Automation PC 820

User's Manual

Version: **1.21 (May 2011)**

Model number: **MAAPC820-ENG**

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Chapter 1 • General information

1. Manual history

Version	Date	Change
0.10 Preliminary	2008-12-11	- First version
0.20 Preliminary	2009-01-23	- The Chapters 4 "Software" and 7 "Maintenance / Servicing" were updated. - Additional information about humidity specifications. - Section "Installation", on page 83 updated. - Section 5 "Glossary", on page 299 added - Description of the temperature sensor positions moved to Chapter 2 "Technical data". - Section 2.7 "Environmentally-friendly disposal" in chapter 1 "General information" added.
1.00	2009-09-08	- 2.4.2 "Power calculation" added to Chapter 2 "Technical data". - Section 2 "CAN plug (4-pin)" in chapter 6 "Accessories" added. - Photos of the power and reset button added. - B&R CompactFlash card added. - Technical data for Silicon Systems CFs revised. - Section 2.2.3 "Temperature monitoring - Fan control", on page 45 added - According updates regarding small changes made to interfaces and component positions for the APC820. - L2 cache of CPU board 5PC800.B945-00 corrected to 2 MB. - Section 5.5 "Plug-in cards", on page 23 in chapter 2 "Technical data" added. - Figure 14 "Block diagram - Automation PC 820", on page 49 updated. - Interface descriptions added for revision A1 and later. - PCIec plug-in cards 5ACPCC.ETH0-00 and 5ACPCC.MPL0-00 updated. - RUN LED added to 2.6.11 "Status LEDs", on page 65. - CPU board 5PC800.B945-04 added. - Power supply with heat sink 5AC802.HS00-01 added. - Chapter 5 "Standards and certifications", on page 215 added. - ETH1 and ETH2 interfaces swapped. - Technical data for the system unit 5PC820.SX1-00 completed. - Data in section 2.2.2 "Temperature sensor position", on page 44 added. - Figure 26 "Swivel range of the front cover", on page 87 changed. - Section 2.3 "Humidity specifications", on page 46 changed. - Figure "Block diagram - supply voltage", on page 47 changed. - Section 2 "B&R Key Editor information", on page 293 added - Section 2 "Upgrade information", on page 183 added - Section 3 "Automation PC 820 with MS-DOS", on page 196 added - Section 1.12 "Distribution of resources", on page 177 added

Table 1: Manual history

Version	Date	Change
1.10	2009-11-13	- System unit 5PC820.SX01-01 added. - Section 5 "CompactFlash cards 5CFCRD.xxxx-04", on page 241 and Section 6 "CompactFlash cards - 5CFCRD.xxxx-03", on page 246 updated. - Section 5 "Known problems / issues", on page 109 in chapter 3 "Commissioning" added. - Section 3 "Connection examples", on page 92 in chapter 3 "Commissioning" added. - Section 4 "Connection of USB peripheral devices", on page 106 in chapter 3 "Commissioning" added. - Section 1.2.3 "Wall mounting", on page 85 in chapter 3 "Commissioning" added. - Information about the Status LEDs was added to page 65 (power LED blinking). - The section "Creating a bootable USB flash drive" removed. - Section 2.2 "Firmware upgrade", on page 187 in chapter 4 "Software" added. - Section 3 "B&R Automation Device Interface (ADI) development kit", on page 295 in "Appendix A" added. - Technical data for the replacement fan 8BXF001.0000-00 corrected on page 75. - Section 9 "Cables", on page 256 in chapter 6 "Accessories" added. - Images for the CAN plugs 0TB704.9 and 0TB704.91 corrected.
1.15	2009-12-03	- System unit weight for 5PC820.SX01-00 corrected. - Section 1.6 "Installation guidelines Mounting orientation", on page 90 added - Figure 1 "Configuration - Basic system", on page 31 corrected. - Vibration and shock specifications for the system units changed. - Information about the lifespan with and without the use of SRAM changed. - Technical data for some SDL cables corrected and updated. - SDL cable 5CASDL.0400-13 updated. - Additional point added to section 5 "Known problems / issues", on page 109. - Shock specifications were removed.
1.20	2010-08-20	- Chapter 5 "Standards and certifications", on page 215 updated. - Section 6 "Automation PC 820 with Windows Embedded Standard 2009", on page 203 added - B&R ID codes for system units added. - B&R USB flash drive added to the chapter 6 "Accessories" on page 253. - CPU boards 5PC800.B945-10, 5PC800.B945-11, 5PC800.B945-12, 5PC800.B945-13, and 5PC800.B945-14 added. - Technical data "Remanent variables for AR (Automation Runtime) in Power Fail Mode". added for the APC820 system units. - Section 9 "Cables", on page 256 updated.
1.21	2011-05-30	- BIOS version updated (1.14 -> 1.17) - SRAM information for "POWERLINK card 2-port - 5ACPCC.MPL0-00", on page 79 added. - Sections "Automation PC 820 with Windows Embedded Standard 7", on page 206, "Automation PC 820 with Automation Runtime", on page 209, "B&R Automation Device Interface (ADI) .NET SDK", on page 297, "HMI Drivers & Utilities DVD 5SWHMI.0000-00", on page 282 and "B&R Automation Runtime Dongle", on page 255 added. - Sections "B&R Automation Device Interface (ADI) - Control Center", on page 210, "B&R Key Editor information", on page 293, and "B&R Automation Device Interface (ADI) development kit", on page 295 updated. - Information about the lifespan of the battery corrected. - Chipset information of "CPU boards 945GME", on page 72 corrected. - Figure "Configuration software, accessories", on page 32 ppdated.

Table 1: Manual history (Forts.)

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 discharges

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

2.2.1 Packaging

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

2.2.2 Guidelines for proper ESD handling

Electrical components with housing

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

Electrical components without housing

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

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

All tasks such as installation, commissioning, and maintenance are only permitted to be carried out by qualified personnel. Qualified personnel are persons familiar with transport, ounting, 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 guidelines, 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 from excessive stress (mechanical load, temperature, humidity, aggressive atmospheres, etc.).

2.5 Installation

- Installation must take place according to the documentation, using suitable equipment and tools.
- Devices must be installed without voltage applied and by qualified personnel. Before installation, voltage to the switching cabinet should be switched off and prevented from being switched on again.
- 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. A life-threatening electrical shock could occur if you come into contact with these parts. This could result in death, severe injury or material damage.

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

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

2.6.2 Environmental conditions - dust, humidity, aggressive gases

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

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

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

2.6.3 Programs, viruses, and dangerous programs

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

2.7 Environmentally-friendly disposal

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

2.7.1 Separation of materials

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

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

Table 2: Environmentally-friendly separation of materials

Disposal must comply with the respective legal regulations.

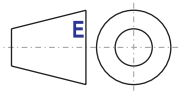
3. Organization of safety notices

The safety notices in this manual are organized as follows:

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

Table 3: Organization of safety notices

4. 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
5PC820.SX01-00	**APC820 System cold-plate mounting** APC820 system unit; cold-plate mounting, 1 PCIec card slot, 2x CompactFlash slots, 1x RS232, 1x RS232/422/485, 1x POWERLINK, 1x CAN, Smart Display Link/DVI/Monitor, 5x USB 2.0, 2x ETH 10/100/1000, 24 VDC via ACOPOSmulti rail.	See page 33
5PC820.SX01-01	**APC820 System wall mounting** APC820 system unit; wall mounting, 1 PCIec card slot, 2x CompactFlash slots, 1x RS232, 1x RS232/422/485, 1x POWERLINK, 1x CAN, Smart Display Link/DVI/Monitor, 5x USB 2.0, 2x ETH 10/100/1000, 24 VDC via ACOPOSmulti rail.	See page 33

Table 4: Model numbers - system units

5.2 CPU boards 945GME

Model number	Short description	Note
5PC800.B945-00	**CPU board Intel® Core™ Duo L2400, 1.66 GHz** 667 MHz FSB, 2 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 modules	See page 72
5PC800.B945-01	**CPU board Intel® Core™2 Duo L7400, 1.5 GHz** 667 MHz FSB, 4 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 modules	See page 72
5PC800.B945-02	**CPU board Intel® Core™2 Duo U7500, 1.06 GHz** 533 MHz FSB, 2 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 modules	See page 72
5PC800.B945-03	**CPU board Intel® Celeron® M 423, 1.06 GHz** 533 MHz FSB, 1 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 modules	See page 72
5PC800.B945-04	**CPU board Intel® Core™2 Duo T7400, 2.16 GHz** 667 MHz FSB, 4 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 modules	See page 72
5PC800.B945-10	**CPU board Intel® Core™ Duo L2400, 1.66 GHz** 667 MHz FSB, 2 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 module	See page 72
5PC800.B945-11	**CPU board Intel® Core™2 Duo L7400, 1.5 GHz** 667 MHz FSB, 4 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 module	See page 72
5PC800.B945-12	**CPU board Intel® Core™2 Duo U7500, 1.06 GHz** 533 MHz FSB, 2 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 module	See page 72
5PC800.B945-13	**CPU board Intel® Celeron® M 423, 1.06 GHz** 533 MHz FSB, 1 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 module	See page 72
5PC800.B945-14	**CPU board Intel® Core™2 Duo T7400, 2.16 GHz** 667 MHz FSB, 4 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 module	See page 72

Table 5: Model numbers - CPU boards 945GME

5.3 Power supply with heat sink

Model number	Short description	Note
5AC802.HS00-00	**Power supply with heat sink** APC820 power supply with heat sink for CPU boards with Dual Core processors L2400, L7400, U7500 and Celeron® M 423.	See page 74

Table 6: Model numbers - Heat sinks

Model number	Short description	Note
5AC802.HS00-01	**Power supply with heat sink** APC820 power supply with heat sink for CPU boards with Dual Core processor T7400.	See page 74

Table 6: Model numbers - Heat sinks

5.4 Main memory

Model number	Short description	Note
5MMDDR.0512-01	**SO-DIMM DDR2 512MB PC2-5300**	See page 73
5MMDDR.1024-01	**SO-DIMM DDR2 1024MB PC2-5300**	See page 73
5MMDDR.2048-01	**SO-DIMM DDR2 2048MB PC2-5300**	See page 73

Table 7: Model numbers - Main memory

5.5 Plug-in cards

Model number	Short description	Note
5ACPCC.ETH0-00	**PCIec Ethernet card 10/100/1000** PCIec Ethernet plug-in card, 1 Ethernet interface 10/100/1000	See page 77
5ACPCC.MPL0-00	**PCIec POWERLINK MN 2-port** PCIec POWERLINK plug-in card, 2 POWERLINK interfaces	See page 79

Table 8: Model numbers - Plug-in cards

5.6 Replacement fan kit

Model number	Short description	Note
8BXF001.0000-00	**ACPmulti fan module** Replacement filter for APC820 system unit.	See page 75

Table 9: Model numbers - Fan kits

5.7 Accessories

Model number	Short description	Note
0TB704.9	**4-pin screw clamp** Screw clamp 1.5 mm²	See page 238
0TB704.91	**4-pin cage clamps** cage clamps 2.5 mm²	See page 238
0AC201.91	**Lithium batteries, 4 pcs**. Lithium batteries, 4 pcs., 3 V / 950 mAh, button cell	See page 239
4A0006.00-000	**Lithium battery, 1 pc.** Lithium battery, 1 pc., 3 V / 950 mAh, button cell	See page 239

Table 10: Model numbers - Accessories

Model number	Short description	Note
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 240
5CFCRD.0512-04	**CompactFlash 512 MB B&R** CompactFlash card with 512 MB SLC NAND flash and IDE/ATA interface	See page 241
5CFCRD.1024-04	**CompactFlash 1024 MB B&R** CompactFlash card with 1024 MB SLC NAND flash and IDE/ATA interface	See page 241
5CFCRD.2048-04	**CompactFlash 2048 MB B&R** CompactFlash card with 2048 MB SLC NAND flash and IDE/ATA interface	See page 241
5CFCRD.4096-04	**CompactFlash 4096 MB B&R** CompactFlash card with 4096 MB SLC NAND flash and IDE/ATA interface	See page 241
5CFCRD.8192-04	**CompactFlash 8192 MB B&R** CompactFlash card with 8192 MB SLC NAND flash and IDE/ATA interface	See page 241
5CFCRD.016G-04	**CompactFlash 16 GB B&R** CompactFlash card with 16 GB SLC NAND flash and IDE/ATA interface	See page 241
5CFCRD.0064-03	**CompactFlash 64 MB SSI** CompactFlash card with 64 MB SLC NAND flash and IDE/ATA interface	See page 246
5CFCRD.0128-03	**CompactFlash 128 MB SSI** CompactFlash card with 128 MB SLC NAND flash and IDE/ATA interface	See page 246
5CFCRD.0256-03	**CompactFlash 256 MB SSI** CompactFlash card with 256 MB SLC NAND flash and IDE/ATA interface	See page 246
5CFCRD.0512-03	**CompactFlash 512 MB SSI** CompactFlash card with 512 MB SLC NAND flash and IDE/ATA interface	See page 246
5CFCRD.1024-03	**CompactFlash 1024 MB SSI** CompactFlash card with 1024 MB SLC NAND flash and IDE/ATA interface	See page 246
5CFCRD.2048-03	**CompactFlash 2048 MB SSI** CompactFlash card with 2048 MB SLC NAND flash and IDE/ATA interface	See page 246
5CFCRD.4096-03	**CompactFlash 4096 MB SSI** CompactFlash card with 4096 MB SLC NAND flash and IDE/ATA interface	See page 246
5CFCRD.8192-03	**CompactFlash 8192 MB SSI** CompactFlash card with 8192 MB SLC NAND flash and IDE/ATA interface	See page 246
5MMUSB.2048-00	**USB flash drive 2 GB SanDisk** USB 2.0 flash drive 2 GB	See page 250
5MMUSB.2048-01	**USB flash drive 2 GB B&R** USB 2.0 flash drive 2 GB	See page 250
1A4600.10	**B&R Automation Runtime ARwin, incl. License Label and Security Key**	See page 255
1A4600.10-2	**B&R Automation Runtime ARwin, ARNC0**	See page 255
1A4600.10-3	**B&R Automation Runtime ARwin+PVIControls, incl. License Label and Security Key**	See page 255
1A4600.10-4	**B&R Automation Runtime ARwin+ARNC0+PVIControls**	See page 255
5CADVI.0018-00	**DVI-D cable 1.8 m** Single cable, DVI-D/m:DVI-D/m; length: 1.8 m	See page 256
5CADVI.0050-00	**DVI-D cable 5 m** Single cable, DVI-D/m:DVI-D/m; length: 5 m	See page 256
5CADVI.0100-00	**DVI-D cable 10 m** Single cable, DVI-D/m:DVI-D/m; length: 10 m	See page 256

Table 10: Model numbers - Accessories (Forts.)

Model number	Short description	Note
5CASDL.0018-00	**SDL cable 1.8 m** SDL cable for a fixed type of layout; length: 1.8 m	See page 260
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	See page 264
5CASDL.0018-03	**1.8 m flex SDL cable** SDL cable for fixed and flexible type of layout; length: 1.8 m	See page 268
5CASDL.0050-00	**SDL cable 5 m** SDL cable for a fixed type of layout; length: 5 m	See page 260
5CASDL.0050-01	**SDL cable 5 m 45°** SDL cable for fixed type of layout with one-sided 45° plug; length: 5 m	See page 264
5CASDL.0050-03	**5 m flex SDL cable** SDL cable for fixed and flexible type of layout; length: 5 m	See page 268
5CASDL.0100-00	**SDL cable 10 m** SDL cable for a fixed type of layout; length: 10 m	See page 260
5CASDL.0100-01	**SDL cable 10 m 45°** SDL cable for fixed type of layout with one-sided 45° plug; length: 10 m	See page 264
5CASDL.0100-03	**10 m flex SDL cable** SDL cable for fixed and flexible type of layout; length: 10 m	See page 268
5CASDL.0150-00	**SDL cable 15 m** SDL cable for a fixed type of layout; length: 15 m	See page 260
5CASDL.0150-01	**SDL cable 15 m 45°** SDL cable for fixed type of layout with one-sided 45° plug; length: 15 m	See page 264
5CASDL.0150-03	**15 m flex SDL cable** SDL cable for fixed and flexible type of layout; length: 15 m	See page 268
5CASDL.0200-00	**SDL cable 20 m** SDL cable for a fixed type of layout; length: 20 m	See page 260
5CASDL.0200-03	**20 m flex SDL cable** SDL cable for fixed and flexible type of layout; length: 20 m	See page 268
5CASDL.0250-00	**SDL cable 25 m** SDL cable for a fixed type of layout; length: 25 m	See page 260
5CASDL.0250-03	**25 m flex SDL cable** SDL cable for fixed and flexible type of layout; length: 25 m	See page 268
5CASDL.0300-00	**SDL cable 30 m** SDL cable for a fixed type of layout; length: 30 m	See page 260
5CASDL.0300-03	**30 m flex SDL cable** SDL cable for fixed and flexible type of layout; length: 30 m	See page 268
5CASDL.0300-13	**30 m SDL flex cable with extender** SDL cable with extender for fixed and flexible type of layout; length: 30 m	See page 273
5CASDL.0400-13	**40 m SDL flex cable with extender** SDL cable with extender for fixed and flexible type of layout; length: 40 m	See page 273
5CASDL.0430-13	**43 m SDL flex cable with extender** SDL cable with extender for fixed and flexible type of layout; length: 43 m	See page 273
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	See page 280
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	See page 280

Table 10: Model numbers - Accessories (Forts.)

Model number	Short 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.	See page 278
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.	See page 278
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.	See page 278
5SWHMI.0000-00	**HMI Drivers & Utilities DVD**	See page 282

Table 10: Model numbers - Accessories (Forts.)

5.8 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. A CompactFlash card is required for operation. This is not included in delivery and must be ordered separately.	See page 196
9S0000.01-020	**OEM MS-DOS 6.22 English (disk)** OEM MS-DOS 6.22 English disks Only delivered with a new PC. A CompactFlash card is required for operation. This is not included in delivery and must be ordered separately.	See page 196
5SWWXP.0600-GER	**WinXP Professional with SP3, GER** Microsoft OEM Windows XP Professional Service Pack 3, CD, German. Only available with a new device. A CompactFlash card is required for operation. This is not included in delivery and must be ordered separately.	See page 198
5SWWXP.0600-ENG	**WinXP Professional with SP3, ENG** Microsoft OEM Windows XP Professional Service Pack 3, CD, English. Only available with a new device. A CompactFlash card is required for operation. This is not included in delivery and must be ordered separately.	See page 198
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. A CompactFlash card is required for operation. This is not included in delivery and must be ordered separately.	See page 198
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. A CompactFlash card is required for operation. This is not included in delivery and must be ordered separately.	See page 198
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. A CompactFlash card is required for operation. This is not included in delivery and must be ordered separately.	See page 198

Table 11: Model numbers - Software

Model number	Short description	Note
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. A CompactFlash card is required for operation. This is not included in delivery and must be ordered separately.	See page 198
5SWWXP.0428-ENG	**WinXPe FP2007 APC820 B945GME** Microsoft OEM Windows XP Embedded Feature Pack 2007, English; for APC820 with 945GME chipset; order CompactFlash card separately (at least 512 MB). A CompactFlash card is required for operation. This is not included in delivery and must be ordered separately.	See page 200
5SWWXP.0728-ENG	**Windows Embedded Standard 2009 APC820 945GME** Microsoft OEM Windows Embedded, Standard 2009, English; for APC820 with 945GME chipset; order CompactFlash separately (at least 1 GB). A CompactFlash card is required for operation. This is not included in delivery and must be ordered separately.	See page 203
5SWWI7.0528-ENG	**WES7E 32bit APC820 945GME** Microsoft OEM Windows Embedded Standard 7 32-bit, English; for APC820 with 945GME chipset; please order CompactFlash separately (minimum 8 GB).	See page 206
5SWWI7.0628-ENG	**WES7E 32bit APC820 945GME** Microsoft OEM Windows Embedded Standard 7 64-bit, English; for APC820 with 945GME chipset; please order CompactFlash separately (minimum 16 GB).	See page 206
5SWWI7.0728-MUL	**WES7P 32bit APC820 945GME** Microsoft OEM Windows Embedded Standard 7 Premium 32-bit, multilanguage; for APC820 with 945GME chipset; please order CompactFlash separately (minimum 8 GB).	See page 206
5SWWI7.0828-MUL	**WES7P 64bit APC820 945GME** Microsoft OEM Windows Embedded Standard 7 Premium 64-bit, multilanguage; for APC820 with 945GME chipset; please order CompactFlash separately (minimum 16 GB).	See page 206
5SWWI7.0900-MUL	**WES7P 32bit Language Pack DVD**	See page 206
5SWWI7.1000-MUL	**WES7P 64bit Language Pack DVD**	See page 206

Table 11: Model numbers - Software

Chapter 2 • Technical data

1. Introduction

The ultra-compact, integrated ACOPOSmulti solution offers the most cost-effective solution possible for machines with multiple axes. The modular cooling concept that can be flexibly adapted to any installation, the user-friendly cabling, as well as the compactness and scalability of the performance are all factors that make the ACOPOSmulti so easy to use.

The Automation PC 820 was developed for the ACOPOSmulti system and is equipped on the machine for rough environmental conditions. Because the APC820 can be completely integrated into the ACOPOSmulti system, the space otherwise needed for the PC is no longer occupied in the switching cabinet. The APC820 was designed for the toughest environments. Not a single internal cable connection was used during construction. This has made it possible to achieve maximum vibration resistance and operational safety. Free of any rotating parts, CompactFlash cards are the optimum storage media for use in the machine.

1.1 Features

- Latest processor technologies - Core Duo, Core 2 Duo and Celeron M
- Up to 3 GB main memory (Dual Channel Memory Support)
- 2 CompactFlash slots (type I)
- 1 PCI Express compact Slot (for PCIec cards)
- 5x USB 2.0
- 2x Ethernet 10/100/1000 MBit interfaces
- 1x POWERLINK (with node switch)
- 1x CAN interface (with node switch)
- 1x RS232 interface
- 1x RS232/422/485 interface
- SRAM 1MB (battery backed)
- Connection of various display devices to the "Monitor/Panel" video output (supports SDL, DVI, and monitor signals)
- Fans
- BIOS (AMI)
- 24 VDC supply voltage (via ACOPOSmulti supply busbar)
- Installation as with ACOPOSmulti system units
- Dongle
- Battery

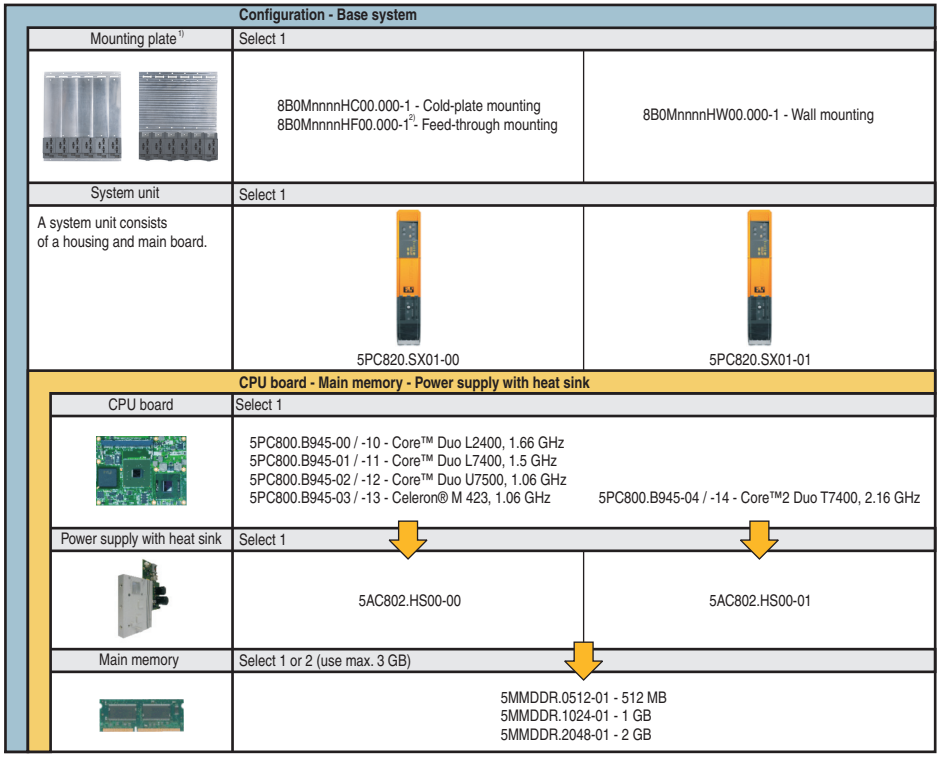
1.2 System components / Configuration

The APC820 system can be assembled to meet individual requirements and operational conditions.

The following components are absolutely essential for operation:

- Mounting plate (cold plate or feed-through mounting, see ACOPOSmulti manual)
- System unit
- CPU board
- Power supply with heat sink (already part of the system unit, heat sink depends on the CPU board being used)
- Fan (already part of the system unit)
- Main memory
- CompactFlash card for the operating system
- Operating system

1.2.1 Configuration - Basic system



1) The desired number of slots must be specified in the model number by nnnn (e.g. 0160 equals 16 slots). Additional information can be found in the ACOPOSmulti user's manual, which can be downloaded for free from the B&R homepage.
2) The number of slots must be a multiple of 4.

Figure 1: Configuration - Basic system

1.2.2 Configuration software, accessories

Configuration - Software, accessories		
System unit		
A system unit consists of a housing and a main board.	 5PC820.SX01-00	 5PC820.SX01-01
PCIec plug-in cards	Select 1	
	5ACPCC.ETH0-00 (PCIec Ethernet Card 10/100/1000) 5ACPCC.MPL0-00 (PCIec POWERLINK MN 2port)	
Replacement fan	Select 1	
	8BXF001.0000-00	
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
Software	Select 1	
Microsoft Windows xp Professional	9S0000.01-010 (MS-DOS 6.22 German) 9S0000.01-020 (MS-DOS 6.22 English) 5SWWXP.0600-GER (XP Pro SP3 German) 5SWWXP.0600-ENG (XP Pro SP3 English) 5SWWXP.0600-MUL (XP Pro SP3 Multilanguage) 5SWWXP.0500-GER (XP Pro SP2c German) 5SWWXP.0500-ENG (XP Pro SP2c English)	5SWWXP.0500-MUL (XP Pro SP2c Multilanguage) 5SWWXP.0428-ENG (XPe FP2007 APC820 B945GME) 5SWWXP.0728-ENG (WES2009 English) 5SWWI7.0528-ENG (WES7 32-Bit English) 5SWWI7.0628-ENG (WES7 64-Bit English) 5SWWI7.0728-MUL (WES7 32-Bit Multilanguage) 5SWWI7.0828-MUL (WES7 64-Bit Multilanguage)

Figure 2: Configuration software, accessories

2. Entire device

2.1 Overview of APC820 1 card slot variations

2.1.1 Interfaces

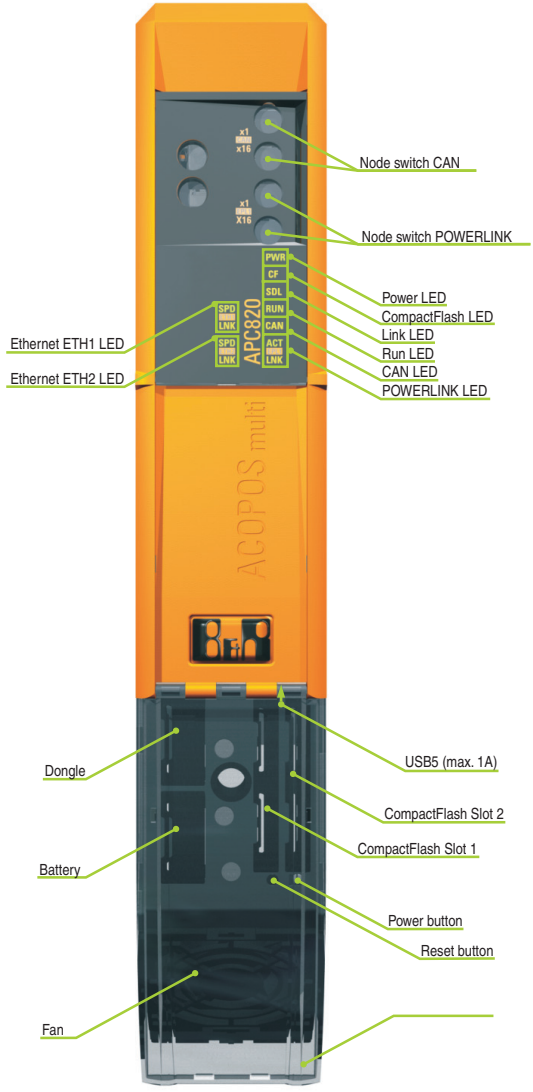


Figure 3: APC820 interface overview - Front side ≤ A0

Figure 4: APC820 interface overview - Front side A1

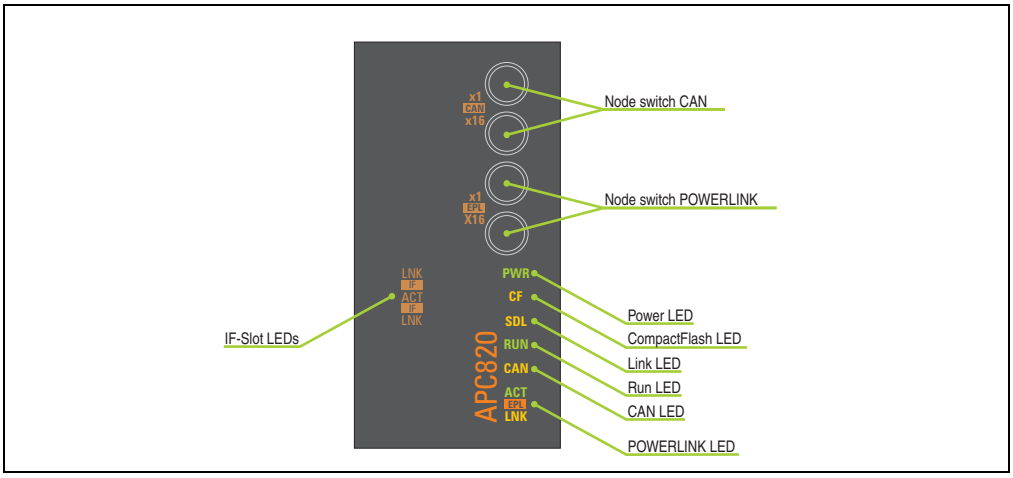


Figure 5: APC820 LED description - Front side A1

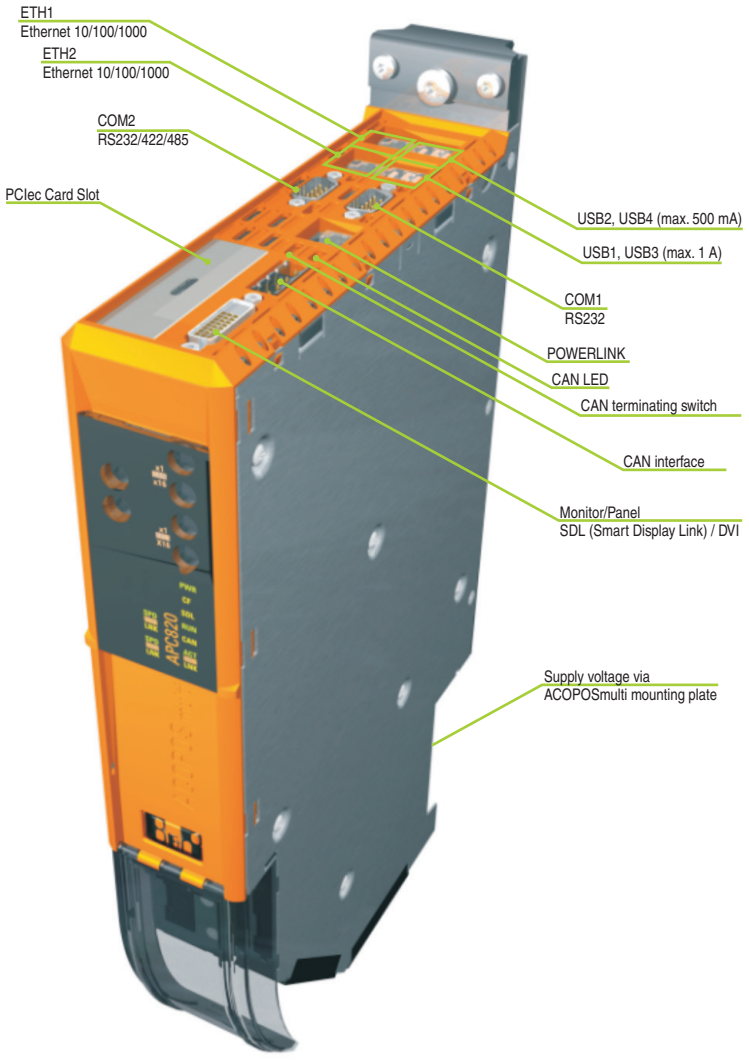


Figure 6: APC820 interface overview - Top side ≤ A0

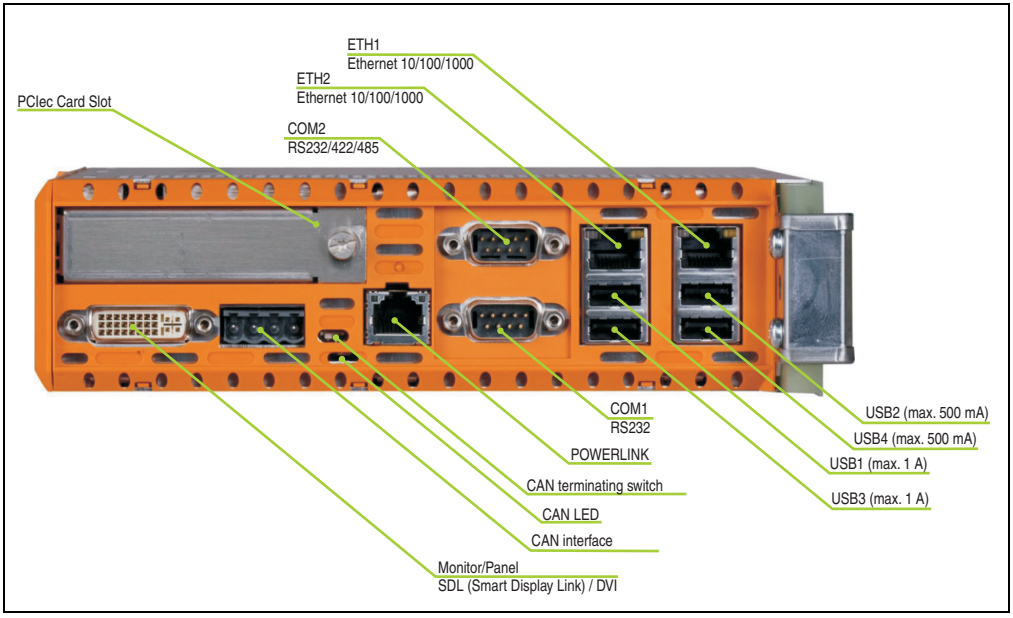


Figure 7: APC820 interface overview - Top side A1

2.1.2 Technical data

General information	5PC820.SX01-00	5PC820.SX01-01
Available cooling and mounting methods Wall mounting Cold plate or feed-through mounting	 No Yes	 Yes No
B&R ID code	$A7DE	$AD8A
Reset button	Yes, accessible behind the upper front cover	
Buzzer	Yes	
LEDs	7 directed outwards via fiber optic lines, also see page 65	
Controller		
Bootloader	BIOS	
Processor Cooling Method	Component-dependent, see technical data "CPU boards 945GME", on page 72 Passive via heat sink and supported with an active fan kit	
Main memory	Max. 3 GB	
Graphics Controller	 Intel® Graphics Media Accelerator 950, see page 72	
Power failure logic Controller Buffer time	 MTCX[1)] 10 ms	
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At 25°C typ. 12 ppm (1 second)[2)] per day	
SRAM Battery-buffered Quantity Remanent variables for AR (Automation Runtime) in power fail mode	 Yes 1 MB 192 kB	
Battery Type Removable Lifespan	For more information, see page 68 Renata 950 mAh Yes, accessible behind the cable cover 2 years[3)]	
Interfaces		
Ethernet Amount Controller	 2 See page 63 and 64	
POWERLINK Amount Station Number Dial Status LED	For more information, see page 61 1 2 pcs. Yes	
CAN bus Amount Transfer rate Node switch Terminating resistor Terminating LED Status LED	For more information, see page 59 1 Max. 500 kBit/s Yes Yes, can be activated using a switch Yes Yes	

Table 12: Technical data - APC820

Interfaces	5PC820.SX01-00	5PC820.SX01-01
CompactFlash Type Amount	For more information, see page 70 Type I 2	
Serial interface COM1 Type UART Transfer rate Connection	For more information, see page 53 RS232, modem-capable, not electrically isolated 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB plug	
Serial interface COM2 Type UART Transfer rate Connection	For more information, see page 55 RS232/422/485 16550-compatible, 16-byte FIFO Max. 115 kBaud 9-pin DSUB plug	
USB interface Type Amount Transfer rate Connection Current load	For more information, see page 51 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	
Card Slot Type Amount	For more information, see page 76 PCIec (PCI Express compact) 1	
Electrical characteristics		
Power supply Rated voltage Rated current Starting current Power consumption	24 VDC ±25% 5 A Typ. 7 A, max. 50 A for < 300 µs Component-dependent, see section 2.4.2 "Power calculation"	
Mechanical characteristics		
Housing[4)] Item Front cover Cable cover	Steel Niro, plastic Polycarbonate, black Polycarbonate, transparent	
Outer dimensions Width Height Depth	53 mm 344 mm 205 mm	53 mm 344 mm 253 mm
Weight	Approx. 1.85 kg	Approx. 2.55 kg
Environmental characteristics		
Ambient temperature Operation Bearings Transport	Component-dependent - see section 2.2.1 "Maximum ambient temperature with a fan kit" -20 to +60°C -20 to +60°C	
Relative humidity Operation Bearings Transport	Component-dependent - see section 2.3 "Humidity specifications", on page 46 Component-dependent - see section 2.3 "Humidity specifications", on page 46 Component-dependent - see section 2.3 "Humidity specifications", on page 46	

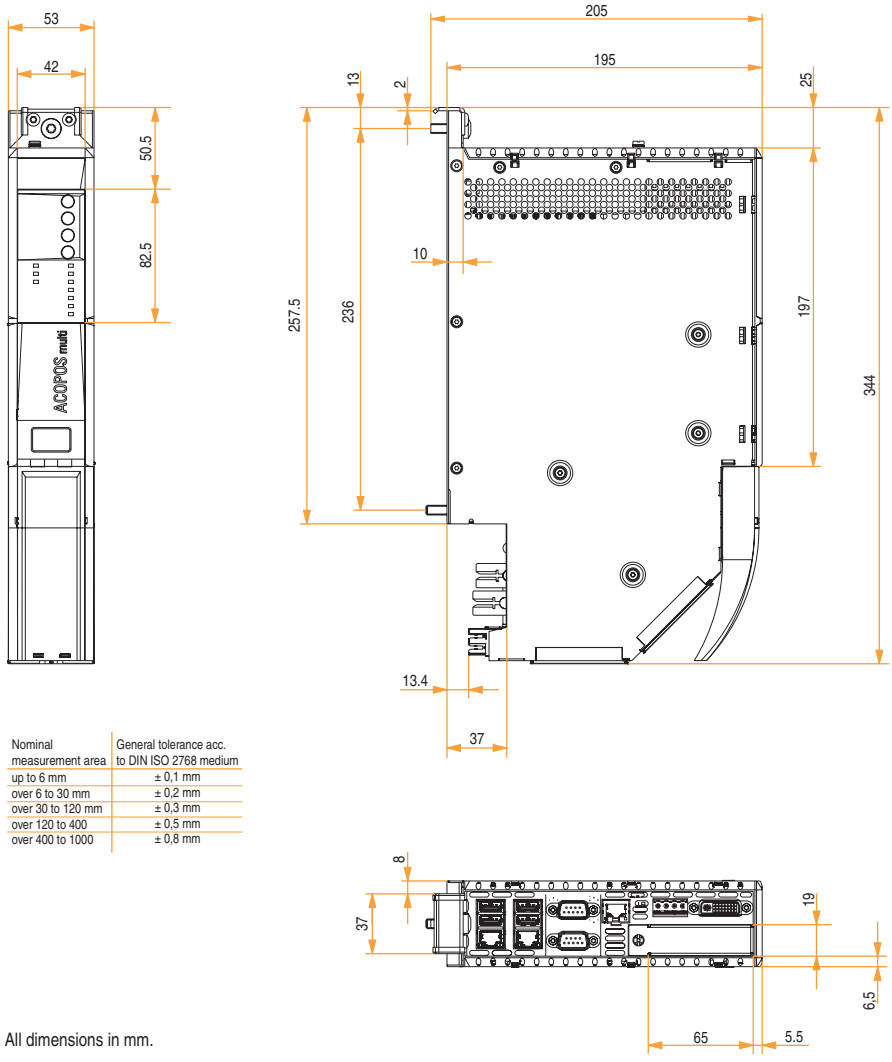
Table 12: Technical data - APC820 (Forts.)

Environmental characteristics	5PC820.SX01-00	5PC820.SX01-01
Vibration[5)] Operation Bearings Transport	 2 - 9 Hz: 0.3 mm amplitude / 9 - 200 Hz: 0.1 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g / 200 - 500 Hz: 1.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g / 200 - 500 Hz: 1.5 g	
Protection type	IP20	
Drop height in free fall [6)] Weight < 100 kg	 0.25 m	
Altitude Operation	 max. 3000m[7)] (component-dependent)	

Table 12: Technical data - APC820 (Forts.)

