Automation PC 810 with GM45 CPU board

User's Manual

Version: **1.12 (February 2011)**

Model no.: **MAAPC800A-ENG**

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Chapter 1 • General Information

1. Manual history

Version	Date	Change
1.00	2010-01-18	- First version
1.05	2010-03-24	- Documentation "Automation PC 810 with BM45 CPU board" renamed to "Automation PC 810 with GM45 CPU board". - Table 24 "Monitor / Panel connection - RGB, DVI, SDL", on page 82 corrected. - Figure 4 "Configuration - Drives, software, accessories", on page 38 corrected. - Section "Automation PC 810 with Windows XP Embedded" renamed to "Automation PC 810 with Windows Embedded Standard 2009", see page 301.
1.10	2010-08-16	- Chapter 5 "Standards and certifications", on page 323 updated. - CPU board name changed from BM45 to GM45. - The system unit 5PC810.SX03-00, the bus unit 5PC810.BX03-00, the fan kit 5PC810.FA03-00 and the replacement fan 5AC801.FA03-00 added. - CPU board 5PC800.BM45-01 added. - Main memory 5MMDDR.4096-02 added. - B&R ID codes for system units added. - Technical data "Remanent variables for AR (Automation Runtime) in Power Fail Mode" added for the APC810 system units. - Section 8 "B&R Automation Device Interface (ADI) - Control Center", on page 307 updated. - B&R 16 GB CompactFlash card (5CFCRD.016G-04) added. - Section 13 "Cables", on page 391 in chapter 6 "Accessories" added. - B&R USB flash drive added to the chapter 6 "Accessories" on page 372. - Section 5 "Automation PC 810 with Windows 7", on page 298 in chapter 4 "Software" added. - GM45 BIOS Version updated from V1.10 to V1.11, see page 213.
1.11	2010-11-04	- Ready relay 5AC801.RDYR-01 updated in the chapter 6 "Accessories". - Section 11 "Installing the ready relay /2 in the add-on UPS slot", on page 453 in chapter 7 "Maintenance / Servicing" added. - "Slide-in compact HDD 250GB - 5AC801.HDDI-03", on page 114 added. - "PCI SATA RAID 2 x 250 GB - 5ACPCI.RAIC-05", on page 138 added. - "Replacement SATA HDD 250 GB - 5MMHDD.0250-00", on page 142 added. - Figure "Configuration - Drives, software, accessories", on page 38 updated. - 5AC801.HDDI-03, 5ACPCI.RAIC-05 and 5MMHDD.0250-00 added in figure "Ambient temperatures with a fan kit", on page 60 and "Overview of humidity specifications for individual components", on page 62.
1.12	2011-02-18	- BIOS updated to version 1.13. - The sections 6 "CompactFlash cards 5CFCRD.xxxx-04", on page 352 and 7 "CompactFlash cards - 5CFCRD.xxxx-03", on page 357 were updated. - "Automation PC 810 with Windows Embedded Standard 7", on page 304 updated.

Table 1: Manual history

2. Safety notices

2.1 Intended use

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

2.2 Protection against electrostatic discharge

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

2.2.1 Packaging

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

2.2.2 Guidelines for proper ESD handling

Electrical components with housing

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

Electrical components without housing

The following is valid in addition to "Electrical components with housing"

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

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

Individual components

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

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

2.3 Policy and procedures

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

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

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

2.4 Transport and storage

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

2.5 Installation

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

2.6 Operation

2.6.1 Protection against touching electrical parts

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

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

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

2.6.2 Environmental conditions - dust, humidity, aggressive gases

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

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

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

2.6.3 Programs, viruses, and dangerous programs

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

2.7 Environmentally-friendly disposal

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

2.7.1 Separation of materials

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

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

Table 2: Environmentally-friendly separation of materials

Disposal must comply with the respective legal regulations.

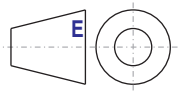
3. Organization of safety notices

The safety notices in this manual are organized as follows:

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

Table 3: Organization of safety notices

4. Directives



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

5. Model numbers

5.1 System units

Model number	Short description	Note
5PC810.SX01-00	**APC810 System 1CS[1] 1SI[2]** APC810 system unit 1 card slot (PCI, PCI Express, depending on bus), 1 slide-in compact slot for drive, 2 CompactFlash slots; Smart Display Link/DVI/Monitor, connections for 2x RS232, 5x USB 2.0, 2x ETH 10/100/1000, AC97 sound, 24 VDC	See page 39
5PC810.SX02-00	**APC810 System 2CS[1] 2SI[2] 1LS[3]** APC810 system unit 2 card slots (PCI, PCI Express, depending on bus), 1 slot for Automation Panel Link Transmitter; 1 slide-in compact slot and 1 slide-in slot for drives, 2 CompactFlash slots; Smart Display Link/DVI/Monitor, connections for 2x RS232, 5x USB 2.0, 2x ETH 10/100/1000, AC97 sound, 24 VDC	See page 44
5PC810.SX03-00	**APC810 System 3CS[1] 2SI[2] 1LS[3]** APC810 system unit, 3 slots (PCI Express, PCI, depending on bus); 1 slot for Automation Panel Link transmitter; 1 compact slide-in and 1 slide-in slot; Smart Display Link/DVI/Monitor, 2x RS232, 5x USB 2.0, 2x ETH 10/100/1000, AC97 sound, 24 VDC (order 0TB103.9 screw clamp or 0TB103.91 cage clamp terminals separately)	See page 49
5PC810.SX05-00	**APC810 System 5CS[1] 3SI[2] 1LS[3]** APC810 system unit 5 card slots (PCI, PCI Express, depending on bus), 1 slot for Automation Panel Link Transmitter; 1 slide-in compact slot and 2 slide-in slots for drives, 2 CompactFlash slots; Smart Display Link/DVI/Monitor, connections for 2x RS232, 5x USB 2.0, 2x ETH 10/100/1000, AC97 sound, 24 VDC.	See page 54

Table 4: Model numbers - System units

1) Card slot = PCI slot: PCI or PCI Express
2) Slide-in/Slide-in compact = Slide-in and Slide-in compact drive slot
3) Link slot = Slot for one AP Link card

5.2 Bus units

Model number	Short description	Note
5PC810.BX01-00	**APC810 bus 1PCI** APC810 bus unit with a PCI slot.	See page 103
5PC810.BX01-01	**APC810 bus 1PCIe.x4** APC810 bus unit with a PCIe slot.	See page 103
5PC810.BX02-00	**APC810 bus 2PCI** APC810 bus unit with 2 PCI slots.	See page 103
5PC810.BX02-01	**APC810 bus 1PCI 1PCIe.x4** APC810 bus unit with one PCI and one PCIe slot.	See page 103
5PC810.BX03-00	**APC810 Bus 2PCI 1PCIe.x4 1SI** APC810 bus unit with 2 PCI slots and one PCIe slot.	See page 103
5PC810.BX05-00	**APC810 bus 4PCI 1PCIe.x1** APC810 bus unit with 4 PCI slots and one PCIe slot.	See page 103
5PC810.BX05-01	**APC810 bus 2PCI 3PCIe.x1** APC810 bus unit with 2 PCI slots and 3 PCIe slots.	See page 103

Table 5: Model numbers - Bus units

5.3 GM45 CPU board

Model number	Short description	Note
5PC800.BM45-00	**CPU board Intel® Core™2 Duo T9400, 2.53 GHz** 1066 MHz FSB, 6 MB L2 cache; GM45 chipset; 2 sockets for SO-DIMM DDR3 module	See page 105
5PC800.BM45-01	**CPU board Intel® Core™2 Duo P8400, 2.26 GHz** 1066 MHz FSB, 3 MB L2 cache; GM45 chipset; 2 sockets for SO-DIMM DDR3 module	See page 105

Table 6: Model numbers - GM45 CPU board

5.4 Heat sink

Model number	Short description	Note
5AC801.HS00-01	**APC810 heat sink T7400, T9400, T8400** Heat sink APC810 for CPU board with Dual Core processor T7400, T9400 and T8400	See page 106

Table 7: Model numbers - Heat sinks

5.5 Main memory

Model number	Short description	Note
5MMDDR.2048-02	**SO-DIMM DDR3 2048MB PC3-8500**	See page 107
5MMDDR.4096-02	**SO-DIMM DDR3 4096MB PC3-8500**	See page 107

Table 8: Model numbers - Main memory

5.6 Drives

Model number	Short description	Note
5AC801.ADAS-00	**APC810 slide-in compact adapter** Adapter for operating compact slide-in drives in a slide-in slot drive slot (can only be used in slide-in slot 1).	See page 121
5AC801.HDDI-00	**APC810 slide-in compact HDD 40GB** 40 GB SATA hard disk (slide-in compact), 24/7 hard disk with extended temperature range.	See page 108
5AC801.HDDI-02	**APC810 slide-in compact HDD 160GB 24x7 ET** 160 GB SATA hard disk (slide-in compact), 24/7 hard disk with extended temperature range.	See page 111
5AC801.HDDI-03	**APC810 slide-in compact HDD 250GB (M5400.6)** 250 GB SATA hard disk (slide-in compact); 24/7 hard disk with extended temperature range.	See page 114
5AC801.HDDS-00	**APC810 slide-in HDD 40GB** 40 GB SATA hard disk (slide-in), 24/7 hard disk with extended temperature range.	See page 122
5AC801.SSDI-00	**APC810 slide-in compact SSD 32GB (SLC)** 32 GB SSD drive (slide-in)	See page 117
5AC801.DVDS-00	**APC810 slide-in DVD-ROM** DVD-ROM drive (slide-in)	See page 125

Table 9: Model numbers - Drives

Model number	Short description	Note
5AC801.DVRS-00	**APC810 slide-in DVD-R/RW** DVD-R/RW, DVD+R/RW drive (slide-in)	See page 128
5ACPCI.RAIC-03	**PCI SATA RAID System 2x160 GB** PCI RAID controller + 2 x 160 GB SATA hard disks; requires a free PCI slot.	See page 131
5ACPCI.RAIC-04	**Replacement SATA-HDD 160GB** Hard disk 160 GB SATA, replacement part for 5ACPCI.RAIC-03	See page 135
5ACPCI.RAIC-05	**PCI RAID system SATA 2x250GB (M5400.6)** PCI RAID controller + 2 x 250 GB SATA hard disks; requires a free PCI slot.	See page 138
5MMHDD.0250-00	**Replacement SATA-HDD 250GB (M5400.6)** Hard disk 250 GB SATA, replacement part for 5ACPCI.RAIC-03 and 5ACPCI.RAIC-05.	See page 142

Table 9: Model numbers - Drives (cont.)

5.7 Fan kits

Model number	Short description	Note
5PC810.FA01-00	**APC810 fan kit for system unit 5PC800.SX01-00** APC810 fan kit for system unit with 1CS, made up of 3 fans (40x40x10)	See page 145
5PC810.FA02-01	**APC810 fan kit for system unit 5PC800.SX02-00** APC810 fan kit for system unit with CS, made up of 2 fans (70x70x15)	See page 146
5PC810.FA03-00	**APC810 fan kit for system unit 5PC810.SX03-00** APC810 fan kit for system unit with 3CS, made up of 2 fans (70x70x15)	See page 146
5PC810.FA05-00	**APC810 fan kit for system unit 5PC800.SX05-00** APC810 fan kit for system unit with 5CS, made up of 3 fans (70x70x15)	See page 148

Table 10: Model numbers - Fan kits

5.8 AP Link cards

Model number	Short description	Note
5AC801.SDL0-00	**APC810 AP Link SDL transmitter** Automation Panel SDL link transmitter	See page 149
5AC801.RDYR-00	**APC810 Ready relay** APC810 Ready relay	See page 152

Table 11: Model numbers - AP Link

5.9 Add-on interfaces (IF option)

Model number	Short description	Note
5AC600.CANI-00	**Add-on CAN interface** CAN interface for installation in an APC620, APC800 or PPC700.	See page 154
5AC600.485I-00	**Add-on RS232/422/485 interface** Add-on RS232/422/485 interface for installation in an APC620, AP800 and PPC700.	See page 158

Table 12: Model numbers - Add-on interfaces (IF option)

5.10 Uninterruptible power supply

Model number	Short description	Note
5AC600.UPSI-00	**Add-on UPS module** Order UPS module for Automation PC, cable (5CAUPS.0005-00 or 5CAUPS.0030-00) and battery unit (5AC600.UPSB-00) separately.	See page 374
5AC600.UPSB-00	**Battery unit 5 Ah** UPS battery unit for the add-on UPS module	See page 374
5CAUPS.0005-00	**UPS cable 0.5 m** Connection cable between add-on UPS module and UPS battery unit, length 0.5 meters	See page 374
5CAUPS.0030-00	**UPS cable 3 m** Connection cable between add-on UPS module and UPS battery unit, length 3 meters	See page 374

Table 13: Model numbers - Uninterruptible power supply

5.11 Accessories

Model number	Short description	Note
0TB103.9	**Plug 24V 5.08 3-pin screw clamp** 24 VDC 3-pin connector, female. Screw clamps, 3.31 mm², protected against vibration by the screw flange	See page 347
0TB103.91	**Plug 24V 5.08 3-pin cage clamp** 24 VDC 3-pin connector, female. Cage clamps, 3.31 mm², protected against vibration by the screw flange	See page 347
0AC201.91	**Lithium batteries, 4 pcs**. Lithium batteries, 4 pcs., 3 V / 950 mAh, button cell	See page 349
4A0006.00-000	**Lithium battery, 1 pc.** Lithium battery, 1 pc., 3 V / 950 mAh, button cell	See page 349
5AC801.FA01-00	**APC810 replacement fan filter for system units with 1CS 5 pcs**	See page 350
5AC801.FA02-00	**APC810 replacement fan filter for system units with 2CS 5 pcs**	See page 350
5AC801.FA03-00	**APC810 replacement fan filter for system units with 3CS 5 pcs**	See page 350
5AC801.FA05-00	**APC810 replacement fan filter for system units with 5CS 5 pcs**	See page 350
5AC900.1000-00	**Adapter DVI-A/m to CRT DB15HD/f** Adapter DVI (plug) to CRT (socket), for connecting a standard monitor DVI-I interface.	See page 351
5CFCRD.0512-04	**CompactFlash 512 MB B&R** CompactFlash card with 512 MB SLC NAND flash and IDE/ATA interface	See page 352
5CFCRD.1024-04	**CompactFlash 1024 MB B&R** CompactFlash card with 1024 MB SLC NAND flash and IDE/ATA interface	See page 352
5CFCRD.2048-04	**CompactFlash 2048 MB B&R** CompactFlash card with 2048 MB SLC NAND flash and IDE/ATA interface	See page 352
5CFCRD.4096-04	**CompactFlash 4096 MB B&R** CompactFlash card with 4096 MB SLC NAND flash and IDE/ATA interface	See page 352

Table 14: Model numbers - Accessories

Model number	Short description	Note
5CFCRD.8192-04	**CompactFlash 8192 MB B&R** CompactFlash card with 8192 MB SLC NAND flash and IDE/ATA interface	See page 352
5CFCRD.016G-04	**CompactFlash 16 GB B&R** CompactFlash card with 16 GB SLC NAND flash and IDE/ATA interface	See page 352
5CFCRD.0064-03	**CompactFlash 64 MB SSI** CompactFlash card with 64 MB SLC NAND flash, and IDE/ATA interface	See page 357
5CFCRD.0128-03	**CompactFlash 128 MB SSI** CompactFlash card with 128 MB SLC NAND flash, and IDE/ATA interface	See page 357
5CFCRD.0256-03	**CompactFlash 256 MB SSI** CompactFlash card with 256 MB SLC NAND flash, and IDE/ATA interface	See page 357
5CFCRD.0512-03	**CompactFlash 512 MB SSI** CompactFlash card with 512 MB SLC NAND flash, and IDE/ATA interface	See page 357
5CFCRD.1024-03	**CompactFlash 1024 MB SSI** CompactFlash card with 1024 MB SLC NAND flash, and IDE/ATA interface	See page 357
5CFCRD.2048-03	**CompactFlash 2048 MB SSI** CompactFlash card with 2048 MB SLC NAND flash, and IDE/ATA interface	See page 357
5CFCRD.4096-03	**CompactFlash 4096 MB SSI** CompactFlash card with 4096 MB SLC NAND flash, and IDE/ATA interface	See page 357
5CFCRD.8192-03	**CompactFlash 8192 MB SSI** CompactFlash card with 8,192 MB SLC NAND flash, and IDE/ATA interface	See page 357
5MD900.USB2-01	**USB 2.0 drive DVD-RW/CD-RW FDD CF USB** USB 2.0 drive combination; Consists of DVD-R/RW/DVD+R/RW/CD-RW, FDD, CompactFlash slot (type II), USB connection (type A front side, type B back side); 24 VDC.	See page 361
5A5003.03	**Front cover for the USB Media Drive 5MD900.USB2-01** Front cover for the remote USB 2.0 drive combination 5MD900.USB2-01.	See page 367
5MMUSB.2048-00	**USB flash drive 2 GB SanDisk** USB 2.0 flash drive 2 GB	See page 369
5MMUSB.2048-01	**USB flash drive 2 GB B&R** USB 2.0 flash drive 2 GB	See page 369
0PS102.0	**Power supply, 1-phase, 2.1 A** 24 VDC power supply, 1-phase, 2.1 A, input 100-240 VAC, wide range, DIN rail mounting	See page 383
0PS104.0	**Power supply, 1-phase, 4.2 A** 24 VDC power supply, 1 phase, 4.2 A, input 115/230 VAC, auto select, DIN rail mounting	See page 383
0PS105.1	**Power supply, 1-phase, 5 A** 24 VDC power supply, 1 phase, 5 A, input 115/230 VAC, manual select, DIN rail mounting	See page 383
0PS105.2	**Power supply, 1-phase, 5 A, redundant** 24 VDC power supply, 1 phase, 5 A, redundant through parallel operation, input 115/230 VAC, manual select, DIN rail mounting	See page 383
0PS110.1	**Power supply, 1-phase, 10 A** 24 VDC power supply, 1 phase, 10 A, input 115/230 VAC, manual select, DIN rail mounting	See page 383
0PS110.2	**Power supply, 1-phase, 10 A, redundant** 24 VDC power supply, 1 phase, 10 A, redundant through parallel operation, input 115/230 VAC, manual select, DIN rail mounting	See page 383
0PS120.1	**Power supply, 1-phase, 20 A** 24 VDC power supply, 1 phase, 20 A, input 115/230 VAC, auto select, DIN rail mounting	See page 383

Table 14: Model numbers - Accessories (cont.)

Model number	Short description	Note
0PS305.1	**Power supply, 3-phase, 5 A** 24 VDC power supply, 3-phase, 5 A, input 400..500 VAC (3 phases), wide range, DIN rail mounting	See page 383
0PS310.1	**Power supply, 3-phase, 10 A** 24 VDC power supply, 3-phase, 10 A, input 400..500 VAC (3 phases), wide range, DIN rail mounting	See page 383
0PS320.1	**Power supply, 3-phase, 20 A** 24 VDC power supply, 3-phase, 20 A, input 400..500 VAC (3 phases), wide range, DIN rail mounting	See page 383
0PS340.1	**Power supply, 3-phase, 40 A** 24 VDC power supply, 3-phase, 40 A, input 400..500 VAC (3 phases), wide range, DIN rail mounting	See page 383
5ACPCI.ETH1-01	**PCI Ethernet card 10/100** half size PCI Ethernet card, 1 Ethernet connection	See page 385
5ACPCI.ETH3-01	**PCI Ethernet card 10/100 3port** half size PCI Ethernet card, 3 Ethernet connections	See page 388
5SWHMI.0000-00	**HMI Drivers & Utilities DVD** Contains drivers, utilities, software upgrades and user's manuals for B&R panel system products (see B&R homepage – Industrial PCs, Visualization and Operation).	See page 421
5CAMSC.0001-00	**APC810 internal supply cable**	See page 416
5AC801.FRAM-00	**HDD replacement tray** APC810 SATA hard disk replacement tray	See page 417
5AC801.RDYR-01	**APC810 Ready relay /2** Ready relay for APC810 for installation on an add-on UPS slot	See page 419

Table 14: Model numbers - Accessories (cont.)

5.12 Software

Model number	Short description	Note
9S0000.01-010	**OEM MS-DOS 6.22 German (disk)** OEM MS-DOS 6.22 German disks Only delivered with a new PC.	See page 293
9S0000.01-020	**OEM MS-DOS 6.22 English (disk)** OEM MS-DOS 6.22 English disks Only delivered with a new PC.	See page 293
5SWWXP.0600-ENG	**WinXP Professional with SP3, GER** Microsoft OEM Windows XP Professional Service Pack 3, CD, German. Only available with a new device.	See page 295
5SWWXP.0600-GER	**WinXP Professional with SP3, ENG** Microsoft OEM Windows XP Professional Service Pack 3, CD, English. Only available with a new device.	See page 295
5SWWXP.0600-MUL	**WinXP Professional with SP3, MUL** Microsoft OEM Windows XP Professional Service Pack 3, CD, multi-language. Only available with a new device.	See page 295
5SWWXP.0500-ENG	**WinXP Professional with SP 2c, GER** Microsoft OEM Windows XP Professional Service Pack 2c, CD, German. Only available with a new device.	See page 295

Table 15: Model numbers - Software

Model number	Short description	Note
5SWWXP.0500-GER	**WinXP Professional with SP 2c, ENG** Microsoft OEM Windows XP Professional Service Pack 2c, CD, English. Only available with a new device.	See page 295
5SWWXP.0500-MUL	**WinXP Professional with SP 2c, MUL** Microsoft OEM Windows XP Professional Service Pack 2c, CD, multi-language. Only available with a new device.	See page 295
5SWWI7.0100-GER	**Win7 Pro 32-bit DVD, GER** Microsoft OEM Windows 7 Professional 32-bit, DVD, German. Only available with a new device.	See page 298
5SWWI7.0100-ENG	**Win7 Pro 32-bit DVD, ENG** Microsoft OEM Windows 7 Professional 32-bit, DVD, English. Only available with a new device.	See page 298
5SWWI7.0200-GER	**Win7 Pro 64-bit DVD, GER** Microsoft OEM Windows 7 Professional 64-bit, DVD, German. Only available with a new device.	See page 298
5SWWI7.0200-ENG	**Win7 Pro 64-bit DVD, ENG** Microsoft OEM Windows 7 Professional 64-bit, DVD, English. Only available with a new device.	See page 298
5SWWI7.0300-MUL	**Win7 Ult 32-bit DVD, MUL** Microsoft OEM Windows 7 Ultimate 32-bit, DVD, Multilanguage. Only available with a new device.	See page 298
5SWWI7.0400-MUL	**Win7 Ult 64-bit DVD, MUL** Microsoft OEM Windows 7 Ultimate 64-bit, DVD, Multilanguage. Only available with a new device.	See page 298
5SWWXP.0733-ENG	**WES2009 APC810 GM45** Microsoft OEM Windows XP Embedded Standard 2009, English; for APC810 with CPU board 5PC800.BM45-00; order CompactFlash separately (at least 1 GB).	See page 301
5SWWI7.0533-ENG	**Windows Embedded Standard 7 APC810 GM45** Microsoft OEM Windows Embedded Standard 7 32-bit, English; for APC810 with GM45 chipset; order CompactFlash separately (at least 16 GB)	
5SWWI7.0633-ENG	**Windows Embedded Standard 7 APC810 GM45** Microsoft OEM Windows Embedded Standard 7 64-bit, English; for APC810 with GM45 chipset; order CompactFlash separately (at least 16 GB)	
5SWWI7.0733-MUL	**Windows Embedded Standard 7 Premium APC810 GM45** Microsoft OEM Windows Embedded Standard 7 Premium 32-bit, multilanguage; for APC810 with GM45 chipset; order CompactFlash separately (at least 8 GB)	
5SWWI7.0833-MUL	**Windows Embedded Standard 7 Premium APC810 GM45** Microsoft OEM Windows Embedded Standard 7 Premium 64-bit, multilanguage; for APC810 with GM45 chipset; order CompactFlash separately (at least 16 GB)	

Table 15: Model numbers - Software

6. Typical topology

6.1 APC810 for central control and visualization

The control program runs on the APC810 parallel to Windows. The visualization project is integrated with Visual Components. Up to four display units are connected to the PC either locally or remotely. The PC is networked over Ethernet TCP/IP; additional Power Panel-based operator terminals can also be connected via Ethernet. Fieldbus systems (CAN bus, POWERLINK) are used to handle communication to I/O systems with axis control.

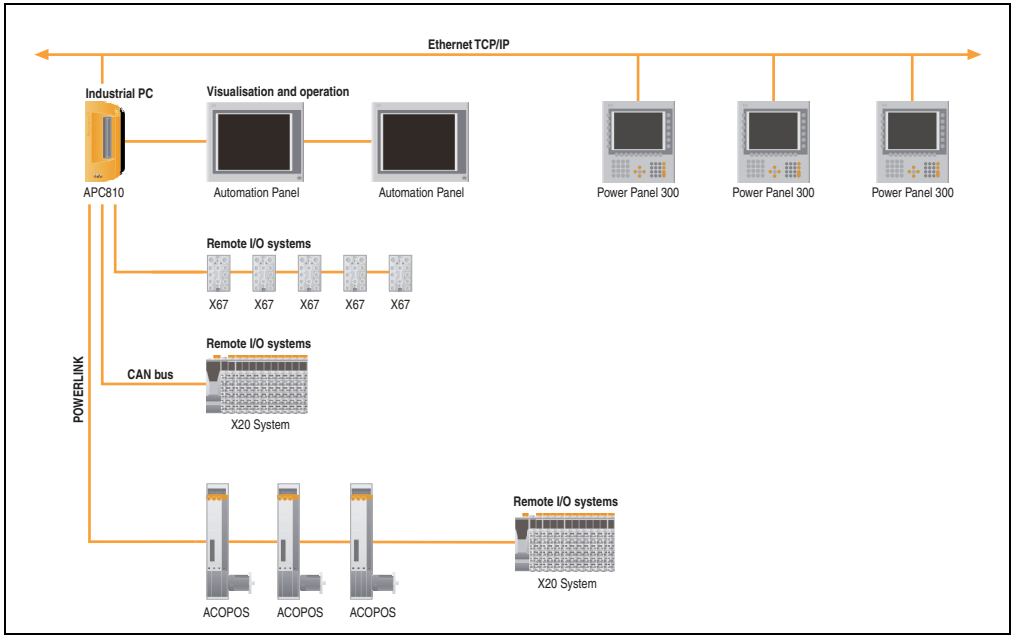


Figure 1: APC810 for central control and visualization

6.2 APC810 as a visualization device

The visualization runs as a SCADA application on the APC810. Up to four display units are connected to the PC either locally or remotely. The control tasks interact with one or more underlying PLC stations where I/O systems and drives are connected locally or remotely over fieldbus systems. Additional SCADA stations can be networked via Ethernet TCP/IP.

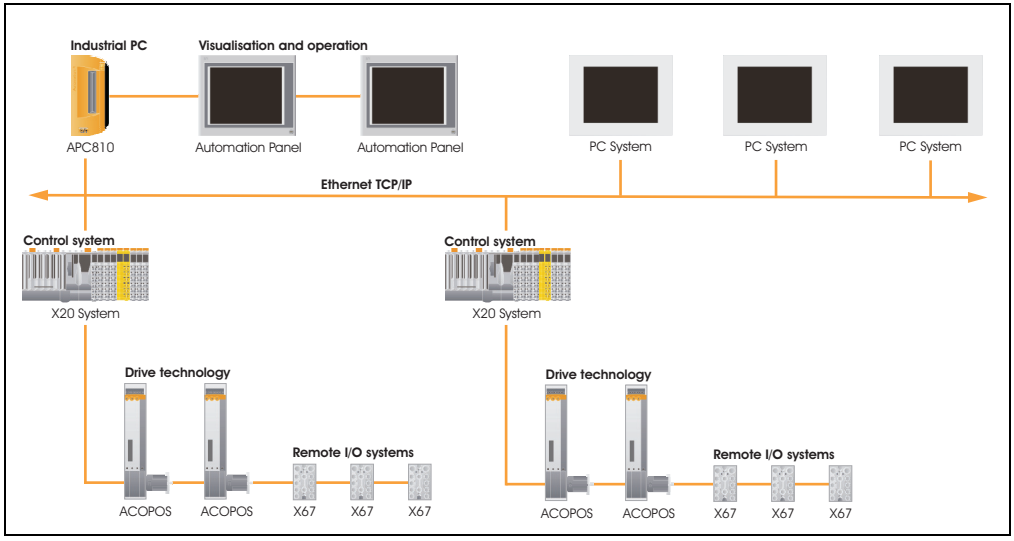


Figure 2: APC810 as a visualization device

Chapter 2 • Technical data

1. Introduction

The APC810 is the sophisticated upgrade to the APC620 product series. Based on the latest Intel® Core™2 Duo technology, the APC810 offers the highest level of performance for any application that requires maximum computing power.

The APC810 saves space in the control cabinet. Drive inserts (DVD, HDD) and two CompactFlash slots are protected behind a cover on the front of the device (only one CF slot can be used with the GM45 CPU board). The modular plug-in technology makes it easy for the user to switch drives. All connections and interfaces are located on the top side of the housing. The installation depth is not increased by protruding connectors. The different APC810 sizes with one, two or five card slots (for PCI/PCI Express cards) provide the optimum design for every type of installation - a perfect fit without wasting valuable space in the control cabinet.

1.1 Features

- Latest processor technology - Core 2 Duo
- Up to 8 GB main memory (Dual Channel Memory Support)
- 1 CompactFlash slot (type I)
- 1, 2 or 5 card slots (for PCI / PCI Express (PCIe) cards)
- SATA drives (slide-in and slide-in compact slots)
- 5x USB 2.0
- 2x Ethernet 10/100/1000 Mbit interfaces
- 2x RS232 Interface, modem compatible
- 24 VDC supply voltage
- BIOS (AMI)
- Real-time clock, RTC (battery-buffered)
- 512 KB SRAM (with battery back-up)
- Connection of various display devices to the "Monitor/Panel" video output (supports RGB, DVI, and SDL - Smart Display Link - signals)
- 2nd graphics line with installation of the optional AP Link card
- Easy slide-in drive exchange (SATA hot plug capable)
- Optional installation of the add-on UPS module
- Optional CAN interface
- Optional RS232/422/485 interface
- Optional RAID controller (requires an open PCI slot)

1.2 System components / configuration

The AP810 system can be assembled to meet individual requirements and operating conditions.

The following components are absolutely essential for operation:

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

1.3 Configuration - Basic system

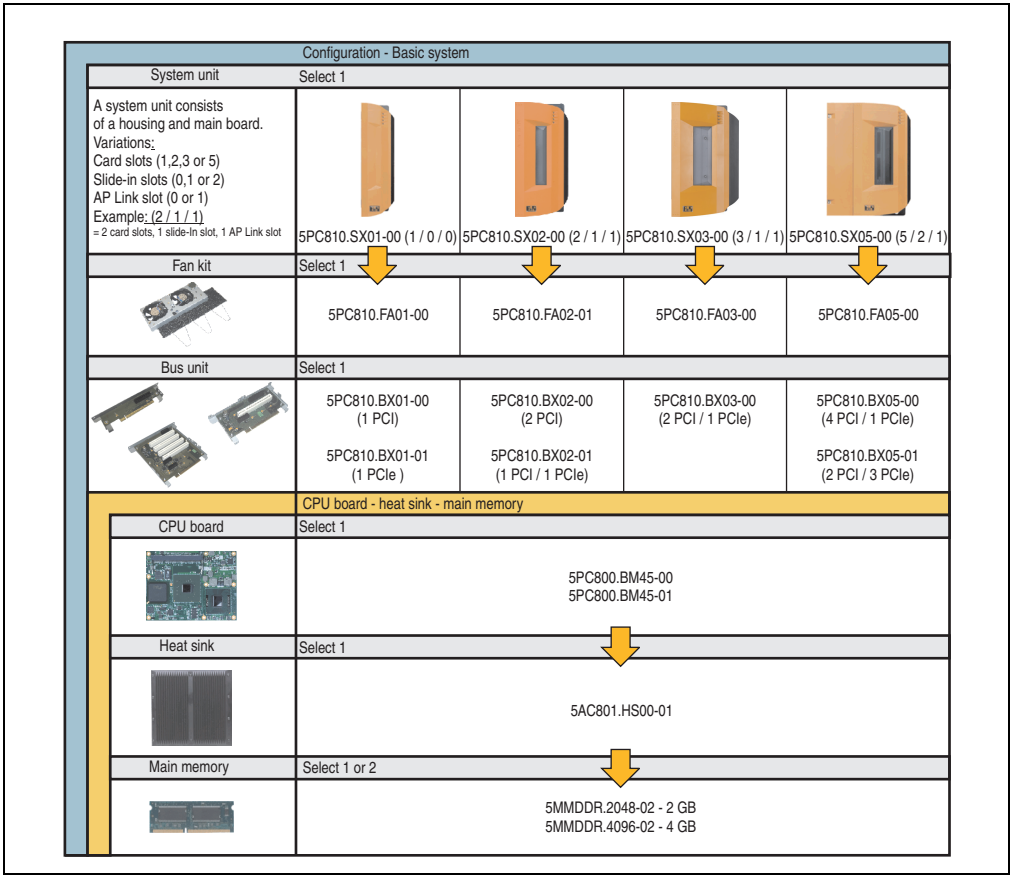


Figure 3: Configuration - Basic system

1.4 Configuration - Drives, software, accessories

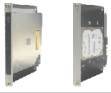
Configuration - Drives, software, accessories				
System unit				
A system unit consists of a housing and main board. Variations: Card slots (1,2,3 or 5) Slide-in slots (0,1 or 2) AP Link slot (0 or 1) Example: (2 / 1 / 1) = 2 card slots, 1 slide-in slot, 1 AP Link slot	 5PC810.SX01-00 (1 / 0 / 0)	 5PC810.SX02-00 (2 / 1 / 1)	 5PC810.SX03-00 (3 / 1 / 1)	 5PC810.SX05-00 (5 / 2 / 1)
Slide-in compact drive	Select 1			
	5AC801.HDDI-00 (40 GB) 5AC801.HDDI-02 (160 GB) 5AC801.SSDI-00 (32 GB)			
CompactFlash	Select 1 or 2			
	5CFCRD.0512-04, 5CFCRD.1024-04, 5CFCRD.2048-04, 5CFCRD.4096-04, 5CFCRD.8192-04, 5CFCRD.016G-04	5CFCRD.0064-03, 5CFCRD.0128-03, 5CFCRD.0256-03, 5CFCRD.0512-03, 5CFCRD.1024-03, 5CFCRD.2048-03, 5CFCRD.4096-03, 5CFCRD.8192-03		
Slide-in drive	Not possible	1 possible	2 possible	
		5AC801.HDDS-00 (40 GB) 5AC801.DVDS-00 (DVD Laufwerk) 5AC801.ADAS-00 (Adapter) 5AC801.DVRS-00 (DVD Brenner)		
AP Link slot		Select 1		
		5AC801.SDL0-00 (for 2nd graphics graphics line) 5AC801.RDYR-00 (Ready relay)		
RAID system	Select 1			
	5ACPCI.RAIC-03 (2x160 GB, occupies 1 PCI slot) 5ACPCI.RAIC-04 (replacement SATA-HDD 160GB)			
Interface option	Select 1			
	5AC600.CANI-00 (CAN) 5AC600.485I-00 (combined RS232/RS422/RS485)			
UPS module + battery	Select 1			
	5AC600.UPSI-00 (Add-on UPS module) + 5AC600.UPSB-00 (UPS battery unit) Connection cable APC -> Battery: 5CAUPS.0005-00 (0.5 meters) or 5CAUPS.0030-00 (3 meters)			
Spannungsversorgungsstecker	Select 1			
	0TB103.9 (screw clamp) 0TB103.91 (cage clamp)			
Software	Select 1			
Microsoft Windows XP Professional Microsoft Windows XP Embedded	5SWWXP.0600-GER (XP Pro SP3 German) 5SWWXP.0600-ENG (XP Pro SP3 English) 5SWWXP.0600-MUL (XP Pro SP3 Multilanguage)	5SWWXP.0733-ENG (WES 2009) 9S0000.01-010 (MS-DOS 6.22 German) 9S0000.01-020 (MS-DOS 6.22 English)		

Figure 4: Configuration - Drives, software, accessories

2. Entire device

2.1 Overview of APC810 1 card slot variations

2.1.1 Interfaces

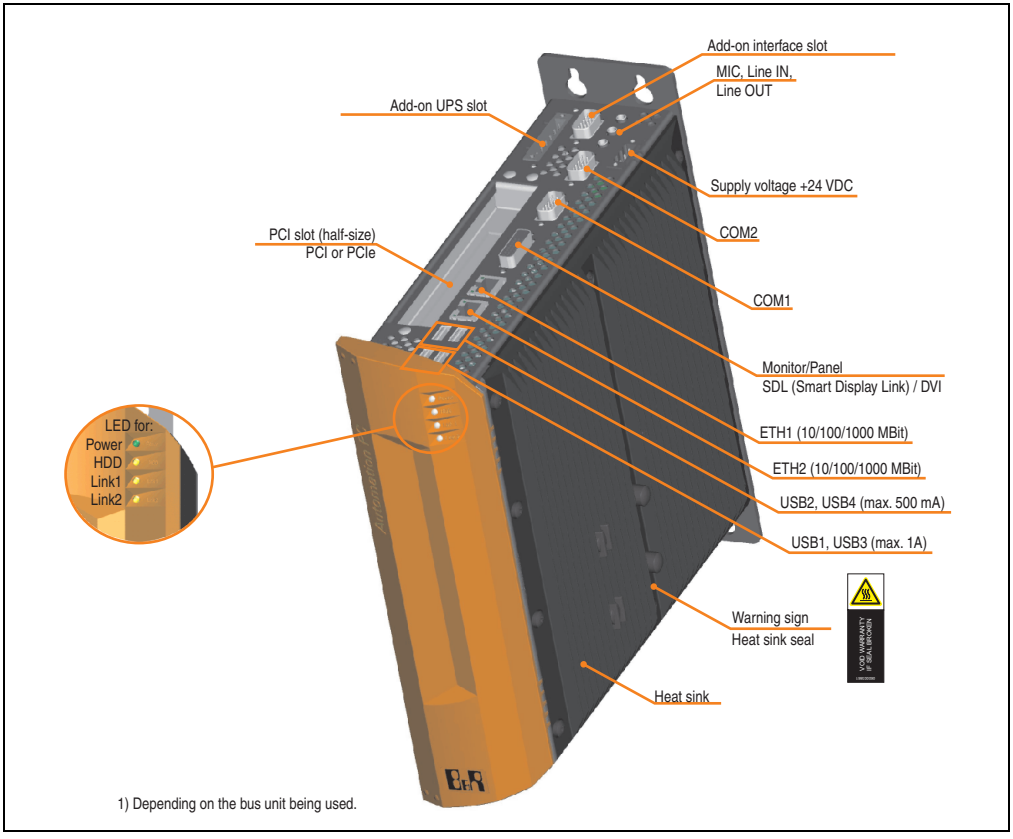


Figure 5: Interface overview - APC810, 1 card slot variant (top)

Warning!

Do not remove mounting screws from the heat sink, as it is connected to the processor and chipset by a thermal coupling. If this connection is broken, the APC810 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").

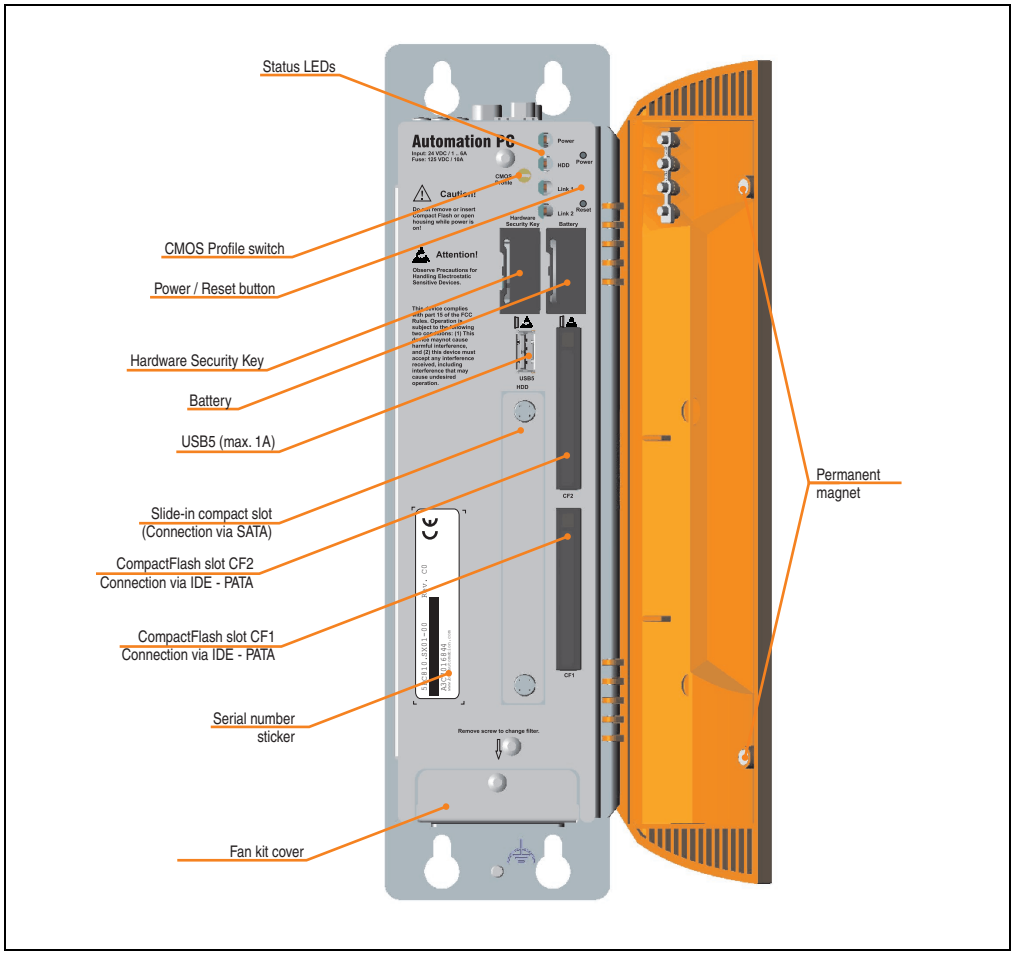


Figure 6: Interface overview - APC810, 1 card slot variant (front)

Information:

The orange front doors contain two permanent magnets. Contact between a data carrier that saves data magnetically (hard disk, diskette, the magnetic strip of a credit card, etc.) and a magnet can cause loss of data.

2.1.2 Technical data

Features	5PC810.SX01-00
B&R ID code	$A3ED
Boot loader / Operating system	BIOS
Processor Cooling Method	Component-dependent, see technical data for the "CPU boards GM45", on page 105 Passive via heat sink and supported with an active fan kit
Main memory	Max. 8 GB
Graphics Controller	 Component-dependent, see technical data for the "CPU boards GM45", on page 105
Power failure logic Controller Buffer time	 MTCX[1] (see also page 456) 10 ms
Real-time clock (RTC) Battery-buffered Accuracy	 Yes see technical data of the "CPU boards GM45", on page 105
SRAM Battery-buffered Size Remanent variables for AR (Automation Runtime) in power fail mode	 Yes 512 kB 192 kB
Battery Type removable Service life	See also page 94 Renata 950 mAh Yes, accessible behind the orange front doors 2½ years[2]
Ethernet Amount Speed Controller	 2 10/100/1000 Mbit/s See also page 83 or page 84
CAN bus	Optional using add-on interface (5AC600.CANI-00)
CompactFlash Type Amount	See also page 96 or page 97 Type I 1
Serial interface Amount Type UART Transfer rate Connection	See also page 81 or page 82 2 RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Amount Transfer rate Connection Current load	Also see page 85 USB 2.0 5 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) Type A Max. 500 mA or 1 A per connection
Reset button	Yes, accessible behind the orange front doors
LEDs	4 directed outwards via fiber optic lines, also see section "Status LEDs", on page 91
Buzzer	Yes

Table 16: Technical data - APC810, 1 card slot variant

Features	5PC810.SX01-00
Card slots Amount half-size	See also section "Card slot (PCI / PCIe)", on page 90 1 Dimensions of the PCI / PCIe cards vary
Add-on UPS slot	Yes
AP Link slot	-
Electrical characteristics	
Power supply Rated voltage Rated current Starting current Power consumption	 24 VDC ±25% 6 A Typ. 7 A, max. 50 A < 300µs Component-dependent, see section "Power calculation with 5PC810.SX01-00 revision >= D0", on page 64
Mechanical characteristics	
Housing[3)] Material Paint Front cover	 Galvanized plate, plastic Light gray (similar to Pantone 427CV), dark gray (similar to Pantone 432CV) Colored orange plastic (similar to Pantone 144CV)
Outer dimensions	See "Dimensions - APC810 1 card slot variant", on page 43
Weight	Approx. 2.2 kg (component-dependent)
Environmental characteristics	
Ambient temperature Operation Bearings Transport	 Component-dependent - see section 2.5 "Ambient temperatures", on page 59 -20 to +60°C -20 to +60°C
Relative humidity Operation Bearings Transport	 Component-dependent, see section "Humidity specifications", on page 62 Component-dependent, see section "Humidity specifications", on page 62 Component-dependent, see section "Humidity specifications", on page 62
Vibration[4)] Operation (continuous) Operation (occasional) Bearings Transport	 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock[4)] Operation Bearings Transport	 15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Protection	IP20
Altitude Operation	 max. 3000 m[5)] (component-dependent)

Table 16: Technical data - APC810, 1 card slot variant (cont.)

1) Maintenance controller extended.
2) At 50°C, 8.5 µA of the supplied components and a self discharge of 40%.
3) Depending on the process or batch, there may be visible deviations in the color and surface structure.
4) Maximum values, as long as no other individual component specifies any other.
5) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

2.1.3 Dimensions

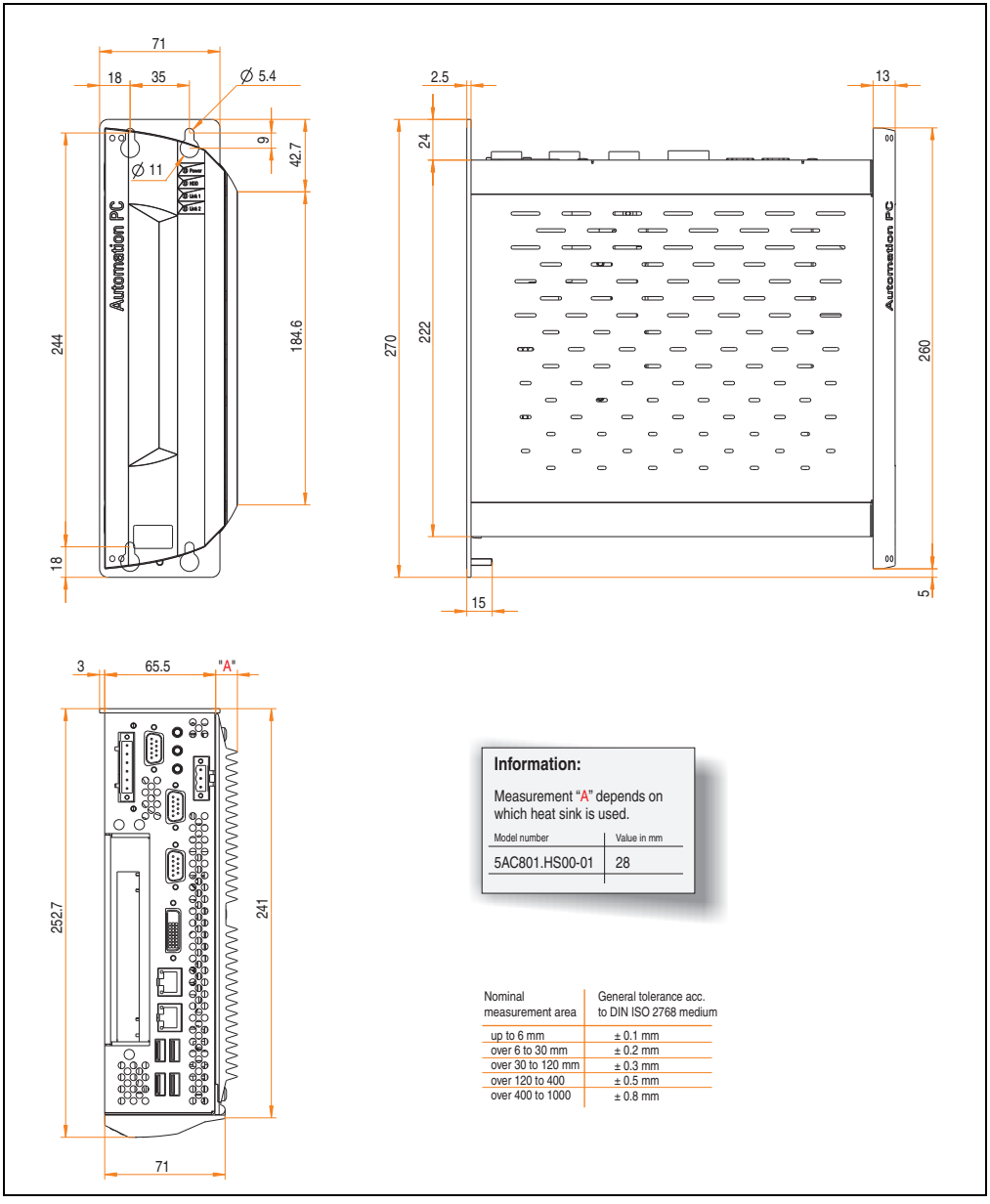


Figure 7: Dimensions - APC810 1 card slot variant

2.2 Overview of APC810 2 card slot variations

2.2.1 Interfaces

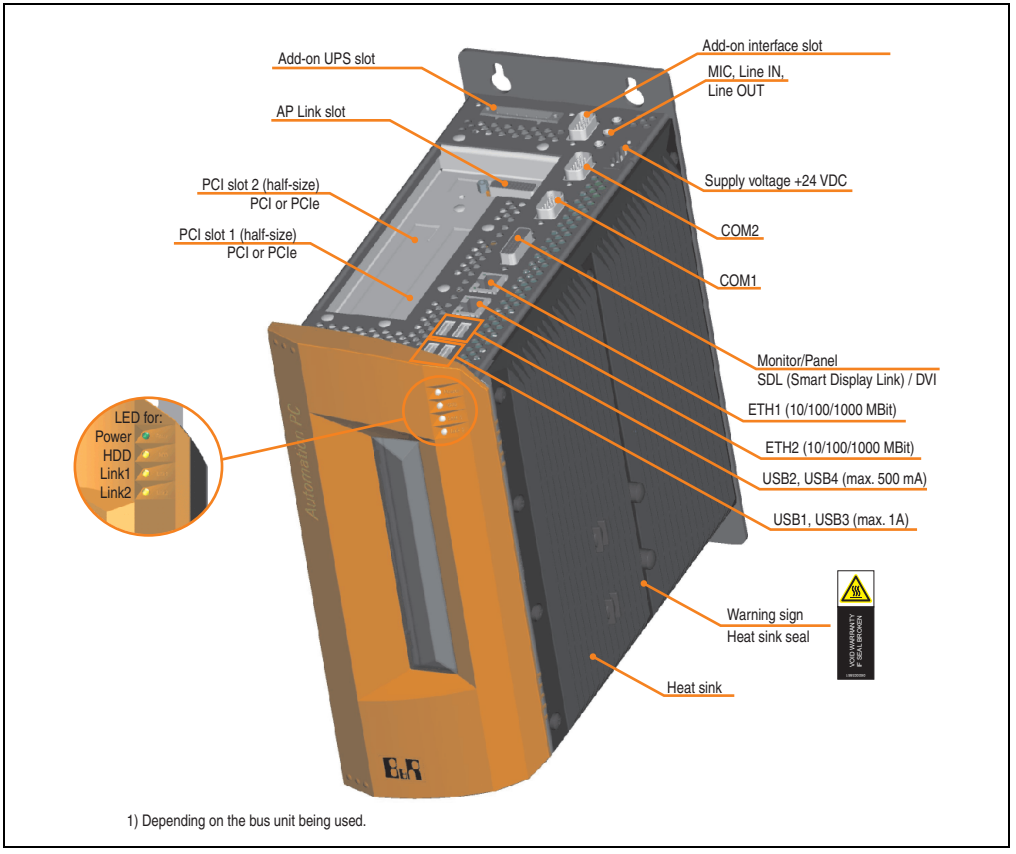


Figure 8: Interface overview - APC810, 2 card slot variant (top)

Warning!

Do not remove mounting screws from the heat sink, as it is connected to the processor and chipset by a thermal coupling. If this connection is broken, the APC810 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").

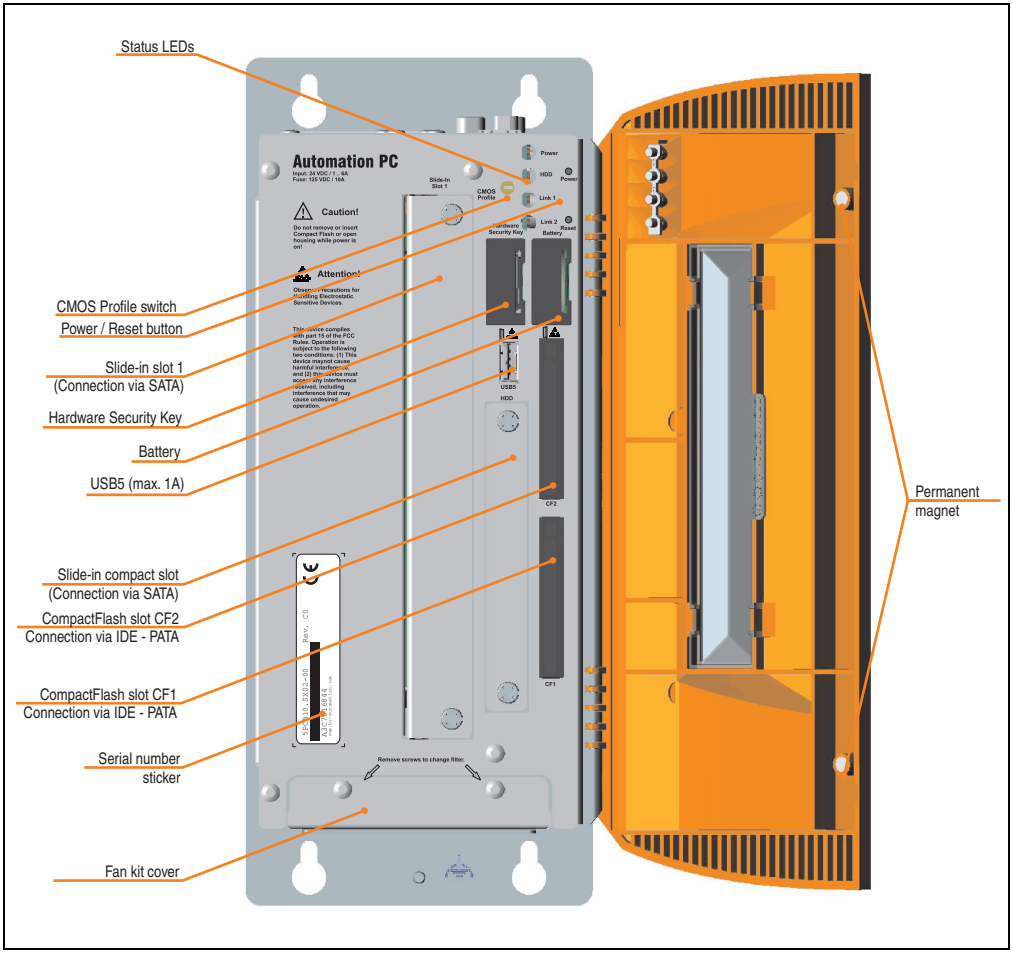


Figure 9: Interface overview - APC810, 2 card slot variant (front)

Information:

The orange front doors contain two permanent magnets. Contact between a data carrier that saves data magnetically (hard disk, diskette, the magnetic strip of a credit card, etc.) and a magnet can cause loss of data.

2.2.2 Technical data

Features	5PC810.SX02-00
B&R ID code	$A3C7
Boot loader / Operating system	BIOS
Processor Cooling Method	Component-dependent, see technical data for the "CPU boards GM45", on page 105 Passive via heat sink and supported with an active fan kit
Main memory	Max. 8 GB
Graphics Controller	 Component-dependent, see technical data for the "CPU boards GM45", on page 105
Power failure logic Controller Buffer time	 MTCX[1] (see also page 456) 10 ms
Real-time clock (RTC) Battery-buffered Accuracy	 Yes see technical data of the "CPU boards GM45", on page 105
SRAM Battery-buffered Size Remanent variables for AR (Automation Runtime) in power fail mode	 Yes 512 kB 192 kB
Battery Type removable Service life	See also page 94 Renata 950 mAh Yes, accessible behind the orange front doors 2½ years[2]
Ethernet Amount Speed Controller	 2 10/100/1000 Mbit/s See also page 83 or page 84
CAN bus	Optional using add-on interface (5AC600.CANI-00)
CompactFlash Type Amount	See also page 96 or page 97 Type I 1
Serial interface Amount Type UART Transfer rate Connection	See also page 81 or page 82 2 RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Amount Transfer rate Connection Current load	Also see page 85 USB 2.0 5 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) Type A Max. 500 mA or 1 A per connection
Reset button	Yes, accessible behind the orange front doors
LEDs	4 directed outwards via fiber optic lines, also see section "Status LEDs", on page 91
Buzzer	Yes

Table 17: Technical data - APC810, 2 card slot variant

Features	5PC810.SX02-00
Card slots Amount half-size	See also section "Card slot (PCI / PCIe)", on page 90 2 Dimensions of the PCI / PCIe cards vary
Add-on UPS slot	Yes
AP Link slot	Yes
Electrical characteristics	
Power supply Rated voltage Rated current Starting current Power consumption	 24 VDC ±25% 6 A Typ. 7 A, max. 50 A < 300µs Component-dependent, see section "Power calculation with 5PC810.SX02-00 revision>= D0", on page 66
Mechanical characteristics	
Housing[3)] Material Paint Front cover	 Galvanized plate, plastic Light gray (similar to Pantone 427CV), dark gray (similar to Pantone 432CV) Colored orange plastic (similar to Pantone 144CV)
Outer dimensions	See "Dimensions - APC810 2 card slot variant", on page 48
Weight	Approx. 2.8 kg (component-dependent)
Environmental characteristics	
Ambient temperature Operation Bearings Transport	 Component-dependent - see section 2.5 "Ambient temperatures", on page 59 -20 to +60°C -20 to +60°C
Relative humidity Operation Bearings Transport	 Component-dependent, see section "Humidity specifications", on page 62 Component-dependent, see section "Humidity specifications", on page 62 Component-dependent, see section "Humidity specifications", on page 62
Vibration[4)] Operation (continuous) Operation (occasional) Bearings Transport	 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock[4)] Operation Bearings Transport	 15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Protection	IP20
Altitude Operation	 max. 3000 m[5)] (component-dependent)

Table 17: Technical data - APC810, 2 card slot variant (cont.)

1) Maintenance controller extended.

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

3) Depending on the process or batch, there may be visible deviations in the color and surface structure.

4) Maximum values, as long as no other individual component specifies any other.

5) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

2.2.3 Dimensions

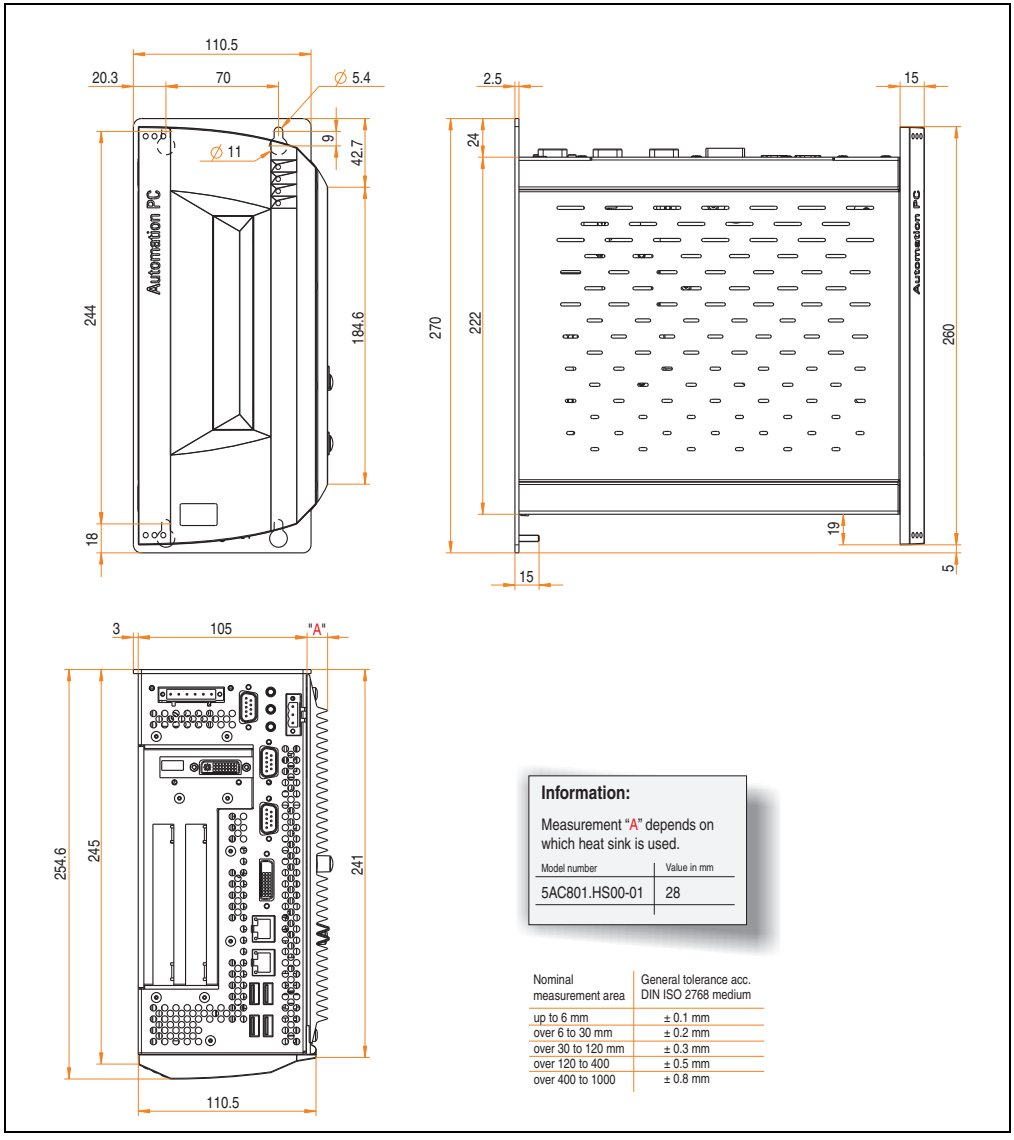


Figure 10: Dimensions - APC810 2 card slot variant

2.3 Overview of APC810 3 card slot variations

2.3.1 Interfaces

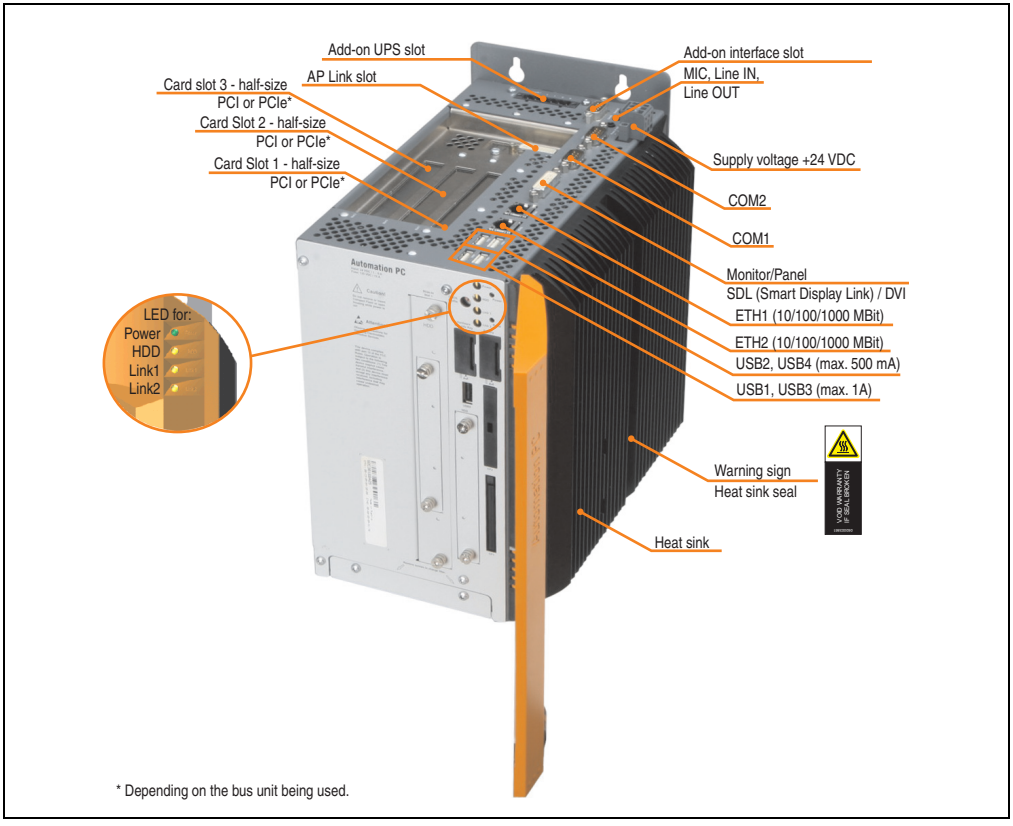


Figure 11: Interface overview - APC810, 3 card slot variant (top)

Warning!

Do not remove mounting screws from the heat sink, as it is connected to the processor and chipset by a thermal coupling. If this connection is broken, the APC810 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").

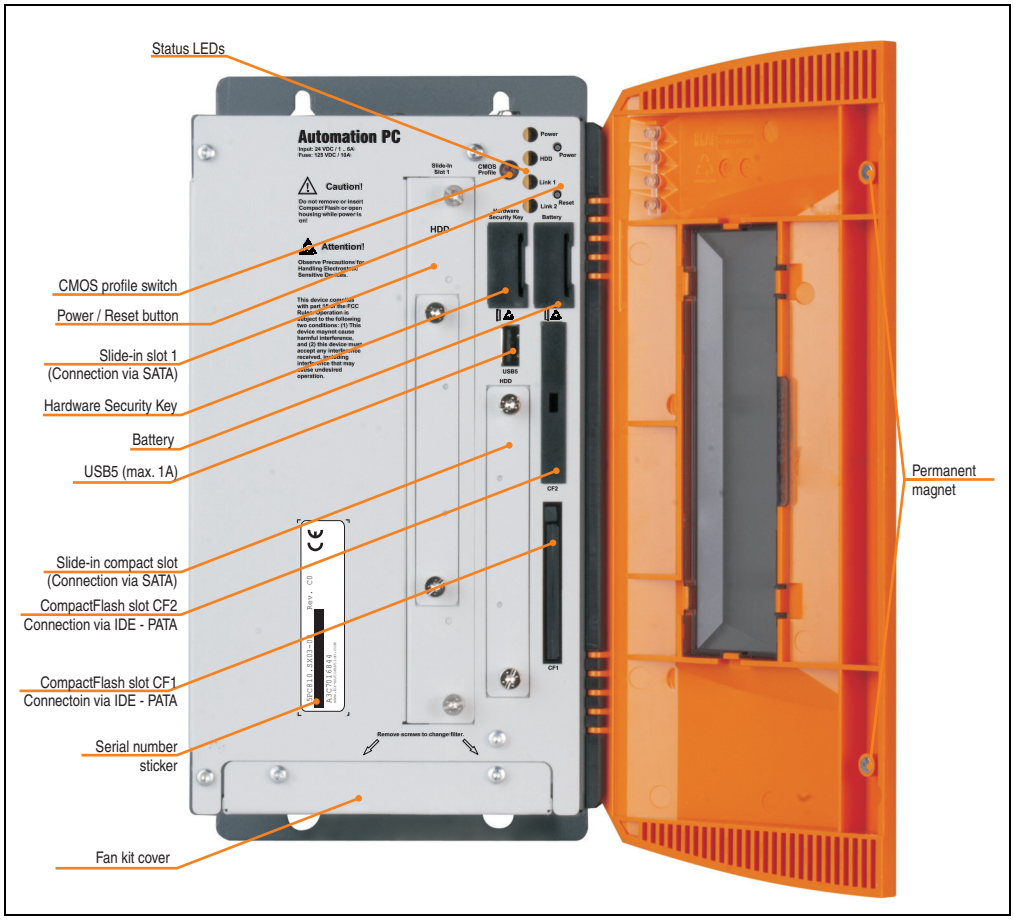


Figure 12: Interface overview - APC810, 3 card slot variant (front)

Information:

The orange front doors contain two permanent magnets. Contact between a data carrier that saves data magnetically (hard disk, diskette, the magnetic strip of a credit card, etc.) and a magnet can cause loss of data.

2.3.2 Technical data

Features	5PC810.SX03-00
B&R ID code	$B2C3
Boot loader / Operating system	BIOS
Processor Cooling Method	Component-dependent, see technical data for the "CPU boards GM45", on page 105 Passive via heat sink and optionally supported with an active fan kit
Main memory	Max. 8 GB
Graphics Controller	 Component-dependent, see technical data for the "CPU boards GM45", on page 105
Power failure logic Controller Buffer time	 MTCX[1] (see also page 456) 10 ms
Real-time clock (RTC) Battery-buffered Accuracy	 Yes see technical data of the "CPU boards GM45", on page 105
SRAM Battery-buffered Size Remanent variables for AR (Automation Runtime) in power fail mode	 Yes 512 kB 192 kB
Battery Type removable Service life	See also page 94 Renata 950 mAh Yes, accessible behind the orange front doors 2 1/2 years[2]
Ethernet Amount Speed Controller	 2 10/100/1000 Mbit/s See also page 83 or page 84
CAN bus	Optional using add-on interface (5AC600.CANI-00)
CompactFlash Type Amount	See also page 96 or page 97 Type I 2
Serial interface Amount Type UART Transfer rate Connection	See also page 81 or page 82 2 RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Amount Transfer rate Connection Current load	Also see page 85 USB 2.0 5 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) Type A Max. 500 mA or 1 A per connection
Reset button	Yes, accessible behind the orange front doors
LEDs	4 directed outwards via fiber optic lines, also see section "Status LEDs", on page 91
Buzzer	Yes

Table 18: Technical data - APC810, 3 card slot variant

Features	5PC810.SX03-00
Card slots Amount half-size	See also section "Card slot (PCI / PCIe)", on page 90 3 Dimensions of the PCI / PCIe cards vary
Add-on UPS slot	Yes
AP Link slot	Yes
Electrical characteristics	
Power supply Rated voltage Rated current Starting current Power consumption	 24 VDC ±25% 6 A Typ. 7 A, max. 50 A < 300µs Component-dependent, see section "Power calculation with 5PC810.SX03-00", on page 68
Mechanical characteristics	
Housing[3)] Material Paint Front cover	 Galvanized plate, plastic Light gray (similar to Pantone 427CV), dark gray (similar to Pantone 432CV) Colored orange plastic (similar to Pantone 144CV)
Outer dimensions	See "Dimensions - APC810 3 card slot variant", on page 53
Weight	Approx. 3.2 kg (component-dependent)
Environmental characteristics	
Ambient temperature Operation Bearings Transport	 Component-dependent - see section 2.5 "Ambient temperatures", on page 59 -20 to +60°C -20 to +60°C
Relative humidity Operation Bearings Transport	 Component-dependent, see section "Humidity specifications", on page 62 Component-dependent, see section "Humidity specifications", on page 62 Component-dependent, see section "Humidity specifications", on page 62
Vibration[4)] Operation (continuous) Operation (occasional) Bearings Transport	 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock[4)] Operation Bearings Transport	 15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Protection	IP20
Altitude Operation	 max. 3000 m[5)] (component-dependent)

Table 18: Technical data - APC810, 3 card slot variant (cont.)

1) Maintenance controller extended.

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

3) Depending on the process or batch, there may be visible deviations in the color and surface structure.

4) Maximum values, as long as no other individual component specifies any other.

5) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

2.3.3 Dimensions

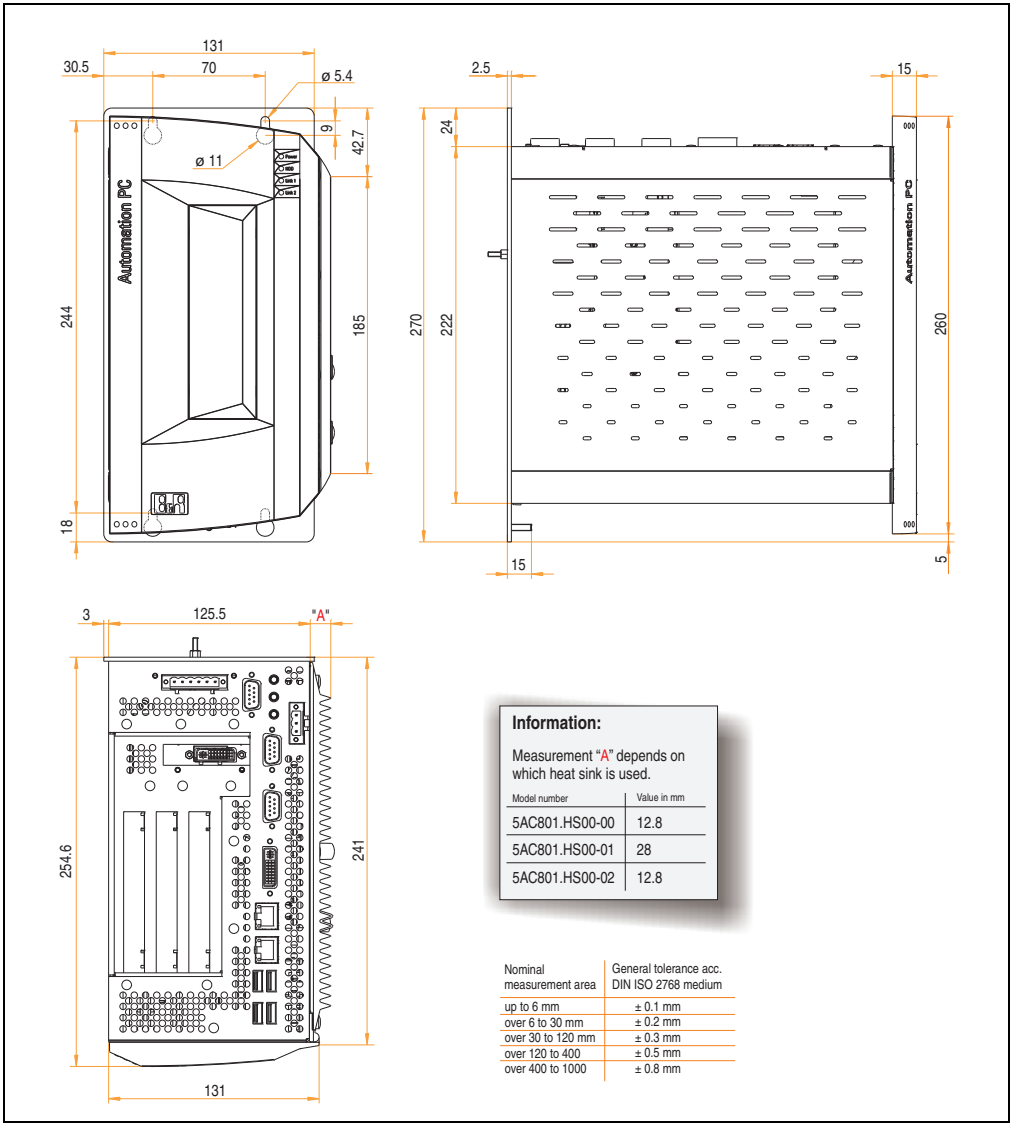


Figure 13: Dimensions - APC810 3 card slot variant

2.4 Overview of APC810 5 card slot variations

2.4.1 Interfaces

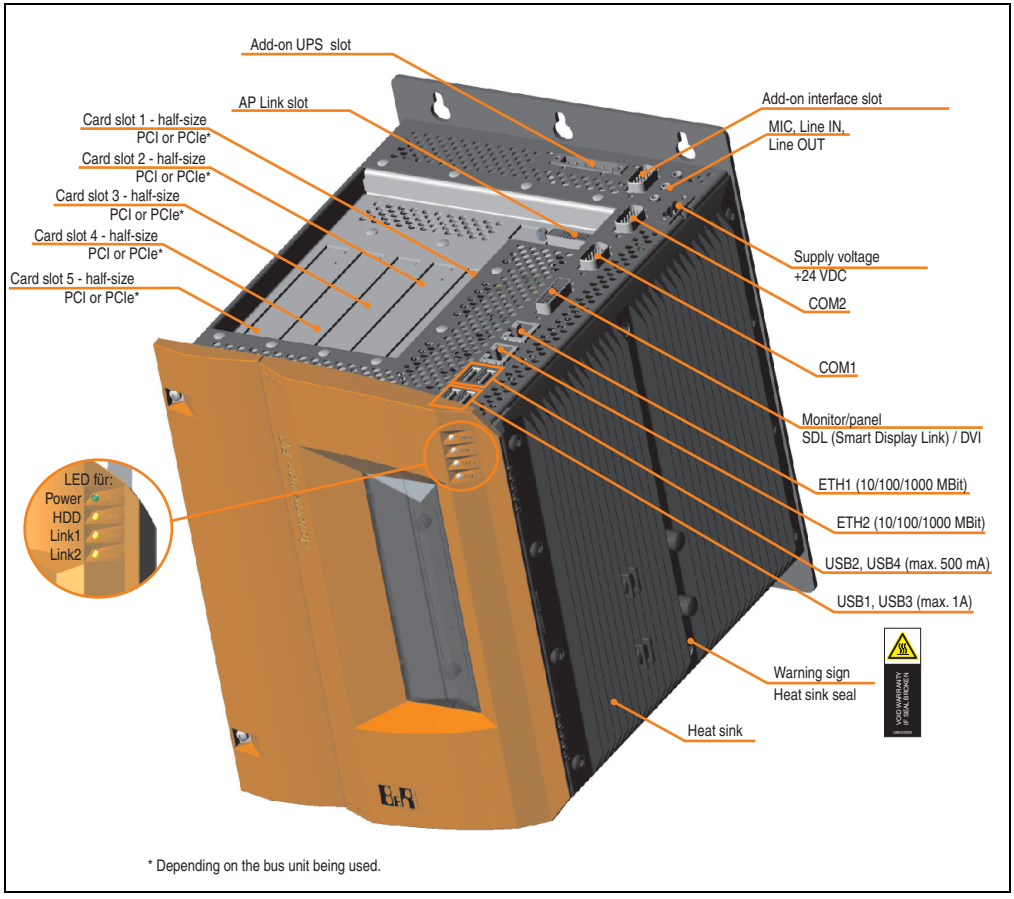


Figure 14: Interface overview - APC810, 5 card slot variant (top)

Warning!

Do not remove mounting screws from the heat sink, as it is connected to the processor and chipset by a thermal coupling. If this connection is broken, the APC810 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").

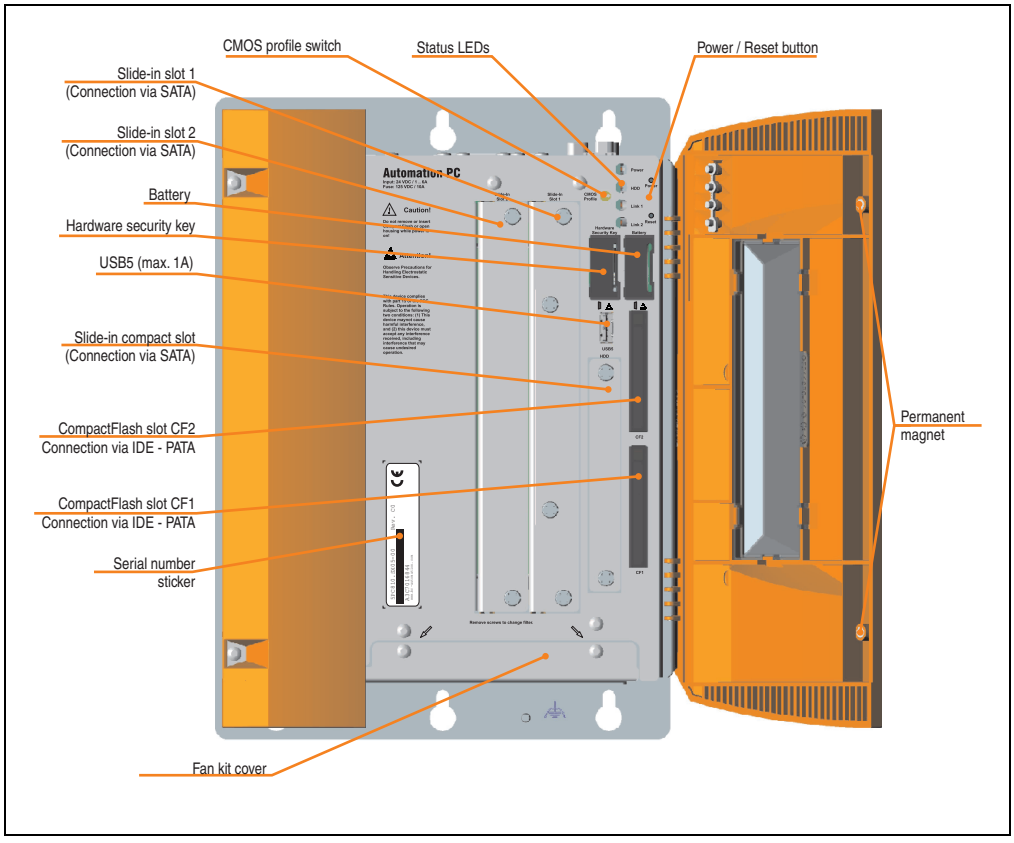


Figure 15: Interface overview - APC810, 5 card slot variant (front)

Information:

The orange front doors contain two permanent magnets. Contact between a data carrier that saves data magnetically (hard disk, diskette, the magnetic strip of a credit card, etc.) and a magnet can cause loss of data.

2.4.2 Technical data

Features	5PC810.SX05-00
B&R ID code	$A3EE
Boot loader / Operating system	BIOS
Processor Cooling Method	Component-dependent, see technical data for the "CPU boards GM45", on page 105 Passive via heat sink and supported with an active fan kit
Main memory	Max. 8 GB
Graphics Controller	 Component-dependent, see technical data for the "CPU boards GM45", on page 105
Power failure logic Controller Buffer time	 MTCX[1] (see also page 456) 10 ms
Real-time clock (RTC) Battery-buffered Accuracy	 Yes see technical data of the "CPU boards GM45", on page 105
SRAM Battery-buffered Size Remanent variables for AR (Automation Runtime) in power fail mode	 Yes 512 kB 192 kB
Battery Type removable Service life	See also page 94 Renata 950 mAh Yes, accessible behind the orange front doors 2½ years[2]
Ethernet Amount Speed Controller	 2 10/100/1000 Mbit/s See also page 83 or page 84
CAN bus	Optional using add-on interface (5AC600.CANI-00)
CompactFlash Type Amount	See also page 96 or page 97 Type I 1
Serial interface Amount Type UART Transfer rate Connection	See also page 81 or page 82 2 RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Amount Transfer rate Connection Current load	Also see page 85 USB 2.0 5 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) Type A Max. 500 mA or 1 A per connection
Reset button	Yes, accessible behind the orange front doors
LEDs	4 directed outwards via fiber optic lines, also see section "Status LEDs", on page 91
Buzzer	Yes

Table 19: Technical data - APC810, 5 card slot variant

Features	5PC810.SX05-00
Card slots Amount half-size	See also section "Card slot (PCI / PCIe)", on page 90 5 Dimensions of the PCI / PCIe cards vary
Add-on UPS slot	Yes
AP Link slot	Yes
Electrical characteristics	
Power supply Rated voltage Rated current Starting current Power consumption	 24 VDC ±25% 6 A Typ. 7 A, max. 50 A < 300µs Component-dependent, see section "Power calculation with 5PC810.SX05-00", on page 69
Mechanical characteristics	
Housing[3)] Material Paint Front cover	 Galvanized plate, plastic Light gray (similar to Pantone 427CV), dark gray (similar to Pantone 432CV) Colored orange plastic (similar to Pantone 144CV)
Outer dimensions	See "Dimensions - APC810 5 card slot variant", on page 58
Weight	Approx. 3.9 kg (component-dependent)
Environmental characteristics	
Ambient temperature Operation Bearings Transport	 Component-dependent - see section 2.5 "Ambient temperatures", on page 59 -20 to +60°C -20 to +60°C
Relative humidity Operation Bearings Transport	 Component-dependent, see section "Humidity specifications", on page 62 Component-dependent, see section "Humidity specifications", on page 62 Component-dependent, see section "Humidity specifications", on page 62
Vibration[4)] Operation (continuous) Operation (occasional) Bearings Transport	 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock[4)] Operation Bearings Transport	 15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Protection	IP20
Altitude Operation	 max. 3000 m[5)] (component-dependent)

Table 19: Technical data - APC810, 5 card slot variant (cont.)

1) Maintenance controller extended.

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

3) Depending on the process or batch, there may be visible deviations in the color and surface structure.

4) Maximum values, as long as no other individual component specifies any other.

5) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

2.4.3 Dimensions

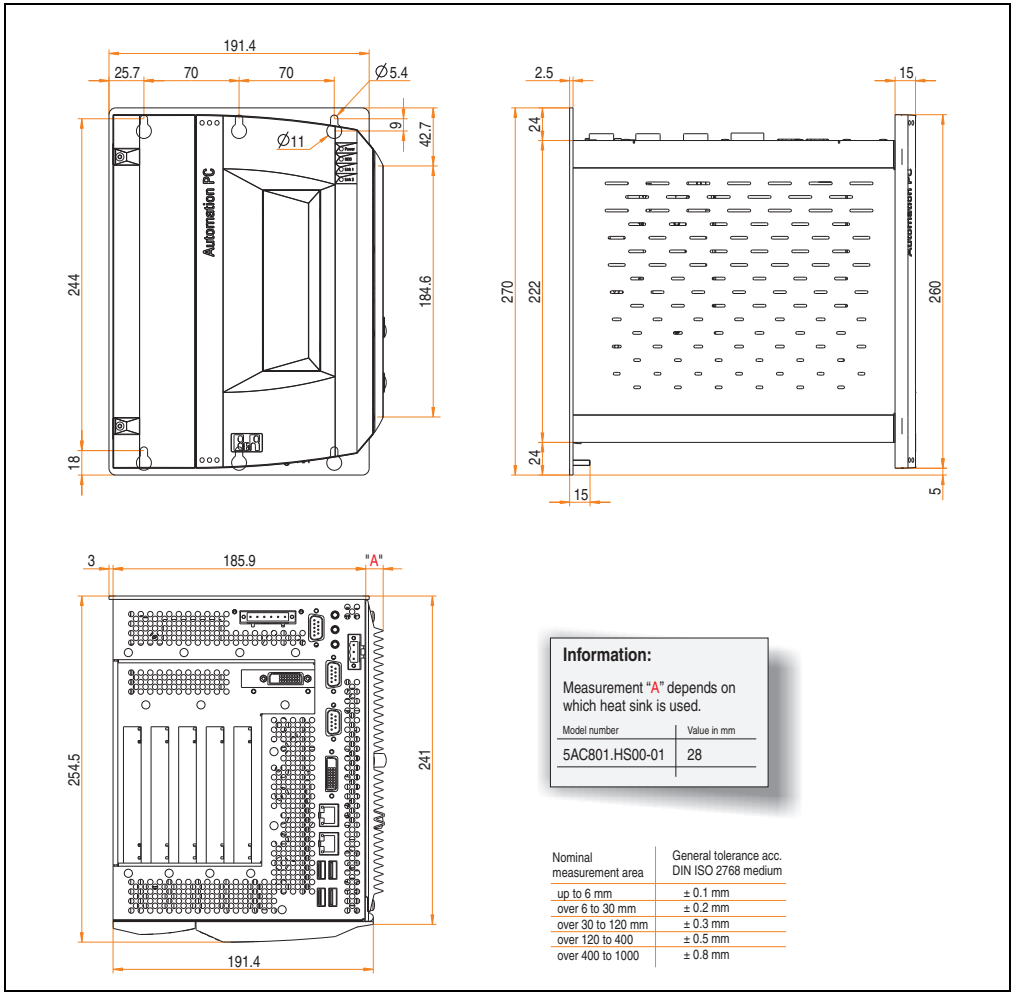


Figure 16: Dimensions - APC810 5 card slot variant

2.5 Ambient temperatures

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

Information:

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

Information regarding the worst-case conditions

- Thermal Analysis Tool (TAT V3.8.1) from Intel for simulating 100% processor load
- BurnIn testing tool (BurnIn V4.0 Pro from Passmark Software) to simulate a 100% load on the interface via loop-back adapters (serial interfaces, add-on and slide-in drives, USB ports, audio outputs)
- Maximum system extension and power consumption

What must be considered when determining the maximum ambient temperature?

- Operation of the Ethernet interfaces (ETH1/ETH2) in 10/100Mbit or 1 Gbit mode
- Revision of heat sink being used

2.5.1 Maximum ambient temperature with a fan kit

Information:

- **Vertical and horizontal (minus 5°C) mounting orientations are permitted (see also Chapter 3 "Commissioning", Section "Mounting orientation", on page 166).**
- **The specifications in the following table are only valid for system units with with the heat sink 5AC801.HS00-01 Rev. D0.**

All temperature values in degrees celsius (°C) at 500 meters above sea level.

Derating of the maximum ambient temperature, generally 1°C per 1000 meters starting at 500 meters above sea level.

		T9400 5PC800.BM45-00	P8400 5PC800.BM45-01	Temperature limits	Location of sensor(s)
	Maximum ambient temperature [1]	50	55		
	What can also be operated at the max. ambient temperature, or are there limits?				
Slide-in compact	On-board CompactFlash [2]	✓	✓	80	I/O
	5AC801.HDDI-00	✓	✓	80	
	5AC801.HDDI-02	✓	✓	80	
	5AC801.HDDI-03	✓	50	60	
	5AC801.SSDI-00	✓	✓	70	
Slide-in option	5AC801.HDDS-00	✓	✓	80	Slide-in drive
	5AC801.DVDS-00	✓	✓	50	
	5AC801.DVRS-00	✓	✓	50	
Main memory	5MMDDR.2048-02	✓	✓	-	
	5MMDDR.4096-02	✓	✓	-	
System units	5PC810.SX01-00	✓	✓	80	Power supply
	5PC810.SX02-00	✓	✓	80	
	5PC810.SX03-00	✓	✓	80	
	5PC810.SX05-00	✓	✓	80	
Additional insert cards Interfaces / AP Link	5AC600.CANI-00	✓	✓	-	
	5AC600.485I-00	✓	✓	-	
	5AC801.SDL0-00	✓	✓	-	
	5AC801.RDYR-00	✓	✓	-	
	5ACPCI.RAIC-03	✓	✓	-	
	5ACPCI.RAIC-05	✓	50	-	

1) With horizontal mounting, the maximum ambient temperature, must be reduced by 5°C!

2) Only possible with a CompactFlash card from B&R (5CFCRD.xxxx-04 or 5CFCRD.xxxx-03).

Figure 17: Ambient temperatures with a fan kit

2.5.2 Minimum ambient temperature

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

2.5.3 How is the the maximum ambient temperature determined?

1) Select the CPU board.

2) The "maximum ambient temperature" line shows the maximum ambient temperature for the entire system when using 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 (add-on, slide-in), main memory, additional insert cards, etc. can change the temperature limits of an APC810 system.

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

If there is a specific temperature, for example "35", next to the component, then the ambient temperature of the whole APC810 system cannot exceed this temperature.

2.5.4 Temperature monitoring

Sensors monitor temperature values in various places (CPU, board, board I/O, board ETH2, board power supply, ETH2 controller, power supply and slide-in drives 1/2) on the APC810. The position of the temperature sensors can be found in the figure "Temperature sensor locations", on page 455. The value listed in the table represents the defined maximum temperature for this measurement point[1)]. An alarm is not triggered when this temperature is exceeded. The temperatures[1)] can be read in BIOS (menu item "Advanced" - Baseboard/panel features - Baseboard monitor) or in Microsoft Windows XP/embedded, using the B&R Control Center.
Additionally, the hard disks for PPC810 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 Microsoft Windows XP/embedded.

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

2.6 Humidity specifications

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

Component		Operation	Storage / Transport
CPU boards GM45 COM Express		10 - 90%	5 - 95%
System units (all models)		5- 90%	5 - 95%
Main memory for CPU boards		10 - 90%	5 - 95%
Slide-in drives	5AC801.HDDI-00	5 - 90%	5 - 95%
	5AC801.HDDI-02	8 - 80%	5 - 95%
	5AC801.HDDI-03	5 - 95%	5 - 95%
	5AC801.HDDS-00	5 - 90%	5 - 90%
	5AC801.DVDS-00	8 - 90%	5 - 95%
	5AC801.DVRS-00	8 - 90%	5 - 95%
Additional insert cards Interfaces AP Link	5AC600.CANI-00	5 - 90%	5 - 95%
	5AC600.485I-00	5 - 90%	5 - 95%
	5AC801.SDL0-00	5 - 90%	5 - 95%
	5AC801.RDYR-00	5 - 90%	5 - 95%
	5ACPCI.RAIC-03 (24 hours/default)	8 - 90%	5 - 95%
	5ACPCI.RAIC-04 (24 hours/default)	8 - 90%	5 - 95%
	5ACPCI.RAIC-05 (24 hours/default)	5 - 95%	5 - 95%
	5MMHDD.0250-00 (24 hours/default)	5 - 95%	5 - 95%
Accessories	CompactFlash cards 5CFCRD.xxxx-04	85%	85%
	CompactFlash cards - 5CFCRD.xxxx-03	8 - 95%	8 - 95%
	Flash drive 5MMUSB.2048-xx	10 - 90%	5 - 90%
	USB Media Drive 5MD900.USB2-01	20 - 80%	5 - 90%

Table 20: 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.

