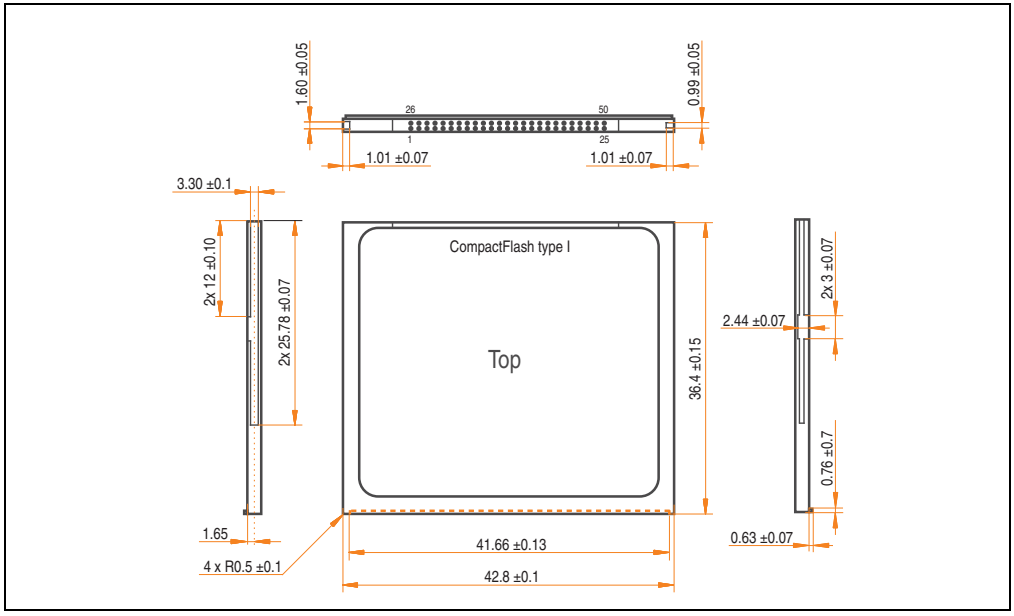


Figure 334: Dimensions - CompactFlash card Type I

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. As a result, the following measures may be necessary (e.g. Therefore, the following measures might be necessary in order to boot from these flash drives (e.g. the SanDisk Cruzer Micro flash drive with 2 GB):

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

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

Table 240: Technical data - USB flash drive 5MMUSB.2048-00

Environmental characteristics	5MMUSB.2048-00
Shock	
Operation	40 g and 11 ms duration (all axes)
Bearings	80 g and 11 ms duration (all axes)
Transport	80 g and 11 ms duration (all axes)
Altitude	
Operation	3048 meters
Bearings	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

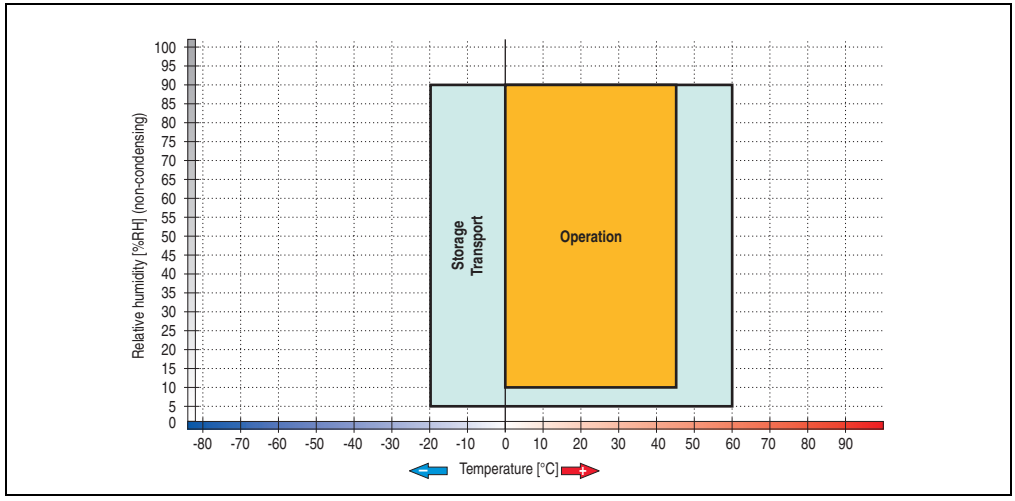


Figure 335: Temperature humidity diagram - USB flash drive - 5MMUSB.2048-00

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 Current requirements	Via the USB port max. 500 µA in 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 (at 25°C)	> 3.000.000 hours
Data retention	10 years
Maintenance	None
Operating system support	Windows CE, ME, 2000, XP, Vista and Mac OS 9 or newer, Linux 2.4 or newer
Mechanical characteristics	
Dimensions Length Width Thickness	 67.85 mm 17.97 mm 8.35 mm
Environmental characteristics	
Ambient temperature Operation Bearings Transport	 0 to +70°C -50 to +100°C -50 to +100°C
Relative humidity Operation Bearings Transport	 85%, non-condensing 85%, non-condensing 85%, non-condensing
Vibration Operation Bearings Transport	 at 20 - 2000 Hz: 20 g (peak) at 20 - 2000 Hz: 20 g (peak) at 20 - 2000 Hz: 20 g (peak)
Shock Operation Bearings Transport	 Max. 1500 g (peak) Max. 1500 g (peak) Max. 1500 g (peak)

Table 241: Technical data - USB flash drive 5MMUSB.2048-01

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

Table 241: Technical data - USB flash drive 5MMUSB.2048-01 (Forts.)

