Panel PC 800 with NM10 CPU board

User's Manual

Version: **1.05 (May 2013)**
Model no.: **MAPPC800B-ENG**

Chapter 1 • General information

1 Manual history

Version	Date	Change
0.10 Preliminary	19-Dec-12	• First version
1.00	12-Mar-13	• The section "BIOS options" on page 142 in the Chapter "Software" on page 142 was added and revised. • Updated the following drives: "5AC801.HDDI-04" on page 82, "5ACPCI.RAIC-06" on page 110, "5MMHDD.0500-00" on page 115 • General information about the drive "5ACPCI.RAIC-05" on page 107 and "5MMHDD.0250-00" on page 113 was updated.
1.05	15-May-13	• Added section "Hardware monitoring" on page 151 in Chapter 4 "Software". • Updated all technical data. • Section "Serial number sticker" on page 34 revised. • Updated add-on fuse kit "5AC600.UPSF-00" on page 231 and replacement fuses "5AC600.UPSF-01" on page 231 for the UPS battery unit. • Added drive "5AC801.SSDI-03" on page 91. • Updated replacement SSDs "5MMSSD.0060-00" on page 93, "5MMSSD.0060-01" on page 95 and "5MMSSD.0180-00" on page 97. • Updated technical data for HDD "5AC801.HDDI-04" on page 82.

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 "Electrical components with a 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 applies in addition to the points listed under "Electrical components with a housing":

- Any persons handling electrical components or devices with installed electrical components 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. If the programmable control system, operating/monitoring device or uninterruptible power supply fails, the user is responsible for ensuring that other connected devices, e.g. motors, are brought to a secure state.

When using programmable logic controllers or operating/monitoring devices as control systems together with a Soft PLC (e.g. B&R Automation Runtime or comparable product) or Slot PLC (e.g. B&R LS251 or comparable product), safety precautions relevant 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 the installation, commissioning and servicing of devices are only permitted to be carried out by qualified personnel. Qualified personnel are those familiar with the transport, mounting, installation, commissioning and operation of of devices 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 Installation

- 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 sections, 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, it is necessary for certain parts to carry dangerous voltage levels 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 or the uninterruptible power supply, the housing must be properly grounded (PE rail). Ground connections must be established even when testing or operating operating/monitoring devices or the uninterruptible power supply for 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 (e.g. cutout installations) operating/monitoring devices like the Automation Panel or Power Panel are protected on the front. The back of all devices must be protected from dust and humidity and cleaned at suitable intervals.

2.6.3 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 disposal

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 Operating/monitoring devices Uninterruptible power supply Batteries and rechargeable batteries 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.

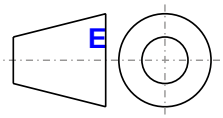
3 Organization of safety notices

Safety notices in this manual are organized as follows:

Safety notice	Description
Danger!	Disregarding these safety guidelines and notices can be life-threatening.
Warning!	Disregarding these safety guidelines and notices can result in severe injury or substantial damage to equipment.
Caution!	Disregarding these safety guidelines and notices can result in injury or damage to equipment.
Information:	This information is important for preventing errors.

Table 3: Description of the safety notices used in this documentation

4 Guidelines



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

All dimensions are specified in mm.

Range of nominal sizes	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: Range of nominal sizes

5 Overview

Product ID	Short description	on page
	24 VDC UPS modules	
9A0100.11	UPS 24 VDC, 24 VDC input, 24 VDC output, serial interface	232
	Accessories	
5AC900.1201-00	USB interface cover M20 IP65 flat	222
5AC900.1201-01	USB interface cover M20 IP65 curved	222
5AC900.BLOC-00	Terminal block with brackets, 10 pcs.; replacement part	223
5ACPCI.ETH1-01	PCI Ethernet card 1x 10/100	234
5ACPCI.ETH3-01	PCI Ethernet card 3x 10/100	237
5CAMSC.0001-00	Internal supply cable	266
9A0003.02U	USB port button holder DS9490B	199
	Adapter	
5AC803.BC01-00	PPC800 adapter: 1 compact PCI Express.	70
5AC803.BC02-00	PPC800 adapter: 1 compact slide-in.	70
	Automation Runtime	
1A4600.10-2	B&R Automation Runtime ARwin, ARNC0	199
1A4600.10-3	B&R Automation Runtime ARwin+PVIControls incl. license sticker and copy protection	199
1A4600.10-4	B&R Automation Runtime ARwin+ARNC0+PVIControls	199
	Batteries	
0AC201.91	Lithium batteries 4 pcs., 3 V / 950 mAh button cell We hereby 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	218
4A0006.00-000	Lithium battery, 3 V / 950 mAh, button cell	218
	Battery units	
9A0100.12	UPS battery unit type A, 24 V, 7 Ah, incl. battery cage	232
9A0100.14	UPS battery unit type B, 24 V, 2.2 Ah, incl. battery cage	232
9A0100.16	UPS battery unit type C, 24 V, 4.5 Ah, incl. battery cage	232
	Bus units	
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, 1 slide-in slot.	68
5AC803.BX02-01	PPC800 bus: 1 PCI, 1 PCI Express, 1 slide-in slot.	68
	CPU boards	
5PC800.CCAX-00	Intel Atom N2800 CPU board, 1.86 GHz, dual-core, 533 MHz FSB, 1 MB L2 cache; NM10 chipset; 1 socket for SO-DIMM DDR3 module	59
	CompactFlash	
5CFCRD.0064-03	CompactFlash 64 MB Western Digital (SLC)	246
5CFCRD.0128-03	CompactFlash 128 MB Western Digital (SLC)	246
5CFCRD.016G-06	CompactFlash 16 GB B&R (SLC)	242
5CFCRD.0256-03	CompactFlash 256 MB Western Digital (SLC)	246
5CFCRD.032G-06	CompactFlash 32 GB B&R (SLC)	242
5CFCRD.0512-03	CompactFlash 512 MB Western Digital (SLC)	246
5CFCRD.0512-06	CompactFlash 512 MB B&R (SLC)	242
5CFCRD.1024-03	CompactFlash 1 GB Western Digital (SLC)	246
5CFCRD.1024-06	CompactFlash 1 GB B&R (SLC)	242
5CFCRD.2048-03	CompactFlash 2 GB Western Digital (SLC)	246
5CFCRD.2048-06	CompactFlash 2 GB B&R (SLC)	242
5CFCRD.4096-03	CompactFlash 4 GB Western Digital (SLC)	246
5CFCRD.4096-06	CompactFlash 4 GB B&R (SLC)	242
5CFCRD.8192-03	CompactFlash 8 GB Western Digital (SLC)	246
5CFCRD.8192-06	CompactFlash 8 GB B&R (SLC)	242
	Drives	
5AC801.ADAS-00	SATA hard disk adapter for operating a slide-in compact hard disk in a slide-in slot	99
5AC801.DVDS-00	DVD-ROM slide-in SATA drive.	102
5AC801.DVRS-00	DVD-R/RW DVD+R/RW slide-in SATA drive.	104
5AC801.HDDI-00	40 GB slide-in compact SATA hard disk; 24/7 operation with extended temperature range. Note: Please see the manual for information about using this hard disk.	78
5AC801.HDDI-03	250 GB slide-in compact SATA hard disk, 24/7 operation. Note: Please see the manual for information about using this hard disk.	80
5AC801.HDDI-04	500 GB SATA hard disk (slide-in compact); 24/7 hard disk. Note: Please see the manual for information about using this hard disk.	82
5AC801.HDDS-00	40 GB slide-in SATA hard disk; 24/7 operation with extended temperature range. Note: Please see the manual for information about using this hard disk.	100
5AC801.SSDI-00	32 GB slide-in compact SATA SSD (SLC).	84
5AC801.SSDI-01	60 GB slide-in compact SATA SSD (MLC).	87
5AC801.SSDI-02	180 GB slide-in compact SATA SSD (MLC).	89
5AC801.SSDI-03	60 GB slide-in compact SATA SSD (MLC).	91
5ACPCI.RAIC-05	PCI RAID system SATA 2x 250 GB; Note: Please see the manual for information about using this hard disk.	107
5ACPCI.RAIC-06	PCI RAID system SATA 2x 500 GB; Note: Please see the manual for information about using this hard disk.	110
5MMHDD.0250-00	250 GB SATA hard disk replacement part for 5AC801.HDDI-03 and 5ACPCI.RAIC-05; Note: Please see the manual for information about using this hard disk.	113
5MMHDD.0500-00	500 GB SATA hard disk replacement part for 5AC801.HDDI-04, 5AC901.CHDD-01 and 5ACPCI.RAIC-06; Note: Please see the manual for information about using this hard disk.	115

Product ID	Short description	on page
5MMSSD.0060-00	60 GB SATA SSD (MLC); replacement part for 5AC801.SSDI-01 and 5AC901.CSSD-01; SSD for 5PP5IO.GMAC-00; note: Please see the manual for information about using this SSD.	93
5MMSSD.0060-01	60 GB SATA SSD (MLC); replacement part for 5AC801.SSDI-03 and 5AC901.CSSD-03; SSD for 5PP5IO.GMAC-00; note: Please see the manual for information about using this SSD.	95
5MMSSD.0180-00	180 GB SATA SSD (MLC); replacement part for 5AC801.SSDI-02 and 5AC901.CSSD-02; SSD for 5PP5IO.GMAC-00; note: Please see the manual for information about using this SSD.	97
	Expansions	
5AC803.SX01-00	PPC800 expansion; 1 PCI/PCI Express and 1 slide-in slot (bus 5AC803.BX01-00 or 5AC803.BX01-01 required)	63
5AC803.SX02-00	PPC800 expansion; 2 PCI/PCI Express and 1 slide-in slot (bus 5AC803.BX02-00 or 5AC803.BX02-01 required)	63
	Fan kits	
5AC803.FA01-00	PPC800 fan kit for system units without an expansion	117
5AC803.FA02-00	PPC800 fan kit for system units with expansion 5AC803.SX01-00	118
5AC803.FA03-00	PPC800 fan kit for system units with expansion 5AC803.SX02-00	120
	Heat sinks	
5AC803.HS00-04	PPC800 heat sink for CPU board with Atom dual-core processor N2800.	61
	Interface cards	
5ACPCC.ETH0-00	Compact PCIe Ethernet card 1x 10/100/1000	72
5ACPCC.MPL0-00	PCIec POWERLINK card, 2 POWERLINK interfaces, 512 kB SRAM	74
	MS-DOS	
9S0000.01-010	OEM Microsoft MS-DOS 6.22, German disks, only supplied together with a new PC.	191
9S0000.01-020	OEM Microsoft MS-DOS 6.22, English disks, only supplied together with a new PC.	191
	Main memory for GM45 CPU boards	
5MMDDR.2048-02	SO-DIMM DDR3 RAM 2048 MB PC3-8500	62
5MMDDR.4096-02	SO-DIMM DDR3 RAM 4096 MB PC3-8500	62
	Miscellaneous	
5AC900.1000-00	Adapter DVI (plug) to CRT (socket). For connecting a standard monitor to a DVI-I interface.	221
	Other	
5SWHMI.0000-00	HMI Drivers & Utilities DVD	260
	RS232 cable	
9A0014.02	RS232 extension cable for remote operation of a display unit with touch screen, 1.8 m	264
9A0014.05	RS232 extension cable for remote operation of a display unit with touch screen, 5 m	264
9A0014.10	RS232 extension cable for remote operation of a display unit with touch screen, 10 m	264
	Replacement batteries	
9A0100.13	UPS batteries type A (replacement part), 2x 12 V, 7 Ah, for battery unit 9A0100.12	232
9A0100.15	UPS batteries type B (replacement part), 2x 12 V, 2.2 Ah, for battery unit 9A0100.14	232
9A0100.17	UPS batteries type C (replacement part), 2x 12 V, 4.5 Ah, for battery unit 9A0100.16	232
	System units	
5PC820.1505-00	Panel PC 820 15" XGA 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 CompactPCI Express and compact slide-in slot; IP65 protection (front side); order 24 VDC plug for supply voltage separately (screw clamp: 0TB103.9; cage clamp: 0TB103.91).	47
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 CompactPCI Express and compact slide-in slot; IP65 protection (front side); order 24 VDC plug for supply voltage separately (screw clamp: 0TB103.9; cage clamp: 0TB103.91).	53
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, 3.31 mm² screw clamp, protected against vibration by the screw flange	220
0TB103.91	Connector, 24 VDC, 3-pin female, 3.31 mm² cage clamp, protected against vibration by the screw flange	220
	USB accessories	
5A5003.03	Front cover, for Remote CD-ROM drive 5A5003.02 and USB 2.0 drive combination 5MD900.USB2-00, 5MD900.USB2-01 and 5MD900.USB2-02.	258
5MD900.USB2-02	USB 2.0 drive combination, consists of DVD-R/RW DVD+R/RW, CompactFlash slot (Type II), USB connection (Type A on the front, Type B on the back); 24V DC (order screw clamp terminal 0TB103.9 or cage clamp terminal 0TB103.91 separately)	254
5MMUSB.2048-00	USB 2.0 flash drive, 2048 MB	250
5MMUSB.2048-01	USB 2.0 flash drive, 2048 MB, B&R	252
	USB cable	
5CAUSB.0018-00	USB 2.0 connection cable type A - type B, 1.8 m.	263
5CAUSB.0050-00	USB 2.0 connection cable type A - type B, 5 m.	263
	Uninterruptible power supplies	
5AC600.UPSB-00	Battery unit 5 Ah; or APC620, APC810 or PPC800 UPS.	227
5AC600.UPSF-00	UPS fuse kit for battery unit 5AC600.UPSB-00 up to revision D0.	231
5AC600.UPSF-01	UPS fuse, 5 pcs.	231
5AC600.UPSI-00	UPS module for APC620, APC810, PPC800; for system units 5PC600.SX01-00 (beginning with rev. H0), 5PC600.SX02-00 (beginning with rev. G0), 5PC600.SX02-01 (beginning with rev. H0), 5PC600.SX05-00 (beginning with rev. F0), 5PC600.SX05-01 (beginning with rev. F0), 5PC600.SF03-00 (beginning with rev. A0), 5PC810.SX*. 5PC820.1505-00, 5PC820.1906-00. Order cable (5CAUPS.0005-00 or 5CAUPS.0030-00) and battery unit (5AC600.UPSB-00) separately.	225
5CAUPS.0005-00	UPS cable 0.5 m; for UPS 5AC600.UPSI-00.	230
5CAUPS.0030-00	UPS cable 3 m; for UPS 5AC600.UPSI-00.	230
	Windows 7 Professional/Ultimate	
5SWWI7.1100-ENG	Microsoft OEM Windows 7 Professional 32-bit, Service Pack 1, DVD, English. Only available with a new device.	193
5SWWI7.1100-GER	Microsoft OEM Windows 7 Professional 32-bit, Service Pack 1, DVD, German. Only available with a new device.	193
5SWWI7.1300-MUL	Microsoft OEM Windows 7 Ultimate 32-bit, Service Pack 1, DVD, multilingual. Only available with a new device.	193
	Windows Embedded Standard 2009	
5SWWXP.0739-ENG	Microsoft OEM Windows Embedded Standard 2009, English; for PPC800 with NM10 chipset; order CompactFlash separately (min. 1 GB)	195

Product ID	Short description	on page
	Windows Embedded Standard 7	
5SWWI7.1539-ENG	Microsoft OEM Windows Embedded Standard 7 32-bit, Service Pack 1, English; for PPC800 with NM10 chipset; order CompactFlash separately (at least 16 GB).	197
5SWWI7.1739-MUL	Microsoft OEM Windows Embedded Standard 7 Premium 32-bit, Service Pack 1, Multilanguage; for PPC800 with NM10 chipset; order CompactFlash separately (min. 16 GB).	197
	Windows XP Professional	
5SWWXP.0600-ENG	Microsoft OEM Windows XP Professional Service Pack 3, CD, English. Only available with a new device.	192
5SWWXP.0600-GER	Microsoft OEM Windows XP Professional Service Pack 3, CD, German. Only available with a new device.	192
5SWWXP.0600-MUL	Microsoft OEM Windows XP Professional Service Pack 3, CD, Multilanguage. Only available with a new device.	192
	Windows-based Runtime	
1A4600.10	B&R Automation Runtime ARwin, incl. license sticker and copy protection	199

Chapter 2 • Technical data

1 Introduction

The Panel PC 800 covers a wide performance range from efficient Intel Atom N2800 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 - Atom N2800 (dual core)
- Up to 4GB main memory
- 2 CompactFlash slots (type I)
- Expandable expansion with 1 or 2 slots for PCI / PCI Express (PCIe) cards and a slide-in drive slot
- 1 optional PCIec (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-UEFI)
- Real-time clock (RTC, battery-backed)
- Easy slide-in drive replacement (SATA hot plugging)
- 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
- Drive (mass storage device such as CompactFlash card or hard disk) for the operating system
- Software

1.2.1 Base system configuration

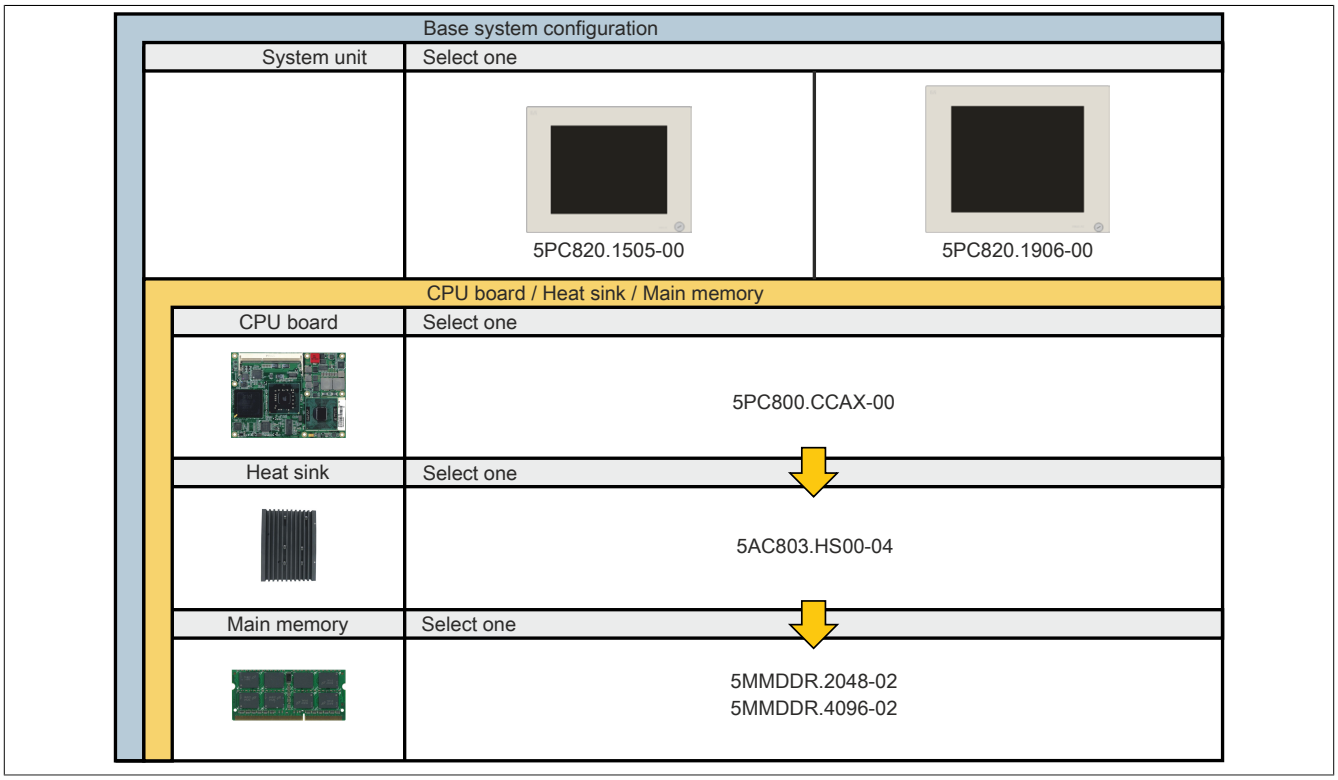


Figure 1: Base system configuration

1.2.2 Accessory and software configuration

Accessory and software configuration			
Configuration of a system unit with adapter			
Adapters[1]	Select one or both		
	5AC803.BC01-00		5AC803.BC02-00
	PCIec plug-in cards, select 1		Slide-in compact drives, select 1
	5ACPCC.ETH0-00 (PCIec Ethernet Card 10/100/1000) 5ACPCC.MPL0-00 (PCIec POWERLINK MN 2-port)		5AC801.HDDI-00 (40 GB) 5AC801.HDDI-03 (250 GB) 5AC801.HDDI-04 (500 GB) 5AC801.SSDI-00 (32 GB) 5AC801.SSDI-01 (60 GB) 5AC801.SSDI-02 (180 GB) 5AC801.SSDI-03 (60 GB)
Configuration of a system unit with expansion			
Expansion	No expansion	1x PCI/PCIe + 1x slide-in slot	2x PCI/PCIe + 1x slide-in slot
		5AC803.SX01-00	5AC803.SX02-00
Bus units		Select one	Select one
		5AC803.BX01-00 5AC803.BX01-01	5AC803.BX02-00 5AC803.BX02-01
Fan kit	Select one		
	5AC803.FA01-00	5AC803.FA02-00	5AC803.FA03-00
Slide-in drives		Select one	
		5AC801.HDDS-00 (40 GB) 5AC801.DVDS-00 (DVD drive) 5AC801.DVRS-00 (DVD writer) 5AC801.ADAS-00 (adapter)	
RAID system		Select one	
		5ACPCI.RAIC-05 (2x 250 GB, uses 1 PCI slot) 5ACPCI.RAIC-06 (2x 500 GB, uses 1 PCI slot) 5MMHDD.0250-00 (replacement SATA-HDD 250 GB) 5MMHDD.0500-00 (replacement SATA-HDD 500 GB)	
CompactFlash	Select one		
	5CFCRD.0512-06, 5CFCRD.1024-06, 5CFCRD.2048-06, 5CFCRD.4096-06, 5CFCRD.8192-06, 5CFCRD.016G-06, 5CFCRD.032G-06	5CFCRD.0064-03, 5CFCRD.0128-03, 5CFCRD.0256-03, 5CFCRD.0512-03, 5CFCRD.1024-03, 5CFCRD.2048-03, 5CFCRD.4096-03, 5CFCRD.8192-03	
UPS battery	Select one		
	5AC600.UPSI-00 (add-on UPS module), 5AC600.UPSB-00 (UPS battery unit) Connection cable: 5CAUPS.0005-00 (0.5 meters) or 5CAUPS.0030-00 (3 meters)		
Supply voltage plug	Select one		
	0TB103.9 (screw clamps) 0TB103.91 (cage clamps)		
Software	Select one		
	Windows XP 5SWWXP.0600-ENG 5SWWXP.0600-GER 5SWWXP.0600-MUL **Windows 7** 5SWWI7.1100-ENG 5SWWI7.1100-GER 5SWWI7.1300-MUL	**Windows Embedded Standard 2009** 5SWWXP.0739-ENG **Windows Embedded Standard 7** 5SWWI7.1539-ENG 5SWWI7.1739-MUL	**Microsoft DOS** 9S0000.01-010 9S0000.01-020

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

Figure 2: Accessory and software configuration

2 Fully assembled 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 and without a fan kit have been determined under worst-case conditions. Experience has shown that higher ambient temperatures can be reached in typical applications, e.g. those in Microsoft Windows. Testing and evaluation must be performed on-site by the user (temperatures can be read in BIOS or with the B&R Control Center).**

Information regarding worst-case conditions

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

What must be considered when determining the maximum ambient temperature?

- Operating the fully assembled device with or without fan kit

2.1.1 Maximum ambient temperatures

Information:

Only specified mounting orientations are permitted. See chapter "Installation", section "Mounting orientation" on page 122.

	All temperature values in degrees Celsius (°C) at 500 m above sea level. The maximum ambient temperature is typically derated by 1°C per 1000 meters (starting at 500 meters above sea level).	Operation without Fan kit 5PC800.CCAX-00	Operation where Fan kit 5PC800.CCAX-00	Temperature limits	Location of sensor(s)
	Maximum ambient temperature	**50**	**60**		
	What else can also be operated at the max. ambient temperature, or are there any limits?				
Slide-in compact drives	Onboard CompactFlash[1)]	✓	✓	80	Board Power
	5AC801.HDDI-00	✓	✓	80	
	5AC801.HDDI-03	45	50	60	
	5AC801.HDDI-04	45	50	60	
	5AC801.SSDI-00	✓	✓	70	
	5AC801.SSDI-01	✓	✓	70	
	5AC801.SSDI-02	✓	✓	70	
	5AC801.SSDI-03	✓	✓	70	
Slide-in drives	5AC801.HDDS-00	✓	✓	80	Slide-in Drive 1
	5AC801.DVDS-00	✓	50	50	
	5AC801.DVRS-00	✓	50	50	
Main memory	5MMDDR.2048-02	✓	✓	-	
	5MMDDR.4096-02	✓	✓	-	
System units	5PC820.1505-00	✓	✓	80	Power supply
	5PC820.1906-00	45	50	80	
Additional insert cards PCIec / PCI card slot	5ACPCC.ETH0-00	✓	✓	-	Additional insert cards
	5ACPCC.MPL0-00	✓	✓	-	
	5ACPCI.RAIC-05 (24 hours / standard)	45	50	-	
	5ACPCI.RAIC-06 (24 hours / standard)	45	50	-	

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

Table 5: Ambient temperatures

2.1.1.1 How is the maximum ambient temperature determined?

1. The CPU board is selected (i.e. operation with or without a fan kit).
2. The "Maximum ambient temperature" row shows the maximum ambient temperature for the fully assembled device, including the respective CPU board.

Information:

Maximum temperature data is for operation at 500 meters. The maximum ambient temperature is typically 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 "✓" next to the component, it can be used at the maximum ambient temperature of the fully assembled device without problems.

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

2.1.2 Minimum ambient temperatures

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 Temperature monitoring

Sensors monitor temperature values at various places in the PPC800 (board I/O, board ETH2, board power, power supply, slide-in drive 1, IF slot). The location of the temperature sensors can be seen in "Figure 3: Temperature sensor locations" on page 25. 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[1)] 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.

In addition, 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, e.g. temperature, using software (such as HDD Thermometer, a freeware program) on approved Microsoft operating systems (except Windows CE).

2.1.4 Temperature sensor locations

Sensors monitor temperature values at many different locations 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[2)].

For applications that don't use Windows, the temperatures can be evaluated using the B&R implementation guide. In addition to the implementation guide, there are also programs available in MS-DOS.

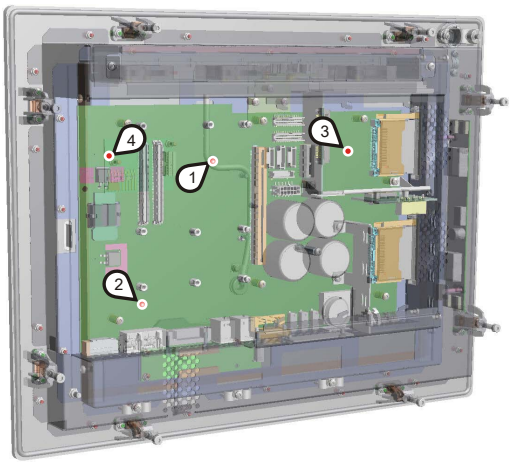


Figure 3: Temperature sensor locations

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 mainboard)	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 PCIec slot; the sensor is located directly on the plug-in card.	Depending on the plug-in cards used

Table 6: Temperature sensor locations

1) The measured temperature approximates the immediate ambient temperature, but can be influenced by neighboring components.
2) The ADI driver containing the B&R Control Center is available in the Downloads section of the B&R website (www.br-automation.com).

2.2 Humidity specifications

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

Component		Operation	Storage / Transport
CPU boards NM10 COM Express		10 to 90%	5 to 95%
Main memory for CPU boards		10 to 90%	5 to 95%
Slide-in compact drives	5AC801.HDDI-00	5 to 90%	5 to 95%
	5AC801.HDDI-03	5 to 95%	5 to 95%
	5AC801.HDDI-04	5 to 95%	5 to 95%
	5AC801.SSDI-00	5 to 95%	5 to 95%
	5AC801.SSDI-01	5 to 95%	5 to 95%
	5AC801.SSDI-02	5 to 95%	5 to 95%
	5AC801.SSDI-03	8 to 95%	8 to 95%
Slide-in drives	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-05 (24 hours / standard)	5 to 95%	5 to 95%
	5ACPCI.RAIC-06 (24 hours / standard)	5 to 95%	5 to 95%
	5MMHDD.0250-00 (24 hours / standard)	5 to 95%	5 to 95%
	5MMHDD.0500-00 (24 hours / standard)	5 to 95%	5 to 95%
Accessories	5CFCRD.xxxx-06 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%
	5MD900.USB2-02 USB media drive	20 to 80%	5 to 90% / 5 to 95%

Table 7: Overview of humidity specifications for individual components

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

2.3 Power management

2.3.1 Supply voltage block diagram

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

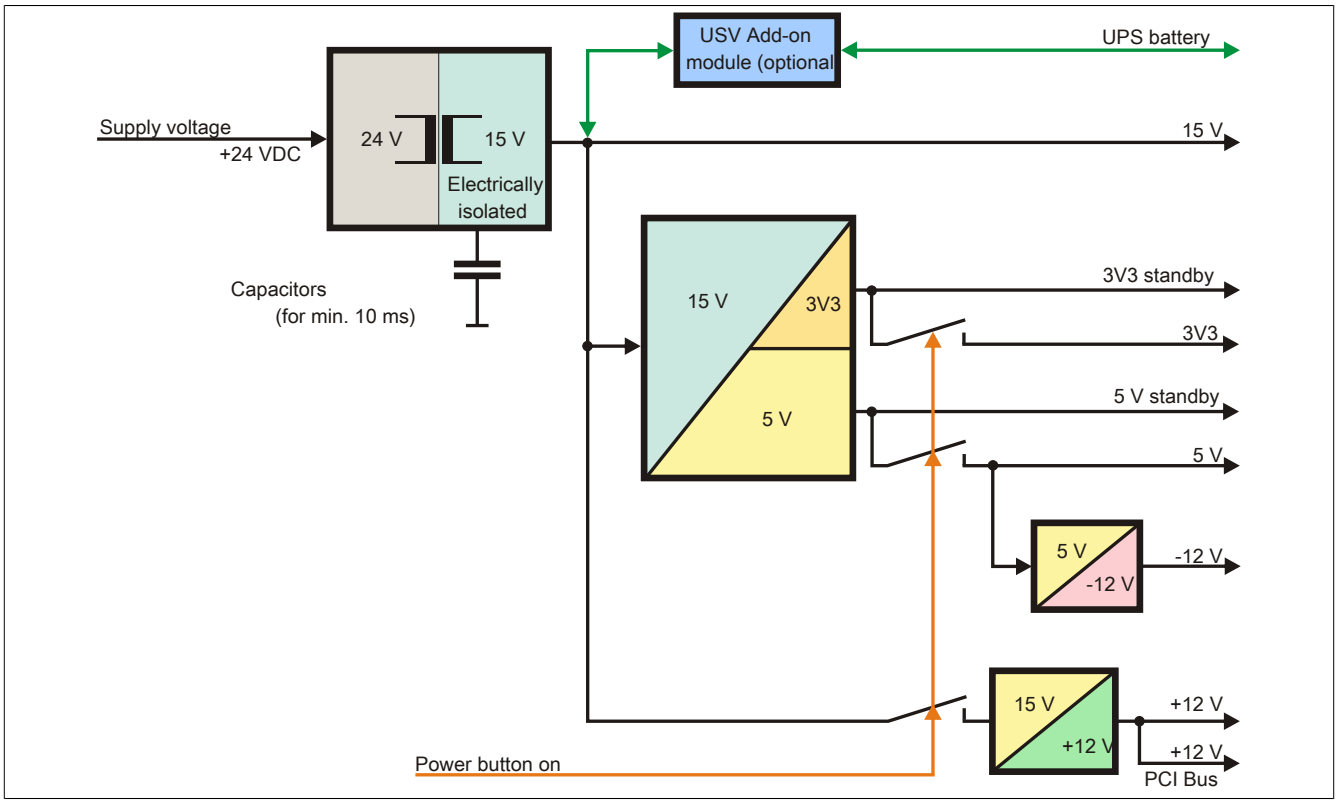


Figure 4: Supply voltage block diagram

Description

15 V is generated from the supply voltage using a DC-to-DC converter. This electrically isolated 15 V supplies additional DC-to-DC converters that generate the remaining voltage.

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

The optional add-on UPS (with battery unit) is supplied with 15 V and provides an uninterrupted power supply of the 15 V bus during a power failure.

2.3.2 Power calculation with 5PC820.1505-00

Information:			CPU board	Current system
All values in **watts** The values for the **suppliers** are maximum values. The values for the **consumers** are average maximum values, but not peak values.			5PC800.CCAX-00	Enter values in this column
		Total power supply power (maximum)		**130**
Total power supply		Add-on UPS module, optional	7.5	
		Backlight Display 15"	14	
		Maximum possible at +12V		**75**
	+12 V	CPU board, permanent consumers	13	
		2048 MB RAM, max. 1 with 3 W each		
		4096 MB RAM, max. 1 with 4 W each		
		Fan kit, optional	2.4	
		Power consumption of the PCIec cards, optional, max. 4 W[2)]		
		PCI card limit, optional (max. 3 W without a fan kit, max. 6 W with a fan kit)[1)]		
		PCIe x1 card limit, optional (max. 3 W without a fan kit, max. 20 W with a fan kit)[1)]		
		Consumers +12 V ∑		
		Maximum possible at +5V		**65**
	+5 V	System unit, permanent consumers	4	
		Hard disk (slide-in compact)	4	
		Slide-in drive (hard disk, DVD-ROM, etc.)	4	
		USB peripherals USB2 and USB4 with 2.5 W each		
		USB peripherals USB1, USB3 and USB5 with 5 W each		
		Power consumption of the PCIec cards, optional, max. 4 W[2)]		
		PCI card limit, optional (max. 3 W without a fan kit, max. 20 W with a fan kit)[1)]		
		Maximum possible at -12V		**1.2**
	-12 V	PCI card limit, optional (max. 1.2 W with or without a fan kit)[1)]		
		Consumers -12 V ∑		
		Consumers +5 V ∑		
		Maximum possible at 3V3		**40**
	3V3	System unit, permanent consumers	9	
		CompactFlash, 1 W each		
		Power consumption of the PCIec cards, optional, max. 4 W[2)]		
		PCI card limit, optional (max. 3 W without a fan kit, max. 15 W with a fan kit)[1)]		
		PCIe x1 card limit, optional (max. 3 W without a fan kit, max. 10 W with a fan kit)[1)]		
		Consumers 3V3 ∑		
		Consumers ∑		

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

2) The total performance of one PCIec card per PCIec 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 PCIec card must not consume more than a total of 4 W (12V/5V/3V3)!

2.3.3 Power calculation with 5PC820.1906-00

Information: All values in **watts** The values for the **suppliers** are maximum values. The values for the **consumers** are average maximum values, but not peak values.				CPU board 5PC800.CCAX-00	Current system Enter values in this column
			Total power supply power (maximum)		**130**
Total power supply			Add-on UPS module, optional	7.5	
			Backlight Display 19"	32	
			Maximum possible at +12V		**75**
	+12 V		CPU board, permanent consumers	13	
			2048 MB RAM, max. 1 with 3 W each		
			4096 MB RAM, max. 1 with 4 W each		
			Fan kit, optional	2.4	
			Power consumption of the PCIec cards, optional, max. 4 W[2)]		
			PCI card limit, optional (max. 3 W without a fan kit, max. 6 W with a fan kit)[1)]		
			PCIe x1 card limit, optional (max. 3 W without a fan kit, max. 20 W with a fan kit)[1)]		
			Consumers +12 V ∑		
	+ 5 V		**Maximum possible at +5V**		**65**
			System unit, permanent consumers	12	
			Hard disk (slide-in compact)	4	
			Slide-in drive (hard disk, DVD-ROM, etc.)	4	
			USB peripherals USB2 and USB4 with 2.5 W each		
			USB peripherals USB1, USB3 and USB5 with 5 W each		
			Power consumption of the PCIec cards, optional, max. 4 W[2)]		
			PCI card limit, optional (max. 3 W without a fan kit, max. 20 W with a fan kit)[1)]		
			Maximum possible at -12V		**1.2**
		-12 V	PCI card limit, optional (max. 1.2 W with or without a fan kit)[1)]		
			Consumers -12 V ∑		
			Consumers +5 V ∑		
	3V3		**Maximum possible at 3V3**		**40**
			System unit, permanent consumers	9	
			CompactFlash, 1 W each		
			Power consumption of the PCIec cards, optional, max. 4 W[2)]		
			PCI card limit, optional (max. 3 W without a fan kit, max. 15 W with a fan kit)[1)]		
			PCIe x1 card limit, optional (max. 3 W without a fan kit, max. 10 W with a fan kit)[1)]		
			Consumers 3V3 ∑		
			Consumers ∑		

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

2) The total performance of one PCIec card per PCIec 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 PCIec card must not consume more than a total of 4 W (12V/5V/3V3)!

2.4 Block diagrams

The following block diagrams show the simplified structure of system units (5PC820.1505-00 / 5PC820.1906-00) with a NM10 CPU board that depend on different bus units.

2.4.1 Bus unit 5AC803.BX01-00

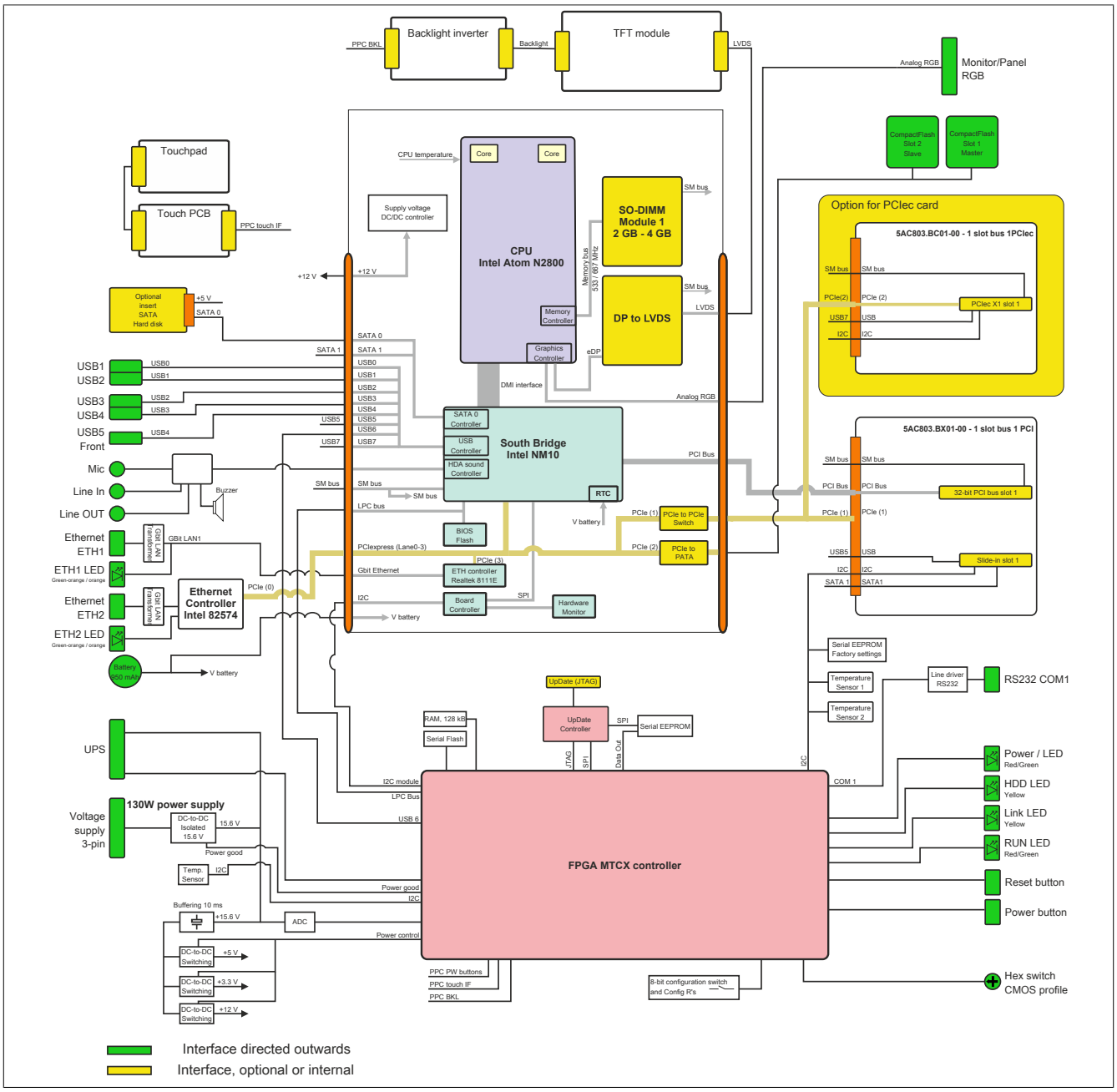


Figure 5: Block diagram with bus unit 5AC803.BX01-00

2.4.2 Bus unit 5AC803.BX01-01

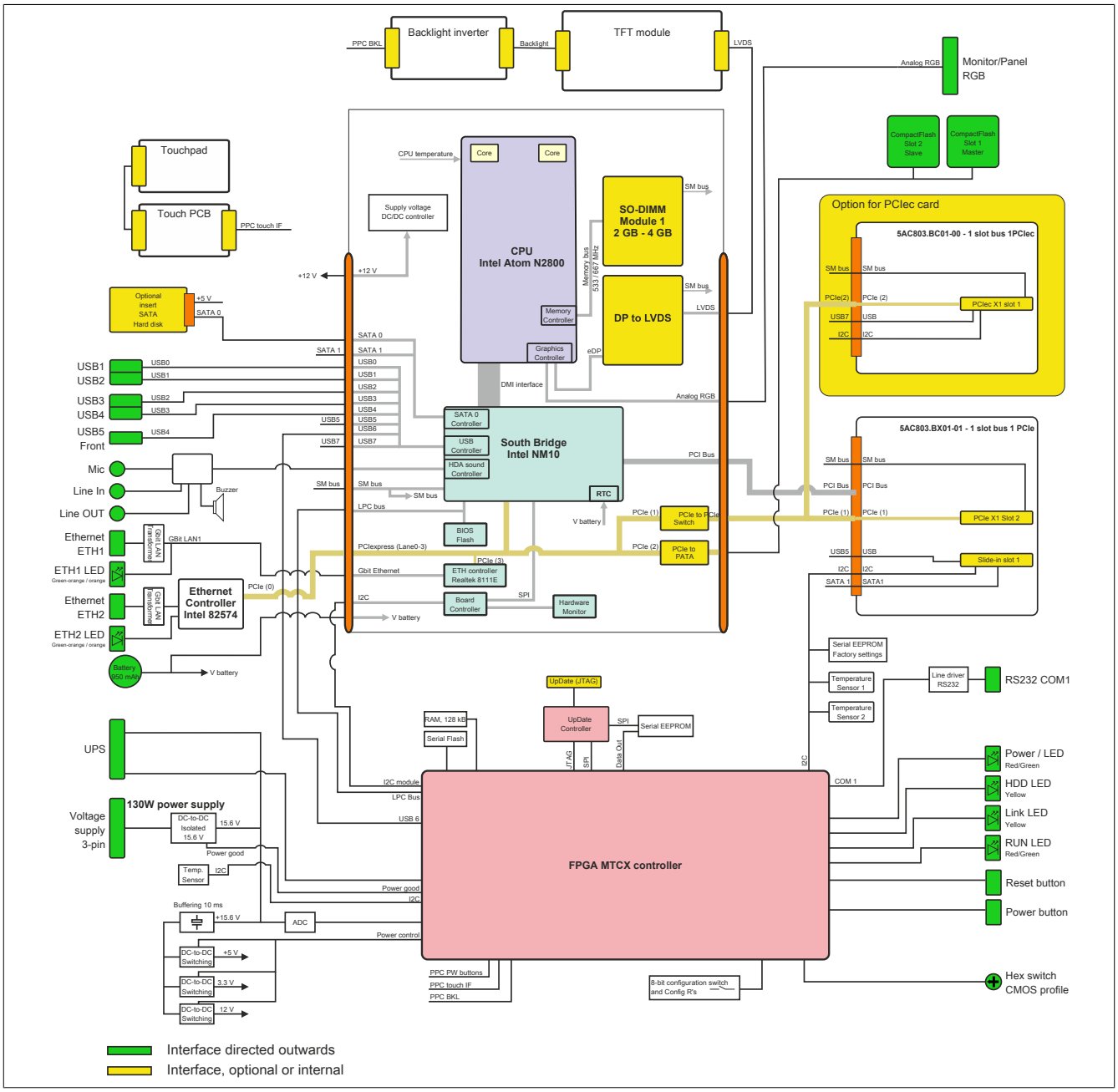


Figure 6: Block diagram with bus unit 5AC803.BX01-01

2.4.3 Bus unit 5AC803.BX02-00

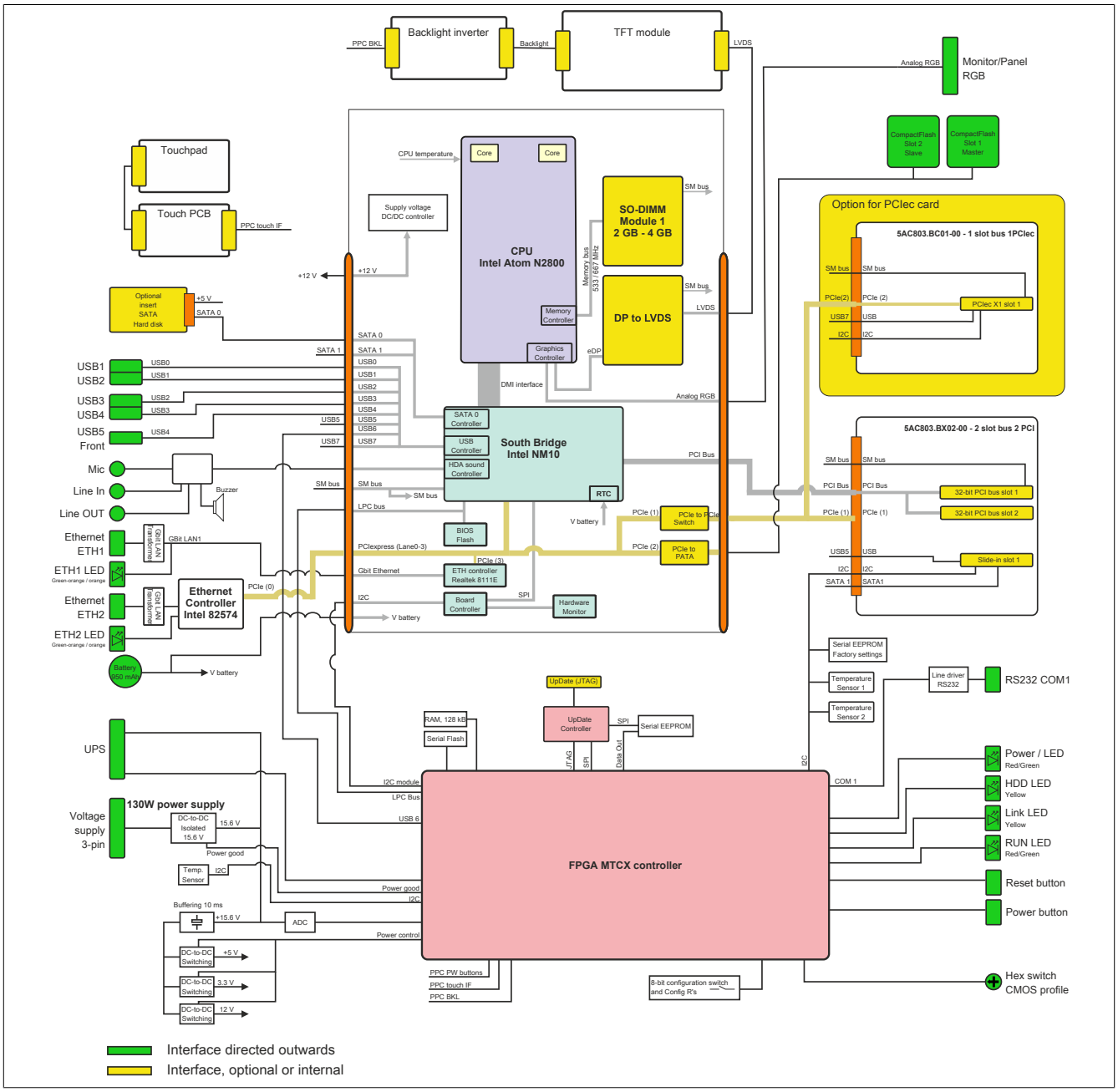


Figure 7: Block diagram with bus unit 5AC803.BX02-00

2.4.4 Bus unit 5AC803.BX02-01

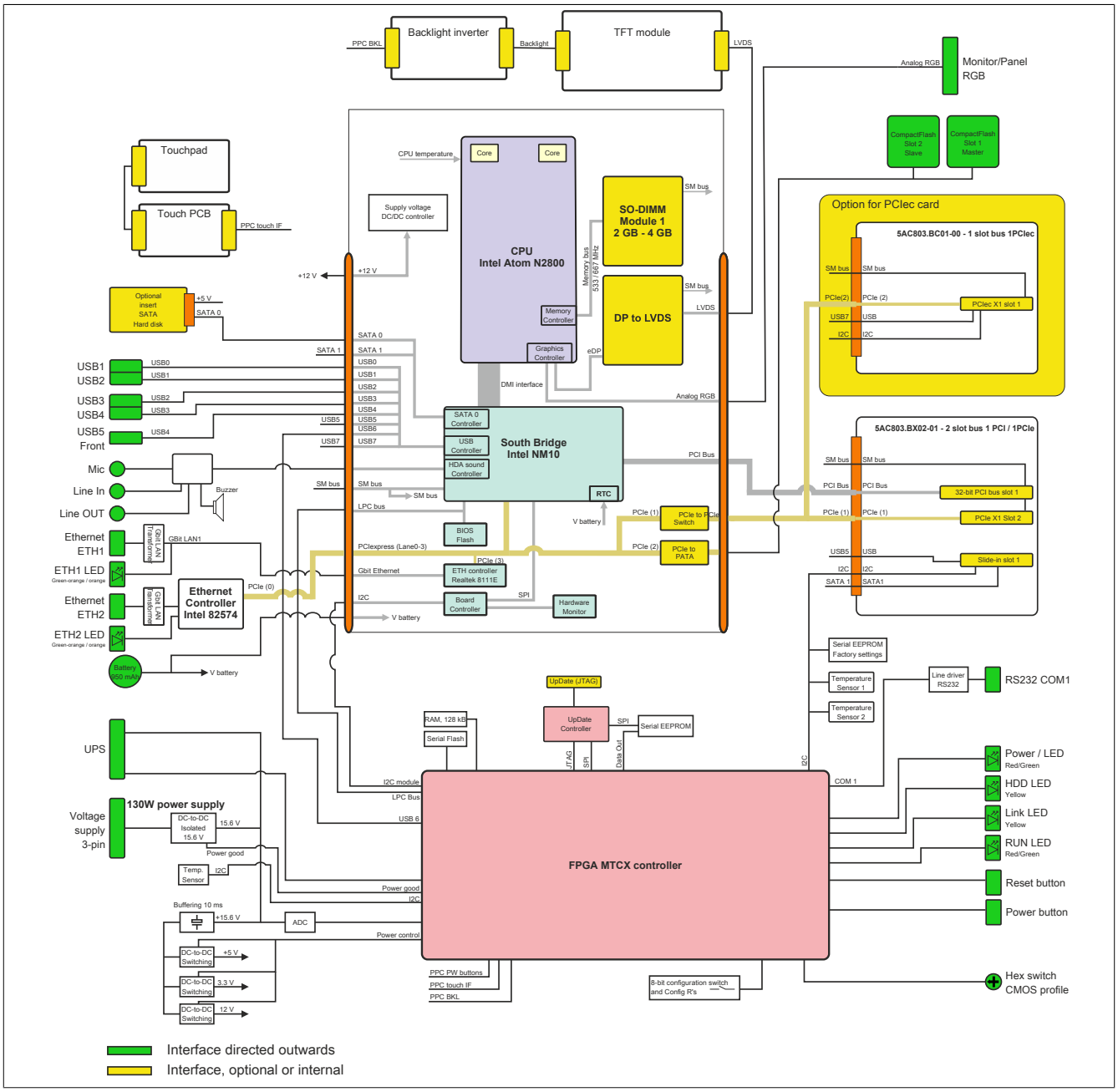


Figure 8: Block diagram with bus unit 5AC803.BX02-01

2.5 Serial number sticker

A unique serial number sticker with a barcode (Code 128) is affixed to each B&R device for identification purposes. This serial number represents all of the individual components built into the system (model number, name, revision, serial number, delivery date and duration of warranty).

Figure 9: Serial number sticker (back)

This information can also be found on the B&R website by entering the serial number of the fully assembled device in the search field tab (after selecting the "Serial number" option) at the top of the homepage www.br-automation.com. The search provides a detailed list of the installed components.

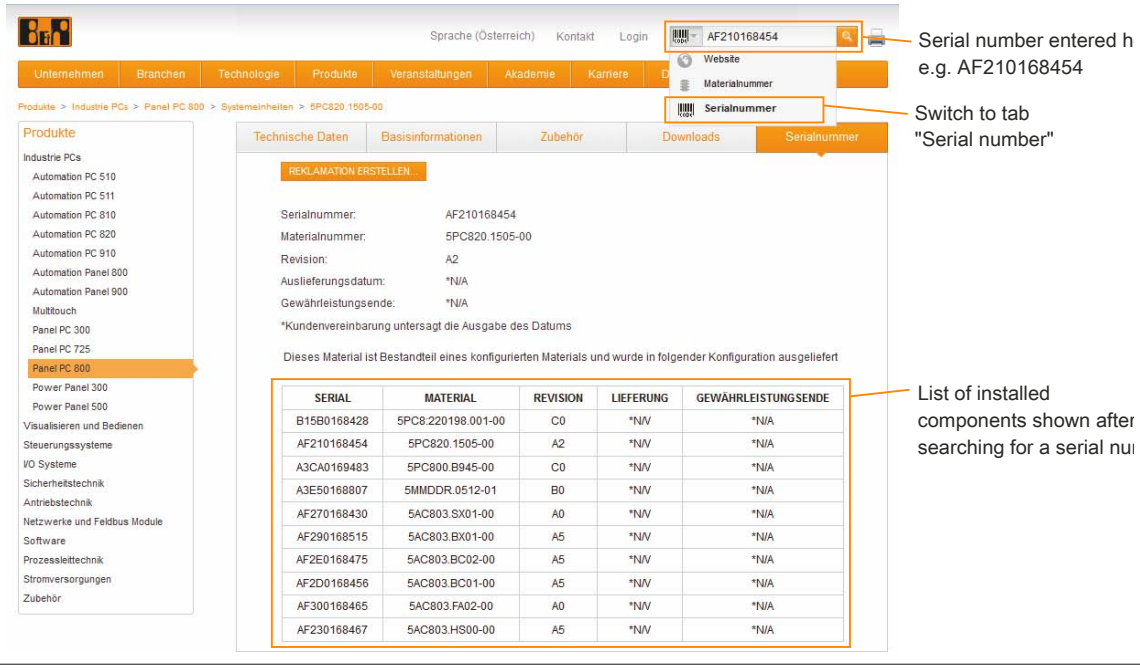


Figure 10: Example of serial number search

2.6 Device interfaces

2.6.1 +24 VDC supply voltage

The 3-pin connector 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 pinout is listed in the following table and 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 an overload occurs (fuse replacement necessary) or 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 in the event of an error.

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

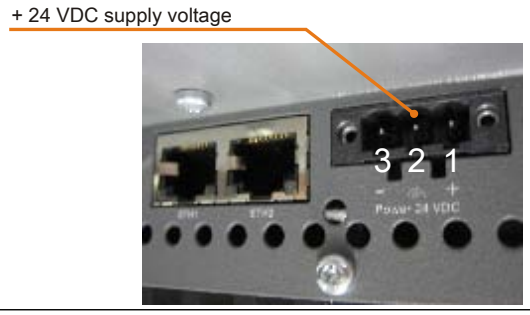


Table 10: Supply voltage connection 24 VDC

2.6.1.1 Grounding

> **Caution!**
>
> **The pin's connection to the functional ground (pin 2) should be as short a path as possible (e.g. in the control cabinet). Using the largest possible conductor cross section on the supply plug is recommended.**

The ground connection is located on the back of the PPC800 system.

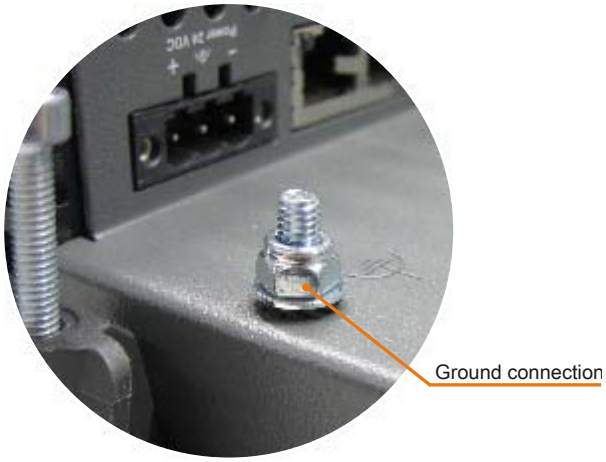


Figure 11: Ground connection

The M4 self-locking nut can be used, for example, to fasten a copper strip to a central grounding point in the control cabinet or system where the PPC800 is installed. The largest possible conductor cross section should be used (at least 2.5 mm²).

2.6.2 Monitor / Panel connection - RGB

Monitor/Panel connection - RGB	
The following is an overview of the video signals available on the monitor/panel output. For details, see the technical data for the CPU board being used.	
CPU board	**Video signals with all system unit variants**
5PC800.CCAX-00	RGB

Table 11: Monitor/Panel connection - RGB

2.6.2.1 Pinout

Pin	Assignment	Description	Pin	Assignment	Description
1	NC	Not connected	16	HPD	Hot plug detect
2	NC	Not connected	17	NC	Not connected
3	NC	Not connected	18	NC	Not connected
4	NC	Not connected	19	NC	Not connected
5	NC	Not connected	20	NC	Not connected
6	DDC clock	DDC-based control signal (clock)	21	NC	Not connected
7	DDC data	DDC-based control signal (data)	22	NC	Not connected
8	Analog V-Sync	Analog vertical synchronization	23	NC	Not connected
9	NC	Not connected	24	NC	Not connected
10	NC	Not connected	C1	ANALOG RED	Analog red
11	NC	Not connected	c2	ANALOG GREEN	Analog green
12	NC	Not connected	C3	ANALOG BLUE	Analog blue
13	NC	Not connected	C4	ANALOG HORZ SYNC	Analog horizontal synchronization
14	+5 V power [1)]	+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			

DVI 24-pin, female

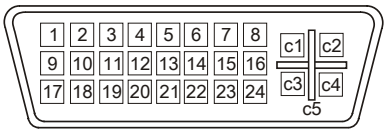


Table 12: DVI connection - Pinout

1) Protected internally by a multifuse.

2.6.3 COM1 serial interface

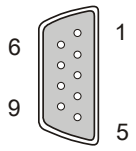
COM1 serial interface[1]		
	RS232	9-pin DSUB connector 
Type	RS232, modem-capable, not electrically isolated	
UART	16550-compatible, 16-byte FIFO	
Transfer rate	Max. 115 kbaud	
Cable length	Max. 15 meters	
Pin	**Assignment**	
1	DCD	
2	RXD	
3	TXD	
4	DTR	
5	GND	
6	DSR	
7	RTS	
8	CTS	
9	RI	

Table 13: COM1 - Pinout

1) The interfaces, etc. available on the device or module have been numbered as such for easy identification. This numbering may 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.

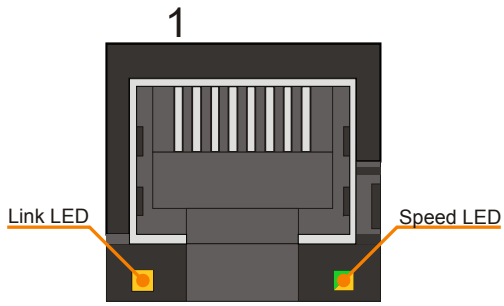
Ethernet 1 connection (ETH1)[1]			
Controller	RTL 8111E		RJ45 twisted pair (10BaseT/100BaseT), female
Cabling	S/STP (Cat 5e)		
Transfer rate	10/100/1000 Mbit/s[2]		
Cable length	Max. 100 m (min. Cat 5e)		
Speed LED	**On**	**Off**	
Green	100 Mbit/s	10 Mbit/s[3]	
Orange	1000 Mbit/s	-	
Link LED	**On**	**Off**	
Orange	Link (Ethernet network connection available)	Activity (blinking) (Data transfer in progress)	

Table 14: Ethernet connection (ETH1)

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

Driver support

A special driver is required in order to operate the Realtek 8111E Ethernet controller. Drivers for approved operating systems are available in the Downloads section of the B&R website (www.br-automation.com).

Information:

Required drivers can only be downloaded from the B&R website, not from manufacturer websites.

2.6.5 Ethernet 2 (ETH2)

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

Ethernet 2 connection (ETH2 [1])			
Controller	Intel 82574		RJ45 twisted pair (10BaseT/100BaseT), female
Cabling	S/STP (Cat 5e)		
Transfer rate	10/100/1000 Mbit/s[2]		
Cable length	Max. 100 m (min. Cat 5e)		
Speed LED	**On**	**Off**	
Green	100 Mbit/s	10 Mbit/s[3]	
Orange	1000 Mbit/s	-	
Link LED	**On**	**Off**	
Orange	Link (Ethernet network connection available)	Activity (blinking) (Data transfer in progress)	

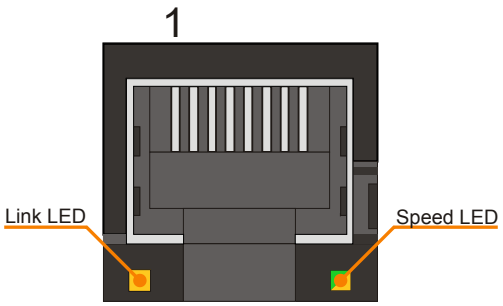


Table 15: Ethernet connection (ETH2)

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

Driver support

A special driver is required in order to operate the Intel 82574 Ethernet controller. Drivers for approved operating systems are available in the Downloads section of the B&R website (www.br-automation.com).

Information:

Required drivers can only be downloaded from the B&R website, not from manufacturer websites.

2.6.6 USB interfaces (USB1, 2, 3, 4, 5)

The PPC800 features a USB 2.0 (Universal Serial Bus) host controller with multiple USB ports, 5 of which are accessible externally for easy user access.

Warning!

Peripheral USB devices can be connected to the USB ports on this device. Due to the vast number of USB devices available on the market, B&R cannot guarantee their performance. USB devices from B&R are guaranteed to work.

Caution!

Because this interface is designed according to general PC specifications, extreme care should be exercised with regard to EMC, cable routing, etc.

USB1,2,3,4

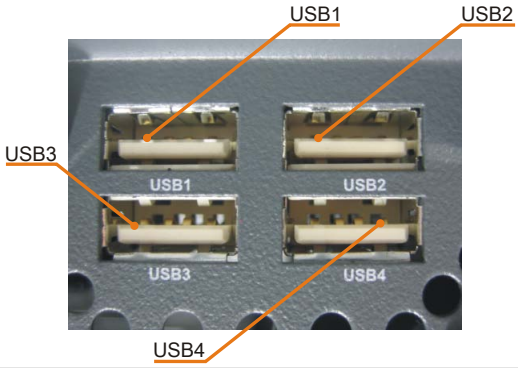
Universal Serial Bus (USB1, USB2, USB3, USB4[1])		
Type	USB 2.0	4x USB type A, female
Design	Type A	
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)	
Current load[2] USB1, USB3 USB2, USB4	 Max. 1 A Max. 500 mA	
Cable length	Max. 5 m (without hub)	

Table 16: USB1, USB2, USB3 and USB4 connections

1) The interfaces, etc. available on the device or module have been numbered as such for easy identification. This numbering may differ from that used by the particular operating system.
2) Each USB port is protected by a maintenance-free "USB current-limiting circuit breaker" (max. 500 mA or 1 A).

USB5

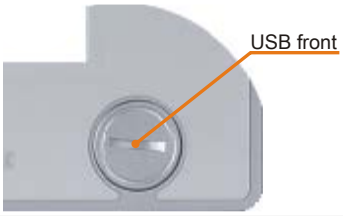
Universal Serial Bus (USB5)[1]		
Type	USB 2.0	1x USB type A, female
Design	Type A	
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)	
Current load[2] USB5	 Max. 1 A	
Cable length	Max. 5 m (without hub)	

Table 17: USB5 interface

1) The interfaces, etc. available on the device or module have been numbered as such for easy identification. This numbering may differ from that used by the particular operating system.
2) Each USB port is protected by 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 PCIe to PATA bridge. Type I CompactFlash cards are supported.

CompactFlash slot (CF1)		
Connection	PCIe 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	
5CFCRD.032G-06	CompactFlash 32 GB B&R	
5CFCRD.0064-03	CompactFlash 64 MB WD	
5CFCRD.0128-03	CompactFlash 128 MB WD	
5CFCRD.0256-03	CompactFlash 256 MB WD	
5CFCRD.0512-03	CompactFlash 512 MB WD	
5CFCRD.1024-03	CompactFlash 1024 MB WD	
5CFCRD.2048-03	CompactFlash 2048 MB WD	
5CFCRD.4096-03	CompactFlash 4096 MB WD	
5CFCRD.8192-03	CompactFlash 8192 MB WD	

Table 18: CompactFlash slot (CF1)

Warning!

Power must be turned off before inserting or removing CompactFlash cards.

2.6.8 CompactFlash slot 2

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

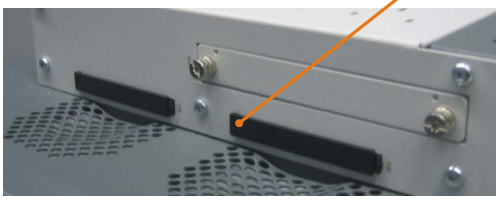
CompactFlash slot (CF2)		
Connection	PCIe to PATA	
CompactFlash Type	Type I	
Model number	**Short description**	
	CompactFlash	
5CFCRD.0512-06	CompactFlash 512 MB B&R	
5CFCRD.1024-06	CompactFlash 1024 MB B&R	
5CFCRD.2048-06	CompactFlash 2048 MB B&R	
5CFCRD.4096-06	CompactFlash 4096 MB B&R	
5CFCRD.8192-06	CompactFlash 8192 MB B&R	
5CFCRD.016G-06	CompactFlash 16 GB B&R	
5CFCRD.032G-06	CompactFlash 32 GB B&R	
5CFCRD.0064-03	CompactFlash 64 MB WD	
5CFCRD.0128-03	CompactFlash 128 MB WD	
5CFCRD.0256-03	CompactFlash 256 MB WD	
5CFCRD.0512-03	CompactFlash 512 MB WD	
5CFCRD.1024-03	CompactFlash 1024 MB WD	
5CFCRD.2048-03	CompactFlash 2048 MB WD	
5CFCRD.4096-03	CompactFlash 4096 MB WD	
5CFCRD.8192-03	CompactFlash 8192 MB WD	

Table 19: CompactFlash slot (CF2)

Warning!

Power must be turned off before inserting or removing CompactFlash cards.

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.

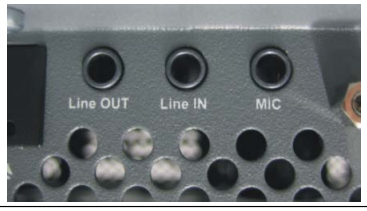
MIC, Line IN, Line OUT		
Controller	Realtek ALC 662	3.5 mm jack, female
MIC	Connection of a mono microphone with a 3.5 mm jack	
Line IN	Stereo Line IN signal supplied via a 3.5 mm jack	
Line OUT	Connection of a stereo playback device (e.g. amplifier) via a 3.5 mm jack	

Table 20: MIC, Line IN, Line OUT

Driver support

A special driver is required in order to operate the audio controller. Drivers for approved operating systems are available in the Downloads section of the B&R website (www.br-automation.com).

> **Information:**
>
> **Required drivers can only be downloaded from the B&R website, not from manufacturer websites.**

2.6.10 Add-on UPS slot

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

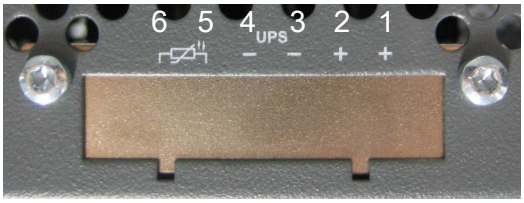
Add-on UPS slot		
Pinout with installed add-on UPS module		
1	+	
2	+	
3	-	
4	-	
5	NTC (for battery temperature measurement)	
6	NTC (for battery temperature measurement)	
Model number	**Short description**	
	Uninterruptible power supply	
5AC600.UPSI-00	Add-on UPS module	
5AC600.UPSB-00	Battery unit 5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

Table 21: Add-on UPS slot

Information about the UPS module see "Accessories" on page 218.

2.6.11 Power button

The power button provides a wide range of ATX power supply functions.

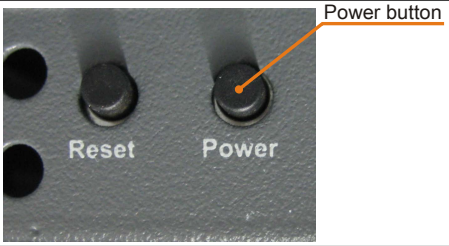
Power button	
The power button acts like the on/off switch on a normal desktop PC with an ATX power supply: **Press and release** ... Switches on the PPC800 or shuts down the operating system and switches off the PPC800 **Press and hold** ... Switches off the ATX power supply without shutting down the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

Table 22: Power button

2.6.12 Reset button

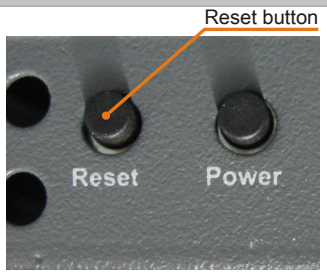
Reset button	
Pushing the reset button triggers a hardware and PCI reset. The PPC800 restarts cold. Pressing the reset button does not reset the MTCX processor.	

Table 23: Reset button

Warning!

A system reset can result in lost data!

2.6.13 Status LEDs

Status LEDs are located on the back of the system unit.

Status LEDs			
LED	**Color**	**Status**	**Description**
Power	Green	On	Supply voltage OK
	Red	On	The system is in standby mode (S5: Soft-off mode; S4: Hibernate mode - suspend-to-disk or S3: Suspend-to-RAM)
	Orange[1)]	On	Supply voltage not OK, system 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	Indicates IDE drive access (CF, HDD, CD, etc.)
Link	Yellow	On	Indicates an active SDL connection on the monitor/panel connector
		Blinking	Indicates that an active SDL connection has been interrupted by a loss of power to the display unit
Run	Green	On	Application running
		Off	Application not running

Table 24: 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 specified using the 16-position CMOS profile switch.	
Switch position	**Description**
0	Profile 0: Default profile reserved.
5	**Profile 5: Optimized for system units 5PC820.1505-00 and 5PC820.1906-00**

Table 25: 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) and individually stored BIOS settings. It is located behind the black cover on the front of the device. The battery's buffer lifespan is at least 2½ years (at 50°C, 8.5 µA for the components being supplied and a self-discharge of 40%). The battery has a limited service life and should be replaced regularly (after the specified service life at the latest).

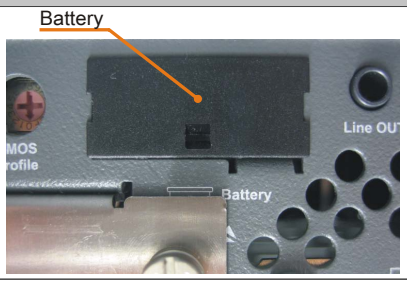
Battery		
Battery Type Removable Service life	 Renata 950 mAh Yes, accessible from the outside 2½ years[1)]	
Model number	**Short description**	
	Batteries	
0AC201.91	Lithium batteries, 4 pcs., 3 V / 950 mAh, button cell	
4A0006.00-000	Lithium battery, 1 pc., 3 V / 950 mAh, button cell	

Table 26: Battery

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

Battery status evaluation

The status of the battery is determined immediately after the device is started and subsequently checked by the system every 24 hours. During this measurement, the battery is subjected to a brief load (approximately 1 second) and then evaluated. Once determined, the battery status is displayed in BIOS (under Advanced -> OEM features -> System board features -> Voltage values) and in the B&R Control Center (ADI driver); it can also be read in a customer application using the ADI library.

Battery status	Description
N/A	The hardware or firmware being used is too old and does not support reading the battery status.
GOOD	Data buffering is intact.
BAD	From the point when battery capacity is recognized as insufficient (BAD), data buffering is intact for approximately another 500 hours

Table 27: Battery status

From the point when battery capacity is recognized as insufficient, data buffering is intact for approximately another 500 hours When replacing the battery, data is buffered for approximately 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 II.

Slide-in compact slot		
Connection	SATA II	
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 the 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 the manual for information about using this hard disk.	
5AC801.HDDI-04	500 GB SATA hard disk (slide-in compact); 24/7 hard disk. Note: Please see the manual for information about using this hard disk.	
5AC801.SSDI-00	32 GB SATA SSD (SLC) (slide-in compact).	
5AC801.SSDI-01	60 GB SATA SSD (SLC) (slide-in compact).	
5AC801.SSDI-02	180 GB SATA SSD (SLC)(slide-in compact).	
5AC801.SSDI-03	60 GB SATA SSD (SLC) (slide-in compact).	

Table 28: Slide-in compact slot

Information:

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

Information:

The SATA II 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 PCIec slot (card slot)

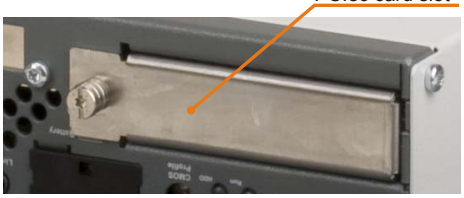
PCIec slots		
Model number	**Short description**	
	Adapters	
5AC803.BC01-00	PPC800 adapter: 1 compact PCI Express	
	Plug-in cards	
5ACPCC.ETH0-00	Compact PCIe Ethernet card 1x 10/100/1000	
5ACPCC.MPL0-00	PCIec POWERLINK card, 2 POWERLINK interfaces, 512 kB SRAM	

Table 29: PCIec slots

Information:

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

Information:

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

For more information, see see "PCIec Insert cards" on page 71.

3 Individual components

3.1 System units

3.1.1 5PC820.1505-00

3.1.1.1 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

3.1.1.2 Order data

Model number	Short description	Figure
	System units	
5PC820.1505-00	Panel PC 820 15" XGA 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 CompactPCI Express and compact slide-in slot; IP65 protection (front side); order 24 VDC plug for supply voltage separately (screw clamp: 0TB103.9; cage clamp: 0TB103.91).	
	Required accessories	
	CPU boards	
5PC800.CCAX-00	Intel Atom N2800 CPU board, 1.86 GHz, dual-core, 533 MHz FSB, 1 MB L2 cache; NM10 chipset; 1 socket for SO-DIMM DDR3 module	
	Terminal blocks	
0TB103.9	24 VDC supply voltage plug, 3-pin female, 3.31 mm² screw clamp, protected against vibration by the screw flange	
0TB103.91	24 VDC supply voltage plug, 3-pin female, 3.31 mm² cage clamp, protected against vibration by the screw flange	
	Main memory	
5MMDDR.2048-02	SO-DIMM DDR3 RAM 2048 MB PC3-8500	
5MMDDR.4096-02	SO-DIMM DDR3 RAM 4096 MB PC3-8500	
	Heat sink	
5AC803.HS00-04	PPC800 heat sink for CPU board with Atom dual-core processor N2800.	
	Optional accessories	
	Adapters	
5AC803.BC01-00	PPC800 adapter: 1 compact PCI Express.	
5AC803.BC02-00	PPC800 adapter: 1 compact slide-in.	
	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, 1 slide-in slot.	
5AC803.BX02-01	PPC800 bus: 1 PCI, 1 PCI Express, 1 slide-in slot	
	Plug-in cards	
5ACPCC.ETH0-00	Compact PCIe Ethernet card 1x 10/100/1000	
5ACPCC.MPL0-00	PCIec POWERLINK card, 2 POWERLINK interfaces, 512 kB SRAM	
	Expansions	
5AC803.SX01-00	PPC800 expansion; 1 PCI/PCI Express and 1 slide-in slot (bus 5AC803.BX01-00 or 5AC803.BX01-01 required)	
5AC803.SX02-00	PPC800 expansion; 2 PCI/PCI Express and 1 slide-in slot (bus 5AC803.BX02-00 or 5AC803.BX02-01 required)	
	Drives	
5AC801.ADAS-00	SATA hard disk adapter for operating a slide-in compact hard disk in a slide-in slot	
5AC801.DVDS-00	DVD-ROM slide-in SATA drive.	
5AC801.DVRS-00	DVD-R/RW DVD+R/RW slide-in SATA drive.	
5AC801.HDDI-00	40 GB slide-in compact SATA hard disk, 24/7 operation with extended temperature range. Note: Please see the manual for information about using this hard disk.	

Table 30: 5PC820.1505-00 - Order data

Model number	Short description	Figure
5AC801.HDDI-04	500 GB slide-in compact SATA hard disk; 24/7 operation. Note: Please see the manual for information about using this hard disk.	
5AC801.HDDS-00	40 GB slide-in SATA hard disk; 24/7 operation with extended temperature range. Note: Please see the manual for information about using this hard disk.	
5AC801.SSDI-00	32 GB SATA SSD (SLC), slide-in compact drive.	
5AC801.SSDI-01	60 GB slide-in compact SATA SSD (MLC).	
5AC801.SSDI-02	180 GB slide-in compact SATA SSD (MLC).	
5AC801.SSDI-03	60 GB slide-in compact SATA SSD (MLC).	
	Fan kit	
5AC803.FA01-00	PPC800 fan kit for system units without an expansion	
5AC803.FA02-00	PPC800 fan kit for system units with expansion 5AC803.SX01-00	
5AC803.FA03-00	PPC800 fan kit for system units with expansion 5AC803.SX02-00	
	Uninterruptible power supply	
5AC600.UPSI-00	UPS module for APC620, APC810, PPC800; for system units 5PC600.SX01-00 (starting with Rev. H0), 5PC600.SX02-00 (starting with Rev. G0), 5PC600.SX02-01 (starting with Rev. H0), 5PC600.SX05-00 (starting with Rev. F0), 5PC600.SX05-01 (starting with Rev. F0), 5PC600.SF03-00 (starting with Rev. A0), 5PC810.SX*. 5PC820.1505-00, 5PC820.1906-00. Order cable (5CAUPS.0005-00 or 5CAUPS.0030-00) and battery unit (5AC600.UPSB-00) separately.	

Table 30: 5PC820.1505-00 - Order data

3.1.1.3 Interfaces

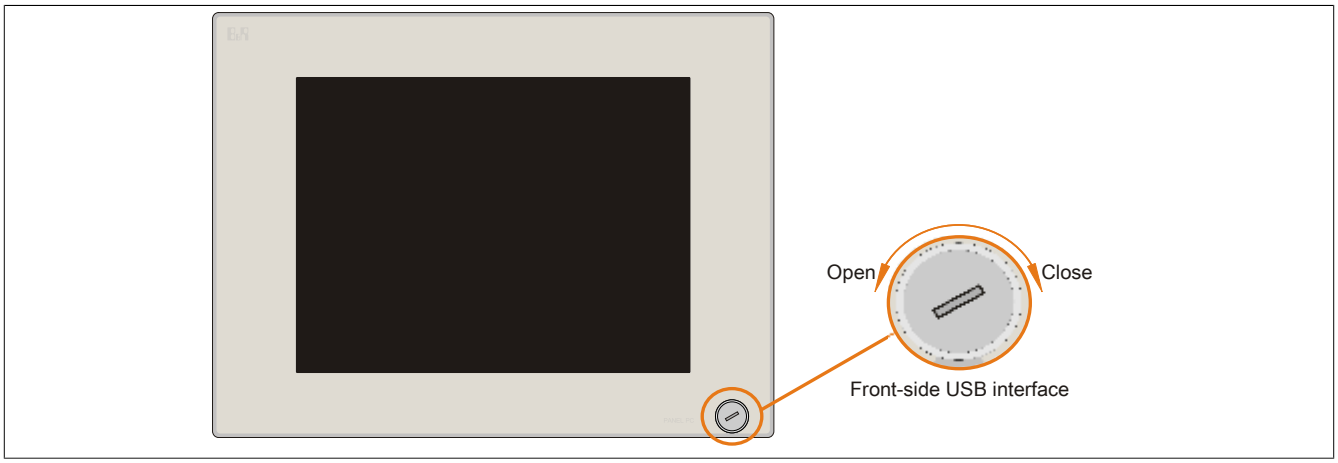


Figure 12: 5PC820.1505-00 - Front view

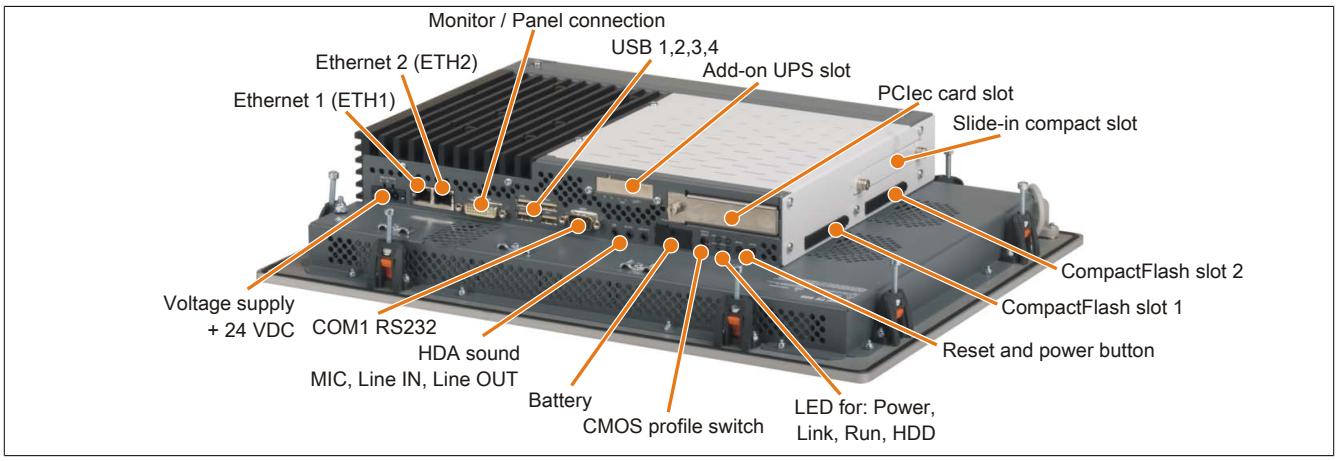


Figure 13: 5PC820.1505-00 - Rear view

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").

3.1.1.4 Technical data

Product ID	5PC820.1505-00
General information	
LEDs	Power, HDD, Link, Run
B&R ID code	$AF21
Battery	
Type	Renata 950 mAh
Service life	2½ years
Removable	Yes, accessible from the outside
Design	Lithium Ion
Power button	Yes
Reset button	Yes
Buzzer	Yes
Certification	
CE	Yes
cULus	Yes
Controller	
Boot loader	BIOS
Power failure logic	
Controller	MTCX [1)]
Buffer time	10 ms

Table 31: 5PC820.1505-00 - Technical data

Product ID	5PC820.1505-00
Graphics	
Controller	Depends on the CPU board being used
Memory	
Type	Depends on the CPU board being used
Size	Depends on the CPU board being used
Interfaces	
COM1	
Type	RS232, modem-capable, not electrically isolated
Design	9-pin DSUB connector
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), 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	TFT color
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°
Backlight	
Brightness	250 cd/m²
Half brightness time [2)]	50,000 h
Touch screen [3)]	
Type	Accu Touch
Technologies	Analog, resistive
Controller	Elo, serial, 12-bit
Transmittance	81% ±3%
Inserts	
PCI slots	
Quantity	1 or 2 (optional) [4)]
PCIe slots	
Quantity	1 [5)]
PCIec slots	
Quantity	Optional [6)]
Slide-in drives	Component-dependent (on the expansion and bus unit being used)
Slide-in compact drives	Optional [7)]
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 on industrial surfaces (in original packaging)
Protection in accordance with EN 60529	Back-side IP20 IP65, dust and sprayed water protection (front)
Environmental conditions	
Temperature	
Operation	Component-dependent
Storage	-20 to 60°C
Transport	-20 to 60°C

Table 31: 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 T > 40°C: <90%, non-condensing
Transport	T ≤ 40°C: 5 to 90%, non-condensing 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
Panel membrane	
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 31: 5PC820.1505-00 - Technical data

1) Maintenance Controller Extended.
2) At an ambient temperature of 25°C. Reducing the brightness by 50% can result in an approximately 50% increase in the half-brightness time.
3) Touch screen drivers for approved operating systems are available in the Downloads section of the B&R website.
4) The PCI slots available depend on the expansion and bus unit being used.
5) The PCIe slots available depend on the expansion and bus unit being used.
6) Optional with PCIec adapter 5AC803.BC01-00.
7) Optional with slide-in compact adapter 5AC803.BC02-00.