2.7 Power management

2.7.1 Block diagram - supply voltage

The following block diagram presents the simplified structure of the APC810 supply voltage for system units.

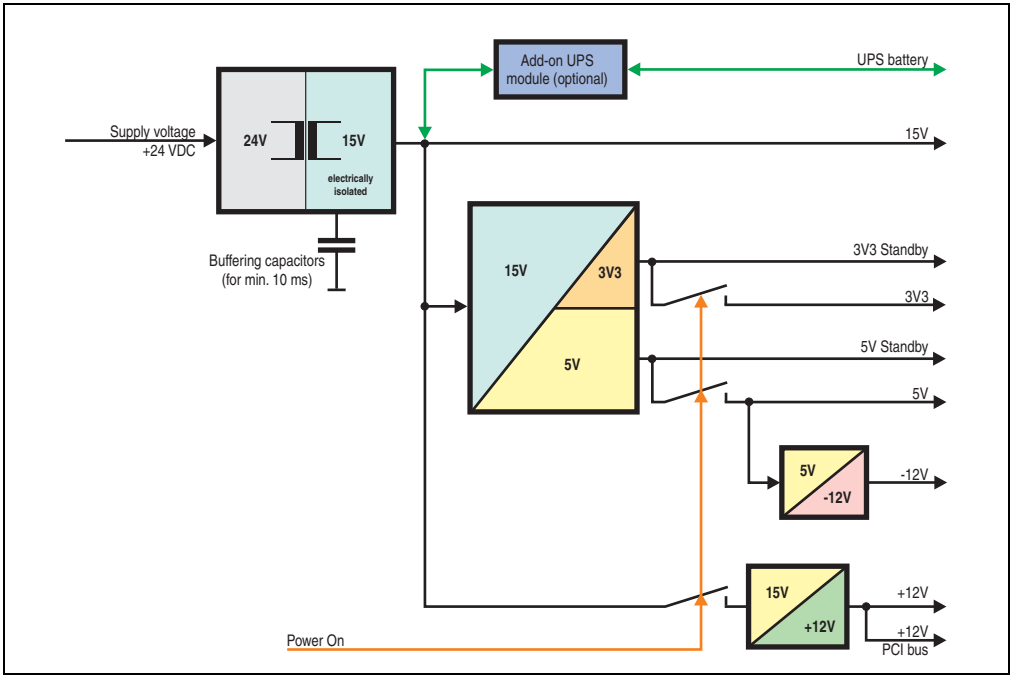


Figure 18: Supply voltage for system units

Description

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

After the system is turned on (e.g. using the power button), the voltages 3V3 and 5 V are placed on the bus. At the 5 V output, yet 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.

2.7.2 Power calculation with 5PC810.SX01-00 revision >= D0

Information:

Alle values in watts
The entries for the **generator** are maximum values.
The entires for the **device** are determined maximum values, but not peak values.

		CPU board		This system
		T9400 5PC800.BM45-00	P8400 5PC800.BM45-01	Enter values in this column
Total power supply	Total power supply rating (maximum)			130
	Add-on UPS module, optional	7.5	7.5	
+12V	Maximum possible at +12V			75
	CPU board, fixed device	43	36	
	2048MB RAM max. 2 pcs., each 3 W			
	4096MB RAM max. 2 pcs., each 4 W			
	Fan kit	1.8	1.8	
	External device, optional (via main board)	10	10	
	Power required by PCI card, optional, max. 6 W 1)			
	Power required by PCIe x4 card, optional, max. 20 W 1)			
	Devices +12V ∑			
+5V	Maximum possible at +5V			65
	System unit, fixed device	4	4	
	Hard disk (Slide-in compact)	4	4	
	Slide-in drive (hard disk, DVD-ROM, etc.)	4	4	
	USB peripheral USB2 and USB4, each 2.5 W			
	USB peripheral USB1, USB3 and USB5, each 5 W			
	Interface option (add-on interface), optional	0.5	0.5	
	External device, optional (via main board)	5	5	
	Power required by PCI card, optional, max. 20 W 1)			
-12V	Maximum possible at -12V			1.2
	Power required by PCI card, optional, max. 1.2 W 1)			
	Devices -12V ∑			
	Devices 5V ∑			
3V3	Maximum possible at 3V3			40
	System unit, fixed device	4	4	
	CompactFlash	1	1	
	Interface option (add-on interface), optional	0.25	0.25	
	Power required by PCI card, optional, max. 15 W 1)			
	Power required by PCIe x4 card, optional, max. 10 W 1)			
	Devices 3V3 ∑			
	Devices ∑			

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 fan kit.

Figure 19: Power calculation with 5PC810.SX01-00 revision >= D0

2.7.3 Power calculation with 5PC810.SX01-00 revision < D0

Information:	CPU board		This system
Alle values in watts The entries for the **generator** are maximum values. The entires for the **device** are determined maximum values, but not peak values.	T9400 5PC800.BM45-00	P8400 5PC800.BM45-01	Enter values in this column
Total power supply rating (maximum)			**85**
Add-on UPS module, optional	7.5	7.5	
+12V: Maximum possible at +12V			**75**
CPU board, fixed device	43	36	
2048MB RAM max. 2 pcs., each 3 W			
4096MB RAM max. 2 pcs., each 4 W			
Fan kit	1.8	1.8	
External device, optional (via main board)	10	10	
Power required by PCI card, optional, max. 6 W 1)			
Power required by PCIe x4 card, optional, max. 20 W 1)			
Devices +12V ∑			
+5V: Maximum possible at +5V			**65**
System unit, fixed device	4	4	
Hard disk (Slide-in compact)	4	4	
Slide-in drive (hard disk, DVD-ROM, etc.)	4	4	
USB peripheral USB2 and USB4, each 2.5 W			
USB peripheral USB1, USB3 and USB5, each 5 W			
Interface option (add-on interface), optional	0.5	0.5	
External device, optional (via main board)	5	5	
Power required by PCI card, optional, max. 20 W 1)			
-12V: Maximum possible at -12V			**1.2**
Power required by PCI card, optional, max. 1.2 W 1)			
Devices -12V ∑			
Devices 5V ∑			
3V3: Maximum possible at 3V3			**40**
System unit, fixed device	4	4	
CompactFlash	1	1	
Interface option (add-on interface), optional	0.25	0.25	
Power required by PCI card, optional, max. 15 W 1)			
Power required by PCIe x4 card, optional, max. 10 W 1)			
Devices 3V3 ∑			
Devices ∑			

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 fan kit.

Figure 20: Power calculation with 5PC810.SX01-00 revision < D0

2.7.4 Power calculation with 5PC810.SX02-00 revision>= D0

Information:	CPU board		This system
Alle values in watts The entries for the **generator** are maximum values. The entires for the **device** are determined maximum values, but not peak values.	T9400 5PC800.BM45-00	P8400 5PC800.BM45-01	Enter values in this column
Total power supply rating (maximum)			**130**
Add-on UPS module, optional	7.5	7.5	
+12V: Maximum possible at +12V			**75**
CPU board, fixed device	43	36	
2048MB RAM max. 2 pcs., each 3 W			
4096MB RAM max. 2 pcs., each 4 W			
Fan kit	1.8	1.8	
External device, optional (via main board)	10	10	
Power required by PCI card, optional, max. 6 W 1)			
Power required by PCIe x4 card, optional, max. 20 W 1)			
Devices +12V ∑			
+5V: Maximum possible at +5V			**65**
System unit, fixed device	4	4	
Hard disk (Slide-in compact)	4	4	
Slide-in drive (hard disk, DVD-ROM, etc.)	4	4	
USB peripheral USB2 and USB4, each 2.5 W			
USB peripheral USB1, USB3 and USB5, each 5 W			
Interface option (add-on interface), optional	0.5	0.5	
Graphics adapter (AP Link), optional	5	5	
External device, optional (via main board)	5	5	
Power required by PCI card, optional, max. 20 W 1)			
-12V: Maximum possible at -12V			**1.2**
Power required by PCI card, optional, max. 1.2 W 1)			
Devices -12V ∑			
Devices 5V ∑			
3V3: Maximum possible at 3V3			**40**
System unit, fixed device	4	4	
CompactFlash	1	1	
Interface option (add-on interface), optional	0.25	0.25	
Graphics adapter (AP Link), optional	1.5	1.5	
Power required by PCI card, optional, max. 15 W 1)			
Power required by PCIe x4 card, optional, max. 10 W 1)			
Devices 3V3 ∑			
Devices ∑			

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 fan kit.

Figure 21: Power calculation with 5PC810.SX02-00 revision >= D0

2.7.5 Power calculation with 5PC810.SX02-00 revision < D0

Information:	CPU board		This system
Alle values in watts The entries for the **generator** are maximum values. The entires for the **device** are determined maximum values, but not peak values.	T9400 5PC800.BM45-00	P8400 5PC800.BM45-01	Enter values in this column
Total power supply rating (maximum)			**85**
Add-on UPS module, optional	7.5	7.5	
+12V: Maximum possible at +12V			**75**
CPU board, fixed device	43	36	
2048MB RAM max. 2 pcs., each 3 W			
4096MB RAM max. 2 pcs., each 4 W			
Fan kit	1.8	1.8	
External device, optional (via main board)	10	10	
Power required by PCI card, optional, max. 6 W 1)			
Power required by PCIe x4 card, optional, max. 20 W 1)			
Devices +12V ∑			
+5V: Maximum possible at +5V			**65**
System unit, fixed device	4	4	
Hard disk (Slide-in compact)	4	4	
Slide-in drive (hard disk, DVD-ROM, etc.)	4	4	
USB peripheral USB2 and USB4, each 2.5 W			
USB peripheral USB1, USB3 and USB5, each 5 W			
Interface option (add-on interface), optional	0.5	0.5	
Graphics adapter (AP Link), optional	5	5	
External device, optional (via main board)	5	5	
Power required by PCI card, optional, max. 20 W 1)			
-12V: Maximum possible at -12V			**1.2**
Power required by PCI card, optional, max. 1.2 W 1)			
Devices -12V ∑			
Devices 5V ∑			
3V3: Maximum possible at 3V3			**40**
System unit, fixed device	4	4	
CompactFlash	1	1	
Interface option (add-on interface), optional	0.25	0.25	
Graphics adapter (AP Link), optional	1.5	1.5	
Power required by PCI card, optional, max. 15 W 1)			
Power required by PCIe x4 card, optional, max. 10 W 1)			
Devices 3V3 ∑			
Devices ∑			

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 fan kit.

Figure 22: Power calculation with 5PC810.SX02-00 revision < D0

2.7.6 Power calculation with 5PC810.SX03-00

Information:	CPU board		This system
Alle values in watts The entries for the **generator** are maximum values. The entires for the **device** are determined maximum values, but not peak values.	T9400 5PC800.BM45-00	P8400 5PC800.BM45-01	Enter values in this column
Total power supply rating (maximum)			**130**
Add-on UPS module, optional	7.5	7.5	
+12V — Maximum possible at +12V			**75**
CPU board, fixed device	43	36	
2048MB RAM max. 2 pcs., each 3 W			
4096MB RAM max. 2 pcs., each 4 W			
Fan kit	3.7	3.7	
External device, optional (via main board)	10	10	
Power required by PCI card, optional, max. 6 W 1)			
Power required by PCIe x4 card, optional, max. 20 W 1)			
Devices +12V ∑			
+5V — Maximum possible at +5V			**65**
System unit, fixed device	4	4	
Hard disk (Slide-in compact)	4	4	
Slide-in drive (hard disk, DVD-ROM, etc.)	4	4	
USB peripheral USB2 and USB4, each 2.5 W			
USB peripheral USB1, USB3 and USB5, each 5 W			
Interface option (add-on interface), optional	0.5	0.5	
Graphics adapter (AP Link), optional	5	5	
External device, optional (via main board)	5	5	
Power required by PCI card, optional, max. 20 W 1)			
-12V — Maximum possible at -12V			**1.2**
Power required by PCI card, optional, max. 1.2 W 1)			
Devices -12V ∑			
Devices 5V ∑			
3V3 — Maximum possible at 3V3			**40**
System unit, fixed device	4	4	
CompactFlash	1	1	
Interface option (add-on interface), optional	0.25	0.25	
Graphics adapter (AP Link), optional	1.5	1.5	
Power required by PCI card, optional, max. 15 W 1)			
Power required by PCIe x4 card, optional, max. 10 W 1)			
Devices 3V3 ∑			
Devices ∑			

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 fan kit.

Figure 23: Power calculation with 5PC810.SX03-00

2.7.7 Power calculation with 5PC810.SX05-00

Information:	CPU board		This system
Alle values in watts The entries for the **generator** are maximum values. The entires for the **device** are determined maximum values, but not peak values.	T9400 5PC800.BM45-00	P8400 5PC800.BM45-01	Enter values in this column
Total power supply rating (maximum)			**130**
Add-on UPS module, optional	7.5	7.5	
+12V — Maximum possible at +12V			**75**
CPU board, fixed device	43	36	
2048MB RAM max. 2 pcs., each 3 W			
4096MB RAM max. 2 pcs., each 4 W			
Fan kit	2.8	2.8	
External device, optional (via main board)	10	10	
Power required by PCI card, optional, max. 6 W 1)			
Power required by PCIe x4 card, optional, max. 20 W 1)			
Devices +12V ∑			
+5V — Maximum possible at +5V			**65**
System unit, fixed device	4	4	
Hard disk (Slide-in compact)	4	4	
Slide-in drive (hard disk, DVD-ROM, etc.)	4	4	
USB peripheral USB2 and USB4, each 2.5 W			
USB peripheral USB1, USB3 and USB5, each 5 W			
Interface option (add-on interface), optional	0.5	0.5	
Graphics adapter (AP Link), optional	5	5	
External device, optional (via main board)	5	5	
Power required by PCI card, optional, max. 20 W 1)			
-12V — Maximum possible at -12V			**1.2**
Power required by PCI card, optional, max. 1.2 W 1)			
Devices -12V ∑			
Devices 5V ∑			
3V3 — Maximum possible at 3V3			**40**
System unit, fixed device	4	4	
CompactFlash	1	1	
Interface option (add-on interface), optional	0.25	0.25	
Graphics adapter (AP Link), optional	1.5	1.5	
Power required by PCI card, optional, max. 15 W 1)			
Power required by PCIe x4 card, optional, max. 10 W 1)			
Devices 3V3 ∑			
Devices ∑			

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 fan kit.

Figure 24: Power calculation with 5PC810.SX05-00

2.8 Serial number sticker

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

Figure 25: Serial number sticker (front)

A sticker with detailed information about the individual components can also be found on the back side of the mounting plate.

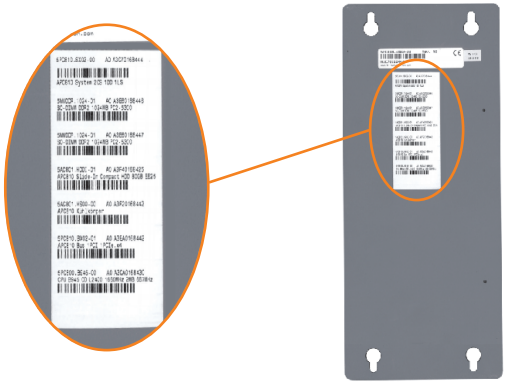


Figure 26: Serial number sticker (back)

This information can also be found on the B&R homepage. Enter the serial number of the entire device (found behind the front door) in the serial number search field on the start page **www.br-automation.com**. The search provides you with a detailed list of the individual components.

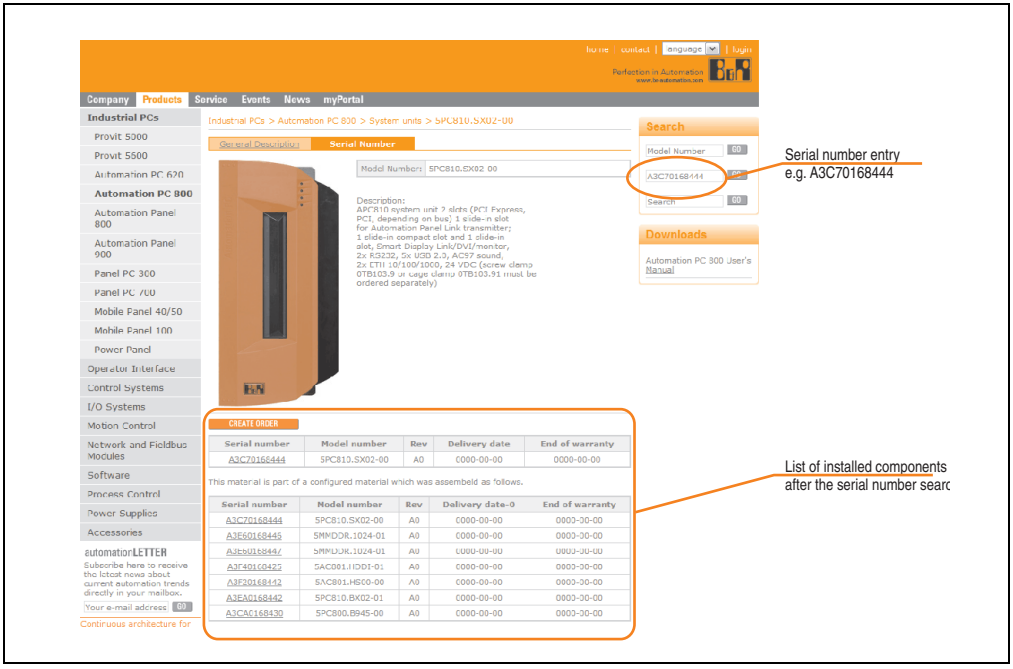


Figure 27: Example of serial number search - A3C70168444

2.9 Block diagram

The following block diagrams show the simplified structure of system units with a CPU board that depend on different bus units.

2.9.1 System unit 5PC810.SX01-00 + bus unit 5PC810.BX01-00

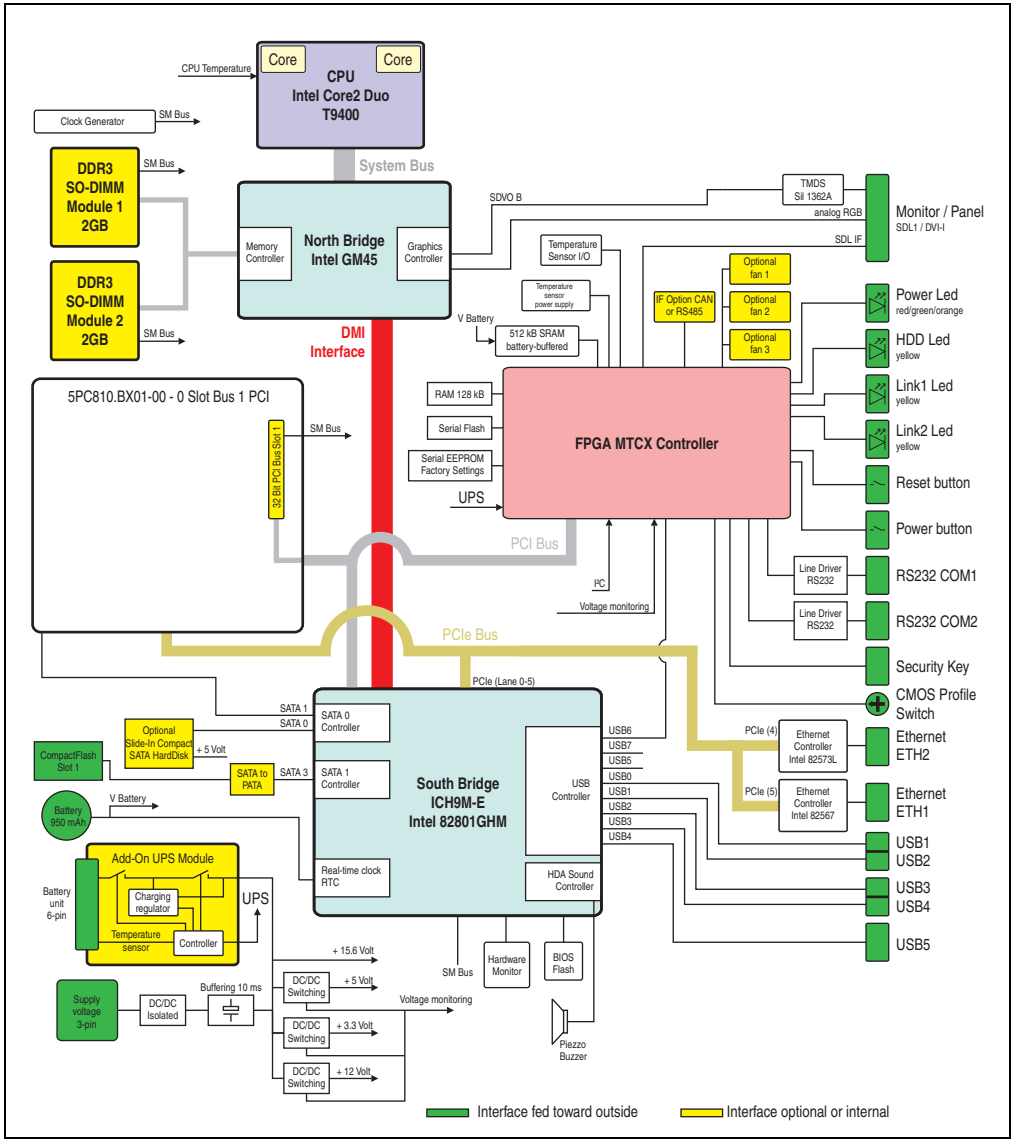


Figure 28: Block diagram 5PC810.SX01-00 + 5PC810.BX01-00

2.9.2 System unit 5PC810.SX01-00 + bus unit 5PC810.BX01-01

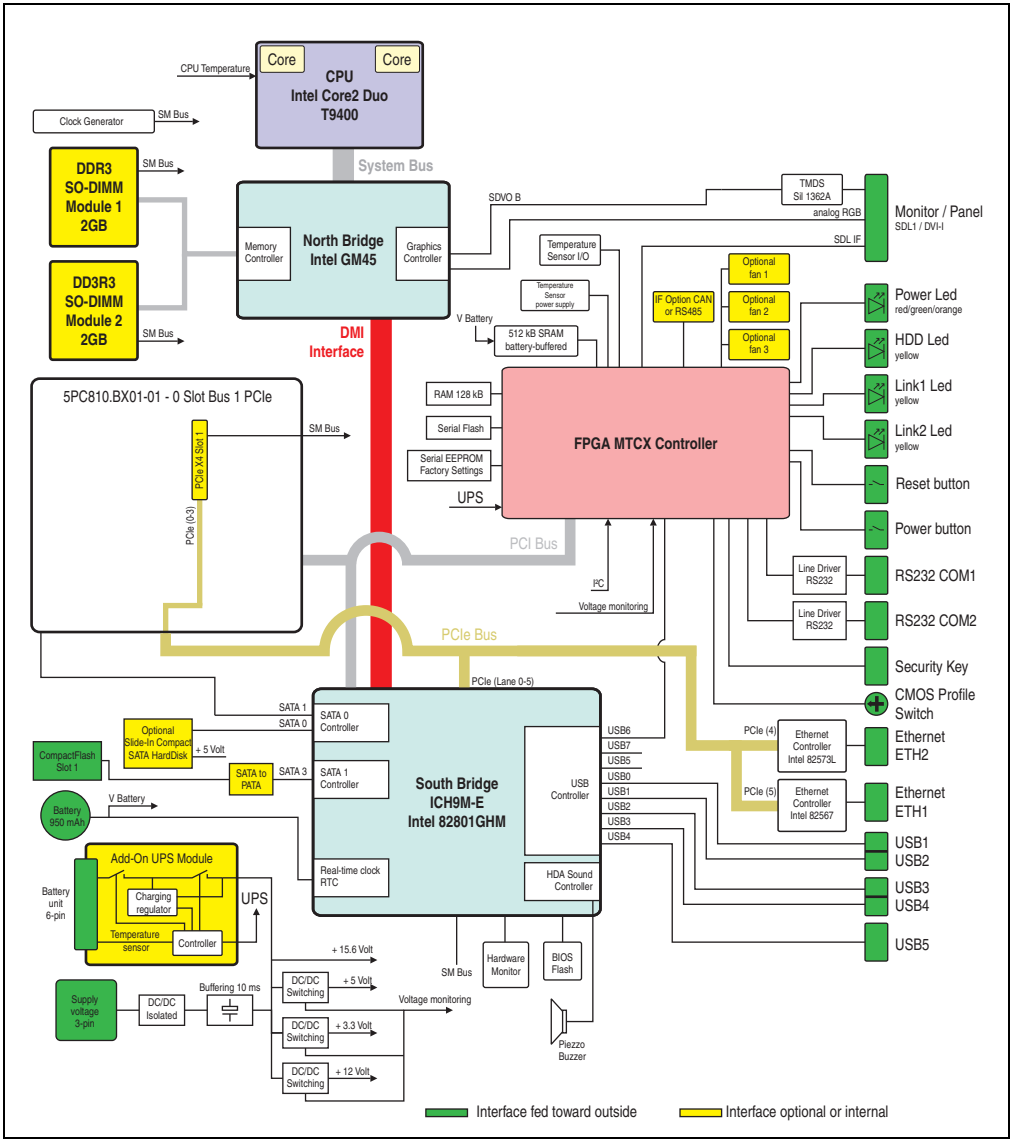


Figure 29: Block diagram 5PC810.SX01-00 + 5PC810.BX01-01

2.9.3 System unit 5PC810.SX02-00 + bus unit 5PC810.BX02-00

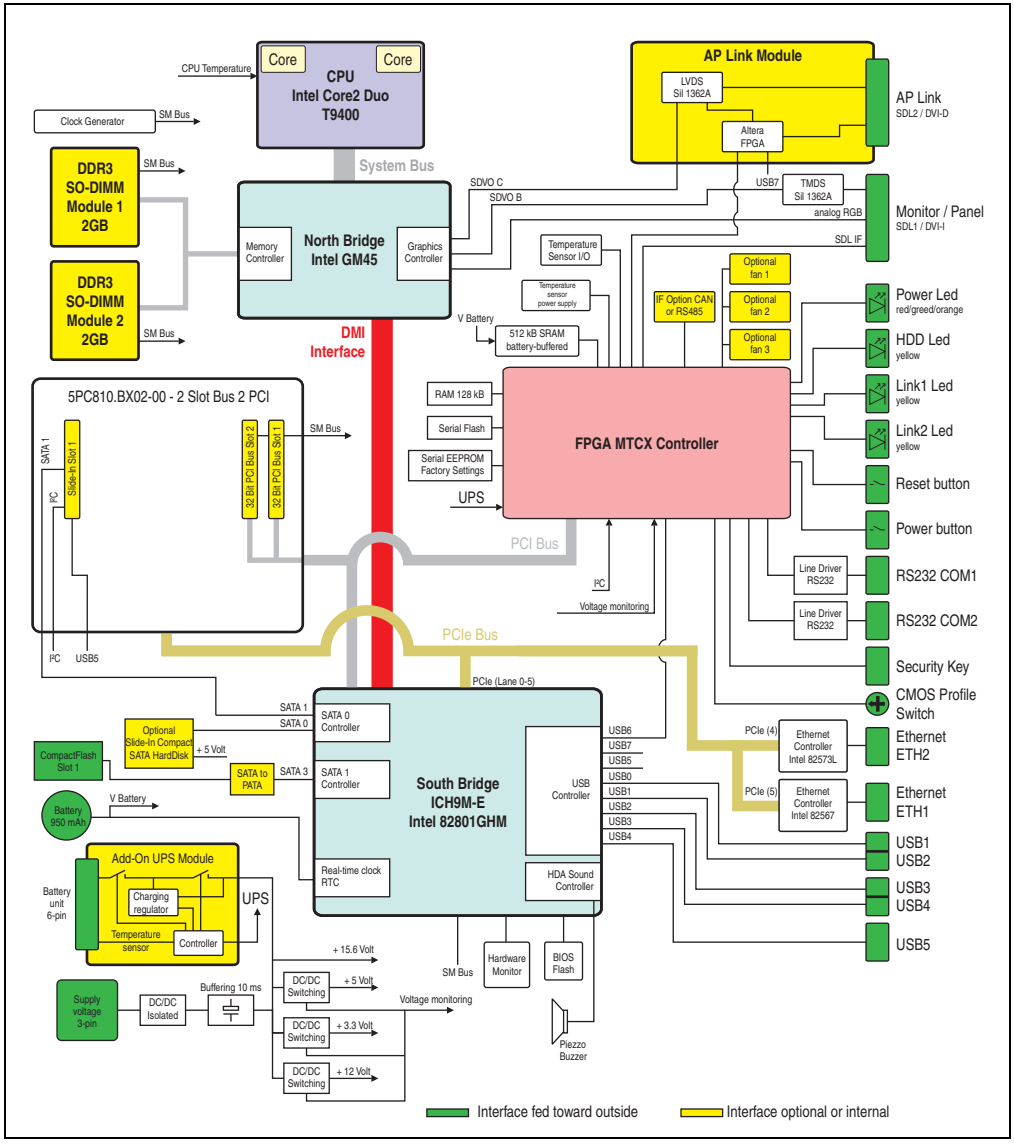


Figure 30: Block diagram 5PC810.SX02-00 + 5PC810.BX02-00

2.9.4 System unit 5PC810.SX02-00 + bus unit 5PC810.BX02-01

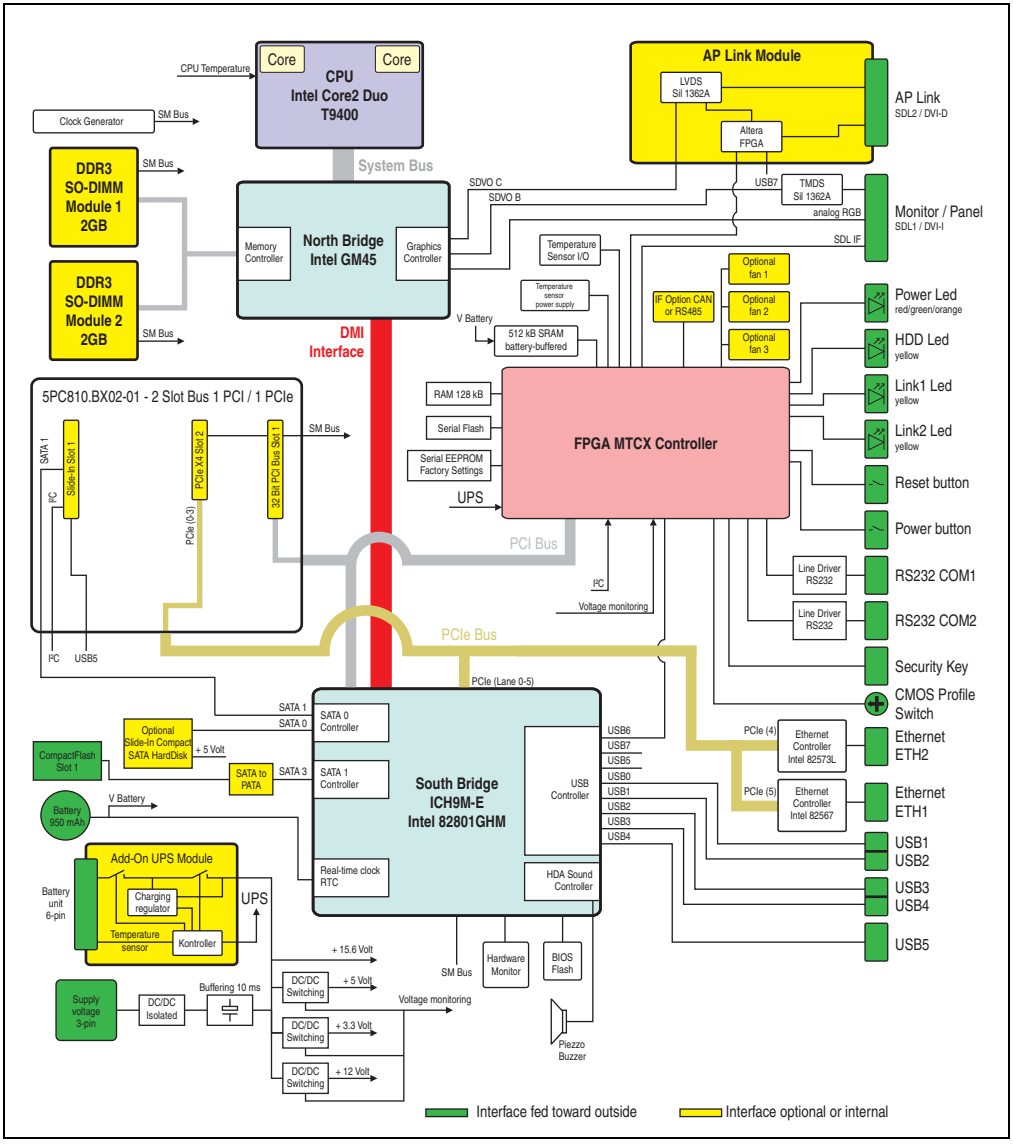


Figure 31: Block diagram 5PC810.SX02-00 + 5PC810.BX02-01

2.9.5 System unit 5PC810.SX03-00 + bus unit 5PC810.BX03-00

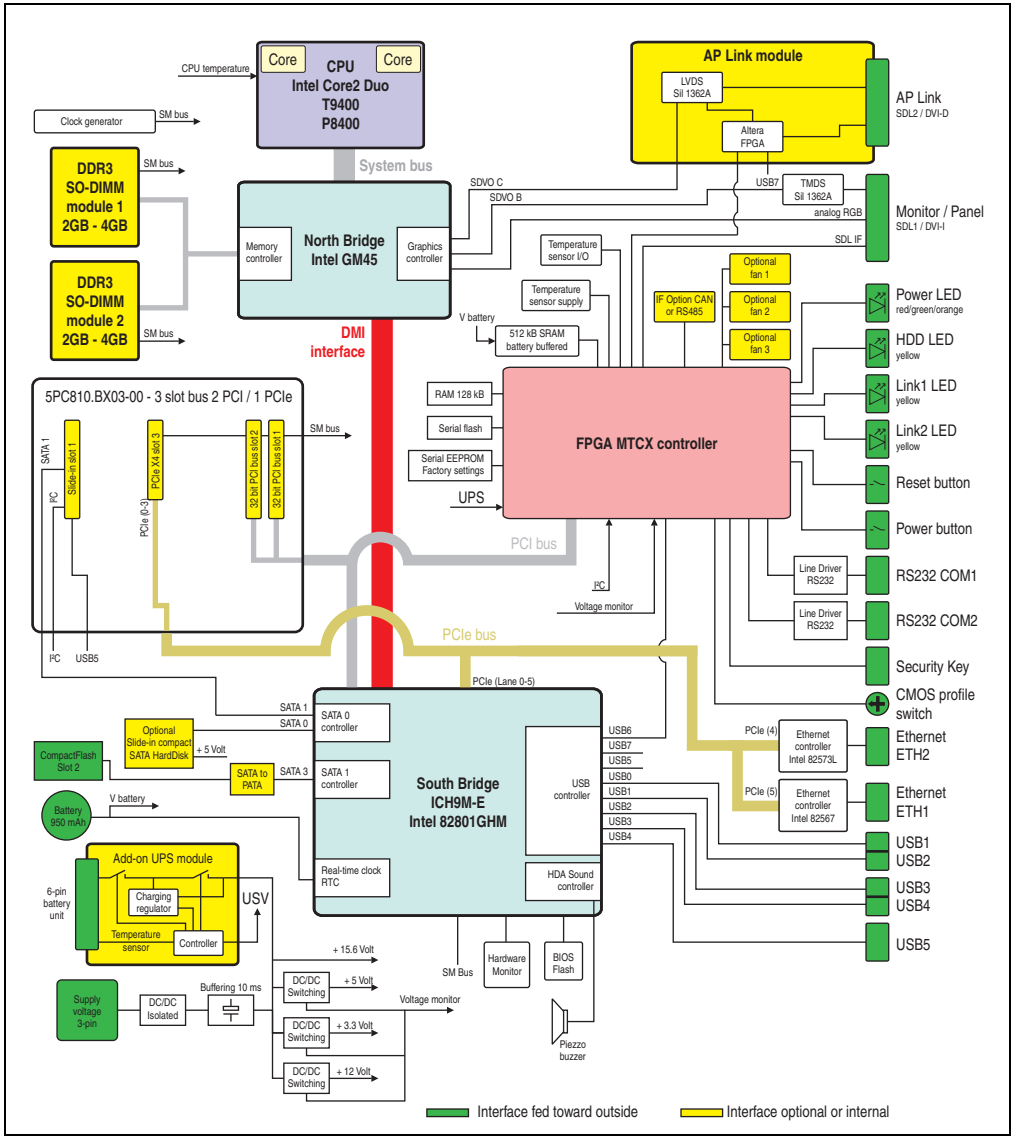


Figure 32: Block diagram 5PC810.SX03-00 + 5PC810.BX03-00

2.9.6 System unit 5PC810.SX05-00 + bus unit 5PC810.BX05-00

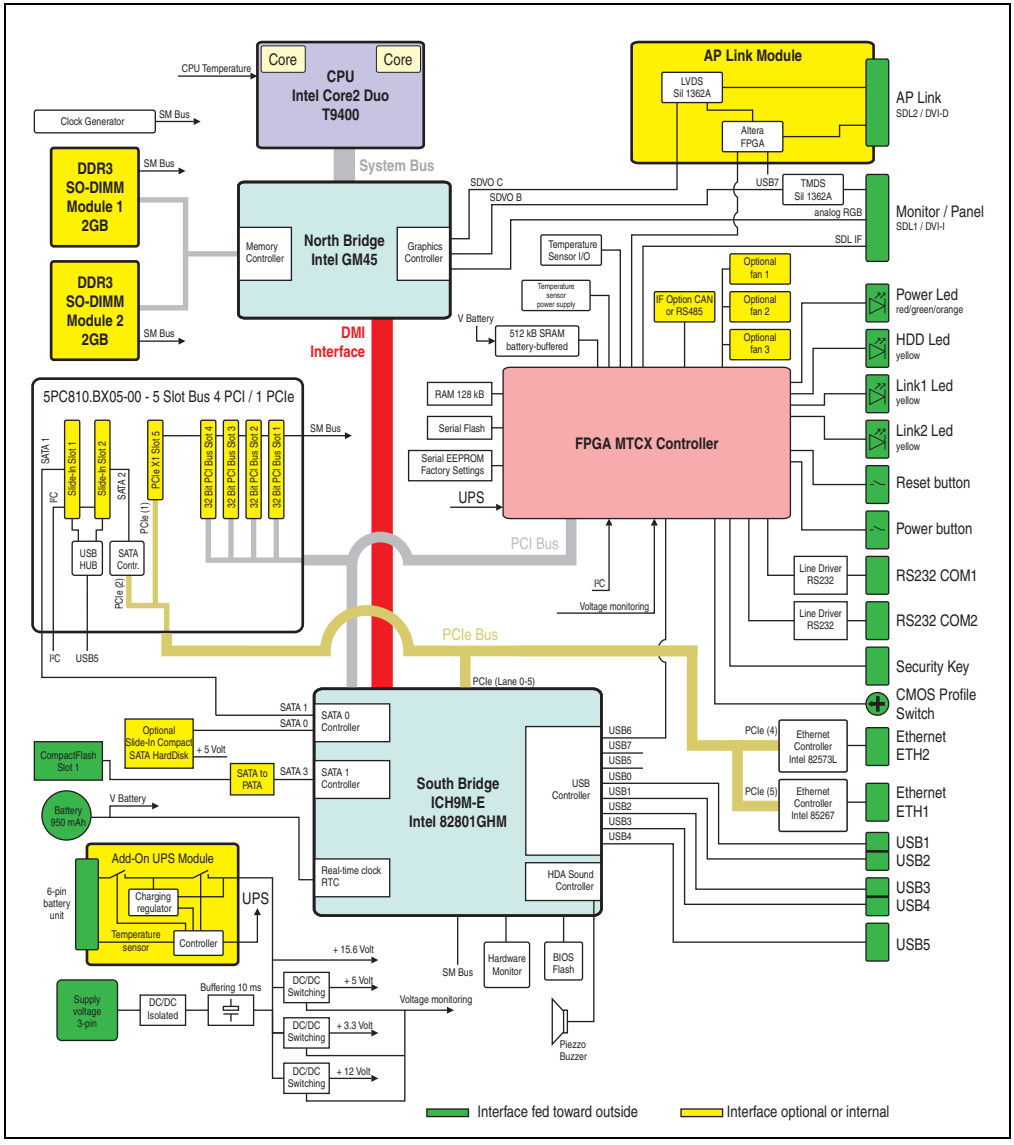


Figure 33: Block diagram 5PC810.SX05-00 + 5PC810.BX05-00

2.9.7 System unit 5PC810.SX05-00 + bus unit 5PC810.BX05-01

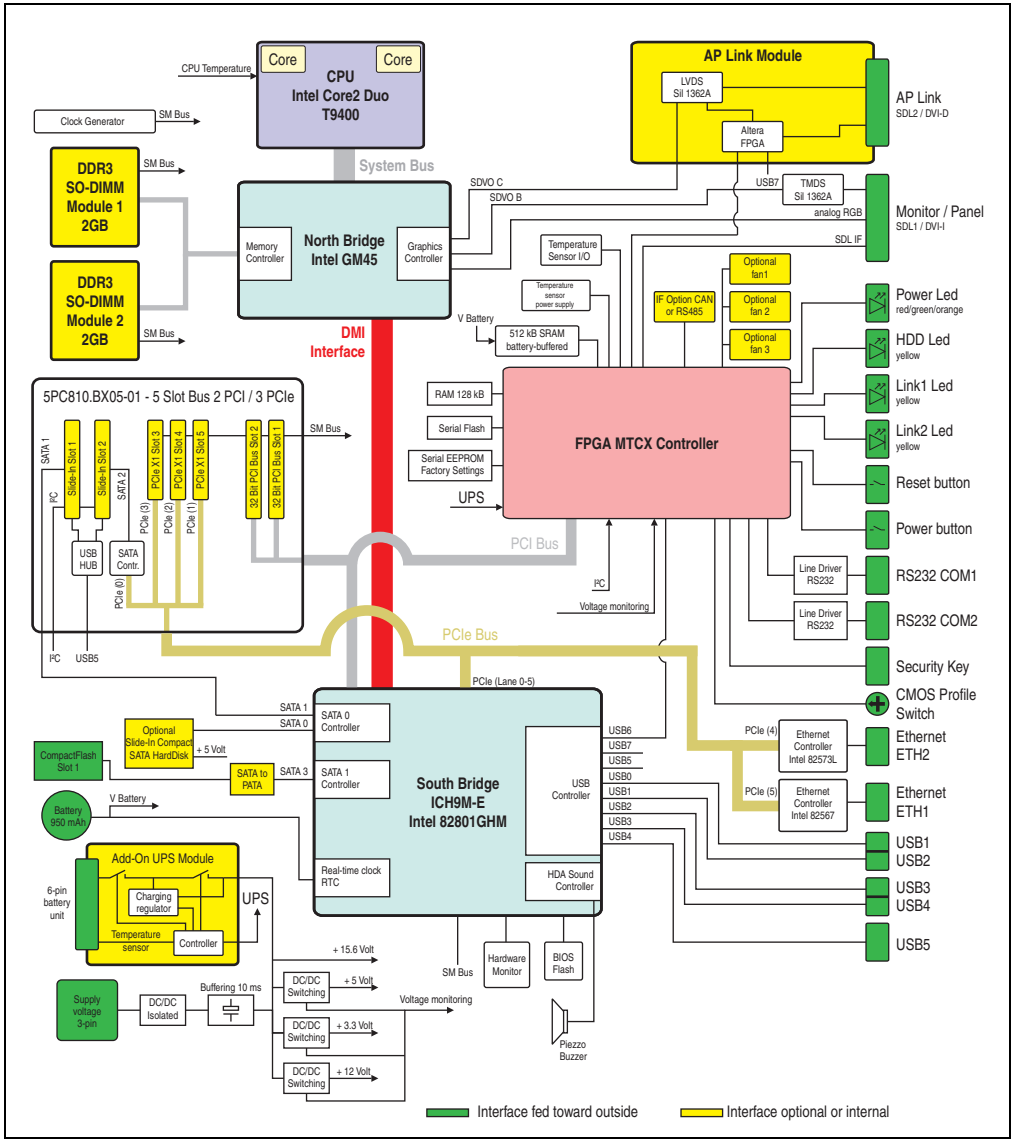


Figure 34: Block diagram 5PC810.SX05-00 + 5PC810.BX05-01

2.10 Device interfaces

2.10.1 +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 the model number 0TB103.9 (screw clamp) or 0TB103.91 (cage clamp).

The pin assignments can be found either in the following table or printed on the APC810 housing. The supply voltage is protected internally by a soldered fuse (15A, fast-acting), so that the device cannot be damaged if there is an overload (fuse replacement necessary) or if the voltage supply is connected incorrectly (reverse polarity protection - fuse replacement not necessary). The device must be returned to B&R for repairs if the fuse is blown because of an error.

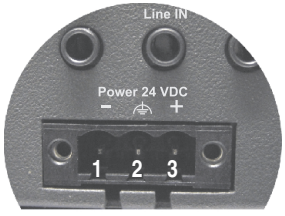
Supply voltage		
Protected against reverse polarity		3-pin, male 
Pin	**Description**	
1	-	
2	Functional ground	
3	+	
Accessories		
0TB103.9	Plug 24 V 5.08 3p screw clamps	
0TB103.91	Plug 24 V 5.08 3p cage clamps	

Table 21: Supply voltage connection + 24VDC

Ground

Caution!

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

The grounding connection is located on the bottom of the APC810 systems.

Figure 35: Ground connection

The M4 self-locking nut can be used, for example, to fasten a copper strip that is built into the APC810 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).

2.10.2 Serial interface COM1

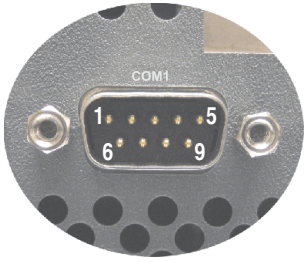
Serial interfaces - COM1[1)]		
Type	RS232, modem-capable, not electrically isolated	9-pin DSUB, male 
UART	16550-compatible, 16-byte FIFO	
Transfer rate	Max. 115 kBaud	
Cable length	Max. 15 meters	
Pin	**Assignment**	
1	DCD	
2	RXD	
3	TXD	
4	DTR	
5	GND	
6	DSR	
7	RTS	
8	CTS	
9	RI	

Table 22: Pin assignments - COM1

1) The interfaces, etc. available on the device or module were numbered accordingly for easy identification. This numbering can differ from the numbering used by the particular operating system.

2.10.3 Serial interface COM2

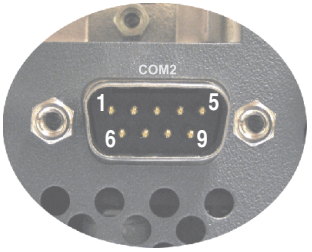
Serial interfaces - COM2[1)]		
Type	RS232, modem-capable, not electrically isolated	9-pin DSUB, male 
UART	16550-compatible, 16-byte FIFO	
Transfer rate	Max. 115 kBaud	
Cable length	Max. 15 meters	
Pin	**Assignment**	
1	DCD	
2	RXD	
3	TXD	
4	DTR	
5	GND	
6	DSR	
7	RTS	
8	CTS	
9	RI	

Table 23: Pin assignments - COM2

1) The interfaces, etc. available on the device or module were numbered accordingly for easy identification. This numbering can differ from the numbering used by the particular operating system.

2.10.4 Monitor / Panel connection - SDL (Smart Display Link / DVI)

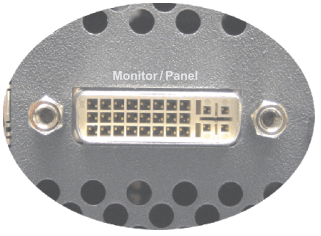
Monitor / Panel connection - SDL (Smart Display Link / DVI)		
The following will provide an overview of the video signals available on the monitor/panel output. For details, see technical data for the CPU board being used.		
CPU board	**Video signals with all system unit variations**	
5PC800.BM45-00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

Table 24: Monitor / Panel connection - RGB, DVI, SDL

2.10.5 Ethernet 1 (ETH1)

This Ethernet controller is integrated in the CPU board and is fed outwards via the system unit.

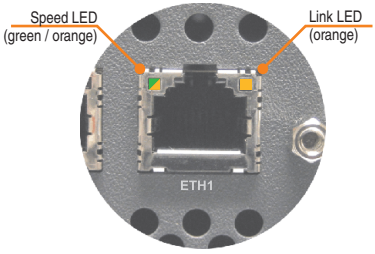
Ethernet 1 connection (ETH1[1])			
Controller	Intel 82567		RJ45 twisted pair (10BaseT/100BaseT), female 
Cabling	S/STP (Cat5e)		
Transfer rate	10/100/1000 Mbit/s [2]		
Cable length	max. 100 m (min. Cat5e)		
Speed LED	**On**	**Off**	
Green	100 Mbit/s	10 Mbit/s[3]	
Orange	1000 Mbit/s	-	
Link LED	**On**	**Off**	
Orange	Link (Ethernet network connection available)	Activity (blinking) (Data transfer in progress)	

Table 25: Ethernet connection (ETH1)

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

Driver support

A special driver is necessary for operating the Intel Ethernet controller 82567. The necessary software can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).

Information:

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

2.10.6 Ethernet 2 (ETH2)

This Ethernet controller is integrated in the main board and is fed outwards via the system unit.

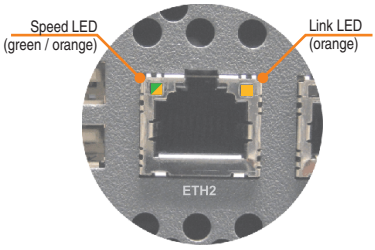
Ethernet 2 connection (ETH2[1])			
Controller	Intel 82573L		RJ45 twisted pair (10BaseT/100BaseT), female 
Cabling	S/STP (Cat5e)		
Transfer rate	10/100/1000 Mbit/s [2]		
Cable length	max. 100 m (min. Cat5e)		
Speed LED	**On**	**Off**	
Green	100 Mbit/s	10 Mbit/s[3]	
Orange	1000 Mbit/s	-	
Link LED	**On**	**Off**	
Orange	Link (Ethernet network connection available)	Activity (blinking) (Data transfer in progress)	

Table 26: Ethernet connection (ETH2)

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

Driver support

A special driver is necessary for operating the Intel Ethernet controller 82573L. The necessary software can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).

Information:

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

2.10.7 USB interfaces (USB1, 2, 3, 4)

The APC810 devices have a USB 2.0 (Universal Serial Bus) host controller with multiple USB ports, two of which are on the outside for easy access.

Warning!

Peripheral USB devices can be connected to the USB ports. Due to the vast number of USB devices available on the market, B&R cannot guarantee their performance. B&R does ensure the performance of all USB devices that they provide.
See Chapter 3 "Commissioning", Section "Connection of USB peripheral devices", on page 198 for additional information.

Caution!

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

USB1,2,3,4

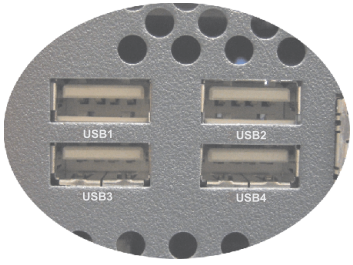
Universal Serial Bus (USB1, USB2, USB3, USB4)[1]		
Transfer rate	Low speed (1,5 Mbit/s), Full speed (12 Mbit/s) up to High speed (480 Mbit/s)	4 x USB type A, female 
Power supply[2] USB1, USB3 USB2, USB4	 Max. 1 A Max. 500 mA	
Maximum Cable length	5 m (without hub)	

Table 27: USB1, USB2, USB3, USB4 connection

1) The interfaces, etc. available on the device or module were numbered accordingly for easy identification. This numbering can differ from the numbering used by the particular operating system.

2) For safety, every USB port is equipped with a maintenance free "USB current-limiting circuit breaker" (max. 500 mA or 1 A).

USB5

Universal Serial Bus (USB5)[1]		
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s)	4 x USB type A, female
Power supply[2] USB5	Max. 1 A	
Maximum Cable length	5 m (without hub)	

Table 28: USB5 connection

1) The interfaces, etc. available on the device or module were numbered accordingly for easy identification. This numbering can differ from the numbering used by the particular operating system.

2) For safety, the USB port is equipped with a maintenance free "USB current-limiting circuit breaker" (max. 1 A)

2.10.8 MIC, Line IN, Line OUT

Since the Intel GM45 chipset used in the 5PC800.BM45-0x doesn't support AC97 sound, the MIC, Line In and Line OUT connections are not supported.

MIC, Line IN, Line OUT
3.5 mm jack, female

Table 29: MIC, Line IN, Line OUT

2.10.9 Add-on interface slot

An optional add-on interface (e.g. CAN, RS485) can be installed here. See also 3.9 "Add-on interfaces (IF option)", on page 153.

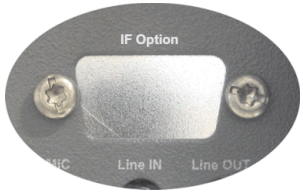
Add-on interface slot		
Available add-on interfaces		
5AC600.CANI-00	Add-on CAN interface	
5AC600.458I-00	Add-on RS232/422/458 interface	

Table 30: Add-on interface slot

2.10.10 Add-on UPS slot

An optional Automation PC add-on UPS module can be installed here.

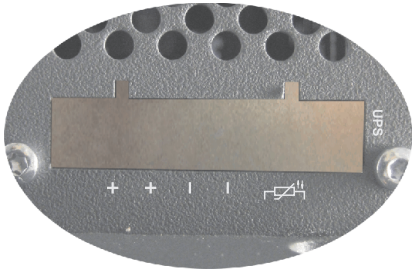
Add-on UPS slot		
		
Add-on UPS + accessories		
5AC600.UPSI-00	Add-on UPS module	
5AC600.UPSB-00	Battery unit 5 Ah	
5CAUPS.0005-00	UPS cable 0.5 m	
5CAUPS.0030-00	UPS cable 3 m	
Pin assignments with mounted add-on UPS module		
1	+	
2	+	
3	-	
4	-	
5	NTC (for battery temperature measurement	
6	NTC (for battery temperature measurement	

Table 31: Add-on UPS slot (with and without mounted UPS)

2.10.11 AP Link slot

When connected with the AP Link card 5AC801.SDL0-00, it is possible to implement a second graphic line with DVI and SDL, but without RGB signals. Furthermore, the APC810 ready relay 5AC801.RDYR-00 can also be mounted.

Information:

Installation of AP Link cards is only possible in connection with the system units 5PC810.SX02-00, 5PC810.SX03-00 and 5PC810.SX05-00.

2.10.12 Card slot (PCI / PCIe)

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

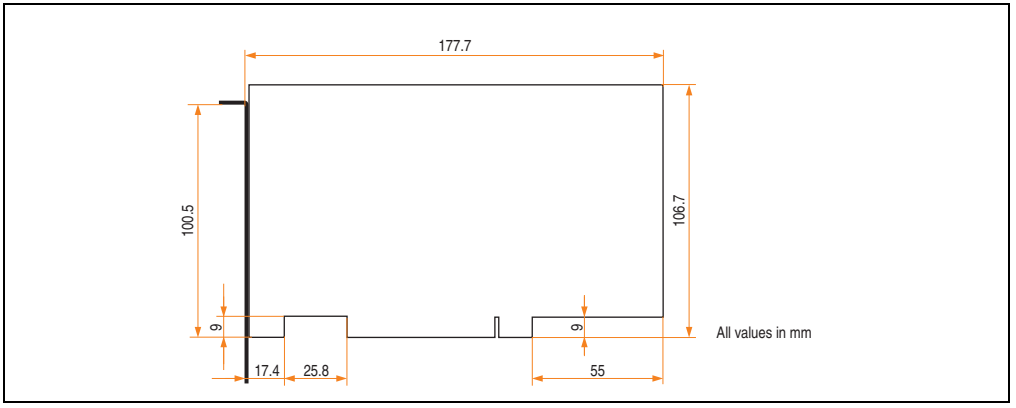


Figure 36: Dimensions - Standard half-size PCI card

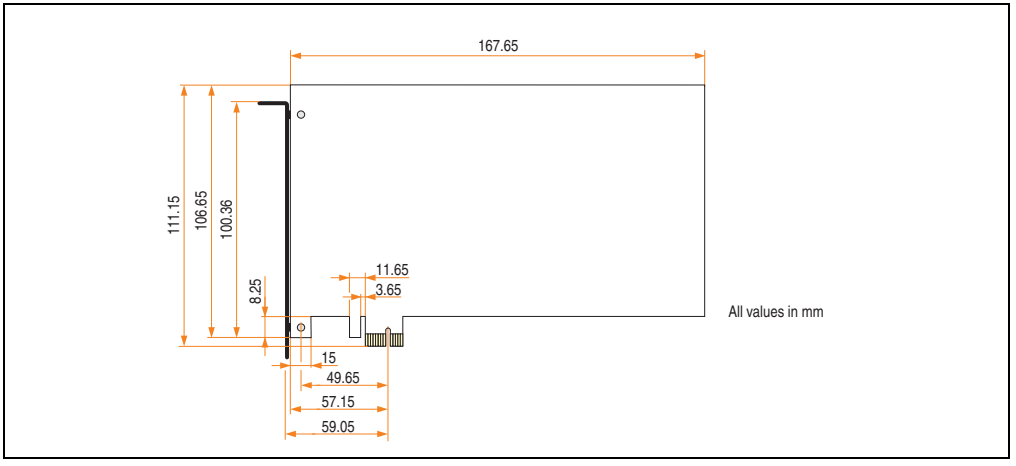


Figure 37: Dimensions - Standard half-size PCIe card

2.10.13 Status LEDs

The status LEDs are in the system unit.

Status LEDs			
LED	**Color**		**Meaning**
Power	Green	On	Supply voltage OK
	Red	On	The system is in standby mode (S5: soft-off mode or S4: Hibernate mode -Suspend-to-Disk)
	Orange 1)	On	Supply voltage not OK; the system is operating on battery power.
HDD	Yellow	On	Signals IDE drive access (CF, HDD, CD, etc.)
Link 1	Yellow	On	Indicates an active SDL connection on the monitor / panel interface.
		blinking	An active SDL connection has been interrupted by a loss of power in the display unit.
Link 2	Yellow	On	Indicates an active SDL connection on the AP Link.
		blinking	An active SDL connection on the AP link has been interrupted by a loss of power in the display unit.

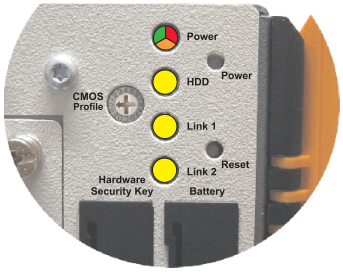


Table 32: Data - status LEDs

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

The light for the Status LEDs is fed to the front cover via fiber optic lines.

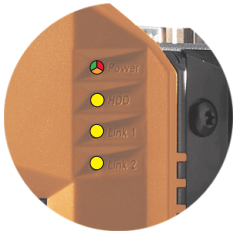


Figure 38: Front-side status LEDs

2.10.14 CMOS profile switch

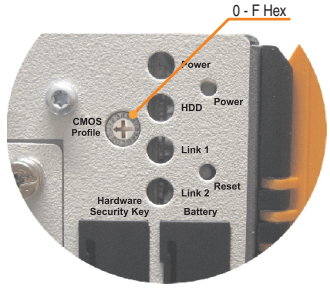
CMOS profile switch		
Different BIOS default value profiles can be defined using the 16-position CMOS profile switch.		
Switch position	**Description**	
0	Profile 0: Default profile reserved.	
1	Profile 1: Optimized for system units 5PC810.SX01-00, 5PC810.SX02-00 and 5PC810.SX03-00	
2	Profile 2: Optimized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

Table 33: 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 is displayed in the BIOS setup pages and in the B&R ADI Control Center, among other places.

2.10.15 Power button

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

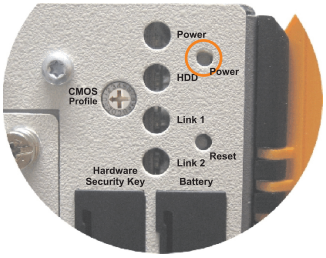
Power button	
The power button can be pressed with a pointed object (e.g. paper clip or tip of a pen). The power button acts like the on/off switch on a normal desktop PC with ATX power supply: **Press and release** ... Switches on APC810 or shuts down operating system and switches off the APC810. **Press and hold** ... ATX power supply switches off without shutting down the APC810 (**data could be lost!**). Pressing the power button does not reset the MTCX processor.	

Table 34: Power button

2.10.16 Reset button

Information:

From MTCX PX32 firmware V00.11 and higher, the reset button is only triggered by edges. This means that the device boots even when the reset button is pressed. In MTCX PX32 firmware < V00.11, the system does not start after pressing (ca. 10 seconds) and releasing the reset button.

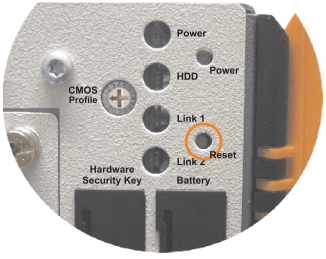
Reset button	
The reset button can be pressed with a pointed object (e.g. paper clip or tip of a pen). Pushing the reset button triggers a hardware and PCI reset. The APC810 is restarted (cold restart). The MTCX processor is not reset when the reset button is pressed.	

Table 35: Reset button

Warning!

A system reset can result in data loss!

2.10.17 Battery

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

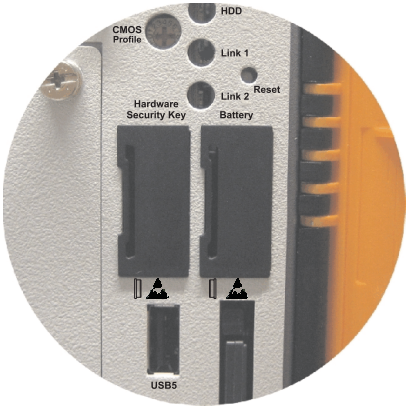
Battery		
Battery Type Removable Service life	 Renata 950 mAh Yes, accessible from the outside 2 1/2 years[1)]	
Accessories	**Short description**	
0AC201.91	**Lithium batteries, 4 pcs**. Lithium batteries (4 pcs.), 3 V / 950 mAh, button cell	
4A0006.00-000	**Lithium battery, 1 pc.** Lithium battery (1 pcs.), 3 V / 950 mAh, button cell	

Table 36: Battery

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

Battery status evaluation

The battery status is evaluated immediately following start-up of the device and is subsequently checked by the system every 24 hours. The battery is subjected to a brief load (1 second) during the measurement and then evaluated. The evaluated battery status is displayed in the BIOS Setup pages (under Advanced - Baseboard monitor) and in the B&R Control Center (ADI driver), but can also be read in a customer application via the ADI Library.

Battery status	Meaning
N/A	Hardware, i.e. firmware used is too old and does not support read.
Good	Data buffering is guaranteed
Bad	Data buffering is guaranteed for approx. another 500 hours from the point in time that the battery capacity is determined to be BAD (insufficient).

Table 37: Meaning of battery status

2.10.18 Hardware security key

B&R recommends a hardware security key (dongle) based on the DS1425 from MAXIM (previously Dallas Semiconductors) for software copy protection.

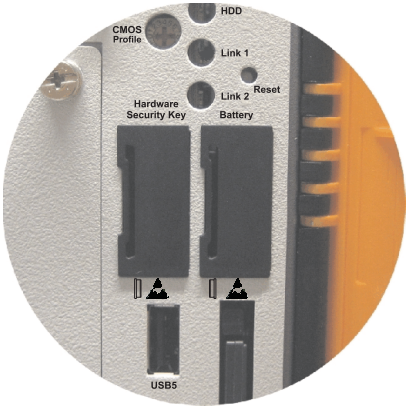
Hardware security key	
A hardware security key (dongle) can be inserted behind the black cover.	

Table 38: Hardware security key

Warning!

Turn off power before removing or adding the hardware security key.

2.10.19 CompactFlash slot 1

This CompactFlash slot is a fixed part of an APC810 system and is internally connected with the chipset via SATA to PATA bridge. Type I CompactFlash cards are supported.

CompactFlash slot (CF1)		
Connection	PATA Master	
CompactFlash Type	Type I	
Accessories	**Short description**	
5CFCRD.0512-04	512 MB B&R CompactFlash card	
5CFCRD.1024-04	1024 MB B&R CompactFlash card	
5CFCRD.2048-04	2048 MB B&R CompactFlash card	
5CFCRD.4096-04	4096 MB B&R CompactFlash card	
5CFCRD.8192-04	8192 MB B&R CompactFlash card	
5CFCRD.0064-03	CompactFlash 64 MB SSI	
5CFCRD.0128-03	CompactFlash 128 MB SSI	
5CFCRD.0256-03	CompactFlash 256 MB SSI	
5CFCRD.0512-03	CompactFlash 512 MB SSI	
5CFCRD.1024-03	CompactFlash 1024 MB SSI	
5CFCRD.2048-03	CompactFlash 2048 MB SSI	
5CFCRD.4096-03	CompactFlash 4096 MB SSI	
5CFCRD.8192-03	CompactFlash 8192 MB SSI	

Table 39: CompactFlash slot (CF1)

Warning!

Turn off power before inserting or removing the CompactFlash card!

2.10.20 CompactFlash slot 2

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

CompactFlash slot (CF2)

Table 40: CompactFlash slot (CF2)

2.10.21 Slide-in slot 1

The slide-in slot 1 is internally connected with the chipset via SATA I and USB.

Slide-in slot 1		
Connection	SATA I and USB	
Accessories	**Short description**	
5AC801.ADAS-00	APC810 slide-in compact adapter	
5AC801.HDDS-00	APC810 slide-in HDD EE25	
5AC801.DVRS-00	APC810 slide-in DVD-R/RW	
5AC801.DVDS-00	APC810 slide-in DVD-ROM	

Table 41: Slide-in slot 1

Information:

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

2.10.22 Slide-in slot 2

The slide-in slot 2 is internally connected with the chipset via SATA I and USB.

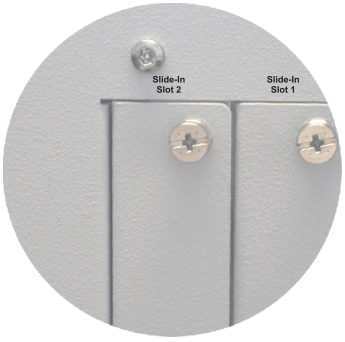
Slide-in slot 2		
Connection	SATA I and USB	
Accessories	**Short description**	
5AC801.HDDS-00	APC810 slide-in HDD EE25	
5AC801.DVRS-00	APC810 slide-in DVD-R/RW	
5AC801.DVDS-00	APC810 slide-in DVD-ROM	

Table 42: Slide-in slot 2

Information:

The APC810 slide-in compact adapter 5AC801.ADAS-00 can only be inserted into slide-in slot 1 for mechanical reasons (closing the front door).

Information:

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

2.10.23 Slide-in compact slot

The slide-in compact slot is internally connected with the chipset via SATA I.

Slide-in compact slot		
Connection	SATA I	
Accessories	**Short description**	
5AC801.HDDI-00	APC810 slide-in compact HDD 40GB EE25	
5AC801.HDDI-02	APC810 slide-in compact HDD 160GB EE25	
5AC801.SSDI-00	APC810 slide-in compact SSD 32GB (SLC)	

Table 43: Slide-in compact slot

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.

For information about installing / exchanging a slide-in compact drive, see the section "Installing / exchanging a slide-in compact drive", on page 428.

3. Individual components

3.1 System units

The system unit unites all of the individual components in one compact device. It consists of a housing with an integrated main board. The interfaces easily accessible on the front side, just behind the orange front doors or on the top. The system units are available in sizes with 1, 2, 3 or 5 card slots.

3.1.1 Technical data

Features	5PC810.SX01-00	5PC810.SX02-00	5PC810.SX03-00	5PC810.SX05-00
Photo				
B&R ID code	$A3ED	$A3C7	$B2C3	$A3EE
Serial interface Amount	2			
Ethernet interface Amount	2			
USB interface Amount	5			
Monitor / Panel output	Yes			
AC97 sound	Yes			
IF optional slot	Yes			
Card slots (PCI / PCIe slots[1)])	1	2	3	5
CompactFlash slot Amount	2			
Slot for slide-in drive	-	1	1	2
Slot for slide-in compact drive	1			
Slot for add-on UPS module	Yes			
Reset button	Yes			
Power button	Yes			
CMOS profile switch	Yes			
Battery compartment	Yes			
Hardware security compartment	Yes			
Fan kit insert	Yes			

Table 44: Technical data - System units

Features	5PC810.SX01-00	5PC810.SX02-00	5PC810.SX03-00	5PC810.SX05-00
AP Link slot	-	Yes		
Status LEDs	Yes			
MTCX[2)]	Yes			
Electrical characteristics				
Supply voltage Rated voltage Starting current Power consumption	 24 VDC ±25% Typ. 7 A, max. 50 A < 300µs See 2.7 "Power management"			
Mechanical characteristics				
Housing[3)] Material Paint Front cover	 Galvanized steel plate Light gray (similar to Pantone 427C), dark gray (similar to Pantone 432C) Orange colored plastic (similar to Pantone 144C)			
Outer dimensions (without heat sink) Width Length Height	 74 mm 252.7 mm 270 mm	 113.5 mm 254.6 mm 270 mm	 134 mm 254.5 mm 270 mm	 194.4 mm 254.5 mm 270 mm
Weight (without heat sink)	Approx. 2.2 kg	Approx. 2.8 kg	Approx. 3.2 kg	Approx. 3.9 kg
Mounting plates (for M4 screws)	4	4	4	6
Drilling templates for mounting	See Chapter 3 "Commissioning", section 1.2 "Drilling templates", on page 164			

Table 44: Technical data - System units (cont.)

1) Depends on the bus unit.

2) For more information about Maintenance Controller Extended, see the section "Maintenance Controller Extended (MTCX)", on page 456.

3) Depending on the process or batch, there may be visible deviations in the color and surface structure.

3.2 Bus units

The bus units are compatible with the system units in 1, 2, 3 or 5 card slot sizes, available with PCI and/or PCI Express support.

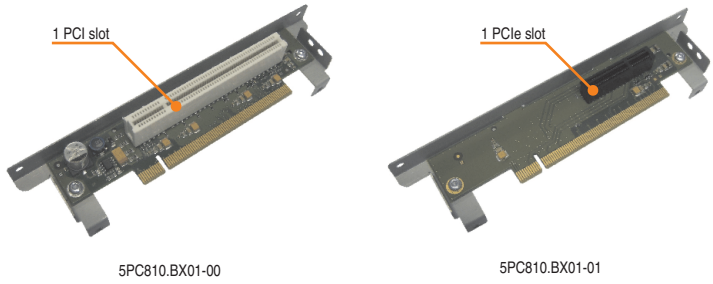


Figure 39: 1 slot bus units

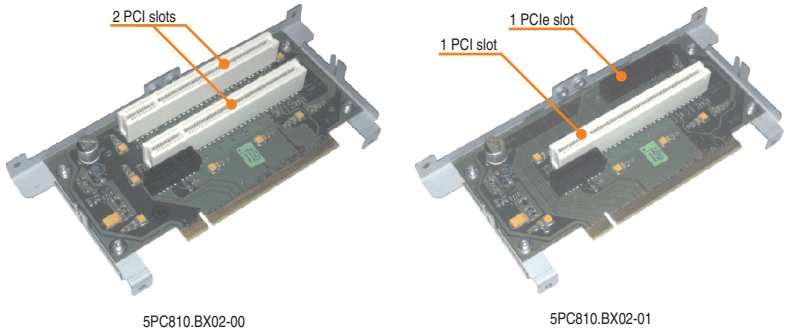


Figure 40: 2 slot bus units

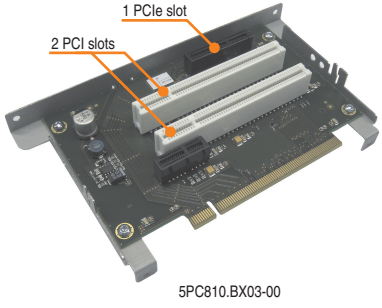


Figure 41: 3 slot bus units

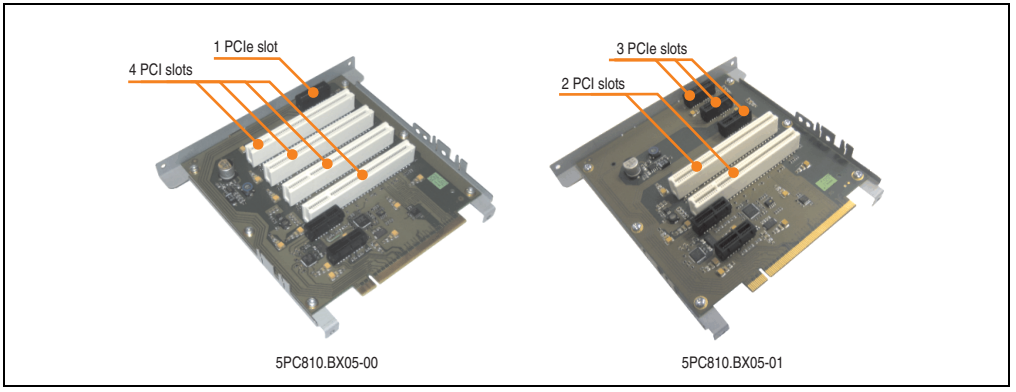


Figure 42: 5 slot bus units

3.2.1 Technical data

Features	5PC810.BX01 -00	5PC810.BX01 -01	5PC810.BX02 -00	5PC810.BX02 -01	5PC810.BX03 -00	5PC810.BX05 -00	5PC810.BX05 -01
PCI slot Amount Standard PCI bus type Bus speed	 1 2.2 32-bit 33 MHz	-	 2 2.2 32-bit 33 MHz	 1 2.2 32-bit 33 MHz	 2 2.2 32-bit 33 MHz	 4 2.2 32-bit 33 MHz	 2 2.2 32-bit 33 MHz
PCI Express Amount Standard Bus speed	-	 1 1.0a x4 (10 GB/s)	-	 1 1.0a x4 (10 GB/s)	 1 1.0a x4 (10 GB/s)	 1 1.0a x1 (2.5 GB/s)	 3 1.0a x1 (2.5 GB/s)

Table 45: Technical data - Bus units

3.3 CPU boards GM45

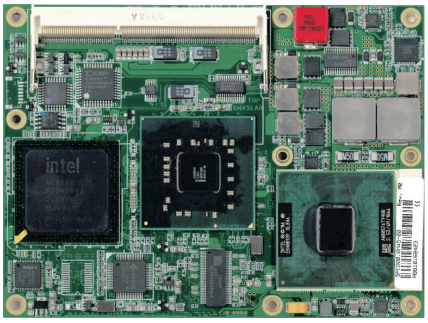


Figure 43: GM45 CPU board

3.3.1 Technical data

Features	5PC800.BM45-00	5PC800.BM45-01
Boot loader / Operating system	embedded AMI BIOS (for a description, see Chapter 4 "Software", section "BIOS options", on page 213)	
Processor Type Name Clock frequency Architectures Expanded command set L1 cache L2 cache Front side bus - FSB	 Intel® Core™ 2 Duo T9400 2.53 GHz 45 nm Intel® Virtualization Technology, G4 Architecture, Enhanced SpeedStep Technology SSE, SSE2, SSE3, Intel 64 architecture 32 KB 6 MB 1066 MHz	 Intel® Core™ 2 Duo P8400 2.26 GHz 45 nm Intel® Virtualization Technology, G4 Architecture, Enhanced SpeedStep Technology SSE, SSE2, SSE3, Intel 64 architecture 32 KB 3 MB 1066 MHz
Chipset	Intel® GM45 / Intel 82801 (ICH9M-E)	
Memory	SO-DIMM DDR3 1067/PC8500, max. 8 GB	
Graphics Controller Memory Color depth Resolution RGB DVI	 Intel® Graphics Media Accelerator 4500MDH Up to 384 MB (reserved from main memory) Max. 32-bit 300 MHz RAMDAC, resolutions up to 2048 x 1536 @ 70 Hz (QXGA) 2x Intel compliant SDVO ports	
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At 25°C typ. 12 ppm (1 second)[1] per day	
Mass memory management	4 x SATA[2]	
Power management	ACPI 3.0 with battery support	

Table 46: Technical data - GM45 CPU boards

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

2) The SATA 2 port is not used internally on the APC810, and the SATA 3 port is used internally for the SATA to PATA bridge.

3.4 Heat sink

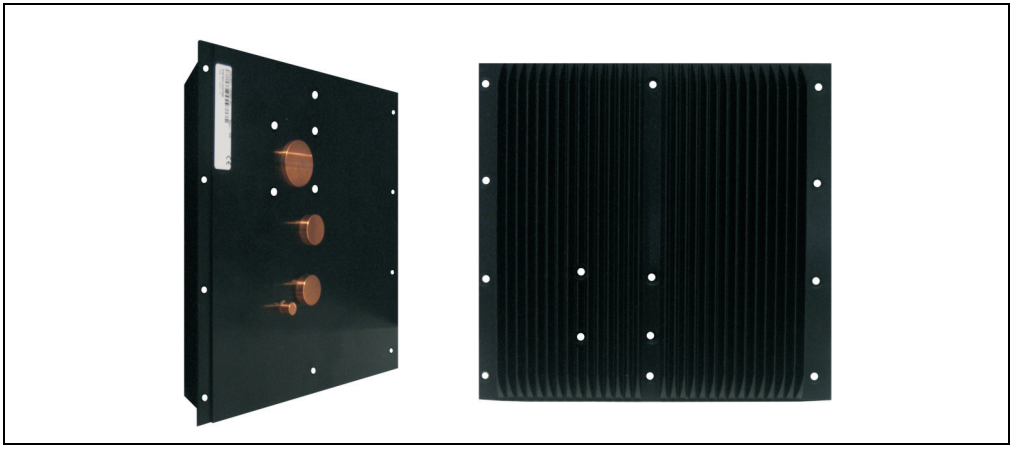


Figure 44: Heat sink

3.4.1 Technical data

Mechanical characteristics	5AC801.HS00-01
Ideal for CPU boards	5PC800.B945-04 5PC800.BM45-00 5PC800.BM45-01
Material	Aluminum, black-coated with copper heat pipes
Outer dimensions Width Height Depth	 228.7 mm 218 mm 28 mm
Weight	Approx. 2 kg

Table 47: Technical data - Heat sink

3.5 Main memory

The CPU boards offer room for two main memory modules. Dual-Channel memory technology is supported when two modules of the same size (e.g. 2 GB) are plugged in.

Figure 45: Main memory

3.5.1 Technical data

Features	5MMDDR.2048-02	5MMDDR.4096-02
Size	2 GB	4 GB
Type	DDR3 SDRAM / PC3-8500	
Construction	204 Pin SO-DIMM	
Organization	256M x 64-bit	512M x 64-bit

Table 48: Technical data - Main memory

Information:

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

3.6 Drives

3.6.1 Slide-in compact HDD 40GB EE25 - 5AC801.HDDI-00

This hard disk is specified for 24-hour operation and also provides an extended temperature specification.

Figure 46: Slide-in compact HDD 40GB EE25 - 5AC801.HDDI-00

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.

Features	5AC801.HDDI-00
Manufacturer's product ID	Seagate ST940817SM
Formatted capacity	40 GB
Number of heads	1
Number of sectors (user)	78,140,160
Bytes per sector	512
Revolution speed	5400 rpm
Access time (average)	12.5 ms

Table 49: Technical data - Add-on hard disk - 5AC801.HDDI-00

Features	5AC801.HDDI-00
Positioning time (seek, typical values) Minimum (track to track) Average (read access) Maximum (read access)	 1 ms 12.5 ms 23 ms
Starting time (0 rpm to read access)	3 seconds (typically)
Interface	SATA
Data transfer rate Internal To/from host	 Max. 450 Mbit/s Max. 150 MB/s (Ultra-DMA Mode 5)
Cache	8 MB
S.M.A.R.T. Support	Yes
MTBF	750,000 Power On Hours[1)]
Mechanical characteristics	
Slide-in compact mounting	Fixed
Outer dimensions Height Width Depth	 98 mm 13 mm 105 mm
Weight	134 g
Environmental characteristics	
Ambient temperature[2)] Operation - Standard / 24-hour Storage Transport	 -30 to +85°C -40 to +95°C -40 to +95°C
Relative humidity[3)] Operation Storage Transport	 5 to 90%, non-condensing 5 to 95%, non-condensing 5 to 95%, non-condensing
Vibration Operation Storage	 2 g at 5 - 500 Hz, no non-recovered errors 5 g at 5 - 500 Hz, no non-recovered errors
Shock (pulse with a sine half-wave) Operation Storage	 300 g and 2 ms duration, no non-recovered errors 150 g and 11 ms duration, no non-recovered errors 800 g and 2 ms duration, no non-recovered errors 400 g and 0.5 ms duration, no non-recovered errors
Altitude Operation Storage	 - 300 to 5000 m - 300 to 12,192 m

Table 49: Technical data - Add-on hard disk - 5AC801.HDDI-00 (cont.)

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) Humidity gradient: Maximum 15% per hour.

Temperature humidity diagram - Operation and storage

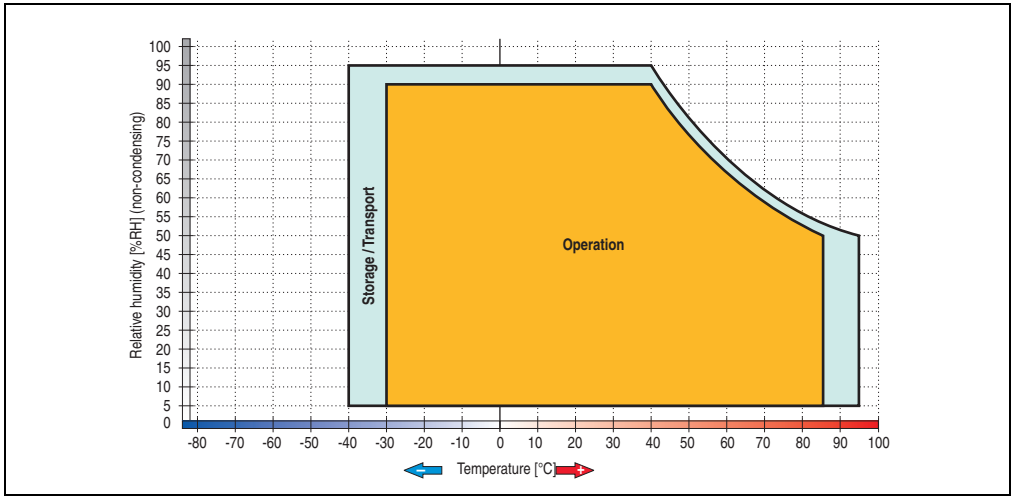


Figure 47: Temperature humidity diagram - 5AC801.HDDI-00

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.

3.6.2 Slide-in compact HDD 160 GB 24x7 ET - 5AC801.HDDI-02

This hard disk is specified for 24-hour operation (24x7) and also provides an extended temperature specification (ET).

Figure 48: Slide-in compact HDD 160 GB - 5AC801.HDDI-02

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.

Features	5AC801.HDDI-02
Manufacturer's product ID	Fujitsu MHY2160BH-ESW
Formatted capacity	160 GB
Number of heads	3
Number of sectors (user)	312,581,808
Bytes per sector	512
Revolution speed	5400 rpm
Access time (average)	12 ms
Positioning time (seek, typical values) Minimum (track to track) Average (read access) Maximum (read access)	 1.5 ms 12 ms 22 ms

Table 50: Technical data - Slide-in compact HDD - 5AC801.HDDI-02

Features	5AC801.HDDI-02
Starting time (0 rpm to read access)	4 seconds (typically)
Interface	SATA
Data transfer rate Internal To/from host	 Max. 84.6 Mbit/s Max. 150 MB/s (Ultra-DMA Mode 5)
Cache	8 MB
S.M.A.R.T. Support	Yes
MTBF	300,000 Power On Hours[1)]
Mechanical characteristics	
Slide-in compact mounting	Fixed
Outer dimensions Height Width Depth	 98 mm 13 mm 105 mm
Weight	135 g
Environmental characteristics	
Ambient temperature[2)] Operation - Standard / 24-hour Storage Transport	 -15 to +80°C -40 to +95°C -40 to +95°C
Relative humidity[3)] Operation Storage Transport	 8 to 90% non-condensing (maximum humidity at +29°C) 5 to 95% non-condensing (maximum humidity at +40°C) 5 to 95% non-condensing (maximum humidity at +40°C)
Vibration Operation Storage	 5 - 500 Hz: 1 g, no unrecoverable errors 5 - 500 Hz: 5 g, no damage
Shock (pulse with a sine half-wave) Operation Storage	 325 g, 2 ms, no unrecoverable errors 900 g, 1 ms, no damage 120 g, 11 ms, no damage
Altitude Operation Storage	 - 300 to 3000 m - 300 to 12,192 m

Table 50: Technical data - Slide-in compact HDD - 5AC801.HDDI-02 (cont.)

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) Humidity gradient: Maximum 15% per hour.

Temperature humidity diagram - Operation and storage

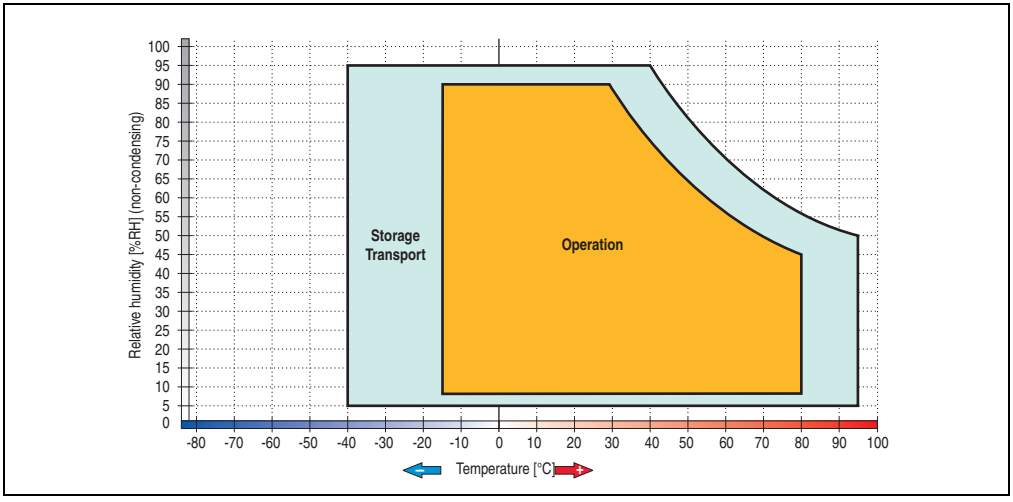


Figure 49: Temperature humidity diagram - 5AC801.HDDI-02

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.

3.6.3 Slide-in compact HDD 250GB - 5AC801.HDDI-03

This hard disk is specified for 24-hour operation.

Figure 50: Slide-in compact HDD 250GB - 5AC801.HDDI-03

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.

Features	5AC801.HDDI-03
Manufacturer's product ID	Seagate ST9250315AS
Formatted capacity	250 GB
Number of heads	1
Number of sectors (user)	488,397,168
Bytes per sector	512
Revolution speed	5400 rpm ±0.2%
Access time (average)	5.56 ms
Positioning time (seek, typical values) Minimum (track to track) Average (read access) Maximum (read access)	 1 ms 14 ms 30 ms
Starting time (0 rpm to read access)	3.6 seconds (typically)

Table 51: Technical data - Slide-in compact HDD - 5AC801.HDDI-03

Features	5AC801.HDDI-03
Interface	SATA
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 Mbits/s Max. 150 MB/s (SATA I), max. 300 MB/s (SATA II)
Cache	8 MB
S.M.A.R.T. Support	Yes
MTBF	550,000 Power On Hours[1)]
Mechanical characteristics	
Slide-in compact mounting	Fixed
Outer dimensions Height Width Depth	 98 mm 13 mm 105 mm
Weight	134 g
Environmental characteristics	
Ambient temperature[2)] Operation - Standard / 24-hour[3)] Storage Transport	 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 Operation Storage	 0.5 g at 5 - 500 Hz, no non-recovered errors 5 g at 5 - 500 Hz, no non-recovered errors
Shock (pulse with a sine half-wave) Operation Storage	 350 g and 2 ms duration, no non-recovered errors 800 g and 2 ms duration, no non-recovered errors 1000 g and 1 ms duration, no non-recovered errors 600 g and 0.5 ms duration, no non-recovered errors
Altitude Operation Storage	 -300 to 3048 m -300 to 12,192 m

Table 51: Technical data - Slide-in compact HDD - 5AC801.HDDI-03 (cont.)

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) 24-hour operation means 732 POH (power-on hours) per month.

4) Humidity gradient: Maximum 30% per hour.

Temperature humidity diagram

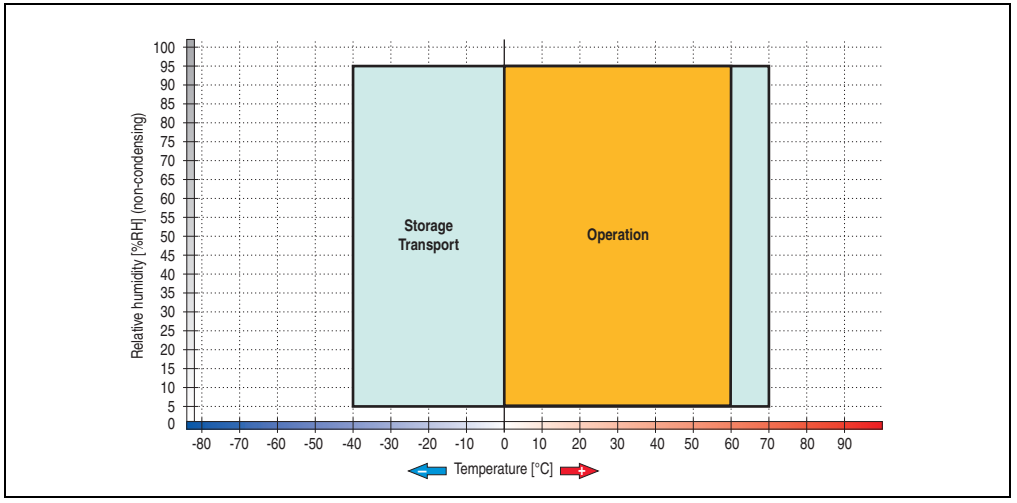


Figure 51: Temperature humidity diagram - 5AC801.HDDI-03

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.

3.6.4 Slide-in compact SSD - 5AC801.SSDI-00

Figure 52: Slide-in compact SSD 5AC801.SSDI-00

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 slide-in compact SSD cannot be used in the 5 card slot version of the APC810 in slide-in slot 2 with the 5AC801.ADAS-00 adapter.

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.

Features	5AC801.SSDI-00
Manufacturer's product ID	Intel SSDSA2SH032G1
Formatted capacity	32 GB
Interface	SATA
Continuous reading	Max. 250 MB/s
Continuous writing	Max. 170 MB/s
IOPS[1)] 4k write 4k read	 3,300 35,000
S.M.A.R.T support	Yes
MTBF	2,000,000 hours
Maintenance	None
Data reliability	< 1 unrecoverable error in 10^{15} bit read accesses
Power on/off cycles	50,000
Endurance	
Guaranteed amount of data Results for 5 years	700 TB 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
Mechanical characteristics	
Slide-in compact mounting	Fixed
Outer dimensions Height Width Depth	 98 mm 13 mm 105 mm
Weight	118 g
Environmental characteristics	
Ambient temperature Operation Storage Transport	 0 to +70°C -55 to +95°C -55 to +95°C
Relative humidity Operation Storage Transport	 5 to 95% 5 to 95% 5 to 95%
Vibration Operation Storage Transport	 2.17 g at 7 - 800 Hz 3.13 g at 10 - 500 Hz 3.13 g at 10 - 500 Hz

Table 52: Technical data - Slide-in compact SSD - 5AC801.SSDI-00

Environmental characteristics	5AC801.SSDI-00
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

Table 52: Technical data - Slide-in compact SSD - 5AC801.SSDI-00 (cont.)

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

Temperature humidity diagram - Operation and storage

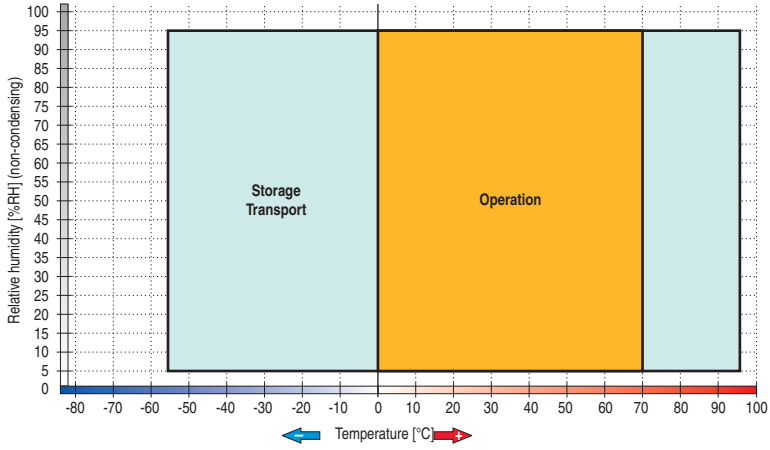


Figure 53: Temperature humidity diagram - 5AC801.SSDI-00

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.

