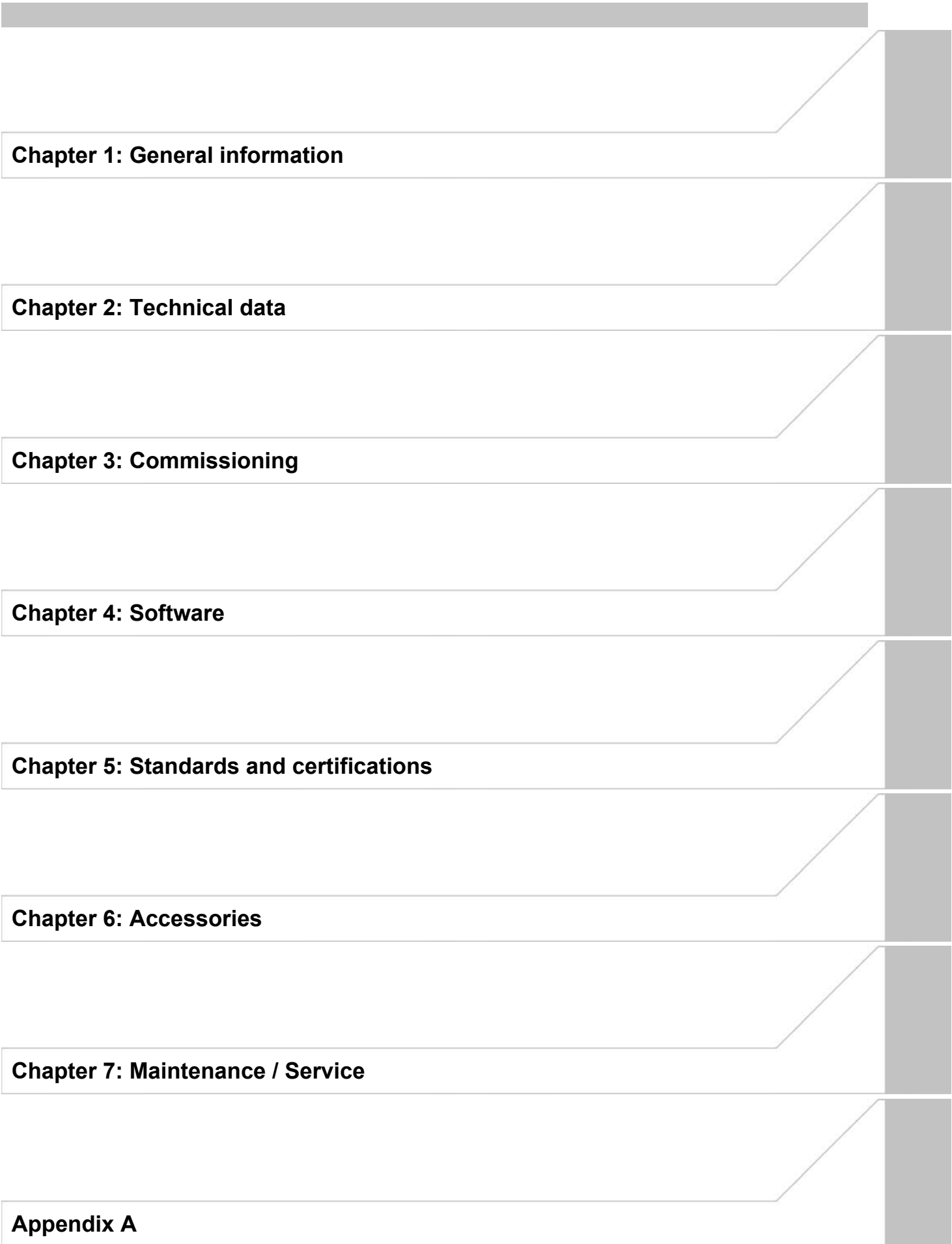


# **Panel PC 800 with GM45 CPU board**

## **User's Manual**

Version: **1.01 (July 2012)**  
Order no.: **MAPPC800A-ENG**

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| 7 Glossary.....                                           | 323 |

# Chapter 1 • General information

---

## 1 Manual history

| Version | Date      | Change                                                                                                                                                                                                                    |
|---------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.00    | 24-Apr-12 | <ul style="list-style-type: none"><li>• First version</li></ul>                                                                                                                                                           |
| 1.01    | 02-Jul-12 | <ul style="list-style-type: none"><li>• Section "Cable lengths and resolutions for SDL transfer" on page 37 updated.</li><li>• "Option" renamed to "Adapter".</li><li>• BIOS version updated (1.15 -&gt; 1.17).</li></ul> |

Table 1: Manual history



## 2 Safety guidelines

### 2.1 Intended use

Programmable logic controllers (PLCs), operating/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 industrial environments. 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, their use in flight control or flight safety systems as well as in the control of mass transportation systems, medical life support systems or weapons systems.

### 2.2 Protection against electrostatic discharge

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

#### 2.2.1 Packaging

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

#### 2.2.2 Guidelines for proper ESD- handling

##### Electrical components with a housing

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

##### Electrical components without a housing

The following apply in addition to "Electrical components with housing":

- Any persons handling electrical components or devices with electrical components installed in them must be grounded.
- Components may only be touched on their narrow sides or front plate.
- Components should always be stored in a suitable medium (ESD packaging, conductive foam, etc.). Metallic surfaces are not suitable storage surfaces!
- Components should not be subjected to electrostatic discharge (e.g. through the use of charged plastics).
- Ensure a minimum distance of 10 cm 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.).
- These increased ESD protective measures for individual components are not necessary for customers handling B&R products.

### 2.3 Policies and procedures

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

When using programmable logic controllers or operating/monitoring devices as control systems in conjunction with a Soft PLC (e.g. B&R Automation Runtime or comparable product) or slot PLC (e.g. B&R LS251 or comparable product), 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 those familiar with the transport, mounting, installation, commissioning and operation of the device who also have the appropriate qualifications (e.g. IEC 60364). National accident prevention regulations must be observed.

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

## 2.4 Transport and storage

During transport and storage, devices must be protected against undue stress (mechanical loads, temperature, humidity, aggressive atmospheres, etc.).

## 2.5 Mounting

- Installation must be performed according to this documentation using suitable equipment and tools.
- Devices may only be installed by qualified personnel without voltage applied. Before installation, voltage to the control cabinet must be switched off and prevented from being switched on again.
- General safety guidelines and national accident prevention regulations must be observed.
- Electrical installation must be carried out according to applicable guidelines (e.g. line cross-section, fuses, protective ground connections).

## 2.6 Operation

### 2.6.1 Protection against touching electrical parts

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

Before turning on the programmable logic controller, operating/monitoring devices and the uninterruptible power supply, the housing must be properly grounded (PE rail). Ground connections must be established when testing operating/monitoring devices or the uninterruptible power supply even when operating them for only a short time!

Before turning the device on, all parts that carry voltage must be securely covered. During operation, all covers must remain closed.

### 2.6.2 Environmental conditions - Dust, humidity, aggressive gases

The use of operating/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 can affect functionality and may prevent sufficient cooling, especially in systems with active cooling systems (fans).

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

For operation in dusty or humid conditions, correctly installed (cutout installation) operating/monitoring devices like the 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 cleaned at suitable intervals.

### 2.6.3 Programs, viruses and dangerous programs

This system is subject to potential risk 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 preventive measures such as virus protection programs, firewalls, etc. and making sure that software is only obtained from trusted sources.

## 2.7 Environmentally friendly

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

### 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<br>Operating/monitoring devices<br>Uninterruptible power supply<br>Batteries & rechargeable batteries<br>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 applicable legal regulations.

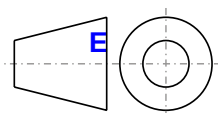
### 3 Organization of safety notices

The safety notices in this manual are organized as follows:

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

Table 3: Organization of safety notices

### 4 Guidelines



European dimension standards apply to all dimension diagrams in this document.

All dimensions are specified in mm.

| Nominal measurement area | General tolerance according to DIN ISO 2768 medium |
|--------------------------|----------------------------------------------------|
| Up to 6 mm               | ±0.1 mm                                            |
| For 6 to 30 mm           | ±0.2 mm                                            |
| For 30 to 120 mm         | ±0.3 mm                                            |
| For 120 to 400 mm        | ±0.5 mm                                            |
| For 400 to 1000 mm       | ±0.8 mm                                            |

Table 4: Nominal measurement areas

## 5 Overview

| Product ID                | Short description                                                                                                                                                                                                                                                                                                                                 | on page |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| <b>24 VDC UPS modules</b> |                                                                                                                                                                                                                                                                                                                                                   |         |
| 9A0100.11                 | UPS 24 VDC, 24 VDC input, 24 VDC output, serial interface                                                                                                                                                                                                                                                                                         | 241     |
| <b>Accessories</b>        |                                                                                                                                                                                                                                                                                                                                                   |         |
| 5AC900.1201-00            |                                                                                                                                                                                                                                                                                                                                                   | 231     |
| 5AC900.1201-01            |                                                                                                                                                                                                                                                                                                                                                   | 231     |
| 5AC900.BLOC-00            | Mounting block with wings 10pcs, spare part.                                                                                                                                                                                                                                                                                                      | 232     |
| 5ACPCI.ETH1-01            | PCI Ethernet card 1x 10/100                                                                                                                                                                                                                                                                                                                       | 243     |
| 5ACPCI.ETH3-01            | PCI Ethernet card 3x 10/100                                                                                                                                                                                                                                                                                                                       | 246     |
| <b>Adapter</b>            |                                                                                                                                                                                                                                                                                                                                                   |         |
| 5AC803.BC01-00            | PPC800 adapter 1 PCI Express compact.                                                                                                                                                                                                                                                                                                             | 70      |
| 5AC803.BC02-00            | PPC800 adapter 1 Slide-in compact.                                                                                                                                                                                                                                                                                                                | 70      |
| <b>Batteries</b>          |                                                                                                                                                                                                                                                                                                                                                   |         |
| 0AC201.91                 | Lithium batteries 4 pieces, 3 V / 950 mAh button cell Hereby we declare that the Lithium cells contained in this shipment qualify as „partly regulated“. Handle with care. If the package is damaged, inspect cells, repack intact cells and protect cells against short circuits. For emergency information, call RENATA SA at + 41 61 319 28 27 | 228     |
| 4A0006.00-000             | Lithium battery, 3 V / 950 mAh, button cell                                                                                                                                                                                                                                                                                                       | 228     |
| <b>Battery units</b>      |                                                                                                                                                                                                                                                                                                                                                   |         |
| 9A0100.12                 | UPS battery unit type A, 24 V, 7 Ah, incl. battery cage                                                                                                                                                                                                                                                                                           | 241     |
| 9A0100.14                 | UPS battery unit type B, 24 V, 2.2 Ah, incl. battery cage                                                                                                                                                                                                                                                                                         | 241     |
| 9A0100.16                 | UPS battery unit type C, 24 V, 4.5 Ah, incl. battery cage                                                                                                                                                                                                                                                                                         | 241     |
| <b>Bus units</b>          |                                                                                                                                                                                                                                                                                                                                                   |         |
| 5AC803.BX01-00            | PPC800 bus 1 PCI, 1 slide-in slot.                                                                                                                                                                                                                                                                                                                | 68      |
| 5AC803.BX01-01            | PPC800 bus 1 PCI Express, 1 slide-in slot.                                                                                                                                                                                                                                                                                                        | 68      |
| 5AC803.BX02-00            | PPC800 bus 2 PCI slots, 1 slide-in slot.                                                                                                                                                                                                                                                                                                          | 68      |
| 5AC803.BX02-01            | PPC800 bus with 1 PCI, 1 PCI Express, 1 slide-in slot.                                                                                                                                                                                                                                                                                            | 68      |
| <b>CPU boards</b>         |                                                                                                                                                                                                                                                                                                                                                   |         |
| 5PC800.BM45-00            | Intel Core2 Duo T9400 CPU board, 2.53 GHz, dual-core, 1066 MHz FSB, 6 MB L2 cache; chipset GM45; 2 sockets for SO-DIMM DDR3 modules                                                                                                                                                                                                               | 61      |
| 5PC800.BM45-01            | Intel Core2 Duo P8400 CPU board, 2.26 GHz, dual-core, 1066 MHz FSB, 3 MB L2 Cache; chipset GM45; 2 sockets for SO-DIMM DDR3 modules                                                                                                                                                                                                               | 61      |
| <b>CompactFlash</b>       |                                                                                                                                                                                                                                                                                                                                                   |         |
| 5CFCRD.0064-03            | CompactFlash 64 MB Western Digital (SLC)                                                                                                                                                                                                                                                                                                          | 258     |
| 5CFCRD.0128-03            | CompactFlash 128 MB Western Digital (SLC)                                                                                                                                                                                                                                                                                                         | 258     |
| 5CFCRD.016G-04            | CompactFlash 16 GB B&R (SLC)                                                                                                                                                                                                                                                                                                                      | 254     |
| 5CFCRD.016G-06            | CompactFlash 16 GB B&R (SLC)                                                                                                                                                                                                                                                                                                                      | 250     |
| 5CFCRD.0256-03            | CompactFlash 256 MB Western Digital (SLC)                                                                                                                                                                                                                                                                                                         | 258     |
| 5CFCRD.0512-03            | CompactFlash 512 MB Western Digital (SLC)                                                                                                                                                                                                                                                                                                         | 258     |
| 5CFCRD.0512-04            | CompactFlash 512 MB B&R (SLC)                                                                                                                                                                                                                                                                                                                     | 254     |
| 5CFCRD.0512-06            | CompactFlash 512 MB B&R (SLC)                                                                                                                                                                                                                                                                                                                     | 250     |
| 5CFCRD.1024-03            | CompactFlash 1 GB Western Digital (SLC)                                                                                                                                                                                                                                                                                                           | 258     |
| 5CFCRD.1024-04            | CompactFlash 1 GB B&R (SLC)                                                                                                                                                                                                                                                                                                                       | 254     |
| 5CFCRD.1024-06            | CompactFlash 1 GB B&R (SLC)                                                                                                                                                                                                                                                                                                                       | 250     |
| 5CFCRD.2048-03            | CompactFlash 2 GB Western Digital (SLC)                                                                                                                                                                                                                                                                                                           | 258     |
| 5CFCRD.2048-04            | CompactFlash 2 GB B&R (SLC)                                                                                                                                                                                                                                                                                                                       | 254     |
| 5CFCRD.2048-06            | CompactFlash 2 GB B&R (SLC)                                                                                                                                                                                                                                                                                                                       | 250     |
| 5CFCRD.4096-03            | CompactFlash 4 GB Western Digital (SLC)                                                                                                                                                                                                                                                                                                           | 258     |
| 5CFCRD.4096-04            | CompactFlash 4 GB B&R (SLC)                                                                                                                                                                                                                                                                                                                       | 254     |
| 5CFCRD.4096-06            | CompactFlash 4 GB B&R (SLC)                                                                                                                                                                                                                                                                                                                       | 250     |
| 5CFCRD.8192-03            | CompactFlash 8 GB Western Digital (SLC)                                                                                                                                                                                                                                                                                                           | 258     |
| 5CFCRD.8192-04            | CompactFlash 8 GB B&R (SLC)                                                                                                                                                                                                                                                                                                                       | 254     |
| 5CFCRD.8192-06            | CompactFlash 8 GB B&R (SLC)                                                                                                                                                                                                                                                                                                                       | 250     |
| <b>DVI cable</b>          |                                                                                                                                                                                                                                                                                                                                                   |         |
| 5CADVI.0018-00            | DVI-D cable, 1.8 m.                                                                                                                                                                                                                                                                                                                               | 269     |
| 5CADVI.0050-00            | DVI-D cable, 5 m.                                                                                                                                                                                                                                                                                                                                 | 269     |
| 5CADVI.0100-00            | DVI-D cable, 10 m.                                                                                                                                                                                                                                                                                                                                | 269     |
| <b>Drives</b>             |                                                                                                                                                                                                                                                                                                                                                   |         |
| 5AC801.ADAS-00            | SATA hard disk adapter to operate a slide-in compact hard disk in a slide-in slot.                                                                                                                                                                                                                                                                | 87      |
| 5AC801.DVDS-00            | DVD-ROM SATA drive (slide-in).                                                                                                                                                                                                                                                                                                                    | 90      |
| 5AC801.DVRS-00            | DVD-R/RW DVD+R/RW SATA drive (slide-in).                                                                                                                                                                                                                                                                                                          | 92      |
| 5AC801.HDDI-00            | 40 GB SATA hard disk (slide-in compact); 24/7 hard disk with extended temperature range. Remark: Please see manual for proper use of the hard disk.                                                                                                                                                                                               | 78      |
| 5AC801.HDDI-03            | 250 GB SATA hard disk (slide-in compact); 24/7 hard disk. Remark: Please see manual for proper use of the hard disk.                                                                                                                                                                                                                              | 82      |
| 5AC801.HDDS-00            | 40 GB SATA hard disk (slide-in); 24/7 hard disk with extended temperature range. Remark: Please see manual for proper use of the hard disk.                                                                                                                                                                                                       | 88      |
| 5AC801.SSDI-00            | 32 GByte SATA SSD (SLC) (slide-in compact).                                                                                                                                                                                                                                                                                                       | 84      |
| 5ACPCI.RAIC-05            | PCI RAID System SATA 2x 250 GB; Remark: Please see manual for proper use of the hard disk.                                                                                                                                                                                                                                                        | 100     |
| 5MMHDD.0250-00            | 250 GB SATA Hard Disk Spare part for 5AC801.HDDI-03 and 5ACPCI.RAIC-05; Remark: Please see manual for proper use of the hard disk.                                                                                                                                                                                                                | 103     |
| <b>Expansions</b>         |                                                                                                                                                                                                                                                                                                                                                   |         |
| 5AC803.SX01-00            | PPC800 expansion 1 PCI/PCI Express and 1 Slide-in (bus 5AC803.BX01-00 or 5AC803.BX01-01 necessary).                                                                                                                                                                                                                                               | 64      |
| 5AC803.SX02-00            | PPC800 expansion 2 PCI/PCI Express and 1 Slide-in (bus 5AC803.BX02-00 or 5AC803.BX02-01 necessary).                                                                                                                                                                                                                                               | 64      |

| Product ID                             | Short description                                                                                                                                                                                                                                                                                                                                                                                                                                 | on page |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| <b>Fan kits</b>                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |         |
| 5AC803.FA01-00                         | PPC800 fan kit for system units without expansion.                                                                                                                                                                                                                                                                                                                                                                                                | 105     |
| 5AC803.FA02-00                         | PPC800 fan kit for system units with the expansion 5AC803.SX01-00.                                                                                                                                                                                                                                                                                                                                                                                | 106     |
| 5AC803.FA03-00                         | PPC800 fan kit for system units with the expansion 5AC803.SX02-00.                                                                                                                                                                                                                                                                                                                                                                                | 107     |
| <b>Heat sinks</b>                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |         |
| 5AC803.HS00-01                         | PPC800 heat sink for CPU boards with Dual Core processor T7400, T9400 and P8400.                                                                                                                                                                                                                                                                                                                                                                  | 62      |
| <b>Interface cards</b>                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |         |
| 5ACPCC.ETH0-00                         | PCleC Ethernet card 1x 10/100/1000                                                                                                                                                                                                                                                                                                                                                                                                                | 72      |
| 5ACPCC.MPL0-00                         | PCleC POWERLINK card, 2 POWERLINK interfaces, 512 kByte SRAM                                                                                                                                                                                                                                                                                                                                                                                      | 74      |
| <b>MS-DOS</b>                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |         |
| 9S0000.01-010                          | OEM Microsoft MS-DOS 6.22, German Floppy disks, only available with a new PC.                                                                                                                                                                                                                                                                                                                                                                     | 189     |
| 9S0000.01-020                          | OEM Microsoft MS-DOS 6.22, English Floppy disks, only available with a new PC.                                                                                                                                                                                                                                                                                                                                                                    | 189     |
| <b>Main memory for GM45 CPU boards</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |         |
| 5MMDDR.2048-02                         | SO-DIMM DDR3 RAM 2048 MB PC3-8500                                                                                                                                                                                                                                                                                                                                                                                                                 | 63      |
| 5MMDDR.4096-02                         | SO-DIMM DDR3 RAM 4096 MByte PC3-8500                                                                                                                                                                                                                                                                                                                                                                                                              | 63      |
| <b>Miscellaneous</b>                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |         |
| 5AC900.1000-00                         | Adapter DVI (male) to CRT (female). For connecting a standard monitor to a DVI-I interface.                                                                                                                                                                                                                                                                                                                                                       | 230     |
| <b>Other</b>                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |         |
| 5SWHMI.0000-00                         | HMI Drivers & Utilities DVD                                                                                                                                                                                                                                                                                                                                                                                                                       | 266     |
| <b>RS232 cable</b>                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |         |
| 9A0014.02                              | RS232 extension cable for remote operating of a display unit with touch screen, 1.8 m.                                                                                                                                                                                                                                                                                                                                                            | 286     |
| 9A0014.05                              | RS232 extension cable for remote operating of a display unit with touch screen, 5 m.                                                                                                                                                                                                                                                                                                                                                              | 286     |
| 9A0014.10                              | RS232 extension cable for remote operating of a display unit with touch screen, 10 m.                                                                                                                                                                                                                                                                                                                                                             | 286     |
| <b>Replacement batteries</b>           |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |         |
| 9A0100.13                              | UPS batteries type A (spare part), 2x 12 V, 7 Ah, for battery unit 9A0100.12                                                                                                                                                                                                                                                                                                                                                                      | 241     |
| 9A0100.15                              | UPS batteries type B (spare part), 2x 12 V, 2.2 Ah, for battery unit 9A0100.14                                                                                                                                                                                                                                                                                                                                                                    | 241     |
| 9A0100.17                              | UPS batteries type C (spare part), 2x 12 V, 4.5 Ah, for battery unit 9A0100.16                                                                                                                                                                                                                                                                                                                                                                    | 241     |
| <b>SDL cable - 45° connector</b>       |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |         |
| 5CASDL.0018-01                         | SDL cable; 45° connector, 1.8 m.                                                                                                                                                                                                                                                                                                                                                                                                                  | 275     |
| 5CASDL.0050-01                         | SDL cable; 45° connector, 5 m.                                                                                                                                                                                                                                                                                                                                                                                                                    | 275     |
| 5CASDL.0100-01                         | SDL cable; 45° connector, 10 m.                                                                                                                                                                                                                                                                                                                                                                                                                   | 275     |
| 5CASDL.0150-01                         | SDL cable; 45° connector, 15 m.                                                                                                                                                                                                                                                                                                                                                                                                                   | 275     |
| <b>SDL cables</b>                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |         |
| 5CASDL.0018-00                         | SDL cable, 1.8 m.                                                                                                                                                                                                                                                                                                                                                                                                                                 | 272     |
| 5CASDL.0050-00                         | SDL cable, 5 m.                                                                                                                                                                                                                                                                                                                                                                                                                                   | 272     |
| 5CASDL.0100-00                         | SDL cable, 10 m.                                                                                                                                                                                                                                                                                                                                                                                                                                  | 272     |
| 5CASDL.0150-00                         | SDL cable, 15 m.                                                                                                                                                                                                                                                                                                                                                                                                                                  | 272     |
| 5CASDL.0200-00                         | SDL cable, 20 m.                                                                                                                                                                                                                                                                                                                                                                                                                                  | 272     |
| 5CASDL.0250-00                         | SDL cable, 25 m.                                                                                                                                                                                                                                                                                                                                                                                                                                  | 272     |
| 5CASDL.0300-00                         | SDL cable, 30 m.                                                                                                                                                                                                                                                                                                                                                                                                                                  | 272     |
| <b>SDL flex cable</b>                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |         |
| 5CASDL.0018-03                         | SDL Cable flex, 1.8 m.                                                                                                                                                                                                                                                                                                                                                                                                                            | 278     |
| 5CASDL.0050-03                         | SDL cable flex, 5 m.                                                                                                                                                                                                                                                                                                                                                                                                                              | 278     |
| 5CASDL.0100-03                         | SDL cable flex, 10 m.                                                                                                                                                                                                                                                                                                                                                                                                                             | 278     |
| 5CASDL.0150-03                         | SDL cable flex, 15 m.                                                                                                                                                                                                                                                                                                                                                                                                                             | 278     |
| 5CASDL.0200-03                         | SDL cable flex, 20 m.                                                                                                                                                                                                                                                                                                                                                                                                                             | 278     |
| 5CASDL.0250-03                         | SDL cable flex, 25 m.                                                                                                                                                                                                                                                                                                                                                                                                                             | 278     |
| 5CASDL.0300-03                         | SDL cable flex, 30 m.                                                                                                                                                                                                                                                                                                                                                                                                                             | 278     |
| 5CASDL.0300-13                         | SDL cable flex with extender, 30 m.                                                                                                                                                                                                                                                                                                                                                                                                               | 281     |
| 5CASDL.0400-13                         | SDL cable flex with extender, 40 m.                                                                                                                                                                                                                                                                                                                                                                                                               | 281     |
| 5CASDL.0430-13                         | SDL Cable flex with extender, 43 m.                                                                                                                                                                                                                                                                                                                                                                                                               | 281     |
| <b>System units</b>                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |         |
| 5PC820.1505-00                         | Panel PC 820 15" XGA color TFT display with touch screen (resistive); connections for 1x RS232, 5x USB 2.0, Smart Display Link/DVI/Monitor, 2x Ethernet 10/100/1000, HDA Sound, add-on UPS slot, expandable with 1 or 2 PCI / PCI express slots, optional PCI Express compact and slide-in compact slot; IP65 protection (front side); 24 VDC Plug for power supply must be ordered separately (screw clamp: 0TB103.9; cage clamp: 0TB103.91).    | 49      |
| 5PC820.1906-00                         | Panel PC 820 19" SXGA color TFT display with touch screen (resistive); connections for 1x RS232, 5x USB 2.0, Smart Display Link/DVI/Monitor, 2x Ethernet 10/100/1000, HDA Sound, add-on UPS slot, expandable with 1 or 2 PCI / PCI express slots, optional PCI Express compact and slide-in compact slot, IP65 protection (front side); 24 VDC Plug for power supply must be ordered separately (screw clamps: 0TB103.9; cage clamps: 0TB103.91). | 55      |
| <b>Terminal blocks</b>                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |         |
| 0TB103.9                               | Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm <sup>2</sup> , protected against vibration by the screw flange                                                                                                                                                                                                                                                                                                                              | 229     |
| 0TB103.91                              | Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm <sup>2</sup> , protected against vibration by the screw flange                                                                                                                                                                                                                                                                                                                               | 229     |
| <b>USB accessories</b>                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |         |
| 5MMUSB.2048-01                         | USB 2.0 flash drive 2048 MB B&R                                                                                                                                                                                                                                                                                                                                                                                                                   | 264     |
| <b>USB cable</b>                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |         |
| 5CAUSB.0018-00                         | USB 2.0 connecting cable type A - type B, 1.8 m.                                                                                                                                                                                                                                                                                                                                                                                                  | 285     |
| 5CAUSB.0050-00                         | USB 2.0 connecting cable type A - type B, 5 m.                                                                                                                                                                                                                                                                                                                                                                                                    | 285     |
| <b>Undefined</b>                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |         |
| 1A4600.10-2                            | B&R Automation Runtime ARwin, ARNC0                                                                                                                                                                                                                                                                                                                                                                                                               | 198     |
| 1A4600.10-3                            | B&R Automation Runtime ARwin+PVIControls incl. License Label and Security Key                                                                                                                                                                                                                                                                                                                                                                     | 198     |
| 1A4600.10-4                            | B&R Automation Runtime ARwin+ARNC0+PVIControls                                                                                                                                                                                                                                                                                                                                                                                                    | 198     |
| 5AC801.HDDI-02                         | 160 GB SATA hard disk (slide-in compact); 24/7 hard disk with extended temperature range. Remark: Please see manual for proper use of the hard disk.                                                                                                                                                                                                                                                                                              | 80      |
| 5ACPCI.RAIC-03                         | PCI RAID System SATA 2x 160 GB; Remark: Please see manual for proper use of the hard disk.                                                                                                                                                                                                                                                                                                                                                        | 95      |

| Product ID                            | Short description                                                                                                                                                                                                                                                                                                                                                                                       | on page |
|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| 5ACPCI.RAIC-04                        | 160 GB SATA Hard Disk Spare part for 5ACPCI.RAIC-03; Remark: Please see manual for proper use of the hard disk.                                                                                                                                                                                                                                                                                         | 98      |
| 5CAMSC.0001-00                        | APC620 internal power supply cable - Customized -                                                                                                                                                                                                                                                                                                                                                       | 288     |
| 5MMUSB.2048-00                        | USB 2.0 Memory Stick 2048 MB                                                                                                                                                                                                                                                                                                                                                                            | 262     |
| 9A0003.02U                            | USB Port Button Holder DS9490B                                                                                                                                                                                                                                                                                                                                                                          | 198     |
| <b>Uninterruptible power supplies</b> |                                                                                                                                                                                                                                                                                                                                                                                                         |         |
| 5AC600.UPSB-00                        | Battery unit 5Ah; for APC620, APC800 or PPC800 UPS.                                                                                                                                                                                                                                                                                                                                                     | 237     |
| 5AC600.UPSI-00                        | UPS module for APC620, APC810, PPC800; for system units 5PC600.SX01-00 (from Rev. H0), 5PC600.SX02-00 (from Rev. G0), 5PC600.SX02-01 (from Rev. H0), 5PC600.SX05-00 (from Rev. F0), 5PC600.SX05-01 (from Rev. F0), 5PC600.SF03-00 (from Rev. A0), 5PC810.SX*, 5PC820.1505-00, 5PC820.1906-00. Cable (5CAUPS.0005-00 or 5CAUPS.0030-00) and battery unit (5AC600.UPSB-00) have to be ordered separately. | 235     |
| 5CAUPS.0005-00                        | UPS cable 0.5 m; for UPS 5AC600.UPSI-00.                                                                                                                                                                                                                                                                                                                                                                | 240     |
| 5CAUPS.0030-00                        | UPS cable 3 m; for UPS 5AC600.UPSI-00.                                                                                                                                                                                                                                                                                                                                                                  | 240     |
| <b>Windows 7</b>                      |                                                                                                                                                                                                                                                                                                                                                                                                         |         |
| 5SWWI7.0100-ENG                       | Microsoft OEM Windows 7 Professional 32-bit, DVD, English. Only available with a new device.                                                                                                                                                                                                                                                                                                            | 192     |
| 5SWWI7.0100-GER                       | Microsoft OEM Windows 7 Professional 32-bit, DVD, German. Only available with a new device.                                                                                                                                                                                                                                                                                                             | 192     |
| 5SWWI7.0200-ENG                       | Microsoft OEM Windows 7 Professional 64-bit, DVD, English. Only available with a new device.                                                                                                                                                                                                                                                                                                            | 192     |
| 5SWWI7.0200-GER                       | Microsoft OEM Windows 7 Professional 64-bit, DVD, German. Only available with a new device.                                                                                                                                                                                                                                                                                                             | 192     |
| 5SWWI7.0300-MUL                       | Microsoft OEM Windows 7 Ultimate 32-bit, DVD, multilanguage. Only available with a new device.                                                                                                                                                                                                                                                                                                          | 192     |
| 5SWWI7.0400-MUL                       | Microsoft OEM Windows 7 Ultimate 64-bit, DVD, multilanguage. Only available with a new device.                                                                                                                                                                                                                                                                                                          | 192     |
| <b>Windows Embedded Standard 2009</b> |                                                                                                                                                                                                                                                                                                                                                                                                         |         |
| 5SWWXP.0734-ENG                       | Microsoft OEM Windows Embedded Standard 2009, English; for PPC800 with GM45 chipset; please order CompactFlash separately (minimum 1 GB).                                                                                                                                                                                                                                                               | 194     |
| <b>Windows Embedded Standard 7</b>    |                                                                                                                                                                                                                                                                                                                                                                                                         |         |
| 5SWWI7.0534-ENG                       | Microsoft OEM Windows Embedded Standard 7 32-bit, English; for PPC800 with GM45 chipset; please order CompactFlash separately (minimum 8 GB).                                                                                                                                                                                                                                                           | 196     |
| 5SWWI7.0634-ENG                       | Microsoft OEM Windows Embedded Standard 7 64-bit, English; for PPC800 with GM45 chipset; please order CompactFlash separately (minimum 16 GB).                                                                                                                                                                                                                                                          | 196     |
| 5SWWI7.0734-MUL                       | Microsoft OEM Windows Embedded Standard 7 Premium 32-bit, multilanguage; for PPC800 with GM45 chipset; please order CompactFlash separately (minimum 8 GB).                                                                                                                                                                                                                                             | 196     |
| 5SWWI7.0834-MUL                       | Microsoft OEM Windows Embedded Standard 7 Premium 64-bit, multilanguage; for PPC800 with GM45 chipset; please order CompactFlash separately (minimum 16 GB).                                                                                                                                                                                                                                            | 196     |
| <b>Windows XP Professional</b>        |                                                                                                                                                                                                                                                                                                                                                                                                         |         |
| 5SWWXP.0500-ENG                       | Microsoft OEM Windows XP Professional Service Pack 2c, CD, English. Only available with a B&R device.                                                                                                                                                                                                                                                                                                   | 190     |
| 5SWWXP.0500-GER                       | Microsoft OEM Windows XP Professional Service Pack 2c, CD, German. Only available with a B&R device.                                                                                                                                                                                                                                                                                                    | 190     |
| 5SWWXP.0500-MUL                       | Microsoft OEM Windows XP Professional Service Pack 2c, CD, Multilanguage Only available with a B&R device.                                                                                                                                                                                                                                                                                              | 190     |
| 5SWWXP.0600-ENG                       | Microsoft OEM Windows XP Professional Service Pack 3, CD, English. Only available with a B&R device.                                                                                                                                                                                                                                                                                                    | 190     |
| 5SWWXP.0600-GER                       | Microsoft OEM Windows XP Professional Service Pack 3, CD, German. Only available with a device.                                                                                                                                                                                                                                                                                                         | 190     |
| 5SWWXP.0600-MUL                       | Microsoft OEM Windows XP Professional Service Pack 3, CD, multilanguage. Only available with a B&R device.                                                                                                                                                                                                                                                                                              | 190     |
| <b>Windows-based Runtime</b>          |                                                                                                                                                                                                                                                                                                                                                                                                         |         |
| 1A4600.10                             | B&R Automation Runtime ARwin, incl. License Label and Security Key                                                                                                                                                                                                                                                                                                                                      | 198     |

## Chapter 2 • Technical data

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### 1 Introduction

The Panel PC 800 covers a wide performance range from efficient Intel Atom N270 processors to Core2 Duo processors for applications with the highest performance requirements. Brilliant 15" XGA and 19" SXGA touch screen displays provide a simple and intuitive user interface. The flexibility was raised to a new level when designing the PPC800. This makes it possible to add several different options to the cost-effective basic device. This includes up to two PCI and PCI Express slots, modular drives, additional interfaces and an integrated UPS. The chipset, processor and other components are connected directly to the heat sink using heat conductive materials. This makes it possible to operate not only Atom processors but also certain Dual Core processors without a fan at all.





## 1.1 Features

- 15" and 19" diagonals
- Latest processor technology - Core 2 Duo
- Up to 8 GB main memory (dual-channel memory support)
- 1 CompactFlash slot (type I)
- Expandable expansion with 1 or 2 slots for PCI / PCI Express (PCIe) cards and a slide-in drive slot
- 1 optional PCIe (PCI express compact) card slot (can be expanded with adapter)
- 1 optional slide-in compact slot (can be expanded with adapter)
- 5x USB 2.0
- 2x Ethernet 10/100/1000 Mbit interfaces
- 1x RS232 interface, modem compatible
- 24 VDC supply voltage
- BIOS (AMI)
- Real-time clock (RTC, battery-backed)
- Easy slide-in drive exchange (SATA hot plug capable)
- HDA sound
- Add-on UPS slot

## 1.2 System components / configuration

The PPC800 system can be assembled to meet individual requirements and operating conditions.

The following components are absolutely essential for operation:

- System unit
- CPU board
- Heat sink (CPU board dependent)
- Main memory
- Fan kits
- Drive (mass memory such as CompactFlash card or hard disk) for the operating system
- Software

### 1.2.1 Configuration - Basic system

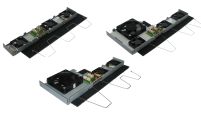
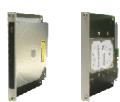
| Configuration - Basic system                                                        |                                                                                                     |                                                                                                       |                |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|----------------|
| System unit                                                                         | Select 1                                                                                            |                                                                                                       |                |
|                                                                                     | <br>5PC820.1505-00 | <br>5PC820.1906-00 |                |
| Fan kits                                                                            | Select 1                                                                                            |                                                                                                       |                |
|   | 5AC803.FA01-00                                                                                      | 5AC803.FA02-00                                                                                        | 5AC803.FA03-00 |
| CPU board - Heat sink - Main memory                                                 |                                                                                                     |                                                                                                       |                |
| CPU board                                                                           | Select 1                                                                                            |                                                                                                       |                |
|  | 5PC800.BM45-00<br>5PC800.BM45-01                                                                    |                                                                                                       |                |
| Heat sink                                                                           | Select 1                                                                                            |                                                                                                       |                |
|  | 5AC803.HS00-01                                                                                      |                                                                                                       |                |
| Main memory                                                                         | Select 1 or 2                                                                                       |                                                                                                       |                |
|  | 5MMDDR.2048-02<br>5MMDDR.4096-02                                                                    |                                                                                                       |                |

Image 1: Configuration - Basic system

## 1.2.2 Configuration - Optional components

| Configuration - Optional components                                                 |                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                             |                                                                                                                                                                               |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Configuration of a system unit with adapter                                         |                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                             |                                                                                                                                                                               |
| Adapter <sup>1)</sup>                                                               | Select 1 or both                                                                                                                                                                                                                                |                                                                                                                                                                                                                                             |                                                                                                                                                                               |
|    | 5AC803.BC01-00<br>↓                                                                                                                                                                                                                             | 5AC803.BC02-00<br>↓                                                                                                                                                                                                                         |                                                                                                                                                                               |
|                                                                                     | PClec plug-in cards, select 1                                                                                                                                                                                                                   | Slide-in compact drives, select 1                                                                                                                                                                                                           |                                                                                                                                                                               |
|    | 5ACPCC.ETH0-00<br>(PClec Ethernet card 10/100/1000)<br>5ACPCC.MPL0-00<br>(PClec POWERLINK MN 2-port)                                                                                                                                            | 5AC801.HDDI-00 (40 GB)<br>5AC801.HDDI-03 (250 GB)<br>5AC801.SSDI-00 (32 GB)                                                                                                                                                                 |                                                                                                                                                                               |
| Configuration of a system unit with expansion                                       |                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                             |                                                                                                                                                                               |
| Expansion                                                                           | No expansion                                                                                                                                                                                                                                    | 1x PCI/PCle + 1x slide-in slot                                                                                                                                                                                                              | 2x PCI/PCle + 1x slide-in slot                                                                                                                                                |
|    |                                                                                                                                                                | 5AC803.SX01-00                                                                                                                                                                                                                              | 5AC803.SX02-00                                                                                                                                                                |
| Bus units                                                                           |                                                                                                                                                                                                                                                 | Select one                                                                                                                                                                                                                                  | Select one                                                                                                                                                                    |
|    |                                                                                                                                                                | 5AC803.BX01-00<br>5AC803.BX01-01                                                                                                                                                                                                            | 5AC803.BX02-00<br>5AC803.BX02-01                                                                                                                                              |
| Slide-in drives                                                                     |                                                                                                                                                                                                                                                 | Select one                                                                                                                                                                                                                                  |                                                                                                                                                                               |
|   |                                                                                                                                                                | 5AC801.HDDS-00 (40 GB)<br>5AC801.DVDS-00 (DVD drive)<br>5AC801.DVRS-00 (DVD writer)<br>5AC801.ADAS-00 (adapter)                                                                                                                             |                                                                                                                                                                               |
| CompactFlash                                                                        | Select one                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                             |                                                                                                                                                                               |
|  | 5CFCRD.0512-06, 5CFCRD.1024-06,<br>5CFCRD.2048-06, 5CFCRD.4096-06,<br>5CFCRD.8192-06, 5CFCRD.016G-06<br>5CFCRD.0064-03, 5CFCRD.0128-03,<br>5CFCRD.0256-03, 5CFCRD.0512-03,<br>5CFCRD.1024-03, 5CFCRD.2048-03,<br>5CFCRD.4096-03, 5CFCRD.8192-03 |                                                                                                                                                                                                                                             |                                                                                                                                                                               |
| UPS battery                                                                         | Select one                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                             |                                                                                                                                                                               |
|  | 5AC600.UPSI-00 (add-on UPS module), 5AC600.UPSB-00 (UPS battery unit)<br>Connection cable: 5CAUPS.0005-00 (0.5 meters) or 5CAUPS.0030-00 (3 meters)                                                                                             |                                                                                                                                                                                                                                             |                                                                                                                                                                               |
| Supply voltage plug                                                                 | Select one                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                             |                                                                                                                                                                               |
|  | 0TB103.9 (screw clamps)<br>0TB103.91 (cage clamps)                                                                                                                                                                                              |                                                                                                                                                                                                                                             |                                                                                                                                                                               |
| Software                                                                            | Select one                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                             |                                                                                                                                                                               |
|  | <b>Windows XP</b><br>5SWWXP.0500-ENG<br>5SWWXP.0500-GER<br>5SWWXP.0500-MUL<br>5SWWXP.0600-ENG<br>5SWWXP.0600-GER<br>5SWWXP.0600-MUL<br><br><b>Windows 7</b><br>5SWWI7.0100-ENG<br>5SWWI7.0100-GER<br>5SWWI7.0200-ENG                            | <b>Windows Embedded Standard 2009</b><br>5SWWXP.0734-ENG<br><br><b>Windows Embedded Standard 7</b><br>5SWWI7.0534-ENG<br>5SWWI7.0634-ENG<br>5SWWI7.0734-MUL<br>5SWWI7.0834-MUL<br><br>5SWWI7.0200-GER<br>5SWWI7.0300-MUL<br>5SWWI7.0400-MUL | <b>Microsoft DOS</b><br>9S0000.01-010<br>9S0000.01-020<br><br><b>Automation Runtime</b><br>1A4601.06<br>1A4601.06-2<br>1A4600.10<br>1A4600.10-2<br>1A4600.10-3<br>1A4600.10-4 |

1) If both adapters are used, then a PCle plug-in card and a slide-in compact drive can also be operated in a device.

Image 2: Configuration - Optional components

## 2 Complete device

### 2.1 Temperature specifications

CPU boards can be combined with various other components, such as drives, main memory, additional insert cards, etc. depending on the system unit and fan kit. The various configurations result in varying maximum possible ambient temperatures, which can be seen in the following tables.

#### Information:

The maximum specified ambient temperatures for operation with a fan kit were determined under worst-case conditions. Experience has shown that higher ambient temperatures can be reached under typical conditions, e.g. using Microsoft Windows. The testing and evaluation is to be done on-site by the user (temperatures can be read in BIOS or using the B&R Control Center).

#### Information regarding worst-case conditions

- Thermal Analysis Tool (TAT V3.8) from Intel for simulating 100% processor load
- BurnIn testing tool (BurnIn V4.0 Pro from Passmark Software) to simulate a 100% load on the interface via loop-back adapters (serial interfaces, slide-in drives, USB ports, audio outputs)
- Maximum system extension and power consumption

#### 2.1.1 Maximum ambient temperature

#### Information:

Only specified mounting orientations are permitted. See chapter "Commissioning", section "Mounting orientation" on page 109.

| All temperature values in degrees Celsius (°C) at 500 meters above sea level.                                              |                                     | 5PC800.BM45-00 | 5PC800.BM45-01 | Temperature limits | Location of sensor(s) |
|----------------------------------------------------------------------------------------------------------------------------|-------------------------------------|----------------|----------------|--------------------|-----------------------|
| The maximum ambient temperature must typically be derated by 1°C per 1000 meters (starting at 500 meters above sea level). |                                     |                |                |                    |                       |
| Maximum ambient temperature                                                                                                |                                     | 45             | 50             |                    |                       |
| What else can be operated at the max. ambient temperature, or are there any limits?                                        |                                     |                |                |                    |                       |
| Compact slide-in drive                                                                                                     | Onboard CompactFlash1               | ✓              | ✓              | 80                 | I/O                   |
|                                                                                                                            | 5AC801.HDDI-00                      | ✓              | ✓              | 80                 |                       |
|                                                                                                                            | 5AC801.HDDI-02                      | ✓              | ✓              | 80                 |                       |
|                                                                                                                            | 5AC801.HDDI-03                      | ✓              | ✓              | 60                 |                       |
|                                                                                                                            | 5AC801.SSDI-00                      | ✓              | ✓              | 70                 |                       |
| Slide-in drives                                                                                                            | 5AC801.HDDS-00                      | ✓              | ✓              | 80                 | Slide-in drive 1      |
|                                                                                                                            | 5AC801.DVDS-00                      | ✓              | ✓              | 50                 |                       |
|                                                                                                                            | 5AC801.DVRS-00                      | ✓              | ✓              | 50                 |                       |
| Main memory                                                                                                                | 5MMDDR.2048-02                      | ✓              | ✓              | -                  | -                     |
|                                                                                                                            | 5MMDDR.4096-02                      | ✓              | ✓              | -                  |                       |
| System units                                                                                                               | 5PC820.1505-00                      | ✓              | ✓              | 80                 | Power supply          |
|                                                                                                                            | 5PC820.1906-00                      | ✓              | ✓              | 80                 |                       |
| Additional insert cards<br>PClec cards                                                                                     | 5ACPCC.ETH0-00                      | ✓              | ✓              | -                  | -                     |
|                                                                                                                            | 5ACPCC.MPL0-00                      | ✓              | ✓              | -                  |                       |
|                                                                                                                            | 5ACPCI.RAIC-03 (24 hours / default) | ✓              | ✓              | -                  |                       |
|                                                                                                                            | 5ACPCI.RAIC-04 (24 hours / default) | ✓              | ✓              | -                  |                       |
|                                                                                                                            | 5ACPCI.RAIC-05 (24 hours / default) | ✓              | ✓              | -                  |                       |

1) Only possible with a CompactFlash card from B&R that is compatible with the device.

Table 5: Ambient temperature with a fan kit

#### 2.1.2 Minimum ambient temperature

For systems containing one of the following components, the minimum ambient temperature is +5°C: 5AC801.DVDS-00, 5AC801.DVRS-00. If none of these components are used, then the minimum ambient temperature is 0°C.

### 2.1.3 How is the the maximum ambient temperature determined?

1. Selection of the CPU board (use with or without fan kit).
2. The "Maximum ambient temperature" row shows the maximum ambient temperature for the system as a whole, including the respective CPU board.

#### Information:

**Maximum temperature data is for operation at 500 meters. The maximum ambient temperature must typically be derated by 1°C per 1000 meters (starting at 500 meters above sea level).**

3. Incorporating additional drives (slide-in), main memory, additional insert cards, etc. can change the temperature limits of an PPC800 system.

If there is a "✓" (checkmark) next to the component, it can be used at the maximum ambient temperature of the whole system without problems.

If there is a specific temperature, for example "50", next to the component, then the ambient temperature of the whole PPC800 system cannot exceed this temperature.

### 2.1.4 Temperature monitoring

Sensors monitor temperature values in various places (board I/O, board ETH2, board power, power supply, slide-in drive 1, IF slot) in the PPC800. The locations of the temperature sensors can be seen in "Image 3: Temperature sensor locations" on page 26. The value listed in the table represents the defined maximum temperature for this measurement point. An alarm is not triggered if this temperature is exceeded. The temperatures<sup>1)</sup> can be read in BIOS (menu item "Advanced" - Baseboard/Panel Features - Baseboard Monitor) or in approved Microsoft Windows operating systems using the B&R Control Center.

Additionally, the hard disks for PPC800 systems available from B&R are equipped with S.M.A.R.T, or Self Monitoring, Analysis, and Reporting Technology. This makes it possible to read various parameters, for example the temperature, using software (e.g. HDD thermometer - freeware) in approved Microsoft operating systems (except Windows CE).

<sup>1)</sup> The measured temperature approximates the immediate ambient temperature, but can be influenced by neighboring components.

### 2.1.5 Temperature sensor locations

Sensors monitor temperature values in many different areas in the PPC800. The temperatures can be read in BIOS (menu item "Advanced" - Baseboard/Panel Features - Baseboard Monitor) or in approved Microsoft operating systems using the B&R Control Center<sup>2)</sup>.

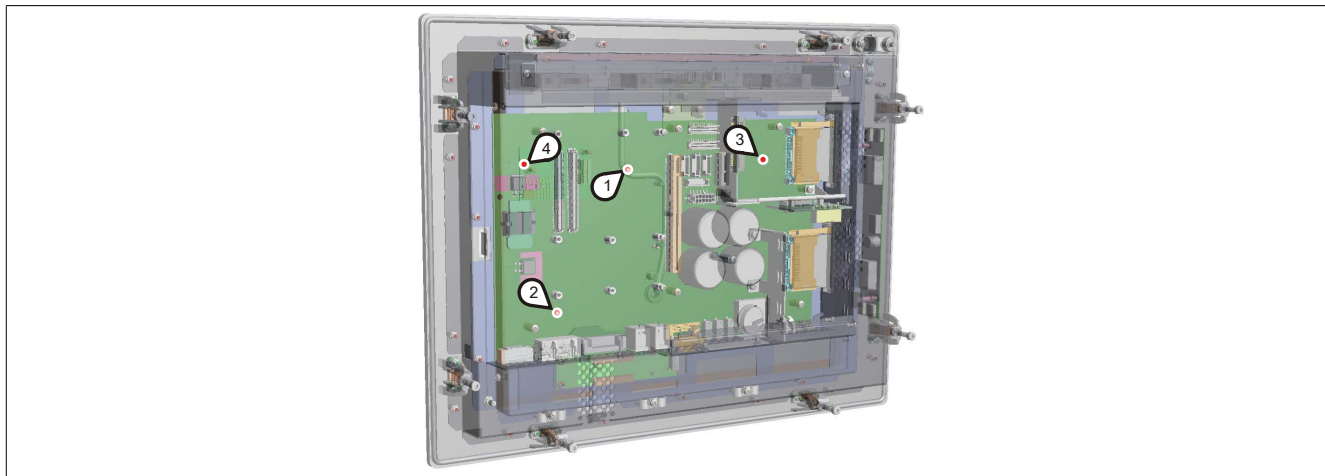


Image 3: Temperature sensor locations

| Position | Measurement point for | Measurement                                                                       | Max. specified                             |
|----------|-----------------------|-----------------------------------------------------------------------------------|--------------------------------------------|
| 1        | Board I/O             | Board I/O area temperature (sensor on the baseboard).                             | 80°C                                       |
| 2        | Board ETH2            | Baseboard temperature near the ETH2 controller (sensor on the baseboard).         | 80°C                                       |
| 3        | Board Power           | Board power supply temperature (sensor on the baseboard).                         | 80°C                                       |
| 4        | Power supply          | Power supply temperature.                                                         | 80°C                                       |
| -        | Slide-in drive 1      | Temperature of a slide-in drive (the sensor is integrated on the slide-in drive). | Depending on the slide-in drive being used |
| -        | IF slot               | Temperature of the PCIe slot; the sensor is located directly on the plug-in card. | Depending on the plug-in cards used        |

Table 6: Temperature sensor locations

<sup>2)</sup> The ADI driver containing the B&R Control Center is available in the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

## 2.2 Humidity specifications

The following table displays the minimum and maximum relative humidity for the individual components that are relevant for the humidity limitations of the entire device. The lowest and highest common values are always used when establishing these limits.

| Component                                 |                                     | Operation | Storage / Transport |
|-------------------------------------------|-------------------------------------|-----------|---------------------|
| CPU boards GM45 COM Express               |                                     | 10 to 90% | 5 to 95%            |
| Main memory for CPU boards                |                                     | 10 to 90% | 5 to 95%            |
| Compact slide-in drive<br>Slide-in drives | 5AC801.HDDI-00                      | 5 to 90%  | 5 to 95%            |
|                                           | 5AC801.HDDI-02                      | 8 to 80%  | 5 to 95%            |
|                                           | 5AC801.HDDI-03                      | 5 to 95%  | 5 to 95%            |
|                                           | 5AC801.SSDI-00                      | 5 to 95%  | 5 to 95%            |
|                                           | 5AC801.HDDS-00                      | 5 to 90%  | 5 to 90%            |
|                                           | 5AC801.DVDS-00                      | 8 to 90%  | 5 to 95%            |
|                                           | 5AC801.DVRS-00                      | 8 to 90%  | 5 to 95%            |
| Additional insert cards                   | 5ACPCI.RAIC-03 (24 hours / default) | 8 to 90%  | 5 to 95%            |
|                                           | 5ACPCI.RAIC-04 (24 hours / default) | 8 to 90%  | 5 to 95%            |
|                                           | 5ACPCI.RAIC-05 (24 hours / default) | 5 to 95%  | 5 to 95%            |
|                                           | 5MMHDD.250-00 (24 hours / default)  | 5 to 95%  | 5 to 95%            |
| Accessories                               | 5CFCRD.xxxx-06 CompactFlash cards   | 85%       | 85%                 |
|                                           | 5CFCRD.xxxx-04 CompactFlash cards   | 85%       | 85%                 |
|                                           | 5CFCRD.xxxx-03 CompactFlash cards   | 8 to 95%  | 8 to 95%            |
|                                           | 5MMUSB.2048-01 flash drive          | 10 to 90% | 5 to 90%            |
|                                           | USB Media Drive 5MD900.USB2-01      | 20 to 80% | 5 to 90%            |

Table 7: Overview of humidity specifications for individual components

The listed specifications correspond to the relative humidity at an ambient temperature of 30°C. More detailed information about the specific temperature-dependent humidity values can be found in the technical data for the individual components.

## 2.3 Power management

### 2.3.1 Block diagram - Supply voltage

The following block diagram shows the simplified structure of the PPC800 supply voltage.

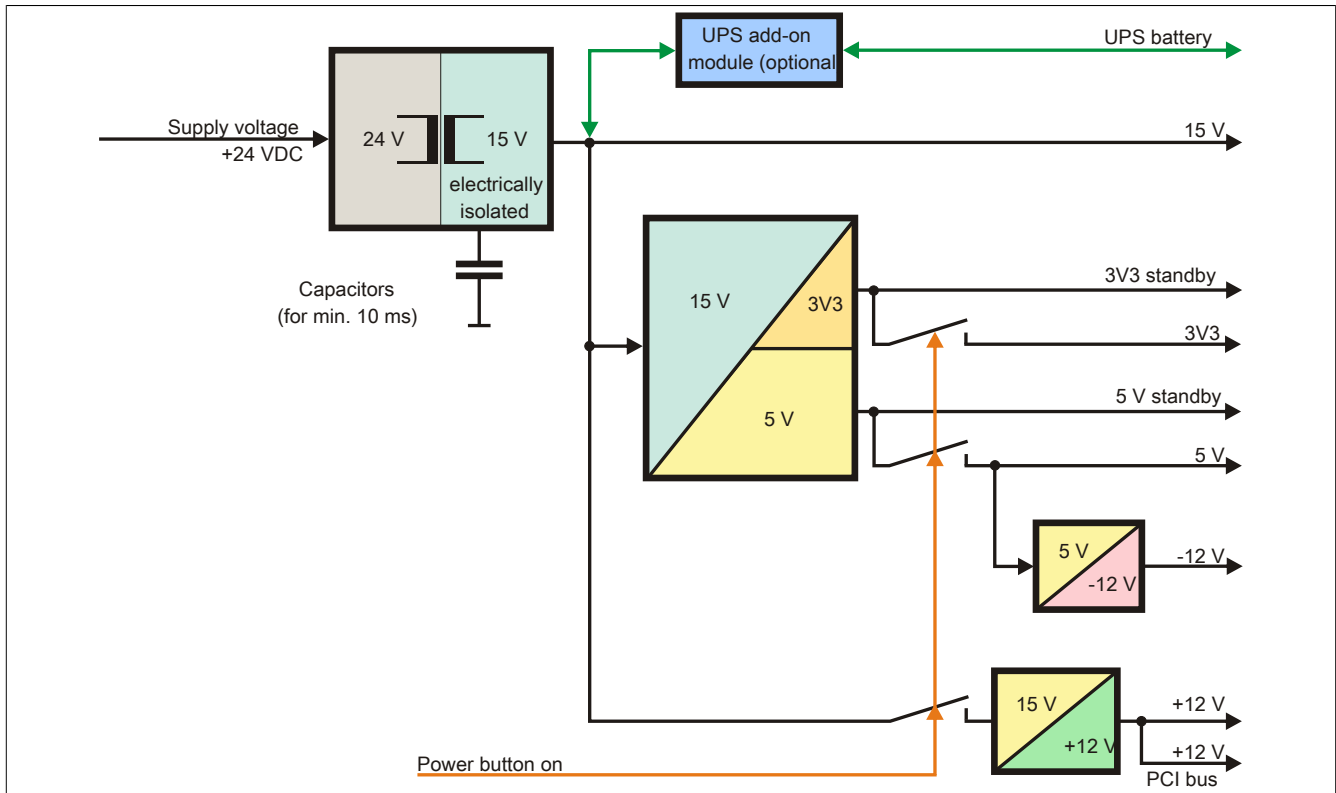


Image 4: Block diagram - Supply voltage

#### Description

The supply voltage is converted to 15 V with a DC/DC converter. These electrically isolated 15 V feed further DC/DC converters, which generate the remaining voltages.

After the system is turned on (e.g. using the power button), the voltages 3V3 and 5 V are placed on the bus. At the 5 V output, another DC/DC converter generates -12 V, and places these on the bus. An additional DC/DC converter generates +12 V.

The optional Add-on UPS (with battery unit) is supplied with 15 V and provides an uninterrupted power supply from the 15 V bus during power failures.



## 2.3.2 Power calculation with 5PC820.1505-00

| Information:                                                                                                                                                               |       |                                                                                                  |  | CPU board      |                | Current system              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------------------------------------------------------------------------------------------------|--|----------------|----------------|-----------------------------|
| All values in <b>watts</b><br>The values for the <b>suppliers</b> are maximum values. The values for the <b>consumers</b> are average maximum values, but not peak values. |       |                                                                                                  |  | 5PC800.BM45-00 | 5PC800.BM45-01 | Enter values in this column |
| <b>Total power supply power (maximum)</b>                                                                                                                                  |       |                                                                                                  |  |                |                | <b>130</b>                  |
| Total power supply                                                                                                                                                         | +12 V | Add-on UPS module, optional                                                                      |  | 7.5            | 7.5            |                             |
|                                                                                                                                                                            |       | Backlight Display 15"                                                                            |  | 14             | 14             |                             |
|                                                                                                                                                                            |       | <b>Maximum possible at +12 V</b>                                                                 |  |                |                | <b>75</b>                   |
|                                                                                                                                                                            |       | CPU board, permanent consumers                                                                   |  | 43             | 36             |                             |
|                                                                                                                                                                            |       | 2048 MB RAM, max. 2 with 3 W each                                                                |  |                |                |                             |
|                                                                                                                                                                            |       | 4096 MB RAM, max. 2 with 4 W each                                                                |  |                |                |                             |
|                                                                                                                                                                            |       | Fan kit, optional                                                                                |  | 2.4            | 2.4            |                             |
|                                                                                                                                                                            |       | Power consumption of the PClec cards, optional, max. 4 W <sup>2)</sup>                           |  |                |                |                             |
|                                                                                                                                                                            |       | PCI card limit, optional<br>(max. 3 W without fan kit, max. 6 W with fan kit) <sup>1)</sup>      |  |                |                |                             |
|                                                                                                                                                                            |       | PCIe x1 card limit, optional<br>(max. 3 W without fan kit, max. 20 W with fan kit) <sup>1)</sup> |  |                |                |                             |
|                                                                                                                                                                            |       | <b>Consumers +12 V <math>\Sigma</math></b>                                                       |  |                |                |                             |
|                                                                                                                                                                            | +5 V  | <b>Maximum possible at +5 V</b>                                                                  |  |                |                | <b>65</b>                   |
|                                                                                                                                                                            |       | System unit, permanent consumers                                                                 |  | 4              | 4              |                             |
|                                                                                                                                                                            |       | Hard disk (slide-in compact)                                                                     |  | 4              | 4              |                             |
|                                                                                                                                                                            |       | Slide-in drive (hard disk, DVD-ROM, etc.)                                                        |  | 4              | 4              |                             |
|                                                                                                                                                                            |       | USB peripherals USB1 and USB3 with 2.5 W each                                                    |  |                |                |                             |
|                                                                                                                                                                            |       | USB peripherals USB2, USB4 and USB5 with 5 W each                                                |  |                |                |                             |
|                                                                                                                                                                            |       | Power consumption of the PClec cards, optional, max. 4 W <sup>2)</sup>                           |  |                |                |                             |
|                                                                                                                                                                            |       | PCI card limit, optional<br>(max. 3 W without fan kit, max. 20 W with fan kit) <sup>1)</sup>     |  |                |                |                             |
|                                                                                                                                                                            |       | <b>Maximum possible at -12 V</b>                                                                 |  |                |                | <b>1.2</b>                  |
|                                                                                                                                                                            |       | PCI card limit, optional<br>(max. 1.2 W with or without fan kit) <sup>1)</sup>                   |  |                |                |                             |
|                                                                                                                                                                            |       | <b>Consumers -12 V <math>\Sigma</math></b>                                                       |  |                |                |                             |
|                                                                                                                                                                            | 3V3   | <b>Consumers +5 V <math>\Sigma</math></b>                                                        |  |                |                |                             |
|                                                                                                                                                                            |       | <b>Maximum possible at 3V3</b>                                                                   |  |                |                | <b>40</b>                   |
|                                                                                                                                                                            |       | System unit, permanent consumers                                                                 |  | 9              | 9              |                             |
|                                                                                                                                                                            |       | CompactFlash, 1 W each                                                                           |  |                |                |                             |
|                                                                                                                                                                            |       | Power consumption of the PClec cards, optional, max. 4 W <sup>2)</sup>                           |  |                |                |                             |
|                                                                                                                                                                            |       | PCI card limit, optional<br>(max. 3 W without fan kit, max. 15 W with fan kit) <sup>1)</sup>     |  |                |                |                             |
|                                                                                                                                                                            |       | PCIe x1 card limit, optional<br>(max. 3 W without fan kit, max. 10 W with fan kit) <sup>1)</sup> |  |                |                |                             |
|                                                                                                                                                                            |       | <b>Consumers 3V3 <math>\Sigma</math></b>                                                         |  |                |                |                             |
|                                                                                                                                                                            |       | <b>Consumers <math>\Sigma</math></b>                                                             |  |                |                |                             |

1) The total performance of one PCI/PCIe card per PCI slot (= sum of power consumptions for each voltage area) may not exceed the limits stated for operation with or without a fan kit.

2) The total performance of one PClec card per PClec slot (= sum of power consumptions for each voltage area) may not exceed the limits stated for operation with or without a fan kit.

Table 8: Power calculation for PPC800 15"

**Information:**

**The PClec card must not consume more than a total of 4 W (12V/5V/3V3)!**

## 2.3.3 Power calculation with 5PC820.1906-00

| Information:                                                                                                                                                               |                             | CPU board                                                                                        |                                                                                | Current system              |                          |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|-----------------------------|--------------------------|-----|
|                                                                                                                                                                            |                             | 5PC800.BM45-00                                                                                   | 5PC800.BM45-01                                                                 | Enter values in this column |                          |     |
| All values in <b>watts</b><br>The values for the <b>suppliers</b> are maximum values. The values for the <b>consumers</b> are average maximum values, but not peak values. |                             |                                                                                                  |                                                                                |                             |                          |     |
|                                                                                                                                                                            |                             | Total power supply power (maximum)                                                               |                                                                                | 130                         |                          |     |
| Total power supply                                                                                                                                                         | Add-on UPS module, optional |                                                                                                  | 7.5                                                                            | 7.5                         |                          |     |
|                                                                                                                                                                            | Backlight Display 19"       |                                                                                                  | 32                                                                             | 32                          |                          |     |
|                                                                                                                                                                            |                             |                                                                                                  | Maximum possible at +12 V                                                      |                             | 75                       |     |
|                                                                                                                                                                            | +12 V                       | CPU board, permanent consumers                                                                   |                                                                                | 43                          | 36                       |     |
|                                                                                                                                                                            |                             | 2048 MB RAM, max. 2 with 3 W each                                                                |                                                                                |                             |                          |     |
|                                                                                                                                                                            |                             | 4096 MB RAM, max. 2 with 4 W each                                                                |                                                                                |                             |                          |     |
|                                                                                                                                                                            |                             | Fan kit, optional                                                                                |                                                                                | 2.4                         | 2.4                      |     |
|                                                                                                                                                                            |                             | Power consumption of the PCIe cards, optional, max. 4 W <sup>2)</sup>                            |                                                                                |                             |                          |     |
|                                                                                                                                                                            |                             | PCI card limit, optional<br>(max. 3 W without fan kit, max. 6 W with fan kit) <sup>1)</sup>      |                                                                                |                             |                          |     |
|                                                                                                                                                                            |                             | PCIe x1 card limit, optional<br>(max. 3 W without fan kit, max. 20 W with fan kit) <sup>1)</sup> |                                                                                |                             |                          |     |
|                                                                                                                                                                            |                             |                                                                                                  |                                                                                | Consumers +12 V $\Sigma$    |                          |     |
|                                                                                                                                                                            |                             |                                                                                                  | Maximum possible at +5 V                                                       |                             | 65                       |     |
|                                                                                                                                                                            | +5 V                        | System unit, permanent consumers                                                                 |                                                                                | 12                          | 12                       |     |
|                                                                                                                                                                            |                             | Hard disk (slide-in compact)                                                                     |                                                                                | 4                           | 4                        |     |
|                                                                                                                                                                            |                             | Slide-in drive (hard disk, DVD-ROM, etc.)                                                        |                                                                                | 4                           | 4                        |     |
|                                                                                                                                                                            |                             | USB peripherals USB1 and USB3 with 2.5 W each                                                    |                                                                                |                             |                          |     |
|                                                                                                                                                                            |                             | USB peripherals USB2, USB4 and USB5 with 5 W each                                                |                                                                                |                             |                          |     |
|                                                                                                                                                                            |                             | Power consumption of the PCIe cards, optional, max. 4 W <sup>2)</sup>                            |                                                                                |                             |                          |     |
|                                                                                                                                                                            |                             | PCI card limit, optional<br>(max. 3 W without fan kit, max. 20 W with fan kit) <sup>1)</sup>     |                                                                                |                             |                          |     |
|                                                                                                                                                                            |                             |                                                                                                  |                                                                                | Maximum possible at -12 V   |                          | 1.2 |
|                                                                                                                                                                            |                             | -12 V                                                                                            | PCI card limit, optional<br>(max. 1.2 W with or without fan kit) <sup>1)</sup> |                             |                          |     |
|                                                                                                                                                                            |                             |                                                                                                  |                                                                                |                             | Consumers -12 V $\Sigma$ |     |
|                                                                                                                                                                            |                             |                                                                                                  | Consumers +5 V $\Sigma$                                                        |                             |                          |     |
|                                                                                                                                                                            |                             |                                                                                                  | Maximum possible at 3V3                                                        |                             | 40                       |     |
|                                                                                                                                                                            | 3V3                         | System unit, permanent consumers                                                                 |                                                                                | 9                           | 9                        |     |
|                                                                                                                                                                            |                             | CompactFlash, 1 W each                                                                           |                                                                                |                             |                          |     |
| Power consumption of the PCIe cards, optional, max. 4 W <sup>2)</sup>                                                                                                      |                             |                                                                                                  |                                                                                |                             |                          |     |
| PCI card limit, optional<br>(max. 3 W without fan kit, max. 15 W with fan kit) <sup>1)</sup>                                                                               |                             |                                                                                                  |                                                                                |                             |                          |     |
| PCIe x1 card limit, optional<br>(max. 3 W without fan kit, max. 10 W with fan kit) <sup>1)</sup>                                                                           |                             |                                                                                                  |                                                                                |                             |                          |     |
|                                                                                                                                                                            |                             | Consumers 3V3 $\Sigma$                                                                           |                                                                                |                             |                          |     |
|                                                                                                                                                                            |                             | Consumers $\Sigma$                                                                               |                                                                                |                             |                          |     |

1) The total performance of one PCI/PCIe card per PCI slot (= sum of power consumptions for each voltage area) may not exceed the limits stated for operation with or without a fan kit.

2) The total performance of one PClec card per PClec slot (= sum of power consumptions for each voltage area) may not exceed the limits stated for operation with or without a fan kit.

Table 9: Power calculation for PPC800 19"

**Information:**

**The PClec card must not consume more than a total of 4 W (12V/5V/3V3)!**

## 2.4 Block diagram

The following block diagrams show the simplified structure of system units (5PC820.1505 / 5PC820.1906-00) with a GM45 CPU board that depend on different bus units.

### 2.4.1 Bus unit 5AC803.BX01-00

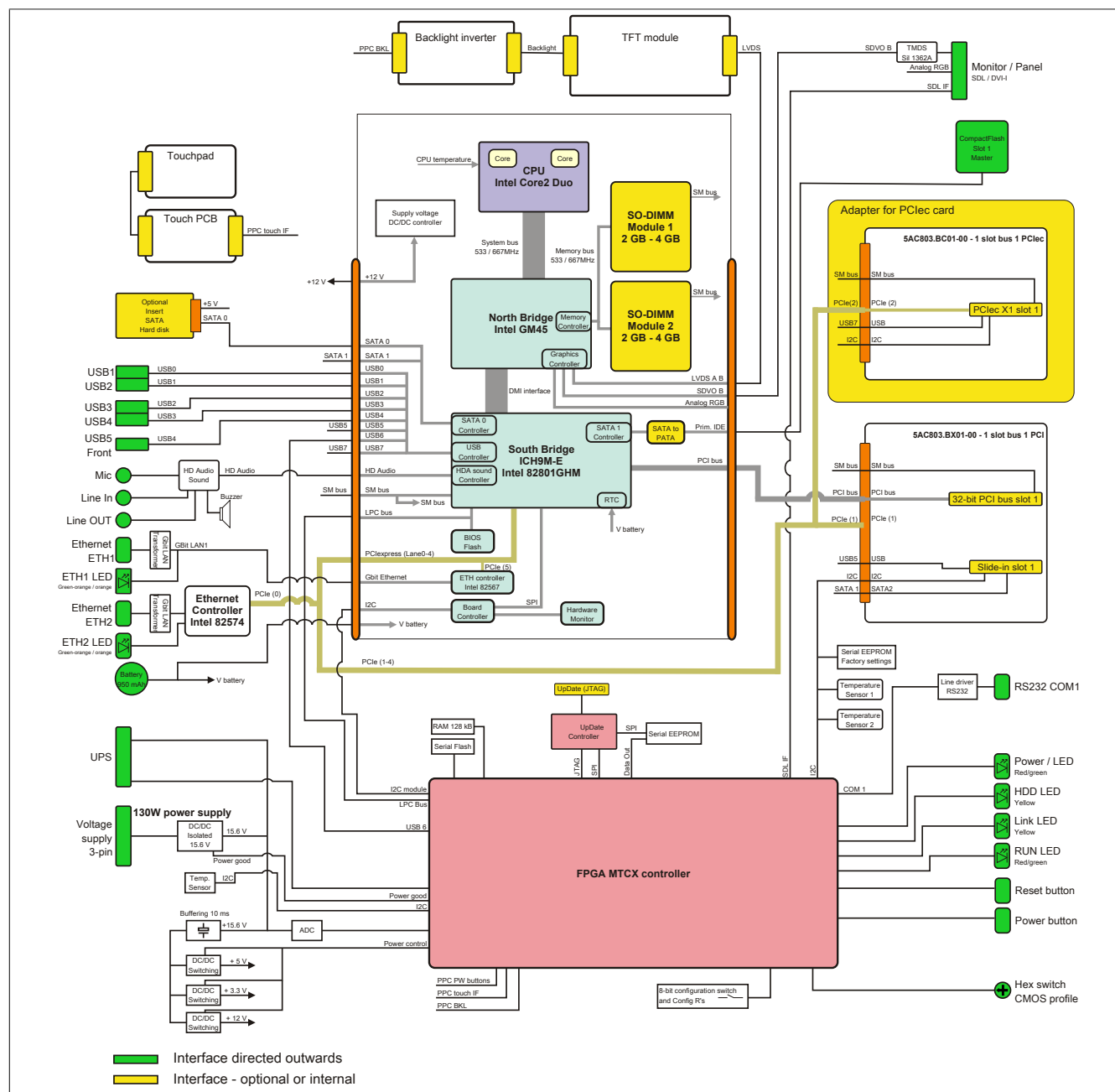


Image 5: Block diagram with bus unit 5AC803.BX01-00

## 2.4.2 Bus unit 5AC803.BX01-01

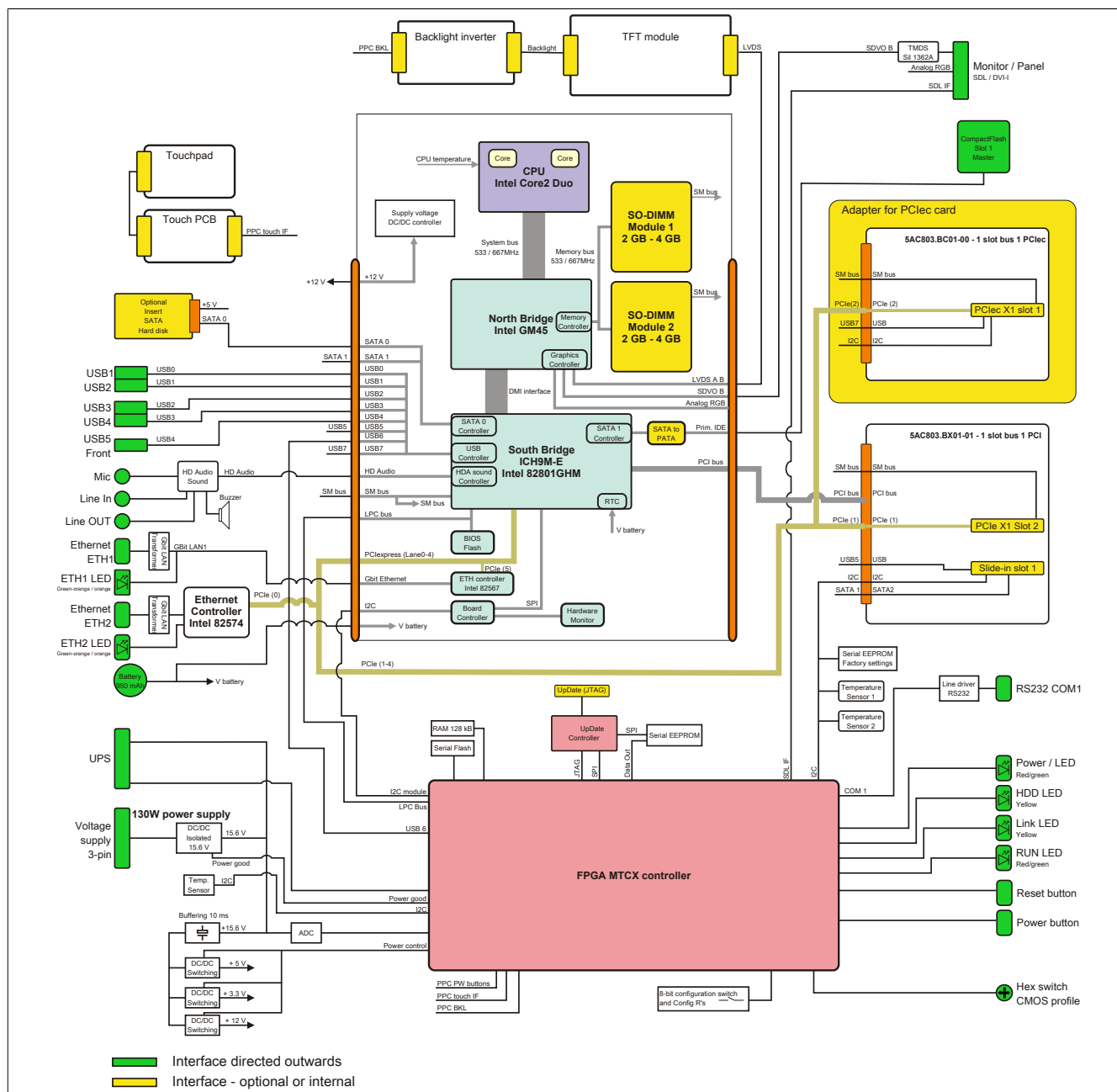
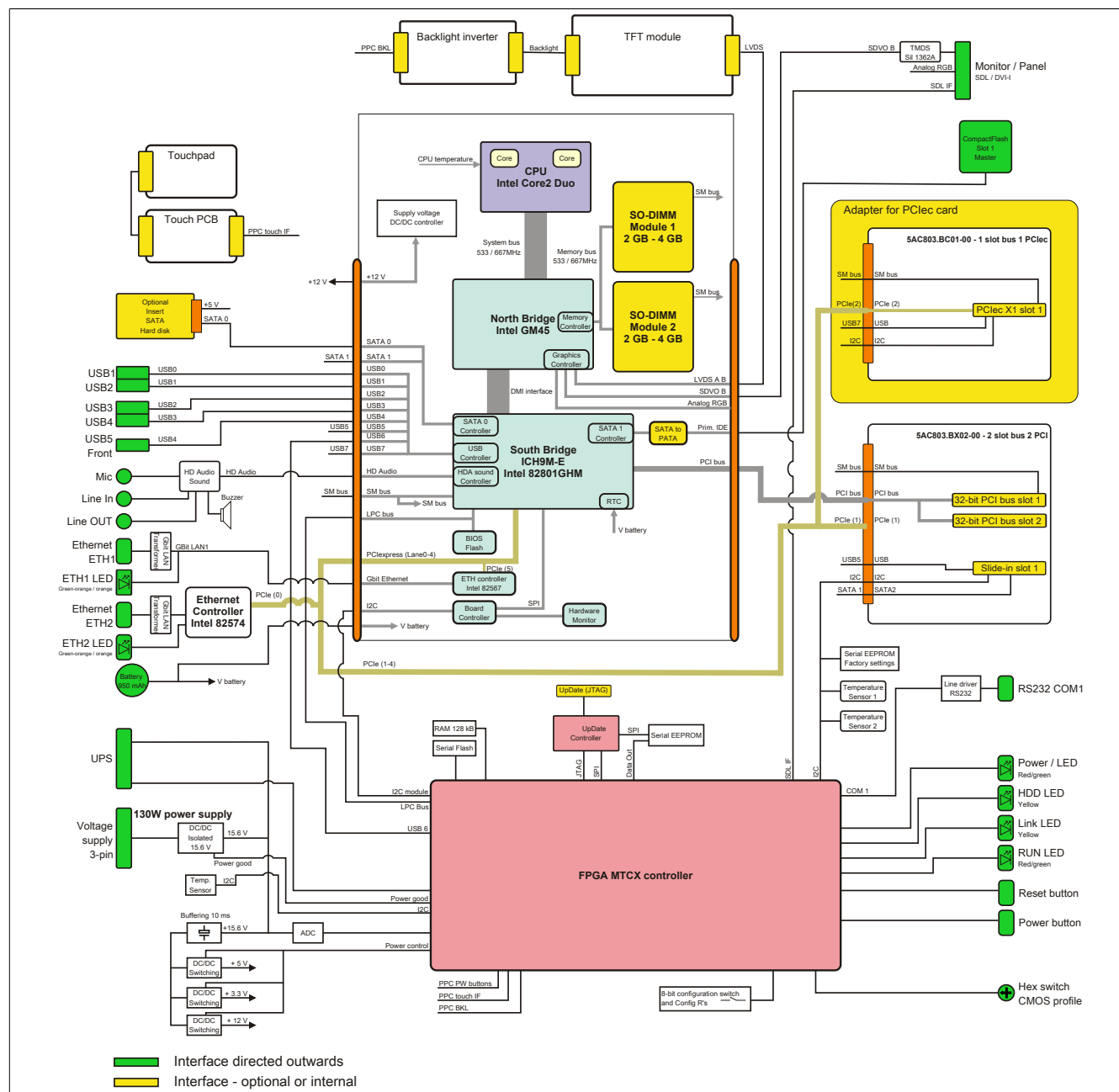
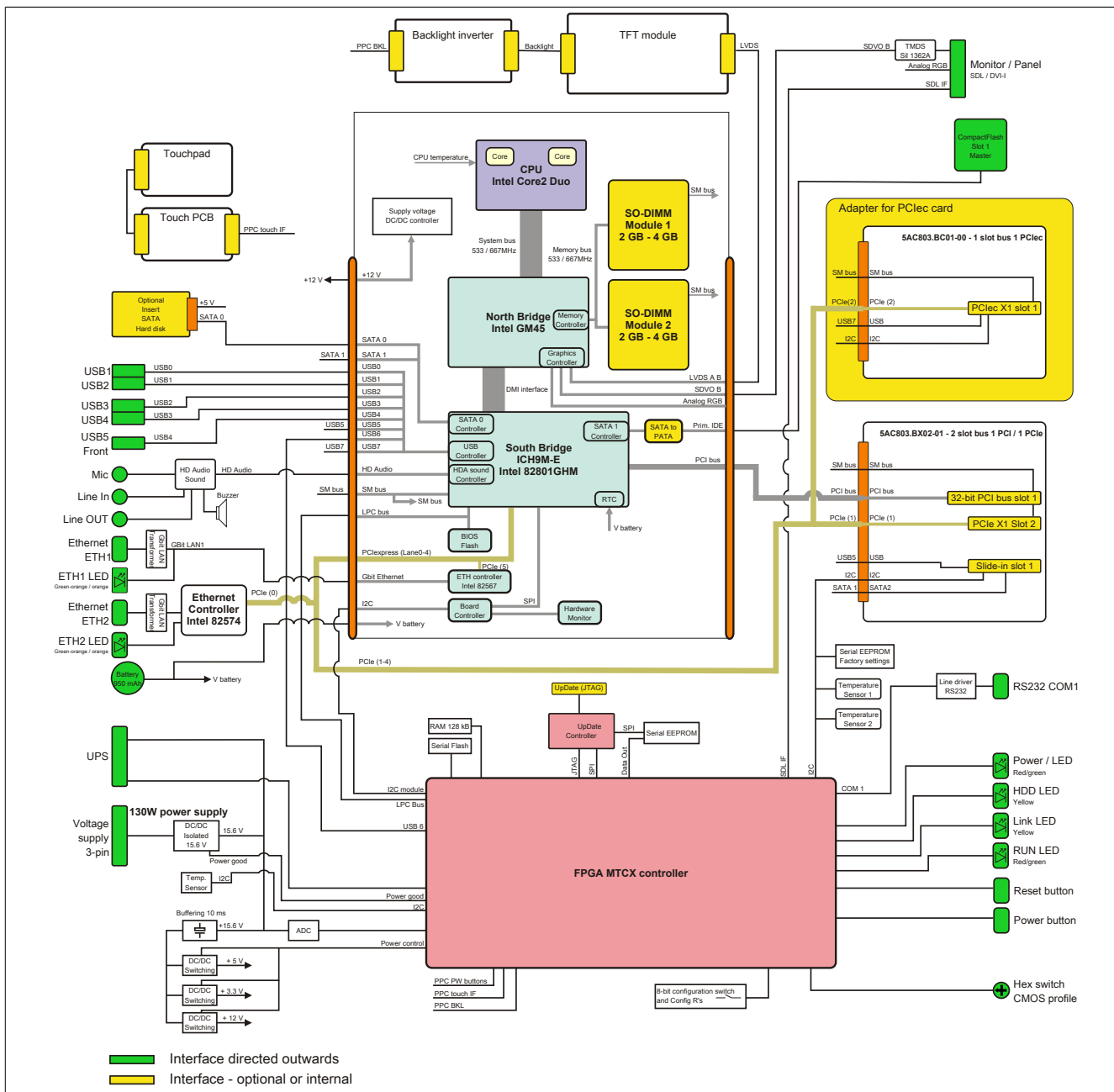


Image 6: Block diagram with bus unit 5AC803.BX01-01

## 2.4.3 Bus unit 5AC803.BX02-00





## 2.5 Serial number sticker

Each B&R device is assigned a unique serial number label with a bar code (type 128), which allows the device to be clearly identified. This serial number represents all of the components built into the system (model number, name, revision, serial number, delivery date and duration of warranty).



Image 9: Serial number sticker (back)

This information can also be found on the B&R homepage. On the start page [www.br-automation.com](http://www.br-automation.com) the serial number must be entered for the entire device in the serial number search field. The search provides you with a detailed list of the individual components.

 A screenshot of the B&R website's search interface. The 'Suche' (Search) field contains the serial number 'AF210168454'. Below the search field, a table lists the components of the device. The table has columns: Seriennummer, Materialnummer, Rev, Auslieferungsdatum, and Gewährleistungsende. The first row shows the main device, and subsequent rows show various modules like the display, power supply, and I/O modules.
 

serial number is entered  
e.g. AF210168454

List of installed  
components shown after  
searching serial number

| Seriennummer | Materialnummer | Rev | Auslieferungsdatum | Gewährleistungsende |
|--------------|----------------|-----|--------------------|---------------------|
| B15B0168428  | SPC820.1505-00 | A2  | 0000-00-00         | 0000-00-00          |
| AF2E0168475  | 5AC803.BC02-00 | A5  | 0000-00-00         | 0000-00-00          |
| AF2D0168456  | 5AC803.BC01-00 | A5  | 0000-00-00         | 0000-00-00          |
| AF210168454  | SPC820.1505-00 | A2  | 0000-00-00         | 0000-00-00          |
| A3CA0169483  | SPC800.B945-00 | C0  | 0000-00-00         | 0000-00-00          |
| A3E50168807  | 5MMDOR.0512-01 | B0  | 0000-00-00         | 0000-00-00          |
| AF270168430  | 5AC803.SX01-00 | A0  | 0000-00-00         | 0000-00-00          |
| AF290168515  | 5AC803.BX01-00 | A5  | 0000-00-00         | 0000-00-00          |
| AF300168465  | 5AC803.FA02-00 | A0  | 0000-00-00         | 0000-00-00          |
| AF230168467  | 5AC803.HS00-00 | A5  | 0000-00-00         | 0000-00-00          |

Image 10: Example of serial number search

## 2.6 Device interfaces

### 2.6.1 Supply voltage (+24 VDC)

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

The pin assignments can be found either in the following table or printed on the PPC800 housing. The supply voltage is protected internally by a soldered fuse (15 A, fast-acting), 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). The device must be returned to B&R for repairs if the fuse is blown because of an error.

| Supply voltage                     |                                 |
|------------------------------------|---------------------------------|
| Protected against reverse polarity |                                 |
| Pin                                | Description                     |
| 1                                  | +                               |
| 2                                  | Functional ground               |
| 3                                  | -                               |
| Model number                       | Short description               |
| Terminal blocks                    |                                 |
| 0TB103.9                           | Plug 24V 5.08 3-pin screw clamp |
| 0TB103.91                          | Plug 24V 5.08 3-pin cage clamp  |
|                                    |                                 |

3-pin, male

+ 24 VDC supply voltage



Table 10: Supply voltage connection + 24 VDC

## Ground

### Caution!

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

The grounding connection is located on the top right on the back of the PPC800 system.

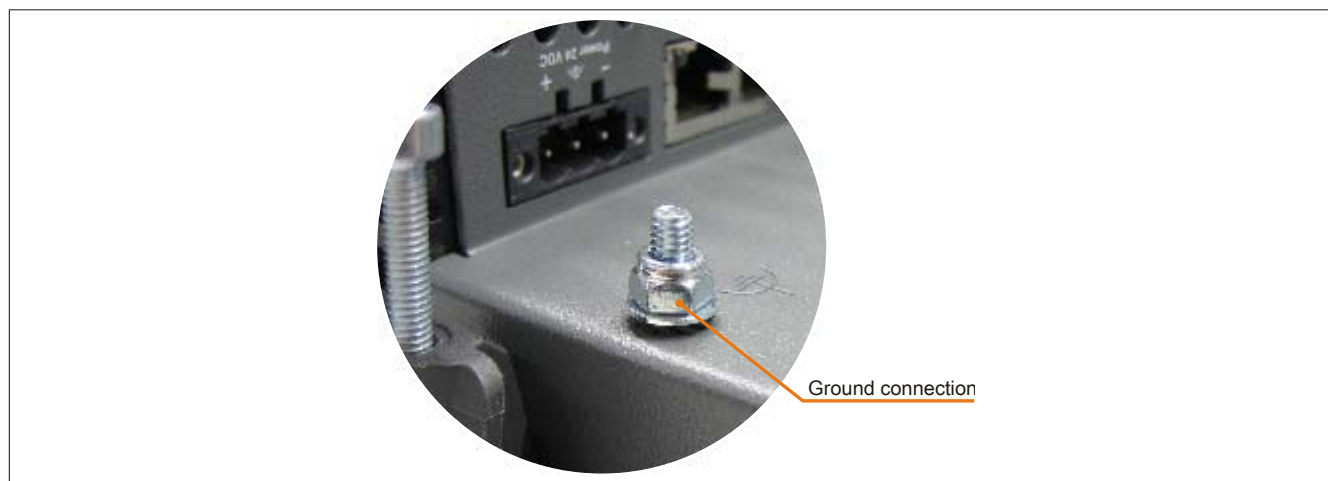


Image 11: Ground connection

The M4 self-locking nut can be used, for example, to fasten a copper strip that is built into the PPC800 at a central grounding point in the control cabinet or system. The largest possible conductor cross section should be used (at least 2.5 mm<sup>2</sup>).



## 2.6.2 Monitor/panel connection - SDL (Smart Display Link / DVI)

| Monitor / Panel connection - SDL (Smart Display Link) / DVI                                                                                                   |                                             |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|--|
| The following is an overview of the video signals available on the monitor/panel output.<br>For details, see the technical data for the CPU board being used. |                                             |  |
| CPU board                                                                                                                                                     | Video signals with all system unit variants |  |
| 5PC800.BM45-00                                                                                                                                                | RGB, DVI, SDL                               |  |
| 5PC800.BM45-01                                                                                                                                                | RGB, DVI, SDL                               |  |



Table 11: Monitor / Panel connection - RGB, DVI, SDL

### Pinout

| Pin | assignment                                | Description                                 | Pin  | assignment                | Description                                   |
|-----|-------------------------------------------|---------------------------------------------|------|---------------------------|-----------------------------------------------|
| 1   | TMDS Data 2-                              | DVI lane 2 (negative)                       | 16   | HPD                       | Hot plug detect                               |
| 2   | TMDS Data 2+                              | DVI lane 2 (positive)                       | 17   | TMDS Data 0-              | DVI lane 0 (negative)                         |
| 3   | TMDS Data 2/4 SHIELD                      | Shield for data pair 2 and 4                | 18   | TMDS Data 0+              | DVI lane 0 (positive)                         |
| 4   | SDL-                                      | SDL lane (negative)                         | 19   | TMDS Data 0/ XUSB1 SHIELD | Shield for data pair 0 and USB1               |
| 5   | SDL+                                      | SDL lane (positive)                         | 20   | XUSB1-                    | USB lane 1 (negative)                         |
| 6   | DDC Clock                                 | DDC-based control signal (clock)            | 21   | XUSB1+                    | USB lane 1 (positive)                         |
| 7   | DDC Data                                  | DDC-based control signal (data)             | 22   | TMDS Clock Shield         | Shield for clock pair                         |
| 8   | n.c.                                      | Not connected                               | 23   | TMDS Clock+               | DVI clock (positive)                          |
| 9   | TMDS Data 1-                              | DVI lane 1 (negative)                       | 24   | TMDS Clock -              | DVI clock (negative)                          |
| 10  | TMDS DATA 1+                              | DVI lane 1 (negative) HDMI clock (positive) | C1   | ANALOG RED                | Analog red                                    |
| 11  | TMDS DATA 1/ XUSB0 SHIELD                 | Shield for data pair 1 and USB0             | "c2" | ANALOG GREEN              | Analog green                                  |
| 12  | XUSB0-                                    | USB lane 0 (negative)                       | C3   | ANALOG BLUE               | Analog blue                                   |
| 13  | XUSB0+                                    | USB lane 0 (positive)                       | C4   | ANALOG HORZ SYNC          | Analog horizontal synchronization             |
| 14  | +5 V Power <sup>1)</sup>                  | +5 V power supply                           | C5   | ANALOG GND                | Analog ground (return for R, G and B signals) |
| 15  | Ground (return for +5 V, HSync and VSync) | Ground                                      |      |                           |                                               |

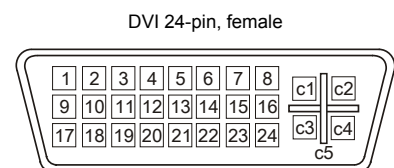


Table 12: Pinout - DVI connection

- 1) Protected internally by a multifuse

### Cable lengths and resolutions for SDL transfer

The following table lists the relationship between segment lengths and maximum resolution depending on the SDL cable used:

| SDL cables<br>Segment length [m] | Resolution                                         |                                                    |                                                    |                                                    |                                                    |                                                    |
|----------------------------------|----------------------------------------------------|----------------------------------------------------|----------------------------------------------------|----------------------------------------------------|----------------------------------------------------|----------------------------------------------------|
|                                  | VGA<br>640 x 480                                   | SVGA<br>800 x 600                                  | XGA<br>1024 x 768                                  | SXGA<br>1280 x 1024                                | UXGA<br>1600 x 1200                                | FHD<br>1920 x 1080                                 |
| 1.8                              | 5CASDL.0018-00<br>5CASDL.0018-01<br>5CASDL.0018-03 | 5CASDL.0018-00<br>5CASDL.0018-01<br>5CASDL.0018-03 | 5CASDL.0018-00<br>5CASDL.0018-01<br>5CASDL.0018-03 | 5CASDL.0018-00<br>5CASDL.0018-01<br>5CASDL.0018-03 | 5CASDL.0018-00<br>5CASDL.0018-01<br>5CASDL.0018-03 | 5CASDL.0018-00<br>5CASDL.0018-01<br>5CASDL.0018-03 |
| 5                                | 5CASDL.0050-00<br>5CASDL.0050-01<br>5CASDL.0050-03 | 5CASDL.0050-00<br>5CASDL.0050-01<br>5CASDL.0050-03 | 5CASDL.0050-00<br>5CASDL.0050-01<br>5CASDL.0050-03 | 5CASDL.0050-00<br>5CASDL.0050-01<br>5CASDL.0050-03 | 5CASDL.0050-00<br>5CASDL.0050-01<br>5CASDL.0050-03 | 5CASDL.0050-00<br>5CASDL.0050-01<br>5CASDL.0050-03 |
| 10                               | 5CASDL.0100-00<br>5CASDL.0100-01<br>5CASDL.0100-03 | 5CASDL.0100-00<br>5CASDL.0100-01<br>5CASDL.0100-03 | 5CASDL.0100-00<br>5CASDL.0100-01<br>5CASDL.0100-03 | 5CASDL.0100-00<br>5CASDL.0100-01<br>5CASDL.0100-03 | 5CASDL.0100-00<br>5CASDL.0100-01<br>5CASDL.0100-03 | 5CASDL.0100-00<br>5CASDL.0100-01<br>5CASDL.0100-03 |
| 15                               | 5CASDL.0150-00<br>5CASDL.0150-01<br>5CASDL.0150-03 | 5CASDL.0150-00<br>5CASDL.0150-01<br>5CASDL.0150-03 | 5CASDL.0150-00<br>5CASDL.0150-01<br>5CASDL.0150-03 | 5CASDL.0150-00<br>5CASDL.0150-01<br>5CASDL.0150-03 | -<br>-<br>-                                        | -<br>-<br>5CASDL.0150-03                           |
| 20                               | 5CASDL.0200-00<br>5CASDL.0200-03                   | 5CASDL.0200-00<br>5CASDL.0200-03                   | 5CASDL.0200-00<br>5CASDL.0200-03                   | 5CASDL.0200-00<br>5CASDL.0200-03                   | -<br>-                                             | -<br>5CASDL.0200-03                                |
| 25                               | 5CASDL.0250-00<br>5CASDL.0250-03                   | 5CASDL.0250-00<br>5CASDL.0250-03                   | 5CASDL.0250-00<br>5CASDL.0250-03                   | -<br>-                                             | -<br>-                                             | -<br>-                                             |
| 30                               | 5CASDL.0300-00<br>5CASDL.0300-03                   | 5CASDL.0300-00<br>5CASDL.0300-03                   | -<br>5CASDL.0300-13                                | -<br>5CASDL.0300-13                                | -<br>-                                             | -<br>5CASDL.0300-13                                |
| 40                               | 5CASDL.0400-13                                     | 5CASDL.0400-13                                     | 5CASDL.0400-13                                     | 5CASDL.0400-13                                     | -                                                  | 5CASDL.0400-13                                     |

Table 13: Cable lengths and resolutions for SDL transfer

### Cable lengths and resolutions for DVI transfer

The following table lists the relationship between segment lengths and maximum resolution depending on the DVI cable used:

| DVI cable<br>Segment length [m] | Resolution       |                   |                   |                     |                     |                    |
|---------------------------------|------------------|-------------------|-------------------|---------------------|---------------------|--------------------|
|                                 | VGA<br>640 x 480 | SVGA<br>800 x 600 | XGA<br>1024 x 768 | SXGA<br>1280 x 1024 | UXGA<br>1600 x 1200 | FHD<br>1920 x 1080 |
| 1.8                             | 9A0014.02        | 9A0014.02         | 9A0014.02         | 9A0014.02           | 9A0014.02           | 9A0014.02          |
| 5                               | 9A0014.05        | 9A0014.05         | 9A0014.05         | 9A0014.05           | 9A0014.05           | 9A0014.05          |

Table 14: Cable lengths and resolutions for DVI transfer

### 2.6.3 Serial interface COM1

| Serial interface COM1 <sup>1)</sup> |                                                 |
|-------------------------------------|-------------------------------------------------|
| RS232                               |                                                 |
| Type                                | RS232, modem-capable, not electrically isolated |
| UART                                | 16550-compatible, 16-byte FIFO                  |
| Transfer rate                       | Max. 115 kBaud                                  |
| Cable length                        | Max. 15 meters                                  |
| Pin                                 | Assignment                                      |
| 1                                   | DCD                                             |
| 2                                   | RXD                                             |
| 3                                   | TXD                                             |
| 4                                   | DTR                                             |
| 5                                   | GND                                             |
| 6                                   | DSR                                             |
| 7                                   | RTS                                             |
| 8                                   | CTS                                             |
| 9                                   | RI                                              |

9-pin DSUB plug

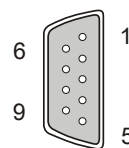


Table 15: Pinout - COM1

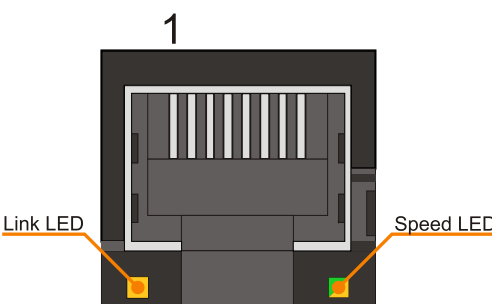
- 1) The interfaces, etc. available on the device or module have been numbered as such for easy identification. This numbering can differ from that used by the particular operating system.

## 2.6.4 Ethernet 1 (ETH1)

This Ethernet controller is integrated in the CPU board and connected to external devices via the system unit.

| Ethernet 1 connection (ETH1) <sup>1)</sup> |                                              |                                                    |
|--------------------------------------------|----------------------------------------------|----------------------------------------------------|
| Controller                                 | Intel 82567                                  |                                                    |
| Cabling                                    | S/STP (Cat5e)                                |                                                    |
| Transfer rate                              | 10/100/1000 Mbit/s <sup>2)</sup>             |                                                    |
| Cable length                               | Max. 100 m (min. Cat5e)                      |                                                    |
| <b>Speed LED</b>                           | <b>On</b>                                    | <b>Off</b>                                         |
| Green                                      | 100 Mbit/s                                   | 10 Mbit/s <sup>3)</sup>                            |
| Orange                                     | 1000 Mbit/s                                  | -                                                  |
| <b>Link LED</b>                            | <b>On</b>                                    | <b>Off</b>                                         |
| Orange                                     | Link (Ethernet network connection available) | Activity (blinking)<br>(Data transfer in progress) |

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



The diagram shows a top-down view of an RJ45 port. Above the port is a large number '1'. The port itself is a rectangular socket with eight vertical pins. Below the port are two LEDs: a yellow one on the left and a green one on the right. An orange line points from the text 'Link LED' to the yellow LED, and another orange line points from the text 'Speed LED' to the green LED.

Table 16: Ethernet connection (ETH1)

- 1) The interfaces, etc. available on the device or module have been numbered as such for easy identification. This numbering can differ from that used by the particular operating system.
- 2) Switching takes place automatically.
- 3) The 10 Mbit/s transfer speed / connection is only present if the Link LED is also lit at the same time.

### Driver support

A special driver is required in order to operate the Intel 82567 Ethernet controller. Drivers for approved operating systems are available in the Downloads area of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

### Information:

Required drivers can only be downloaded from the B&R homepage, not from manufacturers' pages.

## 2.6.5 Ethernet 2 (ETH2)

This Ethernet controller is integrated in the main board and is connected to external devices via the system unit.

| Ethernet 2 connection (ETH2 <sup>1)</sup> ) |                                              |                                                    |
|---------------------------------------------|----------------------------------------------|----------------------------------------------------|
| Controller                                  | Intel 82574                                  |                                                    |
| Cabling                                     | S/STP (Cat5e)                                |                                                    |
| Transfer rate                               | 10/100/1000 Mbit/s <sup>2)</sup>             |                                                    |
| Cable length                                | max. 100 m (min. Cat5e)                      |                                                    |
| <b>Speed LED</b>                            | <b>On</b>                                    | <b>Off</b>                                         |
| Green                                       | 100 Mbit/s                                   | 10 Mbit/s <sup>3)</sup>                            |
| Orange                                      | 1000 Mbit/s                                  | -                                                  |
| <b>Link LED</b>                             | <b>On</b>                                    | <b>Off</b>                                         |
| Orange                                      | Link (Ethernet network connection available) | Activity (blinking)<br>(Data transfer in progress) |

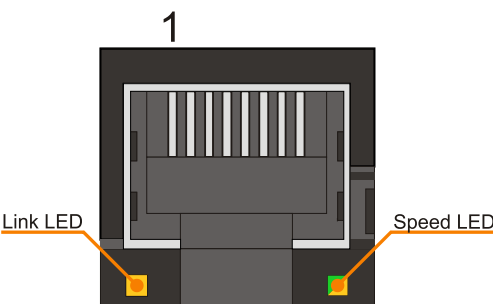


Table 17: Ethernet connection (ETH2)

- 1) The interfaces, etc. available on the device or module were numbered accordingly for easy identification. This numbering can differ from the numbering used by the particular operating system.
- 2) Switching takes place automatically.
- 3) The 10 Mbit/s transfer speed / connection is only present if the Link LED is simultaneously active.

### Driver support

A special driver is required in order to operate the Intel Ethernet controller 82574. The necessary drivers are available in the Downloads area of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

### Information:

Required drivers can only be downloaded from the B&R homepage, not from manufacturers' pages.

## 2.6.6 USB ports (USB1, 2, 3, 4, 5)

PPC800 devices have a USB 2.0 (Universal Serial Bus) host controller with multiple USB ports, five of which are on the outside for easy access.

### 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.

### Caution!

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

### USB1,2,3,4

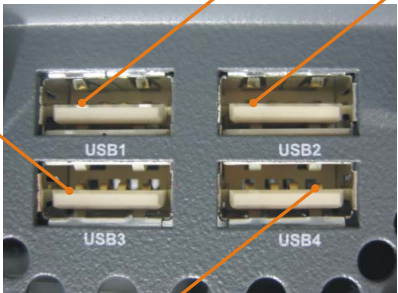
| Universal Serial Bus (USB1, USB2, USB3, USB4) <sup>1)</sup> |                                                                            | 4x USB type A, female                                                               |
|-------------------------------------------------------------|----------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Type                                                        | USB 2.0                                                                    |  |
| Design                                                      | Type A                                                                     |                                                                                     |
| Transfer rate                                               | Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) |                                                                                     |
| Current load <sup>2)</sup><br>USB1, USB3<br>USB2, USB4      | Max. 1 A<br>Max. 500 mA                                                    |                                                                                     |
| Cable length                                                | Max. 5 m (without hub)                                                     |                                                                                     |

Table 18: USB1, USB2, USB3, USB4 connection

- 1) The interfaces, etc. available on the device or module were numbered accordingly for easy identification. This numbering can differ from the numbering used by the particular operating system.
- 2) For safety, every USB port is equipped with a maintenance free "USB current-limiting circuit breaker" (max. 500 mA or 1 A).

### USB5

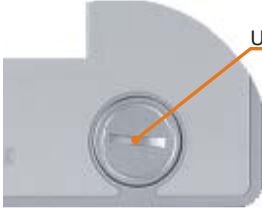
| Universal Serial Bus (USB5) <sup>1)</sup> |                                                                            | 1x USB type A, female                                                                |
|-------------------------------------------|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Type                                      | USB 2.0                                                                    |  |
| Design                                    | Type A                                                                     |                                                                                      |
| Transfer rate                             | Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) |                                                                                      |
| Current load <sup>2)</sup><br>USB5        | Max. 1 A                                                                   |                                                                                      |
| Cable length                              | Max. 5 m (without hub)                                                     |                                                                                      |

Table 19: USB5 connection

- 1) The interfaces, etc. available on the device or module were numbered accordingly for easy identification. This numbering can differ from the numbering used by the particular operating system.
- 2) For safety, the USB port is equipped with a maintenance free "USB current-limiting circuit breaker" (max. 1 A)

## 2.6.7 CompactFlash slot 1

This CompactFlash slot is a fixed part of an PPC800 system and is internally connected with the chipset via SATA to PATA bridge. Type I CompactFlash cards are supported.

| CompactFlash slot (CF1) |                          |
|-------------------------|--------------------------|
| Connection              | SATA to PATA             |
| CompactFlash Type       | Type I                   |
| Model number            | Short description        |
| CompactFlash            |                          |
| 5CFCRD.0512-06          | CompactFlash 512 MB B&R  |
| 5CFCRD.1024-06          | CompactFlash 1024 MB B&R |
| 5CFCRD.2048-06          | CompactFlash 2048 MB B&R |
| 5CFCRD.4096-06          | CompactFlash 4096 MB B&R |
| 5CFCRD.8192-06          | CompactFlash 8192 MB B&R |
| 5CFCRD.016G-06          | CompactFlash 16 GB B&R   |

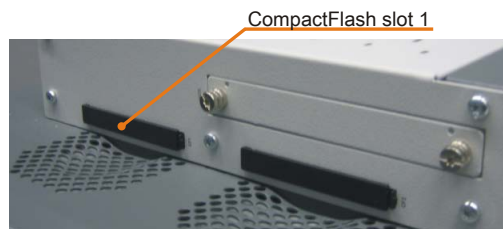


Table 20: CompactFlash slot (CF1)

### Warning!

Turn off power before inserting or removing the CompactFlash card!

## 2.6.8 CompactFlash slot 2

Since the Intel GM45 chipset used on 5PC800.BM45-0x doesn't support an IDE (PATA) channel, the CF2 slot is not supported.

| CompactFlash slot (CF2) |
|-------------------------|
|                         |

Table 21: CompactFlash slot (CF2)

### Warning!

Turn off power before inserting or removing the CompactFlash card!

## 2.6.9 MIC, Line IN, Line OUT

All PPC800 systems include an HDA compatible sound chip with access to the channels MIC, Line IN and Line OUT from the outside.

| MIC, Line IN, Line OUT |                                                                         |                                                                                                           |
|------------------------|-------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| Controller             | Realtek ALC 662                                                         | 3.5 mm jack, female<br> |
| MIC                    | Connection of a mono microphone with a 3.5 mm stereo (headphone) jack.  |                                                                                                           |
| Line IN                | Stereo Line IN signals supplied via a 3.5 mm jack.                      |                                                                                                           |
| Line OUT               | Connection of a stereo sound device (e.g. amplifier) via a 3.5 mm jack. |                                                                                                           |

Table 22: MIC, Line IN, Line OUT

## Driver support

A special driver is necessary for operating the audio controller. The necessary drivers are available in the Downloads area of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

### Information:

Required drivers can only be downloaded from the B&R homepage, not from manufacturers' pages.

## 2.6.10 Add-on UPS slot

An optional Automation PC add-on UPS module can be mounted in this slot.

| Add-on UPS slot                                |                                           |
|------------------------------------------------|-------------------------------------------|
| Pin assignments with mounted add-on UPS module |                                           |
| 1                                              | +                                         |
| 2                                              | +                                         |
| 3                                              | -                                         |
| 4                                              | -                                         |
| 5                                              | NTC (for battery temperature measurement) |
| 6                                              | NTC (for battery temperature measurement) |
| Model number                                   | Short description                         |
|                                                | Uninterruptible power supply              |
| 5AC600.UPSI-00                                 | Add-on UPS module                         |
| 5AC600.UPSB-00                                 | Battery unit 5 Ah                         |
| 5CAUPS.0005-00                                 | UPS cable 0.5 m                           |
| 5CAUPS.0030-00                                 | UPS cable 3 m                             |

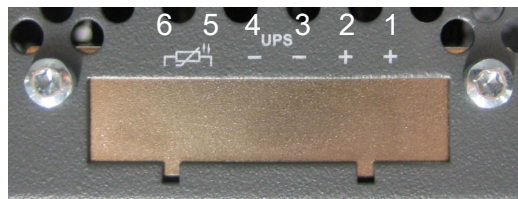


Table 23: Add-on UPS slot

Information about the UPS module see "Accessories" on page 228.



## 2.6.11 Power button

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

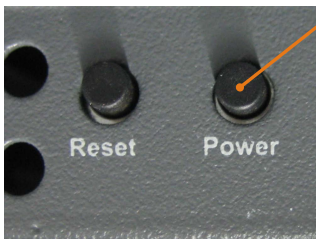
| Power button                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| <p>The power button acts like the on/off switch on a normal desktop PC with ATX power supply:</p> <p><b>Press and release ...</b> Switches on PPC800 or shuts down the operating system and switches off the PPC800.</p> <p><b>Press and hold ...</b> ATX power supply switches off without shutting down the PPC8000 (<b>data could be lost!</b>).</p> <p>Pressing the power button does not reset the MTCX processor.</p> |  |

Table 24: Power button

## 2.6.12 Reset button

| Reset button                                                                                                                                                                        |                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <p>Pushing the reset button triggers a hardware and PCI reset. The PPC800 is restarted (cold restart).</p> <p>The MTCX processor is not reset when the reset button is pressed.</p> |  |

Table 25: Reset button

### Warning!

**A system reset can cause data to be lost!**

### 2.6.13 Status LEDs

The status LEDs are located on the back of the system unit.

| Status LEDs |                      |          |                                                                                                                                                                                                                                                                                              |
|-------------|----------------------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LED         | Color                | Status   | Meaning                                                                                                                                                                                                                                                                                      |
| Power       | Green                | On       | Supply voltage OK                                                                                                                                                                                                                                                                            |
|             | Red                  | On       | The system is in standby mode (S5: soft-off mode or S4: Hibernate mode - Suspend-to-disk)                                                                                                                                                                                                    |
|             | Orange <sup>1)</sup> | On       | Supply voltage not OK; the system is operating on battery power.                                                                                                                                                                                                                             |
|             | Red / green          | Blinking | Service function for MTCX upgrade: A red/green blinking power LED indicates a faulty or incomplete MTCX upgrade. The MTCX runs using the firmware version installed when delivered. This could be caused by a power failure during an MTCX upgrade. An MTCX upgrade must be performed again. |
| HDD         | Yellow               | On       | Signals IDE drive access (CF, HDD, CD, etc.)                                                                                                                                                                                                                                                 |
| Link        | Yellow               | On       | Indicates an active SDL connection on the monitor / panel plug.                                                                                                                                                                                                                              |
|             |                      | Blinking | An active SDL connection has been interrupted by a loss of power in the display unit.                                                                                                                                                                                                        |
| Run         | Green                | On       | Application running                                                                                                                                                                                                                                                                          |
|             |                      | Off      | Application is not running                                                                                                                                                                                                                                                                   |

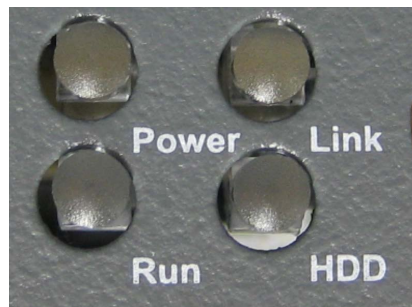


Table 26: Status LEDs

1) Only lit when an add-on UPS module is installed.

### 2.6.14 CMOS profile switch

| CMOS profile switch                                                                             |                                                                                         |
|-------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| Different BIOS default value profiles can be defined using the 16-position CMOS profile switch. |                                                                                         |
| Switch position                                                                                 | Description                                                                             |
| 0                                                                                               | Profile 0: Default profile reserved.                                                    |
| 1                                                                                               | Profile 1: Optimized for system units 5PC810.SX01-00, 5PC810.SX02-00 and 5PC810.SX03-00 |
| 2                                                                                               | Profile 2: Optimized for 5PC810.SX05-00 system unit                                     |
| 3                                                                                               | Profile 3: Optimized for system units 5PC820.SX01-00 and 5PC820.SX01-01                 |
| 4                                                                                               | Profile 4: Reserved                                                                     |
| 5                                                                                               | Profile 5: Optimized for system units 5PC820.1505-00 and 5PC820.1906-00                 |



Table 27: CMOS profile switch

#### Information:

The switch position that is set upon delivery represents the optimum BIOS default values for this system and should therefore not be changed.

The position of the CMOS profile switch is displayed in the BIOS setup pages and in the B&R ADI Control Center, among other places.

## 2.6.15 Battery

The lithium battery (3 V, 950 mAh) buffers the internal real-time clock (RTC) as well as the individually saved BIOS settings and is located behind the black cover. The buffer duration of the battery is at least 2½ years (at 50°C, 8.5 µA current requirements of the supplied components and a self discharge of 40%). The battery has a limited lifespan and should be replaced regularly (at least following the specified lifespan).

| Battery       |                                                       |
|---------------|-------------------------------------------------------|
| Battery Type  | Renata 950 mAh                                        |
| Removable     | Yes, accessible from the outside                      |
| Service life  | 2½ years <sup>1)</sup>                                |
| Model number  | Short description                                     |
| Batteries     |                                                       |
| 0AC201.91     | Lithium batteries, 4 pcs., 3 V / 950 mAh, button cell |
| 4A0006.00-000 | Lithium battery, 1 pcs., 3 V, 950 mAh, button cell    |
|               |                                                       |

Battery



Table 28: Battery

1) At 50°C, 8.5 µA of the supplied components and a self-discharge of 40%.

### Battery status evaluation

The battery status is evaluated immediately following start-up of the device and is subsequently checked by the system every 24 hours. The battery is subjected to a brief load (1 second) during the measurement and then evaluated. The evaluated battery status is displayed in the BIOS Setup pages (under Advanced - Baseboard monitor) 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                                                                                                                                             |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| N/A            | Hardware, i.e. firmware used is too old and does not support read.                                                                                  |
| GOOD           | 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 29: Meaning of battery status

From the point when battery capacity is recognized as insufficient, data buffering is guaranteed for approximately another 500 hours. When changing the battery, data is buffered for approximately another 10 minutes by a gold leaf capacitor.

## 2.6.16 Slide-in compact slot

The internal connection between the slide-in compact slot and the chipset is made via SATA I.

| Slide-in compact slot |                                                                                                                                                               |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connection            | SATA I                                                                                                                                                        |
| Model number          | Short description                                                                                                                                             |
| Adapters              |                                                                                                                                                               |
| 5AC803.BC02-00        | PPC800 adapter: 1 compact slide-in                                                                                                                            |
| Drives                |                                                                                                                                                               |
| 5AC801.HDDI-00        | 40 GB SATA hard disk (slide-in compact); 24/7 hard disk with extended temperature range. Note: Please see manual for information about using this hard disk.  |
| 5AC801.HDDI-02        | 160 GB SATA hard disk (slide-in compact); 24/7 hard disk with extended temperature range. Note: Please see manual for information about using this hard disk. |
| 5AC801.HDDI-03        | 250 GB SATA hard disk (slide-in compact); 24/7 hard disk. Note: Please see manual for information about using this hard disk.                                 |
| 5AC801.SSDI-00        | 32 GB SATA SSD (SLC) (slide-in compact).                                                                                                                      |



Table 30: Slide-in compact slot

### Information:

The adapter 5AC803.BC02-00 is required for the use of slide-in compact drives.

### Information:

The SATA I interface allows data carriers to be exchanged during operation (hot-plug). To utilize this capability, it must be supported by the operating system.

## 2.6.17 PClec slot (card slot)

| PClec slots    |                                                           |
|----------------|-----------------------------------------------------------|
| Model number   | Short description                                         |
|                | <b>Adapters</b>                                           |
| 5AC803.BC01-00 | PPC800 adapter: 1 compact PCI Express                     |
|                | <b>Plug-in cards</b>                                      |
| 5ACPCC.ETH0-00 | Compact PCIe Ethernet card 1x 10/100/1000                 |
| 5ACPCC.MPL0-00 | PClec POWERLINK card, 2 POWERLINK interfaces, 512 kB SRAM |



Table 31: PClec slots

### Information:

The adapter 5AC803.BC01-00 is required for the use of PClec plug-in cards.

### Information:

Only B&R PClec cards that were specially designed for the Automation PC 820 and Panel PC 800 can be used.

For more information, see "PClec Plug-in cardn" on page 71.

## 3 Individual components

### 3.1 System units

#### 3.1.1 5PC820.1505-00

##### General information

- 15" TFT XGA color display
- Analog resistive touch screen
- Robust design
- Small installation depth
- Fan-free operation
- 1 optional PCI Express compact slot
- 1 optional slide-in compact slot
- Optional PCI and PCIe slots and optional slide-in drives, optional expansions available

##### Order data

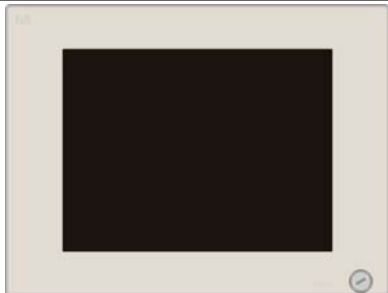
| Model number   | Short description                                                                                                                                                                                                                                                                                                                                                                                                                              | Image                                                                                |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|                | <b>System units</b>                                                                                                                                                                                                                                                                                                                                                                                                                            |  |
| 5PC820.1505-00 | Panel PC 820 15" XGA color TFT display with touch screen (resistive); connections for 1x RS232, 5x USB 2.0, Smart Display Link/DVI/Monitor, 2x Ethernet 10/100/1000, HDA Sound, add-on UPS slot, expandable with 1 or 2 PCI / PCI express slots, optional PCI Express compact and slide-in compact slot; IP65 protection (front side); 24 VDC Plug for power supply must be ordered separately (screw clamp: 0TB103.9; cage clamp: 0TB103.91). |                                                                                      |
|                | <b>Required accessories</b>                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                      |
|                | <b>CPU boards</b>                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                      |
| 5PC800.B945-05 | Intel Atom N270 CPU board, 1.6 GHz, single-core, 533 MHz FSB, 512 kB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.                                                                                                                                                                                                                                              |                                                                                      |
| 5PC800.B945-10 | Intel Core Duo L2400 CPU board, 1.66 GHz, dual-core, 667 MHz FSB, 2 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.                                                                                                                                                                                                                                            |                                                                                      |
| 5PC800.B945-11 | Intel Core2 Duo L7400 CPU board, 1.5 GHz, dual-core, 667 MHz FSB, 4 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.                                                                                                                                                                                                                                            |                                                                                      |
| 5PC800.B945-12 | Intel Core2 Duo U7500 CPU board, 1.06 GHz, dual-core, 533 MHz FSB, 2 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.                                                                                                                                                                                                                                           |                                                                                      |
| 5PC800.B945-13 | Intel Celeron M 423 CPU board, 1.06 GHz, single-core, 533 MHz FSB, 1 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.                                                                                                                                                                                                                                           |                                                                                      |
| 5PC800.B945-14 | Intel Core2 Duo T7400 CPU board, 2.16 GHz, dual-core, 667 MHz FSB, 4 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.                                                                                                                                                                                                                                           |                                                                                      |
| 5PC800.BM45-00 | Intel Core2 Duo T9400 CPU board, 2.53 GHz, dual-core, 1066 MHz FSB, 6 MB L2 cache; chipset GM45; 2 sockets for SO-DIMM DDR3 modules                                                                                                                                                                                                                                                                                                            |                                                                                      |
| 5PC800.BM45-01 | Intel Core2 Duo P8400 CPU board, 2.26 GHz, dual-core, 1066 MHz FSB, 3 MB L2 Cache; chipset GM45; 2 sockets for SO-DIMM DDR3 modules                                                                                                                                                                                                                                                                                                            |                                                                                      |
|                | <b>Fan kits</b>                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                      |
| 5AC803.FA01-00 | PPC800 fan kit for system units without expansion.                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                      |
|                | <b>Heat sinks</b>                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                      |
| 5AC803.HS00-00 | PPC800 heat sink for CPU boards with Dual Core processors L2400, L7400, U7500 and Celeron M 423.                                                                                                                                                                                                                                                                                                                                               |                                                                                      |
| 5AC803.HS00-01 | PPC800 heat sink for CPU boards with Dual Core processor T7400, T9400 and P8400.                                                                                                                                                                                                                                                                                                                                                               |                                                                                      |
| 5AC803.HS00-02 | PPC800 heat sink for CPU board with Atom processor N270.                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                      |
|                | <b>Main memory</b>                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                      |
| 5MMDDR.0512-01 | SO-DIMM DDR2 RAM 512 MB PC2-5300                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                      |
| 5MMDDR.1024-01 | SO-DIMM DDR2 RAM 1024 MB PC2-5300                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                      |
| 5MMDDR.2048-01 | SO-DIMM DDR2 RAM 2048 MB PC2-5300                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                      |

Table 32: 5PC820.1505-00 - Order data

| Model number   | Short description                                                                                                                                                                                                                                                                                                                                                                                       | Image |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
|                | <b>Main memory for GM45 CPU boards</b>                                                                                                                                                                                                                                                                                                                                                                  |       |
| 5MMDDR.2048-02 | SO-DIMM DDR3 RAM 2048 MB PC3-8500                                                                                                                                                                                                                                                                                                                                                                       |       |
| 5MMDDR.4096-02 | SO-DIMM DDR3 RAM 4096 MByte PC3-8500                                                                                                                                                                                                                                                                                                                                                                    |       |
|                | <b>Terminal blocks</b>                                                                                                                                                                                                                                                                                                                                                                                  |       |
| 0TB103.9       | Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm <sup>2</sup> , protected against vibration by the screw flange                                                                                                                                                                                                                                                                                    |       |
| 0TB103.91      | Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm <sup>2</sup> , protected against vibration by the screw flange                                                                                                                                                                                                                                                                                     |       |
|                | <b>Optional accessories</b>                                                                                                                                                                                                                                                                                                                                                                             |       |
|                | <b>Adapter</b>                                                                                                                                                                                                                                                                                                                                                                                          |       |
| 5AC803.BC01-00 | PPC800 adapter 1 PCI Express compact.                                                                                                                                                                                                                                                                                                                                                                   |       |
| 5AC803.BC02-00 | PPC800 adapter 1 Slide-in compact.                                                                                                                                                                                                                                                                                                                                                                      |       |
|                | <b>Bus units</b>                                                                                                                                                                                                                                                                                                                                                                                        |       |
| 5AC803.BX01-00 | PPC800 bus 1 PCI, 1 slide-in slot.                                                                                                                                                                                                                                                                                                                                                                      |       |
| 5AC803.BX01-01 | PPC800 bus 1 PCI Express, 1 slide-in slot.                                                                                                                                                                                                                                                                                                                                                              |       |
| 5AC803.BX02-00 | PPC800 bus 2 PCI slots, 1 slide-in slot.                                                                                                                                                                                                                                                                                                                                                                |       |
| 5AC803.BX02-01 | PPC800 bus with 1 PCI, 1 PCI Express, 1 slide-in slot.                                                                                                                                                                                                                                                                                                                                                  |       |
|                | <b>Drives</b>                                                                                                                                                                                                                                                                                                                                                                                           |       |
| 5AC801.ADAS-00 | SATA hard disk adapter to operate a slide-in compact hard disk in a slide-in slot.                                                                                                                                                                                                                                                                                                                      |       |
| 5AC801.DVDS-00 | DVD-ROM SATA drive (slide-in).                                                                                                                                                                                                                                                                                                                                                                          |       |
| 5AC801.DVRS-00 | DVD-R/RW DVD+R/RW SATA drive (slide-in).                                                                                                                                                                                                                                                                                                                                                                |       |
| 5AC801.HDDI-00 | 40 GB SATA hard disk (slide-in compact); 24/7 hard disk with extended temperature range. Remark: Please see manual for proper use of the hard disk.                                                                                                                                                                                                                                                     |       |
| 5AC801.HDDI-03 | 250 GB SATA hard disk (slide-in compact); 24/7 hard disk. Remark: Please see manual for proper use of the hard disk.                                                                                                                                                                                                                                                                                    |       |
| 5AC801.HDDS-00 | 40 GB SATA hard disk (slide-in); 24/7 hard disk with extended temperature range. Remark: Please see manual for proper use of the hard disk.                                                                                                                                                                                                                                                             |       |
| 5AC801.SSDI-00 | 32 GB SATA SSD (SLC), Slide-in compact                                                                                                                                                                                                                                                                                                                                                                  |       |
|                | <b>Expansions</b>                                                                                                                                                                                                                                                                                                                                                                                       |       |
| 5AC803.SX01-00 | PPC800 expansion 1 PCI/PCI Express and 1 Slide-in (bus 5AC803.BX01-00 or 5AC803.BX01-01 necessary).                                                                                                                                                                                                                                                                                                     |       |
| 5AC803.SX02-00 | PPC800 expansion 2 PCI/PCI Express and 1 Slide-in (bus 5AC803.BX02-00 or 5AC803.BX02-01 necessary).                                                                                                                                                                                                                                                                                                     |       |
|                | <b>Fan kits</b>                                                                                                                                                                                                                                                                                                                                                                                         |       |
| 5AC803.FA02-00 | PPC800 fan kit for system units with the expansion 5AC803.SX01-00.                                                                                                                                                                                                                                                                                                                                      |       |
| 5AC803.FA03-00 | PPC800 fan kit for system units with the expansion 5AC803.SX02-00.                                                                                                                                                                                                                                                                                                                                      |       |
|                | <b>Interface cards</b>                                                                                                                                                                                                                                                                                                                                                                                  |       |
| 5ACPCC.ETH0-00 | PClec Ethernet card 1x 10/100/1000                                                                                                                                                                                                                                                                                                                                                                      |       |
| 5ACPCC.MPL0-00 | PClec POWERLINK card, 2 POWERLINK interfaces, 512 kByte SRAM                                                                                                                                                                                                                                                                                                                                            |       |
|                | <b>Uninterruptible power supplies</b>                                                                                                                                                                                                                                                                                                                                                                   |       |
| 5AC600.UPSI-00 | UPS module for APC620, APC810, PPC800; for system units 5PC600.SX01-00 (from Rev. H0), 5PC600.SX02-00 (from Rev. G0), 5PC600.SX02-01 (from Rev. H0), 5PC600.SX05-00 (from Rev. F0), 5PC600.SX05-01 (from Rev. F0), 5PC600.SF03-00 (from Rev. A0), 5PC810.SX*. 5PC820.1505-00, 5PC820.1906-00. Cable (5CAUPS.0005-00 or 5CAUPS.0030-00) and battery unit (5AC600.UPSB-00) have to be ordered separately. |       |

Table 32: 5PC820.1505-00 - Order data

## Interfaces

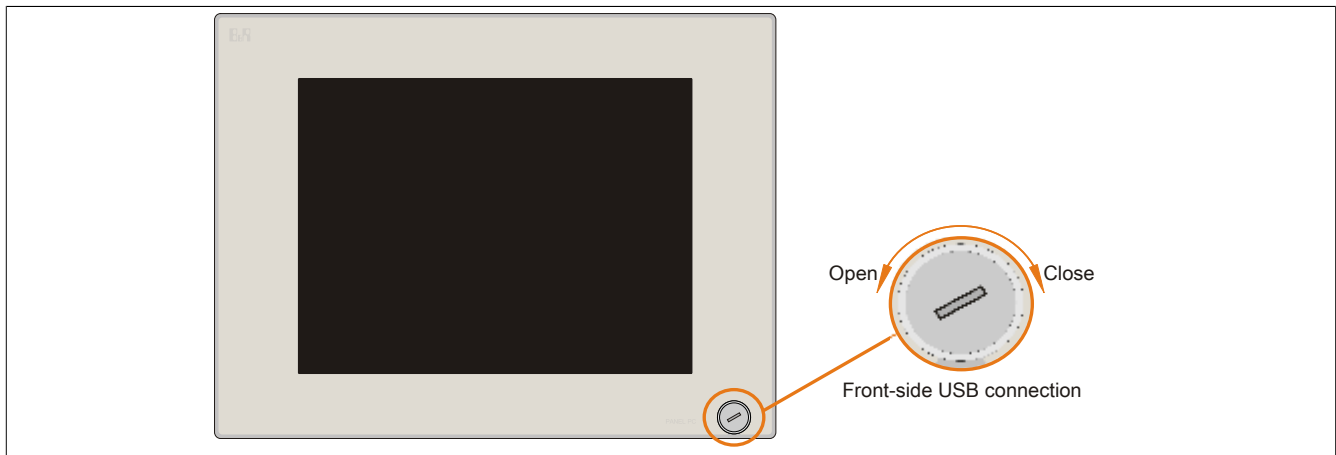


Image 12: 5PC820.1505-00 - Front view

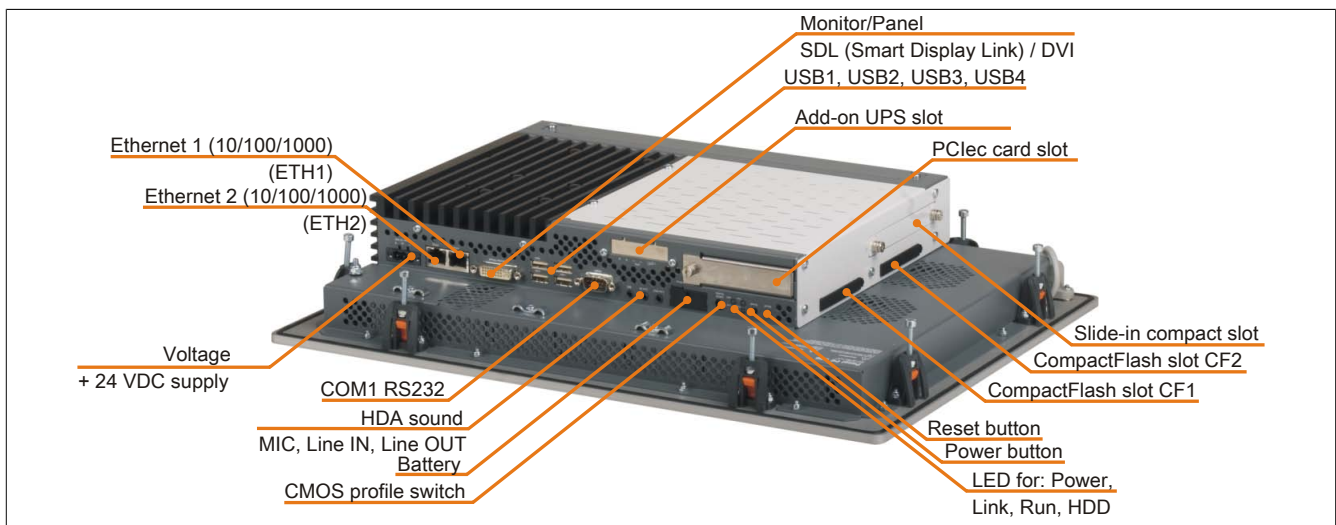


Image 13: 5PC820.1505-00 - Rear view

**Warning!**

Do not remove mounting screws from the heat sink, as it is connected to the processor and chipset by a thermal coupling. Should this connection be broken, the B&R industrial PC must be sent for repair. Removal of the mounting screws, which can be determined by a broken seal, voids all warranty.

During operation, surface temperatures of the heat sink may reach 70°C (warning "hot surface").

## Technical data

| Product ID                 | 5PC820.1505-00                   |
|----------------------------|----------------------------------|
| <b>General information</b> |                                  |
| LEDs                       | Power, HDD, Link, Run            |
| B&R ID code                | \$AF21                           |
| Battery                    |                                  |
| Type                       | Renata 950 mAh                   |
| Lifespan                   | 2½ years                         |
| removable                  | Yes, accessible from the outside |
| Design                     | Lithium ion                      |
| Power button               | Yes                              |
| Reset button               | Yes                              |
| Buzzer                     | Yes                              |
| Certification              |                                  |
| CE                         | Yes                              |
| c-UL-us                    | Yes                              |
| <b>Controller</b>          |                                  |
| Bootloader                 | BIOS                             |
| Power failure logic        |                                  |

Table 33: 5PC820.1505-00 - Technical data

| Product ID                         | 5PC820.1505-00                                                                    |
|------------------------------------|-----------------------------------------------------------------------------------|
| Controller                         | MTCX <sup>1)</sup>                                                                |
| Buffer time                        | 10 ms                                                                             |
| Graphics                           |                                                                                   |
| Controller                         | Depending on the CPU board used                                                   |
| Memory                             |                                                                                   |
| Type                               | Depending on the CPU board used                                                   |
| Size                               | Depending on the CPU board used                                                   |
| Interfaces                         |                                                                                   |
| COM1                               |                                                                                   |
| Type                               | RS232, modem-capable, not electrically isolated                                   |
| Design                             | 9-pin DSUB plug                                                                   |
| UART                               | 16550-compatible, 16-byte FIFO                                                    |
| Max. baud rate                     | 115 kbit/s                                                                        |
| CompactFlash slot 1                |                                                                                   |
| Type                               | Type I                                                                            |
| CompactFlash slot 2                |                                                                                   |
| Type                               | Type I                                                                            |
| USB                                |                                                                                   |
| Quantity                           | 5                                                                                 |
| Type                               | USB 2.0                                                                           |
| Design                             | Type A                                                                            |
| Transfer rate                      | Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s)        |
| Current load                       | Max. 500 mA or 1 A per connection                                                 |
| Ethernet                           |                                                                                   |
| Quantity                           | 2                                                                                 |
| Design                             | Shielded RJ45 port                                                                |
| Transfer rate                      | 10/100/1000 Mbit/s                                                                |
| Audio                              |                                                                                   |
| Type                               | HDA sound                                                                         |
| Inputs                             | Microphone, Line in                                                               |
| Outputs                            | Line Out                                                                          |
| Display                            |                                                                                   |
| Type                               | Color TFT                                                                         |
| Diagonal                           | 15" (381 mm)                                                                      |
| Colors                             | 16 million                                                                        |
| Resolution                         | XGA, 1024 x 768 pixels                                                            |
| Contrast                           | 550, 1                                                                            |
| Viewing angles                     |                                                                                   |
| Horizontal                         | Direction R / direction L = 60°                                                   |
| Vertical                           | Direction U = 45° / direction D = 55°                                             |
| Background lighting                |                                                                                   |
| Brightness                         | 250 cd/m²                                                                         |
| Half brightness time <sup>2)</sup> | 50,000 h                                                                          |
| Touch screen <sup>3)</sup>         |                                                                                   |
| Type                               | Accu Touch                                                                        |
| Technology                         | Analog, resistive                                                                 |
| Controller                         | Elo, serial, 12-bit                                                               |
| Degree of transmission             | 81% ±3%                                                                           |
| Inserts                            |                                                                                   |
| PCI slots                          |                                                                                   |
| Quantity                           | 1 or 2 (optional) <sup>4)</sup>                                                   |
| PCIe slots                         |                                                                                   |
| Quantity                           | 1 <sup>5)</sup>                                                                   |
| PClec slots                        |                                                                                   |
| Quantity                           | Optional <sup>6)</sup>                                                            |
| Slide-in drives                    | Component-dependent (on the expansion and bus unit being used)                    |
| Compact slide-in drive             | Optional <sup>7)</sup>                                                            |
| Add-on UPS slot                    | Yes                                                                               |
| Insert for fan kit                 | Yes                                                                               |
| Electrical characteristics         |                                                                                   |
| Nominal voltage                    | 24 VDC ±25%                                                                       |
| Nominal current                    | 6 A                                                                               |
| Starting current                   | Typ. 10 A, max. 50 A for < 300 µs                                                 |
| Power consumption                  | Component-dependent                                                               |
| Electrical isolation               | Yes                                                                               |
| Operating conditions               |                                                                                   |
| Height of drop                     | 1 m to industrial floor                                                           |
| EN 60529 protection                | IP20 (back)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front) |
| Environmental conditions           |                                                                                   |
| Temperature                        |                                                                                   |
| Operation                          | Component-dependent                                                               |
| Storage                            | -20 to 60°C                                                                       |
| Transport                          | -20 to 60°C                                                                       |

Table 33: 5PC820.1505-00 - Technical data



| Product ID                 | 5PC820.1505-00                                                        |
|----------------------------|-----------------------------------------------------------------------|
| Relative humidity          |                                                                       |
| Operation                  | 10 to 85%, non-condensing                                             |
| Storage                    | T ≤ 40°C: 5 to 90%, non-condensing<br>T > 40°C: < 90%, non-condensing |
| Transport                  | T ≤ 40°C: 5 to 90%, non-condensing<br>T > 40°C: < 90%, non-condensing |
| Vibration                  |                                                                       |
| Operation (continuous)     | 2 to 9 Hz: 1.75 mm amplitude / 9 to 150 Hz: 0.5 g                     |
| Operation (occasional)     | 2 to 9 Hz: 3.5 mm amplitude / 9 to 150 Hz: 1 g                        |
| Storage                    | 2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g   |
| Transport                  | 2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g   |
| Shock                      |                                                                       |
| Operation                  | 15 g, 11 ms                                                           |
| Storage                    | 30 g, 15 ms                                                           |
| Transport                  | 30 g, 15 ms                                                           |
| Mechanical characteristics |                                                                       |
| Housing                    |                                                                       |
| Material                   | Metal                                                                 |
| Front                      |                                                                       |
| Frame                      | Naturally anodized aluminum                                           |
| Design                     | Gray                                                                  |
| Décor foil                 |                                                                       |
| Material                   | Polyester                                                             |
| Light background           | Similar to Pantone 427CV                                              |
| Gasket                     | Flat gasket around display front                                      |
| Dimensions                 |                                                                       |
| Width                      | 435 mm                                                                |
| Height                     | 330 mm                                                                |
| Depth                      | Component-dependent                                                   |
| Weight                     | 5500 g (component-dependent)                                          |

Table 33: 5PC820.1505-00 - Technical data

- 1) Maintenance controller extended.
- 2) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 3) Touch screen drivers can be downloaded from the download area on the B&R homepage ([www.br-automation.com](http://www.br-automation.com)).
- 4) The PCI slots are dependent on the expansion and bus unit used.
- 5) The PCIe slots are dependent on the expansion and bus unit used.
- 6) Optional with PCIe adapter 5AC803.BC01-00.
- 7) Optional with slide-in compact adapter 5AC803.BC02-00.

