Panel PC 800 with NM10 CPU board

User's Manual

Version: **1.00 (March 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 133 in the Chapter "Software" on page 133 was added and revised. • The following drives were added: "5AC801.HDDI-04" on page 81, "5ACPCI.RAIC-06" on page 101, "5MMHDD.0500-00" on page 106 • General information about the drive "5ACPCI.RAIC-05" on page 98 and "5MMHDD.0250-00" on page 104 was updated.

Table 1: Manual history

2 Safety notices

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 ESDhandling

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), the safety precautions applying to industrial control systems (e.g. the provision of safety devices such as emergency stop circuits, etc.) must be observed in accordance with applicable national and international regulations. The same applies for all other devices connected to the system, such as drives.

All tasks such as 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 operating/monitoring devices or the uninterruptible power supply or operating them 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.

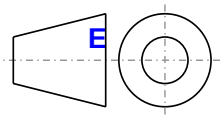
3 Organization of safety notices

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	224
	Accessories	
5AC900.1201-00	USB port cap M20 IP65 flat	216
5AC900.1201-01	USB port cap M20 IP65 rounded, knurled	216
5AC900.BLOC-00	Mounting block with wings 10pcs, spare part.	217
5ACPCI.ETH1-01	PCI Ethernet card 1x 10/100	226
5ACPCI.ETH3-01	PCI Ethernet card 3x 10/100	229
	Adapter	
5AC803.BC01-00	PPC800 adapter 1 PCI Express compact.	69
5AC803.BC02-00	PPC800 adapter 1 Slide-in compact.	69
	Batteries	
0AC201.91	Lithium batteries 4 pieces, 3 V / 950 mAh button cell Hereby we declare that the Lithium cells contained in this shipment qualify as „partly regulated“. Handle with care. If the package is damaged, inspect cells, repack intact cells and protect cells against short circuits. For emergency information, call RENATA SA at + 41 61 319 28 27	212
4A0006.00-000	Lithium battery, 3 V / 950 mAh, button cell	212
	Battery units	
9A0100.12	UPS battery unit type A, 24 V, 7 Ah, incl. battery cage	224
9A0100.14	UPS battery unit type B, 24 V, 2.2 Ah, incl. battery cage	224
9A0100.16	UPS battery unit type C, 24 V, 4.5 Ah, incl. battery cage	224
	Bus units	
5AC803.BX01-00	PPC800 bus 1 PCI, 1 slide-in slot.	67
5AC803.BX01-01	PPC800 bus 1 PCI Express, 1 slide-in slot.	67
5AC803.BX02-00	PPC800 bus 2 PCI slots, 1 slide-in slot.	67
5AC803.BX02-01	PPC800 bus with 1 PCI, 1 PCI Express, 1 slide-in slot.	67
	CPU boards	
5PC800.CCAX-00	Intel Atom N2800 CPU board, 1.86 GHz, Dual-Core, 533 MHz FSB, 1 MB L2 cache; chipset NM10; 1 socket for SO-DIMM DDR3 module	58
	CompactFlash	
5CFCRD.0064-03	CompactFlash 64 MB Western Digital (SLC)	237
5CFCRD.0128-03	CompactFlash 128 MB Western Digital (SLC)	237
5CFCRD.016G-06	CompactFlash 16 GB B&R (SLC)	233
5CFCRD.0256-03	CompactFlash 256 MB Western Digital (SLC)	237
5CFCRD.032G-06	CompactFlash 32 GB B&R (SLC)	233
5CFCRD.0512-03	CompactFlash 512 MB Western Digital (SLC)	237
5CFCRD.0512-06	CompactFlash 512 MB B&R (SLC)	233
5CFCRD.1024-03	CompactFlash 1 GB Western Digital (SLC)	237
5CFCRD.1024-06	CompactFlash 1 GB B&R (SLC)	233
5CFCRD.2048-03	CompactFlash 2 GB Western Digital (SLC)	237
5CFCRD.2048-06	CompactFlash 2 GB B&R (SLC)	233
5CFCRD.4096-03	CompactFlash 4 GB Western Digital (SLC)	237
5CFCRD.4096-06	CompactFlash 4 GB B&R (SLC)	233
5CFCRD.8192-03	CompactFlash 8 GB Western Digital (SLC)	237
	Drives	
5AC801.ADAS-00	SATA hard disk adapter to operate a slide-in compact hard disk in a slide-in slot.	90
5AC801.DVDS-00	DVD-ROM SATA drive (slide-in).	93
5AC801.DVRS-00	DVD-R/RW DVD+R/RW SATA drive (slide-in).	95
5AC801.HDDI-00	40 GB SATA hard disk (slide-in compact); 24/7 hard disk with extended temperature range. Remark: Please see manual for proper use of the hard disk.	77
5AC801.HDDI-03	250 GB SATA hard disk (slide-in compact); 24/7 hard disk. Remark: Please see manual for proper use of the hard disk.	79
5AC801.HDDI-04	500 GByte SATA Hard Disk, Slide-in compact, 24/7 Hard Disk Hinweis: Beachten Sie das Manual zum Einsatz der Harddisk.	81
5AC801.HDDS-00	40 GB SATA hard disk (slide-in); 24/7 hard disk with extended temperature range. Remark: Please see manual for proper use of the hard disk.	91
5AC801.SSDI-00	32 GB SATA SSD (SLC), Slide-in compact	83
5AC801.SSDI-01	60 GB SATA SSD (MLC), Slide-in compact	86
5AC801.SSDI-02	180 GB SATA SSD (MLC), Slide-in compact	88
5ACPCI.RAIC-05	PCI RAID System SATA 2x 250 GB; Remark: Please see manual for proper use of the hard disk.	98
5ACPCI.RAIC-06	PCI RAID System SATA 2x 500 GByte; Hinweis: Beachten Sie das Manual zum Einsatz der Harddisk.	101
5MMHDD.0250-00	250 GB SATA Hard Disk Spare part for 5AC801.HDDI-03 and 5ACPCI.RAIC-05; Remark: Please see manual for proper use of the hard disk.	104
5MMHDD.0500-00	500 GB SATA Hard Disk Spare part for 5AC801.HDDI-04, 5AC901.CHDD-01 and 5ACPCI.RAIC-06; Remark: Please see manual for proper use of the hard disk.	106
	Expansions	
5AC803.SX01-00	PPC800 expansion 1 PCI/PCI Express and 1 Slide-in (bus 5AC803.BX01-00 or 5AC803.BX01-01 necessary).	62
5AC803.SX02-00	PPC800 expansion 2 PCI/PCI Express and 1 Slide-in (bus 5AC803.BX02-00 or 5AC803.BX02-01 necessary).	62
	Fan kits	
5AC803.FA01-00	PPC800 fan kit for system units without expansion.	108
5AC803.FA02-00	PPC800 fan kit for system units with the expansion 5AC803.SX01-00.	109
5AC803.FA03-00	PPC800 fan kit for system units with the expansion 5AC803.SX02-00.	111
	Heat sinks	
5AC803.HS00-04	PPC800 heat sink for CPU board with Atom Dual-Core processor N2800	60

Product ID	Short description	on page
	Interface cards	
5ACPCC.ETH0-00	PCIec Ethernet card 1x 10/100/1000	71
5ACPCC.MPL0-00	PCIec POWERLINK card, 2 POWERLINK interfaces, 512 kByte SRAM	73
	MS-DOS	
9S0000.01-010	OEM Microsoft MS-DOS 6.22, German Floppy disks, only available with a new PC.	173
9S0000.01-020	OEM Microsoft MS-DOS 6.22, English Floppy disks, only available with a new PC.	173
	Main memory for GM45 CPU boards	
5MMDDR.2048-02	SO-DIMM DDR3 RAM 2048 MB PC3-8500	61
5MMDDR.4096-02	SO-DIMM DDR3 RAM 4096 MByte PC3-8500	61
	Miscellaneous	
5AC900.1000-00	Adapter DVI (male) to CRT (female). For connecting a standard monitor to a DVI-I interface.	215
	Other	
5SWHMI.0000-00	HMI Drivers & Utilities DVD	251
	RS232 cable	
9A0014.02	RS232 extension cable for remote operating of a display unit with touch screen, 1.8 m.	255
9A0014.05	RS232 extension cable for remote operating of a display unit with touch screen, 5 m.	255
9A0014.10	RS232 extension cable for remote operating of a display unit with touch screen, 10 m.	255
	Replacement batteries	
9A0100.13	UPS batteries type A (spare part), 2x 12 V, 7 Ah, for battery unit 9A0100.12	224
9A0100.15	UPS batteries type B (spare part), 2x 12 V, 2.2 Ah, for battery unit 9A0100.14	224
9A0100.17	UPS batteries type C (spare part), 2x 12 V, 4.5 Ah, for battery unit 9A0100.16	224
	Systemeinheiten	
5PC820.1505-00	Panel PC 820 15" XGA TFT Display mit Touch Screen (resistiv); Anschlüsse für 1x RS232, 5x USB 2.0, Smart Display Link/DVI/Monitor, 2x Ethernet 10/100/1000, HDA Sound, Add-On USV Steckplatz, erweiterbar mit 1 oder 2 PCI / PCI Express Steckplätzen, optionaler PCI Express compact und Slide-in compact Steckplatz; Schutzart IP65 (frontseitig); 24 VDC Stecker für Spannungsversorgung gesondert bestellen (Schraubklemme: 0TB103.9; Federzugklemme: 0TB103.91).	46
5PC820.1906-00	Panel PC 820 19" SXGA color TFT Display mit Touch Screen (resistiv); Anschlüsse für 1x RS232, 5x USB 2.0, Smart Display Link/DVI/Monitor, 2x Ethernet 10/100/1000, HDA Sound, Add-On USV Steckplatz, erweiterbar mit 1 oder 2 PCI / PCI Express Steckplätzen, optionaler PCI Express compact und Slide-in compact Steckplatz; Schutzart IP65 (frontseitig); 24 VDC Stecker für Spannungsversorgung gesondert bestellen (Schraubklemme: 0TB103.9; Federzugklemme: 0TB103.91).	52
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm², protected against vibration by the screw flange	214
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm², protected against vibration by the screw flange	214
	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.	249
5MD900.USB2-02	USB 2.0 Drives DVD-R/RW DVD+R/RW, CompactFlash slot (type II), USB connector (type A on front side, type B on back side); 24 VDC; (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	245
5MMUSB.2048-00	USB 2.0 Memory Stick 2048 MB	241
5MMUSB.2048-01	USB 2.0 flash drive 2048 MB B&R	243
	USB cable	
5CAUSB.0018-00	USB 2.0 connecting cable type A - type B, 1.8 m.	254
5CAUSB.0050-00	USB 2.0 connecting cable type A - type B, 5 m.	254
	Undefined	
5CAMSC.0001-00	APC620 internal power supply cable - Customized -	257
	Uninterruptible power supplies	
5AC600.UPSB-00	Battery unit 5Ah; for APC620, APC800 or PPC800 UPS.	220
5AC600.UPSI-00	UPS module for APC620, APC810, PPC800; for system units 5PC600.SX01-00 (from Rev. H0), 5PC600.SX02-00 (from Rev. G0), 5PC600.SX02-01 (from Rev. H0), 5PC600.SX05-00 (from Rev. F0), 5PC600.SX05-01 (from Rev. F0), 5PC600.SF03-00 (from Rev. A0), 5PC810.SX*. 5PC820.1505-00, 5PC820.1906-00. Cable (5CAUPS.0005-00 or 5CAUPS.0030-00) and battery unit (5AC600.UPSB-00) have to be ordered separately.	219
5CAUPS.0005-00	UPS cable 0.5 m; for UPS 5AC600.UPSI-00.	223
5CAUPS.0030-00	UPS cable 3 m; for UPS 5AC600.UPSI-00.	223
	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.	176
5SWWI7.1100-GER	Microsoft OEM Windows 7 Professional 32-bit, Service Pack 1, DVD, German. Only available with a new device.	176
5SWWI7.1300-MUL	Microsoft OEM Windows 7 Ultimate 32-bit, Service Pack 1, DVD, multilanguage. Only available with a new device.	176
	Windows Embedded Standard 2009	
5SWWXP.0739-ENG	Microsoft OEM Windows Embedded Standard 2009, English; for PPC800 with NM10 chipset; please order CompactFlash separately (minimum 1 GB).	178
	Windows Embedded Standard 7	
5SWWI7.1539-ENG	Microsoft OEM Windows Embedded Standard 7 32-bit, Service Pack 1, English; for PPC800 with NM10 chipset; please order CompactFlash separately (minimum 16 GB).	180
5SWWI7.1739-MUL	Microsoft OEM Windows Embedded Standard 7 Premium 32-bit, Service Pack 1, multilanguage; for PPC800 with NM10 chipset; please order CompactFlash separately (minimum 16 GB).	180
	Windows XP Professional	
5SWWXP.0600-ENG	Microsoft OEM Windows XP Professional Service Pack 3, CD, English. Only available with a B&R device.	174
5SWWXP.0600-GER	Microsoft OEM Windows XP Professional Service Pack 3, CD, German. Only available with a device.	174
5SWWXP.0600-MUL	Microsoft OEM Windows XP Professional Service Pack 3, CD, multilanguage. Only available with a B&R device.	174

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 exchange (SATA hot plug capable)
- HDA sound
- Add-on UPS slot

1.2 System components / configuration

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

The following components are absolutely essential for operation:

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

1.2.1 Configuration - Base system

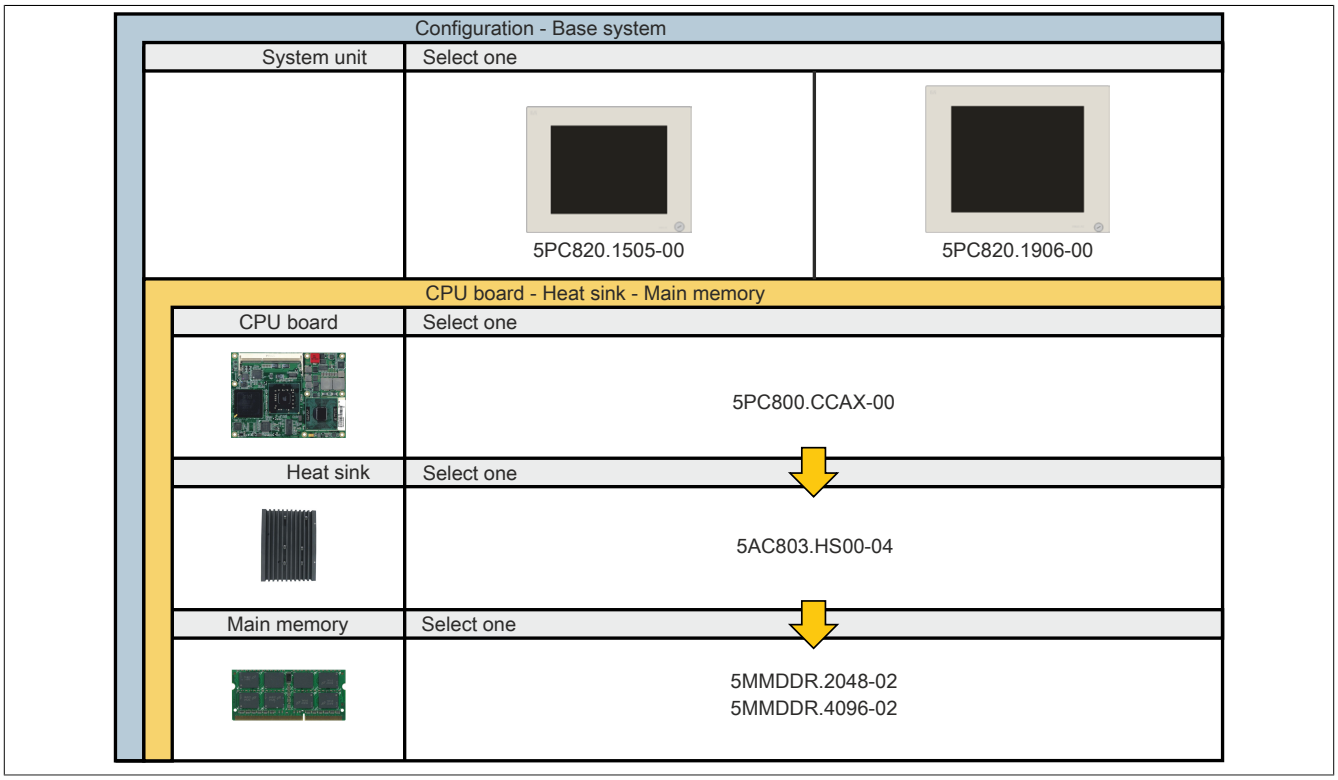
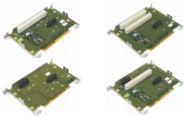
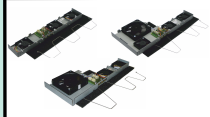
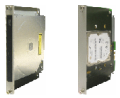


Figure 1: Configuration - Base system

1.2.2 Configuration - Accessories and software

Configuration - Accessories and software			
Configuration of a system unit with adapter			
Adapters[1]	Select one or both		
	5AC803.BC01-00		5AC803.BC02-00
	PCIec plug-in cards, Select one		Slide-in compact drives, select one
	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.SSDI-00 (32 GB) 5AC801.SSDI-01 (60 GB) 5AC801.SSDI-02 (180 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)	
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		
Microsoft Windows xp Windows Embedded Standard 2009 Windows Embedded Standard 7 Windows 7	**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: Configuration - Accessories and software

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 entire 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 113.

	All temperature values in degrees Celsius (°C) at 500 m above sea level. Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).	Operation without Fan kit 5PC800.CCAX-00	Operation with Fan kit 5PC800.CCAX-00	Temperature limits	Location of sensor(s)
	Maximum ambient temperature	**50**	**60**		
	What else can be operated at the max. ambient temperature, or are there any limits?				
Compact slide-in 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	
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 / default)	45	50	-	
	5ACPCI.RAIC-06 (24 hours / default)	45	50	-	

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

Table 5: Ambient temperatures

How is the maximum ambient temperature determined?

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

Information:

Maximum temperature data is for operation at 500 meters. Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 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 complete system without problems.

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

2.1.2 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 locations of the temperature sensors can be seen in "Figure 3: Temperature sensor locations" on page 24. 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.

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

2.1.4 Temperature sensor locations

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

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

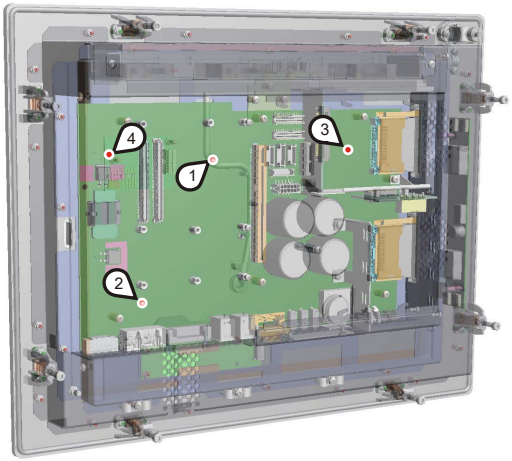


Figure 3: Temperature sensor locations

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 baseboard).	80°C
4	Power Supply	Power supply temperature.	80°C
-	Slide-in drive 1	Temperature of a slide-in drive (the sensor is integrated on the slide-in drive).	Depending on the slide-in drive being used
-	IF Slot	Temperature of the 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 displays the minimum and maximum relative humidity for the individual components that are relevant for the humidity limitations of the entire device. The lowest and highest common values are always used when establishing these limits.

Component		Operation	Storage / Transport
CPU boards NM10 COM Express		10 to 90%	5 to 95%
Main memory for CPU boards		10 to 90%	5 to 95%
Compact slide-in 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%
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 / default)	5 to 95%	5 to 95%
	5ACPCI.RAIC-06 (24 hours / default)	5 to 95%	5 to 95%
	5MMHDD.0250-00 (24 hours / default)	5 to 95%	5 to 95%
	5MMHDD.0500-00 (24 hours / default)	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 listed specifications correspond to the relative humidity at an ambient temperature of 30°C. More detailed information about the specific temperature-dependent humidity values can be found in the technical data for the individual components.

2.3 Power management

2.3.1 Supply voltage block diagram

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

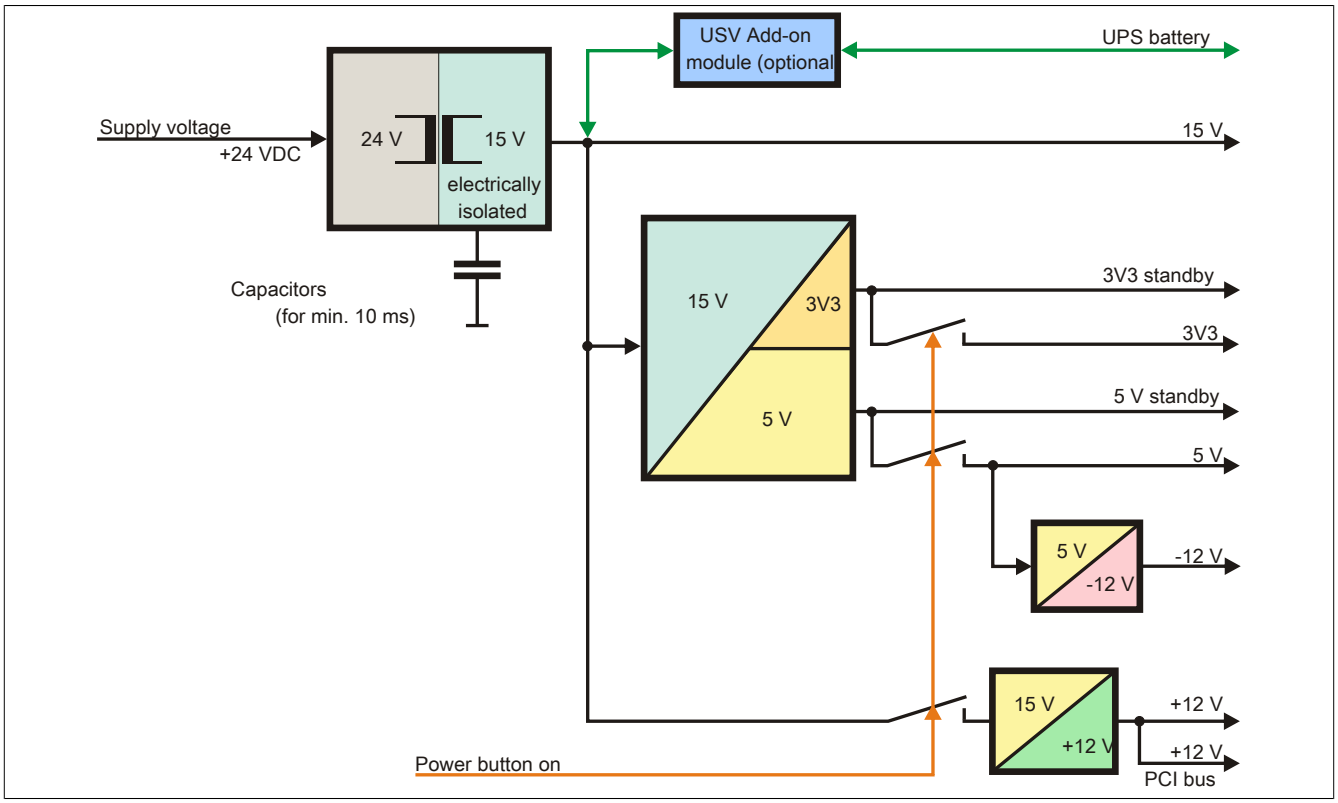


Figure 4: Supply voltage block diagram

Description

15 V is generated from the supply voltage using a DC/DC converter. This electrically isolated 15 V supplies further DC/DC converters, which 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/DC converter generates -12 V, and places these on the bus. An additional DC/DC converter generates +12 V.

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

2.3.2 Power calculation with 5PC820.1505-00

Information:	CPU board	Current system
All values in **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	
Total power supply / Backlight Display 15"	14	
Maximum possible at +12V		**75**
+12 V / CPU board, permanent consumers	13	
+12 V / 2048 MB RAM, max. 1 with 3 W each		
+12 V / 4096 MB RAM, max. 1 with 4 W each		
+12 V / Fan kit, optional	2.4	
+12 V / Power consumption of the PCIec cards, optional, max. 4 W[2]		
+12 V / PCI card limit, optional (max. 3 W without fan kit, max. 6 W with fan kit)[1]		
+12 V / PCIe x1 card limit, optional (max. 3 W without fan kit, max. 20 W with fan kit)[1]		
Consumers +12 V ∑		
Maximum possible at +5V		**65**
+5 V / System unit, permanent consumers	4	
+5 V / Hard disk (slide-in compact)	4	
+5 V / Slide-in drive (hard disk, DVD-ROM, etc.)	4	
+5 V / USB peripherals USB2 and USB4 with 2.5 W each		
+5 V / USB peripherals USB1, USB3 and USB5 with 5 W each		
+5 V / Power consumption of the PCIec cards, optional, max. 4 W[2]		
+5 V / PCI card limit, optional (max. 3 W without fan kit, max. 20 W with fan kit)[1]		
Maximum possible at -12V		**1.2**
-12 V / PCI card limit, optional (max. 1.2 W with or without fan kit)[1]		
Consumers -12 V ∑		
Consumers +5 V ∑		
Maximum possible at 3V3		**40**
3V3 / System unit, permanent consumers	9	
3V3 / CompactFlash, 1 W each		
3V3 / Power consumption of the PCIec cards, optional, max. 4 W[2]		
3V3 / PCI card limit, optional (max. 3 W without fan kit, max. 15 W with fan kit)[1]		
3V3 / PCIe x1 card limit, optional (max. 3 W without fan kit, max. 10 W with fan kit)[1]		
Consumers 3V3 ∑		
Consumers ∑		

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

2) The total performance of one 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:	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	
Total power supply / Backlight Display 19"	32	
Maximum possible at +12V		**75**
+12 V / CPU board, permanent consumers	13	
+12 V / 2048 MB RAM, max. 1 with 3 W each		
+12 V / 4096 MB RAM, max. 1 with 4 W each		
+12 V / Fan kit, optional	2.4	
+12 V / Power consumption of the PCIec cards, optional, max. 4 W[2]		
+12 V / PCI card limit, optional (max. 3 W without fan kit, max. 6 W with fan kit)[1]		
+12 V / PCIe x1 card limit, optional (max. 3 W without fan kit, max. 20 W with fan kit)[1]		
Consumers +12 V ∑		
Maximum possible at +5V		**65**
+5 V / System unit, permanent consumers	12	
+5 V / Hard disk (slide-in compact)	4	
+5 V / Slide-in drive (hard disk, DVD-ROM, etc.)	4	
+5 V / USB peripherals USB2 and USB4 with 2.5 W each		
+5 V / USB peripherals USB1, USB3 and USB5 with 5 W each		
+5 V / Power consumption of the PCIec cards, optional, max. 4 W[2]		
+5 V / PCI card limit, optional (max. 3 W without fan kit, max. 20 W with fan kit)[1]		
Maximum possible at -12V		**1.2**
-12 V / PCI card limit, optional (max. 1.2 W with or without fan kit)[1]		
Consumers -12 V ∑		
Consumers +5 V ∑		
Maximum possible at 3V3		**40**
3V3 / System unit, permanent consumers	9	
3V3 / CompactFlash, 1 W each		
3V3 / Power consumption of the PCIec cards, optional, max. 4 W[2]		
3V3 / PCI card limit, optional (max. 3 W without fan kit, max. 15 W with fan kit)[1]		
3V3 / PCIe x1 card limit, optional (max. 3 W without fan kit, max. 10 W with fan kit)[1]		
Consumers 3V3 ∑		
Consumers ∑		

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

2) The total performance of one 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 diagram

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

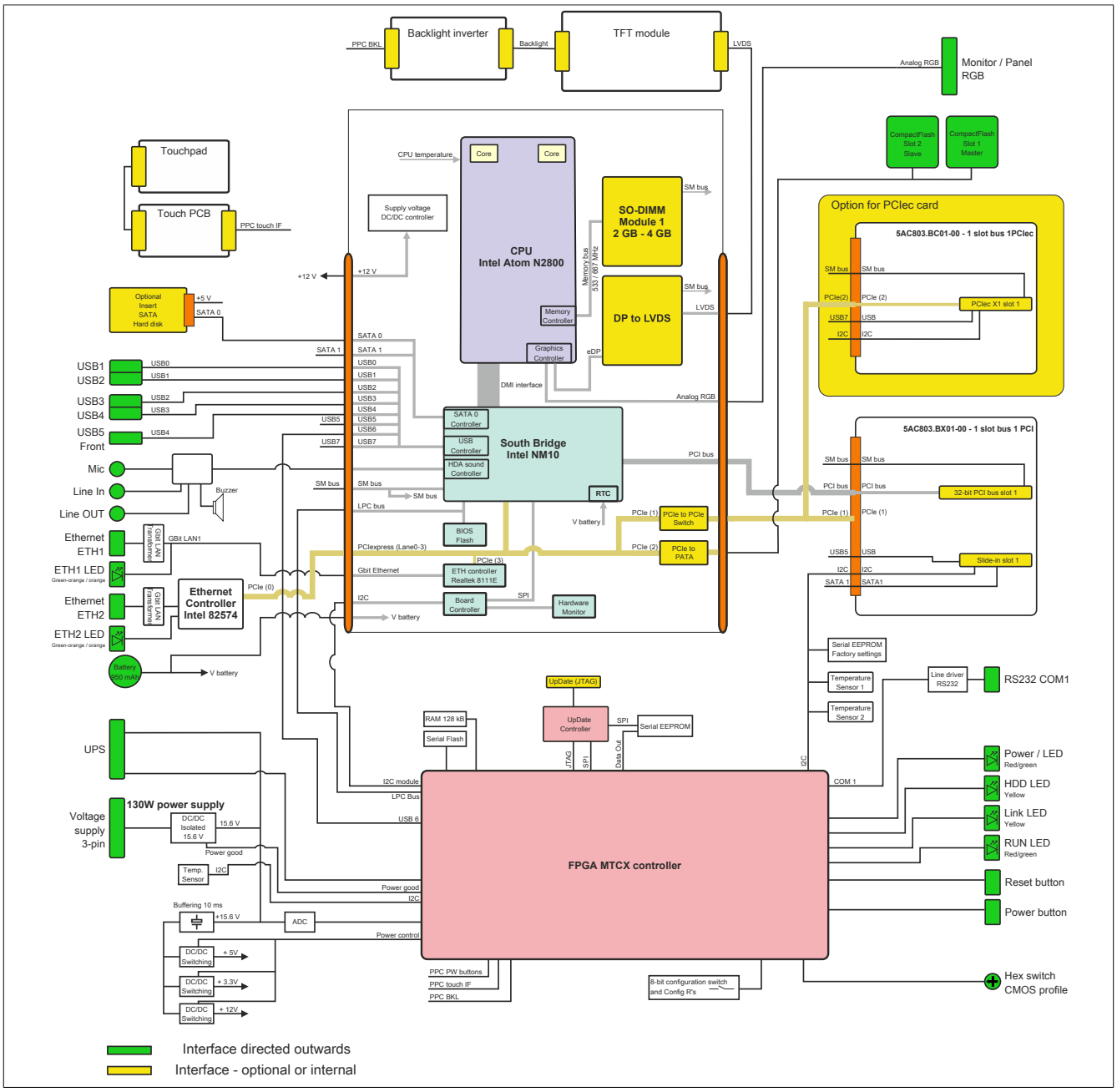


Figure 5: Block diagram with bus unit 5AC803.BX01-00

2.4.2 Bus unit 5AC803.BX01-01

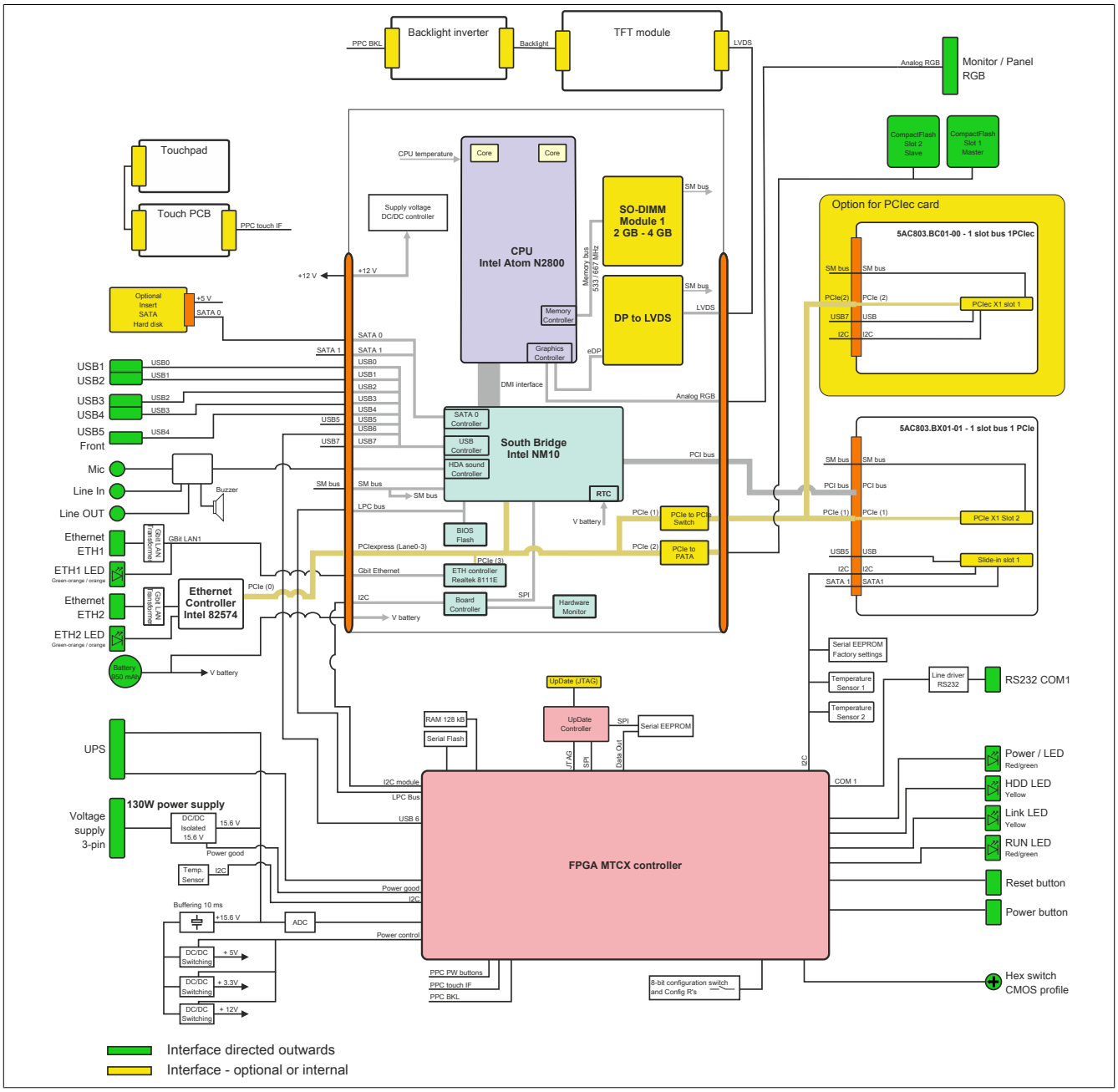


Figure 6: Block diagram with bus unit 5AC803.BX01-01

2.4.3 Bus unit 5AC803.BX02-00

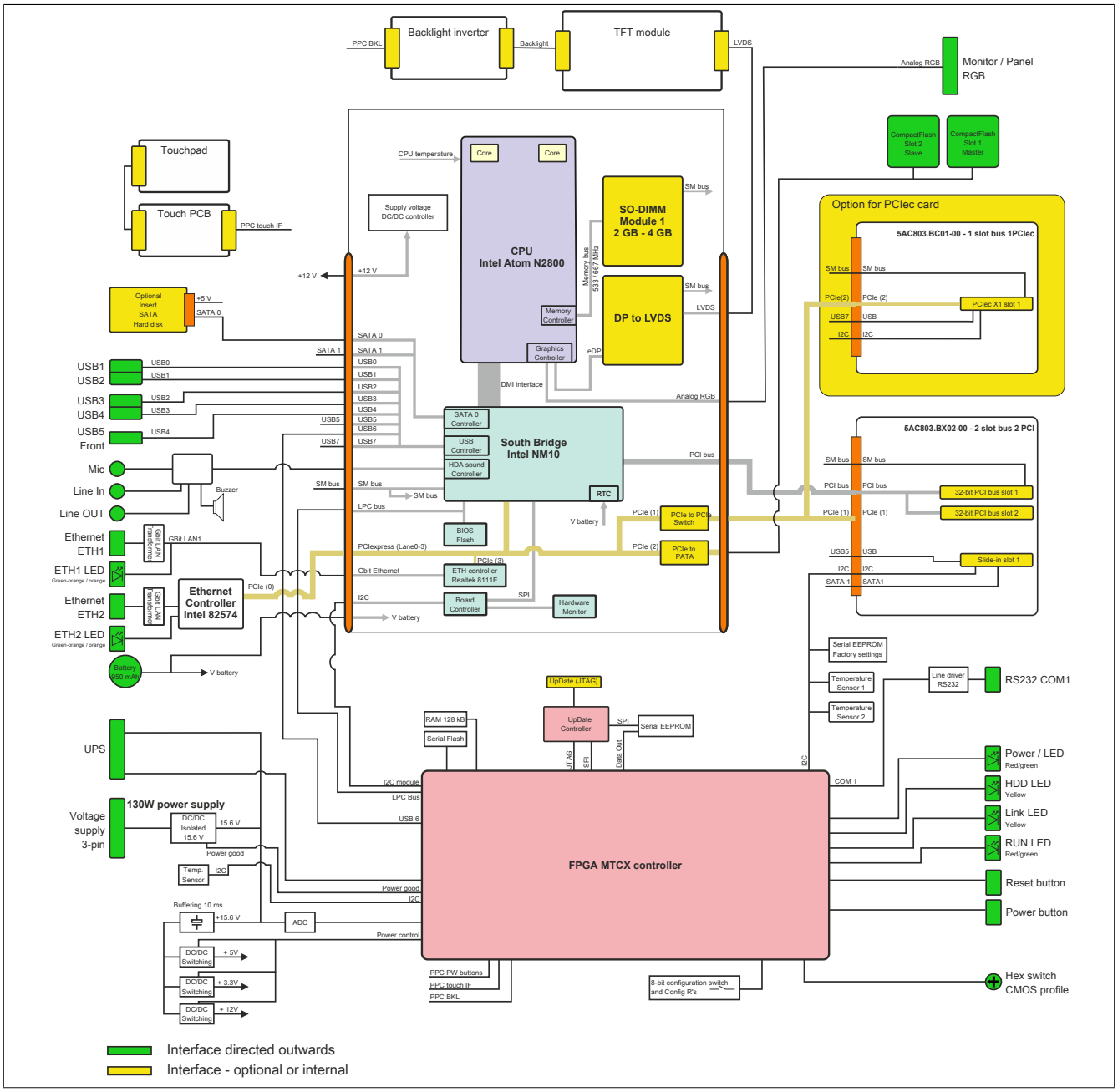


Figure 7: Block diagram with bus unit 5AC803.BX02-00

2.4.4 Bus unit 5AC803.BX02-01

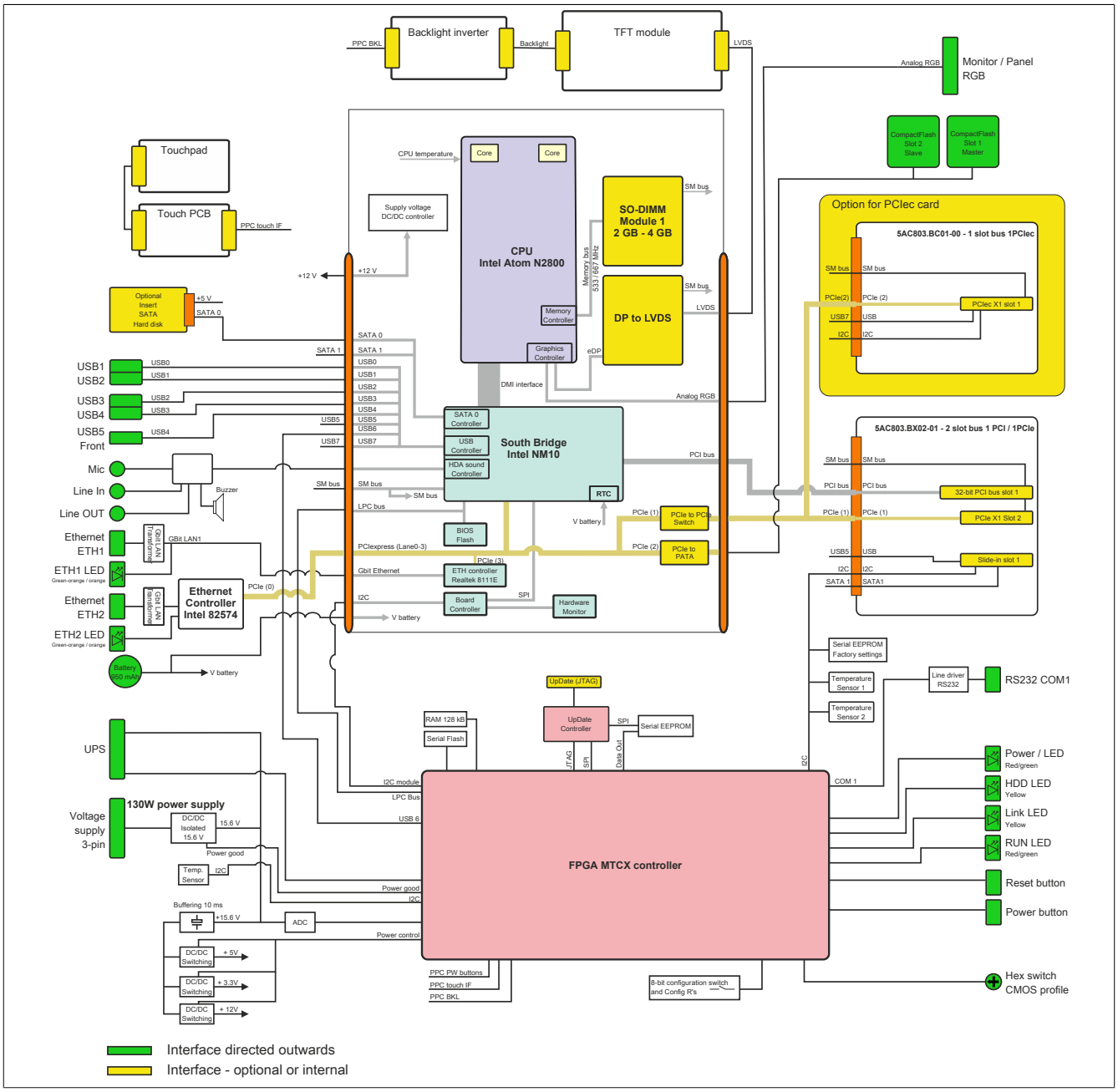


Figure 8: Block diagram with bus unit 5AC803.BX02-01

2.5 Serial number sticker

A unique serial number sticker with a bar code (type 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 (after selecting the "Serial number" option) tab at the top of the homepage www.br-automation.com. The search provides a detailed list of the installed components.

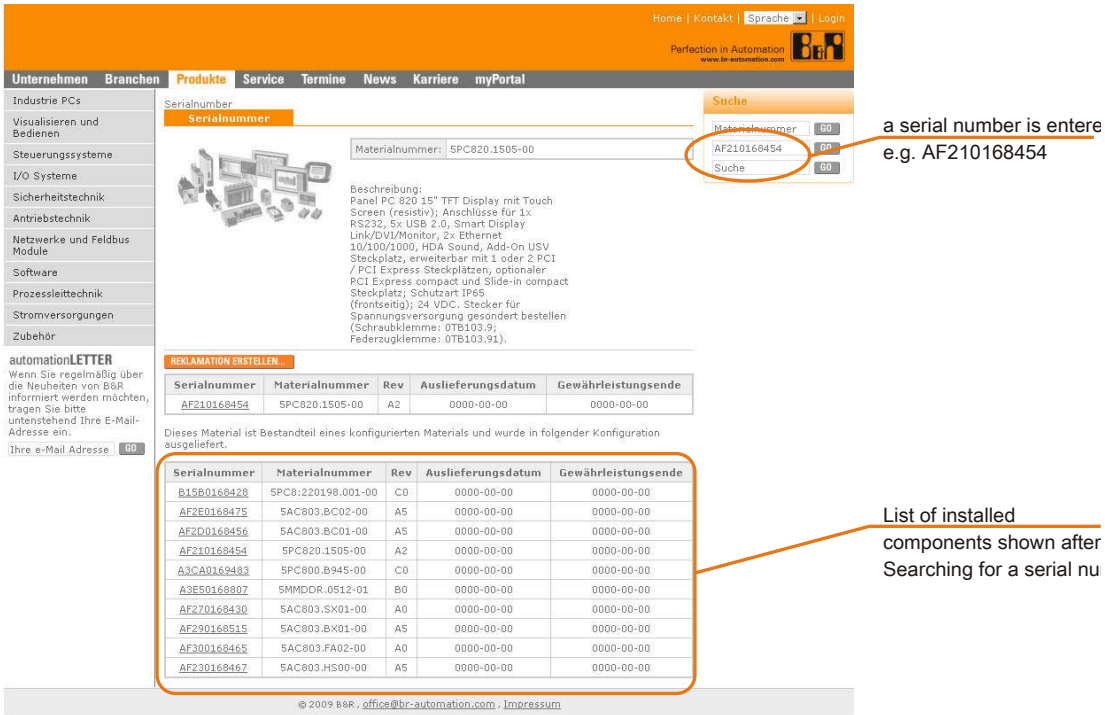


Figure 10: Example of serial number search

2.6 Device interfaces

2.6.1 +24 VDC supply voltage

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

The pinout can be found either in the following table or printed on the PPC800 housing. The supply voltage is protected internally by a soldered fuse (15 A, fast-acting) so that the device cannot be damaged if 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 due to an error.

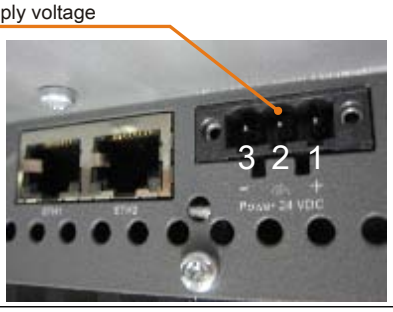
Supply voltage		
Protected against reverse polarity		3-pin, male
Pin	**Description**	+ 24 VDC supply voltage 
1	+	
2	Functional ground	
3	-	
Model number	**Short description**	
	Terminal blocks	
0TB103.9	Connector 24 V 5.08 3-pin screw clamp	
0TB103.91	Connector 24 V 5.08 3-pin cage clamp	

Table 10: 24 VDC supply voltage connection

Ground

> **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). We recommend using the largest possible conductor cross section on the supply plug.**

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

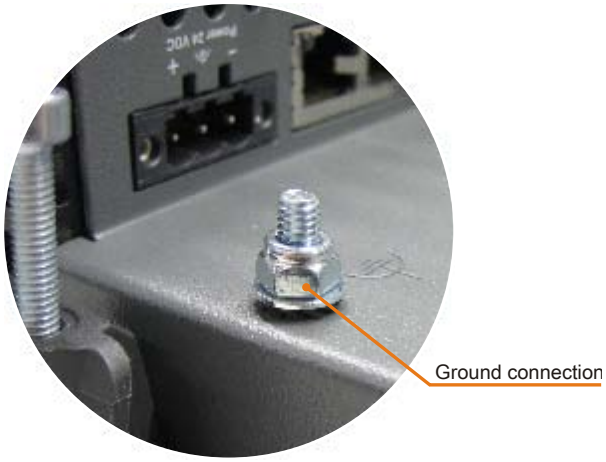


Figure 11: Ground connection

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

Pinout

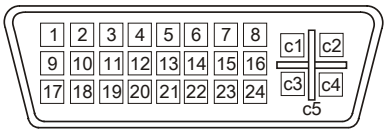
Pin	Assignment	Description	Pin	Assignment	Description	
1			16	HPD	Hot plug detect	DVI 24-pin, female 
2			17			
3			18			
4			19			
5			20			
6	DDC clock	DDC-based control signal (clock)	21			
7	DDC data	DDC-based control signal (data)	22			
8	Analog V-Sync	Analog vertical synchronization	23			
9			24			
10			C1	ANALOG RED	Analog red	
11			"c2"	ANALOG GREEN	Analog green	
12			C3	ANALOG BLUE	Analog blue	
13			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				

Table 12: Pinout - DVI connection

1) Protected internally by a multifuse.

2.6.3 Serial interface COM1

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

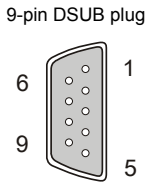


Table 13: Pinout - COM1

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

2.6.4 Ethernet 1 (ETH1)

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

Ethernet 1 connection (ETH1)[1]			
Controller	RTL 8111E		RJ45 twisted pair (10BaseT/100BaseT), female
Cabling	S/STP (Cat5e)		
Transfer rate	10/100/1000 Mbit/s[2]		
Cable length	Max. 100 m (min. Cat5e)		
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)	

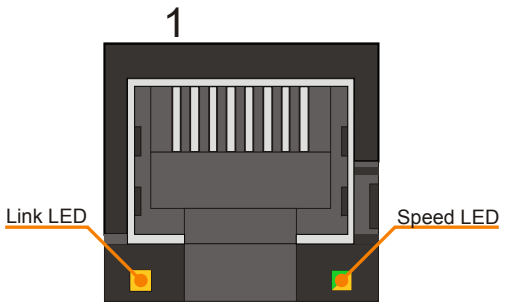


Table 14: Ethernet connection (ETH1)

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

Driver support

A special driver is required in order to operate the Realtek 8111E Ethernet controller. Drivers for approved operating systems are available in the Downloads area 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 main board and connected to external devices via the system unit.

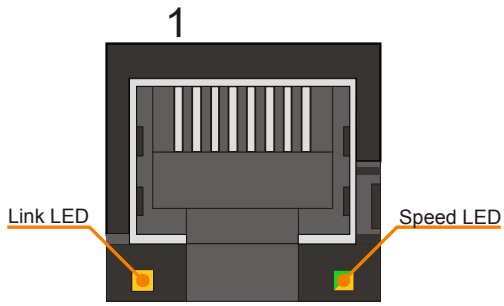
Ethernet 2 connection (ETH2 [1])			
Controller	Intel 82574		RJ45 twisted pair (10BaseT/100BaseT), female
Cabling	S/STP (Cat5e)		
Transfer rate	10/100/1000 Mbit/s[2]		
Cable length	Max. 100 m (min. Cat5e)		
Speed LED	**On**	**Off**	
Green	100 Mbit/s	10 Mbit/s[3]	
Orange	1000 Mbit/s	-	
Link LED	**On**	**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 can differ from that used by the particular operating system.
2) Switching takes place automatically.
3) The 10 Mbit/s transfer speed / connection is only present if the Link LED is also lit at the same time.

Driver support

A special driver is required in order to operate the Intel 82574 Ethernet controller. Drivers for approved operating systems are available in the Downloads area 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 ports (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 these USB ports. Due to the vast number of USB devices available on the market, B&R cannot guarantee their performance. All USB devices provided by B&R are guaranteed to function properly.

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

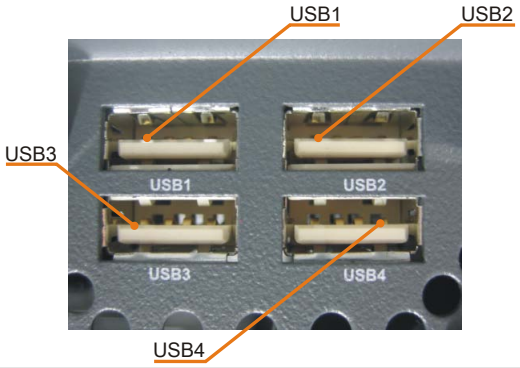
Universal Serial Bus (USB1, USB2, USB3, USB4[1])		
Type	USB 2.0	4x USB type A, female
Design	Type A	
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)	
Current load[2] USB1, USB3 USB2, USB4	 Max. 1 A Max. 500 mA	
Cable length	Max. 5 m (without hub)	

Table 16: USB1, USB2, USB3, USB4 connection

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

USB5

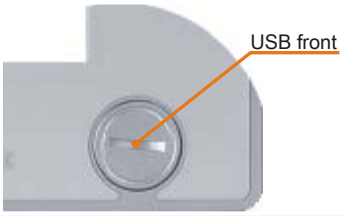
Universal Serial Bus (USB5)[1]		
Type	USB 2.0	1x USB type A, female
Design	Type A	
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)	
Current load[2] USB5	 Max. 1 A	
Cable length	Max. 5 m (without hub)	

Table 17: USB5 connection

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

2.6.7 CompactFlash slot 1

This CompactFlash slot is a fixed part of an PPC800 system and is internally connected with the chipset via 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	B&R CompactFlash 512 MB	
5CFCRD.1024-06	B&R CompactFlash 1024 MB	
5CFCRD.2048-06	B&R CompactFlash 2048 MB	
5CFCRD.4096-06	B&R CompactFlash 4096 MB	
5CFCRD.8192-06	B&R CompactFlash 8192 MB	
5CFCRD.016G-06	B&R CompactFlash 16 GB	
5CFCRD.032G-06	B&R CompactFlash 32 GB	
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.

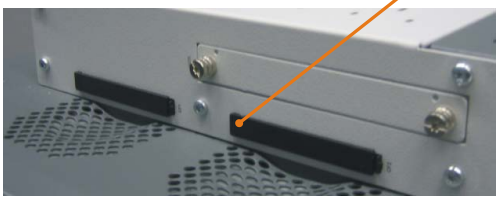
CompactFlash slot (CF2)		
Connection	PCIe to PATA	
CompactFlash Type	Type I	
Model number	**Short description**	
	CompactFlash	
5CFCRD.0512-06	B&R CompactFlash 512 MB	
5CFCRD.1024-06	B&R CompactFlash 1024 MB	
5CFCRD.2048-06	B&R CompactFlash 2048 MB	
5CFCRD.4096-06	B&R CompactFlash 4096 MB	
5CFCRD.8192-06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

Turn off power before inserting or removing the CompactFlash card!

2.6.9 MIC, Line IN, Line OUT

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

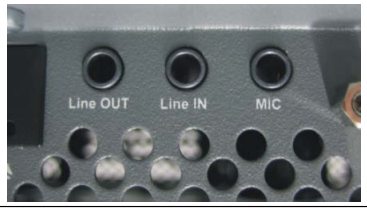
MIC, Line IN, Line OUT		
Controller	Realtek ALC 662	3.5mm socket, female
MIC	Connection of a mono microphone with a 3,5mm jack.	
Line IN	Stereo Line IN signals supplied via a 3.5 mm jack.	
Line OUT	Connection of a stereo sound de- vice (e.g. amplifier) via a 3.5 mm jack.	

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 area 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.

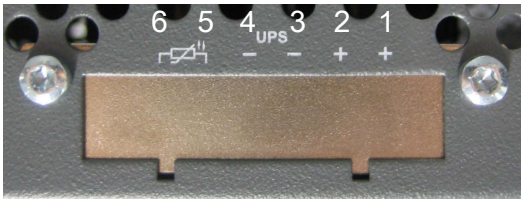
Add-on UPS slot		
Pinout with mounted add-on UPS module		
1	+	
2	+	
3	-	
4	-	
5	NTC (for battery temperature measurement)	
6	NTC (for battery temperature measurement)	
Model number	**Short description**	
	Uninterruptible power supply	
5AC600.UPSI-00	Add-on UPS module	
5AC600.UPSB-00	Battery unit 5 Ah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

Table 21: Add-on UPS slot

Information about the UPS module see "Accessories" on page 212.

2.6.11 Power button

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

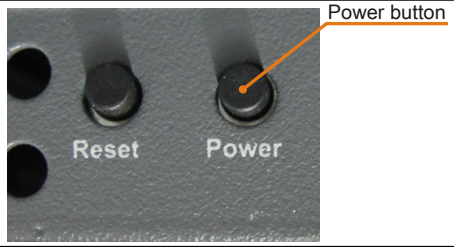
Power button	
The power button acts like the on/off switch on a normal desktop PC with an ATX power supply: **Press and release** ... Switches on the PPC800 or shuts down the operating system and switches off the PPC800. **Press and hold** ... ATX power supply switches off without shutting down the PPC800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

Table 22: Power button

2.6.12 Reset button

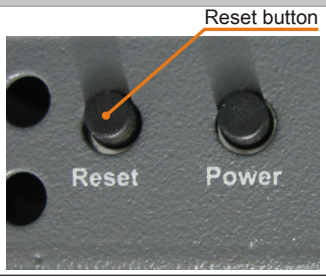
Reset button	
Pushing the reset button triggers a hardware and PCI reset. The PPC800 is restarted (cold restart). Pressing the reset button does not reset the MTCX processor.	

Table 23: Reset button

Warning!

A system reset can result in lost data!

2.6.13 Status LEDs

The 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; the system is operating on battery power.
	Red / green	Blinking	Service function for MTCX upgrade: A red/green blinking power LED indicates a faulty or incomplete MTCX upgrade. The MTCX runs using the firmware version installed when delivered. This could be caused by a power failure during an MTCX upgrade. An MTCX upgrade must be performed again.
HDD	Yellow	On	Signals IDE drive access (CF, HDD, CD, etc.)
Link	Yellow	On	Indicates an active SDL connection on the monitor / panel plug.
		Blinking	An active SDL connection has been interrupted by a loss of power to the display unit.
Run	Green	On	Application running
		Off	Application is 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 defined 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 lifespan and should be replaced regularly (after the specified service life at the latest).

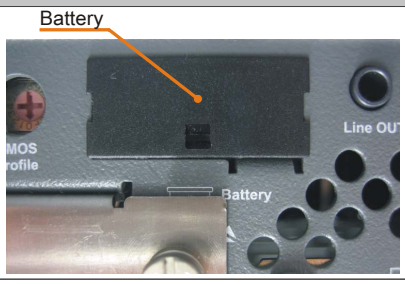
Battery		
Battery Type Removable Lifespan	 Renata 950 mAh Yes, accessible from the outside 2½ years[1)]	
Model number	**Short description**	
	Batteries	
0AC201.91	Lithium batteries, 4 pcs., 3 V / 950 mAh, button cell	
4A0006.00-000	Lithium battery, 1 pc., 3 V / 950 mAh, button cell	

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 manual for information about using this hard disk.	
5AC801.HDDI-03	250 GB SATA hard disk (slide-in compact); 24/7 hard disk. Note: Please see manual for information about using this hard disk.	
5AC801.HDDI-04	500 GB SATA hard disk (slide-in compact); 24/7 hard disk. Note: Please see manual for information about using this hard disk.	
5AC801.SSDI-00	32 GB SATA SSD (SLC) (slide-in compact).	
5AC801.SSDI-01	60 GB SATA SSD (SLC) (slide-in compact).	
5AC801.SSDI-02	180 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 70.

3 Individual components

3.1 System units

3.1.1 5PC820.1505-00

General information

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

Order data

Model number	Short description	Image
	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 SATA drive (slide-in).	
5AC801.DVRS-00	DVD-R/RW DVD+R/RW SATA drive (slide-in).	
5AC801.HDDI-00	40 GB SATA hard disk (slide-in compact); 24/7 hard disk with extended temperature range. Note: Please see manual for information about using this hard disk.	

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

Model number	Short description	Image
5AC801.HDDI-03	250 GB SATA hard disk (slide-in compact); 24/7 hard disk. Note: Please see manual for information about using this hard disk.	
5AC801.HDDI-04	500 GB SATA hard disk, slide-in compact drive; 24/7 hard disk. Note: Please see manual for information about using this hard disk.	
5AC801.HDDS-00	40 GB SATA hard disk (slide-in); 24/7 hard disk with extended temperature range. Note: Please see 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 SATA SSD (MLC), slide-in compact drive	
5AC801.SSDI-02	180 GB SATA SSD (MLC), slide-in compact drive	
	Fan kit	
5AC803.FA01-00	APC800 fan kit for system units without an expansion	
5AC803.FA02-00	APC800 fan kit for system units with expansion 5AC803.SX01-00	
5AC803.FA03-00	APC800 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

Interfaces

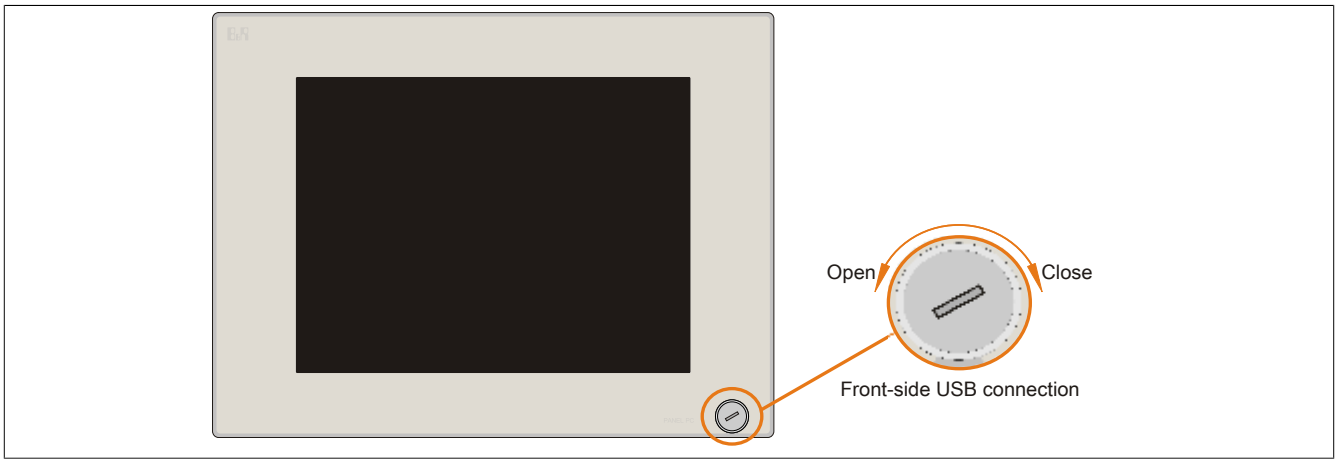


Figure 12: 5PC820.1505-00 - Front view

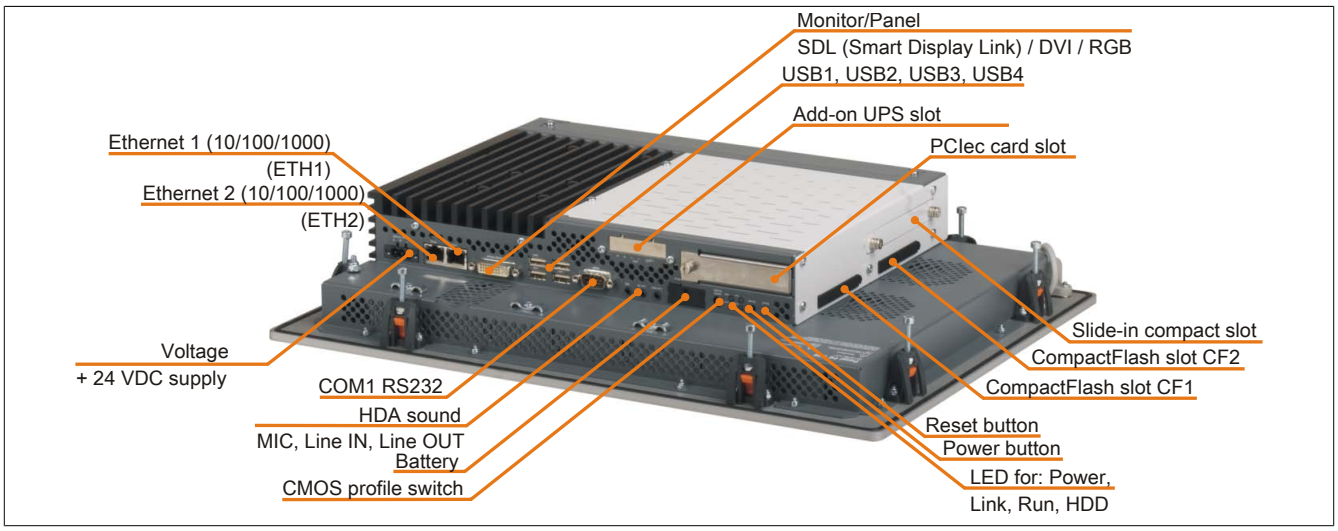


Figure 13: 5PC820.1505-00 - Rear view

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").

Technical data

Product ID	5PC820.1505-00
General information	
LEDs	Power, HDD, Link, Run
B&R ID code	$AF21
Battery	
Type	Renata 950 mAh
Lifespan	2½ years
removable	Yes, accessible from the outside
Design	Lithium Ion
Power button	Yes
Reset button	Yes
Buzzer	Yes
Certification	
CE	Yes
c-UL-us	Yes
Controller	
Boot loader	BIOS

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

Product ID	5PC820.1505-00
Power failure logic	
Controller	MTCX [1]
Buffer time	10 ms
Graphics	
Controller	Depending on the CPU board used
Memory	
Type	Depending on the CPU board used
Size	Depending on the CPU board used
Interfaces	
COM1	
Type	RS232, modem-capable, not electrically isolated
Design	9-pin DSUB plug
UART	16550-compatible, 16-byte FIFO
Max. baud rate	115 kbit/s
CompactFlash slot 1	
Type	Type I
CompactFlash slot 2	
Type	Type I
USB	
Quantity	5
Type	USB 2.0
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Current load	Max. 500 mA or 1 A per connection
Ethernet	
Quantity	2
Design	Shielded RJ45 port
Transfer rate	10/100/1000 Mbit/s
Audio	
Type	HDA sound
Inputs	Microphone, Line in
Outputs	Line OUT
Display	
Type	Color TFT
Diagonal	15" (381 mm)
Colors	16 million
Resolution	XGA, 1024 x 768 pixels
Contrast	550:1
Viewing angles	
Horizontal	Direction R / Direction L = 60°
Vertical	Direction U = 45°/ direction D = 55°
Background lighting	
Brightness	250 cd/m²
Half brightness time [2]	50,000 h
Touch screen [3]	
Type	Accu Touch
Technology	Analog, resistive
Controller	Elo, serial, 12-bit
Degree of transmission	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)
Compact slide-in drive	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	IP20 back side IP65, protection from dust and sprayed water on front side

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

Product ID	5PC820.1505-00
Environmental conditions	
Temperature	
Operation	Component-dependent
Storage	-20 to 60°C
Transport	-20 to 60°C
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
Décor foil	
Material	Polyester
Light background	Similar to Pantone 427CV
Gasket	Flat gasket around display front
Dimensions	
Width	435 mm
Height	330 mm
Depth	Component-dependent
Weight	5500 g (component-dependent)

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

1) Maintenance controller extended.
2) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
3) Touch screen drivers can be downloaded from the download area on the B&R homepage (www.br-automation.com).
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.

