

# Automation PC 820

## User's Manual

Version: **1.30 (December 2012)**

Model no.: **MAAPC820-ENG**

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# Chapter 1 • General information

## 1 Manual history

Version	Date	Change
0.10 Preliminary	11-Dec-08	<ul style="list-style-type: none"> <li>First version</li> </ul>
0.20 Preliminary	23-Jan-09	<ul style="list-style-type: none"> <li>"Software" and "Maintenance / Service" added.</li> <li>Additional information about humidity specifications added.</li> <li>Section see "Mounting" on page 71 revised.</li> <li>Section see "Glossary" on page 229 added.</li> <li>Description of the temperature sensor positions moved to "Technical data".</li> <li>Section "Environmentally friendly disposal" added to "General information".</li> </ul>
1.00	08-Sep-09	<ul style="list-style-type: none"> <li>Section "Power calculation" added to "Technical data".</li> <li>Section 1 "CAN plug (4-pin)" on page 179 added to "Accessories".</li> <li>Photos of the power and reset button added.</li> <li>B&amp;R CompactFlash card added.</li> <li>Technical data for Silicon Systems CFs revised.</li> <li>Section see "Temperature monitoring - Fan control" on page 227 added.</li> <li>Information added based on small changes made to interfaces and component positions for the APC820.</li> <li>L2 cache of CPU board 5PC800.B945-00 corrected to 2 MB.</li> <li>Section see "PClec plug-in cards" on page 64 added to "Technical data".</li> <li>Image "Figure 5: Block diagram - Automation PC 820" on page 27 updated.</li> <li>Interface descriptions added for revision A1 and later.</li> <li>PClec plug-in cards 5ACPCC.ETH0-00 and 5ACPCC.MPL0-00 added.</li> <li>RUN LED added to "Status LEDs".</li> <li>CPU board 5PC800.B945-04 added.</li> <li>Power supply with heat sink 5AC802.HS00-01 added.</li> <li>"Standards and certifications" added.</li> <li>ETH1 and ETH2 interfaces swapped.</li> <li>Technical data for the system unit 5PC820.SX1-00 completed.</li> <li>Data in section 2.1.3 "Temperature sensor locations" on page 23 added.</li> <li>"Figure 20: Swivel range of the front cover" on page 75 changed.</li> <li>Section 2.2 "Humidity specifications" on page 24 revised.</li> <li>"Figure 4: Supply voltage block diagram" on page 25 changed.</li> <li>Section 12 "B&amp;R Key Editor" on page 164 added.</li> <li>Section 2 "Upgrade information" on page 138 added.</li> <li>Section 3 "Microsoft DOS" on page 147 added.</li> <li>Section 1.12 "Distribution of resources" on page 135 added.</li> </ul>
1.10	13-Nov-09	<ul style="list-style-type: none"> <li>System unit 5PC820.SX01-01 added.</li> <li>Section 4.4 "5CFCRD.xxxx-04" on page 188 and section 4.5 "5CFCRD.xxxx-03" on page 192 updated.</li> <li>Section 5 "Known problems / issues" on page 91 added in Chapter 3 "Commissioning".</li> <li>Section 3 "Connection examples" on page 78 added in Chapter 3 "Commissioning".</li> <li>Section 4 "Connecting USB peripheral devices" on page 89 added in Chapter 3 "Commissioning".</li> <li>Section 1.2.3 "Wall mounting" on page 72 added in Chapter 3 "Commissioning".</li> <li>Information about the Status LEDs was added to page 43 (power LED blinking).</li> <li>The section "Creating a bootable USB flash drive" removed.</li> <li>Section 2.2 "Firmware upgrade" on page 141 added in Chapter 4 "Software".</li> <li>Section 10 "B&amp;R Automation Device Interface (ADI) Development Kit" on page 160 added to Appendix A.</li> <li>Technical data for the replacement fan 8BXF001.0000-00 corrected on page 63.</li> <li>Section 6 "Cables" on page 200 added in Chapter 6 "Accessories".</li> <li>Images for the CAN plugs 0TB704.9 and 0TB704.91 corrected.</li> </ul>
1.15	23-Nov-09	<ul style="list-style-type: none"> <li>System unit weight for 5PC820.SX01-00 corrected.</li> <li>Section 1.3 "Mounting orientation" on page 73 added.</li> <li>"Figure 1: Configuration - Base system" on page 20 corrected.</li> <li>Vibration and shock specifications for the system units changed.</li> <li>Information about the lifespan with and without the use of SRAM changed.</li> <li>Technical data for some SDL cables corrected and updated.</li> <li>SDL cable 5CASDL.0400-13 updated.</li> <li>Additional point added to section 5 "Known problems / issues" on page 91.</li> <li>Shock specifications removed.</li> </ul>

Table 1: Manual history

Version	Date	Change
1.20	07-Jul-10	<ul style="list-style-type: none"> <li>Chapter 5 "Standards and certifications" on page 166 revised.</li> <li>Section 6 "Windows Embedded Standard 2009" on page 152 added.</li> <li>B&amp;R ID codes for system units added.</li> <li>B&amp;R USB flash drive added to Chapter 6 "Accessories" on page 198.</li> <li>CPU boards 5PC800.B945-10, 5PC800.B945-11, 5PC800.B945-12, 5PC800.B945-13, 5PC800.B945-14 added.</li> <li>Technical data "Remanent variables for AR (Automation Runtime) in Power Fail Mode" added for the APC820 system units.</li> <li>Section 6 "Cables" on page 200 updated.</li> </ul>
1.21	25-May-11	<ul style="list-style-type: none"> <li>BIOS version updated (1.14 -&gt; 1.17).</li> <li>SRAM information for "5ACPCC.MPL0-00" on page 67 updated.</li> <li>Sections "Windows Embedded Standard 7" on page 154, "Automation Runtime" on page 157, "B&amp;R Automation Device Interface (ADI) .NET SDK" on page 162, "HMI Drivers &amp; Utilities DVD" on page 219 and "B&amp;R Automation Runtime Dongle" added.</li> <li>Sections "B&amp;R Automation Device Interface (ADI) - Control Center" on page 158, "B&amp;R Key Editor" on page 164 and "B&amp;R Automation Device Interface (ADI) Development Kit" on page 160 revised.</li> <li>Information about battery lifespan corrected.</li> <li>Chipset information for "CPU boards 945GME" on page 58 corrected.</li> <li>Section "Figure 2: Configuration - Optional components" on page 21 revised.</li> </ul>
1.30	10-Dec-12	<ul style="list-style-type: none"> <li>Section "Organization of safety notices" on page 15 revised - description text for "Caution" and "Warning" rewritten.</li> <li>Section "CompactFlash cards" updated.</li> <li>Section 10 "B&amp;R Automation Device Interface (ADI) Development Kit" on page 160 moved to the Chapter 4 "Software".</li> <li>Section "Replacing the CompactFlash card" on page 224 added to "Maintenance / Service".</li> <li>New CompactFlash cards 5CFCRD.xxxx-06 updated in Chapter 6 "Accessories". CompactFlash cards 5CFCRD.xxxx-04 discontinued.</li> <li>Section "Cable lengths and resolutions for SDL transfer" on page 29 added.</li> <li>Windows Embedded Standard 7 Service Pack 1 updated (see "Windows Embedded Standard 7" on page 154).</li> <li>"B&amp;R Automation Device Interface (ADI) - Control Center" on page 158 updated.</li> <li>"B&amp;R Automation Device Interface (ADI) Development Kit" on page 160 updated to version 3.40.</li> <li>"B&amp;R Automation Device Interface (ADI) .NET SDK" on page 162 updated to version 1.80.</li> <li>"B&amp;R Key Editor" on page 164 updated to version 3.30.</li> <li>CompactFlash card 5CFCRD.032G-06 added, see "5CFCRD.xxxx-06" on page 184.</li> <li>BIOS version updated (1.17 -&gt; 1.18).</li> <li>Entire manual revised according to current formatting standards.</li> </ul>

Table 1: Manual history

## 2 Safety notices

### 2.1 Intended use

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

### 2.2 Protection against electrostatic discharge

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

#### 2.2.1 Packaging

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

#### 2.2.2 Guidelines for proper ESD handling

##### Electrical components with a housing

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

##### Electrical components without a housing

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

- Any persons handling electrical components or devices with electrical components installed in them must be grounded.
- Components may only be touched on their narrow sides or front plate.
- Components should always be stored in a suitable medium (ESD packaging, conductive foam, etc.). Metallic surfaces are not suitable storage surfaces!
- Components should not be subjected to electrostatic discharge (e.g. through the use of charged plastics).
- Ensure a minimum distance of 10 cm from monitors and TV sets.
- Measurement devices and equipment must be grounded.
- Measurement probes on potential-free measurement devices must be discharged on sufficiently grounded surfaces before taking measurements.

##### Individual components

- ESD protective measures for individual components are thoroughly integrated at B&R (conductive floors, footwear, arm bands, etc.).
- These increased ESD protective measures for individual components are not necessary for customers handling B&R products.

### 2.3 Policies and procedures

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



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

All tasks such as installation, commissioning and maintenance are only permitted to be carried out by qualified personnel. Qualified personnel are those familiar with the transport, mounting, installation, commissioning and operation of the device who also have the appropriate qualifications (e.g. IEC 60364). National accident prevention guidelines must be observed.

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

## 2.4 Transport and storage

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

## 2.5 Installation

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

## 2.6 Operation

### 2.6.1 Protection against touching electrical parts

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

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

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

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

The use of operating/monitoring devices (e.g. industrial PCs, Power Panels, Mobile Panels, etc.) and uninterruptible power supplies in very dusty environments should be avoided. Dust collection on the devices can affect functionality and may prevent sufficient cooling, especially in systems with active cooling systems (fans).

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

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

### 2.6.3 Programs, viruses and dangerous programs

This system is subject to potential risk each time data is exchanged or software is installed from a data medium (e.g. diskette, CD-ROM, USB flash drive, etc.), a network connection or the Internet. The user is responsible for assessing these dangers, implementing preventive measures such as virus protection programs, firewalls, etc. and making sure that software is only obtained from trusted sources.

## 2.7 Environmentally friendly disposal

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

### 2.7.1 Separation of materials

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

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

Table 2: Environmentally friendly separation of materials

Disposal must comply with applicable legal regulations.

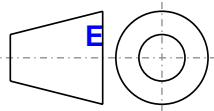
### 3 Organization of safety notices

The safety notices in this manual are organized as follows:

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

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

### 4 Guidelines



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

All dimensions are specified in mm.

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

Table 4: Nominal measurement areas

## 5 Overview

Product ID	Short description	on page
<b>Batteries</b>		
0AC201.91	Lithium batteries 4 pieces, 3 V / 950 mAh button cell Hereby we declare that the Lithium cells contained in this shipment qualify as „partly regulated“. Handle with care. If the package is damaged, inspect cells, repack intact cells and protect cells against short circuits. For emergency information, call RENATA SA at + 41 61 319 28 27	180
4A0006.00-000	Lithium battery, 3 V / 950 mAh, button cell	180
<b>CPU boards</b>		
5PC800.B945-00	Intel Core Duo L2400 CPU board, 1.66 GHz, dual-core, 667 MHz FSB, 2 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111B.	58
5PC800.B945-01	Intel Core2 Duo L7400 CPU board, 1.5 GHz, dual-core, 667 MHz FSB, 4 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111B.	58
5PC800.B945-02	Intel Core2 Duo U7500 CPU board, 1.06 GHz, dual-core, 533 MHz FSB, 2 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111B.	58
5PC800.B945-03	Intel Celeron M 423 CPU board, 1.06 GHz, single-core, 533 MHz FSB, 1 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111B.	58
5PC800.B945-04	Intel Core2 Duo T7400 CPU board, 2.16 GHz, dual-core, 667 MHz FSB, 4 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	58
5PC800.B945-10	Intel Core Duo L2400 CPU board, 1.66 GHz, dual-core, 667 MHz FSB, 2 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	58
5PC800.B945-11	Intel Core2 Duo L7400 CPU board, 1.5 GHz, dual-core, 667 MHz FSB, 4 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	58
5PC800.B945-12	Intel Core2 Duo U7500 CPU board, 1.06 GHz, dual-core, 533 MHz FSB, 2 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	58
5PC800.B945-13	Intel Celeron M 423 CPU board, 1.06 GHz, single-core, 533 MHz FSB, 1 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	58
5PC800.B945-14	Intel Core2 Duo T7400 CPU board, 2.16 GHz, dual-core, 667 MHz FSB, 4 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	58
<b>CompactFlash</b>		
5CFCRD.0064-03	CompactFlash 64 MB Western Digital (SLC)	192
5CFCRD.0128-03	CompactFlash 128 MB Western Digital (SLC)	192
5CFCRD.016G-04	CompactFlash 16 GB B&R (SLC)	188
5CFCRD.016G-06	CompactFlash 16 GB B&R (SLC)	184
5CFCRD.0256-03	CompactFlash 256 MB Western Digital (SLC)	192
5CFCRD.032G-06	CompactFlash 32 GB B&R (SLC)	184
5CFCRD.0512-03	CompactFlash 512 MB Western Digital (SLC)	192
5CFCRD.0512-04	CompactFlash 512 MB B&R (SLC)	188
5CFCRD.0512-06	CompactFlash 512 MB B&R (SLC)	184
5CFCRD.1024-03	CompactFlash 1 GB Western Digital (SLC)	192
5CFCRD.1024-04	CompactFlash 1 GB B&R (SLC)	188
5CFCRD.1024-06	CompactFlash 1 GB B&R (SLC)	184
5CFCRD.2048-03	CompactFlash 2 GB Western Digital (SLC)	192
5CFCRD.2048-04	CompactFlash 2 GB B&R (SLC)	188
5CFCRD.2048-06	CompactFlash 2 GB B&R (SLC)	184
5CFCRD.4096-03	CompactFlash 4 GB Western Digital (SLC)	192
5CFCRD.4096-04	CompactFlash 4 GB B&R (SLC)	188
5CFCRD.4096-06	CompactFlash 4 GB B&R (SLC)	184
5CFCRD.8192-03	CompactFlash 8 GB Western Digital (SLC)	192
5CFCRD.8192-04	CompactFlash 8 GB B&R (SLC)	188
5CFCRD.8192-06	CompactFlash 8 GB B&R (SLC)	184
<b>DVI cable</b>		
5CADVI.0018-00	DVI-D cable, 1.8 m.	200
5CADVI.0050-00	DVI-D cable, 5 m.	200
5CADVI.0100-00	DVI-D cable, 10 m.	200
<b>Fan modules</b>		
8BXF001.0000-00	ACOPOSmulti fan unit, replacement fan for ACOPOSmulti modules (8BxP/8B0C/8BVI/8BVE/8B0K)	63
<b>Heat sinks</b>		
5AC802.HS00-00	APC820 power supply and heat sink for CPU boards with Dual Core processors L2400, L7400, U7500 and Celeron M 423.	62
5AC802.HS00-01	APC820 power supply with heat sink for CPU board with dual core processor T7400.	62
<b>Interface cards</b>		
5ACPCC.ETH0-00	PCleC Ethernet card 1x 10/100/1000	65
5ACPCC.MPL0-00	PCleC POWERLINK card, 2 POWERLINK interfaces, 512 kByte SRAM	67
<b>MS-DOS</b>		
9S0000.01-010	OEM Microsoft MS-DOS 6.22, German Floppy disks, only available with a new PC.	147
9S0000.01-020	OEM Microsoft MS-DOS 6.22, English Floppy disks, only available with a new PC.	147
<b>Main memory</b>		
5MMDDR.0512-01	SO-DIMM DDR2 RAM 512 MB PC2-5300	61
5MMDDR.1024-01	SO-DIMM DDR2 RAM 1024 MB PC2-5300	61
5MMDDR.2048-01	SO-DIMM DDR2 RAM 2048 MB PC2-5300	61
<b>Miscellaneous</b>		
5AC900.1000-00	Adapter DVI (male) to CRT (female). For connecting a standard monitor to a DVI-I interface.	181
<b>Other</b>		
5SWHMI.0000-00	HMI Drivers & Utilities DVD	219
<b>RS232 cable</b>		
9A0014.02	RS232 extension cable for remote operating of a display unit with touch screen, 1.8 m.	217

Product ID	Short description	on page
9A0014.05	RS232 extension cable for remote operating of a display unit with touch screen, 5 m.	217
9A0014.10	RS232 extension cable for remote operating of a display unit with touch screen, 10 m.	217
<b>SDL cable - 45° connector</b>		
5CASDL.0018-01	SDL cable; 45° connector, 1.8 m.	213
5CASDL.0050-01	SDL cable; 45° connector, 5 m.	213
5CASDL.0100-01	SDL cable; 45° connector, 10 m.	213
5CASDL.0150-01	SDL cable; 45° connector, 15 m.	213
<b>SDL cables</b>		
5CASDL.0018-00	SDL cable, 1.8 m.	203
5CASDL.0050-00	SDL cable, 5 m.	203
5CASDL.0100-00	SDL cable, 10 m.	203
5CASDL.0150-00	SDL cable, 15 m.	203
5CASDL.0200-00	SDL cable, 20 m.	203
5CASDL.0250-00	SDL cable, 25 m.	203
5CASDL.0300-00	SDL cable, 30 m.	203
<b>SDL flex cable</b>		
5CASDL.0018-03	SDL Cable flex, 1.8 m.	206
5CASDL.0050-03	SDL cable flex, 5 m.	206
5CASDL.0100-03	SDL cable flex, 10 m.	206
5CASDL.0150-03	SDL cable flex, 15 m.	206
5CASDL.0200-03	SDL cable flex, 20 m.	206
5CASDL.0250-03	SDL cable flex, 25 m.	206
5CASDL.0300-03	SDL cable flex, 30 m.	206
5CASDL.0300-13	SDL cable flex with extender, 30 m.	209
5CASDL.0400-13	SDL cable flex with extender, 40 m.	209
5CASDL.0430-13	SDL Cable flex with extender, 43 m.	209
<b>System units</b>		
5PC820.SX01-00	APC820 system unit, cold plate mounting, 1 PCIe card slot; 2x CompactFlash slot, 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 over the ACOPOSmulti busbar.	50
5PC820.SX01-01	APC820 system unit, wall mounting, 1 PCIe card slot; 2x CompactFlash slot, 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 over the ACOPOSmulti busbar.	54
<b>Terminal blocks</b>		
0TB704.9	Accessory terminal block, 4-pin, screw clamps 2.5 mm <sup>2</sup>	179
0TB704.91	Accessory terminal block, 4-pin, cage clamps 2.5 mm <sup>2</sup>	179
<b>USB accessories</b>		
5MMUSB.2048-00	USB 2.0 Memory Stick 2048 MB	196
5MMUSB.2048-01	USB 2.0 flash drive 2048 MB B&R	198
<b>USB cable</b>		
5CAUSB.0018-00	USB 2.0 connecting cable type A - type B, 1.8 m.	216
5CAUSB.0050-00	USB 2.0 connecting cable type A - type B, 5 m.	216
<b>Undefined</b>		
1A4600.10-2	B&R Automation Runtime ARwin, ARNC0	157
1A4600.10-3	B&R Automation Runtime ARwin+PVIControls incl. License Label and Security Key	157
1A4600.10-4	B&R Automation Runtime ARwin+ARNC0+PVIControls	157
<b>Windows Embedded Standard 2009</b>		
5SWWXP.0728-ENG	Microsoft OEM Windows Embedded Standard 2009, English; for APC820 with 945GME chipset; please order CompactFlash separately (minimum 1 GB).	152
<b>Windows Embedded Standard 7</b>		
5SWWI7.0528-ENG	Microsoft OEM Windows Embedded Standard 7 32-bit, English; for APC820 with 945GME chipset; please order CompactFlash separately (minimum 8 GB).	154
5SWWI7.0628-ENG	Microsoft OEM Windows Embedded Standard 7 64-bit, English; for APC820 with 945GME chipset; please order CompactFlash separately (minimum 16 GB).	154
5SWWI7.0728-MUL	Microsoft OEM Windows Embedded Standard 7 Premium 32-bit, multilanguage; for APC820 with 945GME chipset; please order CompactFlash separately (minimum 8 GB).	154
5SWWI7.0828-MUL	Microsoft OEM Windows Embedded Standard 7 Premium 64-bit, multilanguage; for APC820 with 945GME chipset; please order CompactFlash separately (minimum 16 GB).	154
5SWWI7.1528-ENG	Microsoft OEM Windows Embedded Standard 7 32-bit, Service Pack 1, English; for APC820 with 945GME chipset; please order CompactFlash separately (minimum 16 GB).	154
5SWWI7.1628-ENG	Microsoft OEM Windows Embedded Standard 7 64-bit, Service Pack 1, English; for APC820 with 945GME chipset; please order CompactFlash separately (minimum 16 GB).	154
5SWWI7.1728-MUL	Microsoft OEM Windows Embedded Standard 7 Premium 32-bit, Service Pack 1, multilanguage; for APC820 with 945GME chipset; please order CompactFlash separately (minimum 16 GB).	154
5SWWI7.1828-MUL	Microsoft OEM Windows Embedded Standard 7 Premium 64-bit, Service Pack 1, multilanguage; for APC820 with 945GME chipset; please order CompactFlash separately (minimum 16 GB).	154
<b>Windows XP Embedded</b>		
5SWWXP.0428-ENG	Microsoft OEM Windows XP Embedded Feature Pack 2007, English; for APC820 with 945GME chipset; please order CompactFlash separately (minimum 512 MB).	150
<b>Windows XP Professional</b>		
5SWWXP.0500-ENG	Microsoft OEM Windows XP Professional Service Pack 2c, CD, English. Only available with a B&R device.	148
5SWWXP.0500-GER	Microsoft OEM Windows XP Professional Service Pack 2c, CD, German. Only available with a B&R device.	148
5SWWXP.0500-MUL	Microsoft OEM Windows XP Professional Service Pack 2c, CD, multilanguage. Only available with a B&R device.	148
5SWWXP.0600-ENG	Microsoft OEM Windows XP Professional Service Pack 3, CD, English. Only available with a B&R device.	148
5SWWXP.0600-GER	Microsoft OEM Windows XP Professional Service Pack 3, CD, German. Only available with a device.	148
5SWWXP.0600-MUL	Microsoft OEM Windows XP Professional Service Pack 3, CD, multilanguage. Only available with a B&R device.	148

Product ID	Short description	on page
	<b>Windows-based Runtime</b>	
1A4600.10	B&R Automation Runtime ARwin, incl. License Label and Security Key	157

## Chapter 2 • Technical data

### 1 Introduction

The ultra-compact, integrated ACOPOSmulti solution offers the most cost-effective solution possible for machines with multiple axes. What makes the ACOPOSmulti so easy to use? Maybe it's the modular cooling concept that can be flexibly adapted to any installation, the user-friendly cabling or its scalable performance.

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 control 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 PCIe 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)
- Fan
- BIOS (AMI)

- 24 VDC supply voltage (via ACOPOSmulti supply busbar)
- Installation as with ACOPOSmulti system units
- Dongle
- Battery






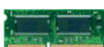
## 1.2 System components

The APC820 system can be assembled to meet individual requirements and operating 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 - Base system

Configuration - Base system		
Mounting plate <sup>1)</sup>	Select one	
	8B0MnnnnHC00.000-1 - Cold-plate mounting 8B0MnnnnHF00.000-1 <sup>2)</sup> - Feed-through mount.	8B0MnnnnHW00.000-1 - Wall mounting
System unit	Select one	
A system unit consists of a housing and main board.	 5PC820.SX01-00	 5PC820.SX01-01
CPU board - Power supply with heat sink - Main memory		
CPU board	Select one	
	5PC800.B945-00 / -10 5PC800.B945-01 / -11 5PC800.B945-02 / -12 5PC800.B945-03 / -12 5PC800.B945-04 / -14	
Power supply + heat sink	Select one	
	5AC802.HS00-00	5AC802.HS00-01
Main memory	Select 1 or 2 (max. 3 GB can be used)	
	5MMDDR.0512-01 - 512 MB 5MMDDR.1024-01 - 1 GB 5MMDDR.2048-01 - 2 GB	

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 from the B&R homepage free of charge.

2) The number of slots must be a multiple of 4.

Figure 1: Configuration - Base system



## 1.2.2 Configuration - Optional components







Configuration - Software and accessories																																			
System unit																																			
A system unit consists of a housing and a main board.	 5PC820.SX01-00	 5PC820.SX01-01																																	
PClec plug-in cards	Select 1																																		
	5ACPCC.ETH0-00 (PClec Ethernet card 10/100/1000) 5ACPCC.MPL0-00 (PClec POWERLINK MN 2-port)																																		
Replacement fan	Select 1																																		
	8BXF001.0000-00																																		
CompactFlash	Select 1 or 2																																		
	5CFCRD.0512-06, 5CFCRD.1024-06, 5CFCRD.2048-06, 5CFCRD.4096-06, 5CFCRD.8192-06, 5CFCRD.016G-06 5CFCRD.0064-03, 5CFCRD.0128-03, 5CFCRD.0256-03, 5CFCRD.0512-03, 5CFCRD.1024-03, 5CFCRD.2048-03, 5CFCRD.4096-03, 5CFCRD.8192-03																																		
Software	Select 1																																		
	<table> <tr> <td><b>Windows XP</b></td><td><b>Windows Embedded Standard 2009</b></td><td><b>Automation Runtime</b></td></tr> <tr> <td>5SWWXP.0500-ENG</td><td>5SWWXP.0728-ENG</td><td>1A4601.06</td></tr> <tr> <td>5SWWXP.0500-GER</td><td></td><td>1A4601.06-2</td></tr> <tr> <td>5SWWXP.0500-MUL</td><td><b>Windows XP Embedded</b></td><td>1A4600.10</td></tr> <tr> <td>5SWWXP.0600-ENG</td><td>5SWWXP.0428-ENG</td><td>1A4600.10-2</td></tr> <tr> <td>5SWWXP.0600-GER</td><td><b>Windows Embedded Standard 7</b></td><td>1A4600.10-3</td></tr> <tr> <td>5SWWXP.0600-MUL</td><td>5SWWI7.0528-ENG</td><td>1A4600.10-4</td></tr> <tr> <td></td><td>5SWWI7.0628-ENG</td><td></td></tr> <tr> <td><b>Microsoft DOS</b></td><td>5SWWI7.0728-MUL</td><td></td></tr> <tr> <td>9S0000.01-010</td><td>5SWWI7.0828-MUL</td><td></td></tr> <tr> <td>9S0000.01-020</td><td></td><td></td></tr> </table>		<b>Windows XP</b>	<b>Windows Embedded Standard 2009</b>	<b>Automation Runtime</b>	5SWWXP.0500-ENG	5SWWXP.0728-ENG	1A4601.06	5SWWXP.0500-GER		1A4601.06-2	5SWWXP.0500-MUL	<b>Windows XP Embedded</b>	1A4600.10	5SWWXP.0600-ENG	5SWWXP.0428-ENG	1A4600.10-2	5SWWXP.0600-GER	<b>Windows Embedded Standard 7</b>	1A4600.10-3	5SWWXP.0600-MUL	5SWWI7.0528-ENG	1A4600.10-4		5SWWI7.0628-ENG		<b>Microsoft DOS</b>	5SWWI7.0728-MUL		9S0000.01-010	5SWWI7.0828-MUL		9S0000.01-020		
<b>Windows XP</b>	<b>Windows Embedded Standard 2009</b>	<b>Automation Runtime</b>																																	
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9S0000.01-010	5SWWI7.0828-MUL																																		
9S0000.01-020																																			

Figure 2: Configuration - Optional components

## 2 Complete device

### 2.1 Temperature specifications

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

#### Information:

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

#### Information regarding worst-case conditions

- Thermal Analysis Tool (TAT V2.02) from Intel for simulating a 100% processor load
- BurnInTest tool (BurnInTest V4.0 Pro from Passmark Software) for simulating a 100% load on the interface via loop back adapters (serial interfaces, USB ports)
- Maximum system expansion and power consumption

#### 2.1.1 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 meters above sea level.		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
The maximum ambient temperature must typically be derated by 1°C per 1000 meters (starting at 500 meters above sea level).						
<b>Maximum ambient temperature</b>		<b>55</b>	<b>55</b>	<b>55</b>	<b>55</b>	<b>55</b>
What can also be operated at the max. ambient temperature, or are there limits?						
<b>Main memory</b>	5MMDDR.0512-01	✓	✓	✓	✓	✓
	5MMDDR.1024-01	✓	✓	✓	✓	✓
	5MMDDR.2048-01	✓	✓	✓	✓	✓
<b>System unit</b>	5PC820.SX01-00	✓	✓	✓	✓	✓
	5PC820.SX01-01	✓	✓	✓	✓	✓
<b>Insert cards PClec card slot</b>	5ACPCC.ETH0-00	✓	✓	✓	✓	✓
	5ACPCC.MPL0-00	✓	✓	✓	✓	✓

Table 5: Ambient temperature with a fan kit

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

1. Selecting the CPU type.
2. The "Maximum ambient temperature" row shows the maximum ambient temperature for the system as a whole, including the respective CPU board.

#### Information:

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

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

If there is a specific temperature, for example "35", next to the component, then the ambient temperature of the whole APC820 system cannot exceed this temperature.

## 2.1.2 Temperature monitoring

Sensors monitor temperature values at various places in the APC820 (CPU, board, board I/O, baseboard out, baseboard center, baseboard in, power supply, IF slot). The locations of the temperature sensors can be seen in "Figure 3: Temperature sensor position" on page 23. The values listed in the table represent the defined maximum temperature<sup>1)</sup> for the respective measurement point. An alarm is not triggered if this temperature is exceeded. The temperatures can be read in BIOS (menu item "Advanced" - Baseboard/Panel Features - Baseboard Monitor) or in approved Microsoft operating systems using the B&R Control Center.

## 2.1.3 Temperature sensor locations

Sensors indicate temperature values in many different areas inside the APC820. The temperatures<sup>1)</sup> can be read in BIOS (menu item Advanced - Baseboard/Panel Features - Baseboard Monitor) or in Microsoft Windows operating systems via the B&R Control Center<sup>2)</sup>.

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

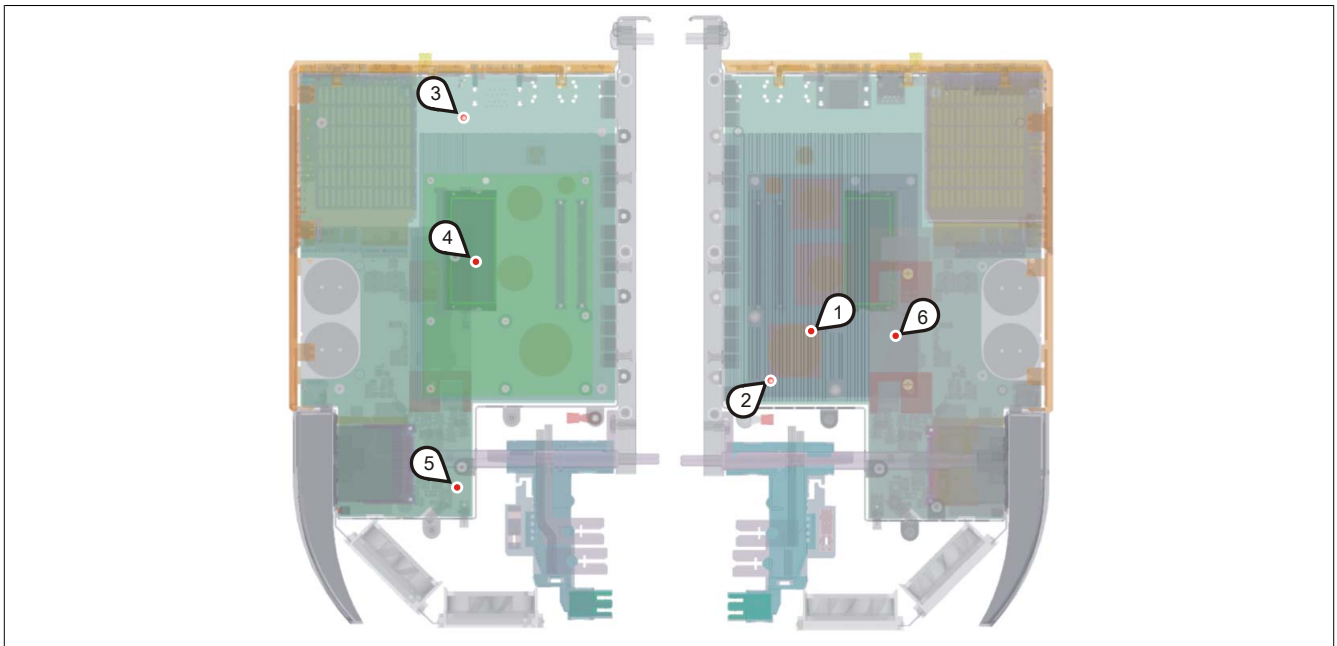


Figure 3: Temperature sensor position

Position	Measurement point for	Measurement	Max. specified
1	CPU	Ambient temperature of the processor (integrated in 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 (PClec card slot)	Temperature of the PClec slot; the sensor is located directly on the plug-in card.	Depending on the plug-in cards used

Table 6: Temperature sensor locations

1) The temperature measured approximates the immediate ambient temperature but may also be influenced by neighboring components.

1) The measured temperature approximates the immediate ambient temperature, but can be influenced by neighbouring components.

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

## 2.2 Humidity specifications

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

Component		Operation	Storage / Transport
CPU boards 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	5CFCRD.xxxx-06 CompactFlash cards	85%	85%
	5CFCRD.xxxx-04 CompactFlash cards	85%	85%
	5CFCRD.xxxx-03 CompactFlash cards	8 to 95%	8 to 95%
	Flash drive 5MMUSB.xxxx-xx	10 to 90%	5 to 90%

Table 7: Humidity specifications

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

## 2.3 Power management

### 2.3.1 Supply voltage block diagram

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

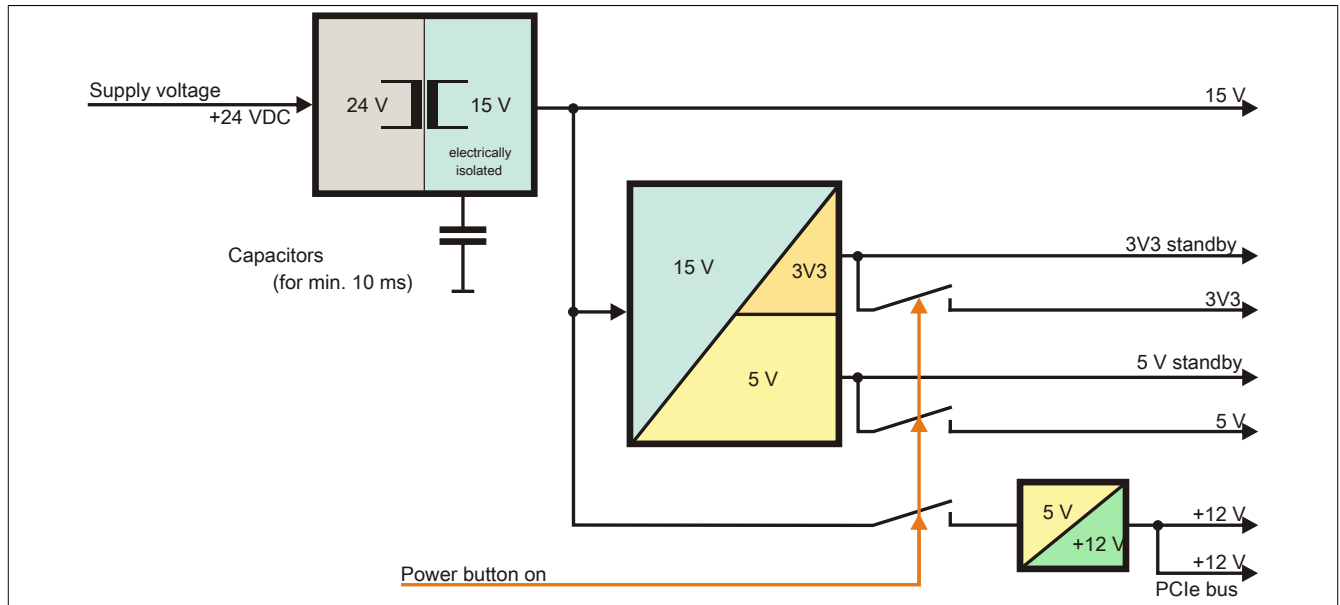


Figure 4: Supply voltage block diagram

#### Description

15 V is generated from the supply voltage using a DC/DC converter. This electrically isolated 15 V supplies further DC/DC converters, which generate the remaining voltage.

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

### 2.3.2 Power calculation

Information:		CPU board						Current system
		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	Enter values in this column	
All values in <b>Watts</b> The values for the <b>suppliers</b> are maximum values. The values for the <b>consumers</b> are average maximum values, but not peak values.		Total power supply power (maximum)						85
		Maximum possible at +12V						75
Total power supply	+12 V	CPU board, permanent consumers	26	30	18	14	43	
		512 MB RAM, max. 2 with 1.5 W each						
		1024 MB RAM, max. 2 with 2.5 W each						
		2048 MB RAM, max. 2 with 3 W each						
		Fan kit (2 pcs.), permanent consumers	5	5	5	5	5	
		PClec card power consumption – max. 4 W	4	4	4	4	4	
		Consumers +12 V ∑						
	+5 V	Maximum possible at +5V						40
		Baseboard, permanent consumers	4	4	4	4	4	
		USB peripherals USB2 and USB4 with 2.5 W each						
		USB peripherals USB1, USB3 and USB5 with 5 W each						
		PClec card power consumption – max. 4 W	4	4	4	4	4	
		Consumers +5 V ∑						
	3V3	Maximum possible at 3V3						30
		Baseboard, permanent consumers	4	4	4	4	4	
		CompactFlash, 1 W each						
		PClec card power consumption – max. 4 W	4	4	4	4	4	
		Consumers 3V3 V ∑						
		Consumers ∑						

Table 8: Power calculation – APC810

#### Information:

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

## 2.4 Block diagram

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

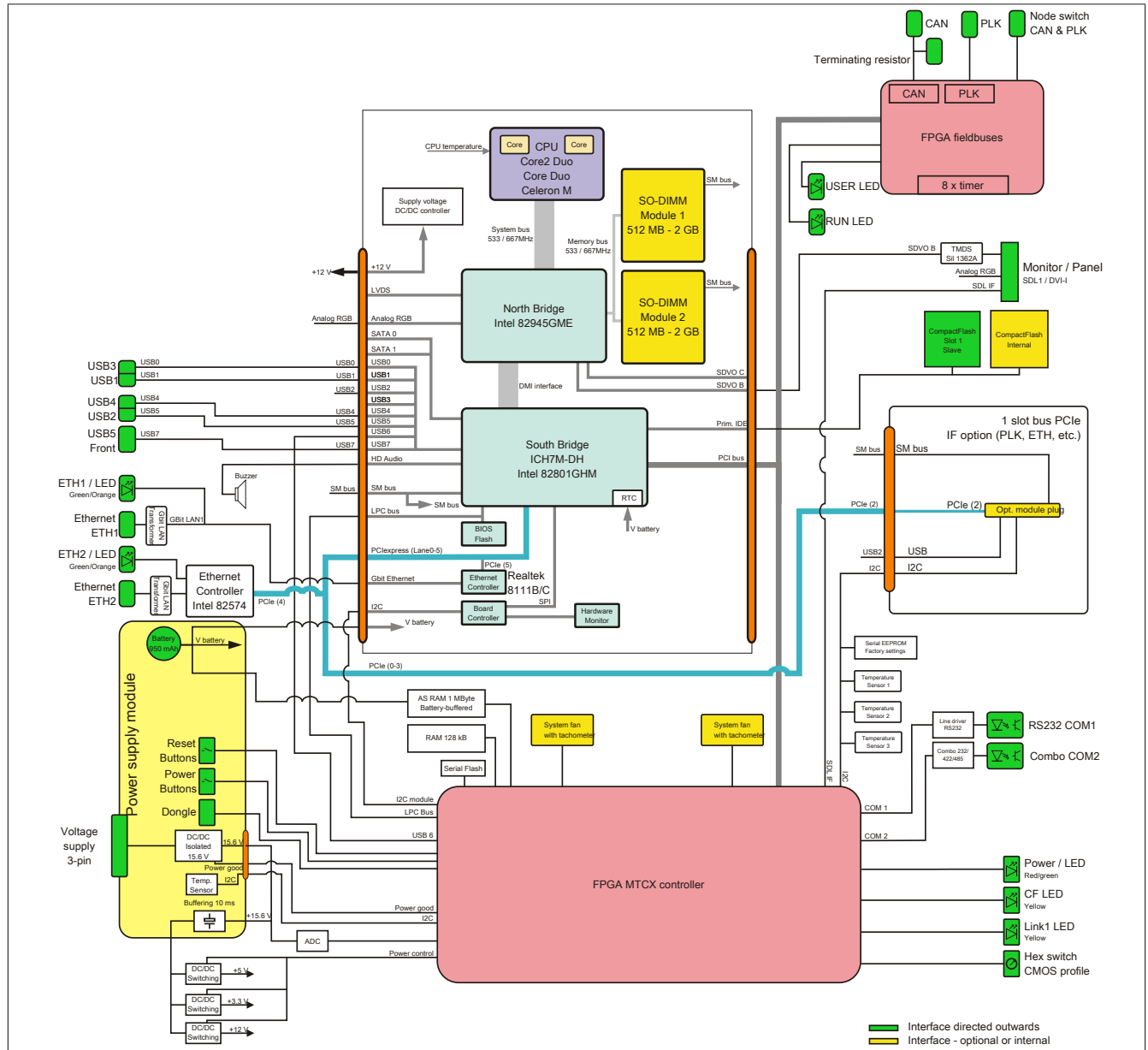


Figure 5: Block diagram - Automation PC 820

## 2.5 Device interfaces

### 2.5.1 +24 VDC supply voltage

If the APC820 is secured, it is automatically connected to the ACOPOSmulti rail supply voltage. For information about installing the APC820, see chapter Commissioning, section see "Mounting" on page 71. The supply voltage is protected internally by a soldered fuse (15 A, fast-acting) so that the device cannot be damaged if an overload occurs (fuse replacement necessary). The device must be returned to B&R for repairs if the fuse is blown due to an error.

### 2.5.2 Ground

The APC820 is automatically grounded if mounted to a cold-plate, feed-through plate or wall mounting plate (ACOPOSmulti rail). More information can be found in the ACOPOSmulti user's manual.

### 2.5.3 Monitor / Panel connection

Monitor / Panel connection - RGB / SDL (Smart Display Link) / DVI	
The following is an overview of the video signals available on the monitor/panel output. For details, see the technical data for the CPU board being used.	
CPU board	Video signals
5PC800.B945-00 / -10	RGB, DVI, SDL
5PC800.B945-01 / -11	RGB, DVI, SDL
5PC800.B945-02 / -12	RGB, DVI, SDL
5PC800.B945-03 / -13	RGB, DVI, SDL
5PC800.B945-04 / -14	RGB, DVI, SDL

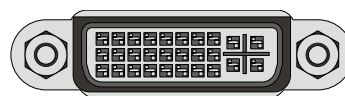


Table 9: Monitor / Panel connection - RGB, DVI, SDL

### Pinout

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

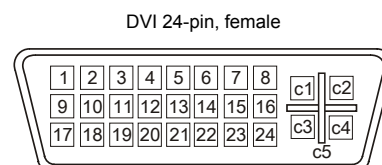


Table 10: Pinout - DVI connection

1) Protected internally by a multifuse.



## Cable lengths and resolutions for SDL transfer

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

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

Table 11: Cable lengths and resolutions for SDL transfer

## Cable lengths and resolutions for DVI transfer

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

DVI cable Segment length [m]	Resolution					
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200	FHD 1920 x 1080
1.8	5CADVI.0018-00	5CADVI.0018-00	5CADVI.0018-00	5CADVI.0018-00	5CADVI.0018-00	5CADVI.0018-00
5	5CADVI.0050-00	5CADVI.0050-00	5CADVI.0050-00	5CADVI.0050-00	5CADVI.0050-00	5CADVI.0050-00

Table 12: Cable lengths and resolutions for DVI transfer

## 2.5.4 USB ports

The APC820 features a USB 2.0 (Universal Serial Bus) host controller with multiple USB ports, 5 of which are accessible externally for easy user access.

### Warning!

Peripheral USB devices can be connected to the USB 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 this interface is designed according to general PC specifications, extreme care should be exercised with regard to EMC, cable routing, etc.

## USB1, USB2, USB3, USB4

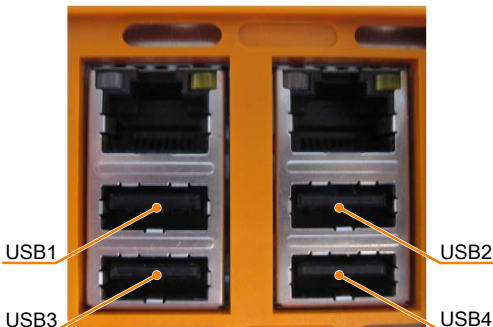
Universal Serial Bus (USB1, USB2, USB3, USB4)		4x USB type A, female 
Type	USB 2.0	
Design	Type A	
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)	
Current load <sup>1)</sup> USB1, USB3 USB2, USB4	Max. 1 A Max. 500 mA	
Cable length	Max. 5 m (without hub)	

Table 13: USB1, USB2, USB3, USB4 connection

- 1) Each USB port is secured 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.

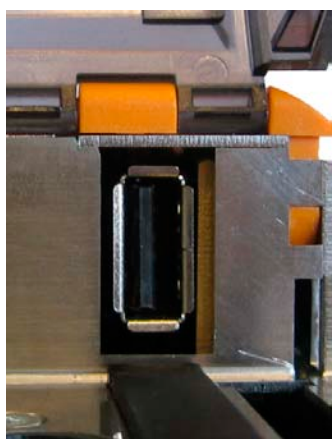
Universal Serial Bus (USB5)		1x USB type A, female 
Type	USB 2.0	
Design	Type A	
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)	
Current load <sup>1)</sup> USB5	Max. 1 A	
Cable length	Max. 5 m (without hub)	


Table 14: USB5 connection

- 1) Each USB port is secured with a maintenance-free "USB current-limiting circuit breaker" (max. 1 A).

### 2.5.5 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
Model number	Short description
CompactFlash	
5CFCRD.0512-06	B&R CompactFlash 512 MB
5CFCRD.1024-06	B&R CompactFlash 1024 MB
5CFCRD.2048-06	B&R CompactFlash 2048 MB
5CFCRD.4096-06	B&R CompactFlash 4096 MB
5CFCRD.8192-06	B&R CompactFlash 8192 MB
5CFCRD.016G-06	B&R CompactFlash 16 GB
5CFCRD.0064-03	CompactFlash 64 MB WD
5CFCRD.0128-03	CompactFlash 128 MB WD
5CFCRD.0256-03	CompactFlash 256 MB WD
5CFCRD.0512-03	CompactFlash 512 MB WD
5CFCRD.1024-03	CompactFlash 1024 MB WD
5CFCRD.2048-03	CompactFlash 2048 MB WD
5CFCRD.4096-03	CompactFlash 4096 MB WD
5CFCRD.8192-03	CompactFlash 8192 MB WD



CompactFlash Slot 2

CompactFlash Slot 1

Table 15: CompactFlash slot (CF1)


## Warning!

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

### 2.5.6 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
Model number	Short description
CompactFlash	
5CFCRD.0512-06	B&R CompactFlash 512 MB
5CFCRD.1024-06	B&R CompactFlash 1024 MB
5CFCRD.2048-06	B&R CompactFlash 2048 MB
5CFCRD.4096-06	B&R CompactFlash 4096 MB
5CFCRD.8192-06	B&R CompactFlash 8192 MB
5CFCRD.016G-06	B&R CompactFlash 16 GB
5CFCRD.0064-03	CompactFlash 64 MB WD
5CFCRD.0128-03	CompactFlash 128 MB WD
5CFCRD.0256-03	CompactFlash 256 MB WD
5CFCRD.0512-03	CompactFlash 512 MB WD
5CFCRD.1024-03	CompactFlash 1024 MB WD
5CFCRD.2048-03	CompactFlash 2048 MB WD
5CFCRD.4096-03	CompactFlash 4096 MB WD
5CFCRD.8192-03	CompactFlash 8192 MB WD



CompactFlash Slot 2

CompactFlash Slot 1

Table 16: CompactFlash slot (CF2)

## Warning!

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

## 2.5.7 Serial interface COM1

Serial interface COM1

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

9-pin DSUB plug

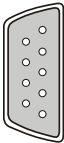


Table 17: Pinout - COM1

### 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 18: 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	4x 0.16 mm <sup>2</sup> (26AWG), tinned Cu wire
Wire insulation	PE
Conductor resistance	≤ 82 Ω/ km
Stranding	Wires stranded in pairs
Shield	Paired shield with aluminum foil
Grounding line	
Cable cross section	1x 0.34 mm <sup>2</sup> (22AWG/19), tinned Cu wire
Wire insulation	PE
Conductor resistance	≤ 59 Ω/km
Outer sheathing	
Material	PUR mixture
Features	Halogen free
Cable shielding	From tinned cu wires

Table 19: RS232 - Cable requirements

## 2.5.8 Serial interface COM2

Serial interface COM2		
	RS232	RS422/485
Type	RS232; not modem capable; electrically isolated	
UART	16550-compatible, 16-byte FIFO	
Transfer rate	Max. 115 kbit/s	
Bus length	Max. 15 m	Max. 1200 m
Pin	RS232 pinout	RS422 pinout
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 plug

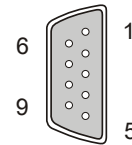


Table 20: Pinout - COM2

### 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 21: 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" on page 121, 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 22: 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	4x 0.16 mm <sup>2</sup> (26AWG), tinned Cu wire
Wire insulation	PE
Conductor resistance	≤ 82 Ω/ km
Stranding	Wires stranded in pairs
Shield	Paired shield with aluminum foil
Grounding line	
Cable cross section	1x 0.34 mm <sup>2</sup> (22AWG/19), tinned Cu wire
Wire insulation	PE
Conductor resistance	≤ 59 Ω/km
Outer sheathing	
Material	PUR mixture
Features	Halogen free
Cable shielding	From tinned cu wires

Table 23: 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 24: 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	4x 0.25 mm <sup>2</sup> (24AWG/19), tinned Cu wire
Wire insulation	PE
Conductor resistance	≤82 Ω/km
Stranding	Wires stranded in pairs
Shield	Paired shield with aluminum foil
Grounding line	
Cable cross section	1x 0.34 mm <sup>2</sup> (22AWG/19), tinned Cu wire
Wire insulation	PE
Conductor resistance	≤59 Ω/km
Outer sheathing	
Material	PUR mixture
Features	Halogen free
Cable shielding	From tinned cu wires

Table 25: RS422 - Cable requirements

### When used as an RS485 interface

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

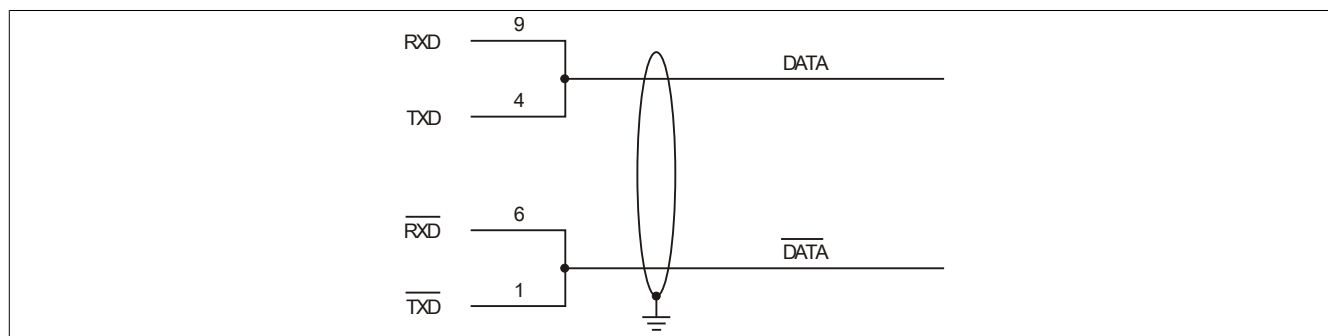


Figure 6: RS232/422/485 interface - operated in RS485 mode

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 resistor.

### 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	Typ. 115 kbit/s

Table 26: 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	4x 0.25 mm <sup>2</sup> (24AWG/19), tinned Cu wire
Wire insulation	PE
Conductor resistance	≤82 Ω/km
Stranding	Wires stranded in pairs
Shield	Paired shield with aluminum foil
Grounding line	
Cable cross section	1x 0.34 mm <sup>2</sup> (22AWG/19), tinned Cu wire
Wire insulation	PE
Conductor cross section	≤59 Ω/km
Outer sheathing	
Material	PUR mixture
Features	Halogen free
Cable shielding	From tinned cu wires

Table 27: RS485 cable - Requirements

## 2.5.9 CAN


CAN		<div><div>CAN bus</div><div>4-pin multipoint plug</div></div>
The electrically isolated CAN bus interface is a 4-pin multipoint plug.		
Transfer rate	Max. 500 kbit/s	
Bus length	Max. 1000 m	
Pin	CAN bus	
1	CAN bus	
2	CAN ⊥ (CAN Ground)	
3	CAN_L (CAN Low)	
4	SHLD (shield)	

Table 28: CAN interface

## Driver support

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

## CAN node switch


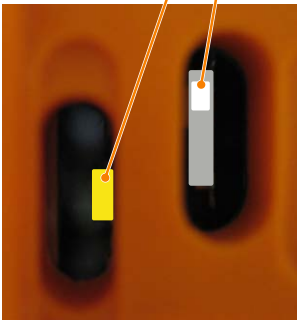
CAN node switch (x1, x16)			
Both of these hex switches (x1, x16) are used to configure the node number for the CAN interface. The node switch is located behind the front cover. The front cover must first be slid down to change the node switch.			
Switch position			
x1	x16	Description	
0...F	0...F	Any	

Table 29: 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 B&R industrial PC has an integrated terminating resistor (delivery state: disabled with the setting "Off").		
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	On position	Off position
Can be pressed using a pointed object.	Terminating resistor is turned on.	Terminating resistor is turned off.



CAN terminating LED

CAN terminating switch

Table 30: CAN terminating switch / LED

## CAN Status LED

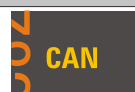
Status LED CAN			
Yellow LED for	On	Off	
CAN	Sending data	Receiving data	

Table 31: Status LED CAN



## 2.5.10 POWERLINK

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

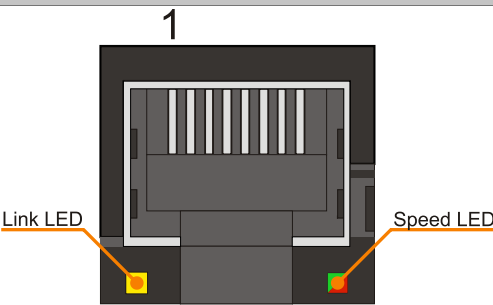


Table 32: POWERLINK connection

### LED STATUS

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

#### Ethernet TCP/IP mode

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

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

Table 33: Status/Error LED - Ethernet TCP/IP operating mode

#### POWERLINK V1

Status LED		Status of the POWERLINK station
Green	Red	
On	Off	The POWERLINK station is running with no errors.
Off	On	A fatal system error has occurred. The error type can be read using the PLC logbook. An irreparable problem has occurred. The system cannot properly carry out its tasks. This status can only be changed by resetting the module.
Blinking alternately		The POWERLINK managing node failed. This error code can only occur in controlled node operation.
Off	Blinking	System failure. The red blinking LED signals a certain type of error using a blink code (see section " System failure error codes" on page 38).

Table 34: Status/error LED - POWERLINK V1 operating mode

#### POWERLINK V2

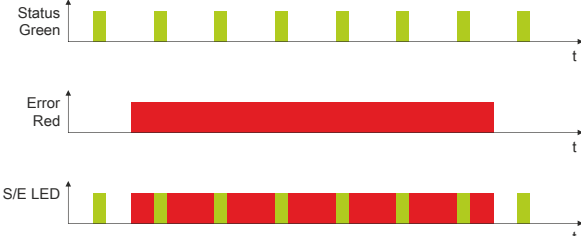
Red - error	Description
On	<p>The POWERLINK interface has encountered an error (failed Ethernet frames, increased number of collisions on the network, etc.).</p> <p>If an error occurs in the following states, then the green LED blinks over the red LED:</p> <ul style="list-style-type: none"> <li>BASIC_ETHERNET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

Table 35: Status / Error LED as error LED - POWERLINK V2 operating mode

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

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

## System failure error codes

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

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

Legend:

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

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

Table 37: Status/error LED as error LED - system failure error codes

## 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
E	F	Operation as controlled node
F	F	Reserved
F	F	Reserved



Table 38: POWERLINK node switch (x1, x16)

## 2.5.11 Ethernet 1 (ETH1)

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

Ethernet 1 connection (ETH1)		
Controller	Realtek RTL8111B/C <sup>1)</sup>	
Cabling	S/STP (Cat5e)	
Transfer rate	10/100/1000 Mbit/s <sup>2)</sup>	
Cable length	Max. 100 m (min. Cat5e)	
<b>Speed LED</b>	<b>On</b>	<b>Off</b>
Green	100 Mbit/s	10 Mbit/s <sup>3)</sup>
Orange	1000 Mbit/s	-
<b>Link LED</b>	<b>On</b>	<b>Off</b>
Orange	Link (Ethernet network connection available)	Activity (blinking - data transfer in progress)

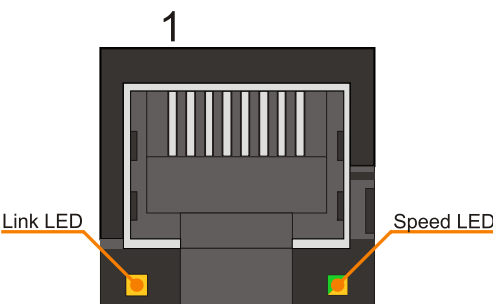


Table 39: Ethernet connection (ETH1)

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

### Driver support

A special driver is required in order to operate the Realtek RTL8111B/C Ethernet controller. Drivers for approved operating systems are available in the Downloads area of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

### Information:

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

## 2.5.12 Ethernet 2 (ETH2)

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

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

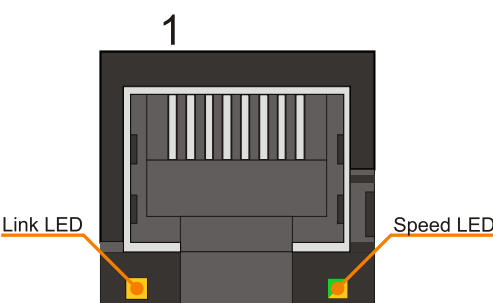


Table 40: Ethernet connection (ETH2)

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

### Driver support

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

### Information:

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

## 2.5.13 Battery

The lithium battery (3 V, 950 mAh) buffers the internal real-time clock (RTC), individually stored BIOS settings and SRAM data. It is located behind the black cover on the front of the device. The battery's buffer lifespan is at least 2½ years (at 50°C, 8.5 µA for the components being supplied and a self-discharge of 40%). The battery has a limited lifespan and should be replaced regularly (after the specified service life at the latest).

The battery is located behind the cable cover.

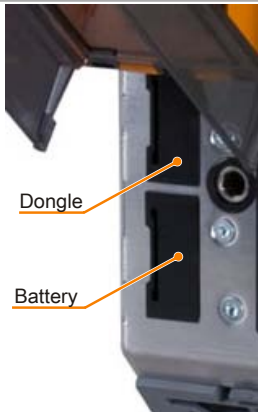
Battery		
Battery		
Type	Renata 950 mAh	
removable	Yes, accessible from the outside	
Lifespan	2½ years <sup>1)</sup>	
Model number	Short description	
	<b>Batteries</b>	
0AC201.91	Lithium batteries, 4 pcs., 3 V / 950 mAh, button cell	
4A0006.00-000	Lithium battery, 1 pc., 3 V / 950 mAh, button cell	

Table 41: Battery

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

### Battery status evaluation

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

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

Table 42: Meaning of battery status

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

2.5.14 Hardware Security Key (Dongle)

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

The hardware security key is located behind the cable cover.

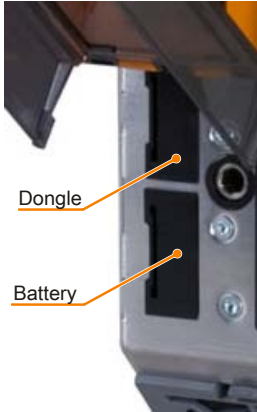
Hardware security key	
A hardware security key (dongle) can be inserted behind the black cover.	

Table 43: Hardware security key

Warning!

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

## 2.5.15 Status LEDs

The status LEDs are used to indicate the following states on the APC820:

Status LEDs			
LED	Color	Status	Meaning
Power	Green	On	Supply voltage OK
	Red	On	The system is in standby mode (S5: Soft-off mode or S4: Hibernate mode - suspend-to-disk)
	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	Yellow	On	Indicates an active SDL connection on the monitor / panel plug.
		Blinking	An active SDL connection has been interrupted by a loss of power to the display unit.
Run	Green	On	Application running
	Red	On	Service mode
	Yellow	On	User LED



Table 44: Data - Status LEDs

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

## 2.5.16 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, 5PC810.SX02-00 and 5PC810.SX03-00
2	Profile 2: Optimized for 5PC810.SX05-00 system unit
3	<b>Profile 3: Optimized for system units 5PC820.SX01-00 and 5PC820.SX01-01</b>
4	Profile 4: Reserved
5	Profile 5: 5PC820.1505-00 and 5PC820.1906-00

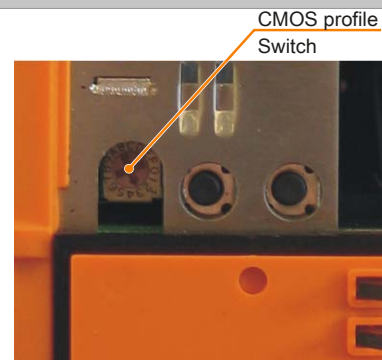


Table 45: CMOS profile switch

### Information:

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

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

2.5.17 Power button

The power button provides a wide range of ATX power supply functions. The power button is located behind the front cover.

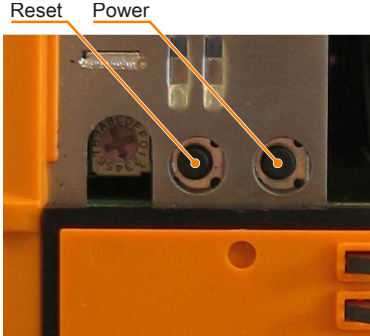
Power button	
<p>The power button can be pressed with a pointed object (e.g. paper clip or tip of a pen).</p> <p>The power button acts like the on/off switch on a normal desktop PC with an ATX power supply:</p> <p><b>Press and release ...</b> Switches on the APC820 or shuts down the operating system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

Table 46: Power button

2.5.18 Reset button

The power button is located behind the front cover.