3.1.1.5 Dimensions

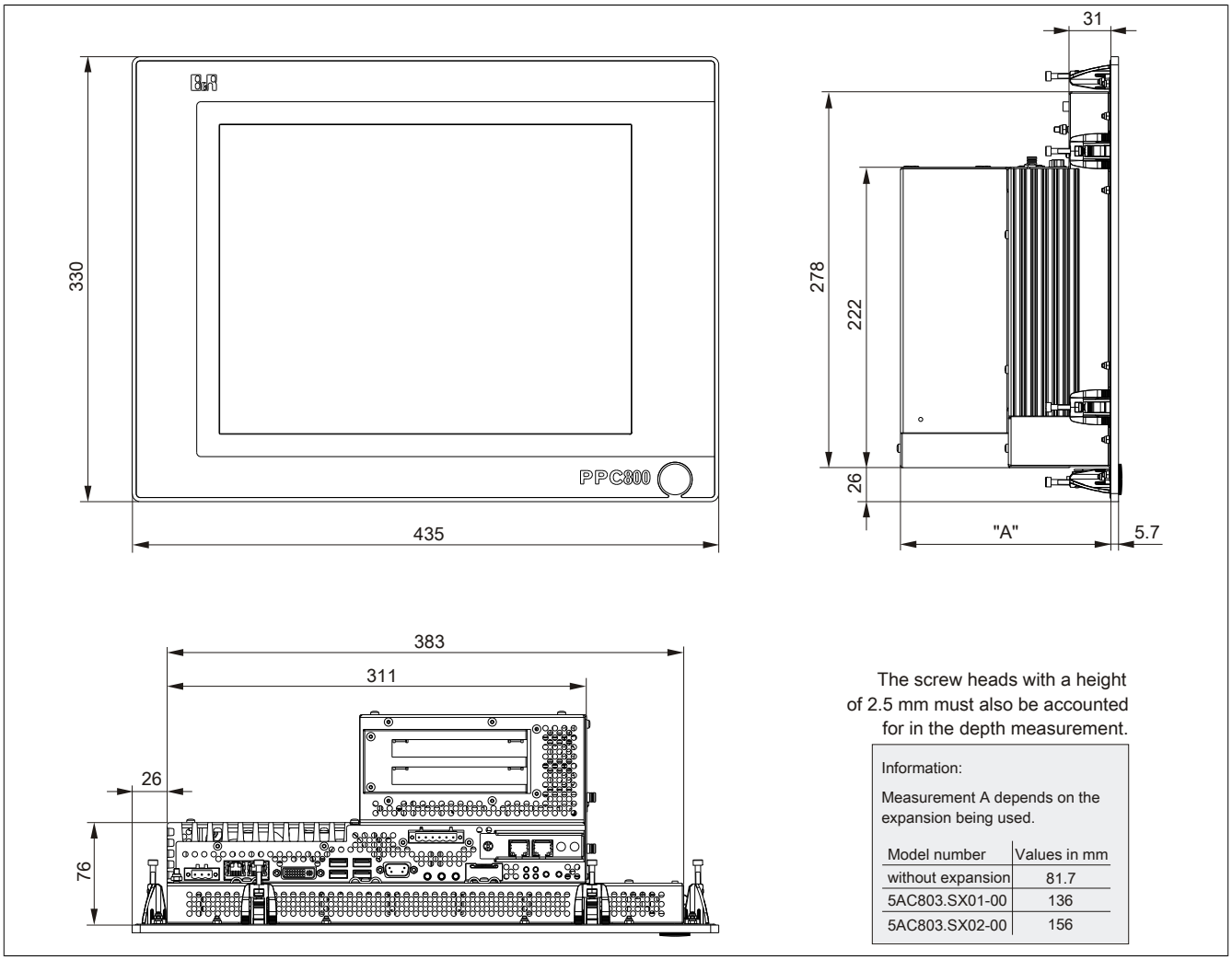


Figure 14: 5PC820.1505 - Dimensions

3.1.1.6 Cutout

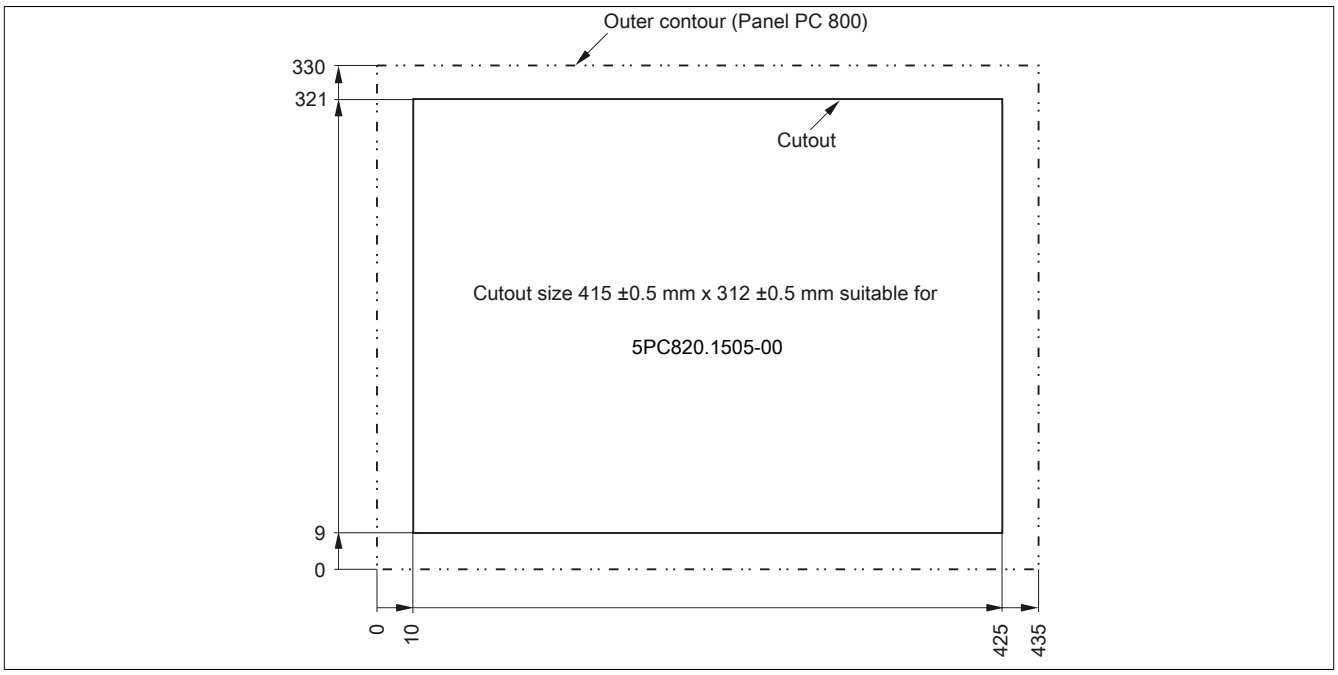


Figure 15: 5PC820.1505-00 - Cutout installation

3.1.2 5PC820.1906-00

3.1.2.1 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

3.1.2.2 Order data

Model number	Short description	Figure
	System units	
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 CompactPCI Express and compact slide-in slot; IP65 protection (front side); order 24 VDC plug for supply voltage separately (screw clamp: 0TB103.9; cage clamp: 0TB103.91).	
	Required accessories	
	CPU boards	
5PC800.CCAX-00	Intel Atom N2800 CPU board, 1.86 GHz, dual-core, 533 MHz FSB, 1 MB L2 cache; NM10 chipset; 1 socket for SO-DIMM DDR3 module	
	Terminal blocks	
0TB103.9	24 VDC supply voltage plug, 3-pin female, 3.31 mm² screw clamp, protected against vibration by the screw flange	
0TB103.91	24 VDC supply voltage plug, 3-pin female, 3.31 mm² cage clamp, protected against vibration by the screw flange	
	Main memory	
5MMDDR.2048-02	SO-DIMM DDR3 RAM 2048 MB PC3-8500	
5MMDDR.4096-02	SO-DIMM DDR3 RAM 4096 MB PC3-8500	
	Heat sink	
5AC803.HS00-04	PPC800 heat sink for CPU board with Atom dual-core processor N2800.	
	Optional accessories	
	Adapters	
5AC803.BC01-00	PPC800 adapter: 1 compact PCI Express.	
5AC803.BC02-00	PPC800 adapter: 1 compact slide-in.	
	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, 1 slide-in slot.	
5AC803.BX02-01	PPC800 bus: 1 PCI, 1 PCI Express, 1 slide-in slot	
	Plug-in cards	
5ACPCC.ETH0-00	Compact PCIe Ethernet card 1x 10/100/1000	
5ACPCC.MPL0-00	PCIec POWERLINK card, 2 POWERLINK interfaces, 512 kB SRAM	
	Expansions	
5AC803.SX01-00	PPC800 expansion; 1 PCI/PCI Express and 1 slide-in slot (bus 5AC803.BX01-00 or 5AC803.BX01-01 required)	
5AC803.SX02-00	PPC800 expansion; 2 PCI/PCI Express and 1 slide-in slot (bus 5AC803.BX02-00 or 5AC803.BX02-01 required)	
	Drives	
5AC801.ADAS-00	SATA hard disk adapter for operating a slide-in compact hard disk in a slide-in slot	
5AC801.DVDS-00	DVD-ROM slide-in SATA drive.	
5AC801.DVRS-00	DVD-R/RW DVD+R/RW slide-in SATA drive.	
5AC801.HDDI-00	40 GB slide-in compact SATA hard disk, 24/7 operation with extended temperature range. Note: Please see the manual for information about using this hard disk.	
5AC801.HDDI-04	500 GB slide-in compact SATA hard disk; 24/7 operation. Note: Please see the manual for information about using this hard disk.	
5AC801.HDDS-00	40 GB slide-in SATA hard disk; 24/7 operation with extended temperature range. Note: Please see the manual for information about using this hard disk.	
5AC801.SSDI-00	32 GB SATA SSD (SLC), slide-in compact drive.	

Table 32: 5PC820.1906-00 - Order data

Model number	Short description	Figure
5AC801.SSDI-01	60 GB slide-in compact SATA SSD (MLC).	
5AC801.SSDI-02	180 GB slide-in compact SATA SSD (MLC).	
5AC801.SSDI-03	60 GB slide-in compact SATA SSD (MLC).	
	Fan kit	
5AC803.FA01-00	PPC800 fan kit for system units without an expansion	
5AC803.FA02-00	PPC800 fan kit for system units with expansion 5AC803.SX01-00	
5AC803.FA03-00	PPC800 fan kit for system units with expansion 5AC803.SX02-00	
	Uninterruptible power supply	
5AC600.UPSI-00	UPS module for APC620, APC810, PPC800; for system units 5PC600.SX01-00 (starting with Rev. H0), 5PC600.SX02-00 (starting with Rev. G0), 5PC600.SX02-01 (starting with Rev. H0), 5PC600.SX05-00 (starting with Rev. F0), 5PC600.SX05-01 (starting with Rev. F0), 5PC600.SF03-00 (starting with Rev. A0), 5PC810.SX*. 5PC820.1505-00, 5PC820.1906-00. Order cable (5CAUPS.0005-00 or 5CAUPS.0030-00) and battery unit (5AC600.UPSB-00) separately.	

Table 32: 5PC820.1906-00 - Order data

3.1.2.3 Interfaces

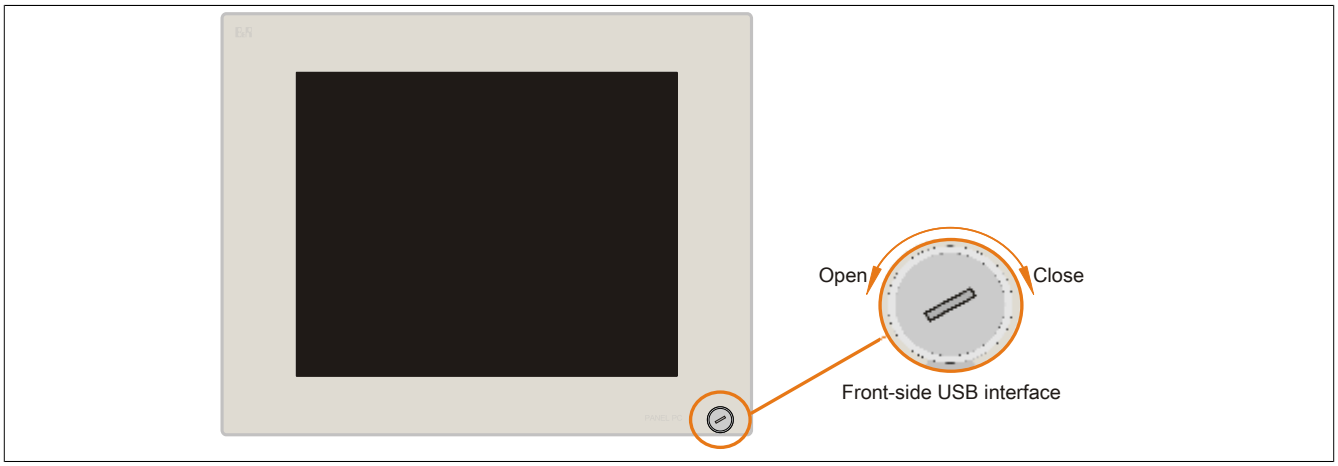


Figure 16: 5PC820.1906-00 - Front view

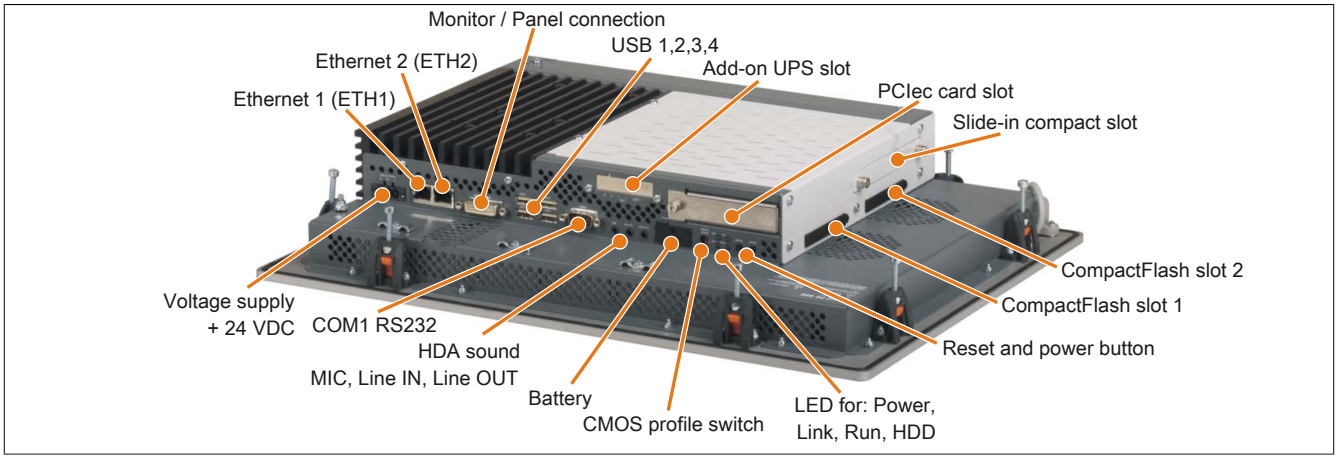


Figure 17: 5PC820.1906-00 - Rear view

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").

3.1.2.4 Technical data

Product ID	5PC820.1906-00
General information	
LEDs	Power, HDD, Link, Run
B&R ID code	$AF22
Battery Type Service life Removable Design	 Renata 950 mAh 2½ years Yes, accessible from the outside Lithium Ion
Power button	Yes
Reset button	Yes
Buzzer	Yes
Certification CE cULus	 Yes Yes
Controller	
Boot loader	BIOS
Power failure logic Controller Buffer time	 MTCX [1)] 10 ms

Table 33: 5PC820.1906-00 - Technical data

Product ID	5PC820.1906-00
Graphics	
Controller	Depends on the CPU board being used
Memory	
Type	Depends on the CPU board being used
Size	Depends on the CPU board being used
Interfaces	
COM1	
Type	RS232, modem-capable, not electrically isolated
Design	9-pin DSUB connector
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), 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	TFT color
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°
Backlight	
Brightness	300 cd/m²
Half brightness time [2]	50,000 h
Touch screen [3]	
Type	Accu Touch
Technologies	Analog, resistive
Controller	Elo, serial, 12-bit
Transmittance	81% ±3%
Inserts	
PCI slots	
Quantity	1 or 2 (optional) [4]
PCIe slots	
Quantity	1 [5]
PCIec slots	
Quantity	Optional [6]
Slide-in drives	Component-dependent (on the expansion and bus unit being used)
Slide-in compact drives	Optional [7]
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 on industrial surfaces (in original packaging)
Protection in accordance with EN 60529	Back-side IP20 IP65, dust and sprayed water protection (front)
Environmental conditions	
Temperature	
Operation	Component-dependent
Storage	-20 to 60°C
Transport	-20 to 60°C

Table 33: 5PC820.1906-00 - Technical data

Product ID	5PC820.1906-00
Relative humidity	
Operation	10 to 85%, non-condensing
Storage	T ≤ 40°C: 5 to 90%, non-condensing T > 40°C: <90%, non-condensing
Transport	T ≤ 40°C: 5 to 90%, non-condensing 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
Panel membrane	
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	10000 g (component-dependent)

Table 33: 5PC820.1906-00 - Technical data

1) Maintenance Controller Extended.
2) At an ambient temperature of 25°C. Reducing the brightness by 50% can result in an approximately 50% increase in the half-brightness time.
3) Touch screen drivers for approved operating systems are available in the Downloads section of the B&R website.
4) The PCI slots available depend on the expansion and bus unit being used.
5) The PCIe slots available depend on the expansion and bus unit being used.
6) Optional with PCIec adapter 5AC803.BC01-00.
7) Optional with slide-in compact adapter 5AC803.BC02-00.

3.1.2.5 Dimensions

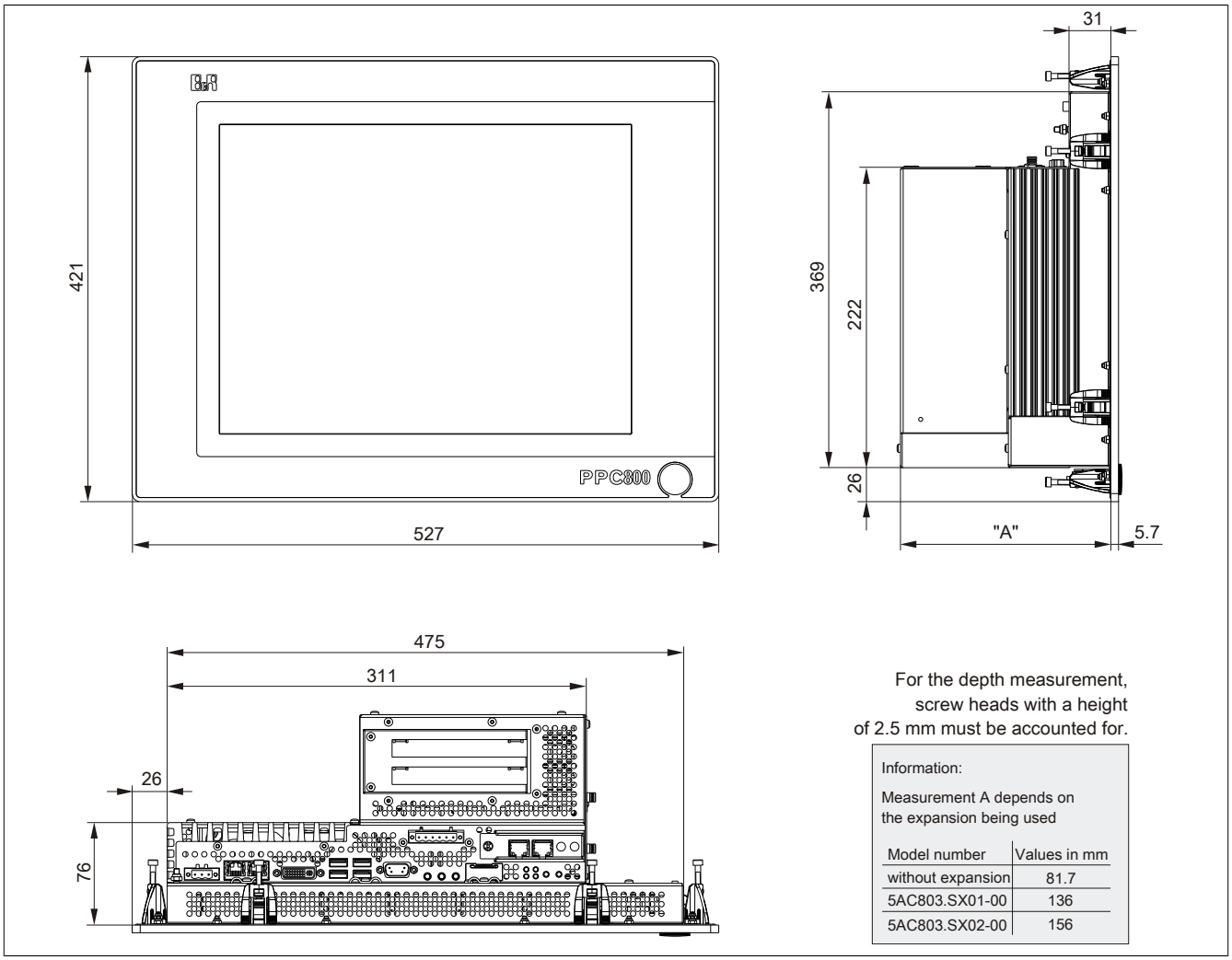


Figure 18: 5PC820.1906-00 - Dimensions

3.1.2.6 Cutout

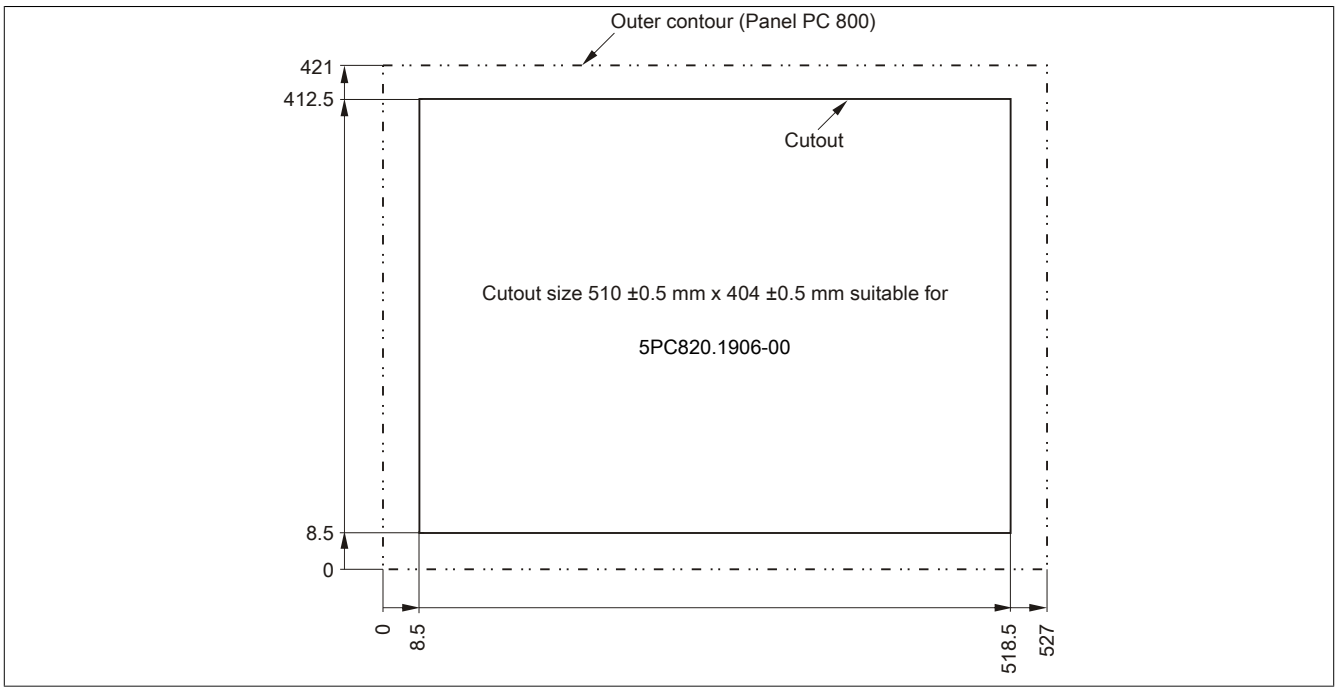


Figure 19: 5PC820.1906-00 - Cutout installation

3.2 NM10 CPU boards

3.2.1 General information

NM10 CPU boards are equipped with one DDR3 memory socket for a maximum of 4 GB. Additionally, the Intel® GMA 3600 is integrated with 384 MB memory and a maximum resolution of 1920 x 1200 pixels (WUXGA).

- AMI BIOS (UEFI)
- Intel® NM10 chipset
- 1x DDR3 memory socket
- Intel® GMA 3600
- Gigabit Ethernet
- Intel® Atom N2800 1.86 GHz dual core

3.2.2 Order data

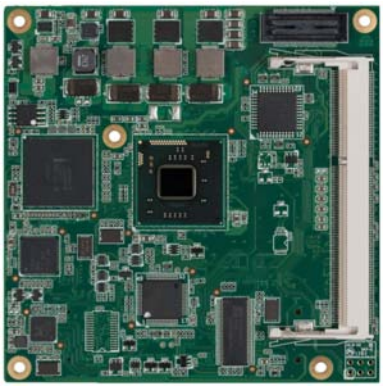
Model number	Short description	Figure
	CPU boards	
5PC800.CCAX-00	Intel Atom N2800 CPU board, 1.86 GHz, dual-core, 533 MHz FSB, 1 MB L2 cache; NM10 chipset; 1 socket for SO-DIMM DDR3 module	
	Required accessories	
	Main memory for GM45 CPU boards	
5MMDDR.2048-02	SO-DIMM DDR3 RAM 2048 MB PC3-8500	
5MMDDR.4096-02	SO-DIMM DDR3 RAM 4096 MB PC3-8500	

Table 34: 5PC800.CCAX-00 - Order data

3.2.3 Technical data

Product ID	5PC800.CCAX-00
General information	
Certification	
CE	Yes
Controller	
Boot loader	embedded AMI BIOS (UEFI)
Processor	
Type	Intel® Atom™ N2800 DualCore
Clock frequency	1860 MHz
Number of cores	2
Architectures	32 nm
L1 cache	2x 56 kB
L2 cache	2x 512 kB
External bus	1066 MHz
Intel® 64 Architecture	Yes
Intel® Hyper-Threading Technology	Yes
Intel® Virtualization Technology (VT-x)	No
Enhanced Intel SpeedStep® Technology	Yes
Expanded command set	SSE2, SSE3, SSSE3
Chipset	Intel® NM10
Real-time clock	
Accuracy	At 25°C: typ. 12 ppm (1 seconds) per day [1)]
Battery-buffered	Yes
Memory socket	
Type	DDR3
Size	Max. 4 GB

Table 35: 5PC800.CCAX-00 - Technical data

Product ID	5PC800.CCAX-00
Graphics	
Controller	Intel® Graphics Media Accelerator 3600
Memory	Up to 384 MB [2]
Color depth	Max. 32-bit
Resolution	
RGB	350 MHz RAMDAC, resolutions up to 1920 x 1200
Mass memory management	2x SATA, 2x PATA
Power management	ACPI 3.0 with battery support

Table 35: 5PC800.CCAX-00 - Technical data

1) At max. specified ambient temperature: typically 58 ppm (5 seconds) - worst-case 220 ppm (19 seconds).
2) Allocated in main memory

3.3 Heat sink

3.3.1 5AC803.HS00-04

3.3.1.1 Order data

Model number	Short description	Figure
	Heat sinks	
5AC803.HS00-04	PPC800 heat sink for CPU board with Atom dual-core processor N2800.	

Table 36: 5AC803.HS00-04 - Order data

3.3.1.2 Technical data

Product ID	5AC803.HS00-04
General information	
Suitable for CPU boards	5PC800.CCAX-00
Suitable for the following system units	5PC820.1505-00 5PC820.1906-00
Certification CE	 Yes
Mechanical characteristics	
Material	Aluminum, black-coated with copper heat pipes
Dimensions Width Height Depth	 143 mm 183.5 mm 60 mm
Weight	1200 g

Table 37: 5AC803.HS00-04 - Technical data

3.4 Main memory

3.4.1 5MMDDR.xxxx-02

3.4.1.1 General information

These 204-pin DDR3 main memory modules operate at 1066 MHz and are available with 2 GB and 4 GB.

3.4.1.2 Order data

Model number	Short description	Figure
	Main memory for GM45 CPU boards	
5MMDDR.2048-02	SO-DIMM DDR3 RAM 2048 MB PC3-8500	
5MMDDR.4096-02	SO-DIMM DDR3 RAM 4096 MB PC3-8500	

Table 38: 5MMDDR.2048-02, 5MMDDR.4096-02 - Order data

3.4.1.3 Technical data

Product ID	5MMDDR.2048-02	5MMDDR.4096-02
General information		
Type	SO-DIMM DDR3 SDRAM	
Memory size	2 GB	4 GB
Construction	204-pin	
Organization	256M x 64-bit	512M x 64-bit
Velocity	DDR3-1066 (PC3-8500)	
Certification		
CE	Yes	
cULus	Yes	
cULus HazLoc Class 1 Division 2	-	Yes
ATEX Zone 22	-	Yes

Table 39: 5MMDDR.2048-02, 5MMDDR.4096-02 - Technical data

Information:

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

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	Figure
	Expansions	
5AC803.SX01-00	PPC800 expansion; 1 PCI/PCI Express and 1 slide-in slot (bus 5AC803.BX01-00 or 5AC803.BX01-01 required)	
5AC803.SX02-00	PPC800 expansion; 2 PCI/PCI Express and 1 slide-in slot (bus 5AC803.BX02-00 or 5AC803.BX02-01 required)	
	Required accessories	
	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, 1 slide-in slot.	
5AC803.BX02-01	PPC800 bus: 1 PCI, 1 PCI Express, 1 slide-in slot.	
	Fan kits	
5AC803.FA02-00	PPC800 fan kit for system units with expansion 5AC803.SX01-00	
5AC803.FA03-00	PPC800 fan kit for system units with expansion 5AC803.SX02-00	
	Optional accessories	
	Drives	
5AC801.ADAS-00	SATA hard disk adapter for operating a slide-in compact hard disk in a slide-in slot	
5AC801.DVDS-00	DVD-ROM slide-in SATA drive.	
5AC801.DVRS-00	DVD-R/RW DVD+R/RW slide-in SATA drive.	
5AC801.HDDS-00	40 GB slide-in SATA hard disk; 24/7 operation with extended temperature range. Note: Please see the manual for information about using this hard disk.	
5ACPCI.RAIC-05	PCI RAID system SATA 2x 250 GB; Note: Please see the manual for information about using this hard disk.	
5ACPCI.RAIC-06	PCI RAID system SATA 2x 500 GB; Note: Please see the manual for information about using this hard disk.	

Table 40: 5AC803.SX01-00, 5AC803.SX02-00 - Order data

3.5.3 Inserts

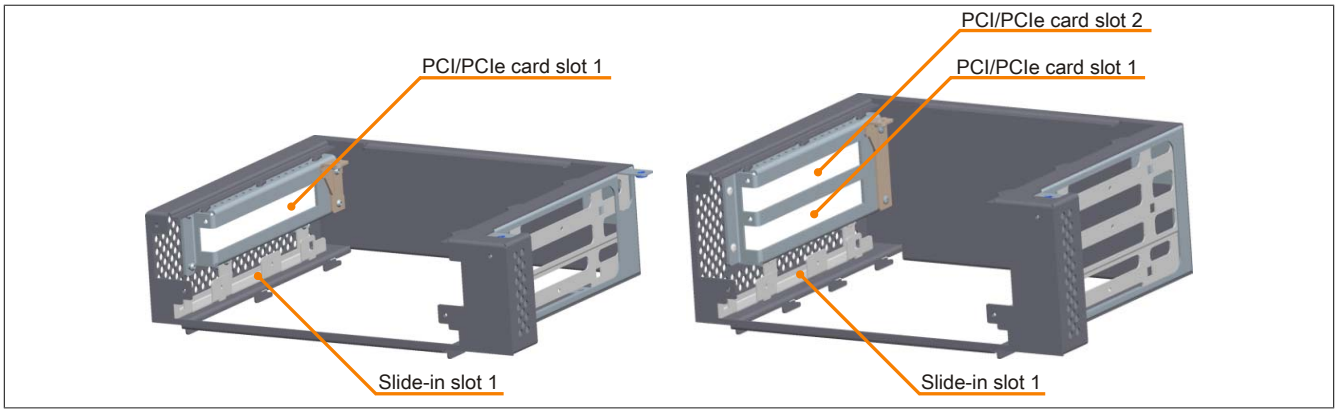


Figure 20: 5AC803.SX01-00, 5AC803.SX02-00 - Slots

3.5.4 Technical data

Product ID	5AC803.SX01-00	5AC803.SX02-00
General information		
Certification CE	Yes	
Inserts		
PCI / PCIe slots Quantity	1	2
Slide-in drives	1	

Table 41: 5AC803.SX01-00, 5AC803.SX02-00 - Technical data

Product ID	5AC803.SX01-00	5AC803.SX02-00
Mechanical characteristics		
Dimensions		
Width	167 mm	
Height	222 mm	
Depth	60 mm	80 mm
Weight	Approx. 1000 g	

Table 41: 5AC803.SX01-00, 5AC803.SX02-00 - Technical data

3.5.5 5AC803.SX01-00 - Dimensions

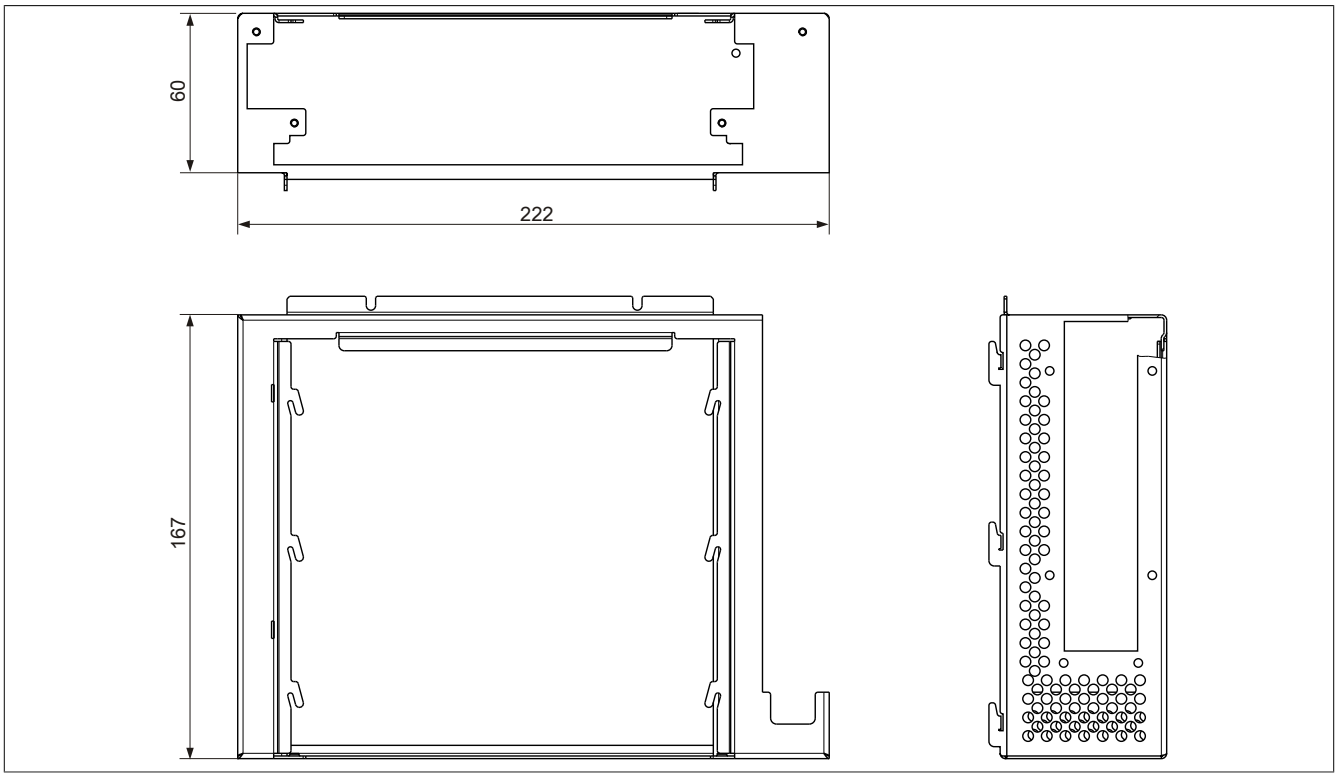


Figure 21: 5AC803.SX01-00 - Dimensions

3.5.6 5AC803.SX02-00 - Dimensions

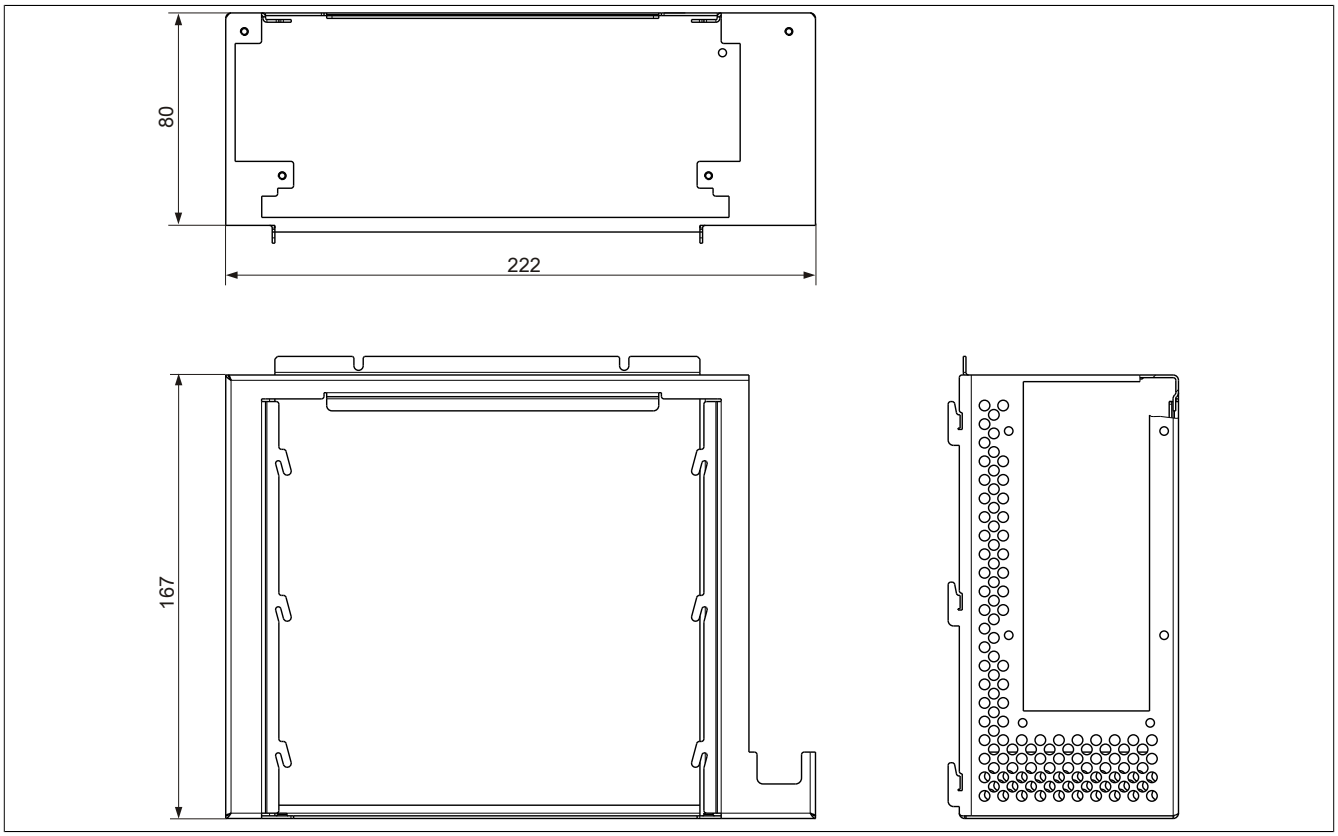


Figure 22: 5AC803.SX02-00 - Dimensions

3.5.7 Slot for bus units

3.5.7.1 Card slot (PCI / PCIe)

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

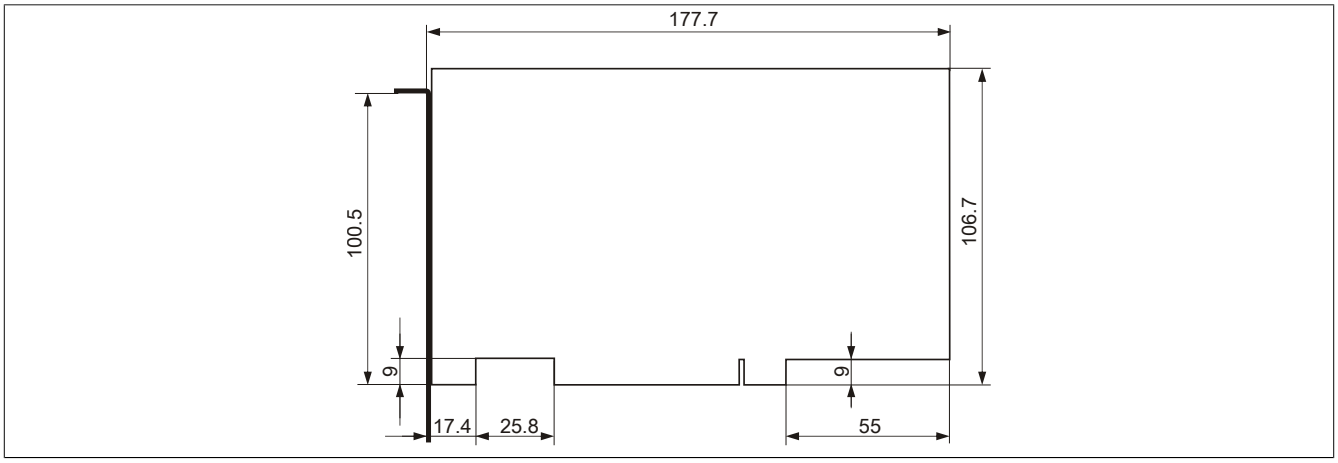


Figure 23: Dimensions - Standard half-size PCI card

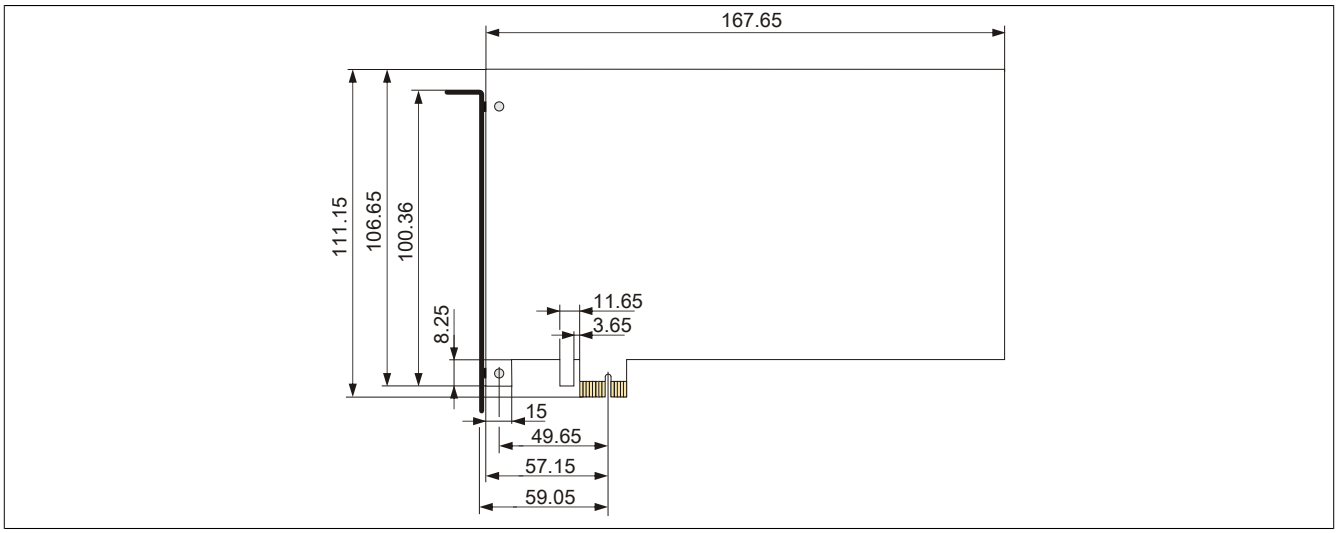


Figure 24: Dimensions - Standard half-size PCIe card

3.5.8 Slide-in slot 1

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

Slide-in slot 1		
Connection	SATA II 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 42: Slide-in slot 1

Information:

The SATA II 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.

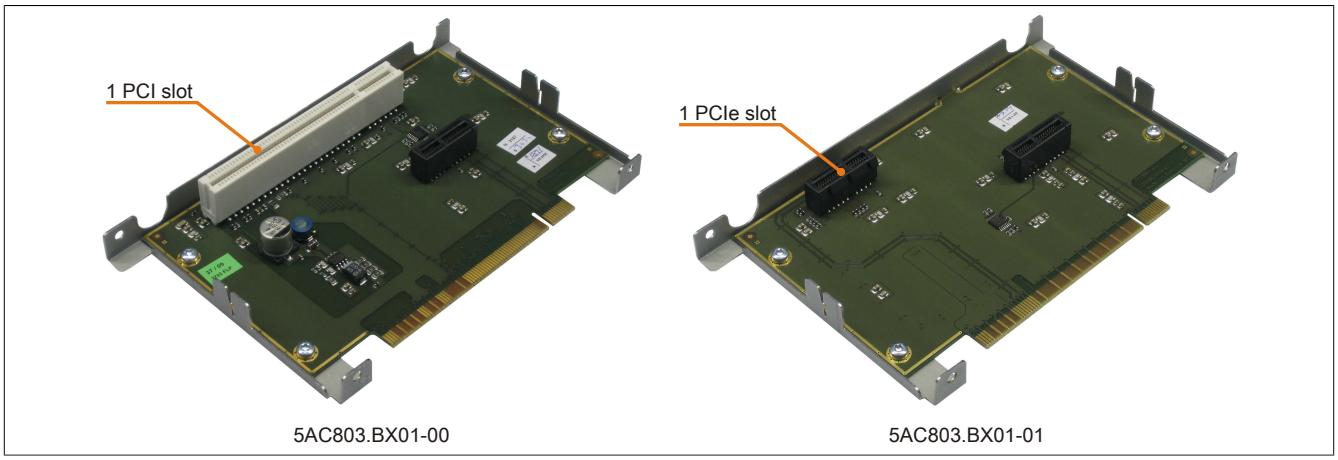


Figure 25: 1 slot bus units

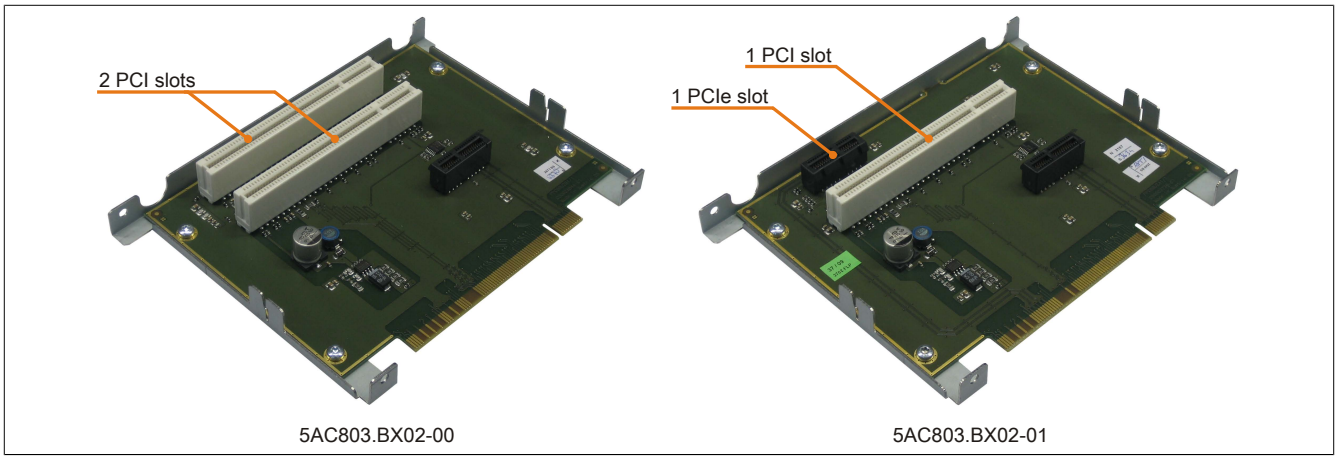


Figure 26: 2 slot bus units

3.6.2 Order data

Model number	Short description	Figure
	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, 1 slide-in slot.	
5AC803.BX02-01	PPC800 bus: 1 PCI, 1 PCI Express, 1 slide-in slot.	

Table 43: 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
General information				
Certification				
CE	Yes			
Inserts				
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
PCIe slots				
Quantity	-	1	-	1
Design	-	PCIe half-size	-	PCIe half-size
Standard	-	1.0 a	-	1.0 a
Bus speed	-	x1 (250 MB/s)	-	x1 (250 MB/s)

Table 44: 5AC803.BX01-00, 5AC803.BX01-01, 5AC803.BX02-00, 5AC803.BX02-01 - Technical data

3.7 Adapters

3.7.1 5AC803.BC01-00

3.7.1.1 General information

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

3.7.1.2 Order data

Model number	Short description	Figure
	Adapter	
5AC803.BC01-00	PPC800 adapter: 1 compact PCI Express.	
	Required accessories	
	Interface cards	
5ACPCC.ETH0-00	Compact PCIe Ethernet card 1x 10/100/1000	
5ACPCC.MPL0-00	PCIec POWERLINK card, 2 POWERLINK interfaces, 512 kB SRAM	

Table 45: 5AC803.BC01-00 - Order data

3.7.2 5AC803.BC02-00

3.7.2.1 General information

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

3.7.2.2 Order data

Model number	Short description	Figure
	Adapter	
5AC803.BC02-00	PPC800 adapter: 1 compact slide-in.	
	Required accessories	
	Drives	
5AC801.HDDI-00	40 GB slide-in compact SATA hard disk; 24/7 operation with extended temperature range. Note: Please see the manual for information about using this hard disk.	
5AC801.HDDI-04	500 GB SATA hard disk (slide-in compact); 24/7 hard disk. Note: Please see the manual for information about using this hard disk.	
5AC801.SSDI-00	32 GB SATA SSD (SLC), Slide-in compact	
5AC801.SSDI-01	60 GB slide-in compact SATA SSD (MLC).	
5AC801.SSDI-02	180 GB slide-in compact SATA SSD (MLC).	
5AC801.SSDI-03	60 GB slide-in compact SATA SSD (MLC).	

Table 46: 5AC803.BC02-00 - Order data

3.8 PCIec Insert cards

3.8.1 General information

The PCIec 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

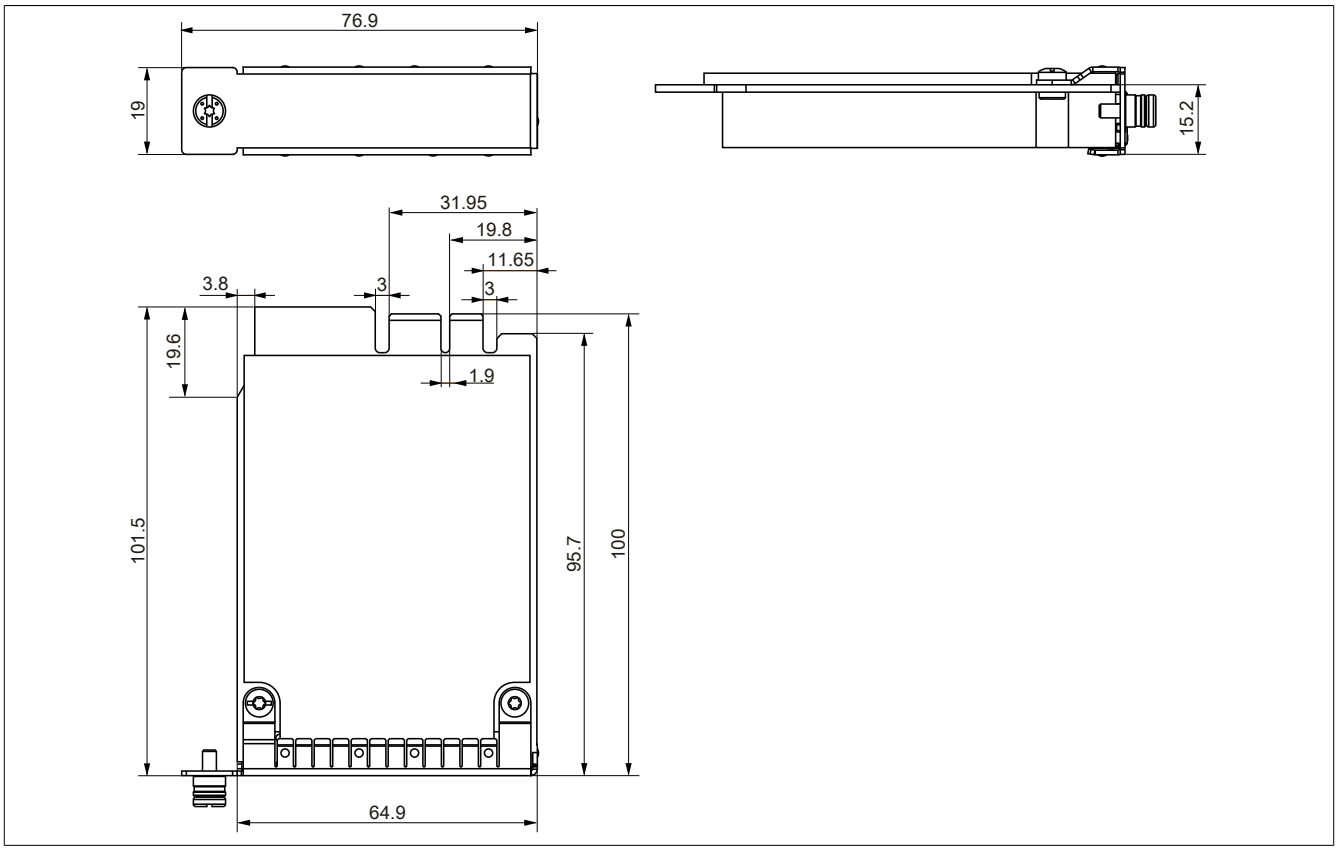


Figure 27: PCI express compact insert cards - Dimensions

Information:

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

3.8.3 5ACPCC.ETH0-00

3.8.3.1 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.

- PCIec 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 PCIec plug-in cards.

3.8.3.2 Order data

Model number	Short description	Figure
	Interface cards	
5ACPCC.ETH0-00	Compact PCIe Ethernet card 1x 10/100/1000	

Table 47: 5ACPCC.ETH0-00 - Order data

3.8.3.3 Technical data

Product ID	5ACPCC.ETH0-00
General information	
B&R ID code	$AB25
Diagnostics	
Data transfer	Yes, using status LED
Certification	
CE	Yes
Interfaces	
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)
Mechanical characteristics	
Slot	PCIec module

Table 48: 5ACPCC.ETH0-00 - Technical data

3.8.3.3.1 Ethernet port

Information:

The following characteristics, features and limit values only apply to this individual component and can deviate from those specified for the fully assembled device. For the assembled device in which this individual component is used, refer to the data given specifically for that device.

Ethernet card 1 connection		
Controller	Intel 82574	
Cabling	S/STP (Cat 5e)	
Transfer rate	10/100/1000 Mbit/s[1)]	
Cable length	Max. 100 m (min. Cat 5e)	
Speed LED	**On**	**Off**
Green	100 Mbit/s	10 Mbit/s[2)]
Orange	1000 Mbit/s	-
Link LED	**On**	**Off**
Orange	Link (Ethernet network connection available)	Activity (blinking - data transfer in progress)

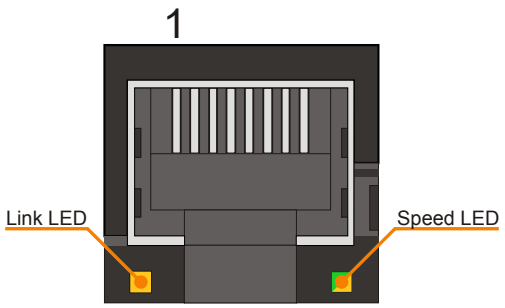


Table 49: 5ACPCC.ETH0-00 - Ethernet interface

1) Switching takes place automatically.
2) The 10 Mbit/s transfer speed / connection is only present if the IF slot Link LED is also lit at the same time.

Driver support

A special driver is required in order to operate the Intel 82574 Ethernet controller. Drivers for approved operating systems are available in the Downloads section of the B&R website (www.br-automation.com).

Information:

Required drivers can only be downloaded from the B&R website, not from manufacturer websites.

3.8.4 5ACPCC.MPL0-00

3.8.4.1 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.

- PCIec POWERLINK 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 PCIec plug-in cards.

3.8.4.2 Order data

Model number	Short description	Figure
	Interface cards	
5ACPCC.MPL0-00	PCIec POWERLINK card, 2 POWERLINK interfaces, 512 kB SRAM	

Table 50: 5ACPCC.MPL0-00 - Order data

3.8.4.3 Technical data

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

Table 51: 5ACPCC.MPL0-00 - Technical data

3.8.4.3.1 POWERLINK port

Information:

The following characteristics, features and limit values only apply to this individual component and can deviate from those specified for the fully assembled device. For the assembled device in which this individual component is used, refer to the data given specifically for that device.

POWERLINK card 2 connections		
Cabling	S/STP (Cat 5e)	
Cable length	Max. 100 m (min. Cat 5e)	
Speed LED	**On**	**Off**
Green / red	see Status / Error LED	
Link LED	**On**	**Off**
Yellow	Link (POWERLINK network connection available)	Activity (blinking - data transfer in progress)

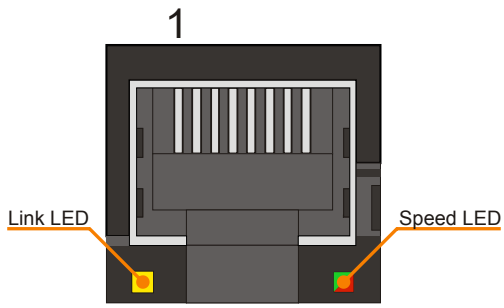


Table 52: 5ACPCC.MPL0-00 - POWERLINK interface

3.8.4.3.2 LED STATUS

The Status/Error LED has two colors, red and green. 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 53: Status/Error LED - Ethernet TCP/IP operating mode

POWERLINK V1

Status LED		
Green	**Red**	**Status of the POWERLINK station**
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 54: Status/Error LED - POWERLINK V1 operating mode

POWERLINK V2

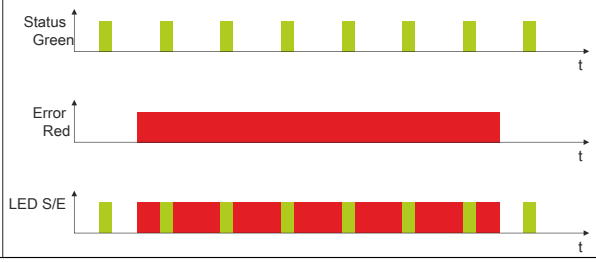
Red - Error	Description
On	The POWERLINK interface has encountered an error (failed Ethernet frames, increased number of collisions on the network, etc.). If an error occurs in the following states, then the green LED blinks over the red LED: • BASIC_ETHERNET • PRE_OPERATIONAL_1 • PRE_OPERATIONAL_2 • READY_TO_OPERATE 

Table 55: Status/Error LED as an Error LED - POWERLINK V2 operating mode

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

Table 56: 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 displayed 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 error	•	•	•	-	Pause	•	•	•	-	Pause
Hardware errors	-	•	•	-	Pause	-	•	•	-	Pause

Table 57: Status/error LED as error LED - system failure error codes

3.8.4.3.3 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

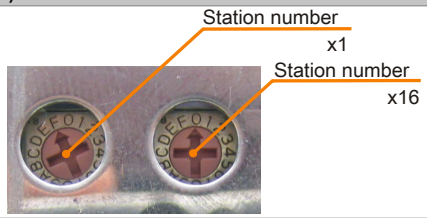


Table 58: POWERLINK station number (x1, x16)

3.8.4.3.4 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.

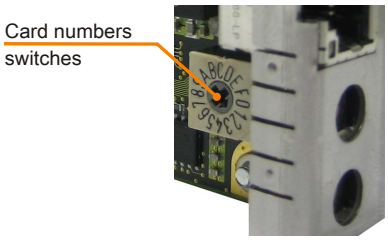


Figure 28: POWERLINK card 2-port node number switch

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

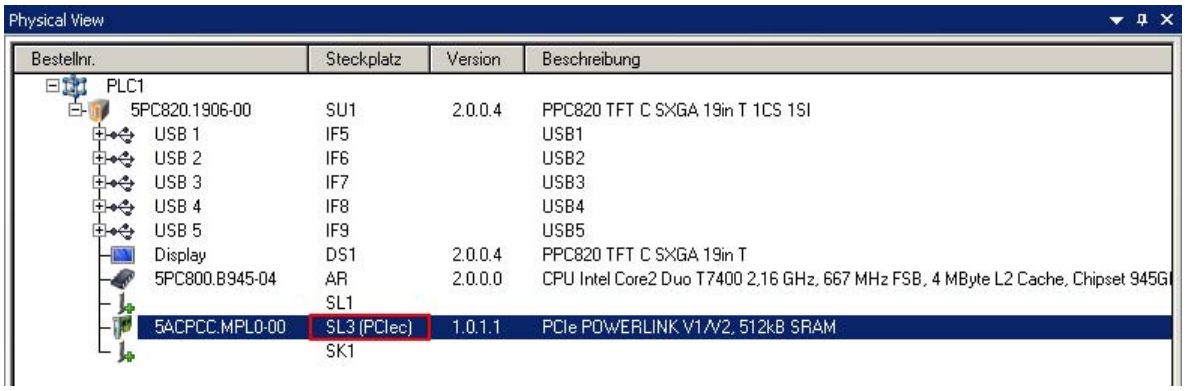


Figure 29: Integrating the POWERLINK plug-in card in Automation Studio

3.8.4.3.5 SRAM

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

3.9 Drives

3.9.1 5AC801.HDDI-00

3.9.1.1 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.

3.9.1.2 Order data

Model number	Short description	Figure
	Drives	
5AC801.HDDI-00	40 GB slide-in compact SATA hard disk; 24/7 operation with extended temperature range. Note: Please see the manual for information about using this hard disk.	

Table 59: 5AC801.HDDI-00 - Order data

3.9.1.3 Technical data

> **Information:**
>
> **The following characteristics, features and limit values only apply to this individual component and can deviate from those specified for the fully assembled device. For the assembled device in which this individual component is used, refer to the data given specifically for that device.**

Product ID	5AC801.HDDI-00
General information	
Certification	
CE	Yes
cULus	Yes
GL	Yes
Hard disk drive	
Capacity	40 GB
Number of heads	1
Number of sectors	78,140,160
Bytes per sector	512
Cache	8 MB
Speed	5400 rpm ±1%
Startup time	Typ. 3 s (from 0 rpm to read access)
MTBF	750,000 POH [1)]
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)

Table 60: 5AC801.HDDI-00 - Technical data

Product ID	5AC801.HDDI-00
Positioning time	
Minimum (track to track)	1 ms
Nominal (read only)	12.5 ms
Maximum (read only)	23 ms
Environmental conditions	
Temperature [2]	
Operation [3]	-30 to 85°C
24-hour operation [4]	-30 to 85°C
Storage	-40 to 95°C
Transport	-40 to 95°C
Relative humidity [5]	
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 150 g and 11 ms duration; no unrecoverable errors
Storage	800 g and 2 ms duration; no unrecoverable errors 400 g and 0.5 ms duration; no unrecoverable errors
Transport	800 g and 2 ms duration; no unrecoverable errors 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 [6]
Dimensions	
Width	13 mm
Height	98 mm
Depth	105 mm
Weight	134 g
Manufacturer information	
Manufacturer	Seagate
Manufacturer product ID	ST940817SM

Table 60: 5AC801.HDDI-00 - Technical data

1) With 8760 POH (power on hours) per year and 70°C surface temperature.
2) Temperature values at an altitude of 305 meters. 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.

3.9.1.4 Temperature humidity diagram

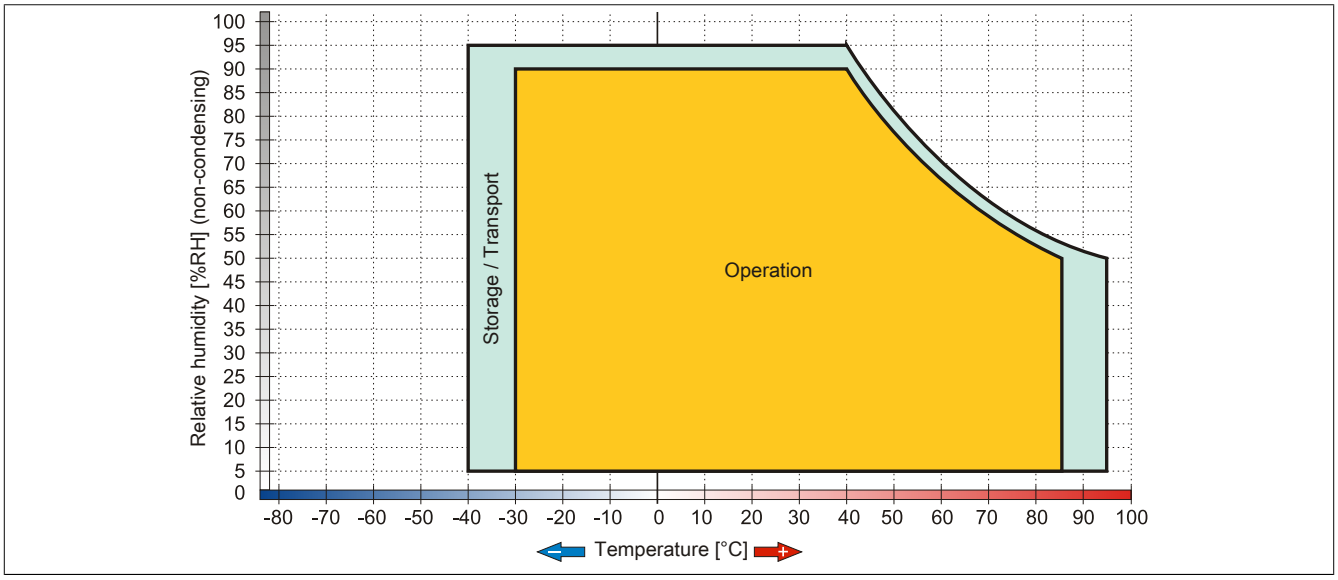


Figure 30: 5AC801.HDDI-00 - Temperature humidity diagram

3.9.2 5AC801.HDDI-03

3.9.2.1 General information

This 250 GB slide-in compact hard disk is specified for 24-hour operation and 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.

3.9.2.2 Order data

Model number	Short description	Figure
	Drives	
5AC801.HDDI-03	250 GB slide-in compact SATA hard disk, 24/7 operation. Note: Please see the manual for information about using this hard disk.	
	Optional accessories	
	Drives	
5MMHDD.0250-00	250 GB SATA hard disk replacement part for 5AC801.HDDI-03 and 5ACPCI.RAIC-05; Note: Please see the manual for information about using this hard disk.	

Table 61: 5AC801.HDDI-03 - Order data

3.9.2.3 Technical data

> **Information:**
>
> **The following characteristics, features and limit values only apply to this individual component and can deviate from those specified for the fully assembled device. For the assembled device in which this individual component is used, refer to the data given specifically for that device.**

Product ID	5AC801.HDDI-03
General information	
Certification	
CE	Yes
cULus	Yes
cULus HazLoc Class 1 Division 2	Yes
ATEX Zone 22	Yes
GL	Yes
Hard disk drive	
Capacity	250 GB
Number of heads	1
Number of sectors	488,397,168
Bytes per sector	512
Cache	8 MB
Speed	5400 rpm ±0.2%
Startup time	Typ. 3.6 s (from 0 rpm to read access)
MTBF	550,000 POH [1)]
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 PIO mode 0-4, multiword DMA mode 0-2, UDMA mode 0-6
Data transfer rate	
Internal	Max. 1175 Mbit/s
To/From host	Max. 150 MB/s (SATA I), max. 300 MB/s (SATA II)

Table 62: 5AC801.HDDI-03 - Technical data

Product ID	5AC801.HDDI-03
Positioning time	
Minimum (track to track)	1 ms
Nominal (read only)	14 ms
Maximum (read only)	30 ms
Environmental conditions	
Temperature [2]	
Operation [3]	0 to 60°C
24-hour operation [4]	0 to 60°C
Storage	-40 to 70°C
Transport	-40 to 70°C
Relative humidity [5]	
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 1000 g and 1 ms duration; no unrecoverable errors 600 g and 0.5 ms duration; no unrecoverable errors
Transport	800 g and 2 ms duration; no unrecoverable errors 1000 g and 1 ms duration; no unrecoverable errors 600 g and 0.5 ms duration; no unrecoverable errors
Altitude	
Operation	-300 to 3048 m
Storage	-300 to 12192 m
Mechanical characteristics	
Installation	Fixed [6]
Dimensions	
Width	13 mm
Height	98 mm
Depth	105 mm
Weight	134 g
Manufacturer information	
Manufacturer	Seagate
Manufacturer product ID	ST9250315AS

Table 62: 5AC801.HDDI-03 - Technical data

1) With 8760 POH (power on hours) per year and 25°C surface temperature.
2) Temperature values at an altitude of 305 meters. 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.

3.9.2.4 Temperature humidity diagram

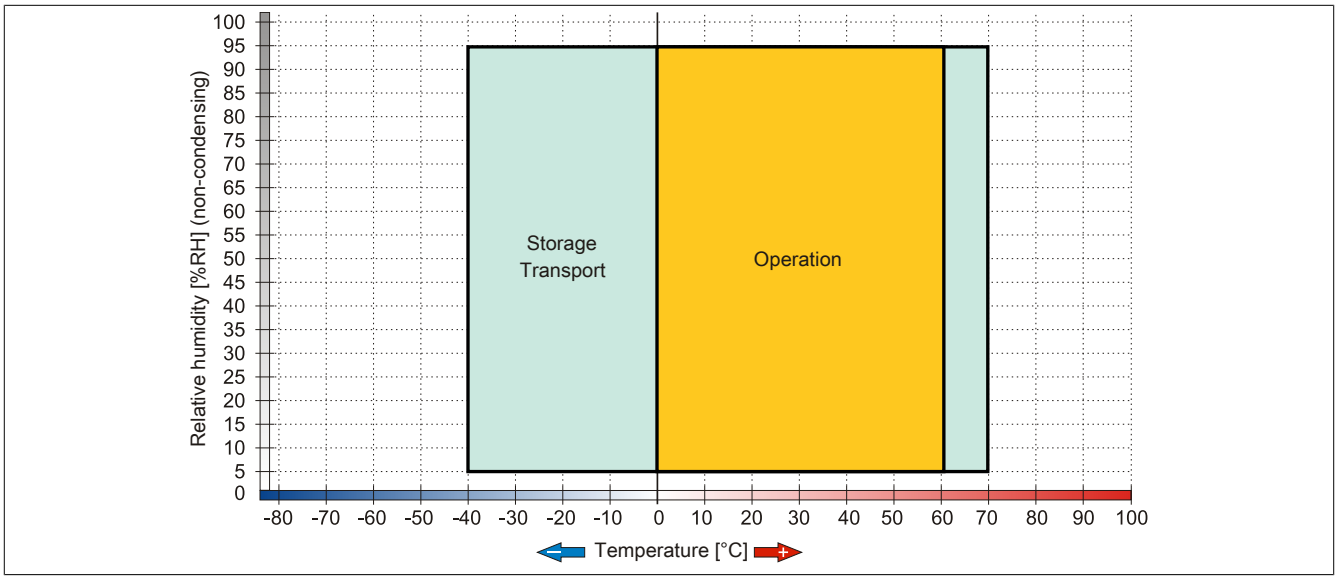


Figure 31: 5AC801.HDDI-03 - Temperature humidity diagram

3.9.3 5AC801.HDDI-04

3.9.3.1 General information

This 500 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.

- 500 GB hard disk
- Slide-in compact
- Specified for 24-hour operation
- S.M.A.R.T. Support

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.

3.9.3.2 Order data

Model number	Short description	Figure
	Drives	
5AC801.HDDI-04	500 GB SATA hard disk (slide-in compact); 24/7 hard disk. Note: Please see the manual for information about using this hard disk.	
	Optional accessories	
	Drives	
5MMHDD.0500-00	500 GB SATA hard disk replacement part for 5AC801.HDDI-04, 5AC901.CHDD-01 and 5ACPCI.RAIC-06; Note: Please see the manual for information about using this hard disk.	

Table 63: 5AC801.HDDI-04 - Order data

3.9.3.3 Technical data

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate from those specified for the fully assembled device. The data specifications for the fully assembled device take precedence over those of individual components.

Product ID	5AC801.HDDI-04
General information	
Certification	
CE	Yes
cULus	Yes
GL	Yes
Hard disk drive	
Capacity	500 GB
Number of heads	2
Number of sectors	976,773,168
Bytes per sector	512 (logical) / 4096 (physical)
Cache	16 MB
Speed	5400 rpm ±0.2%
Startup time	Typ. 3.5 s (from 0 rpm to read access)
Service life	5 years
MTBF	1,000,000 POH [1)]
S.M.A.R.T. Support	Yes
Interface	SATA
Access time	5.5 ms
Supported transfer modes	SATA II
Data transfer rate	
Internal	Max. 147 MB/s
To/From host	Max. 150 MB/s (SATA I), max. 300 MB/s (SATA II)
Positioning time	
Nominal (read only)	11 ms
Maximum (read only)	21 ms

Table 64: 5AC801.HDDI-04 - Technical data

Product ID	5AC801.HDDI-04
Environmental conditions	
Temperature [2]	
Operation [3]	0 to 60°C
24-hour operation [4]	0 to 60°C
Storage	-40 to 70°C
Transport	-40 to 70°C
Relative humidity [5]	
Operation	5 to 95%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Vibration	
Operation (continuous)	5 to 500 Hz: 0.25 g; no unrecoverable errors
Operation (occasional)	5 to 500 Hz: 0.5 g; no unrecoverable errors
Storage	10 to 500 Hz: 5 g; no unrecoverable errors
Transport	10 to 500 Hz: 5 g; no unrecoverable errors
Shock	
Operation	400 g and 2 ms duration; no unrecoverable errors
Storage	1000 g and 2 ms duration; no unrecoverable errors
Transport	1000 g and 2 ms duration; no unrecoverable errors
Altitude	
Operation	-305 to 3048 m
Storage	-305 to 12192 m
Mechanical characteristics	
Installation	Fixed [6]
Dimensions	
Width	13 mm
Height	98 mm
Depth	105 mm
Weight	134 g
Manufacturer information	
Manufacturer	Western Digital
Manufacturer product ID	WD5000LUCT

Table 64: 5AC801.HDDI-04 - Technical data

1) With 8760 POH (power on hours) per year and 25°C surface temperature.
2) Temperature values at an altitude of 305 meters. 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 20% per hour.
6) Slide-in compact mounting.

3.9.3.4 Temperature humidity diagram

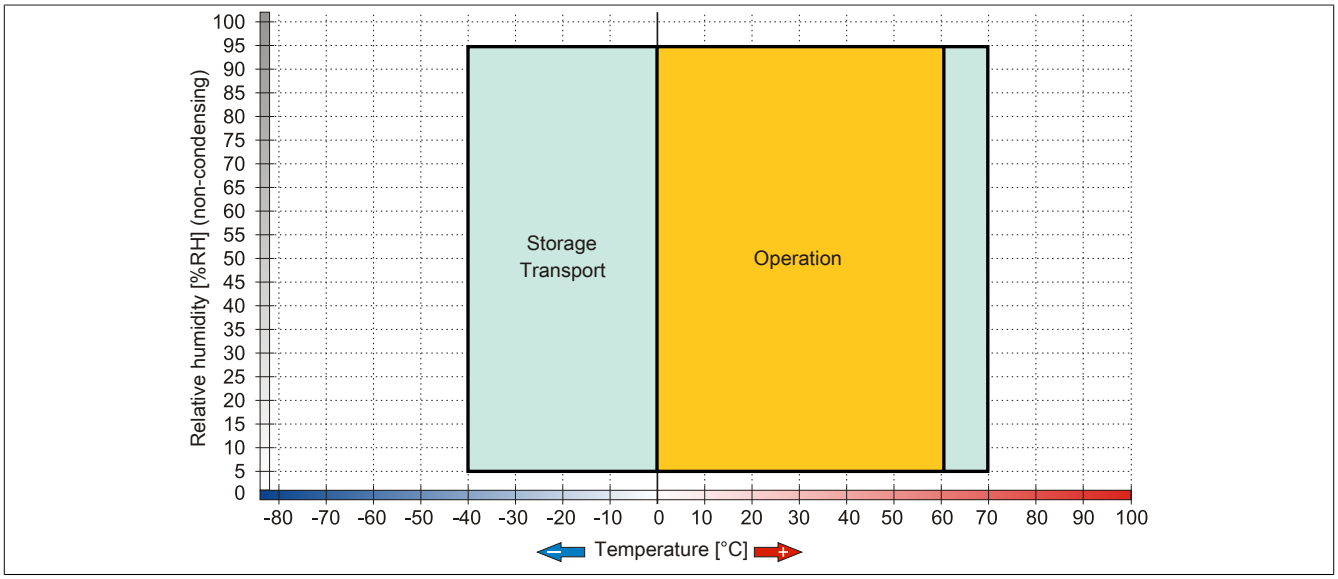


Figure 32: 5AC801.HDDI-04 - Temperature humidity diagram

3.9.4 5AC801.SSDI-00

3.9.4.1 General information

This 32 GB slide-in compact SSD (Solid State Drive) drive can be used in APC810 and PPC800 system units. SSD is based on Single Level Cell (SLC) technology.

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.

3.9.4.2 Order data

Model number	Short description	Figure
	Drives	
5AC801.SSDI-00	32 GB slide-in compact SATA SSD (SLC).	

Table 65: 5AC801.SSDI-00 - Order data

3.9.4.3 Technical data

Caution!

A sudden loss of power may result in data loss! In very rare cases, mass memory may also be damaged.

To prevent damage and loss of data, the use of a UPS device is recommended.

Information:

The following characteristics, features and limit values only apply to this individual component and can deviate from those specified for the fully assembled device. For the assembled device in which this individual component is used, refer to the data given specifically for that device.

Product ID	5AC801.SSDI-00
General information	
Certification	
CE	Yes
cULus	Yes
GL	Yes
Solid state drive	
Capacity	32 GB
Data reliability	< 1 unrecoverable error in 10^{15} 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 [1)]	
4k read	35,000
4k write	3,300

Table 66: 5AC801.SSDI-00 - Technical data

Product ID	5AC801.SSDI-00
Endurance	
Guaranteed data volume	
Guaranteed	700 TB
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 ATA/ATAPI-7 SSD Enhanced SMART ATA feature set Native Command Queuing (NCQ)
Environmental conditions	
Temperature	
Operation	0 to 70°C
Storage	-55 to 95°C
Transport	-55 to 95°C
Relative humidity	
Operation	5 to 95%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
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 12192 m
Storage	-300 to 12192 m
Transport	-300 to 12192 m
Mechanical characteristics	
Installation	Fixed [2)]
Dimensions	
Width	13 mm
Height	98 mm
Depth	105 mm
Weight	118 g
Manufacturer information	
Manufacturer	Intel
Manufacturer product ID	SSDSA2SH032G1

Table 66: 5AC801.SSDI-00 - Technical data

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

3.9.4.4 Temperature humidity diagram

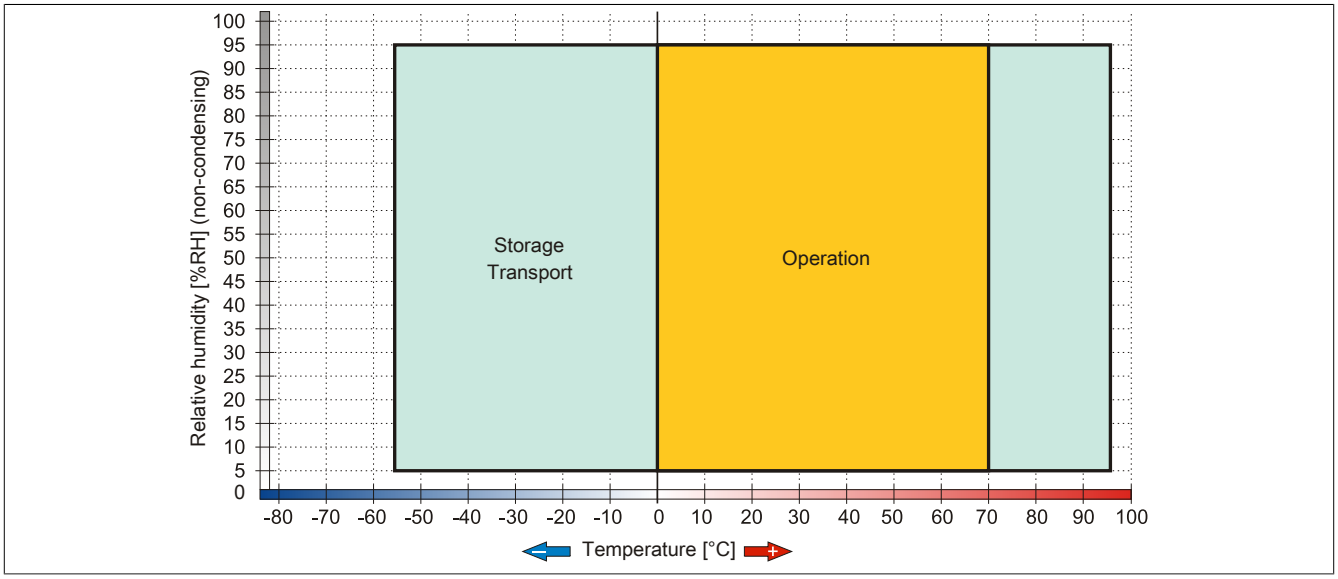


Figure 33: 5AC801.SSDI-00 - Temperature humidity diagram

3.9.4.5 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.

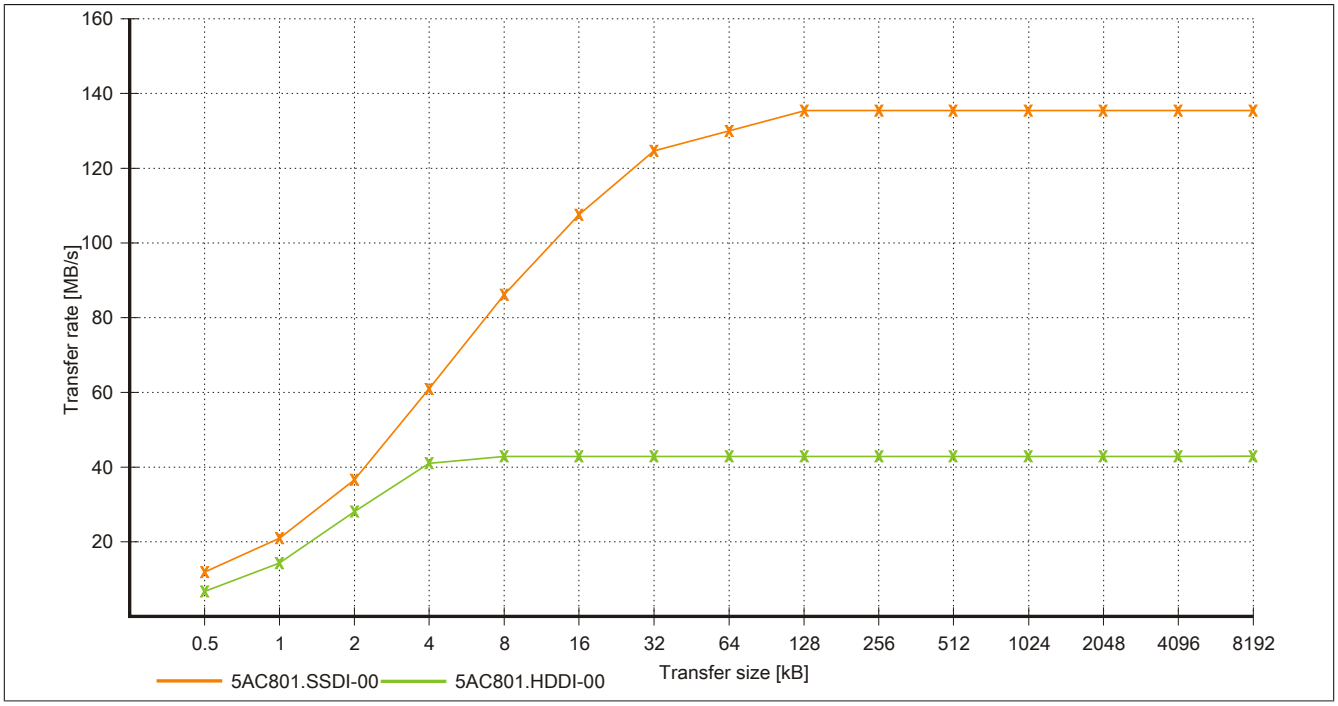


Figure 34: 5AC801.SSDI-00 - ATTO disk benchmark v2.34 - Cyclic read

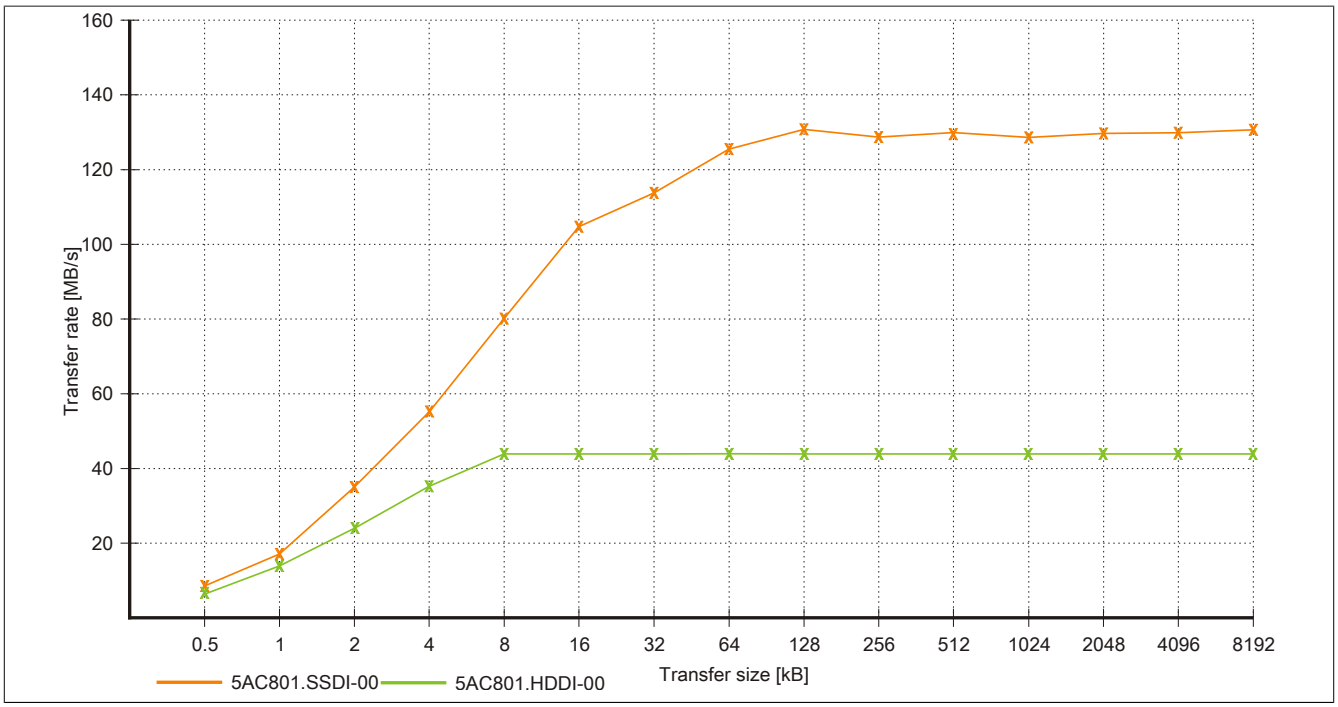


Figure 35: 5AC801.SSDI-00 - ATTO disk benchmark v2.34 - Cyclic write

3.9.5 5AC801.SSDI-01

3.9.5.1 General information

This 60 GB slide-in compact SSD (Solid State Drive) drive can be used in APC810 and PPC800 system units. SSD is based on Multi Level Cell (MLC) technology.

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.

3.9.5.2 Order data

Model number	Short description	Figure
	Drives	
5AC801.SSDI-01	60 GB slide-in compact SATA SSD (MLC).	
	Optional accessories	
	Drives	
5MMSSD.0060-00	60 GB SATA SSD (MLC); replacement part for 5AC801.SSDI-01 and 5AC901.CSSD-01; SSD for 5PP5IO.GMAC-00; note: Please see the manual for information about using this SSD.	