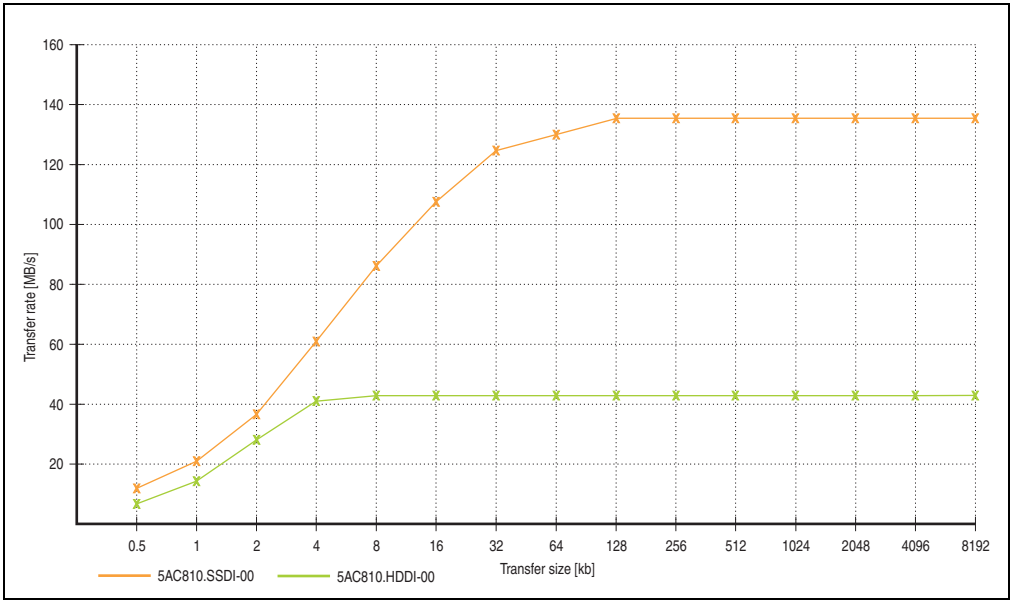


Figure 54: ATTO disk benchmark v2.34 - cyclic read

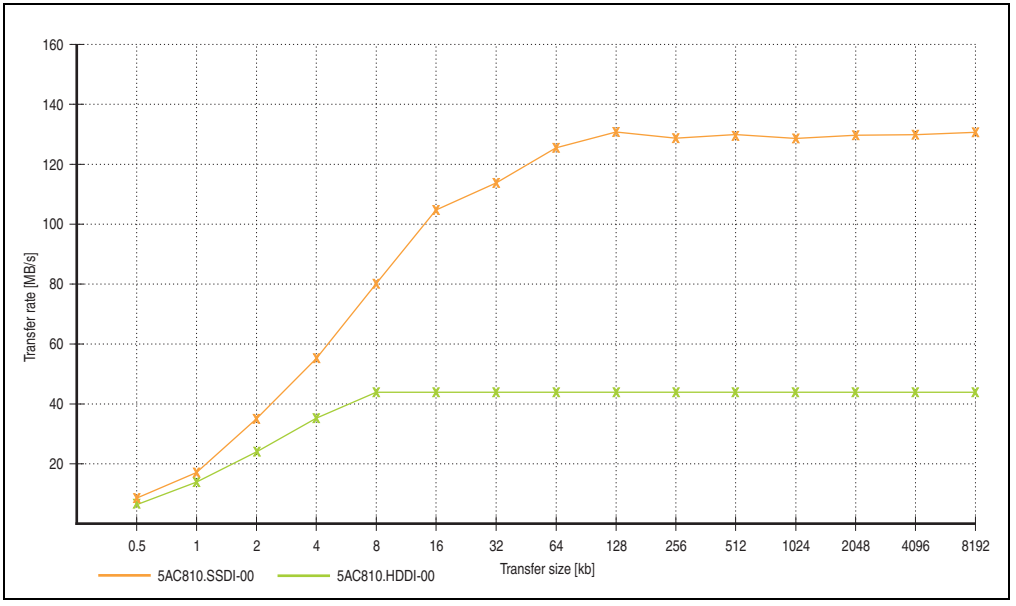


Figure 55: ATTO disk benchmark v2.34 - cyclic write

3.6.5 Hard disk adapter (slide-in compact) - 5AC801.ADAS-00

Figure 56: Hard disk adapter (slide-in compact) 5AC801.ADAS-00

Information:

The APC810 slide-in compact adapter 5AC801.ADAS-00 can only be inserted into slide-in slot 1 for mechanical reasons (closing the front door).

Mechanical characteristics	5AC801.ADAS-00
Outer dimensions Height Width Depth	 172.5 mm 22 mm 150 mm
Weight	328 g

Table 53: Technical data - Slide-in HDD adapter - 5AC801.ADAS-00

3.6.6 Slide-in HDD EE25 - 5AC801.HDDS-00

Figure 57: Slide-in HDD EE25 5AC801.HDDS-00

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.

Features	5AC801.HDDS-00
Manufacturer's product ID	Seagate ST940817SM
Formatted capacity	40 GB
Number of heads	1
Number of sectors (user)	78,140,160
Bytes per sector	512
Revolution speed	5400 rpm
Access time (average)	12.5 ms
Positioning time (seek, typical values) Minimum (track to track) Average (read access) Maximum (read access)	 1 ms 12.5 ms 23 ms
Starting time (0 rpm to read access)	3 seconds (typically)

Table 54: Technical data - Slide-in HDD EE25 - 5AC801.HDDS-00

Features	5AC801.HDDS-00
Interface	SATA
Data transfer rate Internal To/from host	 Max. 450 Mbit/s Max. 150 MB/s (Ultra-DMA Mode 5)
Cache	8 MB
S.M.A.R.T. Support	Yes
MTBF	750,000 Power On Hours[1)]
Mechanical characteristics	
Slide-in compact mounting	Fixed
Outer dimensions Height Width Depth	 172.5 mm 22 mm 150 mm
Weight	387 g
Environmental characteristics	
Ambient temperature[2)] Operation - Standard / 24-hour Storage Transport	 -30 to +85°C -40 to +95°C -40 to +95°C
Relative humidity[3)] Operation Storage Transport	 5 to 90%, non-condensing 5 to 95%, non-condensing 5 to 95%, non-condensing
Vibration Operation Storage	 2 g at 5 - 500 Hz, no non-recovered errors 5 g at 5 - 500 Hz, no non-recovered errors
Shock (pulse with a sine half-wave) Operation Storage	 300 g and 2 ms duration, no non-recovered errors 150 g and 11 ms duration, no non-recovered errors 800 g and 2 ms duration, no non-recovered errors 400 g and 0.5 ms duration, no non-recovered errors
Altitude Operation Storage	 - 300 to 5000 m - 300 to 12,192 m

Table 54: Technical data - Slide-in HDD EE25 - 5AC801.HDDS-00 (cont.)

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) Humidity gradient: Maximum 15% per hour.

Temperature humidity diagram - Operation and storage

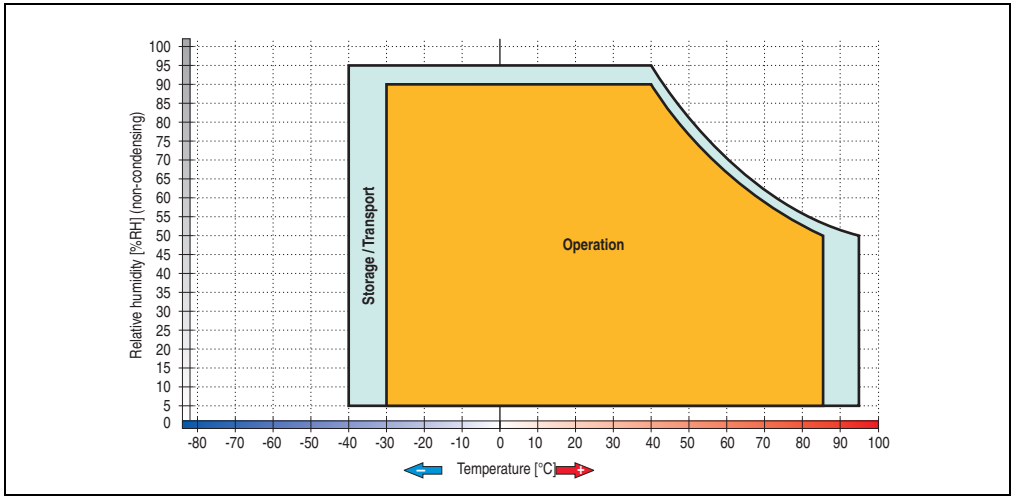


Figure 58: Temperature humidity diagram - 5AC801.HDDS-00

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.

3.6.7 Slide-in DVD-ROM - 5AC801.DVDS-00

Figure 59: Slide-in DVD-ROM 5AC801.DVDS-00

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.

Features	5AC801.DVDS-00
Reading rate CD DVD	 24x 8x
Data transfer rate	max. 1.5 Gbit/s
Access time (average) CD DVD	 130 ms 140 ms
Revolution speed	Max. 5090 rpm ±1%
Starting time (0 rpm to read access)	19 seconds (maximum)
Host interface	SATA

Table 55: Technical data - 5AC801.DVDS-00

Features	5AC801.DVDS-00
Readable media CD DVD	 CD-ROM (12 cm, 8 cm), CD-A CD-R, CD-RW DVD-ROM, DVD-R, DVD-R DL, DVD-RW, DVD+R DVD+R DL, DVD+RW, DVD-RAM
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
Noise level (complete read access)	Approx. 45 dBA in a distance of 50 cm
Service life Opening/closing the drawer	60,000 POH (Power-On Hours) > 10,000 times
Mechanical characteristics	
Outer dimensions Height Width Depth	 172.5 mm 22 mm 150 mm
Weight	455 g
Environmental characteristics	
Ambient temperature[1)] Operation Storage Transport	 +5 to +55°C[2)] -20 to +60°C -40 to +65°C
Relative humidity Operation Storage Transport	 8 to 80%, non-condensing 5 to 95%, non-condensing 5 to 95%, non-condensing
Vibration Operation Storage Transport	 0.2 g at 5 - 500 Hz 2 g at 5 - 500 Hz 2 g at 5 - 500 Hz
Shock Operation Storage Transport	 5 g and 11 ms duration 60 g and 11 ms duration 200 g and 2 ms duration 60 g and 11 ms duration 200 g and 2 ms duration

Table 55: Technical data - 5AC801.DVDS-00 (cont.)

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

2) Drive surface temperature

Temperature humidity diagram - Operation and storage

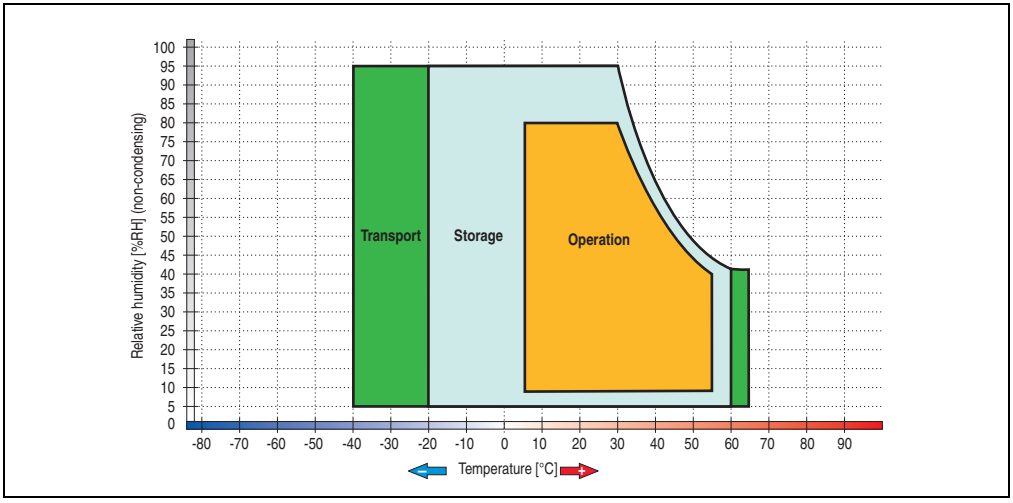


Figure 60: Temperature humidity diagram - Slide-in DVD-ROM/CD-RW - 5AC801.DVDS-00

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).

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.

3.6.8 Slide-in DVD-R/RW - 5AC801.DVRS-00

Figure 61: Slide-in DVD-R/RW - 5AC801.DVRS-00

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.

Features	5AC801.DVRS-00
Write speed	
CD-R	24x, 16x, 10x and 4x
CD-RW	24x, 16x, 10x and 4x
DVD-R	8x, 4x and 2x
DVD-R (Double Layer)	6x, 4x and 2x
DVD-RW	6x, 4x and 2x
DVD-RAM[1)]	5x, 3x and 2x
DVD+R	8x, 4x and 2, 4x
DVD+R (Double Layer)	6x, 4x and 2, 4x
DVD+RW	4x and 2x
Reading rate	
CD	max. 24x
DVD	max. 8x
Data transfer rate	Max. 33.3 MB/s

Table 56: Technical data - Slide-in DVD-R/RW, DVD+R/RW - 5AC801.DVRS-00

Features	5AC801.DVRS-00
Access time (average) CD DVD	 140 ms (24x) 150 ms (8x)
Revolution speed	Max. 5160 rpm ±1%
Starting time (0 rpm to read access) CD DVD	 14 seconds (maximum) 15 seconds (maximum)
Host interface	SATA
Readable media CD DVD	 CD/CD-ROM (12 cm, 8 cm), CD-R, CD-RW 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 DVD	 CD-R, CD-RW DVD-R/RW, DVD-R (double layer), DVD-RAM (4.7 GB), DVD+R/RW, DVD+R (double layer)
Compatible formats	CD-DA, CD-ROM mode 1/mode 2 CD-ROM XA mode 2 (form 1, form 2) Photo CD (single/multi-session), Enhanced CD, CD text DVD-ROM, DVD-R, DVD-R (double layer), DVD-RW, DVD-Video DVD-RAM (4.7 GB, 2.6 GB) DVD+R, DVD+R (double layer), DVD+RW
Write-methods CD DVD	 Disk at once, session at once, packet write, track at once Disk at once, incremental, over-write, sequential, multi-session
Laser class	Class 1 laser
Data buffer capacity	2 MB
Noise level (complete read access)	Approx. 45 dBA at 50 cm
Service life Opening/closing the drawer	60,000 POH (Power-On Hours) > 10,000 times
Mechanical characteristics	
Outer dimensions Height Width Depth	 172.5 mm 22 mm 150 mm
Weight	400 g
Environmental characteristics	
Ambient temperature[2)] Operation Storage Transport	 +5 to +55°C[3)] -20 to +60°C -40 to +65°C
Relative humidity Operation Storage Transport	 8 to 80%, non-condensing 5 to 95%, non-condensing 5 to 95%, non-condensing
Vibration Operation Storage Transport	 At max. 5 - 500 Hz and 0.2 g At max. 5 - 500 Hz and 2 g At max. 5 - 500 Hz and 2 g

Table 56: Technical data - Slide-in DVD-R/RW, DVD+R/RW - 5AC801.DVRS-00

Environmental characteristics	5AC801.DVRS-00
Shock (pulse with a sine half-wave)	
Operation	At max. 5 g for 11 ms
Storage	At max. 60 g for 11 ms At max. 200 g for 2 ms
Transport	At max. 60 g for 11 ms At max. 200 g for 2 ms

Table 56: Technical data - Slide-in DVD-R/RW, DVD+R/RW - 5AC801.DVRS-00

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 - Operation and storage

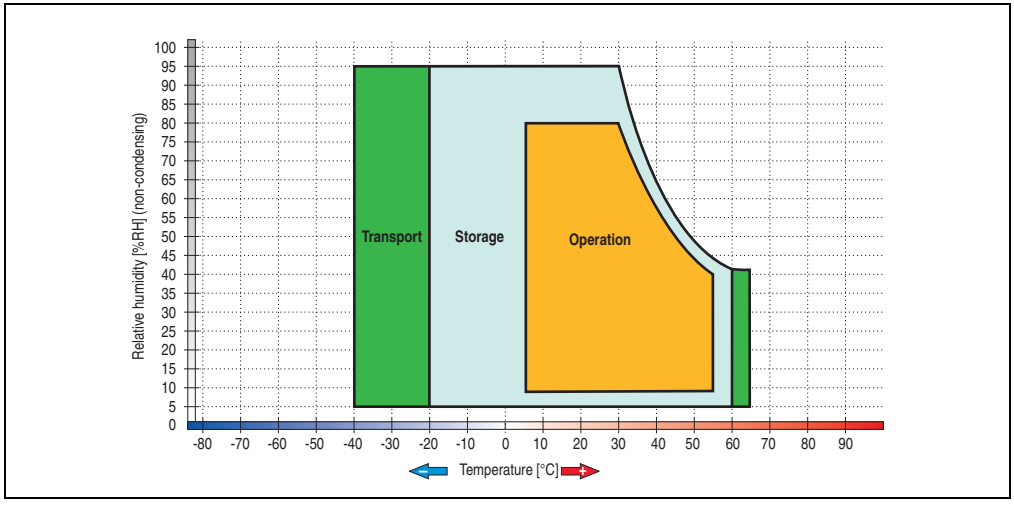


Figure 62: Temperature humidity diagram - Slide-in DVD-R/RW, DVD+R/RW - 5AC801.DVRS-00

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).

3.6.9 PCI SATA RAID 2 x 160 GB 24x7 ET - 5ACPCI.RAIC-03

The hard disks being used are specified for 24-hour operation (24x7) and also provides an extended temperature specification (ET).

Features

- 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

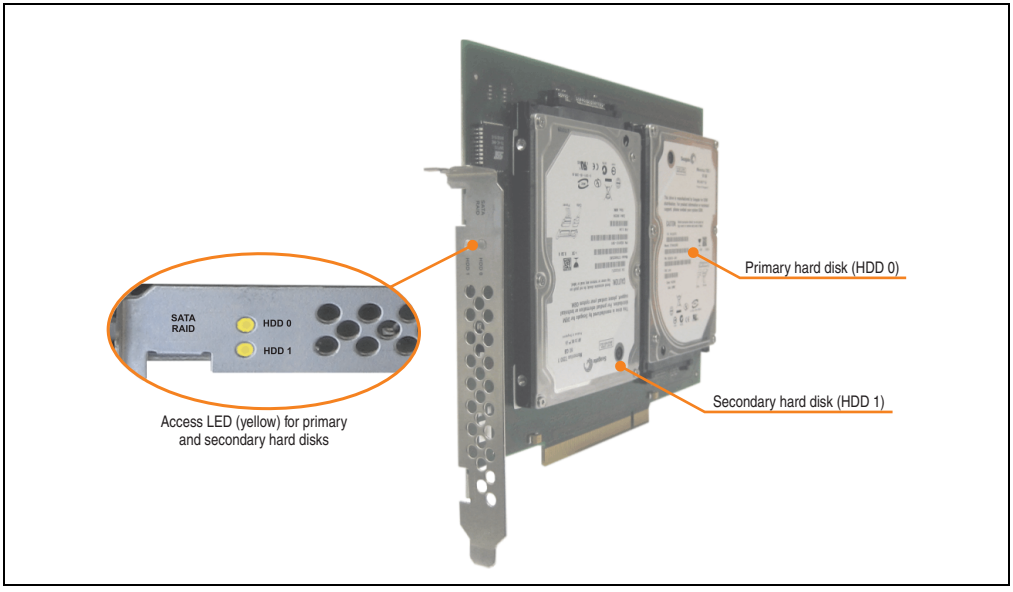


Figure 63: PCI SATA RAID controller - 5ACPCI.RAIC-03

Information:

The PCI SATA RAID controller can not be used in place of a Universal Power Supply (UPS). If the operating system is shut down improperly, the next time it is started it is detected as an error by the RAID 1, and a complete rebuild is executed. This generally takes at least 120 minutes (configurable) to complete.

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.

Features	5ACPCI.RAIC-03
SATA RAID controller Type Specifications Data transfer rate RAID level BIOS Extension ROM - requirements	 Sil 3512 SATA link Serial ATA 1.0 Max. 1.5 GB/s (150 MB/s) Supports RAID 0, 1 Approx. 32 KB
Hard disks Amount	Fujitsu M120-ESW MHY2160BH-ESW 2
Formatted capacity (512 bytes/sector)	160 GB
Number of heads	3
Number of sectors (user)	312,581,808
Bytes per sector	512
Revolution speed	5400 rpm ±1%
Access time (average)	5.56 ms
Positioning time (seek, typical values) Minimum (track to track) Average (read access) Maximum (read access)	 1.5 ms 12 ms 22 ms
Starting time (0 rpm to read access)	4 seconds (typically)
Supported transfer mode	SATA 1.0, PIO mode 0-4, multiword DMA mode 0-2, UDMA 0-5
Data transfer rate On the medium To/from host	 Max. 84.6 Mbit/s Max. 150 MB/s
Cache	8 MB
S.M.A.R.T. Support	Yes
Lifespan	5 years
Electrical characteristics	
Power consumption	0.3 A at 3.3 V (PCI bus) 1 A at 5 V (PCI bus)
Mechanical characteristics	
Mounted on PCI insert	Fixed
Weight	350 g

Table 57: Technical data - RAID hard disk - 5ACPCI.RAIC-03

Environmental characteristics	5ACPCI.RAIC-03
Ambient temperature[1)] Operation - Standard / 24-hour[2)] Storage Transport	 -15 to +80°C -40 to +95°C -40 to +95°C
Relative humidity Operation Storage Transport	 8 to 90% non-condensing (maximum humidity at +29°C) 5 to 95% non-condensing (maximum humidity at +40°C) 5 to 95% non-condensing (maximum humidity at +40°C)
Vibration[3)] Operation (continuous) Operation (occasional) Storage Transport	 5 - 500 Hz: max. 0.125 g; duration 1 octave per minute; no unrecoverable errors 5 - 500 Hz: max. 0.25 g; duration 1 octave per minute; no unrecoverable errors 5 - 500 Hz: max. 5 g; duration 0.5 octaves per minute; no damage 5 - 500 Hz: max. 5 g; duration 0.5 octaves per minute; no damage
Shock[4)] (pulse with a sine half-wave) Operation Storage	 Max. 125 g, 2 ms; no unrecoverable errors Max. 400 g, 2 ms; no damage Max. 450 g, 1 ms; no damage Max. 200 g, 0.5 ms; no damage
Altitude Operation Storage	 - 300 to 3048 m - 300 to 12,192 m

Table 57: Technical data - RAID hard disk - 5ACPCI.RAIC-03 (cont.)

1) Temperature values for 305 meter altitude. The temperature specification must be reduced linearly by 1°C every 305 meters. The temperature increase and decrease can be a maximum of 3°C per minute.

2) 24-hour operation means 732 POH (power-on hours) per month.

3) Operation in areas prone to vibration and shock can affect performance negatively (reduction of transfer rate).

4) Operation in areas prone to vibration and shock can affect performance negatively (reduction of transfer rate).

Temperature humidity diagram - Operation and storage

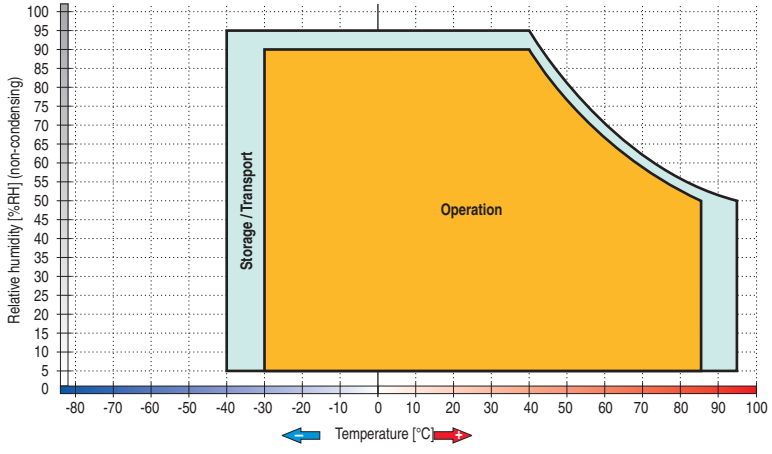


Figure 64: Temperature humidity diagram - SATA RAID hard disk 5ACPCI.RAIC-03

Temperature values for 305 meter altitude. The temperature specification must be reduced linearly by 1°C every 305 meters. The temperature increase and decrease can be a maximum of 3°C per minute.

Driver support

Special drivers are necessary for operating the PCI SATA RAID controller. Drivers for Windows XP Professional and Windows XP Embedded are available for download on the B&R Homepage in the download area (**www.br-automation.com**).

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

Information:

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

Configuration

For configuration of a SATA RAID network, see Chapter 3 "Commissioning", section "Configuration of a SATA RAID array", on page 202.

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 60GB 5ACPCI.RAIC-02 is available as a replacement part for a HDD.

For instructions on exchanging the drive, see Chapter 7 "Maintenance / Servicing", section "Mounting the side cover", on page 447.

3.6.10 Replacement PCI SATA RAID HDD 160 GB - 5ACPCI.RAIC-04

The hard disk can be used as a replacement part for 5ACPCI.RAIC-03.

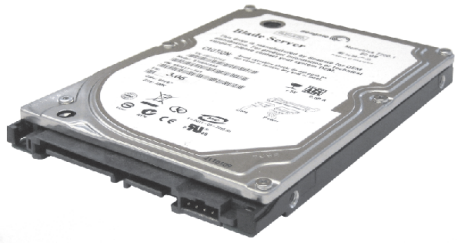


Figure 65: Replacement SATA HDD 160 GB - 5ACPCI.RAIC-04

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.

Features	5ACPCI.RAIC-04
Hard disks Amount	Fujitsu M120-ESW MHY2160BH-ESW 1
Formatted capacity (512 bytes/sector)	160 GB
Number of heads	3
Number of sectors (user)	312,581,808
Bytes per sector	512
Revolution speed	5400 rpm ±1%
Access time (average)	5.56 ms
Positioning time (seek, typical values) Minimum (track to track) Average (read access) Maximum (read access)	 1.5 ms 12 ms 22 ms
Starting time (0 rpm to read access)	4 seconds (typically)
Supported transfer mode	SATA 1.0, PIO mode 0-4, multiword DMA mode 0-2, UDMA 0-5
Data transfer rate On the medium To/from host	 Max. 84.6 Mbit/s Max. 150 MB/s

Table 58: Technical data - RAID hard disk - 5ACPCI.RAIC-04

Features	5ACPCI.RAIC-04
Cache	8 MB
S.M.A.R.T. Support	Yes
Lifespan	5 years
Environmental characteristics	
Ambient temperature[1)] Operation - Standard / 24-hour[2)] Storage Transport	 -15 to +80°C -40 to +95°C -40 to +95°C
Relative humidity Operation Storage Transport	 8 to 90% non-condensing (maximum humidity at +29°C) 5 to 95% non-condensing (maximum humidity at +40°C) 5 to 95% non-condensing (maximum humidity at +40°C)
Vibration[3)] Operation (continuous) Operation (occasional) Storage Transport	 5 - 500 Hz: max. 0.125 g; duration 1 octave per minute; no unrecoverable errors 5 - 500 Hz: max. 0.25 g; duration 1 octave per minute; no unrecoverable errors 5 - 500 Hz: max. 5 g; duration 0.5 octaves per minute; no damage 5 - 500 Hz: max. 5 g; duration 0.5 octaves per minute; no damage
Shock[4)] (pulse with a sine half-wave) Operation Storage	 Max. 125 g, 2 ms; no unrecoverable errors Max. 400 g, 2 ms; no damage Max. 450 g, 1 ms; no damage Max. 200 g, 0.5 ms; no damage
Altitude Operation Storage	 - 300 to 3048 m - 300 to 12,192 m

Table 58: Technical data - RAID hard disk - 5ACPCI.RAIC-04 (cont.)

1) Temperature values for 305 meter altitude. The temperature specification must be reduced linearly by 1°C every 305 meters. The temperature increase and decrease can be a maximum of 3°C per minute.

2) 24-hour operation means 732 POH (power-on hours) per month.

3) Operation in areas prone to vibration and shock can affect performance negatively (reduction of transfer rate).

4) Operation in areas prone to vibration and shock can affect performance negatively (reduction of transfer rate).

Temperature humidity diagram - Operation and storage

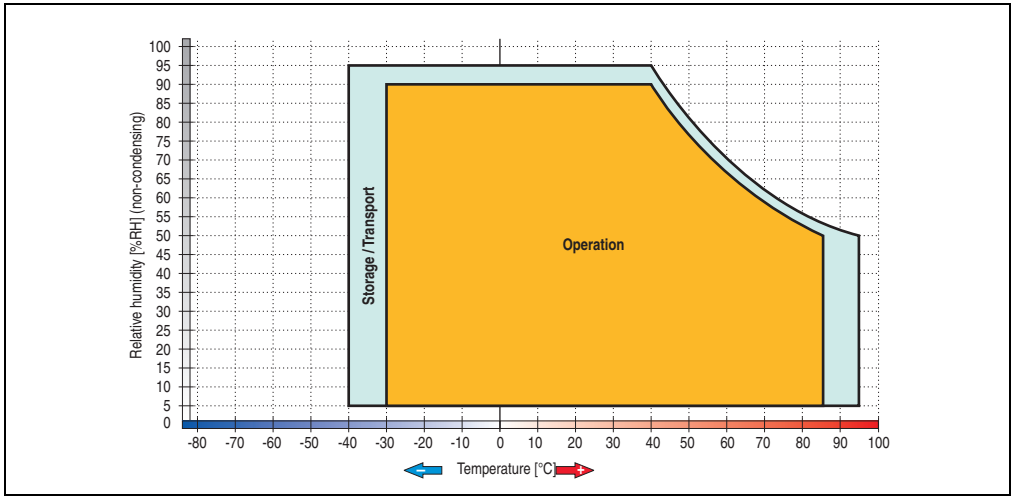


Figure 66: Temperature humidity diagram - SATA RAID hard disk 5ACPCI.RAIC-04

3.6.11 PCI SATA RAID 2 x 250 GB - 5ACPCI.RAIC-05

The hard disks that are used are specified for 24-hour operation (24x7).

Features

- 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

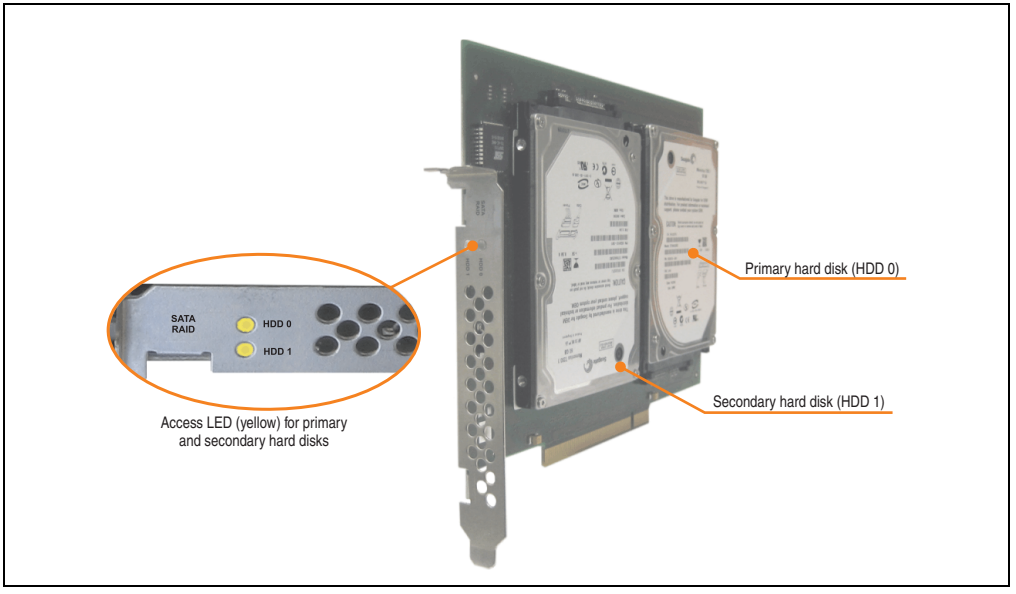


Figure 67: PCI SATA RAID controller - 5ACPCI.RAIC-05

Information:

The PCI SATA RAID controller can not be used in place of a Universal Power Supply (UPS). If the operating system is shut down improperly, the next time it is started it is detected as an error by the RAID 1, and a complete rebuild is executed. This generally takes at least 120 minutes (configurable) to complete.

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.

Features	5ACPCI.RAIC-05
SATA RAID controller Type Specifications Data transfer rate RAID level BIOS Extension ROM - requirements	 Sil 3512 SATA link Serial ATA 1.0 Max. 1.5 GB/s (150 MB/s) Supports RAID 0, 1 Approx. 32 KB
Hard disks Amount	Seagate ST9250315AS 2
Formatted capacity (512 bytes/sector)	250 GB
Number of heads	1
Number of sectors (user)	488,397,168
Bytes per sector	512
Revolution speed	5400 rpm ±0.2%
Access time (average)	5.56 ms
Positioning time (seek, typical values) Minimum (track to track) Average (read access) Maximum (read access)	 1 ms 14 ms 30 ms
Starting time (0 rpm to read access)	3.6 seconds (typically)
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 On the medium To/from host	 Max. 1175 Mbits/s Max. 150 MB/s
Cache	8 MB
S.M.A.R.T. Support	Yes
Electrical characteristics	
Power consumption	0.3 A at 3.3 V (PCI bus) 1 A at 5 V (PCI bus)
Mechanical characteristics	
Mounted on PCI insert	Fixed
Weight	350 g

Table 59: Technical data - RAID Hard Disk - 5ACPCI.RAIC-05

Environmental characteristics	5ACPCI.RAIC-05
Ambient temperature[1)] Operation - Standard / 24-hour[2)] Storage Transport	 0 to 60°C -40 to 70°C -40 to 70°C
Relative humidity[3)] Operation Storage Transport	 5 to 95%, non-condensing 5 to 95%, non-condensing 5 to 95%, non-condensing
Vibration[4)] Operation (continuous) Operation (occasional) Storage Transport	 5 - 500 Hz: max. 0.125 g; duration 1 octave per minute; no unrecoverable errors 5 - 500 Hz: max. 0.25 g; duration 1 octave per minute; no unrecoverable errors 5 - 500 Hz: max. 5 g; duration 0.5 octaves per minute; no damage 5 - 500 Hz: max. 5 g; duration 0.5 octaves per minute; no damage
Shock[4)] (pulse with a sine half-wave) Operation Storage	 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
Altitude Operation Storage	 - 300 to 3048 m - 300 to 12,192 m

Table 59: Technical data - RAID Hard Disk - 5ACPCI.RAIC-05 (cont.)

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) 24-hour operation means 732 POH (power-on hours) per month.

3) Humidity gradient: Maximum 30% per hour.

4) Operation in areas prone to vibration and shock can affect performance negatively (reduction of transfer rate).

Temperature humidity diagram

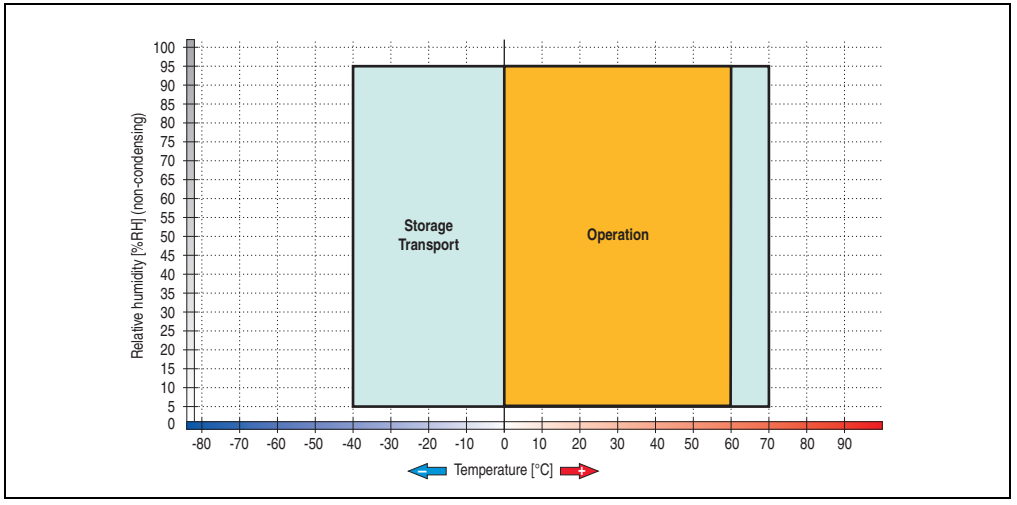


Figure 68: Temperature humidity diagram - SATA RAID Hard Disk - 5ACPCI.RAIC-05

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.

Driver support

Special drivers are necessary for operating the PCI SATA RAID controller. Drivers for Windows XP Professional and Windows XP Embedded are available for download on the B&R Homepage in the download area (**www.br-automation.com**).

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

Information:

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

Configuration

For configuration of a SATA RAID network, see Chapter 3 "Commissioning", section "Configuration of a SATA RAID array", on page 202.

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.

For instructions on exchanging the drive, see Chapter 7 "Maintenance / Servicing", section "Mounting the side cover", on page 447.

3.6.12 Replacement SATA HDD 250 GB - 5MMHDD.0250-00

The hard disk can be used as a replacement part for 5ACPCI.RAIC-05 and 5AC801.HDDI-03.

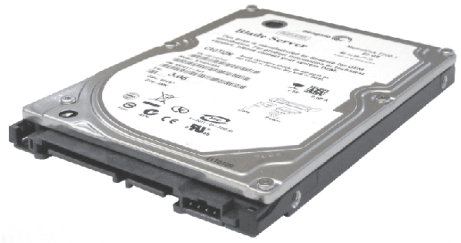


Figure 69: Replacement SATA HDD 250 GB - 5MMHDD.0250-00

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.

Features	5MMHDD.0250-00
Hard disks Amount	Seagate ST9250315AS 1
Formatted capacity (512 bytes/sector)	250 GB
Number of heads	1
Number of sectors (user)	488,397,168
Bytes per sector	512
Revolution speed	5400 rpm ±0.2%
Access time (average)	5.56 ms
Positioning time (seek, typical values) Minimum (track to track) Average (read access) Maximum (read access)	 1 ms 14 ms 30 ms
Starting time (0 rpm to read access)	3.6 seconds (typically)
Supported transfer modes	SATA 1.0, Serial ATA Revision 2.6 PIO mode 0-4, multiword DMA mode 0-2, UDMA mode 0-6
Interface	SATA
Features	**5MMHDD.0250-00**

Table 60: Technical data - RAID hard disk - 5MMHDD.0250-00

Data transfer rate On the medium To/from host	 Max. 1175 Mbits/s Max. 150 MB/s (SATA I), max. 300 MB/s (SATA II)
Cache	8 MB
S.M.A.R.T. Support	Yes
MTBF	550,000 Power On Hours[1)]
Environmental characteristics	
Ambient temperature[2)] Operation - Standard / 24-hour[3)] Storage Transport	 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 Operation Storage	 0.5 g at 5 - 500 Hz, no non-recovered errors 5 g at 5 - 500 Hz, no non-recovered errors
Shock (pulse with a sine half-wave) Operation Storage	 350 g and 2 ms duration, no non-recovered errors 800 g and 2 ms duration, no non-recovered errors 1000 g and 1 ms duration, no non-recovered errors 600 g and 0.5 ms duration, no non-recovered errors
Altitude Operation Storage	 - 300 to 3048 m - 300 to 12,192 m

Table 60: Technical data - RAID hard disk - 5MMHDD.0250-00 (cont.)

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) 24-hour operation means 732 POH (power-on hours) per month.

4) Humidity gradient: Maximum 30% per hour.

Temperature humidity diagram

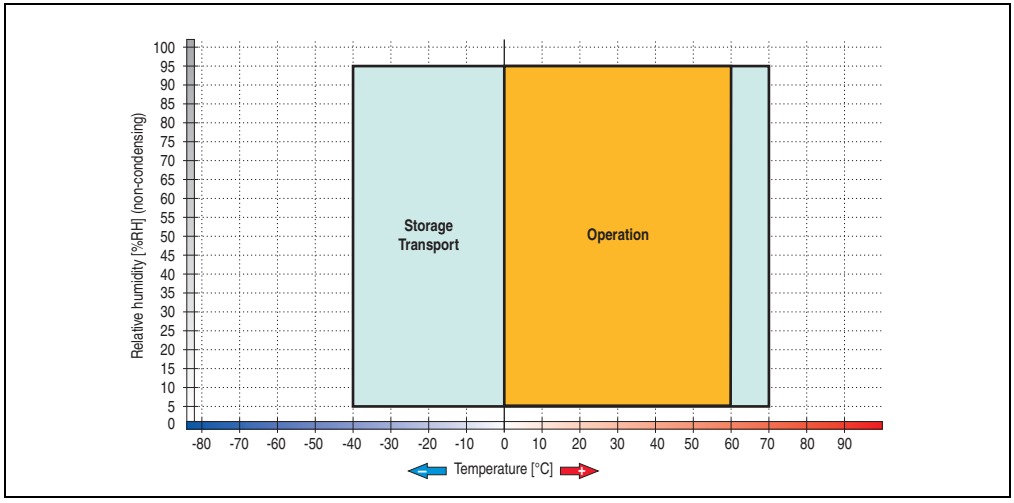


Figure 70: Temperature humidity diagram - SATA RAID hard disk - 5MMHDD.0250-00

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.

3.7 Fan kit

Information:

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).

For more information about fan switching limits, see appendix, section 2.1 "Temperature monitoring - Fan control", on page 457.

3.7.1 Fan kit 1 card slot - 5PC810.FA01-00

This fan kit is an optional addition for system units with one card slot. For available replacement dust filters for this fan kit, see section "Replacement fan", on page 350.

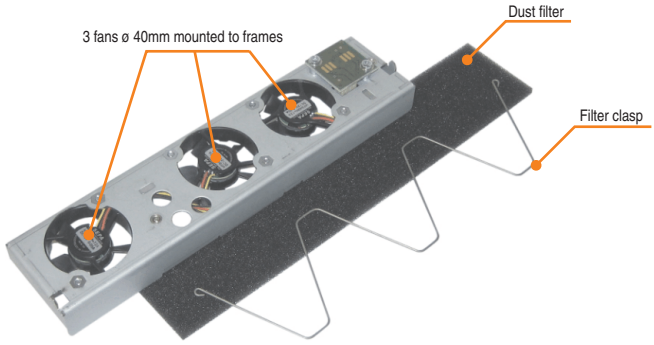


Figure 71: Fan kit - 5PC810.FA01-00

Technical data

Features	5PC810.FA01-00
Fan type Width Length Height	 40 mm 40 mm 10 mm
Revolution speed	Max. 6100 rpm
Noise level	21 dB
Service life	29,000 hours at 70°C 95,000 hours at 20°C
Maintenance interval	The fans are subject to wear. Depending on the work environment, the dust filter should be checked with appropriate frequency to determine whether the air flow provides sufficient cooling. An exchange or cleaning of the filter kit is appropriate at that time.

Table 61: Technical data - 5PC810.FA01-00

For information about installing or exchanging the fan kits, see the section "Installing / exchanging the fan kit", on page 432.

3.7.2 Fan kit 2 card slot - 5PC810.FA02-01

These fan kits are an optional addition for system units with 2 card slots. For available replacement dust filters for these fan kits, see section "Replacement fan", on page 350.

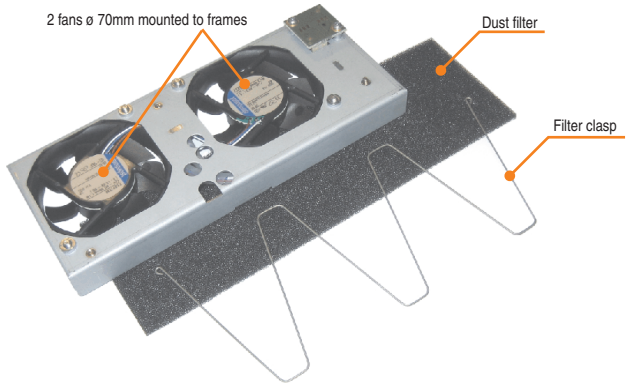


Figure 72: Fan kit - 5PC810.FA02-01

Technical data

Features	5PC810.FA02-01
Fan type Width Length Height	 70 mm 70 mm 15 mm
Revolution speed	Max. 4300 rpm ±12.5%
Noise level	32 dB
Service life	60,000 hours at 40°C
Maintenance interval	The fans are subject to wear. Depending on the work environment, the dust filter should be checked with appropriate frequency to determine whether the air flow provides sufficient cooling. An exchange or cleaning of the filter kit is appropriate at that time.

Table 62: Technical data - 5PC810.FA02-01

For information about installing or exchanging the fan kits, see the section "Installing / exchanging the fan kit", on page 432.

3.7.3 Fan kit 3 card slot - 5PC810.FA03-00

This fan kit is an optional addition for system units with 3 card slots. For available replacement dust filters for this fan kit, see section "Replacement fan", on page 350.

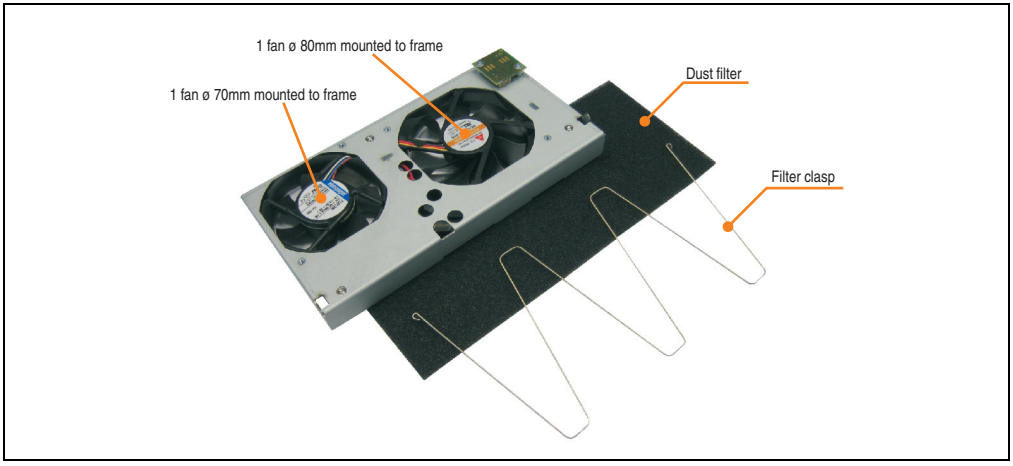


Figure 73: Fan kit - 5PC810.FA03-00

Technical data

Features	5PC810.FA03-00	
Fan type Width Length Height	 70 mm 70 mm 15 mm	 80 mm 80 mm 15 mm
Revolution speed	Max. 4300 rpm ±10%	Max. 3200 rpm ±10%
Noise level	32 dB	33 dB
Service life	60,000 hours at 40°C	75,000 hours at 40°C
Maintenance interval	The fans are subject to wear. Depending on the work environment, the dust filter should be checked with appropriate frequency to determine whether the air flow provides sufficient cooling. An exchange or cleaning of the filter kit is appropriate at that time.	

Table 63: Technical data - 5PC810.FA03-00

For information about installing or exchanging the fan kits, see the section "Installing / exchanging the fan kit", on page 432.

3.7.4 Fan kit 5 card slot - 5PC810.FA05-00

This fan kit is an optional addition for system units with 5 card slots. For available replacement dust filters for this fan kit, see section "Replacement fan", on page 350.

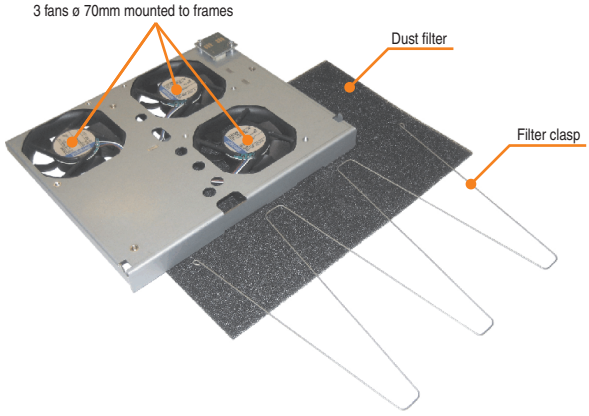


Figure 74: Fan kit - 5PC810.FA05-00

Technical data

Features	5PC810.FA05-00
Fan type Width Length Height	 70 mm 70 mm 15 mm
Revolution speed	Max. 4300 rpm ±10%
Noise level	32 dB
Service life	60,000 hours at 40°C
Maintenance interval	The fans are subject to wear. Depending on the work environment, the dust filter should be checked with appropriate frequency to determine whether the air flow provides sufficient cooling. An exchange or cleaning of the filter kit is appropriate at that time.

Table 64: Technical data - 5PC810.FA05-00

For information about installing or exchanging the fan kits, see the section "Installing / exchanging the fan kit", on page 432.

3.8 AP Link cards

AP Link cards can be installed in the APC810 system units 5PC810.SX02-00 and 5PC810.SX05-00 (also see the section "Configuration - Drives, software, accessories", on page 38).

3.8.1 AP Link SDL transmitter 5AC801.SDL0-00

A second graphics line can be created using an AP Link graphics adapter card. DVI and SDL signals are available with this. RGB signals are not supported. For details, see technical data for the CPU board being used.

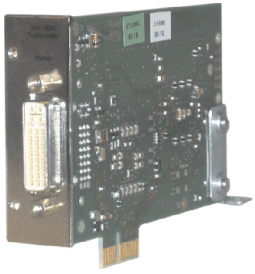


Figure 75: AP Link SDL transmitter 5AC801.SDL0-00

Information:

Installation of AP Link SDL transmitters is only possible in connection with the system units 5PC810.SX02-00, 5PC810.SX03-00 and 5PC810.SX05-00.

You can find information on installing the AP link SDL transmitters under "AP Link installation", on page 449.

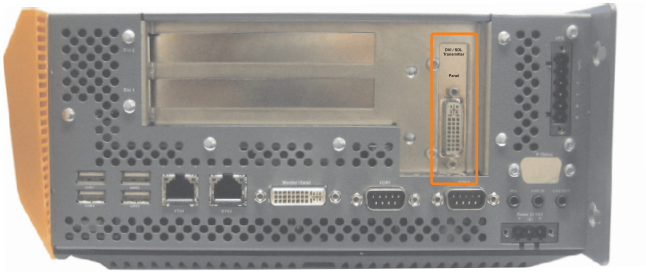


Figure 76: Mounting example with the system unit 5PC810.SX02-00

Pin assignments

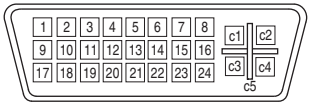
PIN	Assignment	PIN	Assignment	
1	T.M.D.S. Data 2-	16	Hot Plug detect	DVI-I 24 pin, female 
2	T.M.D.S. Data 2-	17	T.M.D.S. Data 0-	
3	T.M.D.S. Data 2/SDL Shield	18	T.M.D.S. Data 0+	
4	SDL-	19	T.M.D.S. DATA 0/XUSB1 Shield	
5	SDL+	20	XUSB1-	
6	DDC clock	21	XUSB1+	
7	DDC data	22	T.M.D.S. Shield	
8	n.c.	23	T.M.D.S. Clock +	
9	T.M.D.S. Data 1-	24	T.M.D.S. Clock -	
10	T.M.D.S. Data 1+	c1	n.c.	
11	T.M.D.S. DATA 1/XUBS0 Shield	c2	n.c.	
12	XUSB0-	c3	n.c.	
13	XUSB0+	c4	n.c.	
14	+ 5V power[1)]	c5	n.c.	
15	Ground (return for + 5 V, HSync and VSync)		n.c.	

Table 65: Pin assignment for AP Link connection

1) Protected internally by a multifuse

Cable lengths and resolutions for SDL transfer

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

Cables Segment length	Resolution				
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200
1.8	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03
5	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03
10	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-03
15	5CASDL.0150-00 5CASDL.0150-01 5CASDL.0150-03	5CASDL.0150-00 5CASDL.0150-01 5CASDL.0150-03	5CASDL.0150-00 5CASDL.0150-01 5CASDL.0150-03	5CASDL.0150-00 5CASDL.0150-01 5CASDL.0150-03	- - -

Table 66: Segment lengths, resolutions and SDL cables

Cables Segment length	Resolution				
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200
20	5CASDL.0200-00 5CASDL.0200-30	5CASDL.0200-00 5CASDL.0200-30	5CASDL.0200-00 5CASDL.0200-30	5CASDL.0200-00 5CASDL.0200-30	- -
25	5CASDL.0250-00 5CASDL.0250-30	5CASDL.0250-00 5CASDL.0250-30	5CASDL.0250-00 5CASDL.0250-30	- -	- -
30	5CASDL.0300-00 5CASDL.0300-03	5CASDL.0300-00 5CASDL.0300-03	5CASDL.0300-10 5CASDL.0300-13	5CASDL.0300-10 5CASDL.0300-13	- -
40	5CASDL.0400-10 5CASDL.0400-13	5CASDL.0400-10 5CASDL.0400-13	5CASDL.0400-10 5CASDL.0400-13	5CASDL.0400-10 5CASDL.0400-13	- -

Table 66: Segment lengths, resolutions and SDL cables

3.8.2 Ready relay 5AC801.RDYR-00

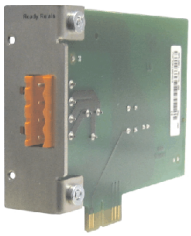


Figure 77: Ready relay 5AC801.RDYR-00

Information:

Installation of the ready relay is only possible in connection with the system units 5PC810.SX02-00, 5PC810.SX03-00 and 5PC810.SX05-00.

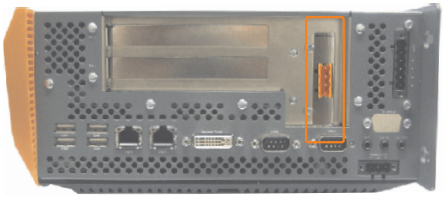


Figure 78: Mounting example with the system unit 5PC810.SX02-00

The relay contacts are closed when the APC810 is powered on.

Ready relay pin assignments	
Pin assignments - 4-pin multipoint plug N.O. and N.C., max. 30 VDC, max. 10 A	
Pin	**Assignment**
1	Normally open contact
2	Root
3	Normally closed contact
4	n.c.
Accessories	
0TB704.90	Terminal block, 4-pin, Screw clamp, 1.5 mm²
TB704.91	Terminal block, 4-pin, Cage clamps, 2.5 mm²

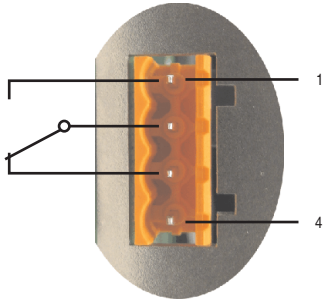


Table 67: Pin assignments - Ready relay 5AC801.RDYR-00

3.9 Add-on interfaces (IF option)

An additional interface (CAN or combined RS232/422/485) can be installed in the APC810's IF optional slot.

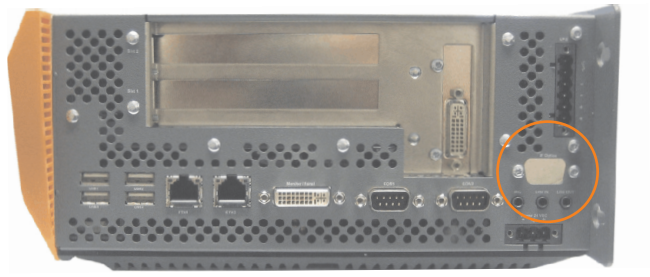


Figure 79: Add-on interfaces (IF option)

Information:

It is possible to add or remove an add-on interface at any time.

Caution!

Turn off power before adding or removing an add-on interface.

3.9.1 Add-on CAN interface - 5AC600.CANI-00

The add-on CAN interface is equipped with an Intel 82527 CAN controller, which conforms to CAN specifications 2.0 part A/B. The CAN controller can trigger an NMI (non-maskable interrupt).

Order data

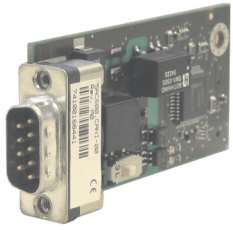
Model number	Description	Image
5AC600.CANI-00	**Add-on CAN interface** CAN interface for installation in an APC620, APC800 or PPC700.	

Table 68: Add-on CAN interface - 5AC600.CANI-00

Technical data

Features	5AC600.CANI-00
CAN interface Controller Amount Connection	 Intel 82527 1 9-pin DSUB, male
Terminating resistor Default setting	Can be activated and deactivated using a sliding switch Disabled

Table 69: Technical data - Add-on CAN interface - 5AC600.CANI-00

Pin assignments

Add-on CAN		
Type	Electrically isolated	
Transfer rate	Max. 500 kbit/s	
Bus length	Max. 1000 Meter	
Pin	**Assignment**	
1	n.c.	9-pin DSUB connector
2	CAN low	
3	GND	
4	n.c.	
5	n.c.	
6	Reserved	
7	CAN high	
8	n.c.	
9	n.c.	

Table 70: Pin assignments - CAN

I/O address and IRQ

Resource	Default setting	Additional setting options
I/O address	384h / 385h	-
IRQ	IRQ10	NMI [1)]

Table 71: Add-on CAN - I/O Adresse und IRQ

1) NMI = Non Maskable Interrupt.

The IRQ setting can be changed in the BIOS setup. Please note any potential conflicts with other resources when changing this setting.

I/O address	Register	Function
384h	Address register	Defines the register number to access.
385h	Data register	Access to the register defined in the address register.

Table 72: CAN address register

Bus length and cable type

The type of cable used depends largely on the required bus length and the number of nodes. The bus length is mainly determined by the bit rate. In accordance with CiA (CAN in Automation) the maximum bus length is 1000 meters.

The following bus lengths are permitted with a maximum oscillator tolerance of 0.121%:

Distance [m]	Transfer rate [kbit/s]
≤ 1000	Typ. 50
≤ 200	Typ. 250
≤ 60	Typ. 500

Table 73: Bus length and transfer rate - CAN

The material used for the cable should preferably have all or most of the following properties in order to reach an optimal transfer rate.

CAN cable	Property
Signal lines	
Cable cross section	2 x 0.25 mm² (24AWG/19), tinned Cu wire
Wire insulation	PE
Conductor resistance	≤ 82 Ω / km
Stranding	Wires stranded in pairs
Shielding	Paired shield with aluminum foil
Grounding line	
Cable cross section	1 x 0.34 mm² (22AWG/19), tinned Cu wire
Wire insulation	PE
Conductor resistance	≤ 59 Ω / km
Outer sheathing	
Material	PUR mixture
Characteristics	Halogen free
Total shielding	From tinned cu wires

Table 74: CAN cable requirements

Terminating resistor

CAN networks are cabled using a bus structure where both ends of the bus are equipped with terminating resistors. The add-on CAN interface has an integrated terminating resistor (delivery state: disabled with the setting "Off").

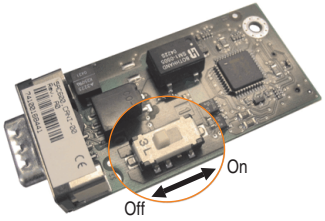


Figure 80: Terminating resistor - Add-on CAN interface 5AC600.CANI-00

Contents of delivery

The screws included in the mounting kit are to be used for installation.

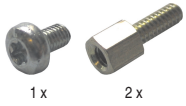


Figure 81: Contents of the delivery / mounting material - 5AC600.CANI-00

Driver support

Because of the Dual Core processors, the INACAN.SYS driver version 2.36, contained in the PVI setup 2.6.0.3105, is required for the operation.

Information:

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

3.9.2 Add-on RS232/422/485 interface - 5AC600.485I-00

The serial interface is a combined RS232/RS422/RS485 interface. The operating mode (RS232/RS422/RS485) is selected automatically, depending on the electrical connection.

Order data

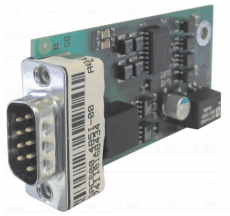
Model number	Description	Image
5AC600.485I-00	**Add-on RS232/422/485 interface** Add-on RS232/422/485 interface for installation in an APC620, AP800 and PPC700.	

Table 75: Add-on RS232/422/485 interface - 5AC600.485I-00

Pin assignments

Add-on RS232/422/485			
	RS232	**RS422/485**	
Type	RS232 not modem compatible; Electrically isolated		
UART	16550 compatible, 16 byte FIFO		
Transfer rate	Max. 115 kbit/s		
Bus length	Max. 15 meters	Max. 1200 meters	
Pin	**Assignments (RS232)**	**Assignments (RS422)**	9-pin DSUB connector
1	n.c.	TXD\	
2	RXD	n.c.	
3	TXD	n.c.	
4	n.c.	TXD	
5	GND	GND	
6	n.c.	RXD\	
7	RTS	n.c.	
8	CTS	n.c.	
9	n.c.	RXD	

Table 76: Pin assignments - RS232/RS422

I/O address and IRQ

Resource	Default setting	Additional setting options
I/O address	2E8h	238, 2F8, 338, 3E8, 3F8
IRQ	IRQ10	IRQ 3, 4, 5, 7, 11, 12

Table 77: Add-on RS232/422/485 - I/O address and IRQ

The setting for the I/O address and the IRQ can be changed in the BIOS setup (under "Advanced" - submenu "Main board/Panel Features" - submenu "Legacy Devices", setting "COM E"). Please note any potential conflicts with other resources when changing this setting.

Bus length and cable type RS232

The maximum transfer rate of 115 kbit/s depends on the cable type being used.

Distance [m]	Transfer rate [kbit/s]
≤ 15	Typ. 64
≤ 10	Typ. 115
≤ 5	Typ. 115

Table 78: RS232 - Bus length and transfer rate

The material used for the cable should preferably have all or most of the following properties in order to reach an optimal transfer rate.

RS232 cable	Property
Signal lines Cable cross section Wire insulation Conductor resistance Stranding Shielding	 4 x 0.16 mm² (26AWG), tinned Cu wire PE ≤ 82 Ω / km Wires stranded in pairs Paired shield with aluminum foil
Grounding line Cable cross section Wire insulation Conductor resistance	 1 x 0.34 mm² (22AWG/19), tinned Cu wire PE ≤ 59 Ω / km
Outer sheathing Material Characteristics Total shielding	 PUR mixture Halogen free From tinned cu wires

Table 79: RS232 - Cable requirements

RS422 - Bus length and cable type

The RTS line must be switched on to activate the sender.

The maximum transfer rate of 115 kbit/s depends on the cable type being used.

Distance [m]	Transfer rate [kbit/s]
1200	Typ. 115

Table 80: RS422 - Bus length and transfer rate

The material used for the cable should preferably have all or most of the following properties in order to reach an optimal transfer rate.

RS422 cable	Property
Signal lines Cable cross section Wire insulation Conductor resistance Stranding Shielding	 4 x 0.25 mm² (24AWG/19), tinned Cu wire PE ≤ 82 Ω / km Wires stranded in pairs Paired shield with aluminum foil
Grounding line Cable cross section Wire insulation Conductor resistance	 1 x 0.34 mm² (22AWG/19), tinned Cu wire PE ≤ 59 Ω / km
Outer sheathing Material Characteristics Total shielding	 PUR mixture Halogen free From tinned cu wires

Table 81: RS422 - Cable requirements

RS485 interface operation

The pins of the RS422 default interface (1, 4, 6 and 9) should be used for operation. The pins should be connected as shown.

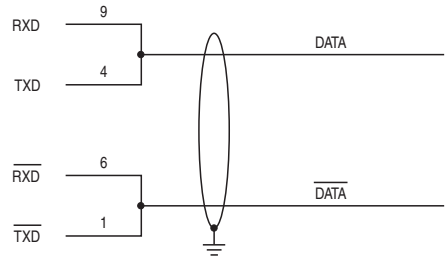


Figure 82: Add-on RS232/422/485 interface - operated in RS485 mode

The RTS line must be switched each time the driver is sent and received; there is no automatic switch back. This cannot be configured in Windows.

The voltage drop caused by long line lengths can lead to greater potential differences between the bus stations, which can hinder communication. This can be improved by running ground wire with the others.

The line ends of the RS485 interface should (at least for longer line lengths or larger transfer rates) be closed. Normally a passive terminator can be used on the bus ends by connecting each of the signal lines with 120 Ω resistance.

RS485 - Bus length and cable type

The maximum transfer rate of 115 kbit/s depends on the cable type being used.

Distance [m]	Transfer rate [kbit/s]
1200	Typ. 115

Table 82: RS485 - Bus length and transfer rate

The material used for the cable should preferably have all or most of the following properties in order to reach an optimal transfer rate.

RS485 cable	Property
Signal lines	
Cable cross section	4 x 0.25 mm² (24AWG/19), tinned Cu wire
Wire insulation	PE
Conductor resistance	≤ 82 Ω / km
Stranding	Wires stranded in pairs
Shielding	Paired shield with aluminum foil
Grounding line	
Cable cross section	1 x 0.34 mm² (22AWG/19), tinned Cu wire
Wire insulation	PE
Conductor resistance	≤ 59 Ω / km
Outer sheathing	
Material	PUR mixture
Characteristics	Halogen free
Total shielding	From tinned cu wires

Table 83: RS485 - Cable requirements

Contents of delivery

The screws included in the mounting kit are to be used for installation.

Figure 83: Contents of the delivery / mounting material - 5AC600.485I-00

Chapter 3 • Commissioning

1. Installation

The APC810 systems are mounted with the mounting plates found on the housing. The plates are designed for M5 screws.

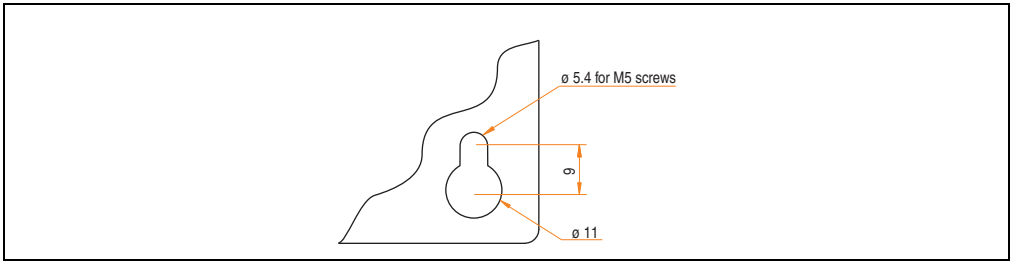


Figure 84: Mounting plates

The exact positioning of the mounting holes can be seen in the following drilling templates.

1.1 Important mounting information

- The environmental conditions must be taken into consideration (see chapter 2 "Technical data", section 2.5 "Ambient temperatures", on page 59).
- The APC810 is only certified for operation in closed rooms.
- The APC810 cannot be situated in direct sunlight.
- The ventilation holes cannot be covered.
- When mounting the device, be sure to adhere to the allowable mounting orientations (see section "Mounting orientation", on page 166).
- Be sure the wall or control cabinet can withstand four times the total weight of the the APC810.
- When connecting certain cable types (DVI, SDL, USB, etc.), keep the flex radius of the cable in mind (see section 2 "Cable connections", on page 168).

1.2 Drilling templates

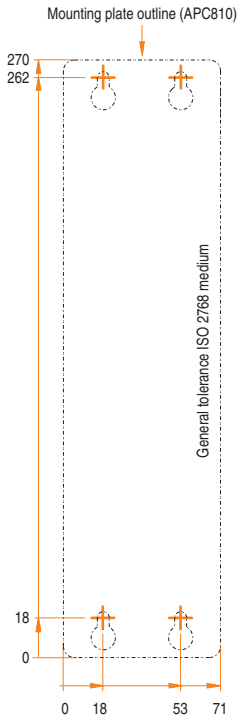
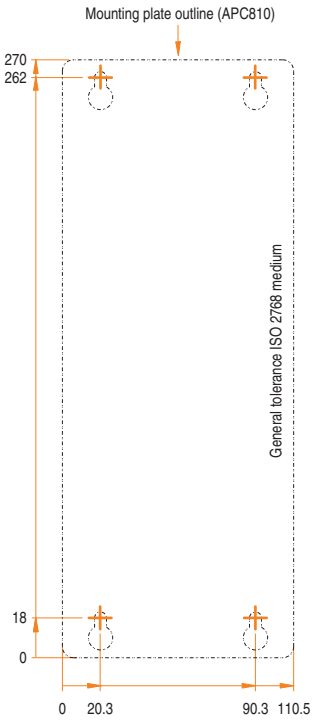
APC810 1 card slot	APC810 2 card slot
	

Table 84: Drilling templates - 1 and 2 card slot system units

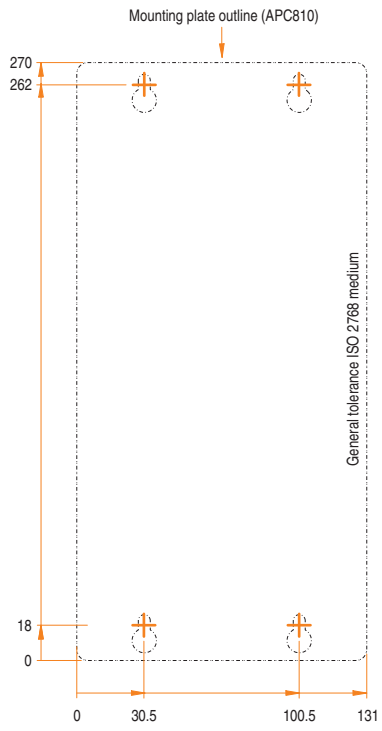
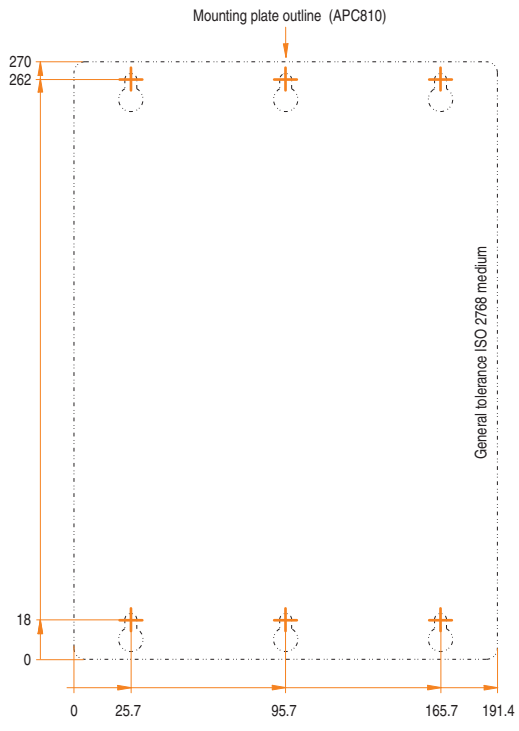
APC810 3 card slot	APC810 5 card slot
	

Table 85: Drilling templates - 3 and 5 card slot system units

1.3 Mounting orientation

The APC810 system must be mounted as described in the following sections.

1.3.1 Standard mounting - vertical

Standard mounting refers to vertical mounting orientation.

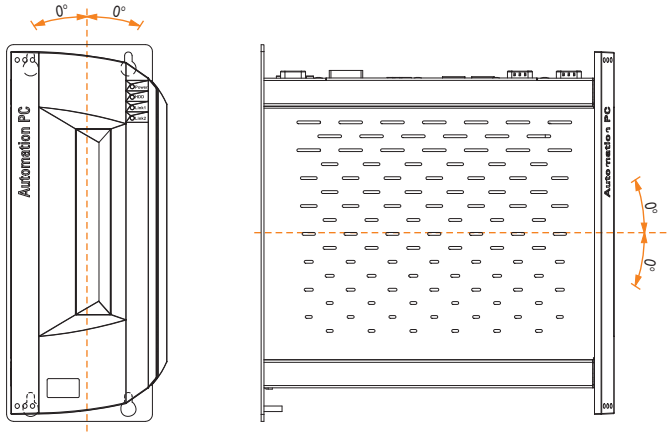


Figure 85: Standard mounting - vertical

1.3.2 Optional mounting - horizontal

Operation in the optional horizontal mounting position (heat sink on top) requires the use of a fan kit. The maximum ambient temperature specification must be lowered to 5°C.

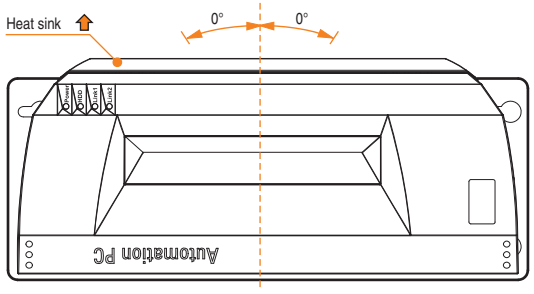


Figure 86: Optional mounting - horizontal

1.3.3 Spacing for air circulation.

In order to guarantee sufficient air circulation, mount the system so that the spacing on the top, bottom, and sides is as follows.

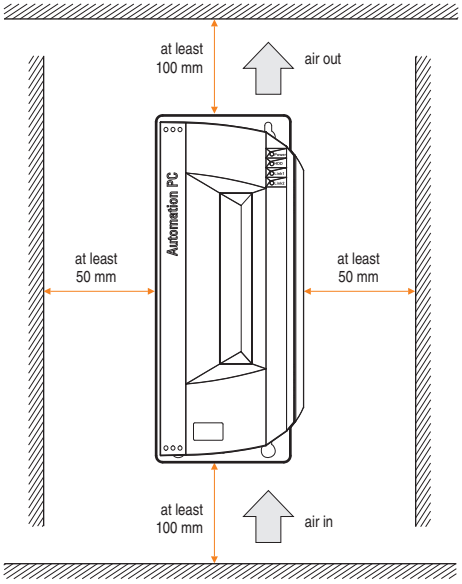


Figure 87: Standard mounting - Mounting distances

These defined distances are valid for both vertical and horizontal mounting of the APC810.

2. Cable connections

When making cable connections and installing cables, it is not permitted to have a flex radius smaller than the minimum value specified.

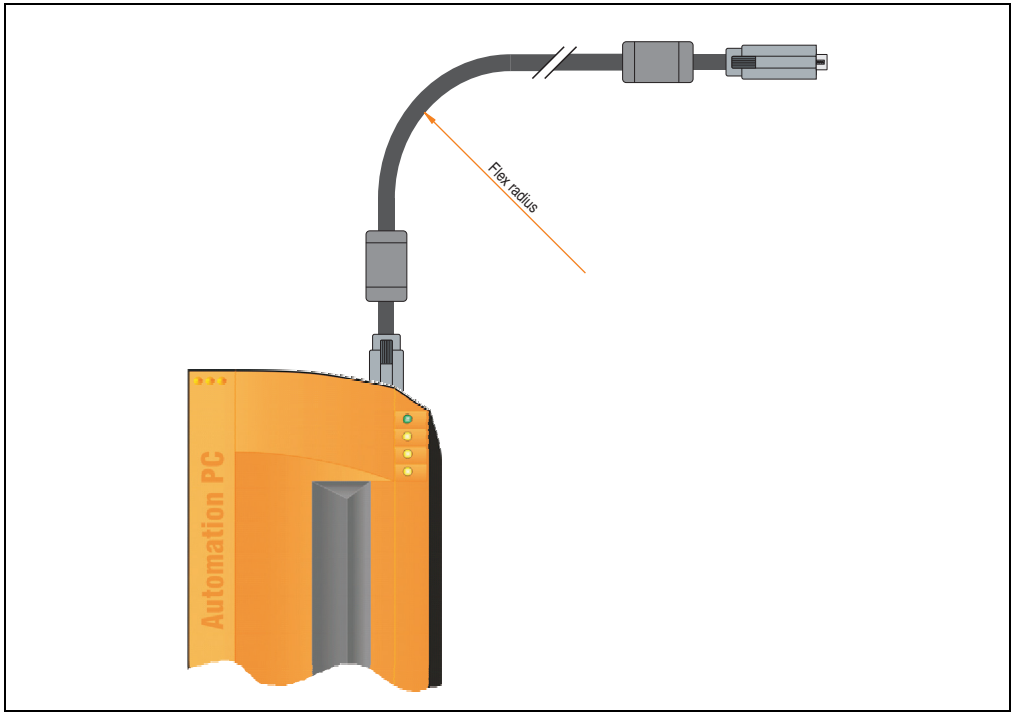


Figure 88: Flex radius - Cable connection

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 homepage www.br-automation.com.

3. Grounding concept

The functional ground is a current path with low impedance between isolated circuits and ground, which is not a protective measure, but rather provides e.g. increased immunity to disturbances. It serves only as disturbance dissipation and not as contact protection for persons.

The APC810 functional ground has 2 connections:

- Supply voltage
- Ground connection

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

- The device should be connected to the ground using the shortest route possible.
- Use cable with a minimum cross section of 2.5 mm² per connection.
- Note the line shielding concept, all connected data cables are used as shielded lines.

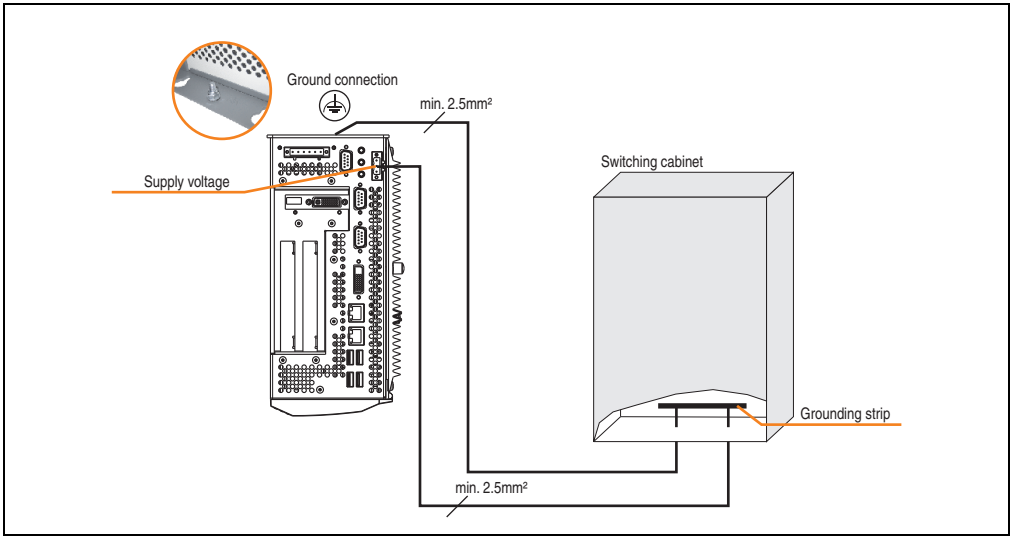


Figure 89: Grounding concept

4. Connection examples

The following examples provide an overview of the configuration options for connecting Automation Panel 800 and Automation Panel 900 and/or Automation Panel 800 devices with the APC810. The following questions will be answered:

- How are Automation Panel 900 devices connected to the monitor / panel output of the APC810, and what needs to be considered?
- How are Automation Panel 800 devices connected to the monitor / panel output of the APC810, and what needs to be considered?
- How are Automation Panel 900 devices connected simultaneously to the Monitor / Panel output on the optional SDL AP Link of the APC810 and what needs to be considered?
- What are "Display Clone" and "Extended Desktop" modes?
- How many Automation Panel 900 devices can be connected per line?
- How many Automation Panel 900 devices can be connected to an Automation Panel 800 device per line?
- How are the connected devices internally numbered?
- Are there limitations to the segment length and if so, what are they?
- What cables and link modules are needed?
- Do BIOS settings have to be changed for a specific configuration?

4.1 Selecting the display units

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

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

Table 86: Selecting the display units

4.2 One Automation Panel 900 via DVI (onboard)

An Automation Panel 900 with max. SXGA resolution is connected to the integrated DVI interface (onboard). As an alternative, an office TFT with DVI interface or an analog monitor (using adapter with model no. 5AC900.1000-00) can also be operated. A separate cable is used

for touch screen and USB. If USB devices are to be operated on the Automation Panel 900, the maximum distance is 5 meters. USB devices can only be connected directly to the Automation Panel (without a hub).

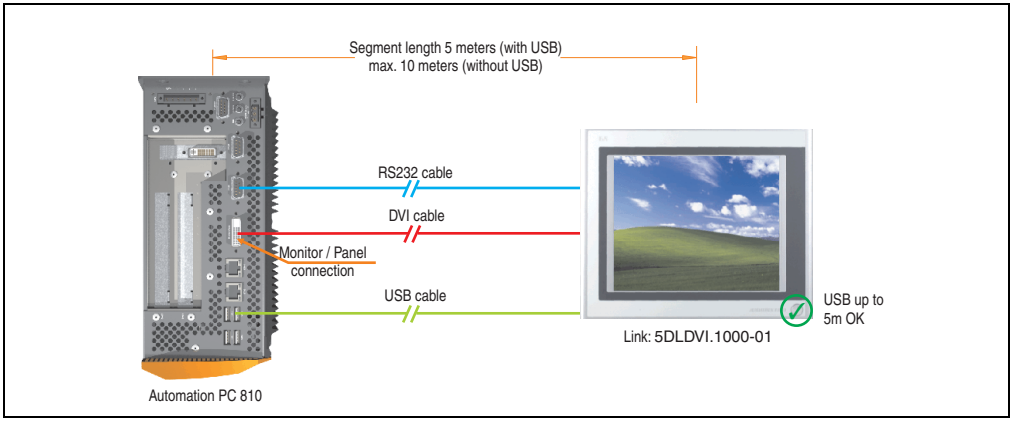


Figure 90: Configuration - One Automation Panel 900 via DVI (onboard)

4.2.1 Basic system requirements

The following table displays the possible combinations for the APC810 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in the following table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit				Restriction Resolution
	5PC810.SX01-00	5PC810.SX02-00	5PC810.SX03-00	5PC810.SX05-00	
5PC800.BM45-00	✓	✓	✓	✓	Max. SXGA
5PC800.BM45-01	✓	✓	✓	✓	Max. SXGA

Table 87: Possible combinations of system unit and CPU board

4.2.2 Link modules

Model number	Description	Note
5DLDVI.1000-01	**Automation Panel Link DVI receiver** connections for DVI-D, RS232 and USB 2.0 (Type B); 24VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900

Table 88: Link module for the configuration - One Automation Panel 900 via DVI

4.2.3 Cables

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

Model number	Type	Length
5CADVI.0018-00	DVI cable	1.8 m
5CADVI.0050-00	DVI cable	5 m
5CADVI.0100-00	DVI cable	10 m[1)]
9A0014.02	Touch screen cable - serial	1.8 m
9A0014.05	Touch screen cable - serial	5 m
9A0014.10	Touch screen cable - serial	10 m[1)]
5CAUSB.0018-00	USB cable	1.8 m
5CAUSB.0050-00	USB cable	5 m

Table 89: Cables for DVI configurations

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

Information:

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

4.2.4 Possible Automation Panel units, resolutions und segment lengths

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

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

Table 90: Possible Automation Panel units, resolutions und segment lengths

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

Information:

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

4.2.5 BIOS settings

No special BIOS settings are necessary for operation.

4.3 An Automation Panel 900 via SDL (onboard)

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

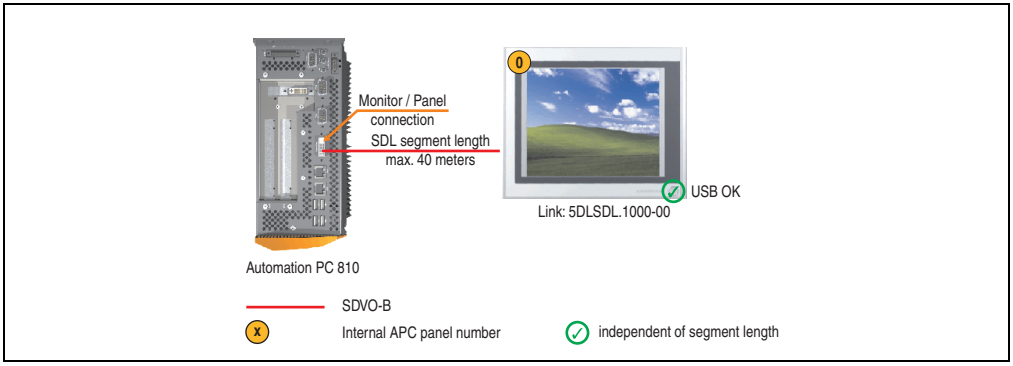


Figure 91: Configuration - An Automation Panel 900 via SDL (onboard)

4.3.1 Basic system requirements

The following table displays the possible combinations for the APC810 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in the following table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit				Restriction
	5PC810.SX01-00	5PC810.SX02-00	5PC810.SX03-00	5PC810.SX05-00	Resolution
5PC800.BM45-00	✓	✓	✓	✓	Max. UXGA
5PC800.BM45-01	✓	✓	✓	✓	Max. UXGA

Table 91: Possible combinations of system unit and CPU board

Link modules

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

Table 92: Link module for the configuration - One Automation Panel 900 via SDL

4.3.2 Cables

Select an Automation Panel 900 cable from the following table.

Model number	Type	Length
5CASDL.0018-00	SDL cable for a fixed type of layout	1.8 m
5CASDL.0018-01	SDL cable with 45° plug for fixed type of layout	1.8 m
5CASDL.0018-03	SDL cable for fixed and flexible type of layout	1.8 m
5CASDL.0050-00	SDL cable for a fixed type of layout	5 m
5CASDL.0050-01	SDL cable with 45° plug for fixed type of layout	5 m
5CASDL.0050-03	SDL cable for fixed and flexible type of layout	5 m
5CASDL.0100-00	SDL cable for a fixed type of layout	10 m
5CASDL.0100-01	SDL cable with 45° plug for fixed type of layout	10 m
5CASDL.0100-03	SDL cable for fixed and flexible type of layout	10 m
5CASDL.0150-00	SDL cable for a fixed type of layout	15 m
5CASDL.0150-01	SDL cable with 45° plug for fixed type of layout	15 m
5CASDL.0150-03	SDL cable for fixed and flexible type of layout	15 m
5CASDL.0200-00	SDL cable for a fixed type of layout	20 m
5CASDL.0200-03	SDL cable for fixed and flexible type of layout	20 m
5CASDL.0250-00	SDL cable for a fixed type of layout	25 m
5CASDL.0250-30	SDL cable for fixed and flexible type of layout	25 m
5CASDL.0300-00	SDL cable for a fixed type of layout	30 m
5CASDL.0300-03	SDL cable for fixed and flexible type of layout	30 m
5CASDL.0300-13	SDL cable with extender for fixed and flexible type of layout	30 m
5CASDL.0400-13	SDL cable with extender for fixed and flexible type of layout	40 m

Table 93: Cables for SDL configurations

Information:

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

Cable lengths and resolutions for SDL transfer

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

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

Table 94: Segment lengths, resolutions and SDL cables

4.3.3 BIOS settings

No special BIOS settings are necessary for operation.

Touch screen functionality

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

4.4 An Automation Panel 800 via SDL (onboard)

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

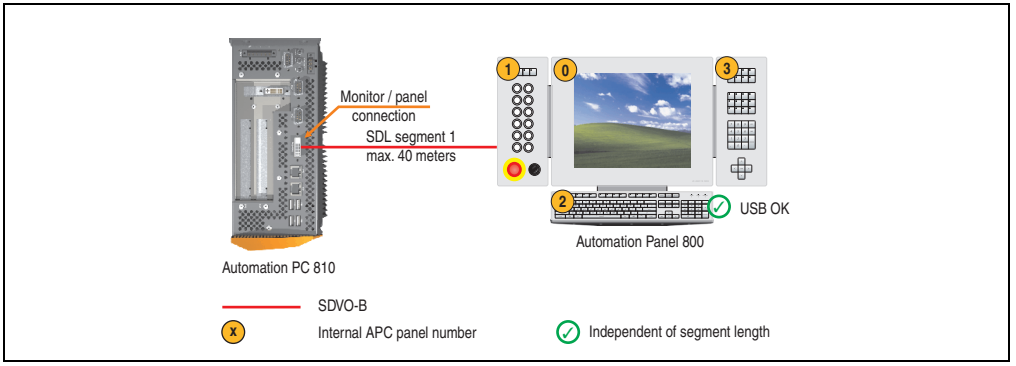


Figure 92: Configuration - An Automation Panel 800 via SDL (onboard)

4.4.1 Basic system requirements

The following table displays the possible combinations for the APC810 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in the following table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit				Restriction
	5PC810.SX01-00	5PC810.SX02-00	5PC810.SX03-00	5PC810.SX05-00	Resolution
5PC800.BM45-00	✓	✓	✓	✓	Max. UXGA
5PC800.BM45-01	✓	✓	✓	✓	Max. UXGA

Table 95: Possible combinations of system unit and CPU board

4.4.2 Cables

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

Model number	Type	Length
5CASDL.0018-20	SDL cable for fixed and flexible type of layout	1.8 m
5CASDL.0050-20	SDL cable for fixed and flexible type of layout	5 m
5CASDL.0100-20	SDL cable for fixed and flexible type of layout	10 m
5CASDL.0150-20	SDL cable for fixed and flexible type of layout	15 m
5CASDL.0200-20	SDL cable for fixed and flexible type of layout	20 m
5CASDL.0250-20	SDL cable for fixed and flexible type of layout	25 m
5CASDL.0300-30	SDL cable with extender for fixed and flexible type of layout	30 m

Table 96: Cables for SDL configurations

Model number	Type	Length
5CASDL.0400-30	SDL cable with extender for fixed and flexible type of layout	40 m

Table 96: Cables for SDL configurations (cont.)

Information:

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

Cable lengths and resolutions for SDL transfer

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

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

Table 97: Segment lengths, resolutions and SDL cables

4.4.3 BIOS settings

No special BIOS settings are necessary for operation.

Touch screen functionality

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

4.5 An AP900 and an AP800 via SDL (onboard)

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

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

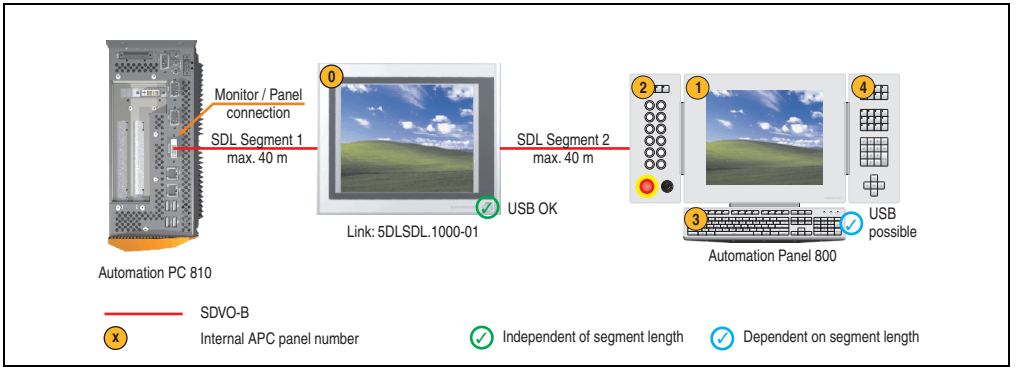


Figure 93: Configuration - One AP900 and an AP800 via SDL (onboard)

4.5.1 Basic system requirements

The following table displays the possible combinations for the APC810 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in the following table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit				Restriction
	5PC810.SX01-00	5PC810.SX02-00	5PC810.SX03-00	5PC810.SX05-00	Resolution
5PC800.BM45-00	✓	✓	✓	✓	Max. UXGA
5PC800.BM45-01	✓	✓	✓	✓	Max. UXGA

Table 98: Possible combinations of system unit and CPU board

4.5.2 Link modules

Model number	Description	Note
5DLSDL.1000-01	**Automation Panel Link SDL transceiver** Connections for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900 1 pieces required

Table 99: Link modules for configuration - One AP900 and one AP800 via SDL (onboard)

4.5.3 Cables

How to select an SDL cable for connecting the AP900 display to the AP900 display4.3 "An Automation Panel 900 via SDL (onboard)".

How to select an SDL cable for connecting the AP800 display to the AP900 display4.4 "An Automation Panel 800 via SDL (onboard)".

Information:

Detailed technical data about the cables can be found in the Automation Panel 800 or Automation Panel 900 User's Manual. These can be downloaded as .pdf files from the B&R homepage www.br-automation.com.

4.5.4 BIOS settings

No special BIOS settings are necessary for operation.

Touch screen functionality

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

4.6 Four Automation Panel 900 units via SDL (onboard)

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

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

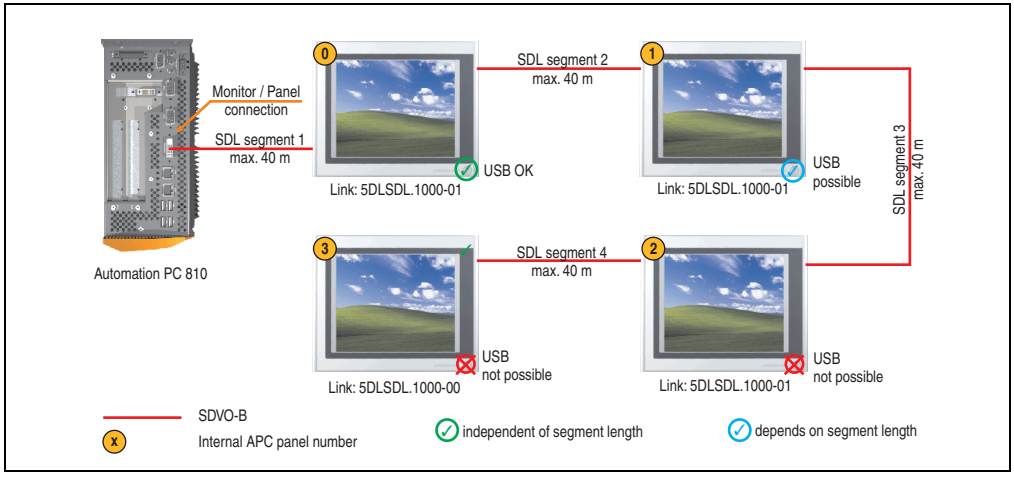


Figure 94: Configuration - Four Automation Panel 900 units via SDL (onboard)

4.6.1 Basic system requirements

The following table displays the possible combinations for the APC810 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in the following table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit				Restriction Resolution
	5PC810.SX01-00	5PC810.SX02-00	5PC810.SX03-00	5PC810.SX05-00	
5PC800.BM45-00	✓	✓	✓	✓	Max. UXGA
5PC800.BM45-01	✓	✓	✓	✓	Max. UXGA

Table 100: Possible combinations of system unit and CPU board

4.6.2 Link modules

Model number	Description	Note
5DLSDL.1000-00	**Automation Panel Link SDL receiver** Connection for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900
5DLSDL.1000-01	**Automation Panel Link SDL transceiver** Connections for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900 3 pieces required

Table 101: Link modules for the configuration: 4 Automation Panel 900 via SDL on 1 line

4.6.3 Cables

Select an Automation Panel 900 cable from the following table.