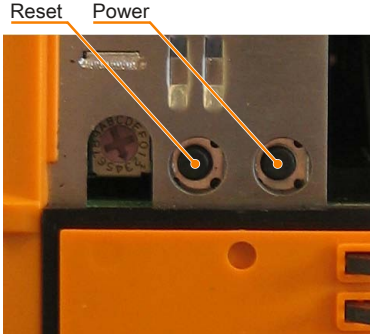
Reset button	
<p>The reset button can be pressed with a pointed object (i.e. paper clip or tip of a pen).</p> <p>Pushing the reset button triggers a hardware and PCI reset. The APC820 is restarted (cold restart).</p> <p>Pressing the reset button does not reset the MTCX processor.</p>	

Table 47: Reset button

**Warning!**

**A system reset can result in lost data!**



## 3 Individual components

### 3.1 System units

#### 3.1.1 Interfaces

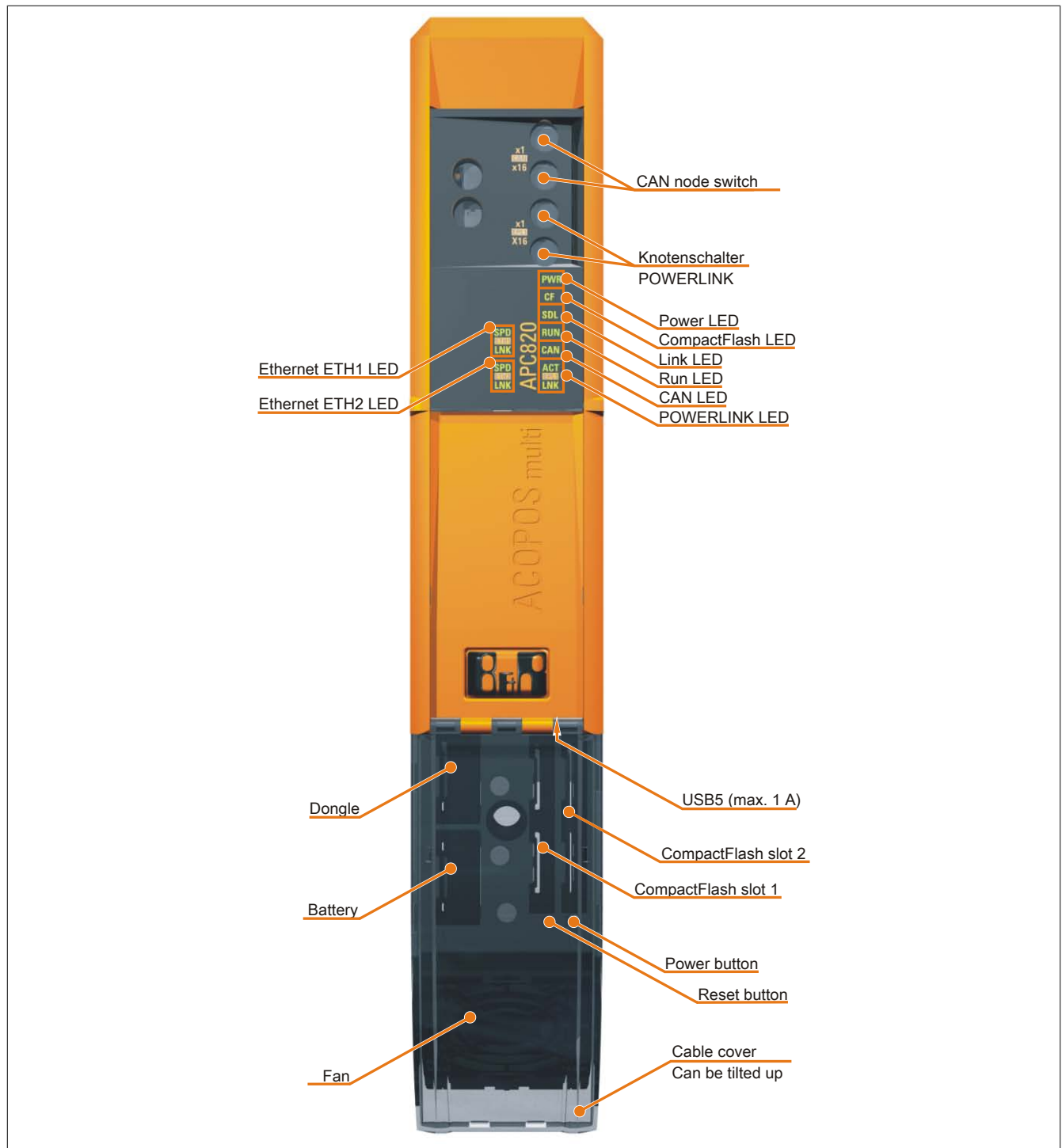


Figure 7: APC820 interface overview - Front side ≤ A0



Figure 8: APC820 interface overview - Front side ≥ A1

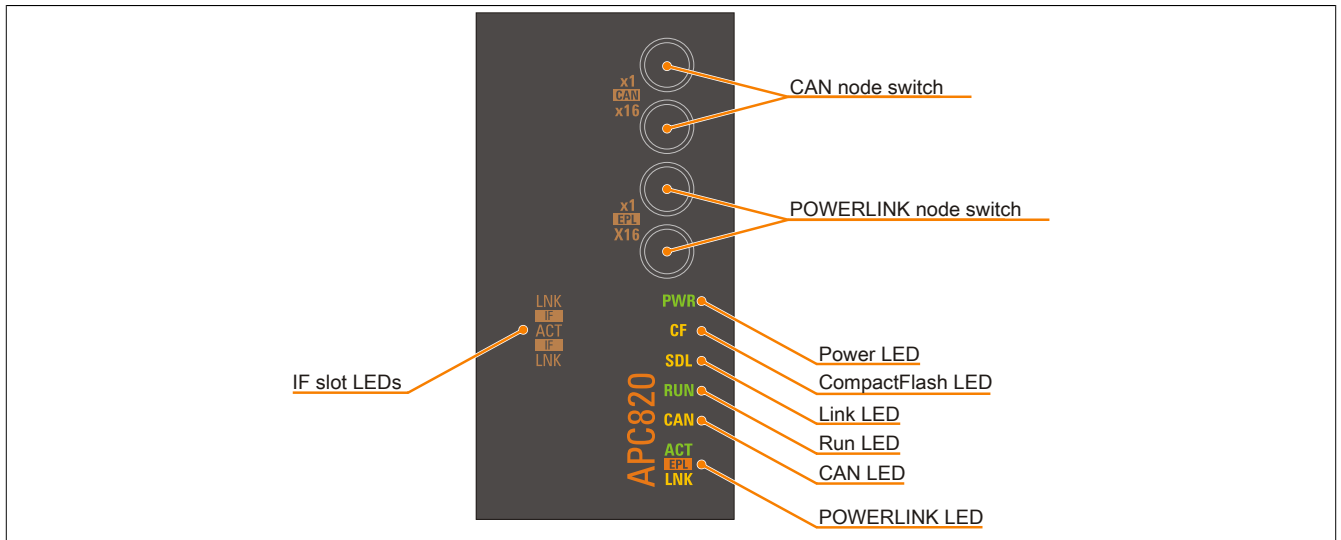


Figure 9: APC820 LED description - Front side #≥ A1

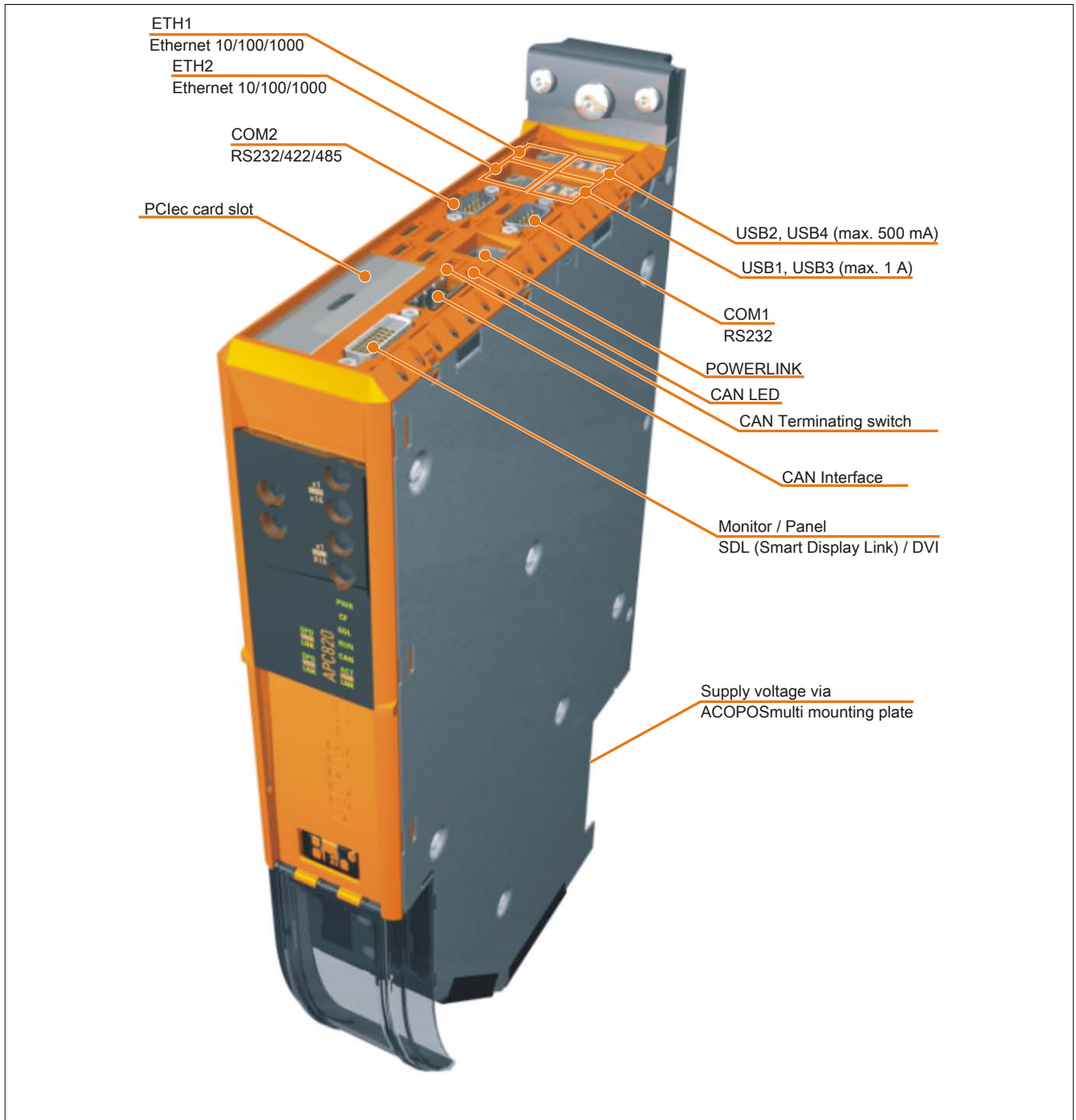


Figure 10: APC820 interface overview - Top side ≤ A0

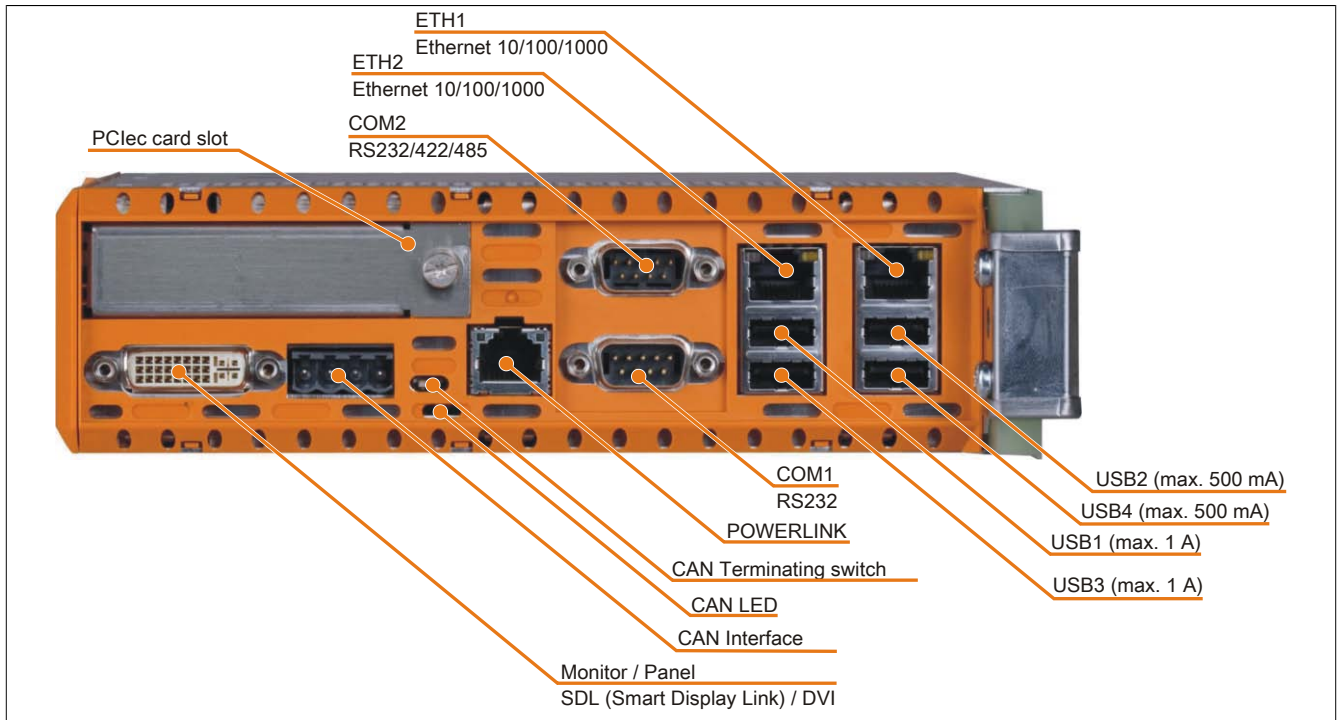


Figure 11: APC820 interface overview - Top side ≥ A1

### 3.1.2 5PC820.SX01-00

#### General information

- Specially developed to operate together with ACOPOSmulti
- Cold plate or feed-through mounting
- 1 PCI Express compact slot
- SRAM, 1 MB onboard
- Integrated POWERLINK and CAN fieldbus interfaces

#### Order data


Model number	Short description	Figure
<b>System units</b>		
5PC820.SX01-00	APC820 system unit, cold plate mounting, 1 PCIe card slot; 2x CompactFlash slot, 1x RS232, 1x RS232/422/485, 1x POWER-LINK, 1x CAN, Smart Display Link/DVI/Monitor, 5x USB 2.0, 2x ETH 10/100/1000, 24 VDC over the ACOPOSmulti busbar.	
<b>Required accessories</b>		
<b>CPU boards</b>		
5PC800.B945-10	Intel Core Duo L2400 CPU board, 1.66 GHz, dual-core, 667 MHz FSB, 2 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	
5PC800.B945-11	Intel Core2 Duo L7400 CPU board, 1.5 GHz, dual-core, 667 MHz FSB, 4 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	
5PC800.B945-12	Intel Core2 Duo U7500 CPU board, 1.06 GHz, dual-core, 533 MHz FSB, 2 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	
5PC800.B945-13	Intel Celeron M 423 CPU board, 1.06 GHz, single-core, 533 MHz FSB, 1 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	
5PC800.B945-14	Intel Core2 Duo T7400 CPU board, 2.16 GHz, dual-core, 667 MHz FSB, 4 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	
<b>Heat sinks</b>		
5AC802.HS00-00	APC820 power supply and heat sink for CPU boards with Dual Core processors L2400, L7400, U7500 and Celeron M 423.	
5AC802.HS00-01	APC820 power supply with heat sink for CPU board with dual core processor T7400.	
<b>Main memory</b>		
5MMDDR.0512-01	SO-DIMM DDR2 RAM 512 MB PC2-5300	
5MMDDR.1024-01	SO-DIMM DDR2 RAM 1024 MB PC2-5300	
5MMDDR.2048-01	SO-DIMM DDR2 RAM 2048 MB PC2-5300	
<b>Optional accessories</b>		
<b>Fan modules</b>		
8BXF001.0000-00	ACOPOSmulti fan unit, replacement fan for ACOPOSmulti modules (8BxP/8B0C/8BV1/8BVE/8B0K)	
<b>Interface cards</b>		
5ACPCC.ETH0-00	PCIec Ethernet card 1x 10/100/1000	
5ACPCC.MPL0-00	PCIec POWERLINK card, 2 POWERLINK interfaces, 512 kByte SRAM	

Table 48: 5PC820.SX01-00 - Order data

#### Technical data

Product ID	5PC820.SX01-00
<b>General information</b>	
Dongle port	Yes
LEDs	Power, CF, Link, Run, CAN, POWERLINK, IF slot
B&R ID code	\$A7DE
Battery	
Type	Renata 950 mAh
Lifespan	2 years <sup>1)</sup>
removable	Yes, accessible behind the cable cover
Design	Lithium Ion
Power button	Yes

Table 49: 5PC820.SX01-00 - Technical data

Product ID	5PC820.SX01-00
Reset button	Yes
Buzzer	Yes
Cooling and mounting method	Cold plate or feed-through mounting
Certification	
CE	Yes
c-UL-us	Yes
Controller	
Boot loader	BIOS
Cooling	Passive via heat sink and supported with an active fan kit
Real-time clock	
Accuracy	At 25°C: typ. 12 ppm (1 seconds) per day <sup>2)</sup>
Battery-buffered	Yes
Power failure logic	
Controller	MTCX <sup>3)</sup>
Buffer time	10 ms
Graphics	
Controller	Intel® Graphics Media Accelerator 950
SRAM	
Size	1 MB
Battery-buffered	Yes
Remanent variables in power fail mode	192 kB (e.g. for Automation Runtime, see AS help documentation)
Memory	
Type	DDR2 SDRAM
Size	Max. 3 GB
Interfaces	
COM1	
Type	RS232, modem-capable, not electrically isolated
Design	9-pin DSUB plug
UART	16550-compatible, 16-byte FIFO
Max. baud rate	115 kbit/s
COM2	
Type	RS232/422/485, electrically isolated
Design	9-pin DSUB plug
UART	16550-compatible, 16-byte FIFO
Max. baud rate	115 kbit/s
CompactFlash slot 1	
Type	Type I
CompactFlash slot 2	
Type	Type I
USB	
Quantity	5
Type	USB 2.0
Connection	To each USB type A interface
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Current load	Max. 500 mA or 1 A per connection
Ethernet	
Quantity	2
Transfer rate	10/100/1000 Mbit/s
Max. baud rate	1000 Mbit/s
Panel/Monitor interface	
Design	DVI-I socket
Type	SDL/DVI/Monitor
POWERLINK	
Quantity	1
Node switch	2
Status LED	Yes
CAN	
Quantity	1
Transfer rate	Max. 500 kbit/s
Node switch	Yes
Status LED	Yes
Terminating resistor	Yes, can be activated using a switch
Inserts	
PCle slots	
Quantity	1
Electrical characteristics	
Nominal voltage	24 VDC ±25%
Nominal current	5 A
Starting current	Typ. 7 A, max. 50 A for < 300 µs
Operating conditions	
Height of drop	0.25 m
EN 60529 protection	IP20

Table 49: 5PC820.SX01-00 - Technical data

<b>Product ID</b>	<b>5PC820.SX01-00</b>
<b>Environmental conditions</b>	
Temperature	
Operation	Component-dependent
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	Component-dependent
Storage	Component-dependent
Transport	Component-dependent
Vibration	
Operation	2 to 9 Hz: 0.3 mm amplitude / 9 to 200 Hz: 0.1 g
Storage	2 to 9 Hz: 3.5 mm amplitude / 9 to 200 Hz: 1 g / 200 to 500 Hz: 1.5 g
Transport	2 to 9 Hz: 3.5 mm amplitude / 9 to 200 Hz: 1 g / 200 to 500 Hz: 1.5 g
Altitude	
Operation	Max. 3000 m (component-dependent)
<b>Mechanical characteristics</b>	
Housing <sup>4)</sup>	
Material	Galvanized plate, plastic
Front cover	Polycarbonate, black
Cable cover	Polycarbonate, transparent
Dimensions	
Width	53 mm
Height	344 mm
Depth	205 mm
Weight	Approx. 1850 g

Table 49: 5PC820.SX01-00 - Technical data

- 1) The service life of 1½ years is only valid if an SRAM module is being used. Without an SRAM module, a service life of 2 years can be expected.  
At 50°C, 8.5 A for the supplied components and a self discharge of 40%.
- 2) At max. specified ambient temperature: typically 58 ppm (5 seconds) - worst-case 220 ppm (19 seconds).
- 3) Maintenance Controller Extended
- 4) Depending on the process or batch, there may be visible deviations in the color and surface structure.



# Dimensions

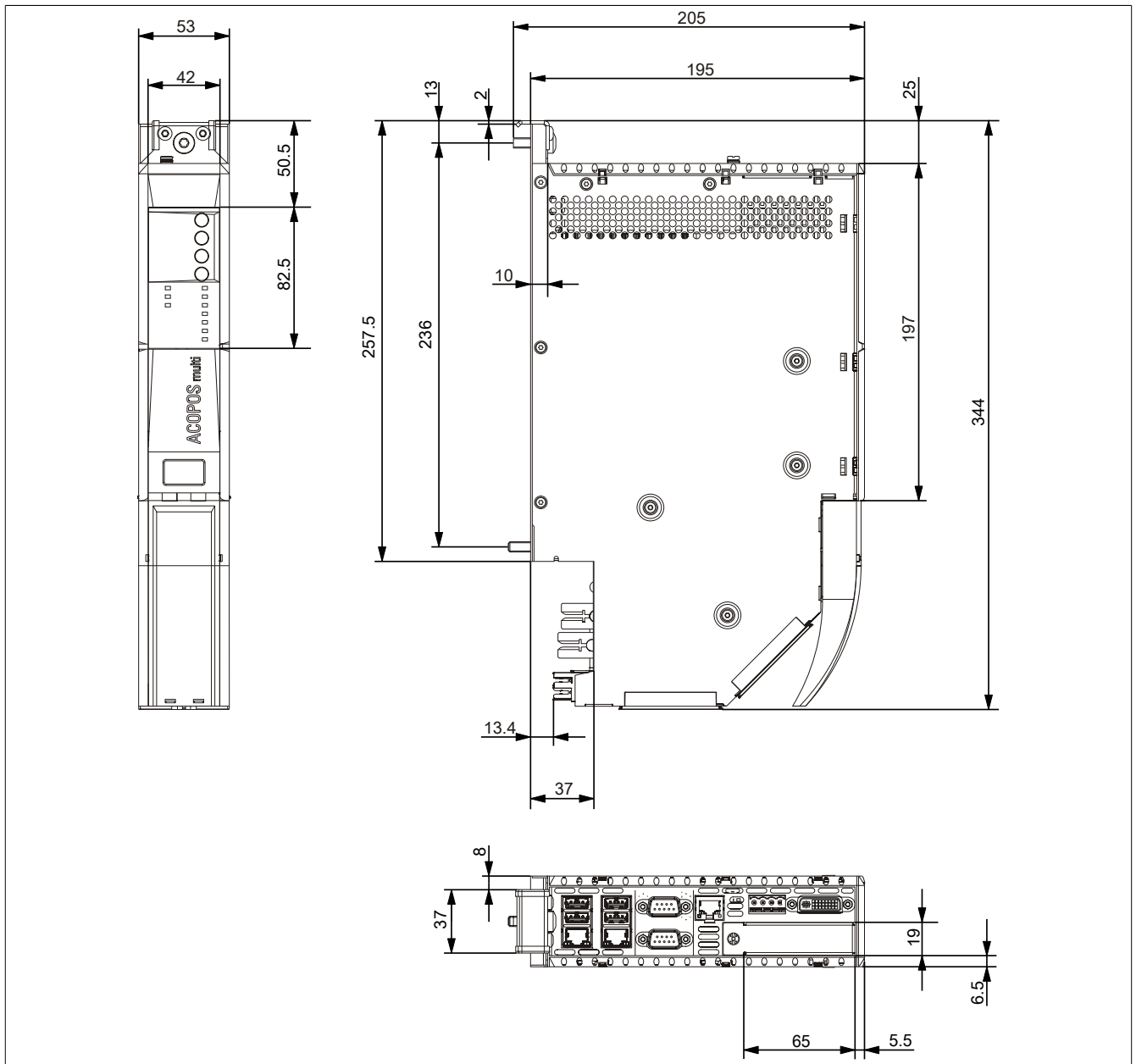


Figure 12: 5PC820.SX01-00 - Dimensions

### 3.1.3 5PC820.SX01-01

#### General information

- Specially developed to operate together with ACOPOSmulti
- Wall mounting
- 1 PCI Express compact slot
- SRAM, 1 MB onboard
- Integrated POWERLINK and CAN fieldbus interfaces

#### Order data


Model number	Short description	Figure
	<b>System units</b>	
5PC820.SX01-01	APC820 system unit, wall mounting, 1 PCIe card slot; 2x CompactFlash slot, 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 over the ACOPOSmulti busbar.	
	<b>Required accessories</b>	
	<b>CPU boards</b>	
5PC800.B945-10	Intel Core Duo L2400 CPU board, 1.66 GHz, dual-core, 667 MHz FSB, 2 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	
5PC800.B945-11	Intel Core2 Duo L7400 CPU board, 1.5 GHz, dual-core, 667 MHz FSB, 4 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	
5PC800.B945-12	Intel Core2 Duo U7500 CPU board, 1.06 GHz, dual-core, 533 MHz FSB, 2 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	
5PC800.B945-13	Intel Celeron M 423 CPU board, 1.06 GHz, single-core, 533 MHz FSB, 1 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	
5PC800.B945-14	Intel Core2 Duo T7400 CPU board, 2.16 GHz, dual-core, 667 MHz FSB, 4 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	
	<b>Heat sinks</b>	
5AC802.HS00-00	APC820 power supply and heat sink for CPU boards with Dual Core processors L2400, L7400, U7500 and Celeron M 423.	
5AC802.HS00-01	APC820 power supply with heat sink for CPU board with dual core processor T7400.	
	<b>Main memory</b>	
5MMDDR.0512-01	SO-DIMM DDR2 RAM 512 MB PC2-5300	
5MMDDR.1024-01	SO-DIMM DDR2 RAM 1024 MB PC2-5300	
5MMDDR.2048-01	SO-DIMM DDR2 RAM 2048 MB PC2-5300	
	<b>Optional accessories</b>	
	<b>Fan modules</b>	
8BXF001.0000-00	ACOPOSmulti fan unit, replacement fan for ACOPOSmulti modules (8BxP/8B0C/8BVI/8BVE/8B0K)	
	<b>Interface cards</b>	
5ACPCC.ETH0-00	PCIec Ethernet card 1x 10/100/1000	
5ACPCC.MPL0-00	PCIec POWERLINK card, 2 POWERLINK interfaces, 512 kByte SRAM	

Table 50: 5PC820.SX01-01 - Order data

#### Technical data

Product ID	5PC820.SX01-01
<b>General information</b>	
Dongle port	Yes
LEDs	Power, CF, Link, Run, CAN, POWERLINK, IF slot
B&R ID code	\$AD8A
Battery	
Type	Renata 950 mAh
Lifespan	2 years <sup>1)</sup>
removable	Yes, accessible behind the cable cover
Design	Lithium Ion
Power button	Yes

Table 51: 5PC820.SX01-01 - Technical data

Product ID	5PC820.SX01-01
Reset button	Yes
Buzzer	Yes
Cooling and mounting method	Wall mounting
Certification	
CE	Yes
c-UL-us	Yes
Controller	
Boot loader	BIOS
Cooling	Passive via heat sink and supported with an active fan kit
Real-time clock	
Accuracy	At 25°C: typ. 12 ppm (1 seconds) per day <sup>2)</sup>
Battery-buffered	Yes
Power failure logic	
Controller	MTCX <sup>3)</sup>
Buffer time	10 ms
Graphics	
Controller	Intel® Graphics Media Accelerator 950
SRAM	
Size	1 MB
Battery-buffered	Yes
Remanent variables in power fail mode	192 kB (e.g. for Automation Runtime, see AS help documentation)
Memory	
Type	DDR2 SDRAM
Size	Max. 3 GB
Interfaces	
COM1	
Type	RS232, modem-capable, not electrically isolated
Design	9-pin DSUB plug
UART	16550-compatible, 16-byte FIFO
Max. baud rate	115 kbit/s
COM2	
Type	RS232/422/485, electrically isolated
Design	9-pin DSUB plug
UART	16550-compatible, 16-byte FIFO
Max. baud rate	115 kbit/s
CompactFlash slot 1	
Type	Type I
CompactFlash slot 2	
Type	Type I
USB	
Quantity	5
Type	USB 2.0
Connection	To each USB type A interface
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Current load	Max. 500 mA or 1 A per connection
Ethernet	
Quantity	2
Transfer rate	10/100/1000 Mbit/s
Max. baud rate	1000 Mbit/s
Panel/Monitor interface	
Design	DVI-I socket
Type	SDL/DVI/Monitor
POWERLINK	
Quantity	1
Node switch	2
Status LED	Yes
CAN	
Quantity	1
Transfer rate	Max. 500 kbit/s
Node switch	Yes
Status LED	Yes
Terminating resistor	Yes, can be activated using a switch
Inserts	
PCle slots	
Quantity	1
Electrical characteristics	
Nominal voltage	24 VDC ±25%
Nominal current	5 A
Starting current	Typ. 7 A, max. 50 A for < 300 µs
Operating conditions	
Height of drop	0.25 m
EN 60529 protection	IP20

Table 51: 5PC820.SX01-01 - Technical data

<b>Product ID</b>	<b>5PC820.SX01-01</b>
<b>Environmental conditions</b>	
Temperature	
Operation	Component-dependent
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	Component-dependent
Storage	Component-dependent
Transport	Component-dependent
Vibration	
Operation	2 to 9 Hz: 0.3 mm amplitude / 9 to 200 Hz: 0.1 g
Storage	2 to 9 Hz: 3.5 mm amplitude / 9 to 200 Hz: 1 g / 200 to 500 Hz: 1.5 g
Transport	2 to 9 Hz: 3.5 mm amplitude / 9 to 200 Hz: 1 g / 200 to 500 Hz: 1.5 g
Altitude	
Operation	Max. 3000 m (component-dependent)
<b>Mechanical characteristics</b>	
Housing <sup>4)</sup>	
Material	Galvanized plate, plastic
Front cover	Polycarbonate, black
Cable cover	Polycarbonate, transparent
Dimensions	
Width	53 mm
Height	344 mm
Depth	253 mm
Weight	Approx. 2550 g

Table 51: 5PC820.SX01-01 - Technical data

- 1) The service life of 1½ years is only valid if an SRAM module is being used. Without an SRAM module, a service life of 2 years can be expected.  
At 50°C, 8.5 A for the supplied components and a self discharge of 40%.
- 2) At max. specified ambient temperature: typically 58 ppm (5 seconds) - worst-case 220 ppm (19 seconds).
- 3) Maintenance Controller Extended
- 4) Depending on the process or batch, there may be visible deviations in the color and surface structure.

## Dimensions

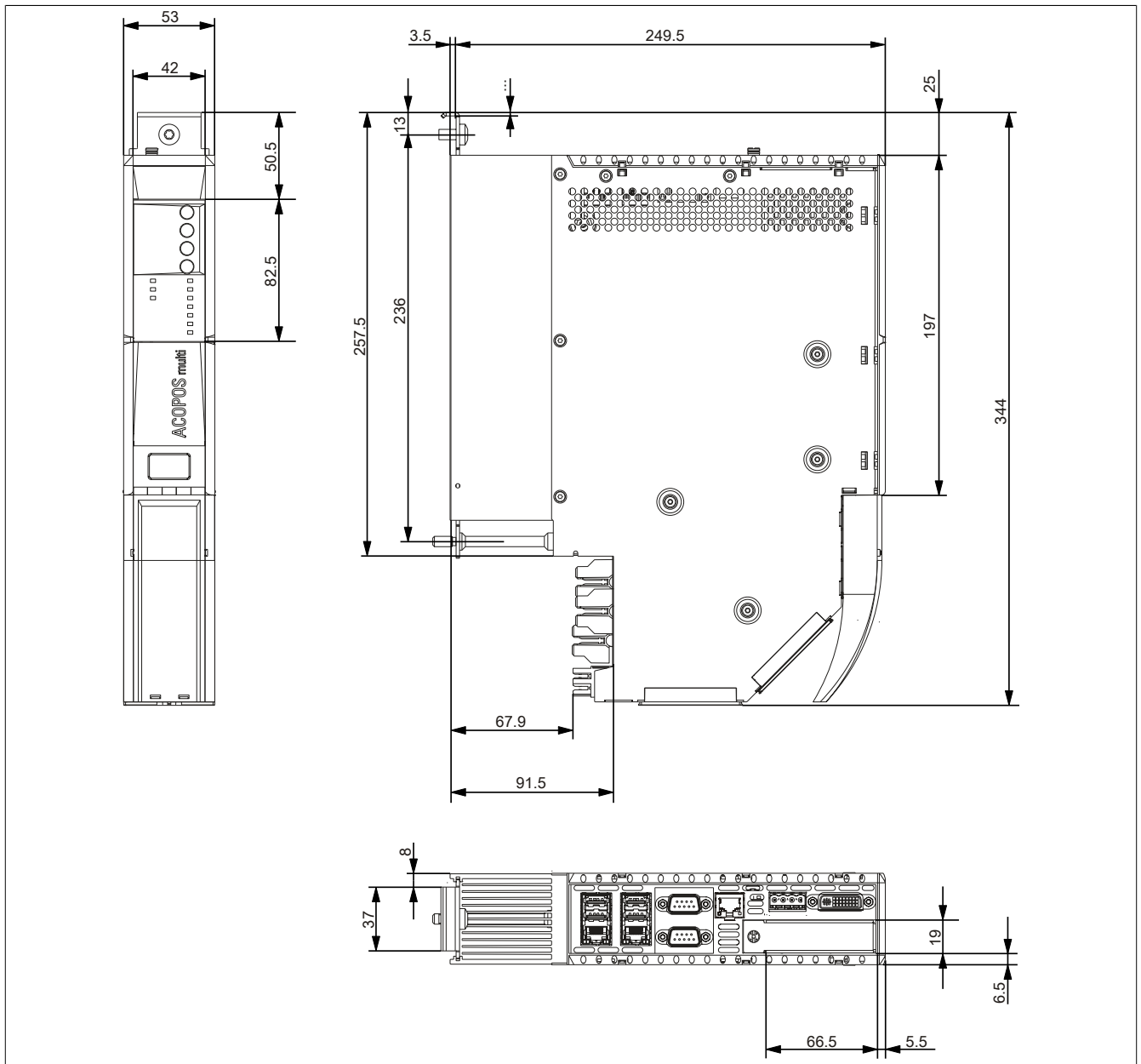


Figure 13: 5PC820.SX01-01 - Dimensions

## 3.2 CPU boards 945GME

### 3.2.1 General information

- AMI BIOS
- Intel® 945GME chipset
- 2x DDR2 memory socket
- Dual channel memory
- Intel® GMA 950
- Gigabit Ethernet

### 3.2.2 Order data


Model number	Short description	Figure
	<b>CPU boards</b>	
5PC800.B945-00	Intel Core Duo L2400 CPU board, 1.66 GHz, dual-core, 667 MHz FSB, 2 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111B.	
5PC800.B945-01	Intel Core2 Duo L7400 CPU board, 1.5 GHz, dual-core, 667 MHz FSB, 4 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111B.	
5PC800.B945-02	Intel Core2 Duo U7500 CPU board, 1.06 GHz, dual-core, 533 MHz FSB, 2 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111B.	
5PC800.B945-03	Intel Celeron M 423 CPU board, 1.06 GHz, single-core, 533 MHz FSB, 1 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111B.	
5PC800.B945-04	Intel Core2 Duo T7400 CPU board, 2.16 GHz, dual-core, 667 MHz FSB, 4 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111B.	
	<b>Required accessories</b>	
	<b>Main memory</b>	
5MMDDR.0512-01	SO-DIMM DDR2 RAM 512 MB PC2-5300	
5MMDDR.1024-01	SO-DIMM DDR2 RAM 1024 MB PC2-5300	
5MMDDR.2048-01	SO-DIMM DDR2 RAM 2048 MB PC2-5300	

Table 52: 5PC800.B945-00, 5PC800.B945-01, 5PC800.B945-02, 5PC800.B945-03, 5PC800.B945-04 - Order data


Model number	Short description	Figure
	<b>CPU boards</b>	
5PC800.B945-10	Intel Core Duo L2400 CPU board, 1.66 GHz, dual-core, 667 MHz FSB, 2 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	
5PC800.B945-11	Intel Core2 Duo L7400 CPU board, 1.5 GHz, dual-core, 667 MHz FSB, 4 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	
5PC800.B945-12	Intel Core2 Duo U7500 CPU board, 1.06 GHz, dual-core, 533 MHz FSB, 2 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	
5PC800.B945-13	Intel Celeron M 423 CPU board, 1.06 GHz, single-core, 533 MHz FSB, 1 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	
5PC800.B945-14	Intel Core2 Duo T7400 CPU board, 2.16 GHz, dual-core, 667 MHz FSB, 4 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	
	<b>Required accessories</b>	
	<b>Main memory</b>	
5MMDDR.0512-01	SO-DIMM DDR2 RAM 512 MB PC2-5300	
5MMDDR.1024-01	SO-DIMM DDR2 RAM 1024 MB PC2-5300	
5MMDDR.2048-01	SO-DIMM DDR2 RAM 2048 MB PC2-5300	

Table 53: 5PC800.B945-10, 5PC800.B945-11, 5PC800.B945-12, 5PC800.B945-13, 5PC800.B945-14 - Order data

## 3.2.3 Technical data - 5PC800.B945-0x

Product ID	5PC800.B945-00	5PC800.B945-01	5PC800.B945-02	5PC800.B945-03	5PC800.B945-04
General information					
Certification CE	Yes				
Controller					
Boot loader	embedded AMI BIOS				
Processor					
Type	Intel® Core™ Duo L2400	Intel® Core™2 Duo L7400	Intel® Core™2 Duo U7500	Intel® Celeron® M 423,	Intel® Core™2 Duo T7400
Clock frequency	1660 MHz	1500 MHz	1060 MHz	1060 MHz	2160 MHz
Number of cores	2	2	2	1	2
Architectures	65 nm				
L1 cache	32 kB				
L2 cache	2 MB	4 MB	2 MB	1 MB	4 MB
External bus	667 MHz	667 MHz	533 MHz	533 MHz	667 MHz
Intel® 64 Architecture	No	Yes	Yes	No	Yes
Intel® Virtualization Technology (VT-x)	Yes	Yes	Yes	No	Yes
Enhanced Intel SpeedStep® Technology	Yes	Yes	Yes	No	Yes
Chipset	Intel® 945GME Intel® 82801 GHM (ICH7M-DH)				
Real-time clock					
Accuracy	At 25°C: typ. 12 ppm (1 seconds) per day				
Battery-buffered	Yes				
Memory socket					
Type	DDR2				
Size	Max. 3 GB				
Graphics					
Controller	Intel® Graphics Media Accelerator 950				
Memory	Up to 224 MB <sup>1)</sup>				
Color depth	Max. 32-bit				
Resolution					
DVI	2x Intel compliant SDVO ports, 1920 x 1080				
RGB	400 MHz RAMDAC, resolutions up to 2048 x 1536 @ 75 Hz (QXGA) and 1920 x 1080 @ 85 Hz (HDTV)				
Mass memory management	2x SATA, 1x IDE				
Power management	ACPI 2.0, S3 Support (suspend to RAM)				

Table 54: 5PC800.B945-00, 5PC800.B945-01, 5PC800.B945-02, 5PC800.B945-03, 5PC800.B945-04 - Technical data

1) Allocated in main memory

## 3.2.4 Technical data - 5PC800.B945-1x

Product ID	5PC800.B945-10	5PC800.B945-11	5PC800.B945-12	5PC800.B945-13	5PC800.B945-14
General information					
Certification CE	Yes				
Controller					
Boot loader	embedded AMI BIOS				
Processor					
Type	Intel® Core™ Duo L2400	Intel® Core™2 Duo L7400	Intel® Core™2 Duo U7500	Intel® Celeron® M 423,	Intel® Core™2 Duo T7400
Clock frequency	1660 MHz	1500 MHz	1060 MHz	1060 MHz	2160 MHz
Number of cores	2	2	2	1	2
Architectures	65 nm				
L1 cache	32 kB				
L2 cache	2 MB	4 MB	2 MB	1 MB	4 MB
External bus	667 MHz	667 MHz	533 MHz	533 MHz	667 MHz
Intel® 64 Architecture	No	Yes	Yes	No	Yes
Intel® Virtualization Technology (VT-x)	Yes	Yes	Yes	No	Yes
Enhanced Intel SpeedStep® Technology	Yes	Yes	Yes	No	Yes
Chipset	Intel® 945GME Intel® 82801 GHM (ICH7M-DH)				
Real-time clock					
Accuracy	At 25°C: typ. 12 ppm (1 seconds) per day				
Battery-buffered	Yes				
Memory socket					
Type	DDR2				
Size	Max. 3 GB				

Table 55: 5PC800.B945-10, 5PC800.B945-11, 5PC800.B945-12, 5PC800.B945-13, 5PC800.B945-14 - Technical data

Product ID	5PC800.B945-10	5PC800.B945-11	5PC800.B945-12	5PC800.B945-13	5PC800.B945-14
Graphics	Intel® Graphics Media Accelerator 950 Up to 224 MB <sup>1)</sup> Max. 32-bit  2x Intel compliant SDVO ports, 1920 x 1080 400 MHz RAMDAC, resolutions up to 2048 x 1536 @ 75 Hz (QXGA) and 1920 x 1080 @ 85 Hz (HDTV)				
Controller					
Memory					
Color depth					
Resolution					
DVI					
RGB					
Mass memory management	2x SATA, 1x IDE				
Power management	ACPI 2.0, S3 Support (suspend to RAM)				

Table 55: 5PC800.B945-10, 5PC800.B945-11, 5PC800.B945-12, 5PC800.B945-13, 5PC800.B945-14 - Technical data

1) Allocated in main memory



### 3.3 Main memory

#### 3.3.1 General information

These 200-pin DDR2 main memory modules operate at 677 MHz and are available in the sizes 512 MB, 1 GB and 2 GB.

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.

#### 3.3.2 Order data


Model number	Short description	Figure
	<b>Main memory</b>	
5MMDDR.0512-01	SO-DIMM DDR2 RAM 512 MB PC2-5300	
5MMDDR.1024-01	SO-DIMM DDR2 RAM 1024 MB PC2-5300	
5MMDDR.2048-01	SO-DIMM DDR2 RAM 2048 MB PC2-5300	

Table 56: 5MMDDR.0512-01, 5MMDDR.1024-01, 5MMDDR.2048-01 - Order data

#### 3.3.3 Technical data

Product ID	5MMDDR.0512-01	5MMDDR.1024-01	5MMDDR.2048-01
<b>General information</b>			
Type	SO-DIMM DDR2 SDRAM		
Memory size	512 MB	1 GB	2 GB
Construction	200-pin		
Organization	64M x 64 bit	128M x 64 bit	256M x 64-bit
Speed	DDR2-667 (PC2-5300)		
Certification CE	Yes		

Table 57: 5MMDDR.0512-01, 5MMDDR.1024-01, 5MMDDR.2048-01 - Technical data

#### Information:

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

### 3.4 Heat sink with power supply

#### 3.4.1 General information

#### Information:

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

#### 3.4.2 Order data


Model number	Short description	Figure
	<b>Heat sinks</b>	
5AC802.HS00-00	APC820 power supply and heat sink for CPU boards with Dual Core processors L2400, L7400, U7500 and Celeron M 423.	
5AC802.HS00-01	APC820 power supply with heat sink for CPU board with dual core processor T7400.	
	<b>Required accessories</b>	
	<b>CPU boards</b>	
5PC800.B945-00	Intel Core Duo L2400 CPU board, 1.66 GHz, dual-core, 667 MHz FSB, 2 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111B.	
5PC800.B945-01	Intel Core2 Duo L7400 CPU board, 1.5 GHz, dual-core, 667 MHz FSB, 4 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111B.	
5PC800.B945-02	Intel Core2 Duo U7500 CPU board, 1.06 GHz, dual-core, 533 MHz FSB, 2 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111B.	
5PC800.B945-03	Intel Celeron M 423 CPU board, 1.06 GHz, single-core, 533 MHz FSB, 1 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111B.	
5PC800.B945-04	Intel Core2 Duo T7400 CPU board, 2.16 GHz, dual-core, 667 MHz FSB, 4 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111B.	
5PC800.B945-10	Intel Core Duo L2400 CPU board, 1.66 GHz, dual-core, 667 MHz FSB, 2 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	
5PC800.B945-11	Intel Core2 Duo L7400 CPU board, 1.5 GHz, dual-core, 667 MHz FSB, 4 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	
5PC800.B945-12	Intel Core2 Duo U7500 CPU board, 1.06 GHz, dual-core, 533 MHz FSB, 2 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	
5PC800.B945-13	Intel Celeron M 423 CPU board, 1.06 GHz, single-core, 533 MHz FSB, 1 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	
5PC800.B945-14	Intel Core2 Duo T7400 CPU board, 2.16 GHz, dual-core, 667 MHz FSB, 4 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	

Table 58: 5AC802.HS00-00, 5AC802.HS00-01 - Order data

#### 3.4.3 Technical data

Product ID	5AC802.HS00-00	5AC802.HS00-01
General information		
Ideal for CPU boards	5PC800.B945-00 / -10 5PC800.B945-01 / -11 5PC800.B945-02 / -12 5PC800.B945-03 / -13	5PC800.B945-04 / -14
Suitable for the following system units	5PC820.SX01-00 5PC820.SX01-01	
Mechanical characteristics		
Material	Aluminum (heat sink)	
Weight	900 g	

Table 59: 5AC802.HS00-00, 5AC802.HS00-01 - Technical data

### 3.5 Replacement fan 8BXF001.0000-00

#### 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).

#### 3.5.1 Order data


Model number	Short description	Figure
	<b>Fan modules</b>	
8BXF001.0000-00	ACOPOSMulti fan unit, replacement fan for ACOPOSMulti modules (8BxP/8B0C/8BVI/8BVE/8B0K)	

Table 60: 8BXF001.0000-00 - Order data

#### 3.5.2 Technical data

Product ID	8BXF001.0000-00
<b>General information</b>	
Short description	ACOPOSMulti fan unit, replacement fan for ACOPOSMulti modules (8BxP/8B0C/8BVI/8BVE/8B0K)

Table 61: 8BXF001.0000-00 - Technical data

### 3.6 PClec plug-in cards

#### 3.6.1 General information

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

#### 3.6.2 Dimensions

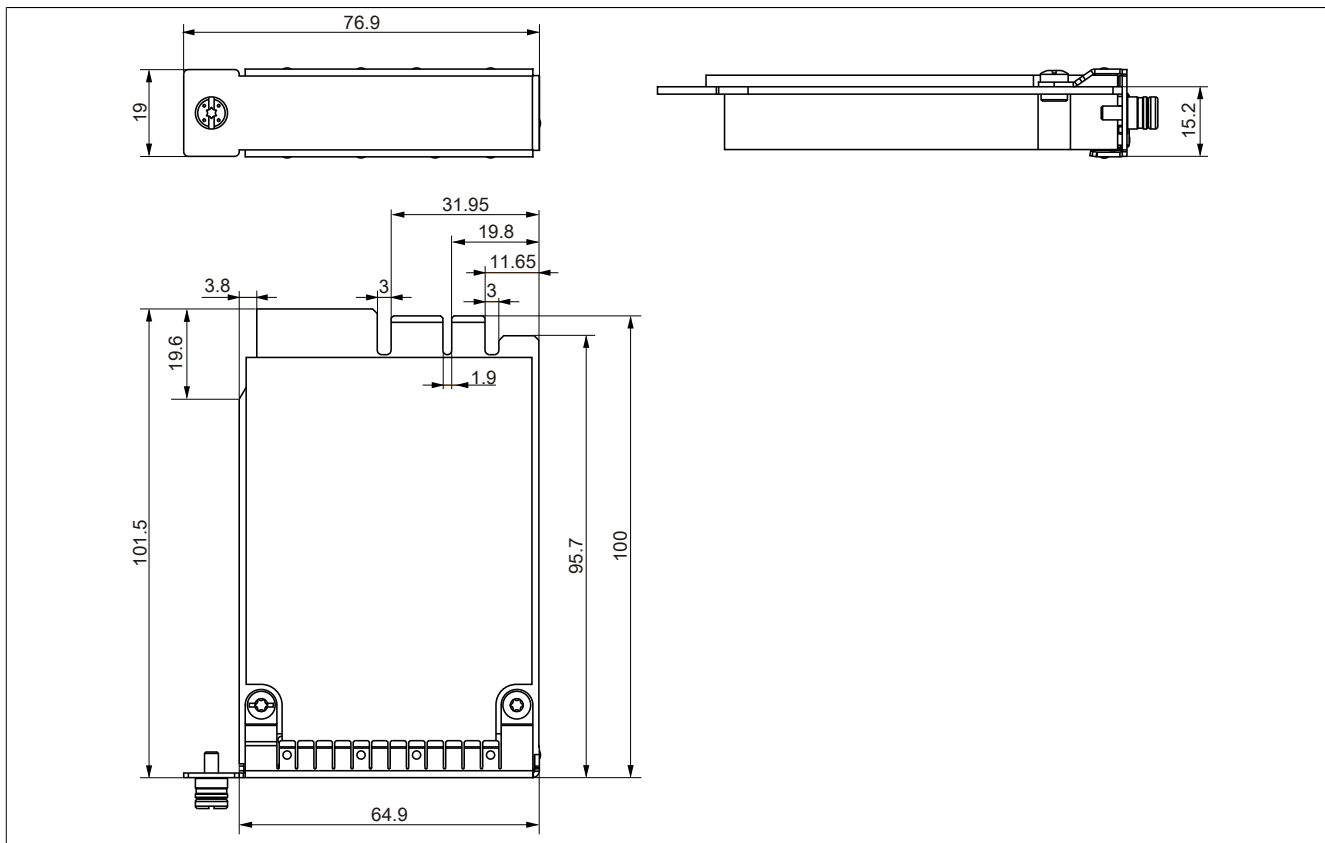


Figure 14: PCI express compact insert cards - Dimensions

#### Information:

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

### 3.6.3 5ACPCC.ETH0-00

#### General information

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

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

#### Order data


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

Table 62: 5ACPCC.ETH0-00 - Order data

#### Technical data

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

Table 63: 5ACPCC.ETH0-00 - Technical data

#### Ethernet interface

##### Information:

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

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

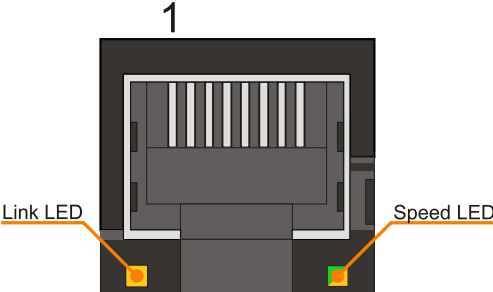


Table 64: 5ACPCC.ETH0-00 - Ethernet interface

1) Switching takes place automatically.

2) The 10 Mbit/s transfer speed / connection is only present if the IF slot Link LED is simultaneously active.

**Driver support**

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

**Information:**

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

### 3.6.4 5ACPCC.MPL0-00

#### General information

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

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

#### Order data


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

Table 65: 5ACPCC.MPL0-00 - Order data

#### Technical data

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

Table 66: 5ACPCC.MPL0-00 - Technical data

#### POWERLINK interface

##### Information:

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

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

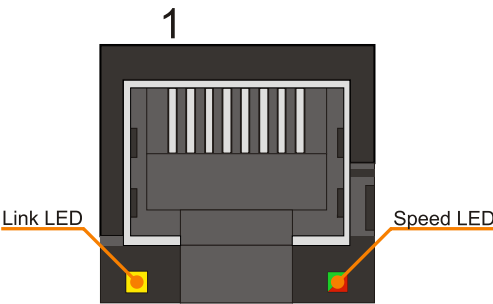


Table 67: 5ACPCC.MPL0-00 - POWERLINK interface

## LED STATUS

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

### Ethernet TCP/IP mode

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

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

Table 68: Status/Error LED - Ethernet TCP/IP operating mode

### POWERLINK V1

Status LED		Status of the POWERLINK station
Green	Red	
On	Off	The POWERLINK station is running with no errors.
Off	On	A fatal system error has occurred. The error type can be read using the PLC logbook. An irreparable problem has occurred. The system cannot properly carry out its tasks. This status can only be changed by resetting the module.
Blinking alternately		The POWERLINK managing node failed. This error code can only occur in controlled node operation.
Off	Blinking	System failure. The red blinking LED signals a certain type of error using a blink code (see section " System failure error codes" on page 38).

Table 69: Status/error LED - POWERLINK V1 operating mode

### POWERLINK V2

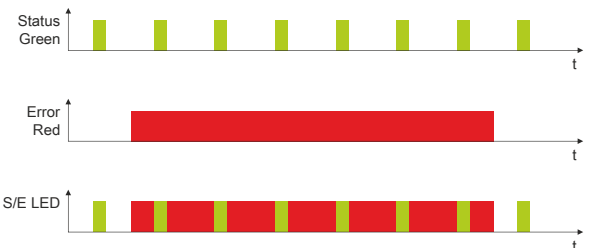
Red - error	Description
On	<p>The POWERLINK interface has encountered an error (failed Ethernet frames, increased number of collisions on the network, etc.).</p> <p>If an error occurs in the following states, then the green LED blinks over the red LED:</p> <ul style="list-style-type: none"> <li>BASIC_ETHERNET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

Table 70: Status / Error LED as error LED - POWERLINK V2 operating mode



Green - status	Description
Off NOT_ACTIVE	<b>Managing Node (MN)</b> 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).  <b>Controlled Node (CN)</b> 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.  <b>Managing Node (MN)</b> This status can only be changed by resetting the interface.  <b>Controlled Node (CN)</b> 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.  <b>Managing Node (MN)</b> The MN starts the operation of the "reduced cycle". Collisions are allowed on the bus. There is not yet any cyclic communication.  <b>Controlled Node (CN)</b> 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.  <b>Managing Node (MN)</b> The MN begins with the cyclic communication (cyclic input data is not yet evaluated). The CNs are configured in this status.  <b>Controlled Node (CN)</b> In this status, the interface is normally configured by the manager. Once complete, a command changes the status to PRE_OPERATIONAL_3 (triple flash).
Triple flash (approx. 1 Hz) READY_TO_OPERATE	The interface status is READY_TO_OPERATE.  <b>Managing Node (MN)</b> Normal cyclic and asynchronous communication. Received PDO data is ignored.  <b>Controlled Node (CN)</b> 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.  <b>Managing Node (MN)</b> This status is not possible for the MN.  <b>Controlled Node (CN)</b> 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 71: Status/Error LED as status LED - POWERLINK operating mode

## System failure error codes

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

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

Legend:

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

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

Table 72: Status/error LED as error LED - system failure error codes

## POWERLINK station number

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

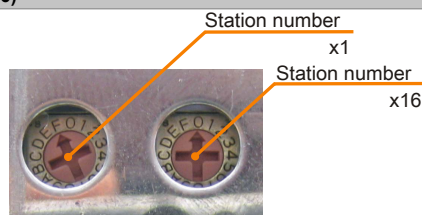


Table 73: POWERLINK station number (x1, x16)

## Card number switch

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

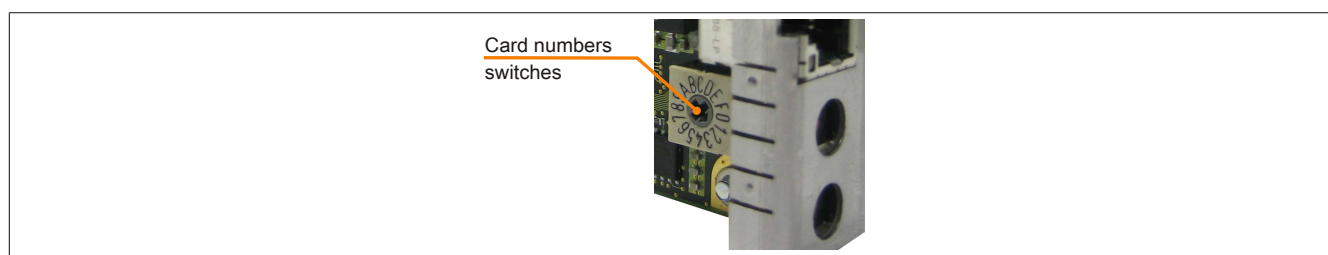


Figure 15: POWERLINK card 2-port node number switch

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

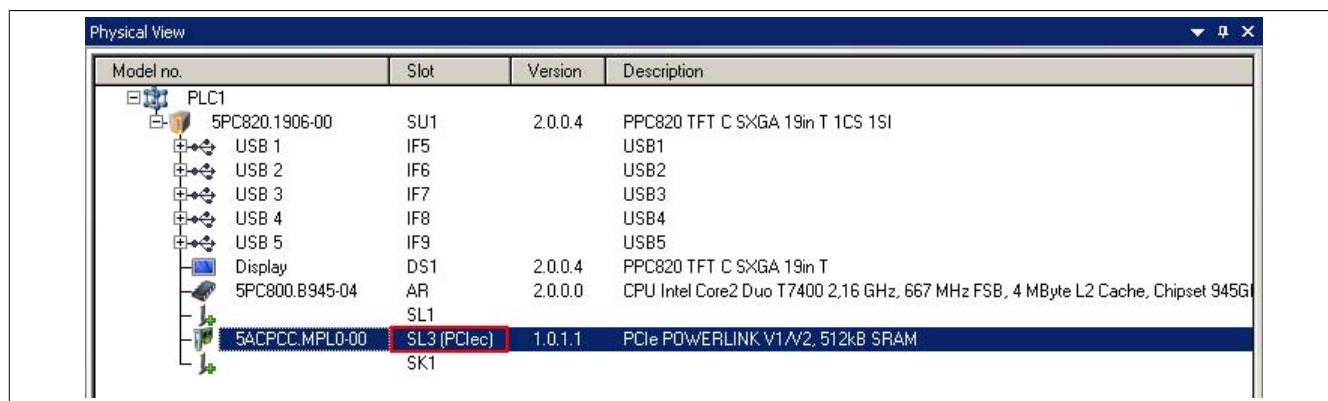


Figure 16: Integrating the POWERLINK plug-in card in Automation Studio

## SRAM

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

# Chapter 3 • Commissioning

## 1 Mounting

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.

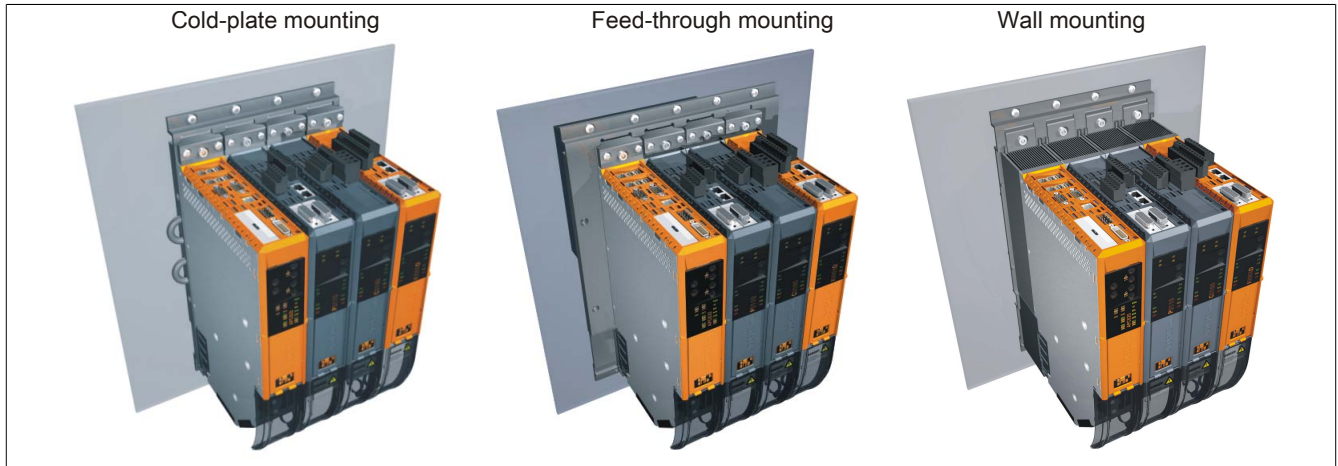


Figure 17: Mounting

### 1.1 Important mounting information

- The APC820 must be secured to the first position of the ACOPOSmulti mounting plate.
- Environmental conditions must be taken into consideration.
- The APC820 is only for operation in closed rooms.
- The APC820 cannot be situated in direct sunlight.
- Ventilation holes must not be covered.
- The flex radius of connected cables (DVI, SDL, USB, etc.) must not be exceeded (see "Cable connections" on page 77).
- 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](http://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 control 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 in accordance with 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](http://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 mounting

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 be found in the ACOPOSmulti manual, which can be downloaded for free from the B&R homepage ([www.br-automation.com](http://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 Mounting orientation

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

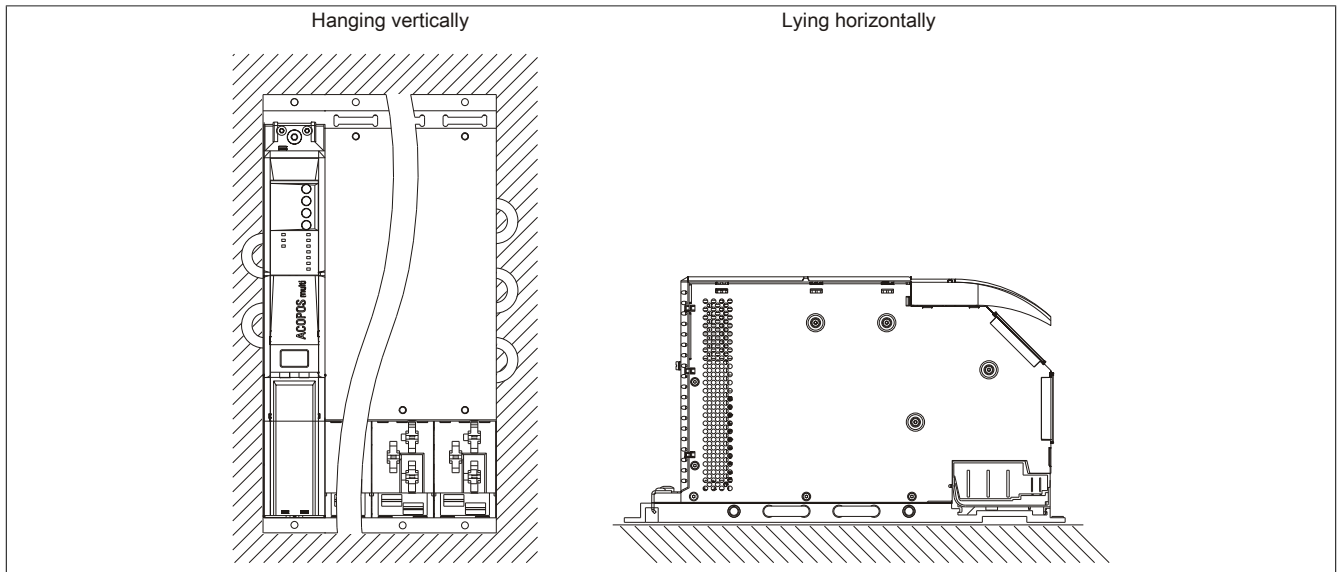


Figure 18: Permitted mounting orientations

## 1.4 Spacing for air circulation

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

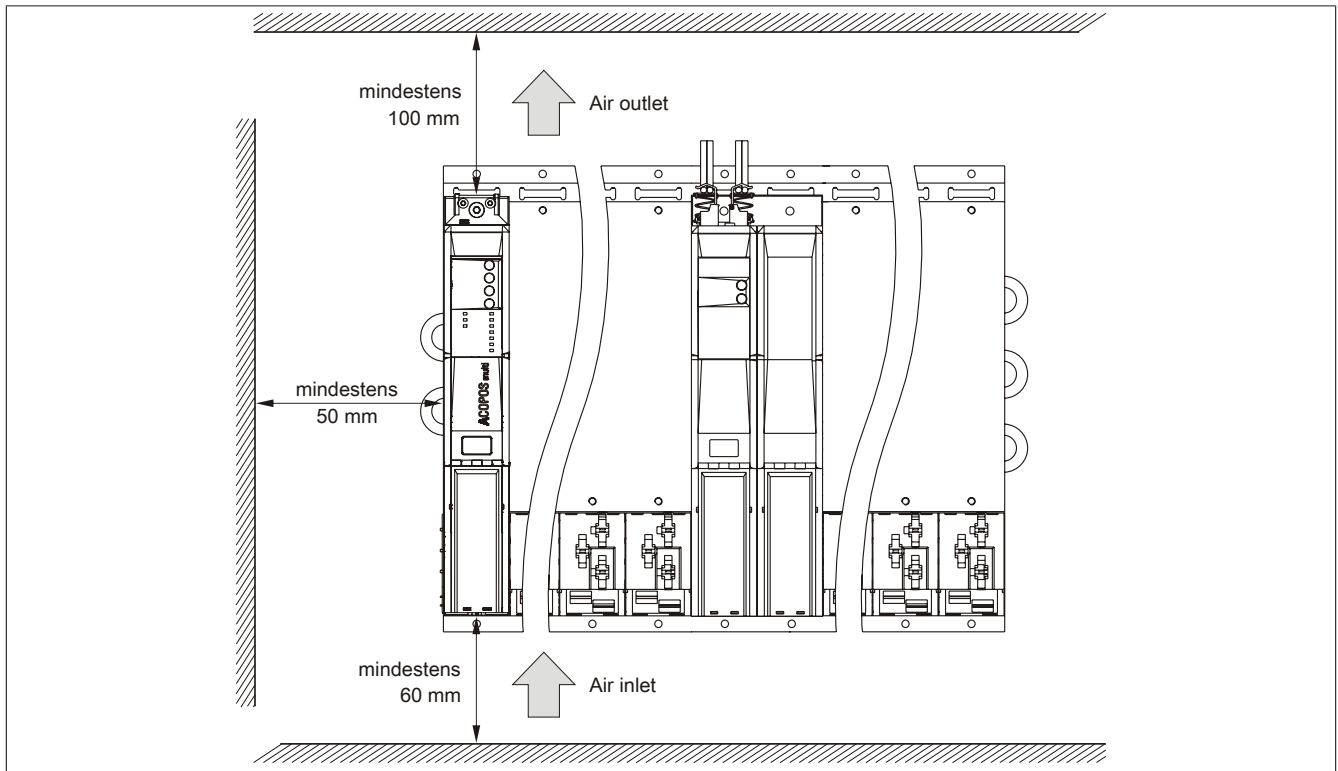


Figure 19: Spacing for air circulation

### 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.

### Information:

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

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

### 1.5 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.

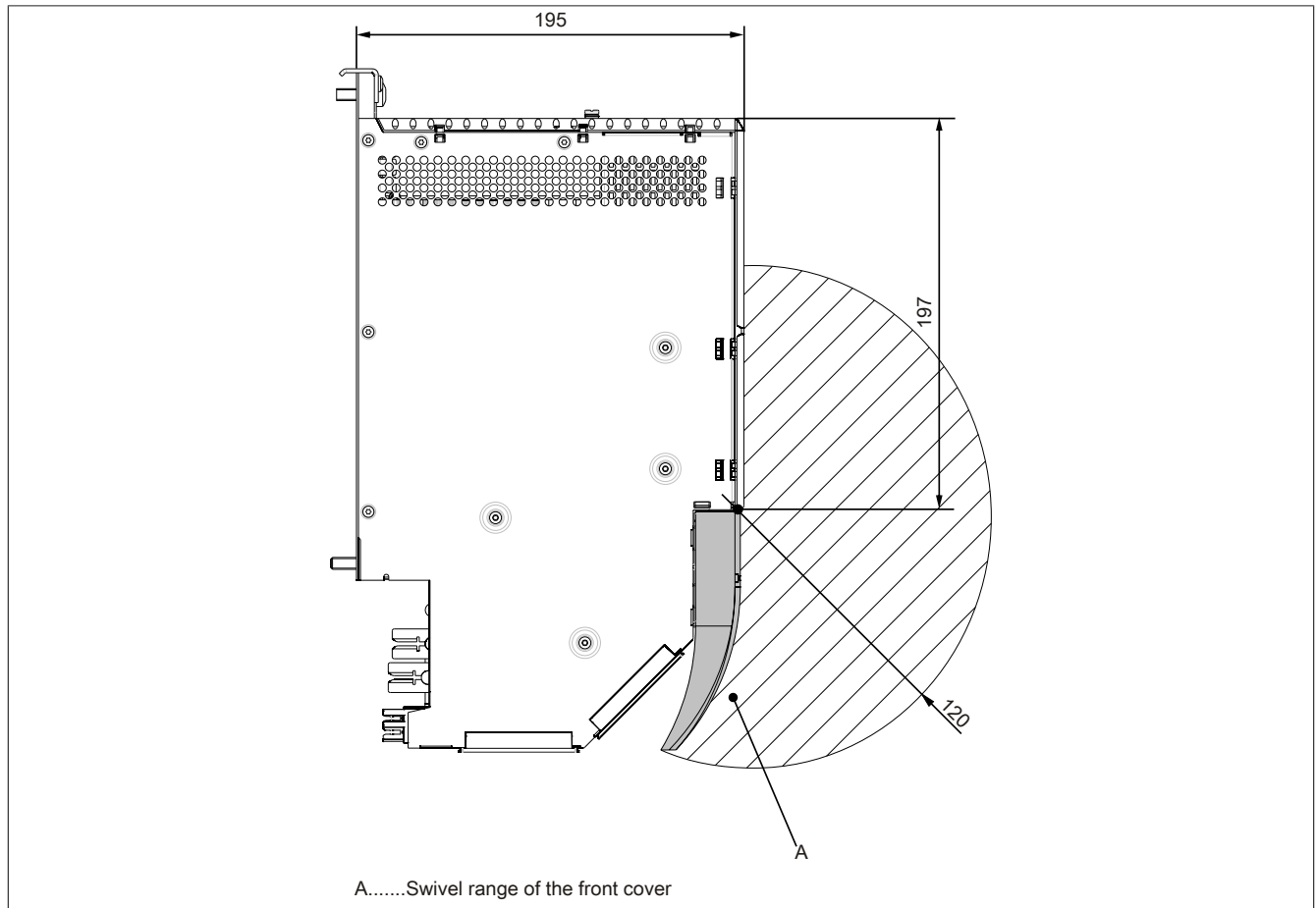


Figure 20: Swivel range of the front cover

## 1.6 Installation guidelines

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.