Table 67: 5AC801.SSDI-01 - Order data

3.9.5.3 Technical data

Caution!

A sudden loss of power may result in data loss! In very rare cases, mass memory may also be damaged.

To prevent damage and loss of data, the use of a UPS device is recommended.

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate from those specified for the fully assembled device. The data specifications for the fully assembled device take precedence over those of individual components.

Product ID	5AC801.SSDI-01
General information	
Certification	
CE	Yes
cULus	Yes
GL	Yes
Solid state drive	
Capacity	60 GB
Data reliability	< 1 unrecoverable error in 10^{16} bit read accesses
MTBF	1,200,000 hours
S.M.A.R.T. Support	Yes
Interface	SATA
Maintenance	None
Continuous reading	Max. 550 MB/s with SATA 6 Gbit/s Max. 280 MB/s with SATA 3 Gbit/s
Continuous writing	Max. 475 MB/s with SATA 6 Gbit/s Max. 245 MB/s with SATA 3 Gbit/s

Table 68: 5AC801.SSDI-01 - Technical data

Product ID	5AC801.SSDI-01
IOPS [1]	
4k read	15,000
4k write	
Typical	23,000
Maximum	80,000
Endurance	
MLC flash	Yes
Compatibility	SATA 3.0 compliant ACS-2 SSD Enhanced SMART ATA feature set Native Command Queuing (NCQ)
Environmental conditions	
Temperature	
Operation	0 to 70°C
Storage	-55 to 95°C
Transport	-55 to 95°C
Relative humidity	
Operation	5 to 95%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Vibration	
Operation	5 to 700 Hz: 2.17 g
Storage	5 to 800 Hz: 3.13 g
Transport	5 to 800 Hz: 3.13 g
Shock	
Operation	1500 g, 0.5 ms
Storage	1500 g, 0.5 ms
Transport	1500 g, 0.5 ms
Altitude	
Operation	-300 to 12192 m
Storage	-300 to 12192 m
Transport	-300 to 12192 m
Mechanical characteristics	
Installation	Fixed [2]
Dimensions	
Width	13 mm
Height	98 mm
Depth	105 mm
Weight	118 g
Manufacturer information	
Manufacturer	Intel
Manufacturer product ID	SSDSC2CW060A3

Table 68: 5AC801.SSDI-01 - Technical data

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

3.9.5.4 Temperature humidity diagram

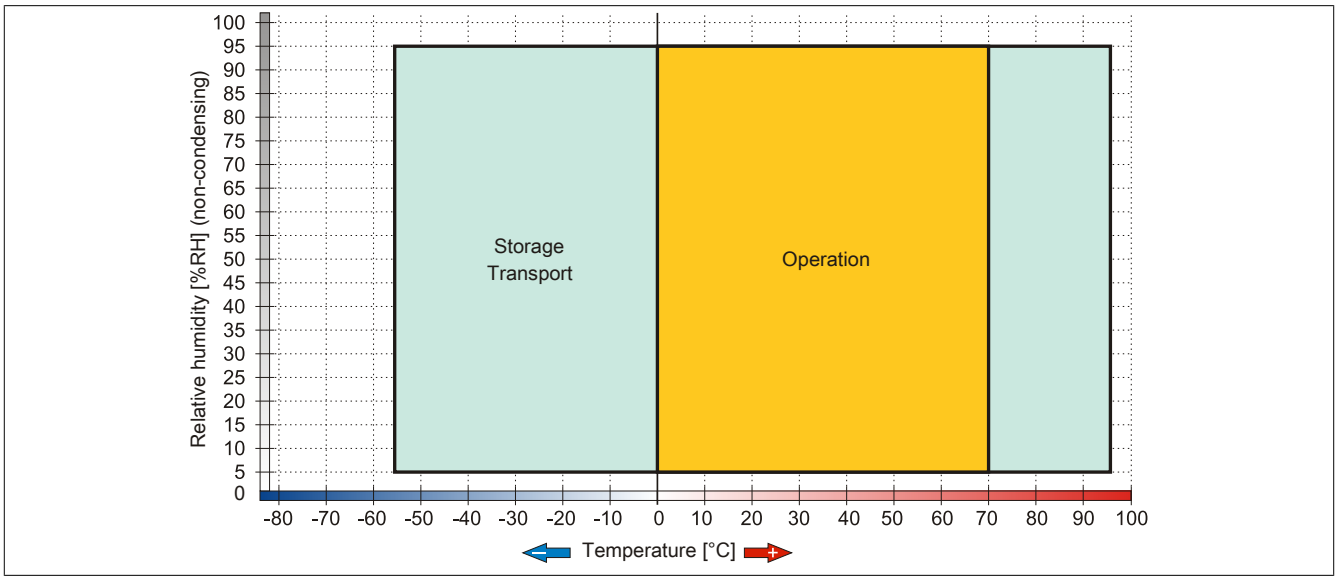


Figure 36: 5AC801.SSDI-01 - Temperature humidity diagram

3.9.6 5AC801.SSDI-02

3.9.6.1 General information

This 180 GB slide-in compact SSD (Solid State Drive) drive can be used in APC810 and PPC800 system units. SSD is based on Multi Level Cell (MLC) technology.

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.

3.9.6.2 Order data

Model number	Short description	Figure
	Drives	
5AC801.SSDI-02	180 GB slide-in compact SATA SSD (MLC).	
	Optional accessories	
	Drives	
5MMSSD.0180-00	180 GB SATA SSD (MLC); replacement part for 5AC801.SSDI-02 and 5AC901.CSSD-02; SSD for 5PP5IO.GMAC-00; note: Please see the manual for information about using this SSD.	

Table 69: 5AC801.SSDI-02 - Order data

3.9.6.3 Technical data

Caution!

A sudden loss of power may result in data loss! In very rare cases, mass memory may also be damaged.

To prevent damage and loss of data, the use of a UPS device is recommended.

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate from those specified for the fully assembled device. The data specifications for the fully assembled device take precedence over those of individual components.

Product ID	5AC801.SSDI-02
General information	
Certification	
CE	Yes
cULus	Yes
GL	Yes
Solid state drive	
Capacity	180 GB
Data reliability	< 1 unrecoverable error in 10^{16} bit read accesses
MTBF	1,200,000 hours
S.M.A.R.T. Support	Yes
Interface	SATA
Maintenance	None
Continuous reading	Max. 550 MB/s with SATA 6 Gbit/s Max. 280 MB/s with SATA 3 Gbit/s
Continuous writing	Max. 520 MB/s with SATA 6 Gbit/s Max. 260 MB/s with SATA 3 Gbit/s

Table 70: 5AC801.SSDI-02 - Technical data

Product ID	5AC801.SSDI-02
IOPS [1]	
4k read	50,000
4k write	
Typical	60,000
Maximum	80,000
Endurance	
MLC flash	Yes
Compatibility	SATA 3.0 compliant ACS-2 SSD Enhanced SMART ATA feature set Native Command Queuing (NCQ)
Environmental conditions	
Temperature	
Operation	0 to 70°C
Storage	-55 to 95°C
Transport	-55 to 95°C
Relative humidity	
Operation	5 to 95%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Vibration	
Operation	5 to 700 Hz: 2.17 g
Storage	5 to 800 Hz: 3.13 g
Transport	5 to 800 Hz: 3.13 g
Shock	
Operation	1500 g, 0.5 ms
Storage	1500 g, 0.5 ms
Transport	1500 g, 0.5 ms
Altitude	
Operation	-300 to 12192 m
Storage	-300 to 12192 m
Transport	-300 to 12192 m
Mechanical characteristics	
Installation	Fixed [2]
Dimensions	
Width	13 mm
Height	98 mm
Depth	105 mm
Weight	118 g
Manufacturer information	
Manufacturer	Intel
Manufacturer product ID	SSDSC2CW180A3

Table 70: 5AC801.SSDI-02 - Technical data

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

3.9.6.4 Temperature humidity diagram

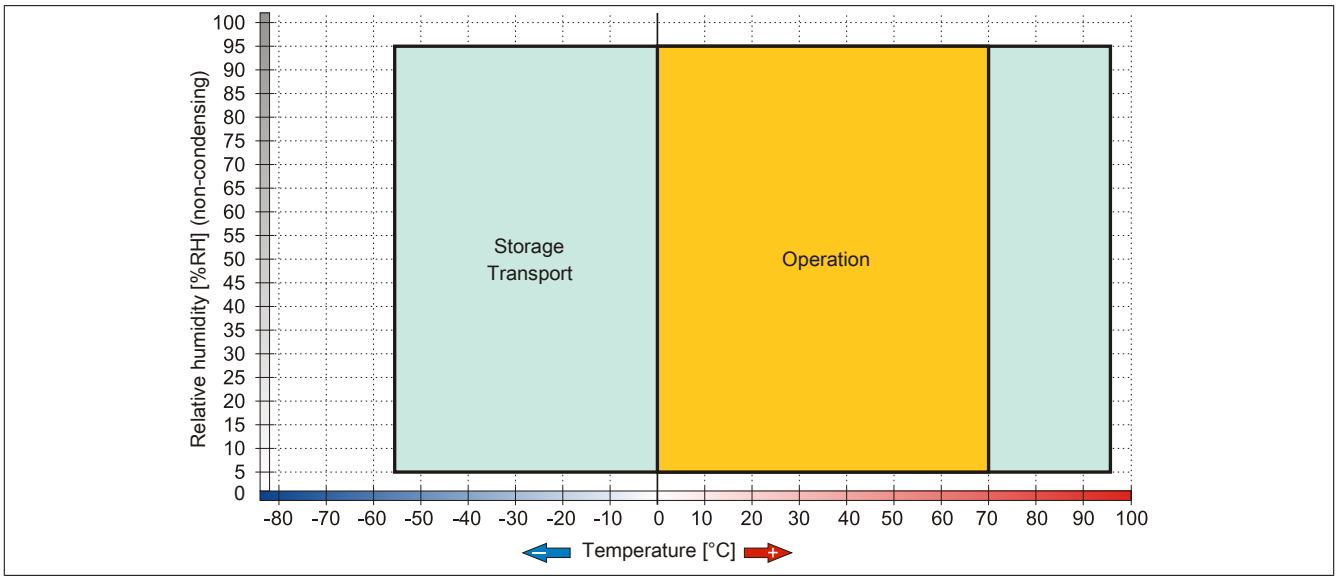


Figure 37: 5AC801.SSDI-02 - Temperature humidity diagram

3.9.7 5AC801.SSDI-03

3.9.7.1 General information

This 60 GB slide-in compact SSD (Solid State Drive) drive can be used in APC810 and PPC800 system units. SSD is based on Multi Level Cell (MLC) technology.

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.

3.9.7.2 Order data

Model number	Short description	Figure
	Drives	
5AC801.SSDI-03	60 GB slide-in compact SATA SSD (MLC).	
	Optional accessories	
	Drives	
5MMSSD.0060-01	60 GB SATA SSD (MLC); replacement part for 5AC801.SSDI-03 and 5AC901.CSSD-03; SSD for 5PP5IO.GMAC-00; note: Please see the manual for information about using this SSD.	

Table 71: 5AC801.SSDI-03 - Order data

3.9.7.3 Technical data

> **Caution!**
>
> **A sudden loss of power may result in data loss! In very rare cases, mass memory may also be damaged.**
>
> **To prevent damage and loss of data, the use of a UPS device is recommended.**

> **Information:**
>
> **The following characteristics, features and limit values only apply to this accessory and can deviate from those specified for the fully assembled device. The data specifications for the fully assembled device take precedence over those of individual components.**

Product ID	5AC801.SSDI-03
General information	
Certification	
CE	Yes
cULus	Yes
GL	Yes
Solid state drive	
Capacity	60 GB
Data reliability	< 1 unrecoverable error in 10^{15} bit read accesses
MTBF	1,500,000 hours
S.M.A.R.T. Support	Yes
Interface	SATA
Maintenance	None
Continuous reading	Max. 510 MB/s
Continuous writing	Max. 430 MB/s
IOPS [1)]	
4k read	Max. 60,000 (random)
4k write	Max. 25,000 (random)
Endurance	
MLC flash	Yes

Table 72: 5AC801.SSDI-03 - Technical data

Product ID	5AC801.SSDI-03
Compatibility	SATA 3.0 compliant ACS-2 SSD Enhanced SMART ATA feature set Native Command Queuing (NCQ)
Environmental conditions	
Temperature	
Operation	0 to 70°C
Storage	-40 to 95°C
Transport	-40 to 95°C
Relative humidity	
Operation	8 to 95%, non-condensing
Storage	8 to 95%, non-condensing
Transport	8 to 95%, non-condensing
Vibration	
Operation	10 to 2000 Hz: 20 g
Storage	10 to 2000 Hz: 20 g
Transport	10 to 2000 Hz: 20 g
Shock	
Operation	1500 g, 0.5 ms
Storage	1500 g, 0.5 ms
Transport	1500 g, 0.5 ms
Altitude	
Operation	-300 to 12192 m
Storage	-300 to 12192 m
Transport	-300 to 12192 m
Mechanical characteristics	
Installation	Fixed [2]
Dimensions	
Width	13 mm
Height	98 mm
Depth	105 mm
Weight	118 g
Manufacturer information	
Manufacturer	Toshiba
Manufacturer product ID	THNSNH060GBST

Table 72: 5AC801.SSDI-03 - Technical data

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

3.9.7.4 Temperature humidity diagram

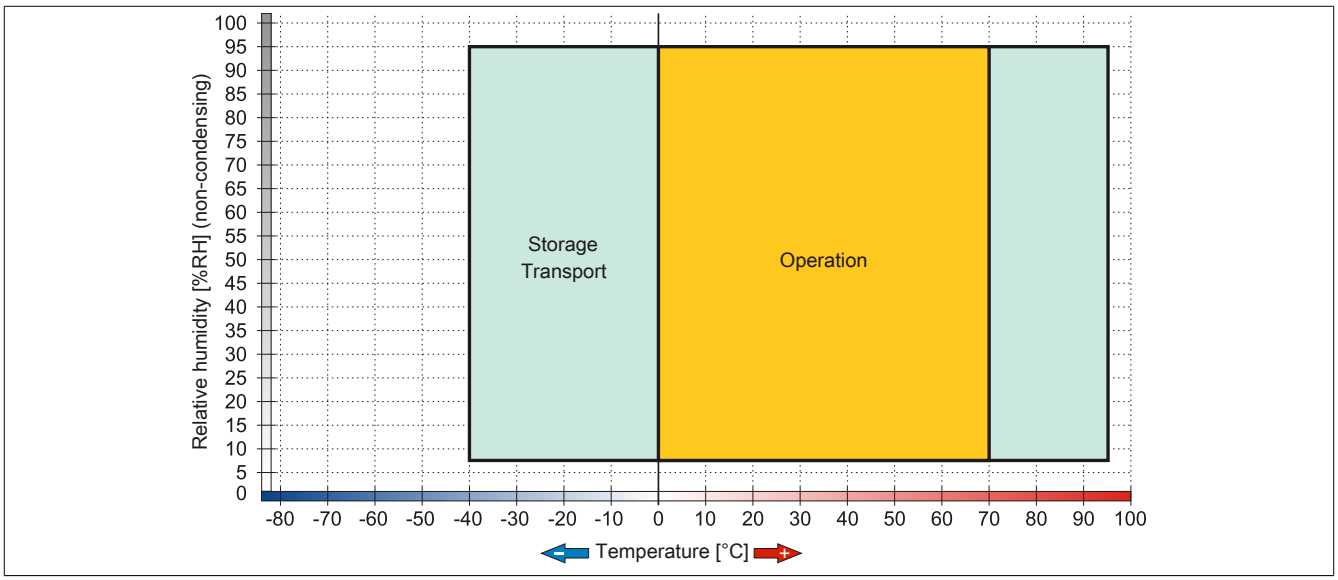


Figure 38: 5AC801.SSDI-03 - Temperature humidity diagram

3.9.8 5MMSSD.0060-00

3.9.8.1 General information

This 60 GB slide-in compact SSD (solid state drive) drive can be used as a replacement or accessory part. This SSD is based on multi-level cell (MLC) technology.

- Replacement drive for 5AC801.SSDI-01 or 5AC901.CSSD-01 SSD drives
- Accessory for the APC510 (optional SSD for I/O board)

3.9.8.2 Order data

Model number	Short description	Figure
	Drives	
5MMSSD.0060-00	60 GB SATA SSD (MLC); replacement part for 5AC801.SSDI-01 and 5AC901.CSSD-01; SSD for 5PP5IO.GMAC-00; note: Please see the manual for information about using this SSD.	

Table 73: 5MMSSD.0060-00 - Order data

3.9.8.3 Technical data

Caution!

A sudden loss of power may result in data loss! In very rare cases, mass memory may also be damaged.

To prevent damage and loss of data, the use of a UPS device is recommended.

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate from those specified for the fully assembled device. The data specifications for the fully assembled device take precedence over those of individual components.

Product ID	5MMSSD.0060-00
General information	
Certification	
CE	Yes
cULus	Yes
Solid state drive	
Capacity	60 GB
Data reliability	< 1 unrecoverable error in 10^{16} bit read accesses
MTBF	1,200,000 hours
S.M.A.R.T. Support	Yes
Interface	SATA
Maintenance	None
Continuous reading	Max. 550 MB/s with SATA 6 Gbit/s Max. 280 MB/s with SATA 3 Gbit/s
Continuous writing	Max. 475 MB/s with SATA 6 Gbit/s Max. 245 MB/s with SATA 3 Gbit/s
IOPS [1)]	
4k read	15,000
4k write	
Typical	23,000
Maximum	80,000
Endurance	
MLC flash	Yes
Compatibility	SATA 3.0 compliant ACS-2 SSD Enhanced SMART ATA feature set Native Command Queuing (NCQ)

Table 74: 5MMSSD.0060-00 - Technical data

Product ID	5MMSSD.0060-00
Environmental conditions	
Temperature	
Operation	0 to 70°C
Storage	-55 to 95°C
Transport	-55 to 95°C
Relative humidity	
Operation	5 to 95%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Vibration	
Operation	5 to 700 Hz: 2.17 g
Storage	5 to 800 Hz: 3.13 g
Transport	5 to 800 Hz: 3.13 g
Shock	
Operation	1500 g, 0.5 ms
Storage	1500 g, 0.5 ms
Transport	1500 g, 0.5 ms
Altitude	
Operation	-300 to 12192 m
Storage	-300 to 12192 m
Transport	-300 to 12192 m
Mechanical characteristics	
Dimensions	
Width	9.5 mm
Height	69 mm
Depth	100 mm
Weight	78 g
Manufacturer information	
Manufacturer	Intel
Manufacturer product ID	SSDSC2CW060A3

Table 74: 5MMSSD.0060-00 - Technical data

1) IOPS: Random read and write input/output operations per second.

3.9.8.4 Temperature humidity diagram

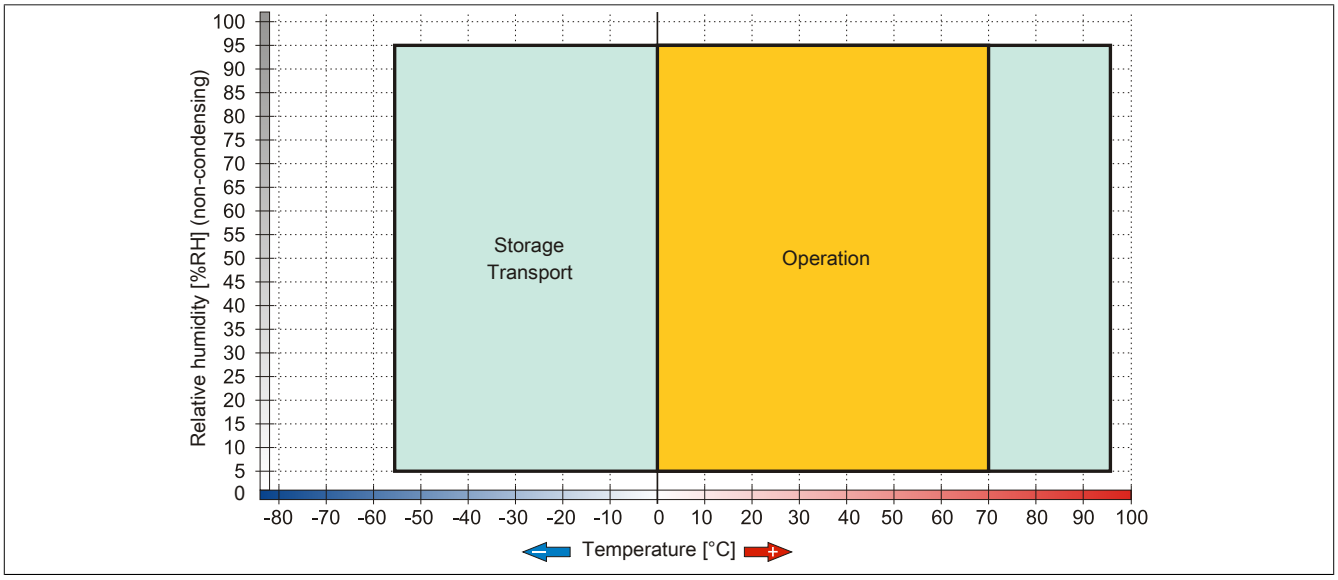


Figure 39: 5MMSSD.0060-00 - Temperature humidity diagram

3.9.9 5MMSSD.0060-01

3.9.9.1 General information

This 60 GB slide-in compact SSD (solid state drive) drive can be used as a replacement or accessory part. This SSD is based on multi-level cell (MLC) technology.

- Replacement drive for 5AC801.SSDI-03 or 5AC901.CSSD-03 SSD drives
- Accessory for the APC510 (optional SSD for I/O board)

3.9.9.2 Order data

Model number	Short description	Figure
	Drives	Image not found for 5MMSSD.0060-01!
5MMSSD.0060-01	60 GB SATA SSD (MLC); replacement part for 5AC801.SSDI-03 and 5AC901.CSSD-03; SSD for 5PP5IO.GMAC-00; note: Please see the manual for information about using this SSD.	

Table 75: 5MMSSD.0060-01 - Order data

3.9.9.3 Technical data

Caution!

A sudden loss of power may result in data loss! In very rare cases, mass memory may also be damaged.

To prevent damage and loss of data, the use of a UPS device is recommended.

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate from those specified for the fully assembled device. The data specifications for the fully assembled device take precedence over those of individual components.

Product ID	5MMSSD.0060-01
General information	
Certification	
CE	Yes
cULus	Yes
Solid state drive	
Capacity	60 GB
Data reliability	< 1 unrecoverable error in 10^{15} bit read accesses
MTBF	1,500,000 hours
S.M.A.R.T. Support	Yes
Interface	SATA
Maintenance	None
Continuous reading	Max. 510 MB/s
Continuous writing	Max. 430 MB/s
IOPS [1)]	
4k read	Max. 60,000 (random)
4k write	Max. 25,000 (random)
Endurance	
MLC flash	Yes
Compatibility	SATA 3.0 compliant ACS-2 SSD Enhanced SMART ATA feature set Native Command Queuing (NCQ)
Environmental conditions	
Temperature	
Operation	0 to 70°C
Storage	-40 to 95°C
Transport	-40 to 95°C
Relative humidity	
Operation	8 to 95%, non-condensing
Storage	8 to 95%, non-condensing
Transport	8 to 95%, non-condensing
Vibration	
Operation	10 to 2000 Hz: 20 g
Storage	10 to 2000 Hz: 20 g
Transport	10 to 2000 Hz: 20 g

Table 76: 5MMSSD.0060-01 - Technical data

Product ID	5MMSSD.0060-01
Shock	
Operation	1500 g, 0.5 ms
Storage	1500 g, 0.5 ms
Transport	1500 g, 0.5 ms
Altitude	
Operation	-300 to 12192 m
Storage	-300 to 12192 m
Transport	-300 to 12192 m
Mechanical characteristics	
Dimensions	
Width	9.5 mm
Height	69 mm
Depth	100 mm
Weight	78 g
Manufacturer information	
Manufacturer	Toshiba
Manufacturer product ID	THNSNH060GBST

Table 76: 5MMSSD.0060-01 - Technical data

1) IOPS: Random read and write input/output operations per second.

3.9.9.4 Temperature humidity diagram

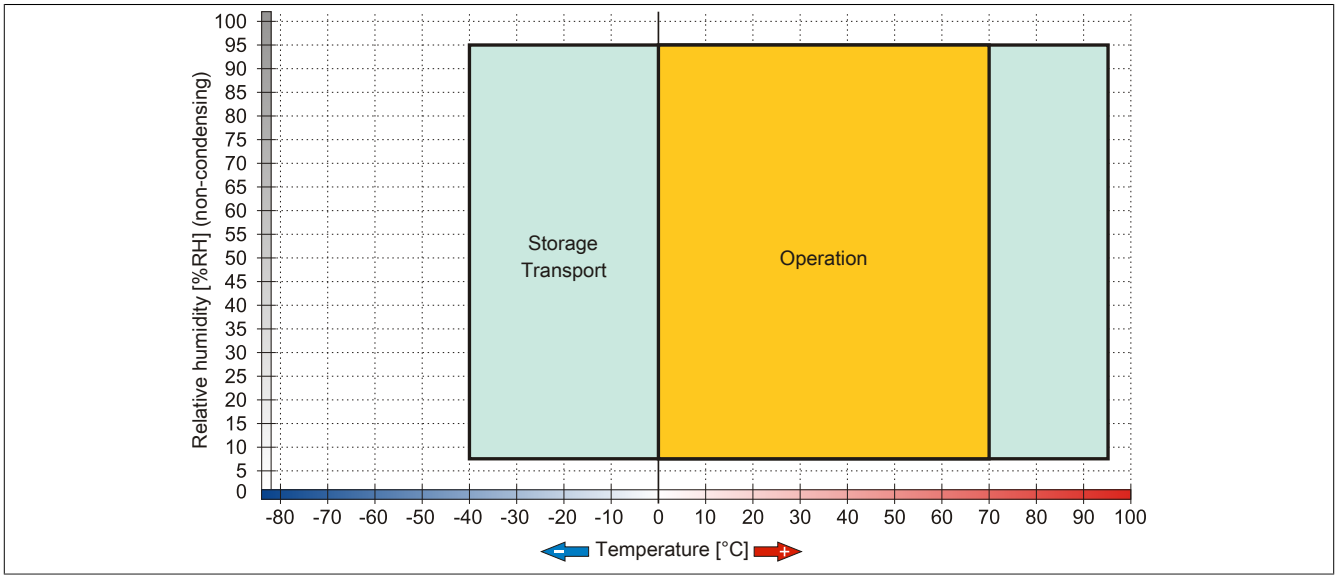


Figure 40: 5MMSSD.0060-01 - Temperature humidity diagram

3.9.10 5MMSSD.0180-00

3.9.10.1 General information

This 180 GB slide-in compact SSD (solid state drive) drive can be used as a replacement or accessory part. SSD is based on Multi Level Cell (MLC) technology.

- Replacement drive for 5AC801.SSDI-02 or 5AC901.CSSD-02 SSD drives
- Accessory for the APC510 (optional SSD for I/O board)

3.9.10.2 Order data

Model number	Short description	Figure
	Drives	
5MMSSD.0180-00	180 GB SATA SSD (MLC); replacement part for 5AC801.SSDI-02 and 5AC901.CSSD-02; SSD for 5PP5IO.GMAC-00; note: Please see the manual for information about using this SSD.	

Table 77: 5MMSSD.0180-00 - Order data

3.9.10.3 Technical data

Caution!

A sudden loss of power may result in data loss! In very rare cases, mass memory may also be damaged.

To prevent damage and loss of data, the use of a UPS device is recommended.

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate from those specified for the fully assembled device. The data specifications for the fully assembled device take precedence over those of individual components.

Product ID	5MMSSD.0180-00
General information	
Certification	
CE	Yes
cULus	Yes
Solid state drive	
Capacity	180 GB
Data reliability	< 1 unrecoverable error in 10^{16} bit read accesses
MTBF	1,200,000 hours
S.M.A.R.T. Support	Yes
Interface	SATA
Maintenance	None
Continuous reading	Max. 550 MB/s with SATA 6 Gbit/s Max. 280 MB/s with SATA 3 Gbit/s
Continuous writing	Max. 520 MB/s with SATA 6 Gbit/s Max. 260 MB/s with SATA 3 Gbit/s
IOPS [1)]	
4k read	50,000
4k write	
Typical	60,000
Maximum	80,000
Endurance	
MLC flash	Yes
Compatibility	SATA 3.0 compliant ACS-2 SSD Enhanced SMART ATA feature set Native Command Queuing (NCQ)

Table 78: 5MMSSD.0180-00 - Technical data

Product ID	5MMSSD.0180-00
Environmental conditions	
Temperature	
Operation	0 to 70°C
Storage	-55 to 95°C
Transport	-55 to 95°C
Relative humidity	
Operation	5 to 95%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Vibration	
Operation	5 to 700 Hz: 2.17 g
Storage	5 to 800 Hz: 3.13 g
Transport	5 to 800 Hz: 3.13 g
Shock	
Operation	1500 g, 0.5 ms
Storage	1500 g, 0.5 ms
Transport	1500 g, 0.5 ms
Altitude	
Operation	-300 to 12192 m
Storage	-300 to 12192 m
Transport	-300 to 12192 m
Mechanical characteristics	
Dimensions	
Width	9.5 mm
Height	69 mm
Depth	100 mm
Weight	78 g
Manufacturer information	
Manufacturer	Intel
Manufacturer product ID	SSDSC2CW180A3

Table 78: 5MMSSD.0180-00 - Technical data

1) IOPS: Random read and write input/output operations per second.

3.9.10.4 Temperature humidity diagram

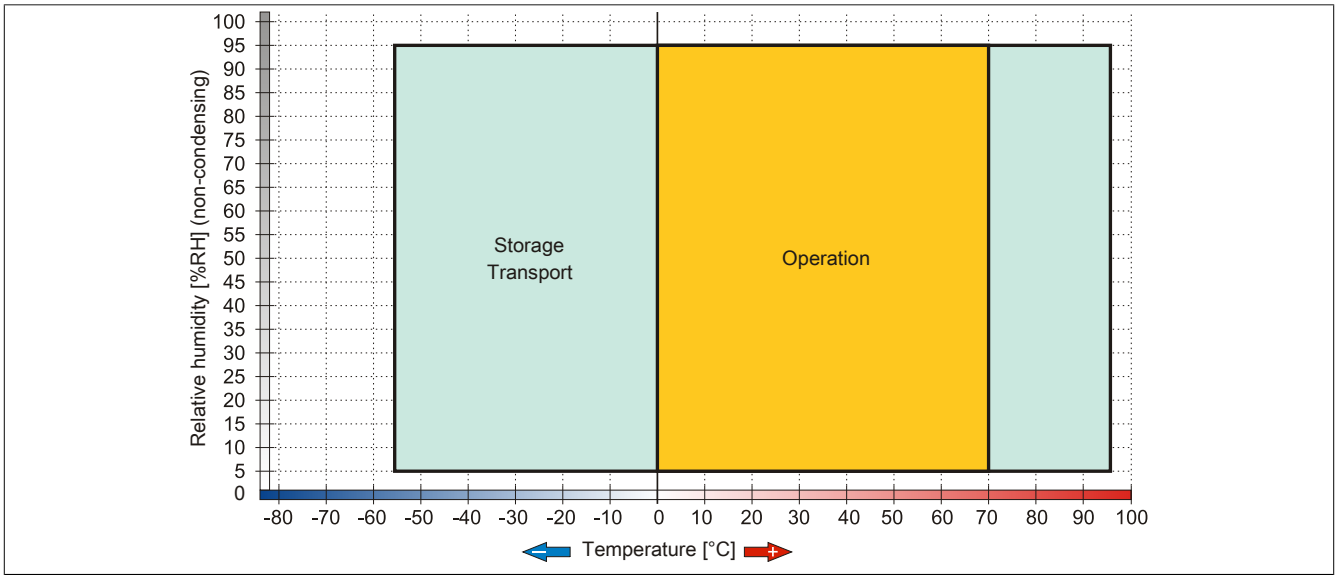


Figure 41: 5MMSSD.0180-00 - Temperature humidity diagram

3.9.11 5AC801.ADAS-00

3.9.11.1 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.**

3.9.11.2 Order data

Model number	Short description	Figure
	Drives	
5AC801.ADAS-00	SATA hard disk adapter for operating a slide-in compact hard disk in a slide-in slot	

Table 79: 5AC801.ADAS-00 - Order data

3.9.11.3 Technical data

Product ID	5AC801.ADAS-00
General information	
Certification	
CE	Yes
cULus	Yes
GL	Yes
Mechanical characteristics	
Dimensions	
Width	22 mm
Height	172.5 mm
Depth	150 mm
Weight	328 g

Table 80: 5AC801.ADAS-00 - Technical data

3.9.12 5AC801.HDDS-00

3.9.12.1 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:

A slide-in drive can be added or removed 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 and USB.

3.9.12.2 Order data

Model number	Short description	Figure
	Drives	
5AC801.HDDS-00	40 GB slide-in SATA hard disk; 24/7 operation with extended temperature range. Note: Please see the manual for information about using this hard disk.	

Table 81: 5AC801.HDDS-00 - Order data

3.9.12.3 Technical data

Information:

The following characteristics, features and limit values only apply to this individual component and can deviate from those specified for the fully assembled device. For the assembled device in which this individual component is used, refer to the data given specifically for that device.

Product ID	5AC801.HDDS-00
General information	
Certification	
CE	Yes
cULus	Yes
GL	Yes
Hard disk drive	
Capacity	40 GB
Number of heads	1
Number of sectors	78,140,160
Bytes per sector	512
Cache	8 MB
Speed	5400 rpm ±1%
Startup time	Typ. 3 s (from 0 rpm to read access)
MTBF	750,000 POH [1)]
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)

Table 82: 5AC801.HDDS-00 - Technical data

Product ID	5AC801.HDDS-00
Positioning time	
Minimum (track to track)	1 ms
Nominal (read only)	12.5 ms
Maximum (read only)	23 ms
Environmental conditions	
Temperature [2]	
Operation [3]	-30 to 85°C
24-hour operation [4]	-30 to 85°C
Storage	-40 to 95°C
Transport	-40 to 95°C
Relative humidity [5]	
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 150 g and 11 ms duration; no unrecoverable errors
Storage	800 g and 2 ms duration; no unrecoverable errors 400 g and 0.5 ms duration; no unrecoverable errors
Transport	800 g and 2 ms duration; no unrecoverable errors 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 [6]
Dimensions	
Width	22 mm
Height	172.5 mm
Depth	150 mm
Weight	387 g
Manufacturer information	
Manufacturer	Seagate
Manufacturer product ID	ST940817SM

Table 82: 5AC801.HDDS-00 - Technical data

1) With 8760 POH (power on hours) per year and 70°C surface temperature.
2) Temperature values at an altitude of 305 meters. 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.

3.9.12.4 Temperature humidity diagram

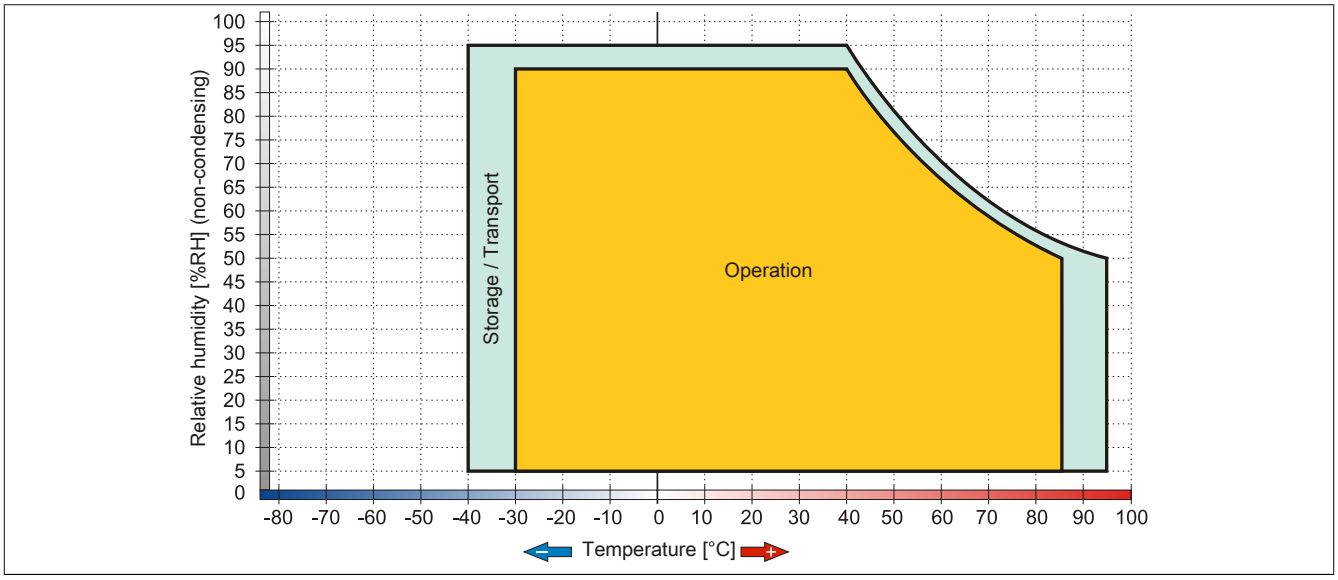


Figure 42: 5AC801.HDDS-00 - Temperature humidity diagram

3.9.13 5AC801.DVDS-00

3.9.13.1 General information

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

> **Information:**
>
> **A slide-in drive can be added or removed 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 and USB.

3.9.13.2 Order data

Model number	Short description	Figure
	Drives	
5AC801.DVDS-00	DVD-ROM slide-in SATA drive.	

Table 83: 5AC801.DVDS-00 - Order data

3.9.13.3 Technical data

> **Information:**
>
> **The following characteristics, features and limit values only apply to this individual component and can deviate from those specified for the fully assembled device. For the assembled device in which this individual component is used, refer to the data given specifically for that device.**

Product ID	5AC801.DVDS-00
General information	
Certification	
CE	Yes
cULus	Yes
GL	Yes
CD / DVD drive	
Data transfer rate	Max. 1.5 Gbit/s
Speed	Max. 5090 rpm ±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 CD-ROM XA mode 2 (form 1, form 2) Photo CD (single/multi-session) Enhanced CD, CD text 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
Service life	60000 POH (power-on hours)
Interface	SATA
Startup time	
CD	Max. 19 seconds (0 RPM to read access)
DVD	Max. 19 seconds (0 RPM to read access)

Table 84: 5AC801.DVDS-00 - Technical data

Product ID	5AC801.DVDS-00
Access time	
CD	Average of 130 ms
DVD	Average of 140 ms
Readable media	
CD	CD-ROM (12 cm, 8 cm), CD-A CD-R, CD-RW
DVD	DVD-ROM, DVD-R, DVD-R DL, DVD-RW, DVD+R DVD+R DL, DVD+RW, DVD-RAM
Read speed	
CD	24x
DVD	8x
Environmental conditions	
Temperature [1]	
Operation	5 to 55°C [2]
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: 0.2 g
Storage	5 to 500 Hz: 2 g
Transport	5 to 500 Hz: 2 g
Shock	
Operation	5 g and 11 ms duration
Storage	60 g and 11 ms duration 200 g and 2 ms duration
Transport	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 84: 5AC801.DVDS-00 - Technical data

1) Temperature data is for operation at 500 meters. The maximum ambient temperature is typically derated by 1°C per 1000 meters (starting at 500 meters above sea level).
2) Drive surface temperature

3.9.13.4 Temperature humidity diagram

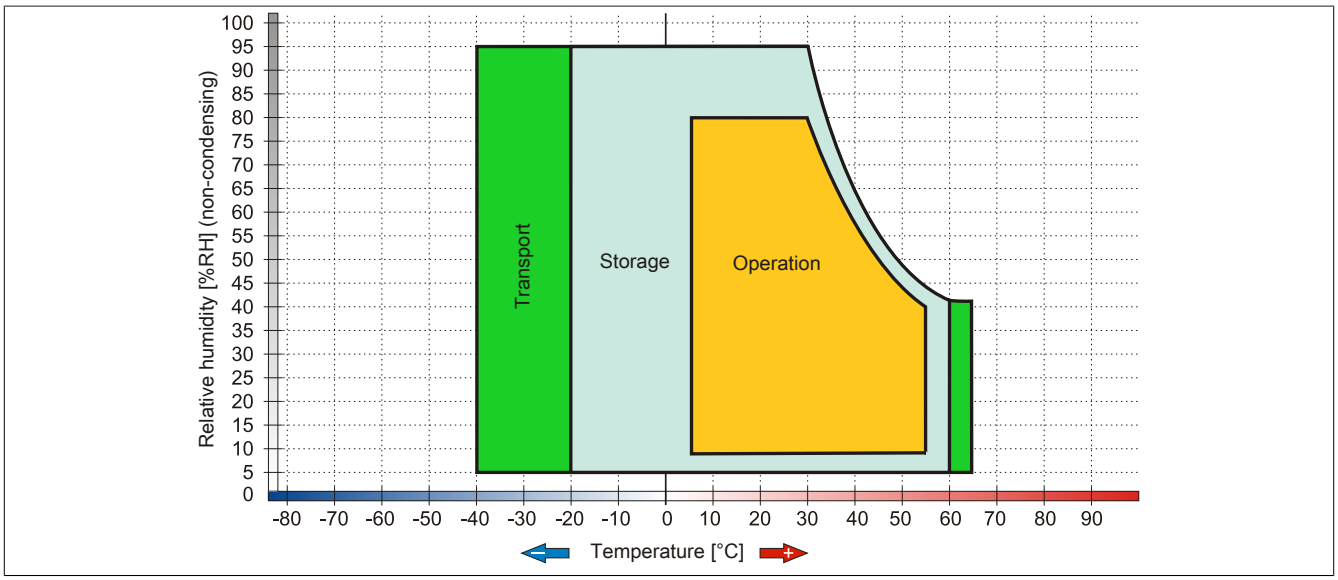


Figure 43: 5AC801.DVDS-00 - Temperature humidity diagram

3.9.13.5 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.

3.9.14 5AC801.DVRS-00

3.9.14.1 General information

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

> **Information:**
>
> **A slide-in drive can be added or removed 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 and USB.

3.9.14.2 Order data

Model number	Short description	Figure
	Drives	
5AC801.DVRS-00	DVD-R/RW DVD+R/RW slide-in SATA drive.	
	Optional accessories	
	Other	
5SWUTI.0000-00	OEM Nero CD-RW Software, only available with a CD writer.	

Table 85: 5AC801.DVRS-00 - Order data

3.9.14.3 Technical data

> **Information:**
>
> **The following characteristics, features and limit values only apply to this individual component and can deviate from those specified for the fully assembled device. For the assembled device in which this individual component is used, refer to the data given specifically for that device.**

Product ID	5AC801.DVRS-00
General information	
Certification CE cULus GL	 Yes Yes Yes
CD / DVD drive	
Data buffer capacity	2 MB
Data transfer rate	Max. 33.3 MB/s
Speed	Max. 5160 rpm ±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 CD-ROM XA mode 2 (form 1, form 2) Photo CD (single/multi-session), Enhanced CD, CD text DVD-ROM, DVD-R, DVD-R (double layer), DVD-RW, DVD-Video DVD-RAM (4.7 GB, 2.6 GB) DVD+R, DVD+R (double layer), DVD+RW
Laser class	Class 1 laser
Service life	60000 POH (power-on hours)
Interface	SATA
Startup time CD DVD	 Max. 14 seconds (0 RPM to read access) Max. 15 seconds (0 RPM to read access)

Table 86: 5AC801.DVRS-00 - Technical data

Product ID	5AC801.DVRS-00
Access time	
CD	On average 140 ms (24x)
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
Writable 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)
Read speed	
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 (dual layer)	6x, 4x and 2.4x
DVD+RW	4x and 2x
DVD-R	8x, 4x and 2x
DVD-R (dual layer)	6x, 4x and 2x
DVD-RAM [1]	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
Environmental conditions	
Temperature [2]	
Operation	5 to 55°C [3]
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: 0.2 g
Storage	5 to 500 Hz: 2 g
Transport	5 to 500 Hz: 2 g
Shock	
Operation	At max. 5 g and 11 ms duration
Storage	At max. 60 g and 11 ms duration At max. 200 g and 2 ms duration
Transport	At max. 60 g and 11 ms duration At max. 200 g and 2 ms duration
Mechanical characteristics	
Dimensions	
Width	22 mm
Height	172.5 mm
Depth	150 mm
Weight	400 g

Table 86: 5AC801.DVRS-00 - Technical data

1) RAM drivers are not provided by the manufacturer. Support of RAM function with burning software "Nero" (model number 5SWUTI.0000-00) or other burning software packages or drivers from third-party providers.
2) Temperature specifications refer to operation at 500 meters. The maximum ambient temperature is typically derated by 1°C per 1000 meters (starting at 500 meters above sea level).
3) Drive surface temperature

3.9.14.4 Temperature humidity diagram

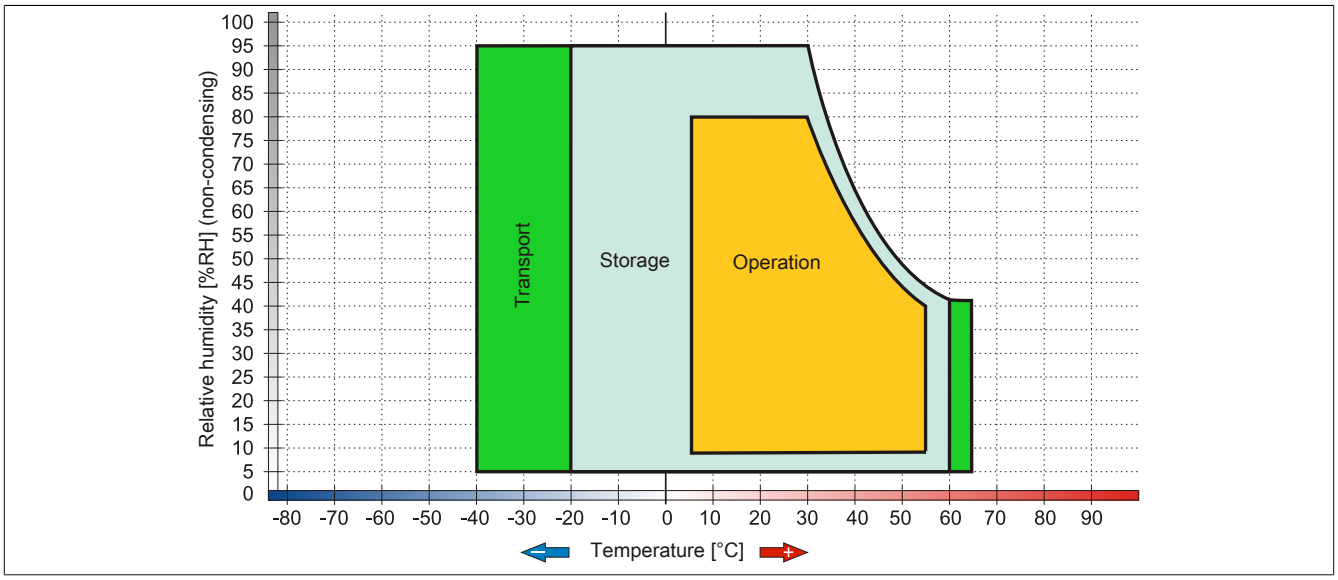


Figure 44: 5AC801.DVRS-00 - Temperature humidity diagram

3.9.15 5ACPCI.RAIC-05

3.9.15.1 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 that are used are specified for 24-hour operation (24x7).

- 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

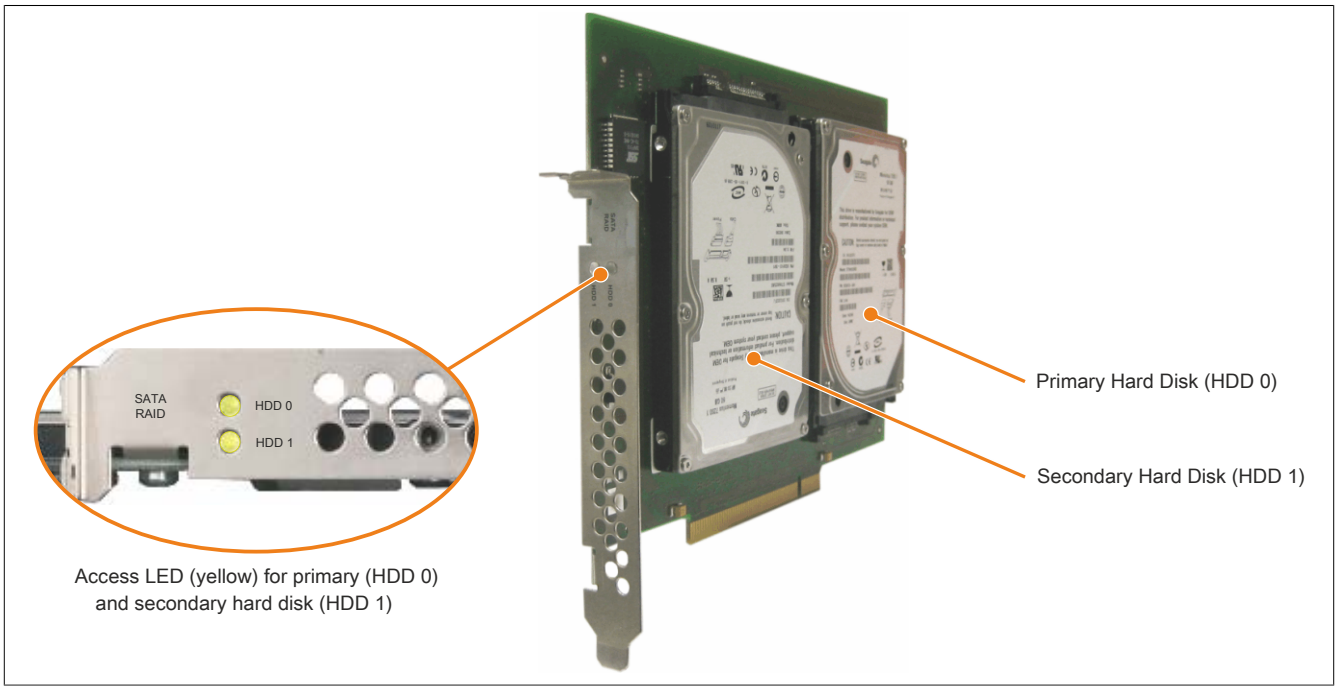


Figure 45: PCI SATA RAID controller

Information:

The PCI SATA RAID controller cannot 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. With a memory size of 250 GB, this generally takes at least 250 minutes to complete (configurable).

3.9.15.2 Order data

Model number	Short description	Figure
	Drives	
5ACPCI.RAIC-05	PCI RAID system SATA 2x 250 GB; Note: Please see the manual for information about using this hard disk.	
	Optional accessories	
	Drives	
5MMHDD.0250-00	250 GB SATA hard disk replacement part for 5AC801.HDDI-03 and 5ACPCI.RAIC-05; Note: Please see the manual for information about using this hard disk.	

Table 87: 5ACPCI.RAIC-05 - Order data

3.9.15.3 Technical data

Product ID	5ACPCI.RAIC-05
General information	
Number of hard disks	2
Certification CE cULus	 Yes Yes
Controller	
Type	SiI 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 drive	
Capacity	250 GB
Number of heads	1
Number of sectors	488,397,168
Bytes per sector	512
Cache	8 MB
Speed	5400 rpm ±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 PIO mode 0-4, multiword DMA mode 0-2, UDMA mode 0-6
Data transfer rate Internal To/From host	 Max. 1175 Mbit/s Max. 150 MB/s
Positioning time Minimum (track to track) Nominal (read only) Maximum (read only)	 1 ms 14 ms 30 ms
Electrical characteristics	
Power consumption	0.3A at 3.3V (PCI bus) 1A at 5V (PCI bus)
Environmental conditions	
Temperature [1] Operation [2] 24-hour operation [3] Storage Transport	 0 to 60°C 0 to 60°C -40 to 70°C -40 to 70°C
Relative humidity [4] Operation Storage Transport	 5 to 95%, non-condensing 5 to 95%, non-condensing 5 to 95%, non-condensing
Vibration [5] Operation (continuous) Operation (occasional) Storage Transport	 5 to 500 Hz: max. 0.125 g; duration 1 octave per minute; no unrecoverable errors 5 to 500 Hz: max. 0.25 g; duration 1 octave per minute; no unrecoverable errors 5 to 500 Hz: 5 g; duration 0.5 octaves per minute; no damage 5 to 500 Hz: 5 g; duration 0.5 octaves per minute; no damage
Shock [5] Operation Storage Transport	 Max. 125 g, 2 ms; no unrecoverable errors Max. 400 g, 2 ms; no damage Max. 500 g, 1 ms; no damage Max. 300 g, 0.5 ms; no damage Max. 400 g, 2 ms; no damage Max. 500 g, 1 ms; no damage Max. 300 g, 0.5 ms; no damage
Altitude Operation Storage	 - 300 to 3048 m - 300 to 12192 m
Mechanical characteristics	
Installation	Fixed [6]
Weight	350 g
Manufacturer information	
Manufacturer	Seagate
Manufacturer product ID	ST9250315AS

Table 88: 5ACPCI.RAIC-05 - Technical data

1) Temperature values at an altitude of 305 meters. 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.

3.9.15.4 Temperature humidity diagram

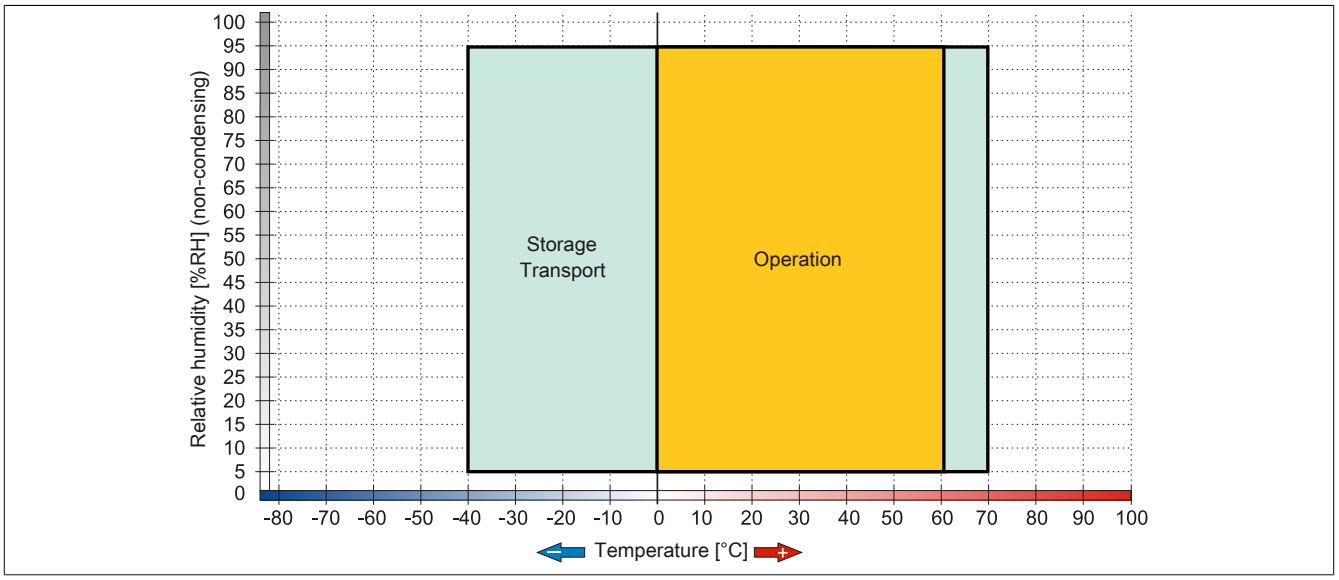


Figure 46: 5ACPCI.RAIC-05 - Temperature humidity diagram

3.9.15.5 Driver support

Special drivers are necessary for operating the PCI SATA RAID controller. Drivers for supported and approved operating systems are available in the Downloads section of the B&R website (www.br-automation.com).

The .NET-based SATA Raid™ 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 website, not from manufacturer websites.

3.9.15.6 Configuration

Configuring a SATA RAID network: see Chapter 3 "Installation", section 8 "Configuration of a SATA RAID array" on page 135.

3.9.15.7 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 exchanging see "Exchanging a PCI SATA RAID hard disk in a RAID 1 system" on page 286.

3.9.16 5ACPCI.RAIC-06

3.9.16.1 General information

This SATA RAID controller supports RAID level 0 and 1 and can be inserted in a PCI slot. The 500 GB hard disks that are used are specified for 24-hour operation (24x7).

- SATA RAID controller
- RAID Level 0 (striped) and 1 (mirrored)
- 2x 500 GB SATA hard disks (suitable 24 hour operation)
- Only requires 1 PCI slot
- Transfer rates up to 150 MB/s

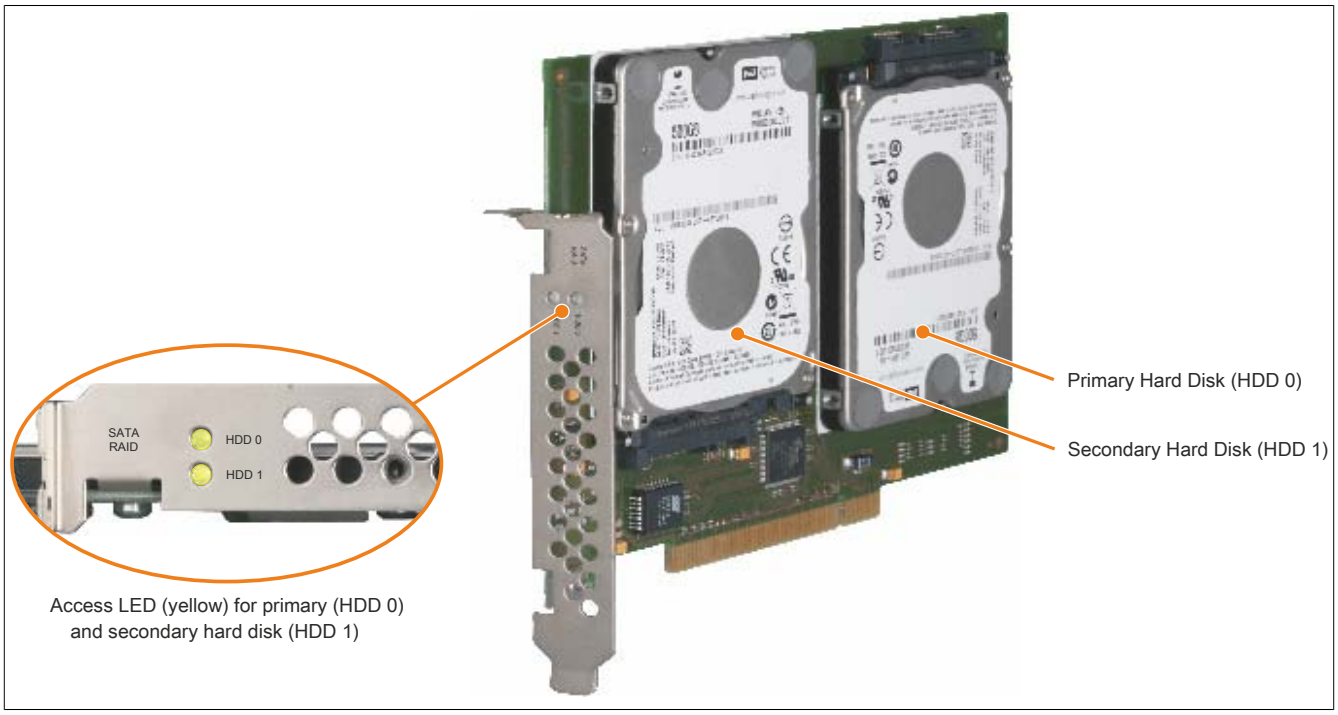


Figure 47: PCI SATA RAID controller

Information:

The PCI SATA RAID controller cannot 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. If 500 GB of memory are used, this generally takes approximately 500 minutes (configurable) to complete.

3.9.16.2 Order data

Model number	Short description	Figure
	Drives	
5ACPCI.RAIC-06	PCI RAID system SATA 2x 500 GB; Note: Please see the manual for information about using this hard disk.	
	Optional accessories	
	Drives	
5MMHDD.0500-00	500 GB SATA hard disk replacement part for 5AC801.HDDI-04, 5AC901.CHDD-01 and 5ACPCI.RAIC-06; Note: Please see the manual for information about using this hard disk.	

Table 89: 5ACPCI.RAIC-06 - Order data

3.9.16.3 Technical data

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate from those specified for the fully assembled device. The data specifications for the fully assembled device take precedence over those of individual components.

Product ID	**5ACPCI.RAIC-06**
General information	
Capacity	2x 500 GB
Number of hard disks	2
Certification	
CE	Yes
cULus	Yes
Controller	
Type	SiI 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 drive [1]	
Capacity	500 GB
Number of heads	2
Number of sectors	976,773,168
Bytes per sector	512 (logical) / 4096 (physical)
Cache	16 MB
Speed	5400 rpm ±0.2%
Startup time	Typ. 3.5 s (from 0 rpm to read access)
Service life	5 years
MTBF	1,000,000 POH [2]
S.M.A.R.T. Support	Yes
Interface	SATA
Access time	5.5 ms
Supported transfer modes	SATA II
Data transfer rate	
Internal	Max. 147 MB/s
To/From host	Max. 150 MB/s (SATA I), max. 300 MB/s (SATA II)
Positioning time	
Nominal (read only)	11 ms
Maximum (read only)	21 ms
Environmental conditions	
Temperature [3]	
Operation [4]	0 to 60°C
24-hour operation [5]	0 to 60°C
Storage	-40 to 70°C
Transport	-40 to 70°C
Relative humidity [6]	
Operation	5 to 95%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Vibration [7]	
Operation (continuous)	5 to 500 Hz: 0.125 g; no unrecoverable errors
Operation (occasional)	5 to 500 Hz: 0.25 g; no unrecoverable errors
Storage	10 to 500 Hz: 5 g; no unrecoverable errors
Transport	10 to 500 Hz: 5 g; no unrecoverable errors
Shock	
Operation	200 g and 2 ms duration; no unrecoverable errors
Storage	1000 g and 2 ms duration; no unrecoverable errors
Transport	1000 g and 2 ms duration; no unrecoverable errors
Altitude	
Operation	-305 to 3048 m
Storage	-305 to 12192 m
Mechanical characteristics	
Installation	Fixed [8]
Weight	350 g
Manufacturer information	
Manufacturer	Western Digital
Manufacturer product ID	WD5000LUCT

Table 90: 5ACPCI.RAIC-06 - Technical data

1) Technical data for a hard disk.
2) With 8760 POH (power on hours) per year and 25°C surface temperature.
3) Temperature values at an altitude of 305 meters. 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.

4) Standard operation means 333 POH (power-on hours) per month.
5) 24-hour operation means 732 POH (power-on hours) per month.
6) Humidity gradient: Maximum 20% per hour.
7) Operation in areas prone to vibration and shock can affect performance negatively (reduction of transfer rate).
8) Mounted on PCI insert.

3.9.16.4 Temperature humidity diagram

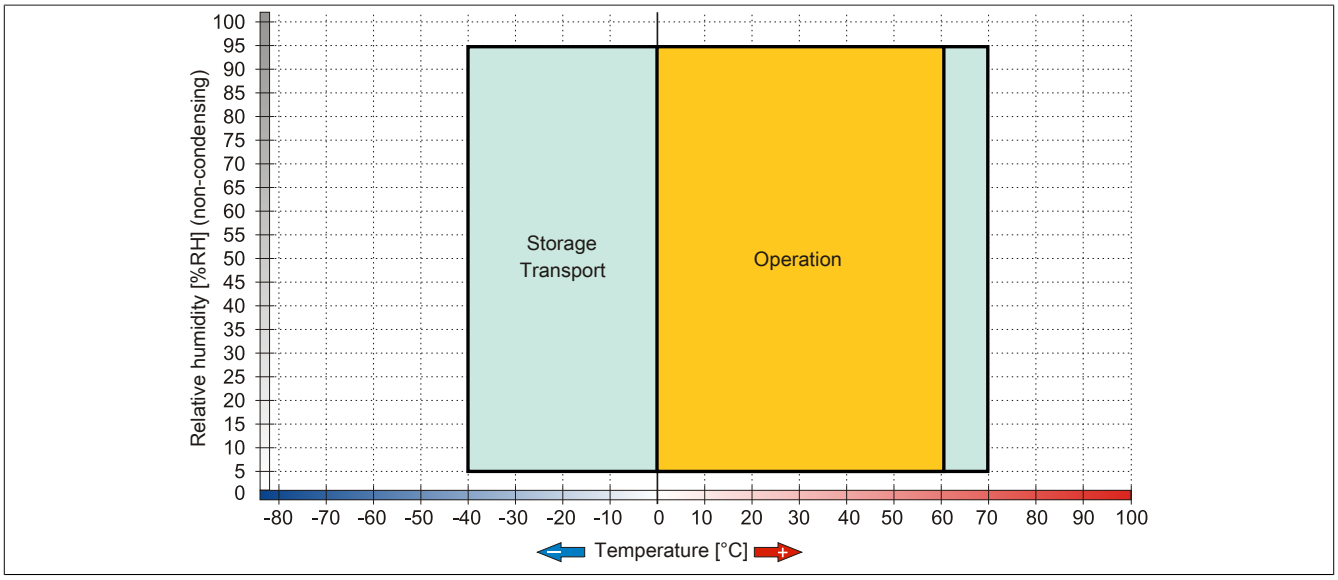


Figure 48: 5ACPCI.RAIC-06 - Temperature humidity diagram

3.9.16.5 Driver support

Special drivers are necessary for operating the PCI SATA RAID controller. Drivers for supported and approved operating systems are available in the Downloads section of the B&R website (www.br-automation.com).

The .NET-based SATA Raid™ 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 website, not from manufacturer websites.

3.9.16.6 Configuration

Configuring a SATA RAID network: see Chapter 3 "Installation", section 8 "Configuration of a SATA RAID array" on page 135.

3.9.16.7 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. Here, the 500 GB 5MMHDD.0500-00 SATA HDD is available as a replacement hard disk.

Instructions for exchanging see "Exchanging a PCI SATA RAID hard disk in a RAID 1 system" on page 286.

3.9.17 5MMHDD.0250-00

3.9.17.1 General information

This 250 GB hard disk can be used as a replacement part or an accessory.

- 250 GB hard disk
- Replacement hard disk for a 5AC801.HDDI-03 hard disk or a 5ACPCI.RAIC-05 RAID controller
- APC510 accessory (optional hard disk for the I/O board)
- Specified for 24-hour operation
- S.M.A.R.T. Support

3.9.17.2 Order data

Model number	Short description	Figure
	Drives	
5MMHDD.0250-00	250 GB SATA hard disk replacement part for 5AC801.HDDI-03 and 5ACPCI.RAIC-05; Note: Please see the manual for information about using this hard disk.	

Table 91: 5MMHDD.0250-00 - Order data

3.9.17.3 Technical data

Information:

The following characteristics, features and limit values only apply to this individual component and can deviate from those specified for the fully assembled device. For the assembled device in which this individual component is used, refer to the data given specifically for that device.

Product ID	5MMHDD.0250-00
General information	
Certification	
CE	Yes
cULus	Yes
Hard disk drive	
Capacity	250 GB
Number of heads	1
Number of sectors	488,397,168
Bytes per sector	512
Cache	8 MB
Speed	5400 rpm ±0.2%
Startup time	Typ. 3.6 s (from 0 rpm to read access)
MTBF	550,000 POH [1)]
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 PIO mode 0-4, multiword DMA mode 0-2, UDMA mode 0-6
Data transfer rate	
Internal	Max. 1175 Mbit/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
Environmental conditions	
Temperature [2)]	
Operation [3)]	0 to 60°C
24-hour operation [4)]	0 to 60°C
Storage	-40 to 70°C
Transport	-40 to 70°C

Table 92: 5MMHDD.0250-00 - Technical data

Product ID	5MMHDD.0250-00
Relative humidity [5]	
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 1000 g and 1 ms duration; no unrecoverable errors 600 g and 0.5 ms duration; no unrecoverable errors
Transport	800 g and 2 ms duration; no unrecoverable errors 1000 g and 1 ms duration; no unrecoverable errors 600 g and 0.5 ms duration; no unrecoverable errors
Altitude	
Operation	-300 to 3048 m
Storage	-300 to 12192 m
Mechanical characteristics	
Dimensions	
Width	9.5 mm
Height	69 mm
Depth	100 mm
Weight	100 g
Manufacturer information	
Manufacturer	Seagate
Manufacturer product ID	ST9250315AS

Table 92: 5MMHDD.0250-00 - Technical data

1) With 8760 POH (power on hours) per year and 25°C surface temperature.
2) Temperature values at an altitude of 305 meters. 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.

3.9.17.4 Temperature humidity diagram

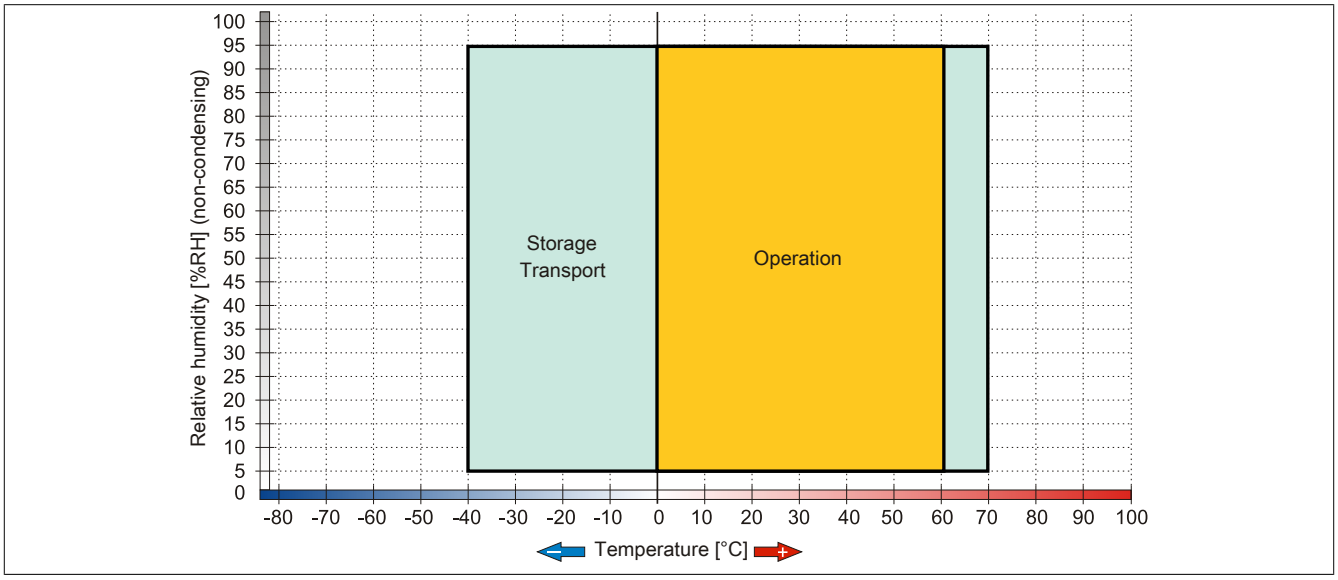


Figure 49: 5MMHDD.0250-00 - Temperature humidity diagram

3.9.18 5MMHDD.0500-00

3.9.18.1 General information

This 500 GB hard disk can be used as a replacement part or an accessory.

- 500 GB hard disk
- Replacement hard disk for a 5AC801.HDDI-04 / 5AC901.CHDD-01 hard disk or a 5ACPCI.RAIC-05 RAID controller
- APC510 accessory (optional hard disk for the I/O board)
- Specified for 24-hour operation
- S.M.A.R.T. Support

3.9.18.2 Order data

Model number	Short description	Figure
	Drives	
5MMHDD.0500-00	500 GB SATA hard disk replacement part for 5AC801.HDDI-04, 5AC901.CHDD-01 and 5ACPCI.RAIC-06; Note: Please see the manual for information about using this hard disk.	

Table 93: 5MMHDD.0500-00 - Order data

3.9.18.3 Technical data

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate from those specified for the fully assembled device. The data specifications for the fully assembled device take precedence over those of individual components.

Product ID	5MMHDD.0500-00
General information	
Certification CE cULus	 Yes Yes
Hard disk drive	
Capacity	500 GB
Number of heads	2
Number of sectors	976,773,168
Bytes per sector	512 (logical) / 4096 (physical)
Cache	16 MB
Speed	5400 rpm ±0.2%
Startup time	Typ. 3.5 s (from 0 rpm to read access)
Service life	5 years
MTBF	1,000,000 POH [1)]
S.M.A.R.T. Support	Yes
Interface	SATA
Access time	5.5 ms
Supported transfer modes	SATA II
Data transfer rate Internal To/From host	 Max. 147 MB/s Max. 150 MB/s (SATA I), max. 300 MB/s (SATA II)
Positioning time Nominal (read only) Maximum (read only)	 11 ms 21 ms

Table 94: 5MMHDD.0500-00 - Technical data

Product ID	5MMHDD.0500-00
Environmental conditions	
Temperature [2]	
Operation [3]	0 to 60°C
24-hour operation [4]	0 to 60°C
Storage	-40 to 70°C
Transport	-40 to 70°C
Relative humidity [5]	
Operation	5 to 95%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Vibration	
Operation (continuous)	5 to 500 Hz: 0.25 g; no unrecoverable errors
Operation (occasional)	5 to 500 Hz: 0.5 g; no unrecoverable errors
Storage	10 to 500 Hz: 5 g; no unrecoverable errors
Transport	10 to 500 Hz: 5 g; no unrecoverable errors
Shock	
Operation	400 g and 2 ms duration; no unrecoverable errors
Storage	1000 g and 2 ms duration; no unrecoverable errors
Transport	1000 g and 2 ms duration; no unrecoverable errors
Altitude	
Operation	-305 to 3048 m
Storage	-305 to 12192 m
Mechanical characteristics	
Dimensions	
Width	7 mm
Height	69 mm
Depth	100 mm
Weight	100 g
Manufacturer information	
Manufacturer	Western Digital
Manufacturer product ID	WD5000LUCT

Table 94: 5MMHDD.0500-00 - Technical data

1) With 8760 POH (power on hours) per year and 25°C surface temperature.
2) Temperature values at an altitude of 305 meters. 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 20% per hour.

3.9.18.4 Temperature humidity diagram

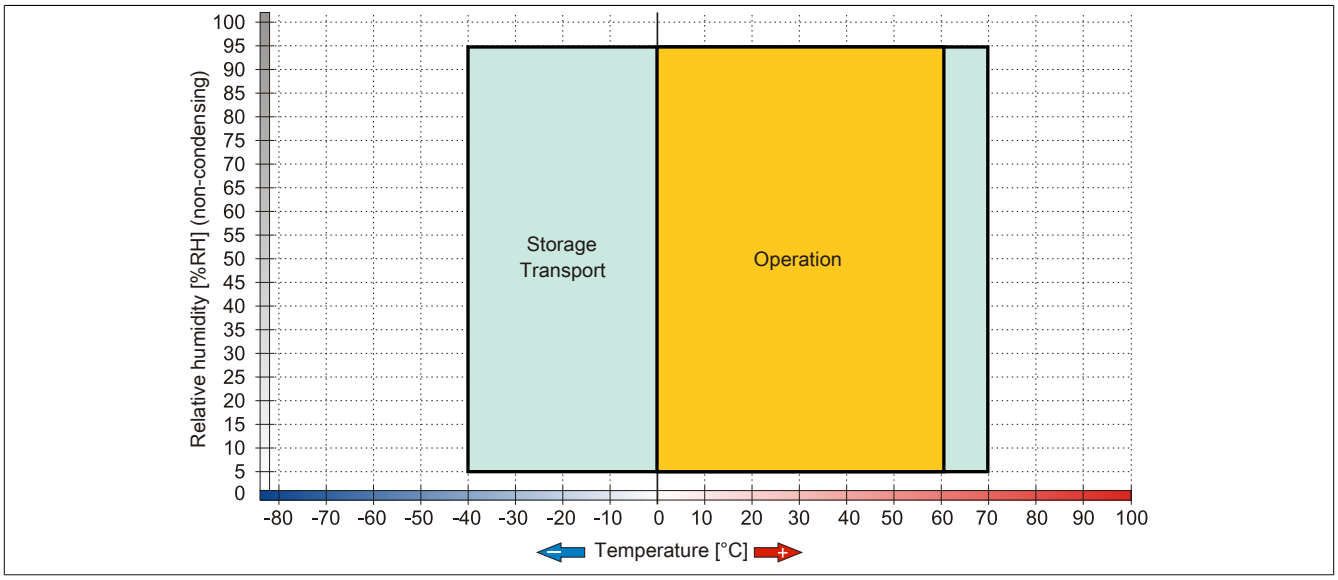


Figure 50: 5MMHDD.0500-00 - Temperature humidity diagram

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

3.10.1.1 General information

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

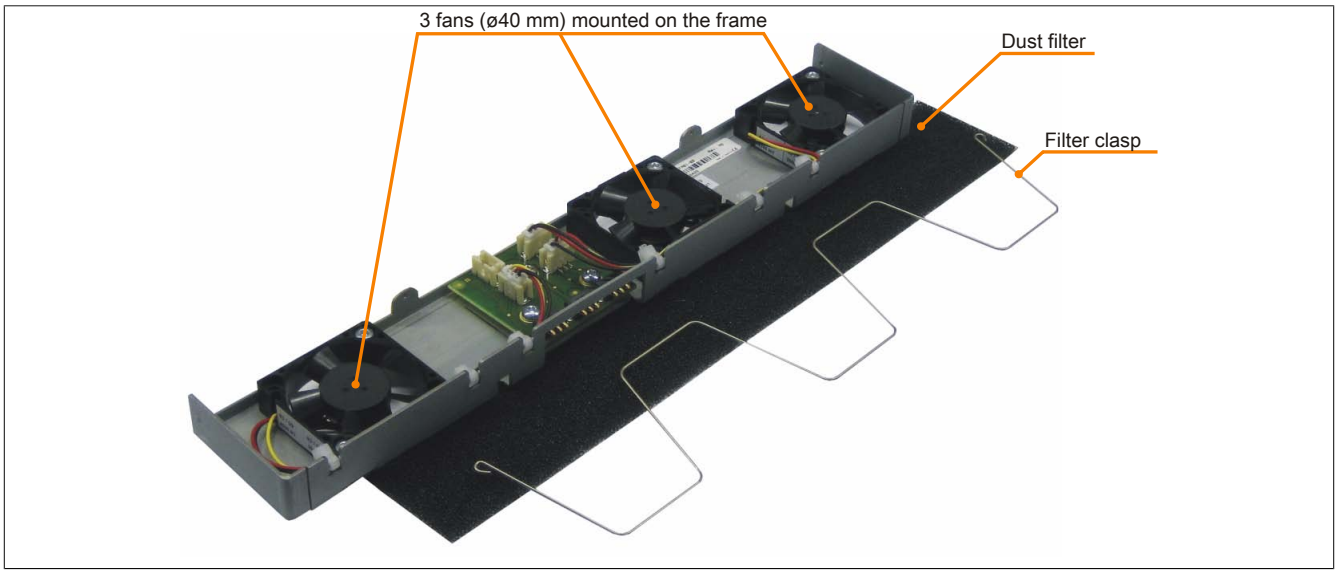


Figure 51: 5AC803.FA01-00 - Fan kit

3.10.1.2 Order data

Model number	Short description	Figure
	Fan kits	
5AC803.FA01-00	PPC800 fan kit for system units without an expansion	

Table 95: 5AC803.FA01-00 - Order data

3.10.1.3 Technical data

Product ID	5AC803.FA01-00
General information	
Number of fans	3
Speed	Max. 6100 rpm
Noise level	21 dB
Service life	29000 hours at 70 °C 95000 hours at 20 °C
Type	Double ball bearings
Certification CE	 Yes

Table 96: 5AC803.FA01-00 - Technical data

Product ID	5AC803.FA01-00
Mechanical characteristics	
Dimensions	
Fan	
Width	40 mm
Height	40 mm
Depth	10 mm

Table 96: 5AC803.FA01-00 - Technical data

3.10.2 5AC803.FA02-00

3.10.2.1 General information

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

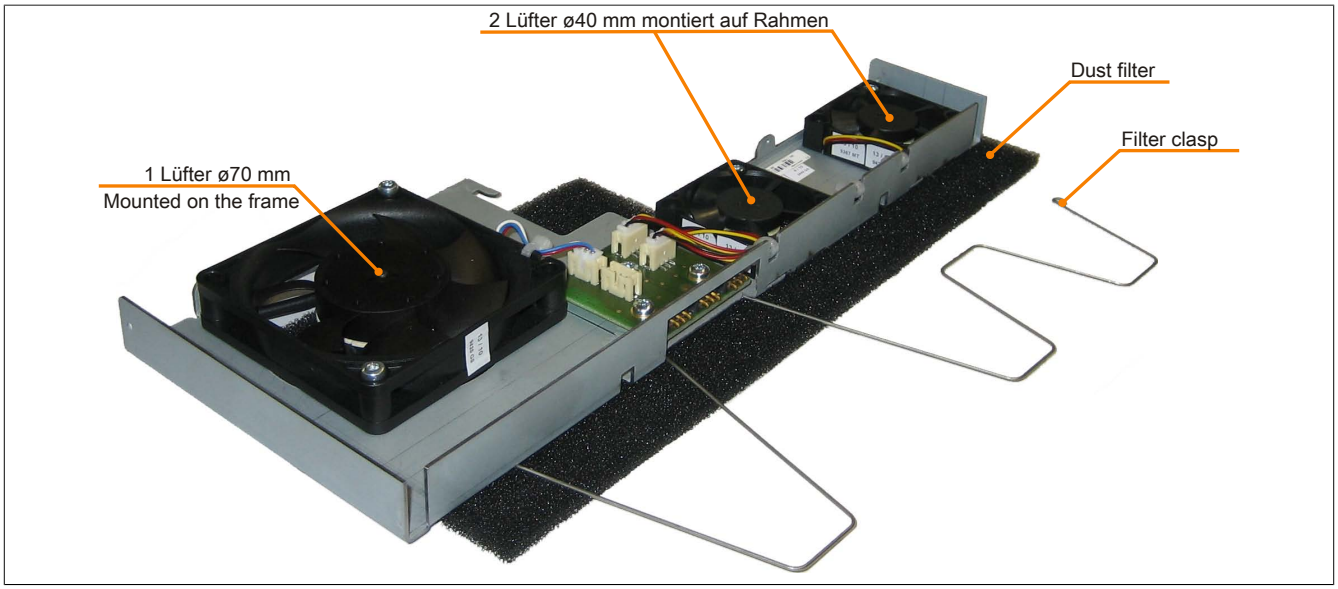


Figure 52: 5AC803.FA02-00 - Fan kit

3.10.2.2 Order data

Model number	Short description	Figure
	Fan kits	
5AC803.FA02-00	PPC800 fan kit for system units with expansion 5AC803.SX01-00	

Table 97: 5AC803.FA02-00 - Order data

3.10.2.3 Technical data

Product ID	5AC803.FA02-00
General information	
Number of fans	3
Speed	Fans 1, 2: max. 6100 rpm Fan 3: 4300 rpm ± 10%
Noise level	Fans 1, 2: 21 dB Fan 3: 5 dB
Service life	Fans 1, 2: 29,000 hours at 70°C, 95,000 hours at 20°C Fan 3: 60000 hours at 40 °C
Type	Double ball bearings
Certification	
CE	Yes

Table 98: 5AC803.FA02-00 - Technical data

Product ID	5AC803.FA02-00
Mechanical characteristics	
Dimensions	
Fan	
Width	Fans 1, 2: 40 mm Fan 3: 70 mm
Height	Fans 1, 2: 40 mm Fan 3: 70 mm
Depth	Fans 1, 2: 10 mm Fan 3: 15 mm

Table 98: 5AC803.FA02-00 - Technical data

3.10.3 5AC803.FA03-00

3.10.3.1 General information

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

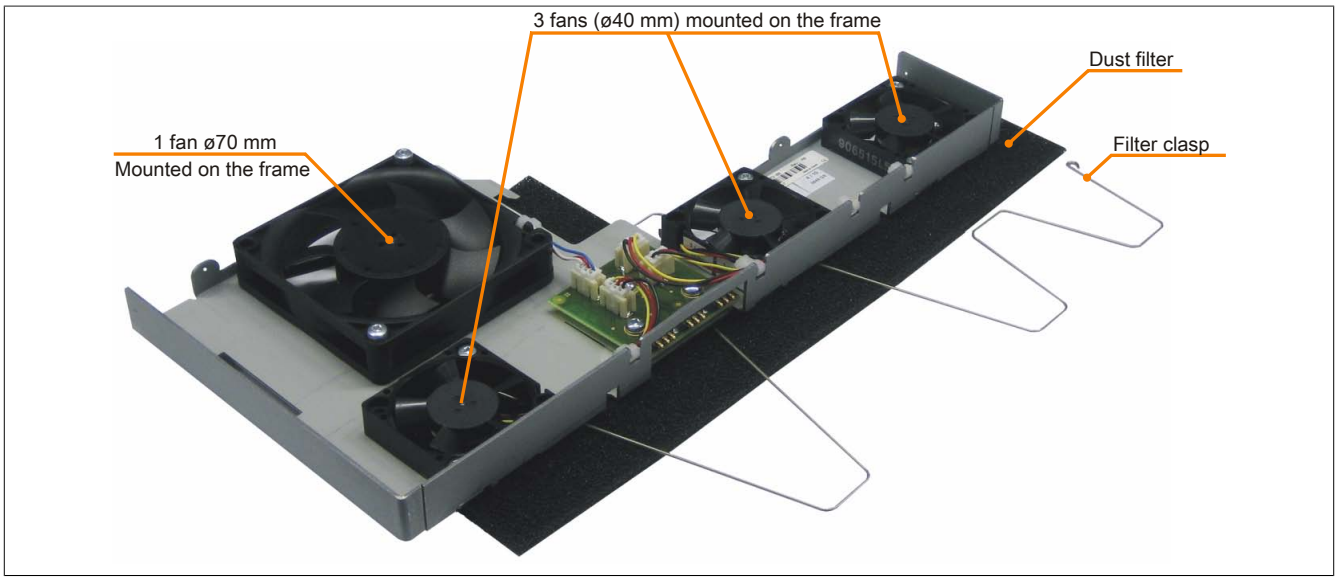


Figure 53: 5AC803.FA03-00 - Fan kit

3.10.3.2 Order data

Model number	Short description	Figure
	Fan kits	
5AC803.FA03-00	PPC800 fan kit for system units with expansion 5AC803.SX02-00	

Table 99: 5AC803.FA03-00 - Order data

3.10.3.3 Technical data

Product ID	5AC803.FA03-00
General information	
Number of fans	4
Speed	Fans 1, 2, 3: max. 6100 rpm Fan 4: 4300 rpm ± 10%
Noise level	Fan 1, 2, 3: 21 dB Fan 4: 5 dB
Service life	Fan 1, 2, 3: 29,000 hours at 70°C, 95,000 hours at 20°C Fan 4: ±60,000 at 40°C
Type	Double ball bearings
Certification CE	 Yes
Mechanical characteristics	
Dimensions Fan Width Height Depth	 Fan 1, 2, 3: 40 mm Fan 4: 70 mm Fan 1, 2, 3: 40 mm Fan 4: 70 mm Fan 1, 2, 3: 10 mm Fan 4: 15 mm

Table 100: 5AC803.FA03-00 - Technical data

Chapter 3 • Installation

1 Installation

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

1.1 Important mounting information

- 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.
- Ventilation holes must not be covered.
- This device must be mounted in one of the approved orientations.
- The wall or control cabinet must be able to withstand four times the total weight of the device.
- The flex radius of connected cables (DVI, SDL, USB, etc.) must not be exceeded.
- 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 Mounting with clamping blocks

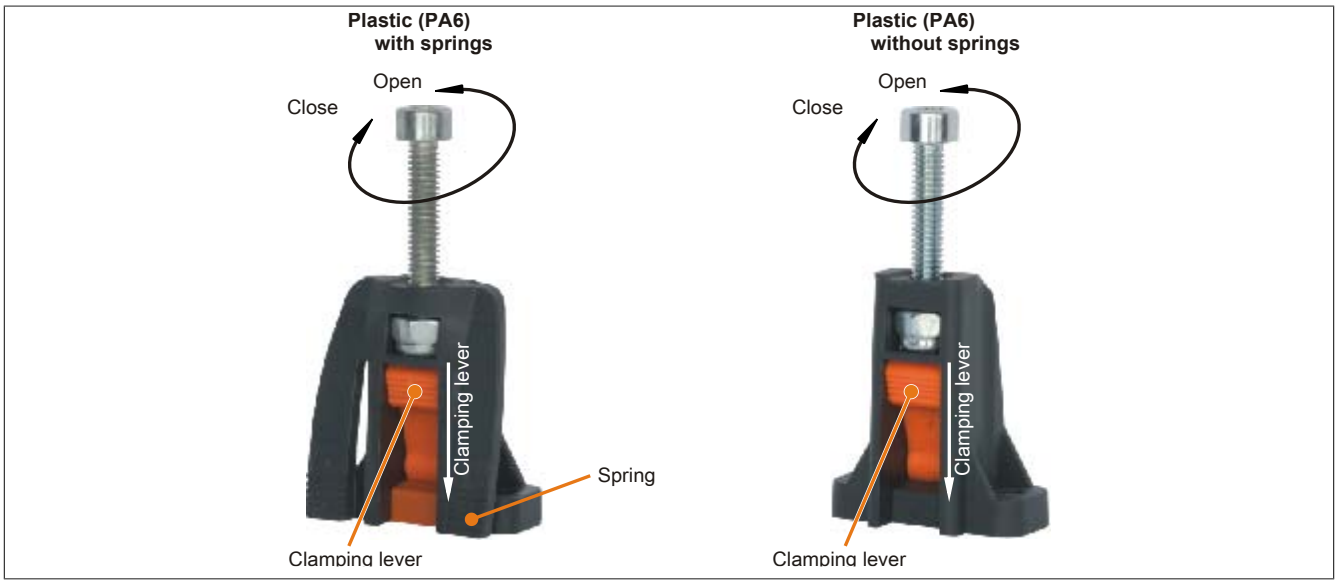


Figure 54: Clamping blocks

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

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

Devices must be installed on flat surface; uneven areas can cause damage to the display when the screws are tightened.