Dimensions

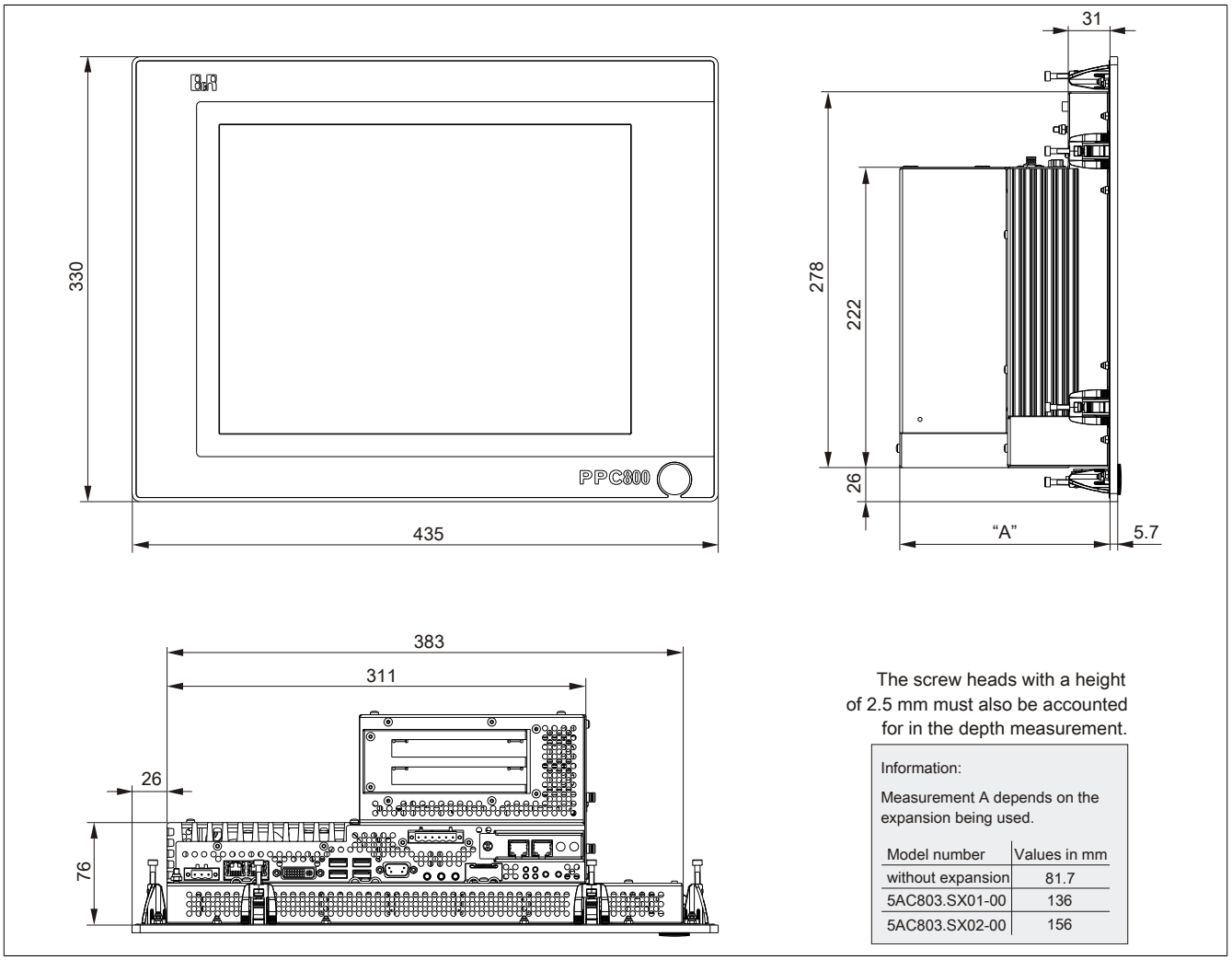


Figure 14: 5PC820.1505 - Dimensions

Cutout

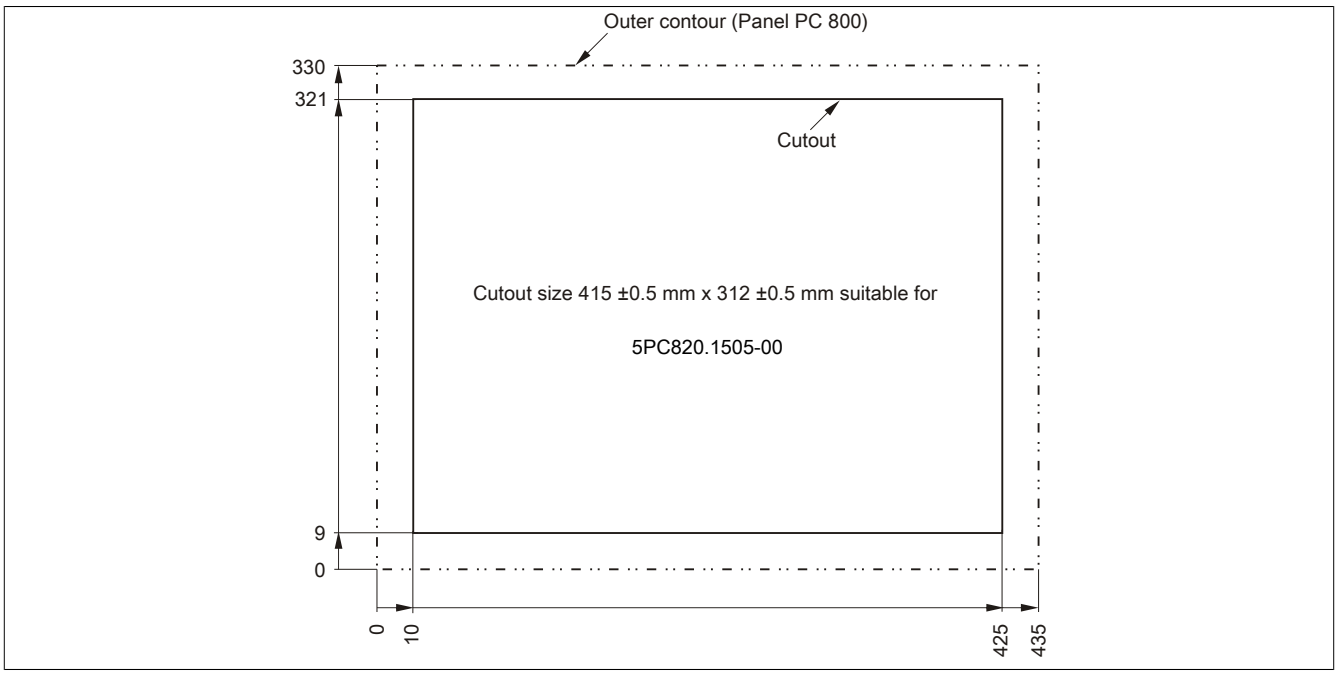


Figure 15: 5PC820.1505-00 - Cutout installation

3.1.2 5PC820.1906-00

General information

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

Order data

Model number	Short description	Image
	System units	
5PC820.1906-00	Panel PC 820 19" SXGA 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 SATA drive (slide-in).	
5AC801.DVRS-00	DVD-R/RW DVD+R/RW SATA drive (slide-in).	
5AC801.HDDI-00	40 GB SATA hard disk (slide-in compact); 24/7 hard disk with extended temperature range. Note: Please see manual for information about using this hard disk.	
5AC801.HDDI-03	250 GB SATA hard disk (slide-in compact); 24/7 hard disk. Note: Please see manual for information about using this hard disk.	
5AC801.HDDI-04	500 GB SATA hard disk, slide-in compact drive; 24/7 hard disk. Note: Please see manual for information about using this hard disk.	

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

Model number	Short description	Image
5AC801.HDDS-00	40 GB SATA hard disk (slide-in); 24/7 hard disk with extended temperature range. Note: Please see 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 SATA SSD (MLC), slide-in compact drive	
5AC801.SSDI-02	180 GB SATA SSD (MLC), slide-in compact drive	
	Fan kit	
5AC803.FA01-00	APC800 fan kit for system units without an expansion	
5AC803.FA02-00	APC800 fan kit for system units with expansion 5AC803.SX01-00	
5AC803.FA03-00	APC800 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

Interfaces

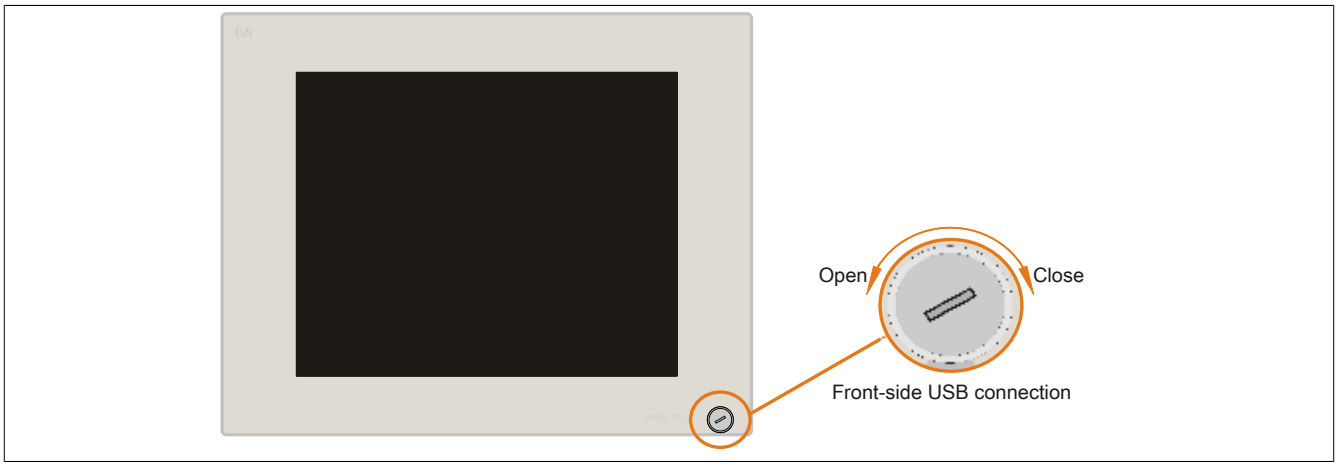


Figure 16: 5PC820.1906-00 - Front view

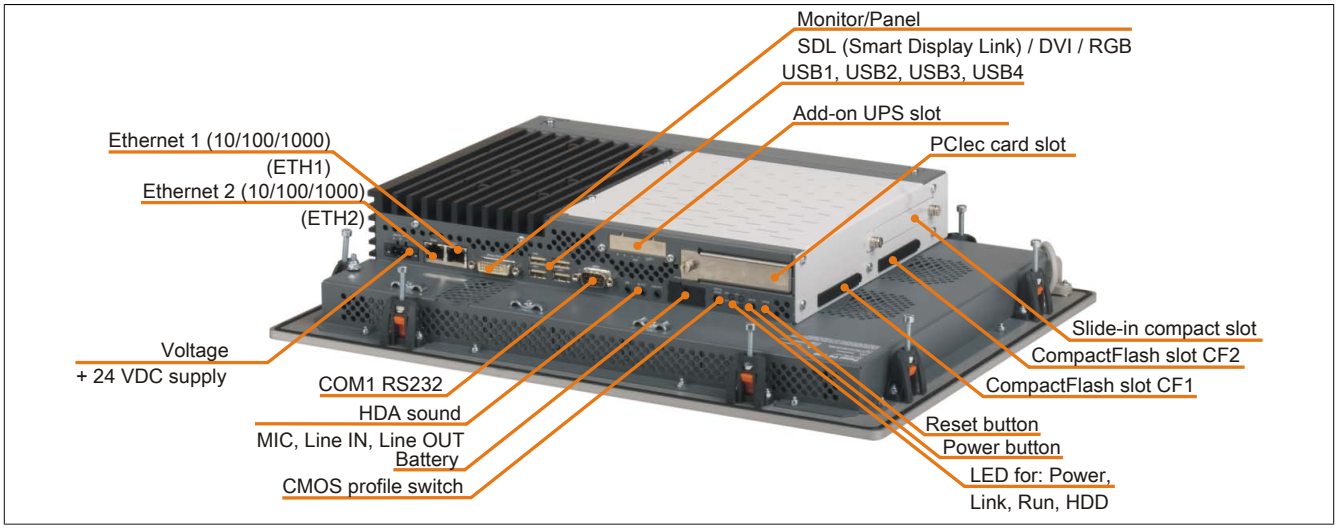


Figure 17: 5PC820.1906-00 - Rear view

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").

Technical data

Product ID	5PC820.1906-00
General information	
LEDs	Power, HDD, Link, Run
B&R ID code	$AF22
Battery Type Lifespan removable Design	 Renata 950 mAh 2½ years Yes, accessible from the outside Lithium Ion
Power button	Yes
Reset button	Yes
Buzzer	Yes
Certification CE c-UL-us	 Yes Yes
Controller	
Boot loader	BIOS

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

Product ID	5PC820.1906-00
Power failure logic	
Controller	MTCX [1]
Buffer time	10 ms
Graphics	
Controller	Depending on the CPU board used
Memory	
Type	Depending on the CPU board used
Size	Depending on the CPU board used
Interfaces	
COM1	
Type	RS232, modem-capable, not electrically isolated
Design	9-pin DSUB plug
UART	16550-compatible, 16-byte FIFO
Max. baud rate	115 kbit/s
CompactFlash slot 1	
Type	Type I
CompactFlash slot 2	
Type	Type I
USB	
Quantity	5
Type	USB 2.0
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Current load	Max. 500 mA or 1 A per connection
Ethernet	
Quantity	2
Design	Shielded RJ45 port
Transfer rate	10/100/1000 Mbit/s
Audio	
Type	HDA sound
Inputs	Microphone, Line in
Outputs	Line OUT
Display	
Type	Color TFT
Diagonal	19" (480 mm)
Colors	16 million
Resolution	SXGA, 1280 x 1024 pixels
Contrast	900:1
Viewing angles	
Horizontal	Direction R / Direction L = 85°
Vertical	Direction U / direction D = 85°
Background lighting	
Brightness	300 cd/m²
Half brightness time [2]	50,000 h
Touch screen [3]	
Type	Accu Touch
Technology	Analog, resistive
Controller	Elo, serial, 12-bit
Degree of transmission	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)
Compact slide-in drive	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	IP20 back side IP65, protection from dust and sprayed water on front side

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

Product ID	5PC820.1906-00
Environmental conditions	
Temperature	
Operation	Component-dependent
Storage	-20 to 60°C
Transport	-20 to 60°C
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
Décor foil	
Material	Polyester
Light background	Similar to Pantone 427CV
Gasket	Flat gasket around display front
Dimensions	
Width	527 mm
Height	421 mm
Depth	Component-dependent
Weight	10000 g (component-dependent)

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

1) Maintenance controller extended.
2) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
3) Touch screen drivers can be downloaded from the download area on the B&R homepage (www.br-automation.com).
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.

Dimensions

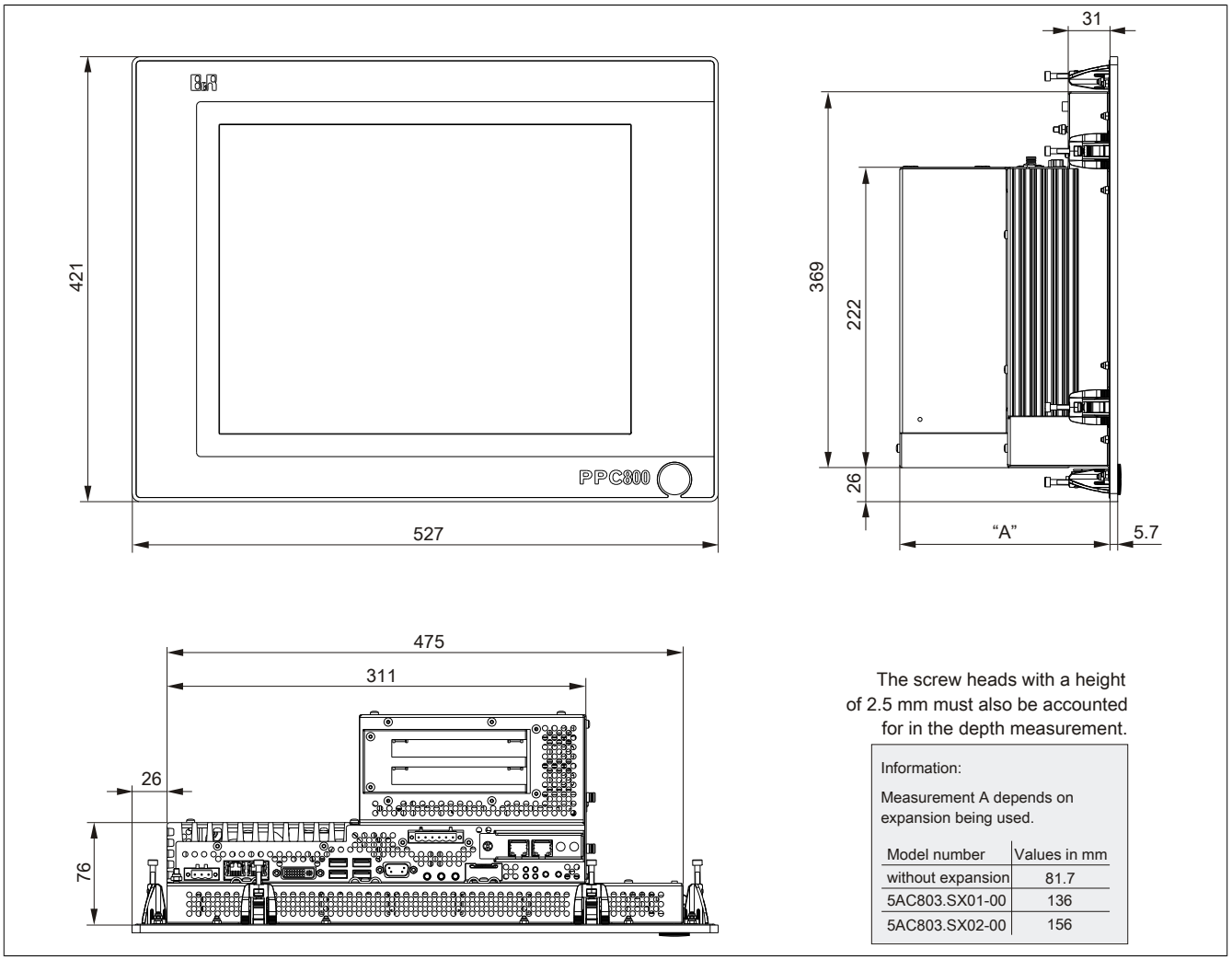


Figure 18: 5PC820.1906-00 - Dimensions

Cutout

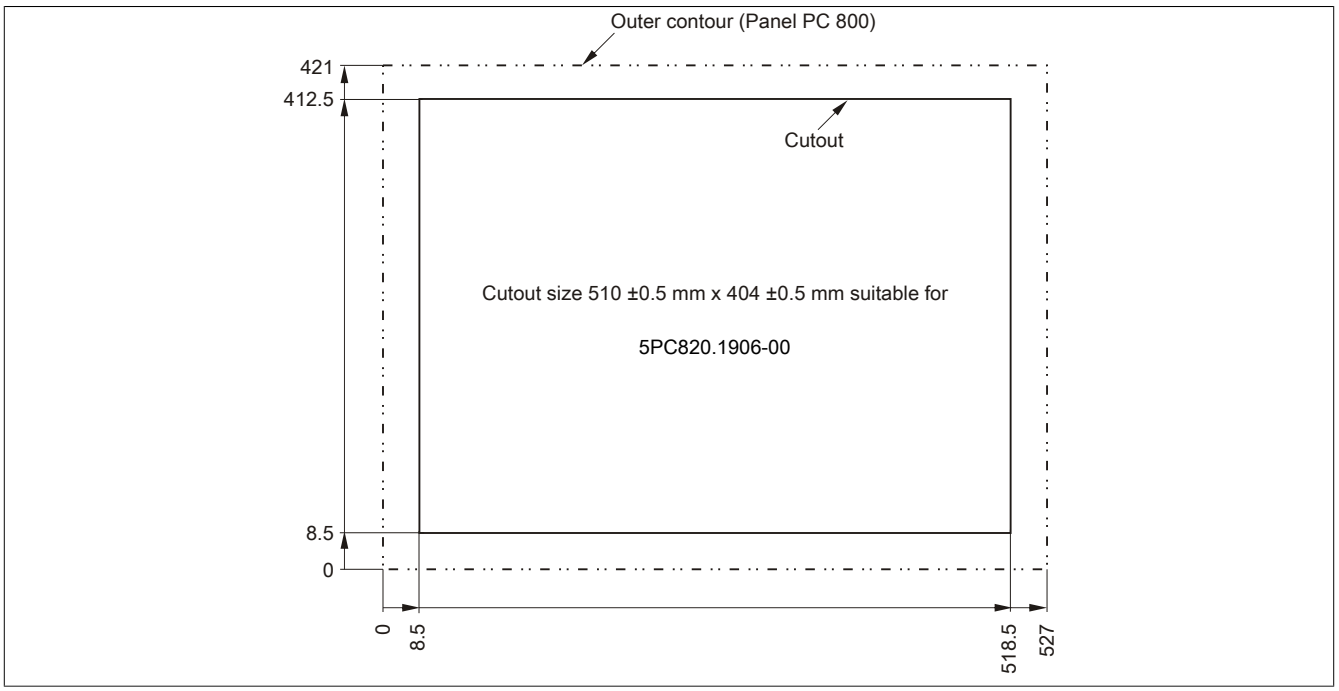


Figure 19: 5PC820.1906-00 - Cutout installation

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

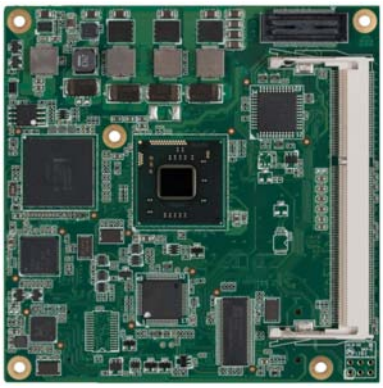
Model number	Short description	Figure
	CPU boards	
5PC800.CCAX-00	Intel Atom N2800 CPU board, 1.86 GHz, Dual-Core, 533 MHz FSB, 1 MB L2 cache; chipset NM10; 1 socket for SO-DIMM DDR3 module	
	Required accessories	
	Main memory for GM45 CPU boards	
5MMDDR.2048-02	SO-DIMM DDR3 RAM 2048 MB PC3-8500	
5MMDDR.4096-02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

3.3.1 5AC803.HS00-04

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

Technical data

Product ID	5AC803.HS00-04
General information	
Ideal for CPU boards	5PC800.CCAX-00
Suitable for the following system units	5PC820.1505-00 5PC820.1906-00
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

General information

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

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 MByte PC3-8500	

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

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	

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 (bus 5AC803.BX01-00 or 5AC803.BX01-01 necessary).	
5AC803.SX02-00	PPC800 expansion 2 PCI/PCI Express and 1 Slide-in (bus 5AC803.BX02-00 or 5AC803.BX02-01 necessary).	
	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 slots, 1 slide-in slot.	
5AC803.BX02-01	PPC800 bus with 1 PCI, 1 PCI Express, 1 slide-in slot.	
	Fan kits	
5AC803.FA02-00	PPC800 fan kit for system units with the expansion 5AC803.SX01-00.	
5AC803.FA03-00	PPC800 fan kit for system units with the expansion 5AC803.SX02-00.	
	Optional accessories	
	Drives	
5AC801.ADAS-00	SATA hard disk adapter to operate a slide-in compact hard disk in a slide-in slot.	
5AC801.DVDS-00	DVD-ROM SATA drive (slide-in).	
5AC801.DVRS-00	DVD-R/RW DVD+R/RW SATA drive (slide-in).	
5AC801.HDDS-00	40 GB SATA hard disk (slide-in); 24/7 hard disk with extended temperature range. Remark: Please see manual for proper use of the hard disk.	
5ACPCI.RAIC-05	PCI RAID System SATA 2x 250 GB; Remark: Please see manual for proper use of the hard disk.	
5ACPCI.RAIC-06	PCI RAID System SATA 2x 500 GB; Remark: Please see manual for proper use of the hard disk.	

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

3.5.3 Inserts

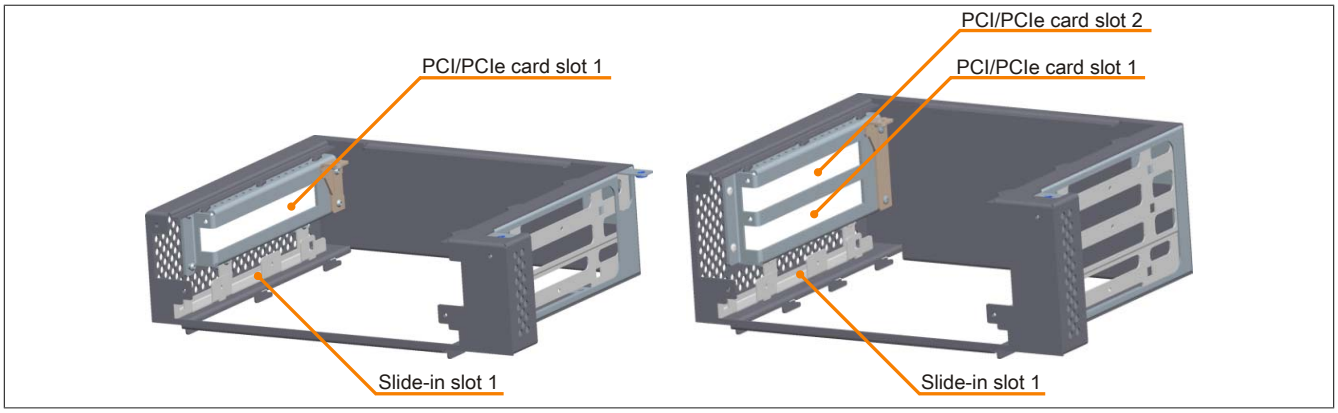


Figure 20: 5AC803.SX01-00, 5AC803.SX02-00 - Inserts

3.5.4 Technical data

Product ID	5AC803.SX01-00	5AC803.SX02-00
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 Dimensions - 5PC803.SX01-00

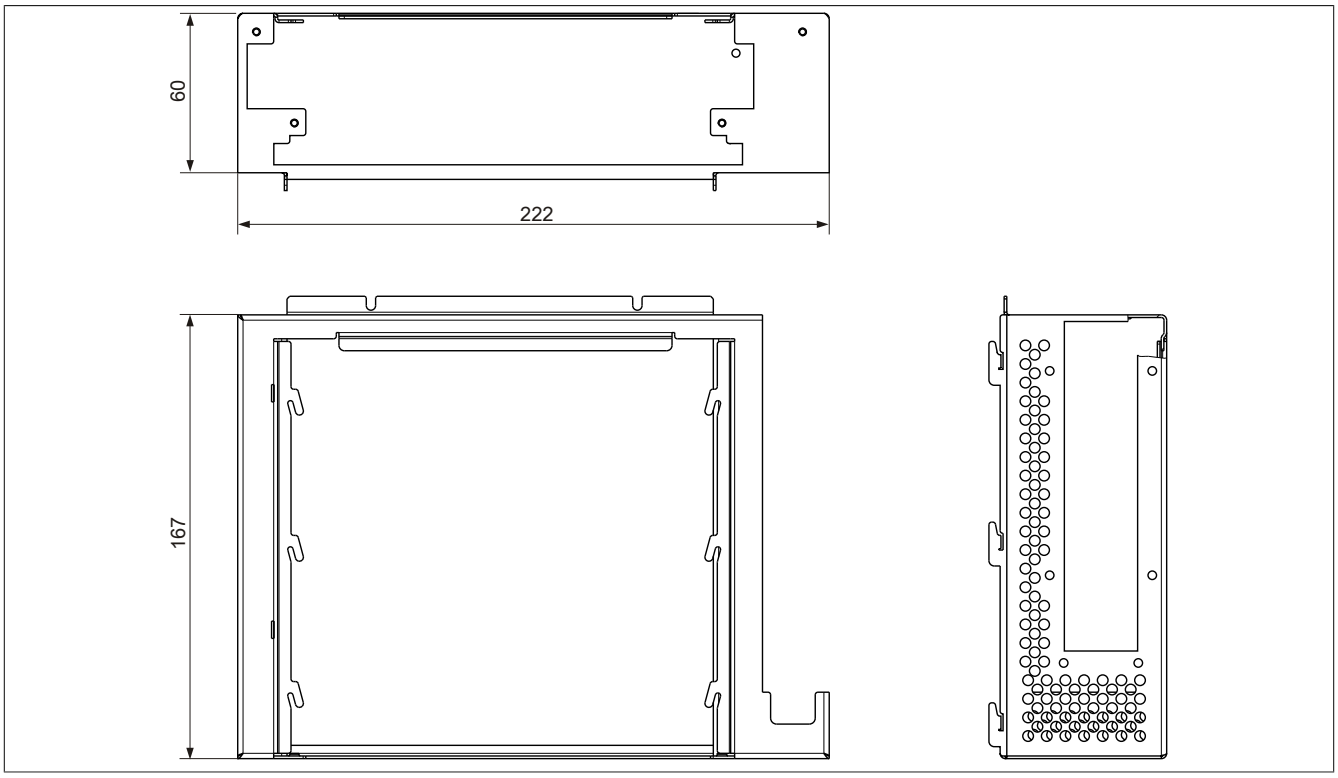


Figure 21: 5AC803.SX01-00 - Dimensions

3.5.6 Dimensions - 5PC803.SX02-00

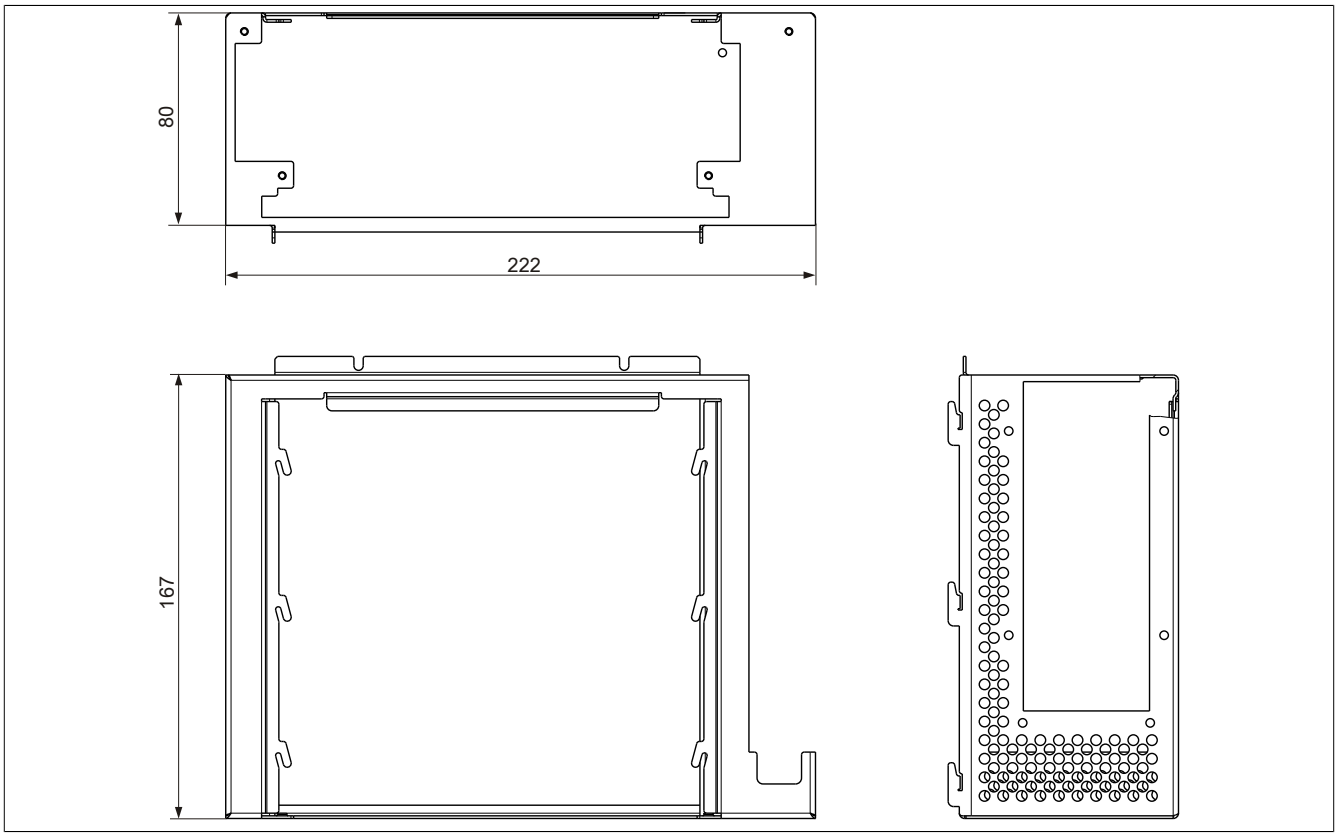


Figure 22: 5AC803.SX02-00 - Dimensions

3.5.7 Slot for bus units

Card slot (PCI / PCIe)

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

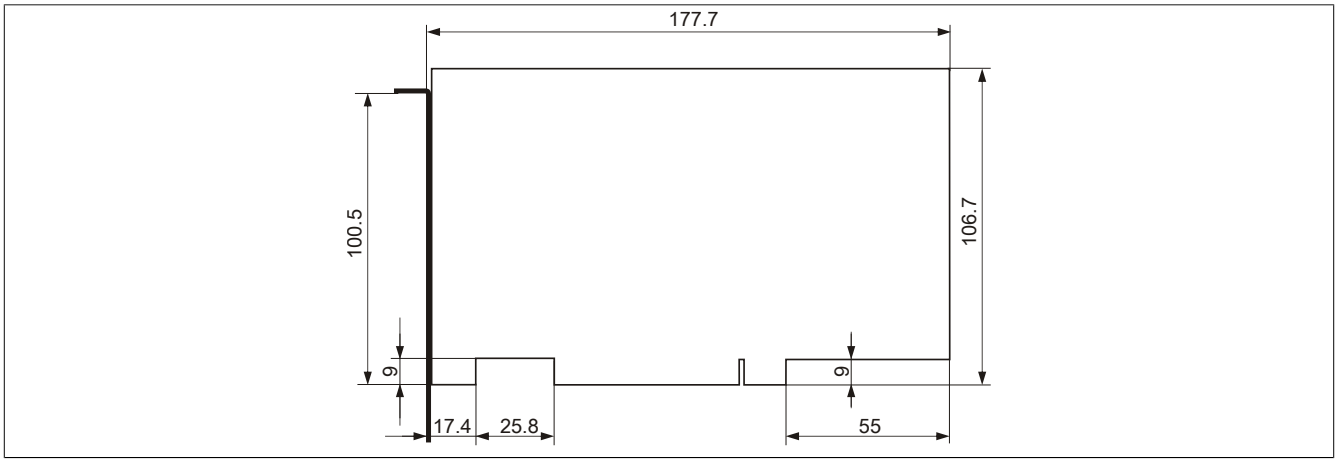


Figure 23: Dimensions - Standard half-size PCI card

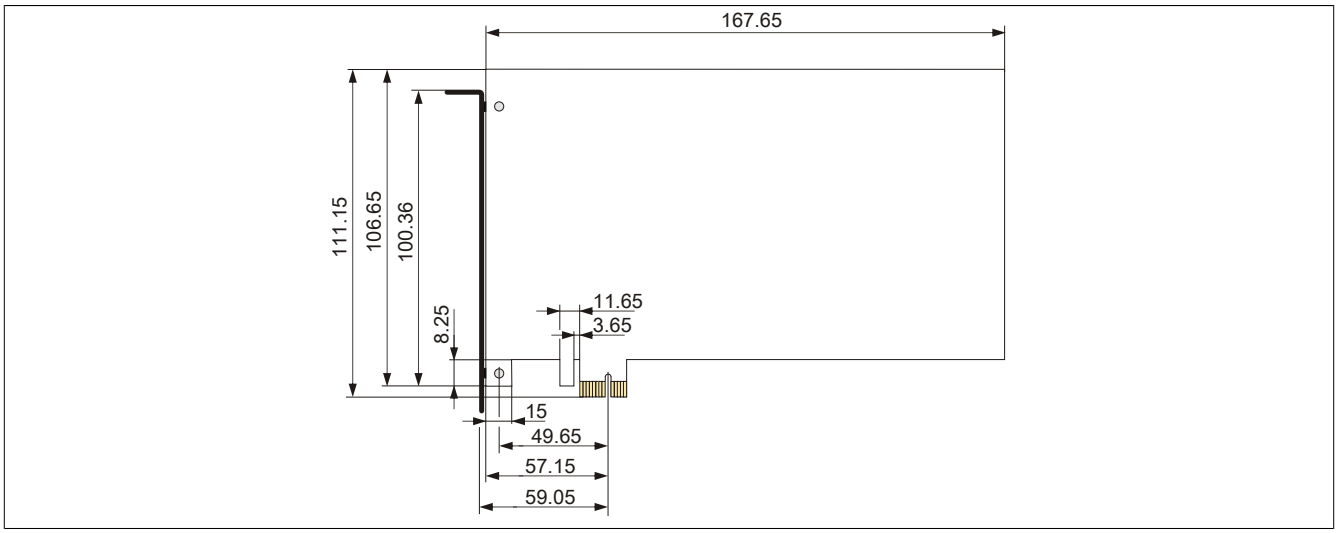


Figure 24: Dimensions - Standard half-size PCIe card

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.

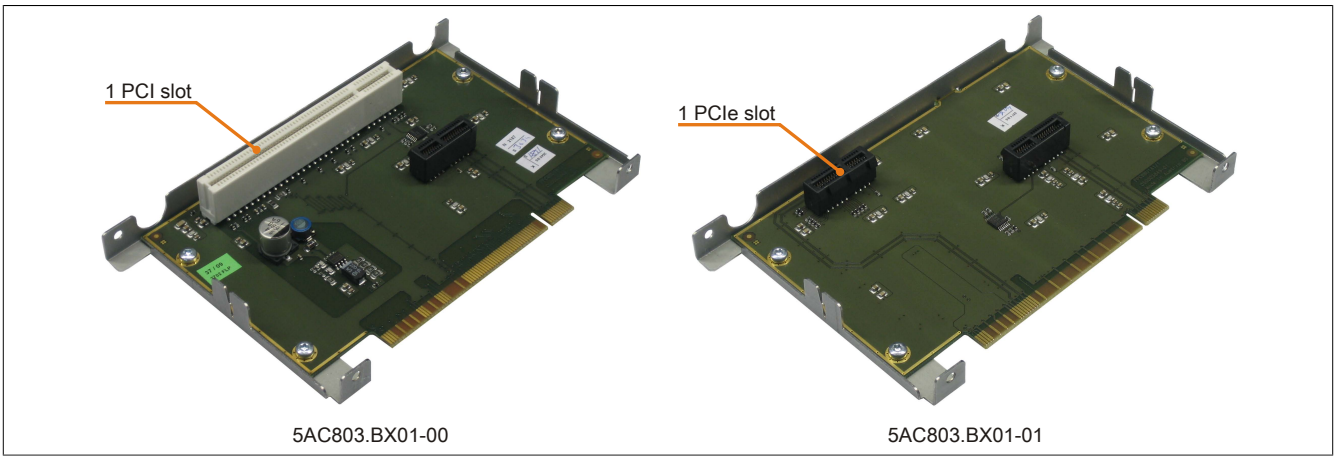


Figure 25: 1 slot bus units

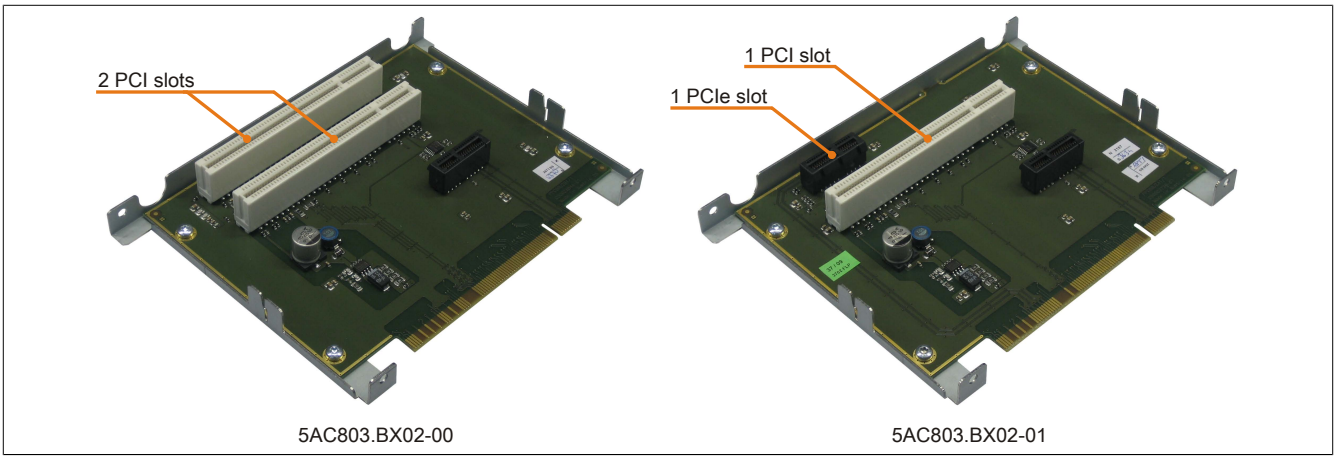


Figure 26: 2 slot bus units

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 slots, 1 slide-in slot.	
5AC803.BX02-01	PPC800 bus with 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
Inserts				
PCI slots				
Quantity	1	-	2	1
Type	32-bit	-	32-bit	32-bit
Design	PCI half-size	-	PCI half-size	PCI half-size
Default	2.2	-	2.2	2.2
Bus speed	33 MHz	-	33 MHz	33 MHz

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

Product ID	5AC803.BX01-00	5AC803.BX01-01	5AC803.BX02-00	5AC803.BX02-01
PCIe slots				
Quantity	-	1	-	1
Design	-	PCIe half-size	-	PCIe half-size
Default	-	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

General information

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

Order data

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

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

3.7.2 5AC803.BC02-00

General information

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

Order data

Model number	Short description	Figure
	Adapter	
5AC803.BC02-00	PPC800 adapter 1 Slide-in compact.	
	Required accessories	
	Drives	
5AC801.HDDI-00	40 GB SATA hard disk (slide-in compact); 24/7 hard disk with extended temperature range. Remark: Please see manual for proper use of the hard disk.	
5AC801.HDDI-03	250 GB SATA hard disk (slide-in compact); 24/7 hard disk. Remark: Please see manual for proper use of the hard disk.	
5AC801.HDDI-04	500 GByte SATA Hard Disk, Slide-in compact, 24/7 Hard Disk Hinweis: Beachten Sie das Manual zum Einsatz der Harddisk.	
5AC801.SSDI-00	32 GB SATA SSD (SLC), Slide-in compact	
5AC801.SSDI-01	60 GB SATA SSD (MLC), Slide-in compact	
5AC801.SSDI-02	180 GB SATA SSD (MLC), Slide-in compact	

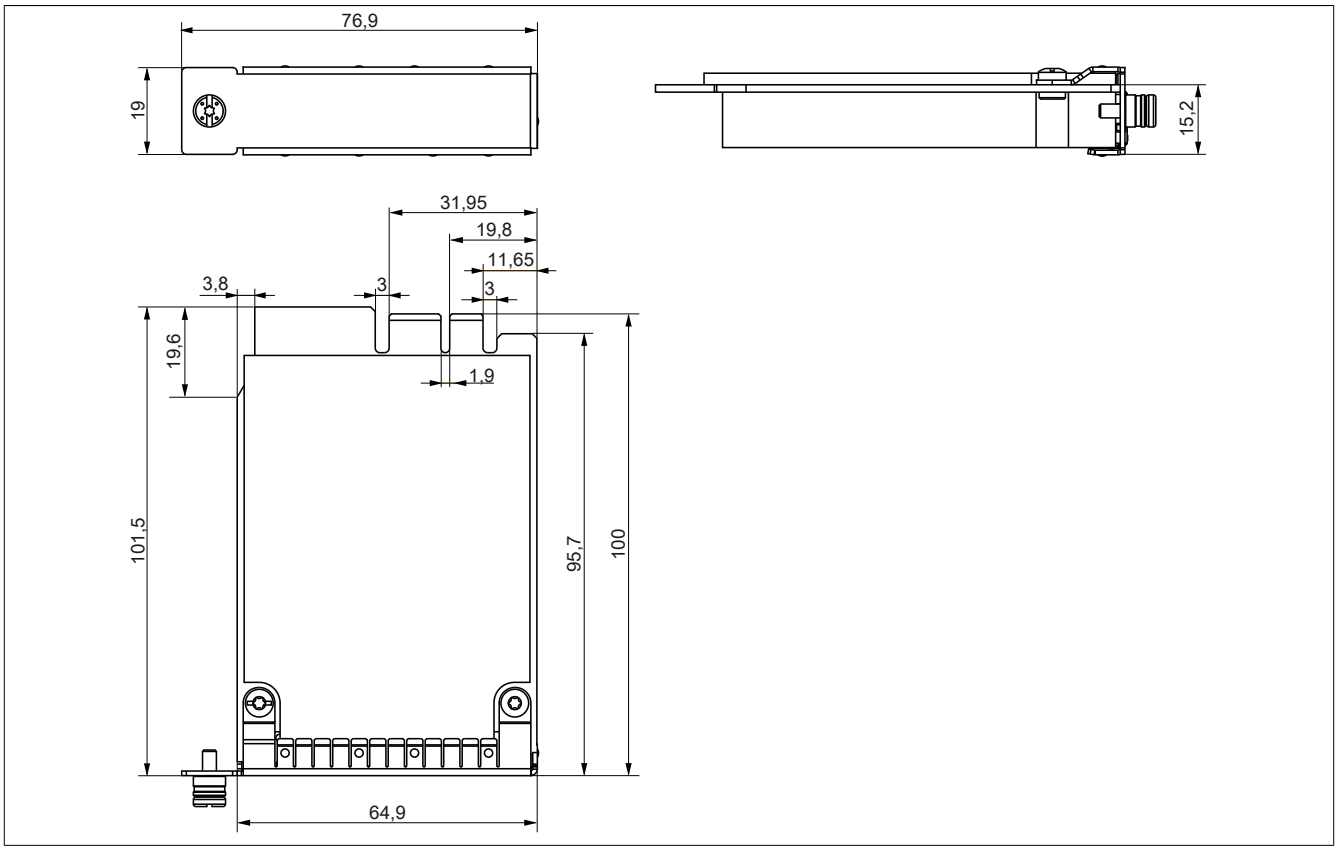
Table 46: 5AC803.BC02-00 - Order data

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



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

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.

Order data

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

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

Technical data

Product ID	5ACPCC.ETH0-00
General information	
B&R ID code	$AB25
Diagnostics	
Data transfer	Yes, with 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

Ethernet interface

Information:

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

Ethernet card 1 connection		
Controller	Intel 82574	
Cabling	S/STP (Cat5e)	
Transfer rate	10/100/1000 Mbit/s[1)]	
Cable length	Max. 100 m (min. Cat5e)	
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)

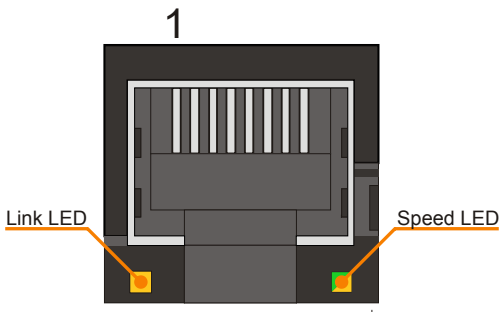


Table 49: 5ACPCC.ETH0-00 - Ethernet interface

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 area 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

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.

Order data

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

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

Technical data

Product ID	5ACPCC.MPL0-00
General information	
B&R ID code	$AB27
Diagnostics Data transfer	 Yes, with status LED
Certification CE	 Yes
Controller	
SRAM Size Remanent variables in power fail 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

POWERLINK interface

Information:

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

POWERLINK card 2 connections		
Cabling	S/STP (Cat5e)	
Cable length	Max. 100 m (min. Cat5e)	
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)

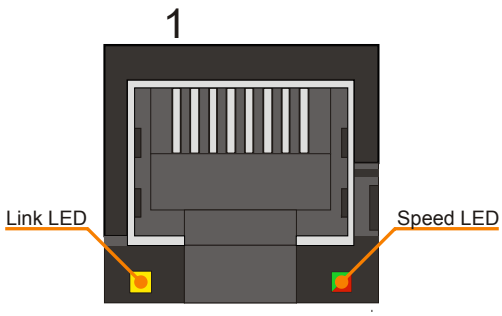


Table 52: 5ACPCC.MPL0-00 - POWERLINK interface

LED STATUS

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

Ethernet TCP/IP mode

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

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

Table 53: Status/Error LED - Ethernet TCP/IP operating mode

POWERLINK V1

Status LED		Status of the POWERLINK station
Green	**Red**	
On	Off	The POWERLINK station is running with no errors.
Off	On	A fatal system error has occurred. The error type can be read using the PLC logbook. An irreparable problem has occurred. The system cannot properly carry out its tasks. This status can only be changed by resetting the module.
Blinking alternately		The POWERLINK managing node failed. This error code can only occur in controlled node operation.
Off	Blinking	System failure. The red blinking LED signals a certain type of error using a blink code (see section "System failure error codes" on page 75).

Table 54: Status/error LED - POWERLINK V1 operating mode

POWERLINK V2

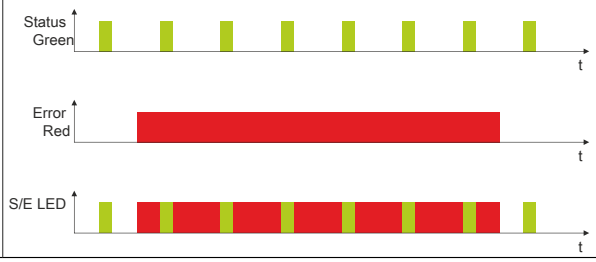
Red - error	Description
On	The POWERLINK interface has encountered an error (failed Ethernet frames, increased number of collisions on the network, etc.). If an error occurs in the following states, then the green LED blinks over the red LED: • BASIC_ETHERNET • PRE_OPERATIONAL_1 • PRE_OPERATIONAL_2 •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

Table 55: Status / Error LED as 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, however, POWERLINK communication is detected before this time passes, 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, however, POWERLINK communication is detected during this time, 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, and is 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 errors	•	•	•	-	Pause	•	•	•	-	Pause
Hardware errors	-	•	•	-	Pause	-	•	•	-	Pause

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

POWERLINK station number

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

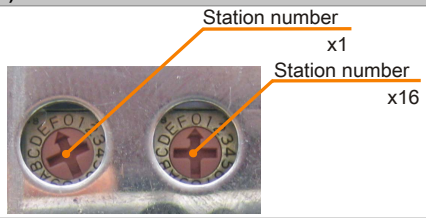


Table 58: POWERLINK station number (x1, x16)

card number switch

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

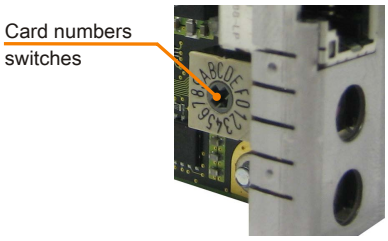


Figure 27: POWERLINK card 2-port node number switch

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

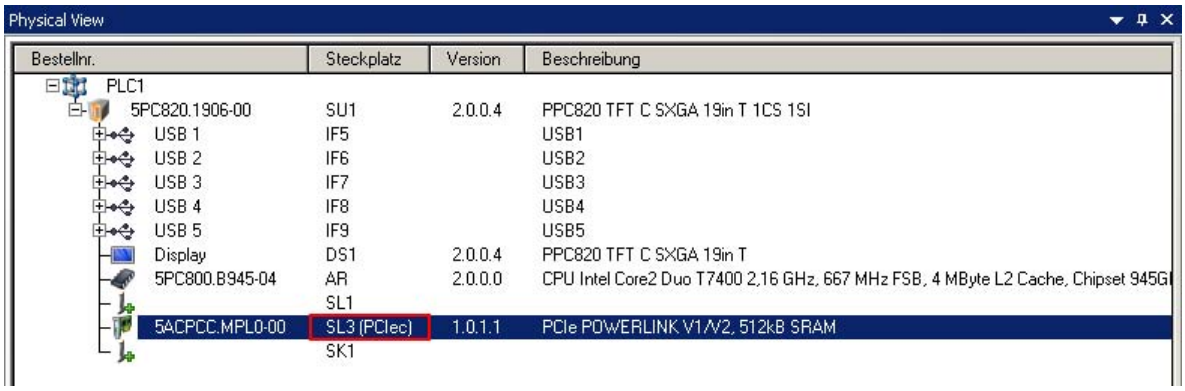


Figure 28: Integrating the POWERLINK plug-in card in Automation Studio

SRAM

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

3.9 Drives

3.9.1 5AC801.HDDI-00

General information

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

When used in a PPC800

Information:

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

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

Order data

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

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

Technical data

Information:

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

Product ID	5AC801.HDDI-00
General information	
Certification CE	 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 To/from host	 Max. 450 Mbits/s Max. 150 MB/s (Ultra DMA mode 5)
Positioning time Minimum (track to track) Nominal (read only) Maximum (read only)	 1 ms 12.5 ms 23 ms

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

Product ID	5AC801.HDDI-00
Environmental conditions	
Temperature [2]	
Operation [3]	-30 to 85°C
Operation - 24-hour [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	
Mounting	Fixed [6]
Dimensions	
Width	13 mm
Height	98 mm
Depth	105 mm
Weight	134 g
Manufacturer information	
Manufacturer	Seagate
Manufacturer's 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 for 305 meter altitude. The temperature specification must be reduced linearly by 1 °C every 305 meters. The temperature increase and decrease can be a maximum of 20 °C per hour.
3) Standard operation means 333 POH (power-on hours) per month.
4) 24-hour operation means 732 POH (power-on hours) per month.
5) Humidity gradient: Maximum 15% per hour.
6) Slide-in compact mounting

Temperature humidity diagram

Figure 29: 5AC801.HDDI-00 - Temperature humidity diagram

3.9.2 5AC801.HDDI-03

General information

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

When used in a PPC800

Information:

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

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

Order data

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

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

Technical data

Information:

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

Product ID	5AC801.HDDI-03
General information	
Certification CE	 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 To/from host	 Max. 1175 Mbit/s Max. 150 MB/s (SATA I), max. 300 MB/s (SATA II)
Positioning time Minimum (track to track) Nominal (read only) Maximum (read only)	 1 ms 14 ms 30 ms

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

Product ID	5AC801.HDDI-03
Environmental conditions	
Temperature [2]	
Operation [3]	0 to 60°C
Operation - 24-hour [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	
Mounting	Fixed [6]
Dimensions	
Width	13 mm
Height	98 mm
Depth	105 mm
Weight	134 g
Manufacturer information	
Manufacturer	Seagate
Manufacturer's 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 for 305 meter altitude. The temperature specification must be reduced linearly by 1 °C every 305 meters. The temperature increase and decrease can be a maximum of 20 °C per hour.
3) Standard operation means 333 POH (power-on hours) per month.
4) 24-hour operation means 732 POH (power-on hours) per month.
5) Humidity gradient: Maximum 30% per hour.
6) Slide-in compact mounting

Temperature humidity diagram

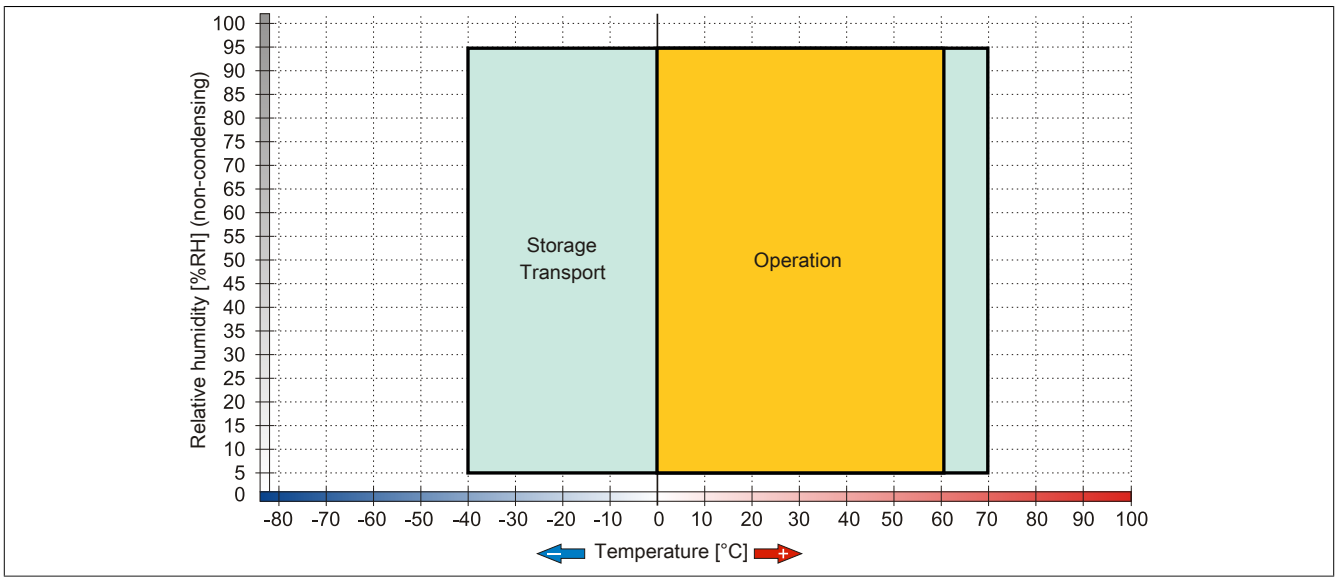


Figure 30: 5AC801.HDDI-03 - Temperature humidity diagram

3.9.3 5AC801.HDDI-04

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.

Order data

Model number	Short description	Figure
	Drives	
5AC801.HDDI-04	500 GByte SATA Hard Disk, Slide-in compact, 24/7 Hard Disk Hinweis: Beachten Sie das Manual zum Einsatz der Harddisk.	
	Optional accessories	
	Drives	
5MMHDD.0500-00	500 GB SATA hard disk replacement for 5AC801.HDDI-04, 5AC901.CHDD-01 and 5ACPCI.RAIC-06; Remark: Please see manual for proper use of the hard disk.	

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

Technical data

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate from those specified for the 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
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)
Lifespan	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 64: 5AC801.HDDI-04 - Technical data

Product ID	5AC801.HDDI-04
Environmental conditions	
Temperature [2]	
Operation [3]	0 to 60°C
Operation - 24-hour [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	
Mounting	Fixed [6]
Dimensions	
Width	13 mm
Height	98 mm
Depth	105 mm
Weight	134 g
Manufacturer information	
Manufacturer	Western Digital
Manufacturer's 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 for 305 meter altitude. The temperature specification must be reduced linearly by 1 °C every 305 meters. The temperature increase and decrease can be a maximum of 20 °C per hour.
3) Standard operation means 333 POH (power-on hours) per month.
4) 24-hour operation means 732 POH (power-on hours) per month.
5) Humidity gradient: Maximum 20% per hour.
6) Slide-in compact mounting

Temperature humidity diagram

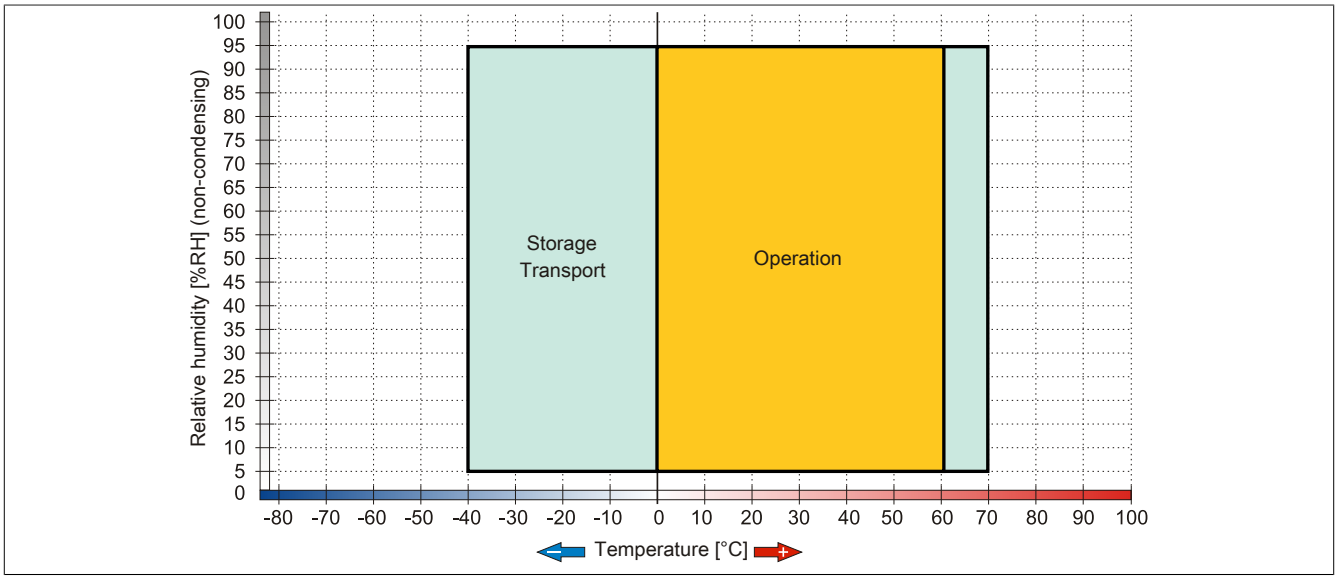


Figure 31: 5AC801.HDDI-04 - Temperature humidity diagram

3.9.4 5AC801.SSDI-00

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.

Order data

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

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

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 entire device. For the entire device in which this individual component is used, refer to the data given specifically for the entire device.

Product ID	5AC801.SSDI-00
General information	
Certification CE	 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	50000
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 4k write	 35,000 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) command
Environmental conditions	
Temperature	
Operation	0 to 70°C
Storage	-55 to 95°C
Transport	-55 to 95°C
Relative humidity	
Operation	5 to 95%
Storage	5 to 95%
Transport	5 to 95%
Vibration	
Operation	7 to 800 Hz: 2.17 g
Storage	10 to 500 Hz: 3.13 g
Transport	10 to 500 Hz: 3.13 g
Shock	
Operation	1000 g, 0.5 ms
Storage	1000 g, 0.5 ms
Transport	1000 g, 0.5 ms
Altitude	
Operation	-300 to 12,192 m
Storage	-300 to 12,192 m
Transport	-300 to 12,192 m
Mechanical characteristics	
Mounting	Fixed [2)]
Dimensions	
Width	13 mm
Height	98 mm
Depth	105 mm
Weight	118 g
Manufacturer information	
Manufacturer	Intel
Manufacturer's 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

Temperature humidity diagram

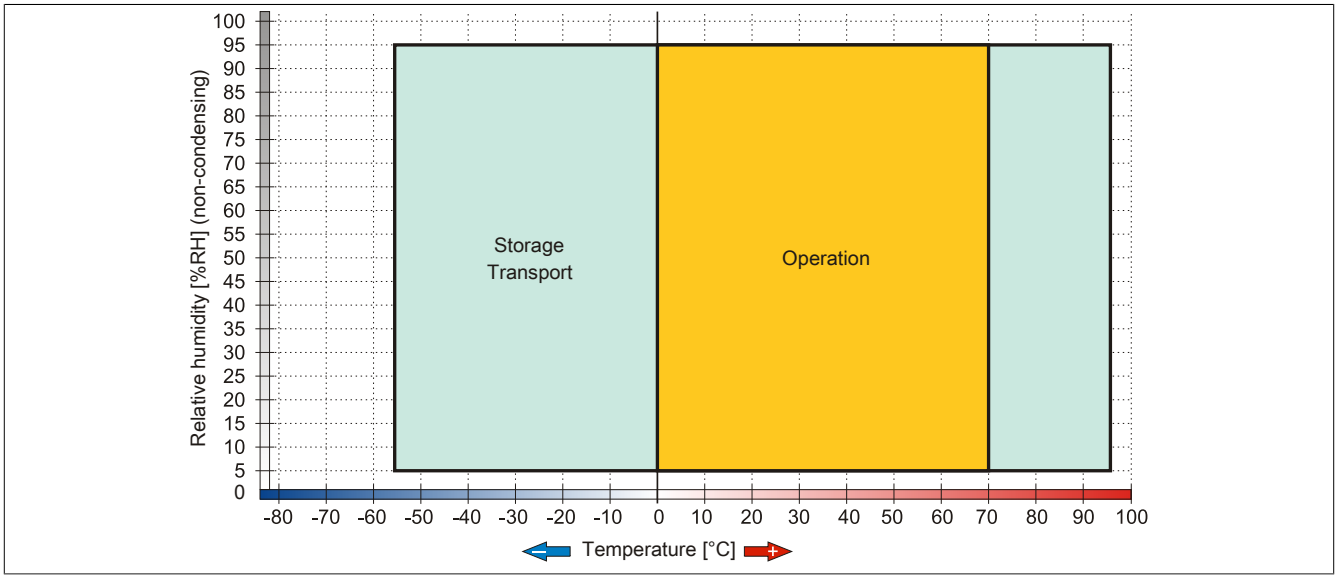


Figure 32: 5AC801.SSDI-00 - Temperature humidity diagram

Benchmark

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

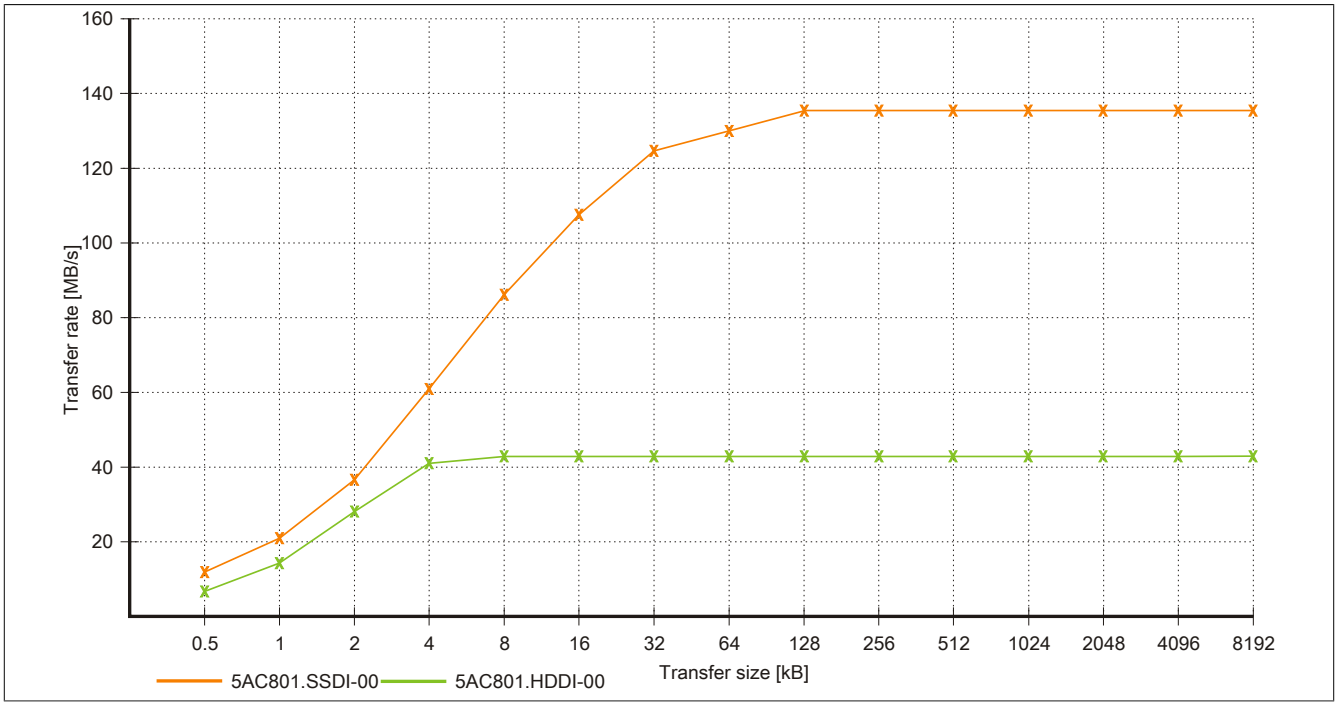


Figure 33: 5AC801.SSDI-00 - ATTO disk benchmark v2.34 - Cyclic read

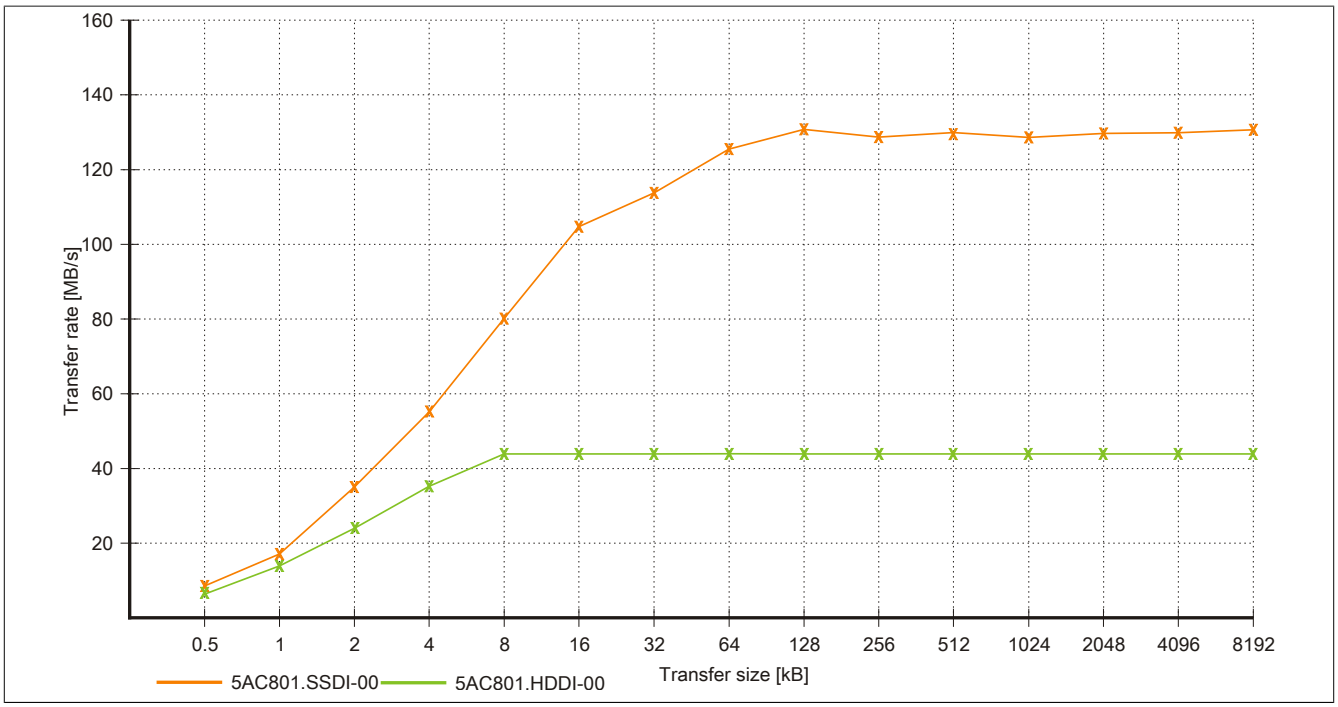


Figure 34: 5AC801.SSDI-00 - ATTO disk benchmark v2.34 - Cyclic write

3.9.5 5AC801.SSDI-01

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.