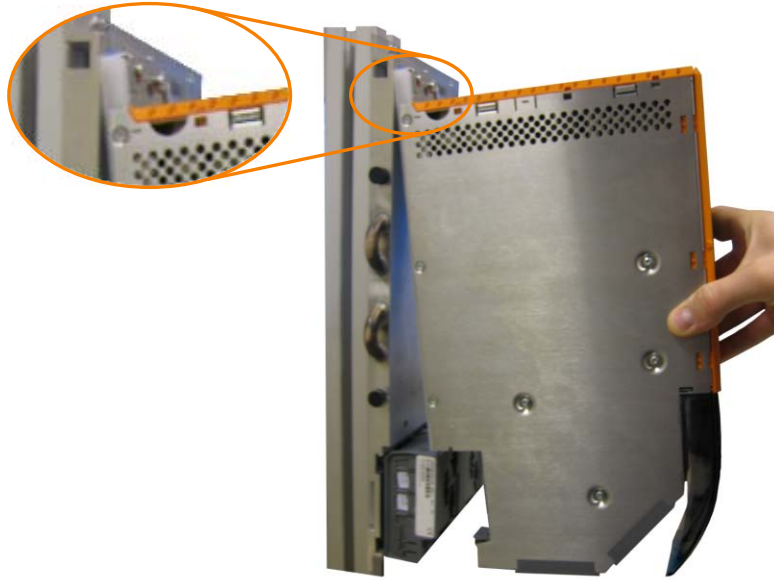


Figure 21: Attaching modules

- 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**.

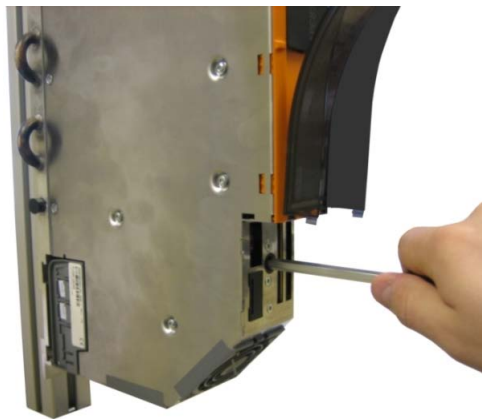


Figure 22: Tightening the fastening screws



## 2 Cable connections

The flex radius specification must be taken into account when connecting or laying cables.

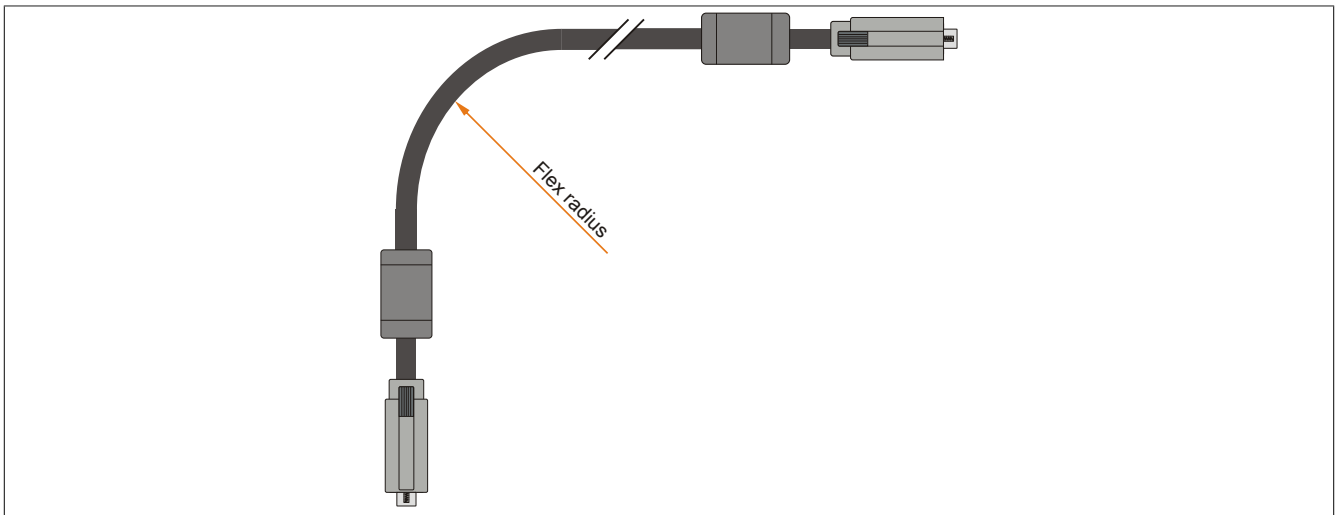


Figure 23: Flex radius - Cable connection

### Information:

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

### 3 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 74: 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 (onboard). As an alternative, an office TFT with DVI interface or an analog monitor (using adapter with model no. 5AC900.1000-00) can also be used. A separate cable is used for touch screen and USB. If USB devices are to be operated on the Automation Panel 900, the maximum distance is 5 meters. USB devices can only be connected directly to the Automation Panel (without a hub).

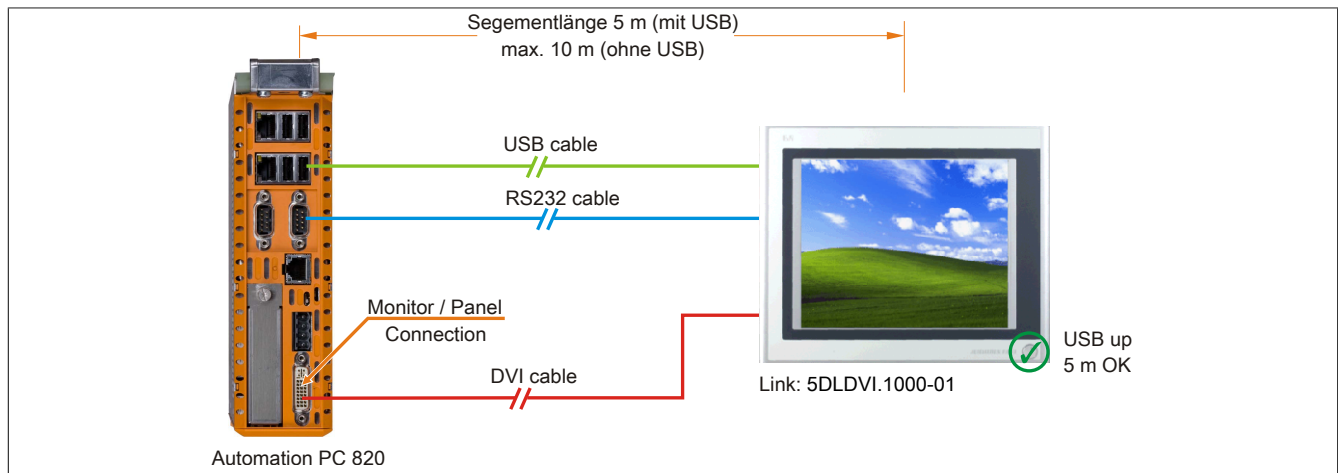


Figure 24: One Automation Panel 900 via DVI

#### 3.2.1 Basic system requirements

The following table shows the possible combinations of APC820 system unit and CPU board to implement the configuration shown in the figure above. If a combination results in a limitation of the maximum resolution, this is also indicated (e.g. when connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit		Limitation Resolution
	5PC820.SX01-00	5PC820.SX01-01	
5PC800.B945-00 5PC800.B945-10	✓	✓	Max. SXGA
5PC800.B945-01 5PC800.B945-11	✓	✓	Max. SXGA
5PC800.B945-02 5PC800.B945-12	✓	✓	Max. SXGA
5PC800.B945-03 5PC800.B945-13	✓	✓	Max. SXGA
5PC800.B945-04 5PC800.B945-14	✓	✓	Max. SXGA

Table 75: Possible combinations of system unit and CPU board

#### 3.2.2 Link modules

##### Information:

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

Model number	Description	Note
5DL DVI.1000-01	<b>Automation Panel Link DVI Receiver</b> 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 76: Link modules

#### 3.2.3 Cables

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

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

Table 77: Cables for DVI configurations

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

Table 77: Cables for DVI configurations

## Information:

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

### 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 <sup>1</sup>
5AP920.1214-01	12.1"	SVGA	✓	-	5 m / 10 m <sup>1</sup>
5AP920.1505-01	15.0"	XGA	✓	-	5 m / 10 m <sup>1</sup>
5AP920.1706-01	17.0"	SXGA	✓	-	5 m / 10 m <sup>1</sup>
5AP920.1906-01	19.0"	SXGA	✓	-	5 m / 10 m <sup>1</sup>

Table 78: 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

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

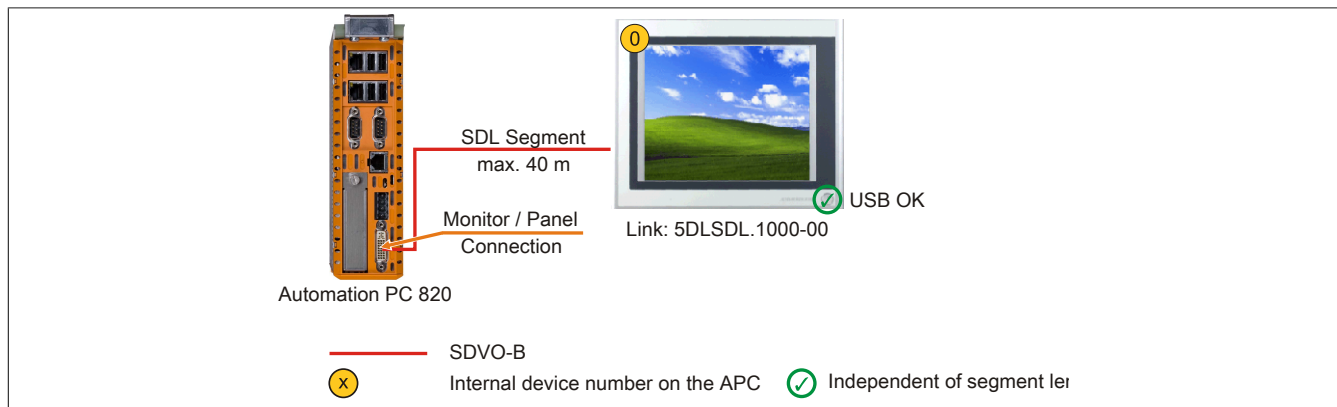


Figure 25: One Automation Panel 900 via SDL

#### 3.3.1 Basic system requirements

The following table shows the possible combinations of APC820 system unit and CPU board to implement the configuration shown in the figure above. If a combination results in a limitation of the maximum resolution, this is also indicated (e.g. when connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit		Limitation Resolution
	5PC820.SX01-00	5PC820.SX01-01	
5PC800.B945-00	✓	✓	Max. UXGA
5PC800.B945-10	✓	✓	Max. UXGA
5PC800.B945-01	✓	✓	Max. UXGA
5PC800.B945-11	✓	✓	Max. UXGA
5PC800.B945-02	✓	✓	Max. UXGA
5PC800.B945-12	✓	✓	Max. UXGA
5PC800.B945-03	✓	✓	Max. UXGA
5PC800.B945-13	✓	✓	Max. UXGA
5PC800.B945-04	✓	✓	Max. UXGA
5PC800.B945-14	✓	✓	Max. UXGA

Table 79: Possible combinations of system unit and CPU board

#### 3.3.2 Link modules

##### Information:

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

Model number	Description	Note
5DLSDDL.1000-00	<b>Automation Panel Link SDL receiver</b> 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 80: Link modules

#### 3.3.3 Cables

Select an Automation Panel 900 cable from the following table.

Order number	Description	Length
5CASDL.0018-00	SDL cable, 1.8 m.	1.8 m ±30 mm
5CASDL.0050-00	SDL cable, 5 m.	5 m ±30 mm
5CASDL.0100-00	SDL cable, 10 m.	10 m ±50 mm
5CASDL.0150-00	SDL cable, 15 m.	15 m ±100 mm
5CASDL.0200-00	SDL cable, 20 m.	20 m ±100 mm
5CASDL.0250-00	SDL cable, 25 m.	25 m ±100 mm
5CASDL.0300-00	SDL cable, 30 m.	30 m ±100 mm
5CASDL.0018-03	SDL flex cable, 1.8 m.	1.8 m ±20 mm
5CASDL.0050-03	SDL flex cable, 5 m.	5 m ±45 mm
5CASDL.0100-03	SDL flex cable, 10 m.	10 m ±90 mm
5CASDL.0150-03	SDL flex cable, 15 m.	15 m ±135 mm
5CASDL.0200-03	SDL flex cable, 20 m.	20 m ±180 mm

Table 81: Cables for SDL configurations

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

Table 81: Cables for SDL configurations

## Information:

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

### Cable lengths and resolutions for SDL transfer

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

Cables 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.0018-00	5CASDL.0018-00	5CASDL.0018-00	5CASDL.0018-00
	5CASDL.0018-01	5CASDL.0018-01	5CASDL.0018-01	5CASDL.0018-01	5CASDL.0018-01
	5CASDL.0018-03	5CASDL.0018-03	5CASDL.0018-03	5CASDL.0018-03	5CASDL.0018-03
5	5CASDL.0050-00	5CASDL.0050-00	5CASDL.0050-00	5CASDL.0050-00	5CASDL.0050-00
	5CASDL.0050-01	5CASDL.0050-01	5CASDL.0050-01	5CASDL.0050-01	5CASDL.0050-01
	5CASDL.0050-03	5CASDL.0050-03	5CASDL.0050-03	5CASDL.0050-03	5CASDL.0050-03
10	5CASDL.0100-00	5CASDL.0100-00	5CASDL.0100-00	5CASDL.0100-00	5CASDL.0100-00
	5CASDL.0100-01	5CASDL.0100-01	5CASDL.0100-01	5CASDL.0100-01	5CASDL.0100-01
	5CASDL.0100-03	5CASDL.0100-03	5CASDL.0100-03	5CASDL.0100-03	5CASDL.0100-03
15	5CASDL.0150-00	5CASDL.0150-00	5CASDL.0150-00	5CASDL.0150-00	-
	5CASDL.0150-01	5CASDL.0150-01	5CASDL.0150-01	5CASDL.0150-01	-
	5CASDL.0150-03	5CASDL.0150-03	5CASDL.0150-03	5CASDL.0150-03	-
20	5CASDL.0200-00	5CASDL.0200-00	5CASDL.0200-00	5CASDL.0200-00	-
	5CASDL.0200-03	5CASDL.0200-03	5CASDL.0200-03	5CASDL.0200-03	-
25	5CASDL.0250-00	5CASDL.0250-00	5CASDL.0250-00	-	-
	5CASDL.0250-03	5CASDL.0250-03	5CASDL.0250-03	-	-
30	5CASDL.0300-00	5CASDL.0300-00	-	-	-
	5CASDL.0300-03	5CASDL.0300-03	5CASDL.0300-13	5CASDL.0300-13	-
40	5CASDL.0400-13	5CASDL.0400-13	5CASDL.0400-13	5CASDL.0400-13	-

Table 82: Cable lengths and resolutions for SDL transfer

### 3.3.4 BIOS settings

No special BIOS settings are necessary for operation.

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

### Touch screen functionality

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

### 3.4 One Automation Panel 800 via SDL

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

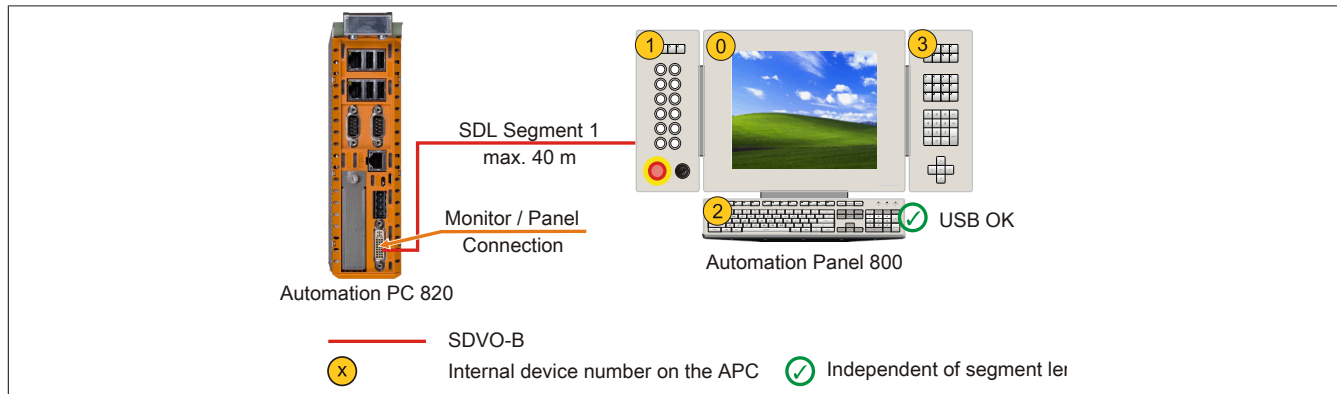


Figure 26: One Automation Panel 800 via SDL

#### 3.4.1 Basic system requirements

The following table shows the possible combinations of APC820 system unit and CPU board to implement the configuration shown in the figure above. If a combination results in a limitation of the maximum resolution, this is also indicated (e.g. when connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit		Limitation Resolution
	5PC820.SX01-00	5PC820.SX01-01	
5PC800.B945-00	✓	✓	Max. UXGA
5PC800.B945-10	✓	✓	Max. UXGA
5PC800.B945-01	✓	✓	Max. UXGA
5PC800.B945-11	✓	✓	Max. UXGA
5PC800.B945-02	✓	✓	Max. UXGA
5PC800.B945-12	✓	✓	Max. UXGA
5PC800.B945-03	✓	✓	Max. UXGA
5PC800.B945-13	✓	✓	Max. UXGA
5PC800.B945-04	✓	✓	Max. UXGA
5PC800.B945-14	✓	✓	Max. UXGA

Table 83: Possible combinations of system unit and CPU board

#### 3.4.2 Cables

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

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

#### Information:

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

#### Cable lengths and resolutions for SDL transfer

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

Cables Segment length [m]	Resolution
	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 84: Cable lengths and resolutions for SDL transfer

### 3.4.3 BIOS settings

No special BIOS settings are necessary for operation.

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

### Touch screen functionality

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



### 3.5 One AP900 and one AP800 via SDL

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

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

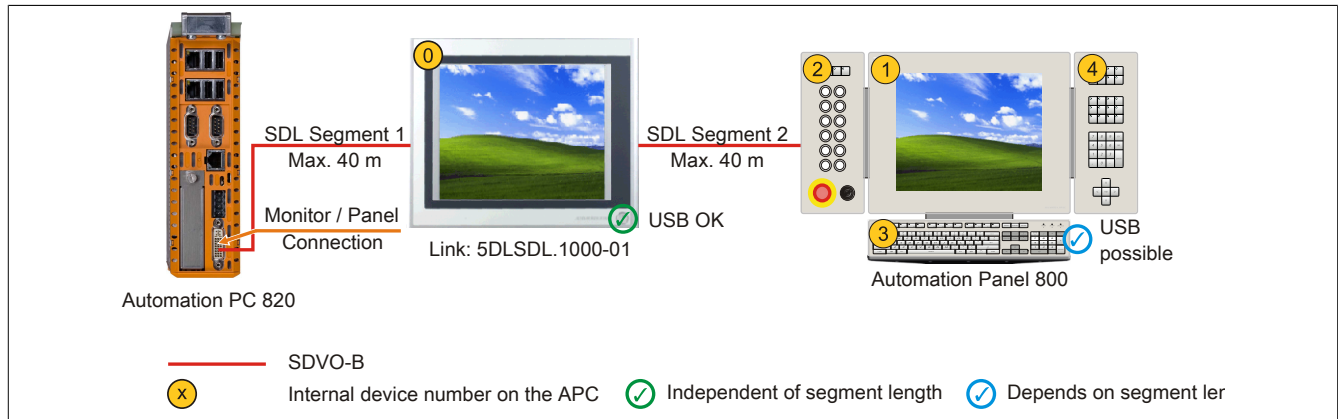


Figure 27: One AP900 and one AP800 via SDL

#### 3.5.1 Basic system requirements

The following table shows the possible combinations of APC820 system unit and CPU board to implement the configuration shown in the figure above. If a combination results in a limitation of the maximum resolution, this is also indicated (e.g. when connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit		Limitation Resolution
	5PC820.SX01-00	5PC820.SX01-01	
5PC800.B945-00 5PC800.B945-10	✓	✓	Max. UXGA
5PC800.B945-01 5PC800.B945-11	✓	✓	Max. UXGA
5PC800.B945-02 5PC800.B945-12	✓	✓	Max. UXGA
5PC800.B945-03 5PC800.B945-13	✓	✓	Max. UXGA
5PC800.B945-04 5PC800.B945-14	✓	✓	Max. UXGA

Table 85: Possible combinations of system unit and CPU board

#### 3.5.2 Link modules

##### Information:

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

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

Table 86: Link modules

#### 3.5.3 Cables

Selection of SDL cables for connecting the AP900 display to the AP900 display see "Cables" on page 81

Selection of SDL cables for connecting the AP800 display to the AP900 display see "Cables" on page 83

##### Information:

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

#### 3.5.4 BIOS settings

No special BIOS settings are necessary for operation.

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

### **Touch screen functionality**

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

### 3.6 Four Automation Panel 900 units via SDL

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

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

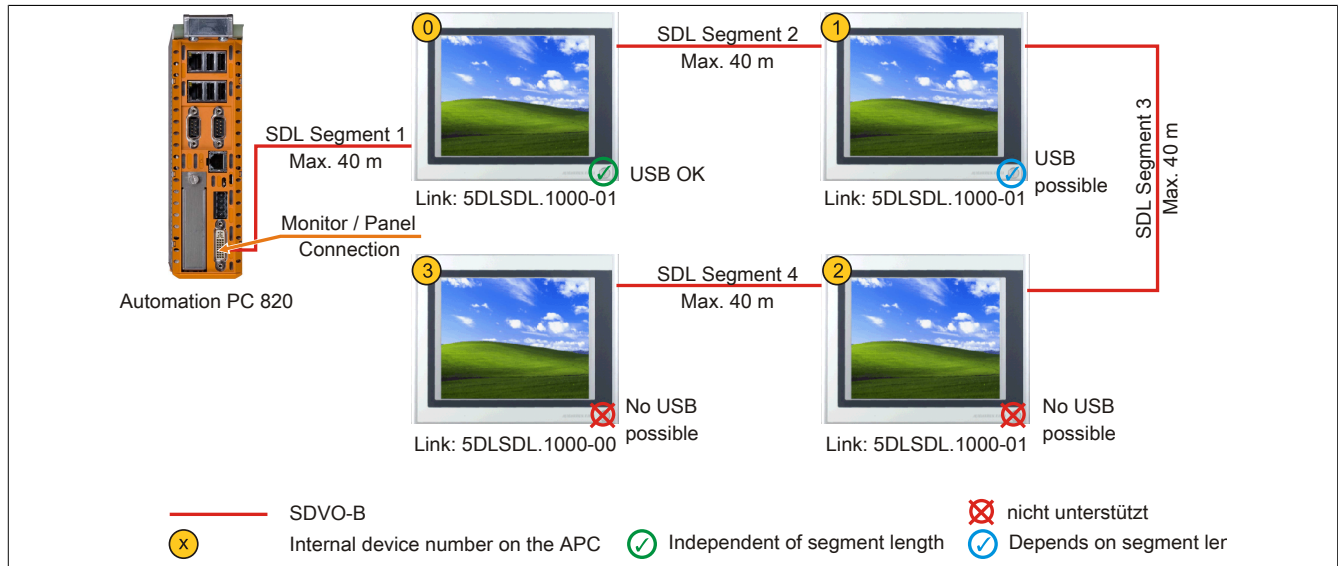


Figure 28: Four Automation Panel 900 units via SDL

#### 3.6.1 Basic system requirements

The following table shows the possible combinations of APC820 system unit and CPU board to implement the configuration shown in the figure above. If a combination results in a limitation of the maximum resolution, this is also indicated (e.g. when connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit		Limitation Resolution
	5PC820.SX01-00	5PC820.SX01-01	
5PC800.B945-00 5PC800.B945-10	✓	✓	Max. UXGA
5PC800.B945-01 5PC800.B945-11	✓	✓	Max. UXGA
5PC800.B945-02 5PC800.B945-12	✓	✓	Max. UXGA
5PC800.B945-03 5PC800.B945-13	✓	✓	Max. UXGA
5PC800.B945-04 5PC800.B945-14	✓	✓	Max. UXGA

Table 87: Possible combinations of system unit and CPU board

#### 3.6.2 Link modules

##### Information:

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

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

Table 88: Link modules

#### 3.6.3 Cables

Select an Automation Panel 900 cable from the following table.

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

Table 89: Cables for SDL configurations

## Information:

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

### Cable lengths and resolutions for SDL transfer

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

Cables 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 90: Cable lengths and resolutions for SDL transfer

### 3.6.4 BIOS settings

No special BIOS settings are necessary for operation.

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

### Touch screen functionality

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

## 4 Connecting USB peripheral devices

### Warning!

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

### 4.1 Locally on the APC820

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



Figure 29: 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 ports on the Automation Panel 900. These can each handle a load of 500 mA. The maximum transfer rate is USB 2.0.

### Information:

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

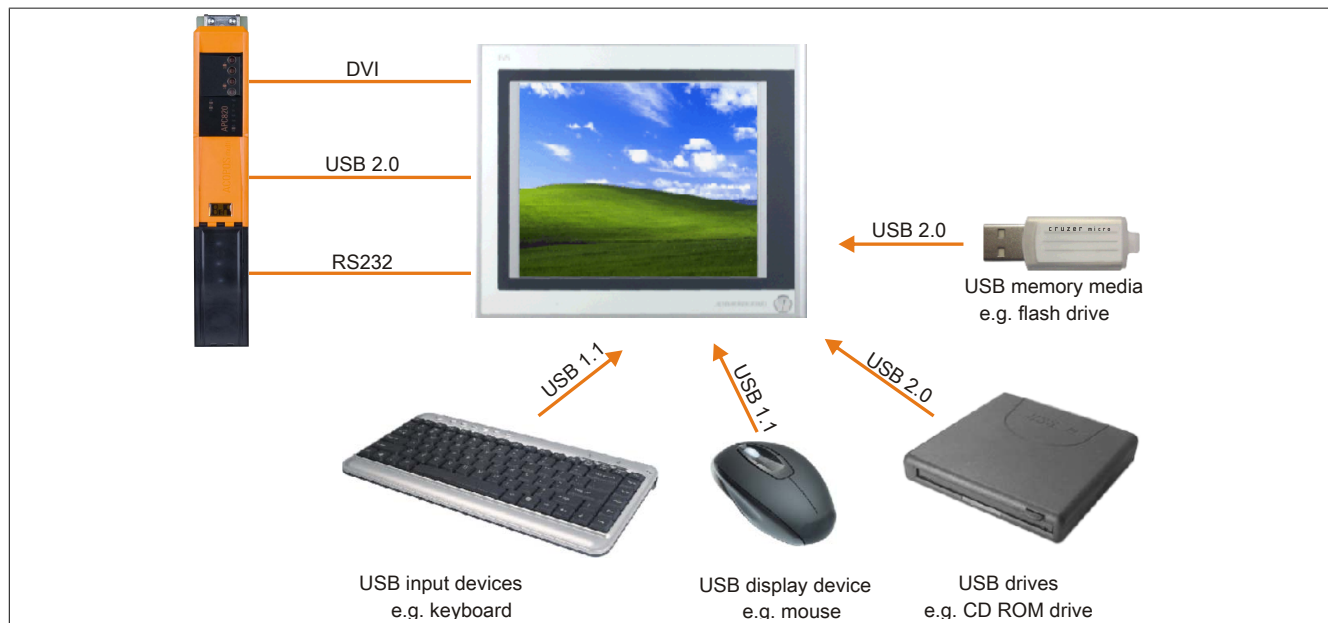


Figure 30: Remote connection of USB peripheral devices to the APC900 via DVI

## 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 ports on Automation Panel 900 and/or USB connections on the Automation Panel 800 devices. These can each handle a load of 500 mA. The maximum transfer rate is USB 1.1.

### Information:

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

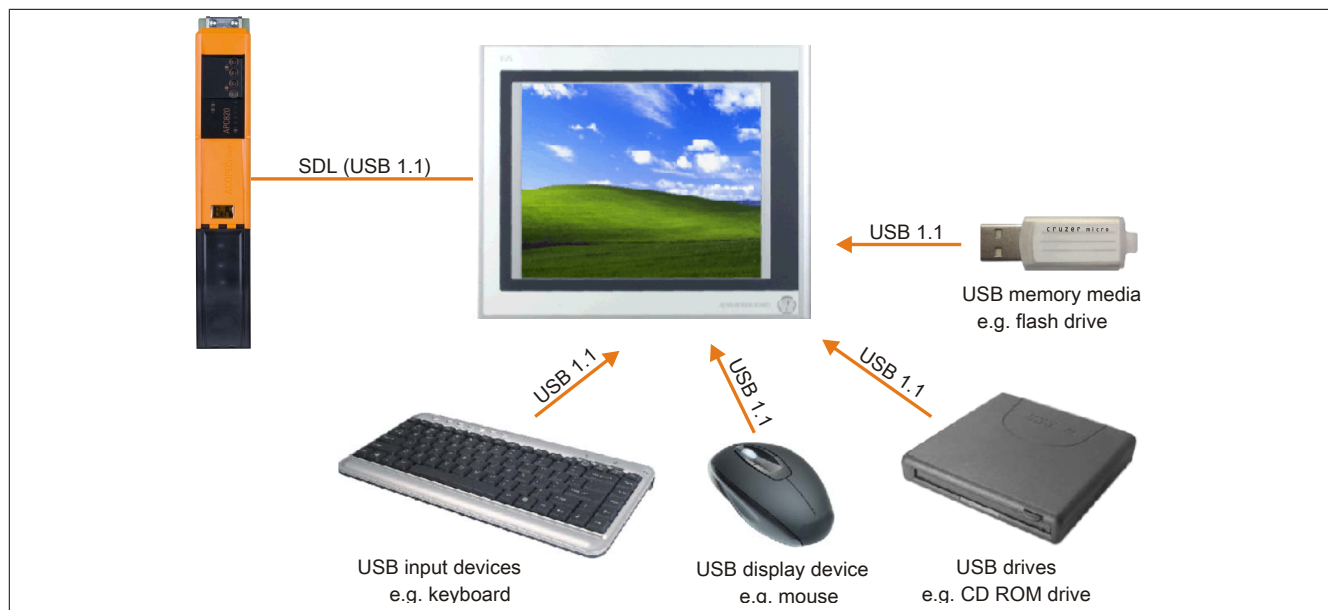


Figure 31: Remote connection of USB peripheral devices to the APC800/900 via SDL

## 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. This can occur because the startup time for the CompactFlash cards fluctuates due to the variance of the components being used. Depending on the CompactFlash cards being used, this error may occur never, sometimes or always.
- 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

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### 1 BIOS options

#### Information:

The following diagrams, BIOS menu items and their descriptions refer to BIOS version 1.18. It is therefore possible that these diagrams and BIOS descriptions do not correspond with the installed BIOS version.

#### 1.1 General information

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

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

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

#### 1.2 BIOS setup and boot procedure

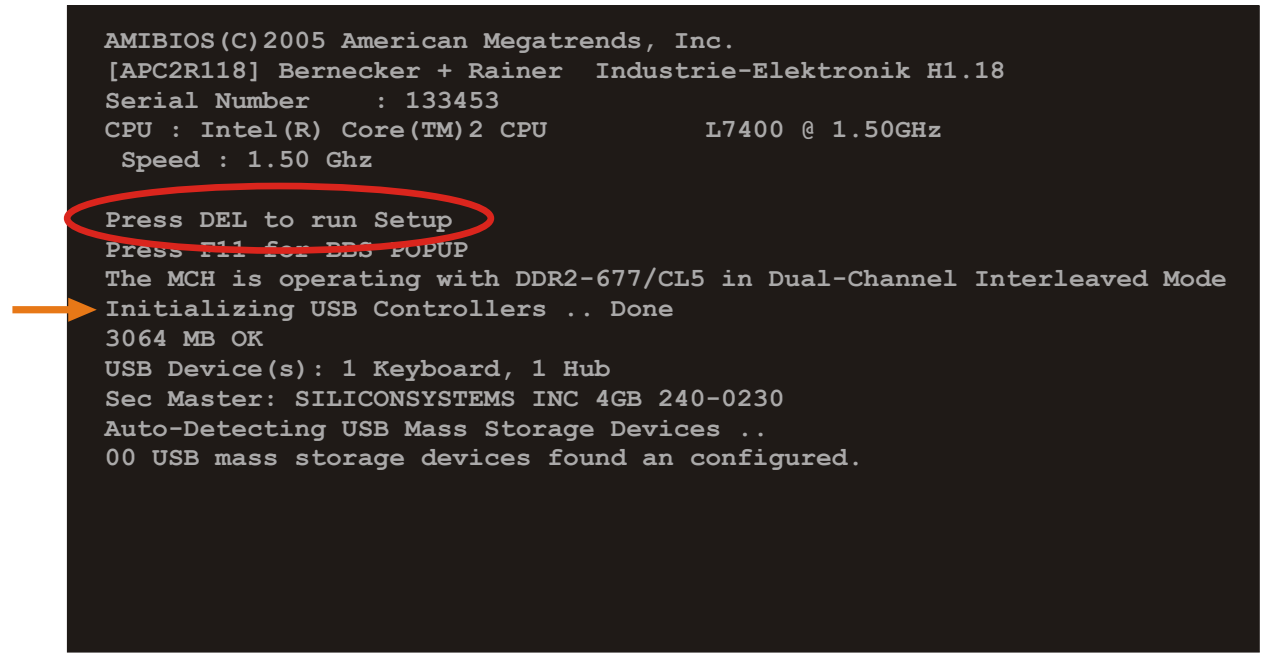
BIOS is immediately activated when switching on the power supply of the B&R industrial PC or pressing the power button. The system checks if the setup data from the EEPROM is "OK". If the data is "OK", then it is transferred to the CMOS. If the data is "not OK", then the CMOS data is checked for validity.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