1.3 Mounting orientation

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

1.3.1 Mounting orientation 0° and +/- 45°

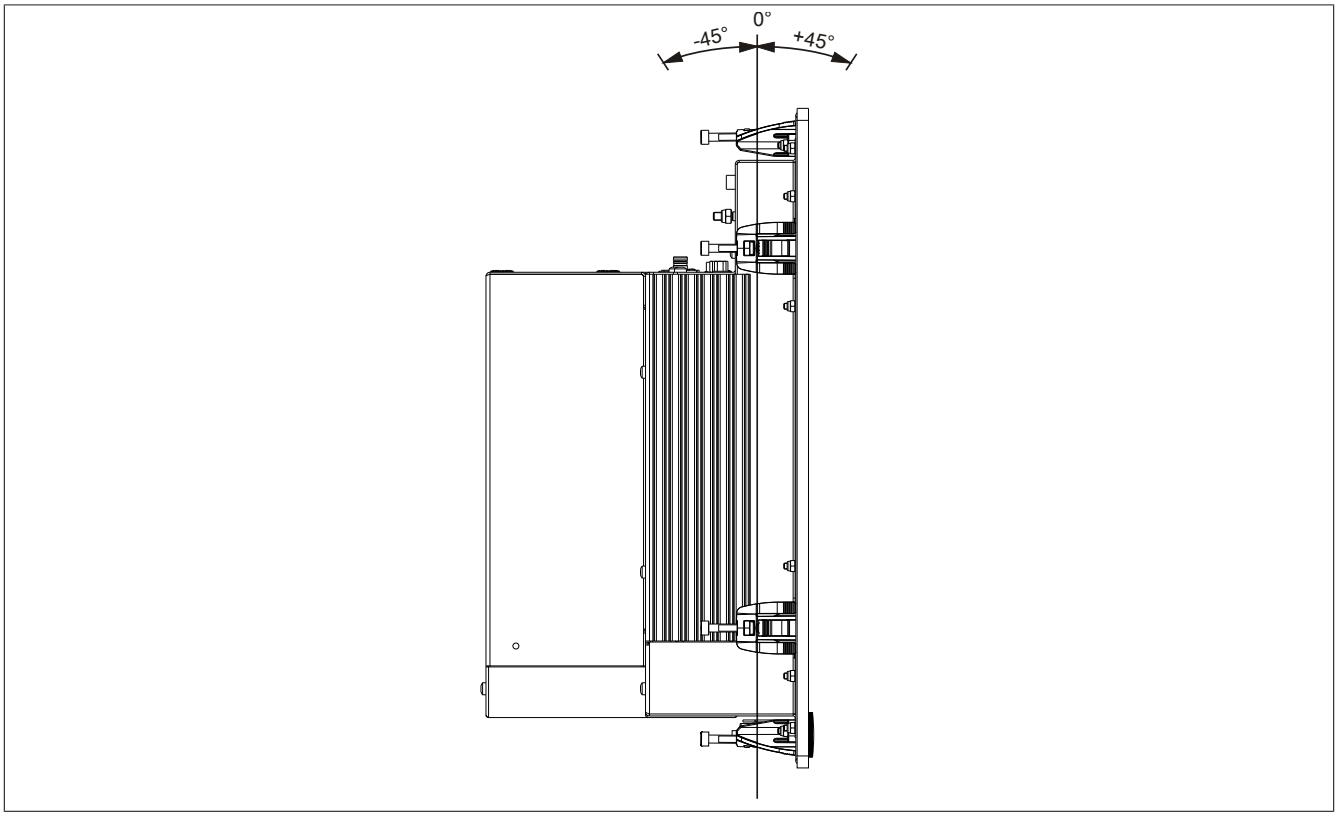


Figure 55: Mounting orientation 0° and +/- 45°

In order to facilitate natural air circulation, devices must be mounted according to the spacing indicated in the section "Air circulation spacing" on page 125.

1.3.2 Mounting orientation with 5AC801.DVRS-00

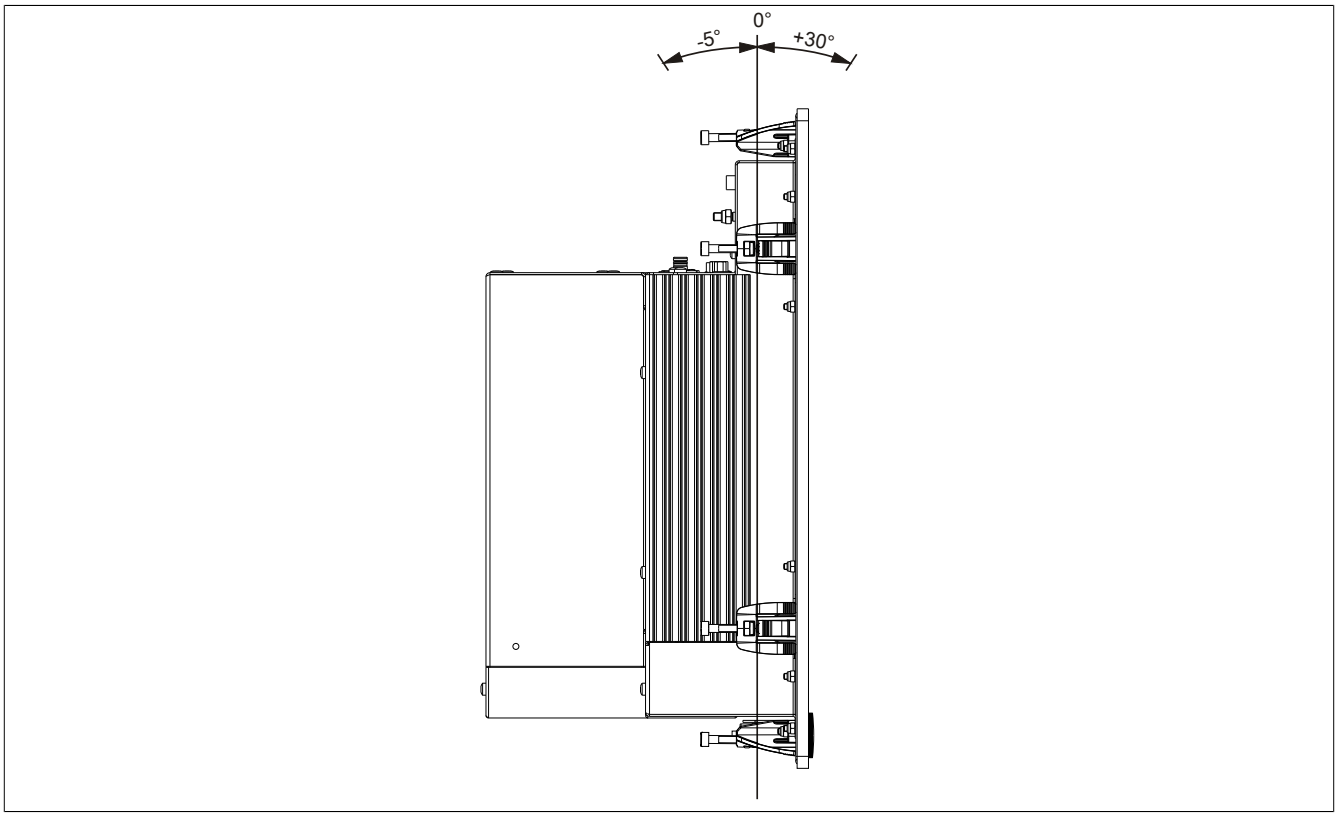


Figure 56: Mounting orientation with 5AC801.DVRS-00

In order to facilitate natural air circulation, devices must be mounted according to the spacing indicated in the section "Air circulation spacing" on page 125.

1.3.3 Mounting orientation with 5AC801.DVDS-00

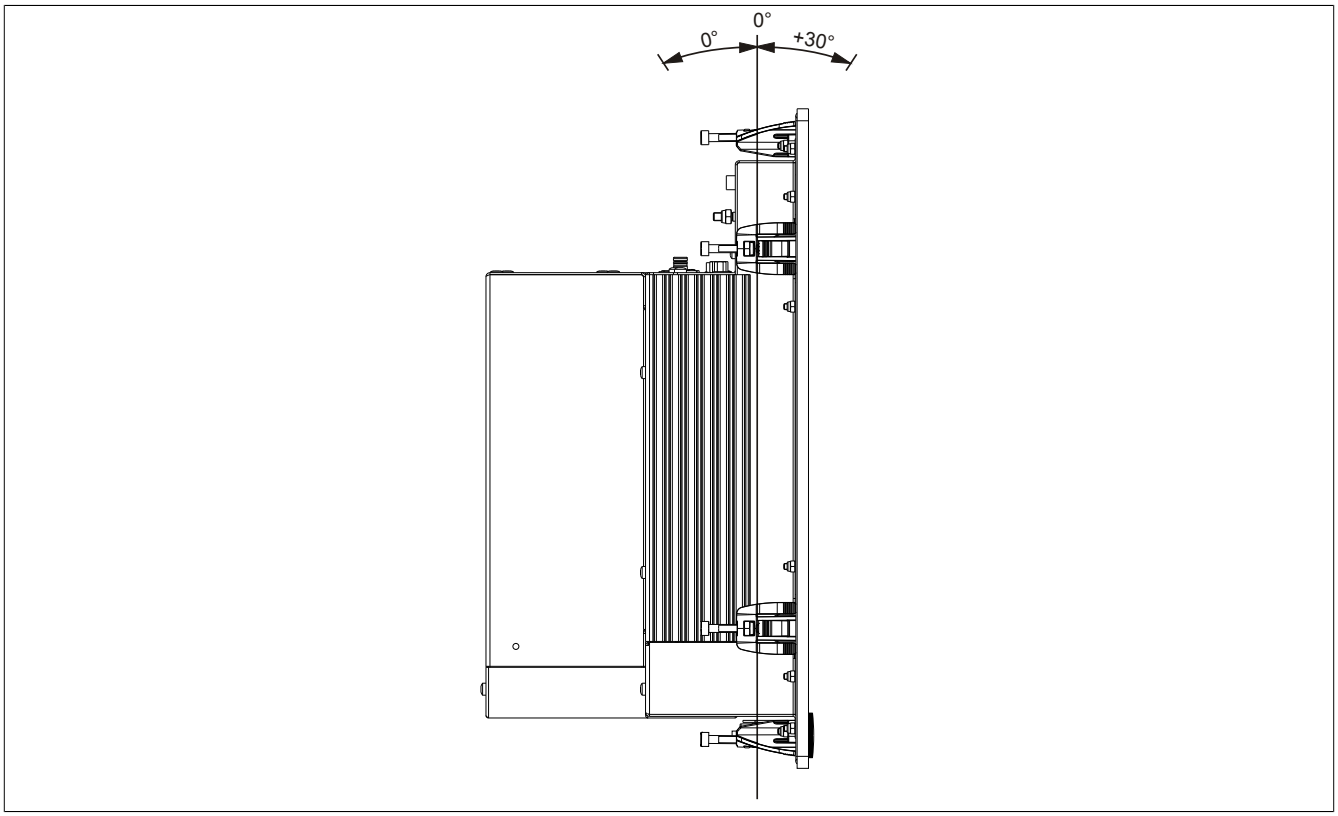


Figure 57: Mounting orientation with 5AC801.DVDS-00

In order to facilitate natural air circulation, devices must be mounted according to the spacing indicated in the section "Air circulation spacing" on page 125.

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 devices. The minimum specified spacing is indicated in the following diagram. This applies to all Panel PC 800 variants.

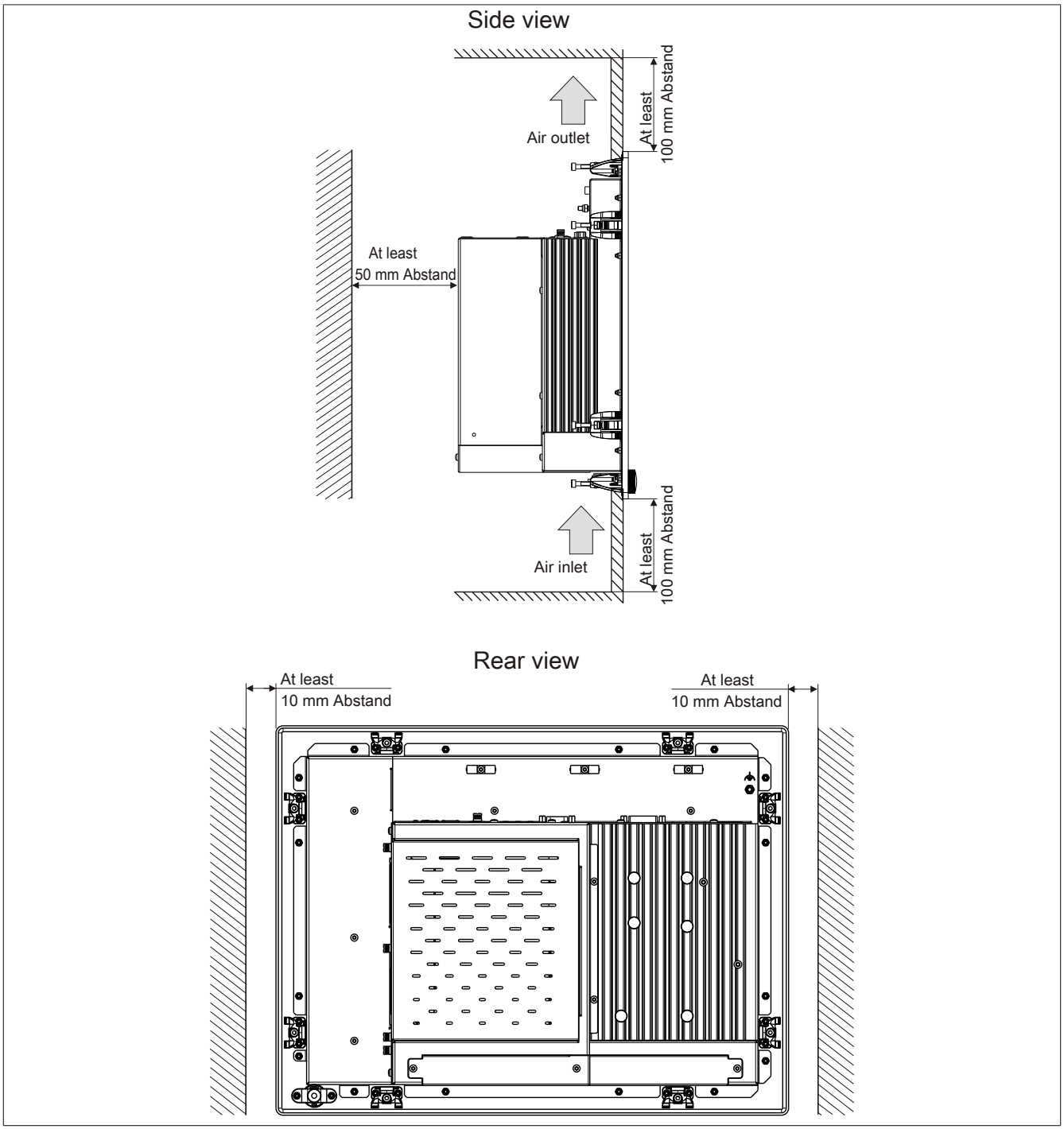


Figure 58: Spacing for air circulation

Information:

The spacing specifications for air circulation are based on the worst-case scenario for operation at the maximum specified ambient temperature (see "Temperature specifications" in the chapter "Technical data").

If the spacing specifications for air circulation cannot be adhered to, then the maximum specified temperatures for the temperature sensors (see "Temperature sensor locations" in chapter "Technical data") must be monitored by the user and appropriate measures taken if they are exceeded.

2 Cable connections

Flex radius specifications must be taken into account when laying or connecting cables.

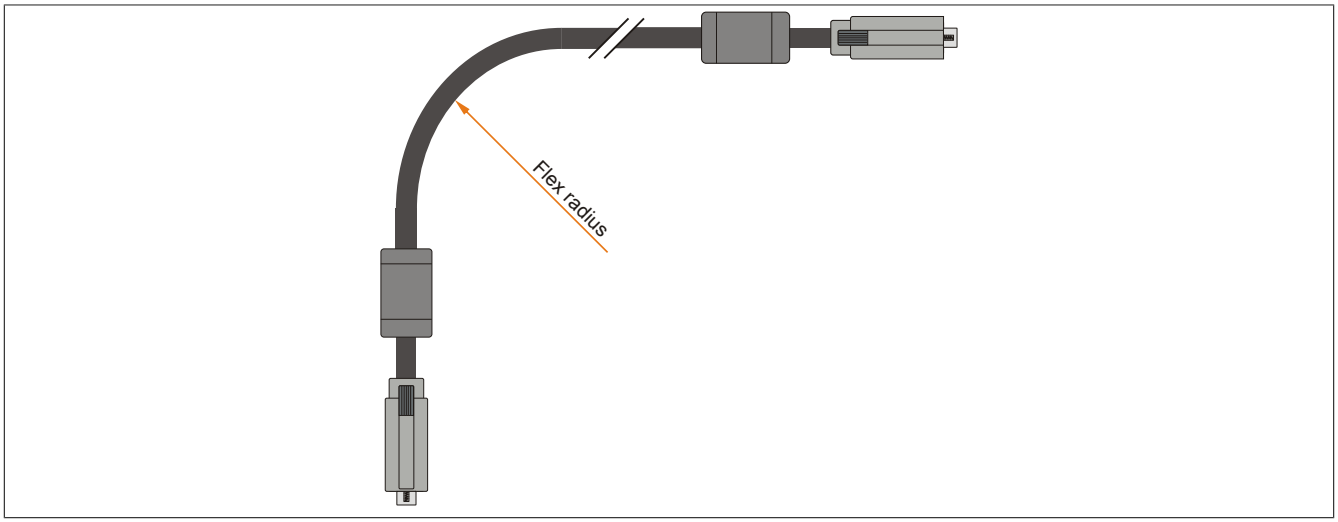


Figure 59: Flex radius - Cable connection

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 at 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 safe conductance 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.
- A cable with a minimum cross section of 2.5 mm² per connection should be used. If a cable with wire tip sleeves is connected to the 0TB103.9 or 0TB103.91 terminal block, then a cable with maximum 1.5 mm² per connection is possible.
- Note the line shielding concept; all connected data cables are used as shielded lines.

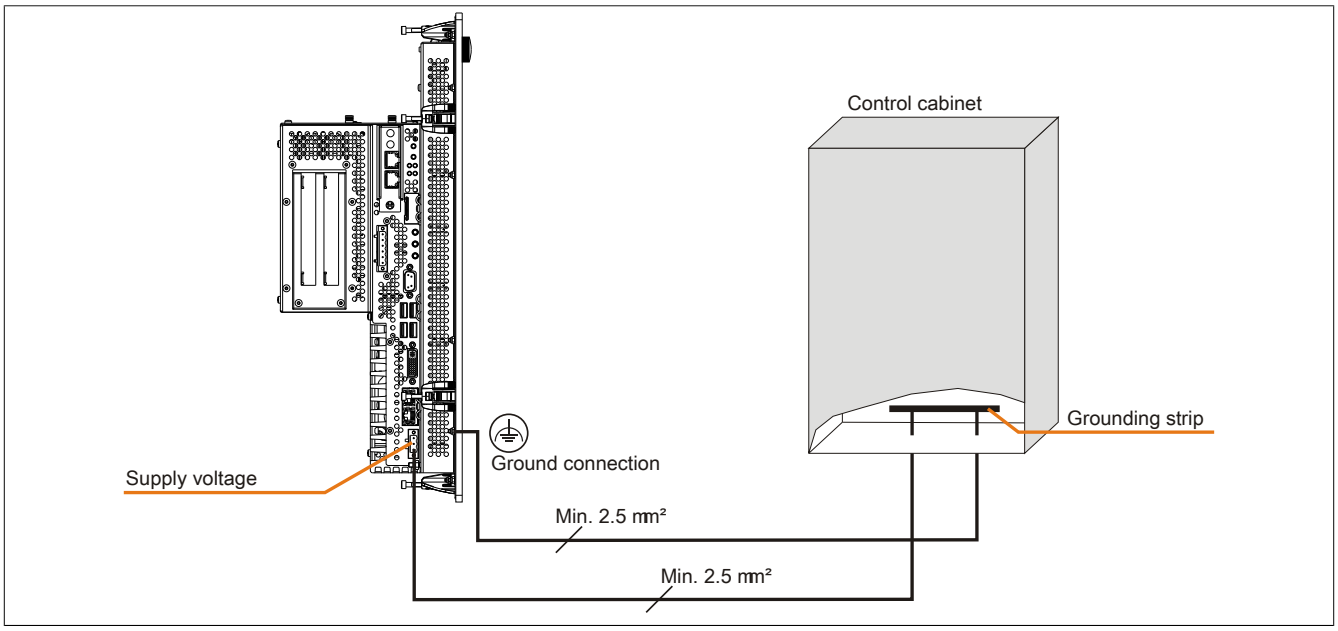


Figure 60: Grounding concept

4 General instructions for performing temperature testing

The purpose of these instructions is to explain general procedures for performing application-specific temperature tests on B&R Industrial PCs and Power Panels. Nevertheless, these instructions are meant to serve only as a guideline.

4.1 Procedure

In order to obtain accurate results, the testing conditions should match the conditions in the field. This means that for the duration of the temperature tests, the target application should be running, the PC should be installed in the control cabinet that will be used, etc.

In addition, a temperature sensor should be installed for the device being tested to provide live monitoring of the ambient temperature. In order to obtain accurate measurements, this sensor should be installed at a distance of 5 to 10 cm from the B&R industrial PC near the air intake (not near the exhaust).

All B&R Industrial PCs and Power Panels are equipped with internal temperature sensors. These are installed in different locations for each series. The number of sensors and the temperature limits also vary from series to series.

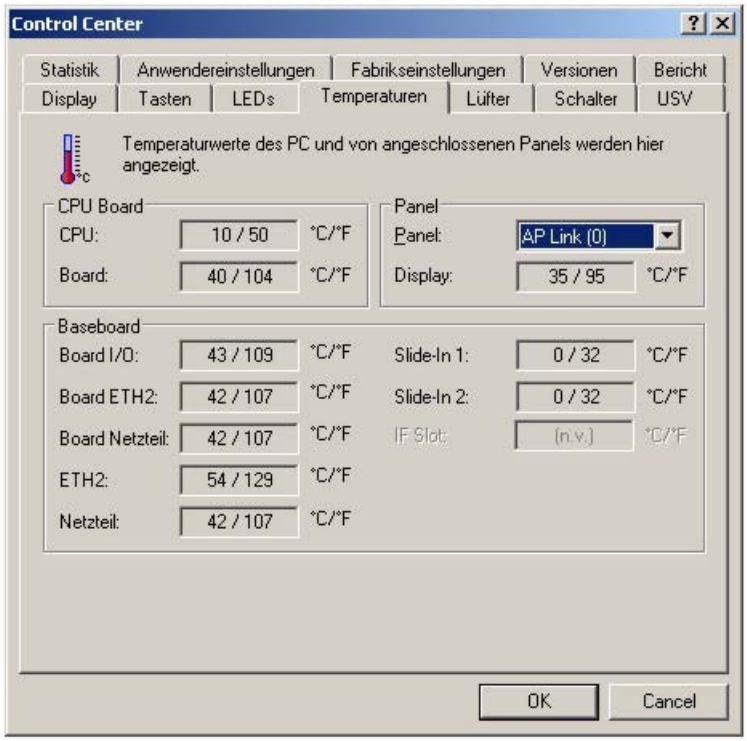
For information about the locations of temperature sensors and the maximum specified values, please see the "Temperature sensor locations" section in Chapter 2 "Technical data".

To ensure that the thermal situation is evaluated reliably, a minimum of 8 hours is recommended for testing.

4.2 Evaluating temperatures in Windows operating systems

4.2.1 Evaluating with the B&R Control Center

The B&R Control Center can be used to evaluate the temperatures. Temperatures can be viewed on the "Temperatures" property page. The B&R Control Center is available at no cost in the Downloads section of the B&R website (www.br-automation.com). The B&R Control Center uses the B&R Automation Device Interface (ADI).



A separate application can be developed if it is necessary to collect historical data.

> **Information:**
>
> **Software development kits such as the ADI .NET SDK are available on the B&R website (www.br-automation.com).**

4.2.2 Evaluating with the BurnInTest tool from Passmark

If a separate application is not created or used to evaluate the temperature, then B&R recommends using the BurnInTest software tool from Passmark.

Standard and Professional versions of BurnInTest are available. In addition to the software package, there are also various loopback plugs (serial, parallel, USB, etc.) and test CDs/DVDs available. The exact software and loopback plugs used will determine the corresponding load that can be generated on the system and peripheral devices.

Information:

Loopback plugs are also available from Passmark. More information is available at www.passmark.com.

The following screenshots are based on Passmark BurnInTest Pro V4 and a 2-slot APC810 with DVD.

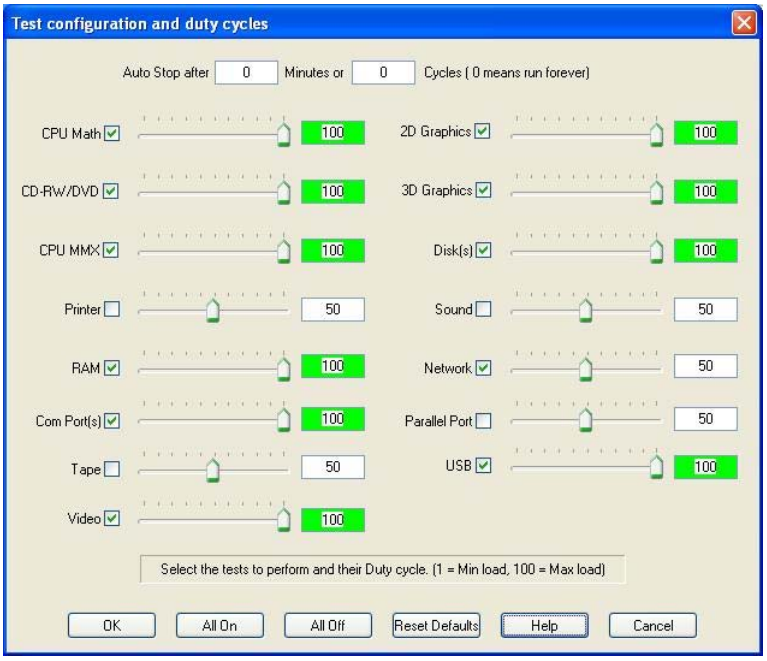


Figure 61: Settings for Passmark BurnInTest Pro V4 and a 2-slot APC810 with DVD

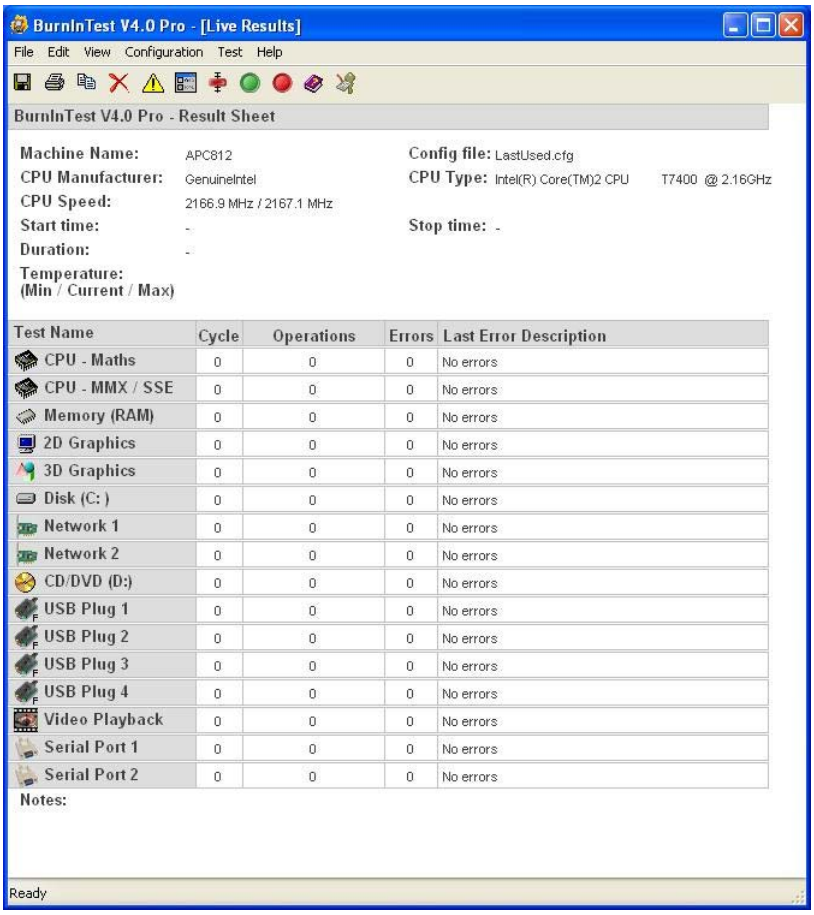


Figure 62: Test overview of a 2-slot APC810 with DVD

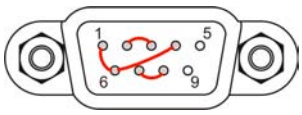
The respective test properties may need to be fine tuned depending on the availability of a loopback plug and DVDs.

Information:

USB flash drives can also be used if a USB loopback plug is not available. The USB flash drives must be detected as formatted drives in Windows. Test USB must then be deselected and the USB flash drives must be configured as the testing device in the disk properties.

Information:

Serial loopback plugs are relatively easy to create. Simply connect several pins on the serial interface with wires.



4.3 Evaluating temperatures in operating systems other than Windows

For applications that don't use Windows, temperatures can be evaluated with the help of the B&R implementation guide. In addition to the implementation guide, there are also programs available in MS-DOS.

The implementation guide only describes device-specific functions and not the main functions of the example programs.

If code from the example programs is used, it is important to observe the notes in the implementation guide regarding TODO statements, I/O access functions, etc.

> **Information:**
>
> **Example programs and implementation guides for all B&R Industrial PCs and Power Panels are available at no cost from the B&R website (www.br-automation.com).**

4.4 Evaluating the measurement results

The maximum temperature value recorded by each sensor must not exceed the temperature limits specified in the user's manuals.

If the temperature tests cannot be performed in a climate-controlled chamber, they can still be performed in an office environment. In this case, however, it is necessary to measure the ambient temperature. Experience at B&R has shown that values measured on passive systems (systems without a fan kit) can be projected linearly based on the ambient temperature. In order to be able to project the temperature values for systems with a fan kit, the fans must be running. It is also important to take values such as speed into consideration.

If the temperature tests are performed in a climate-controlled chamber with fans, the fans will cool the devices and skew the results. Measurement results for passive devices would therefore be unusable in this case. In order to obtain accurate results in climate-controlled chambers with fans, the fans must be turned off and the device must be allowed to run for a sufficient amount of time (several hours) before beginning the test.

Example using a 2-slot APC810

The following example is only valid if the instructions for installation and mounting orientation provided in the user's manual are observed.

Temperature sensor	Measured temperature	Projected temperature	
Ambient temperature	20°C	35°C	45°C
CPU	48°C	63°C	73°C
CPU board	51°C	66°C	76°C
Board I/O	51°C	66°C	76°C
Board ETH2	52°C	67°C	77°C
Board power supply	51°C	66°C	76°C
ETH2	65°C	80°C	90°C
Power supply	51°C	66°C	76°C

Table 101: Evaluation example using a 2-slot APC810

5 Connection examples

The following example provides an overview of the configuration possibilities regarding the way external panels can be connected with the PPC800. Among other things, the following question should be answered:

- Which panels can be operated using the monitor / panel connector?

5.1 One office TFT via RGB onboard

An office TFT (analog RGB) with maximum resolution of 1920 x 1200 (WUXGA) is connected to the integrated RGB interface (onboard).

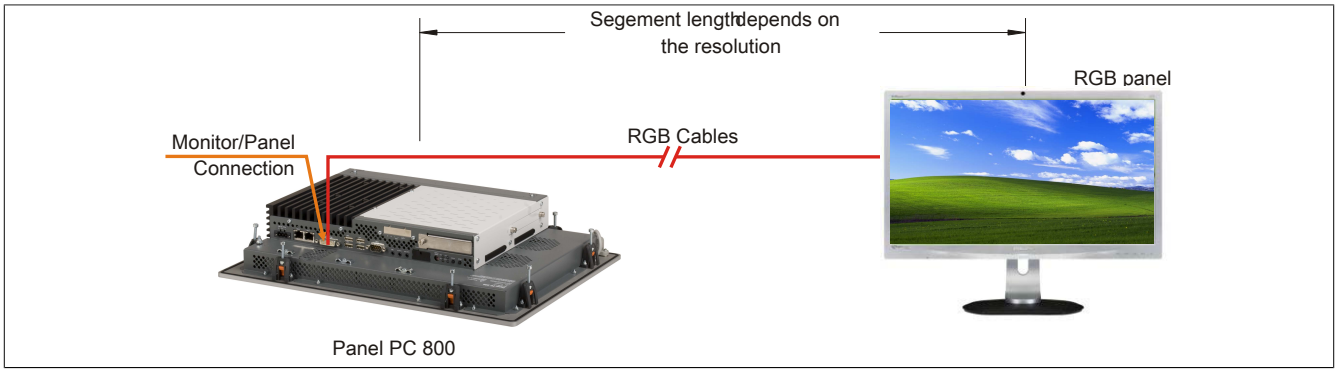


Figure 63: One office TFT via RGB

6 Touch screen calibration

B&R touch screen devices are equipped with a touch controller that supports hardware calibration. As a result, devices are pre-calibrated when delivered. This is an advantageous feature when replacing devices of the same model or type since it avoids having to recalibrate the new device. Nevertheless, calibrating the device is still recommended in order to achieve the best results and to better adapt the touch screen to the user's preferences.

Regardless of this, the touch screen will have to be calibrated once during or following the installation of the touch screen driver.

6.1 Windows XP Professional

After installing Windows XP Professional on the device, the touch screen driver must be installed in order to operate the touch screen. The necessary driver is available in the Downloads section of the B&R website (www.br-automation.com).

6.2 Windows XP Embedded

After starting Windows XP Embedded on the device for the first time (first boot agent), the touch screen driver must be installed in order to operate the touch screen. The necessary driver is available in the Downloads section of the B&R website (www.br-automation.com).

6.3 Windows Embedded Standard 2009

After starting Windows Embedded Standard 2009 on the device for the first time (first boot agent), the touch screen driver must be installed in order to operate the touch screen. The necessary driver is available in the Downloads section of the B&R website (www.br-automation.com).

6.4 Windows 7

After installing Windows 7 on the device, the touch screen driver must be installed in order to operate the touch screen. The necessary driver is available in the Downloads section of the B&R website (www.br-automation.com).

6.5 Windows Embedded Standard 7

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

If a touch controller is not detected during Windows Embedded Standard 7 installation, or if an Automation Panel 800/900 is connected later on, then the touch screen driver will need to be installed manually. The necessary driver is available in the Downloads section of the B&R website (www.br-automation.com).

6.6 Windows CE

Windows CE starts the touch screen calibration sequence during its first boot in its default configuration (i.e. delivered state).

6.7 Automation Runtime / Visual Components

The touch screen must be calibrated once for the customer application when commissioning the device and project.

7 Connection of USB peripheral devices

7.1 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 load of up to 1 A. The maximum transfer rate is USB 2.0.

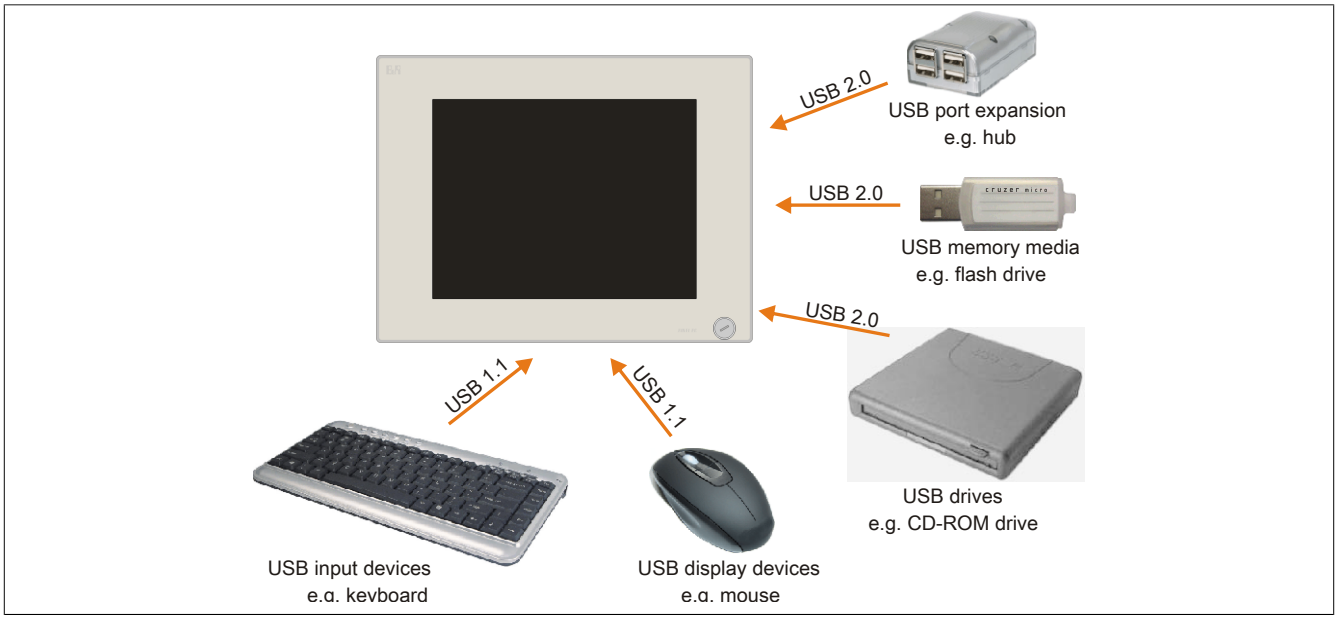


Figure 64: Local connection of USB peripheral devices on the PPC800

8 Configuration of a SATA RAID array

Information:

The following software description is valid for PCI SATA controllers 5ACPCI.RAIC-01, 5ACPCI.RAIC-03, 5ACPCI.RAIC-05 and 5ACPCI.RAIC-06.

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.

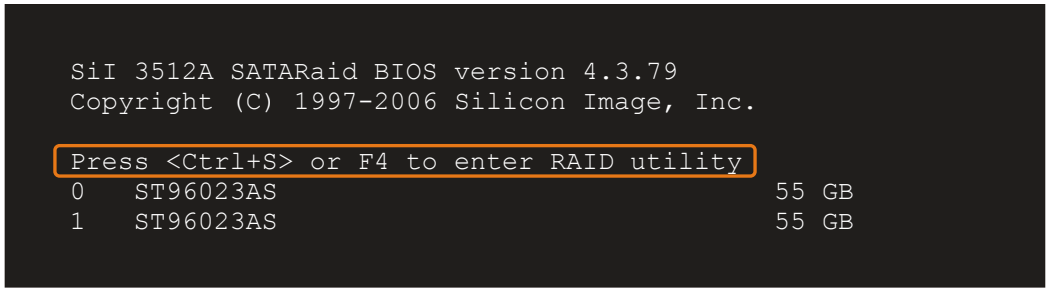


Figure 65: Open the RAID Configuration Utility

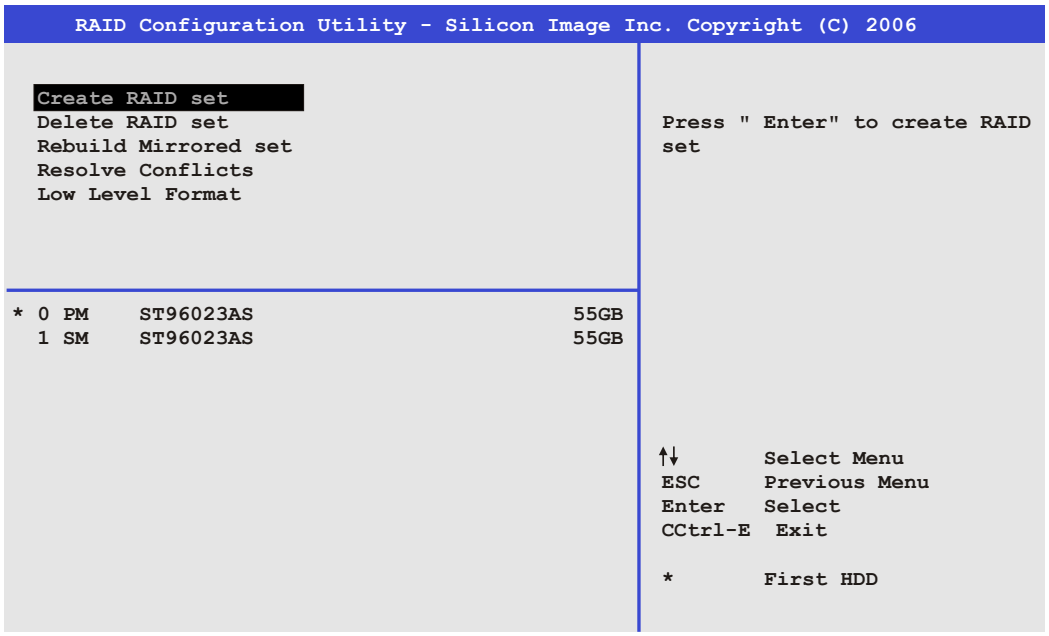


Figure 66: RAID Configuration Utility - Menu

The following keys can be used once inside BIOS Setup:

Key	Function
Cursor ↑	Moves to the previous item
Cursor ↓	Moves to the next item
Enter	Selects an item or opens a submenu
ESC	Returns to the previous menu
Ctrl+E	Saves any changed settings and exits setup

Table 102: BIOS-relevant keys in the RAID Configuration Utility

8.1 Create RAID set

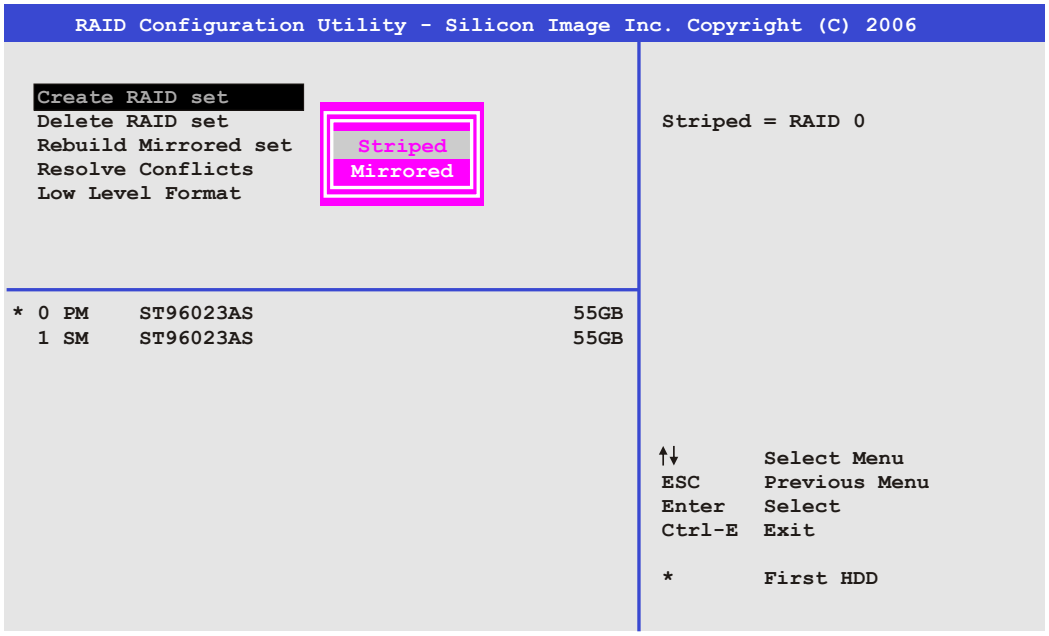


Figure 67: RAID Configuration Utility - Menu

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

8.2 Create RAID set - Striped

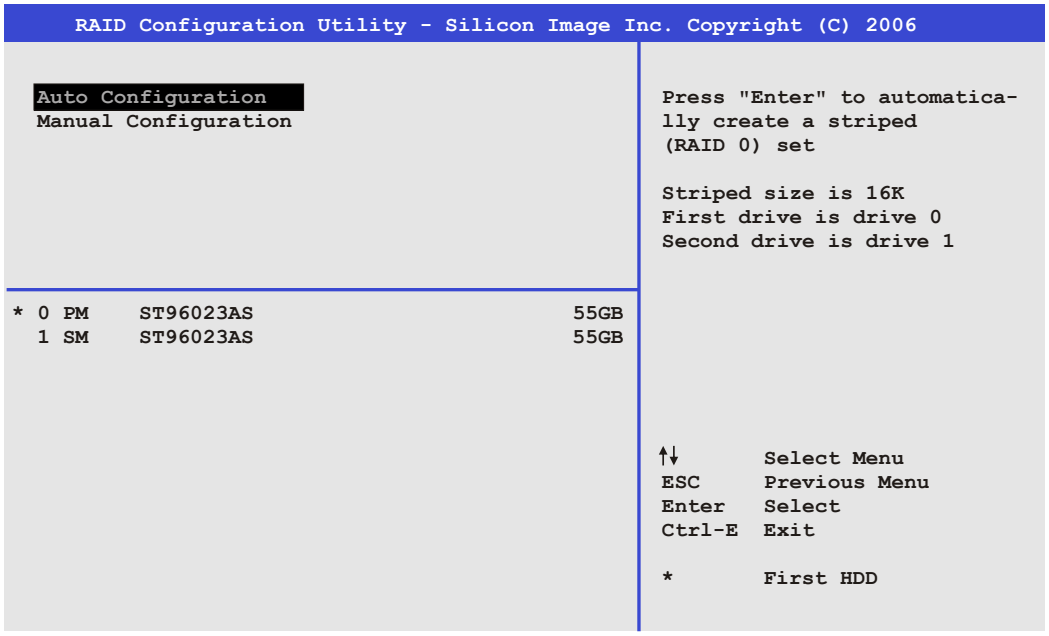


Figure 68: RAID Configuration Utility - Create RAID set - Striped

"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).

8.3 Create RAID set - Mirrored

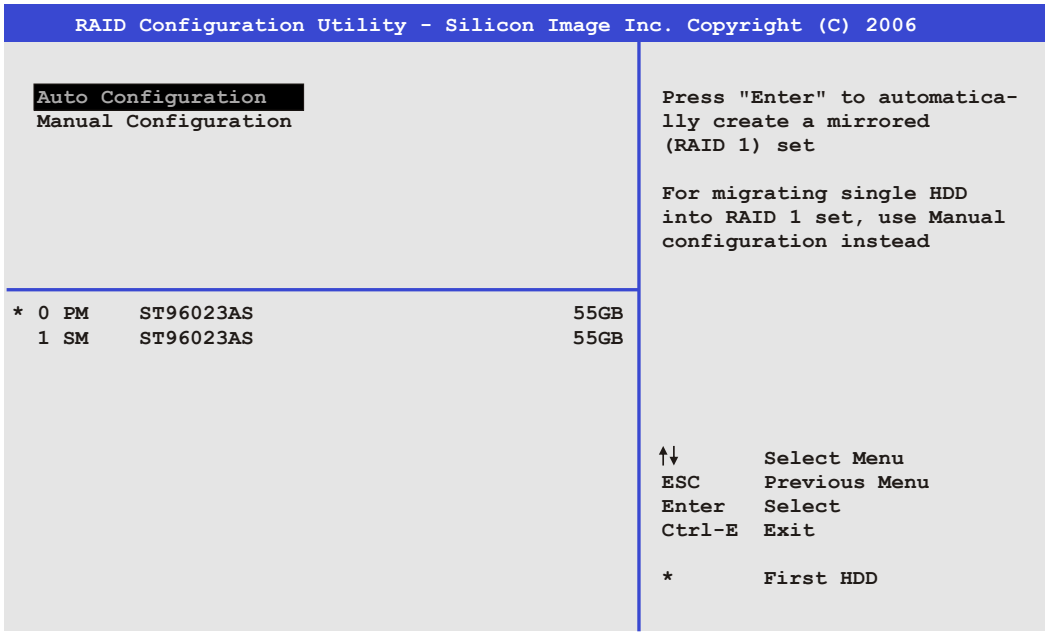


Figure 69: RAID Configuration Utility - Create RAID set - Mirrored

"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).

8.4 Delete RAID set

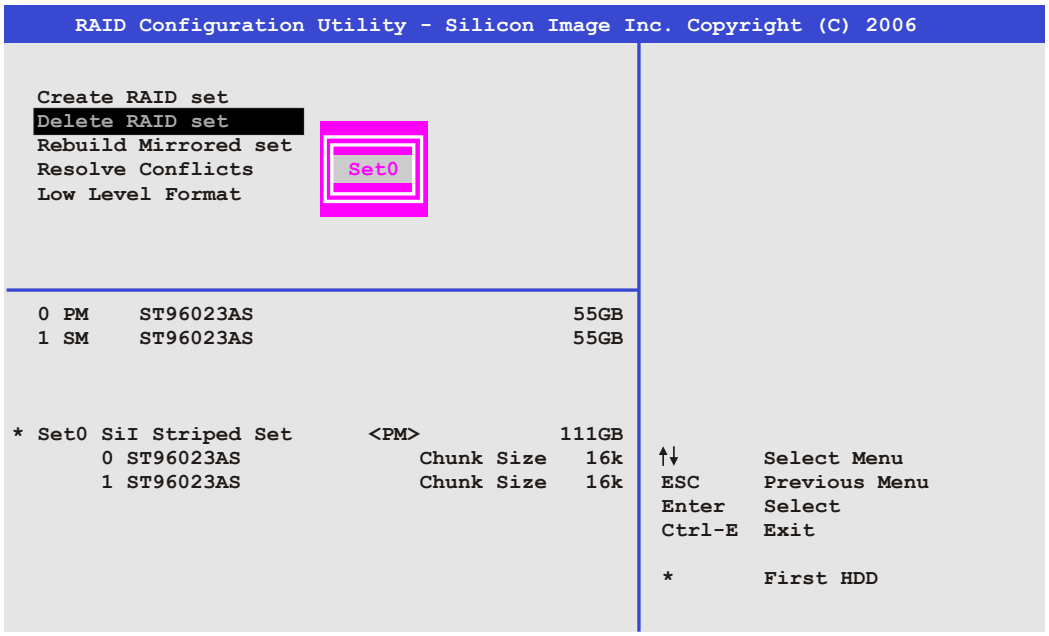


Figure 70: RAID Configuration Utility - Delete RAID set

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

8.5 Rebuild mirrored set

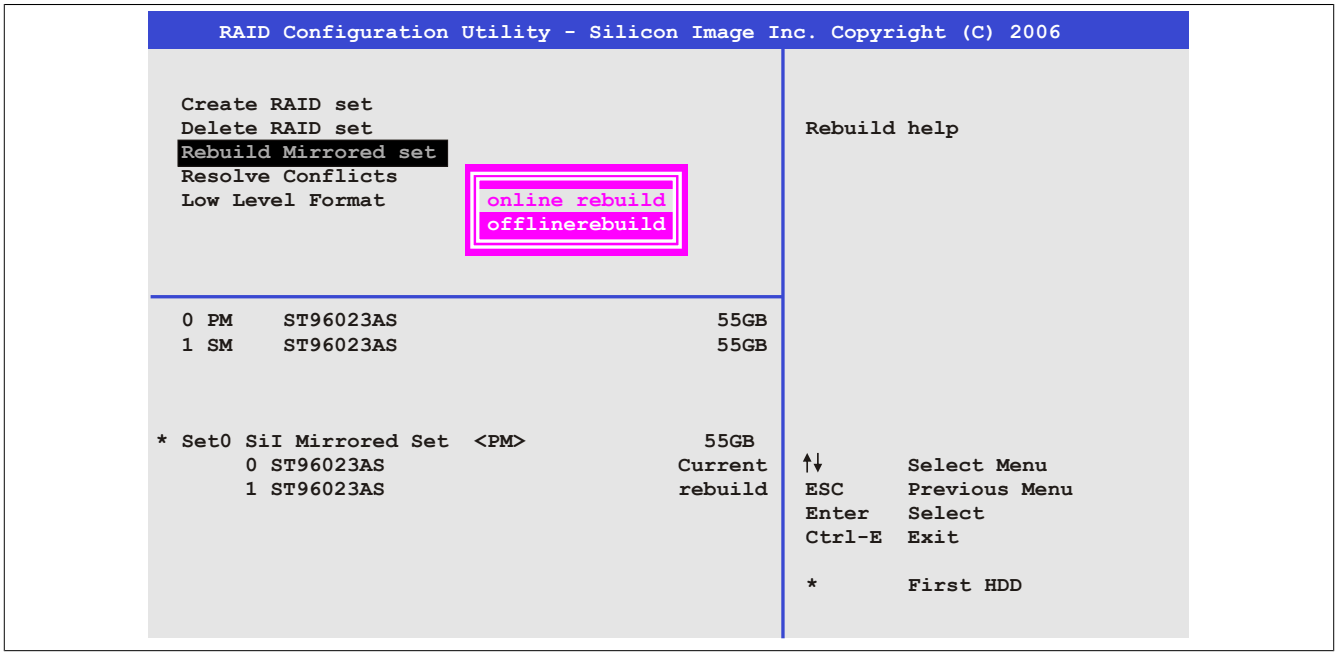


Figure 71: RAID Configuration Utility - Rebuild mirrored set

The "Rebuild mirrored set" menu can be used to restart a rebuild procedure in a RAID 1 set 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 (duration depends on the respective memory size).

8.6 Resolve Conflicts

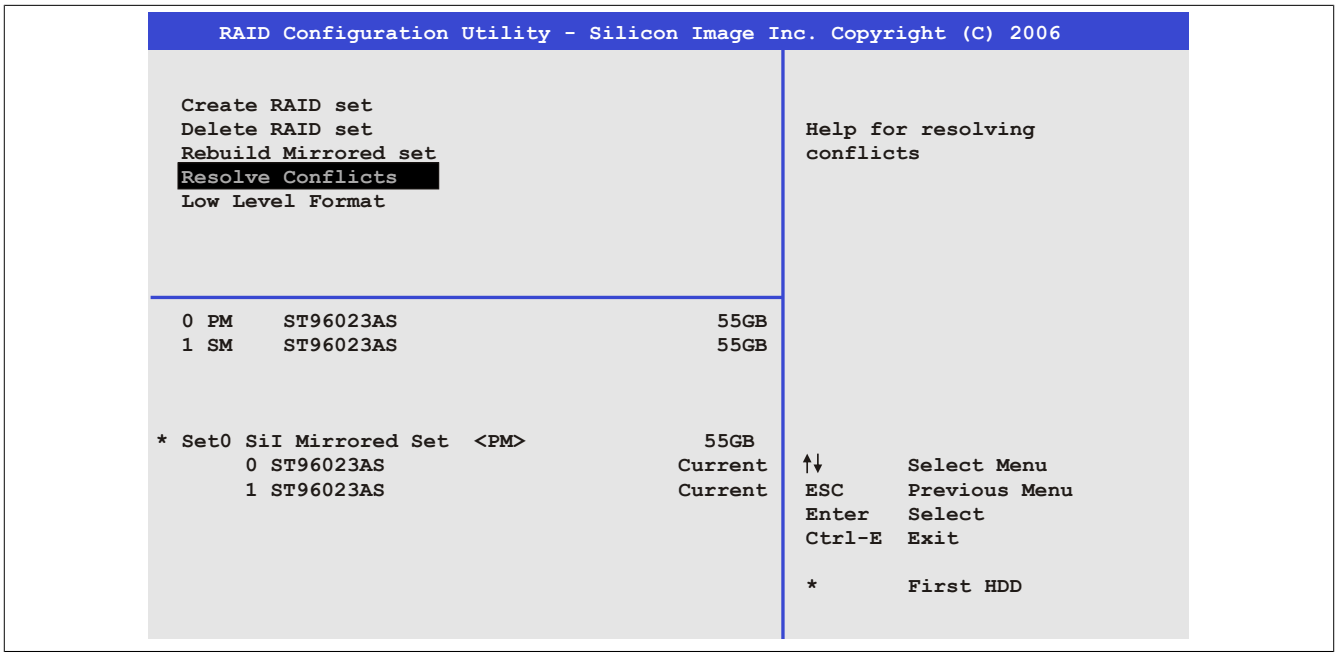


Figure 72: RAID Configuration Utility - Resolve conflicts

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".

8.7 Low Level Format

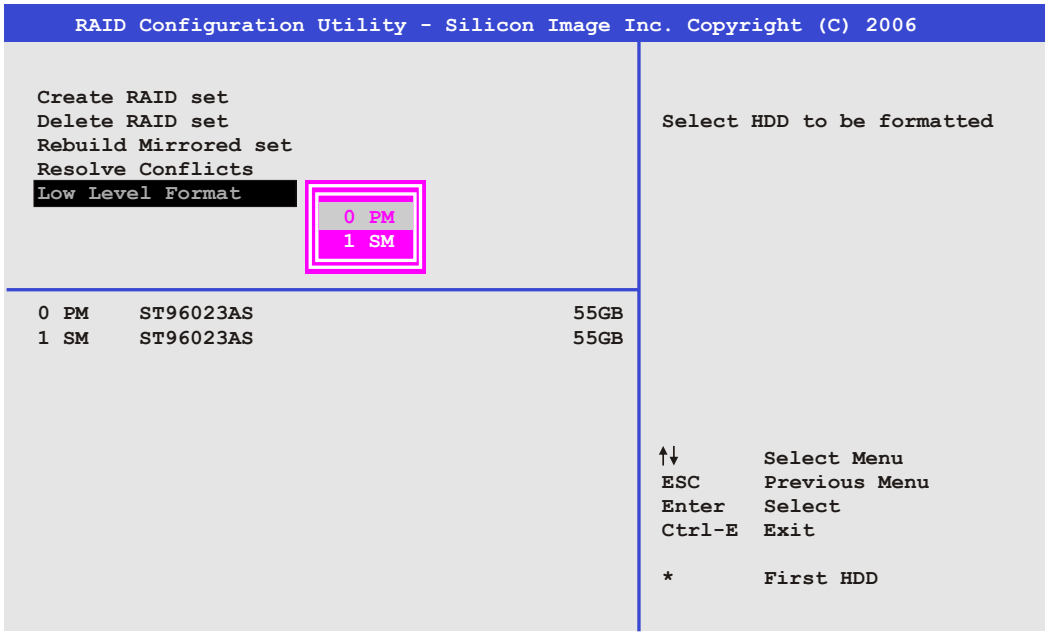


Figure 73: RAID Configuration Utility - Low level format

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.

9 Tips for extending the service life of the display

9.1 Backlight

The service life of the backlight is specified by its "half-brightness time". For example, a specified operating time of 50,000 hours means that the display would still retain 50% of its brightness after this time.

9.1.1 How can the service life of the backlight be extended?

- By setting the display brightness to the lowest value that is still comfortable for the eyes
- By using dark images
- By reducing the brightness by 50%, which can result in an approximately 50% increase in the half-brightness time

9.2 Screen burn-in

Screen burn-in refers to the "burning in" of a static image on a display after being displayed for a prolonged period of time. Nevertheless, static images are not the only cause of screen burn-in. Screen burn-in is also referred to as burn-in effect, image retention, memory effect, memory sticking or ghost image.

There are basically two types:

- Area type: This type of screen burn-in is indicated by a dark gray image. The effect will disappear if the display is switched off for a long period of time.
- Line type: This type of screen burn-in can cause lasting damage.

9.2.1 What causes screen burn-in?

- Static images
- No screensaver
- Sharp transitions in contrast (e.g. black/white)
- High ambient temperatures
- Operation outside of specifications

9.2.2 How can screen burn-in be avoided?

- By constantly changing between static and dynamic images
- By avoiding excessive brightness differences between foreground and background elements
- By using colors with similar brightness
- By using complementary colors in follow-up images
- By using a screensaver

10 Pixel errors

Information:

Displays may contain defective pixels (dead/stuck pixels) that result from the manufacturing process. These flaws are not grounds for claiming reclamation or warranty.

11 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. 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.
- Only RGB is available on the monitor / panel connector
- If the PCIec slot is operated with an exclusive IRQ, then the PCI Express Root Port 2 must be disabled in BIOS. Disabling the PCI Express Root Port 2 turns off the PCIe to PATA Bridge, which is the same PIRQ Line that the PCIec slot uses. As a result, the PCIec slot can again be used exclusively, while the CF1 and CF2 slots are deactivated. Now only a SATA device can be used as mass storage device in the slide-in or compact slide-in slot.
- The Intel NM10 chipset no longer supports AC'97 Sound.

Chapter 4 • Software

1 BIOS options

Information:

The following diagrams and BIOS menu items including descriptions refer to BIOS version 1.10. It is therefore possible that these diagrams and BIOS descriptions will not correspond with the BIOS version actually installed.

1.1 General information

BIOS is an acronym for "Basic Input/Output System". It is the most basic standardized interface between the user and the system (hardware). The BIOS system used in this B&R Industrial PC was developed by American Megatrends Inc.

The BIOS Setup utility can be used to modify basic system configuration settings. These settings are stored in CMOS and EEPROM memory (as a backup).

CMOS data is buffered by a battery (if present) and continues to remain stored on 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 or pressing the power button on the B&R Industrial PC. The system checks if the setup data from EEPROM memory is "OK". If the data is "OK", then it is transferred to CMOS. If the data is "not OK", then the CMOS data is checked to see whether it is valid. An error message is output if the CMOS data contains errors, and the boot procedure can be continued by pressing <F1>. To prevent an error message from appearing at each restart, the BIOS Setup utility can be opened by pressing <Del>. The settings can then be re-saved.

BIOS reads the system configuration information, checks and configures the system with the Power-On Self-Test (POST).

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

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 screen (during POST): "Press DEL or ESC to enter Setup"

Figure 74: Boot screen

1.2.1 BIOS setup keys

The following keys are enabled during POST:

> **Information:**
>
> **Key signals from USB keyboards will only be registered after the USB controller has been initialized.**

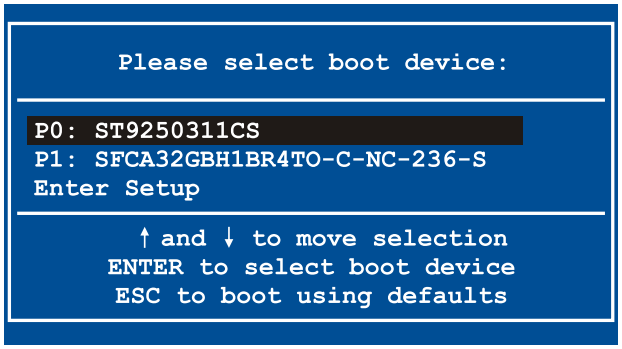
Keys	Function
DEL, ESC	Opens the main BIOS Setup screen
F12	Network boot
F11	Opens the boot menu. This list all bootable devices that are connected to the system. Selecting a device with cursor ↑, cursor ↓ and the pressing <ENTER> will boot from that device. 
<Pause>	Pauses POST. Pressing any other key resumes POST.

Table 103: BIOS-relevant keys for POST

The following keys can be used once inside BIOS Setup:

Key	Function
F1	Opens general help information
Cursor ↑	Moves to the previous item
Cursor ↓	Moves to the next item
Cursor ←	Moves to the previous item
Cursor →	Moves to the next item
+-	Changes the setting for the selected function
Enter	Changes to the selected menu / Confirms selection
Home 1 / PgUp	Jumps to the first BIOS menu item or object
End / PgDn	Jumps to the last BIOS menu item or object
F2	Resets any changes
F9	Loads and configures CMOS default values for all BIOS settings
F10	Saves and exits
ESC	Exits a submenu

Table 104: BIOS-relevant keys

1.3 Main

The main BIOS Setup screen appears immediately after the <Del> button is pressed during startup.

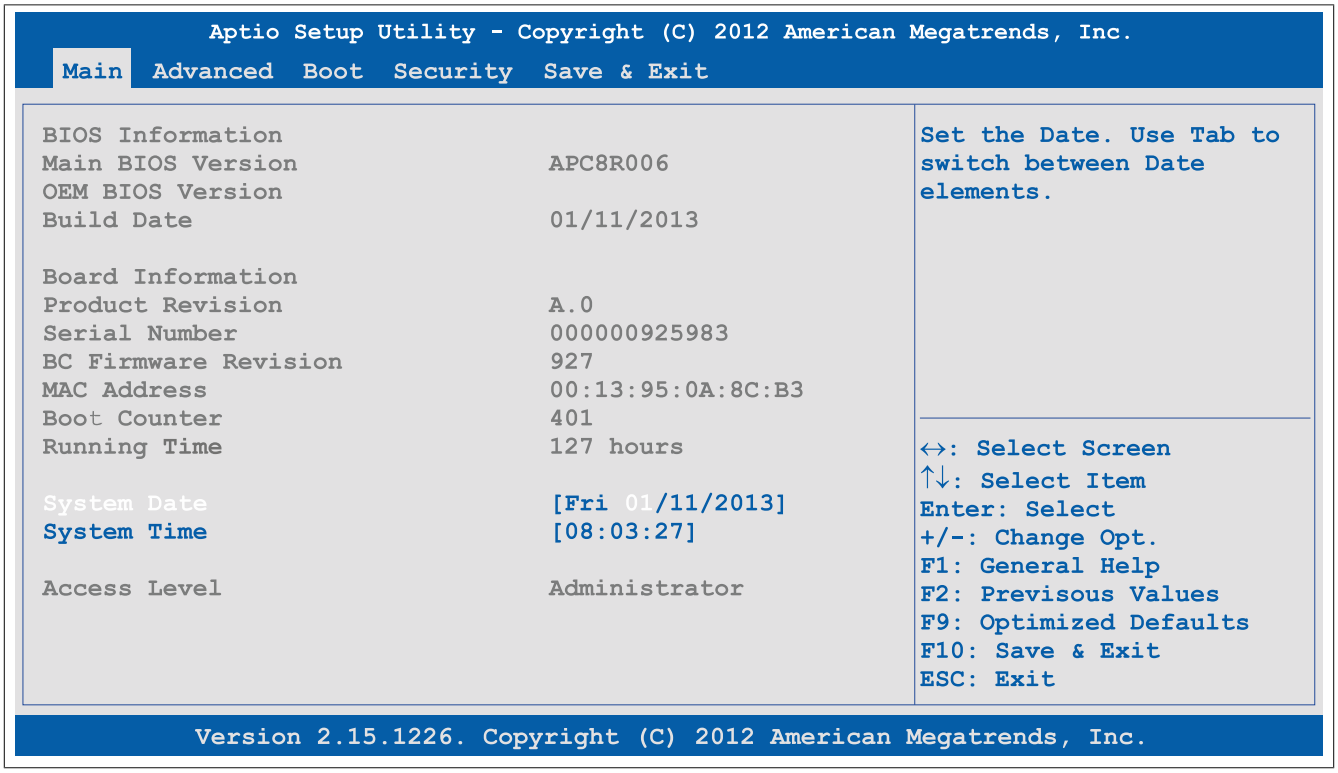


Figure 75: NM10 Main - Overview

BIOS setting	Description	Configuration options	Effect
BIOS information			
Main BIOS version	Displays the BIOS version	None	-
OEM BIOS version	Displays the OEM BIOS version	None	-
Build date	Displays the date the BIOS was created	None	-
Board information			
Product revision	Displays the hardware revision of the CPU board	None	-
Serial number	Displays the serial number of the CPU board	None	-
BC firmware rev.	Displays the firmware revision of the CPU board controller	None	-
ETH1 MAC address	Displays the assigned MAC address for the ETH1 interface	None	-
Boot counter	Displays the boot counter; each restart increases the counter by one (max. 16777215)	None	-
Running time	Displays the runtime in hours (max. 65535)	None	-
System date	The currently configured system date. This is buffered by the CMOS battery when the system is switched off.	Changes the system date	Sets the system date in the format Month:Day:Year (mm:dd:yyyy)
System time	The currently configured system time setting. This is buffered by the CMOS battery when the system is switched off.	Changes the system time	Sets the system time in the format Hour:Minute:Second (hh:mm:ss)
Access Level	Indicates the current access level	None	-

Table 105: NM10 - main - setting options

1.4 Advanced

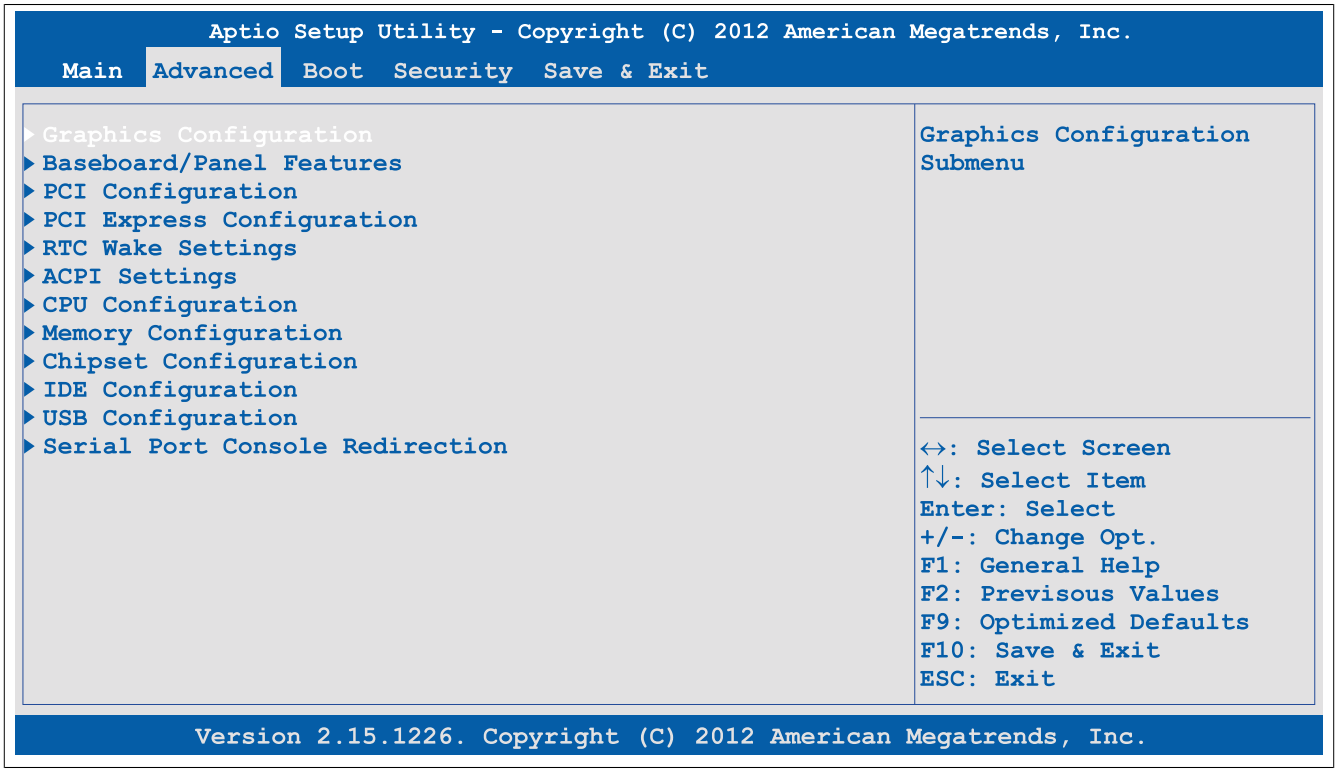


Figure 76: NM10 Advanced - Overview

BIOS setting	Description	Configuration options	Effect
Graphics configuration	Configures graphics settings	Enter	Opens the submenu See "Graphics configuration" on page 146
Main Board/Panel Features	Configuration of baseboard and panel features	Enter	Opens the submenu See "Main Board/Panel Features" on page 147
Hardware monitoring	Displays the current voltage levels as well as the CPU and baseboard temperatures	Enter	Opens the submenu See "Hardware monitoring" on page 151
PCI onfiguration	Configures PCI devices	Enter	Opens the submenu See "PCI Configuration" on page 152
PCI Express onfiguration	Configures PCI Express devices	Enter	Opens the submenu See "PCI Express Configuration" on page 154
RTC wake settings	Configures the start time when switched off	Enter	Opens the submenu See "RTC wake settings" on page 160
ACPI settings	Configures ACPI settings	Enter	Opens the submenu See "ACPI settings" on page 161
CPU configuration	Configures CPU settings	Enter	Opens the submenu See "CPU configuration" on page 162
Memory configuration	Configures main memory settings	Enter	Opens the submenu See "Memory configuration" on page 164
Chipset configuration	Configures chipset settings	Enter	Opens the submenu See "Chipset configuration" on page 165
IDE onfiguration	Configures IDE settings	Enter	Opens the submenu See "IDE Configuration" on page 166
USB onfiguration	Configures USB settings	Enter	Opens the submenu See "USB Configuration" on page 167
Serial port console redirection	Configures the remote console	Enter	Opens the submenu See "Serial port console redirection" on page 168

Table 106: NM10 Advanced overview

1.4.1 Graphics configuration

```
Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
Advanced

IGFX - Boot Type                    [VBIOS Default]
Active LFP                          [LVDS]
Always Try Auto Panel Detect        [No]
Local Flat Panel Type               [Auto]
IGD Clock Source                    [External Clock]
Fixed Graphics Memory Size          [128MB]
Digital Display Interface Port B    [Disabled]

IGFX VBIOS Version                  1089

Select the Video Device
which will be activated
during POST. This has no
effect if external
graphics present.

↔: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previsous Values
F9: Optimized Defaults
F10: Save & Exit
ESC: Exit

Version 2.15.1226. Copyright (C) 2012 American Megatrends, Inc.
```

Figure 77: NM10 Advanced - Graphics configuration

BIOS setting	Description	Configuration options	Effect
IGFX - Boot Type	Option for selecting which device to output graphics to during boot procedure.	VBIOS default	The VBIOS default settings are used.
		CRT	Uses the CRT (cathode ray tube) channel
		LFP	Uses the LFP (local flat panel) channel
		EFP	The EFP (External Flat Panel) channel is used.
		CRT + LFP	The CRT and LFP channels are used.
		CRT + EFP	The CRT and EFP channels are used.
		LFP + EFP	The LFP and EFP channels are used.
Active LFP	Option for selecting the active LFP (local flat panel) channel.	No LVDS	Does not use the LVDS channel
		LVDS	One LVDS channel is used.
Always Try Auto Panel Detect [1)]	Option for setting automatic panel detection.	No	LFP is not configured automatically.
		Yes	LFP configured automatically.
Local Flat Panel Type [1)]	Option for manually setting the LFP type.	Auto	LFP type defined automatically based on EDID data.
		VGA (640x480) to WUXGA (1920x1200)	Manual setting of resolution 640x480 to 1920x1200.
		Customized EDID 1 - 3	User-specific settings for the LFP type.
IGD Clock Source	Option for selecting the IGD (Integrated Graphics Display) clock source.	External Clock	External clock.
		Internal Clock	Internal clock.
Fixed Graphics Memory Size	Option for setting a fixed amount of memory that can be used for the internal graphics controller.	128 MB	Allocates 128 MB of main memory
		256 MB	Allocates 256 MB of main memory
Digital Display Interface Port B	Option for selecting the video device that is connected to Display Port B or to configure the port as an HDMI/DVI or Display Port.	Disabled	No video device connected.
		Display port	Port is configured as a display port.
		HDMI/DVI	Port is configured as an HDMI/DVI port.
IGFX VBIOS version	Displays the IGFX BIOS version	None	-

Table 107: NM10 Advanced - Graphics Configuration - Setting options

1) These settings are only possible if *Active LFP* is set to *LVDS*.