7.4.1 Temperature humidity diagram

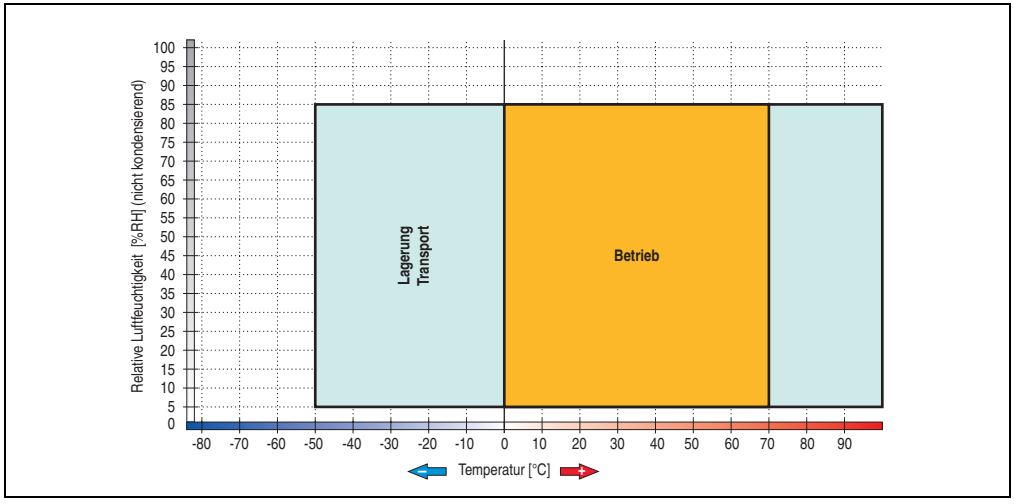


Figure 336: Temperature humidity diagram - USB flash drive - 5MMUSB.2048-01

8. Null modem cable 9A0017.0x

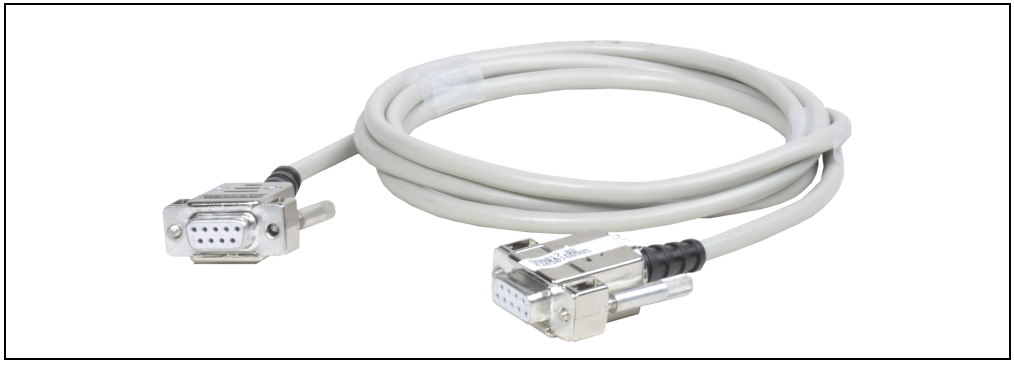


Figure 337: Null modem cable 9A0017.0x

8.1 Order data

Model number	Description	Note
9A0017.01	**RS232 DB9 null modem cable 0.6 m** Null modem cable RS232 0.6 m to connect UPS and IPC (9-pin DSUB socket - 9-pin DSUB socket).	
9A0017.02	**RS232 DB9 null modem cable 1.8 m** Null modem cable RS232 1.8 m to connect UPS and IPC (9-pin DSUB socket - 9-pin DSUB socket).	

Table 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

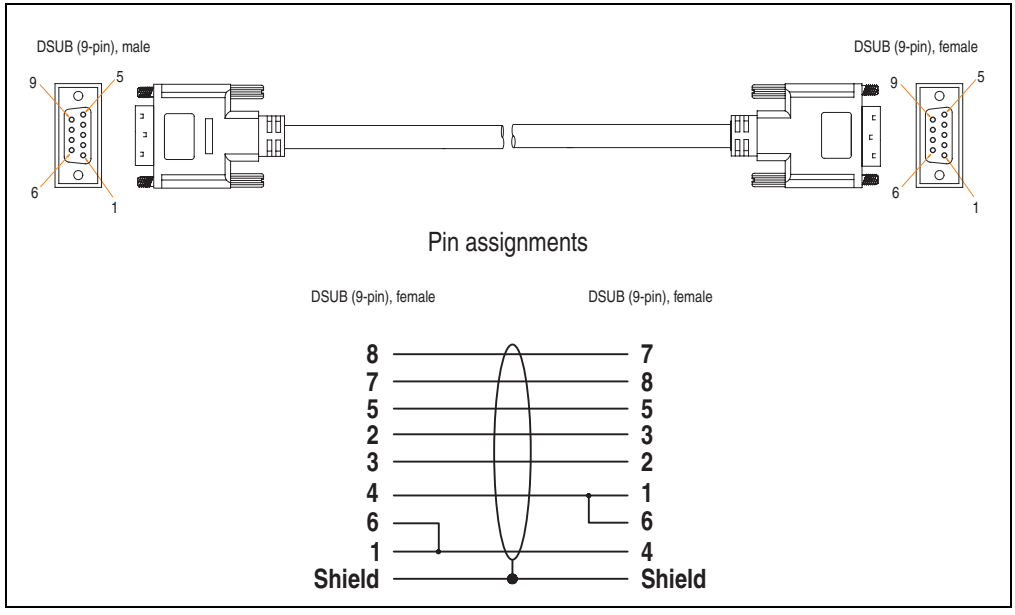


Figure 338: Pin assignments - null modem cable

Chapter 7 • Maintenance / Servicing

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 39.

Changing the battery is only necessary for devices with a lithium battery (see section "Technical data" on page 39 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 244: 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 539.

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 245: 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.

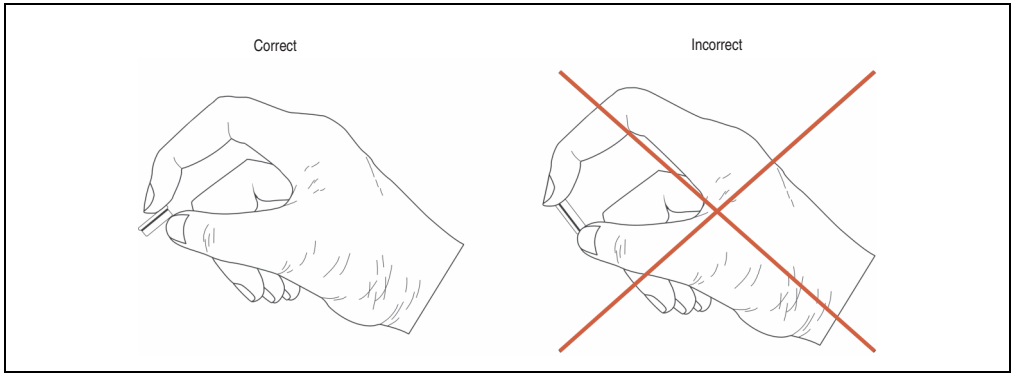


Figure 339: Battery handling

- 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 429).

Warning!

Lithium batteries are considered hazardous waste. Used batteries should be disposed of accordingly.