Model number	Type	Length
5CASDL.0018-00	SDL cable for a fixed type of layout	1.8 m
5CASDL.0018-01	SDL cable with 45° plug for fixed type of layout	1.8 m
5CASDL.0018-03	SDL cable for fixed and flexible type of layout	1.8 m
5CASDL.0050-00	SDL cable for a fixed type of layout	5 m
5CASDL.0050-01	SDL cable with 45° plug for fixed type of layout	5 m
5CASDL.0050-03	SDL cable for fixed and flexible type of layout	5 m
5CASDL.0100-00	SDL cable for a fixed type of layout	10 m
5CASDL.0100-01	SDL cable with 45° plug for fixed type of layout	10 m
5CASDL.0100-03	SDL cable for fixed and flexible type of layout	10 m
5CASDL.0150-00	SDL cable for a fixed type of layout	15 m
5CASDL.0150-01	SDL cable with 45° plug for fixed type of layout	15 m
5CASDL.0150-03	SDL cable for fixed and flexible type of layout	15 m
5CASDL.0200-00	SDL cable for a fixed type of layout	20 m
5CASDL.0200-03	SDL cable for fixed and flexible type of layout	20 m
5CASDL.0250-00	SDL cable for a fixed type of layout	25 m
5CASDL.0250-30	SDL cable for fixed and flexible type of layout	25 m
5CASDL.0300-00	SDL cable for a fixed type of layout	30 m
5CASDL.0300-03	SDL cable for fixed and flexible type of layout	30 m
5CASDL.0300-13	SDL cable with extender for fixed and flexible type of layout	30 m
5CASDL.0400-13	SDL cable with extender for fixed and flexible type of layout	40 m

Table 102: Cables for SDL configurations

Information:

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

Cable lengths and resolutions for SDL transfer

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

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

Table 103: Segment lengths, resolutions and SDL cables

4.6.4 BIOS settings

No special BIOS settings are necessary for operation.

Touch screen functionality

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

4.7 One Automation Panel 900 unit via SDL (AP Link)

An Automation Panel 900 unit is connected to the optional SDL transmitter (AP Link) via an SDL cable. USB devices can only be connected directly to the Automation Panel (without a hub).

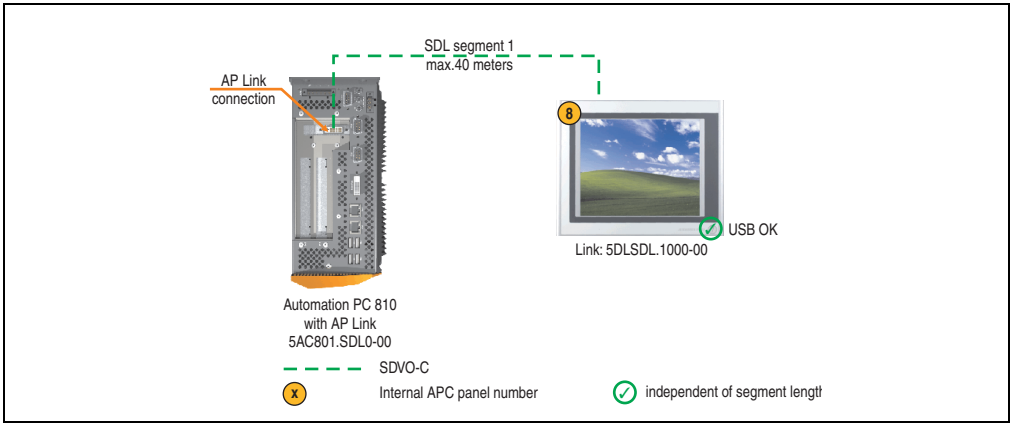


Figure 95: Configuration - One Automation Panel 900 via SDL (AP Link)

4.7.1 Basic system requirements

The following table displays the possible combinations for the APC810 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in the following table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit				Restriction
	5PC810.SX01-00[1)]	5PC810.SX02-00	5PC810.SX03-00	5PC810.SX05-00	Resolution
5PC800.BM45-00	-	✓	✓	✓	Max. UXGA
5PC800.BM45-01	-	✓	✓	✓	Max. UXGA

Table 104: Possible combinations of system unit and CPU board

1) AP Link cannot be installed.

4.7.2 Link modules

Model number	Description	Note
5DLSDL.1000-00	**Automation Panel Link SDL receiver** Connection for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900
5AC801.SDL0-00	**APC810 AP Link SDL transmitter** Automation Panel SDL link transmitter	For Automation PC 810

Table 105: Link modules for the configuration: 4 Automation Panel 900 via SDL on 1 line

4.7.3 Cables

Select an Automation Panel 900 cable from the following table.

Model number	Type	Length
5CASDL.0018-00	SDL cable for a fixed type of layout	1.8 m
5CASDL.0018-01	SDL cable with 45° plug for fixed type of layout	1.8 m
5CASDL.0018-03	SDL cable for fixed and flexible type of layout	1.8 m
5CASDL.0050-00	SDL cable for a fixed type of layout	5 m
5CASDL.0050-01	SDL cable with 45° plug for fixed type of layout	5 m
5CASDL.0050-03	SDL cable for fixed and flexible type of layout	5 m
5CASDL.0100-00	SDL cable for a fixed type of layout	10 m
5CASDL.0100-01	SDL cable with 45° plug for fixed type of layout	10 m
5CASDL.0100-03	SDL cable for fixed and flexible type of layout	10 m
5CASDL.0150-00	SDL cable for a fixed type of layout	15 m
5CASDL.0150-01	SDL cable with 45° plug for fixed type of layout	15 m
5CASDL.0150-03	SDL cable for fixed and flexible type of layout	15 m
5CASDL.0200-00	SDL cable for a fixed type of layout	20 m
5CASDL.0200-03	SDL cable for fixed and flexible type of layout	20 m
5CASDL.0250-00	SDL cable for a fixed type of layout	25 m
5CASDL.0250-30	SDL cable for fixed and flexible type of layout	25 m
5CASDL.0300-00	SDL cable for a fixed type of layout	30 m
5CASDL.0300-03	SDL cable for fixed and flexible type of layout	30 m
5CASDL.0300-13	SDL cable with extender for fixed and flexible type of layout	30 m
5CASDL.0400-13	SDL cable with extender for fixed and flexible type of layout	40 m

Table 106: Cables for SDL configurations

Information:

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

Cable lengths and resolutions for SDL transfer

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

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

Table 107: Segment lengths, resolutions and SDL cables

4.7.4 BIOS settings

No special BIOS settings are necessary for operation.

Touch screen functionality

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

4.8 Four Automation Panel 900 units via SDL (AP Link)

An Automation Panel 900 unit is connected to the optional SDL transmitter (AP Link) via an SDL cable. Three other Automation Panels of the same type are connected to this Automation Panel and operated via SDL. All four panels show the same content (Display Clone).

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

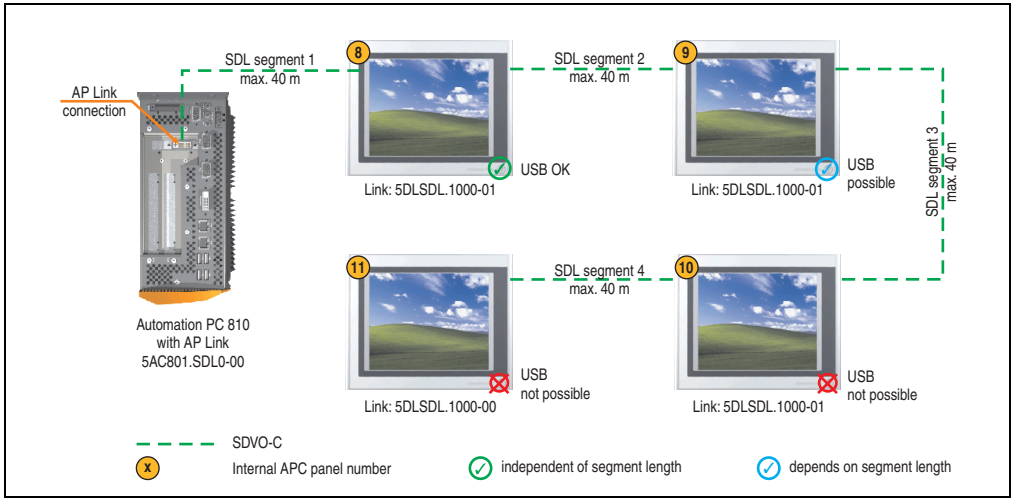


Figure 96: Configuration - Four Automation Panel 900 units via SDL (AP Link)

4.8.1 Basic system requirements

The following table displays the possible combinations for the APC810 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in the following table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit				Restriction Resolution
	5PC810.SX01-00[1)]	5PC810.SX02-00	5PC810.SX03-00	5PC810.SX05-00	
5PC800.BM45-00	-	✓	✓	✓	Max. UXGA
5PC800.BM45-01	-	✓	✓	✓	Max. UXGA

Table 108: Possible combinations of system unit and CPU board

1) AP Link cannot be installed.

4.8.2 Link modules

Model number	Description	Note
5DLSDL.1000-00	**Automation Panel Link SDL receiver** Connection for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900
5DLSDL.1000-01	**Automation Panel Link SDL transceiver** Connections for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900 3 pieces required
5AC801.SDL0-00	**APC810 AP Link SDL transmitter** Automation Panel SDL link transmitter	For Automation PC 810

Table 109: Link modules for configuration - Four Automation Panel 900 units via SDL (AP Link)

4.8.3 Cables

Select four Automation Panel 900 cables from the following table.

Model number	Type	Length
5CASDL.0018-00	SDL cable for a fixed type of layout	1.8 m
5CASDL.0018-01	SDL cable with 45° plug for fixed type of layout	1.8 m
5CASDL.0018-03	SDL cable for fixed and flexible type of layout	1.8 m
5CASDL.0050-00	SDL cable for a fixed type of layout	5 m
5CASDL.0050-01	SDL cable with 45° plug for fixed type of layout	5 m
5CASDL.0050-03	SDL cable for fixed and flexible type of layout	5 m
5CASDL.0100-00	SDL cable for a fixed type of layout	10 m
5CASDL.0100-01	SDL cable with 45° plug for fixed type of layout	10 m
5CASDL.0100-03	SDL cable for fixed and flexible type of layout	10 m
5CASDL.0150-00	SDL cable for a fixed type of layout	15 m
5CASDL.0150-01	SDL cable with 45° plug for fixed type of layout	15 m
5CASDL.0150-03	SDL cable for fixed and flexible type of layout	15 m
5CASDL.0200-00	SDL cable for a fixed type of layout	20 m
5CASDL.0200-03	SDL cable for fixed and flexible type of layout	20 m
5CASDL.0250-00	SDL cable for a fixed type of layout	25 m
5CASDL.0250-30	SDL cable for fixed and flexible type of layout	25 m
5CASDL.0300-00	SDL cable for a fixed type of layout	30 m
5CASDL.0300-03	SDL cable for fixed and flexible type of layout	30 m
5CASDL.0300-13	SDL cable with extender for fixed and flexible type of layout	30 m
5CASDL.0400-13	SDL cable with extender for fixed and flexible type of layout	40 m

Table 110: Cables for SDL configurations

Information:

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

Cable lengths and resolutions for SDL transfer

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

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

Table 111: Segment lengths, resolutions and SDL cables

4.8.4 BIOS settings

No special BIOS settings are necessary for operation.

Touch screen functionality

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

4.9 Two Automation Panel 900 units via SDL (onboard) and SDL (AP Link)

An Automation Panel 900 (max. UXGA) is connected to the integrated SDL interface (onboard) via an SDL cable. A second Automation Panel 900 (max. UXGA) is connected to the optional SDL transmitter (AP Link) via an SDL cable. The Automation Panels show different content (Extended Desktop) and can be different types.

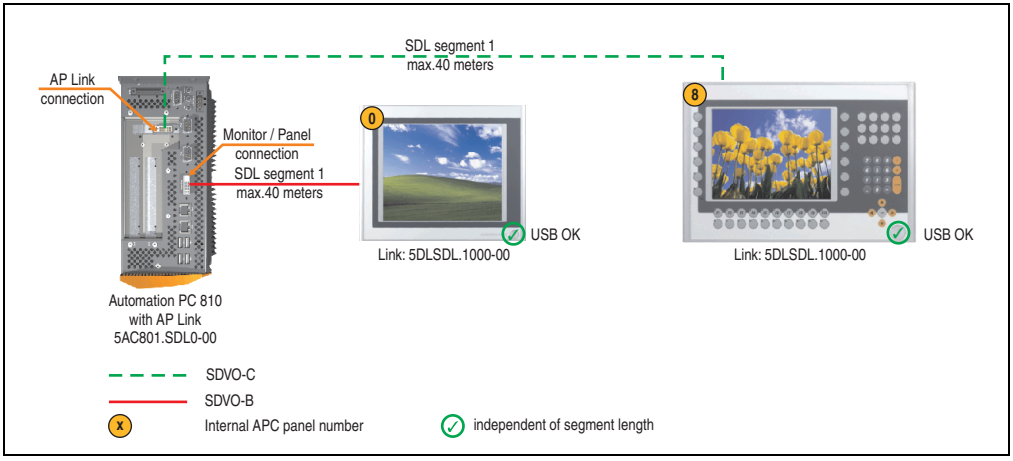


Figure 97: Configuration - Two Automation Panel 900 units via SDL (onboard) and SDL (AP Link)

4.9.1 Basic system requirements

The following table displays the possible combinations for the APC810 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in the following table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit				Restriction Resolution
	5PC810.SX01-00[1)]	5PC810.SX02-00	5PC810.SX03-00	5PC810.SX05-00	
5PC800.BM45-00	-	✓	✓	✓	Max. UXGA
5PC800.BM45-01	-	✓	✓	✓	Max. UXGA

Table 112: Possible combinations of system unit and CPU board

1) AP Link cannot be installed.

4.9.2 Link modules

Model number	Description	Note
5DLSDL.1000-00	**Automation Panel Link SDL receiver** Connection for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	2 pieces for Automation Panel 900
5AC801.SDL0-00	**APC810 AP Link SDL transmitter** Automation Panel SDL link transmitter	For Automation PC 810

Table 113: Link modules for configuration - Two Automation Panel 900 units via SDL (onboard) and SDL (AP Link)

4.9.3 Cables

Select four Automation Panel 900 cables from the following table.

Model number	Type	Length
5CASDL.0018-00	SDL cable for a fixed type of layout	1.8 m
5CASDL.0018-01	SDL cable with 45° plug for fixed type of layout	1.8 m
5CASDL.0018-03	SDL cable for fixed and flexible type of layout	1.8 m
5CASDL.0050-00	SDL cable for a fixed type of layout	5 m
5CASDL.0050-01	SDL cable with 45° plug for fixed type of layout	5 m
5CASDL.0050-03	SDL cable for fixed and flexible type of layout	5 m
5CASDL.0100-00	SDL cable for a fixed type of layout	10 m
5CASDL.0100-01	SDL cable with 45° plug for fixed type of layout	10 m
5CASDL.0100-03	SDL cable for fixed and flexible type of layout	10 m
5CASDL.0150-00	SDL cable for a fixed type of layout	15 m
5CASDL.0150-01	SDL cable with 45° plug for fixed type of layout	15 m
5CASDL.0150-03	SDL cable for fixed and flexible type of layout	15 m
5CASDL.0200-00	SDL cable for a fixed type of layout	20 m
5CASDL.0200-03	SDL cable for fixed and flexible type of layout	20 m
5CASDL.0250-00	SDL cable for a fixed type of layout	25 m
5CASDL.0250-30	SDL cable for fixed and flexible type of layout	25 m
5CASDL.0300-00	SDL cable for a fixed type of layout	30 m
5CASDL.0300-03	SDL cable for fixed and flexible type of layout	30 m
5CASDL.0300-13	SDL cable with extender for fixed and flexible type of layout	30 m
5CASDL.0400-13	SDL cable with extender for fixed and flexible type of layout	40 m

Table 114: Cables for SDL configurations

Information:

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

Cable lengths and resolutions for SDL transfer

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

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

Table 115: Segment lengths, resolutions and SDL cables

4.9.4 BIOS settings

No special BIOS settings are necessary for operation.

Touch screen functionality

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

4.10 Eight Automation Panel 900 units via SDL (onboard) and SDL (AP Link)

Four Automation Panel 900 units (max. UXGA) are connected to the integrated SDL interface (onboard) via SDL. Four additional Automation Panel 900 units (max. UXGA) are connected to the optional SDL transmitter (AP Link). The Automation Panels in each line must be the same type. The two lines show different content (Extended Desktop), but panels in the same line show the same content (Display Clone).

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

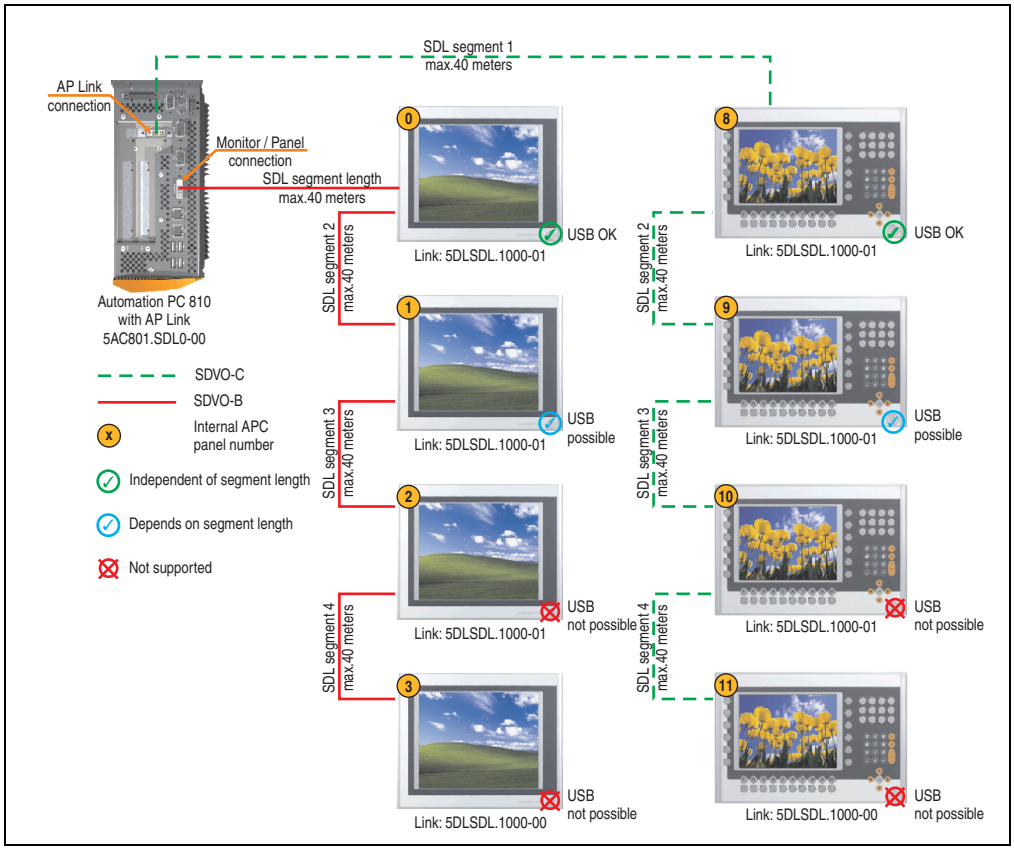


Figure 98: Configuration - Eight Automation Panel 900 units via SDL (onboard) and SDL (AP Link)

4.10.1 Basic system requirements

The following table displays the possible combinations for the APC810 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in the following table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit				Restriction Resolution
	5PC810.SX01-00[1)]	5PC810.SX02-00	5PC810.SX03-00	5PC810.SX05-00	
5PC800.BM45-00	-	✓	✓	✓	Max. UXGA
5PC800.BM45-01	-	✓	✓	✓	Max. UXGA

Table 116: Possible combinations of system unit and CPU board

1) AP Link cannot be installed.

4.10.2 Link modules

Model number	Description	Note
5DLSDL.1000-00	**Automation Panel Link SDL receiver** Connection for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900 2 pieces required
5DLSDL.1000-01	**Automation Panel Link SDL transceiver** Connections for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900 6 pieces required
5AC801.SDL0-00	**APC810 AP Link SDL transmitter** Automation Panel SDL link transmitter	For Automation PC 810

Table 117: Link modules for configuration: 8 Automation Panel 900 units via SDL and SDL (optional)

4.10.3 Cables

Select four Automation Panel 900 cables from the following table.

Model number	Type	Length
5CASDL.0018-00	SDL cable for a fixed type of layout	1.8 m
5CASDL.0018-01	SDL cable with 45° plug for fixed type of layout	1.8 m
5CASDL.0018-03	SDL cable for fixed and flexible type of layout	1.8 m
5CASDL.0050-00	SDL cable for a fixed type of layout	5 m
5CASDL.0050-01	SDL cable with 45° plug for fixed type of layout	5 m
5CASDL.0050-03	SDL cable for fixed and flexible type of layout	5 m
5CASDL.0100-00	SDL cable for a fixed type of layout	10 m
5CASDL.0100-01	SDL cable with 45° plug for fixed type of layout	10 m
5CASDL.0100-03	SDL cable for fixed and flexible type of layout	10 m
5CASDL.0150-00	SDL cable for a fixed type of layout	15 m
5CASDL.0150-01	SDL cable with 45° plug for fixed type of layout	15 m

Table 118: Cables for SDL configurations

Model number	Type	Length
5CASDL.0150-03	SDL cable for fixed and flexible type of layout	15 m
5CASDL.0200-00	SDL cable for a fixed type of layout	20 m
5CASDL.0200-03	SDL cable for fixed and flexible type of layout	20 m
5CASDL.0250-00	SDL cable for a fixed type of layout	25 m
5CASDL.0250-30	SDL cable for fixed and flexible type of layout	25 m
5CASDL.0300-00	SDL cable for a fixed type of layout	30 m
5CASDL.0300-03	SDL cable for fixed and flexible type of layout	30 m
5CASDL.0300-13	SDL cable with extender for fixed and flexible type of layout	30 m
5CASDL.0400-13	SDL cable with extender for fixed and flexible type of layout	40 m

Table 118: Cables for SDL configurations (cont.)

Cable lengths and resolutions for SDL transfer

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

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

Table 119: Segment lengths, resolutions and SDL cables

Information:

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

4.10.4 BIOS settings

No special BIOS settings are necessary for operation.

Touch screen functionality

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

4.11 Six AP900 and two AP800 devices via SDL (onboard) and SDL (AP Link)

Three Automation Panel 900 (max. UXGA) units and one Automation Panel 800 are connected to the integrated SDL interface (onboard) via SDL. Additionally, three Automation Panel 900 (max. UXGA) units and one Automation Panel 800 are operated on the optional SDL transmitters. The Automation Panels in each line must be the same type. The two lines show different content (Extended Desktop), but displays in the same line show the same content (Display Clone).

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

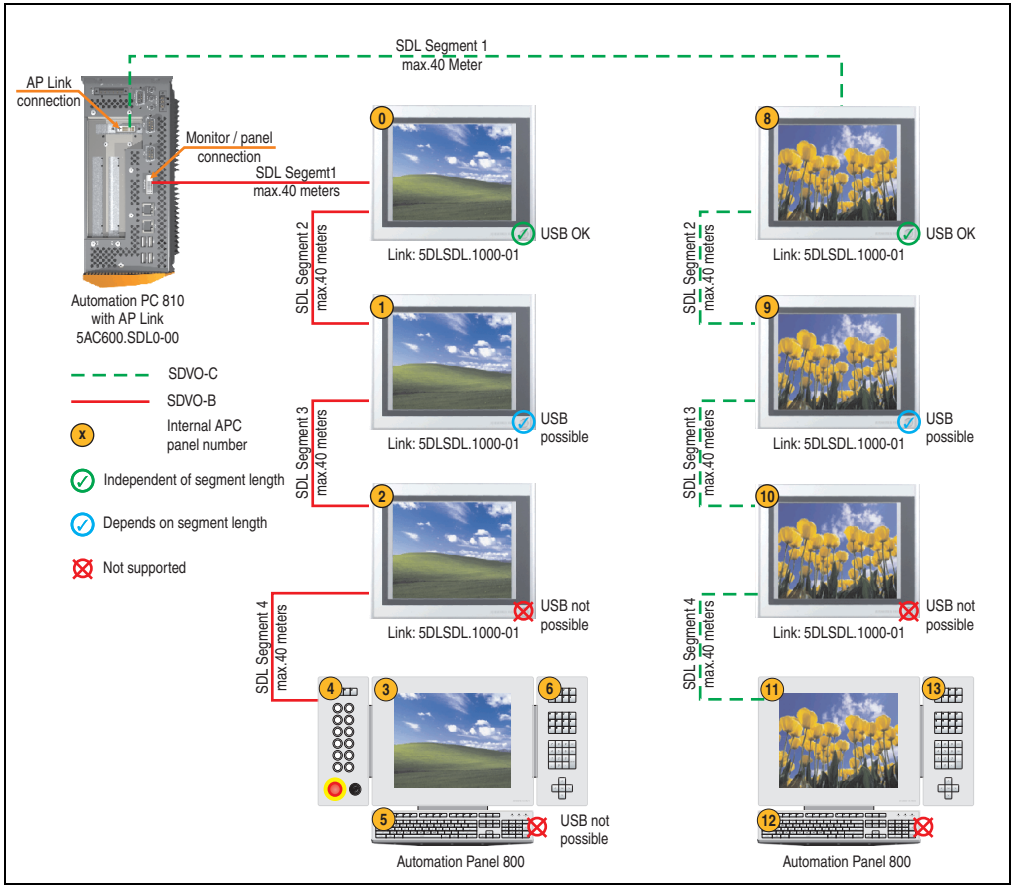


Figure 99: Configuration - Six AP900 and two AP800 devices via SDL (onboard) and SDL (AP Link)

4.11.1 Basic system requirements

The following table displays the possible combinations for the APC810 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in the following table.

If an Automation Panel 800 and an Automation Panel 900 should be connected on the same line, the devices must have the same display type.

CPU board	with system unit				Restriction Resolution
	5PC810.SX01-00[1)]	5PC810.SX02-00	5PC810.SX03-00	5PC810.SX05-00	
5PC800.BM45-00	-	✓	✓	✓	Max. UXGA
5PC800.BM45-01	-	✓	✓	✓	Max. UXGA

Table 120: Possible combinations of system unit and CPU board

1) AP Link cannot be installed.

4.11.2 Link modules

Model number	Description	Note
5DLSDL.1000-01	**Automation Panel Link SDL transceiver** Connections for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900 6 pieces required
5AC801.SDL0-00	**APC810 AP Link SDL transmitter** Automation Panel SDL link transmitter	For Automation PC 810

Table 121: Link modules for configuration: 6 AP900 and 2 AP800 devices via SDL and SDL (optional)

4.11.3 Cables

How to select an SDL cable for connecting the AP900 display to the AP900 display4.3 "An Automation Panel 900 via SDL (onboard)".

How to select an SDL cable for connecting the AP800 display to the AP900 display4.4 "An Automation Panel 800 via SDL (onboard)".

Information:

Detailed technical data about the cables can be found in the Automation Panel 800 or Automation Panel 900 User's Manual. These can be downloaded as .pdf files from the B&R homepage www.br-automation.com.

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

Cables Segment length [m]	Resolution				
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200
1.8	- - - -	- - - -	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-20 5CASDL.0018-03	- - - -	- - - -
5	- - - -	- - - -	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-02 5CASDL.0050-03	- - - -	- - - -
10	- - - -	- - - -	5CASDL.0100-00 5CASDL.0100-01 5CASDL.0100-02 5CASDL.0100-03	- - - -	- - - -
15	- - - -	- - - -	5CASDL.0150-00 5CASDL.0150-01 5CASDL.0150-02 5CASDL.0150-03	- - - -	- - - -
20	- - -	- - -	5CASDL.0200-00 5CASDL.0200-02 5CASDL.0200-03	- - -	- - -
25	- - -	- - -	5CASDL.0250-00 5CASDL.0250-02 5CASDL.0250-03	- - -	- - -
30	- -	- -	5CASDL.0300-13 5CASDL.0300-30	- -	- -
40	- -	- -	5CASDL.0400-13 5CASDL.0400-30	- -	- -

Table 122: Segment lengths, resolutions and SDL cables

Touch screen functionality

Information:

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

5. Connection of USB peripheral devices

Warning!

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

5.1 Local on the APC810

Many different peripheral USB devices can be connected to the 5 USB ports. This means that the USB ports USB1, USB3, USB5 can each handle a load of 1A and USB ports USB2 and USB4 can each handle a load of 500mA. The maximum transfer rate is USB 2.0.

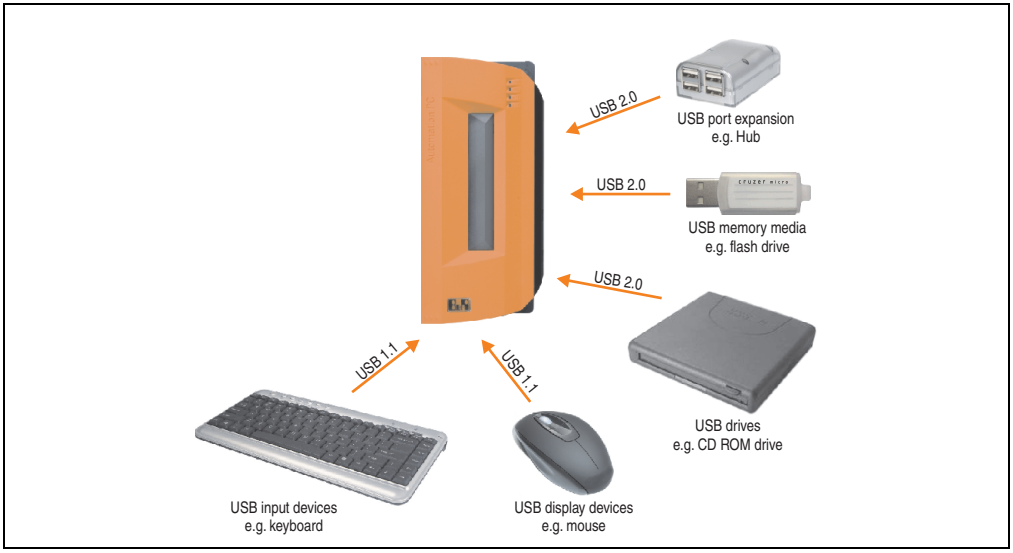


Figure 100: Local connection of USB peripheral devices on the APC810

5.2 Remote connection to Automation Panel 900 via DVI

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

Information:

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

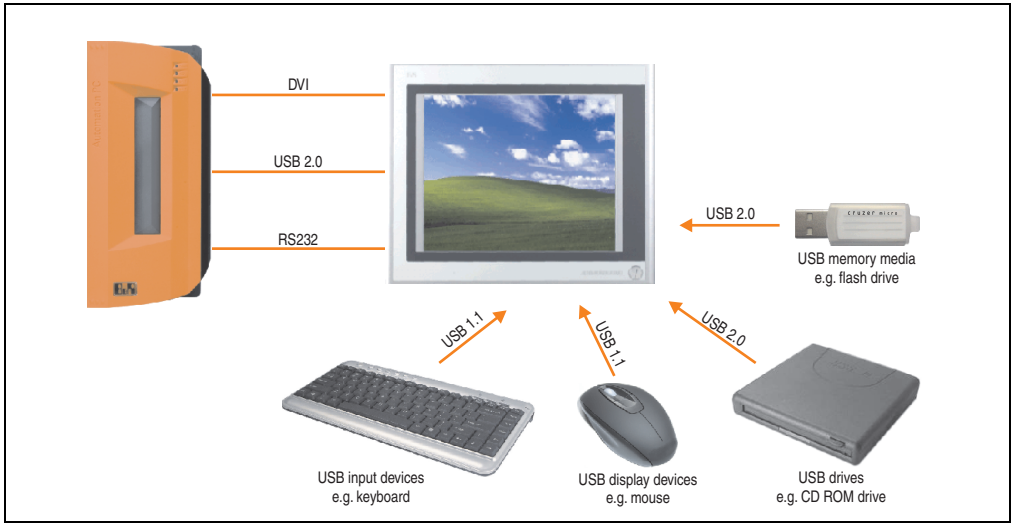


Figure 101: Remote connection of USB peripheral devices to the APC900 via DVI

5.3 Remote connection to Automation Panel 800/900 via SDL

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

Information:

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

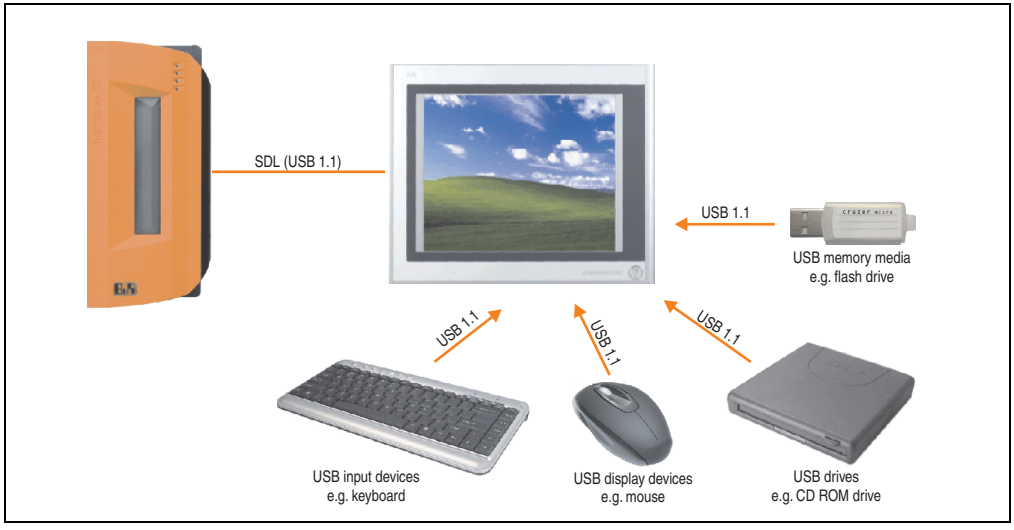


Figure 102: Remote connection of USB peripheral devices to the APC800/900 via SDL

6. Configuration of a SATA RAID array

Information:

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

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

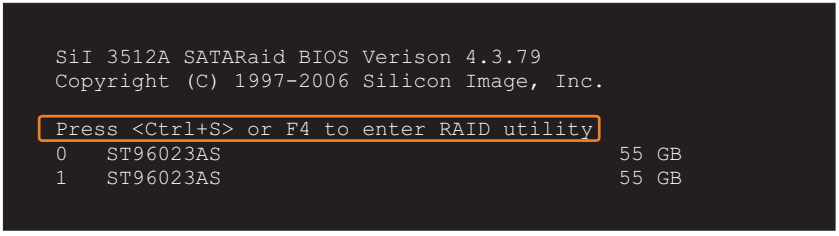


Figure 103: Open the RAID Configuration Utility

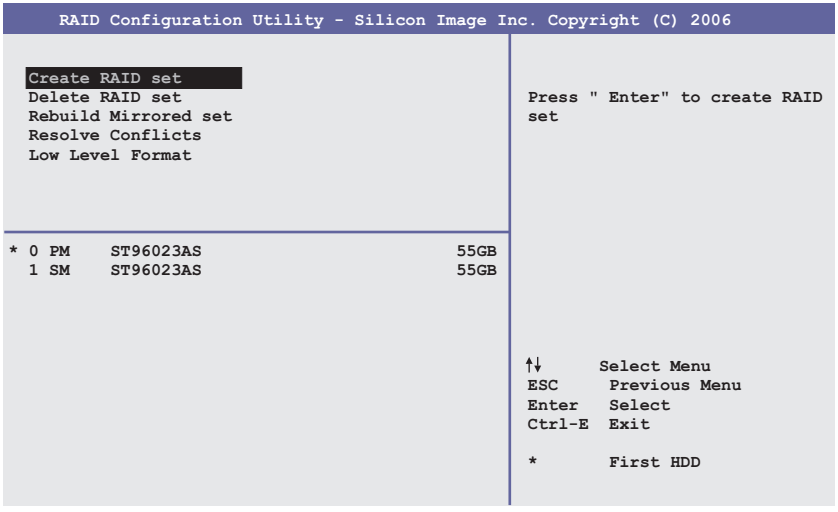


Figure 104: RAID Configuration Utility - Menu

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 123: BIOS-relevant keys in the RAID Configuration Utility

6.1 Create RAID set

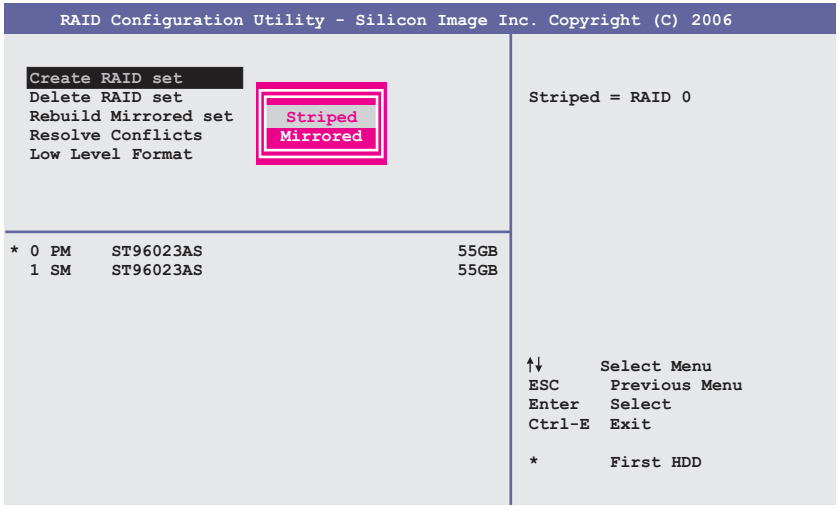


Figure 105: RAID Configuration Utility - Menu

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

6.1.1 Create RAID set - Striped

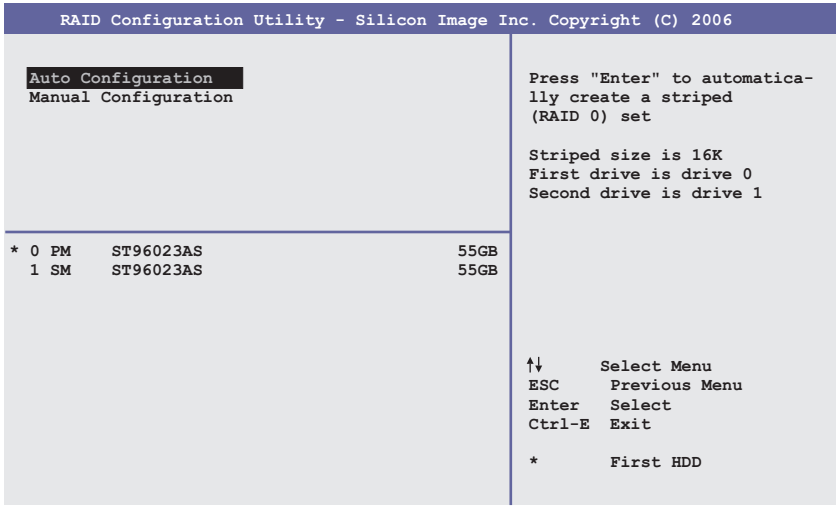


Figure 106: RAID Configuration Utility - Create RAID set - Striped

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).

6.1.2 Create RAID set - Mirrored

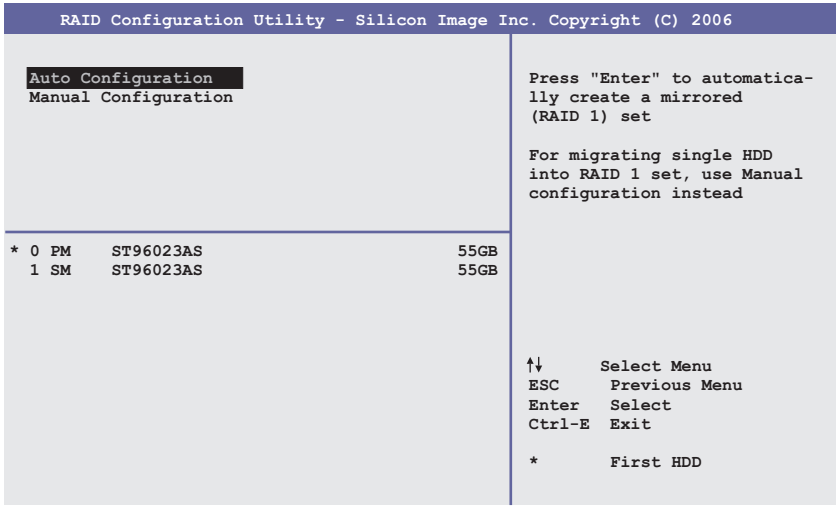


Figure 107: RAID Configuration Utility - Create RAID set - Mirrored

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).

6.2 Delete RAID set

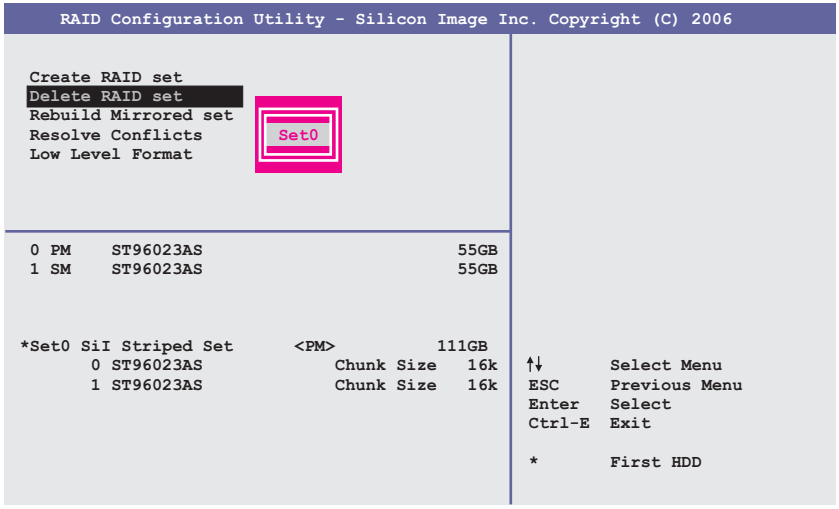


Figure 108: RAID Configuration Utility - Delete RAID set

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

6.3 Rebuild mirrored set

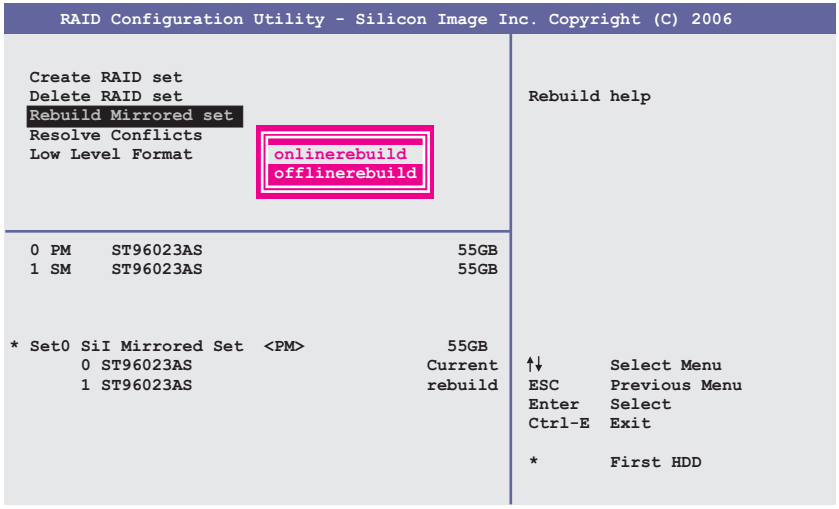


Figure 109: RAID Configuration Utility - Rebuild mirrored set

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 (lasts approximately 30 minutes).

6.4 Resolve conflicts

```
RAID Configuration Utility - Silicon Image Inc. Copyright (C) 2006

 Create RAID set                                  Help for resolving
 Delete RAID set                                  conflicts
 Rebuild Mirrored set
 Resolve Conflicts
 Low Level Format

 0 PM    ST96023AS                          55GB
 1 SM    ST96023AS                          55GB

* Set0 SiI Mirrored Set  <PM>               55GB
       0 ST96023AS                       Current   ↑↓      Select Menu
       1 ST96023AS                       Current   ESC     Previous Menu
                                                   Enter   Select
                                                   Ctrl-E  Exit

                                                   *       First HDD
```

Figure 110: 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".

6.5 Low level format

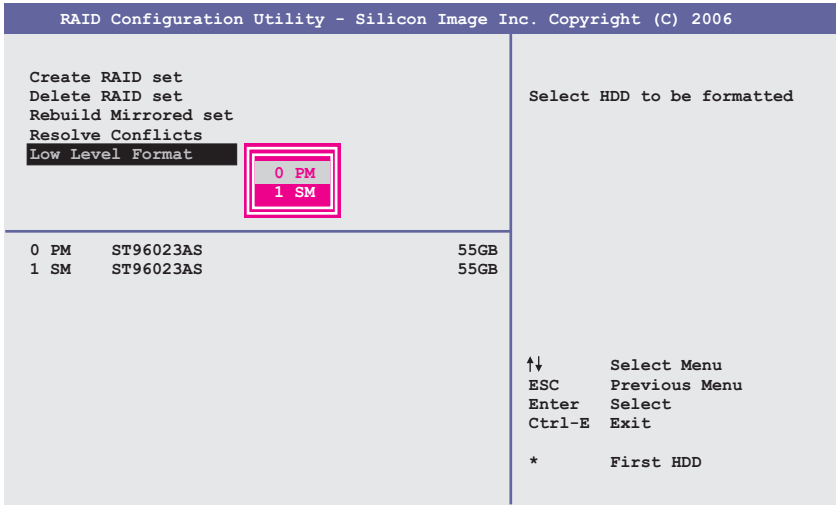


Figure 111: RAID Configuration Utility - Low level format

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.

7. Known problems / issues

7.1 Problems and properties of the first production lot

The following points listed are known as of 2008-05-07 in the first production lot of APC800 devices:

- The hardware security key interface is supported beginning with MTXC FPGA version 00.06 and higher.
- Sporadically, it was possible that the ETH2 interface was not initialized during a power-on and therefore it would not function. The problem could be corrected by a reset or warm restart (Ctrl+Alt+Del). This problem is corrected in MTXC FPGA version 00.03.
- First Boot Agent Windows XP embedded and built-in SATA HDD drive
  The BIOS setting "Legacy IDE Channels" under "Advanced - IDE Configuration" must be set to "PATA only" before inserting a CompactFlash card with a Windows XP embedded image and executing the First Boot Agent or the SATA drive can first be removed.
- When using two graphic lines, the Windows XP graphics driver assigns the labels "digital indicator" to the monitor / panel plug and "digital indicator 2" to the AP Link plug. In the "extended desktop" mode, the following behavior is observed: If the digital display device on the monitor / panel is removed (e.g. cable disconnected), digital display 2 is activated automatically, and the graphics driver settings also switch over accordingly. The next time the system is rebooted, the image content is diverted from the monitor / panel plug to the AP Link plug.
  If the BIOS option "SDVO/DVI Hotplug support" is set to "enabled" (found under the BIOS menu point "Advanced - Graphics - Configuration"), then the image content is automatically diverted from the separate monitor / panel plug to the second graphics line on the AP Link plug.
- Special features of "Quick Switching" - if the APC810 is in Standby mode - Power LED is red (e.g. Windows XP shutdown), then buffering takes a little more time due to capacitors and low power consumption. If the "Power Loss Control" option is set to "Power On" or "Last State" in BIOS, then the system might not restart because a Power Off/On was not detected. To make sure that these system units will restart after a Power Off/On, the turn-off time should be set to at least 10 seconds.
- From MTCX PX32 firmware V00.11 and higher, the reset button is only triggered by edges. This means that the device boots even when the reset button is pressed. In MTCX PX32 firmware < V00.11, the system does not start after pressing (ca. 10 seconds) and releasing the reset button.

7.2 Problems and properties of subsequent production lots

- 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.

- The MIC, Line IN and Line OUT inputs/outputs are not supported due to the Intel GM45 chipset.
- The CompactFlash Slot 2 is not supported due to the Intel GM45 chipset.
- During daisy chain operation of multiple AP800/AP900 devices via SDL, it's possible that the touch controller status shows a red "X" in the Control Center applet for the touch screen driver when the touch controller is detected. The functionality of the touch system is not affected by this. This can be avoided by setting a panel locking time of 50 ms. The panel locking time can be configured with the B&R Key Editor.

Chapter 4 • Software

1. BIOS options

Information:

The following diagrams and BIOS menu items including descriptions refer to BIOS version 1.13. It is therefore possible that these diagrams and BIOS descriptions do not correspond with the installed BIOS version.

1.1 General Information

BIOS stands for "Basic Input Output System". It is the most basic standardized communication between the user and the system (hardware). The BIOS system used in the Automation PC 810 systems is produced by American Megatrends Inc.

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

The CMOS data is buffered by a battery (if present), and remains in the APC810 even when the power is turned off (no 24VDC supply).

1.2 BIOS setup and boot procedure

BIOS is immediately activated when switching on the power supply of the Automation PC 810 system or pressing the power button. The system checks if the setup data from the EEPROM is "OK". If the data is "OK", then it is transferred to the CMOS. If the data is "not OK", then the CMOS data is checked for validity. An error message is output if the CMOS data contains errors and the boot procedure can be continued by pressing the <F1> key. To prevent the error message from appearing at each restart, open the BIOS setup by pressing the <Del> key and re-save the settings.

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

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

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

"Press DEL to run SETUP"

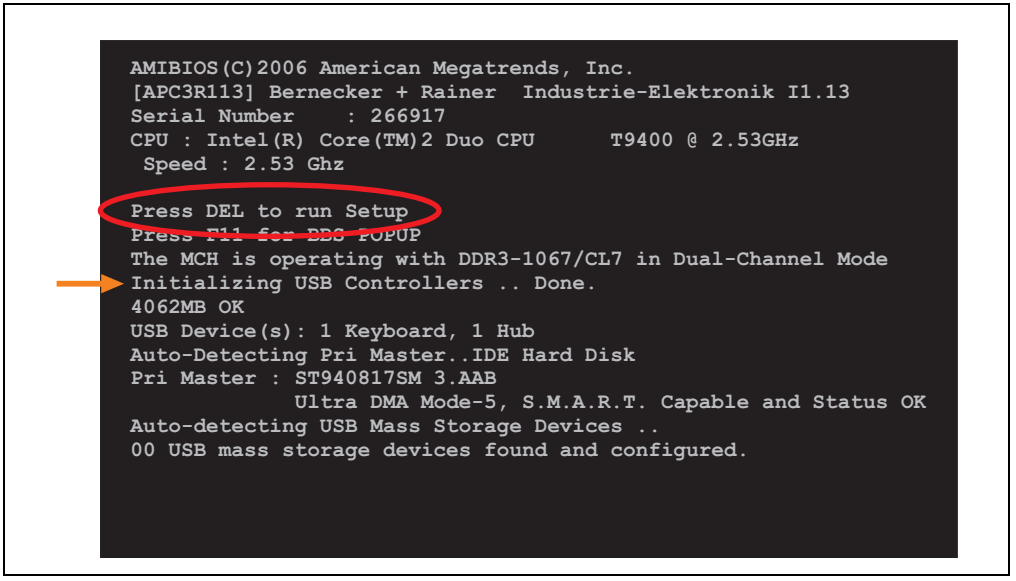


Figure 112: BM45 boot screen

1.2.1 BIOS setup keys

The following keys are enabled during the POST:

Information:

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

Key	Function
Del	Enters the BIOS setup menu.
F12	Using the F12 key, you can boot from the network.

Table 124: BM45 bios-relevant keys at POST

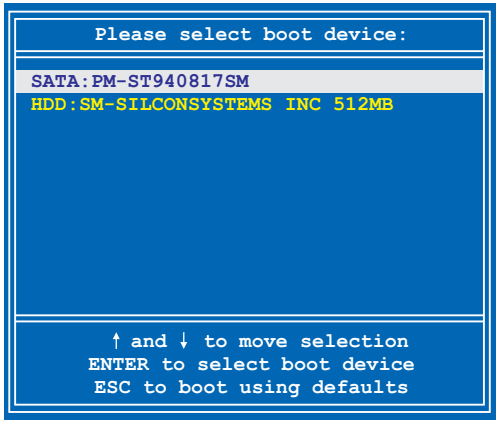
Key	Function
F11	Cues the boot menu. Lists all bootable devices that are connected to the system. With cursor ↑ and cursor ↓ and by pressing <ENTER>, select the device from which will be booted. 
<Break>	Pressing the <pause> key stops the POST. Press any other key to resume the POST.

Table 124: BM45 bios-relevant keys at 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.
PageUp ↑	Change to the previous page.
PageDown ↓	Change to the previous page.
Pos 1	Jumps to the first BIOS menu item or object.
End	Jumps to the last BIOS menu item or object.
F2 / F3	The colors of the BIOS Setup are switched.
F7	Changes are reset.
F9	These settings are loaded for all BIOS configurations.
F10	Save and close.
Esc	Exits the submenu.

Table 125: BM45 bios-relevant keys in the BIOS menu

1.3 Main

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

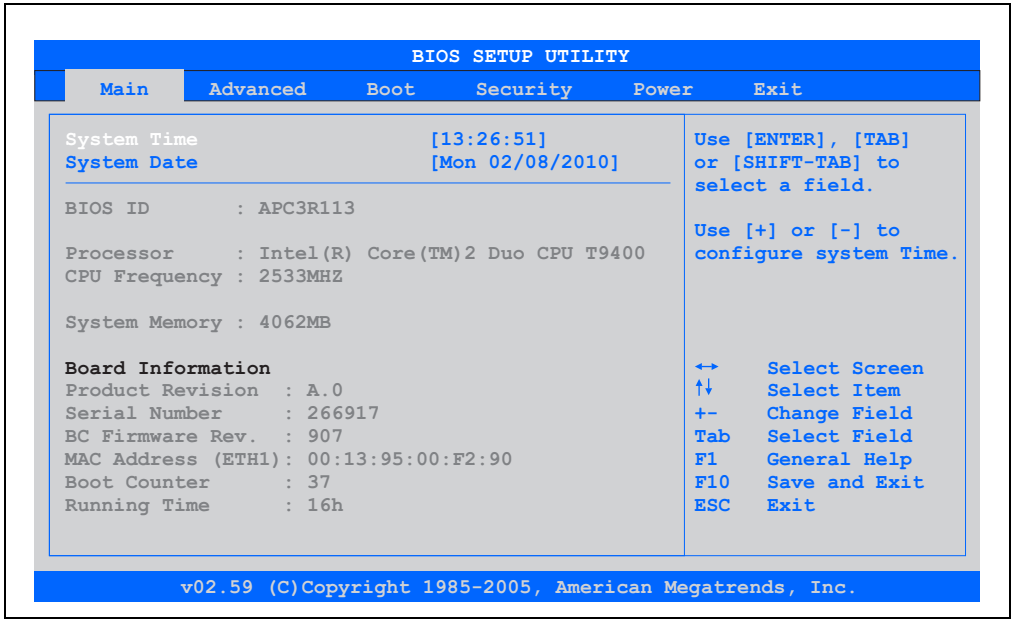


Figure 113: BM45 - BIOS main menu

BIOS setting	Meaning	Setting options	Effect
System Time	This is the current system time setting. The time is buffered by a battery (CMOS battery) after the system has been switched off.	Changes the System time	Set the system time in the format Hour:Minute:Second (hh:mm:ss).
System Date	This is the current system date setting. The time is buffered by a battery (CMOS battery) after the system has been switched off.	Changes the system date	Sets the system date in the format Month:Day:Year (mm:dd:yyyy).
BIOS ID	Displays the BIOS recognition.	None	-
Processor	Displays the processor type.	None	-
CPU Frequency	Displays the processor frequency.	None	-
System Memory	Displays the system memory size.	None	-
Product Revision	Displays the CPU board HW revision.	None	-
Serial number	Displays the CPU board serial number.	None	-
BC Firmware Rev.	Displays the CPU board controller firmware revision.	None	-
MAC Address (ETH1)	Displays the MAC addresses assigned for the ETH1 interface.	None	-

Table 126: BM45 - Main menu - Setting options

BIOS setting	Meaning	Setting options	Effect
Boot Counter	Displays the boot counter - each restart increments the counter by one (max. 16777215).	None	-
Running Time	Displays the runtime in whole hours. (max. 65535).	None	-

Table 126: BM45 - Main menu - Setting options (cont.)

1.4 Advanced

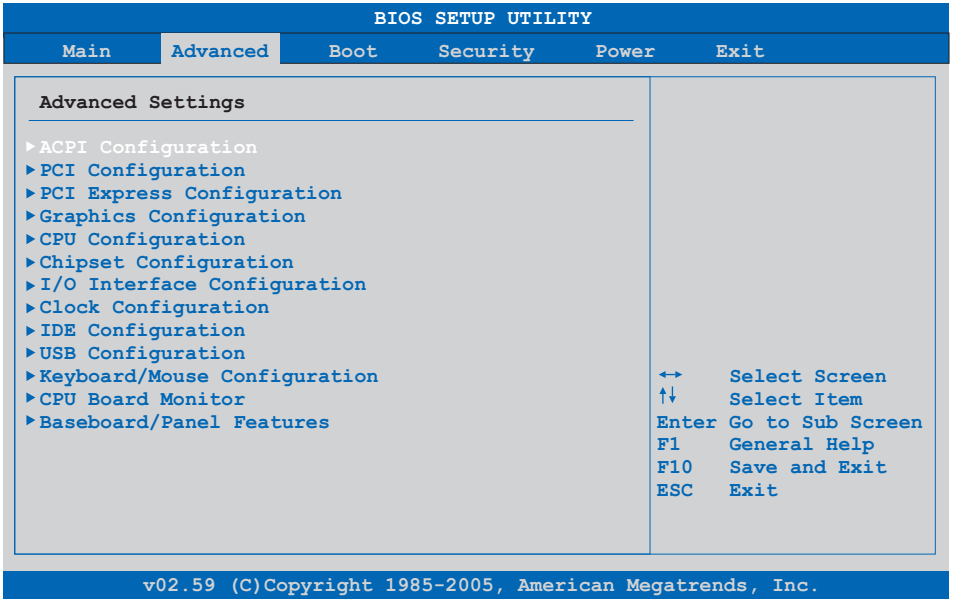


Figure 114: BM45 - Advanced menu

BIOS setting	Meaning	Setting options	Effect
ACPI configuration	Configures the APCI devices.	Enter	Opens the submenu See "ACPI configuration", on page 218.
PCI Configuration	Configures PCI devices.	Enter	Opens the submenu See "PCI Configuration", on page 220.
PCI express configuration	Configures the PCI Express.	Enter	Opens the submenu See "PCI express configuration", on page 225.
Graphics configuration	Configures the graphics settings.	Enter	Opens the submenu See "Graphics configuration", on page 227.
CPU configuration	Configures the CPU settings.	Enter	Opens the submenu See "CPU configuration", on page 231.

Table 127: BM45 - Advanced menu - Setting options

BIOS setting	Meaning	Setting options	Effect
Chipset configuration	Configures the chipset functions.	Enter	Opens the submenu See "Chipset configuration", on page 232.
I/O interface configuration	Configures the I/O devices.	Enter	Opens the submenu See "I/O interface configuration", on page 234.
Clock Configuration	Configures the clock settings.	Enter	Opens the submenu See "Clock Configuration", on page 235.
IDE Configuration	Configures the IDE functions.	Enter	Opens the submenu See "IDE Configuration", on page 236.
USB configuration	Configures the USB settings.	Enter	Opens the submenu See "USB configuration", on page 244.
Keyboard/mouse configuration	Configures the keyboard/mouse options.	Enter	Opens the submenu See "Keyboard/mouse configuration", on page 246.
CPU board monitor	Displays the current voltages and temperature of the processor in use.	Enter	Opens the submenu See "CPU board monitor", on page 247.
Main Board/Panel Features	Displays device specific information and setup of device specific values.	Enter	Opens the submenu See "Main Board/Panel Features", on page 248.

Table 127: BM45 - Advanced menu - Setting options (cont.)

1.4.1 ACPI configuration

```
BIOS SETUP UTILITY
Advanced

ACPI Settings                                  Enable / Disable
                                               ACPI support for
ACPI Aware O/S                  [Yes]          Operating System.

ACPI Version Features           [ACPI v2.0]    ENABLE: If OS
ACPI APIC support               [Enabled]      supports ACPI.
Suspend mode                    [S1 (POS)]
USB Device Wakeup from S3/S4    [Disabled]     DISABLE: If OS
                                               does not support
Active Cooling Trip Point       [Disabled]     ACPI.
Passive Cooling Trip Point      [Disabled]
Critical Trip Point             [105°C]

                                               ←→    Select Screen
                                               ↑↓    Select Item
                                               +-    Change Option
                                               F1    General Help
                                               F10   Save and Exit
                                               ESC   Exit

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```

Figure 115: BM45 - Advanced ACPI configuration

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

Table 128: BM45 - Advanced ACPI configuration - Setting options

1.4.2 PCI Configuration

```
BIOS SETUP UTILITY
Advanced

Advanced PCI/PnP Settings

Plug & Play O/S                [Yes]
PCI Latency Timer              [64]
Allocate IRQ to PCI VGA        [Yes]
Allocate IRQ to SMBUS HC       [Yes]
Allocate IRQ to PCIEX2         [Yes]

▶ PCI IRQ Resource Exclusion

▶ PCI Interrupt Routing

NO: lets the BIOS configure all the device in the system.
YES: lets the operating system configure Plug and Play (PnP) devices not required for boot if your system has a Plug and Play operating system.

←→    Select Screen
↑↓    Select Item
+-    Change Option
F1    General Help
F10   Save and Exit
ESC   Exit

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```

Figure 116: BM45 - Advanced PCI configuration

BIOS setting	Meaning	Setting options	Effect
Plug & Play O/S	BIOS is informed if Plug & Play is capable on the operating system.	Yes	The operating system handles the distribution of resources.
		No	BIOS handles the distribution of resources.
PCI Latency Timer	This option controls how long (in PCI ticks) one PCI bus card can continue to use the master after another PCI card has requested access.	32, 64, 96, 128, 160, 192, 224, 248	Manually sets the value in PCI ticks.
Allocate IRQ to PCI VGA	This function is used to determine if an interrupt is assigned to the PCI VGA.	Yes	Automatic assignment of an interrupt.
		No	No assignment of an interrupt.
Allocate IRQ to SMBUS HC	Use this function to set whether or not the SM (System Management) bus controller is assigned a PCI interrupt.	Yes	Automatic assignment of a PCI interrupt.
		No	No assignment of an interrupt.
Allocate IRQ to PCIEX2	Use this function to set whether or not the PCIEX2 is assigned a PCI interrupt.	Yes	Automatic assignment of a PCI interrupt.
		No	No assignment of an interrupt.
PCI IRQ Resource Exclusion	Configures the PCI IRQ resource settings for ISA Legacy devices.	Enter	Opens the submenu See "PCI IRQ Resource Exclusion", on page 221
PCI Interrupt Routing	Configures PCI interrupt routing	Enter	Opens the submenu See "PCI Interrupt Routing", on page 223

Table 129: BM45 - Advanced PCI configuration - Setting options

PCI IRQ Resource Exclusion

```
BIOS SETUP UTILITY
Advanced

PCI IRQ Resource Exclusion

IRQ3                    [Allocated]
IRQ4                    [Allocated]
IRQ5                    [Available]
IRQ6                    [Available]
IRQ7                    [Available]
IRQ9                    [Allocated]
IRQ10                   [Available]
IRQ11                   [Available]
IRQ12                   [Available]
IRQ14                   [Allocated]
IRQ15                   [Allocated]

Available: Specified IRQ is available to be used by PCI/PnP devices.
Reserved: Specified IRQ is reserved for use by Legacy ISA devices.

←→   Select Screen
↑↓   Select Item
+-   Change Option
F1   General Help
F10  Save and Exit
ESC  Exit

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```

Figure 117: BM45 - Advanced PCI IRQ resource exclusion

BIOS setting	Meaning	Setting options	Effect
IRQ3	IRQ interrupt routing for Legacy ISA devices.	Allocated	Allocated by the system - cannot be used.
IRQ4	IRQ interrupt routing for Legacy ISA devices.	Allocated	Allocated by the system - cannot be used.
IRQ5	IRQ interrupt routing for Legacy ISA devices. **Information:** **No ISA bus present in the APC810 system. Therefore this setting is not relevant.**	Available	Available - can be used.
		Reserved	Reserved - cannot be used.
IRQ6	IRQ interrupt routing for Legacy ISA devices. **Information:** **No ISA bus present in the APC810 system. Therefore this setting is not relevant.**	Available	Available - can be used.
		Reserved	Reserved - cannot be used.

Table 130: BM45 - Advanced PCI IRQ resource exclusion - Setting options

BIOS setting	Meaning	Setting options	Effect
IRQ7	IRQ interrupt routing for Legacy ISA devices. **Information:** **No ISA bus present in the APC810 system. Therefore this setting is not relevant.**	Available	Available - can be used.
		Reserved	Reserved - cannot be used.
IRQ9	IRQ interrupt routing for Legacy ISA devices.	Allocated	Allocated by the system - cannot be used.
IRQ10	IRQ interrupt routing for Legacy ISA devices. **Information:** **No ISA bus present in the APC810 system. Therefore this setting is not relevant.**	Available	Available - can be used.
		Reserved	Reserved - cannot be used.
IRQ11	IRQ interrupt routing for Legacy ISA devices. **Information:** **No ISA bus present in the APC810 system. Therefore this setting is not relevant.**	Available	Available - can be used.
		Reserved	Reserved - cannot be used.
IRQ12	IRQ interrupt routing for Legacy ISA devices. **Information:** **No ISA bus present in the APC810 system. Therefore this setting is not relevant.**	Available	Available - can be used.
		Reserved	Reserved - cannot be used.
IRQ14	IRQ interrupt routing for Legacy ISA devices.	Allocated	Allocated by the system - cannot be used.
IRQ15	IRQ interrupt routing for Legacy ISA devices.	Allocated	Allocated by the system - cannot be used.

Table 130: BM45 - Advanced PCI IRQ resource exclusion - Setting options (cont.)

PCI Interrupt Routing

```
                    BIOS SETUP UTILITY
                    Advanced

PCI Interrupt Routing                          Select fixed IRQ for
                                               set AUTO to let the
PIRQ A (VGA,UHCI2,PCIE0,ETH2)    [Auto]        BIOS and OS route an
PIRQ B (PCIE1,HDA,ETH1)          [Auto]        IRQ to this line.
PIRQ C (PCIE2)                   [Auto]
PIRQ D (UHCI1,PCIE3,SATA)        [Auto]        Make sure that the
PIRQ E (INTD,SMB,UHCI3,EHCI1)    [Auto]        selected IRQ is not
PIRQ F (INTA)                    [Auto]        assigned to legacy IO.
PIRQ G (INTB)                    [Auto]
PIRQ H (INTC,UHCI0,EHCI0)        [Auto]

1st Exclusive PCI                [None]
2nd Exclusive PCI                [None]

PCIEn  : PCI Express Root Port n               ↔    Select Screen
INTn   : External PCI Bus INTn Line            ↑↓   Select Item
SMB    : System Management Bus Controller      +-   Change Option
HDA    : Intel High Definition Audio           F1   General Help
                                               F10  Save and Exit
                                               ESC  Exit

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```

Figure 118: BM45 - Advanced PCI interrupt routing

BIOS setting	Meaning	Setting options	Effect
PIRQ A (VGA,UHCI2,PCIE0, ETH2)	Option for setting the PIRQ A.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment
PIRQ B (PCIE1,HDA,ETH1)	Option for setting the PIRQ B.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment.
PIRQ C (PCIE2)	Option for setting the PIRQ C.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment.
PIRQ D (UHCI1,PCIE3, SATA)	Option for setting the PIRQ D.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment.
PIRQ E (INTD, SMB,UHCI3,EHCI1)	Option for setting the PIRQ E.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment.

Table 131: BM45 - Advanced PCI interrupt routing - Setting options

BIOS setting	Meaning	Setting options	Effect
PIRQ F (INTA)	Option for setting the PIRQ F.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment.
PIRQ G (INTB)	Option for setting the PIRQ G.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment.
PIRQ H (INTC,UHCI0, EHCI0)	Option for setting the PIRQ H.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment.
1st Exclusive PCI	With this option you can determine if the IRQ assigned to the PIRQ x is handled exclusively (no IRQ sharing). **Information:** **Is only displayed if a PIRQ is manually set (e.g. 5).**	None	No interrupt is assigned.
		x	Assigns the PIRQ as 1st exclusive PCI IRQ.
2nd Exclusive PCI	With this option you can determine if the IRQ assigned to the PIRQ x is handled exclusively (no IRQ sharing). **Information:** **Only displayed when two PIRQs are set manually.**	None	No interrupt is assigned.
		x	Assigns the PIRQ as 2nd exclusive PCI IRQ.

Table 131: BM45 - Advanced PCI interrupt routing - Setting options (cont.)

1.4.3 PCI express configuration

```
                    BIOS SETUP UTILITY
                    Advanced

PCI Express Configuration                    Enable/Disable
                                             PCI Express L0s and
Active State Power-Management  [Disabled]    L1 link power
  PCIE Port 0                  [Auto]        states.
  PCIE Port 1                  [Auto]
  PCIE Port 2                  [Auto]
  PCIE Port 3                  [Auto]
  PCIE Port 4 (ETH2)           [Auto]
  PCIE High Priority Port      [Disabled]

Res. PCIE Hotplug Resources    [No]

                                             ←→    Select Screen
  PCIE Port 0 IOxAPCI Enable   [Disabled]    ↑↓    Select Item
  PCIE Port 1 IOxAPCI Enable   [Disabled]    +-    Change Option
  PCIE Port 2 IOxAPCI Enable   [Disabled]    F1    General Help
  PCIE Port 3 IOxAPCI Enable   [Disabled]    F10   Save and Exit
                                             ESC   Exit

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```

Figure 119: BM45 - Advanced PCI express configuration

BIOS setting	Meaning	Setting options	Effect
Active State Power-Management	Option for setting a power saving function (L0s/L1) for PCIE slots if they do not require full power.	Disabled	Disables this function.
		Enabled	Enables this function.
PCIE Port 0	This option activates or deactivates the PCI Express connection function. **Information:** **If you are not using any PCI Express devices, this option should be deactivated.**	Auto	Automatic assignment by the BIOS and operating system.
		Enabled	Enables this function.
		Disabled	Disables this function.
PCIE Port 1	This option activates or deactivates the PCI Express connection function. **Information:** **If you are not using any PCI Express devices, this option should be deactivated.**	Auto	Automatic assignment by the BIOS and operating system.
		Enabled	Enables this function.
		Disabled	Disables this function.

Table 132: BM45 - Advanced PCI express configuration - Setting options

BIOS setting	Meaning	Setting options	Effect
PCIE Port 2	This option activates or deactivates the PCI Express connection function. **Information:** **If you are not using any PCI Express devices, this option should be deactivated.**	Auto	Automatic assignment by the BIOS and operating system.
		Enabled	Enables this function.
		Disabled	Disables this function.
PCIE Port 3	This option activates or deactivates the PCI Express connection function. **Information:** **If you are not using any PCI Express devices, this option should be deactivated.**	Auto	Automatic assignment by the BIOS and operating system.
		Enabled	Enables this function.
		Disabled	Disables this function.
PCIE Port 4 (ETH2)	This option activates or deactivates the PCI Express connection function. **Information:** **If you are not using any PCI Express devices, this option should be deactivated.**	Auto	Automatic assignment by the BIOS and operating system.
		Enabled	Enables this function.
		Disabled	Disables this function.
PCIE High Priority Port	This option activates or deactivates the priority port for PCIE.	Disabled	Disables this function.
		Port 0	Activates Port 0 as priority port.
		Port 1	Activates Port 1 as priority port.
		Port 2	Activates Port 2 as priority port.
		Port 3	Activates Port 3 as priority port.
		ETH2	Activates ETH2 as priority port.
		ETH1	Activates ETH1 as priority port.
Res. PCIE Hotplug Resource	This option can be used to reserve an I/O and memory resource for a free PCIE port. A PCIE port must be set to enabled and resources must be reserved to support ExpressCard hot-plugging on a port.	No	Resource is not reserved.
		Yes	Resource is reserved.
PCIE Port 0 IOxAPIC Enable	This option is used to enable or disable the APIC (Advanced Programmable Interrupt Controller) on the PCIE port 0. The IRQ resources available to the system are expanded when the APIC mode is enabled.	Disabled	Disables this function.
		Enabled	Enables this function.
PCIE Port 1 IOxAPIC Enable	This option is used to enable or disable the APIC (Advanced Programmable Interrupt Controller) on the PCIE port 1. The IRQ resources available to the system are expanded when the APIC mode is enabled.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 132: BM45 - Advanced PCI express configuration - Setting options (cont.)

BIOS setting	Meaning	Setting options	Effect
PCIE Port 2 IOxAPIC Enable	This option is used to enable or disable the APIC (Advanced Programmable Interrupt Controller) on the PCIE port 2. The IRQ resources available to the system are expanded when the APIC mode is enabled.	Disabled	Disables this function.
		Enabled	Enables this function.
PCIE Port 3 IOxAPIC Enable	This option is used to enable or disable the APIC (Advanced Programmable Interrupt Controller) on the PCIE port 3. The IRQ resources available to the system are expanded when the APIC mode is enabled.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 132: BM45 - Advanced PCI express configuration - Setting options (cont.)

1.4.4 Graphics configuration

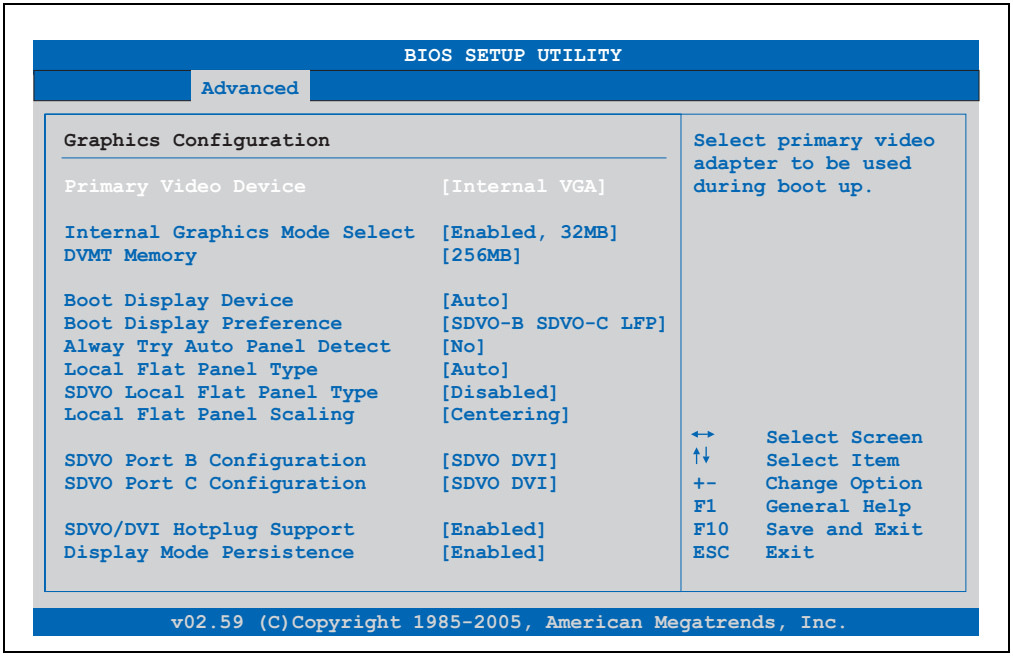

Figure 120: BM45 - Advanced graphics configuration

BIOS setting	Meaning	Setting options	Effect
Primary Video Device	Option for selecting the primary video device.	Internal VGA	The internal graphics chip on the CPU board is used as video device (monitor / panel connection).
		PCI / Int. VGA	The graphics chip of a connected graphics card is used as video device.

Table 133: BM45 - Advanced graphics configuration - Setting options

BIOS setting	Meaning	Setting options	Effect
Internal Graphics Mode Select	Option for setting the memory size that can be used for the internal graphics controller.	Disabled	No reservation - Disables the graphics controller.
		Enabled, 32MB	32MB main memory provided.
		Enabled, 64MB	64MB main memory provided.
		Enabled, 128MB	128MB main memory provided.
DVMT Memory	Option for setting the amount of memory used for the DVMT mode.	128MB	128MB of main memory can be used.
		256MB	256MB of main memory can be used.
		Maximum DVMT	The remaining available main memory can be used.
Boot Display Device	Determines which video channel should be enabled for a video device during the boot procedure.	Auto	Automatic selection.
		CRT only	Only use the CRT (Cathode Ray Tube) channel.
		TV only	Only use the TV channel.
		SDVO only	Only use the SDVO (Serial Digital Video Out) channel.
		CRT + SDVO	Use CRT and SDVO channel.
		LFP only	Only use the LFP (Local Flat Panel) channel.
		CRT + LFP	Use CRT + LFP channel.
Boot Display Preference	This option determines the order in which the devices on the connected channels LFP and SDVO should be checked and booted. **Information:** **The setting is only needed when the Boot Display Device option is set to "Auto".**	LFP SDVO-B SDVO-C	Local Flat Panel - Serial Digital Video B output - Serial Video C output.
		LFP SDVO-C SDVO-B	Local Flat Panel - Serial Digital Video C output - Serial Video B output.
		SDVO-B SDVO-C LFP	Serial Digital Video B output - Serial Digital Video C output - Local Flat Panel.
		SDVO-C SDVO-B LFP	Serial Digital Video C output - Serial Digital Video B output - Local Flat Panel.
Always Try Auto Panel Detect	This option first searches for EDID data in an external EEPROM to configure the LFP. If no EDID data is found, then the data selected under "Local Flat Panel Type" is used.	No	Disables this function.
		Yes	Enables this function.

Table 133: BM45 - Advanced graphics configuration - Setting options (cont.)

BIOS setting	Meaning	Setting options	Effect
Local Flat Panel Type	This option can be used to set a pre-defined profile for the LVDS channel.	Auto	Automatic detection and setting using the EDID data.
		VGA 1x18 (002h)	640 x 480
		VGA 1x18 (013h)	640 x 480
		SVGA 1x18 (01Ah)	800 x 600
		XGA 1x18 (006h)	1024 x 768
		XGA 2x18 (007h)	1024 x 768
		XGA 1x24 (008h)	1024 x 768
		XGA 2x24 (012h)	1024 x 768
		SXGA 2x24 (00Ah)	1280 x 1024
		SXGA 2x24 (018h)	1280 x 1024
		UXGA 2x24 (00Ch)	1600 x 1200
		Customized EDID 1	User-defined profile
		Customized EDID 2	User-defined profile
		Customized EDID 3	User-defined profile
SDVO local flat panel type	This option can be used to set a pre-defined profile for the SDVO LVDS channel. **Information:** **An SDVO LVDS transmitter must be connected to one of the SDVO ports, and the corresponding SDVO port device must be set to LVDS.**	Disabled	Deactivates this function.
		Auto	Automatic detection and setting using the EDID data.
		VGA 1x18 (002h)	640 x 480
		VGA 1x18 (013h)	640 x 480
		SVGA 1x18 (01Ah)	800 x 600
		XGA 1x18 (006h)	1024 x 768
		XGA 2x18 (007h)	1024 x 768
		XGA 1x24 (008h)	1024 x 768
		XGA 2x24 (012h)	1024 x 768
		SXGA 2x24 (00Ah)	1280 x 1024
		SXGA 2x24 (018h)	1280 x 1024
		UXGA 2x24 (00Ch)	1600 x 1200
		Customized EDID 1	User-defined profile
		Customized EDID 2	User-defined profile
		Customized EDID 3	User-defined profile
Local flat panel scaling	Determines the screen content should be output according to the defined Local Flat Panel Type.	Centering	The screen content is output centered on the display.
		Expand Text	The text is stretched across the entire surface of the display.
		Expand Graphics	The graphics are stretched across the entire surface of the display.
		Expand Text & Graphics	Text and graphics are stretched across the entire surface of the display.

Table 133: BM45 - Advanced graphics configuration - Setting options (cont.)

BIOS setting	Meaning	Setting options	Effect
SDVO Port B Configuration	Option for selecting the video device that is connected to the SDVO Port B, or to define the port as an HDMI or display port.	Disabled	No video device connected.
		HDMI Port	Port is configured as an HDMI port.
		Display Port	Port is configured as a display port.
		SDVO DVI	Video signal output is optimized for an SDVO DVI-compatible video device.
		SDVO TV	Video signal output is optimized for an SDVO TV-compatible video device.
		SDVO CRT	Video signal output is optimized for a SDVO CRT-compatible video device.
		SDVO LVDS	Video signal output is optimized for an SDVO LVDS-compatible video device.
		SDVO DVI-Analog	Video signal output is optimized for an analog SDVO DVI-compatible video device.
SDVO Port C Configuration	Option for selecting the video device that is connected to the SDVO Port C, or to define the port as an HDMI or display port.	Disabled	No video device connected.
		HDMI Port	Port is configured as an HDMI port.
		Display Port	Port is configured as a display port.
		SDVO DVI	Video signal output is optimized for an SDVO DVI-compatible video device.
		SDVO TV	Video signal output is optimized for an SDVO TV-compatible video device.
		SDVO CRT	Video signal output is optimized for a SDVO CRT-compatible video device.
		SDVO LVDS	Video signal output is optimized for an SDVO LVDS-compatible video device.
		SDVO DVI-Analog	Video signal output is optimized for an analog SDVO DVI-compatible video device.
SDVO/DVI Hotplug Support	If this option is set to enabled, the Windows XP graphics driver supports "hotplug" and "configuration mode persistence" for DVI monitors connected to a DVI SDVO transmitter. "Hotplug" support means that when a DVI monitor is connected while the operating system is running, it is detected automatically and activated. "Configuration mode persistence" means that, for example, a dual DVI configuration is automatically restored when both DVI monitors are reconnected, even if only one of them was connected and activated during a previous boot.	Enabled	"Hotplug" and "Configuration mode persistence" mode enabled.
		Disabled	"Hotplug" and "Configuration mode persistence" mode disabled.
Display Mode Persistence	"Display mode persistence" means that the operating system can remember and restore the previous display configuration. For example, a dual DVI configuration is automatically restored when both DVI monitors are reconnected, even if only one of them was connected and activated during a previous boot.	Enabled	Enables this function.
		Disabled	Disables this function.

Table 133: BM45 - Advanced graphics configuration - Setting options (cont.)

1.4.5 CPU configuration

```
BIOS SETUP UTILITY
Advanced

Configure advanced CPU settings                    Select MPS
Module Version:3F.15                               Revision.

Manufacturer:Intel
Intel(R) Core(TM)2 Duo CPU      T9400 @2.53GHz
Frequency    :2.53GHz
FSB Speed    :1066MHz
Cache L1     :64 KB
Cache L2     :6144 KB
Ratio Actual Value:9.5

MPS Revision                    [1.4]
Max. CPUID Value Limit          [Disabled]          ←→    Select Screen
Intel (R) Virtualization Tech.  [Enabled]           ↑↓    Select Item
Execute-Disable Bit Capability  [Enabled]           +-    Change Option
Intel(R) SpeedStep(tm) Tech.    [Enabled]           F1    General Help
Intel(R) C-State Tech.          [Enabled]           F10   Save and Exit
Enhanced C-States               [Enabled]           ESC   Exit

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```

Figure 121: BM45 - Advanced CPU configuration

BIOS setting	Meaning	Setting options	Effect
MPS Revision	This option supports the use of multiple CPUs (MPS=multi-processor system).	1.1	Sets MPS support Revision 1.1
		1.4	Sets MPS support Revision 1.4
Max. CPUID Value Limit	Option for limiting the CPUID input value. This could be necessary for older operating systems.	Enabled	The processor limits the maximum CPUID input value to 03h if necessary when the the processor supports a higher value.
		Disabled	The processor returns the current maximum value upon request of the CPUID input value.
Intel(R) Virtualization Tech.	Option for activating or deactivating a virtual machine. **Information:** **You must restart in order to apply changes made to this setting.**	Disabled	Disables this function.
		Enabled	If the function is enabled, a virtual machine can use the additional hardware capacity.
Execute-Disable Bit Capability	Option for enabling or disabling hardware support for prevention of data execution.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 134: BM45 - Advanced CPU configuration - Setting options

BIOS setting	Meaning	Setting options	Effect
Intel(R) SpeedStep(tm) Tech.	Option for controlling the Intel(R) SpeedStep(TM) technology. The processor clock speed is increased or decreased according to the amount of calculations that must be made. As a result, the power consumption depends largely on the processor load.	Enabled	The processor speed is regulated by the operating system.
		Disabled	Disables SpeedStep technology.
Intel(R) C-State Tech.	This setting allows the operating system to set processor clock rates on its own, thereby saving energy.	Disabled	Disables this function. Both processors are run at the same frequency.
		Enabled	Enables this function. The processors are run at different frequencies, thereby saving energy.
Enhanced C-States[1)]	This setting allows the operating system to set processor clock rates on its own, thereby saving energy.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 134: BM45 - Advanced CPU configuration - Setting options

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

1.4.6 Chipset configuration

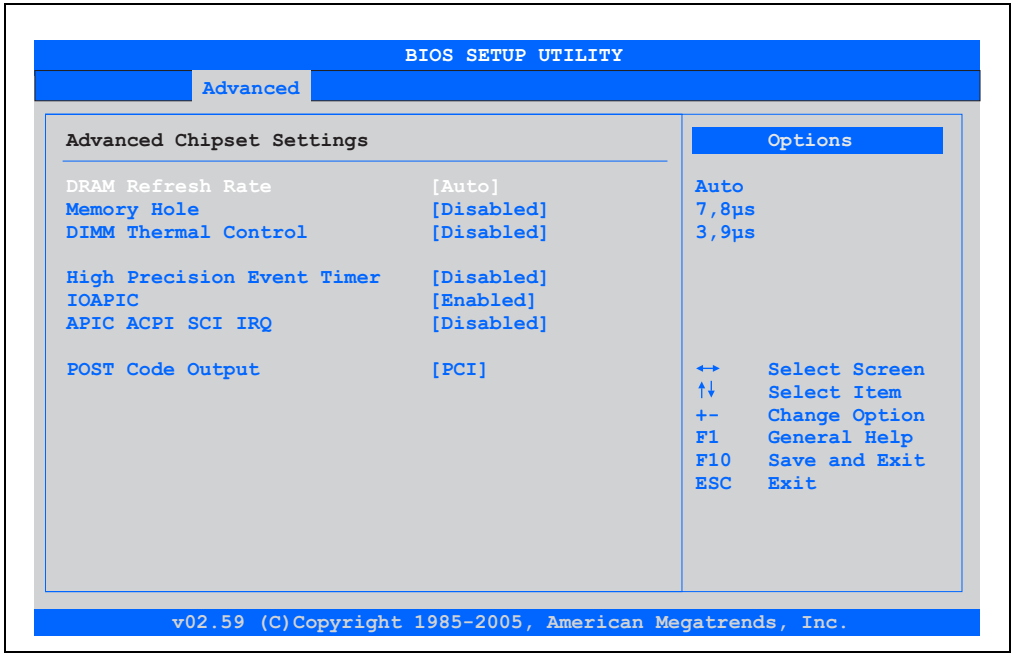

Figure 122: BM45 - Advanced chipset configuration

BIOS setting	Meaning	Setting options	Effect
DRAM Refresh Rate	Option for setting the DRAM refresh rate.	Auto	DRAM Refresh is read from the SPD data of the DRAM module.
		7.8 µs	Manual setting for the DRAM refresh rate.
		3.9 µs	Manual setting for the DRAM refresh rate.
Memory Hole	Option for ISA cards with frame buffer. Not relevant for a APC810.	Disabled	Disables this function.
		15MB-16MB	This address area is reserved.
DIMM Thermal Control	Option for setting the maximum surface temperature of the DIMM module. The module is cooled by limiting the memory bandwidth if the defined surface temperature is reached.	Disabled	Surface temperature not limited.
		40°C, 50°C, 60°C, 70°C, 80°C, 85°C, 90°C	Temperature limit value for the limitation.
High Precision Event Timer	The HPET is a timer inside the PC. It is able to trigger an interrupt with a high degree of accuracy, which allows other programs to better synchronize a variety of applications.	Disabled	Disables this function.
		Enabled	Enables this function. This function is recommended for multimedia applications.
IOAPIC	This option is used to activate or deactivate the APIC (Advanced Programmable Interrupt Controller). **Information:** **The IRQ resources available to the system are expanded when the APIC mode is enabled.**	Disabled	Disables this function.
		Enabled	The IRQ resources available to the system are expanded when the APIC mode is enabled.
APIC ACPI SCI IRQ	This option is used to modify the SCI IRQ when in APIC (Advanced Programmable Interrupt Controller) mode.	Disabled	IRQ9 is used for SCI.
		Enabled	IRQ20 is used for SCI.
POST Code Output	This option is used when the port 80h/84h BIOS POST code output should be routed to the PCI bus or the LPC bus.	PCI	Port 80h/84h is routed to the PCI bus.
		LPC	Port 80h/84h is routed to the LPC bus.

Table 135: BM45 - Advanced chipset - Setting options

1.4.7 I/O interface configuration

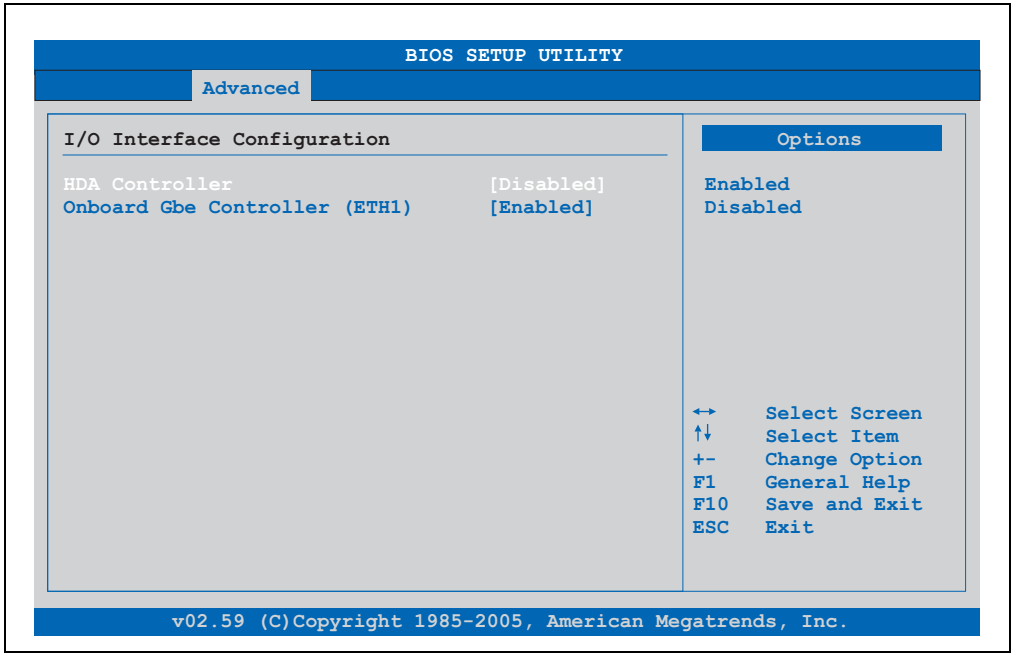

Figure 123: BM45 - Advanced I/O interface configuration

BIOS setting	Meaning	Setting options	Effect
HDA Controller	This option is used to turn the HDA controller on or off. **Information:** **The BM45 CPU board doesn't have a sound controller.**	Enabled	Enables the HDA controller.
		Disabled	Disables the HDA controller.
Onboard Gbe Controller (ETH1)	This option is used to turn the onboard Ethernet controller on or off.	Disabled	Onboard Ethernet controller is disabled.
		Enabled	Onboard Ethernet controller is enabled.