Order data

Model number	Short description	Figure
	Drives	
5AC801.SSDI-01	60 GB SATA SSD (MLC), Slide-in compact	

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

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
Solid state drive	
Capacity	60 GB
Data reliability	< 1 unrecoverable errors 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 4k write Typical Maximum	 15000 23000 80000

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

Product ID	5AC801.SSDI-01
Endurance	
MLC flash	Yes
Compatibility	SATA Revision 3.0 complient ACS-2 SSD Enhanced SMART ATA feature set Native Command Queuing (NCQ) command
Environmental conditions	
Temperature	
Operation	0 to 70°C
Storage	-55 to 95°C
Transport	-55 to 95°C
Relative humidity	
Operation	5 to 95%
Storage	5 to 95%
Transport	5 to 95%
Vibration	
Operation	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 12,192 m
Storage	-300 to 12,192 m
Transport	-300 to 12,192 m
Mechanical characteristics	
Mounting	Fixed [2]
Dimensions	
Width	13 mm
Height	98 mm
Depth	105 mm
Weight	118 g
Manufacturer information	
Manufacturer	Intel
Manufacturer's 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

Temperature humidity diagram

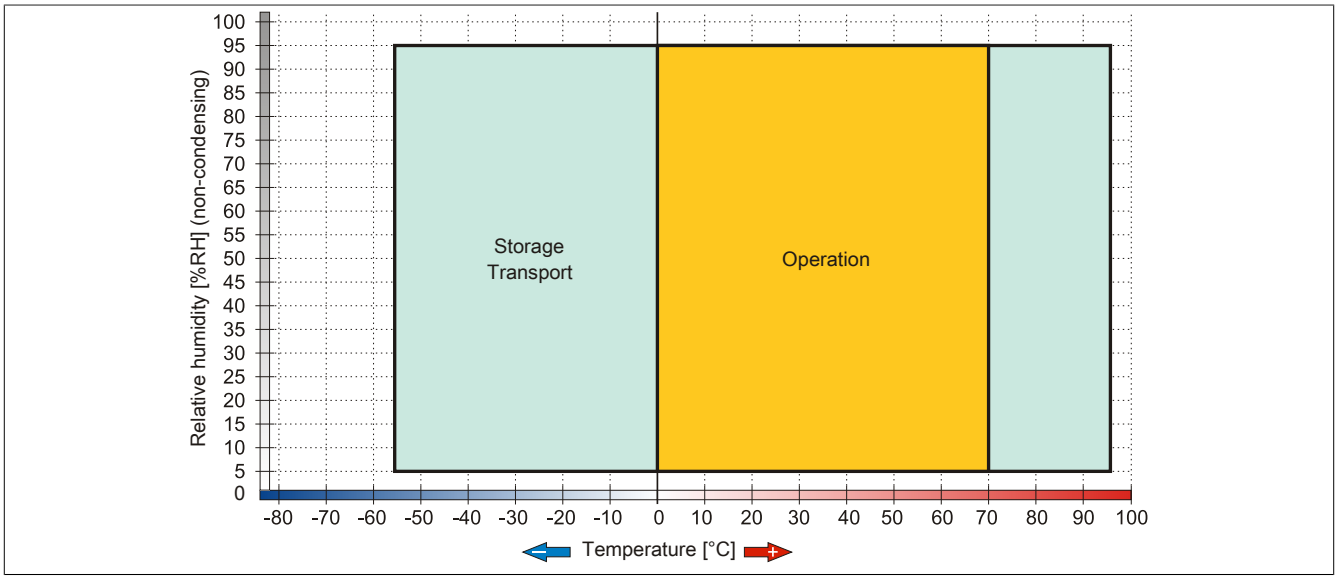


Figure 35: 5AC801.SSDI-01 - Temperature humidity diagram

3.9.6 5AC801.SSDI-02

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.

Order data

Model number	Short description	Figure
	Drives	
5AC801.SSDI-02	180 GB SATA SSD (MLC), Slide-in compact	

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

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
Solid state drive	
Capacity	180 GB
Data reliability	< 1 unrecoverable errors 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 4k write Typical Maximum	 50000 60000 80000

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

Product ID	5AC801.SSDI-02
Endurance	
MLC flash	Yes
Compatibility	SATA Revision 3.0 complient ACS-2 SSD Enhanced SMART ATA feature set Native Command Queuing (NCQ) command
Environmental conditions	
Temperature	
Operation	0 to 70°C
Storage	-55 to 95°C
Transport	-55 to 95°C
Relative humidity	
Operation	5 to 95%
Storage	5 to 95%
Transport	5 to 95%
Vibration	
Operation	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 12,192 m
Storage	-300 to 12,192 m
Transport	-300 to 12,192 m
Mechanical characteristics	
Mounting	Fixed [2]
Dimensions	
Width	13 mm
Height	98 mm
Depth	105 mm
Weight	118 g
Manufacturer information	
Manufacturer	Intel
Manufacturer's 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

Temperature humidity diagram

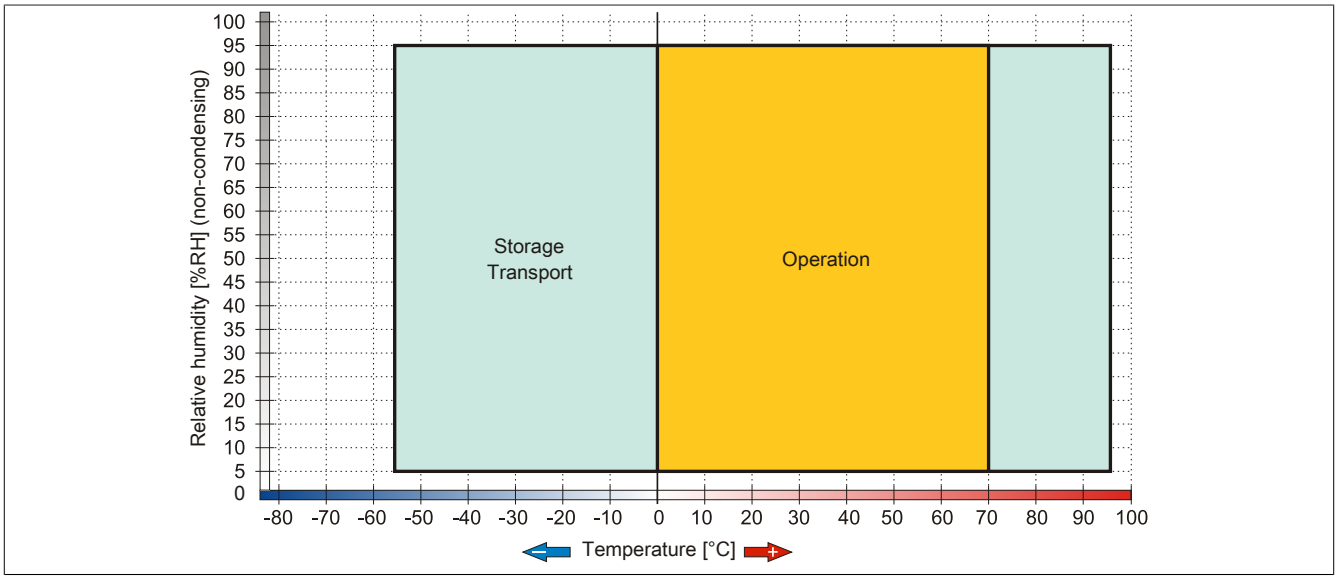


Figure 36: 5AC801.SSDI-02 - Temperature humidity diagram

3.9.7 5AC801.ADAS-00

General information

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

When used in a PPC800

Information:

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

Order data

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

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

Technical data

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

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

3.9.8 5AC801.HDDS-00

General information

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

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

When used in a PPC800

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

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

Order data

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

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

Technical data

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

Product ID	5AC801.HDDS-00
General information	
Certification CE	 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 To/from host	 Max. 450 Mbits/s Max. 150 MB/s (Ultra DMA mode 5)

Table 74: 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
Operation - 24-hour [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	
Mounting	Fixed [6]
Dimensions	
Width	22 mm
Height	172.5 mm
Depth	150 mm
Weight	387 g
Manufacturer information	
Manufacturer	Seagate
Manufacturer's product ID	ST940817SM

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

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

Temperature humidity diagram

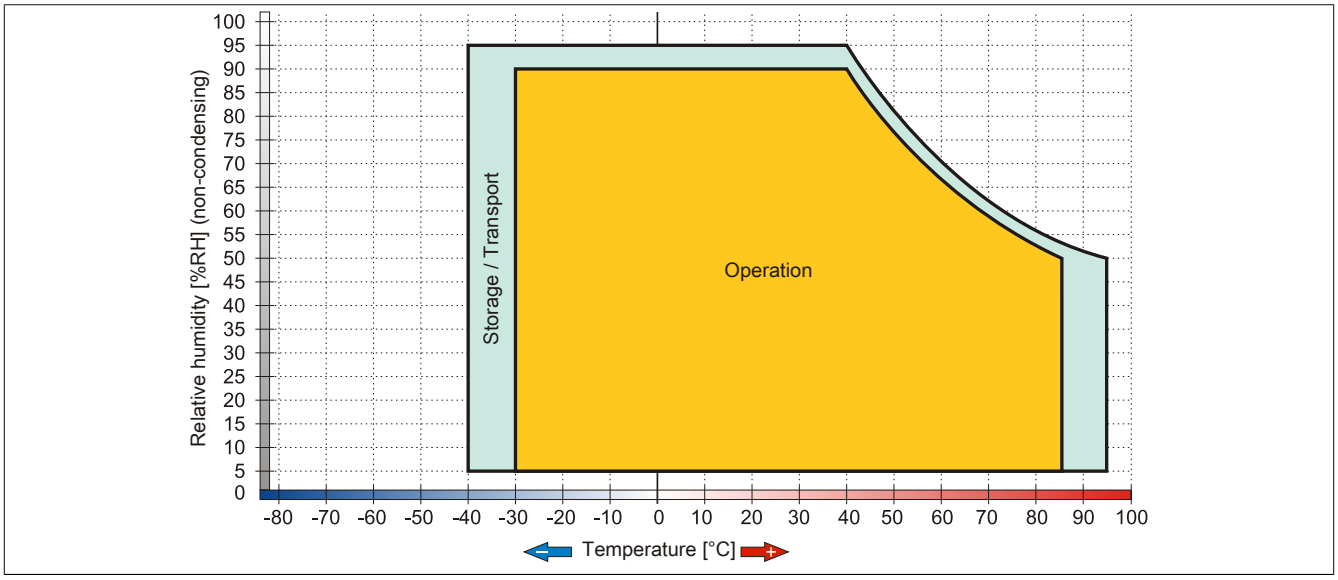


Figure 37: 5AC801.HDDS-00 - Temperature humidity diagram

3.9.9 5AC801.DVDS-00

General information

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

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

When used in a PPC800

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

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

Order data

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

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

Technical data

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

Product ID	5AC801.DVDS-00
General information	
Certification CE	 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
Lifespan	60000 POH (Power-On Hours)
Interface	SATA
Startup time CD DVD	 Max. 19 seconds (0 rpm to read access) Max. 19 seconds (0 rpm to read access)
Access time CD DVD	 Average of 130 ms Average of 140 ms

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

Product ID	5AC801.DVDS-00
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
Reading rate	
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: 0.2g
Storage	5 to 500 Hz: 2g
Transport	5 to 500 Hz: 2g
Shock	
Operation	5 g and 11 ms duration
Storage	60 g and 11 ms duration 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 76: 5AC801.DVDS-00 - Technical data

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

Temperature humidity diagram

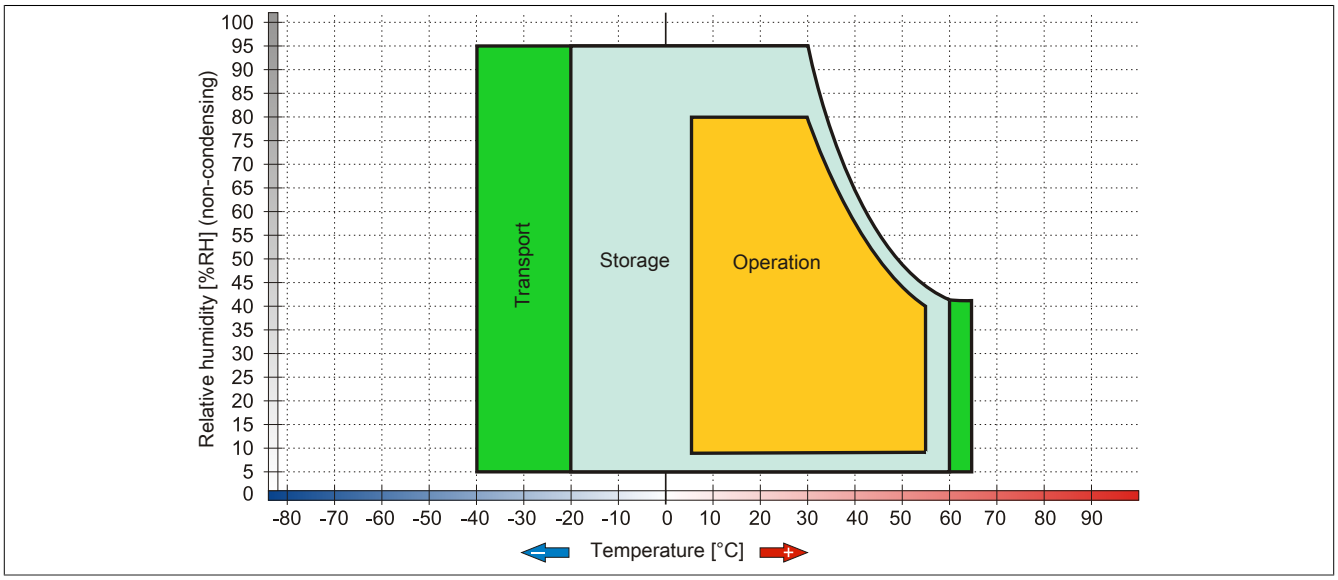


Figure 38: 5AC801.DVDS-00 - Temperature humidity diagram

Hot plug capable

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

3.9.10 5AC801.DVRS-00

General information

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

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

When used in a PPC800

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

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

Order data

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

Table 77: 5AC801.DVRS-00 - Order data

Technical data

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

Product ID	5AC801.DVRS-00
General information	
Certification CE	 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 (4.7GB, 2.6GB) DVD+R, DVD+R (double layer), DVD+RW
Laser class	Class 1 laser
Lifespan	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)
Access time CD DVD	 On average 140 ms (24x) On average 150 ms (8x)

Table 78: 5AC801.DVRS-00 - Technical data

Product ID	5AC801.DVRS-00
Readable media	
CD	CD/CD-ROM (12 cm, 8 cm), CD-R, CD-RW
DVD	DVD-ROM, DVD-R, DVD-R (double layer), DVD-RW. DVD-RAM, DVD+R, DVD+R (double layer),DVD+RW, DVD-RAM
Non-write protected media	
CD	CD-R, CD-RW
DVD	DVD-R/RW, DVD-R (double layer), DVD-RAM (4.7 GB), DVD+R/RW, DVD+R (double layer)
Reading rate	
CD	24x
DVD	8x
Write speed	
CD-R	24x, 16x, 10x and 4x
CD-RW	24x, 16x, 10x and 4x
DVD+R	8x, 4x and 2, 4x
DVD+R (Double Layer)	6x, 4x and 2, 4x
DVD+RW	4x and 2x
DVD-R	8x, 4x and 2x
DVD-R (Double Layer)	6x, 4x and 2x
DVD-RAM [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: 0.2g
Storage	5 to 500 Hz: 2g
Transport	5 to 500 Hz: 2g
Shock	
Operation	At max. 5 g and 11 ms duration
Storage	At max. 60 g and 11 ms duration 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 78: 5AC801.DVRS-00 - Technical data

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

Temperature humidity diagram

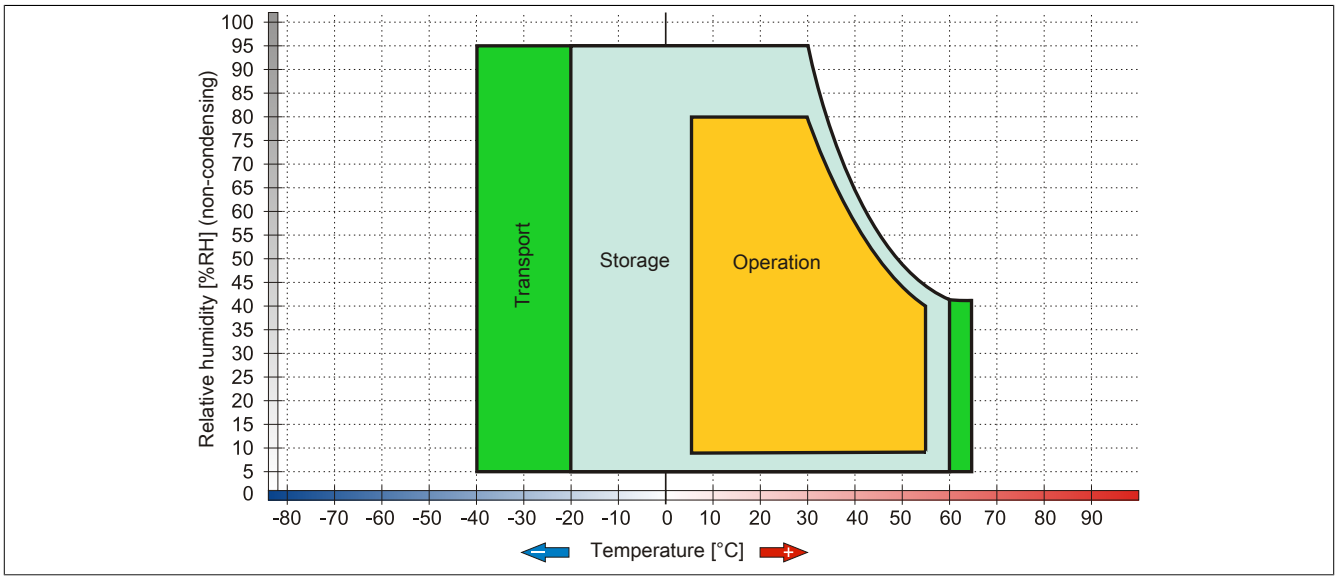


Figure 39: 5AC801.DVRS-00 - Temperature humidity diagram

3.9.11 5ACPCI.RAIC-05

General information

This SATA RAID controller supports RAID level 0 and 1 and can be inserted in a PCI slot. The 250 GB hard disks 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

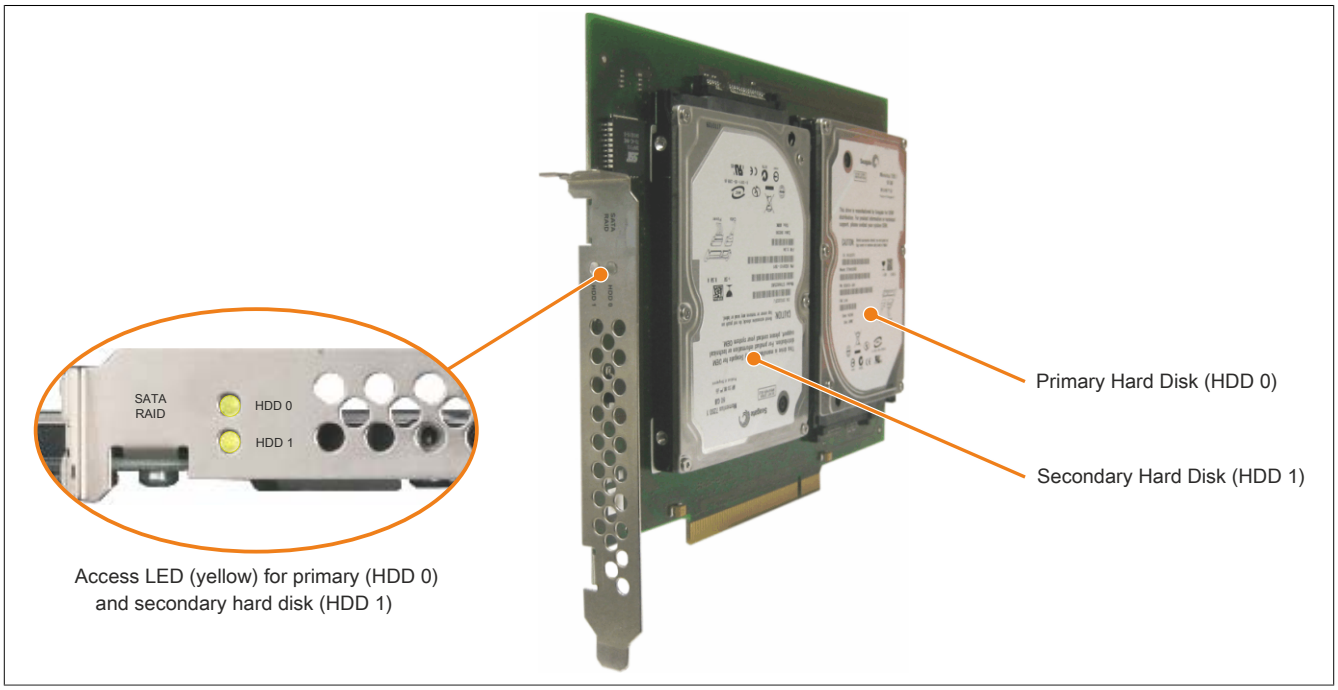


Figure 40: PCI SATA RAID controller

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).

Order data

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

Table 79: 5ACPCI.RAIC-05 - Order data

Technical data

Product ID	5ACPCI.RAIC-05
General information	
Number of hard disks	2
Certification CE	 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] Operation - 24-hour [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	
Mounting	Fixed [6]
Weight	350 g
Manufacturer information	
Manufacturer	Seagate
Manufacturer's product ID	ST9250315AS

Table 80: 5ACPCI.RAIC-05 - Technical data

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

Temperature humidity diagram

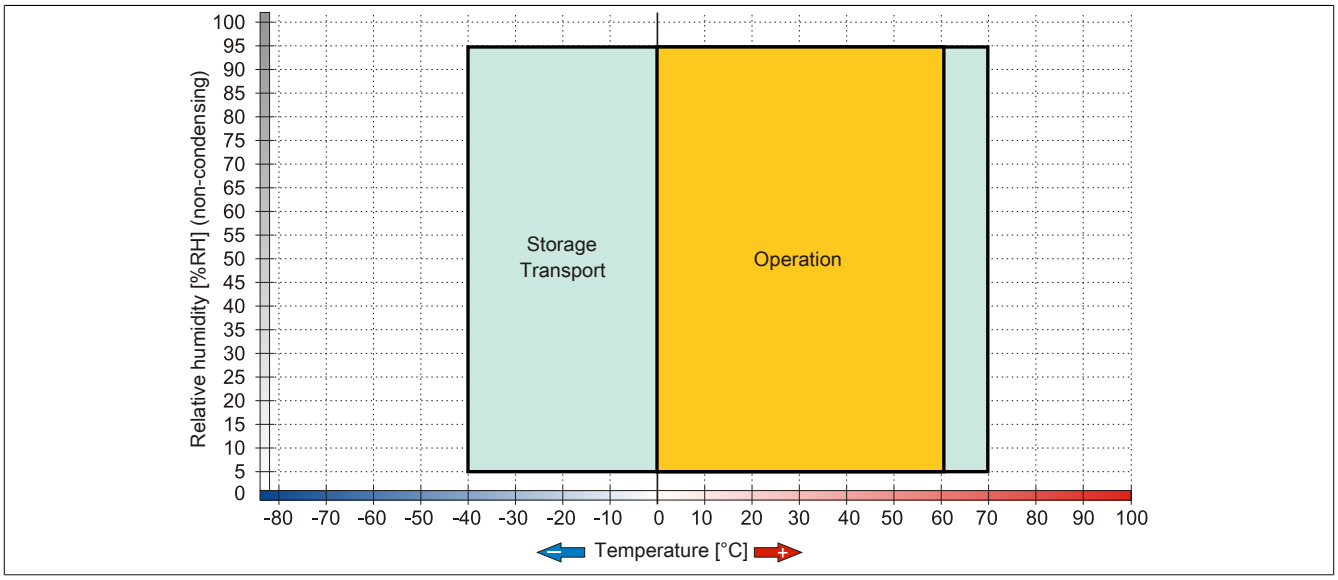


Figure 41: 5ACPCI.RAIC-05 - Temperature humidity diagram

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 area 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.

Configuration

Configuring a SATA RAID network: see Chapter 3 "Installation", section 8 "Configuration of a SATA RAID array" on page 126.

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 275.

3.9.12 5ACPCI.RAIC-06

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

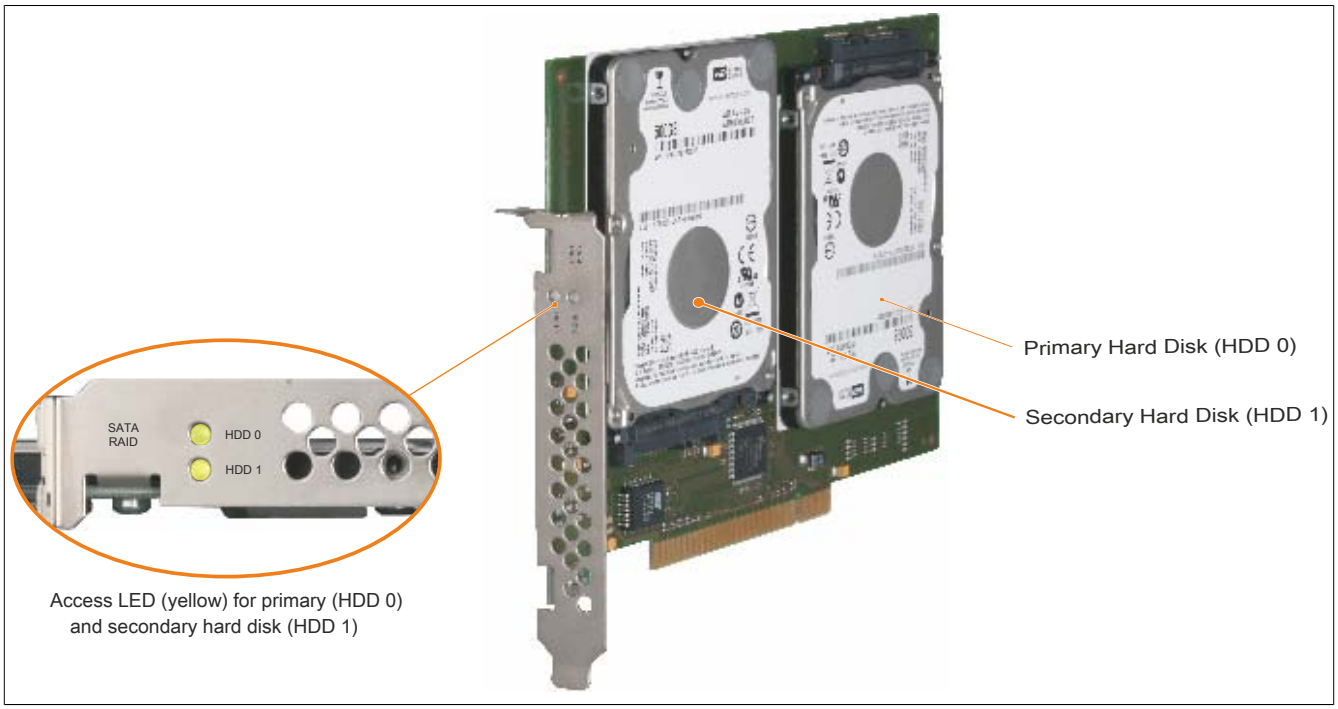


Figure 42: PCI SATA RAID controller

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.

Order data

Model number	Short description	Figure
	Drives	
5ACPCI.RAIC-06	PCI RAID System SATA 2x 500 GByte; Hinweis: Beachten Sie das Manual zum Einsatz der Harddisk.	
	Optional accessories	
	Drives	
5MMHDD.0500-00	500 GB SATA hard disk replacement for 5AC801.HDDI-04, 5AC901.CHDD-01 and 5ACPCI.RAIC-06; Remark: Please see manual for proper use of the hard disk.	

Table 81: 5ACPCI.RAIC-06 - Order data

Technical data

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate from those specified for the 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
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)
Lifespan	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 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
Environmental conditions	
Temperature [3)] Operation [4)] Operation - 24-hour [5)] Storage Transport	 0 to 60°C 0 to 60°C -40 to 70°C -40 to 70°C
Relative humidity [6)] Operation Storage Transport	 5 to 95%, non-condensing 5 to 95%, non-condensing 5 to 95%, non-condensing
Vibration [7)] Operation (continuous) Operation (occasional) Storage Transport	 5 to 500 Hz: 0.125 g; no unrecoverable errors 5 to 500 Hz: 0.25 g; no unrecoverable errors 10 to 500 Hz: 5 g; no unrecoverable errors 10 to 500 Hz: 5 g; no unrecoverable errors
Shock Operation Storage Transport	 200 g and 2 ms duration; no unrecoverable errors 1000 g and 2 ms duration; no unrecoverable errors 1000 g and 2 ms duration; no unrecoverable errors
Altitude Operation Storage	 -305 to 3048 m -305 to 12192 m
Mechanical characteristics	
Mounting	Fixed [8)]
Weight	350 g
Manufacturer information	
Manufacturer	Western Digital
Manufacturer's product ID	WD5000LUCT

Table 82: 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 for 305 meter altitude. The temperature specification must be reduced linearly by 1 °C every 305 meters. The temperature increase and decrease can be a maximum of 20 °C per hour.
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.

Temperature humidity diagram

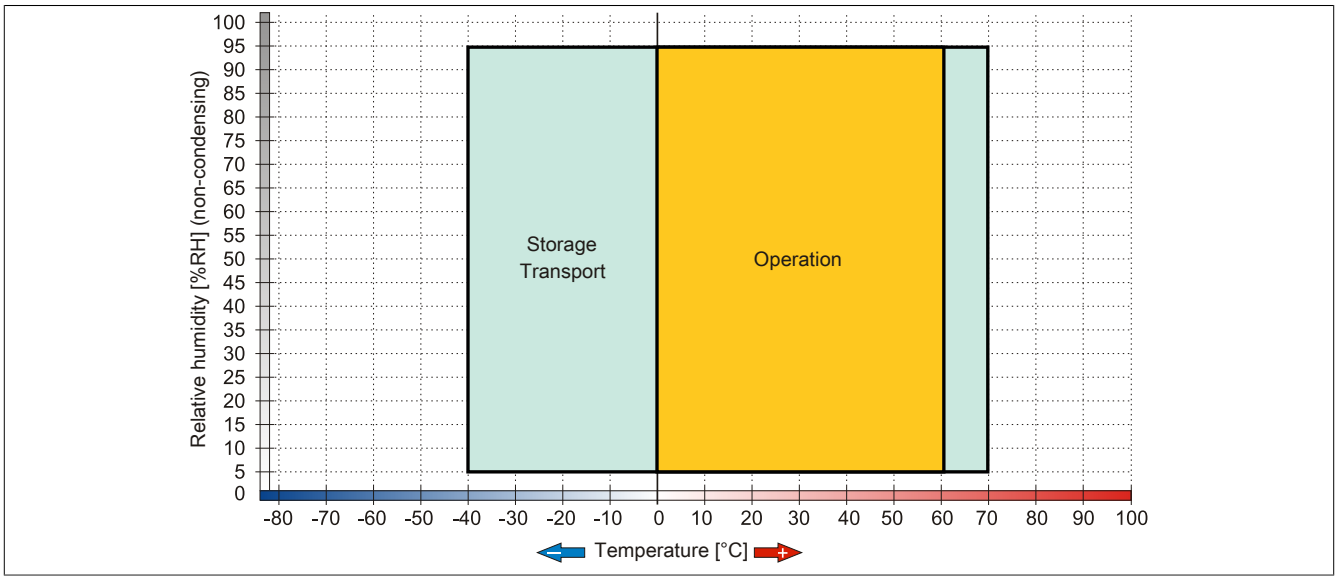


Figure 43: 5ACPCI.RAIC-06 - Temperature humidity diagram

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 area 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.

Configuration

Configuring a SATA RAID network: see Chapter 3 "Installation", section 8 "Configuration of a SATA RAID array" on page 126.

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 275.

3.9.13 5MMHDD.0250-00

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

Order data

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

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

Technical data

Information:

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

Product ID	5MMHDD.0250-00
General information	
Certification	
CE	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
Operation - 24-hour [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

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

Product ID	5MMHDD.0250-00
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's product ID	ST9250315AS

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

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

Temperature humidity diagram

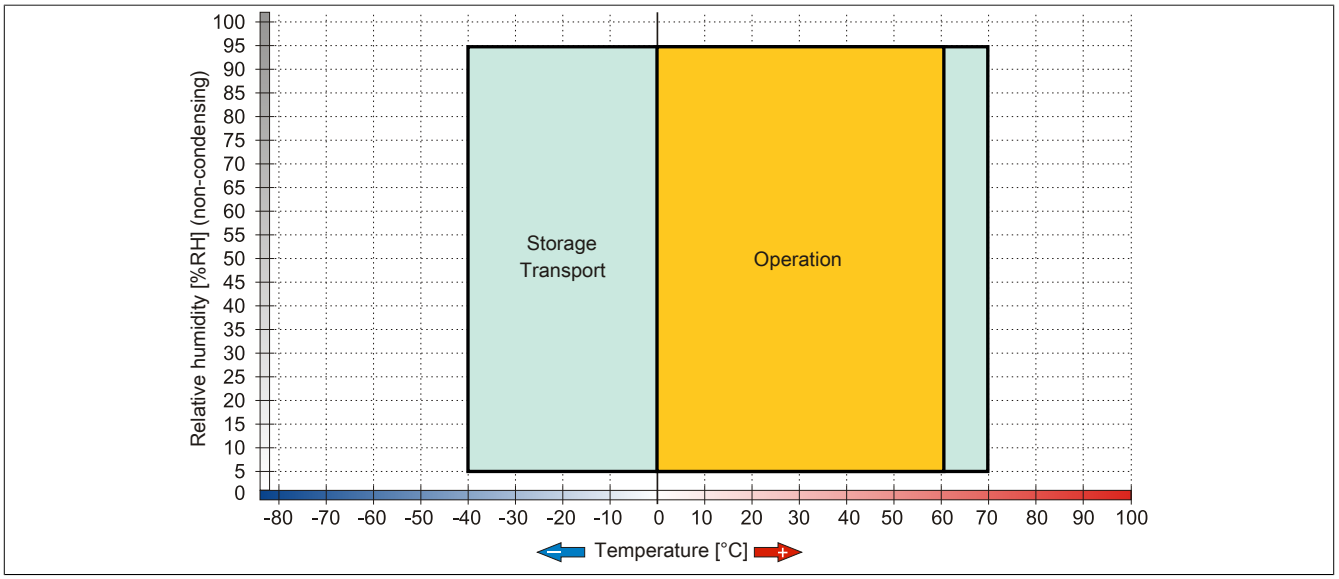


Figure 44: 5MMHDD.0250-00 - Temperature humidity diagram

3.9.14 5MMHDD.0500-00

General information

This 500 GB hard disk can be used as a replacement part or 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
- Specified for 24-hour operation
- S.M.A.R.T. support

Order data

Model number	Short description	Figure
	Drives	
5MMHDD.0500-00	500 GB SATA Hard Disk Spare part for 5AC801.HDDI-04, 5AC901.CHDD-01 and 5ACPCI.RAIC-06; Remark: Please see manual for proper use of the hard disk.	

Table 85: 5MMHDD.0500-00 - Order data

Technical data

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate from those specified for the 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	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)
Lifespan	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
Environmental conditions	
Temperature [2)]	
Operation [3)]	0 to 60°C
Operation - 24-hour [4)]	0 to 60°C
Storage	-40 to 70°C
Transport	-40 to 70°C

Table 86: 5MMHDD.0500-00 - Technical data

Product ID	5MMHDD.0500-00
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's product ID	WD5000LUCT

Table 86: 5MMHDD.0500-00 - Technical data

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

Temperature humidity diagram

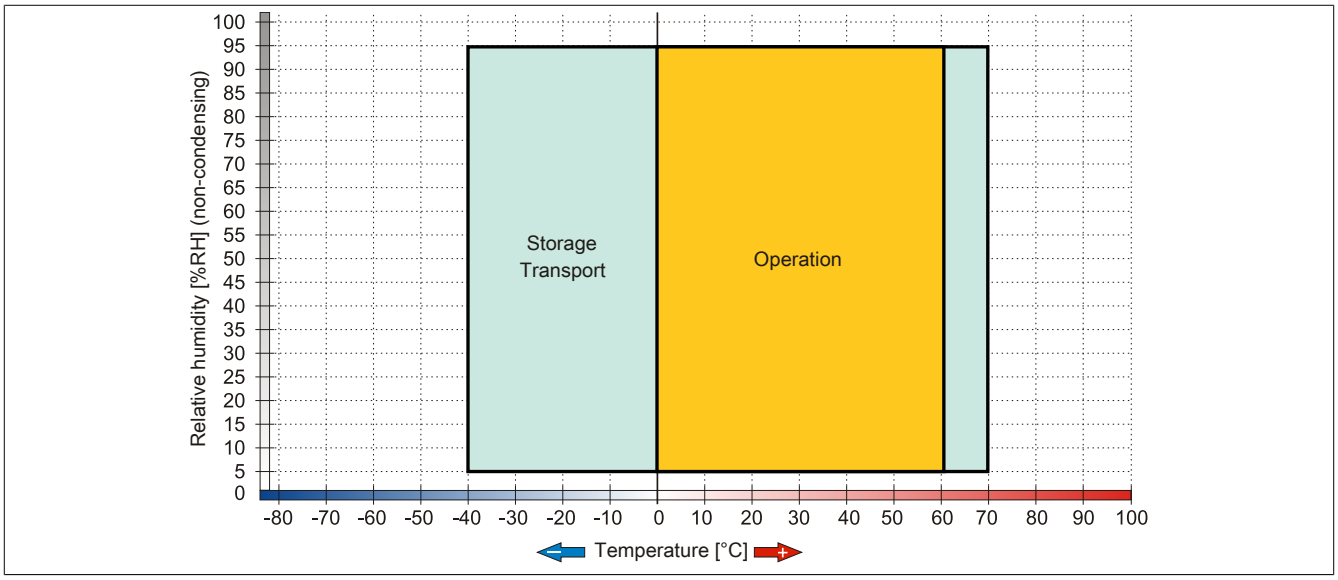


Figure 45: 5MMHDD.0500-00 - Temperature humidity diagram

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

General information

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

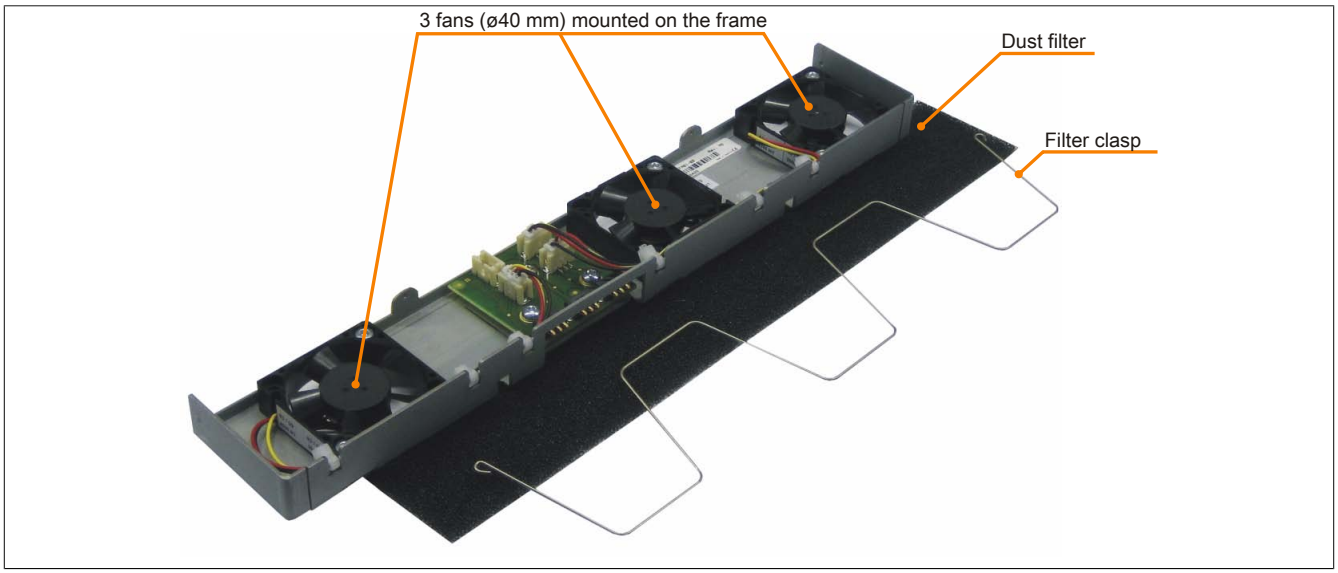


Figure 46: 5AC803.FA01-00 - Fan kit

Order data

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

Table 87: 5AC803.FA01-00 - Order data

Technical data

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

Table 88: 5AC803.FA01-00 - Technical data

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

Table 88: 5AC803.FA01-00 - Technical data

3.10.2 5AC803.FA02-00

General information

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

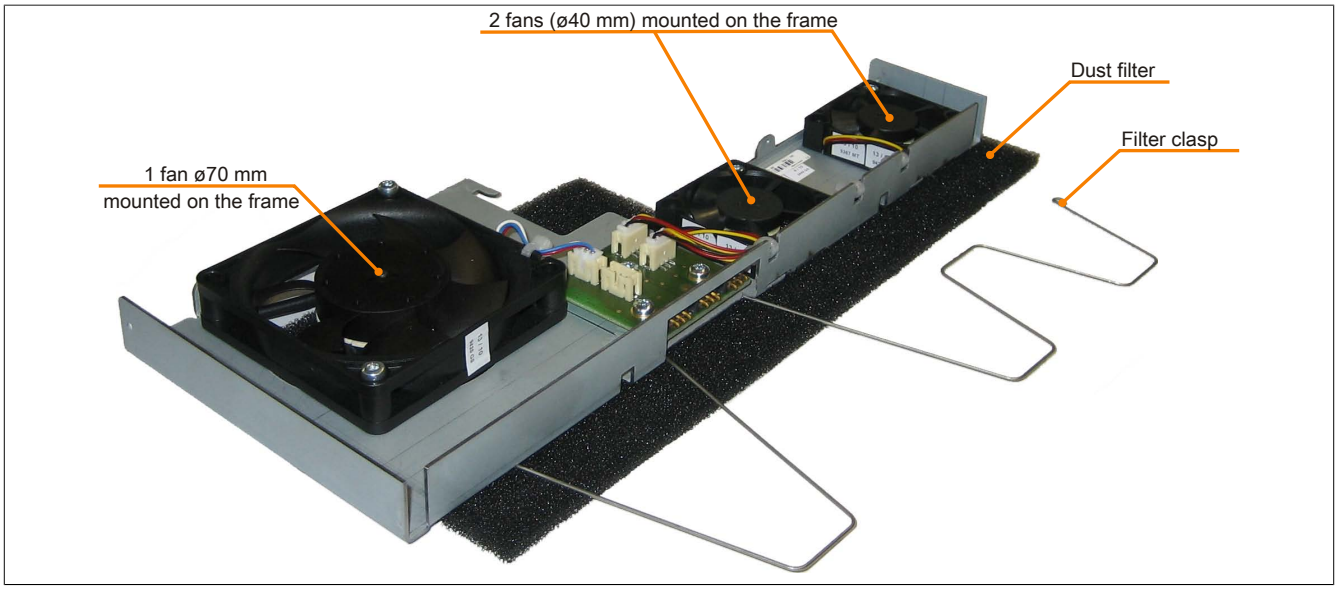


Figure 47: 5AC803.FA02-00 - Fan kit

Order data

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

Table 89: 5AC803.FA02-00 - Order data

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
Lifespan	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

Table 90: 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 90: 5AC803.FA02-00 - Technical data

3.10.3 5AC803.FA03-00

General information

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

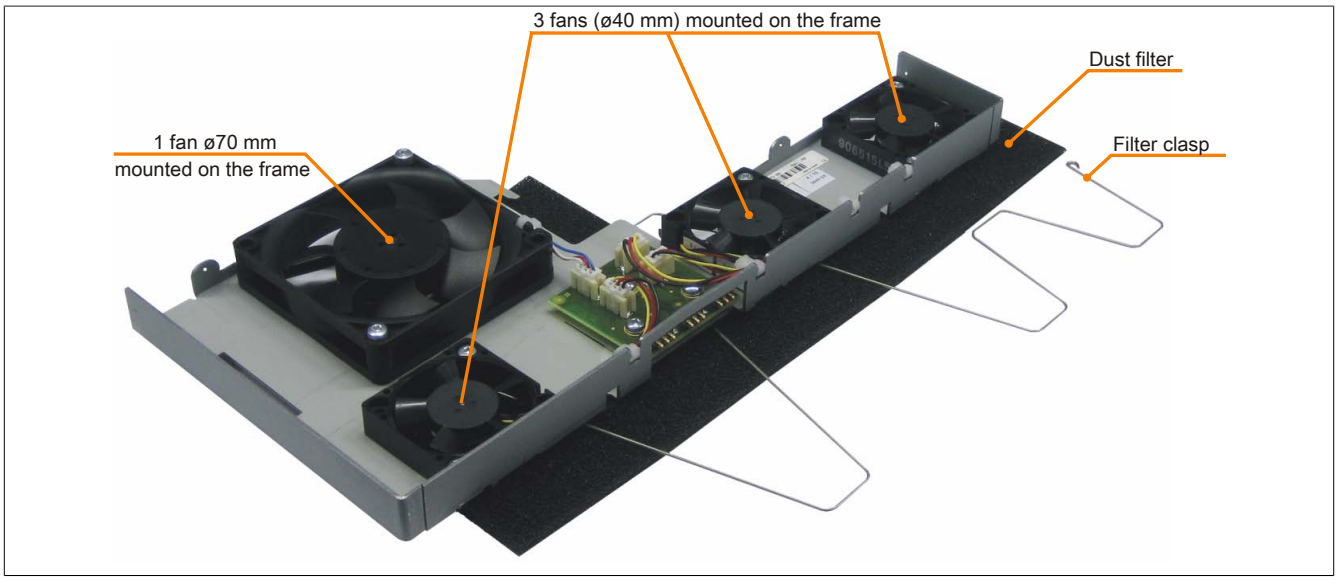


Figure 48: 5AC803.FA03-00 - Fan kit

Order data

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

Table 91: 5AC803.FA03-00 - Order data

Technical data

Product ID	5AC803.FA03-00
General information	
Number of fans	4
Speed	Fan 1, 2, 3: max. 6100 rpm Fan 4: 4300 rpm ± 10%
Noise level	Fan 1, 2, 3: 21 dB Fan 4: 5 dB
Lifespan	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
Mechanical characteristics	
Dimensions	
Fan	
Width	Fan 1, 2, 3: 40 mm Fan 4: 70 mm
Height	Fan 1, 2, 3: 40 mm Fan 4: 70 mm
Depth	Fan 1, 2, 3: 10 mm Fan 4: 15 mm

Table 92: 5AC803.FA03-00 - Technical data

Chapter 3 • Installation

1 Installation

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

1.1 Important mounting information

- 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

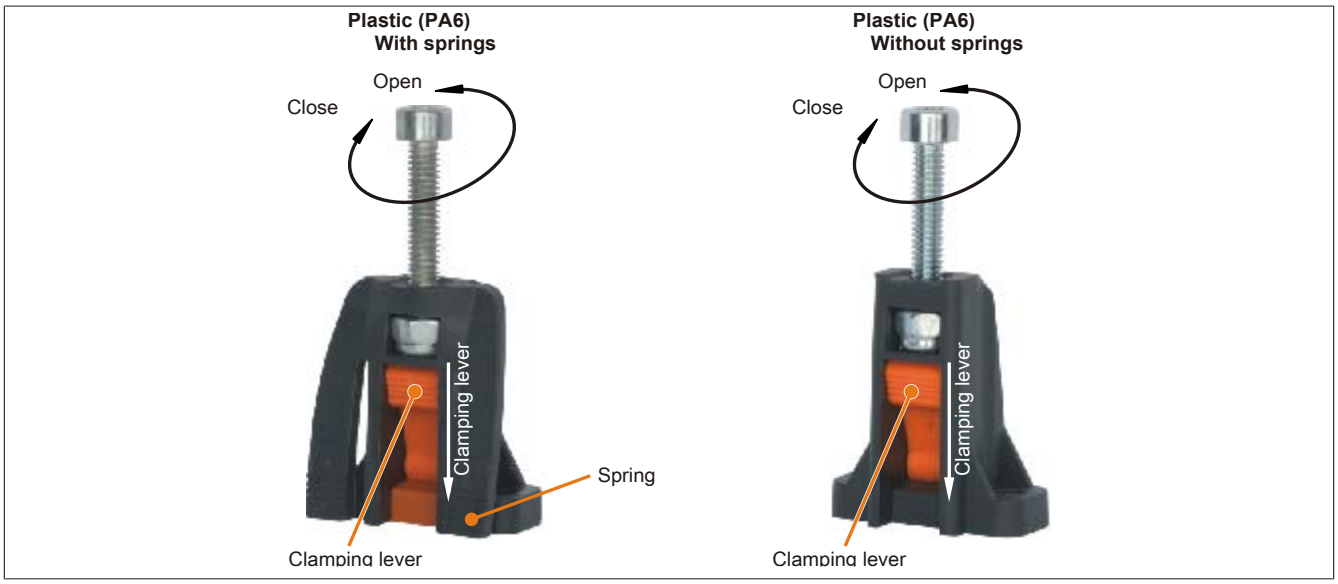


Figure 49: Clamping block

The 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 clamping block is 0.5Nm.

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

1.3 Mounting orientation

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

1.3.1 Mounting orientation 0° and +/- 45°

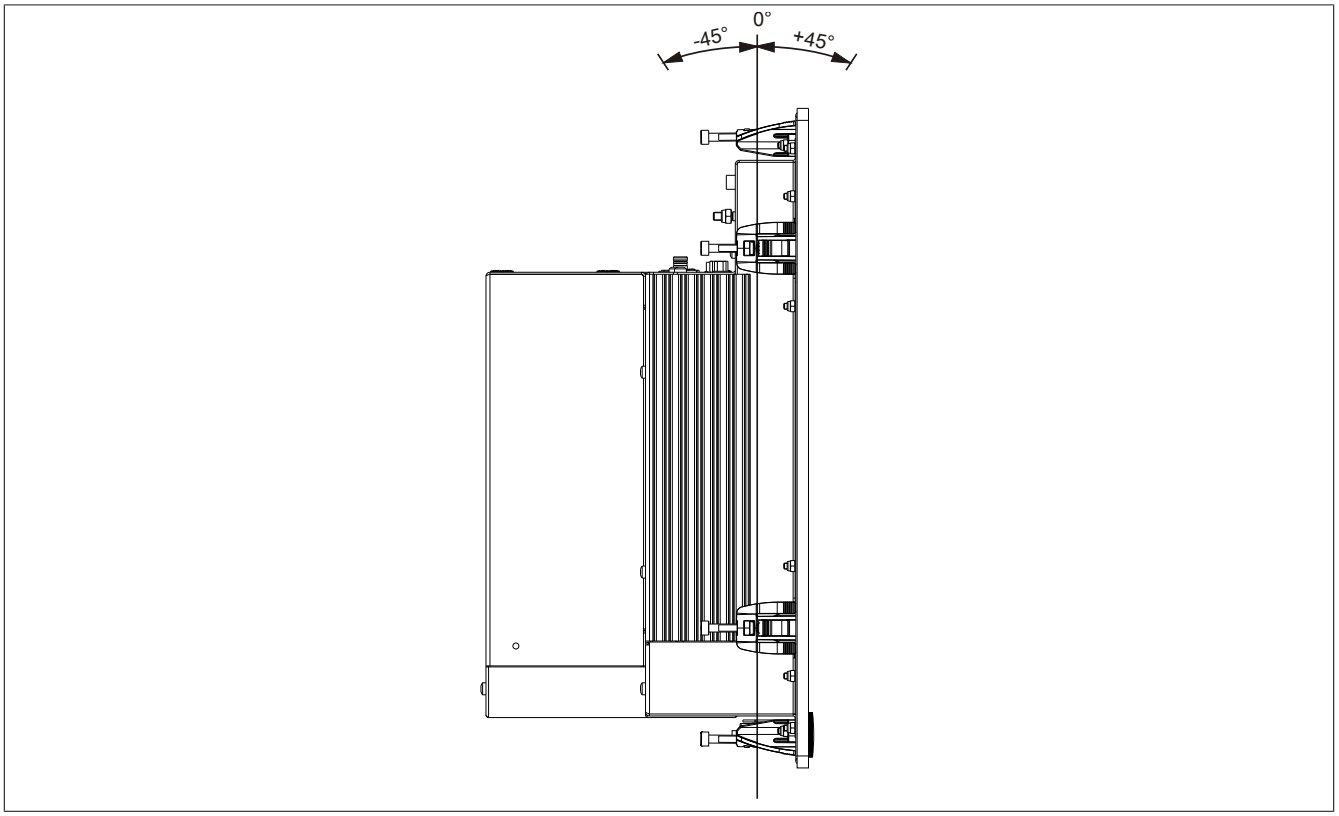


Figure 50: Mounting orientation 0° and +/- 45°

Mount the device so that the spacing is as indicated in section "Air circulation spacing" on page 116 in order to facilitate natural air circulation.

1.3.2 Mounting orientation with 5AC801.DVRS-00

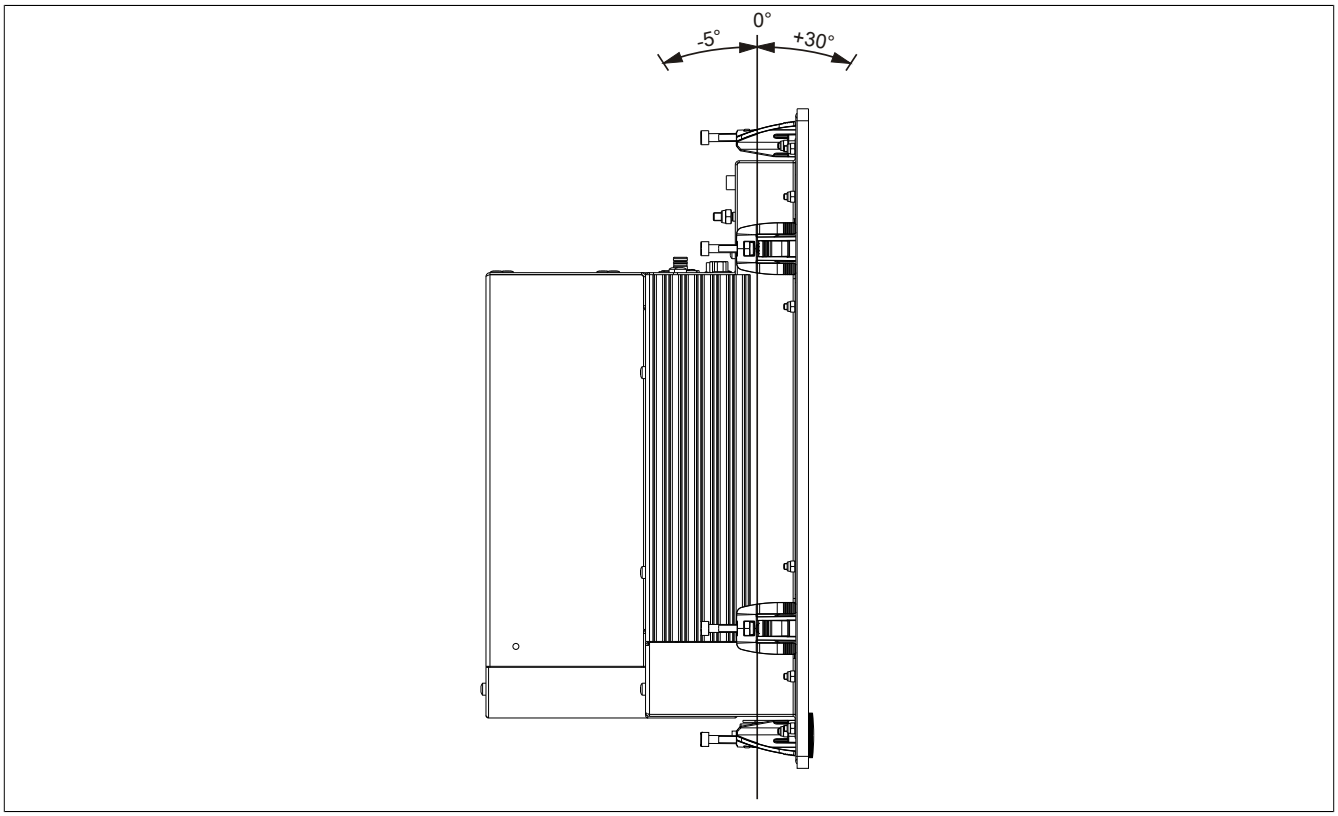


Figure 51: Mounting orientation with 5AC801.DVRS-00

Mount the device so that the spacing is as indicated in section "Air circulation spacing" on page 116 in order to facilitate natural air circulation.

1.3.3 Mounting orientation with 5AC801.DVDS-00

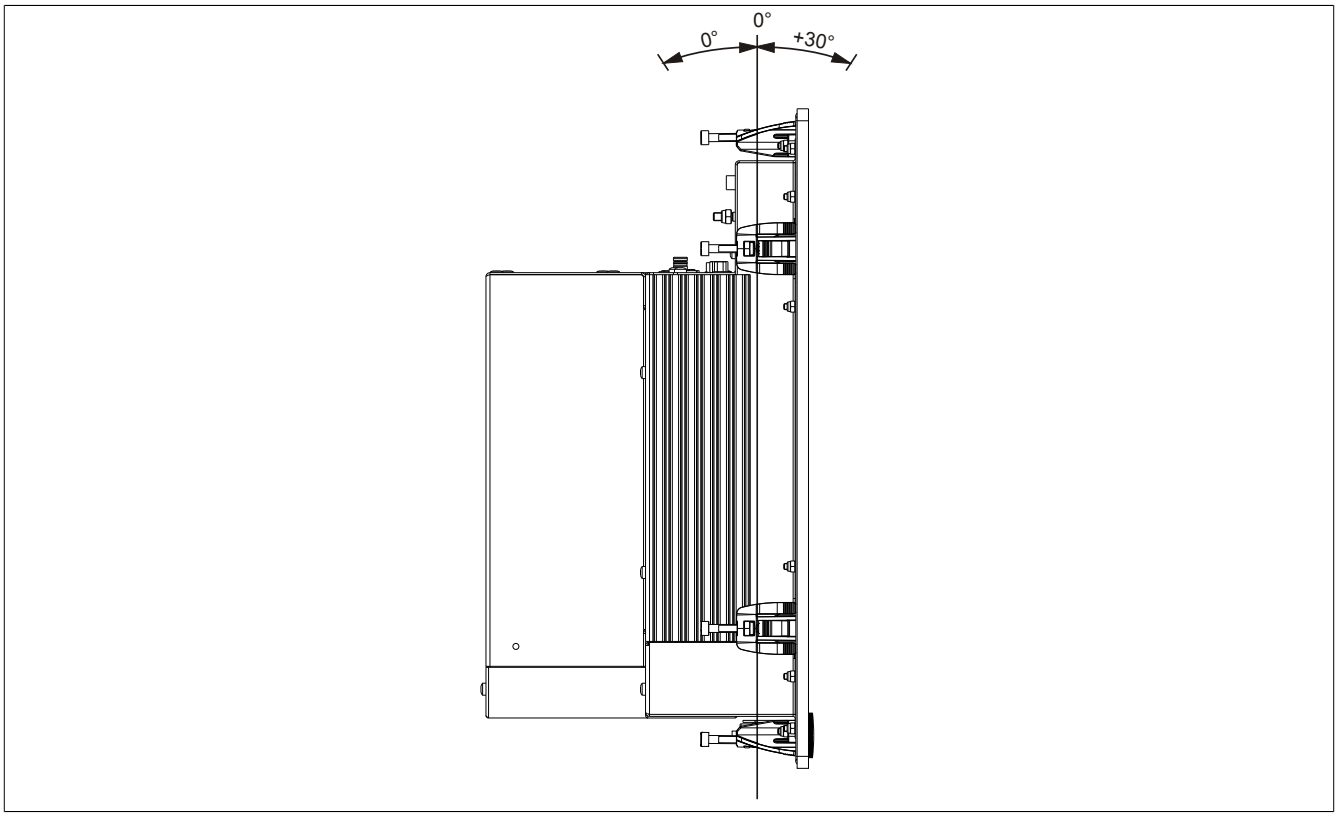


Figure 52: Mounting orientation with 5AC801.DVDS-00

Mount the device so that the spacing is as indicated in section "Air circulation spacing" on page 116 in order to facilitate natural air circulation.

1.4 Air circulation spacing

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

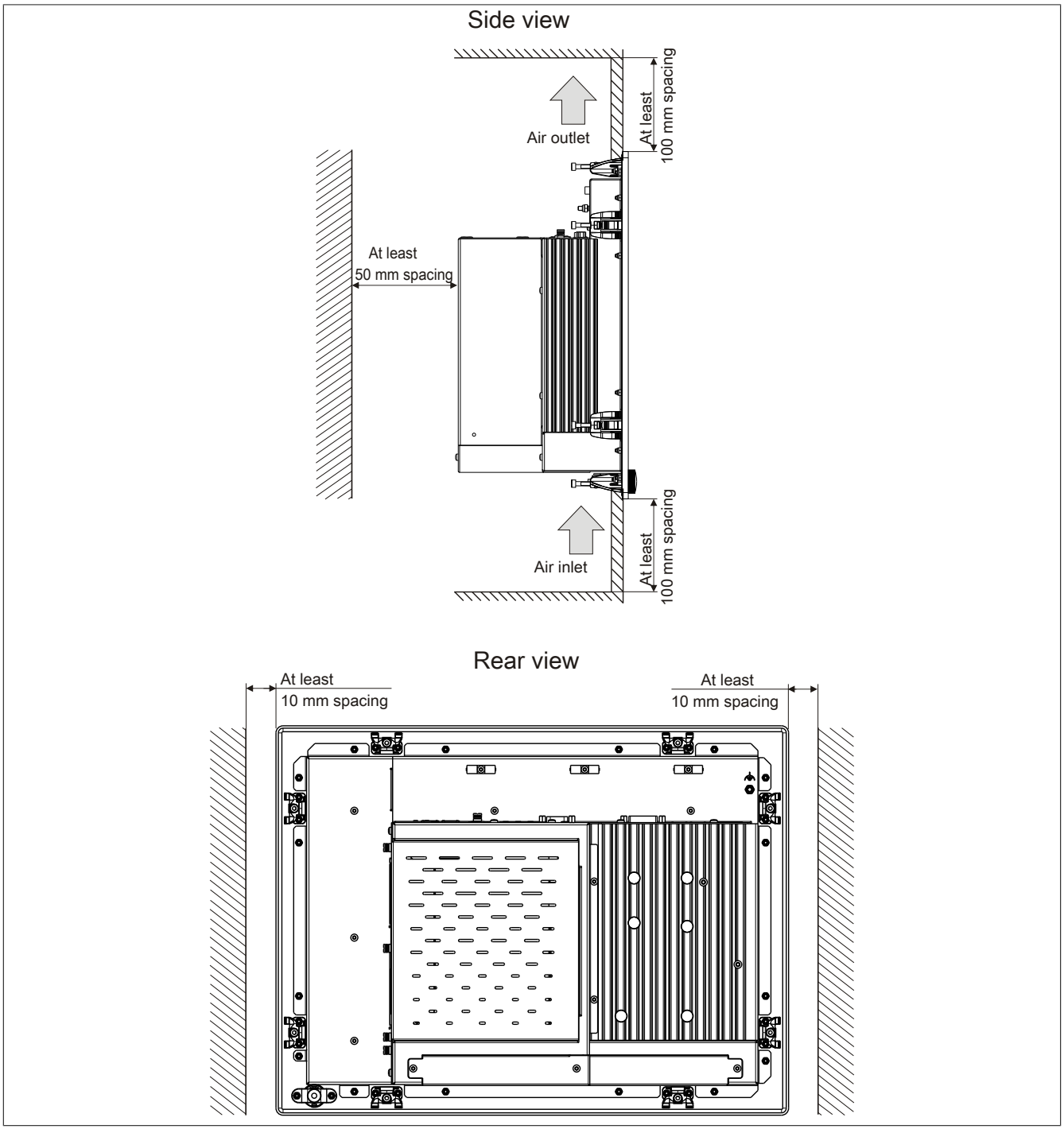


Figure 53: Spacing for air circulation

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 installing or connecting cables.

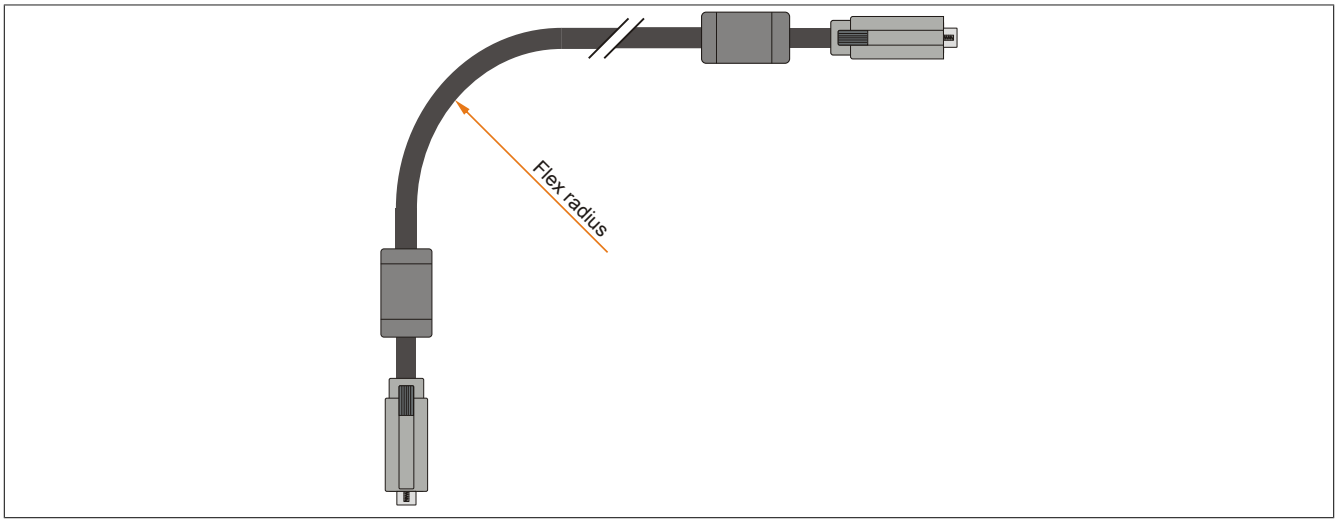


Figure 54: Flex radius - Cable connection

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
- Grounding 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.

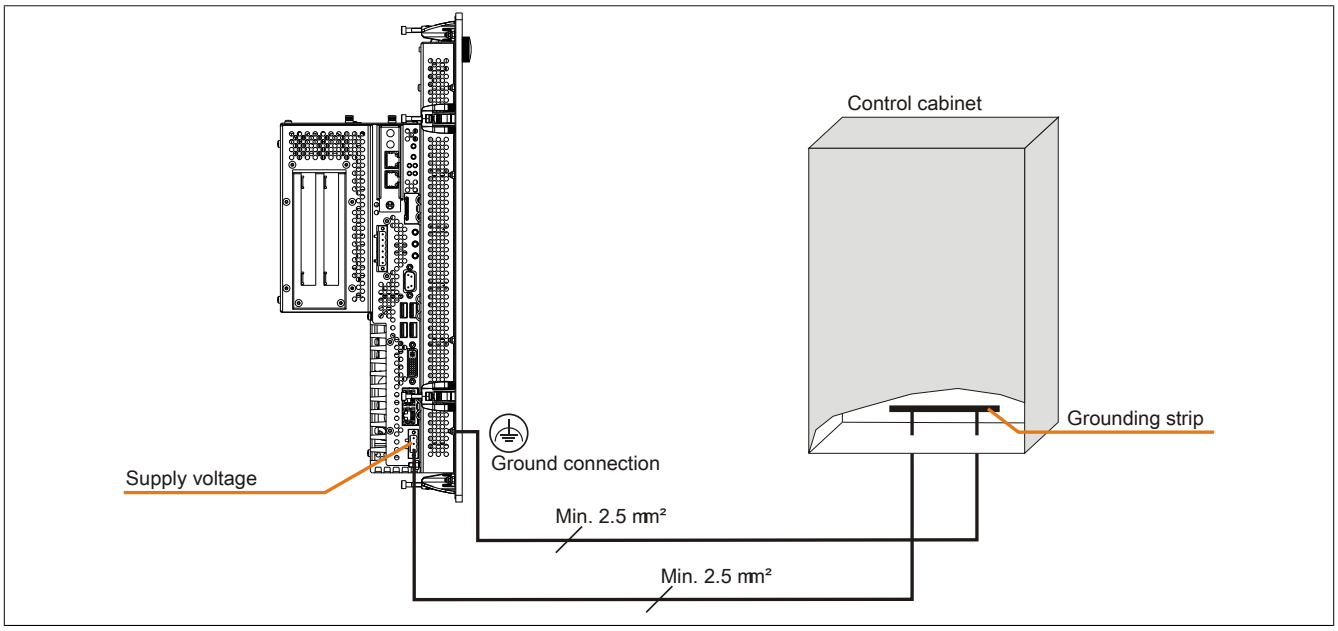


Figure 55: Grounding concept

4 General instructions for performing Temperature tests

The purpose of these instructions is to explain general procedures for performing application-specific temperature tests with B&R industrial PCs or Power Panels. However, 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..