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	Elo
Accuracy For < 18" diagonals For > 18" diagonals	 Typically < 0.080 inches (2.032 mm) Maximum error in all directions 0.180 inches (4.572 mm) Max. 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 Bearings Transport	 -10 to +50°C -40 to +70°C -40 to +70°C
Relative humidity	See 1.1.1 "Temperature humidity diagram" on page 566
Lifespan	35 million touch operations on the same point
Chemical resistance [1)]	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 246: 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

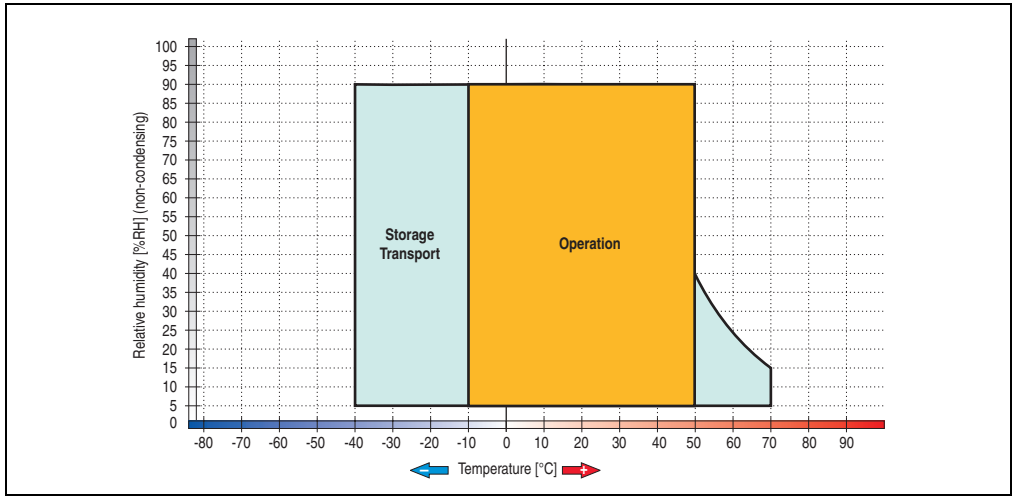


Figure 340: Temperature humidity diagram - Elo Accu touch screen

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	Gunze
Release pressure	10 to 80 g
Light permeability	79%
Temperature Operation Bearings Transport	 0 to +50°C -20 to +70°C -20 to +70°C
Relative humidity	See 1.2.1 "Temperature humidity diagram" on page 568
Lifespan	1 million touch operations
Chemical resistance [1)]	Acetone, ammonia-based glass cleaner, normal food and drinks, hexane, methylene chloride, methyl ethyl ketone, mineral spirits, turpentine, isopropyl alcohol
Activation	Finger, pencil

Table 247: Technical data - Gunze touch screen 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

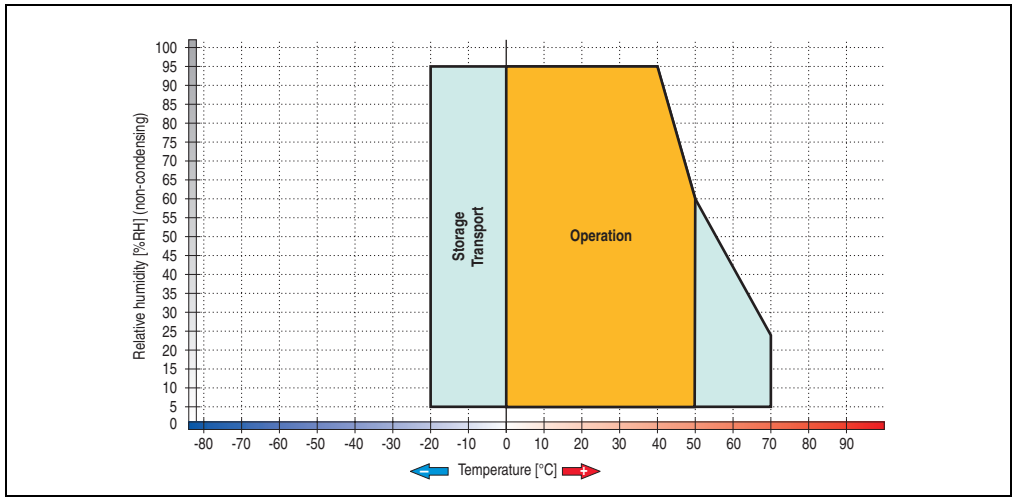


Figure 341: Temperature humidity diagram - Gunze touch screen

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.

2. Décor foil

The décor foil conforms to DIN 42115 (section 2). This means it is resistant to exposure to the following chemicals for a 24-hour period with no visible signs of damage:

Information:

The following characteristics, features, and limit values only apply to this individual component and can deviate from those specified for the entire device.

Ethanol Cyclohexanol Diacetone alcohol Glycol Isopropanol Glycerine Methanol Triacetin Dowandol DRM/PM	Formaldehyde 37%-42% Acetaldehyde Aliphatic hydrocarbons Toluene Xylene White spirits	1.1.1.Trichloroethane Ethyl acetate Diethyl ether N-Butyl acetate Amyl acetate Butylcellosolve Ether
Acetone Methyl ethyl ketone Dioxan Cyclohexanone MIBK Isophorone	Formic acid <50% Acetic acid <50% Phosphoric acid <30% Hydrochloric acid <36% Nitric acid <10% Trichloracetic acid <50% Sulphuric acid <10%	Sodium hypochlorite <20% Hydrogen peroxide <25% Potassium carbonate Washing agents Fabric conditioner Ferric chloride Ferrous chloride (FeCl2) Ferrous chloride (FeCl3) Dibutyl phthalate Dioctyl phthalate Sodium carbonate
Ammonia <40% Caustic soda <40% Potassium hydroxide Alkali carbonate Bichromate Potassium Acetonitrile Sodium bisulphate	Cutting oil Diesel oil Linseed oil Paraffin oil Blown castor oil Silicon oil Turpentine oil substitute Universal brake fluid Aviation fuel Gasoline Water Sea water Decon	

Table 248: 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.

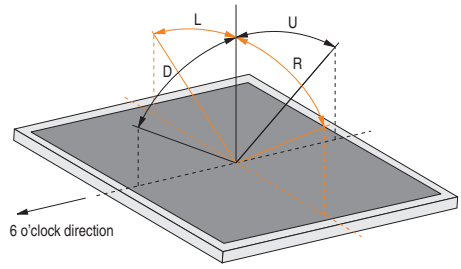


Figure 342: Viewing angles

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 249: 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 573.

Compatibility between the device types is represented on each line by matching symbols.

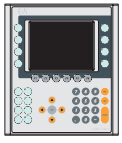
Quantity	Format	Image	Compatible	PP100/200	PP300/400	AP900	PPC700
5.7“	Horizontal1		Outer dimensions	■	■	-	-
			Installation dimensions	●	●	-	-
	Horizontal2		Outer dimensions	■	■	-	-
			Installation dimensions	●	●	-	-
	Vertical1		Outer dimensions	■	■	-	-
			Installation dimensions	●	●	-	-

Table 250: Device compatibility overview

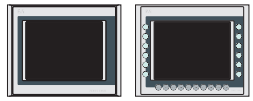
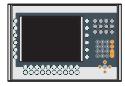
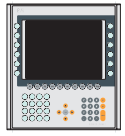
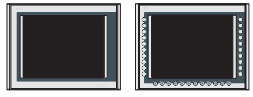
Quantity	Format	Image	Compatible	PP100/200	PP300/400	AP900	PPC700
10.4“	Horizontal1		Outer dimensions	■	■	■	■
			Installation dimensions	●	●	●	●
	Horizontal2		Outer dimensions	■	■	■	■
			Installation dimensions	●	●	▲	▲
	Vertical1		Outer dimensions	■	■	■	■
			Installation dimensions	●	●	▲	▲
12.1“	Horizontal1		Outer dimensions	■	■	■	■
			Installation dimensions	●	●	▲	▲
15“	Horizontal1		Outer dimensions	■	■	■	■
			Installation dimensions	●	●	●	●
	Vertical1		Outer dimensions	■	■	■	■
			Installation dimensions	●	●	●	●

Table 250: Device compatibility overview

4.2 Compatibility details

The measurement values (all in mm) in the following figures have the following meaning.