Table 136: BM45 - Advanced I/O interface configuration - Setting options

1.4.8 Clock Configuration

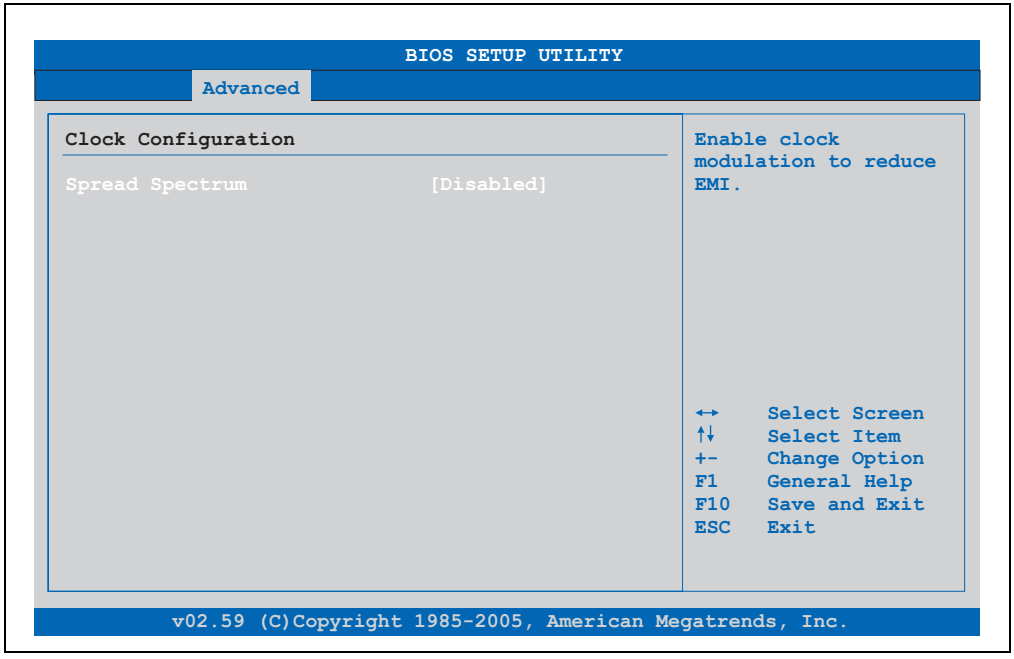

Figure 124: BM45 - Advanced clock configuration

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

Table 137: BM45 - Advanced clock configuration - Setting options

1.4.9 IDE Configuration

```
BIOS SETUP UTILITY
Advanced

IDE Configuration                                  Options

SATA Port 0/1                    [Compatible]      Disabled
SATA Port 2/3(opt. PATA Port)    [Enabled]         Compatible
PATA Detection Time Out (Sec)    [3]               Enhanced

▶ Primary IDE Master               : [Hard Disk]
▶ Secondary IDE Master             : [Not Detected]
▶ Third IDE Master                 : [Not Detected]
▶ Fourth IDE Master                : [Not Detected]

Hard Disk Write Protect          [Disabled]
IDE Detect Time Out (Sec)        [35]              ←→   Select Screen
                                                   ↑↓   Select Item
                                                   +-   Change Option
                                                   F1   General Help
                                                   F10  Save and Exit
                                                   ESC  Exit

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```

Figure 125: BM45 - Advanced IDE configuration

BIOS setting	Meaning	Setting options	Effect
SATA Port 0/1	Option for configuring the integrated SATA controller.	Compatible	The controller runs in Legacy or Compatible mode.
		Disabled	Disables the controller and both ports.
		Enhanced	The controller runs in Enhanced or Native mode.
Configure SATA Port 0/1 as[1)]	The Serial ATA connections 0/1 supported by the Southbridge can be defined here.	IDE	The serial ATA hard drive is used as a parallel ATA physical memory drive.
		RAID	RAID 0, 1, 5, 10 or the Intel® Matrix storage technology can be configured here with the serial ATA hard drive.
		AHCI	The AHCI setting enables the internal memory driver for the SATA functions, which increase the storage performance for random read-write access by allowing the drive to determine the sequence of commands.
Hot Plug[2)]	Option for turning SATA hotplug support on or off.	Disabled	Disables this function.
		Enabled	Enables this function.
SATA Port 2/3 (opt. PATA Port)	Option for turning integrated SATA controllers 2 and 3 on or off.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 138: BM45 - Advanced IDE configuration - Setting options

BIOS setting	Meaning	Setting options	Effect
PATA Detection Time Out (Sec)[3]	Configuring the time overrun limit value for the ATA/ATAPI device identification. This option only applies for PATA channels.	0,1,2,3,5,10,15.30	Time setting in seconds.
Primary IDE Master	The drive in the system that is connected to the primary IDE master port is configured here.	Enter	Opens the submenu See "Primary IDE Master", on page 238
Secondary IDE Master	The drive in the system that is connected to the secondary IDE master port is configured here.	Enter	Opens the submenu See "Secondary IDE Master", on page 240
Third IDE Master	The drive in the system that is connected to the third IDE master port is configured here.	Enter	Opens the submenu See "Third IDE Master", on page 241
Fourth IDE Master	The drive in the system that is connected to the fourth IDE master port is configured here.	Enter	Opens the submenu See "Fourth IDE Master", on page 243
Hard disk write protect	Write protection for the hard drive can be enabled/disabled here.	Disabled	Disables this function.
		Enabled	Enables this function.
IDE Detect Time Out (Sec)	Configuring the time overrun limit value for the ATA/ATAPI device identification. This option applies for SATA and PATA channels.	0, 5, 10, 15, 20, 25, 30, 35	Time setting in seconds.

Table 138: BM45 - Advanced IDE configuration - Setting options

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

Primary IDE Master

```
BIOS SETUP UTILITY
Advanced

Primary IDE Master                          Select the type
                                            of device connected
Device      :Not Detected                   to the system.

Type                              [Auto]
LBA/Large Mode                    [Auto]
Block (Multi-Sector Transfer)     [Auto]
PIO Mode                          [Auto]
DMA Mode                          [Auto]
S.M.A.R.T.                        [Auto]
32Bit Data Transfer               [Enabled]

                                            ←→    Select Screen
                                            ↑↓    Select Item
                                            +-    Change Option
                                            F1    General Help
                                            F10   Save and Exit
                                            ESC   Exit

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```

Figure 126: BM45 - Primary IDE master

BIOS setting	Meaning	Setting options	Effect
Type	The type of drive connected to the primary master is configured here.	Not installed	No drive installed.
		Auto	Automatic recognition of the drive and setup of appropriate values.
		CD/DVD	CD -/ DVD drive.
		ARMD	ARMD - drive (zip drive)
LBA/Large Mode	This option activates the logical block addressing / large mode for IDE.	Disabled	Disables this function.
		Auto	Automatic enabling of this function when supported by the system.
Block (Multi-Sector Transfer)	This option enables the block mode for IDE hard drives. When this option is enabled, the number of blocks per request from the configuration sector of the hard drive is read.	Disabled	Disables this function.
		Auto	Automatic enabling of this function when supported by the system.

Table 139: BM45 - Primary IDE master - Setting options

BIOS setting	Meaning	Setting options	Effect
PIO Mode	The PIO mode determines the data rate of the hard drive. **Information:** **This option is not available on the APC810. Therefore this setting is not relevant.**	Auto	Automatic configuration of PIO mode.
		0, 1, 2, 3, 4	Manual configuration of PIO mode.
DMA Mode	The data transfer rate to and from the primary master drive is defined here. The DMA mode must be activated in the Windows device manager in order to guarantee maximum performance. Only possible when manually setting up the drive.	Auto	Automatic definition of the transfer rate.
		Disabled	Manual definition of the transfer rate.
S.M.A.R.T.	Monitoring function of modern hard drives (self-monitoring, analysis and reporting technology).	Auto	Automatic detection and enabling.
		Disabled	Disables this function.
		Enabled	Enables this function.
32 Bit Data Transfer	This function enables 32-bit IDE data transfer.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 139: BM45 - Primary IDE master - Setting options (cont.)

Secondary IDE Master

```
BIOS SETUP UTILITY
Advanced

Secondary IDE Master                          Select the type
                                              of device connected
Device        :Not Detected                   to the system.

Type                                [Auto]
LBA/Large Mode                      [Auto]
Block (Multi-Sector Transfer)       [Auto]
PIO Mode                            [Auto]
DMA Mode                            [Auto]
S.M.A.R.T.                          [Auto]
32Bit Data Transfer                 [Enabled]

                                              ←→    Select Screen
                                              ↑↓    Select Item
                                              +-    Change Option
                                              F1    General Help
                                              F10   Save and Exit
                                              ESC   Exit

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```

Figure 127: BM45 - Secondary IDE master

BIOS setting	Meaning	Setting options	Effect
Type	The type of drive connected to the secondary master is configured here.	Not installed	No drive installed.
		Auto	Automatic recognition of the drive and setup of appropriate values.
		CD/DVD	CD -/ DVD drive.
		ARMD	ARMD - drive (zip drive)
LBA/Large Mode	This option activates the logical block addressing / large mode for IDE.	Disabled	Disables this function.
		Auto	Automatic enabling of this function when supported by the system.
Block (Multi-Sector Transfer)	This option enables the block mode for IDE hard drives. When this option is enabled, the number of blocks per request from the configuration sector of the hard drive is read.	Disabled	Disables this function.
		Auto	Automatic enabling of this function when supported by the system.

Table 140: BM45 - Secondary IDE master - Setting options

BIOS setting	Meaning	Setting options	Effect
PIO Mode	The PIO mode determines the data rate of the hard drive. **Information:** **This option is not available on the APC810. Therefore this setting is not relevant.**	Auto	Automatic configuration of PIO mode.
		0, 1, 2, 3, 4	Manual configuration of PIO mode.
DMA Mode	The data transfer rate to and from the secondary master drive is defined here. The DMA mode must be activated in the Windows device manager in order to guarantee maximum performance. Only possible when manually setting up the drive.	Auto	Automatic definition of the transfer rate.
		Disabled	Manual definition of the transfer rate.
S.M.A.R.T.	Monitoring function of modern hard drives (self-monitoring, analysis and reporting technology).	Auto	Automatic detection and enabling.
		Disabled	Disables this function.
		Enabled	Enables this function.
32 Bit Data Transfer	This function enables 32-bit data transfer.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 140: BM45 - Secondary IDE master - Setting options (cont.)

Third IDE Master

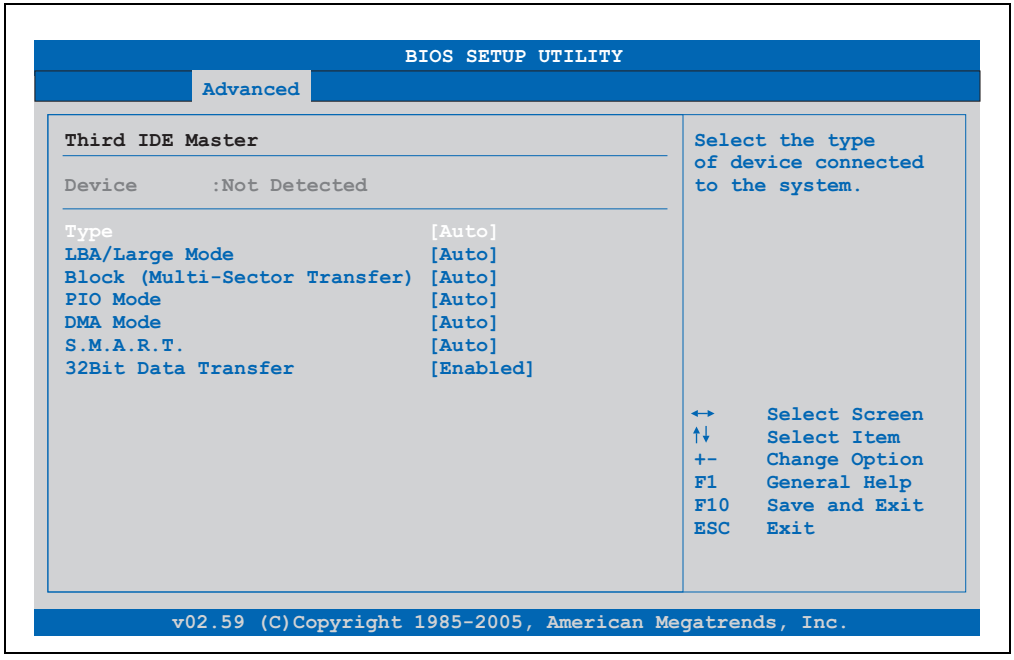

Figure 128: BM45 - Third IDE master

BIOS setting	Meaning	Setting options	Effect
Type	The type of drive connected to the third master is configured here.	Not installed	No drive installed.
		Auto	Automatic recognition of the drive and setup of appropriate values.
		CD/DVD	CD -/ DVD drive.
		ARMD	ARMD - drive (zip drive)
LBA/Large Mode	This option activates the logical block addressing / large mode for IDE.	Disabled	Disables this function.
		Auto	Automatic enabling of this function when supported by the system.
Block (Multi-Sector Transfer)	This option enables the block mode for IDE hard drives. When this option is enabled, the number of blocks per request from the configuration sector of the hard drive is read.	Disabled	Disables this function.
		Auto	Automatic enabling of this function when supported by the system.
PIO Mode	The PIO mode determines the data rate of the hard drive. **Information:** **This option is not available on the APC810. Therefore this setting is not relevant.**	Auto	Automatic configuration of PIO mode.
		0, 1, 2, 3, 4	Manual configuration of PIO mode.
DMA Mode	The data transfer rate to and from the third master drive is defined here. The DMA mode must be activated in the Windows device manager in order to guarantee maximum performance. Only possible when manually setting up the drive.	Auto	Automatic definition of the transfer rate.
		Disabled	Manual definition of the transfer rate.
S.M.A.R.T.	Monitoring function of modern hard drives (self-monitoring, analysis and reporting technology).	Auto	Automatic detection and enabling.
		Disabled	Disables this function.
		Enabled	Enables this function.
32 Bit Data Transfer	This function enables 32-bit data transfer.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 141: BM45 - Third IDE master - Setting options

Fourth IDE Master

```
BIOS SETUP UTILITY
Advanced

Fourth IDE Master                                  Select the type
                                                   of device connected
Device        :Not Detected                        to the system.

Type                                [Auto]
LBA/Large Mode                      [Auto]
Block (Multi-Sector Transfer)       [Auto]
PIO Mode                            [Auto]
DMA Mode                            [Auto]
S.M.A.R.T.                          [Auto]
32Bit Data Transfer                 [Enabled]

                                                   ←→    Select Screen
                                                   ↑↓    Select Item
                                                   +-    Change Option
                                                   F1    General Help
                                                   F10   Save and Exit
                                                   ESC   Exit

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```

Figure 129: BM45 - Fourth IDE master

BIOS setting	Meaning	Setting options	Effect
Type	The type of drive connected to the fourth master is configured here.	Not installed	No drive installed.
		Auto	Automatic recognition of the drive and setup of appropriate values.
		CD/DVD	CD -/ DVD drive.
		ARMD	ARMD - drive (zip drive)
LBA/Large Mode	This option activates the logical block addressing / large mode for IDE.	Disabled	Disables this function.
		Auto	Automatic enabling of this function when supported by the system.
Block (Multi-Sector Transfer)	This option enables the block mode for IDE hard drives. When this option is enabled, the number of blocks per request from the configuration sector of the hard drive is read.	Disabled	Disables this function.
		Auto	Automatic enabling of this function when supported by the system.

Table 142: BM45 - Fourth IDE master - Setting options

BIOS setting	Meaning	Setting options	Effect
PIO Mode	The PIO mode determines the data rate of the hard drive. **Information:** **This option is not available on the APC810. Therefore this setting is not relevant.**	Auto	Automatic configuration of PIO mode.
		0, 1, 2, 3, 4	Manual configuration of PIO mode.
DMA Mode	The data transfer rate to and from the fourth master drive is defined here. The DMA mode must be activated in the Windows device manager in order to guarantee maximum performance. Only possible when manually setting up the drive.	Auto	Automatic definition of the transfer rate.
		Disabled	Manual definition of the transfer rate.
S.M.A.R.T.	Monitoring function of modern hard drives (self-monitoring, analysis and reporting technology).	Auto	Automatic detection and enabling.
		Disabled	Disables this function.
		Enabled	Enables this function.
32 Bit Data Transfer	This function enables 32-bit data transfer.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 142: BM45 - Fourth IDE master - Setting options (cont.)

1.4.10 USB configuration

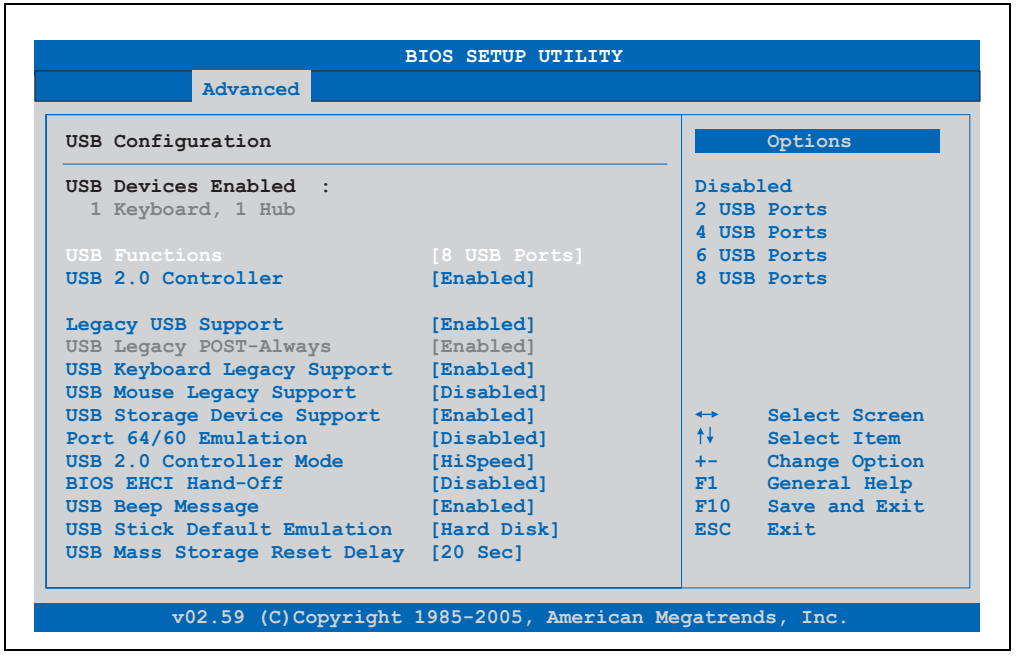

Figure 130: BM45 - Advanced USB configuration

BIOS setting	Meaning	Setting options	Effect
USB Function	USB ports can be enabled/disabled here. The USB numbers (e.g. USB1, USB3, etc.) are printed on the APC810 housing).	Disabled	Disables the USB port.
		2 USB Ports	USB1, USB3 are enabled.
		4 USB Ports	USB1, USB2, USB3, USB4 are enabled.
		6 USB Ports	USB1, USB2, USB3, USB4, USB5 are enabled.
		8 USB Ports	USB1, USB2, USB3, USB4, USB5, USB are enabled on an AP via SDL.
USB 2.0 Controller	Option for enabling or disabling USB 2.0 mode.	Enabled	All USB ports run in USB 2.0 mode.
		Disabled	All USB ports run in USB 1.1 mode.
Legacy USB Support	Legacy USB support can be enabled/disabled here. USB ports do not function during startup. USB is supported again after the operating system has started. A USB keyboard is still recognized during the POST.	Disabled	Disables this function.
		Enabled	Enables this function.
		Auto	Automatic enabling.
USB Legacy POST-Always	Legacy USB support is enabled during the POST (Power On Self Test) regardless of the Legacy USB support setting.	None (automatically enabled)	The BIOS Setup can be called up during the POST using a USB keyboard.
USB Keyboard Legacy Support	USB keyboard support can be enabled/disabled here.	Disabled	Disables this function.
		Enabled	Enables this function.
USB Mouse Legacy Support	USB mouse support can be enabled/disabled here.	Disabled	Disables this function.
		Enabled	Enables this function.
USB Storage Device Support	USB storage device support can be enabled/disabled here.	Disabled	Disables this function.
		Enabled	Enables this function.
Port 64/60 Emulation	Port 64/60 emulation can be enabled/disabled here.	Disabled	USB keyboard functions in all systems excluding Windows NT.
		Enabled	USB keyboard functions in Windows NT.
USB 2.0 Controller Mode	Settings can be made for the USB controller.	Full Speed	12 MBps
		Hi Speed	480 MBps
BIOS EHCI Hand-Off	The support for the operating system can be set up without the fully automatic EHCI function.	Disabled	Disables the function
		Enabled	Enables this function.
USB Beep Message	Option for outputting a tone each time a USB device is detected by the BIOS during the POST.	Disabled	Disables this function.
		Enabled	Enables this function.
USB Stick Default Emulation	You can set how the USB device is to be used.	Auto	USB devices with fewer than 530MB of memory are simulated as floppy disk drives and devices with larger capacities are simulated as hard drives.
		Hard disk	An HDD-formatted drive can be used as an FDD (e.g. zip drive) for starting the system.

Table 143: BM45 - Advanced USB configuration - Setting options

BIOS setting	Meaning	Setting options	Effect
USB Mass Storage Reset Delay	The waiting time that the USB device POST requires after the device start command can be set. **Information:** **The message "No USB mass storage device detected" is displayed if no USB memory device has been installed.**	10 Sec, 20 Sec, 30 Sec, 40 Sec	Value set manually.

Table 143: BM45 - Advanced USB configuration - Setting options (cont.)

1.4.11 Keyboard/mouse configuration

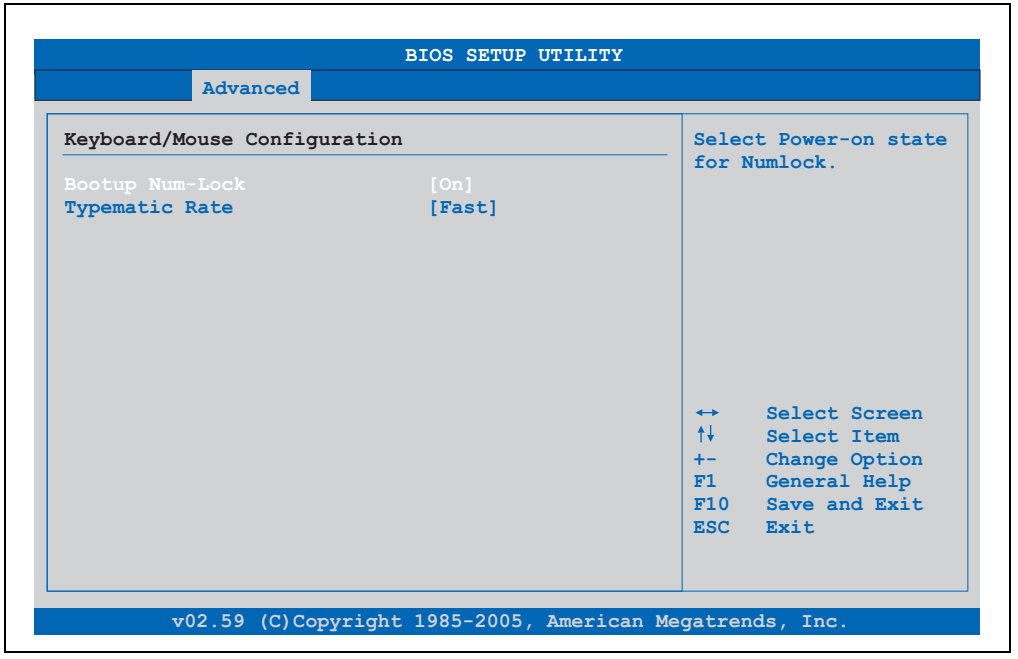

Figure 131: BM45 - Advanced keyboard/mouse configuration

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

Table 144: BM45 - Advanced keyboard/mouse configuration - Setting options

1.4.12 CPU board monitor

Information:

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

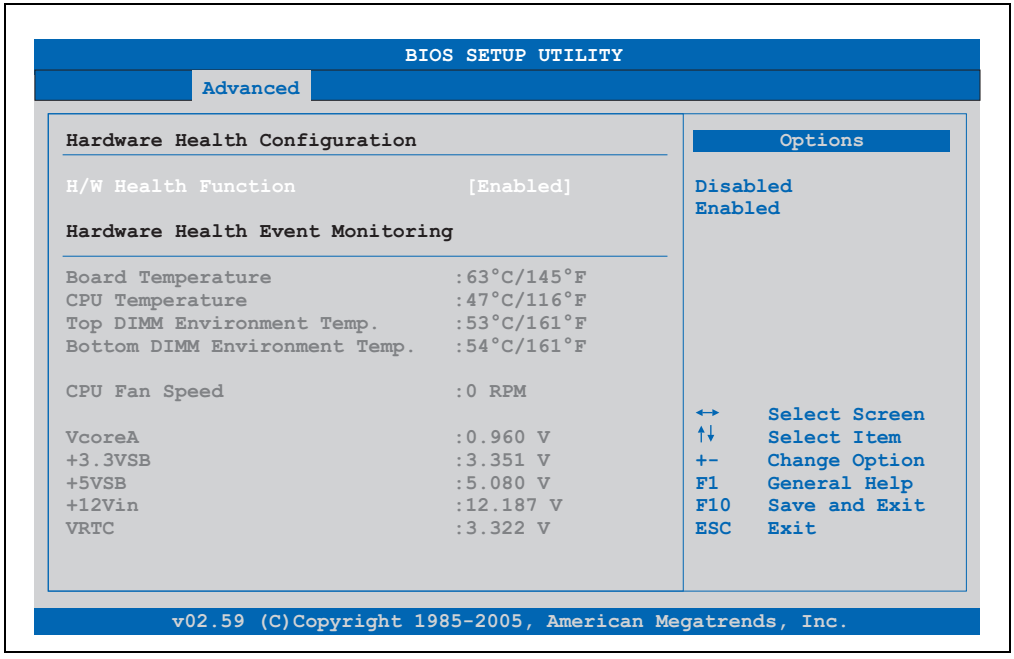

Figure 132: BM45 - Advanced CPU board monitor

BIOS setting	Meaning	Setting options	Effect
H/W Health Function	Option for displaying all values on this page.	Enabled	Displays all values.
		Disabled	No values are shown on this page.
Board temperature	Displays the board temperature in degrees Celsius and Fahrenheit.	None	-
CPU temperature	Displays the processor's temperature (in degrees Celsius and Fahrenheit).	None	-
Top DIMM Environment Temp.	Displays the temperature of the first DRAM module.	None	-

Table 145: BM45 - Advanced remote access configuration - Setting options

BIOS setting	Meaning	Setting options	Effect
Bottom DIMM Environment Temp.	Displays the temperature of the second DRAM module.	None	-
CPU Fan Speed	Displays the rotating speed of the processor fan.	None	-
VcoreA	Displays the processor's core voltage A in volts.	None	-
+3.3VSB	Displays the current voltage of the 3.3 volt supply.	None	-
+5VSB	Displays the current voltage of the 5 volt supply.	None	-
+12Vin	Displays the current voltage of the 12 volt supply.	None	-
VRTC	Displays the battery voltage (in volts).	None	-

Table 145: BM45 - Advanced remote access configuration - Setting options (cont.)

1.4.13 Main Board/Panel Features

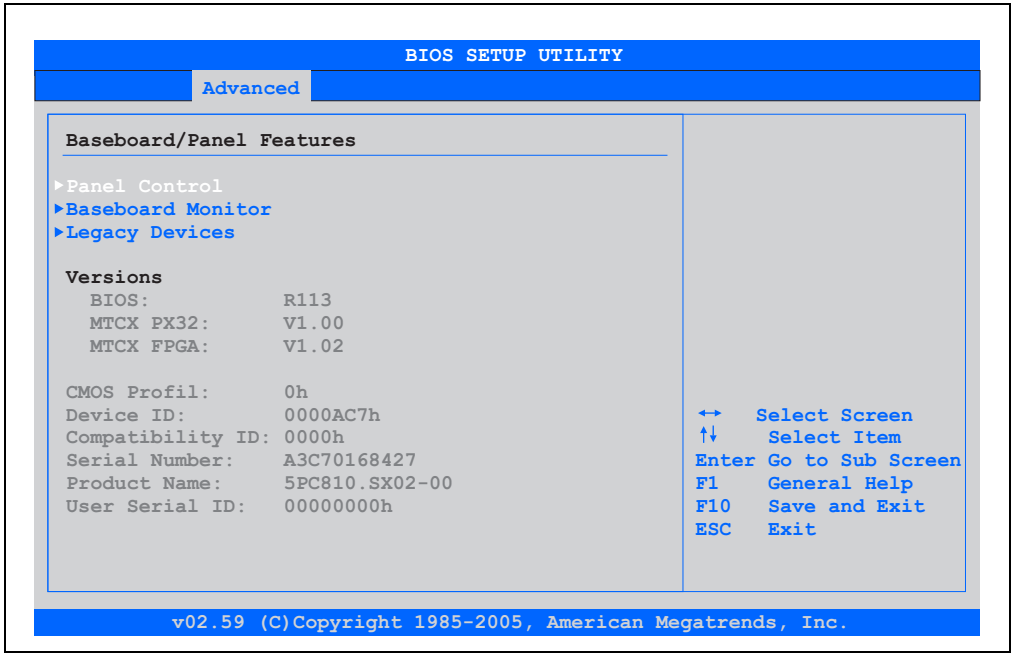

Figure 133: BM45 - Advanced main board/panel features

BIOS setting	Meaning	Setting options	Effect
Panel control	For special setup of connected panels (display units).	Enter	Opens the submenu See "Panel control", on page 250
Baseboard monitor	Display of various temperatures and fan speeds.	Enter	Opens the submenu See "Baseboard monitor", on page 251
Legacy devices	Special settings for the interface can be changed here.	Enter	Opens the submenu See "Legacy devices", on page 252
BIOS	Displays the BIOS version.	None	-
MTCX PX32	Displays the MTCX PX32 firmware version.	None	-
MTCX FPGA	Displays the MTCX FPGA firmware version.	None	-
CMOS profile	Shows the CMOS profile number.	None	-
Device ID	Displays the hexadecimal value of the hardware device ID.	None	-
Compatibility ID	Displays the version of the device within the same B&R device code. This ID is needed for Automation Runtime.	None	-
Serial number	Displays the B&R serial number.	None	-
Product name	Displays the B&R model number.	None	-
User serial ID	Displays the user serial ID. This 8 digit hex value can be freely assigned by the user (e.g. to give the device a unique ID) and can only be changed with using the "B&R Control Center" via the ADI driver.	None	-

Table 146: BM45 - Advanced main board/panel features - Setting options

Panel control

```
BIOS SETUP UTILITY
Advanced

Panel Control

Select Panel Number          [0]
  Version:            V1.16
  Brightness:                [100%]
  Temperature:        41°C/105°F
  Fan Speed:          00 RPM
  Keys/Leds:          128/128

Panel 0-14: connected
to Automation Panel
Link or Monitor/Panel
connector.
Panel 15: connected on
Panel PC Link.
Note: DVI and PPC Link
will show no valid
values. On PPC Link
only the brightness
option will work.

←→    Select Screen
↑↓    Select Item
+-    Change Option
F1    General Help
F10   Save and Exit
ESC   Exit

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```

Figure 134: BM45 - Panel control

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

Table 147: BM45 - Panel control - Setting options

Baseboard monitor

```
BIOS SETUP UTILITY
Advanced

Baseboard Monitor

CMOS Battery:          Good

Temperatures
  Board I/O:           45°C/113°F
  Board ETH2:          39°C/102°F
  Board Power:         43°C/109°F
  Power Supply:        39°C/102°F
  ETH2 Controller:     65°C/149°F
  Slide-In Drive 1:    00°C/32°F
  Slide-In Drive 2:    00°C/32°F

Fan Speeds
  Case 1:              00 RPM
  Case 2:              00 RPM
  Case 3:              00 RPM
  Case 4:              00 RPM

←→    Select Screen
↑↓    Select Item
F1    General Help
F10   Save and Exit
ESC   Exit

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```

Figure 135: BM45 - Main board monitor

BIOS setting	Meaning	Setting options	Effect
CMOS battery	Displays the battery status. **n.a.** - not available **Good** - Battery is OK **Bad** - Battery is damaged.	None	-
Board I/O	Displays the temperature in the I/O area in degrees Celsius and Fahrenheit.	None	-
Board ETH2	Displays the temperature in the ETH2 controller chip area in degrees Celsius and Fahrenheit.	None	-
Board Power	Displays the power supply temperature in degrees Celsius and Fahrenheit.	None	-
Power supply	Displays the temperature in the power supply in degrees Celsius and Fahrenheit.	None	
ETH2 Controller	Displays the temperature of the ETH2 controller in degrees Celsius and Fahrenheit.	None	
Slide-in drive 1	Displays the temperature of the slide-in drive 1 in degrees Celsius and Fahrenheit.	None	-
Slide-in drive 2	Displays the temperature of the slide-in drive 2 in degrees Celsius and Fahrenheit.	None	-

Table 148: BM45 - Main board monitor - Setting options

BIOS setting	Meaning	Setting options	Effect
Case 1	Displays the fan speed of housing fan 1.	None	-
Case 2	Displays the fan speed of housing fan 2.	None	-
Case 3	Displays the fan speed of housing fan 3.	None	-
Case 4	Displays the fan speed of housing fan 4.	None	-

Table 148: BM45 - Main board monitor - Setting options

Legacy devices

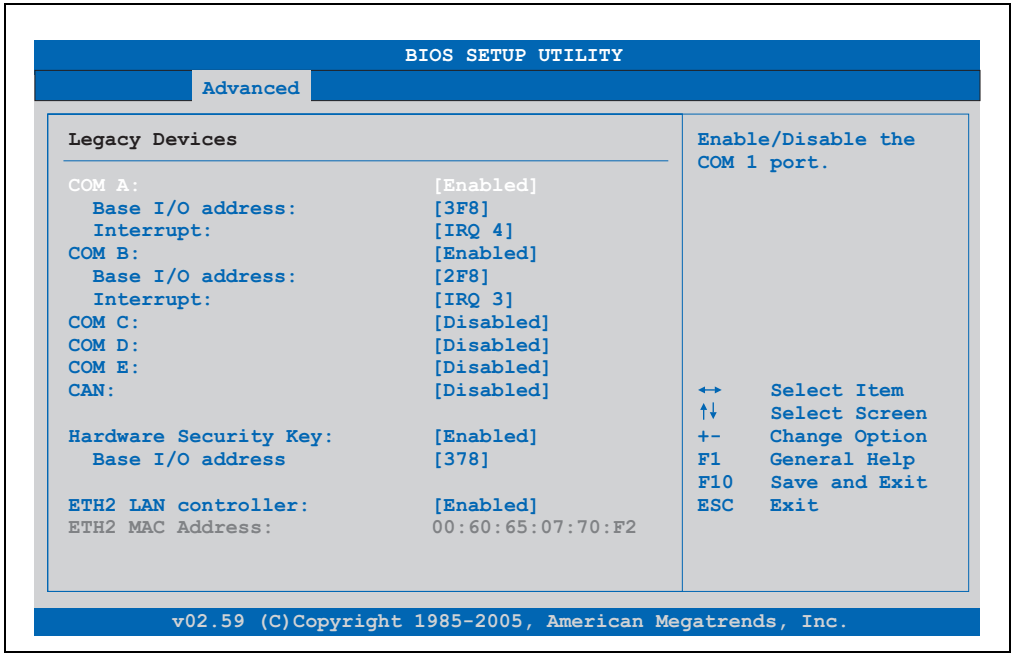

Figure 136: BM45 - Legacy devices

BIOS setting	Meaning	Setting options	Effect
COM A	Settings for the **COM1** serial interface in the system.	Disabled	Disables the interface.
		Enabled	Enables the interface.
Base I/O address	Selection of the base I/O address for the COM port.	238, 2E8, 2F8, 328, 338, 3E8, 3F8	Selected base I/O address is assigned.
Interrupt	Selection of the interrupt for the COM port.	IRQ 3, IRQ 4, IRQ 5, IRQ 6, IRQ 7, IRQ 10, IRQ 11, IRQ 12	Selected interrupt is assigned.
COM B	Settings for the **COM2** serial interface in the system.	Disabled	Disables the interface.
		Enabled	Enables the interface.

Table 149: BM45 - Legacy devices - Setting options

BIOS setting	Meaning	Setting options	Effect
Base I/O address	Selection of the base I/O address for the COM port.	238, 2E8, 2F8, 328, 338, 3E8, 3F8	Selected base I/O address is assigned.
Interrupt	Selection of the interrupt for the COM 2 port.	IRQ 3, IRQ 4, IRQ 5, IRQ 6, IRQ 7, IRQ 10, IRQ 11, IRQ 12	Selected interrupt is assigned.
COM C	Setting of the COM port for the **touch screen on the monitor/panel** connector.	Disabled	Disables the interface.
		Enabled	Enables the interface.
Base I/O address	Selection of the base I/O address for the COM port.	238, 2E8, 2F8, 328, 338, 3E8, 3F8	Selected base I/O address is assigned.
Interrupt	Selection of the interrupt for the COM port.	IRQ 3, IRQ 4, IRQ 5, IRQ 6, IRQ 7, IRQ 10, IRQ 11, IRQ 12	Selected interrupt is assigned.
COM D	Setting of the COM port for the **touch screen on the AP Link** connector.	Disabled	Disables the interface.
		Enabled	Enables the interface.
Base I/O address	Selection of the base I/O address for the COM port.	238, 2E8, 2F8, 328, 338, 3E8, 3F8	Selected base I/O address is assigned.
Interrupt	Selection of the interrupt for the COM port.	IRQ 3, IRQ 4, IRQ 5, IRQ 6, IRQ 7, IRQ 10, IRQ 11, IRQ 12	Selected interrupt is assigned.
COM E	Configuration of the COM port on the B&R add-on interface 5AC600.485I-00 (IF option).	Disabled	Disables the interface.
		Enabled	Enables the interface.
Base I/O address	Selection of the base I/O address for the COM port.	238, 2E8, 2F8, 328, 338, 3E8, 3F8	Selected base I/O address is assigned.
Interrupt	Selection of the interrupt for the COM port.	IRQ 3, IRQ 4, IRQ 5, IRQ 6, IRQ 7, IRQ 10, IRQ 11, IRQ 12	Selected interrupt is assigned.
CAN	Configuration of the CAN port of the B&R add-on CAN interface card 5AC600.CANI-00 (IF option).	Disabled	Disables the interface.
		Enabled	Enables the interface.
Base I/O address	Selection of the base I/O address for the CAN port.	None	-
Interrupt	Selection of the interrupt for the CAN port.	IRQ 10, NMI	Selected interrupt is assigned.
Hardware security key	Settings for the hardware security key (Dongle) are made here.	Disabled	Disables the interface.
		Enabled	Enables the interface.
Base I/O address	Selection of the base I/O address for the hardware security interface.	278, 378, 3BC	Selection of the base I/O address for the parallel port.
ETH2 LAN controller	For turning the onboard LAN controller (ETH2) on and off.	Disabled	Disables the controller.
		Enabled	Enables the controller.
ETH2 MAC Address	Displays the Ethernet 2 controller MAC address.	None	-

Table 149: BM45 - Legacy devices - Setting options (cont.)

1.5 Boot

```
                          BIOS SETUP UTILITY
   Main     Advanced     Boot     Security     Power     Exit

 Boot Priority Selection        [Type Based]          The device based boot
                                                      priority list allows
 Boot Device Priority                                 to select from a list
 ---------------------------------------------------  of currently detected
 1st Boot Device                [Primary Master]      devices.
 2nd Boot Device                [Secondary Master]    The type based boot
 3rd Boot Device                [USB Floppy]          priority list allows
 4th Boot Device                [USB Removable Devi]  to select device types
 5th Boot Device                [USB Harddisk]        even if a respective
 6th Boot Device                [USB CDROM]           device is not (yet)
 7th Boot Device                [Fourth Master]       present.
 8th Boot Device                [Disabled]
                                                      ←→    Select Screen
 Boot Settings Configuration                          ↑↓    Select Item
 ---------------------------------------------------  +-    Change Option
 Quick Boot                     [Enabled]             F1    General Help
 Quiet Boot                     [Disabled]            F10   Save and Exit
 Automatic Boot List Retry      [Disabled]            ESC   Exit
 AddOn ROM Display Mode         [Keep Current]
 Halt On Error                  [Disabled]
 Hit ´DEL´ Message Display      [Enabled]
 Interrupt 19 Capture           [Disabled]
 PXE Boot to LAN                [Disabled]
 Slide-In 2 Option-ROM          [Disabled]
 Power Loss Control             [Turn On]

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```

Figure 137: BM45 - Boot menu

BIOS setting	Meaning	Setting options	Effect
Boot Priority Selection	The method for when the drives should be booted can be set here.	Device Based	Only the devices that are recognized by the system are listed. The sequence of this list can be changed.
		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.

Table 150: BM45 - Boot menu - Setting options

BIOS setting	Meaning	Setting options	Effect
1st Boot Device	The boot drives can be set using this option.	Disabled, Primary Master, Primary Slave, Secondary Master, Secondary Slave, Legacy Floppy, USB Floppy, USB Harddisk, USB CDROM, USB Removable Device, Onboard LAN, External LAN, PCI Mass Storage, PCI SCSI Card, Any PCI BEV Device, Third Master, Third Slave, PCI RAID, Local BEV ROM, Fourth Master, Fourth Slave	Select the desired sequence.
2nd Boot Device			
3rd Boot Device			
4th Boot Device			
5th Boot Device			
6th Boot Device			
7th Boot Device			
8th Boot Device			
Quick Boot	This function reduces the boot time by skipping some POST procedures.	Disabled	Disables this function.
		Enabled	Enables this function.
Quiet Boot	Determines if POST message or OEM logo (default = black background) is displayed.	Disabled	POST message display.
		Enabled	OEM logo display instead of POST message.
Automatic Boot List Retry	With this option, the operating system attempts to automatically restart following startup failure.	Disabled	Disables this function.
		Enabled	Enables this function.
Add-On ROM Display Mode	Sets the display mode for the ROM (during the booting procedure).	Force BIOS	An additional BIOS part can be displayed.
		Keep Current	BIOS information is displayed.
Halt On Error	This option sets whether the system should pause the Power On Self Test (POST) when it encounters an error.	Disabled	The system does not pause. All errors are ignored.
		Enabled	The system pauses. The system pauses every time an error is encountered.
Hit 'DEL' Message Display	Settings can be made here for the "Hit 'DEL' Message" display. **Information:** **When quiet boot is activated the message is not displayed.**	Disabled	The message is not displayed.
		Enabled	The message is displayed.
Interrupt 19 Capture	This function can be used to incorporate the BIOS interrupt.	Disabled	Disables this function.
		Enabled	Enables this function.
PXE Boot to LAN	Enables/disables the function to boot from LAN (ETH1).	Disabled	Disables this function.
		Enabled	Enables this function.
Slide-in 2 Optional ROM	Activation/deactivation of an optional ROM for a slide-in 2 drive.	Disabled	Disables this function.
		Enabled	Enables this function.
Power Loss Control	Determines if the system is on/off following power loss.	Remain Off	Remains off.
		Turn On	Powers on.
		Last State	Enables the previous state.

Table 150: BM45 - Boot menu - Setting options (cont.)

1.6 Security

```
BIOS SETUP UTILITY
Main   Advanced   Boot   Security   Power   Exit

Security Settings                          Install or Change the
                                           password.
Supervisor Password   :Not Installed
User Password         :Not Installed

Change Supervisor Password
Change User Password

Boot Sector Virus Protection   [Disabled]

Hard Disk Security

Ask HDD Password on Every Boot[No]
▸Hard Disk Security User Passwords         ↔    Select Screen
▸Hard Disk Security Master Passwords       ↑↓   Select Item
                                           Enter Change
                                           F1    General Help
                                           F10   Save and Exit
                                           ESC   Exit

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```

Figure 138: BM45 - Security menu

BIOS setting	Meaning	Setting options	Effect
Supervisor Password	Displays whether or not a supervisor password has been set.	None	-
User Password	Displays whether or not a user password has been set.	None	-
Change Supervisor Password	To enter/change a supervisor password. A supervisor password is necessary to edit all BIOS settings.	Enter	Enter password.
Change User Password	To enter/change a user password. A user password allows the user to edit only certain BIOS settings.	Enter	Enter password.
Boot Sector Virus Protection	With this option, a warning is issued when the boot sector is accessed through a program or virus. **Information:** **With this option, only the boot sector is protected, not the entire hard drive.**	Disabled	Disables this function.
		Enabled	Enables this function.

Table 151: BM45 - Security menu - Setting options

BIOS setting	Meaning	Setting options	Effect
Ask HDD Password on Every Boot	This option can be used to select whether the hard disk password must be entered each time the system boots. **Information:** **This option only makes sense if a hard disk user security password is set.**	Yes	The hard disk password must be entered when booting.
		No	The hard disk password doesn't have to be entered when booting.
Hard Disk Security User Passwords	The hard disk security user password can be created here.	Enter	Opens the submenu See "Hard disk security user password", on page 258
Hard Disk Security Master Passwords	The hard disk security master password can be created here.	Enter	Opens the submenu See "Hard disk security master password", on page 259

Table 151: BM45 - Security menu - Setting options (cont.)

1.6.1 Hard disk security user password

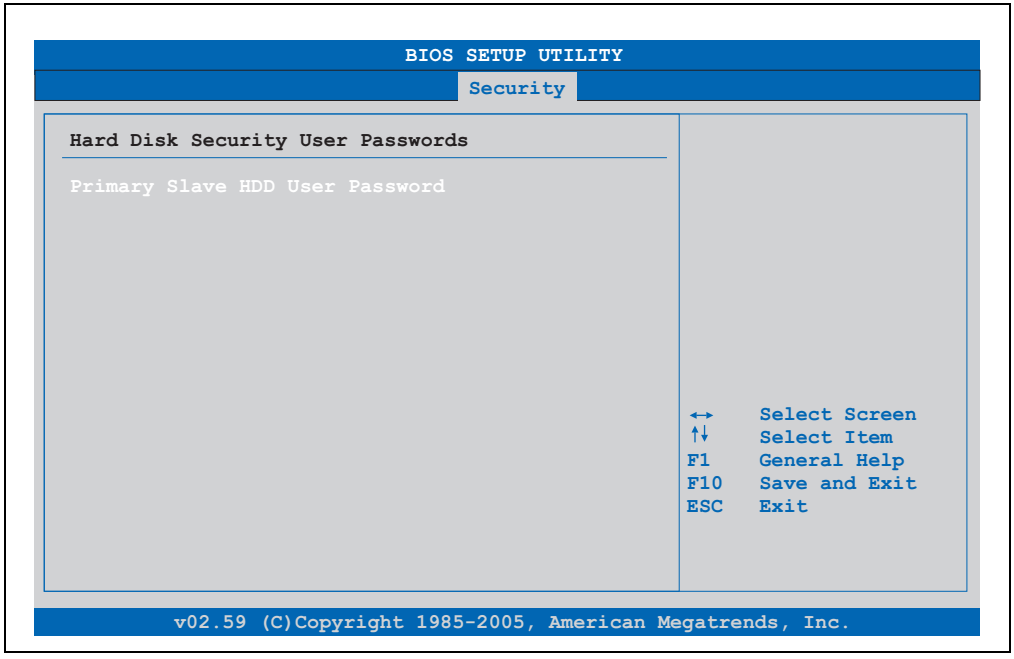

Figure 139: BM45 - Hard disk security user password

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

Table 152: BM45 - Hard disk security user password

1.6.2 Hard disk security master password

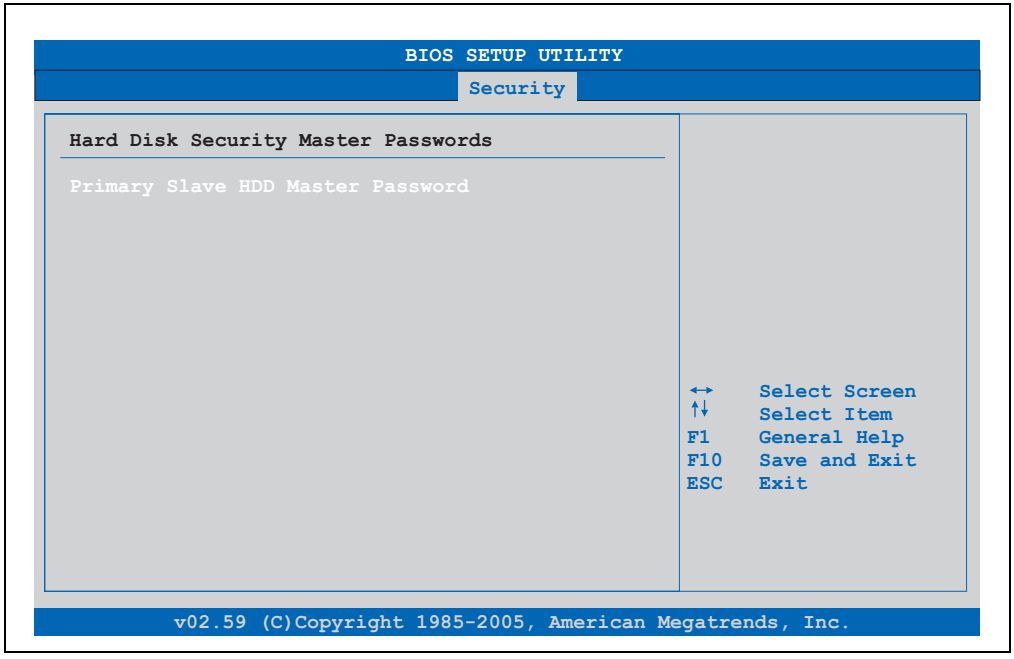

Figure 140: BM45 - Hard disk security master password

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

Table 153: BM45 - Hard disk security master password

1.7 Power

```
BIOS SETUP UTILITY
Main   Advanced   Boot   Security   Power   Exit

Congigure power management and control

Power Management/APM          [Enabled]
Suspend Time Out              [Disabled]
Video Power Down Mode         [Suspend]
Hard Disk Power Down Mode     [Suspend]
Keyboard & PS/2 Mouse         [MONITOR]
FDC/LPT/COM Ports             [MONITOR]
Primary Master IDE            [MONITOR]
Primary Slave IDE             [MONITOR]
Secondary Master IDE          [MONITOR]
Secondary Slave IDE           [MONITOR]

Resume On Ring                [Disabled]
Resume On PME#                [Disabled]
Resume On RTC Alarm           [Disabled]

Power Button Mode             [On/Off]

Enable or disable
APM.

←→    Select Screen
↑↓    Select Item
+-    Change Option
F1    General Help
F10   Save and Exit
ESC   Exit

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```

Figure 141: BM45 - Power menu

BIOS setting	Meaning	Setting options	Effect
Power Management/APM	This option switches the APM function on or off. This is an advanced plug & play and power management functionality.	Disabled	Disables this function.
		Enabled	Enables this function.
Suspend Time Out	Using this option, you can configure how long the system stays inactive (all components but the CPU are shut off, if possible) before entering suspend mode.	Disabled	Disables this function.
		1 Min, 2 Min, 4 Min, 8 Min, 10 Min, 20 Min, 30 Min, 40 Min, 50 Min, 60 Min;	Value set manually.
Video Power Down Mode	This option allows you to set the energy saving mode for the monitor.	Disabled	Do not switch off the monitor.
		Standby	Monitor goes to standby mode.
		Suspend	Monitor goes to suspend mode.
Hard Disk Power Down Mode	This option allows you to set the energy saving mode for the hard drive.	Disabled	Do not switch off the hard drive.
		Standby	Monitor goes to standby mode.
		Suspend	Hard drive goes to suspend mode.
Keyboard & PS/2 Mouse	The monitoring of activities during power saving mode is determined here.	MONITOR	Keyboard or PS/2 mouse activities return the system to its normal state from a particular energy saving mode.
		IGNORE	Activities are ignored.

Table 154: BM45 - Power menu - Setting options

BIOS setting	Meaning	Setting options	Effect
FDC/LPT/COM ports	The monitoring of activities during power saving mode is determined here.	MONITOR	Activity on the parallel port, the serial 1&2 port, or the floppy port returns the system to its normal state from an energy saving mode.
		IGNORE	Activities are ignored.
Primary Master IDE	The monitoring of activities during power saving mode is determined here.	MONITOR	Activities in the IRQ of specific connections or devices return the system to its normal state from power saving mode.
		IGNORE	Activities are ignored.
Primary Slave IDE	The monitoring of activities during power saving mode is determined here.	MONITOR	Activities in the IRQ of specific connections or devices return the system to its normal state from power saving mode.
		IGNORE	Activities are ignored.
Secondary Master IDE	The monitoring of activities during power saving mode is determined here.	MONITOR	Activities in the IRQ of specific connections or devices return the system to its normal state from power saving mode.
		IGNORE	Activities are ignored.
Secondary Slave IDE	The monitoring of activities during power saving mode is determined here.	MONITOR	Activities in the IRQ of specific connections or devices return the system to its normal state from power saving mode.
		IGNORE	Activities are ignored.
Resume On Ring	When the modem receives an incoming call, the PC is brought out of power saving mode.	Disabled	Disables this function.
		Enabled	Enables this function.
Resume on PME#	With this option, you can switch the PME wakeup function on or off.	Disabled	Disables this function.
		Enabled	Enables this function.
Resume On RTC Alarm	With this option, you can activate the alarm and enter the date and time for the system start.	Disabled	Disables this function.
		Enabled	Enables this function.
Power Button Mode	This function determines the function of the power button.	On/Off	Power button switches on/off.
		Suspend	Suppresses the function.

Table 154: BM45 - Power menu - Setting options (cont.)

1.8 Exit

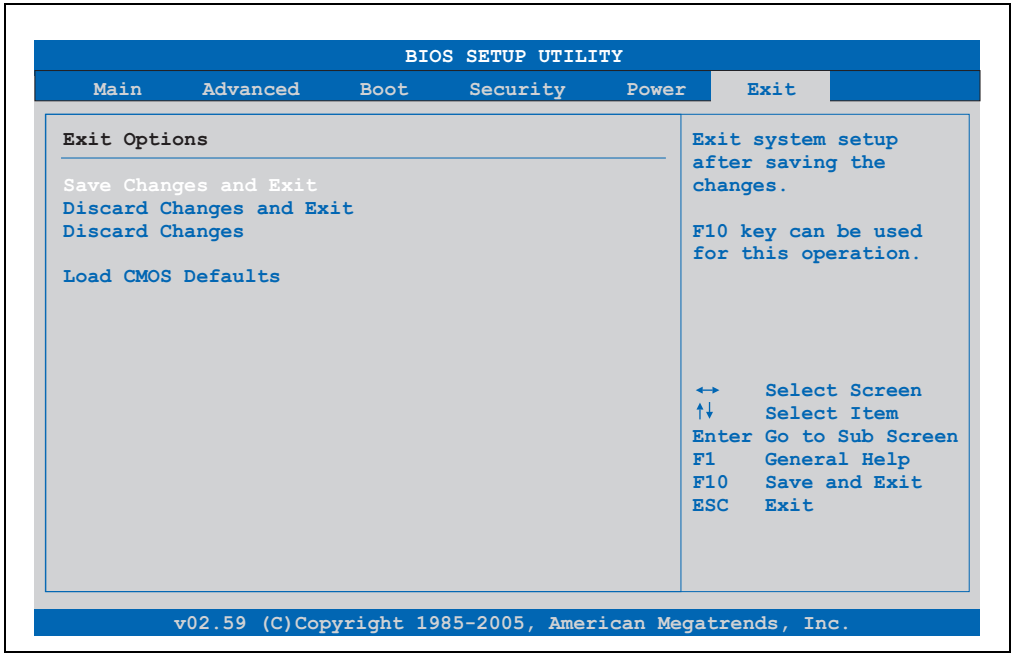


Figure 142: BM45 - Exit menu

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

Table 155: 855GME - (XTX) Exit menu - Setting options

1.9 BIOS default settings

The various positions of the CMOS profile hex switch (see figure "Interface overview - APC810, 2 card slot variant (front)", on page 45) can be used to load pre-defined BIOS profile settings.

Figure 143: CMOS profile hex 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.

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

Profile number	Optimized for	Switch position	Note
Profile 0	**Reserved**	**0**	
Profile 1	**System unit - 5PC810.SX01-00 / 5PC810.SX02-00 / 5PC810.SX03-00**	**1**	
Profile 2	**System unit 5PC810.SX05-00**	**2**	
Profile 3	System unit 5PC820-SX01-00 / 5PC820.SX01-01	3	The default settings for this profile can be found in the APC820 User's Manual. This can be downloaded for free from the B&R homepage.
Profile 4	Reserved	4	
Profile 5	System unit 5PC820.1505-00 / 5PC820.1906-00	5	The default settings for this profile can be found in the PPC800 User's Manual. This can be downloaded for free from the B&R homepage.

Table 156: BM45 - 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).

1.9.1 Main

Setting / View	Profile 0	Profile 1	Profile 2	My setting
System Time	-	-	-	
System Date	-	-	-	
BIOS ID	-	-	-	
Processor	-	-	-	
CPU Frequency	-	-	-	
System Memory	-	-	-	
Product Revision	-	-	-	
Serial number	-	-	-	
BC Firmware Rev.	-	-	-	
MAC Address (ETH1)	-	-	-	
Boot Counter	-	-	-	
Running Time	-	-	-	

Table 157: BM45 - Main - Overview of profile settings

1.9.2 Advanced

ACPI configuration

Setting / View	Profile 0	Profile 1	Profile 2	My setting
ACPI Aware O/S	Yes	Yes	Yes	
ACPI Version Features	ACPI v2.0	ACPI v2.0	ACPI v2.0	
ACPI APIC support	Enabled	Enabled	Enabled	
Suspend mode	S1 (POS)	S1 (POS)	S1 (POS)	
USB Device Wakeup from S3/S4	Disabled	Disabled	Disabled	
Active Cooling Trip Point	Disabled	Disabled	Disabled	
Passive Cooling Trip Point	Disabled	Disabled	Disabled	
Critical Trip Point	105°C	105°C	105°C	

Table 158: BM45 - Advanced ACPI configuration - Overview of profile settings

PCI Configuration

Setting / View	Profile 0	Profile 1	Profile 2	My setting
Plug & Play O/S	No	**Yes**	**Yes**	
PCI Latency Timer	64	64	64	
Allocate IRQ to PCI VGA	Yes	Yes	Yes	
Allocate IRQ to SMBUS HC	Yes	Yes	Yes	
PCI IRQ Resource Exclusion				
IRQ3	Allocated	Allocated	Allocated	
IRQ4	Allocated	Allocated	Allocated	
IRQ5	Available	Available	Available	
IRQ6	Available	Available	Available	
IRQ7	Available	Available	Available	
IRQ9	Allocated	Allocated	Allocated	
IRQ10	Available	Available	Available	
IRQ11	Available	Available	Available	
IRQ12	Available	Available	Available	
IRQ14	Allocated	Allocated	Allocated	
IRQ15	Allocated	Allocated	Allocated	
PCI Interrupt Routing				
PIRQ A (VGA,UHCI2,PCIE0, ETH2)	Auto	Auto	Auto	
PIRQ B (PCIE1,HDA,ETH1)	Auto	Auto	Auto	
PIRQ C (PCIE2)	Auto	Auto	Auto	
PIRQ D (UHCI1,PCIE3, SATA)	Auto	Auto	Auto	
PIRQ E (INTD, SMB,UHCI3,EHCI1)	Auto	Auto	Auto	
PIRQ F (INTA)	Auto	Auto	Auto	
PIRQ G (INTB)	Auto	Auto	Auto	
PIRQ H (INTC,UHCI0, EHCI0)	Auto	Auto	Auto	
1st Exclusive PCI	-	-	-	
2nd Exclusive PCI	-	-	-	

Table 159: BM45 - Advanced PCI configuration - Overview of profile settings

PCI express configuration

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

Table 160: BM45 - Advanced PCI express configuration - Overview of profile settings

Graphics configuration

Setting / View	Profile 0	Profile 1	Profile 2	My setting
Primary Video Device	Internal VGA	Internal VGA	Internal VGA	
Internal Graphics Mode Select	Enabled, 32MB	Enabled, 32MB	Enabled, 32MB	
DVMT Memory	256MB	256MB	256MB	
Boot Display Device	Auto	Auto	Auto	
Boot Display Preference	SDVO-B SDVO-C LFP	SDVO-B SDVO-C LFP	SDVO-B SDVO-C LFP	
Always Try Auto Panel Detect	No	No	No	
Local Flat Panel Type	Auto	Auto	Auto	
SDVO local flat panel type	Disabled	Disabled	Disabled	
Local flat panel scaling	Centering	Centering	Centering	
SDVO Port B Configuration	SDVO DVI	SDVO DVI	SDVO DVI	
SDVO Port C Configuration	SDVO DVI	SDVO DVI	SDVO DVI	
SDVO/DVI Hotplug Support	Enabled	Enabled	Enabled	

Table 161: BM45 - Advanced graphics configuration - Overview of profile settings

Setting / View	Profile 0	Profile 1	Profile 2	My setting
Display Mode Persistence	Enabled	Enabled	Enabled	

Table 161: BM45 - Advanced graphics configuration - Overview of profile settings (cont.)

CPU configuration

Setting / View	Profile 0	Profile 1	Profile 2	My setting
MPS Revision	1.4	1.4	1.4	
Max. CPUID Value Limit	Disabled	Disabled	Disabled	
Intel(R) Virtualization Tech	Enabled	Enabled	Enabled	
Execute-Disable Bit Capability	Enabled	Enabled	Enabled	
Intel(R) SpeedStep(tm) Tech.	Enabled	Enabled	Enabled	
Intel(R) C-State Tech.	Disabled	Disabled	Disabled	
Enhanced C-States	Disabled	Disabled	Disabled	

Table 162: BM45 - Advanced CPU configuration - Overview of profile settings

Chipset configuration

Setting / View	Profile 0	Profile 1	Profile 2	My setting
DRAM Refresh Rate	Auto	Auto	Auto	
Memory Hole	Disabled	Disabled	Disabled	
DIMM Thermal Control	Disabled	Disabled	Disabled	
TMRC Mode	Disabled	Disabled	Disabled	
TS on DIMM	Disabled	Disabled	Disabled	
High Precision Event Timer	Disabled	Disabled	Disabled	
IOAPIC	Enabled	Enabled	Enabled	
APIC ACPI SCI IRQ	Disabled	Disabled	Disabled	
POST Code Output	PCI	PCI	PCI	

Table 163: BM45 - Advanced chipset configuration - Overview of profile settings

I/O interface configuration

Setting / View	Profile 0	Profile 1	Profile 2	My setting
HDA Controller	Disabled	Disabled	Disabled	
Onboard Gbe Controller (ETH1)	Enabled	Enabled	Enabled	

Table 164: BM45 - Advanced I/O interface configuration - Overview of profile settings

Clock Configuration

Setting / View	Profile 0	Profile 1	Profile 2	My setting
Spread spectrum	Disabled	Disabled	Disabled	

Table 165: BM45 - Advanced clock configuration - Overview of profile settings

IDE Configuration

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

Table 166: BM45 - Advanced IDE configuration - Overview of profile settings

Setting / View	Profile 0	Profile 1	Profile 2	My setting
S.M.A.R.T.	Auto	Auto	Auto	
32Bit data transfer	Enabled	Enabled	Enabled	
Fourth IDE Master				
Type	Auto	Auto	Auto	
LBA/Large Mode	Auto	Auto	Auto	
Block (Multi-Sector Transfer)	Auto	Auto	Auto	
PIO Mode	Auto	Auto	Auto	
DMA Mode	Auto	Auto	Auto	
S.M.A.R.T.	Auto	Auto	Auto	
32Bit data transfer	Enabled	Enabled	Enabled	

Table 166: BM45 - Advanced IDE configuration - Overview of profile settings (cont.)

USB configuration

Setting / View	Profile 0	Profile 1	Profile 2	My setting
USB Function	8 USB Ports	8 USB Ports	8 USB Ports	
USB 2.0 Controller	Enabled	Enabled	Enabled	
Legacy USB Support	Enabled	Enabled	Enabled	
USB Legacy POST-Always	-	-	-	
USB Keyboard Legacy Support	Enabled	Enabled	Enabled	
USB Mouse Legacy Support	Disabled	Disabled	Disabled	
USB Storage Device Support	Enabled	Enabled	Enabled	
Port 64/60 Emulation	Disabled	Disabled	Disabled	
USB 2.0 Controller Mode	HiSpeed	HiSpeed	HiSpeed	
BIOS EHCI Hand-Off	Disabled	Disabled	Disabled	
USB Beep Message	Enabled	Enabled	Enabled	
USB Stick Default Emulation	Hard disk	Hard disk	Hard disk	
USB Mass Storage Reset Delay	20 Sec	20 Sec	20 Sec	

Table 167: BM45 - Advanced USB configuration - Overview of profile settings

Keyboard/mouse configuration

Setting / View	Profile 0	Profile 1	Profile 2	My setting
Boot-up Num-lock	On	On	On	
Typematic rate	Fast	Fast	Fast	

Table 168: BM45 - Advanced keyboard/mouse configuration - Overview of profile settings

CPU board monitor

Setting / View	Profile 0	Profile 1	Profile 2	My setting
H/W Health Function	Enabled	Enabled	Enabled	

Table 169: BM45 - Advanced CPU board monitor - Overview of profile settings

Main Board/Panel Features

Setting / View	Profile 0	Profile 1	Profile 2	My setting
Panel control				
Select panel number	-	-	-	
Version	-	-	-	
Brightness	100%	100%	100%	
Temperature	-	-	-	
Fan speed	-	-	-	
Keys/LEDs	-	-	-	
Baseboard monitor				
CMOS battery	-	-	-	
Board I/O	-	-	-	
Board ETH2	-	-	-	
Board Power	-	-	-	
Power supply				
Slide-in drive 1	-	-	-	
Slide-in drive 2	-	-	-	
ETH2 Controller	-	-	-	
Baseboard monitor				
Case 1	-	-	-	
Case 2	-	-	-	
Case 3	-	-	-	
Case 4	-	-	-	

Table 170: BM45 - Advanced main board/panel features - Overview of profile settings

Setting / View	Profile 0	Profile 1	Profile 2	My setting
Legacy devices				
COM A	Enabled	Enabled	Enabled	
Base I/O address	3F8	3F8	3F8	
Interrupt	IRQ4	IRQ4	IRQ4	
COM B	Enabled	Enabled	Enabled	
Base I/O address	2F8	2F8	2F8	
Interrupt	IRQ3	IRQ3	IRQ3	
COM C	Enabled	**Disabled**	**Disabled**	
Base I/O address	3E8	-	-	
Interrupt	IRQ11	-	-	
COM D	Disabled	Disabled	Disabled	
COM E	Disabled	Disabled	Disabled	
CAN	Disabled	Disabled	Disabled	
Hardware security key	Enabled	Enabled	Enabled	
Base I/O address	378	378	378	
ETH2 LAN controller	Enabled	Enabled	Enabled	
ETH2 MAC Address	-	-	-	

Table 170: BM45 - Advanced main board/panel features - Overview of profile settings (cont.)

1.9.3 Boot

Setting / View	Profile 0	Profile 1	Profile 2	My setting
Boot Priority Selection	Type Based	Type Based	Type Based	
1st Boot Device	Onboard LAN	**Primary master**	**Primary master**	
2nd Boot Device	Primary master	**Secondary Master**	**Secondary Master**	
3rd Boot Device	Primary slave	**USB floppy**	**USB floppy**	
4th Boot Device	USB floppy	**USB removable device**	**USB removable device**	
5th Boot Device	USB removable device	**USB hard disk**	**USB hard disk**	
6th Boot Device	USB CDROM	USB CDROM	USB CDROM	
7th Boot Device	Fourth Master	Fourth Master	Fourth Master	
8th Boot Device	Disabled	Disabled	Disabled	
Quick Boot	Enabled	Enabled	Enabled	
Quiet Boot	Disabled	Disabled	Disabled	
Automatic Boot List Retry	Disabled	Disabled	Disabled	
Add-On ROM Display Mode	Keep Current	Keep Current	Keep Current	
Halt On Error	Disabled	Disabled	Disabled	
Hit "DEL" Message Display	Enabled	Enabled	Enabled	

Table 171: BM45 - Boot - Overview of profile settings

Setting / View	Profile 0	Profile 1	Profile 2	My setting
Interrupt 19 Capture	Disabled	Disabled	Disabled	
PXE Boot to LAN	Enabled	**Disabled**	**Disabled**	
Slide-in 2 optional ROM	Enabled	**Disabled**	Enabled	
Power Loss Control	Turn On	Turn On	Turn On	

Table 171: BM45 - Boot - Overview of profile settings

1.9.4 Security

Setting / View	Profile 0	Profile 1	Profile 2	My setting
Supervisor Password	-	-	-	
User Password	-	-	-	
Boot Sector Virus Protection	Disabled	Disabled	Disabled	
Ask HDD Password on Every Boot	No	No	No	
Hard disk security user password	-	-	-	
Hard disk security master password	-	-	-	

Table 172: BM45 - Security - Overview of profile settings

1.9.5 Power

Setting / View	Profile 0	Profile 1	Profile 2	My setting
Power Management/APM	Enabled	Enabled	Enabled	
Suspend Time Out	Disabled	Disabled	Disabled	
Video Power Down Mode	Suspend	Suspend	Suspend	
Hard Disk Power Down Mode	Suspend	Suspend	Suspend	
Keyboard & PS/2 Mouse	MONITOR	MONITOR	MONITOR	
FDC/LPT/COM ports	MONITOR	MONITOR	MONITOR	
Primary Master IDE	MONITOR	MONITOR	MONITOR	
Primary Slave IDE	MONITOR	MONITOR	MONITOR	
Secondary Master IDE	MONITOR	MONITOR	MONITOR	
Secondary Slave IDE	MONITOR	MONITOR	MONITOR	
Resume On Ring	Disabled	Disabled	Disabled	
Resume on PME#	Disabled	Disabled	Disabled	
Resume On RTC Alarm	Disabled	Disabled	Disabled	
Power Button Mode	On/Off	On/Off	On/Off	

Table 173: BM45 - Power - Overview of profile settings

1.10 BIOS Error signals (beep codes)

While the Automation PC 810 is booting, the following messages and errors can occur with BIOS. These errors are signaled by different beeping codes.

1.10.1 BIOS BM45

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

Table 174: BIOS post code messages BIOS BM45

1.11 Distribution of resources

1.11.1 RAM address assignment

RAM address	Address in Hex	Resource
(TOM - 384 kB) – TOM[1)]	N.A.	ACPI reclaim, MPS and NVS area[2)]
(TOM - 128 MB - 384 kB) – (TOM - 384 kB)	N.A.	VGA frame buffer[3)]
1024 kB – (TOM - 128 MB - 384 kB)	100000h - N.A.	Extended memory
869 kB – 1024 kB	0E0000h - 0FFFFFh	Runtime BIOS
832 kB – 869 kB	0D0000h - 0DFFFFh	Upper memory
640 kB – 832 kB	0A0000h - 0CFFFFh	Video memory and BIOS
639 kB – 640 kB	09FC00h - 09FFFFh	Extended BIOS data
0 – 639 kB	000000h - 09FC00h	Conventional memory

Table 175: RAM address assignment

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

1.11.2 I/O address assignment

I/O address	Resource
0000h - 00FFh	Motherboard resources
0170h - 0177h	Secondary IDE channel
01F0h - 01F7h	Primary IDE channel
0238h - 023Fh	COM5
0278h - 027Fh	Hardware Security Key (LPT2)
02E8h - 02EFh	COM4
02F8h - 02FFh	COM2
0376h - 0376h	Secondary IDE channel command port
0377h - 0377h	Secondary IDE channel status port
0378h - 037Fh	Hardware Security Key (LPT1)
0384h - 0385h	CAN controller
03B0h - 03DFh	Video system
03E8h - 03EFh	COM3
03F6h - 03F6h	Primary IDE channel command port
03F7h - 03F7h	Primary IDE channel status port
03F8h - 03FFh	COM1
04D0h - 04D1h	Motherboard resources
0500h - 053Fh	Motherboard resources
0800h - 087Fh	Motherboard resources
0A00h - 0A7Fh	Motherboard resources
0CF8h - 0CFBh	PCI config address register
0CFCh - 0CFFh	PCI config data register
0D00h - FFFFh	PCI / PCI Express bus [1)]
4100h - 417Fh	MTCX
FF00h - FF07h	IDE bus master register

Table 176: I/O address assignment

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

1.11.3 Interrupt assignments in PCI 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)					❍	●	❍	❍	❍			❍	❍	❍					
COM2 (Serial port B)					●	❍	❍	❍	❍			❍	❍	❍					
ACPI[1)]											●								
Real-time clock										●									
Coprocessor (FPU)															●				
Primary IDE channel[2)]																●			
Secondary IDE channel[2)]																	●		
B&R	COM3 (COM C)				❍	❍	❍	❍	❍			❍	❍	❍					●
	COM4 (COM D)				❍	❍	❍	❍	❍			❍	❍	❍					●
	COM5 (COM E)				❍	❍	❍	❍	❍			❍	❍	❍					●
	CAN				❍	❍	❍	❍	❍			❍	❍	❍				❍	●

Table 177: IRQ interrupt assignments in PCI 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 SARA ports, IRQs 14 and 15 are enabled for the system and the SATA ports use other IRQs.

● ... Default setting
❍ ... Optional setting

1.11.4 Interrupt assignments in APIC mode

A total of 23 IRQs are available in the APIC mode (**A**dvanced **P**rogrammable **I**nterrupt **C**ontroller). The activation of this option is only effective if it takes place before the operating system (Windows XP) is activated.

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)					❍	●	❍	❍	❍			❍	❍	❍													
COM2 (Serial port B)					●	❍	❍	❍	❍			❍	❍	❍													
ACPI[1)]											●																
Real-time clock										●																	
Coprocessor (FPU)															●												
Primary IDE channel[2)]																●											
Secondary IDE channel[2)]																	●										
B&R	COM3 (COM C)				❍	❍	❍	❍	❍			❍	❍	❍													●
	COM4 (COM D)				❍	❍	❍	❍	❍			❍	❍	❍													●
	COM5 (COM E)				❍	❍	❍	❍	❍			❍	❍	❍													●
	CAN				❍	❍	❍	❍	❍			❍	❍	❍												❍	●
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 178: 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 SARA ports, IRQs 14 and 15 are enabled for the system and the SATA ports use other IRQs.

3) PIRQ A: for PCIe; UHCI host controller 2, VGA controller, PCI express root port 0, PCI-EX to SATA bridge

4) PIRQ B: for PCIe; HDA audio, PCI express root port 1, onboard gigabit LAN controller

5) PIRQ C: for PCIe; PCI express root port 2
6) PIRQ D: for PCIe; UHCI host controller 1, serial ATA controller 0 + 1 in enhanced/native mode, PCI express root port 3
7) PIRQ E: PCI bus INTD, UHCI host controller 3, EHCI host controller 1, SM bus controller
8) PIRQ F: PCI bus INTA
9) PIRQ G: PCI bus INTB
10) PIRQ H: PCI bus INTC, UHCI host controller 0, EHCI host controller 0

● ... Default setting
❍ ... Optional setting

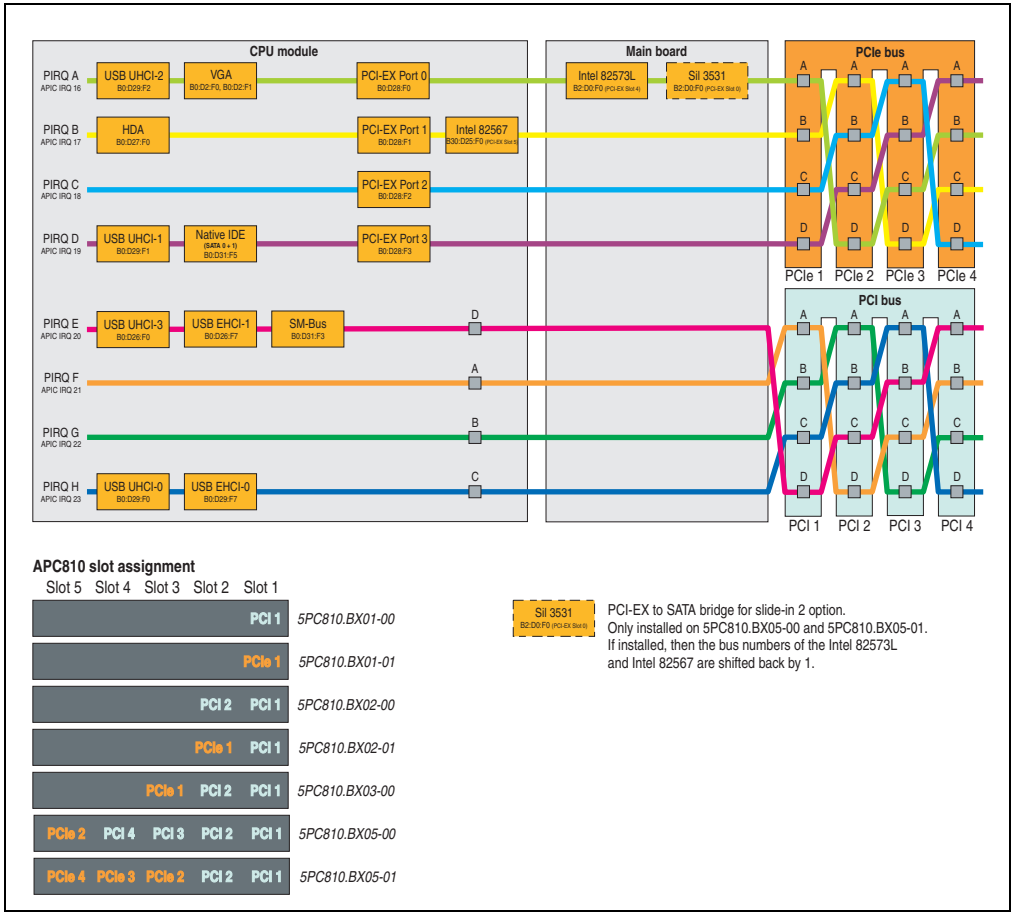


Figure 144: PCI and PCIe routing with activated APIC CPU boards BM45

2. Upgrade information

Warning!

The BIOS and firmware on APC810 systems must be kept up to date. New versions can be downloaded from the B&R homepage (www.br-automation.com).

2.1 BIOS upgrade

An upgrade might be necessary for the following reason:

- To update implemented functions or to add newly implemented functions or components to the BIOS setup (information about changes can be found in the Readme files of the BIOS upgrade).

2.1.1 What information do I need?

Information:

Individually saved BIOS settings are deleted when upgrading the BIOS.

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

Which BIOS version and firmware are already installed on the APC810?

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

- After switching on the APC810, you can get to the BIOS Setup by pressing "Del".
- From the BIOS main menu "Advanced", select "Main board/panel features".

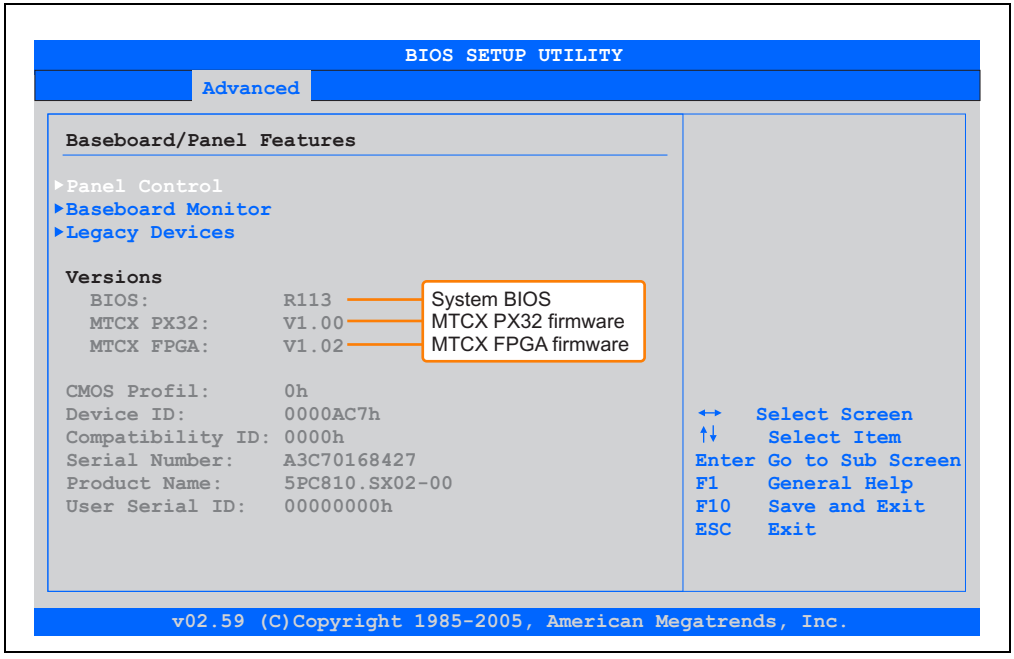


Figure 145: Software version

Which firmware is installed on the Automation Panel Link transmitter?

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

- After switching on the APC810, you can get to the BIOS Setup by pressing "Del".
- From the BIOS main menu "Advanced", select "Main board/panel features" and then "Panel control".

Information:

The version can only be displayed when an Automation Panel with an AP Link SDL transmitter (5AC801.SDL0-00) is connected.

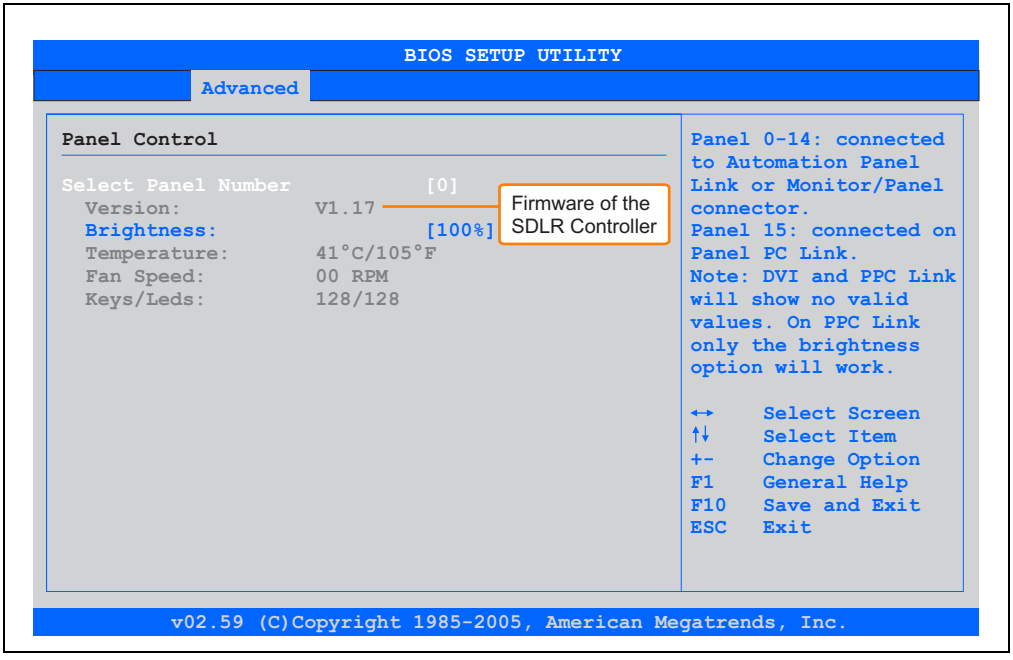


Figure 146: Firmware version of the AP Link SDL transmitter

2.1.2 BIOS upgrade for BM45 COM express

- Download ZIP file from the B&R homepage (www.br-automation.com)
- Create bootable media.

Information:

In MS-DOS, Win95 and Win98, a blank HD disk can be made bootable using the command line command "sys a:" or "format a: /s".
Information concerning creating a bootable diskette in Windows XP can be found on page 287.

Information concerning creating a USB flash drive for a B&R upgrade can be found on page 289.

Information concerning creating a CompactFlash card for a B&R upgrade can be found on page 291.

- Copy the contents of the *.zip file to the bootable media. If the B&R upgrade was already added when the bootable media was created using the B&R Embedded OS Installer, then this step is not necessary.
- Connect the bootable media to the APC810 and reboot the device.
- The following boot menu will be shown after startup:

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

2. Exit
```

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

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

Information:

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

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

2.2 Firmware upgrade

The "Upgrade APC800 MTCX" software makes it possible to update the firmware for multiple controllers (MTCX, SDLT, SDLR, UPSI), depending on the structure of the APC810 system.

Current "Upgrade APC800 MTCX" software can be downloaded directly from the service portal on the B&R homepage (**www.br-automation.com**).

2.2.1 Procedure

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

- Download the zip file from the B&R homepage.
- Create bootable media.

Information:

In MS-DOS, Win95 and Win98, a blank HD disk can be made bootable using the command line command "sys a:" or "format a: /s".
Information concerning creating a bootable diskette in Windows XP can be found on page 287.

Information concerning creating a USB flash drive for a B&R upgrade can be found on page 289.

Information concerning creating a CompactFlash card for a B&R upgrade can be found on page 291.

- Copy the contents of the *.zip file to the bootable media. If the B&R upgrade was already added when the bootable media was created using the B&R OS Installer, then this step is not necessary.
- Connect the bootable media to the APC810 and reboot the device.
- The boot menu is shown after startup
- The system must be powered off and on again after a successful upgrade.

Information:

The following boot menu options including descriptions are based on Version 1.00 of the APC800 upgrade (MTCX, SDLR, SDLT, UPSI) disk. In some cases, these descriptions might not match the version you are currently using.

Boot menu options:

```
1. Upgrade MTCX (APC810) PX32 and FPGA

2. Upgrade SDLT (APC810) only
```

```
3. Upgrade SDLR (AP800/AP900) on monitor/panel

   3.1 Upgrade SDLR on AP 0 (AP800/AP900)

   3.2 Upgrade SDLR on AP 1 (AP800/AP900)

   3.3 Upgrade SDLR on AP 1 (AP800/AP900)

   3.4 Upgrade SDLR on AP 1 (AP800/AP900)

   3.5 Upgrade all SDLR (AP800/AP900)

   3.6 Return to main menu

4. Upgrade SDLR (AP800/AP900) on AP link slot

   4.1 Upgrade SDLR on AP 8 (AP800/AP900)

   4.2 Upgrade SDLR on AP 9 (AP800/AP900)

   4.3 Upgrade SDLR on AP 10 (AP800/AP900)

   4.4 Upgrade SDLR on AP 11 (AP800/AP900)

   4.5 Upgrade all SDLR (AP800/AP900)

   4.6 Return to main menu

5. Upgrade add-on UPS (firmware and battery settings)

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

   5.2 Upgrade Battery Settings (5AC600.UPSB-00)

   5.3 Return to main menu

6. Exit
```

Concerning item 1:
Automatically upgrade PX32 and FPGA for MTCX (default after 5 seconds).

Concerning item 2:
The FPGA of the SDLT controller on the AP Link slot is automatically updated.

Concerning item 3:
Submenu 1 is opened for upgrading the SDLR controller on the Monitor/Panel plug.

3.1 Upgrade SDLR on AP 0 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 0.

3.2 Upgrade SDLR on AP 1 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 1.

3.3 Upgrade SDLR on AP 1 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 2.

3.4 Upgrade SDLR on AP 3 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 3.

3.5 Upgrade all SDLR (AP800/AP900)
All SDLR controllers are automatically updated on all Automation Panels on the Monitor/Panel (by default, after 5 sec).

3.6 Return to main menu
Returns to the main menu

Concerning item 4:
Submenu 2 is opened for upgrading the SDLR controller on the AP Link slot.

4.1 Upgrade SDLR on AP 8 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 8.

4.2 Upgrade SDLR on AP 9 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 9.

4.3 Upgrade SDLR on AP 10 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 10.

4.4 Upgrade SDLR on AP 11 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 11.

4.5 Upgrade all SDLR (AP800/AP900)
All SDLR controllers are automatically updated on all Automation Panels on the AP Link slot (by default, after 5 sec).

4.6 Return to main menu
Returns to the main menu.

Concerning item 5:
Submenu 3 for the add-on UPS firmware and upgrade and the battery settings upgrade is opened.

5.1 Upgrade Add-on UPS Firmware (5AC600.UPSI-00)
The firmware for the add-on UPSI is updated.

5.2 Upgrade Battery Settings (5AC600.UPSB-00)
The battery settings for 5AC600.UPSB-00 are automatically updated.

5.3 Return to main menu
Returns to the main menu.

Concerning item 6:
Returns to the shell (MS-DOS).

Information:

The system must be powered off and on again after a successful upgrade.

2.2.2 Possible upgrade problems and software dependencies (for V1.00)

- The SDLR firmware can only be updated if an Automation Panel with Automation Panel Link Transceiver (5DLSDL.1000-01) and Automation Panel Link Receiver (5DLSDL.1000-00) is connected.
- Automation Panel Link transceivers (5DLSDL.1000-01) or Automation Panel Link receivers (5DLSDL.1000-00) with a Firmware version lower than or equal to V00.10 can no longer be combined with Automation Panel Link transceivers (5DLSDL.1000-01) or Automation Panel Link receivers (5DLSDL.1000-00) with a Firmware higher than or equal to V01.04. Daisy Chain mode is not possible with such a combination.
- If a UPS (e.g. 5AC600.UPSI-00) + battery unit (e.g.: 5AC600.UPSB-00) is connected to the system and operable, then after an upgrade of the MTCX or SDLT you must either disconnect the battery or push the Power button (to put the system in Standby mode), before executing the required power off/on. If not, the firmware upgrade will not work because the UPS buffers the system.
- The function Legacy Mouse Support and Keyboard Controller Reset is only provided with the combination of MTCX PX32 V00.12 and MTCX FPGA V00.09 (included in APC810 MTCX upgrade disk V00.05).

2.3 Creating an MS-DOS boot diskette in Windows XP

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

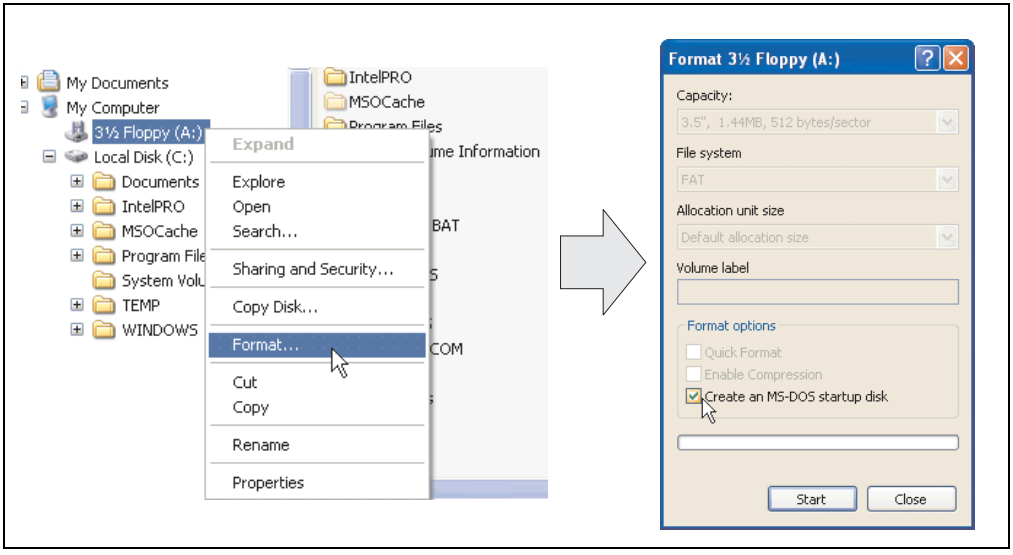


Figure 147: Creating a bootable diskette in Windows XP - step 1

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

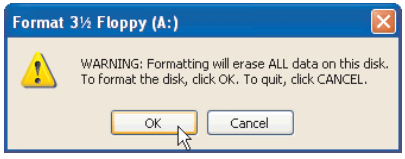


Figure 148: Creating a bootable diskette in Windows XP - step 2

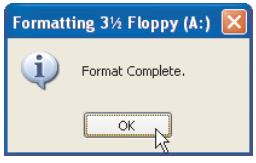


Figure 149: Creating a bootable diskette in Windows XP - step 3

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

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

In the Explorer, go to the "Tools" menu, select "Folder Options..." and open the "View" tab - now deactivate the option "Hide protected operating system files (Recommended)" (activated as default) and activate the option "Show hidden files and folders".

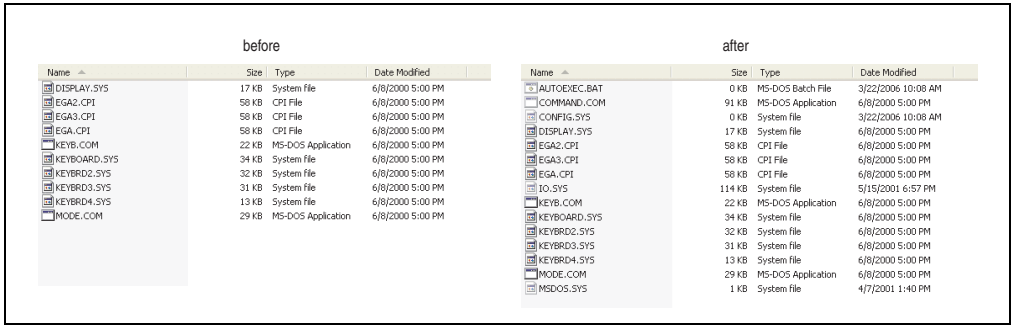


Figure 150: Creating a bootable diskette in Windows XP - step 4

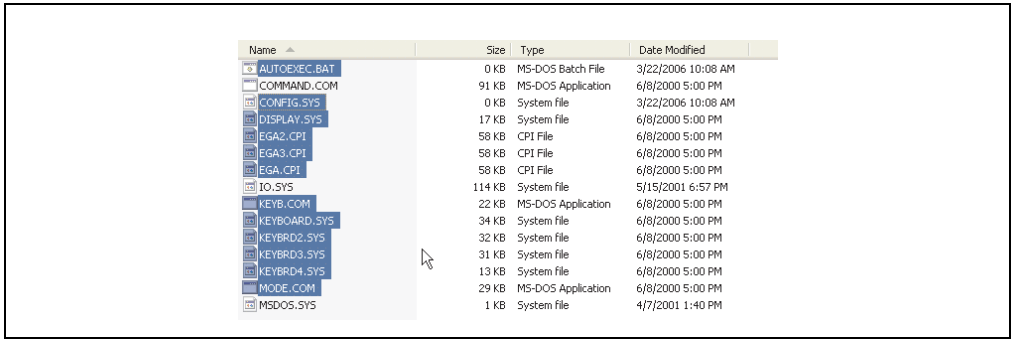


Figure 151: Creating a bootable diskette in Windows XP - step 5

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

2.4 Creating a bootable USB flash drive for B&R upgrade files

When used in connection with a B&R industrial PC, it is possible to upgrade BIOS from one of the USB flash drives available from B&R. To do this, the USB flash drive must be prepared accordingly. This is done with the B&R Embedded OS Installer, which can be downloaded for free from the B&R homepage (www.br-automation.com).

2.4.1 Requirements

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

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

2.4.2 Procedure

- Connect the USB flash drive to the PC.
- If the drive list is not refreshed automatically, the list must be updated using the command **Drives > Refresh**.
- Mark the desired USB flash drive in the drive list.
- Change to the **Action** tab and select **Install a B&R Update to a USB flash drive** as type of action.
- Enter the path to the MS-DOS operating system files. If the files are part of a ZIP archive, then click on the button **By ZIP file...**. If the files are stored in a directory on the hard drive, then click on the button **By folder...**.
- In the **B&R Upgrade** text box, it's also possible to enter the path to the ZIP file for the B&R Upgrade Disk and select the file.
- Click on the **Start action** button in the toolbar.

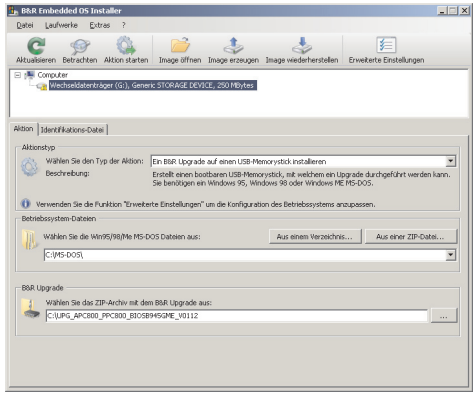


Figure 152: Creating a USB flash drive for B&R upgrade files

2.4.3 Where do I get MS-DOS?

Information concerning creating an MS-DOS boot diskette can be found in section 2.3 "Creating an MS-DOS boot diskette in Windows XP", on page 287. Then the files from the diskette are to be copied to your hard drive.

2.5 Creating a bootable CompactFlash card for B&R upgrade files

When used in connection with a B&R industrial PC, it is possible to upgrade BIOS from one of the CompactFlash cards available from B&R. To do this, the CompactFlash card must be prepared accordingly. This is done with the B&R Embedded OS Installer, which can be downloaded for free from the B&R homepage (www.br-automation.com).