Additionally, 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 mounted 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.

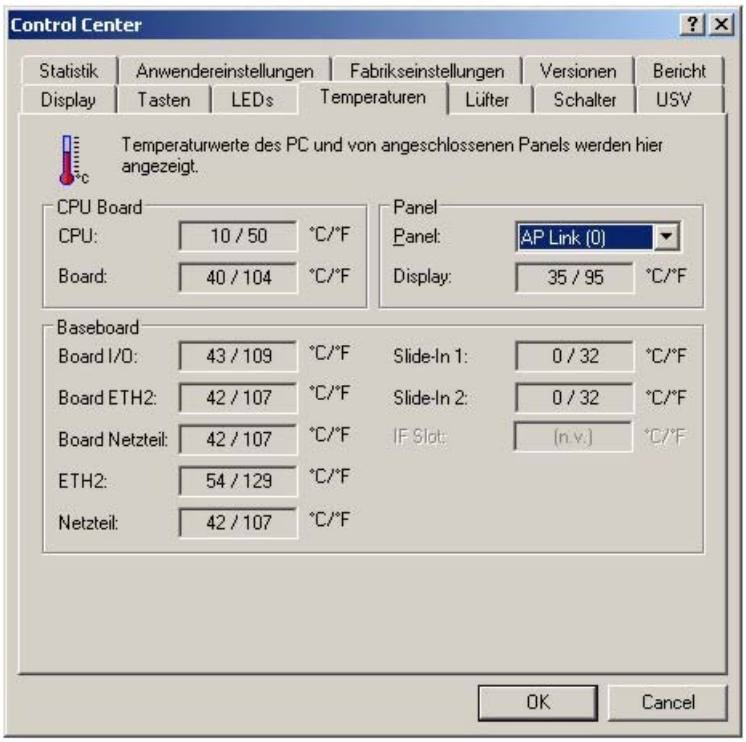
For information about the locations of temperature sensors and the maximum specified values, please see section "Temperature sensor locations" in Chapter 2 "Technical data".

To ensure a reliable evaluation of the temperature situation, a minimum of 8 hours are recommended for testing.

4.2 Evaluation of temperatures in Windows operating systems

4.2.1 Evaluation using B&R Control Center

The B&R Control Center can be used to evaluate the temperatures. The temperatures can be viewed on the "Temperatures" tab. These can be downloaded free of charge from the B&R homepage (www.br-automation.com). The B&R Control Center uses the B&R Automation Device Interface (ADI).



A new application can be created if a historic recording of the data is required.

> **Information:**
>
> **There are SDK's (e.g. the ADI .NET SDK) available on the B&R Homepage (www.br-automation.com) that can be helpful in creating a new application.**

4.2.2 Evaluation using the BurnIn tool from Passmark

If a new application is not created for evaluating the temperatures, B&R recommends using the BurnIn Test software tool from the company Passmark.

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

Information:

Loopback adapters are also available from Passmark. More information can be found at www.passmark.com.

The following screenshots are based on Passmark BurnIn Pro Version V4 and an APC810 2-slot with DVD.

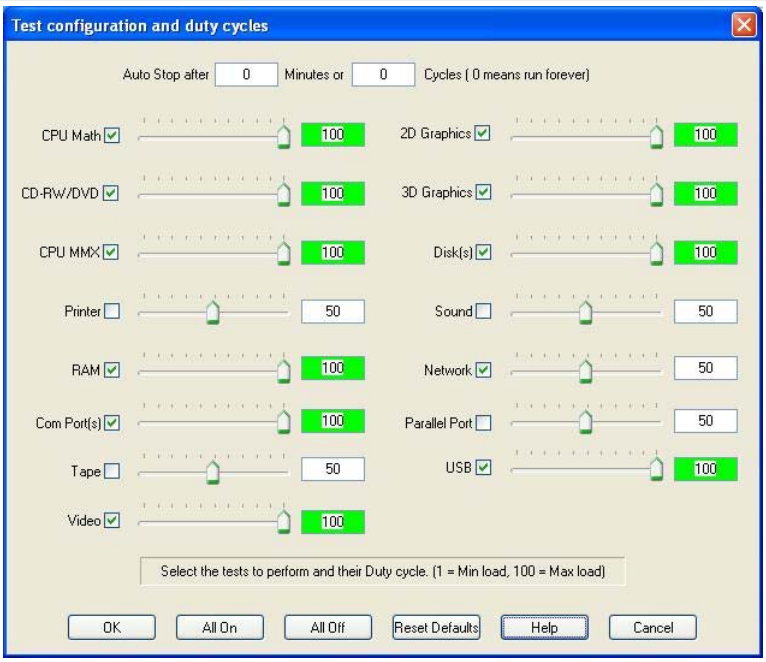


Figure 56: Settings for Passmark BurnIn Pro V4 with an APC810 2-slot with DVD

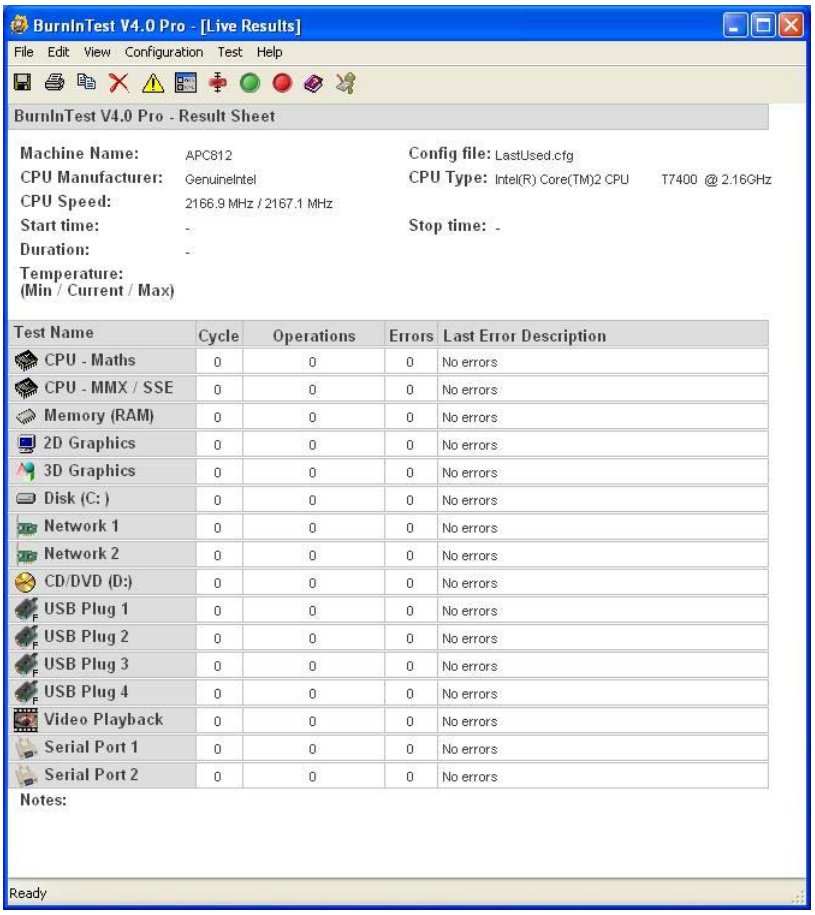


Figure 57: Test overview of an APC810 2-slot with DVD

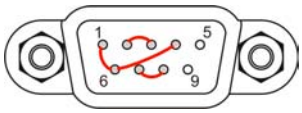
The respective test properties may need to be fine tuned depending on the availability of a loopback adapter and DVDs.

Information:

If there is no USB loopback adapter available, USB flash drives can also be used. The USB flash drives must be available in Windows as formatted drives. The test USB must then be deselected and the USB flash drives must be configured in the disk properties.

Information:

Serial loopback adapters are relatively easy to create yourself. Simple connect several pins with wires to the serial interface.



4.3 Evaluating the temperatures in an operating system other than Windows

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 MS-DOS sample programs available.

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

If code from the sample programs is used, please observe the notes in the implementation guide regarding the TODO statements, I/O access functions, etc.

> **Information:**
>
> **Sample programs and implementation guides for any B&R industrial PC or Power Panel can be downloaded free of charge from the B&R homepage (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 also 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 consider the speed, etc..

If the temperature tests are performed in a climate controlled chamber with fans, the devices will be cooled by these fans, and the results will be skewed. The measurement results for passive devices would therefore be unusable. In order to obtain accurate results in climate controlled chambers with fans, the chamber 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 an APC810 2-slot

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

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 93: Evaluation example using an APC810 2-slot

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).

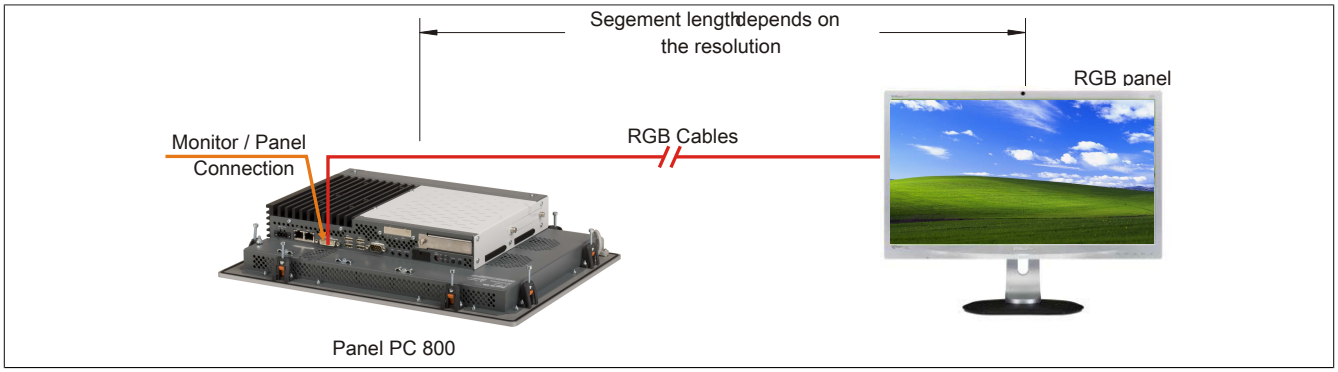


Figure 58: One office TFT via RGB

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 needs 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 maximum load of 1A. The maximum transfer rate is USB 2.0.

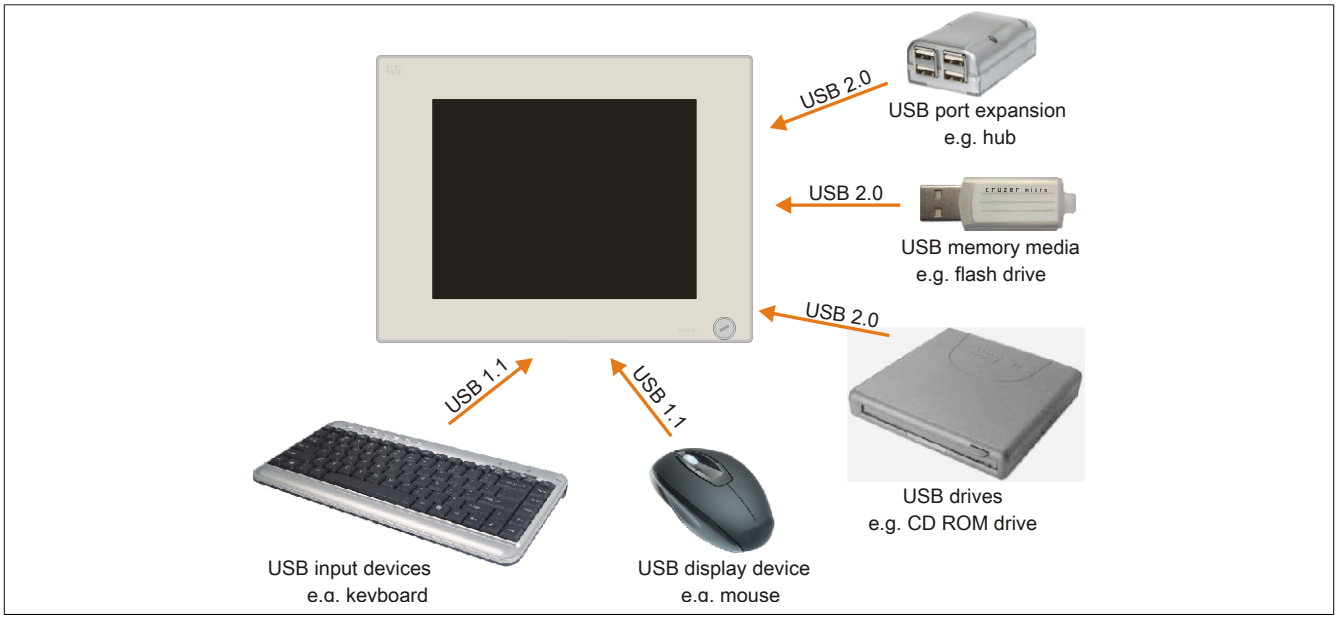


Figure 59: Local connection of USB peripheral devices on the PPC800

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.

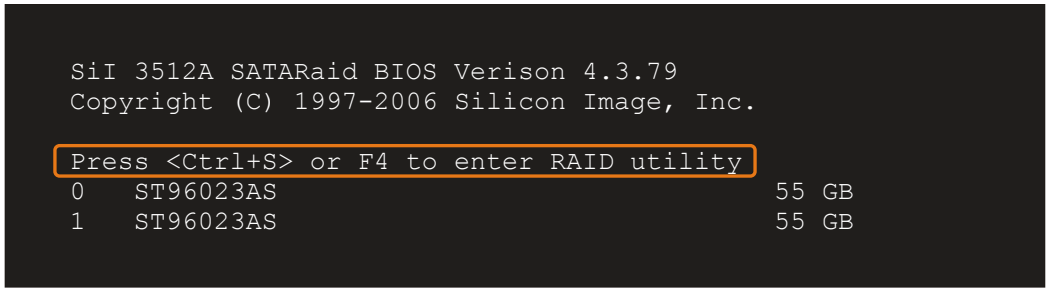


Figure 60: Open the RAID Configuration Utility

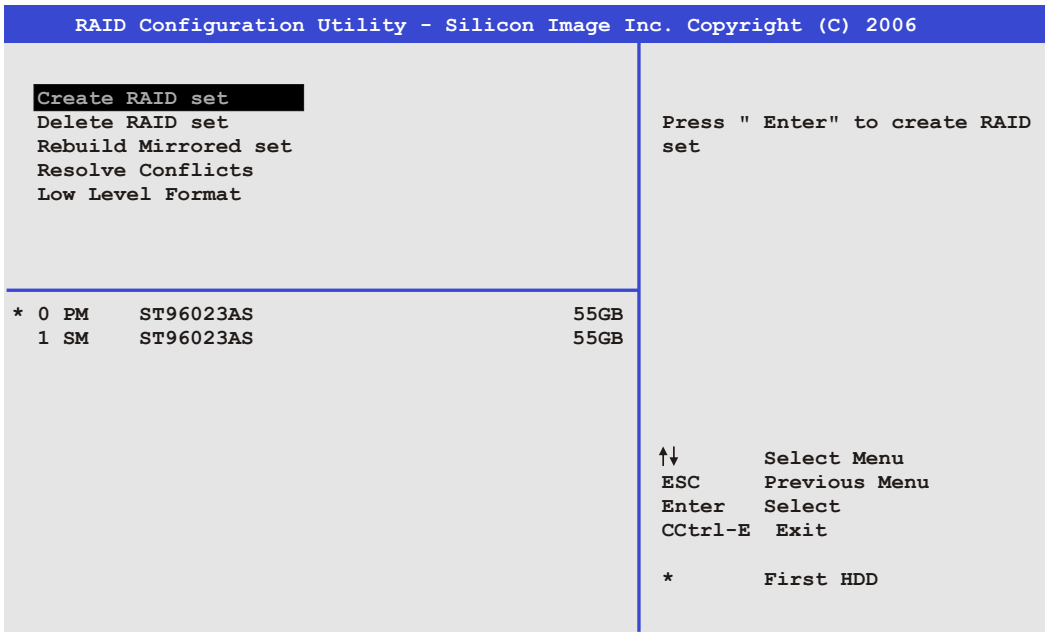


Figure 61: RAID Configuration Utility - Menu

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

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

Table 94: BIOS-relevant keys in the RAID Configuration Utility

8.1 Create RAID set

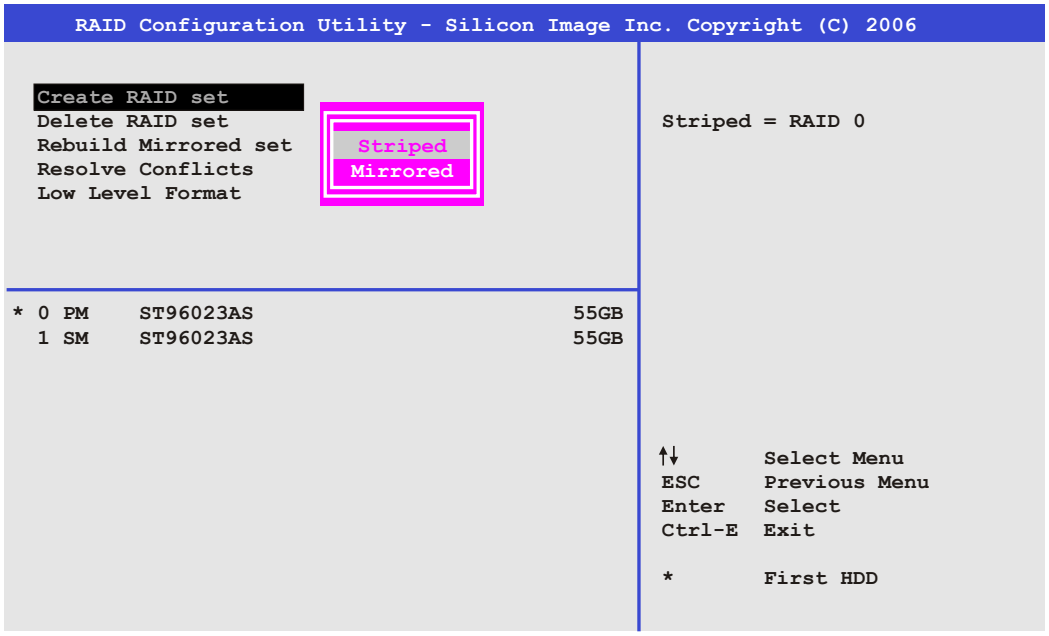


Figure 62: RAID Configuration Utility - Menu

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

8.2 Create RAID set - Striped

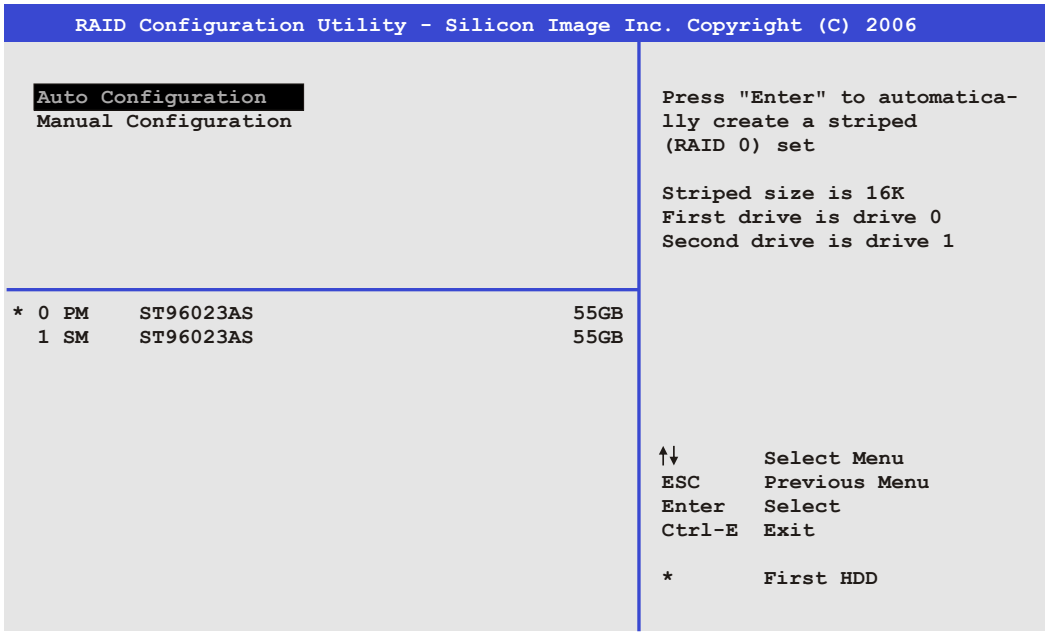


Figure 63: RAID Configuration Utility - Create RAID set - Striped

"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

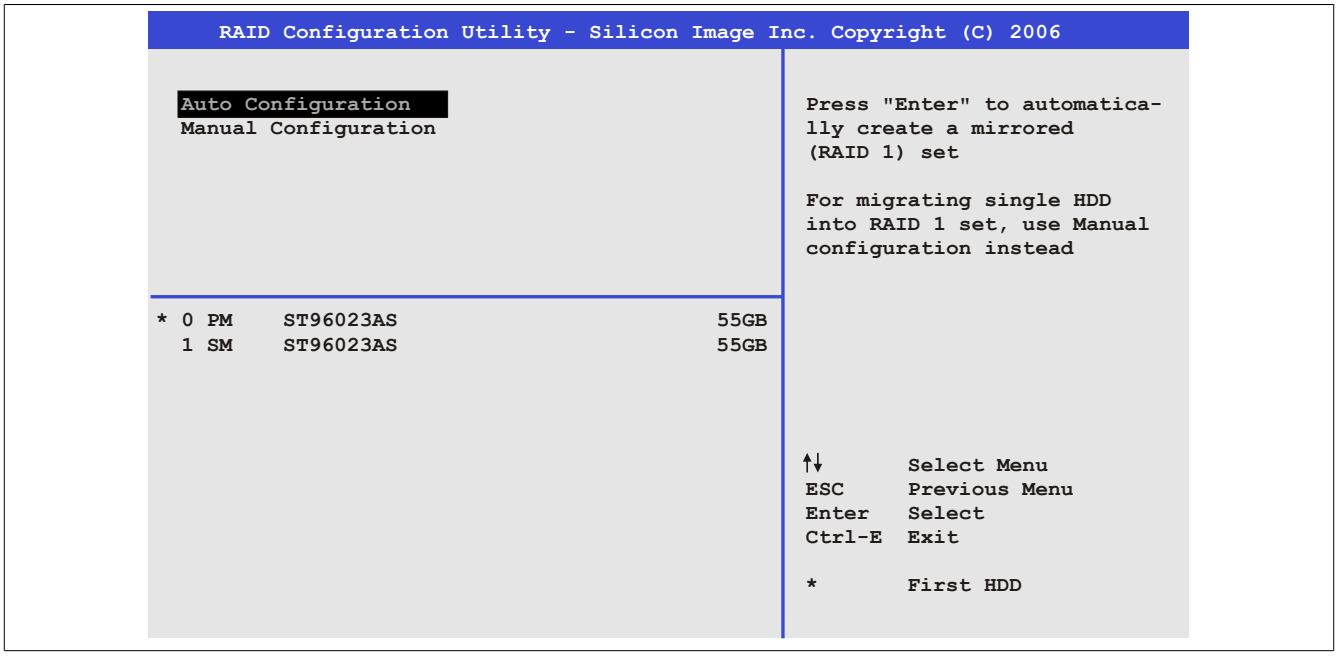


Figure 64: RAID Configuration Utility - Create RAID set - Mirrored

"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

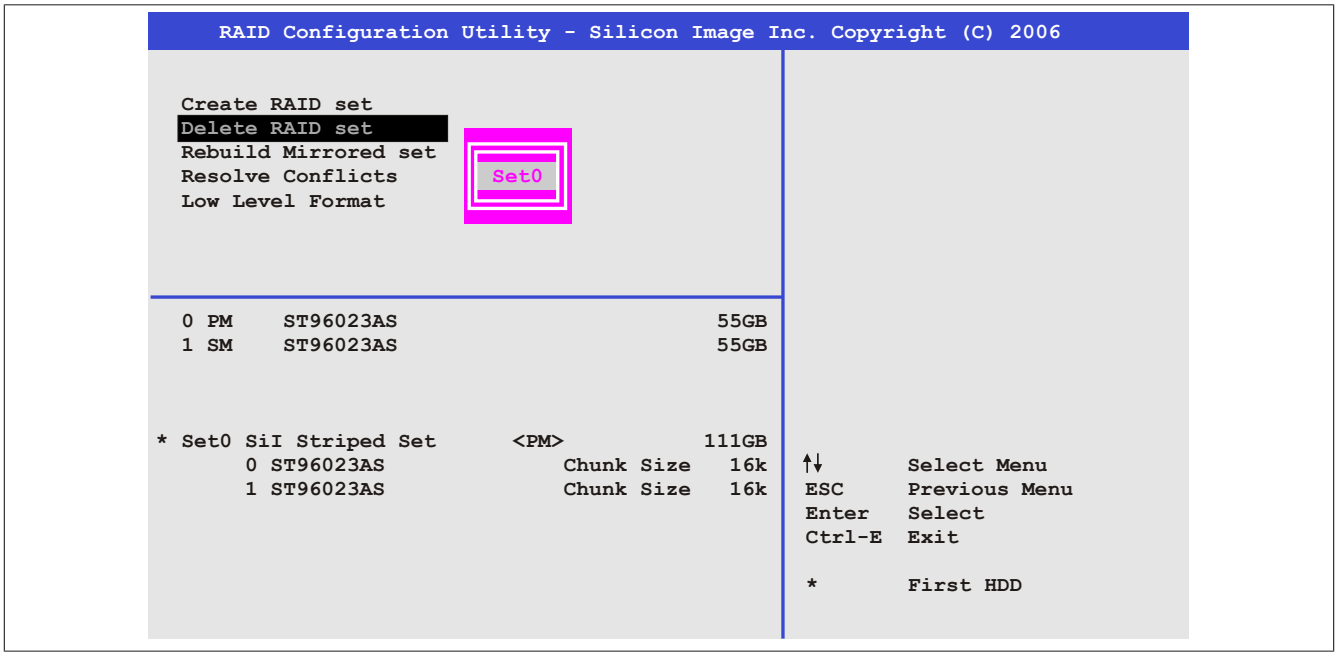


Figure 65: RAID Configuration Utility - Delete RAID set

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

8.5 Rebuild mirrored set

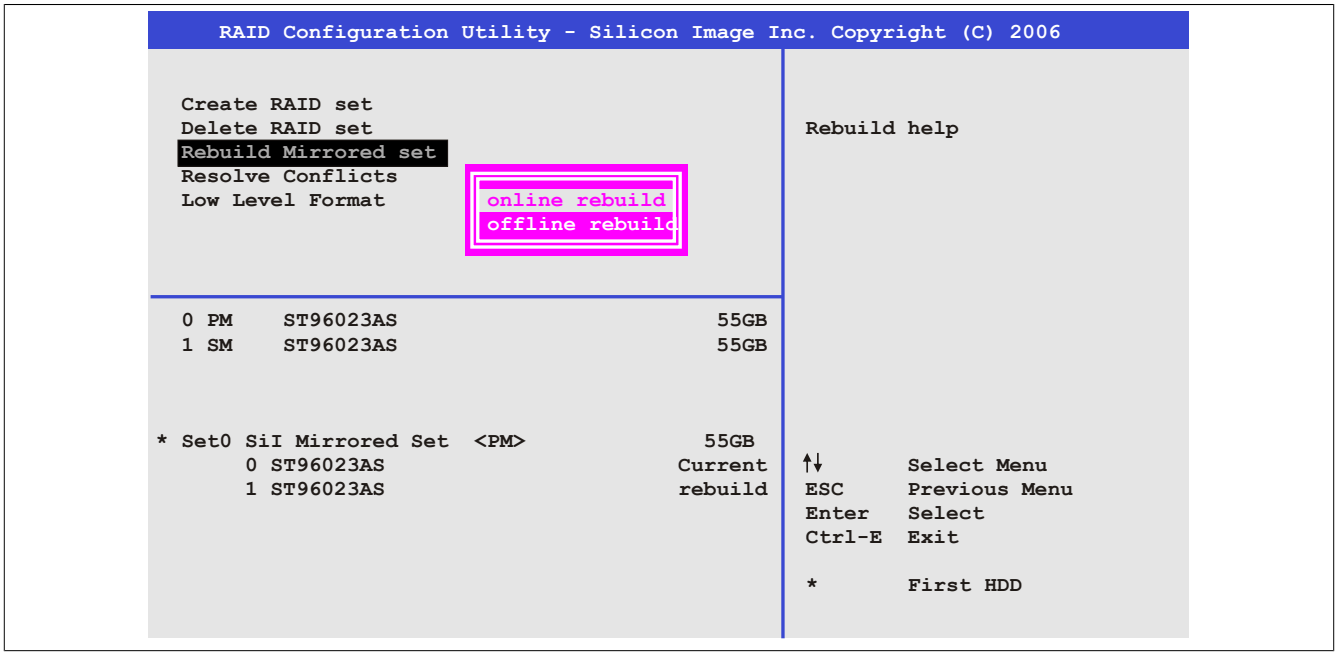


Figure 66: RAID Configuration Utility - Rebuild mirrored set

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

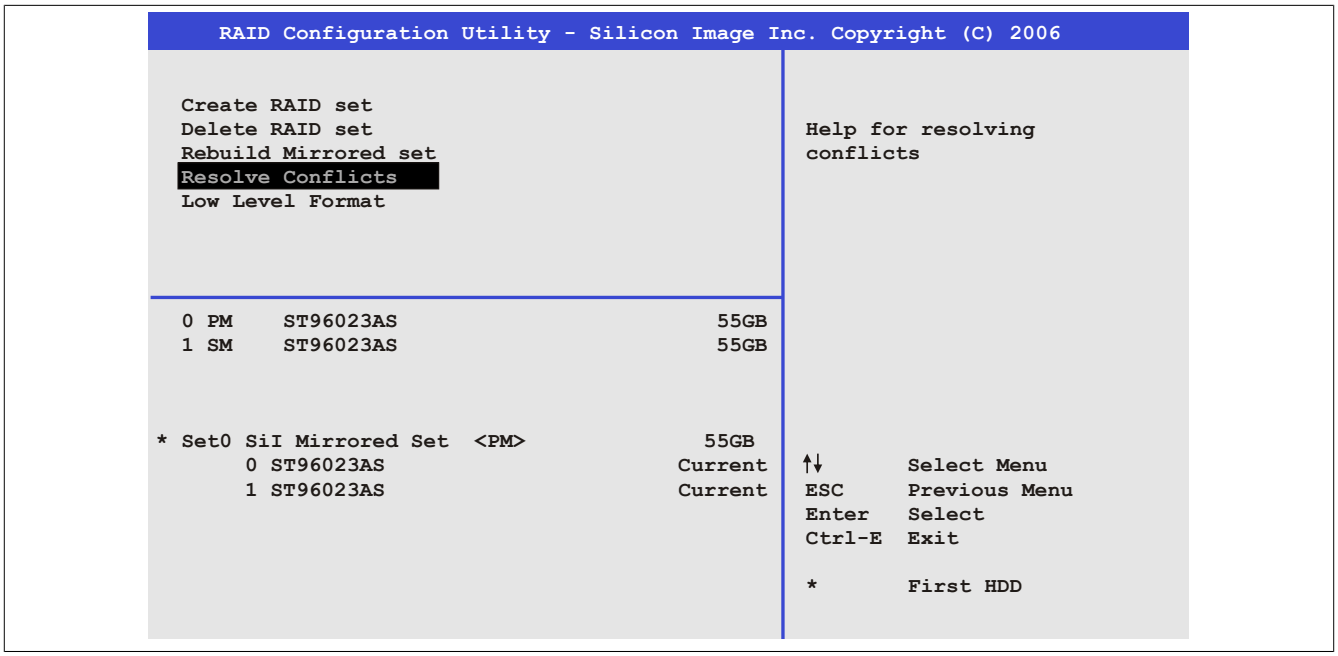


Figure 67: RAID Configuration Utility - Resolve conflicts

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

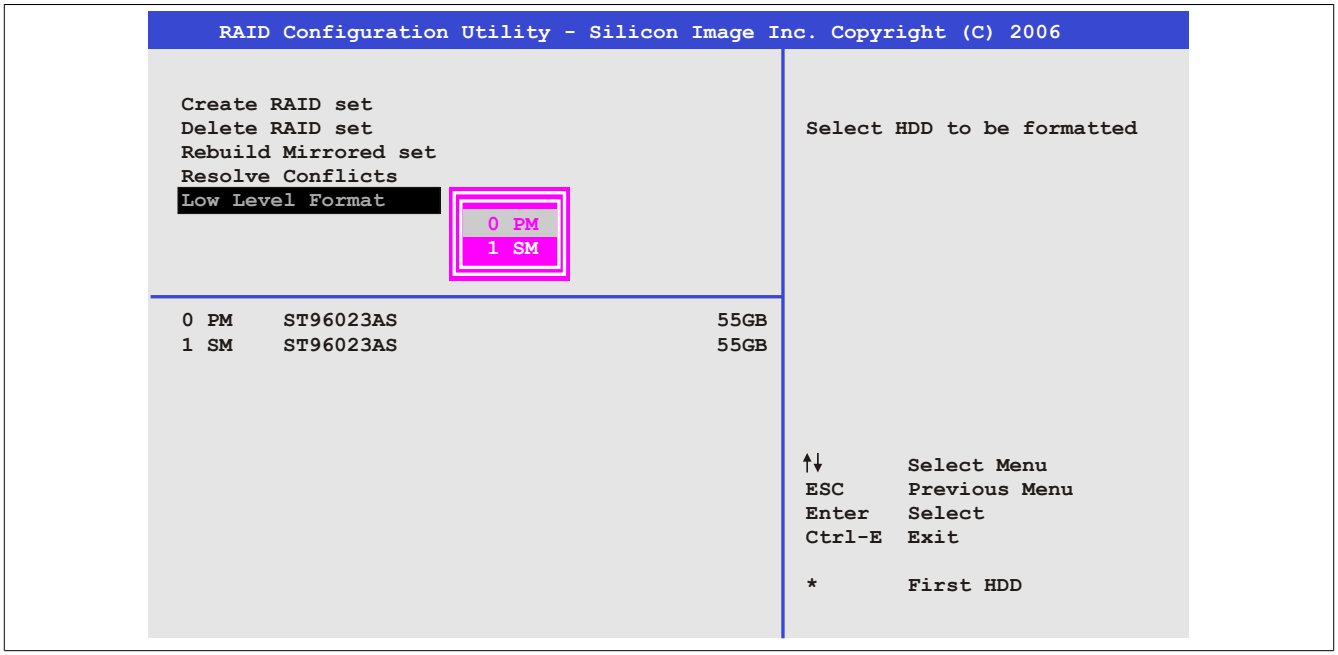


Figure 68: RAID Configuration Utility - Low level format

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, BIOS menu items and their descriptions refer to BIOS version 0.06. It is therefore possible that these diagrams and BIOS descriptions do not correspond with the installed BIOS version.**

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).

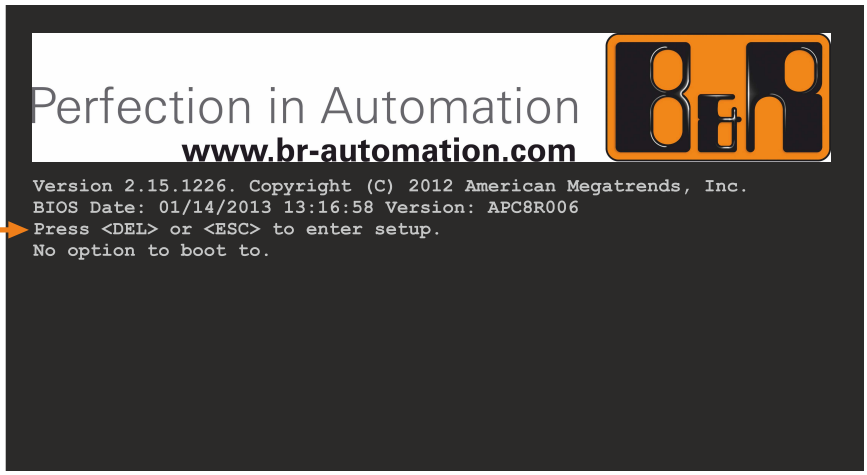
1.2 BIOS setup and boot procedure

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

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

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

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



1.2.1 BIOS setup keys

The following keys are enabled during the POST:

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

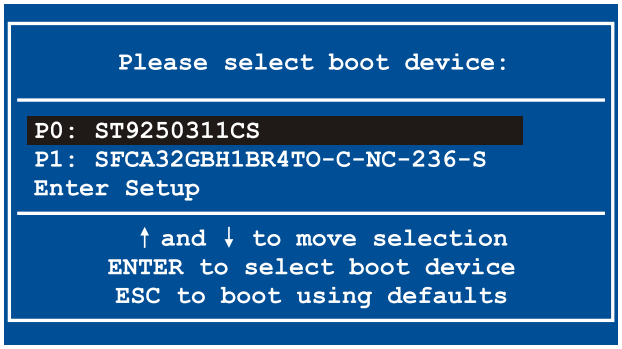
Keys	Function
DEL, ESC	Enters the BIOS setup menu.
F12	Using the F12 key, you can boot from the network.
F11	Cues the boot menu. Lists all bootable devices that are connected to the system. Select the device to boot from with cursor ↑, cursor ↓ and <ENTER>. 
<Pause>	Pressing the <Pause> key stops the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

Table 95: BIOS-relevant keys for POST

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

Key	Function
F1	General help
Cursor ↑	Moves to the previous item
Cursor ↓	Go to the next item
Cursor ←	Moves to the previous item
Cursor →	Go to the next item
+-	Changes the setting of the selected function.
Enter	Changes to the selected menu / 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	Changes are reset.
F9	CMOS default values are loaded and set for all BIOS configurations.
F10	Save and close
ESC	Exits the submenu

Table 96: BIOS-relevant keys in the BIOS menu

1.3 Main

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

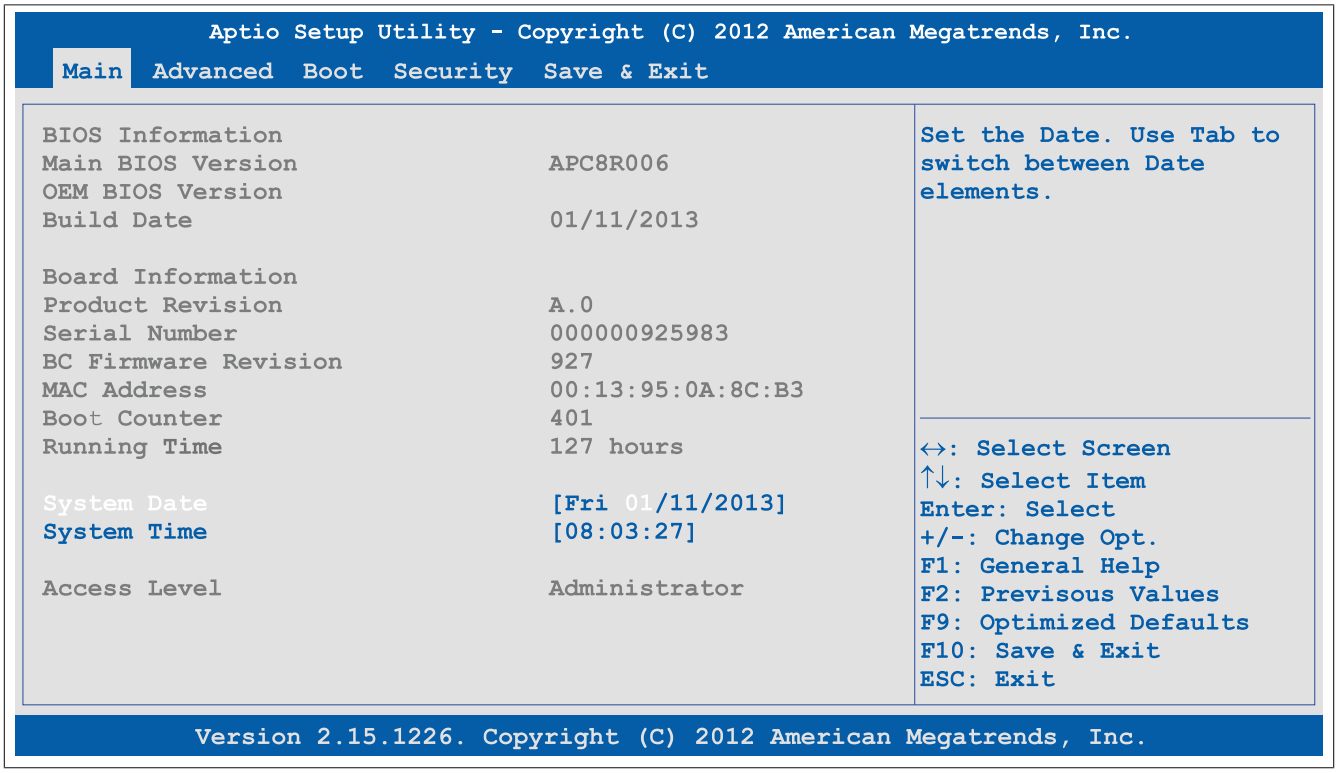


Figure 69: NM10 Main - Menu

BIOS setting	Description	Setting options	Effect
BIOS Information			
Main BIOS Version	Displays the BIOS detection.	None	-
OEM BIOS Version	Displays the OEM BIOS detection.	None	-
Build Date	Displays the date the BIOS was created	None	-
Board Information			
Product Revision	Displays the HW 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 MAC addresses assigned for the ETH1 interface.	None	-
Boot Counter	Displays the boot counter - each restart increments the counter by one (max. 16777215).	None	-
Running Time	Displays the runtime in whole hours. (max. 65535).	None	-
System Date	This is the current system date setting. Buffered by a battery (CMOS battery) after the system has been switched off.	Changes to the system date	Sets the system date in the format Month:Day:Year (mm:dd:yyyy).
System Time	This is the current system time setting. Buffered by a battery (CMOS battery) after the system has been switched off.	Adjustment of the system time	Sets the system time in the format Hour:Minute:Second (hh:mm:ss).
Access Level	Indicates the current access level	None	-

Table 97: NM10 Main - Setting options

1.4 Advanced

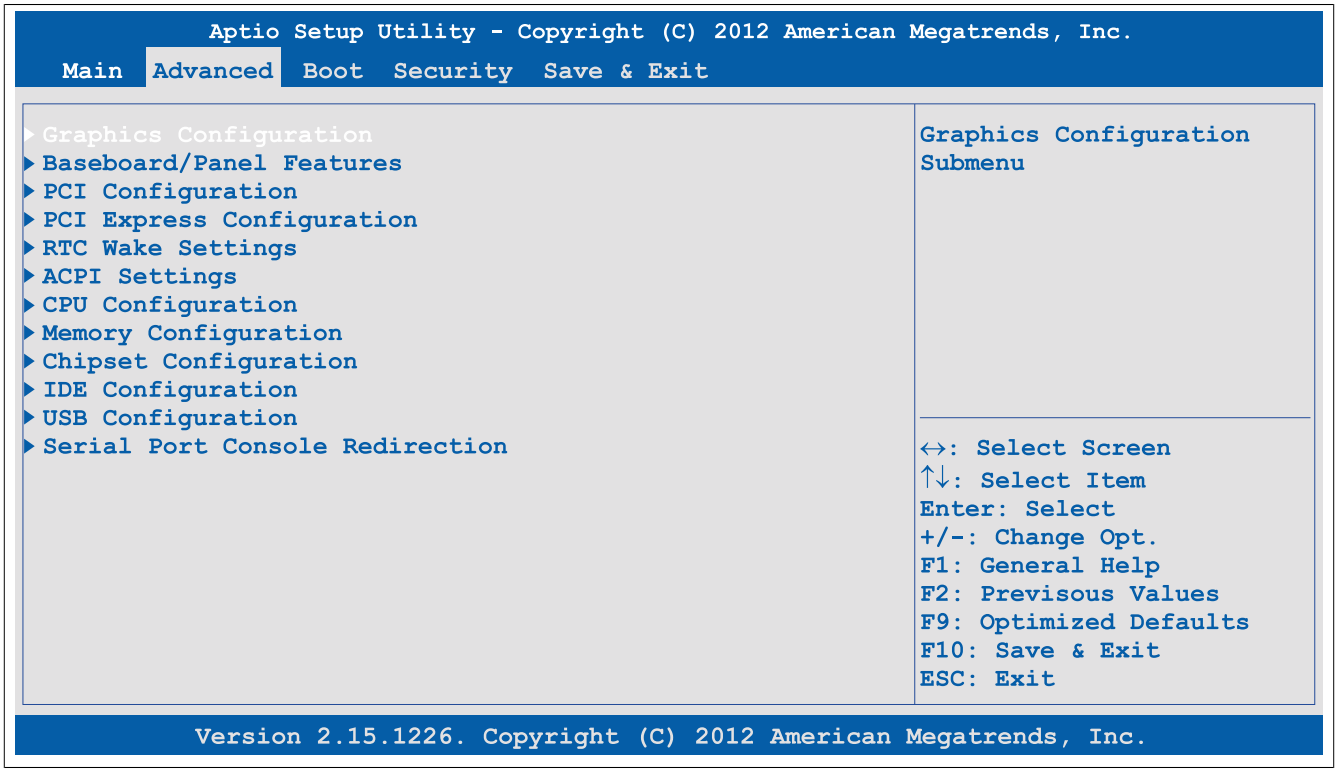


Figure 70: NM10 Advanced - Menu

BIOS setting	Description	Setting options	Effect
Graphics Configuration	Configures graphics settings	Enter	Opens the submenu See "Graphics Configuration" on page 137
Main Board/Panel Features	Configuration of baseboard and panel features	Enter	Opens the submenu See "Main Board/Panel Features" on page 138
PCI Configuration	Configures PCI devices.	Enter	Opens the submenu See "PCI Configuration" on page 142
PCI Express Configuration	Configuration of PCI Express devices.	Enter	Opens the submenu See "PCI Express Configuration" on page 144
RTC Wake Settings	Configuration of start time from being switched off.	Enter	Opens the submenu See "RTC Wake Settings" on page 150
ACPI Settings	Configuration of ACPI settings.	Enter	Opens the submenu See "ACPI Settings" on page 151
CPU Configuration	Configures the CPU settings.	Enter	Opens the submenu See "CPU Configuration" on page 152
Memory Configuration	Configuration of main memory settings	Enter	Opens the submenu See "Memory Configuration" on page 154
Chipset Configuration	Configuration of chipset settings.	Enter	Opens the submenu See "Chipset Configuration" on page 155
IDE Configuration	Configuration of IDE settings.	Enter	Opens the submenu See "IDE Configuration" on page 156
USB Configuration	Configuration of USB settings.	Enter	Opens the submenu See "USB Configuration" on page 157
Serial Port Console Redirection	Configuration of the remote console.	Enter	Opens the submenu See "Serial Port Console Redirection" on page 158

Table 98: 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 71: NM10 Advanced - Graphics Configuration

BIOS setting	Description	Setting 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	The CRT (Cathode Ray Tube) channel is used.
		LFP	The LFP (Local Flat Panel) channel is used.
		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	No LVDS channel is used.
		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 main memory
		256 MB	Allocates 256 MB 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 99: 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 72: NM10 Advanced - Baseboard/Panel Features

BIOS setting	Description	Setting options	Effect
Panel Control	Displays device-specific information about the connected panel.	Enter	Opens the submenu See "Panel Control Features" on page 139
Baseboard Monitor	Displays device-specific information for the CPU board.	Enter	Opens the submenu See"Baseboard Monitor" on page 140
Super I/O Configuration	Configures special settings for the interfaces.	Enter	Opens the submenu See "Super I/O Configuration" on page 141
Realtime Environment	This option configures settings for realtime operating systems such as ARwin.	Disabled	Disables this function.
		Enabled Hyperthreading and EIST disabled.	Enables this function.
Versions			
Main BIOS Version	Displays the B&R BIOS boot 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 code. This ID is needed for Automation Runtime.	None	-
Serial Number	Displays the B&R serial number	None	-
Product Name	Displays the B&R model number	None	-
User Serial ID	Displays the user serial ID. This 8-digit hex value can be freely assigned by the user (e.g. to give the device a unique ID) and can only be changed with using the "B&R Control Center" via the ADI driver.	None	-

Table 100: NM10 Advanced - Baseboard/Panel Features - Setting options

Panel Control Features

```
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Advanced

Panel Control                                   Panel Control Submenu.

> Panel #15

                                                ↔: 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 73: NM10 Advanced - Baseboard/Panel Features - Panel Control

BIOS setting	Description	Setting options	Effect
Panel #x	Displays the panel properties of the connected panel.	Enter	Opens the submenu See "Panel #x" on page 139

Table 101: NM10 Advanced - Baseboard/Panel Features - Panel Control Features

Panel #x

```
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Advanced

Panel #15                                       Set Brightness level.
                                                Requires reboot.
Version                    V0.00
Brightness                 100
Fan Speed                  0 RPM
Keys/Leds                  0/0
Temperature                0 C / 32 F

                                                ↔: 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 74: NM10 Advanced - Baseboard/Panel Features - Panel Control - Panel #x

BIOS setting	Description	Setting options	Effect
Version	Displays the firmware version of the SDLR controller.	None	-
Brightness	Setting for the brightness of the panel.	0 to 100	For setting 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 102: NM10 Advanced - Baseboard/Panel Features - Panel Control Features - Panel #x - Setting options

Baseboard Monitor

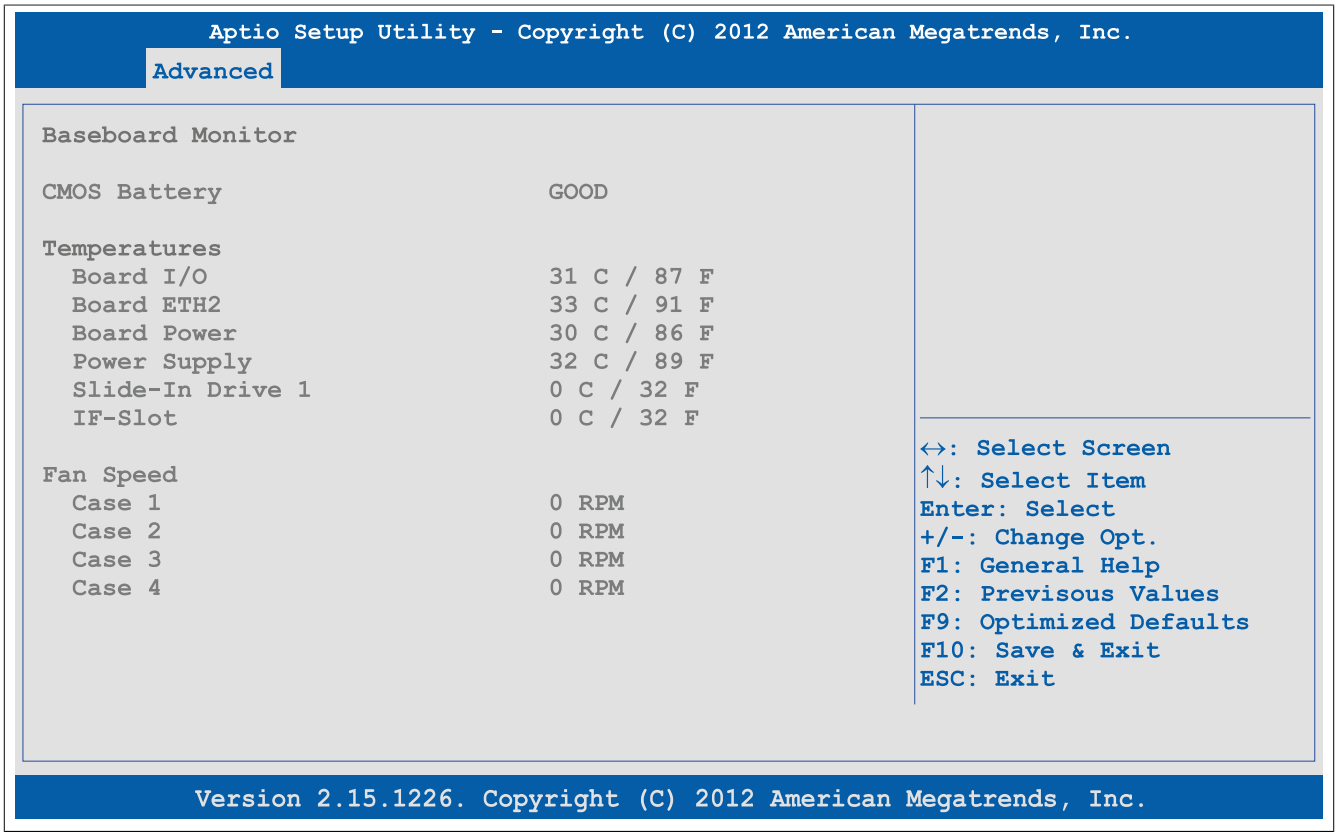


Figure 75: NM10 Advanced - Baseboard/Panel Features - Baseboard Monitor

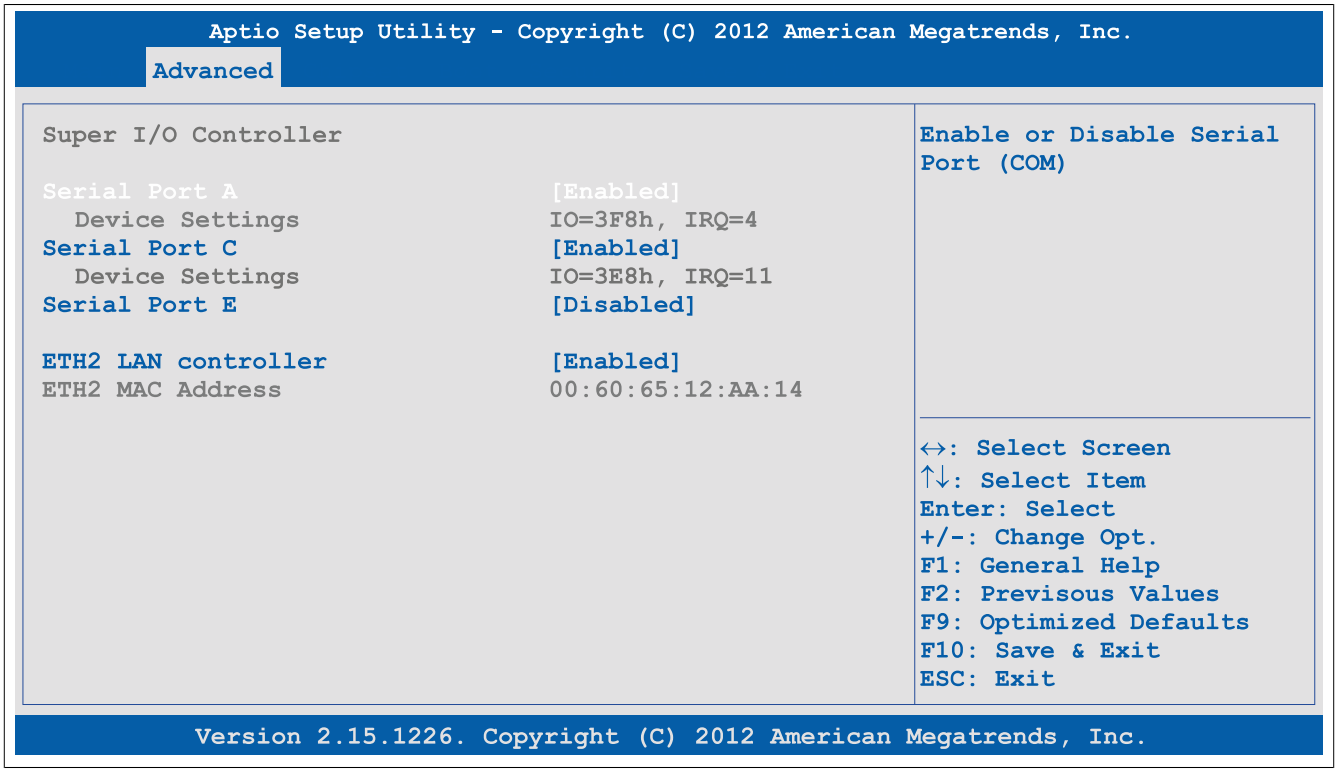
BIOS setting	Description	Setting options	Effect
CMOS Battery	Displays the CMOS battery status. **n.a.** - not available. **Good** - Battery OK. **Bad** - Battery defective.	None	-
Temperatures			
Board I/O	Displays the current temperature in the I/O area in °C and °F.	None	-
Board ETH2	Displays the current 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 Speed			
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 103: NM10 Advanced - Baseboard/Panel Features - Baseboard Monitor

BIOS setting	Description	Setting 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 103: NM10 Advanced - Baseboard/Panel Features - Baseboard Monitor

Super I/O Configuration



BIOS setting	Description	Setting options	Effect
Serial Port A	Settings for the serial **COM1** interface in the system.	Enabled	Enables the interface.
		Disabled	Disables the interface.
Device Settings [1)]	Displays the I/O address and interrupt for the COM port.	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 for the COM port.	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 for the COM port.[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 104: 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 PCI Configuration

```
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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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```

BIOS setting	Description	Setting options	Effect
PCI Latency Timer	This option controls how long (in PCI ticks) one PCI bus card can continue to use the master after another PCI card has requested access.	32 PCI bus clocks to 248 PCI Bus Clocks	Manually sets the value in PCI ticks.
VGA Palette Snoop	Option to support 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 to generate 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 to generate a SERR signal (system error). This signal indicates a data error or other type of system error for a special cycle command.	Disabled	Disables this function.
		Enabled	Enables this function.
PIRQ Routing & IRQ Reservation	Configuration of PIRQ Routing.	Enter	Opens the submenu See "PIRQ Routing & IRQ Reservation" on page 143

Table 105: NM10 Advanced - PCI Configuration - Setting options

PIRQ Routing & IRQ Reservation

```
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Advanced

PIRQA                          [Auto]
PIRQB                          [Auto]
PIRQC                          [Auto]
PIRQD                          [Auto]
PIRQE                          [Auto]
PIRQF                          [Auto]
PIRQG                          [Auto]
PIRQH                          [Auto]

Reserve Legacy Interrupt 1     [None]
Reserve Legacy Interrupt 2     [None]

Set interrupt for selected PIRQ. Please refer to the board's resource list for a detailed list of devices connected to the respective PIRQ.
NOTE: These settings will only be effective while operating in PIC (non-IOAPIC) interrupt mode.

↔: 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 76: NM10 Advanced - PCI Configuration - PIRQ Routing & IRQ Reservation

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

Table 106: NM10 Advanced - PCI Configuration - PIRQ Routing & IRQ Reservation - Setting options

1.4.4 PCI Express Configuration

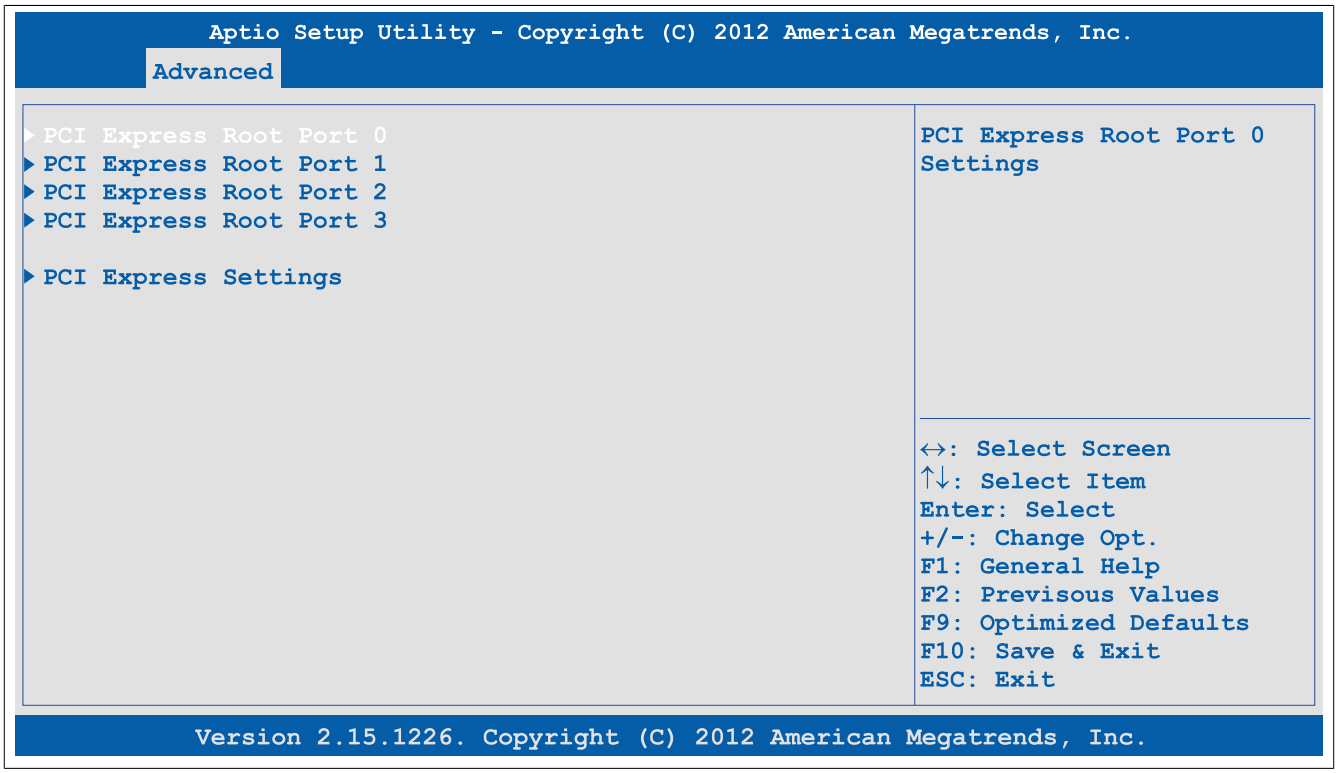

Figure 77: NM10 Advanced - PCI Express Configuration

BIOS setting	Description	Setting options	Effect
PCI Express Root Port 0	Configures the PCI Express settings on Port 0.	Enter	Opens the submenu See "PCI Express Root Port 0" on page 145
PCI Express Root Port 1	Configures the PCI Express settings on Port 1.	Enter	Opens the submenu See "PCI Express Root Port x" on page 147
PCI Express Root Port 2	Configures the PCI Express settings on Port 2.	Enter	Opens the submenu See "PCI Express Root Port x" on page 147
PCI Express Root Port 3	Configures the PCI Express settings on Port 3.	Enter	Opens the submenu See "PCI Express Root Port x" on page 147
PCI Express Settings	Configuration of the PCI Express settings.	Enter	Opens the submenu See "PCI Express Settings" on page 149

Table 107: NM10 Advanced - PCI Express Configuration - Overview

PCI Express Root Port 0

> **Warning!**
>
> **Making improper settings can cause instability or device problems. It is therefore strongly recommended that these settings only be changed by experienced users.**

```
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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 78: NM10 Advanced - PCI Express Configuration - PCI Express Root Port 0

BIOS setting	Description	Setting 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	PCI Express Root Port 0 enabled.
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 the BIOS and 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 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 in 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 in 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 in 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 108: NM10 Advanced - PCI Express Configuration - PCI Express Root Port 0 - Setting options

BIOS setting	Description	Setting options	Effect
CT0	*PCI Express Completion Timer T0* This option is used to enable/disable PCI Express Completion Timer. **Information:** **If the system detected an ROB (Processor Reorder Buffer) Timeout, then this setting should be set to Enabled.**	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 on 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 on 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 on 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. The Root Port is enabled to generate 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 setting extra bus reserved for bridges behind this root bridge.	0 to 7	Sets the respective bus.
Reserved Memory	Option for setting reserved memory for this root bridge.	1 to 20	Size of reserved memory between 1 MB and 20 MB.
Reserved I/O	Option to configure 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 108: 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*.

PCI Express Root Port x

> **Warning!**
>
> **Making improper settings can cause instability or device problems. It is therefore strongly recommended that these settings only be changed by experienced users.**

```
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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 79: NM10 Advanced - PCI Express Configuration - PCI Express Root Port x

BIOS setting	Description	Setting options	Effect
PCI Express Root Port x	This option is used to enable/disable 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 the BIOS and 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 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 in 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 in 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 109: NM10 Advanced - PCI Express Configuration - PCI Express Root Port x - Setting options

BIOS setting	Description	Setting options	Effect
	Option for reporting correctable errors. All of the functions in 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* This option is used to enable/disable PCI Express Completion Timer. **Information:** **If the system detected an ROB (Processor Reorder Buffer) Timeout, then this setting should be set to Enabled.**	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 on 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 on 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 on 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. The Root Port is enabled to generate 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 setting extra bus reserved for bridges behind this root bridge.	0 to 7	Sets the respective bus.
Reserved Memory	Option for setting reserved memory for this root bridge.	1 to 20	Size of reserved memory between 1 MB and 20 MB.
Reserved I/O	Option to configure 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 109: 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*.