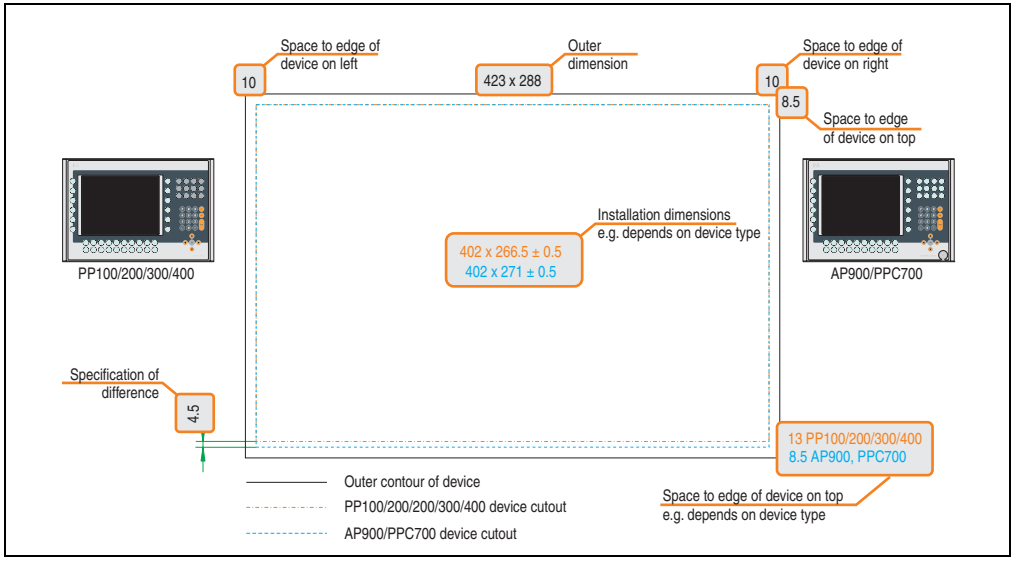


Figure 343: Compatibility details - figure structure

4.2.1 5.7" devices

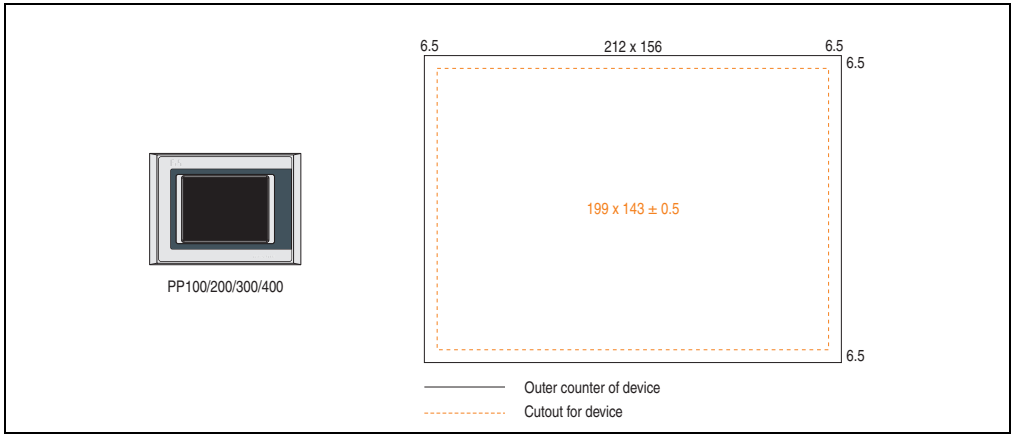


Figure 344: Mounting compatibility - 5.7" device format - Horizontal1

5.7" Power Panel 100/200 and Power Panel 300/400 devices in **Horizontal1 format** are 100% mounting compatible.

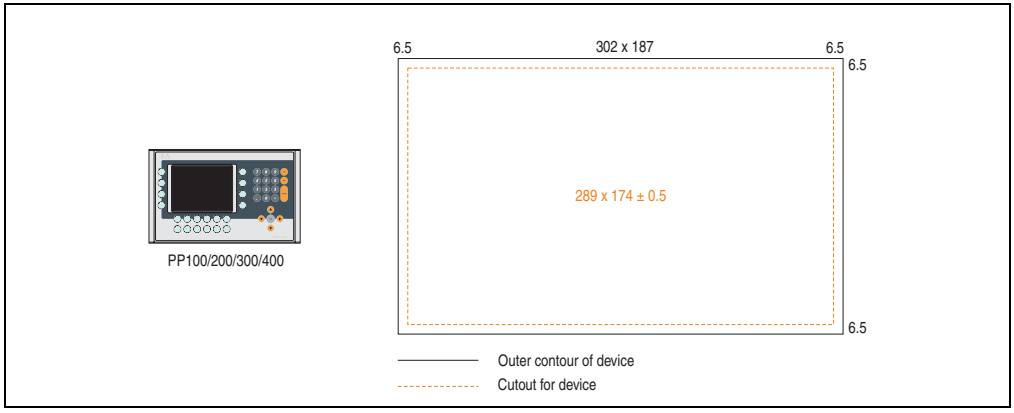


Figure 345: Mounting compatibility - 5.7" device format - Horizontal2

5.7" Power Panel 100/200 and Power Panel 300/400 devices in **Vertical1 format** are 100% mounting compatible.