1) Maintenance controller extended.
2) At max. specified ambient temperature: typically 58 ppm (5 seconds) - worst-case 220 ppm (19 seconds).
3) The lifespan of 1½ years is only valid if an SRAM module is being used. Without SRAM module, a lifespan of 2 years can be expected.
4) Depending on the process or batch, there may be visible deviations in the color and surface structure.
5) Maximum values, as long as no other individual component specifies any other.
Only valid for components in original packaging.
6) Only valid for components in original packaging.
7) Derating the maximum ambient temperature - typically 1°C per 1000 m, from 500 m above sea level or higher.

2.1.3 Dimensions - Cold-plate mounting (5PC820.SX01-00)

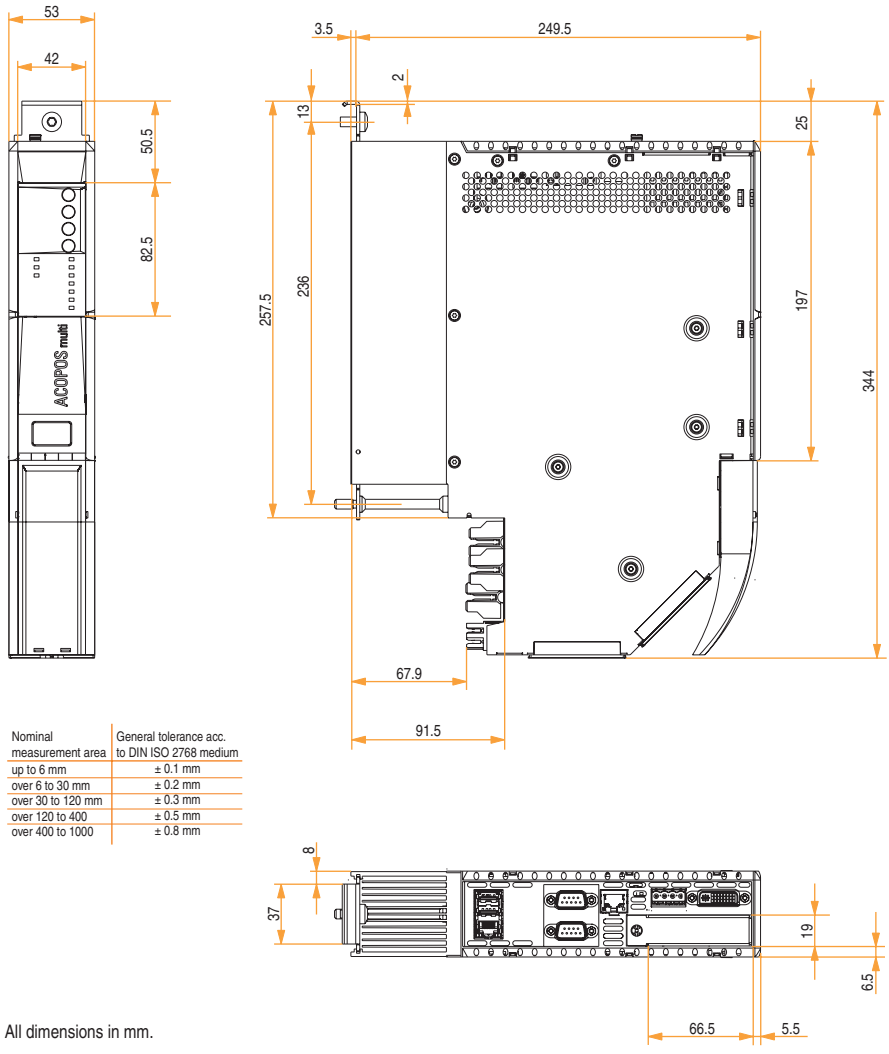


Nominal measurement area	General tolerance acc. to DIN ISO 2768 medium
up to 6 mm	± 0,1 mm
over 6 to 30 mm	± 0,2 mm
over 30 to 120 mm	± 0,3 mm
over 120 to 400	± 0,5 mm
over 400 to 1000	± 0,8 mm

All dimensions in mm.

Figure 8: Dimensions - Cold-plate mounting

2.1.4 Dimensions - Wall mounting (5PC820.SX01-01)



Nominal measurement area	General tolerance acc. 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	± 0.5 mm
over 400 to 1000	± 0.8 mm

All dimensions in mm.

Figure 9: Dimensions - wall mounting

2.2 Temperature specifications

2.2.1 Maximum ambient temperature with a fan kit

Caution!

The Automation PC820 must be attached to the first position of the mounting plate.

	All temperature values in degrees celsius (°C) at 500 m above sea level. Derating the maximum ambient temperature (typically 1°C per 1000 m above 500 m sea level.	L2400 5PC800.B945-00 5PC800.B945-10	L7400 5PC800.B945-01 5PC800.B945-11	U7500 5PC800.B945-02 5PC800.B945-12	CM 423 5PC800.B945-03 5PC800.B945-13	T7400 5PC800.B945-04 5PC800.B945-14
	Maximum ambient temperature	55	55	55	55	50
	What else can be operated at max, ambient temperature, or are there limitations?					
Main memory	5MMDDR.0512-01	✓	✓	✓	✓	✓
	5MMDDR.1024-01	✓	✓	✓	✓	✓
	5MMDDR.2048-01	✓	✓	✓	✓	✓
System unit	5PC820.SX01-00	✓	✓	✓	✓	✓
	5PC820.SX01-01	✓	✓	✓	✓	✓
Add. Plug-in cards PCIec card slot	5ACPCC.ETH0-00	✓	✓	✓	✓	✓
	5ACPCC.MPL0-00	✓	✓	✓	✓	✓

Figure 10: Ambient conditions with a fan kit

2.2.2 Temperature sensor position

Sensors indicate temperature values in many different areas in the APC820. The temperatures[1] can be read in BIOS (menu item "Advanced" - Baseboard/panel features - Baseboard monitor on page 154) or in Microsoft Windows XP, using the B&R Control Center[2] .

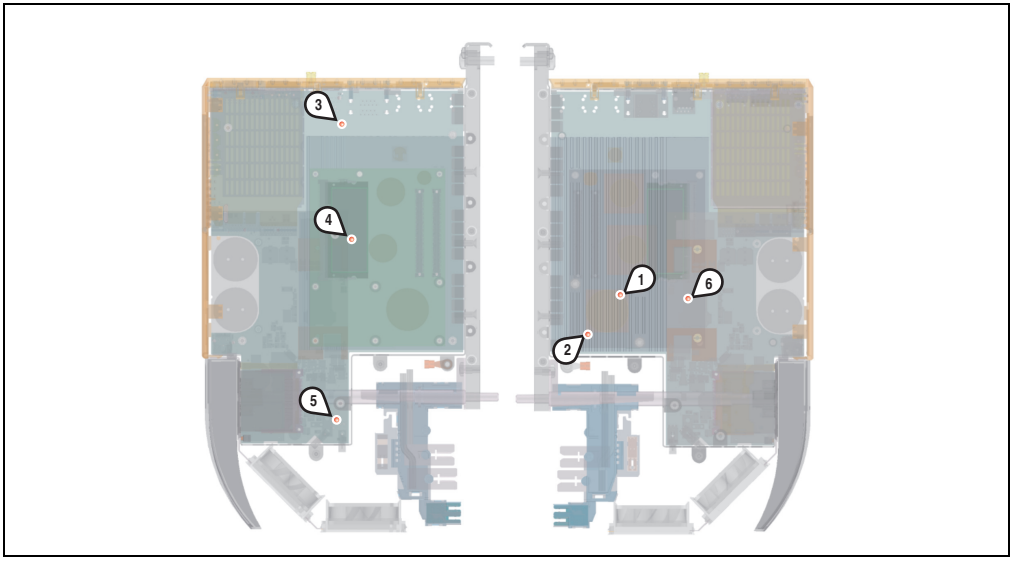


Figure 11: Temperature sensor position

Position	Measurement point for	Measurement	Max. specified
1	CPU	Processor temperature (integrated on the processor).	95°C
2	CPU board	Temperature on the CPU board close to the processor.	85°C
3	Baseboard Out	Temperature of the board in the top area.	80°C
4	Baseboard Center	Temperature of the board in the middle area.	80°C
5	Baseboard In	Temperature of the board in the bottom area.	65°C
6	Power supply	Power supply temperature.	85°C
	IF slot (PCIec card slot)	Temperature of the PCIec slot; the sensor is located directly on the plug-in card.	Depending on the plug-in cards used

Table 13: Temperature sensor position

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**).

2.2.3 Temperature monitoring - Fan control

The MTCX constantly monitors the temperature using temperature sensors (see section 2.2.2 "Temperature sensor position", on page 44), which directly determine how the fan is controlled. The RPM depends on the temperature measured.

Sensor range	Start-up temperature	Max fan speed at:
CPU	+ 70°C	+ 86°C
Baseboard Out	+ 65°C	+ 81°C
Baseboard Center	+ 65°C	+ 81°C
Baseboard In	+ 54°C	+ 70°C
Power supply	+ 65°C	+ 81°C
IF slot (PCIec card slot)	+ 65°C	+ 81°C

Table 14: Temperature limits of the fan (MTCX PX32 V0.05).

The fans are only switched off again when the evaluated temperature remains 6°C below the start-up temperature for a time span of 30 minutes (=lag-time).

2.3 Humidity specifications

The following table displays the minimum and maximum humidity for the individual components 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 945GME COM Express		10 to 90%	5 to 95%
System unit		5 to 85%	5 to 90%
Main memory for CPU boards		10 to 90%	5 to 90%
Accessories	CompactFlash cards 5CFCRD.xxxx-04	85%	85%
	CompactFlash cards - 5CFCRD.xxxx-03	8 to 95%	8 to 95%
	Flash drive 5MMUSB.xxxx-00	10 to 90%	5 to 90%

Table 15: Overview of humidity specifications for individual components

The listed specifications correspond to the 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.

2.4 Power management

2.4.1 Block diagram - supply voltage

The following block diagram shows the simplified structure of the APC820 supply voltage.

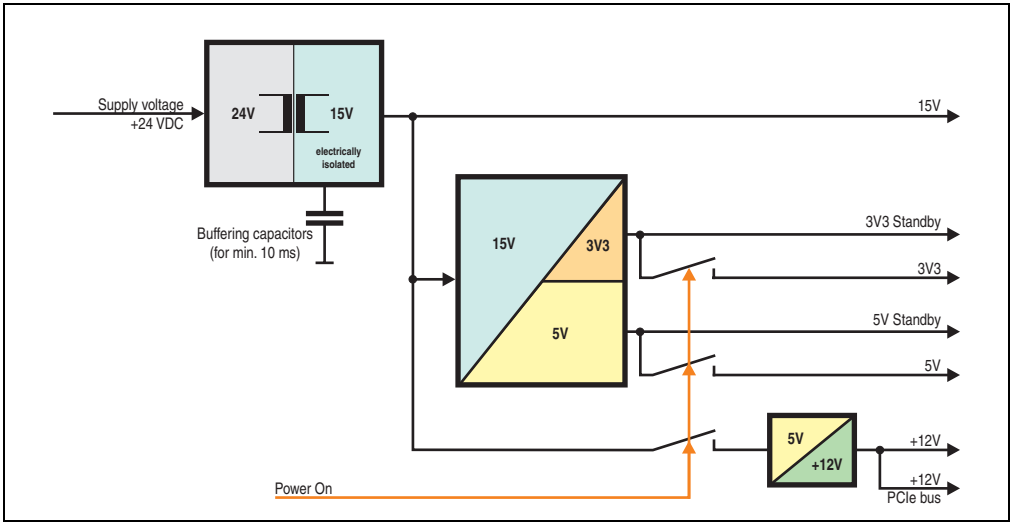


Figure 12: Block diagram - supply voltage

Description

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

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

2.4.2 Power calculation

Information:

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

		CPU boards					This system
		L2400 5PC800.B945-00 5PC800.B945-10	L7400 5PC800.B945-01 5PC800.B945-11	U7500 5PC800.B945-02 5PC800.B945-12	CM423 5PC800.B945-03 5PC800.B945-13	T7400 5PC800.B945-04 5PC800.B945-14	Enter values in this column
Total power supply	Total power supply rating (maximum)						85
+12V	Maximum possible at +12V						75
+12V	CPU board, fixed device	26	30	18	14	43	
+12V	512 MB RAM max. 2 pcs., each 1.5 W						
+12V	1024 MB RAM max. 2 pcs., each 2.5 W						
+12V	2048 MB RAM max. 2 pcs., each 3 W						
+12V	Fan kit, 2 pcs., fixed device	5	5	5	5	5	
+12V	Power required by PCIec card max. 4W	4	4	4	4	4	
+12V	Devices +12V ∑						
+5V	Maximum possible at +5V						40
+5V	Base board fixed device	4	4	4	4	4	
+5V	USB peripheral, each max. 2.5W (USB2, USB4)						
+5V	USB peripheral, each max. 5W (USB1, USB3, USB5)						
+5V	Power required by PCIec card max. 4W	4	4	4	4	4	
+5V	Devices +5V ∑						
3V3	Maximum possible at 3V3						30
3V3	Base board fixed device	5	5	5	5	5	
3V3	CompactFlash, each 1W (2 slot)	1 / 2	1 / 2	1 / 2	1 / 2	1 / 2	
3V3	Power required by PCIec card max. 4W	4	4	4	4	4	
3V3	Devices 3V3 ∑						
Total power supply	Devices ∑						

Figure 13: Power calculation - Automation PC 820

Information:

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

2.5 Block diagram

The following block diagram shows the simplified system unit structure with a CPU board.

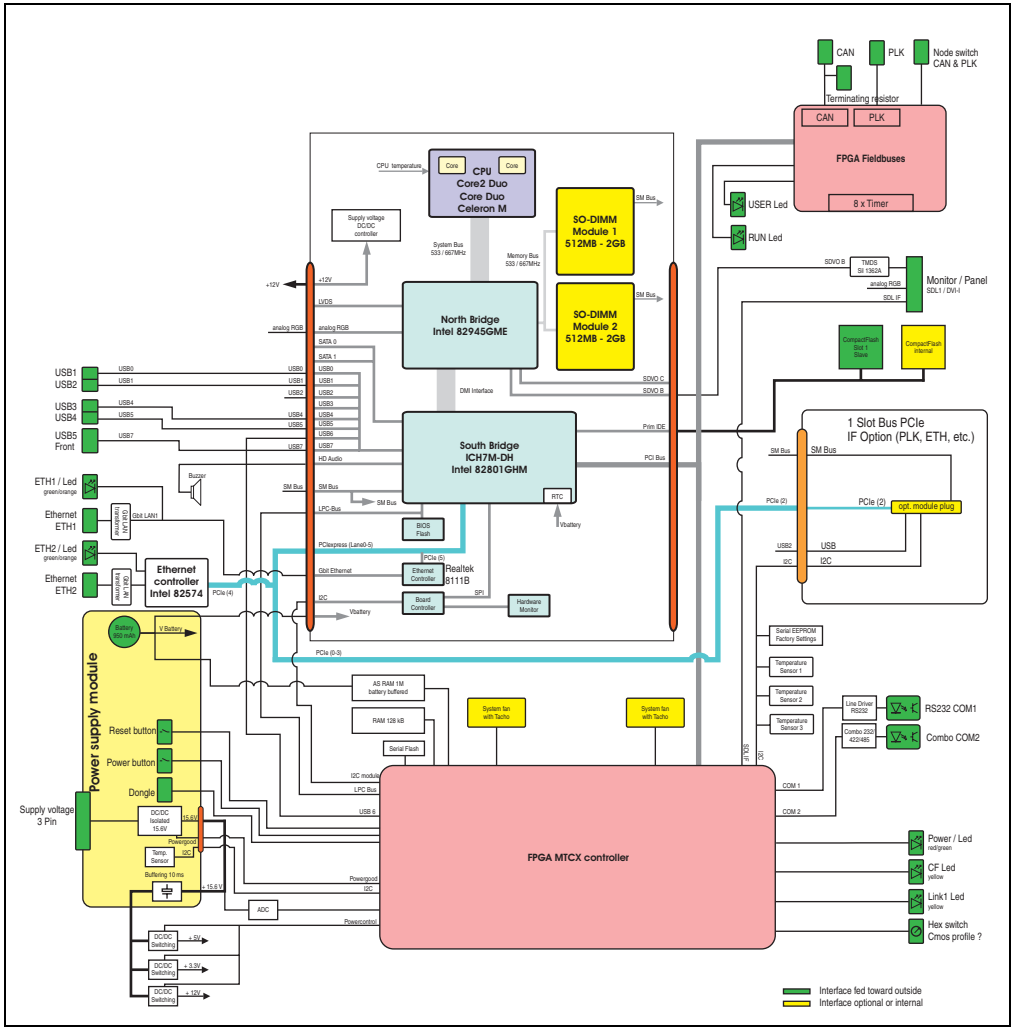


Figure 14: Block diagram - Automation PC 820

2.6 Device interfaces

2.6.1 Supply voltage +24 VDC

If the APC820 is secured, it is automatically connected to the ACOPOSmulti rail supply voltage. For information about installing the APC820, see chapter 3 "Commissioning", section 1 "Installation", on page 83.

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). The device must be returned to B&R for repairs if the fuse is blown because of an error.

2.6.2 Ground

If the APC820 is secured, it is automatically connected to ground (ACOPOSmulti rail).

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

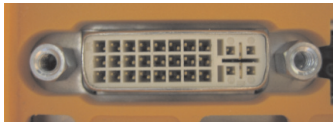
Monitor / Panel connection - SDL (Smart Display Link / DVI)	
The following will provide an overview of the video signals available on the monitor/panel output. For details, see technical data for the CPU board being used.	
CPU board	**Video signals**
5PC800.B945-00	RGB, DVI, SDL
5PC800.B945-01	RGB, DVI, SDL
5PC800.B945-02	RGB, DVI, SDL
5PC800.B945-03	RGB, DVI, SDL
5PC800.B945-04	RGB, DVI, SDL

Table 16: Monitor / Panel connection - RGB, DVI, SDL

2.6.4 USB interfaces

The APC820 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 interfaces. Due to the vast number of USB devices available on the market, B&R cannot guarantee their performance. B&R does ensure the performance of all USB devices that they provide.

Warning!

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

USB 1, 2, 3, 4

Universal Serial Bus (USB1, USB2, USB3, USB4)		
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s), to high speed (480 MBit/s)	4x USB type A, female 
Power supply[1)] USB1, USB3 USB2, USB4	 Max. 1 A Max. 500 mA	
Maximum Cable length	5 m (without hub)	

Table 17: USB1, USB2, USB3, USB4 connection

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

USB5

The USB5- connection is located on the front side at the bottom of the APC820.

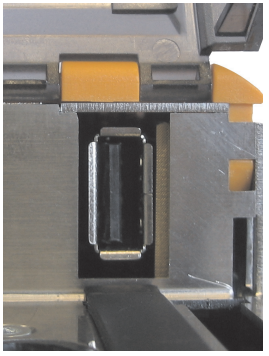
Universal Serial Bus (USB5)		
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s), to high speed (480 MBit/s)	1x USB type A, female 
Power supply[1)] USB5	Max. 1 A	
Maximum Cable length	5 m (without hub)	

Table 18: USB5 connection

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

2.6.5 Serial interface COM1

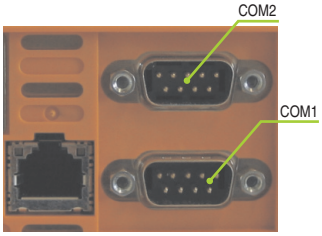
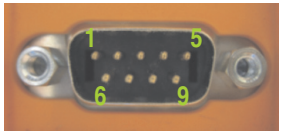
Serial interface COM1		
Type	RS232, modem-capable, not electrically isolated	
UART	16550-compatible, 16-byte FIFO	
Transfer rate	Max. 115 kBit/s	
Cable length	Max. 15 m	
Pin	**Assignment**	
1	DCD	
2	RXD	
3	TXD	
4	DTR	9-pin DSUB, male
5	GND	
6	DSR	
7	RTS	
8	CTS	
9	RI	

Table 19: Pin assignments - COM1

Bus length and cable type RS232

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

Extension	Transfer rate
≤ 15 m	typ. 64 kBit/s
≤ 10 m	typ. 115 kBit/s
≤ 5 m	typ. 115 kBit/s

Table 20: 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 Shield	 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

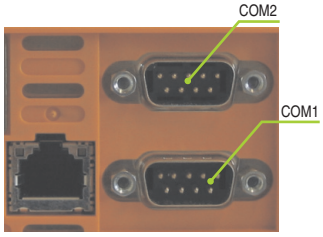
Table 21: RS232 - Cable requirements

RS232 cable	Property
Outer sheathing	
Item	PUR mixture
Characteristics	Halogen free
Entire shielding	From tinned cu wires

Table 21: RS232 - Cable requirements

2.6.6 Serial interface COM2

Serial interface COM2		
	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 m	Max. 1200 m
Pin	**Assignments (RS232)**	**Assignments (RS422)**
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



9-pin DSUB connector

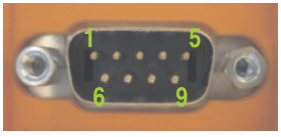


Table 22: Pin assignments - COM2

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 23: 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 "Baseboard/Panel Features" - submenu "Legacy Devices", setting "COM B"). 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.

Extension	Transfer rate
≤ 15 m	typ. 64 kBit/s
≤ 10 m	typ. 115 kBit/s
≤ 5 m	typ. 115 kBit/s

Table 24: 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 Shield	 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 Item Characteristics Entire shielding	 PUR mixture Halogen free From tinned cu wires

Table 25: 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.

Extension	Transfer rate
1200 m	typ. 115 kBit/s

Table 26: 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 Shield	 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 Item Characteristics Entire shielding	 PUR mixture Halogen free From tinned cu wires

Table 27: 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.

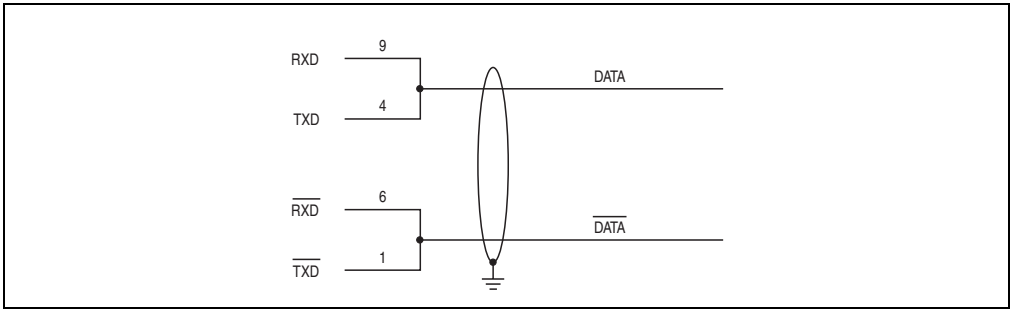


Figure 15: RS232/422/485 interface - operated in RS485 mode

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.

Extension	Transfer rate
1200 m	Typically 115 kbits/s

Table 28: 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
Shield	Paired shield with aluminum foil

Table 29: RS485 - Cable requirements

RS485 cable	Property
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 Item Characteristics Entire shielding	 PUR mixture Halogen free From tinned cu wires

Table 29: RS485 - Cable requirements (Forts.)

2.6.7 CAN

CAN		
The electrically isolated CAN bus interface is a 4-pin multipoint connector.		
Transfer rate	Max. 500 kBit/s	
Bus length	Max. 1000 m	
Pin	**CAN bus**	
1	CAN_H (CAN High)	
2	CAN ⊥ (CAN ground)	
3	CAN_L (CAN Low)	
4	SHLD (shield)	

Table 30: CAN

Driver support

The fieldbus interface CAN is only supported together with Automation Runtime.

CAN node switch

CAN node switch (x1, x16)			
Both of these hex switches (x1, x16) are used to configure the node number for the CAN interface. The node switch is located behind the front cover. The front cover must first be slid down to change the node switch.			
Switch position			
x1	**x16**	**Description**	
0 ... F	0 ... F	Any	

Table 31: CAN node switch (x1, x16)

CAN terminating switch / LED

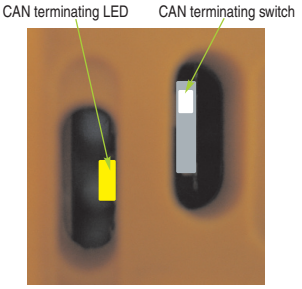
CAN terminating switch / LED			
CAN networks are cabled using a bus structure where both ends of the bus are equipped with terminating resistors. The APC820 has an integrated terminating resistor (delivery state: disabled with the setting "Off"), which is located on the top side (see image 7 "APC820 interface overview - Top side A1", on page 37.)			
LED	**On**	**Off**	
Yellow	The terminating resistor integrated in the bus controller is turned on.	The terminating resistor integrated in the bus controller is turned off.	
CAN terminating switch	**Position On**	**Position Off**	
Can be pressed using a pointed object.	Terminating resistor is turned on.	Terminating resistor is turned off.	

Table 32: CAN terminating switch / LED

Status LED CAN

Status LED CAN			
Yellow LED for	**On**	**Off**	
CAN	Sends data	Receives data	

Table 33: Status LED CAN

2.6.8 POWERLINK

POWERLINK 1 connection		
Cabling	S/STP (Cat5e)	
Cable length	max. 100 m (min. Cat5e)	
Speed LED	**On**	**Off**
Green / red	see Status / Error LED	
Link LED	**On**	**Blinking**
Yellow	Link (POWERLINK network connection available)	Activity (blinking) (Data transfer in progress)

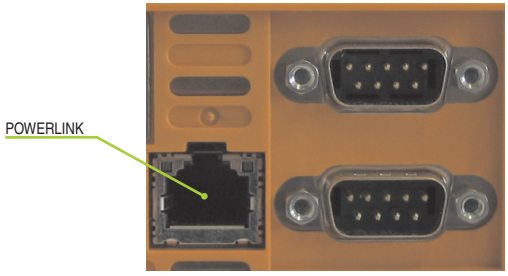


Table 34: POWERLINK connection

Status / Error LED

The status/error LED is a green/red LED.

Red - error	Description
On	The POWERLINK interface has encountered an error (failed Ethernet frames, increased number of collisions on the network, etc.).

Table 35: Status / Error LED as error LED - POWERLINK operating mode

Green - status	Description
Off NOT_ACTIVE	**Managing Node (MN)** The bus is monitored for POWERLINK frames. If a frame is not received within the configured time window (timeout), the interface goes directly into PRE_OPERATIONAL_1 status (single flash). If, however, POWERLINK communication is detected before this time passes, the interface goes directly into the BASIC_ETHERNET status (flickering). **Controlled Node (CN)** The bus is monitored for POWERLINK frames. If a frame is not received within the configured time window (timeout), the interface goes directly into BASIC_ETHERNET status (flickering). If, however, POWERLINK communication is detected during this time, the interface goes directly into the PRE_OPERATIONAL_1 status (single flash).
Green flickering (approx. 10 Hz) BASIC_ETHERNET	The interface is in BASIC_ETHERNET status, and is operated purely as an Ethernet TCP/IP interface. **Managing Node (MN)** This status can only be changed by resetting the interface. **Controlled Node (CN)** If POWERLINK communication is detected while in this status, the interface goes into the PRE_OPERATIONAL_1 state (single flash).
Single flash (approx. 1 Hz) PRE_OPERATIONAL_1	The interface status is PRE_OPERATIONAL_1. **Managing Node (MN)** The MN starts the operation of the "reduced cycle". Collisions are allowed on the bus. There is not yet any cyclic communication. **Controlled Node (CN)** The CN waits until it receives an SoC frame and then switches to PRE_OPERATIONAL_2 status (double flash).

Table 36: Status/Error LED as status LED - POWERLINK operating mode

Green - status	Description
Double flash (approx. 1 Hz) PRE_OPERATIONAL_2	The interface status is PRE_OPERATIONAL_2. **Managing Node (MN)** The MN begins with the cyclic communication (cyclic input data is not yet evaluated). The CNs are configured in this status. **Controlled Node (CN)** In this status, the interface is normally configured by the manager. After this, a command changes the status to PRE_OPERATIONAL_3 (triple flash).
Triple flash (approx. 1 Hz) READY_TO_OPERATE	The interface status is READY_TO_OPERATE. **Managing Node (MN)** Normal cyclic and asynchronous communication. Received PDO data is ignored. **Controlled Node (CN)** The configuration of the interface is complete. Normal cyclic and asynchronous communication. The PDO data sent corresponds to the PDO mapping used. However, cyclic data is not yet evaluated.
On OPERATIONAL	The interface status is OPERATIONAL.
Blinking (approx. 2.5 Hz) STOPPED	The interface status is STOPPED. **Managing Node (MN)** This status is not possible for the MN. **Controlled Node (CN)** No output data is produced and no input data is received. Only the appropriate command from the manager can enter or leave this state.

Table 36: Status/Error LED as status LED - POWERLINK operating mode

POWERLINK node switch

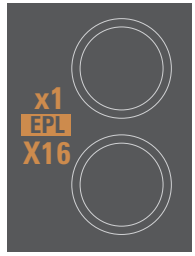
POWERLINK node switch (x1, x16)			
Both of these hex switches (x16, x1) are used to configure the station number for the POWERLINK. Station numbers are permitted between #00 and #FD. The node switch is located behind the front cover. The front cover must first be slid down to change the node switch.			
Switch position			
x1	x16	Description	
0	0	Operation as managing node	
0 ... D	1 ... F	station number Operation as controlled node	
E	F	Reserved	
F	F	Reserved	

Table 37: POWERLINK node switch (x1, x16)

2.6.9 Ethernet 1 (ETH1)

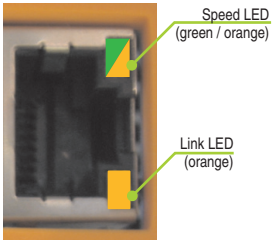
Ethernet 1 connection (ETH1)			
Controller	Realtek RTL8111B/C[1)]		
Cabling	S/STP (Cat5e)		
Transfer rate	10/100/1000 MBit/s[2)]		
Cable length	max. 100 m (min. Cat5e)		
Speed LED	**On**	**Off**	
Green	100 Mbit/s	10 Mbit/s[3)]	
Orange	1000 Mbit/s	-	
Link LED	**On**	**Off**	
Orange	Link (Ethernet network connection available)	Activity (blinking) (Data transfer in progress)	

Table 38: Ethernet connection (ETH1)

1) The Realtek 8111B is integrated in the CPU boards 5PC800.B945-00, -01, -02, -03 and -04.
The Realtek 8111C is integrated in the CPU boards 5PC800.B945-10, -11, -12, -13 and -14.

2) Change-over 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 Realtek Ethernet controllers RTL8111B/C. 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.

2.6.10 Ethernet 2 (ETH2)

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

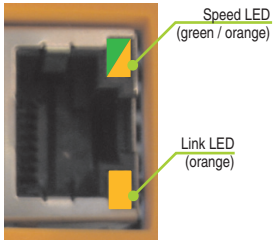


Table 39: Ethernet connection (ETH2)

1) Change-over takes place automatically.
2) 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 82574. The necessary drivers 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.

2.6.11 Status LEDs

The following conditions of the APC820 are signaled via the status LEDs:

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)	
	red / green	Blinking	Service function for MTCX upgrade: A red/green blinking power LED indicates a faulty or incomplete MTCX upgrade. The MTCX runs using the firmware version installed when delivered. This could be caused by a power failure during an MTCX upgrade. An MTCX upgrade must be performed again.	
CF	Yellow	On	Indicates access to CompactFlash (read or write)	
Link (SDL)	Yellow	On	Indicates an active SDL connection on the monitor / panel plug.	
		Blinking	An active SDL connection has been interrupted by a loss of power in the display unit.	
Run	Green	On	Application running	
	Red	On	Service mode	
	Yellow	On	User LED	

Table 40: Data - status LEDs

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

2.6.12 CMOS profile switch

The CMOS profile switch is located behind the front cover.

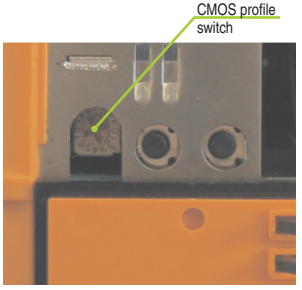
CMOS profile switch		
Different BIOS default value profiles can be defined using the 16-position CMOS profile switch.		
Switch position	**Description**	
0	Profile 0: Default profile reserved.	
1	Profile 1: Optimized for system units 5PC810.SX01-00 and 5PC810.SX02-00	
2	Profile 2: Optimized for 5PC810.SX05-00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

Table 41: 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.

2.6.13 Power button

The power button has a variety of functions due to full ATX power supply support.
The power button is located behind the front cover.

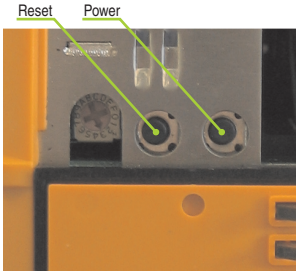
Power button	
The power button can be pressed with a pointed object (i.e. paper clip or tip of a pen). The power button acts like the on/off switch on a normal desktop PC with ATX power supply: **Press and release** ... Switches on APC820 or shuts down operating system and switches off the APC820. **Press and hold** ... ATX power supply switches off without shutting down the APC820 (**data could be lost!**). Pressing the power button does not reset the MTCX processor.	

Table 42: Power button

2.6.14 Reset button

The power button is located behind the front cover.

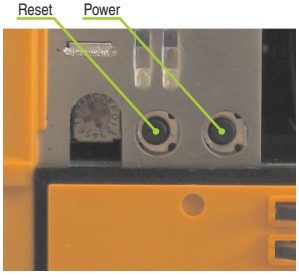
Reset button	
The reset button can be pressed with a pointed object (i.e. paper clip or tip of a pen). Pushing the reset button results in a hardware-reset, PCI-reset. The APC820 is restarted (cold restart). The MTCX processor is not reset when the reset button is pressed.	

Table 43: Reset button

Warning!

A system reset can cause data to be lost!

2.6.15 Battery

The lithium battery (3 V, 950 mAh) buffers the internal real-time clock (RTC) as well as the individually saved BIOS settings and data in the SRAM and is located behind the black cover. The battery is subject to wear and should be replaced regularly (at least following the specified lifespan).

The battery is located behind the cable cover.

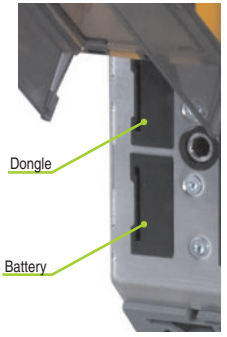
Battery		
Battery Type Removable Lifespan	 Renata 950 mAh Yes, accessible from the outside 2 years[1)]	
Accessories	**Short description**	
0AC201.91	**Lithium batteries, 4 pcs**. Lithium batteries, 4 pcs., 3 V / 950 mAh, button cell	
4A0006.00-000	**Lithium battery, 1 pc.** Lithium batteries, 1 pcs.,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

Table 44: Battery

1) At 50°C, 8.5 µA of the supplied components and a self discharge of 40%.
The lifespan of 1½ years is only valid if an SRAM module is being used. Without SRAM module, a lifespan of 2 years can be expected.

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 - Main board 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 45: Meaning of battery status

2.6.16 Hardware security key (dongle)

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

The hardware security key is located behind the cable cover.

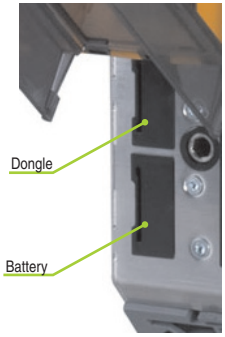
Hardware Security Key	
A hardware security key (dongle) can be inserted behind the black cover.	

Table 46: Hardware Security Key

Warning!

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

2.6.17 CompactFlash slot 1

This CompactFlash slot is a fixed part of an APC820 system and is internally connected with the chipset via IDE PATA. Type I CompactFlash cards are supported. The CompactFlash slots are located behind the cable cover.

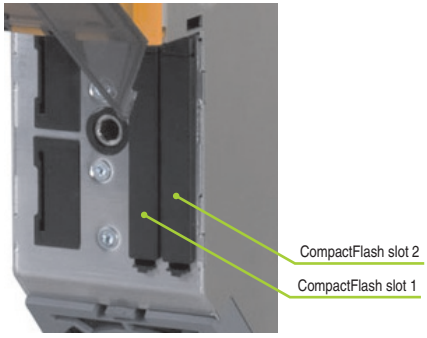
CompactFlash slot (CF1)		
Connection	PATA Master	
CompactFlash Type	Type I	
Accessories	**Short description**	
5CFCRD.0512-04	512 MB B&R CompactFlash card	
5CFCRD.1024-04	1024 MB B&R CompactFlash card	
5CFCRD.2048-04	2048 MB B&R CompactFlash card	
5CFCRD.4096-04	4096 MB B&R CompactFlash card	
5CFCRD.8192-04	8192 MB B&R CompactFlash card	
5CFCRD.016G-04	16 GB 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 47: CompactFlash slot (CF1)

Warning!

Turn off power before inserting or removing the CompactFlash card!

2.6.18 CompactFlash slot 2

This CompactFlash slot is a fixed part of an APC820 system and is internally connected with the chipset via IDE PATA. Type I CompactFlash cards are supported. The CompactFlash slots are located behind the cable cover.

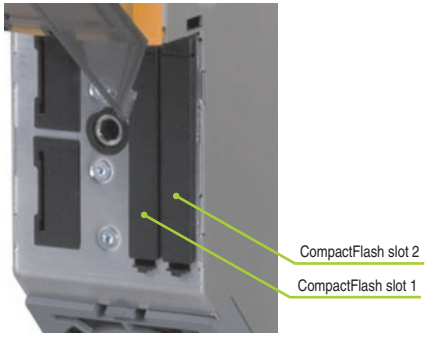
CompactFlash slot (CF2)		
Connection	PATA Slave	
CompactFlash Type	Type I	
Accessories	**Short description**	
5CFCRD.0512-04	512 MB B&R CompactFlash card	
5CFCRD.1024-04	1024 MB B&R CompactFlash card	
5CFCRD.2048-04	2048 MB B&R CompactFlash card	
5CFCRD.4096-04	4096 MB B&R CompactFlash card	
5CFCRD.8192-04	8192 MB B&R CompactFlash card	
5CFCRD.016G-04	16 GB 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 48: CompactFlash slot (CF2)

Warning!

Turn off power before inserting or removing the CompactFlash card!

3. Individual components

3.1 CPU boards 945GME

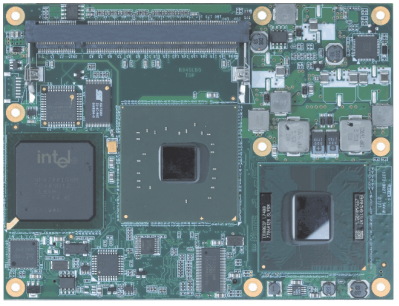


Figure 16: CPU board

3.1.1 Technical data

Features	5PC800.B945-00 5PC800.B945-10	5PC800.B945-01 5PC800.B945-11	5PC800.B945-02 5PC800.B945-12	5PC800.B945-03 5PC800.B945-13	5PC800.B945-04 5PC800.B945-14
Boot loader / O.S.	embedded AMI BIOS (for a description, see Chapter 4 "Software", section 1 "BIOS options", on page 111)				
Processor Type Name Clock frequency Architectures L1 cache L2 cache Front side bus - FSB Intel 64 architecture	 Intel® Core™ Duo L2400 1.66 GHz 65 nm 32 KB 2 MB 667 MHz No	 Intel® Core™2 Duo L7400 1.5 GHz 65 nm 32 KB 4 MB 667 MHz Yes	 Intel® Core™2 Duo U7500 1.06 GHz 65 nm 32 KB 2 MB 533 MHz Yes	 Intel® Celeron® M 423 1.06 GHz 65 nm 32 KB 1 MB 533 MHz No	 Intel® Core™2 Duo T7400 2.16 GHz 65 nm 32 KB 4 MB 667 MHz Yes
Chipset	Intel® 945GME / Intel 82801 GHM (ICH7M-DH)				
DRAM	SO-DIMM DDR2 667/PC5300, max. 3 GByte				
Graphics Controller Memory Color depth Resolution RGB DVI	 Intel® Graphics Media Accelerator 950 Up to 224 MB (reserved from main memory) Max 32 Bit 400 MHz RAMDAC, up to 2048 x 1536 @75 Hz (QXGA) including 1920 x 1080 @ 85 Hz (HDTV) Intel compliant SDVO port, 1920 x 1080				
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At 25°C typ. 12 ppm (1 second)[1] per day				
Mass memory management	2x SATA, 1x IDE				
Power management	ACPI 2.0, S3 Support (suspend to RAM)				

Table 49: Technical data - CPU boards

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

3.2 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. 1 GB) are plugged in. This technology is not supported when two modules of different sizes (e.g. 1 GB and 2 GB) are plugged in.

When two 2 GB modules are plugged in, only 3 GB of main memory can be used.