Dimensions

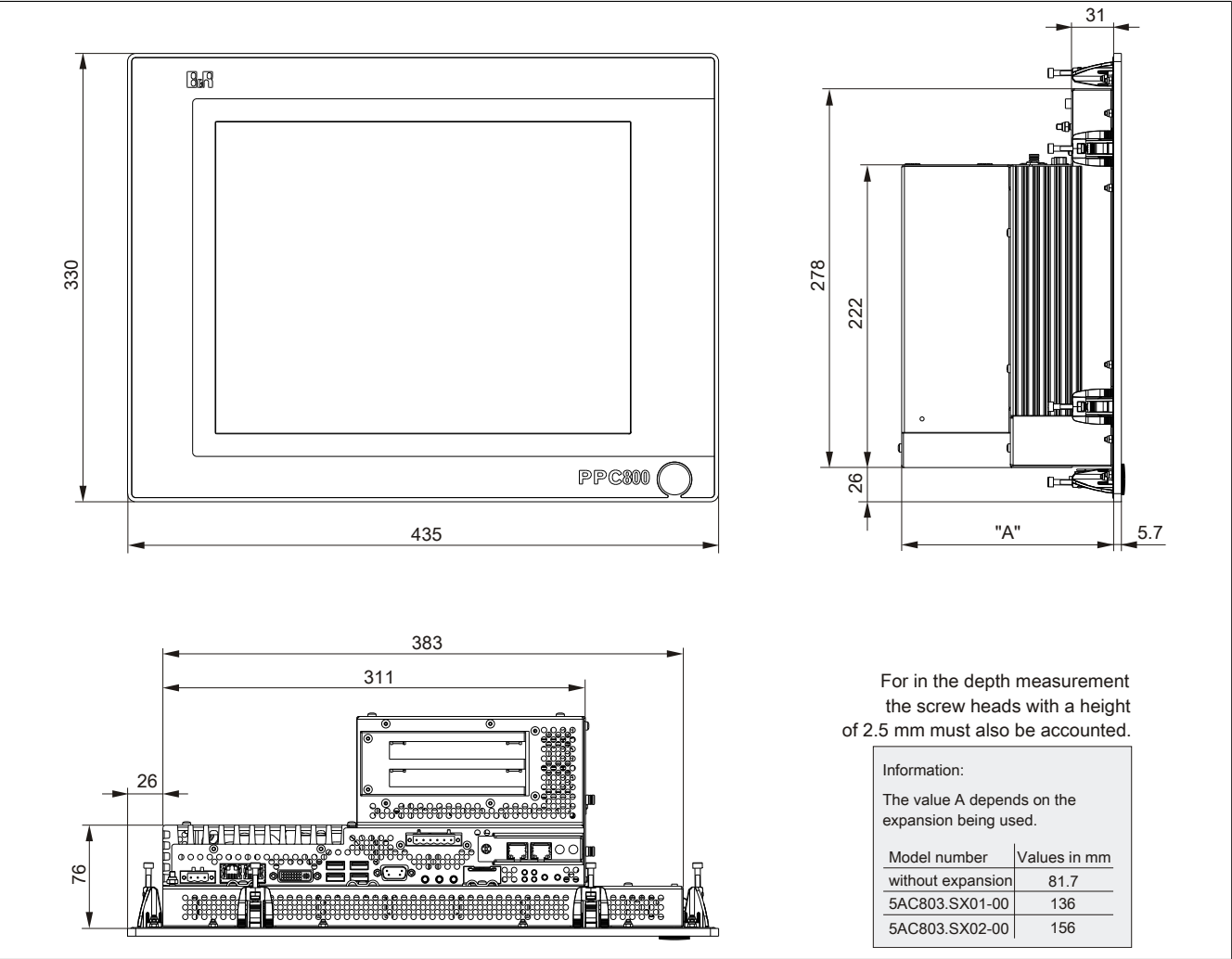


Image 14: 5PC820.1505 - Dimensions

Cutout

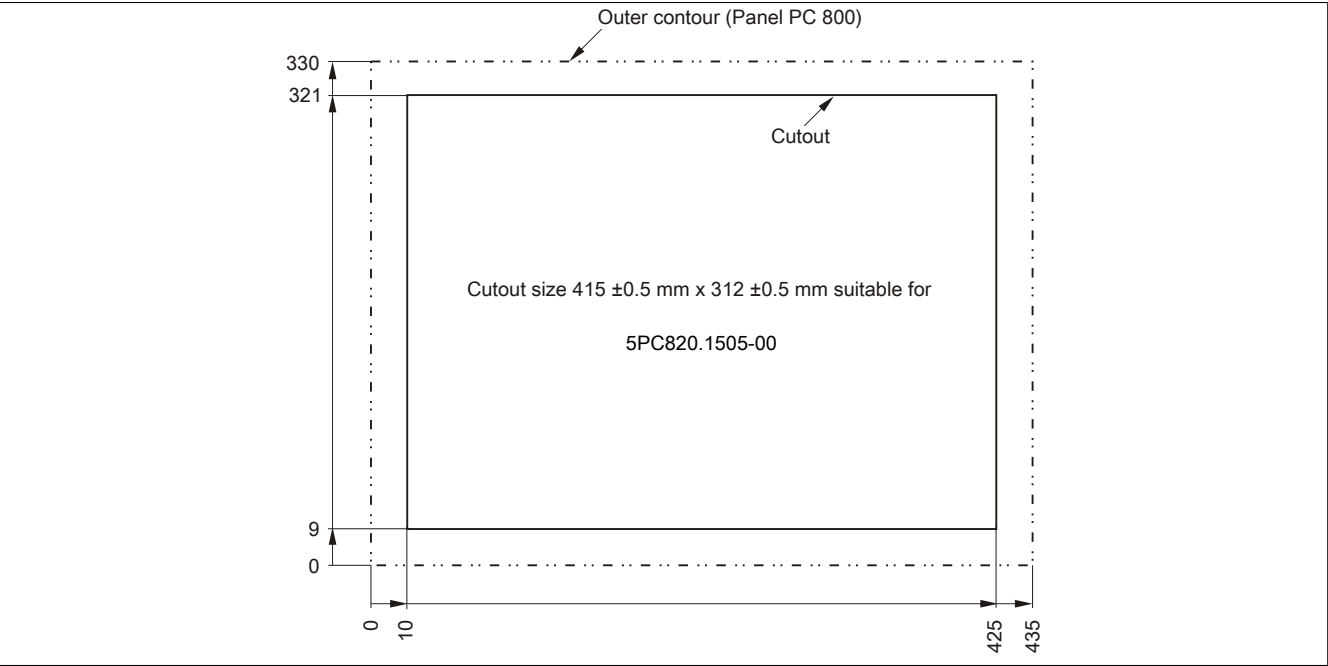


Image 15: 5PC820.1505-00 - Cutout installation

### 3.1.2 5PC820.1906-00

#### General information

- 19" TFT SXGA color display
- Analog resistive touch screen
- Robust design
- Small installation depth
- Fan-free operation
- 1 optional PCI Express compact slot
- 1 optional slide-in compact slot
- Optional PCI and PCIe slots and optional slide-in drives, optional expansions available

#### Order data

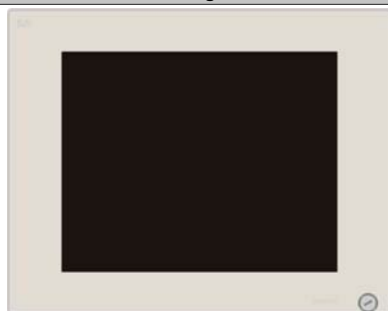
| Model number   | Short description                                                                                                                                                                                                                                                                                                                                                                                                                                 | Image                                                                               |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                | <b>System units</b>                                                                                                                                                                                                                                                                                                                                                                                                                               |  |
| 5PC820.1906-00 | Panel PC 820 19" SXGA color TFT display with touch screen (resistive); connections for 1x RS232, 5x USB 2.0, Smart Display Link/DVI/Monitor, 2x Ethernet 10/100/1000, HDA Sound, add-on UPS slot, expandable with 1 or 2 PCI / PCI express slots, optional PCI Express compact and slide-in compact slot, IP65 protection (front side); 24 VDC Plug for power supply must be ordered separately (screw clamps: 0TB103.9; cage clamps: 0TB103.91). |                                                                                     |
|                | <b>Required accessories</b>                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                     |
|                | <b>CPU boards</b>                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                     |
| 5PC800.B945-05 | Intel Atom N270 CPU board, 1.6 GHz, single-core, 533 MHz FSB, 512 kB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.                                                                                                                                                                                                                                                 |                                                                                     |
| 5PC800.B945-10 | Intel Core Duo L2400 CPU board, 1.66 GHz, dual-core, 667 MHz FSB, 2 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.                                                                                                                                                                                                                                               |                                                                                     |
| 5PC800.B945-11 | Intel Core2 Duo L7400 CPU board, 1.5 GHz, dual-core, 667 MHz FSB, 4 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.                                                                                                                                                                                                                                               |                                                                                     |
| 5PC800.B945-12 | Intel Core2 Duo U7500 CPU board, 1.06 GHz, dual-core, 533 MHz FSB, 2 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.                                                                                                                                                                                                                                              |                                                                                     |
| 5PC800.B945-13 | Intel Celeron M 423 CPU board, 1.06 GHz, single-core, 533 MHz FSB, 1 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.                                                                                                                                                                                                                                              |                                                                                     |
| 5PC800.B945-14 | Intel Core2 Duo T7400 CPU board, 2.16 GHz, dual-core, 667 MHz FSB, 4 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.                                                                                                                                                                                                                                              |                                                                                     |
| 5PC800.BM45-00 | Intel Core2 Duo T9400 CPU board, 2.53 GHz, dual-core, 1066 MHz FSB, 6 MB L2 cache; chipset GM45; 2 sockets for SO-DIMM DDR3 modules                                                                                                                                                                                                                                                                                                               |                                                                                     |
| 5PC800.BM45-01 | Intel Core2 Duo P8400 CPU board, 2.26 GHz, dual-core, 1066 MHz FSB, 3 MB L2 Cache; chipset GM45; 2 sockets for SO-DIMM DDR3 modules                                                                                                                                                                                                                                                                                                               |                                                                                     |
|                | <b>Fan kits</b>                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                     |
| 5AC803.FA01-00 | PPC800 fan kit for system units without expansion.                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                     |
|                | <b>Heat sinks</b>                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                     |
| 5AC803.HS00-00 | PPC800 heat sink for CPU boards with Dual Core processors L2400, L7400, U7500 and Celeron M 423.                                                                                                                                                                                                                                                                                                                                                  |                                                                                     |
| 5AC803.HS00-01 | PPC800 heat sink for CPU boards with Dual Core processor T7400, T9400 and P8400.                                                                                                                                                                                                                                                                                                                                                                  |                                                                                     |
| 5AC803.HS00-02 | PPC800 heat sink for CPU board with Atom processor N270.                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                     |
|                | <b>Main memory</b>                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                     |
| 5MMDDR.0512-01 | SO-DIMM DDR2 RAM 512 MB PC2-5300                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                     |
| 5MMDDR.1024-01 | SO-DIMM DDR2 RAM 1024 MB PC2-5300                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                     |
| 5MMDDR.2048-01 | SO-DIMM DDR2 RAM 2048 MB PC2-5300                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                     |
|                | <b>Main memory for GM45 CPU boards</b>                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                     |
| 5MMDDR.2048-02 | SO-DIMM DDR3 RAM 2048 MB PC3-8500                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                     |
| 5MMDDR.4096-02 | SO-DIMM DDR3 RAM 4096 MByte PC3-8500                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                     |
|                | <b>Terminal blocks</b>                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                     |

Table 34: 5PC820.1906-00 - Order data

| Model number   | Short description                                                                                                                                                                                                                                                                                                                                                                                       | Image |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 0TB103.9       | Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm², protected against vibration by the screw flange                                                                                                                                                                                                                                                                                                 |       |
| 0TB103.91      | Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm², protected against vibration by the screw flange                                                                                                                                                                                                                                                                                                  |       |
|                | Optional accessories                                                                                                                                                                                                                                                                                                                                                                                    |       |
|                | Adapter                                                                                                                                                                                                                                                                                                                                                                                                 |       |
| 5AC803.BC01-00 | PPC800 adapter 1 PCI Express compact.                                                                                                                                                                                                                                                                                                                                                                   |       |
| 5AC803.BC02-00 | PPC800 adapter 1 Slide-in compact.                                                                                                                                                                                                                                                                                                                                                                      |       |
|                | Bus units                                                                                                                                                                                                                                                                                                                                                                                               |       |
| 5AC803.BX01-00 | PPC800 bus 1 PCI, 1 slide-in slot.                                                                                                                                                                                                                                                                                                                                                                      |       |
| 5AC803.BX01-01 | PPC800 bus 1 PCI Express, 1 slide-in slot.                                                                                                                                                                                                                                                                                                                                                              |       |
| 5AC803.BX02-00 | PPC800 bus 2 PCI slots, 1 slide-in slot.                                                                                                                                                                                                                                                                                                                                                                |       |
| 5AC803.BX02-01 | PPC800 bus with 1 PCI, 1 PCI Express, 1 slide-in slot.                                                                                                                                                                                                                                                                                                                                                  |       |
|                | Drives                                                                                                                                                                                                                                                                                                                                                                                                  |       |
| 5AC801.ADAS-00 | SATA hard disk adapter to operate a slide-in compact hard disk in a slide-in slot.                                                                                                                                                                                                                                                                                                                      |       |
| 5AC801.DVDS-00 | DVD-ROM SATA drive (slide-in).                                                                                                                                                                                                                                                                                                                                                                          |       |
| 5AC801.DVRS-00 | DVD-R/RW DVD+R/RW SATA drive (slide-in).                                                                                                                                                                                                                                                                                                                                                                |       |
| 5AC801.HDDI-00 | 40 GB SATA hard disk (slide-in compact); 24/7 hard disk with extended temperature range. Remark: Please see manual for proper use of the hard disk.                                                                                                                                                                                                                                                     |       |
| 5AC801.HDDI-03 | 250 GB SATA hard disk (slide-in compact); 24/7 hard disk. Remark: Please see manual for proper use of the hard disk.                                                                                                                                                                                                                                                                                    |       |
| 5AC801.HDDS-00 | 40 GB SATA hard disk (slide-in); 24/7 hard disk with extended temperature range. Remark: Please see manual for proper use of the hard disk.                                                                                                                                                                                                                                                             |       |
| 5AC801.SSDI-00 | 32 GB SATA SSD (SLC), Slide-in compact                                                                                                                                                                                                                                                                                                                                                                  |       |
|                | Expansions                                                                                                                                                                                                                                                                                                                                                                                              |       |
| 5AC803.SX01-00 | PPC800 expansion 1 PCI/PCI Express and 1 Slide-in (bus 5AC803.BX01-00 or 5AC803.BX01-01 necessary).                                                                                                                                                                                                                                                                                                     |       |
| 5AC803.SX02-00 | PPC800 expansion 2 PCI/PCI Express and 1 Slide-in (bus 5AC803.BX02-00 or 5AC803.BX02-01 necessary).                                                                                                                                                                                                                                                                                                     |       |
|                | Fan kits                                                                                                                                                                                                                                                                                                                                                                                                |       |
| 5AC803.FA02-00 | PPC800 fan kit for system units with the expansion 5AC803.SX01-00.                                                                                                                                                                                                                                                                                                                                      |       |
| 5AC803.FA03-00 | PPC800 fan kit for system units with the expansion 5AC803.SX02-00.                                                                                                                                                                                                                                                                                                                                      |       |
|                | Interface cards                                                                                                                                                                                                                                                                                                                                                                                         |       |
| 5ACPCC.ETH0-00 | PClec Ethernet card 1x 10/100/1000                                                                                                                                                                                                                                                                                                                                                                      |       |
| 5ACPCC.MPL0-00 | PClec POWERLINK card, 2 POWERLINK interfaces, 512 kByte SRAM                                                                                                                                                                                                                                                                                                                                            |       |
|                | Uninterruptible power supplies                                                                                                                                                                                                                                                                                                                                                                          |       |
| 5AC600.UPSI-00 | UPS module for APC620, APC810, PPC800; for system units 5PC600.SX01-00 (from Rev. H0), 5PC600.SX02-00 (from Rev. G0), 5PC600.SX02-01 (from Rev. H0), 5PC600.SX05-00 (from Rev. F0), 5PC600.SX05-01 (from Rev. F0), 5PC600.SF03-00 (from Rev. A0), 5PC810.SX*. 5PC820.1505-00, 5PC820.1906-00. Cable (5CAUPS.0005-00 or 5CAUPS.0030-00) and battery unit (5AC600.UPSB-00) have to be ordered separately. |       |

Table 34: 5PC820.1906-00 - Order data

## Interfaces

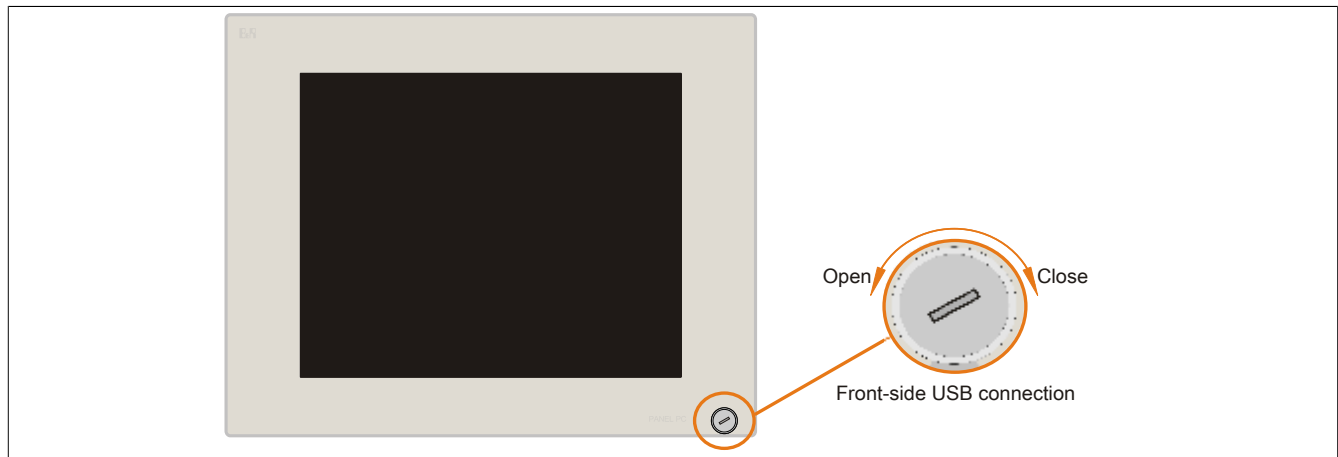


Image 16: 5PC820.1906-00 - Front view

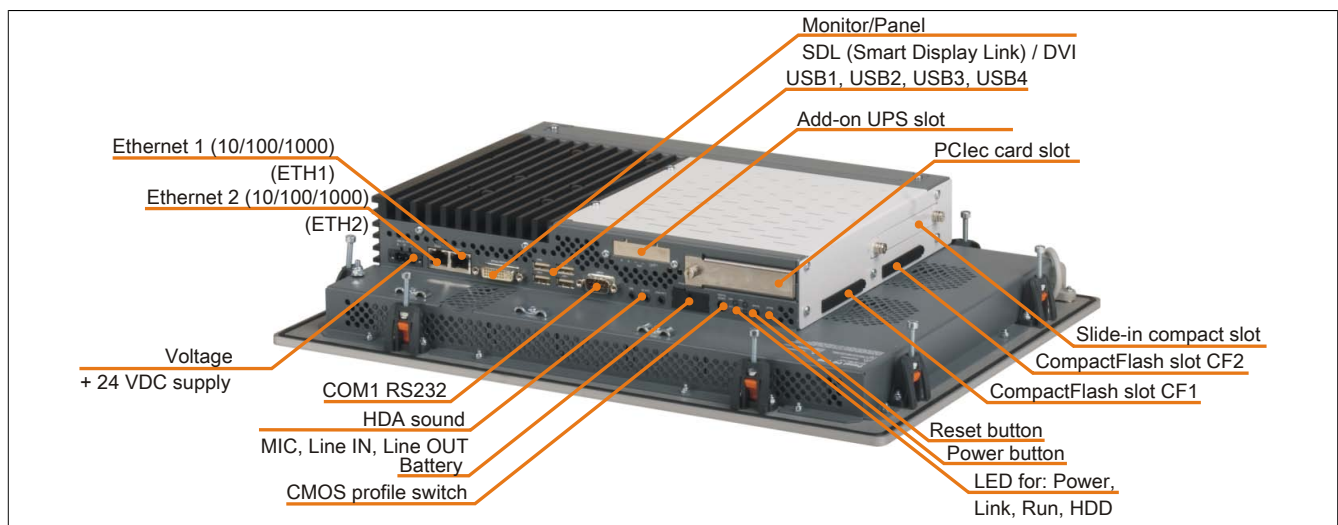


Image 17: 5PC820.1906-00 - Rear view

## Warning!

Do not remove mounting screws from the heat sink, as it is connected to the processor and chipset by a thermal coupling. Should this connection be broken, the B&R industrial PC must be sent for repair. Removal of the mounting screws, which can be determined by a broken seal, voids all warranty.

During operation, surface temperatures of the heat sink may reach 70°C (warning "hot surface").

## Technical data

| Product ID                 | 5PC820.1906-00                   |
|----------------------------|----------------------------------|
| <b>General information</b> |                                  |
| LEDs                       | Power, HDD, Link, Run            |
| B&R ID code                | \$AF22                           |
| Battery                    |                                  |
| Type                       | Renata 950 mAh                   |
| Lifespan                   | 2½ years                         |
| removable                  | Yes, accessible from the outside |
| Design                     | Lithium ion                      |
| Power button               | Yes                              |
| Reset button               | Yes                              |
| Buzzer                     | Yes                              |
| Certification              |                                  |
| CE                         | Yes                              |
| c-UL-us                    | Yes                              |
| <b>Controller</b>          |                                  |
| Bootloader                 | BIOS                             |
| Power failure logic        |                                  |

Table 35: 5PC820.1906-00 - Technical data

| Product ID                         | 5PC820.1906-00                                                                    |
|------------------------------------|-----------------------------------------------------------------------------------|
| Controller                         | MTCX <sup>1)</sup>                                                                |
| Buffer time                        | 10 ms                                                                             |
| Graphics                           |                                                                                   |
| Controller                         | Depending on the CPU board used                                                   |
| Memory                             |                                                                                   |
| Type                               | Depending on the CPU board used                                                   |
| Size                               | Depending on the CPU board used                                                   |
| Interfaces                         |                                                                                   |
| COM1                               |                                                                                   |
| Type                               | RS232, modem-capable, not electrically isolated                                   |
| Design                             | 9-pin DSUB plug                                                                   |
| UART                               | 16550-compatible, 16-byte FIFO                                                    |
| Max. baud rate                     | 115 kbit/s                                                                        |
| CompactFlash slot 1                |                                                                                   |
| Type                               | Type I                                                                            |
| CompactFlash slot 2                |                                                                                   |
| Type                               | Type I                                                                            |
| USB                                |                                                                                   |
| Quantity                           | 5                                                                                 |
| Type                               | USB 2.0                                                                           |
| Design                             | Type A                                                                            |
| Transfer rate                      | Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s)        |
| Current load                       | Max. 500 mA or 1 A per connection                                                 |
| Ethernet                           |                                                                                   |
| Quantity                           | 2                                                                                 |
| Design                             | Shielded RJ45 port                                                                |
| Transfer rate                      | 10/100/1000 Mbit/s                                                                |
| Audio                              |                                                                                   |
| Type                               | HDA sound                                                                         |
| Inputs                             | Microphone, Line in                                                               |
| Outputs                            | Line Out                                                                          |
| Display                            |                                                                                   |
| Type                               | Color TFT                                                                         |
| Diagonal                           | 19" (480 mm)                                                                      |
| Colors                             | 16 million                                                                        |
| Resolution                         | SXGA, 1280 x 1024 pixels                                                          |
| Contrast                           | 900, 1                                                                            |
| Viewing angles                     |                                                                                   |
| Horizontal                         | Direction R / direction L = 85°                                                   |
| Vertical                           | Direction U / direction D = 85°                                                   |
| Background lighting                |                                                                                   |
| Brightness                         | 300 cd/m²                                                                         |
| Half brightness time <sup>2)</sup> | 50,000 h                                                                          |
| Touch screen <sup>3)</sup>         |                                                                                   |
| Type                               | Accu Touch                                                                        |
| Technology                         | Analog, resistive                                                                 |
| Controller                         | Elo, serial, 12-bit                                                               |
| Degree of transmission             | 81% ±3%                                                                           |
| Inserts                            |                                                                                   |
| PCI slots                          |                                                                                   |
| Quantity                           | 1 or 2 (optional) <sup>4)</sup>                                                   |
| PCIe slots                         |                                                                                   |
| Quantity                           | 1 <sup>5)</sup>                                                                   |
| PCIec slots                        |                                                                                   |
| Quantity                           | Optional <sup>6)</sup>                                                            |
| Slide-in drives                    | Component-dependent (on the expansion and bus unit being used)                    |
| Compact slide-in drive             | Optional <sup>7)</sup>                                                            |
| Add-on UPS slot                    | Yes                                                                               |
| Insert for fan kit                 | Yes                                                                               |
| Electrical characteristics         |                                                                                   |
| Nominal voltage                    | 24 VDC ±25%                                                                       |
| Nominal current                    | 6 A                                                                               |
| Starting current                   | Typ. 10 A, max. 50 A for < 300 µs                                                 |
| Power consumption                  | Component-dependent                                                               |
| Electrical isolation               | Yes                                                                               |
| Operating conditions               |                                                                                   |
| Height of drop                     | 1 m to industrial floor                                                           |
| EN 60529 protection                | IP20 (back)<br>IP65 / NEMA 250 type 4X, dust and sprayed water protection (front) |
| Environmental conditions           |                                                                                   |
| Temperature                        |                                                                                   |
| Operation                          | Component-dependent                                                               |
| Storage                            | -20 to 60°C                                                                       |
| Transport                          | -20 to 60°C                                                                       |

Table 35: 5PC820.1906-00 - Technical data

| Product ID                 | 5PC820.1906-00                                                        |
|----------------------------|-----------------------------------------------------------------------|
| Relative humidity          |                                                                       |
| Operation                  | 10 to 85%, non-condensing                                             |
| Storage                    | T ≤ 40°C: 5 to 90%, non-condensing<br>T > 40°C: < 90%, non-condensing |
| Transport                  | T ≤ 40°C: 5 to 90%, non-condensing<br>T > 40°C: < 90%, non-condensing |
| Vibration                  |                                                                       |
| Operation (continuous)     | 2 to 9 Hz: 1.75 mm amplitude / 9 to 150 Hz: 0.5 g                     |
| Operation (occasional)     | 2 to 9 Hz: 3.5 mm amplitude / 9 to 150 Hz: 1 g                        |
| Storage                    | 2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g   |
| Transport                  | 2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g   |
| Shock                      |                                                                       |
| Operation                  | 15 g, 11 ms                                                           |
| Storage                    | 30 g, 15 ms                                                           |
| Transport                  | 30 g, 15 ms                                                           |
| Mechanical characteristics |                                                                       |
| Housing                    |                                                                       |
| Material                   | Metal                                                                 |
| Front                      |                                                                       |
| Frame                      | Naturally anodized aluminum                                           |
| Design                     | Gray                                                                  |
| Décor foil                 |                                                                       |
| Material                   | Polyester                                                             |
| Light background           | Similar to Pantone 427CV                                              |
| Gasket                     | Flat gasket around display front                                      |
| Dimensions                 |                                                                       |
| Width                      | 527 mm                                                                |
| Height                     | 421 mm                                                                |
| Depth                      | Component-dependent                                                   |
| Weight                     | 10,000 g (component-dependent)                                        |

Table 35: 5PC820.1906-00 - Technical data

- 1) Maintenance controller extended.
- 2) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
- 3) Touch screen drivers can be downloaded from the download area on the B&R homepage ([www.br-automation.com](http://www.br-automation.com)).
- 4) The PCI slots are dependent on the expansion and bus unit used.
- 5) The PCIe slots are dependent on the expansion and bus unit used.
- 6) Optional with PCIe adapter 5AC803.BC01-00.
- 7) Optional with slide-in compact adapter 5AC803.BC02-00.

Dimensions

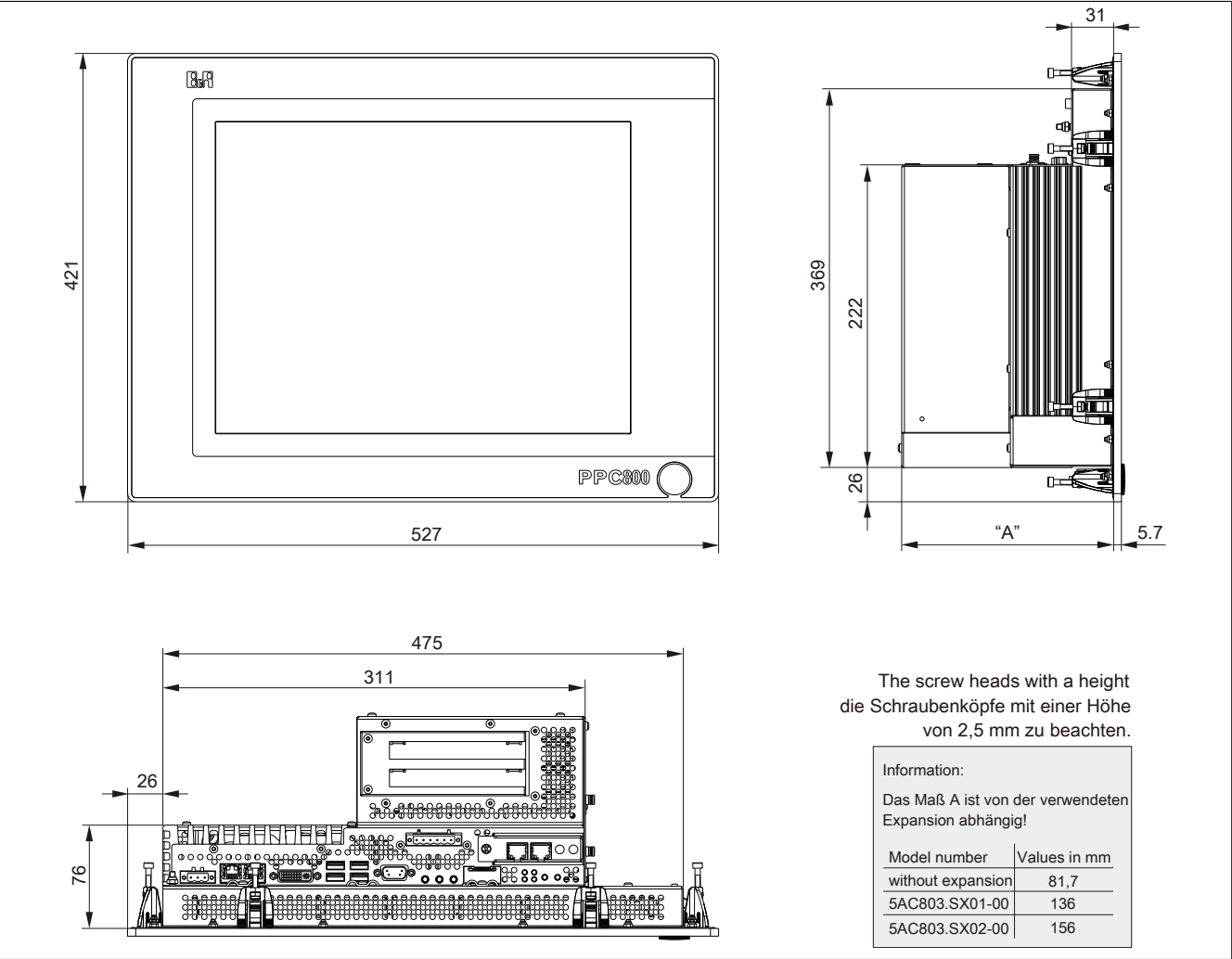


Image 18: 5PC820.1906-00 - Dimensions

Cutout

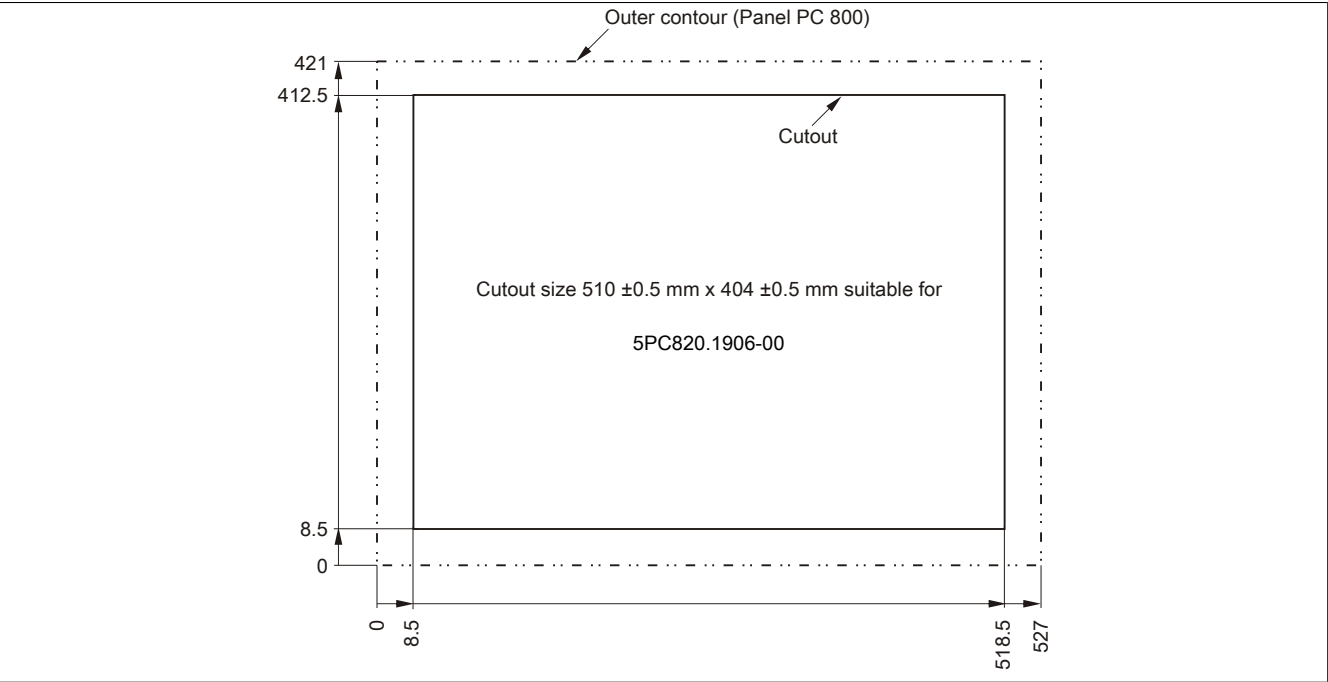


Image 19: 5PC820.1906-00 - Cutout installation



## 3.2 GM45 CPU boards

### 3.2.1 General information

The GM45 CPU boards contain two DDR3 memory sockets for a maximum of 8 GB and support dual channel memory technology. Additionally, the Intel® GMA 4500MDH is integrated with 384 MB memory and a maximum resolution of 2048 x 1537 pixels (QXGA).

- AMI BIOS
- Intel® GM45 chipset
- 2x DDR3 memory socket
- Dual channel memory
- Intel® GMA 4500MDH
- Gigabit Ethernet
- Intel® Core™ 2 Duo T9400, 2.53 GHz

### 3.2.2 Order data

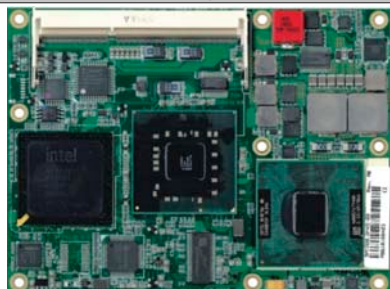
| Model number   | Short description                                                                                                                   | Image                                                                                |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|                | <b>CPU boards</b>                                                                                                                   |  |
| 5PC800.BM45-00 | Intel Core2 Duo T9400 CPU board, 2.53 GHz, dual-core, 1066 MHz FSB, 6 MB L2 cache; chipset GM45; 2 sockets for SO-DIMM DDR3 modules |                                                                                      |
| 5PC800.BM45-01 | Intel Core2 Duo P8400 CPU board, 2.26 GHz, dual-core, 1066 MHz FSB, 3 MB L2 Cache; chipset GM45; 2 sockets for SO-DIMM DDR3 modules |                                                                                      |
|                | <b>Required accessories</b>                                                                                                         |                                                                                      |
|                | <b>Main memory for GM45 CPU boards</b>                                                                                              |                                                                                      |
| 5MMDDR.2048-02 | SO-DIMM DDR3 RAM 2048 MB PC3-8500                                                                                                   |                                                                                      |
| 5MMDDR.4096-02 | SO-DIMM DDR3 RAM 4096 MByte PC3-8500                                                                                                |                                                                                      |

Table 36: 5PC800.BM45-00, 5PC800.BM45-01 - Order data

### 3.2.3 Technical data

| Product ID                                                                       | 5PC800.BM45-00                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 5PC800.BM45-01 |                         |                         |          |          |  |       |  |       |      |      |  |          |  |     |                                                                                  |  |                                         |  |
|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------------------|-------------------------|----------|----------|--|-------|--|-------|------|------|--|----------|--|-----|----------------------------------------------------------------------------------|--|-----------------------------------------|--|
| General information                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                |                         |                         |          |          |  |       |  |       |      |      |  |          |  |     |                                                                                  |  |                                         |  |
| Certification<br>CE                                                              | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                |                         |                         |          |          |  |       |  |       |      |      |  |          |  |     |                                                                                  |  |                                         |  |
| Controller                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                |                         |                         |          |          |  |       |  |       |      |      |  |          |  |     |                                                                                  |  |                                         |  |
| Bootloader                                                                       | Embedded AMI BIOS                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |                         |                         |          |          |  |       |  |       |      |      |  |          |  |     |                                                                                  |  |                                         |  |
| Processor                                                                        | <table><tr><td>Intel® Core™2 Duo T9400</td><td>Intel® Core™2 Duo P8400</td></tr><tr><td>2530 MHz</td><td>2260 MHz</td></tr><tr><td></td><td>45 nm</td></tr><tr><td></td><td>32 kB</td></tr><tr><td>6 MB</td><td>3 MB</td></tr><tr><td></td><td>1066 MHz</td></tr><tr><td></td><td>Yes</td></tr><tr><td colspan="2">Intel® virtualization technology, G4 architecture, Enhanced SpeedStep technology</td></tr><tr><td colspan="2">SSE, SSE2, SSE3, Intel® 64 architecture</td></tr></table> |                | Intel® Core™2 Duo T9400 | Intel® Core™2 Duo P8400 | 2530 MHz | 2260 MHz |  | 45 nm |  | 32 kB | 6 MB | 3 MB |  | 1066 MHz |  | Yes | Intel® virtualization technology, G4 architecture, Enhanced SpeedStep technology |  | SSE, SSE2, SSE3, Intel® 64 architecture |  |
| Intel® Core™2 Duo T9400                                                          | Intel® Core™2 Duo P8400                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                |                         |                         |          |          |  |       |  |       |      |      |  |          |  |     |                                                                                  |  |                                         |  |
| 2530 MHz                                                                         | 2260 MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                |                         |                         |          |          |  |       |  |       |      |      |  |          |  |     |                                                                                  |  |                                         |  |
|                                                                                  | 45 nm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                |                         |                         |          |          |  |       |  |       |      |      |  |          |  |     |                                                                                  |  |                                         |  |
|                                                                                  | 32 kB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                |                         |                         |          |          |  |       |  |       |      |      |  |          |  |     |                                                                                  |  |                                         |  |
| 6 MB                                                                             | 3 MB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                |                         |                         |          |          |  |       |  |       |      |      |  |          |  |     |                                                                                  |  |                                         |  |
|                                                                                  | 1066 MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                |                         |                         |          |          |  |       |  |       |      |      |  |          |  |     |                                                                                  |  |                                         |  |
|                                                                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                |                         |                         |          |          |  |       |  |       |      |      |  |          |  |     |                                                                                  |  |                                         |  |
| Intel® virtualization technology, G4 architecture, Enhanced SpeedStep technology |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                |                         |                         |          |          |  |       |  |       |      |      |  |          |  |     |                                                                                  |  |                                         |  |
| SSE, SSE2, SSE3, Intel® 64 architecture                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                |                         |                         |          |          |  |       |  |       |      |      |  |          |  |     |                                                                                  |  |                                         |  |
| Chipset                                                                          | Intel® GM45<br>Intel® 82801 (ICH9M-E)                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                |                         |                         |          |          |  |       |  |       |      |      |  |          |  |     |                                                                                  |  |                                         |  |
| Real-time clock                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                |                         |                         |          |          |  |       |  |       |      |      |  |          |  |     |                                                                                  |  |                                         |  |
| Precision                                                                        | At 25°C: typ. 12 ppm (1 second) per day <sup>1)</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                      |                |                         |                         |          |          |  |       |  |       |      |      |  |          |  |     |                                                                                  |  |                                         |  |
| Battery-buffered                                                                 | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                |                         |                         |          |          |  |       |  |       |      |      |  |          |  |     |                                                                                  |  |                                         |  |
| Memory socket                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                |                         |                         |          |          |  |       |  |       |      |      |  |          |  |     |                                                                                  |  |                                         |  |
| Type                                                                             | DDR3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                |                         |                         |          |          |  |       |  |       |      |      |  |          |  |     |                                                                                  |  |                                         |  |
| Size                                                                             | Max. 8 GB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                |                         |                         |          |          |  |       |  |       |      |      |  |          |  |     |                                                                                  |  |                                         |  |
| Graphics                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                |                         |                         |          |          |  |       |  |       |      |      |  |          |  |     |                                                                                  |  |                                         |  |
| Controller                                                                       | Intel® Graphics Media Accelerator 4500MDH                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                |                         |                         |          |          |  |       |  |       |      |      |  |          |  |     |                                                                                  |  |                                         |  |
| Memory                                                                           | Up to 384 MB <sup>2)</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                |                         |                         |          |          |  |       |  |       |      |      |  |          |  |     |                                                                                  |  |                                         |  |
| Color depth                                                                      | Max. 32-bit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                |                         |                         |          |          |  |       |  |       |      |      |  |          |  |     |                                                                                  |  |                                         |  |
| Resolution                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                |                         |                         |          |          |  |       |  |       |      |      |  |          |  |     |                                                                                  |  |                                         |  |
| DVI                                                                              | 2x Intel compliant SDVO ports                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |                         |                         |          |          |  |       |  |       |      |      |  |          |  |     |                                                                                  |  |                                         |  |
| RGB                                                                              | 300 MHz RAMDAC, resolutions up to 2048 x 1536 @ 70 Hz (QXGA)                                                                                                                                                                                                                                                                                                                                                                                                                               |                |                         |                         |          |          |  |       |  |       |      |      |  |          |  |     |                                                                                  |  |                                         |  |
| Mass memory management                                                           | 4x SATA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                |                         |                         |          |          |  |       |  |       |      |      |  |          |  |     |                                                                                  |  |                                         |  |
| Power management                                                                 | ACPI 3.0 with battery support                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |                         |                         |          |          |  |       |  |       |      |      |  |          |  |     |                                                                                  |  |                                         |  |

Table 37: 5PC800.BM45-00, 5PC800.BM45-01 - Technical data

1) At max. specified ambient temperature: typ. 58 ppm (5 seconds), worst-case 220 ppm (19 seconds)

2) Allocated in main memory

### 3.3 Heat sink

#### 3.3.1 5AC803.HS00-01

##### Order data

| Model number   | Short description                                                                                                                                                                                    | Image                                                                               |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 5AC803.HS00-01 | <b>Heat sinks</b><br>PPC800 heat sink for CPU boards with Dual Core processor T7400, T9400 and P8400.                                                                                                |  |
|                | <b>Required accessories</b>                                                                                                                                                                          |                                                                                     |
|                | <b>CPU boards</b>                                                                                                                                                                                    |                                                                                     |
| 5PC800.B945-04 | Intel Core2 Duo T7400 CPU board, 2.16 GHz, dual-core, 667 MHz FSB, 4 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111B. |                                                                                     |
| 5PC800.B945-14 | Intel Core2 Duo T7400 CPU board, 2.16 GHz, dual-core, 667 MHz FSB, 4 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C. |                                                                                     |
| 5PC800.BM45-00 | Intel Core2 Duo T9400 CPU board, 2.53 GHz, dual-core, 1066 MHz FSB, 6 MB L2 cache; chipset GM45; 2 sockets for SO-DIMM DDR3 modules                                                                  |                                                                                     |
| 5PC800.BM45-01 | Intel Core2 Duo P8400 CPU board, 2.26 GHz, dual-core, 1066 MHz FSB, 3 MB L2 Cache; chipset GM45; 2 sockets for SO-DIMM DDR3 modules                                                                  |                                                                                     |

Table 38: 5AC803.HS00-01 - Order data

##### Technical data

| Product ID                              | 5AC803.HS00-01                                                       |
|-----------------------------------------|----------------------------------------------------------------------|
| <b>General information</b>              |                                                                      |
| Ideal for CPU boards                    | 5PC800.B945-04<br>5PC800.B945-14<br>5PC800.BM45-00<br>5PC800.BM45-01 |
| Suitable for the following system units | 5PC820.1505-00<br>5PC820.1906-00                                     |
| <b>Mechanical characteristics</b>       |                                                                      |
| Material                                | Aluminum, black-coated with copper heat pipes                        |
| Dimensions                              |                                                                      |
| Width                                   | 143 mm                                                               |
| Height                                  | 183.5 mm                                                             |
| Depth                                   | 60 mm                                                                |
| Weight                                  | 1200 g                                                               |

Table 39: 5AC803.HS00-01 - Technical data

### 3.4 Main memory

#### 3.4.1 General information

These 204-pin DDR3 main memory modules operate at 1066 MHz and are available in the sizes 2 GB and 4 GB. If two RAM modules with the same size (e.g. 2 GB) are plugged in to the CPU board, then dual-channel memory technology is supported. This technology is not supported when two RAM modules of different sizes (e.g. 2 GB and 4 GB) are plugged in.

If two 2 GB modules or one 4 GB module are installed on a 32-bit operating system, only 3 GB main memory can be used. With a 64-bit operating system, max. 8 GB main memory can be used.

#### 3.4.2 Order data

| Model number   | Short description                      | Image                                                                               |
|----------------|----------------------------------------|-------------------------------------------------------------------------------------|
|                | <b>Main memory for GM45 CPU boards</b> |  |
| 5MMDDR.2048-02 | SO-DIMM DDR3 RAM 2048 MB PC3-8500      |                                                                                     |
| 5MMDDR.4096-02 | SO-DIMM DDR3 RAM 4096 MByte PC3-8500   |                                                                                     |

Table 40: 5MMDDR.2048-02, 5MMDDR.4096-02 - Order data

#### 3.4.3 Technical data

| Product ID                 | 5MMDDR.2048-02       | 5MMDDR.4096-02 |
|----------------------------|----------------------|----------------|
| <b>General information</b> |                      |                |
| Type                       | SO-DIMM DDR3 SDRAM   |                |
| Memory size                | 2 GB                 | 4 GB           |
| Construction               | 204-pin              |                |
| Organization               | 256M x 64-bit        | 512M x 64-bit  |
| Speed                      | DDR3-1066 (PC3-8500) |                |
| Certification<br>CE        | Yes                  |                |

Table 41: 5MMDDR.2048-02, 5MMDDR.4096-02 - Technical data

### Information:

**A main memory module can only be replaced at the B&R plant.**

## 3.5 Expansions

### 3.5.1 General information

This is an optional expansion for the PPC800 and has inserts for up to 2 PCI/PCIe slots (only in connection with a bus unit) and a slide-in drive.

### 3.5.2 Order data

| Model number   | Short description                                                                                                                           | Image                                                                               |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                | <b>Expansions</b>                                                                                                                           |  |
| 5AC803.SX01-00 | PPC800 expansion 1 PCI/PCI Express and 1 Slide-in (bus 5AC803.BX01-00 or 5AC803.BX01-01 necessary).                                         |                                                                                     |
| 5AC803.SX02-00 | PPC800 expansion 2 PCI/PCI Express and 1 Slide-in (bus 5AC803.BX02-00 or 5AC803.BX02-01 necessary).                                         |                                                                                     |
|                | <b>Required accessories</b>                                                                                                                 |                                                                                     |
|                | <b>Bus units</b>                                                                                                                            |                                                                                     |
| 5AC803.BX01-00 | PPC800 bus 1 PCI, 1 slide-in slot.                                                                                                          |                                                                                     |
| 5AC803.BX01-01 | PPC800 bus 1 PCI Express, 1 slide-in slot.                                                                                                  |                                                                                     |
| 5AC803.BX02-00 | PPC800 bus 2 PCI slots, 1 slide-in slot.                                                                                                    |                                                                                     |
| 5AC803.BX02-01 | PPC800 bus with 1 PCI, 1 PCI Express, 1 slide-in slot.                                                                                      |                                                                                     |
|                | <b>Fan kits</b>                                                                                                                             |                                                                                     |
| 5AC803.FA02-00 | PPC800 fan kit for system units with the expansion 5AC803.SX01-00.                                                                          |                                                                                     |
| 5AC803.FA03-00 | PPC800 fan kit for system units with the expansion 5AC803.SX02-00.                                                                          |                                                                                     |
|                | <b>Optional accessories</b>                                                                                                                 |                                                                                     |
|                | <b>Drives</b>                                                                                                                               |                                                                                     |
| 5AC801.ADAS-00 | SATA hard disk adapter to operate a slide-in compact hard disk in a slide-in slot.                                                          |                                                                                     |
| 5AC801.DVDS-00 | DVD-ROM SATA drive (slide-in).                                                                                                              |                                                                                     |
| 5AC801.DVRS-00 | DVD-R/RW DVD+R/RW SATA drive (slide-in).                                                                                                    |                                                                                     |
| 5AC801.HDDS-00 | 40 GB SATA hard disk (slide-in); 24/7 hard disk with extended temperature range. Remark: Please see manual for proper use of the hard disk. |                                                                                     |
| 5ACPCI.RAIC-05 | PCI RAID System SATA 2x 250 GB; Remark: Please see manual for proper use of the hard disk.                                                  |                                                                                     |

Table 42: 5AC803.SX01-00, 5AC803.SX02-00 - Order data

### 3.5.3 Inserts

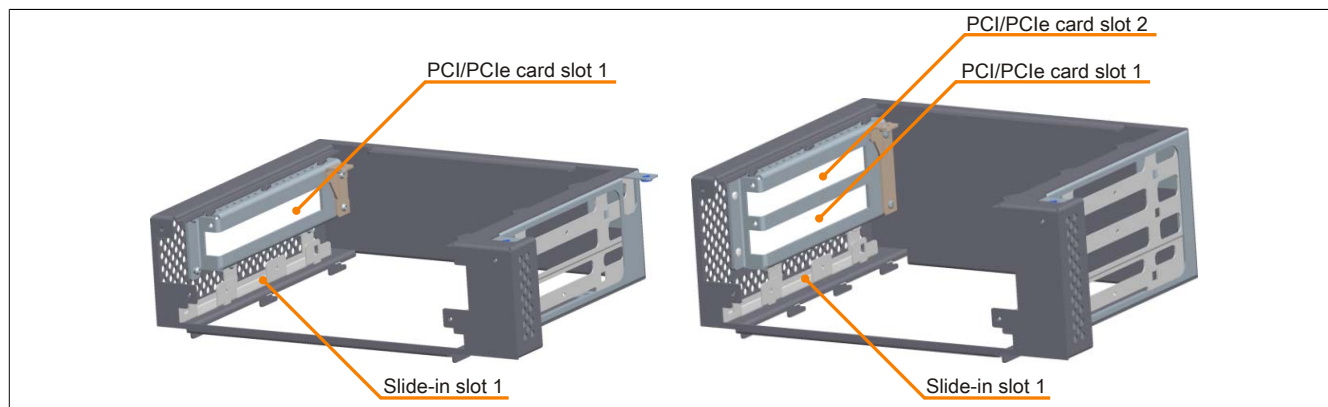


Image 20: 5AC803.SX01-00, 5AC803.SX02-00 - Inserts

### 3.5.4 Technical data

| Product ID                        | 5AC803.SX01-00 | 5AC803.SX02-00 |
|-----------------------------------|----------------|----------------|
| <b>Inserts</b>                    |                |                |
| PCI / PCIe slots                  |                |                |
| Quantity                          | 1              | 2              |
| Slide-in drives                   |                | 1              |
| <b>Mechanical characteristics</b> |                |                |
| Dimensions                        |                |                |
| Width                             |                | 167 mm         |
| Height                            |                | 222 mm         |
| Depth                             | 60 mm          | 80 mm          |
| Weight                            |                | Approx. 1000 g |

Table 43: 5AC803.SX01-00, 5AC803.SX02-00 - Technical data

### 3.5.5 Dimensions - 5PC803.SX01-00

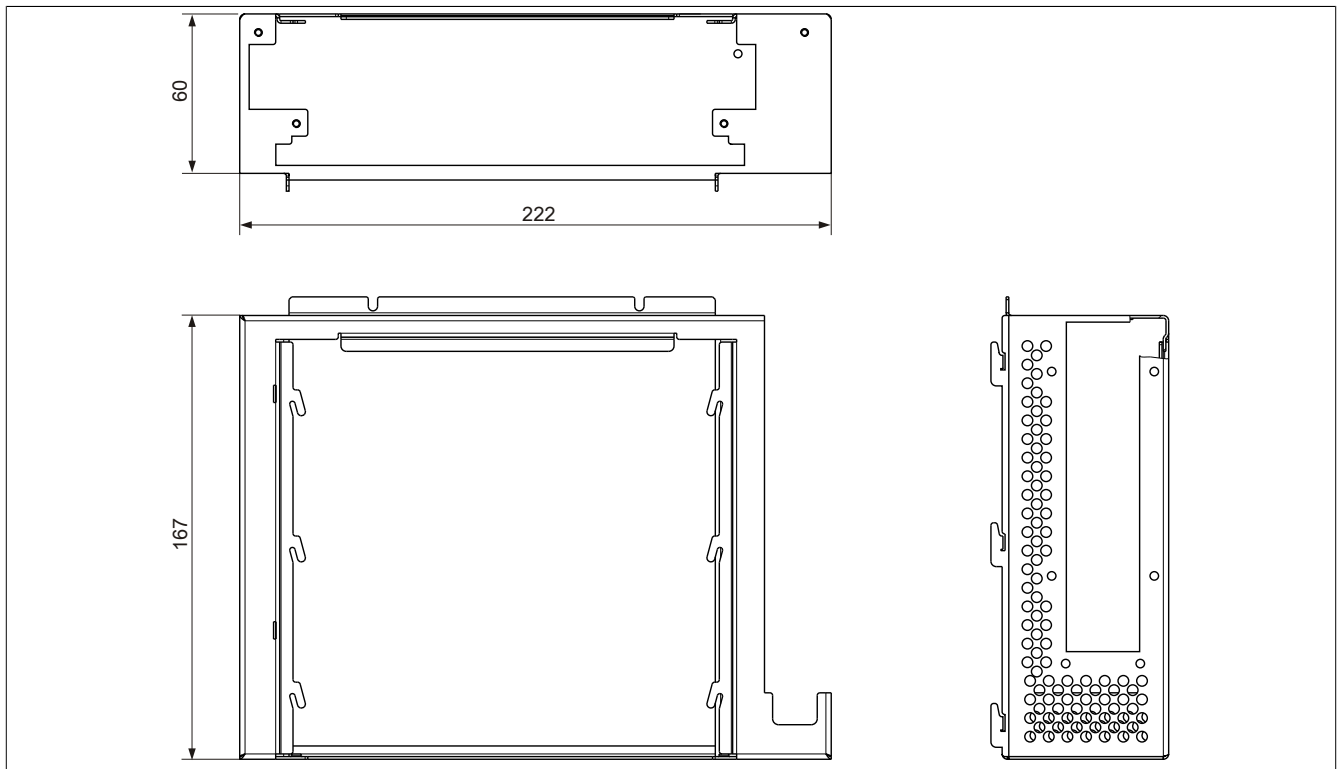


Image 21: 5AC803.SX01-00 - Dimensions

### 3.5.6 Dimensions - 5PC803.SX02-00

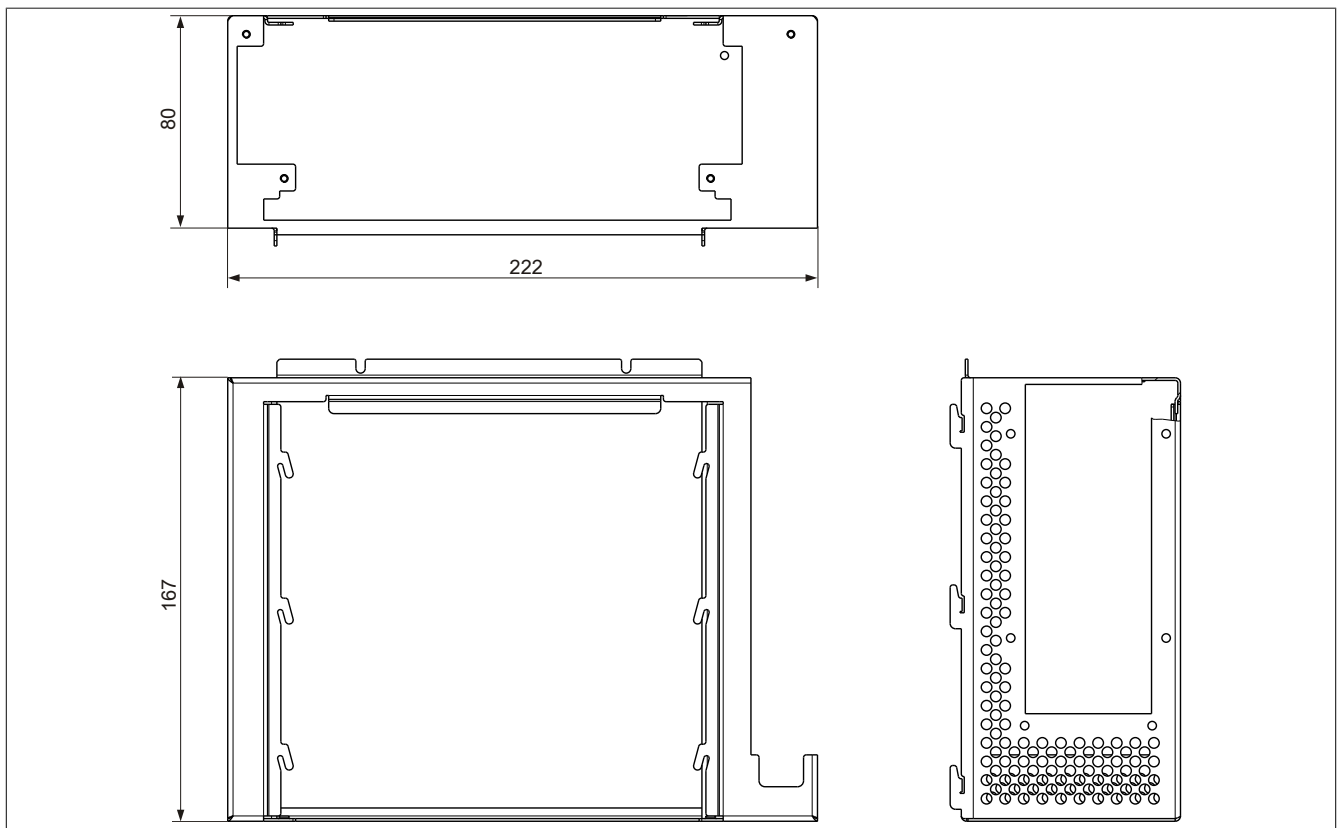


Image 22: 5AC803.SX02-00 - Dimensions

### 3.5.7 Slot for bus units

#### Card slot (PCI / PCIe)

Standard PCI 2.2 half-size cards or PCI Express (PCIe) half-size cards can be plugged in depending on the type of bus unit. They cannot exceed the following dimensions.

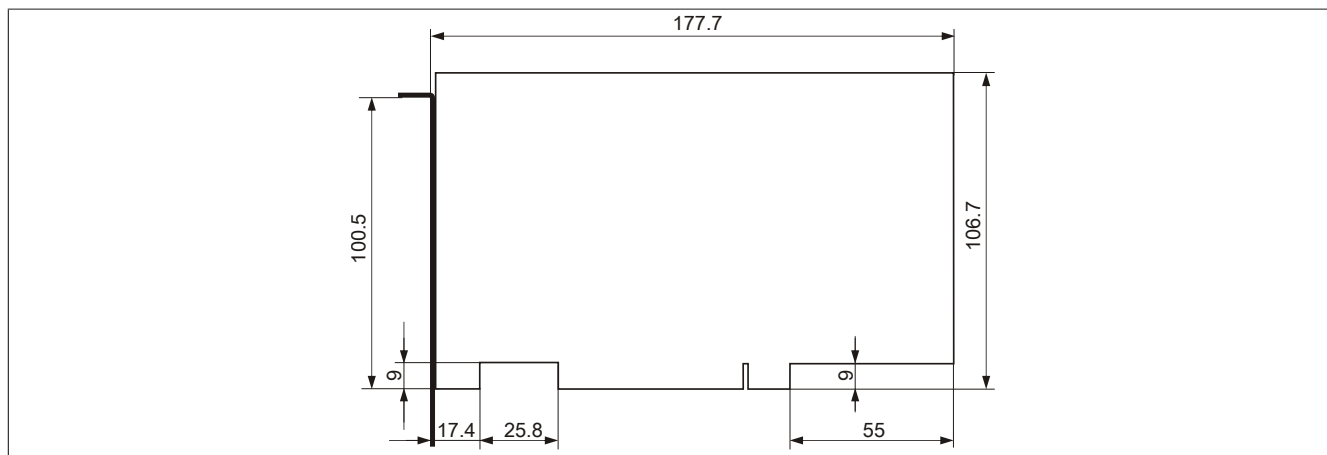


Image 23: Dimensions - Standard half-size PCI card

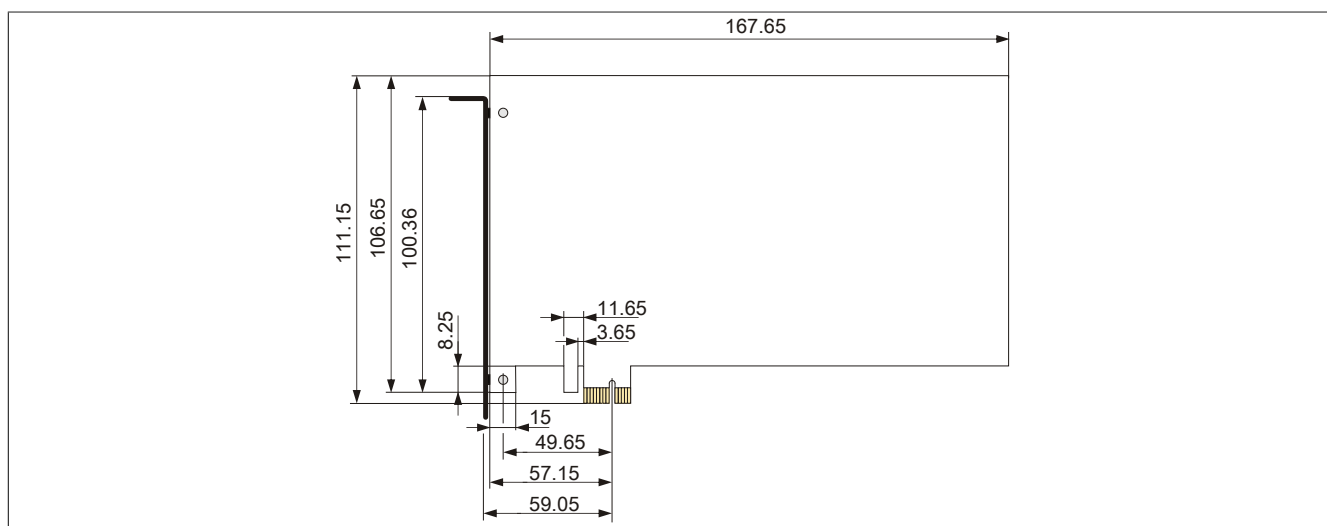


Image 24: Dimensions - Standard half-size PCIe card

### 3.5.8 Slide-in slot 1

The internal connection between slide-in slot 1 and the chipset is made via SATA I and USB.

| Slide-in slot 1 |                                            |
|-----------------|--------------------------------------------|
| Connection      | SATA I and USB                             |
| Model number    | Short description                          |
| Drives          |                                            |
| 5AC801.ADAS-00  | APC810 and PPC800 slide-in compact adapter |
| 5AC801.HDDS-00  | APC810 and PPC800 slide-in HDD EE25        |
| 5AC801.DVRS-00  | APC810 and PPC800 slide-in DVDR/RW         |
| 5AC801.DVDS-00  | APC810 and PPC800 slide-in DVDROM          |
|                 |                                            |
|                 |                                            |



Table 44: Slide-in slot 1

#### Information:

The SATA I interface allows data carriers to be exchanged during operation (hot-plug). To utilize this capability, it must be supported by the operating system.

## 3.6 Bus units

### 3.6.1 General information

The bus units are compatible with the expansions in 1 or 2 PCI slot sizes, available with PCI and/or PCI Express support.

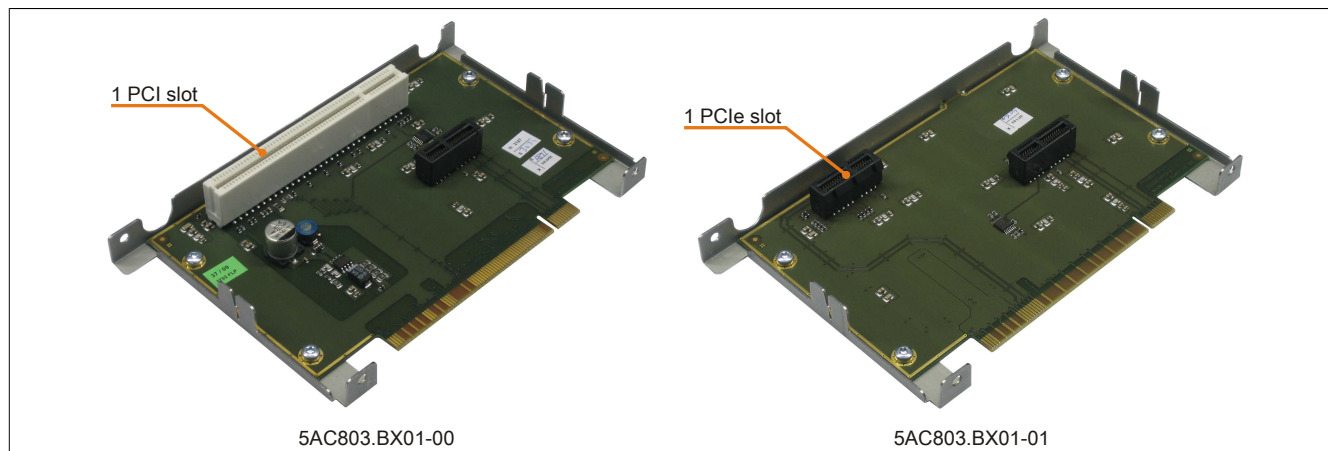


Image 25: 1 slot bus units

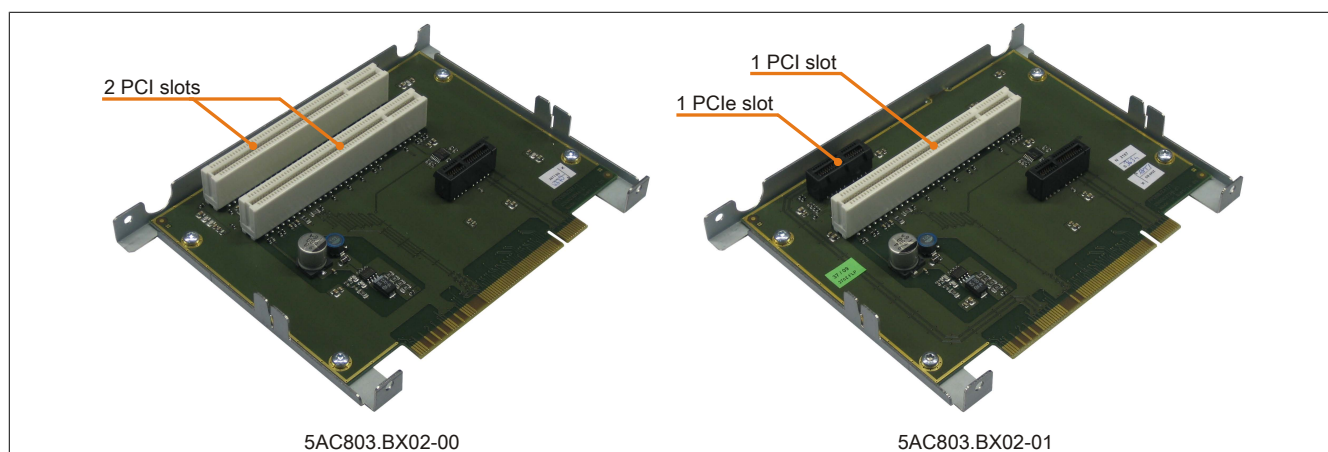


Image 26: 2 slot bus units

### 3.6.2 Order data

| Model number     | Short description                                      | Image                                                                                 |
|------------------|--------------------------------------------------------|---------------------------------------------------------------------------------------|
| <b>Bus units</b> |                                                        |  |
| 5AC803.BX01-00   | PPC800 bus 1 PCI, 1 slide-in slot.                     |                                                                                       |
| 5AC803.BX01-01   | PPC800 bus 1 PCI Express, 1 slide-in slot.             |                                                                                       |
| 5AC803.BX02-00   | PPC800 bus 2 PCI slots, 1 slide-in slot.               |                                                                                       |
| 5AC803.BX02-01   | PPC800 bus with 1 PCI, 1 PCI Express, 1 slide-in slot. |                                                                                       |

Table 45: 5AC803.BX01-00, 5AC803.BX01-01, 5AC803.BX02-00, 5AC803.BX02-01 - Order data

### 3.6.3 Technical data

| Product ID     | 5AC803.BX01-00 | 5AC803.BX01-01 | 5AC803.BX02-00 | 5AC803.BX02-01 |
|----------------|----------------|----------------|----------------|----------------|
| <b>Inserts</b> |                |                |                |                |
| PCI slots      |                |                |                |                |
| Quantity       | 1              | -              | 2              | 1              |
| Type           | 32-bit         | -              | 32-bit         | 32-bit         |
| Design         | PCI half-size  | -              | PCI half-size  | PCI half-size  |
| Standard       | 2.2            | -              | 2.2            | 2.2            |
| Bus speed      | 33 MHz         | -              | 33 MHz         | 33 MHz         |

Table 46: 5AC803.BX01-00, 5AC803.BX01-01, 5AC803.BX02-00, 5AC803.BX02-01 - Technical data



| Product ID | 5AC803.BX01-00 | 5AC803.BX01-01 | 5AC803.BX02-00 | 5AC803.BX02-01 |
|------------|----------------|----------------|----------------|----------------|
| PCIe slots | -              | 1              | -              | 1              |
| Quantity   | -              | 1              | -              | 1              |
| Design     | -              | PCIe half-size | -              | PCIe half-size |
| Standard   | -              | 1.0a           | -              | x1 (250 MB/s)  |
| Bus speed  | -              | x1 (250 MB/s)  | -              | 1.0a           |

Table 46: 5AC803.BX01-00, 5AC803.BX01-01, 5AC803.BX02-00, 5AC803.BX02-01 - Technical data

## 3.7 Adapters

### 3.7.1 5AC803.BC01-00

#### General information

This adapter can be used to operate a PCI Express compact plug-in card in the PPC800 system unit.

#### Order data

| Model number   | Short description                                            | Image                                                                               |
|----------------|--------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                | <b>Adapter</b>                                               |  |
| 5AC803.BC01-00 | PPC800 adapter 1 PCI Express compact.                        |                                                                                     |
|                | <b>Required accessories</b>                                  |                                                                                     |
|                | <b>Interface cards</b>                                       |                                                                                     |
| 5ACPCC.ETH0-00 | PClec Ethernet card 1x 10/100/1000                           |                                                                                     |
| 5ACPCC.MPL0-00 | PClec POWERLINK card, 2 POWERLINK interfaces, 512 kByte SRAM |                                                                                     |

Table 47: 5AC803.BC01-00 - Order data

### 3.7.2 5AC803.BC02-00

#### General information

This adapter can be used to operate a slide-in compact drive in the PPC800 system unit.

#### Order data

| Model number   | Short description                                                                                                                                   | Image                                                                                 |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                | <b>Adapter</b>                                                                                                                                      |  |
| 5AC803.BC02-00 | PPC800 adapter 1 Slide-in compact.                                                                                                                  |                                                                                       |
|                | <b>Required accessories</b>                                                                                                                         |                                                                                       |
|                | <b>Drives</b>                                                                                                                                       |                                                                                       |
| 5AC801.HDDI-00 | 40 GB SATA hard disk (slide-in compact); 24/7 hard disk with extended temperature range. Remark: Please see manual for proper use of the hard disk. |                                                                                       |
| 5AC801.HDDI-03 | 250 GB SATA hard disk (slide-in compact); 24/7 hard disk. Remark: Please see manual for proper use of the hard disk.                                |                                                                                       |
| 5AC801.SSDI-00 | 32 GB SATA SSD (SLC), Slide-in compact                                                                                                              |                                                                                       |

Table 48: 5AC803.BC02-00 - Order data

### 3.8 PClec Plug-in cardn

### 3.8.1 General information

The PCIe plug-in cards are equipped with a sensor that monitors the card's temperature. This is read out in the BIOS and in the ADI.

### 3.8.2 Dimensions

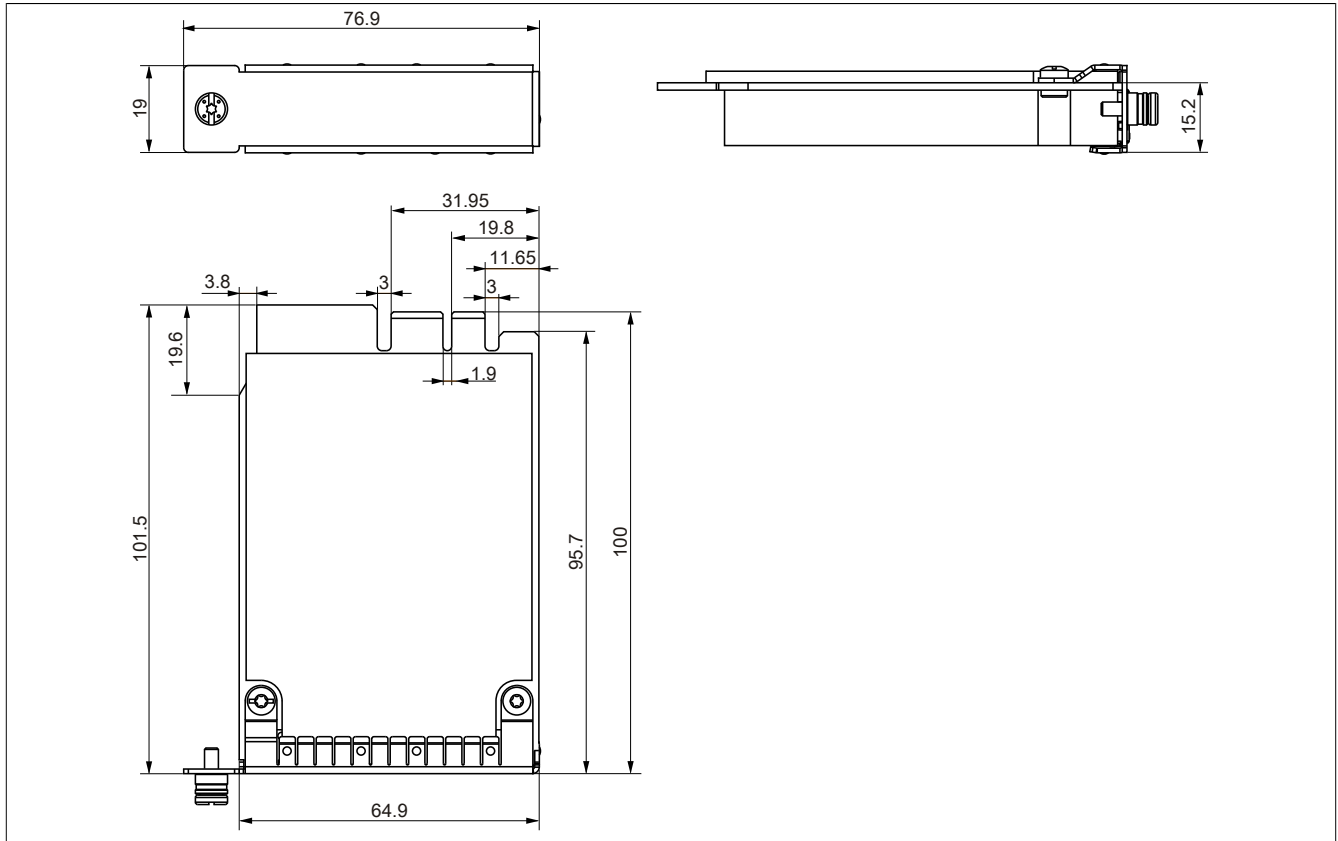


Image 27: PCI express compact insert cards - Dimensions

### Information:

Only B&R PClec cards that were specially designed for the Automation PC 820 and Panel PC 800 can be used.

### 3.8.3 5ACPCC.ETH0-00

#### General information

The PCI Express compact Ethernet card has a 10/100/1000 MBit/s network connection and can be inserted in a PCI Express slot and operated as an additional network interface.

- PClec Ethernet card
- 1 network connection (10/100/1000 MBit/s)

#### When used in a PPC800

##### Information:

The adapter 5AC803.BC01-00 is required for the use of PClec plug-in cards.

#### Order data

| Model number   | Short description                  | Image                                                                                |
|----------------|------------------------------------|--------------------------------------------------------------------------------------|
|                | <b>Interface cards</b>             |                                                                                      |
| 5ACPCC.ETH0-00 | PClec Ethernet card 1x 10/100/1000 |  |

Table 49: 5ACPCC.ETH0-00 - Order data

#### Technical data

| Product ID                        | 5ACPCC.ETH0-00                                   |
|-----------------------------------|--------------------------------------------------|
| <b>General information</b>        |                                                  |
| B&R ID code                       | \$AB25                                           |
| Diagnostics                       |                                                  |
| Data transfer                     | Yes, with status LED                             |
| Certification                     |                                                  |
| CE                                | Yes                                              |
| <b>Interfaces</b>                 |                                                  |
| Ethernet                          |                                                  |
| Quantity                          | 1                                                |
| Controller                        | Intel 82574                                      |
| Design                            | Shielded RJ45 port                               |
| Transfer rate                     | 10/100/1000 Mbit/s                               |
| Cable length                      | Max. 100 m between two stations (segment length) |
| <b>Mechanical characteristics</b> |                                                  |
| Slot                              | PClec module                                     |

Table 50: 5ACPCC.ETH0-00 - Technical data

#### Ethernet interface

##### 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.

| Ethernet card 1 connection |                                              |                                                 |
|----------------------------|----------------------------------------------|-------------------------------------------------|
| Controller                 | Intel 82574                                  |                                                 |
| Cabling                    | S/STP (Cat5e)                                |                                                 |
| Transfer rate              | 10/100/1000 Mbit/s <sup>1)</sup>             |                                                 |
| Cable length               | max. 100 m (min. Cat5e)                      |                                                 |
| <b>Speed LED</b>           | <b>On</b>                                    | <b>Off</b>                                      |
| Green                      | 100 Mbit/s                                   | 10 Mbit/s <sup>2)</sup>                         |
| Orange                     | 1000 Mbit/s                                  | -                                               |
| <b>Link LED</b>            | <b>On</b>                                    | <b>Off</b>                                      |
| Orange                     | Link (Ethernet network connection available) | Activity (blinking - data transfer in progress) |

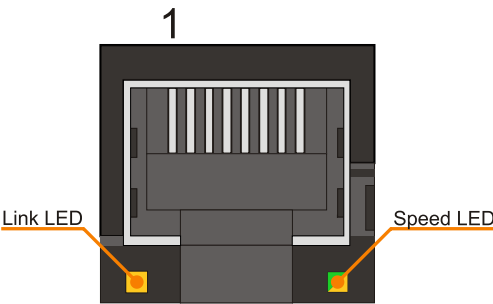


Table 51: 5ACPCC.ETH0-00 - Ethernet interface

- 1) Switching takes place automatically.  
2) The 10 Mbit/s transfer speed / connection is only present if the IF slot Link LED is simultaneously active.

## Driver support

A special driver is required in order to operate the Intel Ethernet controller 82574. The necessary drivers are available in the Downloads area of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

## Information:

**Required drivers can only be downloaded from the B&R homepage, not from manufacturers' pages.**

### 3.8.4 5ACPCC.MPL0-00

#### General information

The PCI Express compact POWERLINK card is equipped with two POWERLINK connections and two station number switches and a card number switch for identifying the modules. The PCI Express compact POWERLINK card can be inserted in a PCI Express compact slot and operated as an additional POWERLINK interface.

- PClec Ethernet card
- 2 POWERLINK connections
- 2 station number switches
- Card number switch

#### When used in a PPC800

##### Information:

The adapter 5AC803.BC01-00 is required for the use of PClec plug-in cards.

#### Order data

| Model number   | Short description                                            | Image                                                                               |
|----------------|--------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 5ACPCC.MPL0-00 | <b>Interface cards</b>                                       |  |
|                | PClec POWERLINK card, 2 POWERLINK interfaces, 512 kByte SRAM |                                                                                     |

Table 52: 5ACPCC.MPL0-00 - Order data

#### Technical data

| Product ID                            | 5ACPCC.MPL0-00                                                         |
|---------------------------------------|------------------------------------------------------------------------|
| <b>General information</b>            |                                                                        |
| B&R ID code                           | \$AB27                                                                 |
| Diagnostics<br>Data transfer          | Yes, with status LED                                                   |
| Certification<br>CE                   | Yes                                                                    |
| <b>Controller</b>                     |                                                                        |
| SRAM<br>Size                          | 512 kB                                                                 |
| Remanent variables in power fail mode | 128 kB (e.g. for Automation Runtime, see AS help documentation)        |
| <b>Interfaces</b>                     |                                                                        |
| POWERLINK<br>Quantity                 | 2                                                                      |
| Transmission<br>Design                | 100 Base-T (ANSI/IEEE 802.3)<br>Internal 2x hub, 2x shielded RJ45 port |
| Transfer rate                         | 100 Mbit/s                                                             |
| Node switch                           | 2                                                                      |
| Cable length                          | Max. 100 m between two stations (segment length)                       |
| <b>Mechanical characteristics</b>     |                                                                        |
| Slot                                  | PClec module                                                           |

Table 53: 5ACPCC.MPL0-00 - Technical data

#### POWERLINK interface

##### 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.

| POWERLINK card 2 connections |                                               |                                                 |
|------------------------------|-----------------------------------------------|-------------------------------------------------|
| Cabling                      | S/STP (Cat5e)                                 |                                                 |
| Cable length                 | max. 100 m (min. Cat5e)                       |                                                 |
| <b>Speed LED</b>             | <b>On</b>                                     | <b>Off</b>                                      |
| Green / red                  | see Status / Error LED                        |                                                 |
| <b>Link LED</b>              | <b>On</b>                                     | <b>Off</b>                                      |
| Yellow                       | Link (POWERLINK network connection available) | Activity (blinking - data transfer in progress) |

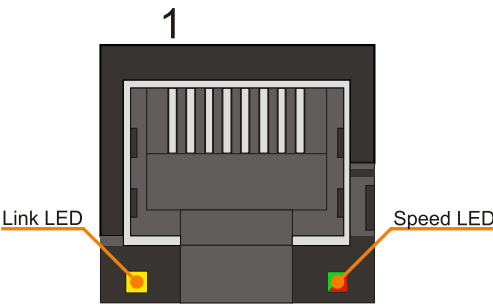


Table 54: 5ACPCC.MPL0-00 - POWERLINK interface

## LED STATUS

The status/error LED is a green/red dual LED. The status LEDs can have different meanings depending on operating mode.

### Ethernet TCP/IP mode

The interface can be operated purely as an Ethernet TCP/IP interface.

| Green - status | Description                                                                 |
|----------------|-----------------------------------------------------------------------------|
| On             | The POWERLINK interface is operated purely as an Ethernet TCP/IP interface. |

Table 55: Status/Error LED - Ethernet TCP/IP operating mode

### POWERLINK V1

| Status LED           |          | Status of the POWERLINK station                                                                                                                                                                                                    |
|----------------------|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Green                | Red      |                                                                                                                                                                                                                                    |
| On                   | Off      | The POWERLINK station is running with no errors.                                                                                                                                                                                   |
| Off                  | On       | A fatal system error has occurred. The error type can be read using the PLC logbook. An irreparable problem has occurred. The system cannot properly carry out its tasks. This status can only be changed by resetting the module. |
| Blinking alternately |          | The POWERLINK managing node failed. This error code can only occur in controlled node operation.                                                                                                                                   |
| Off                  | Blinking | System failure. The red blinking LED signals a certain type of error using a blink code (see section " System failure error codes" on page 76).                                                                                    |

Table 56: Status/error LED - POWERLINK V1 operating mode

### POWERLINK V2

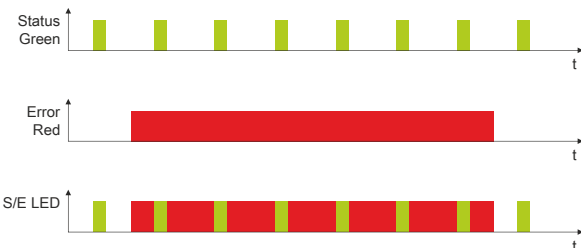
| Red - error | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| On          | <p>The POWERLINK interface has encountered an error (failed Ethernet frames, increased number of collisions on the network, etc.).</p> <p>If an error occurs in the following states, then the green LED blinks over the red LED:</p> <ul style="list-style-type: none"> <li>BASIC_ETHERNET</li> <li>PRE_OPERATIONAL_1</li> <li>PRE_OPERATIONAL_2</li> <li>READY_TO_OPERATE</li> </ul>  |

Table 57: Status / Error LED as error LED - POWERLINK operating mode

| Green - status                                     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Off<br>NOT_ACTIVE                                  | <p><b>Managing Node (MN)</b><br/>The bus is monitored for POWERLINK frames. If a frame is not received within the configured time window (timeout), the interface goes directly into PRE_OPERATIONAL_1 status (single flash).<br/>If, however, POWERLINK communication is detected before this time passes, the interface goes directly into the BASIC_ETHERNET status (flickering).</p> <p><b>Controlled Node (CN)</b><br/>The bus is monitored for POWERLINK frames. If a frame is not received within the configured time window (timeout), the interface goes directly into BASIC_ETHERNET status (flickering).<br/>If, however, POWERLINK communication is detected during this time, the interface goes directly into the PRE_OPERATIONAL_1 status (single flash).</p> |
| Green flickering (approx. 10 Hz)<br>BASIC_ETHERNET | <p>The interface is in BASIC_ETHERNET status, and is operated purely as an Ethernet TCP/IP interface.</p> <p><b>Managing Node (MN)</b><br/>This status can only be changed by resetting the interface.</p> <p><b>Controlled Node (CN)</b><br/>If POWERLINK communication is detected while in this status, the interface goes into the PRE_OPERATIONAL_1 state (single flash).</p>                                                                                                                                                                                                                                                                                                                                                                                           |
| Single flash (approx. 1 Hz)<br>PRE_OPERATIONAL_1   | <p>The interface status is PRE_OPERATIONAL_1.</p> <p><b>Managing Node (MN)</b><br/>The MN starts the operation of the "reduced cycle". Collisions are allowed on the bus. There is not yet any cyclic communication.</p> <p><b>Controlled Node (CN)</b><br/>The CN waits until it receives an SoC frame and then switches to PRE_OPERATIONAL_2 status (double flash).</p>                                                                                                                                                                                                                                                                                                                                                                                                    |
| Double flash (approx. 1 Hz)<br>PRE_OPERATIONAL_2   | <p>The interface status is PRE_OPERATIONAL_2.</p> <p><b>Managing Node (MN)</b><br/>The MN begins with the cyclic communication (cyclic input data is not yet evaluated). The CNs are configured in this status.</p> <p><b>Controlled Node (CN)</b><br/>In this status, the interface is normally configured by the manager. Once complete, a command changes the status to PRE_OPERATIONAL_3 (triple flash).</p>                                                                                                                                                                                                                                                                                                                                                             |
| Triple flash (approx. 1 Hz)<br>READY_TO_OPERATE    | <p>The interface status is READY_TO_OPERATE.</p> <p><b>Managing Node (MN)</b><br/>Normal cyclic and asynchronous communication. Received PDO data is ignored.</p> <p><b>Controlled Node (CN)</b><br/>The configuration of the interface is complete. Normal cyclic and asynchronous communication.<br/>The PDO data sent corresponds to the PDO mapping used. However, cyclic data is not yet evaluated.</p>                                                                                                                                                                                                                                                                                                                                                                 |
| On<br>OPERATIONAL                                  | The interface status is OPERATIONAL.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Blinking (approx. 2.5 Hz)<br>STOPPED               | <p>The interface status is STOPPED.</p> <p><b>Managing Node (MN)</b><br/>This status is not possible for the MN.</p> <p><b>Controlled Node (CN)</b><br/>No output data is produced and no input data is received. Only the appropriate command from the manager can enter or leave this state.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

Table 58: Status/Error LED as status LED - POWERLINK operating mode

## System failure error codes

Incorrect configuration or defective hardware can cause a system failure error.

The error is indicated via the red error LED using four switch-on phases. The switch-on phases are either 150 ms or 600 ms long. Error code outputs are repeated cyclically after 2 seconds.

Legend:

- ... 150 ms
- ... 600 ms
- Delay ... 2 sec. delay

| Error description | Error code displayed by red status LED |   |   |   |       |   |   |   |   |       |
|-------------------|----------------------------------------|---|---|---|-------|---|---|---|---|-------|
| RAM Errors        | •                                      | • | • | - | Break | • | • | • | - | Break |
| Hardware errors   | -                                      | • | • | - | Break | - | • | • | - | Break |

Table 59: Status/error LED as error LED - system failure error codes



**POWERLINK station number**

| POWERLINK station number (x1, x16)                                                                                                                  |         |                                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------------------------------------------|
| Both of these hex switches (x16, x1) are used to configure the station number for the POWERLINK. Station numbers are permitted between #00 and #FD. |         |                                             |
| Switch position                                                                                                                                     |         |                                             |
| x1                                                                                                                                                  | x16     | Description                                 |
| 0                                                                                                                                                   | 0       | Operation as managing node                  |
| 1 ... D                                                                                                                                             | 0 ... F | station number Operation as controlled node |
| E                                                                                                                                                   | F       | Reserved                                    |
| F                                                                                                                                                   | F       | Reserved                                    |

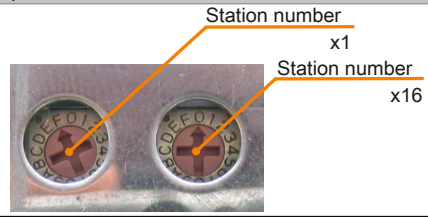


Table 60: POWERLINK station number (x1, x16)

**Card number switch**

The one-digit card number (\$1 – \$F) is configured using the card number switch. This number is used to identify the module.

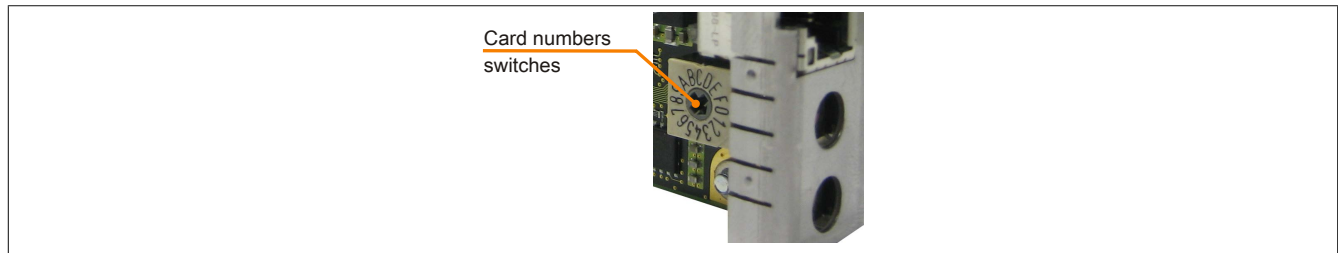


Image 28: POWERLINK card 2-port node number switch

If the card is operated with Automation Runtime, then the card number switch must match the slot number in Automation Studio.

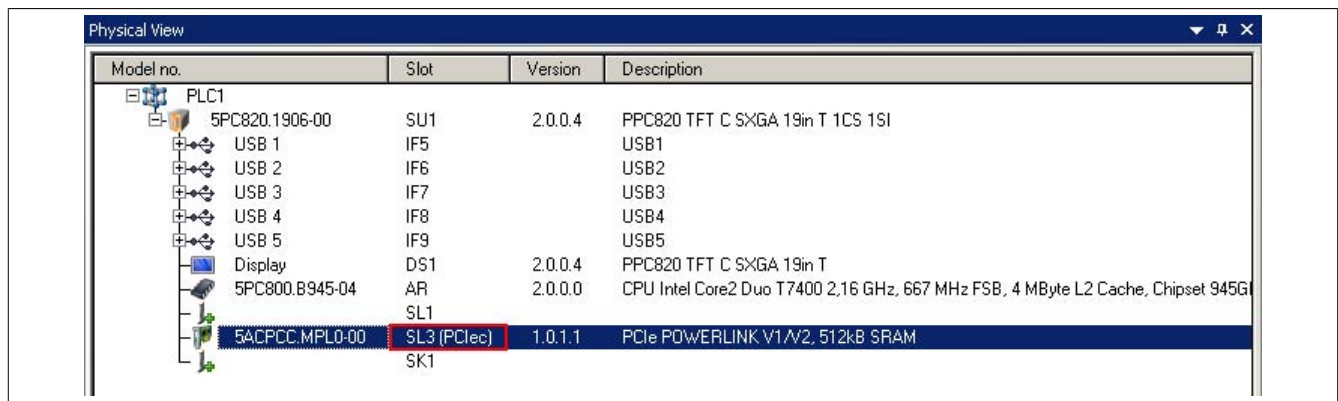


Image 29: Integrating the POWERLINK plug-in card in Automation Studio

**SRAM**

The POWERLINK card 2-port - 5ACPCC.MPL0-00 has 512 kB SRAM.

## 3.9 Drives

### 3.9.1 5AC801.HDDI-00

#### General information

This 40 GB slide-in compact hard disk is specified for 24-hour operation and also provides an extended temperature specification. The slide-in compact drive can be used in APC810 and PPC800 system units.

#### When used in a PPC800

##### Information:

The adapter 5AC803.BC02-00 is required for the use of slide-in compact drives.

When inserted in the slide-in compact slot, the slide-in compact drive is referred to internally as SATA I.

#### Order data

| Model number   | Short description                                                                                                                                   | Image                                                                                |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|                | <b>Drives</b>                                                                                                                                       |                                                                                      |
| 5AC801.HDDI-00 | 40 GB SATA hard disk (slide-in compact); 24/7 hard disk with extended temperature range. Remark: Please see manual for proper use of the hard disk. |  |

Table 61: 5AC801.HDDI-00 - Order data

#### Technical data

##### 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.

| Product ID                      | 5AC801.HDDI-00                       |
|---------------------------------|--------------------------------------|
| <b>General information</b>      |                                      |
| Certification<br>CE             | Yes                                  |
| <b>Hard disk</b>                |                                      |
| Capacity                        | 40 GB                                |
| Number of heads                 | 1                                    |
| Number of sectors               | 78,140,160                           |
| Bytes per sector                | 512                                  |
| Cache                           | 8 MB                                 |
| Speed                           | 5400 rpm $\pm$ 1%                    |
| Startup time                    | Typ. 3 s (from 0 rpm to read access) |
| MTBF                            | 750,000 POH <sup>1)</sup>            |
| S.M.A.R.T. Support              | Yes                                  |
| Interface                       | SATA                                 |
| Access time                     | 5.6 ms                               |
| Data transfer rate              |                                      |
| Internal                        | Max. 450 Mbits/s                     |
| To/from host                    | Max. 150 MB/s (Ultra DMA mode 5)     |
| Positioning time                |                                      |
| Minimum (track to track)        | 1 ms                                 |
| Nominal (read only)             | 12.5 ms                              |
| Maximum (read only)             | 23 ms                                |
| <b>Environmental conditions</b> |                                      |

Table 62: 5AC801.HDDI-00 - Technical data

| Product ID                        | 5AC801.HDDI-00                                     |
|-----------------------------------|----------------------------------------------------|
| Temperature <sup>2)</sup>         |                                                    |
| Operation <sup>3)</sup>           | -30 to 85°C                                        |
| Operation - 24-hour <sup>4)</sup> | -30 to 85°C                                        |
| Storage                           | -40 to 95°C                                        |
| Transport                         | -40 to 95°C                                        |
| Relative humidity <sup>5)</sup>   |                                                    |
| Operation                         | 5 to 90%, non-condensing                           |
| Storage                           | 5 to 95%, non-condensing                           |
| Transport                         | 5 to 95%, non-condensing                           |
| Vibration                         |                                                    |
| Operation                         | 5 to 500 Hz: 2 g; no unrecoverable errors          |
| Storage                           | 5 to 500 Hz: 5 g; no unrecoverable errors          |
| Transport                         | 5 to 500 Hz: 5 g; no unrecoverable errors          |
| Shock                             |                                                    |
| Operation                         | 300 g and 2 ms duration; no unrecoverable errors   |
| Storage                           | 150 g and 11 ms duration; no unrecoverable errors  |
| Transport                         | 800 g and 2 ms duration; no unrecoverable errors   |
| Storage                           | 400 g and 0.5 ms duration; no unrecoverable errors |
| Transport                         | 800 g and 2 ms duration; no unrecoverable errors   |
| Storage                           | 400 g and 0.5 ms duration; no unrecoverable errors |
| Altitude                          |                                                    |
| Operation                         | -300 to 5000 m                                     |
| Storage                           | -300 to 12192 m                                    |
| <b>Mechanical characteristics</b> |                                                    |
| Installation                      | Fixed <sup>6)</sup>                                |
| Dimensions                        |                                                    |
| Width                             | 13 mm                                              |
| Height                            | 98 mm                                              |
| Depth                             | 105 mm                                             |
| Weight                            | 134 g                                              |
| <b>Manufacturer information</b>   |                                                    |
| Manufacturer                      | Seagate                                            |
| Manufacturer's product ID         | ST940817SM                                         |

Table 62: 5AC801.HDDI-00 - Technical data

- 1) At 8760 POH (power-on hours) per year and 70°C surface temperature
- 2) Temperature values for 305 meter altitude. The temperature specification must be reduced linearly by 1°C every 305 meters. The temperature increase and decrease can be a maximum of 20°C per hour.
- 3) Standard operation means 333 POH (power-on hours) per month.
- 4) 24-hour operation means 732 POH (power-on hours) per month.
- 5) Humidity gradient: Maximum 15% per hour.
- 6) Slide-in compact mounting

### Temperature humidity diagram

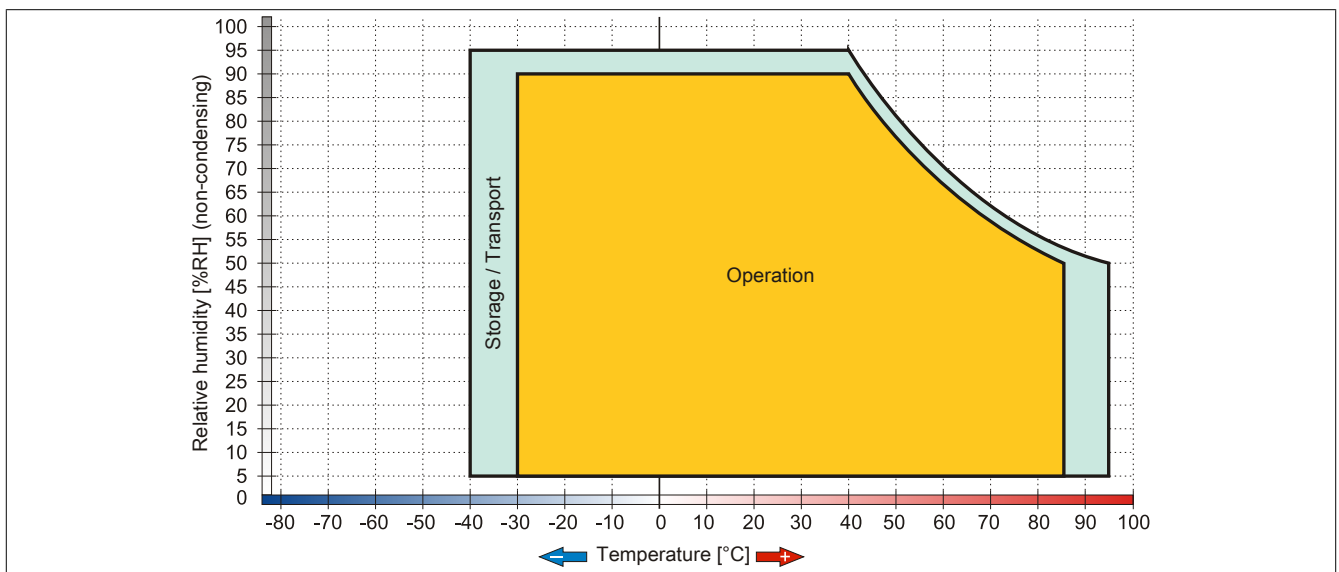


Image 30: 5AC801.HDDI-00 - Temperature humidity diagram

### 3.9.2 5AC801.HDDI-02

#### General information

This 160 GB slide-in compact hard disk is specified for 24-hour operation (24x7) and also provides an extended temperature specification. The slide-in compact drive can be used in APC810 and PPC800 system units.

#### When used in a PPC800

##### Information:

The adapter 5AC803.BC02-00 is required for the use of slide-in compact drives.

When inserted in the slide-in compact slot, the slide-in compact drive is referred to internally as SATA I.

#### Order data

| Model number   | Short description                                                                                                                                    | Image                                                                                |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|                | Undefined                                                                                                                                            |                                                                                      |
| 5AC801.HDDI-02 | 160 GB SATA hard disk (slide-in compact); 24/7 hard disk with extended temperature range. Remark: Please see manual for proper use of the hard disk. |  |

Table 63: 5AC801.HDDI-02 - Order data

#### Technical data

##### 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.

| Product ID                | 5AC801.HDDI-02                       |
|---------------------------|--------------------------------------|
| General information       |                                      |
| Certification<br>CE       | Yes                                  |
| Hard disk                 |                                      |
| Capacity                  | 160 GB                               |
| Number of heads           | 3                                    |
| Number of sectors         | 312,581,808                          |
| Bytes per sector          | 512                                  |
| Cache                     | 8 MB                                 |
| Speed                     | 5400 rpm $\pm 1\%$                   |
| Startup time              | Typ. 4 s (from 0 rpm to read access) |
| MTBF                      | 300,000 POH <sup>1)</sup>            |
| S.M.A.R.T. Support        | Yes                                  |
| Interface                 | SATA                                 |
| Access time               | 12 ms                                |
| Data transfer rate        |                                      |
| Internal                  | Max. 84.6 Mbits/s                    |
| To/from host              | Max. 150 MB/s (Ultra DMA mode 5)     |
| Positioning time          |                                      |
| Minimum (track to track)  | 1.5 ms                               |
| Nominal (read only)       | 12 ms                                |
| Maximum (read only)       | 22 ms                                |
| Environmental conditions  |                                      |
| Temperature <sup>2)</sup> |                                      |
| Operation                 | -15 to 80°C                          |

Table 64: 5AC801.HDDI-02 - Technical data

| Product ID                        | 5AC801.HDDI-02                                   |
|-----------------------------------|--------------------------------------------------|
| Operation - 24-hour <sup>3)</sup> | -15 to 80°C                                      |
| Storage                           | -40 to 95°C                                      |
| Transport                         | -40 to 95°C                                      |
| Relative humidity <sup>4)</sup>   |                                                  |
| Operation                         | 8 to 90%, non-condensing <sup>5)</sup>           |
| Storage                           | 5 to 95%, non-condensing <sup>6)</sup>           |
| Transport                         | 5 to 95%, non-condensing <sup>6)</sup>           |
| Vibration                         |                                                  |
| Operation                         | 5 to 500 Hz: 1 g; no unrecoverable errors        |
| Storage                           | 5 to 500 Hz: 5 g, no damage                      |
| Transport                         | 5 to 500 Hz: 5 g, no damage                      |
| Shock                             |                                                  |
| Operation                         | 325 g and 2 ms duration; no unrecoverable errors |
| Storage                           | 900 g, 1 ms; no damage                           |
|                                   | 120 g, 11 ms; no damage                          |
| Transport                         | 900 g, 1 ms; no damage                           |
|                                   | 120 g, 11 ms; no damage                          |
| Altitude                          |                                                  |
| Operation                         | -300 to 3000 m                                   |
| Storage                           | -300 to 12192 m                                  |
| Mechanical characteristics        |                                                  |
| Installation                      | Fixed <sup>7)</sup>                              |
| Dimensions                        |                                                  |
| Width                             | 13 mm                                            |
| Height                            | 98 mm                                            |
| Depth                             | 105 mm                                           |
| Weight                            | 135 g                                            |
| Manufacturer information          |                                                  |
| Manufacturer                      | Fujitsu                                          |
| Manufacturer's product ID         | MHY2160BH-ESW                                    |

Table 64: 5AC801.HDDI-02 - Technical data

- 1) At 8760 POH (power-on hours) per year and 70°C surface temperature
- 2) Standard operation means 333 POH (power-on hours) per month.
- 3) 24-hour operation means 732 POH (power-on hours) per month.
- 4) Humidity gradient: Maximum 15% per hour.
- 5) Maximum humidity at 29°C.
- 6) Maximum humidity at 40°C.
- 7) Slide-in compact mounting

### Temperature humidity diagram

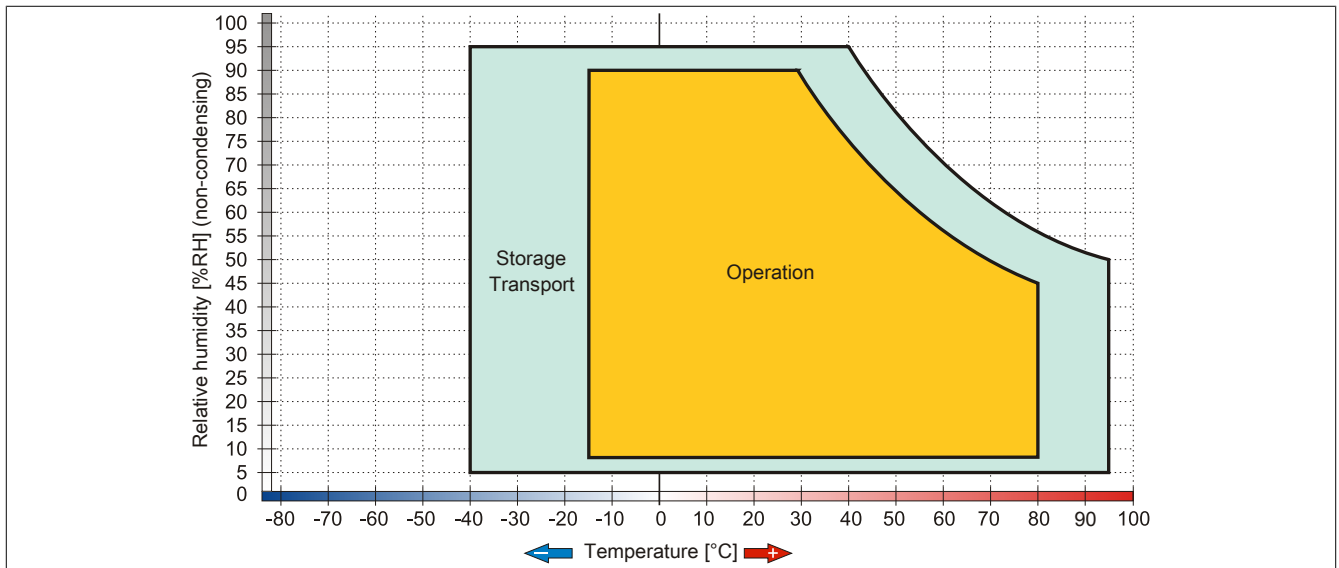


Image 31: 5AC801.HDDI-02 - Temperature humidity diagram

### 3.9.3 5AC801.HDDI-03

#### General information

This 250 GB slide-in compact hard disk is specified for 24-hour operation. The slide-in compact drive can be used in APC810 and PPC800 system units.

#### When used in a PPC800

##### Information:

The adapter 5AC803.BC02-00 is required for the use of slide-in compact drives.

When inserted in the slide-in compact slot, the slide-in compact drive is referred to internally as SATA I.

#### Order data

| Model number   | Short description                                                                                                                  | Image                                                                                |
|----------------|------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|                | <b>Drives</b>                                                                                                                      |                                                                                      |
| 5AC801.HDDI-03 | 250 GB SATA hard disk (slide-in compact); 24/7 hard disk. Remark: Please see manual for proper use of the hard disk.               |  |
|                | <b>Optional accessories</b>                                                                                                        |                                                                                      |
|                | <b>Drives</b>                                                                                                                      |                                                                                      |
| 5MMHDD.0250-00 | 250 GB SATA Hard Disk Spare part for 5AC801.HDDI-03 and 5ACPCI.RAIC-05; Remark: Please see manual for proper use of the hard disk. |                                                                                      |

Table 65: 5AC801.HDDI-03 - Order data

#### Technical data

##### 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.

| Product ID                      | 5AC801.HDDI-03                                                                            |
|---------------------------------|-------------------------------------------------------------------------------------------|
| <b>General information</b>      |                                                                                           |
| Certification<br>CE             | Yes                                                                                       |
| <b>Hard disk</b>                |                                                                                           |
| Capacity                        | 250 GB                                                                                    |
| Number of heads                 | 1                                                                                         |
| Number of sectors               | 488,397,168                                                                               |
| Bytes per sector                | 512                                                                                       |
| Cache                           | 8 MB                                                                                      |
| Speed                           | 5400 rpm $\pm 0.2\%$                                                                      |
| Startup time                    | Typ. 3.6 s (from 0 rpm to read access)                                                    |
| MTBF                            | 550,000 POH <sup>1)</sup>                                                                 |
| S.M.A.R.T. Support              | Yes                                                                                       |
| Interface                       | SATA                                                                                      |
| Access time                     | 5.56 ms                                                                                   |
| Supported transfer modes        | SATA 1.0, Serial ATA Revision 2.6<br>PIO Modus 0-4, Multiword DMA Mode 0-2, UDMA Mode 0-6 |
| Data transfer rate              |                                                                                           |
| Internal                        | Max. 1175 Mbits/s                                                                         |
| To/from host                    | Max. 150 MB/s (SATA I), max. 300 MB/s (SATA II)                                           |
| Positioning time                |                                                                                           |
| Minimum (track to track)        | 1 ms                                                                                      |
| Nominal (read only)             | 14 ms                                                                                     |
| Maximum (read only)             | 30 ms                                                                                     |
| <b>Environmental conditions</b> |                                                                                           |

Table 66: 5AC801.HDDI-03 - Technical data

| Product ID                                                                                                        | 5AC801.HDDI-03                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Temperature <sup>2)</sup><br>Operation <sup>3)</sup><br>Operation - 24-hour <sup>4)</sup><br>Storage<br>Transport | 0 to 60°C<br>0 to 60°C<br>-40 to 70°C<br>-40 to 70°C                                                                                                                                                                                                                                                                                                                           |
| Relative humidity <sup>5)</sup><br>Operation<br>Storage<br>Transport                                              | 5 to 95%, non-condensing<br>5 to 95%, non-condensing<br>5 to 95%, non-condensing                                                                                                                                                                                                                                                                                               |
| Vibration<br>Operation<br>Storage<br>Transport                                                                    | 5 to 500 Hz: 0.5 g; no unrecoverable errors<br>5 to 500 Hz: 5 g; no unrecoverable errors<br>5 to 500 Hz: 5 g; no unrecoverable errors                                                                                                                                                                                                                                          |
| Shock<br>Operation<br>Storage<br><br>Transport                                                                    | 350 g and 2 ms duration; no unrecoverable errors<br>800 g and 2 ms duration; no unrecoverable errors<br>1000 g and 1 ms duration; no unrecoverable errors<br>600 g and 0.5 ms duration; no unrecoverable errors<br>800 g and 2 ms duration; no unrecoverable errors<br>1000 g and 1 ms duration; no unrecoverable errors<br>600 g and 0.5 ms duration; no unrecoverable errors |
| Altitude<br>Operation<br>Storage                                                                                  | -300 to 3048 m<br>-300 to 12192 m                                                                                                                                                                                                                                                                                                                                              |
| <b>Mechanical characteristics</b>                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                |
| Installation                                                                                                      | Fixed <sup>6)</sup>                                                                                                                                                                                                                                                                                                                                                            |
| Dimensions<br>Width<br>Height<br>Depth                                                                            | 13 mm<br>98 mm<br>105 mm                                                                                                                                                                                                                                                                                                                                                       |
| Weight                                                                                                            | 134 g                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Manufacturer information</b>                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                |
| Manufacturer                                                                                                      | Seagate                                                                                                                                                                                                                                                                                                                                                                        |
| Manufacturer's product ID                                                                                         | ST9250315AS                                                                                                                                                                                                                                                                                                                                                                    |

Table 66: 5AC801.HDDI-03 - Technical data

- 1) At 8760 POH (power-on hours) per year and 25°C surface temperature
- 2) Temperature values for 305 meter altitude. The temperature specification must be reduced linearly by 1°C every 305 meters. The temperature increase and decrease can be a maximum of 20°C per hour.
- 3) Standard operation means 333 POH (power-on hours) per month.
- 4) 24-hour operation means 732 POH (power-on hours) per month.
- 5) Humidity gradient: Maximum 30% per hour
- 6) Slide-in compact mounting

### Temperature humidity diagram

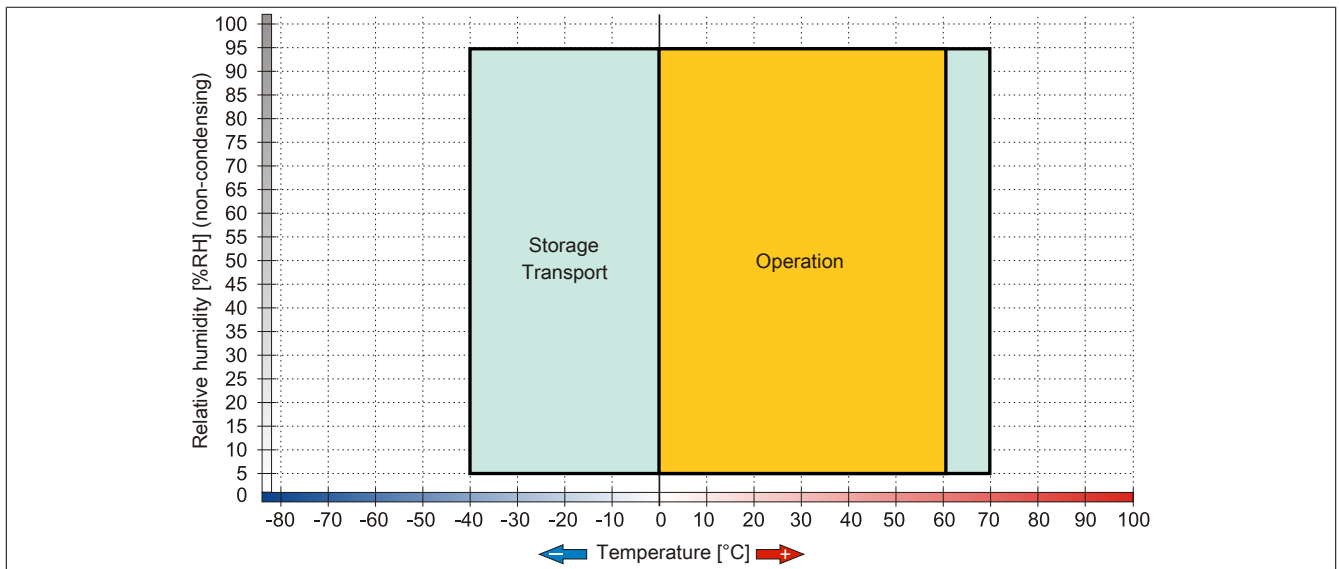


Image 32: 5AC801.HDDI-03 - Temperature humidity diagram

### 3.9.4 5AC801.SSDI-00

#### General information

This SSD (Solid State Drive) slide-in compact drive can be used in APC810 and PPC800 system units.

#### When used in a PPC800

##### Information:

The adapter 5AC803.BC02-00 is required for the use of slide-in compact drives.

When inserted in the slide-in compact slot, the slide-in compact drive is referred to internally as SATA I.

#### Order data

| Model number   | Short description                           | Image                                                                                |
|----------------|---------------------------------------------|--------------------------------------------------------------------------------------|
|                | <b>Drives</b>                               |                                                                                      |
| 5AC801.SSDI-00 | 32 GByte SATA SSD (SLC) (slide-in compact). |  |

Table 67: 5AC801.SSDI-00 - Order data

#### 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 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.

| Product ID                           | 5AC801.SSDI-00                                               |
|--------------------------------------|--------------------------------------------------------------|
| <b>General information</b>           |                                                              |
| Certification<br>CE                  | Yes                                                          |
| <b>Solid state drive</b>             |                                                              |
| Capacity                             | 32 GB                                                        |
| Data reliability                     | < 1 unrecoverable error in 10<SUP>15</SUP> bit read accesses |
| MTBF                                 | 2,000,000 hours                                              |
| Power on/off cycles                  | 50.000                                                       |
| S.M.A.R.T. Support                   | Yes                                                          |
| Interface                            | SATA                                                         |
| Maintenance                          | None                                                         |
| Continuous reading                   | Max. 250 MB/s                                                |
| Continuous writing                   | Max. 170 MB/s                                                |
| IOPS <sup>1)</sup>                   |                                                              |
| 4k read                              | 35.000                                                       |
| 4k write                             | 3.300                                                        |
| <b>Endurance</b>                     |                                                              |
| Guaranteed data volume<br>Guaranteed | 700 TB                                                       |

Table 68: 5AC801.SSDI-00 - Technical data



| Product ID                    | 5AC801.SSDI-00                                                                                                                                                                         |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Results for 5 years           | 350 GB/day                                                                                                                                                                             |
| SLC Flash                     | Yes                                                                                                                                                                                    |
| Wear leveling                 | Static                                                                                                                                                                                 |
| Error Correction Coding (ECC) | Yes                                                                                                                                                                                    |
| Compatibility                 | SATA Revision 2.6 compliant, compatible with SATA 1.5 Gbit/s and 3 Gbit/s interface rates<br>ATA/ATAPI-7<br>SSD Enhanced SMART ATA feature set<br>Native command queuing (NCQ) command |
| Environmental conditions      |                                                                                                                                                                                        |
| Temperature                   |                                                                                                                                                                                        |
| Operation                     | 0 to 70°C                                                                                                                                                                              |
| Storage                       | -55 to 95°C                                                                                                                                                                            |
| Transport                     | -55 to 95°C                                                                                                                                                                            |
| Relative humidity             |                                                                                                                                                                                        |
| Operation                     | 5 to 95%                                                                                                                                                                               |
| Storage                       | 5 to 95%                                                                                                                                                                               |
| Transport                     | 5 to 95%                                                                                                                                                                               |
| Vibration                     |                                                                                                                                                                                        |
| Operation                     | 7 to 800 Hz: 2.17 g                                                                                                                                                                    |
| Storage                       | 10 to 500 Hz: 3.13 g                                                                                                                                                                   |
| Transport                     | 10 to 500 Hz: 3.13 g                                                                                                                                                                   |
| Shock                         |                                                                                                                                                                                        |
| Operation                     | 1000 g, 0.5 ms                                                                                                                                                                         |
| Storage                       | 1000 g, 0.5 ms                                                                                                                                                                         |
| Transport                     | 1000 g, 0.5 ms                                                                                                                                                                         |
| Altitude                      |                                                                                                                                                                                        |
| Operation                     | -300 to 12.192 m                                                                                                                                                                       |
| Storage                       | -300 to 12.192 m                                                                                                                                                                       |
| Transport                     | -300 to 12.192 m                                                                                                                                                                       |
| Mechanical characteristics    |                                                                                                                                                                                        |
| Installation                  | Fixed <sup>2)</sup>                                                                                                                                                                    |
| Dimensions                    |                                                                                                                                                                                        |
| Width                         | 13 mm                                                                                                                                                                                  |
| Height                        | 98 mm                                                                                                                                                                                  |
| Depth                         | 105 mm                                                                                                                                                                                 |
| Weight                        | 118 g                                                                                                                                                                                  |
| Manufacturer information      |                                                                                                                                                                                        |
| Manufacturer                  | Intel                                                                                                                                                                                  |
| Manufacturer's product ID     | SSDSA2SH032G1                                                                                                                                                                          |

Table 68: 5AC801.SSDI-00 - Technical data

- 1) IOPS: Random read and write input/output operations per second  
2) Slide-in compact mounting

### Temperature humidity diagram

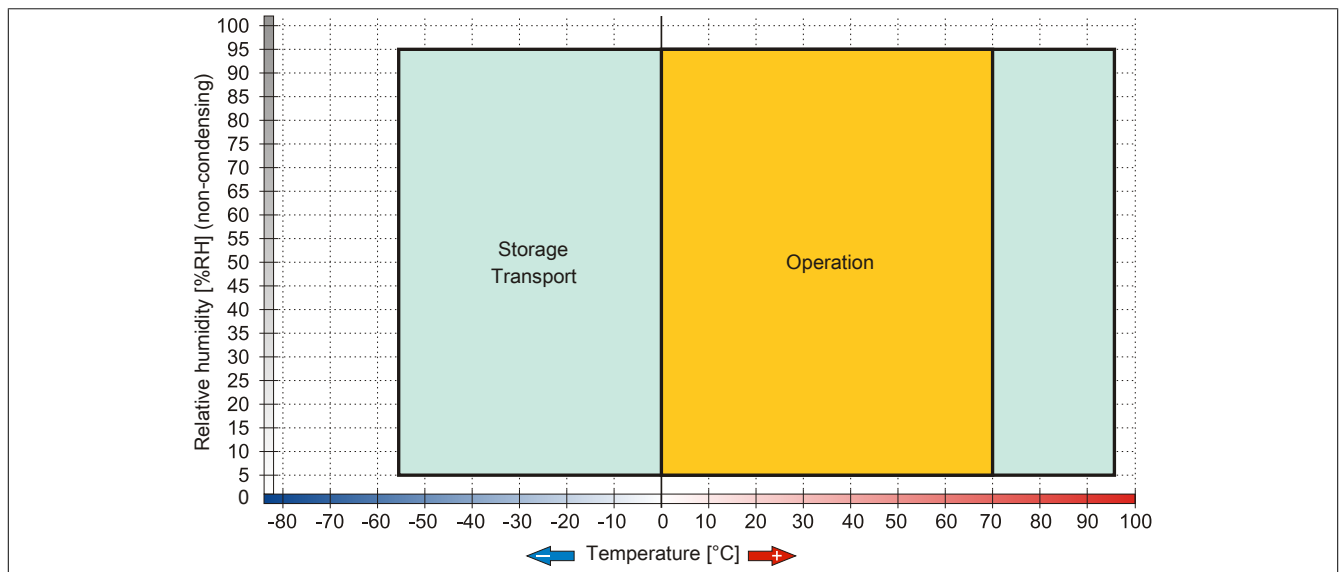


Image 33: 5AC801.SSDI-00 - Temperature humidity diagram

## Benchmark

The following two benchmarks show a comparison of the Intel Solid State Drive (5AC801.SSDI-00) and the Seagate Hard Disk (5AC801.HDDI-00) for cyclic reading and writing.

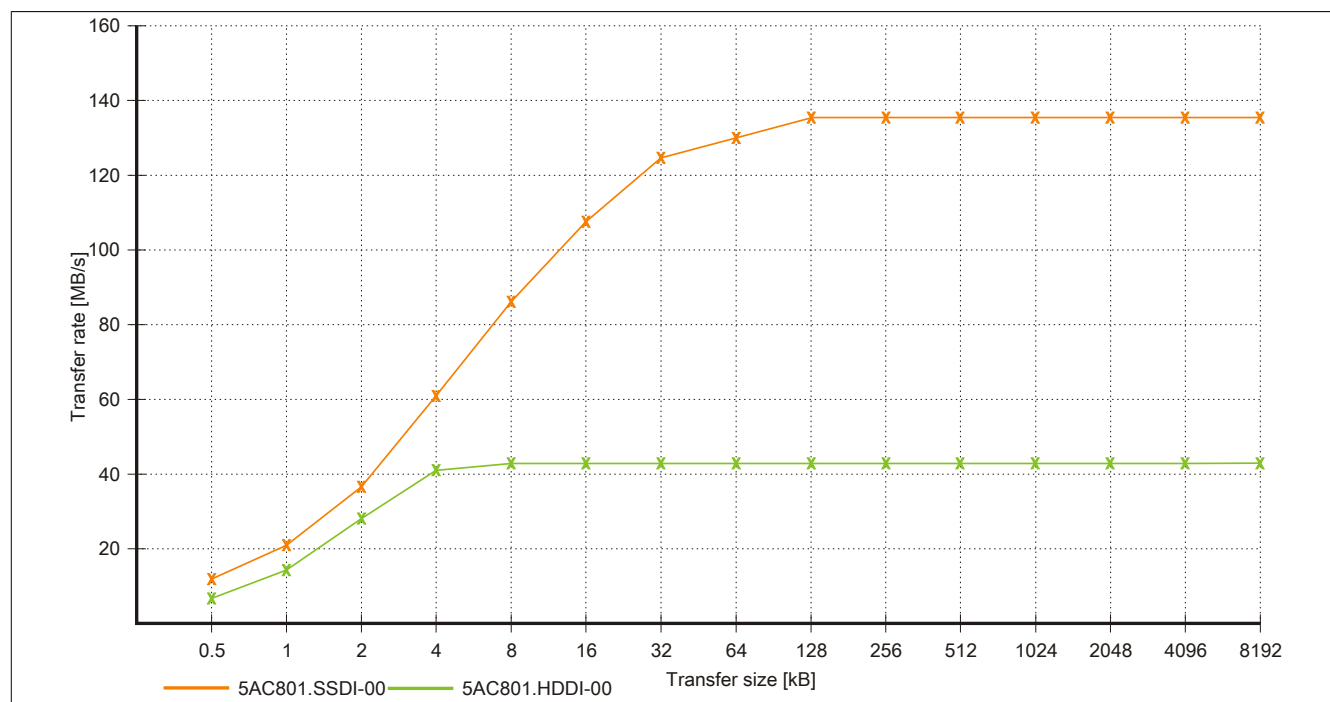


Image 34: 5AC801.SSDI-00 - ATTO disk benchmark v2.34 - Cyclic read

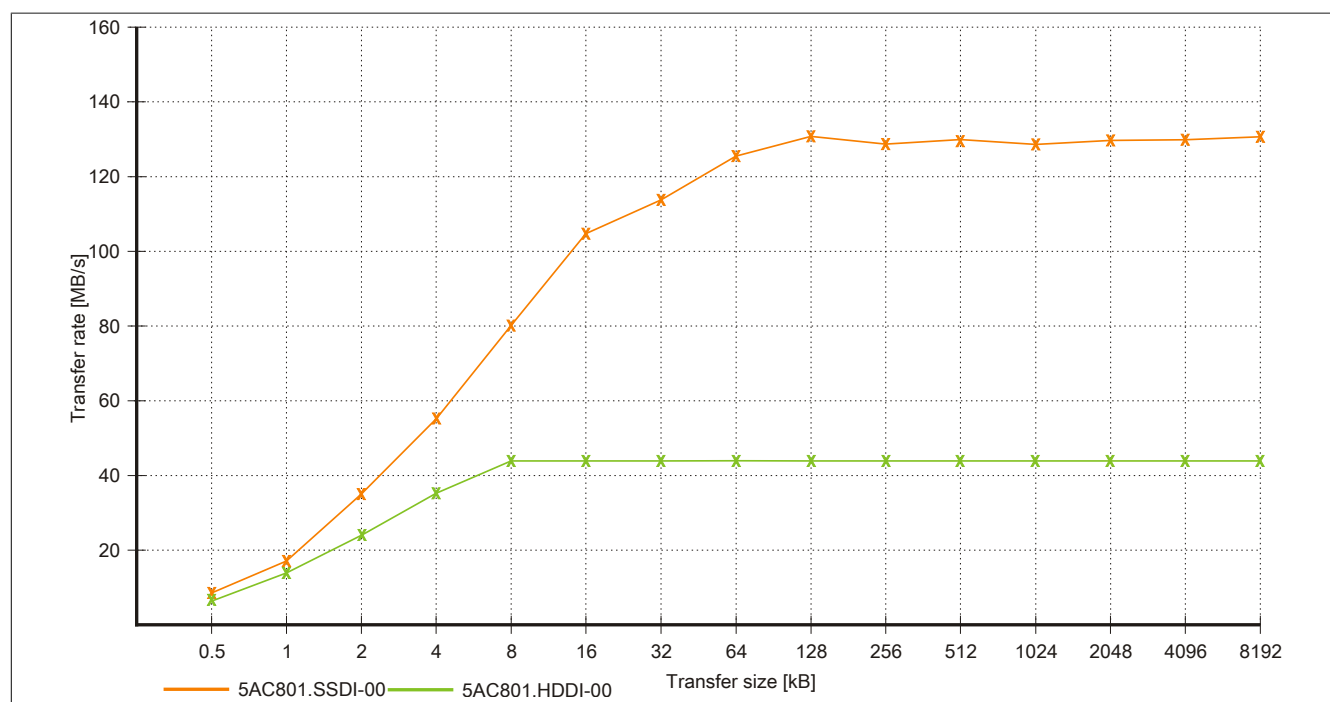


Image 35: 5AC801.SSDI-00 - ATTO disk benchmark v2.34 - Cyclic write

### 3.9.5 5AC801.ADAS-00

#### General information

The hard disk adapter is a slide-in adapter where slide-in compact drives can be installed and then operated on the B&R industrial PC. This adapter can be used in APC810 and PPC800 system units with slide-in drive slot.

#### When used in a PPC800

##### Information:

The expansion 5AC803.SX01-00 or 5AC803.SX02-00 is required in order to use slide-in drives.

#### Order data

| Model number   | Short description                                                                  | Image                                                                               |
|----------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                | <b>Drives</b>                                                                      |                                                                                     |
| 5AC801.ADAS-00 | SATA hard disk adapter to operate a slide-in compact hard disk in a slide-in slot. |  |

Table 69: 5AC801.ADAS-00 - Order data

#### Technical data

| Product ID                        | 5AC801.ADAS-00 |
|-----------------------------------|----------------|
| <b>General information</b>        |                |
| Certification<br>CE               | Yes            |
| <b>Mechanical characteristics</b> |                |
| Dimensions                        |                |
| Width                             | 22 mm          |
| Height                            | 172.5 mm       |
| Depth                             | 150 mm         |
| Weight                            | 328 g          |

Table 70: 5AC801.ADAS-00 - Technical data

### 3.9.6 5AC801.HDDS-00

#### General information

This 40 GB hard disk is specified for 24-hour operation (24x7) and also provides an extended temperature specification (ET). The slide-in drive can be used in APC810 and PPC800 system units with slide-in drive slot.

#### Information:

It is possible to add or remove a slide-in drive at any time.

#### When used in a PPC800

#### Information:

The expansion 5AC803.SX01-00 or 5AC803.SX02-00 is required in order to use slide-in drives.

When inserted in slide-in slot 1, the slide-in drive is referred to internally as SATA I and USB.

#### Order data

| Model number   | Short description                                                                                                                           | Image                                                                                |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|                | <b>Drives</b>                                                                                                                               |                                                                                      |
| 5AC801.HDDS-00 | 40 GB SATA hard disk (slide-in); 24/7 hard disk with extended temperature range. Remark: Please see manual for proper use of the hard disk. |  |

Table 71: 5AC801.HDDS-00 - Order data

#### Technical data

#### 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.

| Product ID                 | 5AC801.HDDS-00                       |
|----------------------------|--------------------------------------|
| <b>General information</b> |                                      |
| Certification<br>CE        | Yes                                  |
| <b>Hard disk</b>           |                                      |
| Capacity                   | 40 GB                                |
| Number of heads            | 1                                    |
| Number of sectors          | 78,140,160                           |
| Bytes per sector           | 512                                  |
| Cache                      | 8 MB                                 |
| Speed                      | 5400 rpm $\pm 1\%$                   |
| Startup time               | Typ. 3 s (from 0 rpm to read access) |
| MTBF                       | 750,000 POH <sup>1)</sup>            |
| S.M.A.R.T. Support         | Yes                                  |
| Interface                  | SATA                                 |
| Access time                | 5.6 ms                               |
| Data transfer rate         |                                      |
| Internal                   | Max. 450 Mb/s                        |
| To/from host               | Max. 150 MB/s (Ultra DMA mode 5)     |
| Positioning time           |                                      |
| Minimum (track to track)   | 1 ms                                 |
| Nominal (read only)        | 12.5 ms                              |

Table 72: 5AC801.HDDS-00 - Technical data

| Product ID                        | 5AC801.HDDS-00                                                                                         |
|-----------------------------------|--------------------------------------------------------------------------------------------------------|
| Maximum (read only)               | 23 ms                                                                                                  |
| Environmental conditions          |                                                                                                        |
| Temperature <sup>2)</sup>         |                                                                                                        |
| Operation <sup>3)</sup>           | -30 to 85°C                                                                                            |
| Operation - 24-hour <sup>4)</sup> | -30 to 85°C                                                                                            |
| Storage                           | -40 to 95°C                                                                                            |
| Transport                         | -40 to 95°C                                                                                            |
| Relative humidity <sup>5)</sup>   |                                                                                                        |
| Operation                         | 5 to 90%, non-condensing                                                                               |
| Storage                           | 5 to 95%, non-condensing                                                                               |
| Transport                         | 5 to 95%, non-condensing                                                                               |
| Vibration                         |                                                                                                        |
| Operation                         | 5 to 500 Hz: 2 g; no unrecoverable errors                                                              |
| Storage                           | 5 to 500 Hz: 5 g; no unrecoverable errors                                                              |
| Transport                         | 5 to 500 Hz: 5 g; no unrecoverable errors                                                              |
| Shock                             |                                                                                                        |
| Operation                         | 300 g and 2 ms duration; no unrecoverable errors<br>150 g and 11 ms duration; no unrecoverable errors  |
| Storage                           | 800 g and 2 ms duration; no unrecoverable errors<br>400 g and 0.5 ms duration; no unrecoverable errors |
| Transport                         | 800 g and 2 ms duration; no unrecoverable errors<br>400 g and 0.5 ms duration; no unrecoverable errors |
| Altitude                          |                                                                                                        |
| Operation                         | -300 to 5000 m                                                                                         |
| Storage                           | -300 to 12192 m                                                                                        |
| Mechanical characteristics        |                                                                                                        |
| Installation                      | Fixed <sup>6)</sup>                                                                                    |
| Dimensions                        |                                                                                                        |
| Width                             | 22 mm                                                                                                  |
| Height                            | 172.5 mm                                                                                               |
| Depth                             | 150 mm                                                                                                 |
| Weight                            | 387 g                                                                                                  |
| Manufacturer information          |                                                                                                        |
| Manufacturer                      | Seagate                                                                                                |
| Manufacturer's product ID         | ST940817SM                                                                                             |

Table 72: 5AC801.HDDS-00 - Technical data

- 1) At 8760 POH (power-on hours) per year and 70°C surface temperature
- 2) Temperature values for 305 meter altitude. The temperature specification must be reduced linearly by 1°C every 305 meters. The temperature increase and decrease can be a maximum of 20°C per hour.
- 3) Standard operation means 333 POH (power-on hours) per month.
- 4) 24-hour operation means 732 POH (power-on hours) per month.
- 5) Humidity gradient: Maximum 15% per hour.
- 6) Slide-in compact mounting

## Temperature humidity diagram

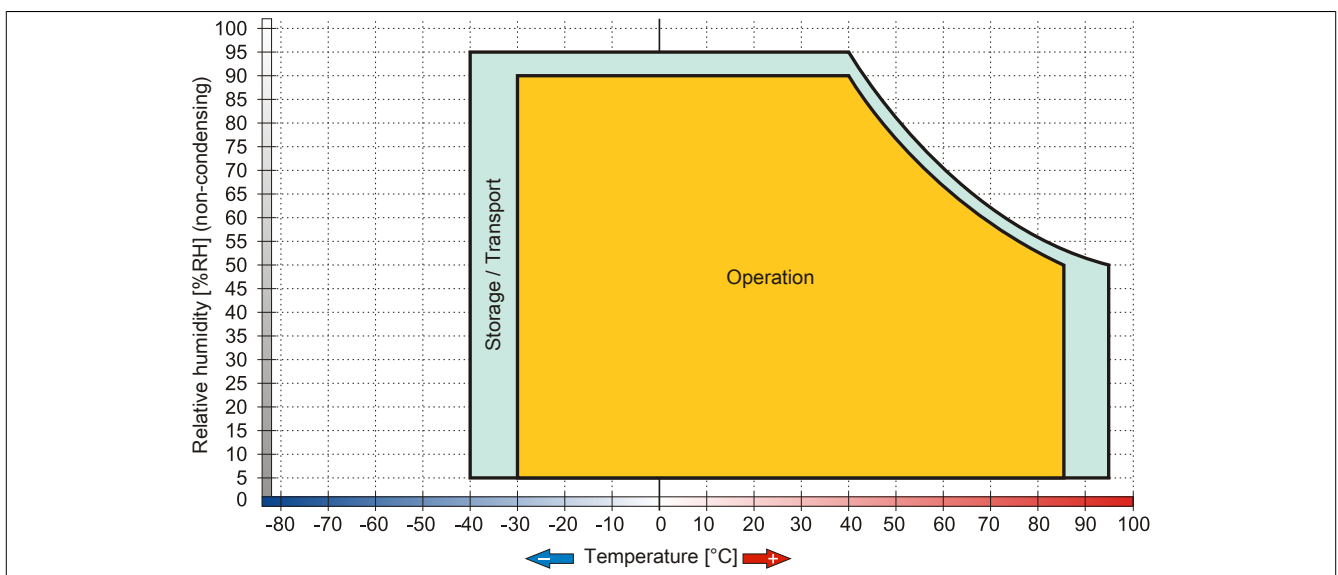


Image 36: 5AC801.HDDS-00 - Temperature humidity diagram

### 3.9.7 5AC801.DVDS-00

#### General information

The DVD-ROM slide-in drive can be used in APC810 and PPC800 system units with slide-in drive slot.