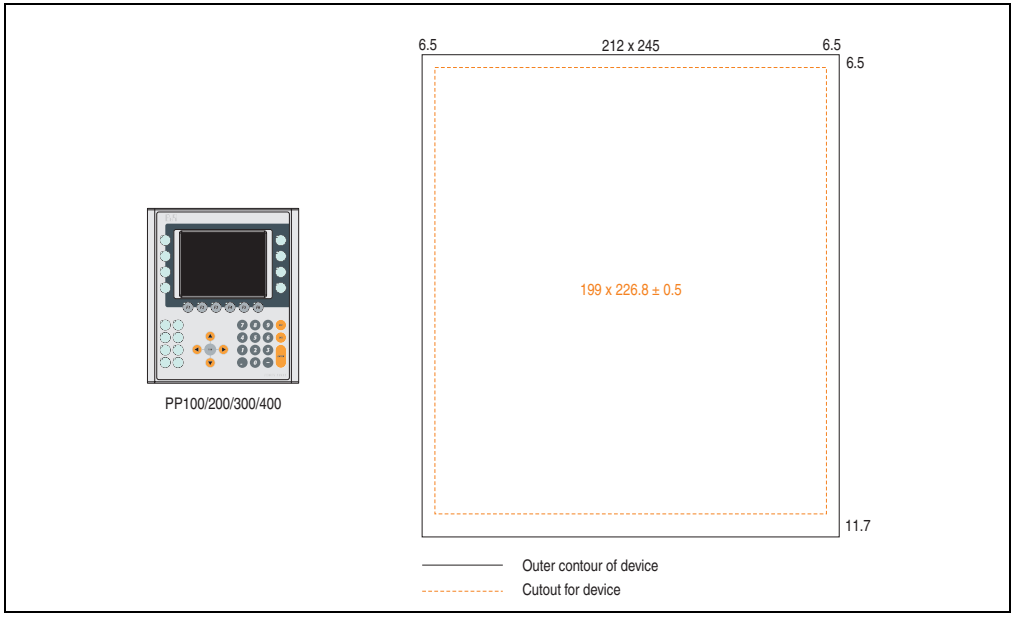


Figure 346: Mounting compatibility - 5.7" device format - Vertical1

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

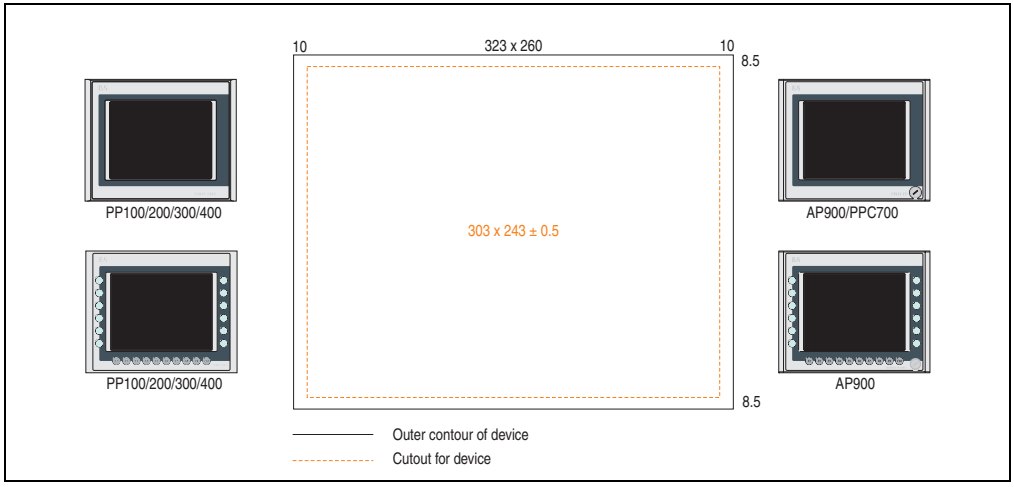


Figure 347: Mounting compatibility - 10.4" device format - Horizontal1

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.

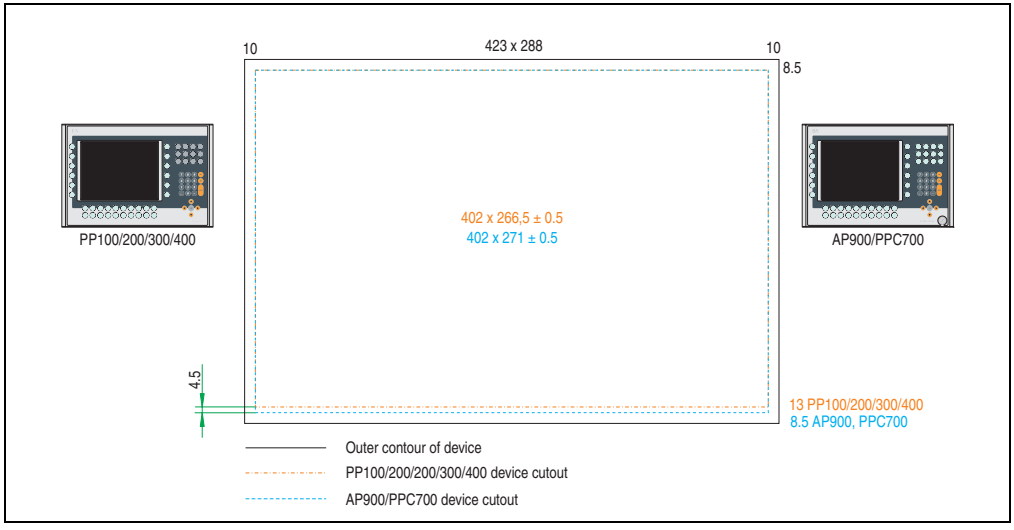


Figure 348: Mounting compatibility - 10.4" device format - Horizontal2

10.4" Power Panel 100/200 and Power Panel 300/400 are 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).

The larger cutout can 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).

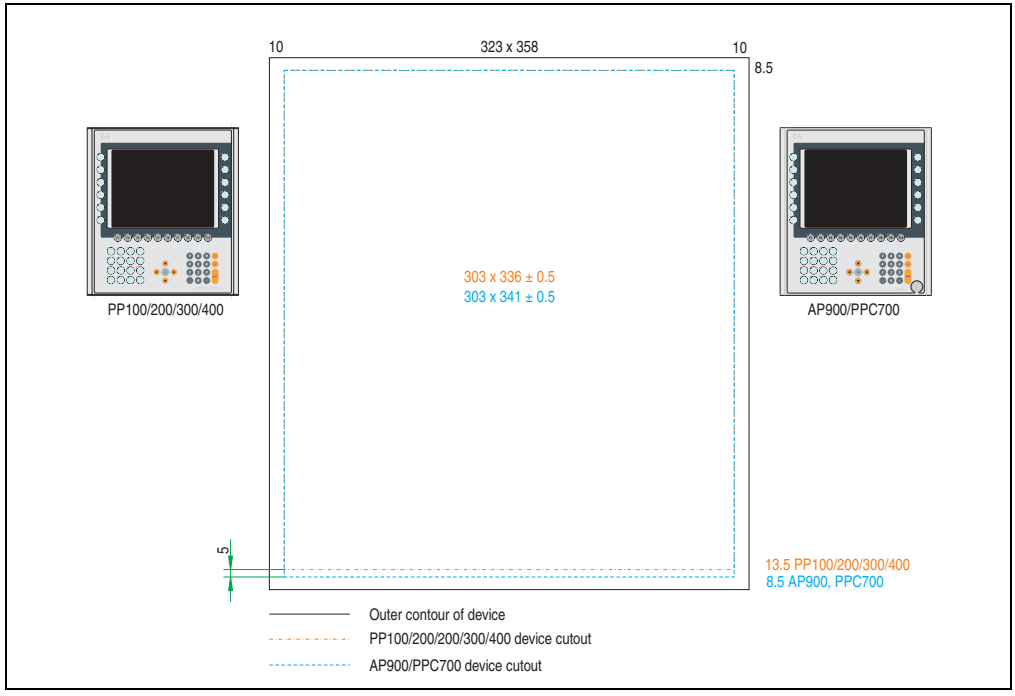


Figure 349: Mounting compatibility - 10.4" device format - Vertical1

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 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