2.5.1 Requirements

The following peripherals are required for creating a bootable CompactFlash card:

- CompactFlash card
- B&R Industrial PC
- B&R Embedded OS Installer (V3.10 or higher)

2.5.2 Procedure

- Insert the CompactFlash card in the CF slot on the industrial PC.
- If the drive list is not refreshed automatically, the list must be updated using the command **Drives > Refresh**.
- Select the desired CompactFlash card from the drive list.
- Change to the **Action** tab and select **Install a B&R Update to a CompactFlash card** as type of action.
- Enter the path to the MS-DOS operating system files. If the files are part of a ZIP archive, then click on the button **By ZIP file...**. If the files are stored in a directory on the hard drive, then click on the button **By folder...**.
- In the **B&R Upgrade** text box, it's also possible to enter the path to the ZIP file for the B&R Upgrade Disk and select the file.
- Click on the **Start action** button in the toolbar.

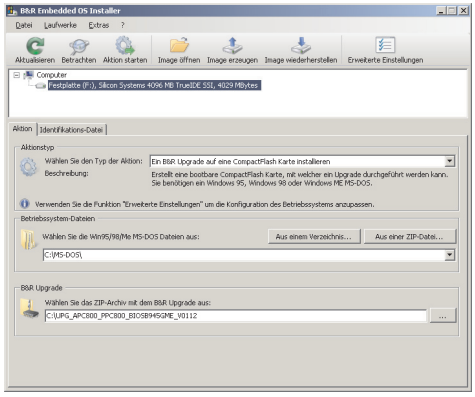


Figure 153: Creating a CompactFlash card for B&R upgrade files

2.5.3 Where do I get MS-DOS?

Information concerning creating an MS-DOS boot diskette can be found in section 2.3 "Creating an MS-DOS boot diskette in Windows XP", on page 287. Then the files from the diskette are to be copied to your hard drive.

2.6 Upgrade problems

Potential upgrade problems are listed in the Liesmich.txt or Readme.txt files on the upgrade disks.

3. Automation PC 810 with MS-DOS

Figure 154: Automation PC 810 with MS-DOS

Model number	Short description	Note
9S0000.01-010	**OEM MS-DOS 6.22 German (disk)** OEM MS-DOS 6.22 German disks Only delivered with a new PC.	
9S0000.01-020	**OEM MS-DOS 6.22 English (disk)** OEM MS-DOS 6.22 English disks Only delivered with a new PC.	

Table 179: Model numbers - MS-DOS

3.1 Known problems

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

- AC97 Sound - no support
- USB 2.0 - only USB 1.1 rates can be reached.
- A second graphics line (and therefore Extended Desktop mode) also cannot be used.
- A few "ACPI control" BIOS functions cannot be used.

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

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

Table 180: Tested resolutions and color depths for DVI and RGB signals

4. Automation PC 810 with Windows XP Professional

Figure 155: Windows XP Professional Logo

Model number	Short description	Note
5SWWXP.0600-GER	**WinXP Professional with SP3, GER** Microsoft OEM Windows XP Professional Service Pack 3, CD, German. Only available with a new device.	
5SWWXP.0600-ENG	**WinXP Professional with SP3, ENG** Microsoft OEM Windows XP Professional Service Pack 3, CD, English. Only available with a new device.	
5SWWXP.0600-MUL	**WinXP Professional with SP3, MUL** Microsoft OEM Windows XP Professional Service Pack 3, CD, multi-language. Only available with a new device.	
5SWWXP.0500-GER	**WinXP Professional with SP 2c, GER** Microsoft OEM Windows XP Professional Service Pack 2c, CD, German. Only available with a new device.	
5SWWXP.0500-ENG	**WinXP Professional with SP 2c, ENG** Microsoft OEM Windows XP Professional Service Pack 2c, CD, English. Only available with a new device.	
5SWWXP.0500-MUL	**WinXP Professional with SP 2c, MUL** Microsoft OEM Windows XP Professional Service Pack 2c, CD, multi-language. Only available with a new device.	

Table 181: Model numbers - Windows XP Professional

4.1 Installation

Upon request, B&R can pre-install the required Windows XP Professional version on the desired mass memory (add-on hard disk, slide-in hard disk). All of the drivers required for operation (graphics, network, etc.) are also installed when doing so.

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

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

1) Download the RAID driver from the B&R homepage (**www.br-automation.com**) and copy the files to a diskette.
2) Connect the Media Drive (5MD900.USB2-01) to the USB port.
3) Insert the diskette and Windows XP Professional CD in the the Media Drive and boot from the CD.
4) Press the F6 key during setup to install a third-party SCSI or a driver.
5) Press the "s" key when asked about installing an additional drive. Insert the disk in the floppy drive. Press "Enter" and select the driver.
6) Follow the setup instructions.
7) The setup copies the files to the Windows XP Professional folder and restarts the Automation PC 810.

4.1.2 Special considerations for the 5PCI slot model

The following steps are necessary when installing to a slide-in HDD being operated in the slide-in slot 2 (located behind the PCI to SATA Bridge) on the APC810:

1) Download the Si3531 SATA driver from the B&R homepage (**www.br-automation.com**) and copy the files to a diskette.
2) Connect the Media Drive (5MD900.USB2-01) to the USB port.
3) Insert the diskette and Windows XP Professional CD in the the Media Drive and boot from the CD.
4) Press the F6 key during setup to install a third-party SCSI or a driver.
5) Press the "s" key when asked about installing an additional drive. Insert the disk in the floppy drive. Press "Enter" and select the driver.
6) Follow the setup instructions.
7) The setup copies the files to the Windows XP Professional folder and restarts the Automation PC 810.

4.2 Drivers

The latest drivers for all released operating systems can be found in the download area (Service - Material Related Downloads - BIOS / Drivers / Updates) on the B&R homepage (**www.br-automation.com**).

Information:

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

5. Automation PC 810 with Windows 7

Figure 156: Windows 7 Logo

Model number	Short description	Note
5SWWI7.0100-GER	**Win7 Pro 32-bit DVD, GER** Microsoft OEM Windows 7 Professional 32-bit, DVD, German. Only available with a new device.	
5SWWI7.0100-ENG	**Win7 Pro 32-bit DVD, ENG** Microsoft OEM Windows 7 Professional 32-bit, DVD, English. Only available with a new device.	
5SWWI7.0200-GER	**Win7 Pro 64-bit DVD, GER** Microsoft OEM Windows 7 Professional 64-bit, DVD, German. Only available with a new device.	
5SWWI7.0200-ENG	**Win7 Pro 64-bit DVD, ENG** Microsoft OEM Windows 7 Professional 64-bit, DVD, English. Only available with a new device.	
5SWWI7.0300-MUL	**Win7 Ult 32-bit DVD, MUL** Microsoft OEM Windows 7 Ultimate 32-bit, DVD, Multilanguage. Only available with a new device.	
5SWWI7.0400-MUL	**Win7 Ult 64-bit DVD, MUL** Microsoft OEM Windows 7 Ultimate 64-bit, DVD, Multilanguage. Only available with a new device.	

Table 182: Model numbers - Windows 7

5.1 Installation

Upon request, B&R can pre-install the required Windows 7 version on the desired mass memory (add-on hard disk, slide-in hard disk). All of the drivers required for operation (graphics, network, etc.) are also installed when doing so.

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

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

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

5.1.2 Special considerations for the 5PCI slot model

The following steps are necessary when installing to a slide-in HDD being operated in the slide-in slot 2 (located behind the PCI to SATA Bridge) on the APC810:

1) Download the Sil3531 SATA driver for Windows 7 from the B&R homepage (**www.br-automation.com**) and copy the data to a folder on a flash drive.
2) Boot using the Windows7 DVD.
3) Follow the installation steps until a page appears asking "Where do you want to install Windows?".
4) Plug the USB flash drive with the RAID drivers into an available USB port.
5) Click on "Load driver", and navigate to the directory containing the RAID drivers. Then click Next to continue.
6) Remove the USB flash drive.
7) The Windows 7 installation can now be performed as usual.

5.2 Drivers

The latest drivers for all released operating systems can be found in the download area (Service - Material Related Downloads - BIOS / Drivers / Updates) on the B&R homepage (www.br-automation.com).

Information:

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

5.3 Special considerations, limitations:

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

6. Automation PC 810 with Windows Embedded Standard 2009

Figure 157: Windows Embedded Standard 2009 Logo

Model number	Short description	Note
5SWWXP.0733-ENG	**Windows Embedded Standard 2009 APC810 GM45** Microsoft OEM Windows Embedded, Standard 2009, English; for APC810 with GM45 chipset; order CompactFlash separately (at least 1 GB).	

Table 183: Model numbers - Windows Embedded Standard 2009

6.1 General Information

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

6.2 Features with WES2009 (Windows Embedded Standard 2009)

The feature list shows the most important device functions in Windows Embedded Standard 2009.

Function	Present
Enhanced write filter (EWF)	✓
File Based Write Filter	✓
Page file	Configurable
Administrator account	✓
User account	Configurable
Explorer shell	✓
Registry filter	✓
Internet Explorer 7.0	✓
Internet information service (IIS)	-
Terminal service	✓
Windows Firewall	✓
MSN-Explorer	-
Outlook Express	-
Administrative Tools	✓
Remote Desktop	✓
Remote Assistance	-
.NET Framework	-
ASP.NET	-
Local Network Bridge	✓
Codepages/User Locale/Keyboard	✓
Disk Management Service	✓
Windows Installer Service	✓
Class Installer	✓
CoDevice Installer	✓
Media Player 6.4	✓
DirectX 9.0c	✓
Accessories	✓
Number of fonts	89

Table 184: Device functions in Windows Embedded Standard 2009

6.3 Installation

Upon request, Windows Embedded Standard 2009 can be preinstalled at B&R Austria on a suitable CompactFlash card (min. 1GB). The APC810 system is then automatically configured after it has been switched on for the first time. This procedure takes approximately 30 minutes, and the device will be rebooted a number of times.

6.4 Drivers

All drivers required for operation are preinstalled on the operating system. If an older driver version is installed, the latest version can be downloaded from the B&R homepage (**www.br-automation.com**) and installed. A potentially activated "Enhanced Write Filter (EWF)" must be taken into consideration.

6.4.1 Touch screen driver

The touch screen driver must be manually installed in order to operate Automation Panel 800 or Automation Panel 900 touch screen devices. The driver can be downloaded from the download area on the B&R homepage (**www.br-automation.com**). A potentially activated "Enhanced Write Filter (EWF)" must be taken into consideration.

Information:

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

7. Automation PC 810 with Windows Embedded Standard 7

Figure 158: Windows Embedded Standard 7 Logo

Model number	Short description	Note
5SWWI7.0533-ENG	**Windows Embedded Standard 7 APC810 GM45** Microsoft OEM Windows Embedded Standard 7 32-bit, English; for APC810 with GM45 chipset; order CompactFlash separately (at least 16 GB)	
5SWWI7.0633-ENG	**Windows Embedded Standard 7 APC810 GM45** Microsoft OEM Windows Embedded Standard 7 64-bit, English; for APC810 with GM45 chipset; order CompactFlash separately (at least 16 GB)	
5SWWI7.0733-MUL	**Windows Embedded Standard 7 Premium APC810 GM45** Microsoft OEM Windows Embedded Standard 7 Premium 32-bit, multilanguage; for APC810 with GM45 chipset; order CompactFlash separately (at least 8 GB)	
5SWWI7.0833-MUL	**Windows Embedded Standard 7 Premium APC810 GM45** Microsoft OEM Windows Embedded Standard 7 Premium 64-bit, multilanguage; for APC810 with GM45 chipset; order CompactFlash separately (at least 16 GB)	

Table 185: Model numbers - Windows Embedded Standard 2009

7.1 General Information

The successor to Windows® XP Embedded has been given the name Windows® Embedded Standard 7. As with previous versions, this embedded operating system offers full system support of Automation PC 620, Automation PC 810, Panel PC 700, Panel PC 800 and Power Panel 500 devices. In addition to brand new features that are also included in Windows ® 7 Professional, Windows® Embedded Standard 7 includes embedded components such as Enhanced Write Filter, File-Based Write Filter, Registry Filter and USB Boot. Windows® Embedded Standard 7 is available in two different versions. The main difference between them has to do with multilanguage support. Windows® Embedded Standard 7 is only available in a single language, whereas Windows® Embedded Standard 7 Premium supports the installation of several languages simultaneously.

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

7.2 Features with WES7 (Windows Embedded Standard 7)

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

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

Table 186: Device functions in Windows Embedded Standard 7

7.3 Installation

Upon request, Windows Embedded Standard 7 can be pre-installed at B&R Austria on a suitable CompactFlash card (32-bit: at least. 8 GB, 64-bit: at least. 16 GB). The APC810 system is then automatically configured after it has been switched on for the first time. This procedure takes approximately 30 minutes, and the device will be rebooted a number of times.

7.4 Drivers

All drivers required for operation are preinstalled on the operating system. If an older driver version is installed, the latest version can be downloaded from the B&R homepage (**www.br-automation.com**) and installed. A potentially activated "Enhanced Write Filter (EWF)" must be taken into consideration.

7.4.1 Touch screen driver

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

The touch screen driver must be installed manually if a touch controller was not detected during the Windows Embedded Standard 7 setup or if a an Automation Panel 800/900 has been connected after setup. The driver can be downloaded from the download area on the B&R homepage (**www.br-automation.com**). A potentially activated "Enhanced Write Filter (EWF)" must be taken into consideration.

Information:

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

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

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

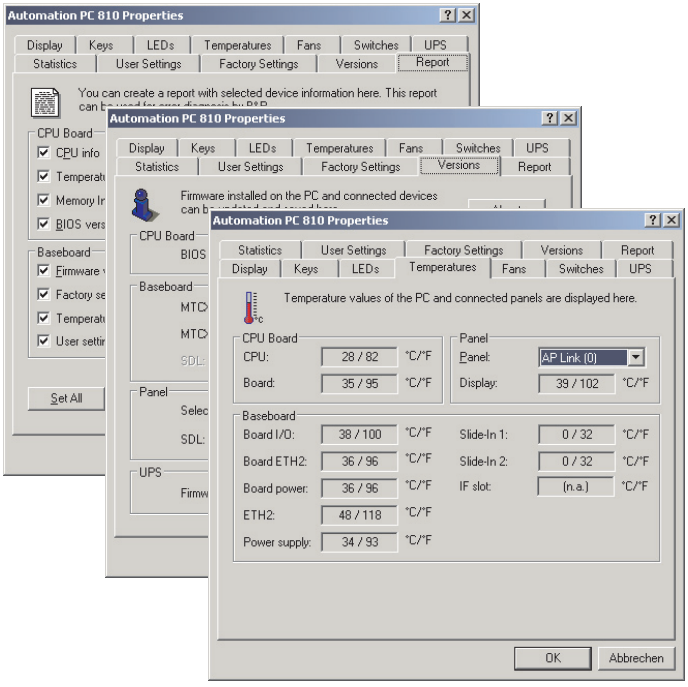


Figure 159: ADI Control Center screenshots - Examples (symbol photo)

Information:

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

8.1 Functions

Information:

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

- Adjusting the display-specific parameters of connected Panels
- Reading of device-specific keys
- Activation of device specific LEDs on a foil keypad
- Reading temperatures, fan speeds, statistical data, and switch settings
- Reading user settings and factory settings
- Reading software versions
- Updating and securing firmware
- Creating reports about the current system (support assistance)
- Setting the SDL equalizer value for the SDL cable adjustment
- Configuring an optional mounted UPS
- Change the user serial ID.

Supports following systems:

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

Table 187: System support - ADI driver

System	Operating system	Note
Panel PC 725	Windows XP Professional	Installation using its own setup
	Windows Embedded Standard 2009	Content of B&R Windows Embedded Standard 2009 image
	Windows CE	Content of B&R Windows CE image
Panel PC 800	Windows XP Professional	Installation using its own setup
	Windows XP Embedded	Content of B&R Windows XP Embedded image
	Windows Embedded Standard 2009	Content of B&R Windows Embedded Standard 2009 image
Power Panel BIOS devices	Windows XP Embedded	Content of B&R Windows XP Embedded image
	Windows CE	Content of B&R Windows CE image
	Windows Embedded Standard 2009	Content of B&R Windows Embedded Standard 2009 image
Mobile Panel BIOS devices	Windows XP Embedded	Content of B&R Windows XP Embedded image
	Windows CE	Content of B&R Windows CE image
Automation Panel 800	-	Together with APC620/ APC810/ APC820/ PPC700/ PPC800
Automation Panel 900	-	Together with APC620/ APC810/ APC820/ PPC700/ PPC800

Table 187: System support - ADI driver

A detailed description of the Control Center can be found in the integrated online help.

The B&R Automation Device Interface (ADI) driver (also contains Control Center) can be downloaded for free from the download area on the B&R homepage (**www.br-automation.com**).

8.2 Installation

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

1. Download and unzip the ZIP archive

2. Close all applications

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

- or -

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

Information:

The ADI driver and B&R control center are already included in the Windows XP Embedded and Windows Embedded Standard 2009 operating system.

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

8.3 SDL Equalizer setting

1) Start the **Control Center** in the **Control Panel**.

2) Then select the **Display** tab.

3) Click on **Settings**. This opens the following dialog box:

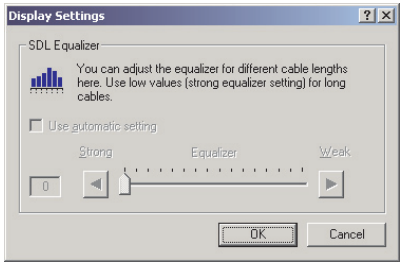


Figure 160: ADI Control Center - SDL equalizer settings

You can change the display's SDL equalizer settings in this dialog box. The equalizer is integrated in the Automation Panel and adapts the DVI signal to various cable lengths. The equalizer value is automatically calculated based on the cable length: You may set a different equalizer value in order to obtain the best possible display quality (e.g. with 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).

8.4 UPS configuration

Here you can view the status values for an optionally installed B&R APC add-on UPS as well as change, update or save the battery settings for the UPS. You can also configure the system settings for the UPS.

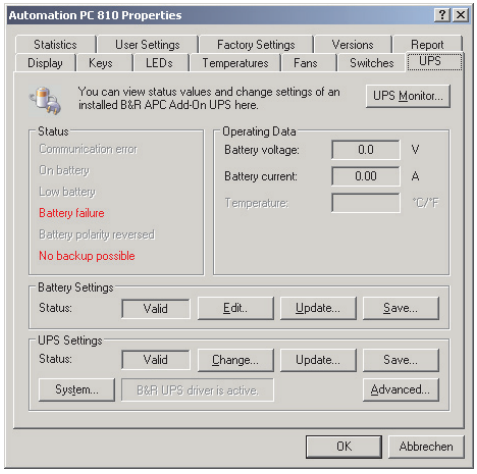


Figure 161: ADI Control Center - UPS settings

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.

8.4.1 Installing the UPS service for the B&R APC add-on UPS

1) Open the **Control Center** in the **Control** Panel.
2) Select **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) Select the **UPS** tab and click **Select...**.
5) Choose 'Bernecker + Rainer' as manufacturer and 'APC Add-On UPS' as 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.

8.4.2 Displaying UPS status values

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

The displayed values are updated automatically.

Information:

The "reversed battery polarity" status is only displayed in UPS firmware Version 1.08 or higher.

In UPS firmware Version 1.07 or smaller, a change between battery operation and normal operation can lead to communication errors.

3) **Select UPS monitor** to display UPS status changes since the last time the system or UPS driver was started.

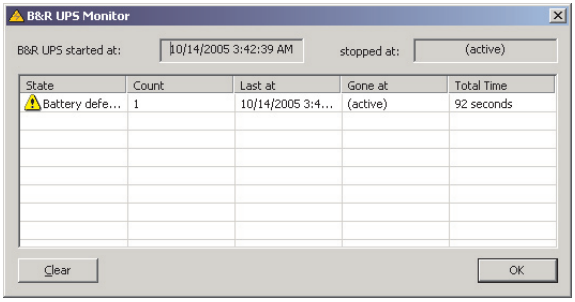


Figure 162: ADI Control Center - UPS monitor

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.

8.4.3 Changing UPS battery settings

1) Open the **Control Center** in the **Control** Panel.

2) Select **UPS** tab.

3) Under Battery settings, click on **Edit**. Clicking on "Open" opens a dialog box.

4) Select and **open** the file containing the battery settings.

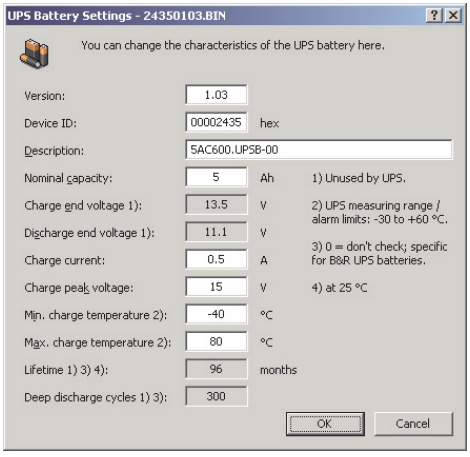


Figure 163: ADI Control Center - UPS battery settings

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

The changed settings are written to the file by clicking on the **OK** button. The battery settings for the UPS can then be updated with this file.

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.

8.4.4 Updating UPS battery settings

1) Open the **Control Center** in the **Control** Panel.
2) Select **UPS** tab.
3) Under **Battery settings**, click on **Update**. Clicking on "Open" opens a dialog box.
4) Select and **open** the file containing the battery settings. The "Download" dialog box is opened.

The transfer can be aborted by clicking on **Cancel** in the Download dialog box. **Cancel** is disabled when the flash memory is being written to.

Caution!

- **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.

8.4.5 Saving UPS battery settings

1) Open the **Control Center** in the **Control** Panel.
2) Select **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.

8.4.6 Configuring UPS system settings

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

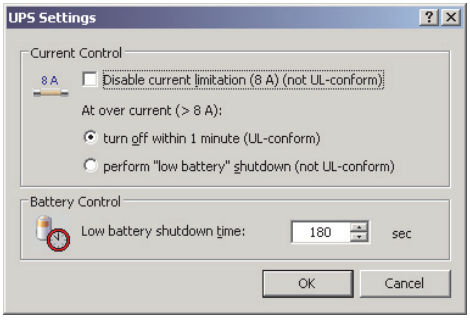


Figure 164: ADI Control Center - UPS settings

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 UPS shutdown time when battery is low

Enter the **"Low Battery" shutdown time** in seconds. This is the amount of time that the UPS will wait before shutting off the power supply when the battery level is low.

This prevents the UPS battery from becoming too discharged if the Windows UPS service is not enabled and the UPS is therefore not turned off by the operating system.

If the UPS service is enabled, then the UPS will be turned off by the operating system when the battery level is low, based on the Windows UPS service **Shutdown time** (see "Changing additional UPS settings", on page 319). 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.**

8.4.7 Changing additional UPS settings

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

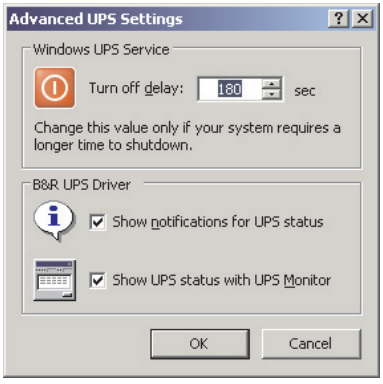


Figure 165: ADI Control Center - Advanced UPS settings

Information:

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

Change shutdown time for UPS

Under **Windows UPS Service**, you can enter the **turn-off time** in seconds. This is the length of time that the UPS waits before switching off the power supply. When a critical alarm occurs (e.g. at low battery level), the Windows UPS service will send a shutdown command with the turn off delay time to the UPS and will shut down the system.

Information:

This time is evaluated by the Windows UPS Service, but can not be set in the UPS system settings of the energy options. This value should only be changed if the system requires longer than the default setting of 180 seconds to shut down.

Caution!

The time entered must be longer than the time required to shut down the operating system.

Activate UPS messages

Under **B&R UPS driver**, activate the checkbox **UPS status messages**. Any changes to the UPS status will then trigger a message from the B&R UPS driver.

Information:

Shutting down the system is only reported by the Windows UPS Service. The UPS Service also sends other messages if they are activated in the UPS system settings energy options. These messages are only displayed when the Windows Alerter and Windows Messenger[1)] are active and the PC is connected to a network. Additionally, some conditions of the B&R APC add-on UPS are not detected by the Windows UPS Service, and are therefore do not trigger messages (e.g. when there are no battery settings on the UPS). The Windows services can be found by opening the Control Panel and selecting "Services" from the Administrative Tools.

1) The Windows Alerter is supported starting with B&R Windows Embedded Version 2.10 or higher.

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").

8.4.8 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 APC810 enters standby mode and will then reboot the system.

Chapter 5 • Standards and certifications

1. Applicable European directives

- EMC directive 2004/108/EC
- Low-voltage directive 2006/95/EC
- Machine directives 98/37/EC beginning 12/29/2009: 2006/42/EC

2. Overview of standards

Standard	Description
EN 55011 Class A	Electromagnetic compatibility (EMC), radio disturbance product standard, industrial, scientific, and medical high-frequency devices (ISM devices), limit values and measurement procedure; group 1 (devices that do not create HF during material processing) and group 2 (devices that create HF during material processing)
EN 55022 Class A	Electromagnetic compatibility (EMC), radio disturbance characteristics, information technology equipment (ITE devices), limits and methods of measurement
EN 60060-1	High-voltage test techniques - part 1: General specifications and testing conditions
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	Degrees 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

Table 188: Overview of standards

Standard	Description
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 61000-3-11	Electromagnetic compatibility (EMC) - part 3-11: Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, equipment with rated current ≤ 75 A per phase, and 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 61000-4-11	Electromagnetic compatibility (EMC) - part 4-11: Testing and measuring techniques; voltage dips, short interruptions and voltage variations immunity tests
EN 61000-4-12	Electromagnetic compatibility (EMC) - part 4-12: Testing and measuring techniques; oscillatory waves immunity test
EN 61000-6-2	Electromagnetic compatibility (EMC), generic immunity standard - part 2: Industrial environment
EN 61000-6-4	Electromagnetic compatibility (EMC), generic emission standard - part 2: Industrial environment
EN 61131-2	Product standard, programmable logic controllers - part 2: Equipment requirements and tests
UL 508	Industrial control equipment (UL = Underwriters Laboratories)
47 CFR	Federal Communications Commission (FCC), 47 CFR Part 15 Subpart B Class A

Table 188: Overview of standards (cont.)

3. Emission requirements

Emissions	Test carried out according to	Limits according to
Network-related emissions	EN 55011 / EN 55022	EN 61000-6-4: Generic standard (industrial areas)
		EN 55011: Industrial, scientific, and medical (ISM) radio-frequency equipment, class A (industrial areas)
		EN 55022: Information technology equipment (ITE devices), class A (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 50091-2: Uninterruptible power systems (UPS), class A
		47 CFR Part 15 Subpart B Class A (FCC)
Emissions, Electromagnetic emissions	EN 55011 / EN 55022	EN 61000-6-4: Generic standard (industrial areas)
		EN 55011: Industrial, scientific, and medical (ISM) radio-frequency equipment, class A (industrial areas)
		EN 55022: Information technology equipment (ITE devices), class A (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 50091-2: Uninterruptible power systems (UPS), class A
		47 CFR Part 15 Subpart B Class A (FCC)
Harmonic currents for devices with an input current of ≤ 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, for equipment with rated current less than or equal to ≤ 16 A per phase and not subject to conditional connection, class A/D
Voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, equipment with rated current ≤ 75 A per phase, and subject to conditional connection.	EN 61000-3-11	EN 61000-3-11: Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current less than or equal to ≤ 75 A per phase and subject to conditional connection, class A/D

Table 189: Overview of limits and testing guidelines for emissions

3.1 Network-related emissions

Test carried out according to EN 55011 / EN 55022	Limits according to EN 61000-6-4	Limits according to EN 55011 Class A	Limits according to EN 55022 Class A
Power mains connections 150 kHz - 500 kHz	-	79 dB (µV) Quasi-peak value 66 dB (µV) Average	79 dB (µV) Quasi-peak value 66 dB (µV) Average
Power mains connections 500 kHz - 30 MHz	-	73 dB (µV) Quasi-peak value 60 dB (µV) Average	73 dB (µV) Quasi-peak value 60 dB (µV) Average
AC mains connections 150 kHz - 500 kHz	79 dB (µV) Quasi-peak value 66 dB (µV) Average	-	-
AC mains connections 500 kHz - 30 MHz	73 dB (µV) Quasi-peak value 60 dB (µV) Average	-	-
Other connections 150 kHz - 500 kHz	-	-	97 - 87 dB (µV) und 53 - 43 dB (µA) Quasi-peak value 84 - 74 dB (µV) und 40 - 30 dB (µA) Average
Other connections 500 kHz - 30 MHz	-	-	87 dB (µV) and 43 dB (µA) Quasi-peak value 74 dB (µV) and 30 dB (µA) Average
Test carried out according to EN 55011 / EN 55022	**Limits according to EN 61000-6-4**	**Limits according to EN 61131-2**	**Limits according to 47 CFR Part 15 Subpart B class A**
Power mains connections [1)] 150 kHz - 500 kHz	79 dB (µV) Quasi-peak value 66 dB (µV) Average	-	-
Power mains connections 500 kHz - 30 MHz	73 dB (µV) Quasi-peak value 60 dB (µV) Average	-	-
AC mains connections 150 kHz - 500 kHz	-	79 dB (µV) Quasi-peak value 66 dB (µV) Average	79 dB (µV) Quasi-peak value 66 dB (µV) Average
AC mains connections 500 kHz - 30 MHz	-	73 dB (µV) Quasi-peak value 60 dB (µV) Average	73 dB (µV) Quasi-peak value 60 dB (µV) Average

Table 190: Test requirements - Network-related emissions for industrial areas

Other connections 150 kHz - 500 kHz	Only informative For line lengths > 10 m 40 - 30 dB (ÊA) Quasi-peak value 30 - 20 dB (ÊA) Average	-	-
Other connections 500 kHz - 30 MHz	Only informative For line lengths > 10 m 30 dB (ÊA) Quasi-peak value 20 dB (ÊA) Average	-	-

Table 190: Test requirements - Network-related emissions for industrial areas (cont.)

1) AC network connections only with EN 61131-2

3.2 Emissions, electromagnetic emissions

Test carried out according to EN 55011 / EN 55022	Limits according to EN 61000-6-4	Limits according to EN 55011 Class A	Limits according to EN 55022 Class A
30 MHz - 230 MHz measured at a distance of 10 m	< 40 dB (µV/m) Quasi-peak value	< 40 dB (µV/m) Quasi-peak value	< 40 dB (µV/m) Quasi-peak value
230 MHz - 1 GHz measured at a distance of 10 m	< 47 dB (µV/m) Quasi-peak value	< 47 dB (µV/m) Quasi-peak value	< 47 dB (µV/m) Quasi-peak value
Test carried out according to EN 55011 / EN 55022	**Limits according to EN 61131-2**	**Limits according to 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		

Table 191: : Test requirements - Electromagnetic emissions for industrial areas

4. Requirements for immunity to disturbances

Immunity	Test carried out according to	Limits according to
Electrostatic discharge (ESD)	EN 61000-4-2	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
Immunity to high-frequency electromagnetic fields (HF field)	EN 61000-4-3	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
Immunity to high-speed transient electrical disturbances (burst)	EN 61000-4-4	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
Immunity to surge voltages	EN 61000-4-5	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
Immunity to conducted disturbances	EN 61000-4-6	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
Immunity against magnetic fields with electrical frequencies	EN 61000-4-8	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
Immunity to voltage dips, short-term interruptions and voltage fluctuations	EN 61000-4-11	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
Immunity to damped vibration	EN 61000-4-12	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers

Table 192: 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:
Deterioration or failure of the function, which can no longer be established (operating equipment destroyed).

4.1 Electrostatic discharge (ESD)

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

Table 193: Test requirements - Electrostatic discharge (ESD)

4.2 High-frequency electromagnetic fields (HF field)

Test carried out according to EN 61000-4-3	Limits according to EN 61000-6-2	Limits according to EN 61131-2	
Housing, completely wired	80 MHz - 1 GHz, 10 V/m, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	2 GHz - 2.7 GHz, 1 V/m, 1.4 GHz - 2 GHz, 3 V/m, 80 MHz - 1 GHz, 10 V/m, 80% amplitude modulation at 1 kHz, duration 3 seconds, criteria A	

Table 194: Test requirements - High-frequency electromagnetic fields (HF field)

4.3 High-speed transient electrical disturbances (burst)

Test carried out according to EN 61000-4-4	Limits according to EN 61000-6-2	Limits according to EN 61131-2	
AC mains inputs/outputs	±2 kV, criteria B	-	
AC power inputs	-	±2 kV, criteria B	
AC power outputs	-	±1 kV, criteria B	
DC power I/O >10 m [1)]	±2 kV, criteria B	-	
DC power inputs >10 m	-	±2 kV, criteria B	
DC power outputs >10 m	-	±1 kV, criteria B	
Functional ground connections, signal lines and I/Os >3 m	±1 kV, criteria B	±1 kV, criteria B	
Unshielded AC I/O >3 m	-	±2 kV, criteria B	
Analog I/O	±1 kV, criteria B	±1 kV, criteria B	

Table 195: Test requirements - High-speed transient electrical disturbances (burst)

1) For EN 55024 without length limitation.

4.4 Surges

Test carried out according to EN 61000-4-5	Limits according to EN 61000-6-2	Limits according to EN 61131-2	
AC power I/O, L to L	±1 kV, criteria B	±1 kV, criteria B	
AC power I/O, L to PE	±2 kV, criteria B	±2 kV, criteria B	
DC power I/O, L+ to L-, >10 m	±0.5 kV, criteria B	-	
DC power I/O, L to PE, >10 m	±0.5 kV, criteria B	-	
DC power inputs, L+ to L-	-	±0.5 kV, criteria B	
DC power inputs, L to PE	-	±1 kV, criteria B	
DC power outputs, L+ to L-	-	±0.5 kV, criteria B	
DC power outputs, L to PE	-	±0.5 kV, criteria B	
Signal connections >30 m	±1 kV, criteria B	±1 kV, criteria B	
All shielded cables	-	±1 kV, criteria B	

Table 196: Test requirements - Surge voltages

4.5 Conducted disturbances

Test carried out according to EN 61000-4-6	Limits according to EN 61000-6-2	Limits according to EN 61131-2	
AC mains inputs/outputs	150 kHz - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	
DC mains inputs/outputs	150 kHz - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	
Functional ground connections	150 kHz - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	
Signal connections >3 m	150 kHz - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	

Table 197: Test requirements - Conducted disturbances

4.6 Magnetic fields with electrical frequencies

Test carried out according to EN 61000-4-8	Limits according to EN 61000-6-2	Limits according to EN 61131-2	
Test direction x, test in the field of an induction coil 1 m x 1 m	30 A/m, criteria A	30 A/m, criteria A	
Test direction y, test in the field of an induction coil 1 m x 1 m	30 A/m, criteria A	30 A/m, criteria A	
Test direction z, test in the field of an induction coil 1 m x 1 m	30 A/m, criteria A	30 A/m, criteria A	

Table 198: Test requirements - Magnetic fields with electrical frequencies

4.7 Voltage dips, fluctuations and short-term interruptions

Test carried out according to EN 61000-4-11	Limits according to EN 61000-6-2	Limits according to EN 61131-2	
AC power inputs	Voltage dip 70% (30% reduction), 0.5 periods, criteria B	-	
AC power inputs	Voltage dip 40% (60% reduction), 5 periods, criteria C	-	
AC power inputs	Voltage dip 40% (60% reduction), 50 periods, criteria C	-	
AC power inputs	Voltage interruptions < 5% (> 95% reduction), 250 periods, criteria C	-	
AC power inputs	-	20 interruptions, 0.5 periods, criteria A	
DC power inputs	-	20 interruptions for 10 ms < UN - 15%, criteria A	

Table 199: Test requirements - Voltage dips, fluctuations, and short-term interruptions

4.8 Damped vibration

Test carried out according to EN 61000-4-12	Limits according to EN 61131-2		
Mains inputs/outputs, L to L	±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 200: Test requirements - Damped vibration

5. Mechanical conditions

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

Table 201: Overview of limits and testing guidelines for vibration

5.1 Vibration operation

Test carried out according to EN 60068-2-6	Limits according to EN 61131-2		Limits according to EN 60721-3-3 class 3M4		
Vibration during operation: Uninterrupted duty with moveable frequency in all 3 axes (x, y, z), 1 octave per minute	10 sweeps for each axis		10 sweeps for each axis		
	Frequency	**Limit value**	**Frequency**	**Limit value**	
	5 - 9 Hz	Amplitude 3.5 mm	2 - 9 Hz	Amplitude 3 mm	
	9 - 150 Hz	Acceleration 1 g	9 - 200 Hz	Acceleration 1 g	

Table 202: Test requirements - Vibration during operation

5.2 Vibration during transport (packaged)

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

Table 203: Test requirements - Vibration during transport (packaged)

5.3 Shock during operation

Test carried out according to EN 60068-2-27	Limits according to EN 61131-2	Limits according to EN 60721-3-3 class 3M4	
Shock during operation: Pulse (half-sine) stress in all 3 axes (x, y, z)	Acceleration 15 g, length 11 ms, 18 shocks	Acceleration 10 g, Duration 11 ms	

Table 204: Test requirements - Shock during operation

5.4 Shock during transport (packaged)

Test carried out according to EN 60068-2-27	Limits according to EN 60721-3-2 class 2M1	Limits according to EN 60721-3-2 class 2M2	Limits according to EN 60721-3-2 class 2M3
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	Acceleration 100 g, Duration 6 ms, each 3 shocks, packaged

Table 205: Test requirements - Shock during transport

5.5 Toppling

Test carried out according to EN 60068-2-31	Limits according to EN 60721-3-2 class 2M1		Limits according to EN 60721-3-2 class 2M2		Limits according to EN 60721-3-2 class 2M3	
Drop and topple	Devices: Drop/topple on each edge, 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 206: Test requirements - Toppling

5.6 Free fall (packaged)

Test carried out according to EN 60068-2-32	Limits according to EN 61131-2		Limits according to EN 60721-3-2 class 2M1		Limits according to EN 60721-3-2 class 2M2		Limits according to EN 60721-3-2 class 2M3	
Free fall	Devices with delivery packaging each with 5 fall tests		Devices packaged		Devices packaged		Devices packaged	
	Weight	**Height**	**Weight**	**Height**	**Weight**	**Height**	**Weight**	**Height**
	< 10 kg	1.0 m	< 20 kg	0.25 m	< 20 kg	1.2 m	< 20 kg	1.5 m
	10 - 40 kg	0.5 m	20 - 100 kg	0.25 m	20 - 100 kg	1.0 m	20 - 100 kg	1.2 m
	> 40 kg	0.25 m	> 100 kg	0.1 m	> 100 kg	0.25 m	> 100 kg	0.5 m
	Devices with product packaging each with 5 fall tests							
	Weight	**Height**						
	< 10 kg	0.3 m						
	10 - 40 kg	0.3 m						
	> 40 kg	0.25 m						

Table 207: Test requirements - Free fall

6. Climate conditions

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

Table 208: Overview of limits and testing guidelines for temperature and humidity

6.1 Worst case operation

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

Table 209: Test requirements - Worst case during operation

6.2 Dry heat

Test carried out according to EN 60068-2-2	Limits according to EN 61131-2		
Dry heat	16 hours at +70°C for 1 cycle, then 1 hour acclimatization and function testing, duration approximately 17 hours		

Table 210: Test requirements - Dry heat

6.3 Dry cold

Test carried out according to EN 60068-2-1	Limits according to EN 61131-2		
Dry cold	16 hours at -40°C for 1 cycle, then 1 hour acclimatization and function testing, duration approximately 17 hours		

Table 211: Test requirements - Dry cold

6.4 Large temperature fluctuations

Test carried out according to EN 60068-2-14	Limits according to EN 61131-2		
Large temperature fluctuations	3 hours at -40°C and 3 hours at +70°C, 2 cycles, then 2 hours acclimatization and function testing, duration approximately 14 hours		

Table 212: Test requirements - Large temperature fluctuations

6.5 Temperature fluctuations in operation

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

Table 213: Test requirements - Temperature fluctuations during operation

6.6 Humid heat, cyclic

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

Table 214: Test requirements - Humid heat, cyclic

6.7 Humid heat, constant (storage)

Test carried out according to EN 60068-2-3	Limits according to EN 61131-2		
Humid heat, constant (storage)	48 hours at +40°C and 92.5% RH, then insulation test within 3 hours, duration approximately 49 hours		

Table 215: Test requirements - Humid heat, constant (storage)

7. Safety

Safety	Test carried out according to	Limits according to
Ground resistance	EN 61131-2	EN 60204-1: Electrical equipment of machines
		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
Voltage range		EN 61131-2: Programmable logic controllers

Table 216: Overview of limits and testing guidelines for safety

7.1 Ground resistance

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

Table 217: Test requirements - Ground resistance

1) See EN 60204-1:1997 page 62, table 9.

7.2 Insulation resistance

Test carried out	Limits according to EN 60204-1[1)]		
Insulation resistance: main circuits to protective ground conductor	> 1 MΩ at 500 V DC voltage		

Table 218: Test requirements - Insulation resistance

1) See EN 60204-1:1997 page 62, table 9.

7.3 High voltage

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

Table 219: Test requirements - High voltage

1) See EN 61131-2:2003 page 104, table 59.

7.4 Residual voltage

Test carried out according to EN 61131-2	Limits according to EN 60204-1	Limits according to 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 220: Test requirements - Residual voltage

7.5 Leakage current

Test carried out	Limits according to VDE 0701-1		
Leakage current: Phase to ground	< 3,5 mA		

Table 221: Test requirements - Leakage current

7.6 Overload

Test carried out according to UL 508	Limits according to EN 61131-2	Limits 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 222: Test requirements - Overload

7.7 Defective component

Test carried out according to UL 508	Limits according to EN 61131-2	Limits according to UL 508	
Simulation of how components in power supply became defective	Non-flammable surrounding cloth No contact with conductive parts	Non-flammable surrounding cloth No contact with conductive parts	

Table 223: Test requirements - Defective component

7.8 Voltage range

Test carried out according to	Limits according to EN 61131-2			
Supply voltage	Measurement value	Tolerance min/max		
	24 VDC 48 VDC 125 VDC	-15% +20%		
	24 VAC 48 VAC 100 VAC 110 VAC 120 VAC 200 VAC 230 VAC 240 VAC 400 VAC	- 15% +10%		

Table 224: Test requirements - Voltage range

8. Other tests

Other tests	Test carried out according to	Limits according to
Protection	-	EN 60529: Degrees 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 225: Overview of limits and testing guidelines for other tests

8.1 Protection

Test carried out according to	Limits according to EN 60529		
Protection of the operating equipment	IP2. Protection against large solid foreign bodies 12.5 mm diameter		
Protection of personnel	IP2. Protection against touching dangerous parts with fingers		
Protection against water permeation with damaging consequences	IP.0 Not protected		

Table 226: Test requirements - Protection

9. International certifications

B&R products and services comply with applicable standards. They are international standards from organizations such as ISO, IEC and CENELEC, as well as national standards from organizations such as UL, CSA, FCC, VDE, ÖVE, etc. We give special consideration to the reliability of our products in an industrial environment.

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

Table 227: International certifications

Chapter 6 • Accessories

1. Overview

Model number	Short description	Note
0TB103.9	**Plug 24V 5.08 3-pin screw clamp** 24 VDC 3-pin connector, female. Screw clamp, 3.31 mm², protected against vibration by the screw flange.	
0TB103.91	**Plug 24V 5.08 3-pin cage clamp** 24 VDC 3-pin connector, female. Cage clamps, 3.31 mm², protected against vibration by the screw flange.	
0AC201.91	**Lithium batteries, 4 pcs**. Lithium batteries, 4 pcs., 3 V / 950 mAh, button cell	
4A0006.00-000	**Lithium battery, 1 pc.** Lithium battery, 1 pc., 3 V / 950 mAh, button cell	
5CFCRD.0512-04	**CompactFlash 512 MB B&R** CompactFlash card with 512 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.1024-04	**CompactFlash 1024 MB B&R** CompactFlash card with 1024 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.2048-04	**CompactFlash 2048 MB B&R** CompactFlash card with 2048 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.4096-04	**CompactFlash 4096 MB B&R** CompactFlash card with 4096 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.8192-04	**CompactFlash 8192 MB B&R** CompactFlash card with 8192 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.016G-04	**16 GB B&R CompactFlash card** CompactFlash card with 16 GB SLC NAND flash and IDE/ATA interface	
5CFCRD.0064-03	**CompactFlash 64 MB WD** CompactFlash card with 64 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.0128-03	**CompactFlash 128 MB WD** CompactFlash card with 128 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.0256-03	**CompactFlash 256 MB WD** CompactFlash card with 256 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.0512-03	**CompactFlash 512 MB WD** CompactFlash card with 512 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.1024-03	**CompactFlash 1024 MB WD** CompactFlash card with 1024 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.2048-03	**CompactFlash 2048 MB WD** CompactFlash card with 2048 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.4096-03	**CompactFlash 4096 MB WD** CompactFlash card with 4096 MB SLC NAND flash and IDE/ATA interface	

Table 228: Model numbers - Accessories

Model number	Short description	Note
5CFCRD.8192-03	**CompactFlash 8192 MB WD** CompactFlash card with 8192 MB SLC NAND flash and IDE/ATA interface	
5MMUSB.2048-00	**USB flash drive 2 GB SanDisk** USB 2.0 flash drive 2 GB	
5MMUSB.2048-01	**USB flash drive 2 GB B&R** USB 2.0 flash drive 2 GB	
5MD900.USB2-01	**USB 2.0 drive DVD-RW/CD-RW FDD CF USB** USB 2.0 drive combination; Consists of DVD-R/RW/DVD+R/RW/CD-RW, FDD, CompactFlash slot (type II), USB connection (type A front side, type B back side); 24 VDC.	
5A5003.03	**Front cover for the USB Media Drive 5MD900.USB2-01** Front cover for the remote USB 2.0 drive combination 5MD900.USB2-01.	
5CADVI.0018-00	**DVI-D cable 1.8 m** Single cable, DVI-D/m:DVI-D/m; length: 1.8 m	
5CADVI.0050-00	**DVI-D cable 5 m** Single cable, DVI-D/m:DVI-D/m; length: 5 m	
5CADVI.0100-00	**DVI-D cable 10 m** Single cable, DVI-D/m:DVI-D/m; length: 10 m	
5CASDL.0018-00	**SDL cable 1.8 m** SDL cable for a fixed type of layout; length: 1.8 m	
5CASDL.0018-01	**SDL cable 1.8 m 45°** SDL cable for fixed type of layout with one-sided 45° plug; length: 1.8 m	
5CASDL.0018-03	**SDL flex cable 1.8 m** SDL cable for fixed and flexible type of layout; length: 1.8 m	
5CASDL.0050-00	**SDL cable 5 m** SDL cable for a fixed type of layout; length: 5 m	
5CASDL.0050-01	**SDL cable 5 m 45°** SDL cable for fixed type of layout with one-sided 45° plug; length: 5 m	
5CASDL.0050-03	**SDL flex cable 5 m** SDL cable for fixed and flexible type of layout; length: 5 m	
5CASDL.0100-00	**SDL cable 10 m** SDL cable for a fixed type of layout; length: 10 m	
5CASDL.0100-01	**SDL cable 10 m 45°** SDL cable for fixed type of layout with one-sided 45° plug; length: 10 m	
5CASDL.0100-03	**SDL flex cable 10 m** SDL cable for fixed and flexible type of layout; length: 10 m	
5CASDL.0150-00	**SDL cable 15 m** SDL cable for a fixed type of layout; length: 15 m	
5CASDL.0150-01	**SDL cable 15 m 45°** SDL cable for fixed type of layout with one-sided 45° plug; length: 15 m	
5CASDL.0150-03	**SDL flex cable 15 m** SDL cable for fixed and flexible type of layout; length: 15 m	
5CASDL.0200-00	**SDL cable 20 m** SDL cable for a fixed type of layout; length: 20 m	
5CASDL.0200-03	**SDL flex cable 20 m** SDL cable for fixed and flexible type of layout; length: 20 m	
5CASDL.0250-00	**SDL cable 25 m** SDL cable for a fixed type of layout; length: 25 m	

Table 228: Model numbers - Accessories

Model number	Short description	Note
5CASDL.0250-03	**SDL flex cable 25 m** SDL cable for fixed and flexible type of layout; length: 25 m	
5CASDL.0300-00	**SDL cable 30 m** SDL cable for a fixed type of layout; length: 30 m	
5CASDL.0300-03	**SDL flex cable 30 m** SDL cable for fixed and flexible type of layout; length: 30 m	
5CASDL.0300-13	**SDL flex cable with extender 30 m** SDL cable with extender for fixed and flexible type of layout; length: 30 m	
5CASDL.0400-13	**SDL flex cable with extender 40 m** SDL cable with extender for fixed and flexible type of layout; length: 40 m	
9A0014.02	**RS232 cable DB9/f:DB9/m 1.8 m** RS232 extension cable for remote operation of a display unit with touch screen; length 1.8 m.	
9A0014.05	**RS232 cable DB9/f:DB9/m 5 m** RS232 extension cable for remote operation of a display unit with touch screen; length 5 m.	
9A0014.10	**RS232 cable DB9/f:DB9/m 10 m** RS232 extension cable for remote operation of a display unit with touch screen; length 10 m.	
5CAUSB.0018-00	**USB 2.0 cable, A/m:B/m 1.8 m** USB 2.0 connection cable; plug type A - type B; length 1.8 m	
5CAUSB.0050-00	**USB 2.0 cable, A/m:B/m 5 m** USB 2.0 connection cable; plug type A - type B; length 5 m	
5CAMSC.0001-00	**APC810 internal supply cable**	
5ACPCI.ETH1-01	**PCI Ethernet card 10/100** half size PCI Ethernet card, 1 Ethernet connection	
5ACPCI.ETH3-01	**PCI Ethernet card 10/100 3port** half size PCI Ethernet card, 3 Ethernet connections	
0PS102.0	**Power supply, 1-phase, 2.1 A** 24 VDC power supply, 1-phase, 2.1 A, input 100-240 VAC, wide range, DIN rail mounting	
0PS104.0	**Power supply, 1-phase, 4.2 A** 24 VDC power supply, 1 phase, 4.2 A, input 115/230 VAC, auto select, DIN rail mounting	
0PS105.1	**Power supply, 1-phase, 5 A** 24 VDC power supply, 1 phase, 5 A, input 115/230 VAC, manual select, DIN rail mounting	
0PS105.2	**Power supply, 1-phase, 5 A, redundant** 24 VDC power supply, 1 phase, 5 A, redundant through parallel operation, input 115/230 VAC, manual select, DIN rail mounting	
0PS110.1	**Power supply, 1-phase, 10 A** 24 VDC power supply, 1 phase, 10 A, input 115/230 VAC, manual select, DIN rail mounting	
0PS110.2	**Power supply, 1-phase, 10 A, redundant** 24 VDC power supply, 1 phase, 10 A, redundant through parallel operation, input 115/230 VAC, manual select, DIN rail mounting	
0PS120.1	**Power supply, 1-phase, 20 A** 24 VDC power supply, 1 phase, 20 A, input 115/230 VAC, auto select, DIN rail mounting	
0PS305.1	**Power supply, 3-phase, 5 A** 24 VDC power supply, 3-phase, 5 A, input 400..500 VAC (3 phases), wide range, DIN rail mounting	

Table 228: Model numbers - Accessories

Model number	Short description	Note
0PS310.1	**Power supply, 3-phase, 10 A** 24 VDC power supply, 3-phase, 10 A, input 400..500 VAC (3 phases), wide range, DIN rail mounting	
0PS320.1	**Power supply, 3-phase, 20 A** 24 VDC power supply, 3-phase, 20 A, input 400..500 VAC (3 phases), wide range, DIN rail mounting	
0PS340.1	**Power supply, 3-phase, 40 A** 24 VDC power supply, 3-phase, 40 A, input 400..500 VAC (3 phases), wide range, DIN rail mounting	
5AC801.FA01-00	**APC810 replacement fan filter for system units with 1CS 5 pcs**	
5AC801.FA02-00	**APC810 replacement fan filter for system units with 2CS 5 pcs**	
5AC801.FA03-00	**APC810 replacement fan filter for system units with 3CS 5 pcs**	
5AC801.FA05-00	**APC810 replacement fan filter for system units with 5CS 5 pcs**	
5AC900.1000-00	**Adapter DVI-A/m to CRT DB15HD/f** Adapter DVI (plug) to CRT (socket), for connecting a standard monitor to a DVI-I interface.	
5AC801.FRAM-00	**HDD replacement tray** APC810 SATA hard disk replacement tray	
5AC801.RDYR-01	**APC810 Ready relay /2** Ready relay for APC810 for installation on an add-on UPS slot	

Table 228: Model numbers - Accessories

2. TB103 3-pin supply voltage connector

2.1 General Information

This single row 3-pin terminal block is mainly used to connect the supply voltage.

2.2 Order data

Model number	Description	Image
0TB103.9	Plug for the 24 V supply voltage (screw clamps)	0TB103.9
0TB103.91	Plug for the 24 V supply voltage (cage clamps)	0TB103.91

Table 229: Order data - Supply plug

2.3 Technical data

Information:

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

Name	0TB103.9	0TB103.91
Number of pins	3	
Type of terminal	Screw clamps	Cage clamps
Distance between contacts	5.08 mm	

Table 230: Technical data - TB103 supply plug

Name	0TB103.9	0TB103.91
Resistance between contacts	≤ 5 mΩ	
Nominal voltage according to VDE / UL,CSA	250 V / 300 V	
Current load according to VDE / UL,CSA	14.5 A / 10 A per contact	
Terminal size	0.08 mm² - 3.31 mm²	
Cable type	Copper wires only (no aluminum wires!)	

Table 230: Technical data - TB103 supply plug (cont.)

3. Replacement CMOS batteries

The lithium battery is needed for buffering the BIOS CMOS data, the real-time clock (RTC), and SRAM data.

3.1 Order data

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

Table 231: Order data Lithium batteries

3.2 Technical data

Information:

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

Features	0AC201.91	4A0006.00-000
Capacity	950 mAh	
Voltage	3 V	
Self discharge at 23°C	< 1% per year	
Storage time	Max. 3 years at 30° C	
Environmental characteristics		
Storage temperature	-20 to +60°C	
Relative humidity	0 to 95% (non-condensing)	

Table 232: Technical data - Lithium batteries

4. Replacement fan

Information:

The fan filters are subject to wear, and should be checked with appropriate frequency to determine whether the air flow provides sufficient cooling. An exchange or cleaning of the filter kit is appropriate at that time.

Figure 166: Replacement fan

Model number	Short description	Note
5AC801.FA01-00	APC810 replacement fan filter 1CS 5 pcs.	
5AC801.FA02-00	APC810 replacement fan filter 2CS 5 pcs.	
5AC801.FA03-00	APC810 replacement fan filter 3CS 5 pcs.	
5AC801.FA05-00	APC810 replacement fan filter 5CS 5 pcs.	

Table 233: Order data - Replacement fan filters

5. DVI - monitor adapter 5AC900.1000-00

This adapter enables a standard monitor to be connected to the DVI-I interface.

5.1 Order data

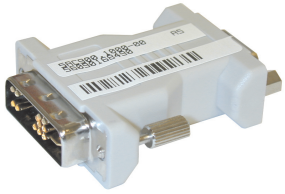
Model number	Description	Image
5AC900.1000-00	Adapter DVI-A/m to CRT DB15HD/f Adapter DVI (plug) to CRT (socket), for connecting a standard monitor to a DVI-I interface.	

Table 234: Order data - DVI - CRT adapter

6. CompactFlash cards 5CFCRD.xxxx-04

6.1 General Information

Information:

B&R CompactFlash cards 5CFCRD.xxxx-04 and CompactFlash cards from a different manufacturer cannot be used in the same system at the same time. Due to differences in technology (older vs. newer technologies), problems can occur during system startup that are caused by the different boot times.

See chapter 3 "Commissioning", section 7 "Known problems / issues", on page 210.

Information:

The 5CFCRD.xxxx-04 CompactFlash cards are supported on B&R devices with WinCE Version 6.0 or higher.

6.2 Order data

Model number	Description	Image
5CFCRD.0512-04	512 MB B&R CompactFlash card	CompactFlash card
5CFCRD.1024-04	1024 MB B&R CompactFlash card	
5CFCRD.2048-04	2048 MB B&R CompactFlash card	
5CFCRD.4096-04	4096 MB B&R CompactFlash card	
5CFCRD.8192-04	8192 MB B&R CompactFlash card	
5CFCRD.016G-04	16 GB B&R CompactFlash card	

Table 235: Order data - CompactFlash cards

6.3 Technical data

Caution!

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

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

Information:

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

Features	5CFCRD.0512-04	5CFCRD.1024-04	5CFCRD.2048-04	5CFCRD.4096-04	5CFCRD.8192-04	5CFCRD.016G-04
MTBF (at 25°C)	> 3,000,000 hours					
Maintenance	None					
Data reliability	< 1 unrecoverable error in 10^{14} bit read accesses					
Data retention	10 years					
Lifetime monitoring	Yes					
Supported operating modes	PIO Mode 0-6, Multiword DMA Mode 0-4, Ultra DMA Mode 0-4					
Continuous reading	Typically 35 MB/s(240X)[1)2)] Max. 37 MB/s (260X)[1) 2)]	Typically 35 MB/s (240X)[1) 2)] Max. 37 MB/s (260X)[1) 2)]	Typically 35 MB/s (240X)[1) 2)] Max. 37 MB/s (260X)[1) 2)]	Typically 33 MB/s (220X)[1) 2)] Max. 34 MB/s (226X)[1) 2)]	Typically 27 MB/s (180X)[1) 2)] Max. 28 MB/s (186X)[1) 2)]	Typically 36 MB/s (240X)[1) 2)] Max. 37 MB/s (247X)[1) 2)]
Continuous writing	Typically 17 MB/s (110X) Max. 20 MB/s (133X)	Typically 17 MB/s (110X) Max. 20 MB/s (133X)	Typically 17 MB/s (110X) Max. 20 MB/s (133X)	Typically 16 MB/s (106X) Max. 18 MB/s (120X)	Typically 15 MB/s (100X) Max. 17 MB/s (110X)	Typically 18 MB/s (120X) Max. 19 MB/s (126X)
Endurance						
Guaranteed amount of data [3)] Results in 5 years [3)]	50 TB 27.40 GB/day	100 TB 54.79 GB/day	200 TB 109.59 GB/day	400 TB 219.18 GB/day	800 TB 438.36 GB/day	1600 TB 876.72 GB/day
Clear/write cycles Guaranteed Typical[4)]	100,000 2,000,000					
SLC flash	Yes					
Wear leveling	Static					
Error Correction Coding (ECC)	Yes					
Support	**5CFCRD.0512-04**	**5CFCRD.1024-04**	**5CFCRD.2048-04**	**5CFCRD.4096-04**	**5CFCRD.8192-04**	**5CFCRD.016G-04**

Table 236: Technical data - CompactFlash cards 5CFCRD.xxxx-04

Hardware	PP300/400, PPC300, PPC700, PPC725, PPC800, APC620, APC810, APC820					
Windows 7 32-bit	-	-	-	-	-	Yes
Windows 7 64-bit	-	-	-	-	-	-
Windows Embedded Standard 7, 32-bit	-	-	-	-	Yes	Yes
Windows Embedded Standard 7, 64-bit	-	-	-	-	-	Yes
Windows XP Professional	-	-	-	Yes	Yes	Yes
Windows XP Embedded	Yes	Yes	Yes	Yes	Yes	Yes
Windows Embedded Standard 2009	No	Yes	Yes	Yes	Yes	Yes
Windows CE 6.0	Yes	Yes	Yes	Yes	Yes	Yes 5)
Windows CE 5.0	-	-	-	-	-	-
PVI Transfer Tool	V3.2.3.8 (part of PVI Development Setup V2.06.00.3011)					-
B&R Embedded OS Installer	V3.10					-
Mechanical characteristics						
Dimensions Length Width Thickness	 36.4 ±0.15 mm 42.8 ±0.10 mm 3.3 ±0.10 mm					
Weight	10 g					
Environmental characteristics						
Ambient temperature Operation Storage Transport	 0 to +70°C -65 to +150°C -65 to +150°C					
Relative humidity Operation/Storage/Transport	 Max. 85% at 85°C					
Vibration Operation/Storage/Transport	 20 G peak, 20- 2000 Hz, 4 in each direction (JEDEC JESD22, method B103) 5.35 G RMS, 15 min per level (IEC 68-2-6)					
Shock Operation/Storage/Transport	 1.5k G peak, 0.5 ms 5 times (JEDEC JESD22, method B110) 30 G, 11 ms 1 time (IEC 68-2-27)					
Altitude	Max. 15,000 feet (4,572 m)					

Table 236: Technical data - CompactFlash cards 5CFCRD.xxxx-04 (cont.)

1) Speed specification with 1X = 150 KB/s. All specifications refer to the Samsung Flash chips, CompactFlash cards in UDMA mode 4, 30 ns cycle time in True-IDE mode with sequential write/read test.

2) The file is written/read sequentially in True IDE mode with the DOS program Thruput.exe.

3) Endurance of B&R CF cards (linear written block size with 128 kB)

4) Depending on the average file size.

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

6.3.1 Temperature humidity diagram

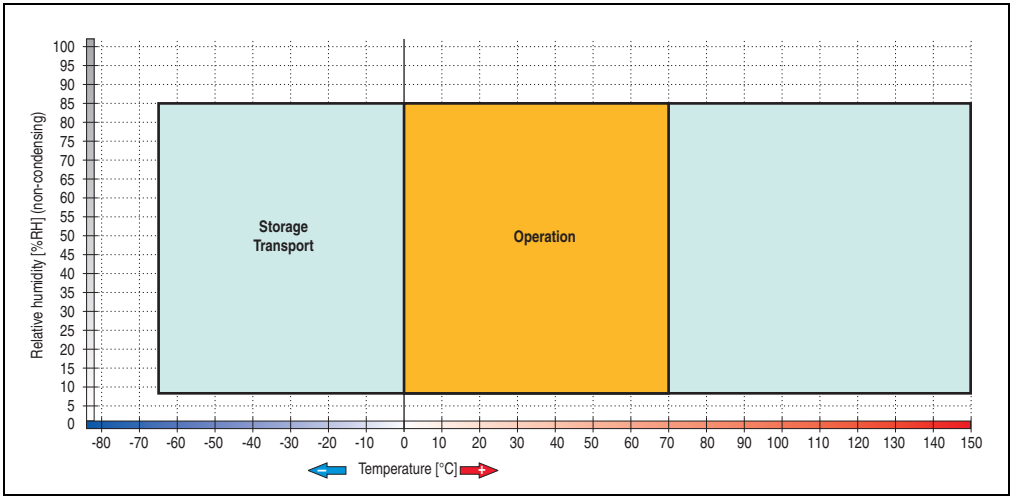


Figure 167: Temperature humidity diagram - CompactFlash cards 5CFCRD.xxxx-04

6.4 Dimensions

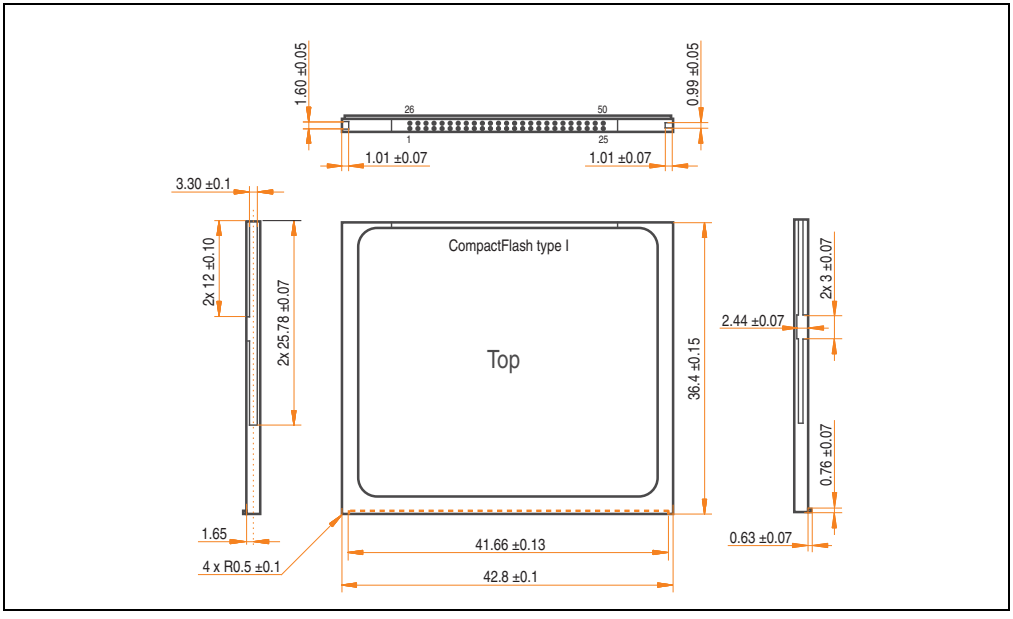


Figure 168: Dimensions - CompactFlash card Type I

6.5 Benchmark

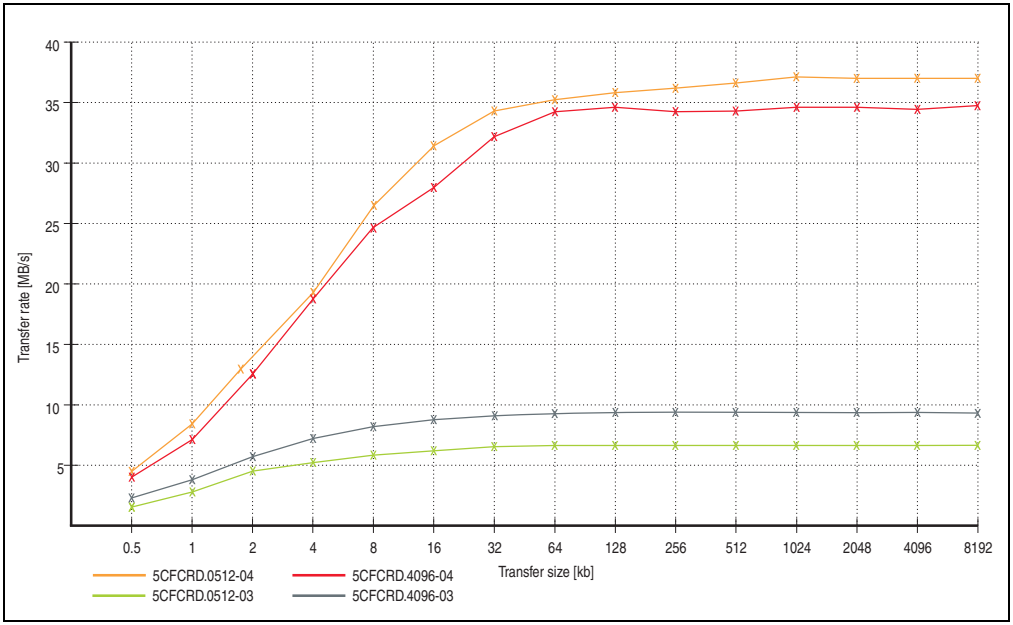


Figure 169: ATTO disk benchmark v2.34 comparison (reading)

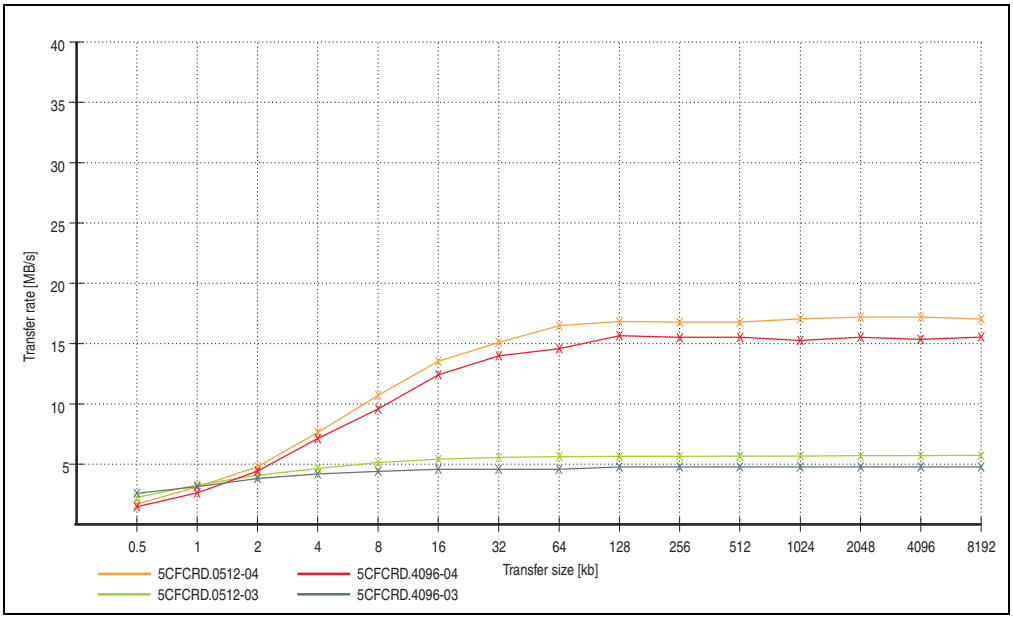


Figure 170: ATTO disk benchmark v2.34 comparison (writing)

7. CompactFlash cards - 5CFCRD.xxxx-03

7.1 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 chapter 3 "Commissioning", section 7 "Known problems / issues", on page 210.

Information:

On Windows CE 5.0 devices, 5CFCRD.xxxx-03 CompactFlash cards up to 1GB are supported.

7.2 Order data

Model number	Description	Image
5CFCRD.0064-03	CompactFlash 64 MB WD	CompactFlash card
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 237: Order data - CompactFlash cards

7.3 Technical data

Caution!

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

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

Information:

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

Features	5CFCRD. 0064-03	5CFCRD. 0128-03	5CFCRD. 0256-03	5CFCRD. 0512-03	5CFCRD. 1024-03	5CFCRD. 2048-03	5CFCRD. 4096-03	5CFCRD. 8192-03
MTBF (at 25°C)	> 4,000,000 hours							
Maintenance	None							
Data reliability	< 1 unrecoverable error in 10^{14} bit read accesses							
Data retention	10 years							
Lifetime monitoring	Yes							
Supported operating modes	PIO Mode 0-4, Multiword DMA Mode 0-2							
Continuous reading	Typically 8 MB/s							
Continuous writing	Typically 6 MB/s							
Endurance								
Clear/write cycles Typical	> 2,000,000							
SLC flash	Yes							
Wear leveling	Static							
Error Correction Coding (ECC)	Yes							
Support								
Hardware	MP100/200, PP100/200, PP300/400, PPC300, PPC700, PPC725 PPC800, Provit 2000, Provit 5000, APC620, APC680, APC810, APC820							
Windows 7 32-bit	-	-	-	-	-	-	-	-
Windows 7 64-bit	-	-	-	-	-	-	-	-
Windows Embedded Standard 7, 32-bit	-	-	-	-	-	-	-	Yes
Windows Embedded Standard 7, 64-bit	-	-	-	-	-	-	-	-

Table 238: Technical data - CompactFlash cards 5CFCRD.xxxx-03

Support	5CFCRD. 0064-03	5CFCRD. 0128-03	5CFCRD. 0256-03	5CFCRD. 0512-03	5CFCRD. 1024-03	5CFCRD. 2048-03	5CFCRD. 4096-03	5CFCRD. 8192-03
Windows XP Professional	-	-	-	-	-	-	Yes	Yes
Windows XP Embedded	-	-	-	Yes	Yes	Yes	Yes	Yes
Windows CE 6.0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes[1)]
Windows CE 5.0	Yes	Yes	Yes	Yes	Yes	-	-	-
PVI Transfer Tool	V2.57 (part of PVI Development Setup V2.5.3.3005)							
B&R Embedded OS Installer	V2.21							
Mechanical characteristics								
Dimensions Length Width Thickness	 36.4 ±0.15 mm 42.8 ±0.10 mm 3.3 ±0.10 mm							
Weight	11.4 g							
Environmental characteristics								
Ambient temperature Operation Storage Transport	 0 to +70°C -50 to +100°C -50 to +100°C							
Relative humidity Operation/Storage/Transport	 8 to 95%, non-condensing							
Vibration Operation Storage/Transport	 Max. 16,3 g (159 m/s^2 0-peak) Max. 30 g (294 m/s^2 0-peak)							
Shock Operation Storage/Transport	 Max. 1000 g (9810 m/s^2 0-peak) Max. 3000 g (29430 m/s^2 0-peak)							
Altitude	Maximum 80,000 feet (24,383 meters)							

Table 238: Technical data - CompactFlash cards 5CFCRD.xxxx-03 (cont.)

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

7.3.1 Temperature humidity diagram

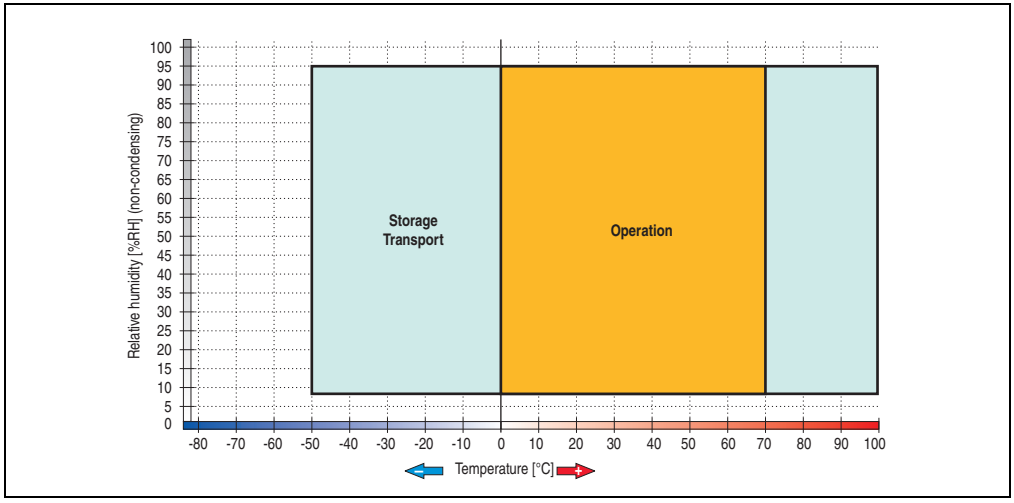


Figure 171: Temperature humidity diagram - CompactFlash cards 5CFCRD.xxxx-03

7.4 Dimensions

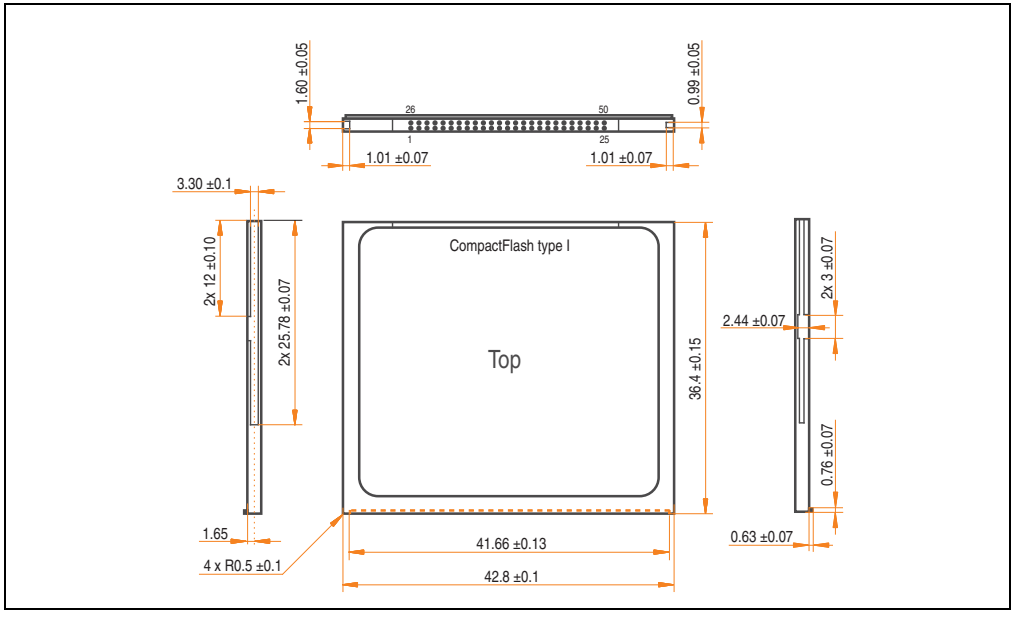


Figure 172: Dimensions - CompactFlash card Type I

8. USB Media Drive - 5MD900.USB2-01

Figure 173: USB Media Drive - 5MD900.USB2-01

8.1 Order data

Model number	Description	Note
5MD900.USB2-01	**USB 2.0 drive DVD-RW/CD-RW FDD CF USB** USB 2.0 drive combination, consists of DVD-R/RW/DVD+R/RW/CD-RW, FDD, CompactFlash slot (type II), USB connection (type A front, type B back); 24V DC.	

Table 239: Order data - Uninterruptible power supply

8.2 Features

- Desk-top or rack-mount operation (mounting rail brackets)
- Integrated USB diskette drive
- Integrated DVD-RW/CD-RW drive
- Integrated CompactFlash slot IDE/ATAPI (Hot Plug capable)
- Integrated USB 2.0 connection (up to 480 Mbit high speed)
- +24 VDC supply (back side)
- USB/B 2.0 connection (back side)
- Optional front cover (see also section 8.9 "Front cover 5A5003.03 for the USB Media Drive", on page 367)

8.3 Technical data

Information:

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

Features - entire device	5MD900.USB2-01 Rev. D0 and higher
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s)
Maximum cable length	5 m (without hub)
Power supply Rated voltage	 24 VDC ±25%
Features - diskette drive	
Data capacity	720 KB / 1.25 MB / 1.44 MB (formatted)
Data transfer rate	250 kBits (720 KB) or 500 kBits (1.25 MB and 1.44 MB)
Rotation speed	Up to 360 rpm
Diskette media	High density (2HD) or normal density (2DD) 3.5" diskettes
MTBF	30,000 POH (Power-On Hours)
Features - DVD-RW/CD-RW drive	
Write speed CD-R CD-RW DVD-R DVD-RW DVD+R DVD+RW DVD+R (Double Layer) DVD-R (Double Layer) DVD-RAM[1)]	 10-24x 10-24x 2-6x 2-6x 3.3-8x 3.3-8x 2.4-4x 2-4x 3-5x
Reading rate CD DVD	 24x 8x
Data transfer rate	Max. 33.3 MB/s
Access time (average) CD / DVD	 130 ms (24x) / 130 ms (8x)
Revolution speed	Max. 5090 rpm ± 1%
Starting time (0 rpm to read access) CD DVD	 14 seconds (maximum) 15 seconds (maximum)
Host interface	IDE (ATAPI)

Table 240: Technical data - USB Media Drive 5MD900.USB2-01 Rev D0 and higher

Features - DVD-RW/CD-RW drive	5MD900.USB2-01
Readable media CD DVD	 CD/CD-ROM (12 cm, 8 cm), CD-R, CD-RW DVD-ROM, DVD-R, DVD-RW. DVD-RAM, DVD+R, DVD+R (double layer), DVD+RW
Non-write protected media CD DVD	 CD-R, CD-RW DVD-R/RW, DVD-RAM (4.7 GB), DVD+R/RW, DVD+R (double layer)
Compatible formats	CD-DA, CD-ROM mode 1/mode 2 CD-ROM XA mode 2 (form 1, form 2) Photo CD (single/multi-session), Enhanced CD, CD text DVD-ROM, DVD-R, DVD-RW, DVD-Video DVD-RAM (4.7 GB; 2.6 GB) DVD+R, DVD+R (double layer), DVD+RW
Write-methods CD DVD	 Disk at once, session at once, packet write, track at once Disk at once, incremental, over-write, sequential, multi-session
Laser class	Class 1 laser
Data buffer capacity	8 MB
Noise level (complete read access)	Approx. 48 dBA in a distance of 50 cm
Service life Opening/closing the drawer	60,000 POH (Power-On Hours) > 10,000 times
CompactFlash slot layout	
CompactFlash Type Amount Connection	 Type I 1 slot IDE/ATAPI
CompactFlash LED	Signals read or write access to an inserted CompactFlash card
Hot Plug capable	Yes
Features - USB connections	
USB A on the front side Power supply Type Transfer rate	Connection of further peripheral devices Max. 500 mA 2.0 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s)
USB B back side	Connection to the system
Mechanical characteristics	
Outer dimensions (without slide-in) Width Length Height	 70 mm 100 mm 9.5 mm
Weight	Approx. 1.1 kg (without front cover)
Environmental characteristics	
Ambient temperature[2)] Operation Storage Transport	 +5 to +45°C -20 to +60°C -40 to +60°C

Table 240: Technical data - USB Media Drive 5MD900.USB2-01 Rev D0 and higher (cont.)

Environmental characteristics	5MD900.USB2-01
Relative humidity Operation Storage Transport	 20 to 80%, non-condensing 5 to 90%, non-condensing 5 to 95%, non-condensing
Vibration Operation Storage Transport	 5 - 500 Hz: 0.3 g (2.9 m/s^2 0-peak) 10 - 100 Hz: 2 g (19.6 m/s^2 0-peak) 10 - 100 Hz: 2 g (19.6 m/s^2 0-peak)
Shock Operation Storage Transport	 Max. 5 g (49 m/s ^{2} 0-peak) and 11 ms duration Max. 60 g (588 m/s ^{2} 0-peak) and 11 ms duration Max. 60 g (588 m/s ^{2} 0-peak) and 11 ms duration
Altitude	Max. 3000 meters

Table 240: Technical data - USB Media Drive 5MD900.USB2-01 Rev D0 and higher (cont.)

1) DVD RAM drivers are not provided by the manufacturer. Support of DVD 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).

8.4 Dimensions

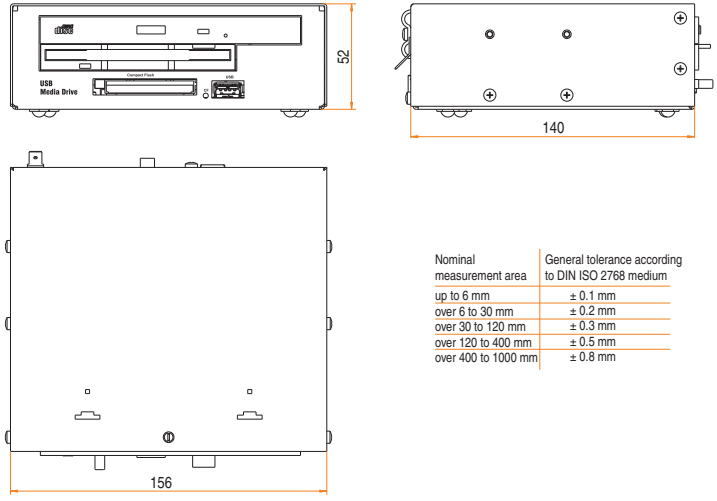
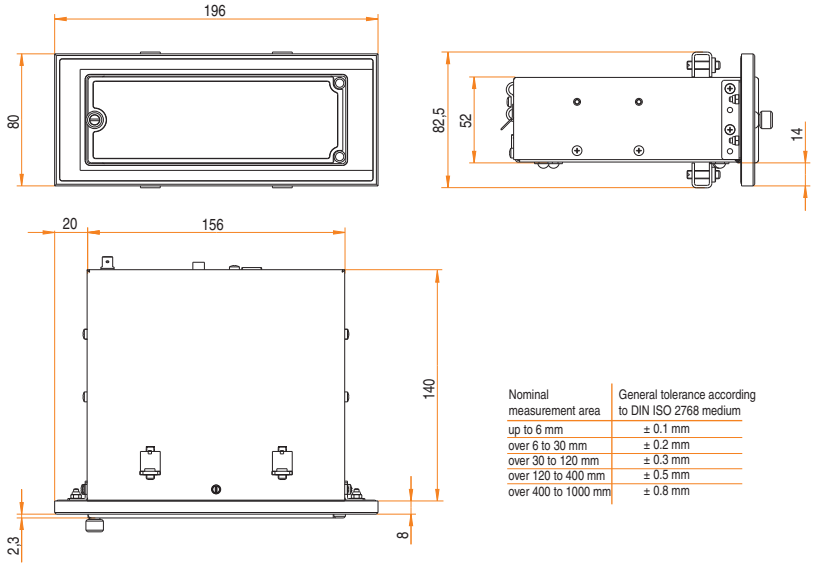


Figure 174: Dimensions - 5MD900.USB2-01

8.5 Dimensions with front cover



Nominal measurement area	General tolerance according to DIN ISO 2768 medium
up to 6 mm	± 0.1 mm
over 6 to 30 mm	± 0.2 mm
over 30 to 120 mm	± 0.3 mm
over 120 to 400 mm	± 0.5 mm
over 400 to 1000 mm	± 0.8 mm

Figure 175: Dimensions - USB Media Drive with front cover

8.5.1 Cutout installation

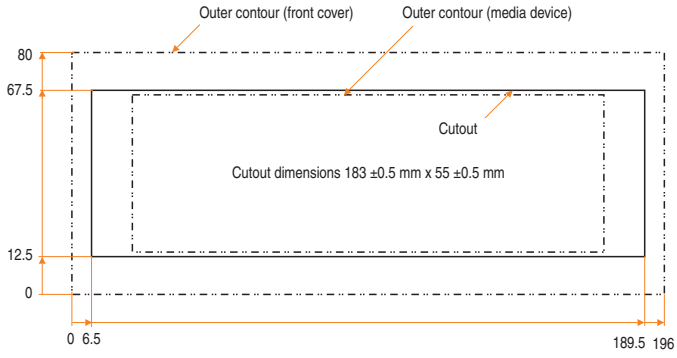


Figure 176: Installation cutout - USB Media Drive with front cover

8.6 Contents of delivery

Amount	Component
1	USB Media Drive complete unit
2	Mounting rail brackets

Table 241: Contents of delivery - USB Media Drive - 5MD900.USB2-01

8.7 Interfaces

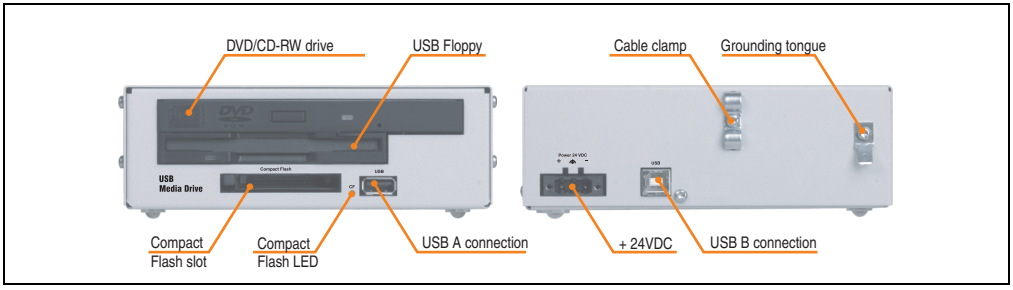


Figure 177: Interfaces - 5MD900.USB2-01

8.8 Installation

The USB Media Drive can be operated as a desk-top device (rubber feet) or as a rack-mount device (2 mounting rail brackets included).

8.8.1 Mounting orientation

Because of limits to the mounting orientation with the components used (floppy, DVD-CDRW drive), the USB media drive is only permitted to be mounted and operated as shown in the following figure.

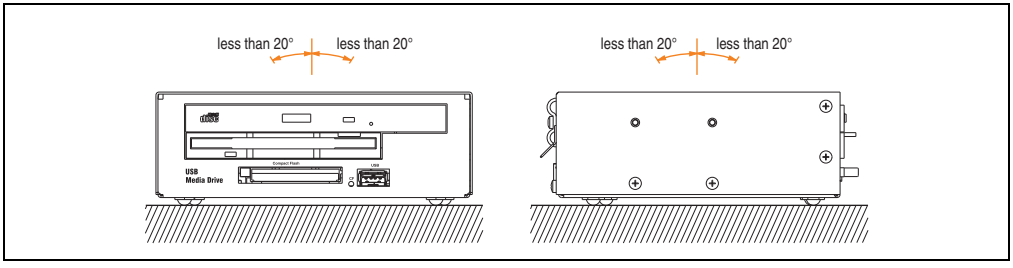


Figure 178: Mounting orientation - 5MD900.USB2-01

8.9 Front cover 5A5003.03 for the USB Media Drive

This front cover can also be mounted on the front of the USB media drive (model number 5MD900.USB2-00 or 5MD900.USB2-01) to protect the interface.

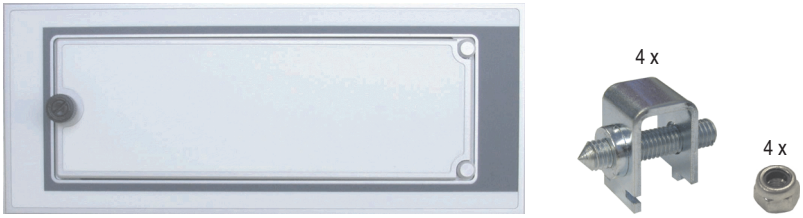


Figure 179: Front cover 5A5003.03

8.9.1 Technical data

Features	5A5003.03
Front cover design / colors Dark gray border around the cover Light gray background	 Pantone 432CV Pantone 427CV

Table 242: Technical data - 5A5003.03

8.9.2 Dimensions

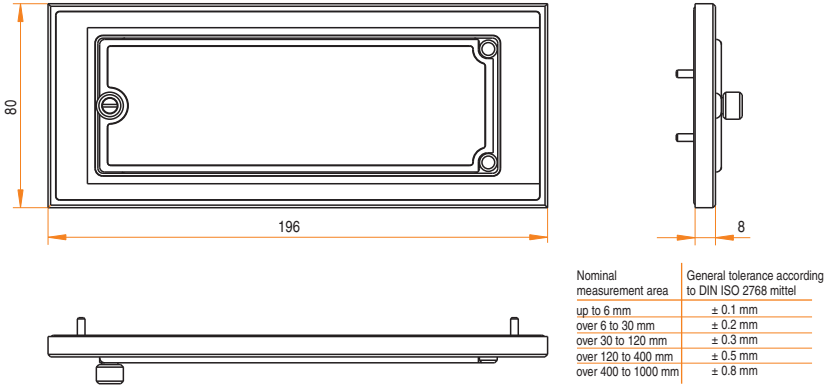
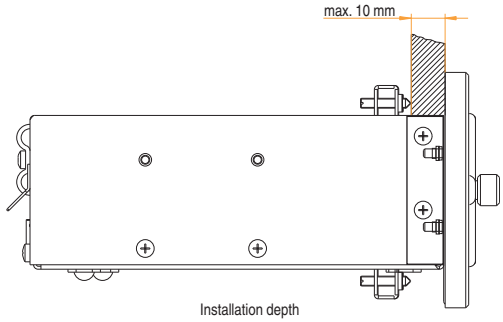


Figure 180: Dimensions - 5A5003.03

8.9.3 Installation

The front cover is attached with 2 mounting rail brackets (included with USB Media Drive) and 4 M3 locknuts. The USB media drive and front cover can be mounted as a whole in (for example) a control cabinet door.

Mounting



Installation depth

Figure 181: Front cover mounting and installation depth

8.9.4 Cutout installation

See the figure 176 "Installation cutout - USB Media Drive with front cover", on page 365.

9. USB flash drive

Information:

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

- **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.**

9.1 General Information

USB flash drives are easy-to-exchange storage media. Because of the fast data transfer (USB 2.0), the USB flash drives are ideal for use as a portable memory medium. Without requiring additional drivers ("Hot Plug & Play" - except with Windows 98SE), the USB flash drive can be converted immediately into an additional drive where data can be read or written.

9.2 Order data

Model number	Description	Image
5MMUSB.2048-00	USB flash drive 2 GB SanDisk Cruzer Micro	
5MMUSB.2048-01	**USB flash drive 2 GB B&R** USB 2.0 flash drive 2 GB	

Table 243: Order data - USB flash drives

9.3 Technical data - 5MMUSB.2048-00

Information:

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

Features	5MMUSB.2048-00
LED	1 LED (green), signals data transfer (send and receive)
Power supply Power consumption	Via the USB port 650 µA in sleep mode, 150 mA read/write
Interface Type Transfer rate Sequential reading Sequential writing Connection	USB specification 2.0 high speed device, mass storage class, USB-IF and WHQL certified USB 1.1 and 2.0 compatible Up to 480 Mbit (high speed) Max. 8.7 MB/second Max. 1.7 MB/second To each USB type A interface
MTBF (at 25°C)	100,000 hours
Data retention	10 years
Maintenance	None
Operating system support	Windows CE 4.2, CE 5.0, ME, 2000, XP and Mac OS 9.1.x+, OS X v10.1.2+
Mechanical characteristics	
Dimensions Length Width Thickness	 52.2 mm 19 mm 7.9 mm
Environmental characteristics	
Ambient temperature Operation Storage Transport	 0 to +45°C -20 to +60°C -20 to +60°C
Relative humidity Operation Storage Transport	 10 to 90%, non-condensing 5 to 90%, non-condensing 5 to 90%, non-condensing
Vibration Operation Storage Transport	 At 10 - 500 Hz: 2 g (19,6 m/s^2 0-peak), oscillation rate 1/minute At 10 - 500 Hz: 4 g (39,2 m/s^2 0-peak), oscillation rate 1/minute At 10 - 500 Hz: 4 g (39,2 m/s^2 0-peak), oscillation rate 1/minute
Shock Operation Storage Transport	 Max. 40 g (392 m/s^2 0-peak) and 11 ms duration Max. 80 g (784 m/s^2 0-peak) and 11 ms duration Max. 80 g (784 m/s^2 0-peak) and 11 ms duration

Table 244: Technical data - USB flash drive 5MMUSB.2048-00

Environmental characteristics	5MMUSB.2048-00
Altitude	
Operation	3,048 meters
Storage	12,192 meters
Transport	12,192 meters

Table 244: Technical data - USB flash drive 5MMUSB.2048-00 (cont.)