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

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

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



The image shows a BIOS boot screen with white text on a black background. The text includes system information like 'AMIBIOS(C)2005 American Megatrends, Inc.', '[APC2R118] Bernecker + Rainer Industrie-Elektronik H1.18', 'Serial Number : 133453', 'CPU : Intel(R) Core(TM)2 CPU L7400 @ 1.50GHz', and 'Speed : 1.50 Ghz'. Below this, it says 'Press DEL to run Setup' and 'Press F11 for BIOS POPUP'. The line 'Press DEL to run Setup' is circled in red. An orange arrow points to the line 'Initializing USB Controllers .. Done'. The screen continues with 'The MCH is operating with DDR2-677/CL5 in Dual-Channel Interleaved Mode', '3064 MB OK', 'USB Device(s): 1 Keyboard, 1 Hub', 'Sec Master: SILICONSYSTEMS INC 4GB 240-0230', 'Auto-Detecting USB Mass Storage Devices ..', and '00 USB mass storage devices found an configured.'

```
AMIBIOS(C)2005 American Megatrends, Inc.  
[APC2R118] Bernecker + Rainer Industrie-Elektronik H1.18  
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 BIOS POPUP  
The MCH is operating with DDR2-677/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 32: 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.

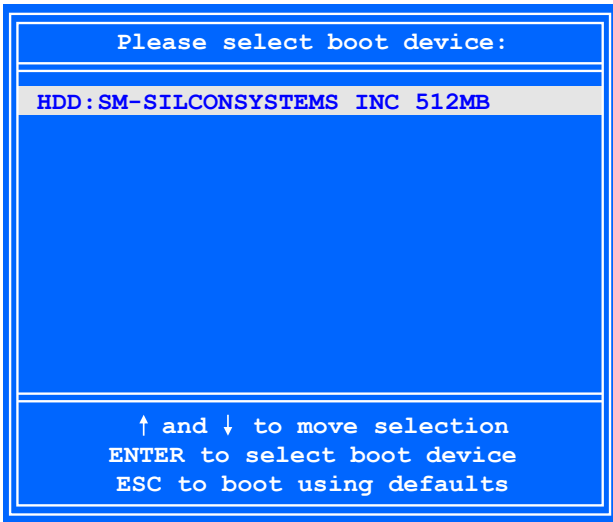
Keys	Function
Del	Enters the BIOS setup menu.
F12	Using the F12 key, you can boot from the network.
F11	Cues the boot menu. Lists all bootable devices that are connected to the system. Select the device to boot from with cursor ↑, cursor ↓ and <ENTER>.
	
<Pause>	Pressing the <Pause> key stops the POST.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

Table 91: BIOS-relevant keys for POST

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

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

Table 92: 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.

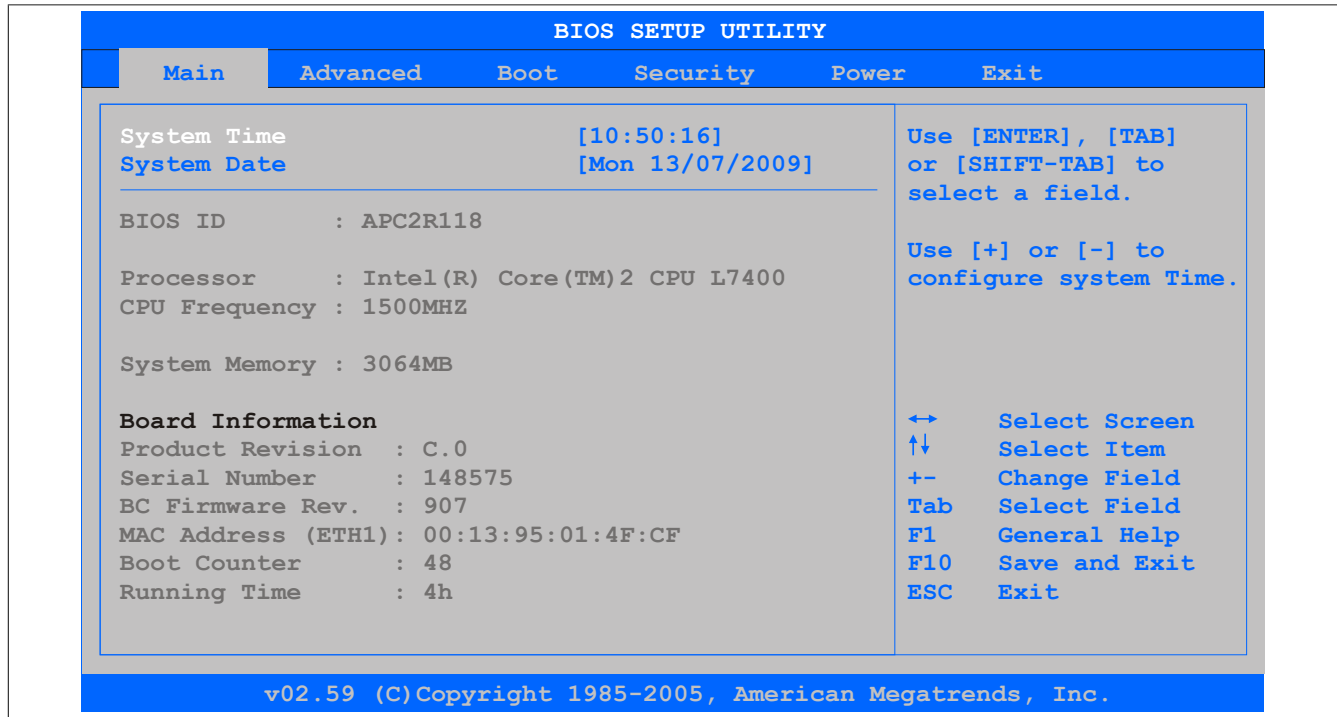


Figure 33: BIOS main menu

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

Table 93: 945GME - Main Menu - Setting options

## 1.5 Advanced

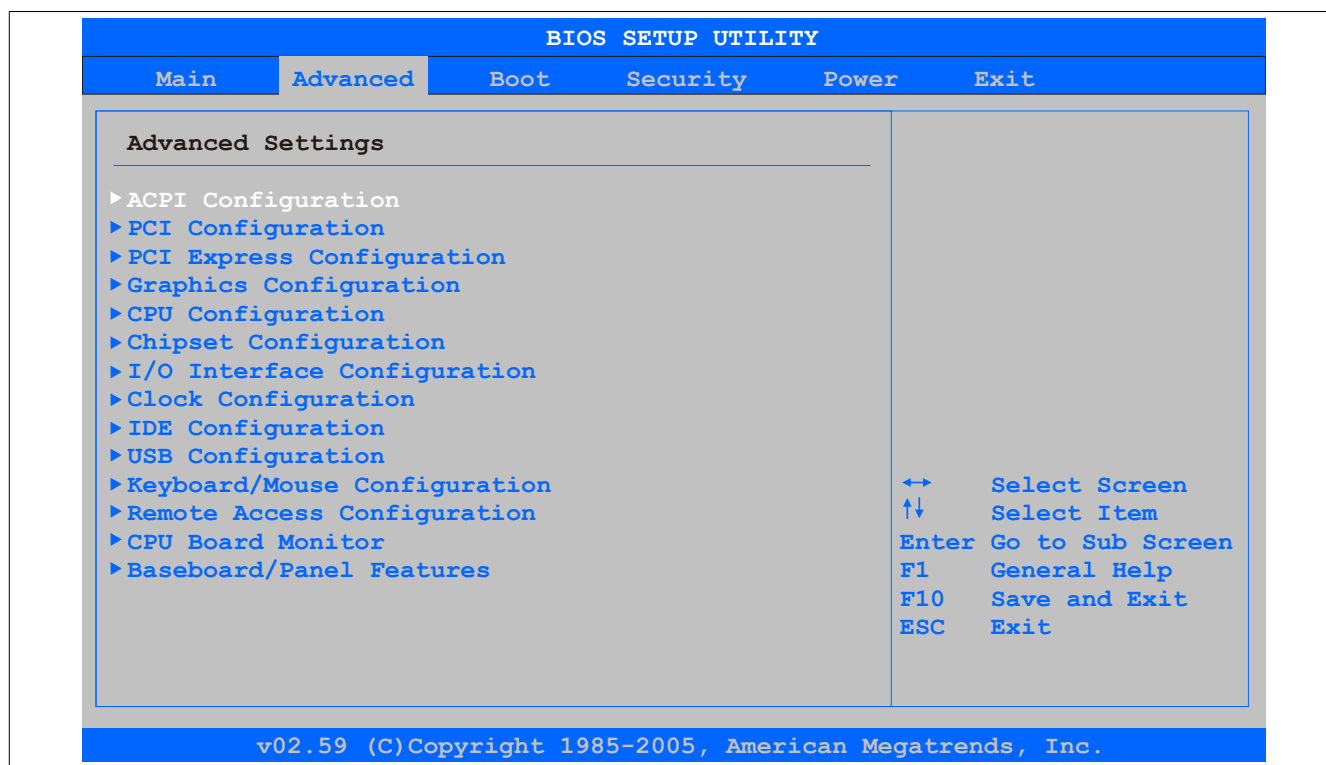


Figure 34: 945GME Advanced Menu

BIOS setting	Meaning	Setting options	Effect
ACPI configuration	Configures the ACPI devices.	Enter	Opens the submenu see "ACPI Configuration" on page 97
PCI Configuration	Configures PCI devices.	Enter	Opens the submenu see "PCI Configuration" on page 98
PCI express configura- tion	Configures the PCI Express.	Enter	Opens the submenu see "PCI Express Configuration" on page 101
Graphics configuration	Configures graphics settings	Enter	Opens the submenu see "Graphics Configuration" on page 103
CPU configuration	Configures the CPU settings.	Enter	Opens the submenu see "CPU Configuration" on page 105
Chipset configuration	Configures the chipset functions.	Enter	Opens the submenu see "Chipset Configuration" on page 106
I/O interface configura- tion	Configures the I/O devices.	Enter	Opens the submenu see "I/O Interface Configuration" on page 107
Clock configuration	Configures the clock settings.	Enter	Opens the submenu see "Clock Configuration" on page 108
IDE Configuration	Configures IDE functions	Enter	Opens the submenu see "IDE Configuration" on page 108
USB Configuration	Configures USB settings	Enter	Opens the submenu see "USB Configuration" on page 113
Keyboard/mouse configu- ration	Configures the keyboard/mouse options.	Enter	Opens the submenu see "Keyboard/Mouse Configuration" on page 115
Remote access configu- ration	Configures the remote access settings.	Enter	Opens the submenu see "Remote access configuration" on page 115
CPU Board Monitor	Displays the current voltages and temperature of the processor in use.	Enter	Opens the submenu see "CPU Board Monitor" on page 117
Main Board/Panel Fea- tures	Displays device specific information and setup of device specific values.	Enter	Opens the submenu see "Baseboard/Panel Features" on page 118

Table 94: 945GME Advanced Menu (Setting options)

## 1.5.1 ACPI Configuration

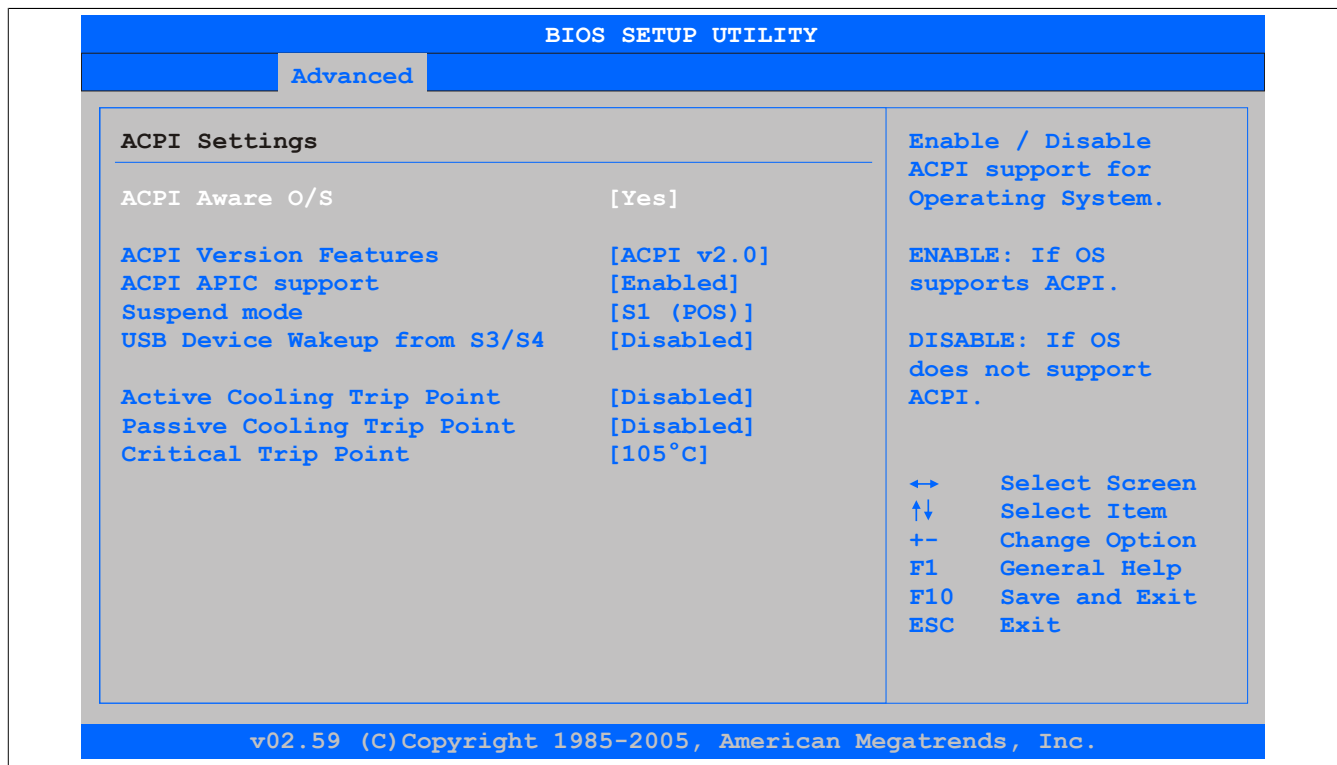


Figure 35: 945GME Advanced ACPI Configuration

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 this function.
Suspend mode	Selects the ACPI status to be used when Suspend Mode is enabled.	S1 (POS)	Sets S1 as Suspend mode. Only a few functions are disabled and are available again at the touch of a button
		S3 (STR)	Sets S3 as Suspend Mode. The current state of the operating system is written to the RAM, which is then supplied solely with power.
USB Device Wakeup from S3/S4	This options makes it possible for activity on a connected USB device to wake the system up from the S3/S4 standby mode.	Enabled	Enables this function.
		Disabled	Disables this function.
Active Cooling Trip Point	With this function, an optional CPU fan above the operating system can be set to turn on when the CPU reaches the set temperature.	Disabled	Disables this function.
		50°C, 60°C, 70°C, 80°C, 90°C	Temperature setting for the active cooling trip point. Can be set in 10 degree increments.
Passive Cooling Trip Point	With this function, a temperature can be set at which the CPU automatically reduces its speed.	Disabled	Disables this function.
		50°C, 60°C, 70°C, 80°C, 90°C	Temperature setting for the passive cooling trip point. Can be set in 10 degree increments.
Critical Trip Point	With this function, a temperature can be set at which the operating system automatically shuts itself down.	80°C, 85°C, 90°C, 95°C, 100°C, 105°C, 110°C	Temperature setting for the critical trip point. Can be set in 5 degree increments.

Table 95: 945GME - Advanced ACPI configuration - Setting options

## 1.5.2 PCI Configuration

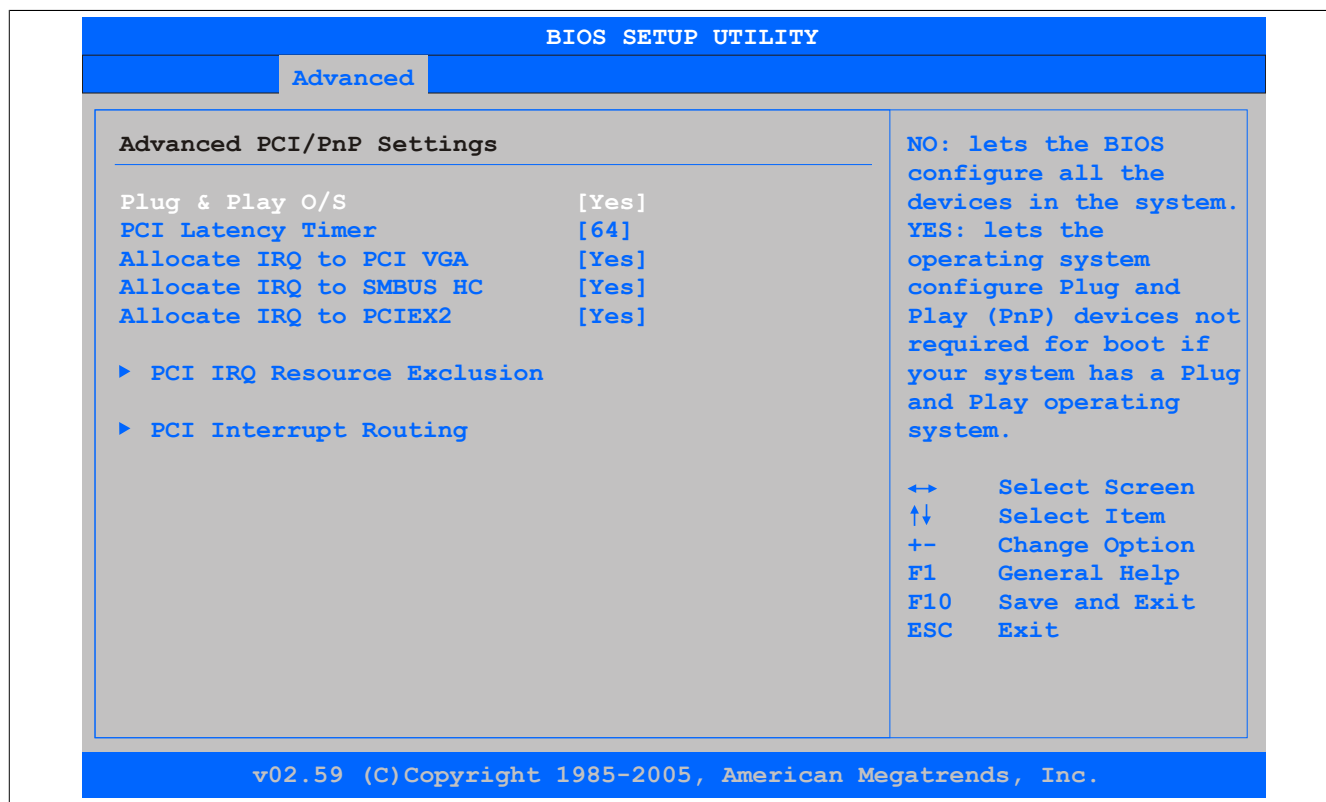


Figure 36: 945GME Advanced PCI Configuration

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 PCIE2	Use this function to set whether or not the PCIE2 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 99
PCI Interrupt Routing	Configures PCI interrupt routing	Enter	Opens the submenu see "PCI Configuration" on page 100

Table 96: 945GME - Advanced PCI configuration - Setting options

## PCI IRQ Resource Exclusion

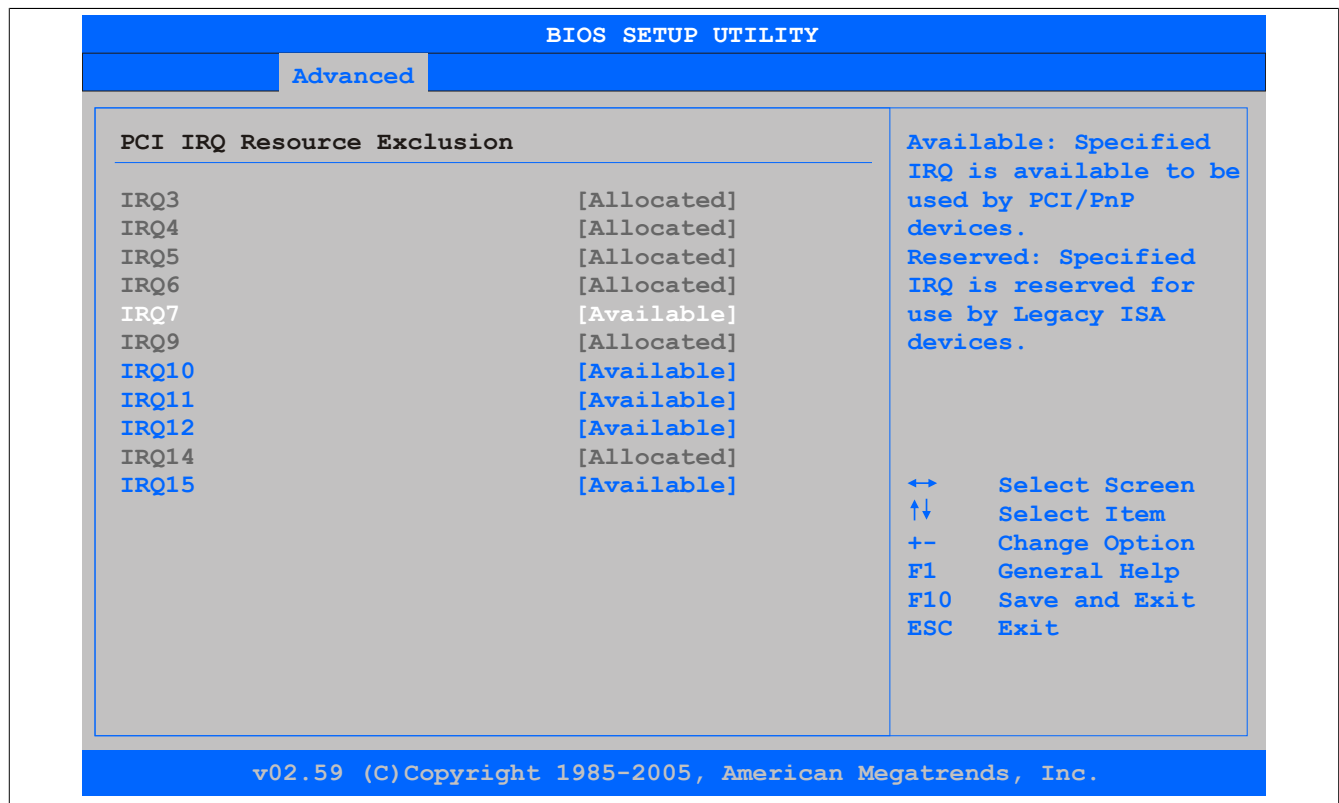


Figure 37: 945GME Advanced PCI IRQ Resource Exclusion

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 97: 945GME - Advanced PCI IRQ Resource Exclusion - Setting options

## PCI Configuration

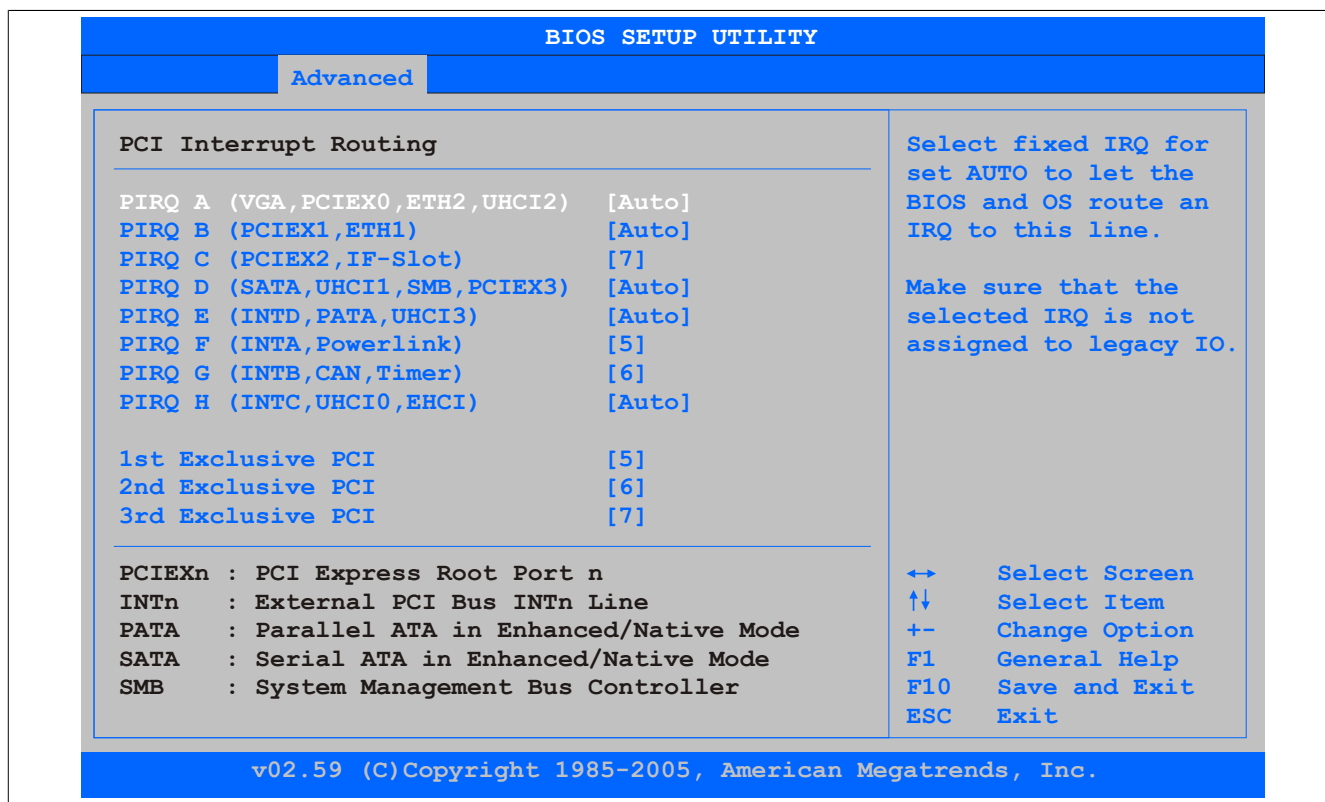


Figure 38: 945GME Advanced PCI Interrupt Routing

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
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).	None	No interrupt is assigned.
		x	Assigns the PIRQ as 1st exclusive PCI IRQ.

**Information:**

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

Table 98: 945GME - Advanced PCI Interrupt Routing - Setting options



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

Table 98: 945GME - Advanced PCI Interrupt Routing - Setting options

### 1.5.3 PCI Express Configuration

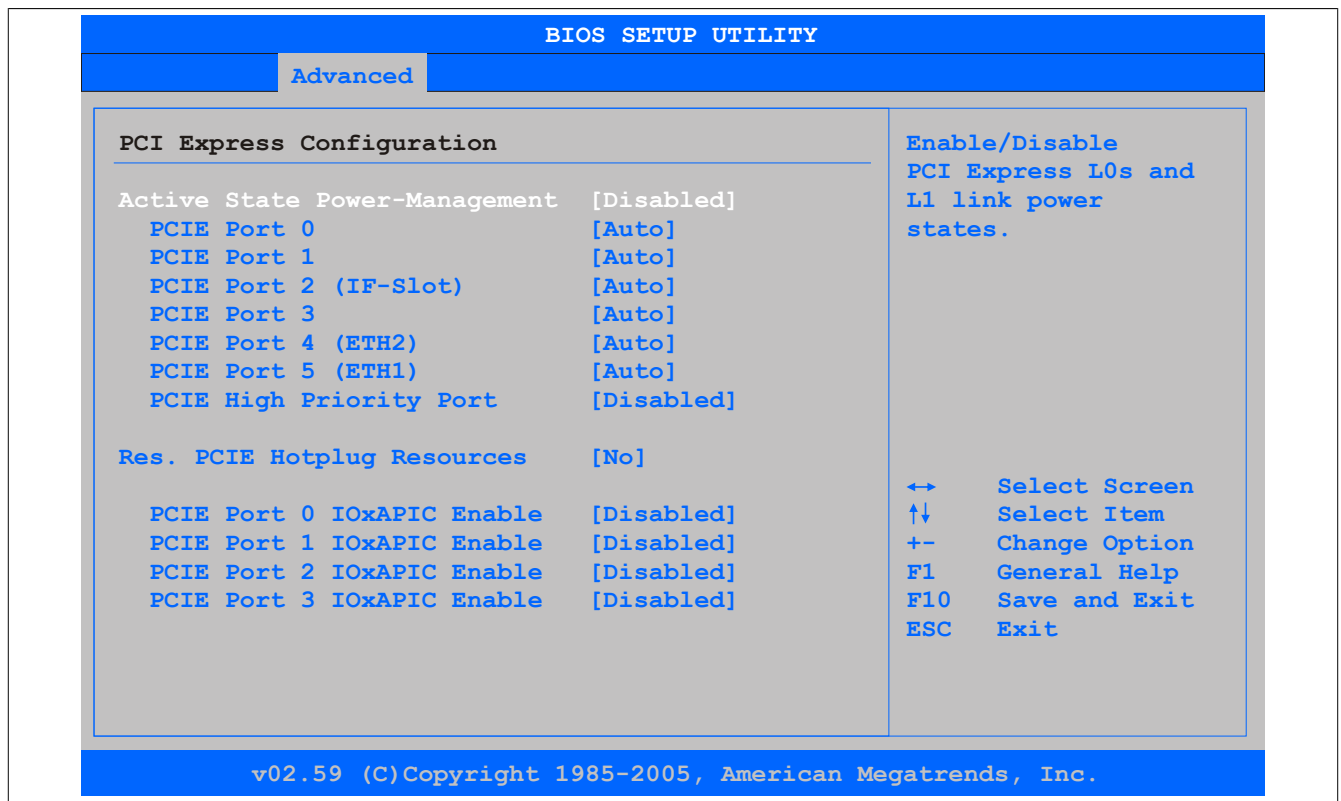


Figure 39: 945GME Advanced PCI Express Configuration

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.
PCIE Port 0	This option activates or deactivates the PCI Express connection function.  <b>Information:</b>  If you are not using any PCI Express devices, this option should be deactivated.	Enabled	Enables this function.
		Auto	Automatic assignment by the BIOS and operating system.
		Disabled	Disables this function.
PCIE Port 1	This option activates or deactivates the PCI Express connection function.  <b>Information:</b>  If you are not using any PCI Express devices, this option should be deactivated.	Enabled	Enables this function.
		Auto	Automatic assignment by the BIOS and operating system.
		Disabled	Disables this function.
PCIE Port 2 (IF slot)	This option activates or deactivates the PCI Express connection function.	Auto	Automatic assignment by the BIOS and operating system.

Table 99: 945GME Advanced PCI Express Configuration (Setting options)

BIOS setting	Meaning	Setting options	Effect
	<b>Information:</b>  If you are not using any PCI Express devices, this option should be deactivated.	Enabled	Enables this function.
		Disabled	Disables this function.
PCIE Port 3	This option activates or deactivates the PCI Express connection function.  <b>Information:</b>  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.  <b>Information:</b>  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	Enables this function.
PCIE Port 5 (ETH1)	This option activates or deactivates the PCI Express connection function.  <b>Information:</b>  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 Hot Plugging Resource	This option can be used to reserve an I/O and memory resource for a free PCIE port. A PCIE port must be set to enabled and resources must be reserved to support ExpressCard hot-plugging on a port.	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	Disables this function.
PCIE Port 1 IOxAPIC enable	This option is used to enable or disable the APIC (Advanced Programmable Interrupt Controller) on the PCIE port 1. The IRQ resources available to the system are expanded when the APIC mode is enabled.	Disabled	Disables this function.
		Enabled	Disables this function.
PCIE Port 2 IOxAPIC enable	This option is used to enable or disable the APIC (Advanced Programmable Interrupt Controller) on the PCIE port 2. The IRQ resources available to the system are expanded when the APIC mode is enabled.	Disabled	Disables this function.
		Enabled	Disables this function.
PCIE Port 3 IOxAPIC enable	This option is used to enable or disable the APIC (Advanced Programmable Interrupt Controller) on the PCIE port 3. The IRQ resources available to the system are expanded when the APIC mode is enabled.	Disabled	Disables this function.
		Enabled	Disables this function.

Table 99: 945GME Advanced PCI Express Configuration (Setting options)

## 1.5.4 Graphics Configuration

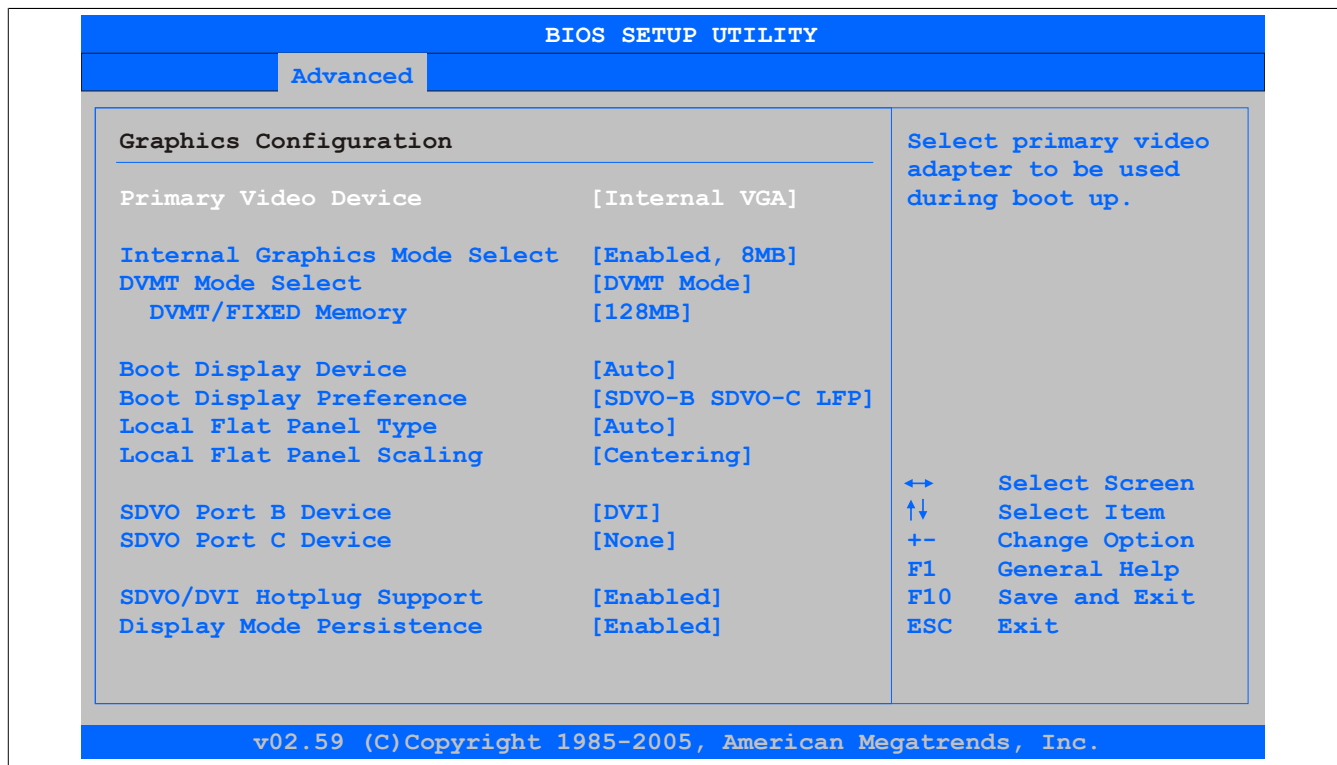


Figure 40: 945GME Advanced Graphics Configuration

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.	64 MB	64MB of main memory can be used.
		128 MB	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.
Boot Display Preference	This option determines the order in which the devices on the connected channels LFP and SDVO should be checked and booted.	CRT + LFP	Use CRT + LFP channel.
		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.
Local Flat Panel Type	This option can be used to set a pre-defined profile for the LVDS channel.	SDVO-C SDVO-B LFP	Serial Digital Video C output - Serial Digital Video B output - Local Flat Panel.
		Auto	Automatic detection and setting using the EDID data.
		VGA 1x18 (002h)	640x480
		VGA 1x18 (013h)	640x480

Table 100: 945GME Advanced Graphics Configuration (Setting options)

BIOS setting	Meaning	Setting options	Effect
		SVGA 1x18 (004h)	800x600
		XGA 1x18 (006h)	1024x768
		XGA 2x18 (007h)	1024x768
		XGA 1x24 (008h)	1024x768
		XGA 2x24 (012h)	1024x768
		SXGA 2x24 (00Ah)	1280x1024
		SXGA 2x24 (018h)	1280x1024
		UXGA 2x24 (00Ch)	1600x1200
		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.
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 Hot Plugging Support	If this option is set to enabled, the Windows XP graphics driver supports "hot plugging" and "configuration mode persistence" for DVI monitors connected to a DVI SDVO transmitter. "Hot plugging" support means that when a DVI monitor is connected while the operating system is running, it is detected automatically and activated. "Configuration mode persistence" means that, for example, a dual DVI configuration is automatically restored when both DVI monitors are reconnected, even if only one of them was connected and activated during a previous boot.	Enabled	"Hot plugging" and "Configuration mode persistence" mode enabled.
		Disabled	"Hot plugging" 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 100: 945GME Advanced Graphics Configuration (Setting options)

## 1.5.5 CPU Configuration

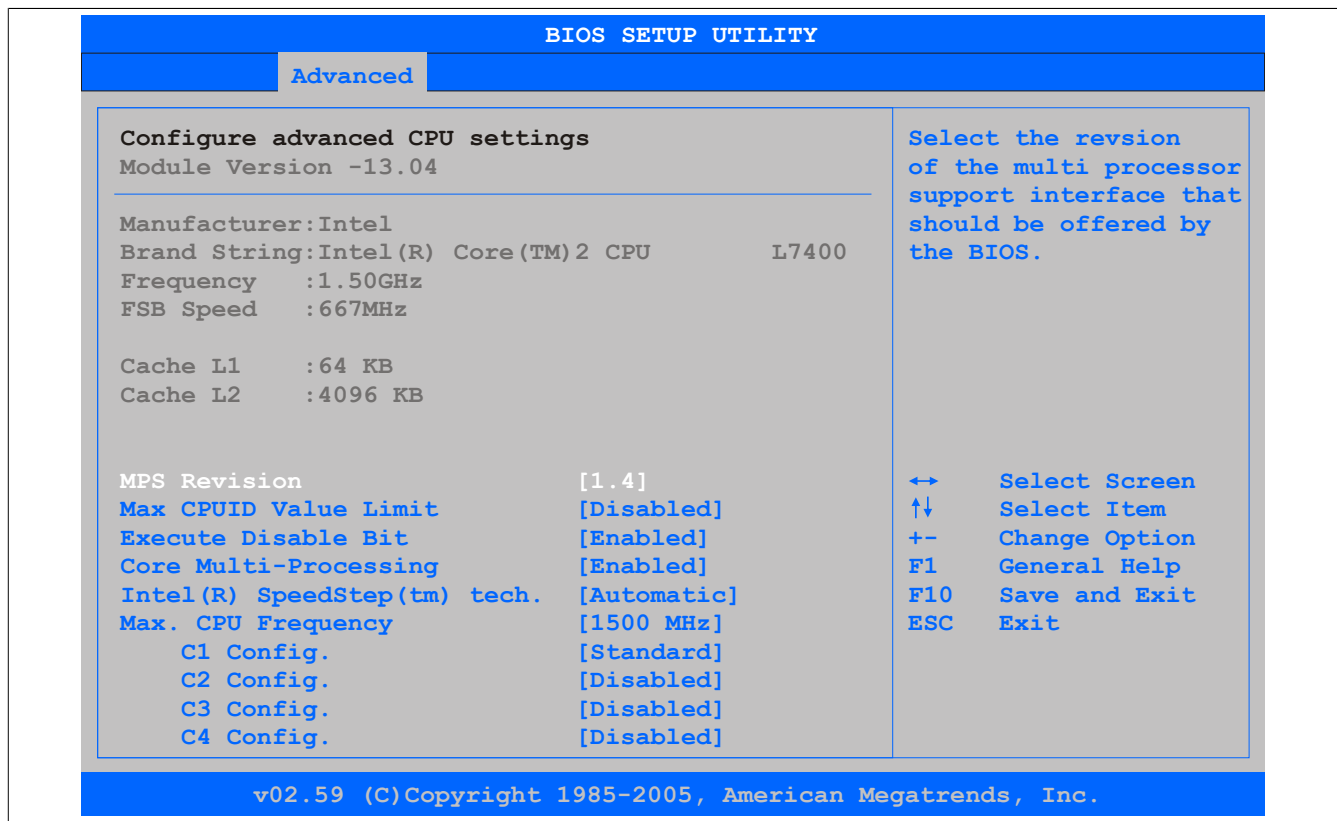


Figure 41: 945GME Advanced CPU Configuration

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.
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.	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.".	xxxx MHz	The processor speed is limited to the set value.
	<b>Information:</b> This option is not available for Celeron M processors.		
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.

Table 101: 945GME Advanced CPU Configuration (Setting options)

BIOS setting	Meaning	Setting options	Effect
C4 Config	Power Management in the Intel Core Duo processors.	Disabled	Disabled C3 support.
		Standard	Standard C4 support.
		Enhanced	Enhanced C4 support.
		Disabled	Disabled C4 support.

Table 101: 945GME Advanced CPU Configuration (Setting options)

### 1.5.6 Chipset Configuration

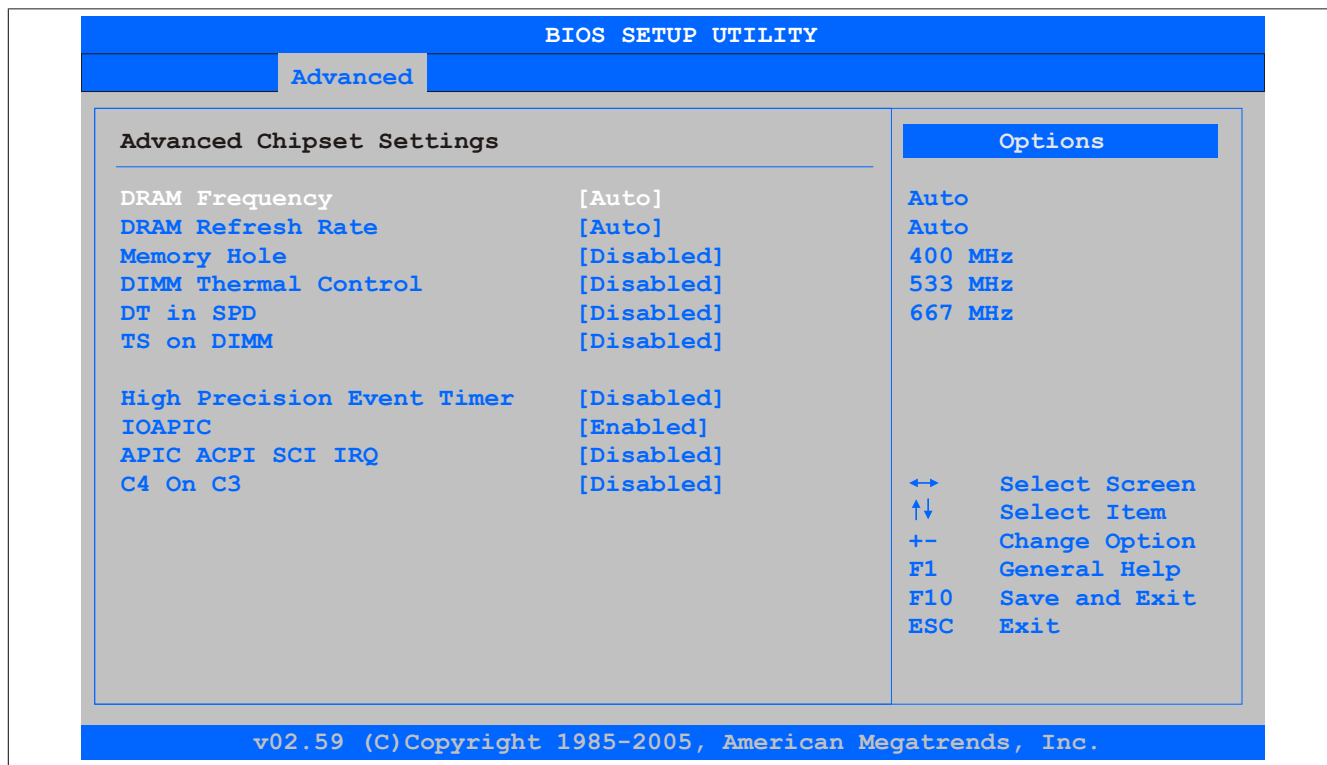


Figure 42: 945GME Advanced Chipset Configuration

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 $\mu$ s	Manual setting for the DRAM refresh rate.
		3.9 $\mu$ s	Manual setting for the DRAM refresh rate.
Memory Hole	Option for ISA cards with frame buffer. Not important 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.
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.

Table 102: 945GME Advanced Chipset (Setting options)

BIOS setting	Meaning	Setting options	Effect
IOAPIC	This option is used to activate or deactivate the APIC (Advanced Programmable Interrupt Controller).  <b>Information:</b>  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	Disables this function.
		Enabled	Processor is needed in C4 if the operating system is initiated in a C3 state.

Table 102: 945GME Advanced Chipset (Setting options)

### 1.5.7 I/O Interface Configuration

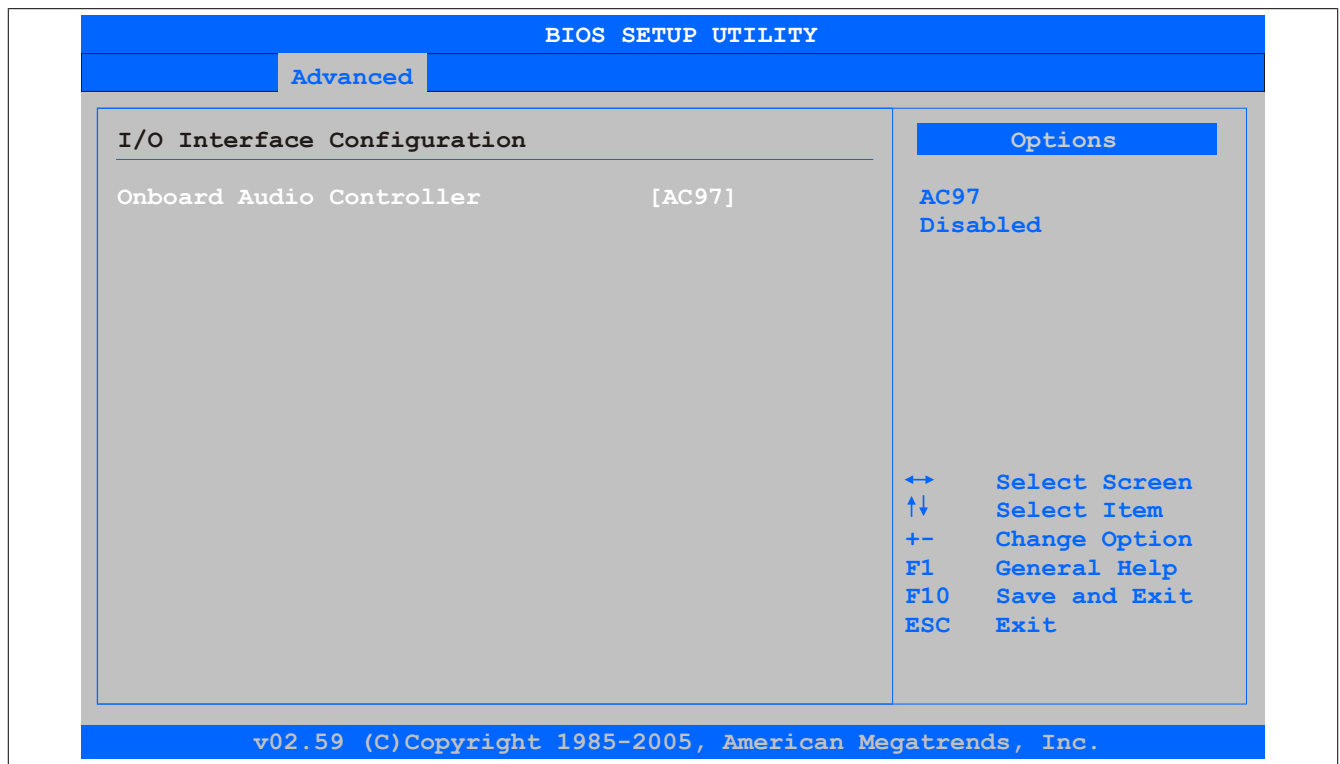


Figure 43: 945GME Advanced I/O Interface Configuration

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 103: 945GME Advanced I/O Interface Configuration

1.5.8 Clock Configuration

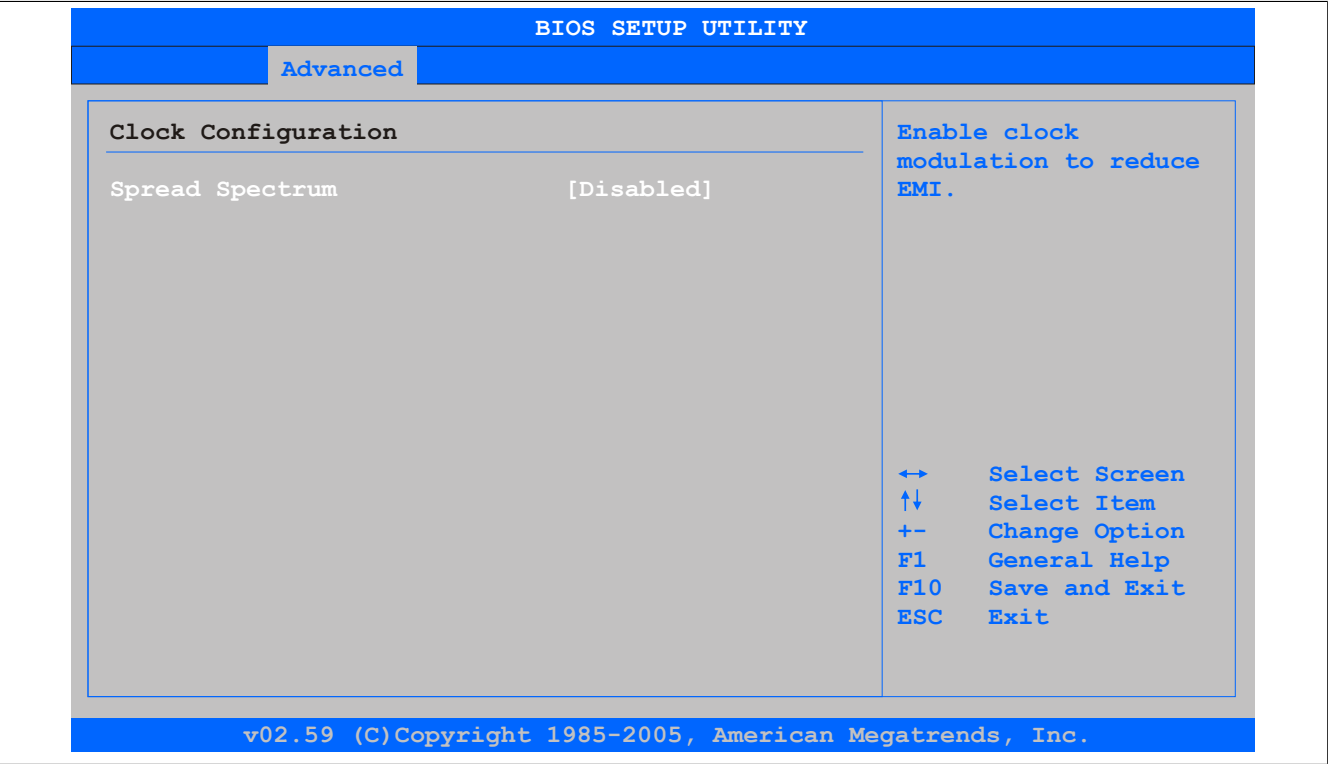


Figure 44: 945GME Advanced Clock Configuration

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 104: 945GME Advanced Clock Configuration (Setting options)

1.5.9 IDE Configuration

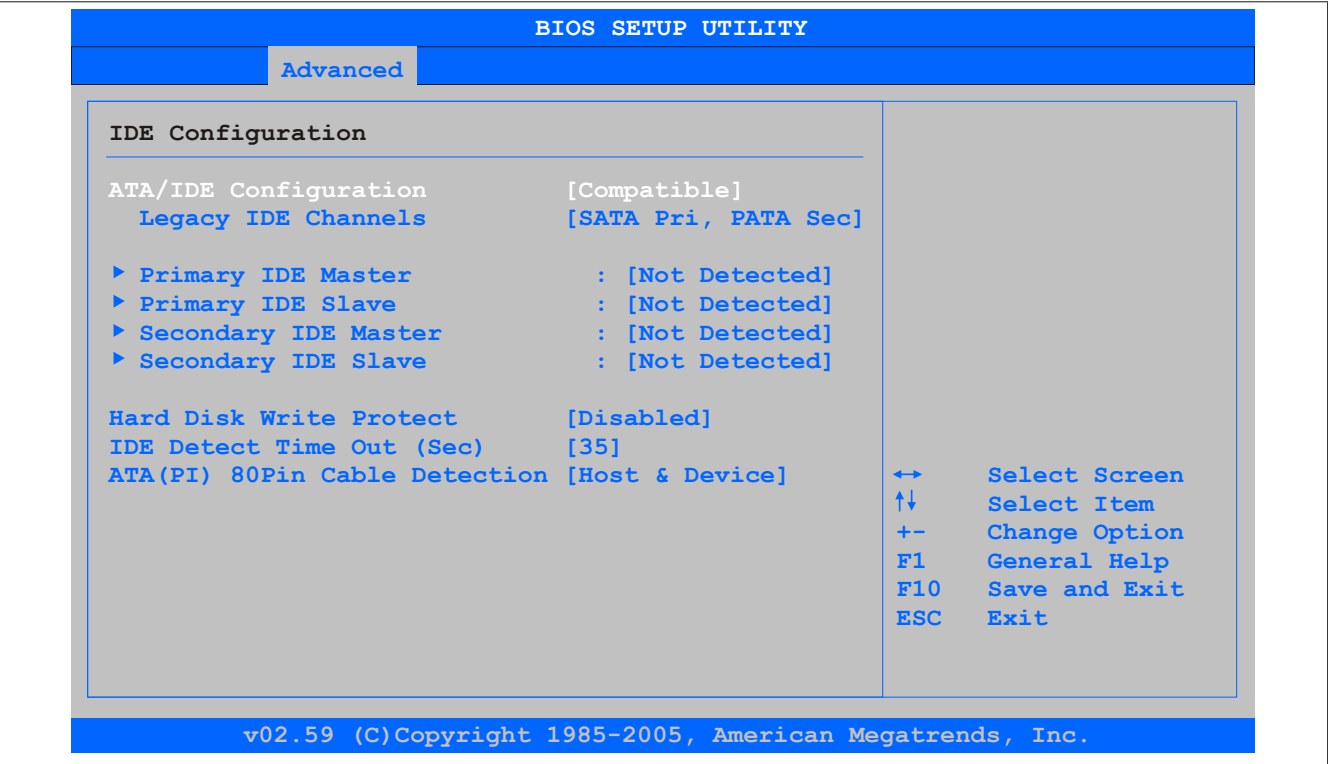


Figure 45: 945GME Advanced IDE Configuration



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 109
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 110
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 111
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 112
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) 80-Pin Cable Detection	<b>Information:</b>  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 105: 945GME Advanced IDE Configuration (Setting options)

## Primary IDE Master

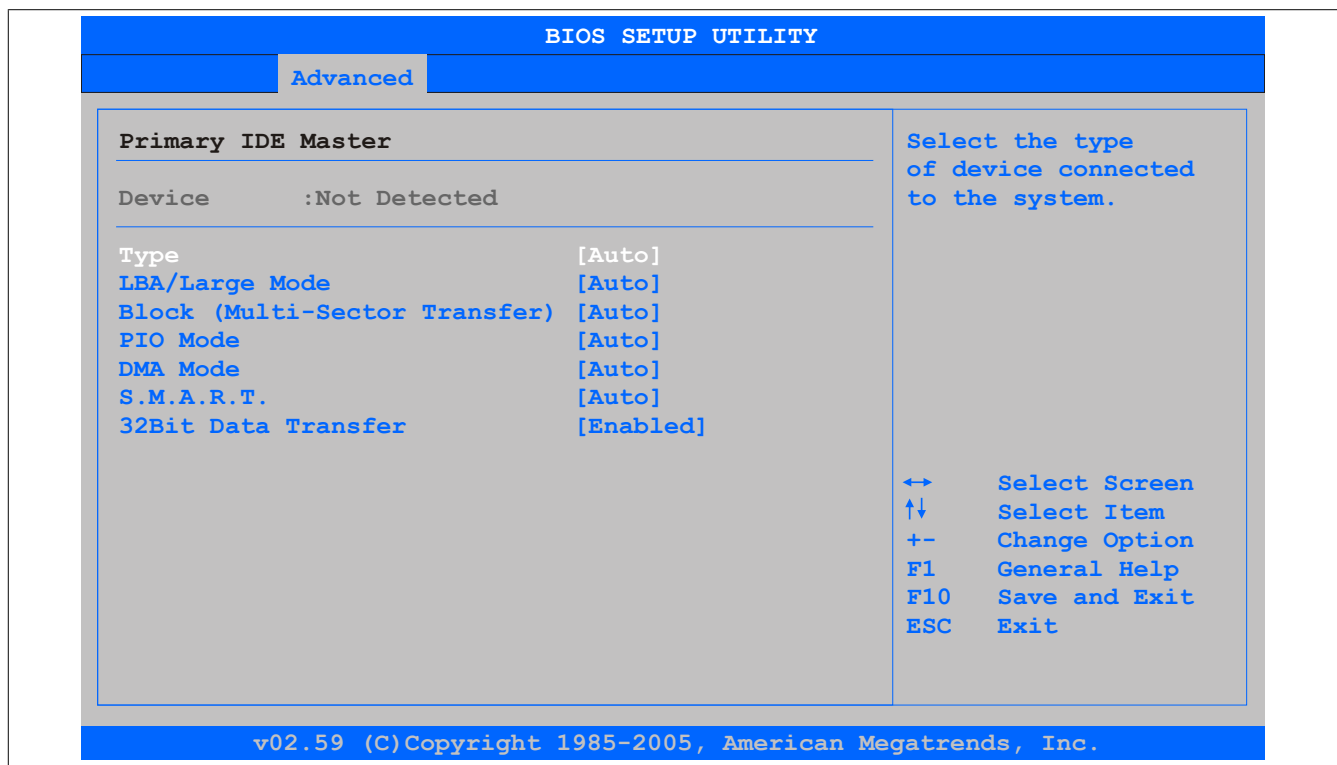


Figure 46: 945GME Primary IDE Master

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)

Table 106: 945GME - Primary IDE Master - Setting options

BIOS setting	Meaning	Setting options	Effect
LBA/Large Mode	This option activates the logical block addressing / large mode for IDE.	Disabled	Disables this function.
		Auto	Automatic enabling of this function when supported by the system.
Block (Multi-Sector Transfer)	This option enables the block mode for IDE hard drives. When this option is enabled, the number of blocks per request from the configuration sector of the hard drive is read.	Disabled	Disables this function.
		Auto	Automatic enabling of this function when supported by the system.
PIO Mode	The PIO mode determines the data rate of the hard drive.	Auto	Automatic configuration of PIO mode.
		0, 1, 2, 3, 4	Manual configuration of PIO mode.
	<b>Information:</b>  This option is not available on the APC820. Therefore this setting is not relevant.	Auto	Automatic definition of the transfer rate.
DMA Mode		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 106: 945GME - Primary IDE Master - Setting options

## Primary IDE slave

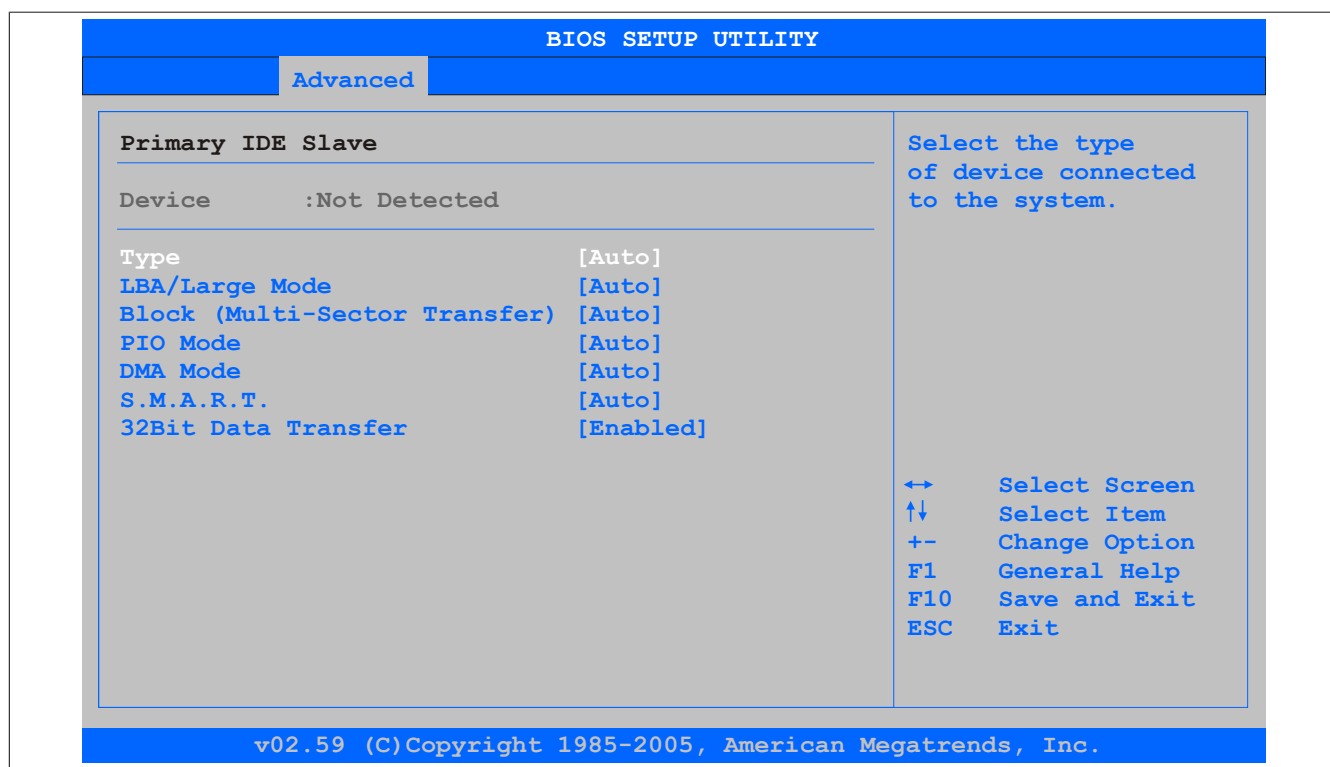


Figure 47: 945GME Primary IDE Slave

BIOS setting	Meaning	Setting options	Effect
Type	The type of drive connected to the primary slave 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 107: 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.  <b>Information:</b>  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 slave 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 107: 945GME - Primary IDE Slave - Setting options

## Secondary IDE Master

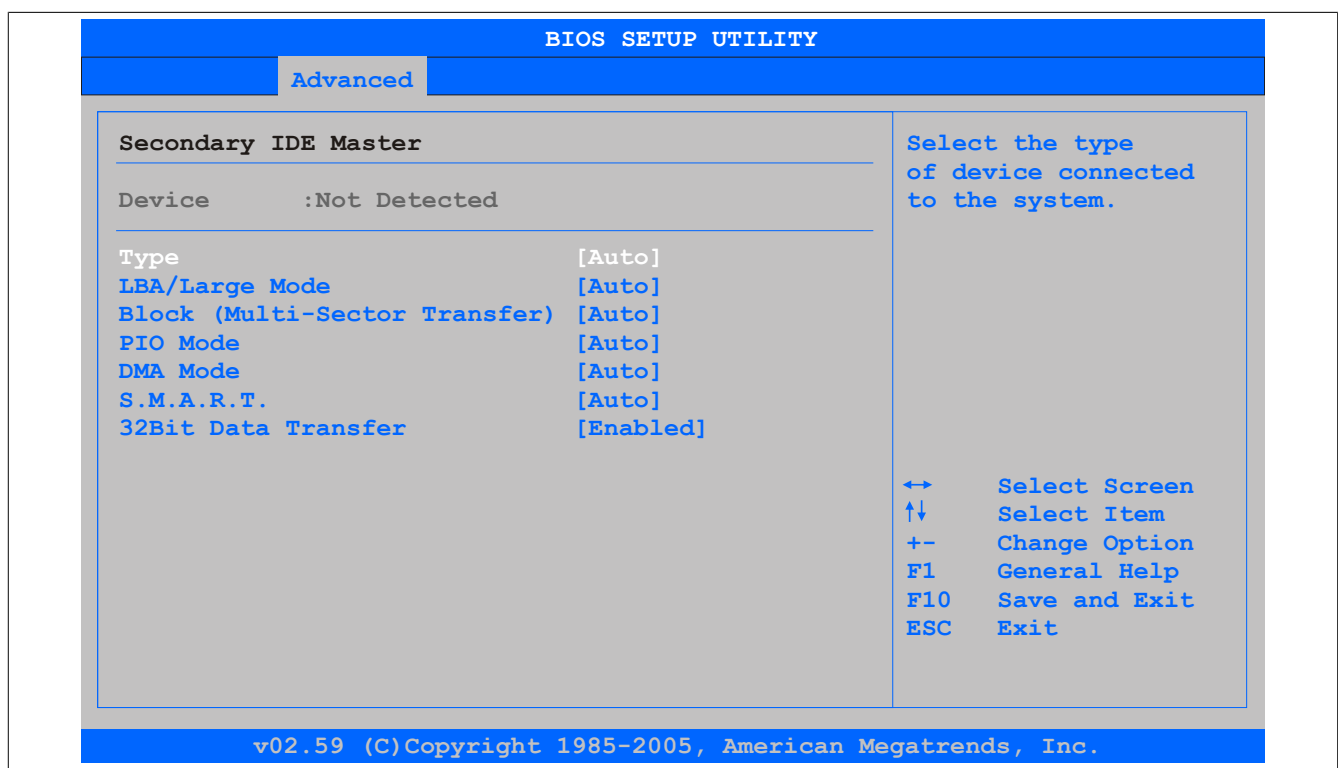


Figure 48: 945GME Secondary IDE Master

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

Table 108: 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.  <b>Information:</b>  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 secondary master drive is defined here. The DMA mode must be activated in the Windows device manager in order to guarantee maximum performance. Only possible when manually setting up the drive.	Auto	Automatic definition of the transfer rate.
		Disabled	Manual definition of the transfer rate.
S.M.A.R.T.	Monitoring function of modern hard drives (self-monitoring, analysis and reporting technology).	Auto	Automatic detection and enabling.
		Disabled	Disables this function.
		Enabled	Enables this function.
32 Bit Data Transfer	This function enables 32-bit data transfer.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 108: 945GME - Secondary IDE Master - Setting options

## Secondary IDE slave

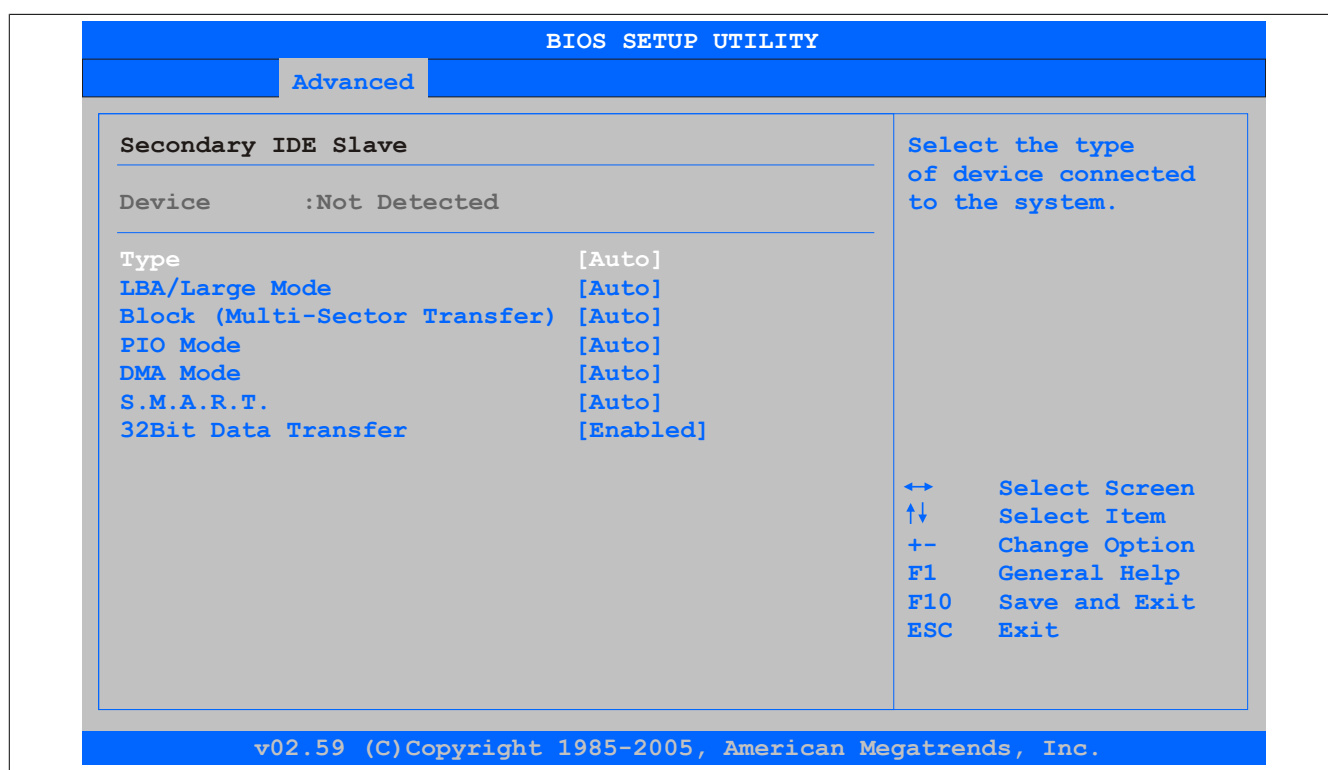


Figure 49: 945GME Secondary IDE Slave

BIOS setting	Meaning	Setting options	Effect
Type	The type of drive connected to the secondary slave 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 109: 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.  <b>Information:</b>  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 secondary slave 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 109: 945GME - Secondary IDE Slave - Setting options

### 1.5.10 USB Configuration

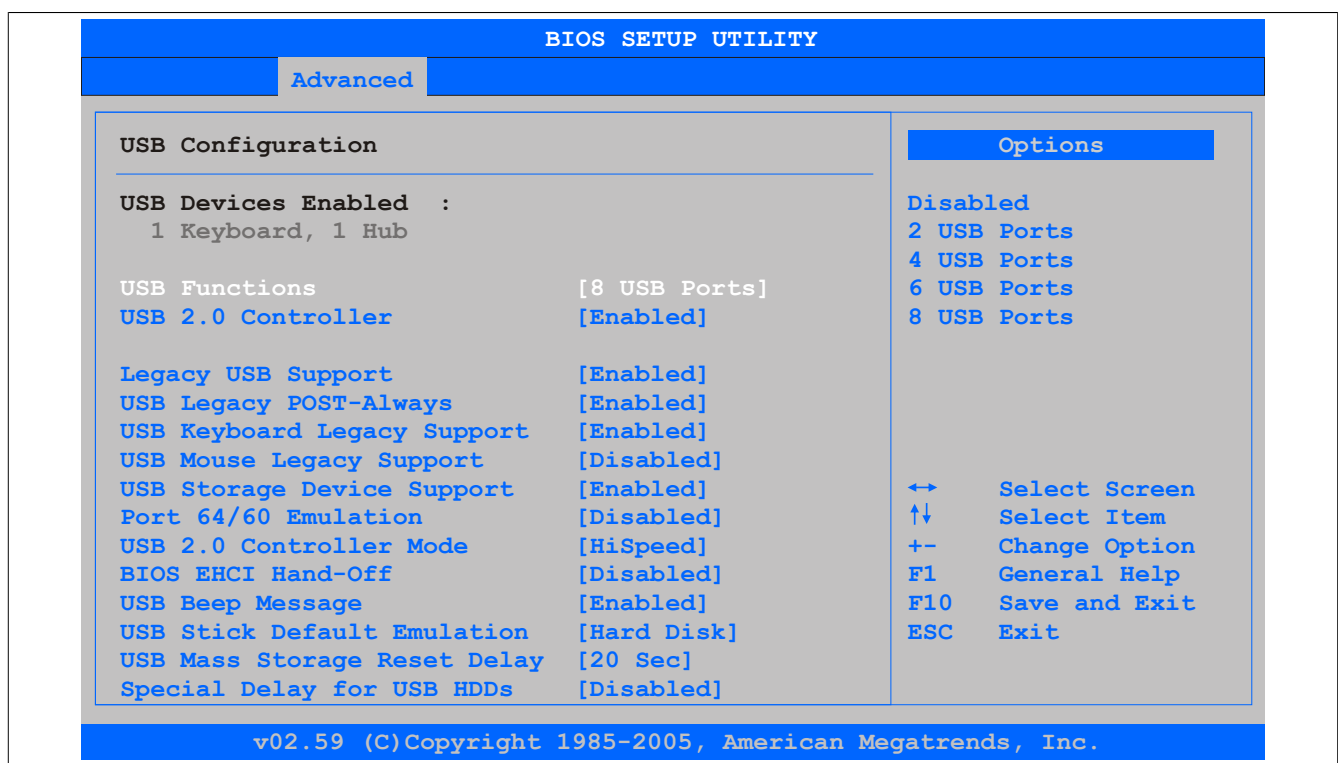


Figure 50: 945GME Advanced USB Configuration

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 ports run in USB 2.0 mode.
		Disabled	All USB ports run in USB 1.1 mode.
		Auto	Automatic enabling.
Legacy USB Support	Legacy USB support can be enabled/disabled here. USB ports do not function during startup. USB is supported again after the operating system has started. A USB keyboard is still recognized during the POST.	Disabled	Disables this function.
		Enabled	Enables this function.
		Auto	Automatic enabling.
USB Legacy POST-Always	Option to enable Legacy USB Support during the POST (Power On Self Test).	Enabled	The BIOS Setup can be called up during the POST using a USB keyboard.

Table 110: 945GME - Advanced USB Configuration - Setting options

BIOS setting	Meaning	Setting options	Effect
	<b>Information:</b>  Only one setting can be made if the option "Legacy USB Support" is enabled.	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 memory 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 here.	Full Speed	12 MBps
		Hi Speed	480 MBps
BIOS EHCI Hand-Off	The support for the operating system can be set up without the fully automatic EHCI function.	Disabled	Disables this 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 drive	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.  <b>Information:</b>  The message "No USB mass storage device detected" is displayed if no USB memory device has been installed.	10 Sec, 20 Sec, 30 Sec, 40 Sec	Value set manually.
Special Delay for USB HDDs	Option for setting a boot delay prior to counting USB 2.0 devices, which allows slow-booting USB devices (e.g. USB hard disks) to boot.  <b>Information:</b>  This option should only be used when required, since it would otherwise unnecessarily extend the boot process by the configured time.	Disabled 1 Sec, 2 Sec, 3 Sec, 4 Sec, 5 Sec, 7 Sec, 10 Sec	Disables this function. No boot delay is added. A boot delay of 1, 2, 3, 4, 5, 7 or 10 seconds is added.

Table 110: 945GME - Advanced USB Configuration - Setting options

### 1.5.11 Keyboard/Mouse Configuration

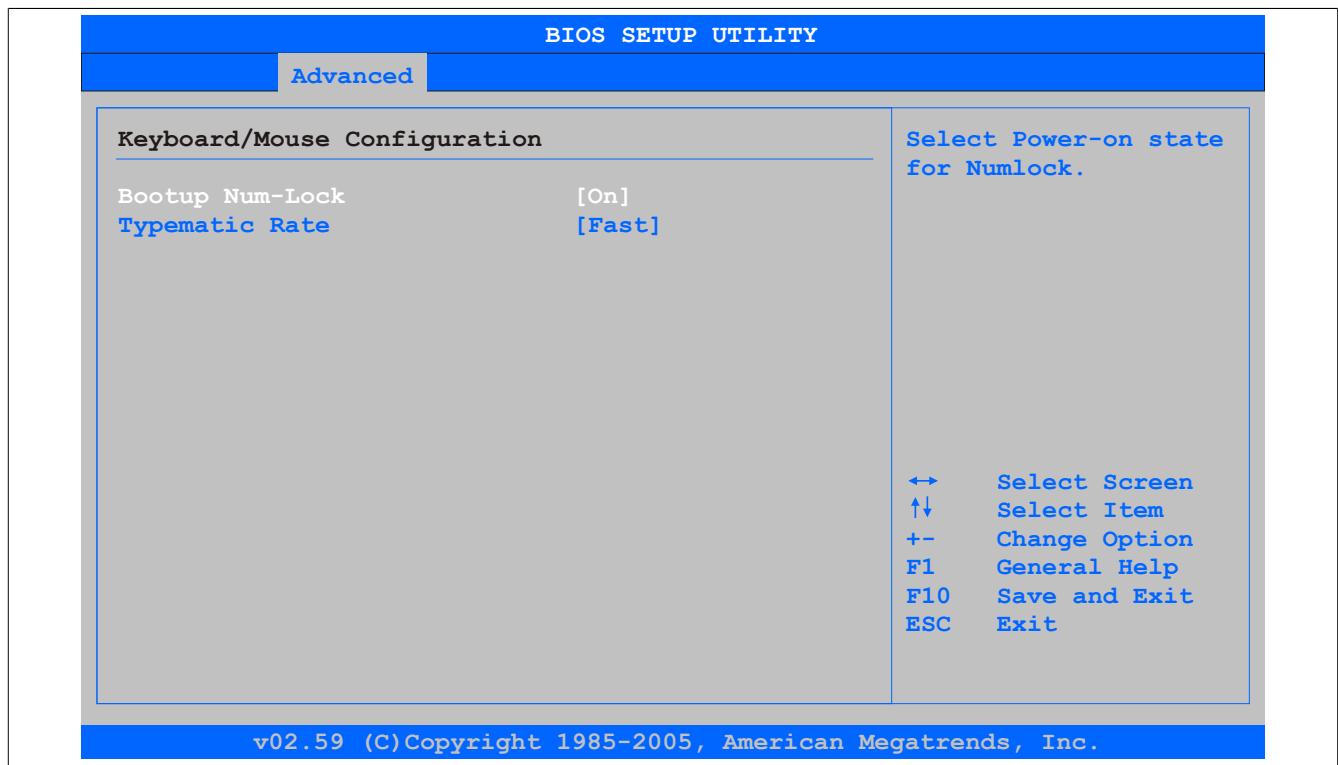


Figure 51: 945GME Advanced Keyboard/Mouse Configuration

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

Table 111: 945GME Advanced Keyboard/Mouse Configuration (Setting options)

### 1.5.12 Remote access configuration

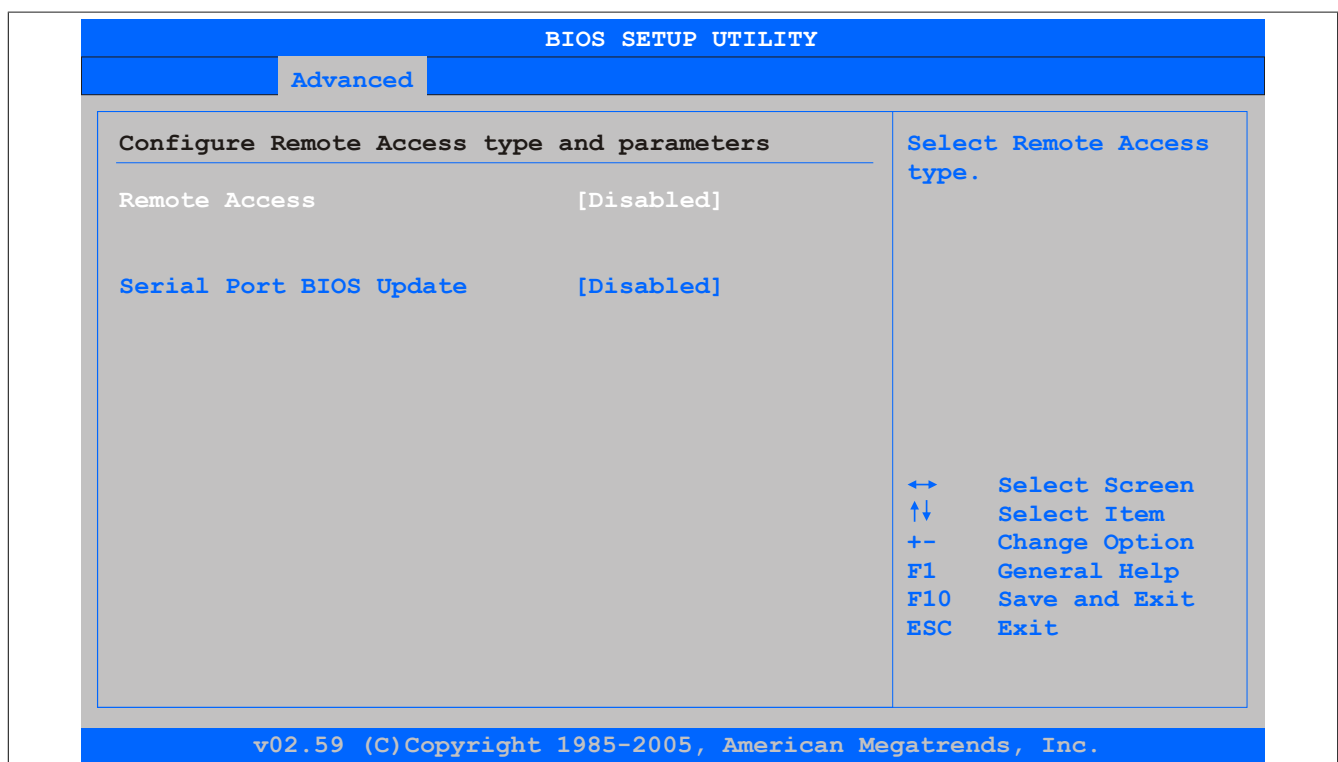


Figure 52: 945GME Advanced Remote Access Configuration

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 <i>Remote access</i> field.	COM1	Enables the COM1 interface as remote access interface.
		COM2	Enables the COM2 interface as remote access interface.
		COM3	Enables the COM3 interface as remote access interface.
Base address, IRQ	Displays the logical address and interrupt for the serial port as long as disabled is not entered in the <i>Remote access</i> field.	None	-
Serial port mode	The serial port transfer rate is defined here as long as disabled is not entered in the <i>Remote access</i> field.	115200 8,n,1 57600 8,n,1 38400 8,n,1 19200 8,n,1 09600 8,n,1	Value set manually.
Flow control	<p>This setting determines how the transfer is controlled via the interface.</p> <p><b>Information:</b></p> <p>The setting must be the same on the terminal and the server.</p>	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 <i>Remote access</i> 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 <i>Remote access</i> 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 <i>Remote access</i> 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	<p>During system start up, the update is loaded via the serial interface in the processor.</p> <p><b>Information:</b></p> <p>If this option is disabled, the boot time is reduced.</p>	Disabled	Disables this function.
		Enabled	Enables this function.

Table 112: 945GME Advanced Remote Access Configuration (Setting options)



## 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.

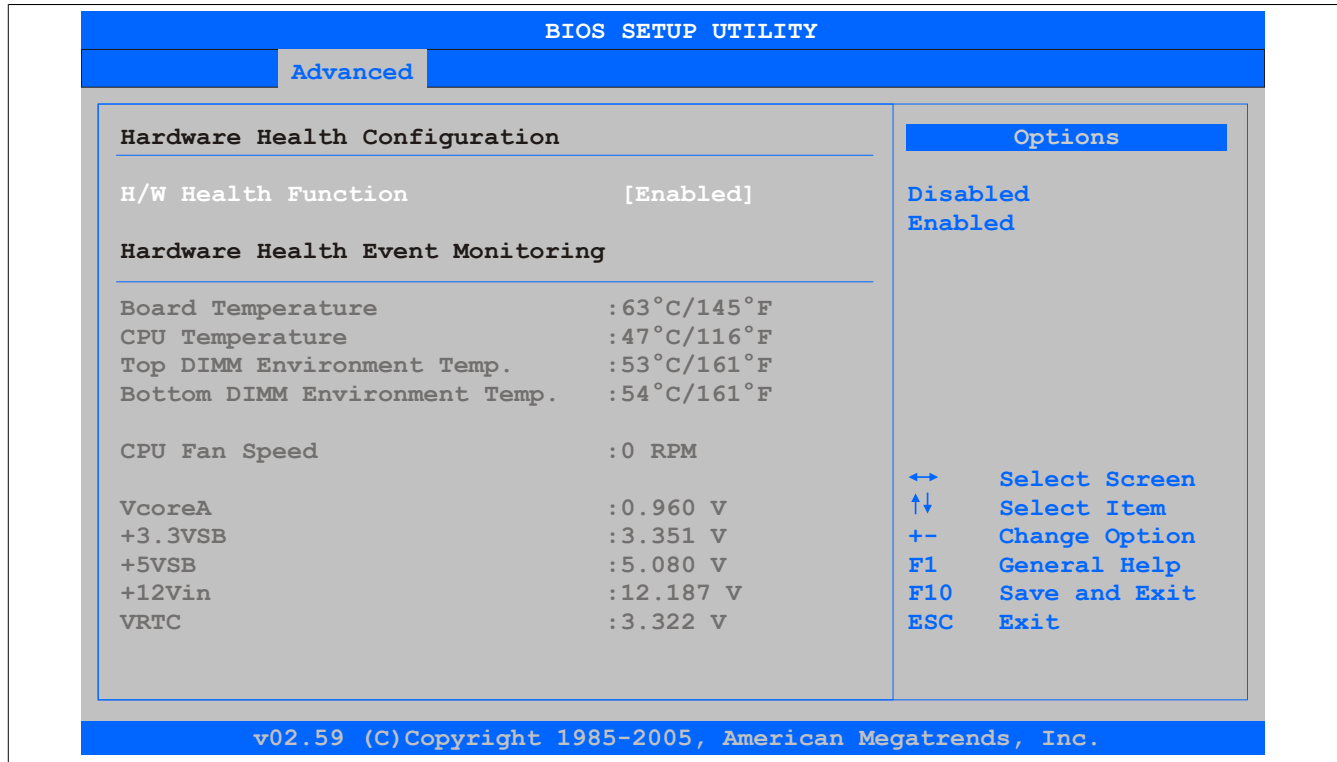


Figure 53: 945GME Advanced CPU Board Monitor

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	-
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 113: 945GME Advanced Remote Access Configuration (Setting options)

## 1.5.14 Baseboard/Panel Features

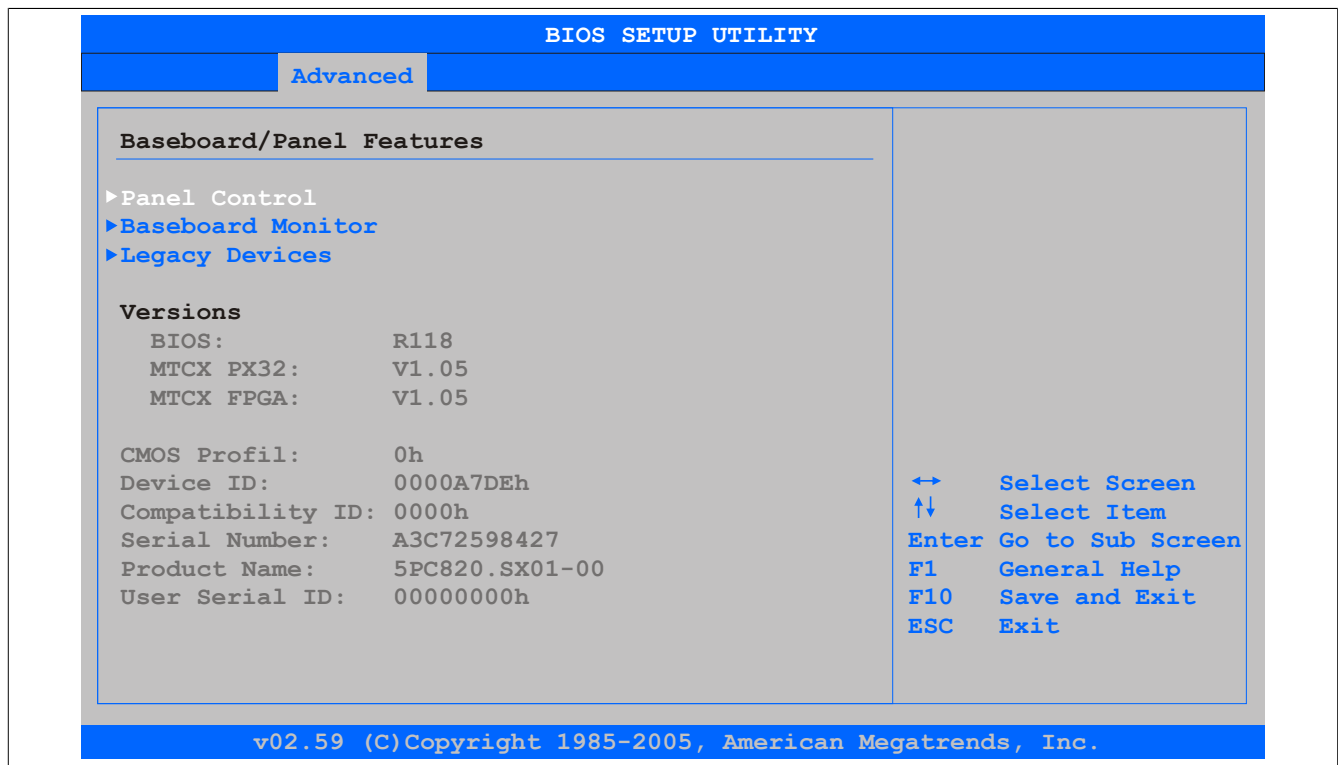


Figure 54: 945GME Advanced Baseboard/Panel Features

BIOS setting	Meaning	Setting options	Effect
<b>Panel control</b>	For special setup of connected panels (display units).	Enter	Opens the submenu see "Panel control" on page 119
<b>Baseboard monitor</b>	Display of various temperatures and fan speeds.	Enter	Opens the submenu see "Baseboard Monitor" on page 120
<b>Legacy Devices</b>	Special settings for the interface can be changed here.	Enter	Opens the submenu see "Legacy Devices" on page 121
BIOS	Displays the BIOS version.	None	-
MTCX PX32	Displays the MTCX PX32 firmware version.	None	-
MTCX FPGA	Displays the MTCX FPGA firmware version.	None	-
CMOS profile	Shows the CMOS profile number.	None	-
Device ID	Displays the hexadecimal value of the hardware device ID.	None	-
Compatibility ID	Displays the version of the device within the same B&R device code. This ID is needed for Automation Runtime.	None	-
Serial Number	Displays the B&R serial number	None	-
Product Name	Displays the B&R model number	None	-
User Serial ID	Displays the user serial ID. This 8-digit hex value can be freely assigned by the user (e.g. to give the device a unique ID) and can only be changed with using the "B&R Control Center" via the ADI driver.	None	-

Table 114: 945GME - Advanced Baseboard/Panel Features - Setting options

## Panel control

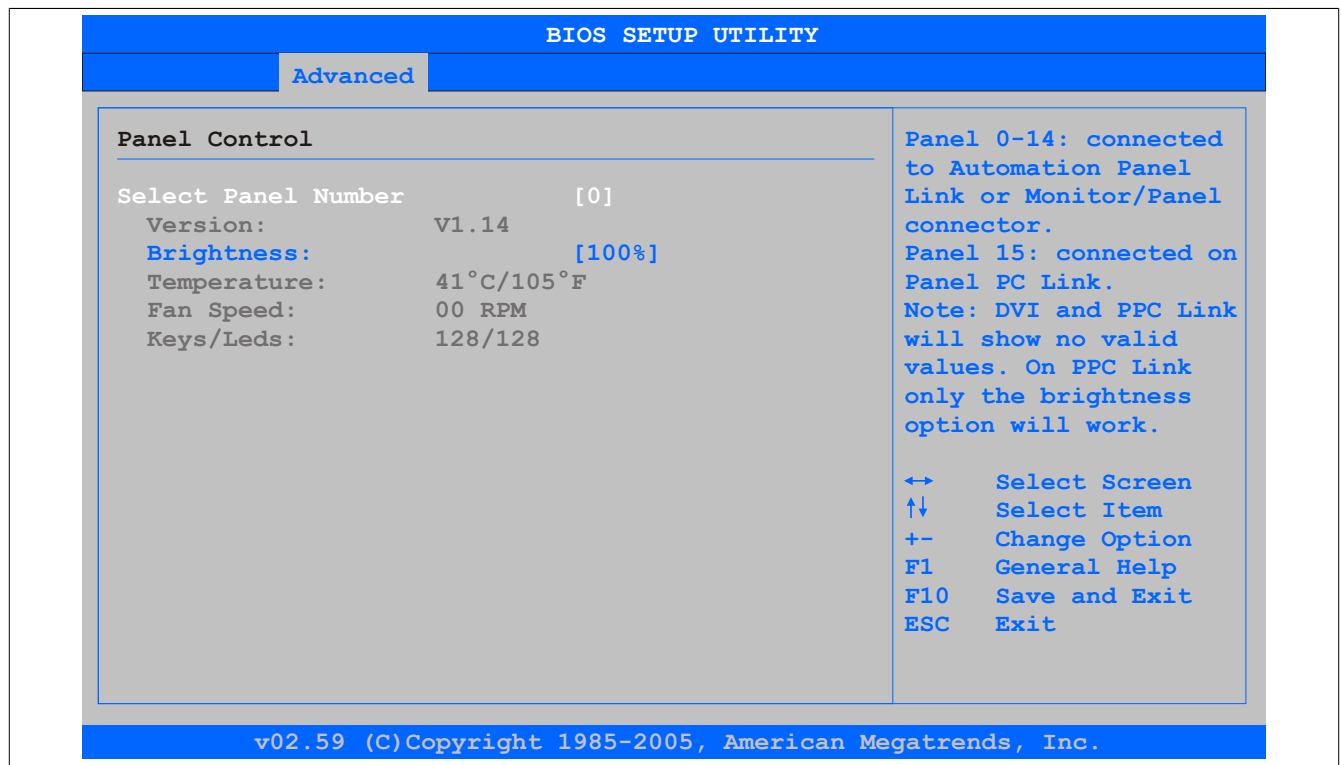


Figure 55: 945GME Panel Control

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>).
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 115: 945GME Panel Control (Setting options)

## Baseboard Monitor

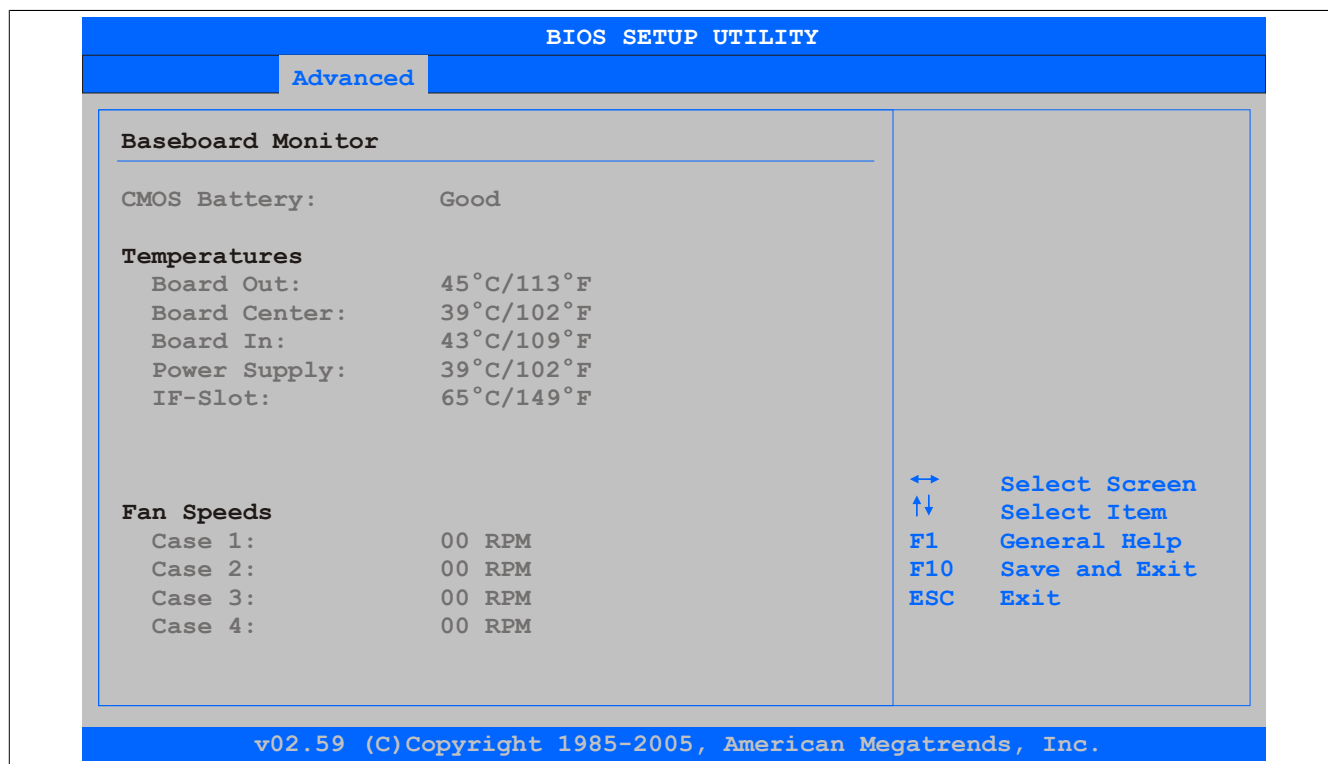


Figure 56: 945GME Baseboard Monitor

BIOS setting	Meaning	Setting options	Effect
CMOS battery	Displays the battery status. <b>n.a.</b> - not available <b>Good</b> - Battery OK. <b>Bad</b> - Battery not OK.	None	-
Board Out	Displays the temperature in the upper part of the baseboard in degrees Celsius and Fahrenheit.	None	-
Board Center	Displays the temperature in the center of the baseboard in degrees Celsius and Fahrenheit.	None	-
Board 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.  <b>Information:</b> 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.  <b>Information:</b> The APC820 only has 2 housing fans, which means this value is not relevant.	None	-

Table 116: 945GME Baseboard Monitor (Setting options)

## Legacy Devices

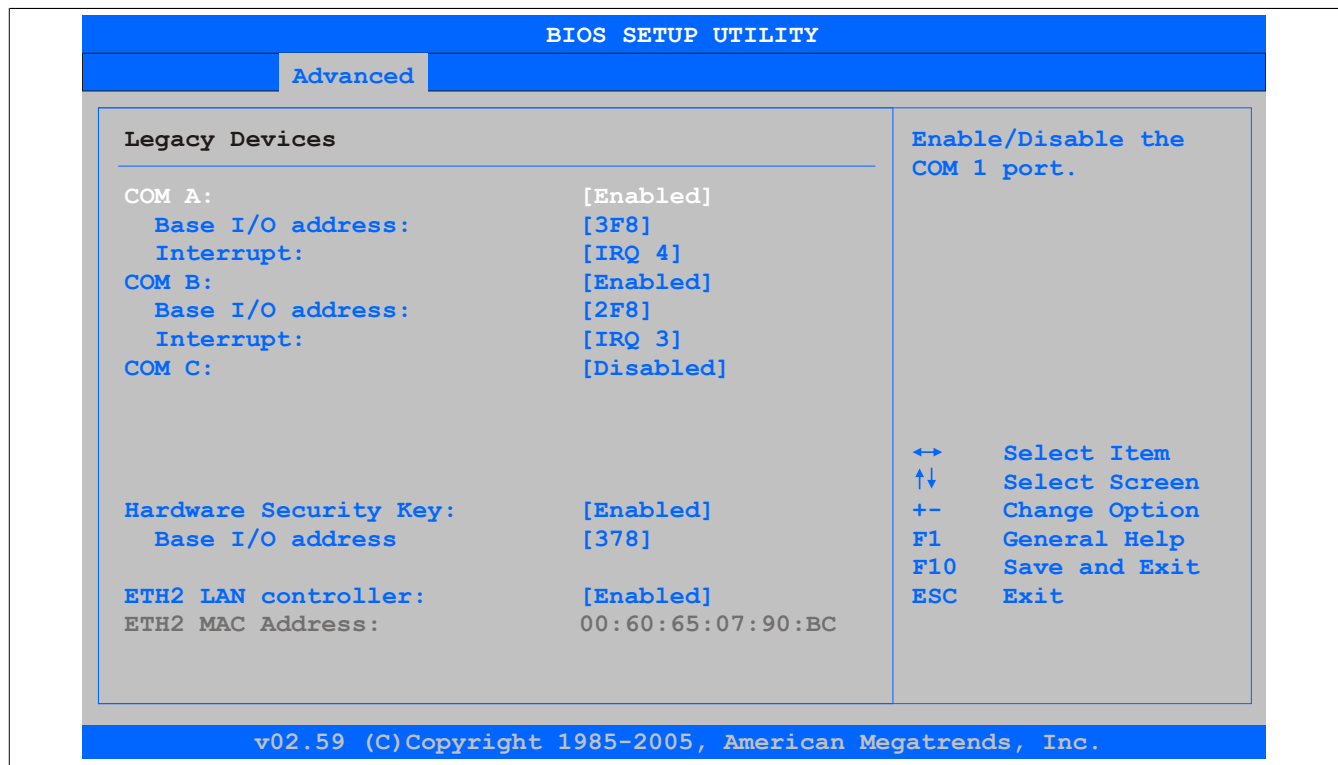


Figure 57: 945GME Legacy Devices

BIOS setting	Meaning	Setting options	Effect
COM A	Settings for the <b>COM1</b> serial interface in the system.	Disabled	Disables the interface.
		Enabled	Enables the interface.
Base I/O address	Selects the base I/O address for the COM port	238, 2E8, 2F8, 328, 338, 3E8, 3F8	Selected base I/O address is assigned.
Interrupt	Selection of the interrupt for the COM port.	IRQ 3, IRQ 4, IRQ 5, IRQ 6, IRQ 7, IRQ 10, IRQ 11, IRQ 12	Selected interrupt is assigned.
COM B	Settings for the <b>COM2</b> serial interface in the system.	Disabled	Disables the interface.
		Enabled	Enables the interface.
Base I/O address	Selects the base I/O address for the COM port	238, 2E8, 2F8, 328, 338, 3E8, 3F8	Selected base I/O address is assigned.
Interrupt	Selection of the interrupt for the COM 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 the COM port for the <b>touch screen on the monitor/panel</b> connector.	Disabled	Disables the interface.
		Enabled	Enables the interface.
Base I/O address	Selects the base I/O address for the COM port	238, 2E8, 2F8, 328, 338, 3E8, 3F8	Selected base I/O address is assigned.
Interrupt	Selection of the interrupt for the COM port.	IRQ 3, IRQ 4, IRQ 5, IRQ 6, IRQ 7, IRQ 10, IRQ 11, IRQ 12	Selected interrupt is assigned.
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 117: 945GME Legacy Devices (Setting options)

## 1.6 Boot

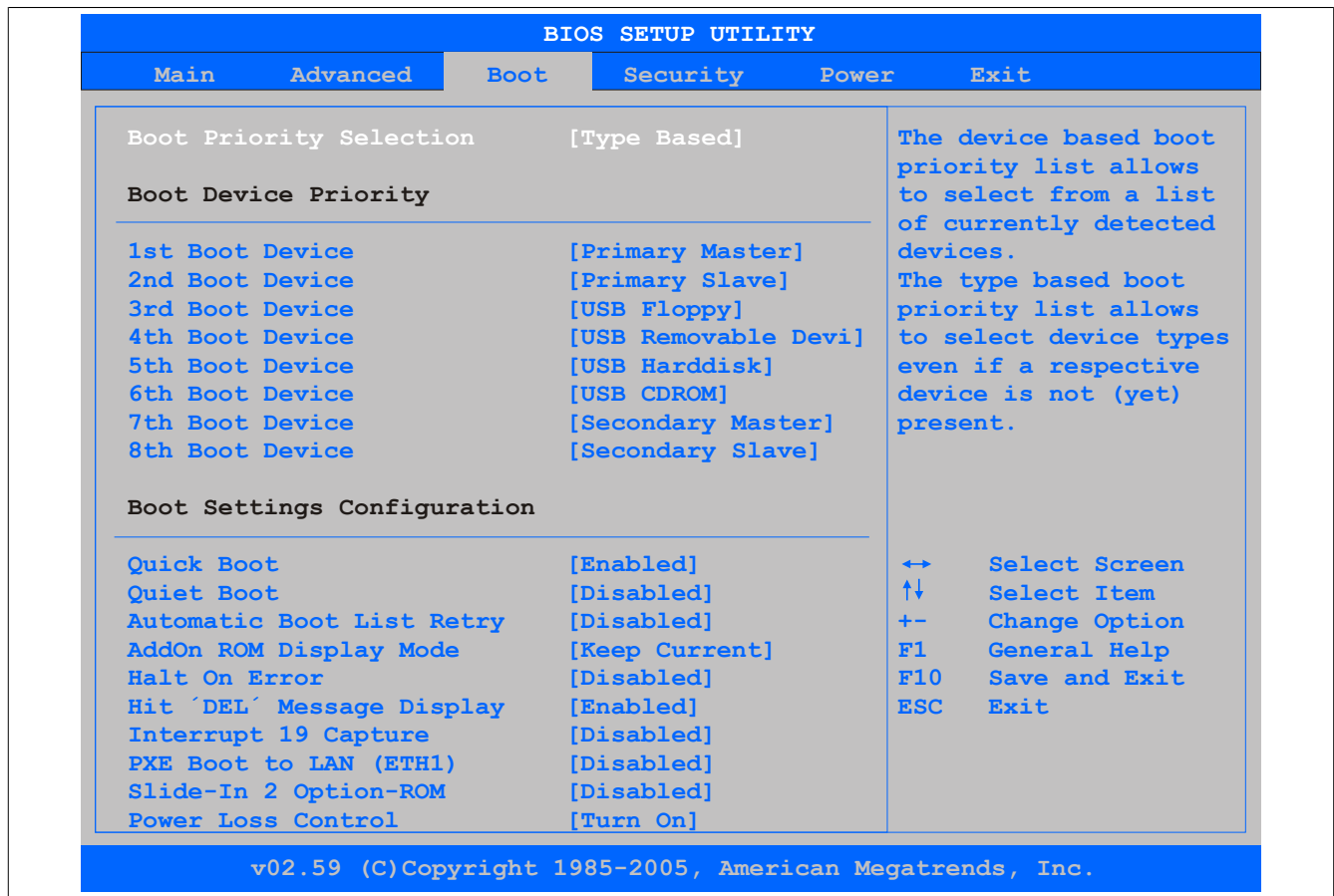


Figure 58: 945GME Boot Menu

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.  <b>Information:</b> Either "device based" or "type based" must be used. Mixed operation is not permitted.
		Type Based	The boot sequence of a device type list can be changed. Device types that are not connected can also be entered to this list.  <b>Information:</b> Either "device based" or "type based" must be used. Mixed operation is not permitted.
1st Boot Device	The boot drives can be set using this option.	Disabled, Primary Master, Primary Slave, Secondary Master, Secondary Slave, Legacy Floppy, USB Floppy, USB Hard Disk, USB CDROM, USB Removeable Device, Onboard LAN, External LAN, PCI Mass Storage PCI SCSI Card, Any PCI BEV Device, Third Master, Third Slave, PCI RAID, Local BEV ROM	Selects the desired sequence.
2nd Boot Device			
3rd Boot Device			
4th Boot Device			
5th Boot Device			
6th Boot Device			
7th Boot Device			
8th Boot Device			
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.

Table 118: 945GME Boot Menu (Setting options)

BIOS setting	Meaning	Setting options	Effect
Add-On ROM Display Mode	Sets the display mode for the ROM (during the booting procedure).	Force BIOS	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.	Disabled	The message is not displayed.
		Enabled	The message is displayed.
	<b>Information:</b> When quiet boot is activated the message is not 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 118: 945GME Boot Menu (Setting options)

## 1.7 Security

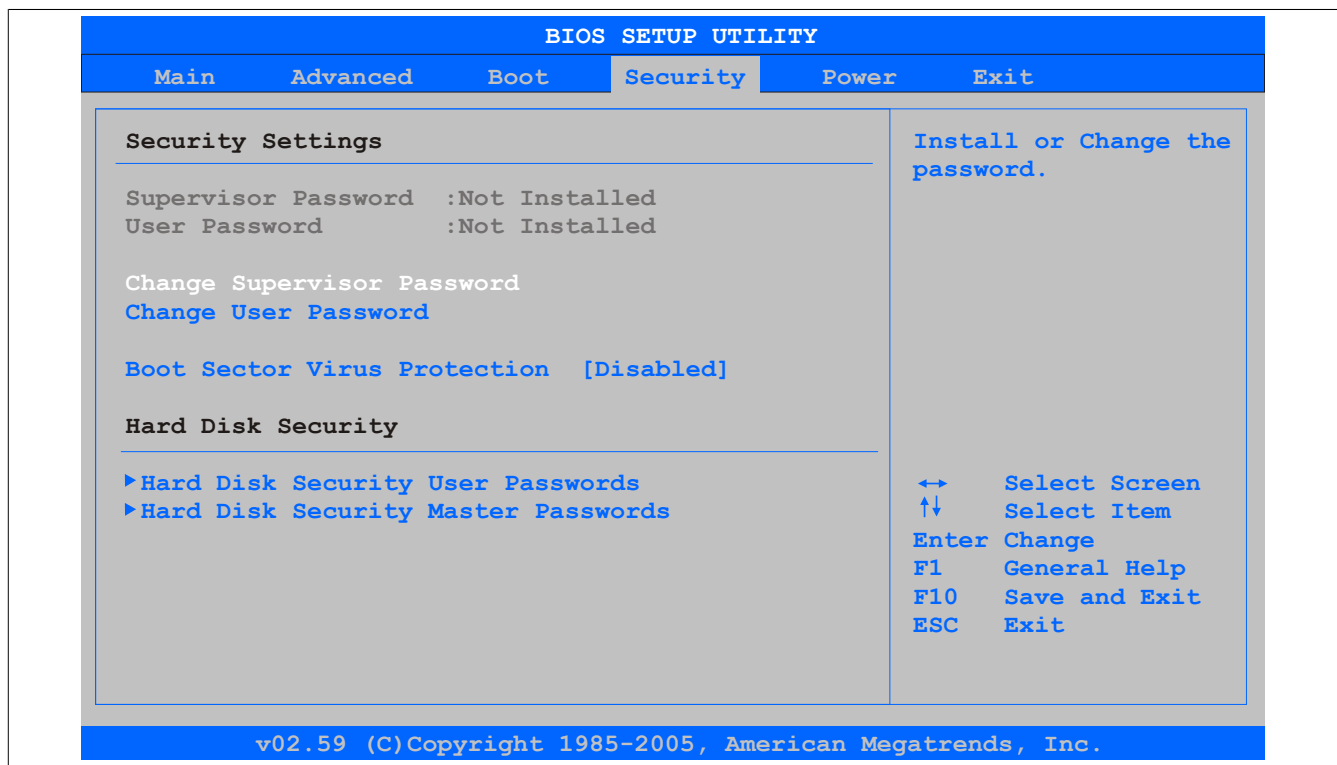


Figure 59: 945GME Security Menu

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.

Table 119: 945GME - Advanced PCI configuration - Setting options

BIOS setting	Meaning	Setting options	Effect
Boot Sector Virus Protection	With this option, a warning is issued when the boot sector is accessed through a program or virus.  <b>Information:</b>  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 124
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 125

Table 119: 945GME - Advanced PCI configuration - Setting options

### 1.7.1 Hard Disk Security User Password

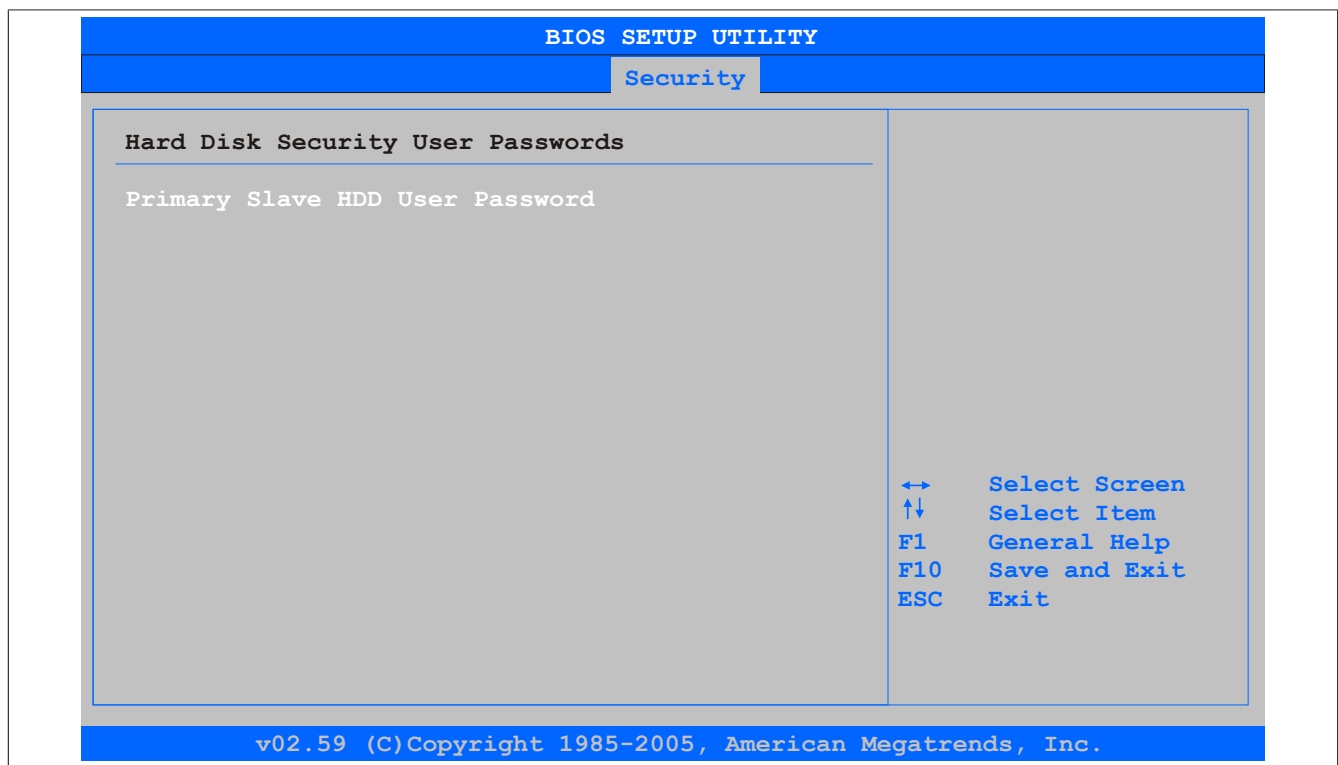


Figure 60: 945GME Hard Disk Security User Password

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 120: 945GME Hard Disk Security User Password



## 1.7.2 Hard Disk Security Master Password

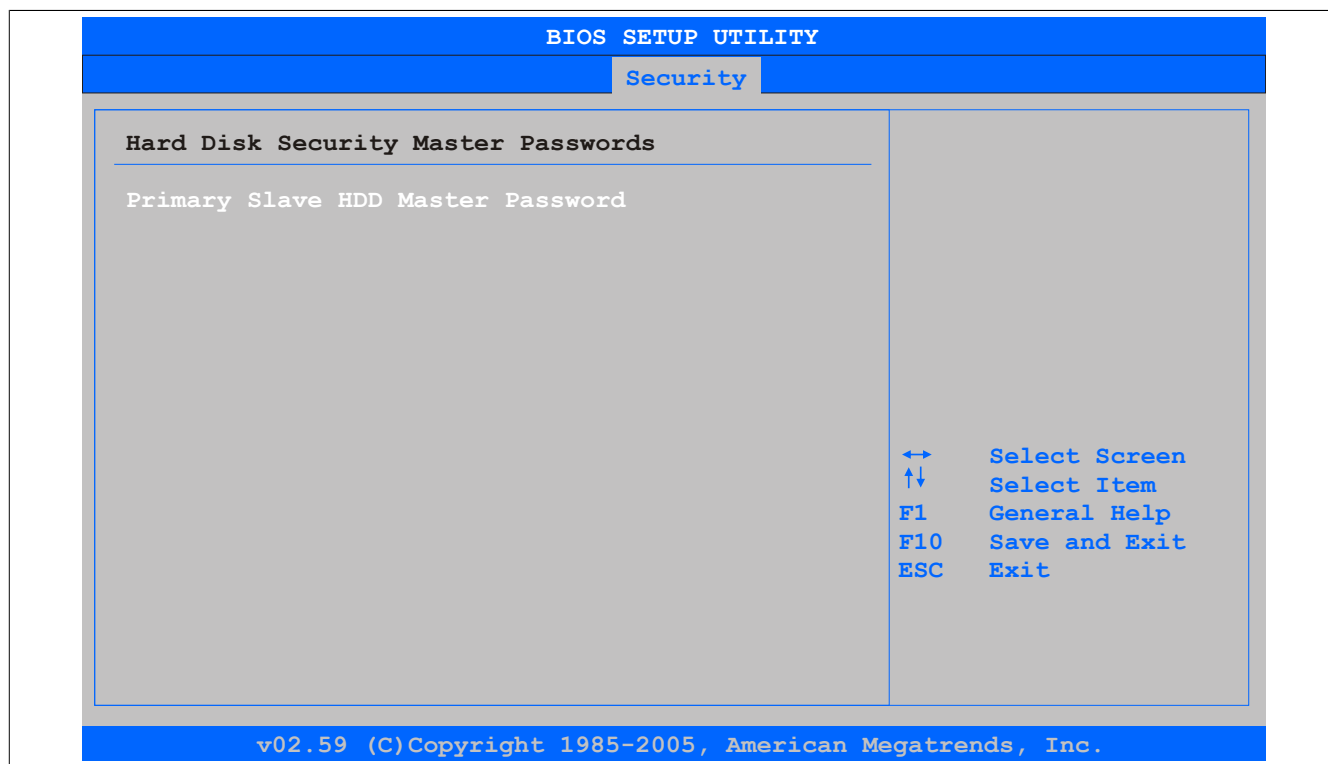


Figure 61: 945GME Hard Disk Security Master Password

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 121: 945GME Hard Disk Security Master Password

## 1.8 Power

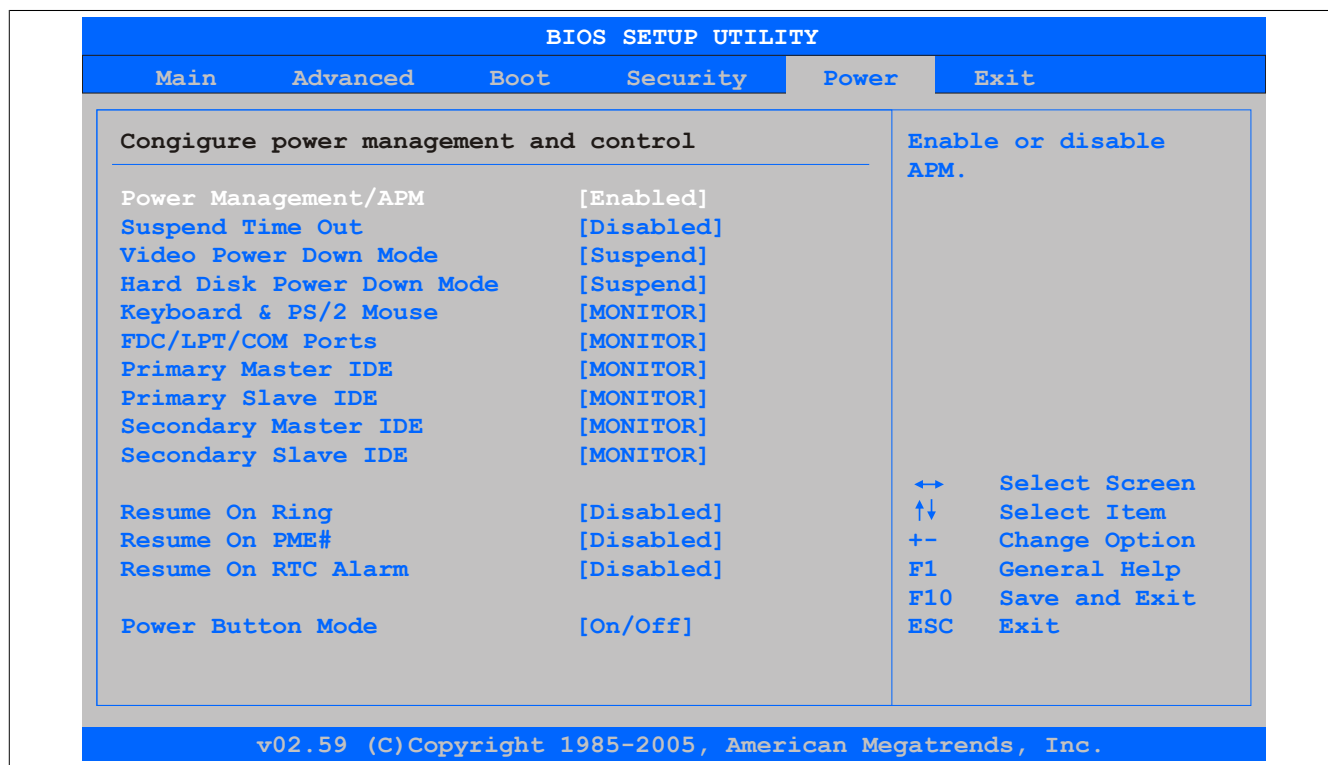


Figure 62: 945GME Power Menu

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	
		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.
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 wake-up 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 122: 945GME Power Menu (Setting options)

## 1.9 Exit

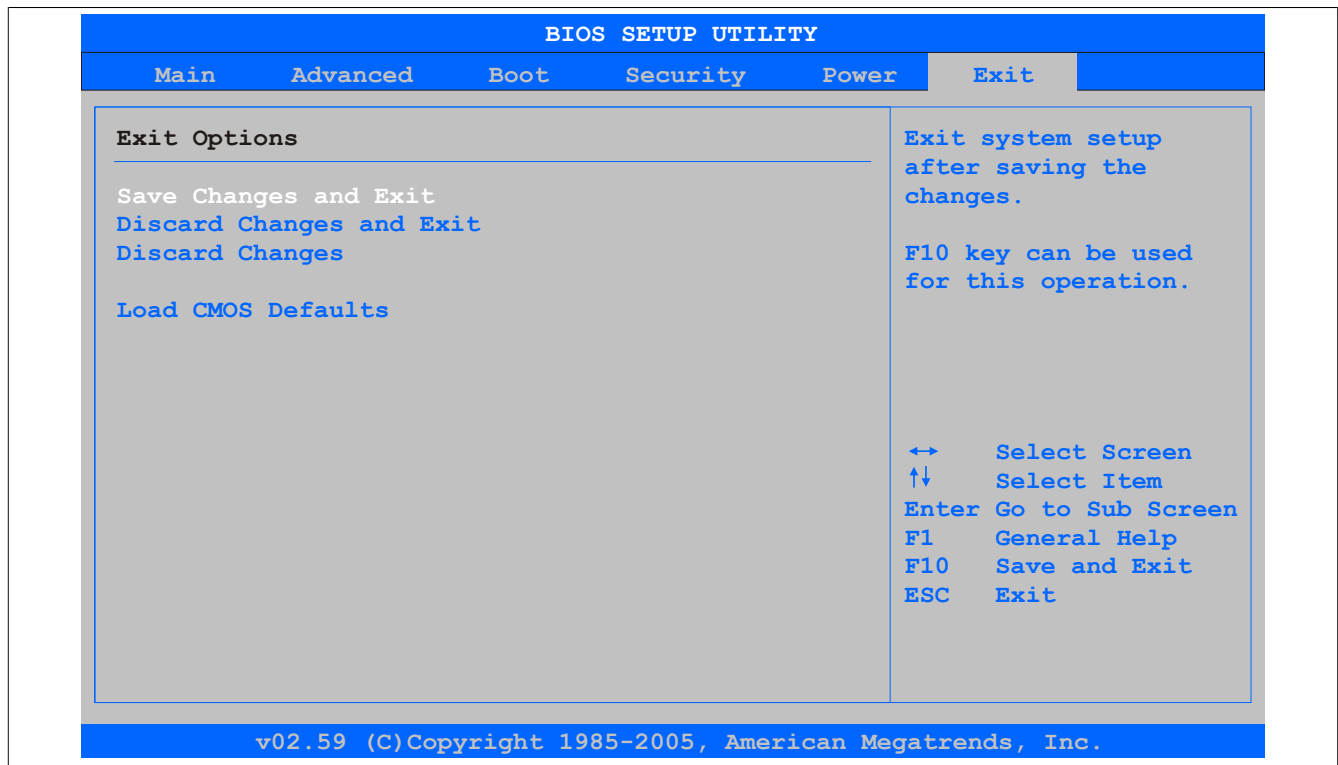


Figure 63: 945GME Exit Menu

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.	OK / Cancel	
Discard Changes	In the event that settings were made that the user can no longer remember, they can be reset as long as they haven't been saved.	OK / Cancel	
Load CMOS Defaults	This item loads the CMOS default values, which are defined by the DIP switch settings. These settings are loaded for all BIOS configurations.	OK / Cancel	

Table 123: 945GME - Advanced PCI configuration - Setting options

## 1.10 BIOS default settings

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

### Information:

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

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

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

Table 124: 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	-	-	
System Date	-	-	
BIOS ID	-	-	
Processor	-	-	
CPU Frequency	-	-	
System Memory	-	-	
Product Revision	-	-	
Serial Number	-	-	
BC Firmware Rev.	-	-	
MAC Address (ETH1)	-	-	
Boot Counter	-	-	
Running Time	-	-	

Table 125: 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 126: 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	

Table 127: 945GME Advanced - PCI configuration profile setting overview

Setting / View	Profile 0	Profile 3	My setting
<b>PCI IRQ Resource Exclusion</b>			
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	
<b>PCI Interrupt Routing</b>			
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 127: 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 Hot Plugging Resource	No	No	
PCIE Port 0 IOxAPIC Enable	Disabled	Disabled	
PCIE Port 1 IOxAPIC Enable	Disabled	Disabled	
PCIE Port 2 IOxAPIC Enable	Disabled	Disabled	
PCIE Port 3 IOxAPIC Enable	Disabled	Disabled	

Table 128: 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, 8MB	
DVMT Mode Select	DVMT Mode	DVMT Mode	
DVMT/FIXED Memory	128 MB	128 MB	
Boot Display Device	Auto	Auto	
Boot Display Preference	SDVO-B SDVO-C LFP	SDVO-B SDVO-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 Hot Plugging Support	Enabled	Enabled	
Display Mode Persistence	Enabled	Enabled	

Table 129: 945GME Advanced - Graphics configuration profile setting overview

## CPU configuration

Setting / View	Profile 0	Profile 3	My setting
MPS Revision	1.4	1.4	
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 130: 945GME Advanced - CPU configuration profile setting overview

## 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 131: 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 132: 945GME Advanced - I/O Interface Configuration profile setting overview

## Clock configuration

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

Table 133: 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) 80-Pin Cable Detection	Host & device	Host & device	
<b>Primary IDE Master</b>			
Type	Auto	Auto	
LBA/Large Mode	Auto	Auto	
Block (Multi-Sector Transfer)	Auto	Auto	
PIO Mode	Auto	Auto	
DMA Mode	Auto	Auto	
S.M.A.R.T.	Auto	Auto	
32Bit data transfer	Enabled	Enabled	
<b>Primary IDE slave</b>			
Type	Auto	Auto	
LBA/Large Mode	Auto	Auto	
Block (Multi-Sector Transfer)	Auto	Auto	
PIO Mode	Auto	Auto	
DMA Mode	Auto	Auto	
S.M.A.R.T.	Auto	Auto	
32Bit data transfer	Enabled	Enabled	

Table 134: 945GME Advanced - IDE configuration profile setting overview

Setting / View	Profile 0	Profile 3	My setting
<b>Secondary IDE Master</b>			
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	-	
<b>Secondary IDE slave</b>			
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	-	

Table 134: 945GME Advanced - IDE configuration profile setting overview

## 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 drive	Hard disk drive	
USB Mass Storage Reset Delay	20 Sec	20 Sec	

Table 135: 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 136: 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 137: 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 138: 945GME Advanced - CPU board monitor profile setting overview

## Main Board/Panel Features

Setting / View	Profile 0	Profile 3	My setting
<b>Panel control</b>			
Select panel number	-	-	
Version	-	-	
Brightness	100%	100%	
Temperature	-	-	
Fan speed	-	-	

Table 139: 945GME Advanced - Baseboard/Panel Features profile setting overview

Setting / View	Profile 0	Profile 3	My setting
Keys/LEDs	-	-	
<b>Baseboard monitor</b>			
CMOS battery	-	-	
Baseboard Out	-	-	
Baseboard Center	-	-	
Baseboard In	-	-	
Power supply	-	-	
IF slot	-	-	
Case 1	-	-	
Case 2	-	-	
Case 3	-	-	
Case 4	-	-	
<b>Legacy Devices</b>			
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	
Base I/O address	378	378	
ETH2 LAN Controller	Enabled	Enabled	
ETH2 MAC Address	-	-	

Table 139: 945GME Advanced - Baseboard/Panel Features profile setting overview

### 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 140: 945GME Main (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 141: 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 142: 945GME Power profile setting overview

## 1.11 BIOS error signals (Beep codes)

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

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

Table 143: 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 <sup>1)</sup>	N.A.	ACPI reclaim, MPS and NVS area <sup>2)</sup>
(TOM - 8 MB - 192 kB) – (TOM - 192 kB)	N.A.	VGA frame buffer <sup>3)</sup>
1024 kB – (TOM - 8 MB - 192 kB)	100000h - N.A.	Extended memory
869kB – 1024 kB	0E0000h - 0FFFFFFh	Runtime BIOS
832kB – 869 kB	0D0000h - 0DFFFFh	Upper memory (available)
640kB – 832 kB	0A0000h - 0CFFFFh	Video memory and BIOS
639kB – 640 kB	09FC00h - 09FFFFh	Extended BIOS data
0 - 639 kB	000000h - 09FC00h	Conventional memory

Table 144: RAM address assignment

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

### 1.12.2 I/O address assignments

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 <sup>1)</sup>
4100h - 417Fh	MTCX
FF00h - FF07h	IDE bus master register

Table 145: I/O address assignment

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

### 1.12.3 Interrupt assignments in PIC mode

IRQ	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	NMI	NONE
System timer	•																	
Keyboard		•																
IRQ cascade			•															
COM1 (Serial port A)				○	•	○	○	○			○	○	○					
COM2 (Serial port B)				•	○	○	○	○			○	○	○					
ACPI <sup>1)</sup>										•								
Real-time clock									•									
Coprocessor (FPU)														•				
Primary IDE channel															•			
Secondary IDE channel																○		
B&R COM3 (COM C)				○	○	○	○	○			○	○	○					•

Table 146: IRQ interrupt assignments PIC Mode

- 1) Advanced Configuration and Power Interface.

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

### 1.12.4 Interrupt assignments in APIC mode

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

IRQ	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	NMI	NONE
System timer	•																									
Keyboard		•																								
IRQ cascade			•																							
COM1 (Serial port A)				○	•	○	○	○			○	○	○													
COM2 (Serial port B)				•	○	○	○	○			○	○	○													
ACPI <sup>1)</sup>									•																	
Real-time clock								•																		
Coprocessor (FPU)														•												
Primary IDE channel															•											
Secondary IDE channel																○										
B&R COM3 (COM C)				○	○	○	○	○			○	○	○													•
PIRQ A <sup>2)</sup>																	•									
PIRQ B <sup>3)</sup>																		•								
PIRQ C <sup>4)</sup>																			•							
PIRQ D <sup>5)</sup>																				•						
PIRQ E <sup>6)</sup>																					•					
PIRQ F <sup>7)</sup>																						•				
PIRQ G <sup>8)</sup>																							•			
PIRQ H <sup>9)</sup>																								•		

Table 147: IRQ interrupt assignments in APIC mode

- 1) Advanced Configuration and Power Interface.
- 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

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

#### Information:

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

### 1.12.5 Interrupt routing for BIOS up to V1.12

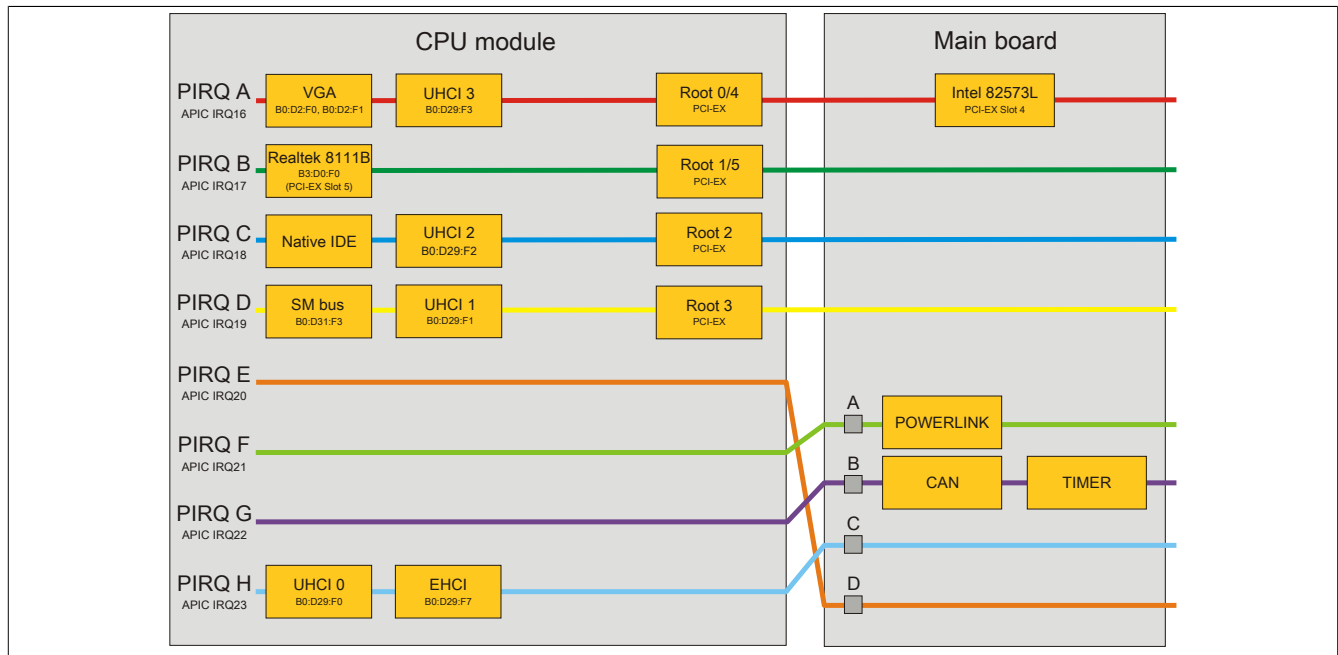


Figure 64: Interrupt routing for BIOS up to V1.12

#### 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 ports (USB2 and USB4).

### 1.12.6 Interrupt routing for BIOS starting with V1.14

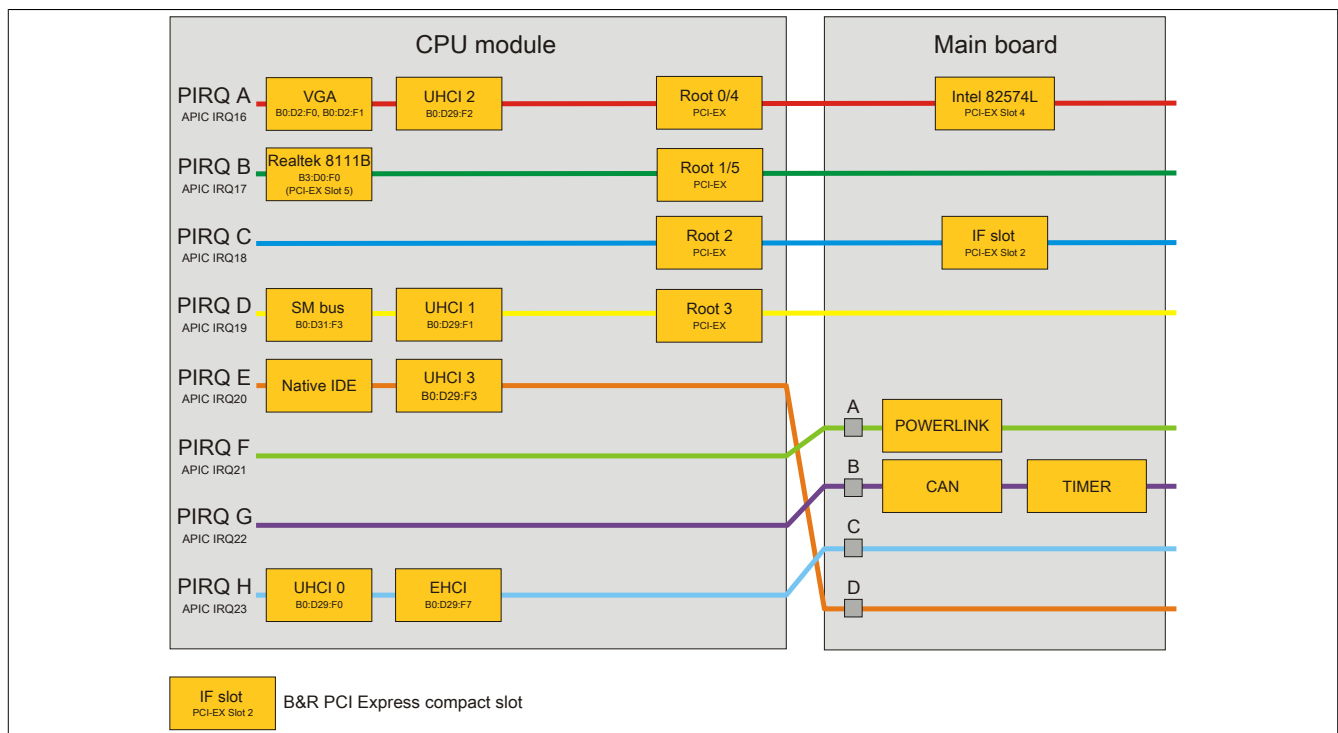


Figure 65: Interrupt routing for BIOS starting with V1.14

## 2 Upgrade information

### Warning!

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

### 2.1 BIOS upgrade

An upgrade might be necessary for the following reason:

- To update implemented functions or to add newly implemented functions or components to the BIOS setup (information about changes can be found in the Readme files of the BIOS upgrade).

#### 2.1.1 What information do I need?

### Information:

Individually saved BIOS settings are deleted when upgrading the BIOS.

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

#### Which BIOS version and firmware are already installed on the 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".

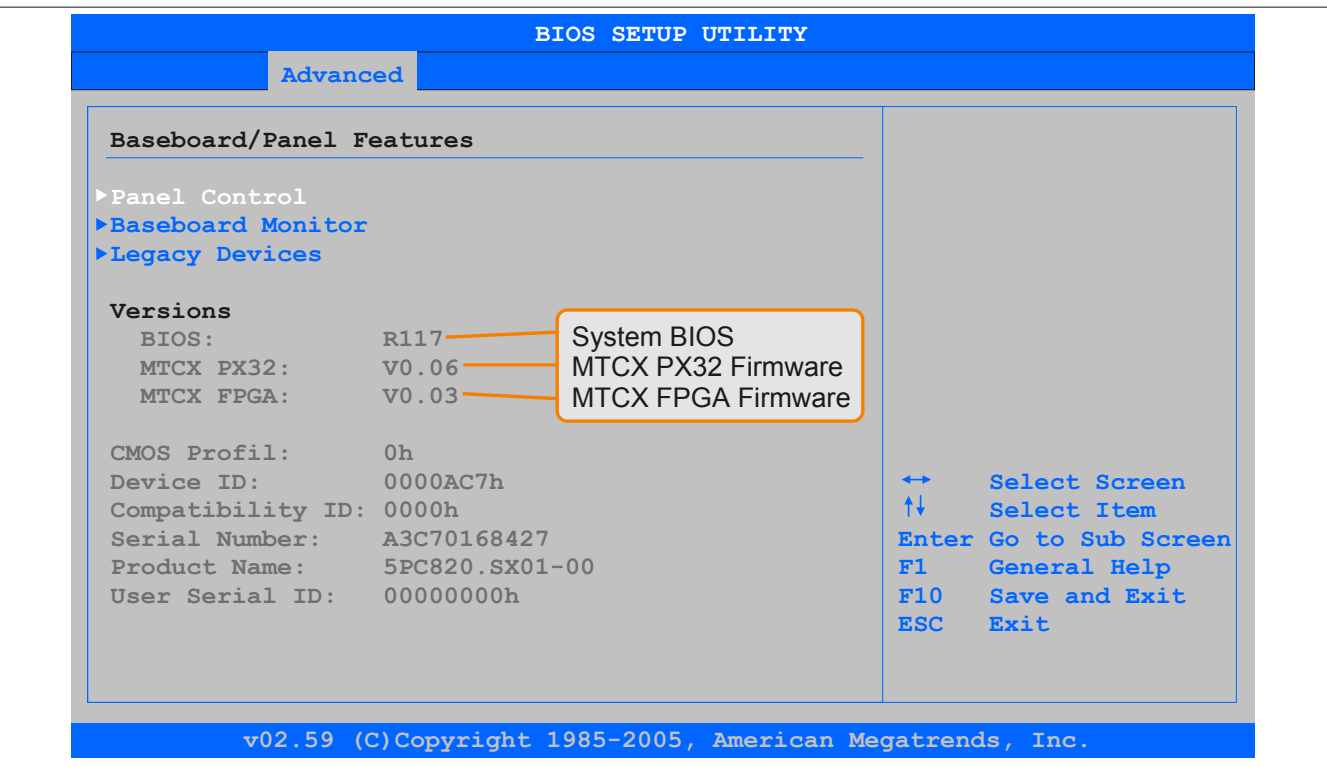


Figure 66: Software version

#### 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" on page 119.

## Information:

The version can only be displayed when an Automation Panel is connected.

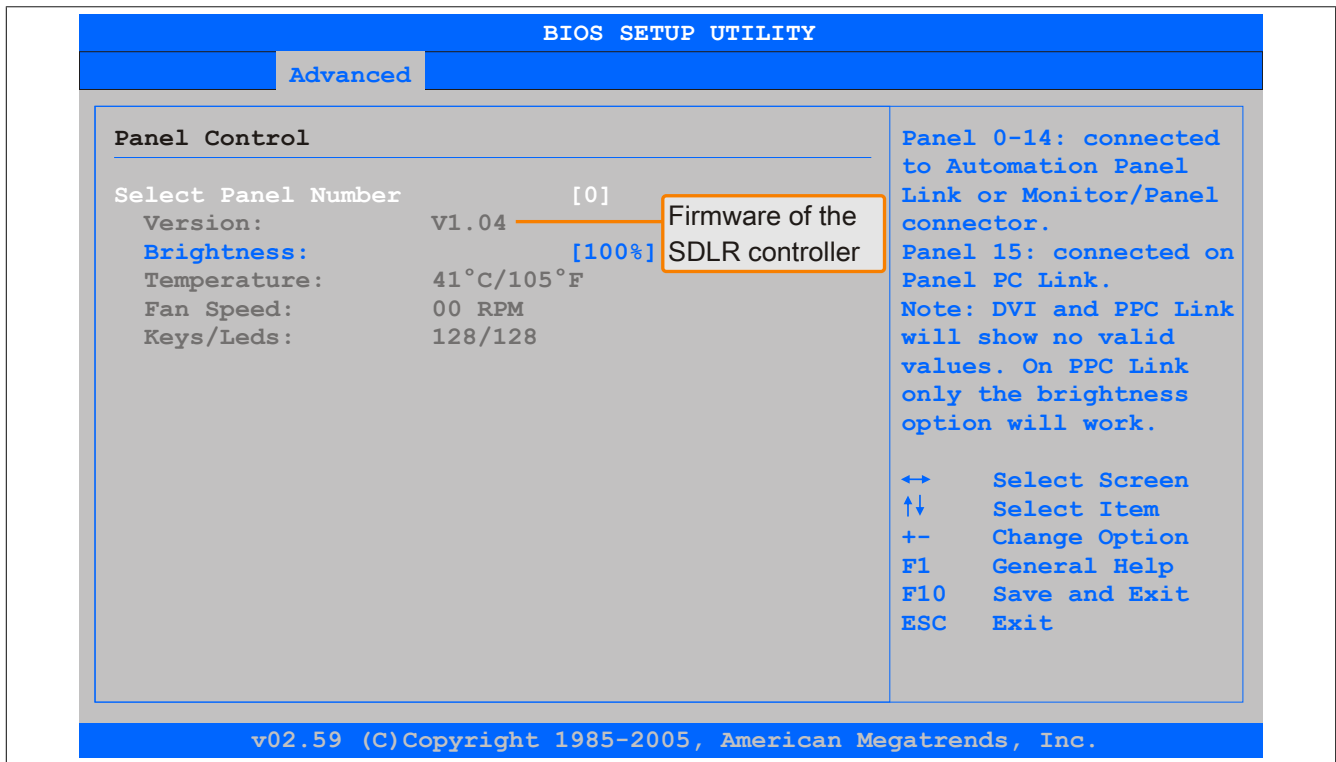


Figure 67: Firmware version of the AP Link SDL transmitter

### 2.1.2 Procedure with MS-DOS

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

## Information:

In MS-DOS, Win95 and Win98, a blank HD disk can be made bootable using the command line command "sys a:" or "format a: /s".

Information on creating a bootable diskette in Windows XP can be found on page 143.

Information on creating a USB flash drive for a B&R upgrade can be found on page 145.

Information on creating a CompactFlash card for a B&R upgrade can be found on page 146.

3. Copy the contents of the \*.zip file to the bootable media. If the B&R upgrade was already added when the bootable media was created using the B&R Embedded OS Installer, then this step is not necessary.
4. Connect the bootable media to the B&R device and reboot.
5. The following boot menu will be shown after startup:

```
1. Upgrade AMI BIOS for B945
2. Exit
```

#### Concerning item 1:

BIOS is automatically upgraded (default after 5 seconds).

#### Concerning item 2:

Returns to the shell (MS-DOS).

**Information:**

If you do not press a button within 5 seconds, then step 1 "Upgrade AMI BIOS for B945" is automatically carried out and the industrial PC is automatically updated.

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

**2.1.3 Using the Control Center**

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

The transfer can be canceled by clicking on **Cancel**. Cancel is disabled when the flash memory is being written to. Deleting the data in flash memory can take several seconds depending on the memory block being used. The progress indicator is not updated during this time.

**Information:**

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

**Information:**

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



## 2.2 Firmware upgrade

The "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 is available in the Service area of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

### 2.2.1 Procedure

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

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

#### Information:

**In MS-DOS, Win95 and Win98, a blank HD disk can be made bootable using the command line command "sys a:" or "format a: /s".**

**Information on creating a bootable diskette in Windows XP can be found on page 143.**

**Information on creating a USB flash drive for a B&R upgrade can be found on page 145.**

**Information on creating a CompactFlash card for a B&R upgrade can be found on page 146.**

3. Copy the contents of the \*.zip file to the bootable media. If the B&R upgrade was already added when the bootable media was created using the B&R Embedded OS Installer, then this step is not necessary.
4. Connect the bootable media to the B&R device and reboot.
5. The following boot menu will be shown after startup:

#### Information:

**The following boot menu options including descriptions are based on Version 1.01 of the APC820 upgrade (MTCX, SDLR, SDLT, UPSI) disk. In some cases, these descriptions might not match the version you are currently using.**

```

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 item 1:

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

#### Concerning item 2:

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

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

The SDLR controller is automatically updated on Automation Panel 0.

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

The SDLR controller is automatically updated on Automation Panel 1.

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

The SDLR controller is automatically updated on Automation Panel 2.

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

The SDLR controller is automatically updated on Automation Panel 3.

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

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

##### 2.6. Return to Main Menu

Returns to main menu.

Concerning item 3:

Return 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

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

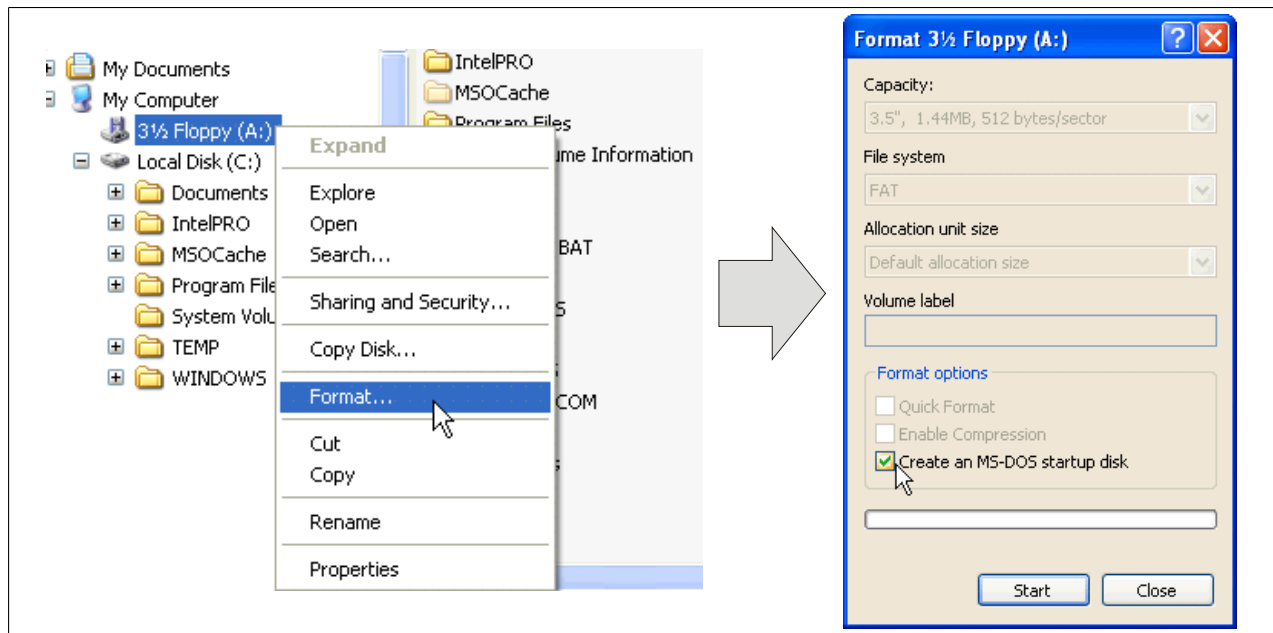


Figure 68: Creating a bootable diskette in Windows XP - step 1

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



Figure 69: Creating a bootable diskette in Windows XP - step 2

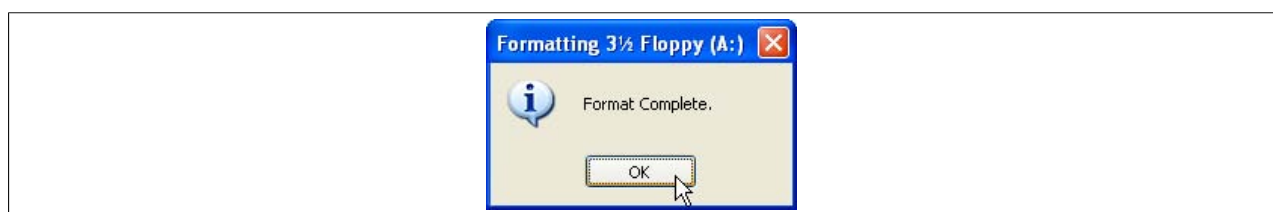


Figure 70: Creating a bootable diskette in Windows XP - step 3

After creating the startup disk, some of the files must be deleted because of the size of the update.

When doing this, all files (hidden, system files, etc.) must be shown on the diskette.

In the Explorer, go to the "Tools" menu, select "Folder Options..." and open the "View" tab - now deactivate the option "Hide protected operating system files (Recommended)" (activated as default) and activate the option "Show hidden files and folders".

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

Figure 71: Creating a bootable diskette in Windows XP - step 4

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

Figure 72: Creating a bootable diskette in Windows XP - step 5

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

## 2.4 Creating a bootable USB flash drive for B&R upgrade files

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

### 2.4.1 Requirements

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

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

### 2.4.2 Procedure

- Connect the USB flash drive to the PC.
- If the drive list is not refreshed automatically, the list must be updated using the command **Drives > Refresh**.
- Mark the desired USB flash drive in the drive list.
- Change to the **Action** tab and select **Install a B&R Update to a USB flash drive** as type of action.
- Enter the path to the MS-DOS operating system files. If the files are part of a ZIP archive, then click on the button **By ZIP file....** If the files are stored in a directory on the hard drive, then click on the button **By folder....**
- In the **B&R Upgrade** text box, it's also possible to enter the path to the ZIP file for the B&R Upgrade Disk and select the file.
- Click on the **Start action** button in the toolbar.

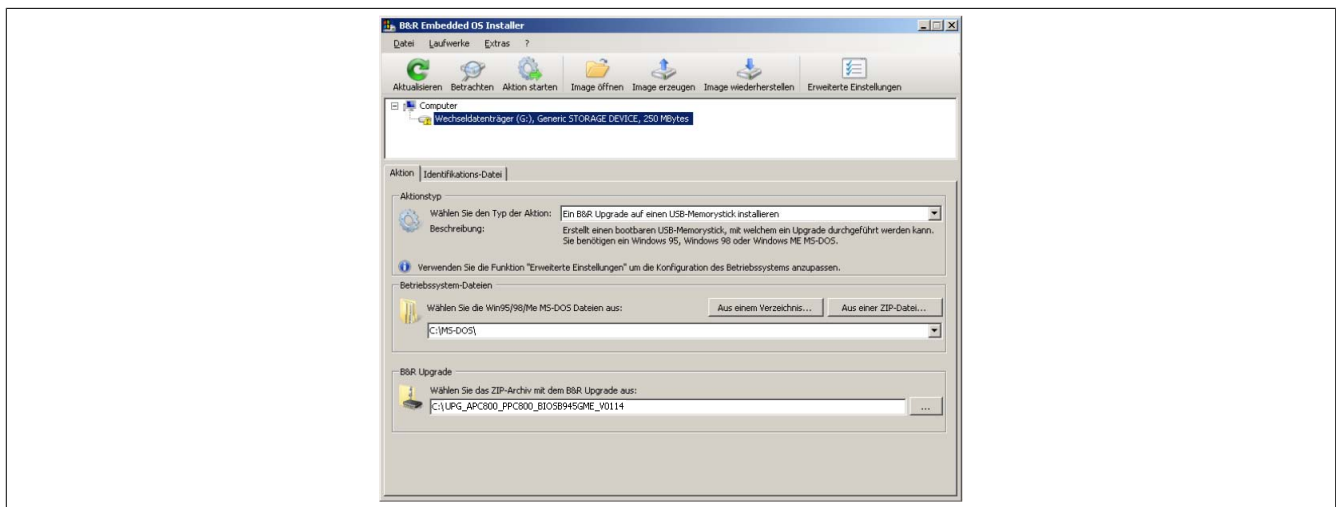


Figure 73: Creating a USB flash drive for B&R upgrade files

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

Information on creating an MS-DOS boot diskette can be found in section see "Creating an MS-DOS boot diskette in Windows XP" on page 143. Then the files from the diskette are to be copied to your hard drive.