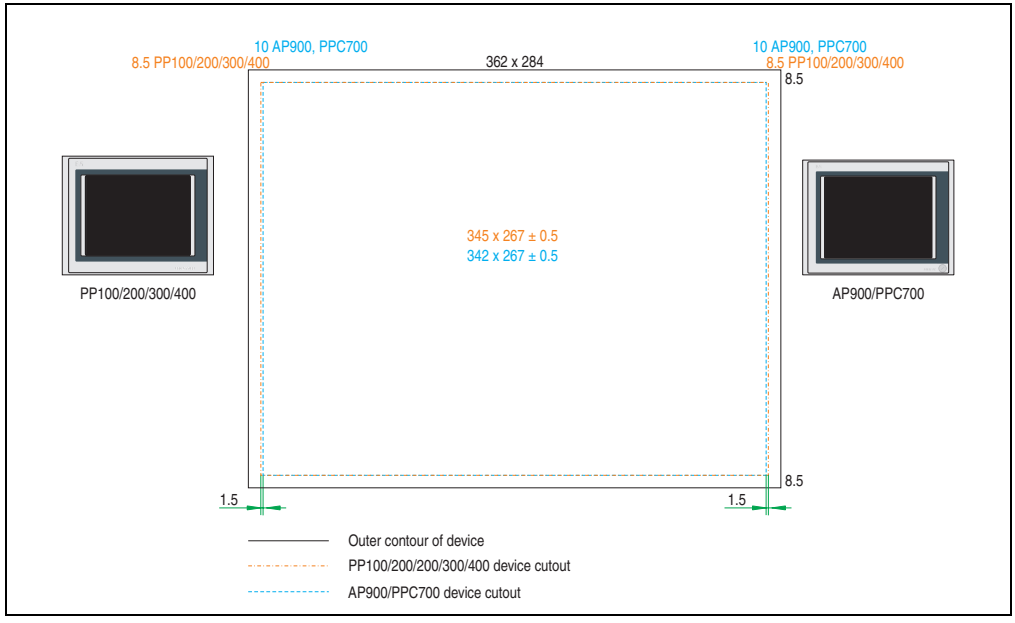


Figure 350: Mounting compatibility - 12.1" device format - Horizontal1

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 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

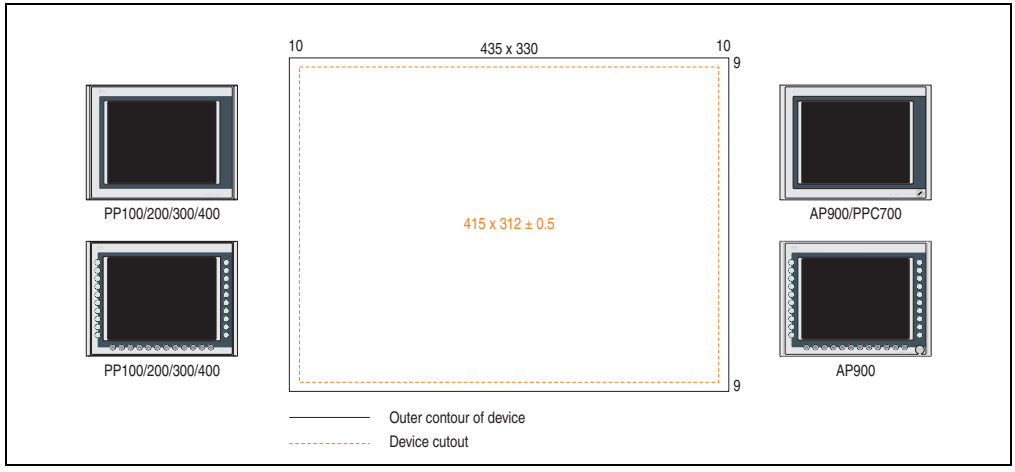


Figure 351: Mounting compatibility - 15" device format - Horizontal1

15" Power Panel 100/200, Power Panel 300/400, Automation Panel 900 and Panel PC 700 devices in **Horizontal1 format** are 100% mounting compatible.

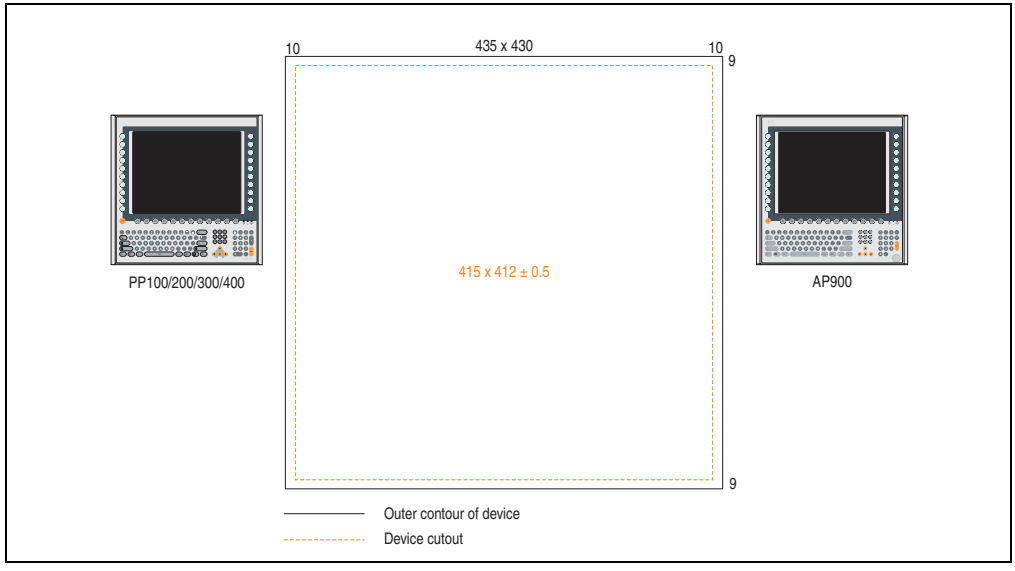


Figure 352: Mounting compatibility - 15" device format - Vertical1

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. With the B&R Key Editor, it is possible to quickly and easily set up the application individually.