#### Information:

It is possible to add or remove a slide-in drive at any time.

#### When used in a PPC800

#### Information:

The expansion 5AC803.SX01-00 or 5AC803.SX02-00 is required in order to use slide-in drives.

When inserted in slide-in slot 1, the slide-in drive is referred to internally as SATA I and USB.

#### Order data

| Model number   | Short description              | Image                                                                                |
|----------------|--------------------------------|--------------------------------------------------------------------------------------|
|                | <b>Drives</b>                  |                                                                                      |
| 5AC801.DVDS-00 | DVD-ROM SATA drive (slide-in). |  |

Table 73: 5AC801.DVDS-00 - Order data

#### Technical data

#### 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.

| Product ID                 | 5AC801.DVDS-00                                                                                                                                                                                                                                                                                                                                                                      |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>General information</b> |                                                                                                                                                                                                                                                                                                                                                                                     |
| Certification<br>CE        | Yes                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>CD / DVD drive</b>      |                                                                                                                                                                                                                                                                                                                                                                                     |
| Data transfer rate         | Max. 1.5 Gbit/s                                                                                                                                                                                                                                                                                                                                                                     |
| Speed                      | Max. 5090 rpm $\pm 1\%$                                                                                                                                                                                                                                                                                                                                                             |
| Noise level                | Approx. 45 dBA in a distance of 50 cm (full read access)                                                                                                                                                                                                                                                                                                                            |
| Compatible formats         | CD-DA, CD-ROM mode 1/mode 2<br>CD-ROM XA mode 2 (form 1, form 2)<br>Photo CD (single/multi-session)<br>Enhanced CD, CD text<br>DVD-ROM, DVD-Video (Double Layer), DVD-R (Single/Multi-border), DVD-R DL (Single/Multi-border), DVD-RW (Single/Multi-border), DVD+R (Single/Multi session), DVD+R DL (Single/Multi session), DVD+RW (Single/Multi session), DVD-RAM (4.7 GB, 2.6 GB) |
| Laser class                | Class 1 laser                                                                                                                                                                                                                                                                                                                                                                       |
| Lifespan                   | 60,000 POH (Power-On Hours)                                                                                                                                                                                                                                                                                                                                                         |
| Interface                  | SATA                                                                                                                                                                                                                                                                                                                                                                                |
| Startup time<br>CD<br>DVD  | Max. 19 seconds (0 rpm to read access)<br>Max. 19 seconds (0 rpm to read access)                                                                                                                                                                                                                                                                                                    |
| Access time<br>CD          | Average of 130 ms                                                                                                                                                                                                                                                                                                                                                                   |

Table 74: 5AC801.DVDS-00 - Technical data

| Product ID                 | 5AC801.DVDS-00                                                                                              |
|----------------------------|-------------------------------------------------------------------------------------------------------------|
| DVD                        | Average of 140 ms                                                                                           |
| Readable media             | CD-ROM (12 cm, 8 cm), CD-A CD-R, CD-RW<br>DVD-ROM, DVD-R, DVD-R DL, DVD-RW, DVD+R DVD+R DL, DVD+RW, DVD-RAM |
| Reading rate               | 24x                                                                                                         |
| CD                         | 8x                                                                                                          |
| DVD                        |                                                                                                             |
| Environmental conditions   |                                                                                                             |
| Temperature <sup>1)</sup>  |                                                                                                             |
| Operation                  | 5 to 55°C <sup>2)</sup>                                                                                     |
| Storage                    | -20 to 60°C                                                                                                 |
| Transport                  | -40 to 65°C                                                                                                 |
| Relative humidity          |                                                                                                             |
| Operation                  | 8 to 80%, non-condensing                                                                                    |
| Storage                    | 5 to 95%, non-condensing                                                                                    |
| Transport                  | 5 to 95%, non-condensing                                                                                    |
| Vibration                  |                                                                                                             |
| Operation                  | 5 to 500 Hz: 0.2g                                                                                           |
| Storage                    | 5 to 500 Hz: 2g                                                                                             |
| Transport                  | 5 to 500 Hz: 2g                                                                                             |
| Shock                      |                                                                                                             |
| Operation                  | 5 g and 11 ms duration                                                                                      |
| Storage                    | 60 g and 11 ms duration                                                                                     |
| Transport                  | 200 g and 2 ms duration                                                                                     |
|                            | 60 g and 11 ms duration                                                                                     |
|                            | 200 g and 2 ms duration                                                                                     |
| Mechanical characteristics |                                                                                                             |
| Dimensions                 |                                                                                                             |
| Width                      | 22 mm                                                                                                       |
| Height                     | 172.5 mm                                                                                                    |
| Depth                      | 150 mm                                                                                                      |
| Weight                     | 455 g                                                                                                       |

Table 74: 5AC801.DVDS-00 - Technical data

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

### Temperature humidity diagram

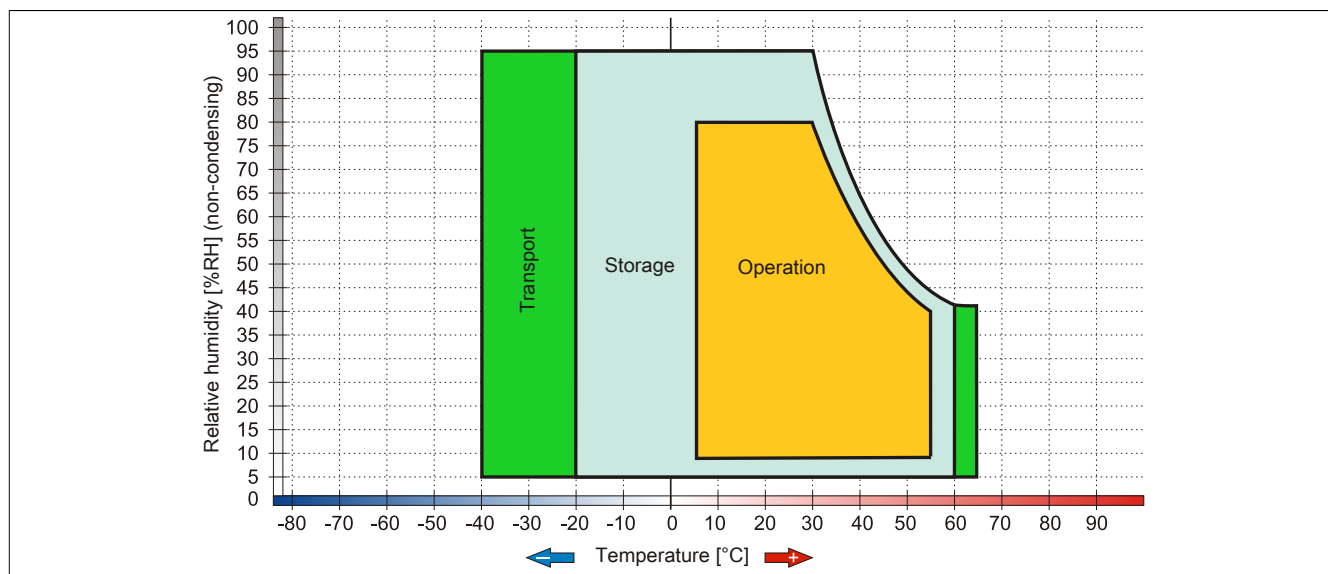


Image 37: 5AC801.DVDS-00 - Temperature humidity diagram

### Hot plug capable

Hardware revision B0 of the slide-in DVD-ROM - 5AC801.DVDS-00 does not offer SATA hot plug capability. Other hardware revisions are hot plug capable.

### 3.9.8 5AC801.DVRS-00

#### General information

The DVD-R/RW slide-in drive can be used in APC810 and PPC800 system units with slide-in drive slot.

#### Information:

It is possible to add or remove a slide-in drive at any time.

#### When used in a PPC800

#### Information:

The expansion 5AC803.SX01-00 or 5AC803.SX02-00 is required in order to use slide-in drives.

When inserted in slide-in slot 1, the slide-in drive is referred to internally as SATA I and USB.

#### Order data

| Model number   | Short description                                         | Image                                                                                |
|----------------|-----------------------------------------------------------|--------------------------------------------------------------------------------------|
|                | <b>Drives</b>                                             |  |
| 5AC801.DVRS-00 | DVD-R/RW DVD+R/RW SATA drive (slide-in).                  |                                                                                      |
|                | <b>Optional accessories</b>                               |                                                                                      |
|                | <b>Other</b>                                              |                                                                                      |
| 5SWUT1.0000-00 | OEM Nero CD-RW Software, only available with a CD writer. |                                                                                      |

Table 75: 5AC801.DVRS-00 - Order data

#### Technical data

#### 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.

| Product ID                 | 5AC801.DVRS-00                                                                                                                                                                                                                                          |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>General information</b> |                                                                                                                                                                                                                                                         |
| Certification<br>CE        | Yes                                                                                                                                                                                                                                                     |
| <b>CD / DVD drive</b>      |                                                                                                                                                                                                                                                         |
| Data buffer capacity       | 2 MB                                                                                                                                                                                                                                                    |
| Data transfer rate         | Max. 33.3 MB/s                                                                                                                                                                                                                                          |
| Speed                      | Max. 5160 rpm $\pm 1\%$                                                                                                                                                                                                                                 |
| Noise level                | Approx. 45 dBA in a distance of 50 cm (full read access)                                                                                                                                                                                                |
| Compatible formats         | CD-DA, CD-ROM mode 1/mode 2<br>CD-ROM XA mode 2 (form 1, form 2)<br>Photo CD (single/multi-session), Enhanced CD, CD text<br>DVD-ROM, DVD-R, DVD-R (double layer), DVD-RW, DVD-Video<br>DVD RAM (4.7 GB, 2.6 GB)<br>DVD+R, DVD+R (double layer), DVD+RW |
| Laser class                | Class 1 laser                                                                                                                                                                                                                                           |
| Lifespan                   | 60,000 POH (Power-On Hours)                                                                                                                                                                                                                             |
| Interface                  | SATA                                                                                                                                                                                                                                                    |
| Startup time<br>CD<br>DVD  | Max. 14 seconds (0 rpm to read access)<br>Max. 15 seconds (0 rpm to read access)                                                                                                                                                                        |
| Access time<br>CD          | On average 140 ms (24x)                                                                                                                                                                                                                                 |

Table 76: 5AC801.DVRS-00 - Technical data



| Product ID                        | 5AC801.DVRS-00                                                                                      |
|-----------------------------------|-----------------------------------------------------------------------------------------------------|
| DVD                               | On average 150 ms (8x)                                                                              |
| Readable media                    |                                                                                                     |
| CD                                | CD/CD-ROM (12 cm, 8 cm), CD-R, CD-RW                                                                |
| DVD                               | DVD-ROM, DVD-R, DVD-R (double layer), DVD-RW, DVD-RAM, DVD+R, DVD+R (double layer), DVD+RW, DVD-RAM |
| Non-write protected media         |                                                                                                     |
| CD                                | CD-R, CD-RW                                                                                         |
| DVD                               | DVD-R/RW, DVD-R (double layer), DVD-RAM (4.7 GB), DVD+R/RW, DVD+R (double layer)                    |
| Reading rate                      |                                                                                                     |
| CD                                | 24x                                                                                                 |
| DVD                               | 8x                                                                                                  |
| Write speed                       |                                                                                                     |
| CD-R                              | 24x, 16x, 10x and 4x                                                                                |
| CD-RW                             | 24x, 16x, 10x and 4x                                                                                |
| DVD+R                             | 8x, 4x and 2, 4x                                                                                    |
| DVD+R (Double Layer)              | 6x, 4x and 2, 4x                                                                                    |
| DVD+RW                            | 4x and 2x                                                                                           |
| DVD-R                             | 8x, 4x and 2x                                                                                       |
| DVD-R (Double Layer)              | 6x, 4x and 2x                                                                                       |
| DVD-RAM <sup>1)</sup>             | 5x, 3x and 2x                                                                                       |
| DVD-RW                            | 6x, 4x and 2x                                                                                       |
| Write-methods                     |                                                                                                     |
| CD                                | Disk at once, session at once, packet write, track at once                                          |
| DVD                               | Disk at once, incremental, over-write, sequential, multi-session                                    |
| <b>Environmental conditions</b>   |                                                                                                     |
| Temperature <sup>2)</sup>         |                                                                                                     |
| Operation                         | 5 to 55°C <sup>3)</sup>                                                                             |
| Storage                           | -20 to 60°C                                                                                         |
| Transport                         | -40 to 65°C                                                                                         |
| Relative humidity                 |                                                                                                     |
| Operation                         | 8 to 80%, non-condensing                                                                            |
| Storage                           | 5 to 95%, non-condensing                                                                            |
| Transport                         | 5 to 95%, non-condensing                                                                            |
| Vibration                         |                                                                                                     |
| Operation                         | 5 to 500 Hz: 0.2g                                                                                   |
| Storage                           | 5 to 500 Hz: 2g                                                                                     |
| Transport                         | 5 to 500 Hz: 2g                                                                                     |
| Shock                             |                                                                                                     |
| Operation                         | At max. 5 g and 11 ms duration                                                                      |
| Storage                           | At max. 60 g and 11 ms duration                                                                     |
| Transport                         | At max. 200 g and 2 ms duration                                                                     |
| <b>Mechanical characteristics</b> |                                                                                                     |
| Dimensions                        |                                                                                                     |
| Width                             | 22 mm                                                                                               |
| Height                            | 172.5 mm                                                                                            |
| Depth                             | 150 mm                                                                                              |
| Weight                            | 400 g                                                                                               |

Table 76: 5AC801.DVRS-00 - Technical data

- 1) RAM drivers are not provided by the manufacturer. Support of RAM function by the burning software "Nero" (model number 5SWUTL.0000-00) or other burning software packages and drivers from third party providers.
- 2) Temperature data is for operation at 500 meters. Derating the max. ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).
- 3) Drive surface temperature

## Temperature humidity diagram

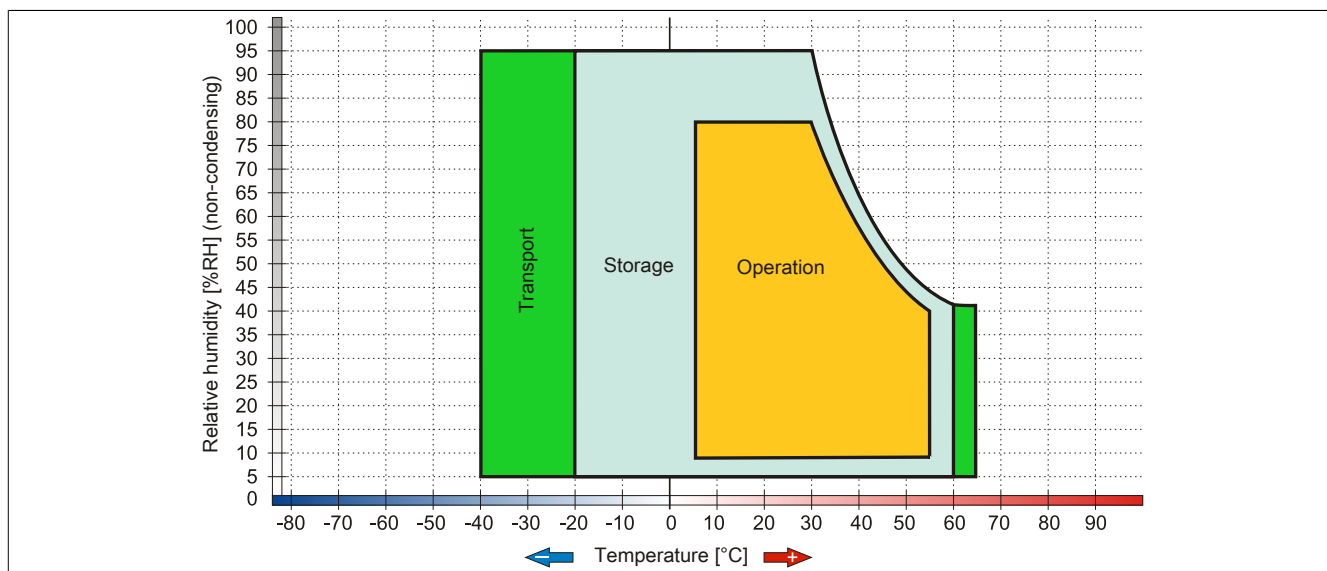


Image 38: 5AC801.DVRS-00 - Temperature humidity diagram

### 3.9.9 5ACPCI.RAIC-03

#### General information

This SATA RAID controller supports RAID level 0 and 1 and can be inserted in a PCI slot. The hard disks being used are specified for 24-hour operation (24x7) and also provides an extended temperature specification (ET).

- SATA RAID controller
- RAID Level 0 (striped) and 1 (mirrored)
- 2 SATA hard disk drives (suitable for 24 hour operation)
- Only requires 1 PCI slot
- Transfer rates up to 150 MB/s

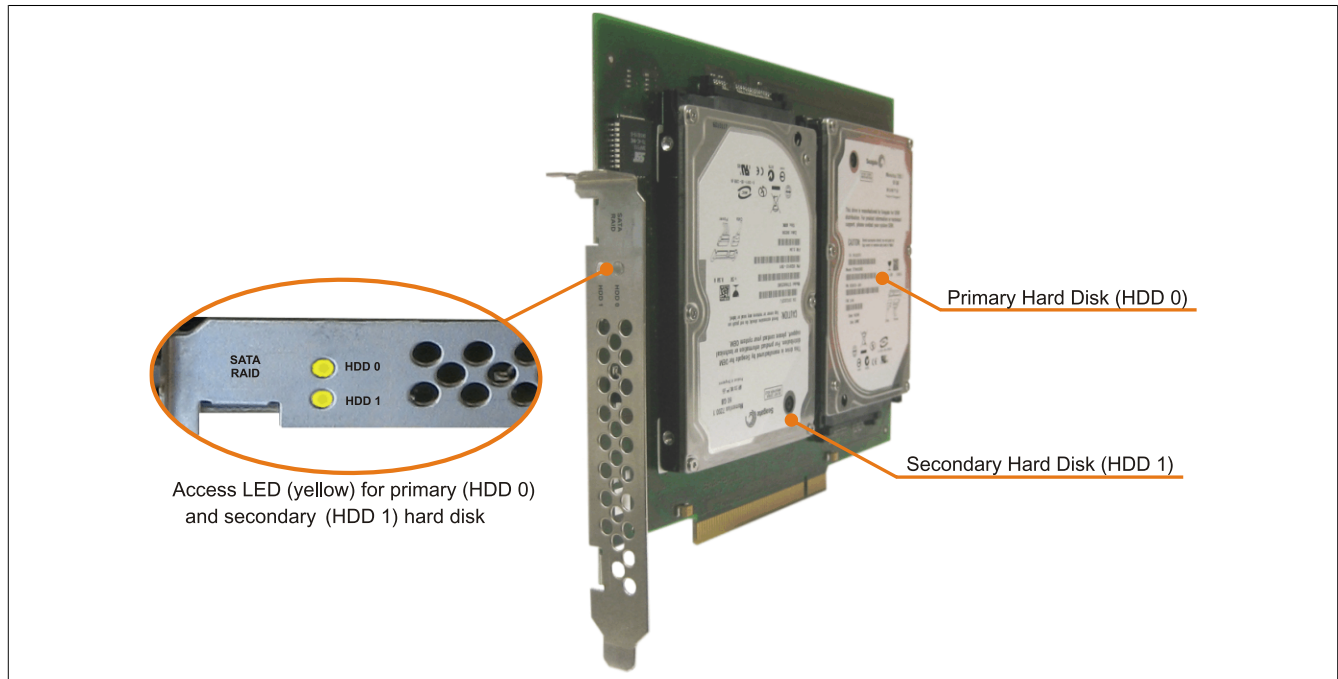


Image 39: PCI SATA RAID controller

#### Information:

The PCI SATA RAID controller can not be used in place of a Universal Power Supply (UPS). If the operating system is shut down improperly, the next time it is started it is detected as an error by the RAID 1, and a complete rebuild is executed. This generally takes at least 50 minutes (configurable) to complete.

#### Order data

| Model number   | Short description                                                                                               | Image |
|----------------|-----------------------------------------------------------------------------------------------------------------|-------|
| 5ACPCI.RAIC-03 | PCI RAID System SATA 2x 160 GB; Remark: Please see manual for proper use of the hard disk.                      |       |
|                | <b>Optional accessories</b>                                                                                     |       |
|                | <b>Undefined</b>                                                                                                |       |
| 5ACPCI.RAIC-04 | 160 GB SATA Hard Disk Spare part for 5ACPCI.RAIC-03; Remark: Please see manual for proper use of the hard disk. |       |

Table 77: 5ACPCI.RAIC-03 - Order data

## Technical data

**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.

|                                   |                                                                                  |
|-----------------------------------|----------------------------------------------------------------------------------|
| <b>Product ID</b>                 | <b>5ACPCI.RAIC-03</b>                                                            |
| <b>General information</b>        |                                                                                  |
| Number of hard disks              | 2                                                                                |
| Certification<br>CE               | Yes                                                                              |
| <b>Controller</b>                 |                                                                                  |
| Type                              | Sil 3512 SATA link                                                               |
| Specification                     | Serial ATA 1.0                                                                   |
| Data transfer rate                | Max. 1.5 Gbit/s (150 MB/s)                                                       |
| RAID level                        | Supports RAID 0, 1                                                               |
| BIOS Extension ROM - requirements | Approx. 32 kB                                                                    |
| <b>Hard disk</b>                  |                                                                                  |
| Capacity                          | 160 GB                                                                           |
| Number of heads                   | 3                                                                                |
| Number of sectors                 | 312,581,808                                                                      |
| Bytes per sector                  | 512                                                                              |
| Cache                             | 8 MB                                                                             |
| Speed                             | 5400 rpm $\pm$ 1%                                                                |
| Startup time                      | Typ. 4 s (from 0 rpm to read access)                                             |
| Lifespan                          | 5 years                                                                          |
| S.M.A.R.T. Support                | Yes                                                                              |
| Access time                       | 5.56 ms                                                                          |
| Supported transfer modes          | SATA 1.0, PIO mode 0-4, multiword DMA mode 0-2, UDMA 0-5                         |
| Data transfer rate                |                                                                                  |
| Internal                          | Max. 84.6 Mbits/s                                                                |
| To/from host                      | Max. 150 MB/s                                                                    |
| Positioning time                  |                                                                                  |
| Minimum (track to track)          | 1.5 ms                                                                           |
| Nominal (read only)               | 12 ms                                                                            |
| Maximum (read only)               | 22 ms                                                                            |
| <b>Electrical characteristics</b> |                                                                                  |
| Power consumption                 | 0.3 A at 3.3 V (PCI bus)<br>1 A at 5 V (PCI bus)                                 |
| <b>Environmental conditions</b>   |                                                                                  |
| Temperature <sup>1)</sup>         |                                                                                  |
| Operation <sup>2)</sup>           | -15 to 80°C                                                                      |
| Operation - 24-hour <sup>3)</sup> | -15 to 80°C                                                                      |
| Storage                           | -40 to 95°C                                                                      |
| Transport                         | -40 to 95°C                                                                      |
| Relative humidity                 |                                                                                  |
| Operation                         | 8 to 90%, non-condensing <sup>4)</sup>                                           |
| Storage                           | 5 to 95%, non-condensing <sup>5)</sup>                                           |
| Transport                         | 5 to 95%, non-condensing <sup>5)</sup>                                           |
| Vibration <sup>6)</sup>           |                                                                                  |
| Operation (continuous)            | 5 to 500 Hz: max. 0.125 g; duration 1 octave per minute; no unrecoverable errors |
| Operation (occasional)            | 5 to 500 Hz: max. 0.25 g; duration 1 octave per minute; no unrecoverable errors  |
| Storage                           | 5 to 500 Hz: max. 5 g; duration 0.5 octaves per minute; no damage                |
| Transport                         | 5 to 500 Hz: max. 5 g; duration 0.5 octaves per minute; no damage                |
| Shock                             |                                                                                  |
| Operation                         | Max. 125 g, 2 ms; no unrecoverable errors                                        |
| Storage                           | Max. 400 g, 2 ms; no damage                                                      |
|                                   | Max. 450 g, 1 ms; no damage                                                      |
|                                   | Max. 200 g, 0.5 ms; no damage                                                    |
| Transport                         | Max. 400 g, 2 ms; no damage                                                      |
|                                   | Max. 450 g, 1 ms; no damage                                                      |
|                                   | Max. 200 g, 0.5 ms; no damage                                                    |
| Altitude                          |                                                                                  |
| Operation                         | -300 to 3048 m                                                                   |
| Storage                           | -300 to 12192 m                                                                  |
| <b>Mechanical characteristics</b> |                                                                                  |
| Installation <sup>7)</sup>        | Fixed                                                                            |
| Dimensions                        |                                                                                  |
| Width                             | 70 mm                                                                            |
| Length                            | 100 mm                                                                           |
| Height                            | 9.5 mm                                                                           |

Table 78: 5ACPCI.RAIC-03 - Technical data

| Product ID                | 5ACPCI.RAIC-03         |
|---------------------------|------------------------|
| Weight                    | 350 g                  |
| Manufacturer information  |                        |
| Manufacturer              | Fujitsu                |
| Manufacturer's product ID | M120-ESW MHY2160BH-ESW |

Table 78: 5ACPCI.RAIC-03 - Technical data

- 1) Temperature values for 305 meter altitude. The temperature specification must be reduced linearly by 1°C every 305 meters. The temperature increase and decrease can be a maximum of 3°C per minute.
- 2) Standard operation means 333 POH (power-on hours) per month.
- 3) 24-hour operation means 732 POH (power-on hours) per month.
- 4) Maximum humidity at 29°C.
- 5) Maximum humidity at 40°C.
- 6) Operation in areas prone to vibration and shock can affect performance negatively (reduction of transfer rate).
- 7) Mounted on PCI insert.

### Temperature humidity diagram

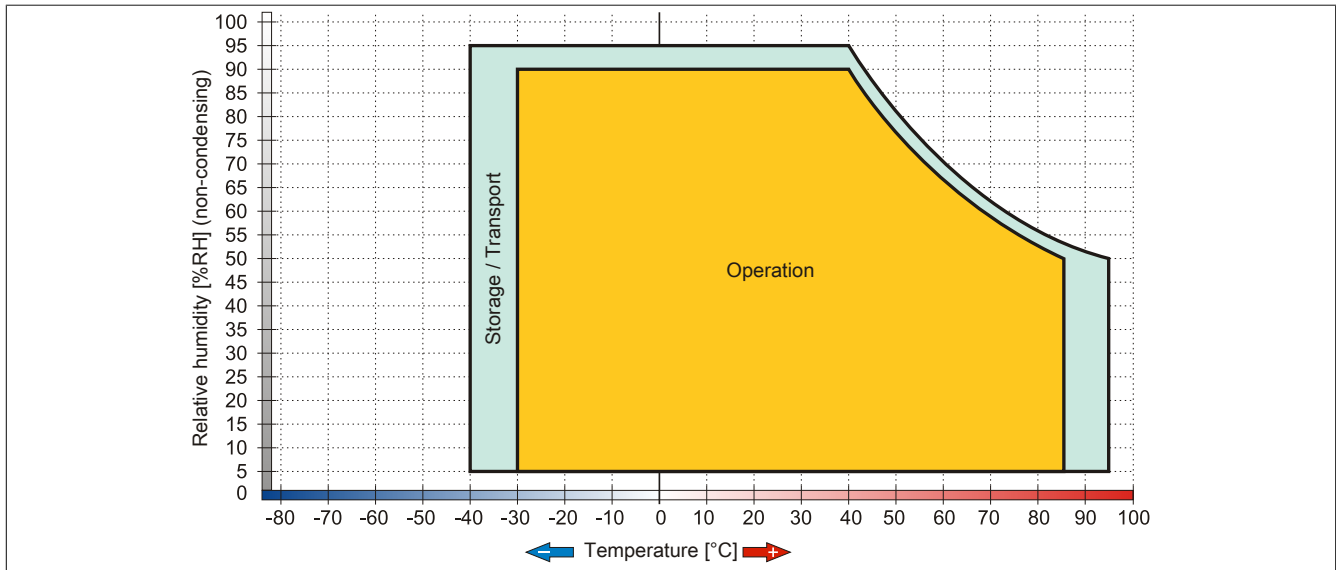


Image 40: 5ACPCI.RAIC-03 - Temperature humidity diagram

### Driver support

Special drivers are necessary for operating the PCI SATA RAID controller. The necessary drivers can be downloaded from the download area on the B&R homepage for approved and supported operating systems ([www.br-automation.com](http://www.br-automation.com)).

The .NET-based SATARaid™ serial ATA RAID management software can also be found on the B&R homepage.

### Information:

**Required drivers can only be downloaded from the B&R homepage, not from manufacturers' pages.**

### Configuration

Configuring a SATA RAID network: see Chapter 3 "Commissioning", section 7 "Configuration of a SATA RAID array" on page 129.

### Exchanging a HDD

A hard drive can be easily exchanged in the event of an error when using the RAID1 (mirroring) configuration without having to re-install the system. The replacement SATA HDD 160GB 5ACPCI.RAIC-04 is available as a replacement part for a HDD.

For instructions on exchanging the drive, see chapter Chapter 7 "Maintenance / Service", section 13 "Exchanging a PCI SATA RAID hard disk in a RAID 1 system" on page 306.

### 3.9.10 5ACPCI.RAIC-04

#### General information

The hard disk can be used as replacement for a HDD in a PCI SATA RAID controller 5ACPCI.RAIC-03.

#### Order data

| Model number   | Short description                                                                                               | Image                                                                               |
|----------------|-----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                | <b>Undefined</b>                                                                                                |                                                                                     |
| 5ACPCI.RAIC-04 | 160 GB SATA Hard Disk Spare part for 5ACPCI.RAIC-03; Remark: Please see manual for proper use of the hard disk. |  |

Table 79: 5ACPCI.RAIC-04 - Order data

#### Technical data

##### 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.

| Product ID                        | 5ACPCI.RAIC-04                                                                   |
|-----------------------------------|----------------------------------------------------------------------------------|
| <b>General information</b>        |                                                                                  |
| Certification<br>CE               | Yes                                                                              |
| <b>Hard disk</b>                  |                                                                                  |
| Capacity                          | 160 GB                                                                           |
| Number of heads                   | 3                                                                                |
| Number of sectors                 | 312,581,808                                                                      |
| Bytes per sector                  | 512                                                                              |
| Cache                             | 8 MB                                                                             |
| Speed                             | 5400 rpm $\pm$ 1%                                                                |
| Startup time                      | Typ. 4 s (from 0 rpm to read access)                                             |
| Lifespan                          | 5 years                                                                          |
| S.M.A.R.T. Support                | Yes                                                                              |
| Access time                       | 5.56 ms                                                                          |
| Supported transfer modes          | SATA 1.0, PIO mode 0-4, multiword DMA mode 0-2, UDMA 0-5                         |
| Data transfer rate                |                                                                                  |
| Internal                          | Max. 84.6 Mbits/s                                                                |
| To/from host                      | Max. 150 MB/s                                                                    |
| Positioning time                  |                                                                                  |
| Minimum (track to track)          | 1.5 ms                                                                           |
| Nominal (read only)               | 12 ms                                                                            |
| Maximum (read only)               | 22 ms                                                                            |
| <b>Electrical characteristics</b> |                                                                                  |
| Power consumption                 | 0.3 A at 3.3 V (PCI bus)<br>1 A at 5 V (PCI bus)                                 |
| <b>Environmental conditions</b>   |                                                                                  |
| Temperature <sup>1)</sup>         |                                                                                  |
| Operation <sup>2)</sup>           | -15 to 80°C                                                                      |
| Operation - 24-hour <sup>3)</sup> | -15 to 80°C                                                                      |
| Storage                           | -40 to 95°C                                                                      |
| Transport                         | -40 to 95°C                                                                      |
| Relative humidity                 |                                                                                  |
| Operation                         | 8 to 90%, non-condensing <sup>4)</sup>                                           |
| Storage                           | 5 to 95%, non-condensing <sup>5)</sup>                                           |
| Transport                         | 5 to 95%, non-condensing <sup>5)</sup>                                           |
| Vibration <sup>6)</sup>           |                                                                                  |
| Operation (continuous)            | 5 to 500 Hz: max. 0.125 g; duration 1 octave per minute; no unrecoverable errors |
| Operation (occasional)            | 5 to 500 Hz: max. 0.25 g; duration 1 octave per minute; no unrecoverable errors  |
| Storage                           | 5 to 500 Hz: max. 5 g; duration 0.5 octaves per minute; no damage                |
| Transport                         | 5 to 500 Hz: max. 5 g; duration 0.5 octaves per minute; no damage                |
| Shock                             |                                                                                  |
| Operation                         | Max. 125 g, 2 ms; no unrecoverable errors                                        |

Table 80: 5ACPCI.RAIC-04 - Technical data

| Product ID                 | 5ACPCI.RAIC-04                                                                                                               |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------|
| Storage                    | Max. 400 g, 2 ms; no damage<br>Max. 450 g, 1 ms; no damage                                                                   |
| Transport                  | Max. 200 g, 0.5 ms; no damage<br>Max. 400 g, 2 ms; no damage<br>Max. 450 g, 1 ms; no damage<br>Max. 200 g, 0.5 ms; no damage |
| Altitude                   |                                                                                                                              |
| Operation                  | -300 to 3048 m                                                                                                               |
| Storage                    | -300 to 12192 m                                                                                                              |
| Mechanical characteristics |                                                                                                                              |
| Dimensions                 |                                                                                                                              |
| Width                      | 70 mm                                                                                                                        |
| Length                     | 100 mm                                                                                                                       |
| Height                     | 9.5 mm                                                                                                                       |
| Weight                     | 350 g                                                                                                                        |
| Manufacturer information   |                                                                                                                              |
| Manufacturer               | Fujitsu                                                                                                                      |
| Manufacturer's product ID  | M120-ESW MHY2160BH-ESW                                                                                                       |

Table 80: 5ACPCI.RAIC-04 - Technical data

- 1) Temperature values for 305 meter altitude. The temperature specification must be reduced linearly by 1°C every 305 meters. The temperature increase and decrease can be a maximum of 3°C per minute.
- 2) Standard operation means 333 POH (power-on hours) per month.
- 3) 24-hour operation means 732 POH (power-on hours) per month.
- 4) Maximum humidity at 29°C.
- 5) Maximum humidity at 40°C.
- 6) Operation in areas prone to vibration and shock can affect performance negatively (reduction of transfer rate).

### Temperature humidity diagram

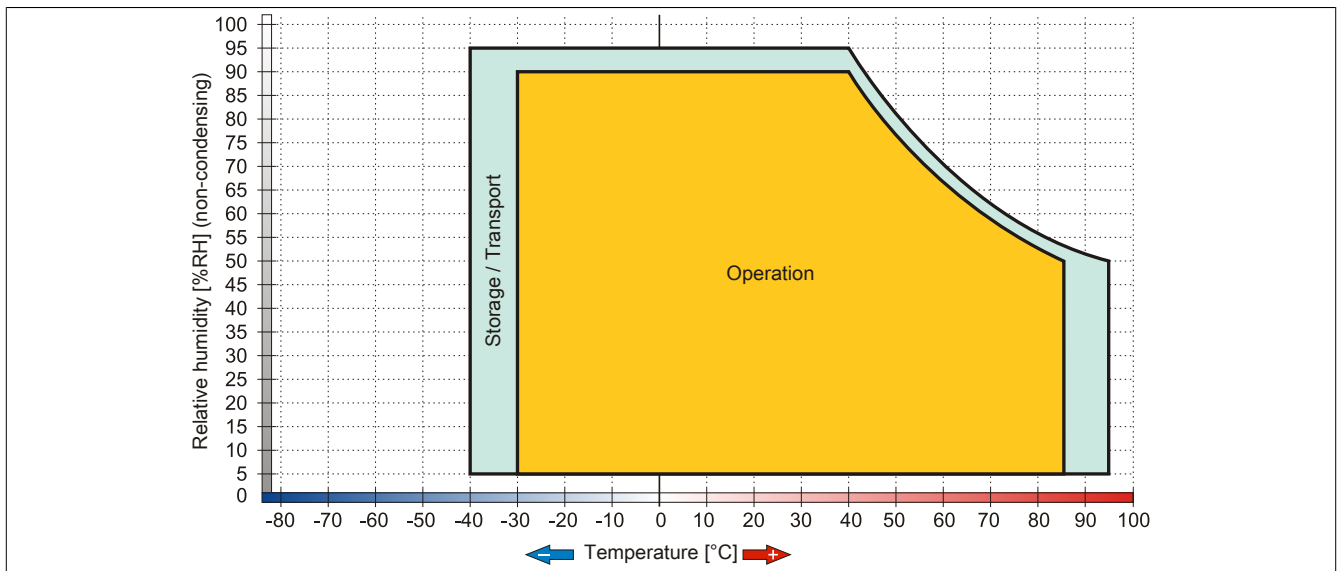


Image 41: 5ACPCI.RAIC-04 - Temperature humidity diagram

3.9.11 5ACPCI.RAIC-05

General information

This SATA RAID controller supports RAID level 0 and 1 and can be inserted in a PCI slot. The 250 GB hard disks being used are specified for 24-hour operation (24x7) and also provides an extended temperature specification (ET).

- SATA RAID controller
- RAID Level 0 (striped) and 1 (mirrored)
- 2 SATA hard disk drives (suitable for 24 hour operation)
- Only requires 1 PCI slot
- Transfer rates up to 150 MB/s

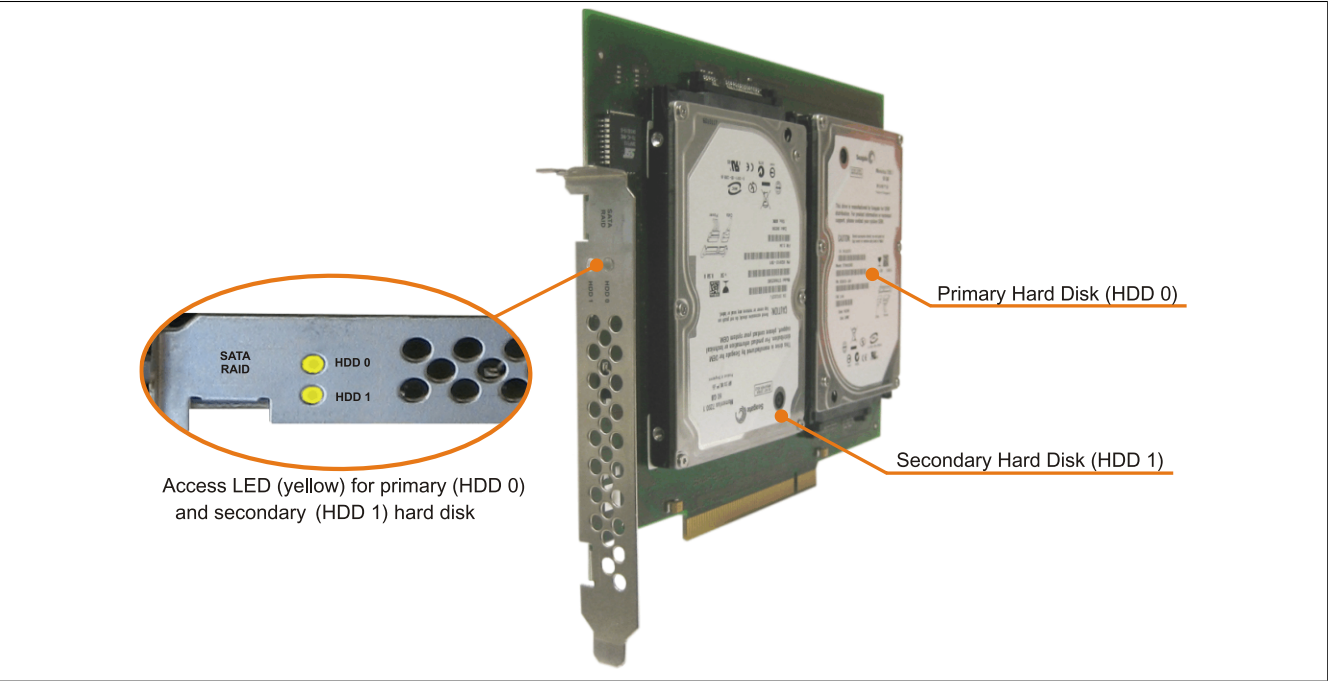


Image 42: PCI SATA RAID controller

Information:

The PCI SATA RAID controller can not be used in place of a Universal Power Supply (UPS). If the operating system is shut down improperly, the next time it is started it is detected as an error by the RAID 1, and a complete rebuild is executed. This generally takes at least 50 minutes (configurable) to complete.

Order data

| Model number   | Short description                                                                                                                                   | Image |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 5ACPCI.RAIC-05 | <b>Drives</b>                                                                                                                                       |       |
|                | PCI RAID System SATA 2x 250 GB; Remark: Please see manual for proper use of the hard disk.                                                          |       |
|                | <b>Optional accessories</b>                                                                                                                         |       |
| 5MMHDD.0250-00 | <b>Drives</b><br>250 GB SATA Hard Disk Spare part for 5AC801.HDDI-03 and 5ACPCI.RAIC-05; Remark: Please see manual for proper use of the hard disk. |       |

Table 81: 5ACPCI.RAIC-05 - Order data



## Technical data

| Product ID                        | 5ACPCI.RAIC-05                                                                              |
|-----------------------------------|---------------------------------------------------------------------------------------------|
| General information               |                                                                                             |
| Number of hard disks              | 2                                                                                           |
| Certification<br>CE               | Yes                                                                                         |
| Controller                        |                                                                                             |
| Type                              | Sil 3512 SATA link                                                                          |
| Specification                     | Serial ATA 1.0                                                                              |
| Data transfer rate                | Max. 1.5 Gbit/s (150 MB/s)                                                                  |
| RAID level                        | Supports RAID 0, 1                                                                          |
| BIOS Extension ROM - requirements | Approx. 32 kB                                                                               |
| Hard disk                         |                                                                                             |
| Capacity                          | 250 GB                                                                                      |
| Number of heads                   | 1                                                                                           |
| Number of sectors                 | 488,397,168                                                                                 |
| Bytes per sector                  | 512                                                                                         |
| Cache                             | 8 MB                                                                                        |
| Speed                             | 5400 rpm $\pm 0.2\%$                                                                        |
| Startup time                      | Typ. 3.6 s (from 0 rpm to read access)                                                      |
| S.M.A.R.T. Support                | Yes                                                                                         |
| Access time                       | 5.56 ms                                                                                     |
| Supported transfer modes          | SATA 1.0, Serial ATA Revision 2.6<br>PIO Modus 0-4, Multiword DMA Mode 0-2, UDMA Mode 0-6   |
| Data transfer rate                |                                                                                             |
| Internal                          | Max. 1175 Mbits/s                                                                           |
| To/from host                      | Max. 150 MB/s                                                                               |
| Positioning time                  |                                                                                             |
| Minimum (track to track)          | 1 ms                                                                                        |
| Nominal (read only)               | 14 ms                                                                                       |
| Maximum (read only)               | 30 ms                                                                                       |
| Electrical characteristics        |                                                                                             |
| Power consumption                 | 0.3 A at 3.3 V (PCI bus)<br>1 A at 5 V (PCI bus)                                            |
| Environmental conditions          |                                                                                             |
| Temperature <sup>1)</sup>         |                                                                                             |
| Operation <sup>2)</sup>           | 0 to 60°C                                                                                   |
| Operation - 24-hour <sup>3)</sup> | 0 to 60°C                                                                                   |
| Storage                           | -40 to 70°C                                                                                 |
| Transport                         | -40 to 70°C                                                                                 |
| Relative humidity <sup>4)</sup>   |                                                                                             |
| Operation                         | 5 to 95%, non-condensing                                                                    |
| Storage                           | 5 to 95%, non-condensing                                                                    |
| Transport                         | 5 to 95%, non-condensing                                                                    |
| Vibration <sup>5)</sup>           |                                                                                             |
| Operation (continuous)            | 5 to 500 Hz: max. 0.125 g; duration 1 octave per minute; no unrecoverable errors            |
| Operation (occasional)            | 5 to 500 Hz: max. 0.25 g; duration 1 octave per minute; no unrecoverable errors             |
| Storage                           | 5 to 500 Hz: 5 g; duration 0.5 octaves per minute; no damage                                |
| Transport                         | 5 to 500 Hz: 5 g; duration 0.5 octaves per minute; no damage                                |
| Shock <sup>5)</sup>               |                                                                                             |
| Operation                         | Max. 125 g, 2 ms; no unrecoverable errors                                                   |
| Storage                           | Max. 400 g, 2 ms; no damage<br>Max. 500 g, 1 ms; no damage<br>Max. 300 g, 0.5 ms; no damage |
| Transport                         | Max. 400 g, 2 ms; no damage<br>Max. 500 g, 1 ms; no damage<br>Max. 300 g, 0.5 ms; no damage |
| Altitude                          |                                                                                             |
| Operation                         | - 300 to 3048 m                                                                             |
| Storage                           | - 300 to 12192 m                                                                            |
| Mechanical characteristics        |                                                                                             |
| Installation                      | Fixed <sup>6)</sup>                                                                         |
| Weight                            | 350 g                                                                                       |
| Manufacturer information          |                                                                                             |
| Manufacturer                      | Seagate                                                                                     |
| Manufacturer's product ID         | ST9250315AS                                                                                 |

Table 82: 5ACPCI.RAIC-05 - Technical data

- 1) Temperature values for 305 meter altitude. The temperature specification must be reduced linearly by 1°C every 305 meters. The temperature increase and decrease can be a maximum of 20°C per hour.
- 2) Standard operation means 333 POH (power-on hours) per month.
- 3) 24-hour operation means 732 POH (power-on hours) per month.
- 4) Humidity gradient: Maximum 30% per hour
- 5) Operation in areas prone to vibration and shock can affect performance negatively (reduction of transfer rate).
- 6) Mounted on PCI insert.

## Temperature humidity diagram

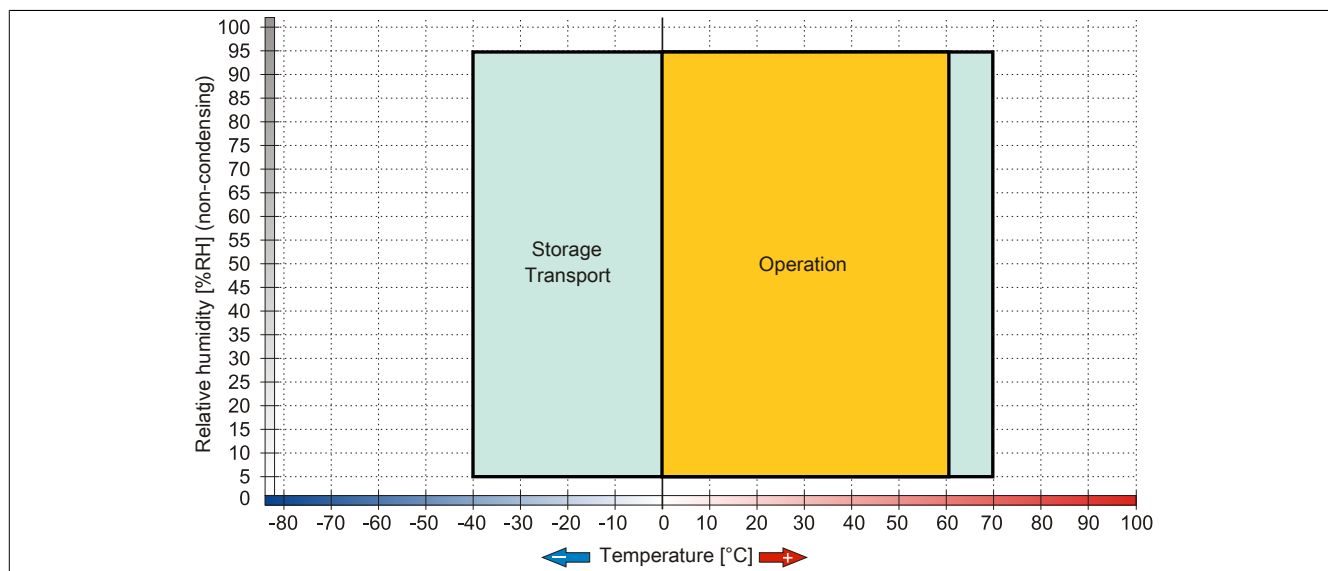


Image 43: 5ACPCI.RAIC-05 - Temperature humidity diagram

## Driver support

Special drivers are necessary for operating the PCI SATA RAID controller. The necessary drivers can be downloaded from the download area on the B&R homepage for approved and supported operating systems ([www.br-automation.com](http://www.br-automation.com)).

The .NET-based SATARaid™ serial ATA RAID management software can also be found on the B&R homepage.

### Information:

**Required drivers can only be downloaded from the B&R homepage, not from manufacturers' pages.**

## Configuration

Configuring a SATA RAID network: see Chapter 3 "Commissioning", section 7 "Configuration of a SATA RAID array" on page 129.

## Exchanging a HDD

A hard drive can be easily exchanged in the event of an error when using the RAID1 (mirroring) configuration without having to re-install the system. The replacement SATA HDD 250GB 5MMHDD.0250-00 is available as a replacement part for a HDD.

Instructions for exchange see "Maintenance / Service" on page 289.

### 3.9.12 5MMHDD.0250-00

#### General information

The hard disk can be used as replacement for a HDD in a PCI SATA RAID controller 5ACPCI.RAIC-05.

#### Order data

| Model number   | Short description                                                                                                                                   | Image                                                                               |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 5MMHDD.0250-00 | <b>Drives</b><br>250 GB SATA Hard Disk Spare part for 5AC801.HDDI-03 and 5ACPCI.RAIC-05; Remark: Please see manual for proper use of the hard disk. |  |

Table 83: 5MMHDD.0250-00 - Order data

#### Technical data

##### 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.

| Product ID                        | 5MMHDD.0250-00                                                                            |
|-----------------------------------|-------------------------------------------------------------------------------------------|
| <b>Hard disk</b>                  |                                                                                           |
| Capacity                          | 250 GB                                                                                    |
| Number of heads                   | 1                                                                                         |
| Number of sectors                 | 488,397,168                                                                               |
| Bytes per sector                  | 512                                                                                       |
| Cache                             | 8 MB                                                                                      |
| Speed                             | 5400 rpm $\pm 0.2\%$                                                                      |
| Startup time                      | Typ. 3.6 s (from 0 rpm to read access)                                                    |
| MTBF                              | 550,000 POH <sup>1)</sup>                                                                 |
| S.M.A.R.T. Support                | Yes                                                                                       |
| Interface                         | SATA                                                                                      |
| Access time                       | 5.56 ms                                                                                   |
| Supported transfer modes          | SATA 1.0, Serial ATA Revision 2.6<br>PIO Modus 0-4, Multiword DMA Mode 0-2, UDMA Mode 0-6 |
| Data transfer rate                |                                                                                           |
| Internal                          | Max. 1175 Mb/s                                                                            |
| To/from host                      | Max. 150 MB/s (SATA I), max. 300 MB/s (SATA II)                                           |
| Positioning time                  |                                                                                           |
| Minimum (track to track)          | 1 ms                                                                                      |
| Nominal (read only)               | 14 ms                                                                                     |
| Maximum (read only)               | 30 ms                                                                                     |
| <b>Environmental conditions</b>   |                                                                                           |
| Temperature <sup>2)</sup>         |                                                                                           |
| Operation <sup>3)</sup>           | 0 to 60°C                                                                                 |
| Operation - 24-hour <sup>4)</sup> | 0 to 60°C                                                                                 |
| Storage                           | -40 to 70°C                                                                               |
| Transport                         | -40 to 70°C                                                                               |
| Relative humidity <sup>5)</sup>   |                                                                                           |
| Operation                         | 5 to 95%, non-condensing                                                                  |
| Storage                           | 5 to 95%, non-condensing                                                                  |
| Transport                         | 5 to 95%, non-condensing                                                                  |
| Vibration                         |                                                                                           |
| Operation                         | 5 to 500 Hz: 0.5 g; no unrecoverable errors                                               |
| Storage                           | 5 to 500 Hz: 5 g; no unrecoverable errors                                                 |
| Transport                         | 5 to 500 Hz: 5 g; no unrecoverable errors                                                 |
| Shock                             |                                                                                           |
| Operation                         | 350 g and 2 ms duration; no unrecoverable errors                                          |
| Storage                           | 800 g and 2 ms duration; no unrecoverable errors                                          |
| Transport                         | 1000 g and 1 ms duration; no unrecoverable errors                                         |
| Transport                         | 600 g and 0.5 ms duration; no unrecoverable errors                                        |
| Transport                         | 800 g and 2 ms duration; no unrecoverable errors                                          |
| Transport                         | 1000 g and 1 ms duration; no unrecoverable errors                                         |
| Transport                         | 600 g and 0.5 ms duration; no unrecoverable errors                                        |

Table 84: 5MMHDD.0250-00 - Technical data

| Product ID                | 5MMHDD.0250-00  |
|---------------------------|-----------------|
| Altitude                  |                 |
| Operation                 | -300 to 3048 m  |
| Storage                   | -300 to 12192 m |
| Manufacturer information  |                 |
| Manufacturer              | Seagate         |
| Manufacturer's product ID | ST9250315AS     |

Table 84: 5MMHDD.0250-00 - Technical data

- 1) At 8760 POH (power-on hours) per year and 25°C surface temperature
- 2) Temperature values for 305 meter altitude. The temperature specification must be reduced linearly by 1°C every 305 meters. The temperature increase and decrease can be a maximum of 20°C per hour.
- 3) Standard operation means 333 POH (power-on hours) per month.
- 4) 24-hour operation means 732 POH (power-on hours) per month.
- 5) Humidity gradient: Maximum 30% per hour

### Temperature humidity diagram

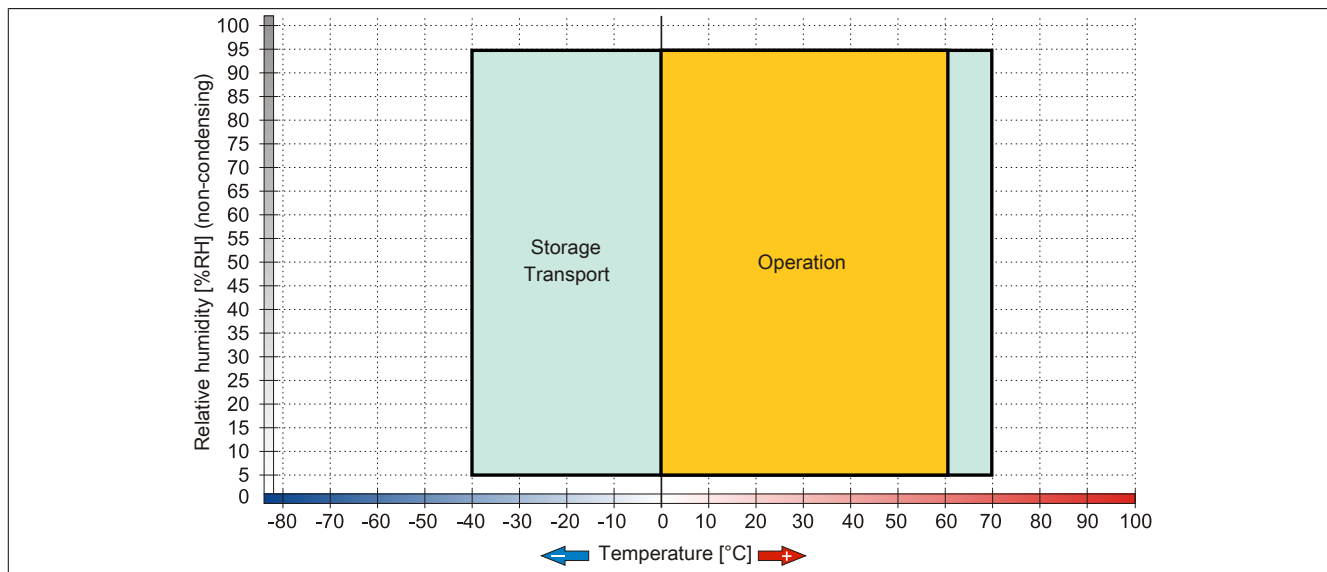


Image 44: 5MMHDD.0250-00 - Temperature humidity diagram

### 3.10 Fan kit

#### Information:

Fans are necessary when using components which must work within certain temperature limits, e.g. DVD combos, PCI cards, etc.

The fan and dust filter are subject to wear and must be checked with appropriate frequency and cleaned or replaced when not functioning properly (e.g. due to dirt and grime).

#### 3.10.1 5AC803.FA01-00

##### General information

This fan kit is an optional addition for PPC800 system units without expansion.

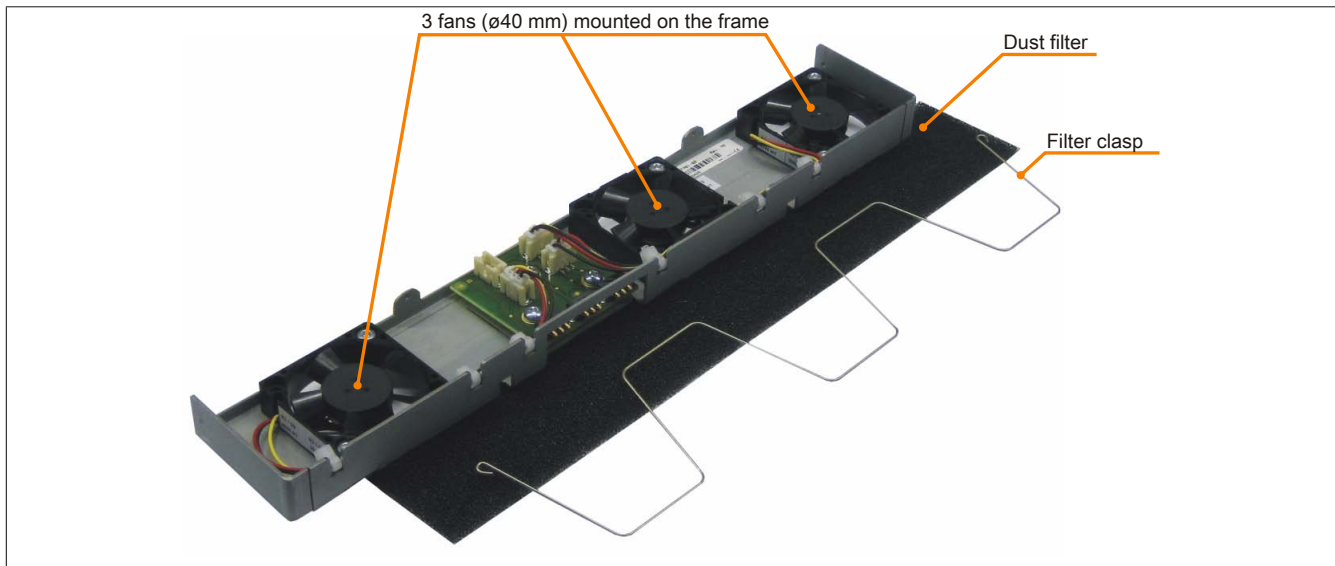


Image 45: 5AC803.FA01-00 - Fan kit

##### Order data

| Model number   | Short description                                  | Image |
|----------------|----------------------------------------------------|-------|
|                | <b>Fan kits</b>                                    |       |
| 5AC803.FA01-00 | PPC800 fan kit for system units without expansion. |       |

Table 85: 5AC803.FA01-00 - Order data

##### Technical data

| Product ID                        | 5AC803.FA01-00                               |
|-----------------------------------|----------------------------------------------|
| <b>General information</b>        |                                              |
| Number of fans                    | 3                                            |
| Speed                             | Max. 6100 rpm                                |
| Noise level                       | 21 dB                                        |
| Lifespan                          | 29,000 hours at 70°C<br>95,000 hours at 20°C |
| Type                              | Double ball bearings                         |
| <b>Mechanical characteristics</b> |                                              |
| Dimensions                        |                                              |

Table 86: 5AC803.FA01-00 - Technical data

| Product ID | 5AC803.FA01-00 |
|------------|----------------|
| Fan        |                |
| Width      | 40 mm          |
| Height     | 40 mm          |
| Depth      | 10 mm          |

Table 86: 5AC803.FA01-00 - Technical data

### 3.10.2 5AC803.FA02-00

#### General information

This fan kit can be installed as an option on PPC800 system units with the 1-slot expansion.

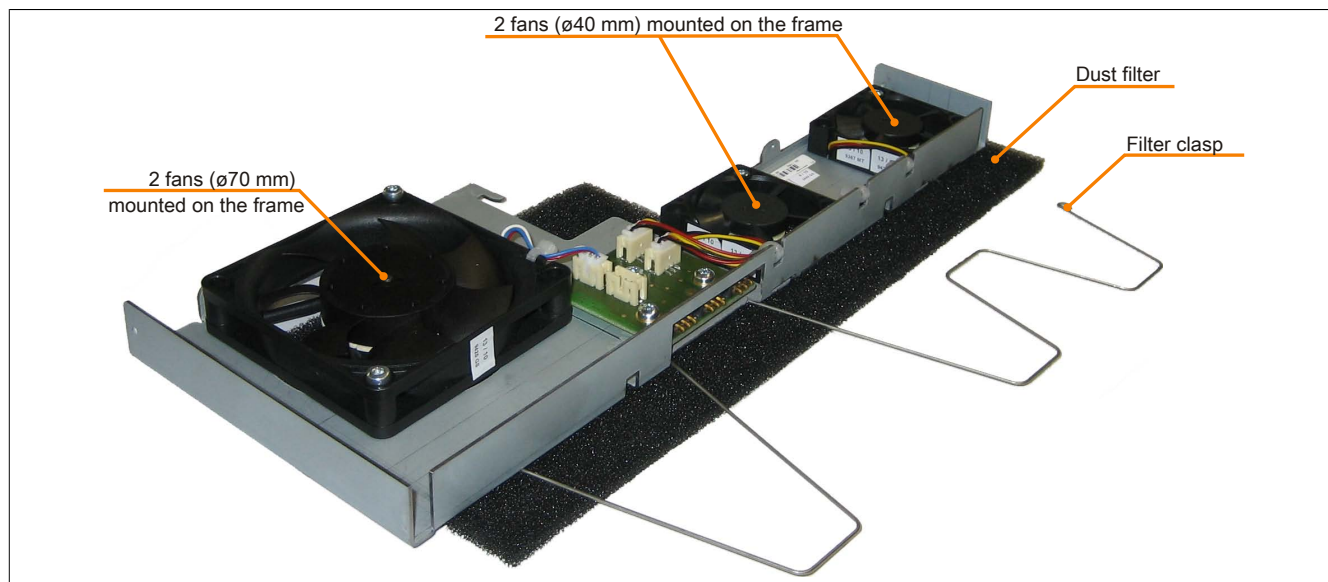


Image 46: 5AC803.FA02-00 - Fan kit

#### Order data

| Model number   | Short description                                                  | Image |
|----------------|--------------------------------------------------------------------|-------|
|                | <b>Fan kits</b>                                                    |       |
| 5AC803.FA02-00 | PPC800 fan kit for system units with the expansion 5AC803.SX01-00. |       |

Table 87: 5AC803.FA02-00 - Order data

#### Technical data

| Product ID                        | 5AC803.FA02-00                               |
|-----------------------------------|----------------------------------------------|
| <b>General information</b>        |                                              |
| Number of fans                    | 4                                            |
| Speed                             | Max. 6100 rpm                                |
| Noise level                       | 21 dB                                        |
| Lifespan                          | 29,000 hours at 70°C<br>95,000 hours at 20°C |
| Type                              | Double ball bearings                         |
| <b>Mechanical characteristics</b> |                                              |
| Dimensions                        |                                              |
| Fan                               |                                              |
| Width                             | 40 mm                                        |
| Height                            | 40 mm                                        |
| Depth                             | 10 mm                                        |

Table 88: 5AC803.FA02-00 - Technical data

### 3.10.3 5AC803.FA03-00

#### General information

This fan kit can be installed as an option on PPC800 system units with the 2-slot expansion.

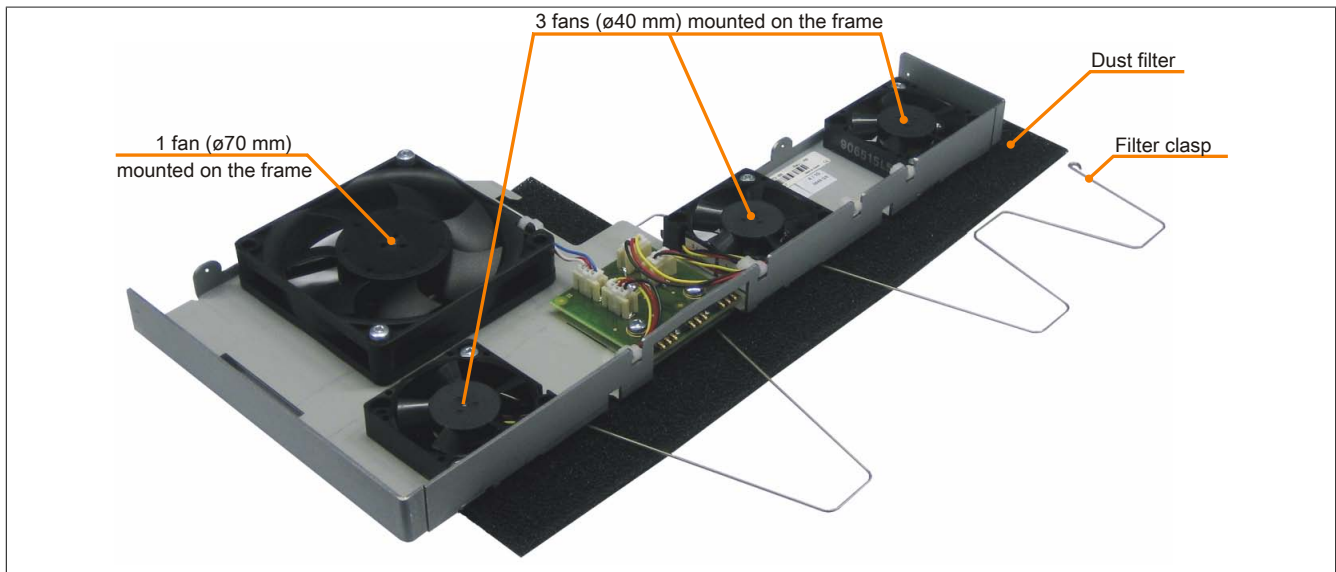


Image 47: 5AC803.FA03-00 - Fan kit

#### Order data

| Model number   | Short description                                                                     | Image |
|----------------|---------------------------------------------------------------------------------------|-------|
| 5AC803.FA03-00 | <b>Fan kits</b><br>PPC800 fan kit for system units with the expansion 5AC803.SX02-00. |       |

Table 89: 5AC803.FA03-00 - Order data

#### Technical data

| Product ID                        | 5AC803.FA03-00                                                                         |
|-----------------------------------|----------------------------------------------------------------------------------------|
| <b>General information</b>        |                                                                                        |
| Number of fans                    | 4                                                                                      |
| Speed                             | Fan 1, 2, 3: max. 6100 rpm<br>Fan 4: 4300 rpm $\pm$ 10%                                |
| Noise level                       | Fan 1, 2, 3: 21 dB<br>Fan 4: 5 dB                                                      |
| Lifespan                          | Fan 1, 2, 3: 29,000 hours at 70°C, 95,000 hours at 20°C<br>Fan 4: $\pm$ 60,000 at 40°C |
| Type                              | Double ball bearings                                                                   |
| <b>Mechanical characteristics</b> |                                                                                        |
| Dimensions                        |                                                                                        |
| Fan                               |                                                                                        |
| Width                             | Fan 1, 2, 3: 40 mm<br>Fan 4: 70 mm                                                     |
| Height                            | Fan 1, 2, 3: 40 mm<br>Fan 4: 70 mm                                                     |
| Depth                             | Fan 1, 2, 3: 10 mm<br>Fan 4: 15 mm                                                     |

Table 90: 5AC803.FA03-00 - Technical data

## Chapter 3 • Commissioning

### 1 Installation

B&R Industrial PCs are best mounted in a housing cutout using the retaining clips or clamping blocks found on the housing (design may vary).

#### 1.1 Important mounting information

- The environmental conditions must be taken into consideration.
- This device must be mounted to a flat surface.
- This device is only certified for operation in closed rooms.
- This device must not be subjected to direct sunlight.
- The ventilation holes must not be covered.
- This device must be mounted in one of the specified approved orientations.
- Be sure the wall or control cabinet can withstand four times the total weight of the device.
- When connecting cables (DVI, SDL, USB, etc.) do not exceed the flex radius.
- This device should be mounted in a position that minimizes glare on the screen.
- This device should be mounted in a position and orientation that make it as easy as possible for the operator to view it.

#### 1.2 Installation with clamping blocks

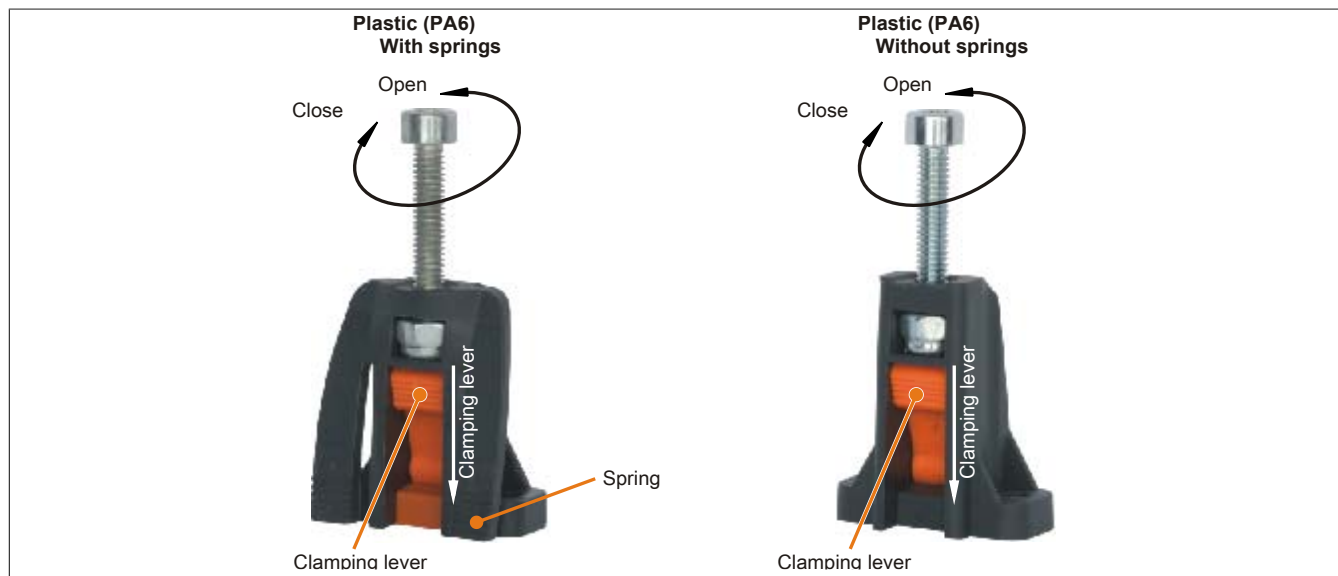


Image 48: Clamping block

The clamping blocks are designed to clamp a maximum thickness of 10 mm and minimum thickness of 2 mm.

A hex key (3 mm) is needed to tighten and loosen the screws. The maximum torque when tightening the clamping block is 0.5 Nm.

The device must be mounted to a flat surface; uneven areas can cause damage to the display when the screws are tightened.



### 1.3 Mounting orientation

The PPC800 system must be mounted as described in the following sections.

#### 1.3.1 Mounting orientation 0° and +/- 45°

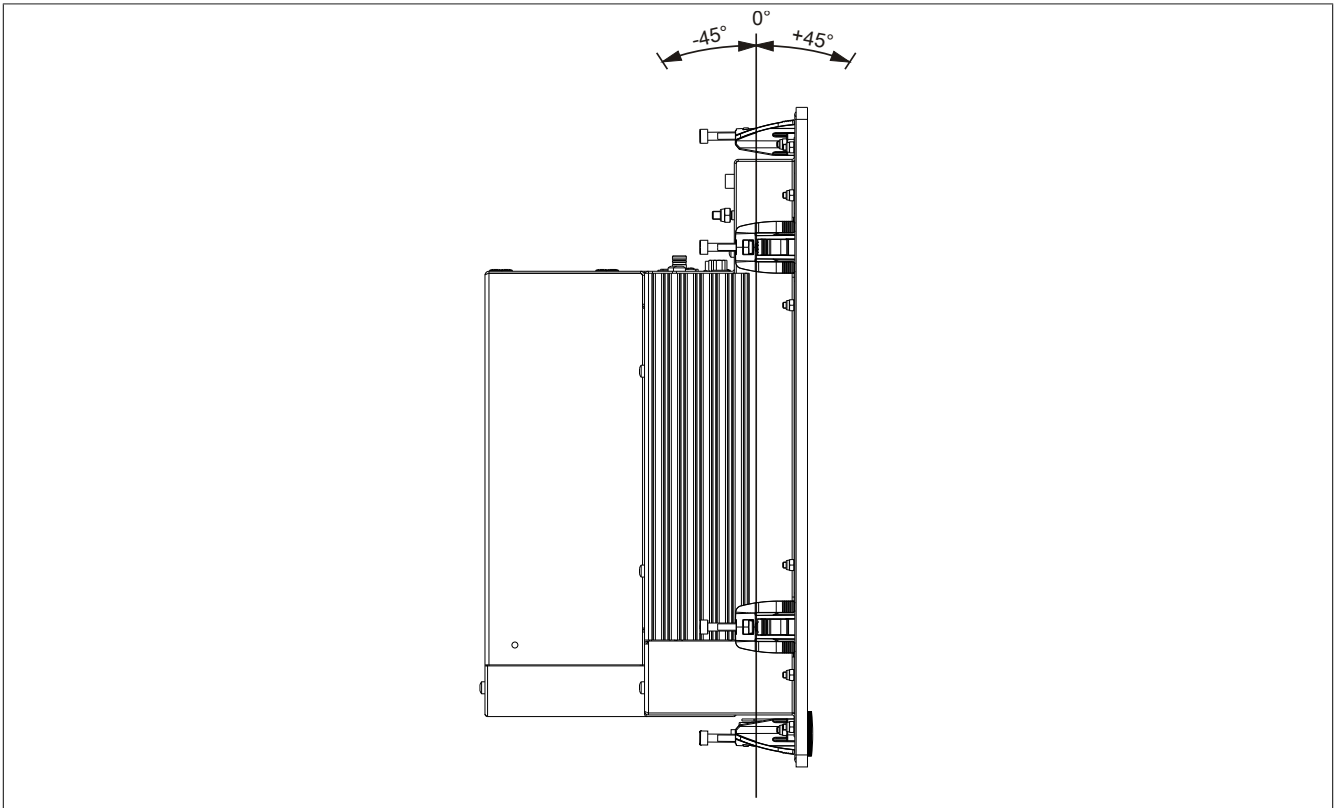


Image 49: Mounting orientation 0° and +/- 45°

Mount the device so that the spacing is as indicated in section " Air circulation spacing" on page 112 in order to facilitate natural air circulation.

### 1.3.2 Mounting orientation with 5AC801.DVRS-00

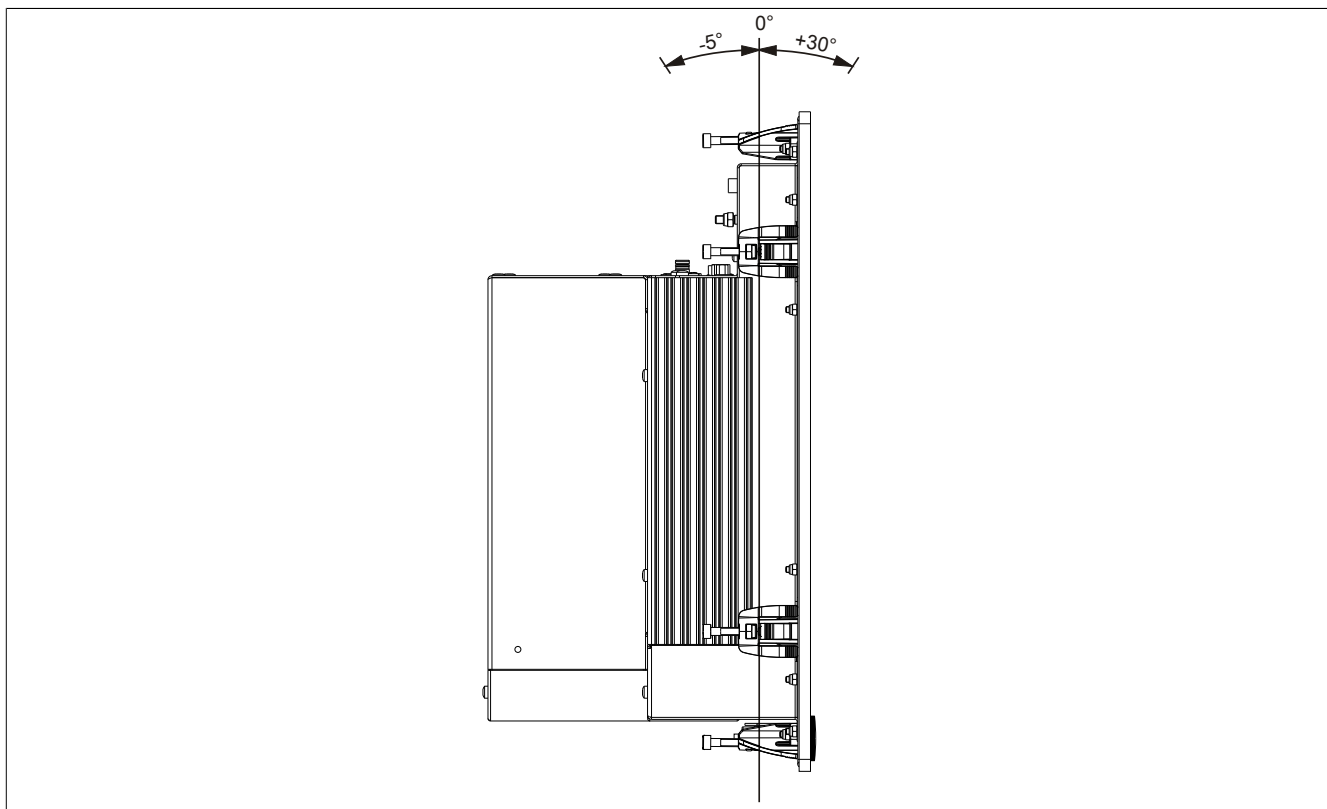


Image 50: Mounting orientation with 5AC801.DVRS-00

Mount the device so that the spacing is as indicated in section " Air circulation spacing" on page 112 in order to facilitate natural air circulation.

### 1.3.3 Mounting orientation with 5AC801.DVDS-00

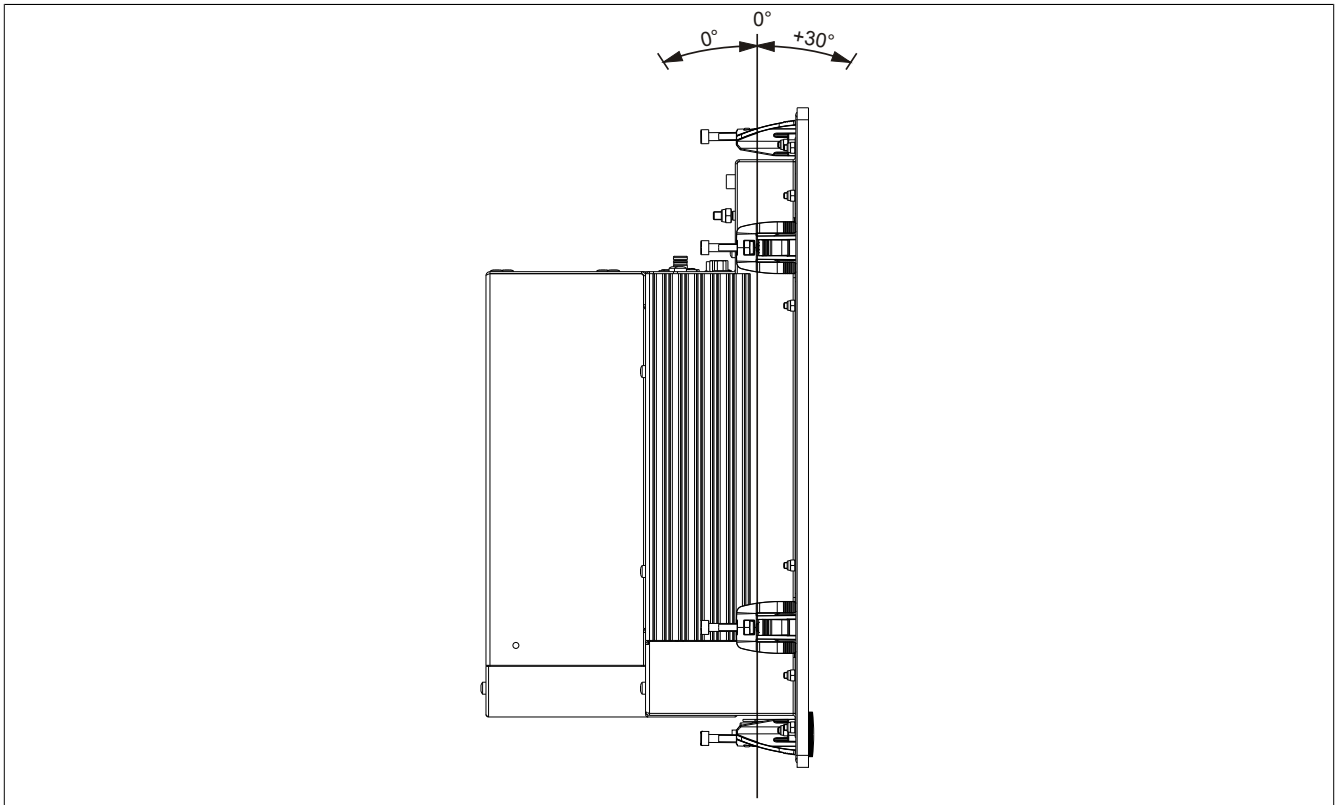


Image 51: Mounting orientation with 5AC801.DVDS-00

Mount the device so that the spacing is as indicated in section " Air circulation spacing" on page 112 in order to facilitate natural air circulation.

## 1.4 Air circulation spacing

In order to guarantee sufficient air circulation, allow the specified amount of space above, below, to the side and behind the Panel PC 800 . The minimum specified spacing is indicated in the following diagrams. This applies for all Panel PC 800 variants.

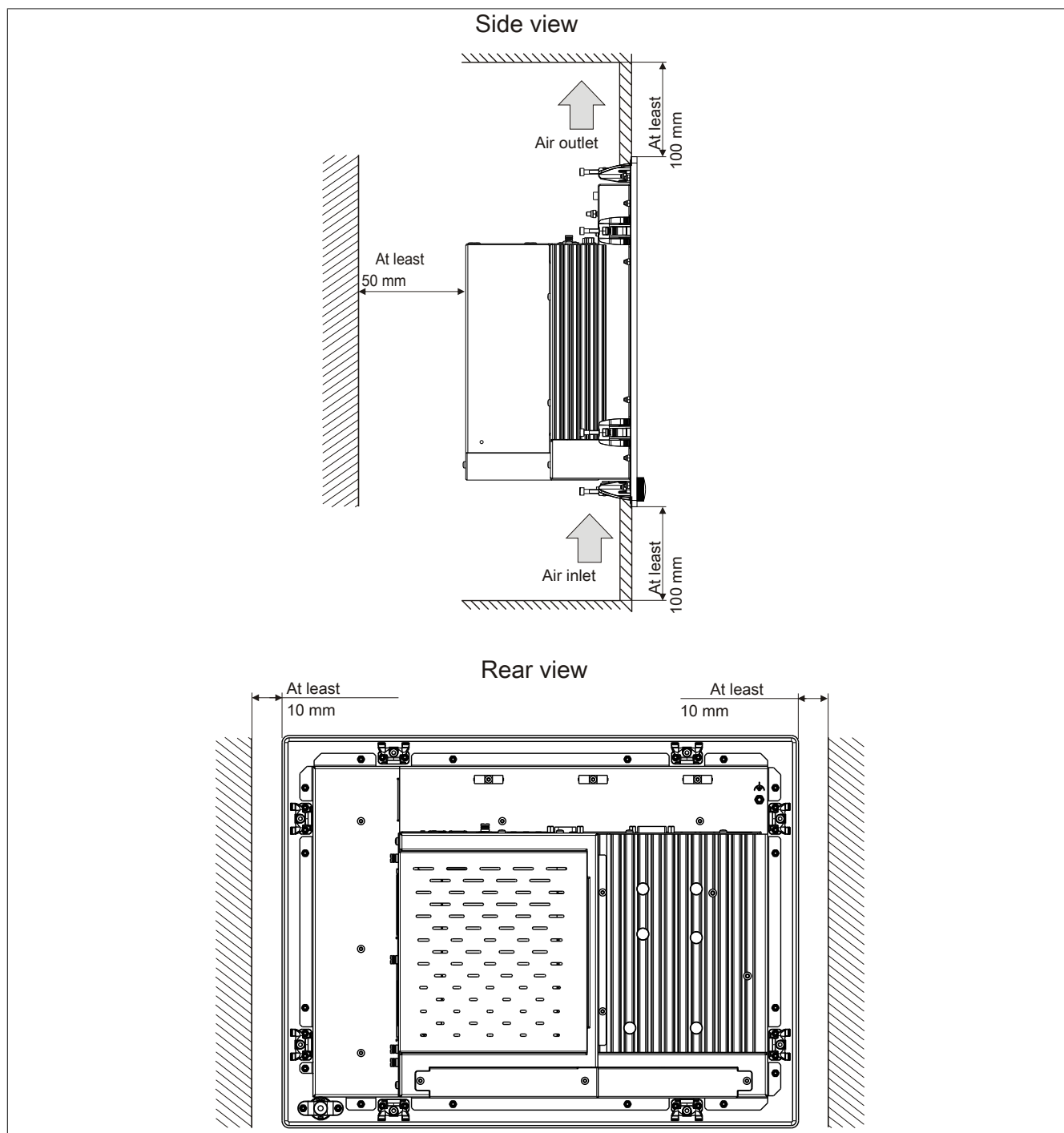


Image 52: Distances for air circulation

## 2 Cable connections

When connecting and laying cables, it is not permitted to have a flex radius smaller than the minimum value specified.

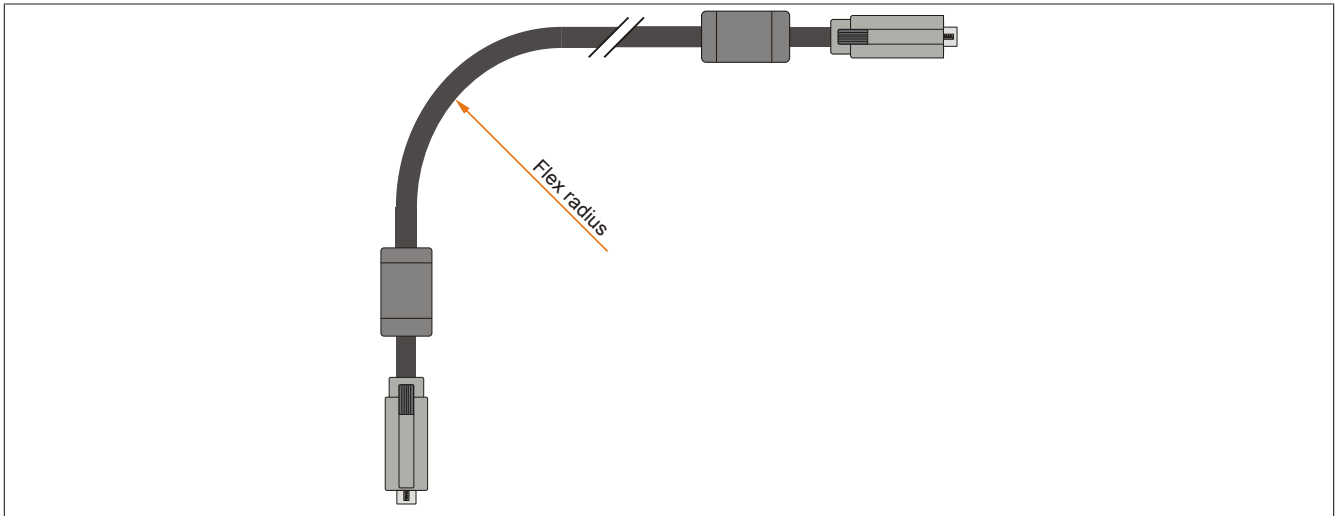


Image 53: Flex radius - Cable connection

### Information:

The specified flex radius can be found in the Automation Panel 800 or Automation Panel 900 User's Manual, which can be downloaded as a .PDF file from the B&R website ([www.br-automation.com](http://www.br-automation.com)).

### 3 Grounding concept

Functional ground is a current path of low impedance between electrical circuits and ground. It is used, for example, to improve immunity to disturbances and not necessarily as a protective measure. It therefore serves only to deflect disturbances, not to provide any kind of protection against electric shock.

The functional ground on the device has 2 connections:

- Supply voltage
- Ground connection

To guarantee secure dissipation of electric disturbances, the following points should be observed:

- The device should be connected to the central grounding point in the control cabinet using the shortest route possible.
- Use a cable with a minimum cross section of 2.5 mm<sup>2</sup> per connection.
- Note the line shielding concept, all connected data cables are used as shielded lines.

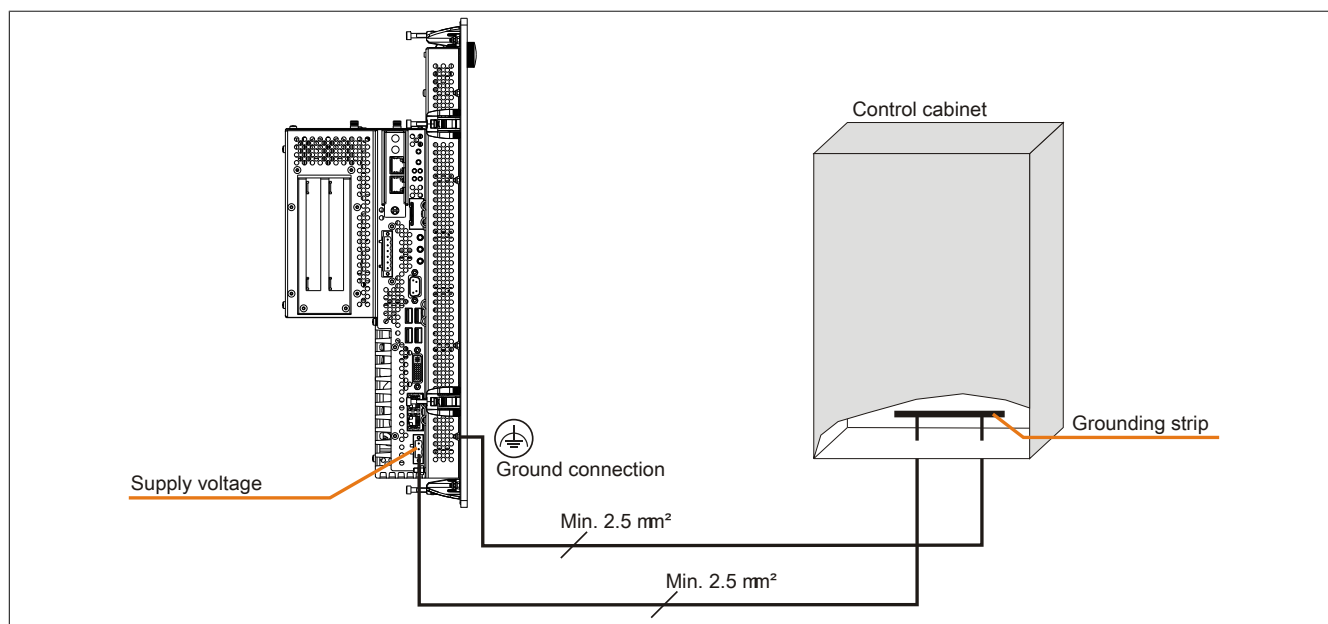


Image 54: Grounding concept

## 4 Connection examples

The following examples provide an overview of the configuration options for connecting Automation Panel 800 and Automation Panel 900 and/or Automation Panel 800 devices with the PPC800. The following questions will be answered:

- How are Automation Panel 900 devices connected to the monitor / panel output of the PPC800, and what needs to be considered?
- How are Automation Panel 800 devices connected to the monitor / panel output of the PPC800, and what needs to be considered?
- What are "Display Clone" and "Extended Desktop" modes?
- How many Automation Panel 900 devices can be connected per line?
- How many Automation Panel 900 devices can be connected to an Automation Panel 800 device per line?
- How are the connected devices internally numbered?
- Are there limitations to the segment length and if so, what are they?
- What cables and link modules are needed?
- Do BIOS settings have to be changed for a specific configuration?

### 4.1 Selecting the display units

If an Automation Panel 800 and an Automation Panel 900 should be connected on the same line, the devices must have the same display type. The following table lists the AP900 devices that can be connected on the same line with an AP800 device.

| Automation Panel 800 | Automation Panel 900                                                 |
|----------------------|----------------------------------------------------------------------|
| 5AP820.1505-00       | 5AP920.1505-01<br>5AP951.1505-01<br>5AP980.1505-01<br>5AP981.1505-01 |
| 5AP880.1505-00       | 5AP920.1505-01<br>5AP951.1505-01<br>5AP980.1505-01<br>5AP981.1505-01 |

Table 91: Selecting the display units

## 4.2 One Automation Panel 900 via onboard DVI

An Automation Panel 900 with max. SXGA resolution is connected to the integrated DVI interface (onboard). As an alternative, an office TFT with DVI interface or an analog monitor (using adapter with model no. 5AC900.1000-00) can also be used. A separate cable is used for touch screen and USB. If USB devices are to be operated on the Automation Panel 900, the maximum distance is 5 meters. USB devices can only be connected directly to the Automation Panel 900 (without a hub).

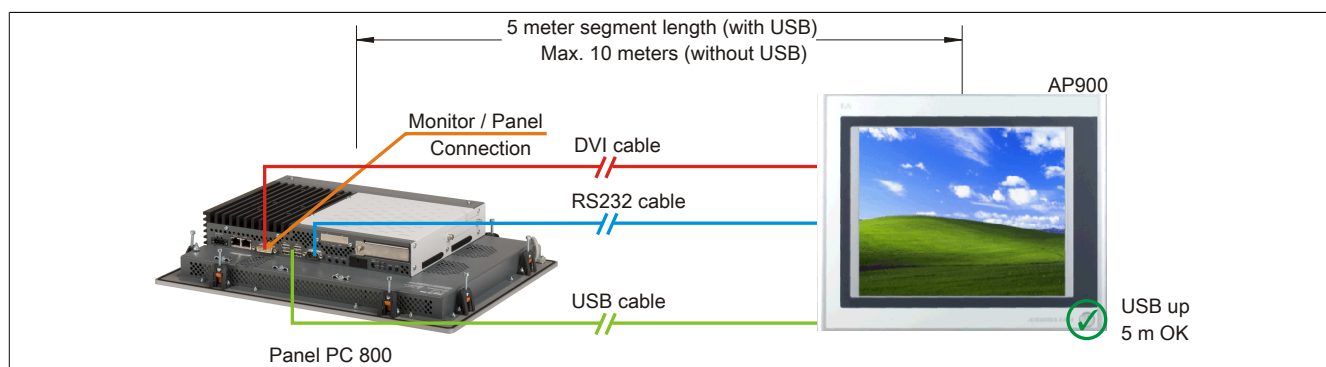


Image 55: One Automation Panel 900 via DVI

### 4.2.1 Basic system requirements

The following table displays the possible combinations for the PPC800 system unit with CPU board to implement the configuration shown in the figure above. If a combination results in a limitation of the maximum resolution, this is also indicated (e.g. when connecting a non-B&R Automation Panel 900 device).

| CPU board      | with system unit |                | Limitation Resolution |
|----------------|------------------|----------------|-----------------------|
|                | 5PC820.1505-00   | 5PC820.1906-00 |                       |
| 5PC800.BM45-00 | ✓                | ✓              | Max. SXGA             |
| 5PC800.BM45-01 | ✓                | ✓              | Max. SXGA             |

Table 92: Possible combinations of system unit and CPU board

### 4.2.2 Link modules

#### Information:

**A corresponding link module must be selected for every device used.**

| Model number    | Description                                                                                                                                                           | Note                     |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 5DL DVI.1000-01 | <b>Automation Panel Link DVI Receiver</b><br>connections for DVI-D, RS232 and USB 2.0 (Type B); 24VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately). | For Automation Panel 900 |

Table 93: Link modules

### 4.2.3 Cables

Select one Automation Panel 900 cable each from the 3 required types.

| Order number   | Description                                                                            | Length       |
|----------------|----------------------------------------------------------------------------------------|--------------|
| 5CADVI.0018-00 | DVI-D Cable, 1.8 m.                                                                    | 1.8 m ±50 mm |
| 5CADVI.0050-00 | DVI-D Cable, 5 m.                                                                      | 5 m ±80 mm   |
| 5CADVI.0100-00 | DVI-D Cable, 10 m.                                                                     | 10 m ±100 mm |
| 9A0014.02      | RS232 extension cable for remote operating of a display unit with touch screen, 1.8 m. | 1.8 m ±50 mm |
| 9A0014.05      | RS232 extension cable for remote operating of a display unit with touch screen, 5 m.   | 5 m ±80 mm   |
| 9A0014.10      | RS232 extension cable for remote operating of a display unit with touch screen, 10 m.  | 10 m ±100 mm |
| 5CAUSB.0018-00 | USB 2.0 connecting cable type A - type B, 1.8 m.                                       | 1.8 m ±30 mm |
| 5CAUSB.0050-00 | USB 2.0 connecting cable type A - type B, 5 m.                                         | 5 m ±50 mm   |

Table 94: Cables for DVI configurations

#### Information:

Detailed technical data about the cables can be found in the Automation Panel 900 User's Manual. This can be downloaded as a .pdf file from the B&R homepage [www.br-automation.com](http://www.br-automation.com).



#### 4.2.4 Possible Automation Panel units, resolutions and segment lengths

The following Automation Panel 900 units can be used. In rare cases, the segment length is limited according to the resolution.

| Model number   | Diagonal | Resolution | Touch screen | Keys | Max. segment length     |
|----------------|----------|------------|--------------|------|-------------------------|
| 5AP920.1043-01 | 10.4"    | VGA        | ✓            | -    | 5 m / 10 m <sup>1</sup> |
| 5AP920.1214-01 | 12.1"    | SVGA       | ✓            | -    | 5 m / 10 m <sup>1</sup> |
| 5AP920.1505-01 | 15.0"    | XGA        | ✓            | -    | 5 m / 10 m <sup>1</sup> |
| 5AP920.1706-01 | 17.0"    | SXGA       | ✓            | -    | 5 m / 10 m <sup>1</sup> |
| 5AP920.1906-01 | 19.0"    | SXGA       | ✓            | -    | 5 m / 10 m <sup>1</sup> |

Table 95: Possible Automation Panel units, resolutions and segment lengths

- 1) USB support is not possible on the Automation Panel 900 because USB is limited to 5 m.

### Information:

The DVI transfer mode does not allow reading statistical values on Automation Panel 900 units.

### 4.3 One Automation Panel 900 via onboard SDL

An Automation Panel 900 is connected to the integrated SDL interface (onboard) via an SDL cable. USB devices can only be connected directly to the Automation Panel (without a hub).

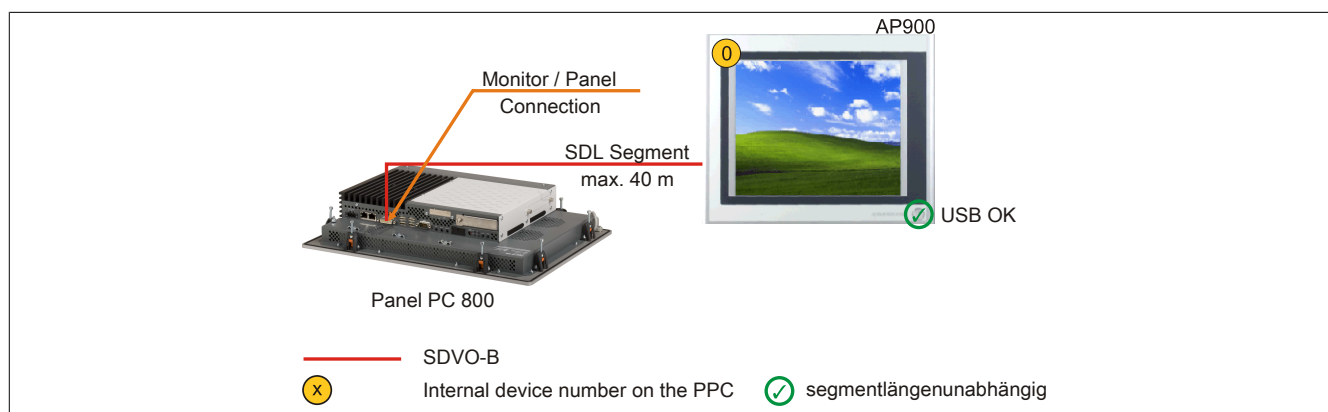


Image 56: One Automation Panel 900 via onboard SDL

#### 4.3.1 Basic system requirements

The following table displays the possible combinations for the PPC800 system unit with CPU board to implement the configuration shown in the figure above. If a combination results in a limitation of the maximum resolution, this is also indicated (e.g. when connecting a non-B&R Automation Panel 800/900 device).

| CPU board      | with system unit |                | Limitation Resolution |
|----------------|------------------|----------------|-----------------------|
|                | 5PC820.1505-00   | 5PC820.1906-00 |                       |
| 5PC800.BM45-00 | ✓                | ✓              | Max. UXGA             |
| 5PC800.BM45-01 | ✓                | ✓              | Max. UXGA             |

Table 96: Possible combinations of system unit and CPU board

#### 4.3.2 Link modules

##### Information:

A corresponding link module must be selected for every device used.

| Model number   | Description                                                                                                                                                                                                                | Note                     |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 5DLSDL.1000-00 | <b>Automation Panel Link SDL receiver</b><br>Connection for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately). | For Automation Panel 900 |

Table 97: Link modules

#### 4.3.3 Cables

Select an Automation Panel 900 cable from the following table.

| Order number   | Description                         | Length       |
|----------------|-------------------------------------|--------------|
| 5CASDL.0018-00 | SDL cable, 1.8 m.                   | 1.8 m ±30 mm |
| 5CASDL.0050-00 | SDL cable, 5 m.                     | 5 m ±30 mm   |
| 5CASDL.0100-00 | SDL cable, 10 m.                    | 10 m ±50 mm  |
| 5CASDL.0150-00 | SDL cable, 15 m.                    | 15 m ±100 mm |
| 5CASDL.0200-00 | SDL cable, 20 m.                    | 20 m ±100 mm |
| 5CASDL.0250-00 | SDL cable, 25 m.                    | 25 m ±100 mm |
| 5CASDL.0300-00 | SDL cable, 30 m.                    | 30 m ±100 mm |
| 5CASDL.0018-03 | SDL flex cable, 1.8 m.              | 1.8 m ±20 mm |
| 5CASDL.0050-03 | SDL flex cable, 5 m.                | 5 m ±45 mm   |
| 5CASDL.0100-03 | SDL flex cable, 10 m.               | 10 m ±90 mm  |
| 5CASDL.0150-03 | SDL flex cable, 15 m.               | 15 m ±135 mm |
| 5CASDL.0200-03 | SDL flex cable, 20 m.               | 20 m ±180 mm |
| 5CASDL.0250-03 | SDL flex cable, 25 m.               | 25 m ±225 mm |
| 5CASDL.0300-03 | SDL flex cable, 30 m.               | 30 m ±270 mm |
| 5CASDL.0300-13 | SDL cable with extender, 30 m.      | 30 m ±280 mm |
| 5CASDL.0400-13 | SDL flex cable with extender, 40 m. | 40 m ±380 mm |
| 5CASDL.0430-13 | SDL flex cable with extender, 43 m. | 43 m ±410 mm |

Table 98: Cables for SDL configurations

| Order number   | Description                      | Length       |
|----------------|----------------------------------|--------------|
| 5CASDL.0018-01 | SDL cable; 45° connector, 1.8 m. | 1,8 m ±30 mm |
| 5CASDL.0050-01 | SDL cable; 45° connector, 5 m.   | 5 m ±50 mm   |
| 5CASDL.0100-01 | SDL cable; 45° connector, 10 m.  | 10 m ±100 mm |
| 5CASDL.0150-01 | SDL cable; 45° connector, 15 m.  | 15 m ±100 mm |

Table 98: Cables for SDL configurations

## Information:

Detailed technical data about the cables can be found in the Automation Panel 900 User's Manual. This can be downloaded as a .pdf file from the B&R homepage [www.br-automation.com](http://www.br-automation.com).

### Cable lengths and resolutions for SDL transfer

The following table shows the relationship between segment lengths and the maximum resolution according to the SDL cable used:

| Cables<br>Segment length [m] | Resolution       |                   |                   |                     |                     |
|------------------------------|------------------|-------------------|-------------------|---------------------|---------------------|
|                              | VGA<br>640 x 480 | SVGA<br>800 x 600 | XGA<br>1024 x 768 | SXGA<br>1280 x 1024 | UXGA<br>1600 x 1200 |
| 1.8                          | 5CASDL.0018-00   | 5CASDL.0018-00    | 5CASDL.0018-00    | 5CASDL.0018-00      | 5CASDL.0018-00      |
|                              | 5CASDL.0018-01   | 5CASDL.0018-01    | 5CASDL.0018-01    | 5CASDL.0018-01      | 5CASDL.0018-01      |
|                              | 5CASDL.0018-03   | 5CASDL.0018-03    | 5CASDL.0018-03    | 5CASDL.0018-03      | 5CASDL.0018-03      |
| 5                            | 5CASDL.0050-00   | 5CASDL.0050-00    | 5CASDL.0050-00    | 5CASDL.0050-00      | 5CASDL.0050-00      |
|                              | 5CASDL.0050-01   | 5CASDL.0050-01    | 5CASDL.0050-01    | 5CASDL.0050-01      | 5CASDL.0050-01      |
|                              | 5CASDL.0050-03   | 5CASDL.0050-03    | 5CASDL.0050-03    | 5CASDL.0050-03      | 5CASDL.0050-03      |
| 10                           | 5CASDL.0100-00   | 5CASDL.0100-00    | 5CASDL.0100-00    | 5CASDL.0100-00      | 5CASDL.0100-00      |
|                              | 5CASDL.0100-01   | 5CASDL.0100-01    | 5CASDL.0100-01    | 5CASDL.0100-01      | 5CASDL.0100-01      |
|                              | 5CASDL.0100-03   | 5CASDL.0100-03    | 5CASDL.0100-03    | 5CASDL.0100-03      | 5CASDL.0100-03      |
| 15                           | 5CASDL.0150-00   | 5CASDL.0150-00    | 5CASDL.0150-00    | 5CASDL.0150-00      | -                   |
|                              | 5CASDL.0150-01   | 5CASDL.0150-01    | 5CASDL.0150-01    | 5CASDL.0150-01      | -                   |
|                              | 5CASDL.0150-03   | 5CASDL.0150-03    | 5CASDL.0150-03    | 5CASDL.0150-03      | -                   |
| 20                           | 5CASDL.0200-00   | 5CASDL.0200-00    | 5CASDL.0200-00    | 5CASDL.0200-00      | -                   |
|                              | 5CASDL.0200-03   | 5CASDL.0200-03    | 5CASDL.0200-03    | 5CASDL.0200-03      | -                   |
| 25                           | 5CASDL.0250-00   | 5CASDL.0250-00    | 5CASDL.0250-00    | -                   | -                   |
|                              | 5CASDL.0250-03   | 5CASDL.0250-03    | 5CASDL.0250-03    | -                   | -                   |
| 30                           | 5CASDL.0300-00   | 5CASDL.0300-00    | -                 | -                   | -                   |
|                              | 5CASDL.0300-03   | 5CASDL.0300-03    | 5CASDL.0300-13    | 5CASDL.0300-13      | -                   |
| 40                           | 5CASDL.0400-13   | 5CASDL.0400-13    | 5CASDL.0400-13    | 5CASDL.0400-13      | -                   |

Table 99: Cable lengths and resolutions for SDL transfer

### 4.3.4 BIOS settings

No special BIOS settings are necessary for operation.

For detailed information, see the user's manual for the B&R industrial PC used.

### Touch screen functionality

The COM C must be enabled in BIOS in order to operate the connected panel touch screen on the monitor / panel connection (found in the BIOS menu under "Advanced - Main board / Panel Features - Legacy Devices").

#### 4.4 One Automation Panel 800 via onboard SDL

An Automation Panel 800 is connected to the integrated SDL interface (onboard) via an SDL cable. USB devices can only be connected directly to the extension keyboard (without a hub).

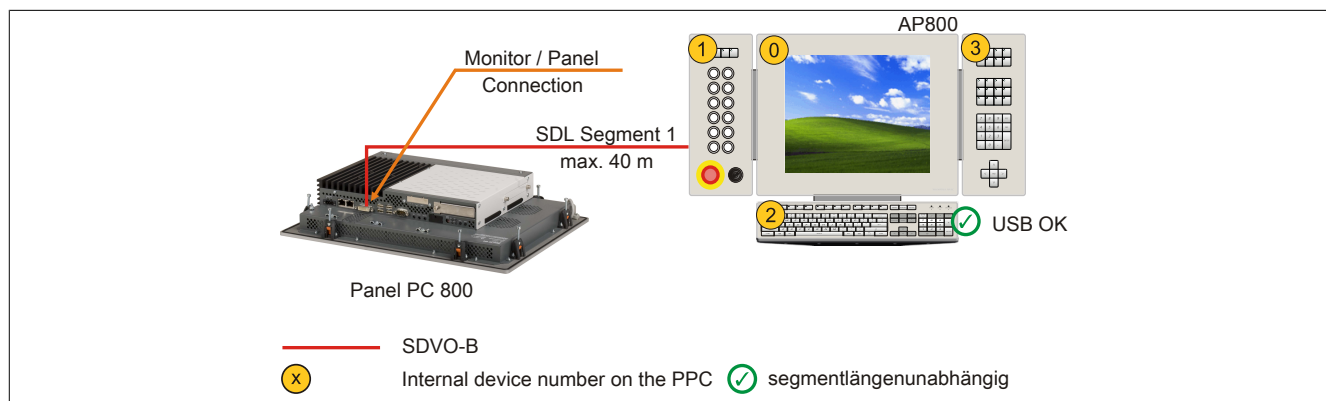


Image 57: One Automation Panel 800 via onboard SDL

##### 4.4.1 Basic system requirements

The following table displays the possible combinations for the PPC800 system unit with CPU board to implement the configuration shown in the figure above. If a combination results in a limitation of the maximum resolution, this is also indicated (e.g. when connecting a non-B&R Automation Panel 800/900 device).

| CPU board      | with system unit |                | Limitation<br>Resolution |
|----------------|------------------|----------------|--------------------------|
|                | 5PC820.1505-00   | 5PC820.1906-00 |                          |
| 5PC800.BM45-00 | ✓                | ✓              | Max. UXGA                |
| 5PC800.BM45-01 | ✓                | ✓              | Max. UXGA                |

Table 100: Possible combinations of system unit and CPU board

##### 4.4.2 Cables

Select an Automation Panel 800 SDL cable from the following table.

| Order number   | Description                                                  | Length       |
|----------------|--------------------------------------------------------------|--------------|
| 5CASDL.0018-20 | SDL flex cable for Automation Panel 800, 1.8 m.              | 1,8 m ±20 mm |
| 5CASDL.0050-20 | SDL flex cable for Automation Panel 800, 5 m.                | 5 m ±45 mm   |
| 5CASDL.0100-20 | SDL flex cable for Automation Panel 800, 10 m.               | 10 m ±90 mm  |
| 5CASDL.0150-20 | SDL flex cable for Automation Panel 800, 15 m.               | 15 m ±135 mm |
| 5CASDL.0200-20 | SDL flex cable for Automation Panel 800, 20 m.               | 20 m ±180 mm |
| 5CASDL.0250-20 | SDL flex cable for Automation Panel 800, 25 m.               | 25 m ±230 mm |
| 5CASDL.0300-30 | SDL flex cable for Automation Panel 800 with extender, 30 m. | 30 m ±280 mm |
| 5CASDL.0400-30 | SDL flex cable for Automation Panel 800 with extender, 40 m. | 40 m ±380 mm |

### Information:

Detailed technical data about the cables can be found in the Automation Panel 800 User's Manual. This can be downloaded as a .pdf file from the B&R homepage [www.br-automation.com](http://www.br-automation.com).

##### Cable lengths and resolutions for SDL transfer

The following table shows the relationship between segment lengths and the maximum resolution according to the SDL cable used:

| Cables<br>Segment length [m] | Resolution<br>XGA<br>1024 x 768 |
|------------------------------|---------------------------------|
|                              |                                 |
| 1.8                          | 5CASDL.0018-20                  |
| 5                            | 5CASDL.0050-20                  |
| 10                           | 5CASDL.0100-20                  |
| 15                           | 5CASDL.0150-20                  |
| 20                           | 5CASDL.0200-20                  |
| 25                           | 5CASDL.0250-20                  |
| 30                           | 5CASDL.0300-30                  |
| 40                           | 5CASDL.0400-30                  |

Table 101: Cable lengths and resolutions for SDL transfer

#### 4.4.3 BIOS settings

No special BIOS settings are necessary for operation.

For detailed information, see the user's manual for the B&R industrial PC used.

#### Touch screen functionality

The COM C must be enabled in BIOS in order to operate the connected panel touch screen on the monitor / panel connection (found in the BIOS menu under "Advanced - Main board / Panel Features - Legacy Devices").

## 4.5 One AP900 and one AP800 via onboard SDL

An Automation Panel 900 and an Automation Panel 800 are connected to the integrated SDL interface (onboard) via SDL.

USB is supported up to a maximum distance (segment 1 + segment 2) of 30 m on the two displays. Starting at a distance of 30 m, USB is only available on the first display (front and back) up to a maximum of 40 m. USB devices can only be connected directly to the Automation Panel 900 or extension keyboard (without a hub).

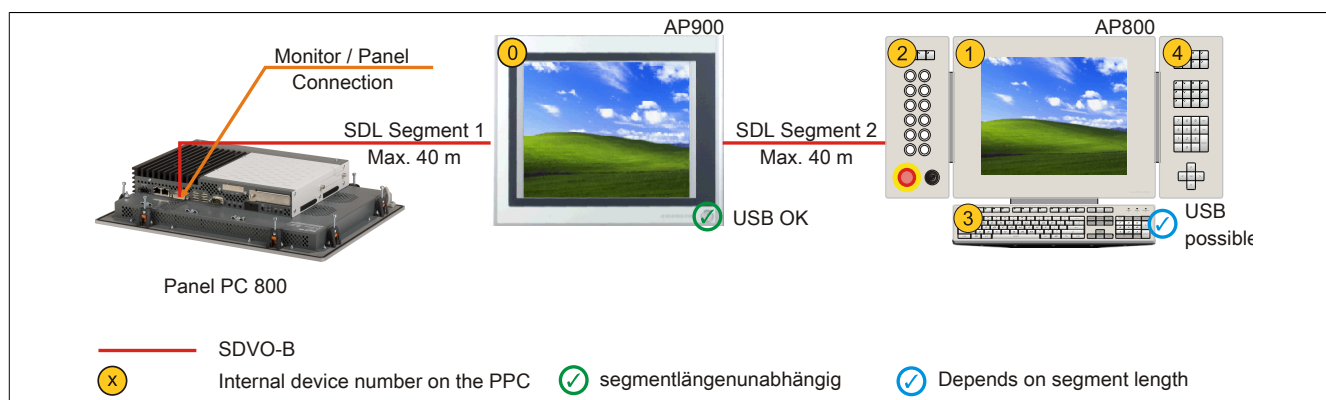


Image 58: One AP900 and one AP800 via onboard SDL

### 4.5.1 Basic system requirements

The following table displays the possible combinations for the PPC800 system unit with CPU board to implement the configuration shown in the figure above. If a combination results in a limitation of the maximum resolution, this is also indicated (e.g. when connecting a non-B&R Automation Panel 800/900 device).

| CPU board      | with system unit |                | Limitation<br>Resolution |
|----------------|------------------|----------------|--------------------------|
|                | 5PC820.1505-00   | 5PC820.1906-00 |                          |
| 5PC800.BM45-00 | ✓                | ✓              | Max. UXGA                |
| 5PC800.BM45-01 | ✓                | ✓              | Max. UXGA                |

Table 102: Possible combinations of system unit and CPU board

### 4.5.2 Link modules

#### Information:

**A corresponding link module must be selected for every device used.**

| Model number   | Description                                                                                                                                                                                                                    | Note                     |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 5DLDMI.1000-01 | <b>Automation Panel Link SDL transceiver</b><br>Connections for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately). | For Automation Panel 900 |

Table 103: Link modules

### 4.5.3 Cables

Selection of SDL cables for connecting the AP900 display to the AP900 display see "Cables" on page 118

Selection of SDL cables for connecting the AP800 display to the AP900 display see "Cables" on page 120

#### Information:

**Detailed technical data about the cables can be found in chapter " Accessories".**

### 4.5.4 BIOS settings

No special BIOS settings are necessary for operation.

For detailed information, see the user's manual for the B&R industrial PC used.

### Touch screen functionality

The COM C must be enabled in BIOS in order to operate the connected panel touch screen on the monitor / panel connection (found in the BIOS menu under "Advanced - Main board / Panel Features - Legacy Devices").

## 4.6 Four Automation Panel 900 units via onboard SDL

An Automation Panel 900 is connected to the integrated SDL interface (onboard) via an SDL cable. Up to three other Automation Panels of the same type are connected to this Automation Panel and operated via SDL. All four panels show the same content (Display Clone).

USB is supported up to a maximum distance (SDL segment 1 + SDL segment 2) of 30 m on the first two panels (front and back side). From a distance of 30 m and longer, USB is only available for the first panel (front and back side). USB devices can only be connected directly to the Automation Panel (without a hub).

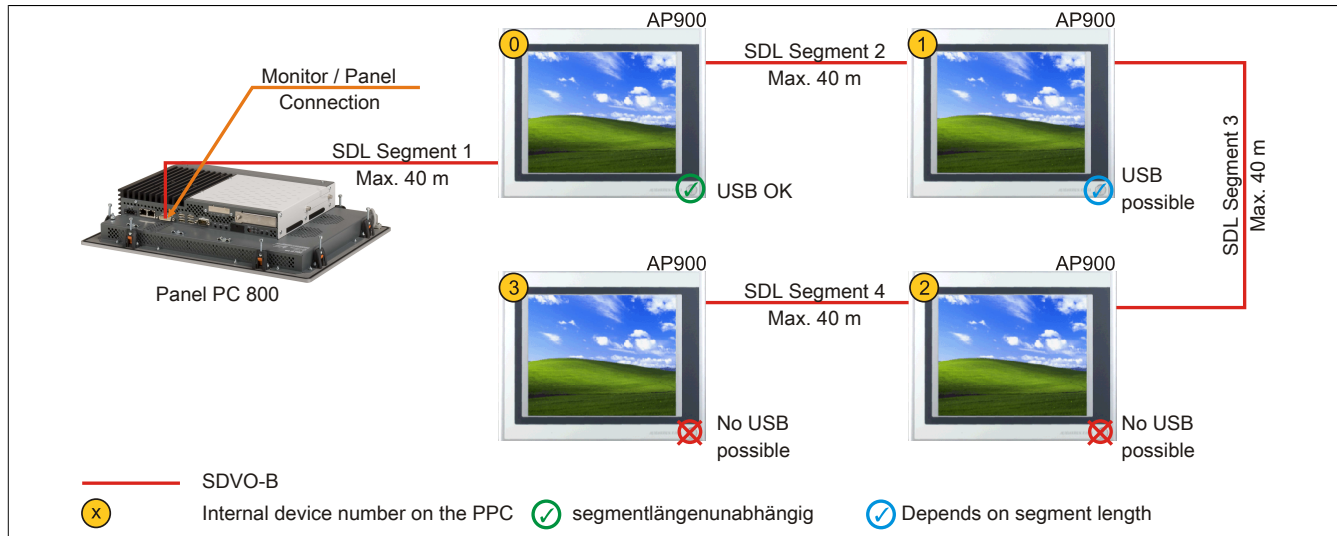


Image 59: Four Automation Panel 900 units via onboard SDL

### 4.6.1 Basic system requirements

The following table displays the possible combinations for the PPC800 system unit with CPU board to implement the configuration shown in the figure above. If a combination results in a limitation of the maximum resolution, this is also indicated (e.g. when connecting a non-B&R Automation Panel 800/900 device).

| CPU board      | with system unit |                | Limitation<br>Resolution |
|----------------|------------------|----------------|--------------------------|
|                | 5PC820.1505-00   | 5PC820.1906-00 |                          |
| 5PC800.BM45-00 | ✓                | ✓              | Max. UXGA                |
| 5PC800.BM45-01 | ✓                | ✓              | Max. UXGA                |

Table 104: Possible combinations of system unit and CPU board

### 4.6.2 Link modules

#### Information:

A corresponding link module must be selected for every device used.

| Model number    | Description                                                                                                                                                                                                                    | Note                     |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 5DL DVI.1000-00 | <b>Automation Panel Link SDL receiver</b><br>Connection for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).     | For Automation Panel 900 |
| 5DLS DL.1000-01 | <b>Automation Panel Link SDL transceiver</b><br>Connections for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately). | For Automation Panel 900 |

Table 105: Link modules

### 4.6.3 Cables

Select an Automation Panel 900 cable from the following table.

| Order number   | Description       | Length       |
|----------------|-------------------|--------------|
| 5CASDL.0018-00 | SDL cable, 1.8 m. | 1.8 m ±30 mm |
| 5CASDL.0050-00 | SDL cable, 5 m.   | 5 m ±30 mm   |
| 5CASDL.0100-00 | SDL cable, 10 m.  | 10 m ±50 mm  |
| 5CASDL.0150-00 | SDL cable, 15 m.  | 15 m ±100 mm |
| 5CASDL.0200-00 | SDL cable, 20 m.  | 20 m ±100 mm |

Table 106: Cables for SDL configurations

| Order number   | Description                         | Length       |
|----------------|-------------------------------------|--------------|
| 5CASDL.0250-00 | SDL cable, 25 m.                    | 25 m ±100 mm |
| 5CASDL.0300-00 | SDL cable, 30 m.                    | 30 m ±100 mm |
| 5CASDL.0018-03 | SDL flex cable, 1.8 m.              | 1.8 m ±20 mm |
| 5CASDL.0050-03 | SDL flex cable, 5 m.                | 5 m ±45 mm   |
| 5CASDL.0100-03 | SDL flex cable, 10 m.               | 10 m ±90 mm  |
| 5CASDL.0150-03 | SDL flex cable, 15 m.               | 15 m ±135 mm |
| 5CASDL.0200-03 | SDL flex cable, 20 m.               | 20 m ±180 mm |
| 5CASDL.0250-03 | SDL flex cable, 25 m.               | 25 m ±225 mm |
| 5CASDL.0300-03 | SDL flex cable, 30 m.               | 30 m ±270 mm |
| 5CASDL.0300-13 | SDL cable with extender, 30 m.      | 30 m ±280 mm |
| 5CASDL.0400-13 | SDL flex cable with extender, 40 m. | 40 m ±380 mm |
| 5CASDL.0430-13 | SDL flex cable with extender, 43 m. | 43 m ±410 mm |
| 5CASDL.0018-01 | SDL cable; 45° connector, 1.8 m.    | 1,8 m ±30 mm |
| 5CASDL.0050-01 | SDL cable; 45° connector, 5 m.      | 5 m ±50 mm   |
| 5CASDL.0100-01 | SDL cable; 45° connector, 10 m.     | 10 m ±100 mm |
| 5CASDL.0150-01 | SDL cable; 45° connector, 15 m.     | 15 m ±100 mm |

Table 106: Cables for SDL configurations

## Information:

Detailed technical data about the cables can be found in the Automation Panel 900 User's Manual. This can be downloaded as a .pdf file from the B&R homepage [www.br-automation.com](http://www.br-automation.com).

### Cable lengths and resolutions for SDL transfer

The following table shows the relationship between segment lengths and the maximum resolution according to the SDL cable used:

| Cables<br>Segment length [m] | Resolution                                         |                                                    |                                                    |                                                    |                                                    |
|------------------------------|----------------------------------------------------|----------------------------------------------------|----------------------------------------------------|----------------------------------------------------|----------------------------------------------------|
|                              | VGA<br>640 x 480                                   | SVGA<br>800 x 600                                  | XGA<br>1024 x 768                                  | SXGA<br>1280 x 1024                                | UXGA<br>1600 x 1200                                |
| 1.8                          | 5CASDL.0018-00<br>5CASDL.0018-01<br>5CASDL.0018-03 | 5CASDL.0018-00<br>5CASDL.0018-01<br>5CASDL.0018-03 | 5CASDL.0018-00<br>5CASDL.0018-01<br>5CASDL.0018-03 | 5CASDL.0018-00<br>5CASDL.0018-01<br>5CASDL.0018-03 | 5CASDL.0018-00<br>5CASDL.0018-01<br>5CASDL.0018-03 |
| 5                            | 5CASDL.0050-00<br>5CASDL.0050-01<br>5CASDL.0050-03 | 5CASDL.0050-00<br>5CASDL.0050-01<br>5CASDL.0050-03 | 5CASDL.0050-00<br>5CASDL.0050-01<br>5CASDL.0050-03 | 5CASDL.0050-00<br>5CASDL.0050-01<br>5CASDL.0050-03 | 5CASDL.0050-00<br>5CASDL.0050-01<br>5CASDL.0050-03 |
| 10                           | 5CASDL.0100-00<br>5CASDL.0100-01<br>5CASDL.0100-03 | 5CASDL.0100-00<br>5CASDL.0100-01<br>5CASDL.0100-03 | 5CASDL.0100-00<br>5CASDL.0100-01<br>5CASDL.0100-03 | 5CASDL.0100-00<br>5CASDL.0100-01<br>5CASDL.0100-03 | 5CASDL.0100-00<br>5CASDL.0100-01<br>5CASDL.0100-03 |
| 15                           | 5CASDL.0150-00<br>5CASDL.0150-01<br>5CASDL.0150-03 | 5CASDL.0150-00<br>5CASDL.0150-01<br>5CASDL.0150-03 | 5CASDL.0150-00<br>5CASDL.0150-01<br>5CASDL.0150-03 | 5CASDL.0150-00<br>5CASDL.0150-01<br>5CASDL.0150-03 | -<br>-<br>-                                        |
| 20                           | 5CASDL.0200-00<br>5CASDL.0200-03                   | 5CASDL.0200-00<br>5CASDL.0200-03                   | 5CASDL.0200-00<br>5CASDL.0200-03                   | 5CASDL.0200-00<br>5CASDL.0200-03                   | -<br>-                                             |
| 25                           | 5CASDL.0250-00<br>5CASDL.0250-03                   | 5CASDL.0250-00<br>5CASDL.0250-03                   | 5CASDL.0250-00<br>5CASDL.0250-03                   | -<br>-                                             | -<br>-                                             |
| 30                           | 5CASDL.0300-00<br>5CASDL.0300-03                   | 5CASDL.0300-00<br>5CASDL.0300-03                   | -<br>5CASDL.0300-13                                | -<br>5CASDL.0300-13                                | -<br>-                                             |
| 40                           | 5CASDL.0400-13                                     | 5CASDL.0400-13                                     | 5CASDL.0400-13                                     | 5CASDL.0400-13                                     | -                                                  |

Table 107: Cable lengths and resolutions for SDL transfer

### 4.6.4 BIOS settings

No special BIOS settings are necessary for operation.

For detailed information, see the user's manual for the B&R industrial PC used.

### Touch screen functionality

The COM C must be enabled in BIOS in order to operate the connected panel touch screen on the monitor / panel connection (found in the BIOS menu under "Advanced - Main board / Panel Features - Legacy Devices").



## 5 Touch screen calibration

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

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

### 5.1 Windows XP Professional

After installing Windows XP Professional, the touch screen driver must be installed in the device in order to operate the touch screen. The necessary driver is available in the Download area of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

### 5.2 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 necessary driver is available in the Download area of the B&R website [www.br-automation.com](http://www.br-automation.com).

### 5.3 Windows Embedded Standard 2009

After first starting Windows Embedded Standard 2009 (First Boot Agent), the touch screen driver must be installed in the device in order to operate the touch screen. The necessary driver is available in the Download area of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

### 5.4 Windows 7

After installing Windows 7, the touch screen driver must be installed in the device in order to operate the touch screen. The necessary driver is available in the Download area of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

### 5.5 Windows Embedded Standard 7

A touch screen driver will be automatically installed if a touch controller is detected during the Windows Embedded Standard 7 setup.

The touch screen driver must be installed manually if a touch controller was not detected during the Windows Embedded Standard 7 setup or if an Automation Panel 800/900 has been connected after setup. The necessary driver is available in the Download area of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

### 5.6 Windows CE

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

### 5.7 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.

## 6 Connecting USB peripheral devices

### Warning!

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

### 6.1 Locally on the PPC800

Many different peripheral USB devices can be connected to the 5 USB ports on the Panel PC 800. These can each handle a maximum load of 1A. The maximum transfer rate is USB 2.0.

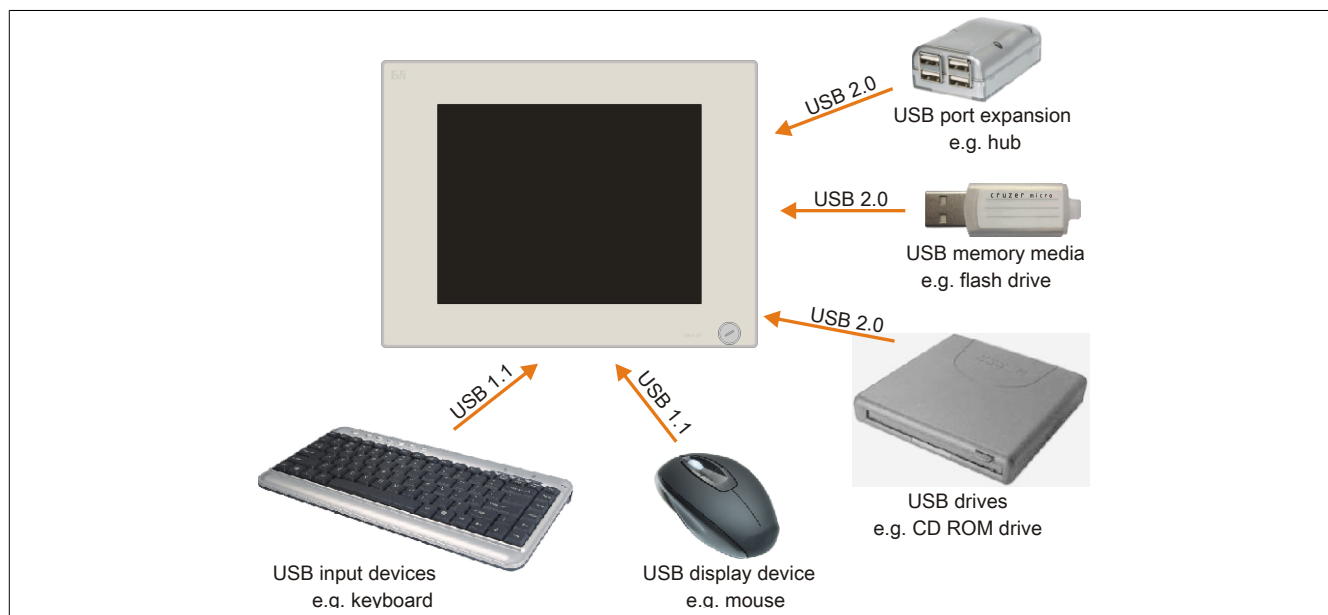


Image 60: Local connection of USB peripheral devices on the PPC800

## 6.2 Remote connection to Automation Panel 900 via DVI

Many different peripheral USB devices can be connected to the 2 or 3 USB ports on the Automation Panel 900. These can each handle a load of 500 mA. The maximum transfer rate is USB 2.0.

### Information:

Only end devices (no hubs) can be connected to the Automation Panel 900.

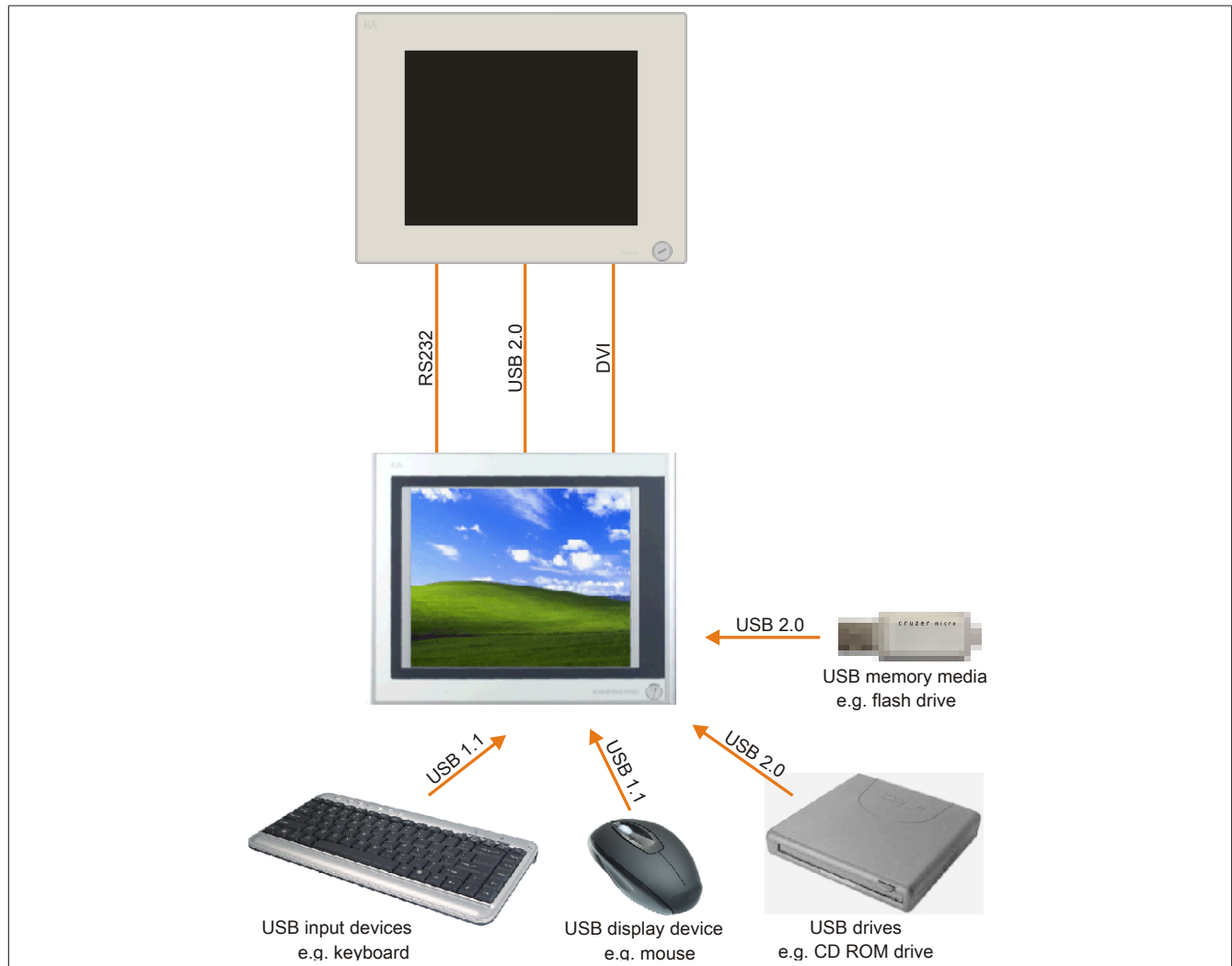


Image 61: Remote connection of USB peripheral devices to the APC900 via DVI

### 6.3 Remote connection to Automation Panel 800/900 via SDL

Many different peripheral USB devices can be connected to the 2 or 3 USB ports on Automation Panel 900 and/or USB connections on the Automation Panel 800 devices. These can each handle a load of 500 mA. The maximum transfer rate is USB 1.1.

#### Information:

Only end devices (no hubs) can be connected to the Automation Panel 800/900.