PCI Express Settings

```
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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
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```

Figure 80: NM10 Advanced - PCI Express Configuration - PCI Express Settings

BIOS setting	Description	Setting options	Effect
Relaxed Ordering	Option to activate/deactivate relaxed ordering	Disabled	Disables this function.
		Enabled	Enables this function.
Extended Tag	Option to activate/deactivate 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 activating/deactivating the no snoop option.	Disabled	Disables this function.
		Enabled	Enables this function.
Maximum Payload	Option for setting the maximum surface packet size for data transfer.	Auto	Automatic mapping of packet size.
		128 bytes to 4096 bytes	Manual mapping of 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	The energy saving function is disabled.
		Auto	Maximum energy savings. The energy saving function is set to L0 or L1.
		Force L0s	L0 mode is enabled.
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 to define the number of times the software should attempt to reroute the 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 1,000	Time setting in µs.
Unpopulated Links	Option for enabling/disabling PCIe slots where no devices are connected.	Keep Link On	PCIe slots where no devices are connected remain enabled.
		Disable Link	PCIe slots where no devices are connected are disabled to save power.

Table 110: NM10 Advanced - PCI Express Configuration - PCI Express Settings - Setting options

1) ASPM = Active State Power Management

1.4.5 RTC Wake Settings

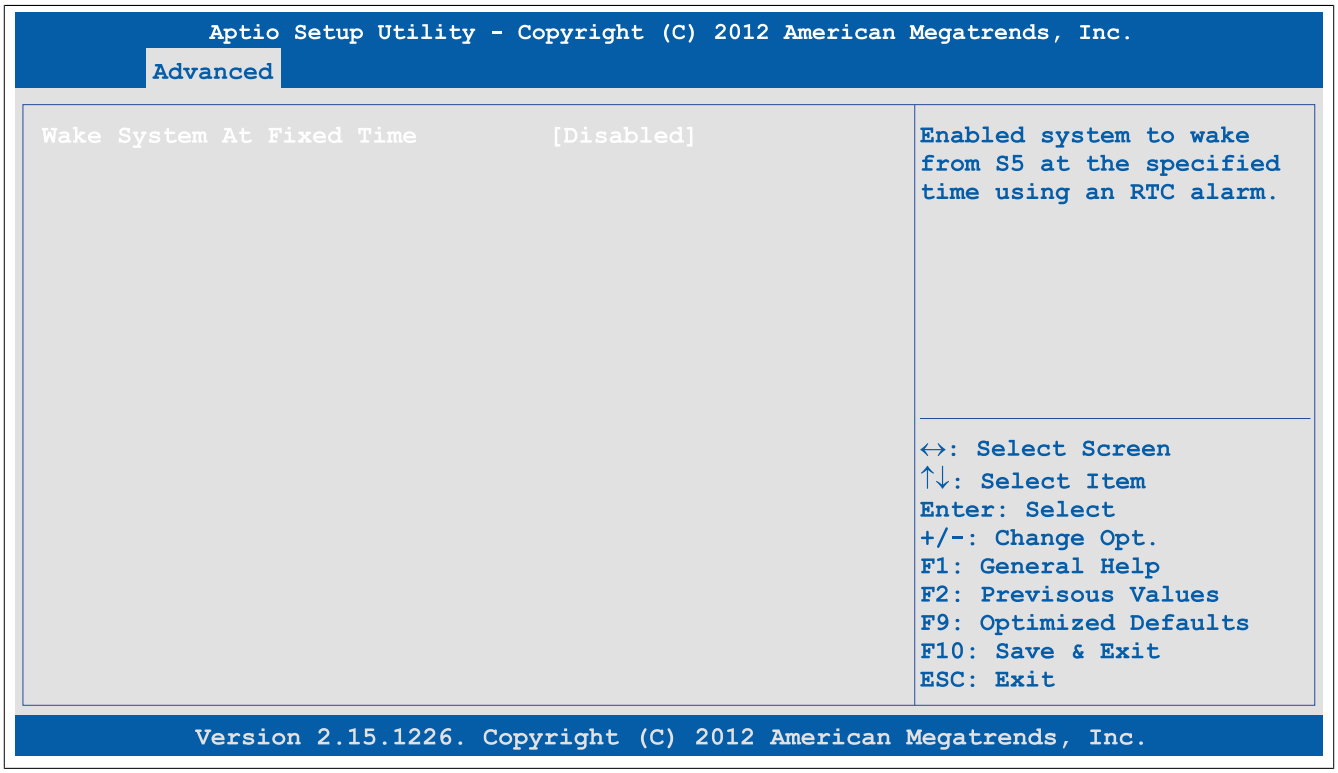

Figure 81: NM10 Advanced - RTC Wake Settings

BIOS setting	Description	Setting options	Effect
Wake System At Fixed Time	Option to set the time (to the second) at which the system should boot (from ACPI S5 state).	Disabled	Disables this function.
		Enabled	Enables this function.
Wake up hour[1)]	Option for setting the hour.	0 to 23	Example: Set to 3, the system starts up at 3 AM. Set to 15, the system starts up at 3 PM.
Wake up minute[1)]	Option for setting the minute.	0 to 59	Example: Set to 15, the system starts up at minute 15.
Wake up second[1)]	Option for setting the second.	0 to 59	Example: Set to 32, the system starts up at second 32.

Table 111: NM10 Advanced - RTC Wake Settings - Setting options

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

1.4.6 ACPI Settings

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

Enable Hibernation                [Enabled]                  Enables or Disables System
ACPI Sleep State                  [Both S1 and S3 avai..]    ability toHibernate (OS/S4
Lock Legacy Resources             [Disabled]                 Sleep State). This option
S3 Video Repost                   [Disabled]                 may be not effective with
                                                             some OS.
Critical Trip Point               [111 C]
Passive Trip Point                [95 C]
  Passive TC1 Value               1
  Passive TC2 Value               5
  Passive TSP Value               10

                                                             ↔: 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 82: NM10 Advanced - ACPI Settings

BIOS setting	Description	Setting options	Effect
Enable Hibernation	Option to enable/disable the hibernate function. Can be used to set the operating system to the S4 state. This option may not have any effect for 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 the RAM, which is then supplied solely with power.
		Both S1 and S3 available for OS to choose from	S1 and S3 are enabled. The states can then be selected by the operating system.
Lock Legacy Resources	Option to set 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.
Critical Trip Point	With this function, a temperature can be set at which the operating system automatically shuts itself down.	POR	The Critical Trip Point is set to 100°C.
		79 C, 87 C, 95 C, 103 C, 111 C, 119 C, 127 C	Temperature setting for the critical trip point. Can be set 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 112: NM10 Advanced - ACPI Settings - Setting options

1.4.7 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 83: NM10 Advanced - CPU Configuration

BIOS setting	Description	Setting options	Effect
CPU Information	Displays the CPU properties.	Enter	Opens the submenu See "CPU Information" on page 153
Hyper-Threading	Option to enable/disable 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 could be necessary for older operating systems. **Information:** **When using Windows XP this option must be set to *Disabled*.**	Disabled	The processor returns the current maximum value upon request of the CPUID value.
		Enabled	The processor limits the maximum CPUID value to 03h if necessary when the processor supports a higher value.
EIST	Option to enable/disable Intel® SpeedStep™ technology.	Disabled	Intel® SpeedStep™ is disabled.
		Enabled	Intel® SpeedStep™ is enabled.
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 113: NM10 Advanced - CPU Configuration - Setting options

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

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 84: NM10 Advanced - CPU Configuration - CPU Information

BIOS setting	Description	Setting 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 processor cores.	None	-
Hyper-threading	Displays the Intel Hyper-Threading technology.	None	-

Table 114: NM10 Advanced - CPU Configuration - Setting options

1.4.8 Memory Configuration

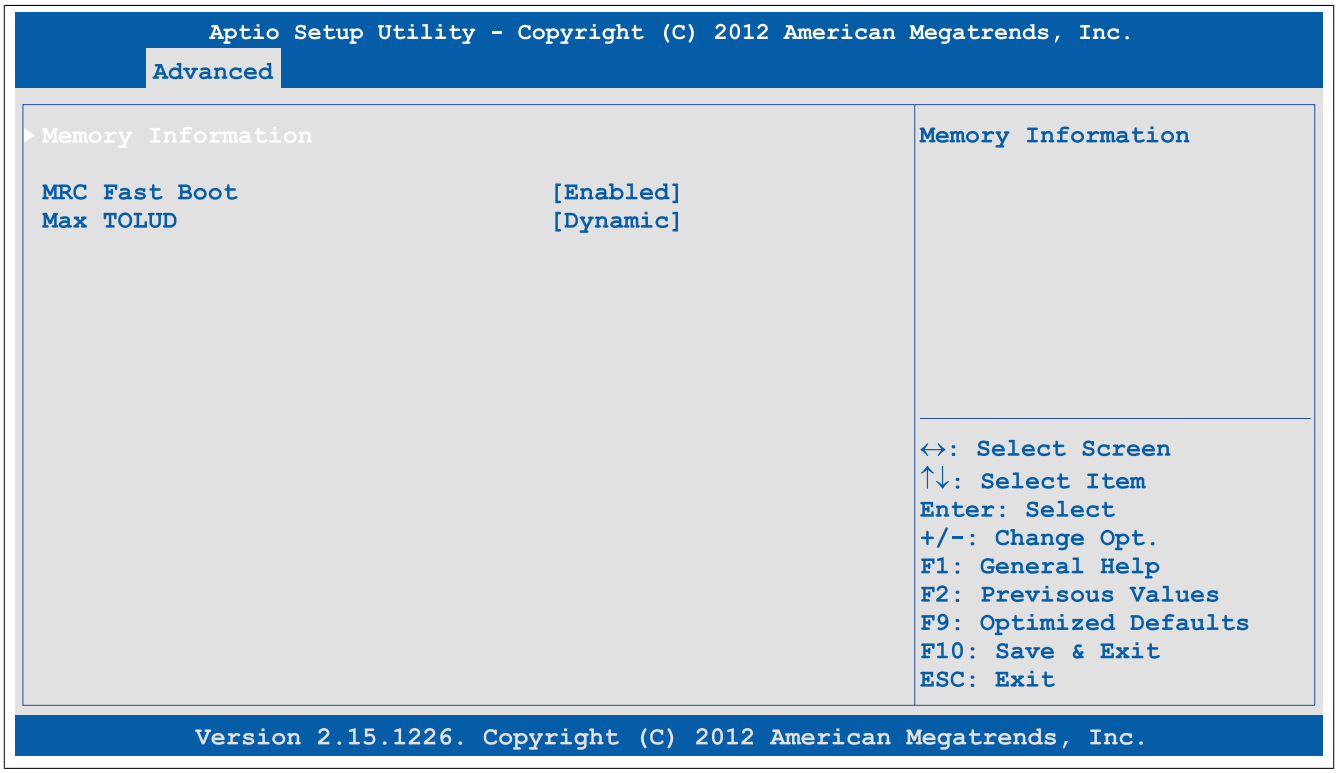

Figure 85: NM10 Advanced - Memory Configuration

BIOS setting	Description	Setting options	Effect
Memory Information	Displays the properties of the main memory.	Enter	Opens the submenu See "Memory Information" on page 155
MRC Fast Boot	Option to enable/disable MRC fast boot.	Enabled	Enables this function.
		Disabled	Disables this function.
Max TOLUD	Option to set the maximum "Top Of Low Usable DRAM".	Dynamic	Dynamic assignment 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 115: NM10 Advanced - Memory Configuration - Setting options

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

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```

Figure 86: NM10 Advanced - Memory Configuration - Memory Information

BIOS setting	Description	Setting 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 116: NM10 Advanced - Memory Configuration - Memory Information

1.4.9 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

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```

Figure 87: NM10 Advanced - Chipset Configuration

BIOS setting	Description	Setting options	Effect
Azalia Controller	Option to enable/disable the audio controller.	Disabled	Disables the audio controller.
		HD Audio	Enables the audio controller.
Azalia PME Enable[1)]	Option to enable/disable 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 Prescision 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 117: 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*.

1.4.10 IDE Configuration

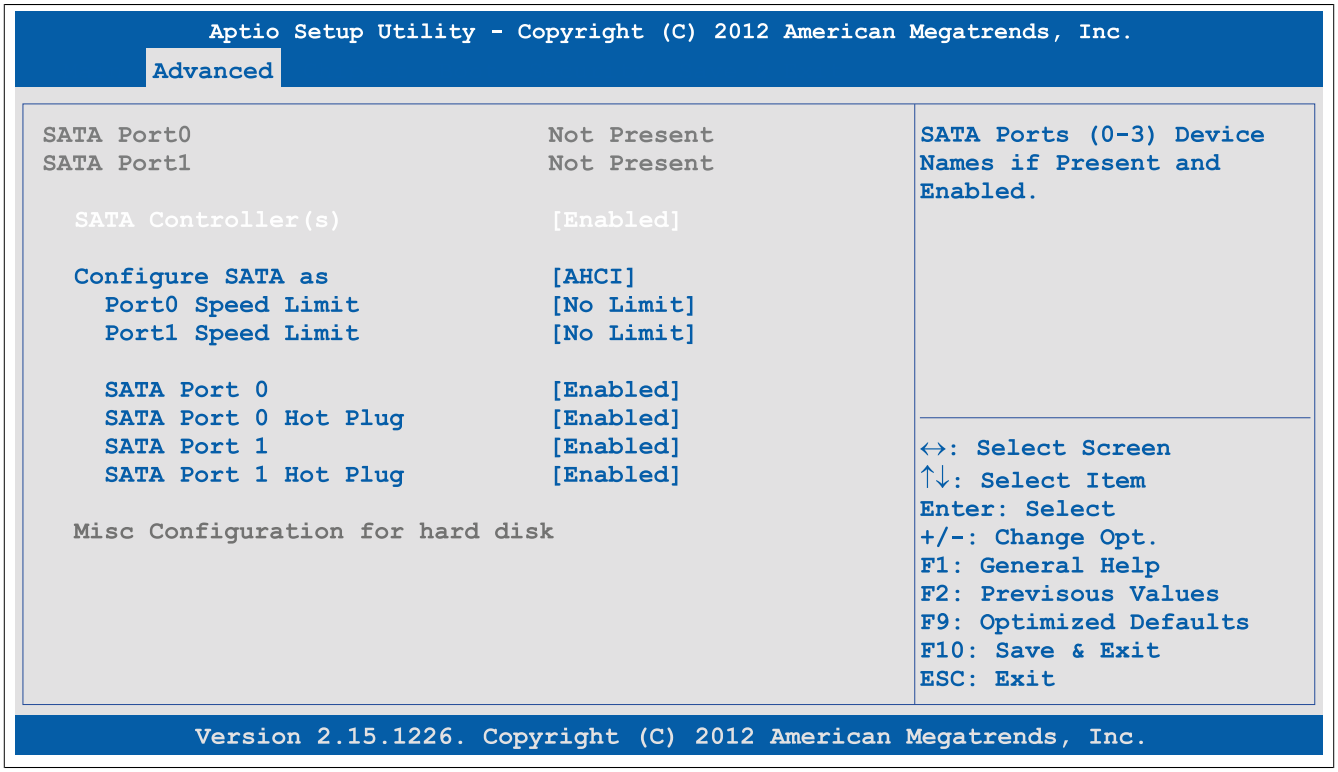

Figure 88: NM10 Advanced - IDE Configuration

BIOS setting	Description	Setting options	Effect
SATA Ports (0-3)	Displays the connected hardware name on the respective port	None	-
SATA Controller(s)	Enable / disable SATA controller	Disabled	Disables the controller.
		Enabled	Enables the controller.
Configure SATA as [1)]	Option for setting the SATA configuration.	IDE	Configuration 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	The maximum transfer rate is 2.5 GT/s.
		GEN2 Rate	The maximum transfer rate is 5 GT/s.
SATA Port 0 [2)]	Option to enable/disable SATA Port 0.	Disabled	SATA Port 0 is disabled.
		Enabled	SATA Port 0 is enabled.

Table 118: NM10 Advanced - IDE Configuration - Setting options

BIOS setting	Description	Setting options	Effect
SATA Port 0 Hot Plug [2]	Option to set hot plug capability of SATA Port 0.	Disabled	SATA Port 0 is not hot pluggable.
		Enabled	SATA Port 0 is hot pluggable. Devices can be connected/disconnected during operation.
SATA Port 1 [2]	Option to enable/disable SATA Port 1.	Disabled	SATA Port 1 is disabled.
		Enabled	SATA Port 1 is enabled.
SATA Port 1 Hot Plug [2]	Option to set hot plug capability of SATA Port 1.	Disabled	SATA Port 1 is not hot pluggable.
		Enabled	SATA Port 1 is hot pluggable. Devices can be connected/disconnected during operation.

Table 118: NM10 Advanced - IDE Configuration - Setting options

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

1.4.11 USB Configuration

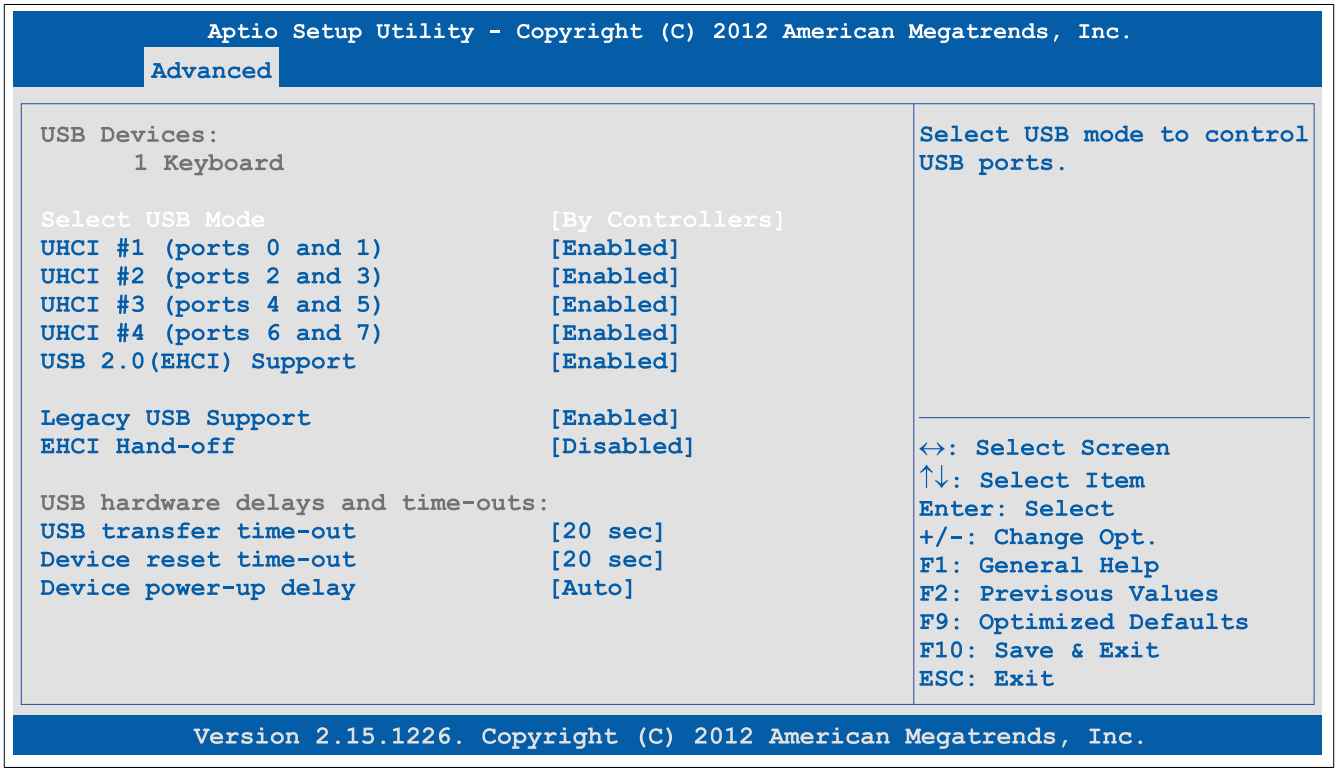

Figure 89: NM10 Advanced - USB Configuration

BIOS setting	Description	Setting 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 setting legacy USB support. USB ports do not function during startup. USB is supported again after the operating system has started. A USB keyboard is still recognized during the POST.	Enabled	Enables this function.
		Disabled	Disables this function.
		Auto	Automatic enabling.
EHCI Hand-off	Option for setting 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 to set the timeout value for control, bulk and interrupt transfer.	1 sec, 5 sec, 10 sec, 20 sec	Value in seconds.
Device reset time-out	The waiting time that the USB device POST requires after the device start command can be set.	10 sec, 20 sec, 30 sec, 40 sec	Value in seconds.

Table 119: NM10 Advanced - USB Configuration - Setting options

BIOS setting	Description	Setting 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	The maximum time is set automatically. For a root port, 100 ms is set, for a hub port, the data from the hub descriptor is used.
		Manual	The maximum time can be entered manually using the option "Device power-up delay in seconds".
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 119: 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*.

1.4.12 Serial Port Console Redirection

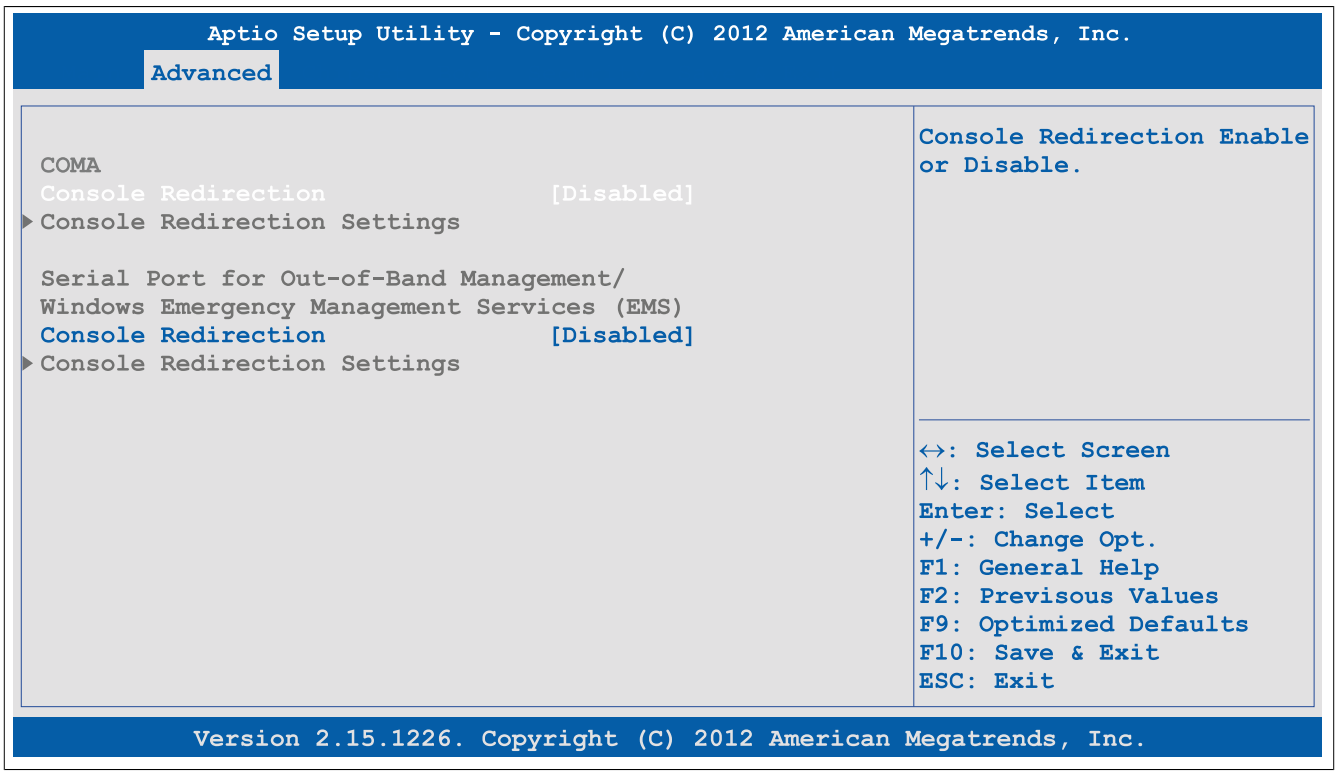

Figure 90: NM10 Advanced - Serial Port Console Redirection

BIOS setting	Description	Setting options	Effect
COMA			
Console Redirection	Option to enable/disable console redirection.	Disabled	Disables this function.
		Enabled	Enables this function.
Console Redirection Settings[1)]	Configuration of the remote console.	Enter	Opens the submenu See "Console Redirection Settings (COMA)" on page 159
Serial Port for Out-of-Band Management / Windows Emergency Management Services (EMS)			
Console Redirection	Option to enable/disable console redirection.	Disabled	Disables this function.
		Enabled	Enables this function.
Console Redirection Settings[2)]	Configuration of the remote console.	Enter	Opens the submenu See "Console Redirection Settings (EMS)" on page 160

Table 120: 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*.

Console Redirection Settings (COMA)

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

COMA
Console Redirection Settings

Terminal Type                          [ANSI]
Bits per second                        [115200]
Data Bits                              [8]
Parity                                 [None]
Stop Bits                              [1]
Flow Control                           [None]
VT-UTF8 Combo Key Support              [Enabled]
Recorder Mode                          [Disabled]
Resolution 100x31                      [Disabled]
Legacy OS Redirection Resolution       [80x24]
Putty KeyPad                           [VT100]
Redirection After BIOS POST            [Always Enable]

Emulation: ANSI: Extended
ASCII char set. VT100:
ASCII char set. VT100+:
Extends VT100 to support
color, function keys, etc.
VT-UTF8: Uses UTF8
encoding to map Unicode
chars onto 1 or more
bytes.

↔: 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 Console Redirection Settings (COMA)

BIOS setting	Description	Setting 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	No parity bit used.
		Even	An even number of parity bits is used.
		Odd	An odd number of parity bits is used.
		Mark	Parity bit is always 1.
		Space	Parity bit is 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	This option can be used to enable VT-UTF8 combo key support for the ANSI and VT100 connections.	Disabled	Deactivates the function
		Enabled	Enable the function
Recorder Mode	Option to enable/disable 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 a misformatted screen output but makes automatic storage of the serial console output easier.
Resolution 100x31	Option to enable/disable extended terminal resolution.	Disabled	Disables this function.
		Enabled	Enables this function.
Legacy OS Redirection Resolution	Option for setting 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 121: NM10 Advanced - Serial Port Console Redirection - Console Redirection Settings (COMA) - Setting options

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 92: NM10 Console Redirection Settings (EMS)

BIOS setting	Description	Setting 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 122: 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

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```

Figure 93: NM10 Boot - Menu

BIOS setting	Description	Setting options	Effect
Boot Device Priority	Configuration of boot order.	Enter	Opens the submenu See "Boot Device Priority" on page 161
Boot Configuration	Configuration of boot properties.	Enter	Opens the submenu See "Boot Configuration" on page 162

Table 123: 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 94: NM10 Boot - Boot Device Priority

BIOS setting	Description	Setting options	Effect
Boot Priority Selection	The method for when the drives should be booted can be set here.	Device Based	Only the devices that are recognized by the system are listed. The sequence of this list can be changed. **Information:** **Either "device based" or "type based" must be used. Mixed operation is not permitted.**
		Type Based	The boot sequence of a device type list can be changed. Device types that are not connected can also be entered to this list. **Information:** **Either "device based" or "type based" must be used. Mixed operation is not permitted.**
1st Boot Device	The boot drives can be set using this option.	Disabled, SATA 0 Drive, SATA 1 Drive, Primary Master, Primary Slave, USB Floppy, USB Harddisk, USB CDROM, Onboard LAN, External LAN, Other BEV Device	Selects the desired sequence.
2nd Boot Device			
3rd Boot Device			
4th Boot Device			
5th Boot Device			
6th Boot Device			
7th Boot Device			
8th Boot Device			

Table 124: Boot - Boot Device Priority - Setting options

1.5.2 Boot Configuration

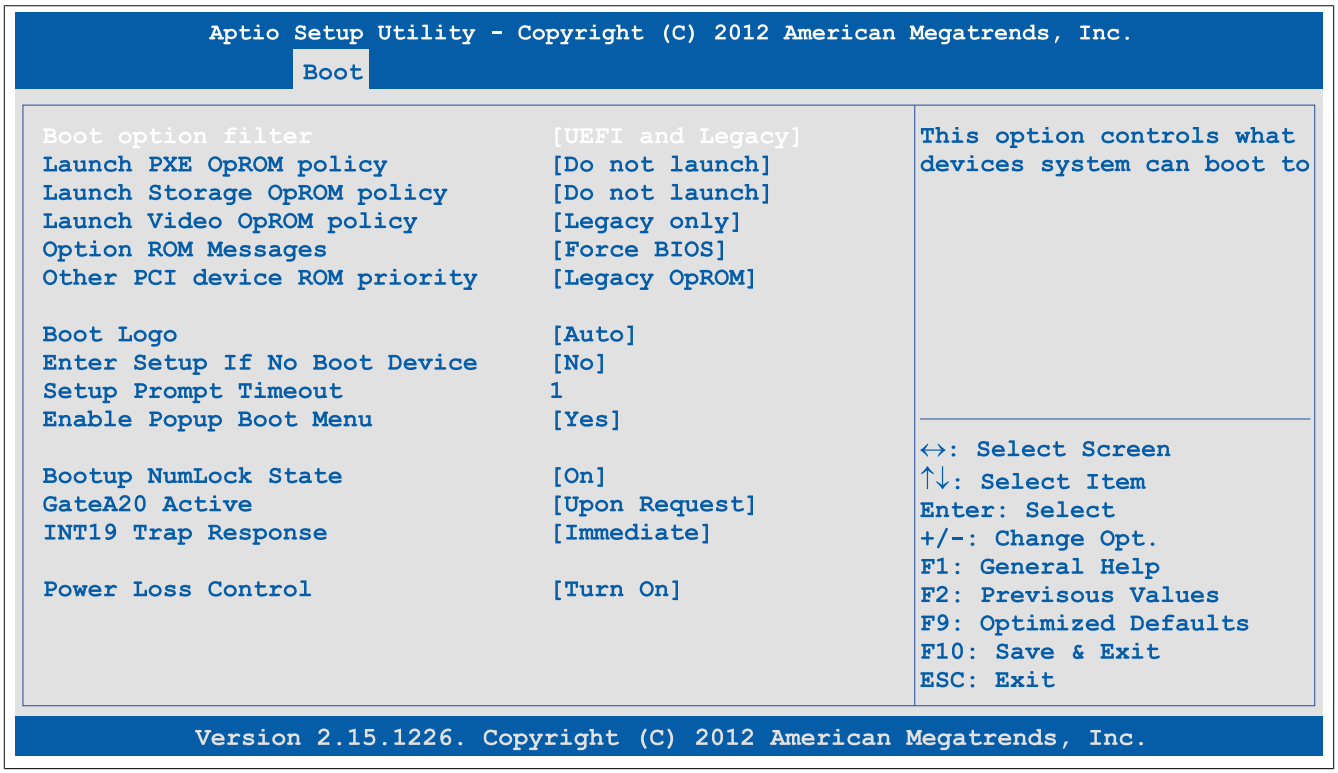


Figure 95: NM10 Boot - Boot Configuration

BIOS setting	Description	Setting 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 to boot 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 to boot 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 125: Boot - Boot Configuration - Setting options

BIOS setting	Description	Setting options	Effect
Launch Video OpROM Policy	Option to boot 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	Option ROM messages are displayed during POST.
		Keep Current	Option ROM messages are not displayed 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 setting the boot logo.	Disabled	The boot logo is not displayed.
		Enabled	The boot logo is displayed.
		Auto	Boot logo displayed? TBD
Enter Setup If No Boot Device	Option to set whether the setup menu is displayed when no bootable drive is connected.	No	The setup menu is not displayed.
		Yes	The setup menu is displayed.
Setup Prompt Timeout	Option to set how long the setup activation key (key to enter BIOS) is displayed.	1 to 65,534	The setup activation key is shown for x seconds.
		65535	The setup activation key is shown for an unlimited amount of time.
Enable Popup Boot Menu	Option to enable/disable 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. The devices boot in the configured boot order.
Bootup NumLock State	Option to configure the numeric keypad when the system is booted.	On	Numeric keypad is enabled.
		Off	Only the cursor functions of the numerical keypad are activated.
GateA20 Active	Defines 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	Determines if the system is on/off following power loss.	Remain Off	The PPC800 remains off.
		Turn On	Turns on the PPC800.
		Last State	Enables the previous state.

Table 125: Boot - Boot Configuration - Setting options

1.6 Security

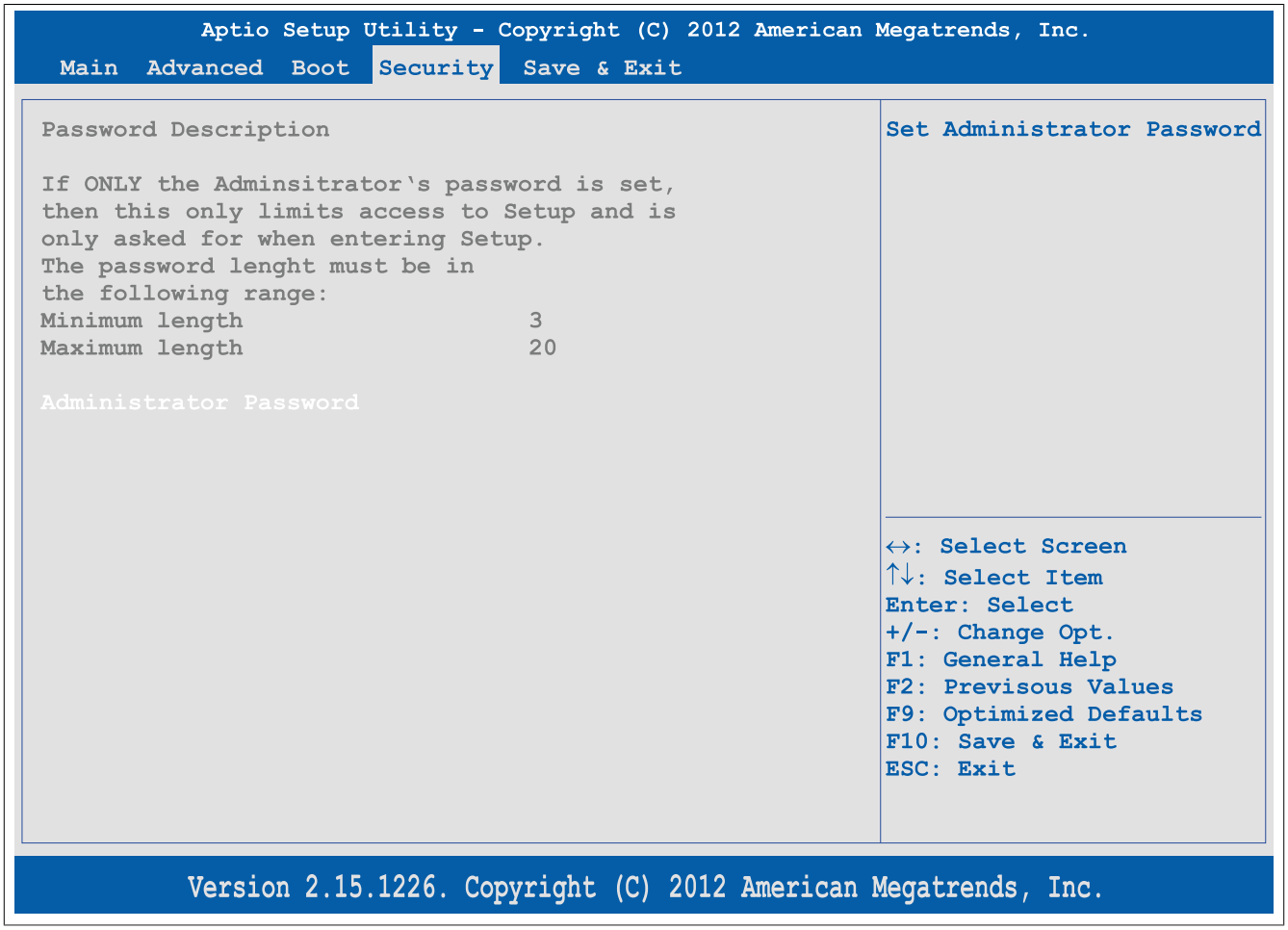


Figure 96: NM10 Security - Menu

BIOS setting	Description	Setting options	Effect
Administrator Password	Function to enter/change the administrator password.	Enter	Enter password.

Table 126: NM10 Security menu - Setting options

1.7 Save & Exit

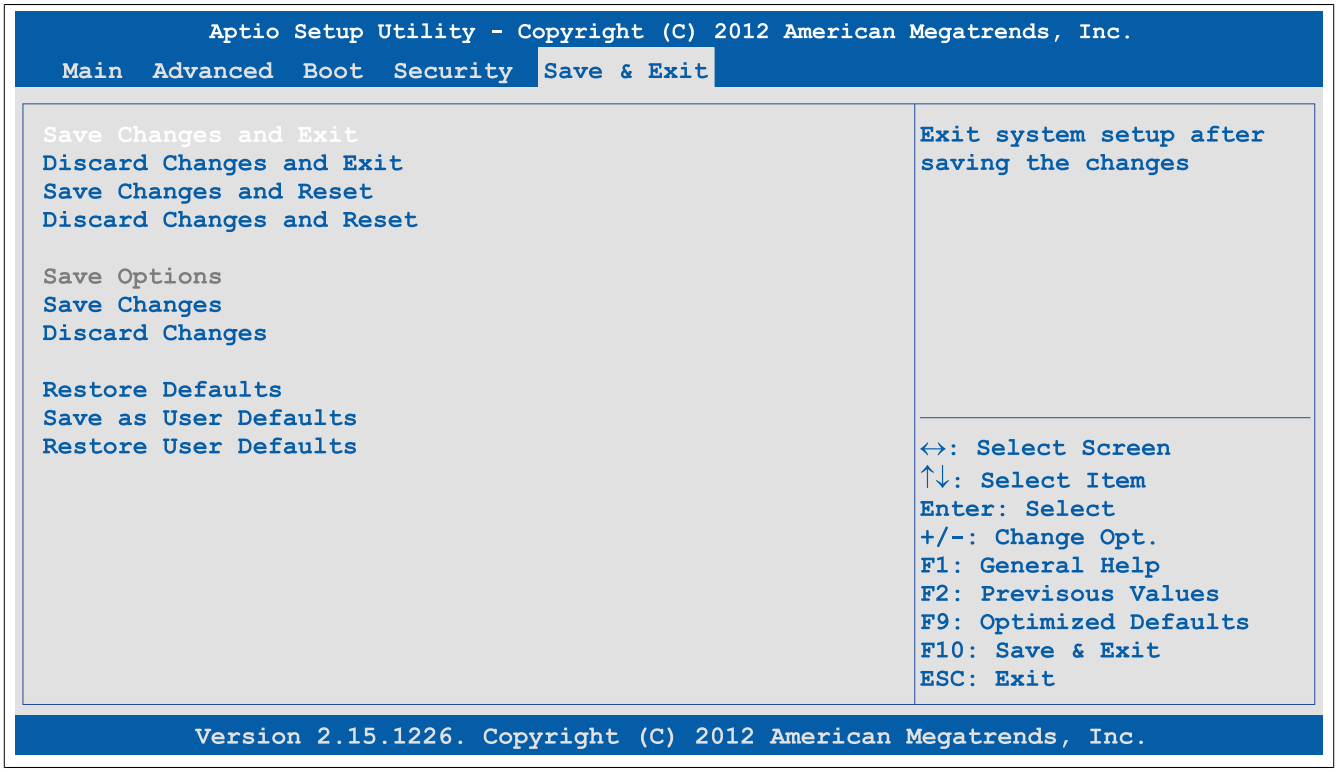


Figure 97: NM10 Save & Exit - Menu

BIOS setting	Description	Setting options	Effect
Save Changes and Exit	BIOS setup is closed with this item. Changes made are saved in CMOS after confirmation.	Yes / No	
Discard Changes and Exit	With this item you can close BIOS setup without saving the changes made.	Yes / No	
Save Changes and Reset	BIOS setup is closed with this item. Changes made are saved in CMOS after confirmation, and the system is rebooted.	Yes / No	
Discard Changes and Reset	With this item you can close BIOS setup without saving the changes made. The system is then rebooted.	Yes / No	
Save Changes	Changes made are saved in CMOS after confirmation.	Yes / No	
Discard Changes	In the event that settings were made that the user can no longer remember, they can be reset (as long as they haven't been saved).	Yes / No	
Restore Defaults	This option restores the 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 127: 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 APC800 user's manual. This can be downloaded for free from the B&R homepage.

Table 128: 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 / View	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 129: NM10 Main profile settings

1.8.2 Advanced

Graphics Configuration

Setting / View	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 130: NM10 Advanced - Graphics Configuration - Profile settings

Main Board/Panel Features

Setting / View	Profile 0	Profile 5	My setting
Realtime 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 131: NM10 Advanced - Baseboard/Panel Features - Profile settings

Setting / View	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 131: NM10 Advanced - Baseboard/Panel Features - Profile settings

PCI Configuration

Setting / View	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 Interrupt 1	None	None	
Reserve Legacy Interupt 1	None	None	

Table 132: NM10 Advanced - PCI Configuration - Profile settings

PCI Express Configuration

Setting / View	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	

Table 133: NM10 Advanced - PCI Express - Profile settings

Setting / View	Profile 0	Profile 5	My setting
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 133: NM10 Advanced - PCI Express - Profile settings

RTC Wake Settings

Setting / View	Profile 0	Profile 5	My setting
Wake System At Fixed Time	Disabled	Disabled	

Table 134: NM10 Advanced - RTC Wake - Profile settings

ACPI Settings

Setting / View	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	
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 135: NM10 Advanced - ACPI Settings - Profile settings

CPU Configuration

Setting / View	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			

Table 136: NM10 Advanced - CPU Configuration - Profile settings

Setting / View	Profile 0	Profile 5	My setting
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 136: NM10 Advanced - CPU Configuration - Profile settings

Memory Configuration

Setting / View	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 137: NM10 Advanced - Memory Configuration - Profile settings

Chipset Configuration

Setting / View	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 138: NM10 Advanced - Chipset Configuration - Profile settings

IDE Configuration

Setting / View	Profile 0	Profile 5	My setting
SATA Port0	-	-	
SATA Port1	-	-	
SATA Controller(s)	Enabled	Enabled	
Configure SATA as	AHCI	AHCI	
Port0 Speed Limit	No Limit	No Limit	
Port1 Speed Limit	No Limit	No Limit	
Sata Port 0	Enabled	Enabled	
Sata Port 0 Hot Plug	Enabled	Enabled	
Sata Port 1	Enabled	Enabled	
Sata Port 1 Hot Plug	Enabled	Enabled	

Table 139: NM10 Advanced - IDE Configuration - Profile settings

USB Configuration

Setting / View	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	

Table 140: NM10 Advanced - USB Configuration - Profile settings

Setting / View	Profile 0	Profile 5	My setting
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 140: NM10 Advanced - USB Configuration - Profile settings

Serial Port Console Redirection

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

Table 141: NM10 Advanced - Serial Port Console Redirection - Profile settings

1.8.3 Boot

Setting / View	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 142: NM10 Boot - Profile settings overview

1.8.4 Security

Setting / View	Profile 0	Profile 5	My setting
Administrator Password	-	-	

Table 143: NM10 Security - Profile settings

1.9 Distribution of resources

1.9.1 RAM address assignment

RAM address	Address in Hex	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 144: 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 145: 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 146: IRQ interrupt assignments 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 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 147: 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

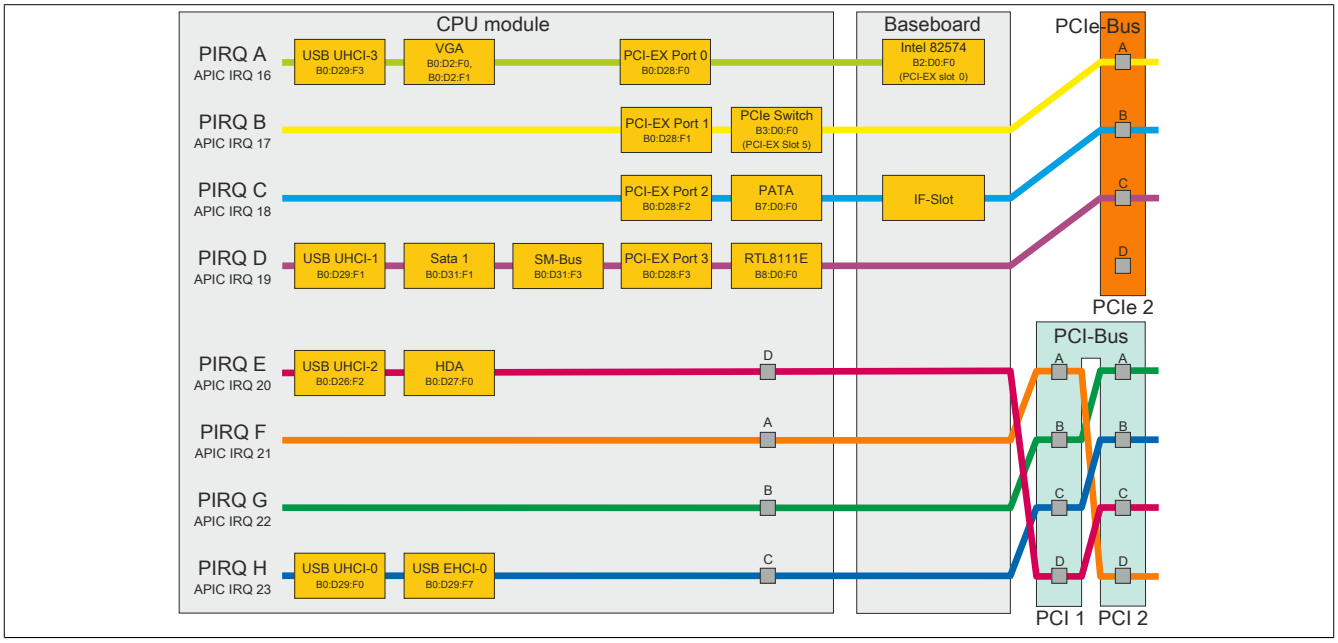


Figure 98: PCI and PCIe Routing with activated APIC for CPU boards NM10

2 Microsoft DOS

2.1 Order data

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

Table 148: 9S0000.01-010, 9S0000.01-020 - Order data

2.2 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.

2.3 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 149: Tested resolutions and color depths for RGB signals

3 Windows XP Professional

3.1 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 B&R device.	
5SWWXP.0600-GER	Microsoft OEM Windows XP Professional Service Pack 3, CD, German. Only available with a device.	
5SWWXP.0600-MUL	Microsoft OEM Windows XP Professional Service Pack 3, CD, multilanguage. Only available with a B&R device.	

Table 150: 5SWWXP.0600-ENG, 5SWWXP.0600-GER, 5SWWXP.0600-MUL - Order data

3.2 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	Multilingual	Optional	≤ 2.1 GB	128 MB

3.3 Installation

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

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

The following steps are necessary to install Windows XP Professional on a PCI SATA RAID controller:

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

Information:

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

3.4 Drivers

The latest drivers for all approved operating systems are available in the Downloads section (Service / Material-related downloads - BIOS / Drivers / Updates) of the B&R website at www.br-automation.com.

Information:

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

4 Windows 7

4.1 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 when compared to products offered on the consumer market.

4.2 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, multilanguage. Only available with a new device.	

Table 151: 5SWWI7.1100-ENG, 5SWWI7.1100-GER, 5SWWI7.1300-MUL - Order data

4.3 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	Multilingual	Optional	16 GB [1]	1 GB

1) The memory space needed for additional language packs is not included in the minimum size specified for the data storage medium.

4.4 Installation

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

4.4.1 Installation on 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 www.br-automation.com and copy the data to a folder on a 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 adjusted in BIOS.**

4.5 Drivers

The latest drivers for all approved operating systems are available in the Downloads section (Service / Material-related downloads - BIOS / Drivers / Updates) of the B&R website at www.br-automation.com.

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

4.6 Special considerations and 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).

5 Windows Embedded Standard 2009

5.1 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.

5.2 Order data - PPC800 (NM10)

Model number	Short description	Figure
	Windows Embedded Standard 2009	
5SWWXP.0739-ENG	Microsoft OEM Windows Embedded Standard 2009, English; for PPC800 with NM10 chipset; please order CompactFlash separately (minimum 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 152: 5SWWXP.0739-ENG - Order data

5.3 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

5.4 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	Available
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 153: Device functions in Windows Embedded Standard 2009

Function	Available
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 153: Device functions in Windows Embedded Standard 2009

5.5 Installation

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

5.6 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.

5.6.1 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 is available in the Download area of the B&R website (www.br-automation.com). Be sure to check whether the Enhanced Write Filter (EWF) is disabled.

Information:

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

6 Windows Embedded Standard 7

6.1 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 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.

6.2 Order data - PPC800 (NM10)

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; please order CompactFlash separately (minimum 16 GB).	
5SWWI7.1739-MUL	Microsoft OEM Windows Embedded Standard 7 Premium 32-bit, Service Pack 1, multilanguage; for PPC800 with NM10 chipset; please order CompactFlash separately (minimum 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 154: 5SWWI7.1539-ENG, 5SWWI7.1739-MUL - Order data

6.3 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	Multilingual	Optional	16 GB [1)]	1 GB

1) The memory space needed for additional language packs is not included in the minimum size specified for the data storage medium.

6.4 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 account	✓	✓
User account	Configurable	Configurable
Windows Explorer Shell	✓	✓
Registry filter	✓	✓
Internet Explorer 8.0	✓	✓
Internet Information Service (IIS) 7.0	✓	✓
AntiMalware (Windows Defender)	-	✓
Add-ons (Snipping tool, Sticky Notes)	-	✓
Windows Firewall	✓	✓
.NET Framework 3.5	✓	✓
Remote Desktop Protocol 7.0	✓	✓
File Compression Utility	✓	✓

Table 155: 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 Installer Service	✓	✓
Windows XP Mode	-	-
Media Player 12	✓	✓
DirectX	✓	✓
Multilingual User Interface Packs in the same image	-	✓
International Components and Language Services	✓	✓
Language Pack Setup	✓	✓
Windows Update	Configurable	Configurable
Windows PowerShell 2.0	✓	✓
BitLocker	-	✓
Applocker	-	✓
Tablet PC support	-	✓
Windows Touch	-	✓
Boot from USB Stick	✓	✓
Accessories	✓	✓
Page file	Configurable	Configurable
Number of fonts	134	134

Table 155: Device functions in Windows Embedded Standard 7