## 2.5 Creating a bootable CompactFlash card for B&R upgrade files

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

### 2.5.1 Requirements

The following peripherals are required for creating a bootable CompactFlash card:

- CompactFlash card
- B&R Industrial PC
- B&R Embedded OS Installer (V3.10 at least)

### 2.5.2 Procedure

1. Insert the CompactFlash card in the CF slot on the industrial PC.
2. If the drive list is not refreshed automatically, the list must be updated using the command **Drives > Refresh**.
3. Select the desired CompactFlash card from the drive list.
4. Change to the **Action** tab and select **Install a B&R Update to a CompactFlash card** as the type of action.
5. Enter the path to the MS-DOS operating system files. If the files are part of a ZIP archive, then click on the button **By ZIP file....** If the files are stored in a directory on the hard drive, then click on the button **By folder....**
6. In the **B&R Upgrade** text box, it's also possible to enter the path to the ZIP file for the B&R Upgrade Disk and select the file.
7. Click on the **Start action** button in the toolbar.

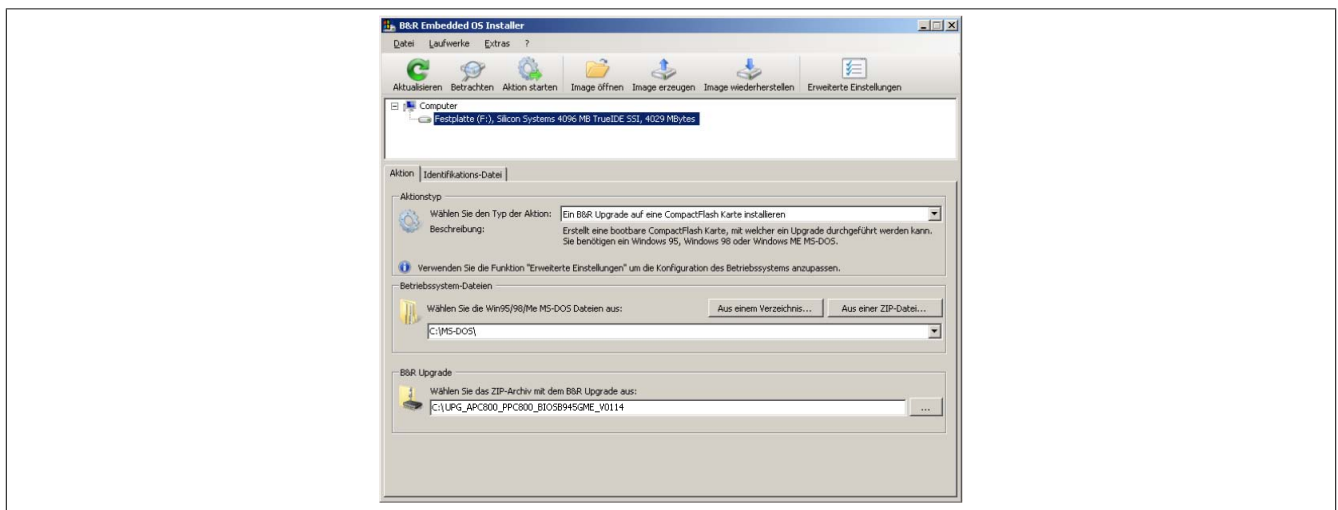


Figure 74: Creating a CompactFlash card for B&R upgrade files

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

Information on creating an MS-DOS boot diskette can be found in section see "Creating an MS-DOS boot diskette in Windows XP" on page 143. Then the files from the diskette are to be copied to your hard drive.

## 3 Microsoft DOS

### 3.1 Order data


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

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

### 3.2 Known problems

- AC97 Sound - no support
- USB 2.0 - only USB 1.1 rates can be achieved.
- A few "ACPI control" BIOS functions cannot be used.

### 3.3 Resolutions and color depths

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

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

Table 149: Tested resolutions and color depths for DVI signals

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

Table 150: Tested resolutions and color depths for RGB signals

## 4 Windows XP Professional

### 4.1 Order data


Model number	Short description	Figure
	<b>Windows XP Professional</b>	
5SWWXP.0600-ENG	Microsoft OEM Windows XP Professional Service Pack 3, CD, English. Only available with a B&R device.	
5SWWXP.0600-GER	Microsoft OEM Windows XP Professional Service Pack 3, CD, German. Only available with a device.	
5SWWXP.0600-MUL	Microsoft OEM Windows XP Professional Service Pack 3, CD, multilanguage. Only available with a B&R device.	
5SWWXP.0500-ENG	Microsoft OEM Windows XP Professional Service Pack 2c, CD, English. Only available with a B&R device.	
5SWWXP.0500-GER	Microsoft OEM Windows XP Professional Service Pack 2c, CD, German. Only available with a B&R device.	
5SWWXP.0500-MUL	Microsoft OEM Windows XP Professional Service Pack 2c, CD, multilanguage. Only available with a B&R device.	

Table 151: 5SWWXP.0600-ENG, 5SWWXP.0600-GER, 5SWWXP.0600-MUL, 5SWWXP.0500-ENG, 5SWWXP.0500-GER, 5SWWXP.0500-MUL - Order data

### 4.2 Overview

Model number	Edition	Target system	Chipset	Service Pack	Language	Preinstalled	Memory required on the disk	Minimum amount of RAM
5SWWXP.0600-ENG	Professional	APC510 APC511 APC620 APC810 APC820 APC910 PPC700 PPC725 PPC800 PP500	945GME GM45 QM77/HM76 NM10 US15W	SP3	English	Optional	≤ 2.1 GB	128 MB
5SWWXP.0600-GER	Professional	APC510 APC511 APC620 APC810 APC820 APC910 PPC700 PPC725 PPC800 PP500	945GME GM45 QM77/HM76 NM10 US15W	SP3	German	Optional	≤ 2.1 GB	128 MB
5SWWXP.0600-MUL	Professional	APC510 APC511 APC620 APC810 APC820 APC910 PPC700 PPC725 PPC800 PP500	945GME GM45 QM77/HM76 NM10 US15W	SP3	Multilanguage	Optional	≤ 2.1 GB	128 MB
5SWWXP.0500-ENG	Professional	APC620 APC810 APC820 PPC700 PPC725 PPC800	945GME GM45	SP2c	English	Optional	≤ 2.1 GB	128 MB
5SWWXP.0500-GER	Professional	APC620 APC810 APC820 PPC700 PPC725 PPC800	945GME GM45	SP2c	German	Optional	≤ 2.1 GB	128 MB
5SWWXP.0500-MUL	Professional	APC620 APC810 APC820 PPC700 PPC725 PPC800	945GME GM45	SP2c	Multilanguage	Optional	≤ 2.1 GB	128 MB

### 4.3 Installation

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



## 4.4 Drivers

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

### **Information:**

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

## 5 Windows 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 Order data


Model number	Short description	Figure
	<b>Windows XP Embedded</b>	
5SWWXP.0428-ENG	Microsoft OEM Windows XP Embedded Feature Pack 2007, English; for APC820 with 945GME chipset; please order CompactFlash separately (minimum 512 MB).	
	<b>Required accessories</b>	
	<b>CompactFlash</b>	
5CFCRD.016G-06	CompactFlash 16 GB B&R (SLC)	
5CFCRD.0512-03	CompactFlash 512 MB Western Digital (SLC)	
5CFCRD.1024-03	CompactFlash 1 GB Western Digital (SLC)	
5CFCRD.1024-06	CompactFlash 1 GB B&R (SLC)	
5CFCRD.2048-03	CompactFlash 2 GB Western Digital (SLC)	
5CFCRD.2048-06	CompactFlash 2 GB B&R (SLC)	
5CFCRD.4096-03	CompactFlash 4 GB Western Digital (SLC)	
5CFCRD.4096-06	CompactFlash 4 GB B&R (SLC)	
5CFCRD.8192-03	CompactFlash 8 GB Western Digital (SLC)	
5CFCRD.8192-06	CompactFlash 8 GB B&R (SLC)	

Table 152: 5SWWXP.0428-ENG - Order data

### 5.3 Overview

Model number	Target system	Chipset	Language	Preinstalled	Minimum size of the disk	Minimum amount of RAM
5SWWXP.0428-ENG	APC820	945GME	English	Yes	512 MB	128 MB

### 5.4 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	✓
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 153: Device functions in Windows XP Embedded with FP2007

## 5.5 Installation

Upon request, Windows XP Embedded can be preinstalled at B&R Austria on a suitable CompactFlash card (min. 512 MB). The system is then automatically configured when it is switched on for the first time. This procedure takes approximately 30 minutes, and the device will be rebooted a number of times.

## 5.6 Drivers

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

### 5.6.1 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 is available in the Download area of the B&R website ([www.br-automation.com](http://www.br-automation.com)). Be sure to check whether the "Enhanced Write Filter (EWF)" is enabled.

#### **Information:**

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

## 6 Windows Embedded Standard 2009

### 6.1 General information

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

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

### 6.2 Order data


Model number	Short description	Figure
	<b>Windows Embedded Standard 2009</b>	
5SWWXP.0728-ENG	Microsoft OEM Windows Embedded Standard 2009, English; for APC820 with 945GME chipset; please order CompactFlash separately (minimum 1 GB).	
	<b>Required accessories</b>	
	<b>CompactFlash</b>	
5CFCRD.016G-06	CompactFlash 16 GB B&R (SLC)	
5CFCRD.032G-06	CompactFlash 32 GB B&R (SLC)	
5CFCRD.1024-06	CompactFlash 1 GB B&R (SLC)	
5CFCRD.2048-06	CompactFlash 2 GB B&R (SLC)	
5CFCRD.4096-06	CompactFlash 4 GB B&R (SLC)	
5CFCRD.8192-06	CompactFlash 8 GB B&R (SLC)	

Table 154: 5SWWXP.0728-ENG - Order data

### 6.3 Overview

Model number	Target system	Chipset	Language	Preinstalled	Minimum size of the disk	Minimum amount of RAM
5SWWXP.0728-ENG	APC820	945GME	English	Yes	1 GB	256 MB

### 6.4 Features with WES2009 (Windows Embedded Standard 2009)

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

Function	Present
Enhanced write filter (EWF)	✓
File Based Write Filter (FBWF)	✓
Page file	Configurable
Administrator account	✓
User account	Configurable
Explorer shell	✓
Registry filter	✓
Internet Explorer 7.0	✓
Internet information service (IIS)	-
Terminal service	✓
Windows Firewall	✓
MSN-Explorer	-
Outlook Express	-
Administrative Tools	✓
Remote Desktop	✓
Remote Assistance	-
.NET Framework	-
ASP.NET	-
Local Network Bridge	✓

Table 155: Device functions in Windows Embedded Standard 2009

Function	Present
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 155: Device functions in Windows Embedded Standard 2009

## 6.5 Installation

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

## 6.6 Drivers

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

### 6.6.1 Touch screen drivers

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

### Information:

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

## 7 Windows Embedded Standard 7

### 7.1 General information

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

With Windows® Embedded Standard 7, Microsoft has made substantial improvements in the area of security. The AppLocker program, available in the premium version, can prevent the execution of unknown or potentially 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<sup>2)</sup>. This ensures that even the most demanding applications have the level of support they need.

### 7.2 Order data


Model number	Short description	Figure
	<b>Windows Embedded Standard 7</b>	
5SWWI7.0528-ENG	Microsoft OEM Windows Embedded Standard 7 32-bit, English; for APC820 with 945GME chipset; please order CompactFlash separately (minimum 8 GB).	
5SWWI7.1528-ENG	Microsoft OEM Windows Embedded Standard 7 32-bit, Service Pack 1, English; for APC820 with 945GME chipset; please order CompactFlash separately (minimum 16 GB).	
5SWWI7.0628-ENG	Microsoft OEM Windows Embedded Standard 7 64-bit, English; for APC820 with 945GME chipset; please order CompactFlash separately (minimum 16 GB).	
5SWWI7.1628-ENG	Microsoft OEM Windows Embedded Standard 7 64-bit, Service Pack 1, English; for APC820 with 945GME chipset; please order CompactFlash separately (minimum 16 GB).	
5SWWI7.0728-MUL	Microsoft OEM Windows Embedded Standard 7 Premium 32-bit, multilanguage; for APC820 with 945GME chipset; please order CompactFlash separately (minimum 8 GB).	
5SWWI7.1728-MUL	Microsoft OEM Windows Embedded Standard 7 Premium 32-bit, Service Pack 1, multilanguage; for APC820 with 945GME chipset; please order CompactFlash separately (minimum 16 GB).	
5SWWI7.0828-MUL	Microsoft OEM Windows Embedded Standard 7 Premium 64-bit, multilanguage; for APC820 with 945GME chipset; please order CompactFlash separately (minimum 16 GB).	
5SWWI7.1828-MUL	Microsoft OEM Windows Embedded Standard 7 Premium 64-bit, Service Pack 1, multilanguage; for APC820 with 945GME chipset; please order CompactFlash separately (minimum 16 GB).	
	<b>Required accessories</b>	
	<b>CompactFlash</b>	
5CFCRD.016G-06	CompactFlash 16 GB B&R (SLC)	
5CFCRD.032G-06	CompactFlash 32 GB B&R (SLC)	
5CFCRD.8192-06	CompactFlash 8 GB B&R (SLC)	
	<b>Optional accessories</b>	
	<b>Windows Embedded Standard 7</b>	
5SWWI7.0900-MUL	Microsoft OEM Windows Embedded Standard 7 32-bit, Language Pack DVD	
5SWWI7.1000-MUL	Microsoft OEM Windows Embedded Standard 7 64-bit, Language Pack DVD	
5SWWI7.1900-MUL	Microsoft OEM Windows Embedded Standard 7 32-bit, Service Pack 1, Language Pack DVD	
5SWWI7.2000-MUL	Microsoft OEM Windows Embedded Standard 7 64-bit, Service Pack 1, Language Pack DVD	

Table 156: 5SWWI7.0528-ENG, 5SWWI7.1528-ENG, 5SWWI7.0628-ENG, 5SWWI7.1628-ENG, 5SWWI7.0728-MUL, 5SWWI7.1728-MUL, 5SWWI7.0828-MUL, 5SWWI7.1828-MUL - Order data

2) 64-bit versions are not supported by all systems

### 7.3 Overview

Model number	Edition	Target system	Chipset	Service Pack	Architectures	Language	Preinstalled	Minimum size of the disk	Minimum amount of RAM
5SWWI7.0528-ENG	Embedded	APC820	945GME		32-bit	English	Optional	8 GB	1 GB
5SWWI7.1528-ENG	Embedded	APC820	945GME	SP1	32-bit	English	Optional	16 GB	1 GB
5SWWI7.0628-ENG	Embedded	APC820	945GME Intel® Core™2 Duo		64-bit	English	Optional	16 GB	1 GB
5SWWI7.1628-ENG	Embedded	APC820	945GME Intel® Core™2 Duo	SP1	64-bit	English	Optional	16 GB	2 GB
5SWWI7.0728-MUL	Premium	APC820	945GME		32-bit	Multilingual	Optional	8 GB <sup>1)</sup>	1 GB
5SWWI7.1728-MUL	Premium	APC820	945GME	SP1	32-bit	Multilingual	Optional	16 GB <sup>1)</sup>	1 GB
5SWWI7.0828-MUL	Premium	APC820	945GME Intel® Core™2 Duo		64-bit	Multilingual	Optional	16 GB <sup>1)</sup>	1 GB
5SWWI7.1828-MUL	Premium	APC820	945GME Intel® Core™2 Duo	SP1	64-bit	Multilingual	Optional	16 GB <sup>1)</sup>	2 GB

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

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

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

Function	Windows Embedded Standard 7	Windows Embedded Standard 7 Premium
Enhanced Write Filter (EWF)	✓	✓
File Based Write Filter (FBWF)	✓	✓
Administrator 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
Number of fonts	134	134

Table 157: Device functions in Windows Embedded Standard 7

### 7.5 Installation

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

## 7.6 Drivers

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

### 7.6.1 Touch screen driver

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

#### **Information:**

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



## 8 Automation Runtime

### 8.1 General information

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

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

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

### 8.2 Order data


Model number	Short description	Figure
	<b>Windows-based Runtime</b>	
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 158: 1A4600.10, 1A4600.10-2, 1A4600.10-3, 1A4600.10-4 - Order data

### 8.3 Automation Runtime Windows (ARwin)

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

### 8.4 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.

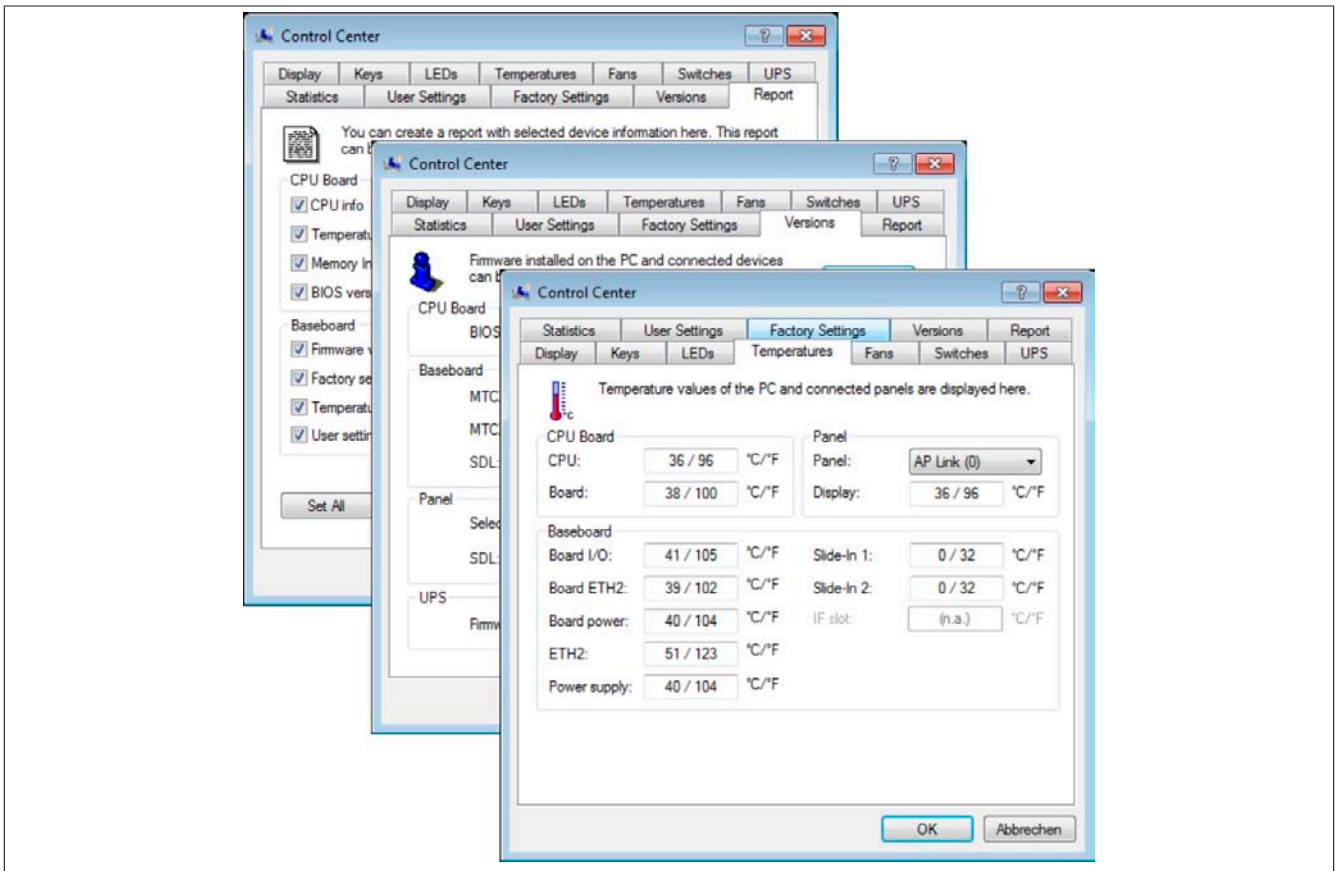


Figure 75: ADI Control Center screenshots - Examples (symbol photo)

### Information:

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

### 9.1 Functions

### Information:

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

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

Supports the following systems:

- Automation PC 510
- Automation PC 511
- Automation PC 620
- Automation PC 810
- Automation PC 820
- Automation PC 910
- Panel PC 300
- Panel PC 700
- Panel PC 725
- Panel PC 800
- Power Panel 100/200
- Power Panel 300/400
- Power Panel 500
- Mobile Panel 40/50
- Mobile Panel 100/200
- Connected Automation Panel 800
- Connected Automation Panel 900

## 9.2 Installation

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

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

### Information:

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

**If a more current ADI driver version exists (see the Downloads area of the B&R website), it can be installed later. During installation, make sure to check whether or not the Enhanced Write Filter (EWF) is disabled.**

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

This software can be used to access B&R Automation Device Interface (ADI) functions from Windows applications created e.g. using the following development environments:

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

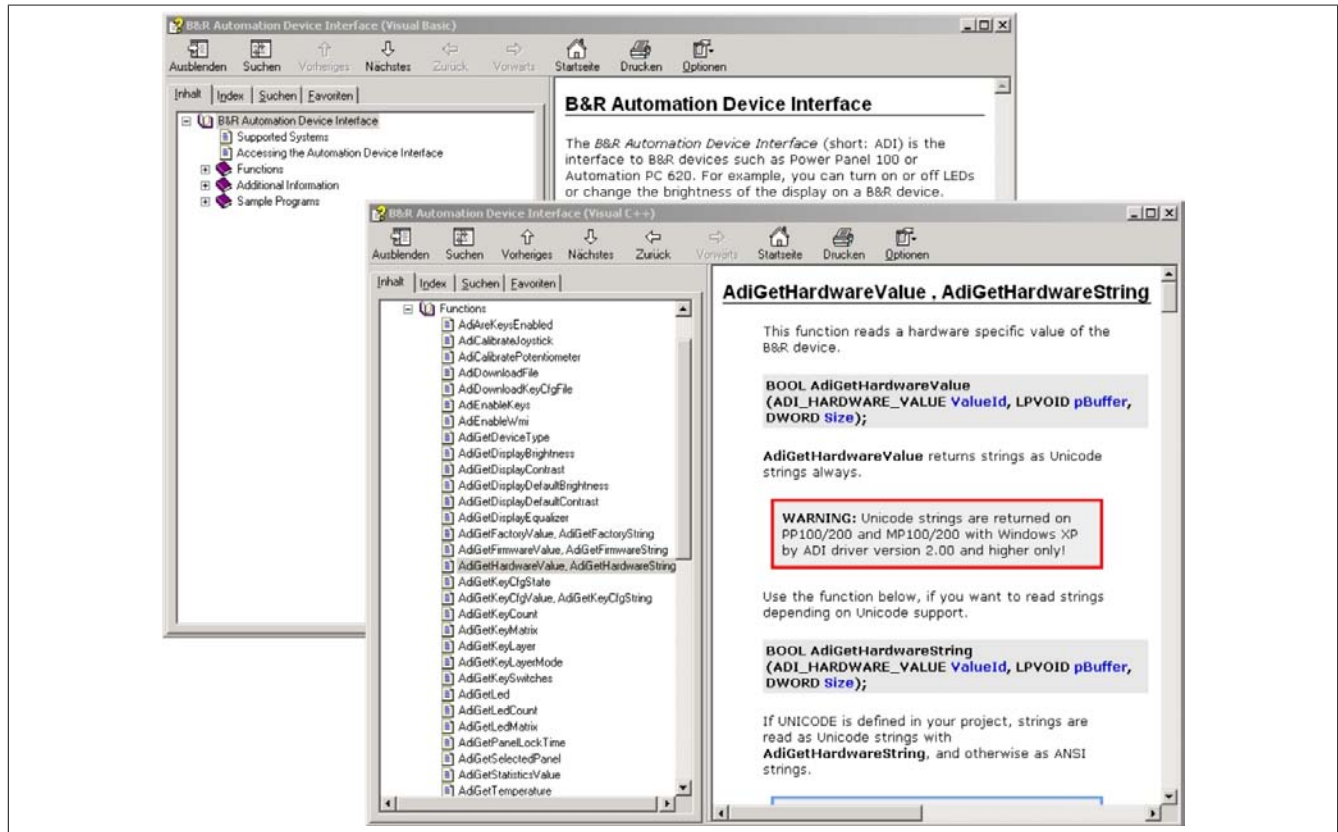


Figure 76: ADI Development Kit screenshots (Version 3.40)

### Features:

- One Microsoft Visual Basic module with ADI function declarations
- Header files and import libraries for Microsoft Visual C++
- Help files for Visual Basic and Visual C++
- Sample projects for Visual Basic and Visual C++
- ADI DLL (for application testing if no ADI driver is installed)

### Supports the following systems (Version 3.40 and higher):

- Automation PC 510
- Automation PC 511
- Automation PC 620
- Automation PC 810
- Automation PC 820
- Automation PC 910
- Panel PC 300
- Panel PC 700
- Panel PC 800
- Power Panel 100/200
- Power Panel 300/400
- Power Panel 500
- Mobile Panel 40/50

- Mobile Panel 100/200

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

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

The B&R Automation Device Interface (ADI) Development Kit is available in the Download area of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

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

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

Supported programming languages:

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

System requirements

- Development system: PC with Windows XP/7 and
  - Microsoft Visual Studio 2005 (or newer)
  - Microsoft .NET Framework 2.0 and/or Microsoft .NET Compact Framework 2.0 (or newer)

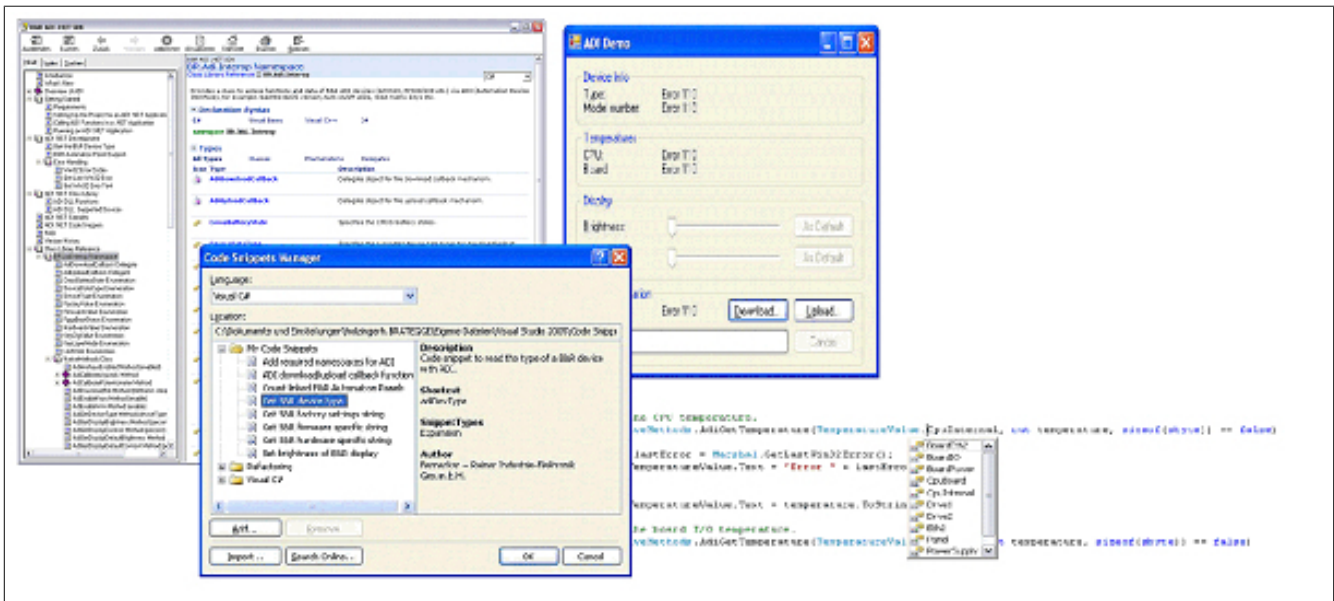


Figure 77: ADI .NET SDK screenshots (Version 1.80)

Features (Version 1.80 and higher)

- ADI .NET class library.
- Help files in HTML Help 1.0 format (.chm file) and MS Help 2.0 format (.HxS file). (Help documentation is in English)
- Sample projects and code snippets for Visual Basic, Visual C++, and Visual C#
- ADI DLL (for application testing if no ADI driver is installed).

Supports the following systems (Version 1.80 and higher):

- Automation PC 510
- Automation PC 511
- Automation PC 620
- Automation PC 810
- Automation PC 820
- Automation PC 910
- Panel PC 300
- Panel PC 700
- Panel PC 800
- Power Panel 100/200
- Power Panel 300/400
- Power Panel 500
- Mobile Panel 40/50
- Mobile Panel 100/200

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

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

ADI .NET SDK is available in the Downloads area of the B&R website ([www.br-automation.com](http://www.br-automation.com)).



## 12 B&R Key Editor

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

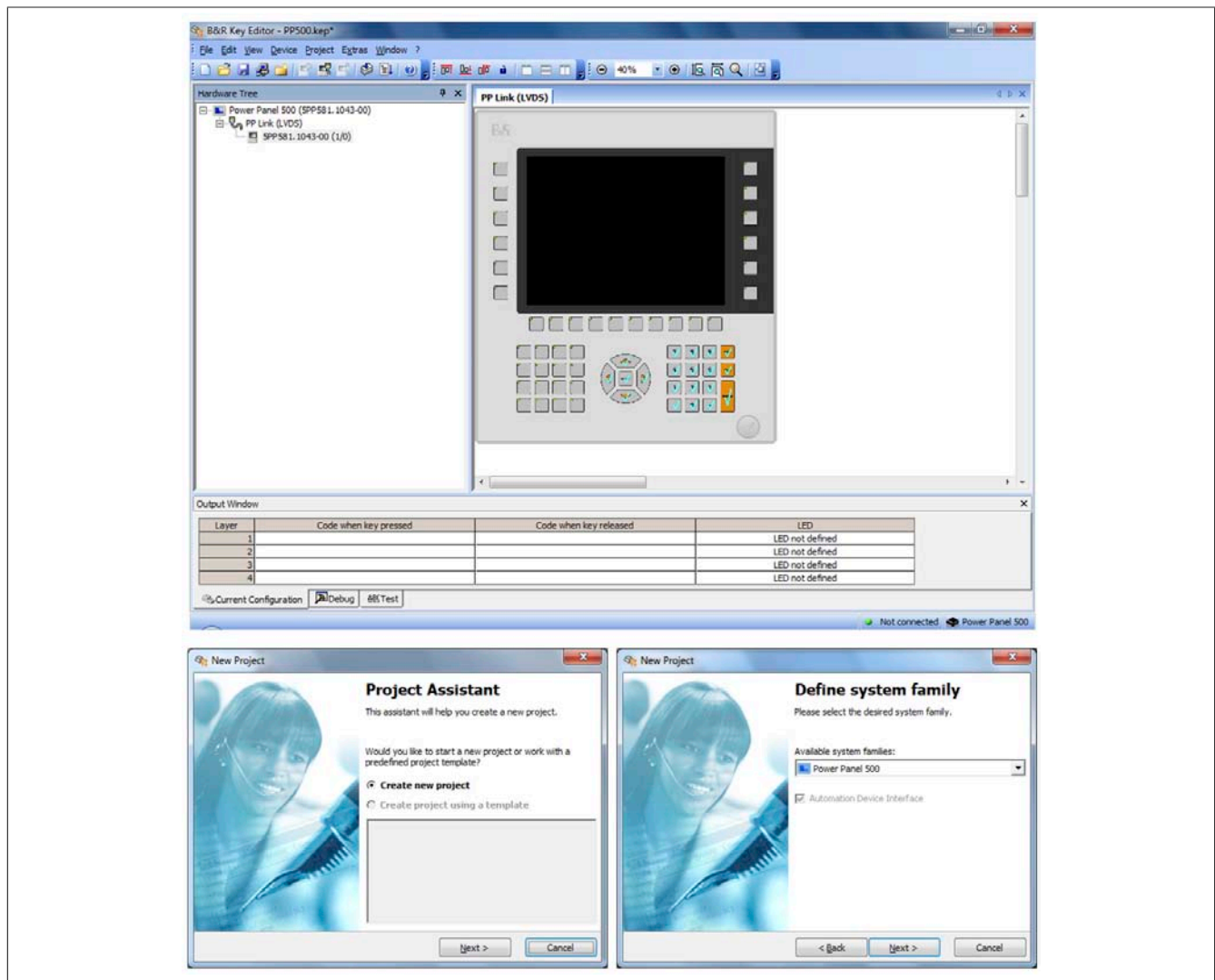


Figure 78: B&R Key Editor Version 3.30 screenshots (sample photo)

### Features:

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

### Supports the following systems (Version 3.30):

- Automation PC 510
- Automation PC 511
- Automation PC 620
- Automation PC 810
- Automation PC 820
- Automation PC 910
- Automation Panel 800
- Automation Panel 830
- Automation Panel 900



- IPC2000, IPC2001, IPC2002
- IPC5000, IPC5600
- IPC5000C, IPC5600C
- Mobile Panel 40/50
- Mobile Panel 100/200
- Panel PC 300
- Panel PC 700
- Panel PC 800
- Power Panel 100/200
- Power Panel 300/400
- Power Panel 500

A detailed guide for configuring keys and LEDs can be found in the B&R Key Editor's Online Help documentation. The B&R Key Editor is available in the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)). It can also be found on the B&R HMI Drivers & Utilities DVD (model number 5SWHMI.0000-00).

## Chapter 5 • Standards and certifications

### 1 Applicable European directives

- EMC directive 2004/108/EC
- Low-voltage directive 2006/95/EC
- Machine directive 2006/42/EC

### 2 Overview of standards

Standard	Description
EN 55011 Class A	Electromagnetic compatibility (EMC), radio disturbance product standard, industrial, scientific, and medical high-frequency devices (ISM devices), limit values and measurement procedure; group 1 (devices that do not create HF during material processing) and group 2 (devices that create HF during material processing)
EN 55022 Class A	Electromagnetic compatibility (EMC), radio disturbance characteristics, information technology equipment (ITE devices), limits and methods of measurement
EN 60060-1	High-voltage test techniques - part 1: General specifications and testing conditions
EN 60068-2-1	Environmental testing - part 2: Tests; test A: Dry cold
EN 60068-2-2	Environmental testing - part 2: Tests; test B: Dry heat
EN 60068-2-3	Environmental testing - part 2: Tests; test and guidance: Damp heat, constant
EN 60068-2-6	Environmental testing - part 2: Tests; test: Vibration (sinusoidal)
EN 60068-2-14	Environmental testing - part 2: Tests; test N: Change of temperature
EN 60068-2-30	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	Degree of protection provided by enclosures (IP code)
EN 60664-1	Insulation coordination for equipment within low-voltage systems - part 1: Principles, requirements and tests
EN 60721-3-2	Classification of environmental conditions - part 3: Classification of groups of environmental parameters and their severities, section 2: Transport
EN 60721-3-3	Classification of environmental conditions - part 3: Classification of groups of environmental parameters and their severities, section 3: Stationary use at weather-protected locations
EN 61000-3-2	Electromagnetic compatibility (EMC) - part 3-2: Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
EN 61000-3-3	Electromagnetic compatibility (EMC) - part 3-3: Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, equipment with rated current ≤ 16 A per phase, and not subject to conditional connection.
EN 61000-3-11	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 159: Overview of standards

### 3 Emission requirements

Emissions	Test carried out according to	Limits according to
Network-related emissions	EN 55011 / EN 55022	EN 61000-6-4: Generic standard (industrial areas)
		EN 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
Emissions, electromagnetic emissions	EN 55011 / EN 55022	47 CFR Part 15 Subpart B Class A (FCC)
		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
Harmonic current emissions for equipment with input current ≤ 16 A per phase	EN 61000-3-2	EN 50091-2: Uninterruptible power systems (UPS), class A
		47 CFR Part 15 Subpart B Class A (FCC)
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 61000-3-2: 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 ≤ 75 A per phase, and subject to conditional connection.	EN 61000-3-11	EN 61000-3-3: Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, equipment with rated current ≤ 16 A per phase, and not subject to conditional connection Class A/D
		EN 61000-3-11: 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 Class A/D

Table 160: Overview of limits and testing guidelines for emissions

#### 3.1 Network-related emissions

Tests in accordance with EN 55011 / EN 55022	Limit values in accordance with EN 61000-6-4	Limit values in accordance with EN 55011 Class A	Limit values in accordance with EN 55022 Class A
Power mains connections 150 kHz - 500 kHz	-	79 dB (μV) quasi-peak value 66 dB (μV) average value	79 dB (μV) quasi-peak value 66 dB (μV) average value
Power mains connections 500 kHz - 30 MHz	-	73 dB (μV) quasi-peak value 60 dB (μV) average value	73 dB (μV) quasi-peak value 60 dB (μV) average value
AC mains connections 150 kHz - 500 kHz	79 dB (μV) quasi-peak value 66 dB (μV) average value	-	-
AC mains connections 500 kHz - 30 MHz	73 dB (μV) quasi-peak value 60 dB (μV) average value	-	-
Other connections 150 kHz - 500 kHz	-	-	97 - 87 dB (μV) and 53 - 43 dB (μA) quasi-peak value 84 - 74 dB (μV) and 40 - 30 dB (μA) average value
Other connections 500 kHz - 30 MHz	-	-	87 dB (μV) and 43 dB (μA) quasi-peak value 74 dB (μV) and 30 dB (μA) average value
Tests in accordance with EN 55011 / EN 55022	Limit values in accordance with EN 61000-6-4	Limit values in accordance with 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 value	-	-
Power mains connections 500 kHz - 5 MHz	86 dB (μV) quasi-peak value 76 dB (μV) average value		
Power mains connections 5 MHz - 30 MHz	90 dB (μV) quasi-peak value 80 dB (μV) average value	-	-
AC mains connections 150 kHz - 500 kHz	-	79 dB (μV) quasi-peak value 66 dB (μV) average value	79 dB (μV) quasi-peak value 66 dB (μV) average value
AC mains connections 500 kHz - 30 MHz	-	73 dB (μV) quasi-peak value 60 dB (μV) average value	73 dB (μV) quasi-peak value 60 dB (μV) average value
Other connections 150 kHz - 500 kHz	-	-	-
Other connections 500 kHz - 30 MHz	-	-	-

Table 161: Test requirements - Network-related emissions for industrial areas

### 3.2 Emissions, electromagnetic emissions

Tests in accordance with EN 55011 / EN 55022	Limit values in accordance with EN 61000-6-4	Limit values in accordance with EN 55011 Class A	Limit values in accordance with EN 55022 Class A
30 MHz - 230 MHz measured at a distance of 10 m	< 40 dB (μV/m) Quasi-peak value	< 40 dB (μV/m) Quasi-peak value	< 40 dB (μV/m) Quasi-peak value
230 MHz - 1 GHz measured at a distance of 10 m	< 47 dB (μV/m) Quasi-peak value	< 47 dB (μV/m) Quasi-peak value	< 47 dB (μV/m) Quasi-peak value
Tests in accordance with EN 55011 / EN 55022	Limit values in accordance with EN 61131-2	Limit values in accordance with EN 50091-2 class A	Limit values in accordance with EN 50091-2 class A
30 MHz - 230 MHz measured at a distance of 10 m	< 40 dB (μV/m) Quasi-peak value	< 40 dB (μV/m) Quasi-peak value	< 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 162: Test requirements - Electromagnetic emissions for industrial areas

## 4 Requirements for immunity to disturbances

Immunity	Test carried out in accordance with	Limits in accordance with
Electrostatic discharge (ESD)	EN 61000-4-3	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-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 EN 55024: Information technology equipment (ITE devices)
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 163: Overview of limits and testing guidelines for immunity

### Evaluation criteria in accordance with EN 61000-6-2

#### Criteria A:

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

#### Criteria B:

The operating equipment must continue to work as intended 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)

Tests in accordance with IEC 61000-4-2	Limit values in accordance with EN 61000-6-2	Limit values in accordance with IEC 61131-2	Limit values in accordance with IEC 61800-3
Contact discharge to powder-coated and bare metal housing parts	±4 kV, 10 discharges, criteria B	±4 kV, 10 discharges, criteria B	±6 kV, 10 discharges, criteria B
Discharge through the air to plastic housing parts	±8 kV, 10 discharges, criteria B	±8 kV, 10 discharges, criteria B	±8 kV, 10 discharges, criteria B

Table 164: Test requirements - Electrostatic discharge (ESD)

### 4.2 High-frequency electromagnetic fields (HF field)

Tests in accordance with IEC 61000-4-3	Limit values in accordance with EN 61000-6-2	Limit values in accordance with IEC 61131-2	Limit values in accordance with IEC 61800-3
Housing, completely wired	80MHz - 1GHz, 10V/m, 80% amplitude modulation with 1kHz, length 3 seconds, criteria A	2 GHz - 2.7 GHz, 1 V/m, 1.4 GHz - 2 GHz, 3 V/m, 80 MHz - 1 GHz, 10 V/m, 80% amplitude modulation with 1kHz, 3 second duration, criteria A	80MHz - 1GHz, 10V/m, 80% amplitude modulation with 1kHz, criteria A

Table 165: Test requirements - High-frequency electromagnetic fields (HF field)

### 4.3 High-speed transient electrical disturbances (Burst)

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

Table 166: Test requirements - High-speed transient electrical disturbances (burst)

### 4.4 Surge

Tests in accordance with IEC 61000-4-5	Limit values in accordance with EN 61000-6-2	Limit values in accordance with IEC 61131-2	Limit values in accordance with IEC 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 mains inputs/outputs, L+ to L-, >10 m	±0.5 kV, criteria B	-	±1 kV, criteria B
DC mains inputs/outputs, 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 167: Test requirements - Surge voltages

### 4.5 Conducted disturbances

Tests in accordance with IEC 61000-4-6	Limit values in accordance with EN 61000-6-2	Limit values in accordance with IEC 61131-2	Limit values in accordance with IEC 61800-3
AC mains inputs/outputs	150kHz - 80MHz, 10V, 80% amplitude modulation with 1kHz, length 3 seconds, criteria A	150kHz - 80MHz, 3V, 80% amplitude modulation with 1kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, criteria A
DC mains inputs/outputs	150kHz - 80MHz, 10V, 80% amplitude modulation with 1kHz, length 3 seconds, criteria A	150kHz - 80MHz, 3V, 80% amplitude modulation with 1kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, criteria A
Functional ground connections	150kHz - 80MHz, 10V, 80% amplitude modulation with 1kHz, length 3 seconds, criteria A	150kHz - 80MHz, 3V, 80% amplitude modulation with 1kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, criteria A
Signal connections >3 m	150kHz - 80MHz, 10V, 80% amplitude modulation with 1kHz, length 3 seconds, criteria A	150kHz - 80MHz, 3V, 80% amplitude modulation with 1kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, criteria A

Table 168: Test requirements - Conducted disturbances

### 4.6 Magnetic fields with electrical frequencies

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

Table 169: Test requirements - Magnetic fields with electrical frequencies

### 4.7 Voltage dips, fluctuations, and short-term interruptions

Tests in accordance with IEC 61000-4-11	Limit values in accordance with EN 61000-6-2	Limit values in accordance with IEC 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	-	

Table 170: Test requirements - Voltage dips, fluctuations, and short-term interruptions

Tests in accordance with IEC 61000-4-11	Limit values in accordance with EN 61000-6-2	Limit values in accordance with IEC 61131-2	
AC power inputs	Voltage dip 40% (60% reduction), 50 periods, criteria C	-	
AC power inputs	Voltage dip < 5% (95% reduction), 250 periods, criteria C	-	
AC power inputs	-	20 interruptions, 0.5 periods, criteria A	
DC power inputs	-	20 interruptions, 0.5 periods, criteria A	

Table 170: Test requirements - Voltage dips, fluctuations, and short-term interruptions

## 4.8 Damped vibration

Tests in accordance with IEC 61000-4-12	Limit values in accordance with IEC 61131-2		
Mains inputs/outputs, L to L	±1 kV, 1 MHz, repeat rate 400/seconds, length 2 seconds, connection lengths 2 m, criteria B		
Power I/O, L to PE	±2.5 kV, 1 MHz, repeat rate 400/seconds, length 2 seconds, connection lengths 2 m, criteria B		

Table 171: Test requirements - Damped 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
Vibration during transport (packaged)	EN 60068-2-6	EN 60721-3-3 class 3M4
		EN 60721-3-2 class 3M4
		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 2M2
Free fall (packaged)	EN 60068-2-32	EN 61131-2: Programmable logic controllers

Table 172: Overview of limits and testing guidelines for vibration

### 5.1 Vibration operation

Tests in accordance with IEC 60068-2-6	Limit values in accordance with IEC 61800-2	
Vibration during operation: Uninterrupted duty with movable frequency in all 3 axes (x, y, z), 1 octave per minute	10 sweeps for each axis	
	<b>Frequency</b>	<b>Limit value</b>
	2 - 9 Hz	Amplitude 3mm
	9 - 200 Hz	Acceleration 1 g

Table 173: Test requirements - Vibration during operation

### 5.2 Vibration during transport (packaged)

Tests in accordance with IEC 60068-2-6	Limit values in accordance with IEC 61800-2	
Vibration during transport: Uninterrupted duty with moveable frequency in all 3 axes (x, y, z)	10 sweeps for each axis	
	<b>Frequency</b>	<b>Limit value</b>
	2 - 9 Hz	Amplitude 3.5mm
	9 - 200 Hz	Acceleration 1 g
	200 - 500 Hz	Acceleration 1.5 g

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

### 5.3 Toppling

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

Table 175: Test requirements - Toppling

### 5.4 Free fall (packaged)

Tests in accordance with EN 61800-2	Limit values in accordance with IEC 60721-3-2 Class 2M1	
Free fall	Devices with delivery packaging	
	<b>Weight</b>	<b>Height</b>
	< 100 kg	0.25 m

Table 176: Test requirements - Free fall



## 6 Climate conditions

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

Table 177: Overview of limits and testing guidelines for temperature and humidity

### 6.1 Worst case operation

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

Table 178: Test requirements - Worst case during operation

### 6.2 Dry heat

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

Table 179: Test requirements - Dry heat

### 6.3 Dry cold

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

Table 180: Test requirements - Dry cold

### 6.4 Large temperature fluctuations

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

Table 181: Test requirements - Large temperature fluctuations

### 6.5 Temperature fluctuations in operation

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

Table 182: Test requirements - Temperature fluctuations during operation

## 6.6 Humid heat, cyclic

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

Table 183: Test requirements - Humid heat, cyclic

## 6.7 Humid heat, constant (Storage)

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

Table 184: 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

Table 185: Overview of limits and testing guidelines for safety

### 7.1 Ground resistance

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

Table 186: Test requirements - Ground resistance

### 7.2 Insulation resistance

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

Table 187: Test requirements - Insulation resistance

### 7.3 High voltage

Tests according to EN 60060-1	Limit values in accordance with IEC 61131-2				Limit values according to UL 508		
High voltage: Primary circuit to secondary circuit and to protective ground circuit (transformers, coils, varistors, capacitors and components used to protect against over-voltage can be removed before the test)	Input voltage	Test voltage			Input voltage	Test voltage	
		1.2/50 μs peak voltage surge	AC, 1 min	DC, 1 min		AC, 1 min	AC, 1 min
	0 - 50 VAC 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 <sub>N</sub>	(1000 V + 2 x U <sub>N</sub> ) 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 188: Test requirements - High voltage

### 7.4 Residual voltage

Tests according to EN 61131-2	Limit value according to IEC 60204-1	Limit value according to IEC 61131-2	
Residual voltage after switching off	< 60 V after 5 sec (active parts) < 60 V after 1 sec (plug pins)	< 60 V after 5 sec (active parts) < 60 V after 1 sec (plug pins)	

Table 189: Test requirements - Residual voltage

## 7.5 Leakage current

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

Table 190: Test requirements - Leakage current

## 7.6 Overload

Tests according to UL 508	Limit value according to IEC 61131-2	Limit values according to UL 508	
Overload of transistor outputs	50 switches, 1.5 I <sub>N</sub> , 1 sec ON / 9 sec OFF	50 switches, 1.5 I <sub>N</sub> , 1 sec ON / 9 sec OFF	

Table 191: Test requirements - Overload

## 7.7 Defective component

Tests according to UL 508	Limit value according to IEC 61131-2	Limit values according to UL 508	
Simulation of how components in power supply became defective	Non-flammable surrounding cloth No contact with conductive parts	Non-flammable surrounding cloth No contact with conductive parts	

Table 192: Test requirements - Defective component

## 8 Other tests

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

Table 193: Overview of limits and testing guidelines for other tests

### 8.1 Protection

Test carried out in accordance with	Limit values in accordance with EN 60529		
Protection of the operating equipment	IP2. Protection against large solid foreign bodies $\geq 12.5$ mm diameter		
Protection of personnel	IP2. Protection against touching dangerous parts with fingers		
Protection against water permeation with damaging consequences	IP0. Not protected		

Table 194: 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 195: International certifications

## Chapter 6 • Accessories

The following accessories have passed B&R's functional testing and are approved for use with this device. Nevertheless, it is important to observe any limitations that may apply to the complete device when operated with different components. When operating the complete device, it is the specifications for the individual components that must be adhered to.

All components listed in this manual have been subjected to extensive system and compatibility testing and are approved for use. B&R can make no guarantee regarding the functionality of non-approved accessories.

### 1 CAN plug (4-pin)

#### 1.1 General information

The single-row 4-pin terminal block TB704 is used as the supply voltage terminal block and the connection terminal for fieldbuses.

#### 1.2 Order data


Model number	Short description	Figure
	<b>Terminal blocks</b>	
0TB704.9	Accessory terminal block, 4-pin, screw clamps 2.5 mm <sup>2</sup>	
0TB704.91	Accessory terminal block, 4-pin, cage clamps 2.5 mm <sup>2</sup>	

Table 196: 0TB704.9, 0TB704.91 - Order data

#### 1.3 Technical data

##### Information:

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

Product ID	0TB704.9	0TB704.91
Terminal block		
Note	Rated values according to UL	
Number of pins	4	
Type of terminal clamp	Screw clamps	Cage clamps <sup>2)</sup>
Cable type	Copper wires only (no aluminum wires!)	
Distance between contacts	5.08 mm	
Connection cross section		
AWG wire	26 to 12 AWG	
Wire tip sleeves with plastic covering	0.20 to 1.50 mm²	
Solid wires	0.20 to 2.50 mm²	
Fine strand wires	0.20 to 1.50 mm²	0.20 to 2.50 mm²
With wire tip sleeves	0.20 to 1.50 mm²	
Electrical characteristics		
Nominal voltage	300 V	
Nominal current <sup>1)</sup>	10 A / contact	
Contact resistance	≤ 5 mΩ	

Table 197: 0TB704.9, 0TB704.91 - Technical data

- 1) Please take the respective limit data for the I/O modules into consideration!  
 2) Cage clamp terminal blocks cannot be strung together.

## 2 Replacement CMOS batteries

### 2.1 0AC201.91 / 4A0006.00-000

#### 2.1.1 General information

This lithium battery is needed to back BIOS CMOS data and the real-time clock (RTC).

The battery is subject to wear and must be replaced when the battery power ("Bad" status) is insufficient.

#### 2.1.2 Order data


Model number	Short description	Figure
	<b>Batteries</b>	
0AC201.91	Lithium batteries 4 pieces, 3 V / 950 mAh button cell Hereby we declare that the Lithium cells contained in this shipment qualify as „partly regulated“. Handle with care. If the package is damaged, inspect cells, repack intact cells and protect cells against short circuits. For emergency information, call RENATA SA at + 41 61 319 28 27	
4A0006.00-000	Lithium battery, 3 V / 950 mAh, button cell	

Table 198: 0AC201.91, 4A0006.00-000 - Order data

#### 2.1.3 Technical data

##### Warning!

Replace battery with Renata, type CR2477N only. Use of another battery may present a risk of fire or explosion.

Battery may explode if mistreated. Do not recharge, disassemble or dispose of in fire.

##### Information:

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

Product ID	0AC201.91	4A0006.00-000
General information		
Storage time	Max. 3 years at 30°C	
Electrical characteristics		
Capacity	950 mAh	
Self discharging	<1% per year (at 23°C)	
Voltage range	3V	
Environmental conditions		
Temperature	-20 to 60°C	
Storage		
Relative humidity	0 to 95%	
Operation		
Storage		
Transport		

Table 199: 0AC201.91, 4A0006.00-000 - Technical data



3 DVI - Monitor adapter

3.1 5AC900.1000-00

3.2 General information

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

3.3 Order data


Model number	Short description	Figure
	Miscellaneous	
5AC900.1000-00	Adapter DVI (male) to CRT (female). For connecting a standard monitor to a DVI-I interface.	

Table 200: 5AC900.1000-00 - Order data

## 4 CompactFlash cards

### 4.1 General information

CompactFlash cards are storage media that are easy to replace. Due to their robustness against environmental influences (e.g. temperature, shock, vibration, etc.), CompactFlash cards are ideal for use as storage media in industrial environments.

### 4.2 Basic information

In order to be suited for use in industrial automation, CompactFlash cards must be highly reliable. To make this possible, the following is very important:

- Flash technology used
- Efficient algorithm for maximizing the lifespan
- Good mechanisms for detecting and fixing errors in the flash memory

#### 4.2.1 Flash technology

Currently, CompactFlash cards are available with MLC (Multi Level Cell) and SLC (Single Level Cell) flash blocks. SLC flash memory has a lifespan that is 10 times longer than MLC, which is why only CompactFlash cards with SLC flash blocks are suited for industrial applications.

#### 4.2.2 Wear leveling

Wear leveling is an algorithm that can be used to maximize the lifespan of a CompactFlash card. There are three different algorithms:

- No wear leveling
- Dynamic wear leveling
- Static wear leveling

The basic idea behind wear leveling is to distribute data over a broad area of blocks or cells on the data carrier so that the same areas don't have to be cleared and reprogrammed over and over again.

#### No wear leveling

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

#### Dynamic wear leveling

Dynamic wear leveling makes it possible to utilize unused flash blocks when writing to a file.

If the data carrier is 80% full with files, then only 20% can be used for wear leveling.

The lifespan of the CompactFlash card is therefore dependent on the amount of unused flash blocks.

#### Static wear leveling

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

#### 4.2.3 ECC error correction

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

#### 4.2.4 S.M.A.R.T. support

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

#### 4.2.5 Maximum reliability

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

### 4.3 5CFCRD.xxxx-06

#### 4.3.1 General information

##### Information:

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

see "Known problems / issues" on page 195

##### Information:

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

#### 4.3.2 Order data


Model number	Short description	Figure
	<b>CompactFlash</b>	
5CFCRD.0512-06	CompactFlash 512 MB B&R (SLC)	
5CFCRD.1024-06	CompactFlash 1 GB B&R (SLC)	
5CFCRD.2048-06	CompactFlash 2 GB B&R (SLC)	
5CFCRD.4096-06	CompactFlash 4 GB B&R (SLC)	
5CFCRD.8192-06	CompactFlash 8 GB B&R (SLC)	
5CFCRD.016G-06	CompactFlash 16 GB B&R (SLC)	
5CFCRD.032G-06	CompactFlash 32 GB B&R (SLC)	

Table 201: 5CFCRD.0512-06, 5CFCRD.1024-06, 5CFCRD.2048-06, 5CFCRD.4096-06, 5CFCRD.8192-06, 5CFCRD.016G-06, 5CFCRD.032G-06 - Order data

#### 4.3.3 Technical data

##### Caution!

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

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

##### Information:

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

Product ID	5CFCRD. 0512-06	5CFCRD. 1024-06	5CFCRD. 2048-06	5CFCRD. 4096-06	5CFCRD. 8192-06	5CFCRD. 016G-06	5CFCRD. 032G-06
<b>General information</b>							
Capacity	512 MB	1 GB	2 GB	4 GB	8 GB	16 GB	32 GB
Data retention	10 years						
Data reliability	< 1 unrecoverable error in 10 <sup>14</sup> bit read accesses	< 1 unrecoverable error in 10 <sup>14</sup> bit read accesses	< 1 unrecoverable errors in 10 <sup>14</sup> bit read accesses	< 1 unrecoverable errors in 10 <sup>14</sup> bit read accesses	< 1 unrecoverable error in 10 <sup>14</sup> bit read accesses	< 1 unrecoverable error in 10 <sup>14</sup> bit read accesses	< 1 unrecoverable error in 10 <sup>14</sup> bit read accesses
Lifetime monitoring	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MTBF	> 3,000,000 hours (at 25°C)						
Maintenance	None						
Supported operating modes	PIO mode 0-6, Multiword DMA mode 0-4, Ultra DMA mode 0-4						
Continuous reading							
Typical	33 MB/s	33 MB/s	33 MB/s	33 MB/s	33 MB/s	36 MB/s	36 MB/s
Maximum	35 MB/s	35 MB/s	35 MB/s	34 MB/s	34 MB/s	37 MB/s	37 MB/s

Table 202: 5CFCRD.0512-06, 5CFCRD.1024-06, 5CFCRD.2048-06, 5CFCRD.4096-06, 5CFCRD.8192-06, 5CFCRD.016G-06, 5CFCRD.032G-06 - Technical data

Product ID	5CFCRD. 0512-06	5CFCRD. 1024-06	5CFCRD. 2048-06	5CFCRD. 4096-06	5CFCRD. 8192-06	5CFCRD. 016G-06	5CFCRD. 032G-06
Continuous writing							
Typical	15 MB/s	15 MB/s	15 MB/s	14 MB/s	14 MB/s	28 MB/s	28 MB/s
Maximum	18 MB/s	18 MB/s	18 MB/s	17 MB/s	17 MB/s	30 MB/s	30 MB/s
Certification							
CE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>Endurance</b>							
Guaranteed data volume							
Guaranteed <sup>1)</sup>	50 TB	100 TB	200 TB	400 TB	800 TB	1600 TB	3200 TB
Results for 5 years <sup>1)</sup>	27.40 GB/day	54.79 GB/day	109.9 GB/day	219.8 GB/day	438.6 GB/day	876.72 GB/day	1753.44 GB/day
Clear/write cycles							
Guaranteed	100,000						
SLC Flash	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wear leveling	Static						
Error Correction Coding (ECC)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
S.M.A.R.T. support	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>Support</b>							
Hardware	PP300/400, PP500, PPC300, PPC700, PPC725, PPC800, APC620, APC810, APC820						
Operating systems							
Windows 7 32-bit	No	No	No	No	No	Yes	Yes
Windows 7 64-bit	No	No	No	No	No	No	No
Windows Embedded Standard 7, 32-bit	No	No	No	No	Yes	Yes	Yes
Windows Embedded Standard 7, 64-bit	No	No	No	No	No	Yes	Yes
Windows XP Professional	No	No	No	Yes	Yes	Yes	Yes
Windows XP Embedded	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Windows Embedded Standard 2009	No	Yes	Yes	Yes	Yes	Yes	Yes
Windows CE 6.0	Yes	Yes	Yes	Yes	Yes	Yes <sup>2)</sup>	Yes <sup>2)</sup>
Windows CE 5.0	No	No	No	No	No	No	No
Software							
PVI Transfer	≥ V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011)	≥ V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011)	≥ V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011)	≥ V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011)	≥ V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011)	No	No
B&R Embedded OS Installer	≥ V3.10	≥ V3.10	≥ V3.10	≥ V3.10	≥ V3.10	≥ V3.20	≥ V3.30
<b>Environmental conditions</b>							
Temperature							
Operation	0 to 70°C						
Storage	-65 to 150°C						
Transport	-65 to 150°C						
Relative humidity							
Operation	Max. 85% at 85°C						
Storage	Max. 85% at 85°C						
Transport	Max. 85% at 85°C						
Vibration							
Operation	20 g peak, 20 to 2000 Hz, 4 in each direction (JEDEC JESD22, method B103) 5.35 g RMS, 15 min per level (IEC 68-2-6)						
Storage	20 g peak, 20 to 2000 Hz, 4 in each direction (JEDEC JESD22, method B103) 5.35 g RMS, 15 min per level (IEC 68-2-6)						
Transport	20 g peak, 20 to 2000 Hz, 4 in each direction (JEDEC JESD22, method B103) 5.35 g RMS, 15 min per level (IEC 68-2-6)						
Shock							
Operation	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)
Storage	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)
Transport	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)

Table 202: 5CFCRD.0512-06, 5CFCRD.1024-06, 5CFCRD.2048-06, 5CFCRD.4096-06, 5CFCRD.8192-06, 5CFCRD.016G-06, 5CFCRD.032G-06 - Technical data

Product ID	5CFCRD. 0512-06	5CFCRD. 1024-06	5CFCRD. 2048-06	5CFCRD. 4096-06	5CFCRD. 8192-06	5CFCRD. 016G-06	5CFCRD. 032G-06
Altitude Operation	Max. 4,572 m						
Mechanical characteristics							
Dimensions							
Width	42.8 ±0.10 mm	42.8 ±0.10 mm	42.8 ±0.10 mm	42.8 ±0.10mm	42.8 ±0.10 mm	42.8 ±0.10 mm	42.8 ±0.10 mm
Length	36.4 ±0.15 mm	36.4 ±0.15 mm	36.4 ±0.15 mm	36.4 ±0.15mm	36.4 ±0.15 mm	36.4 ±0.15 mm	36.4 ±0.15 mm
Height	3.3 ±0.10 mm	3.3 ±0.10 mm	3.3 ±0.10 mm	3.3 ±0.10mm	3.3 ±0.10 mm	3.3 ±0.10 mm	3.3 ±0.10 mm
Weight	10 g						

Table 202: 5CFCRD.0512-06, 5CFCRD.1024-06, 5CFCRD.2048-06, 5CFCRD.4096-06, 5CFCRD.8192-06, 5CFCRD.016G-06, 5CFCRD.032G-06 - Technical data

- 1) Endurance of B&R CFs (with linear written block size ≥ 128 kB)
- 2) Not supported by B&R Embedded OS installer.

