

# Panel PC 725

## User's Manual

Version: **1.16 (October 2014)**

Model no.: **MAPPC725-ENG**

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# Chapter 1 • General information

## 1 Manual history

Version	Date	Change
1.00	06-Jul-10	<ul style="list-style-type: none"> <li>First version</li> </ul>
1.01	22-Oct-10	<ul style="list-style-type: none"> <li>Corrected flange dimensions, see 3.4.4 "Dimensions" on page 44.</li> </ul>
1.02	03-Feb-11	<ul style="list-style-type: none"> <li>Updated BIOS to version 1.14.</li> <li>6 "Windows 7" on page 119 updated.</li> <li>7 "Windows Embedded Standard 7" on page 121 updated.</li> <li>Updated section 8 "Pixel errors" on page 64.</li> </ul>
1.03	04-Mar-11	<ul style="list-style-type: none"> <li>Changed Windows Embedded Standard 7 model number from 5SWWI7.0729-ENG to 5SWWI7.0729-MUL.</li> </ul>
1.04	08-Jun-11	<ul style="list-style-type: none"> <li>Corrected chipset information of "X945 CPU board" on page 41.</li> <li>Updated information about worst case conditions on page Temperature specifications and corrected the version number of the Thermal Analysis Tool.</li> <li>Revised "Configuration - Optional components" on page 18.</li> <li>Revised sections "B&amp;R Automation Device Interface (ADI) - Control Center" on page 126, "HMI Drivers &amp; Utilities DVD" on page 162 and "B&amp;R Automation Device Interface (ADI) Development Kit" on page 128.</li> <li>Updated section "B&amp;R Automation Device Interface (ADI) .NET SDK" on page 130.</li> <li>Corrected information about Windows XP mode in "Features with WES7 (Windows Embedded Standard 7)" on page 122.</li> </ul>
1.10	29-Apr-13	<ul style="list-style-type: none"> <li>Moved section 2.1.3 "Temperature sensor locations" on page 20 to 2 "Technical data".</li> <li>Moved section "B&amp;R Automation Device Interface (ADI) Development Kit" to 4 "Software".</li> <li>Revised section "CompactFlash cards".</li> <li>Revised "Base system configuration" on page 17.</li> <li>Revised "X945 Advanced - Baseboard/Panel Features - Legacy Devices" on page 91.</li> <li>Modified "Organization of safety notices" on page 13. Updated descriptions for cautions and warnings.</li> <li>Added new CompactFlash cards 5CFCRD.xxxx-06 in 6 "Accessories". Discontinued CompactFlash cards 5CFCRD.xxxx-04.</li> <li>Updated Windows 7 Service Pack 1 (see "Windows 7" on page 119).</li> <li>Updated Windows Embedded Standard 7 Service Pack 1 (see "Windows Embedded Standard 7" on page 121).</li> <li>Updated "B&amp;R Automation Device Interface (ADI) - Control Center" on page 126.</li> <li>Updated "B&amp;R Automation Device Interface (ADI) Development Kit" on page 128 to version 3.40.</li> <li>Updated "B&amp;R Automation Device Interface (ADI) .NET SDK" on page 130 to version 1.80.</li> <li>Updated "B&amp;R Key Editor" on page 132 to version 3.30.</li> <li>Revised entire manual according to current formatting standards.</li> <li>Revised 5 "Standards and certifications".</li> <li>Updated drives "5MMSSD.0128-00" on page 52 and "5AC600.SSDI-00" on page 45 in section "Individual components".</li> </ul>
1.15	26-Mar-14	<ul style="list-style-type: none"> <li>Updated B&amp;R USB flash drive 5MMUSB.4096-00, see "USB flash drives" on page 155.</li> <li>Updated GOST-R certification information in the technical data.</li> <li>Updated section "GOST-R" on page 135.</li> <li>Added information about the discontinuation of support for the "Windows XP Professional" on page 115 operating system.</li> <li>Updated "B&amp;R Automation Device Interface (ADI) - Control Center" on page 126.</li> <li>Updated "B&amp;R Automation Device Interface (ADI) Development Kit" on page 128.</li> <li>Updated "B&amp;R Automation Device Interface (ADI) .NET SDK" on page 130.</li> <li>Updated "B&amp;R Key Editor" on page 132 to version 3.40.</li> <li>Updated technical data for add-on drive "5AC600.SSDI-00" on page 45.</li> <li>Changed touch screen controller from Elo to B&amp;R, see technical data for the "System units" on page 31.</li> <li>Updated section "5-wire AMT touch screen" on page 169.</li> <li>Updated technical data for "USB flash drives" on page 155.</li> </ul>
1.16	10/15/2014	<ul style="list-style-type: none"> <li>Added new revisions of 5CFCRD.xxxx-06 CompactFlash cards, see "5CFCRD.xxxx-06" on page 141.</li> <li>Added new revisions of the 5PC725.1505-00 and 5PC725.1505-01 system units, see "System units" on page 31.</li> </ul>

Table 1: Manual history

## 2 Safety guidelines

### 2.1 Intended use

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

### 2.2 Protection against electrostatic discharge

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

#### 2.2.1 Packaging

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

#### 2.2.2 Guidelines for proper ESD handling

##### Electrical components with a housing

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

##### Electrical components without a housing

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

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

##### Individual components

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

### 2.3 Policies and procedures

Electronic devices are never completely failsafe. If the programmable control system, operating/monitoring device or uninterruptible power supply fails, the user is responsible for ensuring that other connected devices, e.g. motors, are brought to a secure state.

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

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

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

## 2.4 Transport and storage

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

## 2.5 Installation

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

## 2.6 Operation

### 2.6.1 Protection against touching electrical parts

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

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

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

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

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

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

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

### 2.6.3 Viruses and dangerous programs

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

## 2.7 Environmentally friendly disposal

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

### 2.7.1 Separation of materials

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

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

Table 2: Environmentally friendly separation of materials

Disposal must comply with applicable legal regulations.

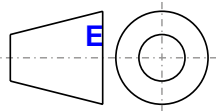
### 3 Organization of safety notices

Safety notices in this manual are organized as follows:

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

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

### 4 Guidelines



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

All dimensions are specified in mm.

Range of nominal sizes	General tolerance according to DIN ISO 2768 (medium)
Up to 6 mm	±0.1 mm
For 6 to 30 mm	±0.2 mm
For 30 to 120 mm	±0.3 mm
For 120 to 400 mm	±0.5 mm
For 400 to 1000 mm	±0.8 mm

Table 4: Range of nominal sizes

## 5 Overview

Product ID	Short description	on page
<b>Batteries</b>		
0AC201.91	Lithium batteries 4 pcs., 3 V / 950 mAh button cell We hereby state that the lithium cells contained in this shipment qualify as "partly regulated". Handle with care. If the package is damaged, inspect the cells, repack intact cells and protect the cells against short circuit. For emergency information, call RENATA SA at +41 61 319 28 27.	136
4A0006.00-000	Lithium battery, 3 V / 950 mAh, button cell	136
<b>CPU boards</b>		
5PC600.X945-00	CPU board Intel Atom, 1600 MHz, 533 MHz FSB, 512 kB L2 cache; 945GME chipset; 1 slot for SO-DIMM DDR2 RAM module	41
<b>CompactFlash</b>		
5CFCRD.016G-06	CompactFlash 16 GB B&R (SLC) ≤ Rev. D0	141
5CFCRD.032G-06	CompactFlash 32 GB B&R (SLC) ≤ Rev. C0	141
5CFCRD.0512-06	CompactFlash 512 MB B&R (SLC) ≤ Rev. E0	141
5CFCRD.1024-06	CompactFlash 1 GB B&R (SLC) ≤ Rev. E0	141
5CFCRD.2048-06	CompactFlash 2 GB B&R (SLC) ≤ Rev. E0	141
5CFCRD.4096-06	CompactFlash 4 GB B&R (SLC) ≤ Rev. E0	141
5CFCRD.8192-06	CompactFlash 8 GB B&R (SLC) ≤ Rev. E0	141
<b>CompactFlash-cards</b>		
5CFCRD.0064-03	CompactFlash 64 MB Western Digital (SLC)	151
5CFCRD.0128-03	CompactFlash 128 MB Western Digital (SLC)	151
5CFCRD.016G-04	CompactFlash 16 GB B&R (SLC)	147
5CFCRD.0256-03	CompactFlash 256 MB Western Digital (SLC)	151
5CFCRD.0512-03	CompactFlash 512 MB Western Digital (SLC)	151
5CFCRD.0512-04	CompactFlash 512 MB B&R (SLC)	147
5CFCRD.1024-03	CompactFlash 1 GB Western Digital (SLC)	151
5CFCRD.1024-04	CompactFlash 1 GB B&R (SLC)	147
5CFCRD.2048-03	CompactFlash 2 GB Western Digital (SLC)	151
5CFCRD.2048-04	CompactFlash 2 GB B&R (SLC)	147
5CFCRD.4096-03	CompactFlash 4 GB Western Digital (SLC)	151
5CFCRD.4096-04	CompactFlash 4 GB B&R (SLC)	147
5CFCRD.8192-03	CompactFlash 8 GB Western Digital (SLC)	151
5CFCRD.8192-04	CompactFlash 8 GB B&R (SLC)	147
<b>Drives</b>		
5AC600.CFSI-00	CompactFlash slot (add-on) for installation in an APC620 or Panel PC	51
5AC600.HDDI-05	40 GB hard disk (add-on) 24/7 operation with extended temperature range. For APC620 and PPC700. Note: Please see the manual for information about using this hard disk.	47
5AC600.HDDI-06	80 GB Hard Disk (add-on) 24/7 hard disk with extended temperature range. For APC620 and PPC700. Remark: Please see manual for proper use of the hard disk.	49
5AC600.SSDI-00	128 GB SATA SSD (MLC), add-on; for APC620 and PPC700. Note: Please see the manual for information about using this SSD.	45
5MMSSD.0128-00	128 GB PATA SSD (MLC); replacement part for 5AC600.SSDI-00; note: Please see the manual for information about using this SSD.	52
<b>Flanges</b>		
5AC725.FLGC-00	PPC725 flange coupling	44
<b>MS-DOS</b>		
9S0000.01-010	OEM Microsoft MS-DOS 6.22, German floppy disks, only supplied together with a new PC	114
9S0000.01-020	OEM Microsoft MS-DOS 6.22, English floppy disks, only supplied together with a new PC	114
<b>Main memory</b>		
5MMDDR.0512-01	SO-DIMM DDR2 RAM 512 MB PC2-5300	43
5MMDDR.1024-01	SO-DIMM DDR2 RAM 1024 MB PC2-5300	43
5MMDDR.2048-01	SO-DIMM DDR2 RAM 2048 MB PC2-5300	43
<b>Other</b>		
5SWHMI.0000-00	HMI Drivers & Utilities DVD	162
<b>RS232 cables</b>		
9A0014.02	RS232 extension cable for remote operation of a display unit with touch screen, 1.8 m	160
9A0014.05	RS232 extension cable for remote operation of a display unit with touch screen, 5 m	160
9A0014.10	RS232 extension cable for remote operation of a display unit with touch screen, 10 m	160
<b>System units</b>		
5PC725.1505-00	Panel PC 725 15" XGA; 15" XGA color TFT display with touch screen (resistive); connections for 1x RS232, 3x USB 2.0, 2x Ethernet 10/100, IP65 protection; 24 VDC. Flange mounting on the top. Order connector for power supply separately (screw clamp: 0TB103.9; cage clamp: 0TB103.91).	31
5PC725.1505-01	Panel PC 725 15" XGA; 15" XGA color TFT display with touch screen (resistive); connections for 1x RS232, 3x USB 2.0, 2x Ethernet 10/100, IP65 protection; 24 VDC. Flange mounting on the bottom. Order connector for power supply separately (screw clamp: 0TB103.9; cage clamp: 0TB103.91).	36
<b>Terminal blocks</b>		
0TB103.9	Connector, 24 VDC, 3-pin female, 3.31 mm² screw clamps, protected against vibration by the screw flange	138
0TB103.91	Connector, 24 VDC, 3-pin female, 3.31 mm² cage clamps, protected against vibration by the screw flange	138
<b>USB accessories</b>		
5MMUSB.2048-00	USB 2.0 flash drive, 2048 MB	155
5MMUSB.2048-01	USB 2.0 flash drive, 2048 MB, B&R	157
5MMUSB.4096-01	USB 2.0 flash drive, 4096 MB, B&R	157
<b>USB cables</b>		
5CAUSB.0018-00	USB 2.0 connection cable type A - type B, 1.8 m	159
5CAUSB.0050-00	USB 2.0 connection cable type A - type B, 5 m	159

Product ID	Short description	on page
<b>Windows 7 Professional/Ultimate</b>		
5SWWI7.0100-ENG	Microsoft OEM Windows 7 Professional 32-bit, DVD, English. Only available with a new device.	119
5SWWI7.0100-GER	Microsoft OEM Windows 7 Professional 32-bit, DVD, German. Only available with a new device.	119
5SWWI7.0300-MUL	Microsoft OEM Windows 7 Ultimate 32-bit, DVD, multilingual. Only available with a new device.	119
5SWWI7.1100-ENG	Microsoft OEM Windows 7 Professional 32-bit, Service Pack 1, DVD, English. Only available with a new device.	119
5SWWI7.1100-GER	Microsoft OEM Windows 7 Professional 32-bit, Service Pack 1, DVD, German. Only available with a new device.	119
5SWWI7.1300-MUL	Microsoft OEM Windows 7 Ultimate 32-bit, Service Pack 1, DVD, multilingual. Only available with a new device.	119
<b>Windows CE 6.0</b>		
5SWWCE.0829-ENG	Microsoft OEM Windows CE 6.0 Professional, English; for PPC700 with 945GME chipset; order CompactFlash separately (at least 128 MB)	124
<b>Windows Embedded Standard 2009</b>		
5SWWXP.0729-ENG	Microsoft OEM Windows Embedded Standard 2009, English; for PPC700 with 945GME chipset; order CompactFlash separately (at least 1 GB).	117
<b>Windows Embedded Standard 7</b>		
5SWWI7.0529-ENG	Microsoft OEM Windows Embedded Standard 7 32-bit, English; for PPC700 with 945GME chipset; order CompactFlash separately (at least 8 GB)	121
5SWWI7.0729-MUL	Microsoft OEM Windows Embedded Standard 7 Premium 32-bit, multilingual; for PPC700 with 945GME chipset; order CompactFlash separately (at least 8 GB)	121
5SWWI7.1529-ENG	Microsoft OEM Windows Embedded Standard 7 32-bit, Service Pack 1, English; for PPC700 with 945GME chipset; order CompactFlash separately (at least 16 GB).	121
5SWWI7.1729-MUL	Microsoft OEM Windows Embedded Standard 7 Premium 32-bit, Service Pack 1, multilingual; for PPC700 with 945GME chipset; order CompactFlash separately (at least 16 GB).	121
<b>Windows XP Professional</b>		
5SWWXP.0500-ENG	Microsoft OEM Windows XP Professional Service Pack 2c, CD, English. Only available with a new device.	115
5SWWXP.0500-GER	Microsoft OEM Windows XP Professional Service Pack 2c, CD, German. Only available with a new device.	115
5SWWXP.0500-MUL	Microsoft OEM Windows XP Professional Service Pack 2c, CD, multilingual. Only available with a new device.	115
5SWWXP.0600-ENG	Microsoft OEM Windows XP Professional Service Pack 3, CD, English. Only available with a new device.	115
5SWWXP.0600-GER	Microsoft OEM Windows XP Professional Service Pack 3, CD, German. Only available with a new device.	115
5SWWXP.0600-MUL	Microsoft OEM Windows XP Professional Service Pack 3, CD, multilingual. Only available with a new device.	115

## Chapter 2 • Technical data

### 1 Introduction

The Panel PC 725 is designed exclusively for operation in the field. Built with IP65 protection from all sides, it can easily handle splashed water, impacts and vibrations. Support arm mounting allows flexible positioning, providing an ergonomic user interface even in cramped spaces. Panel PCs with IP65 protection usually require expensive IP65 connectors, whereas the cabling for the Panel PC 725 is fed through the flange. This makes it possible to use inexpensive standard cables.

The Panel PC 725 provides extensive PC resources in a highly compact design. With two Ethernet interfaces, three USB 2.0 ports and a serial interface, communication is ensured both at the machine level as well as across the company network. Interfaces are easy to access behind the flange cover. A separate cover conceals the battery and CompactFlash card, making servicing a cinch.



#### 1.1 Features

- 15" diagonal
- Intel® Atom™ N270 1.6 GHz processor
- CompactFlash slot (type I)
- 24 VDC supply voltage
- 3x USB 2.0
- 2x Ethernet 10/100 Mbit interfaces
- 1x RS232 interface, modem-compatible
- Add-on interface options
- Up to 2 GB main memory
- Optional built-in add-on drive
- Flange output on top or bottom
- Real-time clock (RTC, battery-backed)
- Fanless operation
- IP65 protection



## 1.2 System components / Configuration

The PPC725 system can be assembled to meet individual requirements and operating conditions.

The following components are absolutely essential for operation:

- System unit (with flange on top or bottom)
- CPU board
- Main memory
- Drive (mass storage device such as CompactFlash card or hard disk) for the operating system
- Flange
- Operating system

### 1.2.1 Configuration - Base system

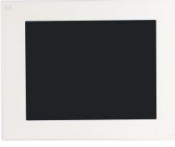




Base system configuration	
System unit	Select one
A system unit consists of a housing and a mainboard.	 5PC725.1505-00 Flange mounting on the top
	 5PC725.1505-01 Flange mounting on the bottom
CPU board - Main memory - Flange	
CPU board	Select one
	5PC600.X945-00 - Atom™ N270, 1.6 GHz
Main memory	Select 1 (max. 2 GB can be used)
	5MMDDR.0512-01 - 512 MB 5MMDDR.1024-01 - 1 GB 5MMDDR.2048-01 - 2 GB
Flange	Select one
	5AC725.FLGC-00

Figure 1: Base system configuration

## 1.2.2 Configuration - Optional components

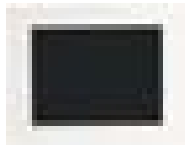











Configuration - Software and accessories		
System unit	Select one	
A system unit consists of a housing and a main board.	 5PC725.1505-00 Flange mounting on the top	 5PC725.1505-01 Flange mounting on the bottom
Drives	Select one	
	5AC600.SSDI-00 (128 GB SSD) 5AC600.HDDI-06 (80 GB HDD) 5AC600.CFSI-00 (CompactFlash Slot)	
CompactFlash	Select one or two	
 	5CFCRD.0512-06, 5CFCRD.1024-06, 5CFCRD.2048-06, 5CFCRD.4096-06, 5CFCRD.8192-06, 5CFCRD.016G-06 5CFCRD.032G-06	
Software	Select one	
    	<b>Windows XP</b> 5SXXWP.0500-ENG 5SXXWP.0500-GER 5SXXWP.0500-MUL 5SXXWP.0600-ENG 5SXXWP.0600-GER 5SXXWP.0600-MUL  <b>Windows 7</b> 5SXXW7.1100-ENG 5SXXW7.1100-GER 5SXXW7.1300-MUL	<b>Windows Embedded Standard 2009</b> 5SXXWP.0729-ENG  <b>Windows Embedded Standard 7</b> 5SXXW7.1529-ENG 5SXXW7.1729-MUL  <b>MS-DOS</b> 9S0000.01-010 9S0000.01-020
Terminal blocks	Select one	
 	<b>Supply voltage plug</b> 0TB103.9 0TB103.91	

Figure 2: Configuration - Optional components

## 2 Complete system

### 2.1 Temperature specifications

CPU boards can be combined with various other components such as drives, main memory, additional plug-in cards, etc. depending on the system unit. The many different configurations possible result in varying maximum ambient temperatures, which can be seen in the following table in this section.

#### Information:

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

#### Information regarding worst-case conditions

- Thermal Analysis Tool (TAT V3.8.1) 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 interface, USB interfaces)
- Maximum system expansion and power consumption

#### 2.1.1 Maximum ambient temperature

All temperature values in degrees Celsius (°C) at 500 meters above sea level.		5PC600.X945-00		
The maximum ambient temperature is typically derated by 1°C per 1000 meters (starting at 500 meters above sea level).				
<b>Maximum ambient temperature</b>		<b>50</b>		
What else can also be operated at the max. ambient temperature, or are there any limits?				
<b>Add-on drives</b>	Onboard CompactFlash <sup>1)</sup>	✓	80	Board I/O
	5AC600.SSDI-00	✓	75	
	5AC600.CFSI-00	✓	80	
	5AC600.HDDI-05	✓	80	
	5AC600.HDDI-06	✓	80	
<b>Main memory</b>	5MMDDR.0512-01	✓	-	
	5MMDDR.1024-01	✓	-	
	5MMDDR.2048-01	✓	-	
<b>System units</b>	5PC725.1505-00	✓	76	Power supply
	5PC725.1505-01	✓	76	

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

Table 5: Ambient temperatures

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

1. The lines under "Maximum ambient temperature" shows the maximum ambient temperature for a fully assembled device (= system unit + CPU board).

#### Information:

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

2. Incorporating additional drives (add-on) can change the temperature limits of a Panel PC system.

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

If there is a specific temperature, for example "35", next to the component, then the ambient temperature of the complete Panel PC 725 system cannot exceed this temperature.

## 2.1.2 Temperature monitoring

Sensors monitor temperature values at different locations in the PPC725 (inside CPU, CPU board, power supply, board I/O). The location of these temperature sensors can be seen in 2.1.3 "Temperature sensor locations" on page 20. The value listed in the table represents the defined maximum temperature for this measurement point. An alarm is not triggered if this temperature is exceeded. The temperatures<sup>1)</sup> can be read in BIOS (menu item Advanced - Baseboard/Panel Features - Baseboard Monitor) or in approved Microsoft Windows operating systems using the B&R Control Center.

In addition, the hard disks for PPC725 systems available from B&R are equipped with S.M.A.R.T, or Self-Monitoring, Analysis, and Reporting Technology. This makes it possible to read various parameters, e.g. temperature, using software (such as HDD Thermometer, a freeware program) on approved Microsoft operating systems (except Windows CE).

## 2.1.3 Temperature sensor locations

Sensors monitor temperature values at different locations in the PPC725 (inside CPU, CPU board, power supply, board I/O). The temperatures<sup>1)</sup> can be read in BIOS (Advanced - Baseboard/Panel features) or in Microsoft Windows operating systems via the B&R Control Center<sup>2)</sup>.

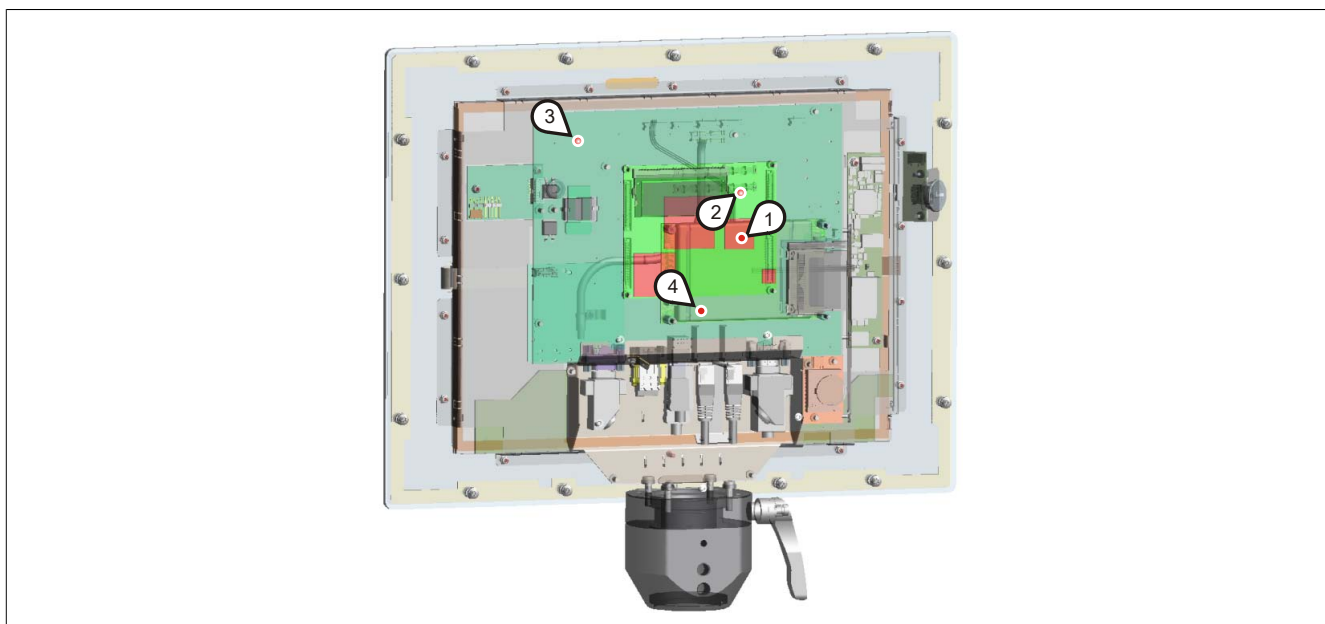


Figure 3: Temperature sensor positions

Position	Measurement point for	Measurement	Max. specified
1	CPU internal	Ambient temperature of the processor (sensor integrated in the processor)	84°C
2	CPU board	CPU board temperature (sensor integrated in the CPU board).	91°C
3	Power supply	Power supply temperature (sensor on the power supply)	76°C
4	Board I/O	Board I/O area temperature (sensor on the baseboard, close to the ETH2 controller).	75°C

Table 6: Temperature sensor locations

<sup>1)</sup> The measured temperature approximates the immediate ambient temperature, but can be influenced by neighboring components.

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

<sup>2)</sup> The ADI driver that includes 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 lists the minimum and maximum relative humidity values for the individual components that are relevant for the humidity limitations of a complete system. The lowest and highest common values are always used when establishing these limits.

Component		Operation	Storage / Transport
X945 CPU board		10 to 90%	5 to 95%
Main memory for CPU board		10 to 90%	5 to 95%
Add-on drives	5AC600.SSDI-00	0 to 95%	0 to 95%
	5AC600.HDDI-05	5 to 90%	5 to 95%
	5AC600.HDDI-06	5 to 90%	5 to 95%
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%
	5MMUSB.2048-xx flash drive	10 to 90%	5 to 90%

Table 7: Humidity specifications

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

## 2.3 Power management

### 2.3.1 Voltage supply block diagram

The following block diagram illustrates the simplified structure of the PPC725 voltage supply.

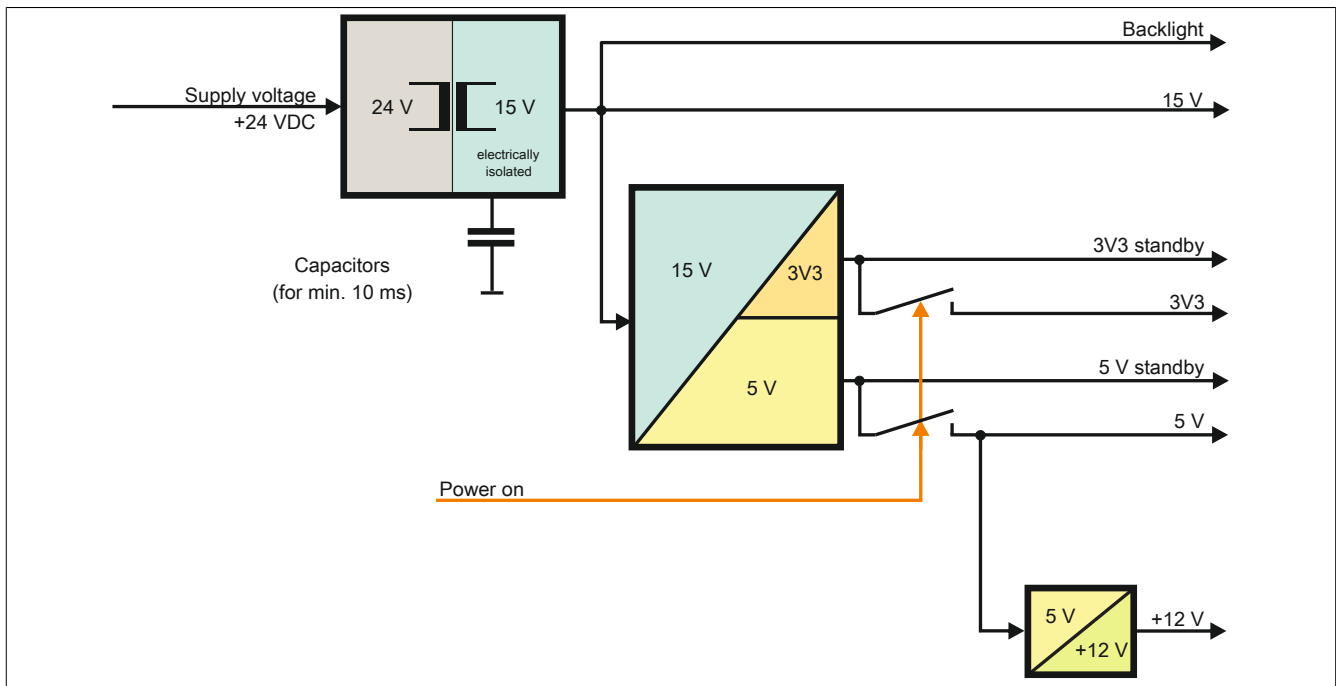


Figure 4: Supply voltage block diagram

#### Description

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

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

## 2.4 Device interfaces and slots

### 2.4.1 +24 VDC power supply

PPC725 system units have a 24 VDC ATX compatible power supply.

The 3-pin male connector required for the power supply interface is not included in delivery. It can be ordered from B&R using model number 0TB103.9 (screw clamp) or 0TB103.91 (cage clamp). The pinout is listed in the following table. The supply voltage is protected internally (10 A fast-acting fuse) so that the device cannot be damaged if an overload occurs (fuse replacement necessary) or the voltage supply is connected incorrectly (reverse polarity protection - fuse replacement not necessary).

Power supply	
Protected against reverse polarity	
Pin	Description
1	+
2	Functional ground
3	-
Model number	Short description
Terminal blocks	
0TB103.9	Male connector 24 V 5.08 3-pin screw clamps
0TB103.91	Male connector 24 V 5.08 3-pin cage clamps

3-pin male connector

Power supply  
+24 VDC




Table 8: Supply voltage connection

### 2.4.2 Grounding

#### **Danger!**

**The functional ground (pin 2) must be connected to ground (e.g. control cabinet) using the shortest possible path. Using the largest possible conductor cross section on the supply connector is recommended.**

A functional grounding clip is located next to the supply voltage connector. This grounding clip (functional ground) must be connected to a central grounding point on the control cabinet using a 6.3 mm tab connector and the shortest possible line with the least resistance possible (e.g. copper strip, at least 2.5 mm<sup>2</sup>).



Figure 5: Grounding clip

## 2.4.3 COM serial interface

COM serial interface	
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 male DSUB connector

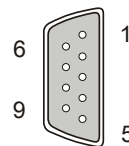


Table 9: COM - Pinout

## I/O address and IRQ

Resource	Default setting	Additional setting options
I/O address	2F8	3F8, 2E8
IRQ	IRQ3	IRQ4

Table 10: COM - I/O address and IRQ

The setting for the I/O address and IRQ can be changed in BIOS (Advanced - I/O device configuration - Serial port 2). It is possible for conflicts with other resources to occur when changing this setting.



## 2.4.4 Ethernet 1 (ETH1)

This Ethernet interface is integrated in the CPU board being used.

Ethernet 1 interface (ETH1 <sup>1)</sup> )		
Controller	Intel 82562	
Cabling	S/STP (Cat 5e)	
Transfer rate	10/100 Mbit/s <sup>2)</sup>	
Cable length	Max. 100 m (min. Cat 5e)	
LED	On	Off
Green	100 Mbit/s	10 Mbit/s
Orange	Link (Ethernet network connection available)	Activity (blinking) (data transfer in progress)

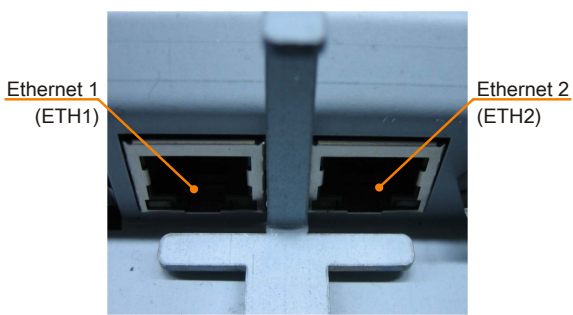


Table 11: Ethernet interface (ETH1)

- 1) The interfaces, etc. available on the device or module have been numbered as such for easy identification. This numbering may differ from that used by the particular operating system.
- 2) Both operating modes possible. Switching takes place automatically.

### Driver support

A special driver is required in order to operate the Intel 82562 Ethernet controller. Drivers for approved operating systems are available in the Downloads section 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 website, not from manufacturer websites.**

## 2.4.5 Ethernet 2 (ETH2)

This Ethernet interface is integrated in the system unit.

Ethernet 2 interface (ETH2 <sup>1)</sup> )		
Controller	Intel 82551ER	
Cabling	S/STP (Cat 5e)	
Transfer rate	10/100 Mbit/s <sup>2)</sup>	
Cable length	Max. 100 m (min. Cat 5e)	
Speed LED	On	Off
Green	100 Mbit/s	10 Mbit/s
Orange	Link (Ethernet network connection available)	Activity (blinking) (data transfer in progress)

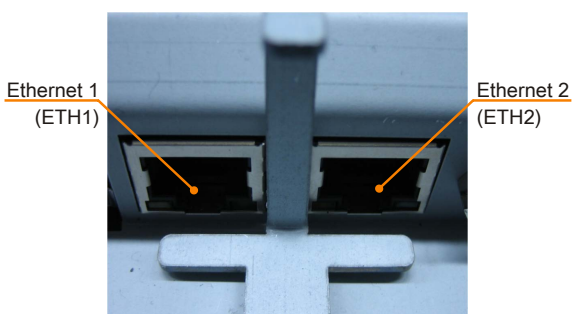


Table 12: Ethernet interface (ETH1)

- 1) The interfaces, etc. available on the device or module have been numbered as such for easy identification. This numbering may differ from that used by the particular operating system.
- 2) Both operating modes possible. Switching takes place automatically.

### Driver support

A special driver is required in order to operate the Intel 82551ER Ethernet controller. Drivers for approved operating systems are available in the Downloads section 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 website, not from manufacturer websites.**

## 2.4.6 USB interfaces

The PPC725 features a USB 2.0 (Universal Serial Bus) host controller with multiple USB interfaces, 3 of which are accessible externally for the user.

### Warning!

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

### Warning!

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

### 2.4.6.1 USB1, 2

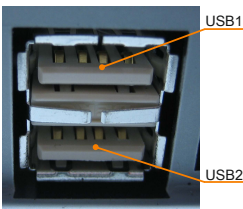
Universal Serial Bus (USB1 and USB2 <sup>1)</sup> )		USB type A, female 
Type	USB 2.0	
Design	Type A	
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)	
Current load USB1, USB2	Max. 500 mA <sup>2)</sup>	
Cable length	Max. 5 m (without hub)	

Table 13: USB connection (back)

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

### 2.4.6.2 USB3

The USB 3 port is on the side of the PPC725 behind the cover.


Universal Serial Bus (USB3 <sup>1)</sup> )		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)	
Power supply <sup>2)</sup> USB3	Max. 500 mA	
Cable length	Max. 5 m (without hub)	

Table 14: USB3 interface

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

## Driver support

For optimal functionality of USB 2.0 (transfer speed up to 480 Mbit/s) with Windows XP, Service Pack 1 or higher must be installed. Without this Service Pack, Windows XP will only support USB 1.1.

USB 2.0 is already integrated in B&R's Windows XP Embedded and Windows Embedded Standard 2009 operating systems.

### Information:

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

## 2.4.7 CompactFlash slot (CF1)

This CompactFlash slot is a standard component of an PPC725 system and is defined in BIOS as the primary master IDE device.

CompactFlash slot (CF1)	
Connection	Primary master IDE device
CompactFlash Type	Type I
Model number	Short description
CompactFlash	
5CFCRD.0512-06	CompactFlash 512 MB B&R
5CFCRD.1024-06	CompactFlash 1024 MB B&R
5CFCRD.2048-06	CompactFlash 2048 MB B&R
5CFCRD.4096-06	CompactFlash 4096 MB B&R
5CFCRD.8192-06	CompactFlash 8192 MB B&R
5CFCRD.016G-06	CompactFlash 16 GB B&R
5CFCRD.032G-06	CompactFlash 32 GB B&R
5CFCRD.0064-03	CompactFlash 64 MB WD
5CFCRD.0128-03	CompactFlash 128 MB WD
5CFCRD.0256-03	CompactFlash 256 MB WD
5CFCRD.0512-03	CompactFlash 512 MB WD
5CFCRD.1024-03	CompactFlash 1024 MB WD
5CFCRD.2048-03	CompactFlash 2048 MB WD
5CFCRD.4096-03	CompactFlash 4096 MB WD
5CFCRD.8192-03	CompactFlash 8192 MB WD

CompactFlash slot  
Side



Table 15: CompactFlash slot (CF1)

### Warning!

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

## 2.4.8 Hard disk / CompactFlash slot (HDD/CF2)

This slot allows a hard disk or second CompactFlash slot to be installed as a so-called add-on drive. An add-on drive is managed as the primary slave drive in BIOS.

### Information:

**Add-on drives can only be installed at B&R. Therefore, they need to be requested when placing an order.**

Hard disk / CompactFlash slot (HDD/CF2)	
Connection	Primary slave IDE device
<b>Model number</b>	<b>Short description</b>
	<b>Drives</b>
5AC600.SSDI-00	Add-on solid state drive (MLC) 128 GB
5AC600.HDDI-05	Add-on hard disk 40 GB ET, 24/7
5AC600.HDDI-06	Add-on hard disk 80 GB ET, 24/7
CompactFlash Type	Type I
<b>Model number</b>	<b>Short description</b>
	<b>Drives</b>
5AC600.CFSI-00	Add-on CompactFlash slot
	<b>CompactFlash</b>
5CFCRD.0512-06	CompactFlash 512 MB B&R
5CFCRD.1024-06	CompactFlash 1024 MB B&R
5CFCRD.2048-06	CompactFlash 2048 MB B&R
5CFCRD.4096-06	CompactFlash 4096 MB B&R
5CFCRD.8192-06	CompactFlash 8192 MB B&R
5CFCRD.016G-06	CompactFlash 16 GB B&R
5CFCRD.032G-06	CompactFlash 32 GB B&R
5CFCRD.0064-03	CompactFlash 64 MB WD
5CFCRD.0128-03	CompactFlash 128 MB WD
5CFCRD.0256-03	CompactFlash 256 MB WD
5CFCRD.0512-03	CompactFlash 512 MB WD
5CFCRD.1024-03	CompactFlash 1024 MB WD
5CFCRD.2048-03	CompactFlash 2048 MB WD
5CFCRD.4096-03	CompactFlash 4096 MB WD
5CFCRD.8192-03	CompactFlash 8192 MB WD



Table 16: Hard disk / CompactFlash slot (HDD/CF2)

## 2.4.9 Battery

The lithium battery (3 V, 950 mAh) buffers the internal real-time clock (RTC) and individually stored BIOS settings. It is located behind the CF battery cover on the front of the device. The battery's buffer lifespan is at least 4 years (at 50°C, 8.5 µA for the components being supplied and a self-discharge of 40%). The battery has a limited service life and should be replaced regularly (after the specified service life at the latest).