6.5 Installation

Upon request, Windows Embedded Standard 7 can be preinstalled at B&R Austria 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, and the device will be 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

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 Downloads section 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.

7 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.

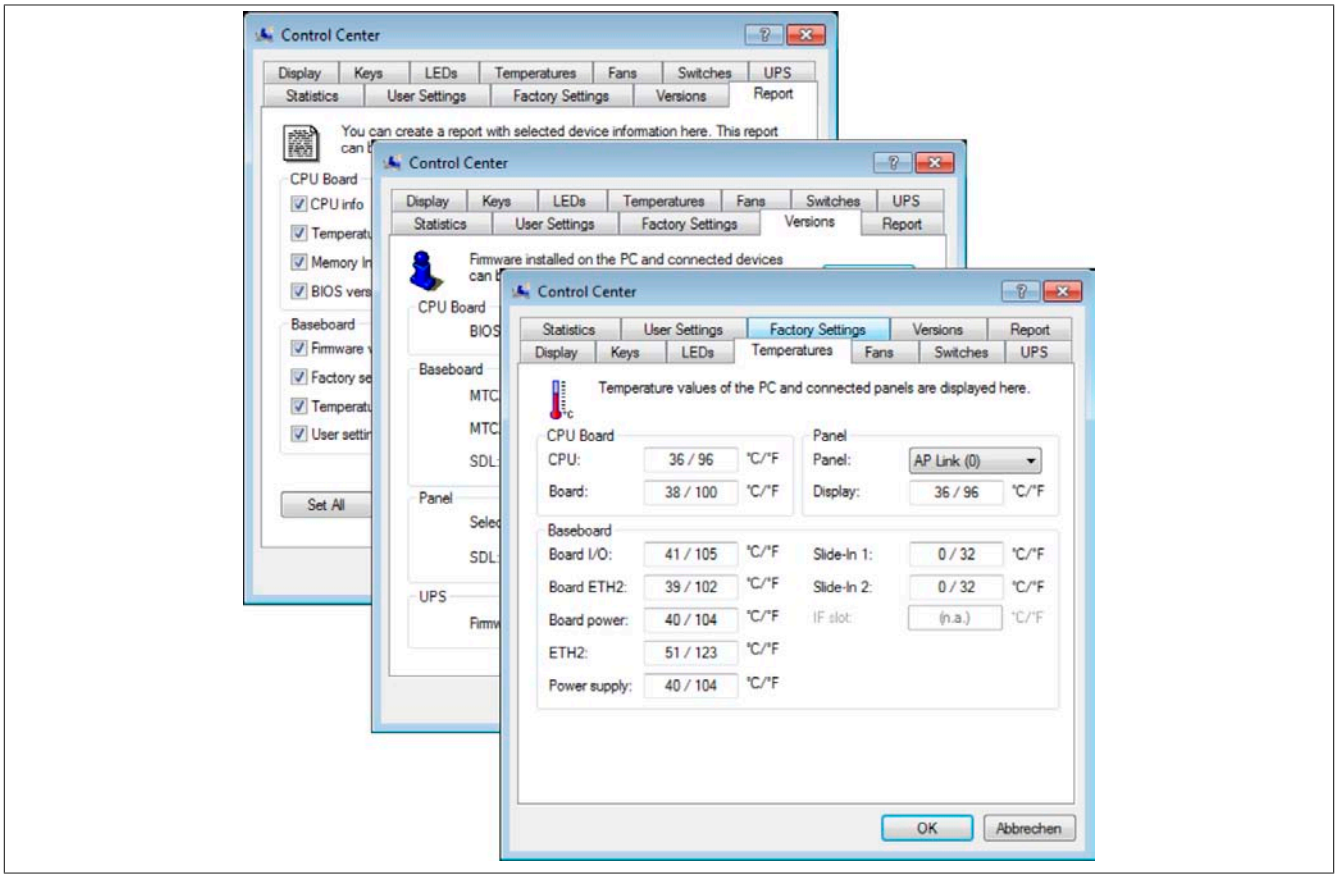


Figure 99: ADI Control Center screenshots - Examples

Information:

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

7.1 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
- Reading 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

7.2 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 includes the 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.

7.3 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:

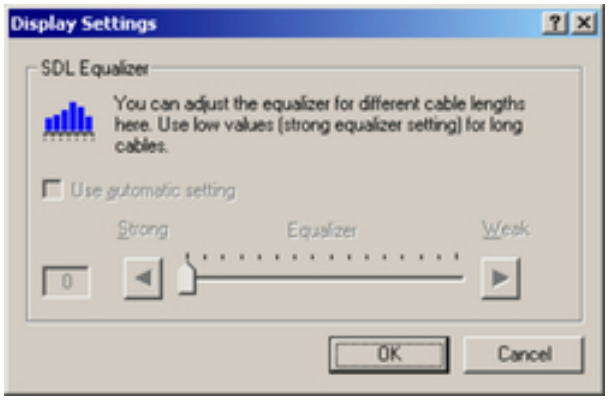


Figure 100: ADI Control Center - SDL equalizer settings

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).

7.4 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.

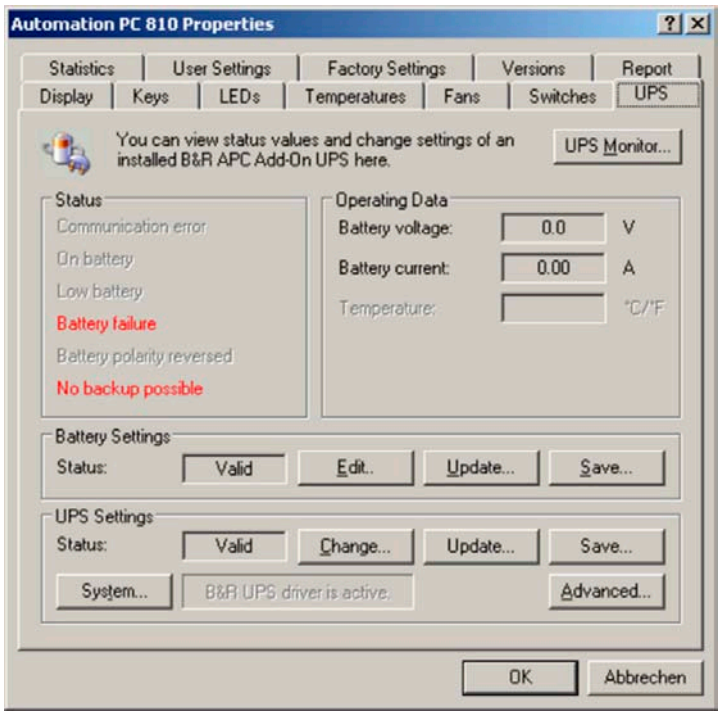


Figure 101: ADI Control Center - UPS settings

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.

7.4.1 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.

7.4.2 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.

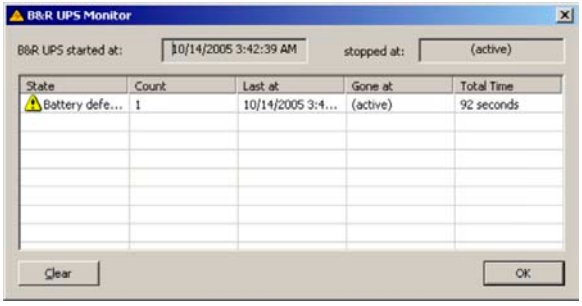


Figure 102: ADI Control Center - UPS monitor

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.

7.4.3 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.

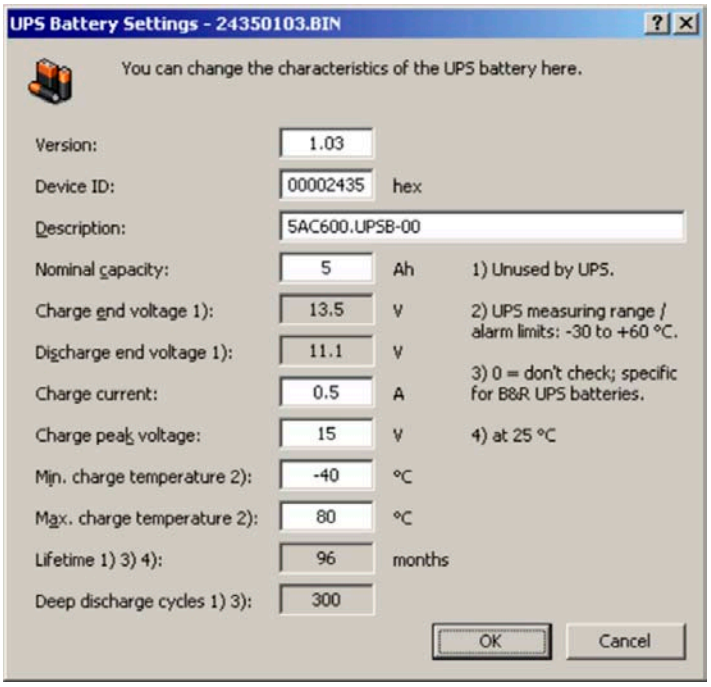


Figure 103: ADI Control Center - UPS battery settings

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.

7.4.4 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.

7.4.5 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.

7.4.6 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:

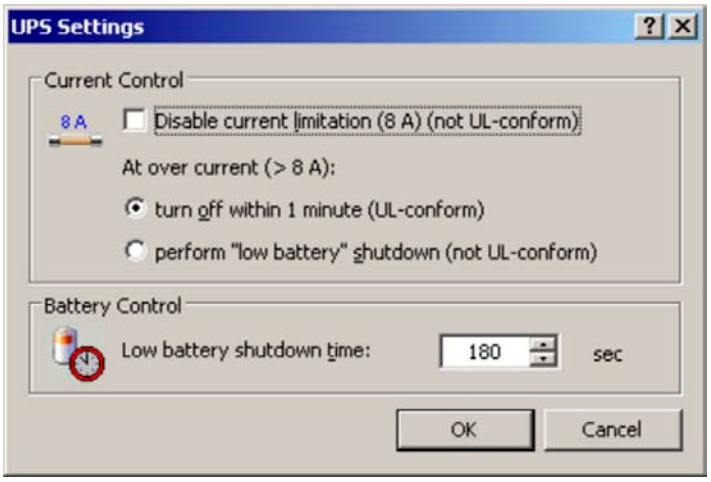


Figure 104: ADI Control Center - UPS settings

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.**

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.

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 189). 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.**

7.4.7 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:

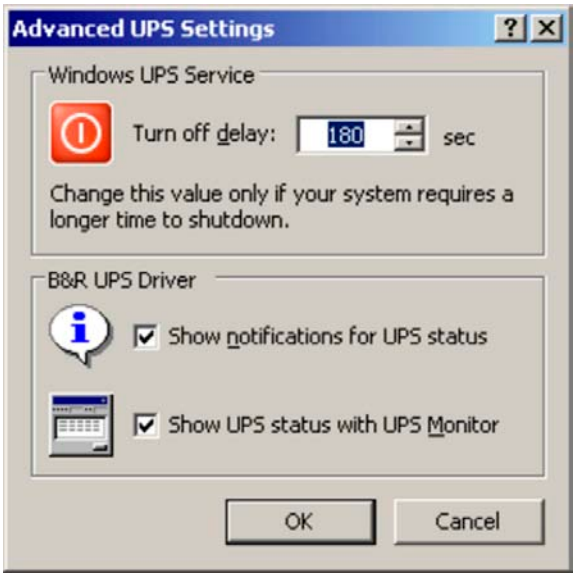


Figure 105: ADI Control Center - Advanced UPS settings

Information:

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

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.

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.

7.4.8 Procedure following power failure

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.**

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.

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.

8 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)

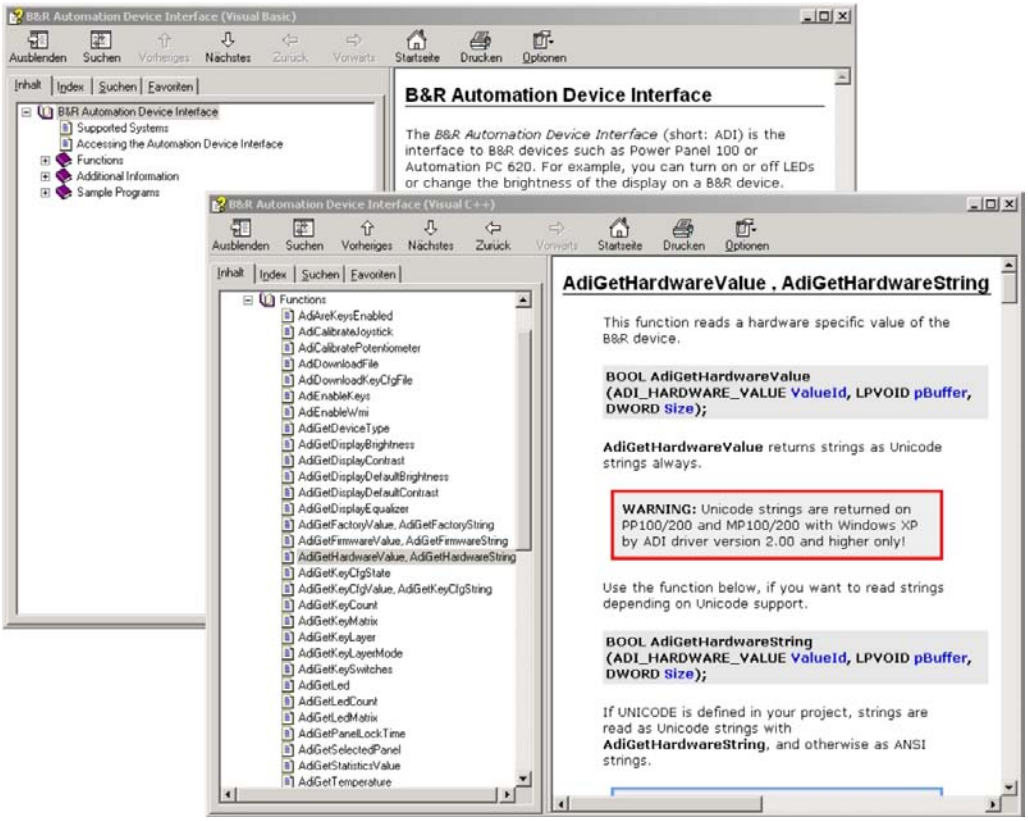


Figure 106: ADI Development Kit screenshots (version 3.40)

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 can be downloaded at no cost from the Downloads section of the B&R website (www.br-automation.com).

9 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)

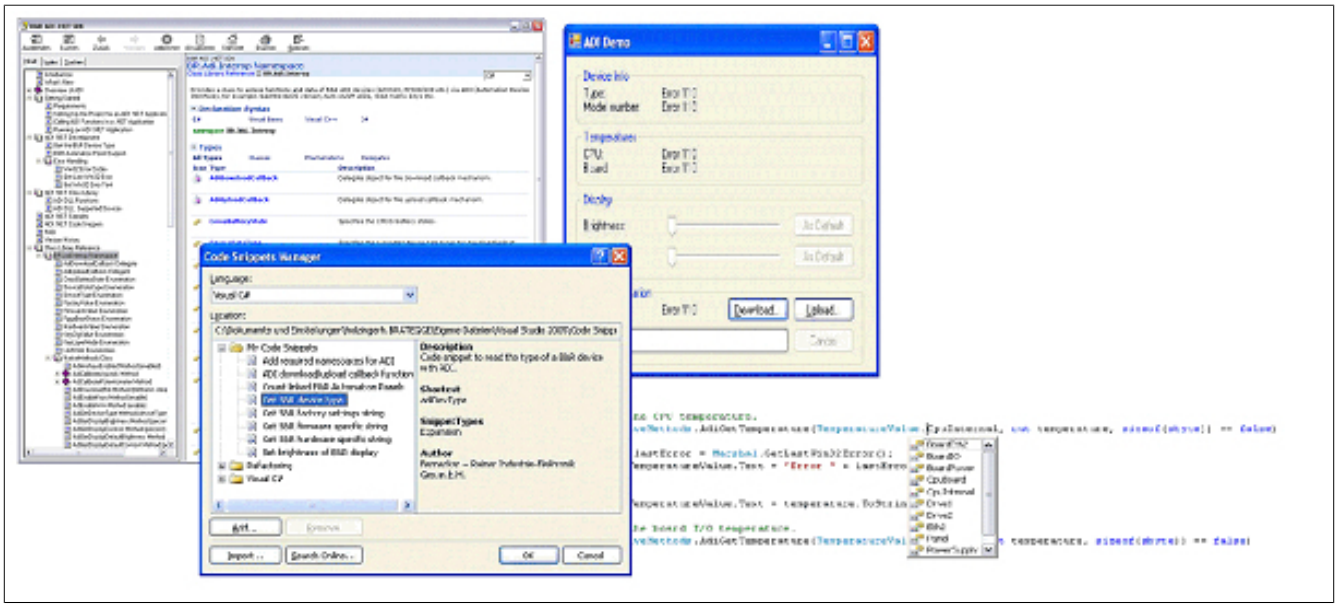


Figure 107: ADI .NET SDK screenshots (version 1.80)

Features (version 1.80 and higher)

- ADI .NET class library
- Help files in HTML Help 1.0 format (.chm) and MS Help 2.0 format (.HxS) (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).

10 B&R Key Editor

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

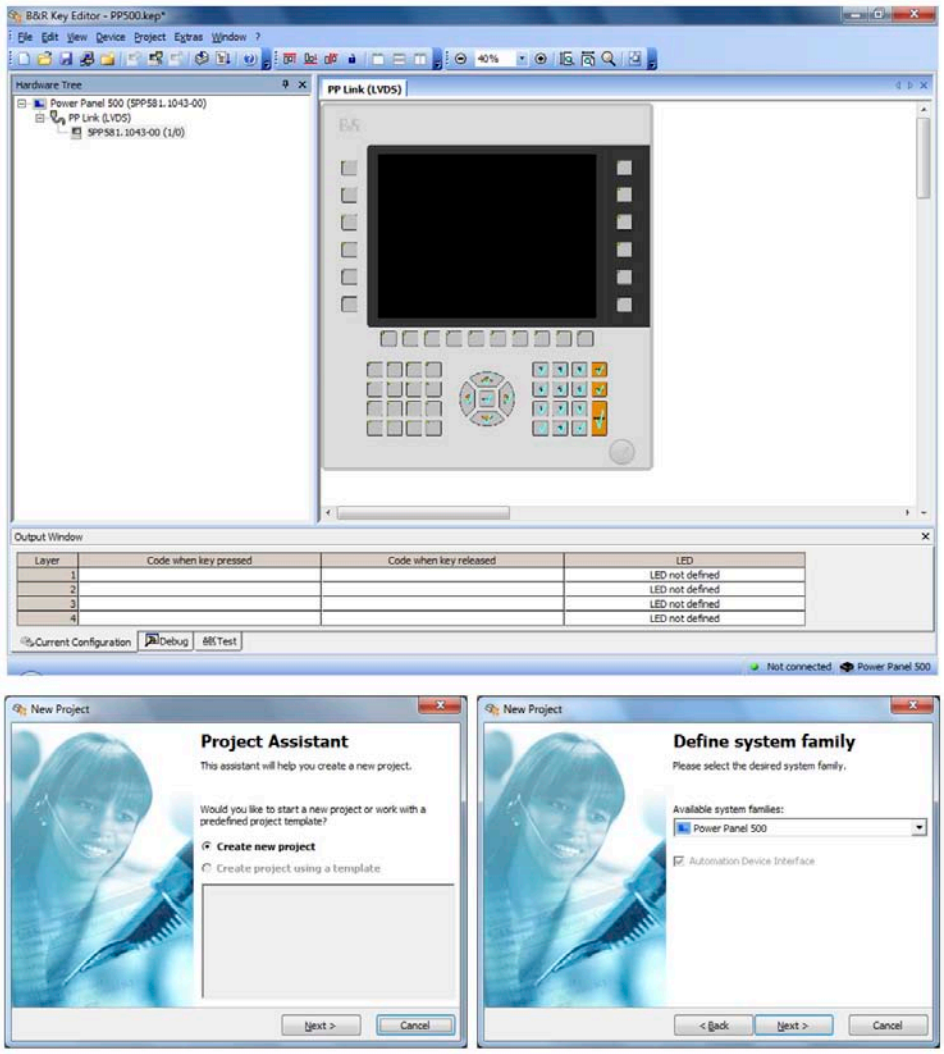


Figure 108: B&R Key Editor Version 3.30 screenshots (sample photo)

Features:

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

Supports the following systems (Version 3.30):

- 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 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 Applicable European Directives

- EMC directive 2004/108/EC
- Low-voltage directive 2006/95/EC

2 Overview of standards

Standard	Description
EN 55011 Class A	Electromagnetic compatibility (EMC), radio disturbance product standard, industrial, scientific, and medical high-frequency devices (ISM devices), limit values and measurement procedure; group 1 (devices that do not create HF during material processing) and group 2 (devices that create HF during material processing)
EN 55022 Class A	Electromagnetic compatibility (EMC), radio disturbance characteristics, information technology equipment (ITE devices), limits and methods of measurement
EN 60060-2	High-voltage test techniques - part 2: Measuring systems
EN 60068-2-1	Environmental testing - part 2: Tests; test A: Dry cold
EN 60068-2-2	Environmental testing - part 2: Tests; test B: Dry heat
EN 60068-2-3	Environmental testing - part 2: Tests; test and guidance: Damp heat, constant
EN 60068-2-6	Environmental testing - part 2: Tests; test: Vibration (sinusoidal)
EN 60068-2-14	Environmental testing - part 2: Tests; test N: Change of temperature
EN 60068-2-27	Environmental testing - part 2: Tests; test and guidance: Shock
EN 60068-2-30	Environmental testing - part 2: Tests; test and guidance: Damp heat, cyclic
EN 60068-2-31	Environmental testing - part 2: Tests; test: Drop and topple, primarily for equipment-type specimens
EN 60068-2-32	Environmental testing - part 2: Tests; test: Free fall
EN 60204-1	Safety of machinery, electrical equipment on machines - part 1: General requirements
EN 60529	Degree of protection provided by enclosures (IP code)
EN 60664-1	Insulation coordination for equipment within low-voltage systems - part 1: Principles, requirements and tests
EN 60721-3-2	Classification of environmental conditions - part 3: Classification of groups of environmental parameters and their severities, section 2: Transport
EN 60721-3-3	Classification of environmental conditions - part 3: Classification of groups of environmental parameters and their severities, section 3: Stationary use at weather-protected locations
EN 61000-3-2	Electromagnetic compatibility (EMC) - part 3-2: Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
EN 61000-3-3	Electromagnetic compatibility (EMC) - part 3-3: Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, equipment with rated current ≤ 16 A per phase, and not subject to conditional connection.
EN 61000-4-2	Electromagnetic compatibility (EMC) - part 4-2: Testing and measuring techniques; electrostatic discharge immunity test
EN 61000-4-3	Electromagnetic compatibility (EMC) - part 4-3: Testing and measuring techniques; radiated radio-frequency electromagnetic field immunity test
EN 61000-4-4	Electromagnetic compatibility (EMC) - part 4-4: Testing and measuring techniques; electrical fast transient/burst immunity test
EN 61000-4-5	Electromagnetic compatibility (EMC) - part 4-5: Testing and measuring techniques; surge immunity test
EN 61000-4-6	Electromagnetic compatibility (EMC) - part 4-6: Testing and measuring techniques; immunity to conducted disturbances, induced by radio-frequency fields
EN 61000-4-8	Electromagnetic compatibility (EMC) - part 4-8: Testing and measuring techniques; power frequency magnetic field immunity test
EN 61000-4-18	Electromagnetic compatibility (EMC) - part 4-18: Testing and measuring techniques; damped oscillatory waves immunity test
EN 61000-4-29	Electromagnetic compatibility (EMC) - part 4-29: Testing and measuring techniques; voltage dips, short interruptions and voltage variations on DC input power port immunity tests
EN 61000-6-2	Electromagnetic compatibility (EMC), generic immunity standard - part 2: Industrial environment
EN 61000-6-4	Electromagnetic compatibility (EMC), generic emission standard - part 2: Industrial environment
EN 61131-2	Product standard, programmable logic controllers - part 2: Equipment requirements and tests
Germanischer Lloyd 2003	Germanischer Lloyd 2003: Supplementary provisions and guidelines - Part 7: Guidelines for type testing
UL 508	Industrial control equipment (UL = Underwriters Laboratories)
47 CFR	Federal Communications Commission (FCC), 47 CFR Part 15 Subpart B Class A
VCCI V-3	Agreement of Voluntary Control Council for Interference by Information Technology Equipment; Class A
ICES 003	Devices that cause interference - Digital devices; Class A

Table 156: Overview of standards

3 Emission requirements

Emissions	Test carried out in accordance with	Limits in accordance with
Network-related emissions	EN 55011 / EN 55022	EN 61000-6-4: Generic standard (industrial areas)
		EN 55011: Industrial, scientific, and medical (ISM) radio-frequency equipment, class A (industrial areas)
		EN 55022: Information technology equipment (ITE devices), class A (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 50091-2: Uninterruptible power systems (UPS), class A
		47 CFR Part 15 Subpart B Class A (FCC)
		Germanischer Lloyd 2003
Emissions, electromagnetic emissions	EN 55011 / EN 55022	EN 61000-6-4: Generic standard (industrial areas)
		EN 55011: Industrial, scientific, and medical (ISM) radio-frequency equipment, class A (industrial areas)
		EN 55022: Information technology equipment (ITE devices), class A (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 50091-2: Uninterruptible power systems (UPS), class A
		47 CFR Part 15 Subpart B Class A (FCC)
		Germanischer Lloyd 2003
Harmonic current emissions for equipment with input current ≤ 16 A per line	EN 61000-3-2	EN 61000-3-2: Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
Voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, equipment with rated current ≤ 16 A per phase, and not subject to conditional connection.	EN 61000-3-3	EN 61000-3-3: Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, equipment with rated current ≤ 16 A per phase, and not subject to conditional connection Class A/D

Table 157: Overview of limits and testing guidelines for emissions

3.1 Network-related emissions

Tests in accordance with EN 55011 / EN 55022	Limit values in accordance with EN 61000-6-4	Limit values in accordance with EN 55011 Class A	Limit values in accordance with EN 55022 Class A
Power mains connections 150 kHz - 500 kHz	-	79 dB (µV) quasi-peak value 66 dB (µV) average value	79 dB (µV) quasi-peak value 66 dB (µV) average value
Power mains connections 500 kHz - 30 MHz	-	73 dB (µV) quasi-peak value 60 dB (µV) average value	73 dB (µV) quasi-peak value 60 dB (µV) average value
AC mains connections 150 kHz - 500 kHz	79 dB (µV) quasi-peak value 66 dB (µV) average value	-	-
AC mains connections 500 kHz - 30 MHz	73 dB (µV) quasi-peak value 60 dB (µV) average value	-	-
Other connections 150 kHz - 500 kHz	-	-	97 - 87 dB (µV) and 53 - 43 dB (µA) quasi-peak value 84 - 74 dB (µV) and 40 - 30 dB (µA) average value
Other connections 500 kHz - 30 MHz	-	-	87 dB (µV) and 43 dB (µA) quasi-peak value 74 dB (µV) and 30 dB (µA) average value
Tests in accordance with EN 55011 / EN 55022	**Limit values in accordance with EN 61131-2**	**Limits in accordance with 47 CFR Part 15 Subpart B class A**	
Power mains connections[1] 150 kHz - 500 kHz	-	-	
Power mains connections 500 kHz - 30 MHz	-	-	
AC mains connections 150 kHz - 500 kHz	79 dB (µV) quasi-peak value 66 dB (µV) average value	79 dB (µV) quasi-peak value 66 dB (µV) average value	
AC mains connections 500 kHz - 30 MHz	73 dB (µV) quasi-peak value 60 dB (µV) average value	73 dB (µV) quasi-peak value 60 dB (µV) average value	
Other connections 150 kHz - 500 kHz	-	-	
Other connections 500 kHz - 30 MHz	-	-	
Test carried out in accordance with CISPR 16-1, 16-2	**Limit value in accordance with Germanischer Lloyd 2003**		
Mains connections 10 kHz - 150 kHz	96 dB(µV) – 50 dB (µV)		
Mains connections 150 kHz - 500 kHz	60 dB(µV) – 50 dB (µV)		
Mains connections 500 kHz - 30 MHz	50 dB (µV)		

Table 158: Test requirements - Network-related emissions for industrial areas

1) AC network connections only with EN 61131-2

3.2 Emissions, electromagnetic emissions

Tests in accordance with EN 55011 / EN 55022	Limit values in accordance with EN 61000-6-4	Limit values in accordance with EN 55011 Class A	Limit values in accordance with EN 55022 Class A
30 MHz - 230 MHz measured at a distance of 10 m	< 40 dB (µV/m) Quasi-peak value	< 40 dB (µV/m) Quasi-peak value	< 40 dB (µV/m) Quasi-peak value
230 MHz - 1 GHz measured at a distance of 10 m	< 47 dB (µV/m) Quasi-peak value	< 47 dB (µV/m) Quasi-peak value	< 47 dB (µV/m) Quasi-peak value
Tests in accordance with EN 55011 / EN 55022	**Limit values in accordance with EN 61131-2**	**Limit values in accordance with EN 50091-2 class A**	
30 MHz - 230 MHz measured at a distance of 10 m	< 40 dB (µV/m) Quasi-peak value	< 40 dB (µV/m) Quasi-peak value	
230 MHz - 1 GHz measured at a distance of 10 m	< 47 dB (µV/m) Quasi-peak value	< 47 dB (µV/m) Quasi-peak value	
Test carried out	**Limits according to 47 CFR Part 15 Subpart B class A**		
30 MHz - 88 MHz measured at a distance of 10 m	< 90 dB (µV/m) Quasi-peak value		
88 MHz - 216 MHz measured at a distance of 10 m	< 150 dB (µV/m) Quasi-peak value		
216 MHz - 960 MHz measured at a distance of 10 m	< 210 dB (µV/m) Quasi-peak value		
> 960 MHz measured at a distance of 10 m	< 300 dB (µV/m) Quasi-peak value		
Test carried out in accordance with CISPR 16-1, CISPR 16-2	**Limit value in accordance with Germanischer Lloyd 2003**		
150 kHz - 300 kHz measured at a distance of 3 m	< 80 dBµV/m - 52 dBµV/m quasi-peak value		
300 kHz - 30 MHz measured at a distance of 3 m	< 52 dBµV/m - 34 dBµV/m quasi-peak value		
30 MHz - 2 GHz measured at a distance of 3 m	< 54 dBµV/m quasi-peak value		
except for 156 MHz - 165 MHz measured at a distance of 3 m	< 24 dBµV/m quasi-peak value		

Table 159: Test requirements - Electromagnetic emissions for industrial areas

4 Requirements for immunity to disturbances

Immunity	Test carried out in accordance with	Limits in accordance with
Electrostatic discharge (ESD)	EN 61000-4-2	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		Germanischer Lloyd 2003
Immunity to high-frequency electro-magnetic fields (HF field)	EN 61000-4-3	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		Germanischer Lloyd 2003
Immunity to high-speed transient elec-trical disturbances (burst)	EN 61000-4-4	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		Germanischer Lloyd 2003
Immunity to surge voltages	EN 61000-4-5	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		Germanischer Lloyd 2003
Immunity to conducted disturbances	EN 61000-4-6	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		Germanischer Lloyd 2003
Immunity against magnetic fields with electrical frequencies	EN 61000-4-8	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		Germanischer Lloyd 2003
Immunity to damped oscillatory waves	EN 61000-4-18	EN 61131-2: Programmable logic controllers
Immunity to voltage fluctuations	EN 61000-4-29	EN 61131-2: Programmable logic controllers
		Germanischer Lloyd 2003
Immunity to voltage dips	EN 61000-4-29	EN 61131-2: Programmable logic controllers
		Germanischer Lloyd 2003
Immunity to supply voltage changes	EN 61131-2	EN 61131-2: Programmable logic controllers
Immunity to gradual shutdown/startup	EN 61131-2	EN 61131-2: Programmable logic controllers

Table 160: Overview of limits and testing guidelines for immunity

Evaluation criteria in accordance with EN 61000-6-2

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

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

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

Criteria D:
Degradation or failure of functionality which can no longer be restored (operating equipment destroyed).

4.1 Electrostatic discharge (ESD)

Tests in accordance with EN 61000-4-2	Limit values in accor-dance with EN 61000-6-2	Limit values in accor-dance with EN 61131-2	Limit value in accordance with Germanischer Lloyd 2003
Contact discharge to powder-coated and bare metal housing parts	±4 kV, 10 discharges, criteria B	±4 kV, 10 discharges, criteria B	±6 kV, 10 discharges, criteria B
Discharge through the air to plastic housing parts	±8 kV, 10 discharges, criteria B	±8 kV, 10 discharges, criteria B	±8 kV, 10 discharges, criteria B

Table 161: Test requirements - Electrostatic discharge (ESD)

4.2 High-frequency electromagnetic fields (HF field)

Tests in accordance with EN 61000-4-3	Limit values in accor-dance with EN 61000-6-2	Limit values in accor-dance with EN 61131-2	Limit value in accordance with Germanischer Lloyd 2003
Housing, completely wired	80MHz - 1GHz, 10V/m, 80% am-plitude modulation with 1kHz, length 3 seconds, criteria A	2 GHz - 2.7 GHz, 1 V/m, 1.4 GHz - 2 GHz, 3 V/m, 80 MHz - 1 GHz, 10 V/m, 80% amplitude modulation with 1kHz, 3 second duration, criteria A	80 MHz - 2 GHz, 10V/m, 80% amplitude modulation with 1 kHz, 1% / 3 sec, criteria A

Table 162: Test requirements - High-frequency electromagnetic fields (HF field)

4.3 High-speed transient electrical disturbances (Burst)

Tests in accordance with EN 61000-4-4	Limit values in accordance with EN 61000-6-2	Limit values in accordance with EN 61131-2	Limit values in accordance with Germanischer Lloyd 2003
AC mains inputs/outputs	±2 kV, criteria B	±2 kV, criteria B	-
AC power inputs	-	±2 kV, criteria B	±2 kV, criteria B
DC mains inputs/outputs >3 m[1)]	±2 kV, criteria B	±2 kV, criteria B	-
DC power outputs	-	-	±2 kV, criteria B
Functional ground connections, signal lines and I/Os >3 m	±1 kV, criteria B	±1 kV, criteria B	±1 kV, criteria B
Unshielded AC inputs/outputs >3 m	±2 kV, criteria B	±2 kV, criteria B	-
Analog I/O	±1 kV, criteria B	±1 kV, criteria B	±1 kV, criteria B

Table 163: Test requirements - High-speed transient electrical disturbances (burst)

1) For EN 55024 without length limitation.

4.4 Surge

Tests in accordance with EN 61000-4-5	Limit values in accordance with EN 61000-6-2	Limit values in accordance with EN 61131-2	Limit values in accordance with Germanischer Lloyd 2003
AC power I/O, L to L	±1 kV, criteria B	±1 kV, criteria B	-
AC power I/O, L to PE	±2 kV, criteria B	±2 kV, criteria B	-
DC mains inputs/outputs, L+ to L-, >30 m	±1 kV, criteria B	±1 kV, criteria B	-
DC mains inputs/outputs, L to PE, >30 m	±2 kV, criteria B	±2 kV, criteria B	-
DC power inputs, L+ to L-	-	-	±0.5 kV, criteria A
DC power inputs, L to PE	-	-	±1 kV, criteria A
Signal connections >30 m	±1 kV, criteria B	±1 kV, criteria B	-
All shielded cables	±1 kV, criteria B	±1 kV, criteria B	-

Table 164: Test requirements - Surge voltages

4.5 Conducted disturbances

Tests in accordance with EN 61000-4-6	Limit values in accordance with EN 61000-6-2	Limit values in accordance with EN 61131-2	Limit value in accordance with Germanischer Lloyd 2003
AC mains inputs/outputs	150kHz - 80MHz, 10V, 80% amplitude modulation with 1kHz, length 3 seconds, criteria A	150kHz - 80MHz, 3V, 80% amplitude modulation with 1kHz, length 3 seconds, criteria A	150kHz - 80MHz, 10V[1)], 80% amplitude modulation with 1kHz, length 3 seconds, criteria A
DC mains inputs/outputs	150kHz - 80MHz, 10V, 80% amplitude modulation with 1kHz, length 3 seconds, criteria A	150kHz - 80MHz, 3V, 80% amplitude modulation with 1kHz, length 3 seconds, criteria A	150kHz - 80MHz, 10V[1)], 80% amplitude modulation with 1kHz, length 3 seconds, criteria A
Functional ground connection	150kHz - 80MHz, 10V, 80% amplitude modulation with 1kHz, length 3 seconds, criteria A	150kHz - 80MHz, 3V, 80% amplitude modulation with 1kHz, length 3 seconds, criteria A	150kHz - 80MHz, 10V[1)], 80% amplitude modulation with 1kHz, length 3 seconds, criteria A
Signal connections >3 m	150kHz - 80MHz, 10V, 80% amplitude modulation with 1kHz, length 3 seconds, criteria A	150kHz - 80MHz, 3V, 80% amplitude modulation with 1kHz, length 3 seconds, criteria A	150kHz - 80MHz, 10V[1)], 80% amplitude modulation with 1kHz, length 3 seconds, criteria A

Table 165: Test requirements - Conducted disturbances

1) Increase carrier signal voltage to 10Veff in accordance with IEC 60945 at following frequencies:2MHz; 3MHz; 4MHz; 6,2 MHz; 8,2MHz; 12,6MHz; 16,5MHz; 18.8 MHz; 22MHz; 25MHz

4.6 Magnetic fields with electrical frequencies

Tests in accordance with EN 61000-4-8	Limit values in accordance with EN 61000-6-2	Limit values in accordance with EN 61131-2	
Test direction x, test in the field of an induction coil 1m x 1m	30 A/m, criteria A	30 A/m, criteria A	
Test direction y, test in the field of an induction coil 1m x 1m	30 A/m, criteria A	30 A/m, criteria A	
Test direction z, test in the field of an induction coil 1m x 1m	30 A/m, criteria A	30 A/m, criteria A	

Table 166: Test requirements - Magnetic fields with electrical frequencies

4.7 Voltage fluctuations

Tests in accordance with EN 61000-4-29	Limit values in accordance with EN 61131-2	Limit value in accordance with Germanischer Lloyd 2003	
Power supply connections	30 min at 0.85 x U_e or 1.2 x U_e Constant ripple 0.05 x U_e	30 min at 0.75 x U_e or 1.3 x U_e	

Table 167: Test requirements - Voltage fluctuations

4.8 Voltage dips

Tests in accordance with EN 61000-4-29	Limit values in accordance with EN 61131-2	Limit value in accordance with Germanischer Lloyd 2003	
DC power inputs	20 interruptions for 10 ms (PS2)	3 interruptions for 30 s in 5 min	

Table 168: Test requirements - Voltage dips

4.9 Changed supply voltage

Tests in accordance with EN 61131-2	Limit values in accordance with EN 61131-2		
Power supply connections	100% to 90% /60s - 90% to 100% /60s 100% to 0% /5s - 0% to 100% /5s		

Table 169: Test requirements - Changed supply voltage

4.10 Turning off and back on

Tests in accordance with EN 61131-2	Limit values in accordance with EN 61131-2		
Supply voltage	100% to 0% /60s - 0% to 100% /60s		

Table 170: Test requirements - Turning off and back on

4.11 Damped oscillatory waves

Tests in accordance with EN 61000-4-18	Limit values in accordance with EN 61131-2		
Mains inputs/outputs, L to L	±1 kV, 1 MHz, repeat rate 400/seconds, length 2 seconds, connection lengths 2 m, criteria B		
Power I/O, L to PE	±2.5 kV, 1 MHz, repeat rate 400/seconds, length 2 seconds, connection lengths 2 m, criteria B		

Table 171: Test requirements - Damped oscillatory waves

5 Mechanical conditions

Vibration	Test carried out in accordance with	Limits in accordance with
Vibration operation	EN 60068-2-6	EN 61131-2: Programmable logic controllers
		EN 60721-3-3 class 3M4
Vibration during transport (packaged)	EN 60068-2-6	EN 60721-3-2 class 2M1
		EN 60721-3-2 class 2M2
		EN 60721-3-2 class 2M3
Shock during operation	EN 60068-2-27	EN 61131-2: Programmable logic controllers
		EN 60721-3-3 class 3M4
Shock during transport (packaged)	EN 60068-2-27	EN 60721-3-2 class 2M1
		EN 60721-3-2 class 2M2
		EN 60721-3-2 class 2M3
Toppling (packaged)	EN 60068-2-31	EN 60721-3-2 class 2M1
		EN 60721-3-2 class 2M2
		EN 60721-3-2 class 2M3
Free fall (packaged)	EN 60068-2-32	EN 61131-2: Programmable logic controllers

Table 172: Overview of limits and testing guidelines for vibration

5.1 Vibration operation

Tests in accordance with EN 60068-2-6	Limit values in accordance with EN 61131-2		Limit values in accordance with EN 60721-3-3 Class 3M4		
Vibration during operation: Uninterrupted duty with movable frequency in all 3 axes (x, y, z), 1 octave per minute	10 sweeps for each axis		10 sweeps for each axis		
	Frequency	**Limit value**	**Frequency**	**Limit value**	
	5 - 9 Hz	Amplitude 3.5 mm	2 - 9 Hz	Amplitude 3 mm	
	9 - 150 Hz	Acceleration 1 g	9 - 200 Hz	Acceleration 1 g	

Table 173: Test requirements - Vibration during operation

5.2 Vibration during transport (packaged)

Tests in accordance with EN 60068-2-6	Limit values in accordance with EN 60721-3-2 Class 2M1		Limit values in accordance with EN 60721-3-2 Class 2M2		Limit values in accordance with EN 60721-3-2 Class 2M3	
Vibration during transport: Uninterrupted duty with moveable frequency in all 3 axes (x, y, z)	10 sweeps for each axis, packaged		10 sweeps for each axis, packaged		10 sweeps for each axis, packaged	
	Frequency	**Limit value**	**Frequency**	**Limit value**	**Frequency**	**Limit value**
	2 - 9 Hz	Amplitude 3.5 mm	2 - 9 Hz	Amplitude 3.5 mm	2 - 8 Hz	Amplitude 7.5 mm
	9 - 200 Hz	Acceleration 1 g	9 - 200 Hz	Acceleration 1 g	8 - 200 Hz	Acceleration 2 g
	200 - 500 Hz	Acceleration 1.5 g	200 - 500 Hz	Acceleration 1.5 g	200 - 500 Hz	Acceleration 4 g

Table 174: Test requirements - Vibration during transport (packaged)

5.3 Shock during operation

Tests in accordance with EN 60068-2-27	Limit values in accordance with EN 61131-2	Limit values in accordance with EN 60721-3-3 Class 3M4	
Shock during operation: Pulse (half-sine) stress in all 3 axes (x, y, z)	Acceleration 15 g, Duration 11 ms, 18 shocks	Acceleration 10 g, Duration 11 ms	

Table 175: Test requirements - Shock during operation

5.4 Shock during transport (packaged)

Tests in accordance with EN 60068-2-27	Limit values in accordance with EN 60721-3-2 Class 2M1	Limit values in accordance with EN 60721-3-2 Class 2M2
Pulse (half-sine) stress in all 3 axes (x, y, z)	Acceleration 10 g, Duration 11 ms, each 3 shocks, packaged	Acceleration 30 g, Duration 6 ms, each 3 shocks, packaged

Table 176: Test requirements - Shock during transport

5.5 Toppling

Tests in accordance with EN 60068-2-31	Limit values in accordance with EN 60721-3-2 Class 2M1		Limit values in accordance with EN 60721-3-2 Class 2M2		Limit values in accordance with EN 60721-3-2 Class 2M3	
Drop and topple	Devices: Drop/topple on each edge, packaged		Devices: Drop/topple on each edge, packaged		Devices: Drop/topple on each edge, packaged	
	Weight	**Required**	**Weight**	**Required**	**Weight**	**Required**
	< 20 kg	Yes	< 20 kg	Yes	< 20 kg	Yes
	20 - 100 kg	-	20 - 100 kg	Yes	20 - 100 kg	Yes
	> 100 kg	-	> 100 kg	-	> 100 kg	Yes

Table 177: Test requirements - Toppling

5.6 Free fall (packaged)

Tests in accordance with EN 60068-2-32	Limit values in accordance with EN 61131-2		Limit values in accordance with EN 60721-3-2 Class 2M1		Limit values in accordance with EN 60721-3-2 Class 2M2	
Free fall	Devices with delivery packaging each with 5 fall tests		Devices packaged		Devices packaged	
	Weight	**Height**	**Weight**	**Height**	**Weight**	**Height**
	< 10 kg	1.0 m	< 20 kg	0.25 m	< 20 kg	1.2 m
	10 - 40 kg	0.5 m	20 - 100 kg	0.25 m	20 - 100 kg	1.0 m
	> 40 kg	0.25 m	> 100 kg	0.1 m	> 100 kg	0.25 m
	Devices with product packaging each with 5 fall tests					
	Weight	**Height**				
	< 10 kg	0.3 m				
	10 - 40 kg	0.3 m				
	> 40 kg	0.25 m				

Table 178: Test requirements - Free fall

6 Climate conditions

Temperature and humidity	Test carried out in accordance with	Limits in accordance with
Worst case operation	UL 508	UL 508: Industrial control equipment
		EN 61131-2: Programmable logic controllers
Dry heat	EN 60068-2-2	EN 61131-2: Programmable logic controllers
Dry cold	EN 60068-2-1	EN 61131-2: Programmable logic controllers
Large temperature fluctuations	EN 60068-2-14	EN 61131-2: Programmable logic controllers
Temperature fluctuations in operation	EN 60068-2-14	EN 61131-2: Programmable logic controllers
Humid heat, cyclic	EN 60068-2-30	EN 61131-2: Programmable logic controllers
Constant humid heat (storage)	EN 60068-2-3	EN 61131-2: Programmable logic controllers

Table 179: Overview of limits and testing guidelines for temperature and humidity

6.1 Worst case operation

Tests according to UL 508	Limit values according to UL 508	Limit values in accordance with EN 61131-2	
Worst case during operation. Operation of the device with the max. ambient temperature specified in the data sheet at the max. specified load	3 hours at max. ambient temperature (min. +40°C) duration approx. 5 hours	3 hours at max. ambient temperature (min. +40°C) duration approx. 5 hours	