#### 4.3.4 Temperature humidity diagram

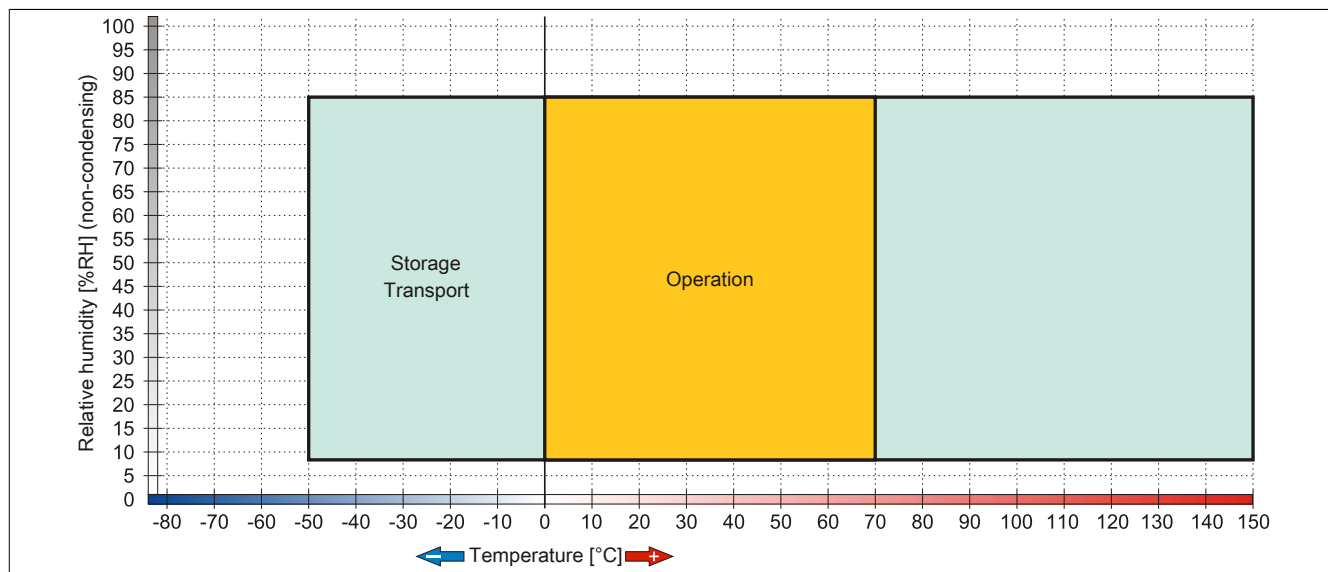


Figure 79: 5CFCRD.xxxx-06 - Temperature humidity diagram for CompactFlash cards

#### 4.3.5 Dimensions

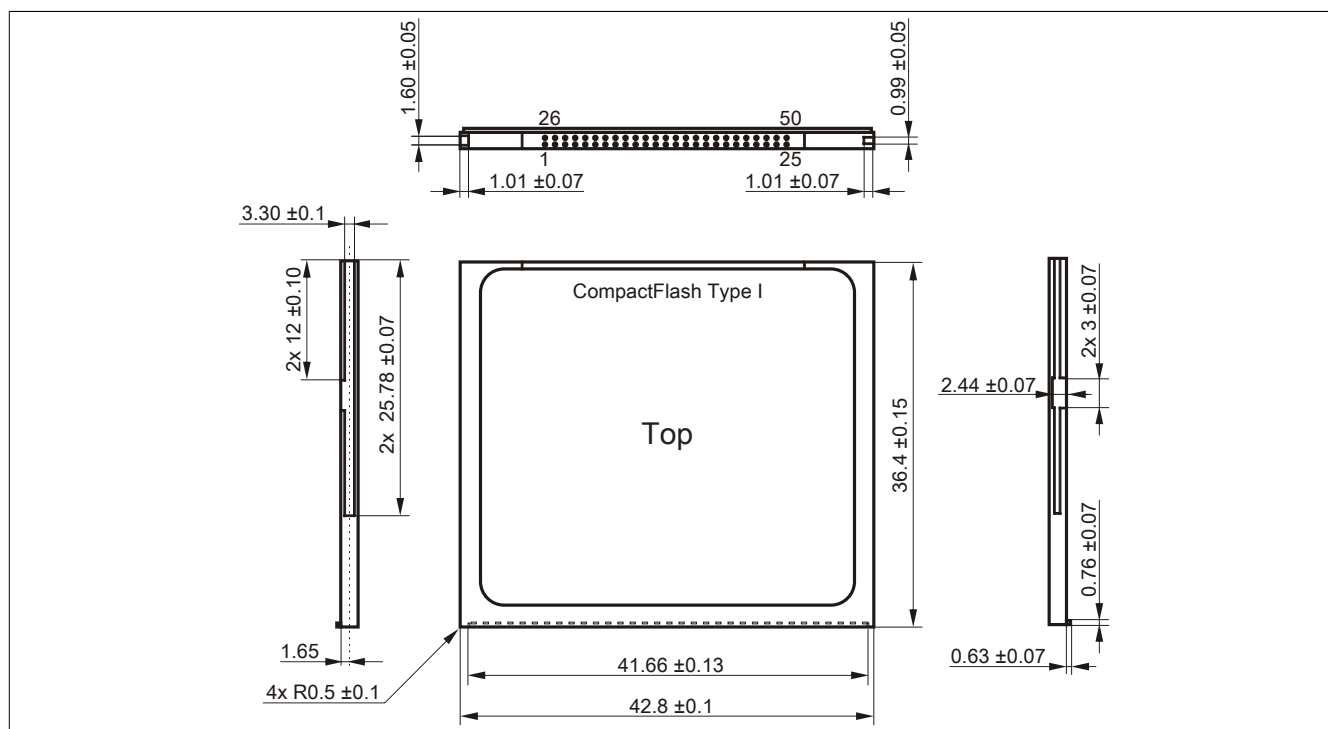


Figure 80: Dimensions - CompactFlash card Type I

### 4.3.6 Benchmark

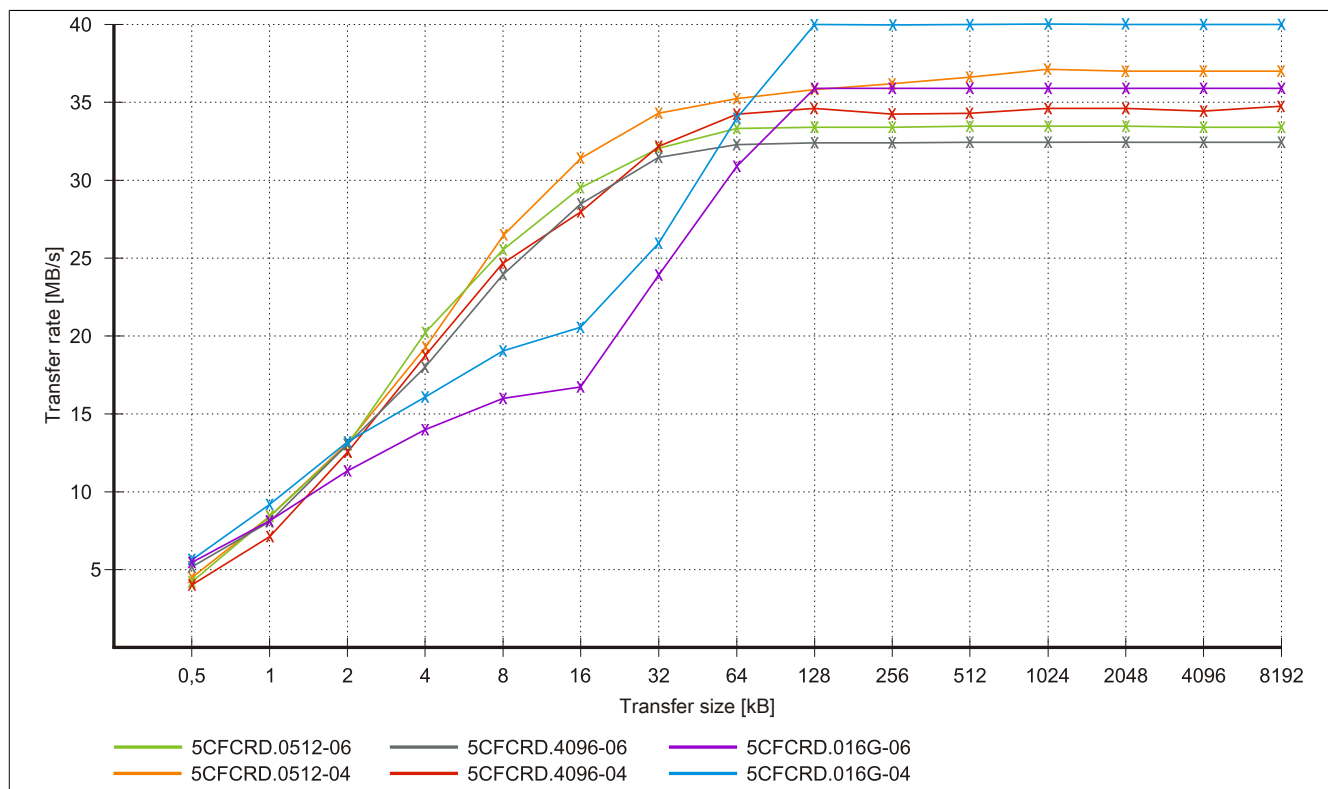


Figure 81: ATTO Disk Benchmark v2.34 comparison when reading - 5CFCRD.xxxx-04 with 5CFCRD.xxxx-06

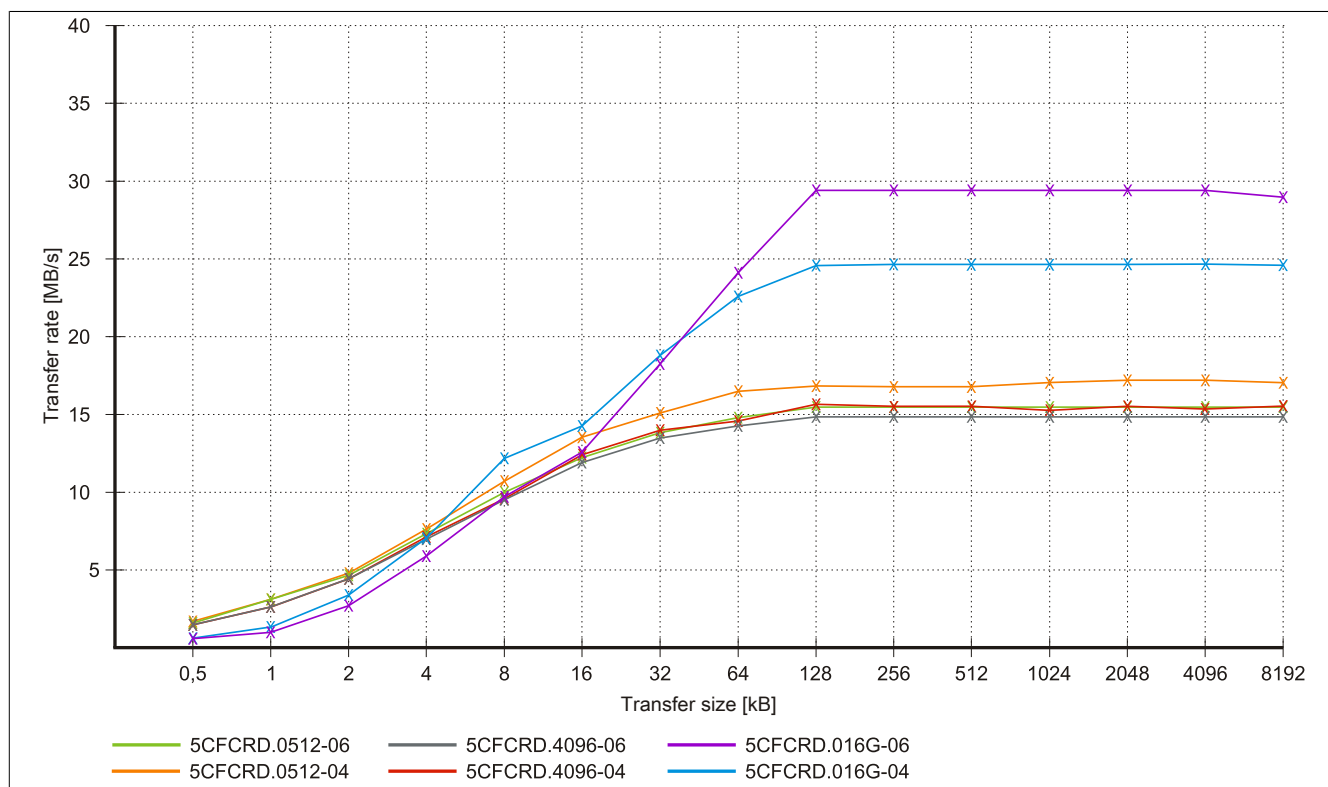


Figure 82: ATTO Disk Benchmark v2.34 comparison when writing - 5CFCRD.xxxx-04 with 5CFCRD.xxxx-06

## 4.4 5CFCRD.xxxx-04

### 4.4.1 General information

#### Information:

B&R CompactFlash cards 5CFCRD.xxxx-04 and CompactFlash cards from a different manufacturer cannot be used in the same system at the same time. Due to differences in technology (older vs. newer technologies), problems can occur during system startup that are caused by the different boot times. see "Known problems / issues" on page 195

#### Information:

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

### 4.4.2 Order data


Model number	Short description	Figure
	<b>CompactFlash</b>	
5CFCRD.0512-04	CompactFlash 512 MB B&R (SLC)	
5CFCRD.1024-04	CompactFlash 1 GB B&R (SLC)	
5CFCRD.2048-04	CompactFlash 2 GB B&R (SLC)	
5CFCRD.4096-04	CompactFlash 4 GB B&R (SLC)	
5CFCRD.8192-04	CompactFlash 8 GB B&R (SLC)	
5CFCRD.016G-04	CompactFlash 16 GB B&R (SLC)	

Table 203: 5CFCRD.0512-04, 5CFCRD.1024-04, 5CFCRD.2048-04, 5CFCRD.4096-04, 5CFCRD.8192-04, 5CFCRD.016G-04 - Order data

### 4.4.3 Technical data

#### Caution!

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

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

#### Information:

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

Product ID	5CFCRD.0512-04	5CFCRD.1024-04	5CFCRD.2048-04	5CFCRD.4096-04	5CFCRD.8192-04	5CFCRD.016G-04
<b>General information</b>						
Capacity	512 MB	1 GB	2 GB	4 GB	8 GB	16 GB
Data retention	10 years					
Data reliability	< 1 unrecoverable errors in $10^{14}$ bit read accesses					
Lifetime monitoring	Yes					
MTBF	> 3,000,000 hours (at 25°C)					
Maintenance	None					
Supported operating modes	PIO mode 0-6, Multiword DMA mode 0-4, Ultra DMA mode 0-4					
Continuous reading	Typical	35 MB/s (240X) <sup>1)</sup>	35 MB/s (240X) <sup>1)</sup>	35 MB/s (240X) <sup>1)</sup>	33 MB/s (220X) <sup>1)</sup>	27 MB/s (180X) <sup>1)</sup>
	Maximum	37 MB/s (260X) <sup>1)</sup>	37 MB/s (260X) <sup>1)</sup>	37 MB/s (260X) <sup>1)</sup>	34 MB/s (226X) <sup>1)</sup>	28 MB/s (186X) <sup>1)</sup>

Table 204: 5CFCRD.0512-04, 5CFCRD.1024-04, 5CFCRD.2048-04, 5CFCRD.4096-04, 5CFCRD.8192-04, 5CFCRD.016G-04 - Technical data



Product ID	5CFCRD.0512-04	5CFCRD.1024-04	5CFCRD.2048-04	5CFCRD.4096-04	5CFCRD.8192-04	5CFCRD.016G-04
Continuous writing						
Typical	17 MB/s (110X)	17 MB/s (110X)	17 MB/s (110X)	16 MB/s (106X)	15 MB/s (100X)	18 MB/s (120X)
Maximum	20 MB/s (133X)	20 MB/s (133X)	20 MB/s (133X)	18 MB/s (120X)	17 MB/s (110X)	19 MB/s (126X)
Certification CE	Yes					
Endurance						
Guaranteed data volume						
Guaranteed <sup>2)</sup>	50 TB	100 TB	200 TB	400 TB	800 TB	1600 TB
Results for 5 years <sup>2)</sup>	27.40 GB/day	54.79 GB/day	109.9 GB/day	219.8 GB/day	438.6 GB/day	876.72 GB/day
Clear/write cycles						
Typical <sup>3)</sup>	2,000,000					
Guaranteed	100,000					
SLC Flash	Yes					
Wear leveling	Static					
Error Correction Coding (ECC)	Yes					
S.M.A.R.T. support	No					
Support						
Hardware	PP300/400, PP500, PPC300, PPC700, PPC725, PPC800, APC620, APC810, APC820					
Operating systems						
Windows 7 32-bit	No	No	No	No	No	Yes
Windows 7 64-bit				No		
Windows Embedded Standard 7, 32-bit	No	No	No	No	Yes	Yes
Windows Embedded Standard 7, 64-bit	No	No	No	No	No	Yes
Windows XP Professional	No	No	No	Yes	Yes	Yes
Windows XP Embedded				Yes		
Windows Embedded Standard 2009	No	Yes	Yes	Yes	Yes	Yes
Windows CE 6.0	Yes	Yes	Yes	Yes	Yes	Yes <sup>4)</sup>
Windows CE 5.0				No		
Software						
PVI Transfer	≥ V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011)	≥ V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011)	≥ V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011)	≥ V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011)	≥ V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011)	≥ V3.6.8.40 (part of PVI Development Setup ≥ V3.0.0.3020)
B&R Embedded OS Installer	≥ V3.10	≥ V3.10	≥ V3.10	≥ V3.10	≥ V3.10	≥ V3.20
Environmental conditions						
Temperature						
Operation	0 to 70°C					
Storage	-65 to 150°C					
Transport	-65 to 150°C					
Relative humidity						
Operation	Max. 85% at 85°C					
Storage	Max. 85% at 85°C					
Transport	Max. 85% at 85°C					
Vibration						
Operation	20 g peak, 20 to 2000 Hz, 4 in each direction (JEDEC JESD22, method B103) 5.35 g RMS, 15 min per level (IEC 68-2-6)					
Storage	20 g peak, 20 to 2000 Hz, 4 in each direction (JEDEC JESD22, method B103) 5.35 g RMS, 15 min per level (IEC 68-2-6)					
Transport	20 g peak, 20 to 2000 Hz, 4 in each direction (JEDEC JESD22, method B103) 5.35 g RMS, 15 min per level (IEC 68-2-6)					
Shock						
Operation	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)					
Storage	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)					
Transport	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)					
Altitude						
Operation	Max. 4,572 m					
Mechanical characteristics						
Dimensions						
Width	42.8 ±0.10 mm					
Length	36.4 ±0.15 mm					
Height	3.3 ±0.10 mm					
Weight	10 g					

Table 204: 5CFCRD.0512-04, 5CFCRD.1024-04, 5CFCRD.2048-04, 5CFCRD.4096-04, 5CFCRD.8192-04, 5CFCRD.016G-04 - Technical data

- 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.
- Endurance of B&R CFs (with linear written block size ≥ 128 Kb)
- Depending on the average file size.
- Not supported by B&R Embedded OS installer.

4.4.4 Temperature humidity diagram

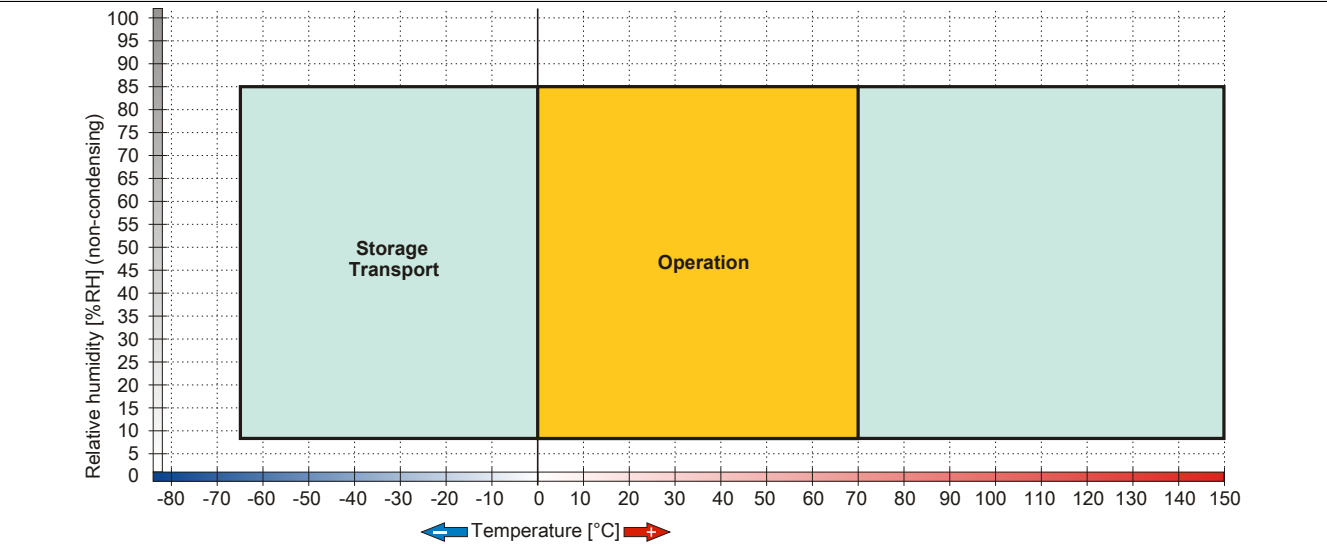


Figure 83: 5CFCRD.xxxx-04 - Temperature humidity diagram for CompactFlash cards

4.4.5 Dimensions

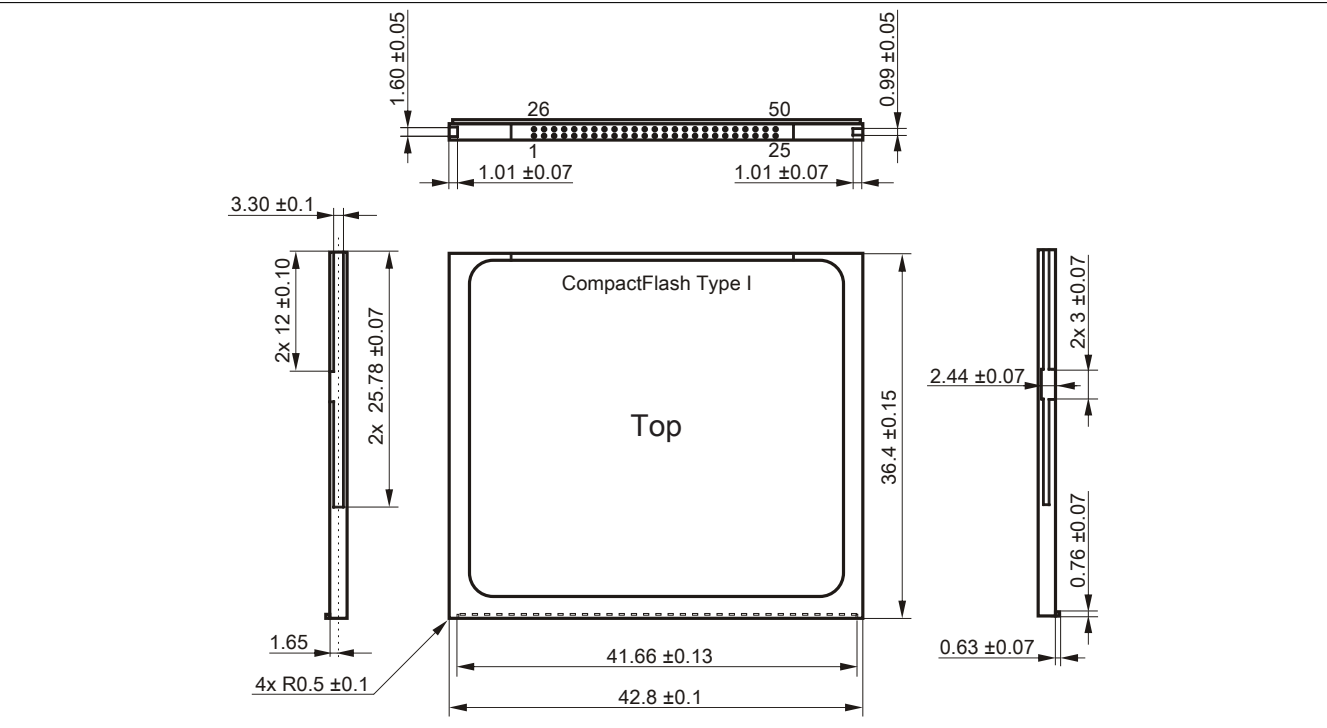


Figure 84: Dimensions - CompactFlash card Type I

#### 4.4.6 Benchmark

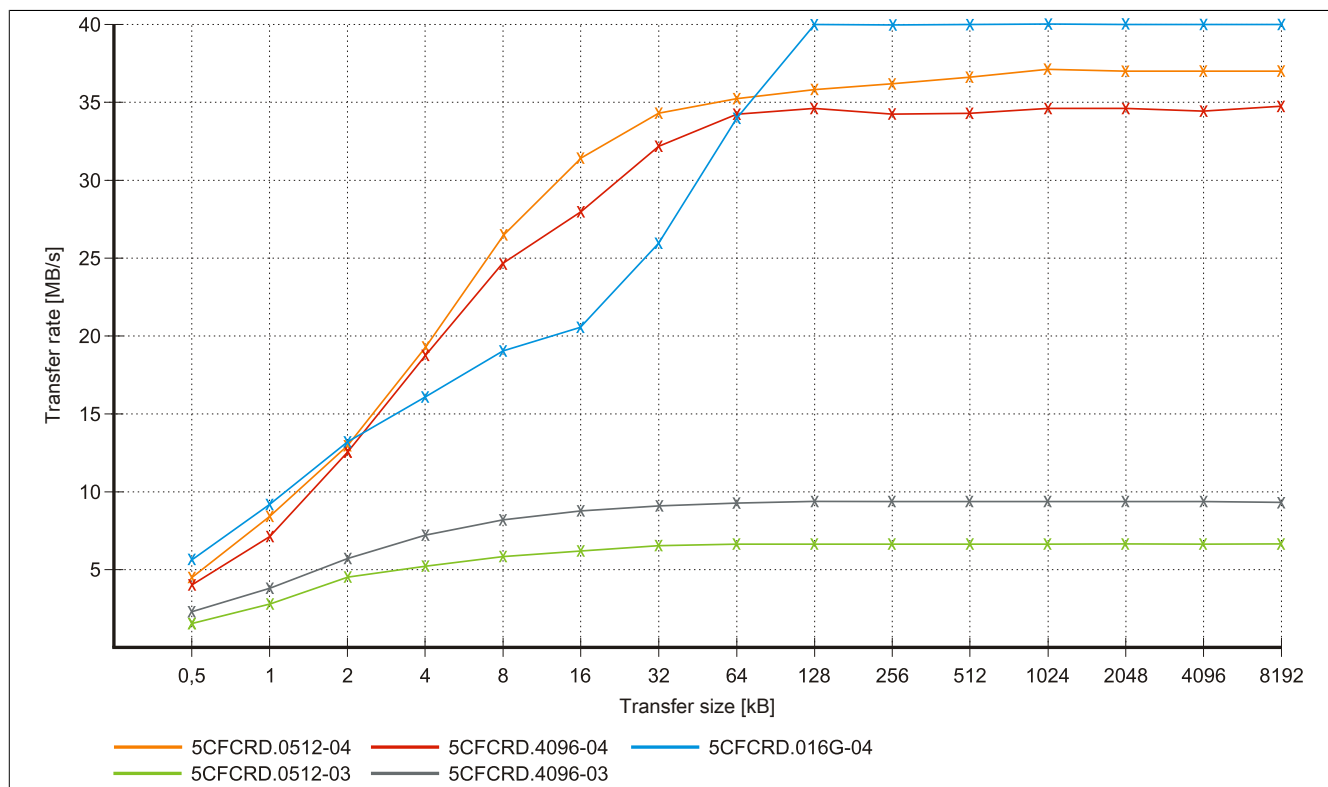


Figure 85: ATTO Disk Benchmark v2.34 comparison when reading - 5CFCRD.xxxx-03 with 5CFCRD.xxxx-04

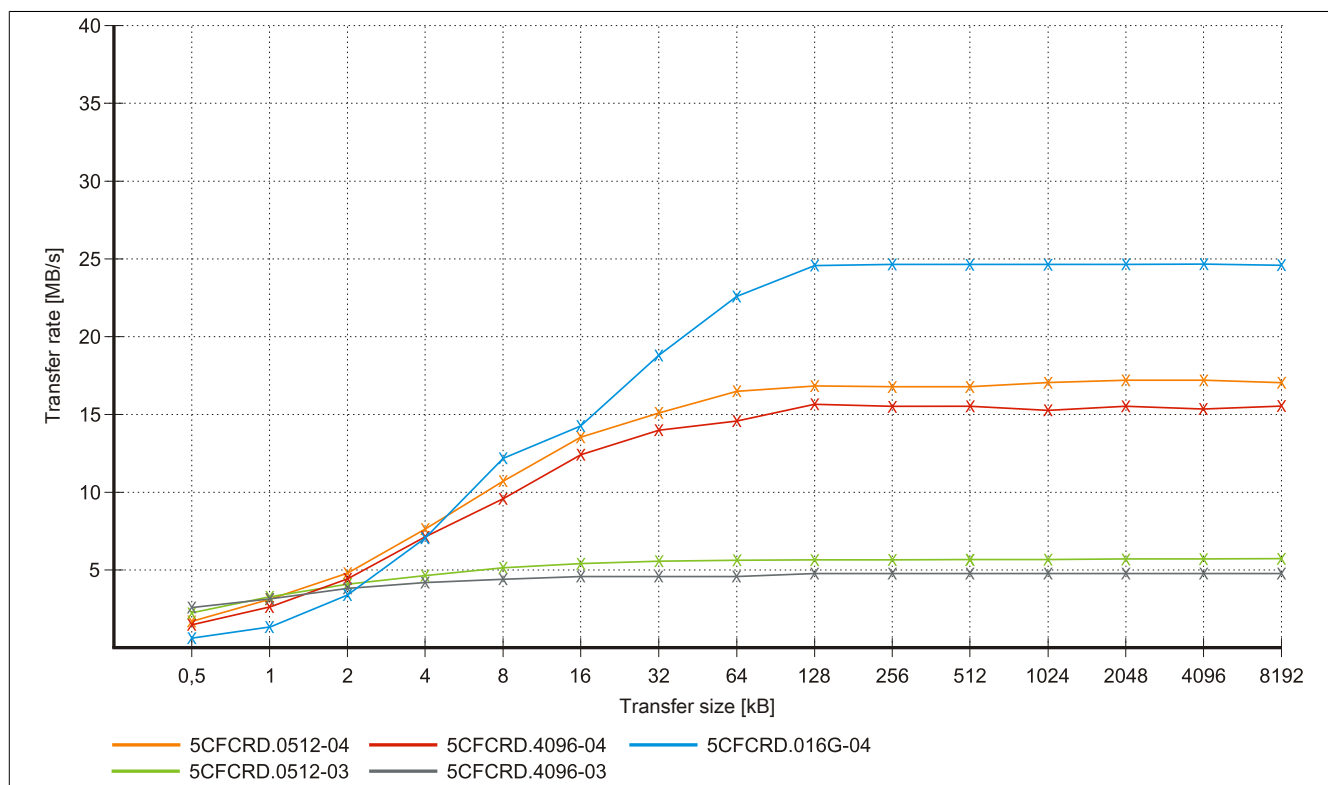


Figure 86: ATTO Disk Benchmark v2.34 comparison when writing - 5CFCRD.xxxx-03 with 5CFCRD.xxxx-04

## 4.5 5CFCRD.xxxx-03

### 4.5.1 General information

#### Information:

Western Digital CompactFlash cards 5CFCRD.xxxx-03 and CompactFlash cards from a different manufacturer cannot be used in the same system at the same time. Due to differences in technology (older vs. newer technologies), problems can occur during system startup that are caused by the different boot times.

see "Known problems / issues" on page 195

#### Information:

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

#### Information:

On CompactFlash cards 5CFCRD.xxxx-03, only the sticker and the description have changed. The technical data has not been changed.

### 4.5.2 Order data


Model number	Short description	Figure
	<b>CompactFlash</b>	
5CFCRD.0064-03	CompactFlash 64 MB Western Digital (SLC)	
5CFCRD.0128-03	CompactFlash 128 MB Western Digital (SLC)	
5CFCRD.0256-03	CompactFlash 256 MB Western Digital (SLC)	
5CFCRD.0512-03	CompactFlash 512 MB Western Digital (SLC)	
5CFCRD.1024-03	CompactFlash 1 GB Western Digital (SLC)	
5CFCRD.2048-03	CompactFlash 2 GB Western Digital (SLC)	
5CFCRD.4096-03	CompactFlash 4 GB Western Digital (SLC)	
5CFCRD.8192-03	CompactFlash 8 GB Western Digital (SLC)	

Table 205: 5CFCRD.0064-03, 5CFCRD.0128-03, 5CFCRD.0256-03, 5CFCRD.0512-03, 5CFCRD.1024-03, 5CFCRD.2048-03, 5CFCRD.4096-03, 5CFCRD.8192-03 - Order data

### 4.5.3 Technical data

#### Caution!

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

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

#### Information:

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

Product ID	5CFCRD. 0064-03	5CFCRD. 0128-03	5CFCRD. 0256-03	5CFCRD. 0512-03	5CFCRD. 1024-03	5CFCRD. 2048-03	5CFCRD. 4096-03	5CFCRD. 8192-03
<b>General information</b>								
Capacity	64 MB	128 MB	256 MB	512 MB	1 GB	2 GB	4 GB	8 GB
Data retention	10 years							
Data reliability	< 1 unrecoverable errors in 10 <sup>14</sup> bit read accesses							
Lifetime monitoring	Yes							
MTBF	> 4,000,000 hours (at 25°C)							

Table 206: 5CFCRD.0064-03, 5CFCRD.0128-03, 5CFCRD.0256-03, 5CFCRD.0512-03, 5CFCRD.1024-03, 5CFCRD.2048-03, 5CFCRD.4096-03, 5CFCRD.8192-03 - Technical data

Product ID	5CFCRD. 0064-03	5CFCRD. 0128-03	5CFCRD. 0256-03	5CFCRD. 0512-03	5CFCRD. 1024-03	5CFCRD. 2048-03	5CFCRD. 4096-03	5CFCRD. 8192-03
Maintenance	None							
Supported operating modes	PIO Mode 0-4, Multiword DMA Mode 0-2							
Continuous reading	8 MB/s							
Typical								
Continuous writing	6 MB/s							
Typical								
Certification CE	Yes							
Endurance								
Clear/write cycles	> 2000000							
Typical								
SLC Flash	Yes							
Wear leveling	Static							
Error Correction Coding (ECC)	Yes							
S.M.A.R.T. support	No							
Support								
Hardware	MP100/200, PP100/200, PP300/400, PP500, PPC300, PPC700, PPC725, PPC800, Provit 2000, Provit 5000, APC620, APC680, APC810, APC820							
Operating systems	No No No No							
Windows 7 32-bit								
Windows 7 64-bit	No	No	No	No	No	No	No	Yes
Windows Embedded Standard 7, 32-bit	No							
Windows Embedded Standard 7, 64-bit								
Windows XP Professional	No	No	No	No	No	No	Yes	Yes
Windows XP Embedded	No	No	No	Yes	Yes	Yes	Yes	Yes
Windows Embedded Standard 2009	No	No	No	No	Yes	Yes	Yes	Yes
Windows CE 6.0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes <sup>1)</sup>
Windows CE 5.0	Yes	Yes	Yes	Yes	Yes	No	No	No
Software	≥ V2.57 (part of PVI Development Setup ≥ V2.5.3.3005) ≥ V2.21							
PVI Transfer								
B&R Embedded OS Installer								
Environmental conditions								
Temperature	0 to 70°C -50 to 100°C -50 to 100°C							
Operation								
Storage								
Transport								
Relative humidity	8 to 95%, non-condensing 8 to 95%, non-condensing 8 to 95%, non-condensing							
Operation								
Storage								
Transport								
Vibration	Max. 16.3 g (159 m/s² 0-peak) Max. 30 g (294 m/s² 0-peak) Max. 30 g (294 m/s² 0-peak)							
Operation								
Storage								
Transport								
Shock	Max. 1000 g (9810 m/s² 0-peak) Max. 3000 g (29430 m/s² 0-peak) Max. 3000 g (29430 m/s² 0-peak)							
Operation								
Storage								
Transport								
Altitude	Max. 24,383 m							
Operation								
Mechanical characteristics								
Dimensions	42.8 ±0.10 mm 36.4 ±0.15 mm 3.3 ±0.10 mm							
Width								
Length								
Height								
Weight	11.4 g							

Table 206: 5CFCRD.0064-03, 5CFCRD.0128-03, 5CFCRD.0256-03, 5CFCRD.0512-03, 5CFCRD.1024-03, 5CFCRD.2048-03, 5CFCRD.4096-03, 5CFCRD.8192-03 - Technical data

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

4.5.4 Temperature humidity diagram

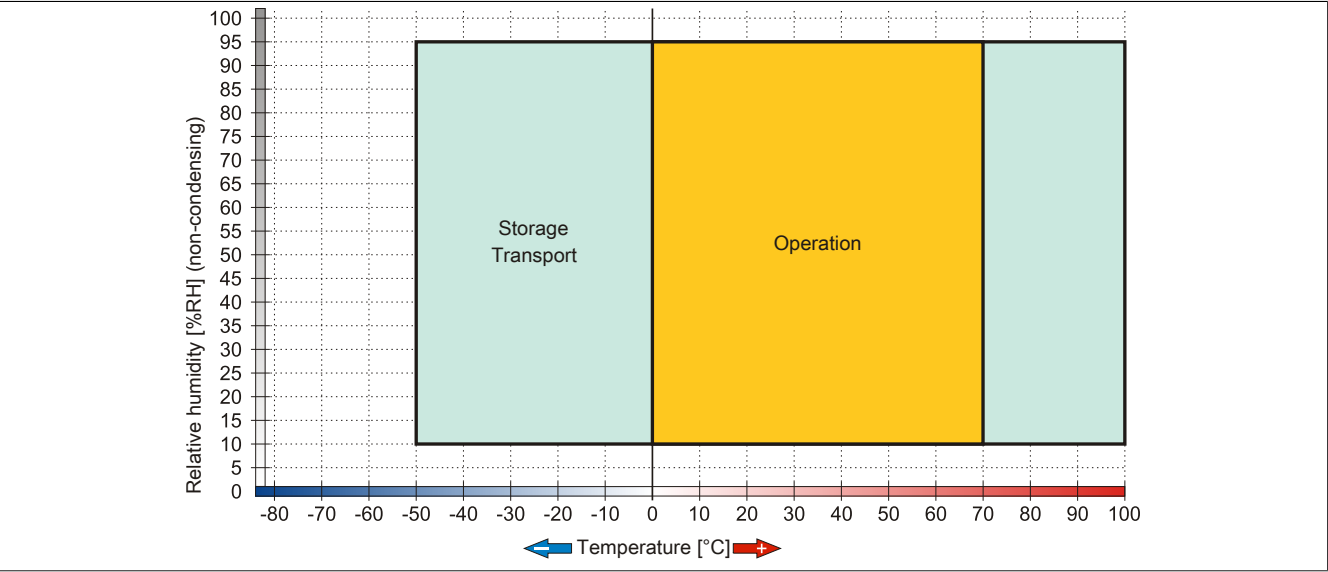


Figure 87: 5CFCRD.xxxx-03 - Temperature humidity diagram for CompactFlash cards

4.5.5 Dimensions

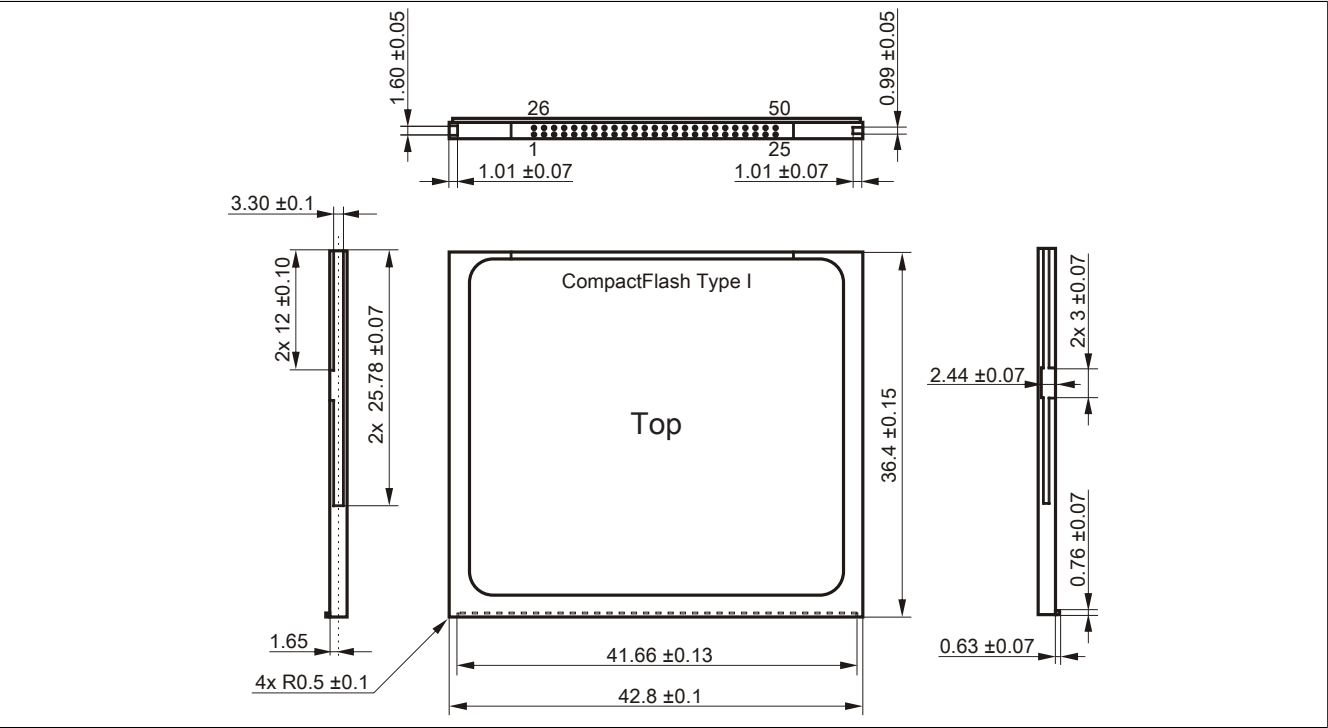


Figure 88: Dimensions - CompactFlash card Type I

## 4.6 Known problems / issues

The following is a known issue for devices with two CompactFlash slots:

- Using two different types of CompactFlash cards can cause problems in Automation PCs and Panel PCs. This can result in one of the two cards not being detected during system startup. This is caused by varying startup speeds. CompactFlash cards with older technology require significantly more time during system startup than CompactFlash cards with newer technology. This behavior occurs near the limits of the time frame provided for startup. This can occur because the startup time for the CompactFlash cards fluctuates due to the variance of the components being used. Depending on the CompactFlash cards being used, this error may occur never, sometimes or always.

## 5 USB flash drive

### 5.1 5MMUSB.2048-00

#### 5.1.1 General information

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

#### Information:

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

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

#### 5.1.2 Order data

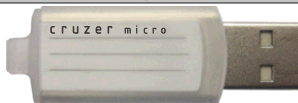
Model number	Short description	Figure
	<b>USB accessories</b>	
5MMUSB.2048-00	USB 2.0 Memory Stick 2048 MB	

Table 207: 5MMUSB.2048-00 - Order data

#### 5.1.3 Technical data

#### Information:

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

Product ID	5MMUSB.2048-00
<b>General information</b>	
Data retention	10 years
LEDs	1 LED (green), signals data transfer (send and receive) <sup>1)</sup>
MTBF	100,000 hours (at 25°C)
Type	USB 1.1, USB 2.0
Maintenance	None
Certification CE	Yes
<b>Interfaces</b>	
USB	
Type	USB 1.1, USB 2.0
Connection	To each USB type A interface
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s)
Sequential reading	Max. 8.7 MB/s
Sequential writing	Max. 1.7 MB/s
<b>Support</b>	
Operating systems	
Windows XP Professional	Yes
Windows XP Embedded	Yes
Windows ME	Yes
Windows 2000	Yes
Windows CE 5.0	Yes
Windows CE 4.2	Yes
<b>Electrical characteristics</b>	
Power consumption	650 µA sleep mode, 150 mA read/write

Table 208: 5MMUSB.2048-00 - Technical data



Product ID	5MMUSB.2048-00
Environmental conditions	
Temperature	
Operation	0 to 45°C
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	10 to 90%, non-condensing
Storage	5 to 90%, non-condensing
Transport	5 to 90%, non-condensing
Vibration	
Operation	10 to 500 Hz: 2 g (19.6 m/s <sup>2</sup> 0-peak), oscillation rate 1/minute
Storage	10 to 500 Hz: 2 g (19.6 m/s <sup>2</sup> 0-peak), oscillation rate 1/minute
Transport	10 to 500 Hz: 2 g (19.6 m/s <sup>2</sup> 0-peak), oscillation rate 1/minute
Shock	
Operation	Max. 40 g (392 m/s <sup>2</sup> 0-peak) and 11 ms length
Storage	Max. 80 g (784 m/s <sup>2</sup> 0-peak) and 11 ms length
Transport	Max. 80 g (784 m/s <sup>2</sup> 0-peak) and 11 ms length
Altitude	
Operation	Max. 3048 m
Storage	Max. 12192 m
Transport	Max. 12192 m
Mechanical characteristics	
Dimensions	
Width	19 mm
Length	52.2 mm
Height	7.9 mm

Table 208: 5MMUSB.2048-00 - Technical data

- 1) Signals data transfer (send and receive).

### 5.1.4 Temperature humidity diagram

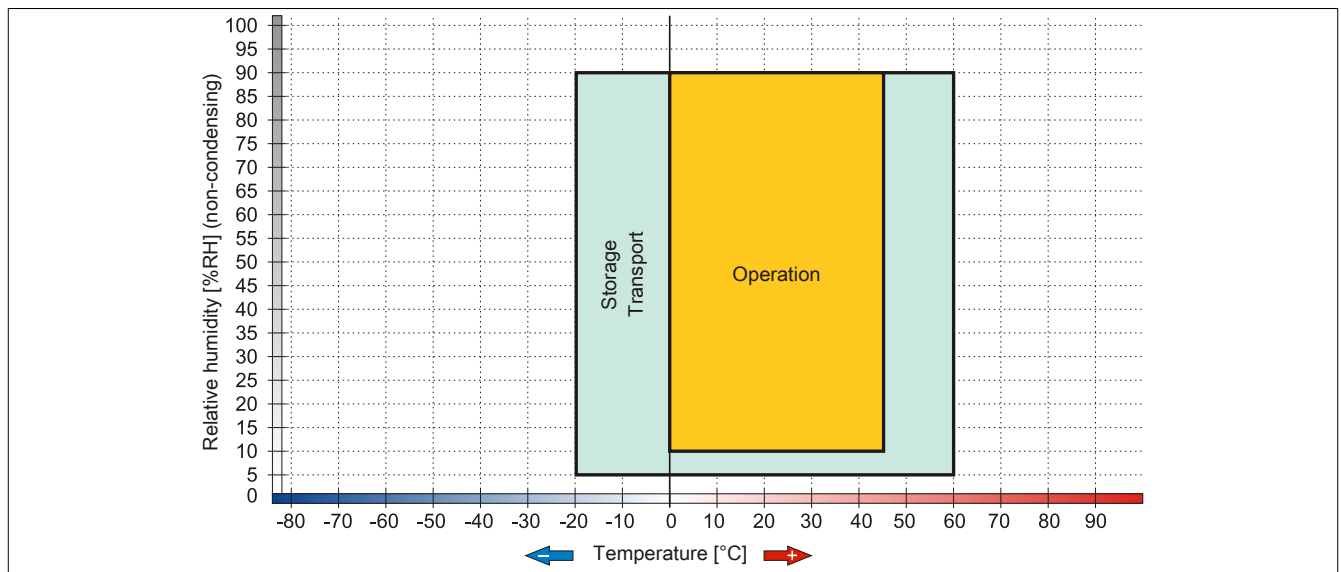


Figure 89: 5MMUSB.2048-00 - Temperature humidity diagram

## 5.2 5MMUSB.2048-01

### 5.2.1 General information

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

#### Information:

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

- The flash drive must be reformatted or in some cases even re-partitioned (set active partition).
  - The flash drive must be at the top of the BIOS boot order, or alternatively the IDE controllers can also be deactivated in the BIOS. This can be avoided in most cases if a "fdisk /mbr" command is also executed on the USB flash drive.
- USB 1.1, USB 2.0
  - High transfer rate
  - High data storage
  - Ambient temperature during operation: 0 to 70°C

### 5.2.2 Order data


Model number	Short description	Figure
	<b>USB accessories</b>	
5MMUSB.2048-01	USB 2.0 flash drive 2048 MB B&R	

Table 209: 5MMUSB.2048-01 - Order data

### 5.2.3 Technical data

Product ID	5MMUSB.2048-01
<b>General information</b>	
Data retention	> 10 years
LEDs	1 LED (green), signals data transfer (send and receive) <sup>1)</sup>
MTBF	> 3,000,000 hours
Type	USB 1.1, USB 2.0
Maintenance	None
Certification	
CE	Yes
<b>Interfaces</b>	
USB	
Type	USB 1.1, USB 2.0
Connection	To each USB type A interface
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s)
Sequential reading	Max. 31 MB/s
Sequential writing	Max. 30 MB/s
<b>Support</b>	
Operating systems	
Windows 7	Yes
Windows XP Professional	Yes
Windows XP Embedded	Yes
Windows ME	Yes
Windows 2000	Yes
Windows CE 5.0	Yes
Windows CE 4.2	Yes
<b>Electrical characteristics</b>	
Power consumption	Max. 500 µA sleep mode, max. 120 mA read/write
<b>Environmental conditions</b>	
Temperature	
Operation	0 to 70°C
Storage	-50 to 100°C
Transport	-50 to 100°C

Table 210: 5MMUSB.2048-01 - Technical data

Product ID	5MMUSB.2048-01
Relative humidity	
Operation	85%, non-condensing
Storage	85%, non-condensing
Transport	85%, non-condensing
Vibration	
Operation	20 to 2000 Hz: 20 g (peak)
Storage	20 to 2000 Hz: 20 g (peak)
Transport	20 to 2000 Hz: 20 g (peak)
Shock	
Operation	Max. 1500 g (peak)
Storage	Max. 1500 g (peak)
Transport	Max. 1500 g (peak)
Altitude	
Operation	Max. 3048 m
Storage	Max. 12192 m
Transport	Max. 12192 m
Mechanical characteristics	
Dimensions	
Width	17.97 mm
Length	67.85 mm
Height	8.35 mm

Table 210: 5MMUSB.2048-01 - Technical data

- 1) Signals data transfer (send and receive).

## 5.2.4 Temperature humidity diagram

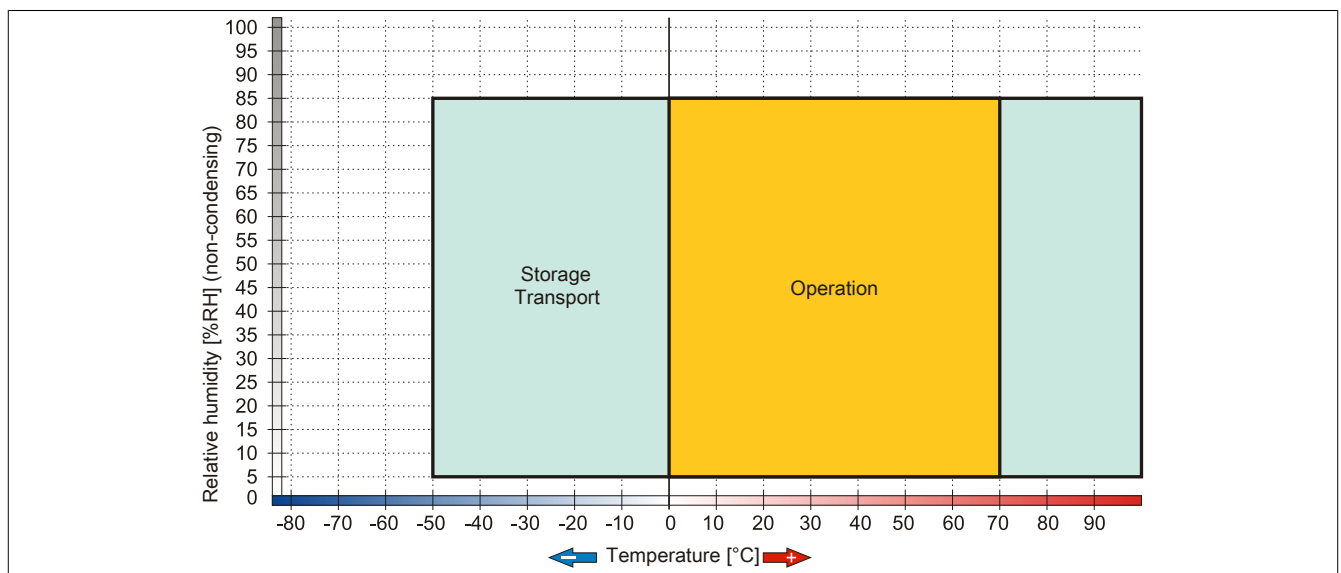


Figure 90: 5MMUSB.2048-01 - Temperature humidity diagram

## 6 Cables

### 6.1 DVI cables

#### 6.1.1 5CADVI.0xxx-00

##### General information

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

### Caution!

Cable can only be plugged in and unplugged when the device is turned off.

##### Order data


Model number	Short description	Figure
	<b>DVI cable</b>	
5CADVI.0018-00	DVI-D cable, 1.8 m.	
5CADVI.0050-00	DVI-D cable, 5 m.	
5CADVI.0100-00	DVI-D cable, 10 m.	

Table 211: 5CADVI.0018-00, 5CADVI.0050-00, 5CADVI.0100-00 - Order data

##### Technical data

Product ID	5CADVI.0018-00		5CADVI.0050-00	5CADVI.0100-00
General information				
Certification	Yes			
CE				
c-UL-us				
Cable structure				
Wire cross section	AWG 28			
Shield	Individual cable pairs and entire cable			
Cable shielding	Tinned CU mesh, optical coverage >86%			Tinned Cu mesh, optical coverage >86%
Outer sheathing	PVC Beige AWM STYLE 20276 80°C 30V VW1 DVI DIGITAL SINGLE LINK DER AN			
Material				
Color				
Labeling				
Connector				
Type	2x DVI-D (18+1), male			
Connection cycles	100			
Electrical characteristics				
Conductor resistance	Max. 237 Ω/km			
Insulation resistance	Min. 100 MΩ/km			
Mechanical characteristics				
Dimensions				
Length	1.8 m ±50 mm	5 m ± 80 mm	10 m ±100 mm	
Diameter	Max. 8.5 mm			
Flex radius	≥ 5x cable diameter (plug - ferrite magnet and ferrite magnet - ferrite magnet)			
Weight	Approx. 260 g	Approx. 460 g	Approx. 790 g	

Table 212: 5CADVI.0018-00, 5CADVI.0050-00, 5CADVI.0100-00 - Technical data

## Flex radius specification

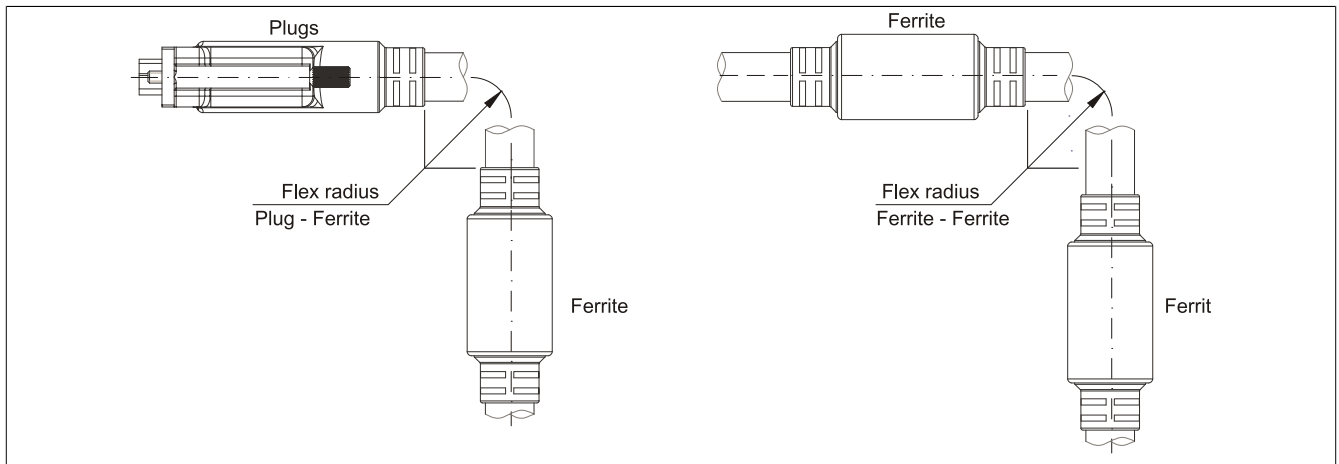


Figure 91: Flex radius specification

## Dimensions

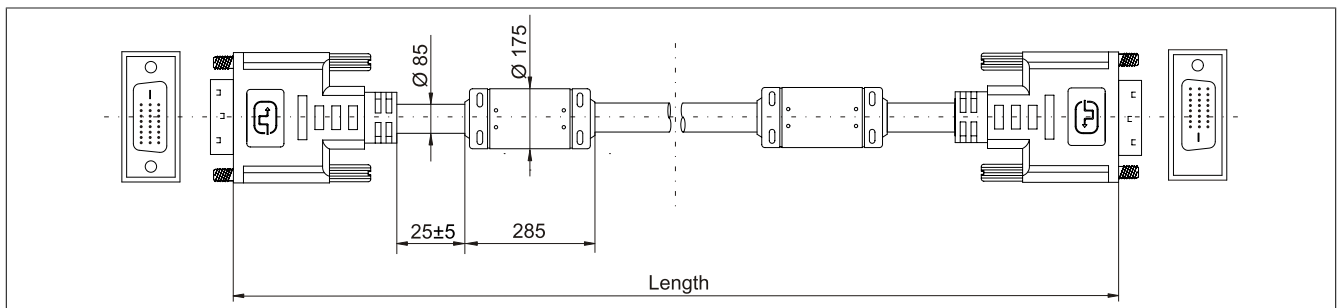


Figure 92: 5CADVI.0xxx-00 - Dimensions

## Cable specifications

**Warning!**

If you want to build a suitable cable yourself, it should be wired according to these specifications.

If a self-built cable is used, B&R cannot guarantee that it will function properly. B&R guarantees the performance of all cables that they provide.

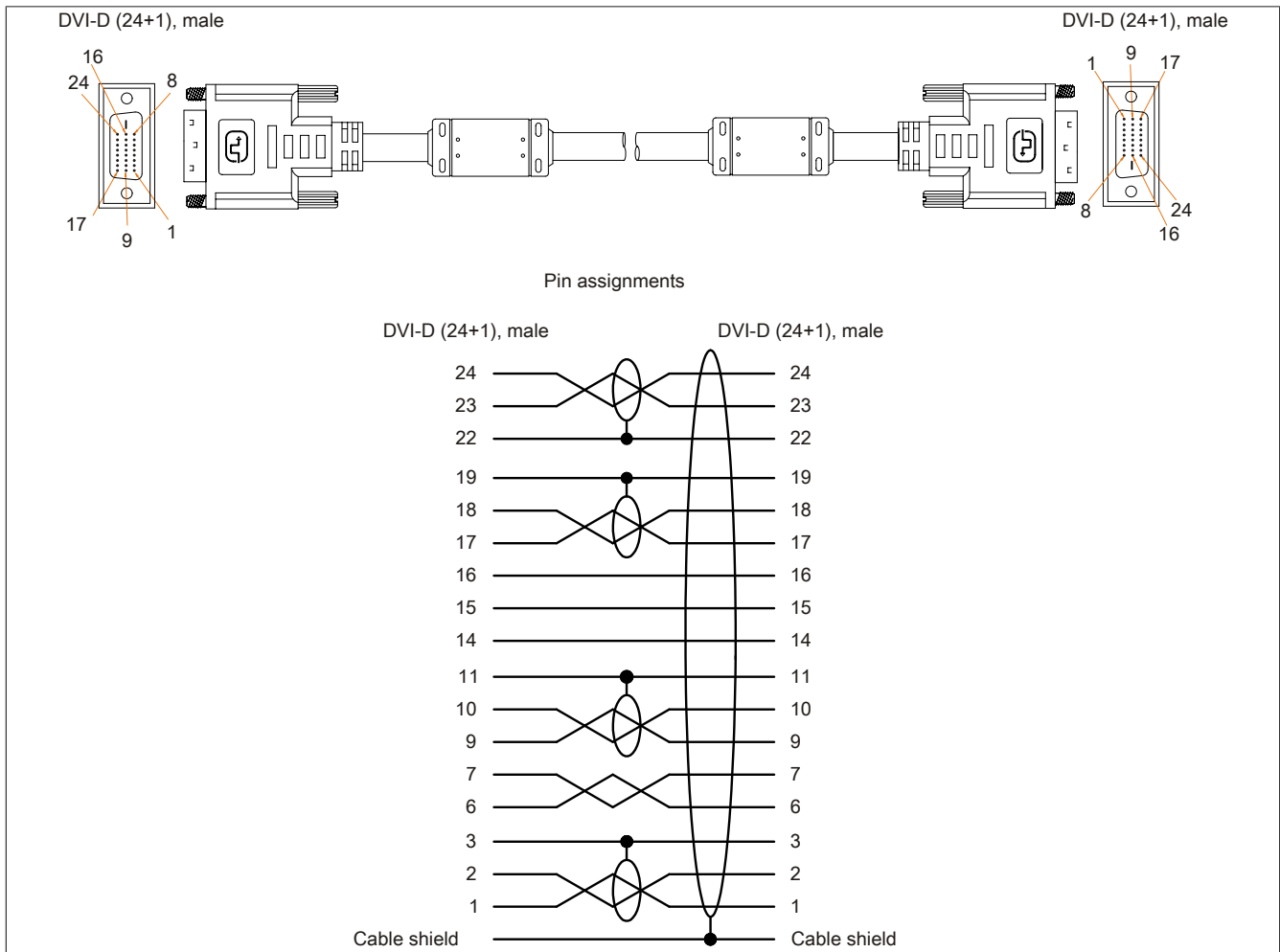


Figure 93: 5CADVI.0xxx-00 - Pinout

## 6.2 SDL cables

### 6.2.1 5CASDL.0xxx-00

#### General information

The SDL cables 5CASDL.0xxx-00 are designed for fixed layout. Use of the SDL flex cable 5CASDL.0xxx-03 is required for a flexible installation (e.g. in swing arm systems).

### Caution!

Cable can only be plugged in and unplugged when the device is turned off.

#### Order data


Model number	Short description	Figure
	<b>SDL cables</b>	
5CASDL.0018-00	SDL cable, 1.8 m.	
5CASDL.0050-00	SDL cable, 5 m.	
5CASDL.0100-00	SDL cable, 10 m.	
5CASDL.0150-00	SDL cable, 15 m.	
5CASDL.0200-00	SDL cable, 20 m.	
5CASDL.0250-00	SDL cable, 25 m.	
5CASDL.0300-00	SDL cable, 30 m.	

Table 213: 5CASDL.0018-00, 5CASDL.0050-00, 5CASDL.0100-00, 5CASDL.0150-00, 5CASDL.0200-00, 5CASDL.0250-00, 5CASDL.0300-00 - Order data

#### Technical data

Product ID	5CASDL. 0018-00	5CASDL. 0050-00	5CASDL. 0100-00	5CASDL. 0150-00	5CASDL. 0200-00	5CASDL. 0250-00	5CASDL. 0300-00
General information							
Certification							
CE	Yes		Yes		Yes		
c-UL-us	Yes		Yes		Yes		
Cable structure							
Wire cross section	AWG 28		AWG 24				
Shield	Individual cable pairs and entire cable						
Cable shielding	Tinned Cu mesh, optical coverage >85%		Tinned Cu mesh, optical coverage > 85%	Tinned Cu mesh, optical coverage >85%			
Outer sheathing							
Material	PVC						
Color	Black						
Labeling	E74020-C (UL) AWM STYLE 20176 80°C 30V VW-1 DVI DIGITAL LINK						
Connector							
Type	2x DVI-D (24+1), male						
Connection cycles	100						
Contacts	Gold plated						
Mechanical protection	Metal cover with crimped stress relief						
Electrical characteristics							
Conductor resistance							
AWG 24	-		≤93 Ω/km				
AWG 28	≤237 Ω/km		-				
Insulation resistance	Min. 10 MΩ/km						
Mechanical characteristics							
Dimensions							
Length	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
Diameter	Typ. 8.6 ± 0.2 mm Max. 9 mm		Typ. 11 ±0.2 mm Max. 11.5 mm	Typ. 11 ± 0.2 mm Max. 11.5 mm			
Flex radius	≥ 5x cable diameter (plug - ferrite magnet and ferrite magnet - ferrite magnet)						
Flexibility	Limited flexibility; valid for ferrite magnet - ferrite magnet (tested 100 cycles with 5x cable diameter, 20 cycles / minute)						
Weight	Approx. 300 g	Approx. 580 g	Approx. 1500 g	Approx. 2250 g	Approx. 2880 g	Approx. 4800 g	Approx. 5520 g

Table 214: 5CASDL.0018-00, 5CASDL.0050-00, 5CASDL.0100-00, 5CASDL.0150-00, 5CASDL.0200-00, 5CASDL.0250-00, 5CASDL.0300-00 - Technical data

## Flex radius specification

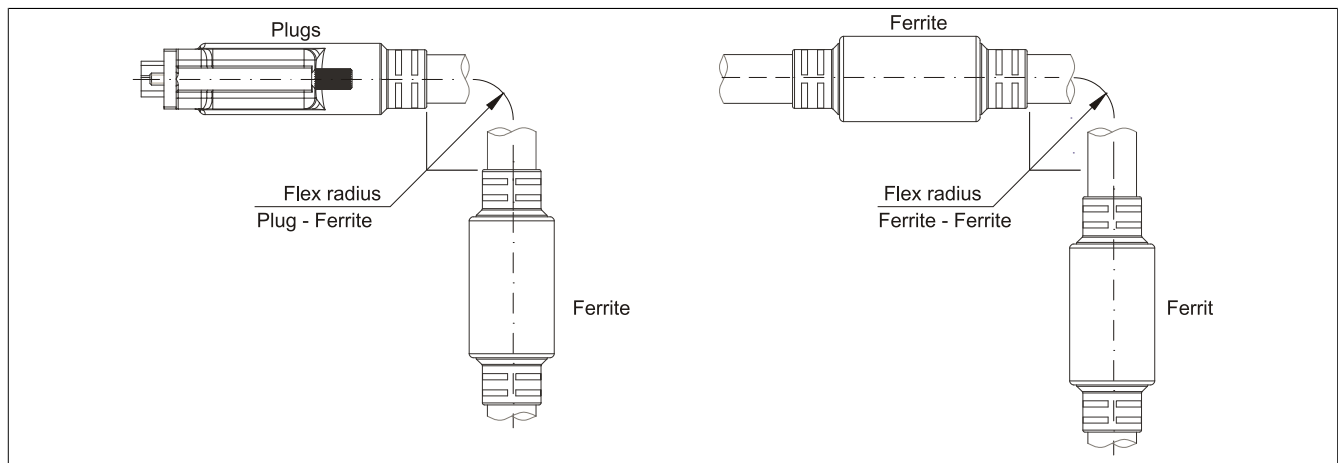


Figure 94: Flex radius specification

## Dimensions

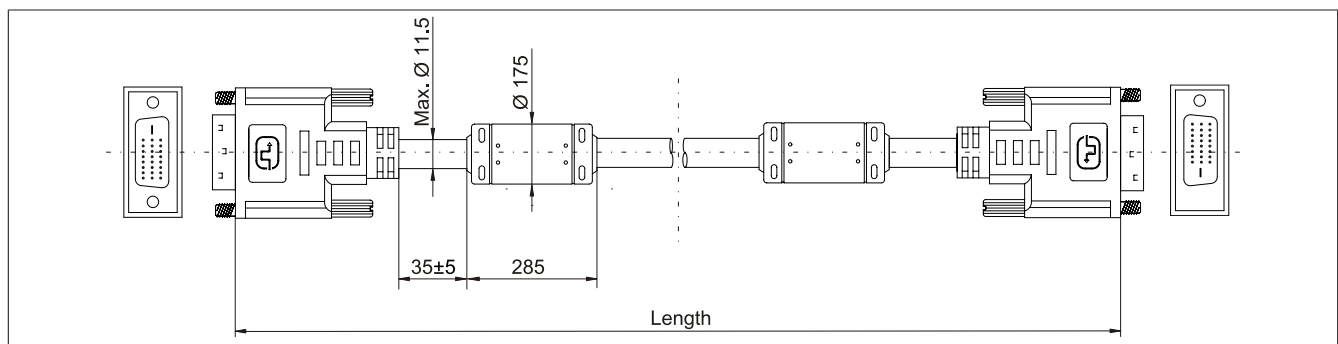


Figure 95: 5CASDL.0xxx-00- Dimensions



## Cable specifications

**Warning!**

If you want to build a suitable cable yourself, it should be wired according to these specifications.