1.4.2 Main Board/Panel Features

```
Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
Advanced

▶ Panel Control                                   Panel Control Submenu.
▶ Baseboard Monitor
▶ Super I/O Configuration

  Realtime Environment              [Disabled]

  Versions
  Main BIOS Version                 APC8R006
  OEM BIOS Version
  MTCX PX32                         V1.03
  MTCX FPGA                         V1.08

  OEM String                                      ↔: Select Screen
  Bernecker + Rainer Industrie-Elektronik O0.06   ↑↓: Select Item
                                                  Enter: Select
  CMOS Profile                      5             +/-: Change Opt.
  Device ID                         0000AF21      F1: General Help
  Combatibility ID                  0000          F2: Previsous Values
  Serial Number                     AF210169827   F9: Optimized Defaults
  Product Name                      5PC820.1505-00 F10: Save & Exit
  User Serial ID                    00000000      ESC: Exit

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```

Figure 78: NM10 Advanced - Baseboard/Panel Features

BIOS setting	Description	Configuration options	Effect
Panel control	Displays device-specific information for the connected panel	Enter	Opens the submenu See "Panel control features" on page 148
Baseboard Monitor	Displays device-specific information for the CPU board	Enter	Opens the submenu See"Baseboard Monitor" on page 149
Super I/O configuration	Configures special interface settings	Enter	Opens the submenu See "Super I/O configuration" on page 150
Real-time environment	Configures settings for real-time operating systems such as ARwin	Disabled	Disables this function
		Enabled Disables hyperthreading, EIST and CPU thermal monitoring	Enables this function
Versions			
Main BIOS version	Displays the installed B&R BIOS version	None	-
OEM BIOS version	Displays the OEM BIOS version.	None	-
MTCX PX32	Displays the MTCX PX32 version that is installed.	None	-
MTCX FPGA	Displays the MTCX FPGA version that is installed.	None	-
CMOS Profile	Displays the CMOS profile that is being used.	None	-
Device ID	Displays the device ID of the system board	None	-
Compatibility ID	Displays the version of the device within the same B&R device ID. 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 hexadecimal value can be freely specified by the user (e.g. to give the device a unique ID) and can only be changed using the "B&R Control Center" included with the ADI driver.	None	-

Table 108: NM10 Advanced - Baseboard/Panel Features - Setting options

1.4.2.1 Panel control features

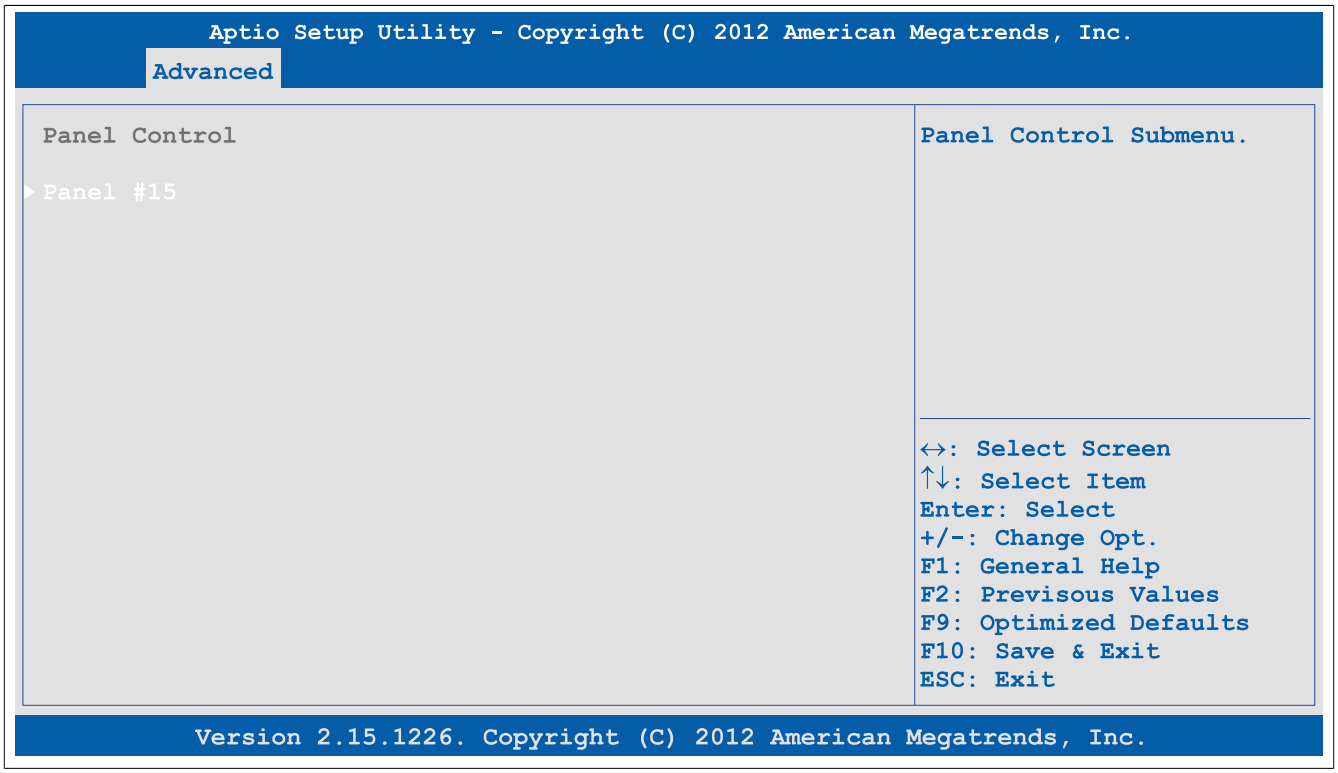

Figure 79: NM10 Advanced - Baseboard/Panel Features - Panel Control

BIOS setting	Description	Configuration options	Effect
Panel #X	Displays the panel properties of the connected panel	Enter	Opens the submenu See "Panel #X" on page 148

Table 109: NM10 Advanced - Baseboard/Panel Features - Panel Control Features

1.4.2.1.1 Panel #X

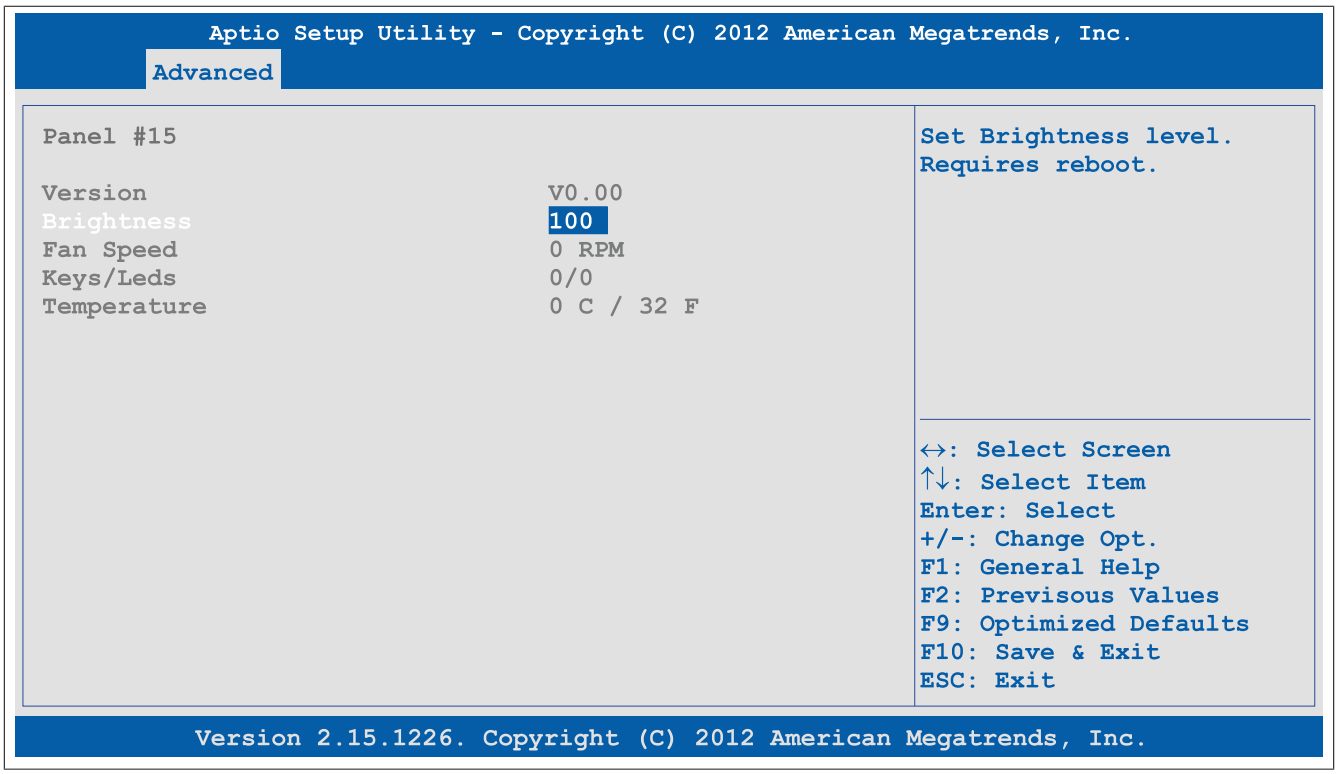

Figure 80: NM10 Advanced - Baseboard/Panel Features - Panel Control - Panel #x

BIOS setting	Description	Configuration options	Effect
Version	Displays the firmware version of the SDLR controller	None	-
Brightness	Setting for the brightness of the panel	0 to 100	Sets the brightness (in %) of the selected panel. Settings may only take effect after the system has been restarted.
Fan speed	Displays the fan speed of the panel	None	-
Keys/LEDs	Displays the available keys and LEDs for the panel	None	-
Temperature	Displays the temperature of the panel in °C and °F	None	-

Table 110: NM10 Advanced - Baseboard/Panel Features - Panel Control Features - Panel #x - Setting options

1.4.2.2 Baseboard Monitor

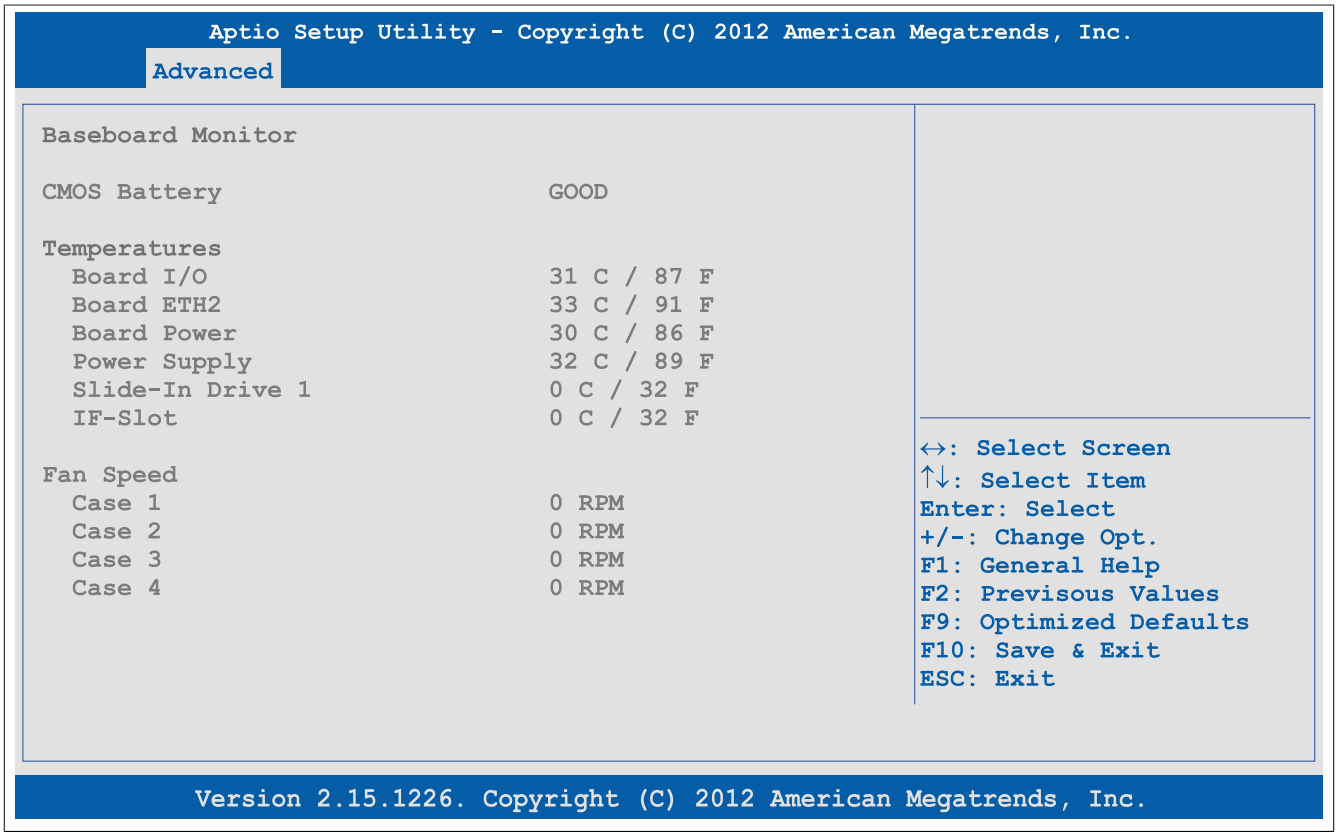

Figure 81: NM10 Advanced - Baseboard/Panel Features - Baseboard Monitor

BIOS setting	Description	Configuration options	Effect
CMOS Battery	Displays the CMOS battery status. **n.a.** - Not available **Good** - Battery OK. **Bad** - Battery defective.	None	-
Temperatures			
Board I/O	Displays the current temperature in the I/O area in °C and °F.	None	-
Board ETH2	Displays the current temperature in the Ethernet controller chip area in °C and °F.	None	-
Board Power	Displays the current board power temperature in °C and °F.	None	-
Power Supply	Displays the current power supply temperature in °C and °F.	None	-
Slide-In Drive 1	Displays the current temperature of slide-in drive 1 in °C and °F.	None	-
IF Slot	Displays the temperature near the IF slot in °C and °F.	None	-
Fan speeds			
Case 1	Displays the current fan speed of case 1 in RPM (revolutions per minute).	None	-
Case 2	Displays the current fan speed of case 2 in RPM (revolutions per minute).	None	-

Table 111: NM10 Advanced - Baseboard/Panel Features - Baseboard Monitor

BIOS setting	Description	Configuration options	Effect
Case 3	Displays the current fan speed of case 3 in RPM (revolutions per minute).	None	-
Case 4	Displays the current fan speed of case 4 in RPM (revolutions per minute).	None	-

Table 111: NM10 Advanced - Baseboard/Panel Features - Baseboard Monitor

1.4.2.3 Super I/O configuration

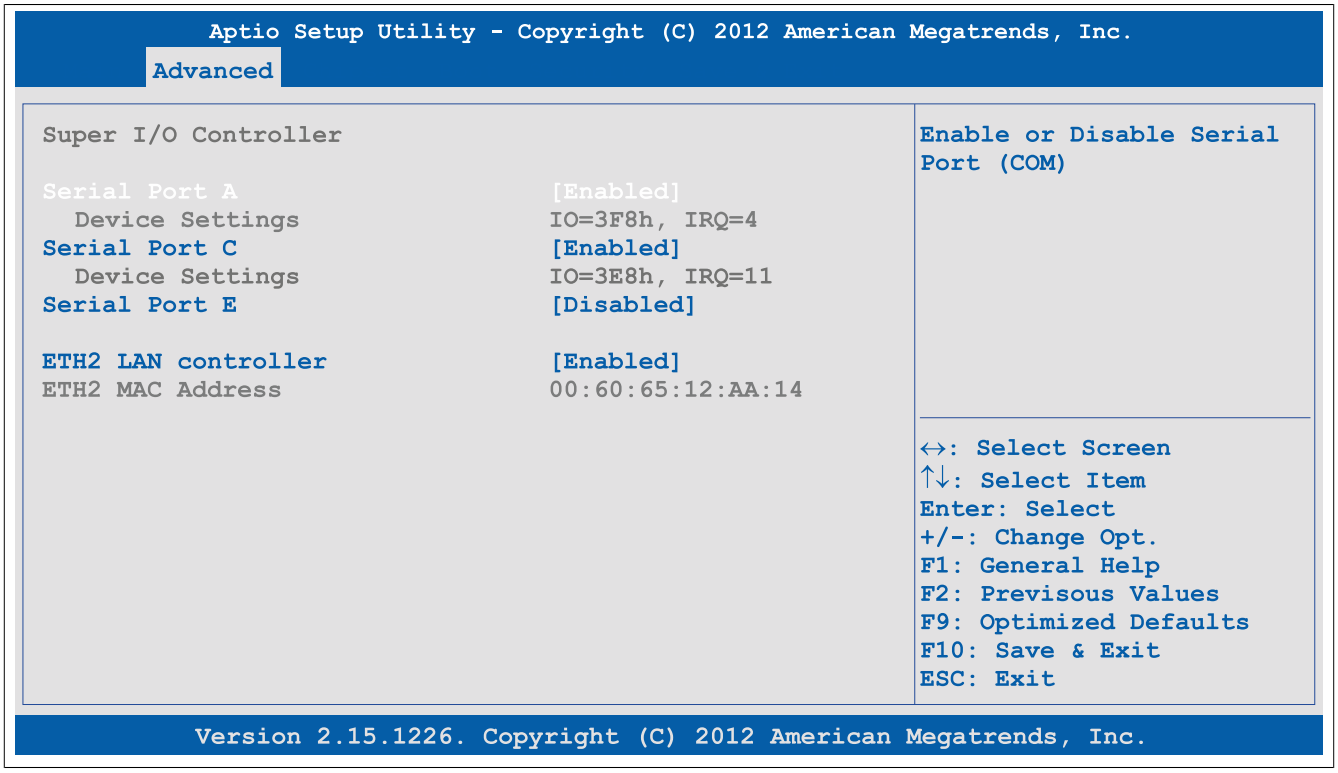

Figure 82: NM10 Advanced - Baseboard/Panel Features - Super I/O Configuration

BIOS setting	Description	Configuration options	Effect
Serial port A	Setting for the **COM1** serial interface in the system.	Enabled	Enables the interface
		Disabled	Disables the interface
Device settings [1]	Displays the I/O address and interrupt of the COM interface	None	-
Serial port C	Setting the COM port for the **touch screen on the monitor/panel** connector.	Enabled	Enables the interface
		Disabled	Disables the interface
Device settings [2]	Displays the I/O address and interrupt of the COM interface	None	-
Serial port E	Configuration of the COM port on the **B&R add-on interface**.	Enabled	Enables the interface
		Disabled	Disables the interface
Device settings[3]	Displays the I/O address and interrupt of the COM interface[4]	None	-
ETH2 LAN Controller	Enable / disable the onboard Ethernet LAN2 controller.	Disabled	Disables the ETH2 controller.
		Enabled	Enables the ETH2 controller.
ETH2 MAC address	Displays the MAC addresses for the Ethernet2 controller.	None	-

Table 112: NM10 Advanced - Baseboard/Panel Features - Super I/O Configuration - Setting options

1) This setting is only displayed if *Serial Port A* is set to *Enabled*.
2) This setting is only displayed if *Serial Port C* is set to *Enabled*.
3) This setting is only displayed if *Serial Port E* is set to *Enabled*.
4) Only displayed after the system has been restarted.

1.4.3 Hardware monitoring

```
Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
Advanced

Hardware monitoring

CPU temperature                    : +35 C
Board temperature 1                : +37 C
Board temperature 2                : +33 C
Board temperature 3                : +40 C

12 V (default)                     : +12.18 V
5 V standby                        : +4.81 V

« : Select Screen
- : Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F9: Optimized Defaults
F10: Save & Exit
ESC: Exit

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```

Figure 83: NM10 Advanced - Hardware Monitoring

BIOS setting	Description	Configuration options	Effect
Hardware monitoring			
CPU temperature	Displays the current temperature of the CPU sensor in °C	None	-
Board temperature 1	Displays the current temperature of board sensor 1 in °C	None	-
Board temperature 2	Displays the current temperature of board sensor 2 in °C	None	-
Board temperature 2	Displays the current temperature of board sensor 3 in °C	None	-
12 V (default)	Displays the current voltage of the 12 volt supply	None	-
5 V standby	Displays the current voltage of the 5 volt supply	None	-

Table 113: NM10 Advanced - Baseboard/Panel Features - Baseboard Monitor

1.4.4 PCI Configuration

```
Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
Advanced

PCI Latency Timer                [32 PCI Bus Clocks]      Value to be programmed
VGA Palette Snoop                [Disabled]               into PCI Latency Timer
PERR# Generation                 [Disabled]               Register.
SERR# Generation                 [Disabled]

▶ PIRQ Routing & IRQ Reservation

                                                          ↔: Select Screen
                                                          ↑↓: Select Item
                                                          Enter: Select
                                                          +/-: Change Opt.
                                                          F1: General Help
                                                          F2: Previsous Values
                                                          F9: Optimized Defaults
                                                          F10: Save & Exit
                                                          ESC: Exit

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```

Figure 84: NM10 Advanced - PCI configuration

BIOS setting	Description	Configuration options	Effect
PCI latency timer	Option for controlling how long (in PCI ticks) one PCI bus card can continue to use the master after another PCI card has requested access	32 PCI bus clocks to 248 PCI bus clocks	Manually sets the value in PCI ticks
VGA palette snoop	Option for supporting graphics cards with 256 colors. This option should only be set to "Enabled" if colors are not displayed correctly.	Disabled	Disables this function
		Enabled	Enables this function
PERR# generation	Option for generating a PERR signal (parity error). This signal indicates a data parity error one cycle after *PAR*.	Disabled	Disables this function
		Enabled	Enables this function
SERR# generation	Option for generating a SERR signal (system error). This signal indicates a data error or other type of system error when executing a special cycle command.	Disabled	Disables this function
		Enabled	Enables this function
PIRQ routing & IRQ reservation	Configures PIRQ routing	Enter	Opens the submenu See "PIRQ routing & IRQ reservation" on page 153

Table 114: NM10 Advanced - PCI Configuration setting options

1.4.4.1 PIRQ routing & IRQ reservation

```
Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
Advanced

PIRQA                                [Auto]      Set interrupt for selected
PIRQB                                [Auto]      PIRQ. Please refer to the
PIRQC                                [Auto]      board's resource list for
PIRQD                                [Auto]      a detailed list of devices
PIRQE                                [Auto]      connected to the
PIRQF                                [Auto]      respective PIRQ.
PIRQG                                [Auto]      NOTE: These settings will
PIRQH                                [Auto]      only be effective while
                                                 operating in PIC (non-
Reserve Legacy Interrupt 1           [None]      IOAPIC) interrupt mode.
Reserve Legacy Interrupt 2           [None]
                                                 ↔: Select Screen
                                                 ↑↓: Select Item
                                                 Enter: Select
                                                 +/-: Change Opt.
                                                 F1: General Help
                                                 F2: Previsous Values
                                                 F9: Optimized Defaults
                                                 F10: Save & Exit
                                                 ESC: Exit

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```

Figure 85: NM10 Advanced - PCI Configuration - PIRQ Routing & IRQ Reservation

BIOS setting	Description	Configuration options	Effect
PIRQA	Option for configuring PIRQ A	Auto	Automatic assignment by BIOS and the operating system
		IRQ3, IRQ4, IRQ5, IRQ6, IRQ10, IRQ11, IRQ14, IRQ15	Manual assignment
PIRQB	Option for configuring PIRQ B	Auto	Automatic assignment by BIOS and the operating system
		IRQ3, IRQ4, IRQ5, IRQ6, IRQ10, IRQ11, IRQ14, IRQ15	Manual assignment
PIRQC	Option for configuring PIRQ C	Auto	Automatic assignment by BIOS and the operating system
		IRQ3, IRQ4, IRQ5, IRQ6, IRQ10, IRQ11, IRQ14, IRQ15	Manual assignment
PIRQD	Option for configuring PIRQ D	Auto	Automatic assignment by BIOS and the operating system
		IRQ3, IRQ4, IRQ5, IRQ6, IRQ10, IRQ11, IRQ14, IRQ15	Manual assignment
PIRQE	Option for configuring PIRQ E	Auto	Automatic assignment by BIOS and the operating system
		IRQ3, IRQ4, IRQ5, IRQ6, IRQ10, IRQ11, IRQ14, IRQ15	Manual assignment
PIRQF	Option for configuring PIRQ F	Auto	Automatic assignment by BIOS and the operating system
		IRQ3, IRQ4, IRQ5, IRQ6, IRQ10, IRQ11, IRQ14, IRQ15	Manual assignment
PIRQG	Option for configuring PIRQ G	Auto	Automatic assignment by BIOS and the operating system
		IRQ3, IRQ4, IRQ5, IRQ6, IRQ10, IRQ11, IRQ14, IRQ15	Manual assignment
PIRQH	Option for configuring PIRQ H	Auto	Automatic assignment by BIOS and the operating system
		IRQ3, IRQ4, IRQ5, IRQ6, IRQ10, IRQ11, IRQ14, IRQ15	Manual assignment
Reserve legacy interrupt 1	The interrupt reserved here is not made available to a PCI or PCI Express device.	None	No interrupt assigned
		IRQ3, IRQ4, IRQ5, IRQ6, IRQ10, IRQ11, IRQ14, IRQ15	Reserves IRQx
Reserve legacy interrupt 2	The interrupt reserved here is not made available to a PCI or PCI Express device.	None	No interrupt assigned
		IRQ3, IRQ4, IRQ5, IRQ6, IRQ10, IRQ11, IRQ14, IRQ15	Reserves IRQx

Table 115: NM10 Advanced - PCI Configuration - PIRQ Routing & IRQ Reservation - Setting options

1.4.5 PCI Express Configuration

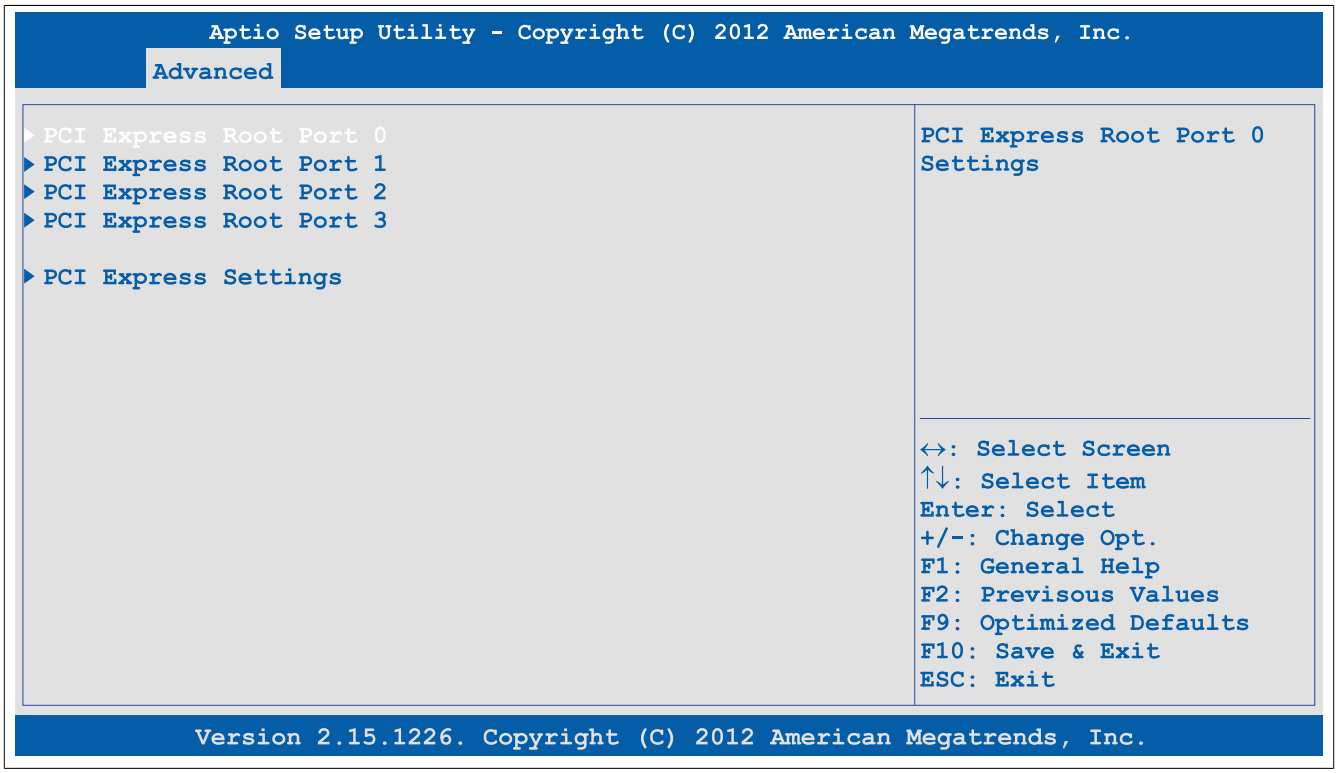

Figure 86: NM10 Advanced - PCI Express configuration

BIOS setting	Description	Configuration options	Effect
PCI Express root port 0	Configures PCI Express settings on port 0	Enter	Opens the submenu See "PCI Express root port 0" on page 155
PCI Express root port 1	Configures PCI Express settings on port 1	Enter	Opens the submenu See "PCI Express root port x" on page 157
PCI Express root port 2	Configures PCI Express settings on port 2	Enter	Opens the submenu See "PCI Express root port x" on page 157
PCI Express root port 3	Configures PCI Express settings on port 3	Enter	Opens the submenu See "PCI Express root port x" on page 157
PCI Express settings	Configures PCI Express settings	Enter	Opens the submenu See "PCI Express settings" on page 159

Table 116: NM10 Advanced - PCI Express Configuration overview

1.4.5.1 PCI Express root port 0

Warning!

Improper settings can cause instability or device problems. It is therefore strongly recommended that these settings only be changed by experienced users.

```
Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
Advanced

PCI Express Port 0                [Enabled]        Enable / Disable PCI
  Port 0 IOxAPIC                  [Disabled]       Express Root Port 0.
Automatic ASPM                    [Manual]
ASPM L0s                          [Disabled]
ASPM L1                           [Disabled]
  URR                             [Disabled]
  FER                             [Disabled]
  NFER                            [Disabled]
  CER                             [Disabled]
  CTO                             [Disabled]
  SEFE                            [Disabled]
  SENFE                           [Disabled]       ↔: Select Screen
  SECE                            [Disabled]       ↑↓: Select Item
  PME SCI                         [Enabled]        Enter: Select
  Hot Plug                        [Disabled]       +/-: Change Opt.
                                                   F1: General Help
Assign INT to Root Port           [Enabled]        F2: Previsous Values
                                                   F9: Optimized Defaults
Extra Bus Reserved                0                F10: Save & Exit
Reserved Memory                   10               ESC: Exit
Reserved I/O                      4

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```

Figure 87: NM10 Advanced - PCI Express Configuration - PCI Express Root Port 0

BIOS setting	Description	Configuration options	Effect
PCI Express Port 0	This option is used to enable/disable PCI Express Root Port 0.	Disabled	PCI Express Root Port 0 disabled.
		Enabled	Enables PCI Express root port 0
Port 0 IOxAPIC	This option is used to enable/disable PCI Express Root Port 0 I/O APIC.	Disabled	PCI Express Root Port 0 I/O APIC disabled.
		Enabled	PCI Express Root Port 0 I/O APIC enabled.
Automatic ASPM	*Active State Power Management* Option for setting an automatic or manual energy saving function (L0s/L1) for PCIE links if they do not require full power.	Manual	Manual setting of energy saving functions L0s and L1
		Auto	Automatic assignment by BIOS and the operating system
ASPM L0s [1)]	Enable / disable the L0 energy saving function.	Disabled	Disables this function
		Root port only	Function only available for the root port.
		Endpoint Port Only	Function only available for the end device port.
		Both root and endpoint ports	Function available for root and end device ports.
ASPM L1 [1)]	Enable / disable the L1 energy saving function. Power consumption is lower than with L0, but the exit latency is higher.	Disabled	Disables the L1 energy saving function
		Enabled	Enables the L1 energy saving function
URR	*Unsupported Request (UR) reporting* Option for reporting unsupported requests. Logging of error messages received by the root port is controlled exclusively by the root control register.	Disabled	Disables this function
		Enabled	Enables this function
FER	*Fatal error reporting* Option for reporting fatal errors. All of the functions of a multifunction device will be monitored. The report for the root port takes place internally inside the root complex.	Disabled	Disables this function
		Enabled	Enables this function
NFER	*Non-fatal error reporting* Option for reporting non-fatal errors. All of the functions of a multifunction device will be monitored. The report for the root port takes place internally inside the root complex.	Disabled	Disables this function
		Enabled	Enables this function
CER	*Correctable error reporting* Option for reporting correctable errors. All of the functions of a multifunction device will be monitored. The report for the root port takes place internally inside the root complex.	Disabled	Disables this function
		Enabled	Enables this function

Table 117: NM10 Advanced - PCI Express Configuration - PCI Express Root Port 0 - Setting options

BIOS setting	Description	Configuration options	Effect
CT0	*PCI Express completion timer T0* Option for enabling/disabling the PCI Express completion timer **Information:** **This setting should be set to "Enabled" if the system detected an ROB (processor reorder buffer) timeout.**	Disabled	Disables this function
		Enabled	Enables this function
SEFE	*System error on fatal error* Option for generating a system error if a fatal error is registered by a device on the root port or by the root port itself	Disabled	Disables this function
		Enabled	Enables this function
SENFE	*System error on non-fatal error* Option for generating a system error if a non-fatal error is registered by a device on the root port or by the root port itself	Disabled	Disables this function
		Enabled	Enables this function
SECE	*System error on correctable error* Option for generating a system error if a correctable error is registered by a device on the root port or by the root port itself	Disabled	Disables this function
		Enabled	Enables this function
PME SCI	Option for generating an SCI if power management is detected	Disabled	Disables this function
		Enabled	Enables this function Enables the root port to generate an SCI if power management is detected
Hot plug	Option for enabling / disabling Hot Plug in order to replace components during operation.	Disabled	Disables this function
		Enabled	Enables this function
Assign INT to root port	Option for enabling/disabling the IRQ for the root port	Disabled	Disables this function
		Enabled	Enables this function
Extra bus reserved	Option for reserving the extra bus to bridges behind this root bridge	0 to 7	Sets the respective bus.
Reserved memory	Option for configuring reserved memory for this root bridge	1 to 20	Size of reserved memory between 1 MB and 20 MB.
Reserved I/O	Option for configuring a reserved I/O range (4K/8K/12K/16K/20K) for this root bridge	4 to 20	Size of reserved I/O area between 4 K and 20 K.

Table 117: NM10 Advanced - PCI Express Configuration - PCI Express Root Port 0 - Setting options

1) This setting is only available if *Automatic ASPM* is set to *Manual*.

1.4.5.2 PCI Express root port x

Warning!

Improper settings can cause instability or device problems. It is therefore strongly recommended that these settings only be changed by experienced users.

```
Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
Advanced

PCI Express Port x                [Auto]          Enable / Disable PCI
  Port 0 IOxAPIC                  [Disabled]      Express Root Port 1.
Automatic ASPM                    [Manual]
ASPM L0s                          [Disabled]
ASPM L1                           [Disabled]
  URR                             [Disabled]
  FER                             [Disabled]
  NFER                            [Disabled]
  CER                             [Disabled]
  CTO                             [Disabled]
  SEFE                            [Disabled]
  SENFE                           [Disabled]      ↔: Select Screen
  SECE                            [Disabled]      ↑↓: Select Item
  PME SCI                         [Enabled]       Enter: Select
  Hot Plug                        [Disabled]      +/-: Change Opt.
                                                  F1: General Help
Assign INT to Root Port           [Enabled]       F2: Previsous Values
                                                  F9: Optimized Defaults
Extra Bus Reserved                0               F10: Save & Exit
Reserved Memory                   10              ESC: Exit
Reserved I/O                      4

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```

Figure 88: NM10 Advanced - PCI Express Configuration - PCI Express Root Port x

BIOS setting	Description	Configuration options	Effect
PCI Express root port x	Option for enabling/disabling the PCI Express root port	Disabled	PCI Express Root Port x disabled.
		Enabled	PCI Express Root Port x enabled.
		Auto	PCI Express Root Port x automatically enabled / disabled.
Port 0 IOxAPIC	This option is used to enable/disable PCI Express Root Port 0 I/O APIC.	Disabled	PCI Express Root Port 0 I/O APIC disabled.
		Enabled	PCI Express Root Port 0 I/O APIC enabled.
Automatic ASPM	*Active State Power Management* Option for setting an automatic or manual energy saving function (L0s/L1) for PCIE links if they do not require full power.	Manual	Manual setting of energy saving functions L0s and L1
		Auto	Automatic assignment by BIOS and the operating system
ASPM L0s	Enable / disable the L0 energy saving function.	Disabled	Disables this function
		Root port only	Function only available for the root port.
		Endpoint Port Only	Function only available for the end device port.
		Both root and endpoint ports	Function available for root and end device ports.
ASPM L1	Enables / disables the L1 energy saving function. Power consumption is lower than with L0, but the exit latency is higher.	Disabled	Disables the L1 energy saving function
		Enabled	Enables the L1 energy saving function
URR	*Unsupported Request (UR) reporting* Option for reporting unsupported requests. Logging of error messages received by the root port is controlled exclusively by the root control register.	Disabled	Disables this function
		Enabled	Enables this function
FER	*Fatal error reporting* Option for reporting fatal errors. All of the functions of a multifunction device will be monitored. The report for the root port takes place internally inside the root complex.	Disabled	Disables this function
		Enabled	Enables this function
NFER	*Non-fatal error reporting* Option for reporting non-fatal errors. All of the functions of a multifunction device will be monitored. The report for the root port takes place internally inside the root complex.	Disabled	Disables this function
		Enabled	Enables this function
CER	*Correctable error reporting*	Disabled	Disables this function

Table 118: NM10 Advanced - PCI Express Configuration - PCI Express Root Port x - Setting options

BIOS setting	Description	Configuration options	Effect
	Option for reporting correctable errors. All of the functions of a multifunction device will be monitored. The report for the root port takes place internally inside the root complex.	Enabled	Enables this function
CT0	*PCI Express completion timer T0* Option for enabling/disabling the PCI Express completion timer **Information:** **This setting should be set to "Enabled" if the system detected an ROB (processor reorder buffer) timeout.**	Disabled	Disables this function
		Enabled	Enables this function
SEFE	*System error on fatal error* Option for generating a system error if a fatal error is registered by a device on the root port or by the root port itself	Disabled	Disables this function
		Enabled	Enables this function
SENFE	*System error on non-fatal error* Option for generating a system error if a non-fatal error is registered by a device on the root port or by the root port itself	Disabled	Disables this function
		Enabled	Enables this function
SECE	*System error on correctable error* Option for generating a system error if a correctable error is registered by a device on the root port or by the root port itself	Disabled	Disables this function
		Enabled	Enables this function
PME SCI	Option for generating an SCI if power management is detected	Disabled	Disables this function
		Enabled	Enables this function Enables the root port to generate an SCI if power management is detected
Hot plug	Option for enabling / disabling Hot Plug in order to replace components during operation.	Disabled	Disables this function
		Enabled	Enables this function
Assign INT to root port	Option for enabling/disabling the IRQ for the root port	Disabled	Disables this function
		Enabled	Enables this function
Extra bus reserved	Option for reserving the extra bus to bridges behind this root bridge	0 to 7	Sets the respective bus.
Reserved memory	Option for configuring reserved memory for this root bridge	1 to 20	Size of reserved memory between 1 MB and 20 MB.
Reserved I/O	Option for configuring a reserved I/O range (4K/8K/12K/16K/20K) for this root bridge	4 to 20	Size of reserved I/O area between 4 K and 20 K.

Table 118: NM10 Advanced - PCI Express Configuration - PCI Express Root Port x - Setting options

1) This setting is only available if *Automatic ASPM* is set to *Manual*.

1.4.5.3 PCI Express settings

```
Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
Advanced

PCI Express Device Register Settings                Enables or Disables PCI
Relaxed Ordering                  [Disabled]        Express Device Relaxed
Extended Tag                      [Disabled]        Ordering.
No Snoop                          [Enabled]
Maximum Payload                   [Auto]
Maximum Read Request              [Auto]

PCI Express Link Register Settings
ASPM Support                      [Disabled]
WARNING: Enabling ASPM may cause some
         PCI-E devices fail
Extended Synch                    [Disabled]        ↔: Select Screen
                                                    ↑↓: Select Item
Link Training Retry               [5]               Enter: Select
Link Training Timeout (uS)        100               +/-: Change Opt.
Unpopulated Links                 [Keep Link ON]    F1: General Help
                                                    F2: Previsous Values
                                                    F9: Optimized Defaults
                                                    F10: Save & Exit
                                                    ESC: Exit
Version 2.15.1226. Copyright (C) 2012 American Megatrends, Inc.
```

Figure 89: NM10 Advanced - PCI Express Configuration - PCI Express Settings

BIOS setting	Description	Configuration options	Effect
Relaxed ordering	Option for enabling/disabling relaxed ordering	Disabled	Disables this function
		Enabled	Enables this function
Extended tag	Option for enabling/disabling the extended tag	Disabled	Disables this function Only 5 bits can be used.
		Enabled	Enables this function Devices with 8 bits in the requester transaction ID field can be used.
No snoop	Option for enabling/disabling the "No snoop" option	Disabled	Disables this function
		Enabled	Enables this function
Maximum payload	Option for setting the maximum surface packet size for data transfers	Auto	Automatically assigns the packet size
		128 bytes to 4096 bytes	Manual maps the packet size
Maximum read request	Option for setting the maximum read request	Auto	Automatic assignment
		128 bytes to 4096 bytes	Manual assignment
ASPM Support[1)]	Option for setting a power saving function (L0s/L1) for PCIe slots if they do not require full power	Disabled	Disables the energy saving function
		Auto	Maximum energy savings. The energy saving function is set to L0 or L1.
		Force L0s	Enables L0 mode
Extended synch	Option for setting an extended synchronization pattern to improve system performance	Disabled	Disables this function
		Enabled	Enables this function
Link training retry	Option for defining the number of times the software should attempt to reroute a link if the previous training attempt was unsuccessful	Disabled	Disables this function
		2	2 link training attempts
		3	3 link training attempts
		5	5 link training attempts
Link training timeout (µS)	Option for defining how many microseconds the software waits before the link training bit in the link status register is queried	10 to 1000	Time setting in µs
Unpopulated links	Option for enabling/disabling PCIe slots where no devices are connected	Keep link on	Keeps PCIe slots where no devices are connected enabled
		Disable link	Disables PCIe slots where no devices are connected to save power

Table 119: NM10 Advanced - PCI Express Configuration - PCI Express Settings - Setting options

1) ASPM = Active State Power Management

1.4.6 RTC wake settings

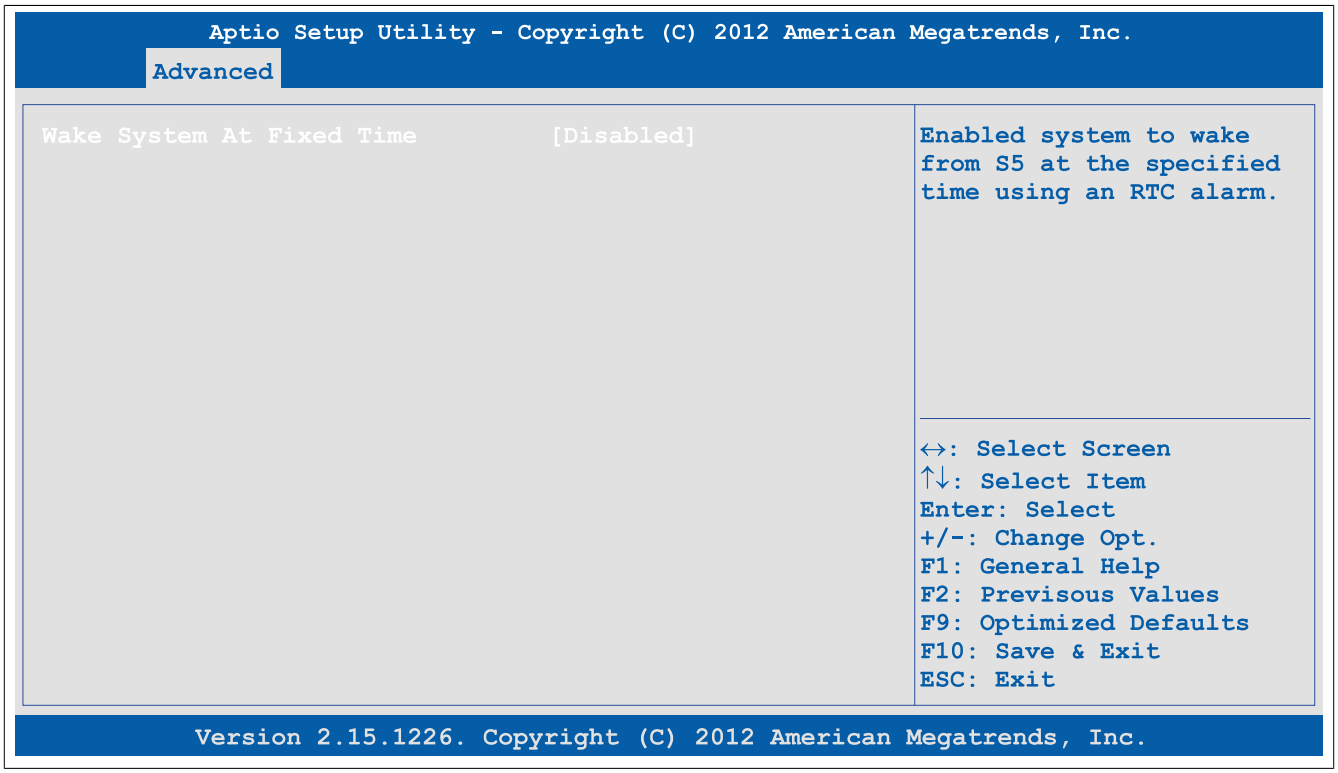

Figure 90: NM10 Advanced - RTC Wake Settings

BIOS setting	Description	Configuration options	Effect
Wake system at fixed time	Option for setting the time (to the second) when the system should boot from a switched-off state (ACPI S5)	Disabled	Disables this function
		Enabled	Enables this function
Wake up hour[1)]	Option for setting the hour	0 to 23	Example: If set to 3, the system will start up at 3 AM. If set to 15, the system will start up at 3 PM.
Wake up minute[1)]	Option for setting the minute	0 to 59	Example: If set to 15, the system will start up at minute 15.
Wake up second[1)]	Option for setting the second	0 to 59	Example: If set to 32, the system will start up at second 32.

Table 120: NM10 Advanced - RTC Wake Settings - Setting options

1) This setting is only available if *Wake System At Fixed Time* is set to *Enabled*.

1.4.7 ACPI settings

```
Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
Advanced

Enable Hibernation                [Enabled]
ACPI Sleep State                  [Both S1 and S3 avai..]
Lock Legacy Resources             [Disabled]
S3 Video Repost                   [Disabled]

Critical Trip Point               [111 C]
Passive Trip Point                [95 C]
  Passive TC1 Value               1
  Passive TC2 Value               5
  Passive TSP Value               10

Enables or Disables System
ability toHibernate (OS/S4
Sleep State). This option
may be not effective with
some OS.

↔: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previsous Values
F9: Optimized Defaults
F10: Save & Exit
ESC: Exit

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```

Figure 91: NM10 Advanced - ACPI Settings

BIOS setting	Description	Configuration options	Effect
Enable hibernation	Option for enabling/disabling the hibernate function. This can put the operating system into the S4 state. This option may not have any effect on some operating systems.	Disabled	Disables this function
		Enabled	Enables this function
ACPI sleep state	Selects the ACPI status to be used when Suspend mode is enabled	Suspend disabled	Disables this function
		S1 only (CPU stop clock)	Sets S1 as Suspend mode. Only a few functions are disabled and are available again at the touch of a button.
		S3 only (Suspend to RAM)	Sets S3 as Suspend mode. The current state of the operating system is written to RAM, which is then the only component to receive power.
		Both S1 and S3 available for OS to choose from	Enables S1 and S3. The states can then be selected by the operating system.
Lock legacy resources	Option for configuring whether the operating system is permitted to configure legacy resources	Disabled	Disables this function
		Enabled	Enables this function
S3 video repost	Option to set whether the graphic POST should be executed again after starting from S3.	Disabled	Disables this function
		Enabled	Enables this function
CPU Thermal Monitoring [1]	Option for enabling/disabling CPU thermal monitoring	Enabled	Enables CPU thermal monitoring, displays temperature values in SCPI and generates SMI
		Disabled	Disables CPU thermal monitoring Disables is recommended for real-time applications.
Critical trip point	Option for configuring a CPU temperature at which the operating system automatically shuts down	POR	Sets the critical trip point to 100°C
		79 C, 87 C, 95 C, 103 C, 111 C, 119 C, 127 C	Temperature setting for the critical trip point. Configurable in increments of 8°C.
Passive Trip Point	With this function, an ACPI Passive Trip Point temperature can be set at which the operating system automatically throttles the CPU speed.	Disabled	Disables this function
		71 C, 79 C, 87 C, 95 C	Temperature setting for the Passive Trip Point in °C.
Passive TC1 Value	Option for setting the TC1 value for the ACPI Passive Cooling formula.	1 to 16	TC1 value setting.
Passive TC2 Value	Option for setting the TC2 value for the ACPI Passive Cooling formula.	1 to 16	TC2 value setting.
Passive TSP Value	Option for setting the TSP value for the ACPI Passive Cooling formula. The TSP value specifies how often the operating system reads the temperature in a tenth of a second.	2 to 32	TSP value setting.

Table 121: NM10 Advanced - ACPI Settings - Setting options

1) This setting is only available if *Advanced - Baseboard/Panel Features - Realtime Environment* is set to *Disabled*.

1.4.8 CPU configuration

```
Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
Advanced

▶ CPU Information                                   CPU Information

  Hyper-Threading                    [Enabled]
  Core-Multi Processing              [Enabled]
  Execute Disable Bit                [Enabled]
  Limit CPUID Maximum                [Disabled]
  EIST                               [Enabled]
  CPU C state Report                 [Disabled]

                                     ↔: Select Screen
                                     ↑↓: Select Item
                                     Enter: Select
                                     +/-: Change Opt.
                                     F1: General Help
                                     F2: Previsous Values
                                     F9: Optimized Defaults
                                     F10: Save & Exit
                                     ESC: Exit

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```

Figure 92: NM10 Advanced - CPU configuration

BIOS setting	Description	Configuration options	Effect
CPU information	Displays CPU properties	Enter	Opens the submenu See "CPU information" on page 163
Hyper-Threading	Option for enabling/disabling Intel hyper-threading technology	Disabled	Disables this function
		Enabled	Enables this function Each processor core can execute multiple tasks (threads) at a time. Intel hyper-threading technology increases processor throughput and improves the overall performance of multi-thread software.
Core-Multi Processing	Option to enable/disable core-multi processing.	Disabled	Disables this function.
		Enabled	Enables this function.
Execute disable bit	Option for enabling/disabling hardware support for prevention of data execution	Disabled	Disables this function
		Enabled	Enables this function
Limit CPUID maximum	Option for limiting the CPUID value. This may be necessary for older operating systems. **Information:** **This option must be set to *Disabled* when using Windows XP.**	Disabled	The processor returns the current maximum value when the CPUID value is requested.
		Enabled	The processor limits the maximum CPUID value to 03h if necessary if the the processor supports a higher value.
EIST	Option for enabling/disabling Intel® SpeedStep™ technology	Disabled	Disables Intel® SpeedStep™ technology
		Enabled	Enables Intel® SpeedStep™ technology
CPU C state Report	Option to enable/disable the CPU C report to the operating system.	Disabled	Disables this function No report is sent to the operating system.
		Enabled	Enables this function
Enhanced C state[1)]	Option to enable/disable Enhanced C state.	Disabled	Disables this function
		Enabled	Enables this function
CPU Hard C4E[1)]	TBD	Disabled	Disables this function
		Enabled	Enables this function
CPU C6 state[1)]	TBD	Disabled	Disables this function
		Enabled	Enables this function
C4 Exit Timing[1)]	Option to enable/disable C4 Exit Timing.	Default	Specified timing.
		Fast	Fast timing.
		Slow	Slow timing.
C-state POPDOWN[1)]	TBD	Disabled	Disables this function
		Enabled	Activates the function.
C-state POPUP[1)]	TBD	Disabled	Disables this function
		Enabled	Activates the function.

Table 122: NM10 Advanced - CPU Configuration - Setting options

1) This setting is only available if *CPU C state Report* is set to *Enabled*.

1.4.8.1 CPU information

```
Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
Advanced

Processor Type                  Intel(R) Atom(TM) CPU N2
EMT64                           Not Supported
Processor Speed                 1865 Mhz
System Bus Speed                533 Mhz
Ratio Status                    14
Actual Ratio                    14
System Bus Speed                533 Mhz
Processor Stepping              30661
Microcode Revision              269
L1 Cache RAM                    2x56 k
L2 Cache RAM                    2x512 k
Processor Core                  Dual
Hyper-Threading                 Supported

                                ↔: Select Screen
                                ↑↓: Select Item
                                Enter: Select
                                +/-: Change Opt.
                                F1: General Help
                                F2: Previsous Values
                                F9: Optimized Defaults
                                F10: Save & Exit
                                ESC: Exit

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```

Figure 93: NM10 Advanced - CPU Configuration - CPU Information

BIOS setting	Description	Configuration options	Effect
Processor Type	Displays the processor type	None	-
EMT64	TBD	None	-
Processor Speed	Displays the processor clock frequency.	None	-
System Bus Speed	Displays the system clock frequency.	None	-
Ratio Status	Displays the processor multiplier status.	None	-
Actual Ratio	Displays the current processor multiplier status.	None	-
System Bus Speed	Displays the system clock frequency.	None	-
Processor Stepping	Displays the processor ID.	None	-
Microcode revision	Displays the processor microcode.	None	-
L1 Cache RAM	Displays the L1 cache.	None	-
L2 Cache RAM	Displays the L2 cache.	None	-
Processor Core	Displays the number of processor cores	None	-
Hyper-threading	Displays the Intel Hyper-Threading technology.	None	-

Table 123: NM10 Advanced - CPU Configuration - Setting options

1.4.9 Memory configuration

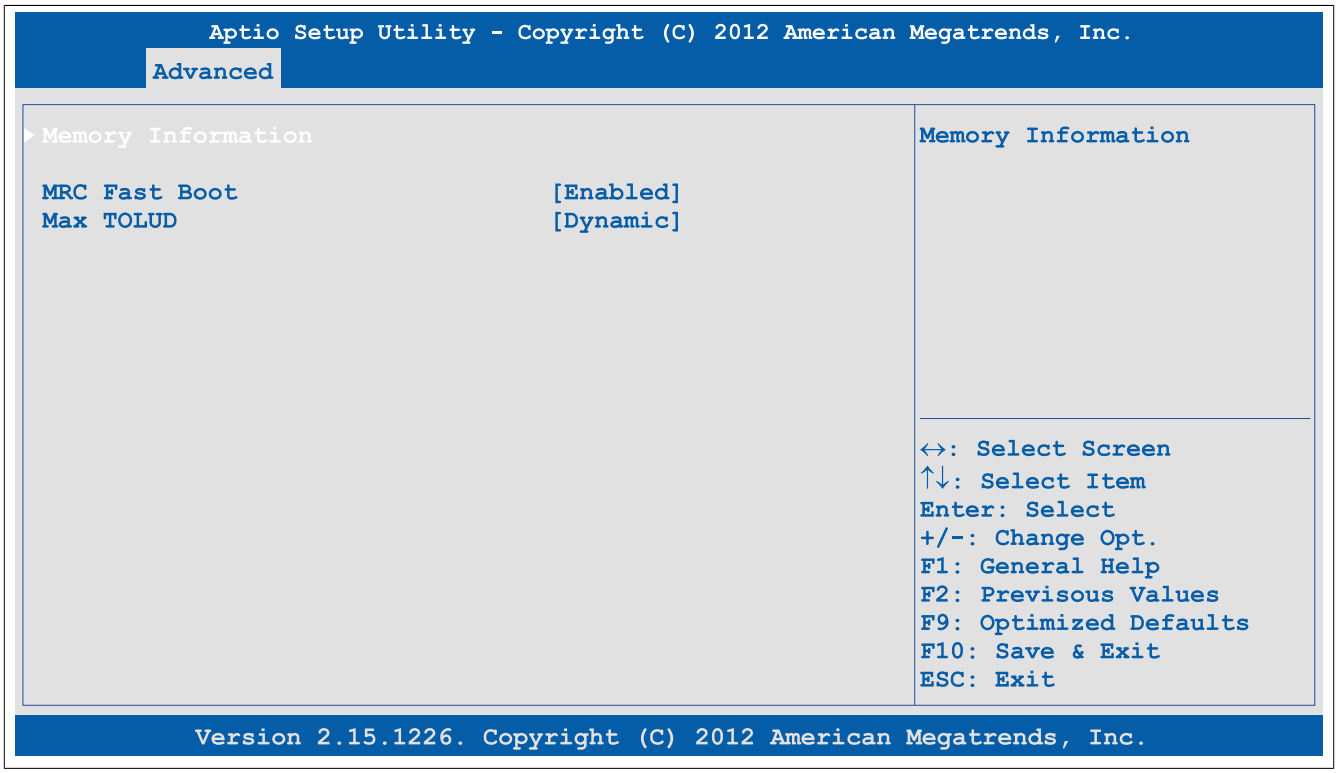

Figure 94: NM10 Advanced - Memory Configuration

BIOS setting	Description	Configuration options	Effect
Memory information	Displays main memory properties	Enter	Opens the submenu See "Memory information" on page 165
MRC fast boot	Option for enabling/disabling MRC fast booting	Enabled	Enables this function
		Disabled	Disables this function
Max TOLUD	Option for configuring the maximum "Top Of Low Usable DRAM"	Dynamic	Automatically adjusts the TOLUD based on the MMIO length of the graphics controller
		1 GB, 1.25 GB, 1.5 GB, 1.75 GB, 2 GB, 2.25 GB, 2.5 GB, 2.75 GB, 3 GB, 3.25 GB	Manual setting of the TOLUD

Table 124: NM10 Advanced - Memory Configuration - Setting options

1.4.9.1 Memory information

```
Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
Advanced

Memory Frequency                    1067 MHz(DDR3)
Total Memory                        4096 MB
DIMM#0                              Not Present
DIMM#1                              4096 MB

                                    ↔: Select Screen
                                    ↑↓: Select Item
                                    Enter: Select
                                    +/-: Change Opt.
                                    F1: General Help
                                    F2: Previsous Values
                                    F9: Optimized Defaults
                                    F10: Save & Exit
                                    ESC: Exit

Version 2.15.1226. Copyright (C) 2012 American Megatrends, Inc.
```

Figure 95: NM10 Advanced - Memory Configuration - Memory Information

BIOS setting	Description	Configuration options	Effect
Memory frequency	Displays the memory clock frequency	None	-
Total memory	Displays the complete system memory size.	None	-
DIMM#0	Displays the memory size in the slot Dimm#0	None	-
DIMM#1	Displays the memory size in the slot Dimm#1	None	-

Table 125: NM10 Advanced - Memory Configuration - Memory Information

1.4.10 Chipset configuration

```
Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
Advanced

Azalia Controller                   [HD Audio]          Azalia Controller
   Azalia PME Enable                [Disabled]
   Azalia Vci Enable                [Enabled]

LAN Controller                      [Enabled]
SMBus Controller                    [Enabled]

SIRQ Logic                          [Enabled]
SIRQ Mode                           [Continous]

DMI Link ASPM Control               [Enabled]
PCI-Exp. High Priority Port         [Disabled]          ↔: Select Screen
                                                        ↑↓: Select Item
High Precision Timer                [Enabled]           Enter: Select
                                                        +/-: Change Opt.
                                                        F1: General Help
                                                        F2: Previsous Values
                                                        F9: Optimized Defaults
                                                        F10: Save & Exit
                                                        ESC: Exit

Version 2.15.1226. Copyright (C) 2012 American Megatrends, Inc.
```

Figure 96: NM10 Advanced - Chipset configuration

BIOS setting	Description	Configuration options	Effect
Azalia Controller	Option for enabling/disabling the audio controller	Disabled	Disables the audio controller
		HD Audio	Enables the audio controller
Azalia PME Enable[1)]	Option for enabling/disabling power management for the audio controller	Disabled	Disables this function
		Enabled	Enables this function
Azalia Vci Enable[1)]	Option to enable / disable Video Management of the Audio Controller.	Disabled	Disables this function
		Enabled	Enables this function
LAN Controller	Enable / disable the onboard LAN controller.	Disabled	Disables the controller
		Enabled	Enables the controller
SMBus Controller	Enable / disable the SMBus (System Management Bus) controller.	Disabled	Disables the controller
		Enabled	Enables the controller
SIRQ Logic	Enable / disable serial IRQ logic.	Disabled	Disables this function
		Enabled	Enables this function
SIRQ Mode[2)]	Select the serial IRQ mode.	Quiet	SIRQ in quiet mode.
		Continuous	SIRQ in continuous mode.
DMI Link ASPM Control	Option to enable/disable active state power management (ASPM) control on the DMI link.	Disabled	Disables the controller
		Enabled	Enables the controller
PCI-Exp. High Priority Port	Select the PCI Express Priority port.	Disabled	Disables this function
		Port 0 - 3	Selects the port.
High-precision 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.	Disabled	Disables this function
		Enabled	Enables this function This function is recommended for multimedia applications.

Table 126: NM10 Advanced - Chipset Configuration - Setting options

1) This setting is only available if *Azalia Controller* is set to *HD Audio*.
2) This setting is only available if *SIRQ Logic* is set to *Enabled*.

1.4.11 IDE Configuration

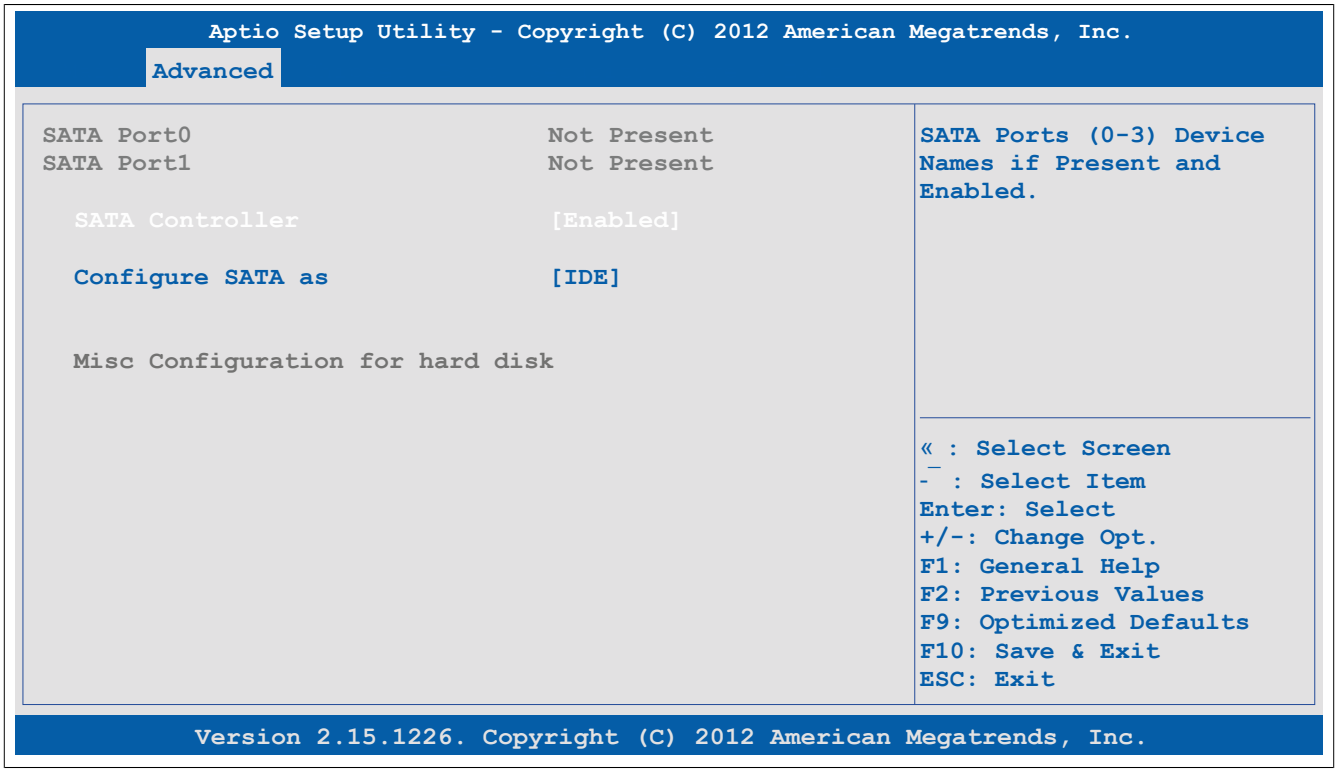

Figure 97: NM10 Advanced - IDE configuration

BIOS setting	Description	Configuration options	Effect
SATA Ports (0-3)	Displays the connected hardware name on the respective port	None	-
SATA Controller	Enable / disable SATA controller	Disabled	Disables the controller.
		Enabled	Enables the controller.
Configure SATA as [1)]	Option for setting the SATA configuration.	IDE	Configured as IDE.
		AHCI	Configuration as AHCI.
Port (0-3) Speed Limit [2)]	Sets the speed of the SATA ports	No Limit	No speed limiting
		GEN1 Rate	Maximum transfer rate = 2.5 GT/s
		GEN2 Rate	Maximum transfer rate = 5 GT/s
SATA Port 0 [2)]	Option for enabling/disabling SATA port 0	Disabled	Disables SATA port 0
		Enabled	Enables SATA port 0

Table 127: NM10 Advanced - IDE Configuration setting options

BIOS setting	Description	Configuration options	Effect
SATA Port 0 Hot Plug [2]	Option for configuring hot plugging for SATA port 0	Disabled	Hot plugging not enabled for SATA port 0
		Enabled	Hot plugging enabled for SATA port 0. Devices can be connected/disconnected during operation.
SATA Port 1 [2]	Option for enabling/disabling SATA port 1	Disabled	Disables SATA port 1
		Enabled	Enables SATA port 1
SATA Port 1 Hot Plug [2]	Option for configuring hot plugging for SATA port 1	Disabled	Hot plugging not enabled for SATA port 1
		Enabled	Hot plugging enabled for SATA port 1. Devices can be connected/disconnected during operation.

Table 127: NM10 Advanced - IDE Configuration setting options

1) This setting is only available if *SATA Controller* is set to *Enabled*.
2) This setting is only available if *SATA Controller* is set to *Enabled* and *Configure SATA as* is set to *AHCI*.

1.4.12 USB Configuration

```
Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
Advanced

USB Devices:                                        Select USB mode to control
      1 Keyboard                                    USB ports.

Select USB Mode                    [By Controllers]
UHCI #1 (ports 0 and 1)            [Enabled]
UHCI #2 (ports 2 and 3)            [Enabled]
UHCI #3 (ports 4 and 5)            [Enabled]
UHCI #4 (ports 6 and 7)            [Enabled]
USB 2.0(EHCI) Support              [Enabled]

Legacy USB Support                 [Enabled]
EHCI Hand-off                      [Disabled]                  ↔: Select Screen
                                                               ↑↓: Select Item
USB hardware delays and time-outs:                             Enter: Select
USB transfer time-out              [20 sec]                    +/-: Change Opt.
Device reset time-out              [20 sec]                    F1: General Help
Device power-up delay              [Auto]                      F2: Previsous Values
                                                               F9: Optimized Defaults
                                                               F10: Save & Exit
                                                               ESC: Exit
Version 2.15.1226. Copyright (C) 2012 American Megatrends, Inc.
```

Figure 98: NM10 Advanced - USB configuration

BIOS setting	Description	Configuration options	Effect
Select USB Mode	Select the USB mode.	By Ports	Selection by ports.
		By Controllers	Selection by controllers.
UHCI #1[1]	Configuration of the USB UHCI controller 1 for USB port	Disabled	Disables the controller
		Enabled	Enables the controller
UHCI #2 - #4[2]	Configuration of the USB UHCI controllers 2 - 4 for USB port.	Disabled	Disables the controller
		Enabled	Enables the controller
USB Function[3]	Switch available USB ports on/off.	Disabled	Disables this function
		1-8 USB Ports	Enables this function
USB 2.0(EHCI) Support[4]	Enable / disable USB 2.0 support.	Disabled	Disables the controller
		Enabled	Enables the controller
Legacy USB support	Option for configuring legacy USB support. USB ports do not function during startup. USB support is available again after the operating system has started. A USB keyboard is still recognized during POST.	Enabled	Enables this function
		Disabled	Disables this function
		Auto	Automatic enabling
EHCI hand-off	Option for configuring support for operating systems without a fully automated EHCI function	Disabled	Disables this function With operating systems that do not have a fully automated EHCI function, USB devices are only operated with USB 1.1.
		Enabled	Enables USB 2.0 support
USB transfer time-out	Option for configuring the timeout value for control, bulk and interrupt transfers	1 sec, 5 sec, 10 sec, 20 sec	Value in seconds
Device reset time-out	Option for configuring the time that POST waits for USB memory storage devices after the device start command is issued	10 sec, 20 sec, 30 sec, 40 sec	Value in seconds

Table 128: NM10 Advanced - USB Configuration setting options

BIOS setting	Description	Configuration options	Effect
Device power-up delay	Option to set the maximum time to wait for a USB device to report to the host controller	Auto	Sets the maximum time automatically. For a root port, 100 ms is set; for a hub port, the data from the hub descriptor is used.
		Manual	Allows the maximum time to be entered manually using the "Device power-up delay in seconds" option
Device power-up delay in seconds[5)]	Option to manually set the maximum time to wait for a USB device to report to the host controller.	1 to 40	The maximum time can be entered in seconds.

Table 128: NM10 Advanced - USB Configuration setting options

1) This setting is only available if *Select USB Mode* is set to *By Controllers*.
2) This setting is only available if *Select USB Mode* is set to *By Controllers* and UHCI #1 is set to Enabled.
3) This setting is only available if *Select USB Mode* is set to *By Ports*.
4) This setting is only available if *UHCI #1* is set to *Enabled*.
5) This setting is only possible if *Device power-up delay* is set to *Manual*.

1.4.13 Serial port console redirection

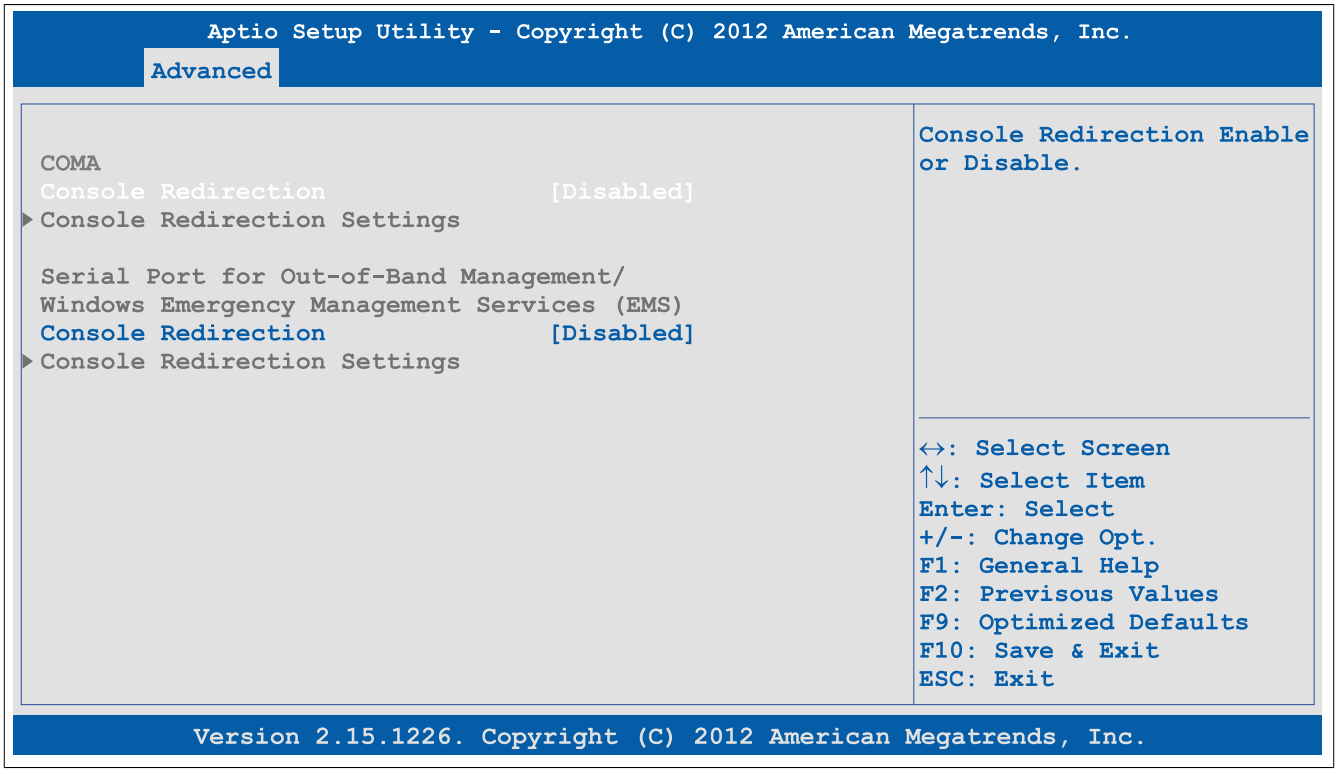

Figure 99: NM10 Advanced - Serial Port Console Redirection

BIOS setting	Description	Configuration options	Effect
COMA			
Console redirection	Option for enabling/disabling console redirection	Disabled	Disables this function
		Enabled	Enables this function
Console redirection settings[1)]	Configures the remote console	Enter	Opens the submenu See "Console Redirection Settings (COMA)" on page 169
Serial Port for Out-of-Band Management / Windows Emergency Management Services (EMS)			
Console redirection	Option for enabling/disabling console redirection	Disabled	Disables this function
		Enabled	Enables this function
Console redirection settings[2)]	Configures the remote console	Enter	Opens the submenu See "Console Redirection Settings (EMS)" on page 170

Table 129: NM10 Advanced - Serial Port Console Redirection - Setting options

1) This setting is only available if *Console Redirection* (COMA) is set to *Enabled*.
2) This setting is only available if *Console Redirection* (EMS) is set to *Enabled*.

1.4.13.1 Console Redirection Settings (COMA)

```
Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
Advanced

COMA                                                  Emulation: ANSI: Extended
Console Redirection Settings                          ASCII char set. VT100:
                                                      ASCII char set. VT100+:
Terminal Type                    [ANSI]               Extends VT100 to support
Bits per second                  [115200]             color, function keys, etc.
Data Bits                        [8]                  VT-UTF8: Uses UTF8
Parity                           [None]               encoding to map Unicode
Stop Bits                        [1]                  chars onto 1 or more
Flow Control                     [None]               bytes.
VT-UTF8 Combo Key Support        [Enabled]
Recorder Mode                    [Disabled]
Resolution 100x31                [Disabled]           ↔: Select Screen
Legacy OS Redirection Resolution [80x24]              ↑↓: Select Item
Putty KeyPad                     [VT100]              Enter: Select
Redirection After BIOS POST      [Always Enable]      +/-: Change Opt.
                                                      F1: General Help
                                                      F2: Previsous Values
                                                      F9: Optimized Defaults
                                                      F10: Save & Exit
                                                      ESC: Exit
Version 2.15.1226. Copyright (C) 2012 American Megatrends, Inc.
```

Figure 100: NM10 Console Redirection Settings (COMA)

BIOS setting	Description	Configuration options	Effect
Terminal type	The type of connection can be selected here.	VT100, VT100+, VT-UTF8, ANSI	Manual configuration of the connection type.
Bits per second	Selection of transfer rate in bits per second	9600, 19200, 38400, 57600, 115200	Transfer rate.
Data bits	Option for setting the data bits.	7, 8	Sets the number of data bits.
Parity	Option for setting a parity bit	None	Parity bit not used
		Even	An even number of parity bits is used.
		Odd	An odd number of parity bits is used.
		Mark	Parity bit always 1
		Space	Parity bit always 0
Stop bits	Set number of stop bits	1, 2	1 or 2 bit(s) is used as stop bit.
Flow control	This setting determines how the transfer is controlled via the interface.	None	The interface is operated without transfer control.
		Hardware RTS/CTS	The interface transfer control is carried out through hardware.
VT-UTF8 combo key support	Option for enabling/disabling VT-UTF8 combo key support for ANSI and VT100 connections	Disabled	Deactivates the function
		Enabled	Enable the function
Recorder mode	Option for enabling/disabling recorder mode	Disabled	Disables this function
		Enabled	Enables this function When this setting is used, all control escape sequences are suppressed from the serial redirection output. This may lead to incorrectly formatted screen output but makes automatic storage of the serial console output easier.
Resolution 100x31	Option for enabling/disabling extended terminal resolution	Disabled	Disables this function
		Enabled	Enables this function
Legacy OS redirection resolution	Option for configuring the number of lines and columns for legacy OS redirection	80x24, 80x25	Resolution with 80x24 or 80x25.
Putty keypad	TBD	VT100	TBD
		LINUX	TBD
		XTERMR6	TBD
		SCO	TBD
		ESCN	TBD
		VT400	TBD
Redirection After BIOS POST	The redirection after start up can be set here.	Always Enable	Redirection is always enabled.
		BootLoader	Redirection is enabled during system start up and charging.

Table 130: NM10 Advanced - Serial Port Console Redirection - Console Redirection Settings (COMA) - Setting options

1.4.13.2 Console Redirection Settings (EMS)

```
Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
Advanced

Out-of-Band Mgmt Port          COMA
Terminal Type                  [VT-UTF8]
Bits per second                [115200]
Flow Control                   [None]
Data Bits                      8
Parity                         None
Stop Bits                      1

VT-UTF8 is the preferred
termional type for out-of-
band management. The next
best choice is VT100+ and
then VT100. See above, in
Console Redirection
Settings page, for more
Help with Terminal
Type/Emulation.

↔: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previsous Values
F9: Optimized Defaults
F10: Save & Exit
ESC: Exit

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```

Figure 101: NM10 Console Redirection Settings (EMS)

BIOS setting	Description	Configuration options	Effect
Out-of-Band Mgmt Port	Display	None	-
Terminal type	The type of connection can be selected here.	VT100, VT100+, VT-UTF8, ANSI	Manual configuration of the connection type.
Bits per second	Selection of transfer rate in bits per second	9600, 19200, 57600, 115200	Transfer rate.
Flow control	This setting determines how the transfer is controlled via the interface.	None	The interface is operated without transfer control.
		Hardware RTS/CTS	The interface transfer control is carried out through hardware.
		Software Xon/Xoff	The interface transfer control is carried out through software.
Data bits	Displays the number of data bits	None	-
Parity	Displays the party bit	None	-
Stop bits	Displays the number of stop bits	None	-

Table 131: NM10 Advanced - Serial Port Console Redirection - Console Redirection Settings (EMS) - Setting options

1.5 Boot

```
Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
Boot

▸ Boot Device Priority                    Boot device priority sub
▸ Boot Configuration                      menu.

                                          ↔: Select Screen
                                          ↑↓: Select Item
                                          Enter: Select
                                          +/-: Change Opt.
                                          F1: General Help
                                          F2: Previsous Values
                                          F9: Optimized Defaults
                                          F10: Save & Exit
                                          ESC: Exit

Version 2.15.1226. Copyright (C) 2012 American Megatrends, Inc.
```

Figure 102: NM10 Boot - Overview

BIOS setting	Description	Configuration options	Effect
Boot device priority	Configures the boot order	Enter	Opens the submenu See "Boot device priority" on page 171
Boot configuration	Configures boot properties	Enter	Opens the submenu See "Boot configuration" on page 172