9.3.1 Temperature humidity diagram

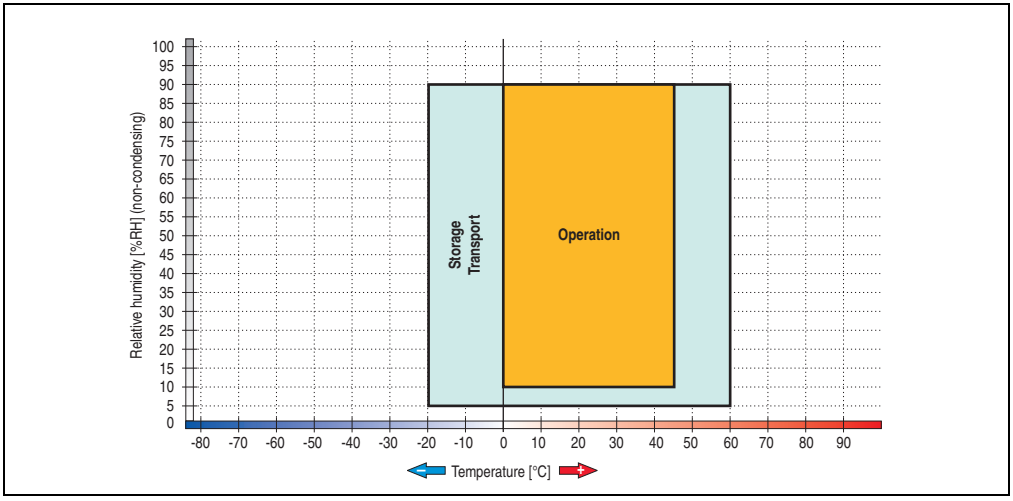


Figure 182: Temperature humidity diagram - USB flash drive - 5MMUSB.2048-00

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).

9.4 Technical data - 5MMUSB.2048-01

Information:

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

Features	5MMUSB.2048-01
LED	1 LED (green), signals data transfer (send and receive)
Power supply Power consumption	Via the USB port max. 500 µA sleep mode, max. 120 mA read/write
Interface Type Transfer rate Sequential reading Sequential writing Connection	USB specification 2.0 high speed device, mass storage class, USB-IF and WHQL certified USB 1.1 and 2.0 compatible Up to 480 Mbit (high speed) Max. 31 MB/second Max. 30 MB/second To each USB type A interface
MTBF	> 3,000,000 hours
Data retention	> 10 years
Maintenance	None
Operating system support	Windows CE, ME, 2000, XP, Vista und Mac OS 9 or newer, Linux 2.4 or newer
Mechanical characteristics	
Dimensions Length Width Thickness	 67.85 mm 17.97 mm 8.35 mm
Environmental characteristics	
Ambient temperature Operation Storage Transport	 0 to +70°C -50 to +100°C -50 to +100°C
Relative humidity Operation Storage Transport	 85%, non-condensing 85%, non-condensing 85%, non-condensing
Vibration Operation Storage Transport	 At 20 - 2000 Hz: 20 g (peak) At 20 - 2000 Hz: 20 g (peak) At 20 - 2000 Hz: 20 g (peak)
Shock Operation Storage Transport	 max. 1500 g (peak) max. 1500 g (peak) max. 1500 g (peak)

Table 245: Technical data - USB flash drive 5MMUSB.2048-01

Environmental characteristics	5MMUSB.2048-01
Altitude	
Operation	3,048 meters
Storage	12,192 meters
Transport	12,192 meters

Table 245: Technical data - USB flash drive 5MMUSB.2048-01 (cont.)

9.4.1 Temperature humidity diagram

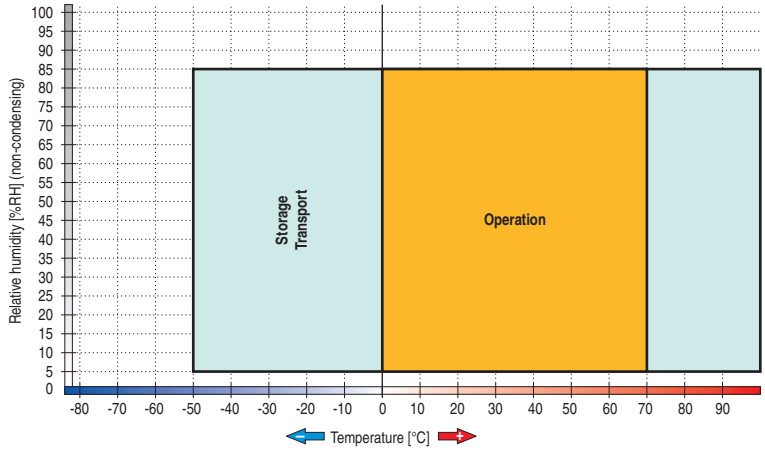


Figure 183: Temperature humidity diagram - USB flash drive - 5MMUSB.2048-01

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).

10. Uninterruptible power supply UPS

With the optionally integrated UPS, the Automation PC 810 makes sure that the PC system completes write operations even after a power failure occurs. When the UPS detects a power failure, it switches to battery operation immediately without interruption. This means that all running programs will be ended properly by the UPS software. This prevents the possibility of inconsistent data (only functions if the UPC is already configured and the driver is activated).

Information:

More detailed information about uninterruptible power supplies can be found in the UPS manual. This can be downloaded from the B&R homepage.

Information:

The monitor is not buffered by the UPS and will shut off when the power fails.

By integrating the charging circuit in the Automation PC 810 housing, the installation has been reduced to merely attaching the connection cable to the battery unit mounted next to the PC.

Special emphasis was placed on ease of maintenance when the battery unit was designed. The batteries are easily accessible from the front and can be switched in just a few moments when servicing.

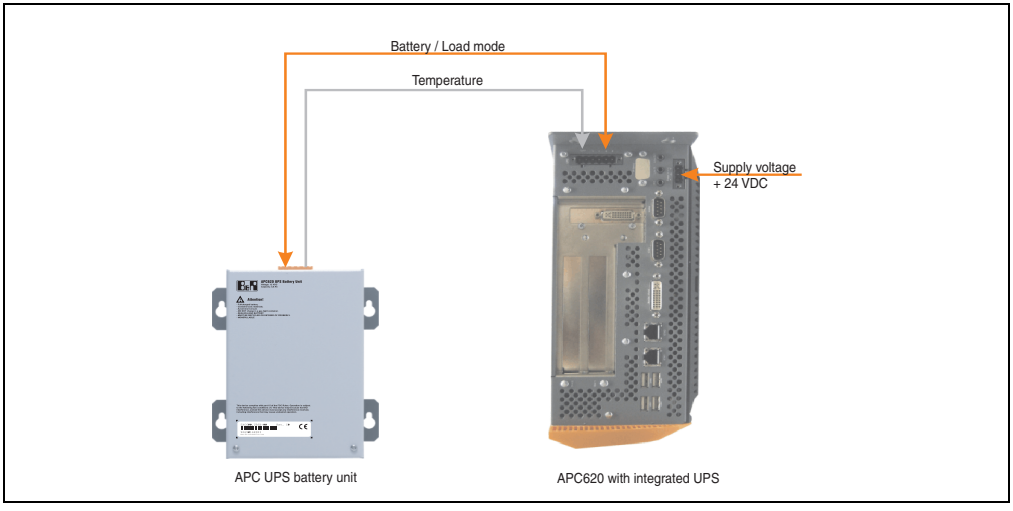


Figure 184: UPS principle

10.1 Order data

Model number	Description	Note
5AC600.UPSI-00	**Add-on UPS module** Order UPS module for Automation PC, cable (5CAUPS.0005-00 or 5CAUPS.0030-00) and battery unit (5AC600.UPSB-00) separately.	
5AC600.UPSB-00	**5Ah battery unit** UPS battery unit for the add-on UPS module	
5CAUPS.0005-00	**0.5 meter UPS cable** Connection cable between add-on UPS module and UPS battery unit, length 0.5 meters	
5CAUPS.0030-00	**3 meter UPS cable** Connection cable between add-on UPS module and UPS battery unit, length 3 meters	

Table 246: Order data - Uninterruptible power supply

10.2 Features

- Long-lasting, maintenance-free rechargeable batteries
- Communication via integrated interfaces
- Temperature sensor
- Driver software
- Deep discharge protection

10.3 Requirements

1) Add-on UPS module 5AC600.UPSI-00
   For more on installing the add-on modules, see chapter 7 "Maintenance / Servicing", section "Installing the UPS module", on page 434.

2) Battery unit 5AC600.UPSB-00

3) UPS connection cable 0.5 m (5CAUPS.0005-00) or 3 m (5CAUPS.0030-00)

4) To configure: Automation Device Interface driver version 1.60 or higher (for the ADI Control Center)

   For info regarding configuration of the B&R UPS using the ADI Control Center, see chapter 8.4 "UPS configuration".

10.4 Individual components

10.4.1 Add-on UPS module 5AC600.UPSI-00

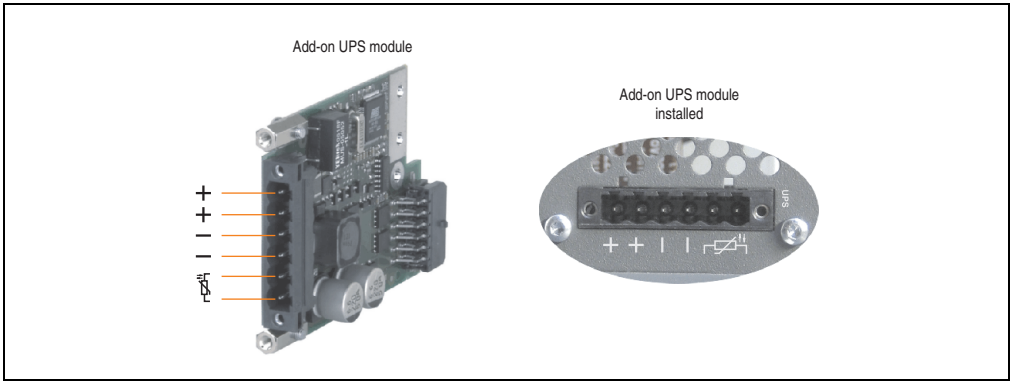


Figure 185: Add-on UPS module 5AC600.UPSI-00

Technical data

Features	5AC600.UPSI-00
Switching threshold mains / battery operation	15 / 13 V
Mains failure bridging	Max. 20 min at 150 W load
Charging current	Max. 0.5 A
Deep discharge protection	Yes, at 10 V on the battery unit
Short circuit protection	No
Power requirements	Max. 7.5 watts
Status indicators	Via the ADI Control Center (see section "Displaying UPS status values", on page 313)
Configuration	Via the ADI Control Center (see section "UPS configuration", on page 312)

Table 247: Technical data - 5AC600.UPSI-00

Contents of delivery

The module is installed using the materials included in the delivery. For installation instructions, see chapter 7 "Maintenance / Servicing", section "Installing the UPS module", on page 434.

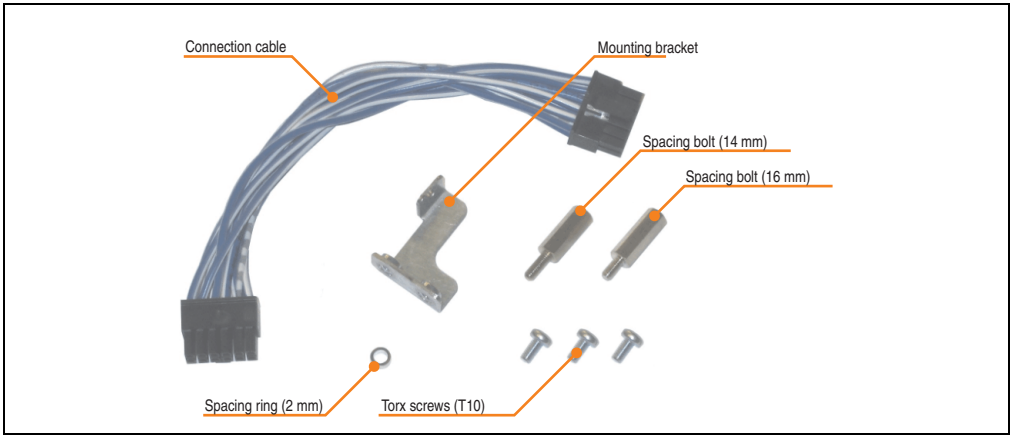


Figure 186: Add-on UPS module 5AC600.UPSI-00 - Installation materials

10.4.2 Battery unit 5AC600.UPSB-00

The battery unit is subject to wear and should be replaced regularly (at least following the specified lifespan).

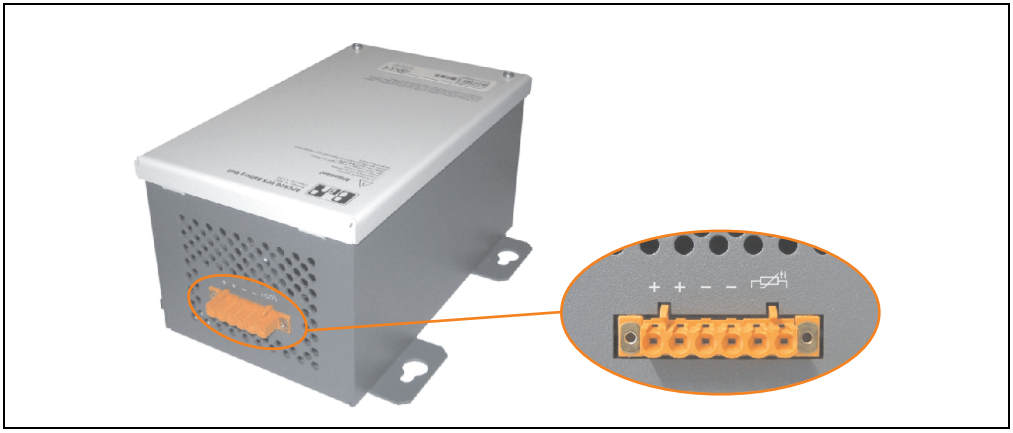


Figure 187: Battery unit 5AC600.UPSB-00

Technical data

Features	5AC600.UPSB-00
Battery Type Method	 Enersys Cyclon 2 V 5 Ah; (6 connected in series) Single cell (X cell)
Operating current	Max. 8 A
Deep discharge voltage	10 V
Dimensions (W x H x D)	Image 190 "Dimensions - 5AC600.UPSB-00", on page 380
Temperature sensor	NTC resistance
Weight	Approx. 3.2 kg
Ambient temperature Operation Storage Transport	 -40 to +80°C -65 to +80°C -65 to +80°C
Relative humidity Operation Storage Transport	 5 to 95% (non-condensing) 5 to 95% (non-condensing) 5 to 95% (non-condensing)
Altitude	Max. 3000 meters
Mounting instructions	See "Mounting instructions", on page 381
Service life	10 years at 25°C (up to 80% battery capacity)
Maintenance interval during storage	6 month interval between charges

Table 248: Technical data - 5AC600.UPSB-00

Temperature life span diagram up to 20% battery capacity.

Temperature	Lifespan (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

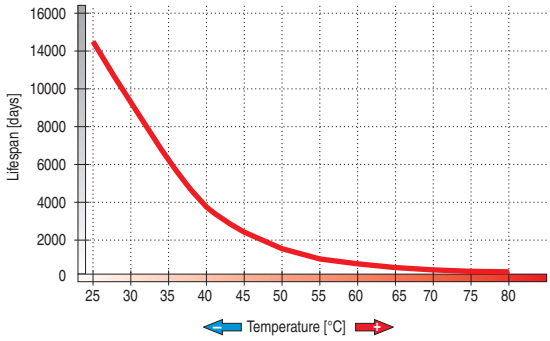


Figure 188: Temperature life span diagram

Deep discharge cycles

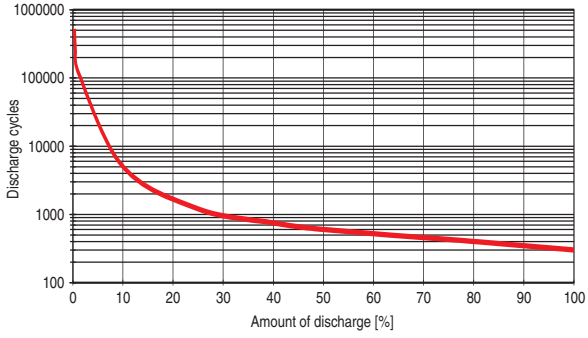


Figure 189: Deep discharge cycles

Dimensions

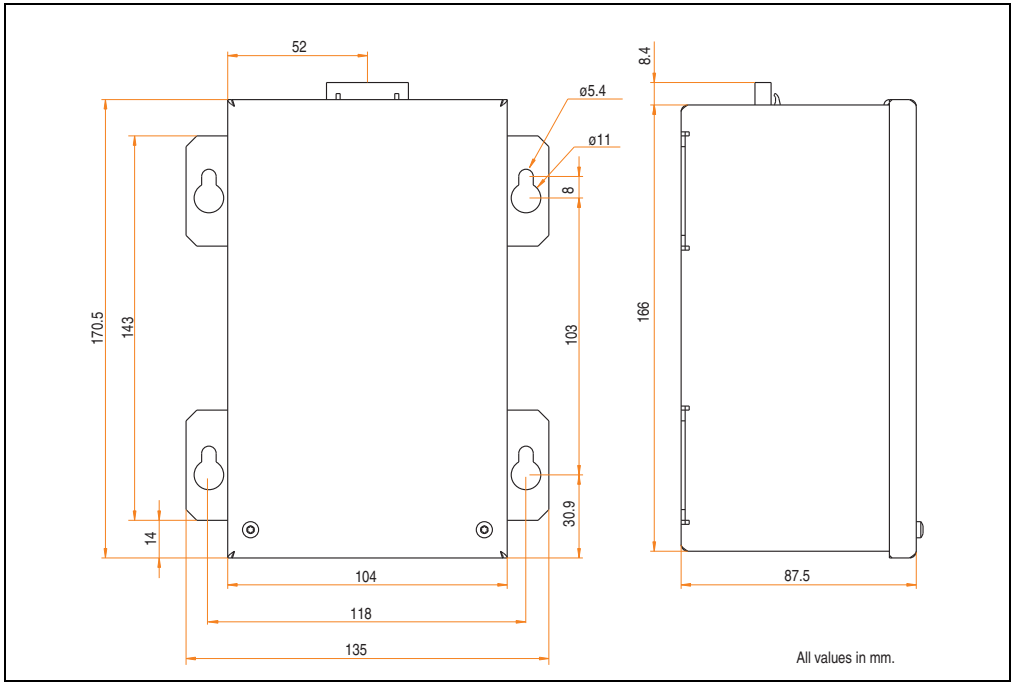


Figure 190: Dimensions - 5AC600.UPSB-00

Drilling template

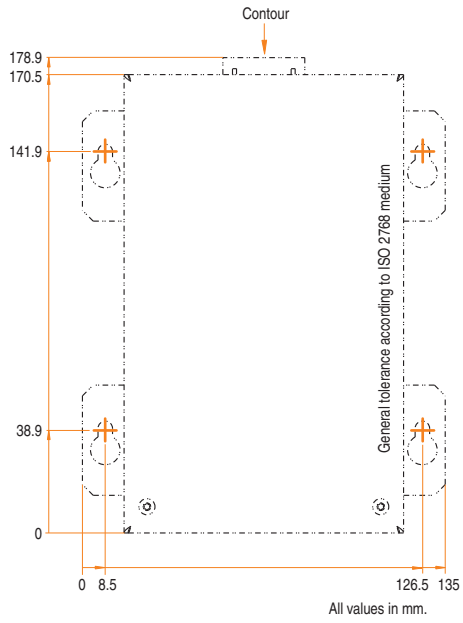


Figure 191: Drilling template for the battery unit

Mounting instructions

Due to the unique construction of these batteries, they can be stored and operated in any position.

10.4.3 UPS connection cable

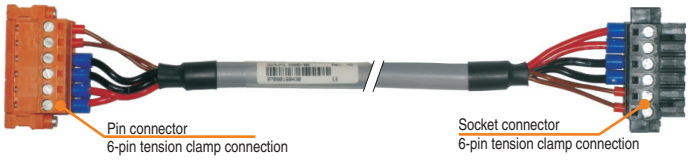


Figure 192: UPS connection cable

Technical data

Features	5CAUPS.0005-00	5CAUPS.0030-00
Length	0.5 m	3 m
Outer diameter	8.5 mm ± 0.2mm	
Connector type	6-pin plug connectors, tension clamp connection / 6-pin socket connectors, tension clamp connection	
Wire cross section Temperature sensor wire Voltage wire	 2 x 0.5 mm^2 (AWG 20) 4 x 2.5 mm^2 (AWG 13)	
Line resistance 0.5 mm^2 2.5 mm^2	 Max. 39 Ω/km Max. 7.98 Ω/km	
Flex radius Fixed installation Free-moving	 5 x wire cross-section 10 x wire cross-section	
Temperature range Moving Non-moving	 -5 to. +80°C -30 to +80°C	
Weight	Approx. 143 kg/km	
Materials Cable shield Color	 Thermoplastic PVC-based material Window gray (similar to RAL 7040)	
Peak operating voltage	12 V DC	
Testing AC voltage Wire / wire	 1500 V	
Operating voltage	Max. 300 V	
Current load	10 A at +20°C	

Table 249: Technical data - UPS connection cable

11. Power supplies

In order to meet demands for complete, comprehensive system solutions, power supplies are available in the B&R product line for mounting rail installation. This extensive spectrum ranges from single-phase power supplies that supply 2.1 A up to three-phase power supplies that supply 40 A. All switching power supplies can handle a wide range of AC and DC input voltages. This input ranges from 100 to 240 VAC or 400 to 500 VAC and from 85 to 375 VDC. Devices are protected against short circuit, overload, and open circuit, which allows them to be operated without functional limitations or derating even when overloads between 15% and 25% occur.

Figure 193: B&R power supplies (examples)

Two mini power supplies (PS102 and PS104) in robust plastic housing are available in the lower performance range. A well-designed cooling concept allows several different mounting orientations. The functional DIN rail allows fast mounting and removal. Wiring is essentially performed in seconds thanks to the spring clamps being used. The compact design, easy mounting and several different mounting orientations make the two smallest power supplies in this product line components that can be used practically anywhere.

11.1 Order data and brief technical overview

The technical data listed in the following tables should act as a brief selection guide. For more detailed technical data, data sheets are available for download from production description section of the B&R homepage (www.br-automation.com).

11.1.1 Single-phase power supplies

Features	0PS102.0	0PS104.0	0PS105.1	0PS105.2	0PS110.1	0PS110.2	0PS120.1
Output Power	50 W	100 W	120 W	120 W	240 W	240 W	480 W
AC input voltage	85-264 V	85-132 V 184-264 V	85-132 V 176-264 V	85-132 V 176-264 V	85-132 V 176-264 V	85-132 V 176-264 V	85-132 V 176-264 V
DC input voltage	85-375 V	220-375 V	210-375 V	210-375 V	210-375 V	210-375 V	-

Table 250: Single-phase power supplies

Features	0PS102.0	0PS104.0	0PS105.1	0PS105.2	0PS110.1	0PS110.2	0PS120.1
Output voltage	24-28 V	24-28 V	24 V	24 V	24-28 V	24-28 V	24-28 V
Output current at 24 V	2.1 A	4.2 A	5 A	5 A	10 A	10 A	20 A
Parallel operation	No	Yes	Yes	Yes	Yes	Yes	Yes
Current balancing	No	Yes	No	Yes	No	Yes	Yes

Table 250: Single-phase power supplies

11.1.2 Three-phase power supplies

Features	0PS305.1	0PS310.1	0PS320.1	0PS340.1
Output Power	120 W	240 W	490 W	960 W
AC input voltage	340-576 V	340-576 V	340-576 V	340-576 V
DC input voltage	450-820 V	450-820 V	450-820 V	450-820 V
Output voltage	24-28 V	24-28 V	24 V	24 V
Output current at 24 V	5 A	10 A	20 A	40 A
Parallel operation	Yes	Yes	Yes	Yes
Current balancing	No	Yes	Yes	Yes

Table 251: Three-phase power supplies

12. PCI cards

12.1 PCI Ethernet card 10/100 1port - 5ACPCI.ETH1-01

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.

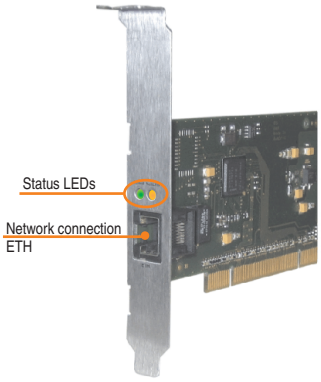


Figure 194: PCI Ethernet card 10/100 - 5ACPCI.ETH1-01

12.1.1 Order data

Model number	Description	Note
5ACPCI.ETH1-01	**PCI Ethernet card 10/100** half size PCI Ethernet card, 1 Ethernet connection	

Table 252: Order data - PCI Ethernet Card 10/100

12.1.2 Technical data

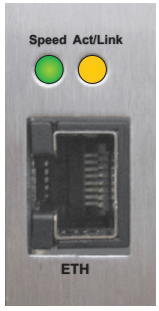
Ethernet connection			
Controller	Intel 82551ER		RJ45 twisted pair (10BaseT/100BaseT), female 
Power supply	Universal card (2 notches) for 3.3 V or 5 V		
Cabling	S/STP (Cat5e)		
Transfer rate	10/100 Mbit/s [1]		
Cable length	max. 100 m (min. Cat5e)		
LED	**On**	**Off**	
Green	100 Mbit/s	10 Mbit/s	
Orange	Link (Ethernet network connection available)	Activity (blinking) (Data transfer in progress)	

Table 253: Ethernet connection ETH

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

12.1.3 Driver support

A special driver is necessary for operating the Intel Ethernet controller 82551ER. 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 homepage, not from manufacturers' pages.

12.1.4 Dimensions

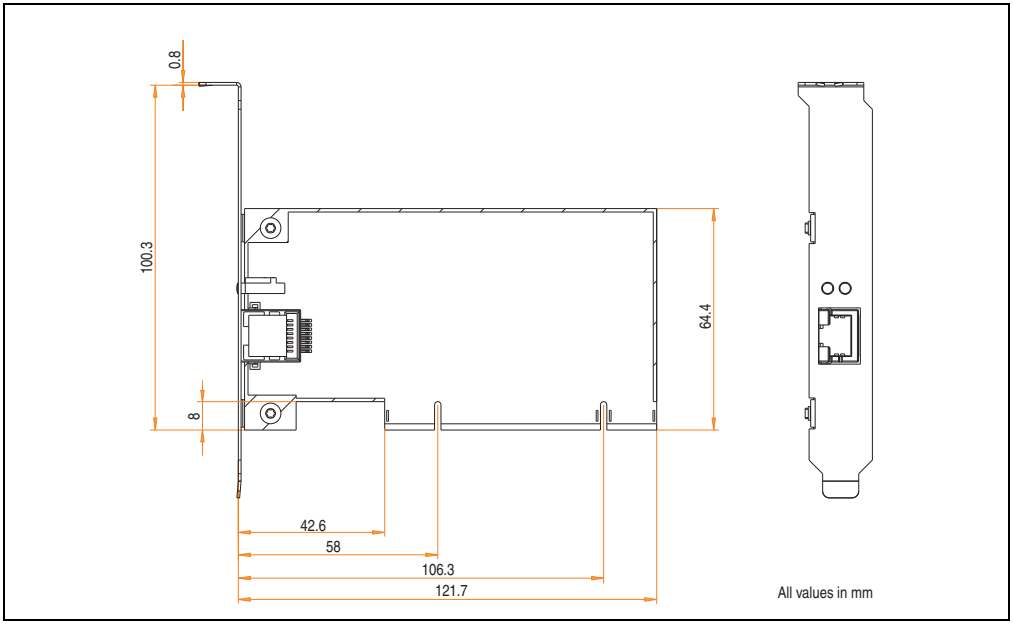


Figure 195: Dimensions - 5ACPCI.ETH1-01

12.2 PCI Ethernet card 10/100 - 5ACPCI.ETH3-01

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.

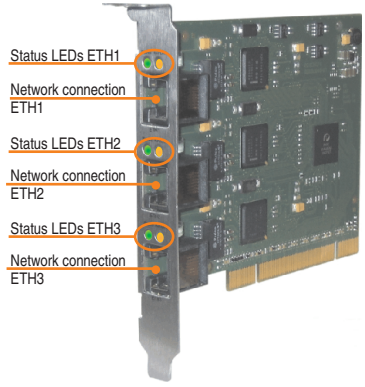


Figure 196: PCI Ethernet card 10/100 - 5ACPCI.ETH3-01

12.2.1 Order data

Model number	Description	Note
5ACPCI.ETH3-01	**PCI Ethernet card 10/100 3port** half size PCI Ethernet card, 3 Ethernet connections	

Table 254: Order data - PCI Ethernet Card 10/100

12.2.2 Technical data

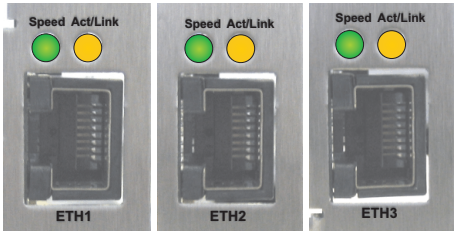
Ethernet connections			
Controller	each with Intel 82551ER		3 x RJ45 twisted pair (10BaseT/100BaseT), female 
Power supply	Universal card (2 notches) for 3.3 V or 5 V		
Cabling	each S/STP (Cat5e)		
Transfer rate	each 10/100 Mbit/s 1)		
Cable length	each max. 100 m (min. Cat5e)		
LED	**On**	**Off**	
Green	100 Mbit/s	10 Mbit/s	
Orange	Link (Ethernet network connection available)	Activity (blinking) (Data transfer in progress)	

Table 255: Ethernet connections ETH1, ETH2, ETH3

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

12.2.3 Driver support

A special driver is necessary for operating the Intel Ethernet controller 82551ER. 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 homepage, not from manufacturers' pages.

12.2.4 Dimensions

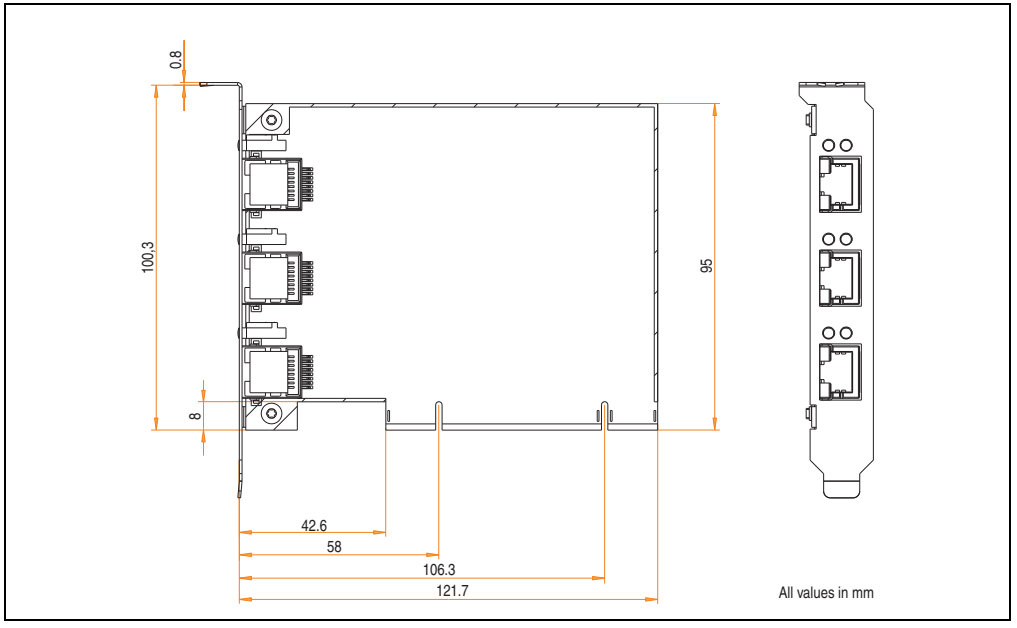


Figure 197: Dimensions - 5ACPCI.ETH3-01

13. Cables

13.1 DVI cable 5CADVI.0xxx-00

The DVI cables 5CADVI.0xxx-00 are designed for fixed layout.

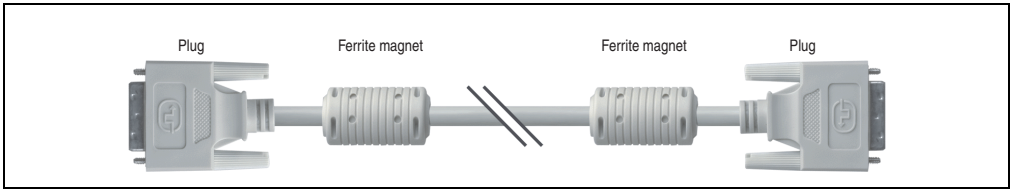


Figure 198: DVI extension cable - 5CADVI.0xxx-00 (similar)

Caution!

The DVI cable can only be plugged in and unplugged when the device is turned off.

13.1.1 Order data

Model number	Description	Note
5CADVI.0018-00	**DVI-D cable 1.8 m** Single cable, DVI-D/m:DVI-D/m; length: 1.8 m	
5CADVI.0050-00	**DVI-D cable 5 m** Single cable, DVI-D/m:DVI-D/m; length: 5 m	
5CADVI.0100-00	**DVI-D cable 10 m** Single cable, DVI-D/m:DVI-D/m; length: 10 m	

Table 256: Order data - DVI cables

13.1.2 Technical data

Features	5CADVI.0018-00	5CADVI.0050-00	5CADVI.0100-00
Length Tolerance	1.8 m ±30 mm	5 m ±50 mm	10 m ±100 mm
Cable diameter Maximum	8.5 mm		
Shielding	Individual cable pairs and entire cable		
Connector type Connection cycles	2x DVI-D (18+1), male 100		
Wire cross section	AWG 28		
Line resistance	Max. 237 Ω/km		
Insulation resistance	Min. 100 MΩ/km		
Flexibility	Limited flexibility; valid for ferrite magnet - ferrite magnet (tested 100 cycles with 5x cable diameter, 20 cycles / minute)		
Flex radius Fixed layout	See figure "Flex radius specification", on page 392 5x cable diameter (plug - ferrite magnet and ferrite magnet - ferrite magnet)		
Weight	Approx. 300 g	Approx. 590 g	Approx. 2100 g

Table 257: Technical data - DVI cable 5CADVI.0xxx-00

13.1.3 Flex radius specification

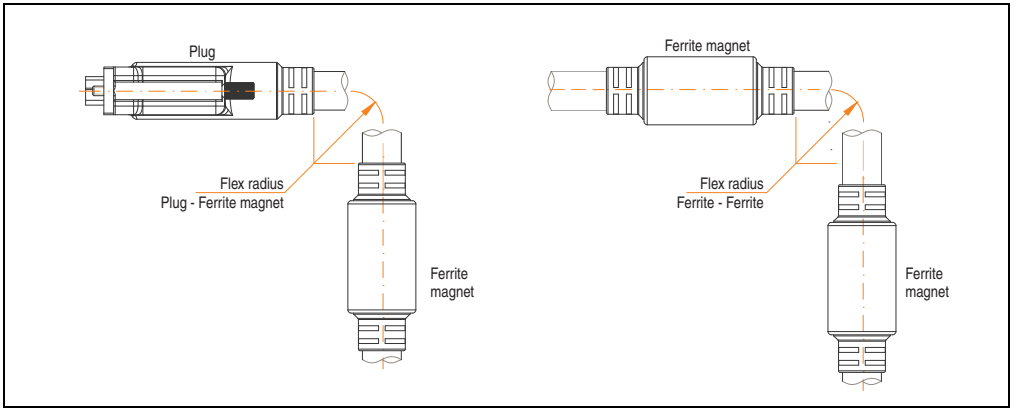


Figure 199: Flex radius specification

13.1.4 Dimensions

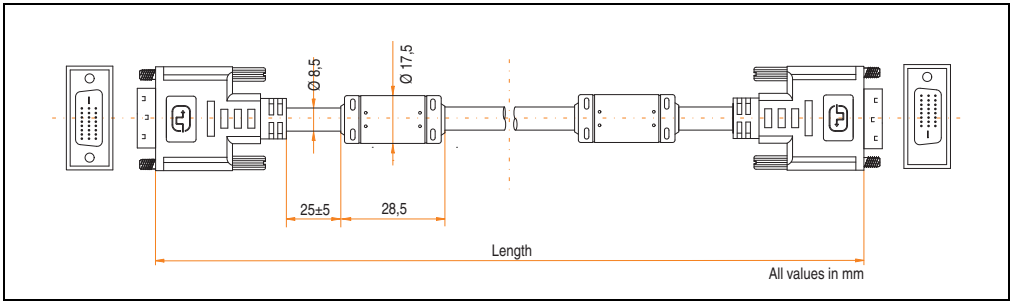


Figure 200: Dimensions - DVI cable 5CADVI.0xxx-00

13.1.5 Contents of delivery

Amount	Component
1	DVI cable in desired length, plug covers are attached at the cable ends.

Table 258: Contents of delivery - DVI cable 5CADVI.0xxx-00

13.1.6 Cable specifications

The following figure shows the pin assignments for the DVI cable available at B&R. If you want to build a suitable cable yourself, it should be wired according to these specifications.

Warning!

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

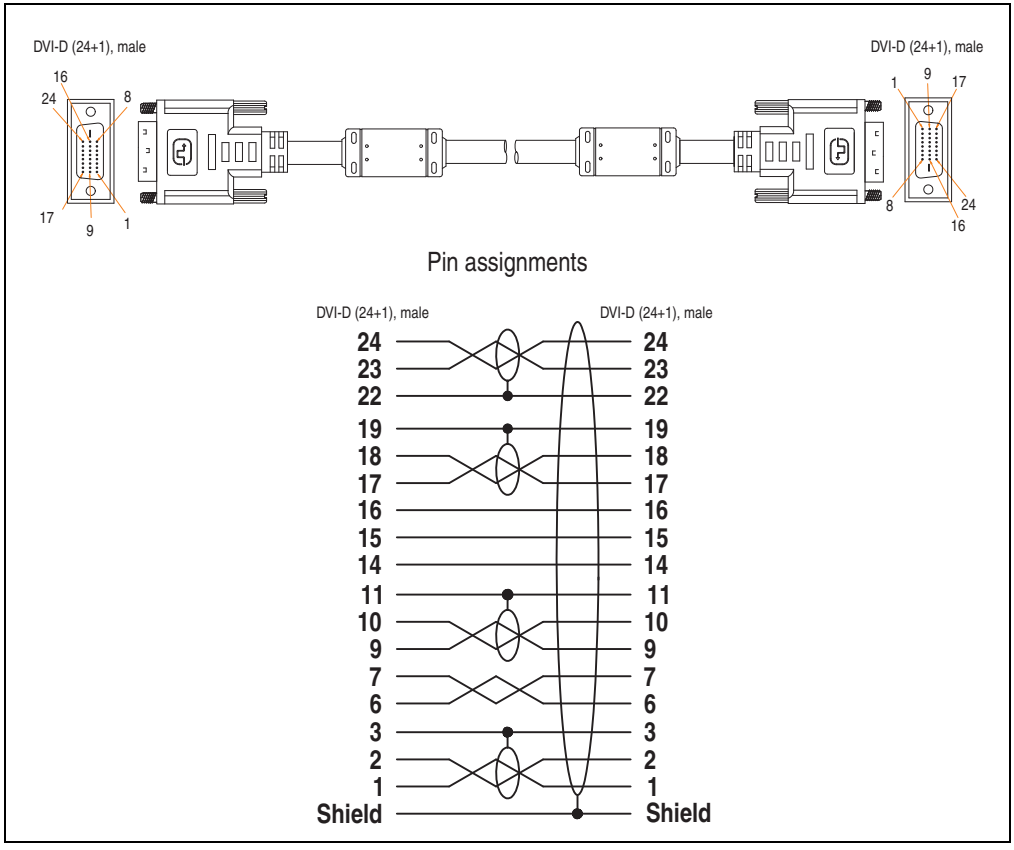


Figure 201: Pin assignments - DVI cable

13.2 SDL cable 5CASDL.0xxx-00

The SDL cables 5CASDL.0xxx-00 are designed for fixed layout. Use of the SDL flex cable 5CASDL.0xxx-03 is required for a flexible installation (e.g. in swing arm systems).

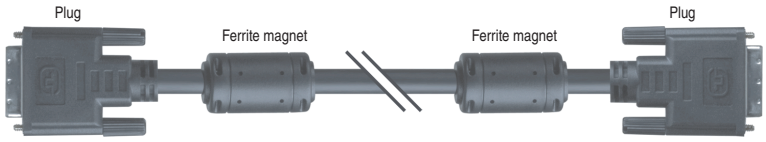


Figure 202: SDL extension cable (similar)

Caution!

The SDl cable can only be plugged in and unplugged when the device is turned off.

13.2.1 Order data

Model number	Description	Note
5CASDL.0018-00	**SDL cable 1.8 m** SDL cable for a fixed type of layout; length: 1.8 m	
5CASDL.0050-00	**SDL cable 5 m** SDL cable for a fixed type of layout; length: 5 m	
5CASDL.0100-00	**SDL cable 10 m** SDL cable for a fixed type of layout; length: 10 m	
5CASDL.0150-00	**SDL cable 15 m** SDL cable for a fixed type of layout; length: 15 m	
5CASDL.0200-00	**SDL cable 20 m** SDL cable for a fixed type of layout; length: 20 m	
5CASDL.0250-00	**SDL cable 25 m** SDL cable for a fixed type of layout; length: 25 m	
5CASDL.0300-00	**SDL cable 30 m** SDL cable for a fixed type of layout; length: 30 m	

Table 259: Order data - SDL cables

13.2.2 Technical data

Features	5CASDL.0018-00	5CASDL.0050-00	5CASDL.0100-00	5CASDL.0150-00	5CASDL.0200-00	5CASDL.0250-00	5CASDL.0300-00
Length Tolerance	1.8 m ±50 mm	5 m ±80 mm	10 m ±100 mm	15 m ±120 mm	20 m ±150 mm	25 m ±200 mm	30 m ±200 mm
Cable diameter Typical Maximum	8.6 ±0.2 mm 9 mm		11 ±0.2 mm 11.5 mm				
Shielding	Individual cable pairs and entire cable						
Connector type Connection cycles	2x DVI-D (24+1), male 100						
Wire cross section	AWG 28		AWG 24				
Line resistance	Max. 237 Ω/km		Max. 93 Ω/km				
Insulation resistance	Min. 10 MΩ/km						
Flexibility	Limited flexibility; valid for ferrite magnet - ferrite magnet (tested 100 cycles with 5x cable diameter, 20 cycles / minute)						
Halogen-free	No						
Flex radius Fixed layout	See figure "Flex radius specification", on page 396 5x cable diameter (plug - ferrite magnet and ferrite magnet - ferrite magnet)						
Weight	Approx. 300 g	Approx. 590 g	Approx. 2100 g	Approx. 3000 g	Approx. 4100 g	Approx. 5100 g	Approx. 6100 g

Table 260: Technical data - SDL cables 5CASDL.0xxx-00

13.2.3 Flex radius specification

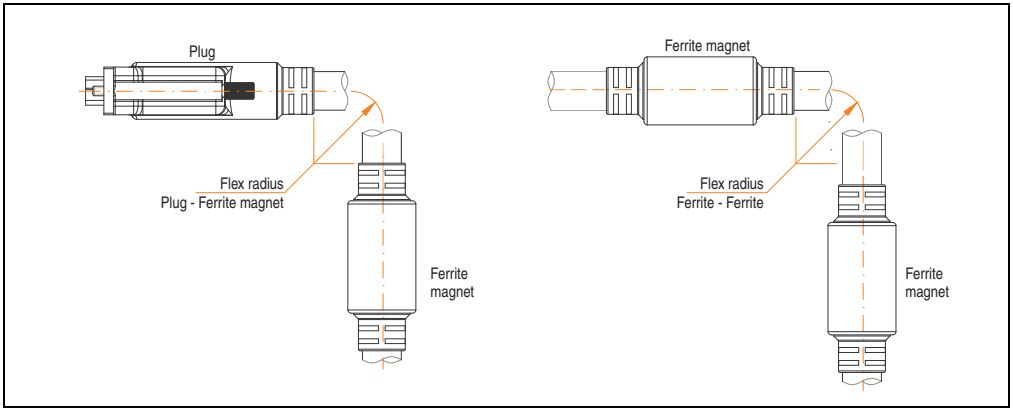


Figure 203: Flex radius specification

13.2.4 Dimensions

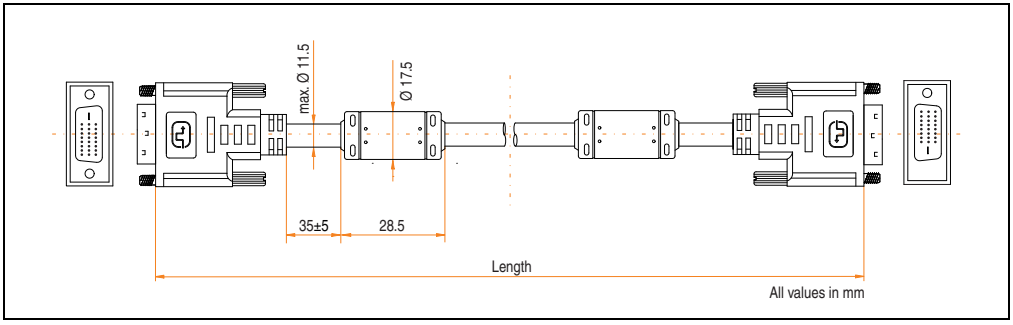


Figure 204: Dimensions - SDL cable 5CASDL.0xxx-00

13.2.5 Contents of delivery

Amount	Component
1	SDL cable in desired length, plug covers are attached at the cable ends.

Table 261: Contents of delivery - SDL cable 5CASDL.0xxx-00

13.2.6 Cable specifications

The following figure shows the pin assignments for the SDL cable available at B&R. If you want to build a suitable cable yourself, it should be wired according to these specifications.

Warning!

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

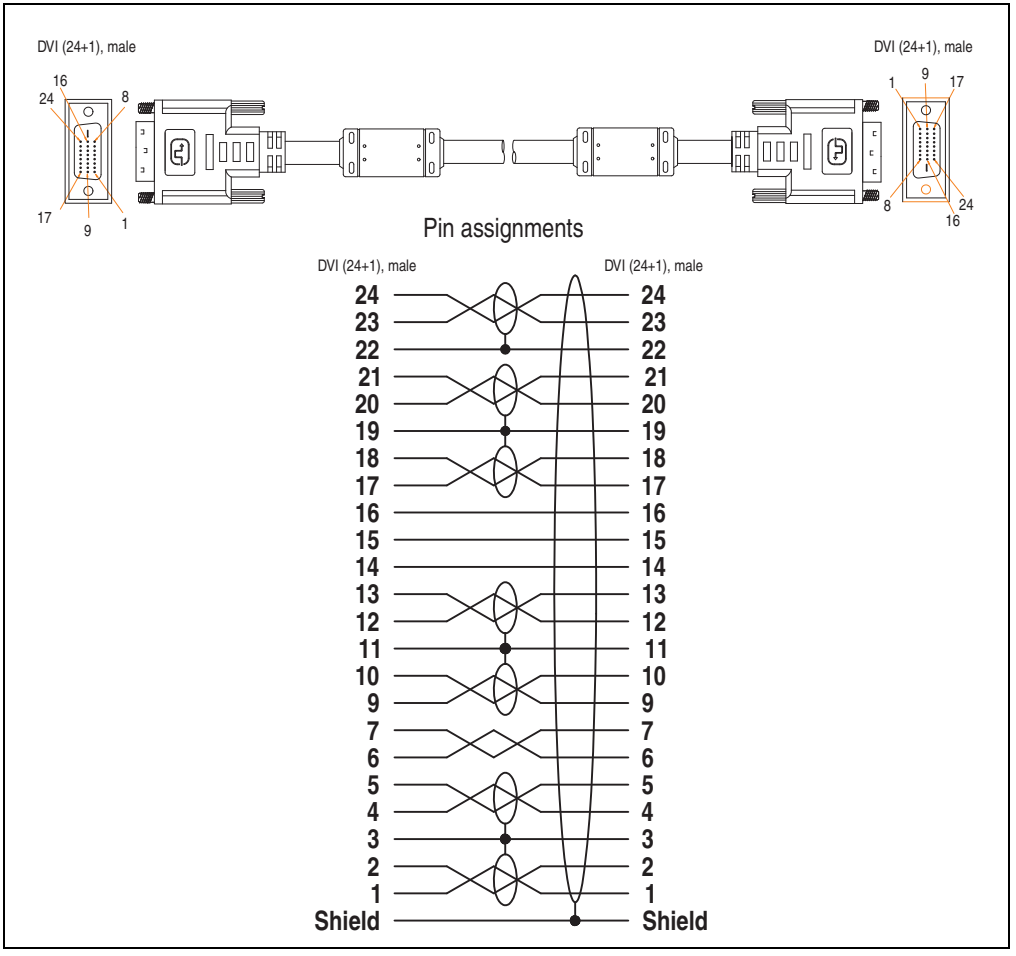


Figure 205: Pin assignments - SDL cable 5CASDL.0xxx-00

13.3 SDL cable with 45° plug 5CASDL.0xxx-01

The SDL cables 5CASDL.0xxx-01 are designed for fixed layout.

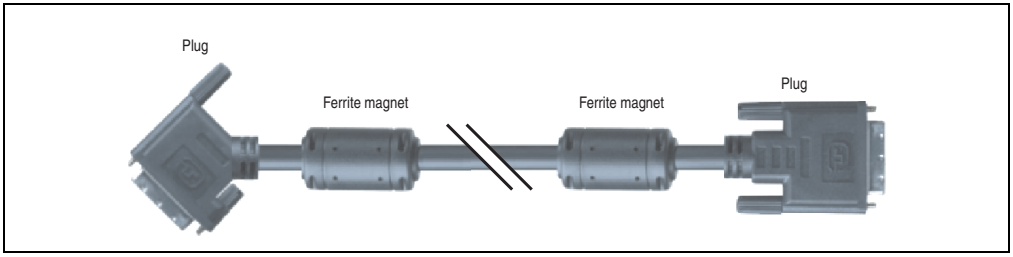


Figure 206: SDL cable with 45° plug (similar)

Caution!

The SDI cable can only be plugged in and unplugged when the device is turned off.

13.3.1 Order data

Model number	Description	Note
5CASDL.0018-01	**SDL cable 1.8 m 45°** SDL cable for fixed type of layout with one-sided 45° plug; length: 1.8 m	
5CASDL.0050-01	**SDL cable 5 m 45°** SDL cable for fixed type of layout with one-sided 45° plug; length: 5 m	
5CASDL.0100-01	**SDL cable 10 m 45°** SDL cable for fixed type of layout with one-sided 45° plug; length: 10 m	
5CASDL.0150-01	**SDL cable 15 m 45°** SDL cable for fixed type of layout with one-sided 45° plug; length: 15 m	

Table 262: Order data - SDL cables with 45° plug

13.3.2 Technical data

Features	5CASDL.0018-01	5CASDL.0050-01	5CASDL.0100-01	5CASDL.0150-01
Length Tolerance	1.8 m ±50 mm	5 m ±80 mm	10 m ±100 mm	15 m ±120 mm
Cable diameter Maximum	9 mm		11.5 mm	
Shielding	Individual cable pairs and entire cable			
Connector type Connection cycles	2x DVI-D (24+1), male 100			
Wire cross section	AWG 28		AWG 24	
Line resistance	Max. 237 Ω/km		Max. 93 Ω/km	
Insulation resistance	Min. 10 MΩ/km			
Flexibility	Limited flexibility; valid for ferrite magnet - ferrite magnet (tested 100 cycles with 5x cable diameter, 20 cycles / minute)			
Halogen-free	No			
Flex radius Fixed layout	See figure "Flex radius specification", on page 400 5x cable diameter (plug - ferrite magnet and ferrite magnet - ferrite magnet)			
Weight	Approx. 300 g	Approx. 590 g	Approx. 2100 g	Approx. 3000 g

Table 263: Technical data - SDL cable with 45° plug 5CASDL.0xxx-01

13.3.3 Flex radius specification

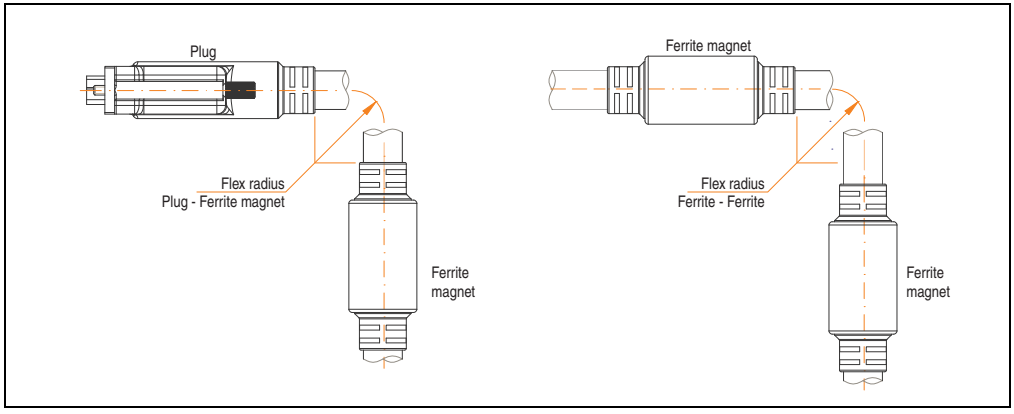


Figure 207: Flex radius specification

13.3.4 Dimensions

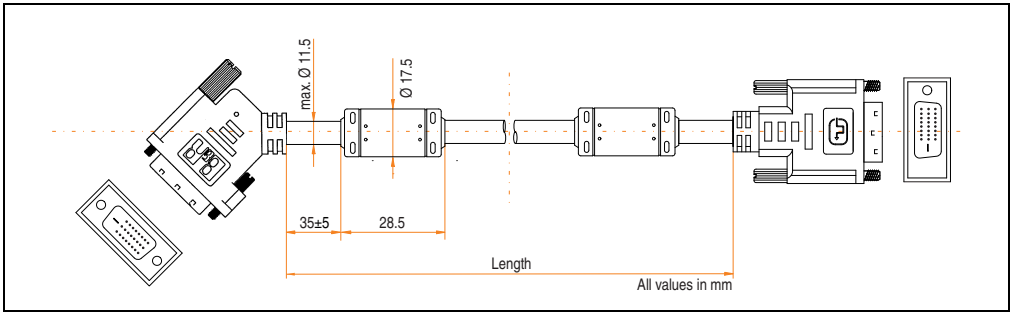


Figure 208: Dimensions - SDL cable with 45° plug 5CASDL.0xxx-01

13.3.5 Contents of delivery

Amount	Component
1	SDL cable with 45° plug in desired length, plug covers are attached at the cable ends.

Table 264: Contents of delivery - SDL cable with 45° plug 5CASDL.0xxx-01

13.3.6 Cable specifications

The following figure shows the pin assignments for the SDL cable available at B&R. If you want to build a suitable cable yourself, it should be wired according to these specifications.

Warning!

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

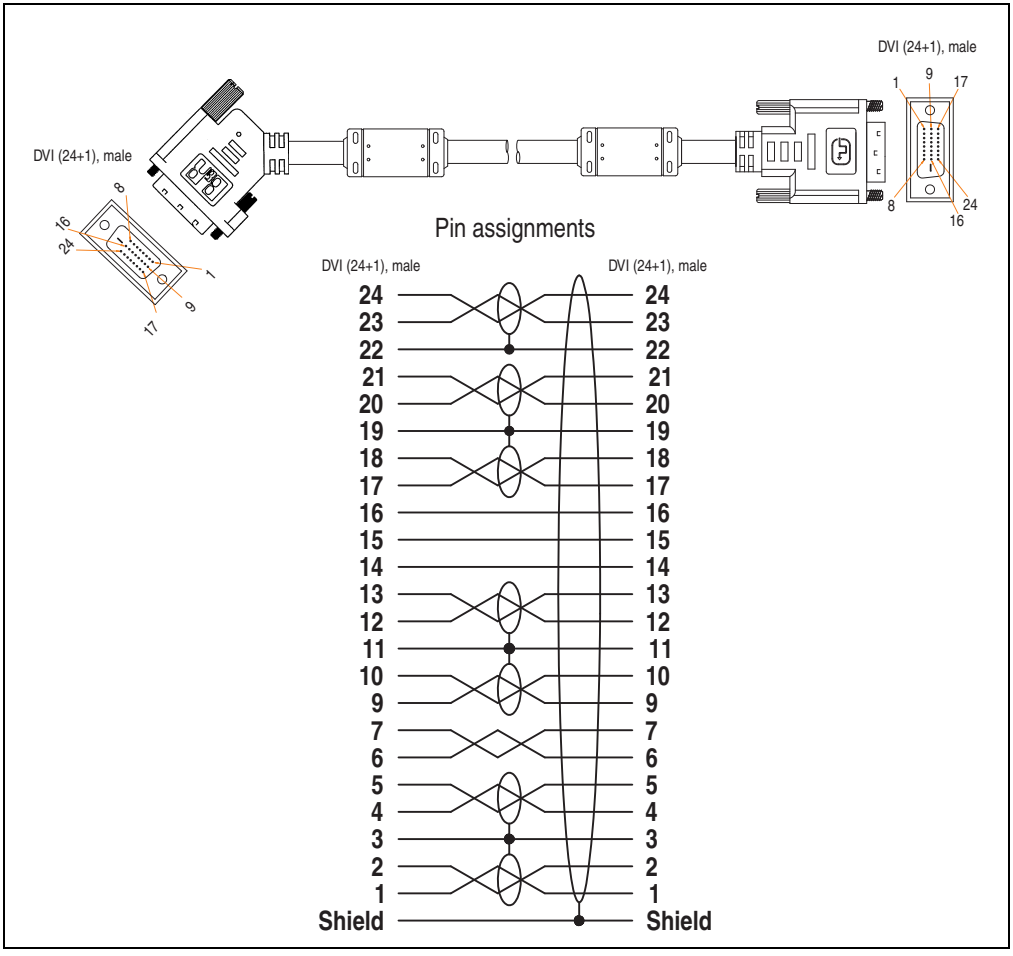


Figure 209: Pin assignments - SDL cable with 45° plug 5CASDL.0xxx-01

13.4 SDL flex cable 5CASDL.0xxx-03

The SDL flex cables 5CASDL.0xxx-03 are designed for both fixed and flexible installations (e.g. in swing arm systems).

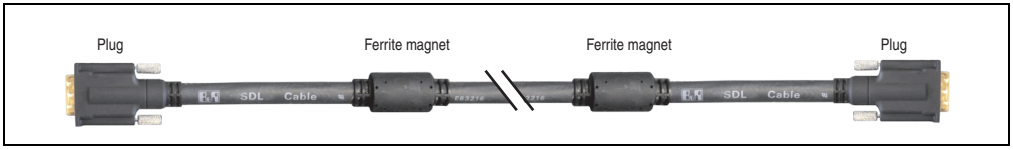


Figure 210: SDL cable 5CASDL.0xxx-03 (similar)

Caution!

The SDl cable can only be plugged in and unplugged when the device is turned off.

13.4.1 Order data

Model number	Description	Note
5CASDL.0018-03	**SDL flex cable 1.8 m** SDL cable for fixed and flexible type of layout; length: 1.8 m	
5CASDL.0050-03	**SDL flex cable 5 m** SDL cable for fixed and flexible type of layout; length: 5 m	
5CASDL.0100-03	**SDL flex cable 10 m** SDL cable for fixed and flexible type of layout; length: 10 m	
5CASDL.0150-03	**SDL flex cable 15 m** SDL cable for fixed and flexible type of layout; length: 15 m	
5CASDL.0200-03	**SDL flex cable 20 m** SDL cable for fixed and flexible type of layout; length: 20 m	
5CASDL.0250-03	**SDL flex cable 25 m** SDL cable for fixed and flexible type of layout; length: 25 m	
5CASDL.0300-03	**SDL flex cable 30 m** SDL cable for fixed and flexible type of layout; length: 30 m	

Table 265: Order data - SDL cable 5CASDL.0xxx-03

13.4.2 Technical data

Mechanical characteristics	5CASDL.0018-03	5CASDL.0050-03	5CASDL.0100-03	5CASDL.0150-03	5CASDL.0200-03	5CASDL.0250-03	5CASDL.0300-03
Length Tolerance	1.8 m ±20 mm	5 m ±45 mm	10 m ±90 mm	15 m ±135 mm	20 m ±180 mm	25 m ±225 mm	30 m ±270 mm
Cable diameter Maximum	12 mm						
Shielding	Individual cable pairs and entire cable						
Connector type Connection cycles Contacts Mechanical protection	2x DVI-D (24+1), male Min. 200 Gold plated Metal cover with crimped stress relief						
Max. tension During installation During operation	≤ 400 N ≤ 50 N						
Materials Cable shield Color	RoHS compliant Aluminum foil clad + tinned copper mesh Black (similar to RAL 9005)						
Flexibility	Flexible; valid for ferrite magnet - ferrite magnet (tested 300,000 cycles with 15x cable diameter, 4800 cycles / hour)						
Halogen-free	Yes						
Flex radius Fixed layout flexible installation	See figure "Flex radius specification", on page 405 6x cable diameter (of plug - ferrite magnet) 10x cable diameter (of ferrite magnet - ferrite magnet) 15x cable diameter (of ferrite magnet - ferrite magnet)						
Weight	Approx. 450 g	Approx. 1000 g	Approx. 2000 g	Approx. 3000 g	Approx. 4000 g	Approx. 5000 g	Approx. 6000 g
Electrical properties (at +20°C)							
Wire cross section	24 AWG (control wires) 26 AWG (DVI, USB, data)						
Line resistance 24 AWG 26 AWG	≤ 95 Ω/km ≤ 145 Ω/km						
Insulation resistance	> 200 MΩ/km						
Wave impedance	100 ±10 Ω						
Test voltage Wire / wire Wire / shield	1 kV_{eff} 0.5 kV_{eff}						
Operating voltage	≤ 30 V						
Environmental characteristics							
Temperature resistance Fixed installation Moving Storage	-20 to +80°C -5 to +60°C -20 to +80°C						
Fire resistance	Fire resistant in accordance with UL758 (cable vertical flame test)						

Table 266: Technical data - SDL cable 5CASDL.0xxx-03

Standards and certifications	5CASDL.0018-03	5CASDL.0050-03	5CASDL.0100-03	5CASDL.0150-03	5CASDL.0200-03	5CASDL.0250-03	5CASDL.0300-03
Torsion load	100,000 cycles (tested angle of rotation: ±85° speed: 50 cycles / minute)						
Cable drag chain	300,000 cycles Tested flex radius: 180 mm;15x cable diameter; hub: 460 mm; speed: 4800 cycles / hour						
Approbation	UL AWM 20236 80°C 30 V						
Oil and hydrolysis resistance	According to VDE 0282-10						

Table 266: Technical data - SDL cable 5CASDL.0xxx-03 (cont.)

13.4.3 Flex radius specification

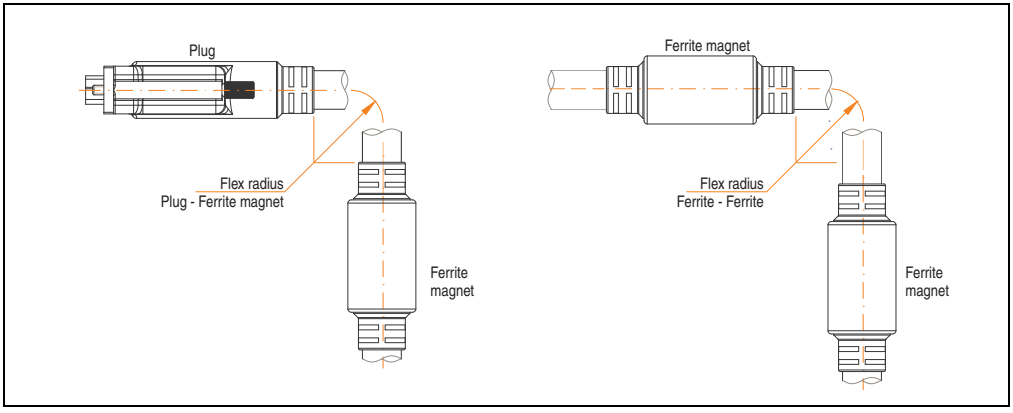


Figure 211: Flex radius specification

13.4.4 Dimensions

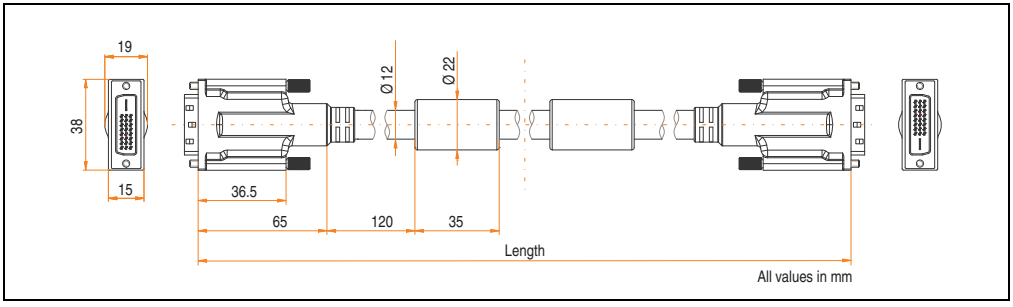


Figure 212: Dimensions - SDL cable 5CASDL.0xxx-03

13.4.5 Contents of delivery

Amount	Component
1	SDL flex cable in desired length, plug covers are attached at the cable ends.

Table 267: Contents of delivery - SDL flex cable 5CASDL.0xxx-03

13.4.6 Construction

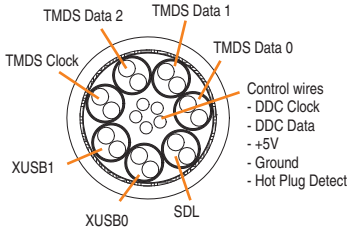
Element	Assignment	Cross section	
DVI	TMDS data 0	26 AWG	 Schematic display
	TMDS data 1	26 AWG	
	TMDS data 2	26 AWG	
	TMDS cycle	26 AWG	
USB	XUSB0	26 AWG	
	XUSB1	26 AWG	
Data	SDL	26 AWG	
Control wires	DDC cycle	24 AWG	
	DDC data	24 AWG	
	+ 5 V	24 AWG	
	mass	24 AWG	
	Hot Plug detect	24 AWG	

Table 268: Structure - SDL cable 5CASDL.0xxx-03

13.4.7 Cable specifications

The following figure shows the pin assignments for the SDL cable available at B&R. If you want to build a suitable cable yourself, it should be wired according to these specifications.

Warning!

If a self-built cable is used, B&R cannot guarantee that it will function properly.

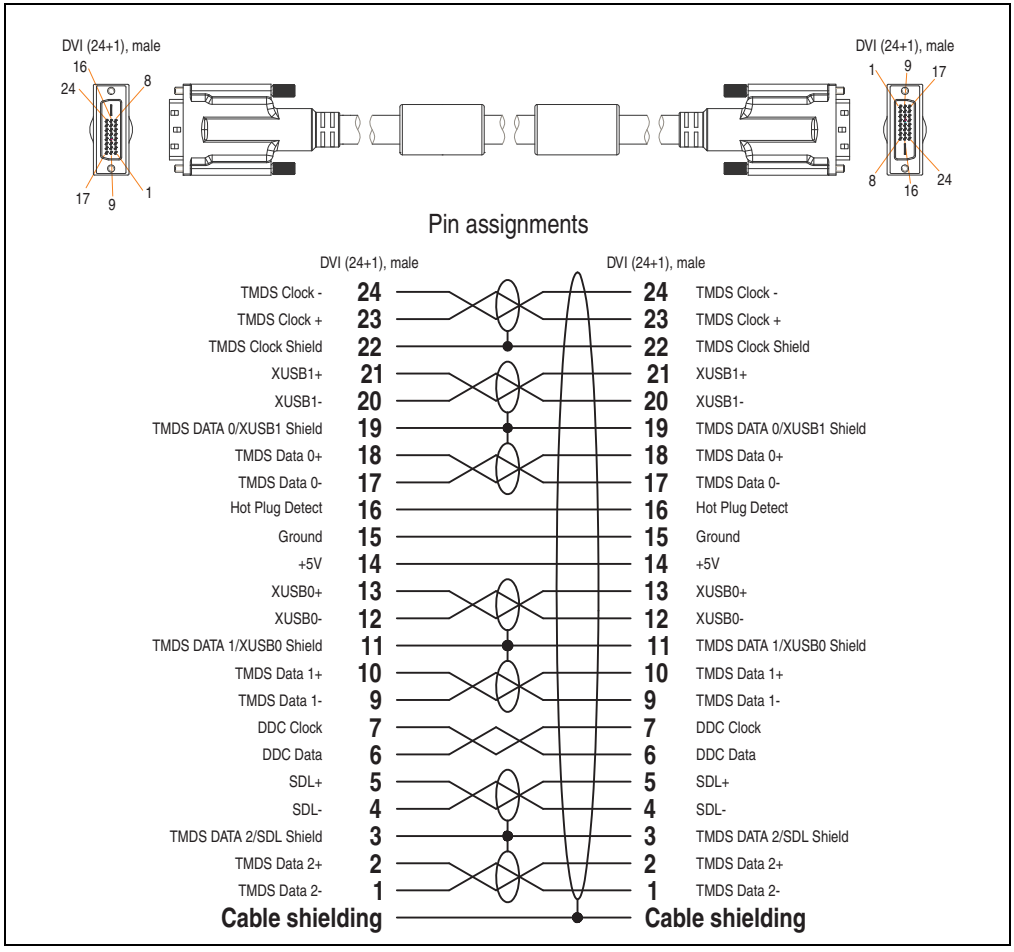


Figure 213: Pin assignments - SDL cable 5CASDL.0xxx-03

13.5 SDL flex cable with extender 5CASDL.0x00-13

The SDL flex cables (with extender) 5CASDL.0x00-13 are designed for both fixed and flexible installations (e.g. in swing arm systems).

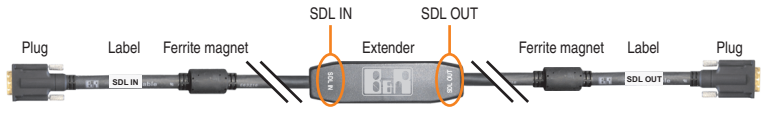


Figure 214: SDL flex cable with extender - 5CASDL.0x00-13 (similar)

Caution!

SDL cables with extender can only be plugged in and unplugged when the device is turned off. The correct direction of connection (SDL IN, SDL OUT) for the wiring is illustrated on the middle of the extender and between the ferrite magnet and plug (with a sticker).

13.5.1 Order data

Model number	Description	Note
5CASDL.0300-13	**SDL flex cable with extender 30 m** SDL cable with extender for fixed and flexible type of layout; length: 30 m	
5CASDL.0400-13	**SDL flex cable with extender 40 m** SDL cable with extender for fixed and flexible type of layout; length: 40 m	

Table 269: Order data - SDL flex cable with extender

13.5.2 Technical data

Features	5CASDL.0300-13	5CASDL.0400-13
Length Tolerance	30 m ±200 mm	40 m ±200 mm
Dimensions - Extender box	Height 18.5 mm, width 35 mm, length 125 mm	
Cable diameter Maximum	12 mm	
Shielding	Individual cable pairs and entire cable	
Connector type Connection cycles Contacts Mechanical protection	2x DVI-D (24+1), male Min. 200 Gold plated Metal cover with crimped stress relief	
Max. tension During installation During operation	≤ 400 N ≤ 50 N	

Table 270: Technical data - SDL flex cable with extender 5CASDL.0x00-13

Features	5CASDL.0300-13	5CASDL.0400-13
Materials Cable shield Color	RoHS compliant Aluminum foil clad + tinned copper mesh Black (similar to RAL 9005)	
Flexibility	Flexible; valid for ferrite magnet - ferrite magnet (tested 300,000 cycles with 15x cable diameter, 4800 cycles / hour)	
Halogen-free	Yes	
Flex radius Fixed layout flexible installation	See figure "Flex radius specification", on page 410 6x cable diameter (of plug - ferrite magnet) 10x cable diameter (of ferrite magnet - extender) 15x cable diameter (of ferrite magnet - ferrite magnet)	
Weight	Approx. 6200 g	Approx. 8000 g
Electrical properties (at +20°C)		
Wire cross section	24 AWG (control wires) 26 AWG (DVI, USB, data)	
Line resistance 24 AWG 26 AWG	 ≤ 95 Ω/km ≤ 145 Ω/km	
Insulation resistance	> 200 MΩ/km	
Wave impedance	100 ±10 Ω	
Test voltage Wire / wire Wire / shield	 1 kV_{eff} 0.5 kV_{eff}	
Operating voltage	≤ 30 V	
Environmental characteristics		
Temperature resistance Fixed installation Moving Storage	 -20 to +60°C -5 to +60°C -20 to +60°C	
Fire resistance	Fire resistant in accordance with UL758 (cable vertical flame test)	
Standards and certifications		
Torsion load	100,000 cycles (tested angle of rotation: ±85° speed: 50 cycles / minute)	
Cable drag chain	300,000 cycles Tested flex radius: 180 mm;15x cable diameter; hub: 460 mm; speed: 4800 cycles / hour	
Approbation	UL AWM 20236 80°C 30 V	
Oil and hydrolysis resistance	According to VDE 0282-10	

Table 270: Technical data - SDL flex cable with extender 5CASDL.0x00-13 (cont.)

13.5.3 Flex radius specification

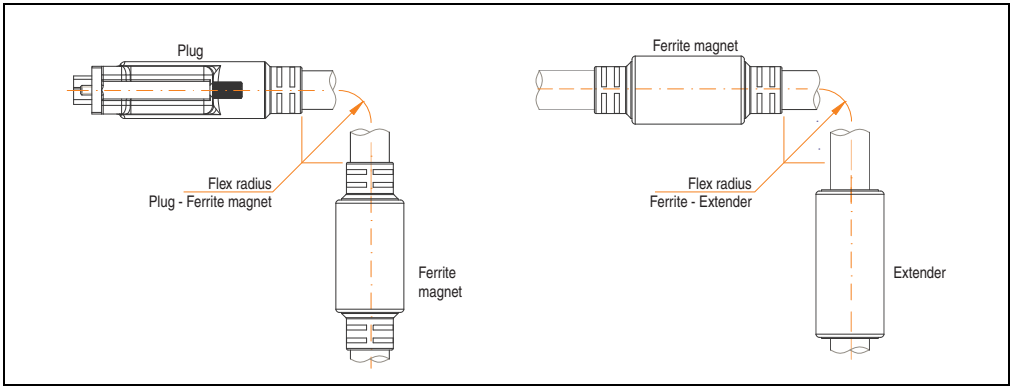


Figure 215: Flex radius specification

13.5.4 Dimensions

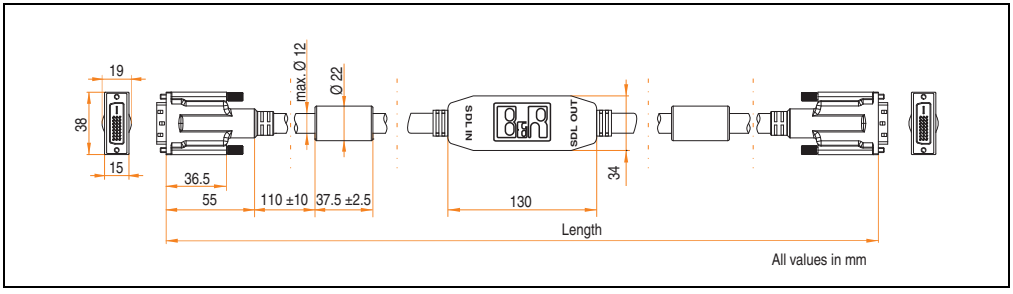


Figure 216: Dimensions - SDL flex cable with extender 5CASDL.0x00-13

13.5.5 Contents of delivery

Amount	Component
1	SDL flex cable with extender in desired length, plug covers are attached at the cable ends.

Table 271: Contents of delivery - SDL flex cable with extender 5CASDL.0xx0-13

13.5.6 Cable specifications

The following figure shows the pin assignments for the SDL flex cable with extender available at B&R.

Information:

Only B&R SDL flex cables with extender can be used.

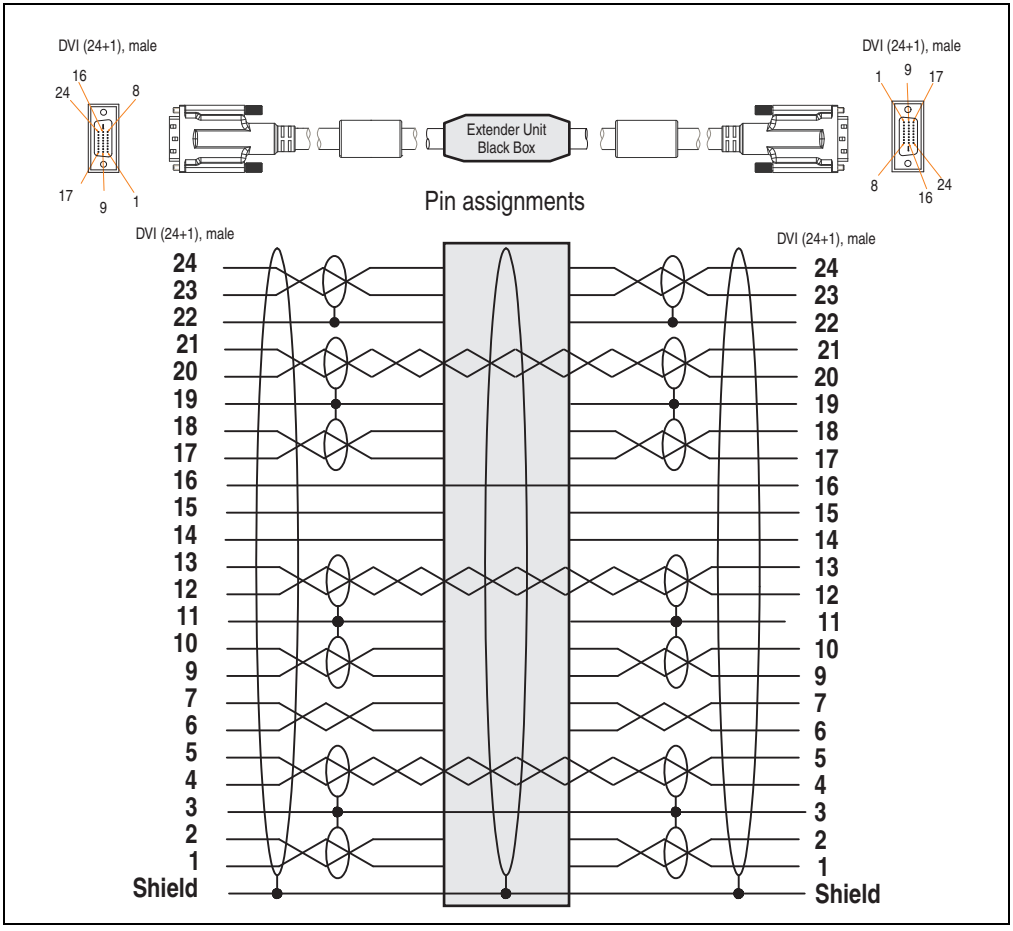


Figure 217: Pin assignments - SDL flex cable with extender 5CASDL.0x00-13

13.6 RS232 cable

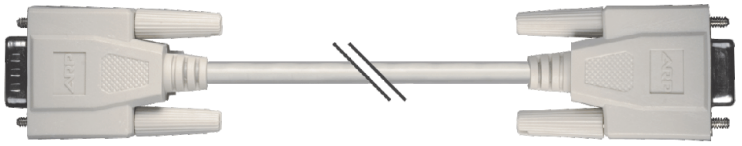


Figure 218: RS232 extension cable (similar)

13.6.1 Order data

Model number	Description	Note
9A0014.02	**RS232 cable DB9/f:DB9/m 1.8 m** RS232 extension cable for remote operation of a display unit with touch screen, length 1.8 m.	
9A0014.05	**RS232 cable DB9/f:DB9/m 5 m** RS232 extension cable for remote operation of a display unit with touch screen, length 5 m.	
9A0014.10	**RS232 cable DB9/f:DB9/m 10 m** RS232 extension cable for remote operation of a display unit with touch screen, length 10 m.	

Table 272: Order data - RS232 cables

13.6.2 Technical data

Features	9A0014.02	9A0014.05	9A0014.10
Length Tolerance	1.8 m ±50 mm	5 m ±80 mm	10 m ±100 mm
Outer diameter	Max. 5 mm		
Shielding	Entire cable		
Connector type	DSUB (9-pin), male / female		
Wire cross section	AWG 26		
Flexibility	Flexible		
Flex radius	Min. 70 mm		

Table 273: Technical data - RS232 cables

13.6.3 Contents of delivery

Amount	Component
1	RS232 cable in desired length

Table 274: Contents of delivery - RS232 cables 9A0014.xx

13.6.4 Cable specifications

The following figure shows the pin assignments for the RS232 cable available at B&R. If you want to build a suitable cable yourself, it should be wired according to these specifications.

Warning!

If a self-built cable is used, B&R cannot guarantee that it will function properly. The RS232 cables provided by B&R are guaranteed to function properly.

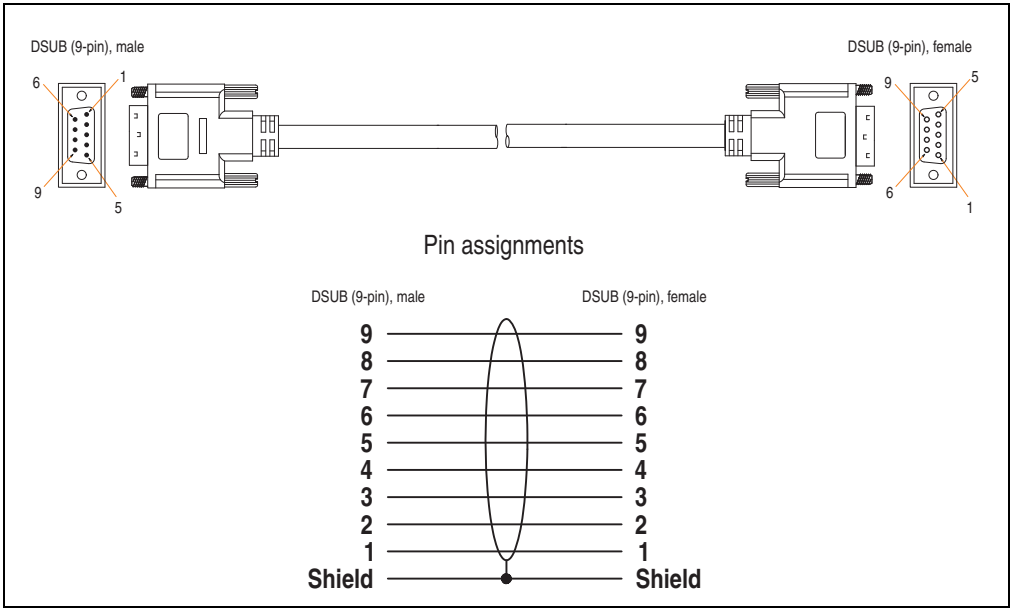


Figure 219: Pin assignments - RS232 cable

13.7 USB cable

Figure 220: USB extension cable (similar)

13.7.1 Order data

Model number	Description	Note
5CAUSB.0018-00	**USB 2.0 cable, A/m:B/m 1.8 m** USB 2.0 connection cable; plug type A - type B; length 1.8 m	
5CAUSB.0050-00	**USB 2.0 cable, A/m:B/m 5 m** USB 2.0 connection cable; plug type A - type B; length 5 m	

Table 275: Order data - USB cables

13.7.2 Technical data

Features	5CAUSB.0018-00	5CAUSB.0050-00
Length Tolerance	1.8 m ±30 mm	5 m ±50 mm
Outer diameter	Max. 5 mm	
Shielding	Entire cable	
Connector type	USB type A male and USB type B male	
Wire cross section	AWG 24, 28	
Flexibility	Flexible	
Flex radius	Min. 100 mm	

Table 276: Technical data - USB cables

13.7.3 Contents of delivery

Amount	Component
1	USB cable in desired length

Table 277: Contents of delivery - USB cable

13.7.4 Cable specifications

The following figure shows the pin assignments for the USB cable available at B&R. If you want to build a suitable cable yourself, it should be wired according to these specifications.

Warning!

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

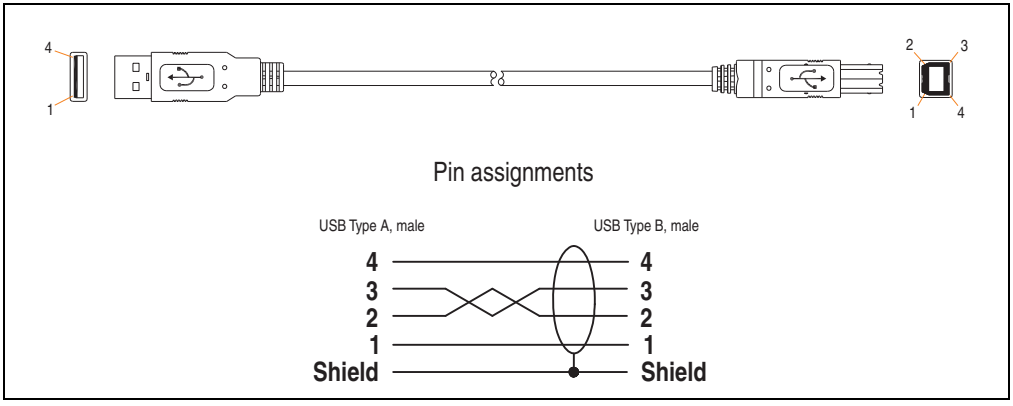


Figure 221: Pin assignments - USB cable

13.8 APC810 internal supply cable 5CAMSC.0001-00

This supply cable is used internally e.g. to supply special PCI cards. It is connected to the APC810 main board. For requirements and procedures, see "Connection of an external device to the main board", on page 458.

Caution!

Cable can only be plugged in and unplugged when the device is turned off.

Figure 222: APC810 internal supply cable - 5CAMSC.0001-00

13.8.1 Order data

Model number	Description	Note
5CAMSC.0001-00	**APC810 internal supply cable**	

Table 278: Order data - APC810 supply cable

13.8.2 Technical data

Features	5CAMSC.0001-00
Length	100 mm ± 5 mm
Connector type	1x 4-pin male disk drive power plug, 1x 4-pin female plug housing
Wire cross section	AWG 22
Flexibility	Flexible

Table 279: Technical data - APC810 internal supply cable 5CAMSC.0001-00

14. HDD replacement tray 5AC801.FRAM-00

To ensure that a hard disk can be replaced as quickly as possible, we offer the possibility to mount a compartment to the APC810 in which a replacement HDD can be stored. For more information about installing the HDD replacement disk tray, see chapter 7 "Maintenance / Servicing", section 10 "Installing the HDD replacement disk tray", on page 452.

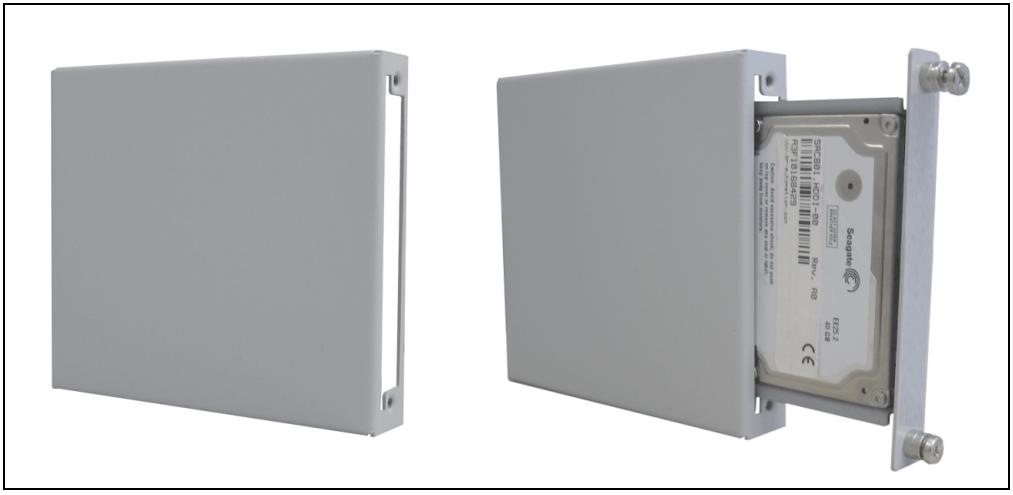


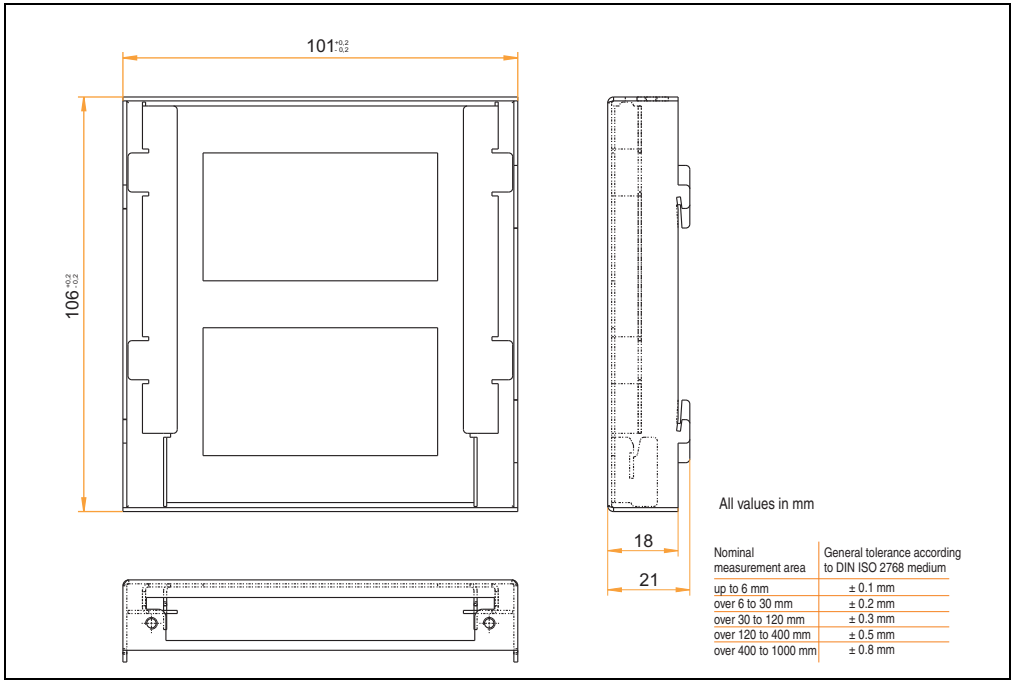
Figure 223: HDD replacement disk tray - 5AC801.FRAM-00

14.1 Order data

Model number	Description	Note
5AC801.FRAM-00	**HDD replacement disk tray** The replacement hard disk is not included in delivery and must be ordered separately. (Order data can be found in Chapter 1 "General Information" on page 26.	

Table 280: Order data - HDD replacement disk tray

14.2 Dimensions



Nominal measurement area	General tolerance according to DIN ISO 2768 medium
up to 6 mm	± 0.1 mm
over 6 to 30 mm	± 0.2 mm
over 30 to 120 mm	± 0.3 mm
over 120 to 400 mm	± 0.5 mm
over 400 to 1000 mm	± 0.8 mm

Figure 224: Dimensions - HDD replacement disk tray

15. Ready relay 5AC801.RDYR-01

The ready relay 5AC801.RDYR-01 can be connected to the APC810 add-on UPS slot (this slot must be available). For more information about installing the ready relay, see chapter 7 "Maintenance / Servicing", section 11 "Installing the ready relay /2 in the add-on UPS slot".

The information sheet included in delivery explains how to attach the label strips to the Automation PC 810.

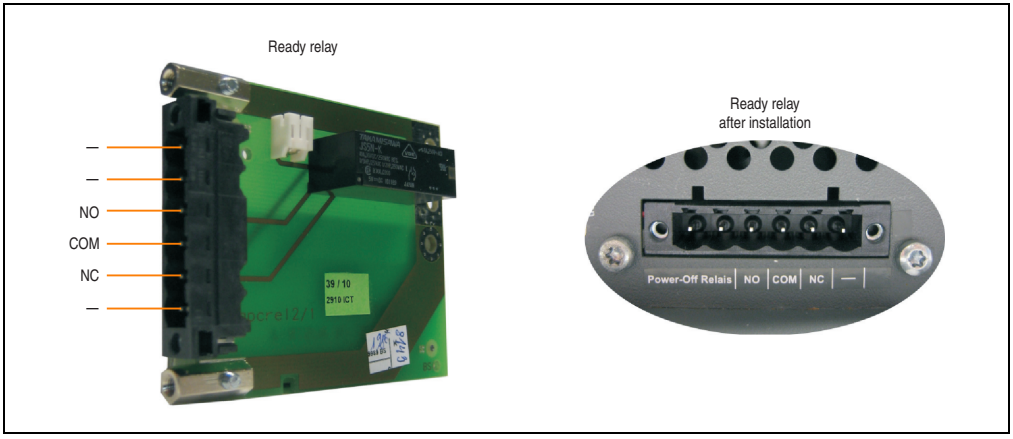


Figure 225: Ready relay - 5AC801.RDYR-01

15.1 Order data

Model number	Description	Note
5AC801.RDYR-01	**APC810 Ready relay /2** Ready relay for APC810 for installation on an add-on UPS slot	

Table 281: Order data - Ready relay

15.2 Pin assignments

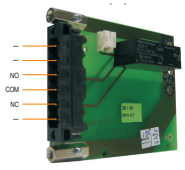
Pin	Assignment	Description	Image
1	-	Not connected	
2	-	Not connected	
3	NO	Normally open	
4	COM	Change-over contact	
5	NC	Normally closed	
6	-	Not connected	

Table 282: Pin assignments - Ready relay

15.3 Contents of delivery

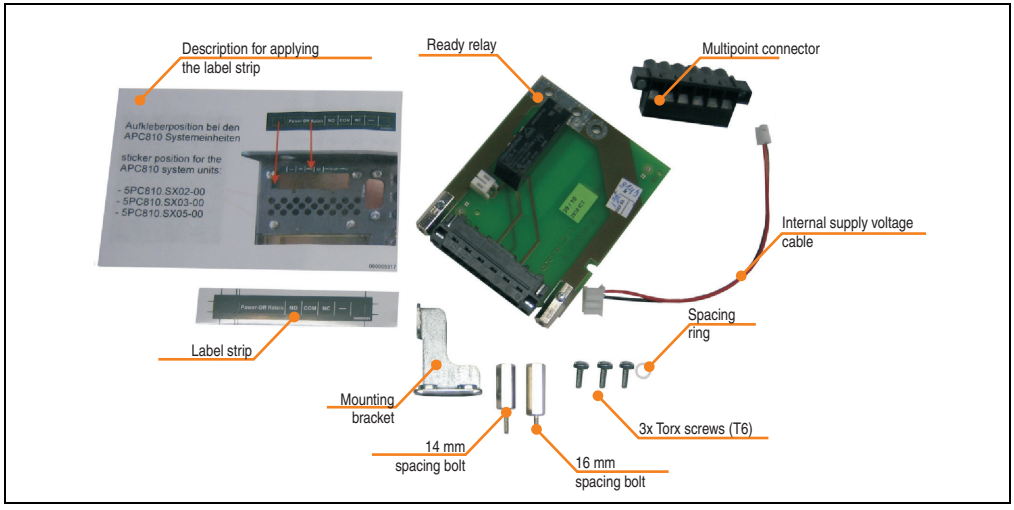


Figure 226: Contents of delivery - Ready relay

16. HMI Drivers & Utilities DVD 5SWHMI.0000-00

Figure 227: HMI Drivers & Utilities DVD 5SWHMI.0000-00

Model number	Short description	Note
5SWHMI.0000-00	**HMI Drivers & Utilities DVD**	

Table 283: Model number - HMI Drivers & Utilities DVD

This DVD contains drivers, utilities, software upgrades and user's manuals for B&R Panel system products (see B&R homepage – Industrial PCs, Visualization and Operation).