Table 180: Test requirements - Worst case during operation

6.2 Dry heat

Tests in accordance with EN 60068-2-2	Limit values in accordance with EN 61131-2		
Dry heat	16 hours at +70°C for 1 cycle, then 1 hour acclimatization and function testing, duration approximately 17 hours		

Table 181: Test requirements - Dry heat

6.3 Dry cold

Tests in accordance with EN 60068-2-1	Limit values in accordance with EN 61131-2		
Dry cold	16 hours at -40°C for 1 cycle, then 1 hour acclimatization and function testing, duration approximately 17 hours		

Table 182: Test requirements - Dry cold

6.4 Large temperature fluctuations

Tests in accordance with EN 60068-2-14	Limit values in accordance with EN 61131-2		
Large temperature fluctuations	3 hours at -40°C and 3 hours at +70°C, 5 cycles, then 2 hours acclimatization and function testing, duration approximately 14 hours		

Table 183: Test requirements - Large temperature fluctuations

6.5 Temperature fluctuations in operation

Tests in accordance with EN 60068-2-14	Limit values in accordance with EN 61131-2		
Open devices: These can also have a housing and are installed in control cabinets	3 hours at +5°C and 3 hours at 55°C, 5 cycles, temperature gradient 3°C / min, the unit is occasionally supplied with voltage during testing, duration approximately 30 hours		
Closed devices: These are devices whose data sheet specifies a surrounding housing (enclosure) with appropriate safety precautions	3 hours at +5°C and 3 hours at +55°C, 5 cycles, temperature gradient 3°C / min, the unit is occasionally supplied with voltage during testing, duration approximately 30 hours		

Table 184: Test requirements - Temperature fluctuations during operation

6.6 Humid heat, cyclic

Tests in accordance with EN 60068-2-30	Limit values in accordance with EN 61131-2		
Alternating climate	24 hours at +25°C / +55°C and 97% / 83% RH, 2 cycles, then 2 hours acclimatization, function testing and insulation, duration approximately 50 hours		

Table 185: Test requirements - Humid heat, cyclic

6.7 Constant humid heat (storage)

Tests in accordance with EN 60068-2-3	Limit values in accordance with EN 61131-2		
Constant humid heat (storage)	48 hours at +40°C and 92.5% RH, then insulation test within 3 hours, duration approximately 49 hours		

Table 186: Test requirements - Humid heat, constant (storage)

7 Safety

Safety	Test carried out in accordance with	Limits in accordance with
Ground resistance	EN 61131-2	EN 60204-1: Electrical equipment of machines
		EN 61131-2: Programmable logic controllers
Insulation resistance		EN 60204-1: Electrical equipment of machines
High voltage	EN 60060-1	EN 61131-2: Programmable logic controllers
		UL 508: Industrial control equipment
Residual voltage	EN 61131-2	EN 60204-1: Electrical equipment of machines
		EN 61131-2: Programmable logic controllers
Leakage current		VDE 0701-1: Service, changes and testing of electrical devices
Overload	UL 508	EN 61131-2: Programmable logic controllers
		UL 508: Industrial control equipment
Simulation component defect	UL 508	EN 61131-2: Programmable logic controllers
		UL 508: Industrial control equipment

Table 187: Overview of limits and testing guidelines for safety

7.1 Ground resistance

Tests in accordance with EN 61131-2	Limit values in accordance with EN 60204-1		Limit values in accordance with EN 61131-2
Ground resistance: housing (from any metal part to the ground terminal)	Smallest effective cross section of the protective ground conductor for the branch being tested	Maximum measured voltage drop at a test current of 10 A	Test current 30 A for 2 min, < 0.1 Ω
	1.0 mm²	3.3 V	
	1.5 mm²	2.6 V	
	2.5 mm²	1.9 V	
	4.0 mm²	1.4 V	
	> 6.0 mm²	1.0 V	

Table 188: Test requirements - Ground resistance

7.2 Insulation resistance

Test carried out	Limit values in accordance with EN 60204-1		
Insulation resistance: main circuits to protective ground conductor	> 1 MΩ at 500 VDC		

Table 189: Test requirements - Insulation resistance

7.3 High voltage

Tests in accordance with EN 60060-1	Limit values in accordance with EN 61131-2				Limit values according to UL 508		
High voltage: Primary circuit to secondary circuit and to protective ground circuit (transformers, coils, varistors, capacitors and components used to protect against overvoltage can be removed before the test)	Input voltage	Test voltage			Input voltage	Test voltage	
		1.2/50 µs peak voltage surge	**AC, 1 min**	**DC, 1 min**		**AC, 1 min**	**AC, 1 min**
	0 - 50 VAC 0 - 60 VDC	850 V	510 V	720 V	≤ 50 V	500 V	707 V
	50 - 100 VAC 60 - 100 VDC	1360 V	740 V	1050 V	> 50 V	1000 V + 2 x U_N	(1000 V + 2 x U_N) x 1.414
	100 - 150 VAC 100 - 150 VDC	2550 V	1400 V	1950 V			
	150 - 300 VAC 150 - 300 VDC	4250 V	2300 V	3250 V			
	300 - 600 VAC 300 - 600 VDC	6800 V	3700 V	5250 V			
	600 - 1000 VAC 600 - 1000 VDC	10200 V	5550 V	7850 V			

Table 190: Test requirements - High voltage

7.4 Residual voltage

Tests in accordance with EN 61131-2	Limit values in accordance with EN 60204-1	Limit values in accordance with EN 61131-2	
Residual voltage after switching off	< 60 V after 5 sec (active parts) < 60 V after 1 sec (plug pins)	< 60 V after 5 sec (active parts) < 60 V after 1 sec (plug pins)	

Table 191: Test requirements - Residual voltage

7.5 Leakage current

Test carried out	Limit value according to VDE 0701-1		
Leakage current: Phase to ground	≤ 3.5 mA		

Table 192: Test requirements - Leakage current

7.6 Overload

Tests according to UL 508	Limit values in accordance with EN 61131-2	Limit values according to UL 508	
Overload of transistor outputs	50 switches, 1.5 I_N, 1 sec ON / 9 sec OFF	50 switches, 1.5 I_N, 1 sec ON / 9 sec OFF	

Table 193: Test requirements - Overload

7.7 Defective component

Tests according to UL 508	Limit values in accordance with EN 61131-2	Limit values according to UL 508	
Simulation of how components in power supply became defective	Non-flammable surrounding cloth No contact with conductive parts	Surrounding cloth does not catch fire No contact with conductive parts	

Table 194: Test requirements - Defective component

8 Other tests

Other tests	Test carried out in accordance with	Limits in accordance with
Protection	-	EN 60529: Degree of protection provided by enclosures (IP code)
Degree of pollution	-	EN 60664-1: Insulation coordination for equipment within low-voltage systems - part 1: Principles, requirements and tests

Table 195: Overview of limits and testing guidelines for other tests

8.1 Protection

Test carried out in accordance with	Limit values in accordance with EN 60529	Limit values in accordance with EN 60529	
Protection of the operating equipment	IP2. Protection against large solid foreign bodies ≥ 12.5 mm diameter	IP6. No penetration of dust -> dust-proof	
Protection of personnel	IP2. Protection against touching dangerous parts with fingers	IP6. Protection against touching dangerous parts with conductor	
Protection against water permeation with damaging consequences	IP0. Not protected	IP5. Protection against water jets	

Table 196: Test requirements - Protection

9 International certifications

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.

Certifications	
USA and Canada	All important B&R products are tested and listed by Underwriters Laboratories and checked quarterly by a UL inspector. This mark is valid for the USA and Canada and simplifies the certification of your machines and systems in these areas.
Europe	All harmonized EN standards for the applicable directives have been met.

Table 197: International certifications

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 buffer 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 pieces, 3 V / 950 mAh button cell Hereby we declare that the Lithium cells contained in this shipment qualify as „partly regulated“. Handle with care. If the package is damaged, inspect cells, repack intact cells and protect cells against short circuits. For emergency information, call RENATA SA at + 41 61 319 28 27	
4A0006.00-000	Lithium battery, 3 V / 950 mAh, button cell	

Table 198: 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	
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 199: 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 199: 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, screw clamps 3.31 mm², protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm², protected against vibration by the screw flange	

Table 200: 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
Terminal block		
Note	Protected against vibration by the screw flange Rated 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 tip 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 tip 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 201: 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 (male) to CRT (female). For connecting a standard monitor to a DVI-I interface.	

Table 202: 5AC900.1000-00 - Order data

4 USB port cap

4.1 5AC900.1201-00

4.1.1 General information

Front side, flat USB port cap for Automation Panel 900, Power Panel 500 and Panel PC 700 and Panel PC 800 devices.

4.1.2 Order data

Model number	Short description	Figure
	Accessories	
5AC900.1201-00	USB port cap M20 IP65 flat	

Table 203: 5AC900.1201-00 - Order data

4.2 5AC900.1201-01

4.2.1 General information

Front side, rounded, knurled USB port cap (attached) for Automation Panel 900, Power Panel 500 and Panel PC 700 and Panel PC 800 devices.

4.2.2 Order data

Model number	Short description	Figure
	Accessories	
5AC900.1201-01	USB port cap M20 IP65 rounded, knurled	

Table 204: 5AC900.1201-01 - Order data

5 Clamping blocks

5.1 5AC900.BLOC-00

5.1.1 General information

These replacement clips are used to fasten B&R panel devices.

5.1.2 Order data

Model number	Short description	Figure
	Accessories	
5AC900.BLOC-00	Mounting block with wings 10pcs, spare part.	

Table 205: 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 UPS is already configured and the driver is activated).

Information:

- **The monitor/panel 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, which 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 replaced in just a few moments when servicing.

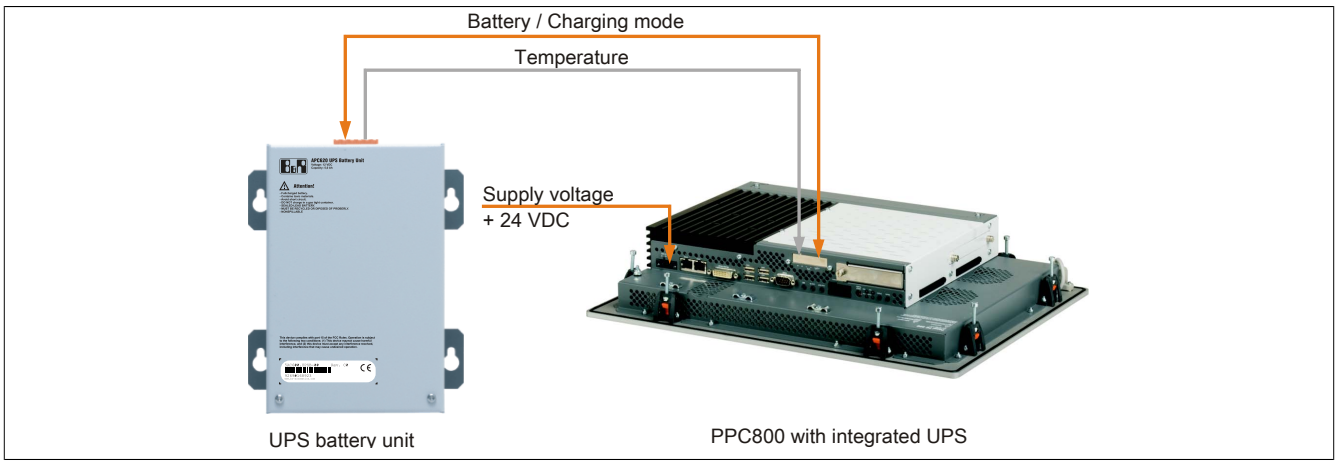


Figure 109: UPS principle

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 218).

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 (from Rev. H0), 5PC600.SX02-00 (from Rev. G0), 5PC600.SX02-01 (from Rev. H0), 5PC600.SX05-00 (from Rev. F0), 5PC600.SX05-01 (from Rev. F0), 5PC600.SF03-00 (from Rev. A0), 5PC810.SX*. 5PC820.1505-00, 5PC820.1906-00. Cable (5CAUPS.0005-00 or 5CAUPS.0030-00) and battery unit (5AC600.UPSB-00) have to be ordered separately.	
	Required accessories	
	Uninterruptible power supplies	
5AC600.UPSB-00	Battery unit 5Ah; for APC620, APC800 or PPC800 UPS.	
5CAUPS.0005-00	UPS cable 0.5 m; for UPS 5AC600.UPSI-00.	
5CAUPS.0030-00	UPS cable 3 m; for UPS 5AC600.UPSI-00.	

Table 206: 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
c-UL-us	Yes
Electrical characteristics	
Power consumption	Max. 7.5 watts
Power failure bypass	max. 20 min bei 150 W Last
Deep discharge protection	Yes, at 10 V on the battery unit
Short circuit proof	No
Battery Charging Rating	
Charging current	Max. 0.5 A
Switching threshold	
Battery operation	13 V
Mains operation	15 V

Table 207: 5AC600.UPSI-00 - Technical data

6.3.4 Installation

The module is installed using the materials included in the delivery. For more information regarding installation, please refer to the chapter Chapter 7 "Maintenance / Service".

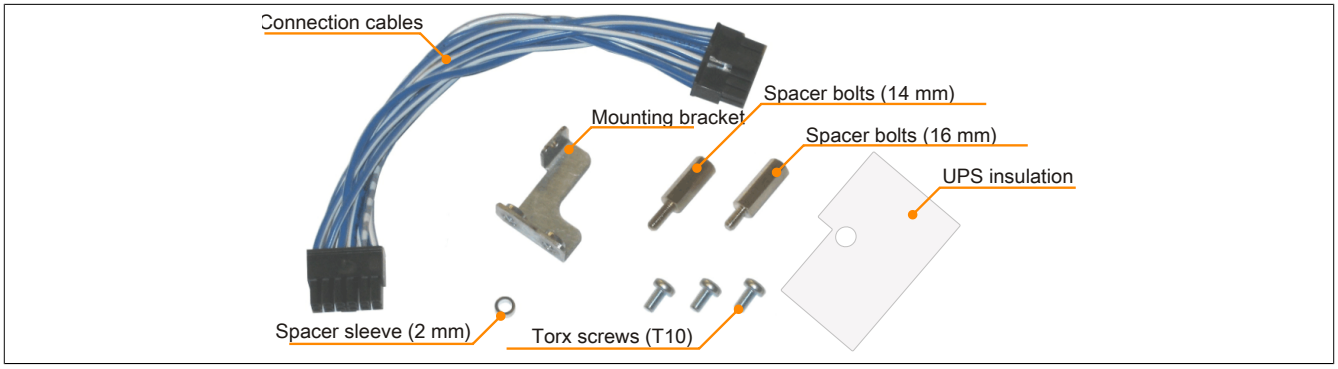


Figure 110: 5AC600.UPSI-00 Add-on UPS module – Installation materials

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 5Ah; for APC620, APC800 or PPC800 UPS.	

Table 208: 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
General information	
Battery	
Type	Enersys Cyclon 12 V 5 Ah (6 connected in series)
Lifespan	10 years [1]
Design	Single cell
Temperature sensor	NTC resistance
Maintenance interval during storage	6 month interval between charges
Certification	
CE	Yes
c-UL-us	Yes
Charge duration when battery low	Typ. 15 hours
Electrical characteristics	
Nominal voltage	12 V
Battery current	Max. 8 A
Capacity	5 Ah
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
Mechanical characteristics	
Dimensions	
Width	104 mm [2]
Length	170.5 mm
Height	87.5 mm
Weight	Approx. 3200 g

Table 209: 5AC600.UPSB-00 - Technical data

1) At 25 °C (up to 80 % battery capacity)
2) 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

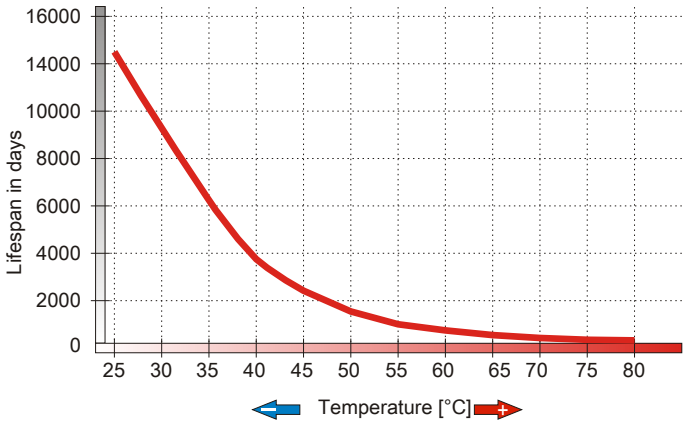


Figure 111: Temperature life span diagram

6.4.5 Deep discharge cycles

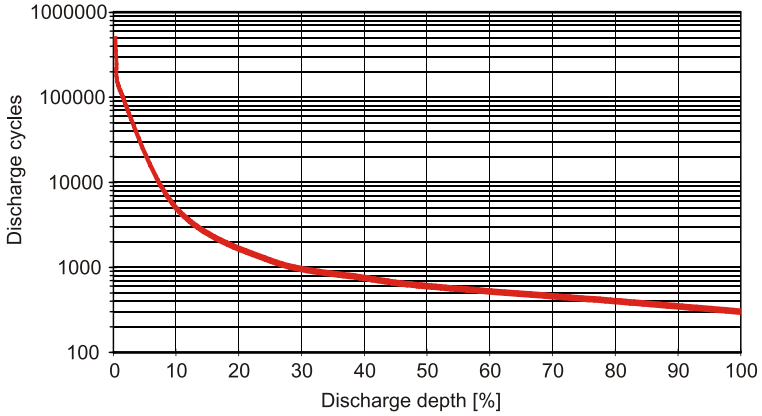


Figure 112: Deep discharge cycles

6.4.6 Dimensions

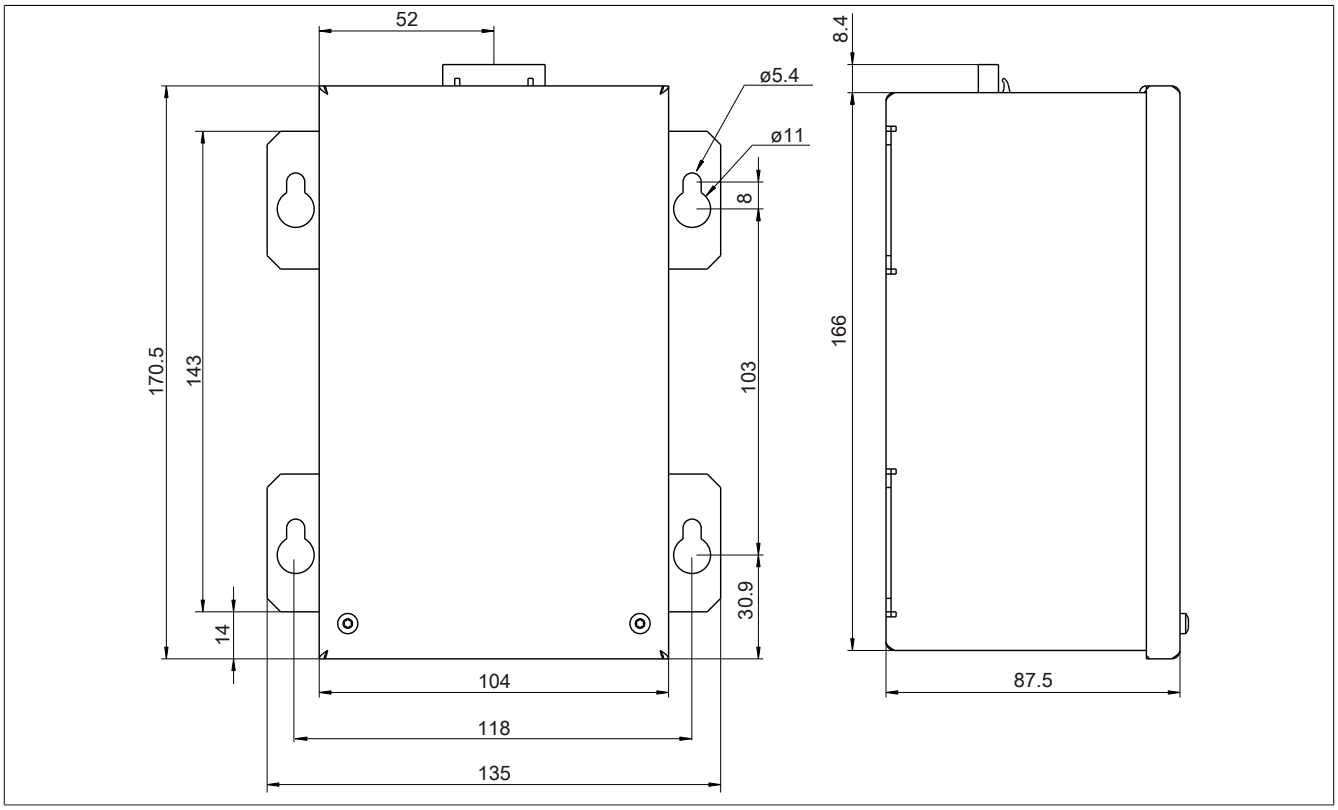


Figure 113: 5PC600.UPSB-00 - Dimensions

6.4.7 Drilling template

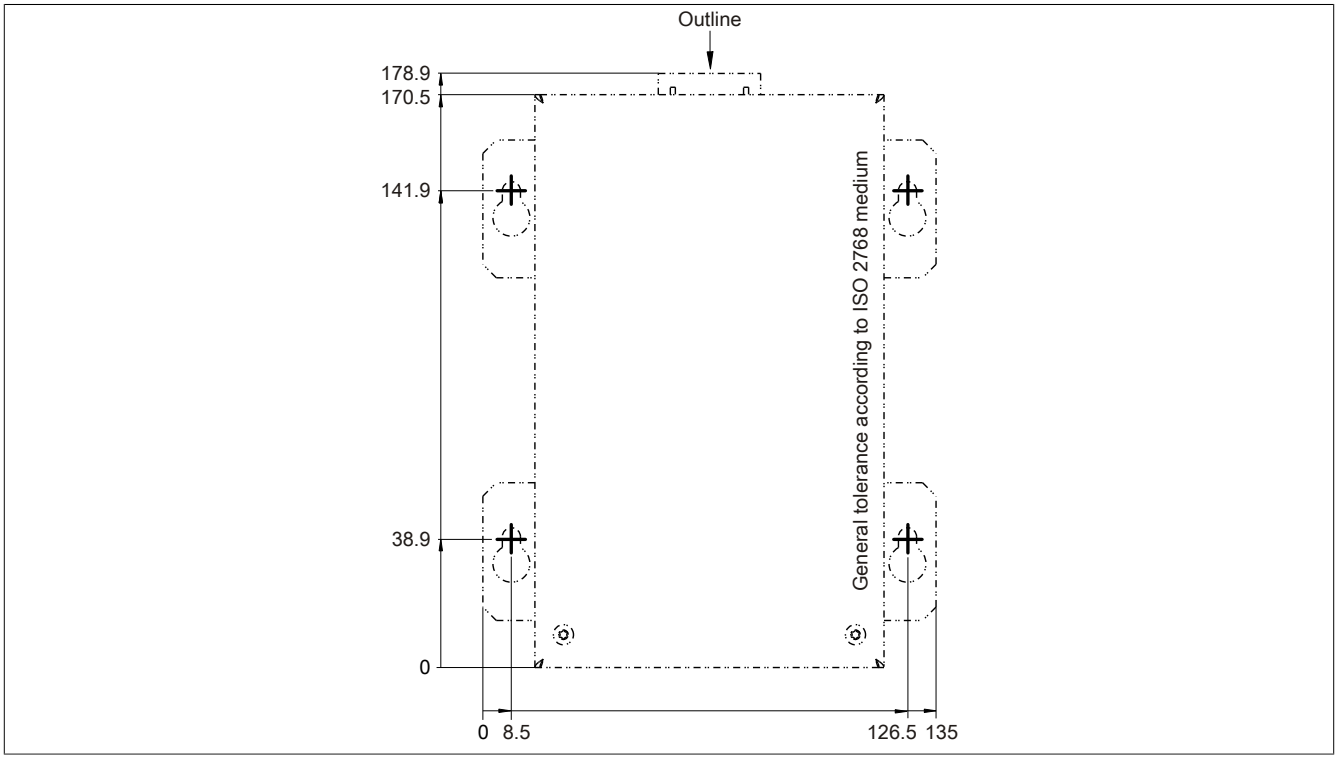


Figure 114: 5PC600.UPSB-00 - Drilling template

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 210: 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	
c-UL-us	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 211: 5CAUPS.0005-00, 5CAUPS.0030-00 - Technical data

7 External UPS

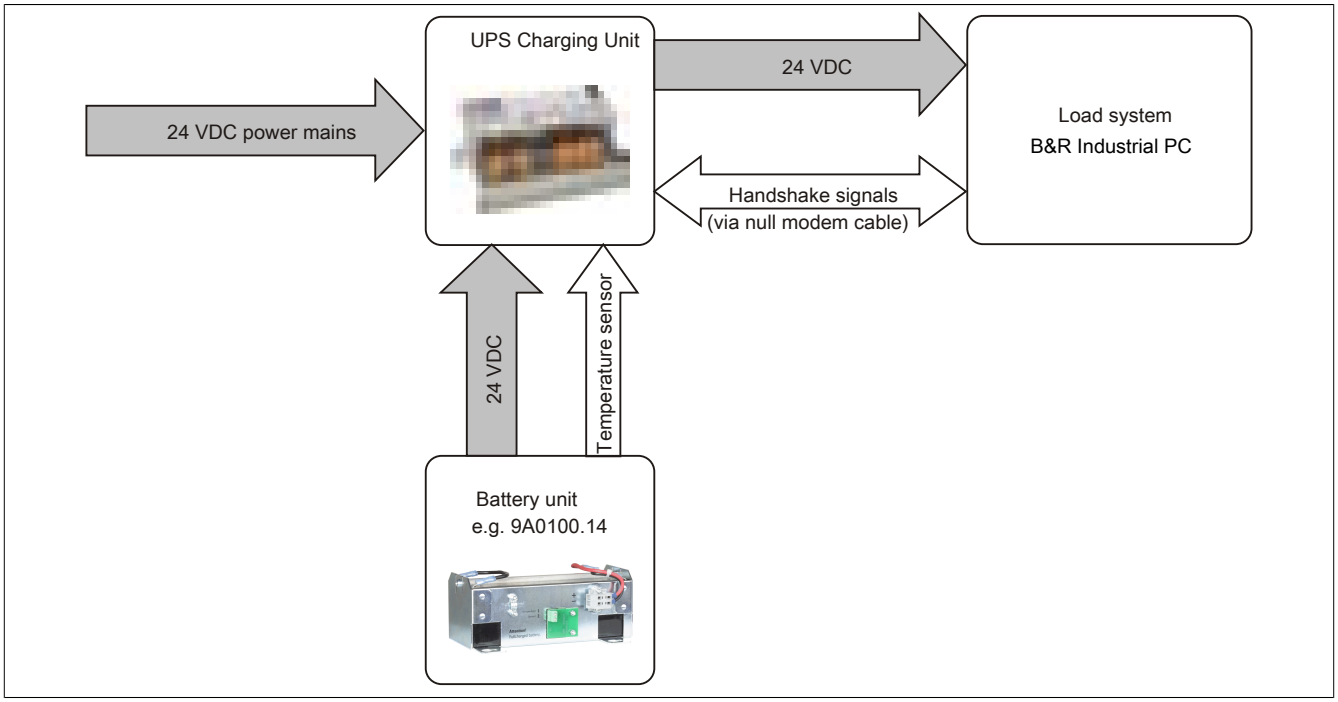


Figure 115: Block diagram of the entire system

7.1 General information

For supply with an external UPS, a UPS charging unit, a battery unit and a null modem cable are required.

In normal operation, the 24 VDC supply voltage is put straight through to the load system. If the supply voltage fails, the rechargeable UPS batteries power the PC to allow controlled shutdown without loss of data.

Data and commands are exchanged between the UPS and the load system via the handshake signals for an RS232 interface.

More information concerning an external UPS is available in the UPS User's Manual, which can be downloaded from the B&R website (www.br-automation.com).

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 (spare part), 2x 12 V, 7 Ah, for battery unit 9A0100.12	
9A0100.14	UPS battery unit type B, 24 V, 2.2 Ah, incl. battery cage	
9A0100.15	UPS batteries type B (spare part), 2x 12 V, 2.2 Ah, for battery unit 9A0100.14	
9A0100.16	UPS battery unit type C, 24 V, 4.5 Ah, incl. battery cage	
9A0100.17	UPS batteries type C (spare part), 2x 12 V, 4.5 Ah, for battery unit 9A0100.16	
	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 (spare part), 2x 12 V, 7 Ah, for battery unit 9A0100.12	

Table 212: 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 (spare part), 2x 12 V, 2.2 Ah, for battery unit 9A0100.14	
9A0100.17	UPS batteries type C (spare part), 2x 12 V, 4.5 Ah, for battery unit 9A0100.16	

Table 212: 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)

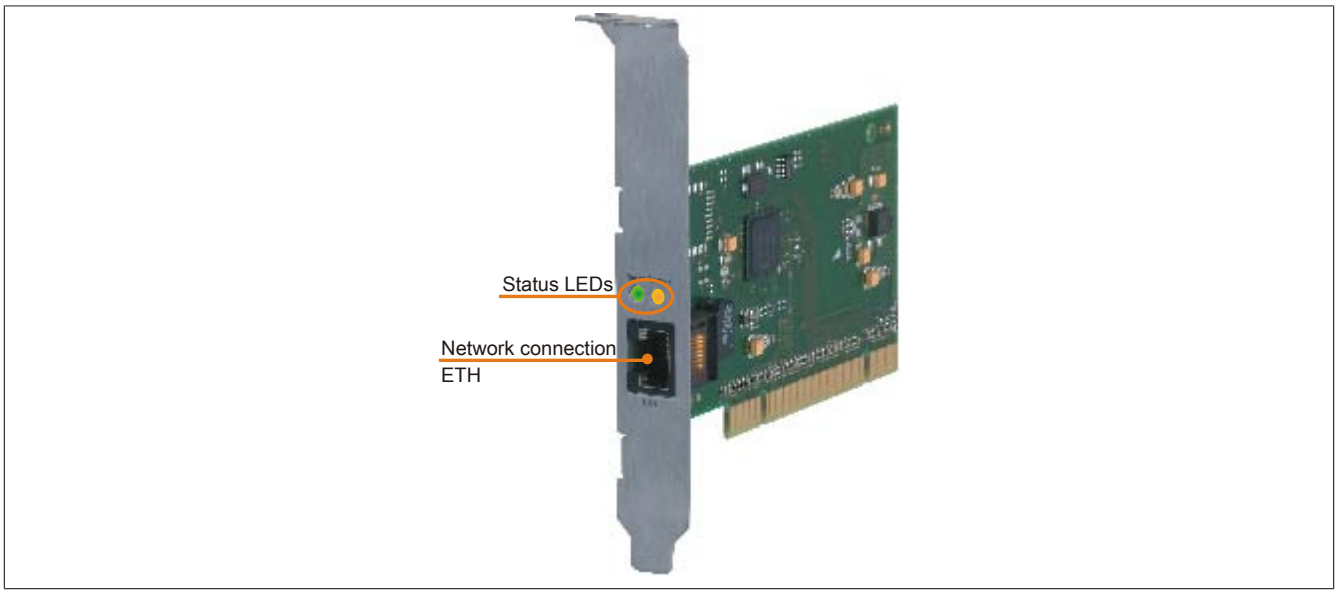


Figure 116: Order data - PCI Ethernet Card 10/100

8.1.2 Order data

Model number	Short description	Figure
	Accessories	
5ACPCI.ETH1-01	PCI Ethernet card 1x 10/100	

Table 213: 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, with status LED
Certification CE	Yes

Table 214: 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 214: 5ACPCI.ETH1-01 - Technical data

Ethernet interface

Information:

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

Ethernet connection		
Controller	Intel 82551ER	
Power supply	Universal card (2 notches) for 3.3 V or 5 V	
Cabling	S/STP (Cat5e)	
Transfer rate	10/100 Mbit/s	
Cable length	Max. 100 m (min. Cat5e)	
LED	**On**	**Off**
Green	100 Mbit/s	10 Mbit/s
Orange	Link (Ethernet network connection available)	Activity (blinking - data transfer in progress)

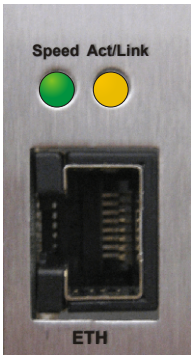


Table 215: 5ACPCI.ETH1-01 - Technical data

8.1.4 Driver support

A special driver is required in order to operate the Intel 82551ER Ethernet controller. Drivers for Windows XP Professional, Windows XP Embedded, and DOS are available for download on the B&R homepage in the download area (www.br-automation.com).

Information:

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

8.1.5 Dimensions

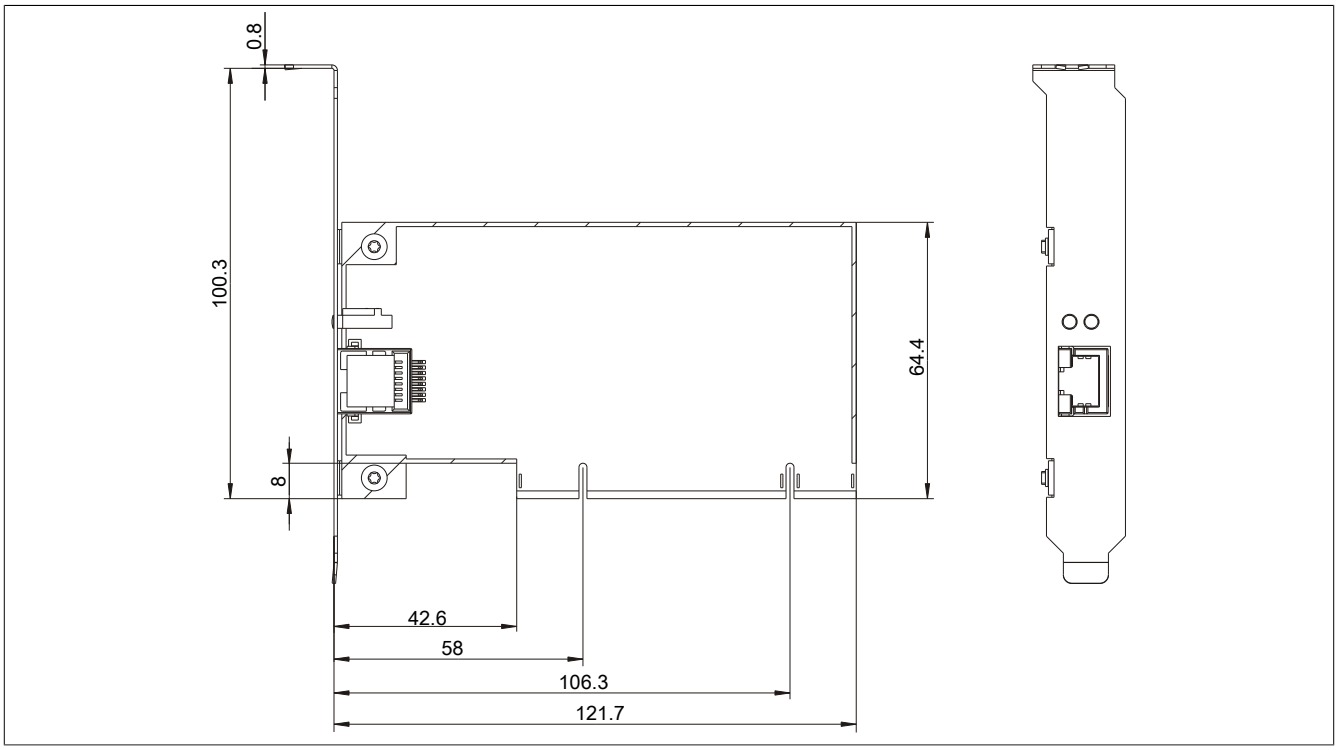


Figure 117: 5ACPCI.ETH1-01 - Dimensions

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)

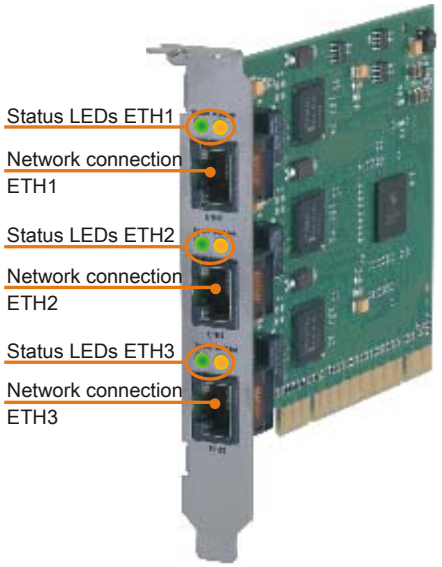


Figure 118: 5ACPCI.ETH3-01 - PCI Ethernet card 10/100

8.2.2 Order data

Model number	Short description	Figure
	Accessories	
5ACPCI.ETH3-01	PCI Ethernet card 3x 10/100	

Table 216: 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, with status LED
Certification CE	 Yes
Interfaces	
Ethernet Quantity Controller Design Transfer rate Cable length	 3 Intel 82551ER Shielded RJ45 port 10/100 Mbit/s Max. 100 m between two stations (segment length)

Table 217: 5ACPCI.ETH3-01 - Technical data

Ethernet interface

Information:

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

Ethernet connections		
Controller	each with Intel 82551ER	
Power supply	Universal card (2 notches) for 3.3 V or 5 V	
Cabling	S/STP (Cat5e)	
Transfer rate	10/100 Mbit/s	
Cable length	Max. 100 m (min. Cat5e)	
LED	**On**	**Off**
Green	100 Mbit/s	10 Mbit/s
Orange	Link (Ethernet network connection available)	Activity (blinking - data transfer in progress)

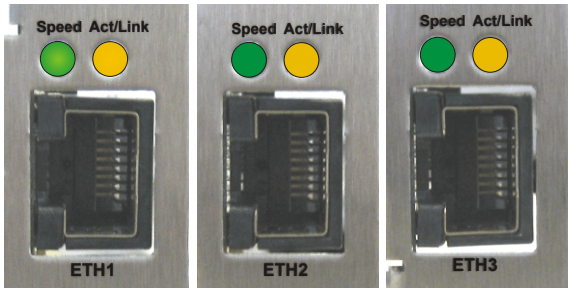


Table 218: 5ACPCI.ETH3-01 - Technical data

8.2.4 Driver support

A special driver is required in order to operate the Intel 82551ER Ethernet controller. Drivers for Windows XP Professional, Windows XP Embedded, and DOS are available for download on the B&R homepage in the download area (www.br-automation.com).

Information:

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

8.2.5 Dimensions

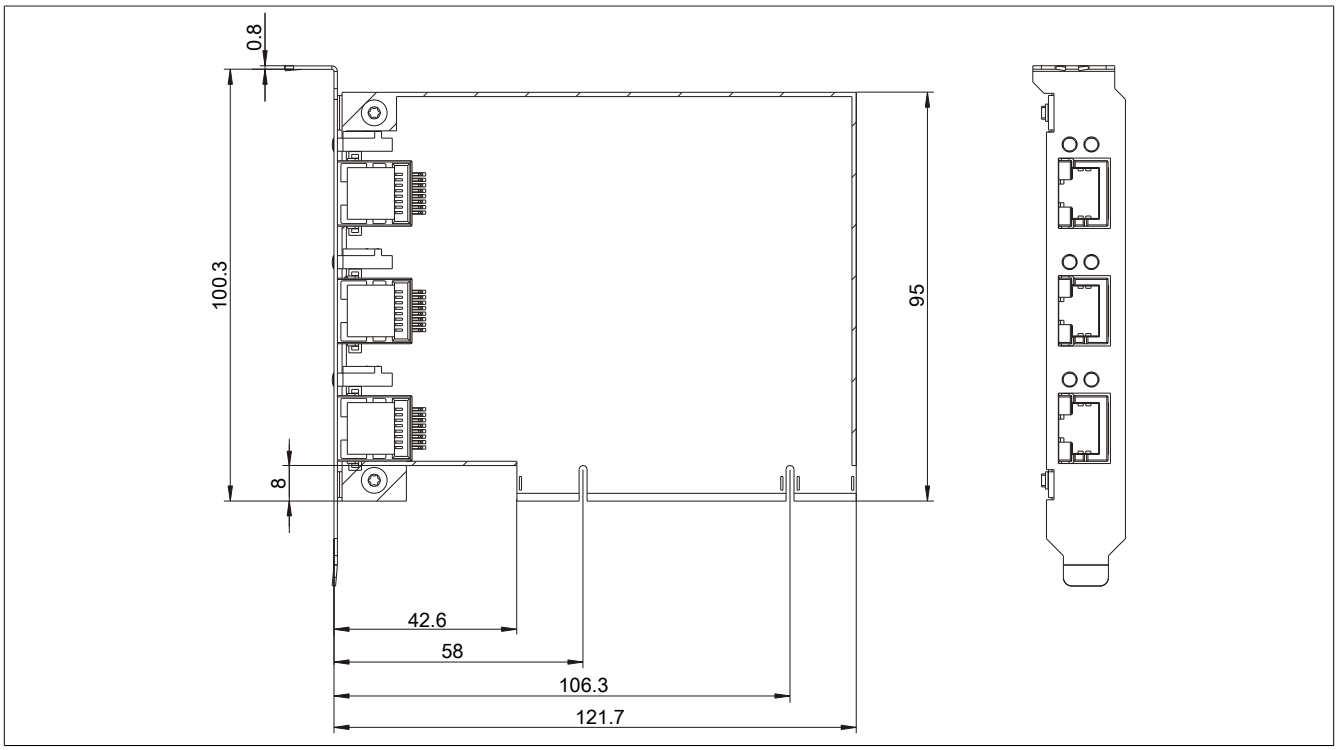


Figure 119: 5ACPCI.ETH3-01 - Dimensions

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.

No wear leveling

The earliest CompactFlash cards didn't have an algorithm for maximizing the lifespan. The lifespan of a CompactFlash card was determined only by the guaranteed lifespan of the flash blocks.

Dynamic wear leveling

Dynamic wear leveling makes it possible to utilize unused flash blocks when writing to a file.
If the data carrier is 80% full with files, then only 20% can be used for wear leveling.
The lifespan of the CompactFlash card is therefore dependent on the amount of unused flash blocks.

Static wear leveling

Static wear leveling also monitors which data is rarely changed. From time to time, the controller then moves this data to blocks that have already been frequently programmed in order to prevent further wear on those cells.

9.2.3 ECC error correction

Bit errors can be caused by inactivity or when a certain cell is operated. Error Correction Coding (ECC) implemented via hardware or software can detect and correct many errors of this type.

9.2.4 S.M.A.R.T. support

Self-Monitoring, Analysis and Reporting Technology (S.M.A.R.T. for short) is an industry standard for mass storage devices that has been introduced to monitor important parameters and quickly detect imminent failures. Critical performance and calibration data is monitored and stored in order to help predict the probability of errors.

9.2.5 Maximum reliability

CompactFlash cards used by B&R use SLC flash blocks and static wear leveling together with a powerful ECC algorithm to provide maximum reliability.

9.3 5CFCRD.xxxx-06

9.3.1 General information

Information:

B&R CompactFlash cards 5CFCRD.xxxx-06 and CompactFlash cards from a different manufacturer cannot be used in the same system at the same time. Due to differences in technology (older vs. newer technologies), problems can occur during system startup that are caused by the different boot times.

see "Known problems / issues" on page 240

Information:

The 5CFCRD.xxxx-06 CompactFlash cards are supported on B&R devices with WinCE version ≥ 6.0 or higher.

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.016G-06	CompactFlash 16 GB B&R (SLC)	
5CFCRD.032G-06	CompactFlash 32 GB B&R (SLC)	

Table 219: 5CFCRD.0512-06, 5CFCRD.1024-06, 5CFCRD.2048-06, 5CFCRD.4096-06, 5CFCRD.016G-06, 5CFCRD.032G-06 - Order data

9.3.3 Technical data

Caution!

A sudden loss of power can cause data to be lost! In very rare cases, the mass memory may also become damaged.

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

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate those specified for the complete device. For the complete device where this accessory is installed, refer to the data provided specifically for the complete device.

Product ID	5CFCRD.0512-06	5CFCRD.1024-06	5CFCRD.2048-06	5CFCRD.4096-06	5CFCRD.016G-06	5CFCRD.032G-06
General information						
Capacity	512 MB	1 GB	2 GB	4 GB	16 GB	32 GB
Data retention	10 years					
Data reliability	< 1 unrecoverable errors in 10^{14} bit read accesses	< 1 unrecoverable errors in 10^{14} bit read accesses	< 1 unrecoverable errors in 10^{14} bit read accesses	< 1 unrecoverable errors in 10^{14} bit read accesses	< 1 unrecoverable error in 10^{14} bit read accesses	< 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	36 MB/s	36 MB/s
Maximum	35 MB/s	35 MB/s	35 MB/s	34 MB/s	37 MB/s	37 MB/s

Table 220: 5CFCRD.0512-06, 5CFCRD.1024-06, 5CFCRD.2048-06, 5CFCRD.4096-06, 5CFCRD.016G-06, 5CFCRD.032G-06 - Technical data

Product ID	5CFCRD.0512-06	5CFCRD.1024-06	5CFCRD.2048-06	5CFCRD.4096-06	5CFCRD.016G-06	5CFCRD.032G-06
Continuous writing						
Typical	15 MB/s	15 MB/s	15 MB/s	14 MB/s	28 MB/s	28 MB/s
Maximum	18 MB/s	18 MB/s	18 MB/s	17 MB/s	30 MB/s	30 MB/s
Endurance						
Guaranteed data volume						
Guaranteed [1]	50 TB	100 TB	200 TB	400 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	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	Yes	Yes
Windows 7 64-bit	No	No	No	No	No	Yes
Windows Embedded Standard 7, 32-bit	No	No	No	No	Yes	Yes
Windows Embedded Standard 7, 64-bit	No	No	No	No	Yes	Yes
Windows XP Professional	No	No	No	Yes	Yes	Yes
Windows XP Embedded	Yes					
Windows Embedded Standard 2009	No	Yes	Yes	Yes	Yes	Yes
Windows CE 6.0	Yes	Yes	Yes	Yes	Yes [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)	≥ V3.6.8.40 (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	≥ V3.20	≥ 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 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)					
Storage	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)					
Transport	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)					
Altitude						
Operation	Max. 4,572 m					
Mechanical characteristics						
Dimensions						
Width	42.8 ±0.10 mm					
Length	36.4 ±0.15 mm					
Height	3.3 ±0.10 mm					
Weight	10 g					

Table 220: 5CFCRD.0512-06, 5CFCRD.1024-06, 5CFCRD.2048-06, 5CFCRD.4096-06, 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 B&R Embedded OS installer.

9.3.4 Temperature humidity diagram

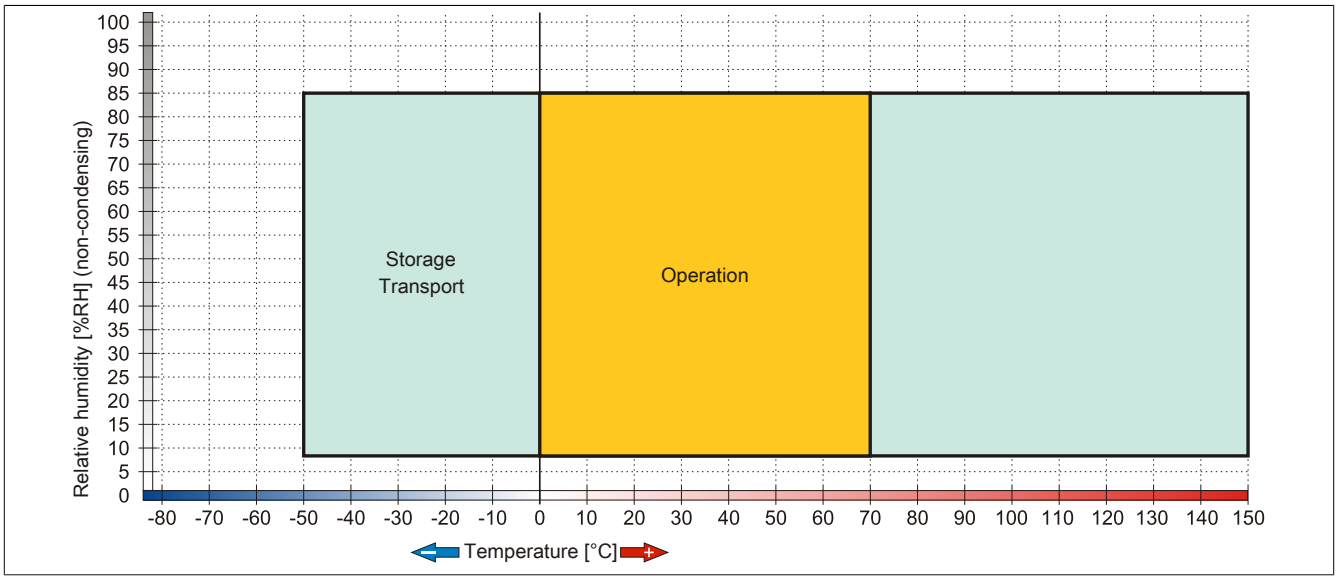


Figure 120: 5CFCRD.xxxx-06 - Temperature humidity diagram for CompactFlash cards

9.3.5 Dimensions

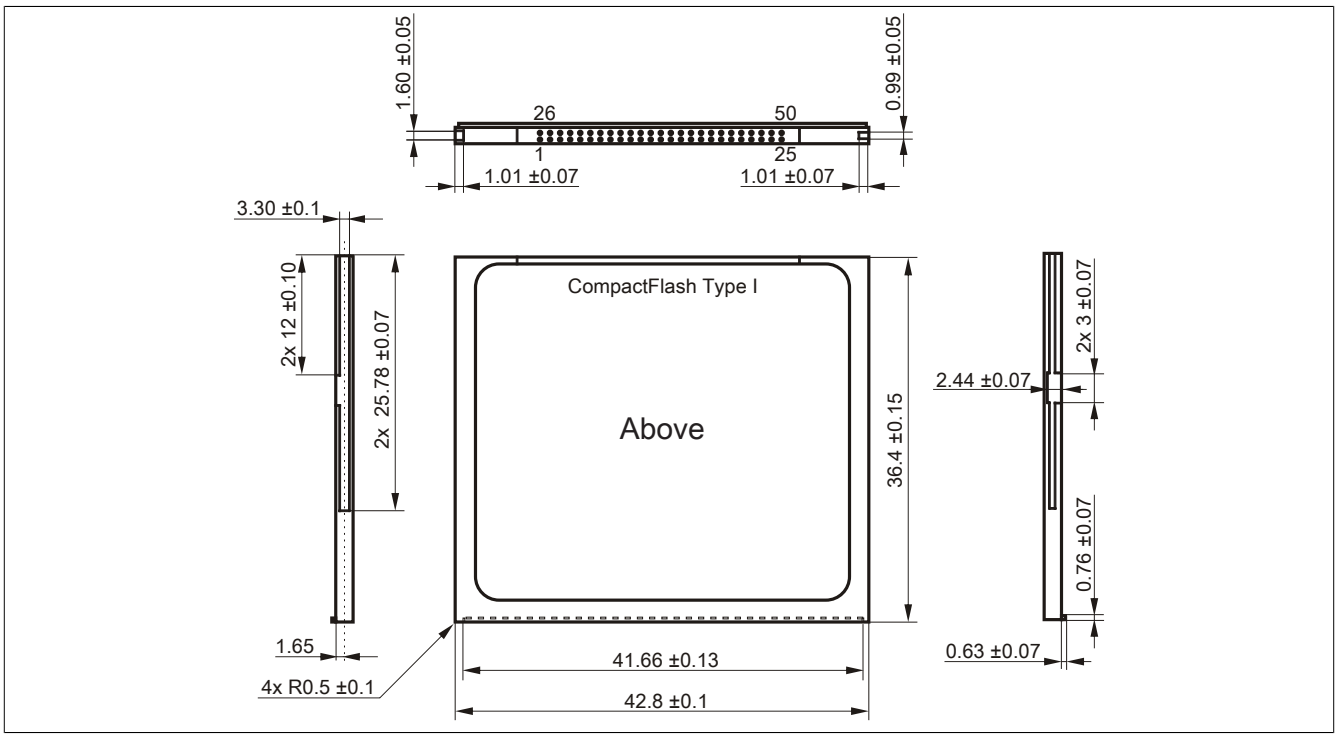


Figure 121: Dimensions - CompactFlash card Type I

9.3.6 Benchmark

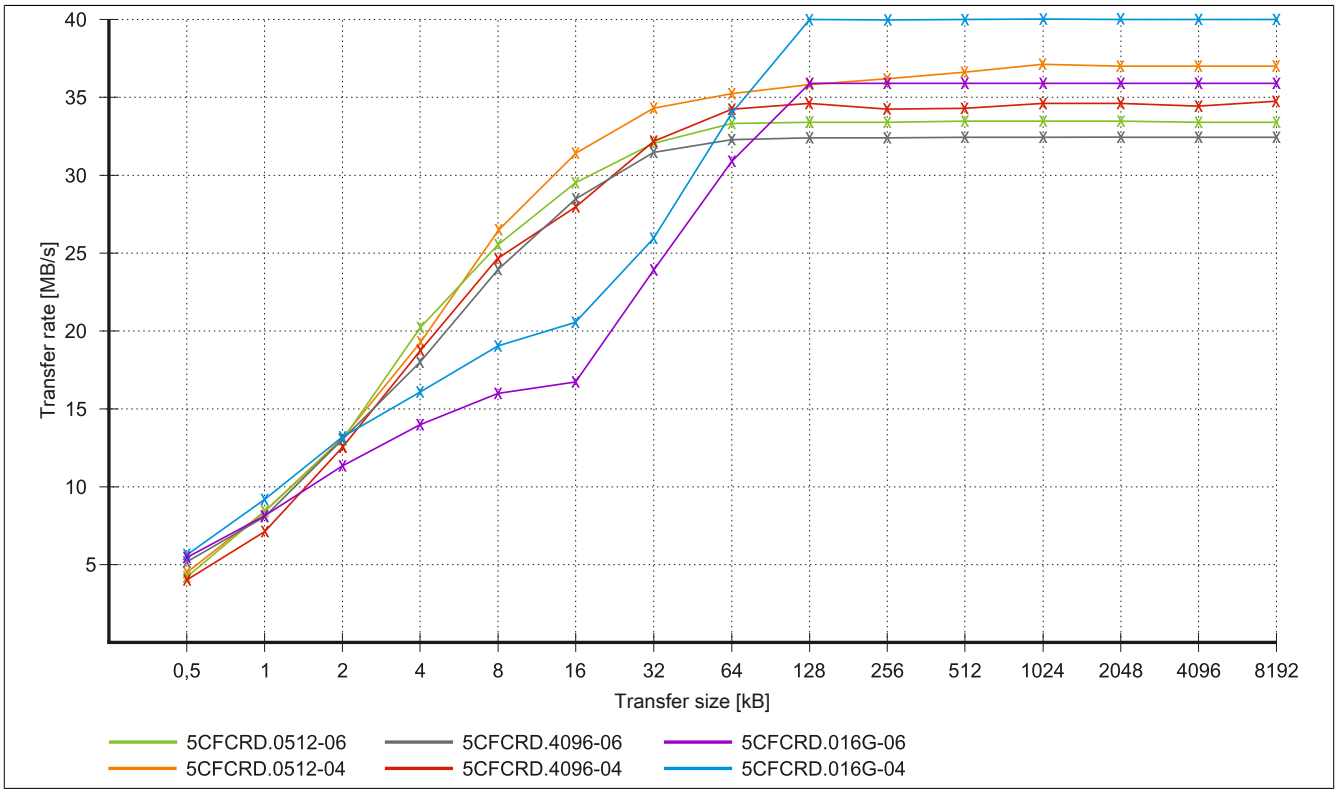


Figure 122: ATTO Disk Benchmark v2.34 comparison when reading - 5CFCRD.xxxx-04 with 5CFCRD.xxxx-06

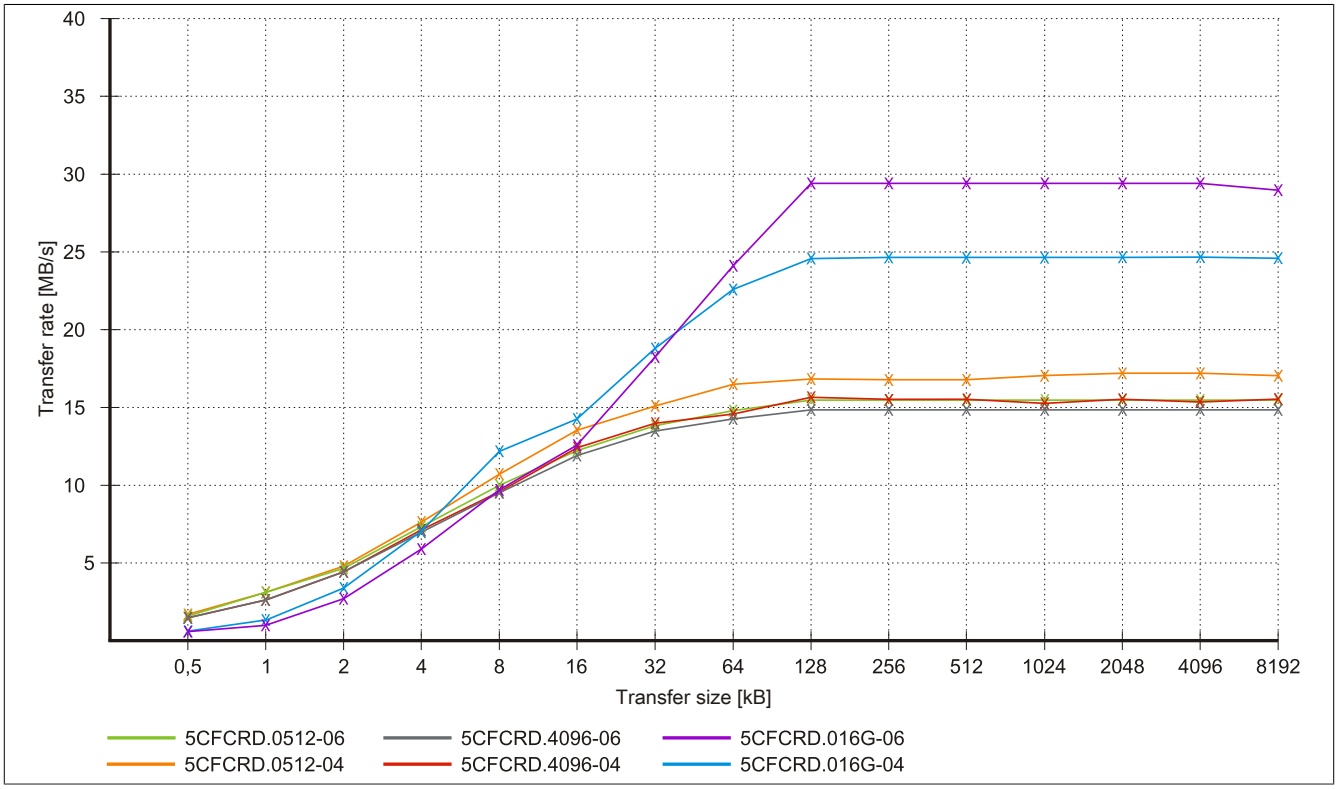


Figure 123: ATTO Disk Benchmark v2.34 comparison when writing - 5CFCRD.xxxx-04 with 5CFCRD.xxxx-06

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 240

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 221: 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 can cause data to be lost! In very rare cases, the mass storage device may also become damaged.

To prevent damage and loss of data, B&R recommends that you use a UPS device.

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate those specified for the complete device. For the complete device where this accessory is installed, refer to the data provided specifically for the complete device.

Product ID	5CFCRD. 0064-03	5CFCRD. 0128-03	5CFCRD. 0256-03	5CFCRD. 0512-03	5CFCRD. 1024-03	5CFCRD. 2048-03	5CFCRD. 4096-03	5CFCRD. 8192-03
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 222: 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							
Endurance								
Clear/write cycles Typical	> 2000000							
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. 24,383 m							
Mechanical characteristics								
Dimensions								
Width	42.8 ±0.10 mm							
Length	36.4 ±0.15 mm							
Height	3.3 ±0.10 mm							
Weight	11.4 g							

Table 222: 5CFCRD.0064-03, 5CFCRD.0128-03, 5CFCRD.0256-03, 5CFCRD.0512-03, 5CFCRD.1024-03, 5CFCRD.2048-03, 5CFCRD.4096-03, 5CFCRD.8192-03 - Technical data

1) Not supported by B&R Embedded OS installer.

9.4.4 Temperature humidity diagram

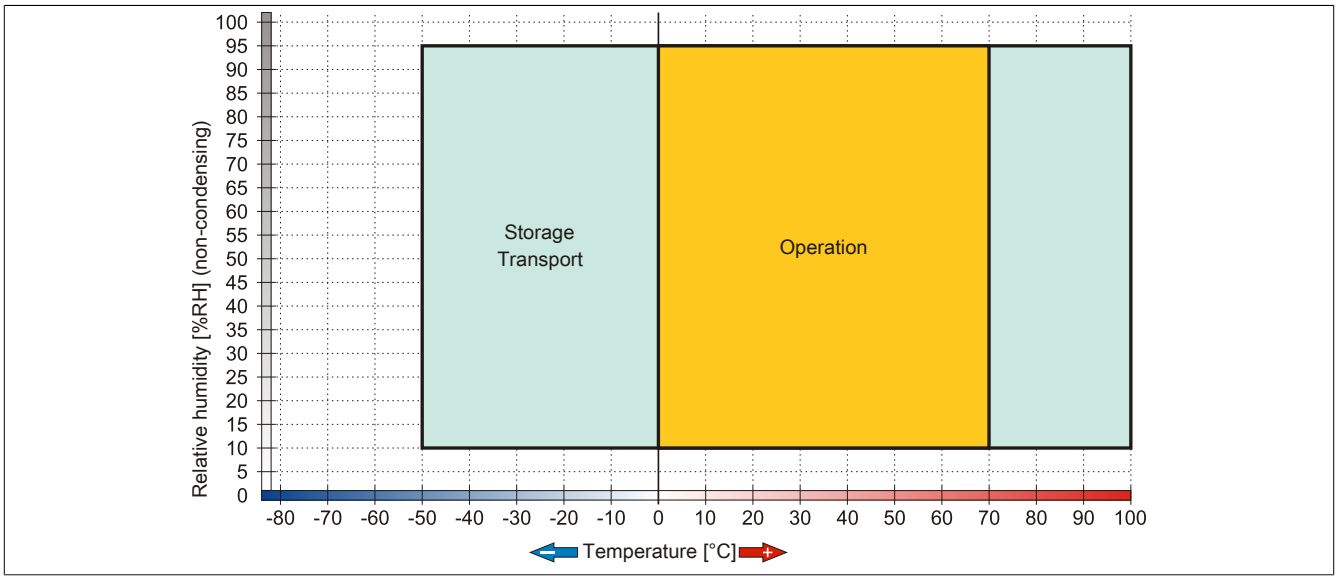


Figure 124: 5CFCRD.xxxx-03 - Temperature humidity diagram for CompactFlash cards

9.4.5 Dimensions

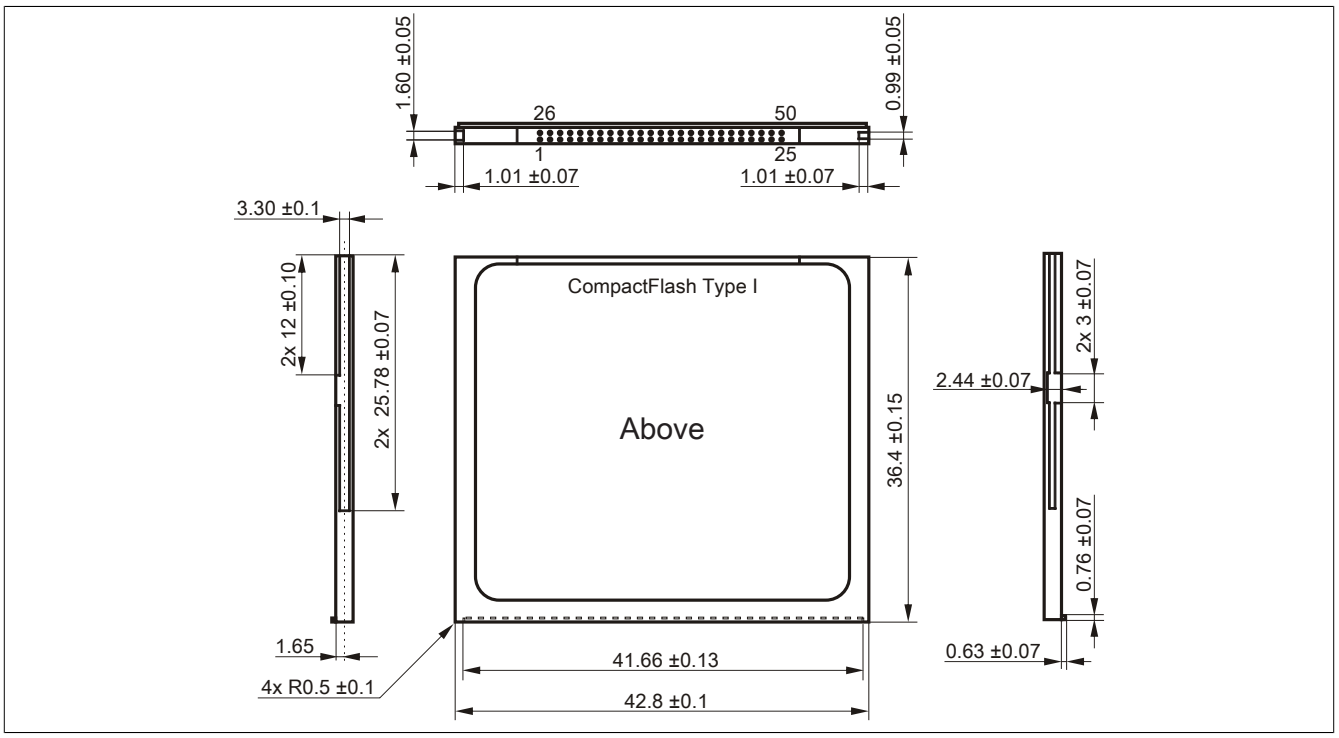


Figure 125: Dimensions - CompactFlash card Type I

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 Plug & Play" - except with Windows 98SE), the USB flash drive can immediately act as an additional drive where data can be read or written. Only USB flash drives from the memory specialists SanDisk are used.

Information:

We reserve the right to supply alternative products due to the vast quantity of USB flash drives available on the market and their corresponding short product lifecycle. Therefore, the following measures might be necessary in order to boot from these flash drives:

- **The flash drive must be reformatted or in some cases even re-partitioned (set active partition).**
- **The flash drive must be at the top of the BIOS boot order, or alternatively the IDE controllers can also be deactivated in the BIOS. This can be avoided in most cases if a "fdisk /mbr" command is also executed on the USB flash drive.**

10.1.2 Order data

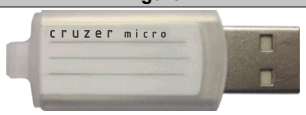
Model number	Short description	Figure
	USB accessories	
5MMUSB.2048-00	USB 2.0 Memory Stick 2048 MB	

Table 223: 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 each 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 224: 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. 3048 m
Storage	Max. 12192 m
Transport	Max. 12192 m
Mechanical characteristics	
Dimensions	
Width	19 mm
Length	52.2 mm
Height	7.9 mm

Table 224: 5MMUSB.2048-00 - Technical data

1) Signals data transfer (send and receive).

10.1.4 Temperature humidity diagram

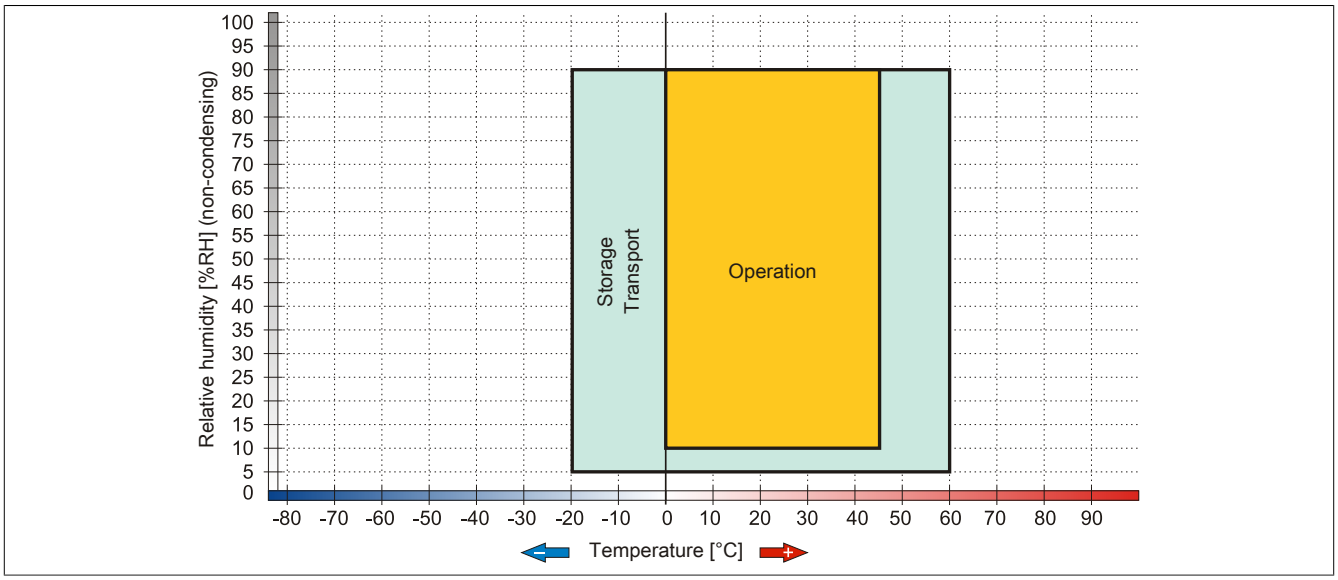


Figure 126: 5MMUSB.2048-00 - Temperature humidity diagram

10.2 5MMUSB.2048-01

10.2.1 General information

USB flash drives are storage media that are easy to connect. 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. 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 storage
- 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 225: 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 each 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 226: 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. 1500g (peak)
Storage	max. 1500g (peak)
Transport	max. 1500g (peak)
Altitude	
Operation	Max. 3048 m
Storage	Max. 12192 m
Transport	Max. 12192 m
Mechanical characteristics	
Dimensions	
Width	17.97 mm
Length	67.85 mm
Height	8.35 mm

Table 226: 5MMUSB.2048-01 - Technical data

1) Signals data transfer (send and receive).

10.2.4 Temperature humidity diagram

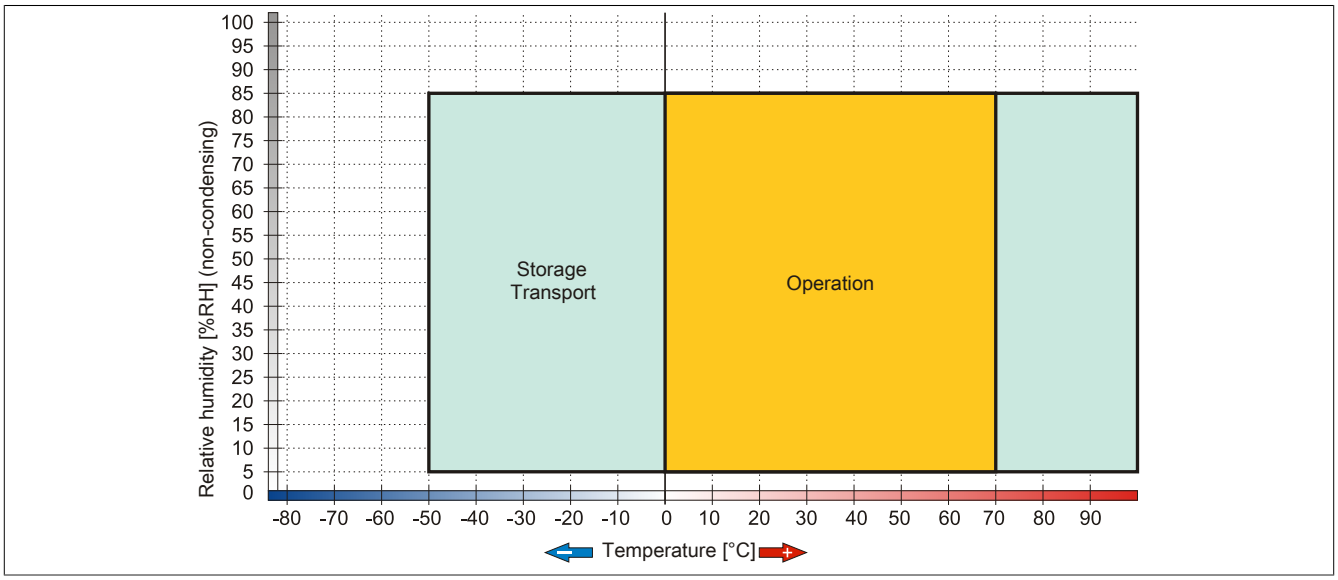


Figure 127: 5MMUSB.2048-01 - Temperature humidity diagram