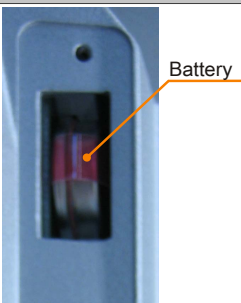
Battery		
Battery		
Type	Renata 950 mAh	
Removable	Yes, accessible from the outside	
Service life	4 years <sup>1)</sup>	
Model number	Short description	
	Batteries	
0AC201.91	Lithium batteries, 4 pcs., 3 V / 950 mAh, button cell	
4A0006.00-000	Lithium battery, 1 pc., 3 V / 950 mAh, button cell	

Table 17: Battery

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

For more on changing the lithium battery, see Maintenance and service, section "Changing the battery" on page 165.

For technical information on the battery, see 6 "Accessories", section "Replacement CMOS batteries" on page 136.

### Evaluating the battery status

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

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

Table 18: Battery status

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

## 2.4.10 Add-on interface slot

An optional add-on interface can be installed here.

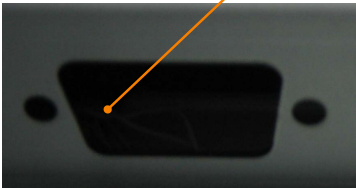
Add-on interface slot	
Available add-on interfaces	
Add-on interfaces are not currently available.	

Table 19: Add-on interface slot

### Information:

An add-on interface module can only be installed at B&R.

## 2.5 Serial number sticker

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



Figure 6: PPC725 - Serial number sticker

This information can also be found on the B&R website by entering the serial number of the complete system in the search field tab (after selecting the "Serial number" option) at the top of the website [www.br-automation.com](http://www.br-automation.com). The search provides a detailed list of installed components.

Serial number entered here  
e.g. B0460168438

Switching to the option  
"Serial number"

List of installed  
components shown after  
searching for a serial numt

SERIAL	MATERIAL	REVISION	LIEFERUNG	GEWÄHRLEISTUNGSSEITE
B0460168438	SPC725.1505-00	A0	*N/V	*N/A
ACEB0168422	5PC600.X945-00	A0	*N/V	*N/A
A3E40170335	5MMDR.2048-01	C0	*N/V	*N/A
B0920168422	5AC725.FLGC-00	A0	*N/V	*N/A

## 3 Individual components

### 3.1 System units

#### 3.1.1 5PC725.1505-00

##### 3.1.1.1 General information

- 15" TFT XGA color display
- Analog resistive touch screen
- IP65 protection
- Fan-free operation
- Flange output on top for mounting on a support arm system

##### 3.1.1.2 Order data

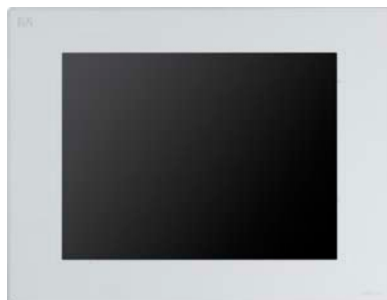
Model number	Short description	Figure
	<b>System units</b>	
5PC725.1505-00	Panel PC 725 15" XGA; 15" XGA color TFT display with touch screen (resistive); connections for 1x RS232, 3x USB 2.0, 2x Ethernet 10/100, IP65 protection; 24 VDC. Flange mounting on the top. Order connector for power supply separately (screw clamp: 0TB103.9; cage clamp: 0TB103.91).	
	<b>Required accessories</b>	
	<b>CPU boards</b>	
5PC600.X945-00	CPU board Intel Atom, 1600 MHz, 533 MHz FSB, 512 kB L2 cache; 945GME chipset; 1 slot for SO-DIMM DDR2 RAM module	
	<b>Flanges</b>	
5AC725.FLGC-00	PPC725 flange coupling	
	<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>Terminal blocks</b>	
0TB103.9	Connector, 24 VDC, 3-pin female, 3.31 mm² screw clamps, protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, 3.31 mm² cage clamps, protected against vibration by the screw flange	
	<b>Optional accessories</b>	
	<b>Drives</b>	
5AC600.CFSI-00	CompactFlash slot (add-on) for installation in an APC620 or Panel PC	
5AC600.HDDI-05	40 GB hard disk (add-on) 24/7 operation with extended temperature range. For APC620 and PPC700. Note: Please see the manual for information about using this hard disk.	
5AC600.HDDI-06	80 GB hard disk (add-on) 24/7 hard disk with extended temperature range. For APC620 and PPC700. Note: Please see the manual for information about using this hard disk.	
5AC600.SSDI-00	128 GB SATA SSD (MLC), add-on; for APC620 and PPC700. Note: Please see the manual for information about using this SSD.	

Table 20: 5PC725.1505-00 - Order data



### 3.1.1.3 Interfaces

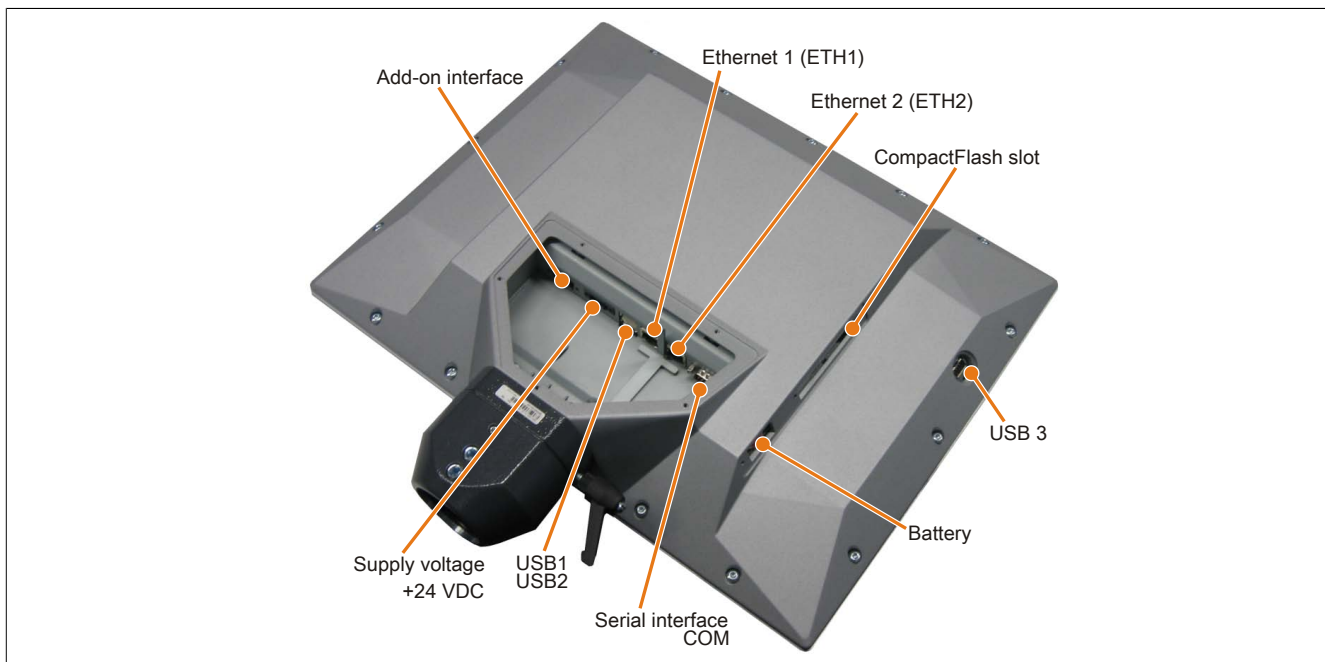


Figure 7: PPC725 - Rear view

### 3.1.1.4 Technical data

Product ID	5PC725.1505-00		
Revision	C0	D0	E0
<b>General information</b>			
LEDs		No	
B&R ID code		0xB046	
Battery			
Type		Renata 950 mAh	
Service life		4 years <sup>1)</sup>	
Removable		Yes, accessible from the outside	
Design		Lithium ion	
Power button		No	
Reset button		No	
Buzzer		Yes	
Certification			
CE		Yes	
cULus		Yes	
GOST-R		Yes	
<b>Controller</b>			
Boot loader		BIOS AMI	
Power failure logic			
Controller		MTCX	
Buffer time		10 ms	
Graphics			
Controller		Depends on the component	
SRAM			
Size		-	
Battery backed		-	
Memory			
Type		DDR2 SDRAM	
Memory size		Max. 2 GB	
<b>Interfaces</b>			
COM1			
Type		RS232, modem capable	
Design		9-pin male DSUB connector	
UART		16550-compatible, 16-byte FIFO	
Max. baud rate		115 kbit/s	
CompactFlash slot 1			
Type		Type I	

Table 21: 5PC725.1505-00, 5PC725.1505-00, 5PC725.1505-00 - Technical data



Product ID		5PC725.1505-00	
USB			
Quantity		3 (2x back, 1x side)	
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)	
Ethernet			
Quantity		2	
Transfer rate		10/100 Mbit/s	
Max. baud rate		100 Mbit/s	
Add-on interface slot			
Quantity		1	
Display			
Type		Color TFT	
Display size		15" (381 mm)	
Colors		16 million	
Resolution		XGA, 1024 x 768 pixels	
Contrast		550:1	800:1
Viewing angles			
Horizontal		Direction R / Direction L = 60°	
Vertical		Direction U = 45° / Direction D = 55°	
Backlight			
Classification		CCFL	LED
Brightness		250 cd/m²	350 cd/m²
Half-brightness time <sup>2)</sup>		50,000 h	
Touch screen			
Type <sup>3)</sup>		AMT	
Technologies		Analog, resistive	
Controller	Elo, serial, 12-bit	B&R, serial, 12-bit	
Transmittance		81% ±3%	
Electrical characteristics			
Nominal voltage		24 VDC ±25%	
Nominal current		1.4 A	
Starting current		Typ. 10 A, max. 40 A for <300 µs	
Power consumption		28.5 W	
Electrical isolation		Yes	
Operating conditions			
EN 60529 protection		All sides: IP65 (only with closed housing)	
Environmental conditions			
Temperature			
Operation		0 to 50°C	
Storage		-20 to 60°C	
Transport		-20 to 60°C	
Relative humidity			
Operation		T ≤ 40°C: 5 to 90%, non-condensing T > 40°C: <90%, non-condensing	
Storage		T ≤ 40°C: 5 to 90%, non-condensing T > 40°C: <90%, non-condensing	
Transport		T ≤ 40°C: 5 to 90%, non-condensing T > 40°C: <90%, non-condensing	
Vibration			
Operation		2 to 9 Hz: 3 mm amplitude / 9 to 200 Hz: 1 g	
Storage		2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g	
Transport		2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g	
Shock			
Operation		15 g, 11 ms	
Storage		30 g, 6 ms	
Transport		30 g, 6 ms	
Mechanical characteristics			
Housing			
Material		Aluminum paint	
Front			
Frame		Naturally anodized aluminum <sup>4)</sup>	
Design		Gray	
Panel membrane			
Material		Polyester	
Gasket		Metamoll	
Flange output		Top	

Table 21: 5PC725.1505-00, 5PC725.1505-00, 5PC725.1505-00 - Technical data

Product ID	5PC725.1505-00
Dimensions	
Width	426 mm
Height	330 mm (without flange) 402 mm (with flange)
Depth	58.7 mm (without flange) 83.2 mm (with flange)
Weight	6.27 kg (without flange)

Table 21: 5PC725.1505-00, 5PC725.1505-00, 5PC725.1505-00 - Technical data

- 1) At 50°C, 8.5  $\mu$ A of the supplied components and a self-discharge of 40%.
- 2) At an ambient temperature of 25°C. Reducing the brightness by 50% can result in an approximately 50% increase in the half-brightness time.
- 3) Touch screen drivers for approved operating systems are available in the Downloads section of the B&R website.
- 4) There may be visible deviations in the color and surface appearance depending on the process or batch.

### 3.1.1.5 Temperature humidity diagram

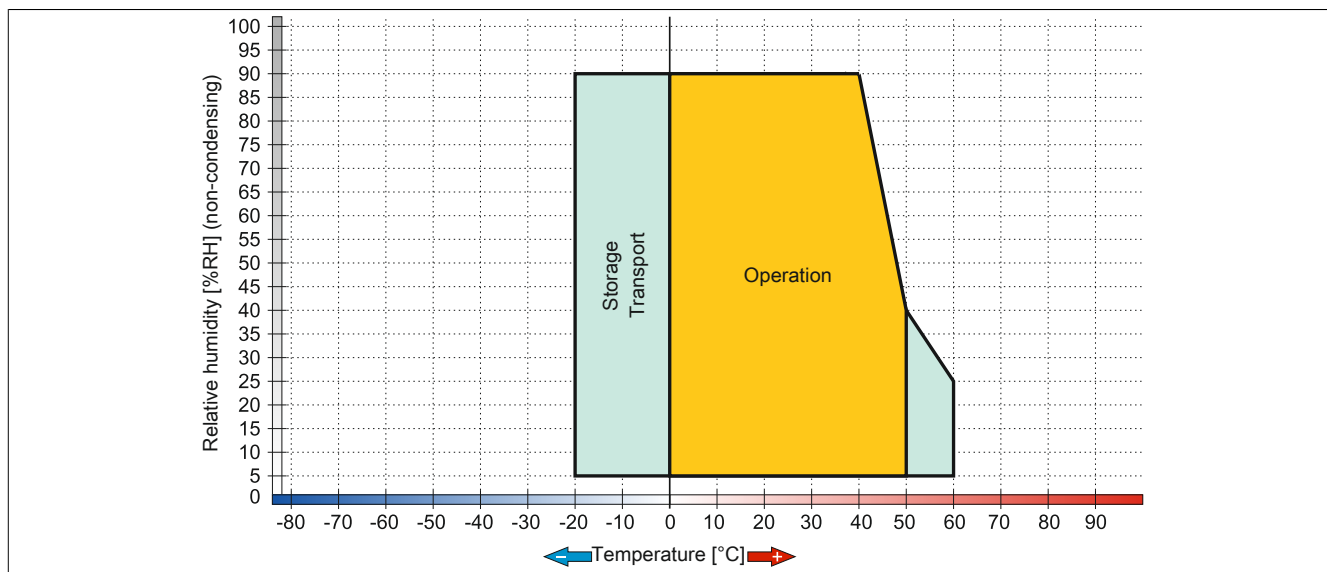


Figure 8: 5PC725.1505-00 - Temperature/Humidity diagram

Technical drawing of the PC panel showing three views: front, side, and bottom.

**Front View Dimensions:**

- Overall height: 330
- Inner display area height: 230
- Bottom bezel height: 50
- Top mounting bracket height: 72
- Overall width: 406
- Left bezel width: 60
- Display area width: 306

**Side View Dimensions:**

- Overall depth: 83.2
- Mounting bracket depth: 58.7

**Bottom View Dimensions:**

- Overall width: 47.7
- Mounting hole diameter:  $\varnothing 40$
- Internal component diameter:  $\varnothing 48.3$

Labels: "PANEL PC" is visible in the bottom right corner of the front view.

Panel PC 725 User's Manual V1.16

### 3.1.2 5PC725.1505-01

#### 3.1.2.1 General information

- 15" TFT XGA color display
- Analog resistive touch screen
- IP65 protection
- Fan-free operation
- Flange output on bottom for mounting on a support arm system

#### 3.1.2.2 Order data


Model number	Short description	Figure
	<b>System units</b>	
5PC725.1505-01	Panel PC 725 15" XGA; 15" XGA color TFT display with touch screen (resistive); connections for 1x RS232, 3x USB 2.0, 2x Ethernet 10/100, IP65 protection; 24 VDC. Flange mounting on the bottom. Order connector for power supply separately (screw clamp: 0TB103.9; cage clamp: 0TB103.91).	
	<b>Required accessories</b>	
	<b>CPU boards</b>	
5PC600.X945-00	CPU board Intel Atom, 1600 MHz, 533 MHz FSB, 512 kB L2 cache; 945GME chipset; 1 slot for SO-DIMM DDR2 RAM module	
	<b>Flanges</b>	
5AC725.FLGC-00	PPC725 flange coupling	
	<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>Terminal blocks</b>	
0TB103.9	Connector, 24 VDC, 3-pin female, 3.31 mm² screw clamps, protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, 3.31 mm² cage clamps, protected against vibration by the screw flange	
	<b>Optional accessories</b>	
	<b>Drives</b>	
5AC600.CFSI-00	CompactFlash slot (add-on) for installation in an APC620 or Panel PC	
5AC600.HDDI-05	40 GB hard disk (add-on) 24/7 operation with extended temperature range. For APC620 and PPC700. Note: Please see the manual for information about using this hard disk.	
5AC600.HDDI-06	80 GB hard disk (add-on) 24/7 hard disk with extended temperature range. For APC620 and PPC700. Note: Please see the manual for information about using this hard disk.	
5AC600.SSDI-00	128 GB SATA SSD (MLC), add-on; for APC620 and PPC700. Note: Please see the manual for information about using this SSD.	

Table 22: 5PC725.1505-01 - Order data

### 3.1.2.3 Interfaces

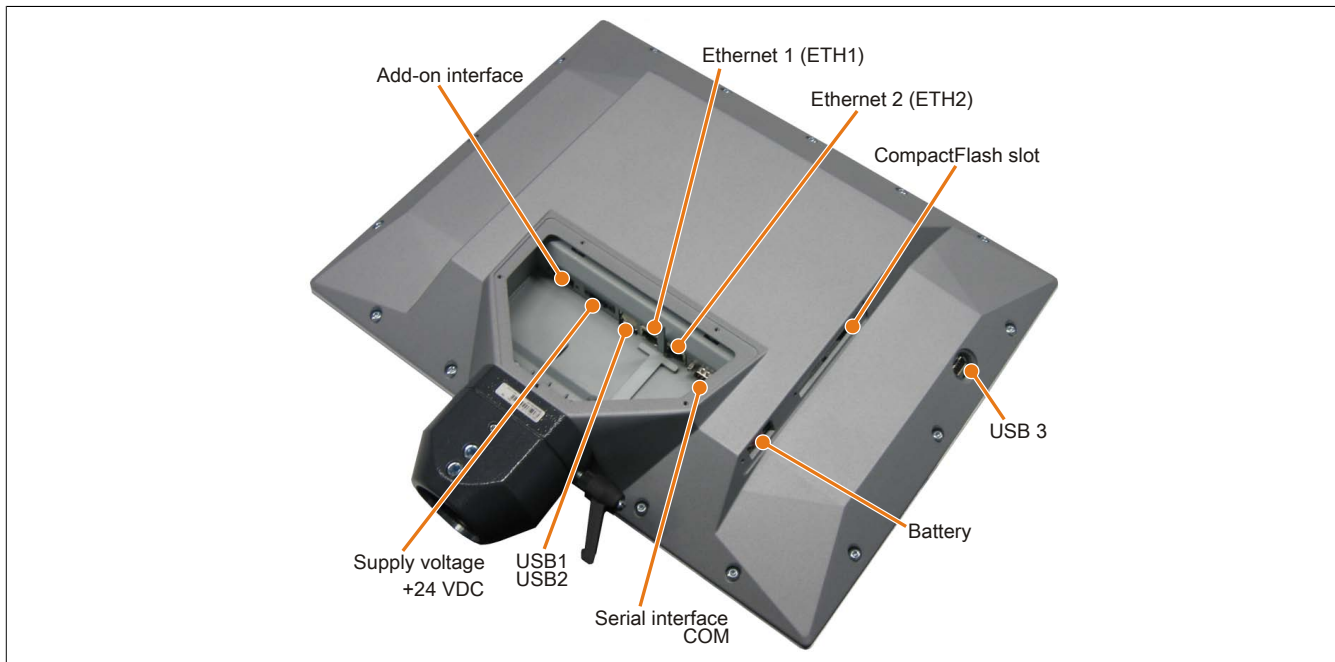


Figure 10: PPC725 - Rear view

### 3.1.2.4 Technical data

Product ID	5PC725.1505-01		
Revision	C0	D0	E0
<b>General information</b>			
LEDs		No	
B&R ID code		0xB0EC	
Battery			
Type		Renata 950 mAh	
Service life		4 years <sup>1)</sup>	
Removable		Yes, accessible from the outside	
Design		Lithium ion	
Power button		No	
Reset button		No	
Buzzer		Yes	
Certification			
CE		Yes	
cULus		Yes	
GOST-R		Yes	
<b>Controller</b>			
Boot loader		BIOS AMI	
Power failure logic			
Controller		MTCX	
Buffer time		10 ms	
Graphics			
Controller		Depends on the component	
SRAM			
Size		-	
Battery backed		-	
Memory			
Type		DDR2 SDRAM	
Memory size		Max. 2 GB	
<b>Interfaces</b>			
COM1			
Type		RS232, modem capable	
Design		9-pin male DSUB connector	
UART		16550-compatible, 16-byte FIFO	
Max. baud rate		115 kbit/s	
CompactFlash slot 1			
Type		Type I	

Table 23: 5PC725.1505-01, 5PC725.1505-01, 5PC725.1505-01 - Technical data

Product ID		5PC725.1505-01	
USB			
Quantity	3 (2x back, 1x side)		
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)		
Ethernet			
Quantity	2		
Transfer rate	10/100 Mbit/s		
Max. baud rate	100 Mbit/s		
Add-on interface slot			
Quantity	1		
Display			
Type	Color TFT		
Display size	15" (381 mm)		
Colors	16 million		
Resolution	XGA, 1024 x 768 pixels		
Contrast	550:1	800:1	
Viewing angles			
Horizontal	Direction R / Direction L = 60°		Direction R / Direction L = 80°
Vertical	Direction U = 45° / Direction D = 55°		Direction U / Direction D = 80°
Backlight			
Classification	CCFL		LED
Brightness	250 cd/m²		350 cd/m²
Half-brightness time <sup>2)</sup>	50,000 h		
Touch screen			
Type <sup>3)</sup>	AMT		
Technologies	Analog, resistive		
Controller	Elo, serial, 12-bit	B&R, serial, 12-bit	
Transmittance	81% ±3%		
Electrical characteristics			
Nominal voltage	24 VDC ±25%		
Nominal current	1.4 A		
Starting current	Typ. 10 A, max. 40 A for <300 µs		
Power consumption	28.5 W		
Electrical isolation	Yes		
Operating conditions			
EN 60529 protection	All sides: IP65 (only with closed housing)		
Environmental conditions			
Temperature			
Operation	0 to 50°C		
Storage	-20 to 60°C		
Transport	-20 to 60°C		
Relative humidity			
Operation	T ≤ 40°C: 5 to 90%, non-condensing T > 40°C: <90%, non-condensing		
Storage	T ≤ 40°C: 5 to 90%, non-condensing T > 40°C: <90%, non-condensing		
Transport	T ≤ 40°C: 5 to 90%, non-condensing T > 40°C: <90%, non-condensing		
Vibration			
Operation	2 to 9 Hz: 3 mm amplitude / 9 to 200 Hz: 1 g		
Storage	2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g		
Transport	2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g		
Shock			
Operation	15 g, 11 ms		
Storage	30 g, 6 ms		
Transport	30 g, 6 ms		
Mechanical characteristics			
Housing			
Material	Aluminum paint		
Front			
Frame	Naturally anodized aluminum <sup>4)</sup>		
Design	Gray		
Panel membrane			
Material	Polyester		
Gasket	Metamoll		
Flange output		Bottom	

Table 23: 5PC725.1505-01, 5PC725.1505-01, 5PC725.1505-01 - Technical data

Product ID	5PC725.1505-01
Dimensions	
Width	426 mm
Height	330 mm (without flange) 402 mm (with flange)
Depth	58.7 mm (without flange) 83.2 mm (with flange)
Weight	6.27 kg (without flange)

Table 23: 5PC725.1505-01, 5PC725.1505-01, 5PC725.1505-01 - Technical data

- 1) At 50°C, 8.5  $\mu$ A of the supplied components and a self-discharge of 40%.
- 2) At an ambient temperature of 25°C. Reducing the brightness by 50% can result in an approximately 50% increase in the half-brightness time.
- 3) Touch screen drivers for approved operating systems are available in the Downloads section of the B&R website.
- 4) There may be visible deviations in the color and surface appearance depending on the process or batch.

### 3.1.2.5 Temperature/Humidity diagram



Figure 11: 5PC725.1505-01 - Temperature/Humidity diagram

### 3.1.2.6 Dimensions

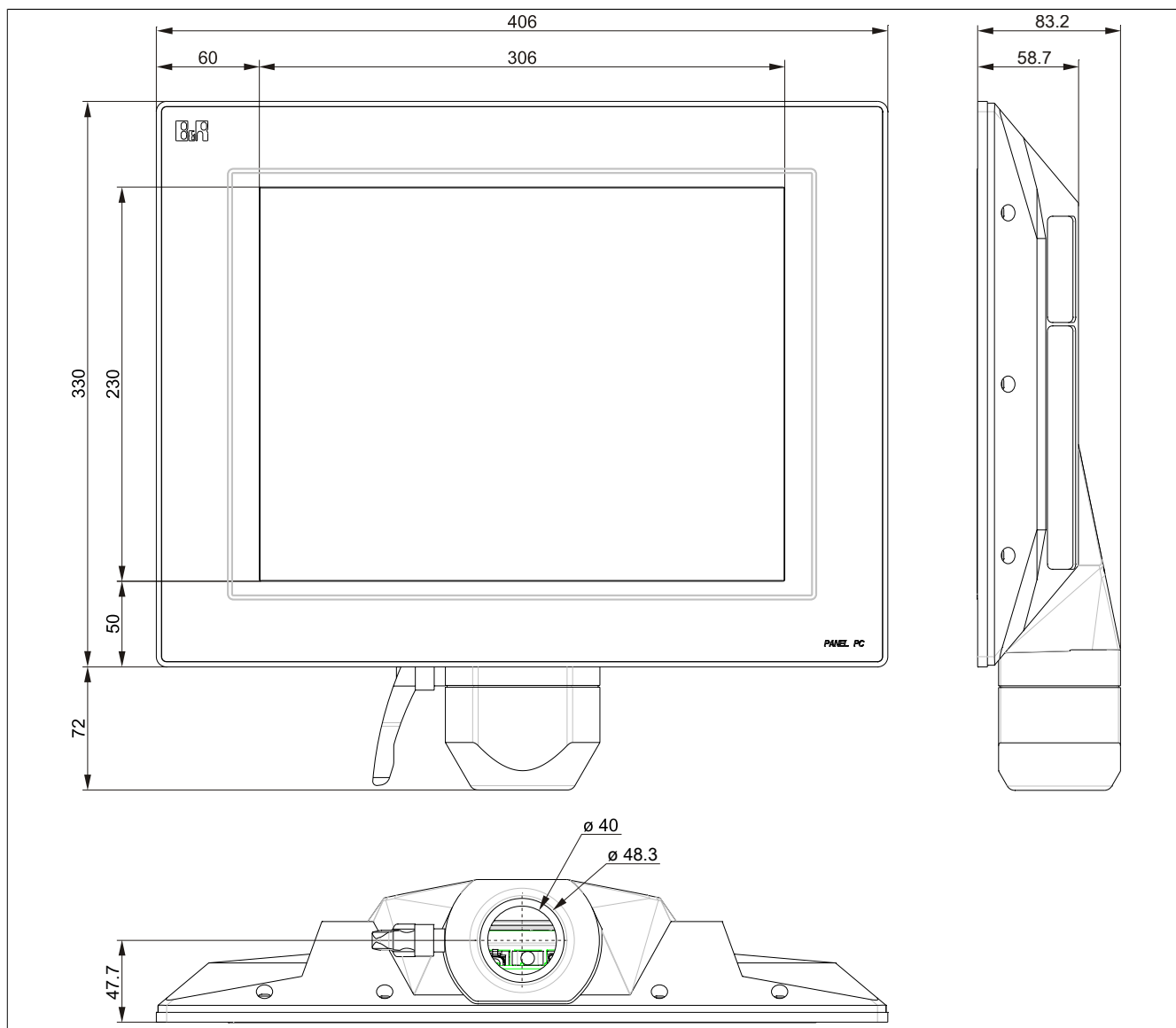


Figure 12: 5PC725.1505-01 - Dimensions



## 3.2 X945 CPU board

### 3.2.1 5PC600.X945-00

#### 3.2.1.1 General information

- Intel® Atom™ N270 1.6 GHz
- Intel® 945GME chipset
- 2x DDR2 memory slot
- Intel® GMA 950
- AMI BIOS

#### 3.2.1.2 Order data


Model number	Short description	<div>Figure</div> 
CPU boards		
5PC600.X945-00	CPU board Intel Atom, 1600 MHz, 533 MHz FSB, 512 kB L2 cache; 945GME chipset; 1 slot for SO-DIMM DDR2 RAM module	
Required accessories		
Main memory		
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 24: 5PC600.X945-00 - Order data

#### 3.2.1.3 Technical data

Product ID	5PC600.X945-00
<b>General information</b>	
Certification	
CE	Yes
GOST-R	Yes
GL	Yes <sup>1)</sup>
<b>Controller</b>	
Boot loader	BIOS AMI
Processor	
Type	Intel® Atom™ N270
Clock frequency	1600 MHz
Architectures	45 nm
L1 cache	512 kB
L2 cache	512 kB
External bus	533 MHz
Intel® 64 Architecture	No
Expanded command set	Hyper-threading technology, enhanced speed step SSE, SSE2, SSE3 (Streaming SIMD extensions)
Chipset	Intel® 945GME Intel® 82801GBM (ICH7-M)
Real-time clock	
Precision	At 25°C: typ. 12 ppm (1 seconds) per day <sup>2)</sup>
Battery backed	Yes
Memory socket	
Type	DDR2
Memory size	Max. 2 GB
Graphics	
Controller	Intel® Graphics Media Accelerator 950
Memory	Up to 224 MB <sup>3)</sup>
Color depth	Max. 32-bit
Resolution	
RGB	400 MHz RAMDAC, resolutions up to 2048 x 1536 @ 75 Hz (QXGA) and 1920 x 1080 @ 85 Hz (HDTV)
GE1 = LVDS <sup>4)</sup>	Resolutions from 640 x 480 up to 1920 x 1200 (Embedded Panel Interface based on VESA EDID™ 1.3)
Mass memory management	1x EIDE

Table 25: 5PC600.X945-00 - Technical data

- 1) Yes, although applies only if all components installed within the complete system have this certification
- 2) At max. specified ambient temperature: typically 58 ppm (5 seconds) - worst-case 220 ppm (19 seconds).
- 3) Allocated in main memory.
- 4) GE = Graphics Engine.

#### 3.2.1.4 Driver support

In order for the CPU board with the Intel 945GME chipset to work properly, it is necessary to install the Intel chipset driver (e.g. special USB driver) and the graphics chip. Drivers for approved operating systems are available in the Downloads section 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 website, not from manufacturer websites.**

### 3.3 Main memory

#### 3.3.1 General information

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

If two RAM modules with the same size (e.g. 1 GB) are inserted, then dual-channel memory technology is supported. This technology is not supported if two modules of different sizes (e.g. 1 GB and 2 GB) are inserted.

If two 2 GB modules are inserted, 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 26: 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
General information			
Certification			
CE	Yes		
cULus	Yes		
GOST-R	Yes		
GL	Yes <sup>1)</sup>		
Controller			
Memory			
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)		

Table 27: 5MMDDR.0512-01, 5MMDDR.1024-01, 5MMDDR.2048-01 - Technical data

<sup>1)</sup> Yes, although applies only if all components installed within the complete system have this certification

### Information:

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

### 3.4 5AC725.FLGC-00

#### 3.4.1 General information

The flange is used to mount the Panel PC 725 on a support arm system.

#### 3.4.2 Order data


Model number	Short description	Figure
	<b>Flanges</b>	
5AC725.FLGC-00	PPC725 flange coupling	

Table 28: 5AC725.FLGC-00 - Order data

#### 3.4.3 Technical data

Product ID	5AC725.FLGC-00
<b>General information</b>	
Certification	
CE	Yes
GOST-R	Yes
<b>Mechanical characteristics</b>	
Housing	
Material	Zinc die casting
Paint	RAL 7024
Dimensions	
Width	90 mm
Height	81 mm
Depth	71 mm
Weight	Approx. 1,100 g

Table 29: 5AC725.FLGC-00 - Technical data

#### 3.4.4 Dimensions

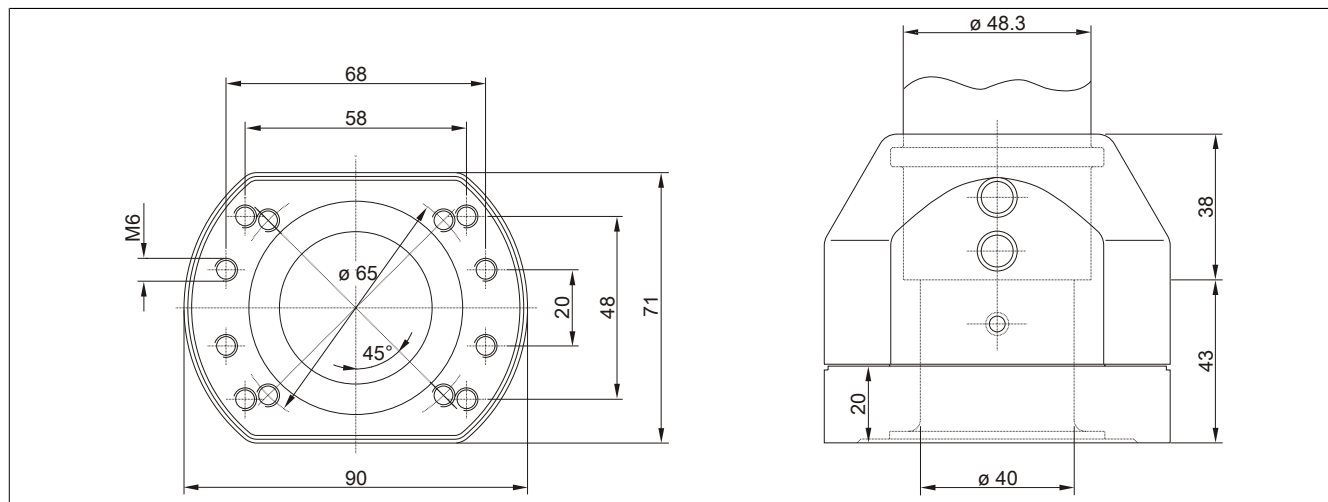


Figure 13: 5AC725.FLGC-00 - Dimensions

## 3.5 Drives

### 3.5.1 5AC600.SSDI-00

#### 3.5.1.1 General information

This 128 GB add-on SSD (solid-state drive) is based on MLC (multi-level cell) technology, ATA/ATAPI compatible and can be used in APC620, PPC700 and PPC725 system units.

- 128 GB solid-state drive
- MLC flash
- PATA support
- Add-on
- ATA/ATAPI compatible

#### Information:

Add-on drives can only be installed at B&R. Therefore, they need to be requested when placing an order.

#### 3.5.1.2 Order data


Model number	Short description	Figure
	<b>Drives</b>	
5AC600.SSDI-00	128 GB SATA SSD (MLC), add-on; for APC620 and PPC700. Note: Please see the manual for information about using this SSD.	
	<b>Optional accessories</b>	
	<b>Drives</b>	
5MMSSD.0128-00	128 GB SATA SSD (MLC); replacement part for 5AC600.SSDI-00; note: please see the manual for information about using this SSD	

Table 30: 5AC600.SSDI-00 - Order data

#### 3.5.1.3 Technical data

#### Caution!

A sudden loss of power may result in data loss! In very rare cases, the mass storage device may also become damaged.

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

#### Information:

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

Product ID	5AC600.SSDI-00	
Revision	C0	D0
General information		
Certification		
CE	Yes	
GOST-R	Yes	
Solid state drive		
Capacity	128 GB	
MTBF	1,000,000 hours	
S.M.A.R.T. support	Yes	
Interface	PATA	
Maintenance	None	
Sequential read	Max. 103.7 MB/s	Max. 118.4 MB/s
Sequential write	Max. 93.15 MB/s	Max. 92.75 MB/s
IOPS <sup>1)</sup>		
4k read	7.733 MB/s	13.09 MB/s
4k write	0.722 MB/s	1.225 MB/s
Endurance		
MLC flash	Yes	

Table 31: 5AC600.SSDI-00, 5AC600.SSDI-00 - Technical data

Product ID		5AC600.SSDI-00
Guaranteed data volume	Guaranteed	80 TBW <sup>2)</sup>
Data reliability		<1 unrecoverable error in 10 <sup>16</sup> bit read accesses
Compatibility		PATA (ATA/ATAPI 8) SSD Enhanced SMART ATA feature set Ultra DMA Mode 0-6 Multi-Word DMA Mode 0-2 PIO Mode 0-4
Environmental conditions		
Temperature		
Operation		0 to 70°C
Storage		-40 to 85°C
Transport		-40 to 85°C
Relative humidity		
Operation		0 to 95%, non-condensing
Storage		0 to 95%, non-condensing
Transport		0 to 95%, non-condensing
Vibration		
Operation		20 to 2000 Hz: 20 g
Storage		20 to 2000 Hz: 20 g
Transport		20 to 2000 Hz: 20 g
Shock		
Operation		1500 g, 0.5 ms
Storage		1500 g, 0.5 ms
Transport		1500 g, 0.5 ms
Altitude		
Operation		-300 to 12192 m
Storage		-300 to 12192 m
Transport		-300 to 12192 m
Mechanical characteristics		
Installation		Fixed <sup>3)</sup>
Dimensions <sup>4)</sup>		
Width		69.85 mm
Height		7.40 mm
Depth		100.3 mm
Weight <sup>5)</sup>		55 g
Manufacturer information		
Manufacturer		Transcend
Manufacturer's product ID	TS128GPSD320	TS128GPSD330

Table 31: 5AC600.SSDI-00, 5AC600.SSDI-00 - Technical data

- 1) IOPS: Random read and write input/output operations per second.
- 2) TBW: Terabytes written
- 3) Add-on mounting
- 4) Dimensions without add-on
- 5) Weight without add-on

### 3.5.1.4 Temperature humidity diagram

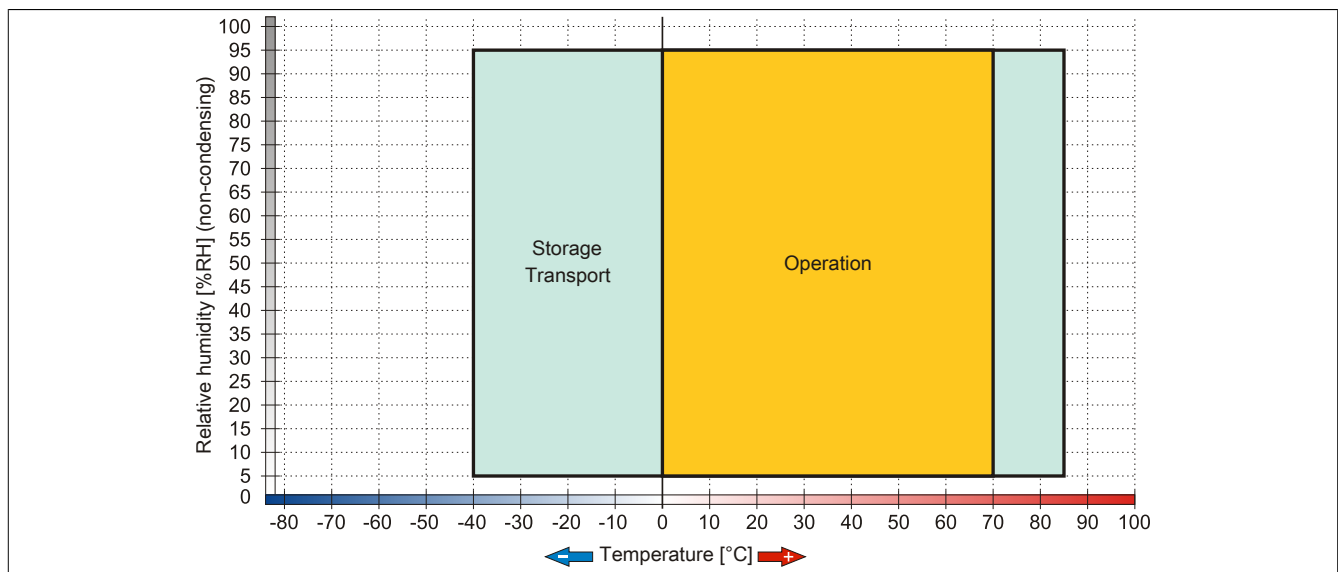


Figure 14: 5AC600.SSDI-00 - Temperature humidity diagram

### 3.5.2 5AC600.HDDI-05

#### 3.5.2.1 General information

This add-on drive provides a slot for a CompactFlash card.