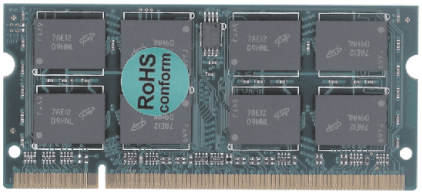


Figure 17: Main memory

3.2.1 Technical data

Features	5MMDDR.0512-01	5MMDDR.1024-01	5MMDDR.2048-01
Quantity	512 MB	1 GB	2 GB
Type	DDR2 SDRAM / PC2-5300		
Construction	200 Pin SO-DIMM		
Organization	64M x 64-bit	128M x 64-bit	256M x 64-bit

Table 50: Technical data - Main memory

Information:

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

3.3 Power supply with heat sink

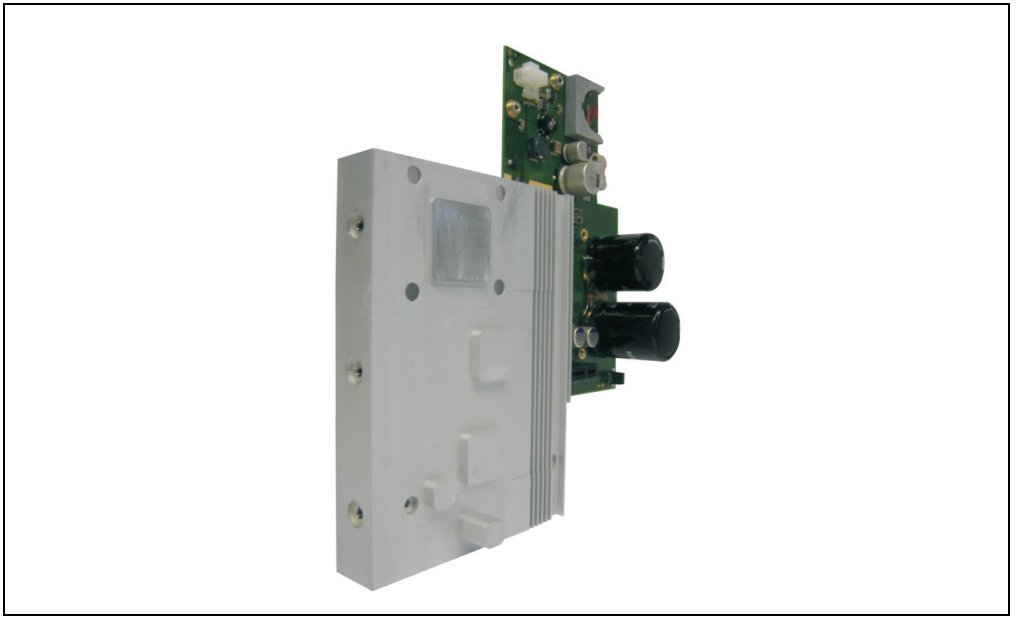


Figure 18: Power supply with heat sink

3.3.1 Technical data

General information	5AC802.HS00-00	5AC802.HS00-01
Suited for CPU board	5PC800.B945-00 / -10 5PC800.B945-01 / -11 5PC800.B945-02 / -12 5PC800.B945-03 / -13	5PC800.B945-04 / -14
Mechanical characteristics		
Item	Aluminum (heat sink)	
Weight	900 g	900 g

Table 51: Technical data - Power supply with heat sink

Information:

The power supply with heat sink can only be replaced at the B&R plant.

3.4 Replacement fan

Information:

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

3.4.1 Replacement fan 8BXF001.0000-00

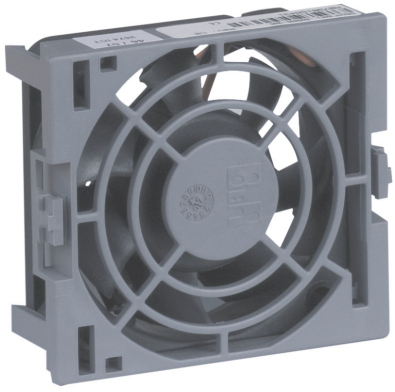


Figure 19: Replacement fan 8BXF001.0000-00

Technical data

Features	8BXF001.0000-00
Fan type Width Length Height	 50 mm 50 mm 15 mm
Revolution speed	5500 rpm ±10%
Noise level	36.5 dB
Lifespan	65,000 hours at 40°C

Table 52: Technical data - Replacement fan

3.5 Plug-in cards

The PCIec plug-in cards are equipped with a sensor that monitors the card's temperature. This value is read out in the BIOS (menu item: Advanced - Baseboard/Panel Features - Baseboard Monitor on page 154) and in the ADI.

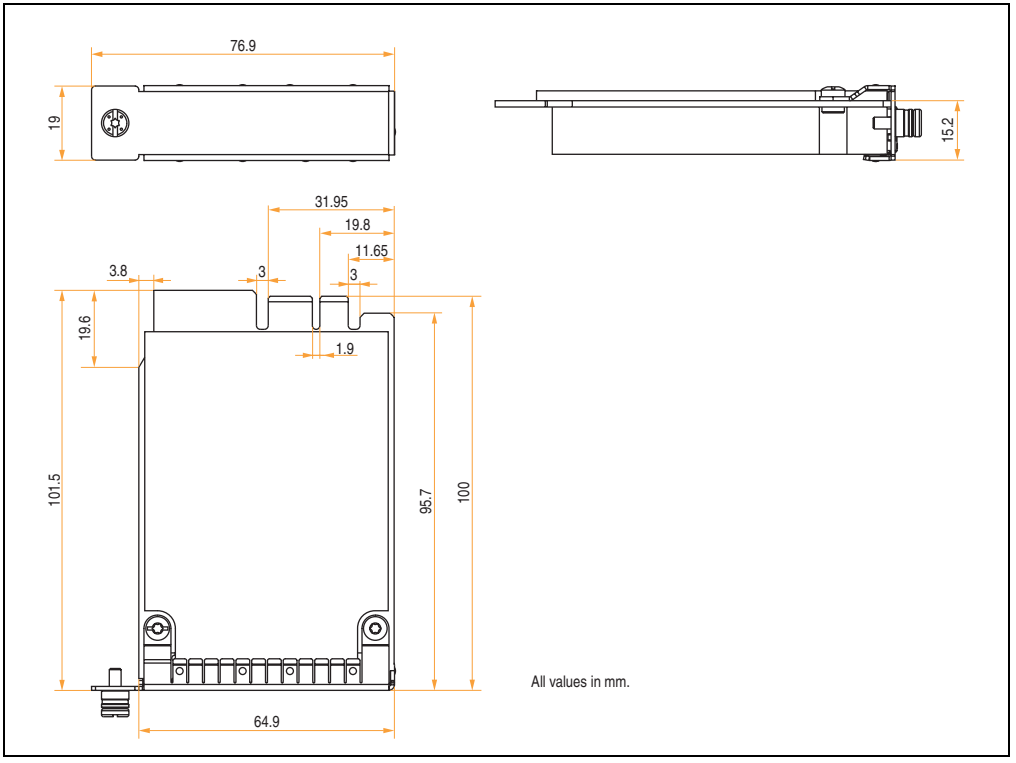


Figure 20: Dimensions - PCIec cards

Information:

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

3.5.1 Ethernet Card 10/100/1000 - 5ACPCC.ETH0-00

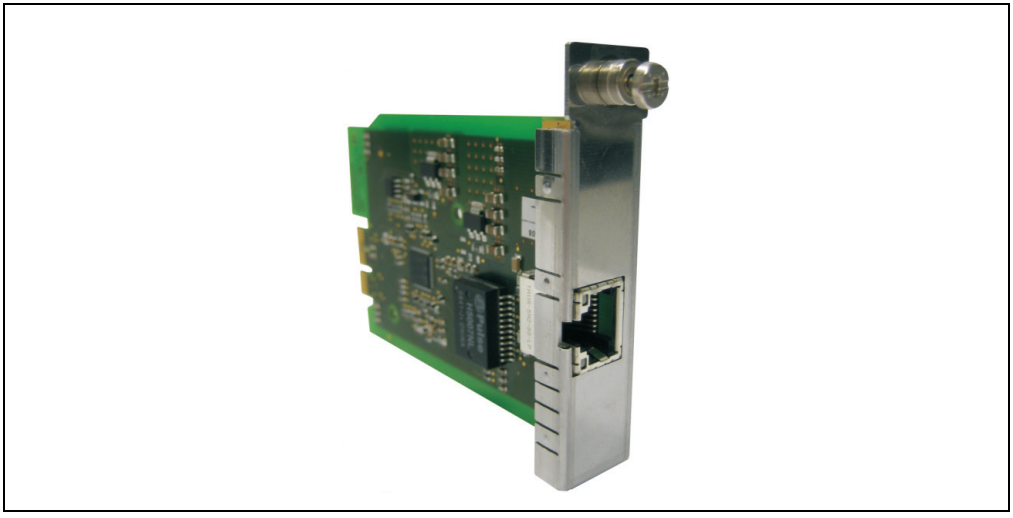


Figure 21: Ethernet card 10/100/1000 - 5ACPCC.ETH0-00

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.

Ethernet card 1 connection		
Controller	Intel 82574	
Cabling	S/STP (Cat5e)	
Transfer rate	10/100/1000 MBit/s[1)]	
Cable length	max. 100 m (min. Cat5e)	
Speed LED	**On**	**Off**
Green	100 Mbit/s	10 Mbit/s[2)]
Orange	1000 Mbit/s	-
Link LED	**On**	**Off**
Orange	Link (Ethernet network connection available)	Activity (blinking) (Data transfer in progress)

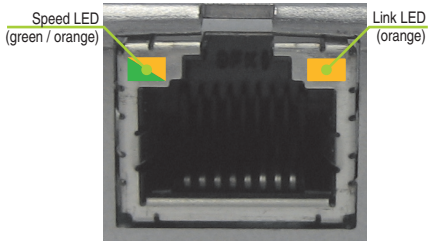


Table 53: Technical data - Ethernet card 10/100/1000 - 5ACPCC.ETH0-00

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

Driver support

A special driver is necessary for operating the Intel Ethernet controller 82574. The necessary drivers 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.

3.5.2 POWERLINK card 2-port - 5ACPCC.MPL0-00

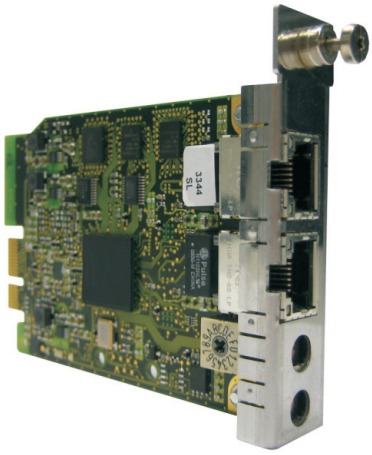


Figure 22: POWERLINK card 2-port - 5ACPCC.MPL0-00

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.

POWERLINK card 2 connections			
Cabling	S/STP (Cat5e)		The LEDs are identical for both connections.
Cable length	max. 100 m (min. Cat5e)		
Speed LED	**On**	**Off**	
Green / red	see Status / Error LED		
Link LED	**On**	**Blinking**	
Yellow	Link (POWERLINK network connection available)	Activity (blinking) (Data transfer in progress)	

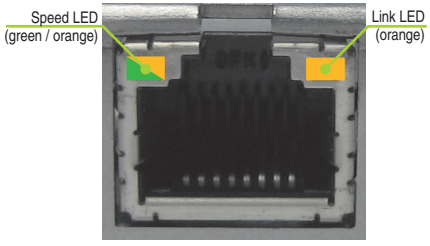


Table 54: POWERLINK card 2-port connection

Status / Error LED

The status/error LED is a green/red LED.

Red - error	Description
On	The POWERLINK interface has encountered an error (failed Ethernet frames, increased number of collisions on the network, etc.).

Table 55: Status / Error LED as error LED - POWERLINK card 2-port operating mode

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

Table 56: Status / Error LED as status LED - POWERLINK card 2-port operating mode

POWERLINK station number

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

Table 57: POWERLINK card 2-port station number (x1, x16)

Card number switch

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

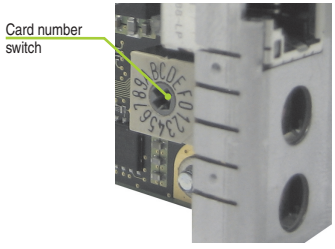


Figure 23: POWERLINK card 2-port node number switch

SRAM

The POWERLINK Card 2port - 5ACPCC.MPL0-00 has 512 kByte SRAM.

Chapter 3 • Commissioning

1. Installation

Generally, the APC820 must be mounted to the first position regardless of mounting method. It is important to make sure that it is correctly fastened to the guide rail.

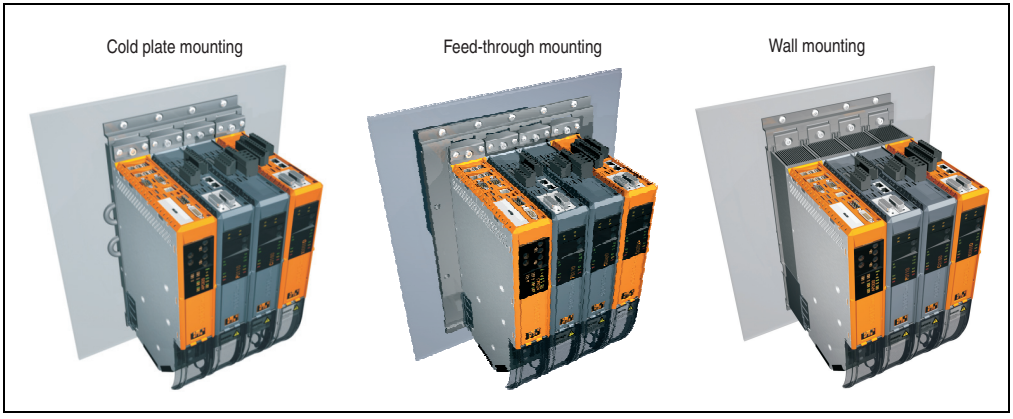


Figure 24: Installation

1.1 Important mounting information

- The APC820 must be secured to the first position of the ACOPOSmulti mounting plate.
- The environmental conditions must be taken into consideration.
- The APC820 is only permitted for operation in closed rooms.
- The APC820 cannot be situated in direct sunlight.
- The vent holes may not be covered.
- 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 91).
- Make sure that sufficient space is provided for air circulation.

1.2 Mounting plates

The model numbers, the exact description as well as the dimension diagrams and installation dimensions for the mounting plates can be found in the ACOPOSmulti manual in chapter 3, "Installation". This can be downloaded for free from the B&R homepage (**www.br-automation.com**).

> **Caution!**
>
> **Only feed-through and cold-plate mounting are allowed for the system unit 5PC820.SX01-00!**
>
> **Only wall mounting is allowed for the system unit 5PC820.SX01-01!**

1.2.1 Feed-through mounting

With feed-through installation, excessive heat is output directly to the ambient air outside of the switching cabinet. Suitable for a large number of axes with any range of power rating.

The mounting surface for feed-through installation must provide sufficient stability for the mounting plate and also be non-flammable, level and free of contaminants.

> **Caution!**
>
> **The area of the mounting surface where the seal for the mounting plate sits must be free of scratches and residue because otherwise it cannot be guaranteed that protection guidelines according to EN 60529 are being met!**

The cutout for the feed-through heat sink and the mounting holes (type and amount) are to be prepared according to the dimension diagrams and installation dimensions in the ACOPOSmulti user's manual, which can be downloaded for free from the B&R homepage (**www.br-automation.com**).

The distances that must be used for mounting and ventilation of the Automation PC 820 and ACOPOSmulti modules can be found in the dimension diagrams for the individual modules.

1.2.2 Cold-plate installation

The excessive heat that is generated by the devices is output directly to the cooling medium via a plate cooled with oil or water. Suitable for a large number of axes with any range of power rating and a machine's own cooling circulation system.

The mounting surface for the mounting plate must provide sufficient stability for the mounting plate and also be non-flammable, level and free of contaminants.

Connection of supply and return lines

The position of the connections for supply and return lines can be found in the installation diagram. This can found in the ACOPOSmulti manual, which can be downloaded for free from the B&R homepage (**www.br-automation.com**).

Caution!

The feed must be connected to the bottom connector of the mounting plate.

The return line must be connected to the top connector of the mounting plate.

1.2.3 Wall mounting

The mounting surface for the 8B0MxxxxHW00.000-1 mounting plate must provide sufficient stability for the mounting plate and also be non-flammable, level and free of contaminants.

The distances that must be used for mounting and ventilation of the Automation PC 820 and ACOPOSmulti modules can be found in the dimension diagrams for the individual modules.

1.3 Spacing for air circulation.

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

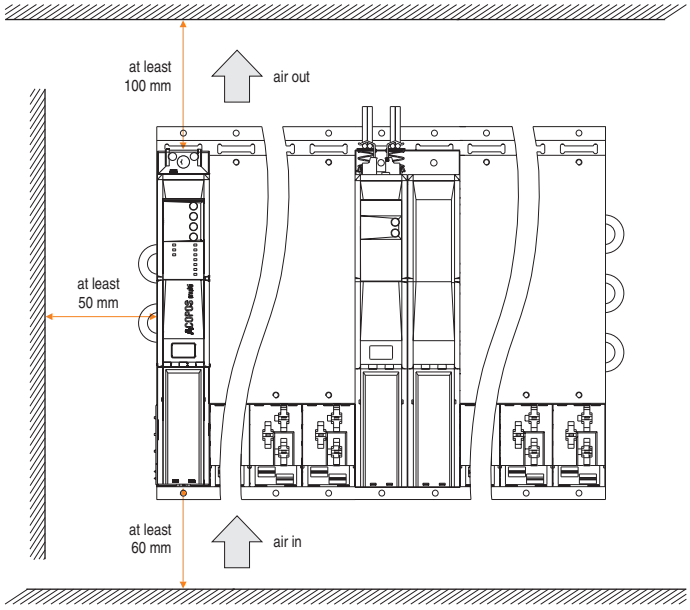


Figure 25: Mounting spacing

Information:

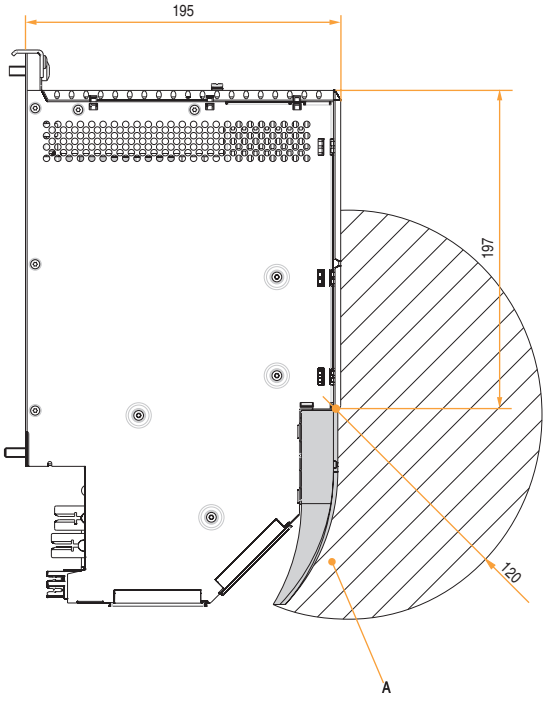
The minimal spacing intervals indicated above must be adhered to in order to ensure sufficient air circulation.

To ensure that the fan modules in the mounting plate can be exchanged easily, at least 250 mm has to be left free below the module.

These defined intervals apply to all mounting methods for APC820.

1.4 Swivel range of the front cover

Keep the swivel range of the front cover on the front side of the APC820 free when installed to prevent problems connecting peripheral devices to the APC820.



A.....Swivel range of the front cover

Figure 26: Swivel range of the front cover

1.5 Mounting the APC820

The following must be taken into consideration when attaching to mounting plates:

- Attach the APC820 to the mounting plate using the mounting clip(s) on the top.

Information:

The Automation PC820 must always be secured to the first position of the mounting plate.

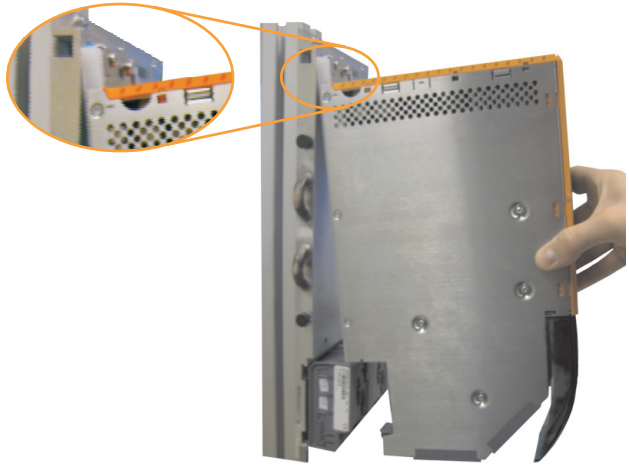


Figure 27: Attaching modules

- Clip the APC820 into the backplane module.
  The APC820 must be thoroughly attached, so that it rests straight in the backplane module in order for the module contacts to function properly.
- Tighten all M6 mounting screws (2 screws per module width) on the APC820 with a **torque of max. 5 Nm**.

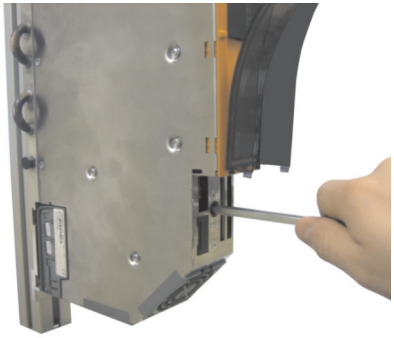


Figure 28: Tightening the fastening screws

1.6 Installation guidelines Mounting orientation

The following diagrams illustrate the mounting orientations permitted by B&R. These are valid for cold-plate, feed-through and wall mounting.

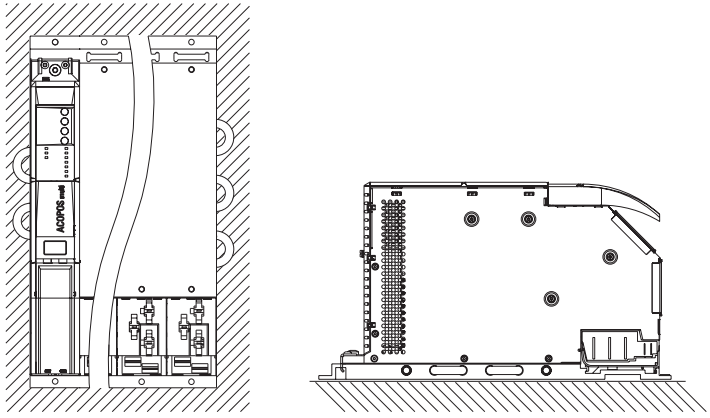


Figure 29: Permitted mounting orientations

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.

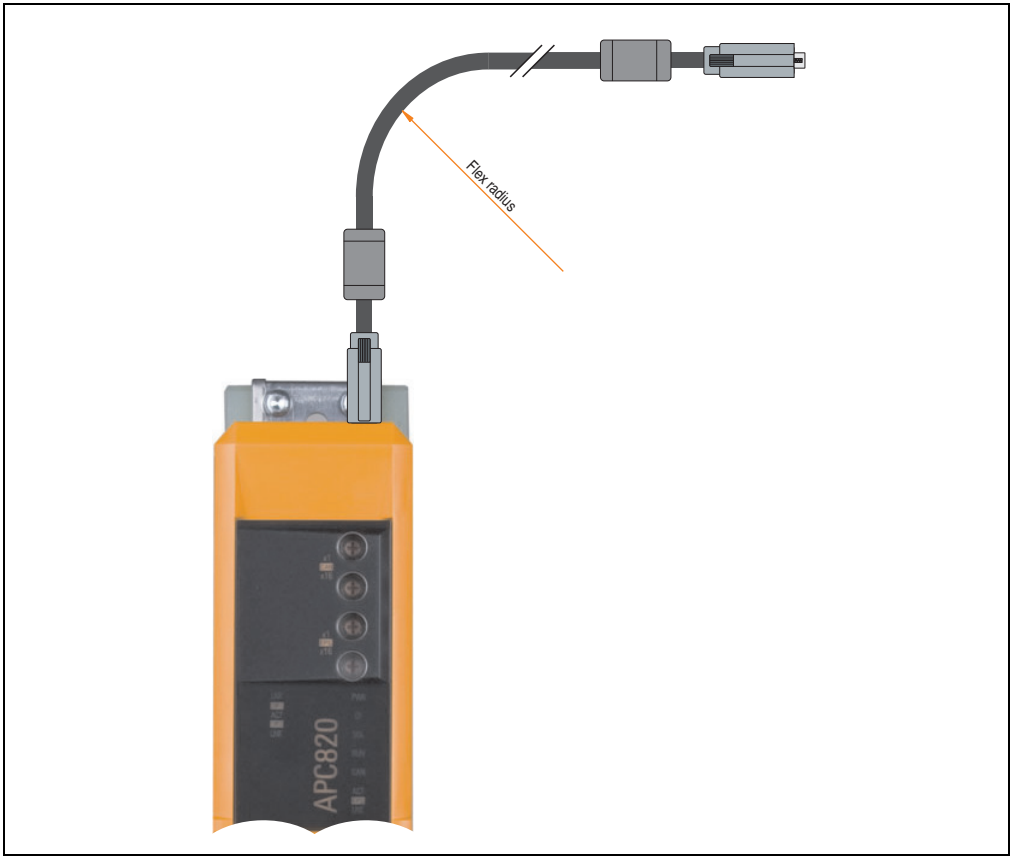


Figure 30: Flex radius - Cable connection

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. 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 APC820. The following questions will be answered:

- How are Automation Panel 900 devices connected to the monitor / panel output of the APC820, and what needs to be considered?
- How are Automation Panel 800 devices connected to the monitor / panel output of the APC820, 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?

3.1 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 58: Selecting the display units

3.2 One Automation Panel 900 via DVI

An Automation Panel 900 with max. SXGA resolution is connected to the integrated DVI interface. 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).

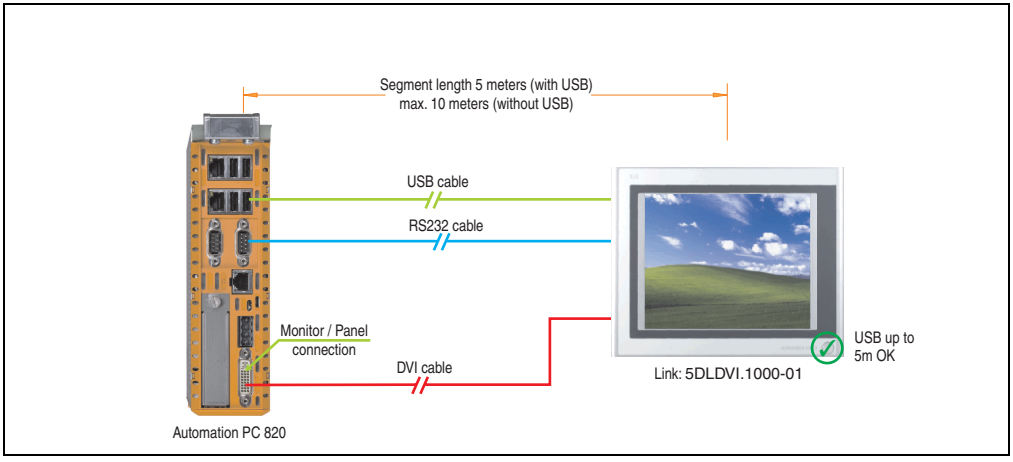


Figure 31: Configuration - One Automation Panel 900 via DVI

3.2.1 Basic system requirements

The following table displays the possible combinations for the APC820 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
	5PC820.SX01-00	5PC820.SX01-01	Resolution
5PC800.B945-00 / -10	✓	✓	Max. SXGA
5PC800.B945-01 / -11	✓	✓	Max. SXGA
5PC800.B945-02 / -12	✓	✓	Max. SXGA
5PC800.B945-03 / -13	✓	✓	Max. SXGA
5PC800.B945-04 / -14	✓	✓	Max. SXGA

Table 59: Possible combinations of system unit and CPU board

3.2.2 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 60: Link module for the configuration - One Automation Panel 900 via DVI

3.2.3 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 61: 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.

3.2.4 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 62: 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.

3.2.5 BIOS settings

No special BIOS settings are necessary for operation.

3.3 One Automation Panel 900 via SDL

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

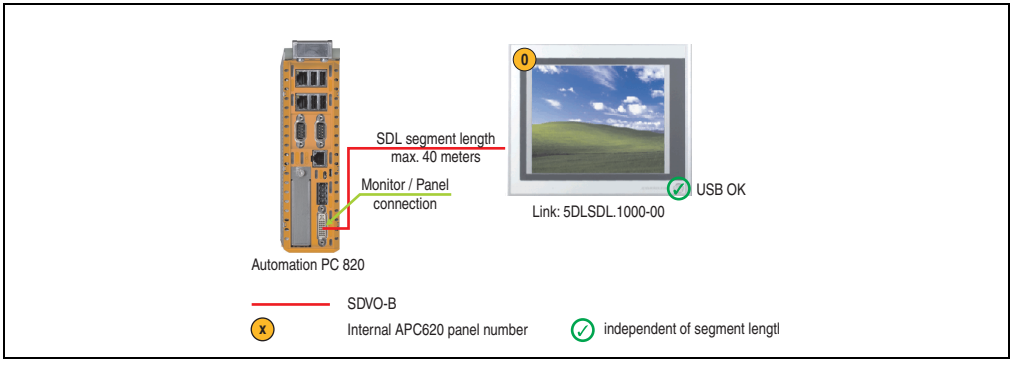


Figure 32: Configuration - One Automation Panel 900 via SDL

3.3.1 Basic system requirements

The following table displays the possible combinations for the APC820 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
	5PC820.SX01-00	5PC820.SX01-01	
5PC800.B945-00 / -10	✓	✓	Max. UXGA
5PC800.B945-01 / -11	✓	✓	Max. UXGA
5PC800.B945-02 / -12	✓	✓	Max. UXGA
5PC800.B945-03 / -13	✓	✓	Max. UXGA
5PC800.B945-04 / -14	✓	✓	Max. UXGA

Table 63: Possible combinations of system unit and CPU board

3.3.2 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

Table 64: Link module for the configuration - One Automation Panel 900 via SDL

3.3.3 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 65: 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 66: Segment lengths, resolutions and SDL cables

3.3.4 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").

3.4 One Automation Panel 800 via SDL

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

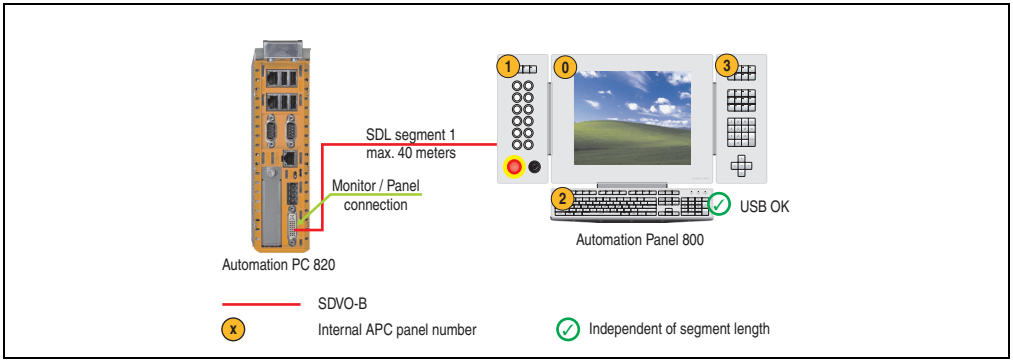


Figure 33: Configuration - One Automation Panel 800 via SDL

3.4.1 Basic system requirements

The following table displays the possible combinations for the APC820 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
	5PC820.SX01-00	5PC820.SX01-01	
5PC800.B945-00 / -10	✓	✓	Max. UXGA
5PC800.B945-01 / -11	✓	✓	Max. UXGA
5PC800.B945-02 / -12	✓	✓	Max. UXGA
5PC800.B945-03 / -13	✓	✓	Max. UXGA
5PC800.B945-04 / -14	✓	✓	Max. UXGA

Table 67: Possible combinations of system unit and CPU board

3.4.2 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

Table 68: Cables for SDL configurations

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

Table 68: Cables for SDL configurations (Forts.)

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 69: Segment lengths, resolutions and SDL cables

3.4.3 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").

3.5 One AP900 and one AP800 via SDL

One Automation Panel 900 and one Automation Panel 800 are connected to the integrated SDL interface 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).

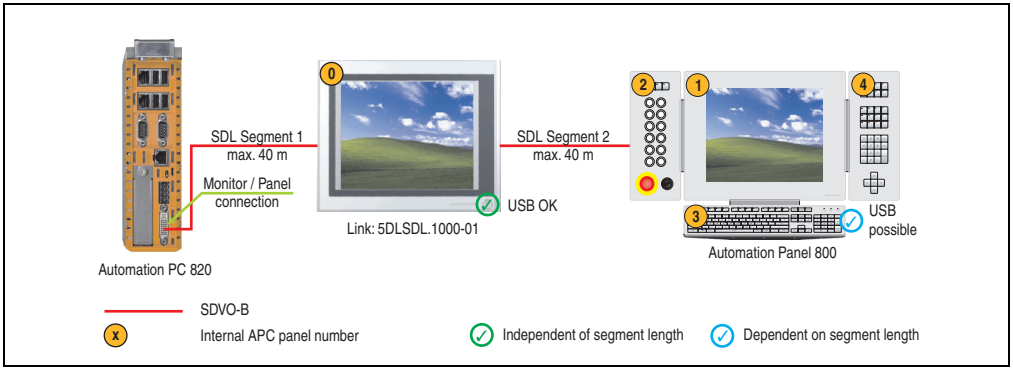


Figure 34: Configuration - One AP900 and one AP800 via SDL

3.5.1 Basic system requirements

The following table displays the possible combinations for the APC820 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
	5PC820.SX01-00	5PC820.SX01-01	Resolution
5PC800.B945-00 / -10	✓	✓	Max. UXGA
5PC800.B945-01 / -11	✓	✓	Max. UXGA
5PC800.B945-02 / -12	✓	✓	Max. UXGA
5PC800.B945-03 / -13	✓	✓	Max. UXGA
5PC800.B945-04 / -14	✓	✓	Max. UXGA

Table 70: Possible combinations of system unit and CPU board

3.5.2 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 71: Link modules for configuration - One AP900 and one AP800 via SDL

3.5.3 Cables

How to select an SDL cable for connecting the AP900 display to the AP900 display 3.3 "One Automation Panel 900 via SDL".

How to select an SDL cable for connecting the AP800 display to the AP900 display3.4 "One Automation Panel 800 via SDL".

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.

3.5.4 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").

3.6 Four Automation Panel 900 units via SDL

One Automation Panel 900 is connected to the integrated SDL interface 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).

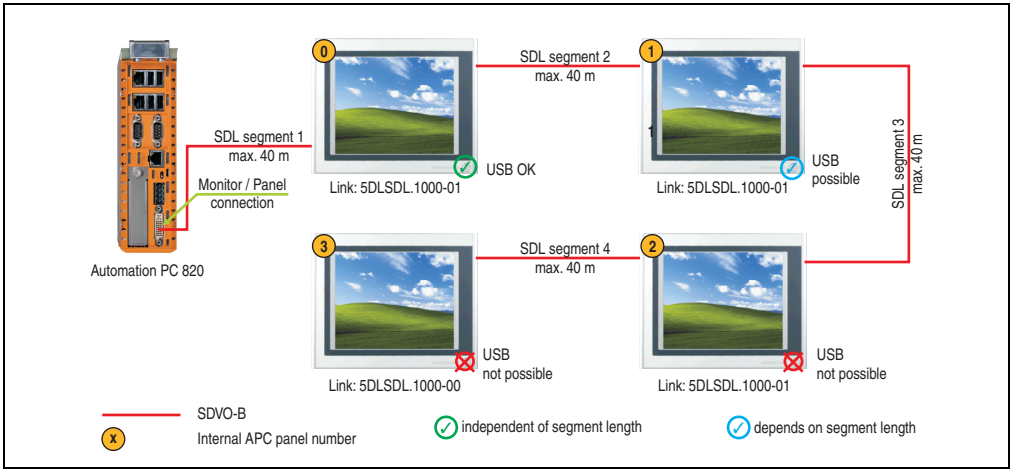


Figure 35: Configuration - Four Automation Panel 900 units via SDL

3.6.1 Basic system requirements

The following table displays the possible combinations for the APC820 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
	5PC820.SX01-00	5PC820.SX01-01	Resolution
5PC800.B945-00 / -10	✓	✓	Max. UXGA
5PC800.B945-01 / -11	✓	✓	Max. UXGA
5PC800.B945-02 / -12	✓	✓	Max. UXGA
5PC800.B945-03 / -13	✓	✓	Max. UXGA
5PC800.B945-04 / -14	✓	✓	Max. UXGA

Table 72: Possible combinations of system unit and CPU board

3.6.2 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 73: Link modules for the configuration: 4 Automation Panel 900 via SDL on 1 line

3.6.3 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 74: 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 75: Segment lengths, resolutions and SDL cables

3.6.4 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. Connection of USB peripheral devices

Warning!

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

4.1 Local on the APC820

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

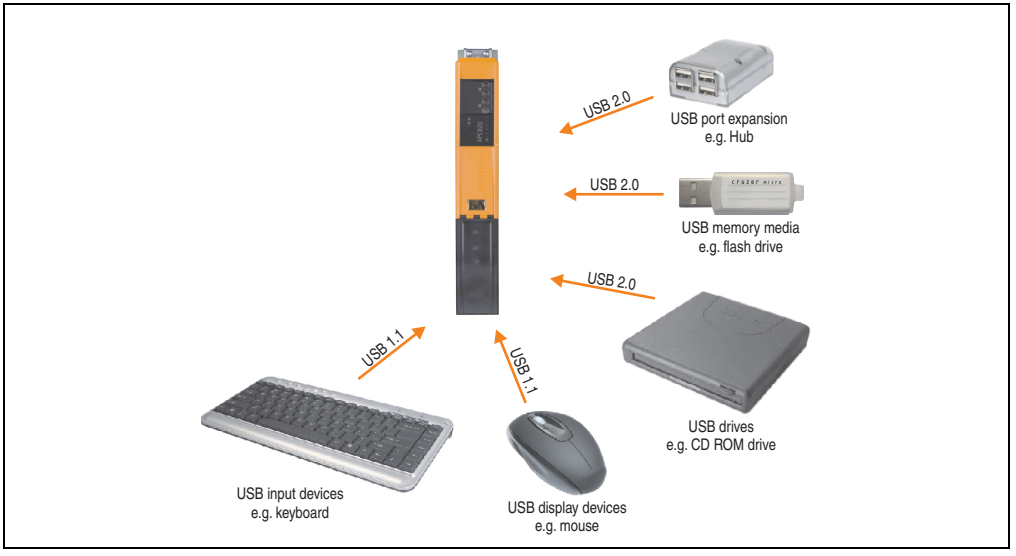


Figure 36: Local connection of USB peripheral devices on the APC820

4.2 Remote connection to Automation Panel 900 via DVI

Many different peripheral USB devices can be connected to the 2 or 3 USB interfaces 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.

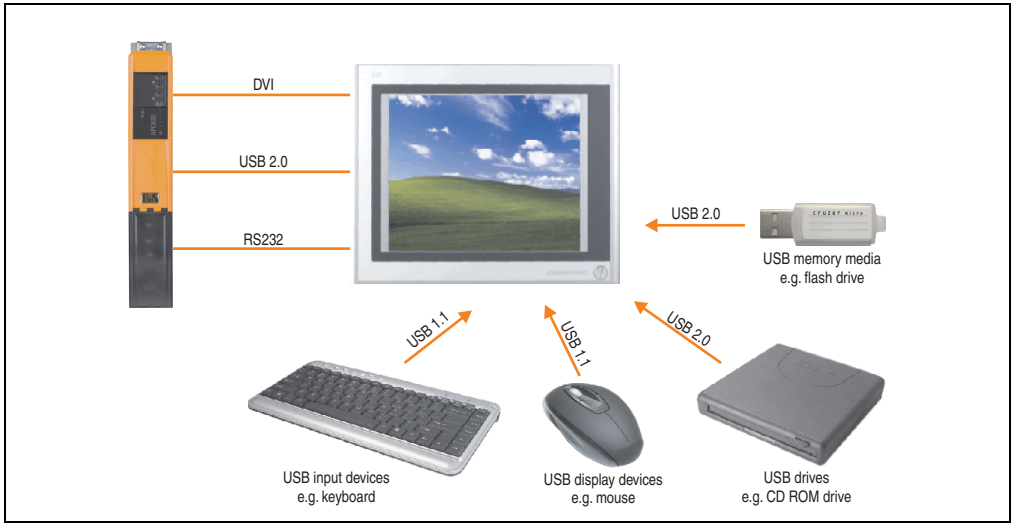


Figure 37: Remote connection of USB peripheral devices to the APC900 via DVI

4.3 Remote connection to Automation Panel 800/900 via SDL

Many different peripheral USB devices can be connected to the 2 or 3 USB interfaces 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.

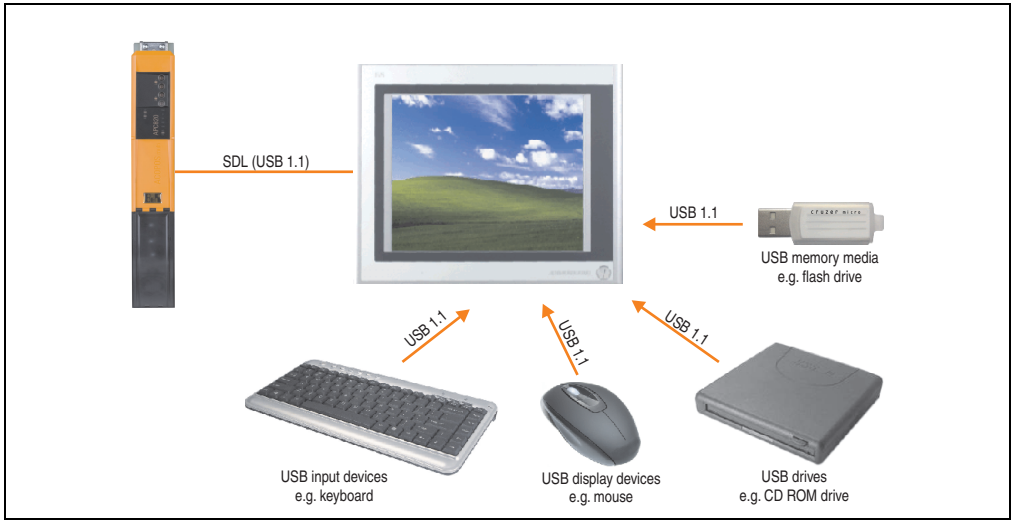


Figure 38: Remote connection of USB peripheral devices to the APC800/900 via SDL

5. Known problems / issues

The following issues for the APC820 devices are known:

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

Chapter 4 • Software

1. BIOS options

Information:

The following diagrams and BIOS menu items including descriptions refer to BIOS version 1.17. It is therefore possible that these diagrams and BIOS descriptions do not correspond with the installed BIOS version.