BIOS upgrades for the products

- Automation PC 810
- Automation PC 620
- Automation PC 680
- Panel PC 700
- Provit 2000 product families - IPC2000/2001/2002
- Provit 5000 product families - IPC5000/5600/5000C/5600C
- Power Panel 100 / Mobile Panel 100 BIOS devices
- Power Panel 100 / Mobile Panel 100 user boot logo
- Power Panel 100 / Mobile Panel 100 REMHOST utility

Drivers for the devices

- Automation Device Interface (ADI)
- Audio
- Chipset
- CD-ROM
- LS120
- Graphics
- Network
- PCI RAID controller
- Touch screen
- Touchpad
- Interface board

Updates

- Firmware upgrades (e.g. MTCX, SMXC)

Utilities & Tools

- ACOPOS
- Automation Device Interface (ADI)
- Miscellaneous
- MTC utilities
- Key editor
- MTC & Mkey utilities
- Mkey utilities
- UPS Configuration Software
- ICU ISA configuration
- Intel PCI NIC boot ROM
- Diagnostics
- CompactFlash lifespan calculation for Silicon Systems CompactFlash cards 5CFCRD.xxxx-03

Windows and embedded operating systems

- Thin client
- Windows CE
- Windows NT Embedded
- Windows XP Embedded

MCAD templates for

- Industrial PCs
- Visualization and operating devices
- Legend strip templates
- Template for custom design
- Control systems
- I/O systems
- Motion control

Documentation for

- B&R Windows CE
- Automation PC 810
- Automation PC 620
- Automation PC 680
- Automation Panel 900
- Panel PC 700
- Power Panel 15/21/35/41
- Power Panel 100/200
- Provit 2000
- Provit 3030
- Provit 4000
- Provit 5000
- Provit Benchmark
- Provit Mkey
- Windows NT Embedded application guide
- Windows XP Embedded application guide
- Uninterruptible power supply

Service tools

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

Chapter 7 • Maintenance / Servicing

The following chapter describes service/maintenance work which can be carried out by a trained, qualified user.

1. Changing the battery

Information:

- **The product design allows the battery to be changed with the APC810 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.**

The following replacement lithium batteries are available: 4A0006.00-000 (1 pc.) and 0AC201.91 (4 pcs.).

1.1 Procedure

- Disconnect the power supply to the Automation PC 810.
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Remove the black plastic cover from the battery compartment and carefully pull out the battery using the removal strips.

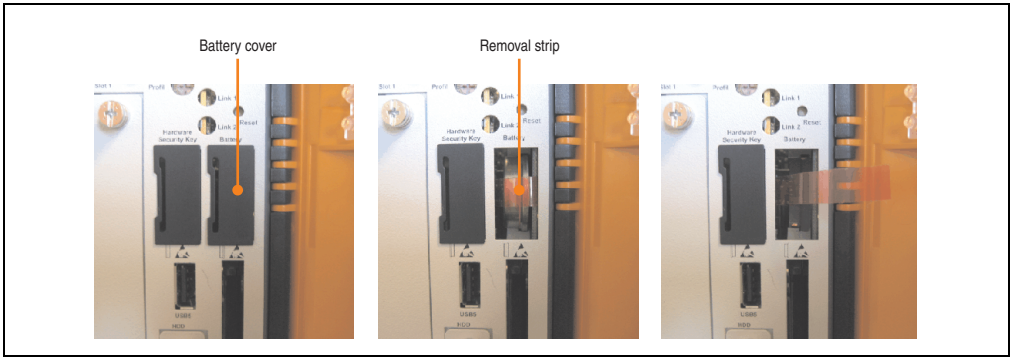


Figure 228: Remove battery

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

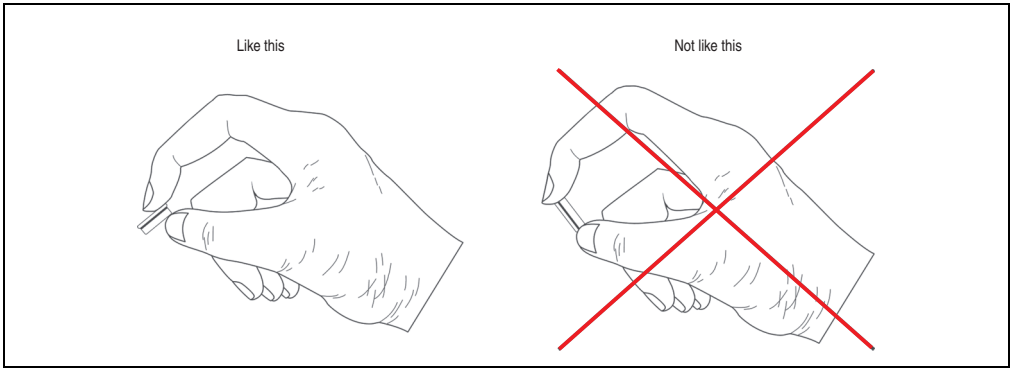


Figure 229: Battery handling

- Insert the new battery with correct polarity.

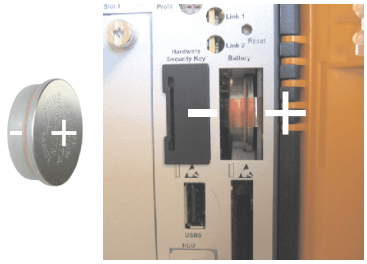


Figure 230: Battery polarity

- To make the next battery change easier, be sure the removal strip is in place when inserting battery.
- Reconnect power supply to the Automation PC 810 (plug in power cable and press power button).
- Date and time might need to be reset in BIOS.

Warning!

Lithium batteries are considered hazardous waste. Used batteries should be disposed of according to local requirements.

2. 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.

- Loosen and remove the two ¼ turn screws on the protective cover / slide-in compact drive.

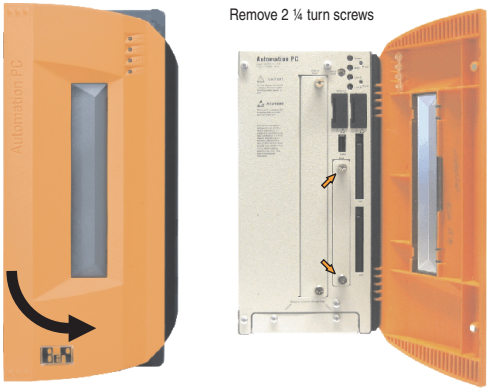


Figure 231: Loosening the ¼ turn screws

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

Figure 232: Inserting the compact SATA drive

3. Installing / exchanging a slide-in slot drive

Slide-in drives can be installed and exchanged in system units with 2, 3 or 5 card slots.

3.1 Procedure

- Disconnect the power supply to the Automation PC 810.
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Remove the dummy slide-in module or slide-in drive by unscrewing the two ¼ turn screws.

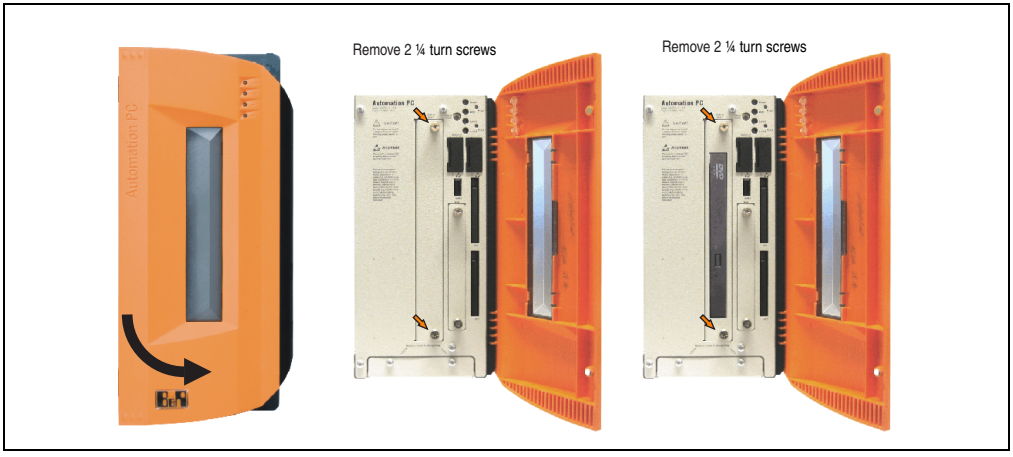


Figure 233: Loosening the ¼ turn screws

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

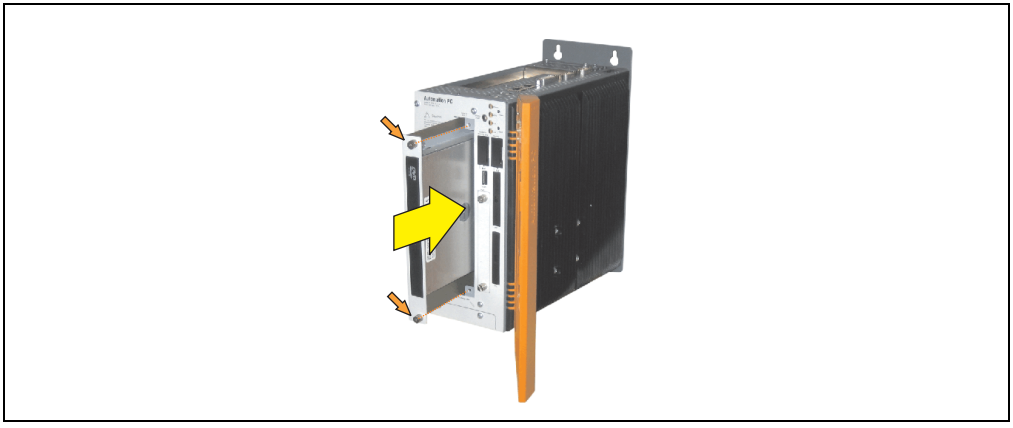


Figure 234: Installing the slide-in drive

4. Installing the slide-in compact adapter

Slide-in compact adapters can be installed and exchanged in system units with 2, 3 or 5 card slots. 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.

4.1 Procedure

- Disconnect the power supply to the Automation PC 810.
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Remove the dummy slide-in module or slide-in drive by unscrewing the two ¼ turn screws.

Figure 235: Loosening the ¼ turn screws

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

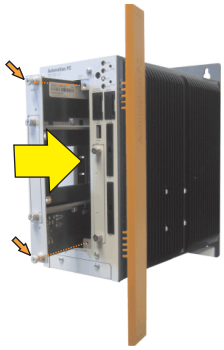


Figure 236: Installing the slide-in compact adapter

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

Figure 237: Inserting the slide-in compact drive

5. Installing / exchanging the fan kit

- Remove side cover (see section "Mounting the side cover", on page 447).
- After the screws have been removed, the fan kit cover can be removed toward the front.

Figure 238: Remove fan kit insert

- Insert the frame - Mount the contact board side to the sliding contacts on the system unit and fasten using the ¼ turn screws.

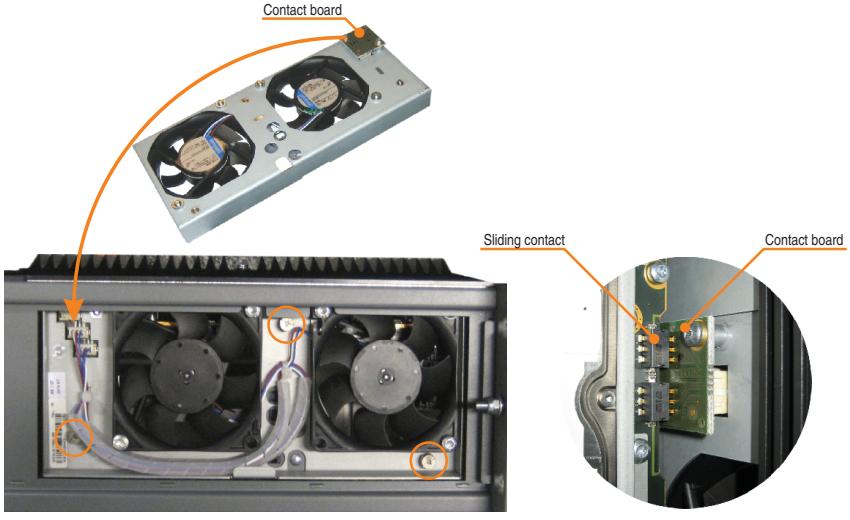


Figure 239: Inserting and fastening the fan kit

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

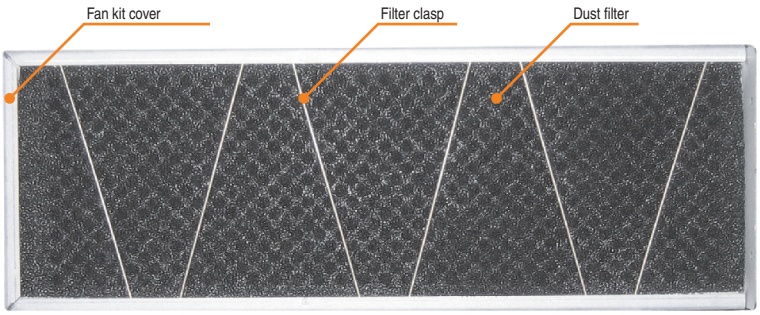


Figure 240: Securing the dust filter with the filter clasp

- 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.

Installation is the same as for all APC810 devices.

6. Installing the UPS module

The module is installed using the materials included in the delivery.

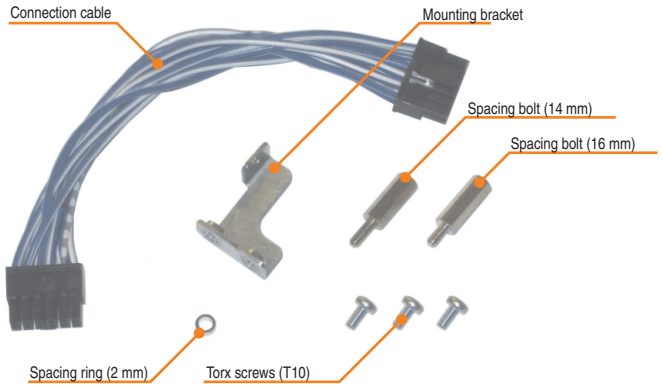


Figure 241: Add-on UPS module 5AC600.UPSI-00 - Installation materials

Installation may vary depending the system unit type (1, 2, 3 or 5 card slots) or whether an add-on interface module (IF option) is installed in the APC810.

6.1 Installation without installed add-on interface module

Different parts are used depending on the system unit and whether the add-on interface module is **installed** (description starting on page 441) or **not installed** (description follows).

6.1.1 APC810 1 card slot

- Remove side cover (see section "Mounting the side cover", on page 447).
- Remove UPS module cover by removing the 2 marked Torx screws (T10).

Figure 242: Remove UPS module cover

- Screw in spacing bolt and spacing ring on the main board (using M5 hex socket screwdriver).

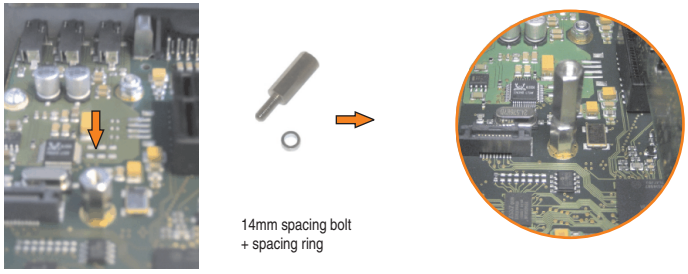


Figure 243: Screw in spacing bolt and spacing ring

- Install UPS module with 2 Torx screws (T10) on the housing and 1 Torx screw (T10) on the main board (spacing bolt). Use the previously removed Torx screws from the mounting materials.

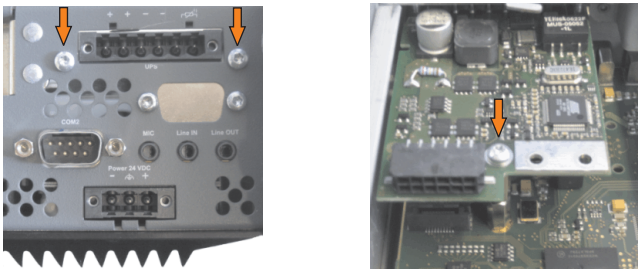


Figure 244: Install UPS module

- Plug in connection cable (see marked socket).

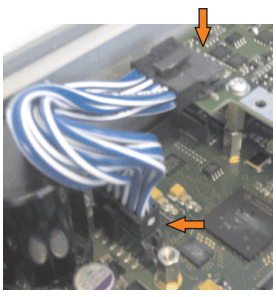


Figure 245: Plug in connection cable

Information:

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

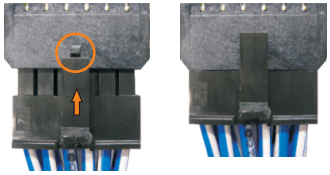


Figure 246: Connector locking mechanism

- Attach the side cover.

6.1.2 APC810 2 and 3 card slot

- Remove side cover (see section "Mounting the side cover", on page 447).
- Remove UPS module cover by removing the 2 marked Torx screws (T10).

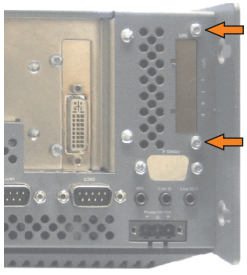


Figure 247: Remove UPS module cover

- Screw in spacing bolt and spacing ring on the main board (using M5 hex socket screwdriver).

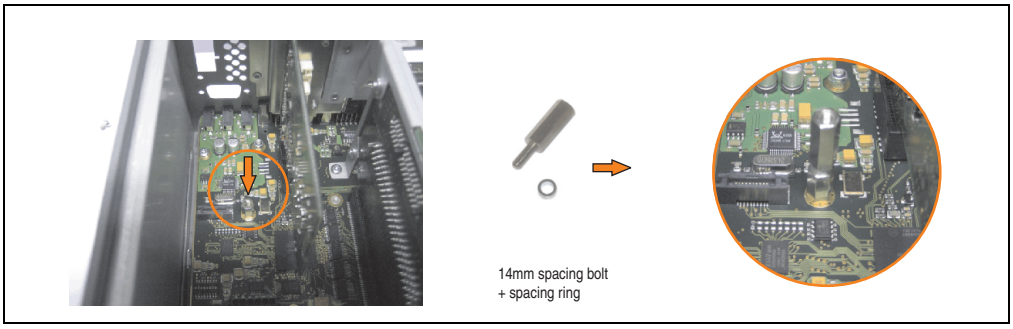


Figure 248: Screw in spacing bolt and spacing ring

- Install mounting bracket on UPS module using 2 Torx screws (T10).

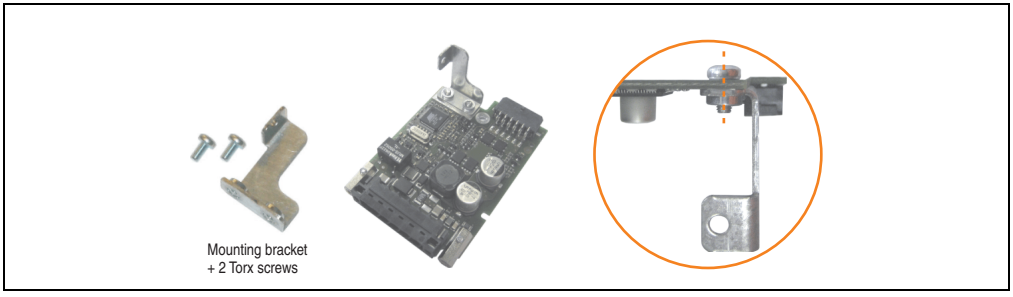


Figure 249: Install mounting bracket

- Install UPS module with 2 Torx screws (T10) on the housing and 1 Torx screw (T10) on the main board (spacing bolt). Use the previously removed Torx screws from the mounting materials.

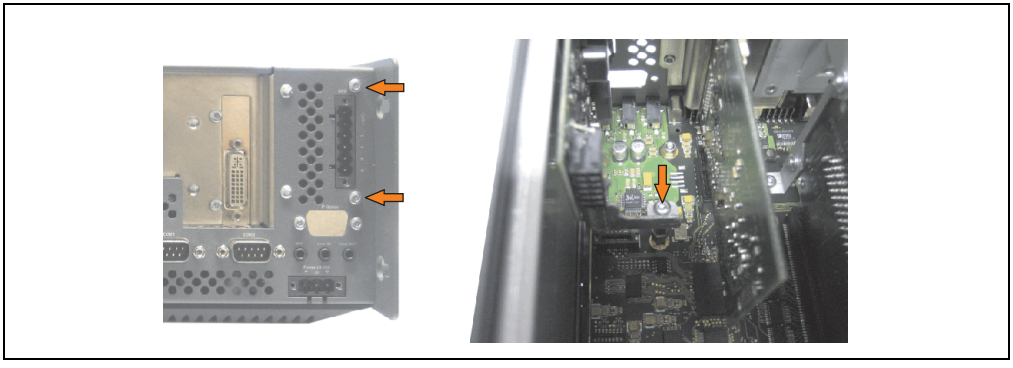


Figure 250: Install UPS module

- Plug in connection cable (see marked socket).

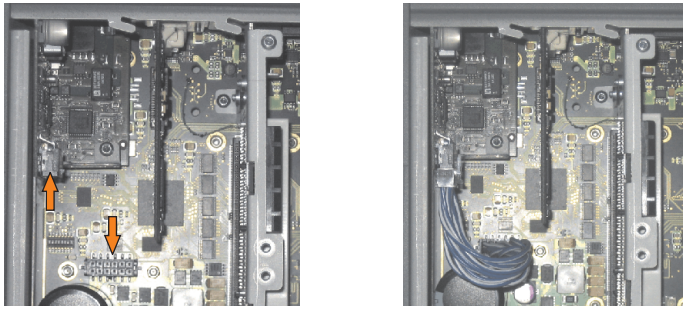


Figure 251: Plug in connection cable

Information:

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

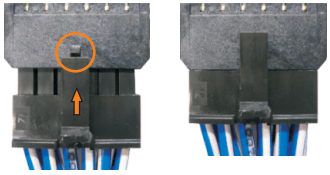


Figure 252: Connector locking mechanism

- Attach the side cover.

6.1.3 APC810 5 card slot

- Remove side cover (see section "Mounting the side cover", on page 447).
- Remove UPS module cover by removing the 2 marked Torx screws (T10).

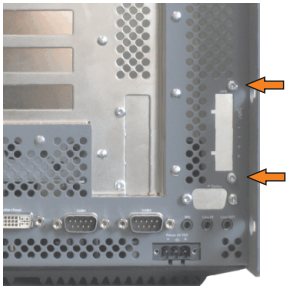


Figure 253: Remove UPS module cover

- Screw in spacing bolt and spacing ring (using M5 hex socket screwdriver).

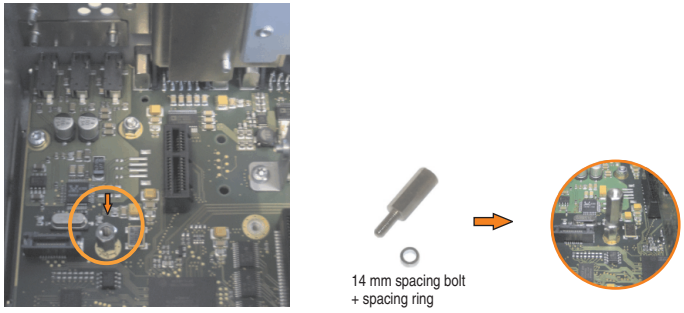


Figure 254: Screw in spacing bolt and spacing ring

- Install mounting bracket on UPS module using 2 Torx screws (T10).

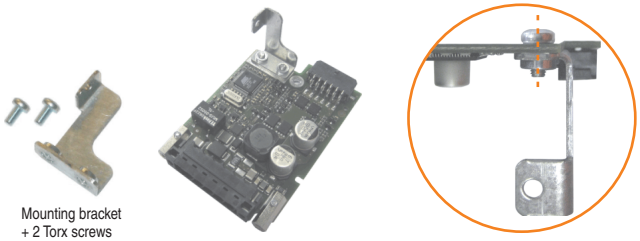


Figure 255: Install mounting bracket

- Install UPS module with 2 Torx screws (T10) on the housing and 1 Torx screw (T10) on the main board (spacing bolt). Use the previously removed Torx screws from the mounting materials.

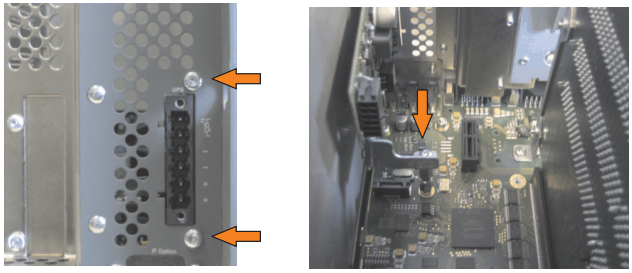


Figure 256: Install UPS module

- Attach connection cable (see marked socket).

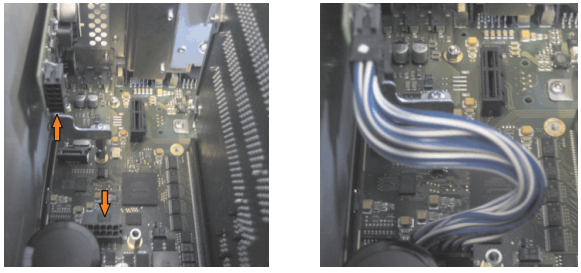


Figure 257: Plug in connection cable

Information:

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

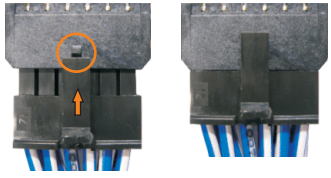


Figure 258: Connector locking mechanism

- Attach the side cover

6.2 Installation with installed add-on interface module

6.2.1 APC810 1 card slot

- Remove side cover (see section "Mounting the side cover", on page 447).
- Remove UPS module cover by removing the 2 marked Torx screws (T10).

Figure 259: Remove UPS module cover

- Screw in spacing bolt (using M5 hex socket screwdriver).

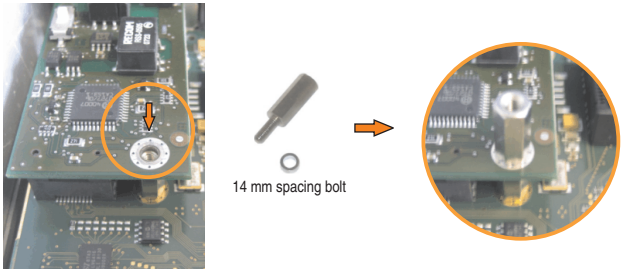


Figure 260: Screw in spacing bolt

- Install the UPS module using 3 Torx screws (T10). Use the previously removed Torx screws and one Torx screw from the mounting materials.

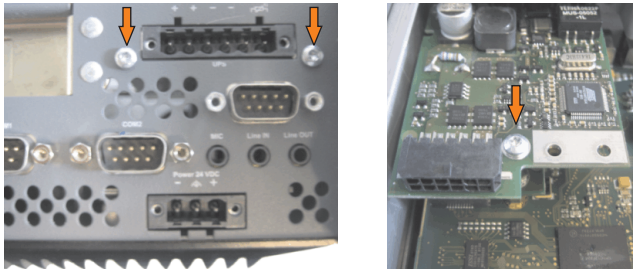


Figure 261: Install UPS module

- Plug in connection cable (see marked socket).

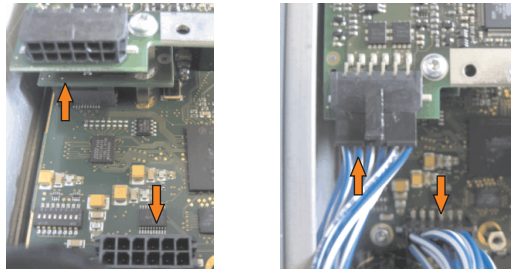


Figure 262: Plug in connection cable

Information:

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

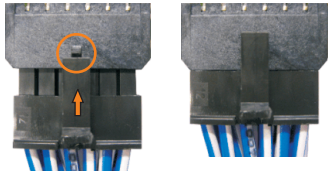


Figure 263: Connector locking mechanism

- Attach cover plate and side cover.

6.2.2 APC810 2 and 5 card slot

- Remove side cover (see section "Mounting the side cover", on page 447).
- Remove UPS module cover by removing the 2 marked Torx screws (T10).

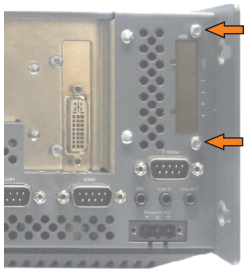


Figure 264: Remove UPS module cover

- Screw in spacing bolt (using M5 hex socket screwdriver).

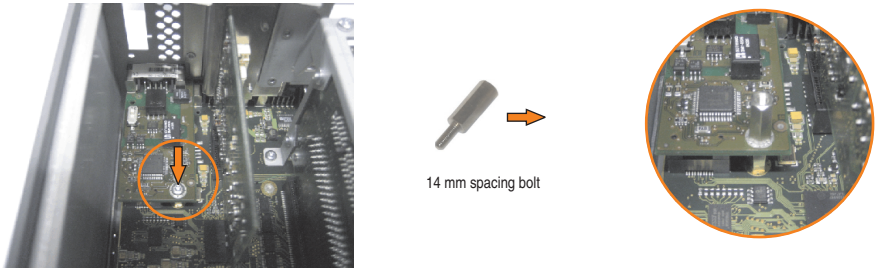


Figure 265: Screw in spacing bolt

- Install mounting bracket on UPS module using 2 Torx screws (T10).

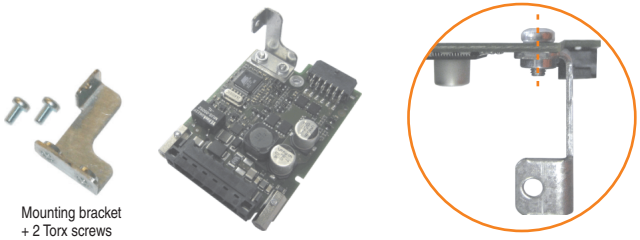


Figure 266: Install mounting bracket

- Install the UPS module using 3 Torx screws (T10). Use the previously removed Torx screws and one Torx screw from the mounting materials.

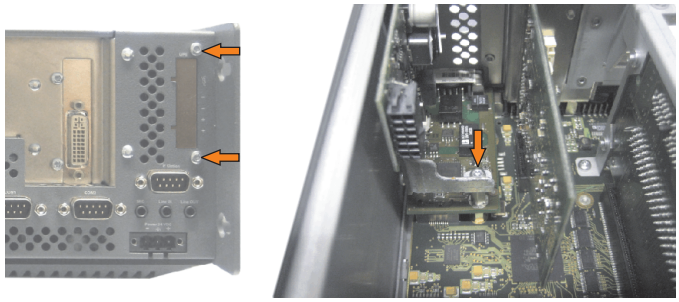


Figure 267: Install UPS module

- Plug in connection cable (see marked socket).

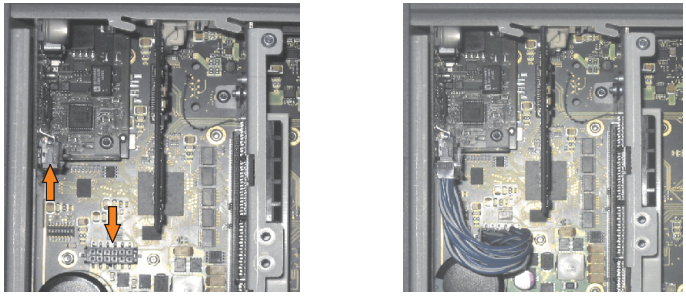


Figure 268: Plug in connection cable

Information:

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

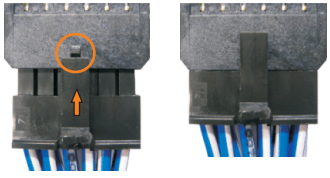


Figure 269: Connector locking mechanism

- Attach cover plate and side cover.

6.2.3 APC810 5 card slot

- Remove side cover (see section "Mounting the side cover", on page 447).
- Remove UPS module cover by removing the 2 marked Torx screws (T10).

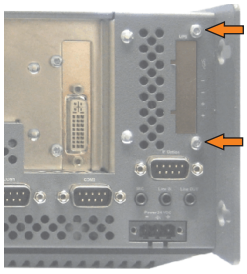


Figure 270: Remove UPS module cover

- Screw in spacing bolt (using M5 hex socket screwdriver).

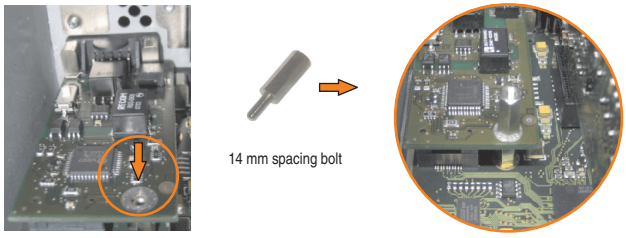


Figure 271: Screw in spacing bolt

- Install mounting bracket on UPS module using 2 Torx screws (T10).

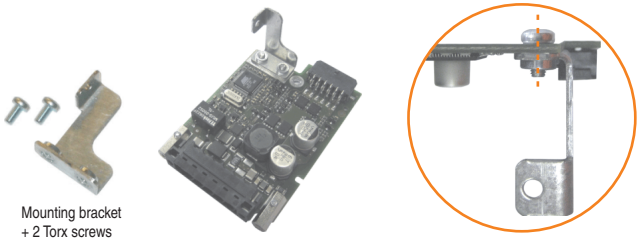


Figure 272: Install mounting bracket

- Install the UPS module using 3 Torx screws (T10). Use the previously removed Torx screws and one Torx screw from the mounting materials.

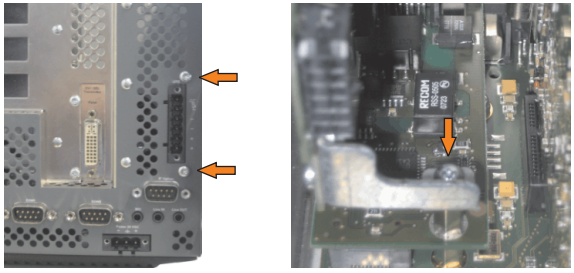


Figure 273: Install UPS module

- Plug in connection cable (see marked socket).

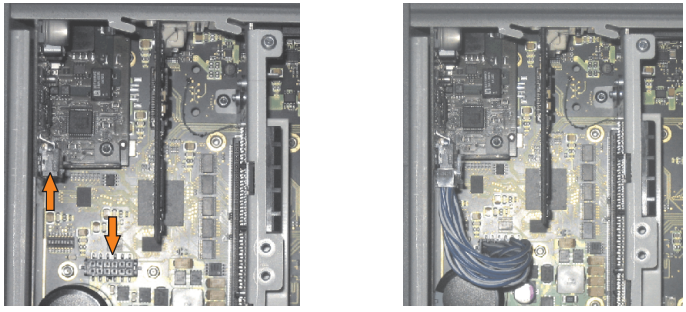


Figure 274: Plug in connection cable

Information:

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

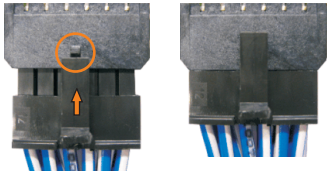


Figure 275: Connector locking mechanism

- Attach cover plate and side cover.

7. 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.

7.1 APC810 with 1 card slot

- Disconnect the power supply to the Automation PC 810.
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Open the orange front cover. Behind the cover there are 4 Kombitorx screws (T10) that must be removed.

Figure 276: Mounting the side cover - APC810 1 card slot

- After the screws have been removed, the side cover can be removed by sliding it toward the front.

7.2 APC810 with 2 and 3 card slot

- Disconnect the power supply to the Automation PC 810.
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Open the orange front cover. Behind the cover there are 4 Kombitorx screws (T10) that must be removed.

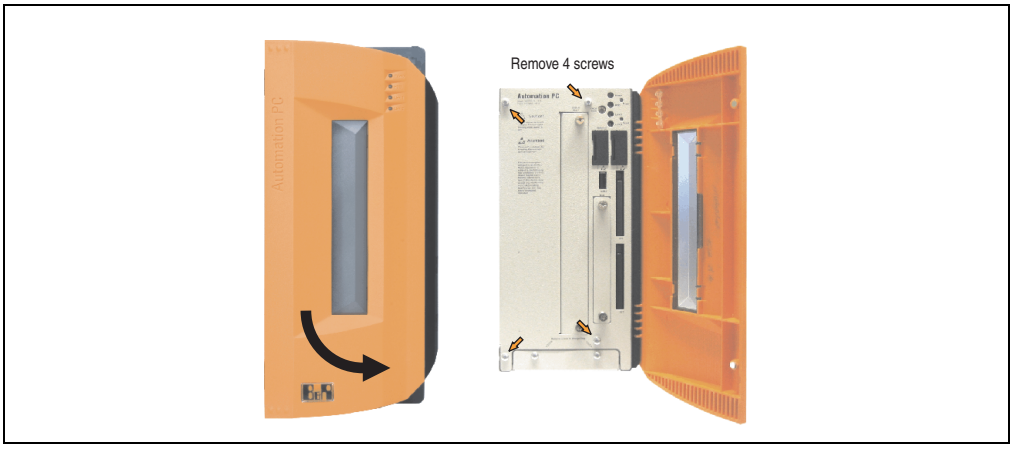


Figure 277: Mounting the side cover - APC810 2 card slot

- After the screws have been removed, the side cover can be removed by sliding it toward the front.

7.3 APC810 with 5 card slot

- Disconnect the power supply to the Automation PC 810.
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Open the orange front cover. Behind the cover there are 4 Kombitorx screws (T10) that must be removed.

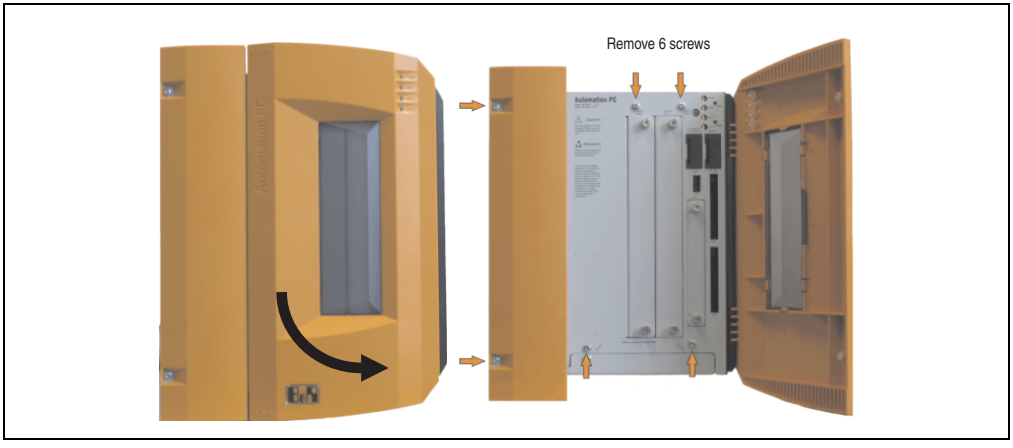


Figure 278: Mounting the side cover - APC810 5 card slot

- After the screws have been removed, the side cover can be removed by sliding it toward the front.

8. AP Link installation

- Remove side cover (see section "Mounting the side cover", on page 447).
- Remove AP Link module cover by removing the 2 marked Torx screws (T10).

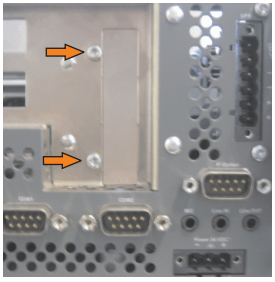


Figure 279: Remove AP Link module cover

- Insert the AP Link card in appropriate slot.

Warning!

When inserting the AP Link card, be sure to push it all the way into the AP Link slot. Do not force the card into the slot.

- Install the AP Link module using 3 Torx screws (T10). Use the previously removed Torx screws and an additional Torx screw from the mounting materials.

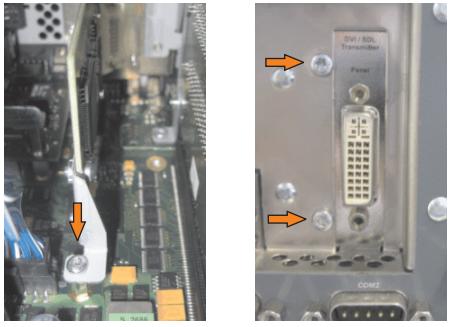


Figure 280: Install AP Link module

- Attach cover plate and side cover.

9. Exchanging a PCI SATA RAID hard disk in a RAID 1 system

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

Model number - PCI SATA RAID controller	Model number of required replacement SATA HDD	Note
5ACPCI.RAIC-03	5ACPCI.RAIC-04	160 GB hard disk

Table 284: Overview of required replacement SATA HDD for PCI SATA HDD RAID controller

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

9.1 Exchange procedure

- Remove the power supply to the device (Automation PC 620 / Panel PC 700 / Automation PC 810).
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Remove the side cover.
- Remove the SATA RAID insert.
- Loosen the 4 appropriate mounting screws (M3x5).

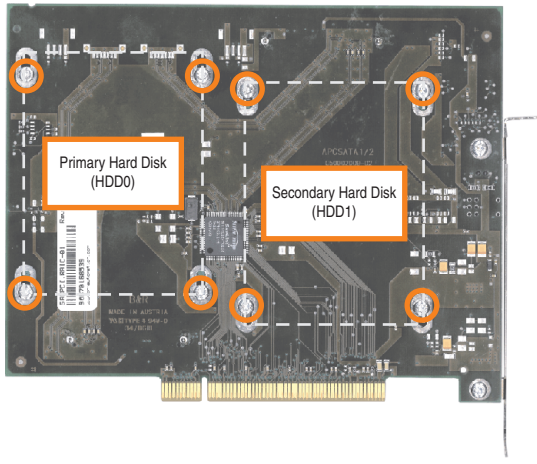


Figure 281: Screw layout on the back side of the SATA RAID controller 5ACPCI.RAIC-03

- On the front side, slide the hard disk down and away (image 1).
- Insert the new hard disk carefully into the connector (image 2), being careful to only touch it on the front, and not on the top.

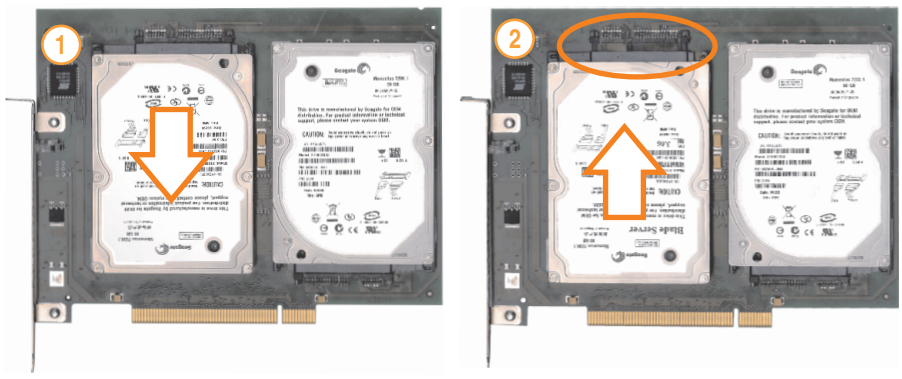


Figure 282: Hard disk exchange

- Re-secure the hard disk using the 4 fastening screws (M3x5) used earlier.
- Reassemble device in the reverse order.
- An error message is output by the RAID BIOS after starting the system "`RAID1 set is in Critical status - press any key to enter Configuration Utility`".
- A rebuild must be executed in the SATA RAID BIOS - for more information on this, see the section "Rebuild mirrored set", on page 207.

10. Installing the HDD replacement disk tray

- Insert the replacement HDD in the replacement disk tray and fasten using the ¼ turn screws.

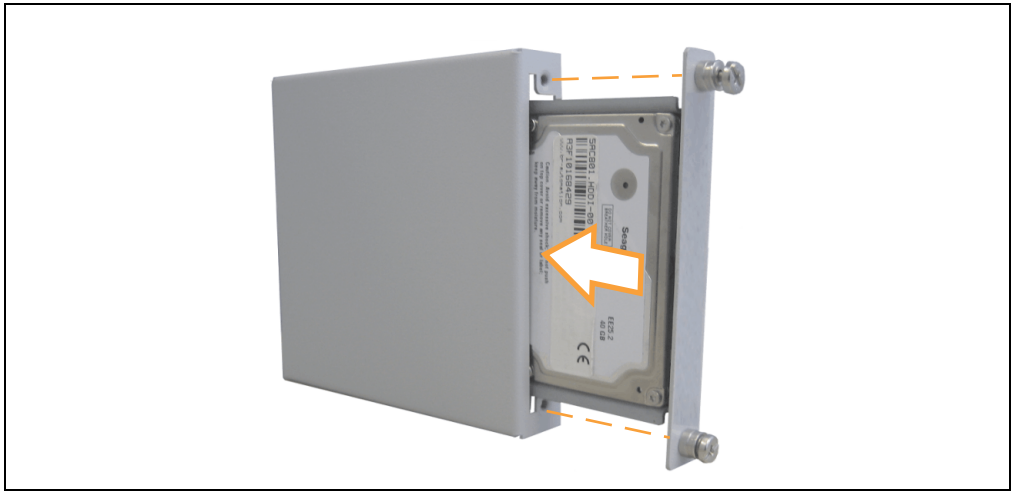


Figure 283: Installing the replacement hard disk in the replacement disk tray

- Attach the HDD replacement disk tray to the ventilation slots on the APC810 housing using the hooks provided.

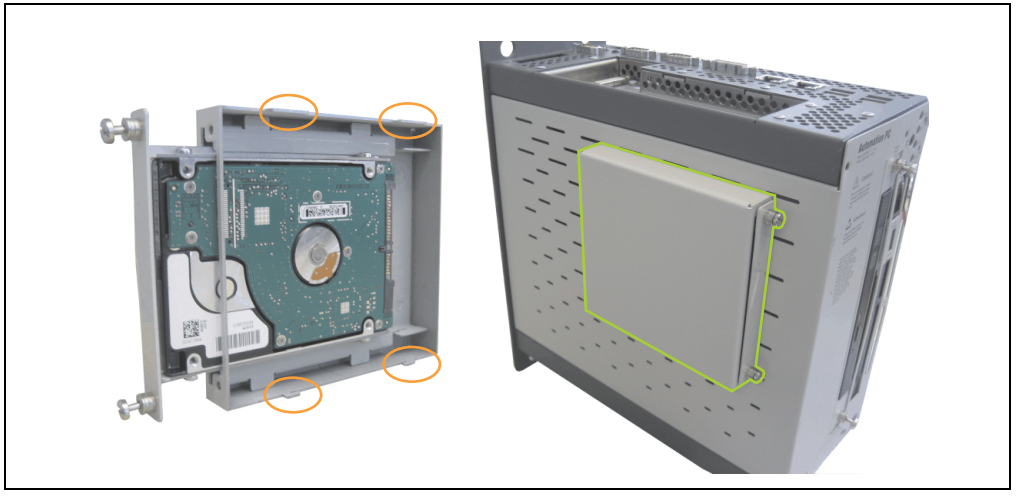


Figure 284: Installing the replacement disk tray in the APC810

11. Installing the ready relay /2 in the add-on UPS slot

- Remove side cover (see section 7 "Mounting the side cover", on page 447).
- Remove UPS module cover or mounted UPS by loosening the 2 marked Torx screws (T10).

Figure 285: Remove UPS module cover

- Attach spacing bolt and spacing ring (if not already mounted from the UPS) on the main board (using size 5 hex screwdriver).
  The spacing bolt with a length of 14 mm must be used for APC810 system units 5PC810.SX01-00, 5PC810.SX02-00 and 5PC810.SX03-00. The spacing bolt with a length of 16 must be used for the system unit 5PC810.SX05-00.

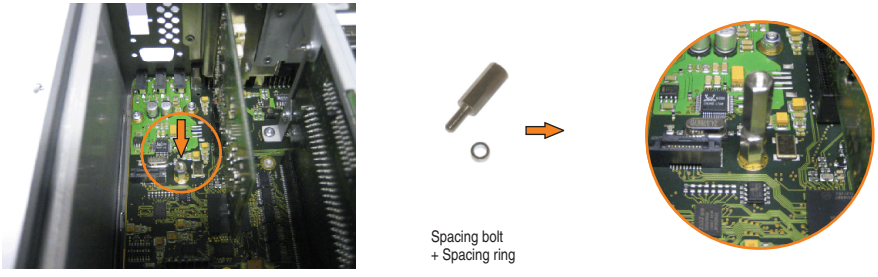


Figure 286: Screw in spacing bolt and spacing ring

- Ready relay with 2 Torx screws (T6) and the mounting bracket on the housing and 1 Torx screw (T6) on the main board (spacing bolt).

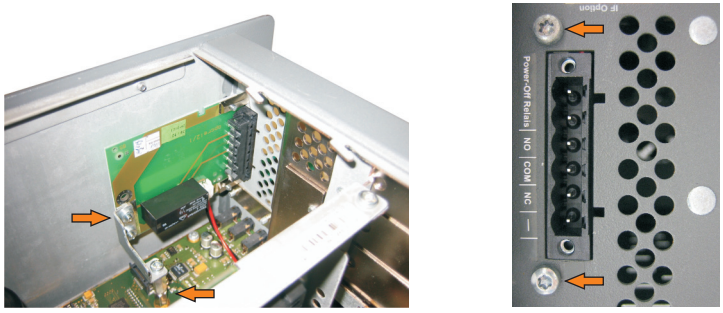


Figure 287: Installing the ready relay

- Plug in connection cable

Information:

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

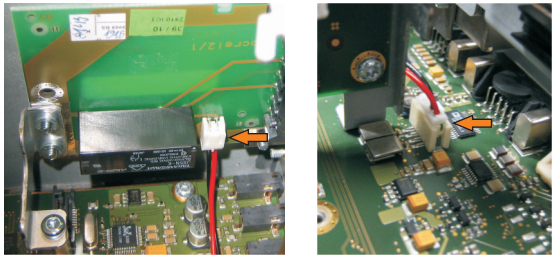


Figure 288: Plug in connection cable

- Attach the side cover

Appendix A

1. Temperature sensor locations

Sensors indicate temperature values at many different locations in the APC810 (CPU, board I/O, slide-in drive, etc). The temperatures[1] can be read in BIOS (menu item "advanced" - CPU monitor) or in Microsoft Windows XP/embedded, using B&R Control Center[2] .

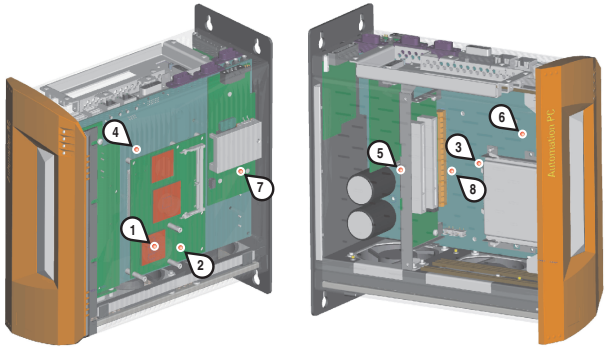


Figure 289: Temperature sensor locations

Position	Measurement point for	Monitoring	Max. specified
1	CPU	Processor temperature (sensor integrated on the processor).	100°C
2	Board	CPU board temperature (sensor integrated on the CPU board).	85°C
3	Board I/O	Board I/O area temperature (sensor on the baseboard).	85°C
4	Board ETH2	Baseboard temperature near the ETH2 controller (sensor on the baseboard).	80°C
5	Board power supply	Board power supply temperature (sensor on the baseboard).	80°C
6	ETH2 Controller	Temperature of ETH2 controller (sensor in the ETH2 controller).	125°C
7	Power supply	Power supply temperature (sensor on the power supply).	80°C
8	Slide-in drive 1	Temperature of a slide-in drive 1 (the sensor is integrated on the slide-in drive)	Drive-dependent
8	Slide-in drive 2	Temperature of a slide-in drive 2 (the sensor is integrated on the slide-in drive)	Drive-dependent

Table 285: Temperature sensor locations

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

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

2. Maintenance Controller Extended (MTCX)

The MTCX controller (FPGA processor) is located on the main board (part of every system unit) of the APC810 device.

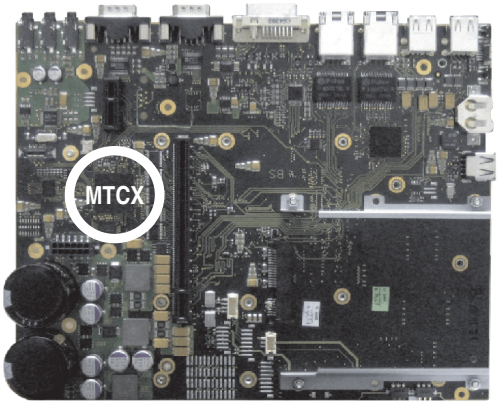


Figure 290: MTCX controller location

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 (I/O area, power supply, slide-in drive 1/2)
- Fan control
- Key and LED handling/coordination (matrix keyboard on B&R display units)
- Advanced desktop operation (keys, USB forwarding)
- Daisy chain display operation (touch screen, USB forwarding)
- Panel locking mechanism (configurable 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, Panel Lock, Link 1, Link 2)

The functions of the MTCX can be expanded via Firmware upgrade[1)] . The version can be read in BIOS (menu item "advanced" - baseboard/panel features) or in Microsoft Windows XP/embedded, using B&R Control Center.

For more information, see section 2.2 "Firmware upgrade", on page 283.

1) Can be downloaded from the download area on the B&R homepage (www.br-automation.com).

2.1 Temperature monitoring - Fan control

The MTCX constantly monitors the temperature using temperature sensors (see section 1 "Temperature sensor locations", on page 455), 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.

Sensor range	Start-up temperature	Max fan speed at:
CPU	+ 65°C	+ 81°C
Board CPU	+ 65°C	+ 81°C
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
ETH2 Controller	+ 70°C	+ 86°C
Slide-in 1/2	+ 44°C	+ 60°C

Table 286: Temperature limits of the fan (MTCX PX32 V0.06).

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 1/2: 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 4 hours (=lag-time).

3. 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 "APC810 internal supply cable 5CAMSC.0001-00", on page 416. The plug is located close to the bus unit(s) and can be attached to it with a cable tie (see arrow in image). The APC810 side cover (see 7 "Mounting the side cover", on page 447) and possibly also the slide-in drive and PCI cards must be removed to reach the connector.

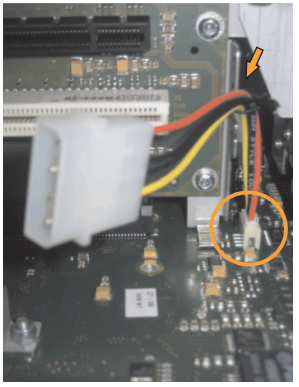


Figure 291: Connector location for external devices

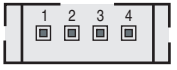
Connector for the external devices			
Pin	Assignment	Power	4-pin connector, male
1	+12 VDC	Max. 10 watts	
2	GND		
3	GND	Max. 5 watts	
4	+5 VDC		

Table 287: Pin assignments - Connector on main board

Connections are protected with a 1A multi-fuse.

4. B&R Key Editor information

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

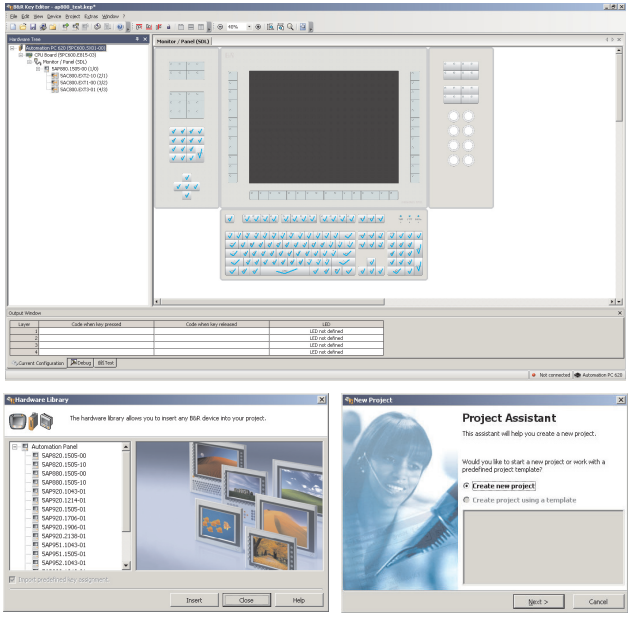


Figure 292: B&R Key Editor screenshots (Version 3.00)

Features:

- Configuration of normal keys like on a keyboard (A, B, C, etc.)
- Keyboard shortcuts (CTRL+C, SHIFT+DEL, etc.) on one key
- Special key functions (change brightness, etc.)
- Assign functions to LEDs (HDD access, power, etc.)
- 4 assignments per key possible (using layer function)
- Configuration of panel locking time when multiple Automation Panel 900 devices are connected to Automation PC 620, Automation PC 810, Automation PC 820 and Panel PC 700 devices.

Supports following systems (Version 3.00):

- Automation PC 620 (ETX, XTX, Embedded)
- Automation PC 800
- Automation PC 820
- Panel PC 300
- Panel PC 700 (ETX, XTX)
- Panel PC 800
- Power Panel 65
- Power Panel 100.200
- Power Panel 300/400
- Mobile Panel 100.200
- Mobile Panel 40/50
- IPC2000, IPC2001, IPC2002
- IPC5000, IPC5600
- IPC5000C, IPC5600C

A detailed guide for configuring keys and LEDs can be found in the B&R Key Editor's online help.

The B&R Key Editor can be downloaded for free from the download area on the B&R homepage (**www.br-automation.com**). Additionally, it can also be found on the B&R HMI Drivers & Utilities DVD (model number 5SWHMI.0000-00).

5. B&R Automation Device Interface (ADI) development kit

The ADI development kit is used to access the functions of the ADI driver. The programming languages C (with import libraries for Microsoft Visual C++ 6.0 and Microsoft eMbedded Visual C++ 4.0) and Visual Basic (for Microsoft Visual Basic 6.0) are supported.

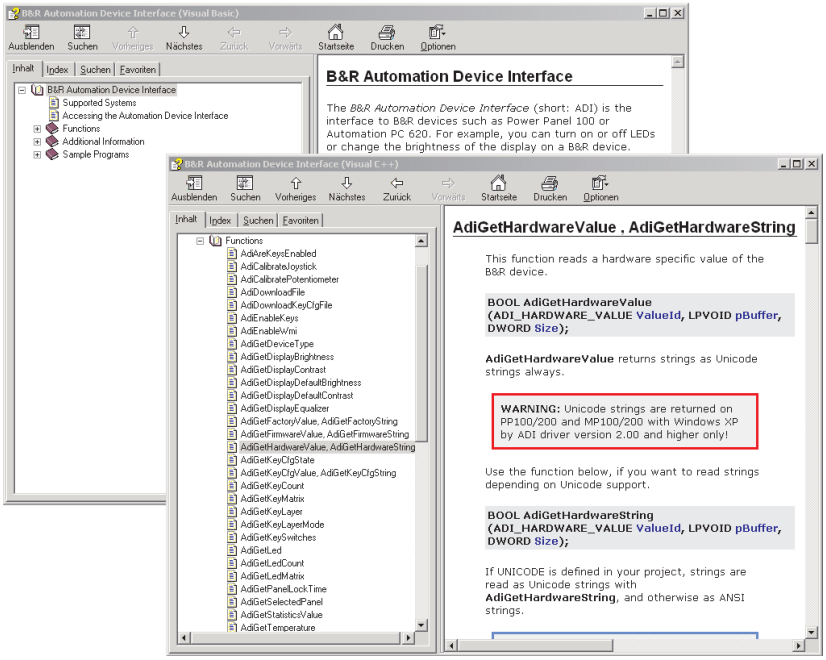


Figure 293: ADI development kit screenshots (Version 2.40)

Features:

- One Microsoft Visual Basic module with declarations for the ADI functions.
- Header files and import libraries for Microsoft Visual C++ 6.0 and Microsoft eMbedded Visual C++ 4.0.
- Help files for Visual Basic and Visual C++.
- Sample projects for Visual Basic and Visual C++.
- ADI DLL (for testing the applications, if no ADI drive is installed).

Supports following systems (Version 2.40 and higher):

- Automation PC 620
- Automation PC 810
- Automation PC 820

- Mobile Panel 40/50
- Mobile Panel 100/200
- Panel PC 300
- Panel PC 700
- Panel PC 800
- Power Panel 100/200
- Power Panel 300/400

The ADI driver suitable for the device must be installed to the stated product series (for Windows XP, Windows XP+SP2). The ADI driver is already included in the Windows XP embedded and Windows CE operating systems offered by B&R and does not have to be additionally installed.

The programming languages C (with import libraries for Microsoft Visual C++ 6.0 and Microsoft eMbedded Visual C++ 4.0) and Visual Basic (for Microsoft Visual Basic 6.0) are supported. A detailed description of using the ADI functions can be found in the integrated online help.

The B&R Automation Device Interface (ADI) development kit can be downloaded for free from the download area on the B&R homepage (**www.br-automation.com**).

6. Glossary

A

ACPI

Abbreviation for "**A**dvanced **C**onfiguration and **P**ower **I**nterface". Configuration interface that enables the operating system to control the power supply for each device connected to the PC. With ACPI, the computer's BIOS is only responsible for the details of communication with the hardware.

ADI

Abbreviation for »Automation Device Interface« The ADI interface allows access to specific functions (e.g. brightness control, firmware updates, static value read) of B&R devices. The settings can be read or changed in the Control Panel with the B&R Control Center Applet (already included in the B&R embedded operating system).

APC

An abbreviation for "**A**utomation **PC**".

API

Abbreviation for "**A**pplication **P**rogram **I**nterface" The interface, which allows applications to communicate with other applications or with the operating system.

Automation Runtime

A uniform runtime system for all B&R automation components.

B

Baud rate

Measurement unit for data transfer speed. It indicates the number of states for a transferred signal per second and is measured using the baud unit of measurement. 1 baud = 1 bit/sec or 1 bps.

BIOS

An abbreviation for "**B**asic **I**nput/**O**utput **S**ystem". Core software for computer systems with essential routines for controlling input and output processes on hardware components, for performing tests after system start and for loading the operating system. Although BIOS is used to configure a system's performance, the user does not usually come into contact with it.

Bit

Binary digit > binary position, binary character, smallest discrete unit of information. A bit can have the value 0 or 1.

Bit rate

The number of bits that can be transferred within a specified time unit. 1 bit/sec = 1 baud.

Bootstrap loader

A program that automatically runs when the computer is switched on or restarted. After some basic hardware tests have been carried out, the bootstrap loader starts a larger loader and hands over control to it, which in turn boots the operating system. The bootstrap loader is typically found in ROM on the computer.

Byte

Data format [1 byte = 8 bits] and a unit for characterizing information amounts and memory capacity. The following units are the commonly used units of progression: KB, MB, GB.

B&R Automation Runtime

Windows-based program for creating installation disks to install B&R Automation Runtime™ on the target system.

C

Cache

Background memory, also known as non-addressable memory or fast buffer memory. It is used to relieve the fast main memory of a computer. For example, data that should be output to slower components by the working memory (e.g. disk storage, printers) is stored temporarily in cache memory and output from there at an appropriate speed for the target devices.

CAN

An abbreviation for "**C**ontroller **A**rea **N**etwork" (serial bus system). Structure according to ISO 11898; Bus medium: twisted pair. Good transfer properties in short distances less than 40 m with a 1 Mbit/sec data transfer rate. Maximum number of stations: Theoretically unlimited, but practically limited up to 64. Real-time capable (i.e. defined maximum latency times for messages with high priority). High reliability using error detection, error handling, troubleshooting. Hamming distance.

CD-ROM

Abbreviation for "**C**ompact **D**isc **R**ead-**O**nly **M**emory". A removable data medium with a capacity of ~700 MB. CD-ROMs are optically scanned.

CE mark

A CE mark for a product. It consists of the letters "CE" and indicates conformity to all EU guidelines for the labeled product. It indicates that the individual or corporate body who has performed or attached the label assures that the product conforms to all EU guidelines for complete harmonization. It also indicates that all mandatory conformity evaluation procedures have taken place.

CMOS

"CMOS" is a battery powered memory area where fundamental parameters of an IBM (or compatible) personal computer are stored. Information such as the type of hard drive, size of the working memory and the current date and time are required when booting the computer. As the name suggests, the memory is based on CMOS technology standards.

COM

A device name used to access serial ports in MS-DOS. The first serial port can be accessed under COM1, the second under COM2, etc. A modem, mouse, or serial printer is typically connected to a serial port.

COM1

Device name for the first serial port in a PC system. The input/output area for COM1 is usually found at address 03F8H. Generally, the COM1 port is assigned to IRQ 4. In many systems, an RS232 serial mouse is connected to COM1.

COM2

Device name for the second serial port in a PC system. The input/output area for COM2 is usually found at address 02F8H. Generally, the COM2 port is assigned to IRQ 3. In many systems, a modem is connected to COM2.

COM3

Device name for a serial port in a PC system. The input/output area for COM3 is usually found at address 03E8H. Generally, the COM3 port is assigned to IRQ 4. In many systems, COM3 is used as an alternative for COM1 or COM2 if peripheral devices are already connected to COM1 and COM2.

CompactFlash®

CompactFlash memory cards [CF cards] are exchangeable nonvolatile mass memory systems with very small dimensions [43 x 36 x 3.3 mm, approximately half the size of a credit card]. In addition to the flash memory chips, the controller is also present on the cards. CF cards provide complete PC card / ATA functionality and compatibility. A 50-pin CF card can be simply inserted in a passive 68-pin type II adapter card. It conforms to all electrical and mechanical PC card interface specifications. CF cards were launched by SanDisk back in 1994. Currently, memory capacities reach up to 64 GB per unit. Since 1995, CompactFlash Association [CFA] has been looking after standardization and the worldwide distribution of CF technology

Controller

A device component which allows access to other devices on a computer subsystem. A disk controller, for example, allows access to hard disks and disk drives and is responsible both for physical and logic drive access.

CPU

An abbreviation for "**C**entral **P**rocessing **U**nit". Interprets and executes commands. It is also known as a "microprocessor" or "processor" for short. A processor is able to receive, decode and execute commands, as well as transfer information to and from other resources via the computer bus.

CRT

Abbreviation for Cathode Ray Tube. The main component of a television set or a standard computer screen. A cathode ray tube consists of a vacuum tube that contains one or more electron guns. Each electron gun creates a horizontal electron beam that appears on the front of the tube (the screen). The inner surface of the screen is coated with phosphor, which is lit when hit by the electrons. Each of the electron beams move in a line from top to bottom. In order to prevent flickering, the screen content is updated at least 25 times per second. The sharpness of the picture is determined by the number of pixels on the screen.

CTS

An abbreviation for "**C**lear **T**o **S**end". A signal used when transferring serial data from modem to computer, indicating its readiness to send the data. CTS is a hardware signal which is transferred via line number 5 in compliance with the RS-232-C standard.

D

DCD

An abbreviation for "**D**ata **C**arrier **D**etected". A signal used in serial communication that is sent by the modem to the computer it is connected to, indicating that it is ready for transfer.

Dial-up

Data is transferred over the telephone network using a modem or an ISDN adapter.

DIMM

"Double In-line Memory Module" consisting of one or more RAM chips on a small circuit board that is connected with the motherboard of a computer.

DMA

Direct **M**emory **A**ccess > Accelerated direct access to a computer’s RAM by bypassing the CPU.

DRAM

An abbreviation for "**D**ynamic **R**andom **A**ccess **M**emory". Dynamic RAM consists of an integrated semiconductor circuit that stores information based on the capacitor principle. Capacitors lose their charge in a relatively short time. Therefore, dynamic RAM circuit boards must contain a logic that allows continual recharging of RAM chips. Since the processor cannot access dynamic RAM while it is being recharged, one or more waiting states can occur when reading or writing data. Although it is slower, dynamic RAM is used more often than static RAM since the simple design of the circuits means that it can store four times more data than static RAM.

DSR

An abbreviation for "**D**ata **S**et **R**eady". A signal used in serial data transfer, which is sent by the modem to the computer it is connected to, indicating its readiness for processing. DSR is a hardware signal which is sent via line number 6 in compliance with the RS-232-C standard.

DTR

An abbreviation for "**D**ata **T**erminal **R**eady". A signal used in serial data transfer that is sent by the computer to the modem it is connected to, indicating the computer's readiness to accept incoming signals.

DVD

An abbreviation for "**D**igital **V**ersatile **D**isc". The next generation of optical data carrier technology is able to store a higher volume of data than conventional CDs. Standard DVDs, which have a single layer, can hold 4.7 GB. Dual-layer DVDs can hold 8.5 GB. Double-sided DVDs can therefore hold up to 17 GB. A special drive is needed for DVDs. Conventional CDs can also be played on DVD drives.

DVI

Abbreviation for "**D**igital **V**isual **I**nterface" An interface for the digital transfer of video data.

DVI-A

Analog only

DVI-D

Digital only

DVI-I

Integrated, i.e. analog and digital

E

EDID data

Abbreviation for "**E**xtended **D**isplay **I**dentification **D**ata". EDID data contains the characteristics of monitors / TFT displays transferred as 128 KB data blocks to the graphics card via the Display Data Channel (DDC). This EDID data can be used to set the graphics card to the monitor properties.

EIDE

An abbreviation for "**E**nhanced **I**ntegrated **D**rive **E**lectronics". An expansion of the IDE standard. Enhanced IDE is considered the standard for hardware interfaces. This interface is designed for drives with an integrated drive controller.

EMC

"**E**lectro**m**agnetic **C**ompatibility" The ability of a device or a system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment [IEV 161-01-07].

EPROM

Erasable **PROM** > (completely with ultraviolet light).

Ethernet

An IEEE 802.3 standard for networks. Ethernet uses bus or star topology and controls the traffic on communication lines using the access procedure CSMA/CD (Carrier Sense Multiple Access with Collision Detection). Network nodes are connected using coaxial cables, fiber optic cables or twisted pair cabling. Data transfer on an Ethernet network takes place in frames of variable lengths that consist of supply and controller information as well as 1500 bytes of data. The Ethernet standard provides base band transfers at 10 megabit and 100 megabit per second.

Ethernet POWERLINK

An enhancement of standard Ethernet. It enables data exchange under strict real-time conditions with cycle times down to 200 µs and jitter under 1 µs. This makes Ethernet power available on all communication levels of automation technology – from control levels to I/O. Ethernet POWERLINK was initiated by the company B&R Industrie-Elektronik and is now managed by the open end user and vendor association, EPSG - Ethernet POWERLINK Standardization Group (**www.ethernet-powerlink.org**).

ETX

Abbreviation for "**E**mbedded **T**echnology e**X**tended" This established standard offers complete PC functionality on a very compact form factor of just 114 mm x 100 mm (´4.5" x 4"). The flexibility offered by ETX® in the development of system specific main boards allows easy requirement fulfillment in a number of different applications.

F

FDD

Abbreviation for "**F**loppy **D**isk **D**rive". Reading device for removable magnetic memory from the early days of PC technology. Due to their sensitivity and moving components, FDDs have been almost completely replaced by CompactFlash memory in modern automation solutions.

FIFO

An abbreviation for "**F**irst **I**n **F**irst **O**ut". A queuing organization method whereby elements are removed in the same order as they were inserted. The first element inserted is the first one removed. Such an organization method is typical for a list of documents that are waiting to be printed.

Firmware

Programs stored permanently in read-only memory. Firmware is software used to operate computer-controlled devices that generally stays in the device throughout its lifespan or over a long period of time. Such software includes operating systems for CPUs and application programs for industrial PCs as well as programmable logic controllers (e.g. the software in a washing machine controller). This software is written in read-only memory (ROM, PROM, EPROM) and cannot be easily replaced.

Floppy

Also known as a diskette. A round plastic disk with an iron oxide coating that can store a magnetic field. When the floppy disk is inserted in a disk drive, it rotates so that the different areas (or sectors) of the disk's surface are moved under the read/write head. This allows the magnetic orientation of the particle to be modified and recorded. Orientation in one direction represents binary 1, while the reverse orientation represents binary 0.

FPC

An abbreviation for "**F**lat **P**anel **C**ontroller".

FPD

An abbreviation for "**F**lat **P**anel **D**isplay".

FTP

"**F**ile **T**ransfer **P**rotocol" Rules for transferring data over a network from one computer to another computer. This protocol is based on TCP/IP, which has established itself as the standard for transferring data over Ethernet networks. FTP is one of the most used protocols on the Internet. It is defined in RFC 959 in the official regulations for Internet communication.

G

GB

Gigabyte (1 GB = 230 or 1,073,741,824 Bytes)

H

Handshake

Method of synchronization for data transfer when data is sent at irregular intervals. The sender signals that data can be sent, and the receiver signals when new data can be received.

HDD

An abbreviation for "**H**ard **D**isk **D**rive". Fixed magnetic mass memory with high capacities, e.g. 120 GB.

I

IDE

An abbreviation for "**I**ntegrated **D**rive **E**lectronics". A drive interface where the controller electronics are integrated in the drive.

Interface

From the hardware point of view, an interface is the connection point between two modules/devices/systems. The units on both sides of the interface are connected by the interface lines so that data, addresses, and control signals can be exchanged. The term interface includes all functional, electrical and constructive conditions [encoding, signal level, pin assignments] that characterize the connection point between the modules, devices, or systems. Depending on the type of data transfer, a differentiation is made between parallel [e.g. Centronics, IEEE 488] and serial interfaces [e.g. V.24, TTY, RS232, RS422, RS485], which are set up for different transfer speeds and transfer distances. From the point of view of software, the term "interface" describes the transfer point between program modules using specified rules for transferring the program data.

ISA

An abbreviation for "**I**ndustry **S**tandard **A**rchitecture". A term given for the bus design which allows expansion of the system with plug-in cards that can be inserted in PC expansion slots.

ISO

International Organization for Standardization > Worldwide federation of national standardization institutions from over 130 countries. ISO is not an acronym for the name of the organization; it is derived from the Greek word "isos", meaning "equal" (**www.iso.ch**).

J

Jitter

Jitter is a term that describes time deviations of cyclic events. If, for example, an event should take place every 200ìs and it actually occurs every 198 to 203ìs, then the jitter is 5ìs. Jitter has many causes. It originates in the components and transfer media of networks because of noise, crosstalk, electromagnetic interference and many other random occurrences. In automation technology, jitter is a measure of the quality of synchronization and timing.

Jumper

A small plug or wire link for adapting the hardware configuration used to connect the different points of an electronic circuit.

K

Keypad modules

Keypad modules are divided into two groups: **Standard Keypad Modules** (can be cascaded to a controller) and **Special Keypad Modules** (must be connected by an electrician according to the function e.g. Emergency Stop)

L

LCD

An abbreviation for "**L**iquid **C**rystal **D**isplay". A display type, based on liquid crystals that have a polarized molecular structure and are enclosed between two transparent electrodes as a thin layer. If an electrical field is applied to the electrodes, the molecules align themselves with the field and form crystalline arrangements that polarize the light passing through. A polarization filter, which is arranged using lamellar electrodes, blocks the polarized light. In this way, a cell (pixel) containing liquid crystals can be switched on using electrode gates, thus coloring this pixel black. Some LCD displays have an electroluminescent plate behind the LCD screen for lighting. Other types of LCD displays can use color.

LED

An abbreviation for "**L**ight **E**mitting **D**iode". A semiconductor diode which converts electrical energy into light. LEDs work on the principle of electroluminescence. They are highly efficient because they do not produce much heat in spite of the amount of light they emit. For example, "operational status indicators" on floppy disk drives are LEDs.

LPT

Logical device name for line printers. In MS-DOS, names are reserved for up to three parallel printer ports with the names LPT1, LPT2 and LPT3. The first parallel port (LPT1) is usually identical to the primary parallel output device PRN (in MS-DOS the logical device name for the printer). The abbreviation LPT stands for "Line Printer Terminal".

Fiber optics

Fiber optic cable

M

MB

Megabyte (1 MB = 220 or 1,048,576 bytes).

Microprocessor

Highly integrated circuit with the functionality of a CPU, normally housed on a single chip. It comprises a control unit, arithmetic and logic unit, several registers and a link system for connecting memory and peripheral components. The main performance features are the internal and external data bus and address bus widths, the command set and the clock frequency. Additionally, a choice can be made between CISC and RISC processors. The first commercially available worldwide microprocessor was the Intel 4004. It came on the market in 1971.

MIPS

Million instructions per second > Measurement for the computing speed of computers.

Mkey

An abbreviation for "**M**odule **key**block". A common term given to keys found on Provit display units. They can be freely configured with Mkey utilities.

Modem

Modulator/demodulator. > Modulation/demodulation device, add-on card, or external device that allows information to be exchanged between computers over the telephone network using digital/analog or analog/digital signal conversion.

Motherboard

A circuit board that houses the main components of a computer such as the CPU switching circuit, co-processors, RAM, ROM for firmware, interface circuits, and expansion slots for hardware expansions.

MTBF

An abbreviation for "**M**ean **t**ime **b**etween **f**ailure". The average time which passes before a hardware component fails and repair is needed. This time is usually expressed in thousands or ten thousands of hours, sometimes known as power-on hours (POH).

MTCX

An abbreviation for »**M**ain**t**enance **C**ontroller E**X**tended«. The MTCX is an independent processor system that provides additional functions for a B&R industrial PC that are not available with a normal PC. The MTC communicates with the B&R industrial PC via the ISA bus (using a couple register).

Multitasking

Multitasking is an operating mode in an operating system that allows several computer tasks to be executed virtually simultaneously.

N

.NET

DOTNET, Microsoft's new development platform that provides a common runtime library and type system for all programming languages. DOTNET is a general term for the following products, strategies and technologies: .NET Framework, a new software platform, Visual Studio .NET, a new development environment that supports several .NET programming languages (e.g. C# or VB.NET, specially created for .NET), .NET My Services, a group of services taking over functions such as authentication, .NET Enterprise Server, which, apart from its name, is independent of the other technologies and includes the products Exchange Server 2000, Application Center 2000, and SQL Server 2000. .NET devices, supported by a slimmed down version of .NET Framework (.NET Compact Framework).

O

OEM

Abbreviation for "**O**riginal **E**quipment **M**anufacturer"; A company that integrates third-party and in-house manufactured components into their own product range and then distributes these products under its own name.

OPC

OLE for Process Control > A communication standard for components in the area of automation. The goal of OPC development is to provide an open interface that builds on Windows-based technologies such as OLE, COM and DCOM. It allows problem-free standardized data transfer between controllers, operating and monitoring systems, field devices and office applications from different manufacturers. This development is promoted by the OPC Foundation, which is made up of over 200 companies from around the world, including Microsoft and other leading companies. Nowadays, OPC is also interpreted as a synonym for Openness, Productivity and Connectivity, symbolizing the new possibilities that this standard opens up.

OPC server

The missing link between connection modules for the Interbus and the visualization application. It communicates serially with the connection modules via the ISA or PCI bus or Ethernet.

P

Panel

A common term for B&R display units (with or without keys).

Panelware

A generic term given for standard and special keypad modules offered by B&R.

PC Card

Registered trademark of PCMCIA for add-on cards conforming to PCMCIA specifications.

PCI Bus

Abbreviation for "**P**eripheral **C**omponent **I**nterconnect bus". Developed by Intel as an intermediary/local bus for the latest PC generations. It is basically a synchronous bus. The main clock of the CPU is used for synchronization. The PCI bus is microprocessor-independent, 32-bit and 64-bit compatible, and supports both 3.3 V and 5 V cards and devices.

PCMCIA

An abbreviation for "**P**ersonal **C**omputer **M**emory **C**ard **I**nternational **A**ssociation". An association of manufacturers and dealers who are dedicated to the cultivation and further development of common standards for peripheral devices based on PC cards with a slot for such cards. PC cards are mainly used for laptops, palmtops (and other portable computers), and intelligent electronic devices. Version 1 of the PCMCIA standard was introduced in 1990.

PICMG

PCI Industrial Computers Manufacturers Group; Goal; Use of commercial PCI bus for industrial environments, especially CompactPCI bus (**www.picmg.org**).

PLC

Programmable Logic Controller; Computer-based control device that functions using an application program. The application program is relatively easy to create using standardized programming languages [IL, FBD, LAD, AS, ST]. Because of its serial functionality, reaction times are slower compared to connection-oriented control. Today, PLCs are available in device families with matched modular components for all levels of an automation hierarchy.

PnP

An abbreviation for "**P**lug and **P**lay". Specifications developed by Intel. Using Plug and Play allows a PC to automatically configure itself so that it can communicate with peripheral devices (e.g. monitors, modems, and printers). Users can connect a peripheral device (plug) and it immediately runs (play) without having to manually configure the system. A Plug and Play PC requires a BIOS that supports Plug and Play and a respective expansion card.

POH

An abbreviation for "**P**ower **O**n **H**ours". See MTBF.

POST

An abbreviation for "**P**ower-**O**n **S**elf **T**est". A set of routines that are stored in ROM on the computer and that test different system components, e.g. RAM, disk drive and the keyboard in order to determine that the connection is operating correctly and ready for operation. POST routines notify the user of problems that occur. This is done using several signal tones or by displaying a message that frequently accompanies a diagnosis value on the standard output or standard error devices (generally the monitor). If the POST runs successfully, control is transferred over to the system's bootstrap loader.

Power Panel

Power Panel is part of the B&R product family and is a combination of an operator panel and controller in one device. This covers products PP21 and PP41.

Powerlink

See "Ethernet POWERLINK".

PP21

B&R Power Panel type. It is equipped with an RS232 interface, a CAN interface, a PCMCIA slot and integrated digital input/output channels. Additionally, up to six B&R System 2003 screw-in modules can be connected. LCD 4 x 20 characters.

PP41

B&R Power Panel type. It is equipped with an RS232 interface, a CAN interface, a PCMCIA slot and integrated digital input/output channels. Additionally, up to six B&R System 2003 screw-in modules can be connected. 5.7" QVGA b/w LCD.

PROFIBUS-DP

PROFIBUS for "decentralized peripherals". PROFIBUS DB can be used to allow simple digital and analog I/O modules as well as intelligent signal and data processing units to be installed in the machine room, which among other things can significantly reduce cabling costs. Often used for time-critical factory automation applications.

Provit

An abbreviation for "**PRO**cess**VI**sualization**T**erminal" Product family name for B&R industrial PCs.

Provit 2000

Product family name for B&R industrial PCs. It is divided into the following products: IPC2000, IPC2001, Compact IPC (IPC2002) and the display units belonging to them.

Provit 5000

Product family name for B&R industrial PCs. It is divided into the following products: IPC5000, IPC5600, IPC5000C, IPC5600C and the display units belonging to them.

PV

Process variable. Logical storage location for values and states in a program.

Q

QVGA

Abbreviation for "**Q**uarter **V**ideo **G**raphics **A**rray". Usually a screen resolution of 320 × 240 pixels.

QUXGA

Abbreviation for "**Q**uad **U**ltra E**x**tended **G**raphics **A**rray". Generally a screen resolution of 3200 × 2400 pixels (4:3). Quad implies the 4x greater pixel resolution compared to the UXGA.

QWUXGA

Abbreviation for "**Q**uad **WUXGA**"; Generally a screen resolution of 3840 × 2400 pixels (8:5, 16:10).

R

RAM

An abbreviation for "**R**andom **A**ccess **M**emory". Semiconductor memory which can be read or written to by the microprocessor or other hardware components. Memory locations can be accessed in any order. The various ROM memory types do allow random access, but they cannot be written to. The term RAM refers to a more temporary memory that can be written to as well as read.

Real time

A system is operating in real time or has real-time capability if the input sizes (e.g. signals, data) are received and processed in a defined time period, and the results are made available in real time for a partner system or the system environment. See also "real-time demands" and "real-time system".

ROM

An abbreviation for "**R**ead-**O**nly **M**emory". Semiconductor memory where programs or data were permanently stored during the production process.

RS232

Recommended **S**tandard **N**umber **232**. Oldest and most widespread interface standard, also called a V.24 interface. All signals are referenced to ground making this an unbalanced interface. High level: -3 to -30 V, low level: +3 to +30 V; cable lengths up to 15 m, transfer rates up to 20 kbit/s; for point-to-point connections between 2 stations.

RS422

Recommended **S**tandard **N**umber **422**. Interface standard, balanced operation, increased immunity to disturbances. High level: 2 to -6 V, low level: +2 to +6 V; four-line connection [inverted/non-inverted], permissible cable length up to 1200 m, transfer rates up to 10 Mbit/s, 1 sender can transfer simplex with up to 10 receivers.

RS485

Recommended **S**tandard **N**umber **485**. Interface standard upgraded from RS422. High level: 1.5 to -6 V, low level: +1.5 to +6 V; two-line connection [half-duplex mode] or four-line connection [full-duplex mode]; permissible cable length up to 1200 m, transfer rates up to 10 Mbit/s. Up to 32 stations (sender/receiver) can be connected to an RS485 bus.

RTS

An abbreviation for "**R**equest **T**o **S**end". A signal used in serial data transfer for requesting send permission. For example, it is sent from a computer to the modem connected to it. The RTS signal is assigned to pin 4 according to the hardware specifications of the RS-232-C standard.

RXD

An abbreviation for "Receive (**RX**) **D**ata". A line for transferring serial data received from one device to another, e.g. from a modem to a computer. For connections complying with the RS-232-C standard, the RXD is connected to pin 3 of the plug.

S

SDRAM

An abbreviation for "**S**ynchronous **D**ynamic **R**andom **A**ccess **M**emory". A construction of dynamic semiconductor components (DRAM) that can operate with higher clock rates than conventional DRAM switching circuits. This is made possible using block access. For each access, the DRAM determines the next memory addresses to be accessed.

SFC

Sequential function chart > Graphic input language for PLCs used to represent sequential control.

Special keypad module

The following keypad modules are offered by B&R: Dummy module, emergency stop module, key switch module (made up of 1 key switch and 1 on /off switch) and a start/stop module (made up of 2 buttons and a label field).

Slot PLC

PC insert card that has full PLC functionality. On the PC, it is coupled via a DPR with the process using a fieldbus connection. It is programmed externally or using the host PC.

SoftPLC

Synonym for SoftPLC.

SRAM

An abbreviation for "**S**tatic **R**andom **A**ccess **M**emory". A semiconductor memory (RAM) made up of certain logic circuits (flip-flop) that only keeps stored information while powered. In computers, static RAM is generally only used for cache memory.

Standard keypad module

The following keypad modules are offered by B&R: 16 keys with 16 LEDs, 12+4 keys with 4 LEDs, 8 keys with 4 LEDs and a label field and 4 keys with 4 LEDs and 4 label fields.

SUXGA

Abbreviation for **S**uper **U**ltra **E**xtended **G**raphics **A**rray; Generally a screen resolution of 2048×1536 pixels (4:3). An alternative name is QXGA (**Q**uad **E**xtended **G**raphics **A**rray), which is 4x the pixel resolution of XGA.

SVGA

Abbreviation for "**S**uper **V**ideo **G**raphics **A**rray"; Graphics standard with a resolution of at least 800×600 pixels and at least 256 colors.

Switch

Device, similar to a hub, that takes data packets received in a network and, unlike a hub, does not pass them on to all network nodes, instead only to the respective addressee. Unlike a hub, a switch provides targeted communication within a network that only takes place between sender and receiver. Other network nodes are not involved.

SXGA

Abbreviation for Super Extended Graphics Array. Graphics standard with a screen resolution of 1280 × 1024 pixels (aspect ratio 5:4).

SXGA+

Abbreviation for SXGA Plus; Generally 1400 × 1050 pixels.

System units

Provit system units consist of a mainboard (without processor), slots for RAM modules, VGA controller, serial and parallel interfaces, and connections for the FPD, monitor, PS/2 AT keyboard, PS/2 mouse, USB, Ethernet (for system units with Intel Celeron and Pentium III processors), Panelware keypad modules and external FDD.

T

Task

Program unit that is assigned a specific priority by the real-time operating system. It contains a complete process and can consist of several modules.

TCP/IP

Transmission Control Protocol/Internet Suit of Protocols. Network protocol that has become the generally accepted standard for data exchange in heterogeneous networks. TCP/IP is used both in local networks for communication between various computer and also for LAN to WAN access.

TFT display

LCD (Liquid Crystal Display) technology where the display consists of a large grid of LCD cells. Each pixel is represented by a cell, whereby electrical fields produced in the cells are supported by thin film transistors (TFT) that result in an active matrix. In its simplest form, there is exactly one thin film transistor per cell. Displays with an active matrix are generally used in laptops and notebooks because they are thin, offer high-quality color displays and can be viewed from all angles.

Touch screen

Screen with touch sensors for selecting options in a displayed menu using the tip of the finger.

TXD

An abbreviation for "Transmit (**TX**) **D**ata". A line for the transfer of serial data sent from one device to another, e.g. from a computer to a modem. For connections complying with the RS-232-C standard, the TXD is connected to pin 2 of the plug.

U

UART

An abbreviation for "**U**niversal **A**synchronous **R**eceiver-**T**ransmitter". A module generally consisting of a single integrated circuit that combines the circuits required for asynchronous serial communication for both sending and receiving. UART represents the most common type of circuit in modems for connecting to a personal computer.

UDMA

An abbreviation for "**U**ltra **D**irect **M**emory **A**ccess". A special IDE data transfer mode that allows high data transfer rates for drives. There have been many variations in recent times.
UDMA33 mode transfers 33 megabytes per second.
UDMA66 mode transfers 66 megabytes per second.
UDMA100 mode transfers 100 megabytes per second.
Both the mainboard and the hard drive must support the specification to implement modifications.

UPS

Abbreviation for "**U**ninterruptible **P**ower **S**upply". See "UPS".

USB

An abbreviation for "**U**niversal **S**erial **B**us" A serial bus with a bandwidth of up to 12 megabits per second (Mbit/s) for connecting a peripheral device to a microcomputer. Up to 127 devices can be connected to the system using a single multipurpose connection, the USB bus (e.g. external CD drives, printer, modems as well as the mouse and keyboard). This is done by connecting the devices in a row. USB allows devices to be changed when the power supply is switched on (hot plugging) and multi-layered data flow.

UPS

An abbreviation for "**U**ninterruptible **P**ower **S**upply". The UPS supplies power to systems that cannot be connected directly to the power mains for safety reasons because a power failure could lead to loss of data. The UPS allows the PC to be shut down securely without losing data if a power failure occurs.

UXGA

Abbreviation for "**U**ltra **E**xtended **G**raphics **A**rray" Generally a screen resolution of 1600 × 1200 pixels (aspect ratio 4:3, 12:9).

V

VGA

An abbreviation for "**V**ideo **G**raphics **A**dapter". A video adapter which can handle all EGA (Enhanced Graphics Adapter) video modes and adds several new modes.

W

Windows CE

Compact 32-bit operating system with multitasking and multithreading that Microsoft developed especially for the OEM market. It can be ported for various processor types and has a high degree of real-time capability. The development environment uses proven, well-established development tools. It is an open and scalable Windows operating system platform for many

different devices. Examples of such devices are handheld PCs, digital wireless receivers, intelligent mobile phones, multimedia consoles, etc. In embedded systems, Windows CE is also an excellent choice for automation technology.

WSXGA

Wide SXGA, generally 1600 × 900 pixels (16:9).

WUXGA

Wide UXGA, generally 1920 × 1200 pixels (16:10).

WXGA

Wide XGA, generally 1280 × 768 pixels.

X

XGA

An abbreviation for "E**X**tended **G**raphics **A**rray". An expanded standard for graphics controllers and monitors that was introduced by IBM in 1990. This standard supports 640x480 resolution with 65,536 colors or 1024x768 resolution with 256 colors. This standard is generally used in workstation systems.

XTX

Abbreviation for "e**X**press **T**echnologoy for ET**X**" A further development consistent with the proven ETX® standard. The newest I/O technology is implemented on a reliable form factor in XTX. The ETX® interface X2 is equipped with new serial buses like PCI Express™ und Serial ATA®, instead of the unpopular ISA bus. All other signals on the X1, X3 and X4 interfaces remain completely compatible with the ETX® Standard (Rev. 2.7). However, if ISA signals are needed, a PCI-ISA can be implemented on the base board. The use of an LPC bus already in XTX™ is considerably cheaper than a bridge solution.

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