A CompactFlash card inserted in the add-on drive is referred to internally as the "primary slave drive."

#### Information:

Add-on drives can only be installed at B&R. Therefore, they need to be requested when placing an order.

#### Caution!

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

#### 3.5.2.2 Order data


Model number	Short description	Figure
	<b>Drives</b>	
5AC600.HDDI-05	40 GB hard disk (add-on) 24/7 operation with extended temperature range. For APC620 and PPC700. Note: Please see the manual for information about using this hard disk.	

Table 32: 5AC600.HDDI-05 - Order data

#### 3.5.2.3 Technical data

#### Information:

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

Product ID	5AC600.HDDI-05
<b>General information</b>	
Certification	
CE	Yes
cULus	Yes
GOST-R	Yes
<b>Hard disk drive</b>	
Capacity	40 GB
Number of heads	2
Number of sectors	78,140,160
Bytes per sector	512
Cache	8 MB
Speed	5400 rpm $\pm$ 1%
Startup time	Typ. 3 s (from 0 rpm to read access)
MTBF	750,000 POH <sup>1)</sup>
S.M.A.R.T. support	Yes
Interface	ATA-6
Access time	12.5 ms
Data transfer rate	
Internal	Max. 450 Mbit/s
To/From host	Max. 100 MB/s (Ultra DMA mode 5)
Positioning time	
Minimum (track to track)	1 ms
Nominal (read only)	12.5 ms
Maximum (read only)	22 ms
<b>Environmental conditions</b>	
Temperature <sup>2)</sup>	
Operation <sup>3)</sup>	-30 to 85°C
24-hour operation <sup>4)</sup>	-30 to 85°C
Storage	-40 to 95°C
Transport	-40 to 95°C

Table 33: 5AC600.HDDI-05 - Technical data

Product ID	5AC600.HDDI-05
Relative humidity	
Operation	5 to 90%
Storage	5 to 95%
Transport	5 to 95%
Vibration	
Operation	5 to 500 Hz: 2 g; no unrecoverable errors
Storage	5 to 500 Hz: 5 g; no unrecoverable errors
Transport	5 to 500 Hz: 5 g; no unrecoverable errors
Shock	
Operation	Max. 300 g, 2 ms; no unrecoverable errors
Storage	Max. 150 g, 11 ms; no unrecoverable errors
Transport	Max. 800 g, 2 ms; no damage Max. 400 g, 0.5 ms; no damage Max. 800 g, 2 ms; no damage Max. 400 g, 0.5 ms; no damage
Altitude	
Operation	-300 to 5000 m
Storage	-300 to 12192 m
<b>Mechanical characteristics</b>	
Installation	Fixed <sup>5)</sup>
Dimensions	
Width	13 mm
Length	128 mm
Height	98 mm
Weight	100 g
<b>Manufacturer information</b>	
Manufacturer	Seagate
Manufacturer's product ID	ST940817AM

Table 33: 5AC600.HDDI-05 - Technical data

- 1) With 8760 POH (power on hours) per year and 70°C surface temperature.
- 2) Temperature values for 305 meter altitude. The temperature specification must be reduced linearly by 1 °C every 305 meters. The temperature increase and decrease can be a maximum of 3°C per minute.
- 3) Standard operation means 250 POH (power-on hours) per month.
- 4) 24-hour operation means 732 POH (power-on hours) per month.
- 5) Add-on mounting.

### 3.5.2.4 Temperature humidity diagram

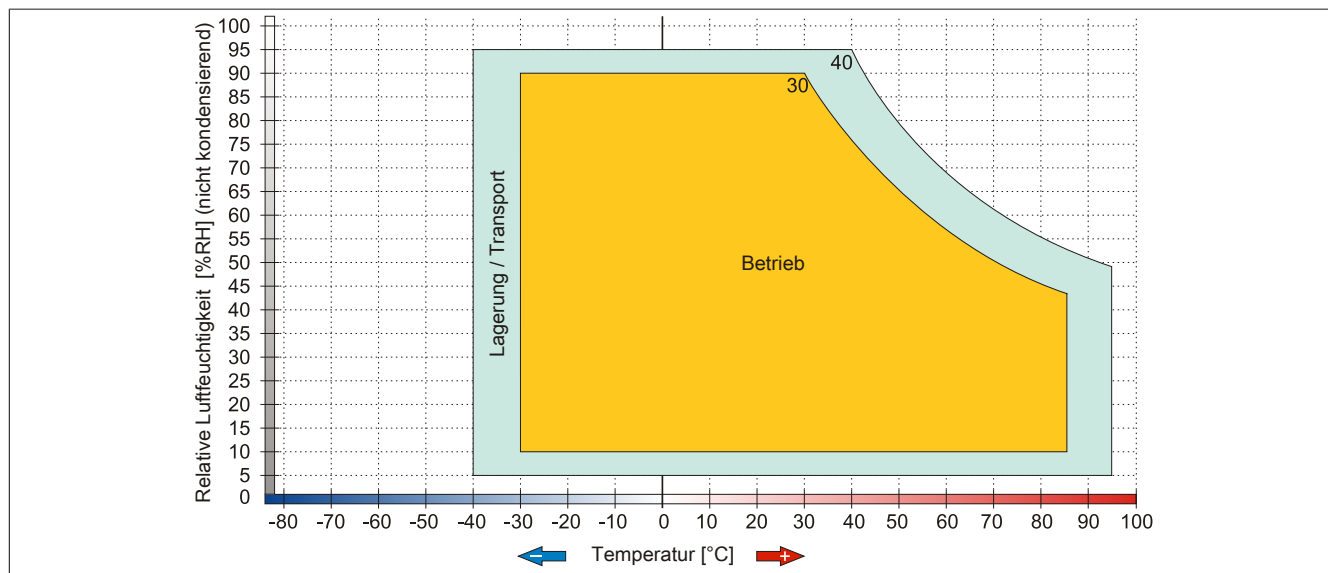


Figure 15: 5AC600.HDDI-05 - Temperature humidity diagram of add-on hard disk



### 3.5.3 5AC600.HDDI-06

#### 3.5.3.1 General information

This 80 GB hard disk is specified for 24-hour operation and also features an extended temperature range.

The add-on drive is managed internally as the primary slave drive.

#### Information:

Add-on drives can only be installed at B&R. Therefore, they need to be requested when placing an order.

#### 3.5.3.2 Order data


Model number	Short description	Figure
	<b>Drives</b>	
5AC600.HDDI-06	80 GB Hard Disk (add-on) 24/7 hard disk with extended temperature range. For APC620 and PPC700. Remark: Please see manual for proper use of the hard disk.	

Table 34: 5AC600.HDDI-06 - Order data

#### 3.5.3.3 Technical data

#### Information:

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

Product ID	5AC600.HDDI-06
<b>General information</b>	
Certification	
CE	Yes
cULus	Yes
<b>Hard disk drive</b>	
Capacity	80 GB
Number of heads	2
Number of sectors	156,301,488
Bytes per sector	512
Cache	8 MB
Speed	5400 rpm $\pm$ 1%
Startup time	Typ. 4 s (from 0 rpm to read access)
MTBF	750,000 POH <sup>1)</sup>
S.M.A.R.T. support	Yes
Interface	ATA-6
Access time	10 ms
Data transfer rate	
Internal	Max. 450 Mbit/s
To/From host	Max. 100 MB/s (Ultra DMA mode 5)
Positioning time	
Minimum (track to track)	1 ms
Nominal (read only)	12.5 ms
Maximum (read only)	22 ms
<b>Environmental conditions</b>	
Temperature <sup>2)</sup>	
Operation	-30 to 85°C
24-hour operation <sup>3)</sup>	-30 to 85°C
Storage <sup>4)</sup>	-40 to 95°C
Transport	-40 to 95°C
Relative humidity	
Operation	5 to 90%
Storage	5 to 95%
Transport	5 to 95%

Table 35: 5AC600.HDDI-06 - Technical data

Product ID	5AC600.HDDI-06
Vibration	
Operation	5 to 500 Hz: 2 g; no unrecoverable errors
Storage	5 to 500 Hz: 5 g; no unrecoverable errors
Transport	5 to 500 Hz: 5 g; no unrecoverable errors
Shock	
Operation	Max. 300 g, 2 ms; no unrecoverable errors Max. 150 g, 11 ms; no unrecoverable errors
Storage	Max. 800 g, 2 ms; no damage Max. 400 g, 0.5 ms; no damage
Transport	Max. 800 g, 2 ms; no damage Max. 400 g, 0.5 ms; no damage
Altitude	
Operation	-300 to 5000 m
Storage	-300 to 12192 m
Mechanical characteristics	
Installation	Fixed <sup>5)</sup>
Dimensions	
Width	13 mm
Length	130 mm
Height	98 mm
Weight	120 g
Manufacturer information	
Manufacturer	Seagate
Manufacturer's product ID	ST980817AM

Table 35: 5AC600.HDDI-06 - Technical data

- 1) With 8760 POH (power on hours) per year and 70°C surface temperature.
- 2) Temperature values for 305 meter altitude. The temperature specification must be reduced linearly by 1 °C every 305 meters. The temperature increase and decrease can be a maximum of 3°C per minute.
- 3) 24-hour operation means 732 POH (power-on hours) per month.
- 4) Standard operation means 250 POH (power-on hours) per month.
- 5) Add-on mounting.

### 3.5.3.4 Temperature humidity diagram

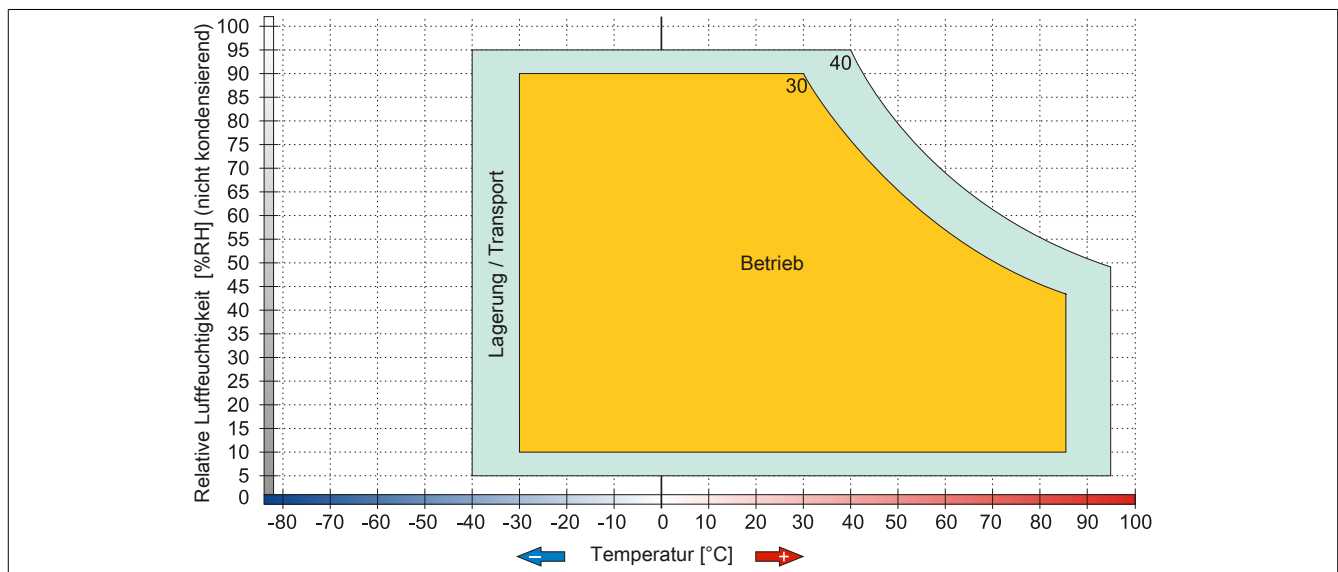


Figure 16: 5AC600.HDDI-06 - Temperature humidity diagram of add-on hard disk

### 3.5.4 5AC600.CFSI-00

#### 3.5.4.1 General information

This add-on drive provides a slot for a CompactFlash card.

A CompactFlash card inserted in the add-on drive is referred to internally as the "primary slave drive."

#### Information:

Add-on drives can only be installed at B&R. Therefore, they need to be requested when placing an order.

#### Caution!

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

#### 3.5.4.2 Order data


Model number	Short description	Figure
5AC600.CFSI-00	CompactFlash slot (add-on) for installation in an APC620 or Panel PC	
	<b>Drives</b>	
	<b>Optional accessories</b>	
	<b>CompactFlash-cards</b>	
5CFCRD.0064-03	CompactFlash 64 MB Western Digital (SLC)	
5CFCRD.0128-03	CompactFlash 128 MB Western Digital (SLC)	
5CFCRD.016G-06	CompactFlash 16 GB B&R (SLC)	
5CFCRD.0256-03	CompactFlash 256 MB Western Digital (SLC)	
5CFCRD.032G-06	CompactFlash 32 GB B&R (SLC)	
5CFCRD.0512-03	CompactFlash 512 MB Western Digital (SLC)	
5CFCRD.0512-06	CompactFlash 512 MB B&R (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 36: 5AC600.CFSI-00 - Order data

#### 3.5.4.3 Technical data

#### Information:

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

Product ID	5AC600.CFSI-00
<b>General information</b>	
Certification	
CE	Yes
cULus	Yes
GOST-R	Yes
<b>Interfaces</b>	
CompactFlash slot 1	
Quantity	1
Type	Type I
Connection	Primary Slave
<b>Mechanical characteristics</b>	
Weight	100 g

Table 37: 5AC600.CFSI-00 - Technical data

### 3.5.5 5MMSSD.0128-00

#### 3.5.5.1 General information

This 128 GB solid-state drive can be used as a replacement part for the 5AC600.SSDI-00 SSD.

- 128 GB solid-state drive
- MLC flash
- PATA support
- Replacement SSD for 5AC600.SSDI-00
- ATA/ATAPI compatible

#### Information:

Add-on drives can only be installed at B&R. Therefore, they need to be requested when placing an order.

#### 3.5.5.2 Order data


Model number	Short description	Figure
	<b>Drives</b>	
5MMSSD.0128-00	128 GB PATA SSD (MLC); replacement part for 5AC600.SSDI-00; note: Please see the manual for information about using this SSD.	

Table 38: 5MMSSD.0128-00 - Order data

#### 3.5.5.3 Technical data

#### Caution!

A sudden loss of power may result in data loss! In very rare cases, the mass storage device may also become damaged.

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

#### Information:

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

Product ID	5MMSSD.0128-00
<b>General information</b>	
Certification	
CE	Yes
cULus	Yes
cULus HazLoc Class 1 Division 2	Yes <sup>1)</sup>
GOST-R	Yes
<b>Solid-state drive</b>	
Capacity	128 GB
MTBF	1,000,000 hours
S.M.A.R.T. support	Yes
Interface	PATA
Maintenance	None
Sequential read	Max. 103.7 MB/s
Sequential write	Max. 93.15 MB/s
IOPS <sup>2)</sup>	
4k read	7.733 MB/s
4k write	0.722 MB/s
<b>Endurance</b>	
MLC flash	Yes
Data reliability	<1 unrecoverable error in 10 <sup>16</sup> bit read accesses
Compatibility	PATA (ATA/ATAPI 8) SSD Enhanced SMART ATA feature set Ultra DMA Mode 0-6 Multi-Word DMA Mode 0-2 PIO Mode 0-4

Table 39: 5MMSSD.0128-00 - Technical data

Product ID	5MMSSD.0128-00
Environmental conditions	
Temperature	
Operation	0 to 70°C
Storage	-40 to 85°C
Transport	-40 to 85°C
Relative humidity	
Operation	0 to 95%, non-condensing
Storage	0 to 95%, non-condensing
Transport	0 to 95%, non-condensing
Vibration	
Operation	20 to 2000 Hz: 20 g
Storage	20 to 2000 Hz: 20 g
Transport	20 to 2000 Hz: 20 g
Shock	
Operation	1500 g, 0.5 ms
Storage	1500 g, 0.5 ms
Transport	1500 g, 0.5 ms
Altitude	
Operation	-300 to 12192 m
Storage	-300 to 12192 m
Transport	-300 to 12192 m
Mechanical characteristics	
Dimensions	
Width	69.85 mm
Height	7.40 mm
Depth	100.3 mm
Weight	55 g
Manufacturer information	
Manufacturer	Transcend
Manufacturer's product ID	TS128GPSD320

Table 39: 5MMSSD.0128-00 - Technical data

- 1) Yes, although applies only if all components installed within the complete system have this certification
- 2) IOPS: Random read and write input/output operations per second.

### 3.5.5.4 Temperature humidity diagram

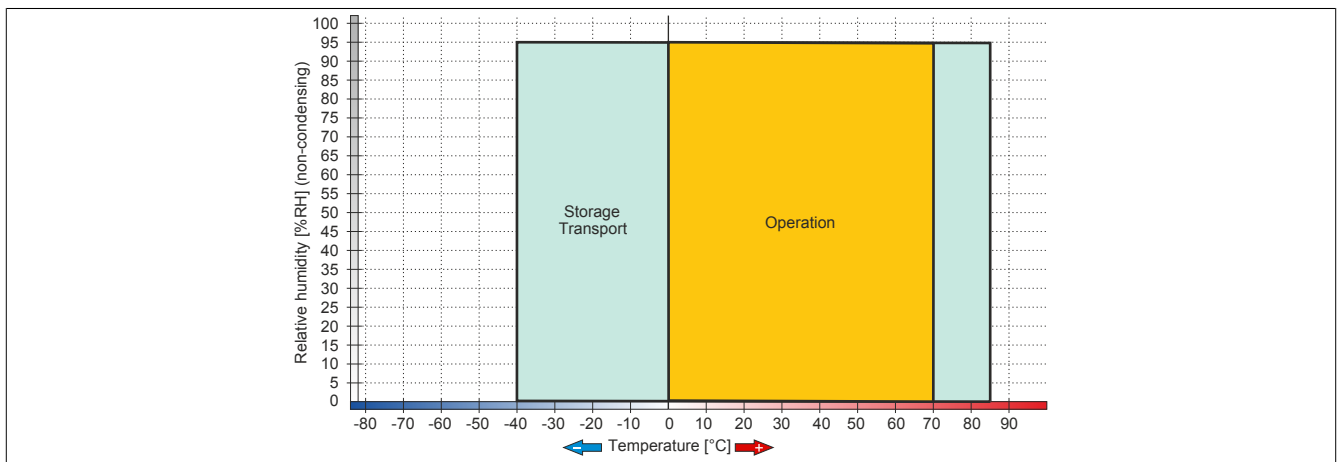


Figure 17: 5MMSSD.0128-00 - Temperature humidity diagram

## Chapter 3 • Commissioning

### 1 Installation

Panel PC 725 devices are best mounted on a swing arm system using the flange output found on the housing.



#### 1.1 Important installation information

- This installation requires a swing arm system.
- Environmental conditions must be taken into consideration.
- The PPC725 is only certified for operation in closed rooms.
- The PPC725 cannot be situated in direct sunlight.
- The protective caps must be attached to the PPC725 before startup, see section 1.2 "Mounting the protective caps" on page 55.

## 1.2 Mounting the protective caps

Panel PC 725 units are delivered with protective caps for the interfaces, which are not yet attached to the device. Therefore, these caps must be attached to the unit before startup to ensure proper operation and IP65 protection.

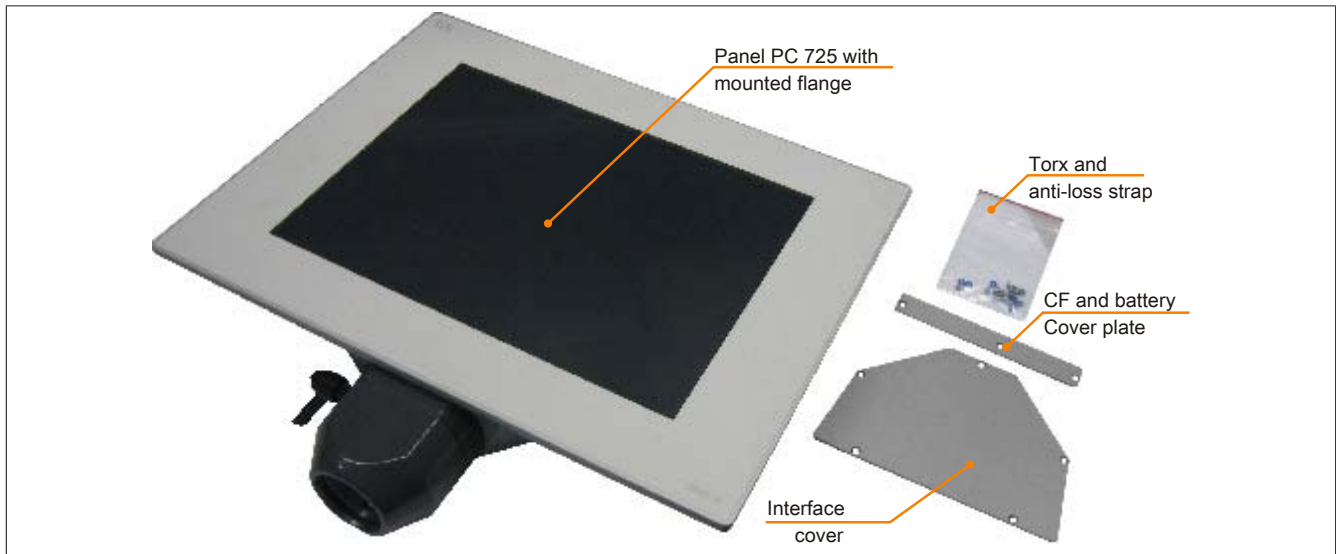


Figure 18: Contents of delivery

- The blue rings included in delivery must be attached to the Torx screws on the covers to help prevent them from getting lost, and should therefore not be removed.

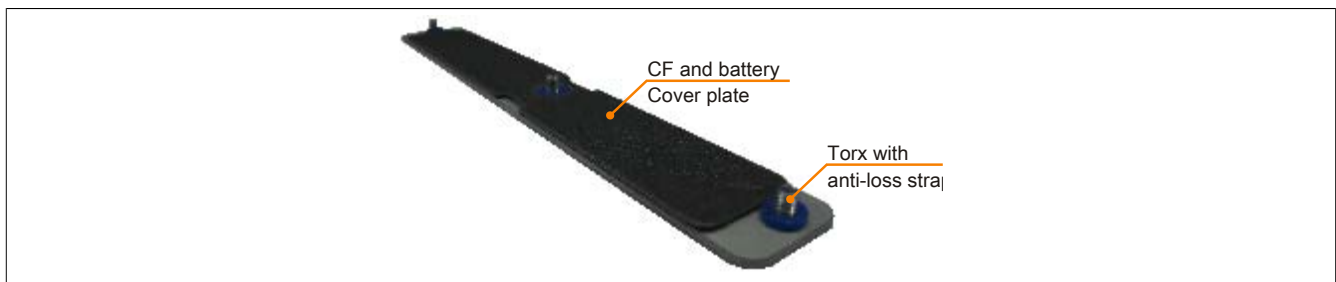


Figure 19: Cover with Torx screws and anti-loss strap

- Attach protective caps to the PPC725. Tighten the Torx screws (TX10) with a torque of 0.7 Nm.



Figure 20: Mounting the protective caps

- The screws included in delivery must be manually attached to the flange. They are then used for mounting the Panel PC 725 to the support arm system.



Figure 21: Mounting the screws on the flange



## 2 Information regarding operation

- The seals on the Panel PC 725 must be kept clean at all times to prevent dirt and moisture from entering the device.
- Make sure to follow the information and instructions provided by the manufacturer of the swing arm system.
- Make sure that water cannot enter the PC via the swing arm system. In addition, air circulation must be prevented to avoid condensation.

## 3 Grounding concept

Functional ground is a current path of low impedance between electrical circuits and ground. It is used, for example, to improve immunity to disturbances and not necessarily as a protective measure. It therefore serves only to deflect disturbances, not to provide any kind of protection against electric shock.

The functional ground on the PPC725 has 2 connections:

- Supply voltage
- Ground connection

To guarantee safe conductance of electric disturbances, the following points should be observed:

- The device should be connected to the ground using the shortest route possible.
- Use cable with a minimum cross section of 2.5 mm<sup>2</sup> per connection.

Note the line shielding concept. All data cables connected to the device must use shielded lines.

## 4 General instructions for performing temperature testing

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

### 4.1 Procedure

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

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

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

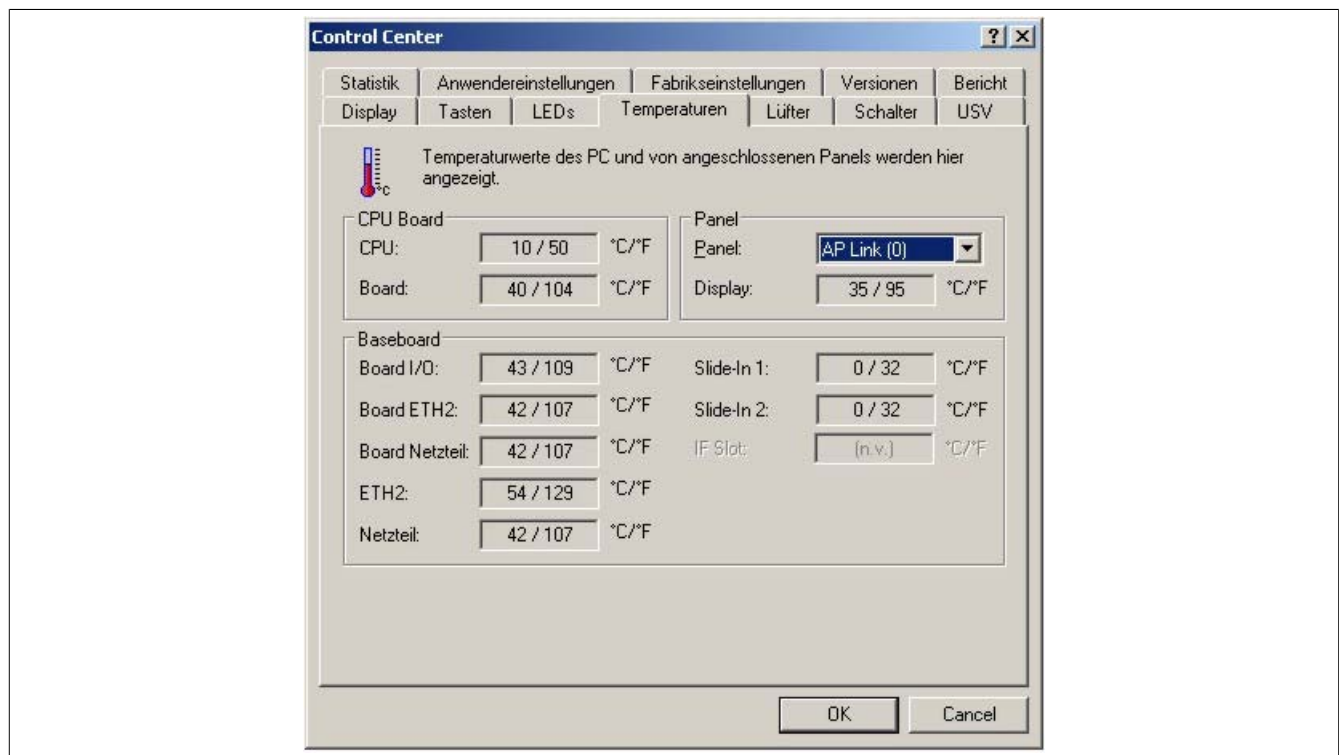
For information about the locations of temperature sensors and the maximum specified values, please see section "Temperature sensor positions" in chapter 2 "Technical data".

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

### 4.2 Evaluating temperatures in Windows operating systems

#### 4.2.1 Evaluating with the B&R Control Center

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



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

### Information:

Software development kits such as the ADI .NET SDK are available on the B&R website ([www.br-automation.com](http://www.br-automation.com)).

#### 4.2.2 Evaluating with the BurnInTest tool from Passmark

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

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

#### Information:

Loopback plugs are also available from Passmark. More information is available at [www.passmark.com](http://www.passmark.com).

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

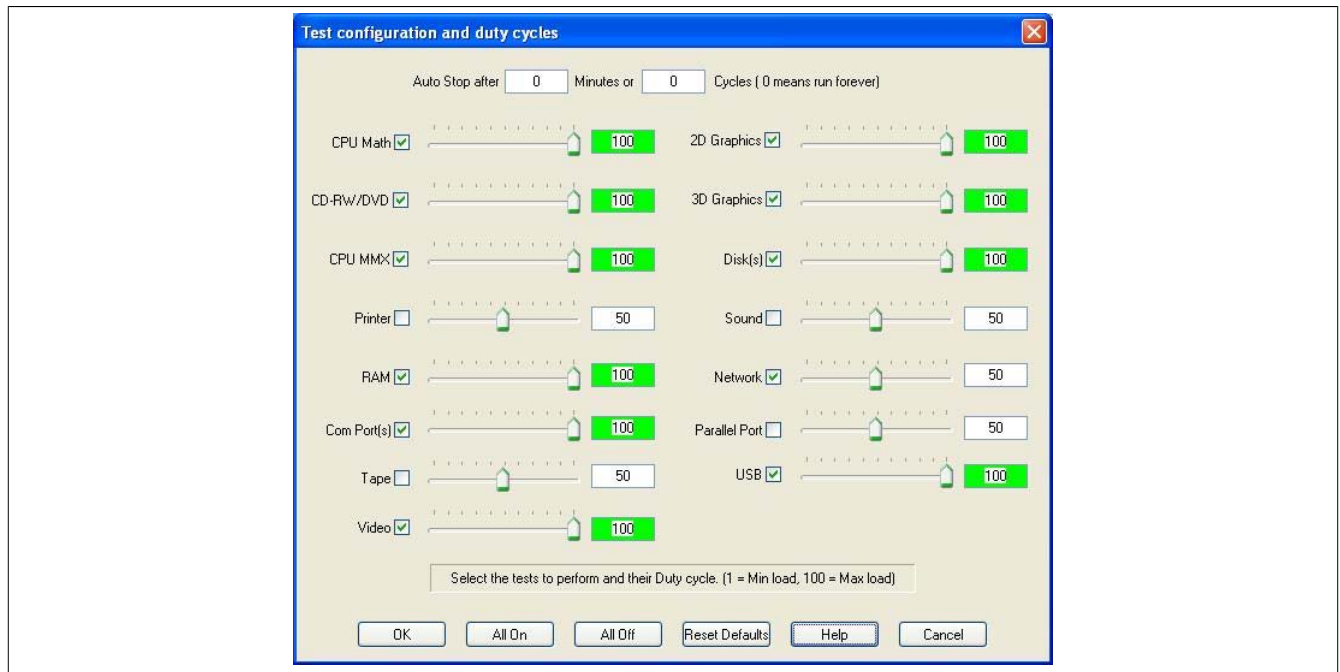


Figure 22: Settings for Passmark BurnInTest Pro V4 and a 2-slot APC810 with DVD

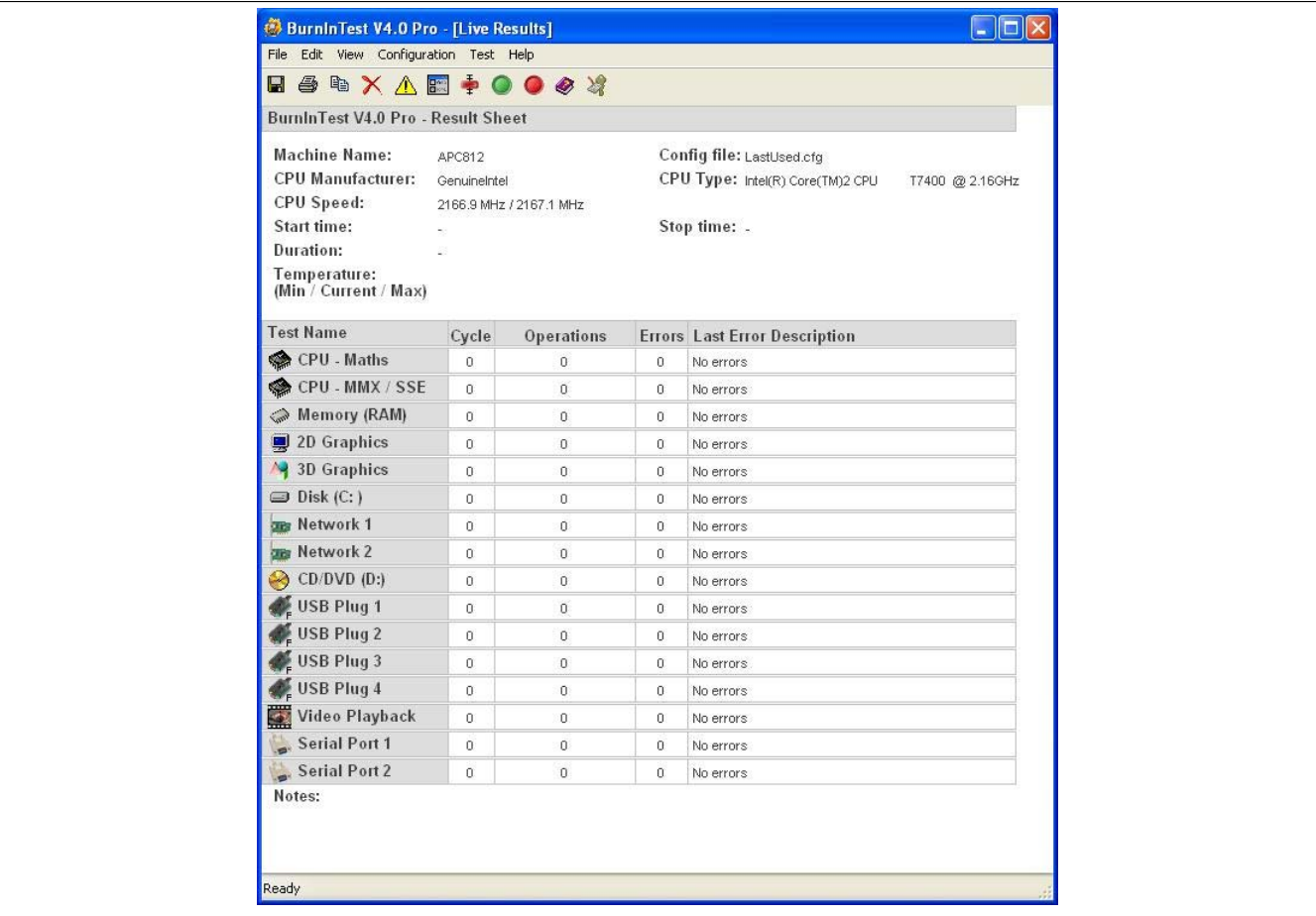


Figure 23: Test overview of a 2-slot APC810 with DVD

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

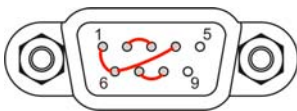
**Information:**

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



**Information:**

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



### 4.3 Evaluating temperatures in operating systems other than Windows

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

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

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

#### Information:

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

### 4.4 Evaluating the measurement results

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

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

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

#### Example using a 2-slot APC810

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

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

Table 40: Evaluation example using a 2-slot APC810

## 5 Touch screen calibration

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

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

### 5.1 Windows XP Professional

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

### 5.2 Windows XP Embedded

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

### 5.3 Windows Embedded Standard 2009

After starting Windows Embedded Standard 2009 on the Panel PC or Power Panel for the first time (first boot agent), the corresponding touch screen driver is installed automatically.

On all other devices, the touch screen driver must be installed in order to operate the touch screen. The necessary driver is available in the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

### 5.4 Windows Embedded Standard 7 Embedded / Premium

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

The touch screen driver must be installed manually if a touch controller was not detected during the Windows Embedded Standard 7 setup or if an Automation Panel 800/900/9x3/9xD has been connected after setup. The necessary driver is available in the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

### 5.5 Windows 7 Professional / Ultimate

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

### 5.6 Windows CE

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

### 5.7 Automation Runtime / Visual Components

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

## 6 Connecting USB peripheral devices

### Warning!

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

### 6.1 Locally on the PPC725

Many different peripheral USB devices can be connected to the 3 USB interfaces on the Panel PC 725. These can each handle a load of 500 mA. The maximum transfer rate is USB 2.0.