Table 132: NM10 Boot overview

1.5.1 Boot device priority

```
Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
Boot

Boot Priority Selection          [Type Based]          Set boot priority
                                                       selection method.
Type Based Boot Priority                               Type Based: Determine boot
1st Boot Device                  [Primary Master]      priority by device type.
2nd Boot Device                  [Primary Slave]       Device Based: Determine
3rd Boot Device                  [SATA 1 Drive]        boot priorityby specific
4th Boot Device                  [SATA 0 Drive]        device selection. Devices
5th Boot Device                  [USB Floppy]          must be present, priority
6th Boot Device                  [USB Harddisk]        will be changed if devices
7th Boot Device                  [USB CDROM]           are removed or added.
8th Boot Device                  [Disabled]
                                                       ↔: Select Screen
                                                       ↑↓: Select Item
                                                       Enter: Select
                                                       +/-: Change Opt.
                                                       F1: General Help
                                                       F2: Previsous Values
                                                       F9: Optimized Defaults
                                                       F10: Save & Exit
                                                       ESC: Exit

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```

Figure 103: NM10 Boot - Boot Device Priority

BIOS setting	Description	Configuration options	Effect
Boot priority selection	Option for determining the method for how drives should be booted	Device based	Only lists devices that are recognized by the system. The order of devices in this list can be changed. **Information:** **It is only possible to use either "Device based" or "Type based". Using both together is not permitted.**
		Type based	The boot sequence of a device type list can be changed. It is also possible to add device types that are not connected to this list. **Information:** **It is only possible to use either "Device based" or "Type based". Using both together is not permitted.**
1st boot device	Option for selecting drives to be used for booting	Disabled, SATA 0 Drive, SATA 1 Drive, Primary Master, Primary Slave, USB Floppy, USB Harddisk, USB CDROM, Onboard LAN, External LAN, Other BEV Device	Specifies the desired boot sequence
2nd boot device			
3rd boot device			
4th boot device			
5th boot device			
6th boot device			
7th boot device			
8th boot device			

Table 133: Boot - Boot device priority - Configuration options

1.5.2 Boot configuration

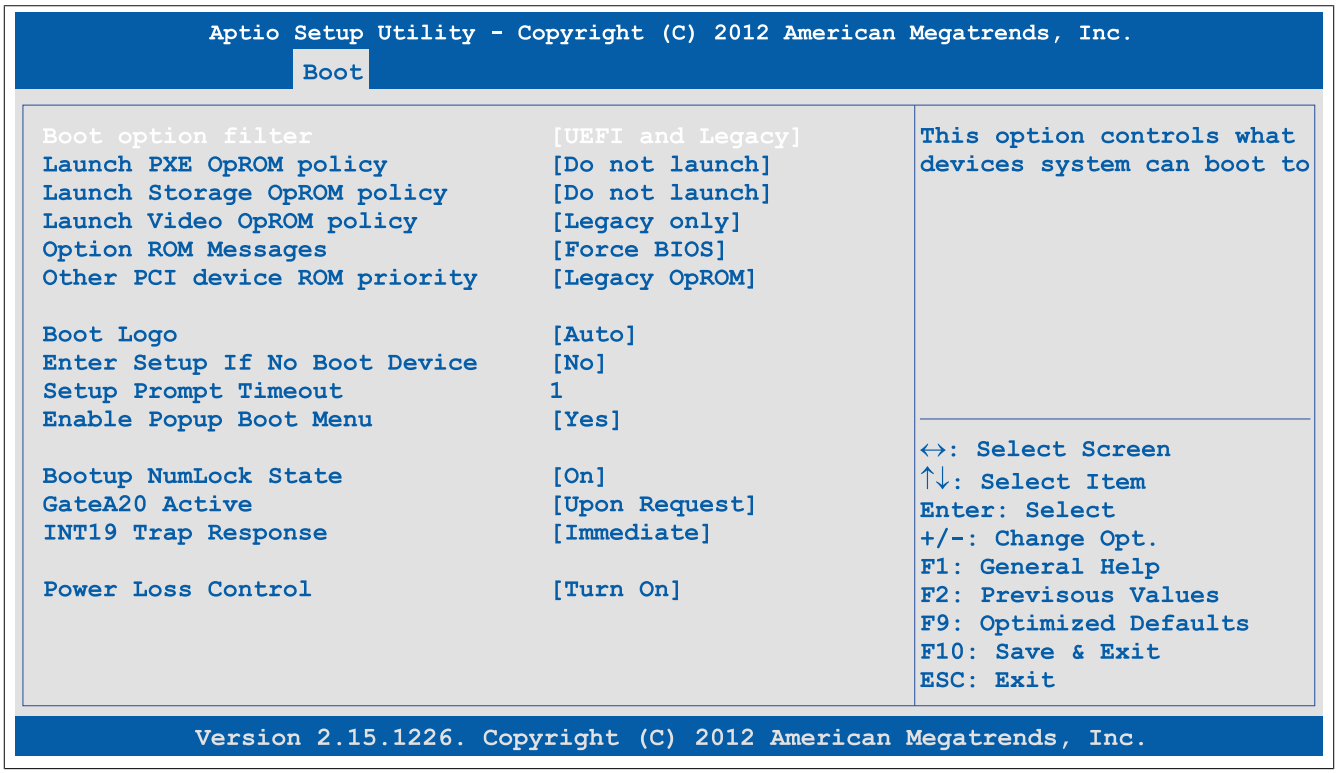


Figure 104: NM10 Boot - Boot Configuration

BIOS setting	Description	Configuration options	Effect
Boot option filter	Option for setting the boot option filter.	UEFI and Legacy	UEFI and Legacy devices can be used for booting.
		Legacy only	Only Legacy devices can be used for booting.
		UEFI only	Only UEFI devices can be used for booting.
Launch PXE OpROM Policy	Option for booting from PXE Option ROM	Do not launch	Does not boot from PXE Option ROM
		UEFI only	Boots from UEFI ROM
		Legacy only	Boots from legacy ROM
Launch Storage OpROM Policy	Option for booting from Storage Option ROM	Do not launch	Does not boot from Storage Option ROM
		UEFI only	Boots from UEFI ROM
		Legacy only	Boots from legacy ROM

Table 134: Boot - Boot configuration - Configuration options

BIOS setting	Description	Configuration options	Effect
Launch Video OpROM Policy	Option for booting from Video Option ROM	Do not launch	Does not boot from Video Option ROM
		UEFI only	Boots from UEFI ROM
		Legacy only	Boots from legacy ROM
Option ROM messages	Option to display Option ROM messages during POST	Force BIOS	Displays Option ROM messages during POST
		Keep current	Does not display Option ROM messages during POST
Other PCI device ROM priority	Option for selecting other PCI boot devices	UEFI OpROM	UEFI PCI devices used.
		Legacy OpROM	Legacy PCI devices used.
Boot logo	Option for configuring the boot logo	Disabled	Does not display the boot logo
		Enabled	Displays the boot logo
		Auto	Boot logo displayed? TBD
Enter setup if no boot device	Option for configuring whether the setup screen is displayed when no bootable drive is connected	No	Does not display the setup screen
		Yes	Displays the setup screen
Setup prompt timeout	Option for configuring how long the setup activation key (key for entering BIOS) is displayed	1 to 65534	Displays the setup activation key for x seconds
		65535	Displays the setup activation key for an unlimited amount of time
Enable popup boot menu	Option for enabling/disabling the popup boot menu	Yes	Enables this function Press "F11" during POST to select a boot device.
		No	Disables this function It is not possible to select a boot device during POST. Devices will boot in their configured order.
Bootup NumLock state	Option for configuring the numeric keypad when booting the system	On	Enables the numeric keypad
		Off	Only enables the cursor (movement) functions of the numeric keypad
GateA20 active	Option for defining how memory above 1 MB is accessed	Upon request	GA20 can be disabled.
		Always	GA20 is not disabled.
INT19 trap response	TBD	Immediate	TBD
		Postponed	TBD
Power loss control	Specifies whether the system should be on/off following power loss	Remain off	Keeps the PPC800 turned off
		Turn on	Turns on the PPC800
		Last state	Enables the previous state

Table 134: Boot - Boot configuration - Configuration options

1.6 Security

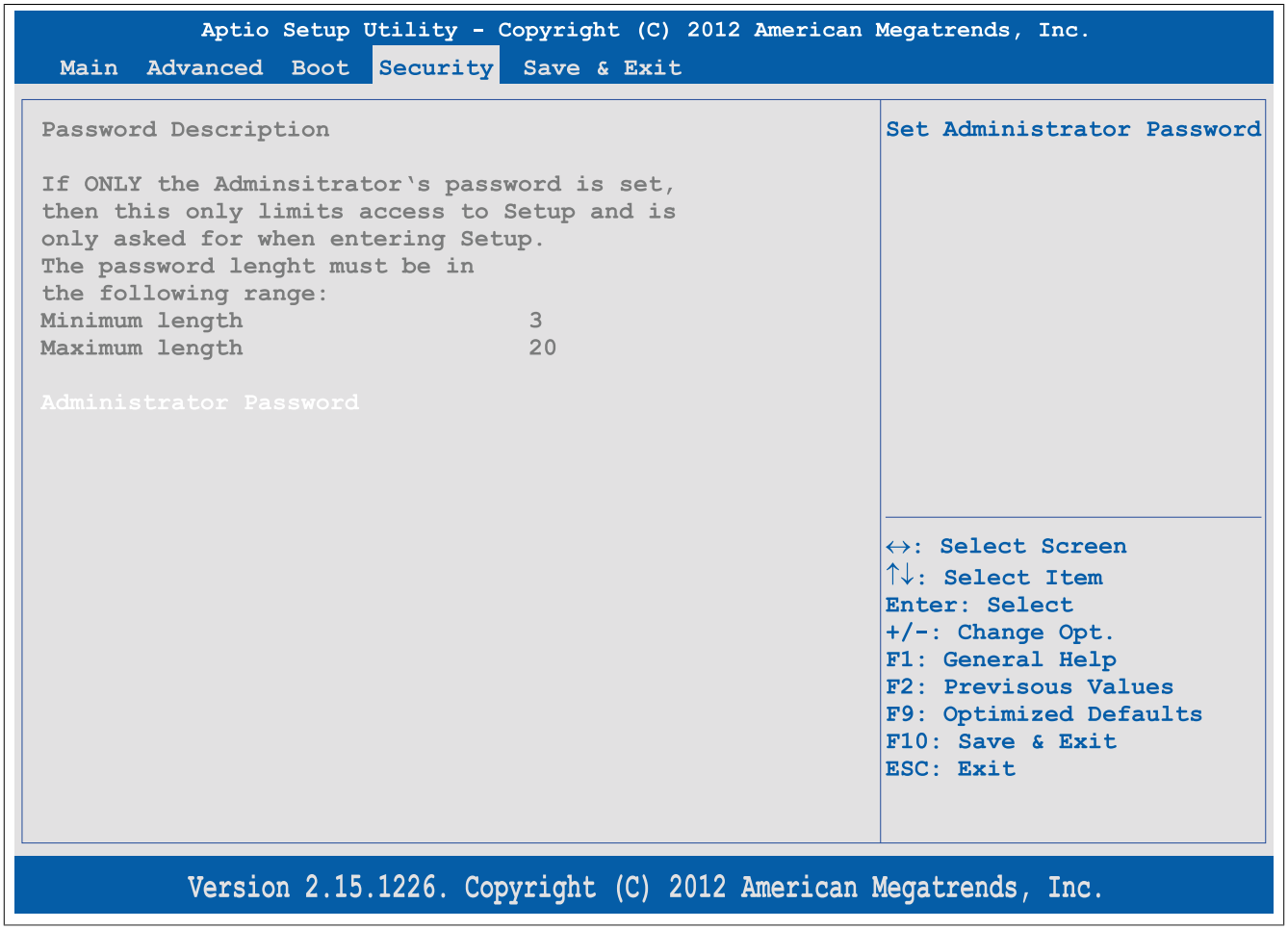


Figure 105: NM10 Security - Overview

BIOS setting	Description	Configuration options	Effect
Administrator password	Function for entering/changing the administrator password	Enter	Password entry

Table 135: NM10 Security Menu (Setting options)

1.7 Save & Exit

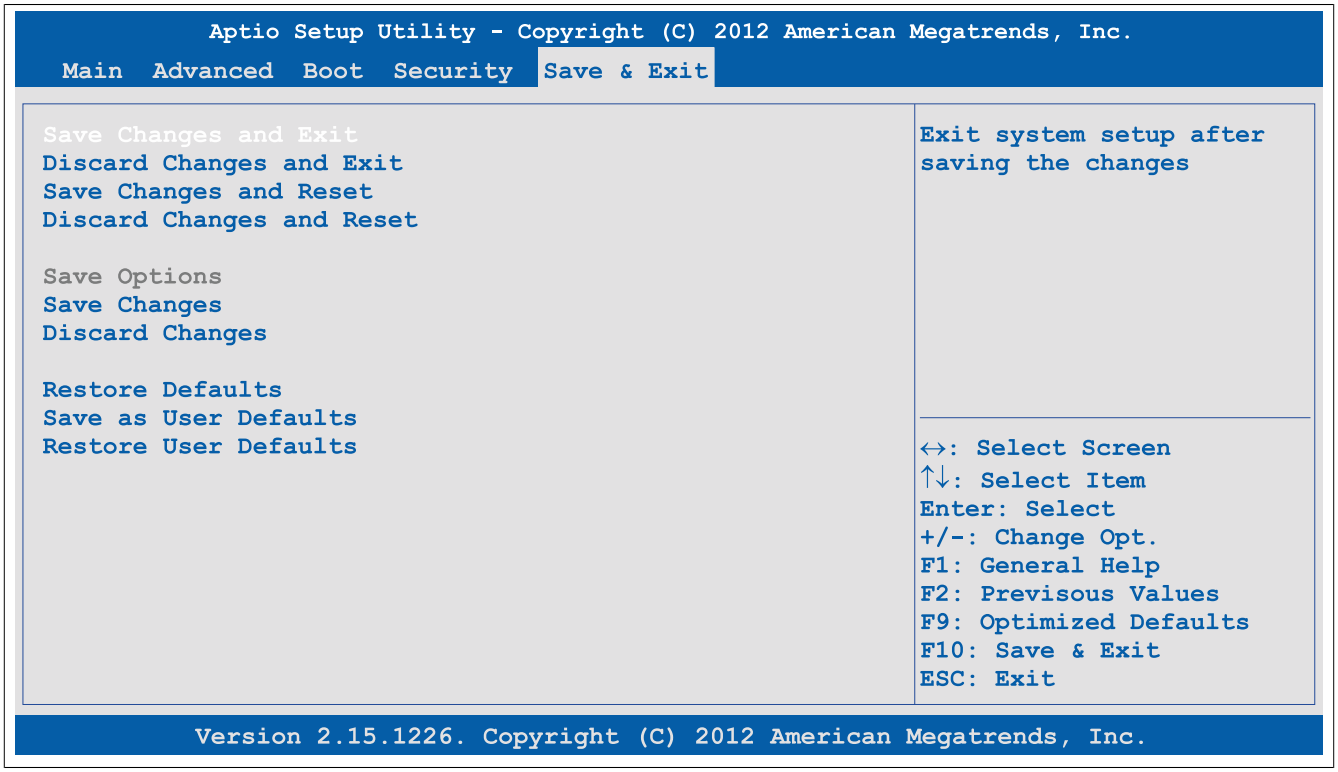


Figure 106: NM10 Save & Exit - Overview

BIOS setting	Description	Configuration options	Effect
Save changes and exit	Selecting this option closes BIOS Setup. Any changes made are saved to CMOS after confirmation.	Yes / No	
Discard changes and exit	Selecting this option closes BIOS Setup without saving any changes made.	Yes / No	
Save changes and reset	Selecting this option closes BIOS Setup. Any changes made are saved to CMOS after confirmation, and the system is rebooted.	Yes / No	
Discard changes and reset	Selecting this option closes BIOS Setup without saving any changes made. The system is then rebooted.	Yes / No	
Save changes	Any changes made are saved to CMOS after confirmation.	Yes / No	
Discard changes	This option can be used to reset any settings that may have been made but have been forgotten in the meantime (provided they have not yet been saved).	Yes / No	
Restore defaults	This option restores BIOS default values.	Yes / No	
Save as User Defaults	This option saves the defined values as user defaults.	Yes / No	
Restore User Defaults	This option restores the user default values.	Yes / No	

Table 136: NM10 Save & Exit menu - Setting options

1.8 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 "Restore Defaults" is chosen in the main BIOS setup menu, or if "Save & Exit" is selected (or F9 is pressed) in the individual setup screens, the following BIOS settings are the optimized values that will be used.

Profile number	Optimized for	Switch position	Note
Profile 0	Reserved	0	
Profile 5	System unit 5PC820.1505-00 / 5PC820.1906-00	5	The default settings for this profile can be found in the PPC800 user's manual. This can be downloaded for free from the B&R homepage.

Table 137: Profile overview

The following pages provide an overview of the BIOS default settings for the different CMOS profile switch positions. Settings highlighted in yellow are variations from the BIOS default profile (=profile 0).

1.8.1 Main

Setting / Option	Profile 0	Profile 5	My settings
Main BIOS version	-	-	
OEM BIOS version	-	-	
Build date	-	-	
Product revision	-	-	
Serial number	-	-	
BC firmware rev.	-	-	
ETH 1 MAC Address	-	-	
Boot counter	-	-	
Running time	-	-	
System date	-	-	
System time	-	-	
Access Level	-	-	

Table 138: NM10 Main - Profile settings

1.8.2 Advanced

1.8.2.1 Graphics configuration

Setting / Option	Profile 0	Profile 5	My setting
IGFX - Boot Type	VBIOS default	VBIOS default	
Active LFP	LVDS	LVDS	
Always Try Auto Panel Detect	No	No	
Local Flat Panel Type	Auto	Auto	
IGD Clock Source	External Clock	External Clock	
Fixed Graphics Memory Size	128 MB	128 MB	
Digital Display Interface Port B	Disabled	Disabled	
IGFX VBIOS version	-	-	

Table 139: NM10 Advanced - Graphics Configuration - Profile settings

1.8.2.2 Main Board/Panel Features

Setting / Option	Profile 0	Profile 5	My setting
Real-time environment	Disabled	Disabled	
Main BIOS version	-	-	
MTCX PX32	-	-	
MTCX FPGA	-	-	
OEM String	-	-	
CMOS Profile	-	-	
Device ID	-	-	
Compatibility ID	-	-	
Serial number	-	-	
Product name	-	-	
User serial ID	-	-	
Panel control			

Table 140: NM10 Advanced - Baseboard/Panel Features - Profile settings

Setting / Option	Profile 0	Profile 5	My setting
Panel #15			
Version	-	-	
Brightness	100%	100%	
Fan speed	-	-	
Keys/LEDs	-	-	
Temperature	-	-	
Baseboard Monitor			
CMOS Battery	-	-	
Board I/O	-	-	
Board ETH2	-	-	
Board Power	-	-	
Power Supply	-	-	
Slide-In Drive 1	-	-	
IF Slot	-	-	
Case 1	-	-	
Case 2	-	-	
Case 3	-	-	
Case 4	-	-	
Super I/O configuration			
Serial port A	Enabled	Enabled	
Device settings	-	-	
Serial port B	Disabled	n/a	
Serial port C	Enabled	Enabled	
Serial Port D	Disabled	n/a	
Serial port E	Disabled	Disabled	
Hardware Security Key	Disabled	n/a	
CAN Controller	Disabled	n/a	
ETH2 LAN Controller	Enabled	Enabled	
ETH2 MAC Address	-	-	

Table 140: NM10 Advanced - Baseboard/Panel Features - Profile settings

1.8.2.3 Hardware monitoring

Setting / Option	Profile 0	Profile 5	My setting
CPU temperature	-	-	
Board temperature 1	-	-	
Board temperature 2	-	-	
Board temperature 3	-	-	
12 V (default)	-	-	
5 V standby	-	-	

Table 141: NM10 Advanced - Hardware Monitoring - Profile settings

1.8.2.4 PCI Configuration

Setting / Option	Profile 0	Profile 5	My setting
PCI latency timer	32 PCI bus clocks	32 PCI bus clocks	
VGA palette snoop	Disabled	Disabled	
PERR# generation	Disabled	Disabled	
SERR# generation	Disabled	Disabled	
PIRQ routing & IRQ reservation			
PIRQA	Auto	Auto	
PIRQB	Auto	Auto	
PIRQC	Auto	Auto	
PIRQD	Auto	Auto	
PIRQE	Auto	Auto	
PIRQF	Auto	Auto	
PIRQG	Auto	Auto	
PIRQH	Auto	Auto	
Reserve Legacy Interupt 1	None	None	
Reserve Legacy Interupt 1	None	None	

Table 142: NM10 Advanced - PCI Configuration - Profile settings

1.8.2.5 PCI Express Configuration

Setting / Option	Profile 0	Profile 5	My setting
PCI Express root port 0			
PCI Express Port 0	Enabled	Enabled	
Port 0 IOxAPIC	Disabled	Disabled	
Automatic ASPM	Manual	Manual	
ASPM L0s	Disabled	Disabled	
ASPM L1	Disabled	Disabled	
URR	Disabled	Disabled	
FER	Disabled	Disabled	
NFER	Disabled	Disabled	
CER	Disabled	Disabled	
CTO	Disabled	Disabled	
SEFE	Disabled	Disabled	
SENFE	Disabled	Disabled	
SECE	Disabled	Disabled	
PME SCI	Enabled	Enabled	
Hot plug	Disabled	Disabled	
Assign INT to root port	Enabled	Enabled	
Extra bus reserved	0	0	
Reserved memory	10	10	
Reserved I/O	4	4	
PCI Express Root Port x (1-3)			
PCI Express Port x (1-3)	Auto	Auto	
Port 0 IOxAPIC	Disabled	Disabled	
Automatic ASPM	Manual	Manual	
ASPM L0s	Disabled	Disabled	
ASPM L1	Disabled	Disabled	
URR	Disabled	Disabled	
FER	Disabled	Disabled	
NFER	Disabled	Disabled	
CER	Disabled	Disabled	
CTO	Disabled	Disabled	
SEFE	Disabled	Disabled	
SENFE	Disabled	Disabled	
SECE	Disabled	Disabled	
PME SCI	Enabled	Enabled	
Hot plug	Disabled	Disabled	
Assign INT to root port	Enabled	Enabled	
Extra bus reserved	0	0	
Reserved memory	10	10	
Reserved I/O	4	4	
PCI Express settings			
Relaxed ordering	Disabled	Disabled	
Extended tag	Disabled	Disabled	
No snoop	Enabled	Enabled	
Maximum payload	Auto	Auto	
Maximum read request	Auto	Auto	
ASPM Support	Disabled	Disabled	
Extended synch	Disabled	Disabled	
Link training retry	5	5	
Link Training Timeout (uS)	100	100	
Unpopulated links	Keep Link ON	Keep Link ON	

Table 143: NM10 Advanced - PCI Express - Profile settings

1.8.2.6 RTC wake settings

Setting / Option	Profile 0	Profile 5	My setting
Wake system at fixed time	Disabled	Disabled	

Table 144: NM10 Advanced - RTC Wake - Profile settings

1.8.2.7 ACPI settings

Setting / Option	Profile 0	Profile 5	My setting
Enable hibernation	Enabled	Enabled	
ACPI sleep state	Both S1 and S3 avai...	Both S1 and S3 avai...	
Lock legacy resources	Disabled	Disabled	
S3 video repost	Disabled	Disabled	
CPU Thermal Monitoring	Enabled	Enabled	

Table 145: NM10 Advanced - ACPI Settings - Profile settings

Setting / Option	Profile 0	Profile 5	My setting
Critical trip point	111 C	111 C	
Passive Trip Point	95 C	95 C	
Passive TC1 Value	1	1	
Passive TC2 Value	5	5	
Passive TSP Value	10	10	

Table 145: NM10 Advanced - ACPI Settings - Profile settings

1.8.2.8 CPU configuration

Setting / Option	Profile 0	Profile 5	My setting
Hyper-Threading	Enabled	Enabled	
Core-Multi Processing	Enabled	Enabled	
Execute disable bit	Enabled	Enabled	
Limit CPUID maximum	Disabled	Disabled	
EIST	Enabled	Enabled	
CPU C state Report	Disabled	Disabled	
CPU information			
Processor Type	-	-	
EMT 64	-	-	
Processor Speed	-	-	
System Bus Speed	-	-	
Ratio Status	-	-	
Actual Ratio	-	-	
System Bus Speed	-	-	
Processor Stepping	-	-	
Microcode revision	-	-	
L1 Cache RAM	-	-	
L2 Cache RAM	-	-	
Processor Core	-	-	
Hyper-Threading	-	-	

Table 146: NM10 Advanced - CPU Configuration - Profile settings

1.8.2.9 Memory configuration

Setting / Option	Profile 0	Profile 5	My setting
MRC fast boot	Enabled	Enabled	
Max TOLUD	Dynamic	Dynamic	
Memory information			
Memory frequency	-	-	
Total memory	-	-	
DIMM#0	-	-	
DIMM#1	-	-	

Table 147: NM10 Advanced - Memory Configuration - Profile settings

1.8.2.10 Chipset configuration

Setting / Option	Profile 0	Profile 5	My setting
Azalia Controller	HD Audio	HD Audio	
Azalia PME Enable	Disabled	Disabled	
Azalia Vci Enable	Enabled	Enabled	
LAN Controller	Enabled	Enabled	
SMBus Controller	Enabled	Enabled	
SIRQ Logic	Enabled	Enabled	
SIRQ Mode	Continuous	Continuous	
DMI Link ASPM Control	Enabled	Enabled	
PCI-Exp. High Priority Port	Disabled	Disabled	
High Precision Timer	Enabled	Enabled	

Table 148: NM10 Advanced - Chipset Configuration - Profile settings

1.8.2.11 IDE Configuration

Setting / Option	Profile 0	Profile 5	My setting
SATA Port0	-	-	
SATA Port1	-	-	
SATA Controller	Enabled	Enabled	
Configure SATA as	IDE	IDE	

Table 149: NM10 Advanced - IDE Configuration - Profile settings

1.8.2.12 USB Configuration

Setting / Option	Profile 0	Profile 5	My setting
Select USB Mode	By Controllers	By Controllers	
UHCI #1 (ports 0 and 1)	Enabled	Enabled	
UHCI #2 (ports 2 and 3)	Enabled	Enabled	
UHCI #3 (ports 4 and 5)	Enabled	Enabled	
UHCI #4 (ports 6 and 7)	Enabled	Enabled	
USB 2.0(EHCI) Support	Enabled	Enabled	
Legacy USB support	Enabled	Enabled	
EHCI hand-off	Disabled	Disabled	
USB transfer time-out	20 sec	20sec	
Device reset time-out	20 sec	20sec	
Device power-up delay	Auto	Auto	

Table 150: NM10 Advanced - USB Configuration - Profile settings

1.8.2.13 Serial port console redirection

Setting / Option	Profile 0	Profile 5	My setting
Console Redirection (COMA)	Disabled	Disabled	
Console Redirection (EMS)	Disabled	Disabled	

Table 151: NM10 Advanced - Serial Port Console Redirection - Profile settings

1.8.3 Boot

Setting / Option	Profile 0	Profile 5	My setting
Boot device priority			
Boot priority selection	Type based	Type based	
1st boot device	Onboard LAN	Primary Master	
2nd boot device	Primary Master	Primary Slave	
3rd boot device	Primary Slave	SATA 1 drive	
4th boot device	USB Floppy	SATA 0 drive	
5th boot device	Disabled	USB Floppy	
6th boot device	Disabled	USB hard disk	
7th boot device	Disabled	USB CDROM	
8th boot device	Disabled	Disabled	
Boot configuration			
Boot option filter	UEFI and Legacy	UEFI and Legacy	
Launch PXE OpROM policy	Legacy only	Do not launch	
Launch Storage OpROM policy	Do not launch	Do not launch	
Launch Video OpROM policy	Legacy only	Legacy only	
Option ROM messages	Force BIOS	Force BIOS	
Other PCi device ROM priority	Legacy OpROM	Legacy OpROM	
Boot logo	Auto	Auto	
Enter setup if no boot device	No	No	
Setup prompt timeout	1	1	
Enable popup boot menu	Yes	Yes	
Bootup NumLock state	On	On	
GateA20 active	Upon request	Upon request	
INT19 trap response	Immediate	Immediate	
Power loss control	Turn on	Turn on	

Table 152: NM10 Boot profile setting overview

1.8.4 Security

Setting / Option	Profile 0	Profile 5	My setting
Administrator password	-	-	

Table 153: NM10 Security - Profile settings

1.9 Distribution of resources

1.9.1 RAM address assignment

RAM address	Address in hexadecimal	Resource
(TOM - 384 kB) – TOM[1]	N.A.	ACPI reclaim, PCI memory range, Video,...[2]
1024 kB – (TOM - xxxx)	100000h - N.A.	Extended memory
869kB – 1024 kB	0E0000h - 0FFFFFh	Runtime BIOS
768kB – 869 kB	0C0000h - 0DFFFFh	Expansion area
640kB – 768 kB	0A0000h - 0BFFFFh	Video memory and BIOS
639kB – 640 kB	09FC00h - 09FFFFh	Extended BIOS data
0 – 639 kB	000000h - 09FC00h	Conventional memory

Table 154: RAM address assignment

1) TOM = Top of Memory: Max. installed DRAM

1.9.2 I/O address assignment

I/O address	Resource
0000h - 00FFh	Motherboard resources
0170h - 0177h	Secondary IDE channel
01F0h - 01F7h	Primary IDE channel
02E8h - 02EFh	COM4
0376h - 0376h	Secondary IDE channel command port
0377h - 0377h	Secondary IDE channel status port
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[1]
4100h - 417Fh	MTCX
FF00h - FF07h	IDE bus master register

Table 155: 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.

1.9.3 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[1]											●								
Real-time clock										●									
Coprocessor (FPU)															●				
Primary IDE channel[2]																●			
Secondary IDE channel[2]																	●		
B&R	COM3 (COM C)				○	○	○	○	○			○	○	○					●
	COM5 (COM E)				○	○	○	○	○			○	○	○					●

Table 156: IRQ interrupt assignments in PIC 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.

● ... Default setting
○ ... Optional setting

1.9.4 Interrupt assignment in APIC mode

A total of 23 IRQs are available in APIC (**A**dvanced **P**rogrammable **I**nterrupt **C**ontroller) mode. Enabling this option is only effective if done before the Windows 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[1]										●																
Real-time clock									●																	
Coprocessor (FPU)														●												
Primary IDE channel[2]															●											
Secondary IDE channel[2]																●										
B&R COM3 (COM C)				○	○	○	○	○			○	○	○													●
PIRQ A[3]																	●									
PIRQ B[4]																		●								
PIRQ C[5]																			●							
PIRQ D[6]																				●						
PIRQ E[7]																					●					
PIRQ F[8]																						●				
PIRQ G[9]																							●			
PIRQ H[10]																								●		

Table 157: 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 3, VGA controller, PCI Express root port 0
4) PIRQ B: for PCIe; PCI Express Root Port 1, PCIe to PCIe Bridge
5) PIRQ C: for PCIe; PCI Express Root Port 2, PCIe to PATA Bridge, IF slot
6) PIRQ D: for PCIe; UHCI host controller 1, serial ATA controller 0 + 1 in enhanced/native mode, PCI express root port 3, SM bus controller, RTL8111E (ETH1)
7) PIRQ E: PCI Bus INTD, UHCI Host Controller 2, HDA Audio
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

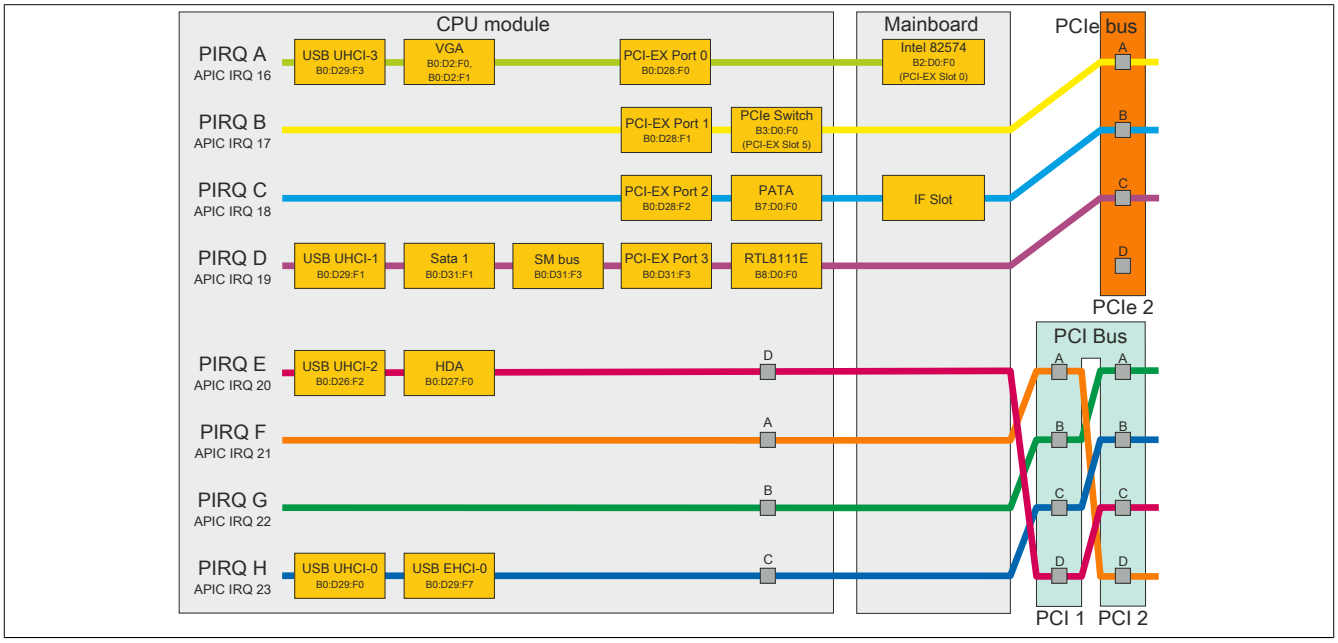


Figure 107: PCI and PCIe routing with activated APIC for NM10 CPU boards

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 website (www.br-automation.com).**

2.1 BIOS upgrade

Upgrade may be necessary in order to accomplish the following:

- Updating implemented functions or adding newly implemented functions or components to BIOS Setup (information about changes can be found in the Readme file for the BIOS upgrade).

2.1.1 Important information

> **Information:**
>
> **Customized BIOS settings are deleted when upgrading BIOS.**

Before starting an upgrade, it helps to determine the various software versions.

2.1.1.1 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, the BIOS Setup screen can be accessed by pressing <Del>.
- From the BIOS main menu "Advanced", select "Main board/panel features".

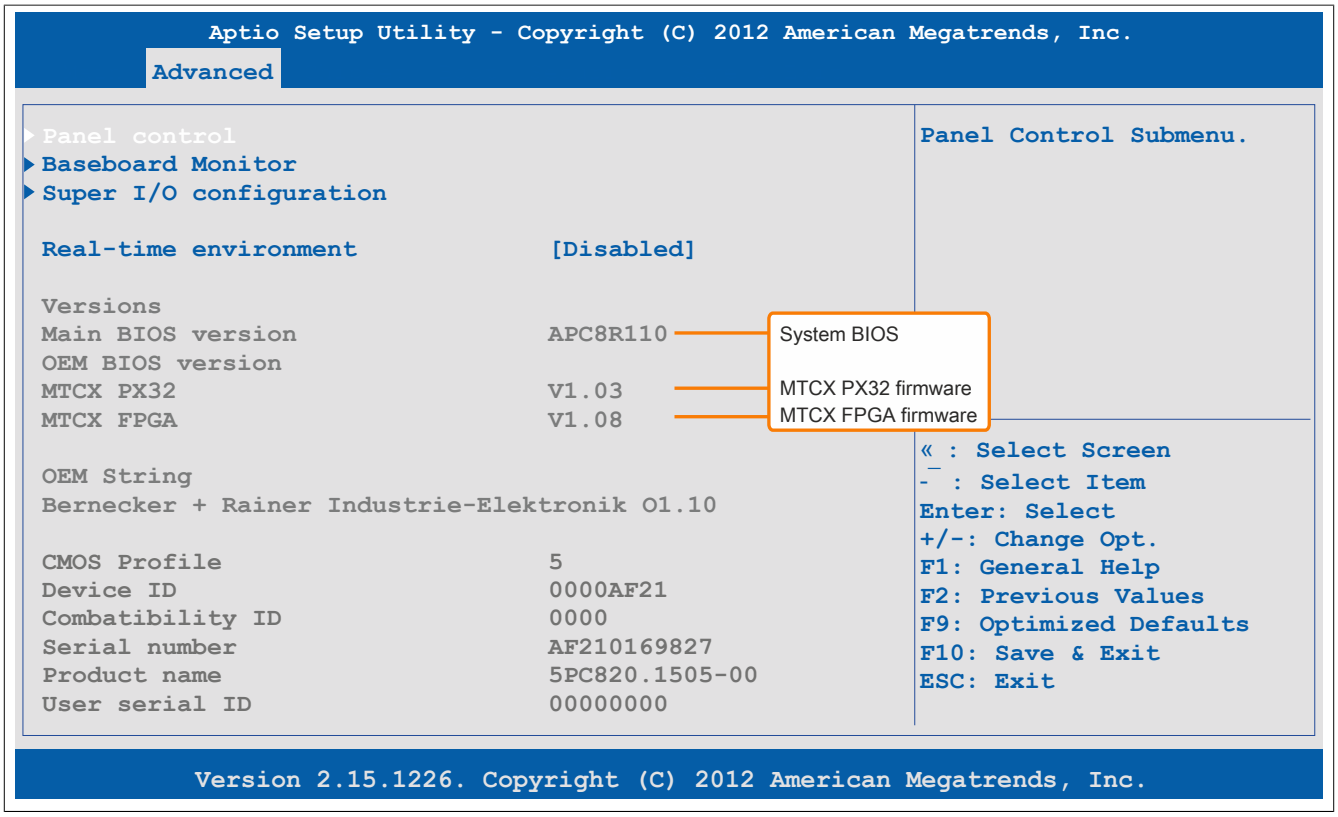


Figure 108: Software version

2.1.2 Procedure with MS-DOS

1. Download the .zip file from the B&R website (www.br-automation.com).
2. Create bootable media.

Information:

In MS-DOS, Win95 and Win98, a blank HD disk can be made bootable by typing "sys a:" or "format a: /s" on the command line.
Information about creating a bootable diskette in Windows XP can be found on page 187.

Information about creating a USB flash drive for a B&R upgrade can be found on page 189.

Information on creating a CompactFlash card for a B&R upgrade can be found on page 190.

3. Copy the contents of the .zip file to the bootable media. If the B&R upgrade was already added when creating the bootable media with 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 (UEFI) BIOS for N2800 (5PC800.CCAX-00)
2. Exit
```

Concerning item 1:
BIOS is automatically upgraded (default after 5 seconds).

Concerning item 2:
Returns to the shell (MS-DOS).

Information:

If a button is not pressed within 5 seconds, then item 1 "Upgrade AMI BIOS for NM10" is automatically carried out and the industrial PC is updated automatically.

6. The system must be rebooted after a successful upgrade.
7. Reboot and press <Del> to enter the BIOS Setup screen and load the setup defaults, then select "Save changes and exit".

2.2 Firmware upgrade

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

The latest firmware upgrade can be directly downloaded from the download area of the B&R website (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).
2. Create bootable media.

> **Information:**
>
> **In MS-DOS, Win95 and Win98, a blank HD disk can be made bootable by typing "sys a:" or "format a: /s" on the command line.**
> **Information about creating a bootable diskette in Windows XP can be found on page 187.**
>
> **Information about creating a USB flash drive for a B&R upgrade can be found on page 189.**
>
> **Information on creating a CompactFlash card for a B&R upgrade can be found on page 190.**

3. Copy the contents of the .zip file to the bootable media. If the B&R upgrade was already added when creating the bootable media with 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
2.1. Upgrade SDLR on AP 0 (AP800/AP900)
2.2. Upgrade SDLR on AP 1 (AP800/AP900)
2.3. Upgrade SDLR on AP 2 (AP800/AP900)
2.4. Upgrade SDLR on AP 3 (AP800/AP900)
2.5. Upgrade all SDLR (AP800/AP900)
2.6. Return to Main Menu
3. Upgrade add-on UPS (firmware and battery settings)
3.1. Upgrade Add-On UPS Firmware (5AC600.UPSI-00)
3.2. Upgrade Battery Settings (5AC600.UPSB-00)
3.3. 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. Insert a blank 1.44 MB HD diskette into the disk drive.
2. Open Windows Explorer.
3. Right-click on the 3½ floppy diskette icon and select "Format".

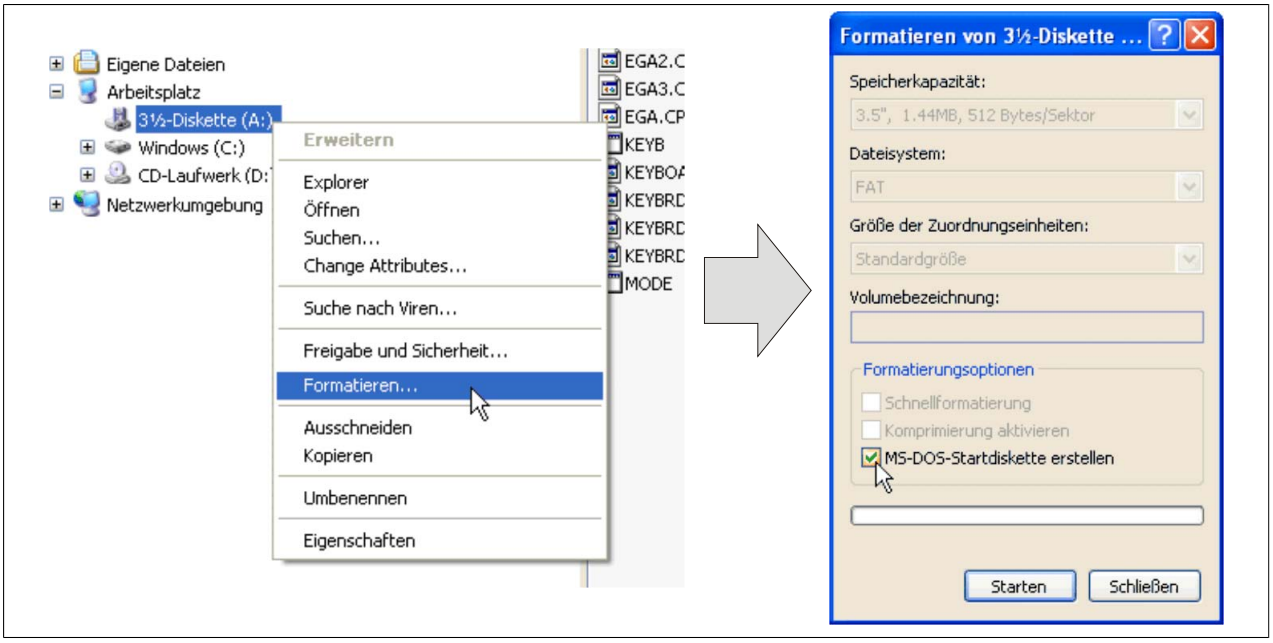


Figure 109: Creating a bootable diskette in Windows XP - Step 1

4. Select the **"Create an MS-DOS startup disk"** option, click on **"Start"** and acknowledge the warning message with "OK".

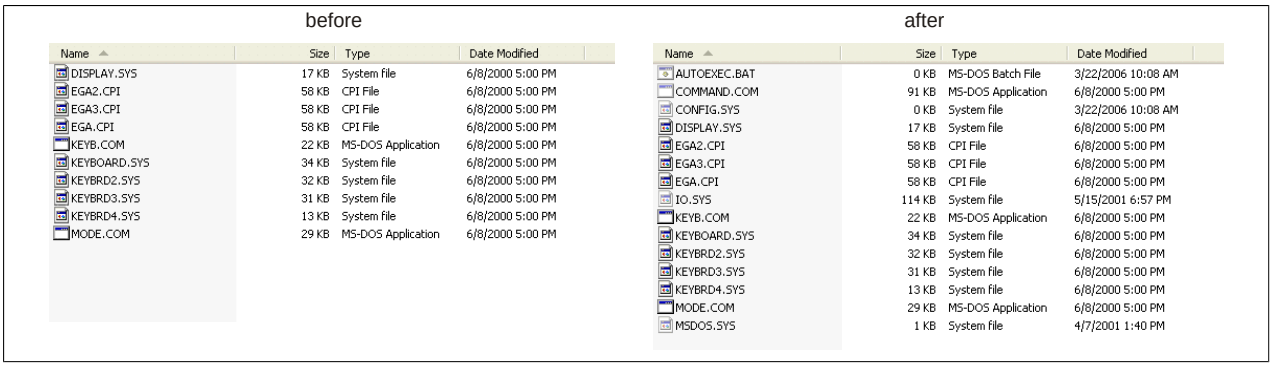
Figure 110: Creating a bootable diskette in Windows XP - Step 2

Figure 111: 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.

To do this, all files (hidden system files, etc.) must be visible on the diskette.

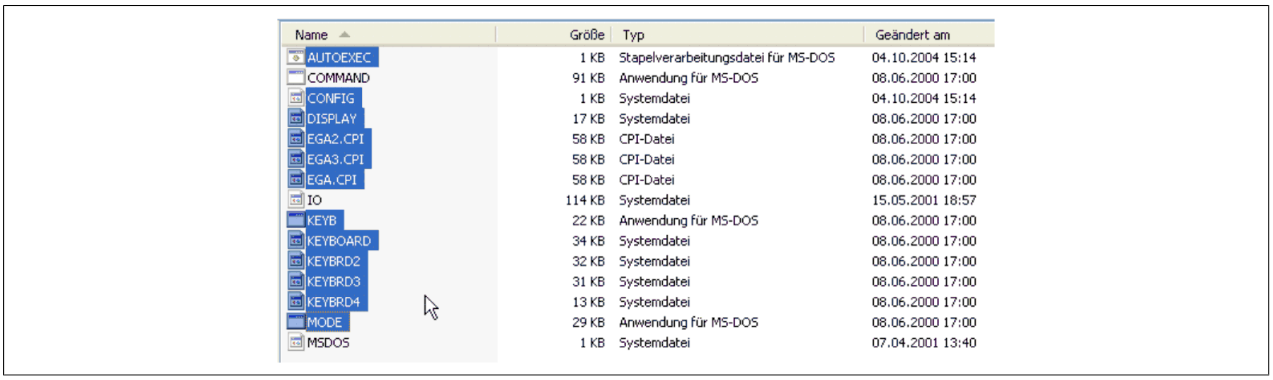
In Windows Explorer, go to the "Tools" menu, select "Folder options" and open the "View" tab. Then deselect the option "Hide protected operating system files (Recommended)" (enabled by default) and enable the option "Show hidden files and folders".



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

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

Figure 112: Creating a bootable diskette in Windows XP - Step 4



Name	Größe	Typ	Geändert am
AUTOEXEC	1 KB	Stapelverarbeitungsdatei für MS-DOS	04.10.2004 15:14
COMMAND	91 KB	Anwendung für MS-DOS	08.06.2000 17:00
CONFIG	1 KB	Systemdatei	04.10.2004 15:14
DISPLAY	17 KB	Systemdatei	08.06.2000 17:00
EGA2.CPI	58 KB	CPI-Datei	08.06.2000 17:00
EGA3.CPI	58 KB	CPI-Datei	08.06.2000 17:00
EGA.CPI	58 KB	CPI-Datei	08.06.2000 17:00
IO	114 KB	Systemdatei	15.05.2001 18:57
KEYB	22 KB	Anwendung für MS-DOS	08.06.2000 17:00
KEYBOARD	34 KB	Systemdatei	08.06.2000 17:00
KEYBRD2	32 KB	Systemdatei	08.06.2000 17:00
KEYBRD3	31 KB	Systemdatei	08.06.2000 17:00
KEYBRD4	13 KB	Systemdatei	08.06.2000 17:00
MODE	29 KB	Anwendung für MS-DOS	08.06.2000 17:00
MSDOS	1 KB	Systemdatei	07.04.2001 13:40

Figure 113: Creating a bootable diskette in Windows XP - Step 5

Now all files (selected) 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 at no cost from the B&R website (www.br-automation.com).

2.4.1 Requirements

The following is required to create 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

1. Connect the USB flash drive to the PC.
2. If the drive list is not refreshed automatically, the list can be updated using the command **Drives > Refresh**.
3. Select the desired USB flash drive in the drive list.
4. Change to the **Action** tab and select **Install a B&R update to a USB flash drive** 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 **From .zip file**. If the files are stored in a directory on the hard drive, then click on the button **From folder**.
6. In the **B&R upgrade** text box, it is 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.

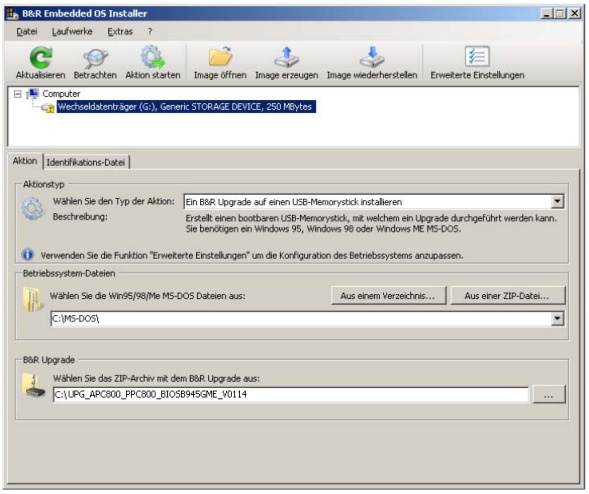


Figure 114: Creating a USB flash drive for B&R upgrade files

2.4.3 How to access 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 187. The files from the diskette are then copied to the 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 at no cost from the B&R website (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
- USB media drive
- B&R Embedded OS Installer (V3.10 or higher)

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 can 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 **From .zip file**. If the files are stored in a directory on the hard drive, then click on the button **From folder**.
6. In the **B&R upgrade** text box, it is 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.

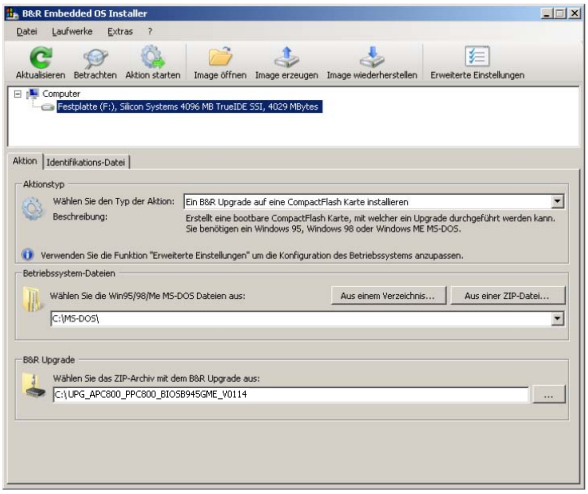


Figure 115: Creating a CompactFlash card for B&R upgrade files

2.5.3 How to access 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 187. The files from the diskette are then copied to the hard drive.

3 Microsoft DOS

3.1 Order data

Model number	Short description	Figure
	MS-DOS	
9S0000.01-010	OEM Microsoft MS-DOS 6.22, German disks, only supplied together with a new PC.	
9S0000.01-020	OEM Microsoft MS-DOS 6.22, English disks, only supplied together with a new PC.	

Table 158: 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.

3.3 Resolutions and color depths

The following table shows the tested resolutions and color depths on the Monitor / Panel connector with NM10 CPU boards.

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

Table 159: Tested resolutions and color depths for RGB signals

4 Windows XP Professional

4.1 Order data

Model number	Short description	Figure
	Windows XP Professional	
5SWWXP.0600-ENG	Microsoft OEM Windows XP Professional Service Pack 3, CD, English. Only available with a new device.	
5SWWXP.0600-GER	Microsoft OEM Windows XP Professional Service Pack 3, CD, German. Only available with a new device.	
5SWWXP.0600-MUL	Microsoft OEM Windows XP Professional Service Pack 3, CD, Multilanguage. Only available with a new device.	

Table 160: 5SWWXP.0600-ENG, 5SWWXP.0600-GER, 5SWWXP.0600-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 APC511 APC620 APC810 APC820 APC910 PPC700 PPC725 PPC800 PP500	945GME GM45 QM77/HM76 NM10 US15W	SP3	English	Optional	≤ 2.1 GB	128 MB
5SWWXP.0600-GER	Professional	APC510 APC511 APC620 APC810 APC820 APC910 PPC700 PPC725 PPC800 PP500	945GME GM45 QM77/HM76 NM10 US15W	SP3	German	Optional	≤ 2.1 GB	128 MB
5SWWXP.0600-MUL	Professional	APC510 APC511 APC620 APC810 APC820 APC910 PPC700 PPC725 PPC800 PP500	945GME GM45 QM77/HM76 NM10 US15W	SP3	Multilanguage	Optional	≤ 2.1 GB	128 MB

4.3 Installation

Upon request, the required Windows XP Professional version can be preinstalled by B&R on a suitable mass storage device (e.g. CompactFlash card). All of the drivers required for operation (graphics, network, etc.) are also installed in this process.

4.4 Drivers

Current drivers for all approved operating systems are available in the Downloads section of the B&R website www.br-automation.com.

Information:

Required drivers can only be downloaded from the B&R website, not from manufacturer websites.

5 Windows 7

5.1 General information

Windows® 7 offers a wealth of innovative features and performance improvements. 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 English and German are available in Windows® 7 Professional, while Windows® 7 Ultimate supports up to 35 different languages (up to 36 languages in Service Pack 1). 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 compared to products offered on the consumer market.

5.2 Order data

Model number	Short description	Figure
	Windows 7 Professional/Ultimate	
5SWWI7.1100-ENG	Microsoft OEM Windows 7 Professional 32-bit, Service Pack 1, DVD, English. Only available with a new device.	
5SWWI7.1100-GER	Microsoft OEM Windows 7 Professional 32-bit, Service Pack 1, DVD, German. Only available with a new device.	
5SWWI7.1300-MUL	Microsoft OEM Windows 7 Ultimate 32-bit, Service Pack 1, DVD, multilingual. Only available with a new device.	

Table 161: 5SWWI7.1100-ENG, 5SWWI7.1100-GER, 5SWWI7.1300-MUL - Order data

5.3 Overview

Model number	Edition	Target system	Chipset	Service Pack	Architecture	Language	Preinstalled	Minimum size of the disk	Minimum amount of RAM
5SWWI7.1100-ENG	Professional	APC510 APC511 APC810 APC910 PPC800 PP500	945GME GM45 QM77/HM76 NM10 US15W	SP1	32-bit	English	Optional	16 GB	1 GB
5SWWI7.1100-GER	Professional	APC510 APC511 APC810 APC910 PPC800 PP500	945GME GM45 QM77/HM76 NM10 US15W	SP1	32-bit	German	Optional	16 GB	1 GB
5SWWI7.1300-MUL	Ultimate	APC510 APC511 APC810 APC910 PPC800 PP500	945GME GM45 QM77/HM76 NM10 US15W	SP1	32-bit	Multilanguage	Optional	16 GB [1]	1 GB

1) The memory used by the additional language packages is not accounted for in the minimum size of the data storage medium.

5.4 Installation

Upon request, the required Windows 7 version can be preinstalled by B&R on a suitable mass storage device (e.g. CompactFlash card). All of the drivers required for operation (graphics, network, etc.) are also installed in this process.

5.4.1 Installation on a PCI SATA RAID controller - 5ACPCI.RAIC-03, 5ACPCI.RAIC-05, 5ACPCI.RAIC-06

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 at www.br-automation.com and copy the data to a folder on a USB flash drive.
2. Boot using the Windows 7 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 changed in BIOS.**

5.5 Drivers

Current drivers for all approved operating systems are available in the Downloads section of the B&R website www.br-automation.com.

> **Information:**
>
> **Required drivers can only be downloaded from the B&R website, not from manufacturer websites.**

5.6 Special considerations, limitations

- Windows 7 does not contain a Beep.sys file, which means that an audible signal is no longer sounded (e.g. when pressing a key).
- There is currently no support for the Windows 7 system rating (although this does not apply to PP500, APC510, APC511, APC910 or PPC800 devices with an NM10 chipset).

6 Windows Embedded Standard 2009

6.1 General information

Windows® Embedded Standard 2009 is the modular version of Windows® XP Professional. It is used if XP applications should be executed with a minimal operating system size. 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 a multilingual version.

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, security and performance improvements as well as the latest technology for web browsing and extensive device support.

6.2 PPC800 (NM10) - Order data

Model number	Short description	Figure
	Windows Embedded Standard 2009	
5SWWXP.0739-ENG	Microsoft OEM Windows Embedded Standard 2009, English; for PPC800 with NM10 chipset; order CompactFlash separately (min. 1 GB)	
	Required accessories	
	CompactFlash	
5CFCRD.016G-06	CompactFlash 16 GB 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)	

Table 162: 5SWWXP.0739-ENG - Order data

6.3 Overview

Model number	Target system	Chipset	Language	Preinstalled	Minimum size of the disk	Minimum amount of RAM
5SWWXP.0739-ENG	PPC800	NM10	English	Yes	1 GB	256 MB

6.4 Features with WES2009 (Windows Embedded Standard 2009)

The following list of features shows the most important device functions included in Windows Embedded Standard 2009.

Function	Present
Enhanced Write Filter (EWF)	✓
File-Based Write Filter (FBWF)	✓
Page file	Configurable
Administrator accounts	✓
User accounts	Configurable
Explorer shell	✓
Registry filter	✓
Internet Explorer 8.0	✓
Internet information service (IIS)	-
Terminal service	✓
Windows Firewall	✓
MSN Explorer	-
Outlook Express	-
Administrative Tools	✓
Remote Desktop	✓
Remote Assistance	-
.NET Framework	-
ASP.NET	-
OpenGL support	✓

Table 163: Device functions in Windows Embedded Standard 2009

Function	Present
Local network bridge	✓
Codepages / User locales / Keyboards	✓
Disk Management Service	✓
Windows Installer Service	✓
Class Installer	✓
CoDevice Installer	✓
Media Player 6.4	✓
DirectX 9.0c	✓
Accessories	✓
Number of fonts	89

Table 163: Device functions in Windows Embedded Standard 2009

6.5 Installation

Upon request, Windows Embedded Standard 2009 can be preinstalled by B&R 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, with the device being rebooted a number of times.

6.6 Drivers

All drivers required for operation are preinstalled along with the operating system. If an older version of the driver is still being used, the latest version can be downloaded and installed from the B&R website (www.br-automation.com). It is important that Enhanced Write Filter (EWF) is disabled for this.

6.6.1 Touch screen driver

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 can be downloaded from the Download area of the B&R website (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 website, not from manufacturer websites.

7 Windows Embedded Standard 7

7.1 General information

The successor to Windows® XP Embedded is Windows® Embedded Standard 7. As with previous versions, this embedded operating system offers full system support for B&R Industrial PCs. 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 undesired applications that are being 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), installation 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 a 32-bit and 64-bit version.[3)] This ensures that even the most demanding applications have the level of support they need.

7.2 PPC800 (NM10) - Order data

Model number	Short description	Figure
	Windows Embedded Standard 7	
5SWWI7.1539-ENG	Microsoft OEM Windows Embedded Standard 7 32-bit, Service Pack 1, English; for PPC800 with NM10 chipset; order CompactFlash separately (at least 16 GB).	
5SWWI7.1739-MUL	Microsoft OEM Windows Embedded Standard 7 Premium 32-bit, Service Pack 1, Multilanguage; for PPC800 with NM10 chipset; order CompactFlash separately (min. 16 GB).	
	Required accessories	
	CompactFlash	
5CFCRD.016G-06	CompactFlash 16 GB B&R (SLC)	
	Optional accessories	
	Windows Embedded Standard 7	
5SWWI7.1900-MUL	Microsoft OEM Windows Embedded Standard 7 32-bit, Service Pack 1, Language Pack DVD	

Table 164: 5SWWI7.1539-ENG, 5SWWI7.1739-MUL - Order data

7.3 Overview

Model number	Edition	Target system	Chipset	Service Pack	Architecture	Language	Preinstalled	Minimum size of the disk	Minimum amount of RAM
5SWWI7.1539-ENG	Embedded	PPC800	NM10	SP1	32-bit	English	Optional	16 GB	1 GB
5SWWI7.1739-MUL	Premium	PPC800	NM10	SP1	32-bit	Multilanguage	Optional	16 GB [1)]	1 GB

1) The memory used by the additional language packages is not accounted for in the minimum size of the data storage medium.

7.4 Features with WES7 (Windows Embedded Standard 7)

The feature list displays the essential device functions and differences in Windows Embedded Standard 7 and Windows Embedded Standard 7 Premium.

Function	Windows Embedded Standard 7	Windows Embedded Standard 7 Premium
Enhanced Write Filter (EWF)	✓	✓
File-Based Write Filter (FBWF)	✓	✓
Administrator accounts	✓	✓
User accounts	Configurable	Configurable
Windows Explorer shell	✓	✓
Registry filter	✓	✓
Internet Explorer 8.0	✓	✓
Internet Information Service (IIS) 7.0	✓	✓
Anti-malware (Windows Defender)	-	✓
Add-ons (Snipping Tool, Sticky Notes)	-	✓
Windows Firewall	✓	✓
.NET Framework 3.5	✓	✓
Remote Desktop Protocol 7.0	✓	✓
File Compression Utility	✓	✓
Windows Installer Service	✓	✓

Table 165: Device functions in Windows Embedded Standard 7

3) 64-bit versions are not supported by all systems

Function	Windows Embedded Standard 7	Windows Embedded Standard 7 Premium
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 flash drive	✓	✓
Accessories	✓	✓
Page file	Configurable	Configurable
Number of fonts	134	134

Table 165: Device functions in Windows Embedded Standard 7

7.5 Installation

Upon request, Windows Embedded Standard 7 can be preinstalled by B&R on a suitable CompactFlash card (min. 8 GB). The system is then automatically configured when it is switched on for the first time. This procedure takes approximately 30 minutes, with the device being rebooted a number of times.

Information:

If the EWF should be used, all mass storage devices should be disconnected from the system during installation oder SYSPREP (except for the boot drive). It is also possible to disable additional mass storage devices in BIOS.

7.6 Drivers

All drivers required for operation are preinstalled along with the operating system. If an older version of the driver is still being used, the latest version can be downloaded and installed from the B&R website (www.br-automation.com). It is important that Enhanced Write Filter (EWF) is disabled for this.

7.6.1 Touch screen driver

A touch screen driver will be installed automatically if a touch controller is detected during the Windows Embedded Standard 7 installation. If a touch controller is not detected during Windows Embedded Standard 7 installation, or if an Automation Panel 800/900 is connected later on, then the touch screen driver needs to be installed manually or the additional touch screen interface must be selected in the touch screen settings in the Windows Control Panel. The driver can be downloaded from the Download area of the B&R website (www.br-automation.com). It is important that both the Enhanced Write Filter (EWF) and the File Based Write Filter (FBWF) are disabled for this.

Information:

Required drivers can only be downloaded from the B&R website, not from manufacturer websites.

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	Figure
	Accessories	
9A0003.02U	USB port button holder DS9490B	
1A4600.10	B&R Automation Runtime ARwin, incl. license sticker and copy protection	
1A4600.10-2	B&R Automation Runtime ARwin, ARNC0	
1A4600.10-3	B&R Automation Runtime ARwin+PVIControls incl. license sticker and copy protection	
1A4600.10-4	B&R Automation Runtime ARwin+ARNC0+PVIControls	

Table 166: 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 3.0.90 / AR 4.02 upgrade. An Automation Runtime dongle is not required.

Information:

***Advanced - Realtime Environment* must be set to *Enabled* in BIOS in order to operate Automation Runtime Windows (ARwin).**

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

The ADI (Automation Device Interface) enables access to specific functions on B&R devices. Settings for devices can be read and configured using the B&R Control Center applet in the Control Panel.

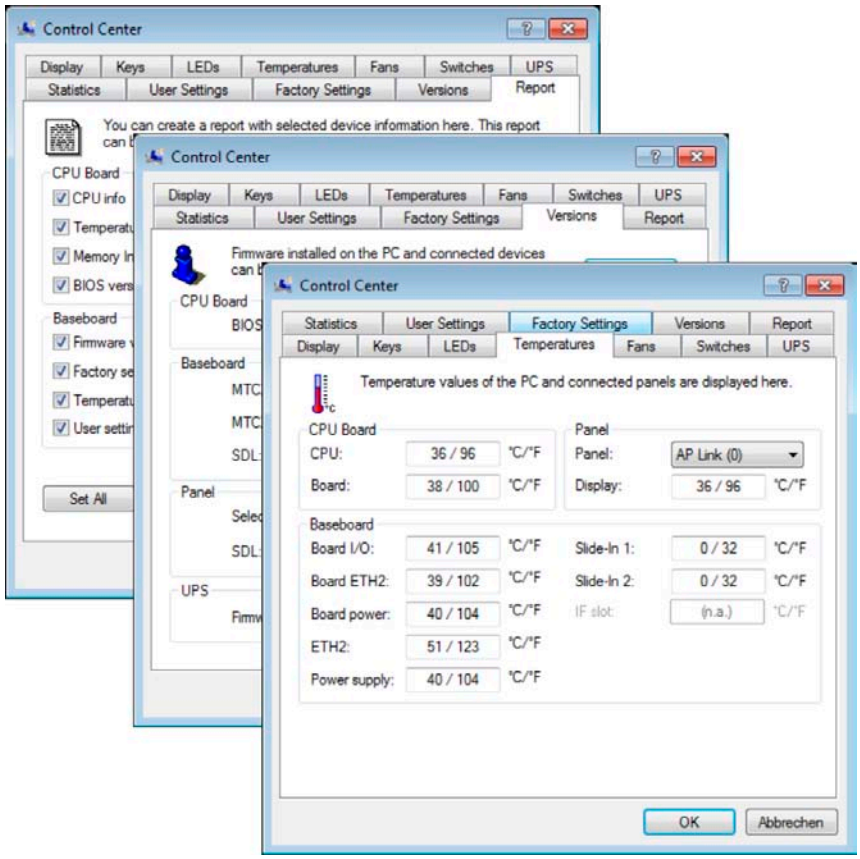


Figure 116: ADI Control Center screenshots - Examples

Information:

The temperature and voltage values (e.g. CPU temperature, core voltage, battery voltage) displayed in the corresponding ADI window represent uncalibrated values for informational purposes. They cannot be used to draw any conclusions about hardware alarms or error conditions. The hardware components used have automatic diagnostic 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 the device series.

- Changing display-specific parameters
- Reading device-specific keys
- Updating the key configuration
- Enabling device-specific LEDs on a membrane keypad
- Reading and calibrating input devices (e.g. key switches, handwheels, joysticks, potentiometers)
- 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 backing up BIOS and firmware
- Creating reports about the current system (support assistance)
- Setting the SDL equalizer value when adjusting SDL cables
- Changing the user serial ID

Supports the following systems:

- Automation PC 510
- Automation PC 511
- Automation PC 620
- Automation PC 810
- Automation PC 820
- Automation PC 910
- 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 documentation. 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).

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 B&R images of embedded operating systems.

If a more current ADI driver version exists (see the Downloads section of the B&R website), it can be installed later. It is important that Enhanced Write Filter (EWF) is disabled for this.

9.3 SDL Equalizer settings

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

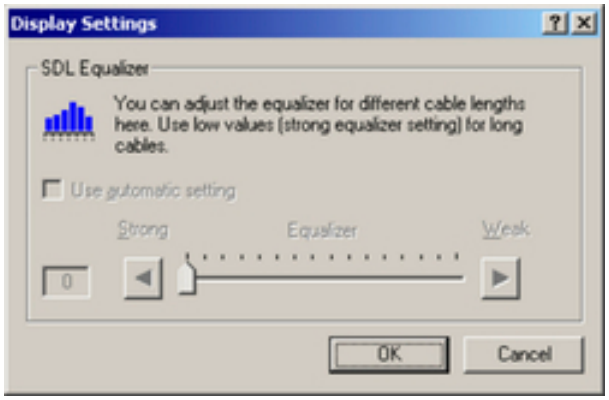


Figure 117: ADI Control Center - SDL equalizer settings

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 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.

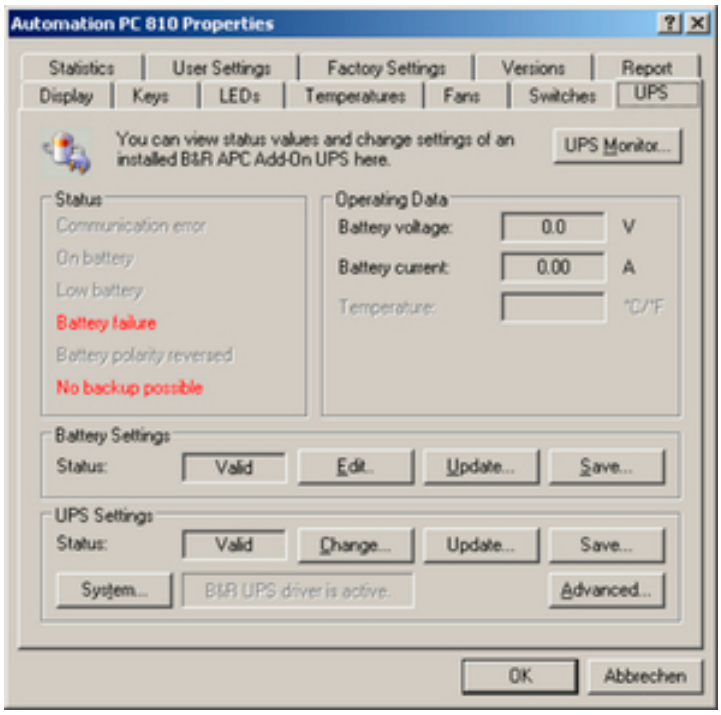


Figure 118: ADI Control Center - UPS settings

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 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 the UPS default values

1. Open the **Control Center** in the **Control Panel**.
2. Select the **UPS** tab.

The displayed values are updated automatically.

Information:

The status "reversed battery polarity" 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.

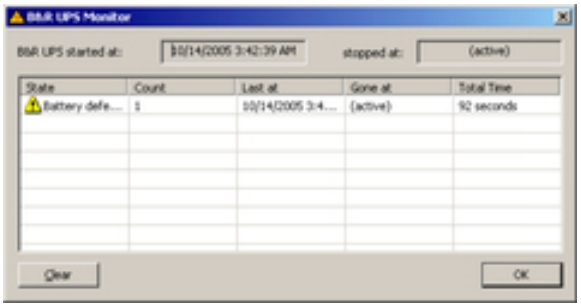


Figure 119: ADI Control Center - UPS monitor

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.

Figure 120: ADI Control Center - UPS battery settings

In this dialog box you can change the settings for the UPS battery.

Click **OK** to write the changed settings to the file. The battery settings for the UPS can then be updated with this file.

Information:

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 the 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 canceled by clicking on **Cancel**. 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 the 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 Configuring UPS system settings

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:

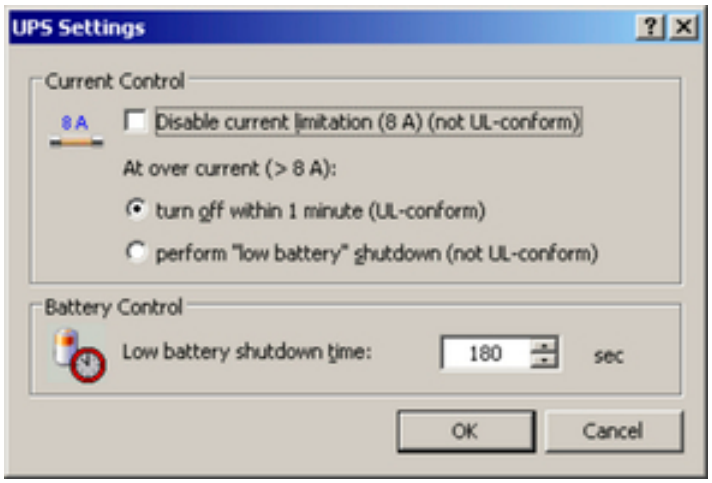


Figure 121: ADI Control Center - UPS settings

Further information regarding the UPD 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.**

9.4.6.1 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 overcurrent > 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.

9.4.6.2 Changing the shutdown time of the UPS when the 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 207). 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

1. Open the **Control Center** in the **Control Panel**.
2. Select the **UPS** tab.
3. Under **UPS settings**, click on **Advanced**. This opens the following dialog box:

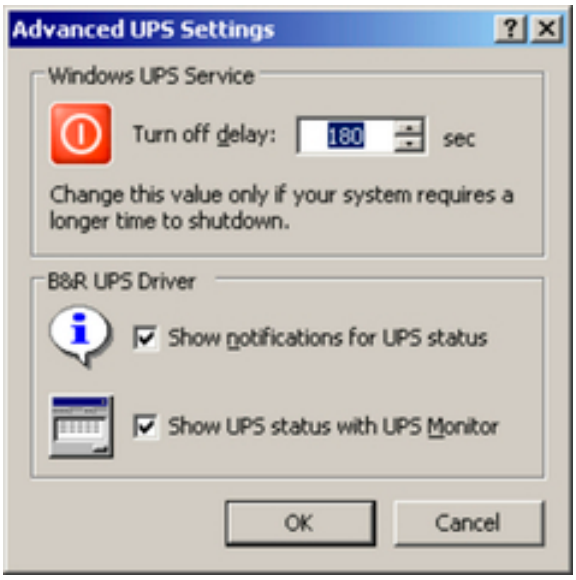


Figure 122: ADI Control Center - Advanced UPS settings

Information:

Administer rights are required in order to display this dialog box.

9.4.7.1 Changing the UPS shutdown time

Under **Windows UPS service** you can enter the **shutdown 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.

9.4.7.2 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)[4] is active and the PC is connected to a network. Additionally, some conditions of the B&R add-on UPS are not detected by the Windows UPS Service, and 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").

[4] **The Windows Alerter is supported starting with B&R Windows Embedded Version 2.20 or higher.**

9.4.8 Procedure following power failure

9.4.8.1 Overcurrent Shutdown

If an overcurrent > 8 A is present during battery operation for a duration of 16 seconds, the overcurrent 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 overcurrent shutdown has the highest priority.

9.4.8.2 Low Battery Shutdown

If the LowBatteryFlag is set during power failure, then the "Low Battery" shutdown is executed, preventing the battery from fully discharging. Once the turn-off time expires (3 minutes by default), the UPS shuts down.

If an "overcurrent" shutdown or "standard" shutdown is detected during the shutdown process, the "low battery" shutdown is replaced by the respective process.

9.4.8.3 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 B&R industrial PC enters standby mode and will then reboot the system.

10 B&R Automation Device Interface (ADI) Development Kit

This software can be used to access B&R Automation Device Interface (ADI) functions directly from Windows applications created in one of the following development environments:

- Microsoft Visual C++ 6.0
- Microsoft Visual Basic 6.0
- Microsoft Embedded Visual C++ 4.0
- Microsoft Visual Studio 2005 (or newer)

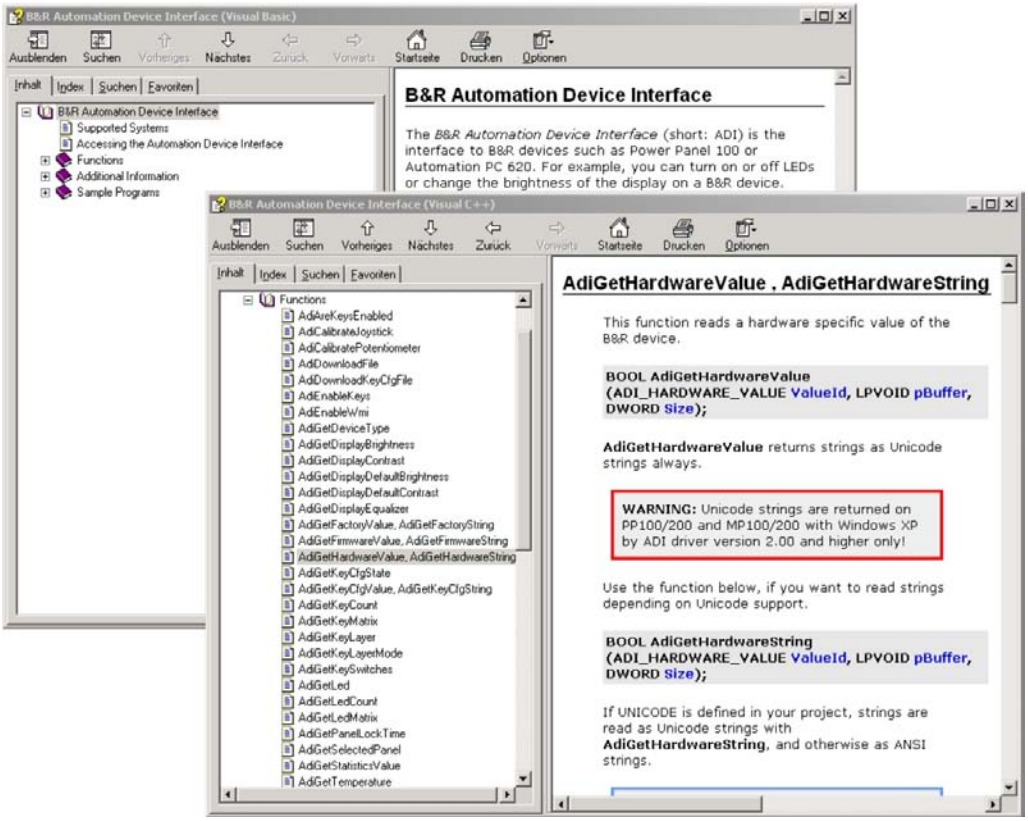


Figure 123: ADI Development Kit screenshots (version 3.40)

Features:

- One Microsoft Visual Basic module with ADI function declarations
- 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 application testing if no ADI driver is installed)

Supports the following systems (version 3.40 and higher):

- Automation PC 510
- Automation PC 511
- Automation PC 620
- Automation PC 810
- Automation PC 820
- Automation PC 910
- 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 installed on the stated product series must be suitable for that device. The ADI driver is already included in B&R images of embedded operating systems.

A detailed description of how to use ADI functions can be found in the online help documentation.

The B&R Automation Device Interface (ADI) development kit is available at no cost in the Downloads section of the B&R website (www.br-automation.com).

11 B&R Automation Device Interface (ADI) .NET SDK

This software can be used to access B&R Automation Device Interface (ADI) functions directly from .NET applications created using Microsoft Visual Studio 2005 or later.

Supported programming languages:

- Visual Basic
- Visual C++
- Visual C#

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)

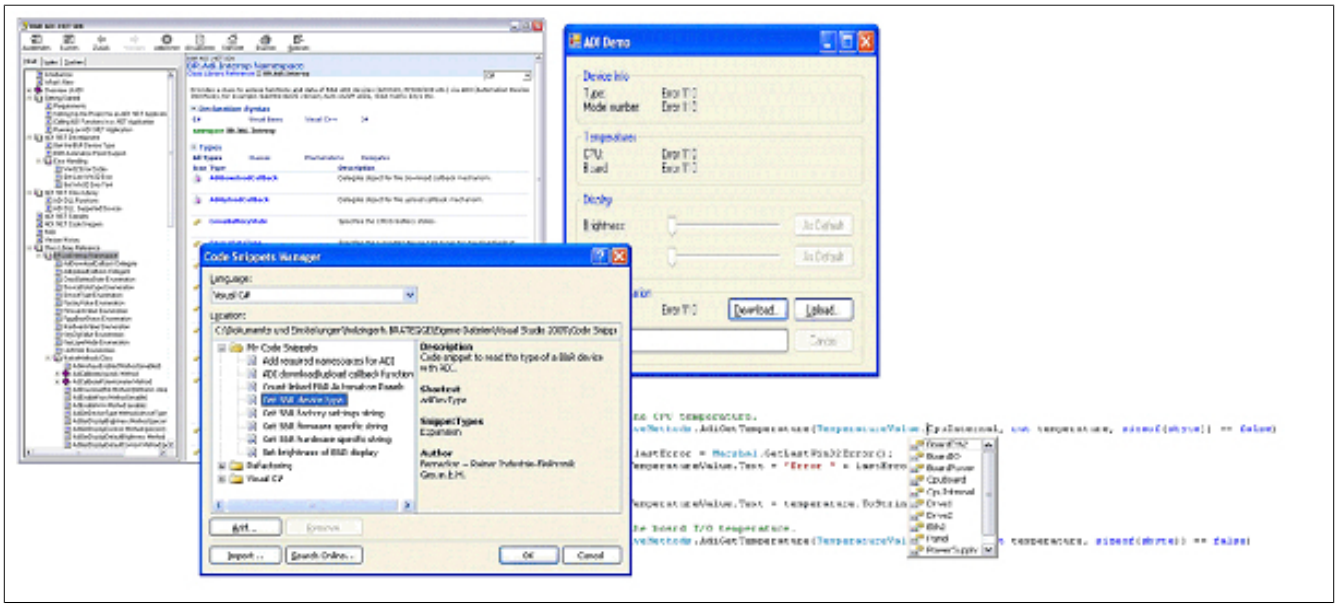


Figure 124: ADI .NET SDK screenshots (version 1.80)

Features (version 1.80 and higher)

- 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++ and Visual C#
- ADI DLL (for application testing if no ADI driver is installed)

Supports the following systems (version 1.80 and higher):

- Automation PC 510
- Automation PC 511
- Automation PC 620
- Automation PC 810
- Automation PC 820
- Automation PC 910
- 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 installed on the stated product series must be suitable for that device. The ADI driver is already included in B&R images of embedded operating systems.

A detailed description of how to use ADI functions can be found in the online help documentation.

The ADI .NET SDK is available in the Downloads section of the B&R website (www.br-automation.com).

12 B&R Key Editor

On display devices, it is often necessary to adapt the function keys and LEDs directly to the application software being used. The B&R Key Editor makes it quick and easy to implement a unique configuration for the application.

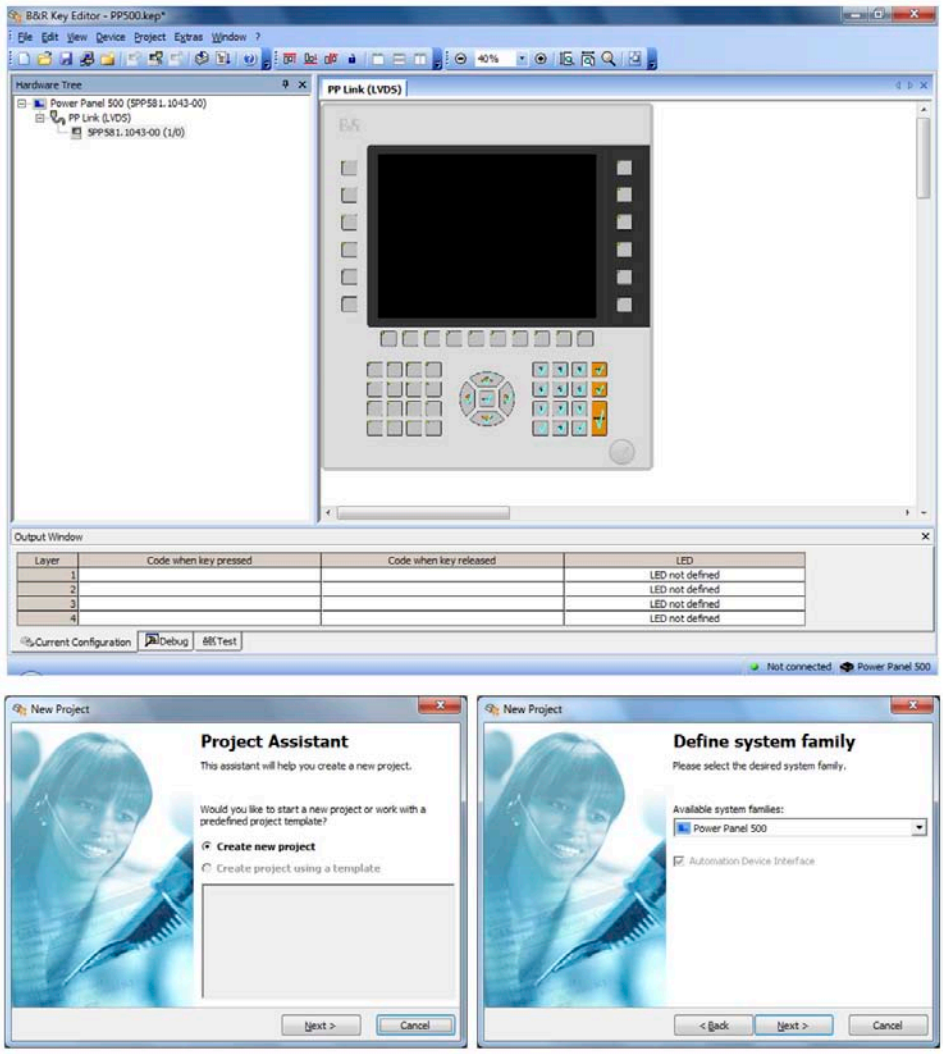


Figure 125: B&R Key Editor screenshots (version 3.30)

Features:

- Configuration of normal keyboard keys (A, B, C, etc.)
- Keyboard shortcuts (CTRL+C, SHIFT+DEL, etc.) using only one key
- Special key functions (change brightness, etc.)
- Assigning functions to LEDs (HDD access, power, etc.)
- 4 assignments possible per key (using layers)
- Configuration of the panel locking time when multiple Automation Panel 900 devices are connected to Automation PC and Panel PC devices.

Supports the following systems (version 3.30):

- Automation PC 510
- Automation PC 511
- Automation PC 620
- Automation PC 810
- Automation PC 820
- Automation PC 910
- Automation Panel 800
- Automation Panel 830
- 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 at no cost in the Downloads section of the B&R website (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 Standards and guidelines

1.1 CE mark

This mark certifies that all harmonized EN standards for the applicable directives have been met for B&R products.

1.2 EMC directive

These devices meet the requirements of EC directive "2004/108/EC Electromagnetic compatibility" and are designed for the following areas:

EN 61131-2:2007	Programmable logic controllers - Part 2: Equipment requirements and tests
EN 61000-6-2:2005	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
EN 61000-6-4:2007	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

1.3 Low voltage directive

These devices satisfy the requirements of EC directive "2006/95/EC Low voltage directive" and are designed for the following areas:

EN 61131-2:2007	Programmable logic controllers - Part 2: Equipment requirements and tests
EN 60204-1:2006 + A1:2009	Safety of machinery - Electrical equipment of machines - Part 1: General requirements

2 Certifications

Danger!

A fully assembled device can only receive certification if ALL of the individual components it includes have the applicable certifications. If an individual component is being used that DOES NOT have an applicable certification, then the fully assembled device will NOT RECEIVE certification.

B&R products and services comply with applicable standards. This includes 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 are committed to ensuring the reliability of our products in an industrial environment.

Unless otherwise specified, the following certifications apply:

Chapter 6 • Accessories

The following accessories have successfully completed functional testing at B&R and are approved for use with this device. Nevertheless, it is important to observe any limitations that may apply to the fully assembled device when operated with other individual components. When operating the fully assembled device, the specifications for the individual components 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 is insufficient ("Bad" status).

1.1.2 Order data

Model number	Short description	Figure
	Batteries	
0AC201.91	Lithium batteries 4 pcs., 3 V / 950 mAh button cell We hereby 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 167: 0AC201.91, 4A0006.00-000 - Order data

1.1.3 Technical data

Warning!

The battery must be replaced by a Type CR2477N Renata battery only. The use of another battery may present a risk of fire or explosion.

The battery may explode if handled improperly. 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 fully assembled device. The data specifications for the fully assembled device take precedence over those of individual components.

Product ID	0AC201.91	4A0006.00-000
General information		
Storage time	Max. 3 years at 30°C	
Certification CE	Yes	
Electrical characteristics		
Capacity	950 mAh	
Self-discharging	<1% per year (at 23°C)	
Voltage range	3 V	
Environmental conditions		
Temperature Storage	-20 to 60°C	

Table 168: 0AC201.91, 4A0006.00-000 - Technical data

Product ID	0AC201.91	4A0006.00-000
Relative humidity		
Operation	0 to 95%	
Storage	0 to 95%	
Transport	0 to 95%	

Table 168: 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 0TB103 is used to connect the supply voltage.

2.1.2 Order data

Model number	Short description	Figure
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, 3.31 mm² screw clamp, protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, 3.31 mm² cage clamp, protected against vibration by the screw flange	

Table 169: 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 fully assembled device. The data specifications for the fully assembled device take precedence over those of individual components.

Product ID	0TB103.9	0TB103.91
General information		
Certification		
CE	Yes	
cULus	Yes	
GL	Yes	
Terminal block		
Note	Protected against vibration by the screw flange Nominal values according to UL	
Number of pins	3 (female)	
Type of terminal clamp	Screw clamps	Cage clamps [2]
Cable type	Only copper wires (no aluminum wires!)	
Distance between contacts	5.08 mm	
Connection cross section		
AWG wire	26 to 14 AWG	26 to 12 AWG
Wire end sleeves with plastic covering	0.20 to 1.50 mm²	
Solid wires	0.20 to 2.50 mm²	
Fine strand wires	0.20 to 1.50 mm²	0.20 to 2.50 mm²
With wire end sleeves	0.20 to 1.50 mm²	
Fastening torque	0.4 Nm	-
Electrical characteristics		
Nominal voltage	300 V	
Nominal current [1]	10 A / contact	
Contact resistance	≤ 5 mΩ	

Table 170: 0TB103.9, 0TB103.91 - Technical data

1) The limit data for each I/O module must be taken into consideration.
2) The terminal block in the cage clamp design cannot be stringed together.

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	Figure
	Miscellaneous	
5AC900.1000-00	Adapter DVI (plug) to CRT (socket). For connecting a standard monitor to a DVI-I interface.	

Table 171: 5AC900.1000-00 - Order data

4 USB interface cover

4.1 5AC900.1201-00

4.1.1 General information

Flat front-side USB interface cover for Automation Panel 900, Power Panel 500, Panel PC 700 and Panel PC 800 devices.

4.1.2 Order data

Model number	Short description	Figure
	Accessories	
5AC900.1201-00	USB interface cover M20 IP65 flat	

Table 172: 5AC900.1201-00 - Order data

4.2 5AC900.1201-01

4.2.1 General information

Round front-side knurled USB interface cover (with anti-loss strap) for Automation Panel 900, Power Panel 500, Panel PC 700 and Panel PC 800 devices.

4.2.2 Order data

Model number	Short description	Figure
	Accessories	
5AC900.1201-01	USB interface cover M20 IP65 curved	

Table 173: 5AC900.1201-01 - Order data

5 Clamping blocks

5.1 5AC900.BLOC-00

5.1.1 General information

These replacement clips are used to mount B&R panel devices.

5.1.2 Order data

Model number	Short description	Figure
	Accessories	
5AC900.BLOC-00	Terminal block with brackets, 10 pcs.; replacement part	

Table 174: 5AC900.BLOC-00 - Order data

6 Uninterruptible power supply

With an optionally integrated UPS, the B&R Industrial PC makes sure that the PC system completes write operations even when 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 shut down 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 panel/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 website.**

Because the charging circuit is integrated in the housing of the B&R Industrial PC, 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. Batteries are easily accessible from the front and can be switched in just a few moments when servicing.

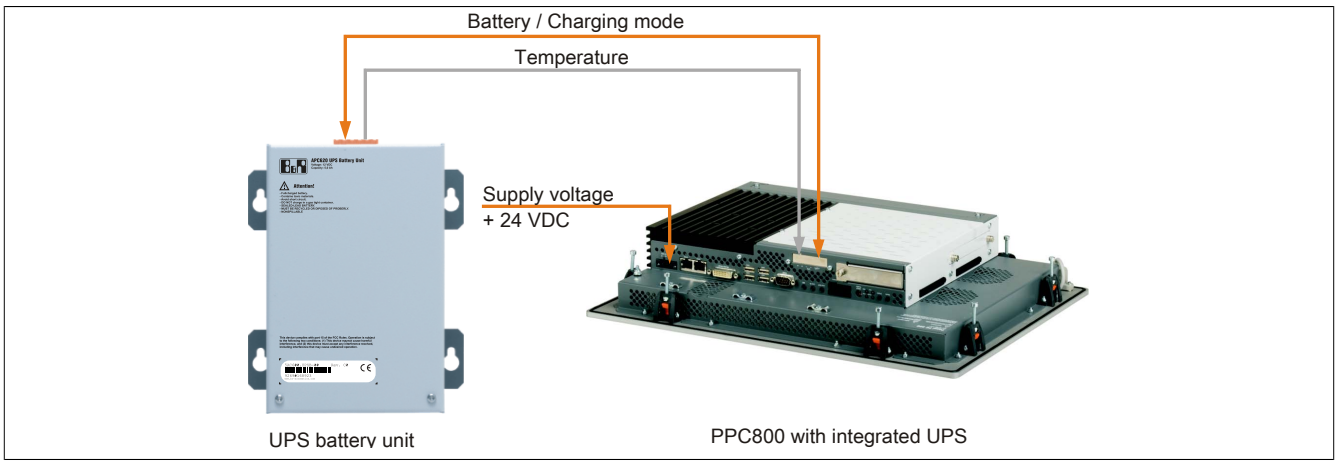


Figure 126: UPS principle

6.1 Features

- Long-lasting, maintenance-free rechargeable batteries
- Communication via integrated interfaces
- Temperature sensor
- Driver software
- Deep discharge protection

6.2 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.

6.3 5AC600.UPSI-00

6.3.1 General information

The add-on UPS module can easily be installed in an appropriate system unit (List of required revisions: see section 6.2 "Requirements" on page 224).

6.3.2 Order data

Model number	Short description	Figure
	Uninterruptible power supplies	
5AC600.UPSI-00	UPS module for APC620, APC810, PPC800; for system units 5PC600.SX01-00 (beginning with rev. H0), 5PC600.SX02-00 (beginning with rev. G0), 5PC600.SX02-01 (beginning with rev. H0), 5PC600.SX05-00 (beginning with rev. F0), 5PC600.SX05-01 (beginning with rev. F0), 5PC600.SF03-00 (beginning with rev. A0), 5PC810.SX*. 5PC820.1505-00, 5PC820.1906-00. Order cable (5CAUPS.0005-00 or 5CAUPS.0030-00) and battery unit (5AC600.UPSB-00) separately.	
	Required accessories	
	Uninterruptible power supplies	
5AC600.UPSB-00	Battery unit 5 Ah; or APC620, APC810 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 175: 5AC600.UPSI-00 - Order data

6.3.3 Technical data

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate from those specified for the fully assembled device. The data specifications for the fully assembled device take precedence over those of individual components.

Product ID	5AC600.UPSI-00
General information	
Certification	
CE	Yes
cULus	Yes
GL	Yes
Electrical characteristics	
Power consumption	Max. 7.5 watts
Power failure bypass	Max. 20min at 150W load
Deep discharge protection	Yes, at 10 V on the battery unit
Short circuit protection	No
Battery charging data	
Charging current	Max. 0.5 A
Switching threshold	
Battery operation	13 V
Mains operation	15 V

Table 176: 5AC600.UPSI-00 - Technical data

6.3.4 Installation

This module is installed using the materials included in delivery. For more information regarding installation, see Chapter 7 "Maintenance and service".

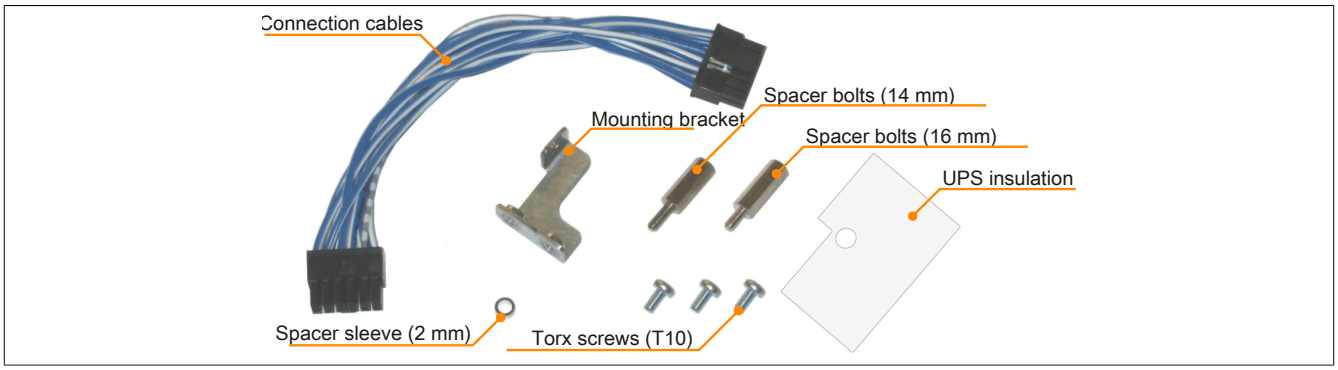


Figure 127: 5AC600.UPSI-00 Add-on UPS module – Installation materials

6.4 5AC600.UPSB-00

6.4.1 General information

The battery unit has a limited lifespan and should be replaced regularly (after the specified service life at the latest).

6.4.2 Order data

Model number	Short description	Figure
	Uninterruptible power supplies	
5AC600.UPSB-00	Battery unit 5 Ah; or APC620, APC810 or PPC800 UPS.	

Table 177: 5AC600.UPSB-00 - Order data

6.4.3 Technical data

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate from those specified for the fully assembled device. The data specifications for the fully assembled device take precedence over those of individual components.

Product ID	5AC600.UPSB-00	
Revision	**D0**	**E0**
General information		
Battery		
Type	Enersys Cyclon 12 V 5 Ah (6 connected in series)	
Service life	10 years [1]	
Design	Single cell	
Temperature sensor	NTC resistance	
Maintenance interval during storage	6 month interval between charges	
Certification		
CE	Yes	
cULus	Yes	
GL	Yes	
Charge duration when battery low	Typ. 15 hours	
Electrical characteristics		
Nominal voltage	12 V	
Battery current	Max. 8 A	
Capacity	5 Ah	
Fuse [2]	No [3]	Yes
Deep discharge voltage	10 V	
Environmental conditions		
Temperature		
Charging mode	-30 to 60°C	
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	

Table 178: 5AC600.UPSB-00, 5AC600.UPSB-00 - Technical data

Product ID	5AC600.UPSB-00
Mechanical characteristics	
Dimensions	
Width	104 mm [4]
Length	170.5 mm
Height	87.5 mm
Weight	Approx. 3200 g

Table 178: 5AC600.UPSB-00, 5AC600.UPSB-00 - Technical data

1) At 25 °C (up to 80 % battery capacity)
2) 25 A fuse. Replacement fuses can be ordered separately whenever needed.
3) The fuse can be installed later in revisions up to and including D0. More information can be found in the "Maintenance / Service" chapter of the APC810 and PPC800 user's manuals.
4) Dimensions without mounting clips

6.4.4 Temperature life span diagram up to 20% battery capacity.

Temperature	Lifespan in days
25	14600
30	9467
35	6139
40	3980
45	2581
50	1674
55	1085
60	704
65	456
70	296
75	192
80	124

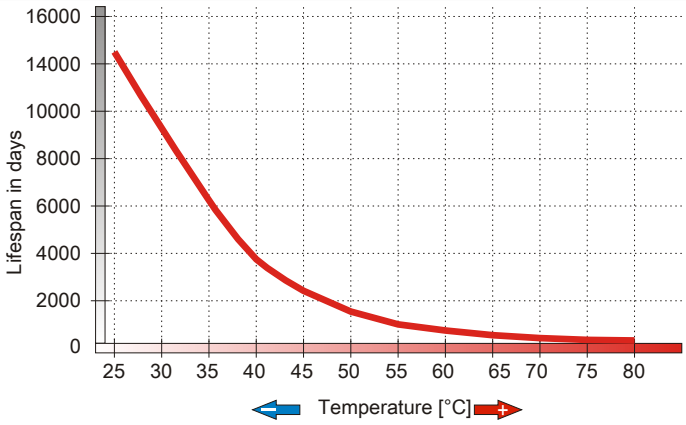


Figure 128: Temperature life span diagram

6.4.5 Deep discharge cycles

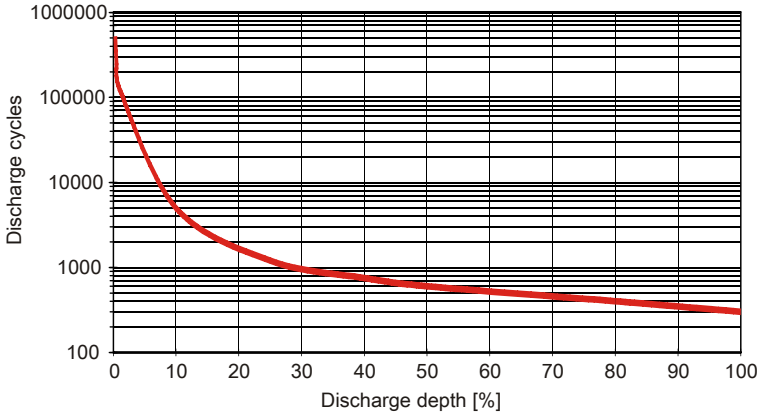


Figure 129: Deep discharge cycles

6.4.6 Dimensions

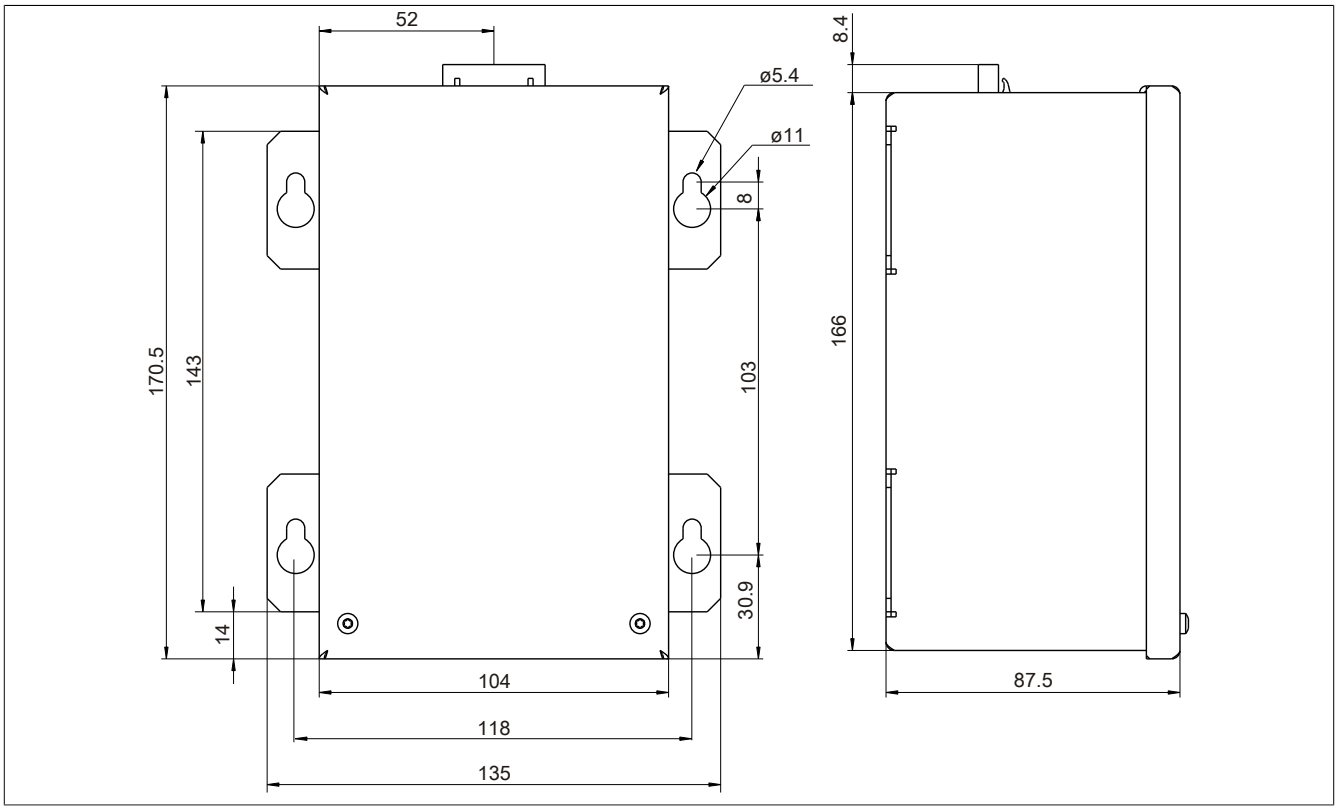


Figure 130: 5PC600.UPSB-00 - Dimensions

6.4.7 Drilling template

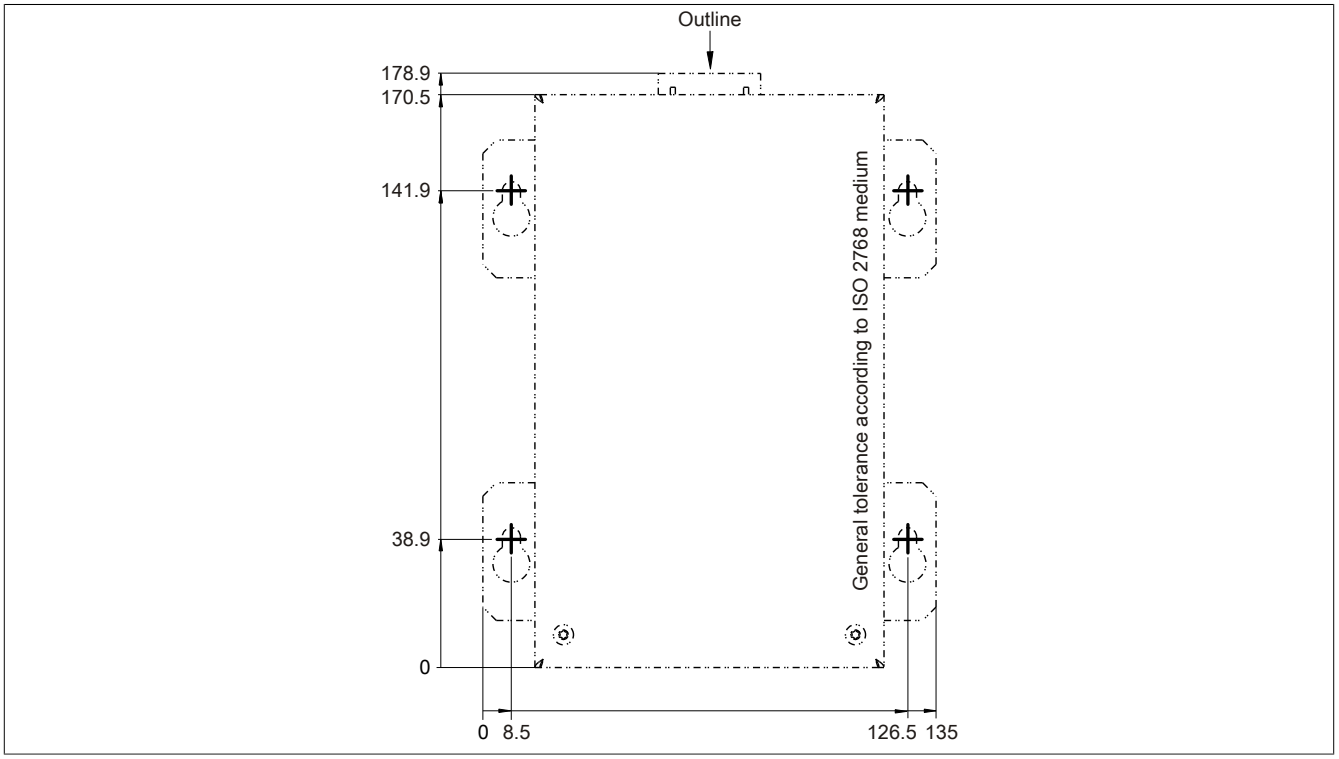


Figure 131: 5PC600.UPSB-00 - Drilling template

6.4.8 Mounting instructions

Due to the unique construction of these batteries, they can be stored and operated in any position.