1.1 General information

BIOS stands for "Basic Input Output System". It is the most basic standardized communication between the user and the system (hardware). The BIOS system used in the Automation PC 820 system 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 APC820 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 820 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"

```
AMIBIOS(C)2005 American Megatrends, Inc.
[APC2R117] Bernecker + Rainer  Industrie-Elektronik H1.17
Serial Number     : 133453
CPU : Intel(R) Core(TM)2 CPU          L7400 @ 1.50GHz
 Speed : 1.50 Ghz

Press DEL to run Setup
Press F11 for BBS POPUP
The MCH is operating with DDR2-667/CL5 in Dual-Channel Interleaved Mode
Initializing USB Controllers .. Done
3064 MB OK
USB Device(s): 1 Keyboard, 1 Hub
Sec Master: SILICONSYSTEMS INC 4GB 240-0230
Auto-Detecting USB Mass Storage Devices ..
00 USB mass storage devices found an configured.
```

Figure 39: Boot screen

1.3 BIOS setup keys

The following keys are enabled during the POST:

Information:

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

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

Table 76: 945GME - Bios-relevant keys at POST

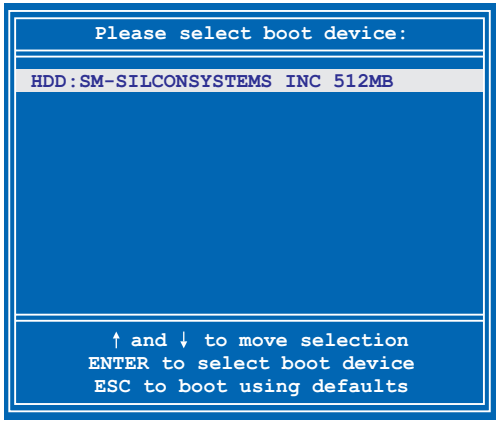
Keys	Function
F11	Cues the boot menu. Lists all bootable devices that are connected to the system. With cursor ↑ and cursor ↓ and by pressing <ENTER>, select the device from which will be booted. 
<Pause>	Pressing the <pause> key stops the POST. Press any other key to resume the POST.

Table 76: 945GME - 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 77: 945GME - Bios-relevant keys in the BIOS menu

1.4 Main

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

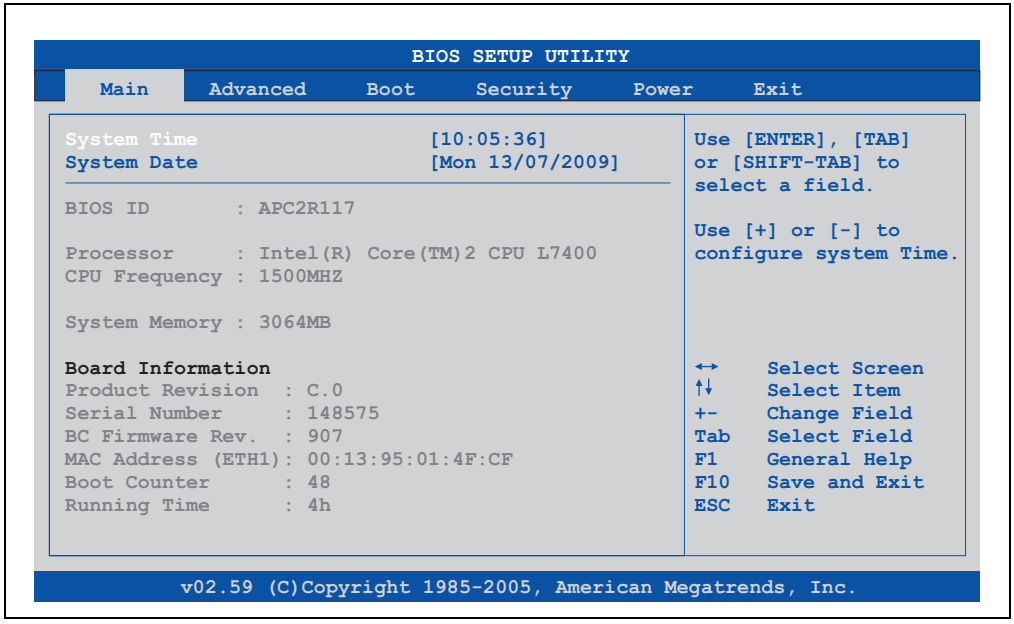


Figure 40: BIOS main menu

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	-

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	-

1.5 Advanced

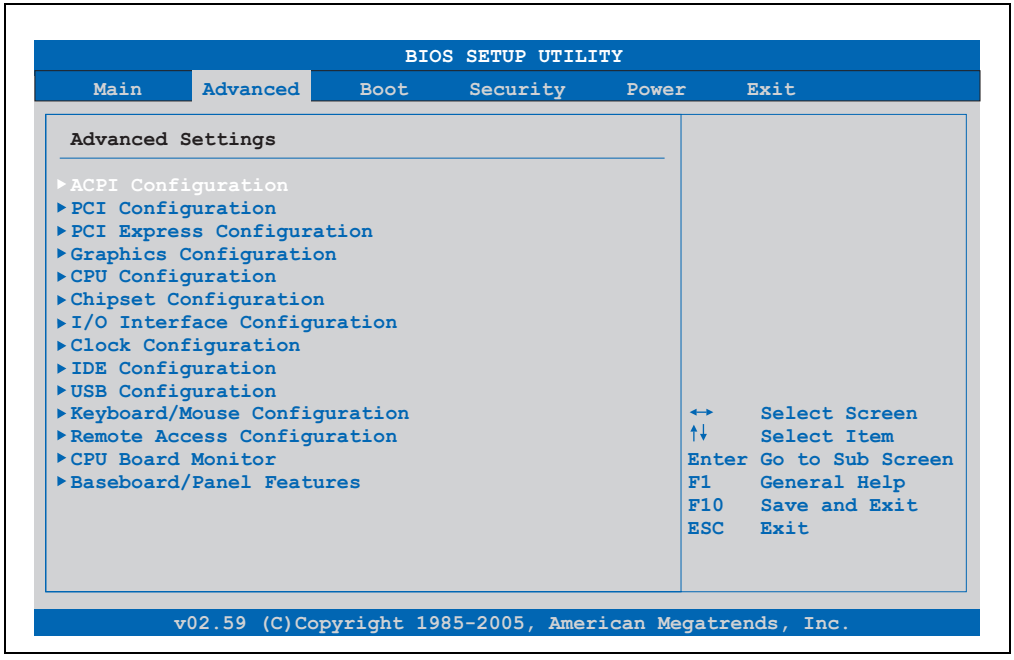


Figure 41: 945GME - Advanced Menu

BIOS setting	Meaning	Setting options	Effect
ACPI configuration	Configures the APCI devices.	Enter	Opens the submenu See "ACPI configuration", on page 117.
PCI Configuration	Configures PCI devices.	Enter	Opens the submenu See "PCI Configuration", on page 119.
PCI express configuration	Configures the PCI Express.	Enter	Opens the submenu See "PCI express configuration", on page 123.
Graphics configuration	Configures the graphics settings.	Enter	Opens the submenu See "Graphics configuration", on page 125.
CPU configuration	Configures the CPU settings.	Enter	Opens the submenu See "CPU configuration", on page 129.
Chipset configuration	Configures the chipset functions.	Enter	Opens the submenu See "Chipset configuration", on page 131.

Table 78: 945GME - Advanced Menu - Setting options

BIOS setting	Meaning	Setting options	Effect
I/O interface configuration	Configures the I/O devices.	Enter	Opens the submenu See "I/O interface configuration", on page 133.
Clock Configuration	Configures the clock settings.	Enter	Opens the submenu See "Clock Configuration", on page 134.
IDE Configuration	Configures the IDE functions.	Enter	Opens the submenu See "IDE Configuration", on page 135.
USB configuration	Configures the USB settings.	Enter	Opens the submenu See "USB configuration", on page 145.
Keyboard/mouse configuration	Configures the keyboard/mouse options.	Enter	Opens the submenu See "Keyboard/mouse configuration", on page 147.
Remote access configuration	Configures the remote access settings.	Enter	Opens the submenu See "Remote access configuration", on page 148.
CPU board monitor	Displays the current voltages and temperature of the processor in use.	Enter	Opens the submenu See "CPU board monitor", on page 150.
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 152.

Table 78: 945GME - Advanced Menu - Setting options (Forts.)

1.5.1 ACPI configuration

```
BIOS SETUP UTILITY
Advanced

ACPI Settings

ACPI Aware O/S                    [Yes]

ACPI Version Features             [ACPI v2.0]
ACPI APIC support                 [Enabled]
Suspend mode                      [S1 (POS)]
USB Device Wakeup from S3/S4      [Disabled]

Active Cooling Trip Point         [Disabled]
Passive Cooling Trip Point        [Disabled]
Critical Trip Point               [105°C]

Enable / Disable
ACPI support for
Operating System.

ENABLE: If OS
supports ACPI.

DISABLE: If OS
does not support
ACPI.

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

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```

Figure 42: 945GME - 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

Table 79: 945GME - Advanced ACPI configuration - Setting options

BIOS setting	Meaning	Setting options	Effect
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 79: 945GME - Advanced ACPI configuration - Setting options (Forts.)

1.5.2 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 devices 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 43: 945GME - 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 120
PCI Interrupt Routing	Configures PCI interrupt routing	Enter	Opens the submenu See "PCI Interrupt Routing", on page 121

Table 80: 945GME - Advanced PCI configuration - Setting options

PCI IRQ Resource Exclusion

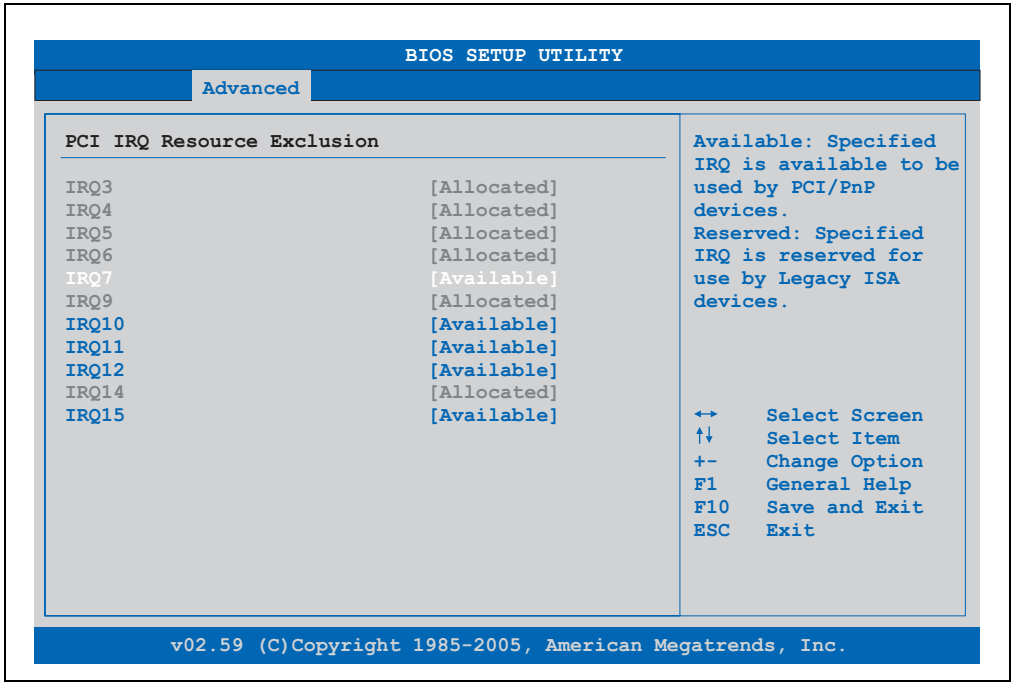

Figure 44: 945GME - Advanced PCI IRQ Resource Exclusion

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

Table 81: 945GME - Advanced PCI IRQ Resource Exclusion - Setting options

PCI Interrupt Routing

```
                          BIOS SETUP UTILITY
                          Advanced

PCI Interrupt Routing                                  Select fixed IRQ for
                                                       set AUTO to let the
PIRQ A (VGA,PCIEX0,ETH2,UHCI2)   [Auto]                BIOS and OS route an
PIRQ B (PCIEX1,ETH1)             [Auto]                IRQ to this line.
PIRQ C (PCIEX2,IF-Slot)          [7]
PIRQ D (SATA,UHCI1,SMB,PCIEX3)   [Auto]                Make sure that the
PIRQ E (INTD,PATA,UHCI3)         [Auto]                selected IRQ is not
PIRQ F (INTA,Powerlink)          [5]                   assigned to legacy IO.
PIRQ G (INTB,CAN,Timer)          [6]
PIRQ H (INTC,UHCI0,EHCI)         [Auto]

1st Exclusive PCI                [5]
2nd Exclusive PCI                [6]
3rd Exclusive PCI                [7]

PCIEXn : PCI Express Root Port n                       ←→    Select Screen
INTn   : External PCI Bus INTn Line                    ↑↓    Select Item
PATA   : Parallel ATA in Enhanced/Native Mode          +-    Change Option
SATA   : Serial ATA in Enhanced/Native Mode            F1    General Help
SMB    : System Management Bus Controller              F10   Save and Exit
                                                       ESC   Exit

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```

Figure 45: 945GME - Advanced PCI Interrupt Routing

BIOS setting	Meaning	Setting options	Effect
PIRQ A (VGA, PCIEX0, ETH2, UHCI2)	Option for setting the PIRQ A.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10.12	Manual assignment
PIRQ B (PCIEX1, ETH1)	Option for setting the PIRQ B.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10.12	Manual assignment.
PIRQ C (PCIEX2, IF slot)	Option for setting the PIRQ C.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10.12	Manual assignment.
PIRQ D (SATA, UHCI1,SMB, PCIEX3)	Option for setting the PIRQ D.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10.12	Manual assignment.
PIRQ E (INTD, PATA, UHCI3)	Option for setting the PIRQ E.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10.12	Manual assignment.

Table 82: 945GME - Advanced PCI Interrupt Routing - Setting options

BIOS setting	Meaning	Setting options	Effect
PIRQ F (INTA, Powerlink)	Option for setting the PIRQ F.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10.12	Manual assignment.
PIRQ G (INTB, CAN, Timer)	Option for setting the PIRQ G.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10.12	Manual assignment.
PIRQ H (INTC, UHCI0, EHCI)	Option for setting the PIRQ H.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10.12	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.
3rd 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 three PIRQs are set manually.**	None	No interrupt is assigned.
			Assigns the PIRQ as 3rd exclusive PCI IRQ.

Table 82: 945GME - Advanced PCI Interrupt Routing - Setting options (Forts.)

1.5.3 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 (IF-Slot)        [Auto]
  PCIE Port 3                  [Auto]
  PCIE Port 4 (ETH2)           [Auto]
  PCIE Port 5 (ETH1)           [Auto]
  PCIE High Priority Port      [Disabled]

Res. PCIE Hotplug Resources    [No]
                                             ←→    Select Screen
  PCIE Port 0 IOxAPIC Enable   [Disabled]    ↑↓    Select Item
  PCIE Port 1 IOxAPIC Enable   [Disabled]    +-    Change Option
  PCIE Port 2 IOxAPIC Enable   [Disabled]    F1    General Help
  PCIE Port 3 IOxAPIC Enable   [Disabled]    F10   Save and Exit
                                             ESC   Exit

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```

Figure 46: 945GME - 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 83: 945GME - Advanced PCI Express Configuration - Setting options

BIOS setting	Meaning	Setting options	Effect
PCIE Port 2 (IF slot)	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 Port 5 (ETH1)	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.

Table 83: 945GME - Advanced PCI Express Configuration - Setting options (Forts.)

BIOS setting	Meaning	Setting options	Effect
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.
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 83: 945GME - Advanced PCI Express Configuration - Setting options (Forts.)

1.5.4 Graphics configuration

```
                    BIOS SETUP UTILITY
                    Advanced

Graphics Configuration                    Select primary video
                                          adapter to be used
Primary Video Device          [Internal VGA]  during boot up.

Internal Graphics Mode Select [Enabled, 8MB]
DVMT Mode Select              [DVMT Mode]
  DVMT/FIXED Memory           [128MB]

Boot Display Device           [Auto]
Boot Display Preference       [SDVO-B SDVO-C LFP]
Local Flat Panel Type         [Auto]
Local Flat Panel Scaling      [Centering]
                                          ←→    Select Screen
SDVO Port B Device            [DVI]       ↑↓    Select Item
SDVO Port C Device            [None]      +-    Change Option
                                          F1    General Help
SDVO/DVI Hotplug Support      [Enabled]   F10   Save and Exit
Display Mode Persistence      [Enabled]   ESC   Exit

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```

Figure 47: 945GME - Advanced Graphics Configuration

BIOS setting	Meaning	Setting options	Effect
Primary Video Device	Option for selecting the primary video device.	Internal VGA	The internal graphics chip on the CPU board is used as video device (monitor / panel connection).
		PCI / Int. VGA	The graphics chip of a connected graphics card is used as video device.
Internal Graphics Mode Select	Option for setting the memory size that can be used for the internal graphics controller.	Disabled	No reservation - Disables the graphics controller.
		Enabled, 1MB	1MB main memory provided.
		Enabled, 8MB	8MB main memory provided.
DVMT Mode Select	Option for determining the DVMT mode (Dynamic Video Memory Technology) of the DVMT graphics driver.	Fixed Mode	A fixed amount of memory is allocated to the graphics chip, which is no longer available to the PC.
		DVMT Mode	Memory consumption is controlled dynamically by the DVMT graphics driver. Only the amount of memory that is required is used.
		Combo Mode	The DVMT graphics driver reserves at least 64MB, but can use up to 224MB if necessary.
DVMT/FIXED Memory	Option for setting the amount of memory used for the DVMT mode.	64MB	64MB of main memory can be used.
		128MB	128MB of main memory can be used.
		Maximum DVMT	The remaining available main memory can be used.
Boot Display Device	Determines which video channel should be enabled for a video device during the boot procedure.	Auto	Automatic selection.
		CRT only	Only use the CRT (Cathode Ray Tube) channel.
		SDVO only	Only use the SDVO (Serial Digital Video Out) channel.
		CRT + SDVO	Use CRT and SDVO channel.
		LFP only	Only use the LFP (Local Flat Panel) channel.
		CRT + LFP	Use CRT + LFP channel.
Boot Display Preference	This option determines the order in which the devices on the connected channels LFP and SDVO should be checked and booted. **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.

Table 84: 945GME - Advanced Graphics Configuration - Setting options

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 (004h)	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.
SDVO Port B Device	Option for selecting the video device that is connected to the SDVO Port B.	None	No video device connected.
		DVI	Video signal output is optimized for a DVI-compatible video device.
		TV	Video signal output is optimized for a TV-compatible video device.
		CRT	Video signal output is optimized for a CRT-compatible video device.
		LVDS	Video signal output is optimized for a LVDS-compatible video device.
		DVI-Analog	Video signal output is optimized for an analog DVI-compatible video device.

Table 84: 945GME - Advanced Graphics Configuration - Setting options (Forts.)

BIOS setting	Meaning	Setting options	Effect
SDVO Port C Device	Option for selecting the video device that is connected to the SDVO Port A.	None	No video device connected.
		DVI	Video signal output is optimized for a DVI-compatible video device.
		TV	Video signal output is optimized for a TV-compatible video device.
		CRT	Video signal output is optimized for a CRT-compatible video device.
		LVDS	Video signal output is optimized for a LVDS-compatible video device.
		DVI-Analog	Video signal output is optimized for an analog 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 84: 945GME - Advanced Graphics Configuration - Setting options (Forts.)

1.5.5 CPU configuration

```
                          BIOS SETUP UTILITY
                          Advanced

Configure advanced CPU settings                  Select the revsion
Module Version -13.04                            of the multi processor
                                                 support interface that
Manufacturer:Intel                               should be offered by
Brand String:Intel(R) Core(TM)2 CPU        L7400 the BIOS.
Frequency   :1.50GHz
FSB Speed   :667MHz

Cache L1    :64 KB
Cache L2    :4096 KB


MPS Revision                  [1.4]              ←→    Select Screen
Max CPUID Value Limit         [Disabled]         ↑↓    Select Item
Execute Disable Bit           [Enabled]          +-    Change Option
Core Multi-Processing         [Enabled]          F1    General Help
Intel(R) SpeedStep(tm) tech.  [Automatic]        F10   Save and Exit
Max. CPU Frequency            [1500 MHz]         ESC   Exit
    C1 Config.                [Standard]
    C2 Config.                [Disabled]
    C3 Config.                [Disabled]
    C4 Config.                [Disabled]

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```

Figure 48: 945GME - 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.
Execute Disable Bit	Option for enabling or disabling hardware support for prevention of data execution.	Enabled	Enables this function.
		Disabled	Disables this function.
Core Multi-Processing	When using a Dual Core processor, this option can be used to disable a core.	Enabled	Both cores are used in a Dual Core processor.
		Disabled	Only one core is used in a Dual Core processor.

Table 85: 945GME - Advanced CPU Configuration - Setting options

BIOS setting	Meaning	Setting options	Effect
Intel(R) Speedster(TM) tech.	Option for controlling the Intel(R) SpeedStep(TM) technology. The processor clock speed is increased or decreased according to the amount of calculations that must be made. As a result, the power consumption depends largely on the processor load. **Information:** **This option is not available for Celeron M processors.**	Automatic	The processor speed is regulated by the operating system.
		Maximum speed	The processor speed is set to a maximum.
		Minimum speed	The processor speed is set to a minimum.
		Disabled	Disables SpeedStep technology.
Max. CPU frequency	Option for setting the maximum processor speed if the value "Automatic" or "Maximum Speed" is set for the option "Intel(R) SpeedStep(TM) tech.". **Information:** **This option is not available for Celeron M processors.**	xxxx MHz	The processor speed is limited to the set value.
C1 Config	Power Management in the Intel Core Duo processors.	Standard	Standard C1 support.
		Enhanced	Enhanced C1 support.
C2 Config	Power Management in the Intel Core Duo processors.	Standard	Standard C2 support.
		Enhanced	Enhanced C2 support.
		Disabled	Disabled C2 support.
C3 Config	Power Management in the Intel Core Duo processors.	Standard	Standard C3 support.
		Enhanced	Enhanced C3 support.
		Disabled	Disabled C3 support.
C4 Config	Power Management in the Intel Core Duo processors.	Standard	Standard C4 support.
		Enhanced	Enhanced C4 support.
		Disabled	Disabled C4 support.

Table 85: 945GME - Advanced CPU Configuration - Setting options (Forts.)

1.5.6 Chipset configuration

```
BIOS SETUP UTILITY
Advanced

Advanced Chipset Settings                    Options

DRAM Frequency                [Auto]         Auto
DRAM Refresh Rate             [Auto]         Auto
Memory Hole                   [Disabled]     400 MHz
DIMM Thermal Control          [Disabled]     533 MHz
DT in SPD                     [Disabled]     667 MHz
TS on DIMM                    [Disabled]

High Precision Event Timer    [Disabled]
IOAPIC                        [Enabled]
APIC ACPI SCI IRQ             [Disabled]
C4 On C3                      [Disabled]     ←→   Select Screen
                                             ↑↓   Select Item
                                             +-   Change Option
                                             F1   General Help
                                             F10  Save and Exit
                                             ESC  Exit

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```

Figure 49: 945GME Advanced Chipset Configuration

BIOS setting	Meaning	Setting options	Effect
DRAM Frequency	Option for setting the RAM frequency.	Auto	Frequency set automatically by the BIOS.
		400, 533, 667 MHz	Desired clock frequency set manually.
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 an APC820.	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.
DT in SPD	Option to determine whether the GMCH (Graphics and Memory Controller Hub) supports DT (Delta Temperature) in the SPD (Serial Presence Detect) Management Algorithm of the DIMM module.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 86: 945GME Advanced Chipset setting options

BIOS setting	Meaning	Setting options	Effect
TS on DIMM	Option to determine whether the GMCH (Graphics and Memory Controller Hub) supports TS (Thermal Sensor) in the Thermal Management Algorithm of the DIMM module.	Disabled	Disables this function.
		Enabled	Enables this function.
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.
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.
C4 On C3	Fine-tunes the power saving function on an ACPI operating system.	Disabled	
		Enabled	Processor is needed in C4 if the operating system is initiated in a C3 state.

Table 86: 945GME Advanced Chipset setting options

1.5.7 I/O interface configuration

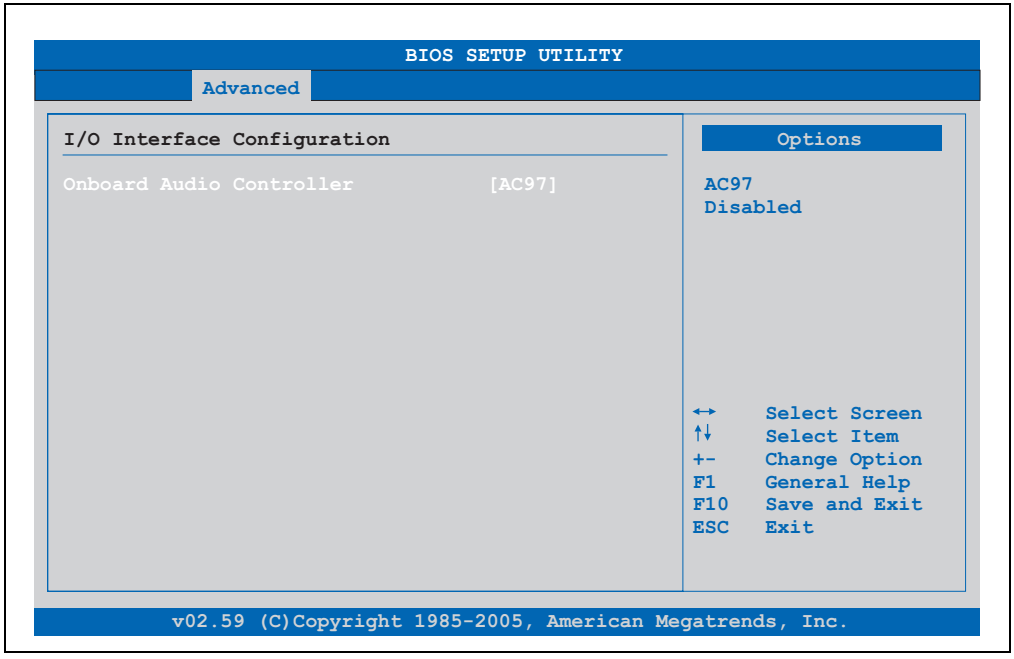

Figure 50: 945GME Advanced I/O Interface Configuration

BIOS setting	Meaning	Setting options	Effect
Onboard Audio Controller	For turning the Onboard AC'97 audio controller on and off.	AC97	Enables AC'97 sound.
		Disabled	Disables AC'97 sound.

Table 87: 945GME Advanced I/O Interface Configuration setting options

1.5.8 Clock Configuration

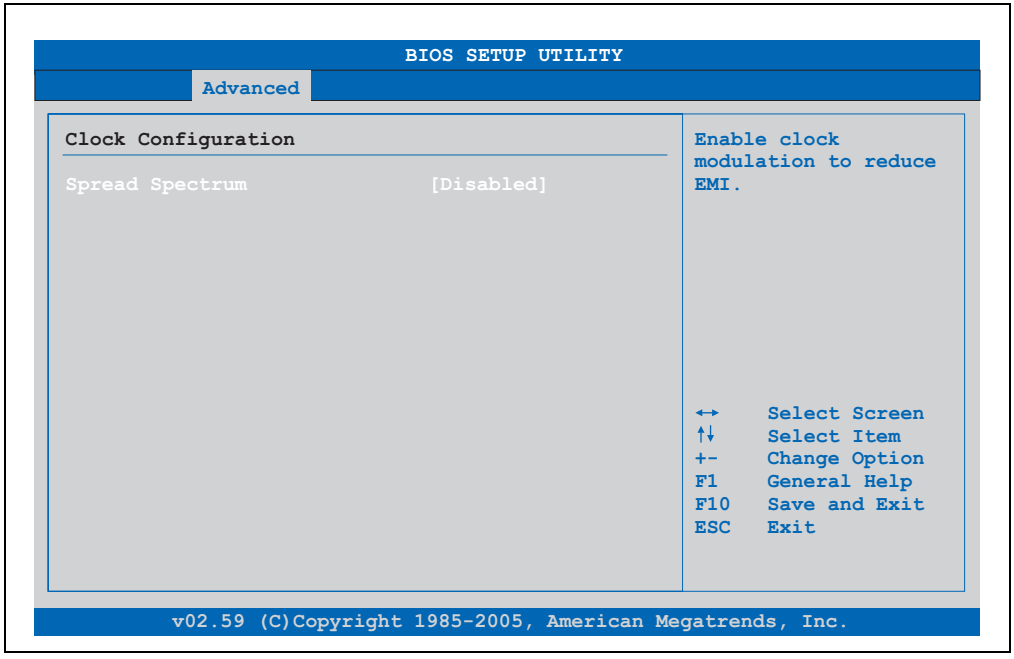

Figure 51: 945GME Advanced Clock Configuration

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 88: 945GME Advanced Clock Configuration setting options

1.5.9 IDE Configuration

```
BIOS SETUP UTILITY
Advanced

IDE Configuration

ATA/IDE Configuration          [Compatible]
  Legacy IDE Channels          [SATA Pri, PATA Sec]

▶ Primary IDE Master             : [Not Detected]
▶ Primary IDE Slave              : [Not Detected]
▶ Secondary IDE Master           : [Not Detected]
▶ Secondary IDE Slave            : [Not Detected]

Hard Disk Write Protect        [Disabled]
IDE Detect Time Out (Sec)      [35]
ATA(PI) 80Pin Cable Detection  [Host & Device]

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

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```

Figure 52: 945GME Advanced IDE Configuration

BIOS setting	Meaning	Setting options	Effect
ATA/IDE Configuration	Option for configuring the integrated PATA and SATA controller.	Compatible	Both controllers run in Legacy or Compatible Mode.
		Disabled	Both controllers disabled.
		Enhanced	Both controllers run in Enhanced or Native Mode.
Legacy IDE Channels	Option for configuring the Legacy IDE channels in Compatible Mode.	SATA Pri, PATA Sec	SATA drives are address primarily and PATA drive secondarily.
		SATA only	Only use SATA drives.
		PATA only	Only use PATA drives.
Primary IDE Master	The drive in the system that is connected to the IDE primary master port is configured here.	Enter	Opens the submenu See "Primary IDE Master", on page 137
Primary IDE slave	The drive in the system that is connected to the IDE primary slave port is configured here.	Enter	Opens the submenu See "Primary IDE slave", on page 139
Secondary IDE Master	The drive in the system that is connected to the IDE secondary master port is configured here.	Enter	Opens the submenu See "Secondary IDE Master", on page 141

Table 89: 945GME Advanced IDE Configuration setting options

BIOS setting	Meaning	Setting options	Effect
Secondary IDE slave	The drive in the system that is connected to the IDE secondary slave port is configured here.	Enter	Opens the submenu See "Secondary IDE slave", on page 143
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.	0, 5, 10, 15, 20, 25, 30, 35	Time setting in seconds.
ATA(PI) 80Pin Cable Detection	Detects whether an 80 pin cable is connected to the drive, the controller or to both. **Information:** **This option is not available on the APC820 CPU board. Therefore this setting is not relevant.**	Host & device	Using both IDE controllers (motherboard, disk drive).
		Host	IDE controller motherboard used.
		Device	IDE disk drive controller used.

Table 89: 945GME Advanced IDE Configuration setting options

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 53: 945GME - 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 90: 945GME - 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 APC820. 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 data transfer.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 90: 945GME - Primary IDE Master - Setting options (Forts.)

Primary IDE slave

```
BIOS SETUP UTILITY
Advanced

Primary IDE Slave                          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 54: 945GME - Primary IDE Slave

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 91: 945GME - Primary IDE Slave - 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 APC820. 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 data transfer.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 91: 945GME - Primary IDE Slave - Setting options (Forts.)

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 55: 945GME - Secondary 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 92: 945GME - 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 APC820. 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 data transfer.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 92: 945GME - Secondary IDE Master - Setting options (Forts.)

Secondary IDE slave

```
BIOS SETUP UTILITY
Advanced

Secondary IDE Slave                          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 56: 945GME - Secondary IDE Slave

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 93: 945GME - Secondary IDE Slave - 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 APC820. 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 data transfer.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 93: 945GME - Secondary IDE Slave - Setting options (Forts.)