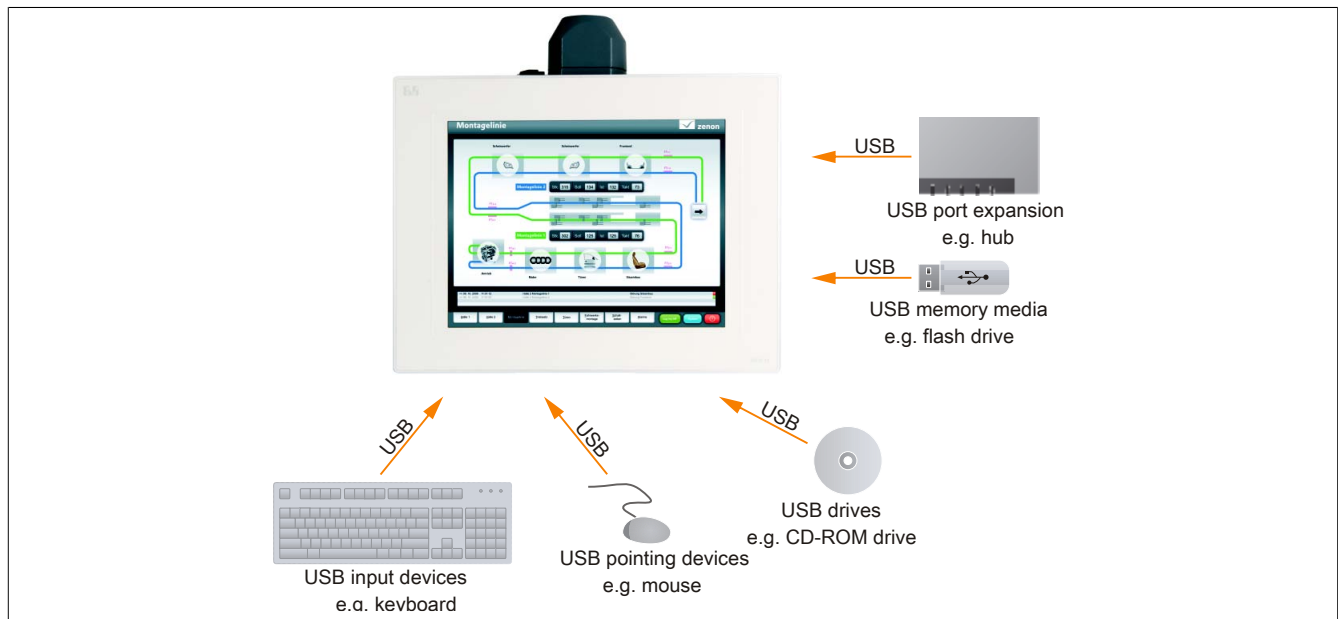


Figure 24: Connecting USB peripheral devices locally to the PPC 725

## 7 Tips for extending the service life of the display

### 7.1 Backlight

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

#### 7.1.1 How can the service life of the backlight be extended?

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

### 7.2 Screen burn-in

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

There are basically two types:

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

#### 7.2.1 What causes screen burn-in?

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

#### 7.2.2 How can screen burn-in be avoided?

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

## 8 Pixel errors

### Information:

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



## 9 Known problems/issues

The following issue for the PPC725 devices is known:

- In Windows XP, the Windows Standby mode is not supported in combination with the add-on hard disk (5AC600.HDDI-05 and 5AC600.HDDI-06) in IDE Slave Only mode. A blue screen or Windows crash can occur sporadically when returning from Windows Standby mode. Windows Standby mode will function if a CompactFlash card is connected to the IDE Master in addition the HDD on the slave slot. The same problem also occurs if the hard disk is switched off under Control panel - Power options.
- If the Intel GMA driver (Graphics Media Accelerator) is installed in the system (e.g. in Windows XP), then an analog RGB monitor will always be detected, regardless of whether one is connected or not.
- Using two different types of CompactFlash cards can cause problems with Automation PCs and Panel PCs. For example, it is possible that one of the two cards is not detected during system startup. This is caused by different 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 end of the time frame provided for startup. The problem described can occur because the startup time for the CompactFlash cards fluctuates due to the different components being used. Depending on the CompactFlash cards being used, this error may occur never, sometimes or always.

## Chapter 4 • Software

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### 1 BIOS options

#### Information:

- The following diagrams and BIOS menu items including descriptions refer to BIOS version 1.14. It is therefore possible that these diagrams and BIOS descriptions will not correspond with the BIOS version actually installed.
- The setup defaults are the settings recommended by B&R. The setup defaults depend on the DIP switch configuration on the baseboard (see "BIOS default settings" on page 98).

#### 1.1 General information

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

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

CMOS data is buffered by a battery (if present) and continues to remain stored on the B&R Industrial PC even when the power is turned off (no 24 VDC supply).

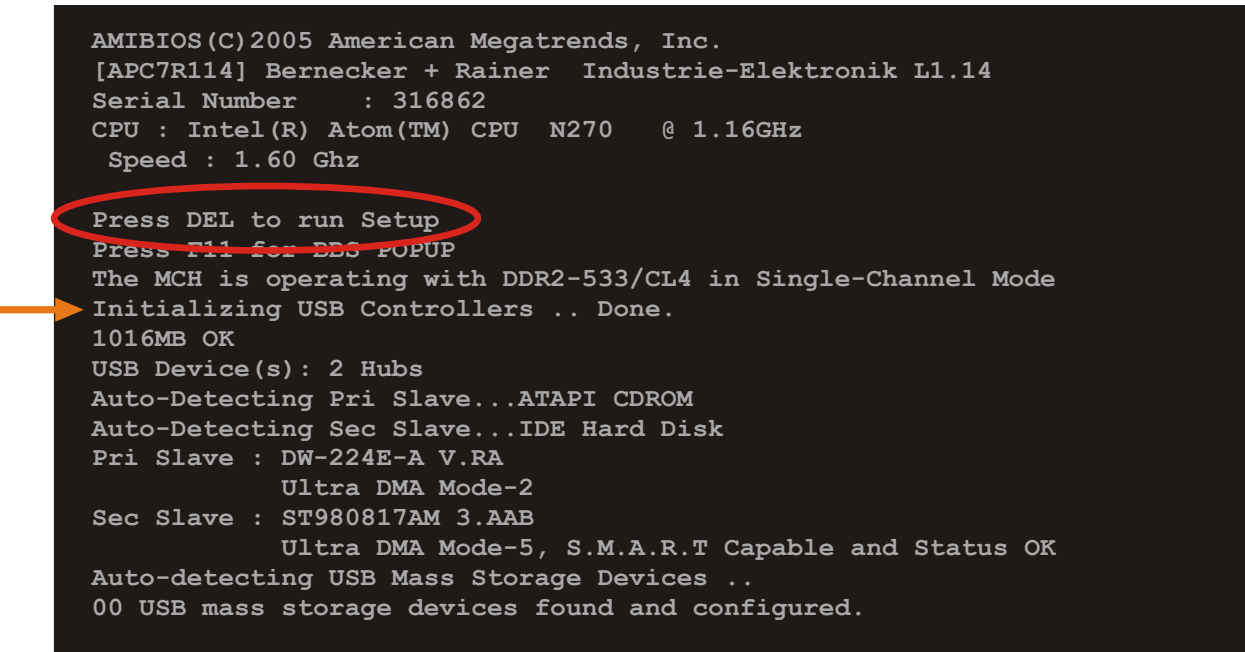
#### 1.2 BIOS Setup and boot procedure

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

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

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

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



```
AMIBIOS(C)2005 American Megatrends, Inc.  
[APC7R114] Bernecker + Rainer Industrie-Elektronik L1.14  
Serial Number      : 316862  
CPU : Intel(R) Atom(TM) CPU  N270    @ 1.16GHz  
Speed : 1.60 Ghz  
  
Press DEL to run Setup  
Press F11 for BIOS POPUP  
The MCH is operating with DDR2-533/CL4 in Single-Channel Mode  
Initializing USB Controllers .. Done.  
1016MB OK  
USB Device(s): 2 Hubs  
Auto-Detecting Pri Slave...ATAPI CDROM  
Auto-Detecting Sec Slave...IDE Hard Disk  
Pri Slave : DW-224E-A V.RA  
              Ultra DMA Mode-2  
Sec Slave : ST980817AM 3.AAB  
              Ultra DMA Mode-5, S.M.A.R.T Capable and Status OK  
Auto-detecting USB Mass Storage Devices ..  
00 USB mass storage devices found and configured.
```

Figure 25: X945 Boot Screen

### 1.2.1 BIOS Setup keys

The following keys are enabled during POST:

#### Information:

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

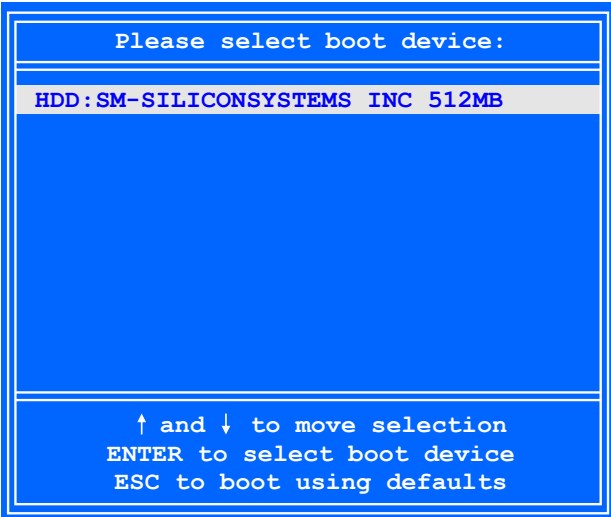
Keys	Function
Del	Opens the main BIOS Setup screen
F12	Network boot
F11	Opens the boot menu. This lists all bootable devices that are connected to the system. Selecting a device with cursor ↑, cursor ↓ and the pressing <ENTER> will boot from that device.
	
<Pause>	Pauses POST. Pressing any other key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

Table 41: BIOS-relevant keys for POST

The following keys can be used once inside BIOS Setup:

Key	Function
F1	Opens general help information
Cursor ↑	Moves to the previous item
Cursor ↓	Moves to the next item
Cursor ←	Moves to the previous item
Cursor →	Moves to the next item
+/-	Changes the setting for the selected function
Enter	Changes to the selected screen
Page ↑	Changes to the previous page
Page ↓	Changes to the next page
Pos 1	Jumps to the first BIOS menu item or object
End	Jumps to the last BIOS menu item or object
F2 / F3	Changes the colors of BIOS Setup
F7	Resets any changes
F9	Loads and configures CMOS default values for all BIOS settings
F10	Saves and exits
ESC	Exits a submenu

Table 42: BIOS-relevant keys

### 1.3 Main

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

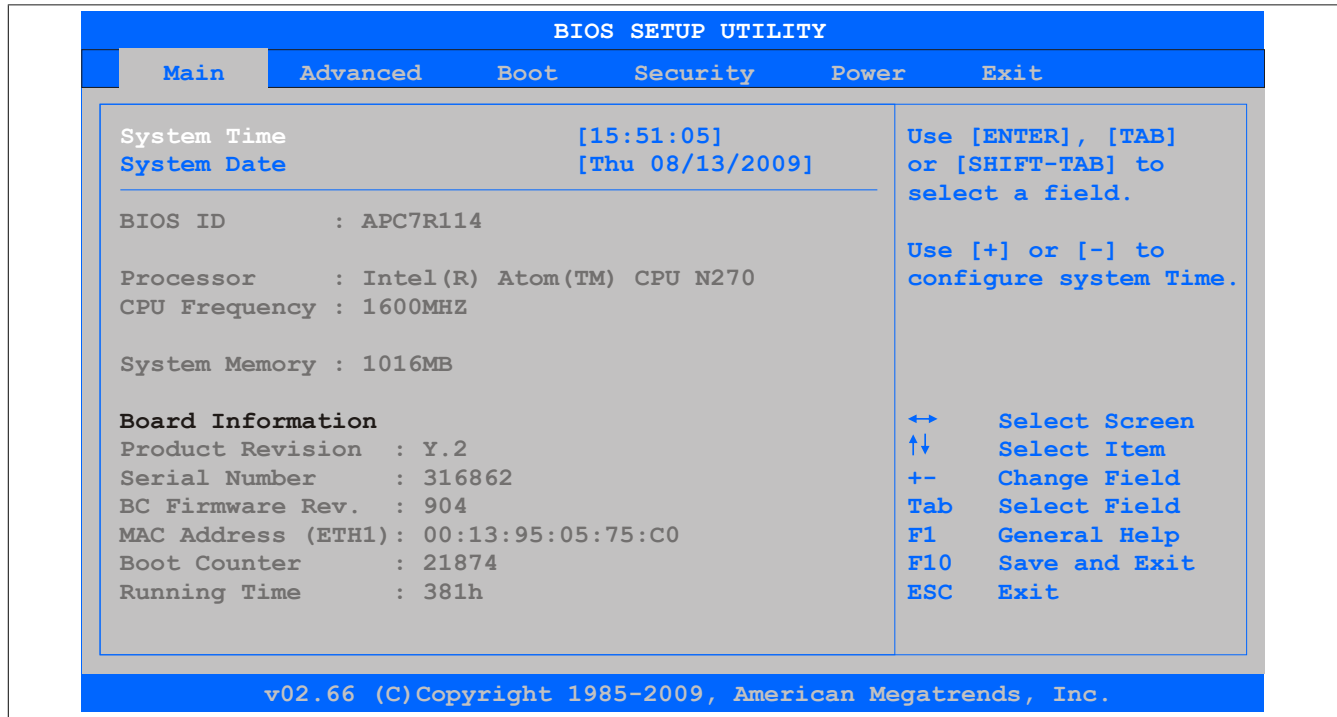


Figure 26: X945 Main - Menü

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

Table 43: X945 Main menu - Configuration options

## 1.4 Advanced

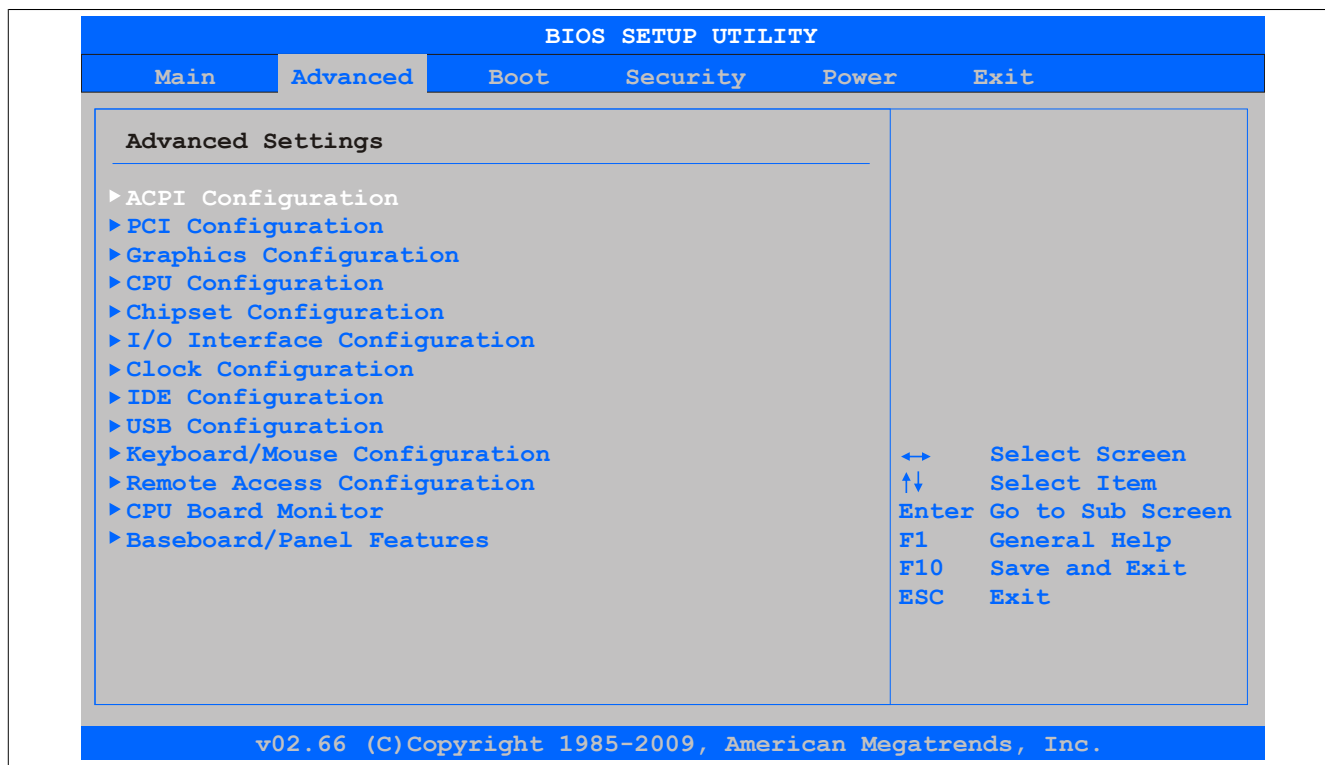


Figure 27: X945 Advanced - Menü

BIOS setting	Function	Configuration options	Effect
<b>ACPI configuration</b>	Configures ACPI devices	Enter	Opens the submenu see "ACPI configuration" on page 71
<b>PCI configuration</b>	Configures PCI devices	Enter	Opens the submenu see "PCI configuration" on page 72
<b>Graphics configuration</b>	Configures graphics settings	Enter	Opens the submenu see "Graphics configuration" on page 75
<b>CPU configuration</b>	Configures CPU settings	Enter	Opens the submenu see "CPU configuration" on page 76
<b>Chipset configuration</b>	Configures chipset functions	Enter	Opens the submenu see "Chipset settings" on page 78
<b>I/O interface configuration</b>	Configures I/O devices	Enter	Opens the submenu see "I/O interface configuration" on page 79
<b>Clock configuration</b>	Configures clock settings	Enter	Opens the submenu see "Clock configuration" on page 80
<b>IDE configuration</b>	Configures IDE functions	Enter	Opens the submenu see "IDE configuration" on page 80
<b>USB configuration</b>	Configures USB settings	Enter	Opens the submenu see "USB configuration" on page 83
<b>Keyboard/Mouse configuration</b>	Configures keyboard/mouse options	Enter	Opens the submenu see "Keyboard/Mouse configuration" on page 84
<b>Remote access configuration</b>	Configures remote access settings	Enter	Opens the submenu see "Remote access configuration" on page 85
<b>CPU board monitor</b>	Displays the current voltages and temperature of the processor in use	Enter	Opens the submenu see "CPU board monitor" on page 87
<b>Baseboard/Panel features</b>	Displays and configures device-specific settings	Enter	Opens the submenu see "Baseboard/Panel features" on page 88

Table 44: X945 Advanced menu - Configuration options

## 1.4.1 ACPI configuration

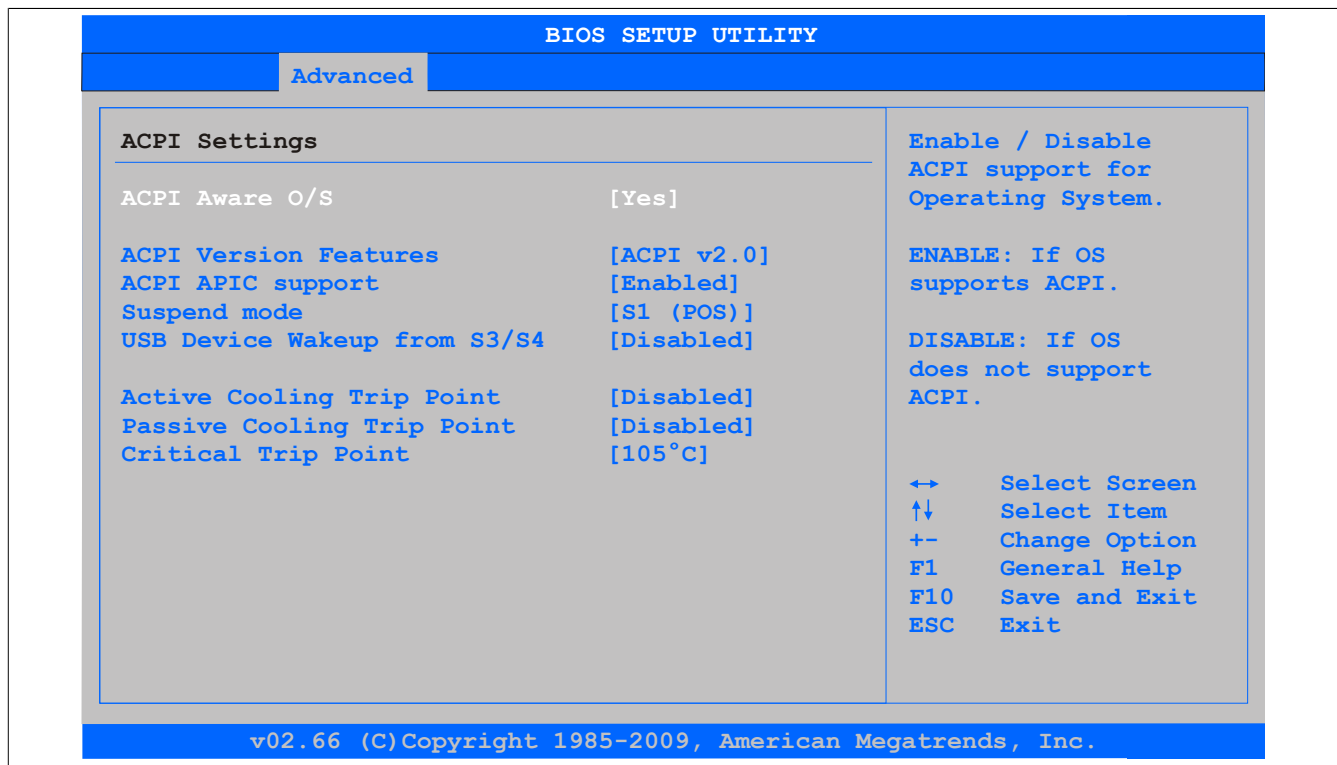


Figure 28: X945 Advanced - ACPI Configuration

BIOS setting	Function	Configuration 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	Uses ACPI functions in accordance with v1.0
		ACPI v2.0	Uses ACPI functions in accordance with v2.0
		ACPI v3.0	Uses 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 RAM, which is then the only component to receive power.
USB device wakeup from S3/S4	This option makes it possible for activity on a connected USB device to wake the system up from S3/S4 standby mode.	Enabled	Enables this function
		Disabled	Disables this function
Active cooling trip point	This function can be used to switch on an optional CPU fan via the operating system 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. Configurable in increments of 10 degrees.
Passive cooling trip point	Option for configuring a CPU temperature at which the operating system throttles the CPU speed	Disabled	Disables this function
		50°C, 60°C, 70°C, 80°C, 90°C	Temperature setting for the passive cooling trip point. Configurable in increments of 10 degrees.
Critical trip point	Option for configuring a CPU temperature at which the operating system automatically shuts down	80°C, 85°C, 90°C, 95°C, 100°C, 105°C, 110°C	Temperature setting for the critical trip point. Configurable in increments of 5 degrees.

Table 45: X945 Advanced - ACPI configuration - Configuration options

## 1.4.2 PCI configuration

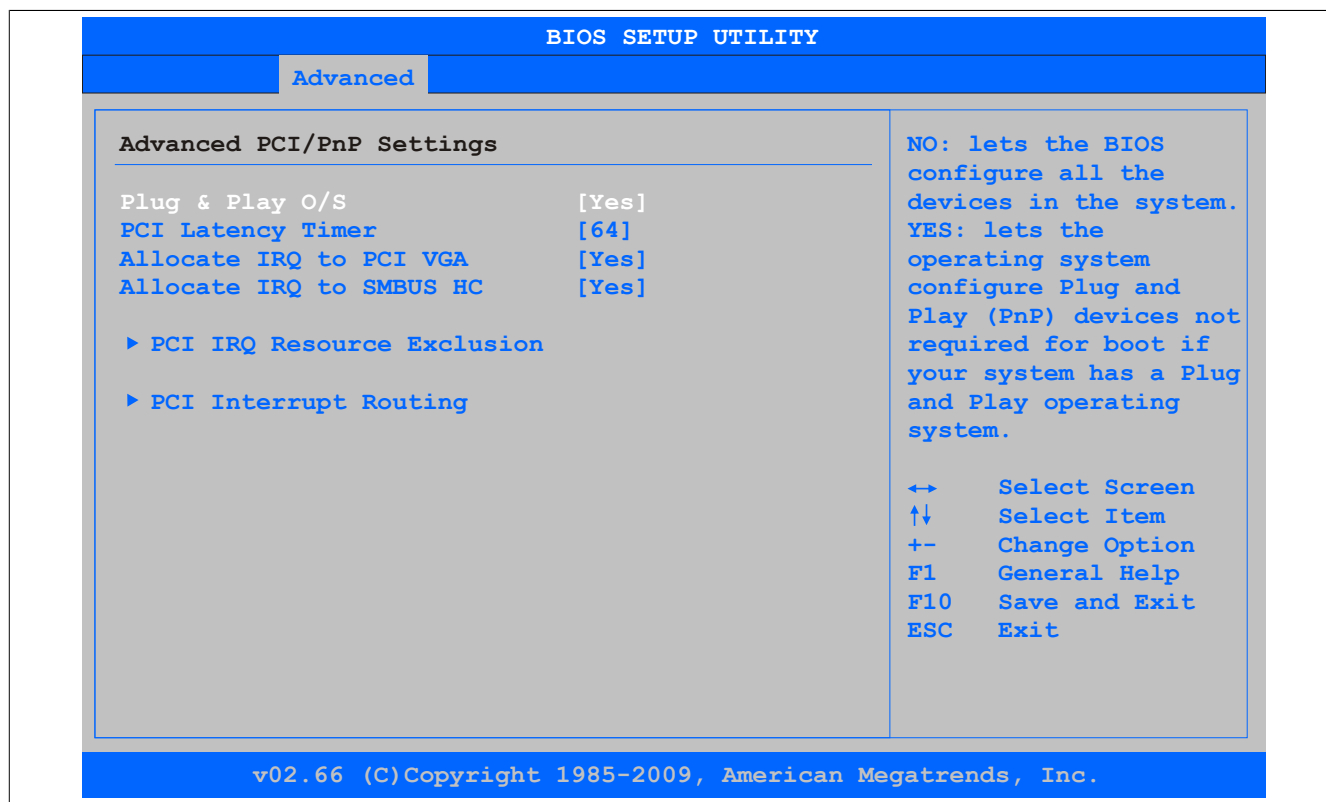


Figure 29: X945 Advanced - PCI Configuration

BIOS setting	Function	Configuration options	Effect
Plug & Play O/S	Informs BIOS if the operating system is capable of handling plug and play	Yes	Resource allocation handled by the operating system
		No	Resource allocation handled by BIOS
PCI latency timer	Option for controlling how long (in PCI ticks) one PCI bus card can continue to use the master after another PCI card has requested access	32, 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	Interrupt assigned automatically
		No	Interrupt not assigned
Allocate IRQ to SMBUS HC	This function is used to set whether the SM (system management) bus controller is assigned a PCI interrupt.	Yes	PCI interrupt assigned automatically
		No	Interrupt not assigned
<b>PCI IRQ resource exclusion</b>	Configures the PCI IRQ resource settings for ISA Legacy devices	Enter	Opens the submenu see "PCI IRQ resource exclusion" on page 73
<b>PCI interrupt routing</b>	Configures PCI interrupt routing	Enter	Opens the submenu see "PCI interrupt routing" on page 74

Table 46: X945 Advanced - PCI configuration - Configuration options



## 1.4.2.1 PCI IRQ resource exclusion

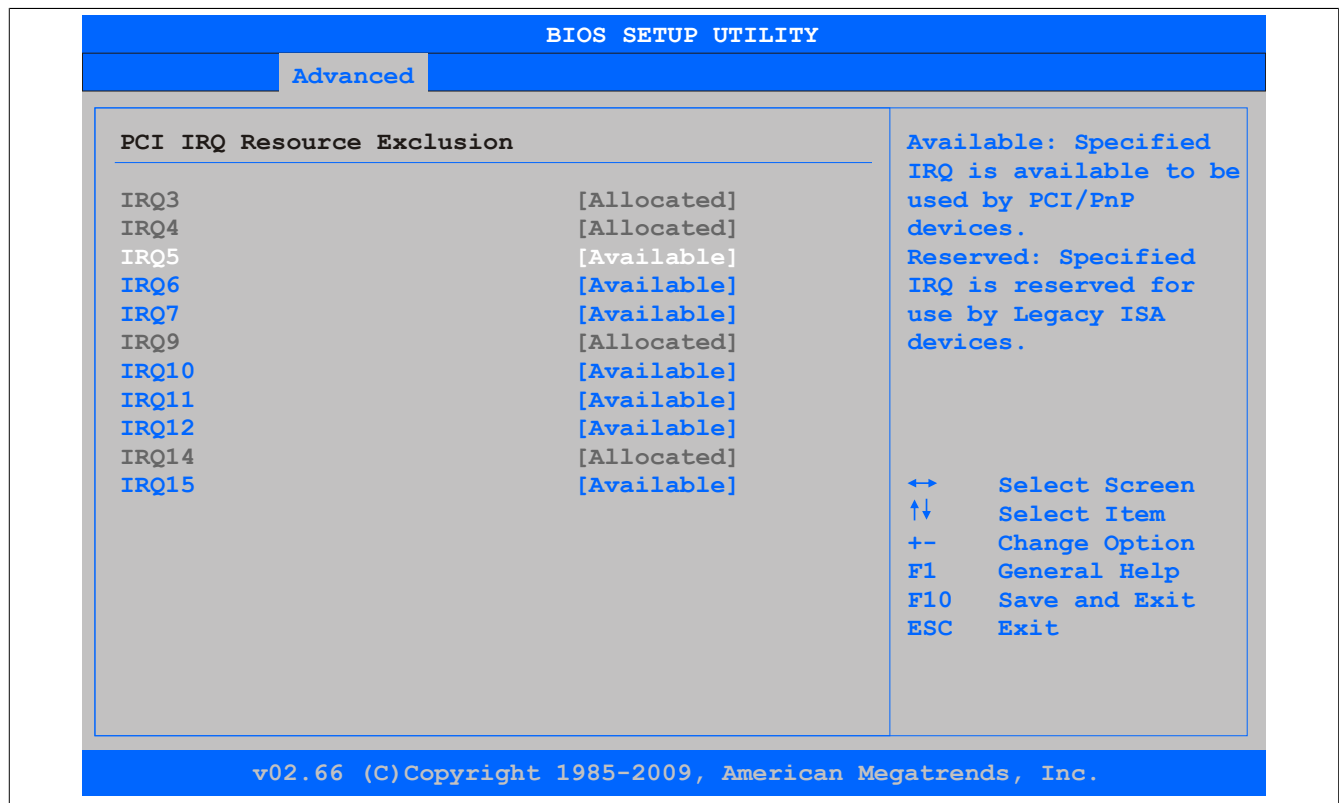


Figure 30: X945 Advanced - PCI Configuration - PCI IRQ Resource Exclusion

BIOS setting	Function	Configuration 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 47: X945 Advanced - PCI IRQ resource exclusion - Configuration options

## 1.4.2.2 PCI interrupt routing

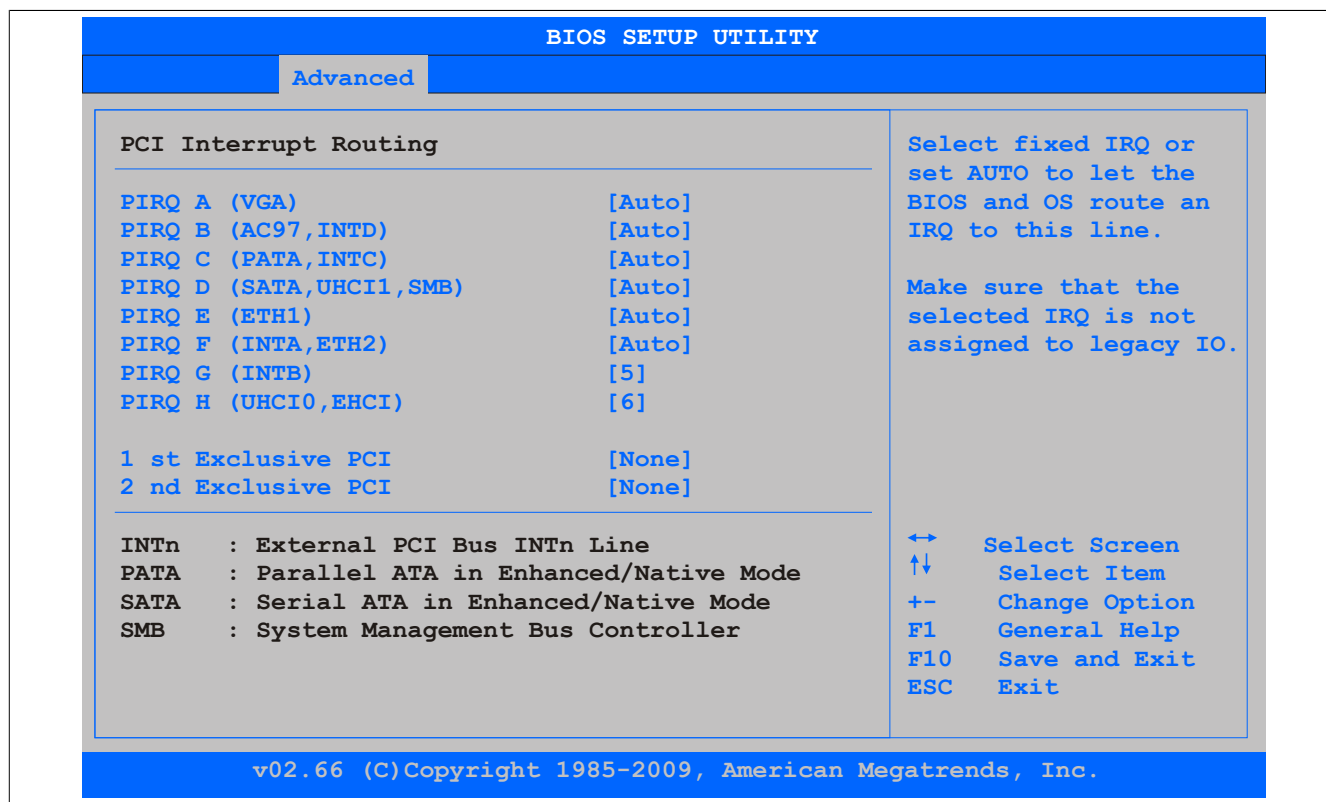


Figure 31: X945 Advanced - PCI Configuration - PCI Interrupt Routing

BIOS setting	Function	Configuration options	Effect
PIRQ A (VGA)	Option for configuring PIRQ A	Auto	Automatic assignment by BIOS and the operating system
		5,6,7,9,10,11,12	Manual assignment
PIRQ B (AC97, INTD)	Option for configuring PIRQ B	Auto	Automatic assignment by BIOS and the operating system
		5,6,7,9,10,11,12	Manual assignment
PIRQ C (PATA,INTC)	Option for configuring PIRQ C	Auto	Automatic assignment by BIOS and the operating system
		5,6,7,9,10,11,12	Manual assignment
PIRQ D (SATA,UHCI1,SMB)	Option for configuring PIRQ D	Auto	Automatic assignment by BIOS and the operating system
		5,6,7,9,10,11,12	Manual assignment
PIRQ E (ETH1)	Option for configuring PIRQ E	Auto	Automatic assignment by BIOS and the operating system
		5,6,7,9,10,11,12	Manual assignment
PIRQ F (INTA, ETH2)	Option for configuring PIRQ F	Auto	Automatic assignment by BIOS and the operating system
		5,6,7,9,10,11,12	Manual assignment
PIRQ G (INTB)	Option for configuring PIRQ G	Auto	Automatic assignment by BIOS and the operating system
		5,6,7,9,10,11,12	Manual assignment
PIRQ H (UHCI0, EHCI)	Option for configuring PIRQ H	Auto	Automatic assignment by BIOS and the operating system
		5,6,7,9,10,11,12	Manual assignment
1st exclusive PCI	This option is used to determine if the IRQ listed under PIRQ x is handled exclusively (no IRQ sharing).	None	No interrupt assigned
		x	Assigns the PIRQ as the 1st exclusive PCI IRQ

**Information:**

This is only displayed if a PIRQ is configured manually (e.g. 5).