6.5 5CAUPS.00xx-00

6.5.1 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.

6.5.2 Order data

Model number	Short description	Figure
	Uninterruptible power supplies	
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 179: 5CAUPS.0005-00, 5CAUPS.0030-00 - Order data

6.5.3 Technical data

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate from those specified for the fully assembled device. The data specifications for the fully assembled device take precedence over those of individual components.

Product ID	5CAUPS.0005-00	5CAUPS.0030-00
General information		
Certification		
CE	Yes	
cULus	Yes	
GL	Yes	
Cable structure		
Wire cross section	2x 0.5 mm² (AWG 20) 4x 2.5 mm² (AWG 13)	
Conductor resistance	At 0.5 mm² max. 39 Ω/km At 2.5 mm² max. 7.98 Ω/km	
Outer sheathing		
Material	Thermoplastic PVC-based material	
Color	Window gray (similar to RAL 7040)	
Connector		
Type	6-pin plug with clamping yoke / 6-pin multipoint socket with clamping yoke	
Electrical characteristics		
Operating voltage	Max. 300 V	
Peak operating voltage	Typically 12 VDC / max. 15 VDC	
Test voltage		
Wire/Wire	1500 V	
Current load	10 A at 20 °C	
Environmental conditions		
Temperature		
Moving	-5 to 80°C	
Static	-30 to 80°C	
Mechanical characteristics		
Dimensions		
Length	0.5 m	3 m
Diameter	8.5 mm ±0.2 mm	
Flex radius		
Moving	10x wire cross-section	
Fixed installation	5x wire cross-section	
Weight	Approx. 100 g	Approx. 470 g

Table 180: 5CAUPS.0005-00, 5CAUPS.0030-00 - Technical data

6.6 5AC600.UPSF-00

6.6.1 General information

The UPS fuse kit is intended to add a fuse for the battery unit 5AC600.UPSB-00.

Information about installing the 5AC600.UPSF-00 fuse kit can be found in the "Installing the UPS fuse kit on the battery unit" on page 279 section.

Information:

The 5AC600.UPSF-00 UPS fuse kit is only needed for battery units up to and including revision D0. A 25 A fuse is integrated on the connector circuit board beginning with revision E0.

6.6.2 Order data

Model number	Short description	Figure
	Uninterruptible power supplies	
5AC600.UPSF-00	UPS fuse kit for battery unit 5AC600.UPSB-00 up to revision D0.	

Table 181: 5AC600.UPSF-00 - Order data

6.7 5AC600.UPSF-01

6.7.1 General information

These 25 A fuses are replacement parts for the 5AC600.UPSB-00 battery unit beginning with revision E0 as well as the 5AC600.UPSF-00 fuse kit.

6.7.2 Order data

Model number	Short description	Figure
	Uninterruptible power supplies	
5AC600.UPSF-01	UPS fuse, 5 pcs.	

Table 182: 5AC600.UPSF-01 - Order data

7 External UPS

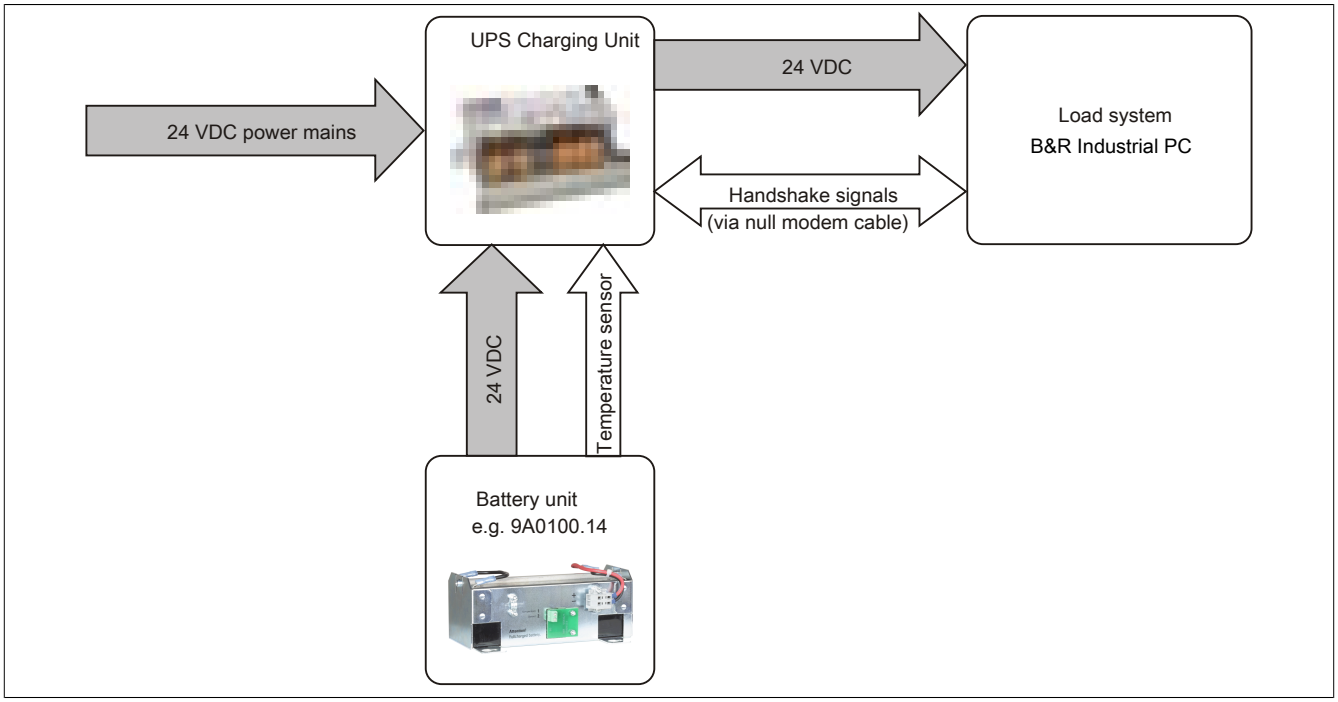


Figure 132: Block diagram of the entire system

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 regarding the external UPS is available in the UPS user's manual, which can be downloaded from the B&R website (www.br-automation.com).

7.2 Order data

Model number	Short description	Figure
	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 (replacement 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 (replacement 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 (replacement part), 2x 12 V, 4.5 Ah, for battery unit 9A0100.16	
	Required accessories	
	Battery units	
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	
	Cables	
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)	
	Optional accessories	
	Replacement batteries	
9A0100.13	UPS batteries type A (replacement part), 2x 12 V, 7 Ah, for battery unit 9A0100.12	

Table 183: 9A0100.11, 9A0100.12, 9A0100.13, 9A0100.14, 9A0100.15, 9A0100.16, 9A0100.17 - Order data

Model number	Short description	Figure
9A0100.15	UPS batteries type B (replacement part), 2x 12 V, 2.2 Ah, for battery unit 9A0100.14	
9A0100.17	UPS batteries type C (replacement part), 2x 12 V, 4.5 Ah, for battery unit 9A0100.16	

Table 183: 9A0100.11, 9A0100.12, 9A0100.13, 9A0100.14, 9A0100.15, 9A0100.16, 9A0100.17 - Order data

8 PCI Insert cards

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)

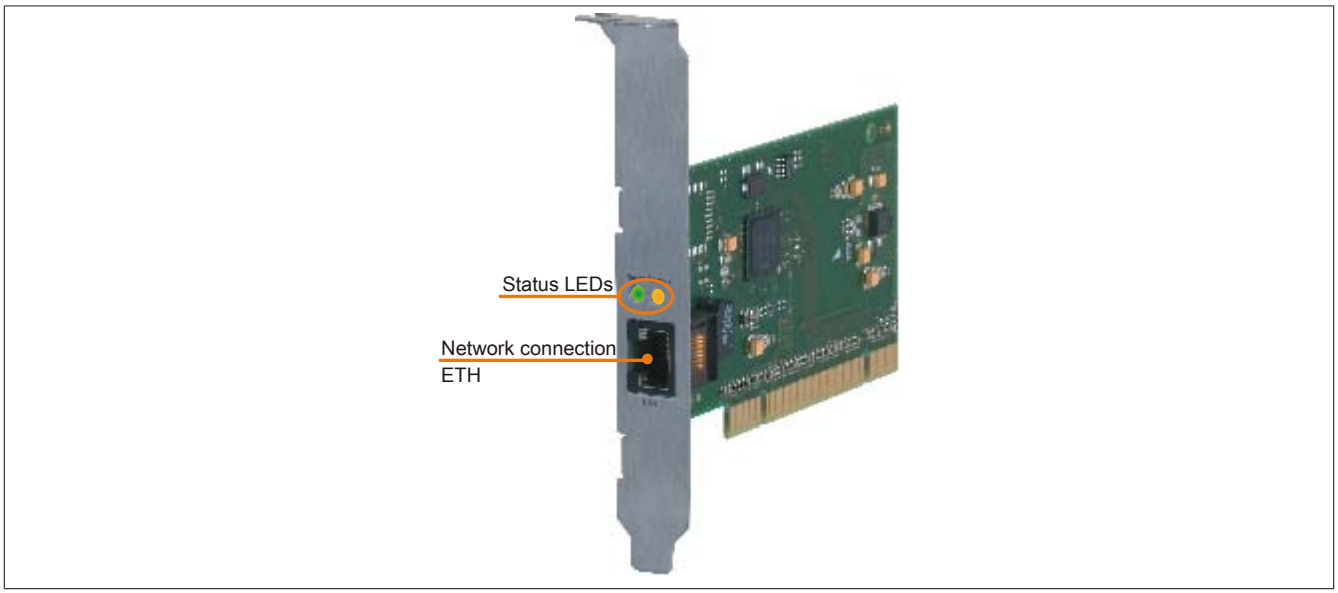


Figure 133: Order data - PCI Ethernet Card 10/100

8.1.2 Order data

Model number	Short description	Figure
	Accessories	
5ACPCI.ETH1-01	PCI Ethernet card 1x 10/100	

Table 184: 5ACPCI.ETH1-01 - Order data

8.1.3 Technical data

Product ID	5ACPCI.ETH1-01
General information	
B&R ID code	$A58A
Diagnostics Data transfer	 Yes, using status LED
Certification CE cULus GL	 Yes Yes Yes

Table 185: 5ACPCI.ETH1-01 - Technical data

Product ID	5ACPCI.ETH1-01
Interfaces	
Ethernet	
Quantity	1
Controller	Intel 82551ER
Design	Shielded RJ45 port
Transfer rate	10/100 Mbit/s
Cable length	Max. 100 m between two stations (segment length)

Table 185: 5ACPCI.ETH1-01 - Technical data

8.1.3.1 Ethernet port

Information:

The following characteristics, features and limit values only apply to this individual component and can deviate from those specified for the fully assembled device. For the assembled device in which this individual component is used, refer to the data given specifically for that device.

Ethernet interface		
Controller	Intel 82551ER	
Power supply	Universal card (2 notches) for 3.3 V or 5 V	
Cabling	S/STP (Cat 5e)	
Transfer rate	10/100 Mbit/s	
Cable length	Max. 100 m (min. Cat 5e)	
LED	**On**	**Off**
Green	100 Mbit/s	10 Mbit/s
Orange	Link (Ethernet network connection available)	Activity (blinking - data transfer in progress)

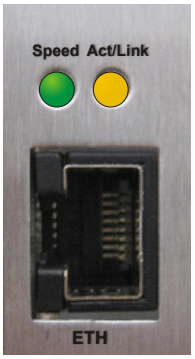


Table 186: 5ACPCI.ETH1-01 - Technical data

8.1.4 Driver support

A special driver is required in order to operate the Intel 82551ER Ethernet controller. Drivers for approved operating systems (Windows XP Professional, Windows XP Embedded and MS-DOS) are available in the Downloads section of the B&R website (www.br-automation.com).

Information:

Required drivers can only be downloaded from the B&R website, not from manufacturer websites.

8.1.5 Dimensions

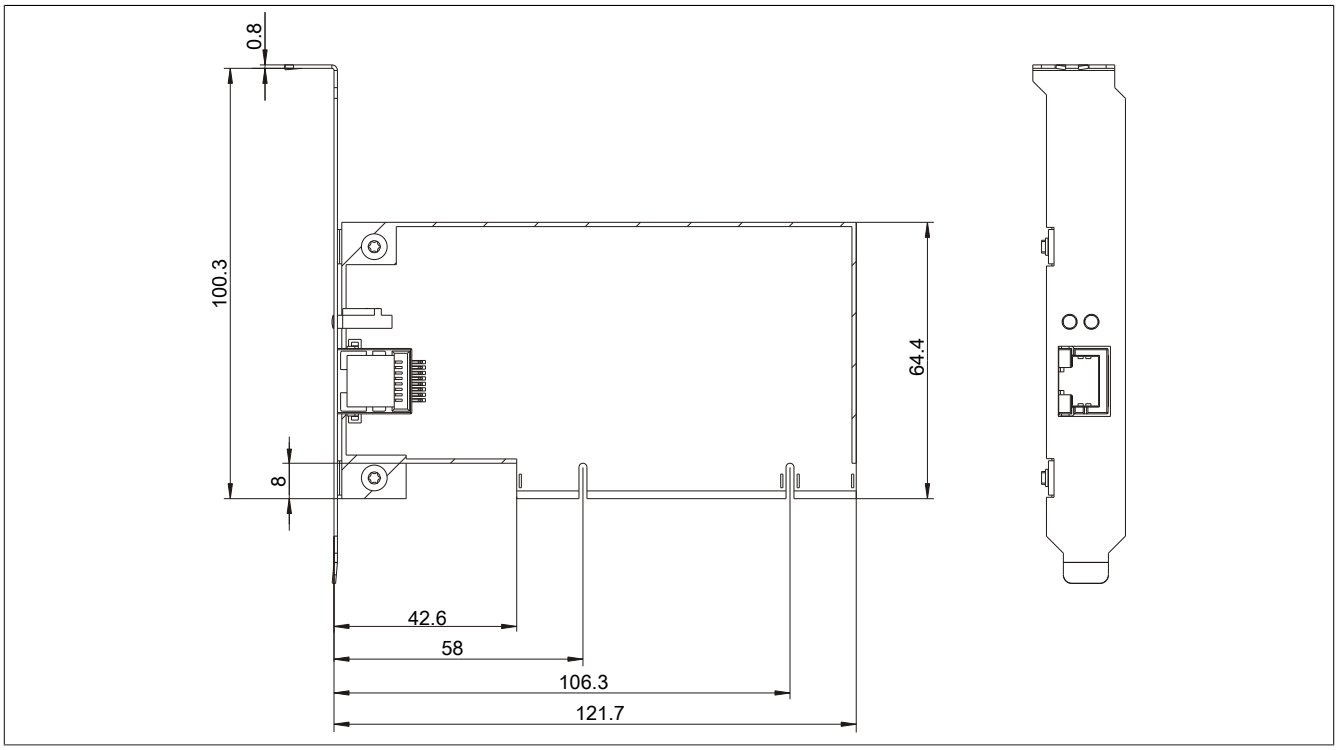


Figure 134: 5ACPCI.ETH1-01 - Dimensions

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)

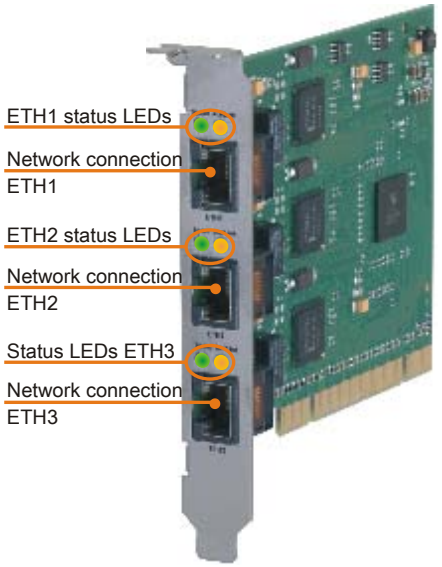


Figure 135: 5ACPCI.ETH3-01 - PCI Ethernet card 10/100

8.2.2 Order data

Model number	Short description	Figure
	Accessories	
5ACPCI.ETH3-01	PCI Ethernet card 3x 10/100	

Table 187: 5ACPCI.ETH3-01 - Order data

8.2.3 Technical data

Product ID	5ACPCI.ETH3-01
General information	
B&R ID code	$A58B
Diagnostics Data transfer	 Yes, using status LED
Certification CE cULus GL	 Yes Yes Yes

Table 188: 5ACPCI.ETH3-01 - Technical data

Product ID	5ACPCI.ETH3-01
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 188: 5ACPCI.ETH3-01 - Technical data

8.2.3.1 Ethernet port

Information:

The following characteristics, features and limit values only apply to this individual component and can deviate from those specified for the fully assembled device. For the assembled device in which this individual component is used, refer to the data given specifically for that device.

Ethernet interfaces		
Controller	each with Intel 82551ER	
Power supply	Universal card (2 notches) for 3.3 V or 5 V	
Cabling	S/STP (Cat 5e)	
Transfer rate	10/100 Mbit/s	
Cable length	Max. 100 m (min. Cat 5e)	
LED	**On**	**Off**
Green	100 Mbit/s	10 Mbit/s
Orange	Link (Ethernet network connection available)	Activity (blinking - data transfer in progress)

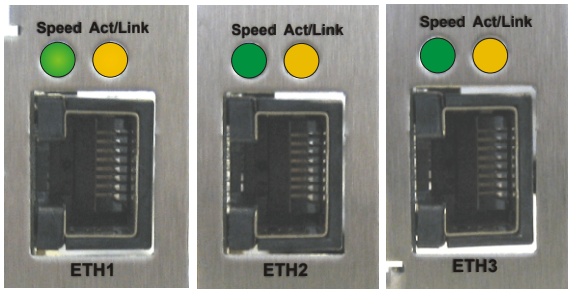


Table 189: 5ACPCI.ETH3-01 - Technical data

8.2.4 Driver support

A special driver is required in order to operate the Intel 82551ER Ethernet controller. Drivers for approved operating systems (Windows XP Professional, Windows XP Embedded and MS-DOS) are available in the Downloads section of the B&R website (www.br-automation.com).

Information:

Required drivers can only be downloaded from the B&R website, not from manufacturer websites.

8.2.5 Dimensions

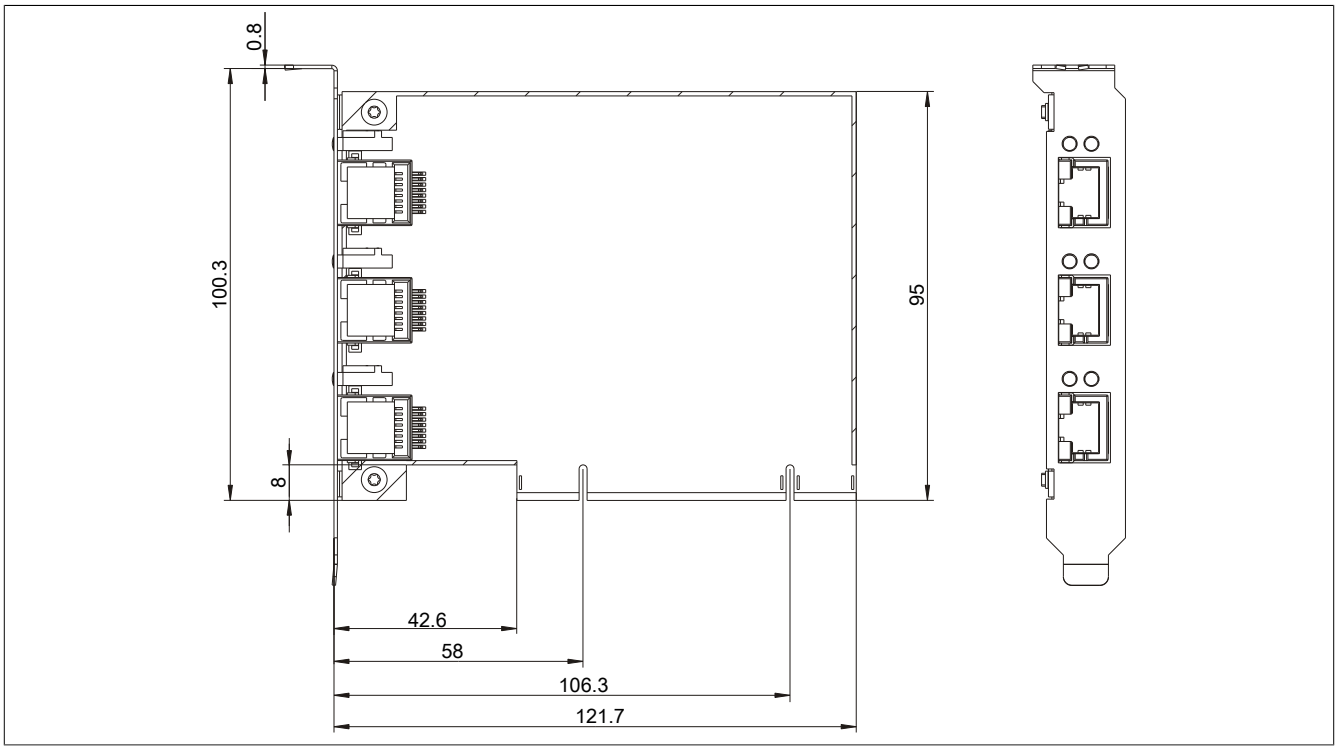


Figure 136: 5ACPCI.ETH3-01 - Dimensions

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 Basics

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.

9.2.2.1 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.

9.2.2.2 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.

9.2.2.3 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 249

Information:

The 5CFCRD.xxxx-06 CompactFlash cards are supported on B&R devices with WinCE version ≥ 6.0.

9.3.2 Order data

Model number	Short description	Figure
	CompactFlash	
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)	
5CFCRD.032G-06	CompactFlash 32 GB B&R (SLC)	

Table 190: 5CFCRD.0512-06, 5CFCRD.1024-06, 5CFCRD.2048-06, 5CFCRD.4096-06, 5CFCRD.8192-06, 5CFCRD.016G-06, 5CFCRD.032G-06 - Order data

9.3.3 Technical data

Caution!

A sudden loss of power may result in data loss! In very rare cases, mass memory may also be damaged.

To prevent damage and loss of data, the use of a UPS device is recommended.

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate from those specified for the fully assembled device. The data specifications for the fully assembled device take precedence over those of individual components.

Product ID	5CFCRD. 0512-06	5CFCRD. 1024-06	5CFCRD. 2048-06	5CFCRD. 4096-06	5CFCRD. 8192-06	5CFCRD. 016G-06	5CFCRD. 032G-06
General information							
Capacity	512 MB	1 GB	2 GB	4 GB	8 GB	16 GB	32 GB
Data retention	10 years						
Data reliability	< 1 unrecoverable error in 10^{14} 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	36 MB/s
Maximum	35 MB/s	35 MB/s	35 MB/s	34 MB/s	34 MB/s	37 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	28 MB/s
Maximum	18 MB/s	18 MB/s	18 MB/s	17 MB/s	17 MB/s	30 MB/s	30 MB/s

Table 191: 5CFCRD.0512-06, 5CFCRD.1024-06, 5CFCRD.2048-06, 5CFCRD.4096-06, 5CFCRD.8192-06, 5CFCRD.016G-06, 5CFCRD.032G-06 - Technical data

Product ID	5CFCRD. 0512-06	5CFCRD. 1024-06	5CFCRD. 2048-06	5CFCRD. 4096-06	5CFCRD. 8192-06	5CFCRD. 016G-06	5CFCRD. 032G-06
Certification							
CE				Yes			
cULus				Yes			
cULus HazLoc Class 1 Division 2	-	-	-	-	-	Yes	-
ATEX Zone 22	-	-	-	-	-	Yes	-
GL				Yes			
Endurance							
Guaranteed data volume							
Guaranteed [1]	50 TB	100 TB	200 TB	400 TB	800 TB	1600 TB	3200 TB
Results for 5 years [1]	27.40 GB/day	54.79 GB/day	109.9 GB/day	219.8 GB/day	438.6 GB/day	876.72 GB/day	1753.44 GB/day
Clear/Write cycles							
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	Yes
Windows 7 64-bit	No	No	No	No	No	No	Yes
Windows Embedded Standard 7, 32-bit	No	No	No	No	Yes	Yes	Yes
Windows Embedded Standard 7, 64-bit	No	No	No	No	No	Yes	Yes
Windows XP Professional	No	No	No	Yes	Yes	Yes	Yes
Windows XP Embedded				Yes			
Windows Embedded Standard 2009	No	Yes	Yes	Yes	Yes	Yes	Yes
Windows CE 6.0	Yes	Yes	Yes	Yes	Yes	Yes [2]	Yes [2]
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)	≥ V3.6.8.40 (part of PVI Development Setup ≥ V3.0.0.3020)	≥ V4.0.0.8 (part of PVI Development Setup ≥ V3.0.2.3014)
B&R Embedded OS Installer	≥ V3.10	≥ V3.10	≥ V3.10	≥ V3.10	≥ V3.10	≥ V3.20	≥ V3.21
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) 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) 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) 5.35 g RMS, 15 min per level (IEC 68-2-6)			
Shock							
Operation				1.5 kg peak, 0.5 ms 5 times (JEDEC JESD22, method B110) 30 g, 11 ms 1 times (IEC 68-2-27)			
Storage				1.5 kg peak, 0.5 ms 5 times (JEDEC JESD22, method B110) 30 g, 11 ms 1 times (IEC 68-2-27)			
Transport				1.5 kg peak, 0.5 ms 5 times (JEDEC JESD22, method B110) 30 g, 11 ms 1 times (IEC 68-2-27)			
Altitude							
Operation				Max. 4572 m			
Mechanical characteristics							
Dimensions							
Width				42.8 ±0.10mm			
Length				36.4 ±0.15mm			
Height				3.3 ±0.10mm			
Weight				10 g			

Table 191: 5CFCRD.0512-06, 5CFCRD.1024-06, 5CFCRD.2048-06, 5CFCRD.4096-06, 5CFCRD.8192-06, 5CFCRD.016G-06, 5CFCRD.032G-06 - Technical data

1) Endurance of B&R CFs (with linear written block size ≥ 128 kB)
2) Not supported by the B&R Embedded OS installer.

9.3.4 Temperature humidity diagram

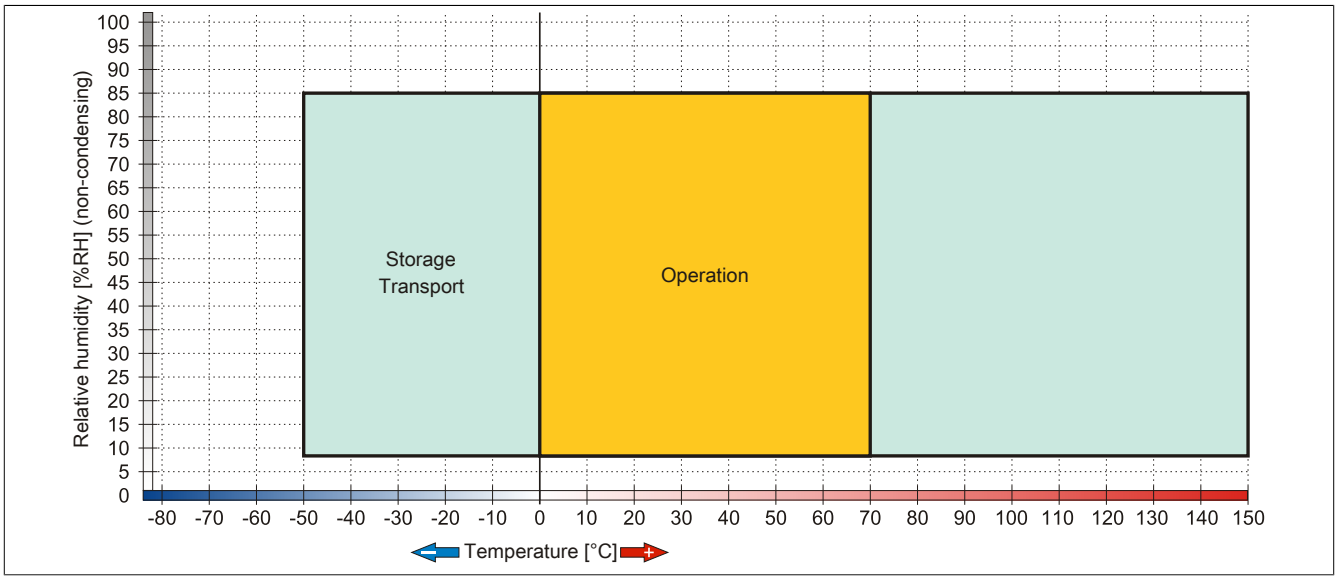


Figure 137: 5CFCRD.xxxx-06 CompactFlash cards - Temperature humidity diagram

9.3.5 Dimensions

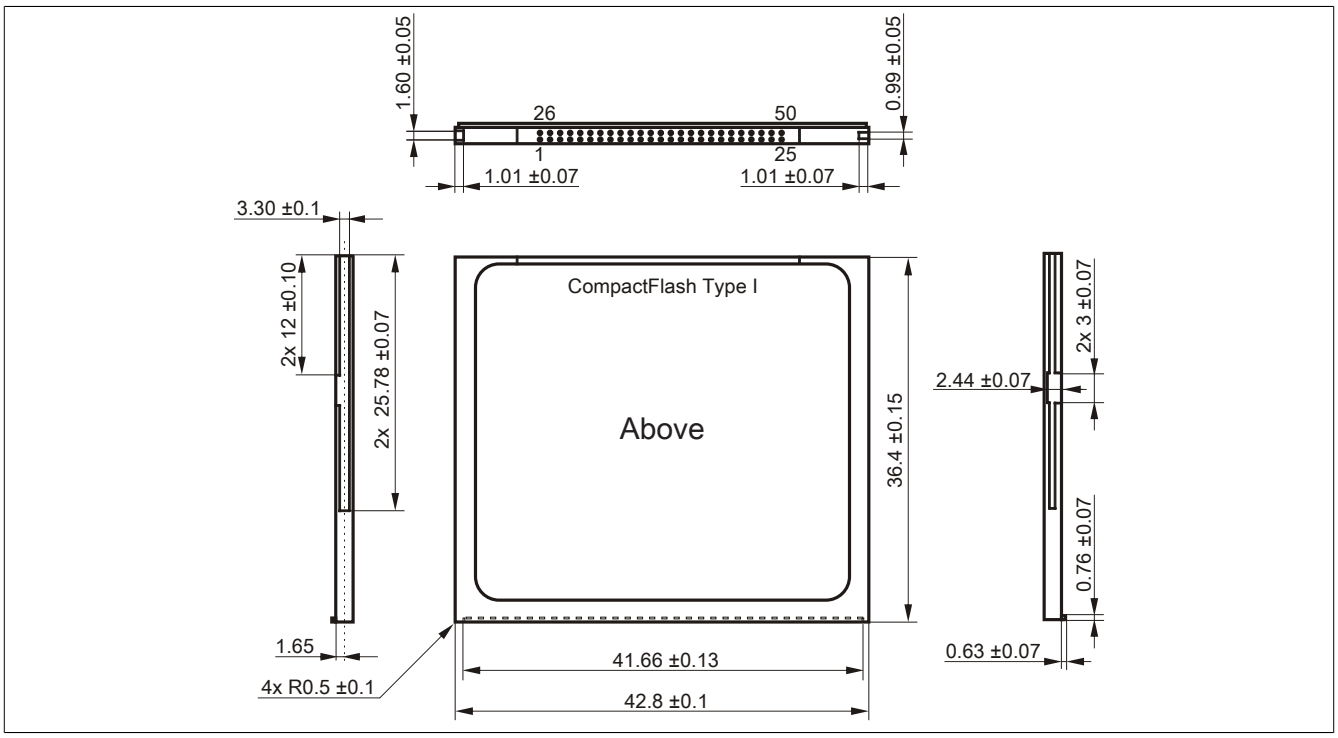


Figure 138: Dimensions - CompactFlash card Type I

9.3.6 Benchmark

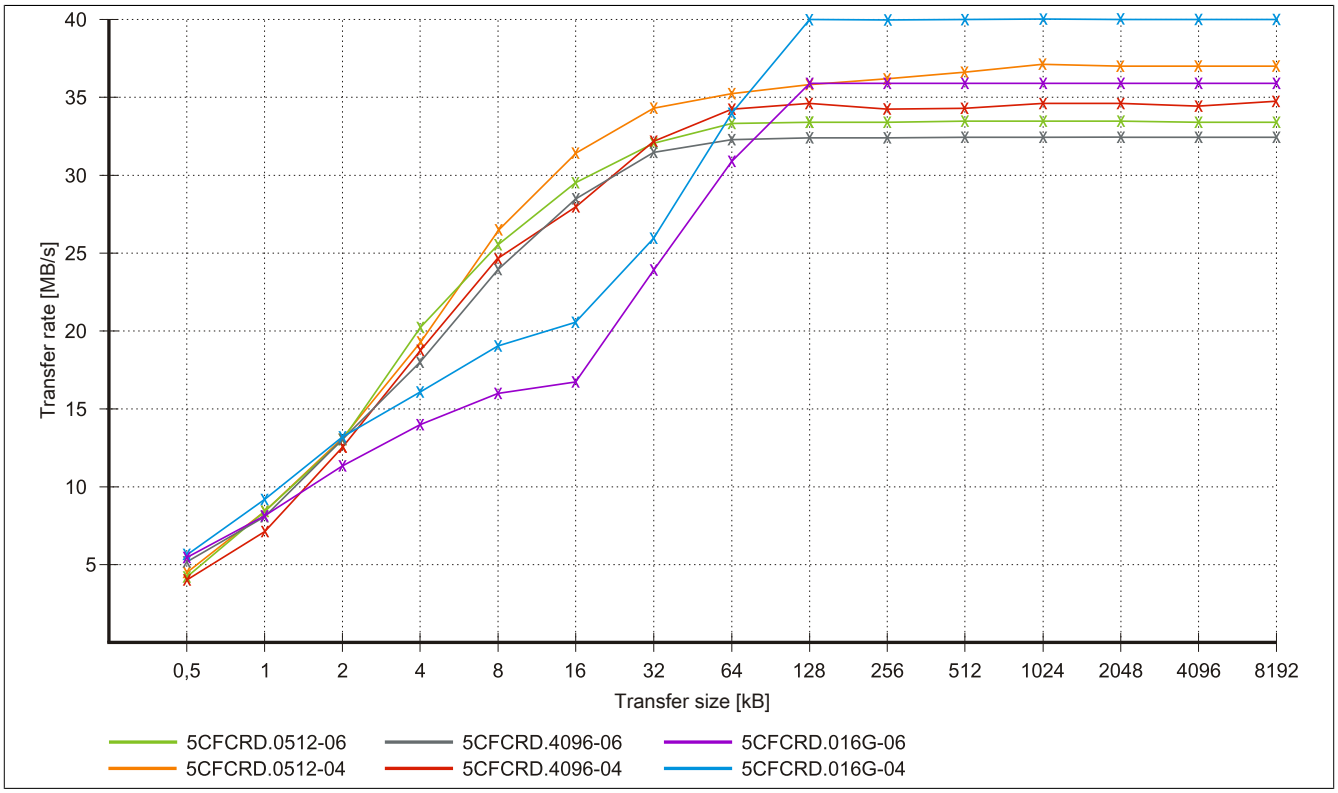


Figure 139: ATTO Disk Benchmark v2.34 comparison when reading - 5CFCRD.xxxx-04 with 5CFCRD.xxxx-06

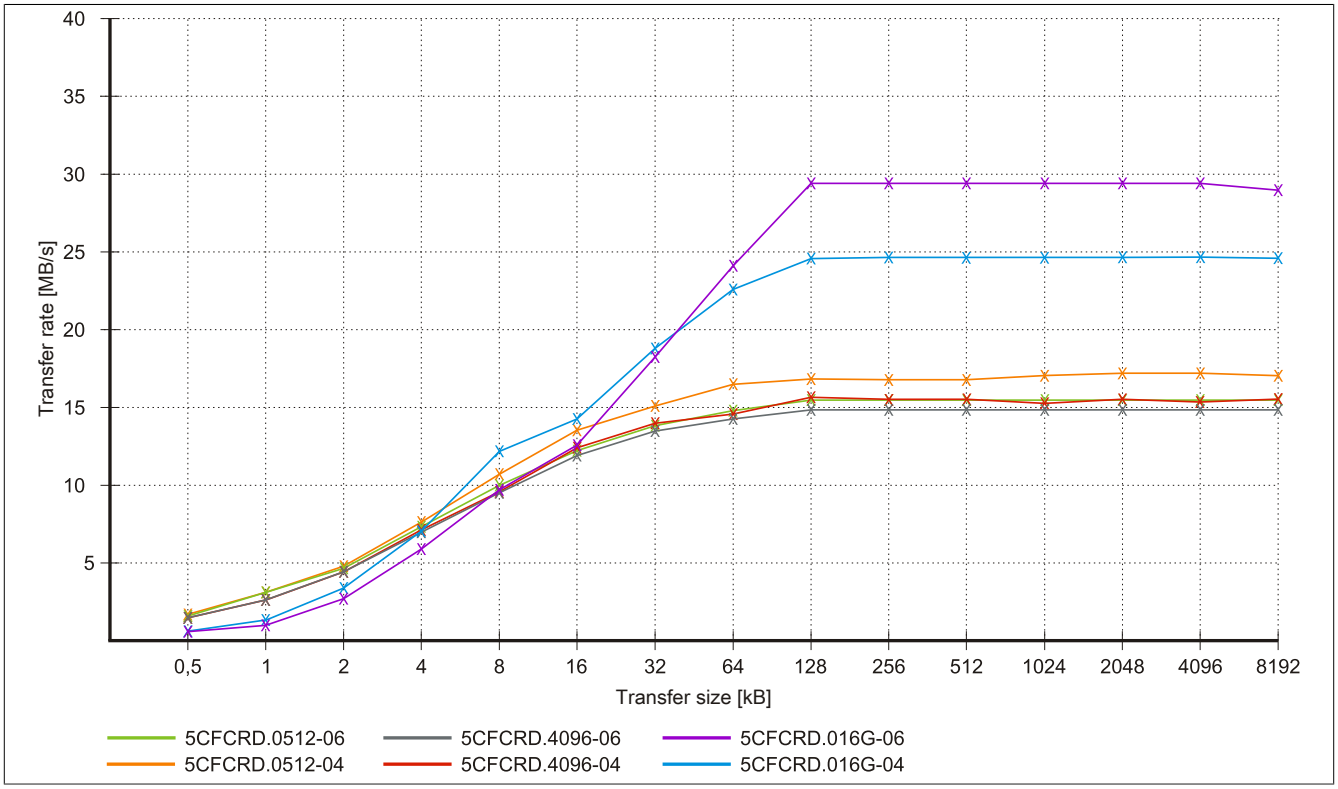


Figure 140: ATTO Disk Benchmark v2.34 comparison when writing - 5CFCRD.xxxx-04 with 5CFCRD.xxxx-06

9.4 5CFCRD.xxxx-03

9.4.1 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 249

Information:

On Windows CE 5.0 devices, 5CFCRD.xxxx-03 CompactFlash cards up to 1GB are supported.

Information:

On CompactFlash cards 5CFCRD.xxxx-03, only the sticker and the description have changed. The technical data has not bee changed.

9.4.2 Order data

Model number	Short description	Figure
	CompactFlash	
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 192: 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

9.4.3 Technical data

Caution!

A sudden loss of power may result in data loss! 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 from those specified for the fully assembled device. The data specifications for the fully assembled device take precedence over those of individual components.

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
General information								
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^{14} bit read accesses							
Lifetime monitoring	Yes							
MTBF	> 4,000,000 hours (at 25°C)							

Table 193: 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. 0064-03	5CFCRD. 0128-03	5CFCRD. 0256-03	5CFCRD. 0512-03	5CFCRD. 1024-03	5CFCRD. 2048-03	5CFCRD. 4096-03	5CFCRD. 8192-03
Maintenance	None							
Supported operating modes	PIO Mode 0-4, Multiword DMA Mode 0-2							
Continuous reading								
Typical	8 MB/s							
Continuous writing								
Typical	6 MB/s							
Certification								
CE	Yes							
cULus	Yes							
GL	Yes							
Endurance								
Clear/Write cycles								
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 [1]
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. 24383 m							
Mechanical characteristics								
Dimensions								
Width	42.8 ±0.10mm							
Length	36.4 ±0.15mm							
Height	3.3 ±0.10mm							
Weight	11.4 g							

Table 193: 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 the B&R Embedded OS installer.

9.4.4 Temperature humidity diagram

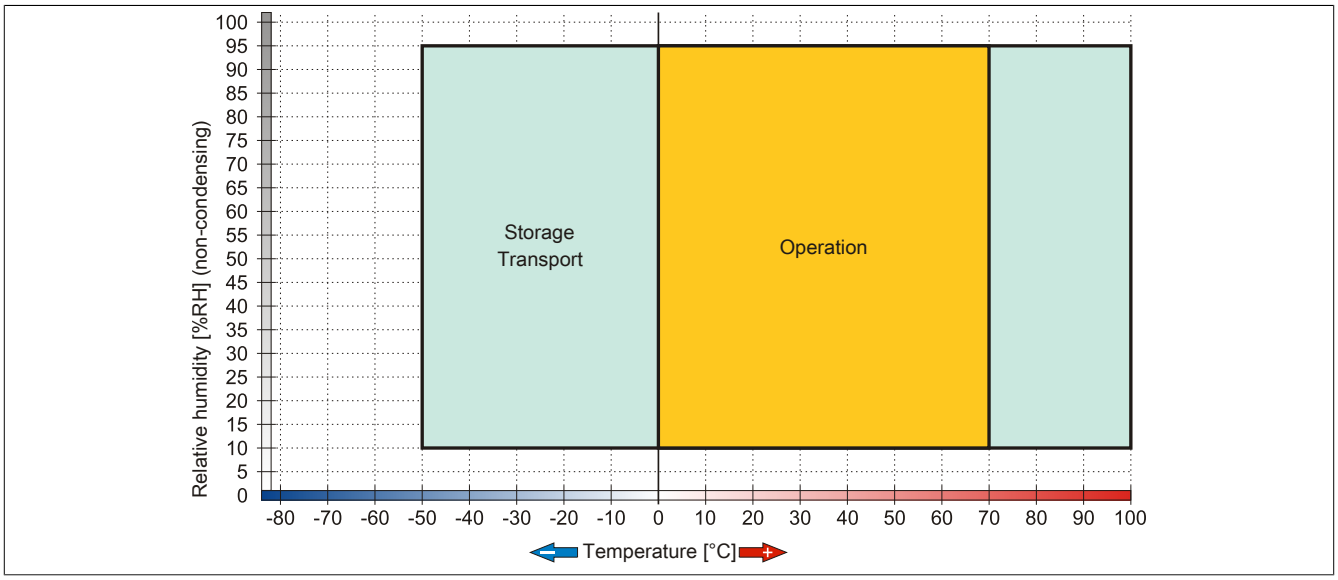


Figure 141: 5CFCRD.xxxx-03 CompactFlash cards - Temperature humidity diagram

9.4.5 Dimensions

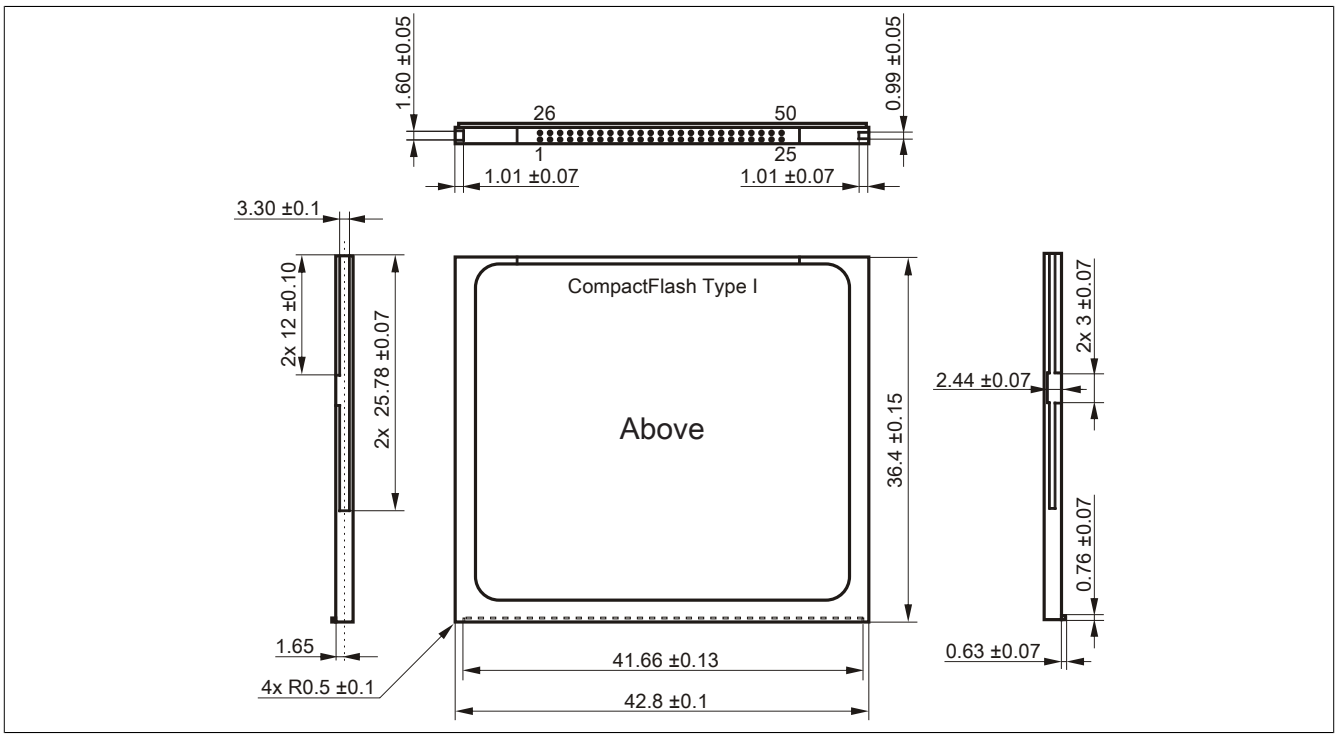


Figure 142: Dimensions - CompactFlash card Type I

9.5 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 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 plugging", except in the case of 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 storage specialists SanDisk are used.

Information:

Due to the vast quantity of USB flash drives available on the market as well as their short product life cycle, we reserve the right to supply alternative products at any time. The following measures may therefore be necessary in order to boot from these flash drives as well:

- **The flash drive must be reformatted or in some cases even repartitioned (set active partition).**
- **The flash drive must be the first bootable device in the BIOS boot order; alternatively, the IDE controllers can be disabled in 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

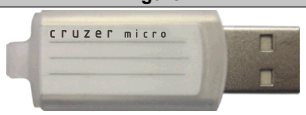
Model number	Short description	Figure
	USB accessories	
5MMUSB.2048-00	USB 2.0 flash drive, 2048 MB	

Table 194: 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 fully assembled device. The data specifications for the fully assembled device take precedence over those of individual components.

Product ID	5MMUSB.2048-00
General information	
Data retention	10 years
LEDs	1 LED (green) [1]
MTBF	100,000 hours (at 25 °C)
Type	USB 1.1, USB 2.0
Maintenance	None
Certification	
CE	Yes
Interfaces	
USB	
Type	USB 1.1, USB 2.0
Connection	To any USB Type A interface
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Sequential reading	Max. 8.7 MB/s
Sequential writing	Max. 1.7 MB/s
Support	
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
Electrical characteristics	
Power consumption	650 µA sleep mode, 150 mA read/write

Table 195: 5MMUSB.2048-00 - Technical data

Product ID	5MMUSB.2048-00
Environmental conditions	
Temperature	
Operation	0 to 45°C
Storage	-20 to 60°C
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/s² 0-peak), oscillation rate 1/minute
Storage	10 to 500 Hz: 2 g (19.6 m/s² 0-peak), oscillation rate 1/minute
Transport	10 to 500 Hz: 2 g (19.6 m/s² 0-peak), oscillation rate 1/minute
Shock	
Operation	Max. 40 g (392 m/s² 0-peak) and 11 ms length
Storage	Max. 80 g (784 m/s² 0-peak) and 11 ms length
Transport	Max. 80 g (784 m/s² 0-peak) and 11 ms length
Altitude	
Operation	Max. 3,048 m
Storage	Max. 12,192 m
Transport	Max. 12,192 m
Mechanical characteristics	
Dimensions	
Width	19 mm
Length	52.2 mm
Height	7.9 mm

Table 195: 5MMUSB.2048-00 - Technical data

1) Indicates data being transferred (sending and receiving)

10.1.4 Temperature humidity diagram

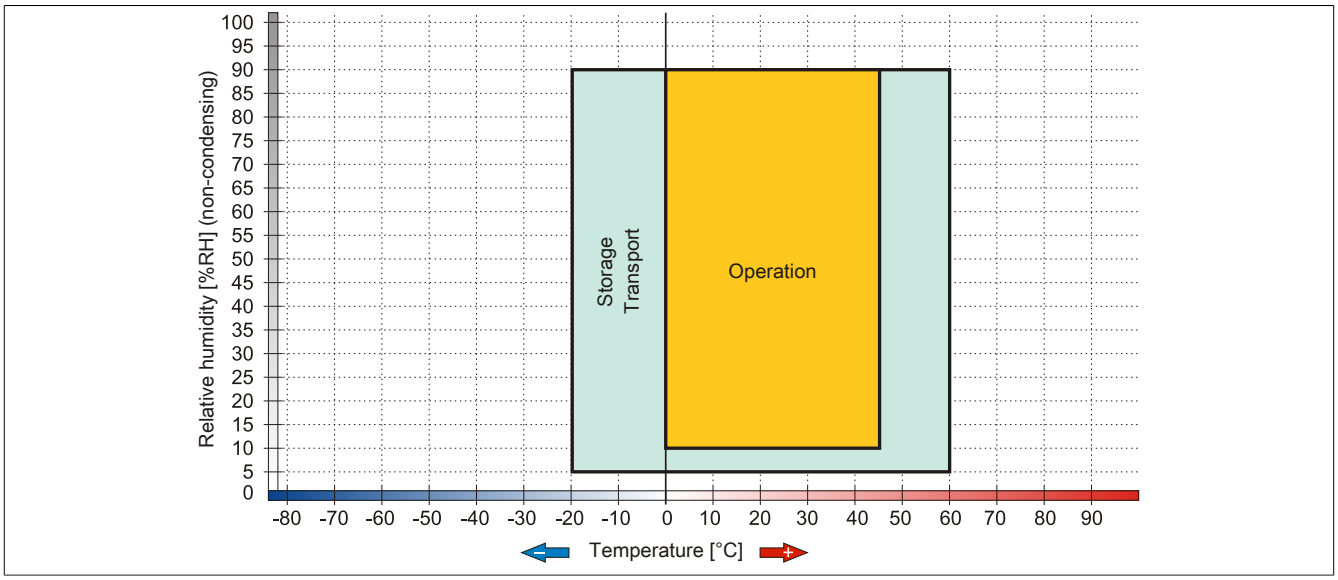


Figure 143: 5MMUSB.2048-00 - Temperature humidity diagram

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 plugging", except in the case of Windows 98SE), the USB flash drive can immediately act as an additional drive where data can be read or written.

Information:

Due to the vast quantity of USB flash drives available on the market as well as their short product life cycle, we reserve the right to supply alternative products at any time. The following measures may therefore be necessary in order to boot from these flash drives as well:

- **The flash drive must be reformatted or in some cases even repartitioned (set active partition).**
- **The flash drive must be the first bootable device in the BIOS boot order; alternatively, the IDE controllers can be disabled in BIOS. This can be avoided in most cases if the "fdisk /mbr" command is additionally executed on the USB flash drive.**

- USB 1.1, USB 2.0
- High transfer rate
- High data retention
- Ambient temperature during operation: 0 to 70°C

10.2.2 Order data

Model number	Short description	Figure
	USB accessories	
5MMUSB.2048-01	USB 2.0 flash drive, 2048 MB, B&R	

Table 196: 5MMUSB.2048-01 - Order data

10.2.3 Technical data

Product ID	5MMUSB.2048-01
General information	
Data retention	>10 years
LEDs	1 LED (green) [1)]
MTBF	>3,000,000 hours
Type	USB 1.1, USB 2.0
Maintenance	None
Certification	
CE	Yes
Interfaces	
USB	
Type	USB 1.1, USB 2.0
Connection	To any USB Type A interface
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Sequential reading	Max. 31 MB/s
Sequential writing	Max. 30 MB/s
Support	
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
Electrical characteristics	
Power consumption	Max. 500 µA sleep mode, max. 120 mA read/write
Environmental conditions	
Temperature	
Operation	0 to 70°C
Storage	-50 to 100°C
Transport	-50 to 100°C

Table 197: 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. 3,048 m
Storage	Max. 12,192 m
Transport	Max. 12,192 m
Mechanical characteristics	
Dimensions	
Width	17.97 mm
Length	67.85 mm
Height	8.35 mm

Table 197: 5MMUSB.2048-01 - Technical data

1) Indicates data being transferred (sending and receiving)

10.2.4 Temperature humidity diagram

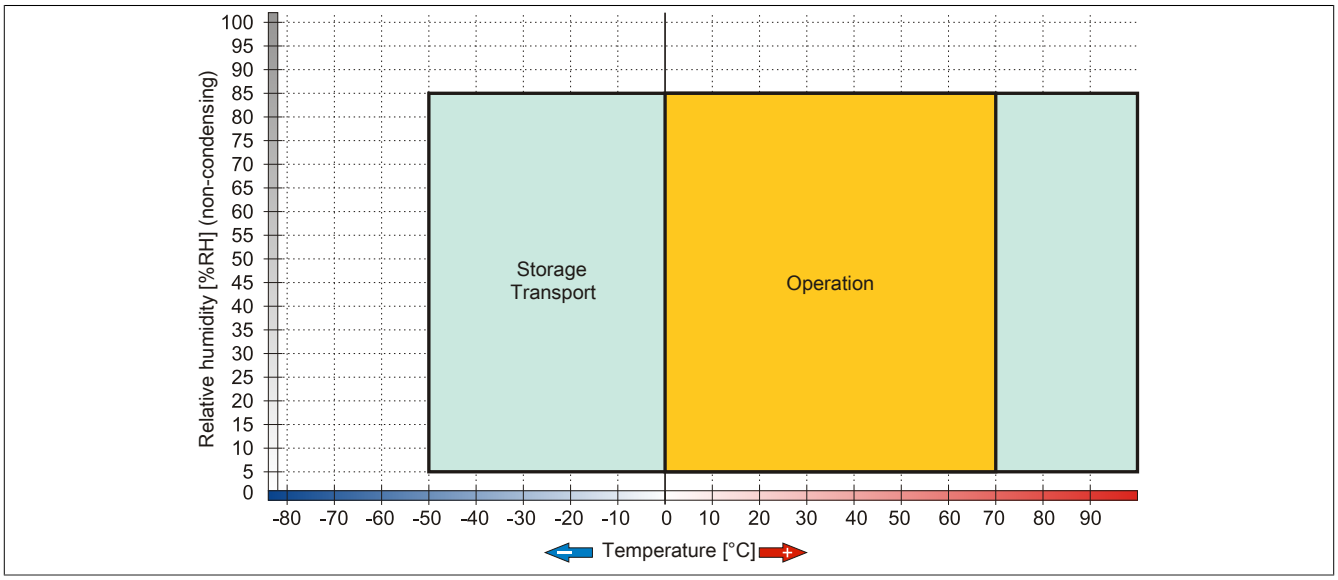


Figure 144: 5MMUSB.2048-01 - Temperature humidity diagram

11 USB media drive

11.1 5MD900.USB2-02

11.1.1 General information

The USB media drive features a DVD-R/RW DVD+R/RW drive, a CompactFlash slot and one USB port on both the front and back. It is connected to the USB port on the B&R Industrial PC.

- Desktop or rack-mounted operation (mounting rail brackets)
- Integrated DVD-R/RW DVD+R/RW drive
- Integrated IDE/ATAPI CompactFlash slot (hot pluggable)
- Integrated USB 2.0 connection
- +24 VDC supply (back)
- USB 2.0 connection (back)
- Optional front cover

11.1.2 Order data

Model number	Short description	Figure
	USB accessories	
5MD900.USB2-02	USB 2.0 drive combination, consists of DVD-R/RW DVD+R/RW, CompactFlash slot (Type II), USB connection (Type A on the front, Type B on the back); 24V DC (order screw clamp terminal 0TB103.9 or cage clamp terminal 0TB103.91 separately)	
	Required accessories	
	Other	
5SWUTI.0000-00	OEM Nero CD-RW Software, only available with a CD writer.	
	Terminal blocks	
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, 3.31 mm² cage clamp, protected against vibration by the screw flange	
	USB cable	
5CAUSB.0018-00	USB 2.0 connection cable type A - type B, 1.8 m.	
5CAUSB.0050-00	USB 2.0 connection cable type A - type B, 5 m.	

Table 198: 5MD900.USB2-02 - Order data

11.1.3 Interfaces

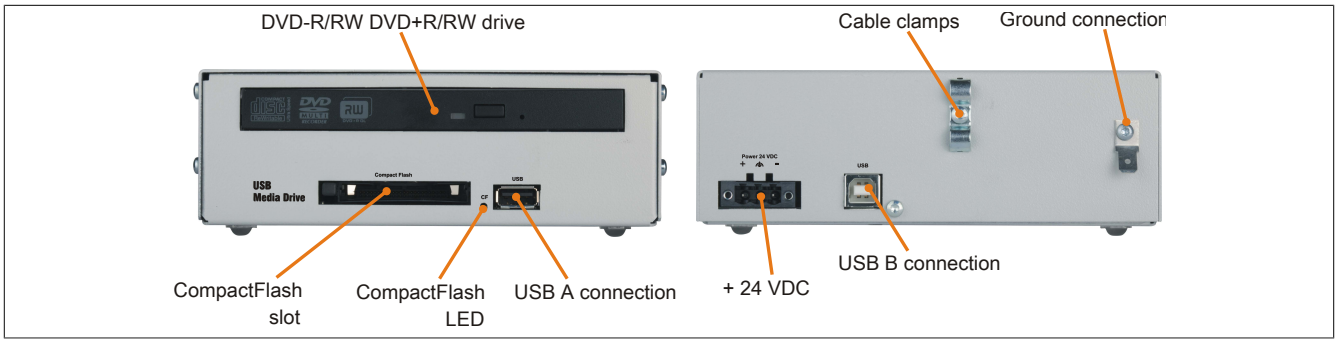


Figure 145: 5MD900.USB2-02 - Interfaces

11.1.4 Technical data

Product ID	5MD900.USB2-02
General information	
Max. cable length	5m (not including hub)
Certification	
CE	Yes
cULus	Yes
Interfaces	
CompactFlash slot 1	
Type	Type I
Connection	IDE/ATAPI
Activity LED	Signals read or write access to an inserted CompactFlash card

Table 199: 5MD900.USB2-02 - Technical data

Product ID	5MD900.USB2-02
USB	
Type	USB 2.0
Design	Type A front Type B back
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Current load	Max. 500 mA
CD / DVD drive	
Data buffer capacity	2 MB
Data transfer rate	Max. 33.3 MB/s
Speed	Max. 5090 rpm ±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 CD-ROM XA mode 2 (form 1, form 2) Photo CD (single/multi-session), Enhanced CD, CD text DVD-ROM, DVD-R, DVD-RW, DVD-Video DVD-RAM (4.7 GB, 2.6 GB) DVD+R, DVD+R (double layer), DVD+RW
Laser class	Class 1 laser
Service life	60000 POH (power-on hours)
Interface	IDE (ATAPI)
Startup time	
CD	Max. 14 seconds (0 RPM to read access)
DVD	Max. 15 seconds (0 RPM to read access)
Access time	
CD	Typ. 140 ms (24x)
DVD	Typ. 150 ms (8x)
Readable media	
CD	CD/CD-ROM (12 cm, 8 cm), CD-R, CD-RW
DVD	DVD-ROM, DVD-R, DVD-RW. DVD-RAM, DVD+R, DVD+R (double layer), DVD+RW
Writable media	
CD	CD-R, CD-RW
DVD	DVD-R/RW, DVD-RAM (4.7 GB), DVD+R/RW, DVD+R (double layer)
Read speed	
CD	24x
DVD	8x
Write speed	
CD-R	10 to 24x
CD-RW	10 to 24x
DVD+R	3.3 to 8x
DVD+R (dual layer)	2.4 to 4x
DVD+RW	3.3 to 8x
DVD-R	2 to 6x
DVD-R (dual layer)	2 to 4x
DVD-RAM	3 to 5x
DVD-RW	2 to 6x
Write methods	
CD	Disk at once, session at once, packet write, track at once
DVD	Disk at once, incremental, overwrite, sequential
Electrical characteristics	
Nominal voltage	24 VDC ±25%
Operating conditions	
Protection in accordance with EN 60529	IP65 on the front (only with optional front cover), IP20 on the back
Environmental conditions	
Temperature [1)]	
Operation	5 to 45°C
Storage	-20 to 60°C
Transport	-40 to 60°C
Relative humidity	
Operation	20 to 80%
Storage	5 to 90%
Transport	5 to 95%
Vibration	
Operation	5 to 500 Hz: 0.3 g (2.9 m/s² 0-peak)
Storage	10 to 100 Hz: 2 g (19.6 m/s² 0-peak)
Transport	10 to 100 Hz: 2 g (19.6 m/s² 0-peak)
Shock	
Operation	5 g, 11 ms
Storage	60 g, 11 ms
Transport	60 g, 11 ms
Altitude	
Operation	Max. 3000 m

Table 199: 5MD900.USB2-02 - Technical data

Product ID	5MD900.USB2-02
Mechanical characteristics	
Dimensions	
Width	156 mm
Height	52 mm
Depth	140 mm
Weight	Approx. 1100 g (without front cover)

Table 199: 5MD900.USB2-02 - Technical data

1) Temperature specifications refer to operation at 500 meters. The maximum ambient temperature is typically derated by 1°C per 1000 meters (starting at 500 meters above sea level).

11.1.5 Dimensions

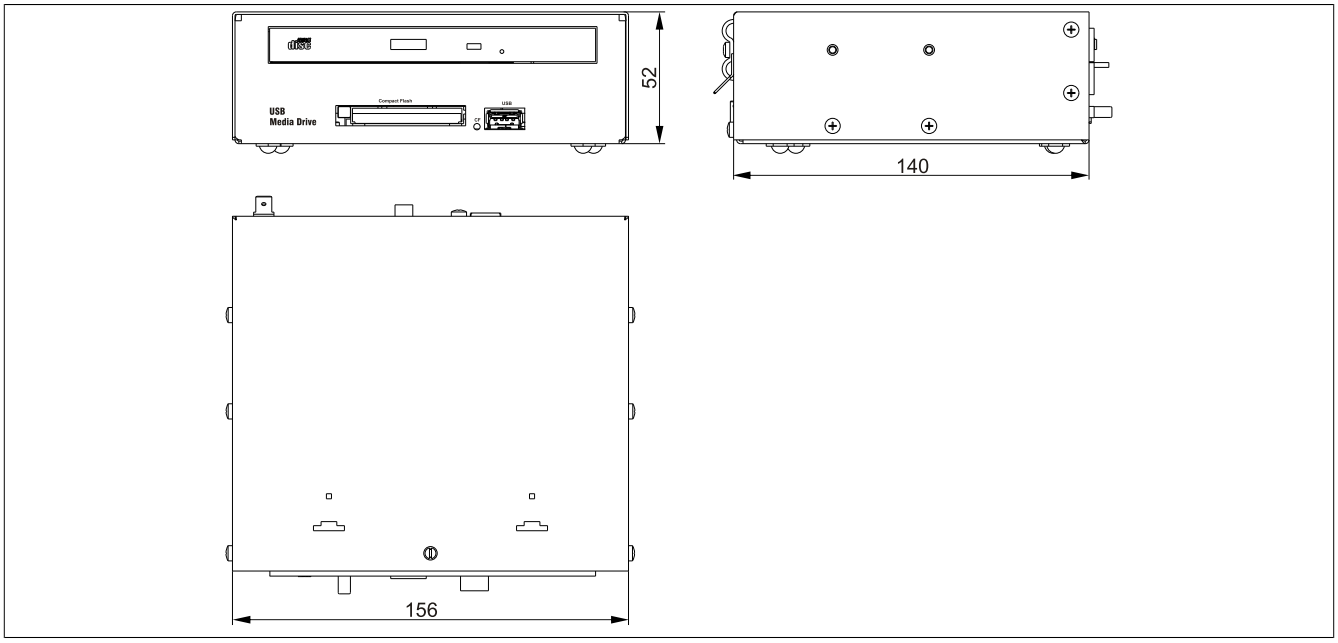


Figure 146: 5MD900.USB2-02 - Dimensions

11.1.6 Dimensions with front cover

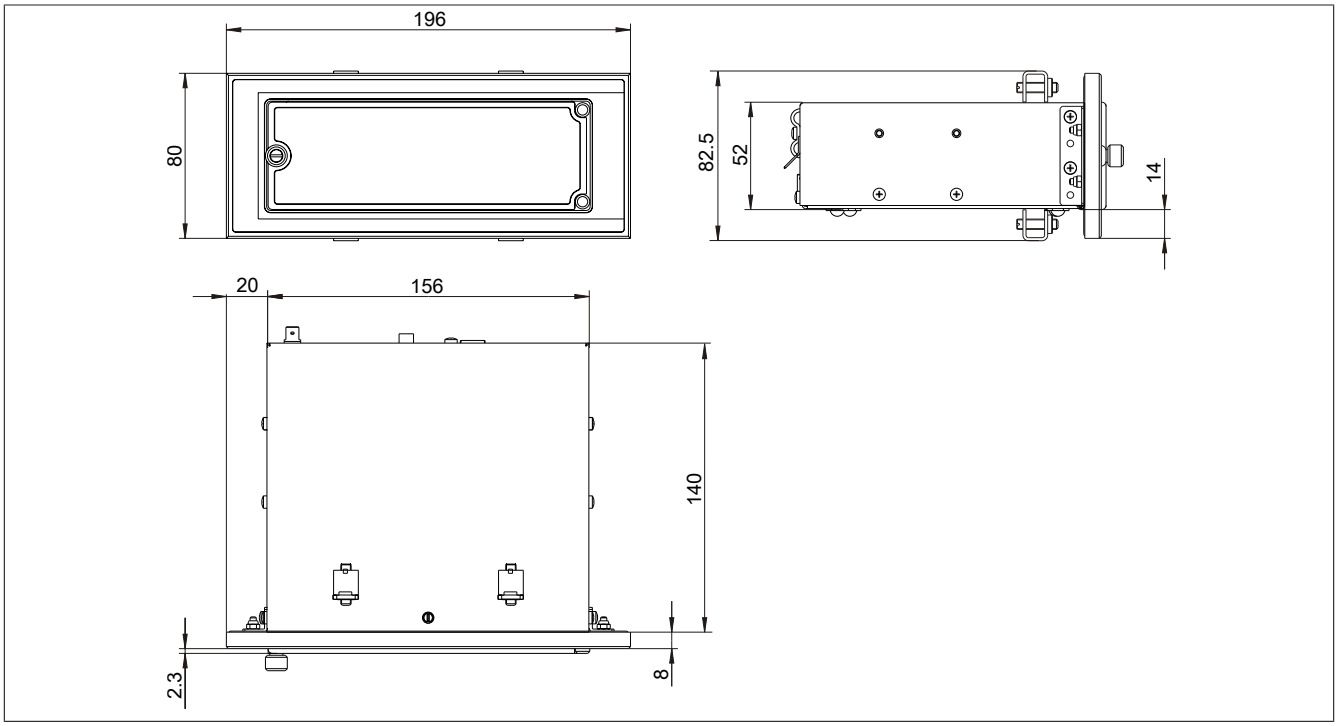


Figure 147: Dimensions - USB media drive with front cover

11.1.7 Cutout installation

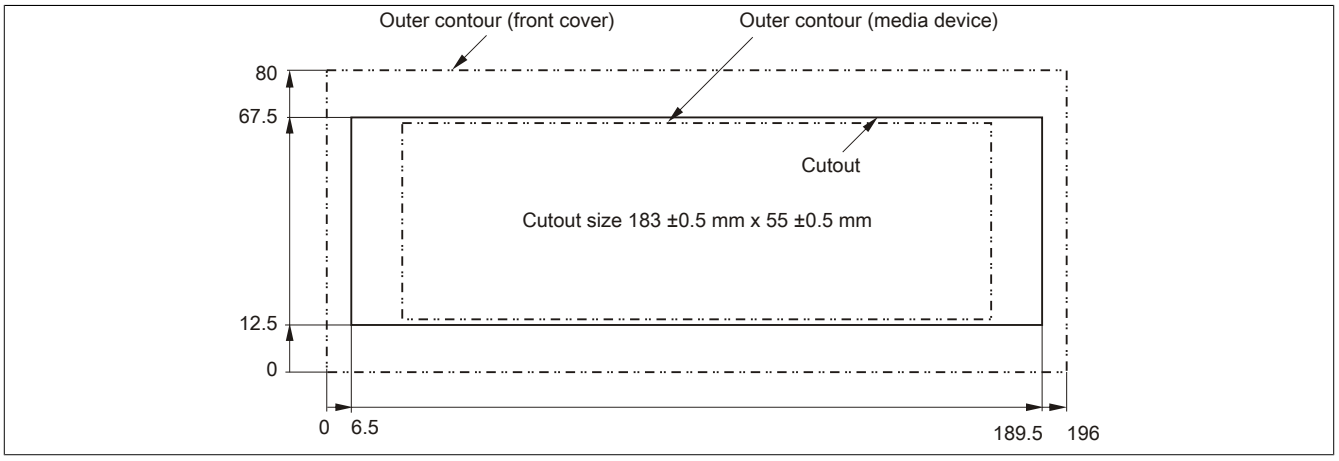


Figure 148: Installation cutout - USB media drive with front cover

11.1.8 Content of delivery

Quantity	Component
1	USB media drive
2	Mounting rail brackets

Table 200: 5MD900.USB2-02 - Contents of delivery

11.1.9 Installation

The USB media drive can be operated as a desktop device (rubber feet) or as a rack-mounted device (2 mounting rail brackets included).

11.1.9.1 Mounting orientation

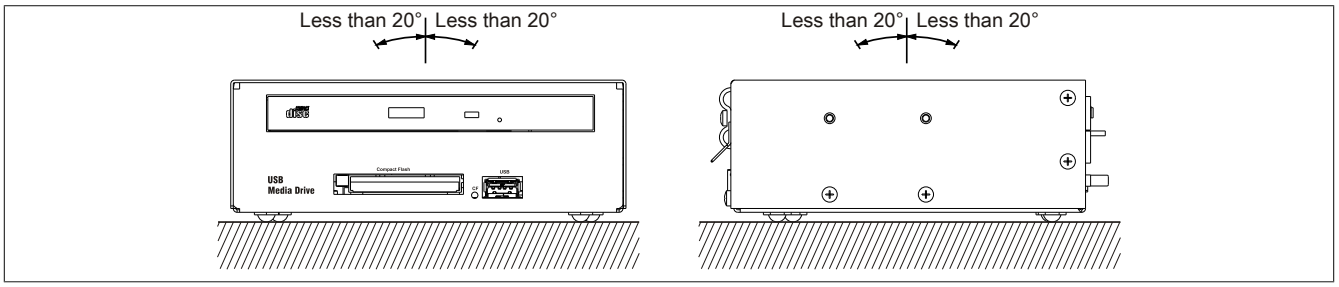


Figure 149: 5MD900.USB2-02 - Mounting orientation

11.2 5A5003.03

11.2.1 General information

This front cover can also be mounted on the front of the USB media drive (model number 5MD900.USB2-00, 5MD900.USB2-01 or 5MD900.USB2-02) to protect the interface.

11.2.2 Order data

Model number	Short description	Figure
	USB accessories	
5A5003.03	Front cover, for Remote CD-ROM drive 5A5003.02 and USB 2.0 drive combination 5MD900.USB2-00, 5MD900.USB2-01 and 5MD900.USB2-02.	

Table 201: 5A5003.03 - Order data

11.2.3 Technical data

Product ID	5A5003.03
General information	
Certification	
CE	Yes
cULus	Yes
Mechanical characteristics	
Front	
Panel membrane	
Light background	Similar to Pantone 427CV
Dimensions	
Width	196 mm
Height	80 mm
Depth	8 mm

Table 202: 5A5003.03 - Technical data

11.2.4 Dimensions

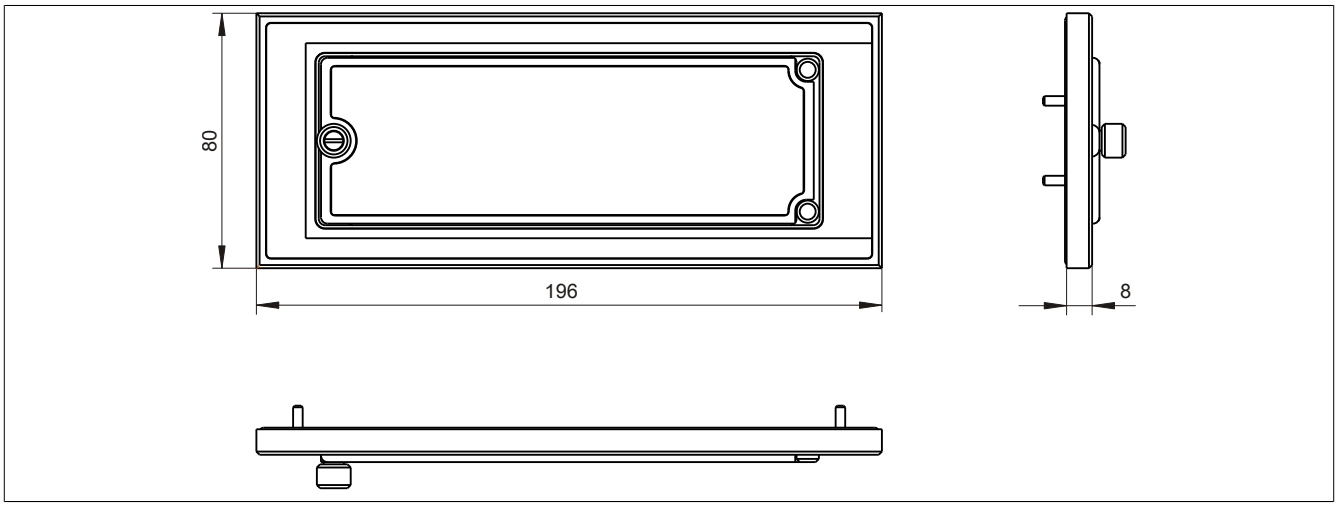


Figure 150: 5A5003.03 - Dimensions

11.2.5 Content of delivery

Quantity	Component
1	Front cover 5A5003.03 for the USB media drive
4	M3 locknut
4	Cover retaining clip

Table 203: 5A5003.03 - Contents of delivery

11.2.6 Installation

The front cover is attached with 2 mounting rail brackets (included with the USB media drive) and 4 M3 locknuts. The 4 retaining clips provided can be used to mount the USB media drive and front cover as a whole, for example in a control cabinet door.

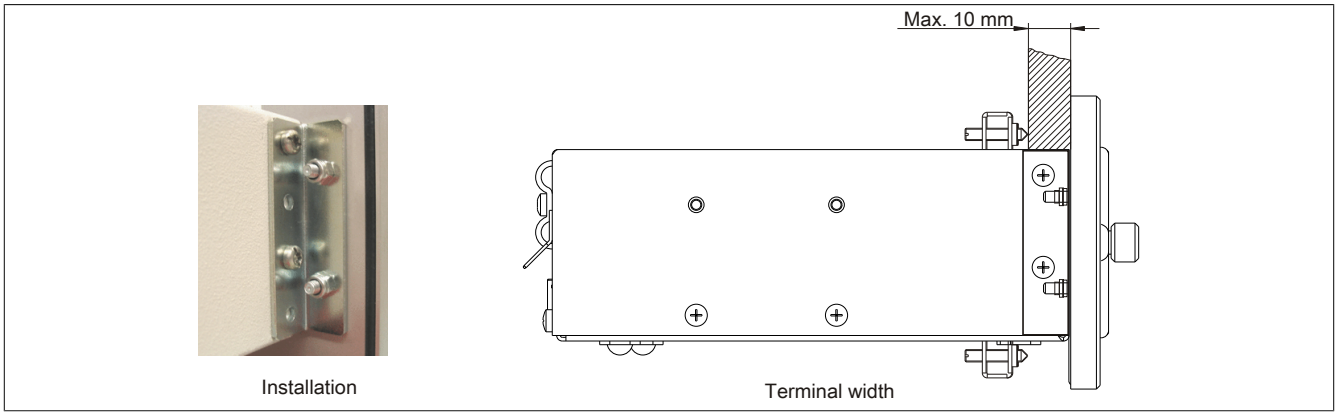


Figure 151: Front cover mounting and installation depth

11.2.6.1 Cutout installation

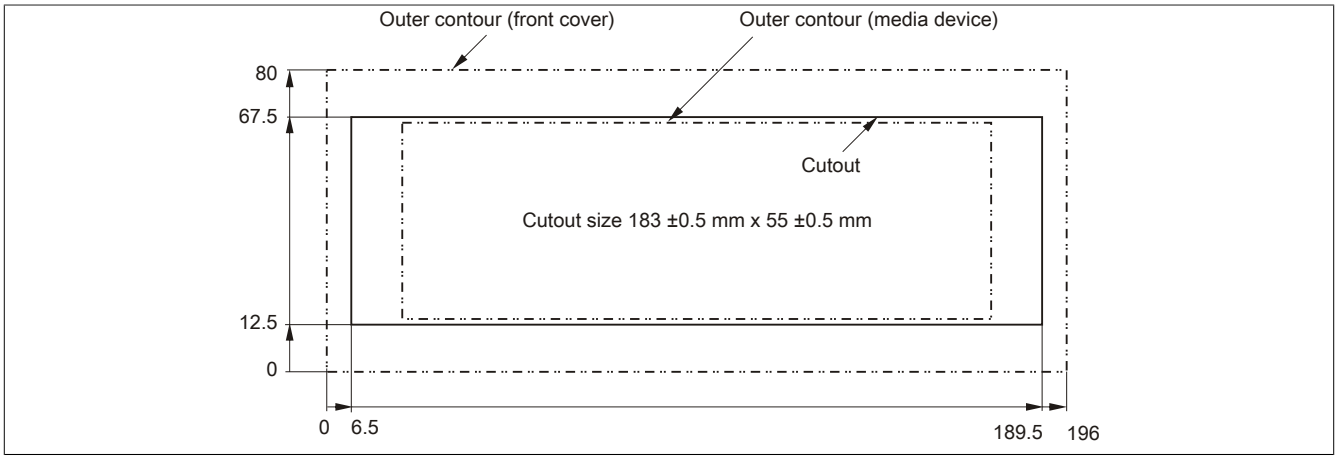


Figure 152: Installation cutout - USB media drive with front cover

12 HMI Drivers & Utilities DVD

12.1 5SWHMI.0000-00

12.1.1 General information

This DVD contains drivers, utilities, software upgrades and user's manuals for B&R panel system products (see the "Industrial PCs" or "Visualization and operation" section of the B&R website at www.br-automation.com).

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").

12.1.2 Order data

Model number	Short description	Figure
	Other	
5SWHMI.0000-00	HMI Drivers & Utilities DVD	

Table 204: 5SWHMI.0000-00 - Order data

12.1.3 Contents (V2.10)

BIOS product upgrades

- 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

Device drivers

- 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 service life calculator (Silicon Systems)
- Miscellaneous
- MTC utilities
- B&R Key Editor
- MTC & Mkey utilities
- Mkey utilities
- UPS configuration software
- ICU ISA configuration
- Intel PCI NIC boot ROM
- Diagnostic 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)

13 Cables

13.1 USB cables

13.1.1 5CAUSB.00xx-00

13.1.1.1 General information

USB cables are designed to achieve USB 2.0 transfer speeds.

13.1.1.2 Order data

Model number	Short description	Figure
	USB cable	
5CAUSB.0018-00	USB 2.0 connection cable type A - type B, 1.8 m.	
5CAUSB.0050-00	USB 2.0 connection cable type A - type B, 5 m.	

Table 205: 5CAUSB.0018-00, 5CAUSB.0050-00 - Order data

13.1.1.3 Technical data

Product ID	5CAUSB.0018-00	5CAUSB.0050-00
General information		
Certification		
CE	Yes	
cULus	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 206: 5CAUSB.0018-00, 5CAUSB.0050-00 - Technical data

13.1.1.4 Cable pinout

Warning!

If you choose to make a suitable cable yourself, it should be wired according to these specifications.

If a self-made cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly.

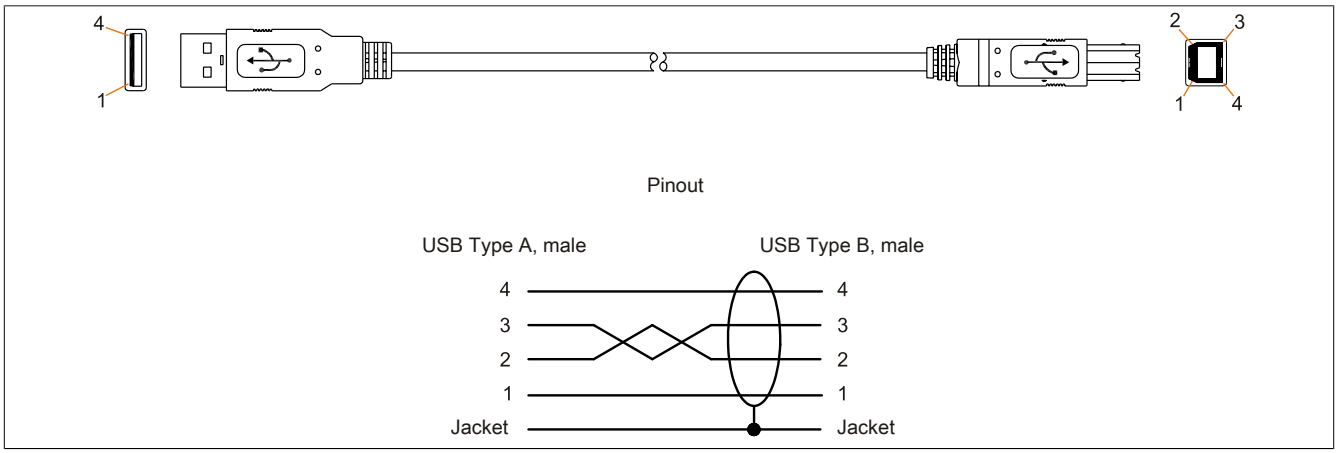


Figure 153: 5CAUSB.00xx-00 USB cables - Pinout

13.2 RS232 cables

13.2.1 9A0014.xx

13.2.1.1 General information

RS232 cables are used as extension cables between two RS232 interfaces.

13.2.1.2 Order data

Model number	Short description	Figure
	RS232 cable	
9A0014.02	RS232 extension cable for remote operation of a display unit with touch screen, 1.8 m	
9A0014.05	RS232 extension cable for remote operation of a display unit with touch screen, 5 m	
9A0014.10	RS232 extension cable for remote operation of a display unit with touch screen, 10 m	

Table 207: 9A0014.02, 9A0014.05, 9A0014.10 - Order data

13.2.1.3 Technical data

Product ID	9A0014.02	9A0014.05	9A0014.10
General information			
Certification CE		Yes	
Cable structure			
Wire cross section		AWG 26	
Shield		Entire cable	
Outer sheathing Color		Beige	
Connector			
Type		9-pin DSUB socket, male / female	
Mechanical characteristics			
Dimensions Length Diameter	1.8 m ±50 mm	5 m ±80 mm Max. 5 mm	10 m ±100 mm
Flex radius		Min. 70 mm	

Table 208: 9A0014.02, 9A0014.05, 9A0014.10 - Technical data

13.2.1.4 Cable pinout

Warning!

If you choose to make a suitable cable yourself, it should be wired according to these specifications.

If a self-made cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly.