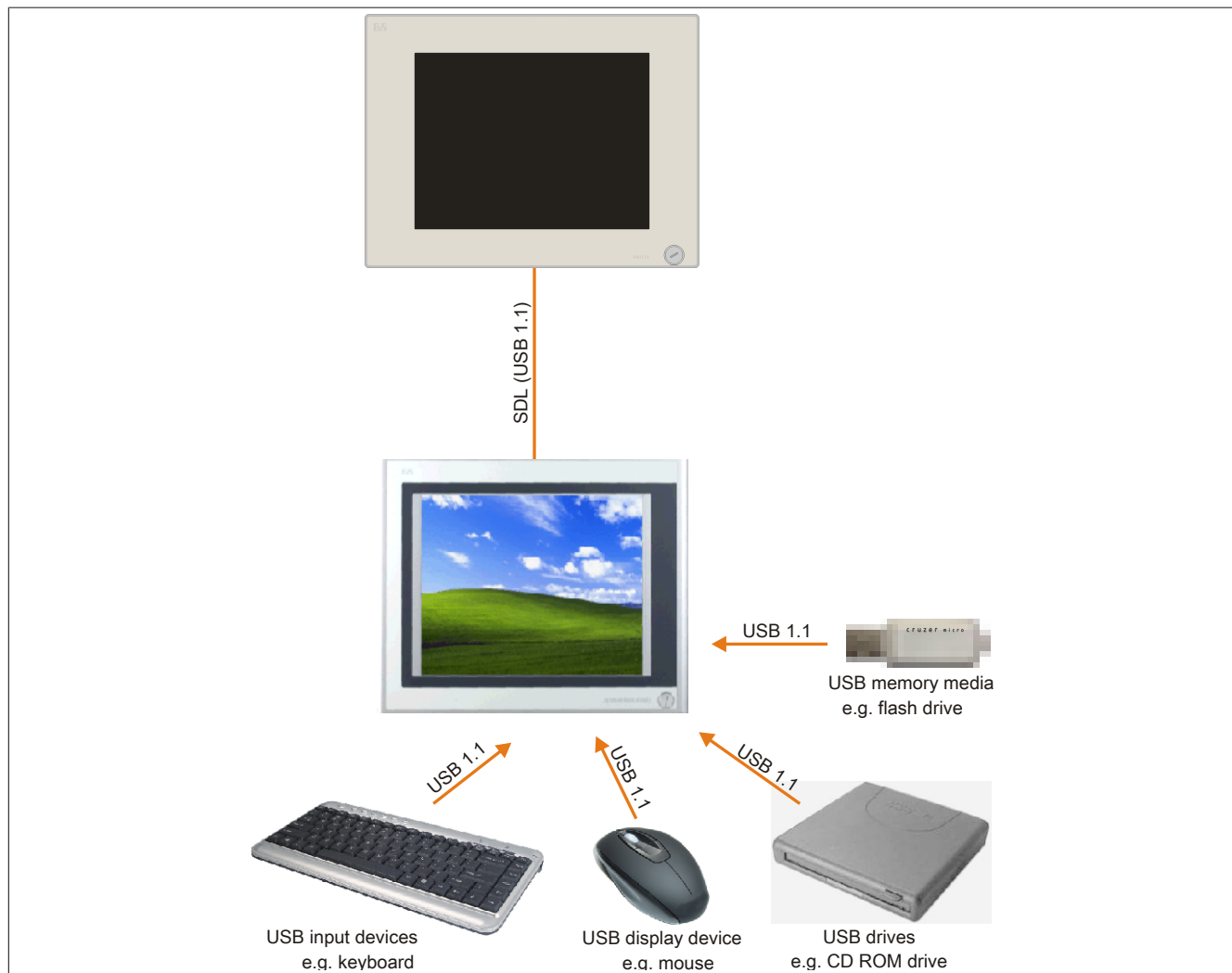


Image 62: Remote connection of USB peripheral devices to the APC800/900 via SDL

## 7 Configuration of a SATA RAID array

### Information:

The following software description is valid for PCI SATA controllers 5ACPCI.RAIC-01 and 5ACPCI.RAIC-03.

You must enter the BIOS "RAID Configuration Utility" in order to make the necessary settings. After the POST, enter <Ctrl+S> or <F4> to open RAID BIOS.

```
SiI 3512A SATARaid BIOS Verison 4.3.79
Copyright (C) 1997-2006 Silicon Image, Inc.

Press <Ctrl+S> or F4 to enter RAID utility
0   ST96023AS           55 GB
1   ST96023AS           55 GB
```

Image 63: Open the RAID Configuration Utility

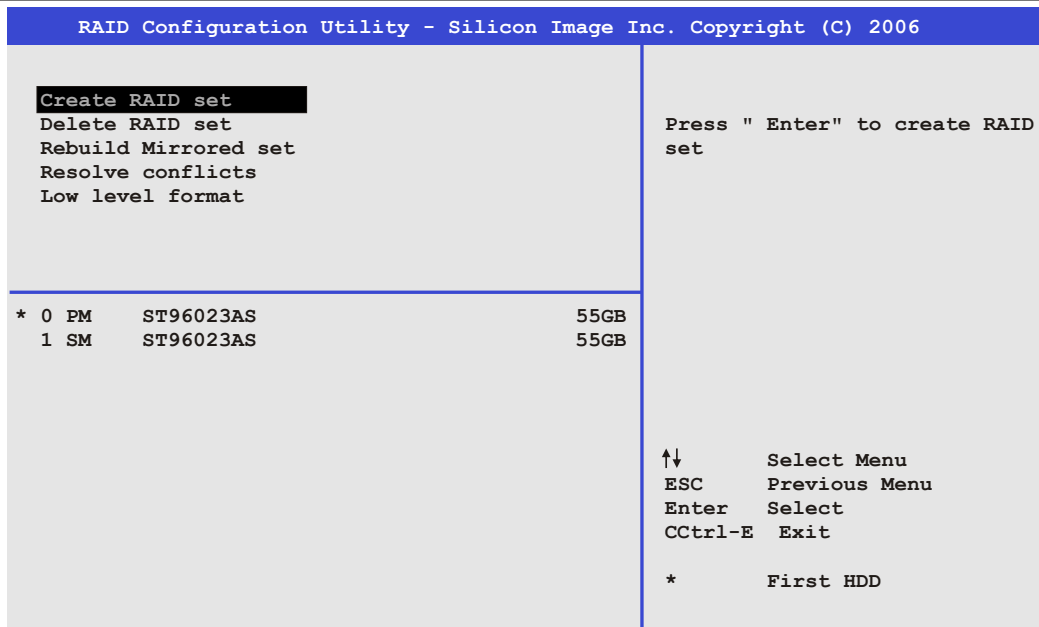


Image 64: RAID Configuration Utility - Menu

The following keys can be used after entering the BIOS setup:

| Key      | Function                                  |
|----------|-------------------------------------------|
| Cursor ↑ | Go to previous item.                      |
| Cursor ↓ | Go to the next item.                      |
| Enter    | Select an item or open a submenu.         |
| ESC      | Go back to previous menu.                 |
| Ctrl+E   | Exit setup and save the changed settings. |

Table 108: BIOS-relevant keys in the RAID Configuration Utility

7.1 Create RAID set

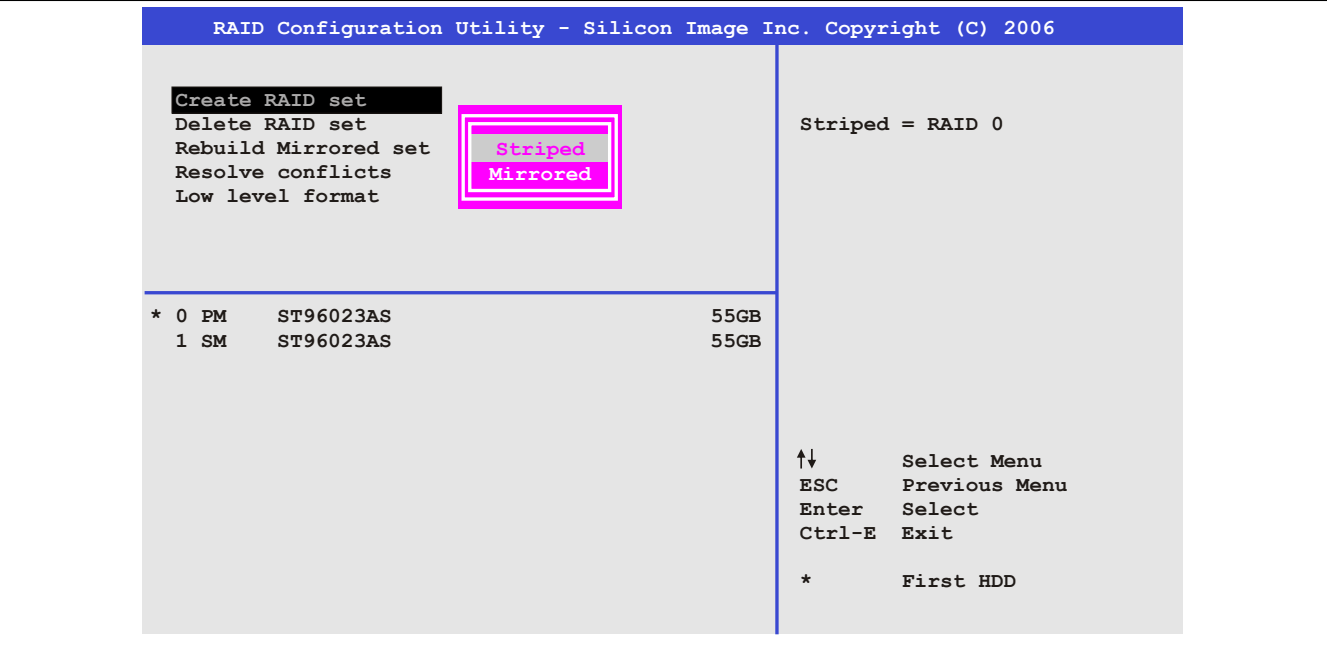


Image 65: RAID Configuration Utility - Menu

The RAID system can be recreated as "Striped" = RAID0 or "Mirrored" = RAID1 using the menu "Create RAID set".

7.2 Create RAID set - Striped

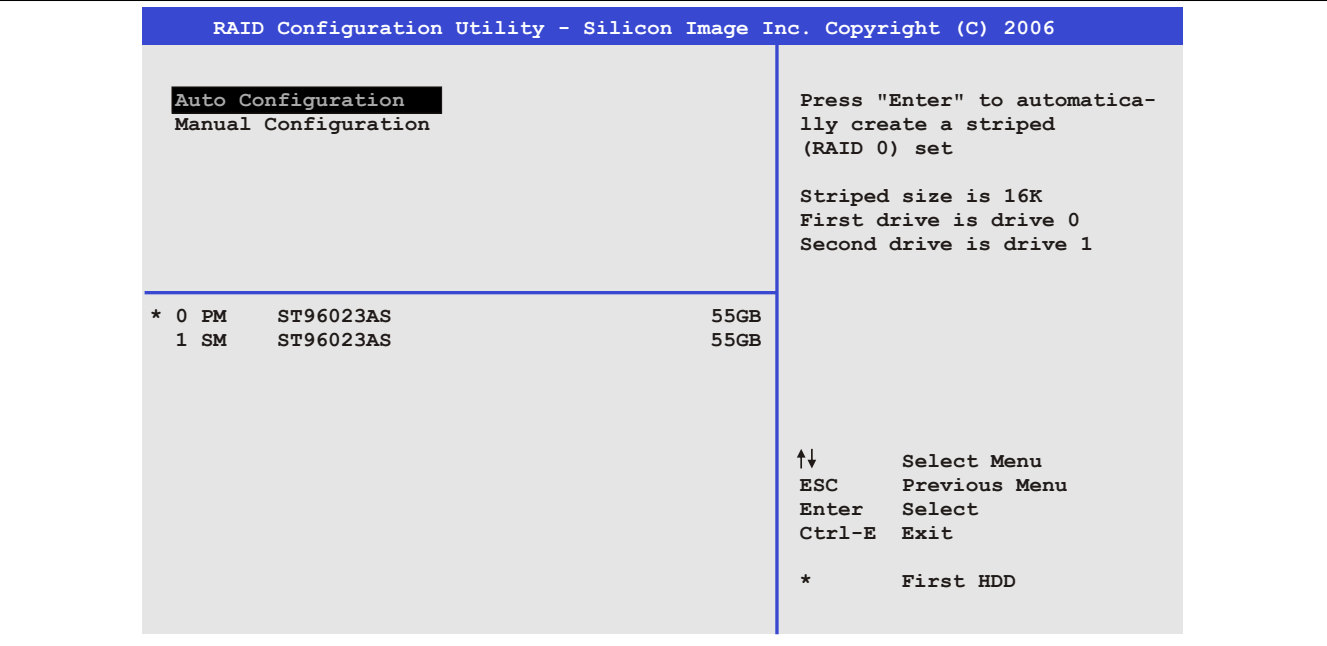


Image 66: RAID Configuration Utility - Create RAID set - Striped

"Auto Configuration"

Auto configuration optimizes all settings.

"Manual Configuration"

It is possible to specify the first and second HDD as well as the "Chunk Size" (= block size, application-dependent).

### 7.3 Create RAID set - Mirrored

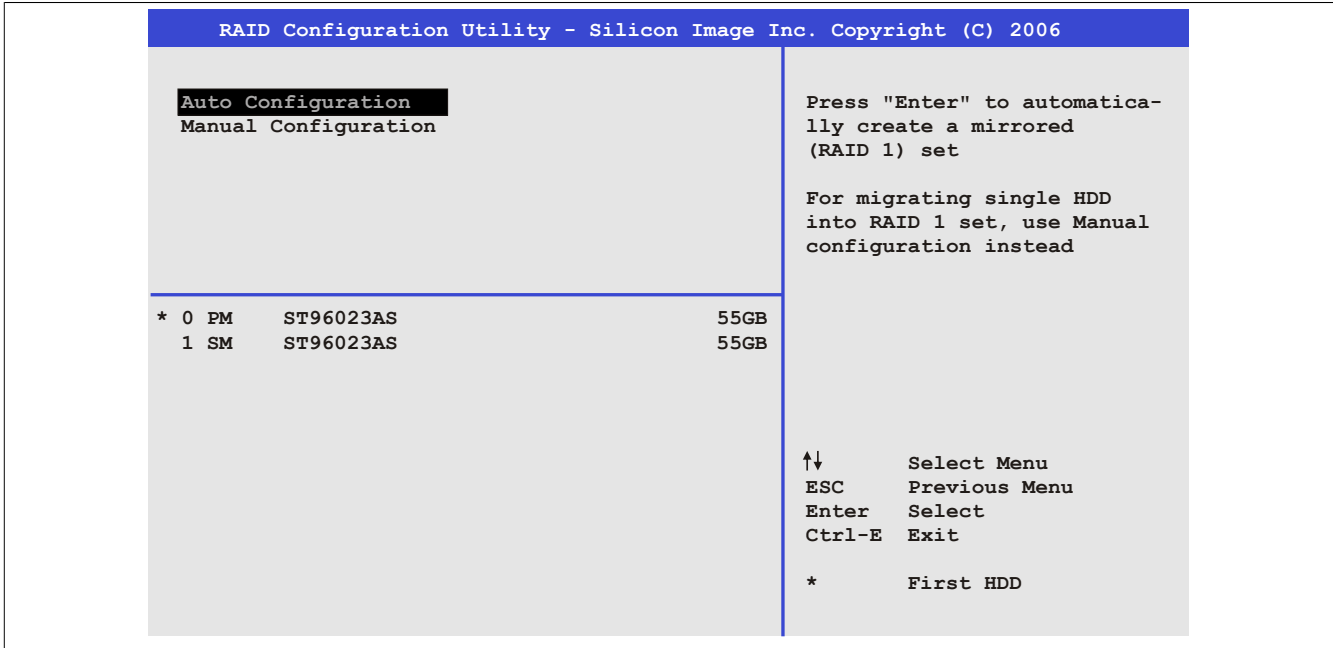


Image 67: RAID Configuration Utility - Create RAID set - Mirrored

#### "Auto Configuration"

Auto configuration optimizes all settings.

#### "Manual Configuration"

It is possible to specify the "Source" and "Target" HDD, and also to specify whether a rebuild (mirror) should be performed immediately (approx. 50 minutes).

### 7.4 Delete RAID set

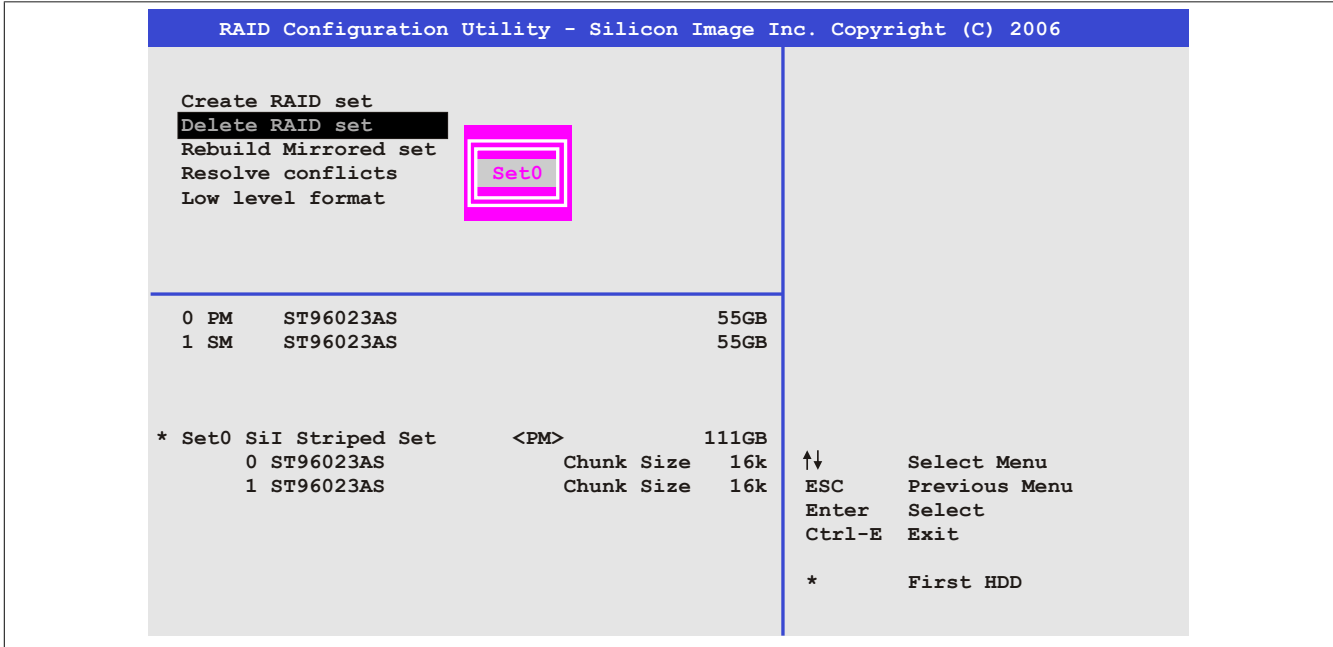


Image 68: RAID Configuration Utility - Delete RAID set

An existing RAID set can be deleted using the menu "Delete RAID set".

7.5 Rebuild mirrored set

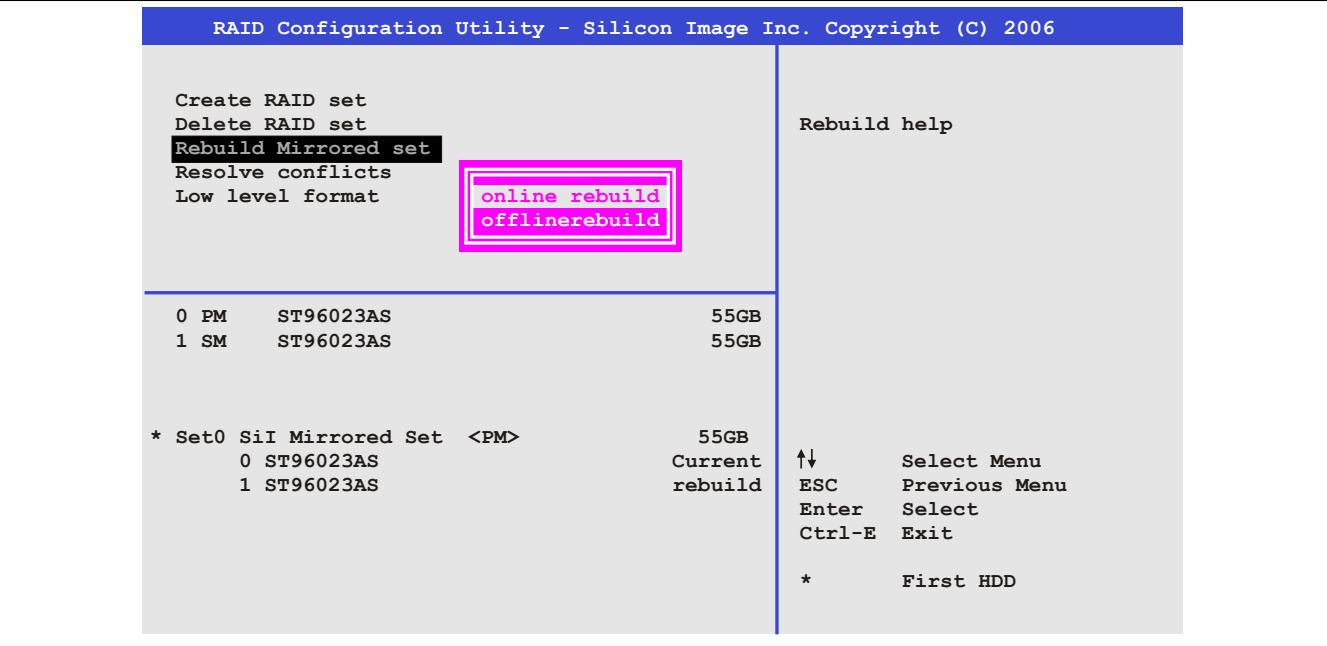


Image 69: RAID Configuration Utility - Rebuild mirrored set

The "Rebuild mirrored set" menu can be used to restart a rebuild procedure in a RAID 1 network if an error occurs, after first interrupting the rebuild procedure or when exchanging a hard disk.

If "onlinerebuild" is selected, then the rebuild is executed during operation after the system is booted. E.g. an event pop-up is displayed by the installed SATA RAID configuration program: SATARaid detected a new event and the rebuild is started. The entire rebuild lasts approximately 50 minutes.

If "offlinerebuild" is selected, then a rebuild is performed immediately before starting the operating system (lasts approximately 30 minutes).

7.6 Resolve conflicts

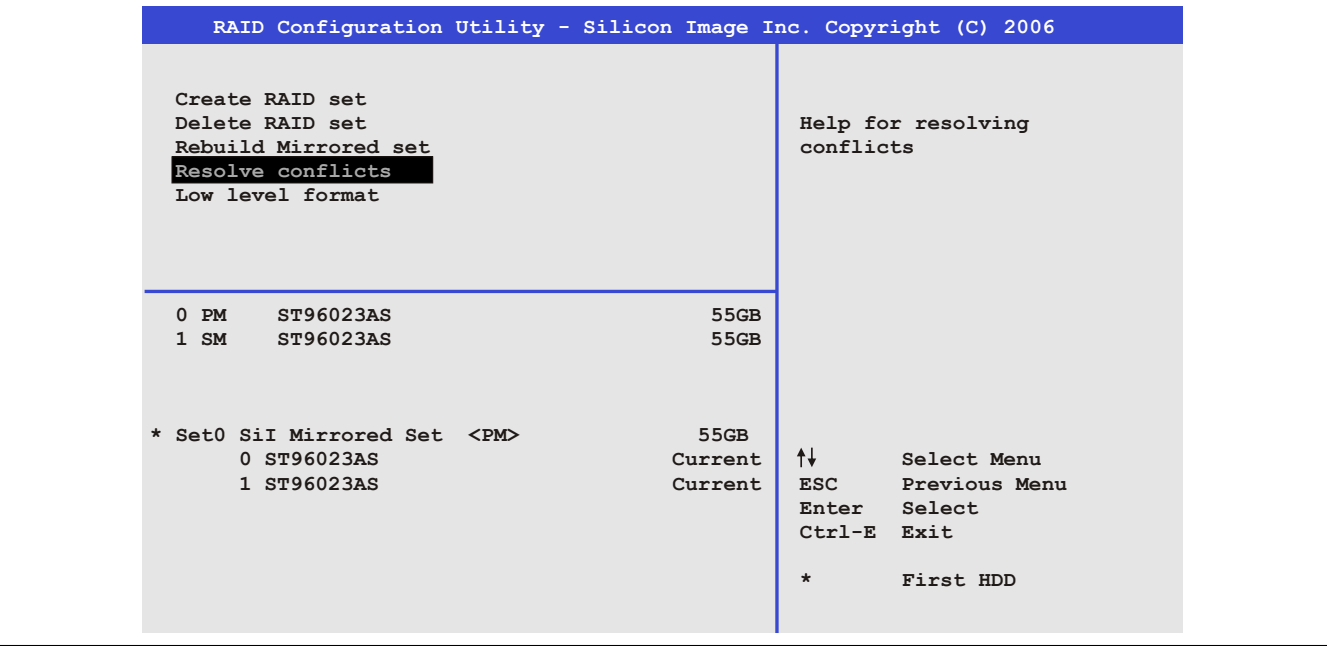


Image 70: RAID Configuration Utility - Resolve conflicts

Conflicts in a RAID set can be resolved using the "Resolve conflicts" menu. This function is only available if the status of the hard disk is "conflict".



7.7 Low level format

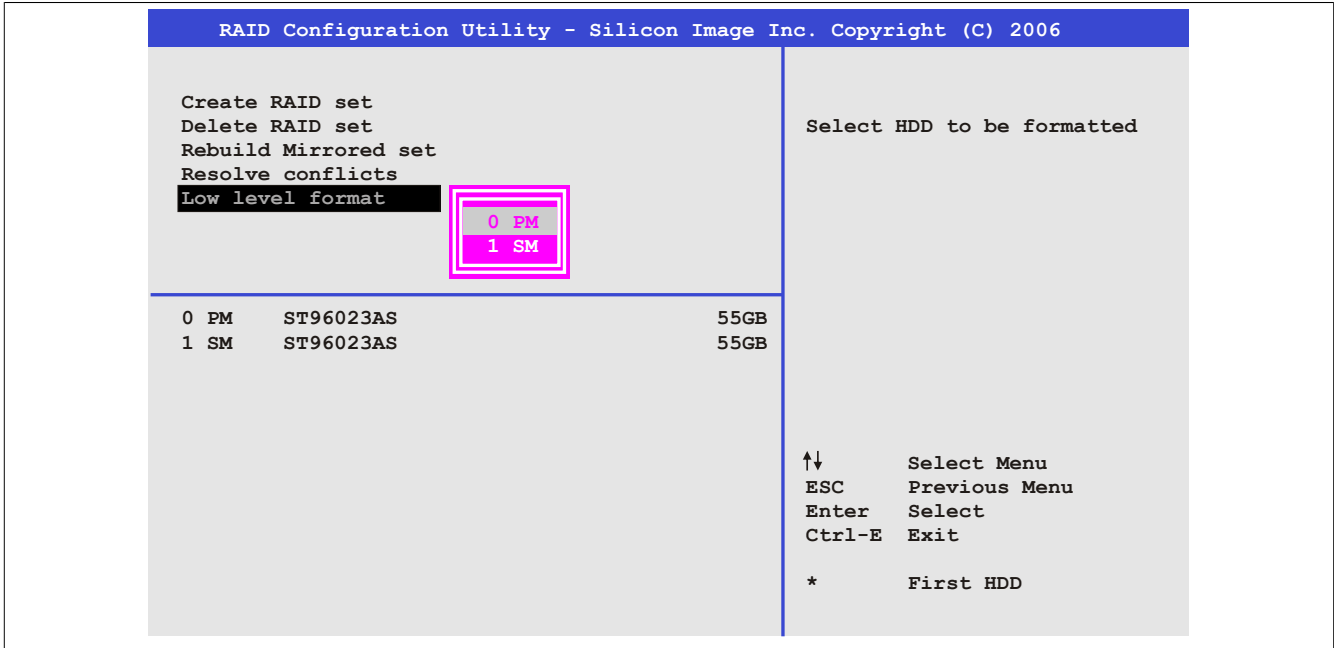


Image 71: RAID Configuration Utility - Low level format

Individual hard disks can be configured using the "Low Level Format" menu. This can only be done if a RAID set is not configured. A low level format of a hard disk takes approx. 40 minutes.

## 8 User tips for increasing the display lifespan

### 8.1 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.

#### 8.1.1 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.

### 8.2 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 also 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.

#### 8.2.1 What causes image sticking?

- Static images
- Screensaver not enabled
- Sharp contrast transitions (e.g. black / white)
- High ambient temperatures
- Operation outside of the specifications

#### 8.2.2 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

## 9 Pixel error

### Information:

Displays can contain faulty pixels (dead pixels) that result from the manufacturing process. These flaws are not grounds claiming reclamation or warranty.

## 10 Known problems / issues

- Using two different types of CompactFlash cards can cause problems in Automation PCs and Panel PCs. This can result in one of the two cards not being detected during system startup. This is caused by varying startup speeds. CompactFlash cards with older technology require significantly more time during system startup than CompactFlash cards with newer technology. This behavior occurs near the limits of the time frame provided for startup. The problem described above can occur because the startup time for the CompactFlash cards fluctuates due to the variance of the components being used. Depending on the CompactFlash cards being used, this error might never, sometimes or always occur.
- During daisy chain operation of multiple AP800/AP900 devices via SDL, it's possible that the touch controller status shows a red "X" in the Control Center applet for the touch screen driver when the touch controller is detected. The functionality of the touch system is not affected by this. This can be avoided by setting a panel locking time of 50 ms. The panel locking time can be configured with the B&R Key Editor.
- The MIC, Line IN and Line OUT inputs/outputs are not supported due to the Intel GM45 chipset.
- The CompactFlash Slot 2 is not supported due to the Intel GM45 chipset.

## Chapter 4 • Software

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### 1 BIOS options

#### Information:

The following diagrams and BIOS menu items including descriptions refer to BIOS version 1.17. 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). The BIOS system used in this B&R industrial PC is produced by American Megatrends Inc.

The BIOS Setup Utility lets you modify basic system configuration settings. These settings are stored in CMOS and in EEPROM (as a backup).

The CMOS data is buffered by a battery (if present), and remains in the B&R industrial PC even when the power is turned off (no 24 VDC supply).

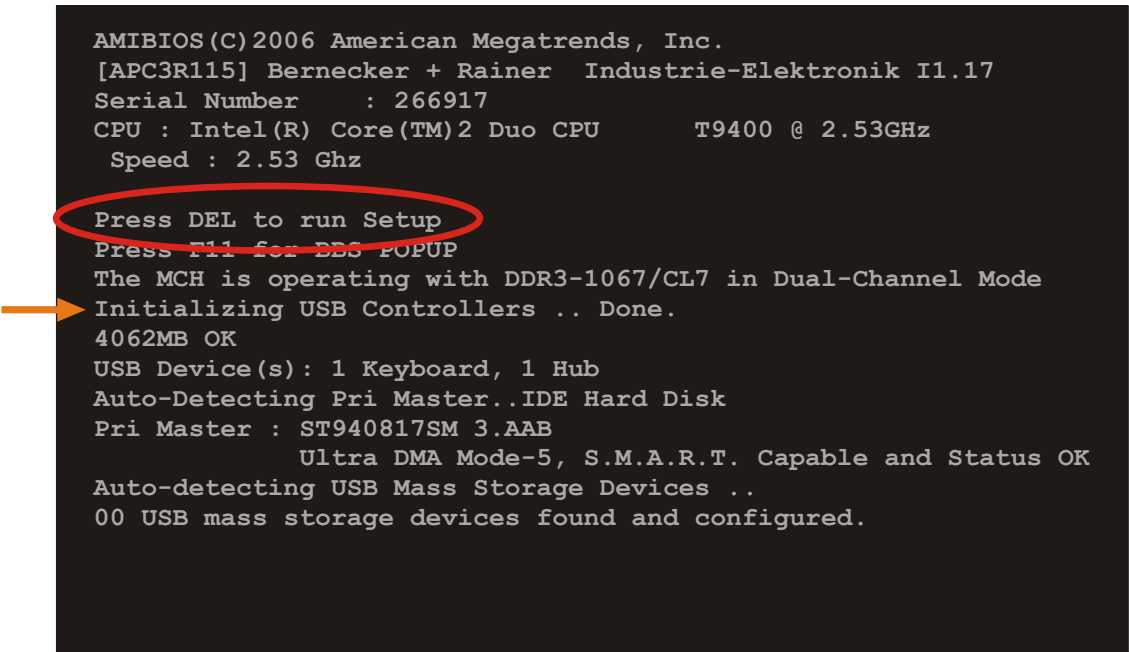
#### 1.2 BIOS setup and boot procedure

BIOS is immediately activated when switching on the power supply of the B&R industrial PC or pressing the power button. The system checks if the setup data from the EEPROM is "OK". If the data is "OK", then it is transferred to the CMOS. If the data is "not OK", then the CMOS data is checked for validity. An error message is output if the CMOS data contains errors and the boot procedure can be continued by pressing the <F1> key. To prevent the error message from appearing at each restart, open the BIOS setup by pressing the <Del> key and re-save the settings.

BIOS reads the system configuration information in CMOS RAM, checks the system, and configures it using the Power On Self Test (POST).

When these "preliminaries" are finished, BIOS seeks an operating system in the data storage devices available (hard drive, floppy drive, etc.). BIOS launches the operating system and hands over control of system operations to it.

To enter BIOS Setup, the DEL key must be pressed after the USB controller has been initialized as soon as the following message appears on the monitor (during POST): "Press DEL to run SETUP"

The image shows a BIOS boot screen with white text on a black background. The text includes system information like CPU, speed, and memory. Two annotations are present: a red oval around the line 'Press DEL to run Setup' and an orange arrow pointing to the line 'Initializing USB Controllers .. Done.'.

```
AMIBIOS(C)2006 American Megatrends, Inc.  
[APC3R115] Bernecker + Rainer Industrie-Elektronik I1.17  
Serial Number      : 266917  
CPU : Intel(R) Core(TM)2 Duo CPU          T9400 @ 2.53GHz  
Speed : 2.53 Ghz  
  
Press DEL to run Setup  
Press F11 for DDS POPUP  
The MCH is operating with DDR3-1067/CL7 in Dual-Channel Mode  
Initializing USB Controllers .. Done.  
4062MB OK  
USB Device(s): 1 Keyboard, 1 Hub  
Auto-Detecting Pri Master..IDE Hard Disk  
Pri Master : ST940817SM 3.AAB  
                Ultra DMA Mode-5, S.M.A.R.T. Capable and Status OK  
Auto-detecting USB Mass Storage Devices ..  
00 USB mass storage devices found and configured.
```

Image 72: Boot screen

## 1.2.1 BIOS setup keys

The following keys are enabled during the POST:

### Information:

The key signals from the USB keyboard are only registered after the USB controller has been initialized.

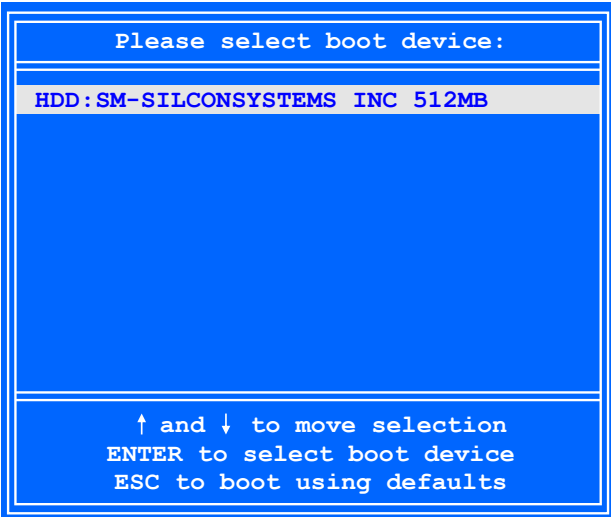
| Keys    | Function                                                                                                                                             |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Del     | Enters the BIOS setup menu.                                                                                                                          |
| F12     | Using the F12 key, you can boot from the network.                                                                                                    |
| F11     | Cues the boot menu. Lists all bootable devices that are connected to the system. Select the device to boot from with cursor ↑, cursor ↓ and <ENTER>. |
|         |                                                                   |
| <Pause> | Pressing the <Pause> key stops the POST. Press any other key to resume the POST.                                                                     |

Table 109: BIOS-relevant keys for POST

The following keys can be used after entering the BIOS setup:

| Key      | Function                                               |
|----------|--------------------------------------------------------|
| F1       | General help.                                          |
| Cursor ↑ | Moves to the previous item.                            |
| Cursor ↓ | Go to the next item.                                   |
| Cursor ← | Moves to the previous item.                            |
| Cursor → | Go to the next item.                                   |
| +/-      | Changes the setting of the selected function.          |
| Enter    | Changes to the selected menu.                          |
| Page ↑   | Change to the previous page.                           |
| Page ↓   | Change to the previous page.                           |
| Pos 1    | Jumps to the first BIOS menu item or object.           |
| End      | Jumps to the last BIOS menu item or object.            |
| F2 / F3  | The colors of the BIOS Setup are switched.             |
| F7       | Changes are reset.                                     |
| F9       | These settings are loaded for all BIOS configurations. |
| F10      | Save and close.                                        |
| Esc      | Exits the submenu.                                     |

Table 110: BIOS-relevant keys in the BIOS menu

### 1.3 Main

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

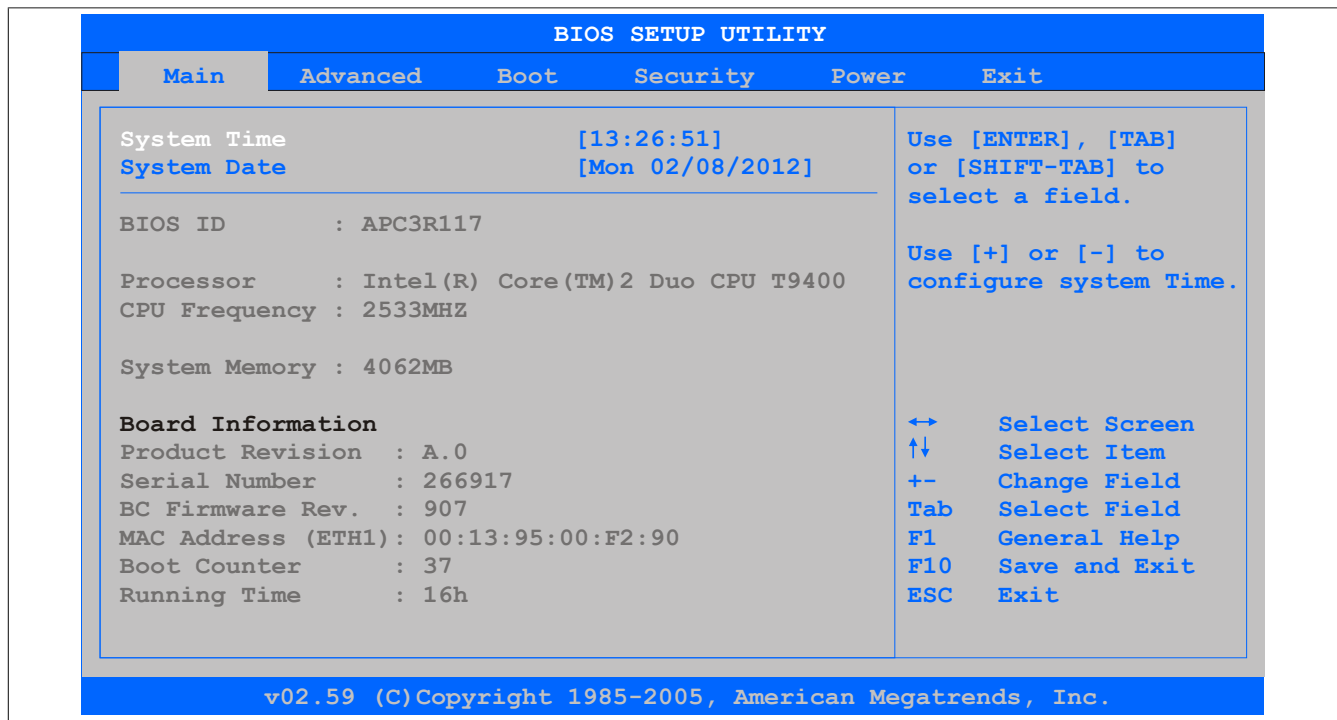


Image 73: GM45 Main menu

| BIOS setting       | Meaning                                                                                                               | Setting options               | Effect                                                            |
|--------------------|-----------------------------------------------------------------------------------------------------------------------|-------------------------------|-------------------------------------------------------------------|
| System Time        | This is the current system time setting. Buffered by a battery (CMOS battery) after the system has been switched off. | Adjustment of the system time | Sets the system time in the format Hour:Minute:Second (hh:mm:ss). |
| System Date        | This is the current system date setting. Buffered by a battery (CMOS battery) after the system has been switched off. | Changes to the system date    | Sets the system date in the format Month:Day:Year (mm:dd:yyyy).   |
| BIOS ID            | Displays the BIOS recognition.                                                                                        | None                          | -                                                                 |
| Processor          | Displays the processor type.                                                                                          | None                          | -                                                                 |
| CPU Frequency      | Displays the processor frequency.                                                                                     | None                          | -                                                                 |
| System Memory      | Displays the system memory size.                                                                                      | None                          | -                                                                 |
| Product Revision   | Displays the CPU board HW revision.                                                                                   | None                          | -                                                                 |
| Serial Number      | Displays the CPU board serial number.                                                                                 | None                          | -                                                                 |
| BC Firmware Rev.   | Displays the CPU board controller firmware revision.                                                                  | None                          | -                                                                 |
| MAC Address (ETH1) | Displays the MAC addresses assigned for the ETH1 interface.                                                           | None                          | -                                                                 |
| Boot Counter       | Displays the boot counter - each restart increments the counter by one (max. 16777215).                               | None                          | -                                                                 |
| Running Time       | Displays the runtime in whole hours. (max. 65535).                                                                    | None                          | -                                                                 |

Table 111: GM45 Main menu - Setting options

## 1.4 Advanced

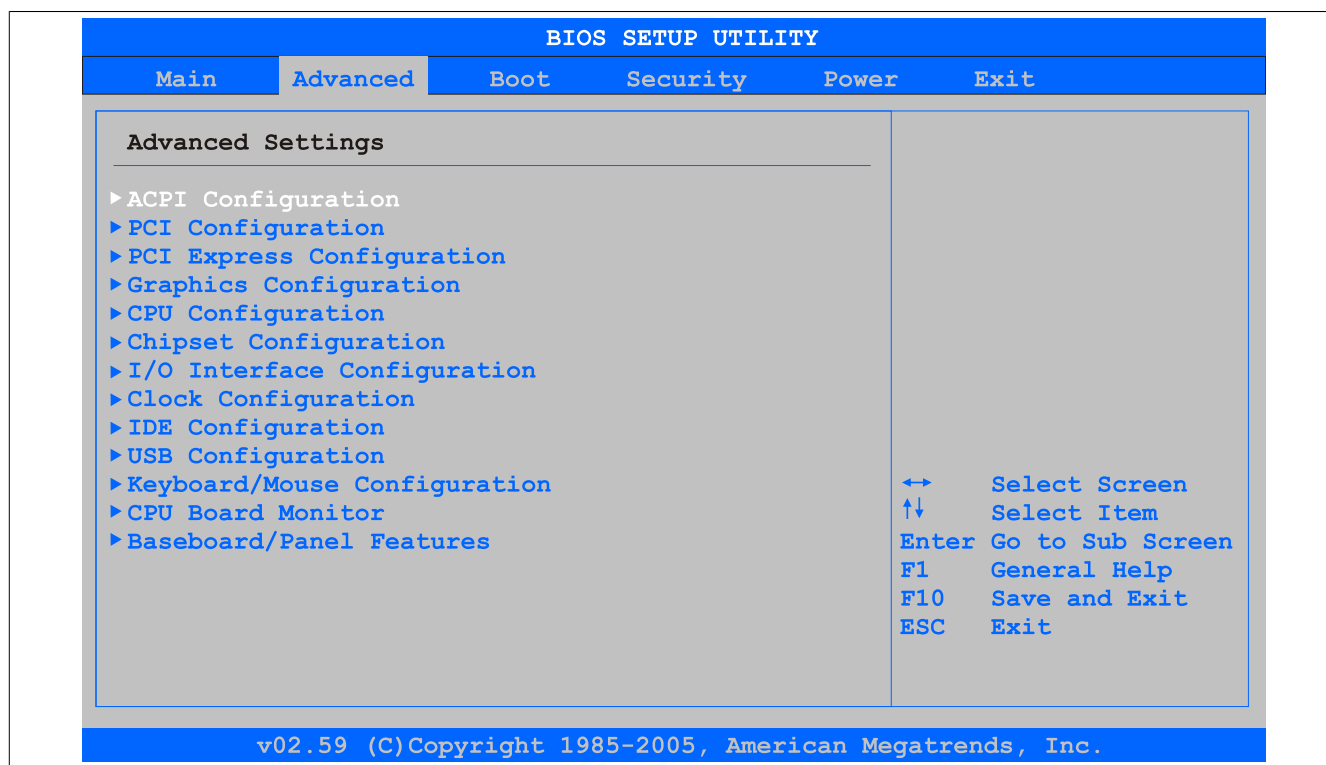


Image 74: GM45 Advanced menu

| BIOS setting                        | Meaning                                                                   | Setting options | Effect                                                              |
|-------------------------------------|---------------------------------------------------------------------------|-----------------|---------------------------------------------------------------------|
| <b>ACPI configuration</b>           | Configures the ACPI devices.                                              | Enter           | Opens the submenu<br>see "ACPI Configuration" on page 141           |
| <b>PCI Configuration</b>            | Configures PCI devices.                                                   | Enter           | Opens the submenu<br>see "PCI Configuration" on page 142            |
| <b>PCI express configuration</b>    | Configures the PCI Express.                                               | Enter           | Opens the submenu<br>see "PCI Express Configuration" on page 145    |
| <b>Graphics configuration</b>       | Configures graphics settings                                              | Enter           | Opens the submenu<br>see "Graphics Configuration" on page 147       |
| <b>CPU configuration</b>            | Configures the CPU settings.                                              | Enter           | Opens the submenu<br>see "CPU Configuration" on page 149            |
| <b>Chipset configuration</b>        | Configures the chipset functions.                                         | Enter           | Opens the submenu<br>see "Chipset Configuration" on page 150        |
| <b>I/O interface configuration</b>  | Configures the I/O devices.                                               | Enter           | Opens the submenu<br>see "I/O Interface Configuration" on page 151  |
| <b>Clock configuration</b>          | Configures the clock settings.                                            | Enter           | Opens the submenu<br>see "Clock Configuration" on page 152          |
| <b>IDE Configuration</b>            | Configures IDE functions                                                  | Enter           | Opens the submenu<br>see "IDE Configuration" on page 152            |
| <b>USB Configuration</b>            | Configures USB settings                                                   | Enter           | Opens the submenu<br>see "USB Configuration" on page 158            |
| <b>Keyboard/mouse configuration</b> | Configures the keyboard/mouse options.                                    | Enter           | Opens the submenu<br>see "Keyboard/Mouse Configuration" on page 159 |
| <b>CPU Board Monitor</b>            | Displays the current voltages and temperature of the processor in use.    | Enter           | Opens the submenu<br>see "CPU Board Monitor" on page 159            |
| <b>Main Board/Panel Features</b>    | Displays device specific information and setup of device specific values. | Enter           | Opens the submenu<br>see "Baseboard/Panel Features" on page 161     |

Table 112: GM45 Advanced menu



### 1.4.1 ACPI Configuration

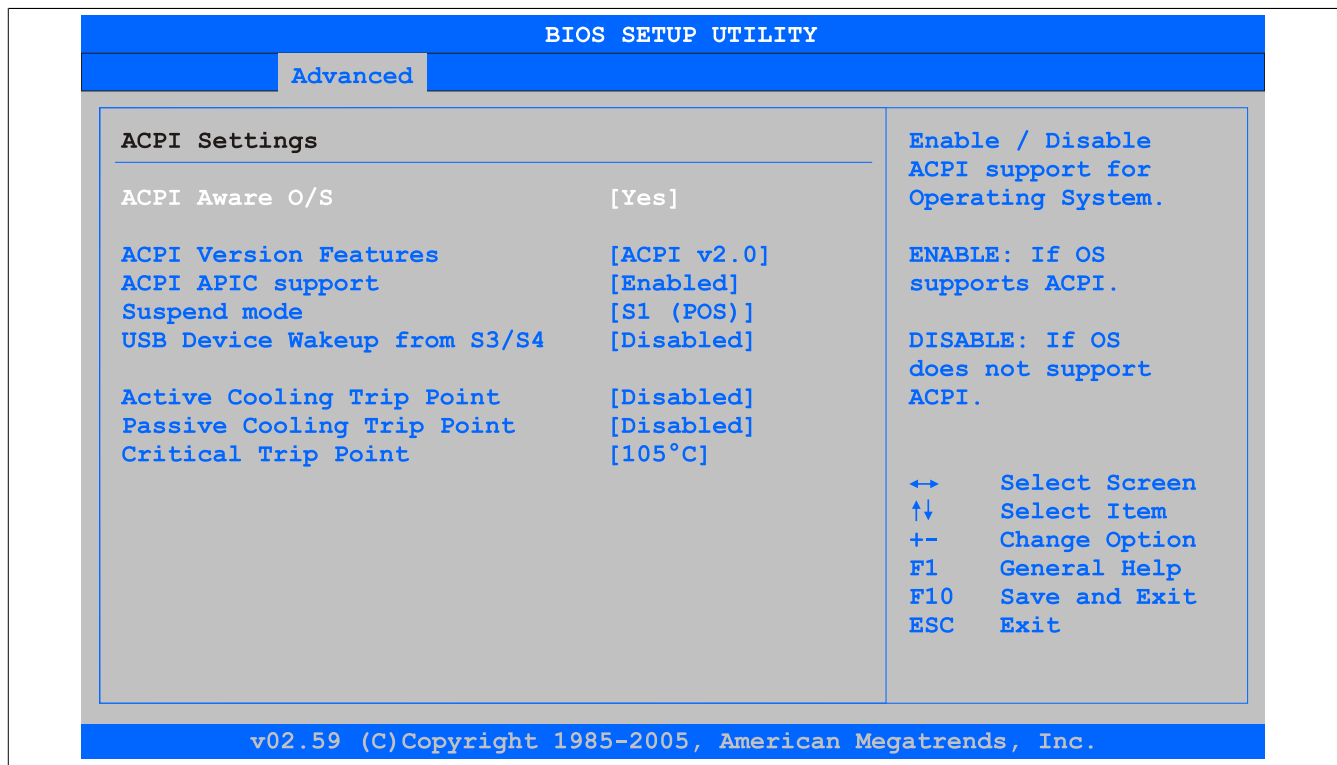


Image 75: GM45 Advanced ACPI configuration

| BIOS setting                 | Meaning                                                                                                                                                   | Setting options                             | Effect                                                                                                                              |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| ACPI Aware O/S               | This function determines if the operating system supports the ACPI function (Advanced Configuration and Power Interface).                                 | Yes                                         | The operating system supports ACPI.                                                                                                 |
|                              |                                                                                                                                                           | No                                          | The operating system does not support ACPI.                                                                                         |
| ACPI Version Features        | Option for setting the power option specifications to be supported. The ACPI functions must be supported by the drivers and operating systems being used. | ACPI v1.0                                   | ACPI functions in accordance with v1.0                                                                                              |
|                              |                                                                                                                                                           | ACPI v2.0                                   | ACPI functions in accordance with v2.0                                                                                              |
|                              |                                                                                                                                                           | ACPI v3.0                                   | ACPI functions in accordance with v3.0                                                                                              |
| ACPI APIC support            | This option controls the support of the advanced programmable interrupt controller in the processor.                                                      | Enabled                                     | Enables this function.                                                                                                              |
|                              |                                                                                                                                                           | Disabled                                    | Disables the function                                                                                                               |
| Suspend mode                 | Selects the ACPI status to be used when Suspend Mode is enabled.                                                                                          | S1 (POS)                                    | Sets S1 as Suspend mode. Only a few functions are disabled and are available again at the touch of a button                         |
|                              |                                                                                                                                                           | S3 (STR)                                    | Sets S3 as Suspend Mode. The current state of the operating system is written to the RAM, which is then supplied solely with power. |
| USB Device Wakeup from S3/S4 | This options makes it possible for activity on a connected USB device to wake the system up from the S3/S4 standby mode.                                  | Enabled                                     | Enables this function.                                                                                                              |
|                              |                                                                                                                                                           | Disabled                                    | Disables this function.                                                                                                             |
| Active Cooling Trip Point    | With this function, an optional CPU fan above the operating system can be set to turn on when the CPU reaches the set temperature.                        | Disabled                                    | Disables this function.                                                                                                             |
|                              |                                                                                                                                                           | 50°C, 60°C, 70°C, 80°C, 90°C                | Temperature setting for the active cooling trip point. Can be set in 10 degree increments.                                          |
| Passive Cooling Trip Point   | With this function, a temperature can be set at which the CPU automatically reduces its speed.                                                            | Disabled                                    | Disables this function.                                                                                                             |
|                              |                                                                                                                                                           | 50°C, 60°C, 70°C, 80°C, 90°C                | Temperature setting for the passive cooling trip point. Can be set in 10 degree increments.                                         |
| Critical Trip Point          | With this function, a temperature can be set at which the operating system automatically shuts itself down.                                               | 80°C, 85°C, 90°C, 95°C, 100°C, 105°C, 110°C | Temperature setting for the critical trip point. Can be set in 5 degree increments.                                                 |

Table 113: GM45 Advanced ACPI Configuration - Setting options

## 1.4.2 PCI Configuration

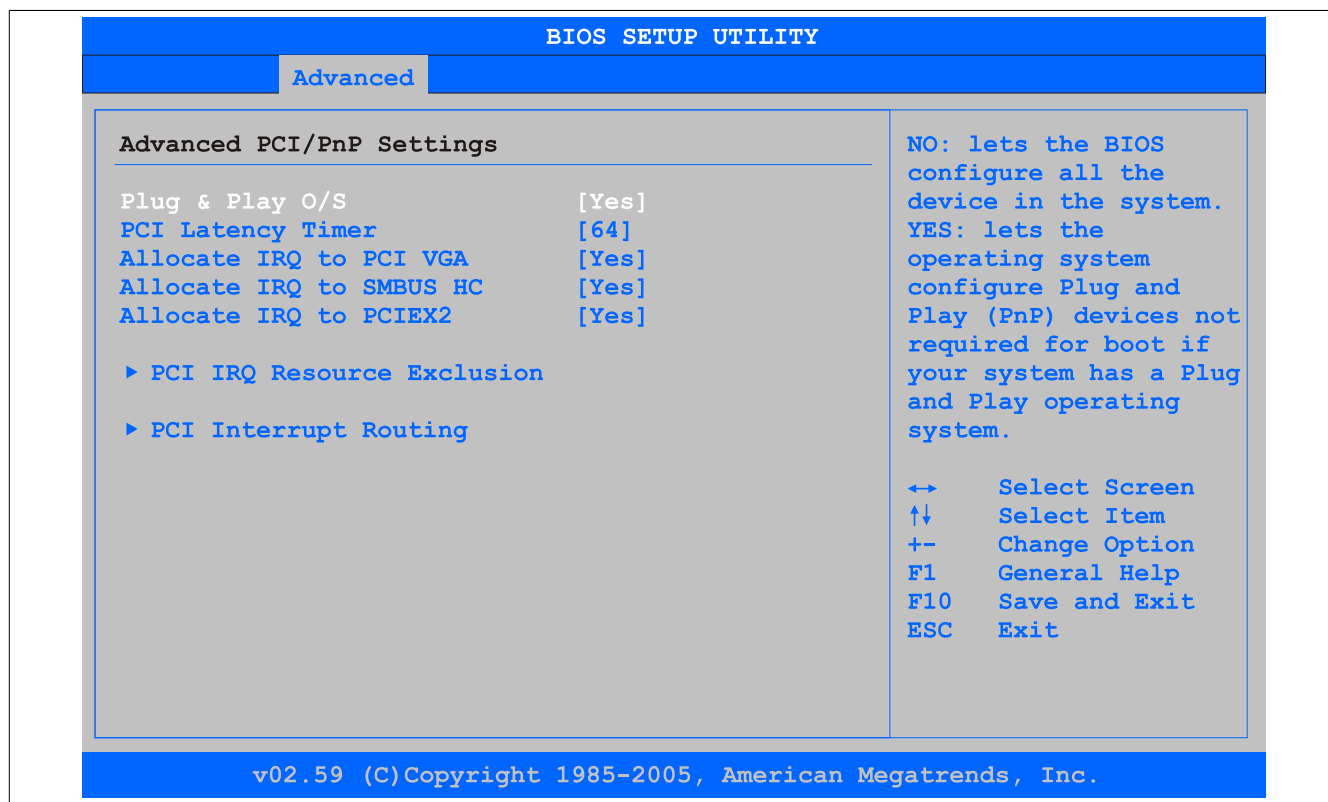


Image 76: GM45 Advanced PCI configuration

| BIOS setting               | Meaning                                                                                                                                   | Setting options                     | Effect                                                         |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|----------------------------------------------------------------|
| Plug & Play O/S            | BIOS is informed if Plug & Play is capable on the operating system.                                                                       | Yes                                 | The operating system handles the distribution of resources.    |
|                            |                                                                                                                                           | No                                  | BIOS handles the distribution of resources.                    |
| PCI Latency Timer          | This option controls how long (in PCI ticks) one PCI bus card can continue to use the master after another PCI card has requested access. | 32, 64, 96, 128, 160, 192, 224, 248 | Manually sets the value in PCI ticks.                          |
| Allocate IRQ to PCI VGA    | This function is used to determine if an interrupt is assigned to the PCI VGA.                                                            | Yes                                 | Automatic assignment of an interrupt.                          |
|                            |                                                                                                                                           | No                                  | No assignment of an interrupt.                                 |
| Allocate IRQ to SMBUS HC   | Use this function to set whether or not the SM (System Management) bus controller is assigned a PCI interrupt.                            | Yes                                 | Automatic assignment of a PCI interrupt.                       |
|                            |                                                                                                                                           | No                                  | No assignment of an interrupt.                                 |
| Allocate IRQ to PCIEX2     | Use this function to set whether or not the PCIEX2 is assigned a PCI interrupt.                                                           | Yes                                 | Automatic assignment of a PCI interrupt.                       |
|                            |                                                                                                                                           | No                                  | No assignment of an interrupt.                                 |
| PCI IRQ Resource Exclusion | Configures the PCI IRQ resource settings for ISA Legacy devices.                                                                          | Enter                               | Opens the submenu see "PCI IRQ Resource Exclusion" on page 143 |
| PCI Interrupt Routing      | Configures PCI interrupt routing                                                                                                          | Enter                               | Opens the submenu see "PCI Interrupt Routing" on page 144      |

Table 114: GM45 Advanced PCI Configuration - Setting options

## PCI IRQ Resource Exclusion

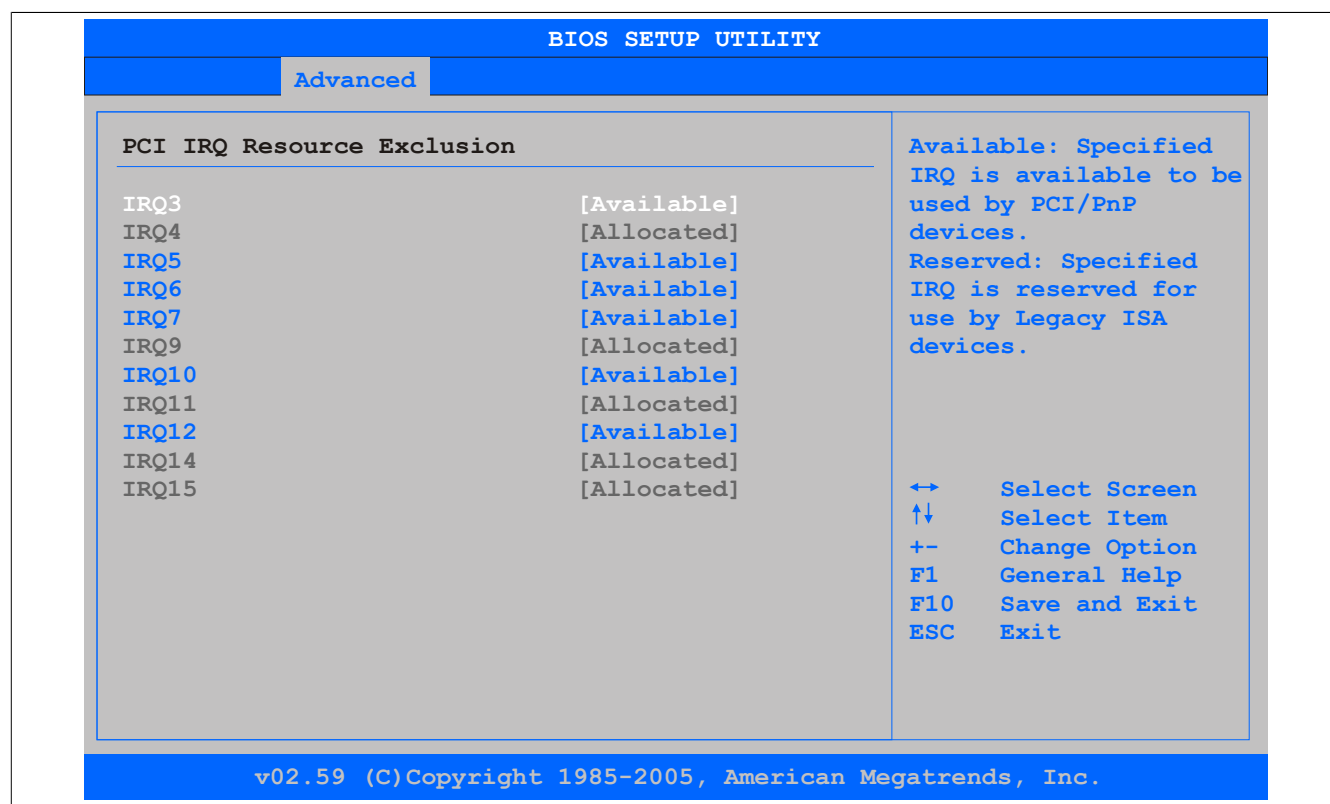


Image 77: GM45 Advanced PCI IRQ resource exclusion

| BIOS setting | Meaning                                       | Setting options | Effect                                    |
|--------------|-----------------------------------------------|-----------------|-------------------------------------------|
| IRQx         | IRQ interrupt routing for Legacy ISA devices. | Allocated       | Allocated by the system - cannot be used. |
|              |                                               | Available       | Available - can be used.                  |
|              |                                               | Reserved        | Reserved - cannot be used.                |

Table 115: GM45 Advanced PCI IRQ Resource Exclusion - Setting options

## PCI Interrupt Routing

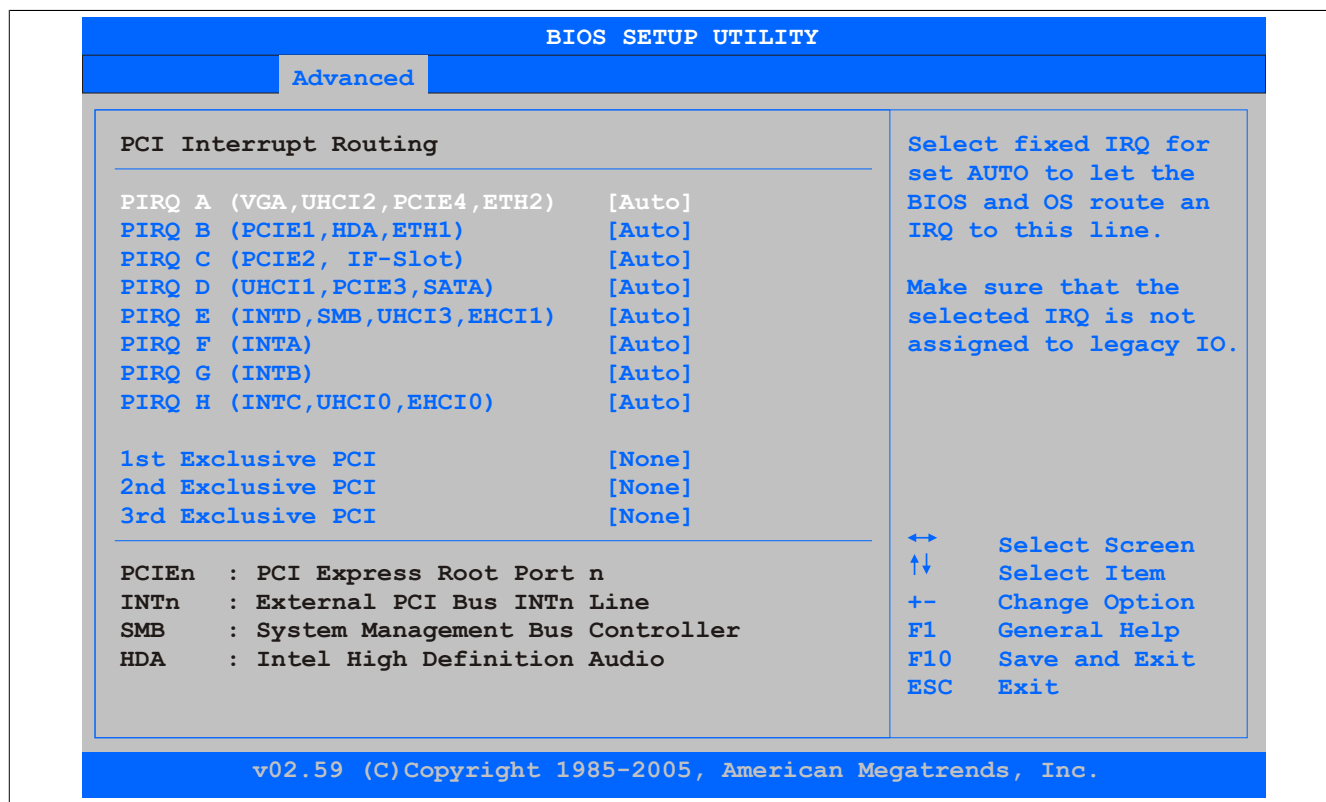


Image 78: GM45 Advanced PCI interrupt routing

| BIOS setting                      | Meaning                                                                                                       | Setting options  | Effect                                                 |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------|------------------|--------------------------------------------------------|
| PIRQ A<br>(VGA,UHCI2,PCIE4,ETH2)  | Option for setting the PIRQ A.                                                                                | Auto             | Automatic assignment by the BIOS and operating system. |
|                                   |                                                                                                               | 5,6,7,9,10,11,12 | Manual assignment.                                     |
| PIRQ B<br>(PCIE1,HDA,ETH1)        | Option for setting the PIRQ B.                                                                                | Auto             | Automatic assignment by the BIOS and operating system. |
|                                   |                                                                                                               | 5,6,7,9,10,11,12 | Manual assignment.                                     |
| PIRQ C<br>(PCIE2, IF-slot)        | Option for setting the PIRQ C.                                                                                | Auto             | Automatic assignment by the BIOS and operating system. |
|                                   |                                                                                                               | 5,6,7,9,10,11,12 | Manual assignment.                                     |
| PIRQ D<br>(UHCI1,PCIE3, SATA)     | Option for setting the PIRQ D.                                                                                | Auto             | Automatic assignment by the BIOS and operating system. |
|                                   |                                                                                                               | 5,6,7,9,10,11,12 | Manual assignment.                                     |
| PIRQ E<br>(INTD, SMB,UHCI3,EHCI1) | Option for setting the PIRQ E.                                                                                | Auto             | Automatic assignment by the BIOS and operating system. |
|                                   |                                                                                                               | 5,6,7,9,10,11,12 | Manual assignment.                                     |
| PIRQ F<br>(INTA)                  | Option for setting the PIRQ F.                                                                                | Auto             | Automatic assignment by the BIOS and operating system. |
|                                   |                                                                                                               | 5,6,7,9,10,11,12 | Manual assignment.                                     |
| PIRQ G<br>(INTB)                  | Option for setting the PIRQ G.                                                                                | Auto             | Automatic assignment by the BIOS and operating system. |
|                                   |                                                                                                               | 5,6,7,9,10,11,12 | Manual assignment.                                     |
| PIRQ H<br>(INTC,UHCI0, EHCI0)     | Option for setting the PIRQ H.                                                                                | Auto             | Automatic assignment by the BIOS and operating system. |
|                                   |                                                                                                               | 5,6,7,9,10,11,12 | Manual assignment.                                     |
| 1st Exclusive PCI                 | With this option you can determine if the IRQ assigned to the PIRQ x is handled exclusively (no IRQ sharing). | None             | No interrupt is assigned.                              |
|                                   |                                                                                                               | x                | Assigns the PIRQ as 1st exclusive PCI IRQ.             |

**Information:**

Is only displayed if a PIRQ is manually set (e.g. 5).

Table 116: GM45 Advanced PCI Interrupt Routing - Setting options

| BIOS setting      | Meaning                                                                                                                                                                                                              | Setting options | Effect                                     |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|--------------------------------------------|
| 2nd Exclusive PCI | With this option you can determine if the IRQ assigned to the PIRQ x is handled exclusively (no IRQ sharing).<br><br><b>Information:</b><br><br>Only displayed when two PIRQs are set manually.                      | None            | No interrupt is assigned.                  |
|                   |                                                                                                                                                                                                                      | x               | Assigns the PIRQ as 2nd exclusive PCI IRQ. |
| 3rd Exclusive PCI | With this option you can determine if the IRQ assigned to the PIRQ x is handled exclusively (no IRQ sharing).<br><br><b>Information:</b><br><br>Only displayed on PPC800 units and when three PIRQ are manually set. | None            | No interrupt is assigned.                  |
|                   |                                                                                                                                                                                                                      | x               | Assigns the PIRQ as 3rd exclusive PCI IRQ. |

Table 116: GM45 Advanced PCI Interrupt Routing - Setting options

### 1.4.3 PCI Express Configuration

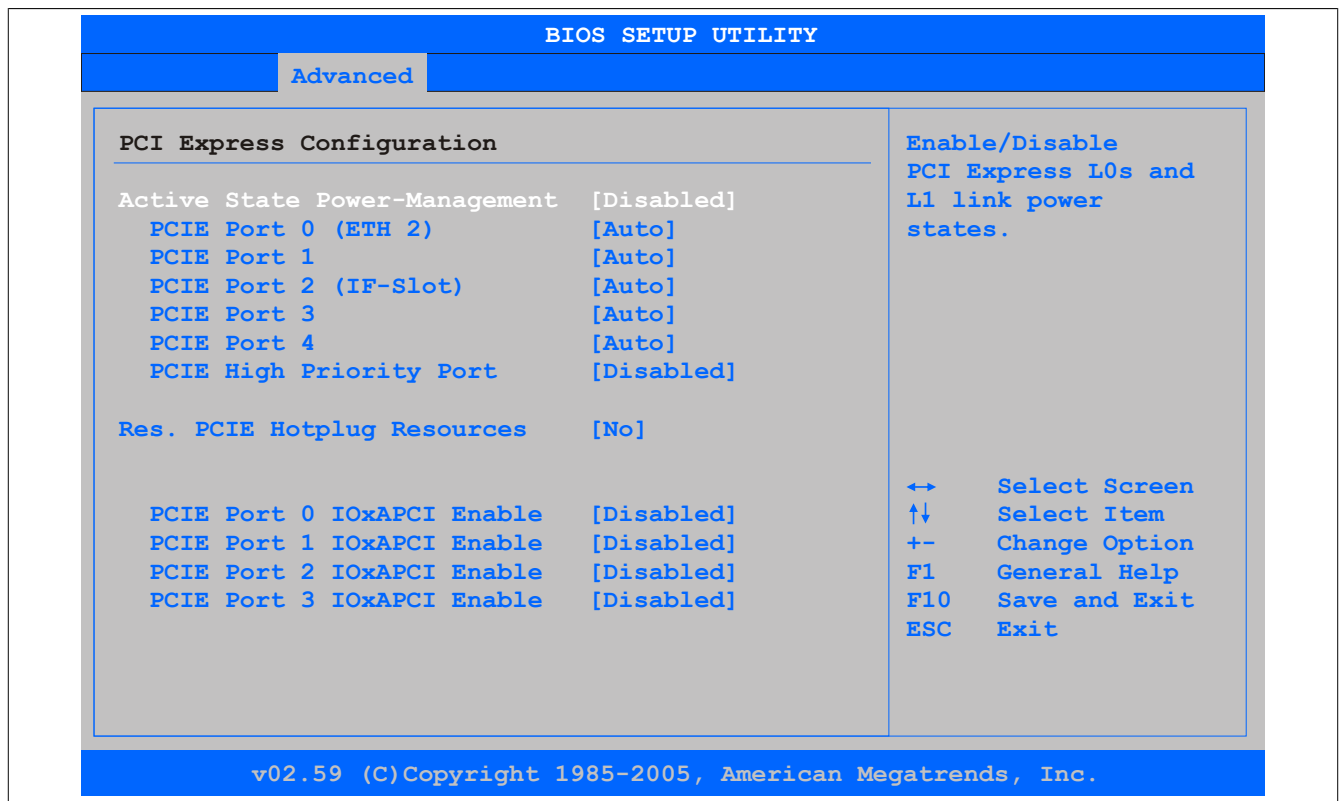


Image 79: GM45 Advanced PCI express configuration

| BIOS setting                  | Meaning                                                                                                                                                                                                              | Setting options | Effect                                                 |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|--------------------------------------------------------|
| Active State Power Management | Option for setting a power saving function (L0s/L1) for PCIE slots if they do not require full power.<br><br><b>Information:</b><br><br>This option should be deactivated if a PCI Express device is not being used. | Enabled         | Enables this function.                                 |
|                               |                                                                                                                                                                                                                      | Disabled        | Disables this function.                                |
| PCIE Port 0 (ETH2)            | This option activates or deactivates the PCI Express connection function.<br><br><b>Information:</b><br><br>This option should be deactivated if a PCI Express device is not being used.                             | Auto            | Automatic assignment by the BIOS and operating system. |
|                               |                                                                                                                                                                                                                      | Enabled         | Enables this function.                                 |
| PCIE Port 1                   | This option activates or deactivates the PCI Express connection function.<br><br><b>Information:</b><br><br>This option should be deactivated if a PCI Express device is not being used.                             | Disabled        | Disables this function.                                |
|                               |                                                                                                                                                                                                                      | Auto            | Automatic assignment by the BIOS and operating system. |
| PCIE Port 2 (IF slot)         | This option activates or deactivates the PCI Express connection function.<br><br><b>Information:</b><br><br>This option should be deactivated if a PCI Express device is not being used.                             | Enabled         | Enables this function.                                 |
|                               |                                                                                                                                                                                                                      | Disabled        | Disables this function.                                |
| PCIE Port 3 (IF slot)         | This option activates or deactivates the PCI Express connection function.                                                                                                                                            | Auto            | Automatic assignment by the BIOS and operating system. |

Table 117: GM45 Advanced PCI Express Configuration - Setting options

| BIOS setting                    | Meaning                                                                                                                                                                                                  | Setting options | Effect                                                 |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|--------------------------------------------------------|
|                                 | <b>Information:</b><br><br>This option should be deactivated if a PCI Express device is not being used.                                                                                                  | Enabled         | Enables this function.                                 |
|                                 |                                                                                                                                                                                                          | Disabled        | Disables this function.                                |
| PCIE Port 3                     | This option activates or deactivates the PCI Express connection function.<br><br><b>Information:</b><br><br>This option should be deactivated if a PCI Express device is not being used.                 | Auto            | Automatic assignment by the BIOS and operating system. |
|                                 |                                                                                                                                                                                                          | Enabled         | Enables this function.                                 |
|                                 |                                                                                                                                                                                                          | Disabled        | Disables this function.                                |
| PCIE Port 4                     | This option activates or deactivates the PCI Express connection function.<br><br><b>Information:</b><br><br>This option should be deactivated if a PCI Express device is not being used.                 | Auto            | Automatic assignment by the BIOS and operating system. |
|                                 |                                                                                                                                                                                                          | Enabled         | Enables this function.                                 |
|                                 |                                                                                                                                                                                                          | Disabled        | Disables this function.                                |
| PCIE High Priority Port         | This option activates or deactivates the priority port for PCIE.                                                                                                                                         | Disabled        | Disables this function.                                |
|                                 |                                                                                                                                                                                                          | Port 0          | Activates Port 0 as priority port.                     |
|                                 |                                                                                                                                                                                                          | Port 1          | Activates Port 1 as priority port.                     |
|                                 |                                                                                                                                                                                                          | Port 2          | Activates Port 2 as priority port.                     |
|                                 |                                                                                                                                                                                                          | Port 3          | Activates Port 3 as priority port.                     |
|                                 |                                                                                                                                                                                                          | ETH2            | Activates ETH2 as priority port.                       |
| Res. PCIE Hot Plugging Resource | This option can be used to reserve an I/O and memory resource for a free PCIE port. A PCIE port must be set to enabled and resources must be reserved to support ExpressCard hot-plugging on a port.     | Yes             | Resource is reserved.                                  |
|                                 |                                                                                                                                                                                                          | No              | Resource is not reserved.                              |
| PCIE Port 0 IOxAPIC Enable      | This option is used to enable or disable the APIC (Advanced Programmable Interrupt Controller) on the PCIE port 0. The IRQ resources available to the system are expanded when the APIC mode is enabled. | Enabled         | Enables this function.                                 |
|                                 |                                                                                                                                                                                                          | Disabled        | Disables this function.                                |
| PCIE Port 1 IOxAPIC Enable      | This option is used to enable or disable the APIC (Advanced Programmable Interrupt Controller) on the PCIE port 1. The IRQ resources available to the system are expanded when the APIC mode is enabled. | Enabled         | Enables this function.                                 |
|                                 |                                                                                                                                                                                                          | Disabled        | Disables this function.                                |
| PCIE Port 2 IOxAPIC Enable      | This option is used to enable or disable the APIC (Advanced Programmable Interrupt Controller) on the PCIE port 2. The IRQ resources available to the system are expanded when the APIC mode is enabled. | Enabled         | Enables this function.                                 |
|                                 |                                                                                                                                                                                                          | Disabled        | Disables this function.                                |
| PCIE Port 3 IOxAPIC Enable      | This option is used to enable or disable the APIC (Advanced Programmable Interrupt Controller) on the PCIE port 3. The IRQ resources available to the system are expanded when the APIC mode is enabled. | Enabled         | Enables this function.                                 |
|                                 |                                                                                                                                                                                                          | Disabled        | Disables this function.                                |

Table 117: GM45 Advanced PCI Express Configuration - Setting options

## 1.4.4 Graphics Configuration

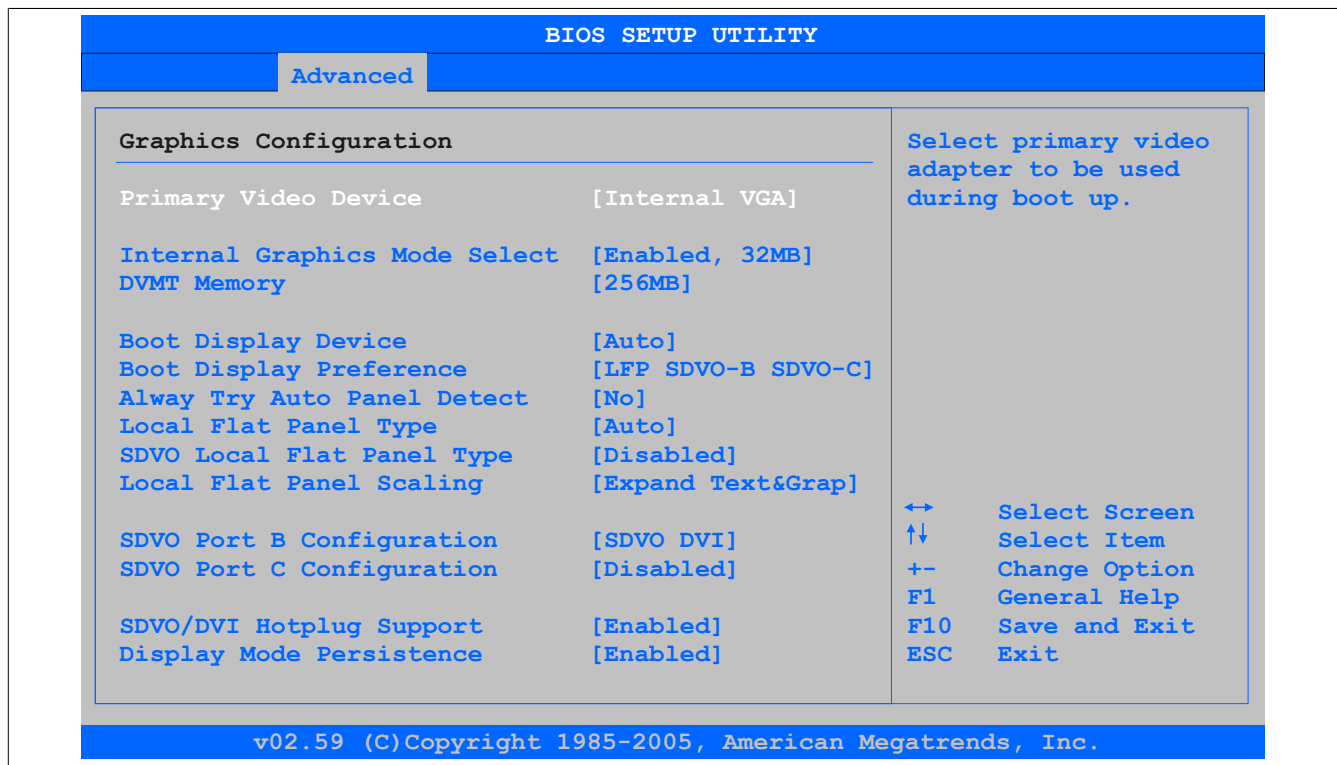


Image 80: GM45 Advanced graphics configuration

| BIOS setting                  | Meaning                                                                                                                                                                      | Setting options   | Effect                                                                                            |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------------------------------------------------------------------------------------------|
| Primary Video Device          | Option for selecting the primary video device.                                                                                                                               | Internal VGA      | The internal graphics chip on the CPU board is used as video device (monitor / panel connection). |
|                               |                                                                                                                                                                              | PCI / Int. VGA    | The graphics chip of a connected graphics card is used as video device.                           |
| Internal Graphics Mode Select | Option for setting the memory size that can be used for the internal graphics controller.                                                                                    | Disabled          | No reservation - Disables the graphics controller.                                                |
|                               |                                                                                                                                                                              | Enabled, 32MB     | 32MB main memory provided.                                                                        |
|                               |                                                                                                                                                                              | Enabled, 64MB     | 64MB main memory provided.                                                                        |
|                               |                                                                                                                                                                              | Enabled, 128MB    | 128MB main memory provided.                                                                       |
| DVMT Memory                   | Option for setting the amount of memory used for the DVMT mode.                                                                                                              | 128 MB            | 128MB of main memory can be used.                                                                 |
|                               |                                                                                                                                                                              | 256 MB            | 256MB of main memory can be used.                                                                 |
|                               |                                                                                                                                                                              | Maximum DVMT      | The remaining available main memory can be used.                                                  |
| Boot Display Device           | Determines which video channel should be enabled for a video device during the boot procedure.                                                                               | Auto              | Automatic selection.                                                                              |
|                               |                                                                                                                                                                              | CRT only          | Only use the CRT (Cathode Ray Tube) channel.                                                      |
|                               |                                                                                                                                                                              | SDVO only         | Only use the SDVO (Serial Digital Video Out) channel.                                             |
|                               |                                                                                                                                                                              | CRT + SDVO        | Use CRT and SDVO channel.                                                                         |
|                               |                                                                                                                                                                              | LFP only          | Only use the LFP (Local Flat Panel) channel.                                                      |
|                               |                                                                                                                                                                              | CRT + LFP         | Use CRT + LFP channel.                                                                            |
| Boot Display Preference       | This option determines the order in which the devices on the connected channels LFP and SDVO should be checked and booted.                                                   | LFP SDVO-B SDVO-C | Local Flat Panel - Serial Digital Video B output - Serial Video C output.                         |
|                               |                                                                                                                                                                              | LFP SDVO-C SDVO-B | Local Flat Panel - Serial Digital Video C output - Serial Video B output.                         |
|                               |                                                                                                                                                                              | SDVO-B SDVO-C LFP | Serial Digital Video B output - Serial Digital Video C output - Local Flat Panel.                 |
|                               |                                                                                                                                                                              | SDVO-C SDVO-B LFP | Serial Digital Video C output - Serial Digital Video B output - Local Flat Panel.                 |
| Always Try Auto Panel Detect  | This option first searches for EDID data in an external EEPROM to configure the LFP. If no EDID data is found, then the data selected under "Local Flat Panel Type" is used. | No                | Disables this function.                                                                           |
|                               |                                                                                                                                                                              | Yes               | Enables this function.                                                                            |
| Local Flat Panel Type         | This option can be used to set a pre-defined profile for the LVDS channel.                                                                                                   | Auto              | Automatic detection and setting using the EDID data.                                              |
|                               |                                                                                                                                                                              | VGA 1x18 (002h)   | 640 x 480                                                                                         |
|                               |                                                                                                                                                                              | VGA 1x18 (013h)   | 640 x 480                                                                                         |
|                               |                                                                                                                                                                              | SVGA 1x18 (01Ah)  | 800 x 600                                                                                         |
|                               |                                                                                                                                                                              | XGA 1x18 (006h)   | 1024 x 768                                                                                        |

Table 118: GM45 Advanced Graphics Configuration - Setting options

| BIOS setting                  | Meaning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Setting options        | Effect                                                                           |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|----------------------------------------------------------------------------------|
| SDVO local flat panel type    | <p>This option can be used to set a pre-defined profile for the SDVO LVDS channel.</p> <p><b>Information:</b></p> <p>An SDVO LVDS transmitter must be connected to one of the SDVO ports, and the corresponding SDVO port device must be set to LVDS.</p>                                                                                                                                                                                                                                                                                                                         | XGA 2x18 (007h)        | 1024 x 768                                                                       |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | XGA 1x24 (008h)        | 1024 x 768                                                                       |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | XGA 2x24 (012h)        | 1024 x 768                                                                       |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | SXGA 2x24 (00Ah)       | 1280 x 1024                                                                      |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | SXGA 2x24 (018h)       | 1280 x 1024                                                                      |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | UXGA 2x24 (00Ch)       | 1600 x 1200                                                                      |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Customized EDID 1      | User-defined profile                                                             |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Customized EDID 2      | User-defined profile                                                             |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Customized EDID 3      | User-defined profile                                                             |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Disabled               | Deactivates this function.                                                       |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Auto                   | Automatic detection and setting using the EDID data.                             |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | VGA 1x18 (002h)        | 640 x 480                                                                        |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | VGA 1x18 (013h)        | 640 x 480                                                                        |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | SVGA 1x18 (01Ah)       | 800 x 600                                                                        |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | XGA 1x18 (006h)        | 1024 x 768                                                                       |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | XGA 2x18 (007h)        | 1024 x 768                                                                       |
| Local flat panel scaling      | <p>Determines the screen content should be output according to the defined Local Flat Panel Type.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Centering              | The screen content is output centered on the display.                            |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Expand Text            | The text is stretched across the entire surface of the display.                  |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Expand Graphics        | The graphics are stretched across the entire surface of the display.             |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Expand Text & Graphics | Text and graphics are stretched across the entire surface of the display.        |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Disabled               | No video device connected.                                                       |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | HDMI Port              | Port is configured as an HDMI port.                                              |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Display Port           | Port is configured as a display port.                                            |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | SDVO DVI               | Video signal output is optimized for an SDVO DVI-compatible video device.        |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | SDVO TV                | Video signal output is optimized for an SDVO TV-compatible video device.         |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | SDVO CRT               | Video signal output is optimized for a SDVO CRT-compatible video device.         |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | SDVO LVDS              | Video signal output is optimized for an SDVO LVDS-compatible video device.       |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | SDVO DVI-Analog        | Video signal output is optimized for an analog SDVO DVI-compatible video device. |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Disabled               | No video device connected.                                                       |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | HDMI Port              | Port is configured as an HDMI port.                                              |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Display Port           | Port is configured as a display port.                                            |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | SDVO DVI               | Video signal output is optimized for an SDVO DVI-compatible video device.        |
| SDVO Port B Device            | <p>Option for selecting the video device that is connected to the SDVO Port B, or to define the port as an HDMI or display port.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                              | SDVO TV                | Video signal output is optimized for an SDVO TV-compatible video device.         |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | SDVO CRT               | Video signal output is optimized for a SDVO CRT-compatible video device.         |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | SDVO LVDS              | Video signal output is optimized for an SDVO LVDS-compatible video device.       |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | SDVO DVI-Analog        | Video signal output is optimized for an analog SDVO DVI-compatible video device. |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Disabled               | No video device connected.                                                       |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | HDMI Port              | Port is configured as an HDMI port.                                              |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Display Port           | Port is configured as a display port.                                            |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | SDVO DVI               | Video signal output is optimized for an SDVO DVI-compatible video device.        |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | SDVO TV                | Video signal output is optimized for an SDVO TV-compatible video device.         |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | SDVO CRT               | Video signal output is optimized for a SDVO CRT-compatible video device.         |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | SDVO LVDS              | Video signal output is optimized for an SDVO LVDS-compatible video device.       |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | SDVO DVI-Analog        | Video signal output is optimized for an analog SDVO DVI-compatible video device. |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Disabled               | No video device connected.                                                       |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | HDMI Port              | Port is configured as an HDMI port.                                              |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Display Port           | Port is configured as a display port.                                            |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | SDVO DVI               | Video signal output is optimized for an SDVO DVI-compatible video device.        |
| SDVO Port C Device            | <p>Option for selecting the video device that is connected to the SDVO Port C, or to define the port as an HDMI or display port.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                              | SDVO TV                | Video signal output is optimized for an SDVO TV-compatible video device.         |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | SDVO CRT               | Video signal output is optimized for a SDVO CRT-compatible video device.         |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | SDVO LVDS              | Video signal output is optimized for an SDVO LVDS-compatible video device.       |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | SDVO DVI-Analog        | Video signal output is optimized for an analog SDVO DVI-compatible video device. |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Disabled               | No video device connected.                                                       |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | HDMI Port              | Port is configured as an HDMI port.                                              |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Display Port           | Port is configured as a display port.                                            |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | SDVO DVI               | Video signal output is optimized for an SDVO DVI-compatible video device.        |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | SDVO TV                | Video signal output is optimized for an SDVO TV-compatible video device.         |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | SDVO CRT               | Video signal output is optimized for a SDVO CRT-compatible video device.         |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | SDVO LVDS              | Video signal output is optimized for an SDVO LVDS-compatible video device.       |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | SDVO DVI-Analog        | Video signal output is optimized for an analog SDVO DVI-compatible video device. |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Disabled               | No video device connected.                                                       |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | HDMI Port              | Port is configured as an HDMI port.                                              |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Display Port           | Port is configured as a display port.                                            |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | SDVO DVI               | Video signal output is optimized for an SDVO DVI-compatible video device.        |
| SDVO/DVI Hot Plugging Support | <p>If this option is set to enabled, the Windows XP graphics driver supports "hot plugging" and "configuration mode persistence" for DVI monitors connected to a DVI SDVO transmitter. "Hot plugging" support means that when a DVI monitor is connected while the operating system is running, it is detected automatically and activated. "Configuration mode persistence" means that, for example, a dual DVI configuration is automatically restored when both DVI monitors are reconnected, even if only one of them was connected and activated during a previous boot.</p> | Enabled                | "Hot plugging" and "Configuration mode persistence" mode enabled.                |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Disabled               | "Hot plugging" and "Configuration mode persistence" mode disabled.               |

Table 118: GM45 Advanced Graphics Configuration - Setting options



| BIOS setting             | Meaning                                                                                                                                                                                                                                                                                                      | Setting options | Effect                  |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------------|
| Display Mode Persistence | "Display mode persistence" means that the operating system can remember and restore the previous display configuration. For example, a dual DVI configuration is automatically restored when both DVI monitors are reconnected, even if only one of them was connected and activated during a previous boot. | Enabled         | Enables this function.  |
|                          |                                                                                                                                                                                                                                                                                                              | Disabled        | Disables this function. |

Table 118: GM45 Advanced Graphics Configuration - Setting options

### 1.4.5 CPU Configuration

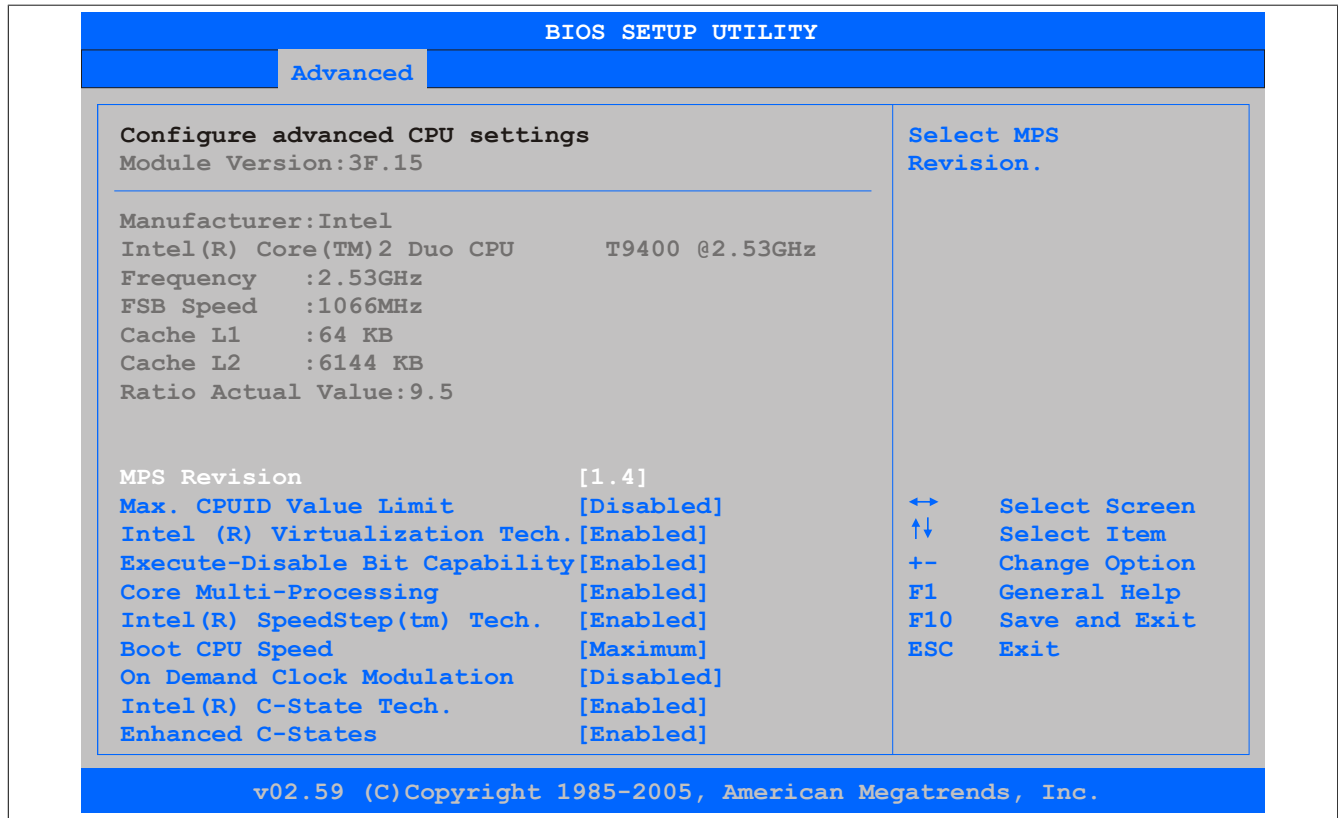


Image 81: GM45 Advanced CPU Configuration

| BIOS setting                  | Meaning                                                                                                                                                                                                                                                | Setting options | Effect                                                                                                                 |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------|
| MPS Revision                  | This option supports the use of multiple CPUs (MPS=multi-processor system).                                                                                                                                                                            | 1.1             | Sets MPS support Revision 1.1                                                                                          |
|                               |                                                                                                                                                                                                                                                        | 1.4             | Sets MPS support Revision 1.4                                                                                          |
| Max CPUID value limit         | Option for limiting the CPUID input value. This could be necessary for older operating systems.                                                                                                                                                        | Enabled         | The processor limits the maximum CPUID input value to 03h if necessary when the the processor supports a higher value. |
|                               |                                                                                                                                                                                                                                                        | Disabled        | The processor returns the current maximum value upon request of the CPUID input value.                                 |
| Intel(R) Virtualization Tech. | Option for activating or deactivating a virtual machine.<br><br><b>Information:</b><br><br>You must restart in order to apply changes made to this setting.                                                                                            | Disabled        | Disables this function.                                                                                                |
|                               |                                                                                                                                                                                                                                                        | Enabled         | If the function is enabled, a virtual machine can use the additional hardware capacity.                                |
| Execute Disable Bit           | Option for enabling or disabling hardware support for prevention of data execution.                                                                                                                                                                    | Enabled         | Enables this function.                                                                                                 |
|                               |                                                                                                                                                                                                                                                        | Disabled        | Disables this function.                                                                                                |
| Core Multi-Processing         | When using a Dual Core processor, this option can be used to disable a core.                                                                                                                                                                           | Enabled         | Both cores are used in a Dual Core processor.                                                                          |
|                               |                                                                                                                                                                                                                                                        | Disabled        | Only one core is used in a Dual Core processor.                                                                        |
| Intel(R) Speedster(TM) tech.  | Option for controlling the Intel(R) SpeedStep(TM) technology. The processor clock speed is increased or decreased according to the amount of calculations that must be made. As a result, the power consumption depends largely on the processor load. | Enabled         | The processor speed is regulated by the operating system.                                                              |
|                               |                                                                                                                                                                                                                                                        | Disabled        | Disables SpeedStep technology.                                                                                         |
| Boot CPU Speed                | Option for setting the CPU speed.                                                                                                                                                                                                                      | Maximum         | Maximum CPU speed                                                                                                      |

Table 119: GM45 Advanced CPU Configuration - Setting options

| BIOS setting                   | Meaning                                                                                                                    | Setting options                           | Effect                                                                                         |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|------------------------------------------------------------------------------------------------|
|                                | <b>Information:</b><br><br>This setting can be changed in ACPI operating systems by activating Intel SpeedStep technology. | Minimum                                   | Throttles the CPU speed. LFM = Low Frequency Mode = 1.6 GHz                                    |
| On Demand Clock Modulation     | Option for setting CPU performance using "On Demand Clock Modulation".                                                     | Disabled                                  | Disables this function.                                                                        |
|                                |                                                                                                                            | 12.5%, 25%, 37.5%, 50%, 62.5%, 75%, 87.5% | Example: 75% means a performance increase of 25%                                               |
| Intel(R) C-State Tech.         | This setting allows the operating system to set processor clock rates on its own, thereby saving energy.                   | Disabled                                  | Disables this function. Both processors are run at the same frequency.                         |
|                                |                                                                                                                            | Enabled                                   | Enables this function. The processors are run at different frequencies, thereby saving energy. |
| Enhanced CStates <sup>1)</sup> | This setting allows the operating system to set processor clock rates on its own, thereby saving energy.                   | Disabled                                  | Disables this function.                                                                        |
|                                |                                                                                                                            | Enabled                                   | Enables this function.                                                                         |

Table 119: GM45 Advanced CPU Configuration - Setting options

1) This setting is only shown if *Intel(R) C-State Tech.* is set to *Enabled*.

## 1.4.6 Chipset Configuration

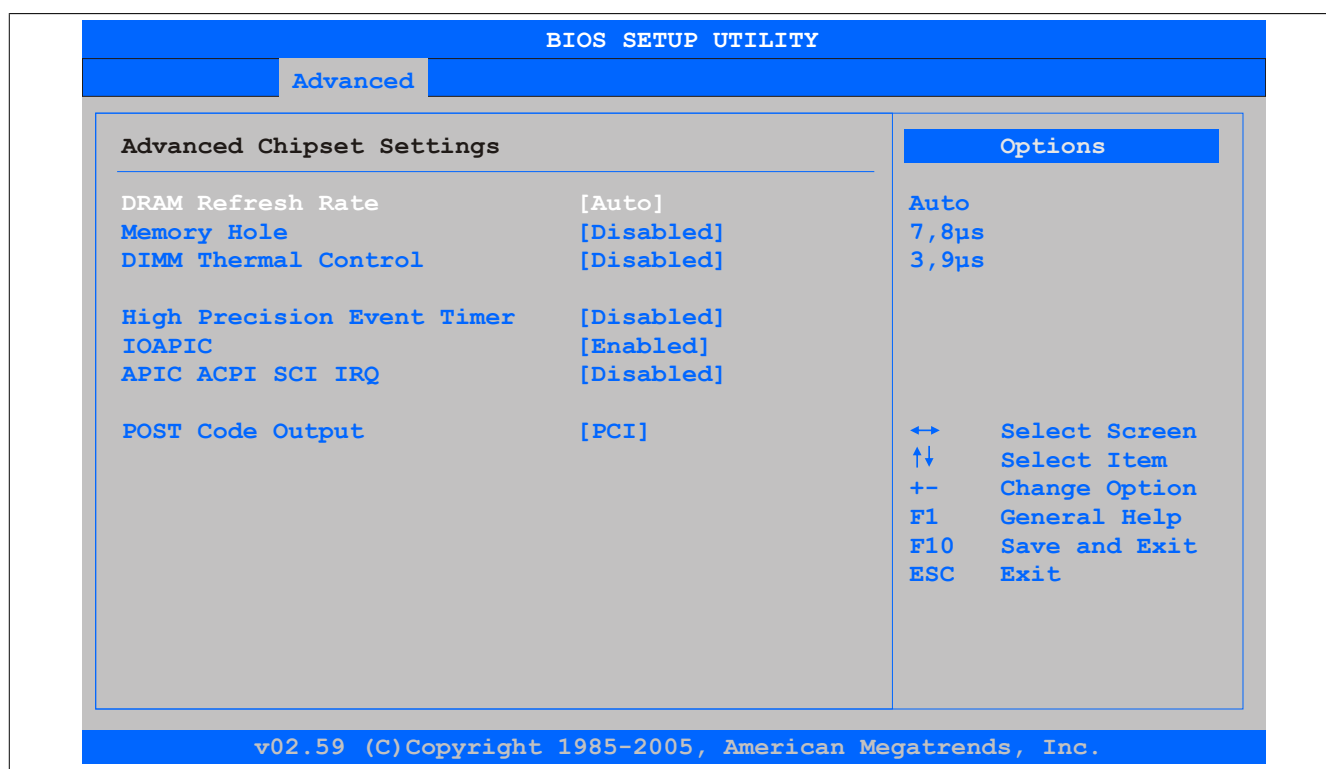


Image 82: GM45 Advanced Chipset Configuration

| BIOS setting               | Meaning                                                                                                                                                                            | Setting options                          | Effect                                                                           |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|----------------------------------------------------------------------------------|
| DRAM Refresh Rate          | Option for setting the DRAM refresh rate.                                                                                                                                          | Auto                                     | DRAM Refresh is read from the SPD data of the DRAM module.                       |
|                            |                                                                                                                                                                                    | 7.8 µs                                   | Manual setting for the DRAM refresh rate.                                        |
|                            |                                                                                                                                                                                    | 3.9 µs                                   | Manual setting for the DRAM refresh rate.                                        |
| Memory Hole                | Option for ISA cards with frame buffer. Not relevant for a PPC800.                                                                                                                 | Disabled                                 | Disables this function.                                                          |
|                            |                                                                                                                                                                                    | 15MB-16MB                                | This address area is reserved.                                                   |
| DIMM Thermal Control       | Option for setting the maximum surface temperature of the DIMM module. The module is cooled by limiting the memory bandwidth if the defined surface temperature is reached.        | Disabled                                 | Surface temperature not limited.                                                 |
|                            |                                                                                                                                                                                    | 40°C, 50°C, 60°C, 70°C, 80°C, 85°C, 90°C | Temperature limit value for the limitation.                                      |
| High Precision Event Timer | The HPET is a timer inside the PC. It is able to trigger an interrupt with a high degree of accuracy, which allows other programs to better synchronize a variety of applications. | Enabled                                  | Enables this function. This function is recommended for multimedia applications. |
|                            |                                                                                                                                                                                    | Disabled                                 | Disables this function.                                                          |

Table 120: GM45 Advanced Chipset - Setting options

| BIOS setting      | Meaning                                                                                                                                                                                                                      | Setting options | Effect                                                                                |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------------------------------------------------------------------------|
| IOAPIC            | This option is used to activate or deactivate the APIC (Advanced Programmable Interrupt Controller).<br><br><b>Information:</b><br><br>The IRQ resources available to the system are expanded when the APIC mode is enabled. | Enabled         | The IRQ resources available to the system are expanded when the APIC mode is enabled. |
|                   |                                                                                                                                                                                                                              | Disabled        | Disables this function.                                                               |
| APIC ACPI SCI IRQ | This option is used to modify the SCI IRQ when in APIC (Advanced Programmable Interrupt Controller) mode.                                                                                                                    | Enabled         | IRQ20 is used for SCI.                                                                |
|                   |                                                                                                                                                                                                                              | Disabled        | IRQ9 is used for SCI.                                                                 |
| POST Code Output  | This option is used when the port 80h/84h BIOS POST code output should be routed to the PCI bus or the LPC bus.                                                                                                              | PCI             | Port 80h/84h is routed to the PCI bus.                                                |
|                   |                                                                                                                                                                                                                              | LPC             | Port 80h/84h is routed to the LPC bus.                                                |

Table 120: GM45 Advanced Chipset - Setting options

### 1.4.7 I/O Interface Configuration

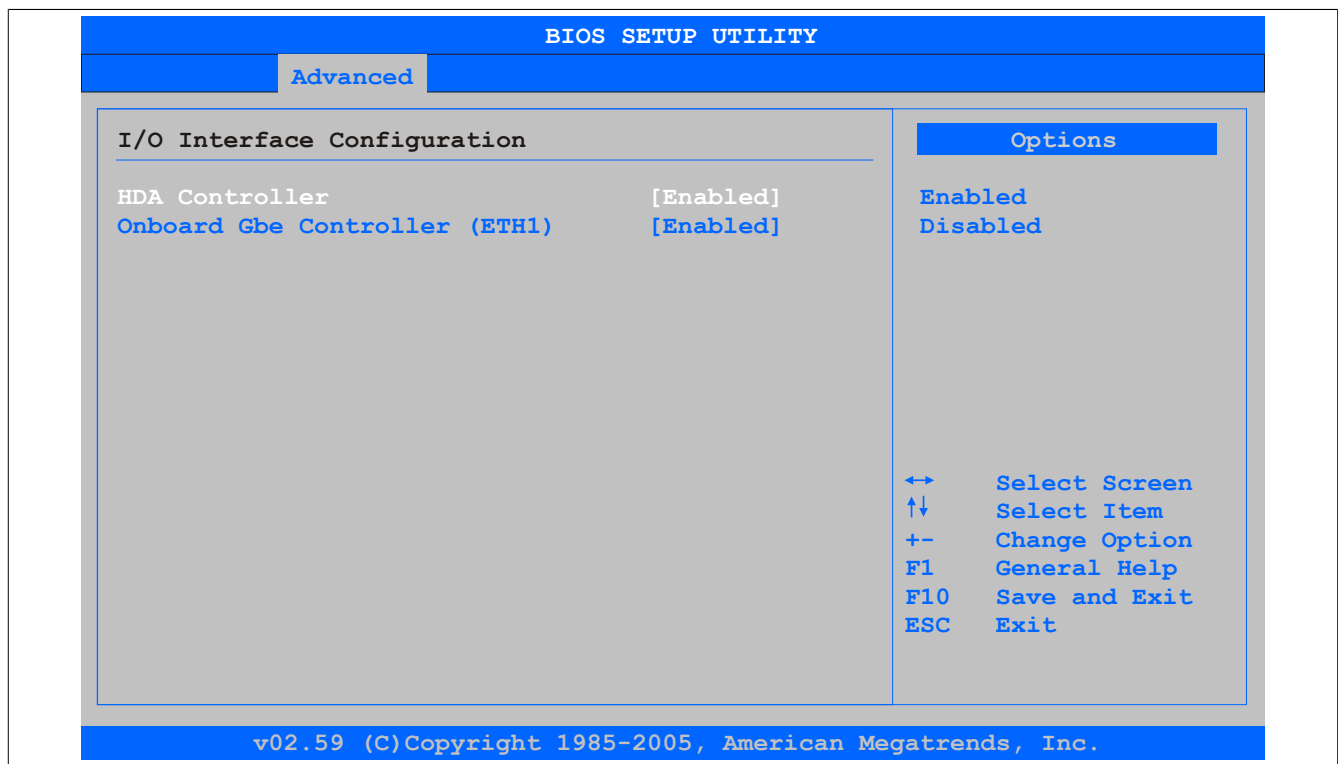


Image 83: GM45 Advanced I/O interface configuration

| BIOS setting                  | Meaning                                                                                                                                          | Setting options | Effect                                   |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------------------------------|
| HDA Controller                | This option is used to turn the HDA controller on or off.<br><br><b>Information:</b><br><br>The GM45 CPU board does not have a sound controller. | Enabled         | Enables the HDA controller.              |
|                               |                                                                                                                                                  | Disabled        | Disables the HDA controller.             |
| Onboard Gbe Controller (ETH1) | This option is used to turn the onboard Ethernet controller on or off.                                                                           | Disabled        | Onboard Ethernet controller is disabled. |
|                               |                                                                                                                                                  | Enabled         | Onboard Ethernet controller is enabled.  |

Table 121: GM45 Advanced I/O Interface Configuration - Setting options

1.4.8 Clock Configuration

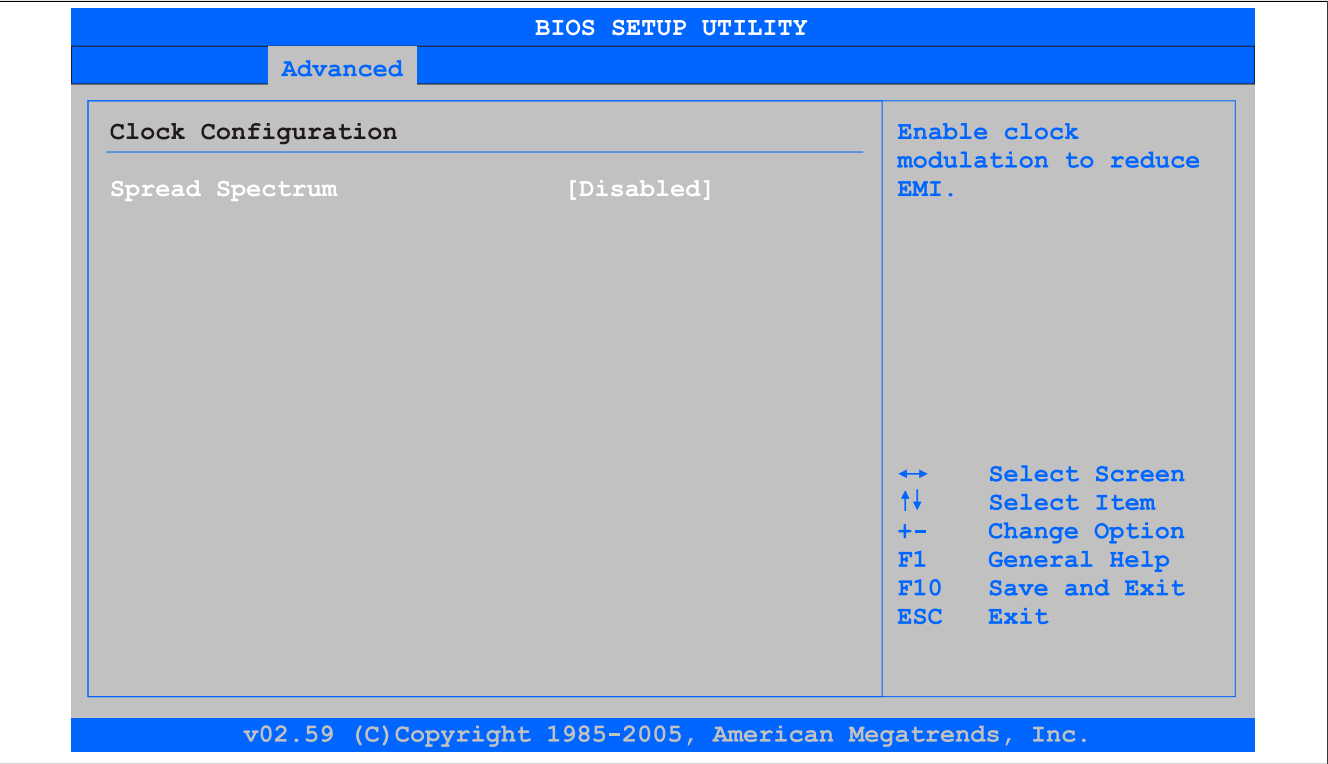


Image 84: GM45 Advanced clock configuration

| BIOS settings   | Meaning                                                                                          | Setting options | Effect                  |
|-----------------|--------------------------------------------------------------------------------------------------|-----------------|-------------------------|
| Spread spectrum | With this option, the cycle frequency can be modulated by reducing electromagnetic disturbances. | Enabled         | Enables this function.  |
|                 |                                                                                                  | Disabled        | Disables this function. |

Table 122: GM45 Advanced Clock Configuration - Setting options

1.4.9 IDE Configuration

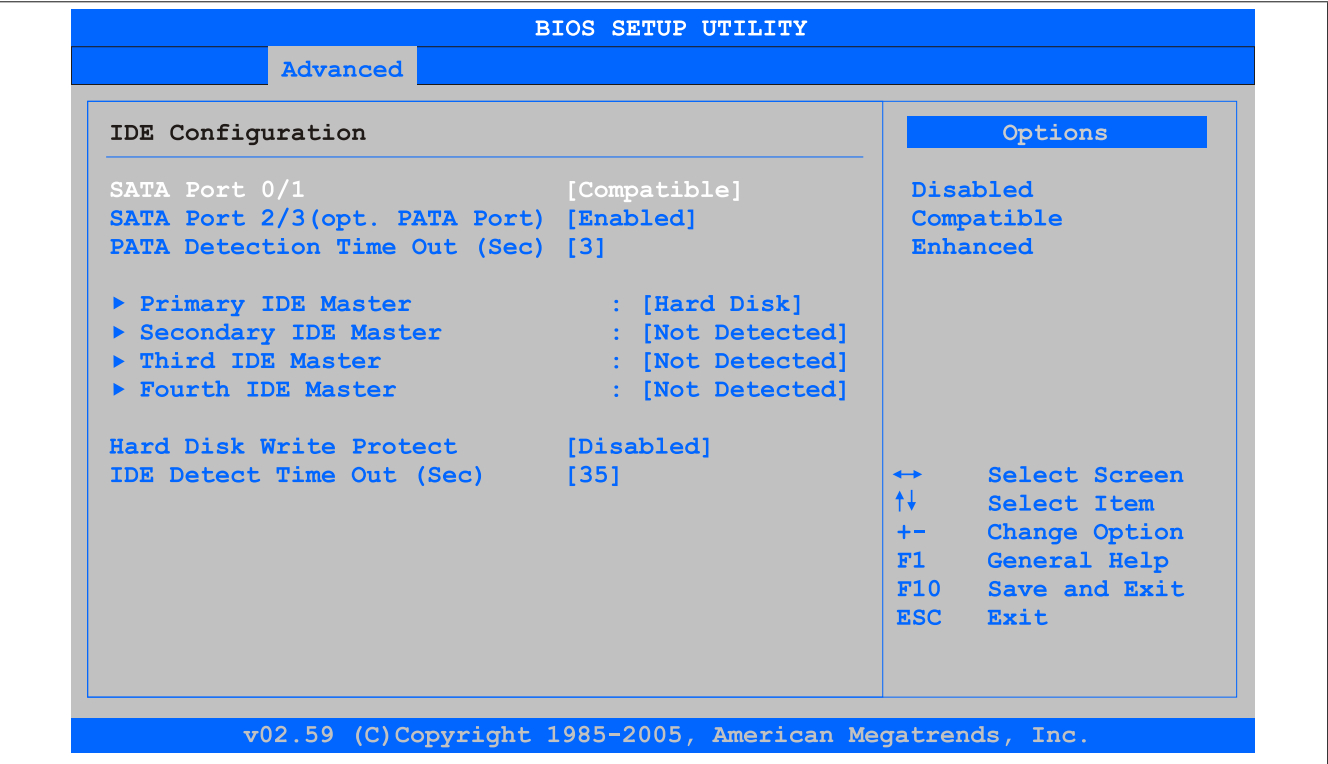


Image 85: GM45 Advanced IDE configuration

| BIOS settings                               | Meaning                                                                                                                                                                                                                 | Setting options              | Effect                                                                                                                                                                                                       |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SATA Port 0/1                               | Option for configuring the integrated SATA controller.                                                                                                                                                                  | Compatible                   | The controller runs in Legacy or Compatible mode.                                                                                                                                                            |
|                                             |                                                                                                                                                                                                                         | Disabled                     | Disables the controller and both ports.                                                                                                                                                                      |
|                                             |                                                                                                                                                                                                                         | Enhanced                     | The controller runs in Enhanced or Native mode.                                                                                                                                                              |
| Configure SATA Port 0/1 as <sup>1)</sup>    | The Serial ATA connections 0/1 supported by the Southbridge can be defined here.                                                                                                                                        | IDE                          | The serial ATA hard drive is used as a parallel ATA physical memory drive.                                                                                                                                   |
|                                             |                                                                                                                                                                                                                         | RAID                         | RAID 0, 1, 5, 10 or the Intel® Matrix storage technology can be configured here with the serial ATA hard drive.                                                                                              |
|                                             |                                                                                                                                                                                                                         | AHCI                         | The AHCI setting enables the internal memory driver for the SATA functions, which increase the storage performance for random read-write access by allowing the drive to determine the sequence of commands. |
| Hot Plug <sup>2)</sup>                      | Option for turning SATA hot plugging support on or off.                                                                                                                                                                 | Disabled                     | Disables this function.                                                                                                                                                                                      |
|                                             |                                                                                                                                                                                                                         | Enabled                      | Enables this function.                                                                                                                                                                                       |
| SATA Port 2/3 (opt. PATA Port)              | Option for turning integrated SATA controllers 2 and 3 on or off.                                                                                                                                                       | Disabled                     | Disables this function.                                                                                                                                                                                      |
|                                             |                                                                                                                                                                                                                         | Enabled                      | Enables this function.                                                                                                                                                                                       |
| PATA Detection Time Out (Sec) <sup>3)</sup> | Configuring the time overrun limit value for the ATA/ATAPI device identification. This option only applies for PATA channels.                                                                                           | 0,1,2,3,5,10,15,30           | Time setting in seconds.                                                                                                                                                                                     |
| Primary IDE Master                          | The drive in the system that is connected to the primary IDE master port is configured here.                                                                                                                            | Enter                        | Opens the submenu see "Primary IDE Master" on page 154                                                                                                                                                       |
| Secondary IDE Master                        | The drive in the system that is connected to the secondary IDE master port is configured here.                                                                                                                          | Enter                        | Opens the submenu see "Secondary IDE master" on page 155                                                                                                                                                     |
| Third IDE Master                            | The drive in the system that is connected to the third IDE master port is configured here.<br><br><b>Information:</b><br><br>The Third IDE Master is not used on the PPC800. Therefore these settings are not relevant. | Enter                        | Opens the submenu see "Third IDE Master" on page 156                                                                                                                                                         |
| Fourth IDE Master                           | The drive in the system that is connected to the fourth IDE master port is configured here.                                                                                                                             | Enter                        | Opens the submenu see "Fourth IDE Master" on page 157                                                                                                                                                        |
| Hard disk write protect                     | Write protection for the hard drive can be enabled/disabled here.                                                                                                                                                       | Enabled                      | Enables this function.                                                                                                                                                                                       |
|                                             |                                                                                                                                                                                                                         | Disabled                     | Disables this function.                                                                                                                                                                                      |
| IDE Detect Time Out (Sec)                   | Configuring the time overrun limit value for the ATA/ATAPI device identification. This option applies for SATA and PATA channels.                                                                                       | 0, 5, 10, 15, 20, 25, 30, 35 | Time setting in seconds.                                                                                                                                                                                     |

Table 123: GM45 Advanced IDE Configuration - Setting options

- 1) These settings are only possible if *SATA Port 0/1* is set to *Enhanced*.  
 2) These settings are only possible if *Configure SATA Port 0/1* as is set to *RAID* or *AHCI*.  
 3) These settings are only possible if *SATA Port 2/3 (opt. PATA port)* is set to *Enabled*.