1.5.10 USB configuration

```
BIOS SETUP UTILITY
Advanced

USB Configuration                                  Options

USB Devices Enabled  :                             Disabled
  1 Keyboard, 1 Hub                                2 USB Ports
                                                   4 USB Ports
USB Functions                  [8 USB Ports]       6 USB Ports
USB 2.0 Controller             [Enabled]           8 USB Ports

Legacy USB Support             [Enabled]
USB Legacy POST-Always         [Enabled]
USB Keyboard Legacy Support    [Enabled]
USB Mouse Legacy Support       [Disabled]
USB Storage Device Support     [Enabled]           ←→    Select Screen
Port 64/60 Emulation           [Disabled]          ↑↓    Select Item
USB 2.0 Controller Mode        [HiSpeed]           +-    Change Option
BIOS EHCI Hand-Off             [Disabled]          F1    General Help
USB Beep Message               [Enabled]           F10   Save and Exit
USB Stick Default Emulation    [Hard Disk]         ESC   Exit
USB Mass Storage Reset Delay   [20 Sec]

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```

Figure 57: 945GME - Advanced USB Configuration

BIOS setting	Meaning	Setting options	Effect
USB Functions	USB ports can be enabled/disabled here.	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 interfaces run in USB 2.0 mode.
		Disabled	All USB interfaces run in USB 1.1 mode.
Legacy USB Support	Legacy USB support can be enabled/disabled here. USB interfaces 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.

Table 94: 945GME - Advanced USB Configuration - Setting options

BIOS setting	Meaning	Setting options	Effect
USB Legacy POST-Always	Option to enable Legacy USB Support during the POST (Power On Self Test). **Information:** **Only one setting can be made if the option "Legacy USB Support" is enabled.**	Enabled	The BIOS Setup can be called up during the POST using a USB keyboard.
		Disabled	Disables this function.
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.
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 94: 945GME - Advanced USB Configuration - Setting options (Forts.)

1.5.11 Keyboard/mouse configuration

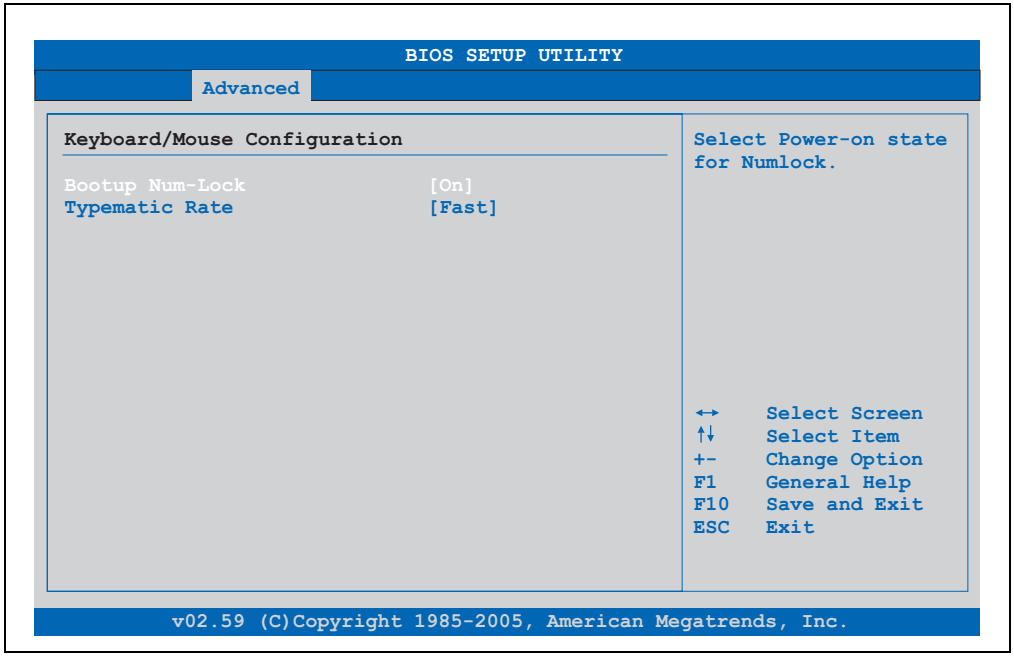

Figure 58: 945GME Advanced Keyboard/Mouse Configuration

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 enabled.
		On	Numeric keypad is enabled.
Typematic rate	The key repeat function is set here.	Slow	Slow key repeat.
		Fast	Fast key repeat.

Table 95: 945GME Advanced Keyboard/Mouse Configuration setting options

1.5.12 Remote access configuration

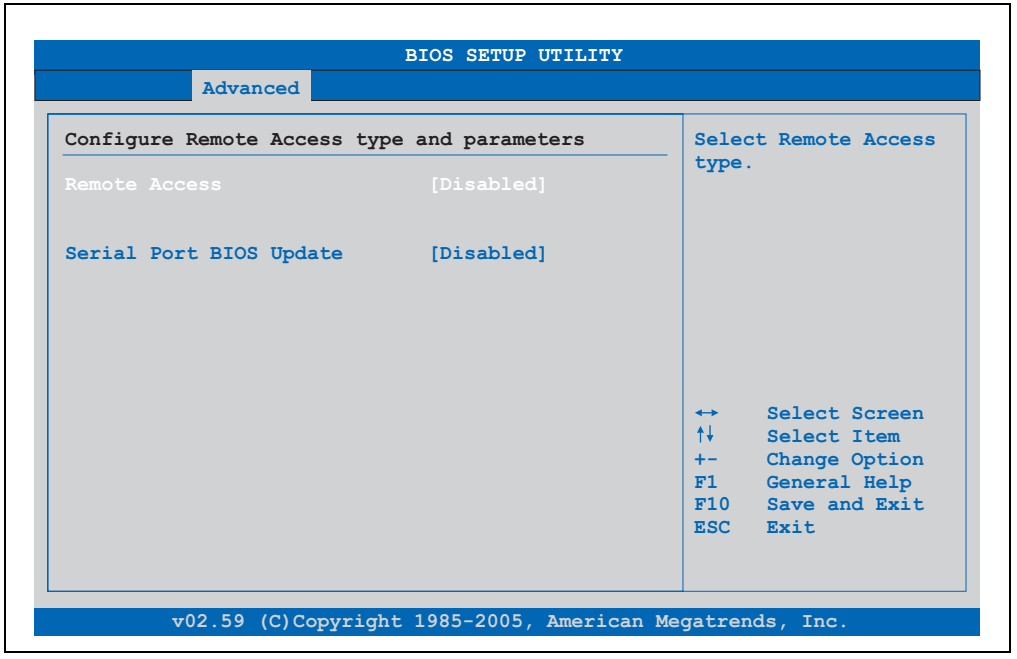

Figure 59: 945GME - Advanced Remote Access Configuration

BIOS setting	Meaning	Setting options	Effect
Remote access	The remote access function can be enabled/disabled here.	Disabled	Disables this function.
		Enabled	Enables this function.
Serial port number	The serial interface can be set using this option, as long as disabled is not entered in the *remote access* field.	COM1	Enables the COM1 interface as remote access interface.
		COM2	Enables the COM2 interface as remote access interface.
		COM 3	Enables the COM3 interface as remote access interface.
Base address, IRQ	Serial connection display for the logical address and interrupt, as long as disabled is not entered in the *remote access* field.	None	-
Serial port mode	The serial interface transfer rate is defined here, as long as disabled is not entered in the *remote access* field.	115200 8,n,1 57600 8,n,1 38400 8,n,1 19200 8,n,1 09600 8,n,1	Value set manually.

Table 96: 945GME - Advanced Remote Access Configuration - Setting options

BIOS setting	Meaning	Setting options	Effect
Flow control	This setting determines how the transfer is controlled via the interface. **Information:** **The setting must be the same on the terminal and the server.**	None	The interface is operated without transfer control.
		Hardware	The interface transfer control is carried out through hardware. This mode must be supported by a cable.
		Software	The interface transfer control is carried out through software.
Redirection after BIOS POST	The redirection after start up can be set here, as long as disabled is not entered in the *remote access* field.	Disabled	The redirection is switched off after start up.
		Boot loader	Redirection is enabled during system start up and charging.
		Always	Redirection is always enabled.
Terminal type	The type of connection can be chosen here, as long as disabled is not entered in the *remote access* field.	ANSI, VT100, VT-UTF8	Manual configuration of the connection type.
VT-UTF8 Combo Key Support	With this option, the VT-UTF8 Combo Key Support for the ANSI and VT100 connections can be enabled, as long as disabled is not entered in the *remote access* field.	Disabled	Disables this function.
		Enabled	Enables this function.
Sredir Memory Display Delay	The memory output delay can be set using this option, as long as disabled is not entered in the *remote access* field (Sredir -> serial redirection).	No delay	No delay.
		Delay 1 sec, Delay 2 sec, Delay 4 sec	Value set manually.
Serial port BIOS update	During system start up, the update is loaded via the serial interface in the processor. **Information:** **If this option is disabled, the boot time is reduced.**	Disabled	Disables this function.
		Enabled	Enables this function.

Table 96: 945GME - Advanced Remote Access Configuration - Setting options (Forts.)

1.5.13 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.

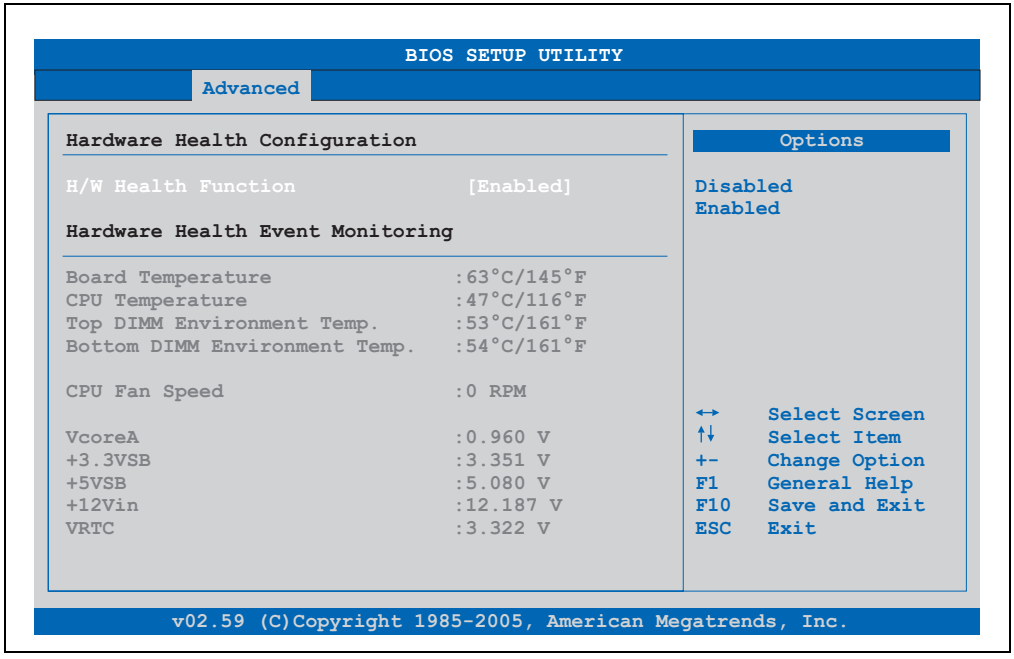

Figure 60: 945GME Advanced CPU Board Monitor

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 in degrees Celsius and Fahrenheit.	None	-

Table 97: 945GME - Advanced Remote Access Configuration - Setting options

BIOS setting	Meaning	Setting options	Effect
Bottom DIMM Environment Temp.	Displays the temperature of the second DRAM module in degrees Celsius and Fahrenheit.	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 97: 945GME - Advanced Remote Access Configuration - Setting options (Forts.)

1.5.14 Main Board/Panel Features

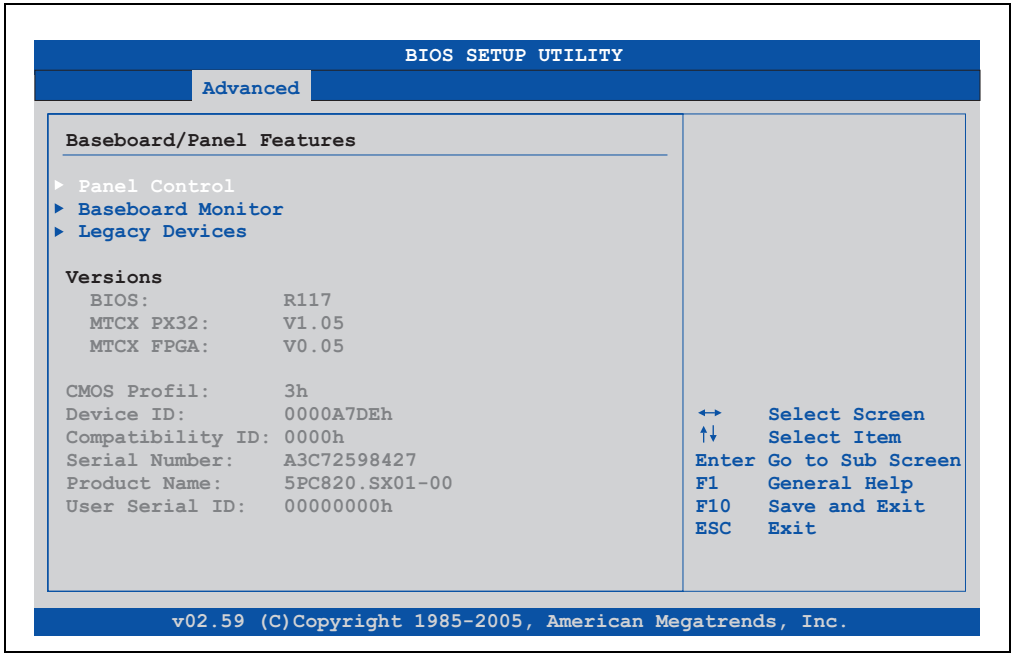

Figure 61: 945GME - Advanced Baseboard/Panel Features

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 153
Main board monitor	Display of various temperatures and fan speeds.	Enter	Opens the submenu See "Main board monitor", on page 154
Legacy devices	Special settings for the interface can be changed here.	Enter	Opens the submenu See "Legacy devices", on page 156
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	-

Table 98: 945GME - Advanced Baseboard/Panel Features - Setting options

BIOS setting	Meaning	Setting options	Effect
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 98: 945GME - Advanced Baseboard/Panel Features - Setting options (Forts.)

Panel control

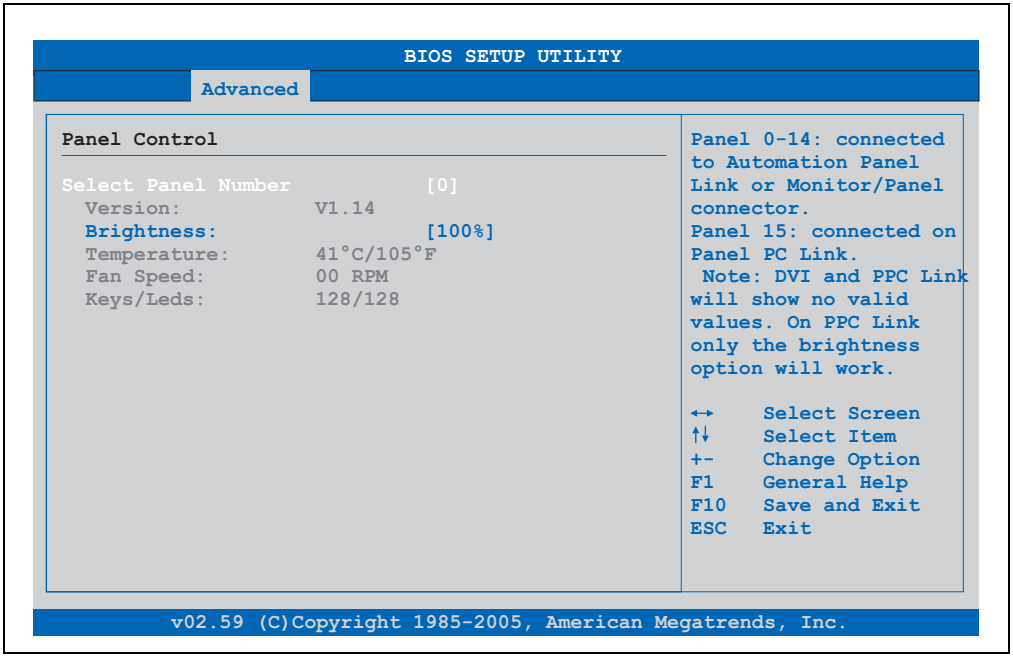

Figure 62: 945GME - Panel Control

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>).

Table 99: 945GME - Panel Control - Setting options

BIOS setting	Meaning	Setting options	Effect
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 99: 945GME - Panel Control - Setting options (Forts.)

Main board monitor

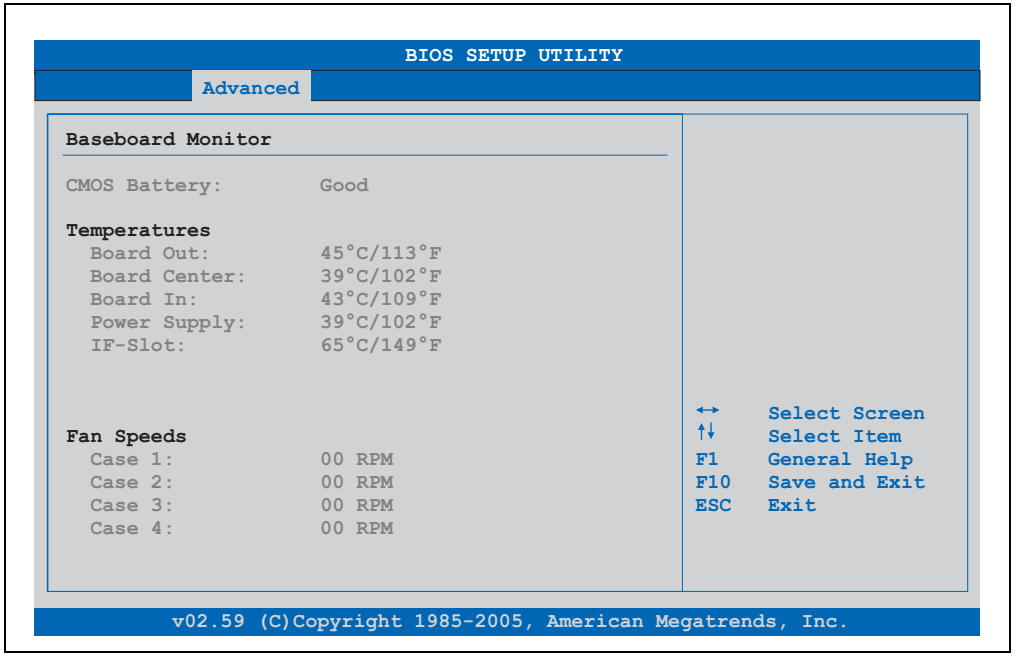

Figure 63: 945GME Baseboard Monitor

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 Out	Displays the temperature in the upper part of the baseboard in degrees Celsius and Fahrenheit.	None	-
Baseboard Center	Displays the temperature in the center of the baseboard in degrees Celsius and Fahrenheit.	None	-

Table 100: 945GME Baseboard Monitor setting options

BIOS setting	Meaning	Setting options	Effect
Baseboard In	Displays the temperature in the lower part of the baseboard in degrees Celsius and Fahrenheit.	None	-
Power supply	Displays the temperature in the power supply in degrees Celsius and Fahrenheit.	None	-
IF slot	Displays the temperature near the IF slot in degrees Celsius and Fahrenheit.	None	-
Case 1	Displays the fan speed of housing fan 1.	None	-
Case 2	Displays the fan speed of housing fan 2.	None	-
Case 3	Displays the fan speed of housing fan 3. **Information:** **The APC820 only has 2 housing fans, which means this value is not relevant.**	None	-
Case 4	Displays the fan speed of housing fan 4. **Information:** **The APC820 only has 2 housing fans, which means this value is not relevant.**	None	-

Table 100: 945GME Baseboard Monitor setting options

Legacy devices

```
BIOS SETUP UTILITY
Advanced

Legacy Devices                                  Enable/Disable the
                                                COM 1 port.
COM A:                          [Enabled]
  Base I/O address:             [3F8]
  Interrupt:                    [IRQ 4]
COM B:                          [Enabled]
  Base I/O address:             [2F8]
  Interrupt:                    [IRQ 3]
COM C:                          [Disabled]

                                                ←→    Select Item
                                                ↑↓    Select Screen
Hardware Security Key:          [Enabled]       +-    Change Option
  Base I/O address              [378]           F1    General Help
                                                F10   Save and Exit
ETH2 LAN controller:            [Enabled]       ESC   Exit
ETH2 MAC Address:               00:60:65:07:90:BC

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```

Figure 64: 945GME - 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.
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.

Table 101: 945GME - Legacy Devices - Setting options

BIOS setting	Meaning	Setting options	Effect
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.
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 101: 945GME - Legacy Devices - Setting options (Forts.)

1.6 Boot

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

Boot Priority Selection        [Type Based]

Boot Device Priority

1st Boot Device                [Primary Master]
2nd Boot Device                [Primary Slave]
3rd Boot Device                [USB Floppy]
4th Boot Device                [USB Removable Devi]
5th Boot Device                [USB Harddisk]
6th Boot Device                [USB CDROM]
7th Boot Device                [Secondary Master]
8th Boot Device                [Secondary Slave]

Boot Settings Configuration

Quick Boot                     [Enabled]
Quiet Boot                     [Disabled]
Automatic Boot List Retry      [Disabled]
AddOn ROM Display Mode         [Keep Current]
Halt On Error                  [Disabled]
Hit ´DEL´ Message Display      [Enabled]
Interrupt 19 Capture           [Disabled]
PXE Boot to LAN (ETH1)         [Disabled]
Slide-In 2 Option-ROM          [Disabled]
Power Loss Control             [Turn On]

The device based boot
priority list allows
to select from a list
of currently detected
devices.
The type based boot
priority list allows
to select device types
even if a respective
device is not (yet)
present.

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

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```

Figure 65: 945GME - 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 102: 945GME - 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 hard disk, 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	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 (ETH1)	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 102: 945GME - Boot Menu - Setting options (Forts.)

1.7 Security

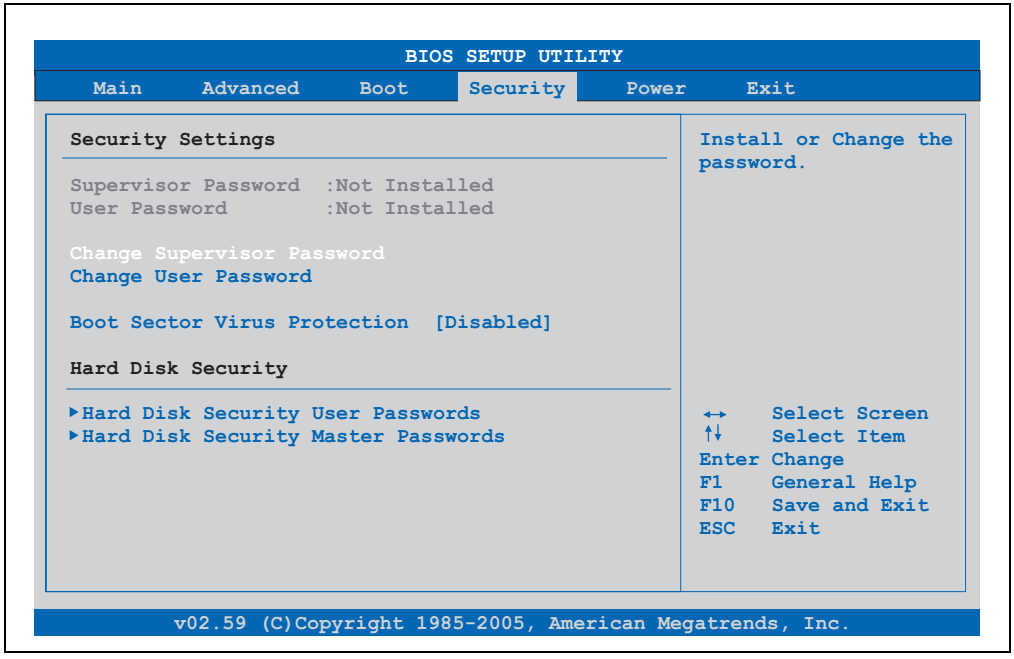

Figure 66: 945GME - Security Menu

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.
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 161

Table 103: 945GME - Security Menu - Setting options

BIOS setting	Meaning	Setting options	Effect
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 162

Table 103: 945GME - Security Menu - Setting options (Forts.)

1.7.1 Hard disk security user password

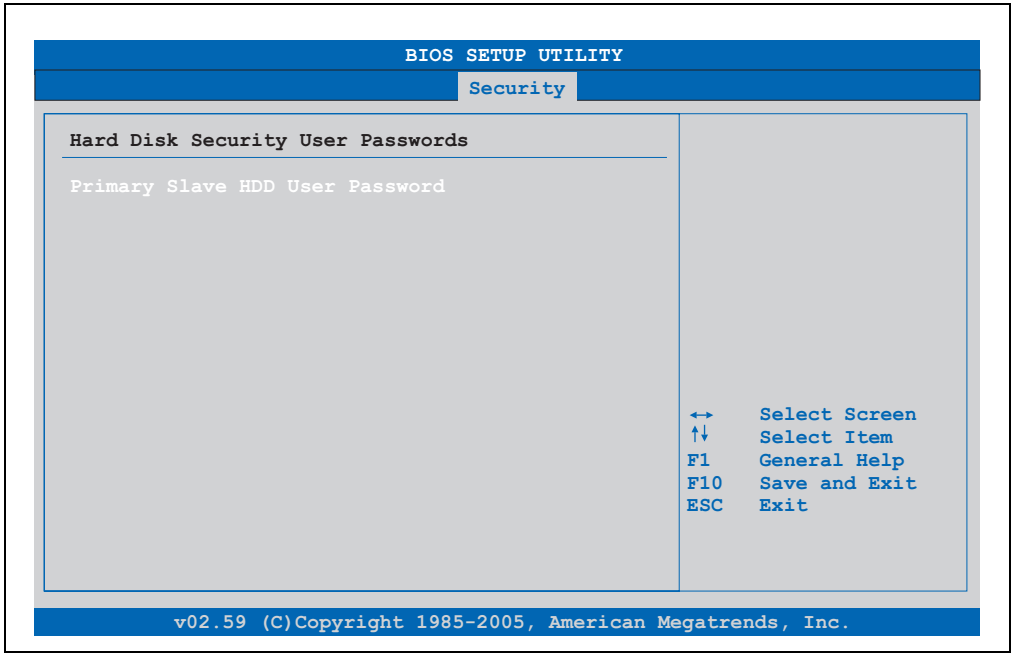

Figure 67: 945GME Hard disk security user password

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 104: 945GME Hard disk security user password

1.7.2 Hard disk security master password

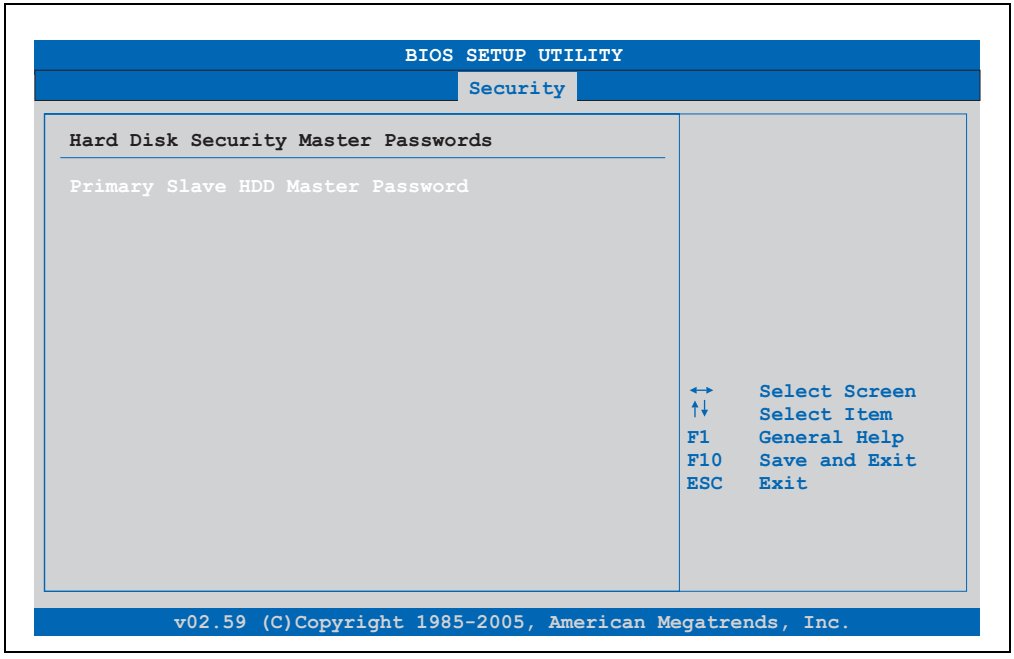

Figure 68: 945GME Hard Disk Security Master Password

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 105: 945GME Hard Disk Security Master Password

1.8 Power

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

 Congigure power management and control          Enable or disable
                                                 APM.
 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]
                                                 ←→    Select Screen
 Resume On Ring                [Disabled]        ↑↓    Select Item
 Resume On PME#                [Disabled]        +-    Change Option
 Resume On RTC Alarm           [Disabled]        F1    General Help
                                                 F10   Save and Exit
 Power Button Mode             [On/Off]          ESC   Exit

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```

Figure 69: 945GME - 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 106: 945GME - 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 106: 945GME - Power Menu - Setting options (Forts.)

1.9 Exit

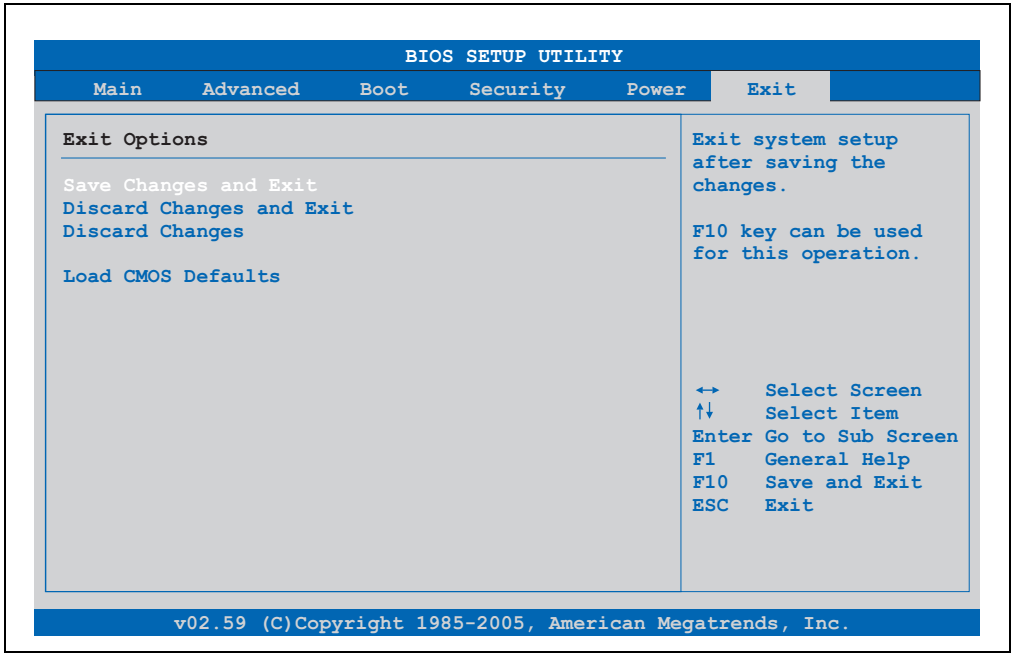


Figure 70: 945GME - Exit Menu

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 107: 945GME - Exit Menu - Setting options

1.10 BIOS default settings

The various positions of the CMOS profile hex switch (see figure "CMOS profile switch", on page 66) can be used to load pre-defined BIOS profile settings.

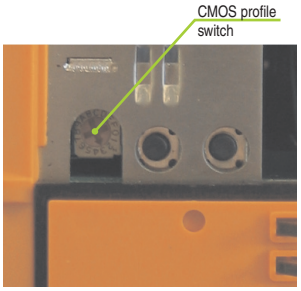


Figure 71: BIOS default settings - CMOS switch

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	1	The default settings for this profile can be found in the APC810 user's manual. This can be downloaded for free from the B&R homepage.
Profile 2	System unit 5PC810.SX05-00	2	
Profile 3	**System unit 5PC820.SX01-00/ 5PC820.SX01-01**	**3**	
Profile 4	Reserved	4	
Profile 5	System unit 5PC820.1505-00 / 5PC820.1906-00	5	The default settings for this profile can be found in the APC800 user's manual. This can be downloaded for free from the B&R homepage.

Table 108: 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).

1.10.1 Main

Setting / View	Profile 0	Profile 3	My setting
System Time	-	-	

Table 109: 945GME Main profile setting overview

Setting / View	Profile 0	Profile 3	My setting
System Date	-	-	
BIOS ID	-	-	
Processor	-	-	
CPU Frequency	-	-	
System Memory	-	-	
Product Revision	-	-	
Serial Number	-	-	
BC Firmware Rev.	-	-	
MAC Address (ETH1)	-	-	
Boot Counter	-	-	
Running Time	-	-	

Table 109: 945GME Main profile setting overview

1.10.2 Advanced

ACPI configuration

Setting / View	Profile 0	Profile 3	My setting
ACPI Aware O/S	Yes	Yes	
ACPI Version Features	ACPI v2.0	ACPI v2.0	
ACPI APIC support	Enabled	Enabled	
Suspend mode	S1 (POS)	S1 (POS)	
USB Device Wakeup from S3/S4	Disabled	Disabled	
Active Cooling Trip Point	Disabled	Disabled	
Passive Cooling Trip Point	Disabled	Disabled	
Critical Trip Point	105°C	105°C	

Table 110: 945GME Advanced - ACPI configuration profile setting overview

PCI Configuration

Setting / View	Profile 0	Profile 3	My setting
Plug & Play O/S	No	**Yes**	
PCI Latency Timer	64	64	
Allocate IRQ to PCI VGA	Yes	Yes	
Allocate IRQ to SMBUS HC	Yes	Yes	
Allocate IRQ to PCIEX2	Yes	Yes	
PCI IRQ Resource Exclusion			
IRQ3	Allocated	Allocated	
IRQ4	Allocated	Allocated	
IRQ5	Available	**Allocated**	
IRQ6	Available	**Allocated**	
IRQ7	Available	Available	
IRQ9	Allocated	Allocated	
IRQ10	Available	Available	
IRQ11	Allocated	**Available**	
IRQ12	Available	Available	
IRQ14	Allocated	Allocated	
IRQ15	Allocated	**Available**	
PCI Interrupt Routing			
PIRQ A (VGA, PCIEX0, ETH2, UHCI2)	Auto	Auto	
PIRQ B (PCIEX1, ETH1)	Auto	Auto	
PIRQ C (PCIEX2, IF slot)	Auto	Auto	
PIRQ D (SATA, UHCI1, SMB, PCIEX3)	Auto	Auto	
PIRQ E (INTD, PATA, UHCI3)	Auto	Auto	
PIRQ F (INTA, POWERLINK)	Auto	**5**	
PIRQ G (INTB, CAN, Timer)	Auto	**6**	
PIRQ H (INTC, UHCI0, EHCI)	Auto	Auto	
1st Exclusive PCI	-	**5**	
2nd Exclusive PCI	-	**6**	
3rd Exclusive PCI	-	-	

Table 111: 945GME Advanced - PCI configuration profile setting overview

PCI express configuration

Setting / View	Profile 0	Profile 3	My setting
Active State Power-Management	Disabled	Disabled	
PCIE Port 0	Auto	Auto	
PCIE Port 1	Auto	Auto	
PCIE Port 2 (IF slot)	Auto	Auto	
PCIE Port 3	Auto	Auto	
PCIE Port 4 (ETH2)	Auto	Auto	
PCIE Port 5 (ETH1)	Auto	Auto	
PCIE High Priority Port	Disabled	Disabled	
Res. PCIE Hotplug Resource	No	No	
PCIE Port 0 IOxAPIC Enable	Disabled	Disabled	
PCIE Port 1 IOxAPIC Enable	Disabled	Disabled	
PCIE Port 2 IOxAPIC Enable	Disabled	Disabled	
PCIE Port 3 IOxAPIC Enable	Disabled	Disabled	

Table 112: 945GME Advanced - PCI Express configuration profile setting overview

Graphics configuration

Setting / View	Profile 0	Profile 3	My setting
Primary Video Device	Internal VGA	Internal VGA	
Internal Graphics Mode Select	Enabled, 8MB	Enabled, 8 MB	
DVMT Mode Select	DVMT Mode	DVMT Mode	
DVMT/FIXED Memory	128MB	128 MB	
Boot Display Device	Auto	Auto	
Boot Display Preference	SDVO-B SDVO-C LFP	SDVO-B SDV0-C LFP	
Local Flat Panel Type	Auto	Auto	
Local flat panel scaling	Centering	Centering	
SDVO Port B Device	DVI	DVI	
SDVO Port C Device	DVI	**None**	
SDVO/DVI Hotplug Support	Enabled	Enabled	
Display Mode Persistence	Enabled	Enabled	

Table 113: 945GME Advanced - Graphics configuration profile setting overview

CPU configuration

Setting / View	Profile 0	Profile 3	My setting
MPS Revision	1.4	1.4	

Table 114: 945GME Advanced - CPU configuration profile setting overview

Setting / View	Profile 0	Profile 3	My setting
Max CPUID value limit	Disabled	Disabled	
Execute Disable Bit	Enabled	Enabled	
Core Multi-Processing	Enabled	Enabled	
Intel(R) SpeedStep(tm) tech.	Automatic	Automatic	
Max. CPU frequency	xxxx MHz	xxxx MHz	
C1 Config.	Standard	Standard	
C2 Config.	Disabled	Disabled	
C3 Config.	Disabled	Disabled	
C4 Config.	Disabled	Disabled	

Table 114: 945GME Advanced - CPU configuration profile setting overview (Forts.)

Chipset configuration

Setting / View	Profile 0	Profile 3	My setting
DRAM Frequency	Auto	Auto	
DRAM Refresh Rate	Auto	Auto	
Memory Hole	Disabled	Disabled	
DIMM Thermal Control	Disabled	Disabled	
DT in SPD	Disabled	Disabled	
TS on DIMM	Disabled	Disabled	
High Precision Event Timer	Disabled	Disabled	
IOAPIC	Enabled	Enabled	
APIC ACPI SCI IRQ	Disabled	Disabled	
C4 On C3	Disabled	Disabled	

Table 115: 945GME Advanced - Chipset configuration profile setting overview

I/O interface configuration

Setting / View	Profile 0	Profile 3	My setting
Onboard Audio Controller	AC97	**Disabled**	

Table 116: 945GME Advanced - I/O Interface Configuration profile setting overview

Clock Configuration

Setting / View	Profile 0	Profile 3	My setting
Spread spectrum	Disabled	Disabled	

Table 117: 945GME Advanced - Clock configuration profile setting overview

IDE Configuration

Setting / View	Profile 0	Profile 3	My setting
ATA/IDE Configuration	Compatible	Compatible	
Legacy IDE Channels	SATA Pri, PATA Sec	**PATA only**	
Configure SATA as	-	**Disabled**	
Hard disk write protect	Disabled	Disabled	
IDE Detect Time Out (Sec)	35	35	
ATA(PI) 80Pin Cable Detection	Host & device	Host & device	
Primary IDE Master			
Type	Auto	Auto	
LBA/Large Mode	Auto	Auto	
Block (Multi-Sector Transfer)	Auto	Auto	
PIO Mode	Auto	Auto	
DMA Mode	Auto	Auto	
S.M.A.R.T.	Auto	Auto	
32Bit data transfer	Enabled	Enabled	
Primary IDE slave			
Type	Auto	Auto	
LBA/Large Mode	Auto	Auto	
Block (Multi-Sector Transfer)	Auto	Auto	
PIO Mode	Auto	Auto	
DMA Mode	Auto	Auto	
S.M.A.R.T.	Auto	Auto	
32Bit data transfer	Enabled	Enabled	
Secondary IDE Master			
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	-	
Secondary IDE slave			
Type	Auto	-	
LBA/Large Mode	Auto	-	
Block (Multi-Sector Transfer)	Auto	-	
PIO Mode	Auto	-	

Table 118: 945GME Advanced - IDE configuration profile setting overview

Setting / View	Profile 0	Profile 3	My setting
DMA Mode	Auto	-	
S.M.A.R.T.	Auto	-	
32Bit data transfer	Enabled	-	

Table 118: 945GME Advanced - IDE configuration profile setting overview (Forts.)

USB configuration

Setting / View	Profile 0	Profile 3	My setting
USB Function	8 USB Ports	8 USB Ports	
USB 2.0 Controller	Enabled	Enabled	
Legacy USB Support	Enabled	Enabled	
USB Legacy POST-Always	Enabled	Enabled	
USB Keyboard Legacy Support	Enabled	Enabled	
USB Mouse Legacy Support	Disabled	Disabled	
USB Storage Device Support	Enabled	Enabled	
Port 64/60 Emulation	Disabled	Disabled	
USB 2.0 Controller Mode	HiSpeed	HiSpeed	
BIOS EHCI Hand-Off	Disabled	Disabled	
USB Beep Message	Enabled	Enabled	
USB Stick Default Emulation	Hard Disk	Hard Disk	
USB Mass Storage Reset Delay	20 Sec	20 Sec	

Table 119: 945GME Advanced - USB configuration profile setting overview

Keyboard/mouse configuration

Setting / View	Profile 0	Profile 3	My setting
Boot-up Num-lock	On	On	
Typematic rate	Fast	Fast	

Table 120: 945GME Advanced - Keyboard/Mouse Configuration profile setting overview

Remote access configuration

Setting / View	Profile 0	Profile 3	My setting
Remote access	Disabled	Disabled	
Serial port BIOS update	Disabled	Disabled	

Table 121: 945GME Advanced - Remote Access Configuration profile setting overview

CPU board monitor

Setting / View	Profile 0	Profile 3	My setting
H/W Health Function	Enabled	Enabled	

Table 122: 945GME Advanced - CPU Board Monitor profile setting overview

Main Board/Panel Features

Setting / View	Profile 0	Profile 3	My setting
Panel control			
Select panel number	-	-	
Version	-	-	
Brightness	100%	100%	
Temperature	-	-	
Fan speed	-	-	
Keys/LEDs	-	-	
Main board monitor			
CMOS battery	-	-	
Baseboard Out	-	-	
Baseboard Center	-	-	
Baseboard In	-	-	
Power supply	-	-	
IF slot	-	-	
Case 1	-	-	
Case 2	-	-	
Case 3	-	-	
Case 4	-	-	
Legacy devices			
COM A	Enabled	Enabled	
Base I/O address	3F8	3F8	
Interrupt	IRQ4	IRQ4	
COM B	Enabled	Enabled	
Base I/O address	2F8	2F8	
Interrupt	IRQ3	IRQ3	
COM C	Enabled	**Disabled**	
Base I/O address	3E8	-	
Interrupt	IRQ11	-	
CAN	Disabled	Disabled	
Hardware Security Key	Enabled	Enabled	

Table 123: 945GME Advanced - Baseboard/Panel Features profile setting overview

Setting / View	Profile 0	Profile 3	My setting
Base I/O address	378	378	
ETH2 LAN Controller	Enabled	Enabled	
ETH2 MAC Address	-	-	

Table 123: 945GME Advanced - Baseboard/Panel Features profile setting overview (Forts.)

1.10.3 Boot

Setting / View	Profile 0	Profile 3	My setting
Boot Priority Selection	Type Based	Type Based	
1st Boot Device	Onboard LAN	**Primary master**	
2nd Boot Device	Primary master	**Primary slave**	
3rd Boot Device	Primary slave	**USB floppy**	
4th Boot Device	USB floppy	**USB removable device**	
5th Boot Device	USB removable device	**USB hard disk**	
6th Boot Device	USB CDROM	USB CDROM	
7th Boot Device	Secondary master	**Disabled**	
8th Boot Device	Secondary slave	**Disabled**	
Quick Boot	Enabled	Enabled	
Quiet Boot	Disabled	Disabled	
Automatic Boot List Retry	Disabled	Disabled	
Add-On ROM Display Mode	Keep Current	Keep Current	
Halt On Error	Disabled	Disabled	
Hit "DEL" Message Display	Enabled	Enabled	
Interrupt 19 Capture	Disabled	Disabled	
PXE boot to LAN (ETH1)	Enabled	**Disabled**	
Slide-in 2 optional ROM	Enabled	**Disabled**	
Power Loss Control	Turn On	Turn On	

Table 124: 945GME Boot profile setting overview

1.10.4 Security

Setting / View	Profile 0	Profile 3	My setting
Supervisor Password	-	-	
User Password	-	-	
Boot Sector Virus Protection	Disabled	Disabled	
Hard disk security user password	-	-	
Hard disk security master password	-	-	

Table 125: 945GME Security profile setting overview

1.10.5 Power

Setting / View	Profile 0	Profile 3	My setting
Power Management/APM	Enabled	Enabled	
Suspend Time Out	Disabled	Disabled	
Video Power Down Mode	Suspend	Suspend	
Hard Disk Power Down Mode	Suspend	Suspend	
Keyboard & PS/2 Mouse	MONITOR	MONITOR	
FDC/LPT/COM ports	MONITOR	MONITOR	
Primary Master IDE	MONITOR	MONITOR	
Primary Slave IDE	MONITOR	MONITOR	
Secondary Master IDE	MONITOR	MONITOR	
Secondary Slave IDE	MONITOR	MONITOR	
Resume On Ring	Disabled	Disabled	
Resume on PME#	Disabled	Disabled	
Resume On RTC Alarm	Disabled	Disabled	
Power Button Mode	On/Off	On/Off	

Table 126: 945GME Power profile setting overview

1.11 BIOS Error signals (beep codes)

While the Automation PC 820 is booting, the following messages and errors can occur with BIOS. These errors are signaled by different beeping codes.

1.11.1 BIOS 945GME

Beeping code	Meaning	Necessary user action
1 x short	Memory refresh failed.	Load BIOS defaults. In the event that the error persists, send industrial PC to B&R for testing.
2 x 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.
3 x short	Base 64 KB memory failure: Basic memory defect, RAM error within the initial 64 KB.	Send industrial PC to B&R for checking.
4 x short	Timer not operational: System timer.	Send industrial PC to B&R for checking.
5 x short	Processor error: Processor defect.	Send industrial PC to B&R for checking.
6 x 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.
7 x short	Processor exception interrupt error: Virtual mode exception error (CPU generated an interrupt error.	Send industrial PC to B&R for checking.
8 x 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.
9 x 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.
10 x short	CMOS shutdown register read/write error: CMOS cannot be read/written.	Send industrial PC to B&R for checking.
11 x short	Cache Error / external Cache bad: L2 - Cache on the mainboard is defected.	Send industrial PC to B&R for checking.

Table 127: BIOS post code messages BIOS 945GME

1.12 Distribution of resources

1.12.1 RAM address assignment

RAM address	Address in Hex	Resource
(TOM - 192 kB) – TOM[1)]	N.A.	ACPI reclaim, MPS and NVS area[2)]
(TOM - 8 MB - 192 kB) – (TOM - 192 kB)	N.A.	VGA frame buffer[3)]
1024 kB – (TOM - 8 MB - 192 kB)	100000h - N.A.	Extended memory
869 kB – 1024 kB	0E0000h - 0FFFFFh	Runtime BIOS
832 kB – 869 kB	0D0000h - 0DFFFFh	Upper memory (available)
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 128: 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 1 MB in the setup.

1.12.2 I/O address assignment

I/O address	Resource
0000h - 00FFh	Motherboard resources
0170h - 0177h	Secondary IDE channel
01F0h - 01F7h	Primary IDE channel
0278h - 027Fh	Hardware Security Key (LPT2)
02F8h - 02FFh	COM2
0376h - 0376h	Secondary IDE channel command port
0377h - 0377h	Secondary IDE channel status port
0378h - 037Fh	Hardware Security Key (LPT1)
03B0h - 03DFh	Video system
03E8h - 03EFh	COM3
03F6h - 03F6h	Primary IDE channel command port
03F7h - 03F7h	Primary IDE channel status port
03F8h - 03FFh	COM1
0480h - 04BFh	Motherboard resources
04D0h - 04D1h	Motherboard resources
0800h - 087Fh	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 129: 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.

1.12.3 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																●			
Secondary IDE channel																	❍		
B&R	COM3 (COM C)				❍	❍	❍	❍	❍			❍	❍	❍					●

Table 130: IRQ interrupt assignments in PCI mode

1) **A**dvanced **C**onfiguration and **P**ower **I**nterface.

● ... Default setting
❍ ... Optional setting

1.12.4 Interrupt assignments in APCI 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															●											
Secondary IDE channel																❍										
B&R COM3 (COM C)				❍	❍	❍	❍	❍			❍	❍	❍													●
PIRQ A [2)]																	●									
PIRQ B [3)]																		●								
PIRQ C [4)]																			●							
PIRQ D [5)]																				●						
PIRQ E [6)]																					●					
PIRQ F [7)]																						●				
PIRQ G [8)]																							●			
PIRQ H [9)]																								●		

Table 131: IRQ interrupt assignments in APIC mode

1) **A**dvanced **C**onfiguration and **P**ower **I**nterface.
2) PIRQ A: for PCIe; UHCI Host Controller 2, VGA controller, PCI Express root port 4
3) PIRQ B: for PCIe; PCI Express root port 5, onboard Gigabit LAN controller
4) PIRQ C: for PCIe; PCI express root port 2, IF slot
5) PIRQ D: for PCIe; UHCI Host Controller 1, SMBus controller, PCI Express root port 3
6) PIRQ E: PCI bus INTD, PATA in native mode, UHCI host controller 3
7) PIRQ F: PCI bus INTA, POWERLINK
8) PIRQ G: PCI bus INTB, CAN, timer
9) PIRQ H: PCI bus INTC, UHCI host controller 0, EHCI host controller

Information:

IF slots cannot be used in system units with revision A0.

1.12.5 Interrupt routing for BIOS up to V1.12

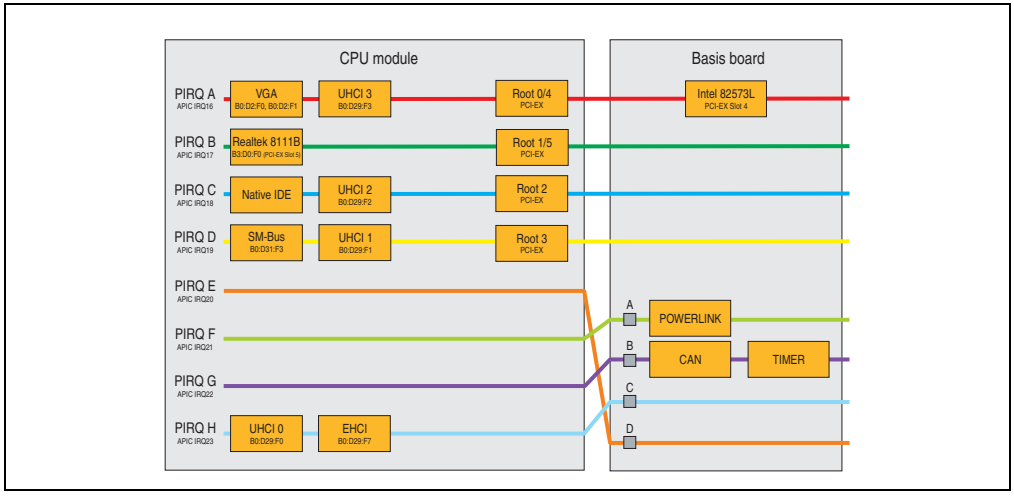


Figure 72: Interrupt routing for BIOS up to V1.12

Information:

The PIRQ C must be set to exclusive for an exclusive interrupt in the BIOS. In this case, devices cannot be connected to the USB interfaces (USB2 and USB4).