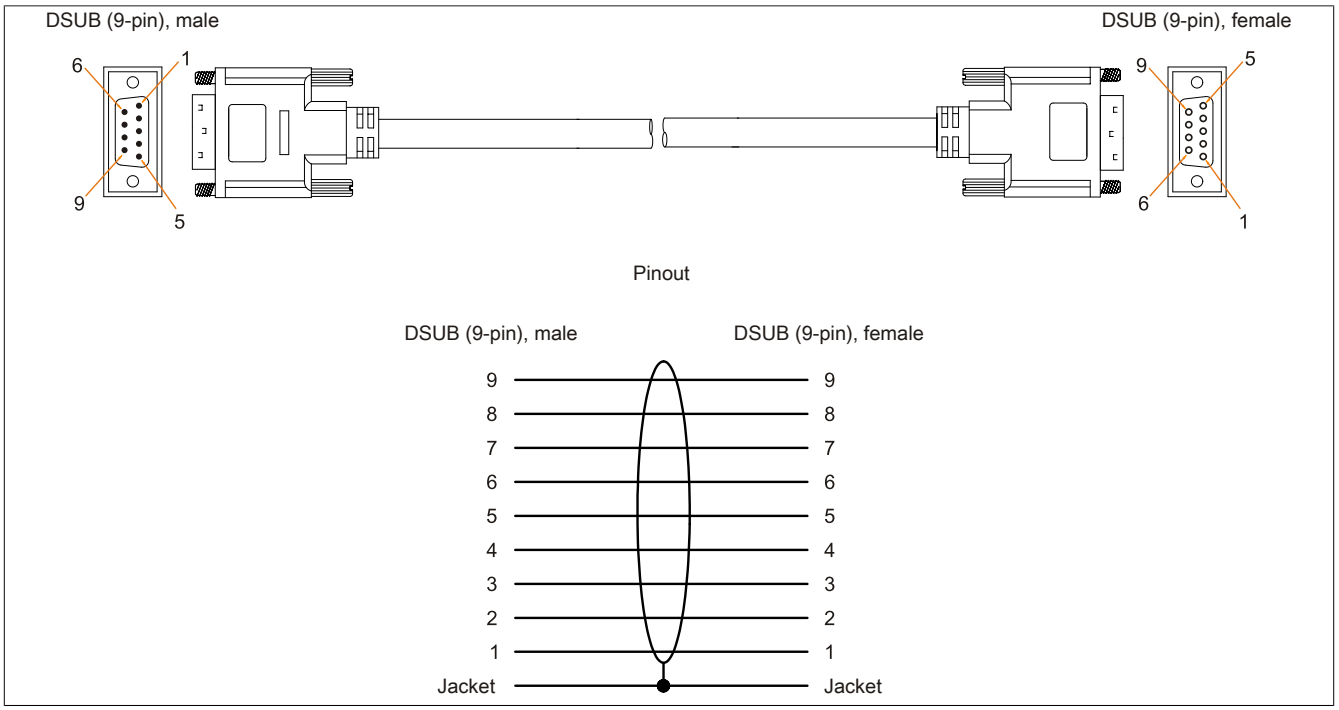


Figure 154: 9A0014.xx RS232 cables - Pinout

13.3 Internal supply cable

13.3.1 5CAMSC.0001-00

13.3.1.1 General information

This supply cable is used internally, for example to supply special PCI cards. It is connected to the mainboard. For requirements and procedures, see "Connecting an external device to the mainboard" on page 290.

> **Caution!**
>
> **Power must be turned off before plugging in and unplugging cables.**

13.3.1.2 Order data

Model number	Short description	Figure
	Accessories	
5CAMSC.0001-00	Internal supply cable	

Table 209: 5CAMSC.0001-00 - Order data

13.3.1.3 Technical data

Product ID	5CAMSC.0001-00
General information	
Certification CE	 Yes
Cable structure	
Wire cross section	AWG 22
Connector	
Type	1x 4-pin male disk drive power plug, 1x 4-pin female plug housing
Mechanical characteristics	
Dimensions Length	 100 mm ±5 mm
Flexibility	Flexible

Table 210: 5CAMSC.0001-00 - Technical data

Chapter 7 • Maintenance and service

This chapter describes service/maintenance work that can be carried out by a qualified end user.

1 Changing the battery

The lithium battery buffers the internal real-time clock (RTC) and 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!

The battery must be replaced by a Type CR2477N Renata battery only. The use of another battery may present a risk of fire or explosion.

The battery may explode if handled improperly. 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 status of the battery is determined immediately after the device is started and subsequently checked by the system every 24 hours. During this measurement, the battery is subjected to a brief load (approximately 1 second) and then evaluated. Once determined, the battery status is displayed in BIOS (under Advanced -> OEM features -> System board features -> Voltage values) and in the B&R Control Center (ADI driver); it can also be read in a customer application using the ADI library.

Battery status	Description
N/A	The hardware or firmware being used is too old and does not support reading the battery status.
GOOD	Data buffering is intact.
BAD	From the point when battery capacity is recognized as insufficient (BAD), data buffering is intact for approximately another 500 hours

Table 211: Battery status

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

1.2 Procedure

- Disconnect the power supply to the B&R Industrial PC.
- Touch the housing or ground connection 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 strip.

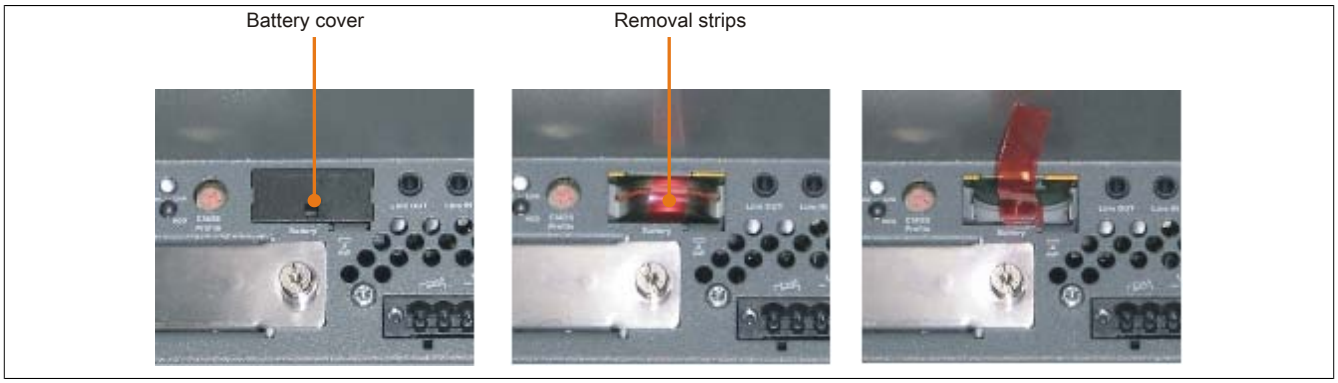


Figure 155: Remove battery

- The battery should not be held by its edges. Insulated tweezers may also be used to insert the battery.

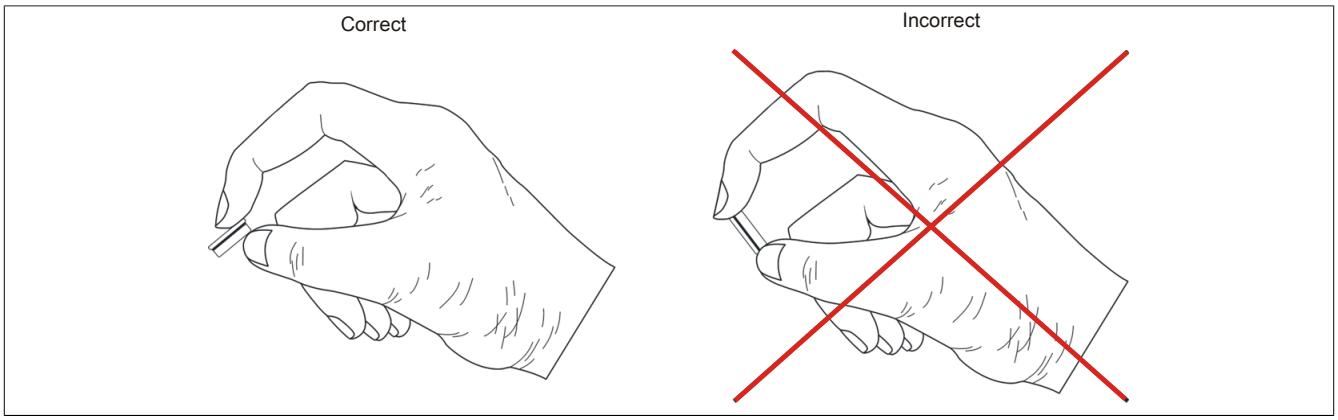


Figure 156: Battery handling

- Insert the new battery with the correct polarity.

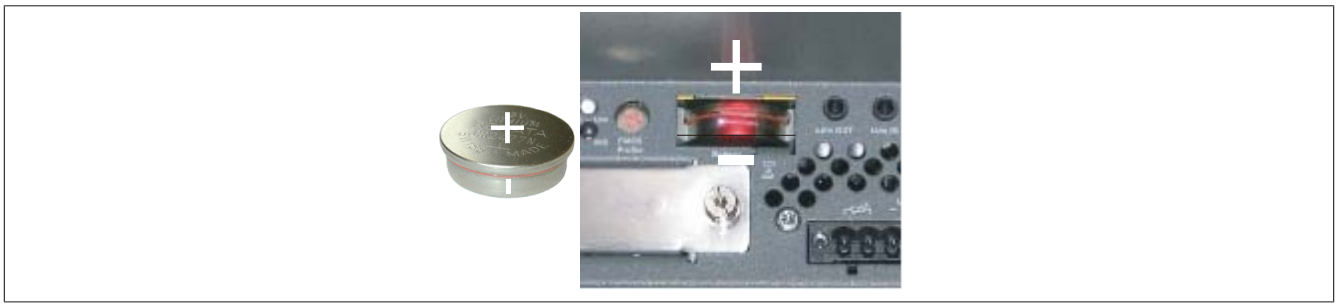


Figure 157: Battery polarity

- To make the next battery change easier, be sure the removal strip is in place when inserting the battery.
- Reconnect the power supply to the B&R Industrial PC (plug in the power cable).
- Reset the date and time in BIOS.

Warning!

Lithium batteries are considered hazardous waste. Used batteries should be disposed of in accordance with applicable local regulations.

2 Cleaning

Danger!

This device can only be cleaned when switched off in order to prevent unintended functions from being triggered when handling the touch screen or pressing keys.

This device should be cleaned with a moist cloth. The cloth should be moistened with water and detergent, a screen cleaning agent or alcohol (ethanol). The cleaning agent should be applied to the cloth beforehand, not sprayed directly on the device! Aggressive solvents, chemicals, scouring agents, pressurized air or steam jets should never be used.

Information:

Displays with a touch screen should be cleaned regularly.

3 Switching the CompactFlash

Caution!

Power must be turned off before replacing CompactFlash cards.

The CompactFlash card can be replaced quickly and easily by pressing the ejector (see image) with a pointed object such as a pen.

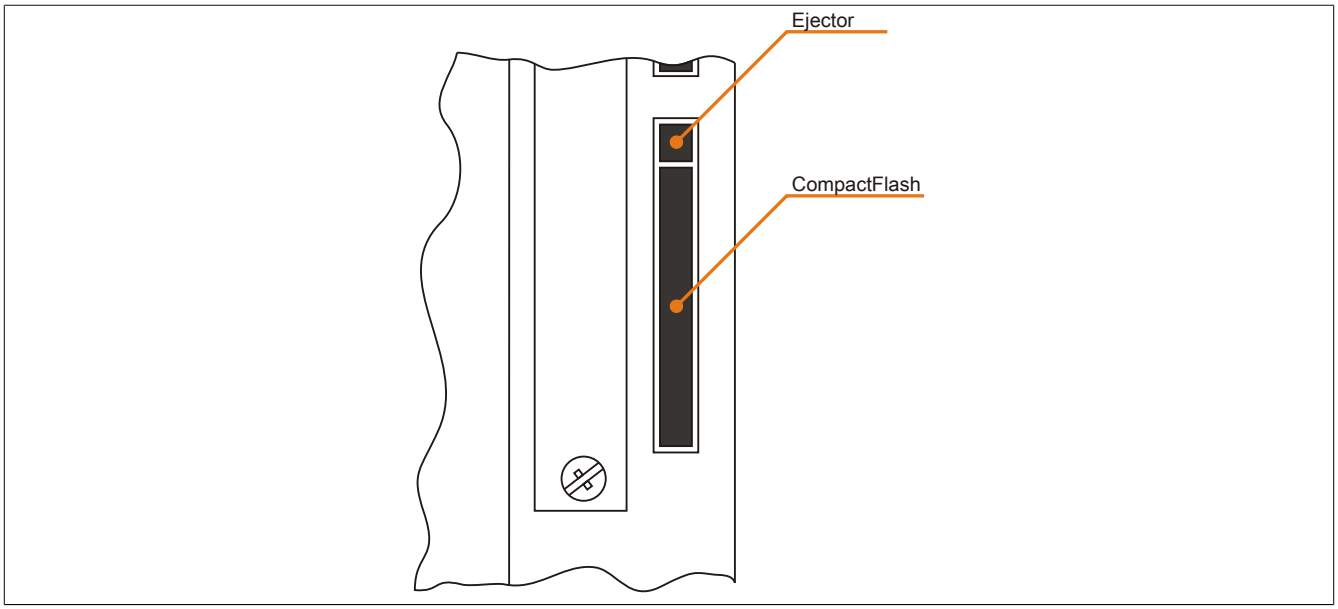


Figure 158: CompactFlash + ejector (sample photo)

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.

Figure 159: Loosening the ¼ turn screws

2. Insert the compact SATA drive and tighten the ¼ turn screws.

Figure 160: 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 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.

Figure 161: Loosening the ¼ turn screws

4. Insert the slide-in drive and tighten with the two ¼ turn screws.

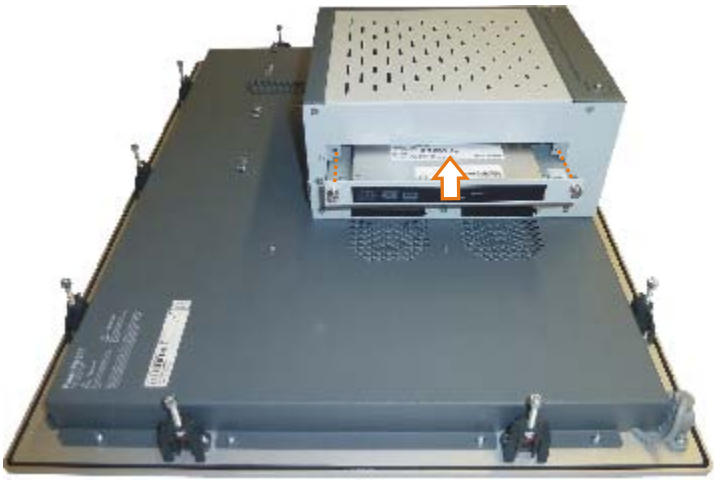


Figure 162: Installing the slide-in drive

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 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.

Figure 163: Loosening the ¼ turn screws

4. Insert the slide-in compact adapter and tighten the two ¼ turn screws.

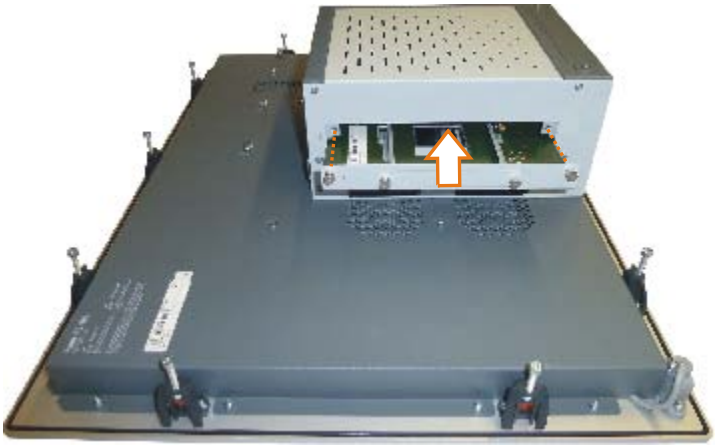


Figure 164: Installing the slide-in compact adapter

5. Once the adapter has been installed, the slide-in compact drive can be inserted.

Figure 165: 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.

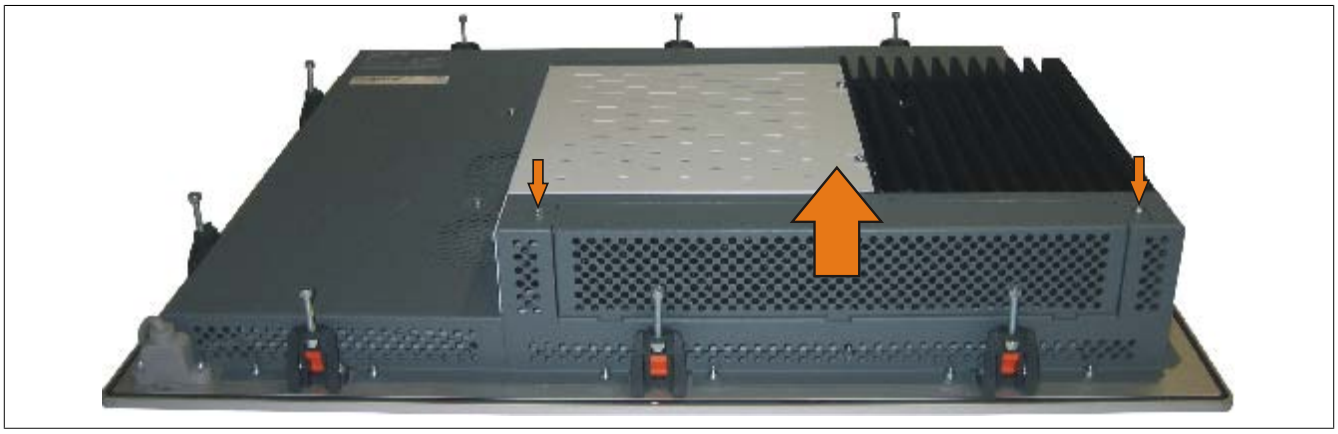


Figure 166: Remove the fan kit cover

2. Insert fan kit frame and press down until it is fully fastened into the terminal.

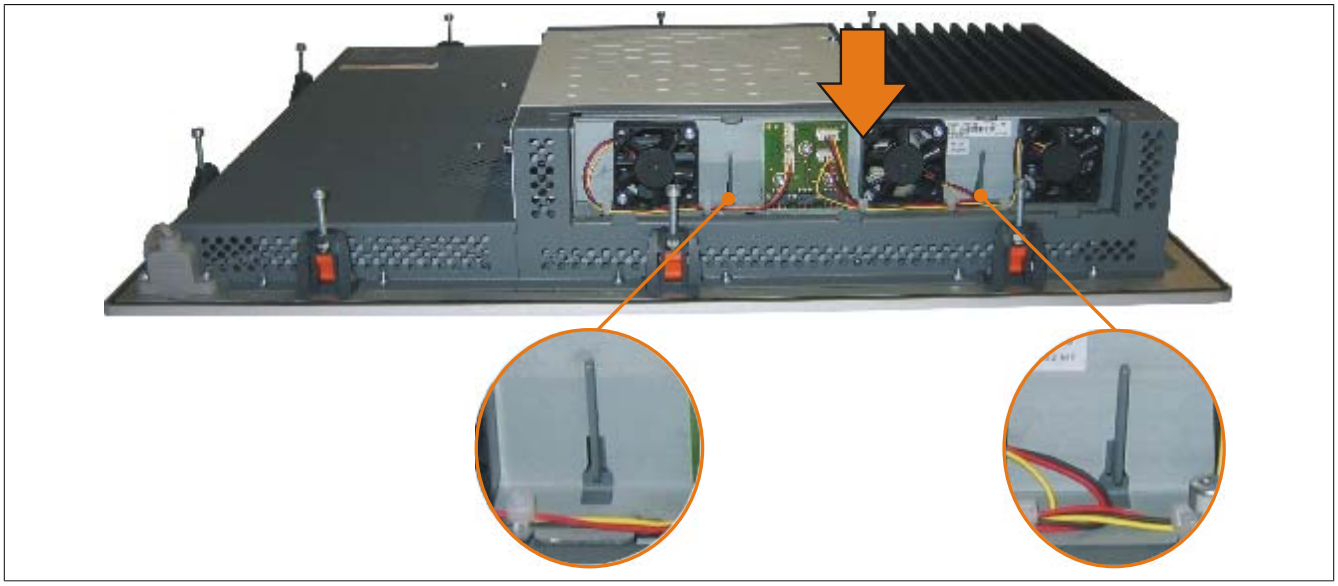


Figure 167: Insert the fan kit

3. Place the dust filter in the fan kit cover and secure with the filter clasp.

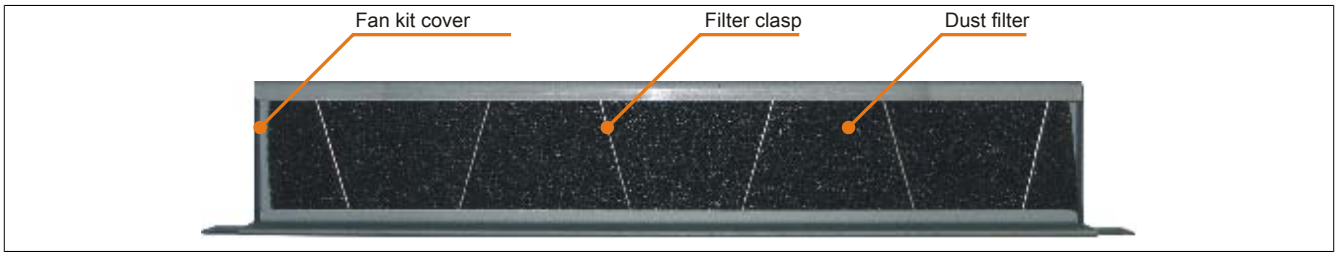


Figure 168: Secure the dust filter and filter clasp

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.

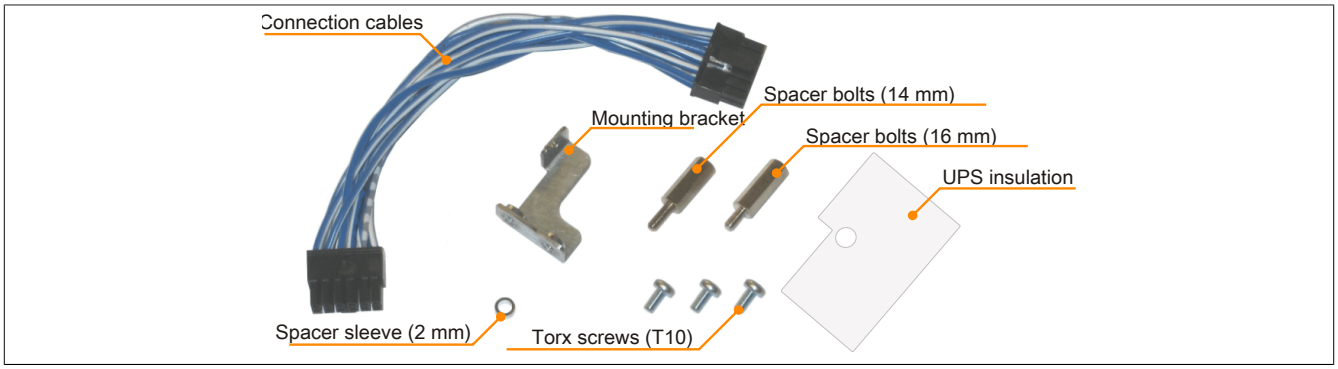


Figure 169: 5AC600.UPSI-00 Add-on UPS module – Installation materials

8.1 Installation guidelines

1. Remove the side cover (see "Mounting the side cover" on page 285).
2. Remove UPS module cover by removing the 2 marked Torx screws (T10).

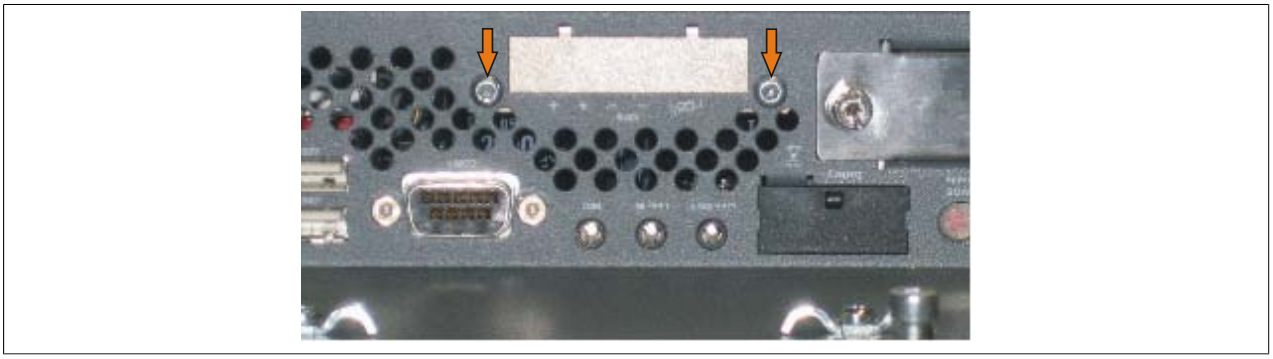


Figure 170: Removing the UPS module cover

3. Install the UPS module using 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.

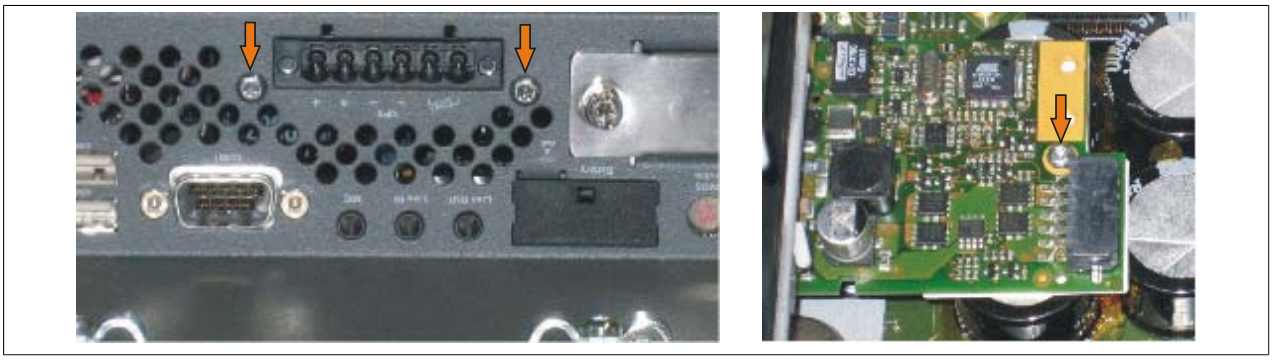


Figure 171: Installing the UPS module

4. Plug in the connection cable (see marked socket).

Figure 172: Plugging in the connection cable

Information:

When connecting the cable, make sure that the connector locks into place.

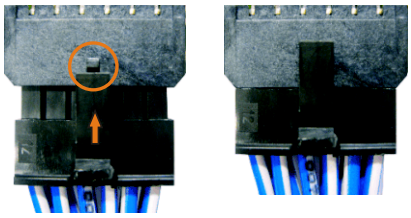


Figure 173: Connector locking mechanism

5. Attach the side cover.

9 Installing the UPS fuse kit on the battery unit

Information:

The 5AC600.UPSF-00 UPS fuse kit is only needed for battery units up to and including revision D0. A 25 A fuse is integrated on the connector circuit board beginning with revision E0.

9.1 Procedure

1. Power to the 5AC600.UPSB-00 battery unit must be disconnected by unplugging the UPS connection cable from the B&R Industrial PC.
2. Remove the cover on the battery unit. This is done by unscrewing the two Torx screws (T10) so that the cover can be removed by sliding it towards the orange connector.

Figure 174: Removing the cover for the battery unit

3. To install the fuse, the red cable must be disconnected from the battery circuit board.

Figure 175: Disconnecting the cable

4. The male fuse kit connector must be connected to the female connector on the red cable (1). The female fuse kit connector must be connected to the male connector on the battery circuit board (2).

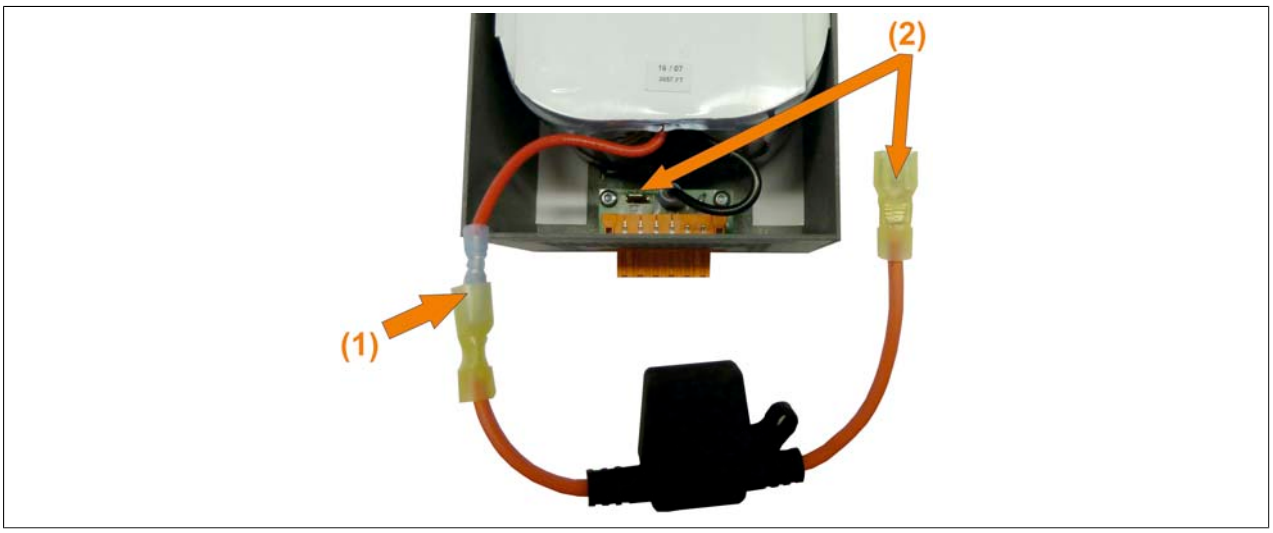


Figure 176: Connecting the fuse

5. The fuse can then be secured in the battery unit.

Figure 177: Securing the fuse

6. The cover for the battery unit can now be reattached. Insert the clips on the cover into the notch on the battery unit and tighten down the cover with the Torx screws removed previously.
7. Reconnect the 5AC600.UPSB-00 battery unit to the B&R Industrial PC.

10 Installing / exchanging the bus unit

Bus units can be installed and exchanged in system units with 1 or 2 card slot expansion.

10.1 Procedure

1. Disconnect the power supply to the Panel PC 800.
2. Touch the housing or ground connection in order to discharge any electrostatic charge from your body.
3. Remove the side cover (see "Mounting the side cover" on page 285).
4. Loosen the Torx screws (T10) mounted to the main board.

Figure 178: Removing the screws

5. Plug the bus unit into the bus unit slot and fasten using three Torx screws (T10).

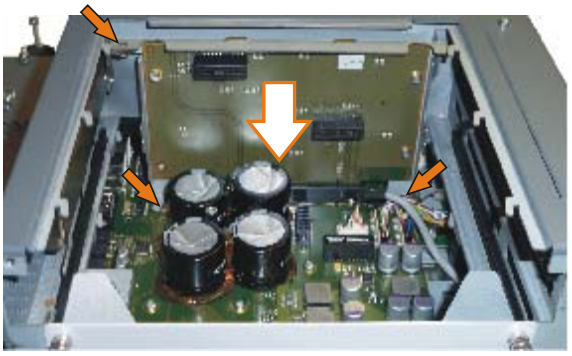


Figure 179: Install bus unit

6. Attach the side cover.

11 Installing / exchanging an adapter

1. Remove the side cover (see "Mounting the side cover" on page 285).
2. Remove 1 card slot or 2 card slot expansion if present.

11.1 Procedure for the adapter 5AC803.BC01-00

1. Loosen the Torx screws (T10) mounted to the main board.

Figure 180: Removing the screws

2. Place adapter and guide rails in the intended positions and fasten using the Torx screws (T10) removed earlier.

Figure 181: Installing the 5AC803.BC01-00 adapter

3. Attach the side cover.

11.2 Procedure for the adapter 5AC803.BC02-00

1. Plug adapter into the intended slot.

Figure 182: Installing the 5AC803.BC02-00 adapter

2. Attach the side cover.

12 Installing / exchanging PCIec plug-in card

12.1 Procedure

1. Loosen the ¼ turn screws and remove PCIec module cover.

Figure 183: Removing the PCIec module cover

2. Slide PCIec plug-in card into place.

Figure 184: Insert PCIec plug-in card

3. Fasten PCIec plug-in card using the ¼ turn screws.

13 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.

13.1 PPC800 without expansion

1. Disconnect the power supply to the Panel PC 800.
2. Touch the housing or ground connection 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).

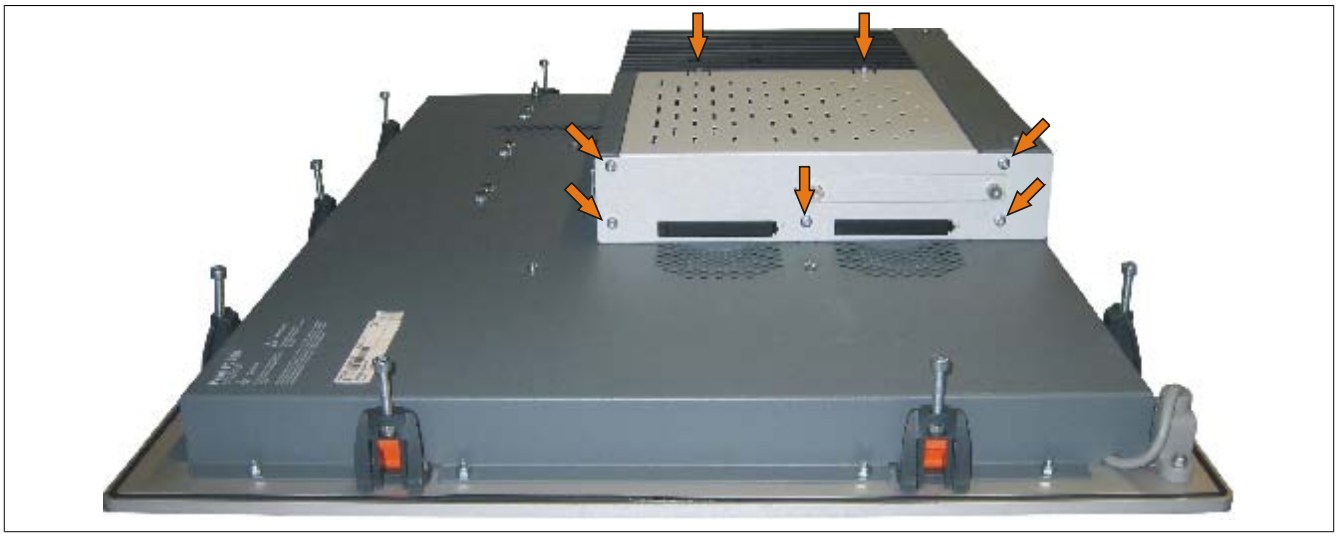


Figure 185: Mounting the side cover on a PPC800 without expansion

13.2 PPC800 with expansion

1. Disconnect the power supply to the Panel PC 800.
2. Touch the housing or ground connection 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).

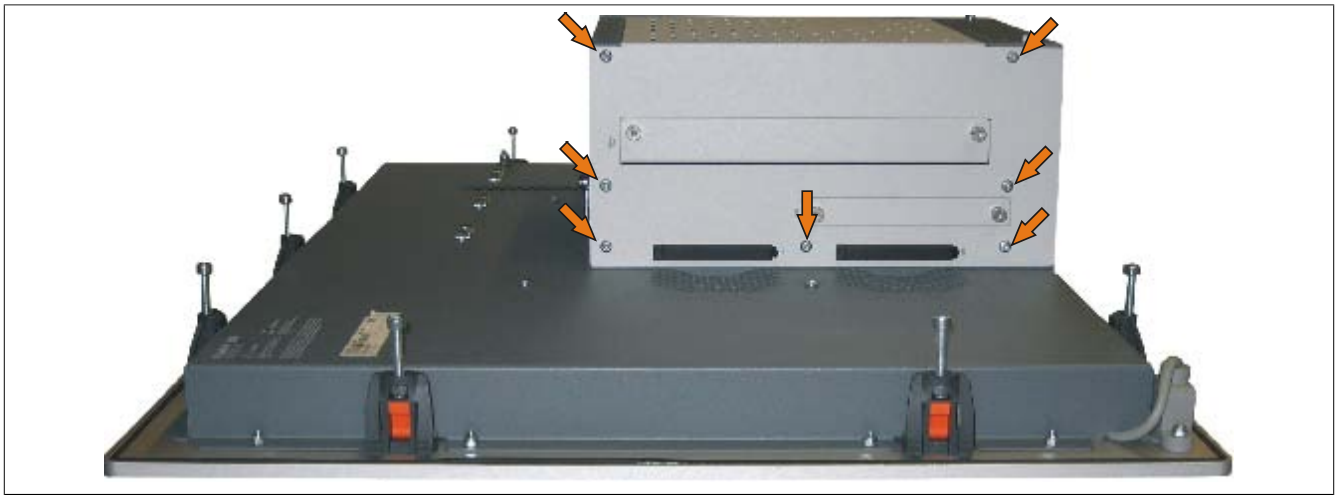


Figure 186: Mounting the side cover on a PPC800 with expansion (1 slot expansion shown in image)

14 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-01	5ACPCI.RAIC-02	60 GB hard disk
5ACPCI.RAIC-03	5ACPCI.RAIC-04	160 GB hard disk
5ACPCI.RAIC-05	5MMHDD.0250-00	250 GB hard disk
5ACPCI.RAIC-06	5MMHDD.0500-00	500 GB hard disk

Table 212: Overview of required replacement SATA HDD for PCI SATA HDD RAID controller

A size 10 Torx screwdriver is needed for exchanging the hard disk.

14.1 Procedure

1. Disconnect the power supply.
2. Touch the housing or ground connection 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).

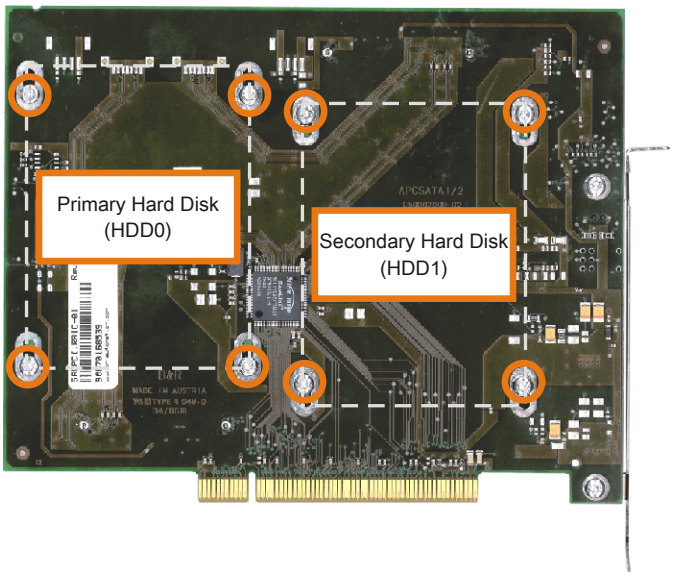


Figure 187: Screw layout on the back side of the SATA RAID controller 5ACPCI.RAIC-03

6. On the front side, slide the hard disk down and away (Figure 188: Hard disk exchange - left image).
7. Insert the new hard disk carefully into the connector (Figure 188: Hard disk exchange - right image), being careful to only touch it on the front, and not on the top.

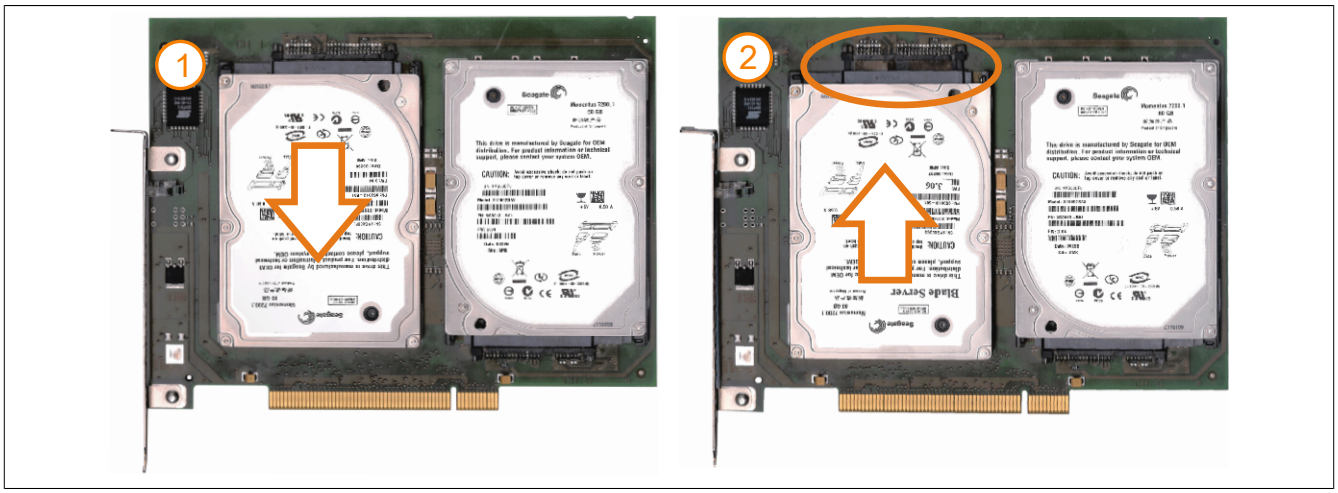


Figure 188: Hard disk exchange

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 Rebuild status. The rebuild will continue after boot sequence is complete".
11. A rebuild can be performed immediately in SATA RAID BIOS, or the rebuild is performed after the PC is booted - see "Rebuild mirrored set" on page 138.

Appendix A

1 Maintenance Controller Extended (MTCX)

The MTCX controller (FPGA processor) is located on the main board (part of every system unit).

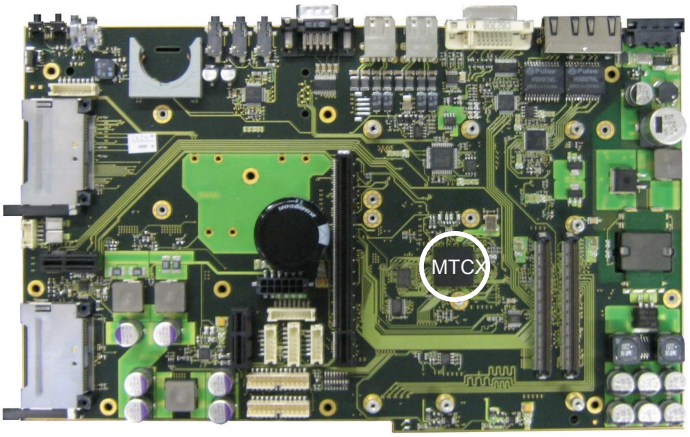


Figure 189: MTCX controller location

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)

Extended MTCX functions are available by upgrading firmware [1)]. 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 in the Downloads section of the B&R website (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 213: 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°C + 16°C = 60°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 Connecting an external device to the mainboard

A plug on the main board enables branching of +5 VDC and +12 VDC for the internal supply of e.g. special PCI cards.

This voltage can be accessed using the "5CAMSC.0001-00" on page 266. The connector is located near the reset or power button (see image). In order to reach the connector, the side cover (see "Mounting the side cover" on page 285) of the PPC800 as well as any slide-in drives and PCIec and PCI insert cards must be removed.

Figure 190: Connector location for external devices

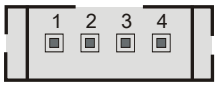
Connector for the external devices			
Pin	Assignment	Power	4-pin connector, male
1	+12 VDC	Max. 10 watts	
2	GND		
3	GND	Max. 5 watts	
4	+5 VDC		

Table 214: Pinout - 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 fully assembled device. For the assembled device in which this individual component is used, refer to the data given specifically for that device.

Product ID	Touch Screen AMT 5-wire
General information	
Certification CE c-UL-us	 Yes Yes
Manufacturer	AMT
Release pressure	≤ 1 N
Light permeability	81 ±3%
Environmental conditions	
Temperature Operation Storage Transport	 - 20 to 70°C - 40 to 80°C - 40 to 80°C
Relative humidity Operation Storage Transport	 90% at max. 50°C 90% RH at max. 60°C for 504 hours 90% RH at max. 60°C for 504 hours
Operating conditions	
Service life	36 million touch operations at the same position (release pressure: 250 g, interval: 2x per second)
Chemical resistance[1)]	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 for approved operating systems are available in the Downloads section of the B&R website (www.br-automation.com).

Table 215: Technical data - Touch Screen AMT 5-wire

1) The active area of the touch screen is resistant to these chemicals for a period of one hour at 25°C.

3.2 Temperature humidity diagram

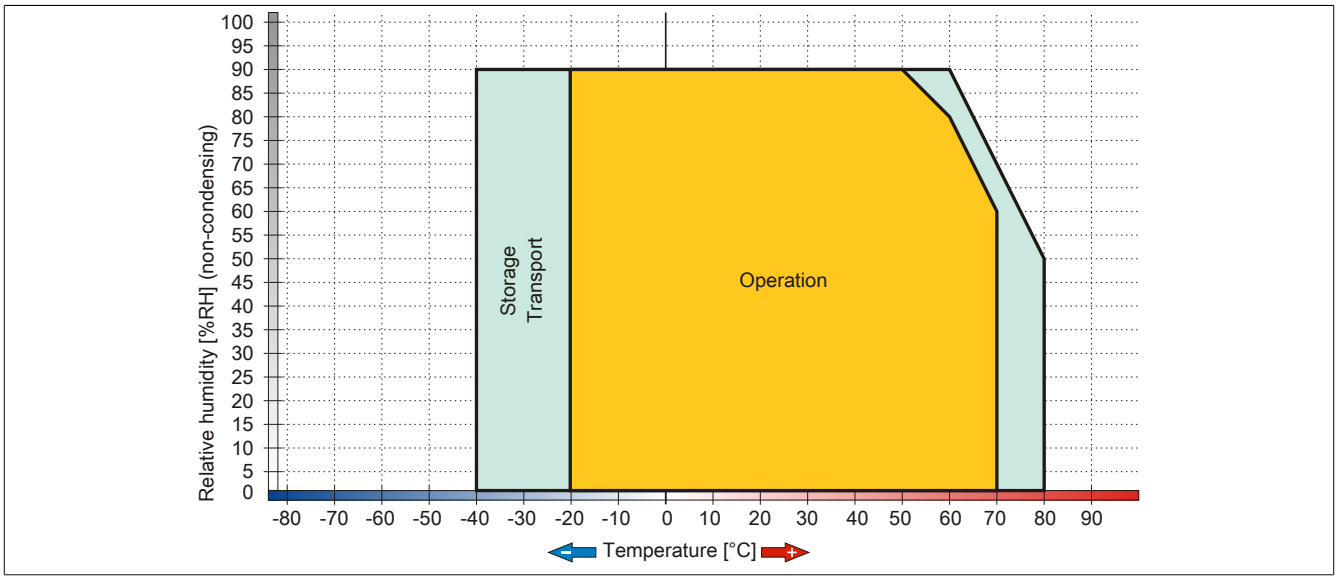


Figure 191: Temperature humidity diagram - AMT touch screen 5-wire

3.3 Cleaning

Danger!

This device can only be cleaned when switched off in order to prevent unintended functions from being triggered when handling the touch screen or pressing keys.

This device should be cleaned with a moist cloth. The cloth should be moistened with water and detergent, a screen cleaning agent or alcohol (ethanol). The cleaning agent should be applied to the cloth beforehand, not sprayed directly on the device! Aggressive solvents, chemicals, scouring agents, pressurized air or steam jets should never be used.

Information:

Displays with a touch screen should be cleaned regularly.

4 Panel membrane

The panel membrane conforms to DIN 42115 (Part 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 fully assembled device.

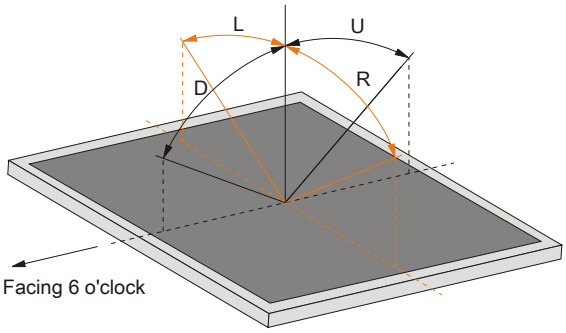
Ethanol Cyclohexanol Diacetone alcohol Glycol Isopropanol Glycerine Methanol Triacetin Dowandol DRM/PM	Formaldehyde 37 to 42% Acetaldehyde Aliphatic hydrocarbons Toluene Xylene White spirits	Trichloroethane Ethyl acetate Diethyl ether N-Butyl acetate Amyl acetate Butylcellosolve Ether
Acetone Methyl ethyl ketone Dioxan Cyclohexanone MIBK Isophorone	Formic acid < 50% Acetic acid < 50% Phosphoric acid < 30% Hydrochloric acid < 36% Nitric acid < 10% Trichloracetic acid < 50% Sulphuric acid < 10%	Sodium hypochlorite < 20% Hydrogen peroxide < 25% Potassium carbonate Washing agents Tenside Fabric conditioner Ferrous chloride ($FeCl_2$) Ferrous chloride ($FeCl_3$) Dibutyl phthalate Dioctyl phthalate Sodium carbonate
Ammonia < 40% Caustic soda < 40% Potassium hydroxide Alkali carbonate Bichromate Potassium Acetonitrile Sodium bisulphate	Cutting oil Diesel oil Linseed oil Paraffin oil Blown castor oil Silicon oil Turpentine oil substitute Brake fluid Aviation fuel Gasoline Water Sea water Decon	

Table 216: 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

Viewing angle specifications (R, L, U, D) for the display types are listed in the technical data for each device.



6 Mounting compatibility

This section describes the compatibility of the installation dimensions for Power Panel 100/200, Power Panel 300/400, Power Panel 500, Automation Panel 900, Automation Panel 700 and Panel PC 800 devices according to 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 217: Product abbreviations

6.1 Compatibility overview

The following table offers an overview of the PP100/200, PP300/400, PP500, AP900, PPC700 and PPC800 devices. Detailed information can be found in the section 6.2 "Compatibility details" on page 296.

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 218: Device compatibility overview

6.2 Compatibility details

6.2.1 Example

The measurement values (all in mm) shown in this image apply to the other figures below.

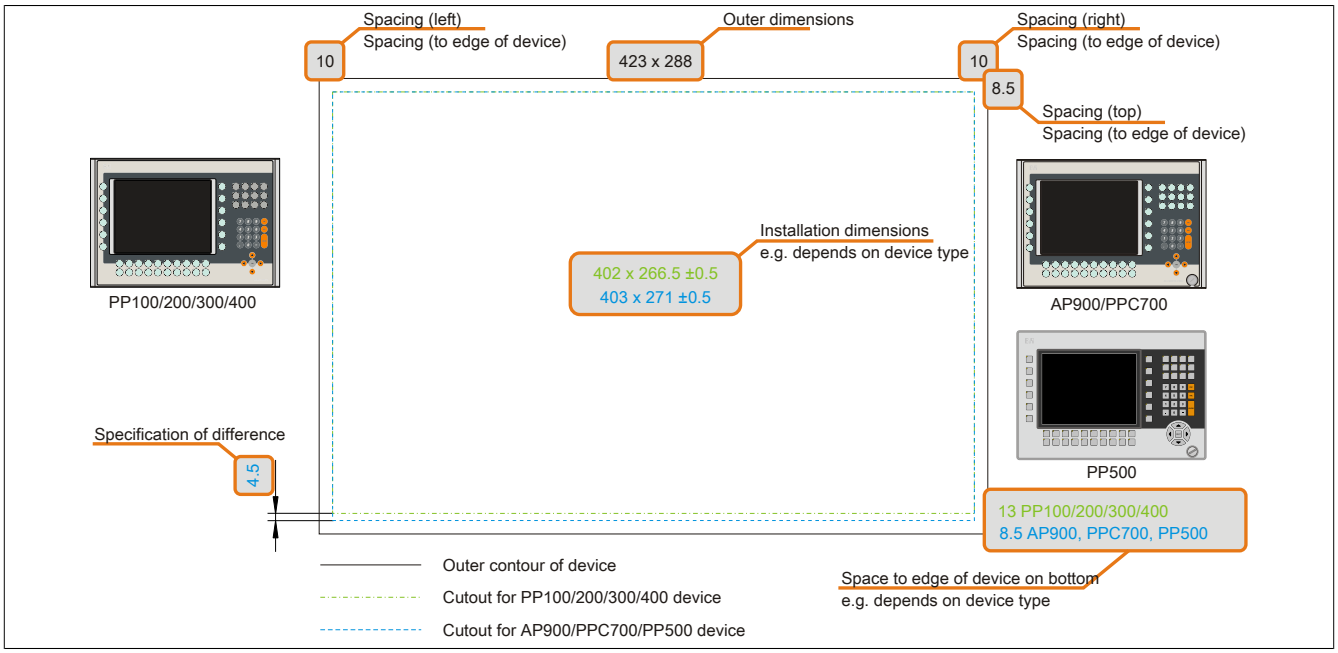


Figure 192: Overview of compatibility figures

6.2.2 5.7" devices

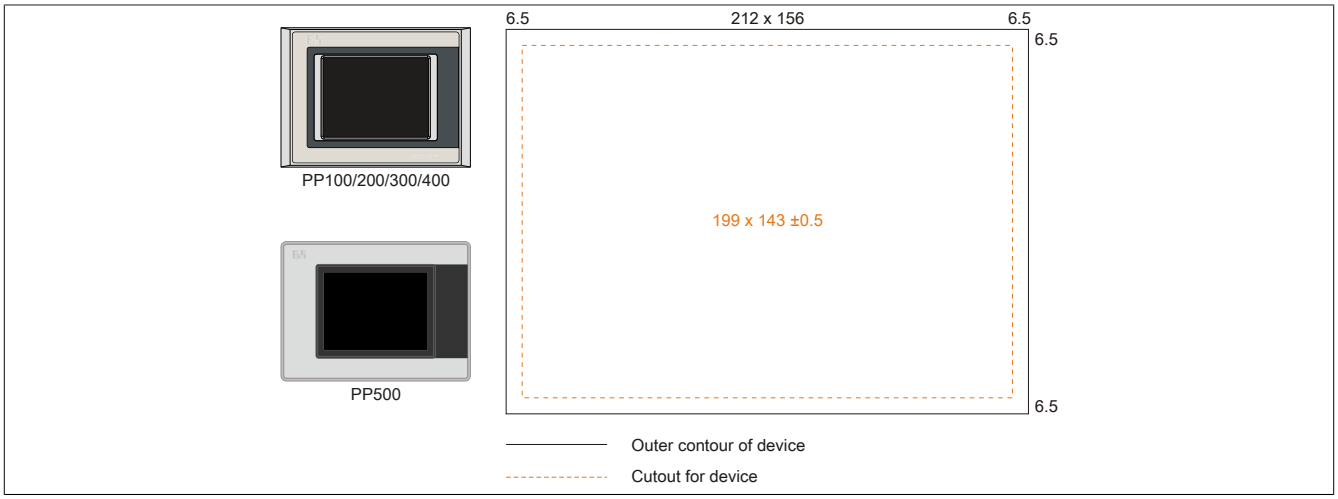


Figure 193: Mounting compatibility - 5.7" device - Horizontal1

5.7" Power Panel 500 devices and Power Panel 100/200/300/400 devices are 100% mounting compatible in the Horizontal1 format.

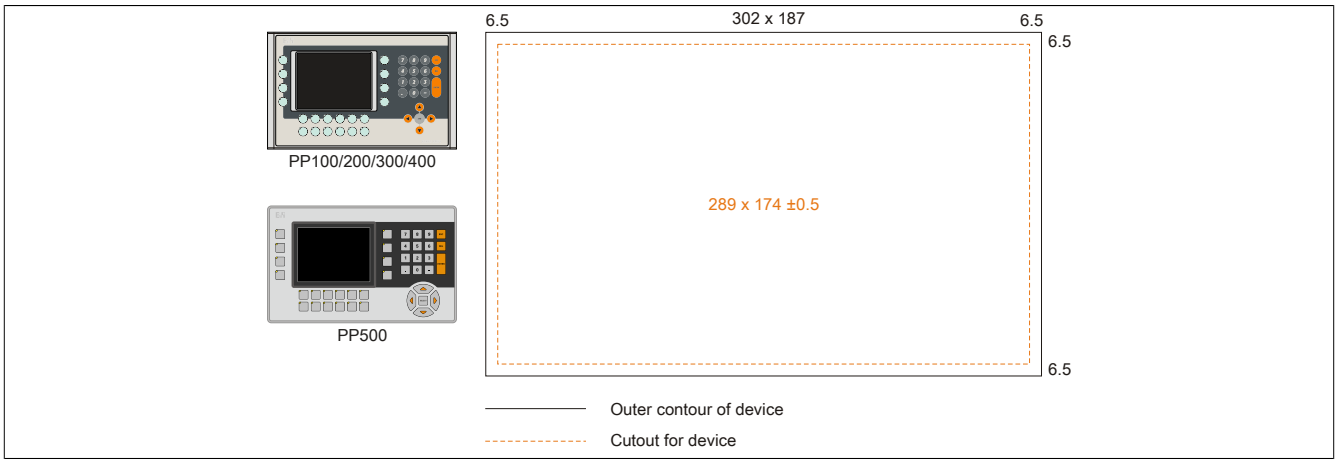


Figure 194: Mounting compatibility - 5.7" device - Horizontal2

5.7" Power Panel 500 devices and Power Panel 100/200300/400 devices are 100% mounting compatible in the Horizontal2 format.

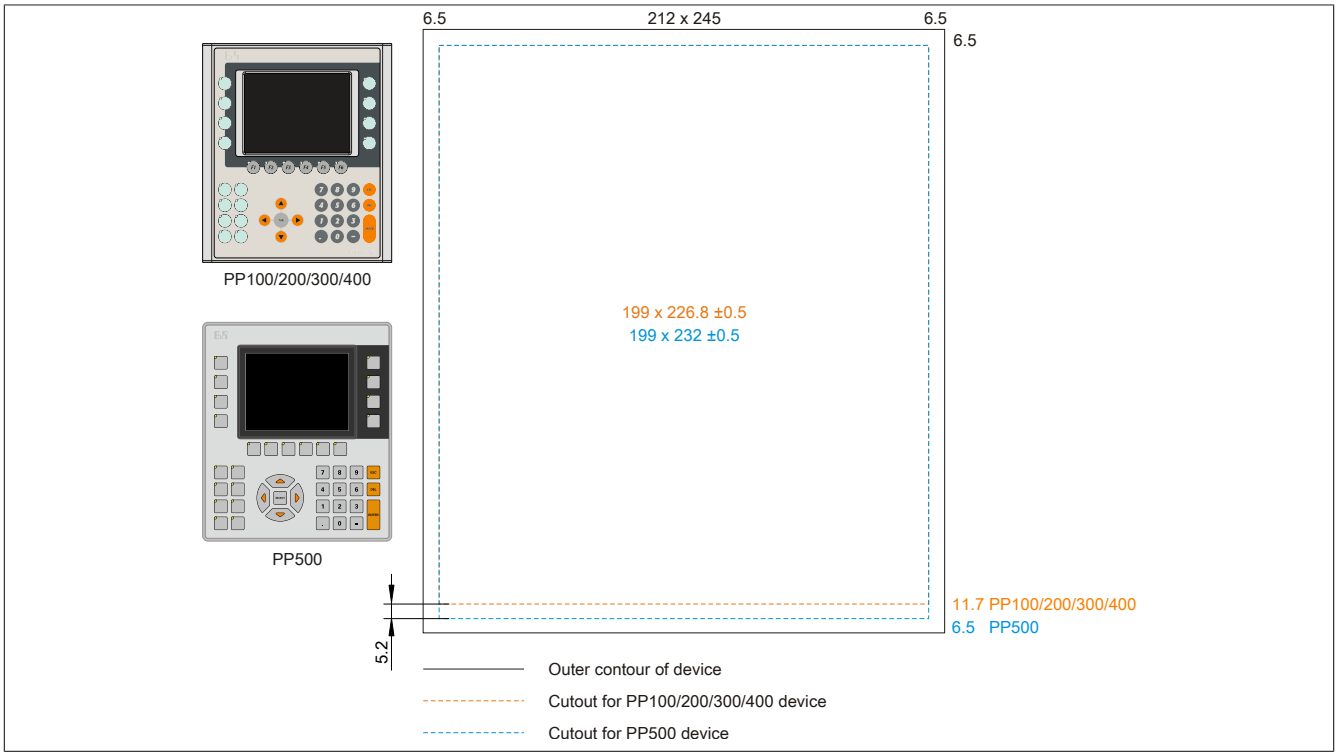


Figure 195: Mounting compatibility - 5.7" device - Vertical1

5.7" Power Panel 500 devices are not 100% mounting compatible with Power Panel 100/200/300/400 devices in the Vertical1 format. 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

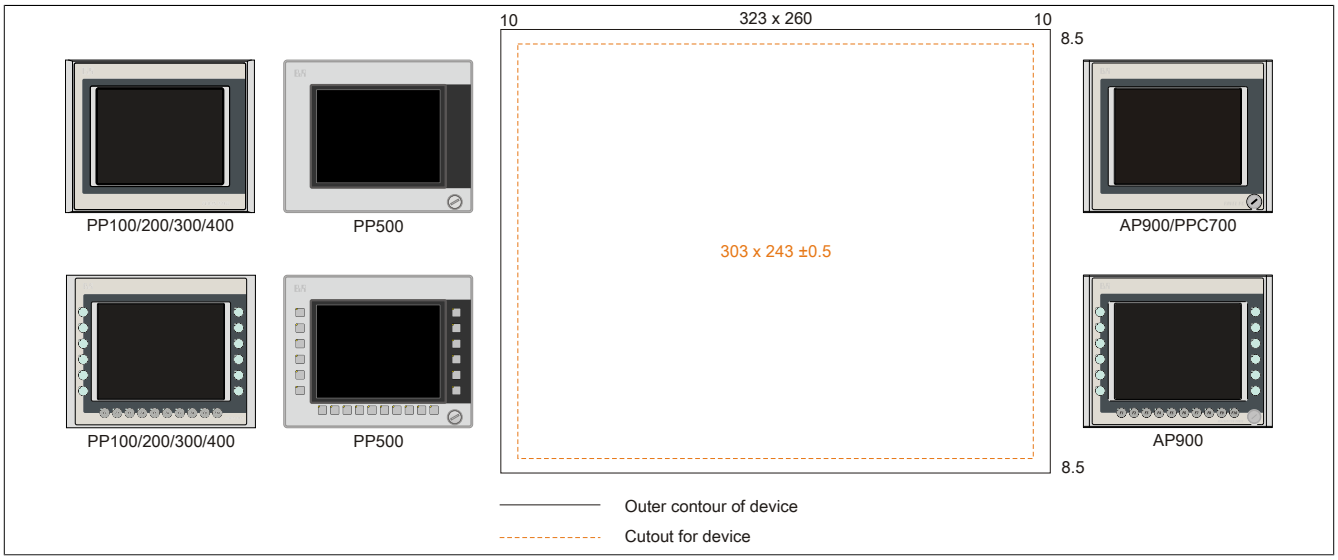


Figure 196: Mounting compatibility - 10.4" device - Horizontal1

10.4" Power Panel 500 devices and Power Panel 100/200/300/400 devices are 100% mounting compatible in the Horizontal1 format.

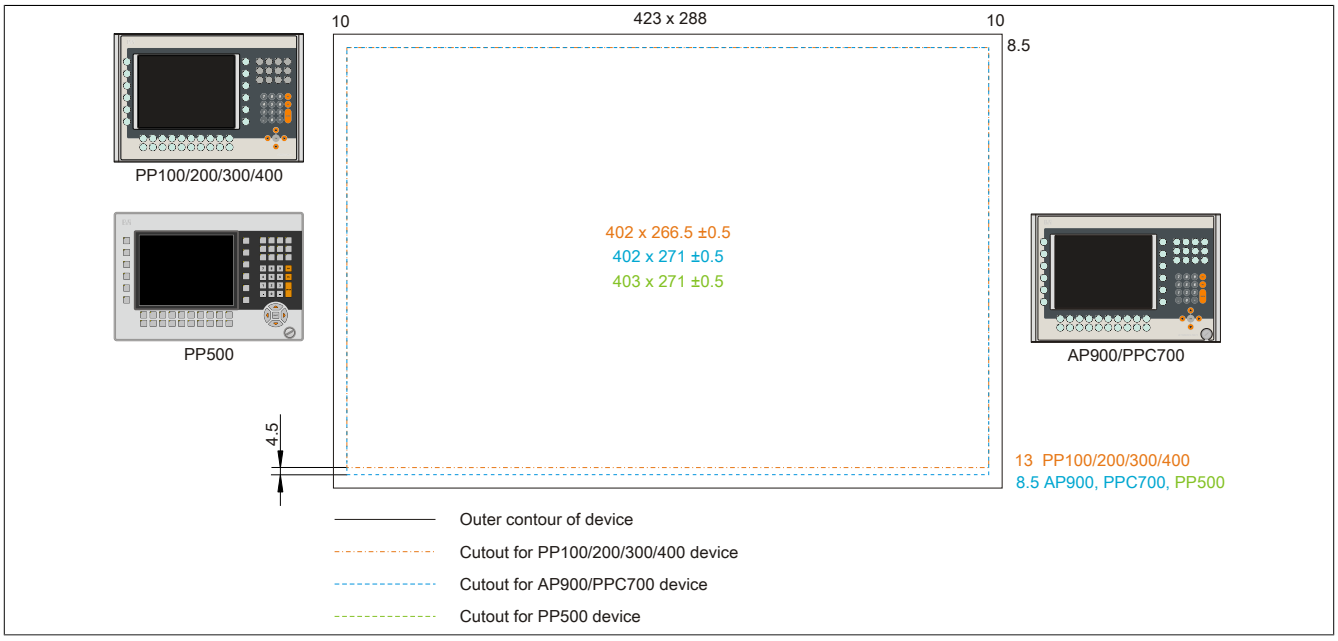


Figure 197: Mounting compatibility - 10.4" device - Horizontal2

10.4" Power Panel 500, Automation Panel 900 and Panel PC 700 devices are not 100% mounting compatible with Power Panel 100/200/300/400 devices in the Horizontal2 format. 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).

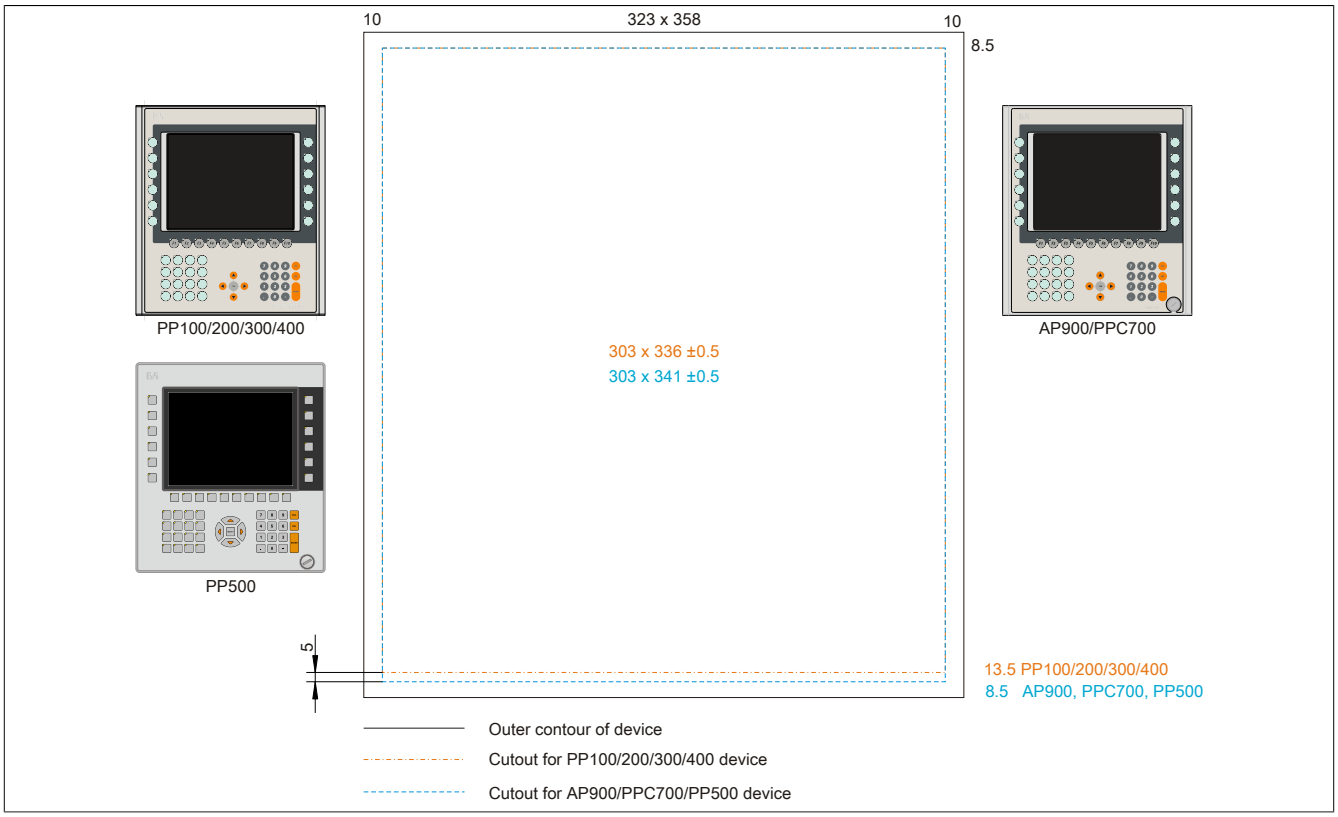


Figure 198: Mounting compatibility - 10.4" device - Vertical1

10.4" Power Panel 500, Automation Panel 900 and Panel PC 700 devices are not 100% mounting compatible with Power Panel 100/200/300/400 devices in Vertical1 format. 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

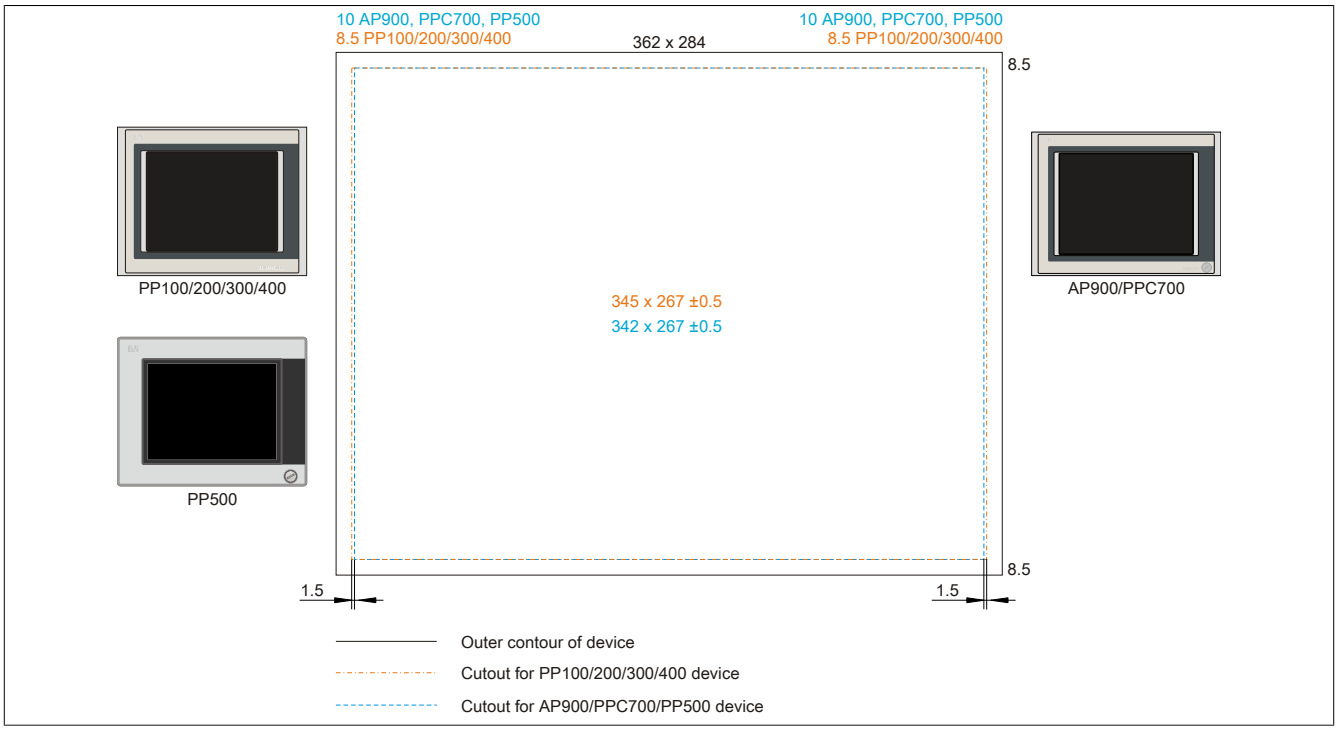


Figure 199: Mounting compatibility - 12.1" device - Horizontal1

12.1" Power Panel 500, Automation Panel 900 and Panel PC 700 devices are not 100% mounting compatible with Power Panel 100/200/300/400 devices in Horizontal1 format. 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

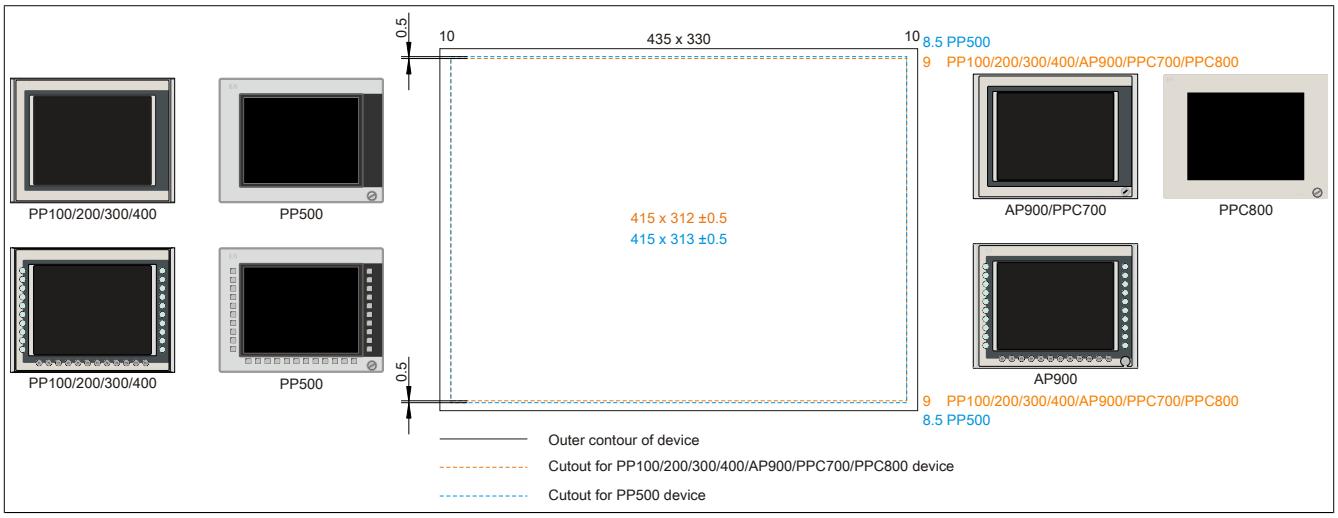


Figure 200: Mounting compatibility - 15" device - Horizontal1

15" Power Panel 500 devices are not 100% mounting compatible with Power Panel 100/200/300/400, Automation Panel 900, Panel PC 700 and Panel PC 800 devices in the Vertical1 format. 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, PP300/400, AP900, PPC700 and PPC800 devices are placed and mounted as close to the center of the cutout as possible. Failure to do so can prevent the retaining clips from holding firmly, which means that a firm seal is no longer guaranteed with the gasket (IP65).

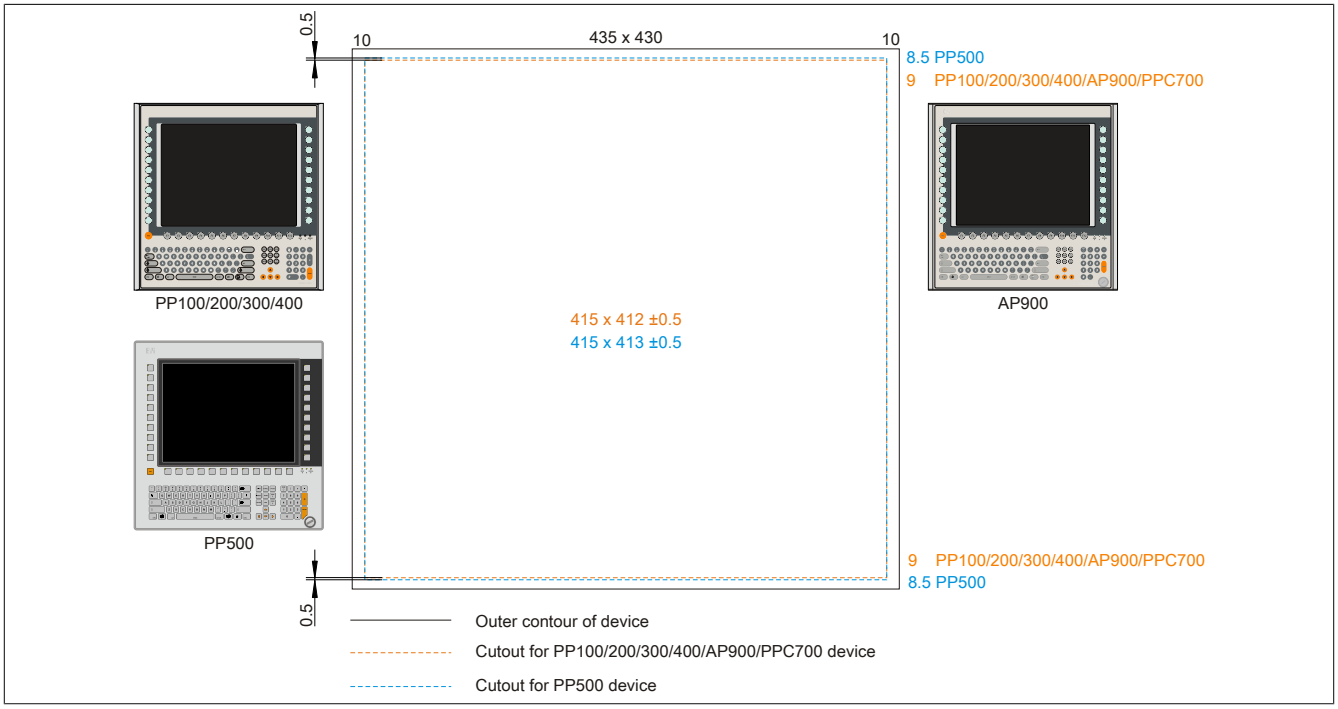


Figure 201: Mounting compatibility - 15" device - Vertical1

15" Power Panel 500 devices are not 100% mounting compatible with Power Panel 100/200/300/400, Automation Panel 900 and Panel PC 700 devices in the Vertical1 format. 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, PP300/400, 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

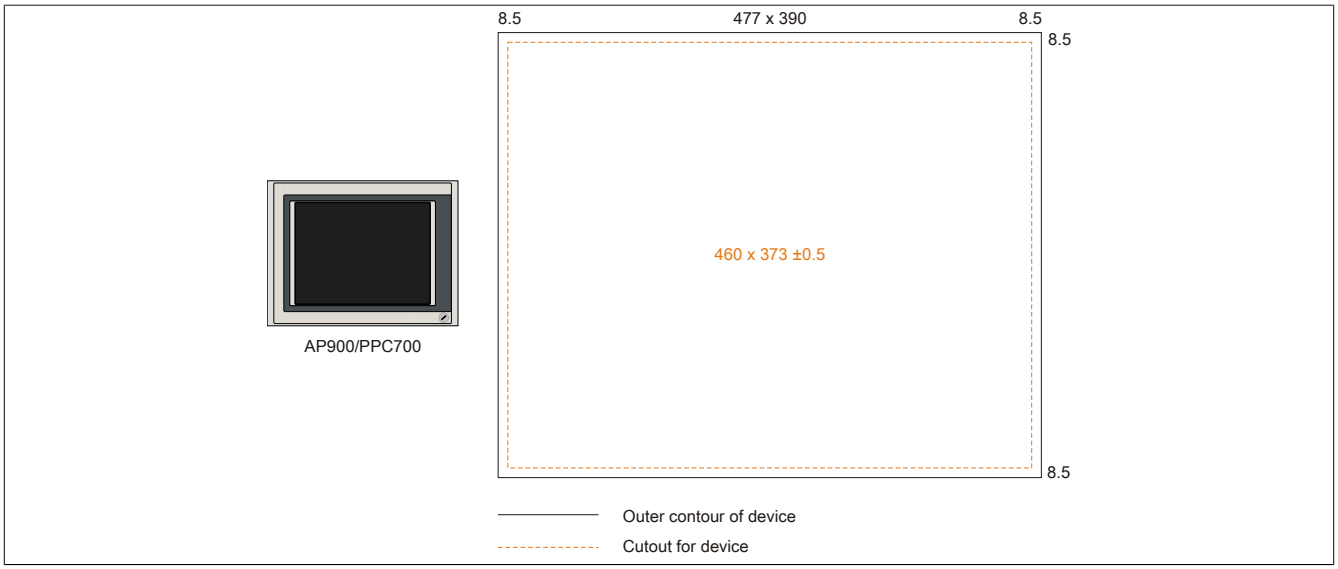


Figure 202: Mounting compatibility - 17" device - Horizontal1

17" Automation Panel 900 devices are 100% mounting compatible with Panel PC 700 devices in the Horizontal1 format.

6.2.7 19" devices

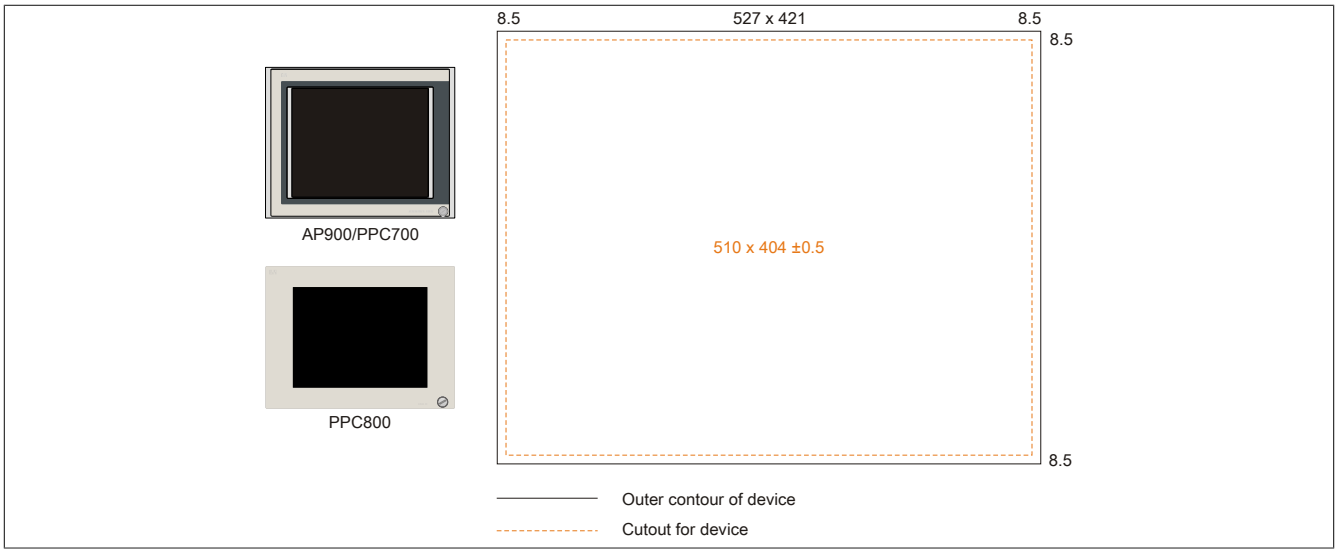


Figure 203: Mounting compatibility - 19" device - Horizontal1

19" Automation Panel 900, Panel PC 700 and Panel PC 800 are 100% mounting compatible in the Horizontal1 format.

6.2.8 21.3" devices

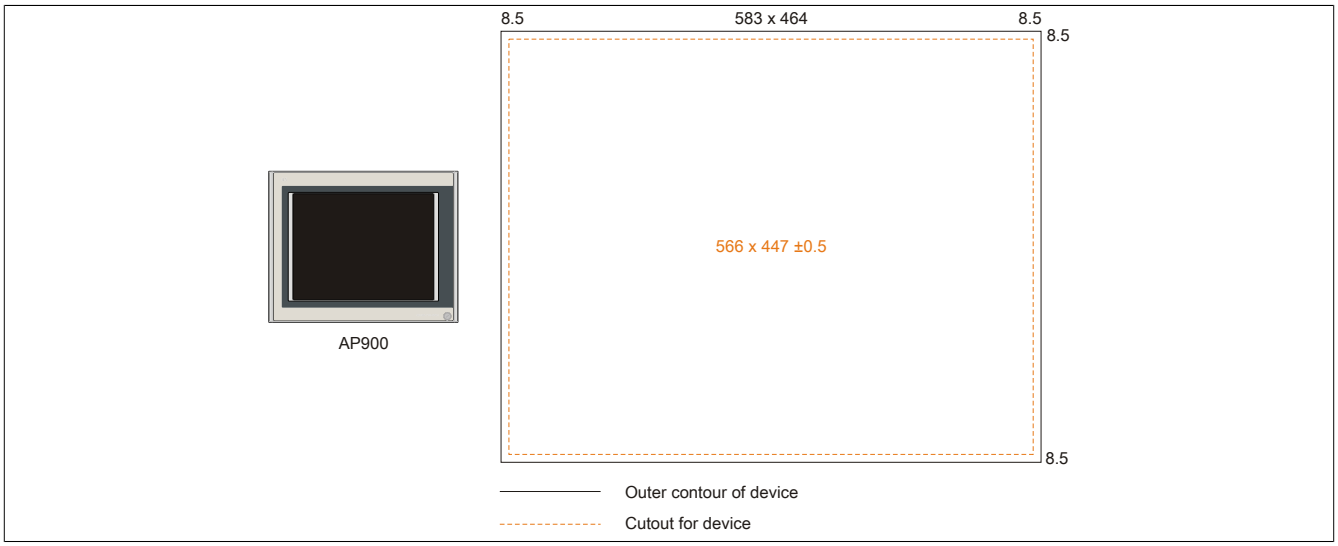


Figure 204: Mounting compatibility - 21.1" device - Horizontal1

7 Glossary

Address	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.
Algorithms	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. *Discreteness:* An algorithm is made up of a finite series of steps. *Determinacy:* Under the same start conditions, it always creates the same end result. *Clearness:* The series of steps is clearly defined. *Finiteness:* It ends after a finite number of steps. 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.].
ANSI	American National Standards Institute > this organization promotes and manages American industrial standards.
APC	Abbreviation for »Automation PC«
Application software	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.
Automation	According to Brockhaus: The application of technical means, using specific programs that (either partially or totally) do not require human intervention to perform operations.
Automation Runtime	A uniform runtime system for all B&R automation components.
Failure	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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