## Primary IDE Master

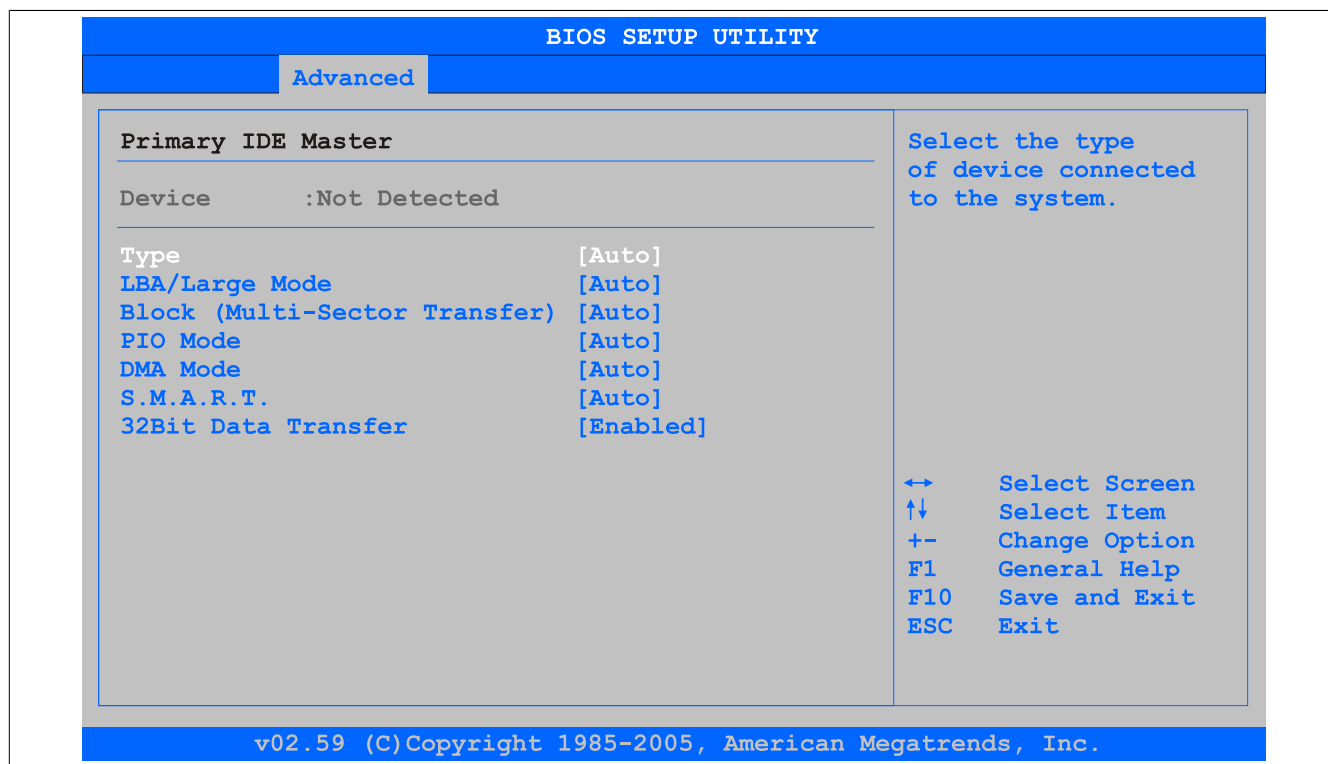


Image 86: GM45 Primary IDE master

| BIOS settings                 | Meaning                                                                                                                                                                                                                                | Setting options | Effect                                                              |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------------------------------------------------------|
| Type                          | The type of drive connected to the primary master is configured here.                                                                                                                                                                  | Not installed   | No drive installed.                                                 |
|                               |                                                                                                                                                                                                                                        | Auto            | Automatic recognition of the drive and setup of appropriate values. |
|                               |                                                                                                                                                                                                                                        | CD/DVD          | CD -/ DVD drive.                                                    |
|                               |                                                                                                                                                                                                                                        | ARMD            | ARMD - drive (zip drive)                                            |
| LBA/Large Mode                | This option activates the logical block addressing / large mode for IDE.                                                                                                                                                               | Disabled        | Disables this function.                                             |
|                               |                                                                                                                                                                                                                                        | Auto            | Automatic enabling of this function when supported by the system.   |
| Block (Multi-Sector Transfer) | This option enables the block mode for IDE hard drives. When this option is enabled, the number of blocks per request from the configuration sector of the hard drive is read.                                                         | Disabled        | Disables this function.                                             |
|                               |                                                                                                                                                                                                                                        | Auto            | Automatic enabling of this function when supported by the system.   |
| PIO Mode                      | The PIO mode determines the data rate of the hard drive.<br><br><b>Information:</b><br><br>This option is not available on the PPC800. Therefore this setting is not relevant.                                                         | Auto            | Automatic configuration of PIO mode.                                |
|                               |                                                                                                                                                                                                                                        | 0, 1, 2, 3, 4   | Manual configuration of PIO mode.                                   |
| DMA Mode                      | The data transfer rate to and from the primary master drive is defined here. The DMA mode must be activated in the Windows device manager in order to guarantee maximum performance. Only possible when manually setting up the drive. | Auto            | Automatic definition of the transfer rate.                          |
|                               |                                                                                                                                                                                                                                        | Disabled        | Manual definition of the transfer rate.                             |
| S.M.A.R.T.                    | Monitoring function of modern hard drives (self-monitoring, analysis and reporting technology).                                                                                                                                        | Auto            | Automatic detection and enabling.                                   |
|                               |                                                                                                                                                                                                                                        | Enabled         | Enables this function.                                              |
|                               |                                                                                                                                                                                                                                        | Disabled        | Disables this function.                                             |
| 32 Bit Data Transfer          | This function enables 32-bit data transfer.                                                                                                                                                                                            | Enabled         | Enables this function.                                              |
|                               |                                                                                                                                                                                                                                        | Disabled        | Disables this function.                                             |

Table 124: GM45 - Primary IDE master - Setting options

## Secondary IDE master

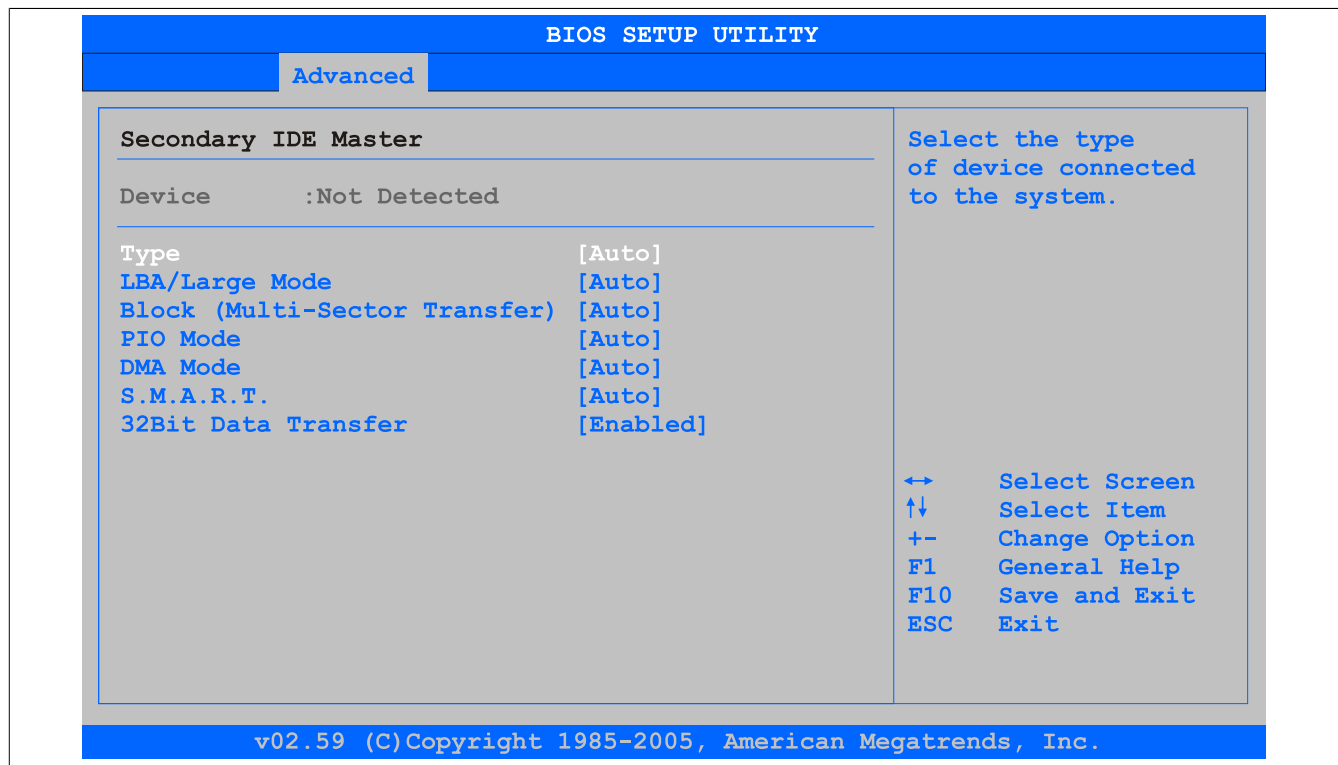


Image 87: GM45 Secondary IDE master

| BIOS settings                 | Meaning                                                                                                                                                                                                                                  | Setting options | Effect                                                              |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------------------------------------------------------|
| Type                          | The type of drive connected to the secondary master is configured here.                                                                                                                                                                  | Not installed   | No drive installed.                                                 |
|                               |                                                                                                                                                                                                                                          | Auto            | Automatic recognition of the drive and setup of appropriate values. |
|                               |                                                                                                                                                                                                                                          | CD/DVD          | CD -/ DVD drive.                                                    |
|                               |                                                                                                                                                                                                                                          | ARMD            | ARMD - drive (zip drive)                                            |
| LBA/Large Mode                | This option activates the logical block addressing / large mode for IDE.                                                                                                                                                                 | Disabled        | Disables this function.                                             |
|                               |                                                                                                                                                                                                                                          | Auto            | Automatic enabling of this function when supported by the system.   |
| Block (Multi-Sector Transfer) | This option enables the block mode for IDE hard drives. When this option is enabled, the number of blocks per request from the configuration sector of the hard drive is read.                                                           | Disabled        | Disables this function.                                             |
|                               |                                                                                                                                                                                                                                          | Auto            | Automatic enabling of this function when supported by the system.   |
| PIO Mode                      | The PIO mode determines the data rate of the hard drive.<br><br><b>Information:</b><br><br>This option is not available on the PPC800. Therefore this setting is not relevant.                                                           | Auto            | Automatic configuration of PIO mode.                                |
|                               |                                                                                                                                                                                                                                          | 0, 1, 2, 3, 4   | Manual configuration of PIO mode.                                   |
| DMA Mode                      | The data transfer rate to and from the secondary master drive is defined here. The DMA mode must be activated in the Windows device manager in order to guarantee maximum performance. Only possible when manually setting up the drive. | Auto            | Automatic definition of the transfer rate.                          |
|                               |                                                                                                                                                                                                                                          | Disabled        | Manual definition of the transfer rate.                             |
| S.M.A.R.T.                    | Monitoring function of modern hard drives (self-monitoring, analysis and reporting technology).                                                                                                                                          | Auto            | Automatic detection and enabling.                                   |
|                               |                                                                                                                                                                                                                                          | Enabled         | Enables this function.                                              |
|                               |                                                                                                                                                                                                                                          | Disabled        | Disables this function.                                             |
| 32 Bit Data Transfer          | This function enables 32-bit data transfer.                                                                                                                                                                                              | Enabled         | Enables this function.                                              |
|                               |                                                                                                                                                                                                                                          | Disabled        | Disables this function.                                             |

Table 125: GM45 - Secondary IDE master - Setting options

## Third IDE Master

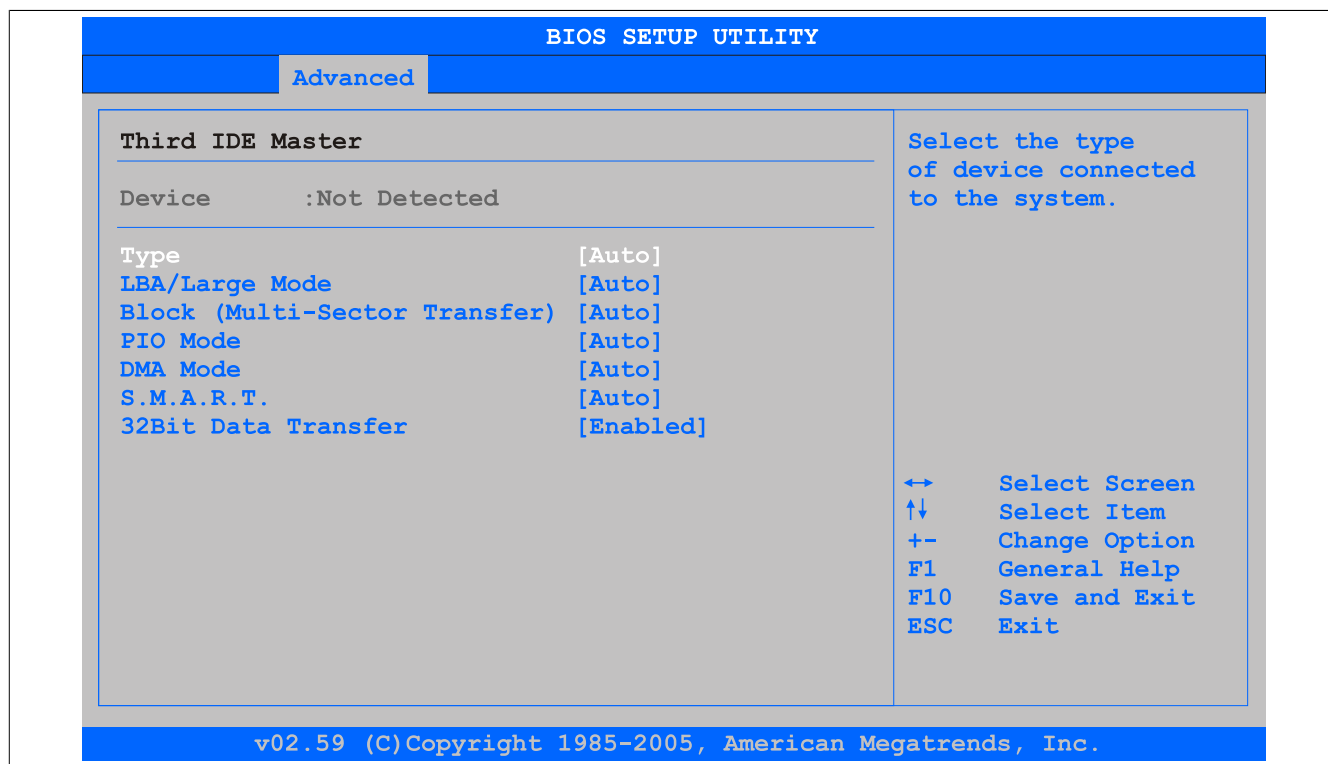


Image 88: GM45 Third IDE master

| BIOS settings                 | Meaning                                                                                                                                                                                                                              | Setting options | Effect                                                              |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------------------------------------------------------|
| Type                          | The type of drive connected to the third master is configured here.                                                                                                                                                                  | Not installed   | No drive installed.                                                 |
|                               |                                                                                                                                                                                                                                      | Auto            | Automatic recognition of the drive and setup of appropriate values. |
|                               |                                                                                                                                                                                                                                      | CD/DVD          | CD -/ DVD drive.                                                    |
|                               |                                                                                                                                                                                                                                      | ARMD            | ARMD - drive (zip drive)                                            |
| LBA/Large Mode                | This option activates the logical block addressing / large mode for IDE.                                                                                                                                                             | Disabled        | Disables this function.                                             |
|                               |                                                                                                                                                                                                                                      | Auto            | Automatic enabling of this function when supported by the system.   |
| Block (Multi-Sector Transfer) | This option enables the block mode for IDE hard drives. When this option is enabled, the number of blocks per request from the configuration sector of the hard drive is read.                                                       | Disabled        | Disables this function.                                             |
|                               |                                                                                                                                                                                                                                      | Auto            | Automatic enabling of this function when supported by the system.   |
| PIO Mode                      | The PIO mode determines the data rate of the hard drive.<br><br><b>Information:</b><br><br>This option is not available on the PPC800. Therefore this setting is not relevant.                                                       | Auto            | Automatic configuration of PIO mode.                                |
|                               |                                                                                                                                                                                                                                      | 0, 1, 2, 3, 4   | Manual configuration of PIO mode.                                   |
| DMA Mode                      | The data transfer rate to and from the third master drive is defined here. The DMA mode must be activated in the Windows device manager in order to guarantee maximum performance. Only possible when manually setting up the drive. | Auto            | Automatic definition of the transfer rate.                          |
|                               |                                                                                                                                                                                                                                      | Disabled        | Manual definition of the transfer rate.                             |
| S.M.A.R.T.                    | Monitoring function of modern hard drives (self-monitoring, analysis and reporting technology).                                                                                                                                      | Auto            | Automatic detection and enabling.                                   |
|                               |                                                                                                                                                                                                                                      | Enabled         | Enables this function.                                              |
|                               |                                                                                                                                                                                                                                      | Disabled        | Disables this function.                                             |
| 32 Bit Data Transfer          | This function enables 32-bit data transfer.                                                                                                                                                                                          | Enabled         | Enables this function.                                              |
|                               |                                                                                                                                                                                                                                      | Disabled        | Disables this function.                                             |

Table 126: GM45 - Third IDE master - Setting options



## Fourth IDE Master

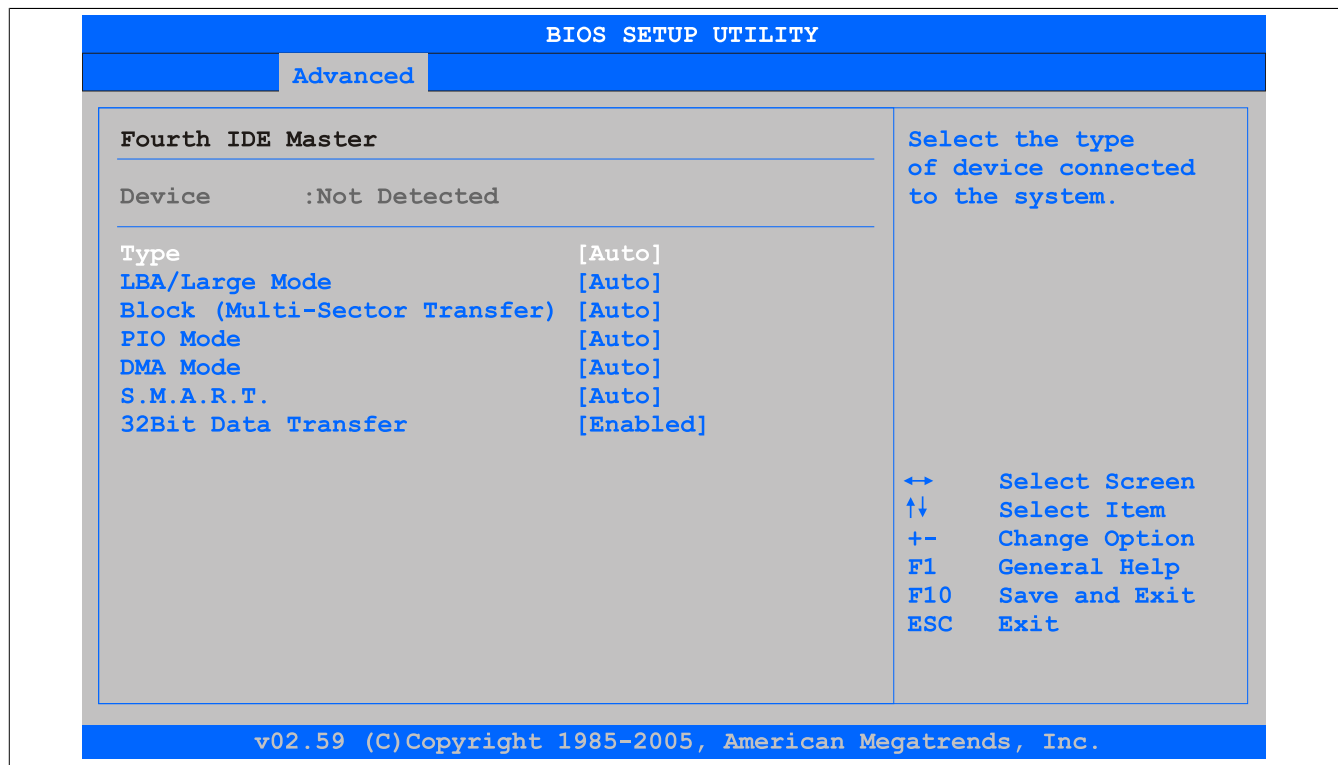


Image 89: GM45 Fourth IDE master

| BIOS settings                 | Meaning                                                                                                                                                                                                                               | Setting options | Effect                                                              |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------------------------------------------------------|
| Type                          | The type of drive connected to the fourth master is configured here.                                                                                                                                                                  | Not installed   | No drive installed.                                                 |
|                               |                                                                                                                                                                                                                                       | Auto            | Automatic recognition of the drive and setup of appropriate values. |
|                               |                                                                                                                                                                                                                                       | CD/DVD          | CD -/ DVD drive.                                                    |
|                               |                                                                                                                                                                                                                                       | ARMD            | ARMD - drive (zip drive)                                            |
| LBA/Large Mode                | This option activates the logical block addressing / large mode for IDE.                                                                                                                                                              | Disabled        | Disables this function.                                             |
|                               |                                                                                                                                                                                                                                       | Auto            | Automatic enabling of this function when supported by the system.   |
| Block (Multi-Sector Transfer) | This option enables the block mode for IDE hard drives. When this option is enabled, the number of blocks per request from the configuration sector of the hard drive is read.                                                        | Disabled        | Disables this function.                                             |
|                               |                                                                                                                                                                                                                                       | Auto            | Automatic enabling of this function when supported by the system.   |
| PIO Mode                      | The PIO mode determines the data rate of the hard drive.<br><br><b>Information:</b><br><br>This option is not available on the PPC800. Therefore this setting is not relevant.                                                        | Auto            | Automatic configuration of PIO mode.                                |
|                               |                                                                                                                                                                                                                                       | 0, 1, 2, 3, 4   | Manual configuration of PIO mode.                                   |
| DMA Mode                      | The data transfer rate to and from the fourth master drive is defined here. The DMA mode must be activated in the Windows device manager in order to guarantee maximum performance. Only possible when manually setting up the drive. | Auto            | Automatic definition of the transfer rate.                          |
|                               |                                                                                                                                                                                                                                       | Disabled        | Manual definition of the transfer rate.                             |
| S.M.A.R.T.                    | Monitoring function of modern hard drives (self-monitoring, analysis and reporting technology).                                                                                                                                       | Auto            | Automatic detection and enabling.                                   |
|                               |                                                                                                                                                                                                                                       | Enabled         | Enables this function.                                              |
|                               |                                                                                                                                                                                                                                       | Disabled        | Disables this function.                                             |
| 32 Bit Data Transfer          | This function enables 32-bit data transfer.                                                                                                                                                                                           | Enabled         | Enables this function.                                              |
|                               |                                                                                                                                                                                                                                       | Disabled        | Disables this function.                                             |

Table 127: GM45 - Fourth IDE master - Setting options

## 1.4.10 USB Configuration

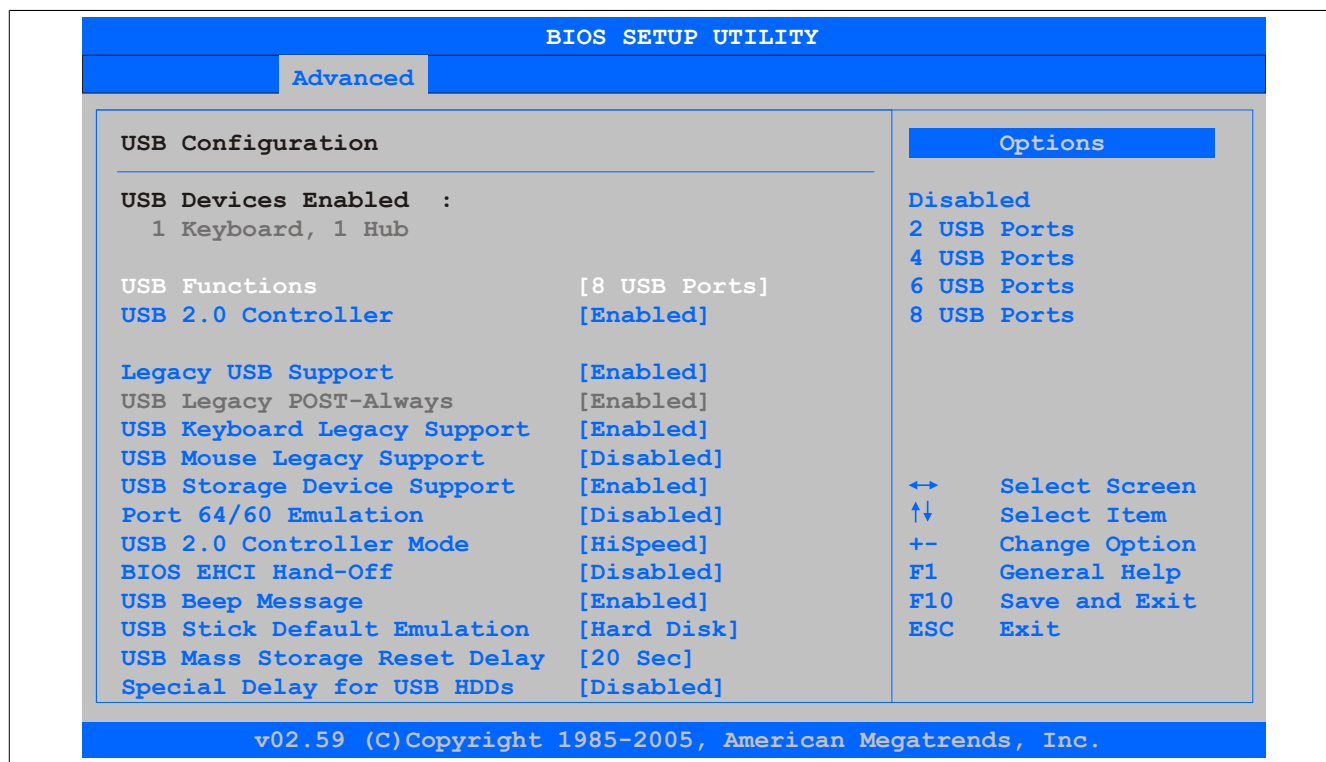


Image 90: GM45 Advanced USB configuration

| BIOS setting                | Meaning                                                                                                                                                                                                       | Setting options              | Effect                                                                                                                                           |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| USB Functions               | USB ports can be enabled/disabled here. The USB numbers (e.g. USB1, USB3, etc.) are printed on the PPC800 housing).                                                                                           | Disabled                     | Disables the USB port.                                                                                                                           |
|                             |                                                                                                                                                                                                               | 2 USB Ports                  | USB1, USB3 are enabled.                                                                                                                          |
|                             |                                                                                                                                                                                                               | 4 USB Ports                  | USB1, USB2, USB3, USB4 are enabled.                                                                                                              |
|                             |                                                                                                                                                                                                               | 6 USB Ports                  | USB1, USB2, USB3, USB4, USB5 are enabled.                                                                                                        |
|                             |                                                                                                                                                                                                               | 8 USB Ports                  | USB1, USB2, USB3, USB4, USB5, USB are enabled on an AP via SDL.                                                                                  |
| USB 2.0 Controller          | Option for enabling or disabling USB 2.0 mode.                                                                                                                                                                | Enabled                      | All USB ports run in USB 2.0 mode.                                                                                                               |
|                             |                                                                                                                                                                                                               | Disabled                     | All USB ports run in USB 1.1 mode.                                                                                                               |
| Legacy USB Support          | Legacy USB support can be enabled/disabled here. USB ports do not function during startup. USB is supported again after the operating system has started. A USB keyboard is still recognized during the POST. | Enabled                      | Enables this function.                                                                                                                           |
|                             |                                                                                                                                                                                                               | Disabled                     | Disables this function.                                                                                                                          |
|                             |                                                                                                                                                                                                               | Auto                         | Automatic enabling.                                                                                                                              |
|                             |                                                                                                                                                                                                               | None (automatically enabled) | The BIOS Setup can be called up during the POST using a USB keyboard.                                                                            |
| USB Legacy POST-Always      | Legacy USB support is enabled during the POST (Power On Self Test) regardless of the Legacy USB support setting.                                                                                              | None (automatically enabled) | The BIOS Setup can be called up during the POST using a USB keyboard.                                                                            |
| USB Keyboard Legacy Support | USB keyboard support can be enabled/disabled here.                                                                                                                                                            | Enabled                      | Enables this function.                                                                                                                           |
|                             |                                                                                                                                                                                                               | Disabled                     | Disables this function.                                                                                                                          |
| USB Mouse Legacy Support    | USB mouse support can be enabled/disabled here.                                                                                                                                                               | Enabled                      | Enables this function.                                                                                                                           |
|                             |                                                                                                                                                                                                               | Disabled                     | Disables this function.                                                                                                                          |
| USB Storage Device Support  | USB memory device support can be enabled/disabled here.                                                                                                                                                       | Enabled                      | Enables this function.                                                                                                                           |
|                             |                                                                                                                                                                                                               | Disabled                     | Disables this function.                                                                                                                          |
| Port 64/60 Emulation        | Port 64/60 emulation can be enabled/disabled here.                                                                                                                                                            | Enabled                      | USB keyboard functions in Windows NT.                                                                                                            |
|                             |                                                                                                                                                                                                               | Disabled                     | USB keyboard functions in all systems excluding Windows NT.                                                                                      |
| USB 2.0 Controller Mode     | Settings can be made for the USB controller here.                                                                                                                                                             | Full Speed                   | 12 MBps                                                                                                                                          |
|                             |                                                                                                                                                                                                               | Hi Speed                     | 480 MBps                                                                                                                                         |
| BIOS EHCI Hand-Off          | The support for the operating system can be set up without the fully automatic EHCI function.                                                                                                                 | Enabled                      | Enables this function.                                                                                                                           |
|                             |                                                                                                                                                                                                               | Disabled                     | Disables this function.                                                                                                                          |
| USB Beep Message            | Option for outputting a tone each time a USB device is detected by the BIOS during the POST.                                                                                                                  | Enabled                      | Enables this function.                                                                                                                           |
|                             |                                                                                                                                                                                                               | Disabled                     | Disables this function.                                                                                                                          |
| USB Stick Default Emulation | You can set how the USB device is to be used.                                                                                                                                                                 | Auto                         | USB devices with fewer than 530MB of memory are simulated as floppy disk drives and devices with larger capacities are simulated as hard drives. |
|                             |                                                                                                                                                                                                               | hard disk                    | An HDD-formatted drive can be used as an FDD (e.g. zip drive) for starting the system.                                                           |

Table 128: GM45 Advanced USB Configuration - Setting options

| BIOS setting                 | Meaning                                                                                                                                                                                                                                                                                                         | Setting options                                              | Effect                                                                                                      |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| USB Mass Storage Reset Delay | The waiting time that the USB device POST requires after the device start command can be set.<br><br><b>Information:</b><br><br>The message "No USB mass storage device detected" is displayed if no USB memory device has been installed.                                                                      | 10 Sec, 20 Sec, 30 Sec, 40 Sec                               | Value set manually.                                                                                         |
| Special Delay for USB HDDs   | Option for setting a boot delay prior to counting USB 2.0 devices, which allows slow-booting USB devices (e.g. USB hard disks) to boot.<br><br><b>Information:</b><br><br>This option should only be used when required, since it would otherwise unnecessarily extend the boot process by the configured time. | Disabled<br>1 Sec, 2 Sec, 3 Sec, 4 Sec, 5 Sec, 7 Sec, 10 Sec | Disables this function. No boot delay is added.<br>A boot delay of 1, 2, 3, 4, 5, 7 or 10 seconds is added. |

Table 128: GM45 Advanced USB Configuration - Setting options

### 1.4.11 Keyboard/Mouse Configuration

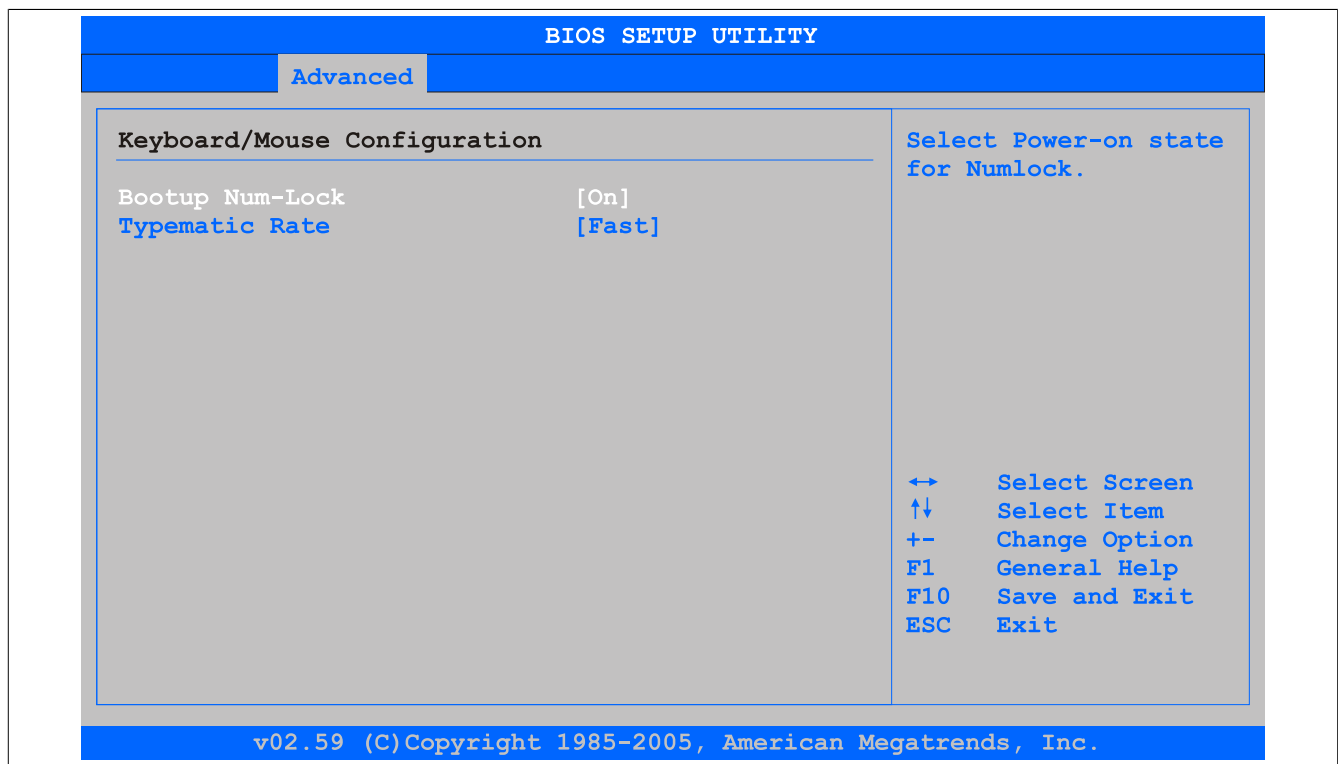


Image 91: GM45 Advanced keyboard/mouse configuration

| BIOS setting     | Meaning                                                                    | Setting options | Effect                                                           |
|------------------|----------------------------------------------------------------------------|-----------------|------------------------------------------------------------------|
| Boot-up Num-lock | With this field you can define the state of the Num-Lock key when booting. | Off             | Only the cursor functions of the numerical keypad are activated. |
|                  |                                                                            | On              | Numeric keypad is enabled.                                       |
| Typematic rate   | The key repeat function is set here.                                       | Slow            | Slow key repeat.                                                 |
|                  |                                                                            | Fast            | Fast key repeat.                                                 |

Table 129: GM45 Advanced Keyboard/Mouse Configuration - Setting options

### 1.4.12 CPU Board Monitor

#### Information:

The displayed voltage values (e.g. core voltage, battery voltage) on this BIOS Setup 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.

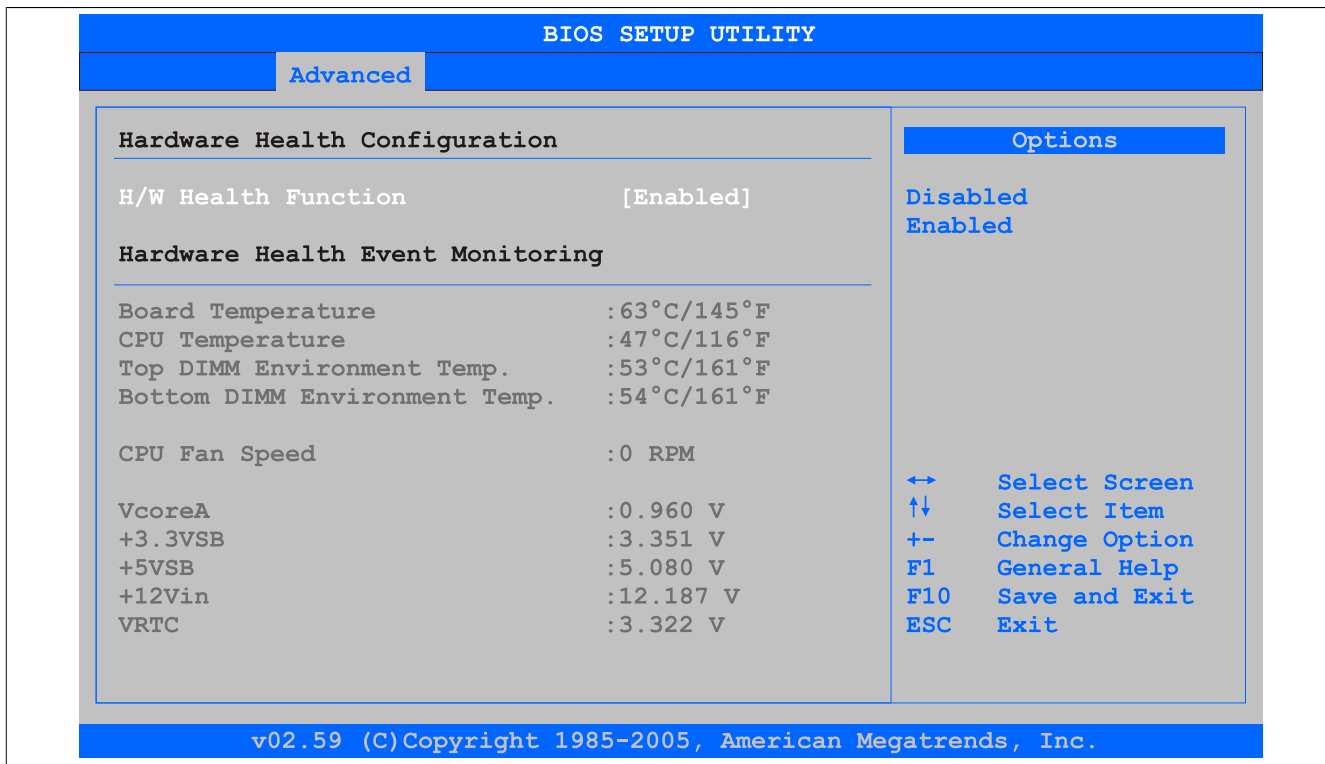


Image 92: GM45 Advanced CPU board monitor

| BIOS setting                  | Meaning                                                                   | Setting options | Effect                            |
|-------------------------------|---------------------------------------------------------------------------|-----------------|-----------------------------------|
| H/W Health Function           | Option for displaying all values on this page.                            | Enabled         | Displays all values.              |
|                               |                                                                           | Disabled        | No values are shown on this page. |
| Board temperature             | Displays the board temperature in degrees Celsius and Fahrenheit.         | None            | -                                 |
| CPU temperature               | Displays the processor's temperature (in degrees Celsius and Fahrenheit). | None            | -                                 |
| Top DIMM Environment Temp.    | Displays the temperature of the first DRAM module.                        | None            | -                                 |
| Bottom DIMM Environment Temp. | Displays the temperature of the second DRAM module.                       | None            | -                                 |
| CPU Fan Speed                 | Displays the rotating speed of the processor fan.                         | None            | -                                 |
| VcoreA                        | Displays the processor's core voltage A in volts.                         | None            | -                                 |
| +3.3VSB                       | Displays the current voltage of the 3.3 volt supply.                      | None            | -                                 |
| +5VSB                         | Displays the current voltage of the 5 volt supply.                        | None            | -                                 |
| +12Vin                        | Displays the current voltage of the 12 volt supply.                       | None            | -                                 |
| VRTC                          | Displays the battery voltage (in volts).                                  | None            | -                                 |

Table 130: GM45 Advanced CPU board monitor - Setting options

## 1.4.13 Baseboard/Panel Features

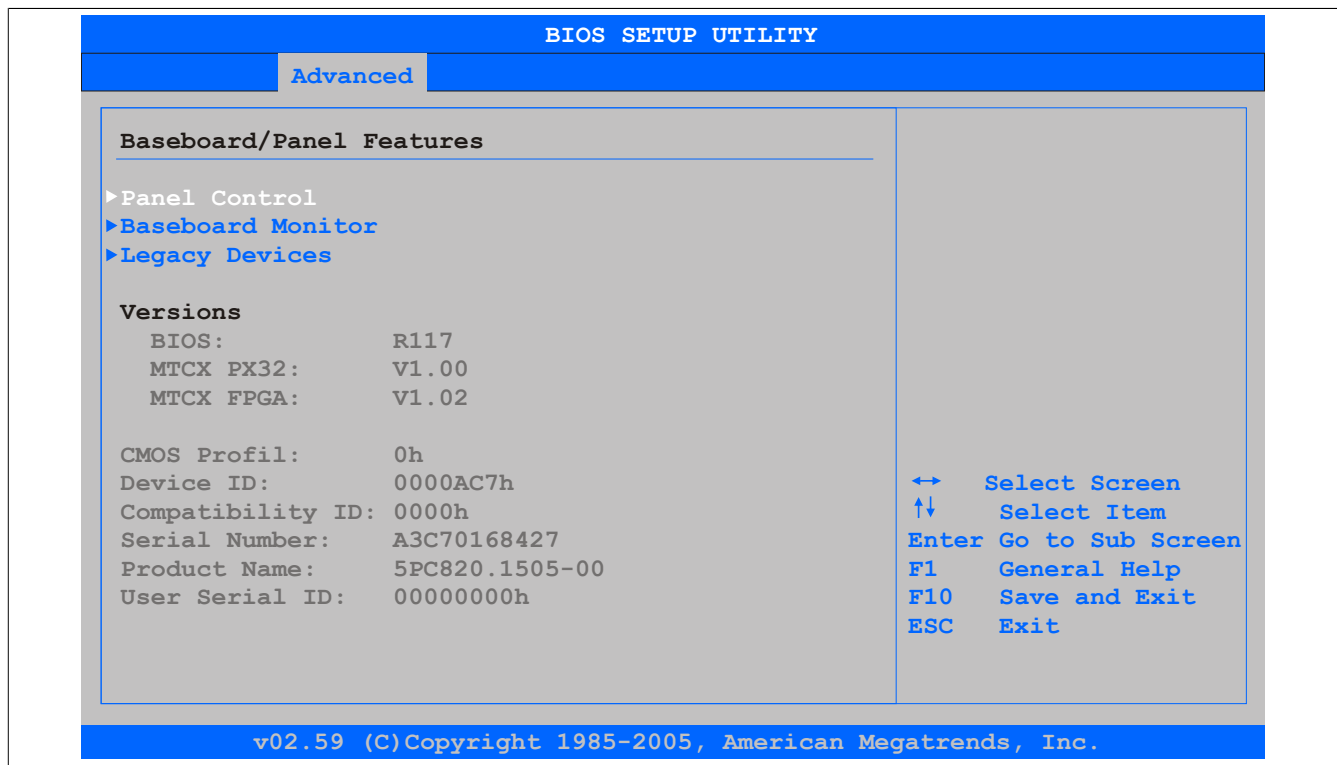


Image 93: GM45 Advanced Baseboard/Panel Features

| BIOS setting             | Meaning                                                                                                                                                                                                      | Setting options | Effect                                                |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------------------------------------------|
| <b>Panel control</b>     | For special setup of connected panels (display units).                                                                                                                                                       | Enter           | Opens the submenu see "Panel Control" on page 162     |
| <b>Baseboard monitor</b> | Display of various temperatures and fan speeds.                                                                                                                                                              | Enter           | Opens the submenu see "Baseboard Monitor" on page 163 |
| <b>Legacy Devices</b>    | Special settings for the interface can be changed here.                                                                                                                                                      | Enter           | Opens the submenu see "Legacy Devices" on page 164    |
| BIOS                     | Displays the BIOS version.                                                                                                                                                                                   | None            | -                                                     |
| MTCX PX32                | Displays the MTCX PX32 firmware version.                                                                                                                                                                     | None            | -                                                     |
| MTCX FPGA                | Displays the MTCX FPGA firmware version.                                                                                                                                                                     | None            | -                                                     |
| CMOS profile             | Shows the CMOS profile number.                                                                                                                                                                               | None            | -                                                     |
| Device ID                | Displays the hexadecimal value of the hardware device ID.                                                                                                                                                    | None            | -                                                     |
| Compatibility ID         | Displays the version of the device within the same B&R device code. This ID is needed for Automation Runtime.                                                                                                | None            | -                                                     |
| Serial Number            | Displays the B&R serial number                                                                                                                                                                               | None            | -                                                     |
| Product Name             | Displays the B&R model number                                                                                                                                                                                | None            | -                                                     |
| User Serial ID           | Displays the user serial 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 131: GM45 Advanced Baseboard/Panel Features - Setting options

## Panel Control

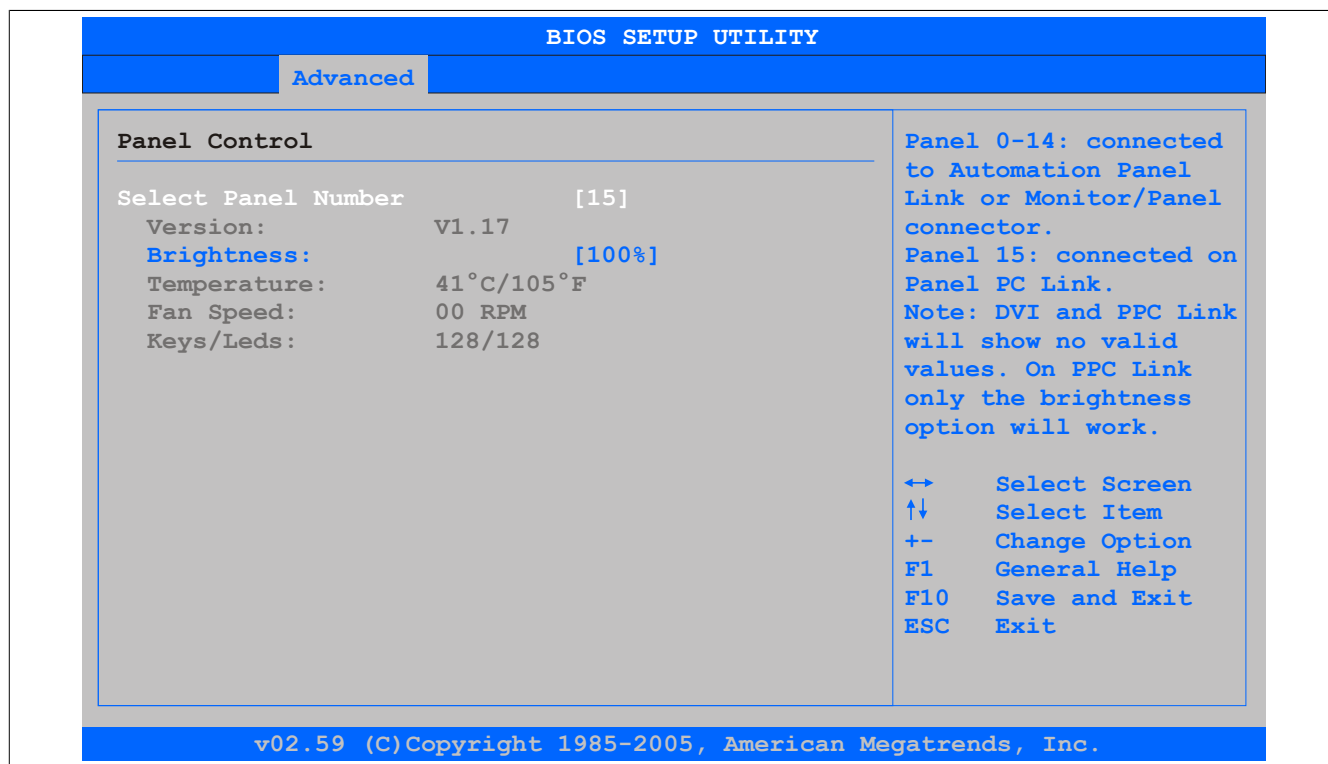


Image 94: GM45 Panel control

| BIOS setting        | Meaning                                                                               | Setting options                                       | Effect                                                                                                                                        |
|---------------------|---------------------------------------------------------------------------------------|-------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Select panel number | Selection of the panel number for which the values should be read out and/or changed. | 0...15                                                | Selection of panel 0 ... 15. Panel 15 is specifically intended for panel PC 800 systems.                                                      |
| Version             | Displays the firmware version of the SDLR controller.                                 | None                                                  | -                                                                                                                                             |
| Brightness          | For setting the brightness of the selected panel.                                     | 0%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 100% | For setting the brightness (in %) of the selected panel. Changes take effect after saving and restarting the system (e.g. by pressing <F10>). |
| Temperature         | Displays the selected panel's temperature (in degrees Celsius and Fahrenheit).        | None                                                  | -                                                                                                                                             |
| Fan Speed           | Displays fan speed for the selected panel.                                            | None                                                  | -                                                                                                                                             |
| Keys/LEDs           | Displays the available keys and LEDs on the selected panel.                           | None                                                  | -                                                                                                                                             |

Table 132: GM45 Panel Control - Setting options

## Baseboard Monitor

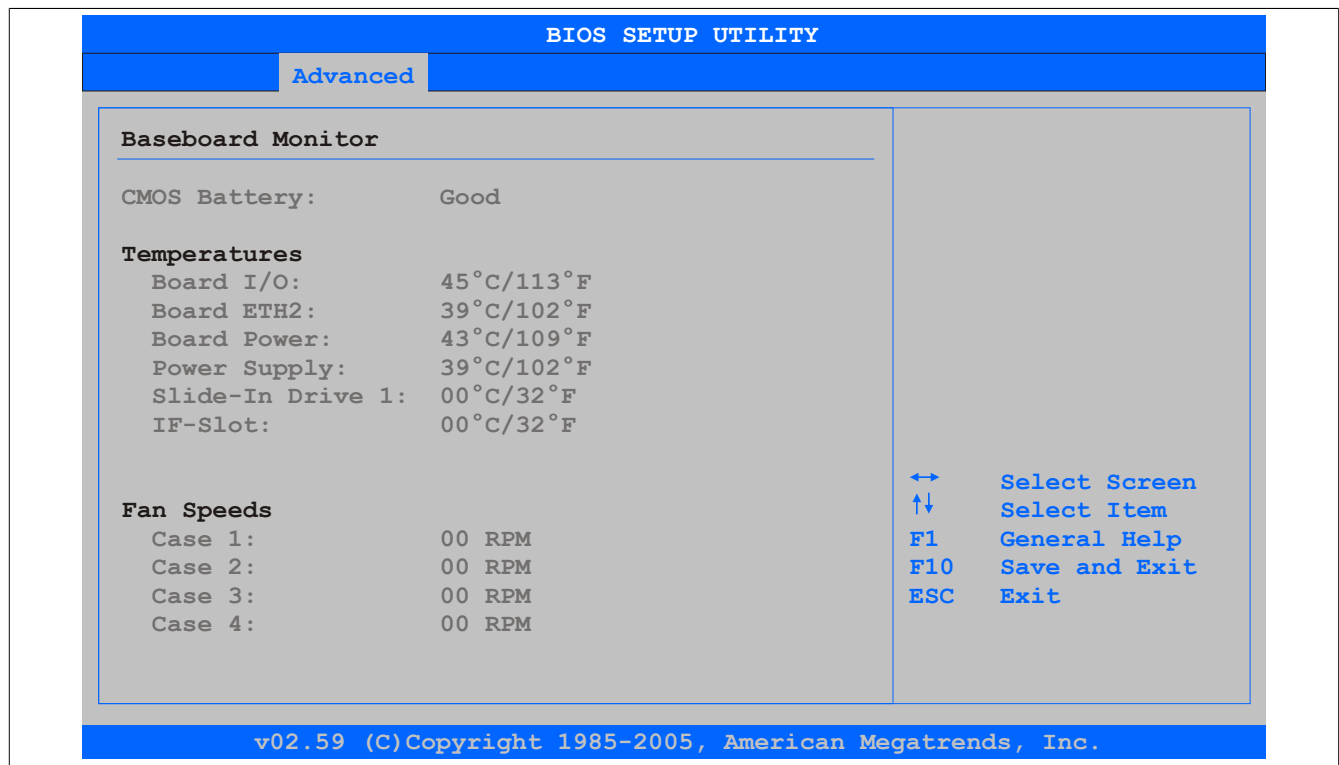


Image 95: GM45 Baseboard monitor

| BIOS setting     | Meaning                                                                                                                  | Setting options | Effect |
|------------------|--------------------------------------------------------------------------------------------------------------------------|-----------------|--------|
| CMOS battery     | Displays the battery status.<br><b>n.a.</b> - not available<br><b>Good</b> - Battery OK.<br><b>Bad</b> - Battery not OK. | None            | -      |
| Board I/O        | Displays the temperature in the I/O area in degrees Celsius and Fahrenheit.                                              | None            | -      |
| Board ETH2       | Displays the temperature in the ETH2 controller chip area in degrees Celsius and Fahrenheit.                             | None            | -      |
| Board Power      | Displays the power supply temperature in degrees Celsius and Fahrenheit.                                                 | None            | -      |
| Power supply     | Displays the temperature in the power supply in degrees Celsius and Fahrenheit.                                          | None            | -      |
| Slide-in drive 1 | Displays the temperature of the slide-in drive 1 in degrees Celsius and Fahrenheit.                                      | None            | -      |
| IF slot          | Displays the temperature of the IF slot in degrees Celsius and Fahrenheit.                                               | None            | -      |
| Case 1           | Displays the fan speed of housing fan 1.                                                                                 | None            | -      |
| Case 2           | Displays the fan speed of housing fan 2.                                                                                 | None            | -      |
| Case 3           | Displays the fan speed of housing fan 3.                                                                                 | None            | -      |
| Case 4           | Displays the fan speed of housing fan 4.                                                                                 | None            | -      |

Table 133: GM45 Baseboard Monitor - Setting options

## Legacy Devices

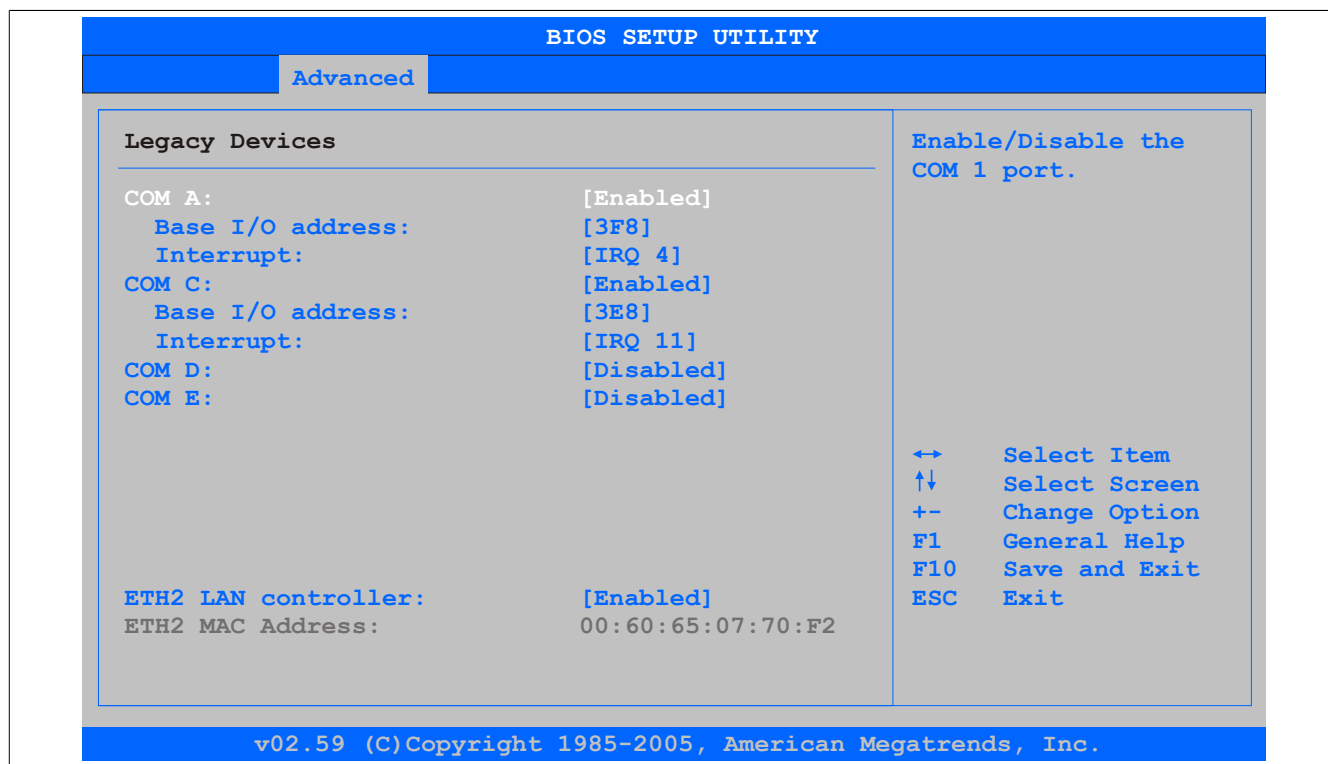


Image 96: GM45 Legacy devices

| BIOS setting        | Meaning                                                                          | Setting options                                           | Effect                                              |
|---------------------|----------------------------------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------|
| COM A               | Settings for the <b>COM1</b> serial interface in the system.                     | Enabled                                                   | Enables the interface.                              |
|                     |                                                                                  | Disabled                                                  | Disables the interface.                             |
| Base I/O address    | Selects the base I/O address for the COM port.                                   | 238, 2E8, 2F8, 328, 338, 3E8, 3F8                         | Selected base I/O address is assigned.              |
| Interrupt           | Selection of the interrupt for the COM port.                                     | IRQ 3, IRQ 4, IRQ 5, IRQ 6, IRQ 7, IRQ 10, IRQ 11, IRQ 12 | Selected interrupt is assigned.                     |
| COM C               | Setting the COM port for the <b>touch screen on the monitor/panel</b> connector. | Enabled                                                   | Enables the interface.                              |
|                     |                                                                                  | Disabled                                                  | Disables the interface.                             |
| Base I/O address    | Selects the base I/O address for the COM port.                                   | 238, 2E8, 2F8, 328, 338, 3E8, 3F8                         | Selected base I/O address is assigned.              |
| Interrupt           | Selection of the interrupt for the COM port.                                     | IRQ 3, IRQ 4, IRQ 5, IRQ 6, IRQ 7, IRQ 10, IRQ 11, IRQ 12 | Selected interrupt is assigned.                     |
| COM D               | Setting the COM port for the <b>touch screen on the AP Link</b> connector.       | Enabled                                                   | Enables the interface.                              |
|                     |                                                                                  | Disabled                                                  | Disables the interface.                             |
| Base I/O address    | Selects the base I/O address for the COM port.                                   | 238, 2E8, 2F8, 328, 338, 3E8, 3F8                         | Selected base I/O address is assigned.              |
| Interrupt           | Selection of the interrupt for the COM port.                                     | IRQ 3, IRQ 4, IRQ 5, IRQ 6, IRQ 7, IRQ 10, IRQ 11, IRQ 12 | Selected interrupt is assigned.                     |
| COM E               | Configuration of the COM port on the <b>B&amp;R add-on interface</b> .           | Enabled                                                   | Enables the interface.                              |
|                     |                                                                                  | Disabled                                                  | Disables the interface.                             |
| Base I/O address    | Selects the base I/O address for the COM port.                                   | 238, 2E8, 2F8, 328, 338, 3E8, 3F8                         | Selected base I/O address is assigned.              |
| Interrupt           | Selection of the interrupt for the COM port.                                     | IRQ 3, IRQ 4, IRQ 5, IRQ 6, IRQ 7, IRQ 10, IRQ 11, IRQ 12 | Selected interrupt is assigned.                     |
| ETH2 LAN controller | For turning the onboard LAN controller (ETH2) on and off.                        | Enabled<br>Disabled                                       | Enables the controller.<br>Disables the controller. |
| ETH2 MAC Address    | Displays the Ethernet 2 controller MAC address.                                  | None                                                      | -                                                   |

Table 134: GM45 Legacy Devices - Setting options



## 1.5 Boot

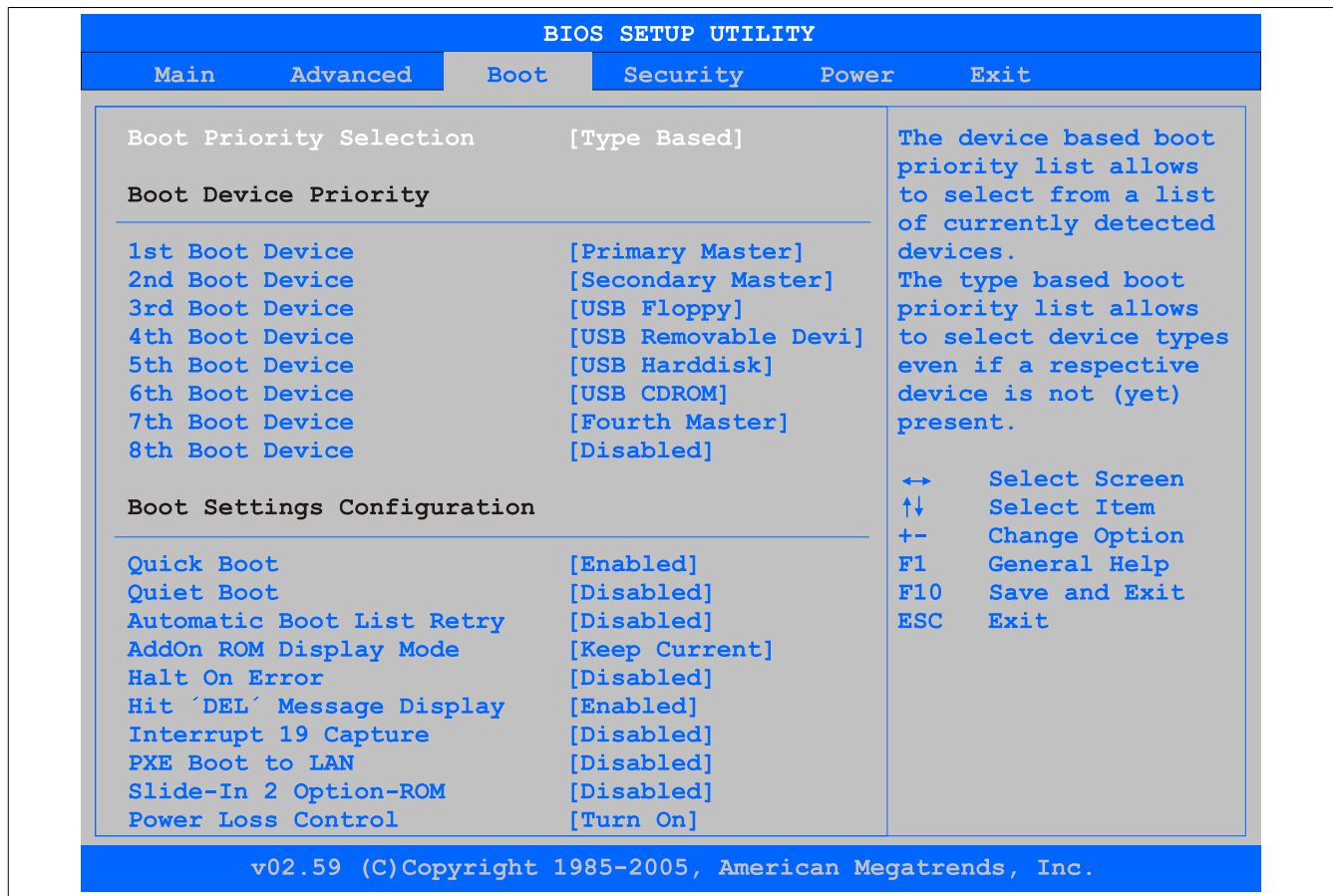


Image 97: GM45 Boot menu

| BIOS setting              | Meaning                                                                                             | Setting options                                                                                                                                                                                                                                                                                                       | Effect                                                                                                                                                                                                                                            |
|---------------------------|-----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Boot Priority Selection   | The method for when the drives should be booted can be set here.                                    | Device Based                                                                                                                                                                                                                                                                                                          | Only the devices that are recognized by the system are listed. The sequence of this list can be changed.<br><br><b>Information:</b><br>Either "device based" or "type based" must be used. Mixed operation is not permitted.                      |
|                           |                                                                                                     | Type Based                                                                                                                                                                                                                                                                                                            | The boot sequence of a device type list can be changed. Device types that are not connected can also be entered to this list.<br><br><b>Information:</b><br>Either "device based" or "type based" must be used. Mixed operation is not permitted. |
| 1st Boot Device           | The boot drives can be set using this option.                                                       | Disabled, Primary Master, Primary Slave, Secondary Master, Secondary Slave, Legacy Floppy, USB Floppy, USB Harddisk, USB CDROM, USB Removable Device, Onboard LAN, External LAN, PCI Mass Storage, PCI SCSI Card, Any PCI BEV Device, Third Master, Third Slave, PCI RAID, Local BEV ROM, Fourth Master, Fourth Slave | Select the desired sequence.                                                                                                                                                                                                                      |
| 2nd boot device           |                                                                                                     |                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                   |
| 3rd boot device           |                                                                                                     |                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                   |
| 4th boot device           |                                                                                                     |                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                   |
| 5th boot device           |                                                                                                     |                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                   |
| 6th boot device           |                                                                                                     |                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                   |
| 7th boot device           |                                                                                                     |                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                   |
| 8th boot device           |                                                                                                     |                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                   |
| Quick Boot                | This function reduces the boot time by skipping some POST procedures.                               | Enabled                                                                                                                                                                                                                                                                                                               | Enables this function.                                                                                                                                                                                                                            |
|                           |                                                                                                     | Disabled                                                                                                                                                                                                                                                                                                              | Disables this function.                                                                                                                                                                                                                           |
| Quiet Boot                | Determines if POST message or OEM logo (default = black background) is displayed.                   | Enabled                                                                                                                                                                                                                                                                                                               | OEM logo display instead of POST message.                                                                                                                                                                                                         |
|                           |                                                                                                     | Disabled                                                                                                                                                                                                                                                                                                              | POST message display.                                                                                                                                                                                                                             |
| Automatic Boot List Retry | With this option, the operating system attempts to automatically restart following startup failure. | Enabled                                                                                                                                                                                                                                                                                                               | Enables this function.                                                                                                                                                                                                                            |
|                           |                                                                                                     | Disabled                                                                                                                                                                                                                                                                                                              | Disables this function.                                                                                                                                                                                                                           |

Table 135: GM45 Boot menu - Setting options

| BIOS setting              | Meaning                                                                                                                                                     | Setting options                     | Effect                                                                                                                         |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Add-On ROM Display Mode   | Sets the display mode for the ROM (during the booting procedure).                                                                                           | Force BIOS<br>Keep Current          | An additional BIOS part can be displayed.<br>BIOS information is displayed.                                                    |
| Halt On Error             | This option sets whether the system should pause the Power On Self Test (POST) when it encounters an error.                                                 | Enabled<br>Disabled                 | The system pauses. The system pauses every time an error is encountered.<br>The system does not pause. All errors are ignored. |
| Hit 'DEL' Message Display | Settings can be made here for the "Hit 'DEL' Message" display.<br><br><b>Information:</b><br><br>When quiet boot is activated the message is not displayed. | Enabled<br>Disabled                 | The message is displayed.<br>The message is not displayed.                                                                     |
| Interrupt 19 Capture      | This function can be used to incorporate the BIOS interrupt.                                                                                                | Enabled<br>Disabled                 | Enables this function.<br>Disables this function.                                                                              |
| PXE Boot to LAN           | Enables/disables the function to boot from LAN (ETH1).                                                                                                      | Enabled<br>Disabled                 | Enables this function.<br>Disables this function.                                                                              |
| Slide-in 2 Optional ROM   | Activation/deactivation of an optional ROM for a slide-in 2 drive.                                                                                          | Enabled<br>Disabled                 | Enables this function.<br>Disables this function.                                                                              |
| Power Loss Control        | Determines if the system is on/off following power loss.                                                                                                    | Remain Off<br>Turn On<br>Last State | Remains off.<br>Powers on.<br>Enables the previous state.                                                                      |

Table 135: GM45 Boot menu - Setting options

## 1.6 Security

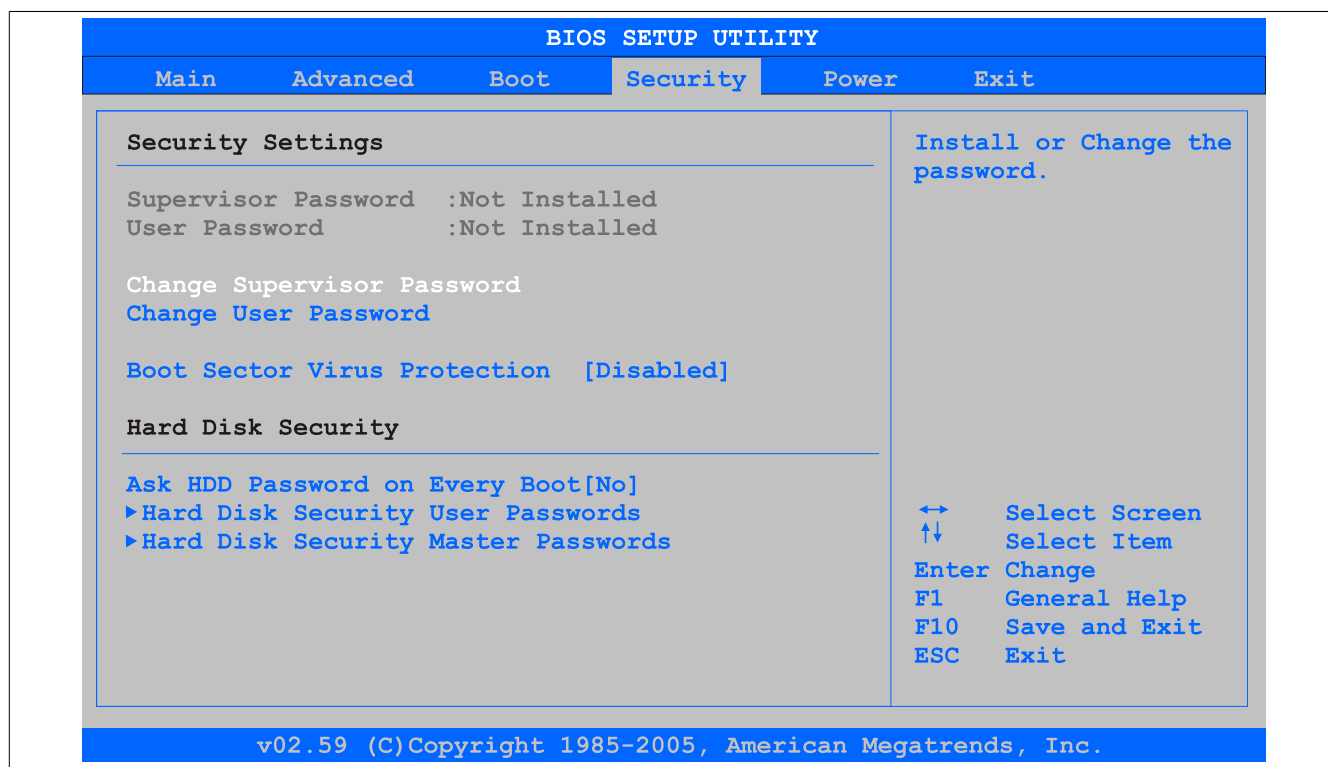


Image 98: GM45 Security menu

| BIOS setting               | Meaning                                                                                              | Setting options | Effect          |
|----------------------------|------------------------------------------------------------------------------------------------------|-----------------|-----------------|
| Supervisor Password        | Displays whether or not a supervisor password has been set.                                          | None            | -               |
| User Password              | Displays whether or not a user password has been set.                                                | None            | -               |
| Change Supervisor Password | To enter/change a supervisor password. A supervisor password is necessary to edit all BIOS settings. | Enter           | Enter password. |
| Change User Password       | To enter/change a user password. A user password allows the user to edit only certain BIOS settings. | Enter           | Enter password. |

Table 136: GM45 Security menu - Setting options

| BIOS setting                        | Meaning                                                                                                                                                                                                                          | Setting options | Effect                                                                  |
|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------------------------------------------------------------|
| Boot Sector Virus Protection        | With this option, a warning is issued when the boot sector is accessed through a program or virus.<br><br><b>Information:</b><br><br><b>With this option, only the boot sector is protected, not the entire hard drive.</b>      | Enabled         | Enables this function.                                                  |
|                                     |                                                                                                                                                                                                                                  | Disabled        | Disables this function.                                                 |
| Ask HDD Password on Every Boot      | This option can be used to select whether the hard disk password must be entered each time the system boots.<br><br><b>Information:</b><br><br><b>This option only makes sense if a hard disk user security password is set.</b> | Yes             | The hard disk password must be entered when booting.                    |
|                                     |                                                                                                                                                                                                                                  | No              | The hard disk password doesn't have to be entered when booting.         |
| Hard Disk Security User Passwords   | The hard disk security user password can be created here.                                                                                                                                                                        | Enter           | Opens the submenu see " Hard Disk Security User Password" on page 167   |
| Hard Disk Security Master Passwords | The hard disk security master password can be created here.                                                                                                                                                                      | Enter           | Opens the submenu see " Hard Disk Security Master Password" on page 168 |

Table 136: GM45 Security menu - Setting options

### 1.6.1 Hard Disk Security User Password



Image 99: GM45 Hard Disk Security User Password

| BIOS setting                    | Meaning                                                                                                                                                                                                  | Setting options | Effect          |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------|
| Primary slave HDD user password | This function makes it possible to use the user password to change or configure each hard drive without having to reboot the device. A user password allows the user to edit only certain BIOS settings. | Enter           | Enter password. |

Table 137: GM45 Hard Disk Security User Password

1.6.2 Hard Disk Security Master Password

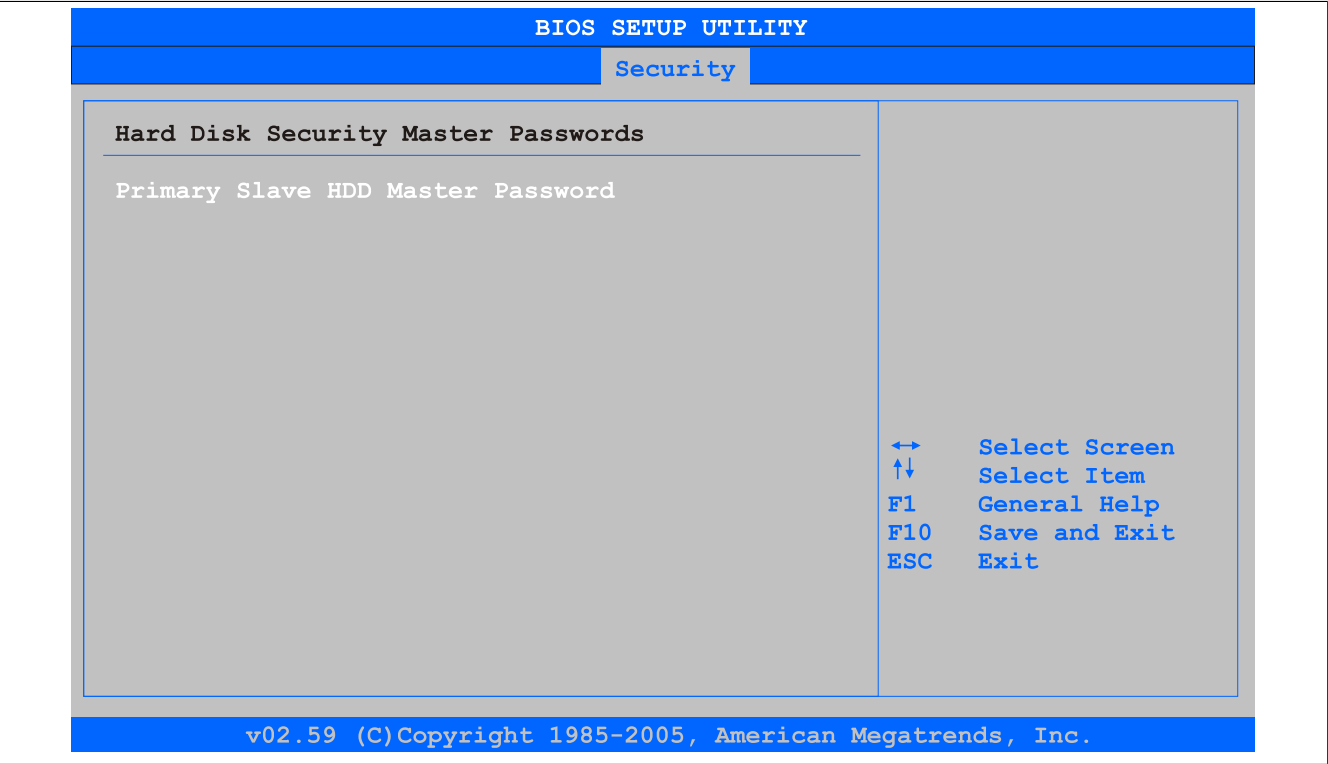


Image 100: GM45 Hard Disk Security Master Password

| BIOS setting                      | Meaning                                                                                                                              | Setting options | Effect          |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------|
| Primary Slave HDD Master Password | This function makes it possible to use the user password to change or configure each hard drive without having to reboot the device. | Enter           | Enter password. |

Table 138: GM45 Hard Disk Security Master Password

1.7 Power

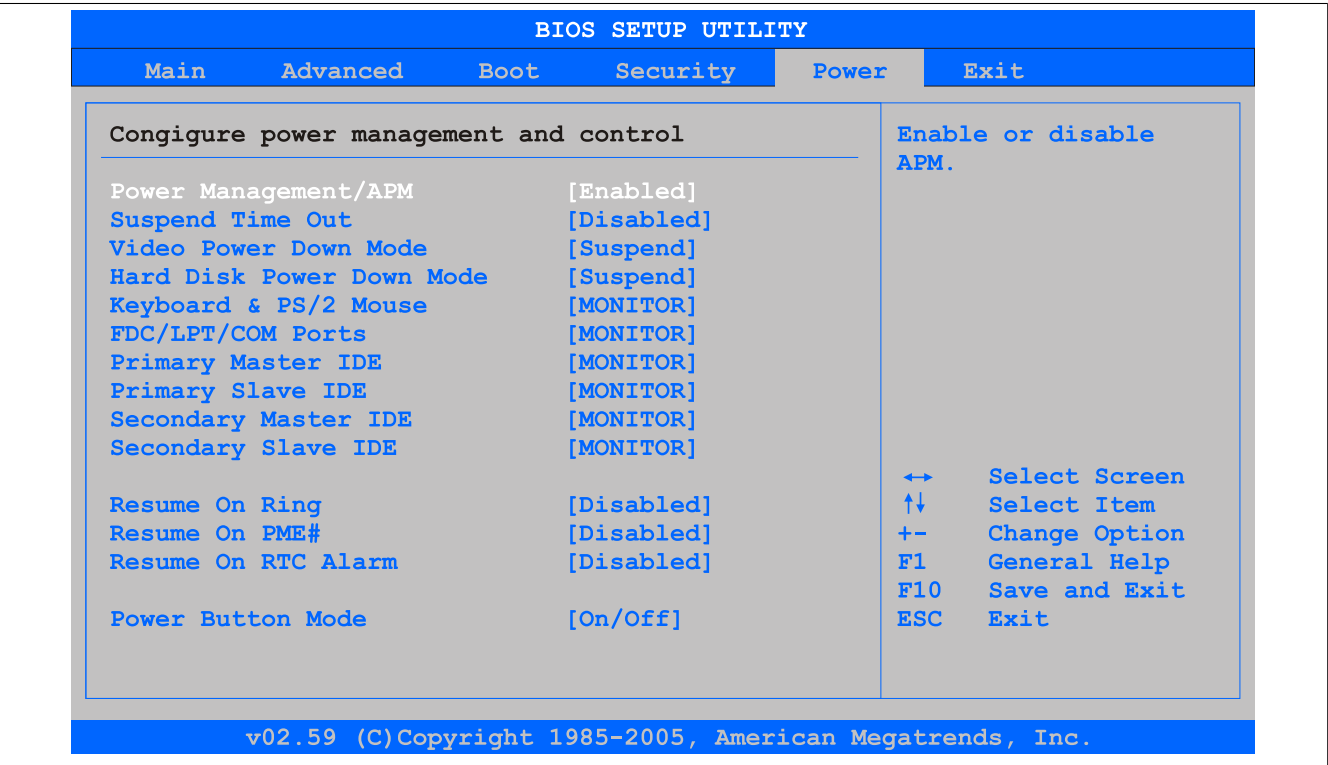


Image 101: GM45 Power menu

| BIOS setting              | Meaning                                                                                                                                                      | Setting options                                                            | Effect                                                                                                                                    |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Power Management / APM    | This option switches the APM function on or off. This is an advanced plug & play and power management functionality.                                         | Enabled                                                                    | Enables this function.                                                                                                                    |
|                           |                                                                                                                                                              | Disabled                                                                   | Disables this function.                                                                                                                   |
| Suspend Time Out          | Using this option, you can configure how long the system stays inactive (all components but the CPU are shut off, if possible) before entering suspend mode. | 1 min, 2 min, 4 min, 8 min, 10 min, 20 min 30 min, 40 min, 50 min, 60 min; | Value set manually.                                                                                                                       |
|                           |                                                                                                                                                              | Disabled                                                                   | Disables this function.                                                                                                                   |
| Video Power Down Mode     | This option allows you to set the energy saving mode for the monitor.                                                                                        | Disabled                                                                   | Do not switch off the monitor.                                                                                                            |
|                           |                                                                                                                                                              | Standby                                                                    | Monitor goes to standby mode.                                                                                                             |
|                           |                                                                                                                                                              | Suspend                                                                    | Monitor goes to suspend mode.                                                                                                             |
| Hard Disk Power Down Mode | This option allows you to set the energy saving mode for the hard drive.                                                                                     | Disabled                                                                   | Do not switch off the monitor.                                                                                                            |
|                           |                                                                                                                                                              | Standby                                                                    | Monitor goes to standby mode.                                                                                                             |
|                           |                                                                                                                                                              | Suspend                                                                    | Monitor goes to suspend mode.                                                                                                             |
| Keyboard & PS/2 Mouse     | The monitoring of activities during power saving mode is determined here.                                                                                    | MONITOR                                                                    | Keyboard or PS/2 mouse activities return the system to its normal state from a particular energy saving mode.                             |
|                           |                                                                                                                                                              | IGNORE                                                                     | Activities are ignored.                                                                                                                   |
| FDC/LPT/COM ports         | The monitoring of activities during power saving mode is determined here.                                                                                    | MONITOR                                                                    | Activity on the parallel port, the serial 1&2 port, or the floppy port returns the system to its normal state from an energy saving mode. |
|                           |                                                                                                                                                              | IGNORE                                                                     | Activities are ignored.                                                                                                                   |
| Primary Master IDE        | The monitoring of activities during power saving mode is determined here.                                                                                    | MONITOR                                                                    | Activities in the IRQ of specific connections or devices return the system to its normal state from power saving mode.                    |
|                           |                                                                                                                                                              | IGNORE                                                                     | Activities are ignored.                                                                                                                   |
| Primary Slave IDE         | The monitoring of activities during power saving mode is determined here.                                                                                    | MONITOR                                                                    | Activities in the IRQ of specific connections or devices return the system to its normal state from power saving mode.                    |
|                           |                                                                                                                                                              | IGNORE                                                                     | Activities are ignored.                                                                                                                   |
| Secondary Master IDE      | The monitoring of activities during power saving mode is determined here.                                                                                    | MONITOR                                                                    | Activities in the IRQ of specific connections or devices return the system to its normal state from power saving mode.                    |
|                           |                                                                                                                                                              | IGNORE                                                                     | Activities are ignored.                                                                                                                   |
| Secondary Slave IDE       | The monitoring of activities during power saving mode is determined here.                                                                                    | MONITOR                                                                    | Activities in the IRQ of specific connections or devices return the system to its normal state from power saving mode.                    |
|                           |                                                                                                                                                              | IGNORE                                                                     | Activities are ignored.                                                                                                                   |
| Resume On Ring            | When the modem receives an incoming call, the PC is brought out of power saving mode.                                                                        | Enabled                                                                    | Enables this function.                                                                                                                    |
|                           |                                                                                                                                                              | Disabled                                                                   | Disables this function.                                                                                                                   |
| Resume on PME#            | With this option, you can switch the PME wakeup function on or off.                                                                                          | Enabled                                                                    | Enables this function.                                                                                                                    |
|                           |                                                                                                                                                              | Disabled                                                                   | Disables this function.                                                                                                                   |
| Resume On RTC Alarm       | With this option, you can activate the alarm and enter the date and time for the system start.                                                               | Enabled                                                                    | Enables this function.                                                                                                                    |
|                           |                                                                                                                                                              | Disabled                                                                   | Disables this function.                                                                                                                   |
| Power Button Mode         | This function determines the function of the power button.                                                                                                   | On/Off                                                                     | Power button switches on/off.                                                                                                             |
|                           |                                                                                                                                                              | Suspend                                                                    | Suppresses the function.                                                                                                                  |

Table 139: GM45 Power menu - Setting options

1.8 Exit

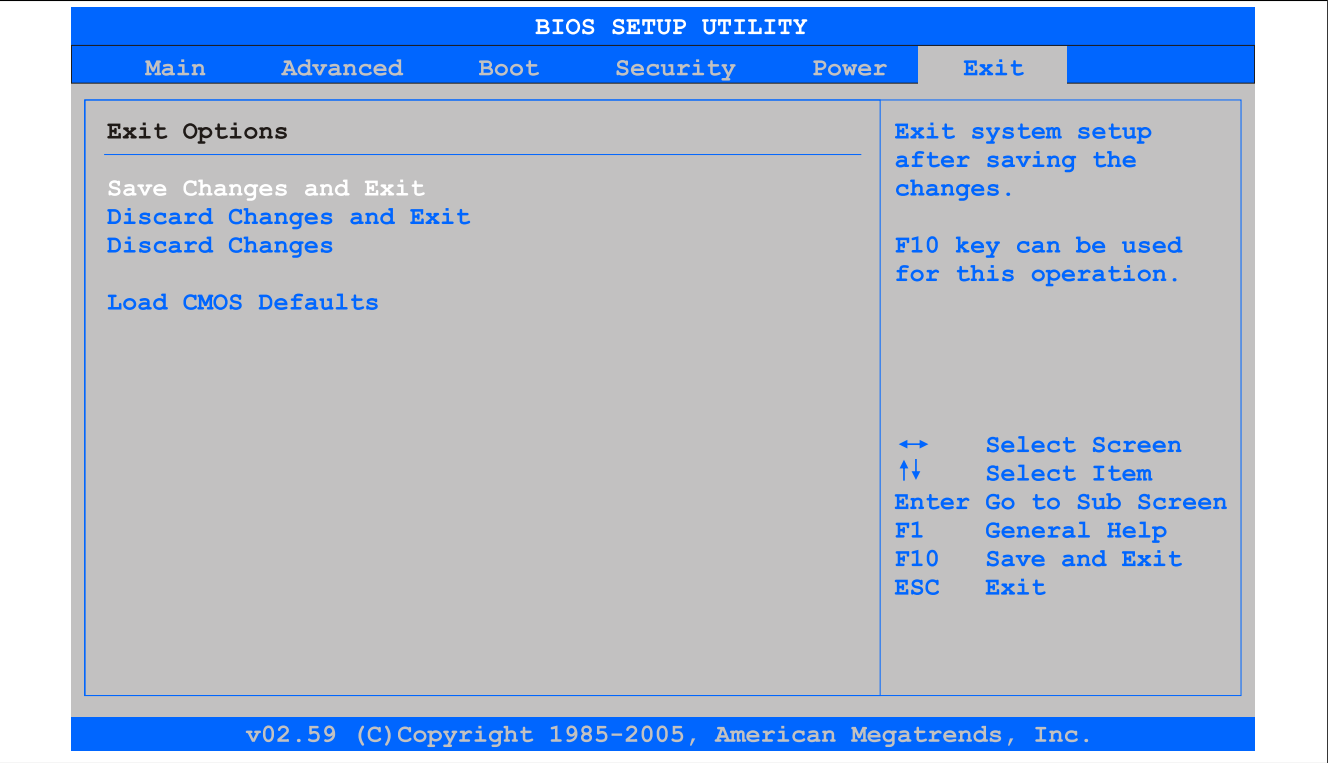


Image 102: GM45 Exit menu

| BIOS setting             | Meaning                                                                                                                                       | Setting options | Effect |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------|--------|
| Save Changes and Exit    | BIOS setup is closed with this item. Changes made are saved in CMOS after confirmation, and the system is rebooted.                           | OK / Cancel     |        |
| Discard Changes and Exit | With this item you can close BIOS setup without saving the changes made. The system is then re-booted.                                        | OK / Cancel     |        |
| Discard Changes          | In the event that settings were made that the user can no longer remember, they can be reset (as long as they haven't been saved).            | OK / Cancel     |        |
| Load CMOS Defaults       | This item loads the CMOS default values, which are defined by the DIP switch settings. These settings are loaded for all BIOS configurations. | OK / Cancel     |        |

Table 140: GM45 Exit menu - Setting options

## 1.9 BIOS default settings

The various positions of the CMOS profile hex switch can be used to load pre-defined BIOS profile settings.

### Information:

**The switch position that is set upon delivery represents the optimum BIOS default values for this system and should therefore not be changed.**

If the function "load setup defaults" is chosen in the main BIOS setup menu, or if exit is selected (or <F9> is pressed) in the individual setup screens, the following BIOS settings are the optimized values that will be used.



Image 103: CMOS profile hex switch

| Profile number | Optimized for                                                | Switch position | Note                                                                                                                                   |
|----------------|--------------------------------------------------------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Profile 0      | Reserved                                                     | 0               |                                                                                                                                        |
| Profile 1      | System unit 5PC810.SX01-00 / 5PC810.SX02-00 / 5PC810.SX03-00 | 1               | The default settings for this profile can be found in the APC810 user's manual. This can be downloaded for free from the B&R homepage. |
| Profile 2      | System unit 5PC810.SX05-00                                   | 2               |                                                                                                                                        |
| Profile 3      | System unit 5PC820.SX01-00/ 5PC820.SX01-01                   | 3               | The default settings for this profile can be found in the APC820 User's Manual. This can be downloaded for free from the B&R homepage. |
| Profile 4      | Reserved                                                     | 4               |                                                                                                                                        |
| Profile 5      | System unit 5PC820.1505-00 / 5PC820.1906-00                  | 5               | The default settings for this profile can be found in the APC800 user's manual. This can be downloaded for free from the B&R homepage. |

Table 141: Profile overview

### 1.9.1 Main

| Setting / View     | Profile 0 | Profile 5 | My setting |
|--------------------|-----------|-----------|------------|
| System Time        | -         | -         |            |
| System Date        | -         | -         |            |
| BIOS ID            | -         | -         |            |
| Processor          | -         | -         |            |
| CPU Frequency      | -         | -         |            |
| System Memory      | -         | -         |            |
| Product Revision   | -         | -         |            |
| Serial Number      | -         | -         |            |
| BC Firmware Rev.   | -         | -         |            |
| MAC Address (ETH1) | -         | -         |            |
| Boot Counter       | -         | -         |            |
| Running Time       | -         | -         |            |

Table 142: GM45 Main profile setting overview

### 1.9.2 Advanced

#### ACPI configuration

| Setting / View               | Profile 0 | Profile 5 | My setting |
|------------------------------|-----------|-----------|------------|
| ACPI Aware O/S               | Yes       | Yes       |            |
| ACPI Version Features        | ACPI v2.0 | ACPI v2.0 |            |
| ACPI APIC support            | Enabled   | Enabled   |            |
| Suspend mode                 | S1 (POS)  | S1 (POS)  |            |
| USB Device Wakeup from S3/S4 | Disabled  | Disabled  |            |
| Active Cooling Trip Point    | Disabled  | Disabled  |            |
| Passive Cooling Trip Point   | Disabled  | Disabled  |            |
| Critical Trip Point          | 105°C     | 105°C     |            |

Table 143: GM45 Advanced - ACPI Configuration profile setting overview

## PCI Configuration

| Setting / View                    | Profile 0 | Profile 5 | My setting |
|-----------------------------------|-----------|-----------|------------|
| Plug & Play O/S                   | No        | Yes       |            |
| PCI Latency Timer                 | 64        | 64        |            |
| Allocate IRQ to PCI VGA           | Yes       | Yes       |            |
| Allocate IRQ to SMBUS HC          | Yes       | Yes       |            |
| <b>PCI IRQ Resource Exclusion</b> |           |           |            |
| IRQ3                              | Allocated | Available |            |
| IRQ4                              | Allocated | Allocated |            |
| IRQ5                              | Available | Available |            |
| IRQ6                              | Available | Available |            |
| IRQ7                              | Available | Available |            |
| IRQ9                              | Allocated | Allocated |            |
| IRQ10                             | Available | Allocated |            |
| IRQ11                             | Allocated | Allocated |            |
| IRQ12                             | Available | Available |            |
| IRQ14                             | Allocated | Allocated |            |
| IRQ15                             | Allocated | Allocated |            |
| <b>PCI Interrupt Routing</b>      |           |           |            |
| PIRQ A<br>(VGA,UHCI2,PCIE4, ETH2) | Auto      | Auto      |            |
| PIRQ B<br>(PCIE1,HDA,ETH1)        | Auto      | Auto      |            |
| PIRQ C<br>(PCIE2, IF-slot)        | Auto      | Auto      |            |
| PIRQ D<br>(UHCI1,PCIE3, SATA)     | Auto      | Auto      |            |
| PIRQ E<br>(INTD,UHCI3,PATA)       | Auto      | Auto      |            |
| PIRQ F (INTA)                     | Auto      | Auto      |            |
| PIRQ G (INTB)                     | Auto      | Auto      |            |
| PIRQ H<br>(INTC,UHCI0, EHCI0)     | Auto      | Auto      |            |
| 1st Exclusive PCI                 | -         | -         |            |
| 2nd Exclusive PCI                 | -         | -         |            |
| 3rd Exclusive PCI                 | -         | -         |            |

Table 144: GM45 Advanced - PCI Configuration profile setting overview

## PCI express configuration

| Setting / View                  | Profile 0 | Profile 5 | My setting |
|---------------------------------|-----------|-----------|------------|
| Active State Power-Management   | Disabled  | Disabled  |            |
| PCIE Port 0 (ETH2)              | Auto      | Auto      |            |
| PCIE Port 1                     | Auto      | Auto      |            |
| PCIE Port 2 (IF slot)           | Auto      | Auto      |            |
| PCIE Port 3                     | Auto      | Auto      |            |
| PCIE Port 4                     | Auto      | Auto      |            |
| PCIE High Priority Port         | Disabled  | Disabled  |            |
| Res. PCIE Hot Plugging Resource | No        | No        |            |
| PCIE Port 0 IOxAPIC Enable      | Disabled  | Disabled  |            |
| PCIE Port 1 IOxAPIC Enable      | Disabled  | Disabled  |            |
| PCIE Port 2 IOxAPIC Enable      | Disabled  | Disabled  |            |
| PCIE Port 3 IOxAPIC Enable      | Disabled  | Disabled  |            |

Table 145: GM45 Advanced - PCI Express Configuration profile setting overview

## Graphics configuration

| Setting / View                | Profile 0         | Profile 5              | My setting |
|-------------------------------|-------------------|------------------------|------------|
| Primary Video Device          | Internal VGA      | Internal VGA           |            |
| Internal Graphics Mode Select | Enabled, 32MB     | Enabled, 32MB          |            |
| DVMT Memory                   | 256 MB            | 256 MB                 |            |
| Boot Display Device           | Auto              | Auto                   |            |
| Boot Display Preference       | SDVO-B SDVO-C LFP | LFP SDVO-B SDVO-C      |            |
| Always Try Auto Panel Detect  | No                | No                     |            |
| Local Flat Panel Type         | Auto              | Auto                   |            |
| SDVO local flat panel type    | Disabled          | Disabled               |            |
| Local flat panel scaling      | Centering         | Expand Text & Graphics |            |

Table 146: GM45 Advanced - Graphics Configuration profile setting overview



| Setting / View                | Profile 0 | Profile 5       | My setting |
|-------------------------------|-----------|-----------------|------------|
| SDVO Port B Configuration     | SDVO DVI  | SDVO DVI        |            |
| SDVO Port C Configuration     | SDVO DVI  | <b>Disabled</b> |            |
| SDVO/DVI Hot Plugging Support | Enabled   | Enabled         |            |
| Display Mode Persistence      | Enabled   | Enabled         |            |

Table 146: GM45 Advanced - Graphics Configuration profile setting overview

## CPU configuration

| Setting / View                 | Profile 0 | Profile 5 | My setting |
|--------------------------------|-----------|-----------|------------|
| MPS revision                   | 1.4       | 1.4       |            |
| Max CPUID value limit          | Disabled  | Disabled  |            |
| Intel(R) Virtualization Tech   | Enabled   | Enabled   |            |
| Execute-Disable Bit Capability | Enabled   | Enabled   |            |
| Intel(R) SpeedStep(tm) tech.   | Enabled   | Enabled   |            |
| Intel(R) C-State Tech.         | Disabled  | Disabled  |            |
| Enhanced C-States              | Disabled  | Disabled  |            |

Table 147: GM45 Advanced - CPU Configuration profile setting overview

## Chipset configuration

| Setting / View             | Profile 0 | Profile 5 | My setting |
|----------------------------|-----------|-----------|------------|
| DRAM Refresh Rate          | Auto      | Auto      |            |
| Memory Hole                | Disabled  | Disabled  |            |
| DIMM Thermal Control       | Disabled  | Disabled  |            |
| TMRC Mode                  | Disabled  | Disabled  |            |
| TS on DIMM                 | Disabled  | Disabled  |            |
| High Precision Event Timer | Disabled  | Disabled  |            |
| IOAPIC                     | Enabled   | Enabled   |            |
| APIC ACPI SCI IRQ          | Disabled  | Disabled  |            |
| POST Code Output           | PCI       | PCI       |            |

Table 148: GM45 Advanced - Chipset Configuration profile setting overview

## I/O interface configuration

| Setting / View                | Profile 0 | Profile 5      | My setting |
|-------------------------------|-----------|----------------|------------|
| HDA Controller                | Disabled  | <b>Enabled</b> |            |
| Onboard Gbe Controller (ETH1) | Enabled   | Enabled        |            |

Table 149: GM45 Advanced - I/O Interface Configuration profile setting overview

## Clock Configuration

| Setting / View  | Profile 0 | Profile 5 | My setting |
|-----------------|-----------|-----------|------------|
| Spread spectrum | Disabled  | Disabled  |            |

Table 150: GM45 Advanced - Clock Configuration profile setting overview

## IDE configuration

| Setting / View                 | Profile 0  | Profile 5  | My setting |
|--------------------------------|------------|------------|------------|
| SATA Port 0/1                  | Compatible | Compatible |            |
| SATA Port 2/3 (opt. PATA Port) | Enabled    | Enabled    |            |
| PATA Detection Time Out (Sec)  | 3          | 3          |            |
| Hard disk write protect        | Disabled   | Disabled   |            |
| IDE Detect Time Out (Sec)      | 35         | 35         |            |
| <b>Primary IDE Master</b>      |            |            |            |
| Type                           | Auto       | Auto       |            |
| LBA/Large Mode                 | Auto       | Auto       |            |
| Block (Multi-Sector Transfer)  | Auto       | Auto       |            |
| PIO Mode                       | Auto       | Auto       |            |
| DMA Mode                       | Auto       | Auto       |            |
| S.M.A.R.T.                     | Auto       | Auto       |            |
| 32Bit data transfer            | Enabled    | Enabled    |            |
| <b>Secondary IDE Master</b>    |            |            |            |
| Type                           | Auto       | Auto       |            |
| LBA/Large Mode                 | Auto       | Auto       |            |
| Block (Multi-Sector Transfer)  | Auto       | Auto       |            |

Table 151: GM45 Advanced - IDE Configuration profile setting overview

| Setting / View                | Profile 0 | Profile 5 | My setting |
|-------------------------------|-----------|-----------|------------|
| PIO Mode                      | Auto      | Auto      |            |
| DMA Mode                      | Auto      | Auto      |            |
| S.M.A.R.T.                    | Auto      | Auto      |            |
| 32Bit data transfer           | Enabled   | Enabled   |            |
| <b>Third IDE Master</b>       |           |           |            |
| Type                          | Auto      | Auto      |            |
| LBA/Large Mode                | Auto      | Auto      |            |
| Block (Multi-Sector Transfer) | Auto      | Auto      |            |
| PIO Mode                      | Auto      | Auto      |            |
| DMA Mode                      | Auto      | Auto      |            |
| S.M.A.R.T.                    | Auto      | Auto      |            |
| 32Bit data transfer           | Enabled   | Enabled   |            |
| <b>Fourth IDE Master</b>      |           |           |            |
| Type                          | Auto      | Auto      |            |
| LBA/Large Mode                | Auto      | Auto      |            |
| Block (Multi-Sector Transfer) | Auto      | Auto      |            |
| PIO Mode                      | Auto      | Auto      |            |
| DMA Mode                      | Auto      | Auto      |            |
| S.M.A.R.T.                    | Auto      | Auto      |            |
| 32Bit data transfer           | Enabled   | Enabled   |            |

Table 151: GM45 Advanced - IDE Configuration profile setting overview

## USB configuration

| Setting / View               | Profile 0   | Profile 5   | My setting |
|------------------------------|-------------|-------------|------------|
| USB Function                 | 8 USB Ports | 8 USB Ports |            |
| USB 2.0 Controller           | Enabled     | Enabled     |            |
| Legacy USB Support           | Enabled     | Enabled     |            |
| USB Legacy POST-Always       | -           | -           |            |
| USB Keyboard Legacy Support  | Enabled     | Enabled     |            |
| USB Mouse Legacy Support     | Disabled    | Disabled    |            |
| USB Storage Device Support   | Enabled     | Enabled     |            |
| Port 64/60 Emulation         | Disabled    | Disabled    |            |
| USB 2.0 Controller Mode      | HiSpeed     | HiSpeed     |            |
| BIOS EHCI Hand-Off           | Disabled    | Disabled    |            |
| USB Beep Message             | Enabled     | Enabled     |            |
| USB Stick Default Emulation  | hard disk   | hard disk   |            |
| USB Mass Storage Reset Delay | 20 Sec      | 20 Sec      |            |

Table 152: GM45 Advanced - USB Configuration profile setting overview

## Keyboard/mouse configuration

| Setting / View   | Profile 0 | Profile 5 | My setting |
|------------------|-----------|-----------|------------|
| Boot-up Num-lock | On        | On        |            |
| Typematic rate   | Fast      | Fast      |            |

Table 153: GM45 Advanced - Keyboard/Mouse Configuration profile setting overview

## Main Board/Panel Features

| Setting / View           | Profile 0 | Profile 5 | My setting |
|--------------------------|-----------|-----------|------------|
| <b>Panel control</b>     |           |           |            |
| Select panel number      | -         | -         |            |
| Version                  | -         | -         |            |
| Brightness               | 100%      | 100%      |            |
| Temperature              | -         | -         |            |
| Fan Speed                | -         | -         |            |
| Keys/LEDs                | -         | -         |            |
| <b>Baseboard Monitor</b> |           |           |            |
| CMOS battery             | -         | -         |            |
| Board I/O                | -         | -         |            |
| Board ETH2               | -         | -         |            |
| Board Power              | -         | -         |            |
| Power supply             | -         | -         |            |
| Slide-in drive 1         | -         | -         |            |
| IF slot                  | -         | -         |            |
| Case 1                   | -         | -         |            |
| Case 2                   | -         | -         |            |
| Case 3                   | -         | -         |            |

Table 154: GM45 Advanced - Baseboard/Panel Features profile setting overview

| Setting / View        | Profile 0 | Profile 5 | My setting |
|-----------------------|-----------|-----------|------------|
| Case 4                | -         | -         |            |
| <b>Legacy Devices</b> |           |           |            |
| COM A                 | Enabled   | Enabled   |            |
| Base I/O address      | 3F8       | 3F8       |            |
| Interrupt             | IRQ4      | IRQ4      |            |
| COM C                 | Enabled   | Enabled   |            |
| Base I/O address      | 3E8       | 3E8       |            |
| Interrupt             | IRQ11     | IRQ11     |            |
| COM D                 | Disabled  | Disabled  |            |
| Base I/O address      | -         | -         |            |
| Interrupt             | -         | -         |            |
| COM E                 | Disabled  | Disabled  |            |
| Base I/O address      | -         | -         |            |
| Interrupt             | -         | -         |            |
| ETH2 LAN Controller   | Enabled   | Enabled   |            |
| ETH2 MAC Address      | -         | -         |            |

Table 154: GM45 Advanced - Baseboard/Panel Features profile setting overview

### 1.9.3 Boot

| Setting / View            | Profile 0            | Profile 5            | My setting |
|---------------------------|----------------------|----------------------|------------|
| Boot Priority Selection   | Type Based           | Type Based           |            |
| 1st Boot Device           | Onboard LAN          | Primary Master       |            |
| 2nd Boot Device           | Primary Master       | Secondary Master     |            |
| 3rd Boot Device           | Primary Slave        | USB Floppy           |            |
| 4th Boot Device           | USB Floppy           | USB Removable Device |            |
| 5th Boot Device           | USB Removable Device | USB Hard Disk        |            |
| 6th Boot Device           | USB CDROM            | USB CDROM            |            |
| 7th Boot Device           | Fourth Master        | Fourth Master        |            |
| 8th Boot Device           | Disabled             | Disabled             |            |
| Quick Boot                | Enabled              | Enabled              |            |
| Quiet Boot                | Disabled             | Disabled             |            |
| Automatic Boot List Retry | Disabled             | Disabled             |            |
| Add-on ROM Display Mode   | Keep Current         | Keep Current         |            |
| Halt On Error             | Disabled             | Disabled             |            |
| Hit "DEL" Message Display | Enabled              | Enabled              |            |
| Interrupt 19 Capture      | Disabled             | Disabled             |            |
| PXE Boot to LAN           | Enabled              | Disabled             |            |
| Slide-in 2 optional ROM   | Enabled              | Disabled             |            |
| Power Loss Control        | Turn On              | Turn On              |            |

Table 155: GM45 Main profile setting overview

### 1.9.4 Security

| Setting / View                     | Profile 0 | Profile 5 | My setting |
|------------------------------------|-----------|-----------|------------|
| Supervisor Password                | -         | -         |            |
| User Password                      | -         | -         |            |
| Boot Sector Virus Protection       | Disabled  | Disabled  |            |
| Ask HDD Password on Every Boot     | No        | No        |            |
| Hard disk security user password   | -         | -         |            |
| Hard disk security master password | -         | -         |            |

Table 156: GM45 Security profile setting overview

### 1.9.5 Power

| Setting / View            | Profile 0 | Profile 5 | My setting |
|---------------------------|-----------|-----------|------------|
| Power Management/APM      | Enabled   | Enabled   |            |
| Suspend Time Out          | Disabled  | Disabled  |            |
| Video Power Down Mode     | Suspend   | Suspend   |            |
| Hard Disk Power Down Mode | Suspend   | Suspend   |            |
| Keyboard & PS/2 Mouse     | MONITOR   | MONITOR   |            |
| FDC/LPT/COM ports         | MONITOR   | MONITOR   |            |
| Primary Master IDE        | MONITOR   | MONITOR   |            |
| Primary Slave IDE         | MONITOR   | MONITOR   |            |
| Secondary Master IDE      | MONITOR   | MONITOR   |            |
| Secondary Slave IDE       | MONITOR   | MONITOR   |            |

Table 157: GM45 Power profile setting overview

| Setting / View      | Profile 0 | Profile 5 | My setting |
|---------------------|-----------|-----------|------------|
| Resume On Ring      | Disabled  | Disabled  |            |
| Resume on PME#      | Disabled  | Disabled  |            |
| Resume On RTC Alarm | Disabled  | Disabled  |            |
| Power Button Mode   | On/Off    | On/Off    |            |

Table 157: GM45 Power profile setting overview

## 1.10 BIOS Error signals (Beep codes)

While the B&R industrial PC is booting, the following messages and errors can occur with BIOS. These errors are signaled by different beeping codes.

| Beeping code | Meaning                                                                                                                           | Necessary User Action                                                                                                                      |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| 1x short     | Memory refresh failed.                                                                                                            | Load BIOS defaults. In the event that the error persists, send industrial PC to B&R for testing.                                           |
| 2x short     | Parity error: POST error (error in one of the hardware testing procedures)                                                        | Check the placement of the inserted card. In the event that the error persists, send industrial PC to B&R for testing.                     |
| 3x short     | Base 64 KB memory failure: Basic memory defect, RAM error within the initial 64 KB.                                               | Send industrial PC to B&R for checking.                                                                                                    |
| 4x short     | Timer not operational: System timer.                                                                                              | Send industrial PC to B&R for checking.                                                                                                    |
| 5x short     | Processor error: Processor defect.                                                                                                | Send industrial PC to B&R for checking.                                                                                                    |
| 6x short     | 8042 gate A20 failure: Keyboard controller defect (block 8042/ A20 gate). Processor cannot switch to protected mode.              | Send industrial PC to B&R for checking.                                                                                                    |
| 7x short     | Processor exception interrupt error: Virtual mode exception error (CPU generated an interrupt error).                             | Send industrial PC to B&R for checking.                                                                                                    |
| 8x short     | Display memory read/write error: Video memory not accessible; graphic card defect or not built in (no fatal error).               | Check inserted graphic card position and eventually exchange. In the event that the error persists, send industrial PC to B&R for testing. |
| 9x short     | ROM-checksum error: ROM-BIOS-checksum incorrect, EPROM, EEPROM or Flash-ROM component defect, BIOS defect or incorrectly updated. | Send industrial PC to B&R for checking.                                                                                                    |
| 10x short    | CMOS shutdown register read/write error: CMOS cannot be read/written.                                                             | Send industrial PC to B&R for checking.                                                                                                    |
| 11x short    | Cache Error / external Cache bad: L2 - Cache on the mainboard is defected.                                                        | Send industrial PC to B&R for checking.                                                                                                    |

Table 158: BIOS post code messages BIOS BM45

## 1.11 Distribution of resources

### 1.11.1 RAM address assignment

| RAM address                            | Address in Hex     | Resource                                     |
|----------------------------------------|--------------------|----------------------------------------------|
| (TOM - 384 kB) – TOM <sup>1)</sup>     | N.A.               | ACPI reclaim, MPS and NVS area <sup>2)</sup> |
| (TOM - 8 MB - 192 kB) – (TOM - 192 kB) | N.A.               | VGA frame buffer <sup>3)</sup>               |
| 1024 kB – (TOM - 8 MB - 192 kB)        | 100000h - N.A.     | Extended memory                              |
| 869kB – 1024 kB                        | 0E0000h - 0FFFFFFh | Runtime BIOS                                 |
| 832kB – 869 kB                         | 0D0000h - 0DFFFFh  | Upper memory                                 |
| 640kB – 832 kB                         | 0A0000h - 0CFFFFh  | Video memory and BIOS                        |
| 639kB – 640 kB                         | 09FC00h - 09FFFFh  | Extended BIOS data                           |
| 0 - 639 kB                             | 000000h - 09FC00h  | Conventional memory                          |

Table 159: RAM address assignment

- 1) TOM - Top of memory: max. installed DRAM
- 2) Only if ACPI Aware OS is set to "YES" in the setup.
- 3) The VGA frame buffer can be reduced to 32 MB in the setup.

### 1.11.2 I/O address assignments

| I/O address   | Resource                            |
|---------------|-------------------------------------|
| 0000h - 00FFh | Motherboard resources               |
| 0170h - 0177h | Secondary IDE channel               |
| 01F0h - 01F7h | Primary IDE channel                 |
| 0238h - 023Fh | COM5                                |
| 0278h - 027Fh | Hardware Security Key (LPT2)        |
| 02E8h - 02EFh | COM4                                |
| 0376h - 0376h | Secondary IDE channel command port  |
| 0377h - 0377h | Secondary IDE channel status port   |
| 0378h - 037Fh | Hardware Security Key (LPT1)        |
| 0384h - 0385h | CAN controller                      |
| 03B0h - 03DFh | Video system                        |
| 03E8h - 03EFh | COM3                                |
| 03F6h - 03F6h | Primary IDE channel command port    |
| 03F7h - 03F7h | Primary IDE channel status port     |
| 03F8h - 03FFh | COM1                                |
| 04D0h - 04D1h | Motherboard resources               |
| 0500h - 053Fh | Motherboard resources               |
| 0800h - 087Fh | Motherboard resources               |
| 0A00h - 0A7Fh | Motherboard resources               |
| 0CF8h - 0CFBh | PCI config address register         |
| 0CFCh - 0CFFh | PCI config data register            |
| 0D00h - FFFFh | PCI / PCI Express bus <sup>1)</sup> |
| 4100h - 417Fh | MTCX                                |
| FF00h - FF07h | IDE bus master register             |

Table 160: I/O address assignment

- 1) The BIOS assigns the PCI and PCI Express Bus I/O resources from FFF0h downward. Devices that are not compatible with PnP/PCI/PCI Express cannot use the I/O resources in this area.

### 1.11.3 Interrupt assignments in PIC mode

| IRQ                                 | 0            | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | NMI | NONE |
|-------------------------------------|--------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|-----|------|
| System timer                        | •            |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |     |      |
| Keyboard                            |              | • |   |   |   |   |   |   |   |   |    |    |    |    |    |    |     |      |
| IRQ cascade                         |              |   | • |   |   |   |   |   |   |   |    |    |    |    |    |    |     |      |
| COM1 (Serial port A)                |              |   |   | ○ | • | ○ | ○ | ○ |   |   | ○  | ○  | ○  |    |    |    |     |      |
| ACPI <sup>1)</sup>                  |              |   |   |   |   |   |   |   | • |   |    |    |    |    |    |    |     |      |
| Real-time clock                     |              |   |   |   |   |   |   |   | • |   |    |    |    |    |    |    |     |      |
| Coprocessor (FPU)                   |              |   |   |   |   |   |   |   |   |   |    |    |    | •  |    |    |     |      |
| Primary IDE channel <sup>2)</sup>   |              |   |   |   |   |   |   |   |   |   |    |    |    |    | •  |    |     |      |
| Secondary IDE channel <sup>2)</sup> |              |   |   |   |   |   |   |   |   |   |    |    |    |    |    | •  |     |      |
| B&R                                 | COM3 (COM C) |   |   | ○ | ○ | ○ | ○ | ○ |   |   | ○  | ○  | ○  |    |    |    |     | •    |
|                                     | COM5 (COM E) |   |   | ○ | ○ | ○ | ○ | ○ |   |   | ○  | ○  | ○  |    |    |    |     | •    |

Table 161: IRQ interrupt assignments PIC Mode

- 1) Advanced Configuration and Power Interface.  
 2) If the SATA configuration in BIOS is set to Enhanced mode for all SATA ports, IRQs 14 and 15 are enabled for the system and the SATA ports use other IRQs.

- ... Default setting
- ... Optional setting

1.11.4 Interrupt assignments in APIC mode

A total of 23 IRQs are available in APIC (**A**dvanced **P**rogrammable Interrupt **C**ontroller) mode. Enabling this option is only effective if done before the operating system is installed.

| IRQ                                 | 0            | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | NMI | NONE |
|-------------------------------------|--------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|------|
| System timer                        | •            |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |      |
| Keyboard                            |              | • |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |      |
| IRQ cascade                         |              |   | • |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |      |
| COM1 (Serial port A)                |              |   |   | ○ | • | ○ | ○ | ○ |   |   | ○  | ○  | ○  |    |    |    |    |    |    |    |    |    |    |    |     |      |
| ACPI <sup>1)</sup>                  |              |   |   |   |   |   |   |   |   | • |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |      |
| Real-time clock                     |              |   |   |   |   |   |   |   | • |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |      |
| Coprocessor (FPU)                   |              |   |   |   |   |   |   |   |   |   |    |    |    | •  |    |    |    |    |    |    |    |    |    |    |     |      |
| Primary IDE channel <sup>2)</sup>   |              |   |   |   |   |   |   |   |   |   |    |    |    |    | •  |    |    |    |    |    |    |    |    |    |     |      |
| Secondary IDE channel <sup>2)</sup> |              |   |   |   |   |   |   |   |   |   |    |    |    |    |    | •  |    |    |    |    |    |    |    |    |     |      |
| B&R                                 | COM3 (COM C) |   |   | ○ | ○ | ○ | ○ | ○ |   |   | ○  | ○  | ○  |    |    |    |    |    |    |    |    |    |    |    |     | •    |
|                                     | COM5 (COM E) |   |   | ○ | ○ | ○ | ○ | ○ |   |   | ○  | ○  | ○  |    |    |    |    |    |    |    |    |    |    |    |     | •    |
| PIRQ A <sup>3)</sup>                |              |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    | •  |    |    |    |    |    |    |    |     |      |
| PIRQ B <sup>4)</sup>                |              |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    | •  |    |    |    |    |    |    |     |      |
| PIRQ C <sup>5)</sup>                |              |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    | •  |    |    |    |    |    |     |      |
| PIRQ D <sup>6)</sup>                |              |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    | •  |    |    |    |    |     |      |
| PIRQ E <sup>7)</sup>                |              |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    | •  |    |    |    |     |      |
| PIRQ F <sup>8)</sup>                |              |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    | •  |    |    |     |      |
| PIRQ G <sup>9)</sup>                |              |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    | •  |    |     |      |
| PIRQ H <sup>10)</sup>               |              |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    | •  |     |      |

Table 162: IRQ interrupt assignments in APIC mode

- 1) **A**dvanced **C**onfiguration and **P**ower **I**nterface.
- 2) If the SATA configuration in BIOS is set to Enhanced mode for all SATA ports, IRQs 14 and 15 are enabled for the system and the SATA ports use other IRQs.
- 3) PIRQ A: for PCIe; UHCI Host Controller 2, VGA controller, PCI Express root port 4
- 4) PIRQ B: for PCIe; HD audio, PCI express root port 1, onboard gigabit LAN controller
- 5) PIRQ C: for PCIe; PCI express root port 2
- 6) PIRQ D: for PCIe; UHCI host controller 1, serial ATA controller 0 + 1 in enhanced/native mode, PCI express root port 3
- 7) PIRQ E: PCI bus INTD, UHCI host controller 3, EHCI host controller 1, SM bus controller
- 8) PIRQ F: PCI bus INTA
- 9) PIRQ G: PCI bus INTB
- 10) PIRQ H: PCI bus INTC, UHCI host controller 0, EHCI host controller 0

- ... Default setting
- ... Optional setting

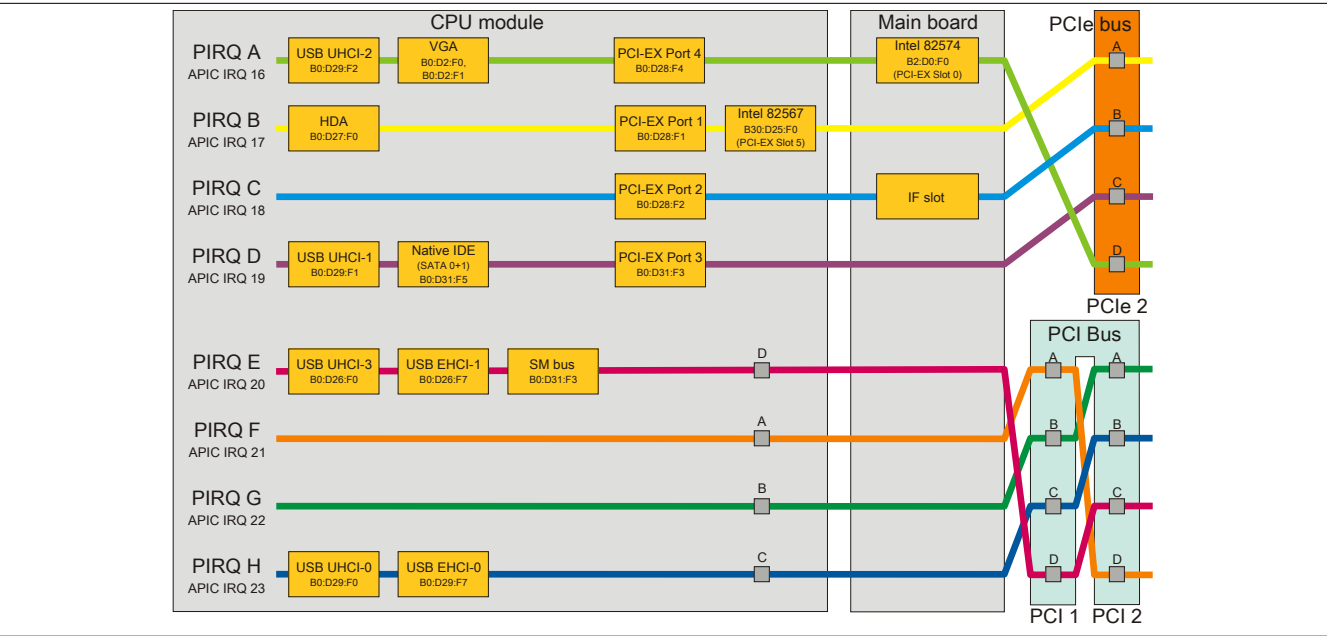


Image 104: PCI and PCIe routing with activated APIC CPU boards GM45



## 2 Upgrade information

### Warning!

The BIOS and firmware on B&R devices must be kept current. New versions can be downloaded from the B&R homepage ([www.br-automation.com](http://www.br-automation.com)).

### 2.1 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).

#### 2.1.1 What information do I need?

### Information:

Individually saved BIOS settings are deleted when upgrading the BIOS.

Before you begin the upgrade, it helps to determine the various software versions.

#### Which BIOS version and firmware are already installed on the PPC800?

This information can be found on the following BIOS setup page:

- After switching on the PPC800, you can get to the BIOS Setup by pressing "Del".
- From the BIOS main menu "Advanced", select "Main board/panel features".

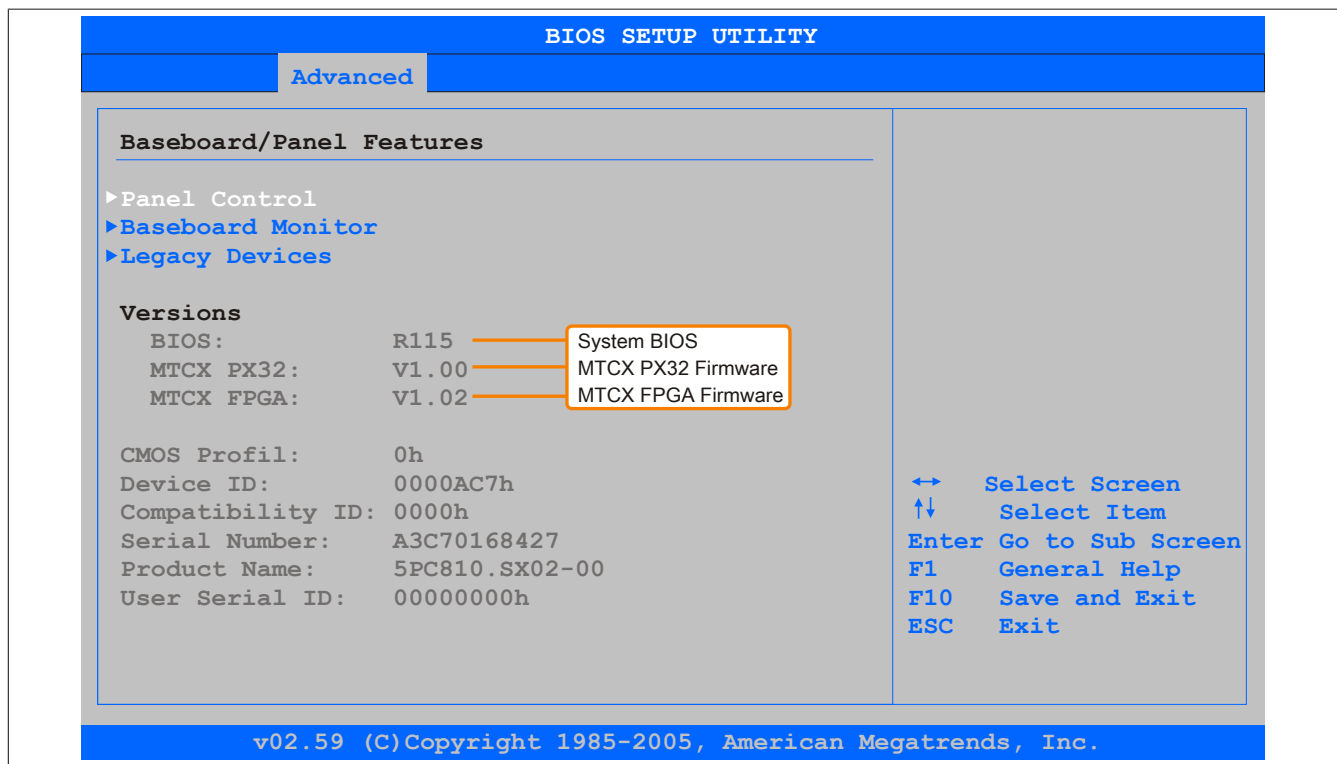


Image 105: Software version

#### 2.1.2 Procedure with MS-DOS

- Download the zip file from the B&R website ([www.br-automation.com](http://www.br-automation.com)).
- 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 on creating a bootable diskette in Windows XP can be found on page 185.

Information on creating a USB flash drive for a B&R upgrade can be found on page 187.

Information on creating a CompactFlash card for a B&R upgrade can be found on page 188.

3. 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.
4. Connect the bootable media to the B&R device and reboot.
5. The following boot menu will be shown after startup:

```
1. Upgrade AMI BIOS for BM45 (5PC800.BM45-00, -01)
2. Exit
```

*Concerning item 1:*

BIOS is automatically upgraded (default after 5 seconds).

*Concerning item 2:*

Return to the shell (MS-DOS).

## Information:

If you do not press a button within 5 seconds, then step 1 "Upgrade AMI BIOS for BM45" is automatically carried out and the APC810 is automatically updated.

6. The system must be rebooted after a successful upgrade.
7. Reboot and press "Del" to enter the BIOS setup menu and load the setup defaults, then select "Save Changes and Exit".

### 2.1.3 Using the Control Center

1. Download the .ZIP file from the B&R website ([www.br-automation.com](http://www.br-automation.com)).
2. Open the **Control Center** in the Control Panel.
3. Then select the **Versions** tab.
4. Click on **Update** under **CPU board(BIOS)**. This brings up the "Open" dialog box.
5. Enter the name of the BIOS file or select the file under **Filename**.
6. Click on **open**. This brings up the "Open" dialog box.

The transfer can be canceled by clicking on **Cancel**. Cancel is disabled when the flash memory is being written to.

Deleting the data in flash memory can take several seconds depending on the memory block being used. The progress indicator is not updated during this time.

## Information:

The system must be restarted for the BIOS to take effect and for the updated version to be displayed. The user is prompted to restart the system when closing the Control Center.

## Information:

For more information about saving and updating the BIOS, please refer to the help files for the Control Center.

## 2.2 Firmware upgrade

The "PPC800 Firmware Upgrade (MTCX, SDLR, SDLT)" software makes it possible to update the firmware for multiple controllers (MTCX, SDLT, SDLR, UPSI), depending on the structure of the PPC800 system.

Current "PPC800 Firmware Upgrade (MTCX, SDLR, SDLT)" software can be downloaded directly from the service portal on the B&R website ([www.br-automation.com](http://www.br-automation.com)).

### 2.2.1 Procedure

To carry out a firmware upgrade, the following steps should be taken:

1. Download the zip file from the B&R website ([www.br-automation.com](http://www.br-automation.com)).
2. 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 on creating a bootable diskette in Windows XP can be found on page 185.**

**Information on creating a USB flash drive for a B&R upgrade can be found on page 187.**

**Information on creating a CompactFlash card for a B&R upgrade can be found on page 188.**

3. 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.
4. Connect the bootable media to the B&R device and reboot.
5. The following boot menu will be shown after startup:

#### Information:

**The following boot menu options including descriptions are based on Version 1.02 of the PPC800 upgrade (MTCX, SDLR, SDLT, UPSI) disk. In some cases, these descriptions might not match the version you are currently using.**

1. Upgrade MTCX (PPC800) PX32 and FPGA
2. Upgrade SDLR (AP800/AP900) on monitor/panel
21. Upgrade SDLR on AP 0 (AP800/AP900)
22. Upgrade SDLR on AP 1 (AP800/AP900)
23. Upgrade SDLR on AP 2 (AP800/AP900)
24. Upgrade SDLR on AP 3 (AP800/AP900)
25. Upgrade all SDLR (AP800/AP900)
26. Return to main menu
3. Upgrade add-on UPS (firmware and battery settings)
31. Upgrade Add-On UPS Firmware (5AC600.UPSI-00)
32. Upgrade Battery Settings (5AC600.UPSB-00)
33. Return to main menu
4. Exit

#### Concerning item 1:

Automatically upgrade PX32 and FPGA for MTCX (default after 5 seconds).

#### Concerning item 2:

Submenu 1 is opened for upgrading the SDLR controller on the Monitor/Panel plug.

#### 2.1 Upgrade SDLR on AP 0 (AP800/AP900)

The SDLR controller is automatically updated on Automation Panel 0.

#### 2.2 Upgrade SDLR on AP 1 (AP800/AP900)

The SDLR controller is automatically updated on Automation Panel 1.

#### 2.3 Upgrade SDLR on AP 2 (AP800/AP900)

The SDLR controller is automatically updated on Automation Panel 2.

#### 2.4 Upgrade SDLR on AP 3 (AP800/AP900)

The SDLR controller is automatically updated on Automation Panel 3.

#### 2.5 Upgrade all SDLR (AP800/AP900)

All SDLR controllers are automatically updated on all Automation Panels on the Monitor/Panel (by default, after 5 sec).

**2.6 Return to Main Menu**

Returns to the main menu.

**Concerning item 3:**

Submenu 3 for the add-on UPS firmware and upgrade and the battery settings upgrade is opened.

**3.1 Upgrade Add-on UPS Firmware (5AC600.UPSI-00)**

The firmware for the add-on UPS is updated.

**3.2 Upgrade Battery Settings (5AC600.UPSB-00)**

The battery settings for 5AC600.UPSB-00 are automatically updated.

**3.3 Return to Main Menu**

Returns to the main menu.

**Concerning item 4:**

Returns to the shell (MS-DOS).

- The system must be rebooted after a successful upgrade.

**2.2.2 Possible upgrade problems and software dependencies (for V1.02)**

- The SDLR firmware can only be updated if an Automation Panel with Automation Panel Link Transceiver (5DLSDL.1000-01) and Automation Panel Link Receiver (5DLSDL.1000-00) is connected.
- Automation Panel Link transceivers (5DLSDL.1000-01) or Automation Panel Link receivers (5DLSDL.1000-00) with a Firmware version lower than or equal to V00.10 can no longer be combined with Automation Panel Link transceivers (5DLSDL.1000-01) or Automation Panel Link receivers (5DLSDL.1000-00) with a Firmware higher than or equal to V01.04. Daisy Chain mode is not possible with such a combination.
- If a UPS (e.g.: 5AC600.UPSI-00) + battery unit (e.g.: 5AC600.UPSB-00) is connected to the system and operable, then after an upgrade of the MTCX or SDLT you must either disconnect the battery or push the Power button (to put the system in Standby mode), before executing the required power off/on. If not, the firmware upgrade will not work because the UPS buffers the system.

## 2.3 Creating an MS-DOS boot diskette in Windows XP

1. Place an empty 1.44 MB HD diskette in the disk drive
2. Open Windows Explorer
3. Right-click on the 3½" Floppy icon and select "Format...".

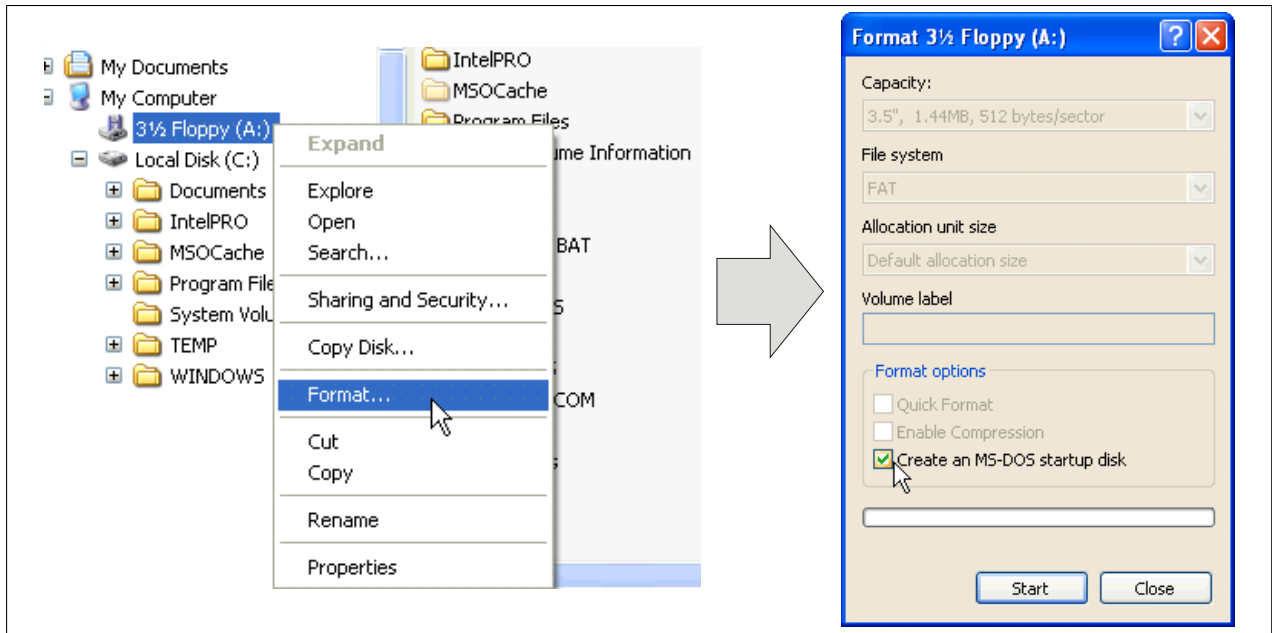


Image 106: Creating a bootable diskette in Windows XP - step 1

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



Image 107: Creating a bootable diskette in Windows XP - step 2

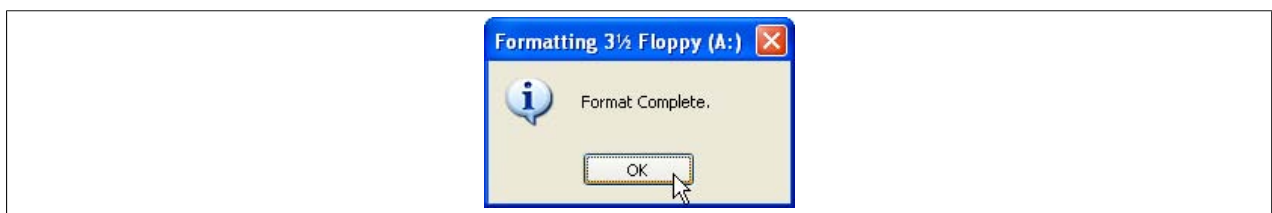


Image 108: Creating a bootable diskette in Windows XP - step 3

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 the 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 activate the option "Show hidden files and folders".

| before       |       |                    |                  | after        |        |                    |                    |
|--------------|-------|--------------------|------------------|--------------|--------|--------------------|--------------------|
| Name         | Size  | Type               | Date Modified    | Name         | Size   | Type               | Date Modified      |
| DISPLAY.SYS  | 17 KB | System file        | 6/8/2000 5:00 PM | AUTOEXEC.BAT | 0 KB   | MS-DOS Batch File  | 3/22/2006 10:08 AM |
| EGA2.CPI     | 58 KB | CPI File           | 6/8/2000 5:00 PM | COMMAND.COM  | 91 KB  | MS-DOS Application | 6/8/2000 5:00 PM   |
| EGA3.CPI     | 58 KB | CPI File           | 6/8/2000 5:00 PM | CONFIG.SYS   | 0 KB   | System file        | 3/22/2006 10:08 AM |
| EGA.CPI      | 58 KB | CPI File           | 6/8/2000 5:00 PM | DISPLAY.SYS  | 17 KB  | System file        | 6/8/2000 5:00 PM   |
| KEYB.COM     | 22 KB | MS-DOS Application | 6/8/2000 5:00 PM | EGA2.CPI     | 58 KB  | CPI File           | 6/8/2000 5:00 PM   |
| KEYBOARD.SYS | 34 KB | System file        | 6/8/2000 5:00 PM | EGA3.CPI     | 58 KB  | CPI File           | 6/8/2000 5:00 PM   |
| KEYBRD2.SYS  | 32 KB | System file        | 6/8/2000 5:00 PM | EGA.CPI      | 58 KB  | CPI File           | 6/8/2000 5:00 PM   |
| KEYBRD3.SYS  | 31 KB | System file        | 6/8/2000 5:00 PM | IO.SYS       | 114 KB | System file        | 5/15/2001 6:57 PM  |
| KEYBRD4.SYS  | 13 KB | System file        | 6/8/2000 5:00 PM | KEYB.COM     | 22 KB  | MS-DOS Application | 6/8/2000 5:00 PM   |
| MODE.COM     | 29 KB | MS-DOS Application | 6/8/2000 5:00 PM | KEYBOARD.SYS | 34 KB  | System file        | 6/8/2000 5:00 PM   |
|              |       |                    |                  | KEYBRD2.SYS  | 32 KB  | System file        | 6/8/2000 5:00 PM   |
|              |       |                    |                  | KEYBRD3.SYS  | 31 KB  | System file        | 6/8/2000 5:00 PM   |
|              |       |                    |                  | KEYBRD4.SYS  | 13 KB  | System file        | 6/8/2000 5:00 PM   |
|              |       |                    |                  | MODE.COM     | 29 KB  | MS-DOS Application | 6/8/2000 5:00 PM   |
|              |       |                    |                  | MSDOS.SYS    | 1 KB   | System file        | 4/7/2001 1:40 PM   |

Image 109: 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   |

Image 110: Creating a bootable diskette in Windows XP - step 5

Now all files (marked) except Command.com, IO.sys and MSDOS.sys can be deleted.

## 2.4 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 (e.g. upgrade BIOS) from one of the USB flash drives available from B&R. To do this, the USB flash drive must be prepared accordingly. This is done with the B&R Embedded OS Installer, which can be downloaded for free from the B&R homepage ([www.br-automation.com](http://www.br-automation.com)).

### 2.4.1 Requirements

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

- B&R USB flash drive
- B&R Industrial PC
- USB Media Drive
- B&R Embedded OS Installer (V3.00 or higher)

### 2.4.2 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.

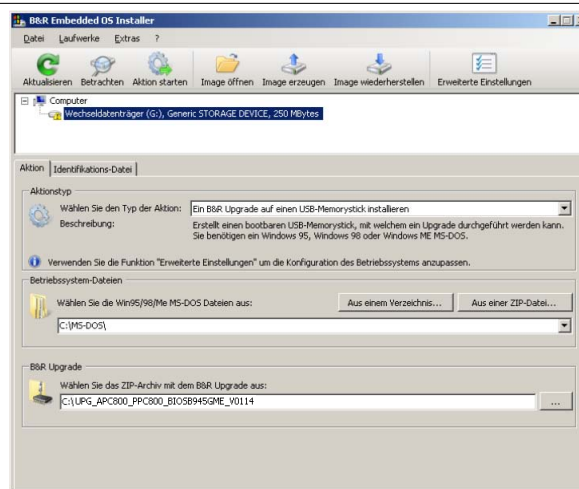


Image 111: Creating a USB flash drive for B&R upgrade files

### 2.4.3 Where do I get MS-DOS?

Information on creating an MS-DOS boot diskette can be found in section see "Creating an MS-DOS boot diskette in Windows XP" on page 185. Then the files from the diskette are to be copied to your hard drive.

## 2.5 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 (e.g. upgrade BIOS) from one of the CompactFlash cards available from B&R. To do this, the CompactFlash card must be prepared accordingly. This is done with the B&R Embedded OS Installer, which can be downloaded for free from the B&R homepage ([www.br-automation.com](http://www.br-automation.com)).

### 2.5.1 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 at least)

### 2.5.2 Procedure

1. Insert the CompactFlash card in the CF slot on the industrial PC.
2. If the drive list is not refreshed automatically, the list must be updated using the command **Drives > Refresh**.
3. Select the desired CompactFlash card from the drive list.
4. Change to the **Action** tab and select **Install a B&R Update to a CompactFlash card** as the type of action.
5. 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...**
6. 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.
7. Click on the **Start action** button in the toolbar.

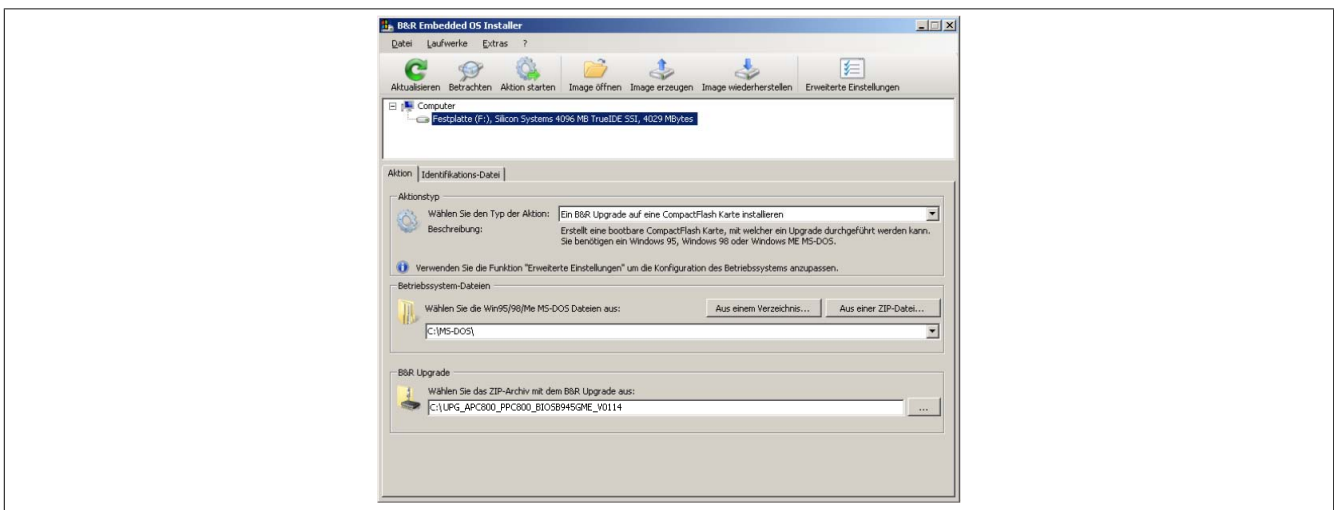


Image 112: Creating a CompactFlash card for B&R upgrade files

### 2.5.3 Where do I get MS-DOS?

Information on creating an MS-DOS boot diskette can be found in section see "Creating an MS-DOS boot diskette in Windows XP" on page 185. Then the files from the diskette are to be copied to your hard drive.



## 3 Microsoft DOS

### 3.1 Order data

| Model number  | Short description                                                                              | Image                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9S0000.01-010 | <b>MS-DOS</b><br>OEM Microsoft MS-DOS 6.22, German Floppy disks, only available with a new PC. |  <b>DOS622 English</b><br>Disk 1- Setup<br><b>Recovery Disk</b><br><br>Only allowed to be used for backup or archiving purposes for B&R automation devices!<br><br><a href="http://www.br-automation.com">www.br-automation.com</a><br><small>©1983-2000 Microsoft Corporation. All rights reserved.</small> |
| 9S0000.01-020 | OEM Microsoft MS-DOS 6.22, English Floppy disks, only available with a new PC.                 |                                                                                                                                                                                                                                                                                                                                                                                                |

Table 163: 9S0000.01-010, 9S0000.01-020 - Order data

### 3.2 Known problems

Either no drivers are available for the following hardware components or only with limitations:

- HDA Sound - No support
- USB 2.0 - only USB 1.1 rates can be achieved.
- "Graphics Engine 2" and therefore Extended Desktop mode also cannot be used.
- A few "ACPI control" BIOS functions cannot be used.

The following table shows the tested resolutions and color depths on the Monitor / Panel connector with 945GME CPU boards.

| Resolutions for DVI | Color depth |        |        |
|---------------------|-------------|--------|--------|
|                     | 8-bit       | 16-bit | 24-bit |
| 640 x 480           | ✓           | ✓      | ✓      |
| 800 x 600           | ✓           | ✓      | ✓      |
| 1024 x 768          | ✓           | ✓      | ✓      |
| 1280 x 1024         | ✓           | ✓      | ✓      |

Table 164: Tested resolutions and color depths for DVI signals

| Resolutions for RGB | Color depth |        |        |
|---------------------|-------------|--------|--------|
|                     | 8-bit       | 16-bit | 24-bit |
| 640 x 480           | ✓           | ✓      | ✓      |
| 800 x 600           | ✓           | ✓      | ✓      |
| 1024 x 768          | ✓           | ✓      | ✓      |
| 1280 x 1024         | ✓           | ✓      | ✓      |
| 1600 x 1200         | ✓           | ✓      | ✓      |
| 1920 x 1440         | ✓           | ✓      | ✓      |

Table 165: Tested resolutions and color depths for RGB signals

## 4 Windows XP Professional

### 4.1 Order data

| Model number    | Short description                                                                                          | Image                                                                               |
|-----------------|------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                 | <b>Windows XP Professional</b>                                                                             |  |
| 5SWWXP.0600-ENG | Microsoft OEM Windows XP Professional Service Pack 3, CD, English. Only available with a B&R device.       |                                                                                     |
| 5SWWXP.0600-GER | Microsoft OEM Windows XP Professional Service Pack 3, CD, German. Only available with a device.            |                                                                                     |
| 5SWWXP.0600-MUL | Microsoft OEM Windows XP Professional Service Pack 3, CD, multilanguage. Only available with a B&R device. |                                                                                     |
| 5SWWXP.0500-ENG | Microsoft OEM Windows XP Professional Service Pack 2c, CD, English. Only available with a B&R device.      |                                                                                     |
| 5SWWXP.0500-GER | Microsoft OEM Windows XP Professional Service Pack 2c, CD, German. Only available with a B&R device.       |                                                                                     |
| 5SWWXP.0500-MUL | Microsoft OEM Windows XP Professional Service Pack 2c, CD, Multilanguage Only available with a B&R device. |                                                                                     |
|                 | <b>Required accessories</b>                                                                                |                                                                                     |
|                 | <b>CompactFlash</b>                                                                                        |                                                                                     |
| 5CFCRD.4096-03  | CompactFlash 4 GB Western Digital (SLC)                                                                    |                                                                                     |
| 5CFCRD.8192-03  | CompactFlash 8 GB Western Digital (SLC)                                                                    |                                                                                     |

Table 166: 5SWWXP.0600-ENG, 5SWWXP.0600-GER, 5SWWXP.0600-MUL, 5SWWXP.0500-ENG, 5SWWXP.0500-GER, 5SWWXP.0500-MUL - Order data

### 4.2 Overview

| Model number    | Edition      | Target system                                                                         | Chipset                 | Service Pack | Language      | Preinstalled | Memory required on the disk | Minimum amount of RAM |
|-----------------|--------------|---------------------------------------------------------------------------------------|-------------------------|--------------|---------------|--------------|-----------------------------|-----------------------|
| 5SWWXP.0600-ENG | Professional | APC510<br>APC511<br>APC620<br>APC810<br>APC820<br>PPC700<br>PPC725<br>PPC800<br>PP500 | 945GME<br>GM45<br>US15W | SP3          | English       | Optional     | ≤ 2.1 GB                    | 128 MB                |
| 5SWWXP.0600-GER | Professional | APC510<br>APC511<br>APC620<br>APC810<br>APC820<br>PPC700<br>PPC725<br>PPC800<br>PP500 | 945GME<br>GM45<br>US15W | SP3          | German        | Optional     | ≤ 2.1 GB                    | 128 MB                |
| 5SWWXP.0600-MUL | Professional | APC510<br>APC511<br>APC620<br>APC810<br>APC820<br>PPC700<br>PPC725<br>PPC800<br>PP500 | 945GME<br>GM45<br>US15W | SP3          | Multilanguage | Optional     | ≤ 2.1 GB                    | 128 MB                |
| 5SWWXP.0500-ENG | Professional | APC620<br>APC810<br>APC820<br>PPC700<br>PPC725<br>PPC800                              | 945GME<br>GM45          | SP2c         | English       | Optional     | ≤ 2.1 GB                    | 128 MB                |
| 5SWWXP.0500-GER | Professional | APC620<br>APC810<br>APC820<br>PPC700<br>PPC725<br>PPC800                              | 945GME<br>GM45          | SP2c         | German        | Optional     | ≤ 2.1 GB                    | 128 MB                |
| 5SWWXP.0500-MUL | Professional | APC620<br>APC810<br>APC820<br>PPC700<br>PPC725<br>PPC800                              | 945GME<br>GM45          | SP2c         | Multilanguage | Optional     | ≤ 2.1 GB                    | 128 MB                |

## 4.3 Installation

Upon request, B&R can pre-install the required Windows XP Professional version on the desired mass storage device (e.g. CompactFlash card, etc.). All of the drivers required for operation (graphics, network, etc.) are also installed when doing so.

### 4.3.1 Installation on PCI SATA RAID controller - 5ACPCI.RAIC-03, 5ACPCI.RAIC-05

The following steps are necessary for installing Windows XP Professional on the PCI SATA RAID controller:

1. Download the RAID driver from the B&R website [www.br-automation.com](http://www.br-automation.com) and copy the files to a diskette.
2. Connect the Media Drive (5MD900.USB2-01) to the USB port.
3. Insert the diskette and Windows XP Professional CD in the the Media Drive and boot from the CD.
4. Press the F6 key during setup to install a third-party SCSI or a driver.
5. Press the "s" key when asked about installing an additional drive. Insert the disk in the floppy drive. Press "Enter" and select the driver.
6. Follow the setup instructions.
7. The setup copies the files to the Windows XP Professional folder and restarts the Panel PC 800.

#### Information:

- Not all USB FDD drives are supported by the Windows XP Setup (see Microsoft Kb 916196).
- Depending on the system, the boot order may have to be adjusted in BIOS.

## 4.4 Drivers

The latest drivers for all approved operating systems can be found in the Download area (Service / Material-related downloads - BIOS / Drivers / Updates) of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

#### Information:

Required drivers can only be downloaded from the B&R homepage, not from manufacturers' pages.

## 5 Windows 7

### 5.1 General information

Windows® 7 offers a wealth of innovative features and performance improvements. The 64-bit variants can also exploit the full power of current PC architectures. Faster switching to power saving mode, quicker restores, less memory usage, and high-speed detection of USB devices are just a few of the advantages provided by Windows® 7. Both German and English are available in Windows® 7 Professional, while Windows® 7 Ultimate supports up to 35 different languages. Product activation is not necessary on B&R PCs, which is a huge advantage for simple logistical procedures relating to machine automation.

All of the Windows® operating systems offered by B&R are from the Microsoft Embedded division. This guarantees much longer availability, especially when compared to products offered on the consumer market.

### 5.2 Order data

| Model number    | Short description                                                                              | Image                                                                               |
|-----------------|------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                 | <b>Windows 7</b>                                                                               |  |
| 5SWWI7.0100-ENG | Microsoft OEM Windows 7 Professional 32-bit, DVD, English. Only available with a new device.   |                                                                                     |
| 5SWWI7.0100-GER | Microsoft OEM Windows 7 Professional 32-bit, DVD, German. Only available with a new device.    |                                                                                     |
| 5SWWI7.0300-MUL | Microsoft OEM Windows 7 Ultimate 32-bit, DVD, multilanguage. Only available with a new device. |                                                                                     |
| 5SWWI7.0200-ENG | Microsoft OEM Windows 7 Professional 64-bit, DVD, English. Only available with a new device.   |                                                                                     |
| 5SWWI7.0200-GER | Microsoft OEM Windows 7 Professional 64-bit, DVD, German. Only available with a new device.    |                                                                                     |
| 5SWWI7.0400-MUL | Microsoft OEM Windows 7 Ultimate 64-bit, DVD, multilanguage. Only available with a new device. |                                                                                     |

Table 167: 5SWWI7.0100-ENG, 5SWWI7.0100-GER, 5SWWI7.0300-MUL, 5SWWI7.0200-ENG, 5SWWI7.0200-GER, 5SWWI7.0400-MUL - Order data

### 5.3 Overview

| Model number    | Edition      | Target system                                 | Chipset                             | Service Pack | Architectures | Language      | Preinstalled | Minimum size of the disk | Minimum amount of RAM |
|-----------------|--------------|-----------------------------------------------|-------------------------------------|--------------|---------------|---------------|--------------|--------------------------|-----------------------|
| 5SWWI7.0100-ENG | Professional | APC510<br>APC511<br>APC810<br>PPC800<br>PP500 | 945GME<br>GM45<br>US15W             |              | 32-bit        | English       | Optional     | 16 GB                    | 1 GB                  |
| 5SWWI7.0100-GER | Professional | APC510<br>APC511<br>APC810<br>PPC800<br>PP500 | 945GME<br>GM45<br>US15W             |              | 32-bit        | German        | Optional     | 16 GB                    | 1 GB                  |
| 5SWWI7.0300-MUL | Ultimate     | APC510<br>APC511<br>APC810<br>PPC800<br>PP500 | 945GME<br>GM45<br>US15W             |              | 32-bit        | Multilanguage | Optional     | 16 GB                    | 1 GB                  |
| 5SWWI7.0200-ENG | Professional | PPC800<br>APC810                              | 945GME Intel®<br>Core™2 Duo<br>GM45 |              | 64-bit        | English       | Optional     | 20 GB                    | 2 GB                  |
| 5SWWI7.0200-GER | Professional | PPC800<br>APC810                              | 945GME Intel®<br>Core™2 Duo<br>GM45 |              | 64-bit        | German        | Optional     | 20 GB                    | 2 GB                  |
| 5SWWI7.0400-MUL | Ultimate     | PPC800<br>APC810                              | 945GME Intel®<br>Core™2 Duo<br>GM45 |              | 64-bit        | Multilanguage | Optional     | 20 GB                    | 2 GB                  |

### 5.4 Installation

Upon request, B&R can pre-install the required Windows 7 version on the desired mass storage device (e.g. CompactFlash card, etc.). All of the drivers required for operation (graphics, network, etc.) are also installed when doing so.