1.12.6 Interrupt routing for BIOS starting with V1.14

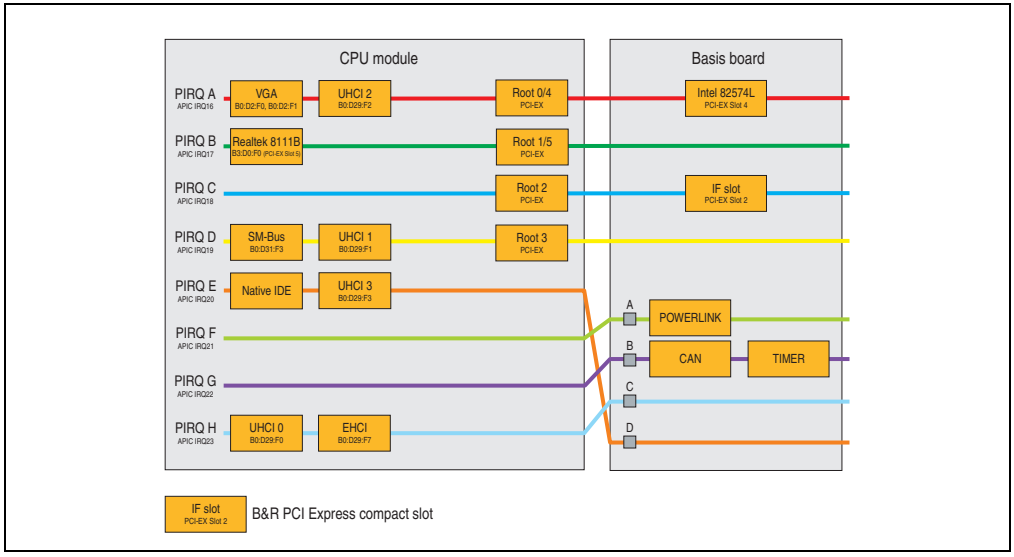


Figure 73: Interrupt routing for BIOS starting with V1.14

2. Upgrade information

Warning!

The BIOS and firmware on APC820 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 APC820?

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

- After switching on the APC820, you can get to the BIOS Setup by pressing "Del".
- From the BIOS main menu "Advanced", select "Main board/panel features".

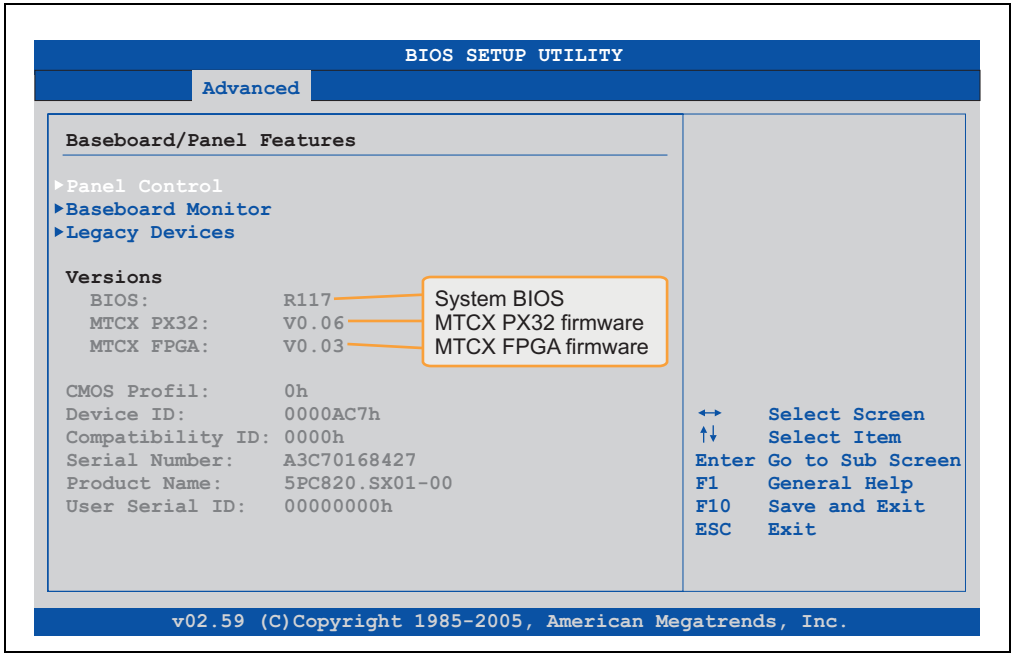


Figure 74: Software version

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 APC820, 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 is connected.

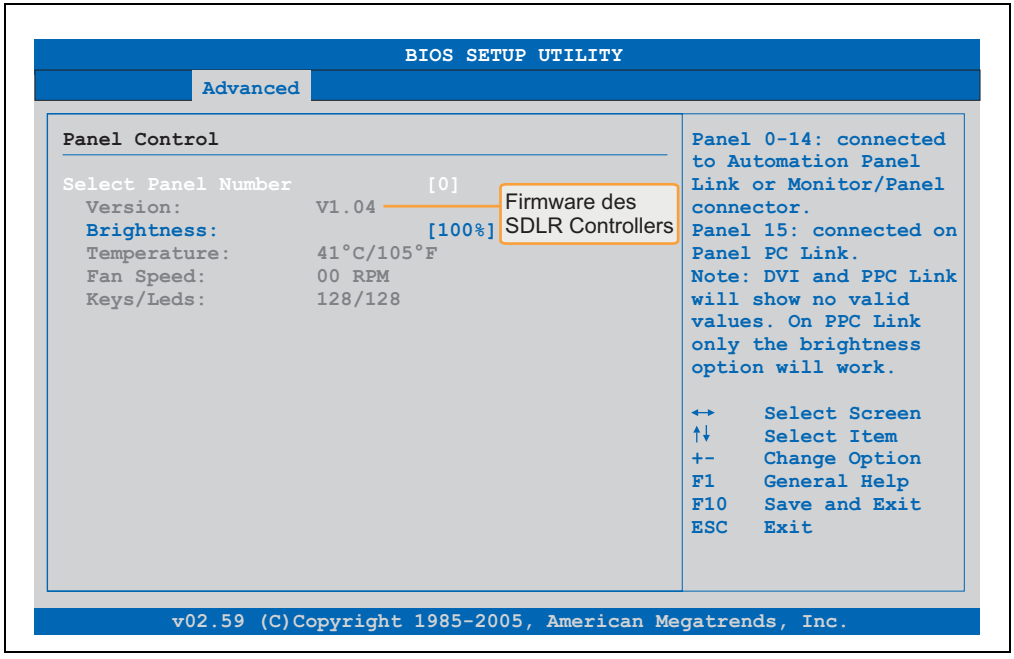


Figure 75: Firmware version of the AP Link SDL transmitter

2.1.2 BIOS upgrade for 945GME 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 cab be found on page 190.

Information concerning creating a USB flash drive for a B&R upgrade can be found on page 192.

Information concerning creating a CompactFlash card for a B&R upgrade can be found on page 194.

- 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 APC820 and reboot the device.
- The following boot menu will be shown after startup:

```
1 . Upgrade AMI BIOS for B945 (5PC800.B945-00,-01,-02,-03,-04)
```

or

```
1 . Upgrade AMI BIOS for B945 (5PC800.B945-10,-11,-12,-13,-14)

2 . Exit
```

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

Concerning point 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 B945" is automatically carried out and the APC820 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 "APC820 MTCX Upgrade" software makes it possible to update the firmware for multiple controllers (MTCX, SDLT, SDLR, UPSI), depending on the structure of the APC820 system.

Current "APC820 MTCX Upgrade" 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 cab be found on page 190.

Information concerning creating a USB flash drive for a B&R upgrade can be found on page 192.

Information concerning creating a CompactFlash card for a B&R upgrade can be found on page 194.

- 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 APC820 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 1.01 of the APC820 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 (APC820) PX32 and FPGA

2 . Upgrade SDLR (AP800/AP900) on monitor/panel

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

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

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

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

   2.5 . Upgrade all SDLR (AP800/AP900)