Table 48: X945 Advanced - PCI interrupt routing - Configuration options

BIOS setting	Function	Configuration options	Effect
2nd exclusive PCI	This option is used to determine if the IRQ listed under PIRQ x is handled exclusively (no IRQ sharing).  <b>Information:</b>  This is only displayed if two PIRQs are configured manually.	None	No interrupt assigned
		x	Assigns the PIRQ as the 2nd exclusive PCI IRQ
3rd exclusive PCI	This option is used to determine if the IRQ listed under PIRQ x is handled exclusively (no IRQ sharing).  <b>Information:</b>  Only displayed in connection with an APC620e and if three PIRQs are set manually.	None	No interrupt assigned
		x	Assigns the PIRQ as the 3rd exclusive PCI IRQ

Table 48: X945 Advanced - PCI interrupt routing - Configuration options

### 1.4.3 Graphics configuration

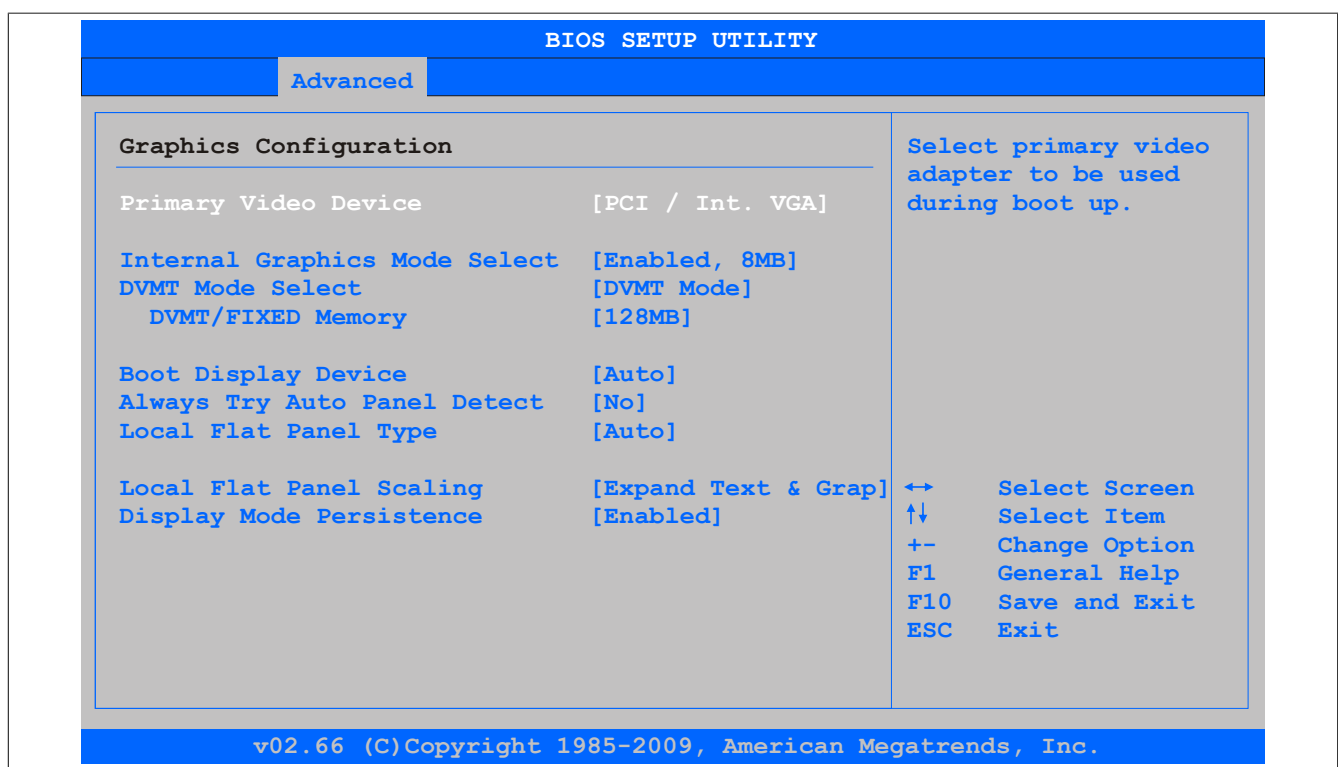


Figure 32: X945 Advanced - Graphics Configuration

BIOS setting	Function	Configuration options	Effect
Primary video device	Option for selecting the primary display device	Internal VGA	Uses the internal graphics chip on the CPU board as the video device (monitor/panel interface)
		PCI / Int. VGA	Uses the graphics chip of a connected graphics card as the display device
Internal graphics mode select	Option for setting the amount of memory used for the internal graphics controller	Disabled	Nothing reserved, disables the graphics controller
		Enabled, 1MB	Provides 1 MB main memory
		Enabled, 8MB	Provides 8 MB main memory
DVMT mode select	Option for determining the DVMT mode (Dynamic Video Memory Technology) of the DVMT graphics driver	Fixed mode	Allocates a fixed amount of memory to the graphics chip, which is then no longer available to the PC
		DVMT mode	Memory consumption controlled dynamically by the DVMT graphics driver. Only the amount of memory that is required is reserved.
		Combo mode	At least 64 MB reserved by the DVMT graphics driver (up to 224 MB possible)
DVMT/FIXED memory	Option for setting the amount of memory used for DVMT mode	64 MB	Allows 64 MB of main memory to be used
		128 MB	Allows 128 MB of main memory to be used

Table 49: X945 Advanced - Graphics configuration - Configuration options

BIOS setting	Function	Configuration options	Effect
		Maximum DVMT	Allows the remaining available main memory to be used
Boot display device	Determines which video channel should be enabled for a display device during booting	Auto	Automatic selection
		CRT only	Uses only the CRT (Cathode Ray Tube) channel
		LFP only	Uses only the LFP (Local Flat Panel) channel
		CRT + LFP	Uses the CRT and LFP channel
Always try auto panel detect	This option first searches for EDID data in an external EEPROM to configure the LFP. If no EDID data is found, then the data selected under "Local flat panel type" is used.	No	Disables this function
		Yes	Enables this function
Local flat panel type	This option can be used to set a predefined profile for the LVDS channel.	Auto	Automatic detection and configuration using the EDID data
		VGA 1x18 (002h)	640 x 480
		VGA 1x18 (013h)	640 x 480
		SVGA 1x18 (01Ah)	800 x 600
		XGA 1x18 (006h)	1024 x 768
		XGA 2x18 (007h)	1024 x 768
		XGA 1x24 (008h)	1024 x 768
		XGA 2x24 (012h)	1024 x 768
		SXGA 2x24 (00Ah)	1280 x 1024
		SXGA 2x24 (018h)	1280 x 1024
		UXGA 2x24 (00Ch)	1600 x 1200
		Customized EDID 1	User-defined profile
		Customized EDID 2	User-defined profile
		Customized EDID 3	User-defined profile
Local flat panel scaling	Determines the screen content should be output depending on the configured local flat panel type	Centering	Centers the screen contents on the display
		Expand text	Expands text across the entire display
		Expand graphics	Expands graphics across the entire display
		Expand text & graphics	Expands text and graphics across the entire display
Display mode persistence	If enabled, the operating system's graphics driver attempts to restore the last set configuration.	Enabled	Enables this function
		Disabled	Disables this function

Table 49: X945 Advanced - Graphics configuration - Configuration options

### 1.4.4 CPU configuration

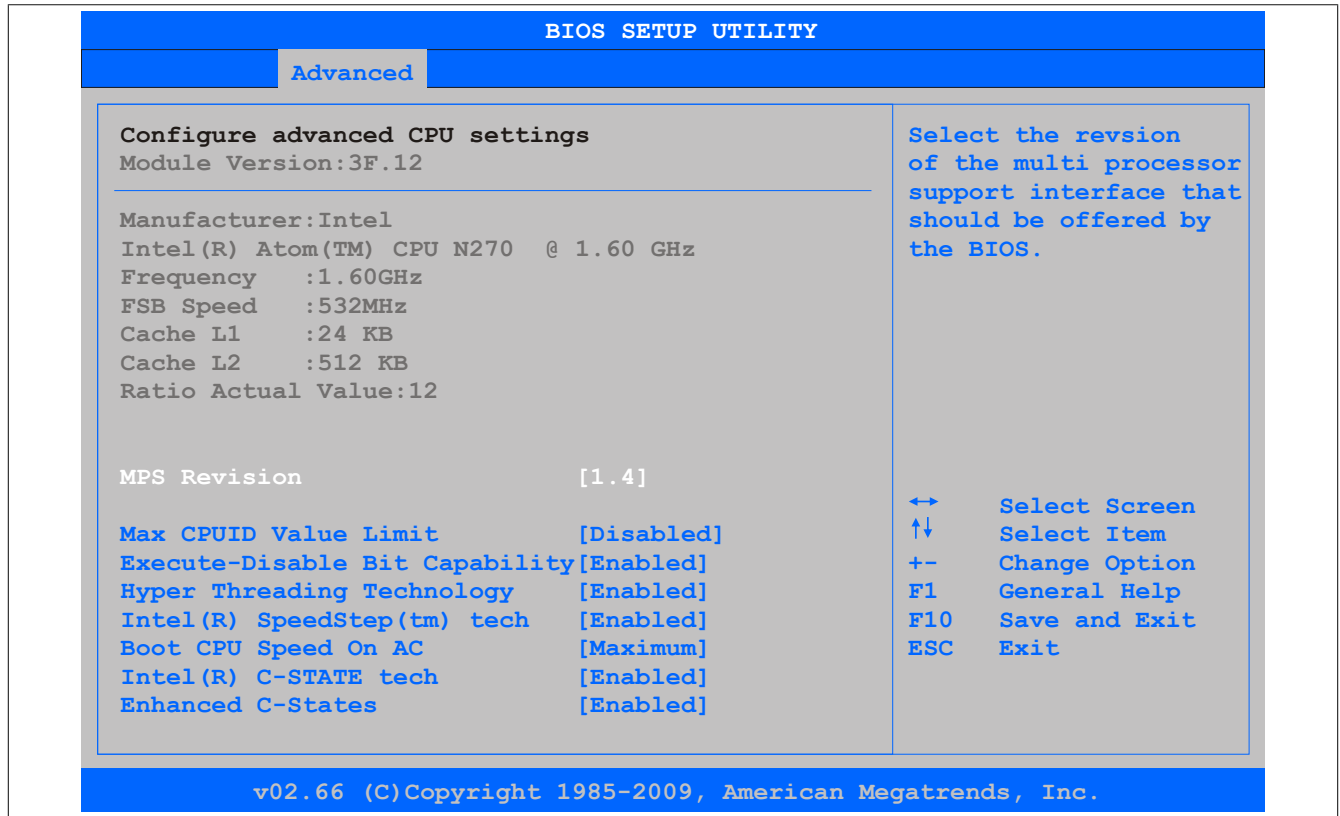


Figure 33: X945 Advanced - CPU Configuration

BIOS setting	Function	Configuration options	Effect
Module version	BIOS Module Version	None	-
Manufacturer	Manufacturer's display.	None	-
Frequency	Processor speed display	None	-
FSB speed	Cycle display of all addressed components. (Front side bus)	None	-
Cache L1	Displays first level cache memory area.	None	-
Cache L2	Displays first level cache memory area.	None	-
Ratio actual value	Displays the Ratio Actual Value.	None	-
MPS revision	This option supports the use of multiple CPUs (MPS=multiprocessor system).	1.1	Sets MPS support to Revision 1.1
		1.4	Sets MPS support to Revision 1.4
Max CPUID value limit	Option for limiting the CPUID input value. This may be necessary for older operating systems.	Enabled	The processor limits the maximum CPUID input value to 03h if necessary if the processor supports a higher value.
		Disabled	The processor returns the current maximum value when the CPUID input value is requested.
Execute-Disable bit capability	Option for enabling/disabling hardware support for prevention of data execution	Enabled	Enables this function
		Disabled	Disables this function
Hyper Threading Technology	Hyper threading technology enables a single physical processor to appear as a multitude of logical processors. This technology allows the operating system to get more out of the internal processor resources, which in turns leads to increased performance.	Enabled	Enables this function
		Disabled	Disables this function
<div> <div></div> <div> <b>Information:</b> <p>This setting should only be disabled when using an operating system older than Windows XP.</p> </div> </div>			
Intel(R) SpeedStep (tm) tech	Option for controlling the Intel(R) SpeedStep(TM) technology. The processor clock speed is increased or decreased according to the number of calculations that must be made. As a result, the power consumption depends largely on the processor load.	Enabled	SpeedStep technology enabled.
		Disabled	Disables SpeedStep technology
Boot CPU Speed On AC	This setting is used to define the maximum or minimum CPU speed during the boot procedure. However, the operating system can change the speed during operation.	Minimum	CPU starts with minimum speed during the boot procedure.
		Maximum	CPU starts with maximum speed during the boot procedure.
Intel(R) C-STATE tech	This setting allows the operating system to set the processor clock speed on its own, thereby saving energy.	Enabled	Enables this function The processors are operated at different frequencies to save energy.
		Disabled	Disables this function Both processors are operated at the same frequency.
Enhanced C-States <sup>1)</sup>	This setting allows the operating system to set the processor clock speed on its own, thereby saving energy.	Enabled	Enables this function
		Disabled	Disables this function

Table 50: X945 Advanced - CPU configuration - Configuration options

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

## 1.4.5 Chipset settings

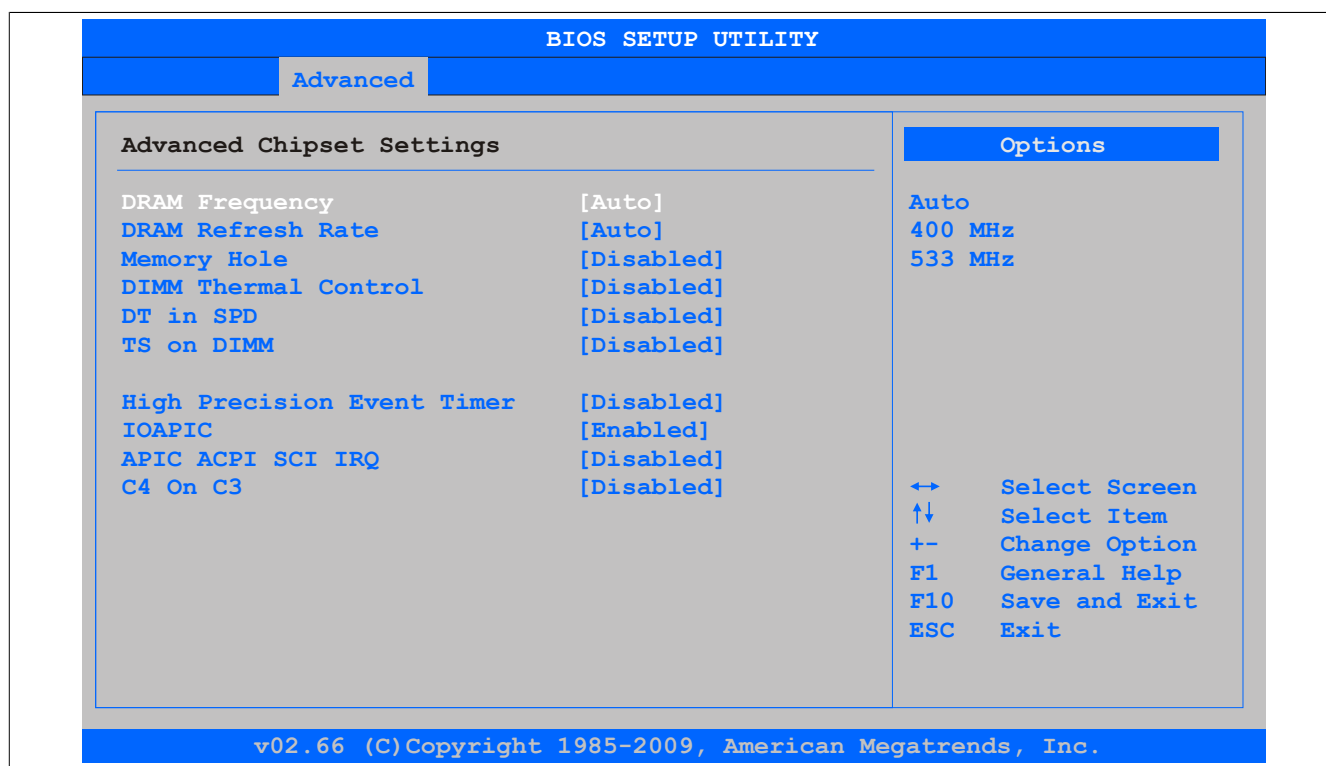


Figure 34: X945 Advanced - Chipset Configuration

BIOS setting	Function	Configuration options	Effect
DRAM frequency	Option for setting the RAM frequency	Auto	BIOS sets the frequency automatically.
		400, 533 MHz	The desired clock frequency is set manually.
DRAM refresh rate	Option for configuring the DRAM refresh rate	Auto	Reads the DRAM refresh rate from the SPD data of the DRAM module
		7.8 $\mu$ s	The DRAM refresh rate is set manually.
		3.9 $\mu$ s	The DRAM refresh rate is set manually.
Memory hole	Option for ISA cards with a frame buffer. This does not apply to the PPC725.	Disabled	Disables this function
		15MB-16MB	Reserves the address range
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 the 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 This function is recommended for multimedia applications.
IOAPIC	This option is used to enable or disable the APIC (Advanced Programmable Interrupt Controller).	Disabled	Disables this function
		Enabled	The IRQ resources available to the system are expanded when 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	Uses IRQ9 for SCI.
		Enabled	Uses IRQ20 for SCI
C4 on C3	Fine-tunes the power saving function on an ACPI operating system	Disabled	Disables this function
		Enabled	Brings the processor to C4 if the operating system is initiated in a C3 state

Table 51: X945 Advanced - Chipset settings - Configuration options

## 1.4.6 I/O interface configuration

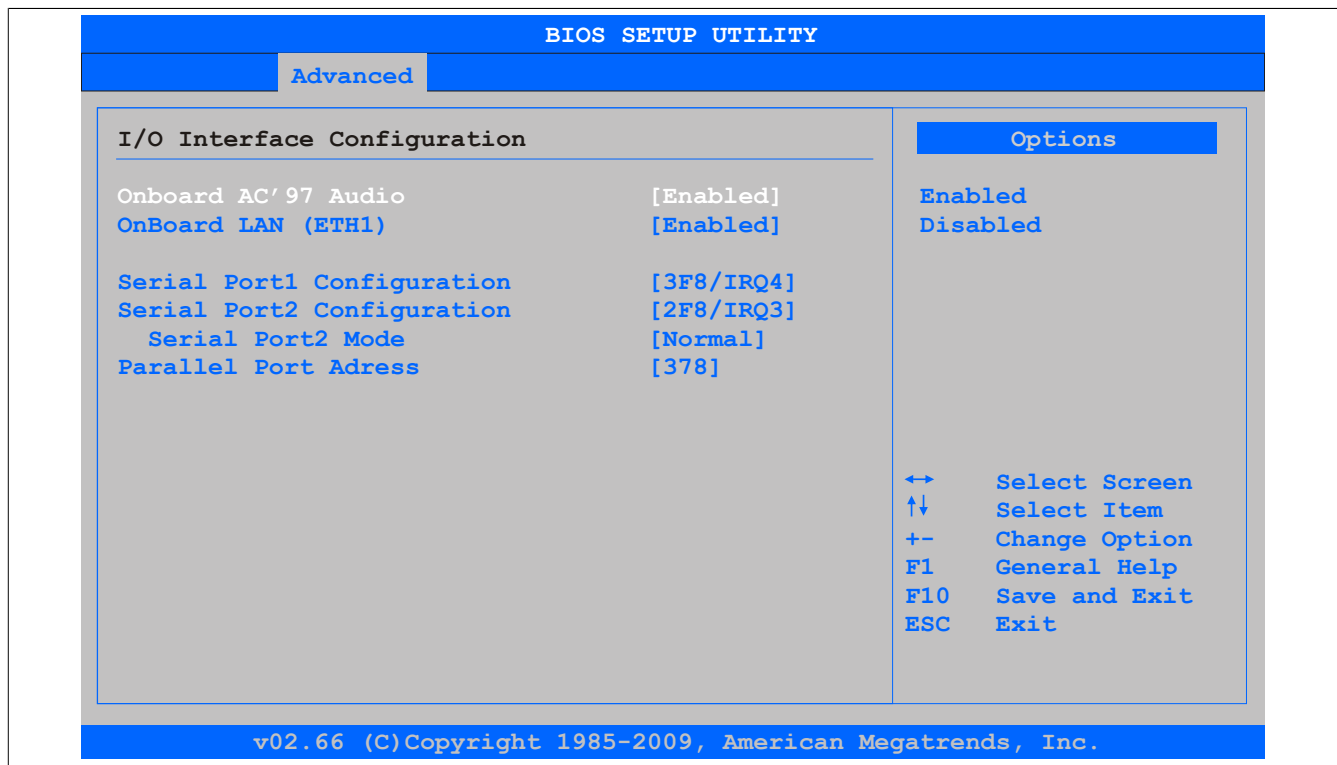


Figure 35: X945 Advanced - I/O Interface Configuration

BIOS setting	Function	Configuration options	Effect
Onboard AC'97 Audio	For turning the AC97 Sound on and off.  <b>Information:</b>  This setting is not relevant for the PPC725 because it does not contain an audio interface.	Enabled	Enables AC'97 sound
		Disabled	Disables AC'97 sound.
Onboard LAN (ETH1)	For turning the on-board LAN controller (for ETH1) on and off.	Enabled	Activates the LAN controller or the ETH1 interface.
		Disabled	Deactivates the LAN controller or the ETH1 interface.
Serial port 1 configuration	For the configuration of serial port 1 (COM1).  <b>Information:</b>  This setting is not relevant for the PPC725 because it only has one serial interface.	Disabled	Port 1 disabled.
		3F8/IRQ4	Assigns the base I/O address and interrupt
		3E8/IRQ4	Assigns the base I/O address and interrupt
Serial Port2 configuration	For the configuration of serial port 2 (COM2).	Disabled	Port 1 disabled.
		2F8/IRQ3	Assigns the base I/O address and interrupt
		2E8/IRQ3	Assigns the base I/O address and interrupt
Serial port 2 mode	This option is for setting the serial port B as either a standard interface or as an infrared interface (not currently supported).	Normal	Standard interface.
		IrDA	IrDA interface (compliant serial infrared port).
		ASK IR	Interface for IR devices (amplitude shift keyed infrared port).
Parallel port address	The address of the parallel interface can be defined with this option.  <b>Information:</b>  Address is automatically set, even if the function is disabled.	Disabled	Deactivates the port.
		378, 278, 3BC	Manual assignment of the port address.

Table 52: X945 Advanced - I/O interface configuration - Configuration options

1.4.7 Clock configuration

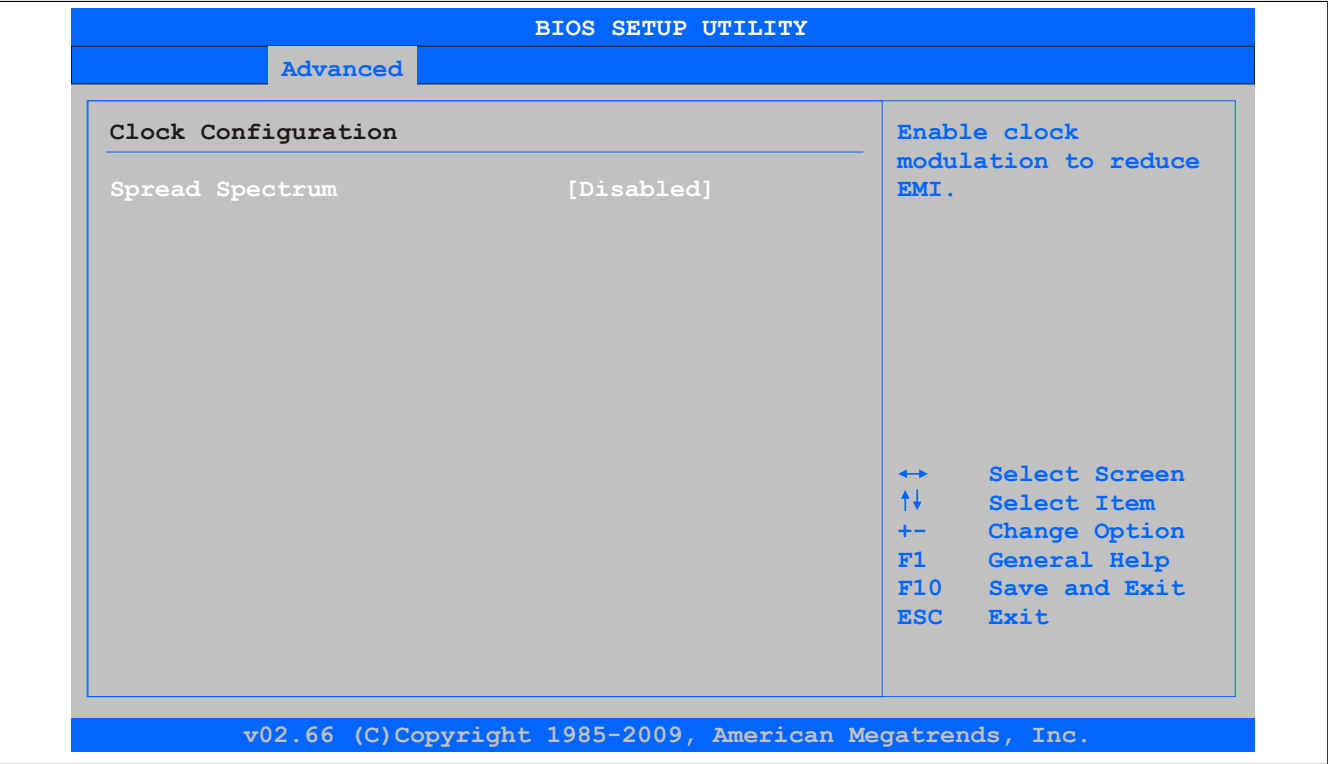


Figure 36: X945 Advanced - Clock Configuration

BIOS setting	Function	Configuration options	Effect
Spread spectrum	This option is used to modulate the cycle frequency to slightly reduce electromagnetic interference.	Enabled	Enables this function
		Disabled	Disables this function

Table 53: X945 Advanced - Clock configuration - Configuration options

1.4.8 IDE configuration

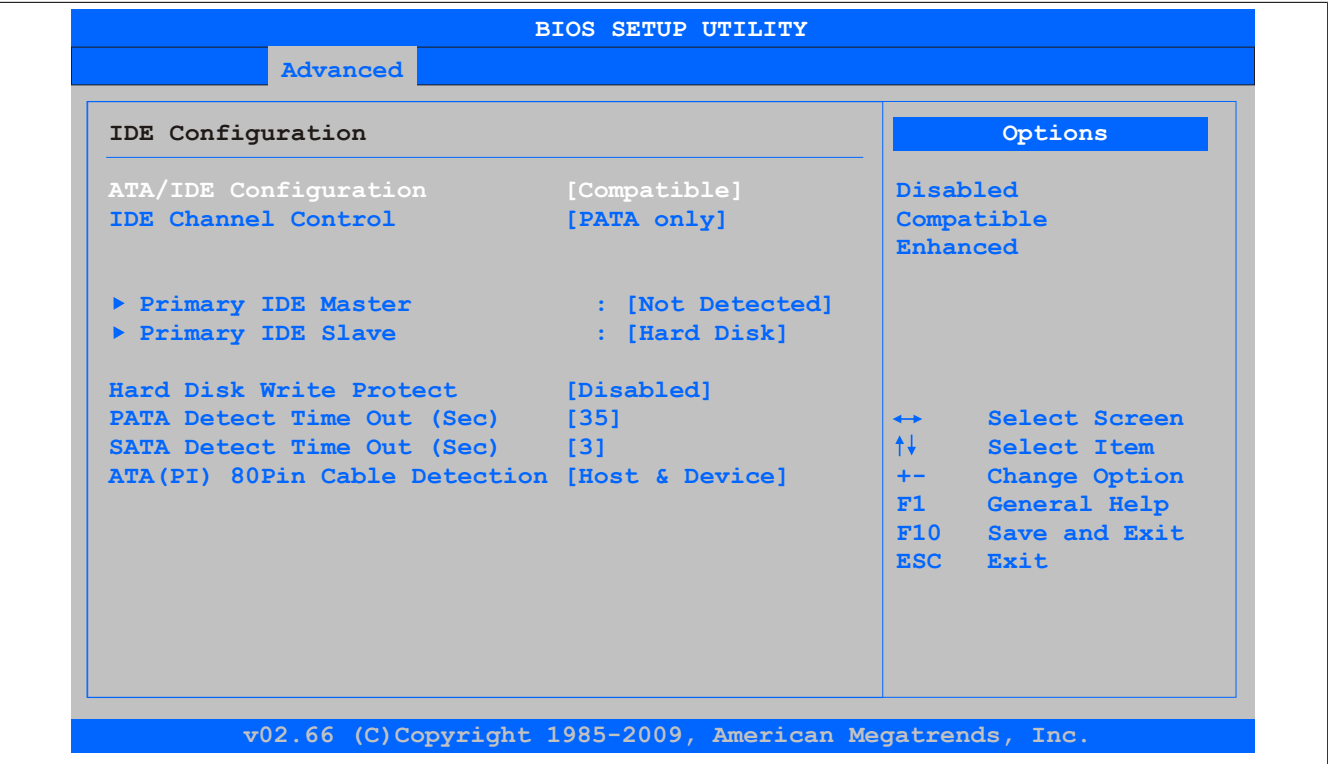


Figure 37: X945 Advanced - IDE Configuration



BIOS setting	Function	Configuration options	Effect
ATA/IDE configuration	Option for configuring the integrated PATA and SATA controllers	Disabled	Disables both controllers
		Compatible	Both controllers run in Legacy or Compatible mode.
		Enhanced	Both controllers run in Enhanced or Native mode.
IDE channel control <sup>1)</sup>	Option for configuring the IDE channels in "Compatible" mode.	SATA only	Uses SATA drives only
		SATA Pri, PATA Sec	Assigns SATA drives as primary and PATA drives as secondary
		PATA only <sup>2)</sup>	Uses PATA drives only
Primary IDE master	Option for configuring the drive in the system that is connected to the IDE primary master port	Enter	Opens the submenu see "Primary IDE master" on page 81
Primary IDE slave	Option for configuring the drive in the system that is connected to the IDE primary slave port	Enter	Opens the submenu see "Primary IDE slave" on page 82
Secondary IDE master	Option for configuring the drive in the system that is connected to the IDE secondary master port	Enter	Opens the submenu
Secondary IDE slave	Option for configuring the drive in the system that is connected to the IDE secondary slave port	Enter	Opens the submenu
Third IDE master <sup>3)</sup>	Option for configuring the drive in the system that is connected to the IDE tertiary master port	Enter	Opens the submenu
Third IDE slave <sup>4)</sup>	Option for configuring the drive in the system that is connected to the IDE tertiary slave port	Enter	Opens the submenu
Hard disk write protect	Option for enabling/disabling write protection for the hard drive	Disabled	Disables this function
		Enabled	Enables this function
PATA detect time out (sec)	Configures the time overrun limit for PATA device detection.	0, 5, 10, 15, 20, 25, 30, 35	Sets the value manually
SATA detect time out (sec)	Configures the time overrun limit for SATA device detection.	0, 1, 2, 3, 5, 10, 15, 30	Sets the value manually
ATA(Pi) 80-pin cable detection	Detects whether an 80 pin cable is connected to the drive, the controller or to both.	Host & device	Uses both IDE controllers (motherboard, disk drive)
		Host	Uses the IDE controller on the motherboard
		Device	Uses the IDE controller on the disk drive

### Information:

This option is not available on the PPC725 CPU board. This setting therefore does not apply.

Table 54: X945 Advanced - IDE configuration - Configuration options

- 1) These settings are only possible if *ATA/IDE configuration* is set to *Compatible* or *Enhanced*.
- 2) If this setting is enabled and *ATA/IDE configuration* is set to *Compatible*, then only the submenus *Primary IDE master* and *Primary IDE slave* will be shown.
- 3) This submenu is only open if *ATA/IDE configuration* is set to *Enhanced*.
- 4) This submenu is only open if *ATA/IDE configuration* is set to *Enhanced*.

#### 1.4.8.1 Primary IDE master

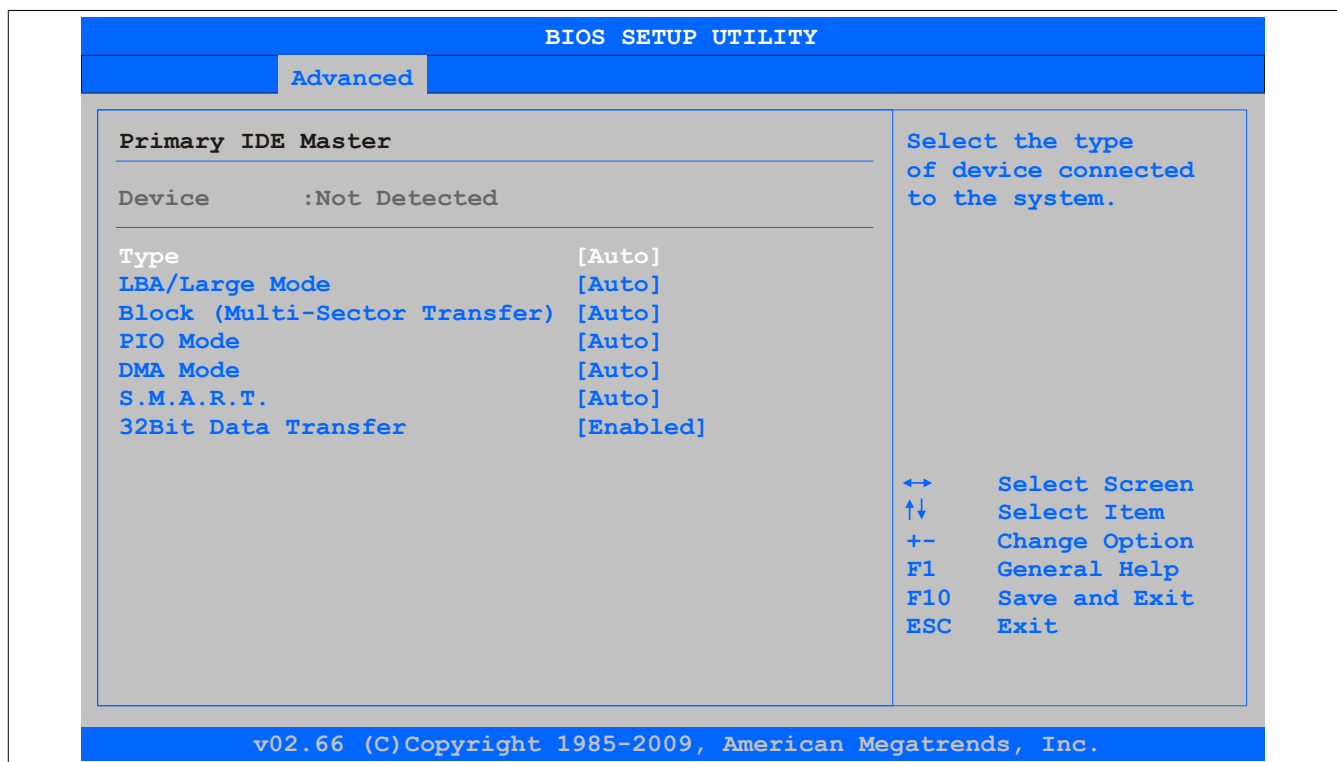


Figure 38: X945 Advanced - IDE Configuration - Primary IDE Master

BIOS setting	Function	Configuration options	Effect
Type	Configures the type of drive connected to the primary master	Not installed	No drive installed
		Auto	Automatically detects the drive and configures the necessary values
		CD/DVD	CD/DVD drive
		ARMD	ARMD drive (zip drive)
LBA/Large mode	This option enables IDE logical block addressing / large mode.	Disabled	Disables this function
		Auto	Automatically enables this function if supported by the system
Block (multi-sector transfer)	This option enables block mode for IDE hard drives. If this option is enabled, the number of blocks per request is read from the configuration sector of the hard drive.	Disabled	Disables this function
		Auto	Automatically enables this function if supported by the system
PIO mode	PIO mode determines the data rate of the hard drive.  <b>Information:</b>  This option is not available on the PPC725. This setting therefore does not apply.	Auto	Configures PIO mode automatically
		0, 1, 2, 3, 4	Configures PIO mode manually
DMA mode	Defines the data transfer rate to and from the primary master drive. DMA mode must be enabled activated in the Windows Device Manager in order to guarantee maximum performance. This is only possible when manually setting up the drive.	Auto	Defines the transfer rate automatically
		Disabled	Defines the transfer rate manually
S.M.A.R.T.	Monitoring function for hard drives (Self-Monitoring, Analysis and Reporting Technology)	Auto	Detected and enabled automatically
		Disabled	Disables this function
		Enabled	Enables this function
32 bit data transfer	Enables 32-bit data transfer	Disabled	Disables this function
		Enabled	Enables this function

Table 55: X945 Advanced - Primary IDE master - Configuration options

### 1.4.8.2 Primary IDE slave

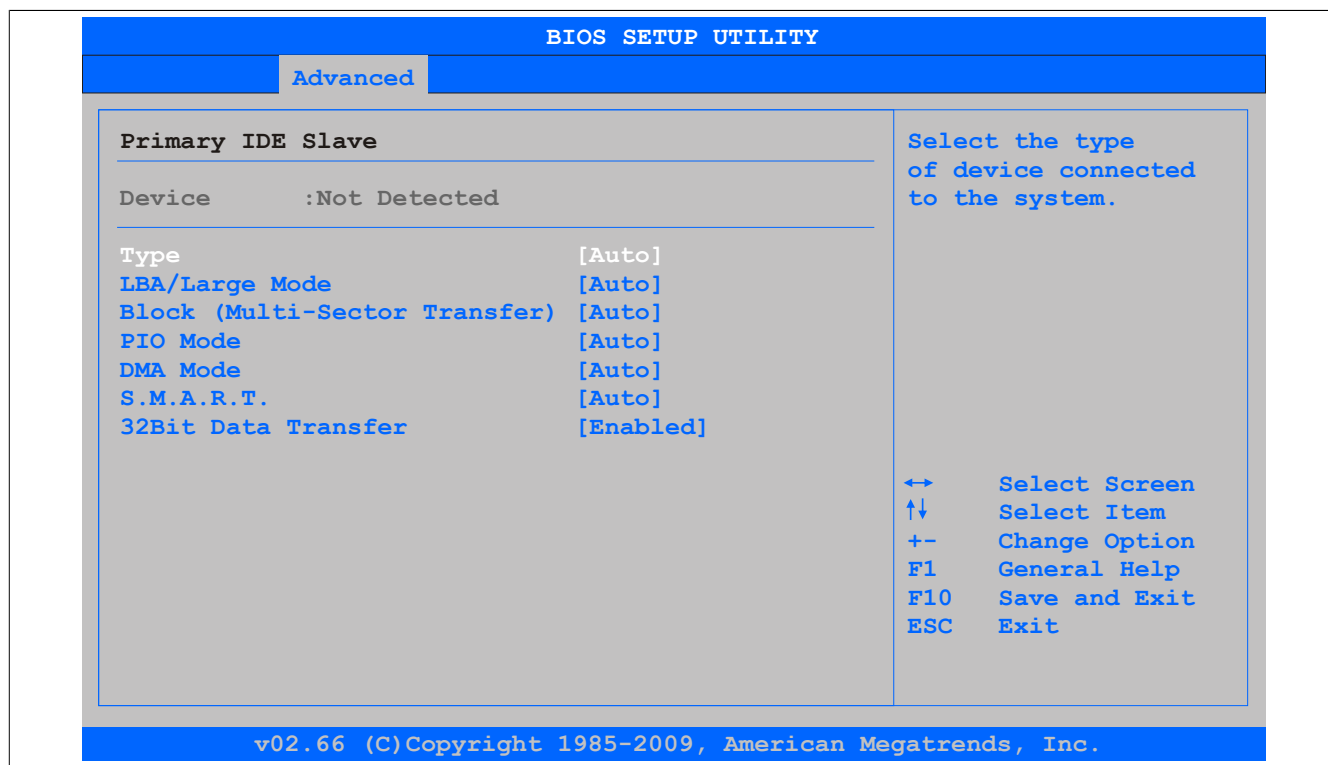


Figure 39: X945 Advanced - IDE Configuration - Primary IDE Slave

BIOS setting	Function	Configuration options	Effect
Type	Configures the type of drive connected to the primary slave	Not installed	No drive installed
		Auto	Automatically detects the drive and configures the necessary values
		CD/DVD	CD/DVD drive
		ARMD	ARMD drive (zip drive)

Table 56: X945 Advanced - Primary IDE slave - Configuration options

BIOS setting	Function	Configuration options	Effect
LBA/Large mode	This option enables IDE logical block addressing / large mode.	Disabled	Disables this function
		Auto	Automatically enables this function if supported by the system
Block (multi-sector transfer)	This option enables block mode for IDE hard drives. If this option is enabled, the number of blocks per request is read from the configuration sector of the hard drive.	Disabled	Disables this function
		Auto	Automatically enables this function if supported by the system
PIO mode	PIO mode determines the data rate of the hard drive.	Auto	Configures PIO mode automatically
		0, 1, 2, 3, 4	Configures PIO mode manually
	<b>Information:</b>  This option is not available on the PPC725. This setting therefore does not apply.	Auto	Defines the transfer rate automatically
DMA mode		Disabled	Defines the transfer rate manually
S.M.A.R.T.	Monitoring function for hard drives (Self-Monitoring, Analysis and Reporting Technology)	Auto	Detected and enabled automatically
		Disabled	Disables this function
		Enabled	Enables this function
32 bit data transfer	Enables 32-bit data transfer	Disabled	Disables this function
		Enabled	Enables this function

Table 56: X945 Advanced - Primary IDE slave - Configuration options

### 1.4.9 USB configuration

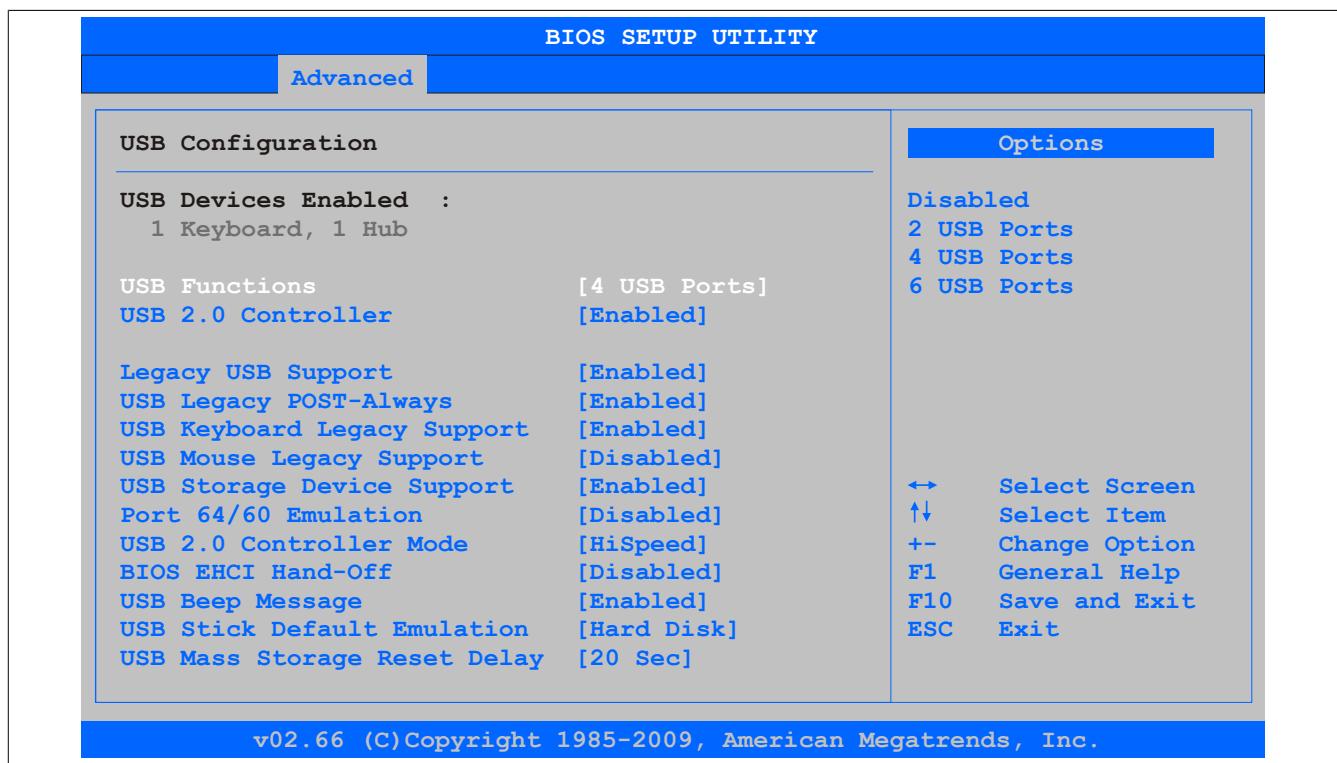


Figure 40: X945 Advanced - USB Configuration

BIOS setting	Function	Configuration options	Effect
USB function	Enables/Disables USB ports	Disabled	Disables the USB port
		2 USB ports	Enables USB1 and USB3
		4 USB ports	Enables USB1, USB2, USB3 and USB4
		6 USB ports	Enables USB1, USB2, USB3, USB4 and USB5
		8 USB ports	Enables USB1, USB2, USB3, USB4, USB5 and USB on an AP via SDL
USB 2.0 controller	Option for enabling or disabling USB 2.0 mode	Enabled	Uses USB 2.0 for all USB ports
		Disabled	Uses USB 1.1 for all USB ports