#### 5.4.1 Installation on PCI SATA RAID controller - 5ACPCI.RAIC-03, 5ACPCI.RAIC-05

The following steps are necessary for installing Windows 7 on the PCI SATA RAID controller:

1. Download the RAID driver for Windows 7 from the B&R website [www.br-automation.com](http://www.br-automation.com) and copy the data to a folder on a flash drive.
2. Boot using the Windows7 DVD.
3. Follow the installation steps until a page appears asking "Where do you want to install Windows?".
4. Plug the USB flash drive with the RAID drivers into an available USB port.
5. Click on "Load driver", and navigate to the directory containing the RAID drivers. Then click Next to continue.
6. Remove the USB flash drive.
7. The Windows 7 installation can now be performed as usual.

#### Information:

Depending on the system, the boot order may have to be adjusted in BIOS.

#### 5.5 Special considerations, limitations

- Windows 7 does not contain a Beep.sys file, which means that audible signal is no longer played (i.e. when touching a key or button).
- Windows 7 system classification is not currently supported (does not apply to PP500, APC510 and APC511 devices).

#### 5.6 Drivers

The latest drivers for all approved operating systems can be found in the Download area (Service / Material-related downloads - BIOS / Drivers / Updates) of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

#### Information:

Required drivers can only be downloaded from the B&R homepage, not from manufacturers' pages.

## 6 Windows Embedded Standard 2009

### 6.1 General information

Windows® Embedded Standard 2009 is the modular version of Windows® XP Professional. It's used if XP applications require a smaller operating system size to run. Together with CompactFlash memory, Windows® Embedded Standard 2009 makes it possible to use the Microsoft desktop operating system in rough environmental conditions. In addition to the familiar features included in Windows® XP Professional, Windows® Embedded Standard 2009 has been improved with regard to dependability by adding a write filter for individual memory partitions. By protecting individual partitions such as the boot partition, the PC system can be started without any problems, even after an unexpected power failure. B&R offers complete images for industrial PCs, Power Panel and Mobile Panel devices to make the transition to Windows® Embedded Standard 2009 as easy as possible. In addition to Windows® Embedded Standard 2009, the standard Windows® XP Professional operating system is also available in English, German and multilingual.

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

### 6.2 Order data

| Model number    | Short description                                                                                                                         | Image                                                                               |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                 | <b>Windows Embedded Standard 2009</b>                                                                                                     |  |
| 5SWWXP.0734-ENG | Microsoft OEM Windows Embedded Standard 2009, English; for PPC800 with GM45 chipset; please order CompactFlash separately (minimum 1 GB). |                                                                                     |

Table 168: 5SWWXP.0734-ENG - Order data

### 6.3 Overview

| Model number    | Target system | Chipset | Language | Preinstalled | Minimum size of the disk | Minimum amount of RAM |
|-----------------|---------------|---------|----------|--------------|--------------------------|-----------------------|
| 5SWWXP.0734-ENG | PPC800        | GM45    | English  | Yes          | 1 GB                     | 256 MB                |

### 6.4 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 (FBWF)     | ✓            |
| 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                 | ✓            |

Table 169: Device functions in Windows Embedded Standard 2009

| Function         | Present |
|------------------|---------|
| Media Player 6.4 | ✓       |
| DirectX 9.0c     | ✓       |
| Accessories      | ✓       |
| Number of fonts  | 89      |

Table 169: Device functions in Windows Embedded Standard 2009

## 6.5 Installation

Upon request, Windows Embedded Standard 2009 can be preinstalled at B&R Austria on a suitable CompactFlash card (min. 1 GB). The system is then automatically configured when it is switched on for the first time. This procedure takes approximately 10 minutes, and the device will be rebooted a number of times.

## 6.6 Drivers

All drivers required for operation are preinstalled on the operating system. If an older version of the driver is still being used, the latest version can be downloaded from the B&R website ([www.br-automation.com](http://www.br-automation.com)) and installed over it. Be sure to check whether the "Enhanced Write Filter (EWF)" is enabled.

### 6.6.1 Touch screen drivers

In order to operate Automation Panel 800 or Automation Panel 900 touch screen devices, you need to either install the touch screen driver manually and update the touch screen interface in the device manager. The driver is available in the Download area of the B&R website ([www.br-automation.com](http://www.br-automation.com)). Be sure to check whether the Enhanced Write Filter (EWF) is enabled.

#### Information:

**Required drivers can only be downloaded from the B&R homepage, not from manufacturers' pages.**

## 7 Windows Embedded Standard 7

### 7.1 General information

The successor to Windows® XP Embedded has been given the name Windows® Embedded Standard 7. As with previous versions, this embedded operating system offers full system support of Automation PC 810, Panel PC 800 and Power Panel 500 devices. In addition to brand new features that are also included in Windows® 7 Professional, Windows® Embedded Standard 7 includes embedded components such as Enhanced Write Filter, File-Based Write Filter, Registry Filter and USB Boot. Windows® Embedded Standard 7 is available in two different versions. The main difference between them has to do with multilingual support. Windows® Embedded Standard 7 is only available in a single language, whereas Windows® Embedded Standard 7 Premium supports the installation of several languages simultaneously.

With Windows® Embedded Standard 7, Microsoft has made substantial improvements in the area of security. The AppLocker program, available in the premium version, can prevent the execution of unknown or potentially unwanted applications that should be installed over a network or from drives that are directly connected. A tiered approach allows the differentiation between scripts (.ps1, .bat, .cmd, .vbs and .js), installer files (.msi, .msp) and libraries (.dll, .ocx). AppLocker can also be configured to record undesired activity and display it in the Event Viewer. Windows® Embedded Standard 7 is available in both 32-bit and 64-bit versions. This also provides support for challenging 64-bit applications.

### 7.2 Order data

| Model number    | Short description                                                                                                                                            | Image                                                                               |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                 | <b>Windows Embedded Standard 7</b>                                                                                                                           |  |
| 5SWWI7.0534-ENG | Microsoft OEM Windows Embedded Standard 7 32-bit, English; for PPC800 with GM45 chipset; please order CompactFlash separately (minimum 8 GB).                |                                                                                     |
| 5SWWI7.0634-ENG | Microsoft OEM Windows Embedded Standard 7 64-bit, English; for PPC800 with GM45 chipset; please order CompactFlash separately (minimum 16 GB).               |                                                                                     |
| 5SWWI7.0734-MUL | Microsoft OEM Windows Embedded Standard 7 Premium 32-bit, multilanguage; for PPC800 with GM45 chipset; please order CompactFlash separately (minimum 8 GB).  |                                                                                     |
| 5SWWI7.0834-MUL | Microsoft OEM Windows Embedded Standard 7 Premium 64-bit, multilanguage; for PPC800 with GM45 chipset; please order CompactFlash separately (minimum 16 GB). |                                                                                     |
|                 | <b>Optional accessories</b>                                                                                                                                  |                                                                                     |
|                 | <b>Windows Embedded Standard 7</b>                                                                                                                           |                                                                                     |
| 5SWWI7.0900-MUL | Microsoft OEM Windows Embedded Standard 7 32-bit, Language Pack DVD                                                                                          |                                                                                     |
| 5SWWI7.1000-MUL | Microsoft OEM Windows Embedded Standard 7 64-bit, Language Pack DVD                                                                                          |                                                                                     |

Table 170: 5SWWI7.0534-ENG, 5SWWI7.0634-ENG, 5SWWI7.0734-MUL, 5SWWI7.0834-MUL - Order data

### 7.3 Overview

| Model number    | Edition  | Target system | Chipset | Architectures | Language      | Preinstalled | Minimum size of the disk | Minimum amount of RAM |
|-----------------|----------|---------------|---------|---------------|---------------|--------------|--------------------------|-----------------------|
| 5SWWI7.0534-ENG | Embedded | PPC800        | GM45    | 32-bit        | English       | Optional     | 8 GB                     | 1 GB                  |
| 5SWWI7.0634-ENG | Embedded | PPC800        | GM45    | 64-bit        | English       | Optional     | 16 GB                    | 1 GB                  |
| 5SWWI7.0734-MUL | Premium  | PPC800        | GM45    | 32-bit        | Multilanguage | Optional     | 8 GB                     | 1 GB                  |
| 5SWWI7.0834-MUL | Premium  | PPC800        | GM45    | 64-bit        | Multilanguage | Optional     | 16 GB                    | 1 GB                  |



## 7.4 Features with WES7 (Windows Embedded Standard 7)

The feature list shows the most important device functions in Windows Embedded Standard 7.

| Function                                            | Windows Embedded Standard 7 | Windows Embedded Standard 7 Premium |
|-----------------------------------------------------|-----------------------------|-------------------------------------|
| Enhanced Write Filter (EWF)                         | ✓                           | ✓                                   |
| File Based Write Filter (FBWF)                      | ✓                           | ✓                                   |
| Administrator account                               | ✓                           | ✓                                   |
| User account                                        | Configurable                | Configurable                        |
| Windows Explorer Shell                              | ✓                           | ✓                                   |
| Registry filter                                     | ✓                           | ✓                                   |
| Internet Explorer 8.0                               | ✓                           | ✓                                   |
| Internet Information Service (IIS) 7.0              | ✓                           | ✓                                   |
| AntiMalware (Windows Defender)                      | -                           | ✓                                   |
| Add-ons (Snipping tool, Sticky Notes)               | -                           | ✓                                   |
| Windows Firewall                                    | ✓                           | ✓                                   |
| .NET Framework 3.5                                  | ✓                           | ✓                                   |
| 32-bit and 64-bit                                   | ✓                           | ✓                                   |
| Remote Desktop Protocol 7.0                         | ✓                           | ✓                                   |
| File Compression Utility                            | ✓                           | ✓                                   |
| Windows Installer Service                           | ✓                           | ✓                                   |
| Windows XP Mode                                     | -                           | -                                   |
| Media Player 12                                     | ✓                           | ✓                                   |
| DirectX                                             | ✓                           | ✓                                   |
| Multilingual User Interface Packs in the same image | -                           | ✓                                   |
| International Components and Language Services      | ✓                           | ✓                                   |
| Language Pack Setup                                 | ✓                           | ✓                                   |
| Windows Update                                      | Configurable                | Configurable                        |
| Windows PowerShell 2.0                              | ✓                           | ✓                                   |
| BitLocker                                           | -                           | ✓                                   |
| AppLocker                                           | -                           | ✓                                   |
| Tablet PC Support                                   | -                           | ✓                                   |
| Windows Touch                                       | -                           | ✓                                   |
| Boot from USB Stick                                 | ✓                           | ✓                                   |
| Accessories                                         | ✓                           | ✓                                   |
| Page file                                           | Configurable                | Configurable                        |
| Number of fonts                                     | 134                         | 134                                 |

Table 171: Device functions in Windows Embedded Standard 7

## 7.5 Installation

Upon request, Windows Embedded Standard 7 can be preinstalled at B&R Austria on a suitable CompactFlash card (32-bit: at least 8 GB, 64-bit: at least 16 GB). The system is then automatically configured when it is switched on for the first time. This procedure takes approximately 30 minutes, and the device will be rebooted a number of times.

## 7.6 Drivers

All drivers required for operation are preinstalled on the operating system. If an older version of the driver is still being used, the latest version can be downloaded from the B&R website ([www.br-automation.com](http://www.br-automation.com)) and installed over it. Be sure to check whether the Enhanced Write Filter (EWF) is enabled.

### 7.6.1 Touch screen driver

A touch screen driver will be automatically installed if a touch controller is detected during the Windows Embedded Standard 7 setup. If a touch controller is not detected during Windows Embedded Standard 7 setup, or if an Automation Panel 800/900 is connected later on, the touch screen driver needs to be installed or the additional touch screen interface needs to be selected in the touch screen settings in the Windows Control Panel. The driver is available in the Download area of the B&R website ([www.br-automation.com](http://www.br-automation.com)). When doing so, be sure that the Enhanced Write Filter (EWF) or File Based Write Filter (FBWF) are not enabled.

### Information:

Required drivers can only be downloaded from the B&R homepage, not from manufacturers' pages.

## 8 Automation Runtime

### 8.1 General information

A integral component of Automation Studio is the real-time operating system. This real-time operating system makes up the software kernel which allows applications to run on a target system.

- Guaranteed highest possible performance for the hardware being used
- Runs on all B&R target systems
- Makes the application hardware-independent
- Applications can be easily ported between B&R target systems
- Cyclic runtime system guarantees deterministic behavior
- Multitasking according to deterministic runtime rules
- Configure priorities, time classes, and jitter tolerance
- Up to eight different time classes with any subprograms
- Guaranteed response to time and jitter tolerance violations
- Exception handling
- Configurable jitter tolerance in all task classes
- Supports all relevant programming language such as IEC 61131-3 and ANSI C
- Extensive function library conforming to IEC 61131-3 as well as the expanded Automation library
- Access to all networks and bus systems via function calls or the Automation Studio configuration

B&R Automation Runtime is fully embedded in the corresponding target system (this is the hardware where Automation Runtime is installed). It allows application programs to access I/O systems (e.g. via fieldbus) and other devices (interfaces, networks, etc.).

### 8.2 Order data

| Model number | Short description                                                             | Image                                                                                |
|--------------|-------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|              | Undefined                                                                     |  |
| 9A0003.02U   | USB Port Button Holder DS9490B                                                |                                                                                      |
| 1A4600.10    | B&R Automation Runtime ARwin, incl. License Label and Security Key            |                                                                                      |
| 1A4600.10-2  | B&R Automation Runtime ARwin, ARNC0                                           |                                                                                      |
| 1A4600.10-3  | B&R Automation Runtime ARwin+PVIControls incl. License Label and Security Key |                                                                                      |
| 1A4600.10-4  | B&R Automation Runtime ARwin+ARNC0+PVIControls                                |                                                                                      |

Table 172: 9A0003.02U, 1A4600.10, 1A4600.10-2, 1A4600.10-3, 1A4600.10-4 - Order data

### 8.3 Automation Runtime Windows (ARwin)

The system is supported by ARwin with an AS 3.0 / AR 2.96 upgrade.

An Automation Runtime dongle (USB port button holder with Automation Runtime ARwin dongle) must be connected to run ARwin on a Panel PC 800, see "Order data" on page 198.

#### Information:

**An Automation Runtime dongle is no longer required in AS 3.0.90 / AR4.00.**

### 8.4 Automation Runtime Embedded (ARemb)

The system is supported by ARemb with an AS 3.0.90 / AR 4.00 upgrade. An Automation Runtime dongle is not required.

## 9 B&R Automation Device Interface (ADI) - Control Center

The ADI (Automation Device Interface) enables access to specific functions of B&R devices. Settings for this device can be read and edited using the B&R Control Center applet in the control panel.

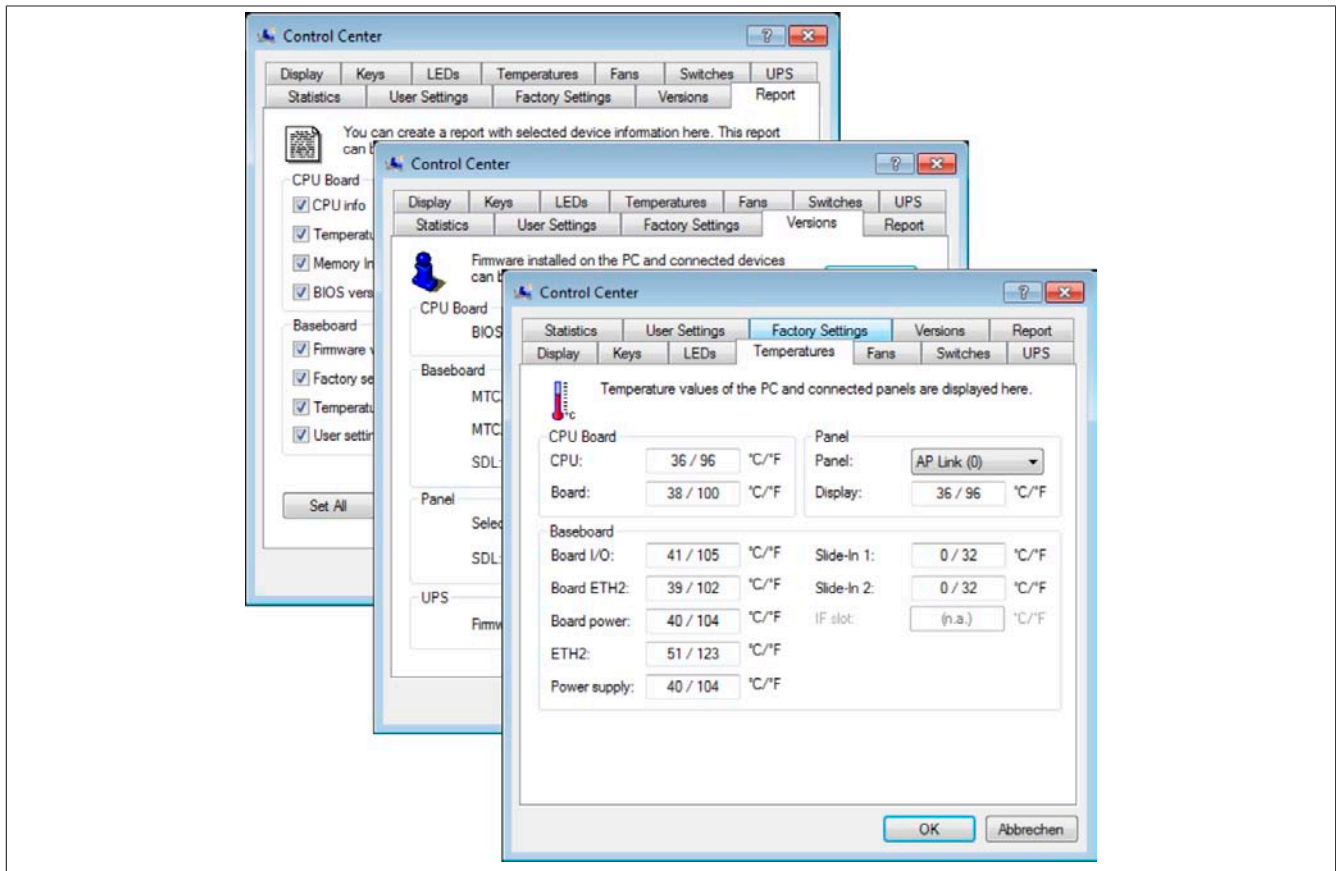


Image 113: ADI Control Center screenshots - Examples (symbol photo)

### Information:

The displayed temperature and voltage values (e.g. CPU temperature, core voltage, battery voltage) on the corresponding ADI page represent uncalibrated information values. These cannot be used to draw any conclusions about any hardware alarms or error conditions. The hardware components used have automatic diagnostics functions that can be applied in the event of error.

### 9.1 Functions

### Information:

The functions provided by the Automation Device Interface (ADI) - Control Center vary according to device series.

- Changing display-specific parameters
- Reading device-specific keys
- Updating the key configuration
- Activating device-specific LEDs on a membrane keypad
- Read or calibrate the entry devices (e.g. key switch, handwheel, joystick, potentiometer)
- Reading temperatures, fan speeds, statistical data and switch settings
- Read the operating hours (power on hours)
- Reading user and factory settings
- Reading software versions
- Updating and securing BIOS and firmware
- Creating reports for the current system (support assistance)
- Setting the SDL equalizer value for the SDL cable adjustment
- Changing the User Serial ID

Supports the following systems:

- Automation PC 510
- Automation PC 511
- Automation PC 620
- Automation PC 810
- Automation PC 820
- Panel PC 300
- Panel PC 700
- Panel PC 725
- Panel PC 800
- Power Panel 100/200
- Power Panel 300/400
- Power Panel 500
- Mobile Panel 40/50
- Mobile Panel 100/200
- Connected Automation Panel 800
- Connected Automation Panel 900

## 9.2 Installation

A detailed description of the Control Center can be found in the integrated online help. The B&R Automation Device Interface (ADI) driver (also contains Control Center) is available in the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

1. Download and unzip the ZIP archive
2. Close all applications
3. Run the Setup.exe file (e.g. double-click on it in Explorer).

### Information:

**The ADI driver is already included in the B&R images of embedded operating systems.**

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

### 9.3 SDL equalizer setting

1. Open the **Control Center** in the **Control Panel**.
2. Select **Display** tab.
3. Click on **Settings**. This opens the following dialog box:

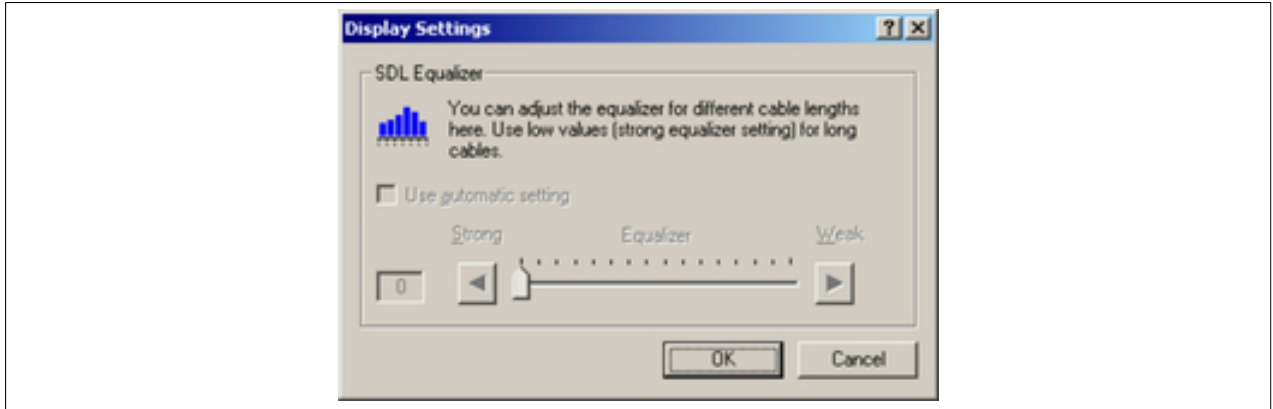


Image 114: ADI Control Center - SDL equalizer settings

You can change the display's SDL equalizer settings in this dialog box. The equalizer is integrated into Automation Panel devices and adapts the DVI signal to various cable lengths. The equalizer value is automatically calculated based on the cable length. It is possible to set a different equalizer value in order to obtain the best possible display quality (e.g. in case of low-quality cables or poor DVI signal quality).

The value is optimally defined for the cable length when using the "Automatic setting".

The equalizer value can only be changed if the function is supported by Automation Panel 900 (starting with Panel Firmware version 1.04 or higher).

## 9.4 UPS configuration

Here you can view the status values for an optionally installed B&R APC add-on UPS as well as change, update or save the battery settings for the UPS. You can also configure the system settings for the UPS.

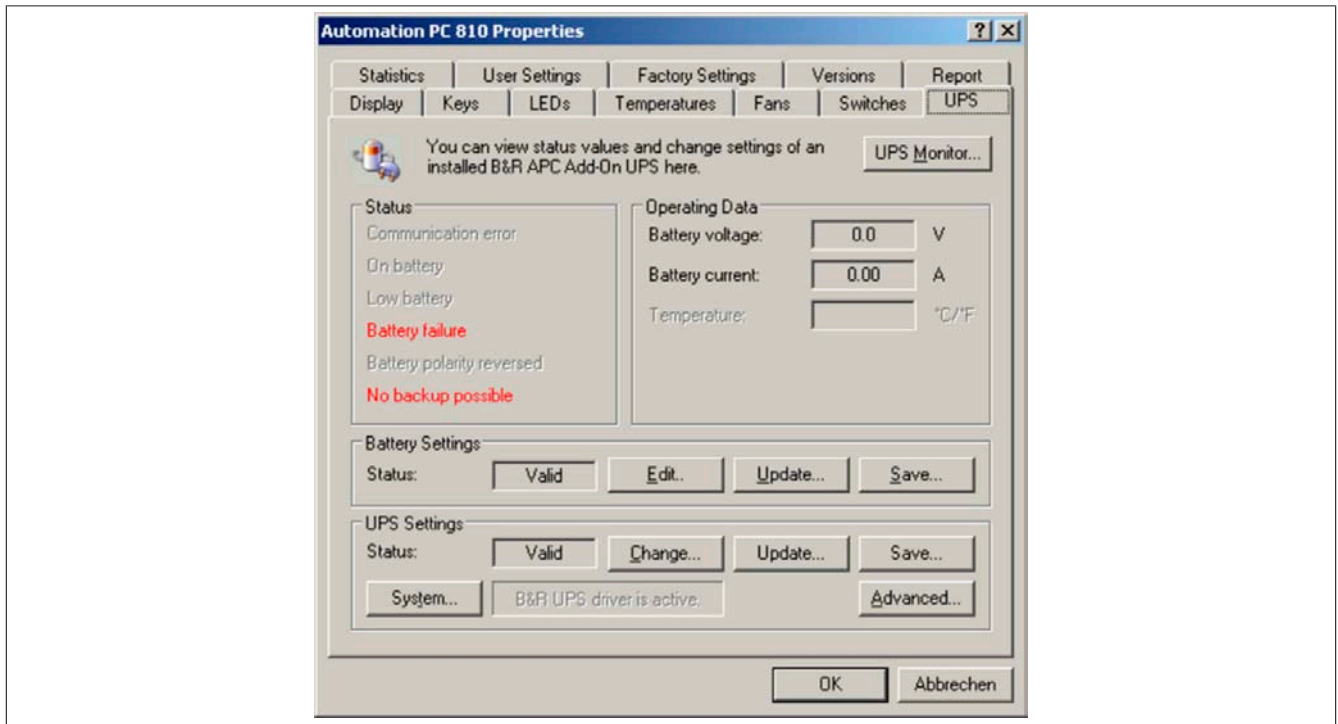


Image 115: ADI Control Center - UPS settings

### Caution!

The installed UPS must be selected and configured in the Control Panel using the energy options in order for battery operation to be supported.

### Information:

The UPS service is supported starting with B&R Windows Embedded Version 2.10 or higher.

#### 9.4.1 Installing the UPS service for the B&R APC add-on UPS

1. Open the **Control Center** in the **Control Panel**.
2. Select the **UPS** tab.
3. Under **UPS settings**, click on **System**. This opens the **Power Options** in the Control Panel. (The **Power Options** can also be opened directly from the **Control Panel**.)
4. Go to the **UPS** tab and click **Select...**
5. Choose 'Bernecker + Rainer' as the manufacturer and 'APC Add-on UPS' as the model and then click **Finish**. The value for the COM connection is only required for a serially connected UPS and is ignored by the APC add-on UPS driver.
6. Click on **Apply** to start the UPS service. After a few seconds the UPS status and details are displayed.
7. Click **OK**.

The text field beside **System** (on the **UPS** tab in the **Control Center**) also indicates whether the B&R UPS driver is active.

### Information:

Administrator rights are required in order to change the energy options or display the UPS status.

#### 9.4.2 Displaying UPS status values

1. Open the **Control Center** in the **Control Panel**.
2. Select the **UPS** tab.

The displayed values are updated automatically.

### Information:

The "reversed battery polarity " status is only displayed in UPS firmware Version 1.08 or higher.

In UPS firmware Version 1.07 or smaller, a change between battery operation and normal operation can lead to communication errors.

3. Select UPS monitor to display UPS status changes since the last time the system or UPS driver was started.

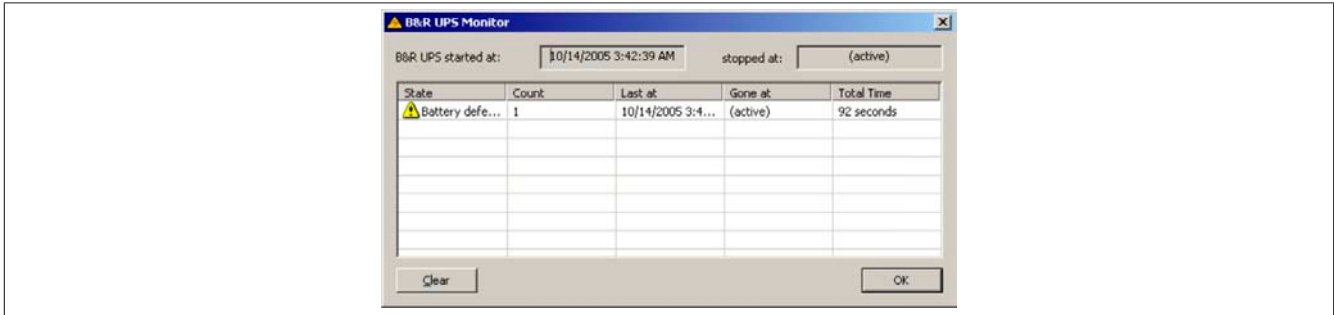


Image 116: ADI Control Center - UPS monitor

The dialog box is updated automatically when the status changes.

To remove a status from the list, click on **delete**.

### Information:

The current status of the UPS is also displayed when the UPS service is started in the Windows Control Panel on the UPS page in the energy options.

### Information:

In a German version of Windows XP Professional the battery status is displayed as "low" in the energy options, even if the battery is OK (Windows error). In an English version, three battery status levels are displayed: unknown, OK, replace A low battery status is never displayed.

#### 9.4.3 Changing UPS battery settings

1. Open the **Control Center** in the **Control Panel**.
2. Select the **UPS** tab.
3. Under **Battery settings**, click on **Edit**. This opens the "Open" dialog box.
4. Select and **open** the file containing the battery settings.



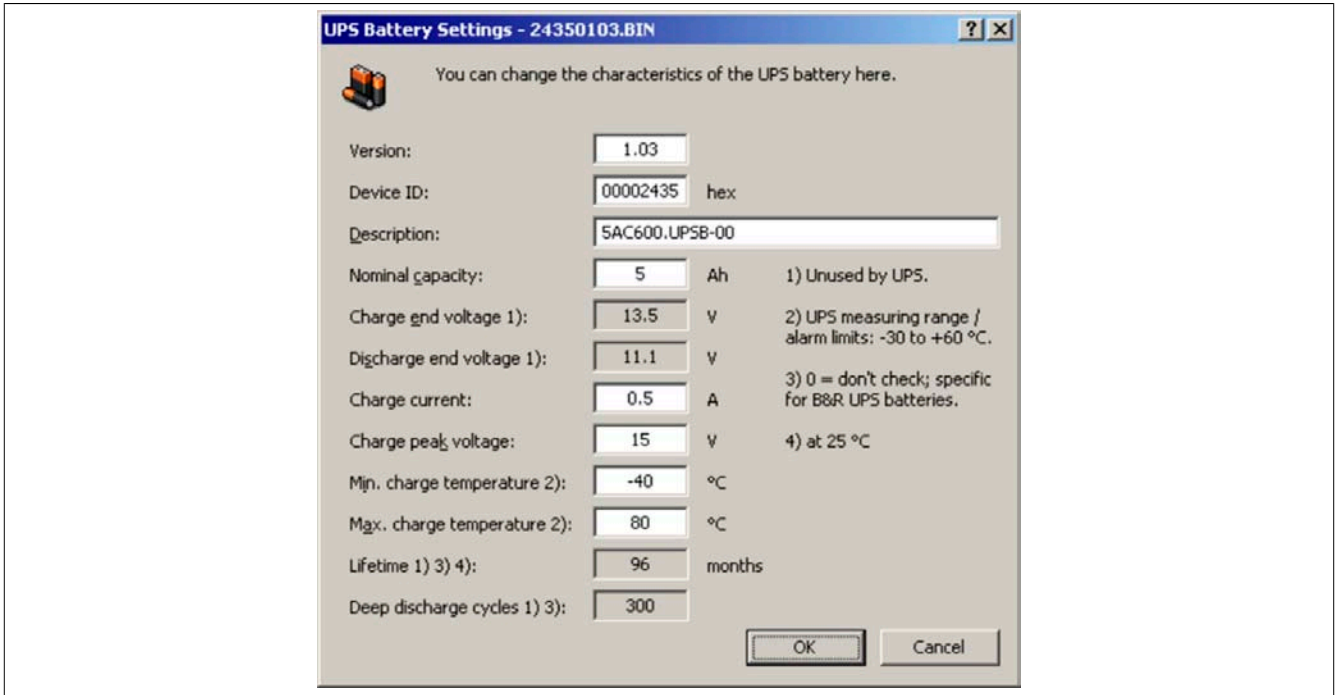


Image 117: ADI Control Center - UPS battery settings

In this dialog box you can change the settings for the UPS battery.

The changed settings are written to the file by clicking on the **OK** button. The battery settings for the UPS can then be updated with this file.

## none

To make settings for batteries not from B&R, it is best to make a copy of a file with battery settings from B&R under a new name and make adjust the settings in this file for the battery being used.

Current files with settings for batteries from B&R can be updated using B&R's "Upgrade PPC800 MTCX" software.

## Information:

- The current UPS firmware version 1.10 does not use charge end voltage, deep discharge voltage, lifespan and deep discharge cycles.
- Lifespan is only included in version 2 (and higher) of the UPS battery settings and only valid for B&R UPS batteries at 25°C ambient temperature.
- Deep discharge cycles are only included in version 3 (and higher) of the UPS battery settings and only valid for B&R UPS batteries.

## Information:

If you would like to change the current battery settings on the UPS, they must first be saved in a file.

### 9.4.4 Updating UPS battery settings

1. Open the **Control Center** in the **Control Panel**.
2. Select the **UPS** tab.
3. Under **Battery settings**, click on **Update**. Clicking on "Open" opens a dialog box.
4. Select and **open** the file containing the battery settings. The "Download" dialog box is opened.

The transfer can be aborted by clicking on **Cancel** in the Download dialog box. Cancel is disabled when the flash memory is being written to.



**Information:**

- The UPS cannot be operated while updating the battery settings.
- If the transfer is interrupted, then the procedure must be repeated until the battery settings have been updated successfully. Otherwise battery operation will no longer be possible.

Deleting the data in flash memory can take several seconds depending on the memory block being used. The progress indicator is not updated during this time.

**Information:**

The UPS is automatically restarted after a successful download. This can cause a brief failure in the UPS communication.

**9.4.5 Saving UPS battery settings**

1. Open the **Control Center** in the **Control Panel**.
2. Select the **UPS** tab.
3. Under Battery settings, click on **Save**. "Save under" dialog box opened.
4. Enter a file name or select an existing file and click on **Save**.

**Information:**

UPS settings can only be saved using UPS firmware version 1.10 and higher.

The transfer can be aborted by clicking on **Cancel** in the "Download" dialog box.

**9.4.6 UPS system settings configure**

1. Open the **Control Center** in the **Control Panel**.
2. Select the **UPS** tab.
3. Under **UPS settings**, click on **Change**. This opens the following dialog box:

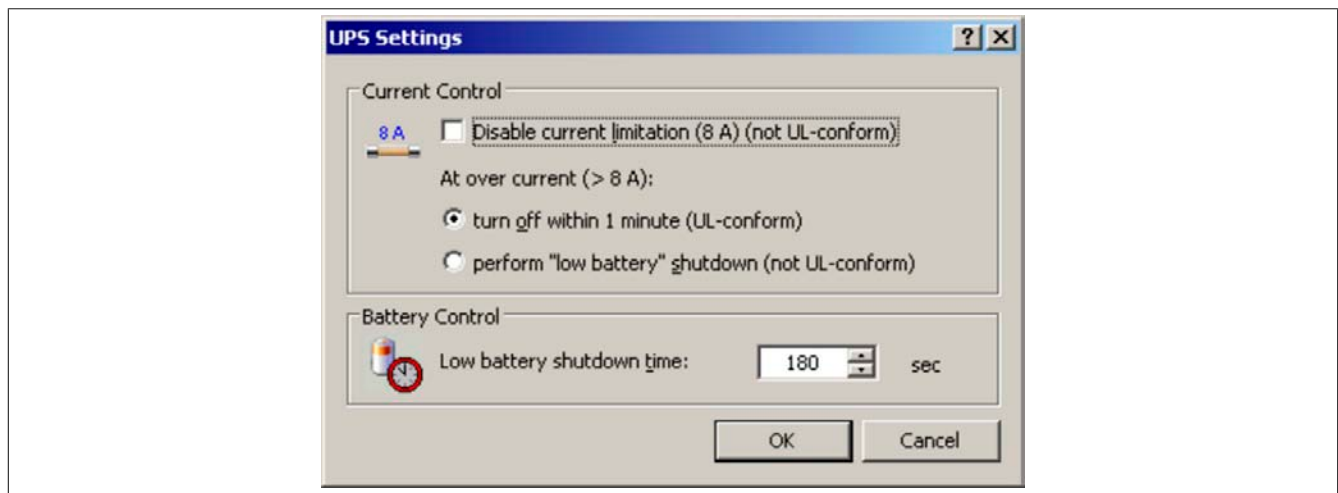


Image 118: ADI Control Center - UPS settings

Further information regarding the UPS system settings can be found in the Windows help.

**Information:**

- UPS settings can only be changed using UPS firmware version 1.10 and higher. If there are no changed settings on the UPS, then the factory or default settings are used.
- The UPS is automatically restarted after UPS settings have been changed. This can cause a brief disruption in communication with the UPS.
- Administrator rights are required in order to change the energy options or display the UPS status.

## Disabling 8 A current limitation

### Information:

It is not UL compliant to switch off the 8 A current limitation on devices during battery operation!

"Low Battery" shutdown caused by an over-current > 8 A on devices during battery operation is not UL compliant!

Select the checkbox **Disable current limitation (8 A)**.

If current limitation is enabled (checkbox deselected), then the UPS uses battery operation to check whether the UPS battery is discharged with 8 A for longer than 16 seconds. If so, then an overcurrent alarm is sent to the PC.

### Information:

**Current limitation is only supported with UPS firmware version 1.10 and higher.**

Enabling one of the two following options determines how the UPS should perform when an overcurrent alarm occurs:

If **Turn-off within 1 minute** is selected, then the UPS will turn-off within one when an overcurrent alarm occurs.

### Warning!

**The operating system will not be properly shut down if an overcurrent alarm occurs!**

If **Perform "low battery" shutdown** is selected, then the UPS will also signal a "Low battery alarm" in addition to the overcurrent alarm and will turn off after the defined **Low battery shutdown time**. This will allow the operating system to shut down properly when UPS service is enabled.

## Changing the shutdown time of the UPS when battery is low

Enter the **"Low Battery" shutdown time** in seconds. This is the amount of time that the UPS will wait before shutting off the power supply when the battery level is low.

This prevents the UPS battery from becoming too discharged if the Windows UPS service is not enabled and the UPS is therefore not turned off by the operating system.

If the UPS service is enabled, then the UPS will be turned off by the operating system when the battery level is low, based on the Windows UPS service **shutdown time** (see "Changing additional UPS settings", on page 309). The **low battery shutdown time** will then be ignored.

### Information:

- The low battery shutdown time must be set to at least 60 seconds, so that the operating system has enough time to send the shutdown command to the UPS when the battery level is low (normally occurs after approximately 30 seconds).
- The low battery shutdown time can only be set in UPS firmware version 1.10 and later. UPS firmware version 1.08 always uses a turn off delay time of 180 seconds. UPS firmware versions earlier than 1.08 do not shut down automatically when the battery level is low.

## 9.4.7 Changing additional UPS settings

### UPS turn-off time - change

Under **Windows UPS Service**, you can enter the **turn-off time** in seconds. This is the length of time that the UPS waits before switching off the power supply. When a critical alarm occurs (e.g. at low battery level), the Windows UPS service will send a shutdown command with the turn off delay time to the UPS and will shut down the system.

### Information:

This time is evaluated by the Windows UPS Service, but can not be set in the UPS system settings of the energy options. This value should only be changed if the system requires longer than the default setting of 180 seconds to shut down.

## Caution!

The time entered must be longer than the time required to shut down the operating system.

### Activate UPS messages

Under **B&R UPS driver**, activate the checkbox **UPS status messages**. Any changes to the UPS status will then trigger a message from the B&R UPS driver.

### Information:

Shutting down the system is only reported by the Windows UPS Service. The UPS Service also sends other messages if they are activated in the UPS system settings energy options. These messages are only displayed when the Windows Alerter (Messenger)<sup>1)</sup> active and the PC is connected to a network. Additionally, some conditions of the B&R APC add-on UPS are not detected by the Windows UPS Service, and are therefore do not trigger messages (e.g. when there are no battery settings on the UPS). The Windows services can be found by opening the Control Panel and selecting "Services" from the Administrative Tools.

If the checkbox **Display UPS status with UPS monitor** is also activated, a new message is not displayed for every change, but only a general message and request for you to start the B&R UPS monitor. As long as the UPS monitor is active, no new messages are displayed.

### Information:

Regardless of these options, all changes to the UPS status are logged in Windows event protocol (under "Application").

## 9.4.8 Procedure following power failure

### Over current shutdown

If an over-current > 8 A is present during battery operation for a duration of 16 seconds, the over-current shutdown is executed. A turn-off time of one minute is available to the system.

If the supply is regenerated during this time, then the shut down process is aborted.

### Information:

The over-current shutdown has the highest priority.

### Low battery shutdown

If the LowBatteryFlag is set during power failure, then the "Low Battery" shutdown is executed. This prevents the rechargeable battery from dying. Once the turn-off time expires (3 minutes by default), the UPS shuts down.

If an "over-current" shutdown or "standard" shutdown is detected during the shutdown process, the "low battery" shutdown is replaced by the respective process.

### Standard shutdown

The standard shutdown is effective when the UPS service is active, the turn-off time is 3 minutes by default.

If the supply voltage returns during the turn-off time, then the shutdown procedure will be stopped.

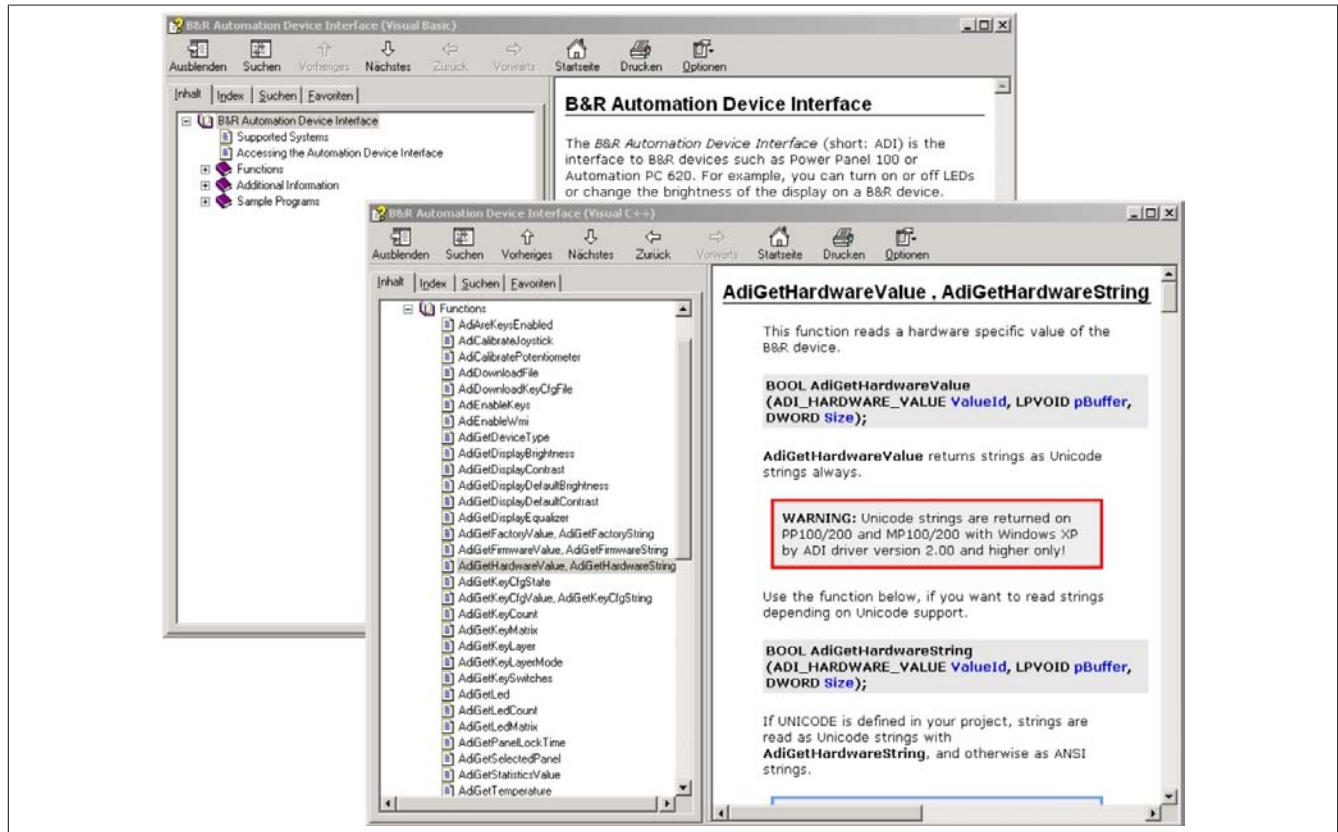
If the supply voltage returns during the shutdown process, then the shutdown timer will run until the APC810 enters standby mode and will then reboot the system.

<sup>1)</sup> The Windows Alerter is supported starting with B&R Windows Embedded Version 2.10 or higher.

## 10 B&R Automation Device Interface (ADI) Development Kit

This software can be used to activate functions in the B&R Automation Device Interface (ADI) from Windows applications, which were created using a development environment such as one of the following.

- Microsoft Visual C++ 6.0
- Microsoft Visual Basic 6.0
- Microsoft Embedded Visual C++ 4.0
- Microsoft Visual Studio 2005 (or newer)



Features:

- One Microsoft Visual Basic module with declarations for the ADI functions.
- Header files and Import libraries for Microsoft Visual C++
- Help files for Visual Basic and Visual C++.
- Sample projects for Visual Basic and Visual C++.
- ADI DLL (for testing the applications, if no ADI drive is installed).

Supports the following systems (Version 3.10 and higher):

- Automation PC 510
- Automation PC 511
- Automation PC 620
- Automation PC 810
- Automation PC 820
- Panel PC 300
- Panel PC 700
- Panel PC 800
- Power Panel 100/200
- Power Panel 300/400
- Power Panel 500
- Mobile Panel 40/50
- Mobile Panel 100/200

The ADI driver suitable for the device must be installed on the stated product series. The ADI driver is already included in the B&R images of embedded operating systems.

A detailed description of using the ADI functions can be found in the online help system.

The B&R Automation Device Interface (ADI) Development Kit is available in the Download area of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

## 11 B&R Automation Device Interface (ADI) .NET SDK

This software can be used to activate functions in the B&R Automation Device Interface (ADI) from .NET applications, which were created using Microsoft Visual Studio 2005 (or newer).

Supported programming languages:

- Visual Basic
- Visual C++
- Visual C#
- Visual J#

System requirements:

- Development system: PC with Windows XP/7 and
  - Microsoft Visual Studio 2005 (or newer)
  - Microsoft .NET Framework 2.0 and/or Microsoft .NET Compact Framework 2.0 (or newer)

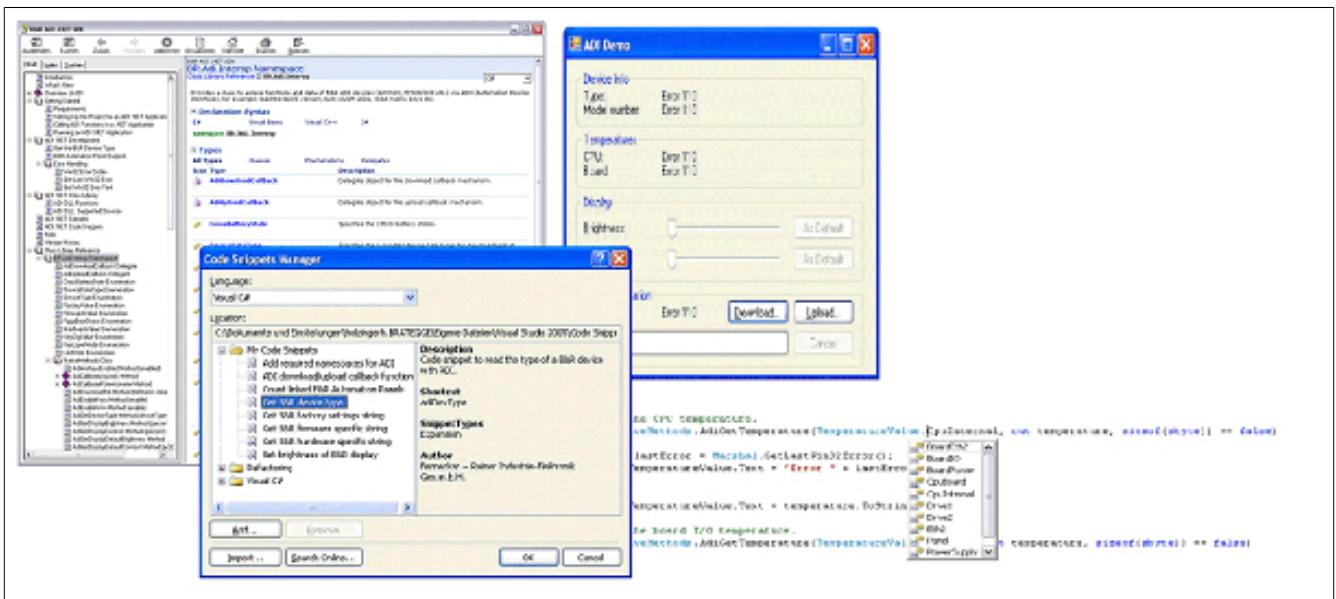


Image 119: ADI .NET SDK screenshots (Version 1.50)

Features:

- ADI .NET class library.
- Help files in HTML Help 1.0 format (.chm file) and MS Help 2.0 format (.HxS file). (Help documentation is in English)
- Sample projects and code snippets for Visual Basic, Visual C++, Visual C# and Visual J#.
- ADI DLL (for testing the applications, if no ADI drive is installed).

Supports following systems (Version 1.50 and higher):

- Automation PC 620
- Automation PC 810
- Automation PC 820
- Panel PC 300
- Panel PC 700
- Panel PC 800
- Power Panel 100/200
- Power Panel 300/400
- Power Panel 500
- Mobile Panel 40/50
- Mobile Panel 100/200

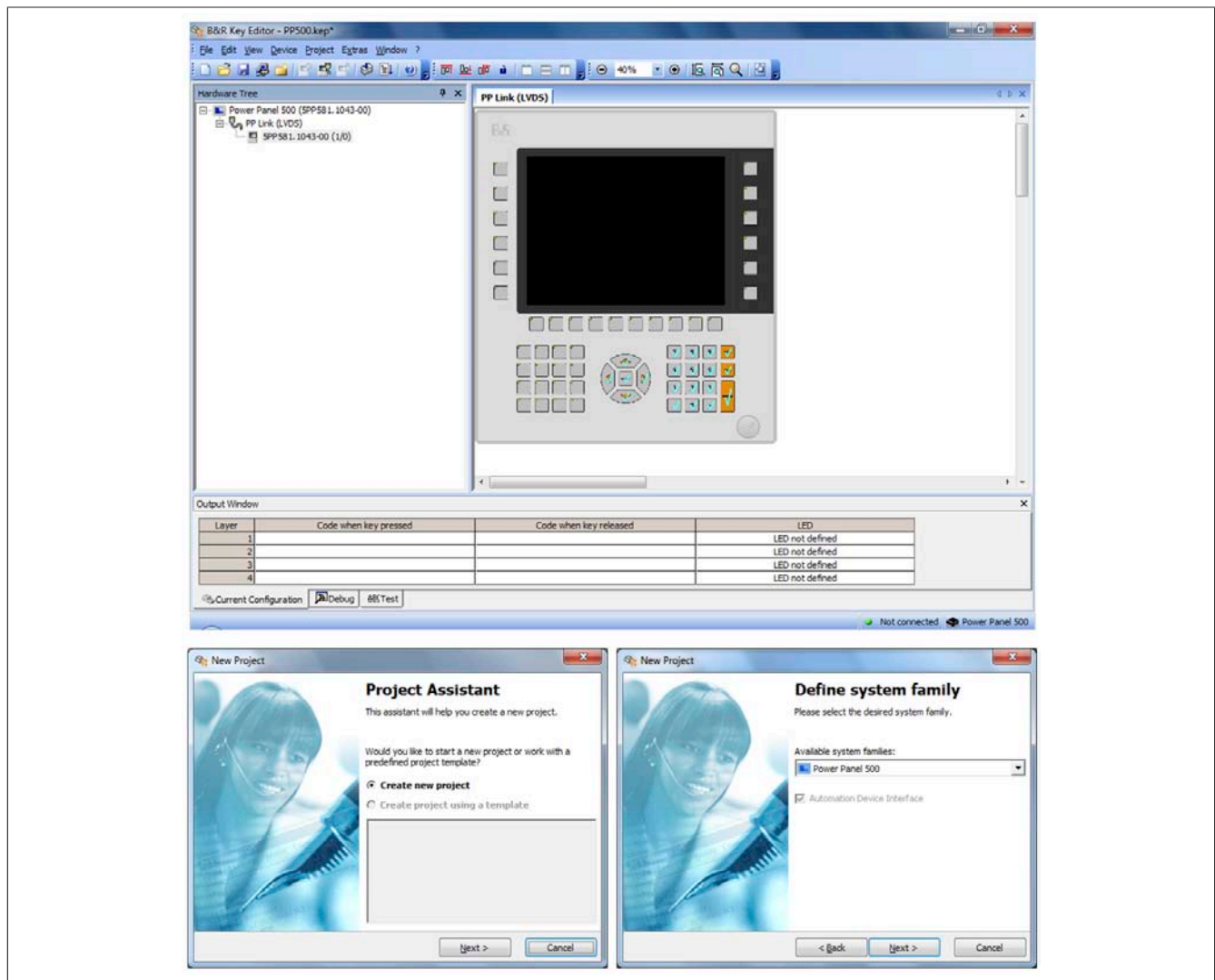
The ADI driver suitable for the device must be installed on the stated product series. The ADI driver is already included in the B&R images of embedded operating systems.

A detailed description of using the ADI functions can be found in the online help system.

ADI .NET SDK is available in the Downloads area of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

## 12 B&R Key Editor

On display units, it is often necessary to adjust the function keys and LEDs for the application software being used. The B&R Key Editor makes it quick and easy to adapt the application to a unique configuration.



### Features:

- Configuration of normal keys like on a keyboard (A, B, C, etc.)
- Keyboard shortcuts (CTRL+C, SHIFT+DEL, etc.) using only 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 and Panel PC devices

### Supports the following systems (Version 3.20):

- Automation PC 510
- Automation PC 511
- Automation PC 620
- Automation PC 810
- Automation PC 820
- Automation Panel 800
- Automation Panel 900
- IPC2000, IPC2001, IPC2002
- IPC5000, IPC5600
- IPC5000C, IPC5600C



- Mobile Panel 40/50
- Mobile Panel 100/200
- Panel PC 300
- Panel PC 700
- Panel PC 800
- Power Panel 100/200
- Power Panel 300/400
- Power Panel 500

A detailed guide for configuring keys and LEDs can be found in the B&R Key Editor's Online Help documentation. The B&R Key Editor is available in the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)). It can also be found on the B&R HMI Drivers & Utilities DVD (model number 5SWHMI.0000-00).

## Chapter 5 • Standards and certifications

### 1 Applicable European Directives

- EMC directive 2004/108/EG
- Low-voltage directive 2006/95/EC

### 2 Overview of standards

| Standard                | Description                                                                                                                                                                                                                                                                                                                   |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EN 55011<br>Class A     | Electromagnetic compatibility (EMC), radio disturbance product standard, industrial, scientific, and medical high-frequency devices (ISM devices), limit values and measurement procedure; group 1 (devices that do not create HF during material processing) and group 2 (devices that create HF during material processing) |
| EN 55022<br>Class A     | Electromagnetic compatibility (EMC), radio disturbance characteristics, information technology equipment (ITE devices), limits and methods of measurement                                                                                                                                                                     |
| EN 60060-2              | High-voltage test techniques - part 2: Measuring systems                                                                                                                                                                                                                                                                      |
| EN 60068-2-1            | Environmental testing - part 2: Tests; test A: Dry cold                                                                                                                                                                                                                                                                       |
| EN 60068-2-2            | Environmental testing - part 2: Tests; test B: Dry heat                                                                                                                                                                                                                                                                       |
| EN 60068-2-3            | Environmental testing - part 2: Tests; test and guidance: Damp heat, constant                                                                                                                                                                                                                                                 |
| EN 60068-2-6            | Environmental testing - part 2: Tests; test: Vibration (sinusoidal)                                                                                                                                                                                                                                                           |
| EN 60068-2-14           | Environmental testing - part 2: Tests; test N: Change of temperature                                                                                                                                                                                                                                                          |
| EN 60068-2-27           | Environmental testing - part 2: Tests; test and guidance: Shock                                                                                                                                                                                                                                                               |
| EN 60068-2-30           | Environmental testing - part 2: Tests; test and guidance: Damp heat, cyclic                                                                                                                                                                                                                                                   |
| EN 60068-2-31           | Environmental testing - part 2: Tests; test: Drop and topple, primarily for equipment-type specimens                                                                                                                                                                                                                          |
| EN 60068-2-32           | Environmental testing - part 2: Tests; test: Free fall                                                                                                                                                                                                                                                                        |
| EN 60204-1              | Safety of machinery, electrical equipment on machines - part 1: General requirements                                                                                                                                                                                                                                          |
| EN 60529                | Degree of protection provided by enclosures (IP code)                                                                                                                                                                                                                                                                         |
| EN 60664-1              | Insulation coordination for equipment within low-voltage systems - part 1: Principles, requirements and tests                                                                                                                                                                                                                 |
| EN 60721-3-2            | Classification of environmental conditions - part 3: Classification of groups of environmental parameters and their severities, section 2: Transport                                                                                                                                                                          |
| EN 60721-3-3            | Classification of environmental conditions - part 3: Classification of groups of environmental parameters and their severities, section 3: Stationary use at weather-protected locations                                                                                                                                      |
| EN 61000-3-2            | Electromagnetic compatibility (EMC) - part 3-2: Limits for harmonic current emissions (equipment input current $\leq 16$ A per phase)                                                                                                                                                                                         |
| EN 61000-3-3            | Electromagnetic compatibility (EMC) - part 3-3: Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, equipment with rated current $\leq 16$ A per phase, and not subject to conditional connection.                                                                          |
| EN 61000-4-2            | Electromagnetic compatibility (EMC) - part 4-2: Testing and measuring techniques; electrostatic discharge immunity test                                                                                                                                                                                                       |
| EN 61000-4-3            | Electromagnetic compatibility (EMC) - part 4-3: Testing and measuring techniques; radiated radio-frequency electromagnetic field immunity test                                                                                                                                                                                |
| EN 61000-4-4            | Electromagnetic compatibility (EMC) - part 4-4: Testing and measuring techniques; electrical fast transient/burst immunity test                                                                                                                                                                                               |
| EN 61000-4-5            | Electromagnetic compatibility (EMC) - part 4-5: Testing and measuring techniques; surge immunity test                                                                                                                                                                                                                         |
| EN 61000-4-6            | Electromagnetic compatibility (EMC) - part 4-6: Testing and measuring techniques; immunity to conducted disturbances, induced by radio-frequency fields                                                                                                                                                                       |
| EN 61000-4-8            | Electromagnetic compatibility (EMC) - part 4-8: Testing and measuring techniques; power frequency magnetic field immunity test                                                                                                                                                                                                |
| EN 61000-4-18           | Electromagnetic compatibility (EMC) - part 4-18: Testing and measuring techniques; damped oscillatory waves immunity test                                                                                                                                                                                                     |
| EN 61000-4-29           | Electromagnetic compatibility (EMC) - part 4-29: Testing and measuring techniques; voltage dips, short interruptions and voltage variations on DC input power port immunity tests                                                                                                                                             |
| EN 61000-6-2            | Electromagnetic compatibility (EMC), generic immunity standard - part 2: Industrial environment                                                                                                                                                                                                                               |
| EN 61000-6-4            | Electromagnetic compatibility (EMC), generic emission standard - part 2: Industrial environment                                                                                                                                                                                                                               |
| EN 61131-2              | Product standard, programmable logic controllers - part 2: Equipment requirements and tests                                                                                                                                                                                                                                   |
| Germanischer Lloyd 2003 | Germanischer Lloyd 2003: Supplementary provisions and guidelines - Part 7: Guidelines for type testing                                                                                                                                                                                                                        |
| UL 508                  | Industrial control equipment (UL = Underwriters Laboratories)                                                                                                                                                                                                                                                                 |
| 47 CFR                  | Federal Communications Commission (FCC), 47 CFR Part 15 Subpart B Class A                                                                                                                                                                                                                                                     |
| VCCI V-3                | Agreement of Voluntary Control Council for Interference by Information Technology Equipment; Class A                                                                                                                                                                                                                          |
| ICES 003                | Devices that cause interference - Digital devices; Class A                                                                                                                                                                                                                                                                    |

Table 173: Overview of standards

### 3 Emission requirements

| Emissions                                                                                                                                                                              | Test carried out in accordance with | Limits in accordance with                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Network-related emissions                                                                                                                                                              | EN 55011 / EN 55022                 | EN 61000-6-4: Generic standard (industrial areas)<br>EN 55011: Industrial, scientific, and medical (ISM) radio-frequency equipment, class A (industrial areas)<br>EN 55022: Information technology equipment (ITE devices), class A (industrial areas)<br>EN 61131-2: Programmable logic controllers<br>EN 50091-2: Uninterruptible power systems (UPS), class A<br>47 CFR Part 15 Subpart B Class A (FCC)<br>Germanischer Lloyd 2003 |
| Emissions, electromagnetic emissions                                                                                                                                                   | EN 55011 / EN 55022                 | EN 61000-6-4: Generic standard (industrial areas)<br>EN 55011: Industrial, scientific, and medical (ISM) radio-frequency equipment, class A (industrial areas)<br>EN 55022: Information technology equipment (ITE devices), class A (industrial areas)<br>EN 61131-2: Programmable logic controllers<br>EN 50091-2: Uninterruptible power systems (UPS), class A<br>47 CFR Part 15 Subpart B Class A (FCC)<br>Germanischer Lloyd 2003 |
| Harmonic current emissions for equipment with input current $\leq 16$ A per line                                                                                                       | EN 61000-3-2                        | EN 61000-3-2: Limits for harmonic current emissions (equipment input current $\leq 16$ A per phase)                                                                                                                                                                                                                                                                                                                                   |
| Voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, equipment with rated current $\leq 16$ A per phase, and not subject to conditional connection. | EN 61000-3-3                        | EN 61000-3-3: Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, equipment with rated current $\leq 16$ A per phase, and not subject to conditional connection Class A/D                                                                                                                                                                                                           |

Table 174: Overview of limits and testing guidelines for emissions

#### 3.1 Network-related emissions

| Tests in accordance with EN 55011 / EN 55022               | Limit values in accordance with EN 61000-6-4            | Limit values in accordance with EN 55011 Class A           | Limit values in accordance with EN 55022 Class A                                                          |
|------------------------------------------------------------|---------------------------------------------------------|------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| Power mains connections<br>150 kHz - 500 kHz               | -                                                       | 79 dB (μV) quasi-peak value<br>66 dB (μV) average value    | 79 dB (μV) quasi-peak value<br>66 dB (μV) average value                                                   |
| Power mains connections<br>500 kHz - 30 MHz                | -                                                       | 73 dB (μV) quasi-peak value<br>60 dB (μV) average value    | 73 dB (μV) quasi-peak value<br>60 dB (μV) average value                                                   |
| AC mains connections<br>150 kHz - 500 kHz                  | 79 dB (μV) quasi-peak value<br>66 dB (μV) average value | -                                                          | -                                                                                                         |
| AC mains connections<br>500 kHz - 30 MHz                   | 73 dB (μV) quasi-peak value<br>60 dB (μV) average value | -                                                          | -                                                                                                         |
| Other connections<br>150 kHz - 500 kHz                     | -                                                       | -                                                          | 97 - 87 dB (μV) and 53 - 43 dB (μA) quasi-peak value<br>84 - 74 dB (μV) and 40 - 30 dB (μA) average value |
| Other connections<br>500 kHz - 30 MHz                      | -                                                       | -                                                          | 87 dB (μV) and 43 dB (μA) quasi-peak value<br>74 dB (μV) and 30 dB (μA) average value                     |
| Tests in accordance with EN 55011 / EN 55022               | Limit values in accordance with IEC 61131-2             | Limits in accordance with 47 CFR Part 15 Subpart B class A |                                                                                                           |
| Power mains connections <sup>1)</sup><br>150 kHz - 500 kHz | -                                                       | -                                                          |                                                                                                           |
| Power mains connections<br>500 kHz - 30 MHz                | -                                                       | -                                                          |                                                                                                           |
| AC mains connections<br>150 kHz - 500 kHz                  | 79 dB (μV) quasi-peak value<br>66 dB (μV) average value | 79 dB (μV) quasi-peak value<br>66 dB (μV) average value    |                                                                                                           |
| AC mains connections<br>500 kHz - 30 MHz                   | 73 dB (μV) quasi-peak value<br>60 dB (μV) average value | 73 dB (μV) quasi-peak value<br>60 dB (μV) average value    |                                                                                                           |
| Other connections<br>150 kHz - 500 kHz                     | -                                                       | -                                                          |                                                                                                           |
| Other connections<br>500 kHz - 30 MHz                      | -                                                       | -                                                          |                                                                                                           |
| Test carried out in accordance with CISPR 16-1, 16-2       | Limit value in accordance with Germanischer Lloyd 2003  |                                                            |                                                                                                           |
| Mains connections 10 kHz - 150 kHz                         | 96 dB(μV) – 50 dB (μV)                                  |                                                            |                                                                                                           |
| Mains connections 150 kHz - 500 kHz                        | 60 dB(μV) – 50 dB (μV)                                  |                                                            |                                                                                                           |
| Mains connections 500 kHz - 30 MHz                         | 50 dB (μV)                                              |                                                            |                                                                                                           |

Table 175: Test requirements - Network-related emissions for industrial areas

1) AC network connections only with EN 61131-2

### 3.2 Emissions, electromagnetic emissions

| Tests in accordance with EN 55011 / EN 55022               | Limit values in accordance with EN 61000-6-4           | Limit values in accordance with EN 55011 Class A   | Limit values in accordance with EN 55022 Class A |
|------------------------------------------------------------|--------------------------------------------------------|----------------------------------------------------|--------------------------------------------------|
| 30 MHz - 230 MHz<br>measured at a distance of 10 m         | < 40 dB (µV/m)<br>Quasi-peak value                     | < 40 dB (µV/m)<br>Quasi-peak value                 | < 40 dB (µV/m)<br>Quasi-peak value               |
| 230 MHz - 1 GHz<br>measured at a distance of 10 m          | < 47 dB (µV/m)<br>Quasi-peak value                     | < 47 dB (µV/m)<br>Quasi-peak value                 | < 47 dB (µV/m)<br>Quasi-peak value               |
| Tests in accordance with EN 55011 / EN 55022               | Limit values in accordance with EN 61131-2             | Limit values in accordance with EN 50091-2 class A |                                                  |
| 30 MHz - 230 MHz<br>measured at a distance of 10 m         | < 40 dB (µV/m)<br>Quasi-peak value                     | < 40 dB (µV/m)<br>Quasi-peak value                 |                                                  |
| 230 MHz - 1 GHz<br>measured at a distance of 10 m          | < 47 dB (µV/m)<br>Quasi-peak value                     | < 47 dB (µV/m)<br>Quasi-peak value                 |                                                  |
| Test carried out                                           | Limits according to 47 CFR Part 15 Subpart B class A   |                                                    |                                                  |
| 30 MHz - 88 MHz<br>measured at a distance of 10 m          | < 90 dB (µV/m)<br>Quasi-peak value                     |                                                    |                                                  |
| 88 MHz - 216 MHz<br>measured at a distance of 10 m         | < 150 dB (µV/m)<br>Quasi-peak value                    |                                                    |                                                  |
| 216 MHz - 960 MHz<br>measured at a distance of 10 m        | < 210 dB (µV/m)<br>Quasi-peak value                    |                                                    |                                                  |
| > 960 MHz<br>measured at a distance of 10 m                | < 300 dB (µV/m)<br>Quasi-peak value                    |                                                    |                                                  |
| Test carried out in accordance with CISPR 16-1, CISPR 16-2 | Limit value in accordance with Germanischer Lloyd 2003 |                                                    |                                                  |
| 150 kHz - 300 kHz measured at a distance of 3 m            | < 80 dBµV/m - 52 dBµV/m quasi-peak value               |                                                    |                                                  |
| 300 kHz - 30 MHz measured at a distance of 3 m             | < 52 dBµV/m - 34 dBµV/m quasi-peak value               |                                                    |                                                  |
| 30 MHz - 2 GHz measured at a distance of 3 m               | < 54 dBµV/m quasi-peak value                           |                                                    |                                                  |
| except for 156 MHz - 165 MHz measured at a distance of 3 m | < 24 dBµV/m quasi-peak value                           |                                                    |                                                  |

Table 176: Test requirements - Electromagnetic emissions for industrial areas

## 4 Requirements for immunity to disturbances

| Immunity                                                         | Test carried out in accordance with | Limits in accordance with                                                                                                  |
|------------------------------------------------------------------|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| Electrostatic discharge (ESD)                                    | EN 61000-4-2                        | EN 61000-6-2: Generic standard (industrial areas)<br>EN 61131-2: Programmable logic controllers<br>Germanischer Lloyd 2003 |
| Immunity to high-frequency electro-magnetic fields (HF field)    | EN 61000-4-3                        | EN 61000-6-2: Generic standard (industrial areas)<br>EN 61131-2: Programmable logic controllers<br>Germanischer Lloyd 2003 |
| Immunity to high-speed transient electrical disturbances (burst) | EN 61000-4-4                        | EN 61000-6-2: Generic standard (industrial areas)<br>EN 61131-2: Programmable logic controllers<br>Germanischer Lloyd 2003 |
| Immunity to surge voltages                                       | EN 61000-4-5                        | EN 61000-6-2: Generic standard (industrial areas)<br>EN 61131-2: Programmable logic controllers<br>Germanischer Lloyd 2003 |
| Immunity to conducted disturbances                               | EN 61000-4-6                        | EN 61000-6-2: Generic standard (industrial areas)<br>EN 61131-2: Programmable logic controllers<br>Germanischer Lloyd 2003 |
| Immunity against magnetic fields with electrical frequencies     | EN 61000-4-8                        | EN 61000-6-2: Generic standard (industrial areas)<br>EN 61131-2: Programmable logic controllers<br>Germanischer Lloyd 2003 |
| Immunity to damped oscillatory waves                             | EN 61000-4-18                       | EN 61131-2: Programmable logic controllers                                                                                 |
| Immunity to voltage fluctuations                                 | EN 61000-4-29                       | EN 61131-2: Programmable logic controllers<br>Germanischer Lloyd 2003                                                      |
| Immunity to voltage dips                                         | EN 61000-4-29                       | EN 61131-2: Programmable logic controllers<br>Germanischer Lloyd 2003                                                      |
| Immunity to supply voltage changes                               | EN 61131-2                          | EN 61131-2: Programmable logic controllers                                                                                 |
| Immunity to gradual shutdown/startup                             | EN 61131-2                          | EN 61131-2: Programmable logic controllers                                                                                 |

Table 177: Overview of limits and testing guidelines for immunity

### Evaluation criteria in accordance with EN 61000-6-2

#### Criteria A:

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

#### Criteria B:

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

#### Criteria C:

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

#### Criteria D:

Degradation or failure of functionality which can no longer be restored (operating equipment destroyed).

### 4.1 Electrostatic discharge (ESD)

| Tests in accordance with IEC 61000-4-2                          | Limit values in accordance with EN 61000-6-2 | Limit values in accordance with IEC 61131-2 | Limit value in accordance with Germanischer Lloyd 2003 |
|-----------------------------------------------------------------|----------------------------------------------|---------------------------------------------|--------------------------------------------------------|
| Contact discharge to powder-coated and bare metal housing parts | ±4 kV, 10 discharges, criteria B             | ±4 kV, 10 discharges, criteria B            | ±6 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 178: Test requirements - Electrostatic discharge (ESD)

### 4.2 High-frequency electromagnetic fields (HF field)

| Tests in accordance with IEC 61000-4-3 | Limit values in accordance with EN 61000-6-2                                                | Limit values in accordance with IEC 61131-2                                                                                                        | Limit value in accordance with Germanischer Lloyd 2003                         |
|----------------------------------------|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| Housing, completely wired              | 80 MHz - 1 GHz, 10 V/m, 80% amplitude modulation with 1 kHz, 3 seconds duration, criteria A | 2 GHz - 2.7 GHz, 1 V/m,<br>14 GHz - 2 GHz, 3 V/m,<br>80 MHz - 1 GHz, 10 V/m,<br>80% amplitude modulation with 1 kHz, 3 second duration, criteria A | 80 MHz - 2 GHz, 10V/m, 80% amplitude modulation with 1kHz, 1%/3sec, criteria A |

Table 179: Test requirements - High-frequency electromagnetic fields (HF field)

### 4.3 High-speed transient elect. disturbance value (burst)

| Tests in accordance with IEC 61000-4-4                    | Limit values in accordance with EN 61000-6-2 | Limit values in accordance with IEC 61131-2 | Limit values in accordance with Germanischer Lloyd 2003 |
|-----------------------------------------------------------|----------------------------------------------|---------------------------------------------|---------------------------------------------------------|
| AC mains inputs/outputs                                   | ±2 kV, criteria B                            | ±2 kV, criteria B                           | -                                                       |
| AC power inputs                                           | -                                            | ±2 kV, criteria B                           | ±2 kV, criteria B                                       |
| DC mains inputs/outputs >3 m <sup>1)</sup>                | ±2 kV, criteria B                            | ±2 kV, criteria B                           | -                                                       |
| DC power outputs                                          | -                                            | -                                           | ±2 kV, criteria B                                       |
| Functional ground connections, signal lines and I/Os >3 m | ±1 kV, criteria B                            | ±1 kV, criteria B                           | ±1 kV, criteria B                                       |
| Unshielded AC inputs/outputs >3 m                         | ±2 kV, criteria B                            | ±2 kV, criteria B                           | -                                                       |
| Analog I/O                                                | ±1 kV, criteria B                            | ±1 kV, criteria B                           | ±1 kV, criteria B                                       |

Table 180: Test requirements - High-speed transient electrical disturbances (burst)

1) For EN 55024 without length limitation.

### 4.4 Surge voltages (surge)

| Tests in accordance with IEC 61000-4-5   | Limit values in accordance with EN 61000-6-2 | Limit values in accordance with IEC 61131-2 | Limit values in accordance with Germanischer Lloyd 2003 |
|------------------------------------------|----------------------------------------------|---------------------------------------------|---------------------------------------------------------|
| AC power I/O, L to L                     | ±1 kV, criteria B                            | ±1 kV, criteria B                           | -                                                       |
| AC power I/O, L to PE                    | ±2 kV, criteria B                            | ±2 kV, criteria B                           | -                                                       |
| DC mains inputs/outputs, L+ to L-, >30 m | ±1 kV, criteria B                            | ±1 kV, criteria B                           | -                                                       |
| DC mains inputs/outputs, L to PE, >30 m  | ±2 kV, criteria B                            | ±2 kV, criteria B                           | -                                                       |
| DC power inputs, L+ to L-                | -                                            | -                                           | ±0.5 kV, Kriterium A                                    |
| DC power inputs, L to PE                 | -                                            | -                                           | ±1 kV, Kriterium A                                      |
| Signal connections >30 m                 | ±1 kV, criteria B                            | ±1 kV, criteria B                           | -                                                       |
| All shielded cables                      | ±1 kV, criteria B                            | ±1 kV, criteria B                           | -                                                       |

Table 181: Test requirements - Surge voltages

### 4.5 Conducted disturbances

| Tests in accordance with IEC 61000-4-6 | Limit values in accordance with EN 61000-6-2                                                | Limit values in accordance with IEC 61131-2                                                | Limit value in accordance with Germanischer Lloyd 2003                                                  |
|----------------------------------------|---------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
| AC mains inputs/outputs                | 150 kHz - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, 3 seconds duration, criteria A | 150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, 3 seconds duration, criteria A | 150 kHz - 80 MHz, 10 V <sup>1)</sup> 80% amplitude modulation with 1 kHz, 3 second duration, criteria A |
| DC mains inputs/outputs                | 150 kHz - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, 3 seconds duration, criteria A | 150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, 3 seconds duration, criteria A | 150 kHz - 80 MHz, 10 V <sup>1)</sup> 80% amplitude modulation with 1 kHz, 3 second duration, criteria A |
| Functional ground connection           | 150 kHz - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, 3 seconds duration, criteria A | 150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, 3 seconds duration, criteria A | 150 kHz - 80 MHz, 10 V <sup>1)</sup> 80% amplitude modulation with 1 kHz, 3 second duration, criteria A |
| Signal connections >3 m                | 150 kHz - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, 3 seconds duration, criteria A | 150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, 3 seconds duration, criteria A | 150 kHz - 80 MHz, 10 V <sup>1)</sup> 80% amplitude modulation with 1 kHz, 3 second duration, criteria A |

Table 182: Test requirements - Conducted disturbances

1) Increase carrier signal voltage to 10Veff in accordance with IEC 60945 at following frequencies: 2MHz; 3MHz; 4MHz; 6,2 MHz; 8,2MHz; 12,6MHz; 16,5MHz; 18,8 MHz; 22MHz; 25MHz

### 4.6 Magnetic fields with electrical frequencies

| Tests according to IEC 61000-4-8                                 | Limit values according to EN 61000-6-2 | Limit value according to IEC 61131-2 |  |
|------------------------------------------------------------------|----------------------------------------|--------------------------------------|--|
| Test direction x, test in the field of an induction coil 1m x 1m | 30 A/m, criteria A                     | 30 A/m, criteria A                   |  |
| Test direction y, test in the field of an induction coil 1m x 1m | 30 A/m, criteria A                     | 30 A/m, criteria A                   |  |
| Test direction z, test in the field of an induction coil 1m x 1m | 30 A/m, criteria A                     | 30 A/m, criteria A                   |  |

Table 183: Test requirements - Magnetic fields with electrical frequencies

### 4.7 Voltage fluctuations

| Tests in accordance with IEC 61000-4-29 | Limit values in accordance with IEC 61131-2                                                      | Limit value in accordance with Germanischer Lloyd 2003  |  |
|-----------------------------------------|--------------------------------------------------------------------------------------------------|---------------------------------------------------------|--|
| Power supply connections                | 30 min at 0.85 x U <sub>e</sub> or 1.2 x U <sub>e</sub><br>Constant ripple 0.05 x U <sub>e</sub> | 30 min at 0.75 x U <sub>e</sub> or 1.3 x U <sub>e</sub> |  |

Table 184: Test requirements - Voltage fluctuations

## 4.8 Voltage dips

| Tests in accordance with IEC 61000-4-29 | Limit values in accordance with IEC 61131-2 | Limit value in accordance with Germanischer Lloyd 2003 |  |
|-----------------------------------------|---------------------------------------------|--------------------------------------------------------|--|
| DC power inputs                         | 20 interruptions for 10 ms (PS2)            | 3 interruptions for 30 s in 5 min                      |  |

Table 185: Test requirements - Voltage dips

## 4.9 Changed supply voltage

| Tests in accordance with EN 61131-2 | Limit values in accordance with IEC 61131-2                            |  |  |
|-------------------------------------|------------------------------------------------------------------------|--|--|
| Power supply connections            | 100% to 90% /60s - 90% to 100% /60s<br>100% to 0% /5s - 0% to 100% /5s |  |  |

Table 186: Test requirements - Changed supply voltage

## 4.10 Turning off and back on

| Tests in accordance with EN 61131-2 | Limit values in accordance with IEC 61131-2 |  |  |
|-------------------------------------|---------------------------------------------|--|--|
| Supply voltage                      | 100% to 0% /60s - 0% to 100% /60s           |  |  |

Table 187: Test requirements - Turning off and back on

## 4.11 Damped oscillatory waves

| Tests in accordance with IEC 61000-4-18 | Limit values in accordance with IEC 61131-2                                           |  |  |
|-----------------------------------------|---------------------------------------------------------------------------------------|--|--|
| Mains inputs/outputs, L to L            | ±1 kV, 1 MHz, repeat rate 400/sec, length 2 sec, connection lengths 2 m, criteria B   |  |  |
| Power I/O, L to PE                      | ±2.5 kV, 1 MHz, repeat rate 400/sec, length 2 sec, connection lengths 2 m, criteria B |  |  |

Table 188: Test requirements - Damped oscillatory waves

## 5 Mechanical conditions

| Vibration                             | Test carried out in accordance with | Limits in accordance with                                                  |
|---------------------------------------|-------------------------------------|----------------------------------------------------------------------------|
| Vibration operation                   | EN 60068-2-6                        | EN 61131-2: Programmable logic controllers<br>EN 60721-3-3 class 3M4       |
| Vibration during transport (packaged) | EN 60068-2-6                        | EN 60721-3-2 class 2M1<br>EN 60721-3-2 class 2M2<br>EN 60721-3-2 class 2M3 |
| Shock during operation                | EN 60068-2-27                       | EN 61131-2: Programmable logic controllers<br>EN 60721-3-3 class 3M4       |
| Shock during transport (packaged)     | EN 60068-2-27                       | EN 60721-3-2 class 2M1<br>EN 60721-3-2 class 2M2<br>EN 60721-3-2 class 2M3 |
| Toppling (packaged)                   | EN 60068-2-31                       | EN 60721-3-2 class 2M1<br>EN 60721-3-2 class 2M2<br>EN 60721-3-2 class 2M3 |
| Free fall (packaged)                  | EN 60068-2-32                       | EN 61131-2: Programmable logic controllers                                 |

Table 189: Overview of limits and testing guidelines for vibration

### 5.1 Vibration operation

| Tests in accordance with IEC 60068-2-6                                                                              | Limit values in accordance with IEC 61131-2 |                    | Limit values in accordance with 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                                |                    |
|                                                                                                                     | <b>Frequency</b>                            | <b>Limit value</b> | <b>Frequency</b>                                       | <b>Limit value</b> |
|                                                                                                                     | 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 190: Test requirements - Vibration during operation

### 5.2 Vibration during transport (packaged)

| Tests in accordance with IEC 60068-2-6                                                         | Limit values in accordance with EN 60721-3-2 Class 2M1 |                    | Limit values in accordance with EN 60721-3-2 Class 2M2 |                    | Limit values in accordance with 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                      |                    |
|                                                                                                | <b>Frequency</b>                                       | <b>Limit value</b> | <b>Frequency</b>                                       | <b>Limit value</b> | <b>Frequency</b>                                       | <b>Limit value</b> |
|                                                                                                | 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 15 g  | 200 - 500 Hz                                           | Acceleration 15 g  | 200 - 500 Hz                                           | Acceleration 4 g   |

Table 191: Test requirements - Vibration during transport (packaged)

### 5.3 Shock during operation

| Tests in accordance with IEC 60068-2-27                                  | Limit values in accordance with IEC 61131-2     | Limit values in accordance with EN 60721-3-3 Class 3M4 |
|--------------------------------------------------------------------------|-------------------------------------------------|--------------------------------------------------------|
| Shock during operation: Pulse (half-sine) stress in all 3 axes (x, y, z) | Acceleration 15 g,<br>Duration 11 ms, 18 shocks | Acceleration 10 g,<br>Duration 11 ms                   |

Table 192: Test requirements - Shock during operation

### 5.4 Shock during transport (packaged)

| Tests in accordance with IEC 60068-2-27          | Limit values in accordance with EN 60721-3-2 Class 2M1        | Limit values in accordance with EN 60721-3-2 Class 2M2       |
|--------------------------------------------------|---------------------------------------------------------------|--------------------------------------------------------------|
| Pulse (half-sine) stress in all 3 axes (x, y, z) | Acceleration 10 g,<br>Duration 11 ms, each 3 shocks, packaged | Acceleration 30 g,<br>Duration 6 ms, each 3 shocks, packaged |

Table 193: Test requirements - Shock during transport



## 5.5 Toppling

| Tests according to IEC 60068-2-31 | Limit values according to EN 60721-3-2 Class 2M1 |                 | Limit values according to EN 60721-3-2 Class 2M2 |                 | Limit values according to EN 60721-3-2 Class 2M3 |                 |
|-----------------------------------|--------------------------------------------------|-----------------|--------------------------------------------------|-----------------|--------------------------------------------------|-----------------|
| Drop and topple                   | Devices: Drop/topple on each edge. packaged      |                 | Devices: Drop/topple on each edge. packaged      |                 | Devices: Drop/topple on each edge. packaged      |                 |
|                                   | <b>Weight</b>                                    | <b>Required</b> | <b>Weight</b>                                    | <b>Required</b> | <b>Weight</b>                                    | <b>Required</b> |
|                                   | < 20 kg                                          | Yes             | < 20 kg                                          | Yes             | < 20 kg                                          | Yes             |
|                                   | 20 - 100 kg                                      | -               | 20 - 100 kg                                      | Yes             | 20 - 100 kg                                      | Yes             |
|                                   | > 100 kg                                         | -               | > 100 kg                                         | -               | > 100 kg                                         | Yes             |

Table 194: Test requirements - Toppling

## 5.6 Free fall (packaged)

| Tests in accordance with IEC 60068-2-32 | Limit values in accordance with IEC 61131-2            |               | Limit values in accordance with EN 60721-3-2 Class 2M1 |               | Limit values in accordance with EN 60721-3-2 Class 2M2 |               |
|-----------------------------------------|--------------------------------------------------------|---------------|--------------------------------------------------------|---------------|--------------------------------------------------------|---------------|
| Free fall                               | Devices with delivery packaging each with 5 fall tests |               | Devices packaged                                       |               | Devices packaged                                       |               |
|                                         | <b>Weight</b>                                          | <b>Height</b> | <b>Weight</b>                                          | <b>Height</b> | <b>Weight</b>                                          | <b>Height</b> |
|                                         | < 10 kg                                                | 1.0 m         | < 20 kg                                                | 0.25 m        | < 20 kg                                                | 1.2 m         |
|                                         | 10 - 40 kg                                             | 0.5 m         | 20 - 100 kg                                            | 0.25 m        | 20 - 100 kg                                            | 1.0 m         |
|                                         | > 40 kg                                                | 0.25 m        | > 100 kg                                               | 0.1 m         | > 100 kg                                               | 0.25 m        |
|                                         | Devices with product packaging each with 5 fall tests  |               |                                                        |               |                                                        |               |
|                                         | <b>Weight</b>                                          | <b>Height</b> |                                                        |               |                                                        |               |
|                                         | < 10 kg                                                | 0.3 m         |                                                        |               |                                                        |               |
|                                         | 10 - 40 kg                                             | 0.3 m         |                                                        |               |                                                        |               |
|                                         | > 40 kg                                                | 0.25 m        |                                                        |               |                                                        |               |

Table 195: Test requirements - Free fall

## 6 Climate conditions

| Temperature and humidity              | Test carried out in accordance with | Limits in accordance with                  |
|---------------------------------------|-------------------------------------|--------------------------------------------|
| Worst case operation                  | UL 508                              | UL 508: Industrial control equipment       |
| 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 |
| Constant humid heat (storage)         | EN 60068-2-3                        | EN 61131-2: Programmable logic controllers |

Table 196: Overview of limits and testing guidelines for temperature and humidity

### 6.1 Worst case operation

| Tests according to UL 508                                                                                                                     | Limit values according to UL 508                                             | Limit values in accordance with IEC 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)<br>duration approx. 5 hours | 3 hours at max. ambient temperature (min. +40°C)<br>duration approx. 5 hours |  |

Table 197: Test requirements - Worst case during operation

### 6.2 Dry heat

| Tests in accordance with IEC 60068-2-2 | Limit values in accordance with IEC 61131-2                                                                      |  |  |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------|--|--|
| Dry heat                               | 16 hours at +70°C for 1 cycle, then 1 hour acclimatization and function testing, duration approximately 17 hours |  |  |

Table 198: Test requirements - Dry heat

### 6.3 Dry cold

| Tests in accordance with IEC 60068-2-1 | Limit values in accordance with IEC 61131-2                                                                      |  |  |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------|--|--|
| Dry cold                               | 16 hours at -40°C for 1 cycle, then 1 hour acclimatization and function testing, duration approximately 17 hours |  |  |

Table 199: Test requirements - Dry cold

### 6.4 Large temperature fluctuations

| Tests in accordance with IEC 60068-2-14 | Limit values in accordance with IEC 61131-2                                                                                         |  |  |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|--|--|
| Large temperature fluctuations          | 3 hours at -40°C and 3 hours at +70°C, 5 cycles, then 2 hours acclimatization and function testing, duration approximately 14 hours |  |  |

Table 200: Test requirements - Large temperature fluctuations

### 6.5 Temperature fluctuations in operation

| Tests in accordance with IEC 60068-2-14                                                                                            | Limit values in accordance with IEC 61131-2                                                                                                                                    |  |  |
|------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| Open devices: These can also have a housing and are installed in control cabinets                                                  | 3 hours at +5°C and 3 hours at 55°C, 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 appropriate 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 201: Test requirements - Temperature fluctuations during operation

## 6.6 Humid heat, cyclic

| Tests in accordance with IEC 60068-2-30 | Limit values in accordance with IEC 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 202: Test requirements - Humid heat, cyclic

## 6.7 Humid heat, constant (Storage)

| Tests in accordance with IEC 60068-2-3 | Limit values in accordance with IEC 61131-2                                                          |  |  |
|----------------------------------------|------------------------------------------------------------------------------------------------------|--|--|
| Constant humid heat (storage)          | 48 hours at +40°C and 92.5% RH, then insulation test within 3 hours, duration approximately 49 hours |  |  |

Table 203: Test requirements - Humid heat, constant (storage)

## 7 Safety

| Safety                      | Test carried out according to | Limits according to                                                                        |
|-----------------------------|-------------------------------|--------------------------------------------------------------------------------------------|
| Ground resistance           | EN 61131-2                    | EN 60204-1: Electrical equipment of machines<br>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<br>UL 508: Industrial control equipment         |
| Residual voltage            | EN 61131-2                    | EN 60204-1: Electrical equipment of machines<br>EN 61131-2: Programmable logic controllers |
| Leakage current             |                               | VDE 0701-1: Service, changes and testing of electrical devices                             |
| Overload                    | UL 508                        | EN 61131-2: Programmable logic controllers<br>UL 508: Industrial control equipment         |
| Simulation component defect | UL 508                        | EN 61131-2: Programmable logic controllers<br>UL 508: Industrial control equipment         |

Table 204: Overview of limits and testing guidelines for safety

### 7.1 Ground resistance

| Tests according to EN 61131-2                                           | Limit values in accordance with IEC 60204-1                                                     |                                                         | Limit value according to IEC 61131-2 |
|-------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|---------------------------------------------------------|--------------------------------------|
| Ground resistance: housing (from any metal part to the ground terminal) | Smallest effective cross section of the protective ground conductor for the branch being tested | Maximum measured voltage drop at a test current of 10 A | Test current 30 A for 2 min, < 0.1 Ω |
|                                                                         | 1.0 mm <sup>2</sup>                                                                             | 3.3 V                                                   |                                      |
|                                                                         | 1.5 mm <sup>2</sup>                                                                             | 2.6 V                                                   |                                      |
|                                                                         | 2.5 mm <sup>2</sup>                                                                             | 1.9 V                                                   |                                      |
|                                                                         | 4.0 mm <sup>2</sup>                                                                             | 1.4 V                                                   |                                      |
|                                                                         | > 6.0 mm <sup>2</sup>                                                                           | 1.0 V                                                   |                                      |

Table 205: Test requirements - Ground resistance

### 7.2 Insulation resistance

| Test carried out                                                    | Limit values in accordance with IEC 60204-1 |  |  |
|---------------------------------------------------------------------|---------------------------------------------|--|--|
| Insulation resistance: main circuits to protective ground conductor | > 1 MΩ at 500 VDC                           |  |  |

Table 206: Test requirements - Insulation resistance

### 7.3 High voltage

| Tests according to EN 60060-1                                                                                                                                                                                       | Limit values in accordance with IEC 61131-2 |                              |           |           | Limit values 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 peak voltage surge | AC, 1 min | DC, 1 min |                                  | AC, 1 min                      | AC, 1 min                              |
|                                                                                                                                                                                                                     | 0 - 50 VAC<br>0 - 60 VDC                    | 850 V                        | 510 V     | 720 V     | ≤ 50 V                           | 500 V                          | 707 V                                  |
|                                                                                                                                                                                                                     | 50 - 100 VAC<br>60 - 100 VDC                | 1360 V                       | 740 V     | 1050 V    | >50 V                            | 1000 V<br>+ 2 x U <sub>N</sub> | (1000 V + 2 x U <sub>N</sub> ) x 1.414 |
|                                                                                                                                                                                                                     | 100 - 150 VAC<br>100 - 150 VDC              | 2550 V                       | 1400 V    | 1950 V    |                                  |                                |                                        |
|                                                                                                                                                                                                                     | 150 - 300 VAC<br>150 - 300 VDC              | 4250 V                       | 2300 V    | 3250 V    |                                  |                                |                                        |
|                                                                                                                                                                                                                     | 300 - 600 VAC<br>300 - 600 VDC              | 6800 V                       | 3700 V    | 5250 V    |                                  |                                |                                        |
|                                                                                                                                                                                                                     | 600 - 1000 VAC<br>600 - 1000 VDC            | 10200 V                      | 5550 V    | 7850 V    |                                  |                                |                                        |

Table 207: Test requirements - High voltage

### 7.4 Residual voltage

| Tests according to EN 61131-2        | Limit value according to IEC 60204-1                                | Limit value according to IEC 61131-2                                |  |
|--------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|--|
| Residual voltage after switching off | < 60 V after 5 sec (active parts)<br>< 60 V after 1 sec (plug pins) | < 60 V after 5 sec (active parts)<br>< 60 V after 1 sec (plug pins) |  |

Table 208: Test requirements - Residual voltage

## 7.5 Leakage current

| Test carried out                 | Limit value according to VDE 0701-1 |  |  |
|----------------------------------|-------------------------------------|--|--|
| Leakage current: Phase to ground | < 3.5 mA                            |  |  |

Table 209: Test requirements - Leakage current

## 7.6 Overload

| Tests according to UL 508      | Limit value according to IEC 61131-2                   | Limit values according to UL 508                       |  |
|--------------------------------|--------------------------------------------------------|--------------------------------------------------------|--|
| Overload of transistor outputs | 50 switches, 1.5 I <sub>N</sub> , 1 sec ON / 9 sec OFF | 50 switches, 1.5 I <sub>N</sub> , 1 sec ON / 9 sec OFF |  |

Table 210: Test requirements - Overload

## 7.7 Defective component

| Tests according to UL 508                                     | Limit value according to IEC 61131-2                                | Limit values according to UL 508                                    |  |
|---------------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|--|
| Simulation of how components in power supply became defective | Non-flammable surrounding cloth<br>No contact with conductive parts | Non-flammable surrounding cloth<br>No contact with conductive parts |  |

Table 211: Test requirements - Defective component

## 8 Other tests

| Other tests         | Test carried out in accordance with | Limits in accordance with                                                                                                 |
|---------------------|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| Protection          | -                                   | EN 60529: Degree of protection provided by enclosures (IP code)                                                           |
| Degree of pollution | -                                   | EN 60664-1: Insulation coordination for equipment within low-voltage systems - part 1: Principles, requirements and tests |

Table 212: Overview of limits and testing guidelines for other tests

### 8.1 Protection

| Test carried out in accordance with                            | Limit values in accordance with EN 60529                                      | Limit values in accordance with EN 60529                           |  |
|----------------------------------------------------------------|-------------------------------------------------------------------------------|--------------------------------------------------------------------|--|
| Protection of the operating equipment                          | IP2.<br>Protection against large solid foreign bodies $\geq 12.5$ mm diameter | IP6.<br>No penetration of dust<br>-> Dust-proof                    |  |
| Protection of personnel                                        | IP2.<br>Protection against touching dangerous parts with fingers              | IP6.<br>Protection against touching dangerous parts with conductor |  |
| Protection against water permeation with damaging consequences | IP0.<br>Not protected                                                         | IP5.<br>Protection against water jets                              |  |

Table 213: 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<br> | 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<br>         | All harmonized EN standards for the applicable directives are met.                                                                                                                                                                         |

Table 214: International certifications

## Chapter 6 • Accessories

The following accessories have passed B&R's functional testing and are approved for use with this device. Nevertheless, it is important to observe any limitations that may apply to the complete device when operated with different components. When operating the complete device, it is the specifications for the individual components that must be adhered to.

All components listed in this manual have been subjected to extensive system and compatibility testing and are approved for use. B&R can make no guarantee regarding the functionality of non-approved accessories.

### 1 Replacement CMOS batteries

#### 1.1 0AC201.91 / 4A0006.00-000

##### 1.1.1 General information

This lithium battery is needed to back BIOS CMOS data and the real-time clock (RTC).

The battery is subject to wear and must be replaced when the battery power ("Bad" status) is insufficient.

##### 1.1.2 Order data

| Model number  | Short description                                                                                                                                                                                                                                                                                                                                 | Image                                                                                |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|               | <b>Batteries</b>                                                                                                                                                                                                                                                                                                                                  |                                                                                      |
| 0AC201.91     | Lithium batteries 4 pieces, 3 V / 950 mAh button cell Hereby we declare that the Lithium cells contained in this shipment qualify as „partly regulated“. Handle with care. If the package is damaged, inspect cells, repack intact cells and protect cells against short circuits. For emergency information, call RENATA SA at + 41 61 319 28 27 |  |
| 4A0006.00-000 | Lithium battery, 3 V / 950 mAh, button cell                                                                                                                                                                                                                                                                                                       |                                                                                      |

Table 215: 0AC201.91, 4A0006.00-000 - Order data

##### 1.1.3 Technical data

#### Warning!

Replace battery with Renata, type CR2477N only. Use of another battery may present a risk of fire or explosion.

Battery may explode if mistreated. Do not recharge, disassemble or dispose of in fire.

#### Information:

The following characteristics, features and limit values only apply to this accessory and can deviate from those specified for the entire device.

|                            |                        |               |
|----------------------------|------------------------|---------------|
| Product ID                 | 0AC201.91              | 4A0006.00-000 |
| General information        |                        |               |
| Storage time               | Max. 3 years at 30°C   |               |
| Electrical characteristics |                        |               |
| Capacity                   | 950 mAh                |               |
| Self discharging           | <1% per year (at 23°C) |               |
| Voltage range              | 3V                     |               |
| Environmental conditions   |                        |               |
| Temperature<br>Storage     | -20 to 60°C            |               |
| Relative humidity          |                        |               |
| Operation                  | 0 to 95%               |               |
| Storage                    | 0 to 95%               |               |
| Transport                  | 0 to 95%               |               |

Table 216: 0AC201.91, 4A0006.00-000 - Technical data



## 2 Power connectors

### 2.1 0TB103.9x

#### 2.1.1 General information

The single row 3-pin terminal block TB103 is used to connect the supply voltage.

#### 2.1.2 Order data

| Model number | Short description                                                                                                    | Image                                                                               |
|--------------|----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|              | <b>Terminal blocks</b>                                                                                               |                                                                                     |
| 0TB103.9     | Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm <sup>2</sup> , protected against vibration by the screw flange |  |
| 0TB103.91    | Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm <sup>2</sup> , protected against vibration by the screw flange  |                                                                                     |

Table 217: 0TB103.9, 0TB103.91 - Order data

#### 2.1.3 Technical data

##### Information:

The following characteristics, features and limit values only apply to this accessory and can deviate from those specified for the entire device.

| Product ID                             | 0TB103.9                                                                        | 0TB103.91                 |
|----------------------------------------|---------------------------------------------------------------------------------|---------------------------|
| <b>Terminal block</b>                  |                                                                                 |                           |
| Note                                   | Protected against vibration by the screw flange<br>Rated values according to UL |                           |
| Number of pins                         | 3 (female)                                                                      |                           |
| Type of terminal                       | Screw clamps                                                                    | Cage clamps <sup>1)</sup> |
| Cable type                             | Copper wires only (no aluminum wires!)                                          |                           |
| Distance between contacts              | 5.08 mm                                                                         |                           |
| Connection cross section               |                                                                                 |                           |
| AWG wire                               | 26 to 12 AWG                                                                    |                           |
| Wire tip sleeves with plastic covering | 0.20 to 1.50 mm <sup>2</sup>                                                    |                           |
| Solid wire line                        | 0.20 to 2.50 mm <sup>2</sup>                                                    |                           |
| Fine wire line                         | 0.20 to 1.50 mm <sup>2</sup>                                                    |                           |
| With wire tip sleeves                  | 0.20 to 1.50 mm <sup>2</sup>                                                    |                           |
| Fastening torque                       | 0.4 Nm                                                                          | -                         |
| <b>Electrical characteristics</b>      |                                                                                 |                           |
| Nominal voltage                        | 300 V                                                                           |                           |
| Nominal current <sup>1)</sup>          | 10 A / contact                                                                  |                           |
| Contact resistance                     | ≤ 5 mΩ                                                                          |                           |

Table 218: 0TB103.9, 0TB103.91 - Technical data

1) Please take the respective limit data for the I/O modules into consideration!

### 3 DVI - Monitor adapter

#### 3.1 5AC900.1000-00

#### 3.2 General information

This adapter enables a standard monitor to be connected to the DVI-I interface.

#### 3.3 Order data

| Model number   | Short description                                                                           | Image                                                                               |
|----------------|---------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                | Miscellaneous                                                                               |                                                                                     |
| 5AC900.1000-00 | Adapter DVI (male) to CRT (female). For connecting a standard monitor to a DVI-I interface. |  |

Table 219: 5AC900.1000-00 - Order data

## 4 USB port cap

### 4.1 5AC900.1201-00

#### 4.1.1 General information

Front side, flat USB port cap for Automation Panel 900, Power Panel 500 and Panel PC 700 and Panel PC 800 devices.

#### 4.1.2 Order data

| Model number   | Short description | Image                                                                               |
|----------------|-------------------|-------------------------------------------------------------------------------------|
|                | Accessories       |                                                                                     |
| 5AC900.1201-00 |                   |  |

Table 220: 5AC900.1201-00 - Order data

### 4.2 5AC900.1201-01

#### 4.2.1 General information

Front side, rounded, knurled USB port cap (attached) for Automation Panel 900, Power Panel 500 and Panel PC 700 and Panel PC 800 devices.

#### 4.2.2 Order data

| Model number   | Short description | Image                                                                                 |
|----------------|-------------------|---------------------------------------------------------------------------------------|
|                | Accessories       |                                                                                       |
| 5AC900.1201-01 |                   |  |

Table 221: 5AC900.1201-01 - Order data

## 5 Clamping blocks

### 5.1 5AC900.BLOC-00

#### 5.1.1 General information

These replacement clips are used to fasten B&R panel devices.

#### 5.1.2 Order data

| Model number       | Short description                            | Image                                                                               |
|--------------------|----------------------------------------------|-------------------------------------------------------------------------------------|
| <b>Accessories</b> |                                              |  |
| 5AC900.BLOC-00     | Mounting block with wings 10pcs, spare part. |                                                                                     |

Table 222: 5AC900.BLOC-00 - Order data

## 6 Uninterruptible power supply (UPS)

With an optionally integrated UPS, the B&R Industrial PC makes sure that the PC system completes write operations even after a power failure occurs. When the UPS detects a power failure, it switches to battery operation immediately without interruption. This means that all running programs are ended properly by the UPS software. This prevents the possibility of inconsistent data (only functions if the UPC is already configured and the driver is activated).

### Information:

- **The monitor is not buffered by the UPS and will shut off when the power fails.**
- **More detailed information about uninterruptible power supplies can be found in the User's Manual for the external UPS. This can be downloaded from the B&R homepage.**

By integrating the charging circuit in the housing of the B&R Industrial PC, the installation has been simplified to merely attaching the connection cable to the battery unit mounted next to the PC.

Special emphasis was placed on ease of maintenance when the battery unit was designed. The batteries are easily accessible from the front and can be switched in just a few moments when servicing.

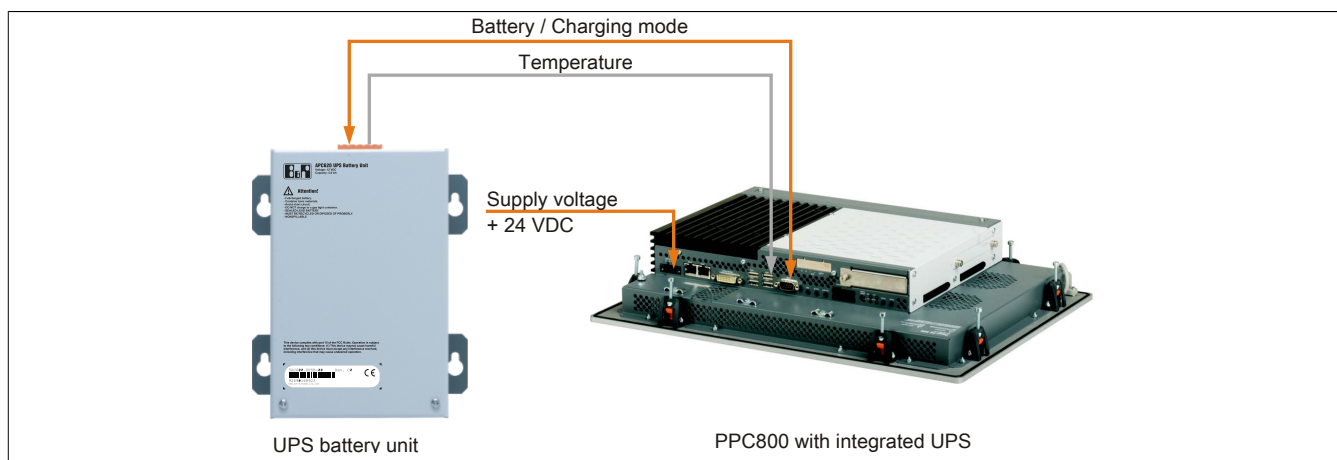


Image 120: UPS principle

### 6.1 Uninterruptible power supply

With an optionally integrated UPS, the B&R Industrial PC makes sure that the PC system completes write operations even after a power failure occurs. When the UPS detects a power failure, it switches to battery operation immediately without interruption. This means that all running programs are ended properly by the UPS software. This prevents the possibility of inconsistent data (only functions if the UPC is already configured and the driver is activated).

### Information:

- **The monitor is not buffered by the UPS and will shut off when the power fails.**
- **More detailed information about uninterruptible power supplies can be found in the User's Manual for the external UPS. This can be downloaded from the B&R homepage.**

By integrating the charging circuit in the housing of the B&R Industrial PC, the installation has been simplified to merely attaching the connection cable to the battery unit mounted next to the PC.

Special emphasis was placed on ease of maintenance when the battery unit was designed. The batteries are easily accessible from the front and can be switched in just a few moments when servicing.

#### 6.1.1 Features

- Long-lasting, maintenance-free rechargeable batteries
- Communication via integrated interfaces
- Temperature sensor
- Driver software
- Deep discharge protection

### 6.1.2 Requirements

- An appropriate system unit.
- Add-on UPS module 5AC600.UPSI-00
- Battery unit 5AC600.UPSB-00
- UPS connection cable 0.5 m (5CAUPS.0005-00) or 3 m (5CAUPS.0030-00)
- For info regarding configuration of the B&R UPS using the ADI Control Center.

### 6.1.3 5AC600.UPSI-00

#### General information

The add-on UPS module can easily be installed in an appropriate system unit (List of required revisions: see section 6.1.2 "Requirements" on page 234).

#### Order data

| Model number   | Short description                                                                                                                                                                                                                                                                                                                                                                                       | Image                                                                               |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                | <b>Uninterruptible power supplies</b>                                                                                                                                                                                                                                                                                                                                                                   |  |
| 5AC600.UPSI-00 | UPS module for APC620, APC810, PPC800; for system units 5PC600.SX01-00 (from Rev. H0), 5PC600.SX02-00 (from Rev. G0), 5PC600.SX02-01 (from Rev. H0), 5PC600.SX05-00 (from Rev. F0), 5PC600.SX05-01 (from Rev. F0), 5PC600.SF03-00 (from Rev. A0), 5PC810.SX*, 5PC820.1505-00, 5PC820.1906-00. Cable (5CAUPS.0005-00 or 5CAUPS.0030-00) and battery unit (5AC600.UPSB-00) have to be ordered separately. |                                                                                     |
|                | <b>Required accessories</b>                                                                                                                                                                                                                                                                                                                                                                             |                                                                                     |
|                | <b>Uninterruptible power supplies</b>                                                                                                                                                                                                                                                                                                                                                                   |                                                                                     |
| 5AC600.UPSB-00 | Battery unit 5Ah; for APC620, APC800 or PPC800 UPS.                                                                                                                                                                                                                                                                                                                                                     |                                                                                     |
| 5CAUPS.0005-00 | UPS cable 0.5 m; for UPS 5AC600.UPSI-00.                                                                                                                                                                                                                                                                                                                                                                |                                                                                     |
| 5CAUPS.0030-00 | UPS cable 3 m; for UPS 5AC600.UPSI-00.                                                                                                                                                                                                                                                                                                                                                                  |                                                                                     |

Table 223: 5AC600.UPSI-00 - Order data

#### Technical data

##### Information:

The following characteristics, features and limit values only apply to this accessory and can deviate from those specified for the entire device.

| Product ID                        | 5AC600.UPSI-00                   |
|-----------------------------------|----------------------------------|
| <b>General information</b>        |                                  |
| Certification                     |                                  |
| CE                                | Yes                              |
| c-UL-us                           | Yes                              |
| <b>Electrical characteristics</b> |                                  |
| Power consumption                 | Max. 7.5 watts                   |
| Power failure bypass              | Max. 20 min with 150 W load      |
| Deep discharge protection         | Yes, at 10 V on the battery unit |
| Short circuit protection          | No                               |
| Battery Charging Rating           |                                  |
| Charging current                  | Max. 0.5 A                       |
| Switching threshold               |                                  |
| Battery operation                 | 13 V                             |
| Mains operation                   | 15 V                             |

Table 224: 5AC600.UPSI-00 - Technical data

#### Installation

The module is installed using the materials included in the delivery.

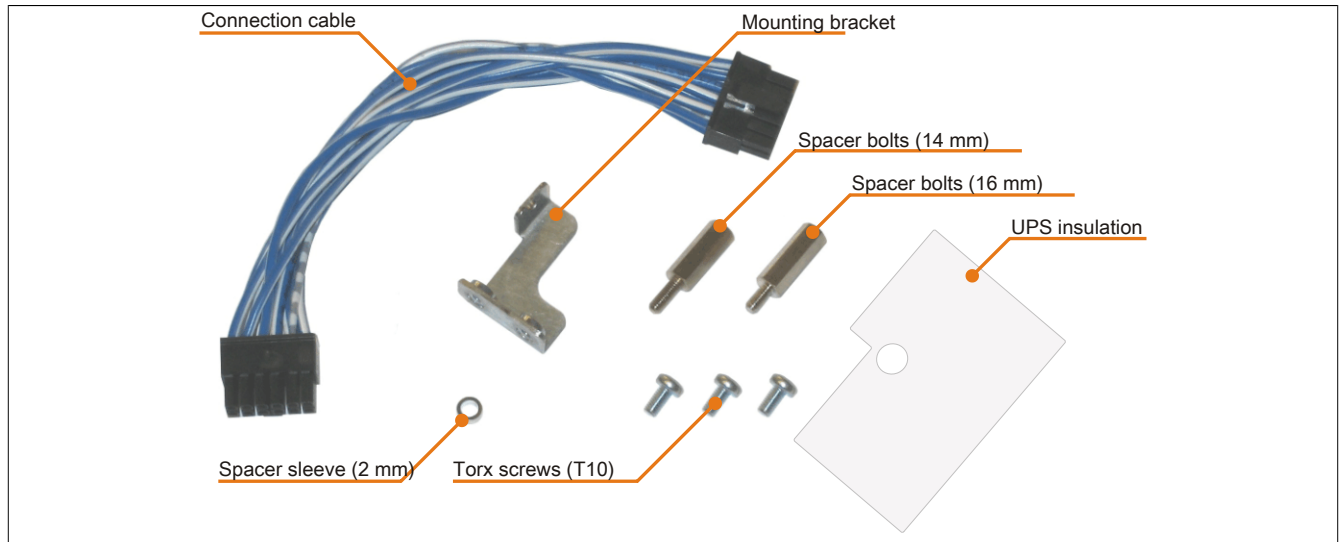


Image 121: 5AC600.UPI-00 Add-on UPS module - Installation materials



## 6.1.4 5AC600.UPSB-00

### General information

The battery unit is subject to wear and should be replaced regularly (at least following the specified lifespan).

### Order data

| Model number   | Short description                                                                            | Image                                                                               |
|----------------|----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 5AC600.UPSB-00 | <b>Uninterruptible power supplies</b><br>Battery unit 5Ah; for APC620, APC800 or PPC800 UPS. |  |

Table 225: 5AC600.UPSB-00 - Order data

### Technical data

#### Information:

The following characteristics, features and limit values only apply to this accessory and can deviate from those specified for the entire device.

| Product ID                          | 5AC600.UPSB-00                                   |
|-------------------------------------|--------------------------------------------------|
| <b>General information</b>          |                                                  |
| Battery                             |                                                  |
| Type                                | Energys Cyclon 12 V 5 Ah (6 connected in series) |
| Lifespan                            | 10 years <sup>1)</sup>                           |
| Design                              | Single cell                                      |
| Temperature sensor                  | NTC resistance                                   |
| Maintenance interval during storage | Charge once every 6 months                       |
| Certification                       |                                                  |
| CE                                  | Yes                                              |
| c-UL-us                             | Yes                                              |
| Charge duration when battery low    | Typ. 15 hours                                    |
| <b>Electrical characteristics</b>   |                                                  |
| Nominal voltage                     | 12 V                                             |
| Battery current                     | Max. 8 A                                         |
| Capacity                            | 5 Ah                                             |
| Deep discharge voltage              | 10 V                                             |
| <b>Environmental conditions</b>     |                                                  |
| Temperature                         |                                                  |
| Operation                           | -40 to 80°C                                      |
| Storage                             | -65 to 80°C                                      |
| Transport                           | -65 to 80°C                                      |
| Relative humidity                   |                                                  |
| Operation                           | 5 to 95%, non-condensing                         |
| Storage                             | 5 to 95%, non-condensing                         |
| Transport                           | 5 to 95%, non-condensing                         |
| Altitude                            |                                                  |
| Operation                           | Max. 3000 m                                      |
| <b>Mechanical characteristics</b>   |                                                  |
| Dimensions                          |                                                  |
| Width                               | 104 mm <sup>2)</sup>                             |
| Length                              | 170.5 mm                                         |
| Height                              | 87.5 mm                                          |
| Weight                              | Approx. 3200 g                                   |

Table 226: 5AC600.UPSB-00 - Technical data

1) At 25°C (up to 80% battery capacity)

2) Dimensions without mounting clips

Temperature life span diagram up to 20% battery capacity.

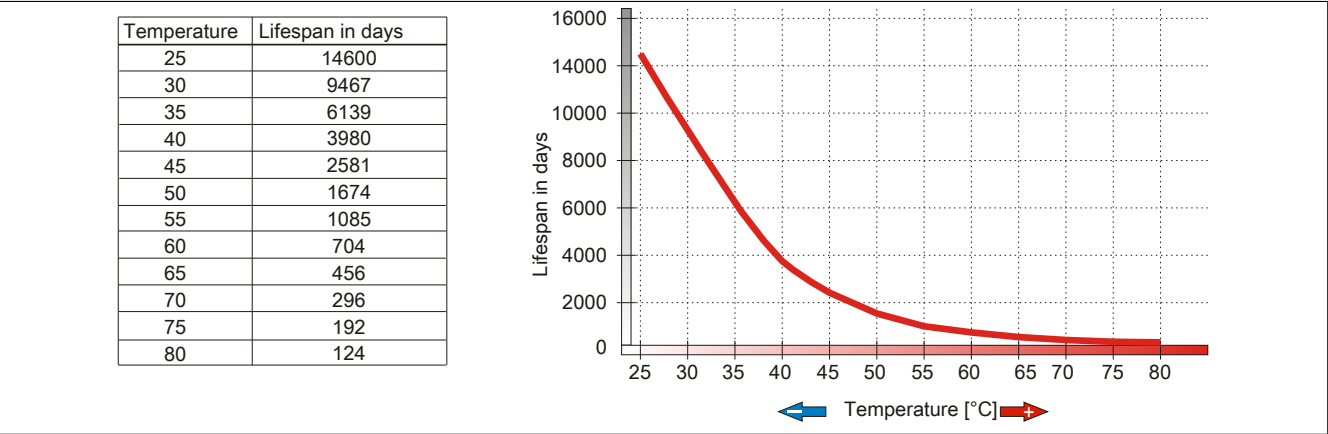


Image 122: Temperature life span diagram

Deep discharge cycles

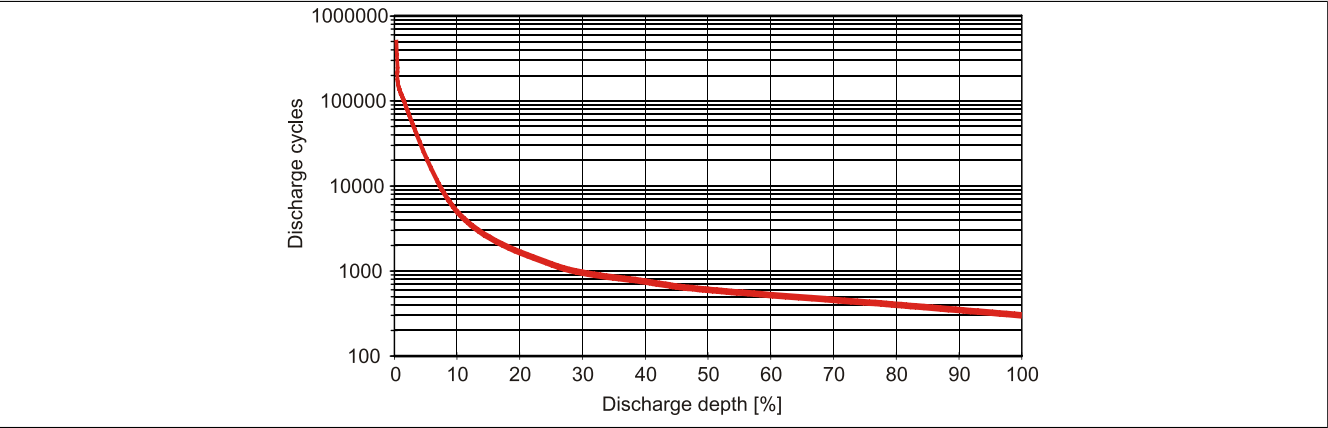


Image 123: Deep discharge cycles

## Dimensions

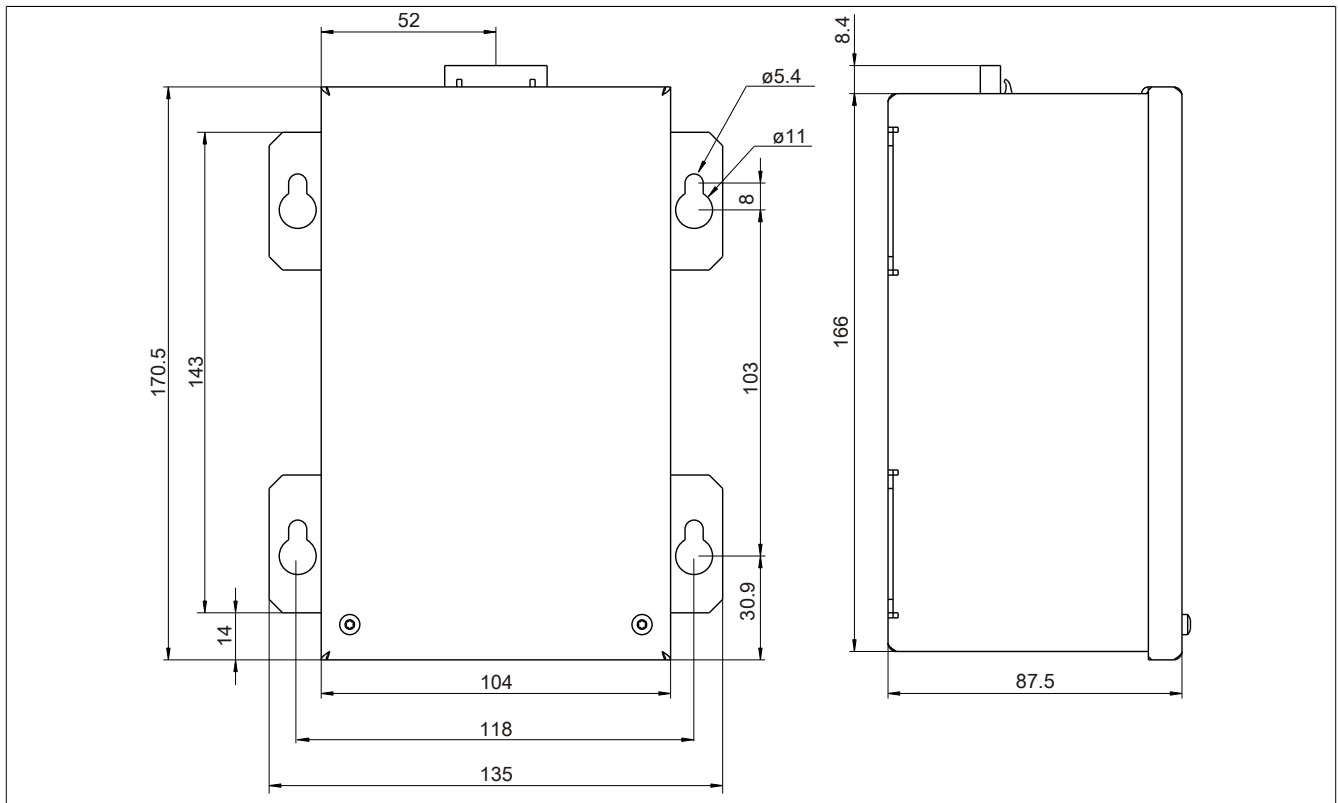


Image 124: 5PC600.UPSB-00 - Dimensions

## Drilling template

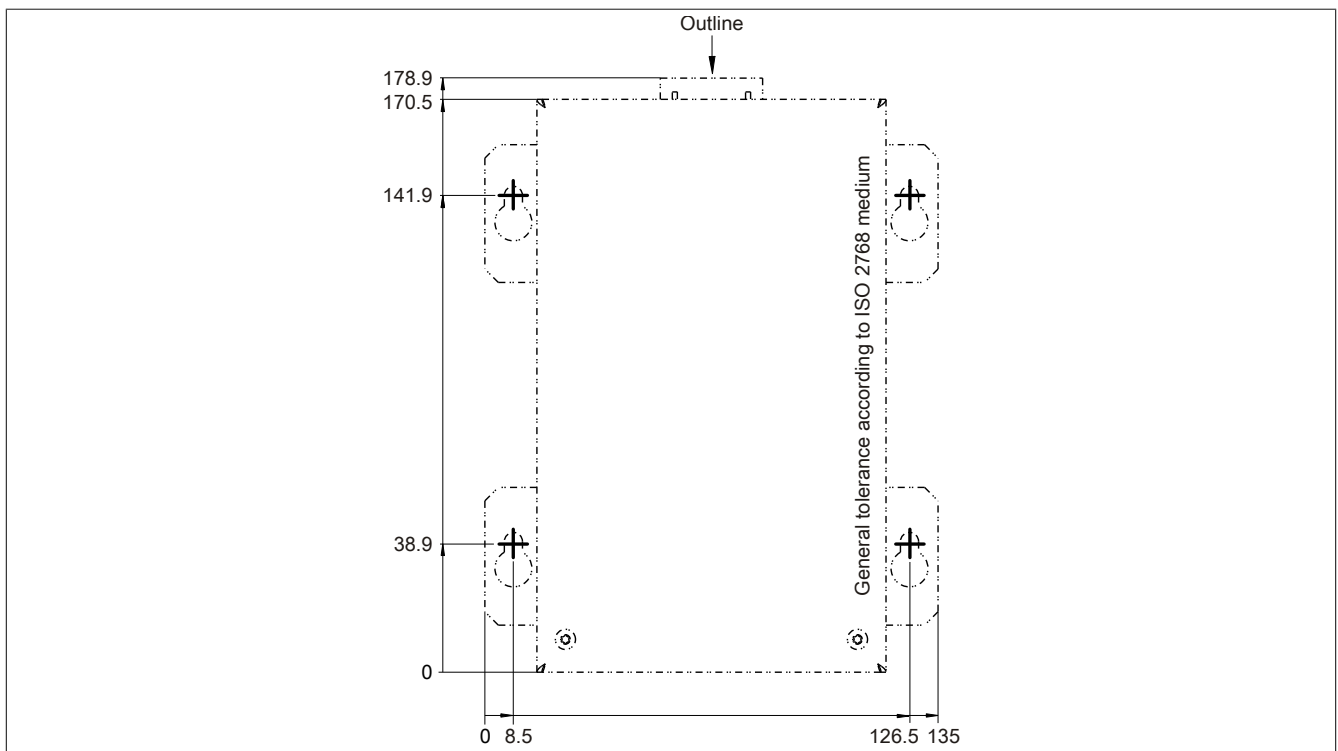


Image 125: 5PC600.UPSB-00 - Drilling template

## Mounting instructions

Due to the unique construction of these batteries, they can be stored and operated in any position.

## 6.1.5 5CAUPS.00xx-00

### General information

The UPS connection cable establishes the connection between the add-on UPS module (5AC600.UPSI-00) and the battery unit (5AC600.UPSB-00). It is available in lengths of 0.5 m and 3 m.

### Order data

| Model number   | Short description                        | Image                                                                               |
|----------------|------------------------------------------|-------------------------------------------------------------------------------------|
|                | <b>Uninterruptible power supplies</b>    |  |
| 5CAUPS.0005-00 | UPS cable 0.5 m; for UPS 5AC600.UPSI-00. |                                                                                     |
| 5CAUPS.0030-00 | UPS cable 3 m; for UPS 5AC600.UPSI-00.   |                                                                                     |

Table 227: 5CAUPS.0005-00, 5CAUPS.0030-00 - Order data

### Technical data

#### Information:

The following characteristics, features and limit values only apply to this accessory and can deviate from those specified for the entire device.

| Product ID                                  | 5CAUPS.0005-00                                                                                      | 5CAUPS.0030-00                                                        |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| General information                         |                                                                                                     |                                                                       |
| Certification<br>CE<br>c-UL-us              | Yes<br>Yes                                                                                          |                                                                       |
| Cable structure                             |                                                                                                     |                                                                       |
| Wire cross section                          | -                                                                                                   | 2x 0.5 mm² (AWG 20)<br>4x 2.5 mm² (AWG 13)                            |
| Conductor resistance                        | -                                                                                                   | At 0.5 mm² 0.5 max. 39 Ω/km<br>At 2.5 mm² max. 7.98 Ω/km              |
| Outer sheathing<br>Material<br>Color        | -<br>-                                                                                              | Thermoplastic PVC-based material<br>Window gray (similar to RAL 7040) |
| Supply lines<br>Conductor resistance        | At 0.5 mm² 0.5 max. 39 Ω/km<br>At 2.5 mm² max. 7.98 Ω/km                                            | -                                                                     |
| Connector                                   |                                                                                                     |                                                                       |
| Type                                        | 6-pin plug connectors, tension clamp connection / 6-pin socket connectors, tension clamp connection |                                                                       |
| Electrical characteristics                  |                                                                                                     |                                                                       |
| Operating voltage                           | Max. 300 V                                                                                          |                                                                       |
| Peak operating voltage                      | 12 VDC                                                                                              |                                                                       |
| Test voltage<br>Wire/wire                   | -                                                                                                   | 1500 V                                                                |
| Current load                                | 10 A at 20°C                                                                                        |                                                                       |
| Environmental conditions                    |                                                                                                     |                                                                       |
| Temperature<br>Moving<br>Static             | -5 to 80°C<br>-30 to 80°C                                                                           |                                                                       |
| Mechanical characteristics                  |                                                                                                     |                                                                       |
| Dimensions<br>Length<br>Diameter            | 0.5 m<br><br>8.5 mm ± 0.2 mm                                                                        | 3 m                                                                   |
| Flex radius<br>Moving<br>Fixed installation | 10x wire cross-section<br>5x wire cross-section                                                     |                                                                       |
| Weight                                      | Approx. 100 g                                                                                       | Approx. 470 g                                                         |

Table 228: 5CAUPS.0005-00, 5CAUPS.0030-00 - Technical data

## 7 External UPS

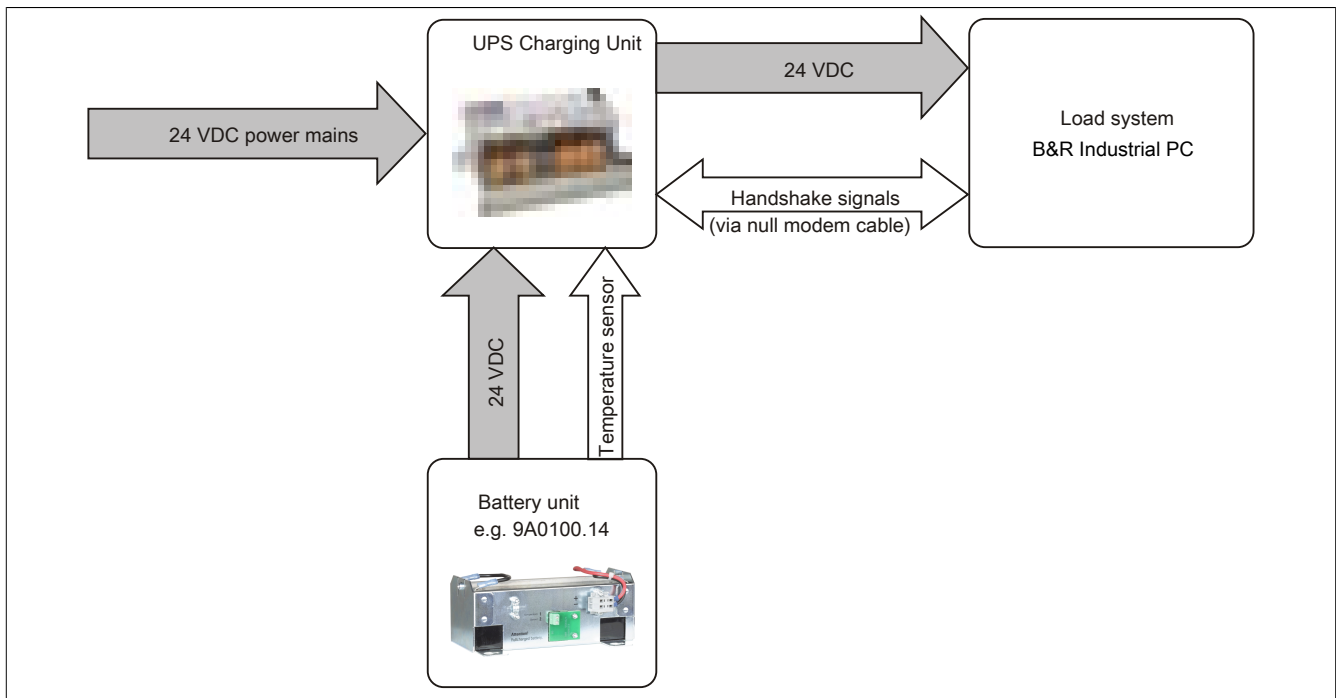


Image 126: Block diagram of the entire system

### 7.1 General information

For supply with an external UPS, a UPS charging unit, a battery unit and a null modem cable are required.

In normal operation, the 24 VDC supply voltage is put straight through to the load system. If the supply voltage fails, the rechargeable UPS batteries power the PC to allow controlled shutdown without loss of data.

Data and commands are exchanged between the UPS and the load system via the handshake signals for an RS232 interface.

More information concerning an external UPS is available in the UPS User's Manual, which can be downloaded from the B&R website ([www.br-automation.com](http://www.br-automation.com)).

### 7.2 Order data

| Model number       | Short description                                                                                     | <div>Image</div>  |
|--------------------|-------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| 24 VDC UPS modules |                                                                                                       |                                                                                                        |
| 9A0100.11          | UPS 24 VDC, 24 VDC input, 24 VDC output, serial interface                                             |                                                                                                        |
| 9A0100.12          | UPS battery unit type A, 24 V, 7 Ah, incl. battery cage                                               |                                                                                                        |
| 9A0100.13          | UPS batteries type A (spare part), 2x 12 V, 7 Ah, for battery unit 9A0100.12                          |                                                                                                        |
| 9A0100.14          | UPS battery unit type B, 24 V, 2.2 Ah, incl. battery cage                                             |                                                                                                        |
| 9A0100.15          | UPS batteries type B (spare part), 2x 12 V, 2.2 Ah, for battery unit 9A0100.14                        |                                                                                                        |
| 9A0100.16          | UPS battery unit type C, 24 V, 4.5 Ah, incl. battery cage                                             |                                                                                                        |
| 9A0100.17          | UPS batteries type C (spare part), 2x 12 V, 4.5 Ah, for battery unit 9A0100.16                        |                                                                                                        |
|                    | <b>Required accessories</b>                                                                           |                                                                                                        |
|                    | <b>Battery units</b>                                                                                  |                                                                                                        |
| 9A0100.12          | UPS battery unit type A, 24 V, 7 Ah, incl. battery cage                                               |                                                                                                        |
| 9A0100.14          | UPS battery unit type B, 24 V, 2.2 Ah, incl. battery cage                                             |                                                                                                        |
| 9A0100.16          | UPS battery unit type C, 24 V, 4.5 Ah, incl. battery cage                                             |                                                                                                        |
|                    | <b>Cables</b>                                                                                         |                                                                                                        |
| 9A0017.01          | Null modem cable RS232, 0.6 m, for connecting UPS and IPC (9 pin D-type socket - 9 pin D-type socket) |                                                                                                        |
| 9A0017.02          | Null modem cable RS232, 1.8 m, for connecting UPS and IPC (9 pin D-type socket - 9 pin D-type socket) |                                                                                                        |
|                    | <b>Optional accessories</b>                                                                           |                                                                                                        |
|                    | <b>Replacement batteries</b>                                                                          |                                                                                                        |
| 9A0100.13          | UPS batteries type A (spare part), 2x 12 V, 7 Ah, for battery unit 9A0100.12                          |                                                                                                        |

Table 229: 9A0100.11, 9A0100.12, 9A0100.13, 9A0100.14, 9A0100.15, 9A0100.16, 9A0100.17 - Order data

| Model number | Short description                                                              | Image |
|--------------|--------------------------------------------------------------------------------|-------|
| 9A0100.15    | UPS batteries type B (spare part), 2x 12 V, 2.2 Ah, for battery unit 9A0100.14 |       |
| 9A0100.17    | UPS batteries type C (spare part), 2x 12 V, 4.5 Ah, for battery unit 9A0100.16 |       |

Table 229: 9A0100.11, 9A0100.12, 9A0100.13, 9A0100.14, 9A0100.15, 9A0100.16, 9A0100.17 - Order data

8 PCI Plug-in cardn

8.1 5ACPCI.ETH1-01

8.1.1 General information

The universal (3.3 V and 5 V) half-size PCI Ethernet card has a 10/100 MBit/s network connection and can be inserted in a 16-bit PCI slot and operated as an additional network interface.

- PCI Ethernet card
- 1 network connection (10/100 MBit/s)

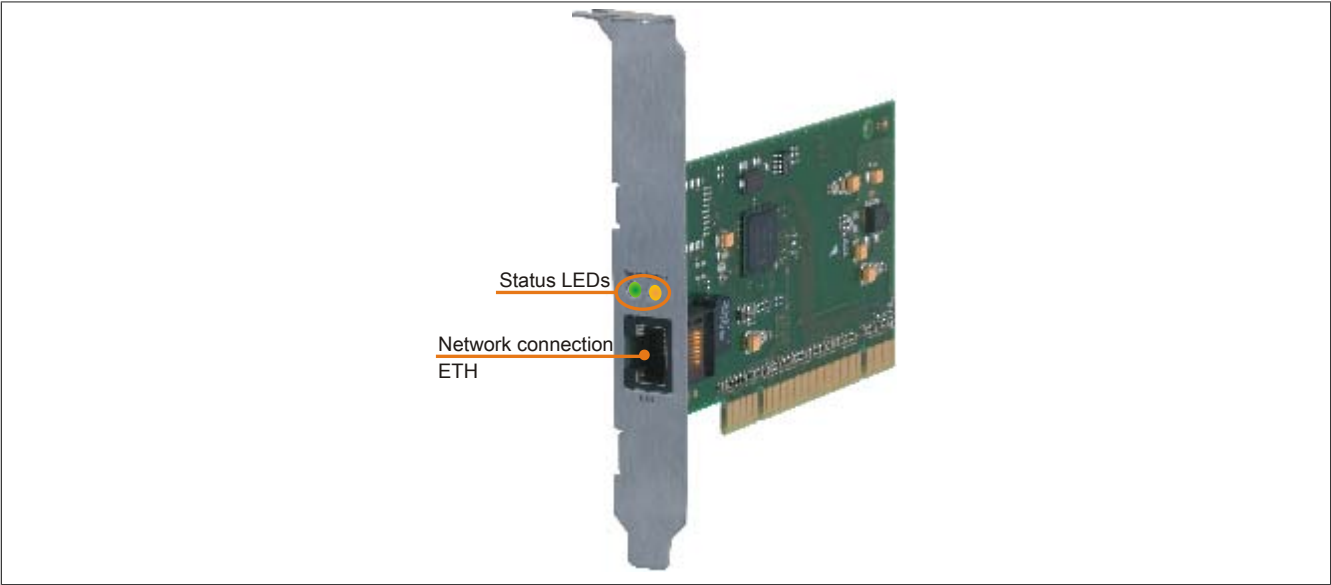


Image 127: Order data - PCI Ethernet Card 10/100

8.1.2 Order data

| Model number       | Short description           | Image |
|--------------------|-----------------------------|-------|
| <b>Accessories</b> |                             |       |
| 5ACPCI.ETH1-01     | PCI Ethernet card 1x 10/100 |       |

Table 230: 5ACPCI.ETH1-01 - Order data

8.1.3 Technical data

| Product ID                   | 5ACPCI.ETH1-01       |
|------------------------------|----------------------|
| <b>General information</b>   |                      |
| B&R ID code                  | \$A58A               |
| Diagnostics<br>Data transfer | Yes, with status LED |
| Certification<br>CE          | Yes                  |
| <b>Interfaces</b>            |                      |
| Ethernet<br>Quantity         | 1                    |

Table 231: 5ACPCI.ETH1-01 - Technical data

| Product ID    | 5ACPCI.ETH1-01                                   |
|---------------|--------------------------------------------------|
| Controller    | Intel 82551ER                                    |
| Design        | Shielded RJ45 port                               |
| Transfer rate | 10/100 Mbit/s                                    |
| Cable length  | Max. 100 m between two stations (segment length) |

Table 231: 5ACPCI.ETH1-01 - Technical data

## Ethernet interface

### 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.

| Ethernet connection |                                              |                                                 |
|---------------------|----------------------------------------------|-------------------------------------------------|
| Controller          | Intel 82551ER                                |                                                 |
| Power supply        | Universal card (2 notches) for 3.3 V or 5 V  |                                                 |
| Cabling             | S/STP (Cat5e)                                |                                                 |
| Transfer rate       | 10/100 MBit/s                                |                                                 |
| Cable length        | max. 100 m (min. Cat5e)                      |                                                 |
| LED                 | On                                           | Off                                             |
| Green               | 100 Mbit/s                                   | 10 Mbit/s                                       |
| Orange              | Link (Ethernet network connection available) | Activity (blinking - data transfer in progress) |

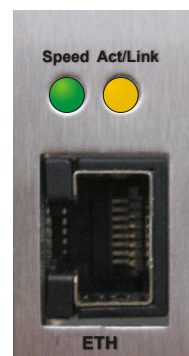


Table 232: 5ACPCI.ETH1-01 - Technical data

### 8.1.4 Driver support

A special driver is required in order to operate the Intel Ethernet controller 82551ER. Drivers for Windows XP Professional, Windows XP Embedded, and DOS are available in the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

### Information:

Required drivers can only be downloaded from the B&R homepage, not from manufacturers' pages.