   2.6 . Return to main menu

3 . Exit
```

Concerning point 1:
Automatically upgrade PX32 and FPGA for MTCX (default after 5 seconds).

Concerning point 2:
Submenu 1 is opened for upgrading the SDLR controller on the Monitor/Panel plug.

2.1 Upgrade SDLR on AP 0 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 0.

2.2 Upgrade SDLR on AP 1 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 1.

2.3 Upgrade SDLR on AP 2 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 2.

2.4 Upgrade SDLR on AP 3 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 3.

2.5 Upgrade all SDLR (AP800/AP900)
All SDLR controllers are automatically updated on all Automation Panels on the Monitor/Panel (default after 5 sec).

2.6 Return to main menu
Returns to the main menu.

Concerning point 3:
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 V1.01)

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

2.3 Creating an MS-DOS boot diskette in Windows XP

- 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...".

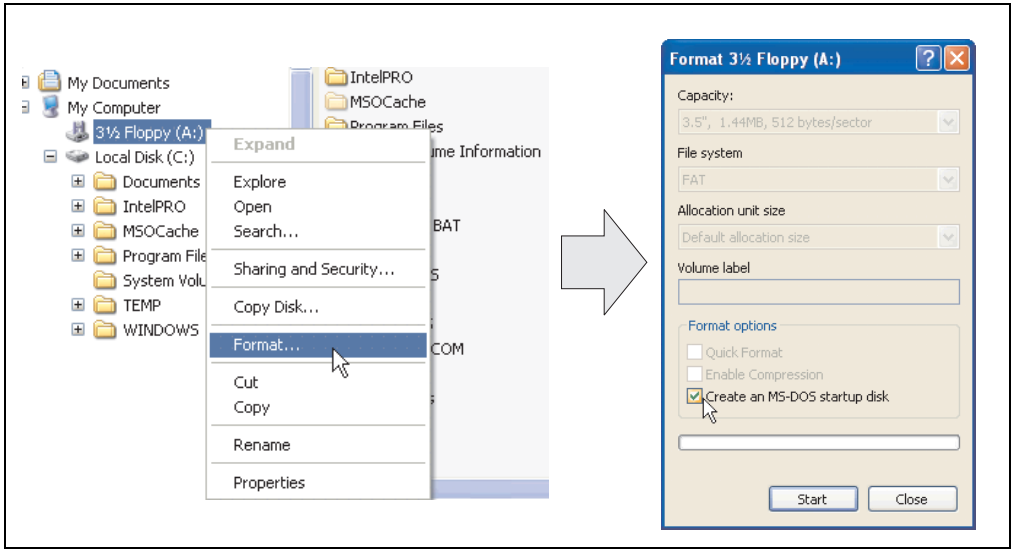


Figure 76: Creating a bootable diskette in Windows XP - step 1

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

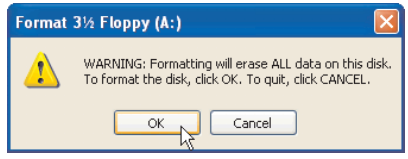


Figure 77: Creating a bootable diskette in Windows XP - step 2

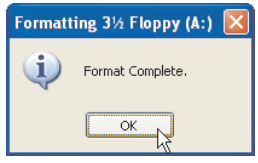


Figure 78: Creating a bootable diskette in Windows XP - step 3

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".

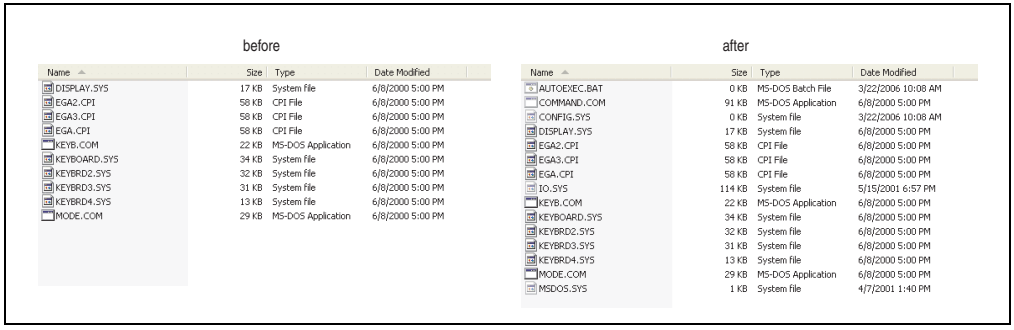


Figure 79: Creating a bootable diskette in Windows XP - step 4

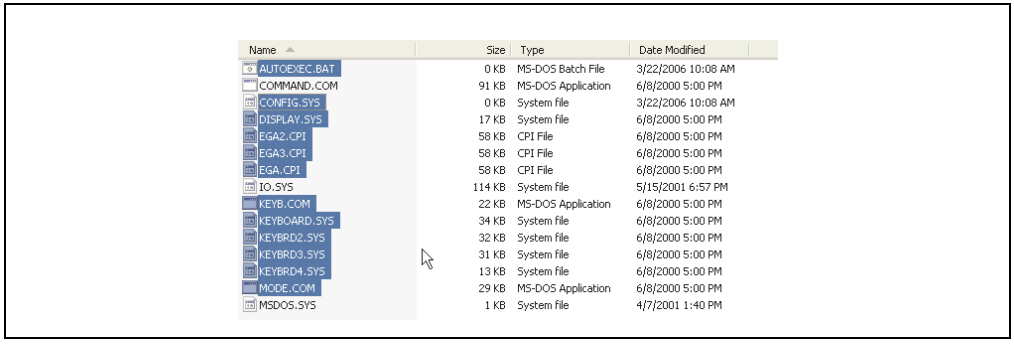


Figure 80: Creating a bootable diskette in Windows XP - step 5

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.

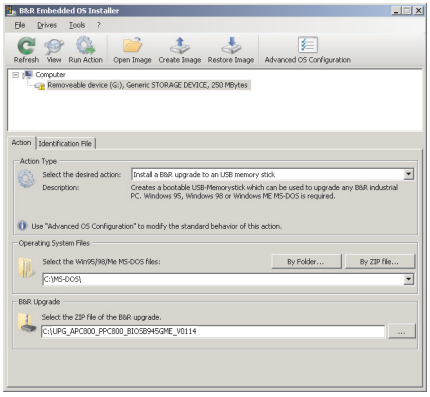


Figure 81: Creating a USB flash drive for B&R upgrade files

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 190. 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.

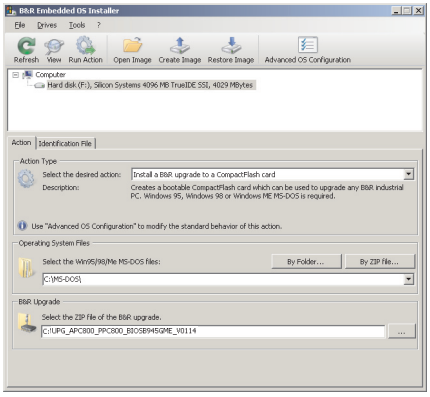


Figure 82: Creating a CompactFlash card for B&R upgrade files

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 190. 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 820 with MS-DOS

Figure 83: Automation PC 820 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 132: 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 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 133: Tested resolutions and color depths for DVI and RGB signals

4. Automation PC 820 with Windows XP Professional

Figure 84: 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. A CompactFlash card is required for operation. This is not included in delivery and must be ordered separately.	
5SWWXP.0600-ENG	**WinXP Professional with SP3, ENG** Microsoft OEM Windows XP Professional Service Pack 3, CD, English. Only available with a new device. A CompactFlash card is required for operation. This is not included in delivery and must be ordered separately.	
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. A CompactFlash card is required for operation. This is not included in delivery and must be ordered separately.	
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. A CompactFlash card is required for operation. This is not included in delivery and must be ordered separately.	
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. A CompactFlash card is required for operation. This is not included in delivery and must be ordered separately.	
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. A CompactFlash card is required for operation. This is not included in delivery and must be ordered separately.	

Table 134: Model numbers - Windows XP Professional

4.1 Installation

Upon request, the required Windows XP Professional version can be pre-installed at B&R Austria on a CompactFlash card. All of the drivers required for operation (graphics, network, etc.) are also installed when doing so.

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 820 with Windows XP embedded

Figure 85: Windows XP Embedded Logo

Model number	Short description	Note
5SWWXP.0428-ENG	**WinXPe FP2007 APC820 B945GME** Microsoft OEM Windows XP Embedded Feature Pack 2007, English; for APC820 with 945GME chipset; order CompactFlash card separately (at least 512 MB).	

Table 135: Model numbers - Windows XP Embedded

5.1 General information

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

5.2 Features with FP2007 (Feature Pack 2007)

The feature list shows the most important device functions in Windows XP Embedded with Feature Pack 2007 (FP2007).

Function	Present
Enhanced write filter (EWF)	✓
File Based Write Filter	✓
Page file	Configurable
Administrator account	✓
User account	Configurable
Explorer shell	✓
Registry filter	✓
Internet Explorer 6.0 + SP2	✓
Internet information service (IIS)	-
Terminal service	✓
Windows Firewall	✓
MSN-Explorer	-
Outlook Express	-
Administrative Tools	✓
Remote Desktop	✓
Remote Assistance	-
.NET Framework	-
ASP.NET	-
Codepages/User Locale/Keyboard	✓
Disk Management Service	✓
Windows Installer Service	✓
Class Installer	✓
CoDevice Installer	✓
Media Player	-
DirectX	-
Accessories	✓
Number of fonts	89

Table 136: Device functions in Windows XP Embedded with FP2007

5.3 Installation

Upon request, Windows XP Embedded can be preinstalled at B&R Austria on a suitable CompactFlash card (min. 512MB). The APC820 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.

5.4 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.

5.4.1 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.

6. Automation PC 820 with Windows Embedded Standard 2009

Figure 86: Windows Embedded Standard 2009 Logo

Model number	Short description	Note
5SWWXP.0728-ENG	**Windows Embedded Standard 2009 APC820 945GME** Microsoft OEM Windows Embedded, Standard 2009, English; for APC820 with 945GME chipset; order CompactFlash separately (at least 1 GB).	

Table 137: Order data - Windows Embedded Standard 2009

6.1 General information

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

6.2 Features with WES2009 (Windows Embedded Standard 2009)

The feature list shows the most important device functions in Windows Embedded Standard 2009.

Function	Present
Enhanced write filter (EWF)	✓
File Based Write Filter	✓
Page file	Configurable
Administrator account	✓
User account	Configurable
Explorer shell	✓
Registry filter	✓
Internet Explorer 7.0	✓
Internet information service (IIS)	-
Terminal service	✓
Windows Firewall	✓
MSN-Explorer	-
Outlook Express	-
Administrative Tools	✓
Remote Desktop	✓
Remote Assistance	-
.NET Framework	-
ASP.NET	-
Local Network Bridge	✓
Codepages/User Locale/Keyboard	✓
Disk Management Service	✓
Windows Installer Service	✓
Class Installer	✓
CoDevice Installer	✓
Media Player 6.4	✓
DirectX 9.0c	✓
Accessories	✓
Number of fonts	89

Table 138: 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 APC820 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 820 with Windows Embedded Standard 7

Abbildung 87: Windows Embedded Standard 7 Logo

Model number	Short description	Note
5SWWI7.0528-ENG	**WES7E 32bit APC820 945GME** Microsoft OEM Windows Embedded Standard 7 32-bit, English; for APC820 with 945GME chipset; please order CompactFlash separately (minimum 8 GB).	
5SWWI7.0628-ENG	**WES7E 32bit APC820 945GME** Microsoft OEM Windows Embedded Standard 7 64-bit, English; for APC820 with 945GME chipset; please order CompactFlash separately (minimum 16 GB).	
5SWWI7.0728-MUL	**WES7P 32bit APC820 945GME** Microsoft OEM Windows Embedded Standard 7 Premium 32-bit, multilanguage; for APC820 with 945GME chipset; please order CompactFlash separately (minimum 8 GB).	
5SWWI7.0828-MUL	**WES7P 64bit APC820 945GME** Microsoft OEM Windows Embedded Standard 7 Premium 64-bit, multilanguage; for APC820 with 945GME chipset; please order CompactFlash separately (minimum 16 GB).	
5SWWI7.0900-MUL	**WES7P 32bit Language Pack DVD**	
5SWWI7.1000-MUL	**WES7P 64bit Language Pack DVD**	

Tabelle 139: 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	✓	✓
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

Table 140: Device functions in Windows Embedded Standard 7

Function	Windows Embedded Standard 7	Windows Embedded Standard 7 Professional
Number of fonts	134	134

Table 140: Device functions in Windows Embedded Standard 7

7.3 Installation

Upon request, Windows Embedded Standard 7 can be preinstalled at B&R Austria on a suitable CompactFlash card (32-Bit: min. 8 GB; 64-Bit: min. 16 GB). The APC820 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. Automation PC 820 with Automation Runtime

8.1 General information

An integral component of Automation Studio™ is Automation Runtime, the software kernel which allows applications to run on a target system. This runtime environment offers numerous important advantages:

- Guaranteed highest possible performance for the hardware being used
- Runs on all B&R target systems
- Makes the application hardware-independent
- Applications can be easily ported between B&R target systems
- Cyclic system guarantees deterministic behavior
- Configurable jitter tolerance in all task classes
- Supports all relevant programming language such as IEC 61131-3 and C
- Extensive function library conforming to IEC 61131-3 as well as the expanded B&R Automation library
- Integrated into Automation NET. Access to all networks and bus systems via function calls or the Automation Studio™ configuration

8.2 Automation Runtime Windows (ARwin)

The system is supported by ARwin with an AS 3.0 / AR 2.95 upgrade.

The Automation Runtime Dongle must be connected to use ARwin on an Automation PC 820 (see section 8 "B&R Automation Runtime Dongle", on page 255).

8.3 Automation Runtime Embedded (ARemb)

The system is supported by ARemb with an AS 3.0.90 / AR 4.00 upgrade.

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

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

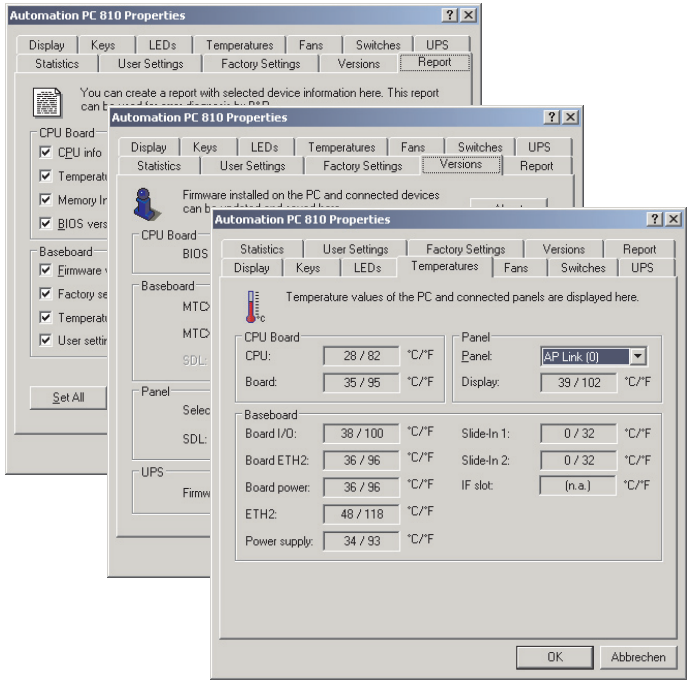


Figure 88: ADI Control Center screenshots - Examples (symbol photo)

Information:

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

9.1 Functions

Information:

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

- 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:

- Automation PC 620
- Automation PC 810
- Automation PC 820
- Panel PC 700
- Panel PC 725
- Panel PC 800
- Power Panel 300/400 BIOS Geräte
- Power Panel 500
- Mobile Panel BIOS Geräte
- Automation Panel 800 (in connection with Automation PCs and Panel PCs)
- Automation Panel 900 (in connection with Automation PCs and Panel PCs)

9.2 Installation

A detailed description of the Control Center can be found in the integrated online help. The B&R Automation Device Interface (ADI) driver (also contains Control Center) can be downloaded for free from the download area 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 -

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

Information:

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

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

9.3 SDL equalizer setting

1) Start the **Control Center** in the **Control Panel**.

2) Then select the **Display** tab.

3) Click on **Settings**. This opens the following dialog box:

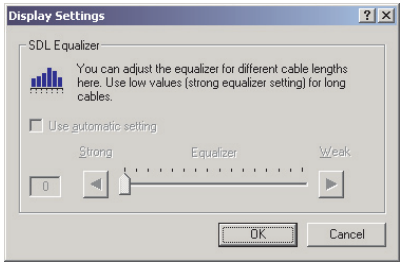


Figure 89: ADI Control Center - SDL equalizer settings

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).

Chapter 5 • Standards and certifications

1. Applicable European directives

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

2. Overview of standards

The Automation PC 820 as an entire device meets the following 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 60068-2-30	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 61800-2	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 141: 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
EN 61800-2	"Adjustable speed electric drives – Part 2: General requirements
EN 61800-3	"Adjustable speed electric drives – Part 3: EMC requirements including specific test methods
UL 508	Industrial control equipment (UL = Underwriters Laboratories)
47 CFR	Federal Communications Commission (FCC), 47 CFR Part 15 Subpart B Class A

Table 141: Overview of standards (Forts.)

3. Emission requirements (emission)

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 61800-3: "Adjustable speed electric drives – Part 3: EMC requirements including specific test methods
		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 61800-3: "Adjustable speed electric drives – Part 3: EMC requirements including specific test methods
		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 142: 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 150 kHz - 500 kHz	100 dB (µV) Quasi-peak value 90 dB (µV) Average	-	-
Power mains connections 500 kHz - 5 MHz	86 dB (µV) Quasi-peak value 76 dB (µV) Average		
Power mains connections 5 MHz - 30 MHz	90 dB (µV) Quasi-peak value 80 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

Table 143: Test requirements - Network-related emissions for industrial areas

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
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
Other connections 150 kHz - 500 kHz	-	-	-
Other connections 500 kHz - 30 MHz	-	-	-

Table 143: Test requirements - Network-related emissions for industrial areas (Forts.)

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**	**Limits according to EN 61800-3**
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	< 50 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	< 60 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 144: : Test requirements - Electromagnetic emissions for industrial areas

4. Requirements for immunity to disturbances (immunity)

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 61800-3: "Adjustable speed electric drives – Part 3: EMC requirements including specific test methods
		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 61800-3: "Adjustable speed electric drives – Part 3: EMC requirements including specific test methods
		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 61800-3: "Adjustable speed electric drives – Part 3: EMC requirements including specific test methods
		EN 61131-2: Programmable logic controllers
Immunity to surge voltages	EN 61000-4-5	EN 61000-6-2: Generic standard (industrial areas)
		EN 61800-3: "Adjustable speed electric drives – Part 3: EMC requirements including specific test methods
		EN 61131-2: Programmable logic controllers
Immunity to conducted disturbances	EN 61000-4-6	EN 61000-6-2: Generic standard (industrial areas)
		EN 61800-3: "Adjustable speed electric drives – Part 3: EMC requirements including specific test methods
		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 145: Overview of limits and testing guidelines for immunity

Evaluation criteria according to EN 61000-6-2

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

Criteria B:
The operating equipment must continue to work as 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	
Test carried out according to EN 61000-4-2	**Limits according to EN 61800-3**		
Contact discharge to powder-coated and bare metal housing parts	±6 kV, 10 discharges, criteria B		
Discharge through the air to plastic housing parts	±8 kV, 10 discharges, criteria B		

Table 146: Test requirements - Electrostatic discharge (ESD)

4.2 High-frequency electromagnetic fields (HF field)

Test carried out according to EN 61000-4-3	Limits according to EN 61000-6-2	Limits according to EN 61131-2	Limits according to EN 61800-3
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	80 MHz - 1 GHz, 10 V/m, 80% amplitude modulation with 1 kHz, criteria A

Table 147: 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 power I/O	±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 148: Test requirements - High-speed transient electrical disturbances (burst)

1) For EN 55024 without length limitation.

4.4 Surges (surge)

Test carried out according to EN 61000-4-5	Limits according to EN 61000-6-2	Limits according to EN 61131-2	Limits according to EN 61800-3
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	-	±1 kV, criteria B
DC power I/O, L to PE, >10 m	±0.5 kV, criteria B	-	±2 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 149: Test requirements - Surge voltages

4.5 Conducted disturbances

Test carried out according to EN 61000-4-6	Limits according to EN 61000-6-2	Limits according to EN 61131-2	Limits according to EN 61800-3
AC power I/O	150 kHz - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, criteria A
DC power I/O	150 kHz - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, 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	150 kHz - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, 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	150 kHz - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, criteria A

Table 150: 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 151: 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	

Table 152: Test requirements - 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	
DC power inputs	-	20 interruptions for 10 ms < UN - 15%, criteria A	

Table 152: Test requirements - Voltage dips, fluctuations, and short-term interruptions (Forts.)

4.8 Damped vibration

Test carried out according to EN 61000-4-12	Limits according to EN 61131-2		
Power I/O, L to L	±1 kV, 1 MHz, repeat rate 400/seconds, length 2 seconds, connection lengths 2 m, criteria B		
Power I/O, L to PE	±2.5 kV, 1 MHz, repeat rate 400/seconds, length 2 seconds, connection lengths 2 m, criteria B		

Table 153: 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
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 154: 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 61800-2	
Vibration during operation: Uninterrupted duty with moveable frequency in all 3 axes (x, y, z), 1 octave per minute	10 sweeps for each axis	
	Frequency	**Limit value**
	2 - 9 Hz	Amplitude 3 mm
	9 - 200 Hz	Acceleration 1 g

Table 155: Test requirements - Vibration during operation

5.2 Vibration during transport (packaged)

Test carried out according to EN 60068-2-6	Limits according to EN 61800-2	
Vibration during transport: Uninterrupted duty with moveable frequency in all 3 axes (x, y, z)	10 sweeps for each axis, packaged	
	Frequency	**Limit value**
	2 - 9 Hz	Amplitude 3.5 mm
	9 - 200 Hz	Acceleration 1 g
	200 - 500 Hz	Acceleration 1.5 g

Table 156: Test requirements - Vibration during transport (packaged)

5.3 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 157: Test requirements - Toppling

5.4 Free fall (packaged)

Test carried out according to EN 61800-2	Limits according to IEC 60721-3-2, class 2M1	
Free fall	Devices with delivery packaging	
	Weight	**Height**
	< 100 kg	0.25 m

Table 158: 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 159: 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 160: 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 161: 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 162: 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 163: Test requirements - Large temperature fluctuations

6.5 Temperature fluctuations in operation

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

Table 164: 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 165: 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 166: 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 167: 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		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 168: Test requirements - Ground resistance

7.2 Insulation resistance

Test carried out	Limits according to EN 60204-1		
Insulation resistance: main circuits to protective ground conductor	> 1 MΩ at 500 V DC voltage		

Table 169: Test requirements - Insulation resistance

7.3 High voltage

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

Table 170: Test requirements - High voltage

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 171: 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 172: 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 173: 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 174: 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 175: Test requirements - Voltage range

8. Other tests

Other tests	Test carried out according to	Limits according to
Protection type	-	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 176: Overview of limits and testing guidelines for other tests

8.1 Protection type

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 177: 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 178: International Certifications

Chapter 6 • Accessories

1. Overview

Model number	Short description	Note
0TB704.9	**4-pin screw clamp** Screw clamp 1.5 mm²	
0TB704.91	**4-pin cage clamps** cage clamps 2.5 mm²	
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	
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.	
5CFCRD.0512-04	**CompactFlash 512 MB B&R** CompactFlash card with 512 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.1024-04	**CompactFlash 1024 MB B&R** CompactFlash card with 1024 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.2048-04	**CompactFlash 2048 MB B&R** CompactFlash card with 2048 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.4096-04	**CompactFlash 4096 MB B&R** CompactFlash card with 4096 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.8192-04	**CompactFlash 8192 MB B&R** CompactFlash card with 8192 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.016G-04	**CompactFlash 16 GB B&R** CompactFlash card with 16 GB SLC NAND flash and IDE/ATA interface	
5CFCRD.0064-03	**CompactFlash 64 MB SSI** CompactFlash card with 64 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.0128-03	**CompactFlash 128 MB SSI** CompactFlash card with 128 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.0256-03	**CompactFlash 256 MB SSI** CompactFlash card with 256 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.0512-03	**CompactFlash 512 MB SSI** CompactFlash card with 512 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.1024-03	**CompactFlash 1024 MB SSI** CompactFlash card with 1024 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.2048-03	**CompactFlash 2048 MB SSI** CompactFlash card with 2048 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.4096-03	**CompactFlash 4096 MB SSI** CompactFlash card with 4096 MB SLC NAND flash and IDE/ATA interface	

Model number	Short description	Note
5CFCRD.8192-03	**CompactFlash 8192 MB SSI** CompactFlash card with 8192 MB SLC NAND flash and IDE/ATA interface	
5MMUSB.2048-00	**USB flash drive 2 GB SanDisk** USB 2.0 flash drive 2 GB	
5MMUSB.2048-01	**USB flash drive 2 GB B&R** USB 2.0 flash drive 2 GB	
1A4600.10	**B&R Automation Runtime ARwin, incl. License Label and Security Key**	
1A4600.10-2	**B&R Automation Runtime ARwin, ARNC0**	
1A4600.10-3	**B&R Automation Runtime ARwin+PVIControls, incl. License Label and Security Key**	
1A4600.10-4	**B&R Automation Runtime ARwin+ARNC0+PVIControls**	
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	

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	
5CASDL.0430-13	**SDL flex cable with extender 43 m** SDL cable with extender for fixed and flexible type of layout; length: 43 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	
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.	
5SWHMI.0000-00	**HMI Drivers & Utilities DVD**	

2. CAN plug (4-pin)

2.1 General information

This 4-pin plug is needed for connecting to the CAN interfaces.

2.2 Order data

Model number	Description	Figure
0TB704.9	4-pin screw clamp Screw clamp 1.5 mm²	 0TB704.9
0TB704.91	4-pin cage clamps Screw clamp 2.5 mm²	 0TB704.91

Table 179: Order data - 0TB704.9 and 0TB704.91

2.3 Technical data

Information:

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

Name	0TB704.9	0TB704.91
Number of pins	4	
Type of terminal	Screw clamps	Cage clamps

Table 180: Technical data - TB103 supply plug

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

Table 181: 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 182: Technical data - Lithium batteries

4. DVI - monitor adapter 5AC900.1000-00

This adapter enables a standard monitor to be connected to the DVI-I interface.

4.1 Order data

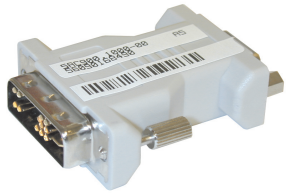
Model number	Description	Figure
5AC900.1000-00	Adapter DVI-A/m to CRT DB15HD/f Adapter DVI (plug) to CRT (socket), for connecting a standard monitor to a DVI-I interface.	

Table 183: Order data - DVI - CRT adapter

5. CompactFlash cards 5CFCRD.xxxx-04

5.1 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 5 "Known problems / issues", on page 109.

Information:

The 5CFCRD.xxxx-04 CompactFlash cards are supported on B&R devices with WinCE Version 6.0 or higher.

5.2 Order data

Model number	Description	Figure
5CFCRD.0512-04	512 MB B&R CompactFlash card	 CompactFlash card
5CFCRD.1024-04	1024 MB B&R CompactFlash card	
5CFCRD.2048-04	2048 MB B&R CompactFlash card	
5CFCRD.4096-04	4096 MB B&R CompactFlash card	
5CFCRD.8192-04	8192 MB B&R CompactFlash card	
5CFCRD.016G-04	16 GB B&R CompactFlash card	

Table 184: Order data - CompactFlash cards

5.3 Technical data

Caution!

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

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

Information:

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

Features	5CFCRD.0512-04	5CFCRD.1024-04	5CFCRD.2048-04	5CFCRD.4096-04	5CFCRD.8192-04	5CFCRD.016G-04
MTBF (at 25°C)	> 3,000,000 hours					
Maintenance	None					
Data reliability	< 1 unrecoverable error in 10^{14} bit read accesses					
Data retention	10 years					
Lifetime monitoring	Yes					
Supported operating modes	PIO Mode 0-6, Multiword DMA Mode 0-4, Ultra DMA Mode 0-4					
Continuous reading	Typically 35 MB/s(240X)[1)2)] Max. 37 MB/s (260X)[1) 2)]	Typically 35 MB/s (240X)[1) 2)] Max. 37 MB/s (260X)[1) 2)]	Typically 35 MB/s (240X)[1) 2)] Max. 37 MB/s (260X)[1) 2)]	Typically 33 MB/s (220X)[1) 2)] Max. 34 MB/s (226X)[1) 2)]	Typically 27 MB/s (180X)[1) 2)] Max. 28 MB/s (186X)[1) 2)]	Typically 36 MB/s (240X)[1) 2)] Max. 37 MB/s (247X)[1) 2)]
Continuous writing	Typically 17 MB/s (110X) Max. 20 MB/s (133X)	Typically 17 MB/s (110X) Max. 20 MB/s (133X)	Typically 17 MB/s (110X) Max. 20 MB/s (133X)	Typically 16 MB/s (106X) Max. 18 MB/s (120X)	Typically 15 MB/s (100X) Max. 17 MB/s (110X)	Typically 18 MB/s (120X) Max. 19 MB/s (126X)
Endurance						
Guaranteed amount of data [3)] Results in 5 years [3)]	50 TB 27.40 GB/day	100 TB 54.79 GB/day	200 TB 109.59 GB/day	400 TB 219.18 GB/day	800 TB 438.36 GB/day	1600 TB 876.72 GB/day
Clear/write cycles Guaranteed Typical[4)]	100,000 2,000,000					
SLC flash	Yes					
Wear leveling	Static					
Endurance	**5CFCRD.0512-04**	**5CFCRD.1024-04**	**5CFCRD.2048-04**	**5CFCRD.4096-04**	**5CFCRD.8192-04**	**5CFCRD.016G-04**
Error Correction Coding (ECC)	Yes					

Table 185: Technical data - CompactFlash cards 5CFCRD.xxxx-04

Support						
Hardware	PP300/400, PPC300, PPC700, PPC725, PPC800, APC620, APC810, APC820					
Windows XP Professional	-	-	-	Yes	Yes	Yes
Windows XP Embedded	Yes	Yes	Yes	Yes	Yes	Yes
Windows Embedded Standard 2009	-	Yes	Yes	Yes	Yes	Yes
Windows CE 6.0	Yes	Yes	Yes	Yes	Yes	Yes 5)
Windows CE 5.0	-	-	-	-	-	-
PVI Transfer Tool	V3.2.3.8 (part of PVI Development Setup V2.06.00.3011)					-
B&R Embedded OS Installer	V3.10					-
Mechanical characteristics						
Dimensions Length Width Thickness	 36.4 ±0.15 mm 42.8 ±0.10 mm 3.3 ±0.10 mm					
Weight	10 g					
Environmental characteristics						
Ambient temperature Operation Bearings Transport	 0 to +70°C -65 to +150°C -65 to +150°C					
Relative humidity Operation/Storage/Transport	 Max. 85% at 85°C					
Vibration Operation/Storage/Transport	 20 G peak, 20- 2000 Hz, 4 in each direction (JEDEC JESD22, method B103) 5.35 G RMS, 15 min per level (IEC 68-2-6)					
Shock Operation/Storage/Transport	 1.5k G peak, 0.5 ms 5 times (JEDEC JESD22, method B110) 30 G, 11 ms 1 time (IEC 68-2-27)					
Altitude	Max. 15,000 feet (4,572 m)					

Table 185: Technical data - CompactFlash cards 5CFCRD.xxxx-04 (Forts.)

1) Speed specification with 1X = 150 KB/s. All specifications refer to the Samsung Flash chips, CompactFlash cards in UDMA mode 4, 30 ns cycle time in True-IDE mode with sequential write/read test.

2) The file is written/read sequentially in True IDE mode with the DOS program Thruput.exe.

3) Endurance of B&R CF cards (linear written block size with 128 kB)

4) Depending on the average file size.

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

5.3.1 Temperature humidity diagram - Operation and storage