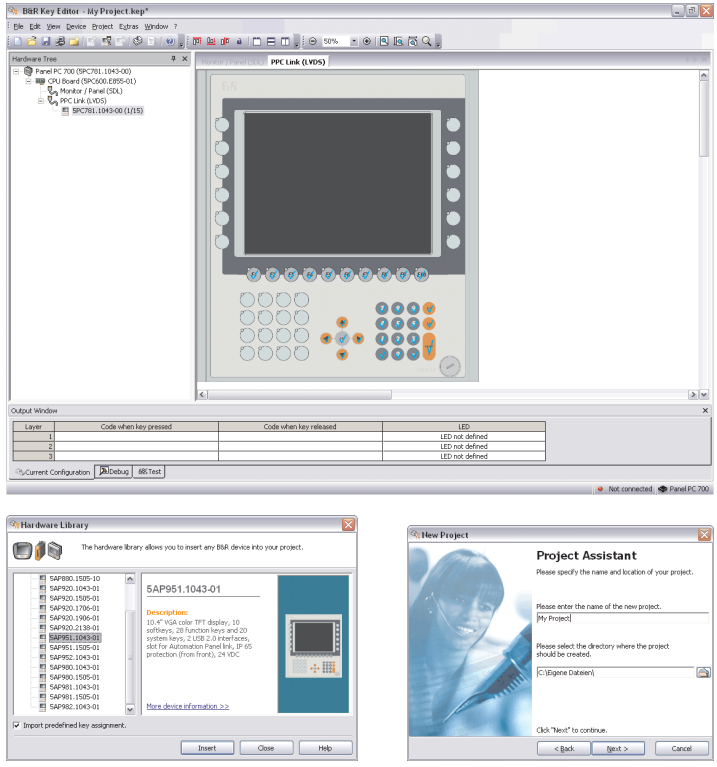


Figure 353: B&R Key Editor screenshots (Version 3.00)

Features:

- Configuration of normal keys like on a keyboard (A, B, C, etc.)
- Keyboard shortcuts (CTRL+C, SHIFT+DEL, etc.) on one key
- Special key functions (change brightness, etc.)
- Assign functions to LEDs (HDD access, power, etc.)
- 4 assignments per key possible (using layer function)
- Configuration of panel locking time when multiple Automation Panel 900 devices are connected to Automation PC 620 and Panel PC 700 devices

Supports following systems (Version 3.00):

- Automation PC 820
- Automation PC 800
- Automation PC 620 (ETX, XTX, Embedded)
- Power Panel 300/400
- Power Panel 100.200
- Power Panel 65
- Panel PC 300
- Panel PC 700 (ETX, XTX)
- Panel PC 800
- Mobile Panel 40/50
- Mobile Panel 100, 200
- IPC2000, IPC2001, IPC2002
- IPC5000, IPC5600
- IPC5000C, IPC5600C

A detailed guide for configuring keys and LEDs can be found in the B&R Key Editor's online help.

The B&R Key Editor can be downloaded for free from the download area on the B&R homepage (**www.br-automation.com**). Additionally, it can also be found on the B&R HMI Drivers & Utilities DVD (model number 5SWHMI.0000-00).

6. B&R Automation Device Interface (ADI) development kit

The ADI development kit is used to access the functions of the ADI driver. The programming languages C (with import libraries for Microsoft Visual C++ 6.0 and Microsoft eMbedded Visual C++ 4.0) and Visual Basic (for Microsoft Visual Basic 6.0) are supported.

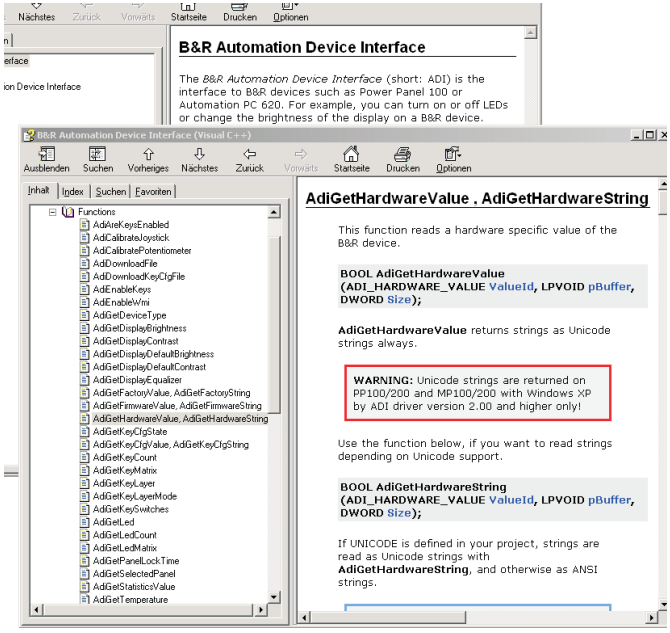


Figure 354: ADI development kit screenshots (Version 2.40)

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 drive is installed).

Supports following systems (Version 2.40 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 to the stated product series (for Windows XP, Windows XP+SP2). The ADI driver is already included in the Windows XP embedded and Windows CE operating systems offered by B&R and does not have to be additionally installed.

The programming languages C (with import libraries for Microsoft Visual C++ 6.0 and Microsoft eMbedded Visual C++ 4.0) and Visual Basic (for Microsoft Visual Basic 6.0) are supported. A detailed description of using the ADI functions can be found in the integrated online help.

The B&R Automation Device Interface (ADI) development kit can be downloaded for free from the download area on the B&R homepage (**www.br-automation.com**).

7. Glossary

A

ACPI

Abbreviation for "**A**dvanced **C**onfiguration and **P**ower **I**nterface". Configuration interface that enables the operating system to control the power supply for each device connected to the PC. With ACPI, the computer's BIOS is only responsible for the details of communication with the hardware.

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

Abbreviation for "**D**ouble **D**ata **R**ate **S**ynchronous **D**ynamic **R**andom **A**ccess **M**emory".

DMA

Direct **M**emory **A**ccess >. Accelerated direct access to a computer's RAM by bypassing the CPU.

DRAM

An abbreviation for "**D**ynamic **R**andom **A**ccess **M**emory". Dynamic RAM consists of an integrated semiconductor circuit that stores information based on the capacitor principle. Capacitors lose their charge in a relatively short time. Therefore, dynamic RAM circuit boards must contain a logic that allows continual recharging of RAM chips. Since the processor cannot access dynamic RAM while it is being recharged, one or more waiting states can occur when reading or writing data. Although it is slower, dynamic RAM is used more often than static RAM since the simple design of the circuits means that it can store four times more data than static RAM.

DSR

An abbreviation for "**D**ata **S**et **R**eady". A signal used in serial data transfer that is sent by the modem to the computer it is connected to, indicating its readiness for processing. DSR is a hardware signal which is sent via line number 6 in compliance with the RS-232-C standard.

DTR

An abbreviation for "**D**ata **T**erminal **R**eady". A signal used in serial data transfer that is sent by the computer to the modem it is connected to, indicating the computer's readiness to accept incoming signals.

E

EDID data

Abbreviation for "**E**xtended **D**isplay **I**dentification **D**ata". EDID data contains the characteristics of monitors / TFT displays transferred as 128 KB data blocks to the graphics card via the Display Data Channel (DDC). This EDID data can be used to set the graphics card to the monitor properties.