### 8.1.5 Dimensions

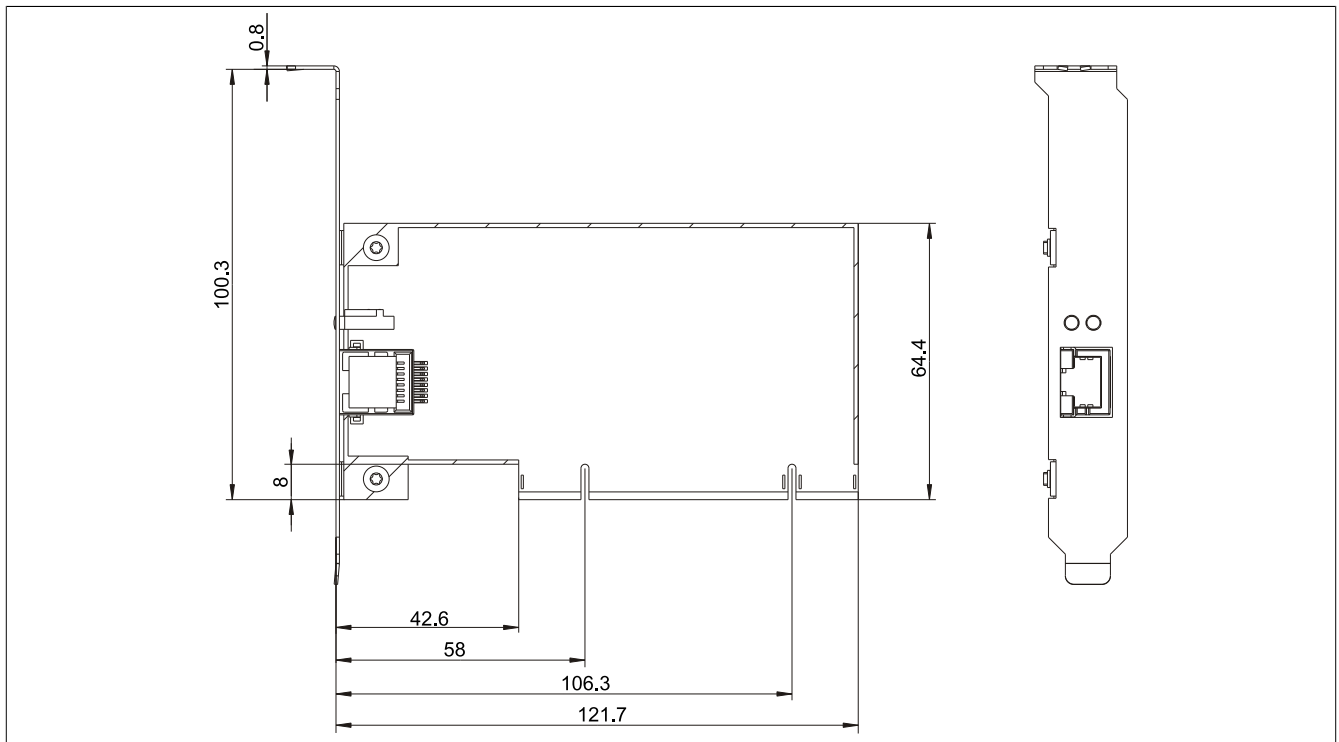


Image 128: 5ACPCI.ETH1-01 - Dimensions

8.2 5ACPCI.ETH3-01

8.2.1 General information

The universal (3.3 V and 5 V) half-size PCI Ethernet card has three 10/100 MBit/s network connections and can be inserted in a 16-bit PCI slot and operated as an additional network interface.

- PCI Ethernet card
- 3 network connections (10/100 MBit/s)



Image 129: 5ACPCI.ETH3-01 - PCI Ethernet card 10/100

8.2.2 Order data

| Model number   | Short description           | Image                                                                                 |
|----------------|-----------------------------|---------------------------------------------------------------------------------------|
|                | Accessories                 |                                                                                       |
| 5ACPCI.ETH3-01 | PCI Ethernet card 3x 10/100 |  |

Table 233: 5ACPCI.ETH3-01 - Order data

8.2.3 Technical data

| Product ID                   | 5ACPCI.ETH3-01                                   |
|------------------------------|--------------------------------------------------|
| General information          |                                                  |
| B&R ID code                  | \$A58B                                           |
| Diagnostics<br>Data transfer | Yes, with status LED                             |
| Certification<br>CE          | Yes                                              |
| Interfaces                   |                                                  |
| Ethernet                     |                                                  |
| Quantity                     | 3                                                |
| Controller                   | Intel 82551ER                                    |
| Design                       | Shielded RJ45 port                               |
| Transfer rate                | 10/100 Mbit/s                                    |
| Cable length                 | Max. 100 m between two stations (segment length) |

Table 234: 5ACPCI.ETH3-01 - Technical data

Ethernet interface

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.

| Ethernet connections |                                              |                                                 |  |
|----------------------|----------------------------------------------|-------------------------------------------------|--|
| Controller           | each with Intel 82551ER                      |                                                 |  |
| Power supply         | Universal card (2 notches) for 3.3 V or 5 V  |                                                 |  |
| Cabling              | S/STP (Cat5e)                                |                                                 |  |
| Transfer rate        | 10/100 MBit/s                                |                                                 |  |
| Cable length         | max. 100 m (min. Cat5e)                      |                                                 |  |
| LED                  | On                                           | Off                                             |  |
| Green                | 100 Mbit/s                                   | 10 Mbit/s                                       |  |
| Orange               | Link (Ethernet network connection available) | Activity (blinking - data transfer in progress) |  |

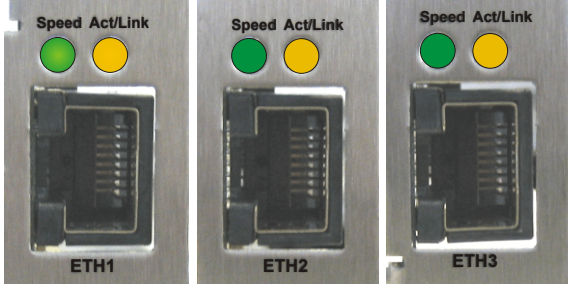


Table 235: 5ACPCI.ETH3-01 - Technical data

8.2.4 Driver support

A special driver is required in order to operate the Intel Ethernet controller 825551ER. Drivers for Windows XP Professional, Windows XP Embedded, and DOS are available in the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

Information:

Required drivers can only be downloaded from the B&R homepage, not from manufacturers' pages.

8.2.5 Dimensions

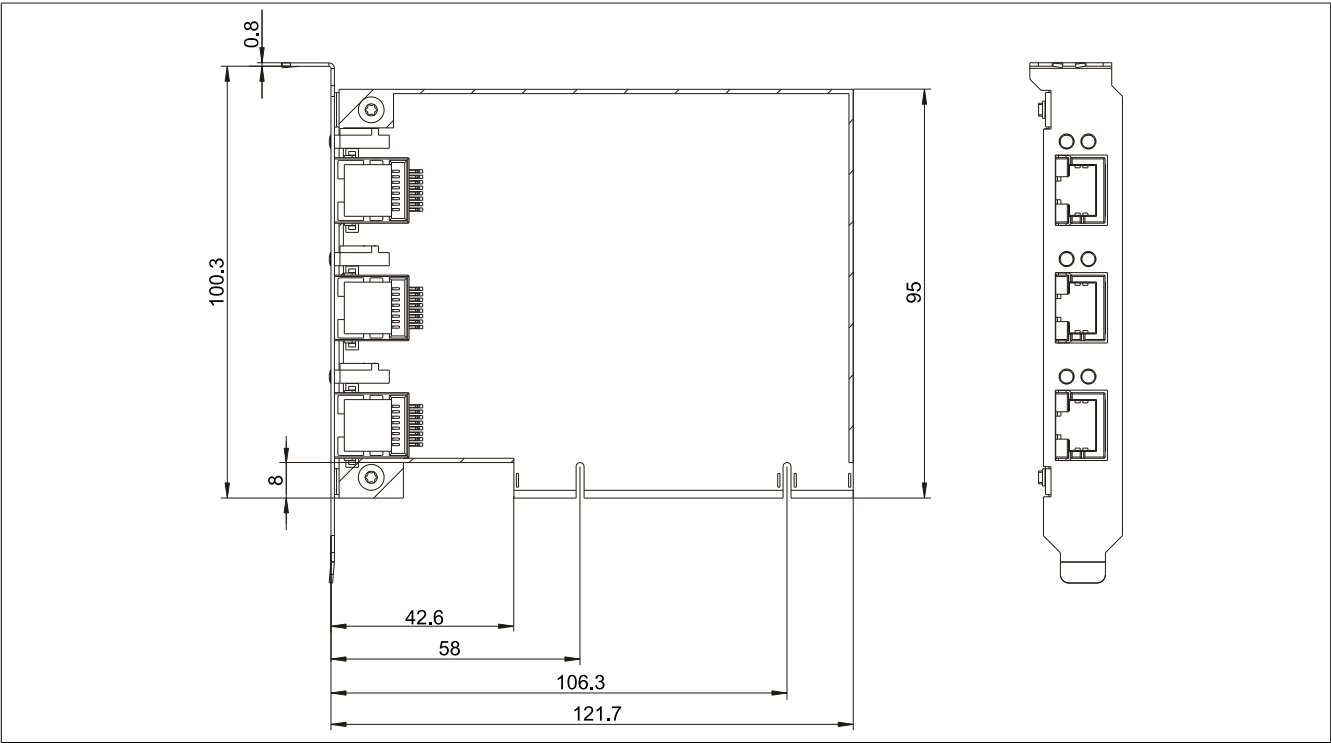


Image 130: 5ACPCI.ETH3-01 - Dimensions

## 9 CompactFlash cards

### 9.1 General information

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

### 9.2 Basic information

In order to be suited for use in industrial automation, CompactFlash cards must be highly reliable. To make this possible, the following is very important:

- Flash technology used
- Efficient algorithm for maximizing the lifespan
- Good mechanisms for detecting and fixing errors in the flash memory

#### 9.2.1 Flash technology

Currently, CompactFlash cards are available with MLC (Multi Level Cell) and SLC (Single Level Cell) flash blocks. SLC flash memory has a lifespan that is 10 times longer than MLC, which is why only CompactFlash cards with SLC flash blocks are suited for industrial applications.

#### 9.2.2 Wear leveling

Wear leveling is an algorithm that can be used to maximize the lifespan of a CompactFlash card. There are three different algorithms:

- No wear leveling
- Dynamic wear leveling
- Static wear leveling

The basic idea behind wear leveling is to distribute data over a broad area of blocks or cells on the data carrier so that the same areas don't have to be cleared and reprogrammed over and over again.

#### No wear leveling

The earliest CompactFlash cards didn't have an algorithm for maximizing the lifespan. The lifespan of a CompactFlash card was determined only by the guaranteed lifespan of the flash blocks.

#### Dynamic wear leveling

Dynamic wear leveling makes it possible to utilize unused flash blocks when writing to a file.

If the data carrier is 80% full with files, then only 20% can be used for wear leveling.

The lifespan of the CompactFlash card is therefore dependent on the amount of unused flash blocks.

#### Static wear leveling

Static wear leveling also monitors which data is rarely changed. From time to time, the controller then moves this data to blocks that have already been frequently programmed in order to prevent further wear on those cells.

#### 9.2.3 ECC error correction

Bit errors can be caused by inactivity or when a certain cell is operated. Error Correction Coding (ECC) implemented via hardware or software can detect and correct many errors of this type.

#### 9.2.4 S.M.A.R.T. support

Self-Monitoring, Analysis and Reporting Technology (S.M.A.R.T. for short) is an industry standard for mass storage devices that has been introduced to monitor important parameters and quickly detect imminent failures. Critical performance and calibration data is monitored and stored in order to help predict the probability of errors.

### 9.2.5 Maximum reliability

CompactFlash cards used by B&R use SLC flash blocks and static wear leveling together with a powerful ECC algorithm to provide maximum reliability.

## 9.3 5CFCRD.xxxx-06

### 9.3.1 General information

#### Information:

B&R CompactFlash cards 5CFCRD.xxxx-06 and CompactFlash cards from a different manufacturer cannot be used in the same system at the same time. Due to differences in technology (older vs. newer technologies), problems can occur during system startup that are caused by the different boot times.

see "Known problems / issues" on page 261

#### Information:

The 5CFCRD.xxxx-06 CompactFlash cards are supported on B&R devices with WinCE version  $\geq 6.0$  or higher.

### 9.3.2 Order data

| Model number   | Short description             | Image                                                                                |
|----------------|-------------------------------|--------------------------------------------------------------------------------------|
|                | <b>CompactFlash</b>           |  |
| 5CFCRD.0512-06 | CompactFlash 512 MB B&R (SLC) |                                                                                      |
| 5CFCRD.1024-06 | CompactFlash 1 GB B&R (SLC)   |                                                                                      |
| 5CFCRD.2048-06 | CompactFlash 2 GB B&R (SLC)   |                                                                                      |
| 5CFCRD.4096-06 | CompactFlash 4 GB B&R (SLC)   |                                                                                      |
| 5CFCRD.8192-06 | CompactFlash 8 GB B&R (SLC)   |                                                                                      |
| 5CFCRD.016G-06 | CompactFlash 16 GB B&R (SLC)  |                                                                                      |

Table 236: 5CFCRD.0512-06, 5CFCRD.1024-06, 5CFCRD.2048-06, 5CFCRD.4096-06, 5CFCRD.8192-06, 5CFCRD.016G-06 - Order data

### 9.3.3 Technical data

#### Caution!

A sudden loss of power can cause data to be lost! In very rare cases, the mass storage device 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 complete device. For the complete device where this accessory is installed, refer to the data provided specifically for the complete device.

| Product ID                 | 5CFCRD.0512-06                                               | 5CFCRD.1024-06 | 5CFCRD.2048-06 | 5CFCRD.4096-06 | 5CFCRD.8192-06 | 5CFCRD.016G-06 |
|----------------------------|--------------------------------------------------------------|----------------|----------------|----------------|----------------|----------------|
| <b>General information</b> |                                                              |                |                |                |                |                |
| Capacity                   | 512 MB                                                       | 1 GB           | 2 GB           | 4 GB           | 8 GB           | 16 GB          |
| Data retention             | 10 years                                                     |                |                |                |                |                |
| Data reliability           | < 1 unrecoverable error in 10<SUP>14</SUP> bit read accesses |                |                |                |                |                |
| Lifetime monitoring        | Yes                                                          |                |                |                |                |                |
| MTBF                       | > 3,000,000 hours (at 25°C)                                  |                |                |                |                |                |
| Maintenance                | None                                                         |                |                |                |                |                |
| Supported operating modes  | PIO mode 0-6, Multiword DMA mode 0-4, Ultra DMA mode 0-4     |                |                |                |                |                |
| Continuous reading         |                                                              |                |                |                |                |                |
| Typical                    | 33 MB/s                                                      | 33 MB/s        | 33 MB/s        | 33 MB/s        | 33 MB/s        | 36 MB/s        |
| Maximum                    | 35 MB/s                                                      | 35 MB/s        | 35 MB/s        | 34 MB/s        | 34 MB/s        | 37 MB/s        |
| Continuous writing         |                                                              |                |                |                |                |                |
| Typical                    | 15 MB/s                                                      | 15 MB/s        | 15 MB/s        | 14 MB/s        | 14 MB/s        | 28 MB/s        |
| Maximum                    | 18 MB/s                                                      | 18 MB/s        | 18 MB/s        | 17 MB/s        | 17 MB/s        | 30 MB/s        |

Table 237: 5CFCRD.0512-06, 5CFCRD.1024-06, 5CFCRD.2048-06, 5CFCRD.4096-06, 5CFCRD.8192-06, 5CFCRD.016G-06 - Technical data

| Product ID                                                                              | 5CFCRD.0512-06                                                                                                         | 5CFCRD.1024-06                                             | 5CFCRD.2048-06                                             | 5CFCRD.4096-06                                             | 5CFCRD.8192-06                                             | 5CFCRD.016G-06           |
|-----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|------------------------------------------------------------|------------------------------------------------------------|------------------------------------------------------------|--------------------------|
| Certification<br>CE                                                                     | Yes                                                                                                                    |                                                            |                                                            |                                                            |                                                            |                          |
| Endurance                                                                               |                                                                                                                        |                                                            |                                                            |                                                            |                                                            |                          |
| Guaranteed data volume<br>Guaranteed <sup>1)</sup><br>Results for 5 years <sup>1)</sup> | 50 TB<br>27.40 GB/day                                                                                                  | 100 TB<br>54.79 GB/day                                     | 200 TB<br>109.9 GB/day                                     | 400 TB<br>219.8 GB/day                                     | 800 TB<br>438.6 GB/day                                     | 1600 TB<br>876.72 GB/day |
| Clear/write cycles<br>Guaranteed                                                        | 100,000                                                                                                                |                                                            |                                                            |                                                            |                                                            |                          |
| SLC Flash                                                                               | Yes                                                                                                                    |                                                            |                                                            |                                                            |                                                            |                          |
| Wear leveling                                                                           | Static                                                                                                                 |                                                            |                                                            |                                                            |                                                            |                          |
| Error Correction Coding (ECC)                                                           | Yes                                                                                                                    |                                                            |                                                            |                                                            |                                                            |                          |
| S.M.A.R.T. Support                                                                      | Yes                                                                                                                    |                                                            |                                                            |                                                            |                                                            |                          |
| Support                                                                                 |                                                                                                                        |                                                            |                                                            |                                                            |                                                            |                          |
| Hardware                                                                                | PP300/400, PP500, PPC300, PPC700, PPC725, PPC800, APC620, APC810, APC820                                               |                                                            |                                                            |                                                            |                                                            |                          |
| Operating systems                                                                       |                                                                                                                        |                                                            |                                                            |                                                            |                                                            |                          |
| Windows 7 32-bit                                                                        | No                                                                                                                     | No                                                         | No                                                         | No                                                         | No                                                         | Yes                      |
| Windows 7 64-bit                                                                        |                                                                                                                        |                                                            |                                                            | No                                                         |                                                            |                          |
| Windows Embedded Standard 7, 32-bit                                                     | No                                                                                                                     | No                                                         | No                                                         | No                                                         | Yes                                                        | Yes                      |
| Windows Embedded Standard 7, 64-bit                                                     | No                                                                                                                     | No                                                         | No                                                         | No                                                         | No                                                         | Yes                      |
| Windows XP Professional                                                                 | No                                                                                                                     | No                                                         | No                                                         | Yes                                                        | Yes                                                        | Yes                      |
| Windows XP Embedded                                                                     |                                                                                                                        |                                                            |                                                            | Yes                                                        |                                                            |                          |
| Windows Embedded Standard 2009                                                          | No                                                                                                                     | Yes                                                        | Yes                                                        | Yes                                                        | Yes                                                        | Yes                      |
| Windows CE 6.0                                                                          | Yes                                                                                                                    | Yes                                                        | Yes                                                        | Yes                                                        | Yes                                                        | Yes <sup>1)</sup>        |
| Windows CE 5.0                                                                          |                                                                                                                        |                                                            |                                                            | No                                                         |                                                            |                          |
| Software                                                                                |                                                                                                                        |                                                            |                                                            |                                                            |                                                            |                          |
| PVI Transfer                                                                            | ≥ V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011)                                                             | ≥ V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011) | ≥ V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011) | ≥ V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011) | ≥ V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011) | No                       |
| B&R Embedded OS Installer                                                               | ≥ V3.10                                                                                                                | ≥ V3.10                                                    | ≥ V3.10                                                    | ≥ V3.10                                                    | ≥ V3.10                                                    | ≥ V3.20                  |
| Environmental conditions                                                                |                                                                                                                        |                                                            |                                                            |                                                            |                                                            |                          |
| Temperature                                                                             |                                                                                                                        |                                                            |                                                            |                                                            |                                                            |                          |
| Operation                                                                               | 0 to 70°C                                                                                                              |                                                            |                                                            |                                                            |                                                            |                          |
| Storage                                                                                 | -65 to 150°C                                                                                                           |                                                            |                                                            |                                                            |                                                            |                          |
| Transport                                                                               | -65 to 150°C                                                                                                           |                                                            |                                                            |                                                            |                                                            |                          |
| Relative humidity                                                                       |                                                                                                                        |                                                            |                                                            |                                                            |                                                            |                          |
| Operation                                                                               | Max. 85% at 85°C                                                                                                       |                                                            |                                                            |                                                            |                                                            |                          |
| Storage                                                                                 | Max. 85% at 85°C                                                                                                       |                                                            |                                                            |                                                            |                                                            |                          |
| Transport                                                                               | Max. 85% at 85°C                                                                                                       |                                                            |                                                            |                                                            |                                                            |                          |
| Vibration                                                                               |                                                                                                                        |                                                            |                                                            |                                                            |                                                            |                          |
| Operation                                                                               | 20 g peak, 20 to 2000 Hz, 4 in each direction (JEDEC JESD22, method B103)<br>5.35 g RMS, 15 min per level (IEC 68-2-6) |                                                            |                                                            |                                                            |                                                            |                          |
| Storage                                                                                 | 20 g peak, 20 to 2000 Hz, 4 in each direction (JEDEC JESD22, method B103)<br>5.35 g RMS, 15 min per level (IEC 68-2-6) |                                                            |                                                            |                                                            |                                                            |                          |
| Transport                                                                               | 20 g peak, 20 to 2000 Hz, 4 in each direction (JEDEC JESD22, method B103)<br>5.35 g RMS, 15 min per level (IEC 68-2-6) |                                                            |                                                            |                                                            |                                                            |                          |
| Shock                                                                                   |                                                                                                                        |                                                            |                                                            |                                                            |                                                            |                          |
| Operation                                                                               | 1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method)<br>30 g, 11 ms 1x (IEC 68-2-27)                                     |                                                            |                                                            |                                                            |                                                            |                          |
| Storage                                                                                 | 1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method)<br>30 g, 11 ms 1x (IEC 68-2-27)                                     |                                                            |                                                            |                                                            |                                                            |                          |
| Transport                                                                               | 1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method)<br>30 g, 11 ms 1x (IEC 68-2-27)                                     |                                                            |                                                            |                                                            |                                                            |                          |
| Altitude                                                                                |                                                                                                                        |                                                            |                                                            |                                                            |                                                            |                          |
| Operation                                                                               | Max. 4,572 m                                                                                                           |                                                            |                                                            |                                                            |                                                            |                          |
| Mechanical characteristics                                                              |                                                                                                                        |                                                            |                                                            |                                                            |                                                            |                          |
| Dimensions                                                                              |                                                                                                                        |                                                            |                                                            |                                                            |                                                            |                          |
| Width                                                                                   | 42.8 ± 0.10 mm                                                                                                         |                                                            |                                                            |                                                            |                                                            |                          |
| Length                                                                                  | 36.4 ± 0.15 mm                                                                                                         |                                                            |                                                            |                                                            |                                                            |                          |
| Height                                                                                  | 3.3 ± 0.10 mm                                                                                                          |                                                            |                                                            |                                                            |                                                            |                          |
| Weight                                                                                  | 10 g                                                                                                                   |                                                            |                                                            |                                                            |                                                            |                          |

Table 237: 5CFCRD.0512-06, 5CFCRD.1024-06, 5CFCRD.2048-06,  
5CFCRD.4096-06, 5CFCRD.8192-06, 5CFCRD.016G-06 - Technical data

1) Endurance of B&R CFs (with linear written block size ≥ 128 kB)

9.3.4 Temperature humidity diagram

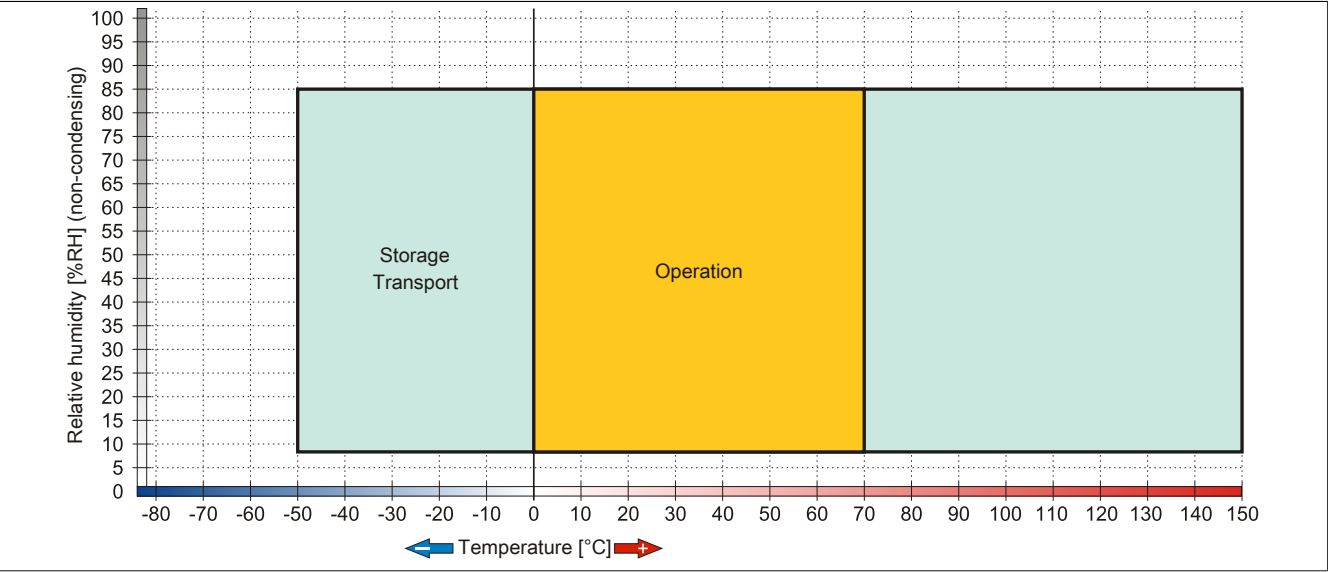


Image 131: 5CFCRD.xxxx-06 - Temperature humidity diagram for CompactFlash cards

9.3.5 Dimensions

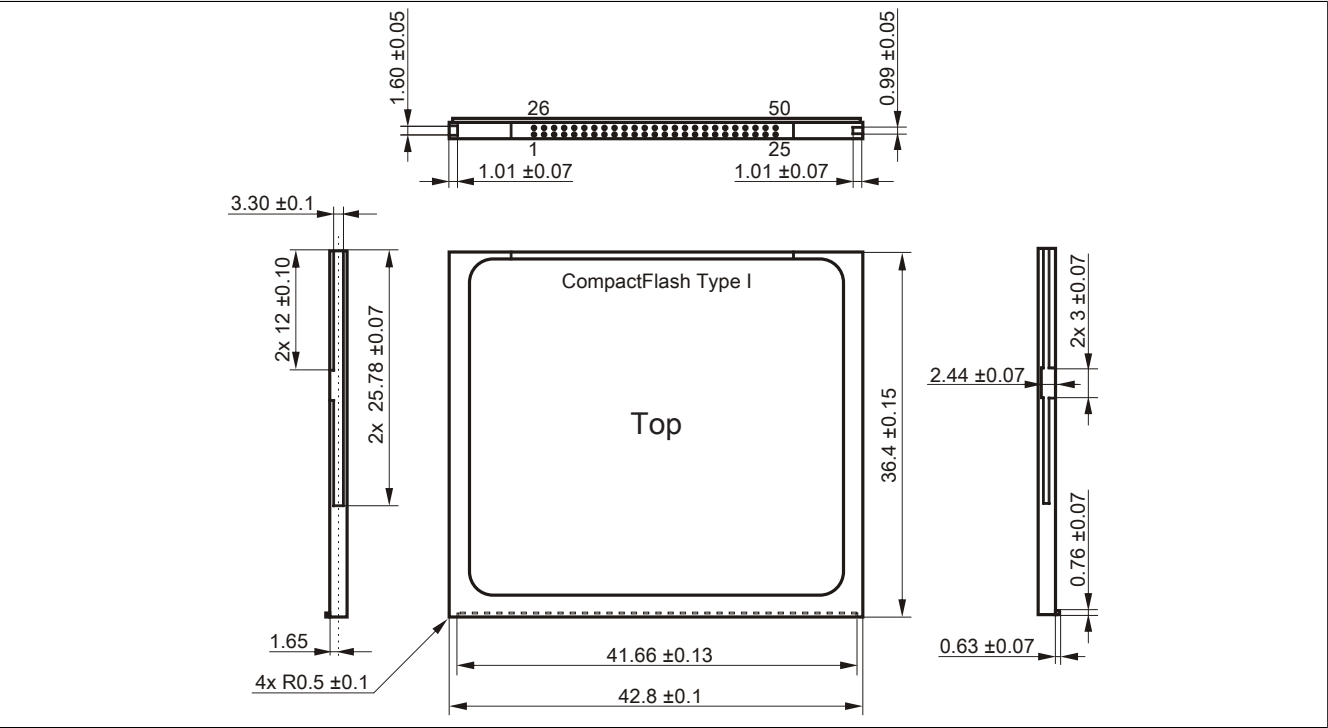


Image 132: Dimensions - CompactFlash card Type I



### 9.3.6 Benchmark

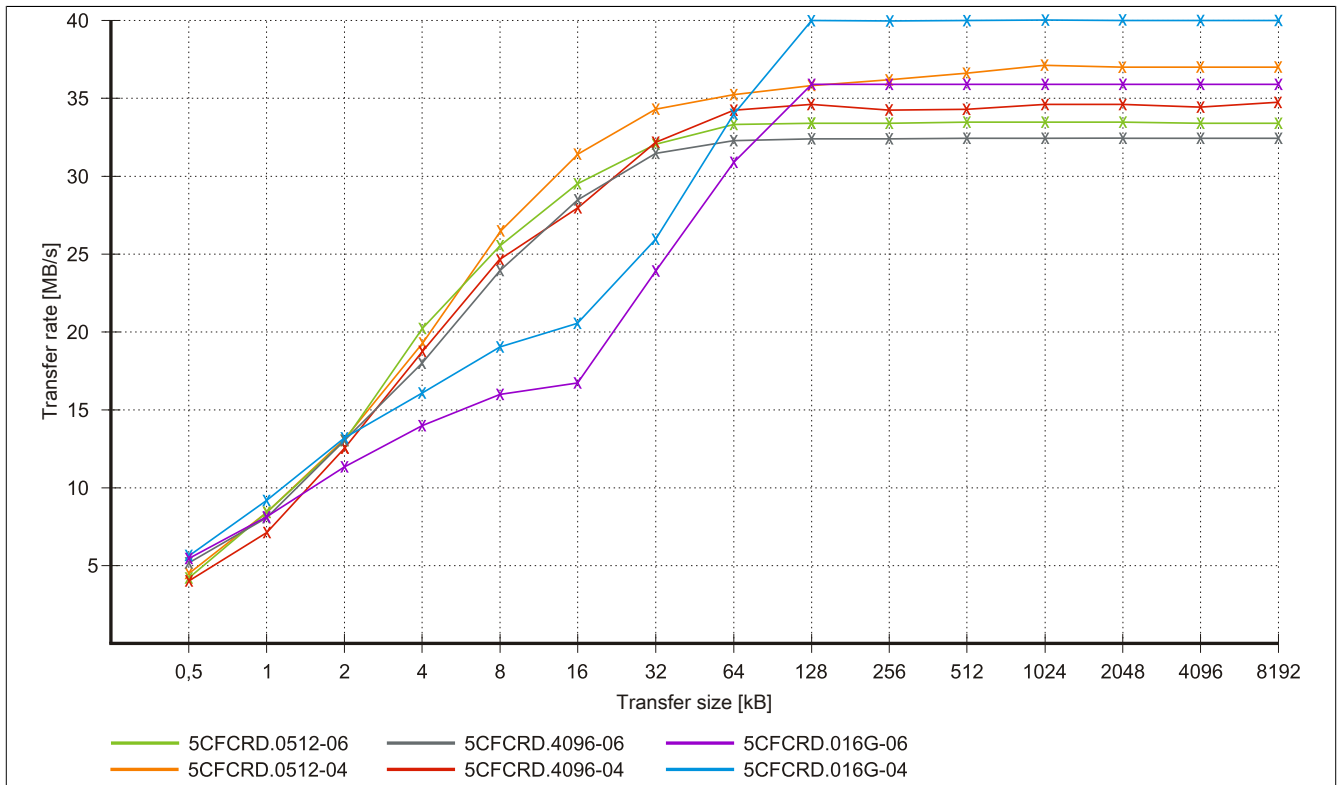


Image 133: ATTO Disk Benchmark v2.34 comparison when reading - 5CFCRD.xxxx-04 with 5CFCRD.xxxx-06

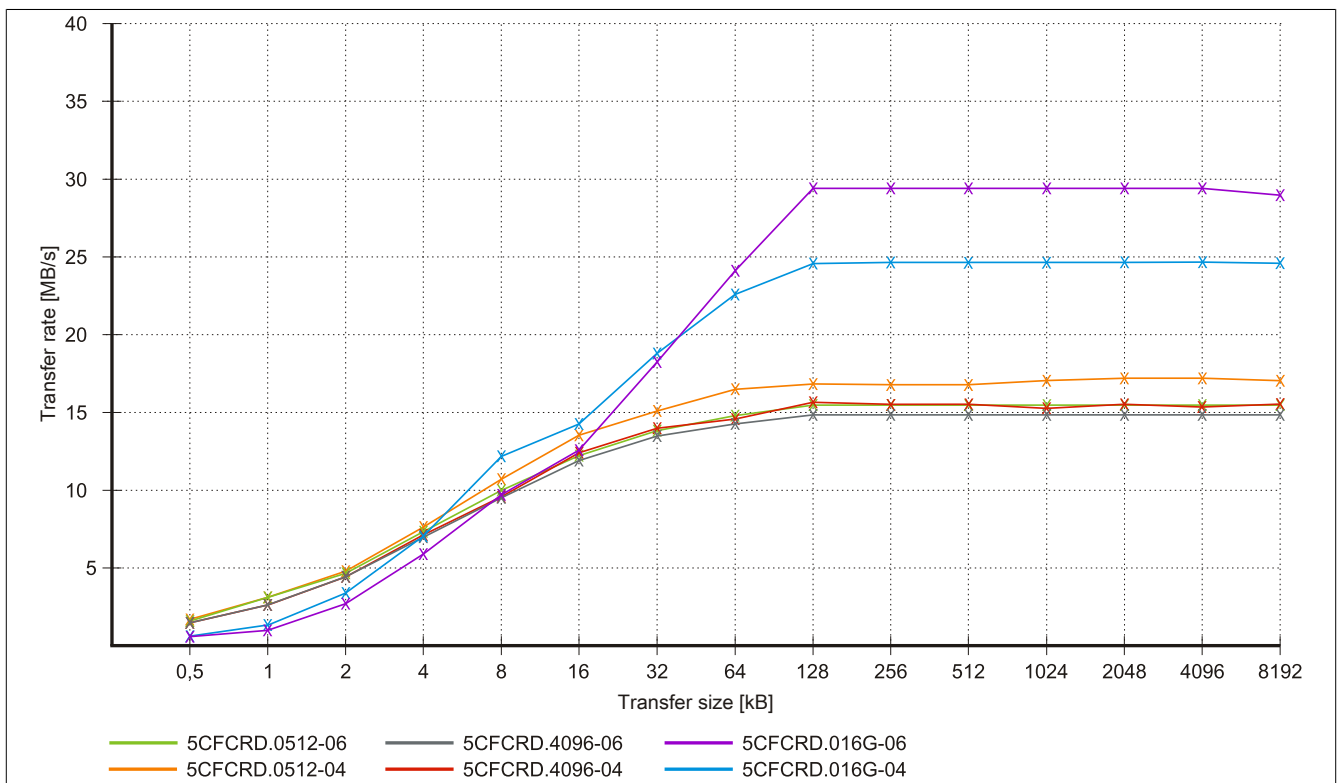


Image 134: ATTO Disk Benchmark v2.34 comparison when writing - 5CFCRD.xxxx-04 with 5CFCRD.xxxx-06

## 9.4 5CFCRD.xxxx-04

### 9.4.1 General information

#### Information:

B&R CompactFlash cards 5CFCRD.xxxx-04 and CompactFlash cards from a different manufacturer cannot be used in the same system at the same time. Due to differences in technology (older vs. newer technologies), problems can occur during system startup that are caused by the different boot times.

see "Known problems / issues" on page 261

#### Information:

The 5CFCRD.xxxx-04 CompactFlash cards are supported on B&R devices with WinCE version  $\geq 6.0$  or higher.

### 9.4.2 Order data

| Model number   | Short description             | Image                                                                                |
|----------------|-------------------------------|--------------------------------------------------------------------------------------|
|                | <b>CompactFlash</b>           |  |
| 5CFCRD.0512-04 | CompactFlash 512 MB B&R (SLC) |                                                                                      |
| 5CFCRD.1024-04 | CompactFlash 1 GB B&R (SLC)   |                                                                                      |
| 5CFCRD.2048-04 | CompactFlash 2 GB B&R (SLC)   |                                                                                      |
| 5CFCRD.4096-04 | CompactFlash 4 GB B&R (SLC)   |                                                                                      |
| 5CFCRD.8192-04 | CompactFlash 8 GB B&R (SLC)   |                                                                                      |
| 5CFCRD.016G-04 | CompactFlash 16 GB B&R (SLC)  |                                                                                      |

Table 238: 5CFCRD.0512-04, 5CFCRD.1024-04, 5CFCRD.2048-04, 5CFCRD.4096-04, 5CFCRD.8192-04, 5CFCRD.016G-04 - Order data

### 9.4.3 Technical data

#### Caution!

A sudden loss of power can cause data to be lost! In very rare cases, the mass storage device 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 complete device. For the complete device where this accessory is installed, refer to the data provided specifically for the complete device.

| Product ID                 | 5CFCRD.0512-04                                               | 5CFCRD.1024-04                  | 5CFCRD.2048-04                  | 5CFCRD.4096-04                  | 5CFCRD.8192-04                  | 5CFCRD.016G-04                  |
|----------------------------|--------------------------------------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| <b>General information</b> |                                                              |                                 |                                 |                                 |                                 |                                 |
| Capacity                   | 512 MB                                                       | 1 GB                            | 2 GB                            | 4 GB                            | 8 GB                            | 16 GB                           |
| Data retention             | 10 years                                                     |                                 |                                 |                                 |                                 |                                 |
| Data reliability           | < 1 unrecoverable error in 10<SUP>14</SUP> bit read accesses |                                 |                                 |                                 |                                 |                                 |
| Lifetime monitoring        | Yes                                                          |                                 |                                 |                                 |                                 |                                 |
| MTBF                       | > 3,000,000 hours (at 25°C)                                  |                                 |                                 |                                 |                                 |                                 |
| Maintenance                | None                                                         |                                 |                                 |                                 |                                 |                                 |
| Supported operating modes  | PIO mode 0-6, Multiword DMA mode 0-4, Ultra DMA mode 0-4     |                                 |                                 |                                 |                                 |                                 |
| Continuous reading         |                                                              |                                 |                                 |                                 |                                 |                                 |
| Typical                    | 35 MB/s<br>(240X) <sup>1)</sup>                              | 35 MB/s<br>(240X) <sup>1)</sup> | 35 MB/s<br>(240X) <sup>1)</sup> | 33 MB/s<br>(220X) <sup>1)</sup> | 27 MB/s<br>(180X) <sup>1)</sup> | 36 MB/s<br>(240X) <sup>1)</sup> |
| Maximum                    | 37 MB/s<br>(260X) <sup>1)</sup>                              | 37 MB/s<br>(260X) <sup>1)</sup> | 37 MB/s<br>(260X) <sup>1)</sup> | 34 MB/s<br>(226X) <sup>1)</sup> | 28 MB/s<br>(186X) <sup>1)</sup> | 37 MB/s<br>(247X) <sup>1)</sup> |
| Continuous writing         |                                                              |                                 |                                 |                                 |                                 |                                 |

Table 239: 5CFCRD.0512-04, 5CFCRD.1024-04, 5CFCRD.2048-04, 5CFCRD.4096-04, 5CFCRD.8192-04, 5CFCRD.016G-04 - Technical data

| Product ID                          | 5CFCRD.0512-04                                                                                                         | 5CFCRD.1024-04                                             | 5CFCRD.2048-04                                             | 5CFCRD.4096-04                                             | 5CFCRD.8192-04                                             | 5CFCRD.016G-04    |
|-------------------------------------|------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|------------------------------------------------------------|------------------------------------------------------------|------------------------------------------------------------|-------------------|
| Typical                             | 17 MB/s (110X)                                                                                                         | 17 MB/s (110X)                                             | 17 MB/s (110X)                                             | 16 MB/s (106X)                                             | 15 MB/s (100X)                                             | 18 MB/s (120X)    |
| Maximum                             | 20 MB/s (133X)                                                                                                         | 20 MB/s (133X)                                             | 20 MB/s (133X)                                             | 18 MB/s (120X)                                             | 17 MB/s (110X)                                             | 19 MB/s (126X)    |
| Certification CE                    | Yes                                                                                                                    |                                                            |                                                            |                                                            |                                                            |                   |
| Endurance                           |                                                                                                                        |                                                            |                                                            |                                                            |                                                            |                   |
| Guaranteed data volume              |                                                                                                                        |                                                            |                                                            |                                                            |                                                            |                   |
| Guaranteed <sup>2)</sup>            | 50 TB                                                                                                                  | 100 TB                                                     | 200 TB                                                     | 400 TB                                                     | 800 TB                                                     | 1600 TB           |
| Results for 5 years <sup>2)</sup>   | 27.40 GB/day                                                                                                           | 54.79 GB/day                                               | 109.9 GB/day                                               | 219.8 GB/day                                               | 438.6 GB/day                                               | 876.72 GB/day     |
| Clear/write cycles                  |                                                                                                                        |                                                            |                                                            |                                                            |                                                            |                   |
| Typical <sup>3)</sup>               | 2,000,000                                                                                                              |                                                            |                                                            |                                                            |                                                            |                   |
| Guaranteed                          | 100,000                                                                                                                |                                                            |                                                            |                                                            |                                                            |                   |
| SLC Flash                           | Yes                                                                                                                    |                                                            |                                                            |                                                            |                                                            |                   |
| Wear leveling                       | Static                                                                                                                 |                                                            |                                                            |                                                            |                                                            |                   |
| Error Correction Coding (ECC)       | Yes                                                                                                                    |                                                            |                                                            |                                                            |                                                            |                   |
| S.M.A.R.T. Support                  | No                                                                                                                     |                                                            |                                                            |                                                            |                                                            |                   |
| Support                             |                                                                                                                        |                                                            |                                                            |                                                            |                                                            |                   |
| Hardware                            | PP300/400, PP500, PPC300, PPC700, PPC725, PPC800, APC620, APC810, APC820                                               |                                                            |                                                            |                                                            |                                                            |                   |
| Operating systems                   |                                                                                                                        |                                                            |                                                            |                                                            |                                                            |                   |
| Windows 7 32-bit                    | No                                                                                                                     | No                                                         | No                                                         | No                                                         | No                                                         | Yes               |
| Windows 7 64-bit                    |                                                                                                                        |                                                            |                                                            | No                                                         |                                                            |                   |
| Windows Embedded Standard 7, 32-bit | No                                                                                                                     | No                                                         | No                                                         | No                                                         | Yes                                                        | Yes               |
| Windows Embedded Standard 7, 64-bit | No                                                                                                                     | No                                                         | No                                                         | No                                                         | No                                                         | Yes               |
| Windows XP Professional             | No                                                                                                                     | No                                                         | No                                                         | Yes                                                        | Yes                                                        | Yes               |
| Windows XP Embedded                 |                                                                                                                        |                                                            |                                                            | Yes                                                        |                                                            |                   |
| Windows Embedded Standard 2009      | No                                                                                                                     | Yes                                                        | Yes                                                        | Yes                                                        | Yes                                                        | Yes               |
| Windows CE 6.0                      | Yes                                                                                                                    | Yes                                                        | Yes                                                        | Yes                                                        | Yes                                                        | Yes <sup>1)</sup> |
| Windows CE 5.0                      |                                                                                                                        |                                                            |                                                            | No                                                         |                                                            |                   |
| Software                            |                                                                                                                        |                                                            |                                                            |                                                            |                                                            |                   |
| PVI Transfer                        | ≥ V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011)                                                             | ≥ V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011) | ≥ V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011) | ≥ V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011) | ≥ V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011) | No                |
| B&R Embedded OS Installer           | ≥ V3.10                                                                                                                | ≥ V3.10                                                    | ≥ V3.10                                                    | ≥ V3.10                                                    | ≥ V3.10                                                    | ≥ V3.20           |
| Environmental conditions            |                                                                                                                        |                                                            |                                                            |                                                            |                                                            |                   |
| Temperature                         |                                                                                                                        |                                                            |                                                            |                                                            |                                                            |                   |
| Operation                           | 0 to 70°C                                                                                                              |                                                            |                                                            |                                                            |                                                            |                   |
| Storage                             | -65 to 150°C                                                                                                           |                                                            |                                                            |                                                            |                                                            |                   |
| Transport                           | -65 to 150°C                                                                                                           |                                                            |                                                            |                                                            |                                                            |                   |
| Relative humidity                   |                                                                                                                        |                                                            |                                                            |                                                            |                                                            |                   |
| Operation                           | Max. 85% at 85°C                                                                                                       |                                                            |                                                            |                                                            |                                                            |                   |
| Storage                             | Max. 85% at 85°C                                                                                                       |                                                            |                                                            |                                                            |                                                            |                   |
| Transport                           | Max. 85% at 85°C                                                                                                       |                                                            |                                                            |                                                            |                                                            |                   |
| Vibration                           |                                                                                                                        |                                                            |                                                            |                                                            |                                                            |                   |
| Operation                           | 20 g peak, 20 to 2000 Hz, 4 in each direction (JEDEC JESD22, method B103)<br>5.35 g RMS, 15 min per level (IEC 68-2-6) |                                                            |                                                            |                                                            |                                                            |                   |
| Storage                             | 20 g peak, 20 to 2000 Hz, 4 in each direction (JEDEC JESD22, method B103)<br>5.35 g RMS, 15 min per level (IEC 68-2-6) |                                                            |                                                            |                                                            |                                                            |                   |
| Transport                           | 20 g peak, 20 to 2000 Hz, 4 in each direction (JEDEC JESD22, method B103)<br>5.35 g RMS, 15 min per level (IEC 68-2-6) |                                                            |                                                            |                                                            |                                                            |                   |
| Shock                               |                                                                                                                        |                                                            |                                                            |                                                            |                                                            |                   |
| Operation                           | 1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method)<br>30 g, 11 ms 1x (IEC 68-2-27)                                     |                                                            |                                                            |                                                            |                                                            |                   |
| Storage                             | 1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method)<br>30 g, 11 ms 1x (IEC 68-2-27)                                     |                                                            |                                                            |                                                            |                                                            |                   |
| Transport                           | 1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method)<br>30 g, 11 ms 1x (IEC 68-2-27)                                     |                                                            |                                                            |                                                            |                                                            |                   |
| Altitude                            |                                                                                                                        |                                                            |                                                            |                                                            |                                                            |                   |
| Operation                           | Max. 4,572 m                                                                                                           |                                                            |                                                            |                                                            |                                                            |                   |
| Mechanical characteristics          |                                                                                                                        |                                                            |                                                            |                                                            |                                                            |                   |
| Dimensions                          |                                                                                                                        |                                                            |                                                            |                                                            |                                                            |                   |
| Width                               | 42.8 ± 0.10 mm                                                                                                         |                                                            |                                                            |                                                            |                                                            |                   |
| Length                              | 36.4 ± 0.15 mm                                                                                                         |                                                            |                                                            |                                                            |                                                            |                   |
| Height                              | 3.3 ± 0.10 mm                                                                                                          |                                                            |                                                            |                                                            |                                                            |                   |
| Weight                              | 10 g                                                                                                                   |                                                            |                                                            |                                                            |                                                            |                   |

Table 239: 5CFCRD.0512-04, 5CFCRD.1024-04, 5CFCRD.2048-04, 5CFCRD.4096-04, 5CFCRD.8192-04, 5CFCRD.016G-04 - Technical data

- 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) Endurance of B&R CFs (with linear written block size ≥ 128 kB)
- 3) Depending on the average file size.

9.4.4 Temperature humidity diagram

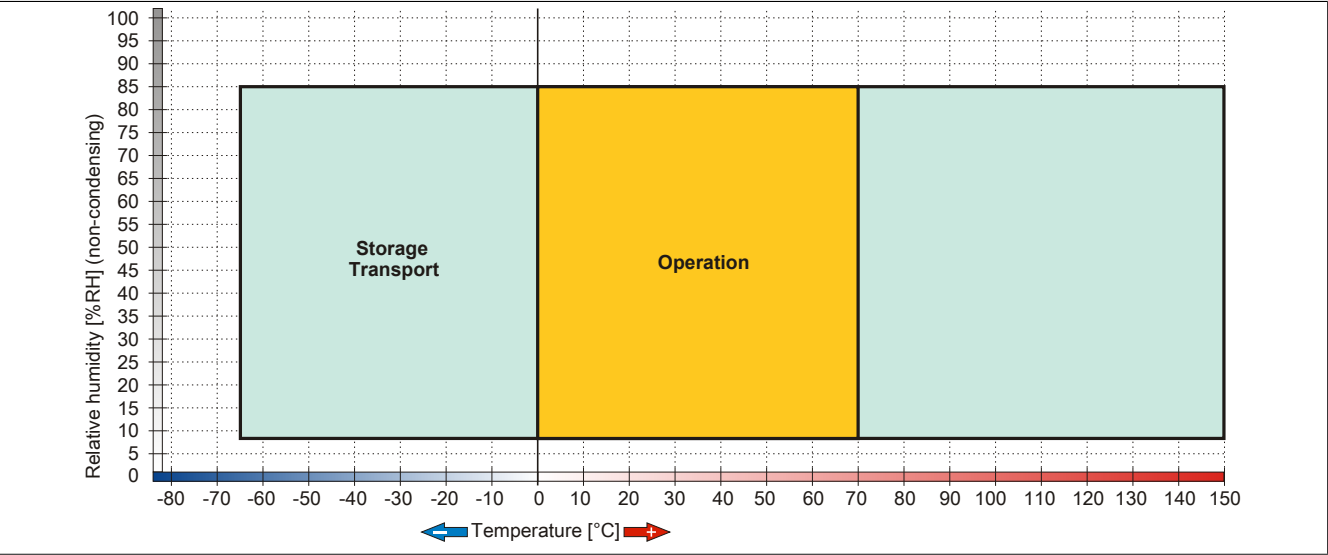


Image 135: 5CFCRD.xxxx-04 - Temperature humidity diagram for CompactFlash cards

9.4.5 Dimensions

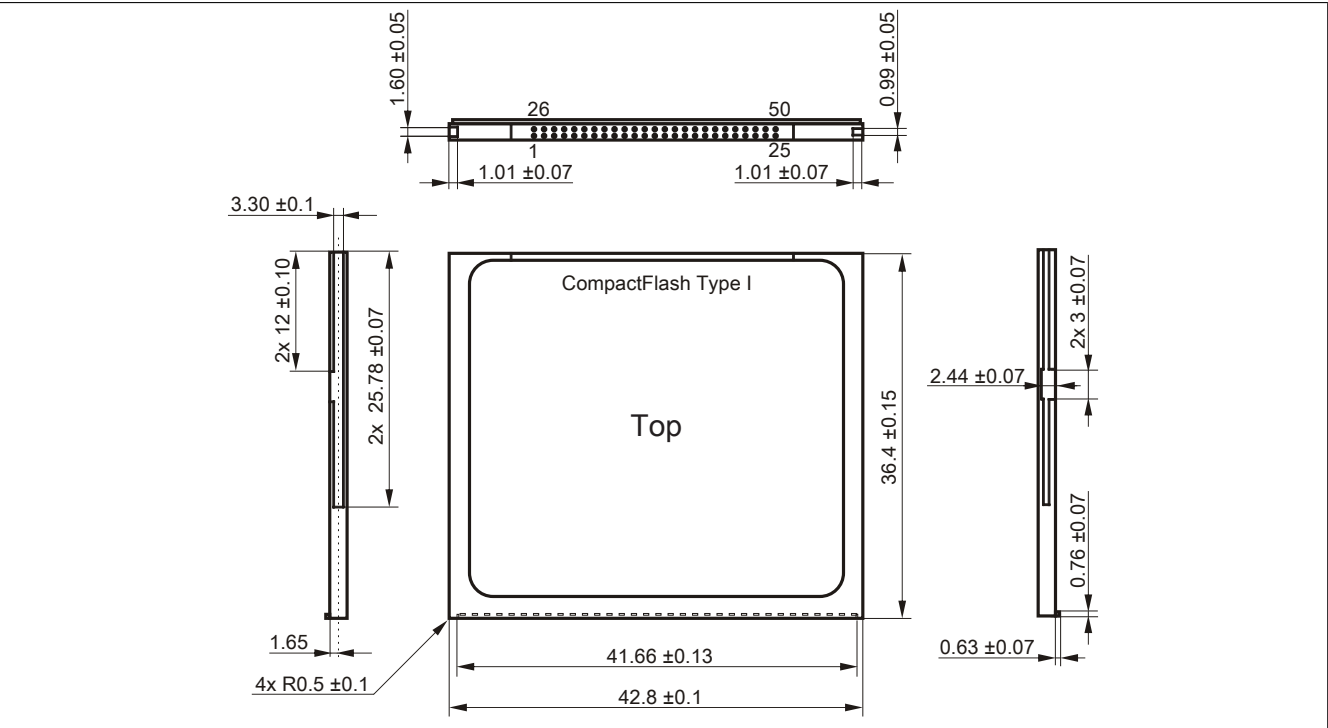


Image 136: Dimensions - CompactFlash card Type I

## 9.4.6 Benchmark

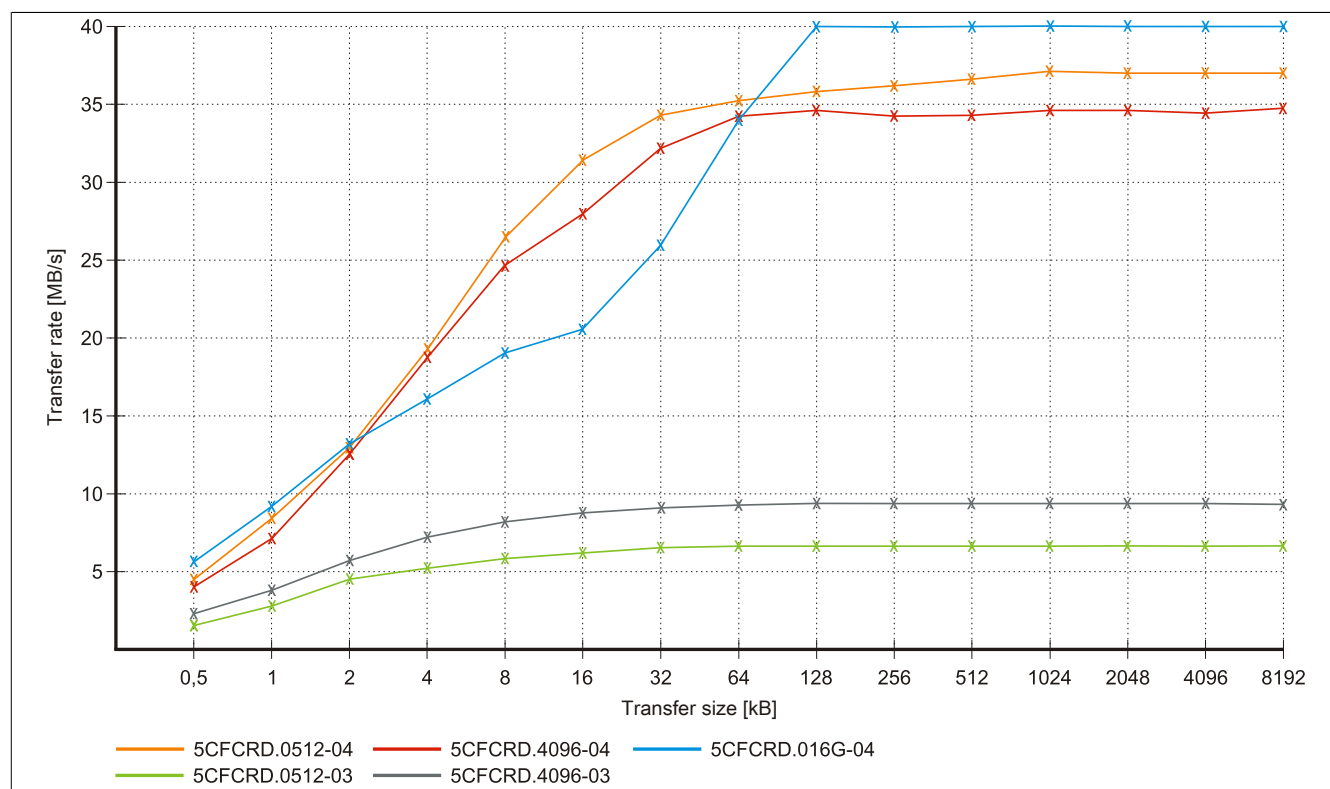


Image 137: ATTO Disk Benchmark v2.34 comparison when reading - 5CFCRD.xxxx-03 with 5CFCRD.xxxx-04

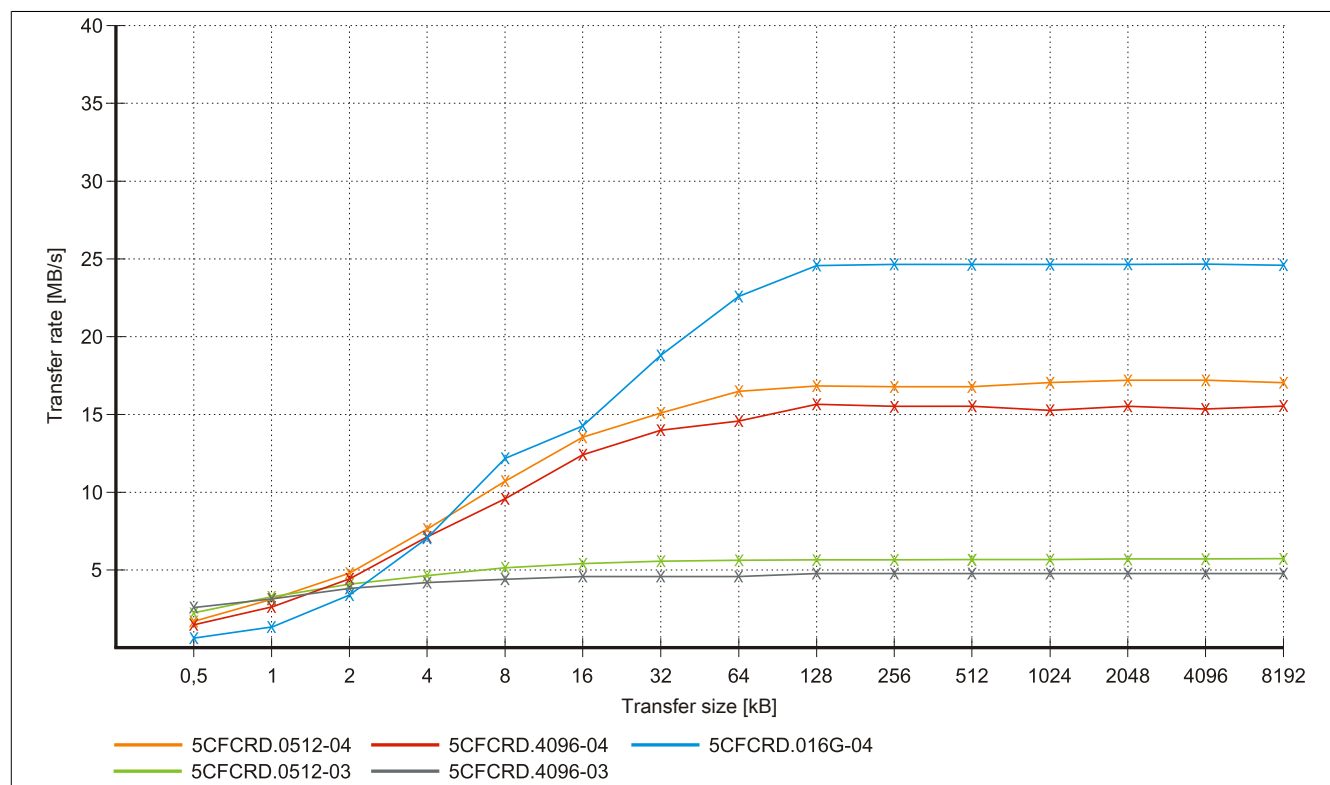


Image 138: ATTO Disk Benchmark v2.34 comparison when writing - 5CFCRD.xxxx-03 with 5CFCRD.xxxx-04

## 9.5 5CFCRD.xxxx-03

### 9.5.1 General information

#### Information:

Western Digital CompactFlash cards 5CFCRD.xxxx-03 and CompactFlash cards from a different manufacturer cannot be used in the same system at the same time. Due to differences in technology (older vs. newer technologies), problems can occur during system startup that are caused by the different boot times.

see "Known problems / issues" on page 261

#### Information:

On Windows CE 5.0 devices, 5CFCRD.xxxx-03 CompactFlash cards up to 1 GB are supported.

#### Information:

On CompactFlash cards 5CFCRD.xxxx-03, only the sticker and the description have changed. The technical data has not been changed.

### 9.5.2 Order data

| Model number   | Short description                         | Image                                                                                |
|----------------|-------------------------------------------|--------------------------------------------------------------------------------------|
|                | <b>CompactFlash</b>                       |  |
| 5CFCRD.0064-03 | CompactFlash 64 MB Western Digital (SLC)  |                                                                                      |
| 5CFCRD.0128-03 | CompactFlash 128 MB Western Digital (SLC) |                                                                                      |
| 5CFCRD.0256-03 | CompactFlash 256 MB Western Digital (SLC) |                                                                                      |
| 5CFCRD.0512-03 | CompactFlash 512 MB Western Digital (SLC) |                                                                                      |
| 5CFCRD.1024-03 | CompactFlash 1 GB Western Digital (SLC)   |                                                                                      |
| 5CFCRD.2048-03 | CompactFlash 2 GB Western Digital (SLC)   |                                                                                      |
| 5CFCRD.4096-03 | CompactFlash 4 GB Western Digital (SLC)   |                                                                                      |
| 5CFCRD.8192-03 | CompactFlash 8 GB Western Digital (SLC)   |                                                                                      |

Table 240: 5CFCRD.0064-03, 5CFCRD.0128-03, 5CFCRD.0256-03, 5CFCRD.0512-03, 5CFCRD.1024-03, 5CFCRD.2048-03, 5CFCRD.4096-03, 5CFCRD.8192-03 - Order data

### 9.5.3 Technical data

#### Caution!

A sudden loss of power can cause data to be lost! In very rare cases, the mass storage device 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 complete device. For the complete device where this accessory is installed, refer to the data provided specifically for the complete device.

| Product ID                 | 5CFCRD.0064-03                                               | 5CFCRD.0128-03 | 5CFCRD.0256-03 | 5CFCRD.0512-03 | 5CFCRD.1024-03 | 5CFCRD.2048-03 | 5CFCRD.4096-03 | 5CFCRD.8192-03 |
|----------------------------|--------------------------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| <b>General information</b> |                                                              |                |                |                |                |                |                |                |
| Capacity                   | 64 MB                                                        | 128 MB         | 256 MB         | 512 MB         | 1 GB           | 2 GB           | 4 GB           | 8 GB           |
| Data retention             | 10 years                                                     |                |                |                |                |                |                |                |
| Data reliability           | < 1 unrecoverable error in 10<SUP>14</SUP> bit read accesses |                |                |                |                |                |                |                |
| Lifetime monitoring        | Yes                                                          |                |                |                |                |                |                |                |
| MTBF                       | > 4,000,000 hours (at 25°C)                                  |                |                |                |                |                |                |                |

Table 241: 5CFCRD.0064-03, 5CFCRD.0128-03, 5CFCRD.0256-03, 5CFCRD.0512-03, 5CFCRD.1024-03, 5CFCRD.2048-03, 5CFCRD.4096-03, 5CFCRD.8192-03 - Technical data

| Product ID                          | 5CFCRD.<br>0064-03                                                                                                               | 5CFCRD.<br>0128-03 | 5CFCRD.<br>0256-03 | 5CFCRD.<br>0512-03 | 5CFCRD.<br>1024-03 | 5CFCRD.<br>2048-03 | 5CFCRD.<br>4096-03 | 5CFCRD.<br>8192-03 |
|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Maintenance                         | None                                                                                                                             |                    |                    |                    |                    |                    |                    |                    |
| Supported operating modes           | PIO mode 0-4, Multiword DMA mode 0-2                                                                                             |                    |                    |                    |                    |                    |                    |                    |
| Continuous reading<br>Typical       | 8 MB/s                                                                                                                           |                    |                    |                    |                    |                    |                    |                    |
| Continuous writing<br>Typical       | 6 MB/s                                                                                                                           |                    |                    |                    |                    |                    |                    |                    |
| Certification<br>CE                 | Yes                                                                                                                              |                    |                    |                    |                    |                    |                    |                    |
| Endurance                           |                                                                                                                                  |                    |                    |                    |                    |                    |                    |                    |
| Clear/write cycles<br>Typical       | > 2,000,000                                                                                                                      |                    |                    |                    |                    |                    |                    |                    |
| SLC Flash                           | Yes                                                                                                                              |                    |                    |                    |                    |                    |                    |                    |
| Wear leveling                       | Static                                                                                                                           |                    |                    |                    |                    |                    |                    |                    |
| Error Correction Coding (ECC)       | Yes                                                                                                                              |                    |                    |                    |                    |                    |                    |                    |
| S.M.A.R.T. Support                  | No                                                                                                                               |                    |                    |                    |                    |                    |                    |                    |
| Support                             |                                                                                                                                  |                    |                    |                    |                    |                    |                    |                    |
| Hardware                            | MP100/200, PP100/200, PP300/400, PP500, PPC300, PPC700, PPC725, PPC800, Provit 2000, Provit 5000, APC620, APC680, APC810, APC820 |                    |                    |                    |                    |                    |                    |                    |
| Operating systems                   |                                                                                                                                  |                    |                    |                    |                    |                    |                    |                    |
| Windows 7 32-bit                    | No                                                                                                                               |                    |                    |                    |                    |                    |                    |                    |
| Windows 7 64-bit                    | No                                                                                                                               |                    |                    |                    |                    |                    |                    |                    |
| Windows Embedded Standard 7, 32-bit | No                                                                                                                               | No                 | No                 | No                 | No                 | No                 | No                 | Yes                |
| Windows Embedded Standard 7, 64-bit | No                                                                                                                               |                    |                    |                    |                    |                    |                    |                    |
| Windows XP Professional             | No                                                                                                                               | No                 | No                 | No                 | No                 | No                 | Yes                | Yes                |
| Windows XP Embedded                 | No                                                                                                                               | No                 | No                 | Yes                | Yes                | Yes                | Yes                | Yes                |
| Windows Embedded Standard 2009      | No                                                                                                                               | No                 | No                 | No                 | Yes                | Yes                | Yes                | Yes                |
| Windows CE 6.0                      | Yes                                                                                                                              | Yes                | Yes                | Yes                | Yes                | Yes                | Yes                | Yes <sup>1)</sup>  |
| Windows CE 5.0                      | Yes                                                                                                                              | Yes                | Yes                | Yes                | Yes                | No                 | No                 | No                 |
| Software                            |                                                                                                                                  |                    |                    |                    |                    |                    |                    |                    |
| PVI Transfer                        | ≥ V2.57 (part of PVI Development Setup ≥ V2.5.3.3005)                                                                            |                    |                    |                    |                    |                    |                    |                    |
| B&R Embedded OS Installer           | ≥ V2.21                                                                                                                          |                    |                    |                    |                    |                    |                    |                    |
| Environmental conditions            |                                                                                                                                  |                    |                    |                    |                    |                    |                    |                    |
| Temperature                         |                                                                                                                                  |                    |                    |                    |                    |                    |                    |                    |
| Operation                           | 0 to 70°C                                                                                                                        |                    |                    |                    |                    |                    |                    |                    |
| Storage                             | -50 to 100°C                                                                                                                     |                    |                    |                    |                    |                    |                    |                    |
| Transport                           | -50 to 100°C                                                                                                                     |                    |                    |                    |                    |                    |                    |                    |
| Relative humidity                   |                                                                                                                                  |                    |                    |                    |                    |                    |                    |                    |
| Operation                           | 8 to 95%, non-condensing                                                                                                         |                    |                    |                    |                    |                    |                    |                    |
| Storage                             | 8 to 95%, non-condensing                                                                                                         |                    |                    |                    |                    |                    |                    |                    |
| Transport                           | 8 to 95%, non-condensing                                                                                                         |                    |                    |                    |                    |                    |                    |                    |
| Vibration                           |                                                                                                                                  |                    |                    |                    |                    |                    |                    |                    |
| Operation                           | Max. 16.3 g (159 m/s² 0-peak)                                                                                                    |                    |                    |                    |                    |                    |                    |                    |
| Storage                             | Max. 30 g (294 m/s² 0-peak)                                                                                                      |                    |                    |                    |                    |                    |                    |                    |
| Transport                           | Max. 30 g (294 m/s² 0-peak)                                                                                                      |                    |                    |                    |                    |                    |                    |                    |
| Shock                               |                                                                                                                                  |                    |                    |                    |                    |                    |                    |                    |
| Operation                           | Max. 1000 g (9810 m/s² 0-peak)                                                                                                   |                    |                    |                    |                    |                    |                    |                    |
| Storage                             | Max. 3000 g (29430 m/s² 0-peak)                                                                                                  |                    |                    |                    |                    |                    |                    |                    |
| Transport                           | Max. 3000 g (29430 m/s² 0-peak)                                                                                                  |                    |                    |                    |                    |                    |                    |                    |
| Altitude                            |                                                                                                                                  |                    |                    |                    |                    |                    |                    |                    |
| Operation                           | Max. 24.383 m                                                                                                                    |                    |                    |                    |                    |                    |                    |                    |
| Mechanical characteristics          |                                                                                                                                  |                    |                    |                    |                    |                    |                    |                    |
| Dimensions                          |                                                                                                                                  |                    |                    |                    |                    |                    |                    |                    |
| Width                               | 42.8 ± 0.10 mm                                                                                                                   |                    |                    |                    |                    |                    |                    |                    |
| Length                              | 36.4 ± 0.15 mm                                                                                                                   |                    |                    |                    |                    |                    |                    |                    |
| Height                              | 3.3 ± 0.10 mm                                                                                                                    |                    |                    |                    |                    |                    |                    |                    |
| Weight                              | 11.4 g                                                                                                                           |                    |                    |                    |                    |                    |                    |                    |

Table 241: 5CFCRD.0064-03, 5CFCRD.0128-03, 5CFCRD.0256-03, 5CFCRD.0512-03, 5CFCRD.1024-03, 5CFCRD.2048-03, 5CFCRD.4096-03, 5CFCRD.8192-03 - Technical data

1) Not supported by B&R Embedded OS installer.

9.5.4 Temperature humidity diagram

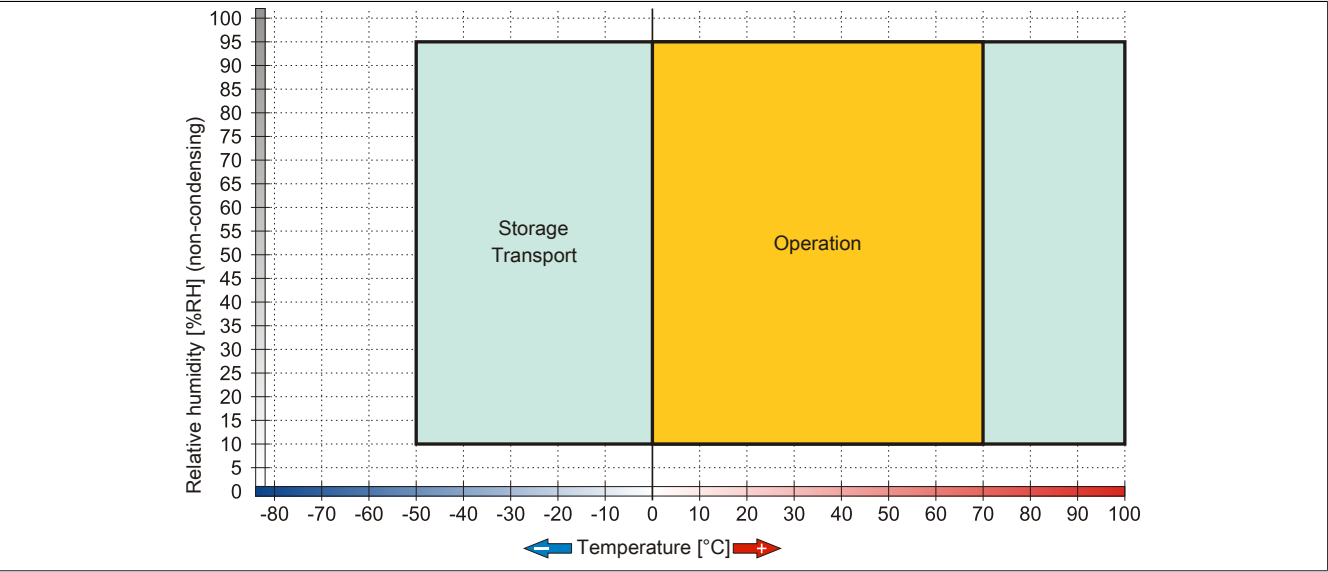


Image 139: 5CFCRD.xxxx-03 - Temperature humidity diagram for CompactFlash cards

9.5.5 Dimensions

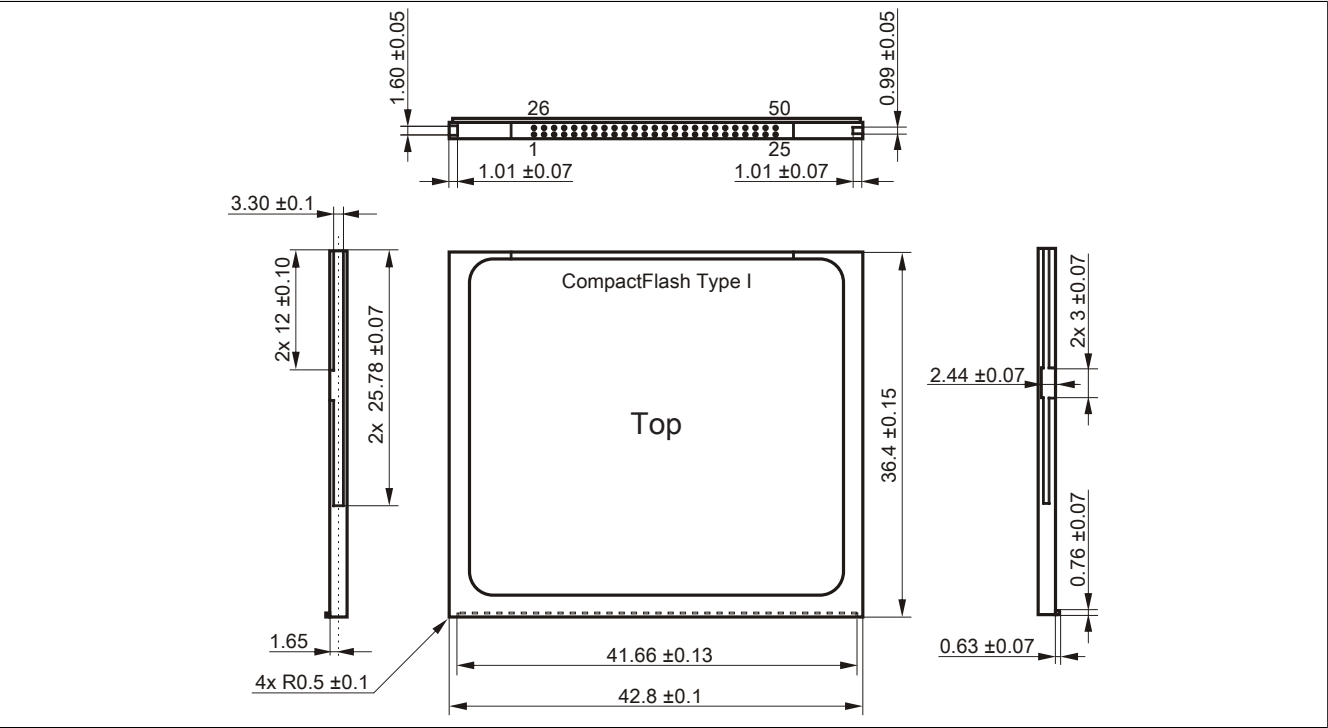


Image 140: Dimensions - CompactFlash card Type I



## 9.6 Known problems / issues

The following is a known issue for devices with two CompactFlash slots:

- Using two different types of CompactFlash cards can cause problems in Automation PCs and Panel PCs. This can result in one of the two cards not being detected during system startup. This is caused by varying startup speeds. CompactFlash cards with older technology require significantly more time during system startup than CompactFlash cards with newer technology. This behavior occurs near the limits of the time frame provided for startup. This can occur because the startup time for the CompactFlash cards fluctuates due to the variance of the components being used. Depending on the CompactFlash cards being used, this error may occur never, sometimes or always.

## 10 USB flash drives

### 10.1 5MMUSB.2048-00

#### 10.1.1 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 immediately act as an additional drive where data can be read or written. Only USB flash drives from the memory specialists SanDisk are used.

#### Information:

We reserve the right to supply alternative products due to the vast quantity of flash drives available on the market and their corresponding short product lifecycle. Therefore, the following measures might be necessary in order to boot from these flash drives:

- 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.

#### 10.1.2 Order data

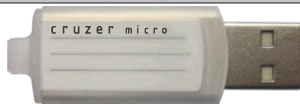
| Model number   | Short description            | Image                                                                               |
|----------------|------------------------------|-------------------------------------------------------------------------------------|
|                | Undefined                    |                                                                                     |
| 5MMUSB.2048-00 | USB 2.0 Memory Stick 2048 MB |  |

Table 242: 5MMUSB.2048-00 - Order data

#### 10.1.3 Technical data

#### Information:

The following characteristics, features and limit values only apply to this accessory and can deviate from those specified for the entire device.

| Product ID                        | 5MMUSB.2048-00                                                             |
|-----------------------------------|----------------------------------------------------------------------------|
| <b>General information</b>        |                                                                            |
| Data retention                    | 10 years                                                                   |
| LEDs                              | 1 LED (green), signals data transfer (send and receive) <sup>1)</sup>      |
| MTBF                              | 100,000 hours (at 25°C)                                                    |
| Type                              | USB 1.1, USB 2.0                                                           |
| Maintenance                       | None                                                                       |
| Certification<br>CE               | Yes                                                                        |
| <b>Interfaces</b>                 |                                                                            |
| USB                               |                                                                            |
| Type                              | USB 1.1, USB 2.0                                                           |
| Connection                        | To each USB type A interface                                               |
| Transfer rate                     | Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) |
| Sequential reading                | Max. 8.7 MB/s                                                              |
| Sequential writing                | Max. 1.7 MB/s                                                              |
| <b>Support</b>                    |                                                                            |
| Operating systems                 |                                                                            |
| Windows XP Professional           | Yes                                                                        |
| Windows XP Embedded               | Yes                                                                        |
| Windows ME                        | Yes                                                                        |
| Windows 2000                      | Yes                                                                        |
| Windows CE 5.0                    | Yes                                                                        |
| Windows CE 4.2                    | Yes                                                                        |
| <b>Electrical characteristics</b> |                                                                            |
| Power consumption                 | 650 µA sleep mode, 150 mA read/write                                       |
| <b>Environmental conditions</b>   |                                                                            |
| Temperature                       |                                                                            |
| Operation                         | 0 to 45°C                                                                  |
| Storage                           | -20 to 60°C                                                                |

Table 243: 5MMUSB.2048-00 - Technical data

| Product ID                 | 5MMUSB.2048-00                                                              |
|----------------------------|-----------------------------------------------------------------------------|
| Transport                  | -20 to 60°C                                                                 |
| Relative humidity          |                                                                             |
| Operation                  | 10 to 90%, non-condensing                                                   |
| Storage                    | 5 to 90%, non-condensing                                                    |
| Transport                  | 5 to 90%, non-condensing                                                    |
| Vibration                  |                                                                             |
| Operation                  | 10 to 500 Hz: 2 g (19.6 m/s <sup>2</sup> 0-peak), oscillation rate 1/minute |
| Storage                    | 10 to 500 Hz: 2 g (19.6 m/s <sup>2</sup> 0-peak), oscillation rate 1/minute |
| Transport                  | 10 to 500 Hz: 2 g (19.6 m/s <sup>2</sup> 0-peak), oscillation rate 1/minute |
| Shock                      |                                                                             |
| Operation                  | Max. 40 g (392 m/s <sup>2</sup> 0-peak) and 11 ms length                    |
| Storage                    | Max. 80 g (784 m/s <sup>2</sup> 0-peak) and 11 ms length                    |
| Transport                  | Max. 80 g (784 m/s <sup>2</sup> 0-peak) and 11 ms length                    |
| Altitude                   |                                                                             |
| Operation                  | Max. 3048 m                                                                 |
| Storage                    | Max. 12192 m                                                                |
| Transport                  | Max. 12192 m                                                                |
| Mechanical characteristics |                                                                             |
| Dimensions                 |                                                                             |
| Width                      | 19 mm                                                                       |
| Length                     | 52.2 mm                                                                     |
| Height                     | 7.9 mm                                                                      |

Table 243: 5MMUSB.2048-00 - Technical data

- 1) Signals data transfer (send and receive).

#### 10.1.4 Temperature humidity diagram

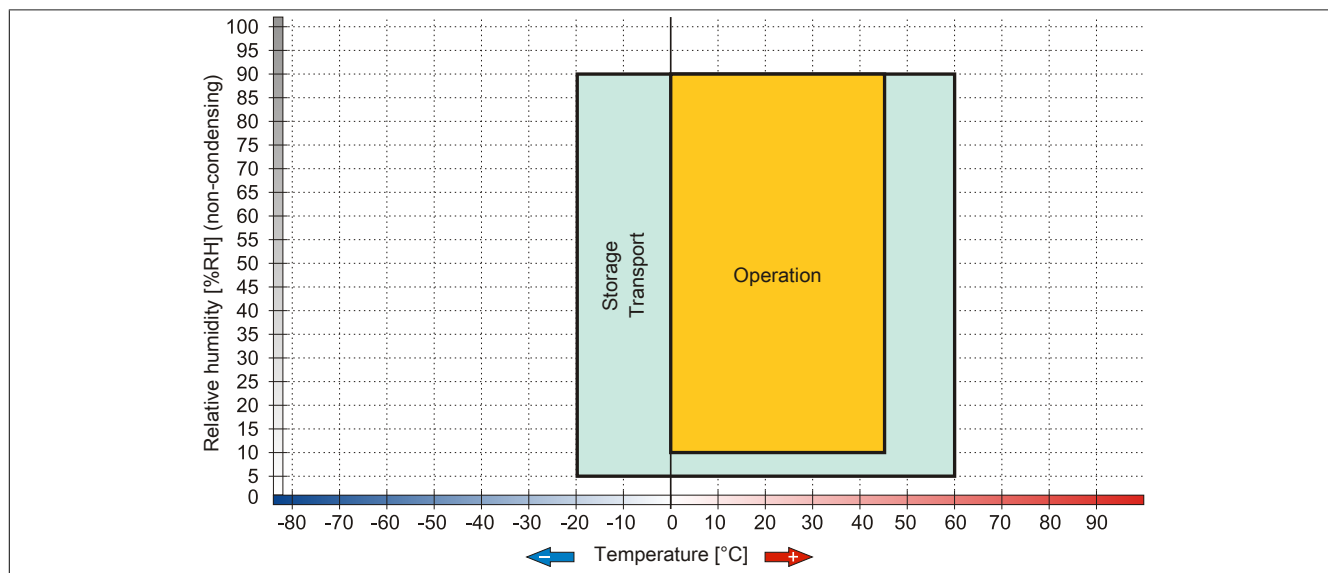


Image 141: 5MMUSB.2048-00 - Temperature humidity diagram

## 10.2 5MMUSB.2048-01

### 10.2.1 General information

USB flash drives are storage media that are easy to replace. Because of their fast data transfer (USB 2.0), USB flash drives are ideal for use as portable data storage. Without requiring additional drivers ("Hot Plug & Play" - except with Windows 98SE), the USB flash drive can immediately act as an additional drive where data can be read or written.

#### Information:

**We reserve the right to supply alternative products due to the vast quantity of flash drives available on the market and their corresponding short product lifecycle. Therefore, the following measures might be necessary in order to boot from these flash drives:**

- 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.

- USB 1.1, USB 2.0
- High transfer rate
- High data storage
- Ambient temperature during operation: 0 to 70°C

### 10.2.2 Order data

| Model number   | Short description               | Image                                                                                |
|----------------|---------------------------------|--------------------------------------------------------------------------------------|
|                | <b>USB accessories</b>          |                                                                                      |
| 5MMUSB.2048-01 | USB 2.0 flash drive 2048 MB B&R |  |

Table 244: 5MMUSB.2048-01 - Order data

### 10.2.3 Technical data

| Product ID                        | 5MMUSB.2048-01                                                             |
|-----------------------------------|----------------------------------------------------------------------------|
| <b>General information</b>        |                                                                            |
| Data retention                    | > 10 years                                                                 |
| LEDs                              | 1 LED (green), signals data transfer (send and receive) <sup>1)</sup>      |
| MTBF                              | > 3,000,000 hours                                                          |
| Type                              | USB 1.1, USB 2.0                                                           |
| Maintenance                       | None                                                                       |
| Certification                     |                                                                            |
| CE                                | Yes                                                                        |
| <b>Interfaces</b>                 |                                                                            |
| USB                               |                                                                            |
| Type                              | USB 1.1, USB 2.0                                                           |
| Connection                        | To each USB type A interface                                               |
| Transfer rate                     | Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) |
| Sequential reading                | Max. 31 MB/s                                                               |
| Sequential writing                | Max. 30 MB/s                                                               |
| <b>Support</b>                    |                                                                            |
| Operating systems                 |                                                                            |
| Windows 7                         | Yes                                                                        |
| Windows XP Professional           | Yes                                                                        |
| Windows XP Embedded               | Yes                                                                        |
| Windows ME                        | Yes                                                                        |
| Windows 2000                      | Yes                                                                        |
| Windows CE 5.0                    | Yes                                                                        |
| Windows CE 4.2                    | Yes                                                                        |
| <b>Electrical characteristics</b> |                                                                            |
| Power consumption                 | Max. 500 µA sleep mode, max. 120 mA read/write                             |
| <b>Environmental conditions</b>   |                                                                            |
| Temperature                       |                                                                            |
| Operation                         | 0 to 70°C                                                                  |
| Storage                           | -50 to 100°C                                                               |
| Transport                         | -50 to 100°C                                                               |

Table 245: 5MMUSB.2048-01 - Technical data

| Product ID                        | 5MMUSB.2048-01             |
|-----------------------------------|----------------------------|
| Relative humidity                 |                            |
| Operation                         | 85%, non-condensing        |
| Storage                           | 85%, non-condensing        |
| Transport                         | 85%, non-condensing        |
| Vibration                         |                            |
| Operation                         | 20 to 2000 Hz: 20 g (peak) |
| Storage                           | 20 to 2000 Hz: 20 g (peak) |
| Transport                         | 20 to 2000 Hz: 20 g (peak) |
| Shock                             |                            |
| Operation                         | Max. 1500 g (peak)         |
| Storage                           | Max. 1500 g (peak)         |
| Transport                         | Max. 1500 g (peak)         |
| Altitude                          |                            |
| Operation                         | Max. 3048 m                |
| Storage                           | Max. 12192 m               |
| Transport                         | Max. 12192 m               |
| <b>Mechanical characteristics</b> |                            |
| Dimensions                        |                            |
| Width                             | 17.97 mm                   |
| Length                            | 67.85 mm                   |
| Height                            | 8.35 mm                    |

Table 245: 5MMUSB.2048-01 - Technical data

1) Signals data transfer (send and receive).

### 10.2.4 Temperature humidity diagram

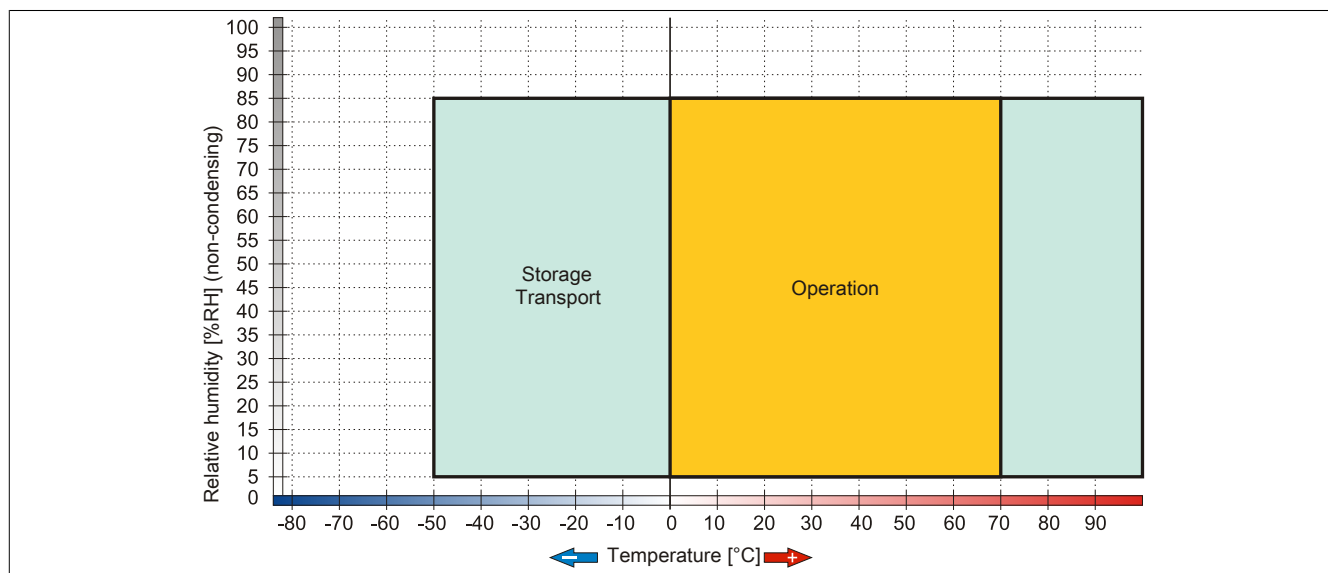


Image 142: 5MMUSB.2048-01 - Temperature humidity diagram

## 11 HMI Drivers & Utilities DVD

### 11.1 5SWHMI.0000-00

#### 11.1.1 General information

This DVD contains drivers, utilities, software upgrades and user's manuals for B&R Panel system products (see B&R website [www.br-automation.com](http://www.br-automation.com) – Industrial PCs, Visualization and Operation).

At the time of its creation, the content of the DVD is identical to the files found in the download area of the B&R homepage (under Service – “Material Related Downloads”).

#### 11.1.2 Order data

| Model number   | Short description           | Image                                                                               |
|----------------|-----------------------------|-------------------------------------------------------------------------------------|
|                | <b>Other</b>                |  |
| 5SWHMI.0000-00 | HMI Drivers & Utilities DVD |                                                                                     |

Table 246: 5SWHMI.0000-00 - Order data

#### 11.1.3 Contents (V2.10)

##### BIOS upgrades for the products

- Automation PC 620 / Panel PC 700 CPU Board 815E and 855GME BIOS
- Automation PC 620 / Panel PC 700 CPU Board X855GME BIOS
- Automation PC 620 / Panel PC 700 CPU Board 945GME N270 BIOS
- Automation PC 680
- Automation PC 810 / Automation PC 820 / Panel PC 800 B945GME BIOS
- Automation PC 810 / Panel PC 800 945GME N270 CPU Board BIOS
- Automation PC 810 / Panel PC 800 GM45 CPU Board BIOS
- Provit 2000 product family - IPC2000/2001/2002
- Provit 5000 product family - IPC5000/5600/5000C/5600C
- Power Panel 100 BIOS devices
- Mobile Panel 100 BIOS devices
- Power Panel 100 / Mobile Panel 100 user boot logo
- Power Panel 100 / Mobile Panel 100 REMHOST utility
- Power Panel 300/400 BIOS devices
- Power Panel 300/400 BIOS user boot logo
- Panel PC 310

##### Drivers for the devices

- Automation Device Interface (ADI)
- Audio
- Chipset
- CD-ROM
- LS120
- Graphics
- Network

- PCI / SATA RAID controller
- Touch screen
- Touchpad
- Interface board

### Firmware upgrades

- Automation PC 620 / Panel PC 700 (MTCX, SDLR, SDLT)
- Automation PC 810 (MTCX, SDLR, SDLT)
- Automation PC 820 (MTCX, SDLR, SDLT)
- Mobile Panel 100 (SMCX)
- Panel PC 300 (MTCX)
- Power Panel 100 (aPCI)
- Power Panel 300/400 (aPCI)
- Power Panel 300/400 (MTCX)
- Panel PC 800 (MTCX, SDLR, SDLT)
- UPS firmware

### Utilities / Tools

- B&R Embedded OS Installer
- Windows CE Tools
- User boot logo conversion program
- SATA RAID Installation Utility
- Automation Device Interface (ADI)
- CompactFlash lifespan calculator (Silicon Systems)
- Miscellaneous
- MTC utilities
- Key editor
- MTC & Mkey utilities
- Mkey utilities
- UPS configuration software
- ICU ISA configuration
- Intel PCI NIC boot ROM
- Diagnostics programs

### Windows

- Windows CE 6.0
- Windows CE 5.0
- Windows CE 4.2
- Windows CE 4.1
- Windows CE Tools
- Windows Embedded Standard 2009
- Thin client
- Windows NT Embedded
- Windows XP Embedded
- VNC viewer

### MCAD templates for

- Industrial PCs
- Visualization and operating devices
- Legend strip templates
- Custom designs

**ECAD templates for**

- Industrial PCs
- Automation PCs
- Automation Panel 900
- Panels (Power Panel)

**Documentation for**

- Automation PC 620
- Automation PC 680
- Automation PC 810
- Automation PC 820
- Automation Panel 800
- Automation Panel 900
- Panel PC 310
- Panel PC 700
- Panel PC 725
- Panel PC 800
- Power Panel 15/21/35/41
- Power Panel 100/200
- Power Panel 300/400
- Mobile Panel 40/50
- Mobile Panel 100/200
- Mobile Panel connection box
- Provit 2000
- Provit 3030
- Provit 4000
- Provit 5000
- Provit Benchmark
- Provit Mkey
- Windows CE 5.0 Help
- Windows CE 6.0 Help
- Windows NT Embedded application guide
- Windows XP Embedded application guide
- Uninterruptible power supply
- Implementation guides
- B&R Hilscher fieldbus cards (CANopen, DeviceNet, PROFIBUS, PROFINET)

**Service tools**

- Acrobat Reader 5.0.5 (freeware in German, English, and French)
- Power Archiver 6.0 (freeware in German, English, and French)
- Internet Explorer 5.0 (German and English)
- Internet Explorer 6.0 (German and English)



## 12 Cables

### 12.1 DVI cables

#### 12.1.1 5CADVI.0xxx-00

##### General information

The DVI cables 5CADVI.0xxx-00 are designed for fixed layout.

### Caution!

Cable can only be plugged in and unplugged when the device is turned off.

##### Order data

| Model number   | Short description   | Image                                                                               |
|----------------|---------------------|-------------------------------------------------------------------------------------|
|                | <b>DVI cable</b>    |  |
| 5CADVI.0018-00 | DVI-D cable, 1.8 m. |                                                                                     |
| 5CADVI.0050-00 | DVI-D cable, 5 m.   |                                                                                     |
| 5CADVI.0100-00 | DVI-D cable, 10 m.  |                                                                                     |

Table 247: 5CADVI.0018-00, 5CADVI.0050-00, 5CADVI.0100-00 - Order data

##### Technical data

| Product ID                 | 5CADVI.0018-00                                                                  | 5CADVI.0050-00 | 5CADVI.0100-00                        |
|----------------------------|---------------------------------------------------------------------------------|----------------|---------------------------------------|
| General information        |                                                                                 |                |                                       |
| Certification              | Yes                                                                             |                |                                       |
| CE                         | Yes                                                                             |                |                                       |
| c-UL-us                    |                                                                                 |                |                                       |
| Cable structure            |                                                                                 |                |                                       |
| Wire cross section         | AWG 28                                                                          |                |                                       |
| Shield                     | Individual cable pairs and entire cable                                         |                |                                       |
| Cable shielding            | Tinned CU mesh, optical coverage >86%                                           |                | Tinned Cu mesh, optical coverage >86% |
| Outer sheathing            | PVC                                                                             |                |                                       |
| Material                   | Beige                                                                           |                |                                       |
| Color                      |                                                                                 |                |                                       |
| Labeling                   | AWM STYLE 20276 80°C 30V VW1 DVI DIGITAL SINGLE LINK DER AN                     |                |                                       |
| Connector                  |                                                                                 |                |                                       |
| Type                       | 2x DVI-D (18+1), male                                                           |                |                                       |
| Connection cycles          | 100                                                                             |                |                                       |
| Electrical characteristics |                                                                                 |                |                                       |
| Conductor resistance       | Max. 237 Ω/km                                                                   |                |                                       |
| Insulation resistance      | Min. 100 MΩ/km                                                                  |                |                                       |
| Mechanical characteristics |                                                                                 |                |                                       |
| Dimensions                 |                                                                                 |                |                                       |
| Length                     | 1.8 m ±50 mm                                                                    | 5 m ± 80 mm    | 10 m ±100 mm                          |
| Diameter                   | Max. 8.5 mm                                                                     |                |                                       |
| Flex radius                | ≥ 5x cable diameter (plug - ferrite magnet and ferrite magnet - ferrite magnet) |                |                                       |
| Weight                     | Approx. 260 g                                                                   | Approx. 460 g  | Approx. 790 g                         |

Table 248: 5CADVI.0018-00, 5CADVI.0050-00, 5CADVI.0100-00 - Technical data

## Flex radius specification

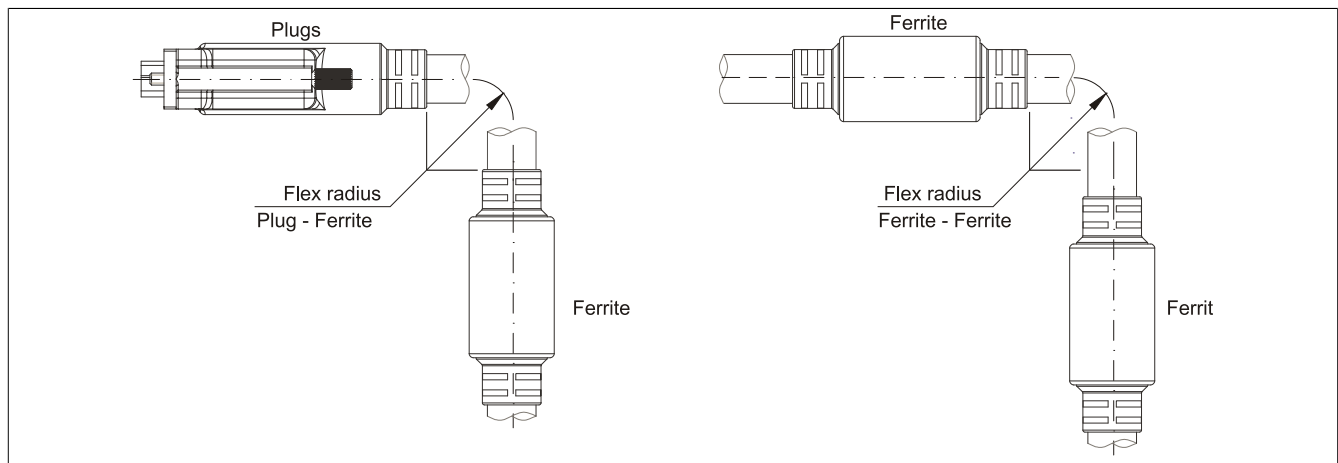


Image 143: Flex radius specification

## Dimensions

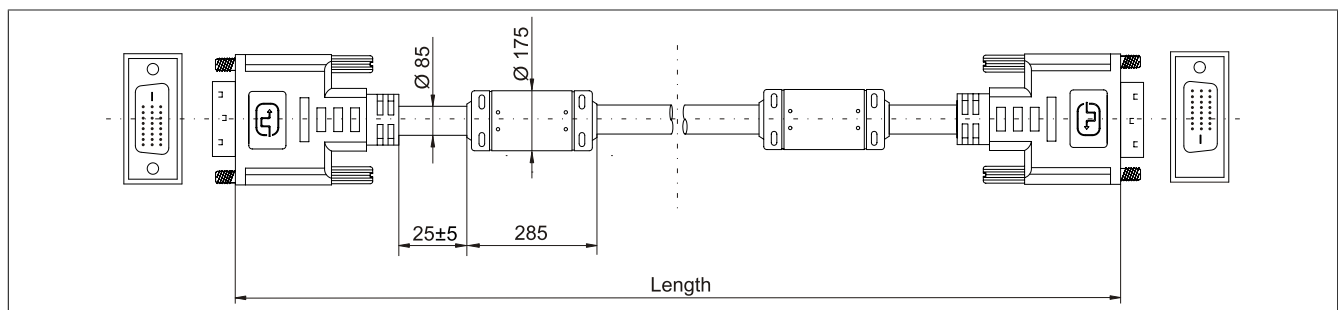


Image 144: 5CADVI.0xxx-00 - Dimensions

Cable specifications

Warning!

If you want to build a suitable cable yourself, it should be wired according to these specifications. If a self-built cable is used, B&R cannot guarantee that it will function properly. B&R guarantees the performance of all cables that they provide.

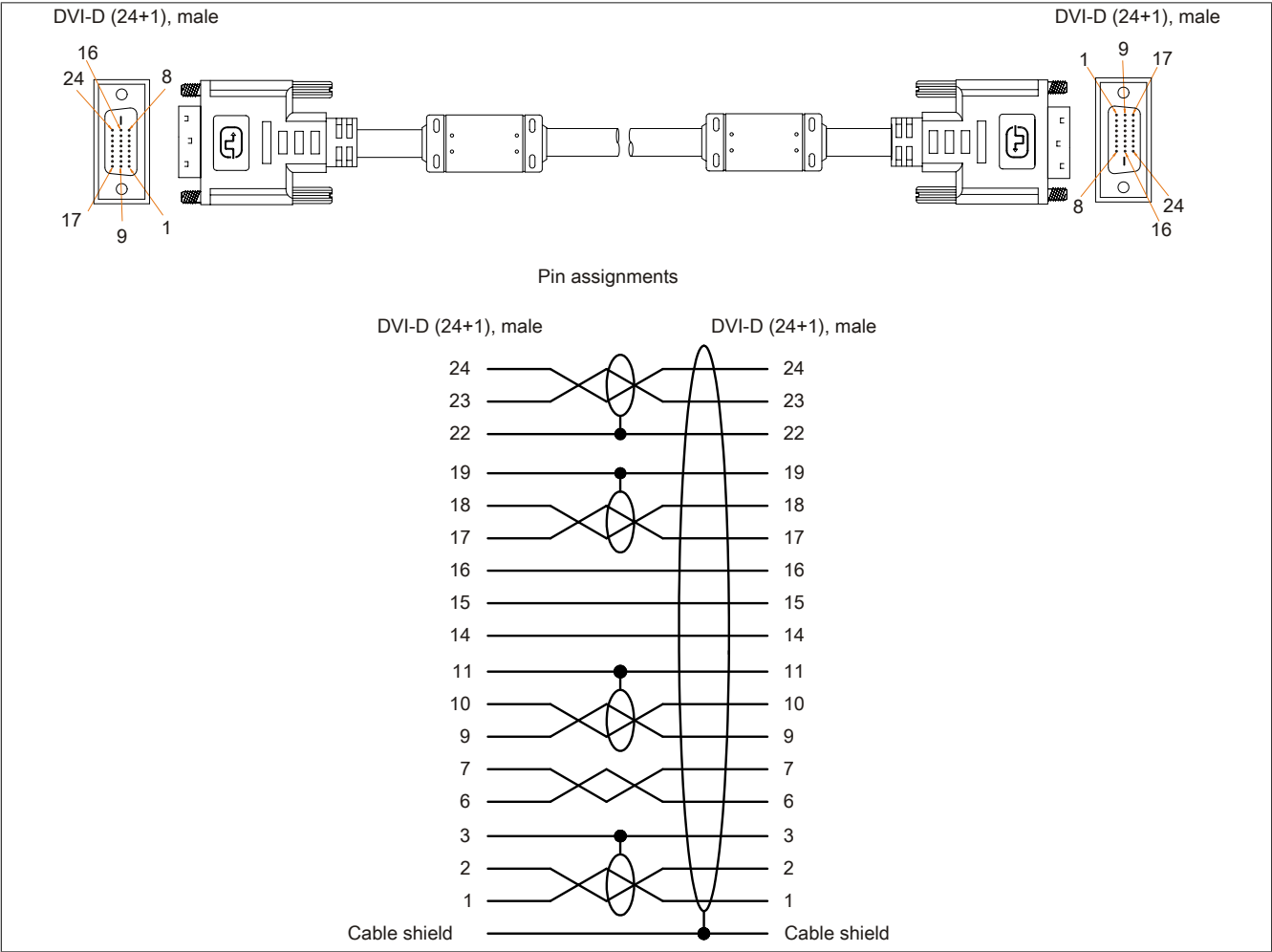


Image 145: 5CADVI.0xxx-00 - Pinout

## 12.2 SDL cables

### 12.2.1 5CASDL.0xxx-00

#### General information

The SDL cables 5CASDL.0xxx-00 are designed for fixed layout. Use of the SDL flex cable 5CASDL.0xxx-03 is required for a flexible installation (e.g. in swing arm systems).

### Caution!

Cable can only be plugged in and unplugged when the device is turned off.

#### Order data

| Model number   | Short description | Image                                                                               |
|----------------|-------------------|-------------------------------------------------------------------------------------|
|                | <b>SDL cables</b> |  |
| 5CASDL.0018-00 | SDL cable, 1.8 m. |                                                                                     |
| 5CASDL.0050-00 | SDL cable, 5 m.   |                                                                                     |
| 5CASDL.0100-00 | SDL cable, 10 m.  |                                                                                     |
| 5CASDL.0150-00 | SDL cable, 15 m.  |                                                                                     |
| 5CASDL.0200-00 | SDL cable, 20 m.  |                                                                                     |
| 5CASDL.0250-00 | SDL cable, 25 m.  |                                                                                     |
| 5CASDL.0300-00 | SDL cable, 30 m.  |                                                                                     |

Table 249: 5CASDL.0018-00, 5CASDL.0050-00, 5CASDL.0100-00, 5CASDL.0150-00, 5CASDL.0200-00, 5CASDL.0250-00, 5CASDL.0300-00 - Order data

#### Technical data

| Product ID                 | 5CASDL.<br>0018-00                                                                                                                                                           | 5CASDL.<br>0050-00 | 5CASDL.<br>0100-00 | 5CASDL.<br>0150-00 | 5CASDL.<br>0200-00 | 5CASDL.<br>0250-00 | 5CASDL.<br>0300-00 |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| General information        |                                                                                                                                                                              |                    |                    |                    |                    |                    |                    |
| Certification              | Yes                                                                                                                                                                          |                    |                    |                    |                    |                    |                    |
| CE                         |                                                                                                                                                                              |                    |                    |                    |                    |                    |                    |
| c-UL-us                    | Yes                                                                                                                                                                          |                    |                    |                    |                    |                    |                    |
| Cable structure            |                                                                                                                                                                              |                    |                    |                    |                    |                    |                    |
| Wire cross section         | AWG 28                                                                                                                                                                       |                    | AWG 24             |                    |                    |                    |                    |
| Shield                     | Individual cable pairs and entire cable                                                                                                                                      |                    |                    |                    |                    |                    |                    |
| Cable shielding            | Tinned Cu mesh, optical coverage >85%                                                                                                                                        |                    |                    |                    |                    |                    |                    |
| Outer sheathing            | PVC<br>Black<br>E74020-C (UL) AWM STYLE 20176 80°C 30V VW-1 DVI DIGITAL LINK                                                                                                 |                    |                    |                    |                    |                    |                    |
| Material                   |                                                                                                                                                                              |                    |                    |                    |                    |                    |                    |
| Color                      |                                                                                                                                                                              |                    |                    |                    |                    |                    |                    |
| Labeling                   |                                                                                                                                                                              |                    |                    |                    |                    |                    |                    |
| Connector                  |                                                                                                                                                                              |                    |                    |                    |                    |                    |                    |
| Type                       | 2x DVI-D (24+1), male                                                                                                                                                        |                    |                    |                    |                    |                    |                    |
| Connection cycles          | 100                                                                                                                                                                          |                    |                    |                    |                    |                    |                    |
| Contacts                   | Gold plated                                                                                                                                                                  |                    |                    |                    |                    |                    |                    |
| Mechanical protection      | Metal cover with crimped stress relief                                                                                                                                       |                    |                    |                    |                    |                    |                    |
| Electrical characteristics |                                                                                                                                                                              |                    |                    |                    |                    |                    |                    |
| Conductor resistance       | -<br>≤93 Ω/km                                                                                                                                                                |                    |                    |                    |                    |                    |                    |
| AWG 24                     |                                                                                                                                                                              |                    |                    |                    |                    |                    |                    |
| AWG 28                     | ≤237 Ω/km                                                                                                                                                                    |                    | -                  |                    |                    |                    |                    |
| Insulation resistance      | Min. 10 MΩ/km                                                                                                                                                                |                    |                    |                    |                    |                    |                    |
| Mechanical characteristics |                                                                                                                                                                              |                    |                    |                    |                    |                    |                    |
| Dimensions                 | 1.8 m ±30 mm   5 m ± 30 mm   10 m ±50 mm   15 m ±100 mm   20 m ±100 mm   25 m ± 100 mm   30 m ± 100 mm<br>Typ. 8.6 ± 0.2 mm<br>Max. 9 mm<br>Typ. 11 ± 0.2 mm<br>Max. 11.5 mm |                    |                    |                    |                    |                    |                    |
| Length                     |                                                                                                                                                                              |                    |                    |                    |                    |                    |                    |
| Diameter                   |                                                                                                                                                                              |                    |                    |                    |                    |                    |                    |
| Flex radius                | ≥ 5x cable diameter (plug - ferrite magnet and ferrite magnet - ferrite magnet)                                                                                              |                    |                    |                    |                    |                    |                    |
| Flexibility                | Limited flexibility; valid for ferrite magnet - ferrite magnet (tested 100 cycles with 5x cable diameter, 20 cycles / minute)                                                |                    |                    |                    |                    |                    |                    |
| Weight                     | Approx. 300 g                                                                                                                                                                | Approx. 580 g      | Approx. 1500 g     | Approx. 2250 g     | Approx. 2880 g     | Approx. 4800 g     | Approx. 5520 g     |

Table 250: 5CASDL.0018-00, 5CASDL.0050-00, 5CASDL.0100-00, 5CASDL.0150-00, 5CASDL.0200-00, 5CASDL.0250-00, 5CASDL.0300-00 - Technical data

Flex radius specification

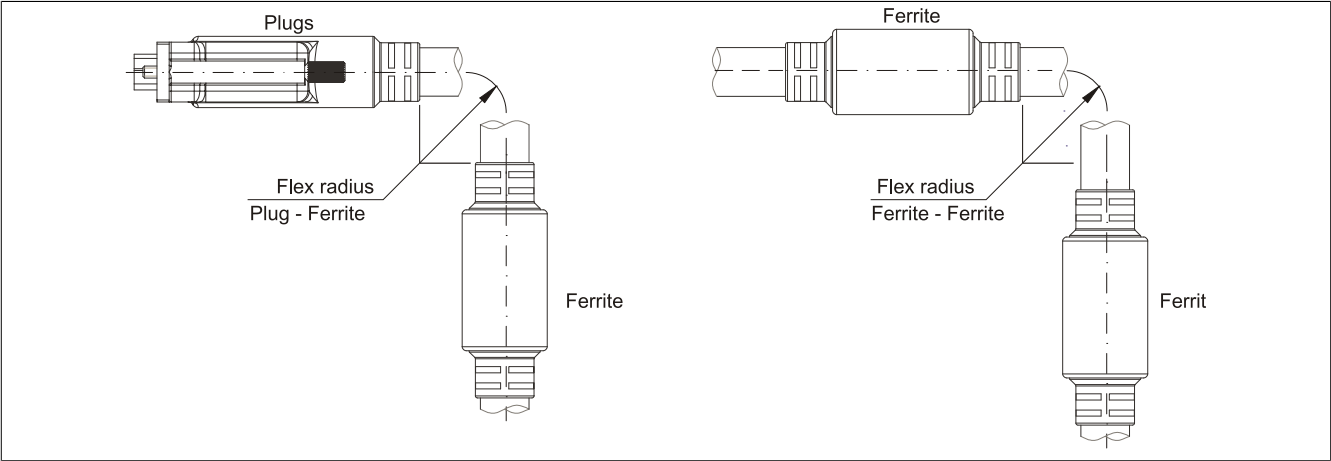


Image 146: Flex radius specification

Dimensions

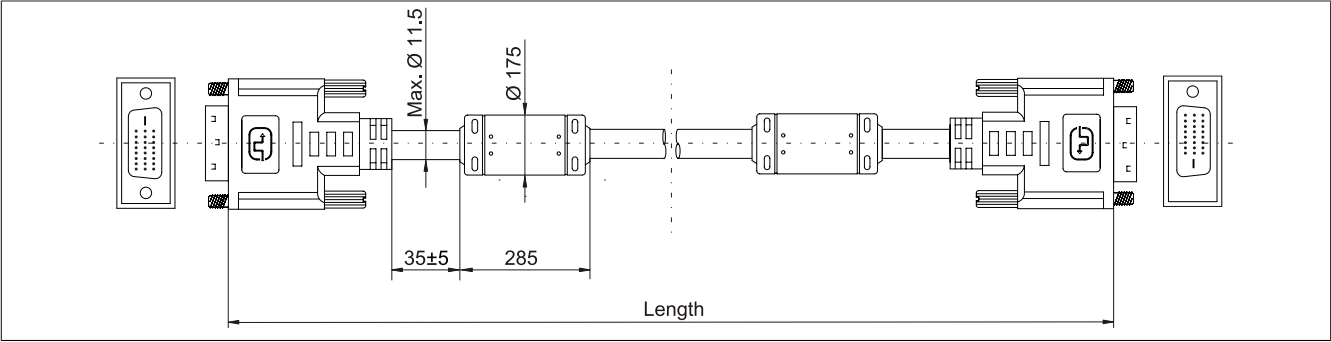


Image 147: 5CASDL.0xxx-00- Dimensions

## Cable specifications

**Warning!**

If you want to build a suitable cable yourself, it should be wired according to these specifications.

If a self-built cable is used, B&R cannot guarantee that it will function properly. B&R guarantees the performance of all cables that they provide.

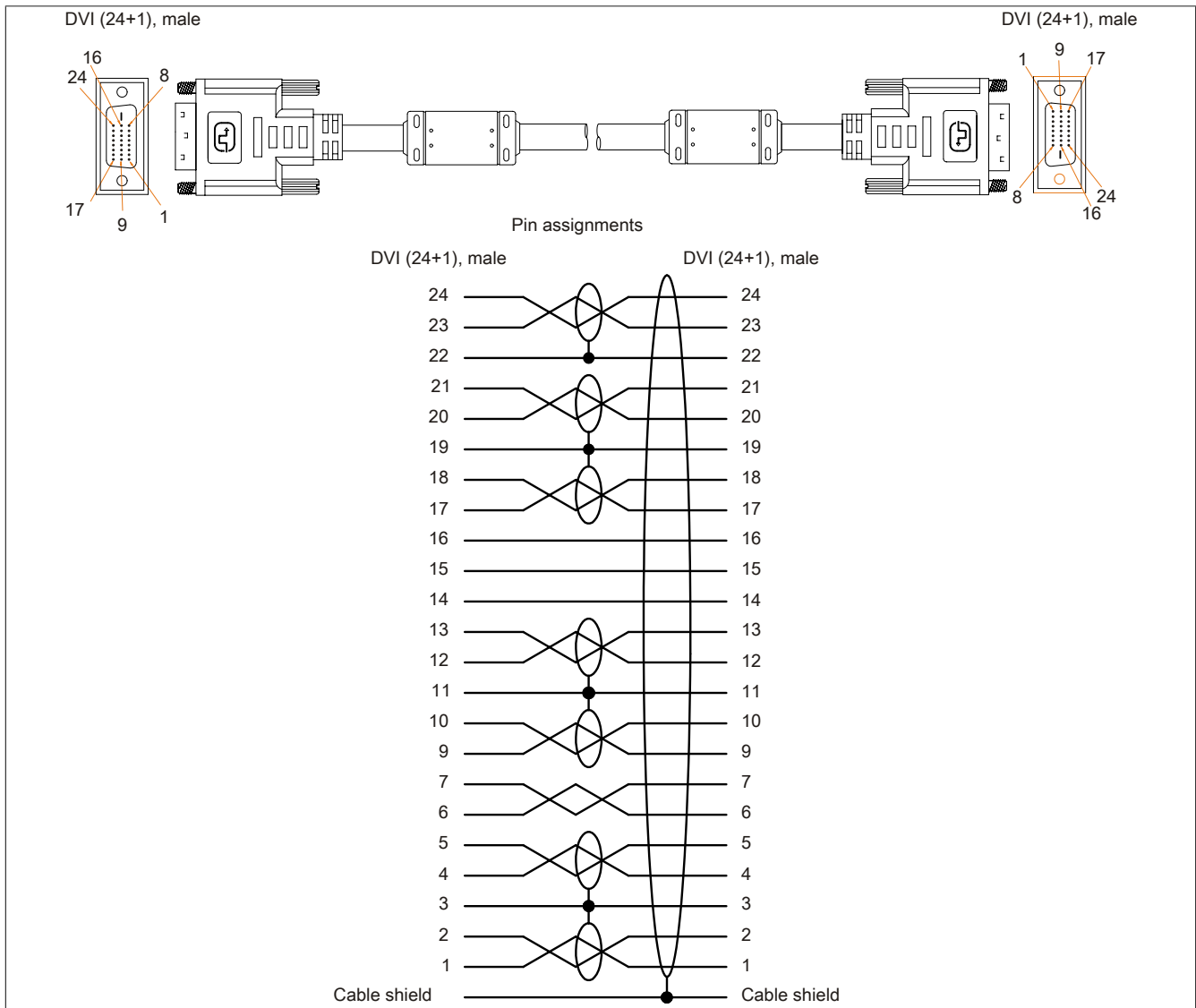


Image 148: 5CASDL.0xxx-00- Pinout

## 12.3 SDL cables with 45° plugs

### 12.3.1 5CASDL.0xxx-01

#### General information

The 5CASDL.xxxx-01 SDL cables with 45° plug are designed for fixed layout.

#### Caution!

Cable can only be plugged in and unplugged when the device is turned off.

#### Order data

| Model number   | Short description                | Image                                                                               |
|----------------|----------------------------------|-------------------------------------------------------------------------------------|
|                | <b>SDL cable - 45° connector</b> |  |
| 5CASDL.0018-01 | SDL cable; 45° connector, 1.8 m. |                                                                                     |
| 5CASDL.0050-01 | SDL cable; 45° connector, 5 m.   |                                                                                     |
| 5CASDL.0100-01 | SDL cable; 45° connector, 10 m.  |                                                                                     |
| 5CASDL.0150-01 | SDL cable; 45° connector, 15 m.  |                                                                                     |

Table 251: 5CASDL.0018-01, 5CASDL.0050-01, 5CASDL.0100-01, 5CASDL.0150-01 - Order data

#### Technical data

| Product ID                 | 5CASDL.0018-01                                                                                                                | 5CASDL.0050-01 | 5CASDL.0100-01 | 5CASDL.0150-01 |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------|----------------|----------------|----------------|
| General information        |                                                                                                                               |                |                |                |
| Certification              | Yes                                                                                                                           |                |                |                |
| CE                         |                                                                                                                               |                |                |                |
| c-UL-us                    | Yes                                                                                                                           |                |                |                |
| Cable structure            |                                                                                                                               |                |                |                |
| Wire cross section         | AWG 28                                                                                                                        |                | AWG 24         |                |
| Shield                     | Individual cable pairs and entire cable                                                                                       |                |                |                |
| Cable shielding            | Tinned Cu mesh, optical coverage >85%                                                                                         |                |                |                |
| Outer sheathing            | PVC                                                                                                                           |                |                |                |
| Material                   |                                                                                                                               |                |                |                |
| Color                      | Black                                                                                                                         |                |                |                |
| Connector                  |                                                                                                                               |                |                |                |
| Type                       | 2x DVI-D (24+1), male                                                                                                         |                |                |                |
| Connection cycles          | 100                                                                                                                           |                |                |                |
| Contacts                   | Gold plated                                                                                                                   |                |                |                |
| Mechanical protection      | Metal cover with crimped stress relief                                                                                        |                |                |                |
| Electrical characteristics |                                                                                                                               |                |                |                |
| Conductor resistance       | ≤93 Ω/km                                                                                                                      |                |                |                |
| AWG 24                     |                                                                                                                               |                |                |                |
| AWG 28                     | -<br>≤237 Ω/km                                                                                                                |                | -              |                |
| Insulation resistance      | Min. 10 MΩ/km                                                                                                                 |                |                |                |
| Mechanical characteristics |                                                                                                                               |                |                |                |
| Dimensions                 | 15 m ±100 mm                                                                                                                  |                |                |                |
| Length                     |                                                                                                                               |                |                |                |
| Diameter                   | Max. 9 mm                                                                                                                     |                | Max. 11.5 mm   |                |
| Flex radius                | ≥ 5x cable diameter (plug - ferrite magnet and ferrite magnet - ferrite magnet)                                               |                |                |                |
| Fixed installation         |                                                                                                                               |                |                |                |
| Flexibility                | Limited flexibility; valid for ferrite magnet - ferrite magnet (tested 100 cycles with 5x cable diameter, 20 cycles / minute) |                |                |                |
| Weight                     | Approx. 300 g                                                                                                                 | Approx. 590 g  | Approx. 2800 g | Approx. 2860 g |

Table 252: 5CASDL.0018-01, 5CASDL.0050-01, 5CASDL.0100-01, 5CASDL.0150-01 - Technical data

## Flex radius specification

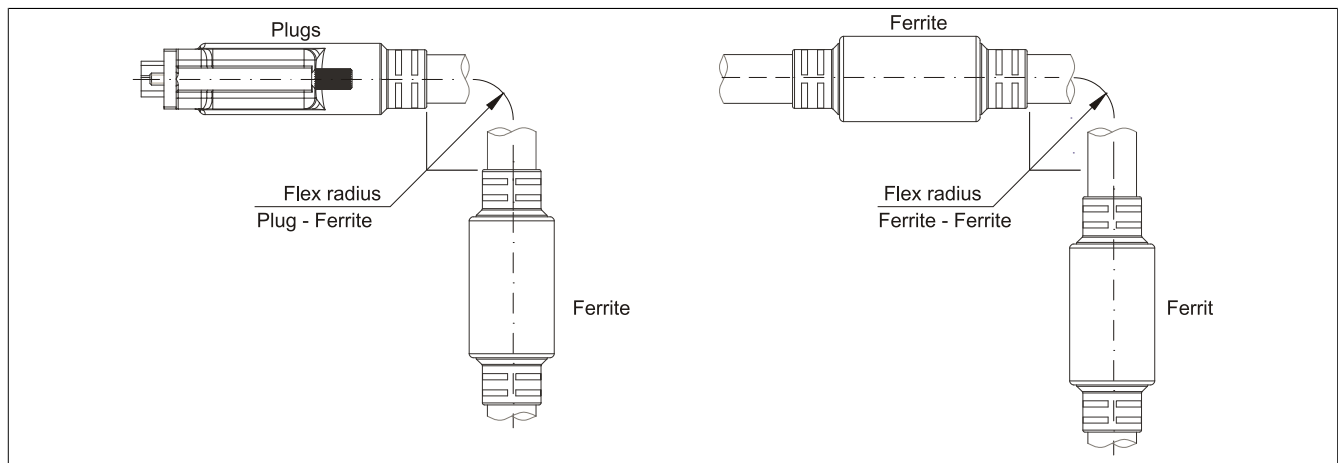


Image 149: Flex radius specification

## Dimensions

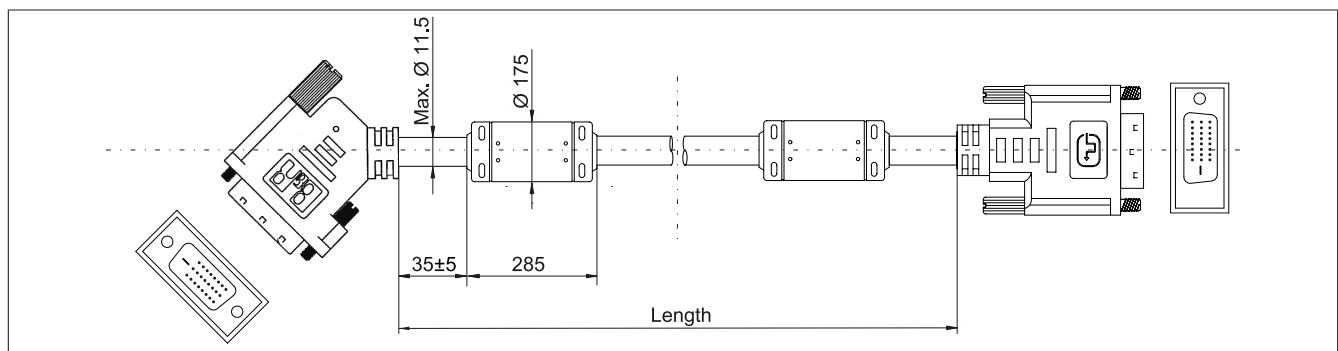


Image 150: 5CASDL.0xxx-01 - Dimensions



Cable specifications

Warning!

If you want to build a suitable cable yourself, it should be wired according to these specifications.  
If a self-built cable is used, B&R cannot guarantee that it will function properly. B&R guarantees the performance of all cables that they provide.

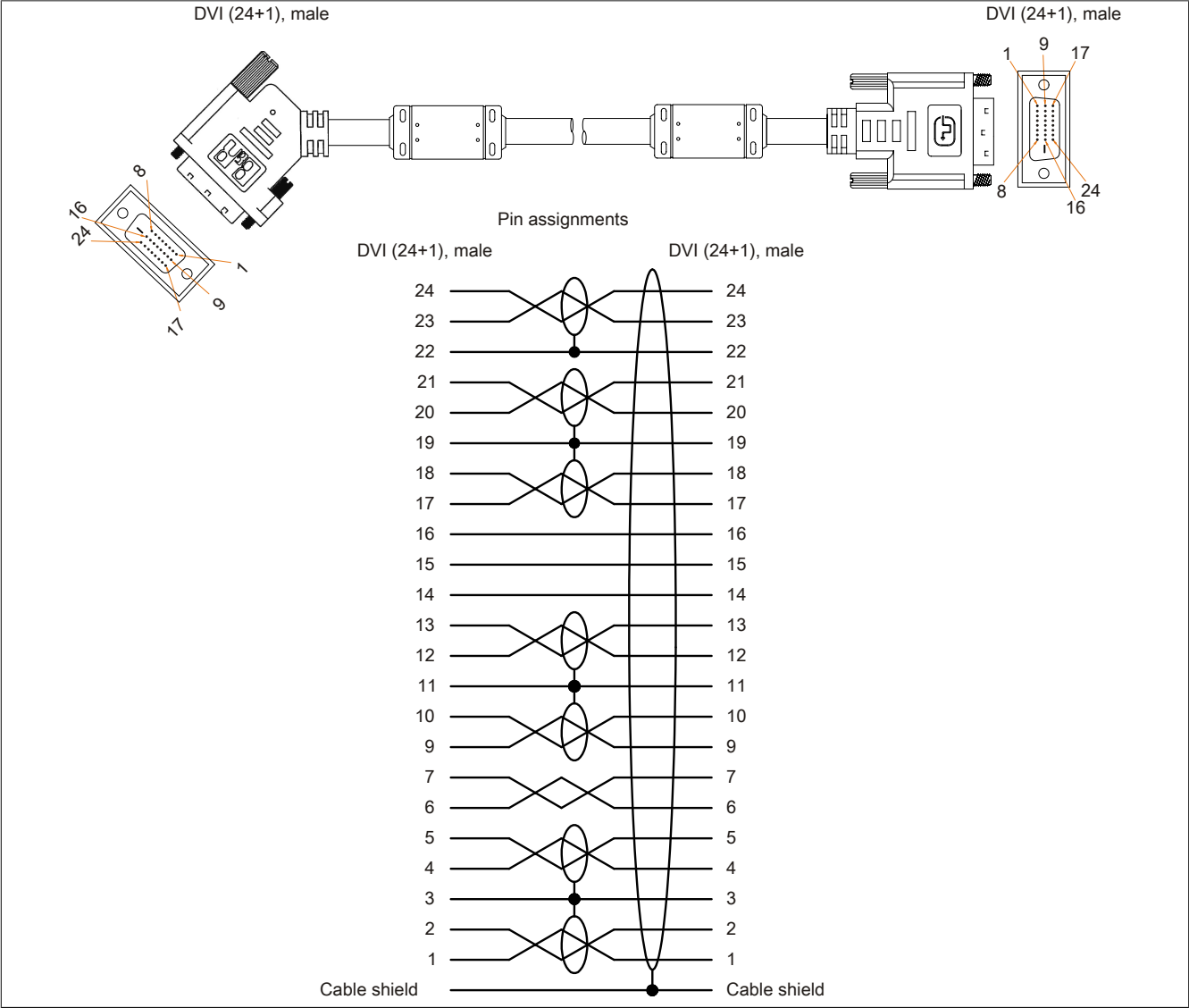


Image 151: 5CASDL.0xxx-01 - Pinout

## 12.4 SDL flex cables

### 12.4.1 5CASDL.0xxx-03

#### General information

The 5CASDL.0xxx-03 SDL flex cables are designed for use in both fixed and flexible installations (e.g. in swing arm systems).

### Caution!

Cable can only be plugged in and unplugged when the device is turned off.

#### Order data

| Model number   | Short description      | Image                                                                               |
|----------------|------------------------|-------------------------------------------------------------------------------------|
|                | <b>SDL flex cable</b>  |  |
| 5CASDL.0018-03 | SDL Cable flex, 1.8 m. |                                                                                     |
| 5CASDL.0050-03 | SDL cable flex, 5 m.   |                                                                                     |
| 5CASDL.0100-03 | SDL cable flex, 10 m.  |                                                                                     |
| 5CASDL.0150-03 | SDL cable flex, 15 m.  |                                                                                     |
| 5CASDL.0200-03 | SDL cable flex, 20 m.  |                                                                                     |
| 5CASDL.0250-03 | SDL cable flex, 25 m.  |                                                                                     |
| 5CASDL.0300-03 | SDL cable flex, 30 m.  |                                                                                     |

Table 253: 5CASDL.0018-03, 5CASDL.0050-03, 5CASDL.0100-03, 5CASDL.0150-03, 5CASDL.0200-03, 5CASDL.0250-03, 5CASDL.0300-03 - Order data

#### Technical data

| Product ID                    | 5CASDL.<br>0018-03                                                                    | 5CASDL.<br>0050-03 | 5CASDL.<br>0100-03 | 5CASDL.<br>0150-03 | 5CASDL.<br>0200-03 | 5CASDL.<br>0250-03 | 5CASDL.<br>0300-03 |
|-------------------------------|---------------------------------------------------------------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| General information           |                                                                                       |                    |                    |                    |                    |                    |                    |
| Certification                 | Yes                                                                                   |                    |                    |                    |                    |                    |                    |
| CE                            |                                                                                       |                    |                    |                    |                    |                    |                    |
| c-UL-us                       | Yes                                                                                   |                    |                    |                    |                    |                    |                    |
| Cable structure               |                                                                                       |                    |                    |                    |                    |                    |                    |
| Wire cross section            | 26 AWG (control wires)<br>26 AWG (DVI, USB, data)                                     |                    |                    |                    |                    |                    |                    |
| Features                      | Free of halogen and silicon                                                           |                    |                    |                    |                    |                    |                    |
| Shield                        | Individual cable pairs and entire cable                                               |                    |                    |                    |                    |                    |                    |
| Cable shielding               | Aluminum foil clad + tinned copper mesh                                               |                    |                    |                    |                    |                    |                    |
| Outer sheathing               | Special TMPU - semi gloss<br>Black<br>(B&R) SDL cable (UL) AWM 20236 80°C 30V E 63216 |                    |                    |                    |                    |                    |                    |
| Material                      |                                                                                       |                    |                    |                    |                    |                    |                    |
| Color                         |                                                                                       |                    |                    |                    |                    |                    |                    |
| Labeling                      |                                                                                       |                    |                    |                    |                    |                    |                    |
| Connector                     |                                                                                       |                    |                    |                    |                    |                    |                    |
| Type                          | 2x DVI-D (24+1), male                                                                 |                    |                    |                    |                    |                    |                    |
| Connection cycles             | Min. 200                                                                              |                    |                    |                    |                    |                    |                    |
| Contacts                      | Gold plated                                                                           |                    |                    |                    |                    |                    |                    |
| Mechanical protection         | Metal cover with crimped stress relief                                                |                    |                    |                    |                    |                    |                    |
| Electrical characteristics    |                                                                                       |                    |                    |                    |                    |                    |                    |
| Operating voltage             | ≤30 V                                                                                 |                    |                    |                    |                    |                    |                    |
| Test voltage                  | 1 kV                                                                                  |                    |                    |                    |                    |                    |                    |
| Wire/wire                     |                                                                                       |                    |                    |                    |                    |                    |                    |
| Wire/shield                   | 0.5 kV                                                                                |                    |                    |                    |                    |                    |                    |
| Wave impedance                | 100 ±10 Ω                                                                             |                    |                    |                    |                    |                    |                    |
| Conductor resistance          | ≤95 Ω/km<br>≤145 Ω/km                                                                 |                    |                    |                    |                    |                    |                    |
| AWG 24                        |                                                                                       |                    |                    |                    |                    |                    |                    |
| AWG 26                        |                                                                                       |                    |                    |                    |                    |                    |                    |
| Insulation resistance         | > 200 MΩ/km                                                                           |                    |                    |                    |                    |                    |                    |
| Operating conditions          |                                                                                       |                    |                    |                    |                    |                    |                    |
| Approbation                   | UL AWM 20236 80°C 30V                                                                 |                    |                    |                    |                    |                    |                    |
| Flame resistant               | In accordance with UL758 (cable vertical flame test)                                  |                    |                    |                    |                    |                    |                    |
| Oil and hydrolysis resistance | According to VDE 0282-10                                                              |                    |                    |                    |                    |                    |                    |
| Environmental conditions      |                                                                                       |                    |                    |                    |                    |                    |                    |
| Temperature                   | -20 to 80°C<br>-5 to 60°C<br>-20 to 80°C                                              |                    |                    |                    |                    |                    |                    |
| Storage                       |                                                                                       |                    |                    |                    |                    |                    |                    |
| Moving                        |                                                                                       |                    |                    |                    |                    |                    |                    |
| Fixed installation            |                                                                                       |                    |                    |                    |                    |                    |                    |

Table 254: 5CASDL.0018-03, 5CASDL.0050-03, 5CASDL.0100-03, 5CASDL.0150-03, 5CASDL.0200-03, 5CASDL.0250-03, 5CASDL.0300-03 - Technical data

| Product ID                        | 5CASDL.<br>0018-03                                                                                                      | 5CASDL.<br>0050-03 | 5CASDL.<br>0100-03 | 5CASDL.<br>0150-03 | 5CASDL.<br>0200-03 | 5CASDL.<br>0250-03 | 5CASDL.<br>0300-03 |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| <b>Mechanical characteristics</b> |                                                                                                                         |                    |                    |                    |                    |                    |                    |
| Dimensions                        |                                                                                                                         |                    |                    |                    |                    |                    |                    |
| Length                            | 1.8 m ±20 mm   5 m ± 45 mm   10 m ±90 mm   15 m ±135 mm   20 m ± 180 mm   25 m ± 225 mm   30 m ± 270 mm                 |                    |                    |                    |                    |                    |                    |
| Diameter                          | Max. 12 mm                                                                                                              |                    |                    |                    |                    |                    |                    |
| Flex radius                       |                                                                                                                         |                    |                    |                    |                    |                    |                    |
| Fixed installation                | ≥ 6x cable diameter (from plug - ferrite magnet)                                                                        |                    |                    |                    |                    |                    |                    |
| flexible installation             | ≥ 10x cable diameter (from ferrite magnet - ferrite magnet)                                                             |                    |                    |                    |                    |                    |                    |
|                                   | ≥ 15x cable diameter (from ferrite magnet - ferrite magnet)                                                             |                    |                    |                    |                    |                    |                    |
| Flexibility                       | Flexible; valid for ferrite magnet - ferrite magnet (tested 300,000 cycles with 15x cable diameter, 4800 cycles / hour) |                    |                    |                    |                    |                    |                    |
| Drag chain data                   |                                                                                                                         |                    |                    |                    |                    |                    |                    |
| Flex cycles                       | 300.000                                                                                                                 |                    |                    |                    |                    |                    |                    |
| Speed                             | 4800 cycles / hour                                                                                                      |                    |                    |                    |                    |                    |                    |
| Flex radius                       | 180 mm; 15x cable diameter                                                                                              |                    |                    |                    |                    |                    |                    |
| Hub                               | 460 mm                                                                                                                  |                    |                    |                    |                    |                    |                    |
| Weight                            | Approx. 460 g                                                                                                           | Approx. 1020 g     | Approx. 1940 g     | Approx. 2840 g     | Approx. 3740 g     | Approx. 4560 g     | Approx. 5590 g     |
| Tension                           |                                                                                                                         |                    |                    |                    |                    |                    |                    |
| In operation                      | ≤50 N                                                                                                                   |                    |                    |                    |                    |                    |                    |
| During installation               | ≤400 N                                                                                                                  |                    |                    |                    |                    |                    |                    |

Table 254: 5CASDL.0018-03, 5CASDL.0050-03, 5CASDL.0100-03, 5CASDL.0150-03, 5CASDL.0200-03, 5CASDL.0250-03, 5CASDL.0300-03 - Technical data

Flex radius specification

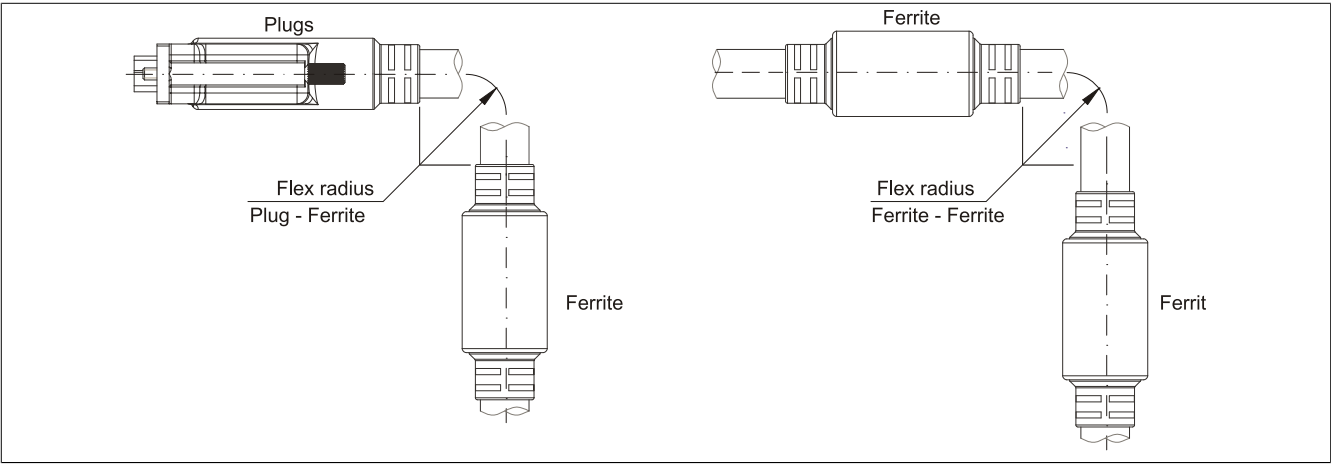


Image 152: Flex radius specification

Dimensions

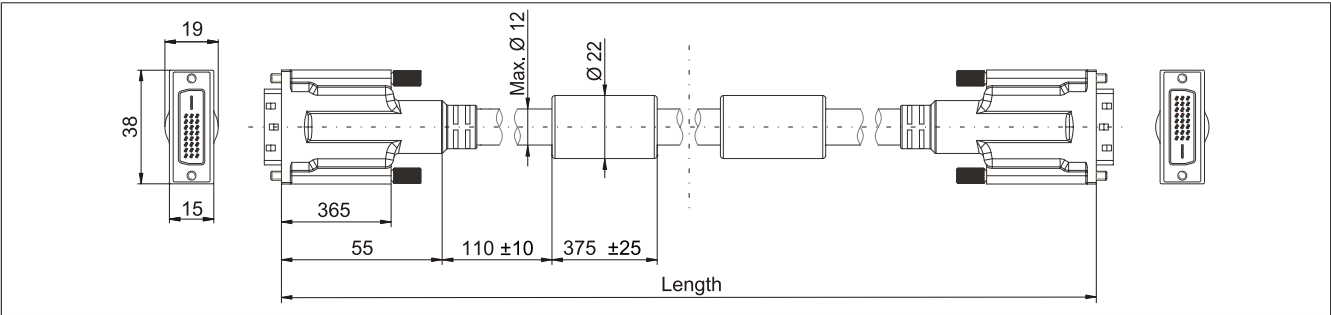


Image 153: 5CASDL.0xxx-03 - Dimensions

## Layout

| Element       | Assignment      | Cross section |  |
|---------------|-----------------|---------------|--|
| DVI           | TMDS data 0     | 26 AWG        |  |
|               | TMDS data 1     | 26 AWG        |  |
|               | TMDS data 2     | 26 AWG        |  |
|               | TMDS cycle      | 26 AWG        |  |
| USB           | XUSB0           | 26 AWG        |  |
|               | XUSB1           | 26 AWG        |  |
| Data          | SDL             | 26 AWG        |  |
|               | DDC cycle       | 24 AWG        |  |
|               | DDC data        | 24 AWG        |  |
|               | +5 V            | 24 AWG        |  |
|               | Mass            | 24 AWG        |  |
| Control wires | Hot Plug detect | 24 AWG        |  |

Table 255: Structure - SDL flex cable 5CASDL.0xxx-03

## Cable specifications

**Warning!**

If you want to build a suitable cable yourself, it should be wired according to these specifications.