If a self-built cable is used, B&R cannot guarantee that it will function properly. B&R guarantees the performance of all cables that they provide.

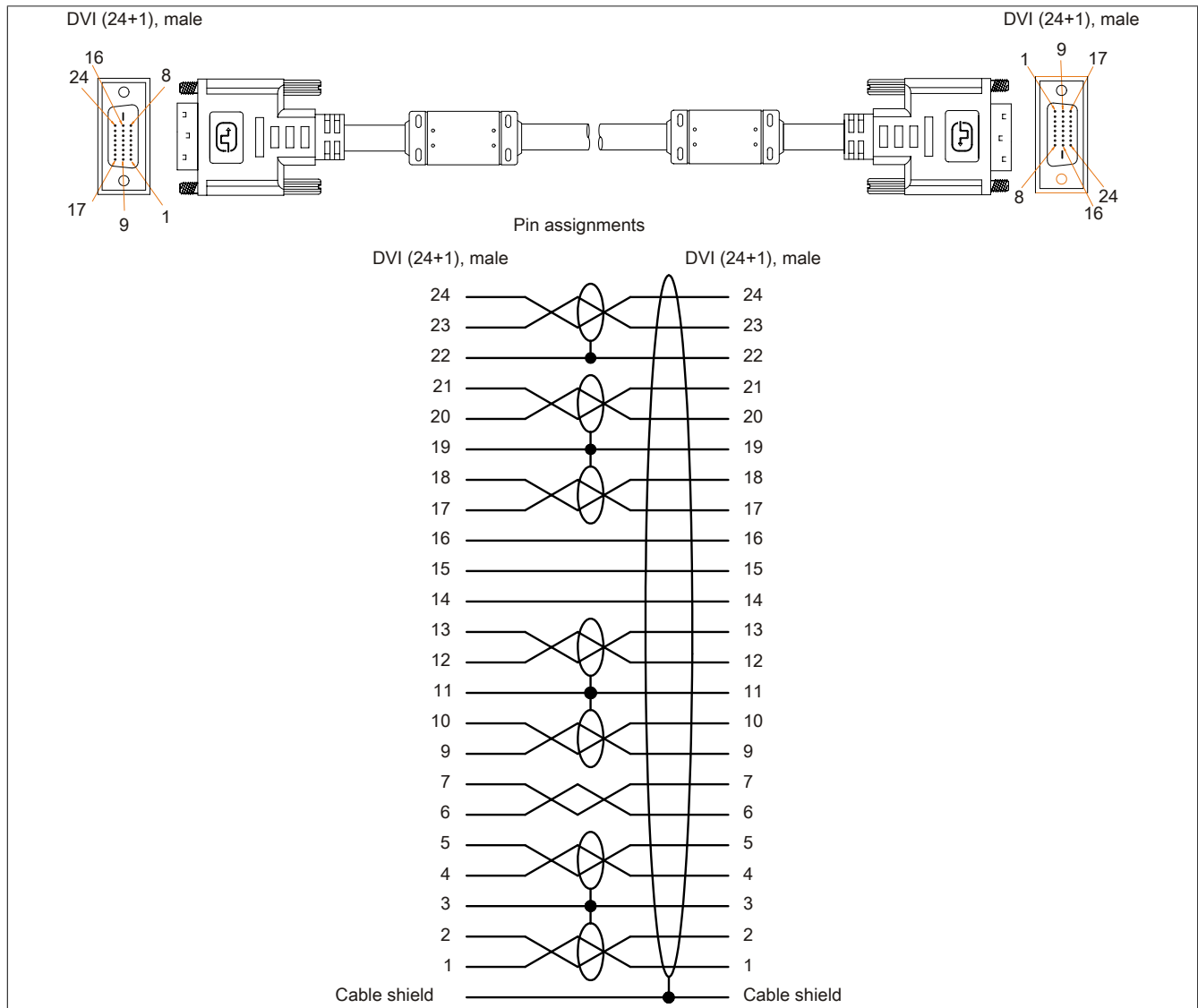


Figure 96: 5CASDL.0xxx-00- Pinout

## 6.3 SDL flex cables

### 6.3.1 5CASDL.0xxx-03

#### General information

The 5CASDL.0xxx-03 SDL flex cables are designed for use in both fixed and flexible installations (e.g. in swing arm systems).

### Caution!

Cable can only be plugged in and unplugged when the device is turned off.

#### Order data


Model number	Short description	Figure
	<b>SDL flex cable</b>	
5CASDL.0018-03	SDL Cable flex, 1.8 m.	
5CASDL.0050-03	SDL cable flex, 5 m.	
5CASDL.0100-03	SDL cable flex, 10 m.	
5CASDL.0150-03	SDL cable flex, 15 m.	
5CASDL.0200-03	SDL cable flex, 20 m.	
5CASDL.0250-03	SDL cable flex, 25 m.	
5CASDL.0300-03	SDL cable flex, 30 m.	

Table 215: 5CASDL.0018-03, 5CASDL.0050-03, 5CASDL.0100-03, 5CASDL.0150-03, 5CASDL.0200-03, 5CASDL.0250-03, 5CASDL.0300-03 - Order data

#### Technical data

Product ID	5CASDL. 0018-03	5CASDL. 0050-03	5CASDL. 0100-03	5CASDL. 0150-03	5CASDL. 0200-03	5CASDL. 0250-03	5CASDL. 0300-03
General information							
Certification							
CE	Yes						Yes
c-UL-us	Yes						Yes
Cable structure							
Wire cross section	26 AWG (control wires) 26 AWG (DVI, USB, data)					AWG 24 (control wires) AWG 26 (DVI, USB, data)	
Features	Free of halogen and silicon						
Shield	Individual cable pairs and entire cable						
Cable shielding	Aluminum foil clad + tinned copper mesh						
Outer sheathing							
Material	Special TMPU - semi gloss						
Color	Black						
Labeling	(B&R) SDL cable (UL) AWM 20236 80°C 30V E 63216					(B&R) SDL Cable (UL) AWM 20236 80°C 30V E 63216	
Connector							
Type	2x DVI-D (24+1), male						
Connection cycles	Min. 200						
Contacts	Gold plated						
Mechanical protection	Metal cover with crimped stress relief						
Electrical characteristics							
Operating voltage	≤30 V					≤ 30 V	
Test voltage							
Wire/wire	1 kV						
Wire/shield	0.5 kV						
Wave impedance	100 ±10 Ω						
Conductor resistance							
AWG 24	≤95 Ω/km						
AWG 26	≤145 Ω/km						
Insulation resistance	> 200 MΩ/km						
Operating conditions							
Approbation	UL AWM 20236 80°C 30V					UL AWM 20236 80 °C 30 V	
Flame resistant	In accordance with UL758 (cable vertical flame test)						
Oil and hydrolysis resistance	According to VDE 0282-10						

Table 216: 5CASDL.0018-03, 5CASDL.0050-03, 5CASDL.0100-03, 5CASDL.0150-03, 5CASDL.0200-03, 5CASDL.0250-03, 5CASDL.0300-03 - Technical data

Product ID	5CASDL. 0018-03	5CASDL. 0050-03	5CASDL. 0100-03	5CASDL. 0150-03	5CASDL. 0200-03	5CASDL. 0250-03	5CASDL. 0300-03
Environmental conditions							
Temperature							
Storage							
Moving							
Fixed installation							
Mechanical characteristics							
Dimensions	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 Max. 12 mm						
Length							
Diameter							
Flex radius	≥ 6x cable diameter (from plug - ferrite magnet) ≥ 10x cable diameter (from ferrite magnet - ferrite magnet) ≥ 15x cable diameter (from ferrite magnet - ferrite magnet)						
Fixed installation							
flexible installation							
Flexibility	Flexible; valid for ferrite magnet - ferrite magnet (tested 300,000 cycles with 15x cable diameter, 4800 cycles / hour)						
Drag chain data	300.000 4800 cycles / hour 180 mm;15x cable diameter 460 mm						
Flex cycles							
Speed							
Flex radius							
Hub							
Weight	Approx. 460 g	Approx. 1020 g	Approx. 1940 g	Approx. 2840 g	Approx. 3740 g	Approx. 4560 g	Approx. 5590 g
Tension							
In operation							
During installation							

Table 216: 5CASDL.0018-03, 5CASDL.0050-03, 5CASDL.0100-03, 5CASDL.0150-03, 5CASDL.0200-03, 5CASDL.0250-03, 5CASDL.0300-03 - Technical data

## Flex radius specification

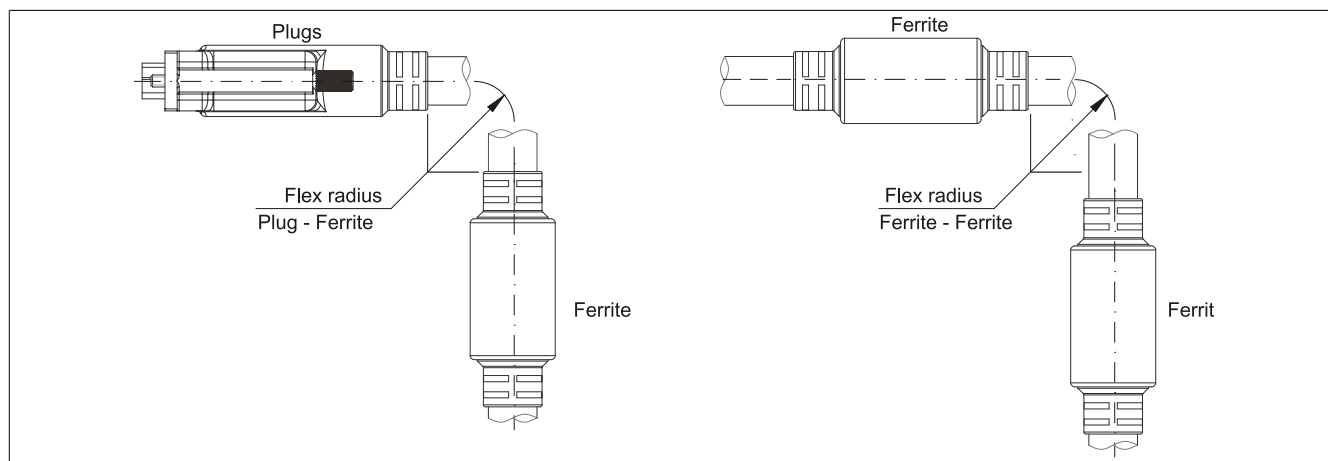


Figure 97: Flex radius specification

## Dimensions

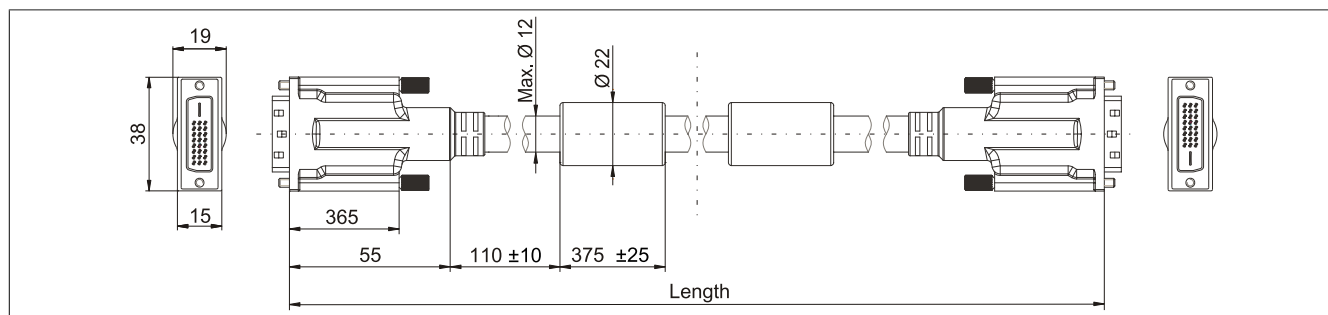


Figure 98: 5CASDL.0xxx-03 - Dimensions

## Layout

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

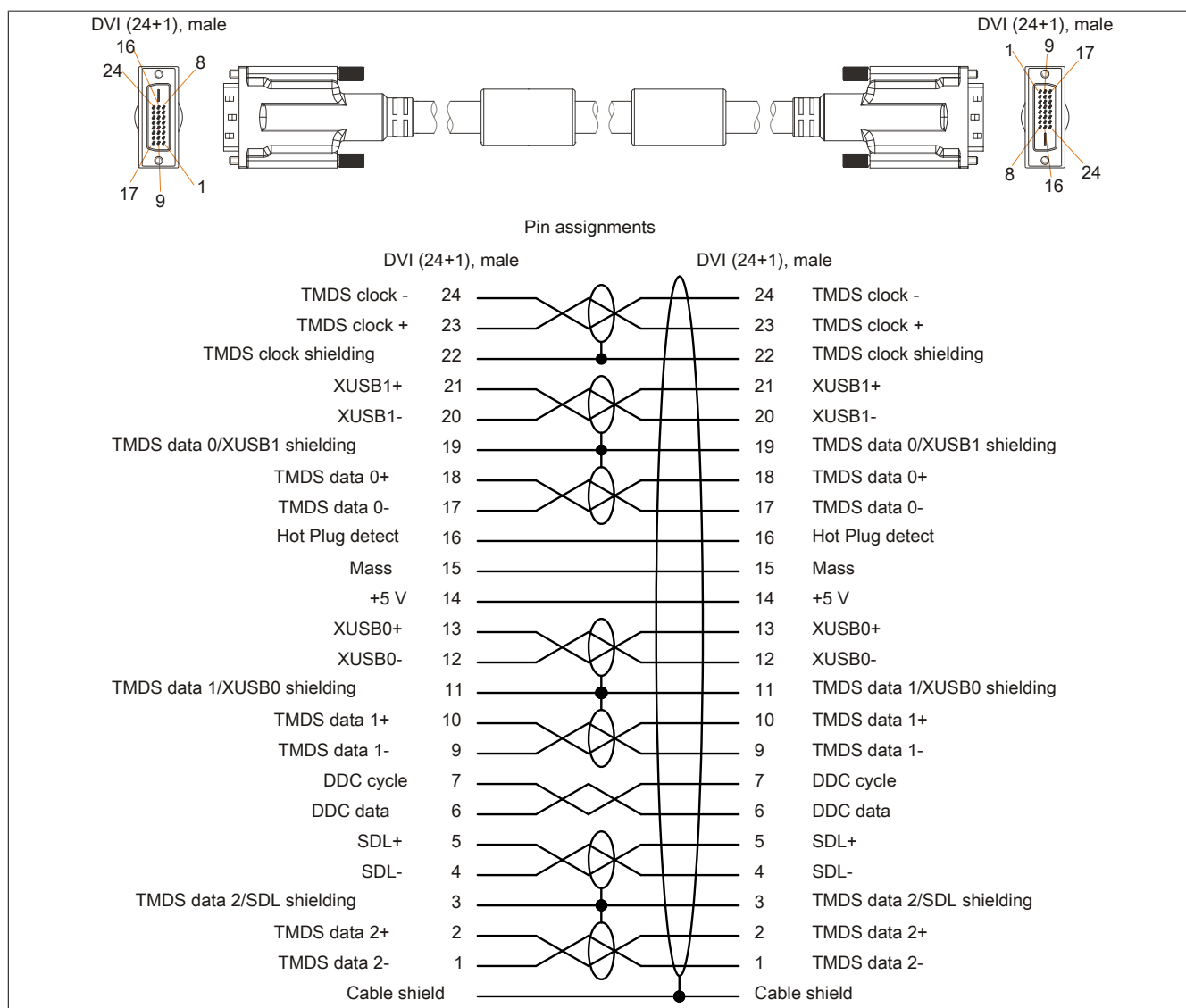
Table 217: Structure - SDL flex cable 5CASDL.0xxx-03

## Cable specifications

**Warning!**

If you want to build a suitable cable yourself, it should be wired according to these specifications.

If a self-built cable is used, B&R cannot guarantee that it will function properly. B&R guarantees the performance of all cables that they provide.



## 6.4 SDL flex cables with extender

### 6.4.1 5CASDL.0xx0-13

#### General information

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

#### Caution!

Cable can only be plugged in and unplugged when the device is turned off.

#### Order data

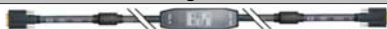
Model number	Short description	Figure
	<b>SDL flex cable</b>	
5CASDL.0300-13	SDL cable flex with extender, 30 m.	
5CASDL.0400-13	SDL cable flex with extender, 40 m.	
5CASDL.0430-13	SDL Cable flex with extender, 43 m.	

Table 218: 5CASDL.0300-13, 5CASDL.0400-13, 5CASDL.0430-13 - Order data

#### Technical data

Product ID	5CASDL.0300-13	5CASDL.0400-13	5CASDL.0430-13
General information			
Certification	Yes		
CE			
c-UL-us	Yes		
Cable structure			
Wire cross section	26 AWG (control wires) 26 AWG (DVI, USB, data)		
Features	Free of halogen and silicon		
Shield	Individual cable pairs and entire cable		
Cable shielding	Aluminum foil clad + tinned copper mesh		
Outer sheathing	Special TMPU - semi gloss Black (B&R) SDL cable (UL) AWM 20236 80°C 30V E63216		
Material			
Color			
Labeling			
Connector			
Type	2x DVI-D (24+1), male		
Connection cycles	Min. 200		
Contacts	Gold plated		
Mechanical protection	Metal cover with crimped stress relief		
Electrical characteristics			
Operating voltage	≤30 V		
Test voltage	1 kV		
Wire/wire			
Wire/shield	0.5 kV		
Wave impedance	100 ±10 Ω		
Conductor resistance	≤95 Ω/km ≤145 Ω/km		
AWG 24			
AWG 26			
Insulation resistance	> 200 MΩ/km		
Operating conditions			
Approbation	UL AWM 20236 80°C 30V		
Flame resistant	In accordance with UL758 (cable vertical flame test)		
Oil and hydrolysis resistance	According to VDE 0282-10		
Environmental conditions			
Temperature	-20 to 60°C -5 to 60°C -20 to 60°C		
Storage			
Moving			
Fixed installation			

Table 219: 5CASDL.0300-13, 5CASDL.0400-13, 5CASDL.0430-13 - Technical data

Product ID	5CASDL.0300-13	5CASDL.0400-13	5CASDL.0430-13
<b>Mechanical characteristics</b>			
Dimensions			
Length	30 m ± 280 mm	40 m ± 380 mm	43 m ± 410 mm
Diameter		Max. 12 mm	
Extender box			
Width		35 mm	
Length		125 mm	
Height		18.5 mm	
Flex radius			
Fixed installation		≥ 6x cable diameter (from plug - ferrite magnet)	
		≥ 10x cable diameter (from ferrite magnet - ferrite magnet)	
flexible installation		≥ 15x cable diameter (from ferrite magnet - ferrite magnet)	
Flexibility		Flexible; valid for ferrite magnet - ferrite magnet (tested 300,000 cycles with 15x cable diameter, 4800 cycles / hour)	
Drag chain data			
Flex cycles		300.000	
Speed		4800 cycles / hour	
Flex radius		180 mm; 15x cable diameter	
Hub		460 mm	
Weight	Approx. 5430 g	Approx. 7200 g	Approx. 7790 g
Tension			
In operation		≤50 N	
During installation		≤400 N	

Table 219: 5CASDL.0300-13, 5CASDL.0400-13, 5CASDL.0430-13 - Technical data

### Flex radius specification

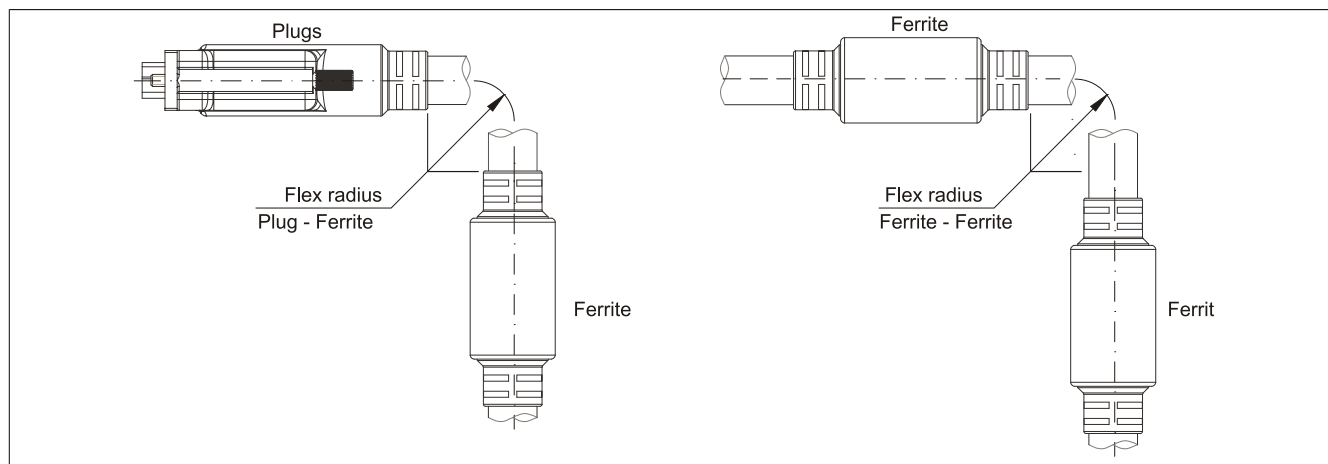


Figure 100: Flex radius specification

### Dimensions

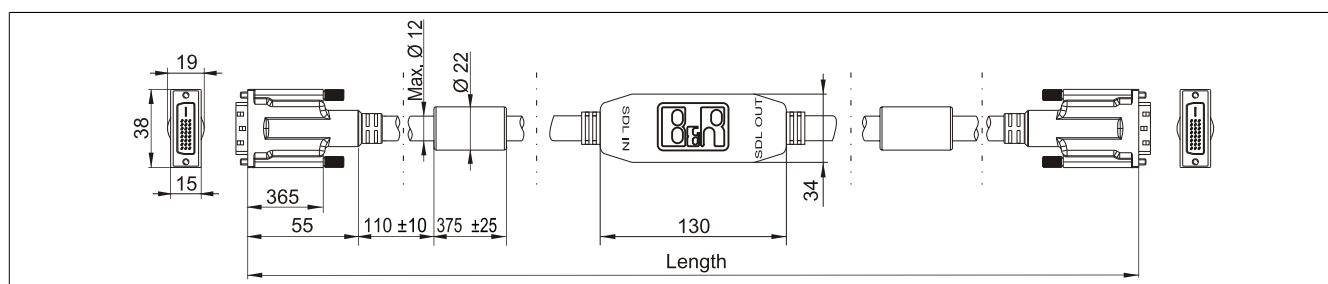


Figure 101: 5CASDL.0xx0-13- Dimensions

## Cable specifications

**Warning!**

If you want to build a suitable cable yourself, it should be wired according to these specifications.

If a self-built cable is used, B&R cannot guarantee that it will function properly. B&R guarantees the performance of all cables that they provide.

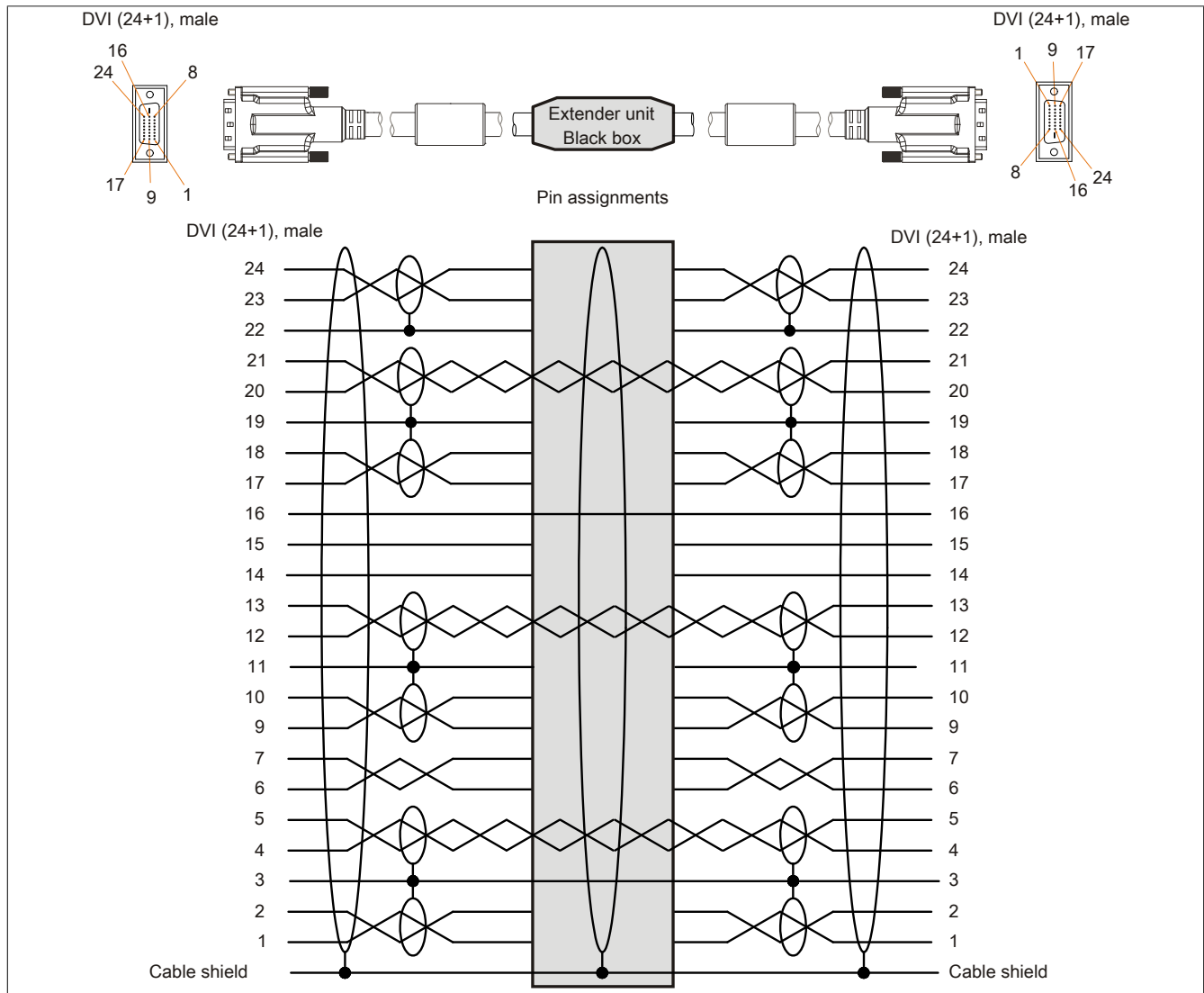


Figure 102: 5CASDL.0xx0-13 - Pinout

## Cable connection

SDL flex cables with extenders must be connected between the B&R industrial PC and Automation Panel 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 APC910 (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).

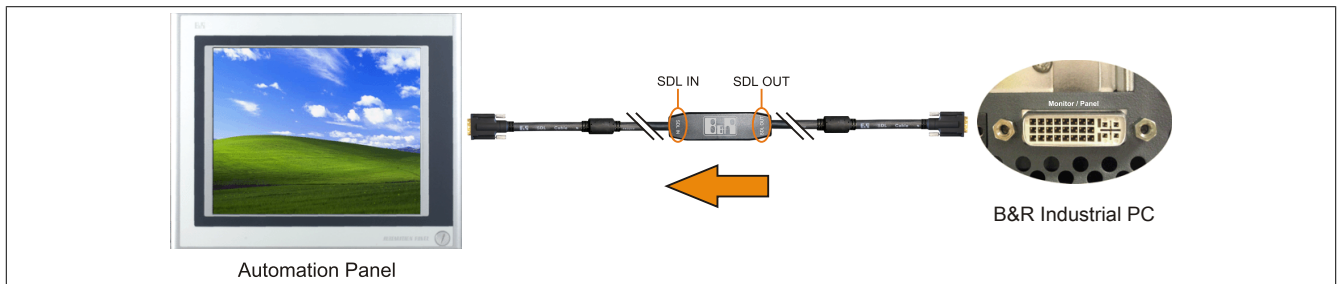


Figure 103: Example of the signal direction for the SDL flex cable with extender



Figure 104: Example of signal direction display - SDL flex cable with extender



## 6.5 SDL cables with 45° plugs

### 6.5.1 5CASDL.0xxx-01

#### General information

The 5CASDL.0xxx-01 SDL cables with 45° plug are designed for a fixed layout.

#### Caution!

Cable can only be plugged in and unplugged when the device is turned off.

#### Order data


Model number	Short description	Figure
	<b>SDL cable - 45° connector</b>	
5CASDL.0018-01	SDL cable; 45° connector, 1.8 m.	
5CASDL.0050-01	SDL cable; 45° connector, 5 m.	
5CASDL.0100-01	SDL cable; 45° connector, 10 m.	
5CASDL.0150-01	SDL cable; 45° connector, 15 m.	

Table 220: 5CASDL.0018-01, 5CASDL.0050-01, 5CASDL.0100-01, 5CASDL.0150-01 - Order data

#### Technical data

Product ID	5CASDL.0018-01	5CASDL.0050-01	5CASDL.0100-01	5CASDL.0150-01
General information				
Certification				
CE	Yes			
c-UL-us	Yes			
Cable structure				
Wire cross section	AWG 28		AWG 24	
Shield	Individual cable pairs and entire cable			
Cable shielding	Tinned Cu mesh, optical coverage >85%			
Outer sheathing				
Material	PVC			
Color	Black			
Connector				
Type	2x DVI-D (24+1), male			
Connection cycles	100			
Contacts	Gold plated			
Mechanical protection	Metal cover with crimped stress relief			
Electrical characteristics				
Conductor resistance				
AWG 24	-		≤93 Ω/km	
AWG 28	≤237 Ω/km		-	
Insulation resistance	Min. 10 MΩ/km			
Mechanical characteristics				
Dimensions				
Length	1.8 m ±30 mm	5 m ± 50 mm	10 m ±100 mm	15 m ±100 mm
Diameter	Max. 9 mm		Max. 11.5 mm	
Flex radius				
Fixed installation	≥ 5x cable diameter (plug - ferrite magnet and ferrite magnet - ferrite magnet)			
Flexibility	Limited flexibility; valid for ferrite magnet - ferrite magnet (tested 100 cycles with 5x cable diameter, 20 cycles / minute)			
Weight	Approx. 300 g	Approx. 590 g	Approx. 2800 g	Approx. 2860 g

Table 221: 5CASDL.0018-01, 5CASDL.0050-01, 5CASDL.0100-01, 5CASDL.0150-01 - Technical data

## Flex radius specification

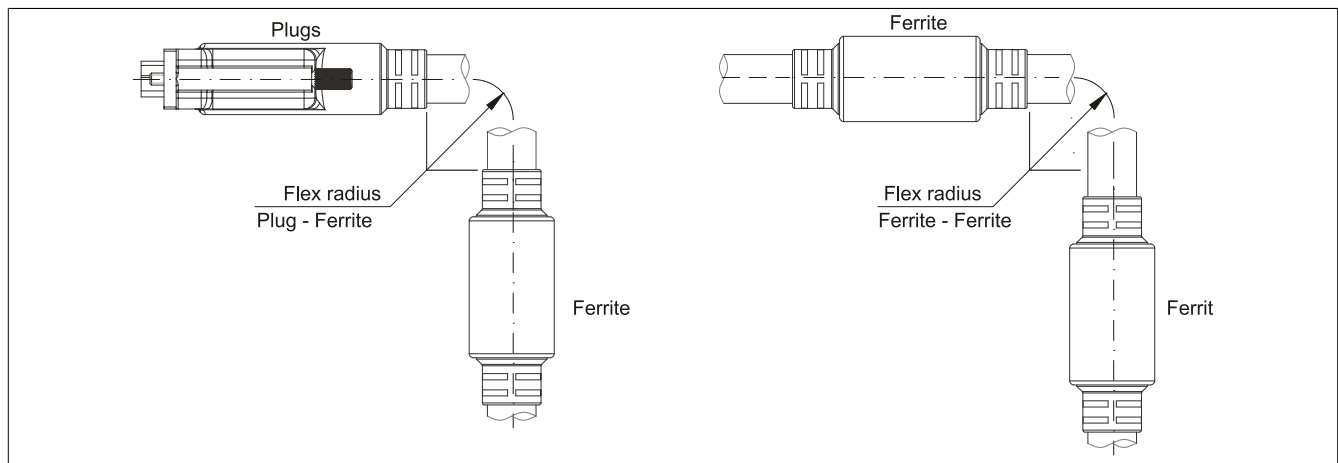


Figure 105: Flex radius specification

## Dimensions

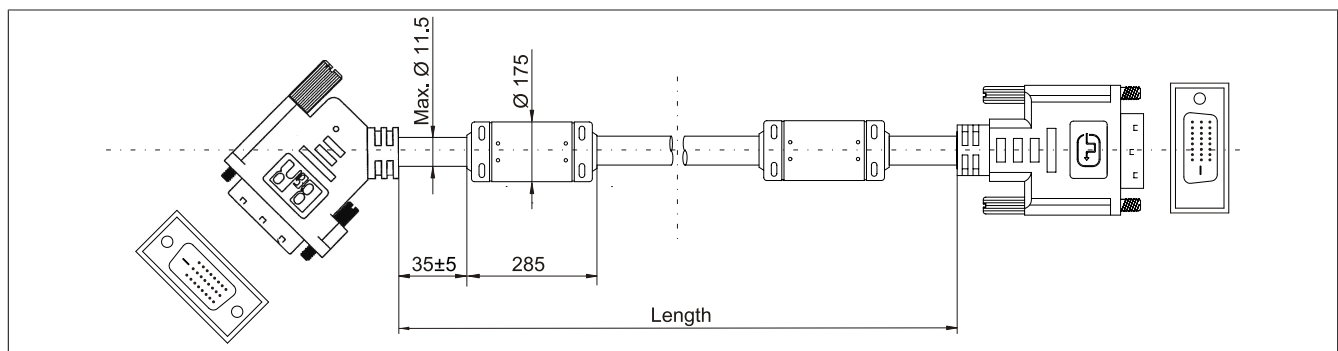


Figure 106: 5CASDL.0xxx-01 - Dimensions

## Cable specifications

**Warning!**

If you want to build a suitable cable yourself, it should be wired according to these specifications.

If a self-built cable is used, B&R cannot guarantee that it will function properly. B&R guarantees the performance of all cables that they provide.

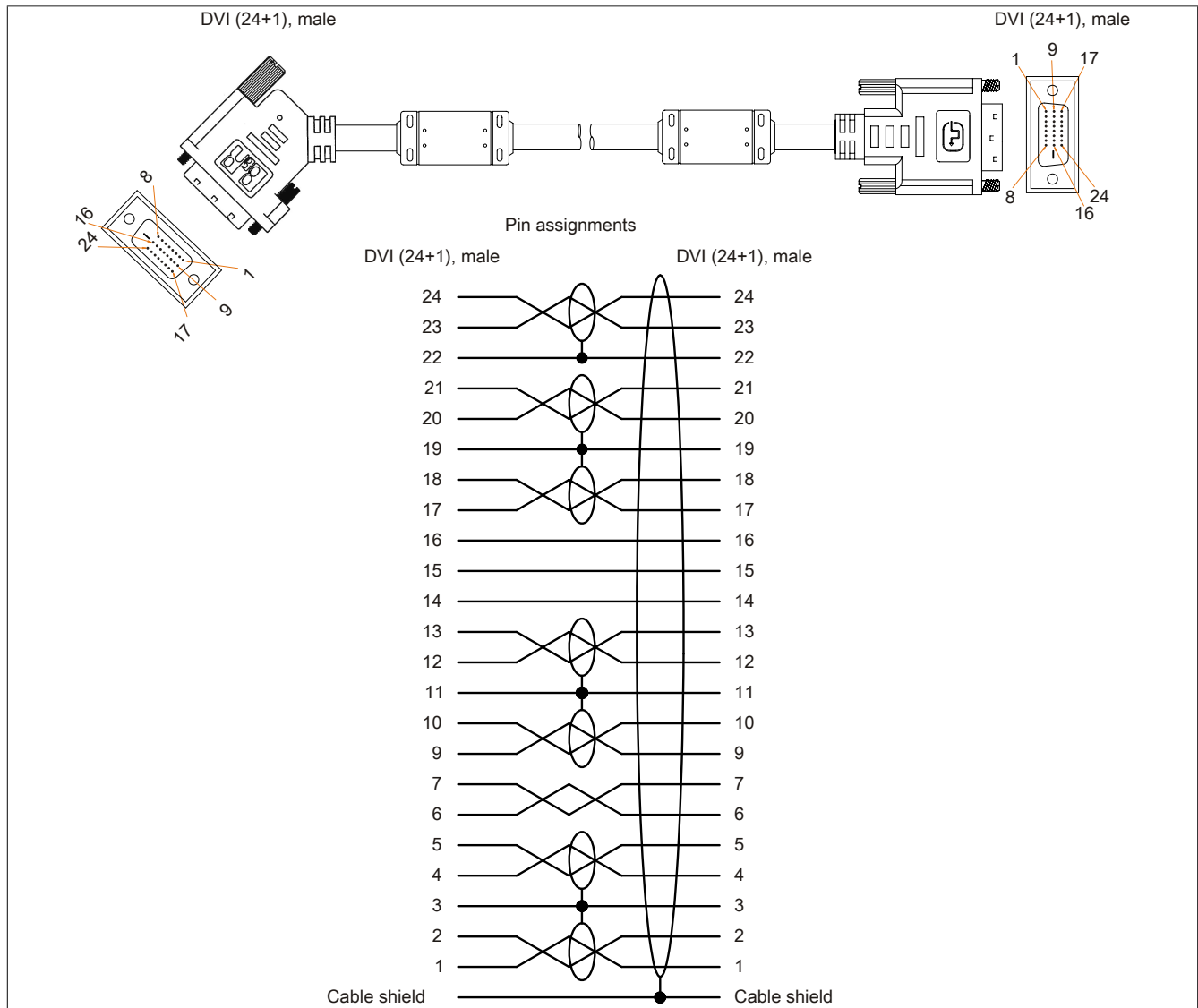


Figure 107: 5CASDL.0xxx-01 - Pinout

6.6 USB cables

6.6.1 5CAUSB.00xx-00

General information

USB cables are designed to achieve USB 2.0 transfer speeds.

Order data


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

Table 222: 5CAUSB.0018-00, 5CAUSB.0050-00 - Order data

Technical data

Product ID	5CAUSB.0018-00	5CAUSB.0050-00
General information		
Certification		
CE	Yes	
c-UL-us	Yes	
Cable structure		
Wire cross section	AWG 24, 28	
Shield	Entire cable	
Outer sheathing		
Color	Beige	
Connector		
Type	USB type A male and USB type B male	
Mechanical characteristics		
Dimensions		
Length	1.8 m ±30 mm	5 m ± 50 mm
Diameter	Max. 5 mm	
Flex radius	Min. 100 mm	

Table 223: 5CAUSB.0018-00, 5CAUSB.0050-00 - Technical data

Cable specifications

Warning!

If you want to build a suitable cable yourself, it should be wired according to these specifications.

If a self-built cable is used, B&R cannot guarantee that it will function properly. B&R guarantees the performance of all cables that they provide.

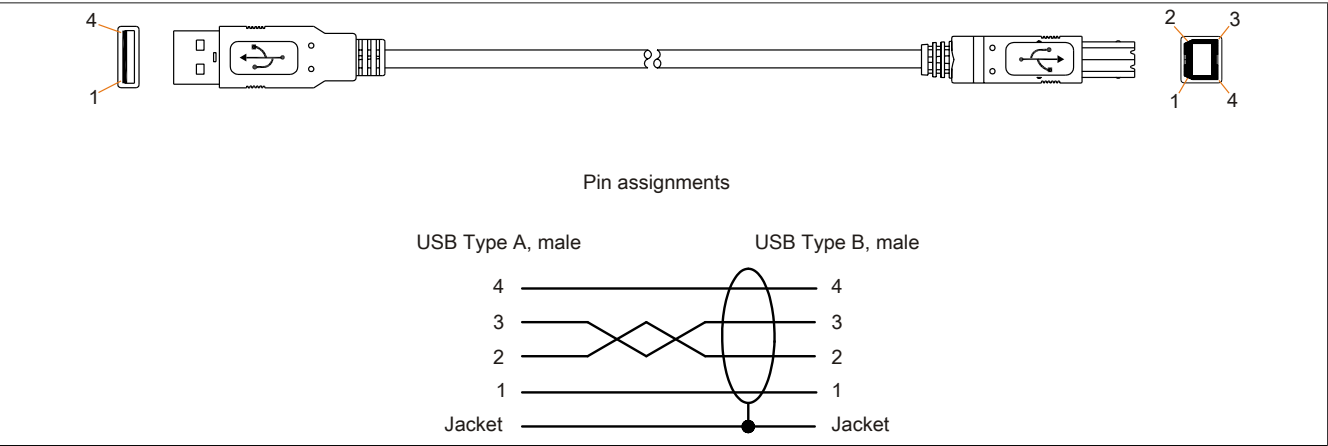


Figure 108: 5CAUSB.00xx-00 - USB cable pinout

## 6.7 RS232 cables

### 6.7.1 9A0014.xx

#### General information

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

#### Order data


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

Table 224: 9A0014.02, 9A0014.05, 9A0014.10 - Order data

#### Technical data

Product ID	9A0014.02	9A0014.05	9A0014.10
<b>General information</b>			
Certification CE		Yes	
<b>Cable structure</b>			
Wire cross section		AWG 26	
Shield		Entire cable	
Outer sheathing Color		Beige	
<b>Connector</b>			
Type		9-pin DSUB socket, male / female	
<b>Mechanical characteristics</b>			
Dimensions			
Length	1.8 m ±50 mm	5 m ± 80 mm	10 m ±100 mm
Diameter		Max. 5 mm	
Flex radius		Min. 70 mm	

Table 225: 9A0014.02, 9A0014.05, 9A0014.10 - Technical data

## Cable specifications

**Warning!**

If you want to build a suitable cable yourself, it should be wired according to these specifications.

If a self-built cable is used, B&R cannot guarantee that it will function properly. B&R guarantees the performance of all cables that they provide.

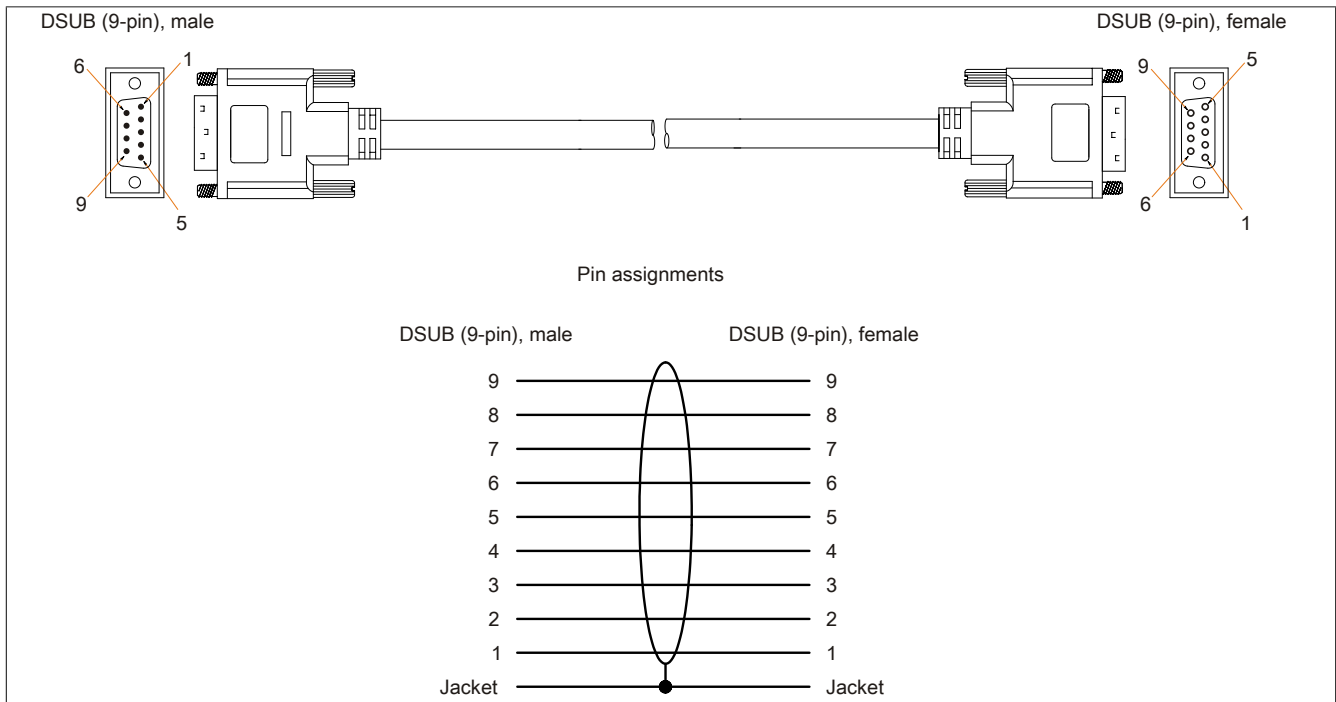


Figure 109: 9A0014.xx - RS232 cable pinout

## 7 HMI Drivers & Utilities DVD

### 7.1 5SWHMI.0000-00

#### 7.1.1 General information

This DVD contains drivers, utilities, software upgrades and user's manuals for B&R Panel system products (see B&R website [www.br-automation.com](http://www.br-automation.com) – Industrial PCs, Visualization and Operation).

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

#### 7.1.2 Order data


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

Table 226: 5SWHMI.0000-00 - Order data

#### 7.1.3 Contents (V2.10)

##### BIOS upgrades for the products

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

##### Drivers for the devices

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

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

### **Firmware upgrades**

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

### **Utilities / Tools**

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

### **Windows**

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

### **MCAD templates for**

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



**ECAD templates for**

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

**Documentation for**

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

**Service tools**

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

## Chapter 7 • Maintenance / Service

The following chapter describes service/maintenance work that can be carried out by a trained, qualified user.

### 1 Changing the battery

The lithium battery buffers the internal real-time clock (RTC) and the CMOS data.

#### Information:

- The product design allows the battery to be changed with the B&R device switched either on or off. In some countries, safety regulations do not allow batteries to be changed while the module is switched on.
- Any BIOS settings that have been made will remain when the battery is changed with the power turned off (stored in non-volatile EEPROM). The date and time must be reset later because this data is lost when the battery is changed.
- The battery should only be changed by qualified personnel.

#### Warning!

Replace battery with Renata, type CR2477N only. Use of another battery may present a risk of fire or explosion.

Battery may explode if mistreated. Do not recharge, disassemble or dispose of in fire.

The following replacement lithium batteries are available: 4A0006.00-000 (1 pc.) and 0AC201.91 (4 pcs.).

#### 1.1 Battery status evaluation

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

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

Table 227: Meaning of battery status

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

#### 1.2 Procedure

- Disconnect the B&R industrial PC.
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Remove the cover from the battery compartment and carefully pull out the battery using the removal strips.

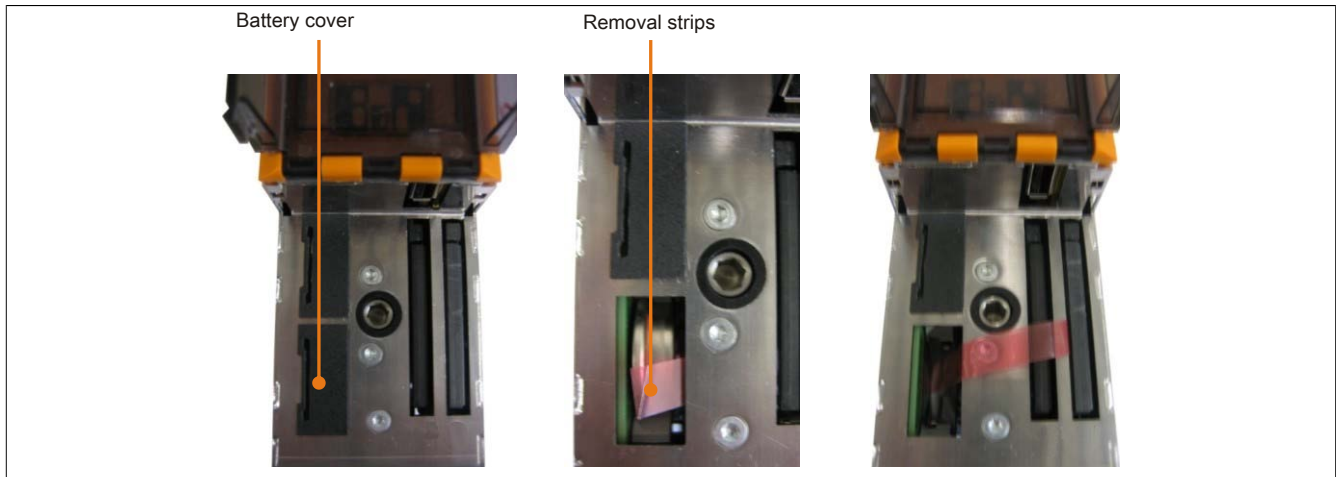


Figure 110: Remove battery

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

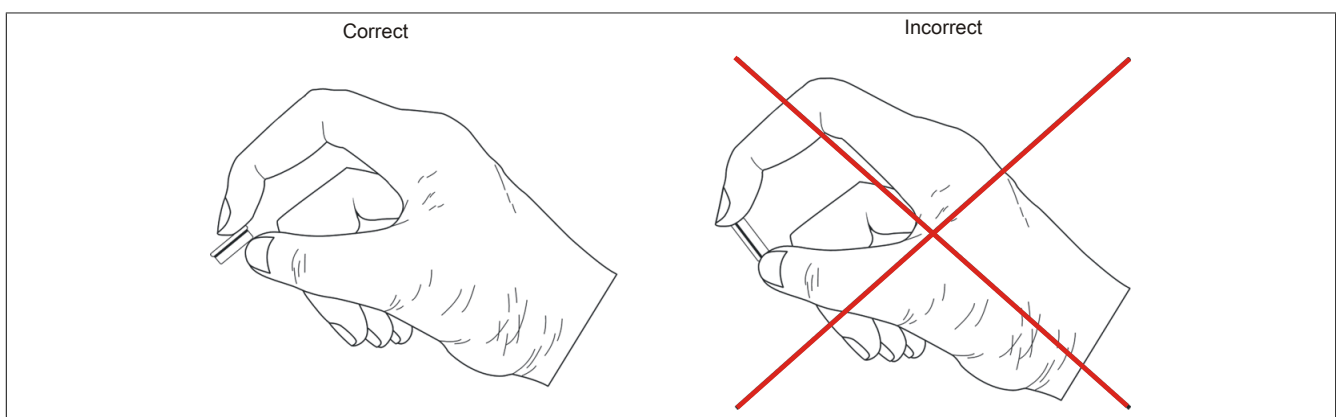


Figure 111: Battery handling

- Insert the new battery with correct polarity.

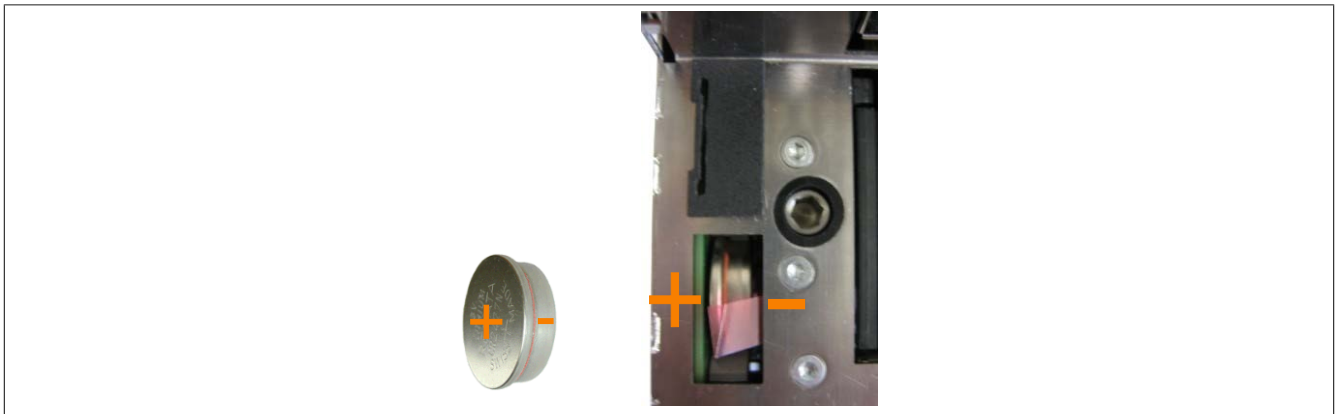


Figure 112: Battery polarity

- To make the next battery change easier, be sure the removal strip is in place when inserting battery.
- Reconnect power supply to the B&R industrial PC (plug in power cable and press power button).
- Date and time might need to be reset in BIOS.

## Warning!

Lithium batteries are considered hazardous waste. Used batteries should be disposed of according to local requirements.

## 2 Replacing the CompactFlash card

### Caution!

**Turn off the power before replacing the CompactFlash card!**

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

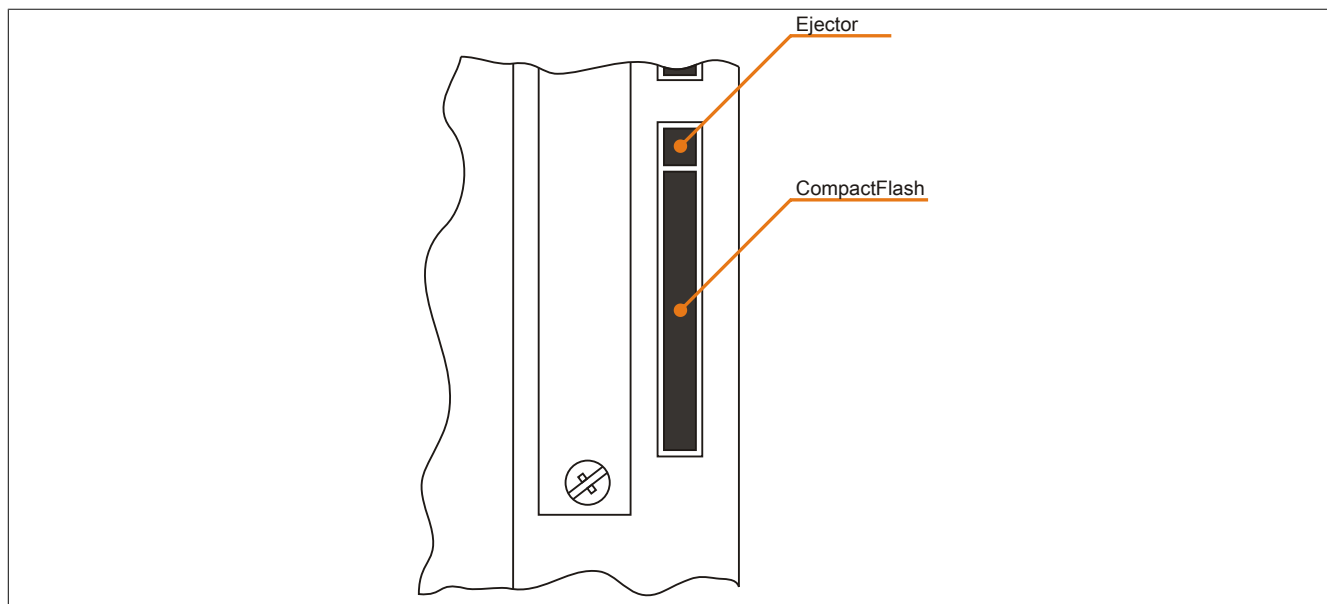


Figure 113: CompactFlash + ejector (sample photo)

## 3 Changing the fan

### 3.1 Procedure

- Cut off power supply to the Automation PC 820 (disconnect from the ACOPOSmulti rail).
- Touch the housing or ground connection 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 114: Removing the fan

- Disconnect the fan cable and remove the fan.

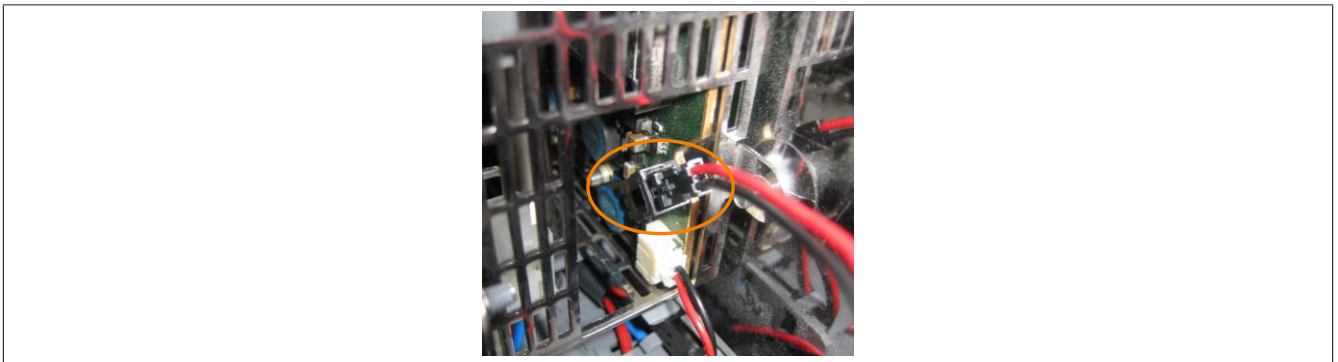


Figure 115: Disconnecting the fan cable

- Install the replacement fan in reverse order.

## 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.

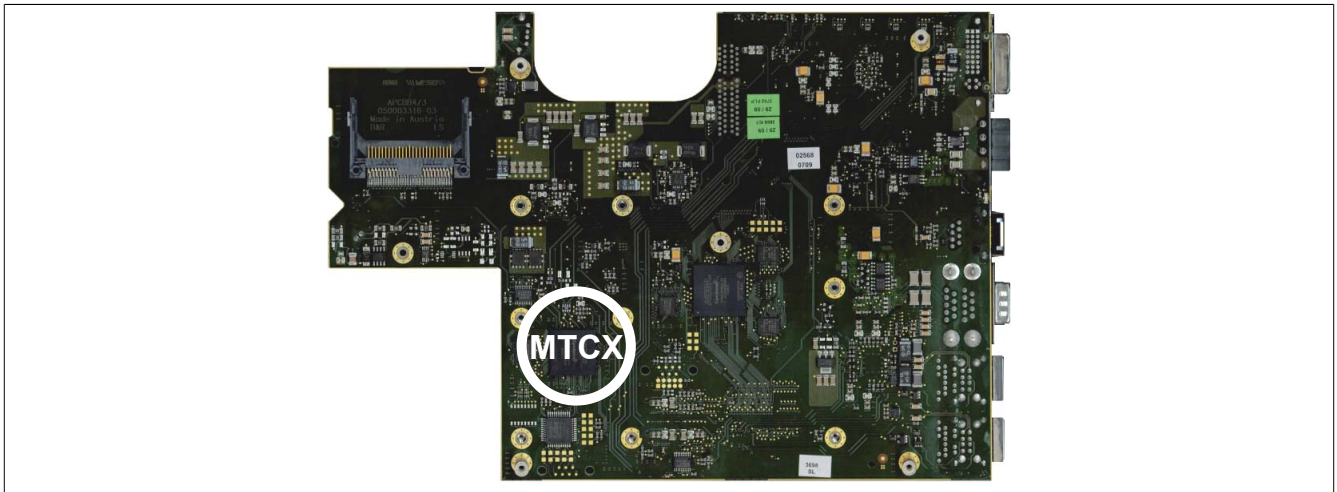


Figure 116: MTCX controller location

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 (can be configured using B&R Control Center - ADI driver)
- Backlight control for a connected B&R display
- Statistical data recording (power cycles - each power on, power on and fan hours are recorded - every full hour is counted e.g. 50 minutes no increase)
- SDL data transfer (display, matrix keyboard, touch screen, service data, USB)
- Status LEDs (CF, Link)

The MTCX functions can be added with a firmware upgrade.<sup>1)</sup> The version can be read in BIOS (menu item "advanced" - baseboard/panel features) or in approved Microsoft Windows operating systems, using B&R Control Center.

<sup>1)</sup> Available for download from the B&R Website ([www.br-automation.com](http://www.br-automation.com)).

## 1.1 Temperature monitoring - Fan control

The MTCX constantly monitors the temperature using temperature sensors (see "Temperature sensor locations" on page 23), 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 (PClec card slot)	65°C	81°C

Table 228: 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 Abbreviations

Abbreviation	Stands for	Description
NC	Normally closed	A normally closed (N.C.) relay contact.
	Not connected	Used in the description of pinout if a terminal or pin is not connected to a module.
ND	Not defined	In data tables, this stands for a value that has not been defined. Because a cable manufacturer does not provide certain technical data, for example.
NO	Normally open	A normally open (N.O.) relay contact.
TBD	To be defined	Used in technical data tables when certain information is not yet available. The value will be provided later.

Table 229: Abbreviations used in this user's manual



### 3 Glossary

<b>Address</b>	An address is a character string for identifying a memory location or a memory area, where data is stored and can be retrieved. It is also a symbol (e.g. with numerical controllers) for identifying a function unit for which subsequent geometrical or technological data are determined by the symbol.
<b>Algorithms</b>	<p>According to DIN 19226: Algorithms are a finite series of well-defined regulations. The desired output quantities are created from permitted system input quantities. It describes how something is to be done. A procedure must at least satisfy the following requirements to be valid as an algorithm in a mathematical context.</p> <p><i>Discreteness:</i> An algorithm is made up of a finite series of steps.</p> <p><i>Determinacy:</i> Under the same start conditions, it always creates the same end result.</p> <p><i>Clearness:</i> The series of steps is clearly defined.</p> <p><i>Finiteness:</i> It ends after a finite number of steps.</p> <p>From a quantity theory perspective, an algorithm is clearly defined by a set of sizes [input, intermediate and output sizes], a set of elementary operations and also by a regulation, which specifies when and in what sequence certain operations should be carried out. From a functional perspective, it transfers a set of input sizes into a set of output sizes. It can be represented in text form in a natural or artificial formal language or using graphic representations [graph, program flow chart, structured chart, Petri Nets etc.].</p>
<b>ANSI</b>	American National Standards Institute > this organization promotes and manages American industrial standards.
<b>APC</b>	Abbreviation for »Automation PC«
<b>Application software</b>	Software, which is not used for operation by the computer itself, but rather when a computer is used to process a concrete application problem. It sets up the system software and uses this for fulfilling individual tasks. Application software can be accommodated in standard software used by a large number of customers in a wide range of industries. Common examples are Word, Excel, PowerPoint, Paint, Matlab etc. Industrial software tailored to the respective problems of a certain industry and individual software created for solving the particular problems of an individual user.
<b>Automation</b>	According to Brockhaus: The application of technical means, using specific programs that (either partially or totally) do not require human intervention to perform operations.
<b>Automation Runtime</b>	A uniform runtime system for all B&R automation components.
<b>Failure</b>	Failure according to IEC 61508: A function unit loses the ability to perform a required function. In regards to safety-oriented systems, a distinction is made between dangerous and safe failures. This depends on whether the status of the system failure is considered dangerous or safe. The cause of the failure may be load related or age-related, and therefore a random failure, or related to a flaw inherent in the system. In this case, it is known as a systematic failure.

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