EMC

"**E**lectro**m**agnetic **C**ompatibility". The ability of a device or a system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment [IEV 161-01-07].

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 "**F**irst **I**n **F**irst **O**ut". A queuing organization method whereby elements are removed in the same order as they were inserted. The first element inserted is the first one removed. Such an organization method is typical for a list of documents that are waiting to be printed.

Firmware

Programs stored permanently in read-only memory. Firmware is software used to operate computer-controlled devices that generally stays in the device throughout its lifespan or over a long period of time. Such software includes operating systems for CPUs and application programs for industrial PCs as well as programmable logic controllers (e.g. the software in a washing machine controller). This software is written in read-only memory (ROM, PROM, EPROM) and cannot be easily replaced.

G

GB

Gigabyte (1 GB = 230 or 1,073,741,824 bytes)

H

Handshake

Method of synchronization for data transfer when data is sent at irregular intervals. The sender signals that data can be sent, and the receiver signals when new data can be received.

I

IDE

An abbreviation for "**I**ntegrated **D**rive **E**lectronics". A drive interface where the controller electronics are integrated in the drive.

Interface

From the hardware point of view, an interface is the connection point between two modules/devices/systems. The units on both sides of the interface are connected by the interface lines so that data, addresses, and control signals can be exchanged. The term interface includes all functional, electrical and constructive conditions [encoding, signal level, pin assignments] that characterize the connection point between the modules, devices, or systems. Depending on the type of data transfer, a differentiation is made between parallel [e.g. Centronics, IEEE 488] and serial interfaces [e.g. V.24, TTY, RS232, RS422, RS485], which are set up for different transfer speeds and transfer distances. From the point of view of software, the term "interface" describes the transfer point between program modules using specified rules for transferring the program data.

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**).

L

LCD

An abbreviation for "**L**iquid **C**rystal **D**isplay". A display type, based on liquid crystals that have a polarized molecular structure and are enclosed between two transparent electrodes as a thin layer. If an electrical field is applied to the electrodes, the molecules align themselves with the field and form crystalline arrangements that polarize the light passing through. A polarization filter, which is arranged using lamellar electrodes, blocks the polarized light. In this way, a cell (pixel) containing liquid crystals can be switched on using electrode gates, thus coloring this pixel black. Some LCD displays have an electroluminescent plate behind the LCD screen for lighting. Other types of LCD displays can use color.

LED

An abbreviation for "**L**ight **E**mitting **D**iode". A semiconductor diode which converts electrical energy into light. LEDs work on the principle of electroluminescence. They are highly efficient because they do not produce much heat in spite of the amount of light they emit. For example, "operational status indicators" on floppy disk drives are LEDs.

M

MB

Megabyte (1 MB = 220 or 1,048,576 bytes).

Microprocessor

Highly integrated circuit with the functionality of a CPU, normally housed on a single chip. It comprises a control unit, arithmetic and logic unit, several registers and a link system for connecting memory and peripheral components. The main performance features are the internal and external data bus and address bus widths, the command set and the clock frequency. Additionally, a choice can be made between CISC and RISC processors. The first commercially available worldwide microprocessor was the Intel 4004. It came on the market in 1971.

MTBF

An abbreviation for "**M**ean **t**ime **b**etween **f**ailure". The average time which passes before a hardware component fails and repair is needed. This time is usually expressed in thousands or ten thousands of hours, sometimes known as power-on hours (POH).

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 "**P**lug and **P**lay". 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 "**P**ower **O**n **H**ours". See MTBF.

POST

An abbreviation for "**P**ower-**O**n **S**elf **T**est". A set of routines that are stored in ROM on the computer and that test different system components, e.g. RAM, disk drive and the keyboard in order to determine that the connection is operating correctly and ready for operation. POST routines notify the user of problems that occur. This is done using several signal tones or by displaying a message that frequently accompanies a diagnosis value on the standard output or standard error devices (generally the monitor). If the POST runs successfully, control is transferred over to the system's bootstrap loader.

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 **Q**uarter **V**ideo **G**raphics **A**rray. 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 **S**tandard **N**umber **232**. Oldest and most widespread interface standard, also called a V.24 interface. All signals are referenced to ground making this an unbalanced interface. High level: -3 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 "**R**equest **T**o **S**end". A signal used in serial data transfer for requesting send permission. For example, it is sent from a computer to the modem connected to it. The RTS signal is assigned to pin 4 according to the hardware specifications of the RS-232-C standard.

RXD

An abbreviation for "Receive (**RX**) **D**ata". A line for transferring serial data received from one device to another, e.g. from a modem to a computer. For connections complying with the RS-232-C standard, the RXD is connected to pin 3 of the plug.

S

SDRAM

An abbreviation for "**S**ynchronous **D**ynamic **R**andom **A**ccess **M**emory". A construction of dynamic semiconductor components (DRAM) that can operate with higher clock rates than conventional DRAM switching circuits. This is made possible using block access. For each access, the DRAM determines the next memory addresses to be accessed.

SRAM

An abbreviation for "**S**tatic **R**andom **A**ccess **M**emory". A semiconductor memory (RAM) made up of certain logic circuits (flip-flop) that only keeps stored information while powered. In computers, static RAM is generally only used for cache memory.

SVGA

Abbreviation for »**S**uper **V**ideo **G**raphics **A**rray«; Graphics standard with a resolution of at least 800×600 pixels and at least 256 colors.

T

TCP/IP

Transmission Control Protocol/Internet Suit of Protocols. Network protocol that has become the generally accepted standard for data exchange in heterogeneous networks. TCP/IP is used both in local networks for communication between various computer and also for LAN to WAN access.

TFT display

LCD (Liquid Crystal Display) technology where the display consists of a large grid of LCD cells. Each pixel is represented by a cell, whereby electrical fields produced in the cells are supported by thin film transistors (TFT) that result in an active matrix. In its simplest form, there is exactly one thin film transistor per cell. Displays with an active matrix are generally used in laptops and notebooks because they are thin, offer high-quality color displays and can be viewed from all angles.

Touch screen

Screen with touch sensors for activating an item with the finger.

TXD

An abbreviation for "Transmit (**TX**) **D**ata". A line for the transfer of serial data sent from one device to another, e.g. from a computer to a modem. For connections complying with the RS-232-C standard, the TXD is connected to pin 2 of the plug.

U

UART

An abbreviation for "**U**niversal **A**synchronous **R**eceiver-**T**ransmitter". A module generally consisting of a single integrated circuit that combines the circuits required for asynchronous serial communication for both sending and receiving. UART represents the most common type of circuit in modems for connecting to a personal computer.

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**X**tended **G**raphics **A**rray". An expanded standard for graphics controllers and monitors that was introduced by IBM in 1990. This standard supports 640x480 resolution with 65,536 colors or 1024x768 resolution with 256 colors. This standard is generally used in workstation systems.

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