If a self-built cable is used, B&R cannot guarantee that it will function properly. B&R guarantees the performance of all cables that they provide.

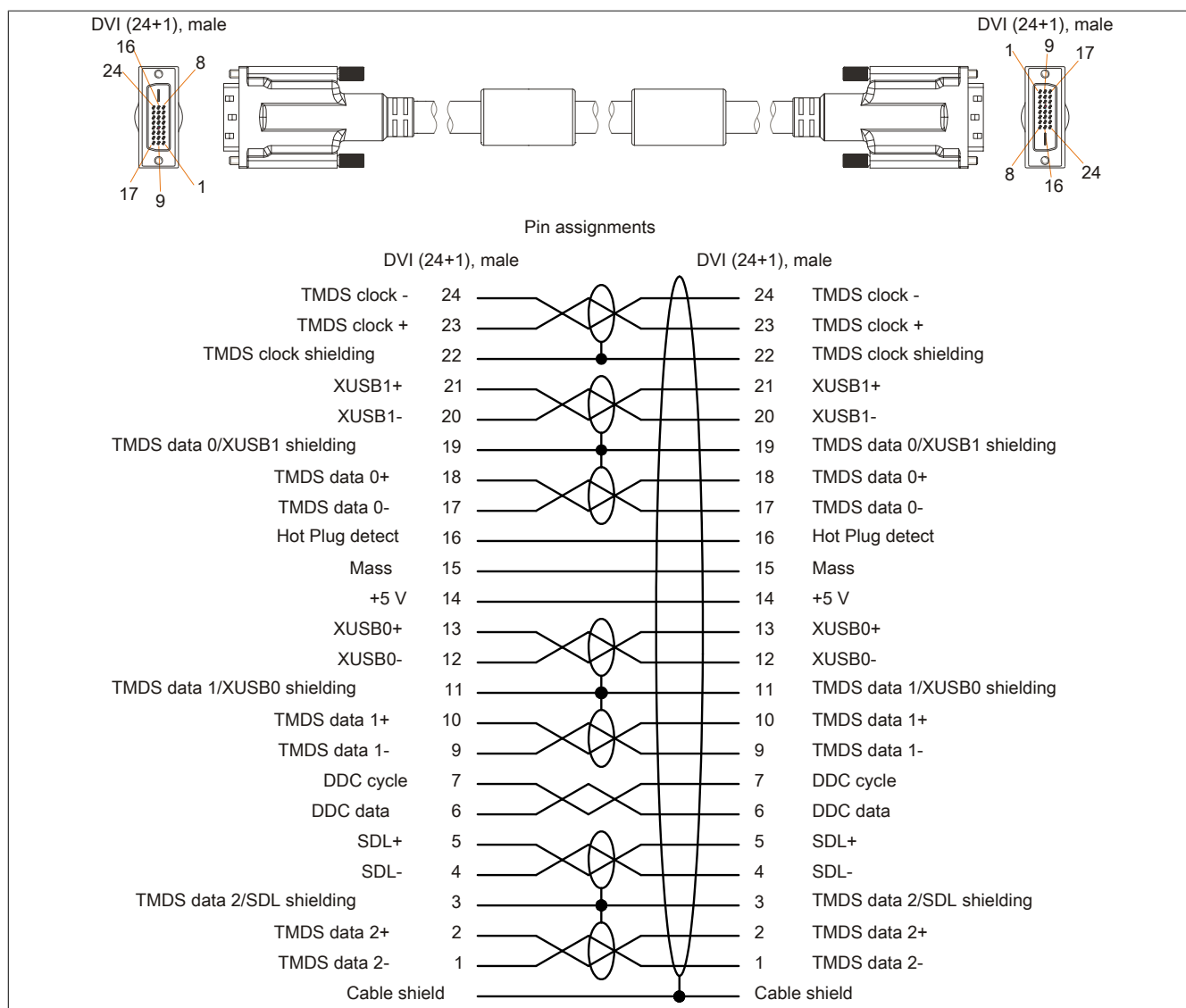


Image 154: 5CASDL.0xxx-03- Pinout

## 12.5 SDL flex cables with extender

### 12.5.1 5CASDL.0xx0-13

#### General information

The 5CASDL.xxxx-13 SDL flex cables with extender are designed for use in both fixed and flexible installations (e.g. in swing arm systems).

#### Caution!

Cable can only be plugged in and unplugged when the device is turned off.

#### Order data

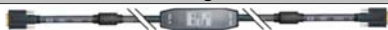
| Model number   | Short description                   | Image                                                                               |
|----------------|-------------------------------------|-------------------------------------------------------------------------------------|
|                | <b>SDL flex cable</b>               |  |
| 5CASDL.0300-13 | SDL cable flex with extender, 30 m. |                                                                                     |
| 5CASDL.0400-13 | SDL cable flex with extender, 40 m. |                                                                                     |
| 5CASDL.0430-13 | SDL Cable flex with extender, 43 m. |                                                                                     |

Table 256: 5CASDL.0300-13, 5CASDL.0400-13, 5CASDL.0430-13 - Order data

#### Technical data

| Product ID                                                          | 5CASDL.0300-13                                                                       | 5CASDL.0400-13                                 | 5CASDL.0430-13 |
|---------------------------------------------------------------------|--------------------------------------------------------------------------------------|------------------------------------------------|----------------|
| General information                                                 |                                                                                      |                                                |                |
| Certification<br>CE<br>c-UL-us                                      | Yes<br>Yes                                                                           |                                                |                |
| Cable structure                                                     |                                                                                      |                                                |                |
| Wire cross section                                                  | 26 AWG (control wires)<br>26 AWG (DVI, USB, data)                                    |                                                |                |
| Features                                                            | Free of halogen and silicon                                                          |                                                |                |
| Shield                                                              | Individual cable pairs and entire cable                                              |                                                |                |
| Cable shielding                                                     | Aluminum foil clad + tinned copper mesh                                              |                                                |                |
| Outer sheathing<br>Material<br>Color<br>Labeling                    | Special TMPU - semi gloss<br>Black<br>(B&R) SDL cable (UL) AWM 20236 80°C 30V E63216 |                                                |                |
| Connector                                                           |                                                                                      |                                                |                |
| Type                                                                | 2x DVI-D (24+1), male                                                                |                                                |                |
| Connection cycles                                                   | Min. 200                                                                             |                                                |                |
| Contacts                                                            | Gold plated                                                                          |                                                |                |
| Mechanical protection                                               | Metal cover with crimped stress relief                                               |                                                |                |
| Electrical characteristics                                          |                                                                                      |                                                |                |
| Operating voltage                                                   | ≤30 V                                                                                |                                                |                |
| Test voltage<br>Wire/wire<br>Wire/shield                            | 1 kV<br>0.5 kV                                                                       |                                                |                |
| Wave impedance                                                      | 100 ±10 Ω                                                                            |                                                |                |
| Conductor resistance<br>AWG 24<br>AWG 26                            | ≤95 Ω/km<br>≤145 Ω/km                                                                |                                                |                |
| Insulation resistance                                               | > 200 MΩ/km                                                                          |                                                |                |
| Operating conditions                                                |                                                                                      |                                                |                |
| Approbation                                                         | UL AWM 20236 80°C 30V                                                                |                                                |                |
| Flame resistant                                                     | In accordance with UL758 (cable vertical flame test)                                 |                                                |                |
| Oil and hydrolysis resistance                                       | According to VDE 0282-10                                                             |                                                |                |
| Environmental conditions                                            |                                                                                      |                                                |                |
| Temperature<br>Storage<br>Moving<br>Fixed installation              | -20 to 60°C<br>-5 to 60°C<br>-20 to 60°C                                             |                                                |                |
| Mechanical characteristics                                          |                                                                                      |                                                |                |
| Dimensions<br>Length<br>Diameter<br>Extender box<br>Width<br>Length | 30 m ± 280 mm                                                                        | 40 m ± 380 mm<br>Max. 12 mm<br>35 mm<br>125 mm | 43 m ± 410 mm  |

Table 257: 5CASDL.0300-13, 5CASDL.0400-13, 5CASDL.0430-13 - Technical data

| Product ID            | 5CASDL.0300-13                                                                                                          | 5CASDL.0400-13 | 5CASDL.0430-13 |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------|----------------|----------------|
| Height                | 18.5 mm                                                                                                                 |                |                |
| Flex radius           |                                                                                                                         |                |                |
| Fixed installation    | ≥ 6x cable diameter (from plug - ferrite magnet)                                                                        |                |                |
|                       | ≥ 10x cable diameter (from ferrite magnet - ferrite magnet)                                                             |                |                |
| flexible installation | ≥ 15x cable diameter (from ferrite magnet - ferrite magnet)                                                             |                |                |
| Flexibility           | Flexible; valid for ferrite magnet - ferrite magnet (tested 300,000 cycles with 15x cable diameter, 4800 cycles / hour) |                |                |
| Drag chain data       |                                                                                                                         |                |                |
| Flex cycles           | 300.000                                                                                                                 |                |                |
| Speed                 | 4800 cycles / hour                                                                                                      |                |                |
| Flex radius           | 180 mm; 15x cable diameter                                                                                              |                |                |
| Hub                   | 460 mm                                                                                                                  |                |                |
| Weight                | Approx. 5430 g                                                                                                          | Approx. 7200 g | Approx. 7790 g |
| Tension               |                                                                                                                         |                |                |
| In operation          | ≤50 N                                                                                                                   |                |                |
| During installation   | ≤400 N                                                                                                                  |                |                |

Table 257: 5CASDL.0300-13, 5CASDL.0400-13, 5CASDL.0430-13 - Technical data

Flex radius specification

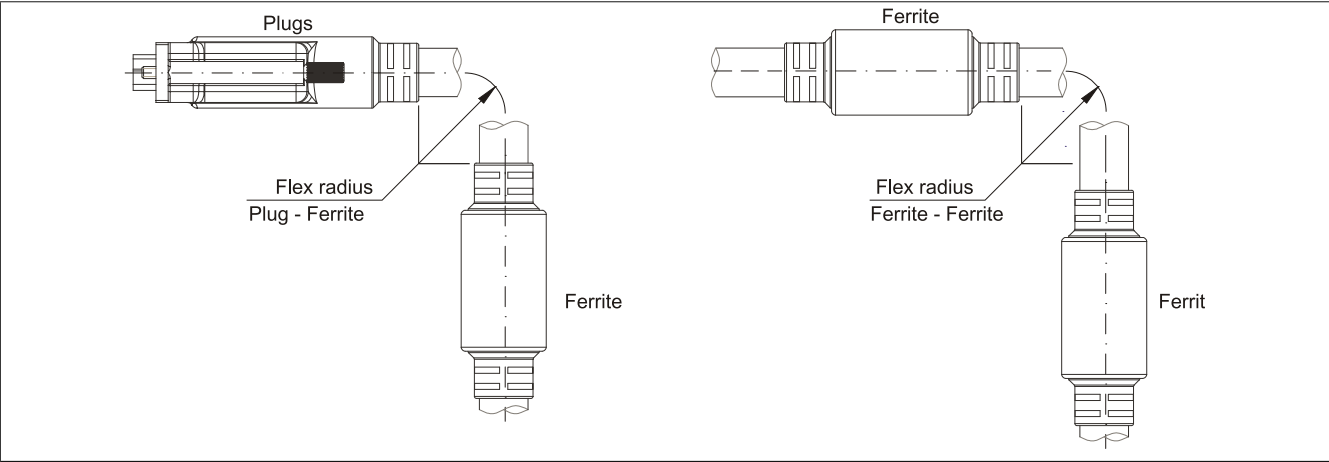


Image 155: Flex radius specification

Dimensions

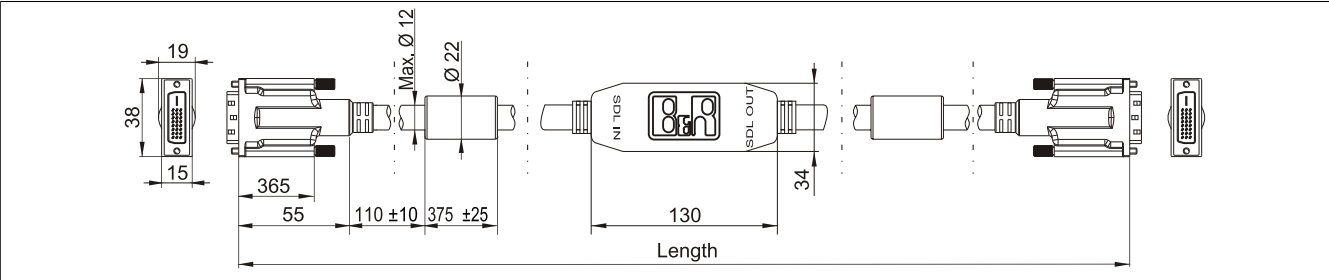


Image 156: 5CASDL.0xx0-13- Dimensions

## Cable specifications

**Warning!**

If you want to build a suitable cable yourself, it should be wired according to these specifications.

If a self-built cable is used, B&R cannot guarantee that it will function properly. B&R guarantees the performance of all cables that they provide.

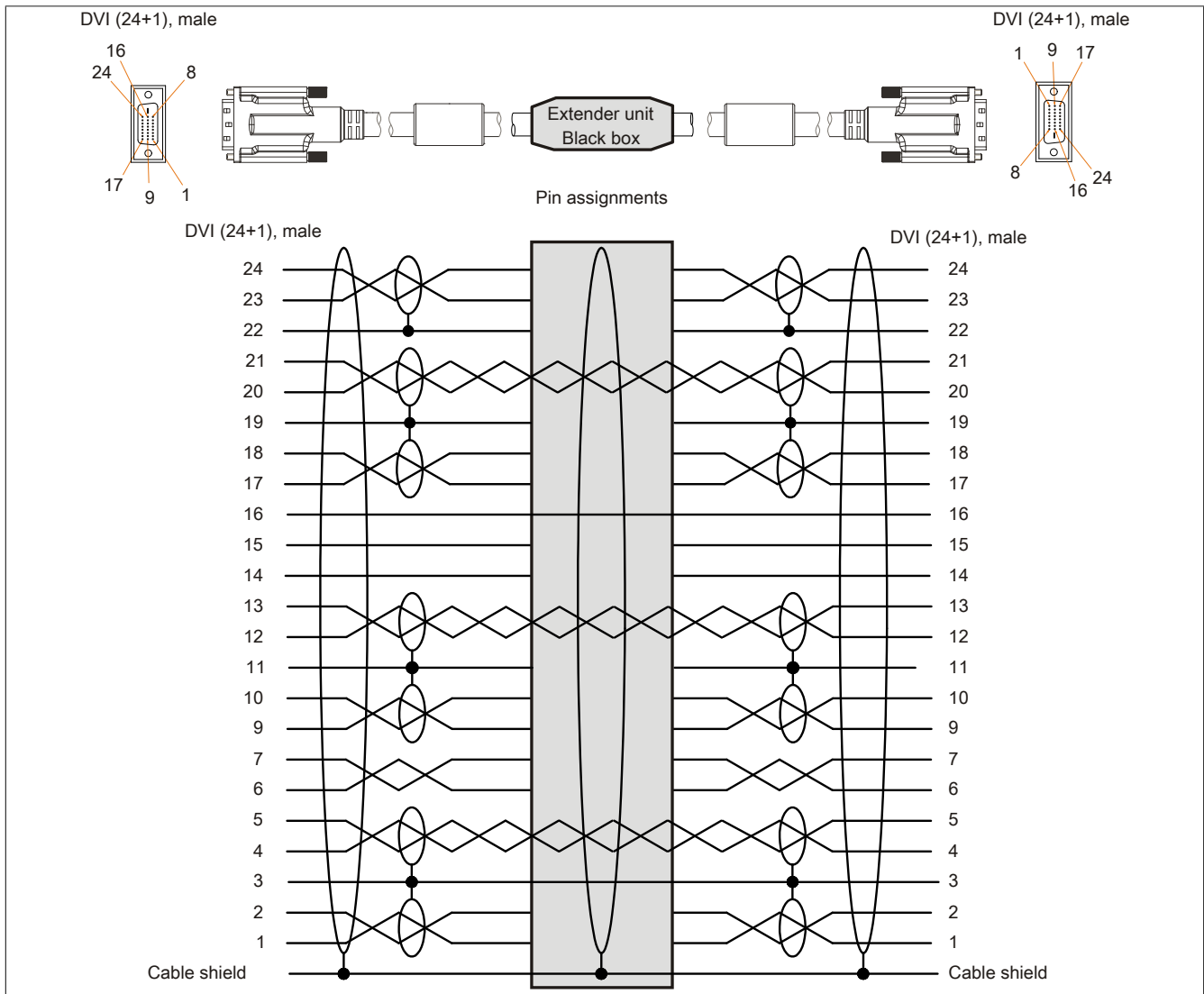


Image 157: 5CASDL.0xx0-13 - Pinout

## Cable connection

SDL flex cables with extenders must be connected between the industrial PC and Automation Panel 900 display unit in the correct direction. The signal direction is indicated on the extender unit for this purpose.

- Connect the end labeled "SDL IN" with the video output of e.g. the APC 820 (monitor/panel output) or Panel OUT of an AP900 AP Link card.
- The "SDL OUT" end should be connected to the display unit (e.g. Automation Panel 900) via the Automation Panel Link insert card (Panel IN).

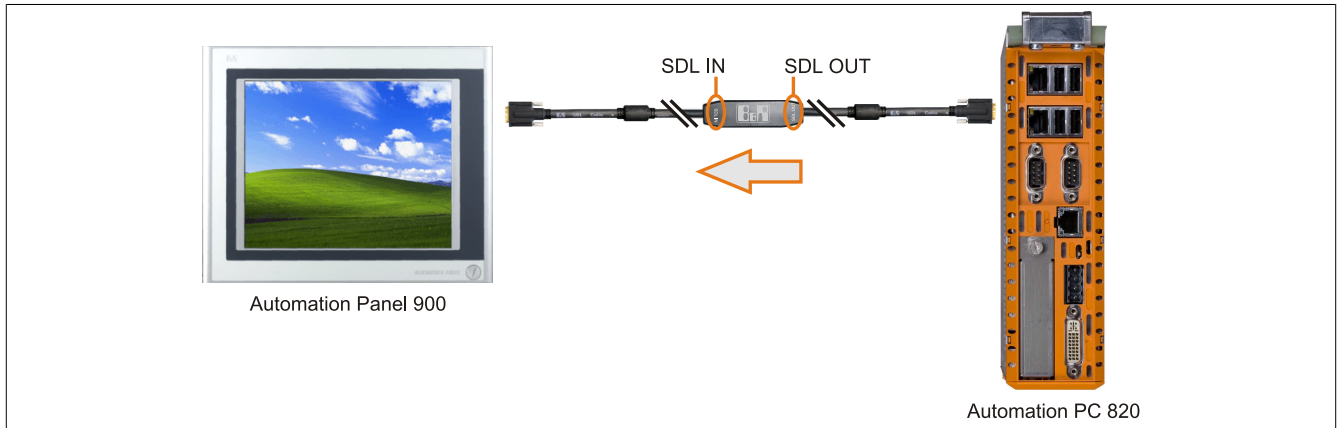


Image 158: Example of signal direction for the SDL flex cable with extender - APC820

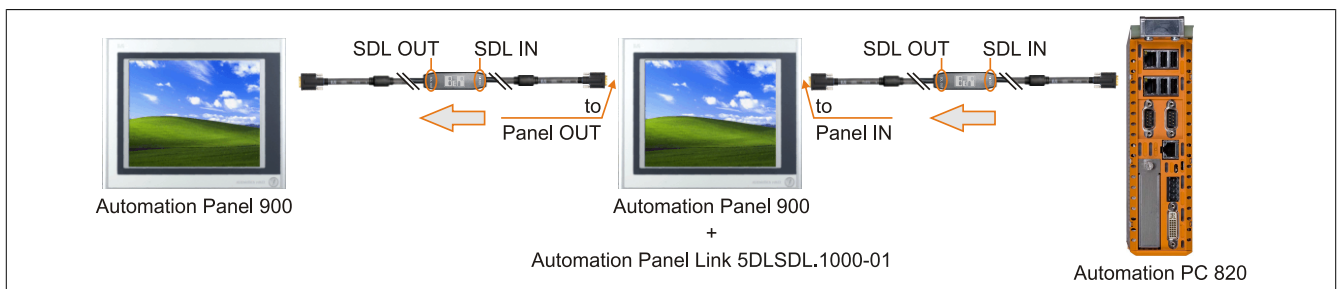


Image 159: Example of signal direction display - SDL flex cable with extender



12.6 USB cables

12.6.1 5CAUSB.00xx-00

General information

USB cables are designed to achieve USB 2.0 transfer speeds.

Order data

| Model number   | Short description                                | Image                                                                               |
|----------------|--------------------------------------------------|-------------------------------------------------------------------------------------|
|                | USB cable                                        |  |
| 5CAUSB.0018-00 | USB 2.0 connecting cable type A - type B, 1.8 m. |                                                                                     |
| 5CAUSB.0050-00 | USB 2.0 connecting cable type A - type B, 5 m.   |                                                                                     |

Table 258: 5CAUSB.0018-00, 5CAUSB.0050-00 - Order data

Technical data

| Product ID                 | 5CAUSB.0018-00                      | 5CAUSB.0050-00 |
|----------------------------|-------------------------------------|----------------|
| General information        |                                     |                |
| Certification              |                                     |                |
| CE                         | Yes                                 |                |
| c-UL-us                    | Yes                                 |                |
| Cable structure            |                                     |                |
| Wire cross section         | AWG 24, 28                          |                |
| Shield                     | Entire cable                        |                |
| Outer sheathing            |                                     |                |
| Color                      | Beige                               |                |
| Connector                  |                                     |                |
| Type                       | USB type A male and USB type B male |                |
| Mechanical characteristics |                                     |                |
| Dimensions                 |                                     |                |
| Length                     | 1.8 m ±30 mm                        | 5 m ± 50 mm    |
| Diameter                   | Max. 5 mm                           |                |
| Flex radius                | Min. 100 mm                         |                |

Table 259: 5CAUSB.0018-00, 5CAUSB.0050-00 - Technical data

Cable specifications

Warning!

If you want to build a suitable cable yourself, it should be wired according to these specifications.

If a self-built cable is used, B&R cannot guarantee that it will function properly. B&R guarantees the performance of all cables that they provide.

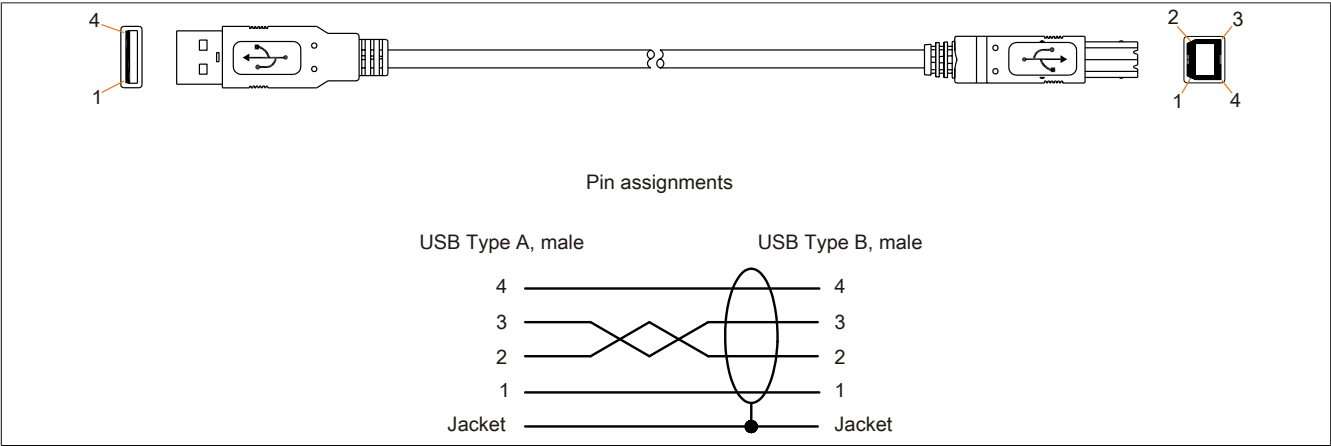


Image 160: 5CAUSB.00xx-00 - USB cable pinout

## 12.7 RS232 cables

### 12.7.1 9A0014.xx

#### General information

The RS232 cables are used as extension cables between two RS232 interfaces.

#### Order data

| Model number | Short description                                                                      | Image                                                                               |
|--------------|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|              | <b>RS232 cable</b>                                                                     |  |
| 9A0014.02    | RS232 extension cable for remote operating of a display unit with touch screen, 1.8 m. |                                                                                     |
| 9A0014.05    | RS232 extension cable for remote operating of a display unit with touch screen, 5 m.   |                                                                                     |
| 9A0014.10    | RS232 extension cable for remote operating of a display unit with touch screen, 10 m.  |                                                                                     |

Table 260: 9A0014.02, 9A0014.05, 9A0014.10 - Order data

#### Technical data

| Product ID                        | 9A0014.02    | 9A0014.05                        | 9A0014.10    |
|-----------------------------------|--------------|----------------------------------|--------------|
| <b>General information</b>        |              |                                  |              |
| Certification<br>CE               |              | Yes                              |              |
| <b>Cable structure</b>            |              |                                  |              |
| Wire cross section                |              | AWG 26                           |              |
| Shield                            |              | Entire cable                     |              |
| Outer sheathing<br>Color          |              | Beige                            |              |
| <b>Connector</b>                  |              |                                  |              |
| Type                              |              | 9-pin DSUB socket, male / female |              |
| <b>Mechanical characteristics</b> |              |                                  |              |
| Dimensions                        |              |                                  |              |
| Length                            | 1.8 m ±50 mm | 5 m ± 80 mm                      | 10 m ±100 mm |
| Diameter                          |              | Max. 5 mm                        |              |
| Flex radius                       |              | Min. 70 mm                       |              |

Table 261: 9A0014.02, 9A0014.05, 9A0014.10 - Technical data

Cable specifications

Warning!

If you want to build a suitable cable yourself, it should be wired according to these specifications.  
If a self-built cable is used, B&R cannot guarantee that it will function properly. B&R guarantees the performance of all cables that they provide.

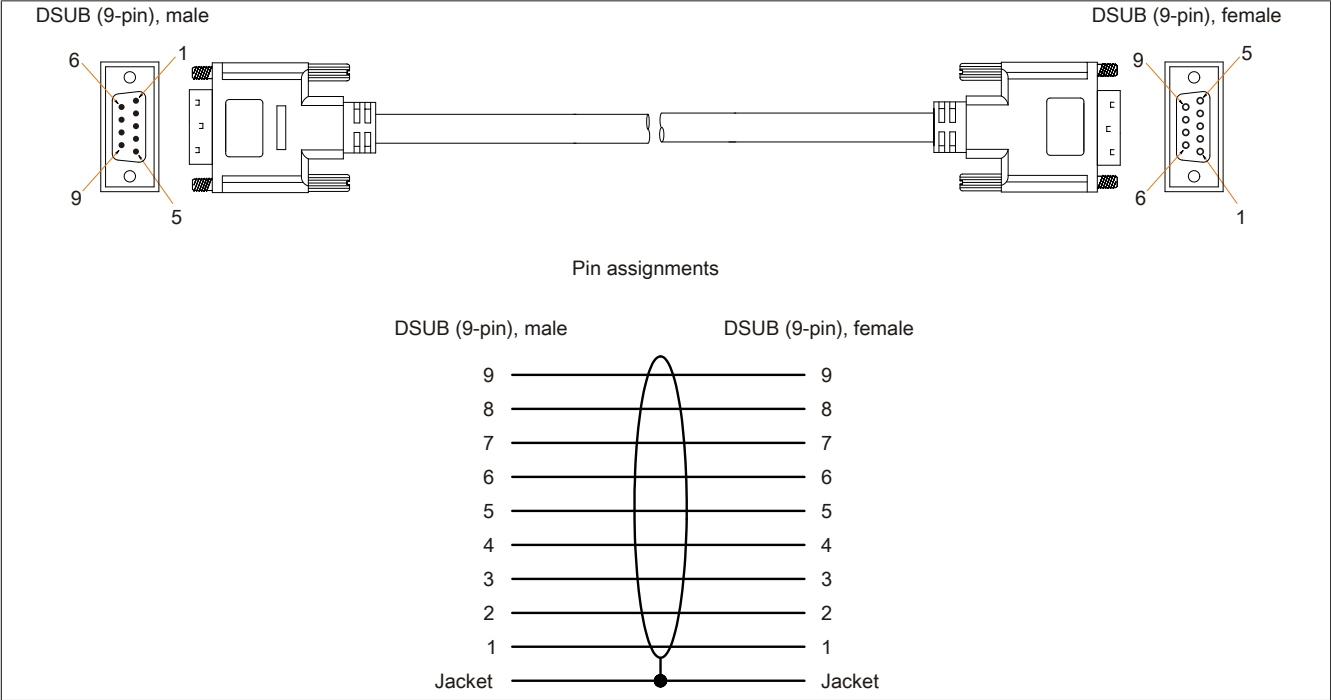


Image 161: 9A0014.xx - RS232 cable pinout

## 12.8 Internal supply cable 5CAMSC.0001-00

### 12.8.1 General information

This supply cable is used internally e.g. to supply special PCI cards. It is connected to the main board.  
For requirements and procedures, see "Connection of an external device to the main board" on page 310.

### Caution!

**Cable can only be plugged in and unplugged when the device is turned off.**

### 12.8.2 Order data

| Model number   | Short description                                 | Image                               |
|----------------|---------------------------------------------------|-------------------------------------|
|                | Undefined                                         | Image not found for 5CAMSC.0001-00! |
| 5CAMSC.0001-00 | APC620 internal power supply cable - Customized - |                                     |

Table 262: 5CAMSC.0001-00 - Order data

### 12.8.3 Technical data

| Product ID                        | 5CAMSC.0001-00                                                    |
|-----------------------------------|-------------------------------------------------------------------|
| <b>General information</b>        |                                                                   |
| Certification<br>CE               | Yes                                                               |
| <b>Cable structure</b>            |                                                                   |
| Wire cross section                | AWG 22                                                            |
| <b>Connector</b>                  |                                                                   |
| Type                              | 1x 4-pin male disk drive power plug, 1x 4-pin female plug housing |
| <b>Mechanical characteristics</b> |                                                                   |
| Dimensions<br>Length              | 100 mm ±5 mm                                                      |
| Flexibility                       | Flexible                                                          |

Table 263: 5CAMSC.0001-00 - Technical data

# Chapter 7 • Maintenance / Service

The following chapter describes service/maintenance work that can be carried out by a trained, qualified user.

## 1 Changing the battery

The lithium battery buffers the internal real-time clock (RTC) and the CMOS data.

### Information:

- The product design allows the battery to be changed with the B&R device switched either on or off. In some countries, safety regulations do not allow batteries to be changed while the module is switched on.
- Any BIOS settings that have been made will remain when the battery is changed with the power turned off (stored in non-volatile EEPROM). The date and time must be reset later because this data is lost when the battery is changed.
- The battery should only be changed by qualified personnel.

### Warning!

Replace battery with Renata, type CR2477N only. Use of another battery may present a risk of fire or explosion.

Battery may explode if mistreated. Do not recharge, disassemble or dispose of in fire.

The following replacement lithium batteries are available: 4A0006.00-000 (1 pc.) and 0AC201.91 (4 pcs.).

### 1.1 Battery status evaluation

The battery status is evaluated immediately following start-up of the device and is subsequently checked by the system every 24 hours. The battery is subjected to a brief load (1 second) during the measurement and then evaluated. The evaluated battery status is displayed in the BIOS Setup pages (under Advanced - Baseboard monitor) 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                                                                                                                                             |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| N/A            | Hardware, i.e. firmware used is too old and does not support read.                                                                                  |
| GOOD           | 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 264: Meaning of battery status

From the point when battery capacity is recognized as insufficient, data buffering is guaranteed for approximately another 500 hours. When changing the battery, data is buffered for approximately another 10 minutes by a gold leaf capacitor.

### 1.2 Procedure

- Disconnect the B&R industrial PC.
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Remove the cover from the battery compartment and carefully pull out the battery using the removal strips.

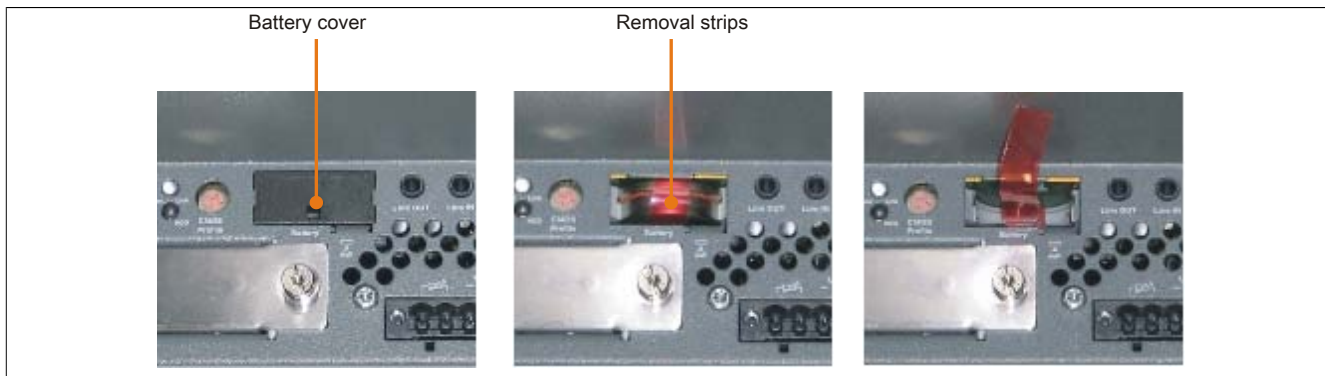


Image 162: Remove battery

- The battery should not be held by its edges. Insulated tweezers may also be used for inserting the battery.

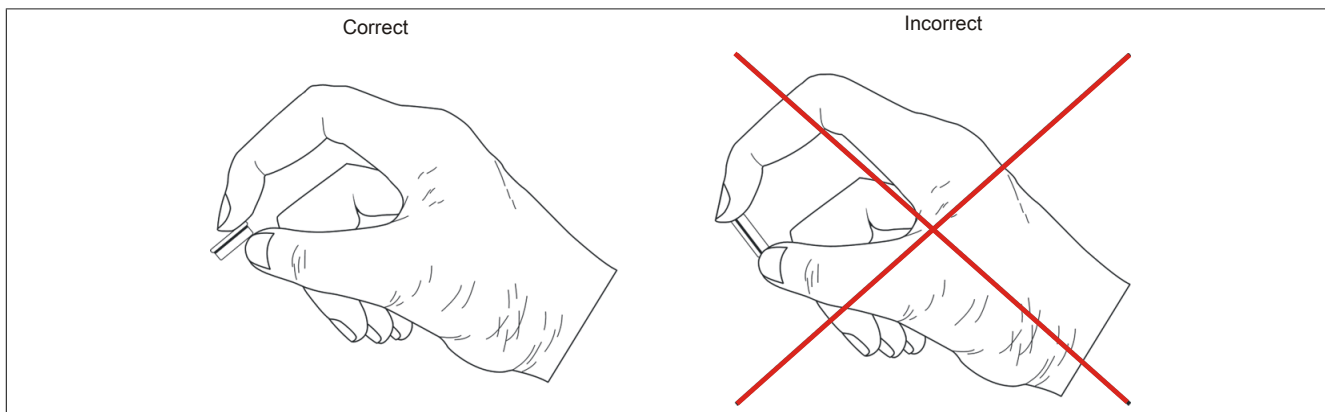


Image 163: Battery handling

- Insert the new battery with correct polarity.



Image 164: Battery polarity

- To make the next battery change easier, be sure the removal strip is in place when inserting battery.
- Reconnect power supply to the B&R industrial PC (plug in power cable and press power button).
- Date and time might need to be reset in BIOS.

## Warning!

**Lithium batteries are considered hazardous waste. Used batteries should be disposed of according to local requirements.**

## 2 Cleaning

### **Danger!**

**The unit can only be cleaned when turned off in order to prevent unintentionally executing functions by actuating the touch screen or pressing keys.**

A moist towel should be used to clean the 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 device! Never use aggressive solvents, chemicals, scouring agents, pressurized air or steam jet.

### **Information:**

**Displays with a touch screen should be cleaned regularly.**

### 3 Replacing the CompactFlash card

#### Caution!

**Turn off the power before replacing the CompactFlash card!**

The CompactFlash card can be exchanged quickly and easily by pressing the ejector (see image) with a pointed object such as a pen.

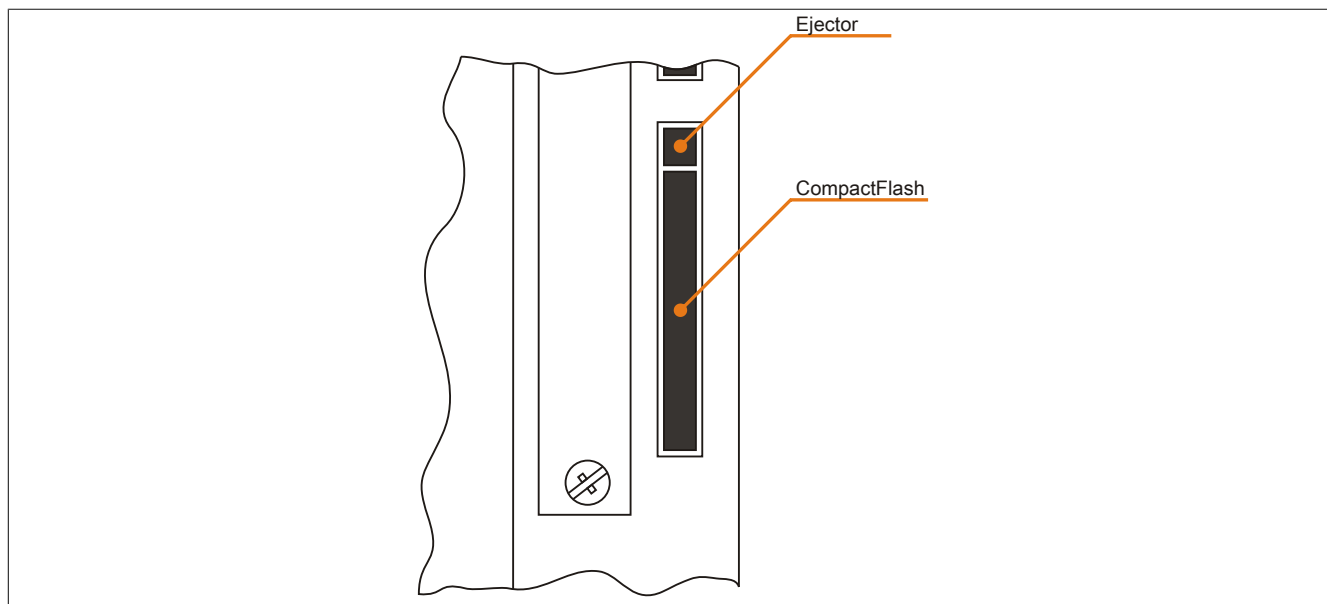


Image 165: CompactFlash + ejector (sample photo)



## 4 Installing / exchanging a slide-in compact drive

### Information:

The SATA I interface allows data carriers to be exchanged during operation (hot-plug). To utilize this capability, it must be supported by the operating system.

### 4.1 Procedure

1. Loosen and remove the two ¼ turn screws on the protective cover / slide-in compact drive.



Image 166: Loosening the ¼ turn screws

2. Insert the compact SATA drive and tighten the ¼ turn screws.



Image 167: Inserting the compact SATA drive

## 5 Installing / exchanging a slide-in slot drive

Slide-in drives can be installed and exchanged in system units with 1 or 2 card slot expansion.

### 5.1 Procedure

1. Disconnect the power supply to the B&R Industrial PC.
2. Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
3. Remove the dummy slide-in module or slide-in drive by unscrewing the two ¼ turn screws.



Image 168: Loosening the ¼ turn screws

4. Insert the slide-in drive and tighten with the two ¼ turn screws.

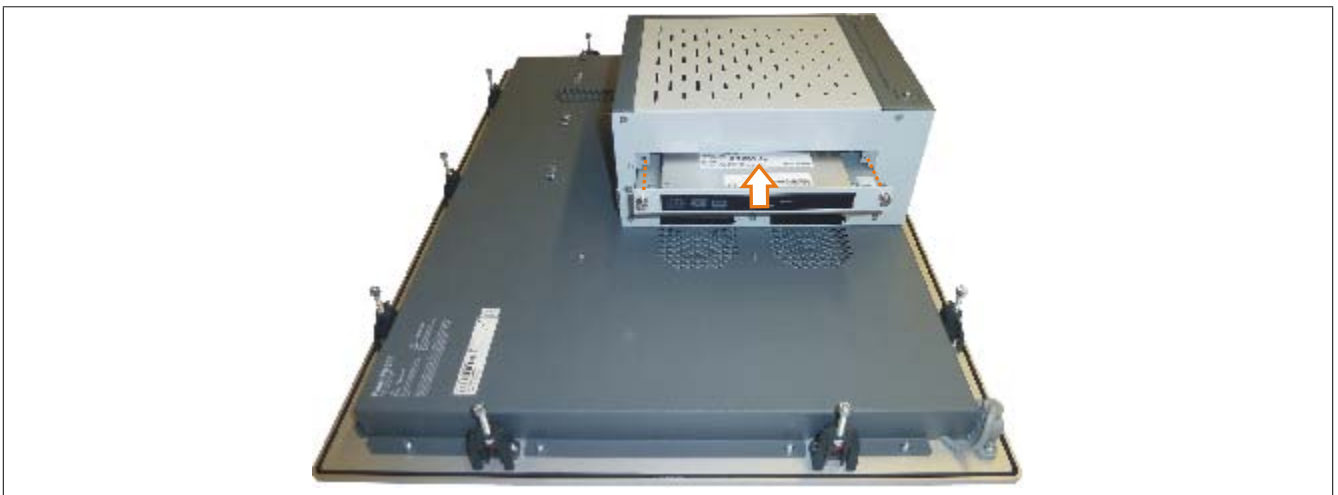


Image 169: Installing the slide-in drive

## 6 Installing the slide-in compact adapter

Slide-in compact adapters can be installed and exchanged in system units with 1 or 2 card slot expansion. A slide-in compact drive (e.g. slide-in compact HDD) can be installed in a slide-in slot using the slide-in compact adapter.

### 6.1 Procedure

1. Disconnect the power supply to the B&R Industrial PC.
2. Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
3. Remove the dummy slide-in module or slide-in drive by unscrewing the two ¼ turn screws.



Image 170: Loosening the ¼ turn screws

4. Insert the slide-in compact adapter and tighten the two ¼ turn screws.

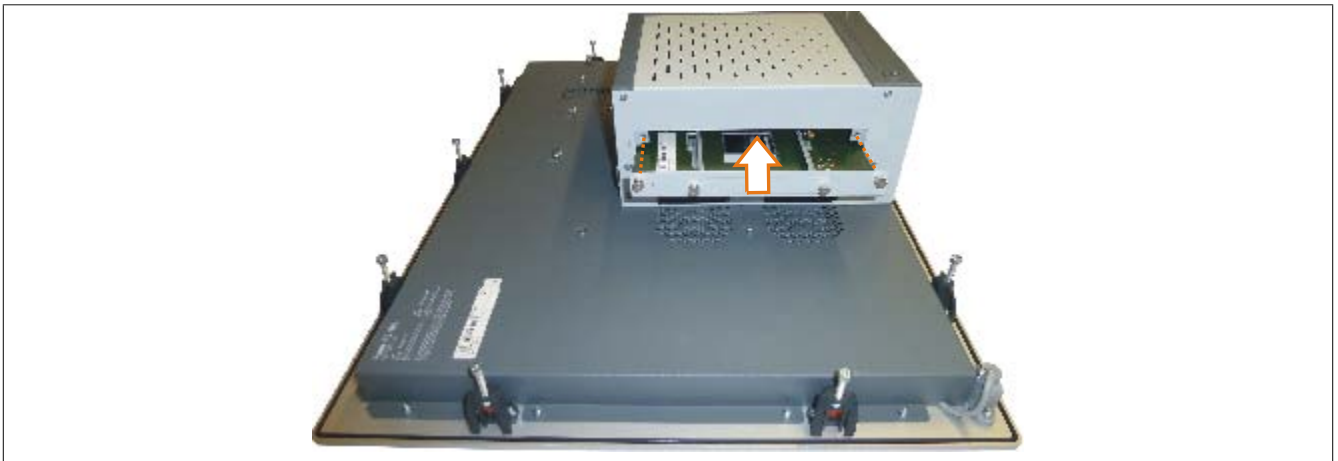


Image 171: Installing the slide-in compact adapter

5. Once the adapter has been installed, the slide-in compact drive can be inserted.



Image 172: Inserting the slide-in compact drive

## 7 Installing / exchanging the fan kit

### Information:

The following section illustrates a characteristic example of a PPC800 model without expansion. The only difference in this procedure compared to models with expansion is the number of combi-torx screws to loosen.

### 7.1 Procedure

1. Loosen the indicated combi-torx screws (T10) and remove fan kit cover.

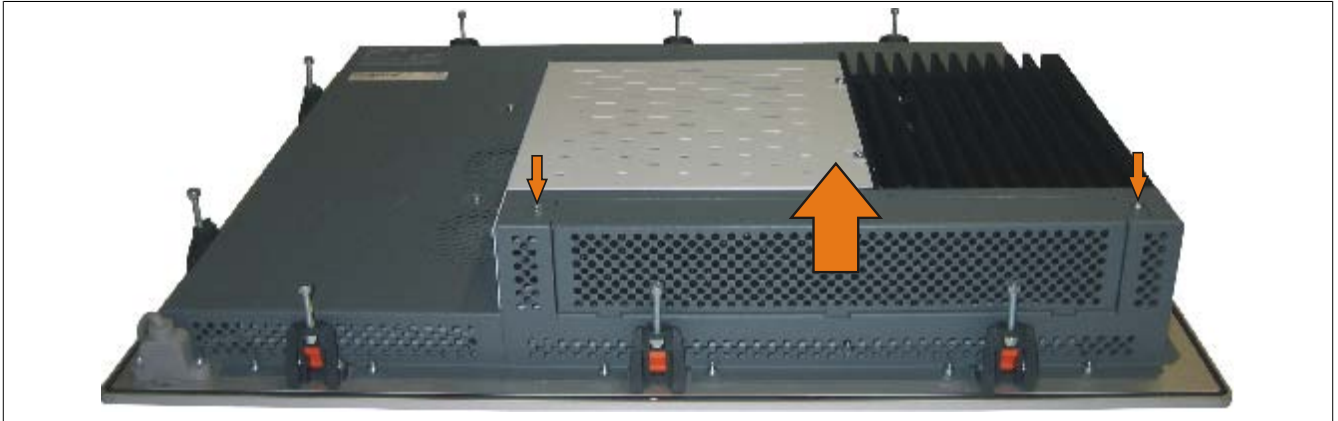


Image 173: Removing the fan kit cover

2. Insert fan kit frame and press down until it is fully fastened into the terminal.

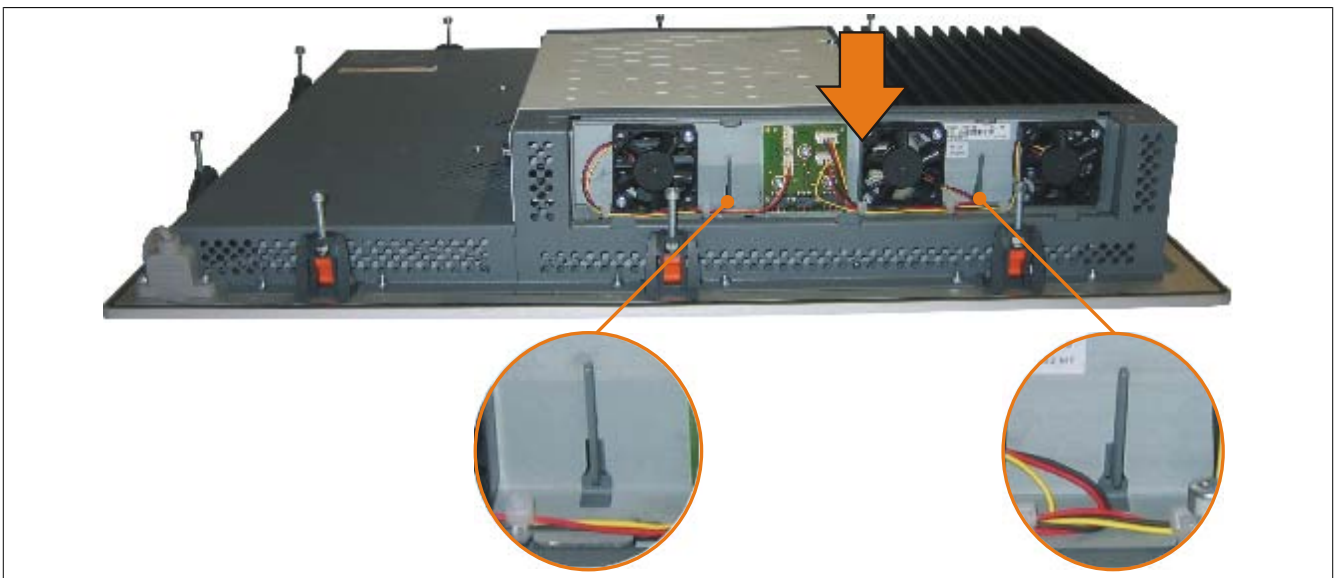


Image 174: Inserting the fan kit

3. Place the dust filter in the fan kit cover and secure with the filter clasp.

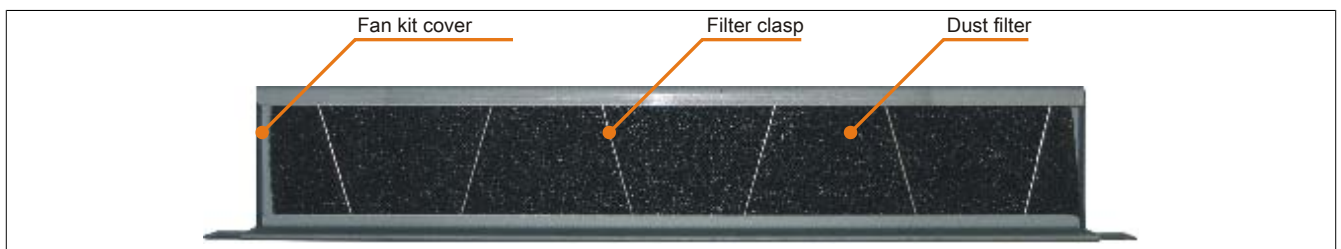


Image 175: Securing the dust filter and filter clasp

4. Place the fan kit cover in the housing and fasten using the Torx screws removed earlier.

## **Information:**

**Regular control of the dust filter depending on area of use and degree of dirtiness.**

## 8 Installing the UPS module

The module is installed using the materials included in the delivery.

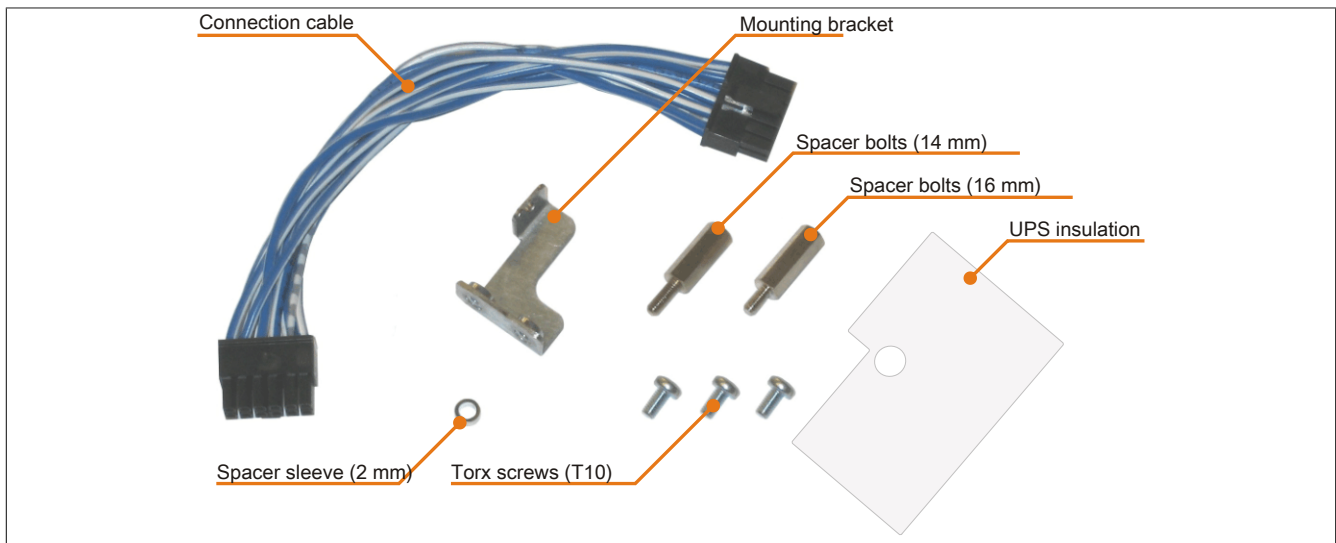


Image 176: 5AC600.UPS1-00 Add-on UPS module - Installation materials

1. Remove the side cover (see "Mounting the side cover" on page 305).
2. Remove UPS module cover by removing the 2 marked Torx screws (T10).

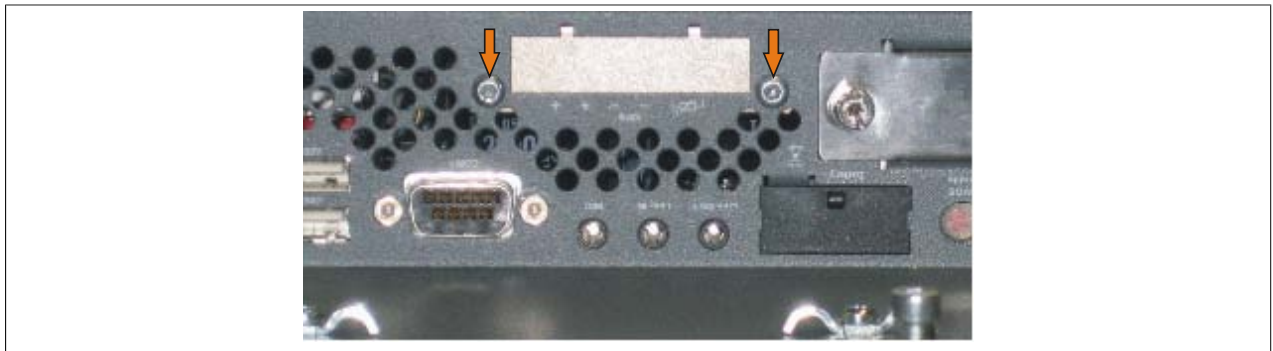


Image 177: Removing the UPS module cover

3. Install UPS module with 2 Torx screws (T10) on the housing and 1 Torx screw (T10) on the main board (spacing bolt). Use the previously removed Torx screws and/or the Torx screws from the mounting materials.

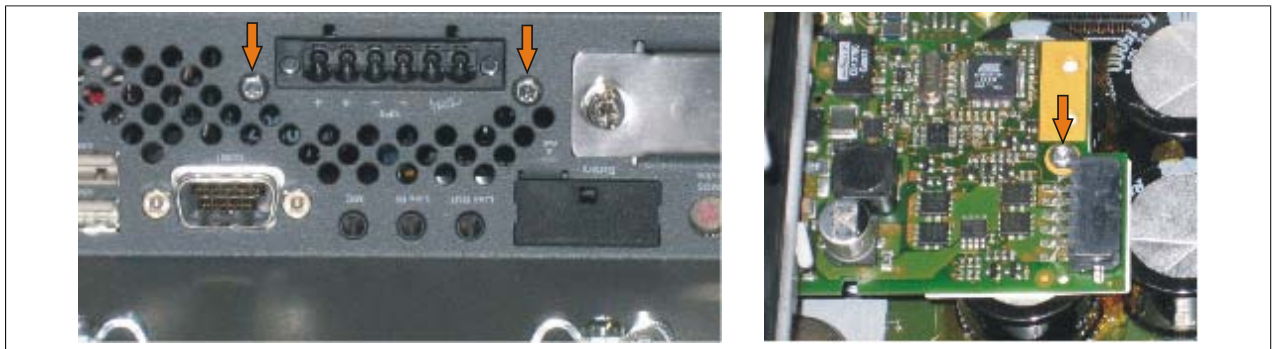


Image 178: Installing the UPS module

4. Plug in connection cable (see marked socket).



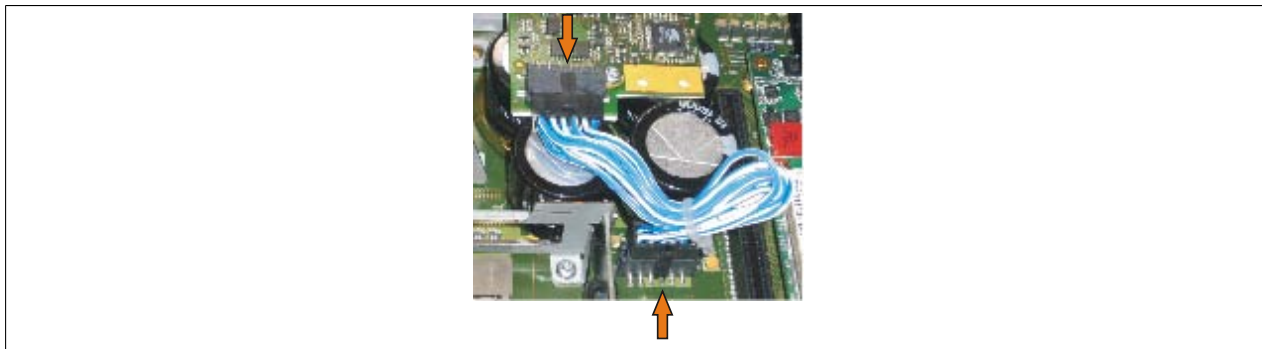


Image 179: Plugging in the connection cable

### Information:

When connecting the cable, make sure that the connector locking mechanism is engaged.

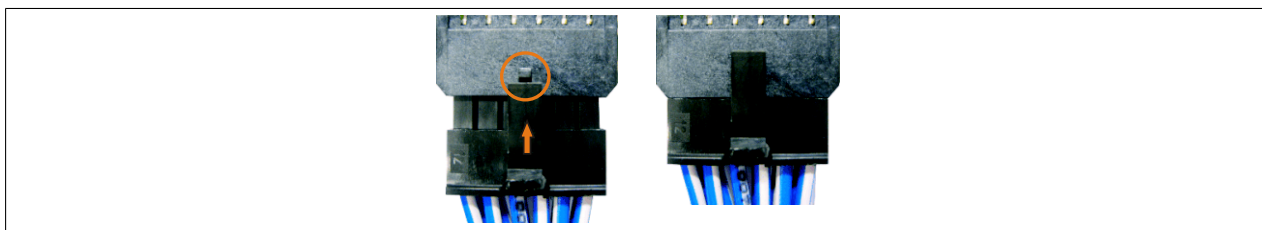


Image 180: Connector locking mechanism

5. Attach the side cover.



## 9 Installing / exchanging the bus unit

Bus units can be installed and exchanged in system units with 1 or 2 card slot expansion.

### 9.1 Procedure

1. Disconnect the power supply to the Panel PC 800.
2. Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
3. Remove the side cover (see "Mounting the side cover" on page 305).
4. Loosen the Torx screws (T10) mounted to the main board.



Image 181: Removing the screws

5. Plug the bus unit into the bus unit slot and fasten using three Torx screws (T10).

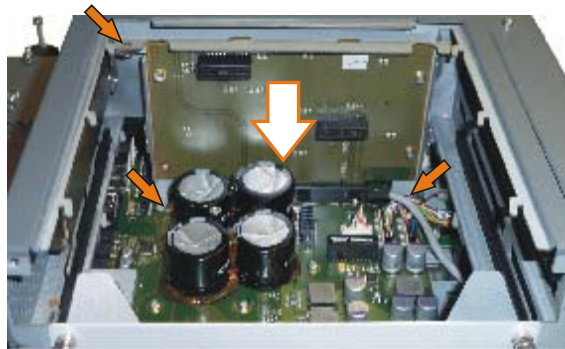


Image 182: Installing the bus unit

6. Attach the side cover.

## 10 Installing / exchanging the adapter

1. Remove the side cover (see "Mounting the side cover" on page 305).
2. Remove 1 card slot or 2 card slot expansion if present.

### 10.1 Procedure for the adapter 5AC803.BC01-00

1. Loosen the Torx screws (T10) mounted to the main board.



Image 183: Removing the screws

2. Place adapter and guide rails in the intended positions and fasten using the Torx screws (T10) removed earlier.

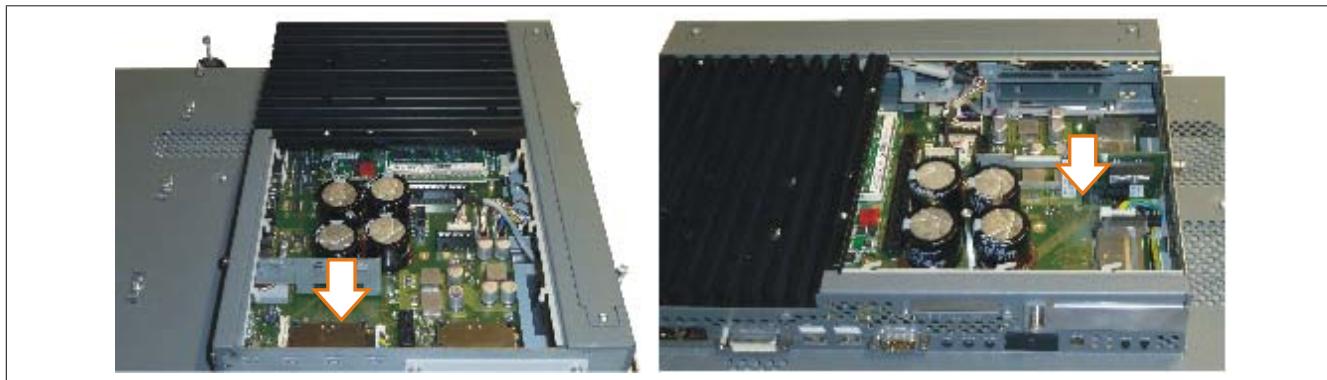


Image 184: Installing the 5AC803.BC01-00 adapter

3. Attach the side cover.

## 10.2 Procedure for the adapter 5AC803.BC02-00

1. Plug adapter into the intended slot.



Image 185: Installing the 5AC803.BC02-00 adapter

2. Attach the side cover.

## 11 Installing / exchanging the PCIec plug-in card

### 11.1 Procedure

1. Loosen the 1/4 turn screws and remove PCIec module cover.



Image 186: Removing the PCIec module cover

2. Slide PCIec plug-in card into place.

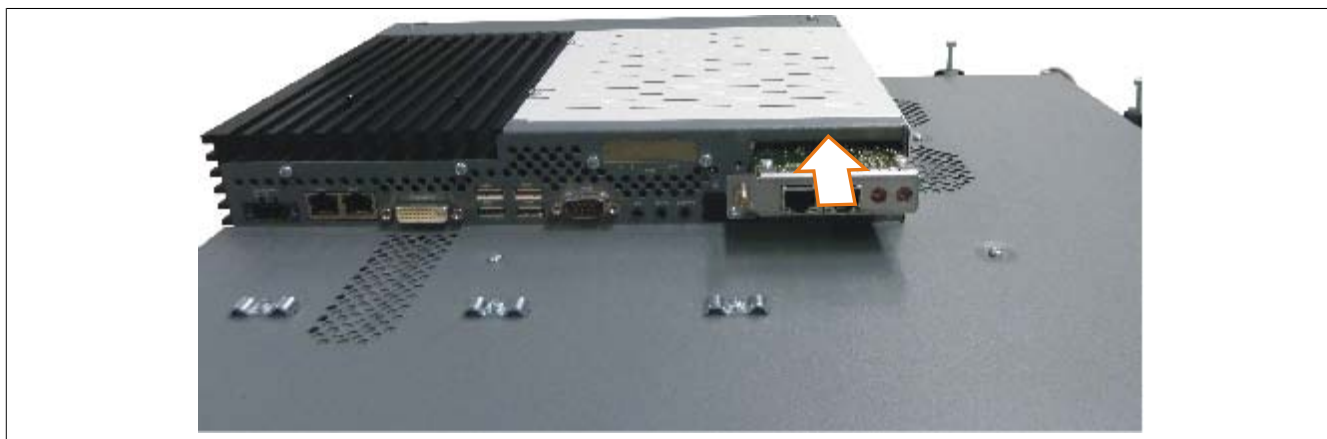


Image 187: Inserting the PCIec plug-in card

3. Fasten PCIec plug-in card using the 1/4 turn screws.

## 12 Mounting the side cover

The side cover can be easily removed by loosening the Torx (T10) screws. The number of Torx screws can vary depending on the system.

### 12.1 PPC800 without expansion

1. Disconnect the power supply to the Panel PC 800.
2. Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
3. Loosen the indicated combi-torx screws (T10).
4. After loosening the screws, the side cover can be removed (by sliding off of heat sink).

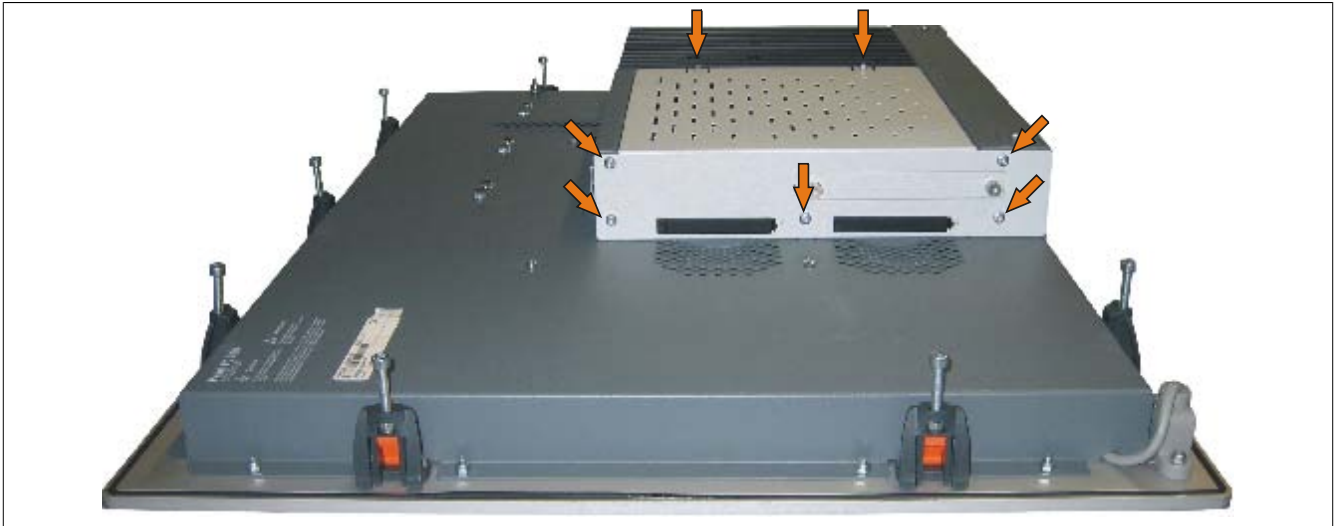


Image 188: Mounting the side cover on a PPC800 without expansion

### 12.2 PPC800 with expansion

1. Disconnect the power supply to the Panel PC 800.
2. Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
3. Loosen the indicated combi-torx screws (T10).
4. After loosening the screws, the side cover can be removed (by sliding off of heat sink).

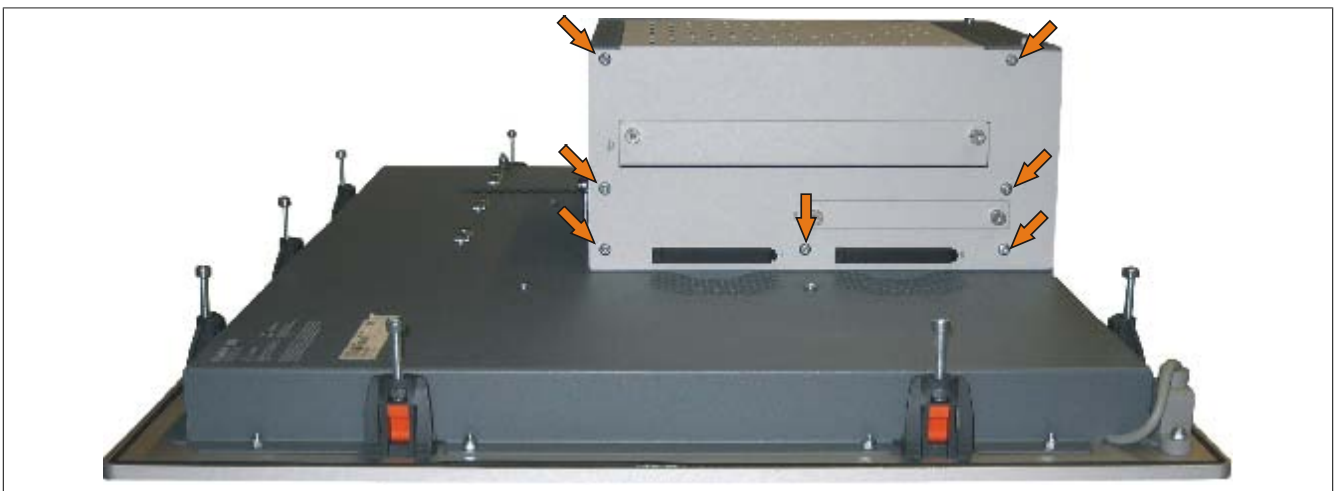


Image 189: Mounting the side cover on a PPC800 with expansion (1 slot expansion shown in image)

## 13 Exchanging a PCI SATA RAID hard disk in a RAID 1 system

In the example, the assumption is made that the secondary hard disk (HDD1) is defective in a RAID 1 configuration. In such a case, the defective hard disk can be replaced by the replacement drive SATA hard disk.

| Model number - PCI SATA RAID controller | Model number of required replacement SATA HDD | Note             |
|-----------------------------------------|-----------------------------------------------|------------------|
| 5ACPCI.RAIC-03                          | 5ACPCI.RAIC-04                                | 160 GB hard disk |
| 5ACPCI.RAIC-05                          | 5MMHDD.0250-00                                | 250 GB hard disk |

Table 265: Overview of required replacement SATA HDD for PCI SATA HDD RAID controller

A size 10 Torx screwdriver is needed for exchanging the hard disk.

### 13.1 Procedure

1. Disconnect the power supply.
2. Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
3. Remove the side cover.
4. Remove the SATA RAID insert.
5. Loosen the 4 appropriate mounting screws (M3x5).

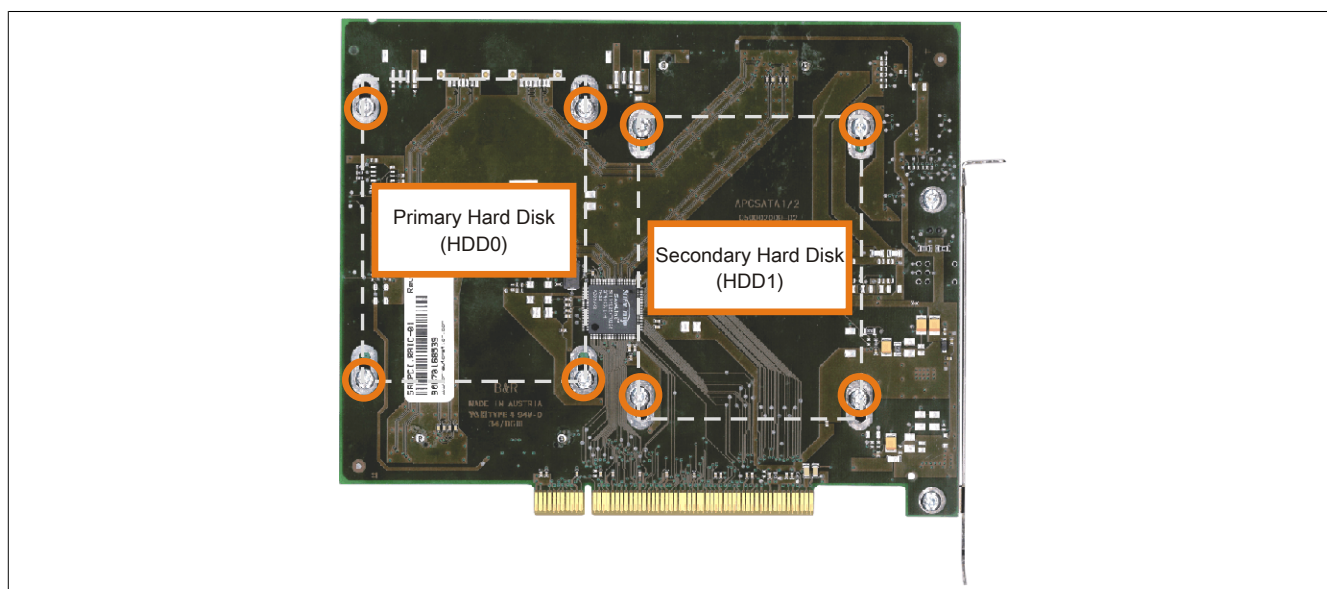


Image 190: Screw layout on the back side of the SATA RAID controller 5ACPCI.RAIC-03

6. On the front side, slide the hard disk down and away (image 1).
7. Insert the new hard disk carefully into the connector (image 2), being careful to only touch it on the front, and not on the top.



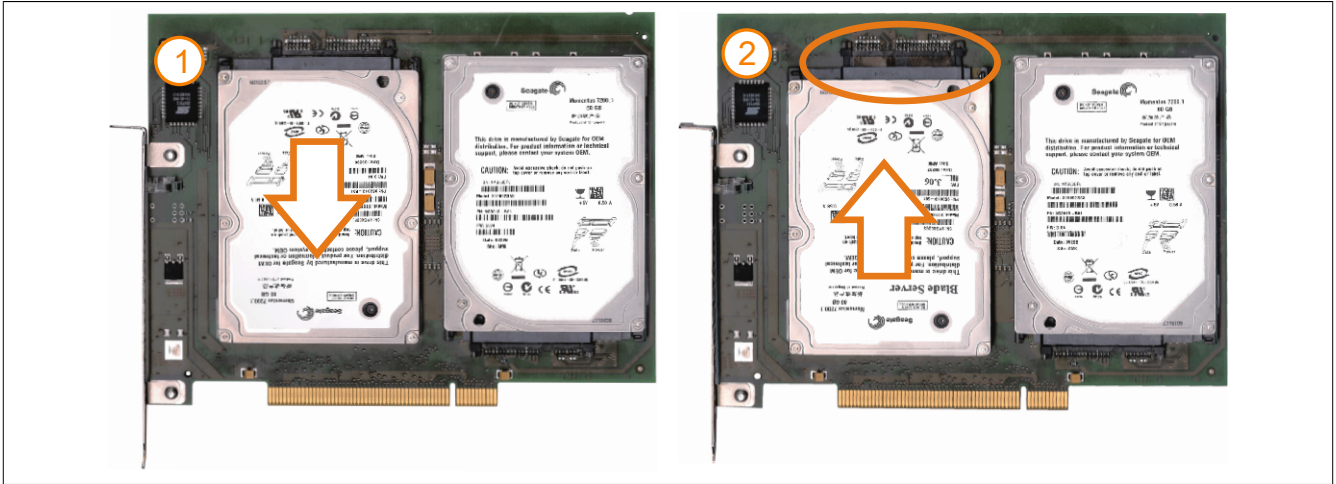


Image 191: Hard disk exchange

8. Re-secure the hard disk using the 4 fastening screws (M3x5) used earlier.
9. Reassemble device in the reverse order.
10. An error message is output by the RAID BIOS after starting the system "RAID1 set is in Critical status - press any key to enter Configuration Utility".
11. A rebuild must be executed in the SATA RAID BIOS - see "Rebuild mirrored set" on page 132.

# Appendix A

## 1 Maintenance Controller Extended (MTCX)

The MTCX controller (FPGA processor) is located on the main board (part of every system unit).

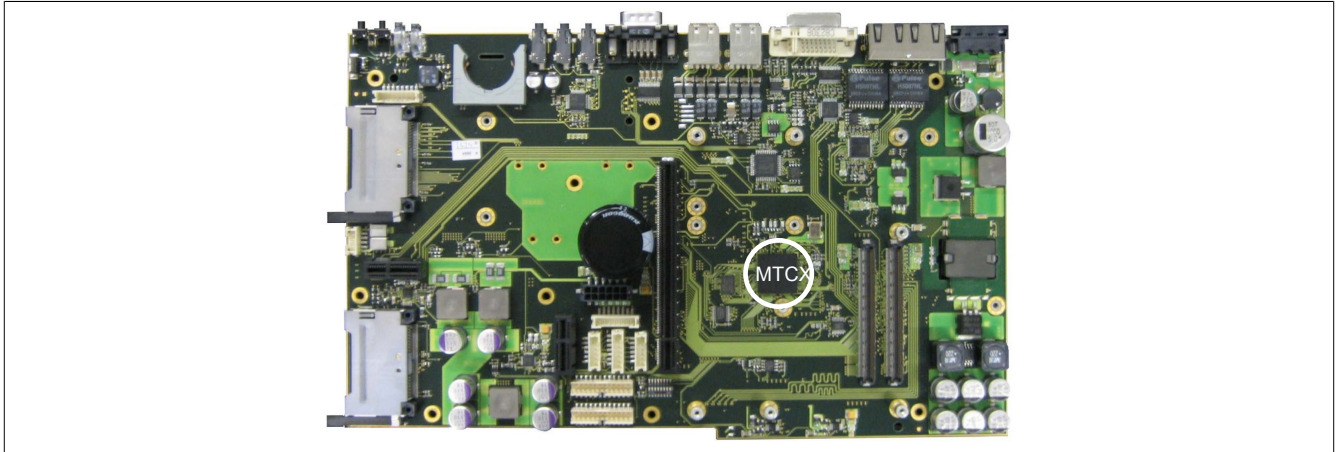


Image 192: MTCX controller location

The MTCX is responsible for the following monitoring and control functions:

- Power on (power OK sequencing) and power fail logic
- Watchdog handling (NMI and reset handling)
- Temperature monitoring
- Fan control
- Key handling / coordination (matrix keyboard on Automation Panel 900 devices configurable using B&R Key Editor, PS/2 keyboard)
- LED handling (matrix keyboard with LEDs on Automation Panel 900 devices configurable using B&R Key Editor)
- Advanced desktop operation (USB forwarding)
- Daisy chain display operation (touch screen, USB forwarding)
- Panel locking mechanism (can be configured using B&R Control Center - ADI driver)
- Backlight control for a connected B&R display
- Statistical data recording (power cycles - each power on, power on and fan hours are recorded - every full hour is counted e.g. 50 minutes no increase)
- SDL data transfer (display, matrix keyboard, touch screen, service data, USB)
- Status LEDs (HDD, Link, Run)

The MTCX functions can be added with a firmware upgrade<sup>1))</sup>. The version can be read in BIOS (menu item "advanced" - baseboard/panel features) or in approved Microsoft Windows operating systems, using B&R Control Center.

### 1.1 Temperature monitoring - Fan control

The MTCX constantly monitors the temperature using temperature sensors, which directly determine how the fan is controlled. The RPM depends on the temperature measured. The limit values depend on the MTCX firmware version being used.

1)) Available for download from the B&R Website ([www.br-automation.com](http://www.br-automation.com)).



| Sensor range     | Start-up temperature | Max fan speed at: |
|------------------|----------------------|-------------------|
| Board I/O        | 60°C                 | 76°C              |
| Board ETH2       | 60°C                 | 76°C              |
| Board Power      | 60°C                 | 76°C              |
| Power supply     | 60°C                 | 76°C              |
| Slide-in drive 1 | 44°C                 | 60°C              |
| IF slot          | 65°C                 | 81°C              |

Table 266: Temperature limits of the fan (MTCX PX32 V1.01).

Once the start-up temperature is reached, the device is started at the minimum fan speed. The maximum fan speed is reached at a start-up temperature of 16°C. The fan speed in this area is controlled depending on the temperature.

For example, slide-in 1:  $44^{\circ}\text{C} + 16^{\circ}\text{C} = 60^{\circ}\text{C}$  --> maximum fan speed

The fans are first switched off again if the evaluated temperature remains 6°C lower than the start-up temperature for a time span of 30 minutes (=lag-time).

2 Connection of an external device to the main board

A plug on the main board enables branching of +5 VDC and +12 VDC for the internal supply of e.g. special PCI cards.

The voltage can be accessed using the "Internal supply cable 5CAMSC.0001-00" on page 288. The connector is located near the reset or power button (see image). The PPC800 side cover (see "Mounting the side cover" on page 305) and possibly also the slide-in drives, PCIec and PCI cards must be removed to reach the connector.



Image 193: Connector location for external devices

| Connector for the external devices |            |               |                                                                                                                |
|------------------------------------|------------|---------------|----------------------------------------------------------------------------------------------------------------|
| Pin                                | Assignment | Power         | 4-pin connector, male<br> |
| 1                                  | +12 VDC    | Max. 10 watts |                                                                                                                |
| 2                                  | GND        | Max. 5 watts  |                                                                                                                |
| 3                                  | GND        |               |                                                                                                                |
| 4                                  | +5 VDC     |               |                                                                                                                |

Table 267: Pin assignments - Connector on main board

Connections are protected with a 1A multi-fuse.

## 3 Touch Screen AMT 5-wire

### 3.1 Technical data

#### 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.

| Product ID                        | Touch Screen AMT 5-wire                                                                                                                                                                                                                                                                                                |
|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>General information</b>        |                                                                                                                                                                                                                                                                                                                        |
| Certification                     |                                                                                                                                                                                                                                                                                                                        |
| CE                                | Yes                                                                                                                                                                                                                                                                                                                    |
| c-UL-us                           | Yes                                                                                                                                                                                                                                                                                                                    |
| Manufacturer                      | AMT                                                                                                                                                                                                                                                                                                                    |
| Release pressure                  | < 1 N                                                                                                                                                                                                                                                                                                                  |
| Light permeability                | 81 ±3%                                                                                                                                                                                                                                                                                                                 |
| <b>Environmental conditions</b>   |                                                                                                                                                                                                                                                                                                                        |
| Temperature                       |                                                                                                                                                                                                                                                                                                                        |
| Operation                         | - 20 to 70°C                                                                                                                                                                                                                                                                                                           |
| Storage                           | - 40 to 80°C                                                                                                                                                                                                                                                                                                           |
| Transport                         | - 40 to 80°C                                                                                                                                                                                                                                                                                                           |
| Relative humidity                 |                                                                                                                                                                                                                                                                                                                        |
| Operation                         | 90% at max. 50°C                                                                                                                                                                                                                                                                                                       |
| Storage                           | 90% RH at max. 60°C for 504 hours                                                                                                                                                                                                                                                                                      |
| Transport                         | 90% RH at max. 60°C for 504 hours                                                                                                                                                                                                                                                                                      |
| <b>Operating conditions</b>       |                                                                                                                                                                                                                                                                                                                        |
| Service life                      | 36 million touch operations on the same point (release pressure: 250 g, interval: 2x per second)                                                                                                                                                                                                                       |
| Chemical resistance <sup>1)</sup> | Acetone, methylene chloride, methyl ethyl ketone, isopropyl alcohol, hexane, turpentine, mineral spirits, unleaded gasoline, diesel, motor oil, gear lubricating oil, antifreeze, ammonia-based glass cleaner, chemical cleaning agents, household cleaning agents, vinegar, coffee, tea, lubricant, cooking oil, salt |
| Activation                        | Finger, pointer, credit card, glove                                                                                                                                                                                                                                                                                    |
| Drivers                           | Touch screen drivers are available from the Downloads area on the B&R website ( <a href="http://www.br-automation.com">www.br-automation.com</a> ).                                                                                                                                                                    |

Table 268: Technical data - Touch Screen AMT 5-wire

1) The active area of the touch screen is resistant to these chemicals for a timeframe of one hour at 25°C.

### 3.2 Temperature humidity diagram

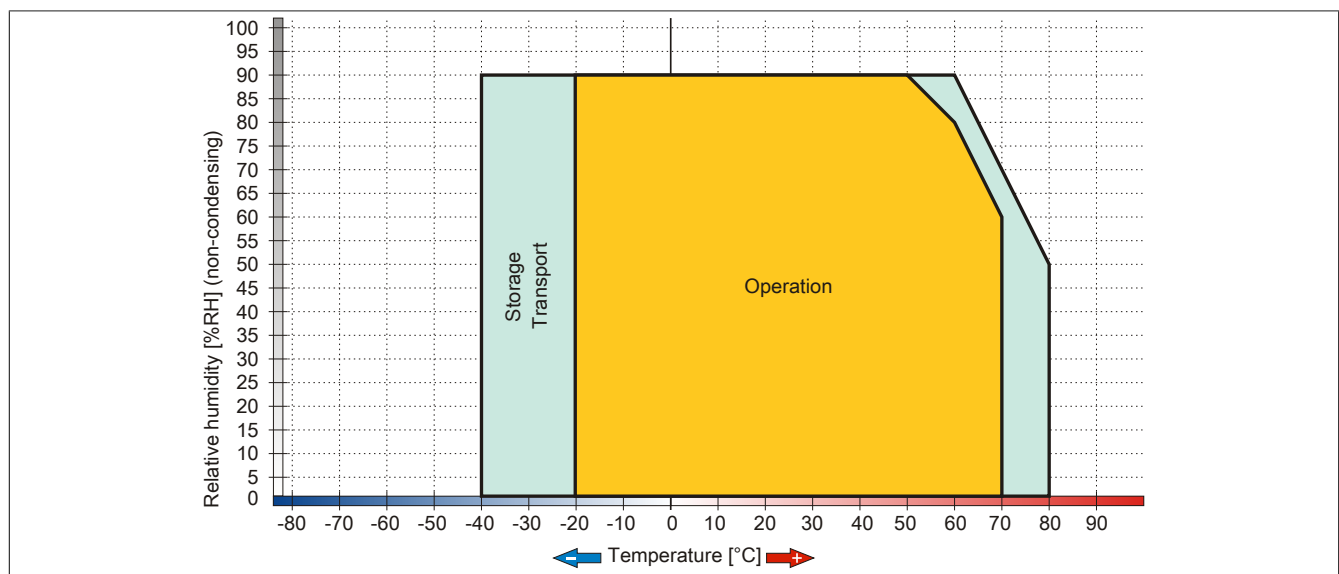


Image 194: Temperature humidity diagram - AMT touch screen 5-wire

### 3.3 Cleaning

#### Danger!

The unit can only be cleaned when turned off in order to prevent unintentionally executing functions by actuating the touch screen or pressing keys.

A moist towel should be used to clean the 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 device! Never use aggressive solvents, chemicals, scouring agents, pressurized air or steam jet.

**Information:**

**Displays with a touch screen should be cleaned regularly.**

## 4 Panel membrane

The panel membrane 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.

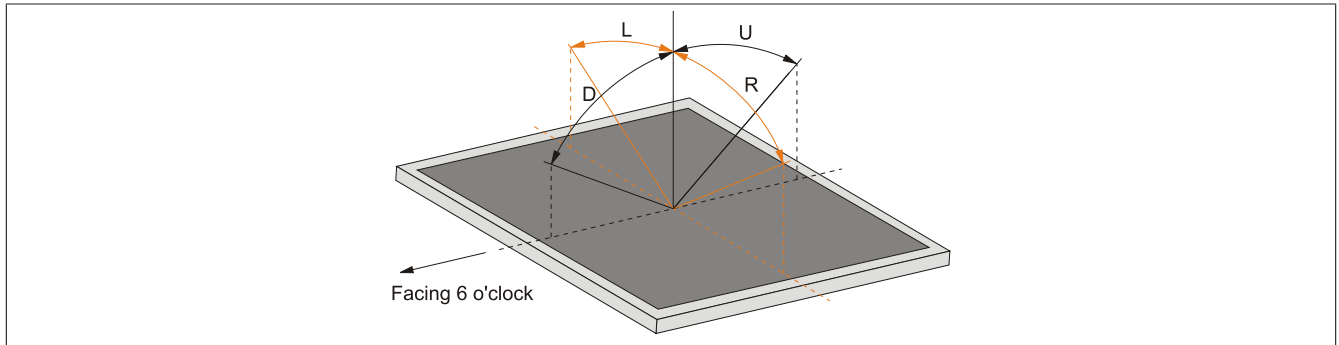
|                                                                                                                                                |                                                                                                                                                                                                               |                                                                                                                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ethanol<br>Cyclohexanol<br>Diacetone alcohol<br>Glycol<br>Isopropanol<br>Glycerine<br>Methanol<br>Triacetin<br>Dowandol<br>DRM/PM              | Formaldehyde 37 to 42%<br>Acetaldehyde<br>Aliphatic hydrocarbons<br>Toluene<br>Xylene<br>White spirits                                                                                                        | Trichloroethane<br>Ethyl acetate<br>Diethyl ether<br>N-Butyl acetate<br>Amyl acetate<br>Butylcellosolve<br>Ether                                                                                                 |
| Acetone<br>Methyl ethyl ketone<br>Dioxan<br>Cyclohexanone<br>MIBK<br>Isophorone                                                                | Formic acid < 50%<br>Acetic acid < 50%<br>Phosphoric acid < 30%<br>Hydrochloric acid < 36%<br>Nitric acid < 10%<br>Trichloroacetic acid < 50%<br>Sulphuric acid < 10%                                         | Sodium hypochlorite < 20%<br>Hydrogen peroxide < 25%<br>Potassium carbonate<br>Washing agents<br>Tenside<br>Fabric conditioner<br>Ferrous chloride (FeCl <sub>2</sub> )<br>Ferrous chloride (FeCl <sub>3</sub> ) |
| Ammonia < 40%<br>Caustic soda < 40%<br>Potassium hydroxide<br>Alkali carbonate<br>Bichromate<br>Potassium<br>Acetonitrile<br>Sodium bisulphate | Cutting oil<br>Diesel oil<br>Linseed oil<br>Paraffin oil<br>Blown castor oil<br>Silicon oil<br>Turpentine oil substitute<br>Universal brake fluid<br>Aviation fuel<br>Gasoline<br>Water<br>Sea water<br>Decon | Dibutyl phthalate<br>Dioctyl phthalate<br>Sodium carbonate                                                                                                                                                       |

Table 269: Chemical resistance of the panel membrane

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

## 5 Viewing angles

The viewing angle information of the display types (R, L, U, D) can be seen in the technical data for the individual components.



## 6 Mounting compatibilities

This section describes the compatibility of the installation dimensions for the Power Panel 100/200, Power Panel 300/400, Power Panel 500, Automation Panel 900, Automation Panel 700 and Panel PC 800 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    |
| Power Panel 500      | PP500        |
| Automation Panel 900 | AP900        |
| Panel PC 700         | PPC700       |
| Panel PC 800         | PPC800       |

Table 270: Product abbreviations

### 6.1 Compatibility overview

The following table offers a brief overview of the devices PP100/200, PP300/400, PP500, AP900, PPC700 and PPC800. Detailed information can be found in the section 6.2 "Compatibility details" on page 316.

Compatibility between the device types is represented on each line by matching symbols.

| Size  | Format       | Compatible              | PP100/200 | PP300/400 | PP500 | AP900 | PPC700 | PPC800 |
|-------|--------------|-------------------------|-----------|-----------|-------|-------|--------|--------|
| 5.7"  | Horizontal1  | Outer dimensions        | ■         | ■         | ■     | -     | -      | -      |
|       |              | Installation dimensions | ●         | ●         | ●     | -     | -      | -      |
|       | Horizontal2  | Outer dimensions        | ■         | ■         | ■     | -     | -      | -      |
|       |              | Installation dimensions | ●         | ●         | ●     | -     | -      | -      |
|       | Vertical1    | Outer dimensions        | ■         | ■         | ■     | -     | -      | -      |
|       |              | Installation dimensions | ●         | ●         | ▲     | -     | -      | -      |
| 10.4" | Horizontal 1 | 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 | ●         | ●         | ▲     | ●     | ●      | -      |
| 17"   | Horizontal 1 | Outer dimensions        | -         | -         | -     | ■     | ■      | -      |
|       |              | Installation dimensions | -         | -         | -     | ▲     | ▲      | -      |
| 19"   | Horizontal 1 | Outer dimensions        | -         | -         | -     | ■     | ■      | -      |
|       |              | Installation dimensions | -         | -         | -     | ▲     | -      | -      |
| 21.3" | Horizontal 1 | Outer dimensions        | -         | -         | -     | ■     | -      | -      |
|       |              | Installation dimensions | -         | -         | -     | ▲     | -      | -      |

Table 271: Device compatibility overview

## 6.2 Compatibility details

### 6.2.1 Example

The measurement values (all in mm) in the following figures have the following meaning.

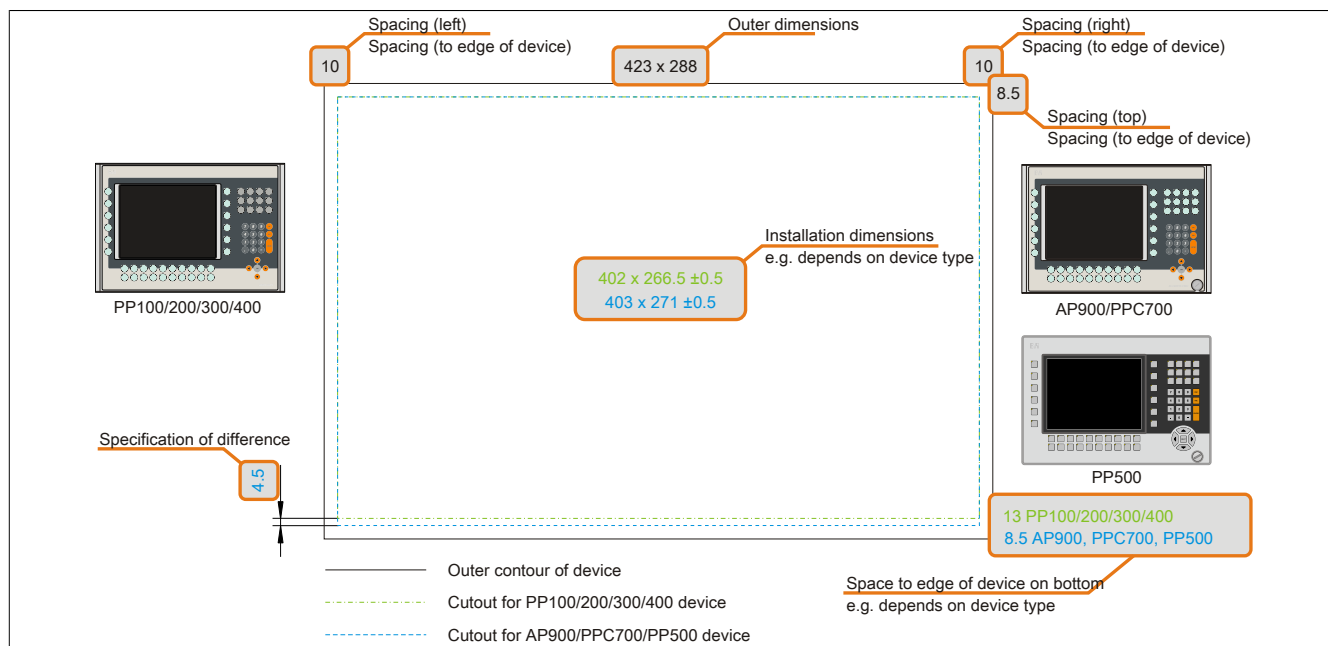


Image 195: Overview of compatibility figures

### 6.2.2 5.7" devices

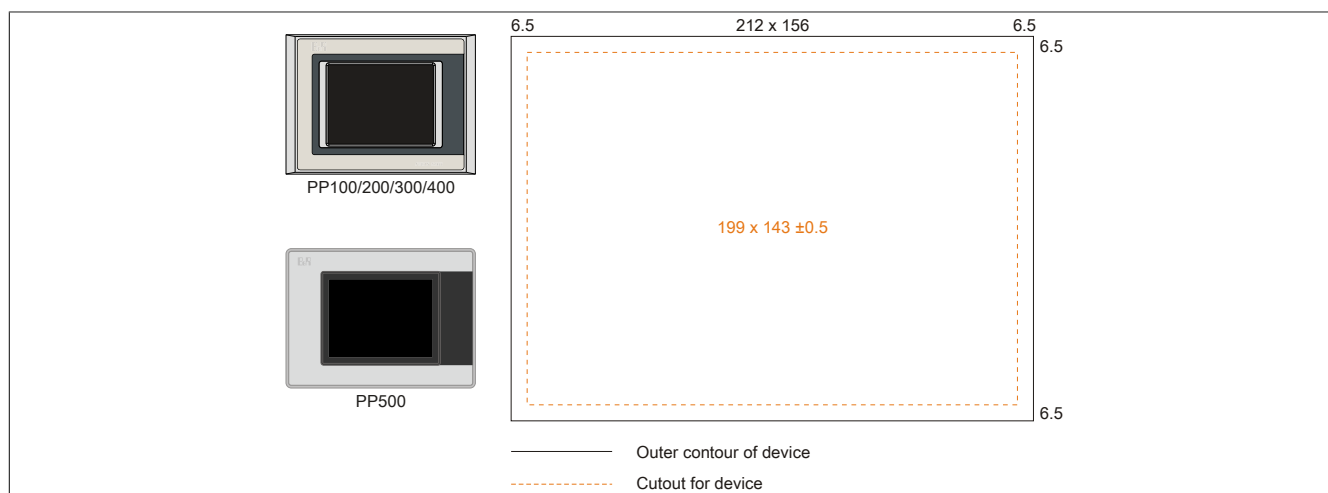


Image 196: Mounting compatibility - 5.7" device - Horizontal1

5.7" Power Panel 500, Power Panel 300/400 and Power Panel 100/200 devices in Horizontal1 format are 100% mounting compatible.



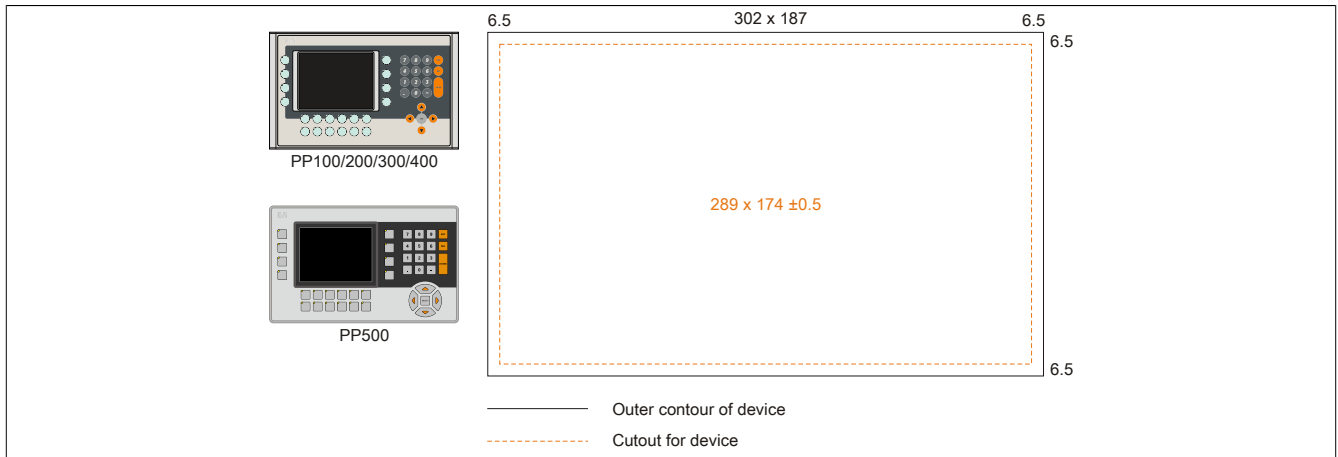


Image 197: Mounting compatibility - 5.7" device - Horizontal2

5.7" Power Panel 500, Power Panel 300/400 and Power Panel 100/200 devices in Horizontal2 format are 100% mounting compatible.

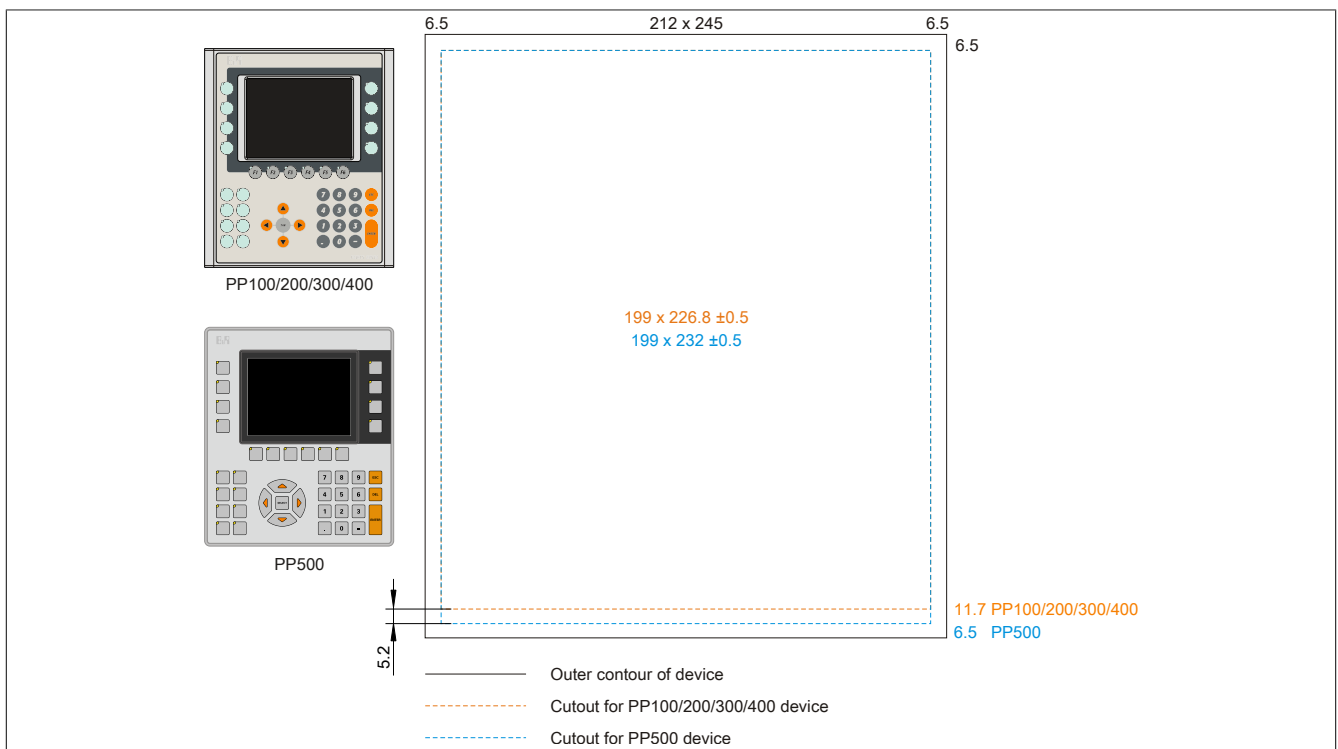


Image 198: Mounting compatibility - 5.7" device - Vertical1

5.7" Power Panel 500 devices are not 100% mounting compatible with Power Panel 300/400 and Power Panel 100/200 devices in Vertical1 format. The Power Panel 500 devices require a cutout that is 5.2 mm higher (bottom edge).

**The larger cutout can be used for all devices under certain conditions:**

- 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).

## 6.2.3 10.4" devices

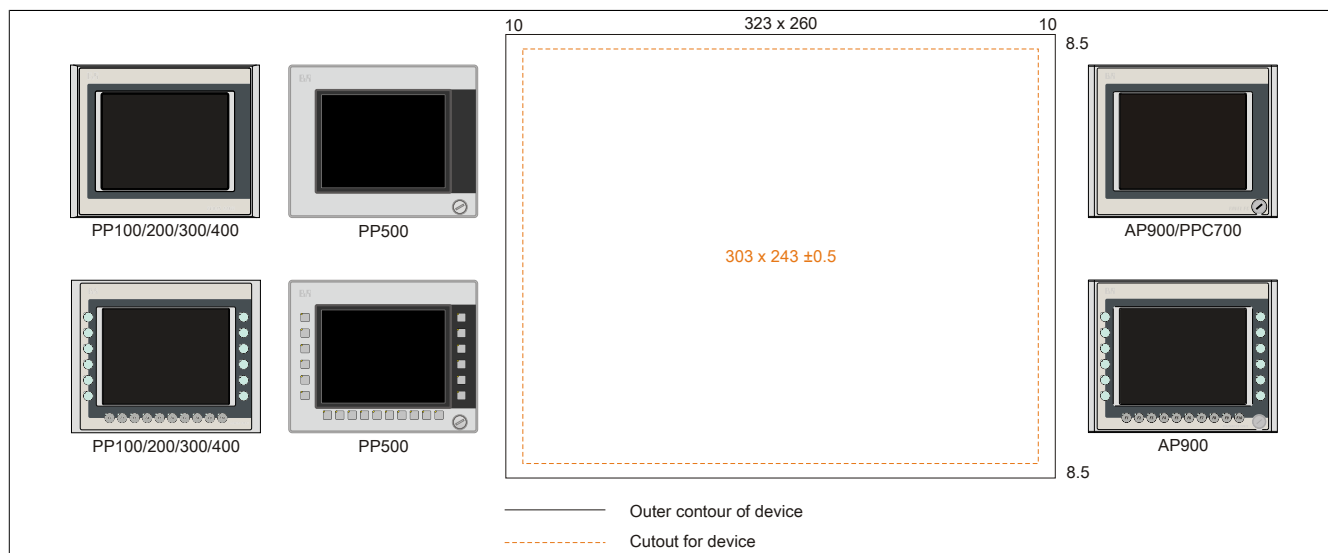


Image 199: Mounting compatibility - 10.4" device - Horizontal1

10.4" Power Panel 500, Power Panel 300/400 and Power Panel 100/200 devices in Horizontal1 format are 100% mounting compatible.

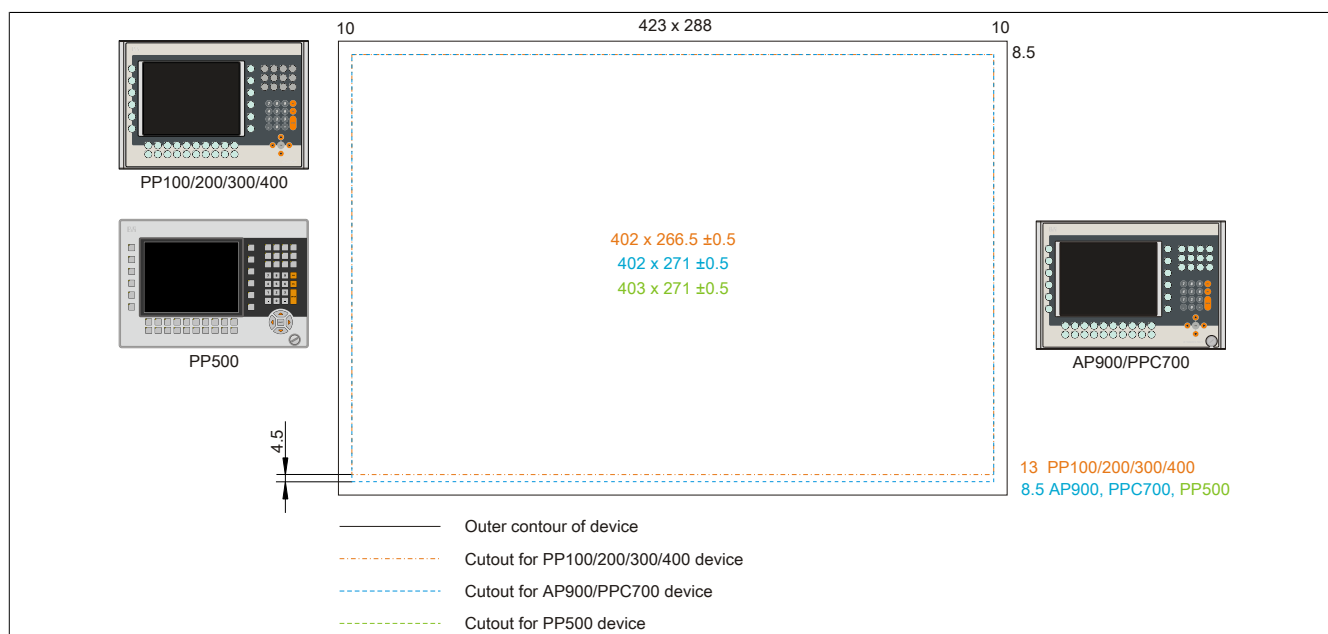


Image 200: Mounting compatibility - 10.4" device - Horizontal2

The 10.4" Power Panel 500, Automation Panel 900 and Panel PC 700 devices are not 100% mounting compatible with the Power Panel 300/400 or Power Panel 100/200 device format Horizontal2. The Power Panel 500, Automation Panel 900 and Panel PC 700 devices require a cutout that is 4.5 mm higher (bottom edge).

**The larger cutout can be used for all devices under certain conditions:**

- 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).

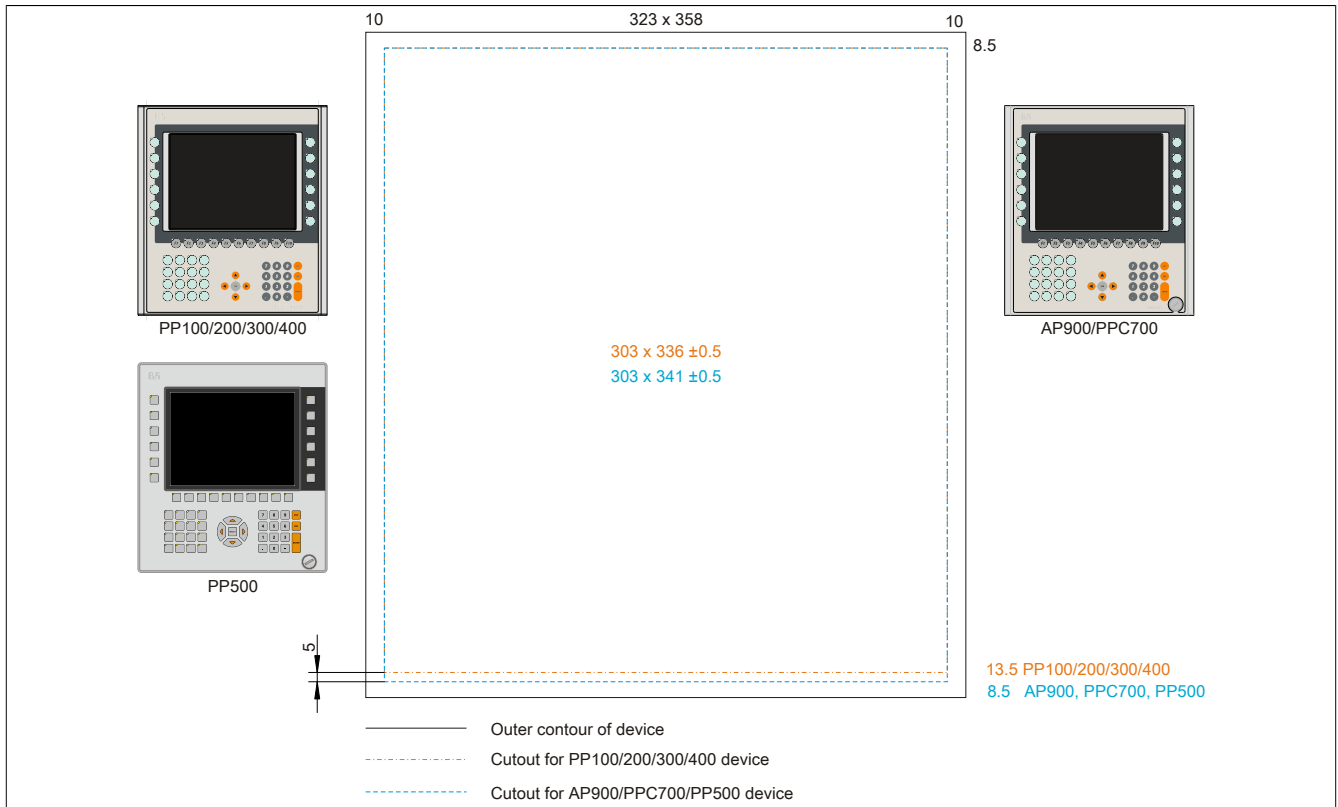


Image 201: Mounting compatibility - 10.4" device - Vertical1

The 10.4" Power Panel 500, Automation Panel 900 and Panel PC 700 devices are not 100% mounting compatible with the Power Panel 300/400 or Power Panel 100/200 device format Vertical1. The Power Panel 500, Automation Panel 900 and Panel PC 700 devices require a cutout that is 5 mm higher (bottom edge).

**The larger cutout can be used for all devices under certain conditions:**

- 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).

#### 6.2.4 12.1" devices

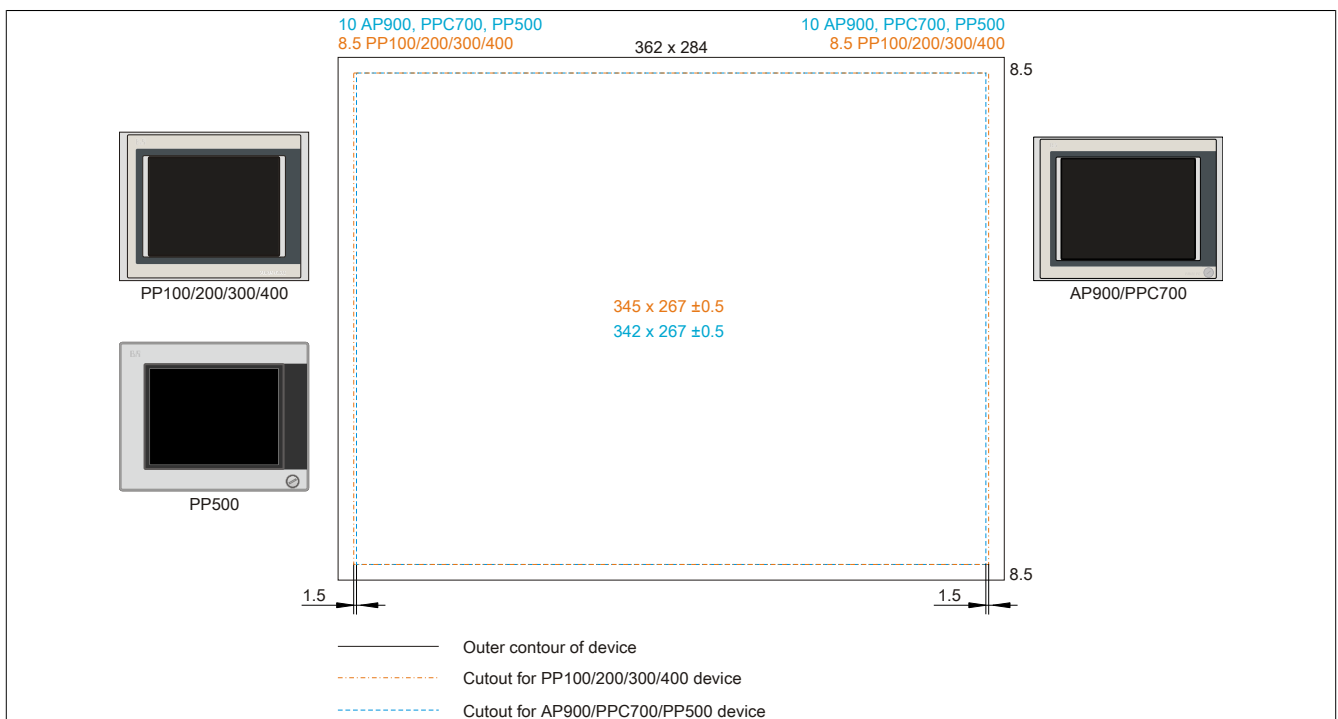


Image 202: Mounting compatibility - 12.1" device - Horizontal1

The 12.1" Power Panel 500, Automation Panel 900 and Panel PC 700 devices are not 100% mounting compatible with the Power Panel 300/400 or Power Panel 100/200 device format Horizontal1. The Power Panel 300/400 and Power Panel 100/200 devices require a cut that is 1.5 mm wider (left and right).

**The larger cutout can be used for all devices under certain conditions:**

- When mounting, make sure that the PP500, AP900 and PPC700 devices are mounted as close to the center of the cutout as possible.

### 6.2.5 15" devices

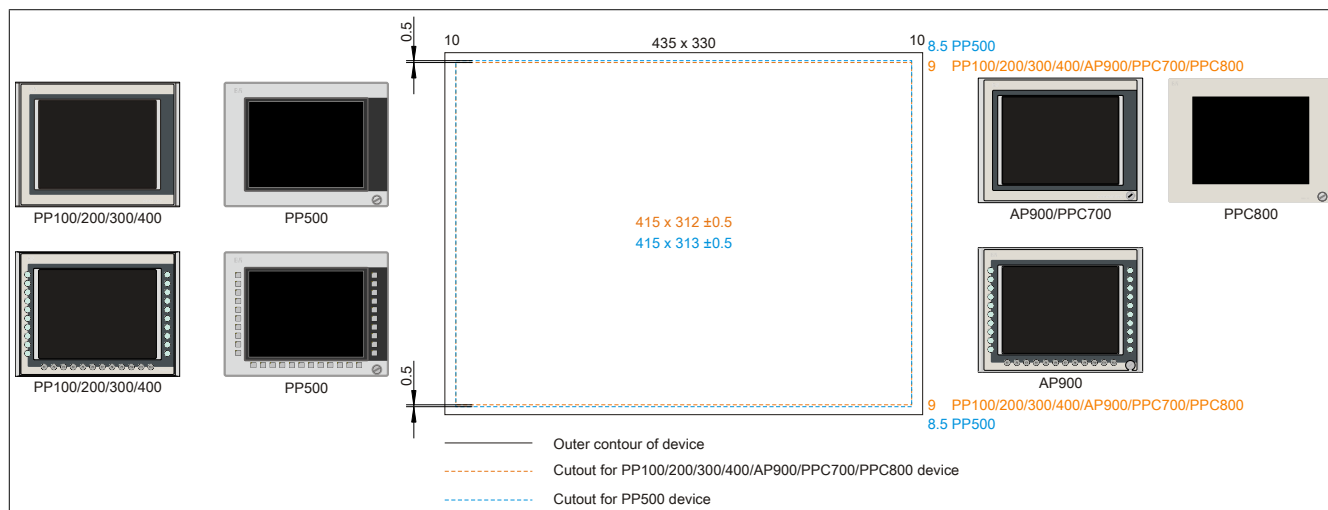


Image 203: Mounting compatibility - 15" device - Horizontal1

15" Power Panel 500 devices are not 100% mounting compatible with the Power Panel 300/400, Power Panel 100/200, Automation Panel 900, Panel PC 700 and Panel PC 800 device format Vertical1. The Power Panel 500 devices require a cutout that is 0.5 mm higher (top and bottom edge).

**The larger cutout can be used for all devices under certain conditions:**

- When mounting, make sure that the PP100/200/300/400, AP900, PPC700 and PPC800 devices are 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).

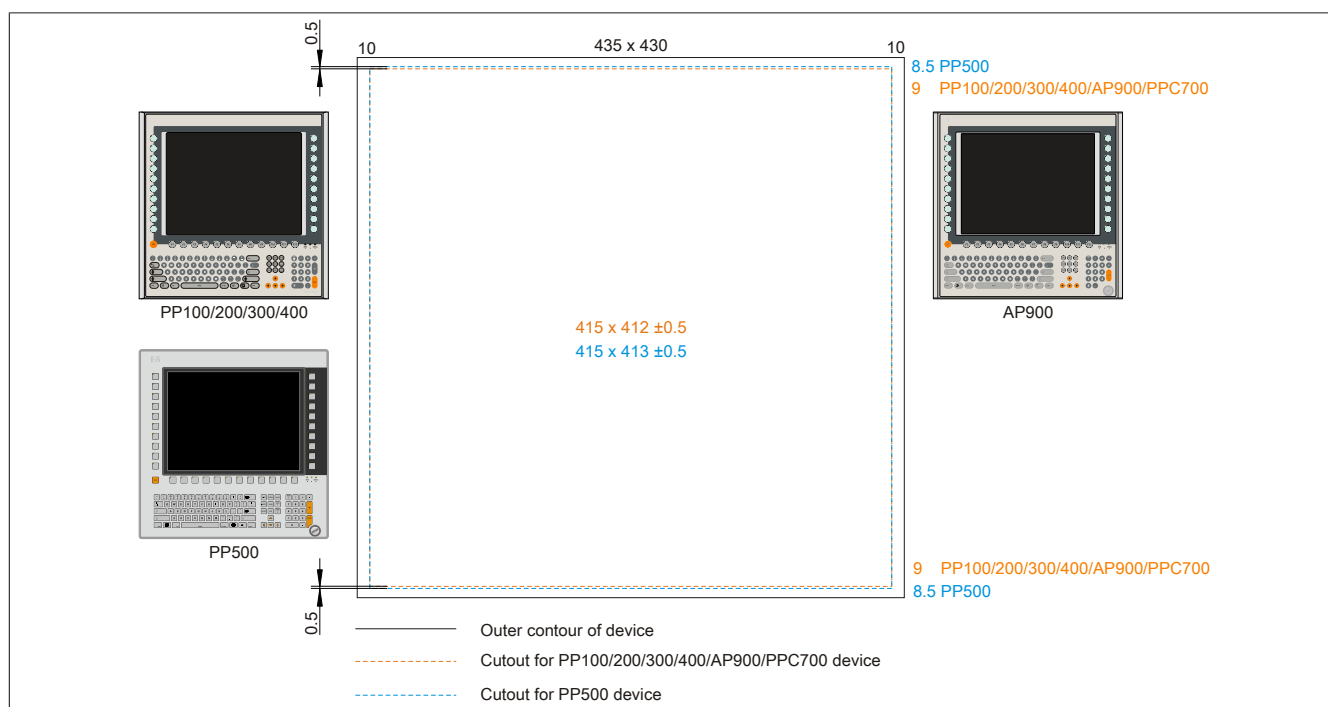


Image 204: Mounting compatibility - 15" device - Vertical1

15" Power Panel 500 devices are not 100% mounting compatible with the Power Panel 300/400, Power Panel 100/200, Automation Panel 900 and Panel PC 700 device format Vertical1. The Power Panel 500 devices require a cutout that is 0.5 mm higher (top and bottom edge).

**The larger cutout can be used for all devices under certain conditions:**

- When mounting, make sure that the PP100/200/300/400, AP900 and PPC700 devices are 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).

### 6.2.6 17" devices

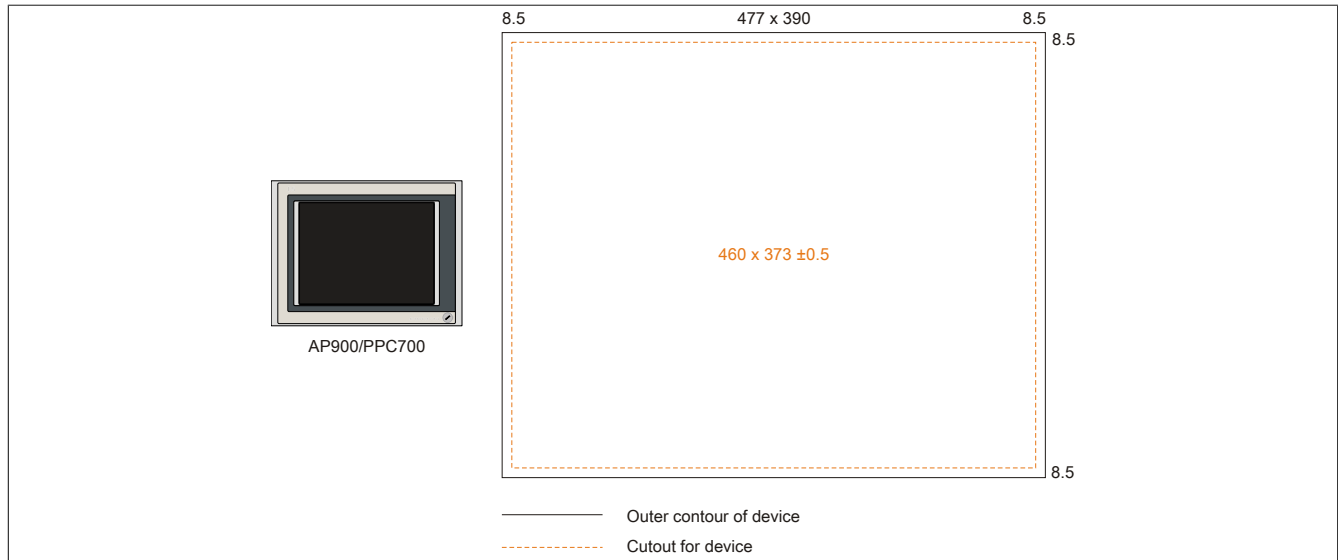


Image 205: Mounting compatibility - 17" device - Horizontal1

17" Automation Panel 900 and Panel PC 700 in Horizontal1 format are 100% mounting compatible.

### 6.2.7 19" devices

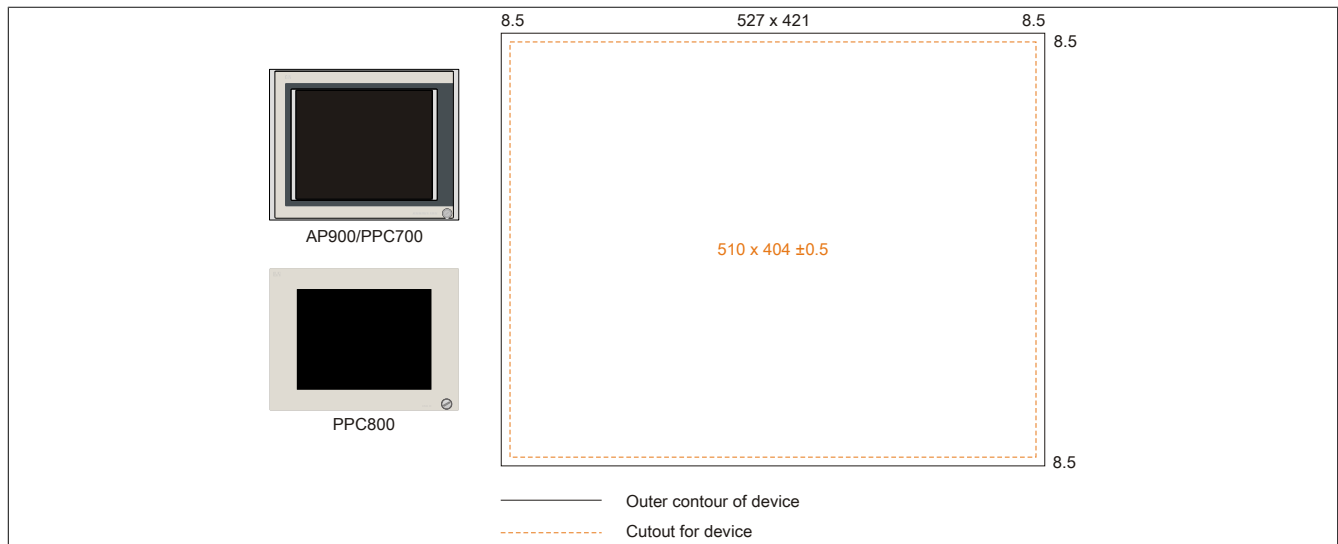


Image 206: Mounting compatibility - 19" device - Horizontal1

19" Automation Panel 900, Panel PC 700 and Panel PC 800 in Horizontal1 format are 100% mounting compatible.

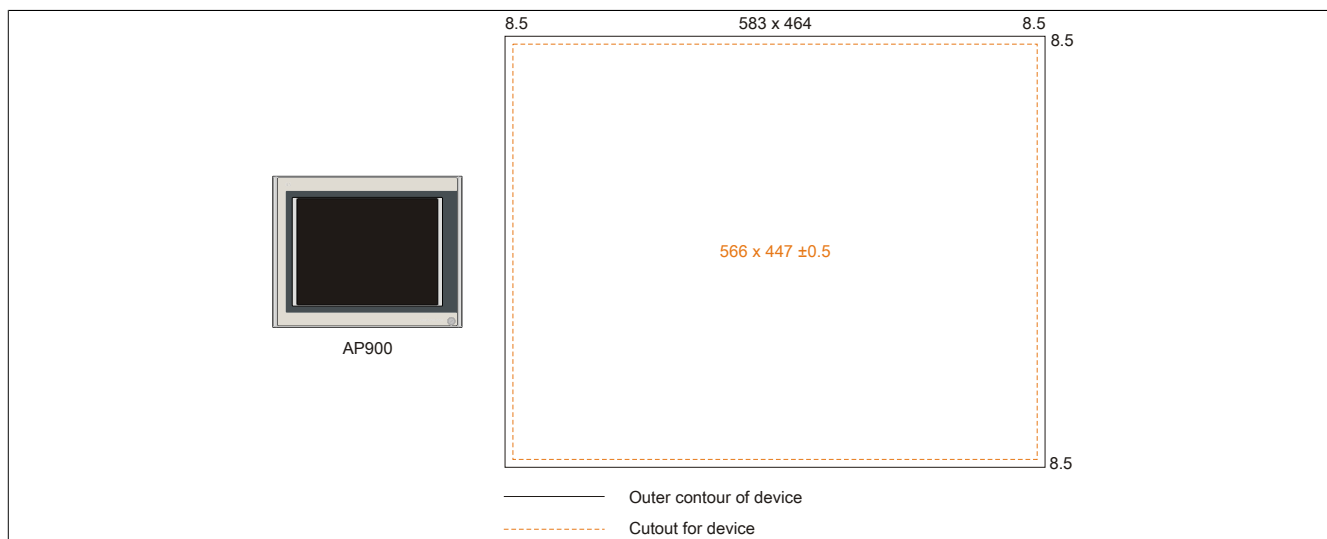
**6.2.8 21.3" devices**

Image 207: Mounting compatibility - 21.1" device - Horizontal1

## 7 Glossary

|                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Address</b>              | An address is a character string for identifying a memory location or a memory area, where data is stored and can be retrieved. It is also a symbol (e.g. with numerical controllers) for identifying a function unit for which subsequent geometrical or technological data are determined by the symbol.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Algorithms</b>           | <p>According to DIN 19226: Algorithms are a finite series of well-defined regulations. The desired output quantities are created from permitted system input quantities. It describes how something is to be done. A procedure must at least satisfy the following requirements to be valid as an algorithm in a mathematical context.</p> <p><i>Discreteness</i>: An algorithm is made up of a finite series of steps.</p> <p><i>Determinacy</i>: Under the same start conditions, it always creates the same end result.</p> <p><i>Clearness</i>: The series of steps is clearly defined.</p> <p><i>Finiteness</i>: It ends after a finite number of steps.</p> <p>From a quantity theory perspective, an algorithm is clearly defined by a set of sizes [input, intermediate and output sizes], a set of elementary operations and also by a regulation, which specifies when and in what sequence certain operations should be carried out. From a functional perspective, it transfers a set of input sizes into a set of output sizes. It can be represented in text form in a natural or artificial formal language or using graphic representations [graph, program flow chart, structured chart, Petri Nets etc.].</p> |
| <b>ANSI</b>                 | American National Standards Institute > this organization promotes and manages American industrial standards.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>APC</b>                  | Abbreviation for »Automation PC«                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Application software</b> | Software, which is not used for operation by the computer itself, but rather when a computer is used to process a concrete application problem. It sets up the system software and uses this for fulfilling individual tasks. Application software can be accommodated in standard software used by a large number of customers in a wide range of industries. Common examples are Word, Excel, PowerPoint, Paint, Matlab etc. Industrial software tailored to the respective problems of a certain industry and individual software created for solving the particular problems of an individual user.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Automation</b>           | According to Brockhaus: The application of technical means, using specific programs that (either partially or totally) do not require human intervention to perform operations.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Automation Runtime</b>   | A uniform runtime system for all B&R automation components.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Failure</b>              | Failure according to IEC 61508: A function unit loses the ability to perform a required function. In regards to safety-oriented systems, a distinction is made between dangerous and safe failures. This depends on whether the status of the system failure is considered dangerous or safe. The cause of the failure may be load related or age-related, and therefore a random failure, or related to a flaw inherent in the system. In this case, it is known as a systematic failure.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

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