Table 57: X945 Advanced - USB configuration - Configuration options

BIOS setting	Function	Configuration options	Effect
Legacy USB support	Enables/Disables Legacy USB support. USB ports do not function during startup. USB support is available again after the operating system has started. A USB keyboard is still recognized during POST.	Disabled	Disables this function
		Enabled	Enables this function
		Auto	Automatic enabling
USB Legacy POST-always	Option to enable Legacy USB support during POST (power-on self test) regardless of the setting made for Legacy USB support	Enabled	Allows BIOS Setup to be opened during POST using a USB keyboard
		Disabled	Disables this function
USB keyboard Legacy support	Enables/Disables USB keyboard support	Disabled	Disables this function
		Enabled	Enables this function
USB mouse Legacy support	Enables/Disables USB mouse support	Disabled	Disables this function
		Enabled	Enables this function
USB storage device support	Enables/Disables USB mass storage device support	Disabled	Disables this function
		Enabled	Enables this function
Port 64/60 emulation	Enables/Disables port 64/60 emulation	Disabled	Allows USB keyboard functionality on all systems except Windows NT
		Enabled	Allows USB keyboard functionality in Windows NT
USB 2.0 controller mode	Configures the USB controller	Full speed	12 MBps
		Hi speed	480 MBps
BIOS EHCI hand-off	Allows support for operating systems to be set up without the fully automatic EHCI function	Disabled	Disables this function
		Enabled	Enables this function
USB beep message	Option for emitting a tone each time a USB device is detected by BIOS during POST.	Disabled	Disables this function
		Enabled	Enables this function
USB stick default emulation	Configures how a USB device is to be used	Auto	USB devices with less than 530 MB of memory are simulated as floppy disk drives. Devices with larger memory capacity are simulated as hard drives.
		Hard disk drive	An HDD-formatted drive can be used as an FDD (e.g. zip drive) to start the system.
USB mass storage reset delay	Option for configuring the time that POST waits for USB memory storage devices after the device start command is issued  <b>Information:</b>  The message "No USB mass storage device detected" is displayed if a USB memory device has not been installed.	10 sec, 20 sec, 30 sec, 40 sec	Sets the value manually

Table 57: X945 Advanced - USB configuration - Configuration options

#### 1.4.10 Keyboard/Mouse configuration

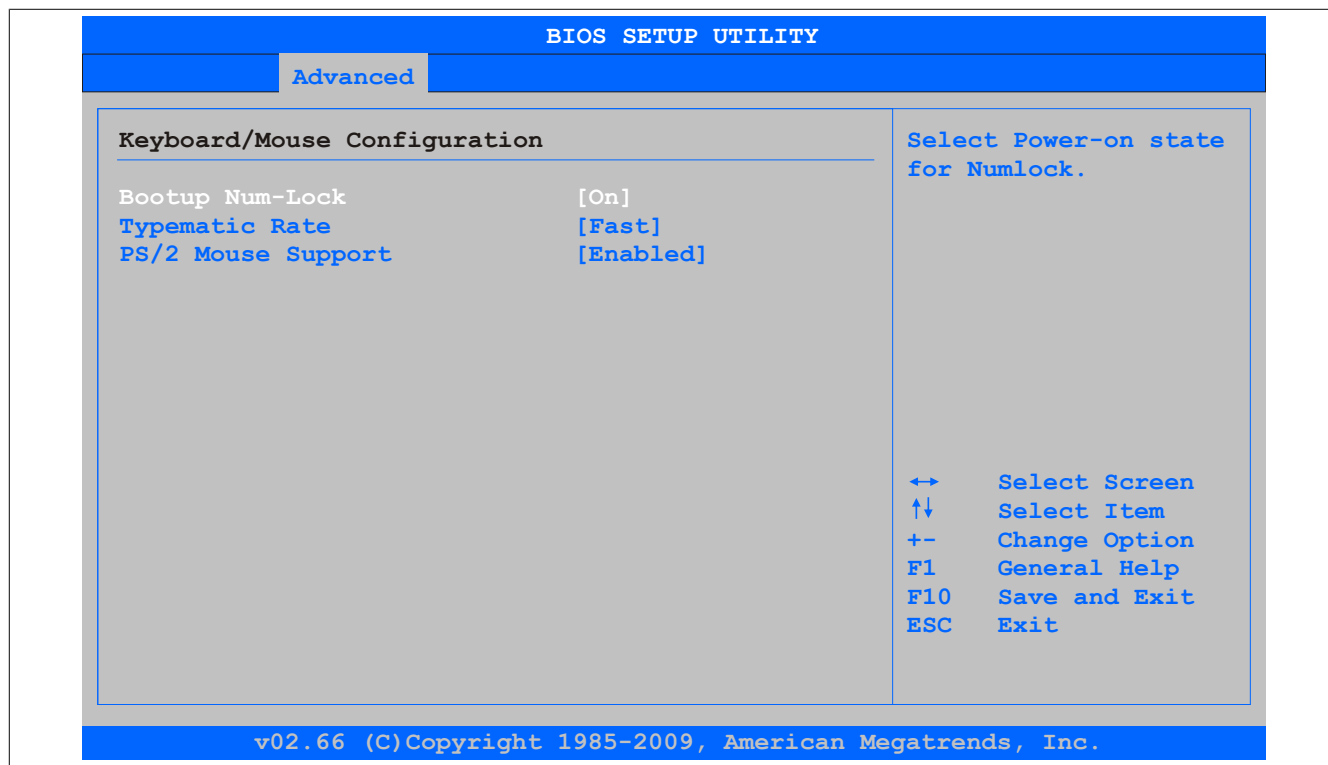


Figure 41: X945 Advanced - Keyboard/Mouse Configuration

BIOS setting	Function	Configuration options	Effect
Bootup Num-lock	Defines the state of the NumLock key on the numeric keypad when booting	Off	Only enables the cursor (movement) functions of the numeric keypad
		On	Enables the numeric keypad
Typematic rate	Configures the key repeat function	Slow	Slow key repeat
		Fast	Fast key repeat
PS/2 mouse support	Sets whether the PS/2 mouse port should be activated.	Disabled	Disables this function
		Enabled	Enables this function
		Auto	Automatic activation of the function if PS/2 mouse port is supported.

Table 58: X945 Advanced - Keyboard/Mouse configuration - Configuration options

### 1.4.11 Remote access configuration

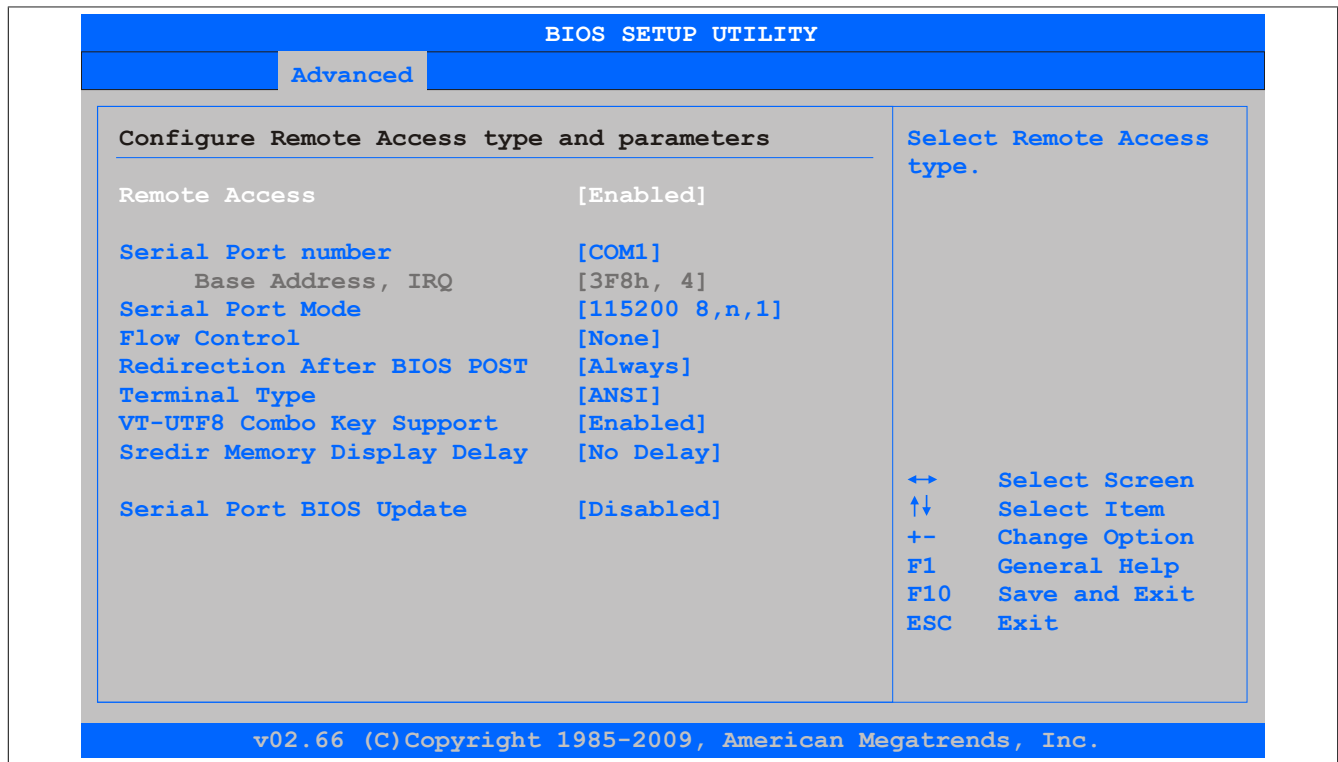


Figure 42: X945 Advanced - Remote Access Configuration (Enabled)

BIOS setting	Function	Configuration options	Effect
Remote access	Enables/Disables the remote access function	Disabled	Disables this function
		Enabled	Enables this function
Serial port number	This option is used to configure the serial interface as long as <i>Remote access</i> is not set to "Disabled".	COM1	Enables the COM1 interface as a remote access interface
		COM2	Enables the COM2 interface as a remote access interface
Base address, IRQ	Displays the logical address and interrupt for the serial port as long as <i>Remote access</i> is not set to "Disabled"	None	-
Serial port mode	Defines the serial port transfer rate as long as <i>Remote access</i> is not set to "Disabled"	115200 8,n,1 57600 8,n,1 38400 8,n,1 19200 8,n,1 09600 8,n,1	Sets the value manually
Flow control	Determines how the transfer is controlled via the interface  <b>Information:</b> The setting must be the same on the terminal and the server.	None	Operates the interface without transfer control
		Hardware	Uses hardware for interface transfer control. This mode must be supported by the cable.
		Software	Uses software for interface transfer control
Redirection After BIOS POST	Configures redirection after startup as long as <i>Remote access</i> is not set to "Disabled"	Disabled	Disables redirection after startup
		Boot loader	Enables redirection during system startup and when charging
		Always	Keeps redirection enabled permanently
Terminal type	Configures the type of connection as long as <i>Remote access</i> is not set to "Disabled".	ANSI, VT100, VT-UTF8	Configures the connection type manually

Table 59: X945 Advanced - Remote access configuration - Configuration options

BIOS setting	Function	Configuration options	Effect
VT-UTF8 combo key support	This option can be used to enable VT-UTF8 combo key support for ANSI and VT100 interfaces as long as Remote access is not set to "Disabled".	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	Sets the value manually
Serial port BIOS update	Loads updates to the processor via the serial interface during system startup	Disabled	Disables this function
		Enabled	Enables this function

**Information:**

Disabling this option reduces the boot time.

Table 59: X945 Advanced - Remote access configuration - Configuration options

## 1.4.12 CPU board monitor

**Information:**

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

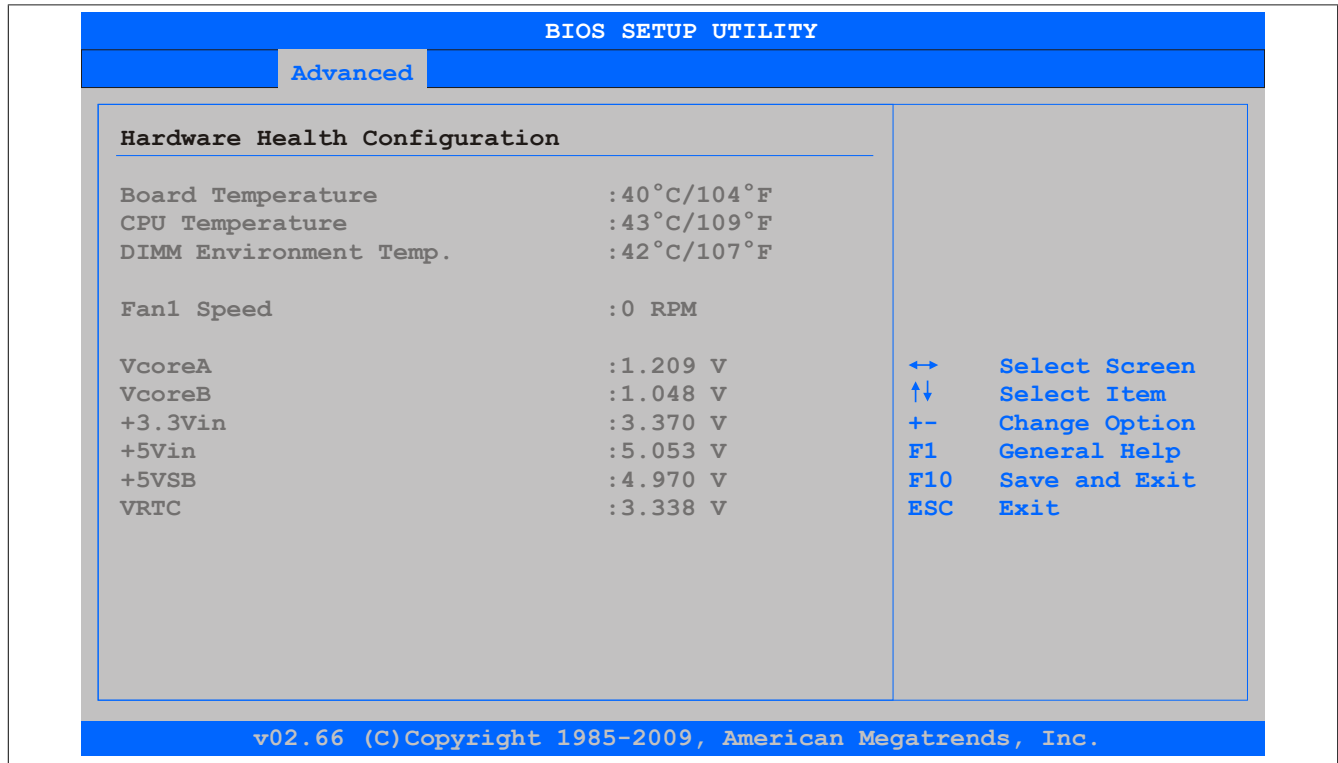


Figure 43: X945 Advanced - CPU Board Monitor

BIOS setting	Function	Configuration options	Effect
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	-
DIMM environment temp.	Displays the temperature of the DRAM module.	None	-
Fan1 Speed	Displays the speed of the processor fan	None	-
VcoreA	Displays the processor core voltage A in volts	None	-
VcoreB	Displays the DDR's core voltage B in volts.	None	-
+3.3 Vin	Displays the current voltage of the 3.3 volt supply	None	-
+5 Vin	Displays the current voltage of the 5 volt supply	None	-
+5VSB	Displays the current level of the jumper.	None	-
VRTC	Displays the battery voltage in volts	None	-

Table 60: X945 Advanced - CPU board monitor

## 1.4.13 Baseboard/Panel features

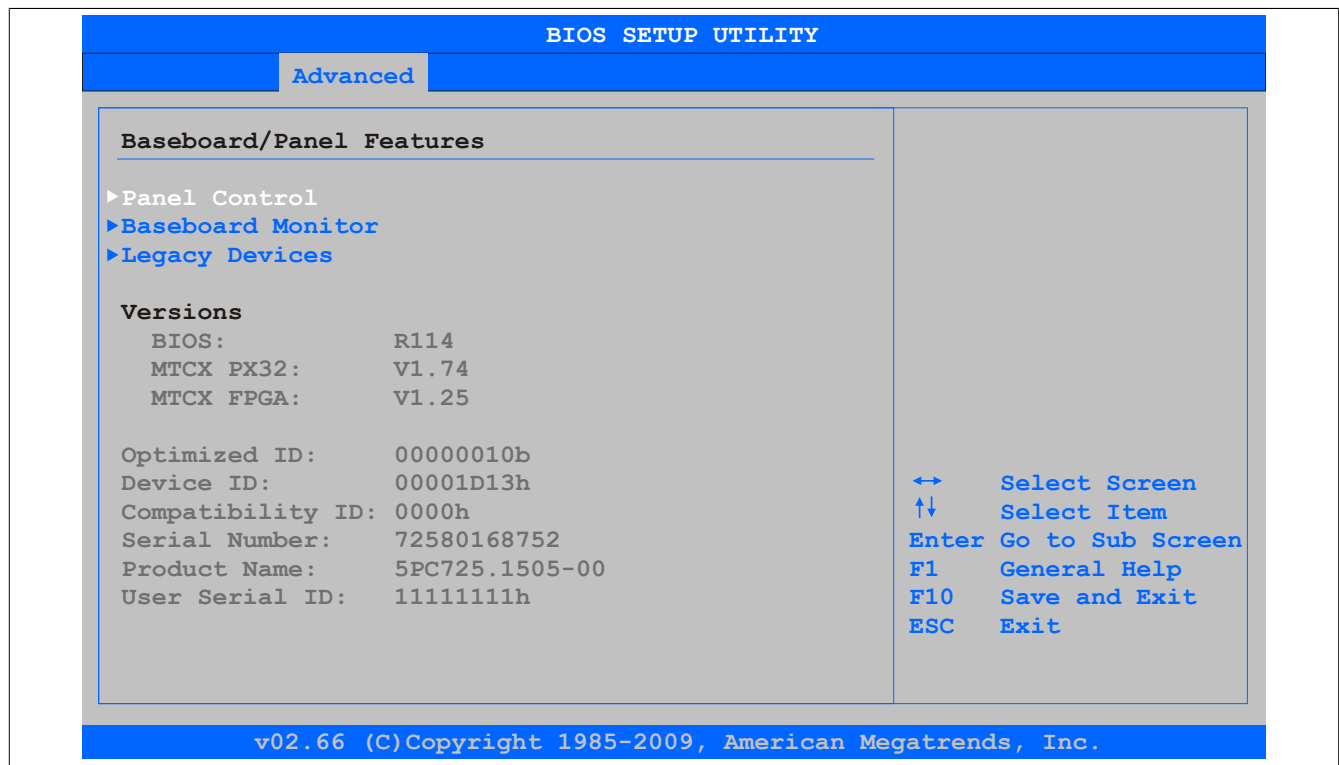


Figure 44: X945 Advanced - Baseboard/Panel Features

BIOS setting	Function	Configuration options	Effect
<b>Panel control</b>	Configures special settings for connected panels (display units)	Enter	Opens the submenu see "Panel control" on page 89
<b>Baseboard monitor</b>	Displays various temperatures and fan speeds	Enter	Opens the submenu see "Baseboard monitor" on page 90
<b>Legacy devices</b>	Configures special settings for interfaces	Enter	Opens the submenu see "Legacy devices" on page 91
BIOS	Displays the BIOS version	None	-
MTCX PX32	Displays the MTCX PX32 firmware version	None	-
MTCX FPGA	Displays the MTCX FPGA firmware version	None	-
Optimized ID	Displays the DIP switch setting of the configuration switch.	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 ID. This ID is needed for Automation Runtime.	None	-
Serial number	Displays the B&R serial number	None	-
Product name	Displays the B&R model number	None	-
User serial ID	Displays the user serial ID. This 8-digit hexadecimal value can be freely specified by the user (e.g. to give the device a unique ID) and can only be changed using the "B&R Control Center" included with the ADI driver.	None	-

Table 61: X945 Advanced - Baseboard/Panel features - Configuration options



## 1.4.13.1 Panel control

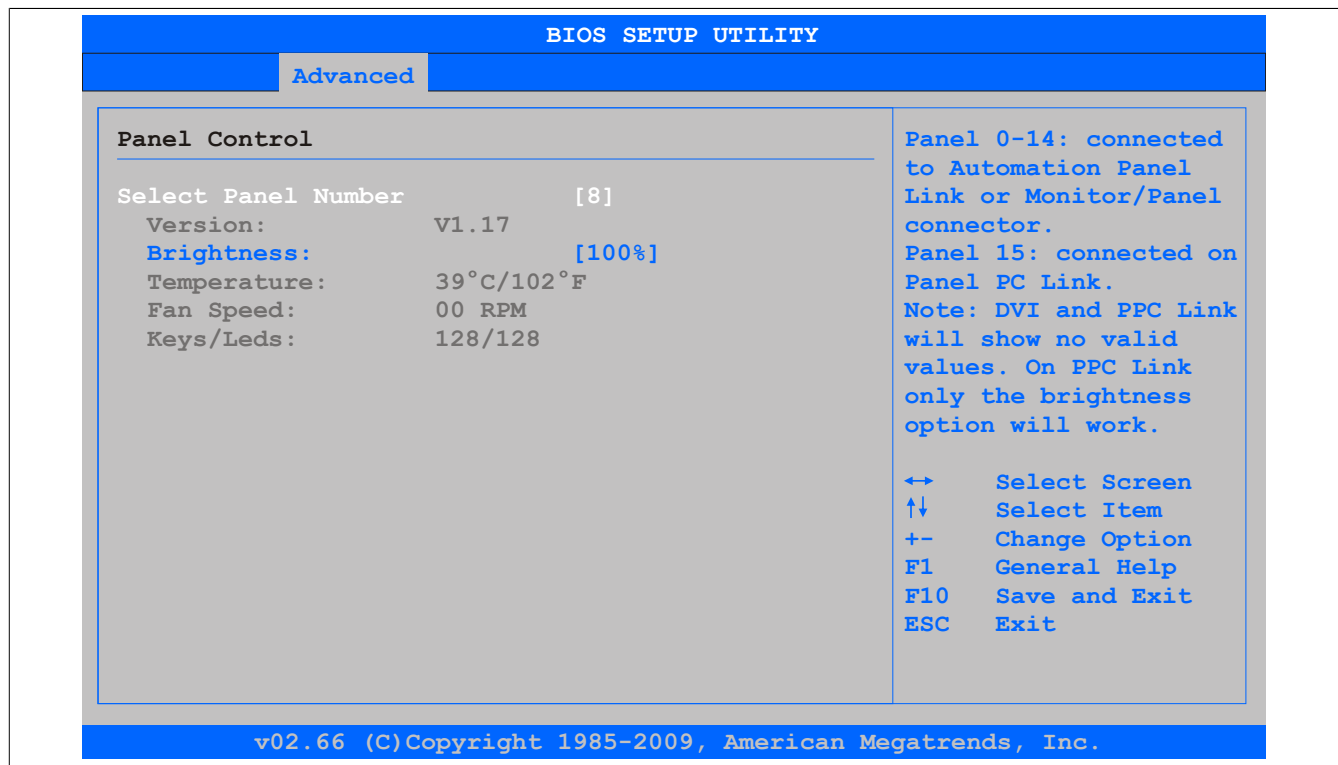


Figure 45: X945 Advanced - Baseboard/Panel Features - Panel Control

BIOS setting	Function	Configuration options	Effect
Select panel number	Selects the panel number for which the values should be displayed and/or changed	0...15	Selects panel 0-15 Panel 15 is specifically intended for Panel PC 700 systems.
Version	Displays the firmware version of the SDLR controller	None	-
Brightness	Sets the brightness of the selected panel	0%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 100%	Sets 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 the fan speed for the selected panel	None	-
Keys/LEDs	Displays the available keys and LEDs on the selected panel	None	-

Table 62: X945 Advanced - Panel control - Configuration options

## 1.4.13.2 Baseboard monitor

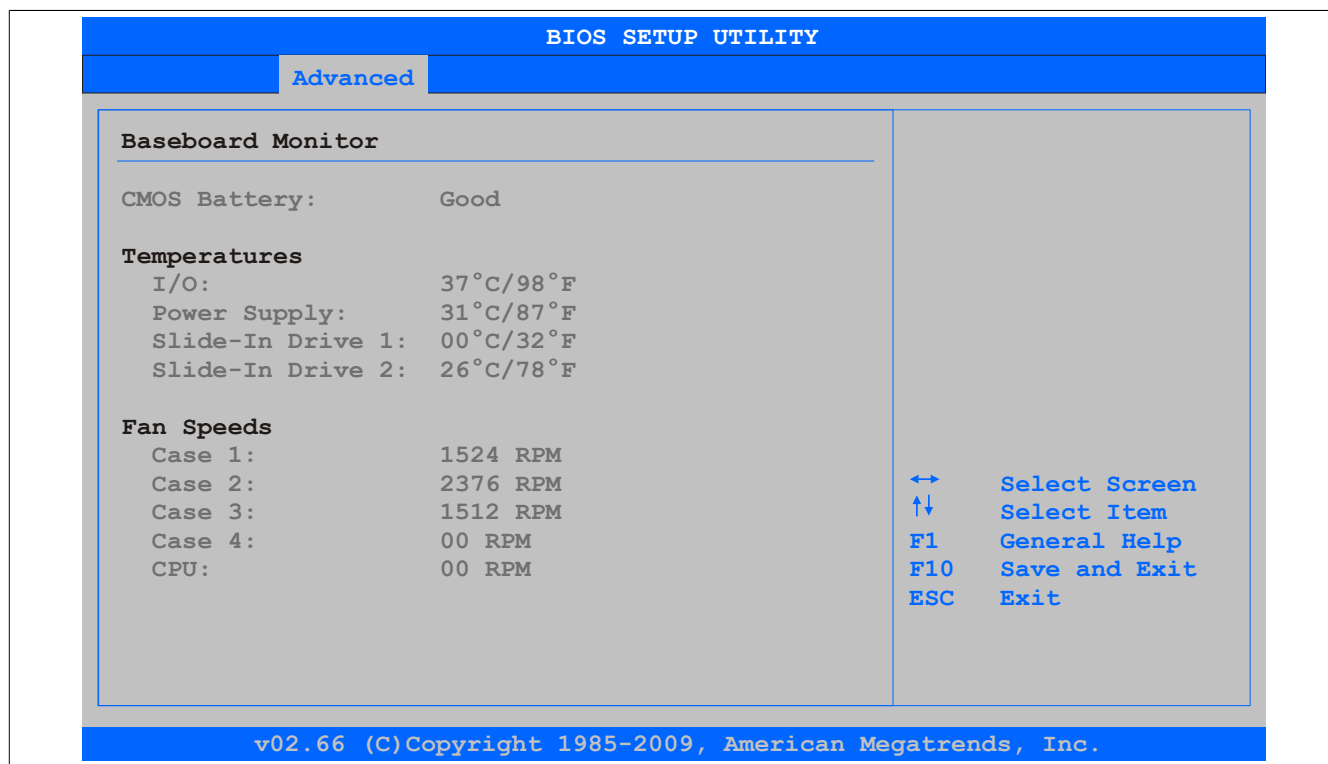


Figure 46: X945 Advanced - Baseboard/Panel Features - Baseboard Monitor

BIOS setting	Function	Configuration 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	-
I/O	Displays the temperature in the I/O area in degrees Celsius and Fahrenheit	None	-
Power supply	Displays the temperature in the power supply in degrees Celsius and Fahrenheit	None	-
Slide-in drive 1	Displays the temperature of slide-in drive 1 in degrees Celsius and Fahrenheit	None	-
Slide-in drive 2	Displays the temperature of slide-in drive 2 in degrees Celsius and Fahrenheit	None	-
Case 1	Displays the speed of housing fan 1	None	-
Case 2	Displays the speed of housing fan 2	None	-
Case 3	Displays the speed of housing fan 3	None	-
Case 4	Displays the speed of housing fan 4	None	-
CPU	Displays the rotational speed of the CPU fan.	None	-

Table 63: X945 Advanced - Baseboard monitor - Configuration options

## 1.4.13.3 Legacy devices

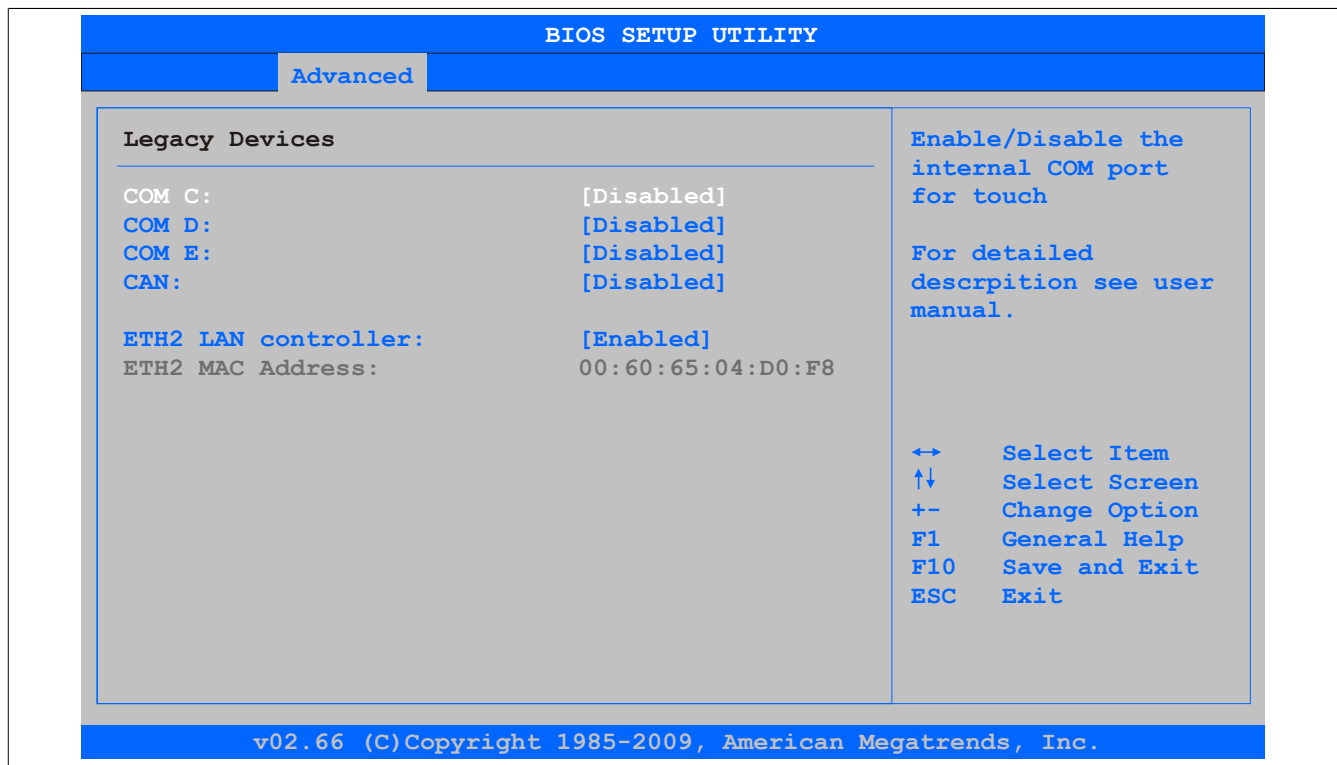


Figure 47: X945 Advanced - Baseboard/Panel Features - Legacy Devices

BIOS setting	Function	Configuration options	Effect
COM C	Sets the COM port for the <b>touch screen connected to the monitor/panel</b> interface	Disabled	Disables the interface
		Enabled	Enables the interface
Base I/O address	Selects the base I/O address of the COM port	238, 2E8, 328, 338, 3E8	Assigns the selected base I/O address
Interrupt	Selects the interrupt for the COM port	IRQ 5, IRQ 6, IRQ 7, IRQ 10, IRQ 11	Assigns the selected interrupt
COM D	Sets the COM port for the <b>touch screen on the AP Link</b> connector.	Disabled	Disables the interface
		Enabled	Enables the interface
Base I/O address	Selects the base I/O address of the COM port	238, 2E8, 328, 338, 3E8	Assigns the selected base I/O address
Interrupt	Selects the interrupt for the COM port	IRQ 5, IRQ 6, IRQ 7, IRQ 10, IRQ 11	Assigns the selected interrupt
COM E	Configures the COM port of the 5AC600.485I-00 B&R add-on interface (IF option)	Disabled	Disables the interface
		Enabled	Enables the interface
Base I/O address	Selects the base I/O address of the COM port	238, 2E8, 328, 338, 3E8	Assigns the selected base I/O address
Interrupt	Selects the interrupt for the COM port	IRQ 5, IRQ 6, IRQ 7, IRQ 10, IRQ 11	Assigns the selected interrupt
CAN	Configures the CAN port on the 5AC600.CANI-00 B&R add-on CAN interface card (IF option)	Disabled	Disables the interface
		Enabled	Enables the interface
Base I/O address	Displays the base I/O address of the CAN port	None	-
Interrupt	Selects the interrupt for the CAN port	IRQ 10, NMI	Assigns the selected interrupt
ETH2 LAN controller	Option for turning the onboard LAN controller (ETH2) on and off	Disabled	Disables the controller
		Enabled	Enables the controller
ETH2 MAC address	Displays the MAC address of the Ethernet 2 controller	None	-

Table 64: X945 Advanced - Legacy devices - Configuration options

## 1.5 Boot

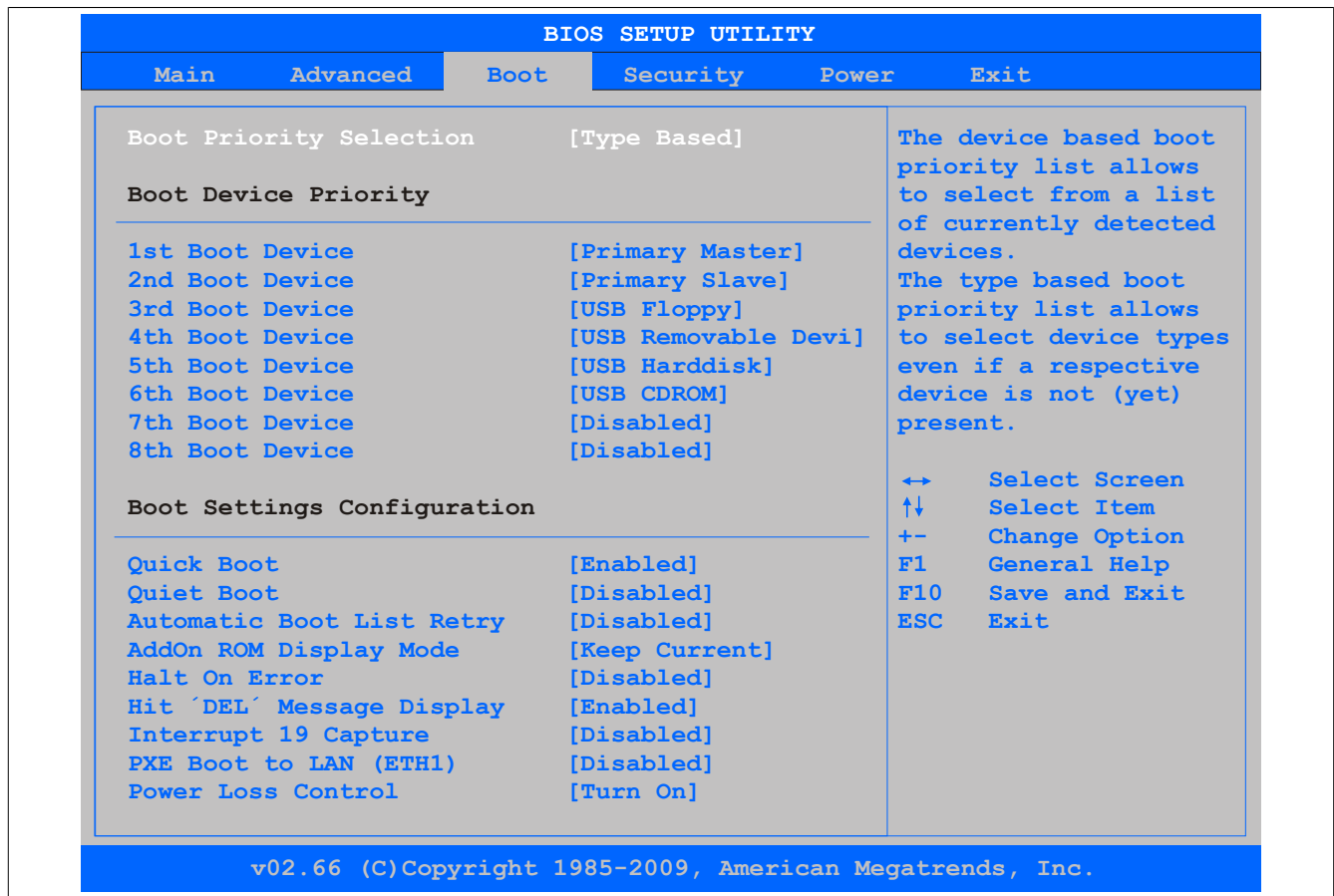


Figure 48: X945 Boot - Menü

BIOS setting	Function	Configuration options	Effect
Boot priority selection	Option for determining the method for how drives should be booted	Device based	Only lists devices that are recognized by the system. The order of devices in this list can be changed.  <b>Information:</b> It is only possible to use either "Device based" or "Type based". Using both together is not permitted.
		Type based	The boot sequence of a device type list can be changed. It is also possible to add device types that are not connected to this list.  <b>Information:</b> It is only possible to use either "Device based" or "Type based". Using both together is not permitted.
1st boot device	Option for selecting drives to be used for booting	Disabled, Primary master, Primary slave, Secondary master, Secondary slave, Legacy floppy, USB floppy, USB hard disk, USB CDROM, USB removable device, Onboard LAN, External LAN, PCI mass storage, PCI SCSI card, Any PCI BEV device, Third master, Third slave, PCI RAID, Local BEV ROM	Specifies the desired boot sequence
2nd boot device			
2nd 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 whether the POST message or the OEM logo (default = black background) is displayed	Disabled	Displays the POST message
		Enabled	Displays the OEM logo instead of the POST message
Automatic boot list retry	This option can be used to attempt to restart the operating system automatically if it fails to start the first time.	Disabled	Disables this function
		Enabled	Enables this function

Table 65: X945 Boot menu - Configuration options

BIOS setting	Function	Configuration options	Effect
Add-on ROM display mode	Sets the display mode for the ROM (during the booting procedure)	Force BIOS	Displays an additional part of BIOS
		Keep current	Displays BIOS information
Halt on error	This option determines the system should resume after a startup error during POST.	Disabled	Does not pause the system. All errors are ignored.
		Enabled	Pauses the system. The system pauses each time an error occurs.
Hit 'DEL' message display	Configures settings for the "Hit 'DEL'" message	Disabled	Does not display the message
		Enabled	Displays the message
Interrupt 19 capture	This function can be used to include BIOS interruptions.	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
Power loss control	Specifies whether the system should be on/off following power loss	Remain off	System remains off
		Turn on	System powered on
		Turn on	Enables the previous state

Table 65: X945 Boot menu - Configuration options

## 1.6 Security

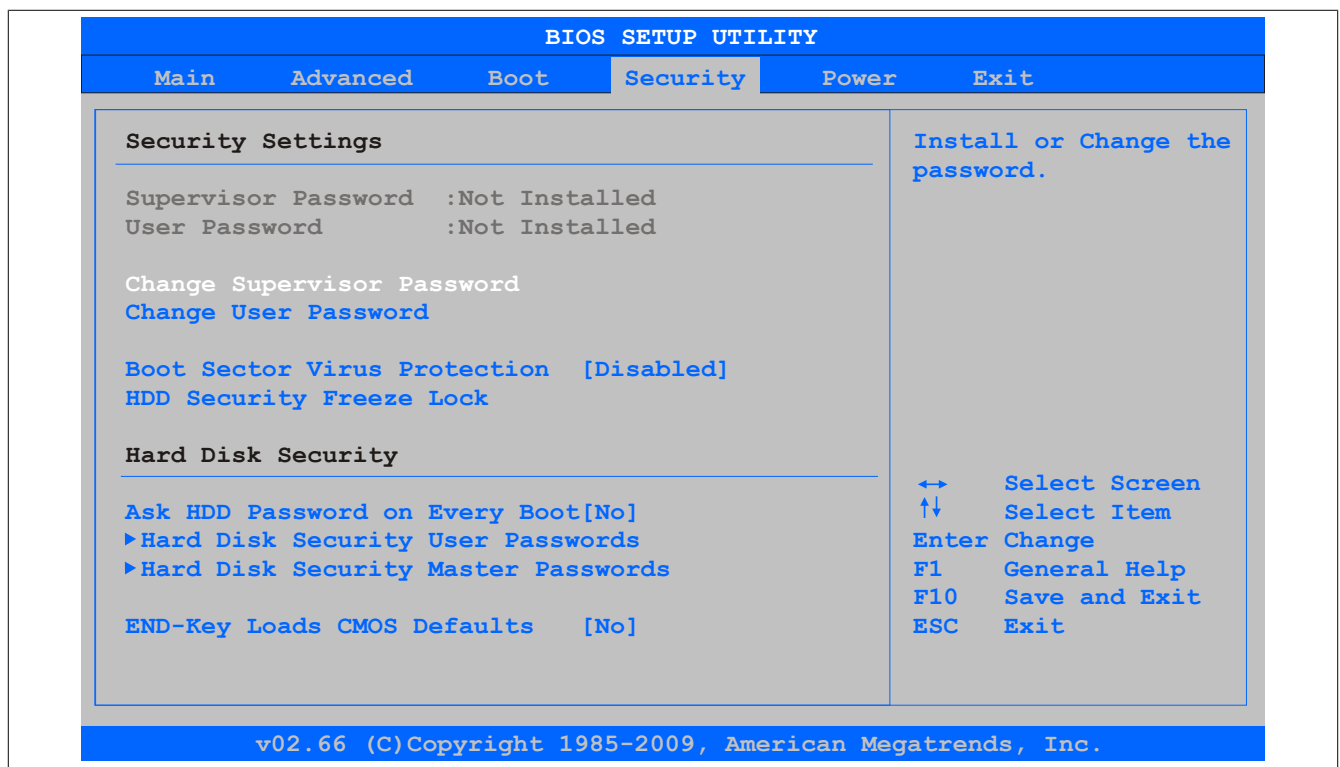


Figure 49: X945 Security - Menü

BIOS setting	Function	Configuration options	Effect
Supervisor password	Displays whether a supervisor password has been set	None	
User password	Displays whether a user password has been set	None	
Change supervisor password	Function for entering/changing a supervisor password. A supervisor password is necessary to edit all BIOS settings.	Enter	Password entry
Change user password	Function for entering/changing a user password. The user password allows the user to edit only certain BIOS settings.	Enter	Password entry
Boot sector virus protection	This option is used to issue a warning when the boot sector is accessed by a program or virus.	Disabled	Disables this function
		Enabled	Enables this function

### Information:

This option only protects the boot sector, not the entire hard drive.