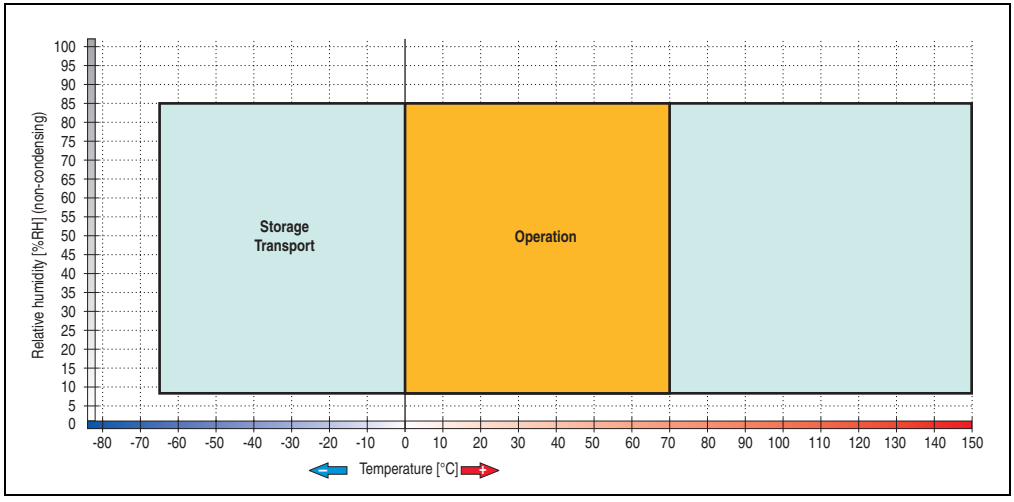


Figure 90: Temperature humidity diagram - CompactFlash cards 5CFCRD.xxxx-04

5.4 Dimensions

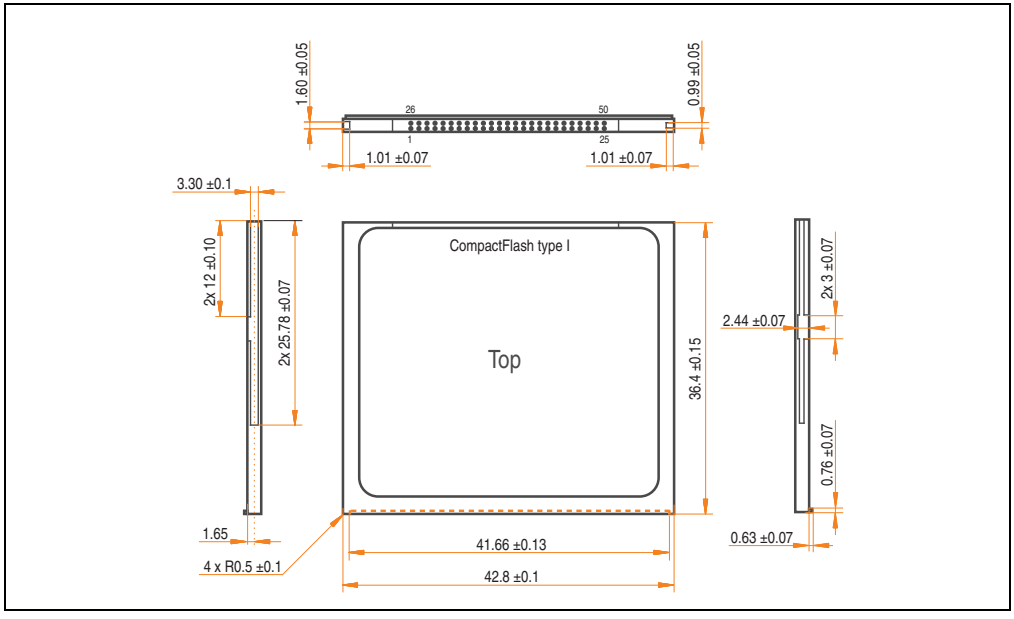


Figure 91: Dimensions - CompactFlash card Type I

5.5 Benchmark

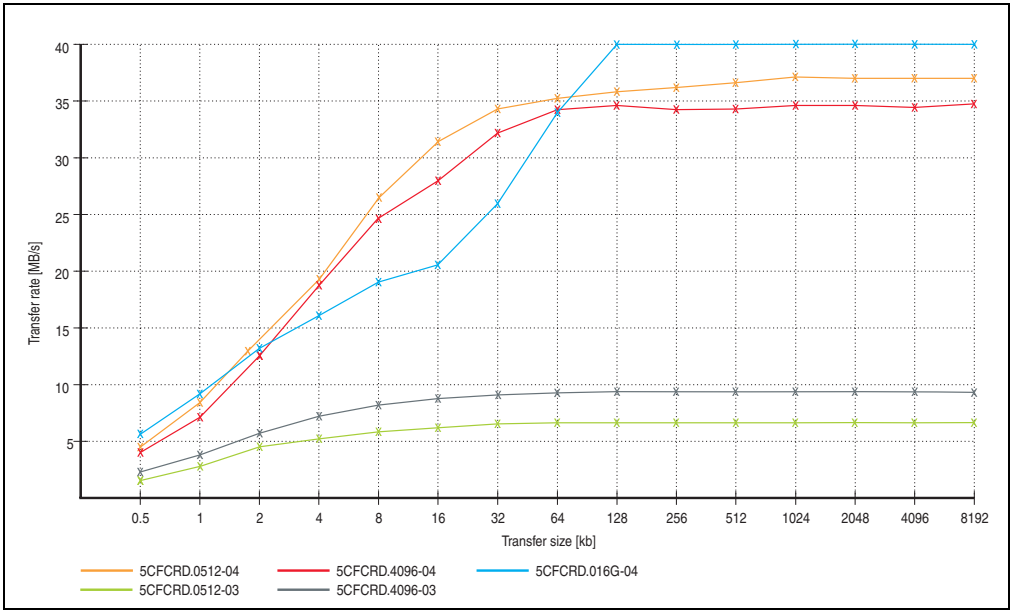


Figure 92: ATTO disk benchmark v2.34 comparison (reading)

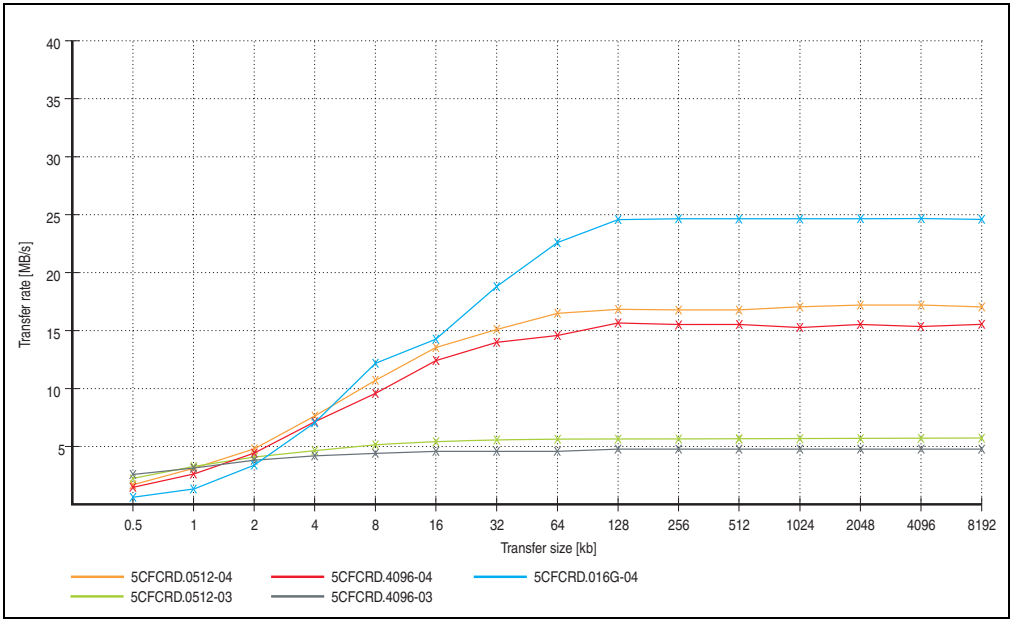


Figure 93: ATTO disk benchmark v2.34 comparison (writing)

6. CompactFlash cards - 5CFCRD.xxxx-03

6.1 General information

Information:

Silicon Systems 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 5 "Known problems / issues", on page 109.

Information:

On Windows CE 5.0 devices, 5CFCRD.xxxx-03 CompactFlash cards up to 1GB are supported.

6.2 Order data

Model number	Description	Figure
5CFCRD.0064-03	CompactFlash 64 MB SSI	 CompactFlash card
5CFCRD.0128-03	CompactFlash 128 MB SSI	
5CFCRD.0256-03	CompactFlash 256 MB SSI	
5CFCRD.0512-03	CompactFlash 512 MB SSI	
5CFCRD.1024-03	CompactFlash 1024 MB SSI	
5CFCRD.2048-03	CompactFlash 2048 MB SSI	
5CFCRD.4096-03	CompactFlash 4096 MB SSI	
5CFCRD.8192-03	CompactFlash 8192 MB SSI	

Table 186: Order data - CompactFlash cards

6.3 Technical data

Caution!

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

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

Information:

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

Features	5CFCRD. 0064-03	5CFCRD. 0128-03	5CFCRD. 0256-03	5CFCRD. 0512-03	5CFCRD. 1024-03	5CFCRD. 2048-03	5CFCRD. 4096-03	5CFCRD. 8192-03
MTBF (at 25°C)	> 4,000,000 hours							
Maintenance	None							
Data reliability	< 1 unrecoverable error in 10^{14} bit read accesses							
Data retention	10 years							
Lifetime monitoring	Yes							
Supported operating modes	PIO Mode 0-4, Multiword DMA Mode 0-2							
Continuous reading	Typically 8 MB/s							
Continuous writing	Typically 6 MB/s							
Endurance								
Clear/write cycles Typical	> 2,000,000							
SLC flash	Yes							
Wear leveling	Static							
Error Correction Coding (ECC)	Yes							
Support								
Hardware	MP100/200, PP100/200, PP300/400, PPC300, PPC700, PPC725, PPC800, Provit 2000, Provit 5000, APC620, APC680, APC810, APC820							
Windows XP Professional	-	-	-	-	-	-	Yes	Yes
Windows XP Embedded	-	-	-	Yes	Yes	Yes	Yes	Yes
Windows Embedded Standard 2009	-	-	-	-	Yes	Yes	Yes	Yes
Windows CE 6.0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes[1)]

Table 187: 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 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 Bearings Transport	 0 to +70°C -50 to +100°C -50 to +100°C							
Relative humidity Operation/Storage/Transport	 8 to 95%, non-condensing							
Vibration Operation Storage/Transport	 max. 16.3 g (159 m/s^2 0-peak) max. 30 g (294 m/s^2 0-peak)							
Shock Operation Storage/Transport	 Max. 1000 g (9810 m/s^2 0-peak) Max. 3000 g (29430 m/s^2 0-peak)							
Altitude	max. 80,000 feet (24,383 m)							

Table 187: Technical data - CompactFlash cards 5CFCRD.xxxx-03 (Forts.)

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

6.3.1 Temperature humidity diagram - Operation and storage

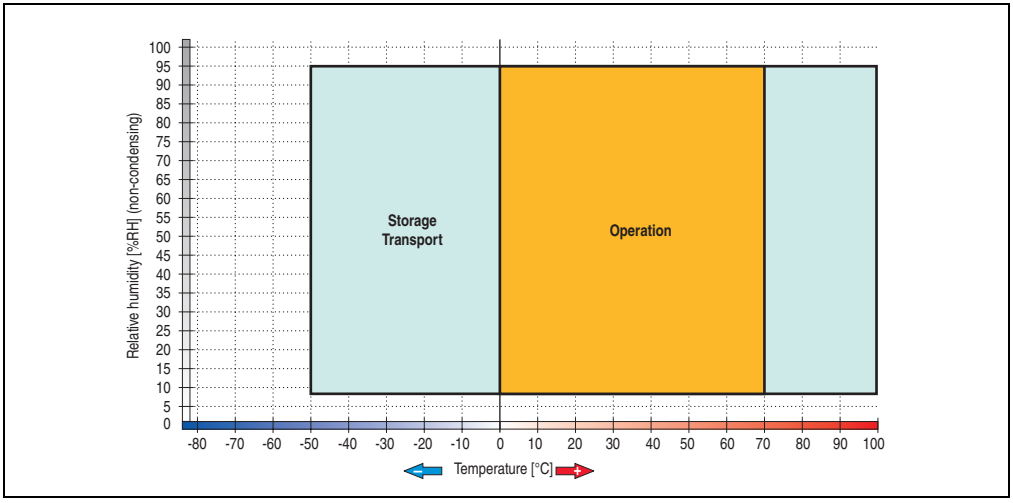


Figure 94: Temperature humidity diagram - CompactFlash cards 5CFCRD.xxxx-03

6.4 Dimensions

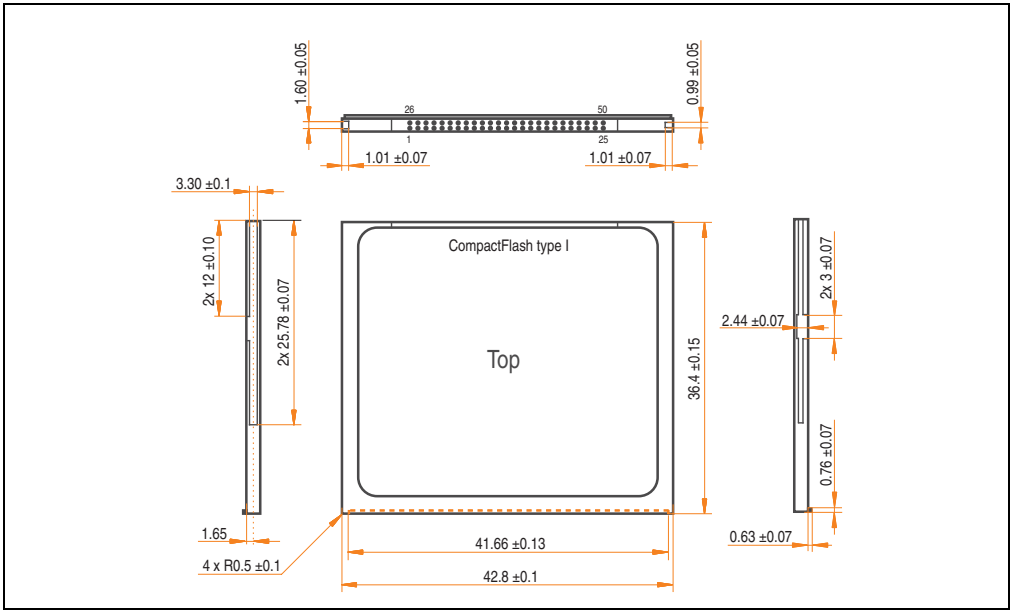


Figure 95: Dimensions - CompactFlash card Type I

7. USB flash drive

Information:

We reserve the right to supply alternative products due to the vast quantity of flash drives available on the market and their corresponding short product lifecycle. 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.**

7.1 General information

USB flash drives are easy-to-exchange storage media. Because of the fast data transfer (USB 2.0), the USB flash drives are ideal for use as a portable memory medium. Without requiring additional drivers ("Hot Plug & Play" - except with Windows 98SE), the USB flash drive can be converted immediately into an additional drive where data can be read or written.

7.2 Order data

Model number	Description	Figure
5MMUSB.2048-00	USB flash drive 2 GB SanDisk Cruzer Micro	
5MMUSB.2048-01	**USB flash drive 2 GB B&R** USB 2.0 flash drive 2 GB	

Table 188: Order data - USB flash drives

7.3 Technical data - 5MMUSB.2048-00

Information:

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

Features	5MMUSB.2048-00
LED	1 LED (green), signals data transfer (send and receive)
Power supply Current requirements	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 Bearings Transport	 0 to +45°C -20 to +60°C -20 to +60°C
Relative humidity Operation Bearings Transport	 10 to 90%, non-condensing 5 to 90%, non-condensing 5 to 90%, non-condensing
Vibration Operation Bearings Transport	 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 Bearings Transport	 Max. 40 g (392 m/s^2 0-peak) and 11 ms length Max. 80 g (784 m/s^2 0-peak) and 11 ms length Max. 80 g (784 m/s^2 0-peak) and 11 ms length

Table 189: Technical data - USB flash drive 5MMUSB.2048-00

Environmental characteristics	5MMUSB.2048-00
Altitude	
Operation	3,048 m
Bearings	12,192 m
Transport	12,192 m

Table 189: Technical data - USB flash drive 5MMUSB.2048-00 (Forts.)

7.3.1 Temperature humidity diagram - Operation and storage

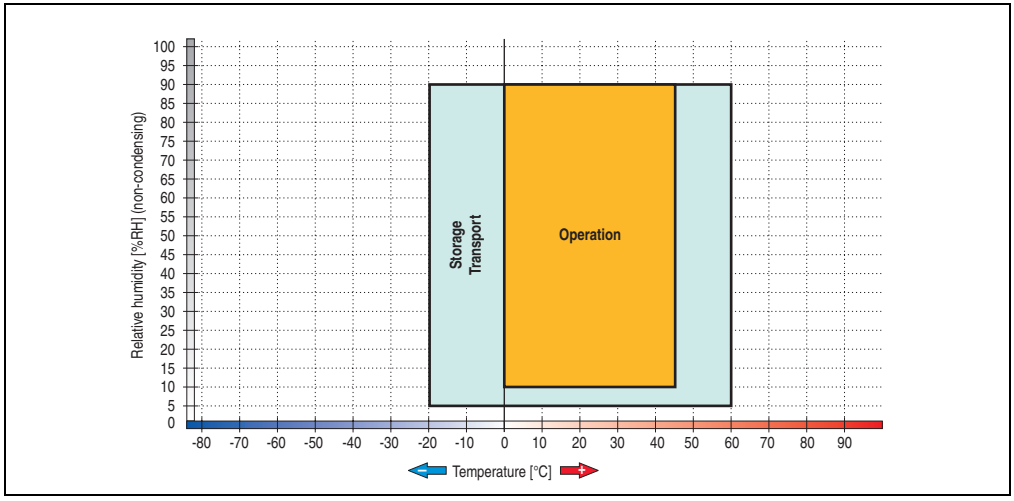


Figure 96: Temperature humidity diagram - USB flash drive - 5MMUSB.2048-00

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).

7.4 Technical data - 5MMUSB.2048-01

Information:

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

Features	5MMUSB.2048-01
LED	1 LED (green), signals data transfer (send and receive)
Power supply Current requirements	Via the USB port max. 500 µA 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 Bearings Transport	 0 to +70°C -50 to +100°C -50 to +100°C
Relative humidity Operation Bearings Transport	 85%, non-condensing 85%, non-condensing 85%, non-condensing
Vibration Operation Bearings Transport	 At 20 - 2000 Hz: 20 g (peak) At 20 - 2000 Hz: 20 g (peak) At 20 - 2000 Hz: 20 g (peak)
Shock Operation Bearings Transport	 max. 1500 g (peak) max. 1500 g (peak) max. 1500 g (peak)

Table 190: Technical data - USB flash drive 5MMUSB.2048-01

Environmental characteristics	5MMUSB.2048-01
Altitude	
Operation	3,048 meters
Bearings	12,192 meters
Transport	12,192 meters

Table 190: Technical data - USB flash drive 5MMUSB.2048-01 (Forts.)

7.4.1 Temperature humidity diagram

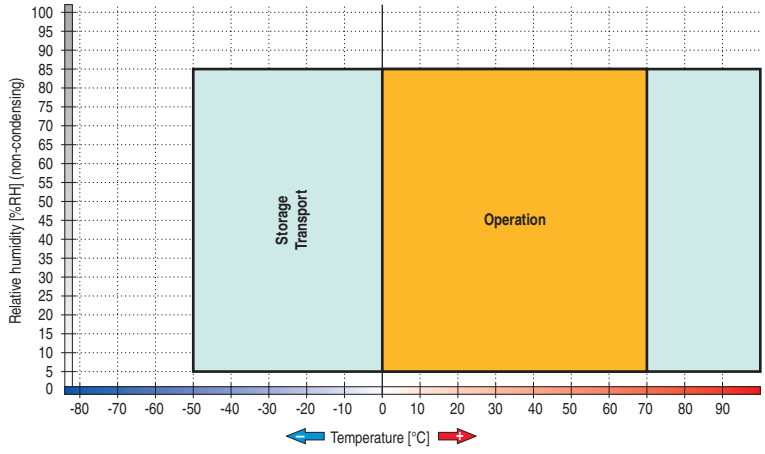


Figure 97: Temperature humidity diagram - USB flash drive - 5MMUSB.2048-01

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).

8. B&R Automation Runtime Dongle

8.1 General information

The Automation Runtime Dongle must be connected to use ARwin on B&R Industrial PC.

8.2 Order data

Model number	Description	Figure
1A4600.10	B&R Automation Runtime ARwin, incl. License Label and Security Key	
1A4600.10-2	B&R Automation Runtime ARwin, ARNC0	
1A4600.10-3	B&R Automation Runtime ARwin+PVIControls incl. License Label and Security Key	
1A4600.10-4	B&R Automation Runtime ARwin+ARNC0+PVIControls	

Table 191: Order data - B&R Automation Runtime Dongle

9. Cables

9.1 DVI cable 5CADVI.0xxx-00

The DVI cables 5CADVI.0xxx-00 are designed for fixed layout.

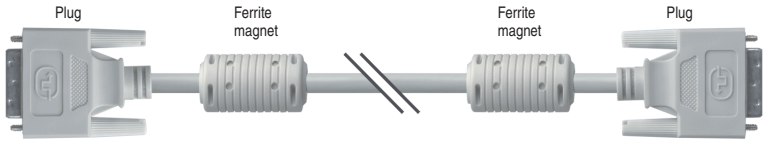


Figure 98: DVI extension cable 5CADVI.0xxx-00 (similar)

Caution!

The DVI cable can only be plugged in and unplugged when the device is turned off.

9.1.1 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 192: Model numbers - DVI cable 5CADVI.0xxx-00

9.1.2 Technical data

Features	5CADVI.0018-00	5CADVI.0050-00	5CADVI.0100-00
Length Tolerance	1.8 m ±50 mm	5 m ±80 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 257 5 x cable diameter (plug - ferrite magnet and ferrite magnet - ferrite magnet)		
Weight	Approx. 260 g	Approx. 460 g	Approx. 790 g

Table 193: Technical data - DVI cable 5CADVI.0xxx-00

9.1.3 Flex radius specification

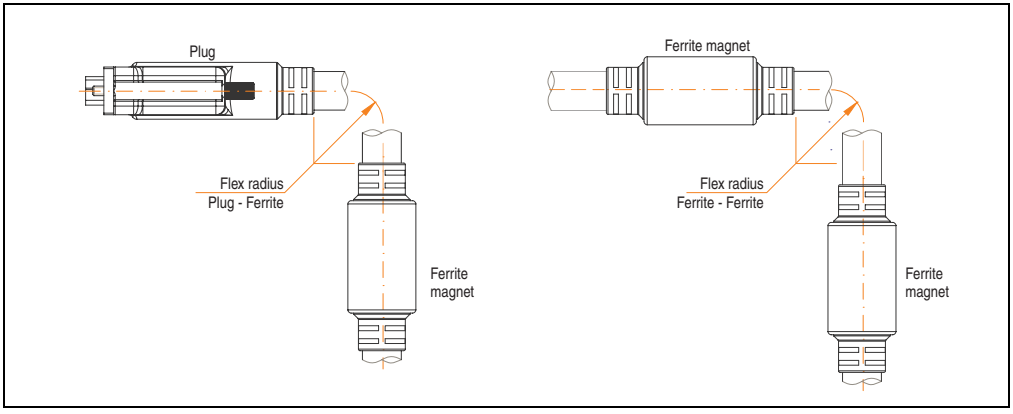


Figure 99: Flex radius specification

9.1.4 Dimensions

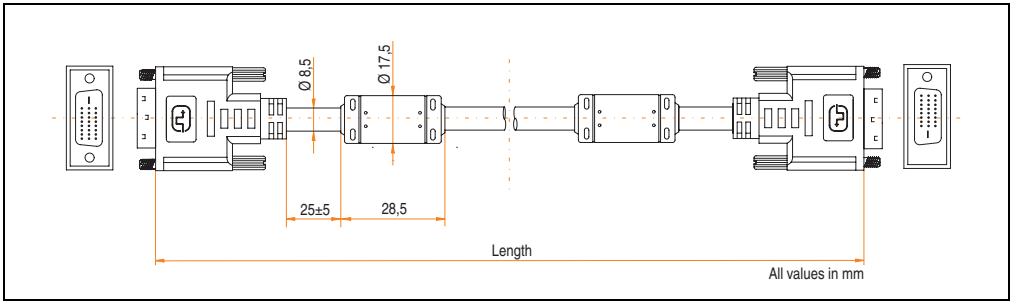


Figure 100: Dimensions - DVI cable 5CADVI.0xxx-00

9.1.5 Contents of delivery

Amount	Component
1	DVI cable in desired length, plug covers are attached at the cable ends.

Table 194: Contents of delivery - DVI cable 5CADVI.0xxx-00

9.1.6 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.

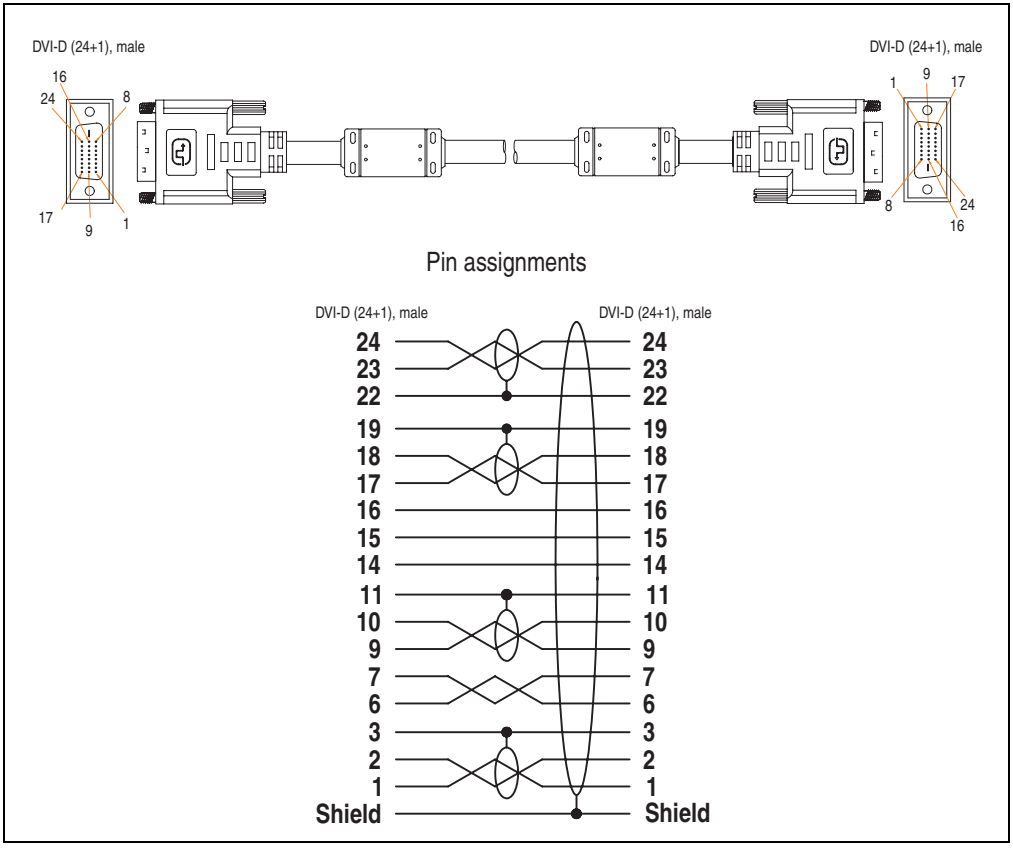


Figure 101: Pin assignments - DVI cable 5CADVI.0xxx-00

9.2 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).

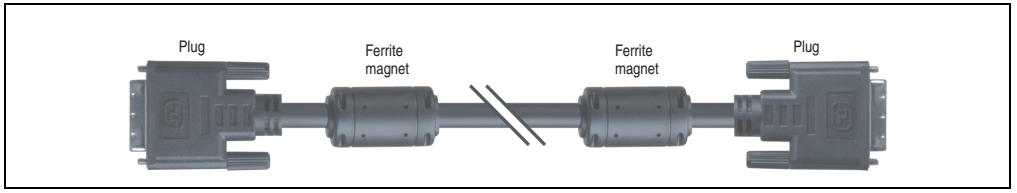


Figure 102: SDL cable 5CASDL.0xxx-00 (similar)

Caution!

The SDl cable can only be plugged in and unplugged when the device is turned off.

9.2.1 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 195: Model numbers - SDL cable 5CASDL.0xxx-00

9.2.2 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 ±30 mm	5 m ±30 mm	10 m ±50 mm	15 m ±100 mm	20 m ±100 mm	25 m ±100 mm	30 m ±100 mm
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 261 5 x cable diameter (plug - ferrite magnet and ferrite magnet - ferrite magnet)						
Weight	Approx. 300 g	Approx. 580 g	Approx. 1500 g	Approx. 2250 g	Approx. 2880 g	Approx. 4800 g	Approx. 5520 g

Table 196: Technical data - SDL cables 5CASDL.0xxx-00

9.2.3 Flex radius specification

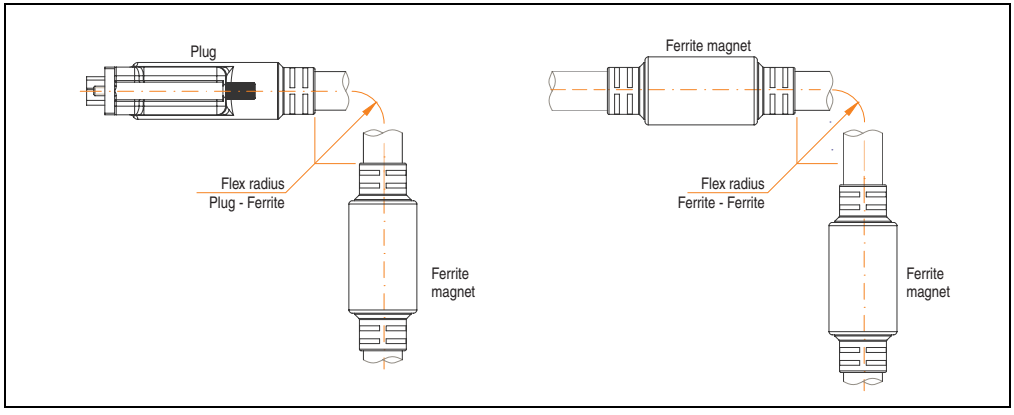


Figure 103: Flex radius specification

9.2.4 Dimensions

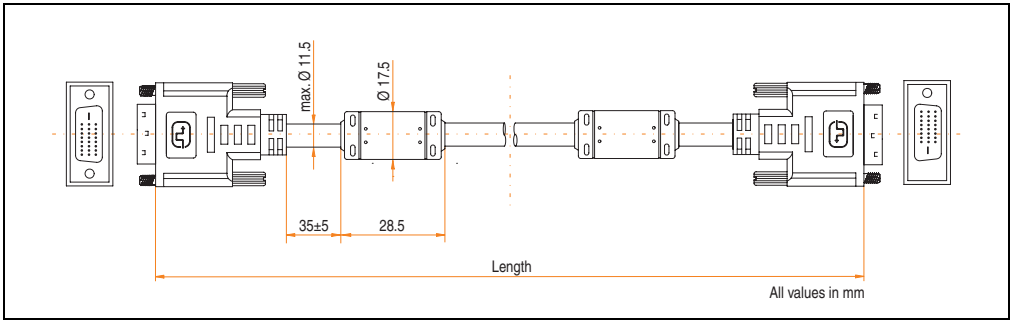


Figure 104: Dimensions - SDL cable 5CASDL.0xxx-00

9.2.5 Contents of delivery

Amount	Component
1	SDL cable in desired length, plug covers are attached at the cable ends.

Table 197: Contents of delivery - SDL cable 5CASDL.0xxx-00

9.2.6 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.

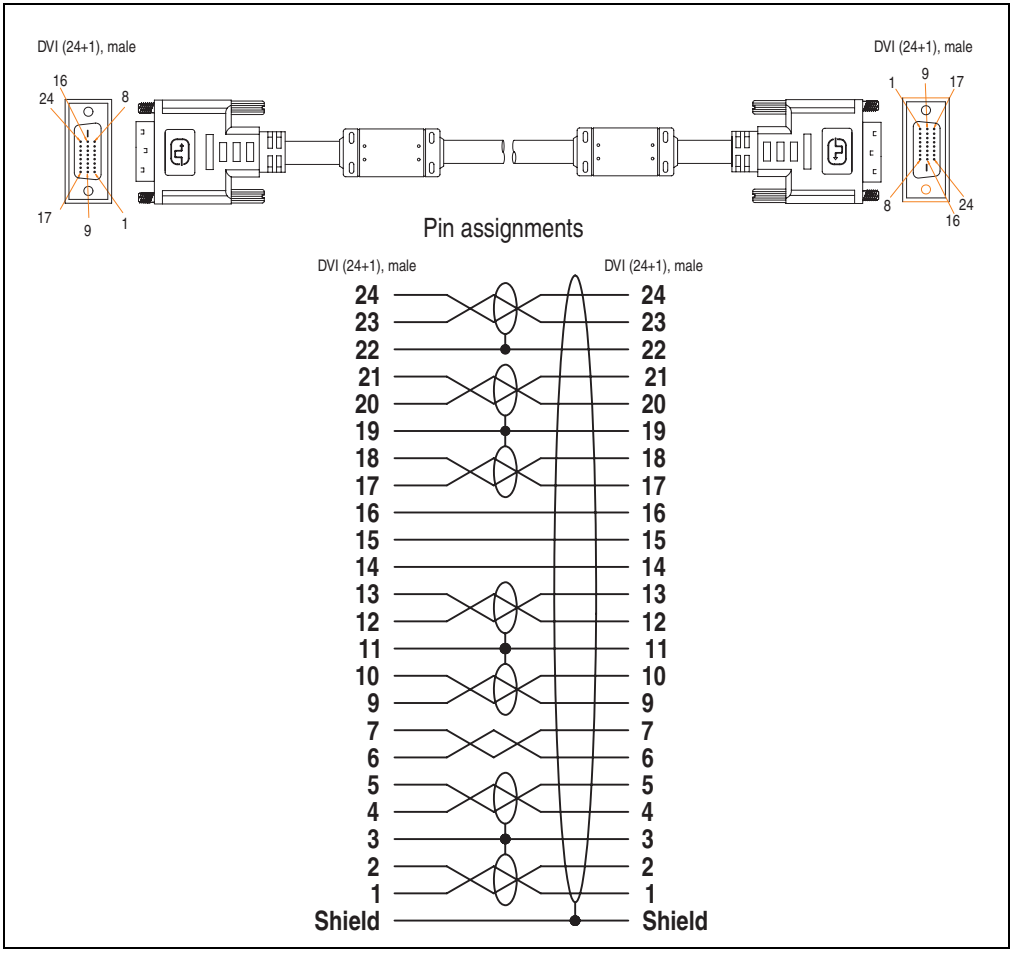


Figure 105: Pin assignments - SDL cable 5CASDL.0xxx-00

9.3 SDL cable with 45° plug 5CASDL.0xxx-01

The SDL cables 5CASDL.0xxx-01 are designed for fixed layout.

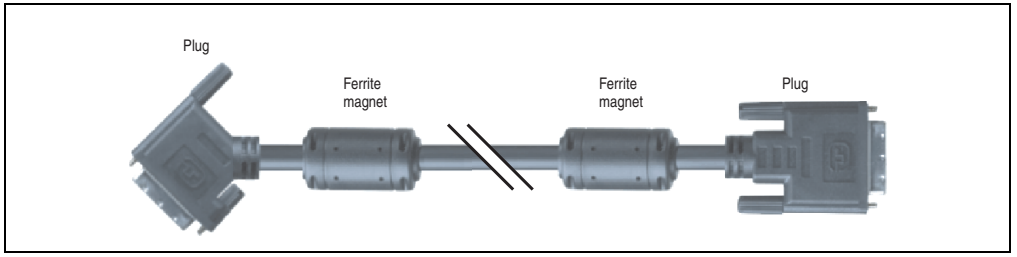


Figure 106: SDL cable with 45° plug 5CASDL.0xxx-01 (similar)

Caution!

The SDI cable can only be plugged in and unplugged when the device is turned off.

9.3.1 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 198: Model numbers - SDL cable with 45° plug 5CASDL.0xxx-01

9.3.2 Technical data

Features	5CASDL.0018-01	5CASDL.0050-01	5CASDL.0100-01	5CASDL.0150-01
Length Tolerance	1.8 m ±30 mm	5 m ±50 mm	10 m ±100 mm	15 m ±100 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 265 5 x cable diameter (plug - ferrite magnet and ferrite magnet - ferrite magnet)			
Weight	Approx. 300 g	Approx. 590 g	Approx. 2800 g	Approx. 2860 g

Table 199: Technical data - SDL cable with 45° plug 5CASDL.0xxx-01

9.3.3 Flex radius specification

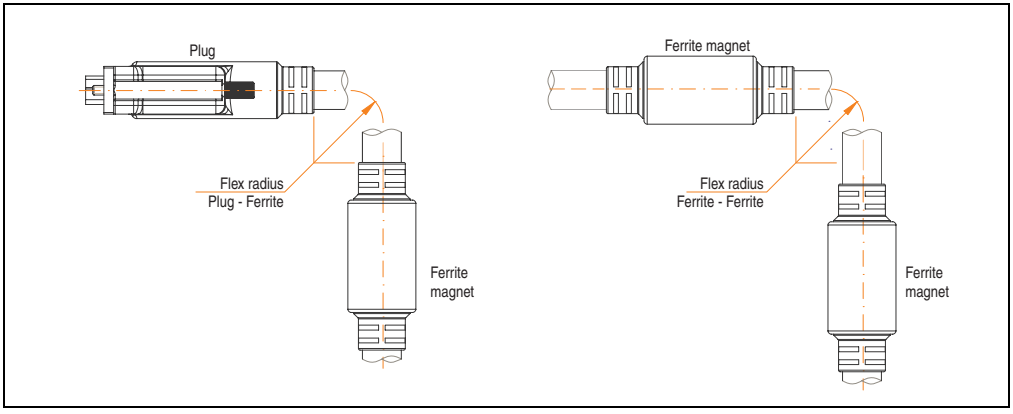


Figure 107: Flex radius specification

9.3.4 Dimensions

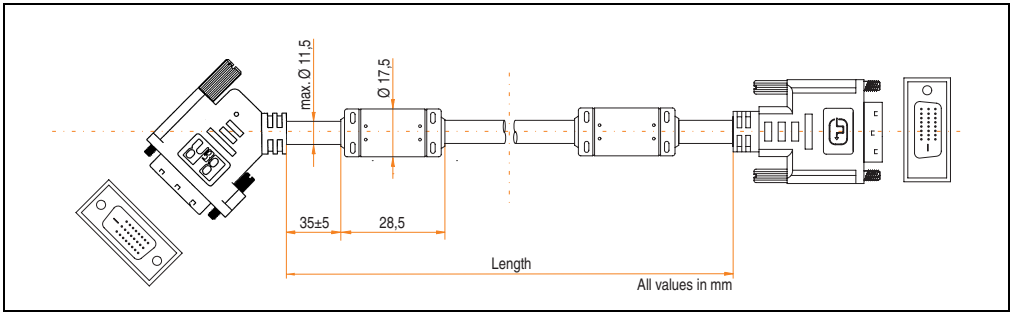


Figure 108: Dimensions - SDL cable with 45° plug 5CASDL.0xxx-01

9.3.5 Contents of delivery

Amount	Component
1	SDL cable with 45° plug in desired length, plug covers are attached at the cable ends.

Table 200: Contents of delivery - SDL cable with 45° plug 5CASDL.0xxx-01

9.3.6 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.

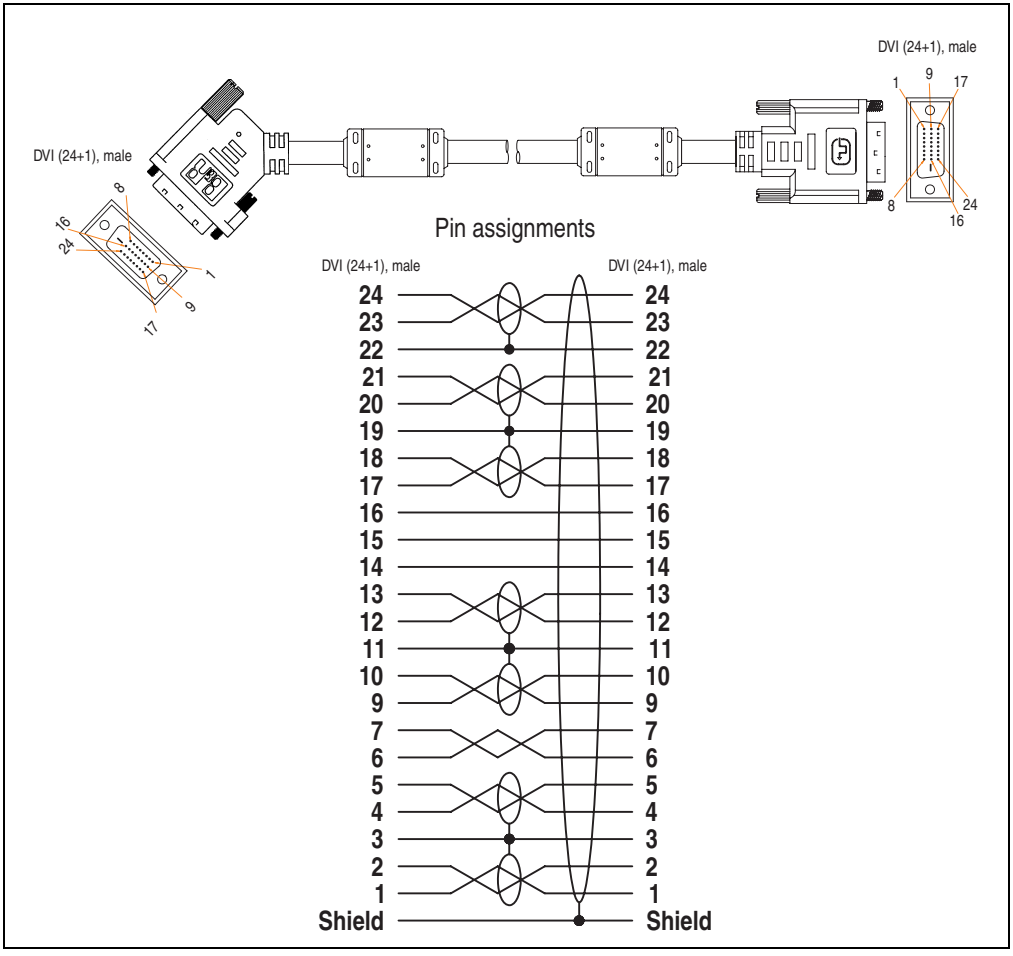


Figure 109: Pin assignments - SDL cable with 45° plug 5CASDL.0xxx-01

9.4 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).

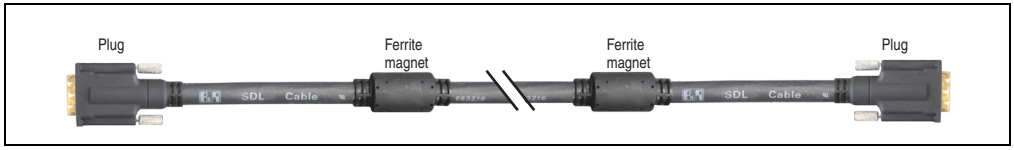


Figure 110: SDL flex cable 5CASDL.0xxx-03 (similar)

Caution!

The SDI cable can only be plugged in and unplugged when the device is turned off.

9.4.1 Order data

Model number	Description	Note
5CASDL.0018-03	**1.8 m flex SDL cable** SDL cable for fixed and flexible type of layout; length: 1.8 m	
5CASDL.0050-03	**5 m flex SDL cable** SDL cable for fixed and flexible type of layout; length: 5 m	
5CASDL.0100-03	**10 m flex SDL cable** SDL cable for fixed and flexible type of layout; length: 10 m	
5CASDL.0150-03	**15 m flex SDL cable** SDL cable for fixed and flexible type of layout; length: 15 m	
5CASDL.0200-03	**20 m flex SDL cable** SDL cable for fixed and flexible type of layout; length: 20 m	
5CASDL.0250-03	**25 m flex SDL cable** SDL cable for fixed and flexible type of layout; length: 25 m	
5CASDL.0300-03	**30 m flex SDL cable** SDL cable for fixed and flexible type of layout; length: 30 m	

Table 201: Model numbers - SDL flex cable 5CASDL.0xxx-03

9.4.2 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 270 6 x cable diameter (from plug to ferrite magnet) 10x cable diameter (of ferrite magnet - ferrite magnet) 15x cable diameter (of ferrite magnet - ferrite magnet)						
Weight	Approx. 460 g	Approx. 1020 g	Approx. 1940 g	Approx. 2840 g	Approx. 3740 g	Approx. 4560 g	Approx. 5590 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							
Ambient temperatures Fixed installation Moving Bearings	-20 to +80°C -5 to +60°C -20 to +80°C						
Fire resistance	Fire resistant according to UL758 (cable vertical flame test)						

Table 202: Technical data - SDL flex 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	100000 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 202: Technical data - SDL flex cable 5CASDL.0xxx-03 (Forts.)

9.4.3 Flex radius specification

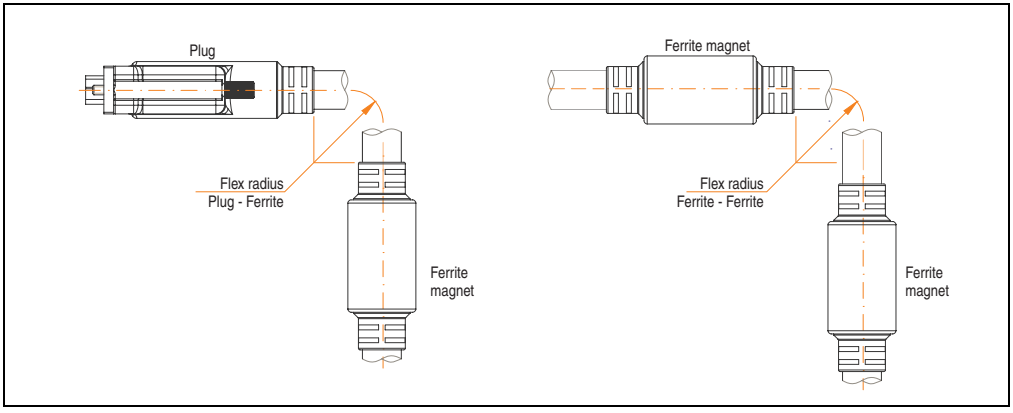


Figure 111: Flex radius specification

9.4.4 Dimensions

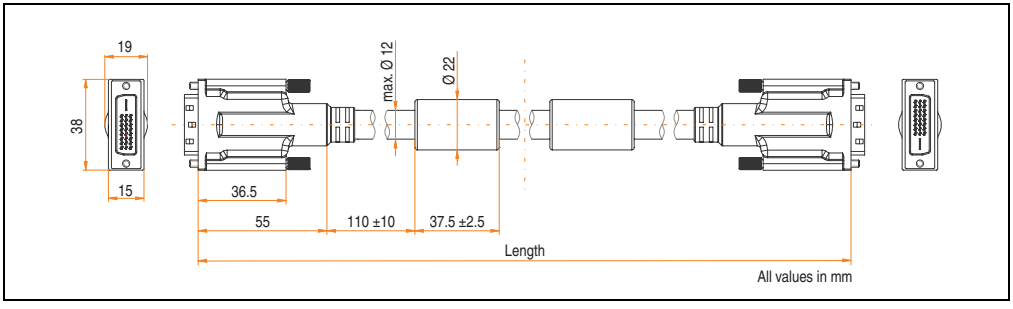


Figure 112: Dimensions - SDL flex cable 5CASDL.0xxx-03

9.4.5 Contents of delivery

Amount	Component
1	SDL flex cable in desired length, plug covers are attached at the cable ends.

Table 203: Contents of delivery - SDL flex cable 5CASDL.0xxx-03

9.4.6 Structure

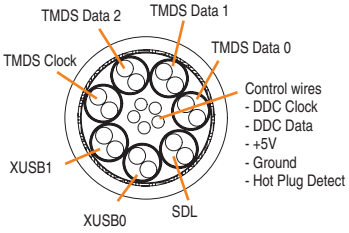
Element	Assignment	Cross section	
DVI	TMDS data 0	26 AWG	 Schematic display
	TMDS data 1	26 AWG	
	TMDS data 2	26 AWG	
	TMDS cycle	26 AWG	
USB	XUSB0	26 AWG	
	XUSB1	26 AWG	
Data	SDL	26 AWG	
Control wires	DDC cycle	24 AWG	
	DDC data	24 AWG	
	+5 V	24 AWG	
	mass	24 AWG	
	Hot Plug detect	24 AWG	

Table 204: Structure - SDL flex cable 5CASDL.0xxx-03

9.4.7 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.

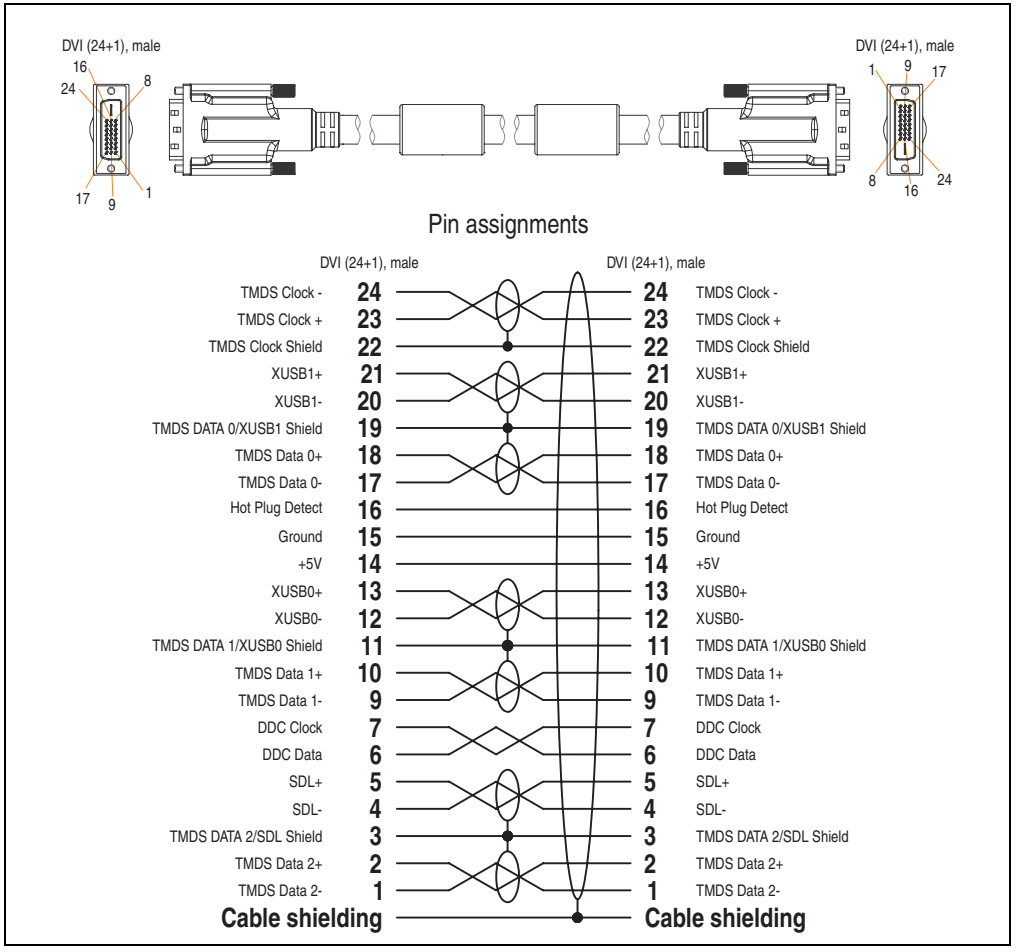


Figure 113: Pin assignments - SDL flex cable 5CASDL.0xxx-03

9.5 SDL flex cable with extender 5CASDL.0xx0-13

The SDL flex cables (with extender) 5CASDL.0xx0-13 are designed for both fixed and flexible installations (e.g. in swing arm systems).

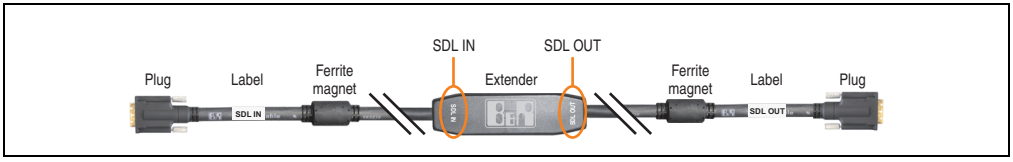


Figure 114: SDL flex cable with extender 5CASDL.0xx0-13

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).

9.5.1 Order data

Model number	Description	Note
5CASDL.0300-13	**30 m SDL flex cable with extender** SDL cable with extender for fixed and flexible type of layout; length: 30 m	
5CASDL.0400-13	**40 m SDL flex cable with extender** SDL cable with extender for fixed and flexible type of layout; length: 40 m	
5CASDL.0430-13	**43 m SDL flex cable with extender** SDL cable with extender for fixed and flexible type of layout; length: 43 m	

Table 205: Model numbers - SDL flex cable with extender 5CASDL.0xx0-13

9.5.2 Technical data

Features	5CASDL.0300-13	5CASDL.0400-13	5CASDL.0430-13
Length Tolerance	30 m ±280 mm	40 m ±380 mm	43 m ±410 mm
Dimensions - Extender box Height Width Length	18.5 mm 35 mm 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		
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 275 6 x cable diameter (from plug to ferrite magnet) 10 x cable diameter (of ferrite magnet - extender) 15x cable diameter (of ferrite magnet - ferrite magnet)		
Weight	Approx. 5430 g	Approx. 7200 g	Approx. 7790 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			

Table 206: Technical data - SDL flex cable with extender 5CASDL.0xx0-13

Ambient temperatures Fixed installation Moving Bearings	-20 to +60°C -5 to +60°C -20 to +60°C		
Environmental characteristics	**5CASDL.0300-13**	**5CASDL.0400-13**	**5CASDL.0430-13**
Fire resistance	Fire resistant according to 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 206: Technical data - SDL flex cable with extender 5CASDL.0xx0-13 (Forts.)

9.5.3 Flex radius specification

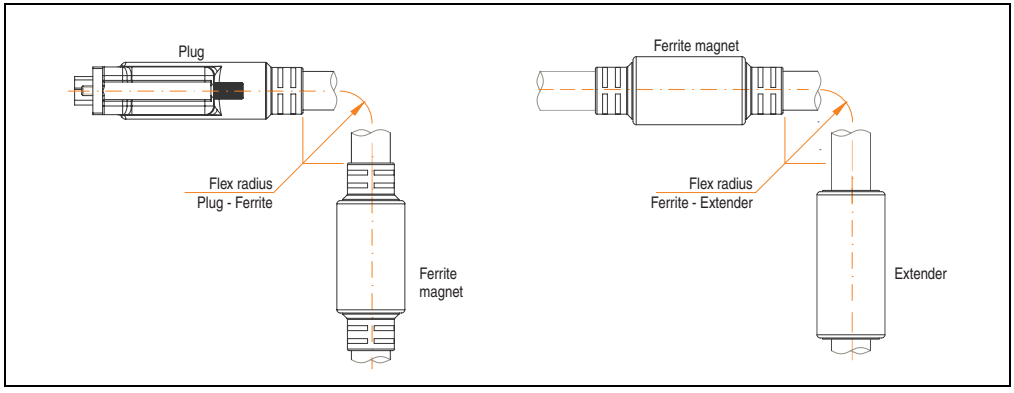


Figure 115: Flex radius specification

9.5.4 Dimensions

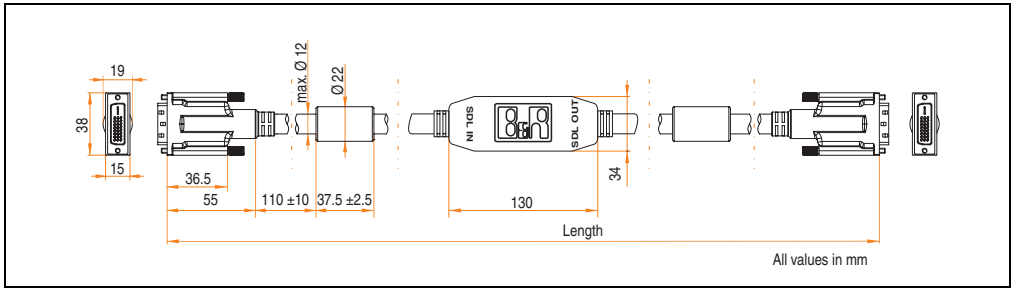


Figure 116: Dimensions - SDL flex cable with extender 5CASDL.0xx0-13

9.5.5 Contents of delivery

Amount	Component
1	SDL flex cable with extender in desired length, plug covers are attached at the cable ends.

Table 207: Contents of delivery - SDL flex cable with extender 5CASDL.0xx0-13

9.5.6 Cable connection

The SDL flex cable with extender must be connected between the Industrial PC and Automation Panel 900 display unit in the correct direction. The signal direction is indicated on the extender unit for this purpose:

- Connect the end labeled "SDL IN" with the video output of the APC 820 (monitor/panel output) or Panel OUT of an AP900 AP Link card.
- The "SDL OUT" end should be connected to the display unit (e.g. Automation Panel 900) via the Automation Panel Link insert card (Panel IN).

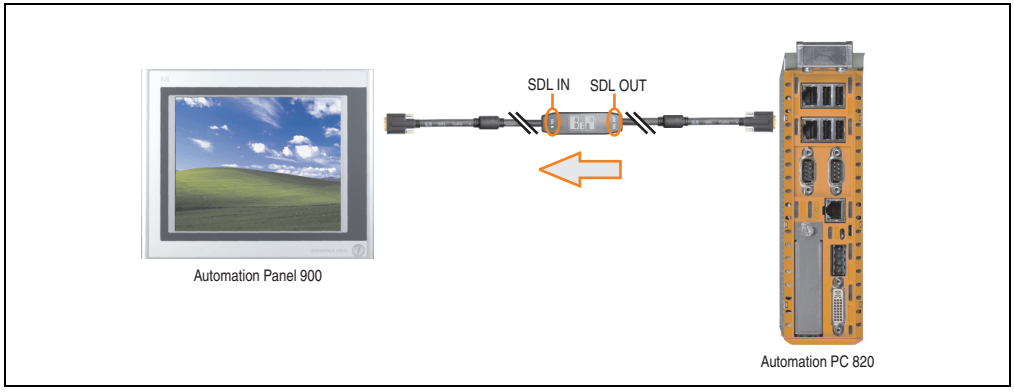


Figure 117: Example of signal direction for the SDL flex cable with extender - APC820

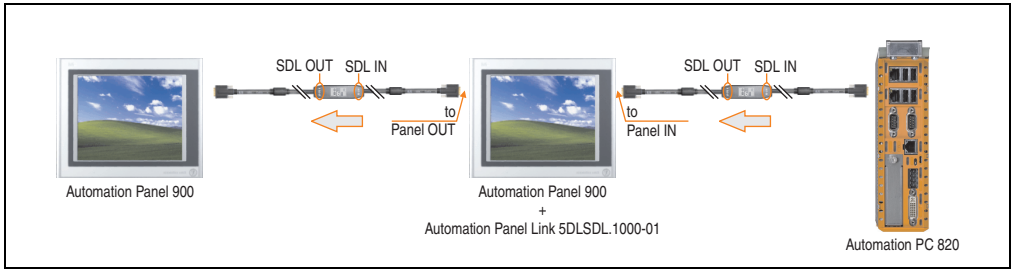


Figure 118: Example of signal direction display - SDL flex cable with extender

9.5.7 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.

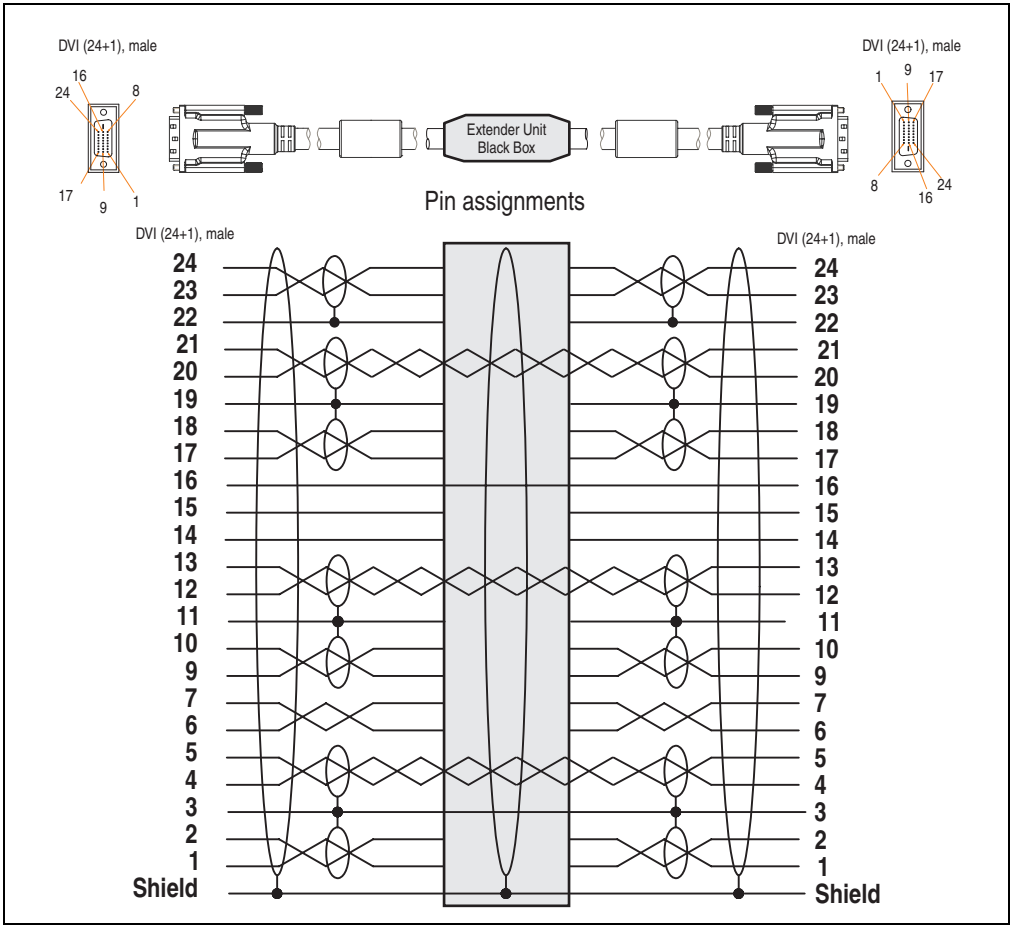


Figure 119: Pin assignments - SDL flex cable with extender 5CASDL.0xx0-13

9.6 RS232 cable 9A0014.xx

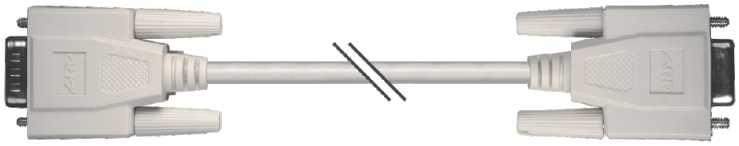


Figure 120: RS232 extension cable 9A0014.xx (similar)

9.6.1 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 208: Model numbers - RS232 cables 9A0014.xx

9.6.2 Technical data

Features	9A0014.02	9A0014.05	9A0014.10
Length	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 209: Technical data - RS232 cables 9A0014.xx

9.6.3 Contents of delivery

Amount	Component
1	RS232 cable in desired length

Table 210: Contents of delivery - RS232 cables 9A0014.xx

9.6.4 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.

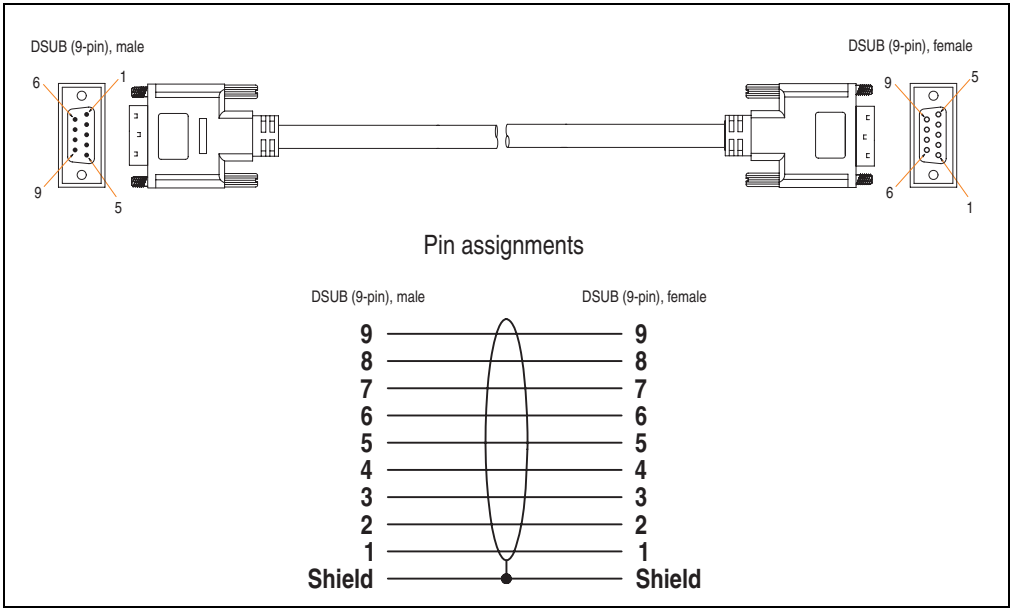


Figure 121: Pin assignments - RS232 cables 9A0014.xx

9.7 USB cable 5CAUSB.00xx-00

Figure 122: USB extension cable (similar)

9.7.1 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 211: Model numbers - USB cables

9.7.2 Technical data

Features	5CAUSB.0018-00	5CAUSB.0050-00
Length	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 212: Technical data - USB cables

9.7.3 Contents of delivery

Amount	Component
1	USB cable in desired length

Table 213: Contents of delivery - USB cable

9.7.4 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.

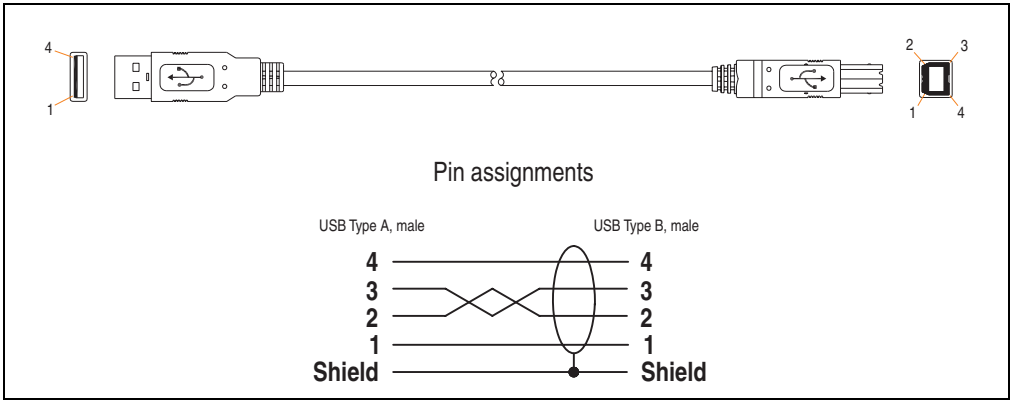


Figure 123: Pin assignments - USB cable

10. HMI Drivers & Utilities DVD 5SWHMI.0000-00

Figure 124: HMI Drivers & Utilities DVD 5SWHMI.0000-00

Model number	Short description	Note
5SWHMI.0000-00	**HMI Drivers & Utilities DVD**	

Table 214: 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 **www.br-automation.com** – Industrial PCs, Visualization and Operation).

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

BIOS upgrades for the products

- Automation PC 620 / Panel PC 700 CPU Board 815E und 855GME BIOS
- Automation PC 620 / Panel PC 700 CPU Board X855GME BIOS
- Automation PC 620 / Panel PC 700 CPU Board 945GME N270 BIOS
- Automation PC 680
- Automation PC 810 / Automation PC 820 / Panel PC 800 B945GME BIOS
- Automation PC 810 / Panel PC 800 945GME N270 CPU Board BIOS
- Automation PC 810 / Panel PC 800 GM45 CPU Board BIOS
- Provit 2000 products - IPC2000/2001/2002
- Provit 5000 products - IPC5000/5600/5000C/5600C

- Power Panel 100 BIOS devices
- Mobile Panel 100 BIOS devices
- Power Panel 100 / Mobile Panel 100 User Boot Logo
- Power Panel 100 / Mobile Panel 100 REMHOST Utility
- Power Panel 300/400 BIOS devices
- Power Panel 300/400 BIOS User Boot Logo
- Panel PC 310

Drivers for the devices

- Automation Device Interface (ADI)
- Audio
- Chipset
- CD-ROM
- LS120
- Graphics
- Network
- PCI / SATA RAID controller
- Touch screen
- Touchpad
- Interfacecard

Firmware Upgrades

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

Utilities / Tools

- B&R Embedded OS Installer
- Windows CE Tools
- User Boot Logo Conversion Utility
- SATA RAID Installations Utility
- Automation Device Interface (ADI)
- CompactFlash endurance calculator (Silicon Systems)
- Miscellaneous
- MTC Utilities
- Key Editor
- MTC & Mkey Utilities
- Mkey Utilities
- UPS configuration software
- ICU ISA configuration
- Intel PCI NIC Boot ROM
- Diagnostic Utilities

Windows

- Windows CE 6.0
- Windows CE 5.0
- Windows CE 4.2
- Windows CE 4.1
- Windows CE Tools
- Windows Embedded Standard 2009
- Thin Client
- Windows NT Embedded
- Windows XP Embedded
- VNC Viewer

MCAD templates for

- Industrial PCs
- Operator Interface devices
- Legend Strips templates
- Customized designs

ECAD templates for

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

Documentation for

- Automation PC 620
- Automation PC 680
- Automation PC 810
- Automation PC 820
- Automation Panel 800
- Automation Panel 900
- Panel PC 310
- Panel PC 700
- Panel PC 725
- Panel PC 800
- Power Panel 15/21/35/41
- Power Panel 100/200
- Power Panel 300/400
- Mobile Panel 40/50
- Mobile Panel 100/200
- Mobile Panel connection box
- Provit 2000
- Provit 3030
- Provit 4000
- Provit 5000
- Provit Benchmark
- Provit Mkey
- Windows CE 5.0 help
- Windows CE 6.0 help
- Windows NT Embedded application guide
- Windows XP Embedded application guide
- UPS - uninterruptible power supply

- Implementation instructions
- B&R Hilscher feldbus cards (CANopen, DeviceNet, PROFIBUS, PROFINET)

Service tools

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

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 APC820 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

- Cut off power supply to the Automation PC 820 (disconnect from the ACOPOSmulti rail).
- 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 removal strips.

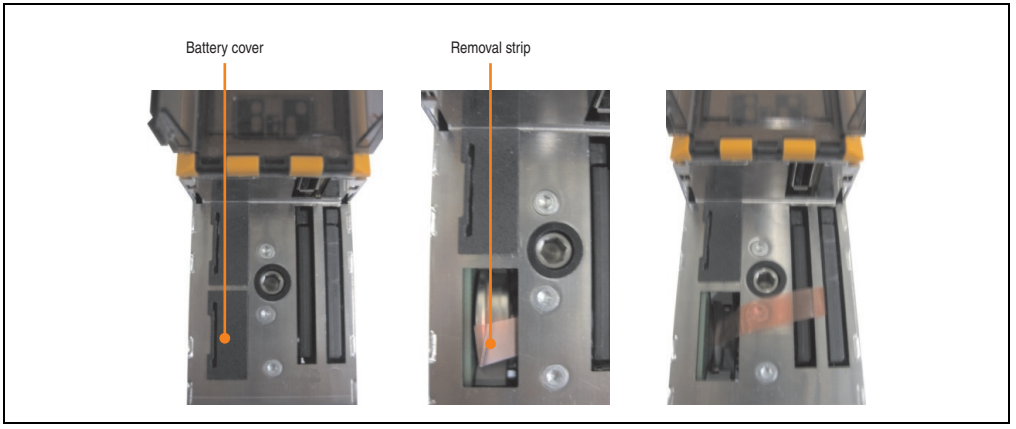


Figure 125: Remove battery

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

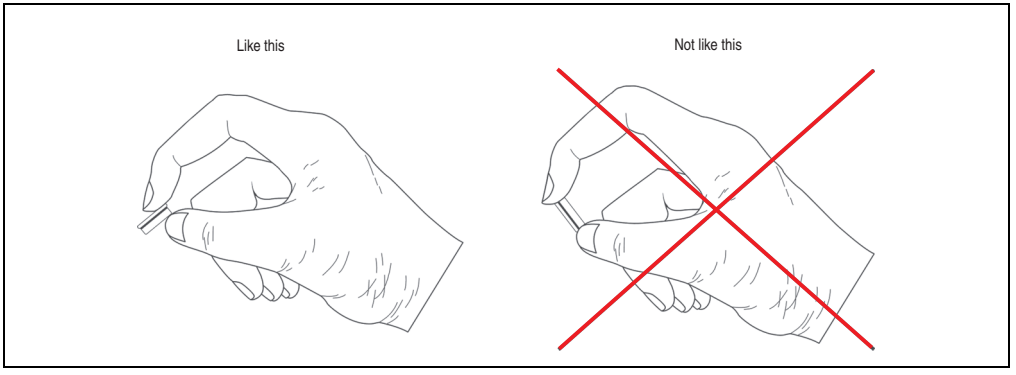


Figure 126: Battery handling

- Insert the new battery with correct polarity.

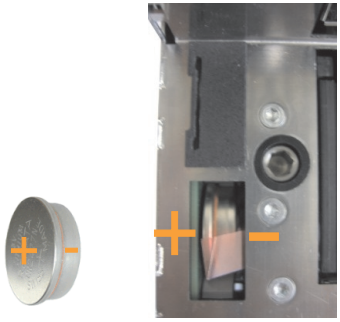


Figure 127: Battery polarity

- To make the next battery change easier, be sure the removal strip is in place when inserting battery.
- Reconnect the APC820 to the ACOPOSmulti rail and press the 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. Changing the fan

- Cut off power supply to the Automation PC 820 (disconnect from the ACOPOSmulti rail).
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Remove the fan from the holder. To do this, simply press the snap arms inward and carefully remove the fan from the housing.

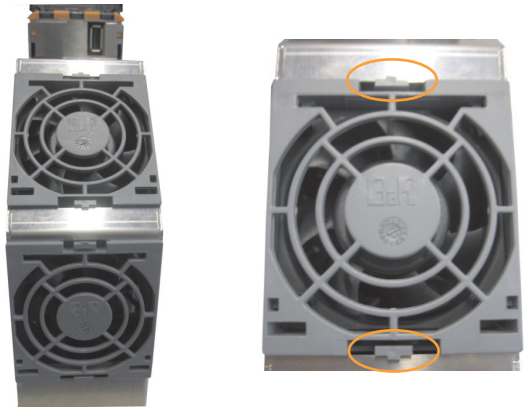


Figure 128: Removing the fan

- Disconnect the fan cable and remove the fan.

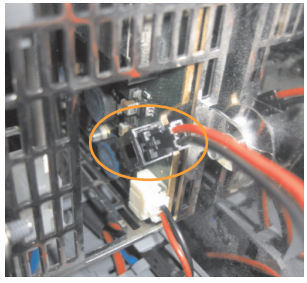


Figure 129: Disconnecting the fan cable

- Install the replacement fan in reverse order.

Appendix A

1. Maintenance Controller Extended (MTCX)

The MTCX controller (FPGA processor) is located on the main board (part of every system unit) of the APC820 device.

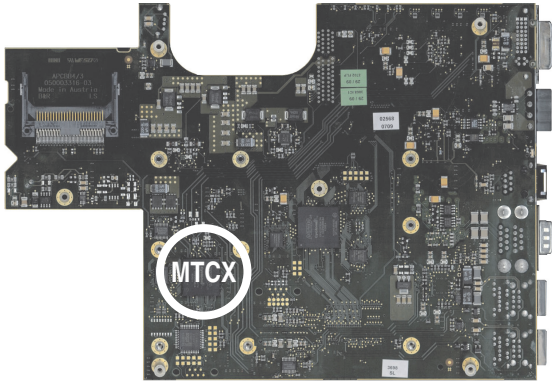


Figure 130: MTCX controller location

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

- Power on (power OK sequencing) and power fail logic
- Watchdog handling (NMI and reset handling)
- Temperature monitoring
- Fan control
- Key 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 (CF, Link)

The functions of the MTCX can be expanded via Firmware upgrade[1)] . The version can be read in BIOS or in Microsoft Windows XP/embedded, using B&R Control Center.

1) Can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).

2. 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.

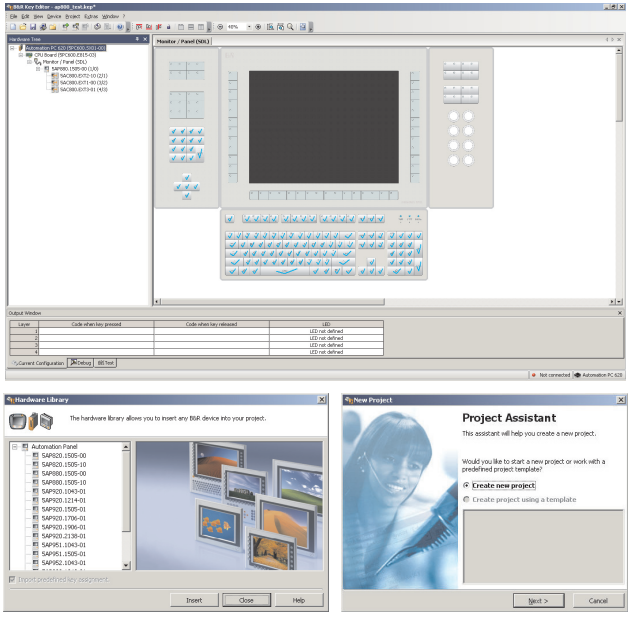


Figure 131: B&R Key Editor screenshots Version 3.10 (representation picture)

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 PCs and Panel PCs devices.

Supports following systems (Version 3.10):

- Automation PC 620
- Automation PC 810
- Automation PC 820
- Automation Panel 800
- Automation Panel 900
- IPC2000, IPC2001, IPC2002
- IPC5000, IPC5600
- IPC5000C, IPC5600C
- Mobile Panel 40/50
- Mobile Panel 100/200
- Panel PC 300
- Panel PC 700
- Panel PC 800
- Power Panel 100/200
- Power Panel 300/400
- Power Panel 500 (the Key Editor device file must be downloaded separately from the B&R homepage)

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).

3. B&R Automation Device Interface (ADI) development kit

This software can be used to activate functions of the B&R Automation Device Interface (ADI) from Windows applications, which, for example, were created using the following development tools:

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

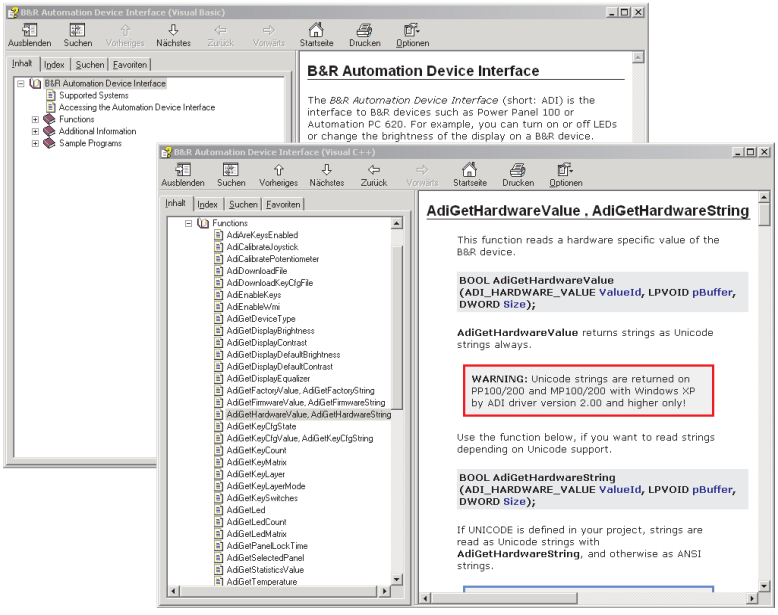


Figure 132: ADI development kit screenshots (Version 3.10)

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 driver is installed).

Supports following systems (Version 3.10 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
- Power Panel 500

The ADI driver suitable for the device must be installed on the stated product series. The ADI driver is already included in the B&R images of embedded operating systems.

A detailed description of using the ADI functions can be found in the 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**).

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

This software can be used to activate functions of the B&R Automation Device Interface (ADI) from .NET applications, which were created using Microsoft Visual Studio 2005 (or newer).

Supported programming languages:

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

System requirements:

- Developingsystem: PC with Windows XP/7 with
  - Microsoft Visual Studio 2005 or newer
  - Microsoft .NET Framework 2.0 and / or Microsoft .NET Compact Framework 2.0 or newer
  - Optional for Windows CE Systems: B&R Windows CE SDK

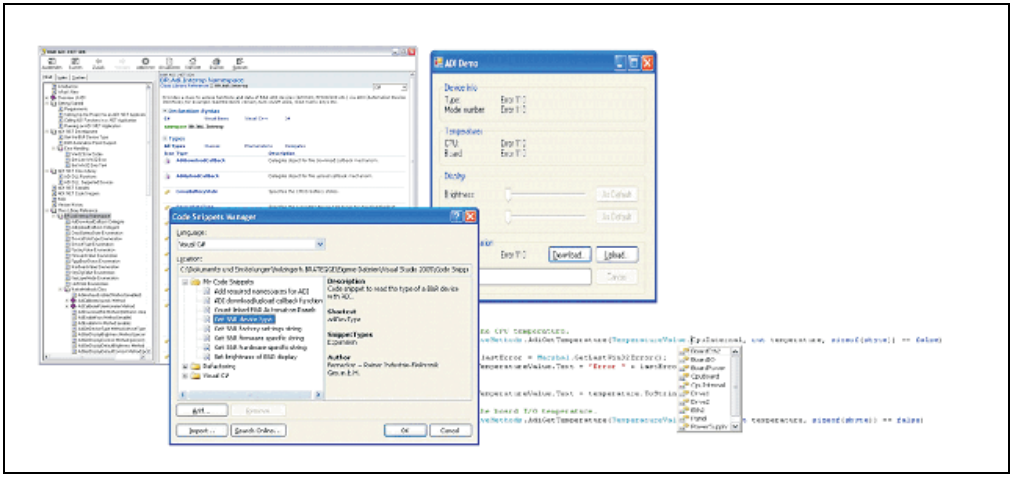


Figure 133: ADI .NET SDK Screenshots (Version 1.30)

Features:

- ADI .NET Class Library.
- Help files in HTML Help 1.0 format (.chm file) and MS Help 2.0 format (.HxS file).
- Sample projects and code snippets for Visual Basic, Visual C++, Visual C# and Visual J#.
- ADI DLL (for testing the applications, if no ADI driver is installed).

Supports following systems (Version 1.30 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 on the stated product series. The ADI driver is already included in the B&R images of embedded operating systems.

A detailed description of using the ADI functions can be found in the integrated online help.

The ADI .NET SDK can be downloaded for free from the download area on the B&R homepage (**www.br-automation.com**).

5. Glossary

A

ACOPOS

Digital B&R servo motor drive

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.

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.

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.

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.

Fiber optics

Fiber optic cable

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.

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".

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 the umbrella 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**).

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

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. 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**).

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 ... -30 V, low level: +3 ... +30 V. Cable lengths up to 15 m, transfer rates up to 20 KBit/s. For point-to-point connections between 2 participants.

RS422

Recommended **S**tandard **N**umber **422**. Interface standard, balanced operation, increased immunity to disturbances. High level: 2 ... -6 V, low level: +2 ... +6 V. 4-wire connection [inverted/not inverted], cable lengths up to 1200 m, transfer rates up to 10 MBit/s, 1 sender can carry out simplex communication with up to 10 receivers.

RS485

Recommended **S**tandard **N**umber **485**. Interface standard upgraded from RS422. High level: 1.5 ... -6 V, low level: +1.5 ... +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.

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.

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.

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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