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 Drives DVD-R/RW DVD+R/RW, CompactFlash slot (type II), USB connector (type A on front side, type B on back side); 24 VDC; (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered 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, cage clamps 3.31 mm², protected against vibration by the screw flange	
	USB cable	
5CAUSB.0018-00	USB 2.0 connecting cable type A - type B, 1.8 m.	
5CAUSB.0050-00	USB 2.0 connecting cable type A - type B, 5 m.	

Table 227: 5MD900.USB2-02 - Order data

11.1.3 Interfaces

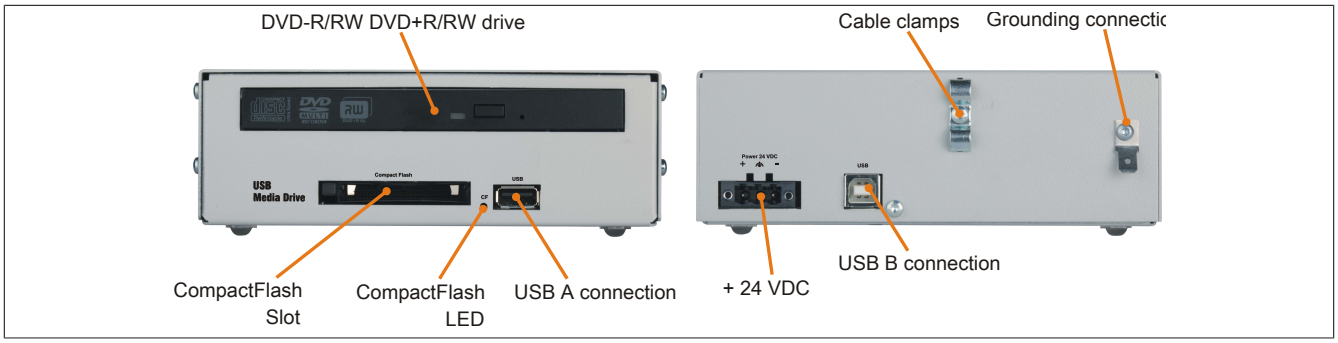


Figure 128: 5MD900.USB2-02 - Interfaces

11.1.4 Technical data

Product ID	5MD900.USB2-02
General information	
Max. cable length	5m (not including hub)
Interfaces	
CompactFlash slot 1	
Type	Type I
Connection	IDE/ATAPI
Activity LED	Signals read or write access to an inserted CompactFlash card

Table 228: 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 (4.7GB, 2.6GB) DVD+R, DVD+R (double layer), DVD+RW
Laser class	Class 1 laser
Lifespan	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
Non-write protected media	
CD	CD-R, CD-RW
DVD	DVD-R/RW, DVD-RAM (4.7 GB), DVD+R/RW, DVD+R (double layer)
Reading rate	
CD	24x
DVD	8x
Write speed	
CD-R	10 to 24x
CD-RW	10 to 24x
DVD+R	3.3 to 8x
DVD+R (Double Layer)	2.4 to 4x
DVD+RW	3.3 to 8x
DVD-R	2 to 6x
DVD-R (Double 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, over-write, sequential
Electrical characteristics	
Nominal voltage	24 VDC ±25%
Operating conditions	
Protection in accordance with EN 60529	IP65 front side (only with optional front cover), IP20 back side
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 228: 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 228: 5MD900.USB2-02 - Technical data

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

11.1.5 Dimensions

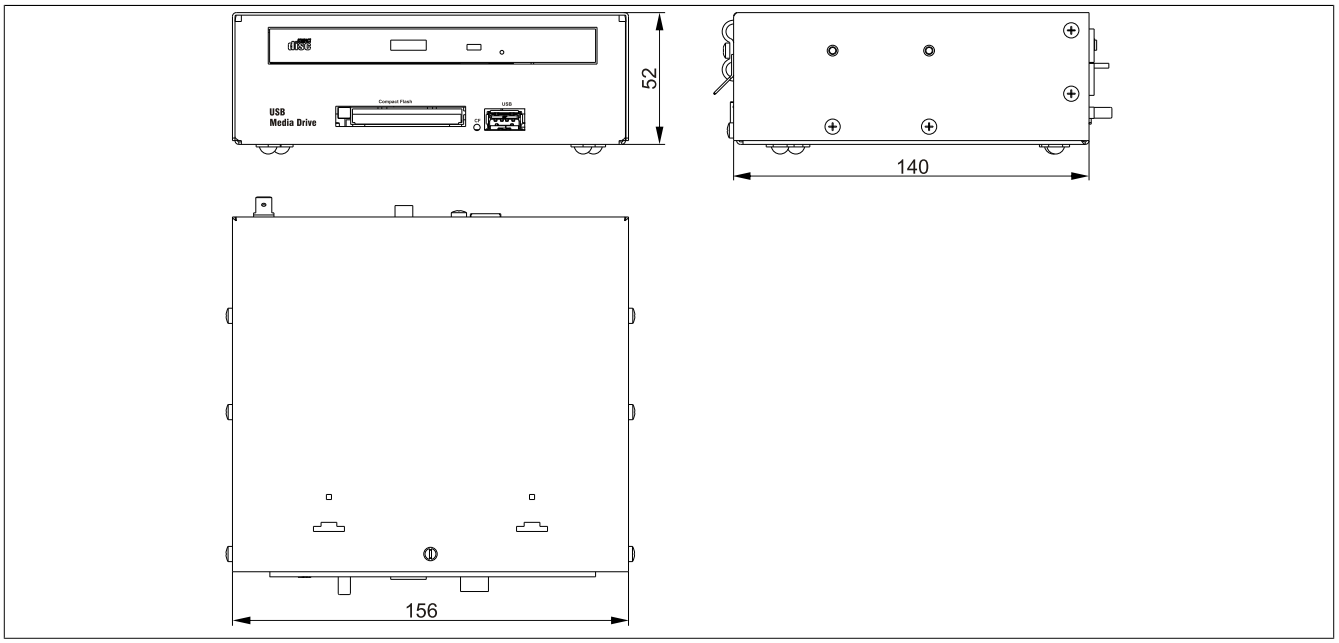


Figure 129: 5MD900.USB2-02 - Dimensions

11.1.6 Dimensions with front cover

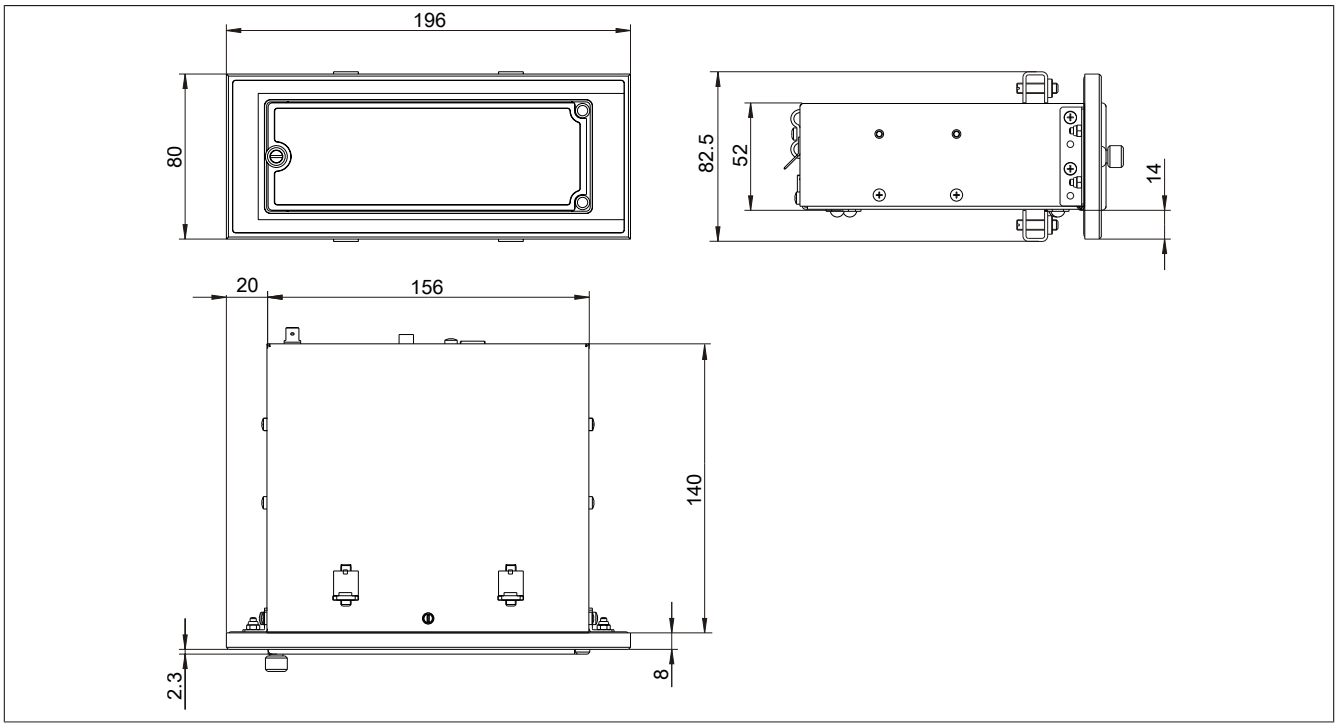


Figure 130: USB media drive with front cover - Dimensions

11.1.7 Cutout installation

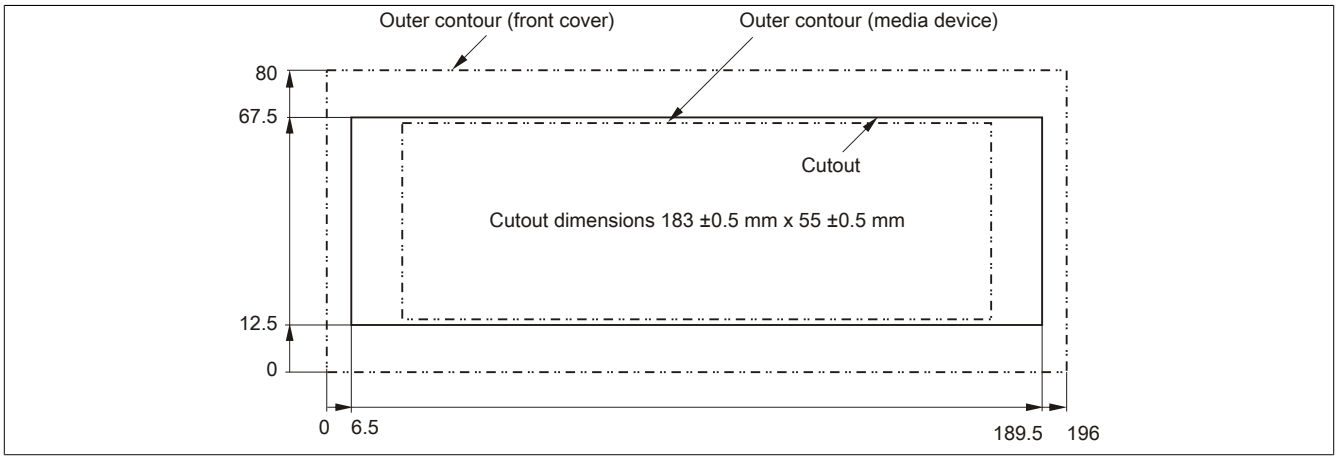


Figure 131: USB media drive with front cover - Installation cutout

11.1.8 Contents of delivery

Number	Component
1	USB media drive
2	Mounting rail brackets

Table 229: 5MD900.USB2-02 - Contents of delivery

11.1.9 Installation

The USB media drive can be operated as a desktop (rubber feet) or rack-mounted device (2 mounting rail brackets included).

Mounting orientation

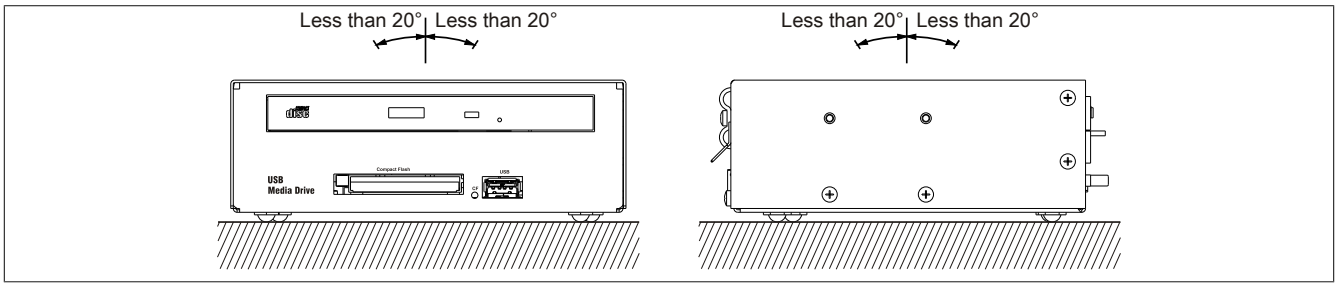


Figure 132: 5MD900.USB2-02 - Mounting orientation

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 230: 5A5003.03 - Order data

11.2.3 Technical data

Product ID	5A5003.03
Mechanical characteristics	
Front	
Décor foil	
Light background	Similar to Pantone 427CV
Dimensions	
Width	196 mm
Height	80 mm
Depth	8 mm

Table 231: 5A5003.03 - Technical data

11.2.4 Dimensions

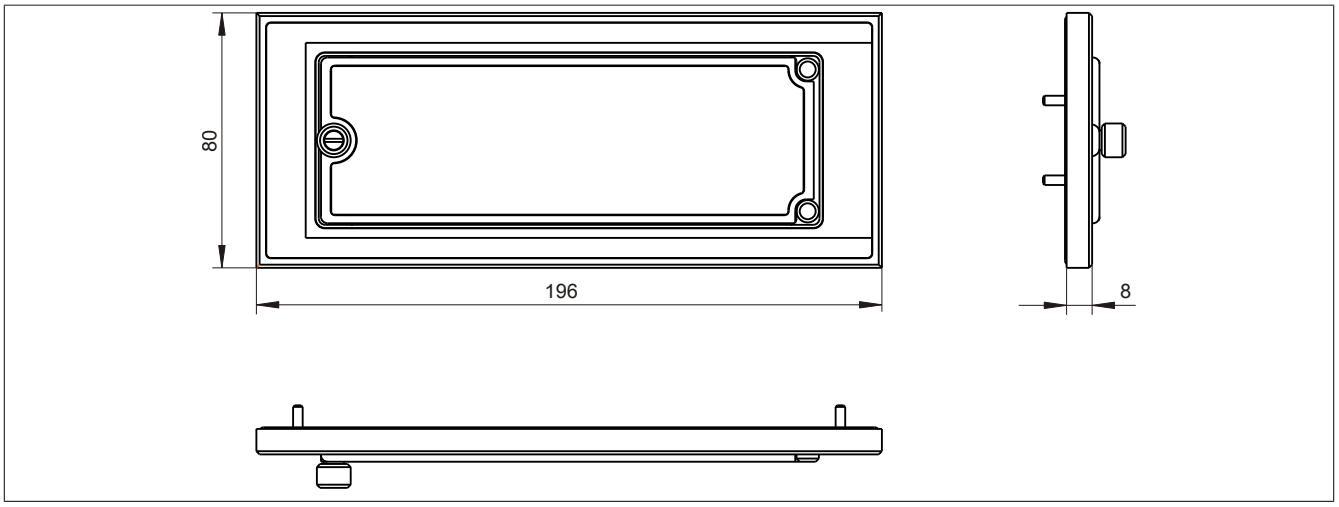


Figure 133: 5A5003.03 - Dimensions

11.2.5 Contents of delivery

Number	Component
1	Front cover 5A5003.03 for the USB media drive
4	M3 locknut
4	Cover retaining clip

Table 232: 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.

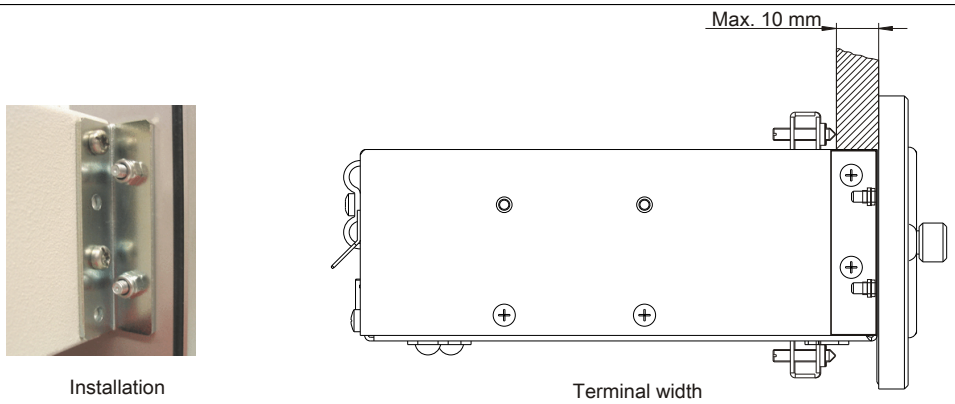


Figure 134: Front cover mounting and installation depth

Cutout installation

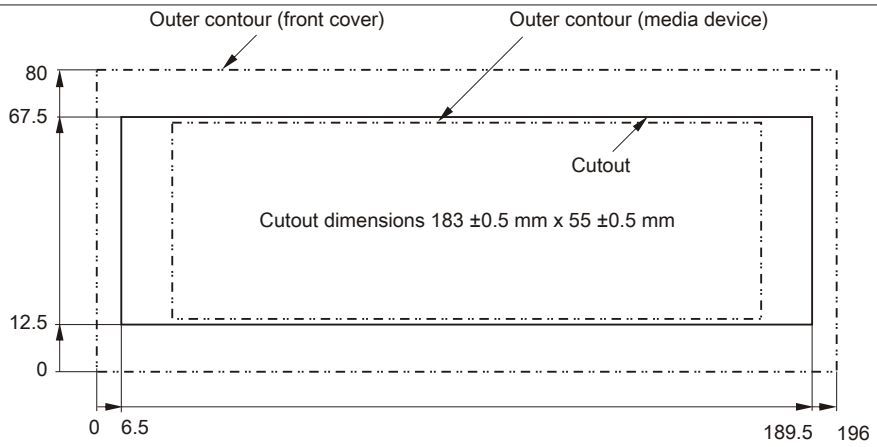


Figure 135: USB media drive with front cover - Installation cutout

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 B&R website www.br-automation.com – Industrial PCs, Visualization and Operation).

At the time of its creation, the content of the DVD is identical to the files found in the download area of the B&R homepage (under Service – “Material Related Downloads”).

12.1.2 Order data

Model number	Short description	Figure
	Other	
5SWHMI.0000-00	HMI Drivers & Utilities DVD	

Table 233: 5SWHMI.0000-00 - Order data

12.1.3 Contents (V2.10)

BIOS upgrades for the products

- Automation PC 620 / Panel PC 700 CPU Board 815E and 855GME BIOS
- Automation PC 620 / Panel PC 700 CPU Board X855GME BIOS
- Automation PC 620 / Panel PC 700 CPU Board 945GME N270 BIOS
- Automation PC 680
- Automation PC 810 / Automation PC 820 / Panel PC 800 B945GME BIOS
- Automation PC 810 / Panel PC 800 945GME N270 CPU Board BIOS
- Automation PC 810 / Panel PC 800 GM45 CPU Board BIOS
- Provit 2000 product family - IPC2000/2001/2002
- Provit 5000 product family - IPC5000/5600/5000C/5600C
- Power Panel 100 BIOS devices
- Mobile Panel 100 BIOS devices
- Power Panel 100 / Mobile Panel 100 user boot logo
- Power Panel 100 / Mobile Panel 100 REMHOST utility
- Power Panel 300/400 BIOS devices
- Power Panel 300/400 BIOS user boot logo
- Panel PC 310

Drivers for the devices

- Automation Device Interface (ADI)
- Audio
- Chipset
- CD-ROM
- LS120
- Graphics
- Network

- PCI / SATA RAID controller
- Touch screen
- Touchpad
- Interface board

Firmware upgrades

- Automation PC 620 / Panel PC 700 (MTCX, SDLR, SDLT)
- Automation PC 810 (MTCX, SDLR, SDLT)
- Automation PC 820 (MTCX, SDLR, SDLT)
- Mobile Panel 100 (SMCX)
- Panel PC 300 (MTCX)
- Power Panel 100 (aPCI)
- Power Panel 300/400 (aPCI)
- Power Panel 300/400 (MTCX)
- Panel PC 800 (MTCX, SDLR, SDLT)
- UPS firmware

Utilities / Tools

- B&R Embedded OS Installer
- Windows CE Tools
- User boot logo conversion program
- SATA RAID Installation Utility
- Automation Device Interface (ADI)
- CompactFlash lifespan calculator (Silicon Systems)
- Miscellaneous
- MTC utilities
- Key editor
- MTC & Mkey utilities
- Mkey utilities
- UPS configuration software
- ICU ISA configuration
- Intel PCI NIC boot ROM
- Diagnostics programs

Windows

- Windows CE 6.0
- Windows CE 5.0
- Windows CE 4.2
- Windows CE 4.1
- Windows CE Tools
- Windows Embedded Standard 2009
- Thin client
- Windows NT Embedded
- Windows XP Embedded
- VNC viewer

MCAD templates for

- Industrial PCs
- Visualization and operating devices
- Legend strip templates
- Custom designs

ECAD templates for

- Industrial PCs
- Automation PCs
- Automation Panel 900
- Panels (Power Panel)

Documentation for

- Automation PC 620
- Automation PC 680
- Automation PC 810
- Automation PC 820
- Automation Panel 800
- Automation Panel 900
- Panel PC 310
- Panel PC 700
- Panel PC 725
- Panel PC 800
- Power Panel 15/21/35/41
- Power Panel 100/200
- Power Panel 300/400
- Mobile Panel 40/50
- Mobile Panel 100/200
- Mobile Panel connection box
- Provit 2000
- Provit 3030
- Provit 4000
- Provit 5000
- Provit Benchmark
- Provit Mkey
- Windows CE 5.0 Help
- Windows CE 6.0 Help
- Windows NT Embedded application guide
- Windows XP Embedded application guide
- Uninterruptible power supply
- Implementation guides
- B&R Hilscher fieldbus cards (CANopen, DeviceNet, PROFIBUS, PROFINET)

Service tools

- Acrobat Reader 5.0.5 (freeware in German, English, and French)
- Power Archiver 6.0 (freeware in German, English, and French)
- Internet Explorer 5.0 (German and English)
- Internet Explorer 6.0 (German and English)

13 Cables

13.1 USB cables

13.1.1 5CAUSB.00xx-00

General information

USB cables are designed to achieve USB 2.0 transfer speeds.

Order data

Model number	Short description	Figure
	USB cable	
5CAUSB.0018-00	USB 2.0 connecting cable type A - type B, 1.8 m.	
5CAUSB.0050-00	USB 2.0 connecting cable type A - type B, 5 m.	

Table 234: 5CAUSB.0018-00, 5CAUSB.0050-00 - Order data

Technical data

Product ID	5CAUSB.0018-00	5CAUSB.0050-00
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 Diameter	1.8 m ±30 mm Max. 5 mm	5 m ±50 mm
Flex radius	Min. 100 mm	

Table 235: 5CAUSB.0018-00, 5CAUSB.0050-00 - Technical data

Cable specifications

Warning!

If a suitable cable is to be assembled manually, it must be wired according to these specifications.

If a self-assembled cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly.

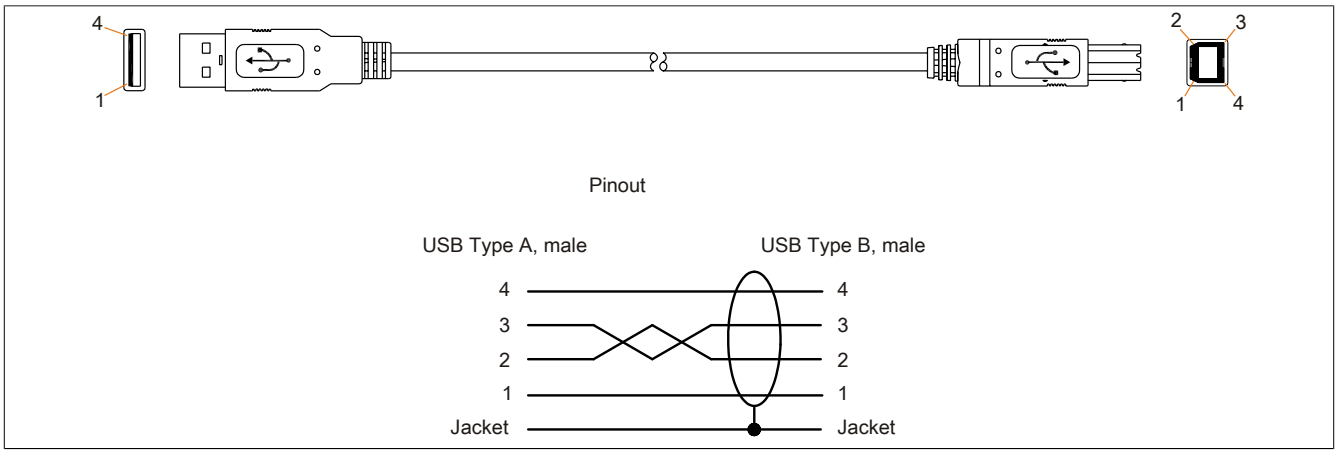


Figure 136: 5CAUSB.00xx-00 - USB cable pinout

13.2 RS232 cables

13.2.1 9A0014.xx

General information

RS232 cables are used as extension cables between two RS232 interfaces.

Order data

Model number	Short description	Figure
	RS232 cable	
9A0014.02	RS232 extension cable for remote operating of a display unit with touch screen, 1.8 m.	
9A0014.05	RS232 extension cable for remote operating of a display unit with touch screen, 5 m.	
9A0014.10	RS232 extension cable for remote operating of a display unit with touch screen, 10 m.	

Table 236: 9A0014.02, 9A0014.05, 9A0014.10 - Order data

Technical data

Product ID	9A0014.02	9A0014.05	9A0014.10
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 237: 9A0014.02, 9A0014.05, 9A0014.10 - Technical data

Cable specifications

Warning!

If a suitable cable is to be assembled manually, it must be wired according to these specifications.

If a self-assembled cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly.

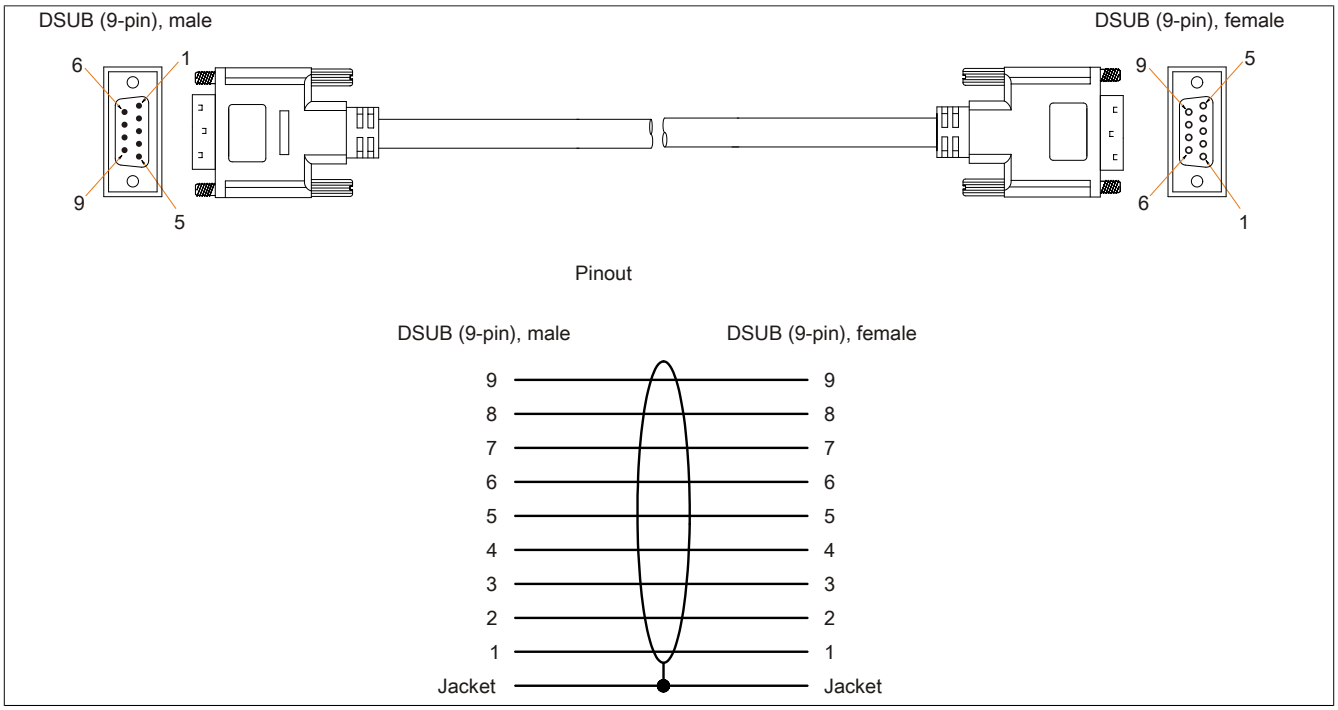


Figure 137: 9A0014.xx - RS232 cable pinout

13.3 5CAMSC.0001-00

13.3.1 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 "Connection of an external device to the main board" on page 279.

> **Caution!**
>
> **Cables can only be plugged in and unplugged when the device is turned off.**

13.3.2 Order data

Model number	Short description	Figure
	Undefined	
5CAMSC.0001-00	APC620 internal power supply cable - Customized -	

Table 238: 5CAMSC.0001-00 - Order data

13.3.3 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 239: 5CAMSC.0001-00 - Technical data

Chapter 7 • Maintenance / 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 240: 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 strips.

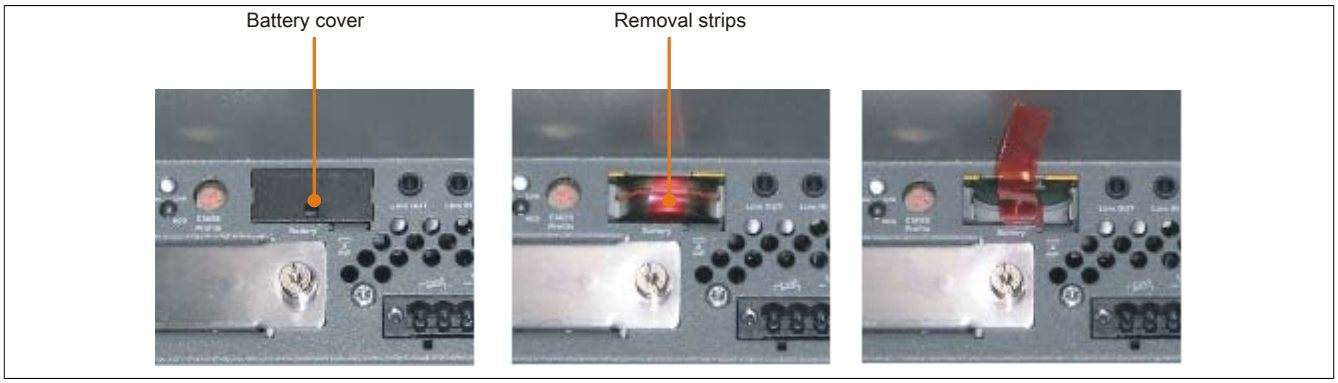


Figure 138: Remove battery

- The battery should not be held by its edges. Insulated tweezers may also be used to insert the battery.

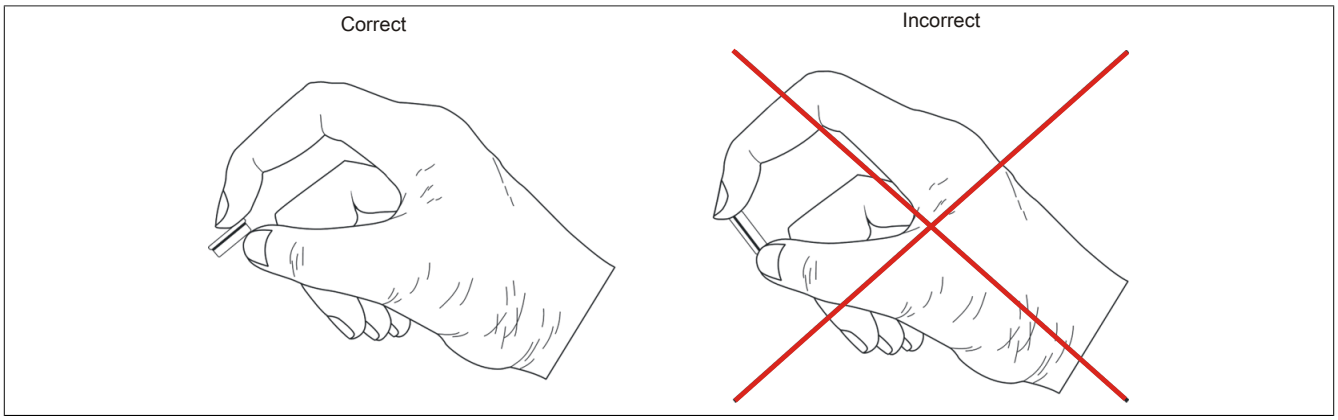


Figure 139: Battery handling

- Insert the new battery with the correct polarity.

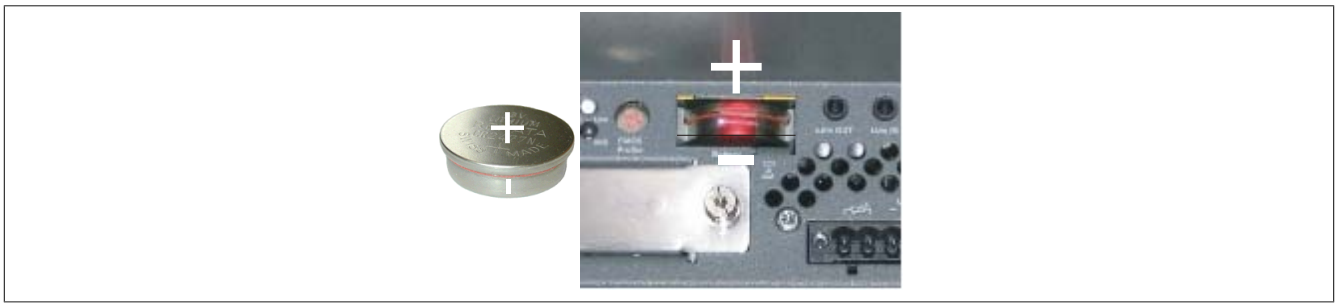


Figure 140: Battery polarity

- 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!

The unit can only be cleaned when turned off in order to prevent unintentionally executing functions by actuating the touch screen or pressing keys.

A moist towel should be used to clean the device. When moistening the cloth, use only water with detergent, screen cleaning agent, or alcohol (ethanol). The cleaning agent should be applied to the cloth beforehand, not sprayed directly on the device! Never use aggressive solvents, chemicals, scouring agents, pressurized air or steam jet.

Information:

Displays with a touch screen should be cleaned regularly.

3 Exchanging the CompactFlash card

Caution!

Turn off the power before replacing the CompactFlash card!

The CompactFlash card can be exchanged quickly and easily by pressing the ejector (see image) with a pointed object such as a pen.

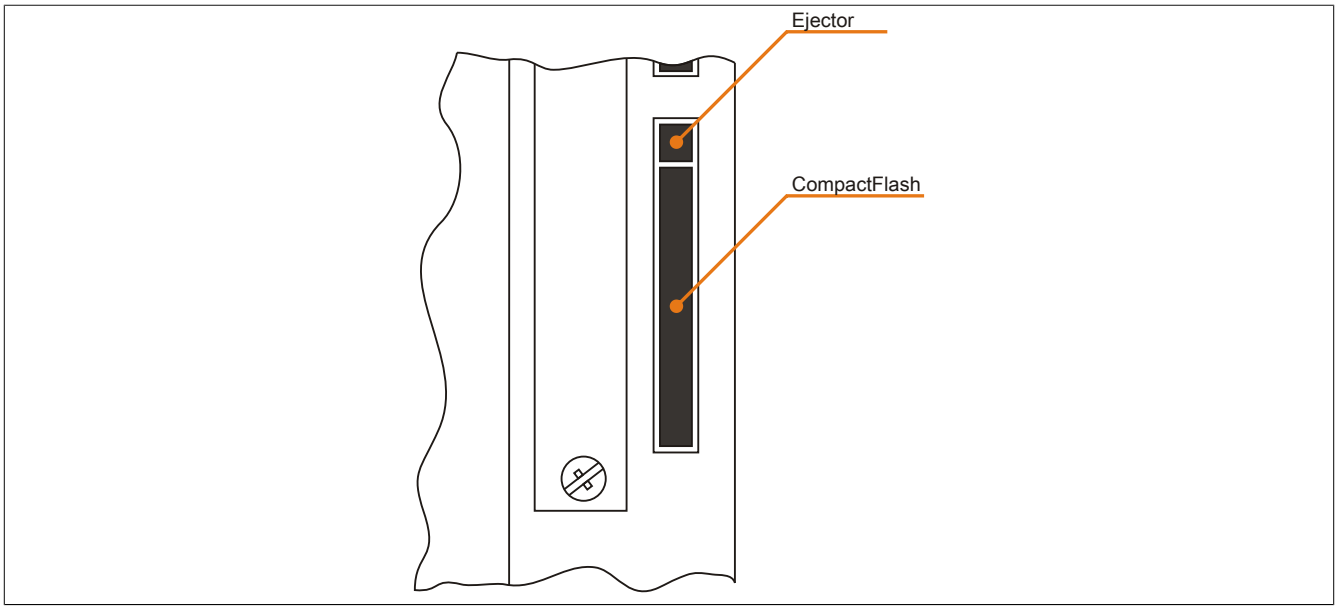


Figure 141: CompactFlash + ejector (sample photo)

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 142: Loosening the ¼ turn screws

2. Insert the compact SATA drive and tighten the ¼ turn screws.

Figure 143: 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 144: Loosening the ¼ turn screws

4. Insert the slide-in drive and tighten with the two ¼ turn screws.

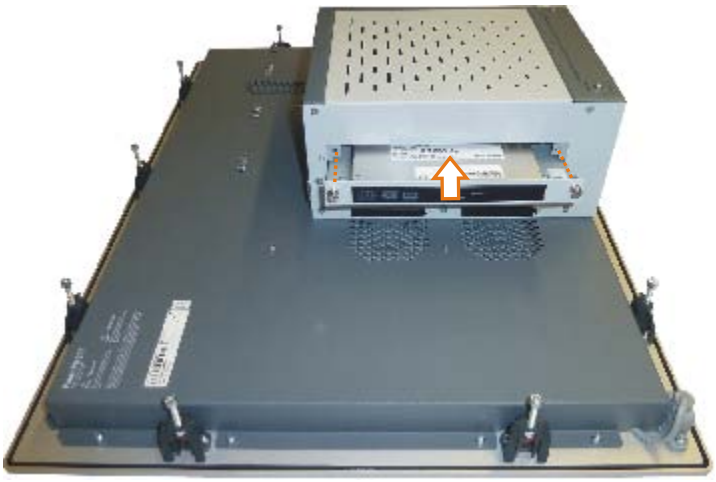


Figure 145: Installing the slide-in drive

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 146: Loosening the ¼ turn screws

4. Insert the slide-in compact adapter and tighten the two ¼ turn screws.

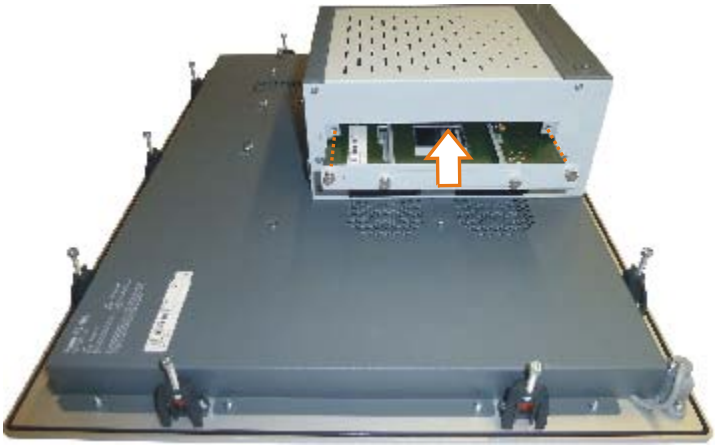


Figure 147: Installing the slide-in compact adapter

5. Once the adapter has been installed, the slide-in compact drive can be inserted.

Figure 148: 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.

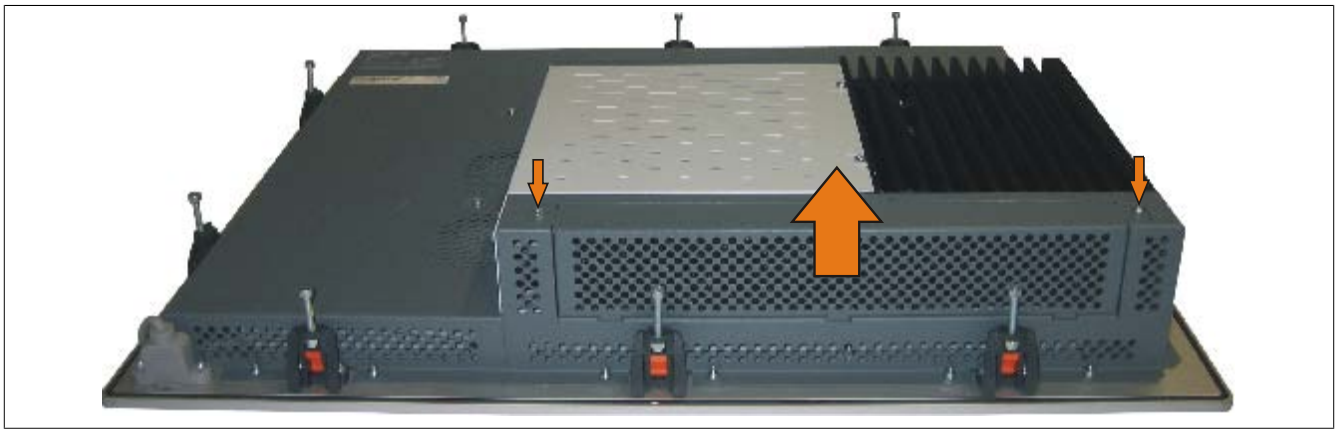


Figure 149: Remove the fan kit cover

2. Insert fan kit frame and press down until it is fully fastened into the terminal.

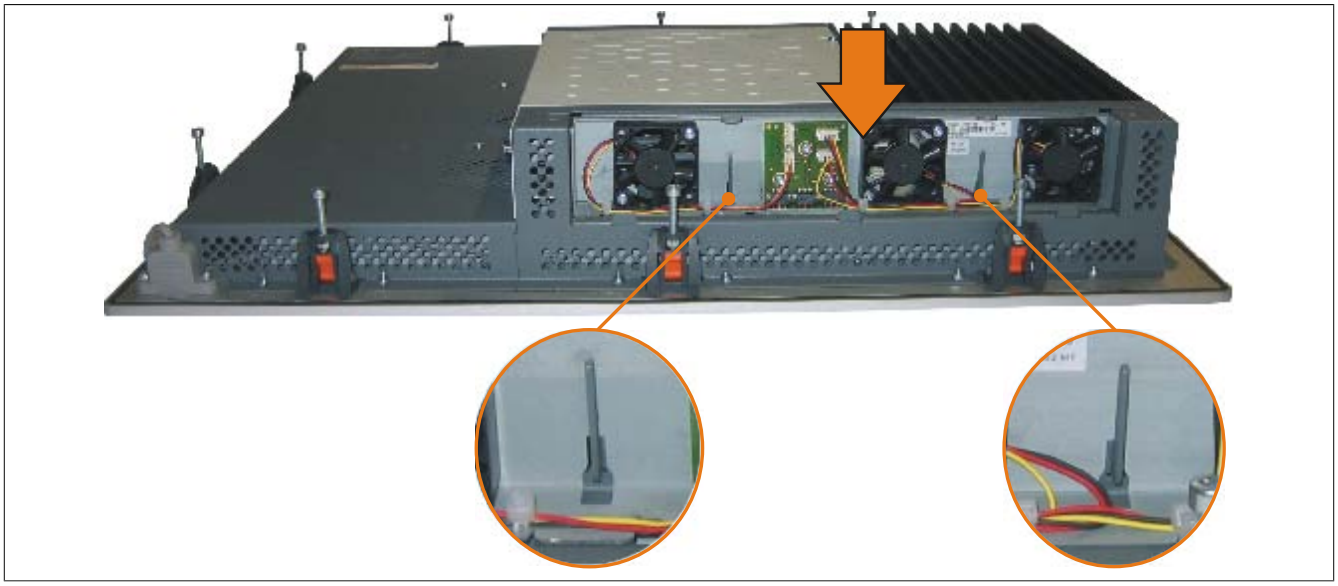


Figure 150: Insert the fan kit

3. Place the dust filter in the fan kit cover and secure with the filter clasp.

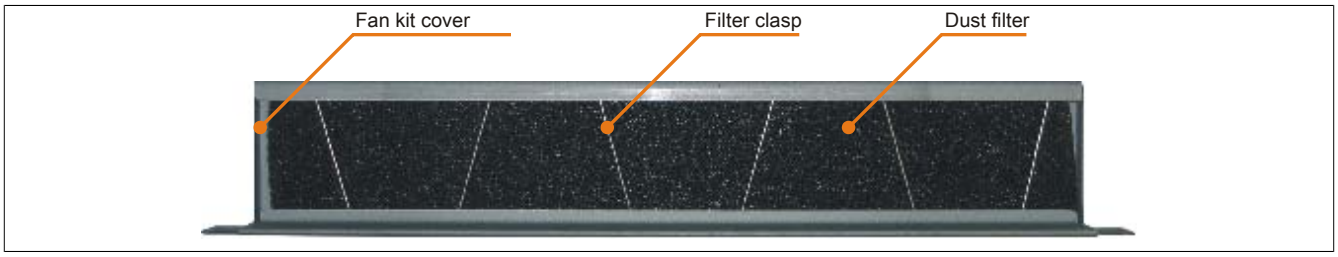


Figure 151: Secure the dust filter and filter clasp

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.

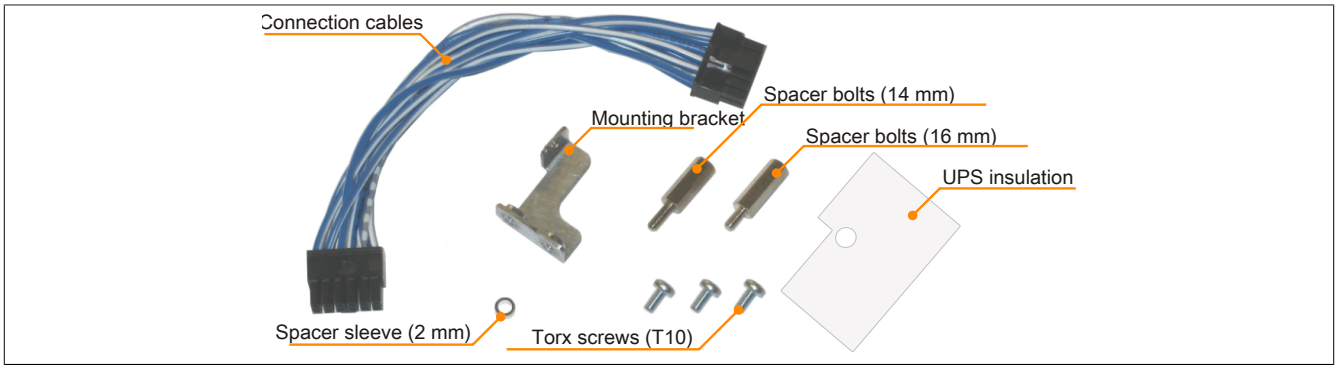


Figure 152: 5AC600.UPSI-00 Add-on UPS module – Installation materials

8.1 Installation guidelines

1. Remove the side cover (see "Mounting the side cover" on page 274).
2. Remove UPS module cover by removing the 2 marked Torx screws (T10).

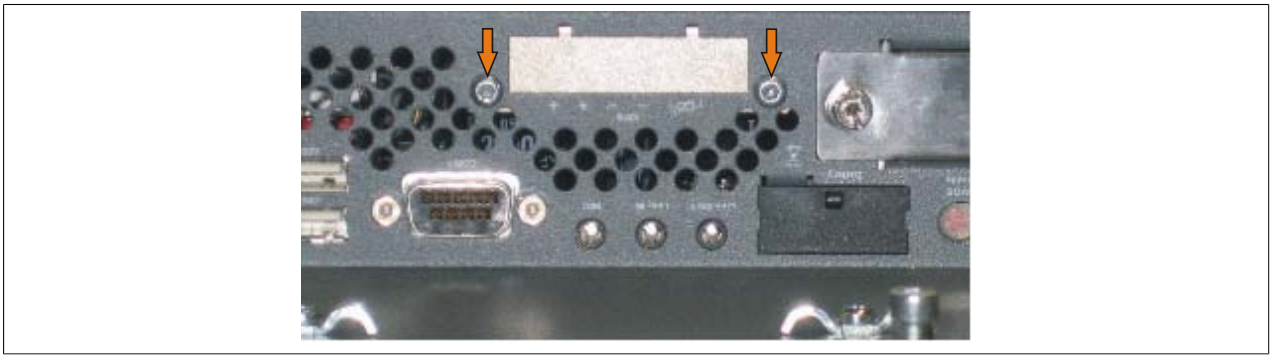


Figure 153: Removing the UPS module cover

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.

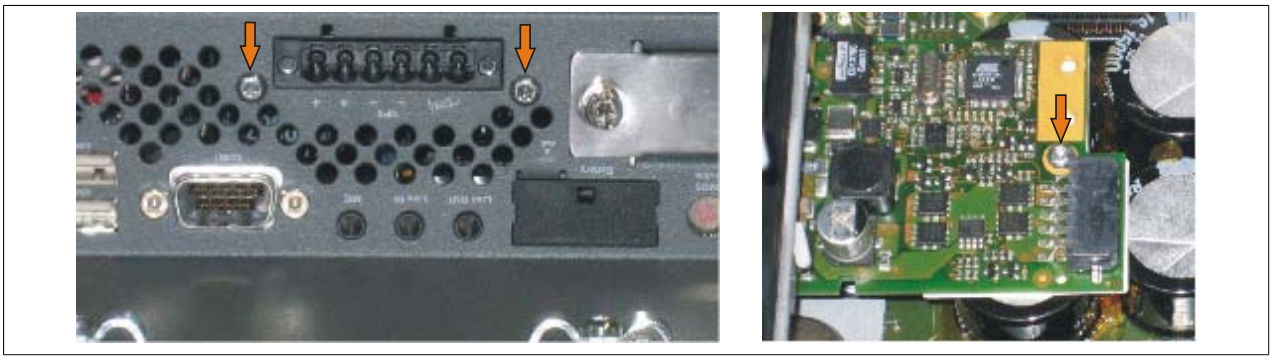


Figure 154: Installing the UPS module

4. Plug in the connection cable (see marked socket).

Figure 155: Plugging in the connection cable

Information:

When connecting the cable, make sure that the connector locking mechanism is engaged.

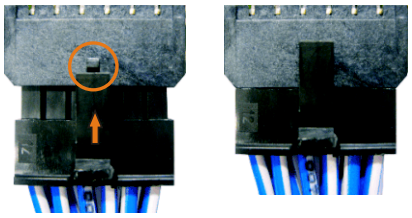


Figure 156: Connector locking mechanism

5. Attach the side cover.

9 Installing / exchanging the bus unit

Bus units can be installed and exchanged in system units with 1 or 2 card slot expansion.

9.1 Procedure

1. Disconnect the power supply to the Panel PC 800.
2. Touch the housing or ground connection in order to discharge any electrostatic charge from your body.
3. Remove the side cover (see "Mounting the side cover" on page 274).
4. Loosen the Torx screws (T10) mounted to the main board.

Figure 157: Removing the screws

5. Plug the bus unit into the bus unit slot and fasten using three Torx screws (T10).

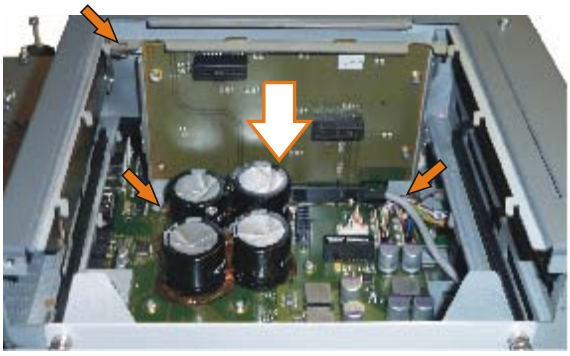


Figure 158: Install bus unit

6. Attach the side cover.

10 Installing / exchanging an adapter

1. Remove the side cover (see "Mounting the side cover" on page 274).
2. Remove 1 card slot or 2 card slot expansion if present.

10.1 Procedure for the adapter 5AC803.BC01-00

1. Loosen the Torx screws (T10) mounted to the main board.

Figure 159: Removing the screws

2. Place adapter and guide rails in the intended positions and fasten using the Torx screws (T10) removed earlier.

Figure 160: Installing the 5AC803.BC01-00 adapter

3. Attach the side cover.

10.2 Procedure for the adapter 5AC803.BC02-00

1. Plug adapter into the intended slot.

Figure 161: Installing the 5AC803.BC02-00 adapter

2. Attach the side cover.

11 Installing / exchanging PCIec plug-in card

11.1 Procedure

1. Loosen the ¼ turn screws and remove PCIec module cover.

Figure 162: Removing the PCIec module cover

2. Slide PCIec plug-in card into place.

Figure 163: Insert PCIec plug-in card

3. Fasten PCIec plug-in card using the ¼ turn screws.

12 Mounting the side cover

The side cover can be easily removed by loosening the Torx (T10) screws. The number of Torx screws can vary depending on the system.

12.1 PPC800 without expansion

1. Disconnect the power supply to the Panel PC 800.
2. Touch the housing or ground connection 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).

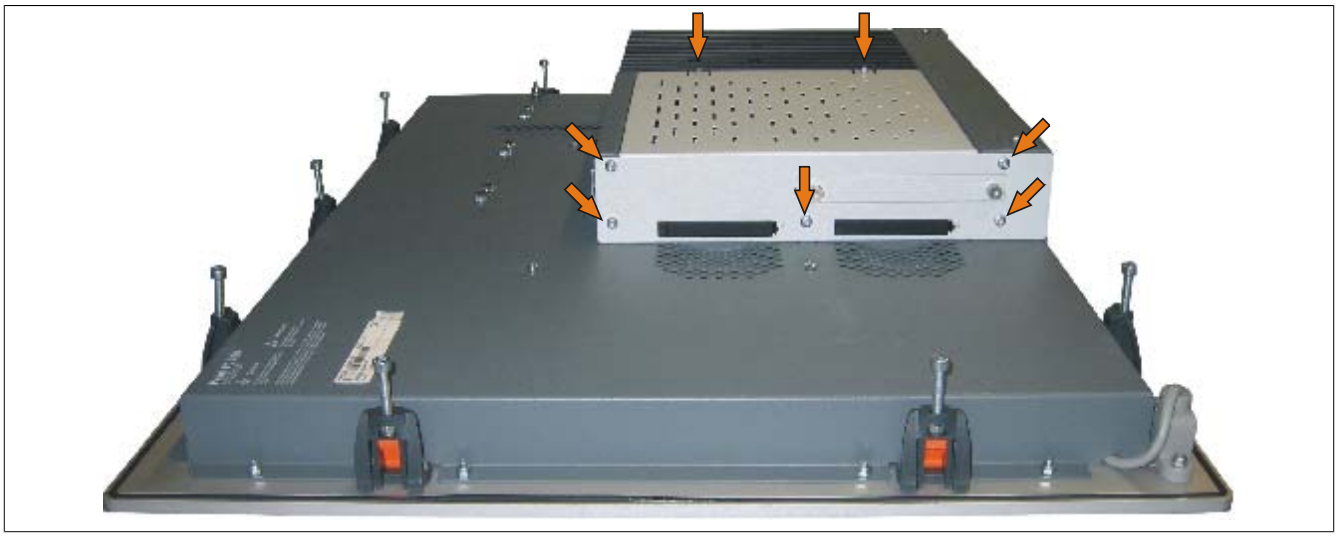


Figure 164: Mounting the side cover on a PPC800 without expansion

12.2 PPC800 with expansion

1. Disconnect the power supply to the Panel PC 800.
2. Touch the housing or ground connection 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).

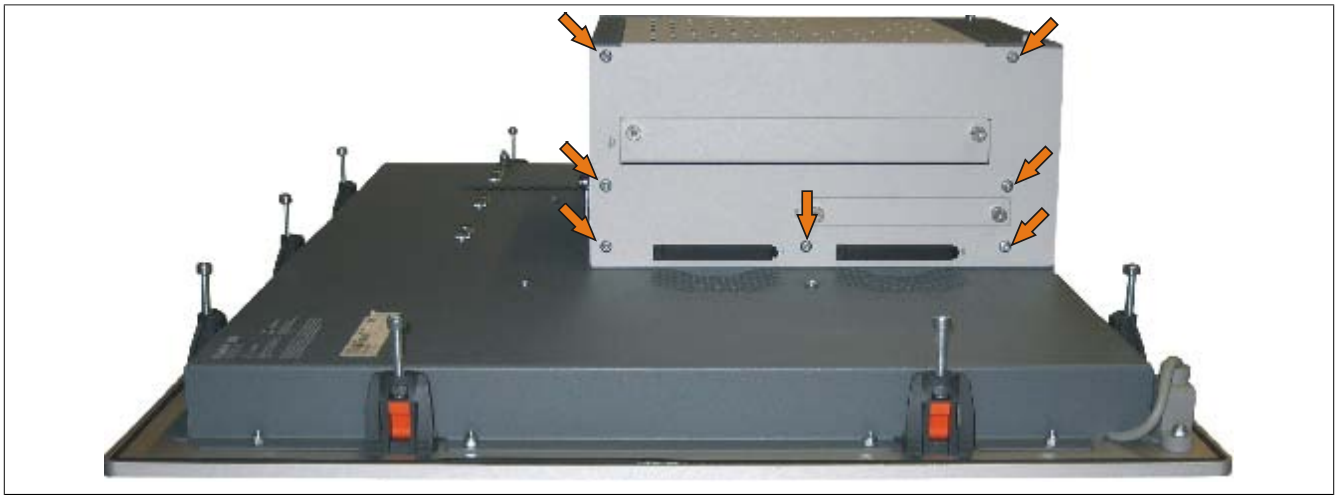


Figure 165: Mounting the side cover on a PPC800 with expansion (1 slot expansion shown in image)

13 Exchanging a PCI SATA RAID hard disk in a RAID 1 system

In the example, the assumption is made that the secondary hard disk (HDD1) is defective in a RAID 1 configuration. In such a case, the defective hard disk can be replaced by the replacement drive SATA hard disk.

Model number - PCI SATA RAID controller	Model number of required replacement SATA HDD	Note
5ACPCI.RAIC-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 241: Overview of required replacement SATA HDD for PCI SATA HDD RAID controller

A size 10 Torx screwdriver is needed for exchanging the hard disk.

13.1 Procedure

1. Disconnect the power supply.
2. Touch the housing or ground connection 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).

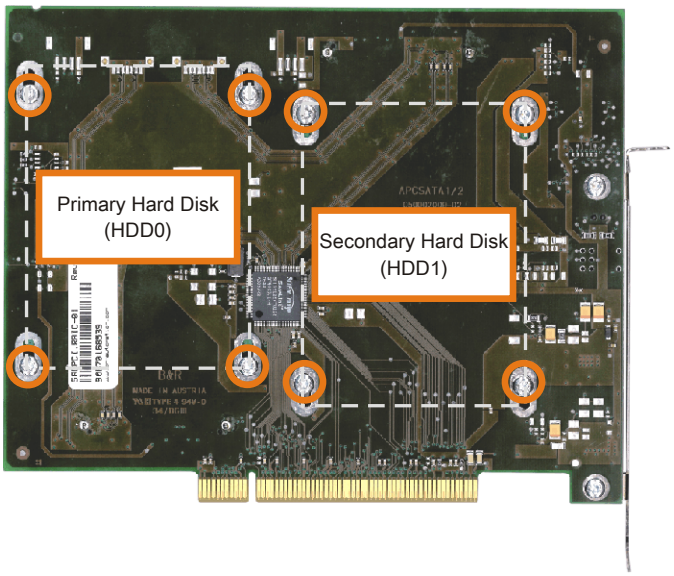


Figure 166: Screw layout on the back side of the SATA RAID controller 5ACPCI.RAIC-03

6. On the front side, slide the hard disk down and away (Figure 167: Hard disk exchange - left image).
7. Insert the new hard disk carefully into the connector (Figure 167: Hard disk exchange - right image), being careful to only touch it on the front, and not on the top.

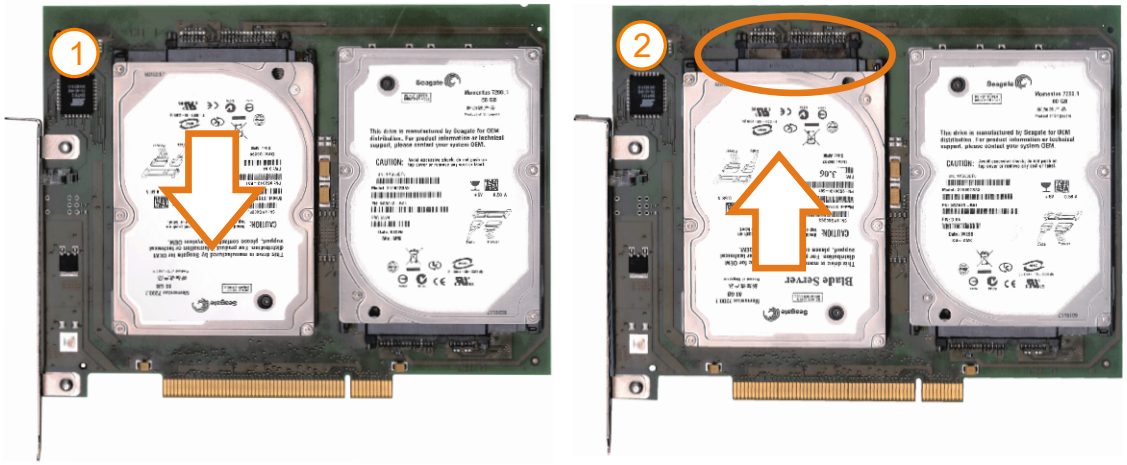


Figure 167: Hard disk exchange

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 129.

Appendix A

1 Maintenance Controller Extended (MTCX)

The MTCX controller (FPGA processor) is located on the main board (part of every system unit).

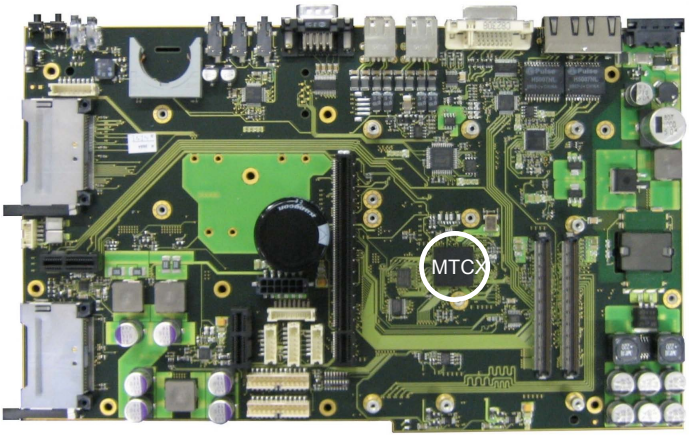


Figure 168: MTCX controller location

The MTCX is responsible for the following monitoring and control functions:

- Power on (power OK sequencing) and power fail logic
- Watchdog handling (NMI and reset handling)
- Temperature monitoring
- Fan control
- Key handling / coordination (matrix keyboard on Automation Panel 900 devices configurable using B&R Key Editor, PS/2 keyboard)
- LED handling (matrix keyboard with LEDs on Automation Panel 900 devices configurable using B&R Key Editor)
- Advanced desktop operation (USB forwarding)
- Daisy chain display operation (touch screen, USB forwarding)
- Panel locking mechanism (can be configured using B&R Control Center - ADI driver)
- Backlight control for a connected B&R display
- Statistical data recording (power cycles - each power on, power on and fan hours are recorded - every full hour is counted e.g. 50 minutes no increase)
- SDL data transfer (display, matrix keyboard, touch screen, service data, USB)
- Status LEDs (HDD, Link, Run)

The MTCX functions can be added with a firmware upgrade.[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 for download from 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 242: 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 Connection of an external device to the main board

A plug on the main board enables branching of +5 VDC and +12 VDC for the internal supply of e.g. special PCI cards.

The voltage can be accessed using the "5CAMSC.0001-00" on page 257. The connector is located near the reset or power button (see image). The PPC800 side cover (see "Mounting the side cover" on page 274) and possibly also the slide-in drives, PCIec and PCI cards must be removed to reach the connector.

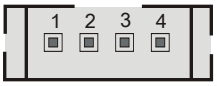
Connector for the external devices			
Pin	Assignment	Power	4-pin connector, male
1	+12 VDC	Max. 10 watts	
2	GND		
3	GND	Max. 5 watts	
4	+5 VDC		

Table 243: 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 entire device. For the entire device in which this individual component is used, refer to the data given specifically for the entire device.

Product ID	Touch Screen AMT 5-wire
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	
Lifespan	36 million touch operations on the same point (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 can be downloaded from the download area on the B&R homepage (www.br-automation.com).

Table 244: Technical data - Touch Screen AMT 5-wire

1) The active area of the touch screen is resistant to these chemicals for a timeframe of one hour at 25°C.

3.2 Temperature humidity diagram

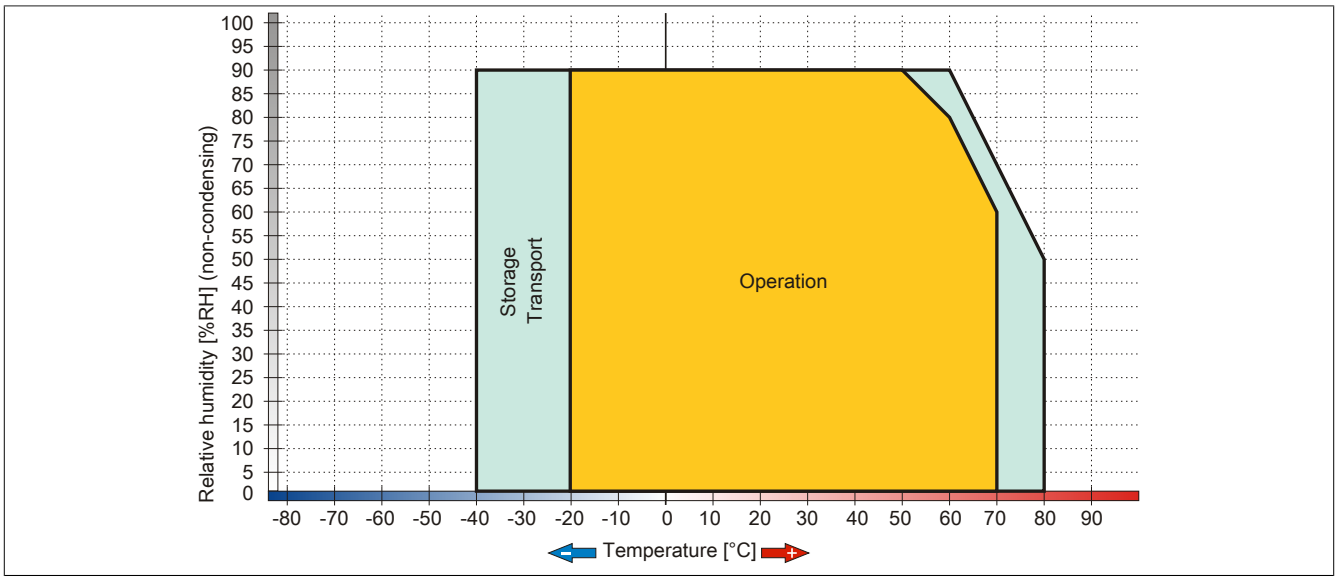


Figure 169: Temperature humidity diagram - AMT touch screen 5-wire

3.3 Cleaning

Danger!

The unit can only be cleaned when turned off in order to prevent unintentionally executing functions by actuating the touch screen or pressing keys.

A moist towel should be used to clean the device. When moistening the cloth, use only water with detergent, screen cleaning agent, or alcohol (ethanol). The cleaning agent should be applied to the cloth beforehand, not sprayed directly on the device! Never use aggressive solvents, chemicals, scouring agents, pressurized air or steam jet.

Information:

Displays with a touch screen should be cleaned regularly.

4 Panel membrane

The panel membrane conforms to DIN 42115 (section 2). This means it is resistant to exposure to the following chemicals for a 24-hour period with no visible signs of damage:

Information:

The following characteristics, features, and limit values only apply to this individual component and can deviate from those specified for the entire device.

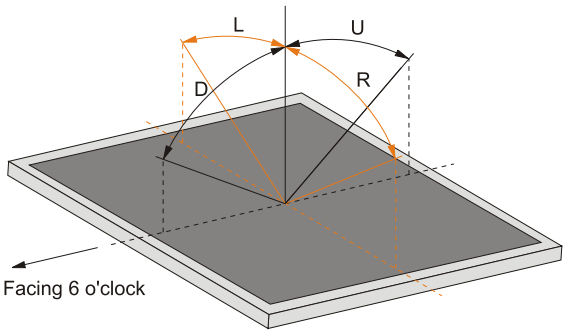
Ethanol Cyclohexanol Diacetone alcohol Glycol Isopropanol Glycerine Methanol Triacetin Dowandol DRM/PM	Formaldehyde 37 to 42% Acetaldehyde Aliphatic hydrocarbons Toluene Xylene White spirits	Trichloroethane Ethyl acetate Diethyl ether N-Butyl acetate Amyl acetate Butylcellosolve Ether
Acetone Methyl 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 245: Chemical resistance of the panel membrane

The panel membrane conforms to DIN 42115 section 2 for exposure to glacial acetic acid for less than one hour without visible damage.

5 Viewing angles

The viewing angle information of the display types (R, L, U, D) can be seen in the technical data for the individual components.



6 Mounting compatibilities

This section describes the compatibility of the installation dimensions for the Power Panel 100/200, Power Panel 300/400, Power Panel 500, Automation Panel 900, Automation Panel 700 and Panel PC 800 units according to the respective device diagonals.

The outer dimensions of the device types are identical for the respective diagonals.

The different device types are abbreviated as follows:

Device type	Abbreviation
Power Panel 100/200	PP100/200
Power Panel 300/400	PP300/400
Power Panel 500	PP500
Automation Panel 900	AP900
Panel PC 700	PPC700
Panel PC 800	PPC800

Table 246: Product abbreviations

6.1 Compatibility overview

The following table offers a brief overview of the devices PP100/200, PP300/400, PP500, AP900, PPC700 and PPC800. Detailed information can be found in the section 6.2 "Compatibility details" on page 285.

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 247: Device compatibility overview

6.2 Compatibility details

6.2.1 Example

The measurement values (all in mm) in the following figures have the following meaning.

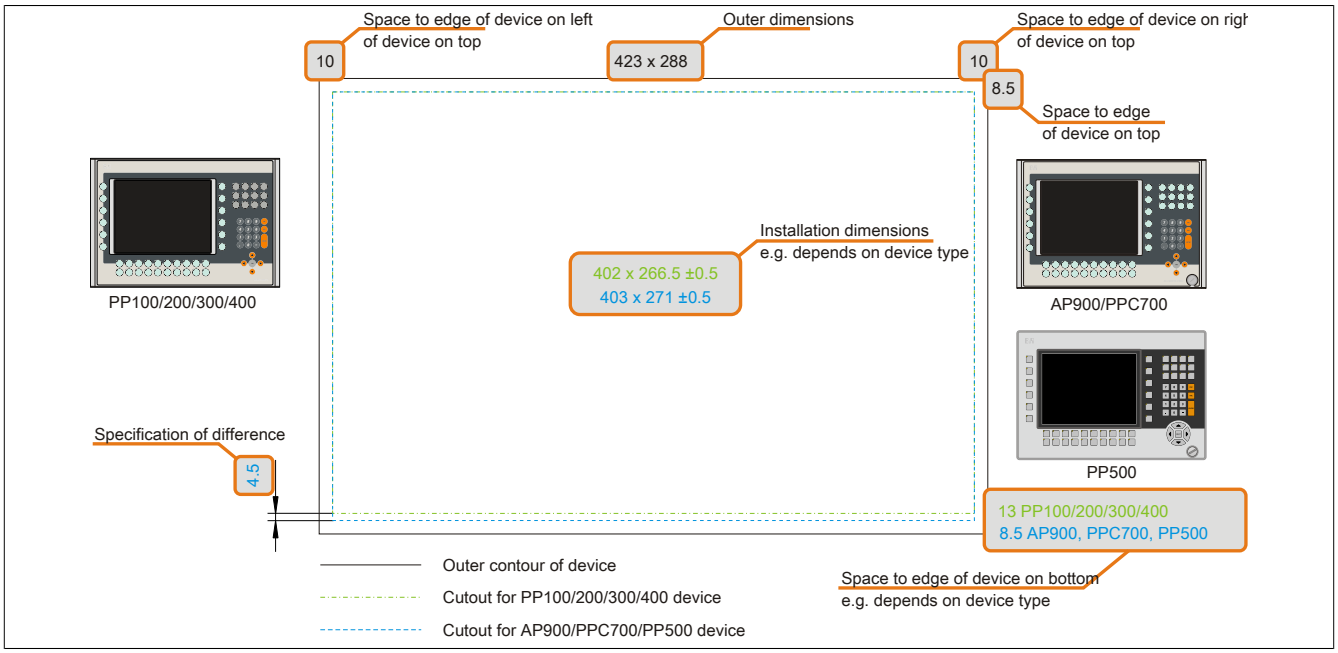


Figure 170: Compatibility details - figure structure

6.2.2 5.7" devices

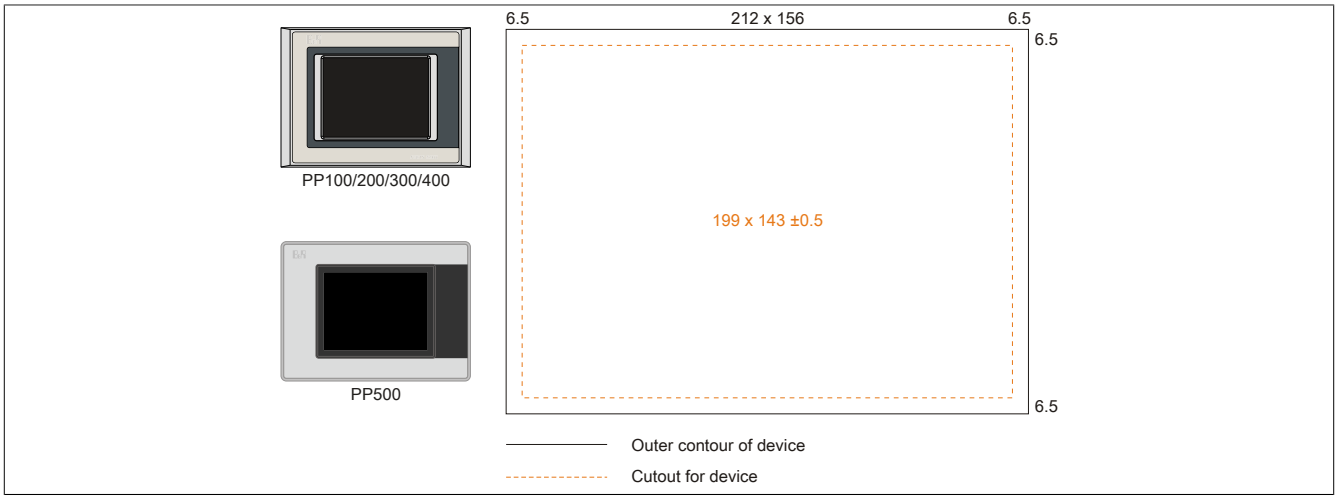


Figure 171: Mounting compatibility - 5.7" device format - Horizontal1

5.7" Power Panel 500, Power Panel 300/400 and Power Panel 100/200 devices in Horizontal1 format are 100% mounting compatible.

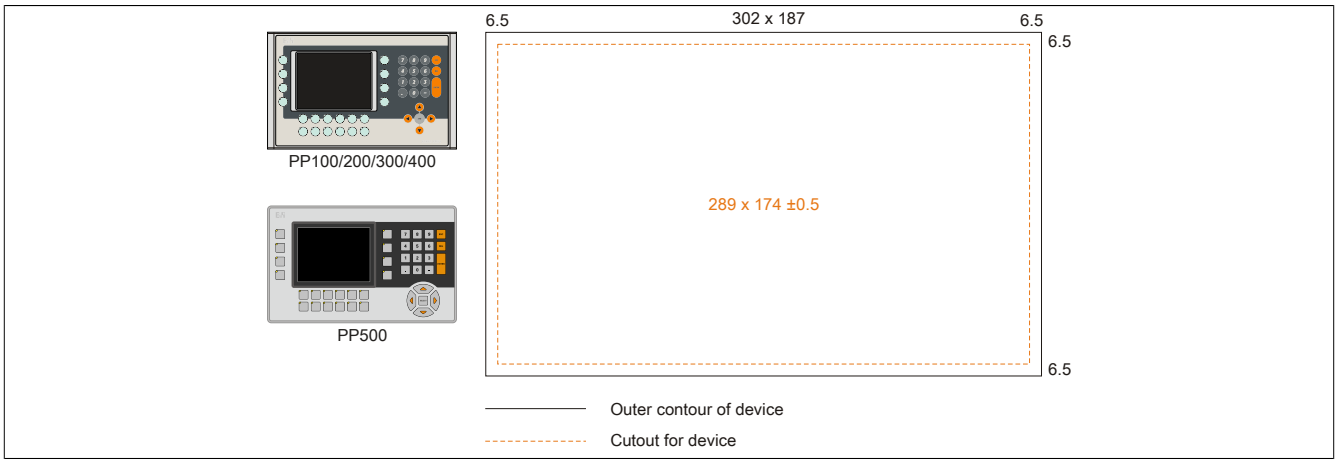


Figure 172: Mounting compatibility - 5.7" device format - Horizontal2

5.7" Power Panel 500, Power Panel 300/400 and Power Panel 100/200 devices in Horizontal2 format are 100% mounting compatible.

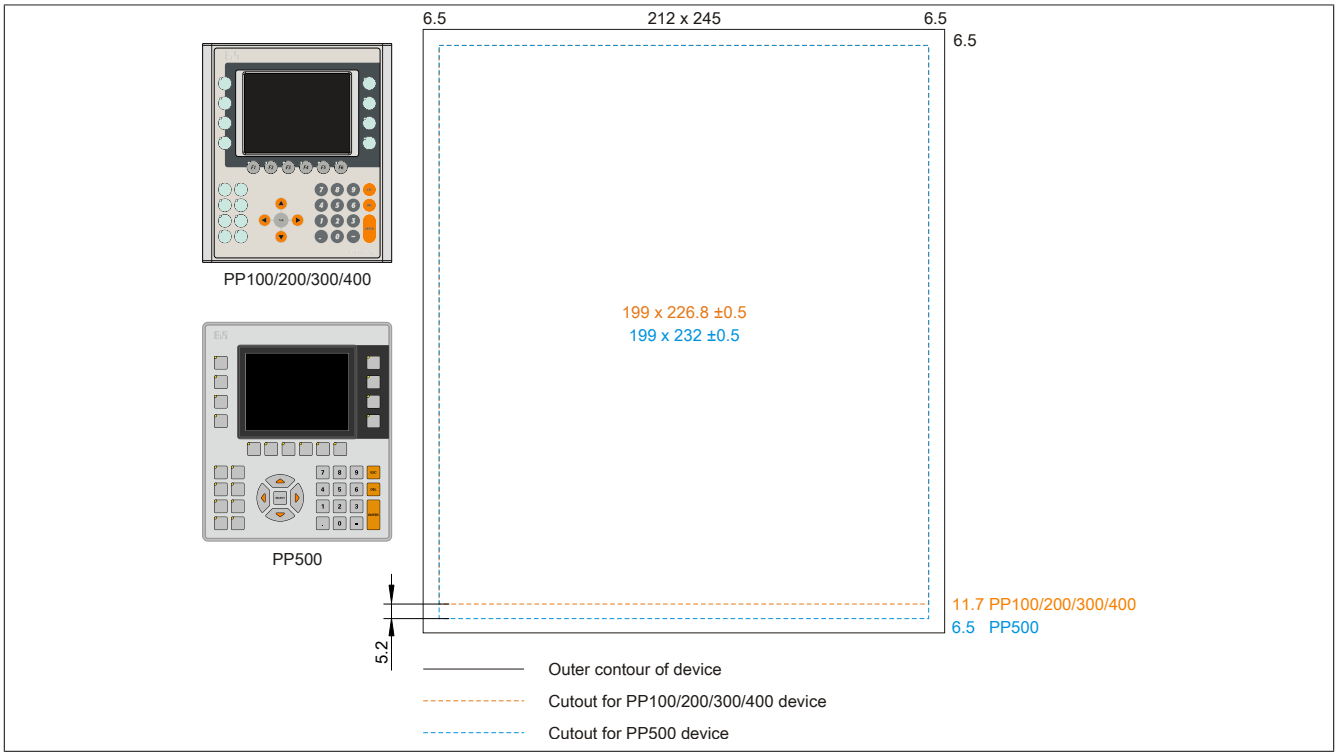


Figure 173: Mounting compatibility - 5.7" device format - Vertical1

5.7" Power Panel 500 devices are not 100% mounting compatible with Power Panel 300/400 and Power Panel 100/200 devices in Vertical1 format. The Power Panel 500 devices require a cutout that is 5.2 mm higher (bottom edge).

The larger cutout can be used for all devices under certain conditions:

- When mounting, make sure that the PP100/200 and PP300/400 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

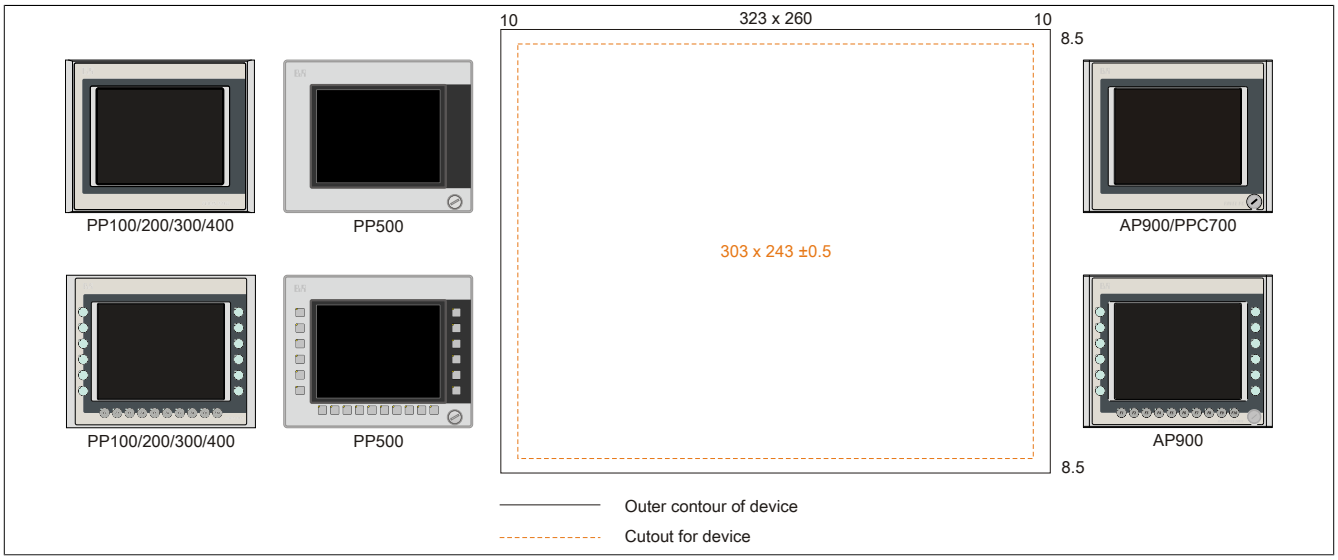


Figure 174: Mounting compatibility - 10.4" device format - Horizontal1

10.4" Power Panel 500, Power Panel 300/400 and Power Panel 100/200 devices in Horizontal1 format are 100% mounting compatible.

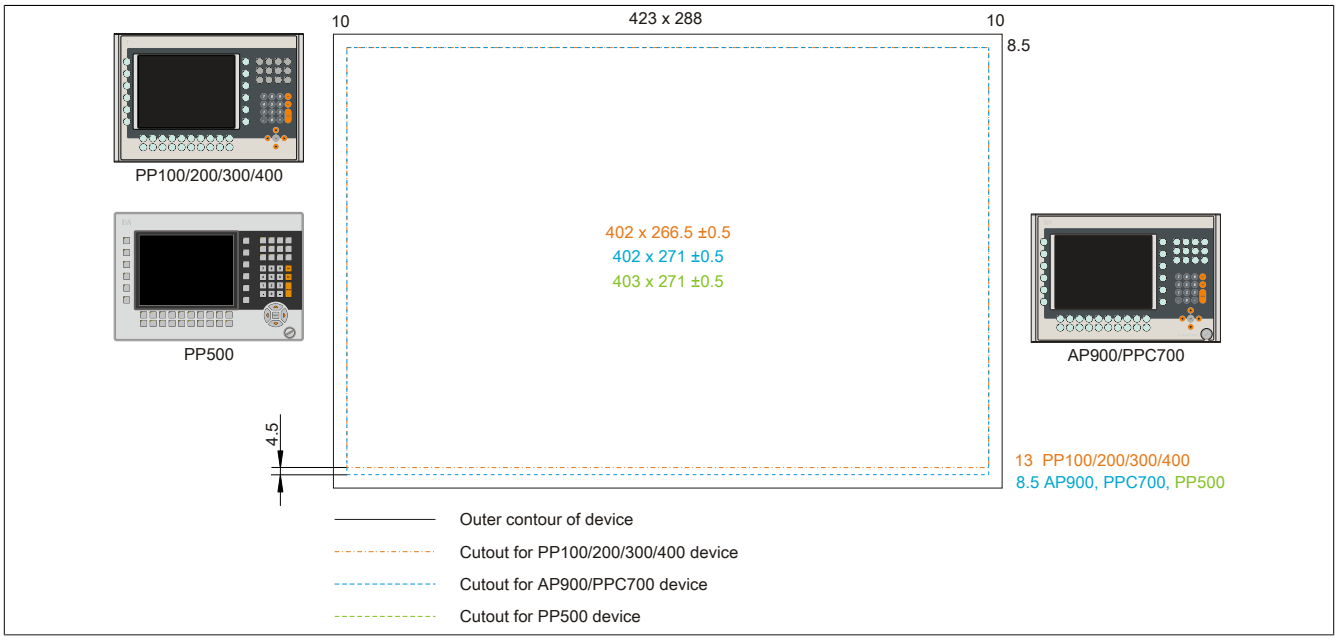


Figure 175: Mounting compatibility - 10.4" device format - Horizontal2

The 10.4" Power Panel 500, Automation Panel 900 and Panel PC 700 devices are not 100% mounting compatible with the Power Panel 300/400 or Power Panel 100/200 device format Horizontal2. The Power Panel 500, Automation Panel 900 and Panel PC 700 devices require a cutout that is 4.5 mm higher (bottom edge).

The larger cutout can be used for all devices under certain conditions:

- When mounting, make sure that the PP100/200 and PP300/400 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).

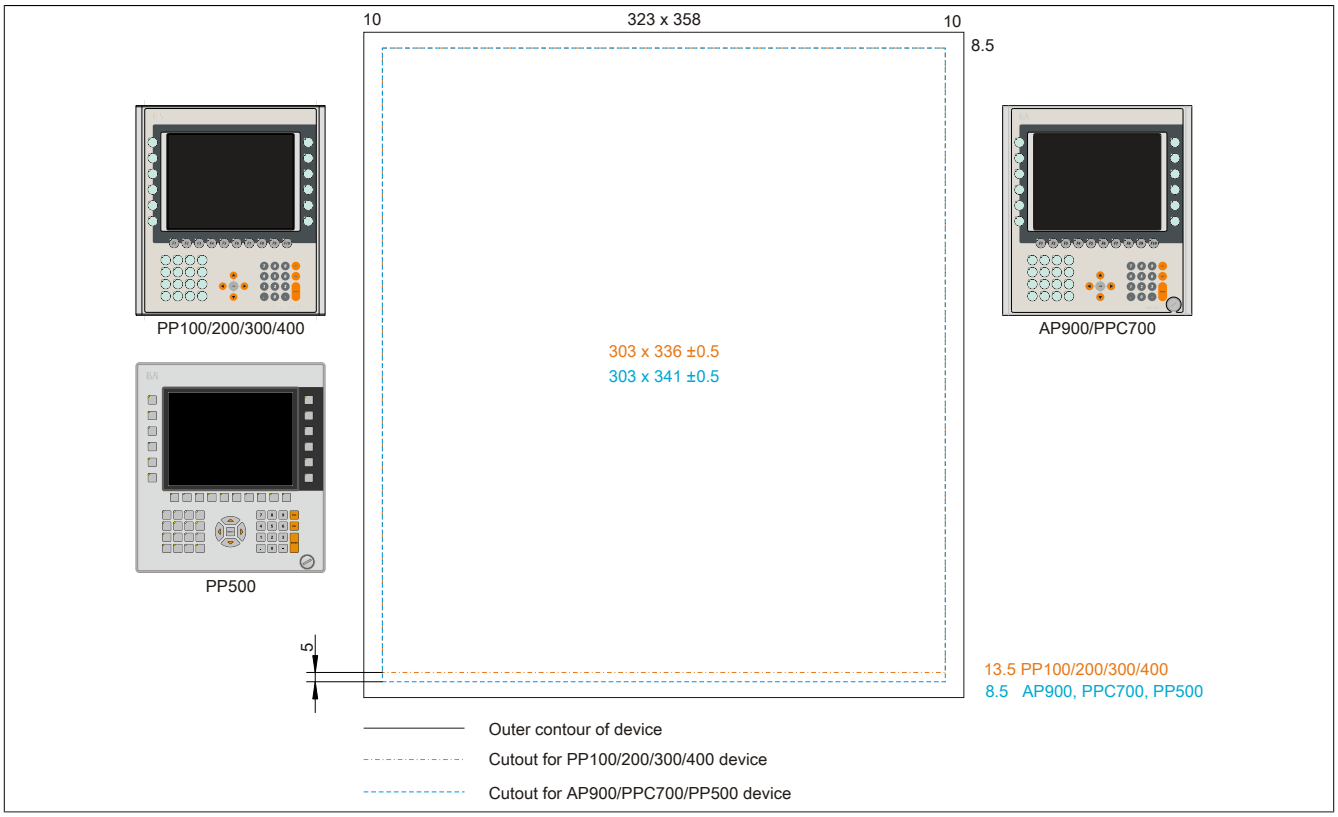


Figure 176: Mounting compatibility - 10.4" device format - Vertical1

The 10.4" Power Panel 500, Automation Panel 900 and Panel PC 700 devices are not 100% mounting compatible with the Power Panel 300/400 or Power Panel 100/200 device format Vertical1. The Power Panel 500, Automation Panel 900 and Panel PC 700 devices require a cutout that is 5 mm higher (bottom edge).

The larger cutout can be used for all devices under certain conditions:

- When mounting, make sure that the PP100/200/300/400 devices are placed and mounted as close to the center of the cutout as possible. Failure to do so can prevent the retaining clips from holding firmly, which means that a firm seal is no longer guaranteed with the gasket (IP65).

6.2.4 12.1" devices

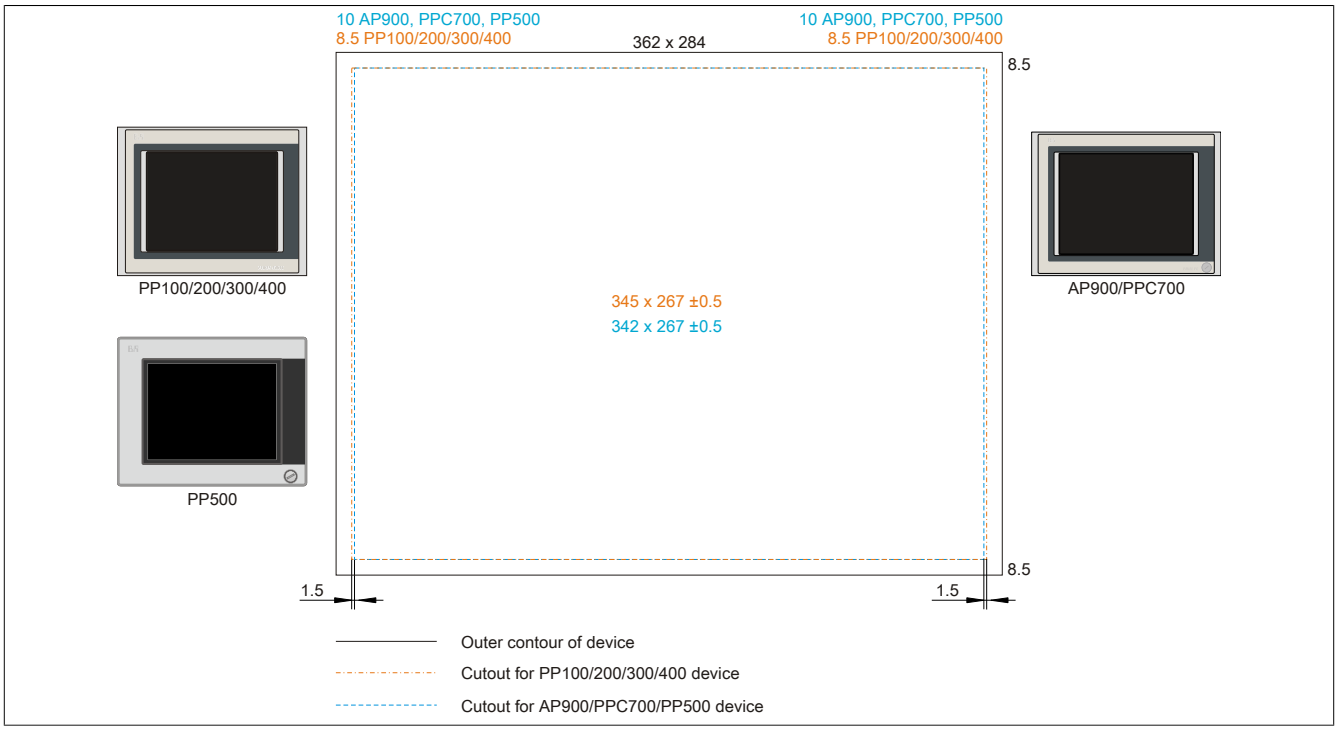


Figure 177: Mounting compatibility - 12.1" device format - Horizontal1

The 12.1" Power Panel 500, Automation Panel 900 and Panel PC 700 devices are not 100% mounting compatible with the Power Panel 300/400 or Power Panel 100/200 device format Horizontal1. The Power Panel 300/400 and Power Panel 100/200 devices require a cut that is 1.5 mm wider (left and right).

The larger cutout can be used for all devices under certain conditions:

- When mounting, make sure that the PP500, AP900 and PPC700 devices are mounted as close to the center of the cutout as possible.

6.2.5 15" devices

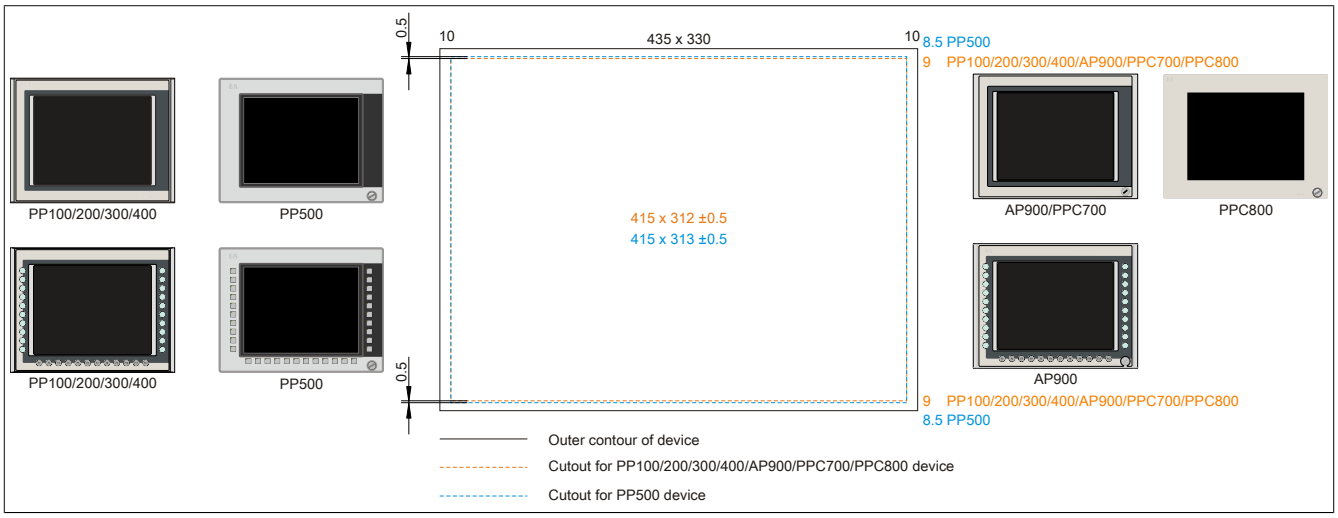


Figure 178: Mounting compatibility - 15" device format - Horizontal1

15" Power Panel 500 devices are not 100% mounting compatible with the Power Panel 100/200, Power Panel 300/400, Automation Panel 900, Panel PC 700 and Panel PC 800 device format Vertical1. The Power Panel 500 devices require a cutout that is 0.5 mm higher (top and bottom edge).

The larger cutout can be used for all devices under certain conditions:

- When mounting, make sure that the PP100/200, 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).

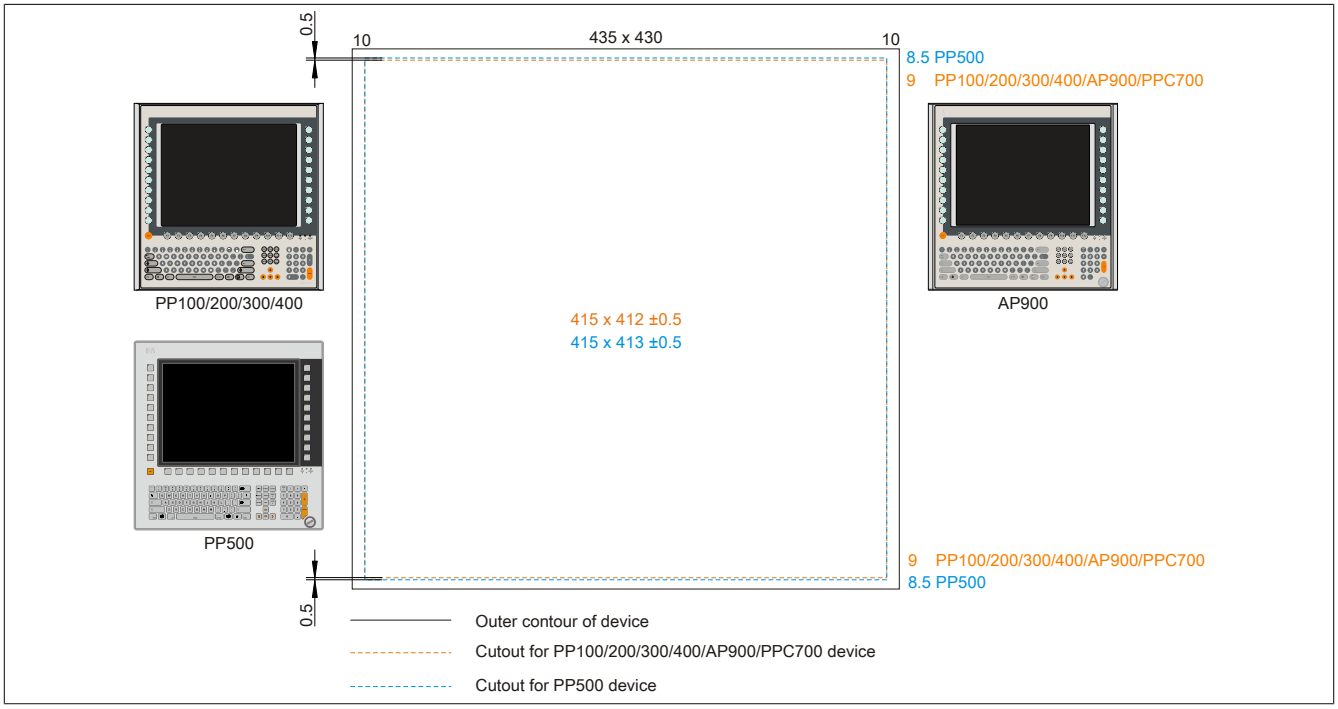


Figure 179: Mounting compatibility - 15" device format - Vertical1

15" Power Panel 500 devices are not 100% mounting compatible with the Power Panel 100/200, Power Panel 300/400, Automation Panel 900 and Panel PC 700 device format Vertical1. The Power Panel 500 devices require a cutout that is 0.5 mm higher (top and bottom edge).

The larger cutout can be used for all devices under certain conditions:

- When mounting, make sure that the PP100/200, 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

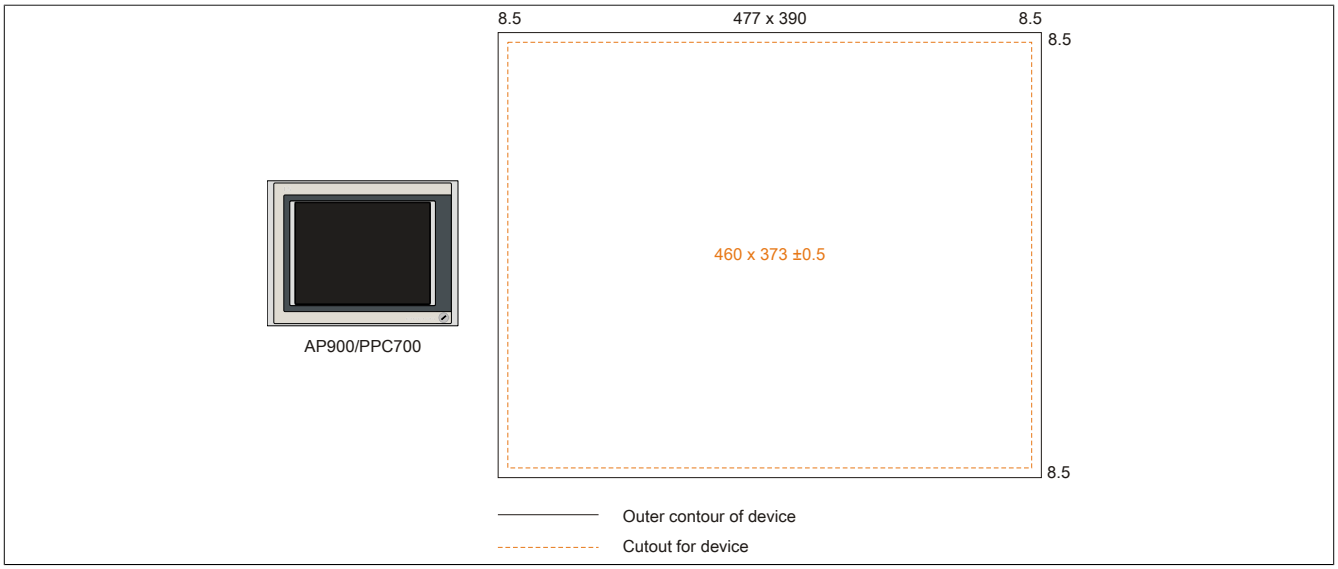


Figure 180: Mounting compatibility - 17" device - Horizontal1

17" Automation Panel 900 and Panel PC 700 in Horizontal1 format are 100% mounting compatible.

6.2.7 19" devices

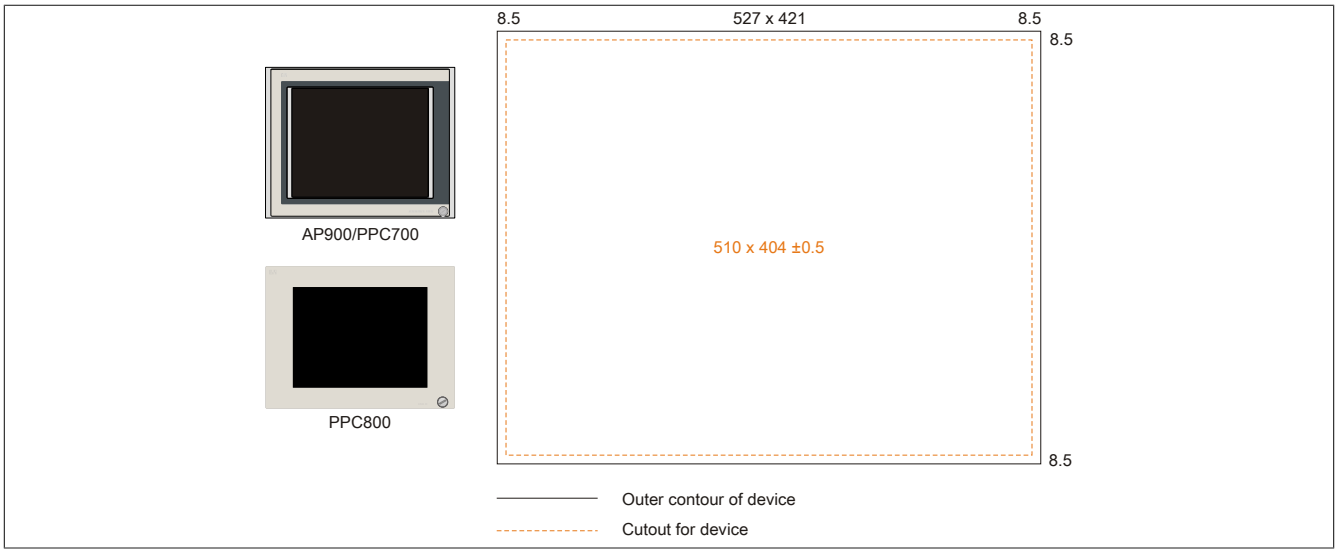


Figure 181: Mounting compatibility - 19" device - Horizontal1

19" Automation Panel 900, Panel PC 700 and Panel PC 800 in Horizontal1 format are 100% mounting compatible.

6.2.8 21.3" devices

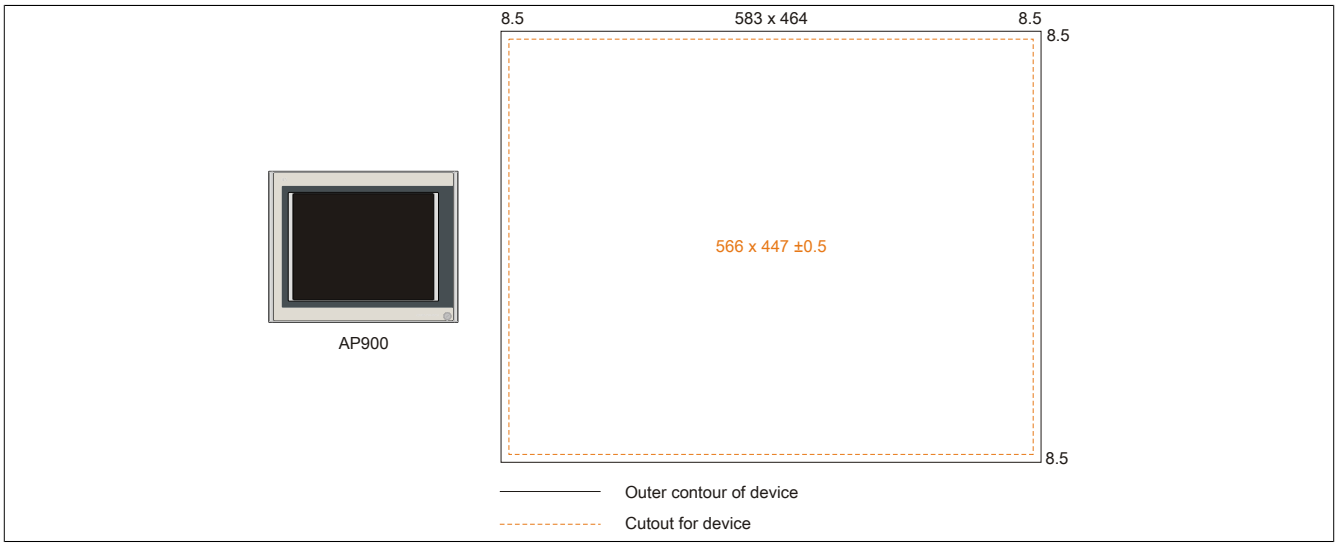


Figure 182: Mounting compatibility - 21.1" device - Horizontal1

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