Table 66: X945 Security menu - Configuration options

BIOS setting	Function	Configuration options	Effect
HDD Security Freeze Lock	This option can be used to define whether the BIOS sends the HDD Security Freeze Lock command to every connected hard disk that supports the Security command. This prevents the setting or changing of a hard disk password after POST.	Disabled	Disables this function
		Enabled	Enables this function
Ask HDD Password on Every Boot	This function can be used to select whether the hard disk password must be entered each time the system boots.  <b>Information:</b>  Can only be used if a hard disk user password has been created.	Yes	Enables this function
		No	Disables this function
Hard disk security user passwords	Creates the hard disk security user password	Enter	Opens the submenu see "Hard disk security user password" on page 94
Hard disk security master passwords	Creates the hard disk security master password	Enter	Opens the submenu see "Hard disk security master password" on page 95
End-key load CMOS defaults	Using this function, CMOS can be loaded by pressing the END key during POST.	No	Disables this function
		Yes	Enables this function

Table 66: X945 Security menu - Configuration options

### 1.6.1 Hard disk security user password

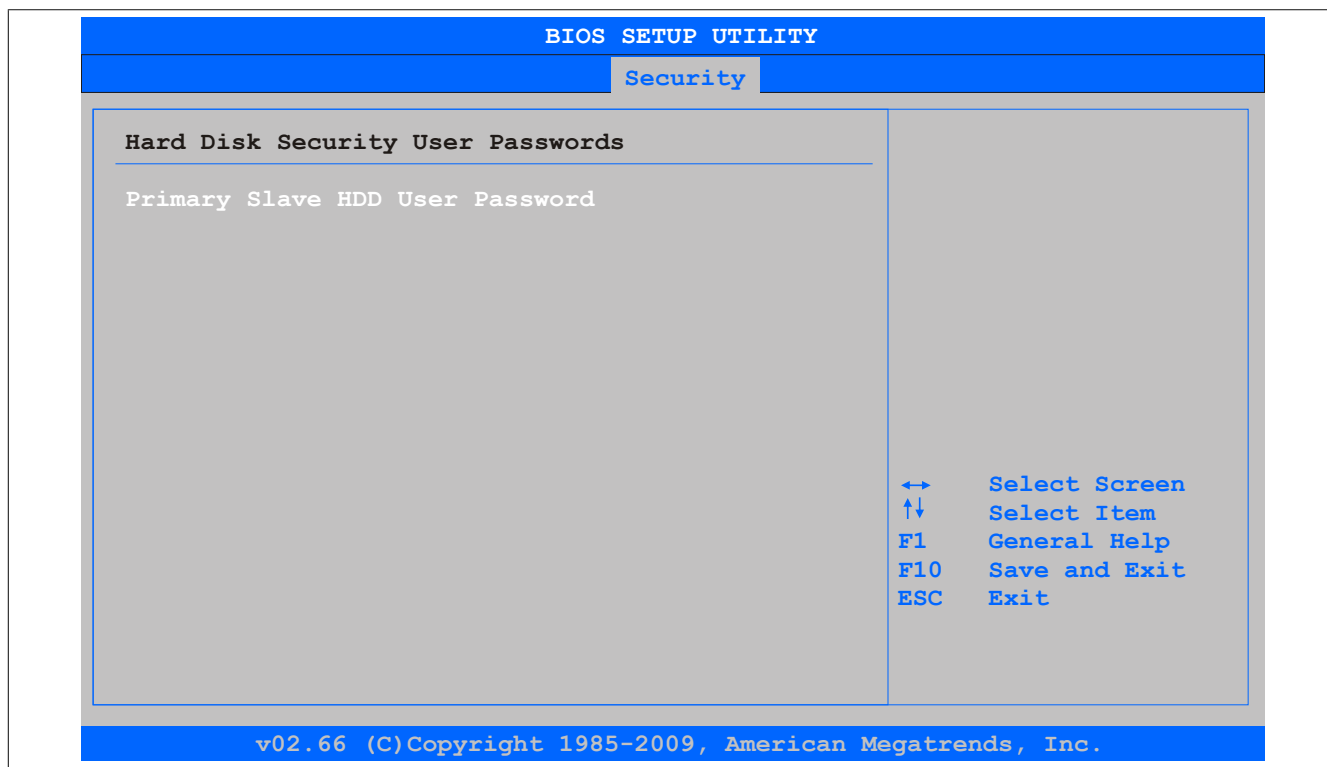


Figure 50: X945 Security - Hard Disk Security User Password

BIOS setting	Function	Configuration options	Effect
Primary slave HDD user password	This function makes it possible to configure or change the user password for each hard drive without having to reboot the device. The user password allows the user to edit only certain BIOS settings.	Enter	Password entry

Table 67: X945 Security - Hard disk security user password

## 1.6.2 Hard disk security master password

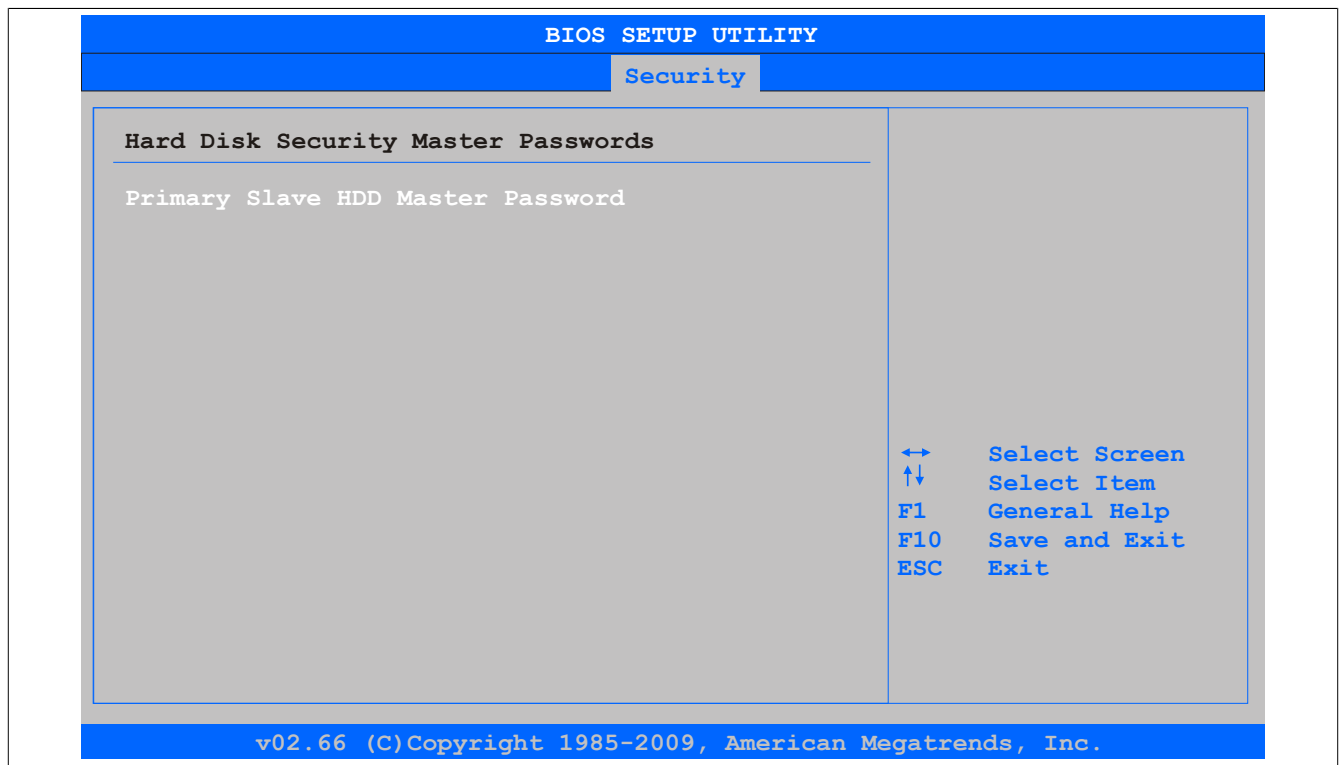


Figure 51: X945 Security - Hard Disk Security Master Password

BIOS setting	Function	Configuration options	Effect
Primary slave HDD master password	This function makes it possible to configure or change the master password for each hard drive without having to reboot the device.	Enter	Password entry

Table 68: X945 Security - Hard disk security master password

## 1.7 Power

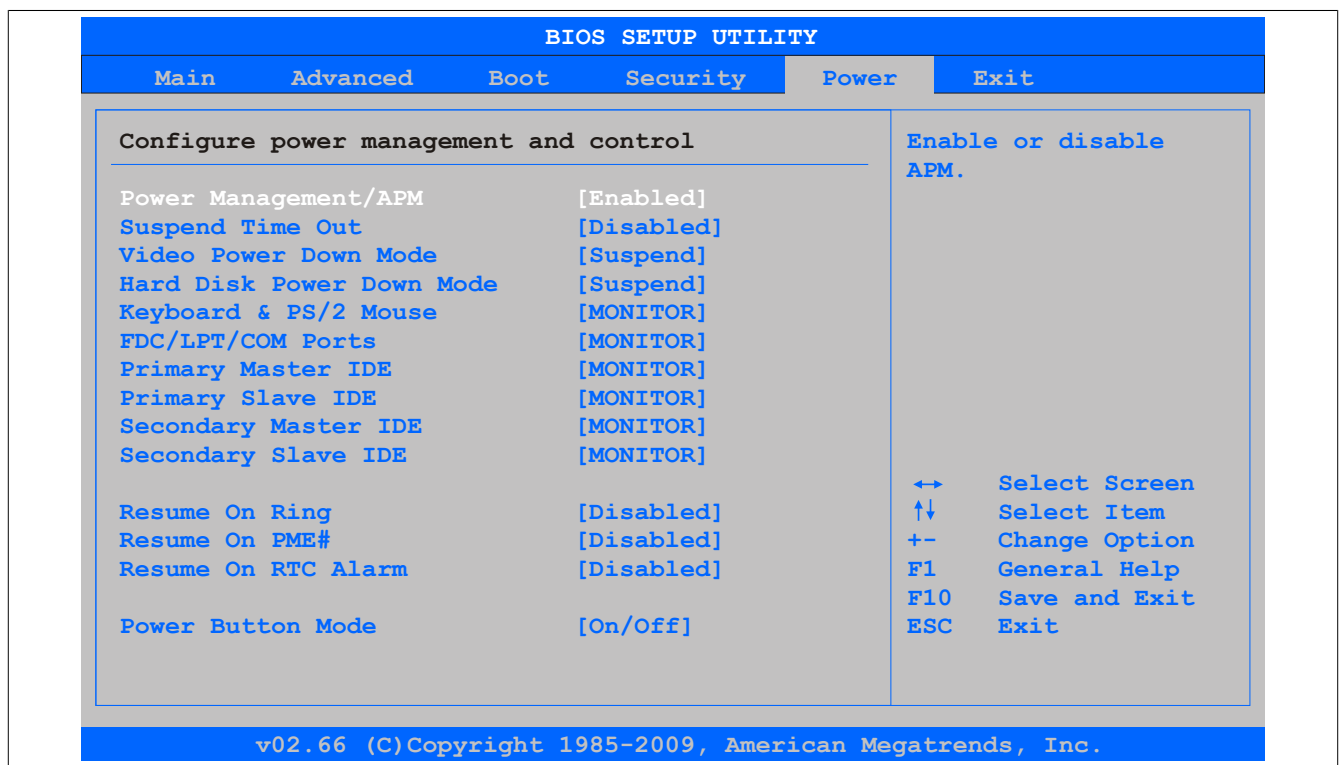


Figure 52: X945 Power - Menü

BIOS setting	Function	Configuration options	Effect
Power Management / APM	This option enables or disables APM functionality. This is advanced plug and play and power management functionality.	Disabled	Disables this function
		Enabled	Enables this function
Suspend time out	This option can be used to configure how long the system must be inactive before entering suspend mode (all components except the CPU are shut down as far as possible).	Disabled	Disables this function
		1 min, 2 min, 4 min, 8 min, 10 min, 20 min, 30 min, 40 min, 50 min, 60 min	Sets the value manually
Video power down mode	This option can be used to set the energy saving mode for the monitor.	Disabled	Does not switch off the monitor
		Standby	Switches the monitor to standby mode
		Suspend	Switches the monitor to suspend mode
Hard disk power down mode	This option is used 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	Configures the monitoring of activity during energy saving mode	MONITOR	Returns the system to its normal state from the respective energy saving mode when activity is detected on the keyboard or PS/2 mouse
		IGNORE	Ignores activity
FDC/LPT/COM ports	Configures the monitoring of activity during energy saving mode	MONITOR	Returns the system to its normal state from the respective energy saving mode when activity is detected on the parallel port, serial port 1&2 or the floppy drive port.
		IGNORE	Ignores activity
Primary master IDE	Configures the monitoring of activity during energy saving mode	MONITOR	Returns the system to its normal state from the respective energy saving mode when activity is detected on the IRQ of the respective interface or device
		IGNORE	Ignores activity
Primary slave IDE	Configures the monitoring of activity during energy saving mode	MONITOR	Returns the system to its normal state from the respective energy saving mode when activity is detected on the IRQ of the respective interface or device
		IGNORE	Ignores activity
Secondary master IDE	Configures the monitoring of activity during energy saving mode	MONITOR	Returns the system to its normal state from the respective energy saving mode when activity is detected on the IRQ of the respective interface or device
		IGNORE	Ignores activity
Secondary slave IDE	Configures the monitoring of activity during energy saving mode	MONITOR	Returns the system to its normal state from the respective energy saving mode when activity is detected on the IRQ of the respective interface or device
		IGNORE	Ignores activity
Resume on ring	Returns the PC from energy saving mode when the modem receives an incoming call	Disabled	Disables this function
		Enabled	Enables this function
Resume on PME#	Configures whether the PME wakeup function is enabled or disabled	Disabled	Disables this function
		Enabled	Enables this function
Resume on RTC alarm	This option can be used to enable the alarm and enter the date and time during system startup.	Disabled	Disables this function
		Enabled	Enables this function
Power button mode	This function determines what the power button does.	On/Off	Switches the system on/off
		Suspend	Suppresses this function

Table 69: X945 Power menu - Configuration options



## 1.8 Exit

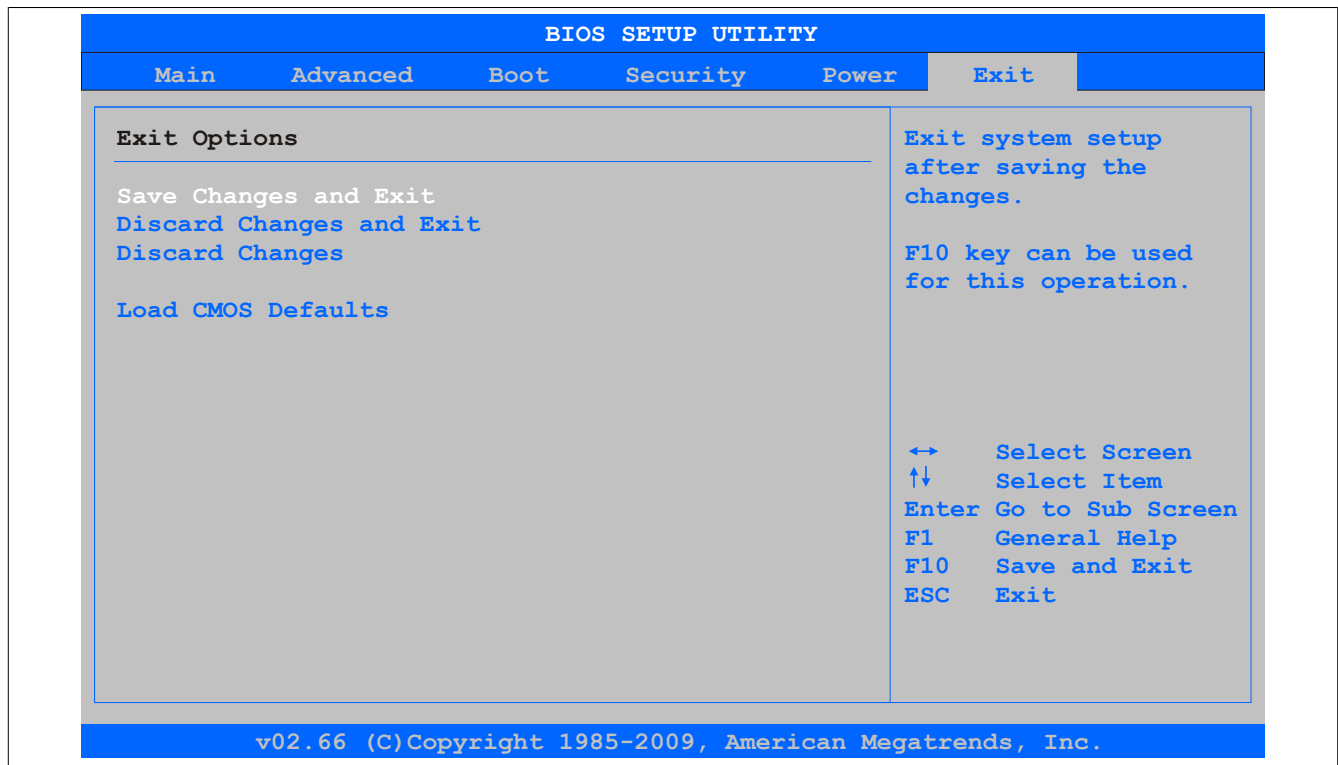


Figure 53: X945 Exit - Menü

BIOS setting	Function	Configuration options	Effect
Save changes and exit	Selecting this option closes BIOS Setup. Any changes made are saved to CMOS after confirmation, and the system is rebooted.	OK / Cancel	
Discard changes and exit	Selecting this option closes BIOS Setup without saving any changes made.	OK / Cancel	
Discard changes	This option can be used to reset any settings that may have been made but have been forgotten in the meantime (provided they have not yet been saved).	OK / Cancel	
Load CMOS defaults	This option loads the CMOS default values defined by the DIP switch settings. These values are loaded for all BIOS settings.	OK / Cancel	

Table 70: X945 Exit menu - Configuration options

## 1.9 BIOS default settings

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

### Information:

**The factory default switch position represents the optimal BIOS default values for this system and should therefore not be changed.**

If the "Load setup defaults" function is selected in the main BIOS Setup screen, 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.

The first six DIP switches (1-6) are used to set the profiles. The rest (7,8) are reserved.

Profile number	Optimized for	DIP switch setting							
		1	2	3	4	5	6	7 <sup>1)</sup>	8 <sup>1)</sup>
Profile 0	Automation PC 620 system units 5PC600.SX01-00.	Off	Off	Off	Off	Off	Off	-	-
Profile 1	Reserved	On	Off	Off	Off	Off	Off	-	-
Profile 2	Automation PC 620 system units 5PC600.SX02-00, 5PC600.SX02-01, 5PC600.SF03-00, 5PC600.SX05-00 and 5PC600.SX05-01.	Off	On	Off	Off	Off	Off	-	-
Profile 3	Panel PC 700 system units 5PC720.1043-00, 5PC720.1214-00, 5PC720.1505-00, 5PC720.1706-00, 5PC720.1906-00, 5PC781.1043-00, 5PC781.1505-00 and 5PC782.1043-00.	On	On	Off	Off	Off	Off	-	-
Profile 4	Panel PC 700 system units 5PC720.1043-01, 5PC720.1214-01, 5PC720.1505-01 and 5PC720.1505-02.	Off	Off	On	Off	Off	Off	-	-
Profile 5	Automation PC 620 embedded system units 5PC600.SE00-00 and 5PC600.SE00-01.	On	Off	On	Off	Off	Off	-	-
Profile 6	Panel PC 725 system units 5PC725.1505-00 and 5PC725.1505-01	Off	On	On	Off	Off	Off	-	-

Table 71: Profile overview

1) Reserved

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

## 1.9.2 Main

Setting/Option	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	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 72: X945 Main - Overview of profile settings

## 1.9.3 Advanced

### 1.9.3.1 ACPI configuration

Setting/Option	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
ACPI aware O/S	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
ACPI version features	ACPI v2.0	ACPI v2.0	ACPI v2.0	ACPI v2.0	ACPI v2.0	ACPI v2.0	ACPI v2.0	
ACPI APIC support	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
Suspend mode	S1 (POS)	S1 (POS)	S1 (POS)	S1 (POS)	S1 (POS)	S1 (POS)	S1 (POS)	
USB device wakeup from S3/S4	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Active cooling trip point	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Passive cooling trip point	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Critical trip point	105°C	105°C	105°C	105°C	105°C	105°C	105°C	

Table 73: X945 Advanced - ACPI configuration - Overview of profile settings

### 1.9.3.2 PCI configuration

Setting/Option	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
Plug & Play O/S	Yes	No	Yes	Yes	Yes	Yes	Yes	
PCI latency timer	64	64	64	64	64	64	64	
Allocate IRQ to PCI VGA	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Allocate IRQ to SMBUS HC	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
<b>PCI IRQ resource exclusion</b>								
IRQ3	Allocated	Allocated	Allocated	Allocated	Allocated	Allocated	Allocated	
IRQ4	Allocated	Allocated	Allocated	Allocated	Allocated	Allocated	Allocated	
IRQ5	Available	Available	Available	Available	Available	<b>Allocated</b>	Available	
IRQ6	Available	Available	Available	Available	Available	<b>Allocated</b>	Available	
IRQ7	Available	Available	Available	Available	Available	<b>Allocated</b>	Available	
IRQ9	Allocated	Allocated	Allocated	Allocated	Allocated	Allocated	Allocated	
IRQ10	Available	Available	Available	Available	Available	Available	Available	
IRQ11	Available	<b>Allocated</b>	Available	<b>Allocated</b>	<b>Allocated</b>	Available	Available	
IRQ12	Available	<b>Allocated</b>	Available	Available	Available	Available	Available	
IRQ14	Allocated	Allocated	Allocated	Allocated	Allocated	Allocated	Allocated	
IRQ15	Available	Available	Available	Available	Available	Available	Available	
<b>PCI interrupt routing</b>								
PIRQ A (VGA)	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
PIRQ B (AC97, INTD)	Auto	Auto	Auto	Auto	Auto	<b>7</b>	Auto	
PIRQ C (PATA, INTC)	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
PIRQ D (SATA, UHCI1, SMB)	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
PIRQ E (ETH1)	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
PIRQ F (INTA, ETH2)	Auto	Auto	Auto	Auto	Auto	<b>5</b>	Auto	
PIRQ G (INTB)	Auto	Auto	Auto	Auto	Auto	<b>6</b>	Auto	
PIRQ H (UHCI0, EHCI)	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
1st exclusive PCI	-	-	-	-	-	<b>5</b>	-	
2nd exclusive PCI	-	-	-	-	-	<b>6</b>	-	
3rd exclusive PCI	-	-	-	-	-	<b>7</b>	-	

Table 74: X945 Advanced - PCI configuration - Overview of profile settings

### 1.9.3.3 Graphics configuration

Setting/Option	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
Primary video device	Internal VGA	Internal VGA	Internal VGA	Internal VGA	Internal VGA	Internal VGA	Internal VGA	
Internal graphics mode select	Enabled, 8MB	Enabled, 8MB	Enabled, 8MB	Enabled, 8MB	Enabled, 8MB	Enabled, 8MB	Enabled, 8MB	
DVMT mode select	DVMT mode	DVMT mode	DVMT mode	DVMT mode	DVMT mode	DVMT mode	DVMT mode	
DVMT/FIXED memory	128 MB	128 MB	128 MB	128 MB	128 MB	128 MB	128 MB	
Boot display device	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
Always try auto panel detect	No	No	No	No	No	No	No	
Local flat panel type	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
Local flat panel scaling	Expand text & graphics	Expand text & graphics	Expand text & graphics	Expand text & graphics	Expand text & graphics	Expand text & graphics	Expand text & graphics	
Display mode persistence	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	

Table 75: X945 Advanced - Graphics configuration - Overview of profile settings

### 1.9.3.4 CPU configuration

Setting/Option	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
Module version	-	-	-	-	-	-	-	
Manufacturer	-	-	-	-	-	-	-	
Frequency	-	-	-	-	-	-	-	
FSB speed	-	-	-	-	-	-	-	
Cache L1	-	-	-	-	-	-	-	
Cache L2	-	-	-	-	-	-	-	
Ratio actual value	-	-	-	-	-	-	-	
MPS revision	1.4	1.4	1.4	1.4	1.4	1.4	1.4	
Max CPUID value limit	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Execute disable bit capability	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
Hyper Threading Technology	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
Intel(R) SpeedStep(tm) tech.	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
Boot CPU Speed On AC	Maximum	Maximum	Maximum	Maximum	Maximum	Maximum	Maximum	
Intel(R) C-STATE tech	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Enhanced C-States	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	

Table 76: X945 Advanced - CPU configuration - Overview of profile settings

### 1.9.3.5 Chipset configuration

Setting/Option	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
DRAM frequency	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
DRAM refresh rate	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
Memory hole	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
DIMM thermal control	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
DT in SPD	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
TS on DIMM	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
High precision event timer	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
IOAPIC	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
APIC ACPI SCI IRQ	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
C4 on C3	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	

Table 77: X945 Advanced - Chipset configuration - Overview of profile settings

### 1.9.3.6 I/O interface configuration

Setting/Option	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
Onboard AC'97 audio	Enabled	Enabled	Enabled	Enabled	Enabled	Disabled	Disabled	
Onboard LAN (ETH1)	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
Serial port 1 configuration	3F8/IRQ4	3F8/IRQ4	3F8/IRQ4	3F8/IRQ4	3F8/IRQ4	3F8/IRQ4	3F8/IRQ4	Disabled
Serial Port2 configuration	2F8/IRQ3	2F8/IRQ3	2F8/IRQ3	2F8/IRQ3	2F8/IRQ3	2F8/IRQ3	2F8/IRQ3	
Serial port 2 mode	Normal	Normal	Normal	Normal	Normal	Normal	Normal	
Parallel port address	378	378	378	378	378	378	378	Disabled

Table 78: X945 Advanced - I/O interface configuration - Overview of profile settings

### 1.9.3.7 Clock configuration

Setting/Option	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
Spread spectrum	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	

Table 79: X945 Advanced - Clock configuration - Overview of profile settings

### 1.9.3.8 IDE configuration

Setting/Option	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
ATA/IDE configuration	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	Compatible	
Legacy IDE channels	PATA only	PATA only	PATA only	PATA only	PATA only	PATA only	PATA only	
Hard disk write protect	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
PATA detect timeout (sec)	35	35	35	35	35	35	35	
SATA detect time out (sec)	3	3	3	3	3	3	3	
ATA(Pi) 80-pin cable detection	Host & device	Host & device	Host & device	Host & device	Host & device	Host & device	Host & device	
<b>Primary IDE master</b>								
Type	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
LBA/Large mode	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
Block (multi-sector transfer)	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
PIO mode	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
DMA mode	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
S.M.A.R.T.	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
32Bit data transfer	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
<b>Primary IDE slave</b>								
Type	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
LBA/Large mode	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
Block (multi-sector transfer)	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
PIO mode	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
DMA mode	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
S.M.A.R.T.	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
32Bit data transfer	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	

Table 80: X945 Advanced - IDE configuration - Overview of profile settings

### 1.9.3.9 USB configuration

Setting/Option	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
USB function	4 USB ports	4 USB ports	4 USB ports	4 USB ports	4 USB ports	<b>6 USB ports</b>	4 USB ports	
USB 2.0 controller	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
Legacy USB support	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
USB Legacy POST-always	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
USB keyboard Legacy support	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
USB mouse Legacy support	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
USB storage device support	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
Port 64/60 emulation	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
USB 2.0 controller mode	HiSpeed	HiSpeed	HiSpeed	HiSpeed	HiSpeed	HiSpeed	HiSpeed	
BIOS EHCI hand-off	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
USB beep message	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
USB stick default emulation	Hard disk drive	Hard disk drive	Hard disk drive	Hard disk drive	Hard disk drive	Hard disk drive	Hard disk drive	
USB mass storage reset delay	20 Sec	20 Sec	20 Sec	20 Sec	20 Sec	20 Sec	20 Sec	

Table 81: X945 Advanced - USB configuration - Overview of profile settings

### 1.9.3.10 Keyboard/Mouse configuration

Setting/Option	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
Bootup Num-lock	On	On	On	On	On	On	On	
Typematic rate	Fast	Fast	Fast	Fast	Fast	Fast	Fast	
PS/2 mouse support	Disabled	<b>Enabled</b>	Disabled	Disabled	Disabled	Disabled	Disabled	

Table 82: X945 Advanced - Keyboard/Mouse configuration - Overview of profile settings

### 1.9.3.11 Remote access configuration

Setting/Option	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
Remote access	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Serial port BIOS update	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	

Table 83: X945 Advanced Remote Access Configuration profile setting overview

### 1.9.3.12 CPU board monitor

Setting/Option	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
Board temperature	-	-	-	-	-	-	-	
CPU temperature	-	-	-	-	-	-	-	
DIMM environment temp.	-	-	-	-	-	-	-	
Fan1 Speed	-	-	-	-	-	-	-	
VcoreA	-	-	-	-	-	-	-	
VcoreB	-	-	-	-	-	-	-	
+3.3 Vin	-	-	-	-	-	-	-	
+5 Vin	-	-	-	-	-	-	-	
+5VSB	-	-	-	-	-	-	-	
VRTC	-	-	-	-	-	-	-	

Table 84: X945 Advanced - CPU board monitor - Overview of profile settings

### 1.9.3.13 Baseboard/Panel features

Setting/Option	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
BIOS	-	-	-	-	-	-	-	
MTCX PX32	-	-	-	-	-	-	-	
MTCX FPGA	-	-	-	-	-	-	-	
Optimized ID	-	-	-	-	-	-	-	
Device ID	-	-	-	-	-	-	-	
Compatibility ID	-	-	-	-	-	-	-	
Serial number	-	-	-	-	-	-	-	
Product name	-	-	-	-	-	-	-	
User serial ID	-	-	-	-	-	-	-	
<b>Panel control</b>								
Select panel number	-	-	-	-	-	-	-	
Version	-	-	-	-	-	-	-	
Brightness	100%	100%	100%	100%	100%	100%	100%	
Temperature	-	-	-	-	-	-	-	
Fan speed	-	-	-	-	-	-	-	
Keys/LEDs	-	-	-	-	-	-	-	
<b>Baseboard monitor</b>								
CMOS battery	-	-	-	-	-	-	-	
I/O	-	-	-	-	-	-	-	
Power supply	-	-	-	-	-	-	-	
Slide-in drive 1	-	-	-	-	-	-	-	
Slide-in drive 2	-	-	-	-	-	-	-	
Case 1	-	-	-	-	-	-	-	
Case 2	-	-	-	-	-	-	-	
Case 3	-	-	-	-	-	-	-	
Case 4	-	-	-	-	-	-	-	
CPU	-	-	-	-	-	-	-	
<b>Legacy devices</b>								
COM C	Disabled	<b>Enabled</b>	Disabled	<b>Enabled</b>	<b>Enabled</b>	Disabled	<b>Enabled</b>	
Base I/O address	-	<b>3E8</b>	-	<b>3E8</b>	<b>3E8</b>	-	<b>3E8</b>	
Interrupt	-	<b>IRQ11</b>	-	<b>IRQ11</b>	<b>IRQ11</b>	-	<b>IRQ11</b>	
COM D	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Base I/O address	-	-	-	-	-	-	-	
Interrupt	-	-	-	-	-	-	-	
COM E	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Base I/O address	-	-	-	-	-	-	-	
Interrupt	-	-	-	-	-	-	-	
CAN	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Base I/O address	-	-	-	-	-	-	-	
Interrupt	-	-	-	-	-	-	-	
ETH2 LAN Controller	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
ETH2 MAC Address	-	-	-	-	-	-	-	

Table 85: X945 Advanced - Baseboard/Panel features - Overview of profile settings

### 1.9.4 Boot

Setting/Option	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
Boot priority selection	Type based	Type based	Type based	Type based	Type based	Type based	Type based	
1st boot device	Primary master	<b>Onboard LAN</b>	Primary master	Primary master	Primary master	Primary master	Primary master	
2nd boot device	Primary slave	<b>Primary Master</b>	Primary slave	Primary slave	Primary slave	Primary slave	Primary slave	

Table 86: X945 Main - Overview of profile settings

Setting/Option	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
3rd boot device	USB floppy	<b>Primary Slave</b>	USB floppy	USB floppy	USB floppy	USB floppy	USB floppy	
4th boot device	USB removable device	<b>USB floppy</b>	USB removable device	USB removable device	USB removable device	USB removable device	USB removable device	
5th boot device	USB hard disk	<b>USB removable device</b>	USB hard disk	USB hard disk	USB hard disk	USB hard disk	USB hard disk	
6th boot device	USB CDROM	<b>USB HDD</b>	USB CDROM	USB CDROM	USB CDROM	USB CDROM	USB CDROM	
7th boot device	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
8th boot device	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Quick boot	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
Quiet boot	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Automatic boot list retry	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Add-on ROM display mode	Keep current	Keep current	Keep current	Keep current	Keep current	Keep current	Keep current	
Halt on error	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Hit "DEL" message display	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
Interrupt 19 capture	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
PXE boot to LAN	Disabled	<b>Enabled</b>	Disabled	Disabled	Disabled	Disabled	Disabled	
Power loss control	Turn on	Turn on	Turn on	Turn on	Turn on	Turn on	Turn on	

Table 86: X945 Main - Overview of profile settings

### 1.9.5 Security

Setting/Option	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
Supervisor password	-	-	-	-	-	-	-	
User password	-	-	-	-	-	-	-	
Boot sector virus protection	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
HDD Security Freeze Lock	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
Ask HDD Password on Every Boot	No	No	No	No	No	No	No	
Hard disk security user password	-	-	-	-	-	-	-	
Hard disk security master password	-	-	-	-	-	-	-	
END-key loads CMOS defaults	No	No	No	No	No	No	No	

Table 87: X945 Security - Overview of profile settings

### 1.9.6 Power

Setting/Option	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
Power management/APM	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	
Suspend time out	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Video power down mode	Suspend	Suspend	Suspend	Suspend	Suspend	Suspend	Suspend	
Hard disk power down mode	Suspend	Suspend	Suspend	Suspend	Suspend	Suspend	Suspend	
Keyboard & PS/2 mouse	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	
FDC/LPT/COM ports	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	
Primary master IDE	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	
Primary slave IDE	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	
Secondary master IDE	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	
Secondary slave IDE	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	MONITOR	
Resume on ring	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Resume on PME#	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Resume on RTC alarm	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	
Power button mode	On/Off	On/Off	On/Off	On/Off	On/Off	On/Off	On/Off	

Table 88: X945 Power - Overview of profile settings

## 1.10 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 beep codes.

Beep code	Description	Necessary user action
1x short	Memory refresh failed	Load BIOS defaults. If the error persists, send the industrial PC to B&R for testing.
2x short	Parity error: POST error (error in one of the hardware testing procedures)	Load BIOS defaults. If the error persists, send the industrial PC to B&R for testing.
3x short	Base 64 kB memory failure: Basic memory error, RAM error within the initial 64 kB	Check that the card has been inserted properly. If the error persists, send the industrial PC to B&R for testing.
4x short	Timer not operational: System timer	Send the industrial PC to B&R for testing.
5x short	Processor error: Defective processor	Send the industrial PC to B&R for testing.
6x short	8042 gate A20 failure: Defective keyboard controller (block 8042/gate A20). The processor cannot switch to protected mode.	Send the industrial PC to B&R for testing.
7x short	Processor exception interrupt error: Virtual mode exception error (CPU generated an interrupt error)	Send the industrial PC to B&R for testing.
8x short	Display memory read/write error: Video memory not accessible, defective graphics card or not installed (not a fatal error)	Check that the graphics card has been inserted correctly, replace if necessary. If the error persists, send the industrial PC to B&R for testing.

Table 89: 945GME BIOS - POST messages



## 1.11 Allocation of resources

### 1.11.1 RAM address assignment

RAM address	Resource
000000h - 0003FFh	Interrupt vectors
000400h - 09FBFFh	MS-DOS program area
09FC00h - 09FFFFh	Advanced BIOS data
0A0000h - 0CFFFFh	VGA BIOS and memory
0D0000h - 0DFFFFh	Available
0E0000h - 0FFFFFFh	System BIOS (AMI)
100000h - (TOM <sup>1)</sup> -8MB-192kB)	SDRAM
(TOM-8MB-192kB) - (TOM-192kB)	VGA frame buffer <sup>2)</sup>
(TOM-192kB) - TOM	ACPI reclaim, MPS and NVS area <sup>3)</sup>

Table 90: RAM address assignment

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

### 1.11.2 DMA channel assignment

DMA channel	Resource
0	Available
1	Available
2	Floppy disk drive (FDC)
3	LPT (ECP) <sup>1)</sup>
4	Reserved (Cascade DMA Controller)
5	Available
6	Available
7	Available

Table 91: DMA channel assignment

- 1) Not available if the parallel port is not used in ECP mode.

### 1.11.3 I/O address assignments

I/O address	Resource
0000h - 001Fh	DMA controller 1
0020h - 003Fh	Interrupt controller 1
0040h - 005Fh	Timer
0060h - 006Fh	Keyboard controller
0070h - 0071h	Real-time clock, NMI mask, CMOS
0080h	Debug port (POST code)
0081h - 009Fh	Page register - DMA controller
00A0h - 00BFh	Interrupt controller 2
00C0h - 00DFh	DMA controller 2
00F0h - 00FFh	FPU
0170h - 0177h	Secondary hard disk IDE channel
01F0h - 01F7h	Primary hard disk IDE channel
02E8h - 02EFh	COM4
02F8h - 02FFh	COM2
0376h - 0376h	Secondary hard disk IDE channel
0384h - 0385h	CAN controller
03B0h - 03BBh	VGA controller
3C0h - 3DFh	VGA controller
03E8h - 03EFh	COM3
03F6h - 03F6h	Primary hard disk IDE channel
03F0h - 03F7h	FDD controller
0CF8h - 0CFBh	PCI config address register
0CFCh - 0CFFh	PCI config data register
4100h - 417Fh	MTCX
FF00h - FF07h	IDE bus master register

Table 92: I/O address assignment

### 1.11.4 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			•															
COM2 (serial port B)				•	○													
ACPI <sup>1)</sup>										•								
FDD							○											•
Real-time clock									•									
Coprocessor (FPU)														•				
Primary IDE channel															•			
Secondary IDE channel																○		
B&R	COM3 (COM C)			○	○	○		○			○	○	○					•
	COM4 (COM E)			○	○	○		○			○	○	○					•
	CAN										○						○	•

Table 93: IRQ interrupt assignments in PIC mode

1) Advanced Configuration and Power Interface.

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

### 1.11.5 Interrupt assignments in APIC mode

A total of 23 IRQs are available in APIC (Advanced Programmable Interrupt Controller) 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			•																							
COM2 (serial port B)				•	○																					
ACPI <sup>1)</sup>										•																
FDD							○																			•
Real-time clock									•																	
Coprocessor (FPU)														•												
Primary IDE channel															•											
Secondary IDE channel																○										
B&R	COM3 (COM C)			○	○	○		○			○	○	○													•
	COM4 (COM E)			○	○	○		○			○	○	○													•
	CAN										○														○	•
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 94: IRQ interrupt assignments in APIC mode

- 1) Advanced Configuration and Power Interface.  
 2) PIRQ A: Graphics controller  
 3) PIRQ B: INTD  
 4) PIRQ C: INTC + Native IDE  
 5) PIRQ D: USB UHCI controller #1 + SM bus  
 6) PIRQ E: LAN controller  
 7) PIRQ F: INTA + ETH2  
 8) PIRQ G: INTB  
 9) PIRQ H: USB EHCI controller + UHCI0

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

The PCI resources are assigned to fixed IRQ lines when the APIC function is enabled. The following image shows the connections to the individual PCI slots.

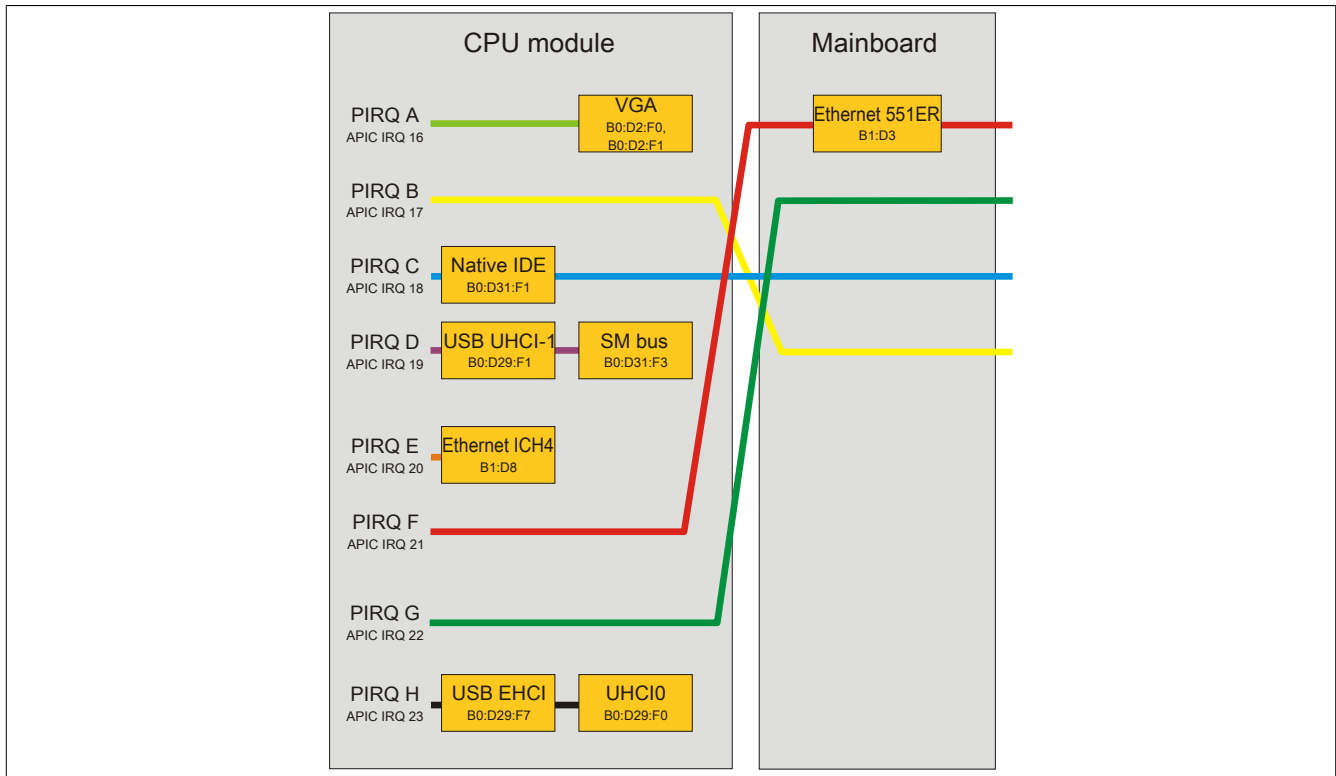


Figure 54: PCI Routing with activated APIC CPU board X945

### 1.11.6 Inter-IC (I<sup>2</sup>C) bus

I <sup>2</sup> C address	Resource	Note
A0h	EEPROM	EEPROM for CMOS data - cannot be used
B0h	Reserved	Cannot be used
58h	Reserved	Cannot be used

Table 95: Inter-IC (I<sup>2</sup>C) bus resources

### 1.11.7 System management (SM) bus

SM Bus address	SM device	Note
12h	SMART_CHARGER	
14h	SMART_SELECTOR	
16h	SMART_BATTERY	
D2h	Clock generator	

Table 96: Inter-IC (I<sup>2</sup>C) bus resources

## 2 Upgrade information

### Warning!

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

### 2.1 BIOS upgrade

An upgrade may be necessary in order to accomplish the following:

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

#### 2.1.1 Important information

### Information:

**Customized BIOS settings are deleted when upgrading BIOS.**

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

##### 2.1.1.1 Which BIOS version and firmware are already installed on the PPC725?

This information can be found on the same BIOS setup page for both the X945 CPU boards:

- After switching on the PPC725, you can get to the BIOS Setup by pressing "F2" or "DEL".
- From the BIOS main menu "advanced" (top), select "baseboard/panel features" (bottom):

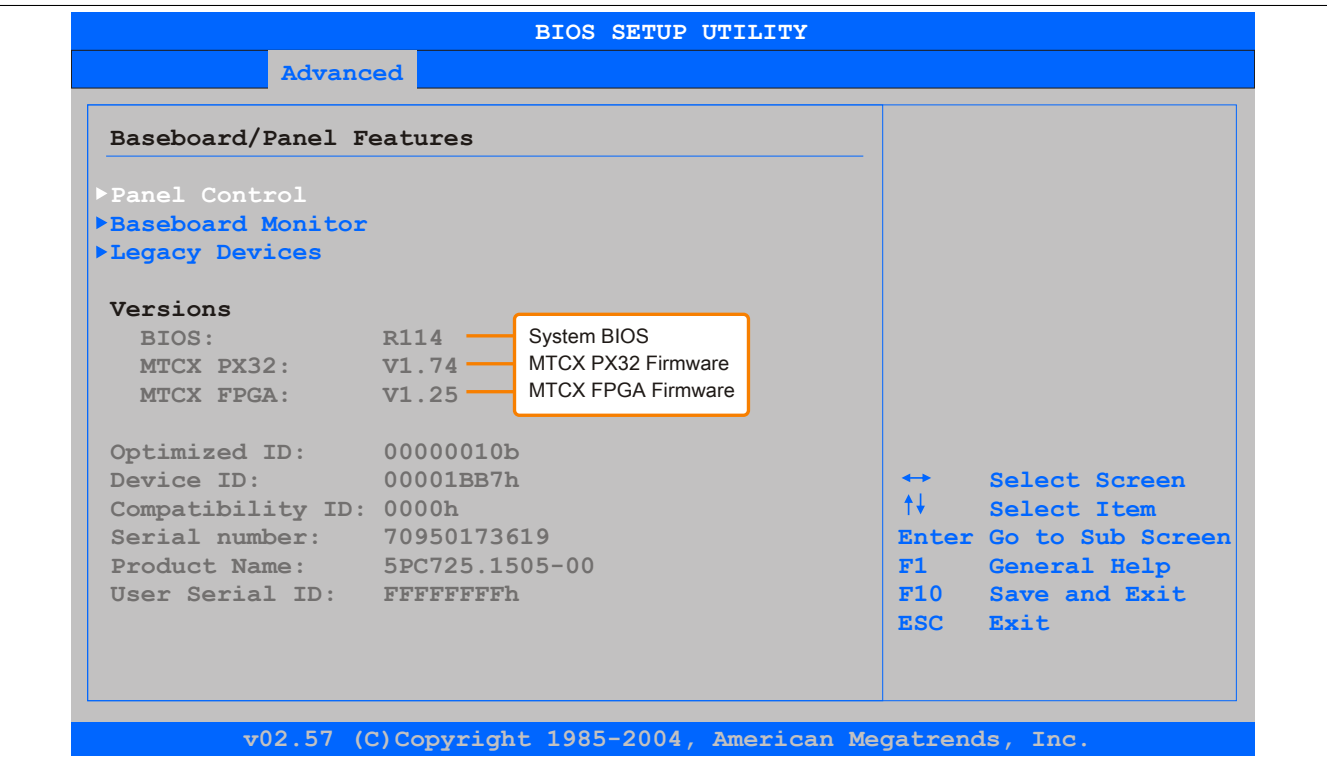


Figure 55: Softwareversionen

### 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 by typing "sys a:" or "format a: /s" on the command line.

Information about creating a bootable diskette in Windows XP can be found on page 110.

Information on creating a USB flash drive for a B&R upgrade can be found on page 112.

Information on creating a CompactFlash card for a B&R upgrade can be found on page 113.

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

```
1. Upgrade AMI BIOS for X945/N270 (5PC600.X945-xx)
2. Exit to MS-DOS
```

#### Item 1:

BIOS is automatically upgraded (default after 5 seconds).

#### Item 2:

Returns to the shell (MS-DOS)

6. The system must be rebooted after a successful upgrade.
7. Reboot and press <Del> to enter BIOS Setup 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. Select the **Versions** tab.
4. Under **CPU board**, click on **Update for 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 writing to flash memory.

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 settings 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 BIOS, please refer to the help documentation for the Control Center.

## 2.2 Creating an MS-DOS boot diskette in Windows XP

1. Insert a blank 1.44 MB HD diskette into the disk drive.
2. Open Windows Explorer.
3. Right-click on the 3½ floppy diskette icon and select "Format".

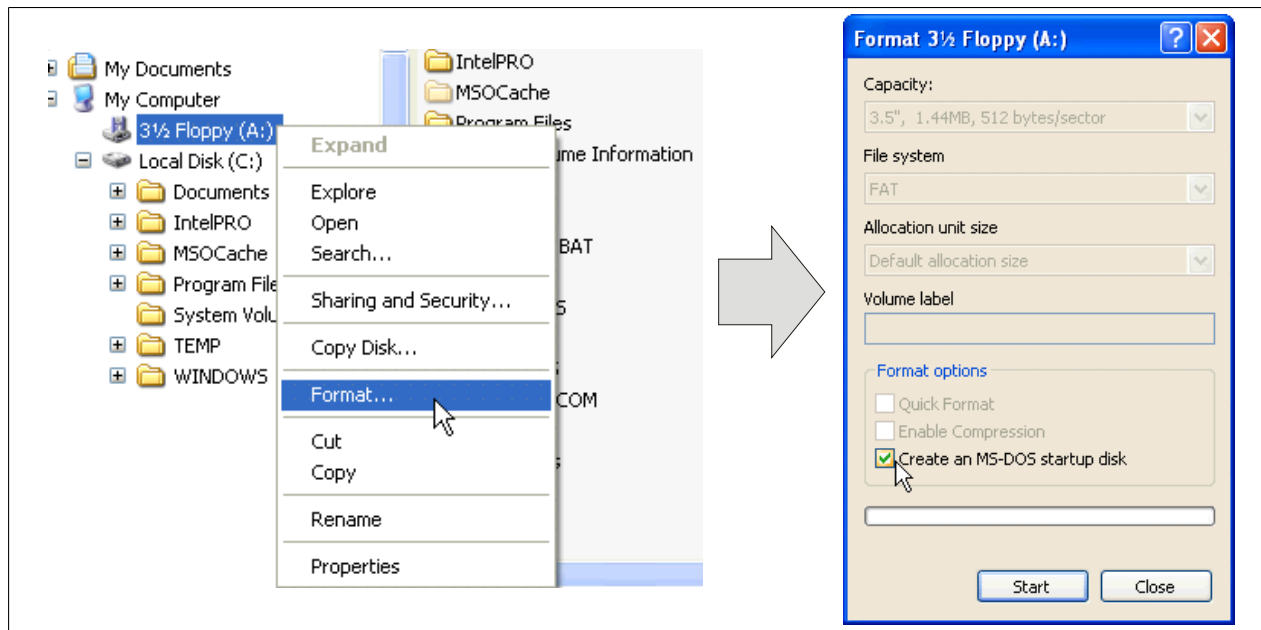


Figure 56: Creating a bootable diskette in Windows XP - Step 1

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



Figure 57: Creating a bootable diskette in Windows XP - Step 2

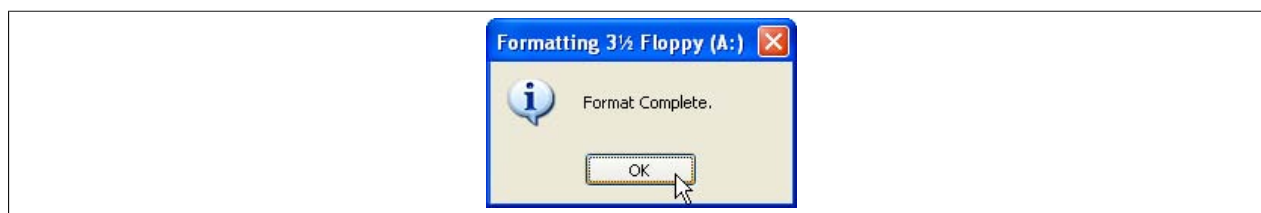


Figure 58: Creating a bootable diskette in Windows XP - Step 3

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

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

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

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 59: 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 60: Creating a bootable diskette in Windows XP - Step 5

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

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

When used in connection with a B&R Industrial PC, it is possible to upgrade (e.g. upgrade BIOS) from one of the USB flash drives available from B&R. To do this, the USB flash drive must be prepared accordingly. This is done with the B&R Embedded OS Installer, which can be downloaded at no cost from the B&R website ([www.br-automation.com](http://www.br-automation.com)).

### 2.3.1 Requirements

The following is required to create a bootable USB flash drive:

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

### 2.3.2 Procedure

1. Connect the USB flash drive to the PC.
2. If the drive list is not refreshed automatically, the list can be updated using the command **Drives > Refresh**.
3. Select the desired USB flash drive in the drive list.
4. Change to the **Action** tab and select **Install a B&R update to a USB flash drive** as the type of action.
5. Enter the path to the MS-DOS operating system files. If the files are part of a .zip archive, then click on the button **From .zip file**. If the files are stored in a directory on the hard drive, then click on the button **From folder**.
6. In the **B&R upgrade** text box, it is also possible to enter the path to the .zip file for the B&R upgrade disk and select the file.
7. Click on the **Start action** button in the toolbar.

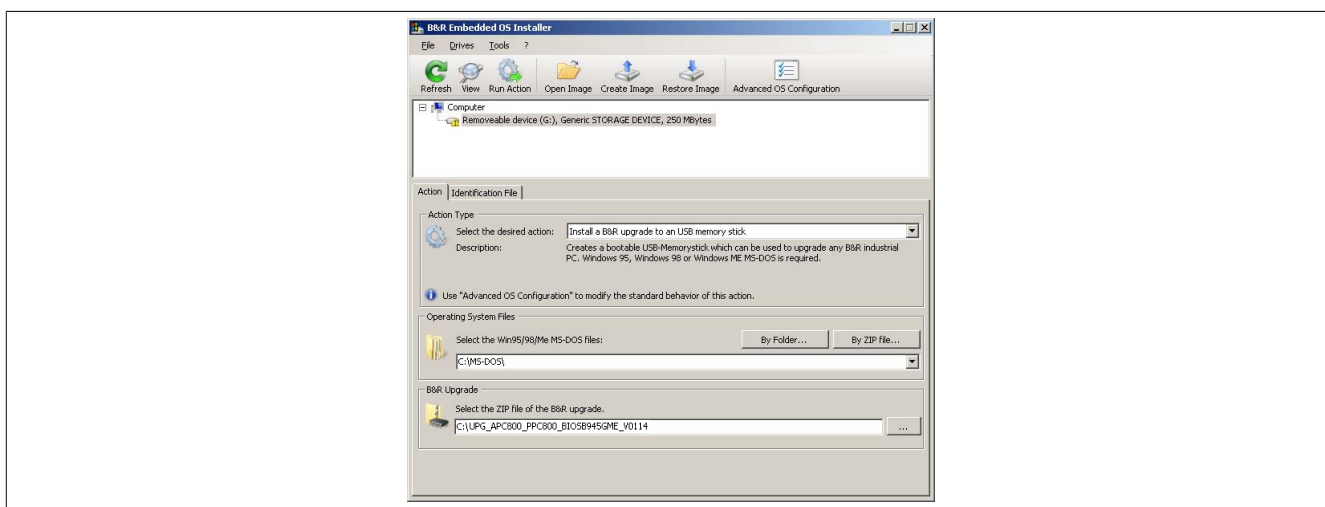


Figure 61: Creating a USB flash drive for B&R upgrade files

### 2.3.3 How to access MS-DOS

Information on creating an MS-DOS boot diskette can be found in section see "Creating an MS-DOS boot diskette in Windows XP" on page 110. The files from the diskette are then copied to the hard drive.



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

When used in connection with a B&R industrial PC, it is possible to upgrade (e.g. upgrade BIOS) from one of the CompactFlash cards available from B&R. To do this, the CompactFlash card must be prepared accordingly. This is done with the B&R Embedded OS Installer, which can be downloaded at no cost from the B&R website ([www.br-automation.com](http://www.br-automation.com)).

### 2.4.1 Requirements

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

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

### 2.4.2 Procedure

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

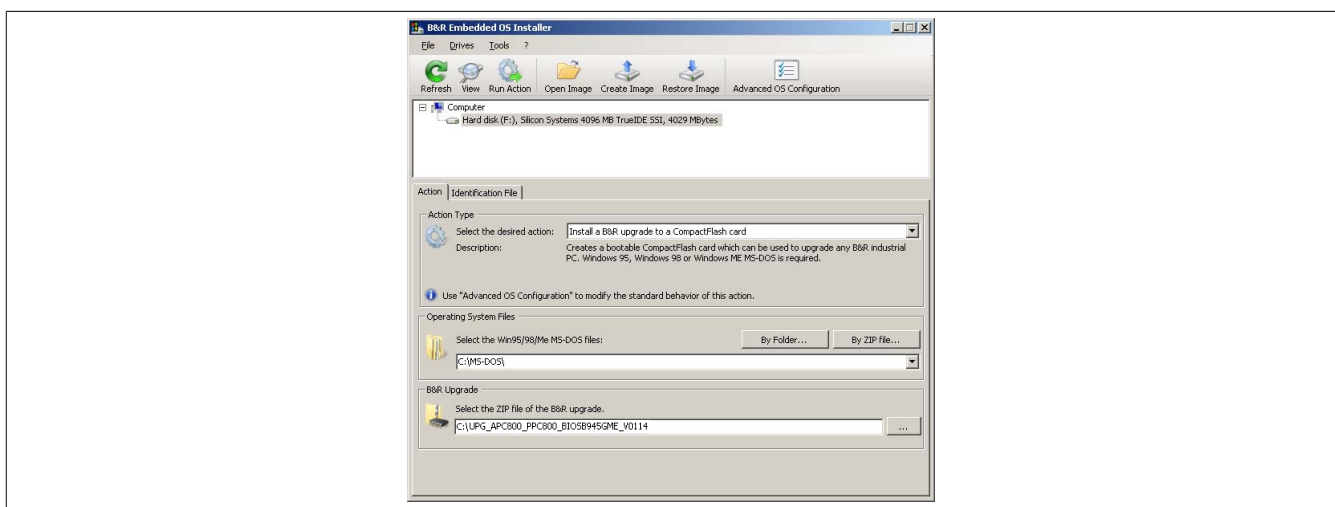


Figure 62: Creating a CompactFlash card for B&R upgrade files

### 2.4.3 How to access MS-DOS

Information on creating an MS-DOS boot diskette can be found in section see "Creating an MS-DOS boot diskette in Windows XP" on page 110. The files from the diskette are then copied to the 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 supplied together 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! <a href="http://www.br-automation.com">www.br-automation.com</a> ©1983-2000 Microsoft Corporation. All rights reserved.
9S0000.01-020	OEM Microsoft MS-DOS 6.22, English floppy disks, only supplied together with a new PC	

Table 97: 9S0000.01-010, 9S0000.01-020 - Order data

#### 3.2 Known problems

Either no drivers are available for the following hardware components or only with limitations:

- USB 2.0: only USB 1.1 rates can be achieved.
- Some "ACPI control" functions in BIOS cannot be used.

## 4 Windows XP Professional

### 4.1 General information

#### Information:

**Discontinuation of support for Windows XP by Microsoft:**

**After April 8th, 2014 Microsoft will no longer be providing any security updates, hotfixes, support (free or paid) or technical resources for Windows XP.**

### 4.2 Order data


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

Table 98: 5SWWXP.0600-GER, 5SWWXP.0600-ENG, 5SWWXP.0600-MUL, 5SWWXP.0500-GER, 5SWWXP.0500-ENG, 5SWWXP.0500-MUL - Order data

### 4.3 Overview

Bestellnummer	Edition	Zielsystem	Chipsatz	Service Pack	Sprache	Vorinstalliert	Benötigter Speicherplatz auf Datenträger	Mindestgröße Arbeitsspeicher
5SWWXP.0600-GER	Professional	APC510 APC511 APC620 APC810 APC820 APC910 PPC700 PPC725 PPC800 PPC900 PP500	945GME GM45 QM77/HM76 NM10 US15W	SP3	German		≤2.1 GB	128 MB
5SWWXP.0600-ENG	Professional	APC510 APC511 APC620 APC810 APC820 APC910 PPC700 PPC725 PPC800 PPC900 PP500	945GME GM45 QM77/HM76 NM10 US15W	SP3	English		≤2.1 GB	128 MB
5SWWXP.0600-MUL	Professional	APC510 APC511 APC620 APC810 APC820 APC910 PPC700 PPC725 PPC800 PPC900 PP500	945GME GM45 QM77/HM76 NM10 US15W	SP3	Multilingual		≤2.1 GB	128 MB
5SWWXP.0500-GER	Professional	APC620 APC810 APC820 PPC700 PPC725 PPC800	945GME GM45	SP2c	German		≤2.1 GB	128 MB

Bestellnummer	Edition	Zielsystem	Chipsatz	Service Pack	Sprache	Vorinstalliert	Benötigter Speicherplatz auf Datenträger	Mindestgröße Arbeitsspeicher
5SWWXP.0500-ENG	Professional	APC620 APC810 APC820 PPC700 PPC725 PPC800	945GME GM45	SP2c	English		≤2.1 GB	128 MB
5SWWXP.0500-MUL	Professional	APC620 APC810 APC820 PPC700 PPC725 PPC800	945GME GM45	SP2c	Multilingual		≤2.1 GB	128 MB

#### 4.4 Installation

Upon request, B&R can preinstall 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 in this process.

#### 4.5 Drivers

Current drivers for all approved operating systems are available in the Downloads section 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 website, not from manufacturer websites.

## 5 Windows Embedded Standard 2009

### 5.1 General information

Windows® Embedded Standard 2009 is the modular version of Windows® XP Professional. It is used if XP applications should be executed with a minimal operating system size. Together with CompactFlash memory, Windows® Embedded Standard 2009 makes it possible to use the Microsoft desktop operating system in harsh 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 problems even after an unexpected power failure. B&R offers complete images for industrial PCs, Power Panel and Mobile Panel devices to make the transition to Windows® Embedded Standard 2009 as easy as possible. In addition to Windows® Embedded Standard 2009, the standard Windows® XP Professional operating system is also available in English, German and a multilingual version.

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

### 5.2 Order data


Model number	Short description	Figure
	<b>Windows Embedded Standard 2009</b>	
5SWWXP.0729-ENG	Microsoft OEM Windows Embedded Standard 2009, English; for PPC700 with 945GME chipset; order CompactFlash separately (at least 1 GB).	
	<b>Required accessories</b>	
	<b>CompactFlash-cards</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 99: 5SWWXP.0729-ENG - Order data

### 5.3 Overview

Bestellnummer	Zielsystem	Chipsatz	Sprache	Vorinstalliert	Mindestgröße Datenträger	Mindestgröße Arbeitsspeicher
5SWWXP.0729-ENG	PPC700 PPC725	945GME	English		1 GB	256 MB

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

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

Function	Present
Enhanced Write Filter (EWF)	✓
File-Based Write Filter (FBWF)	✓
Page file	Configurable
Administrator accounts	✓
User accounts	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	-

Table 100: Device functions in Windows Embedded Standard 2009

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

Table 100: Device functions in Windows Embedded Standard 2009

## 5.5 Installation

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

## 5.6 Drivers

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

### 5.6.1 Touch screen driver

In order to operate Automation Panel 800 or Automation Panel 900 touch screen devices, the touch screen driver must be installed manually or the touch screen interface updated in the device manager. The driver is available in the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)). It is important that Enhanced Write Filter (EWF) is enabled for this.

### Information:

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

## 6 Windows 7

### 6.1 General information

Windows® 7 offers a wealth of innovative features and performance improvements. Faster switching to power saving mode, quicker restores, less memory usage and high-speed detection of USB devices are just a few of the advantages provided by Windows® 7. Both English and German are available in Windows® 7 Professional, while Windows® 7 Ultimate supports up to 35 different languages (up to 36 languages in Service Pack 1). Product activation is not necessary on B&R PCs, which is a huge advantage for simple logistical procedures relating to machine automation.

All of the Windows® operating systems offered by B&R are from the Microsoft Embedded division. This guarantees much longer availability, especially compared to products offered on the consumer market.

### 6.2 Order data


Model number	Short description	Figure
	<b>Windows 7 Professional/Ultimate</b>	
5SWWI7.0100-GER	Microsoft OEM Windows 7 Professional 32-bit, DVD, German. Only available with a new device.	
5SWWI7.1100-GER	Microsoft OEM Windows 7 Professional 32-bit, Service Pack 1, DVD, German. Only available with a new device.	
5SWWI7.0100-ENG	Microsoft OEM Windows 7 Professional 32-bit, DVD, English. Only available with a new device.	
5SWWI7.1100-ENG	Microsoft OEM Windows 7 Professional 32-bit, Service Pack 1, DVD, English. Only available with a new device.	
5SWWI7.0300-MUL	Microsoft OEM Windows 7 Ultimate 32-bit, DVD, multilingual. Only available with a new device.	
5SWWI7.1300-MUL	Microsoft OEM Windows 7 Ultimate 32-bit, Service Pack 1, DVD, multilingual. Only available with a new device.	

Table 101: 5SWWI7.0100-GER, 5SWWI7.1100-GER, 5SWWI7.0100-ENG, 5SWWI7.1100-ENG, 5SWWI7.0300-MUL, 5SWWI7.1300-MUL - Order data

### 6.3 Overview

Bestellnummer	Edition	Zielsystem	Chipsatz	Service Pack	Architektur	Sprache	Vorinstalliert	Benötigter Speicherplatz auf Datenträger	Mindestgröße Arbeitsspeicher
5SWWI7.0100-GER	Professional	APC510 APC511 APC810 APC910 PPC800 PP500	945GME GM45 QM77/HM76 US15W		32-bit	German		16 GB	1 GB
5SWWI7.1100-GER	Professional	APC510 APC511 APC810 APC910 APC2100 PPC800 PPC900 PPC2100 PP500	945GME GM45 QM77/HM76 NM10 US15W Bay Trail	SP1	32-bit	German		16 GB	1 GB
5SWWI7.0100-ENG	Professional	APC510 APC511 APC810 APC910 PPC800 PP500	945GME GM45 QM77/HM76 US15W		32-bit	English		16 GB	1 GB
5SWWI7.1100-ENG	Professional	APC510 APC511 APC810 APC910 APC2100 PPC800 PPC900 PPC2100 PP500	945GME GM45 QM77/HM76 NM10 US15W Bay Trail	SP1	32-bit	English		16 GB	1 GB
5SWWI7.0300-MUL	Ultimate	APC510 APC511 APC810 APC910 PPC800 PP500	945GME GM45 QM77/HM76 US15W		32-bit	Multilingual		16 GB <sup>1)</sup>	1 GB

Bestellnummer	Edition	Zielsystem	Chipsatz	Service Pack	Architektur	Sprache	Vorinstalliert	Benötigter Speicherplatz auf Datenträger	Mindestgröße Arbeitsspeicher
5SWWI7.1300-MUL	Ultimate	APC510 APC511 APC810 APC910 APC2100 PPC800 PPC900 PPC2100 PP500	945GME GM45 QM77/HM76 NM10 US15W Bay Trail	SP1	32-bit	Multilingual		16 GB <sup>1)</sup>	1 GB

1) The memory used by additional language packs is not taken into account in the minimum size of the disk.

## 6.4 Installation

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

## 6.5 Drivers

Current drivers for all approved operating systems are available in the Downloads section 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 website, not from manufacturer websites.

## 6.6 Special considerations, limitations

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



## 7 Windows Embedded Standard 7

### 7.1 General information

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

With Windows® Embedded Standard 7, Microsoft has made substantial improvements in the area of security. The AppLocker program, available in the premium version, can prevent the execution of unknown or potentially undesired applications that are being installed over a network or from drives that are directly connected. A tiered approach allows the differentiation between scripts (.ps1, .bat, .cmd, .vbs and .js), installation files (.msi, .msp) and libraries (.dll, .ocx). AppLocker can also be configured to record undesired activity and display it in the Event Viewer. Windows® Embedded Standard 7 is available in both a 32-bit and 64-bit version.<sup>1)</sup>, which 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>	
5SWWI7.0529-ENG	Microsoft OEM Windows Embedded Standard 7 32-bit, English; for PPC700 with 945GME chipset; order CompactFlash separately (at least 8 GB)	
5SWWI7.1529-ENG	Microsoft OEM Windows Embedded Standard 7 32-bit, Service Pack 1, English; for PPC700 with 945GME chipset; order CompactFlash separately (at least 16 GB).	
5SWWI7.0729-MUL	Microsoft OEM Windows Embedded Standard 7 Premium 32-bit, multilingual; for PPC700 with 945GME chipset; order CompactFlash separately (at least 8 GB)	
5SWWI7.1729-MUL	Microsoft OEM Windows Embedded Standard 7 Premium 32-bit, Service Pack 1, multilingual; for PPC700 with 945GME chipset; order CompactFlash separately (at least 16 GB).	
	<b>Required accessories</b>	
	<b>CompactFlash-cards</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	
5SWWI7.1900-MUL	Microsoft OEM Windows Embedded Standard 7 32-bit, Service Pack 1, Language Pack DVD	

Table 102: 5SWWI7.0529-ENG, 5SWWI7.1529-ENG, 5SWWI7.0729-MUL, 5SWWI7.1729-MUL - Order data

### 7.3 Overview

Bestellnummer	Edition	Zielsystem	Chipsatz	Service Pack	Architektur	Sprache	Vorinstalliert	Mindestgröße Datenträger	Mindestgröße Arbeitsspeicher
5SWWI7.0529-ENG	Embedded	PPC700 PPC725	945GME		32-bit	English		8 GB	1 GB
5SWWI7.1529-ENG	Embedded	PPC700 PPC725	945GME	SP1	32-bit	English		16 GB	1 GB
5SWWI7.0729-MUL	Premium	PPC700 PPC725	945GME		32-bit	Multilingual		8 GB <sup>1)</sup>	1 GB
5SWWI7.1729-MUL	Premium	PPC700 PPC725	945GME	SP1	32-bit	Multilingual		16 GB <sup>1)</sup>	1 GB

1) The memory used by additional language packs is not taken into account in the minimum size of the disk.

<sup>1)</sup> 64-bit versions are not supported by all systems.

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

The following list of features shows the most important device functions included in Windows Embedded Standard 7.

Function	Windows Embedded Standard 7	Windows Embedded Standard 7 Premium
Enhanced Write Filter (EWF)	✓	✓
File-Based Write Filter (FBWF)	✓	✓
Administrator accounts	✓	✓
User accounts	Configurable	Configurable
Windows Explorer shell	✓	✓
Registry filter	✓	✓
	✓	✓
Internet Information Service (IIS) 7.0	✓	✓
Anti-malware (Windows Defender)	-	✓
Add-ons (Snipping Tool, Sticky Notes)	-	✓
Windows Firewall	✓	✓
.NET Framework 3.5	✓	✓
32-bit and 64-bit	✓	✓
Remote Desktop Protocol 7.0	✓	✓
File Compression Utility	✓	✓
Windows Installer Service	✓	✓
Windows XP mode	-	-
Media Player 12	✓	✓
DirectX	✓	✓
Multilingual user interface packs in the same image	-	✓
International components and language services	✓	✓
Language pack setup	✓	✓
Windows update	Configurable	Configurable
Windows PowerShell 2.0	✓	✓
BitLocker	-	✓
AppLocker	-	✓
Tablet PC support	-	✓
Windows Touch	-	✓
Boot from USB flash drive	✓	✓
Accessories	✓	✓
Page file	Configurable	Configurable
Number of fonts	134	134

Table 103: Device functions in Windows Embedded Standard 7

## 7.5 Installation

Upon request, B&R can preinstall Windows Embedded Standard 7 on a suitable CompactFlash card (32-bit: minimum 8 or 16 GB, 64-bit: minimum 16 GB). The system is then automatically configured when it is switched on for the first time. This procedure takes approximately 30 minutes, with the device being rebooted a number of times.

### Information:

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

## 7.6 Drivers

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

### 7.6.1 Touch screen driver

A touch screen driver will be installed automatically if a touch controller is detected during the Windows Embedded Standard 7 installation. If a touch controller is not detected during Windows Embedded Standard 7 installation or a B&R Automation Panel is connected at a later time, then the touch screen driver needs to be installed manually or the additional touch screen interface must be selected in the touch screen settings in the Windows Control Panel. The driver is available in the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)). It is important that both the Enhanced Write Filter (EWF) and the File Based Write Filter (FBWF) are disabled for this.

**Information:**

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

## 8 Windows CE

### 8.1 General information

B&R Windows CE is an operating system that is optimally tailored to B&R's devices, i.e. it includes only the functions and modules that are required by each device. This makes this operating system extremely robust and stable. A further advantage of B&R Windows CE compared to other operating systems are the low licensing costs.

### 8.2 Order data


Model number	Short description	Figure
5SWWCE.0829-ENG	Microsoft OEM Windows CE 6.0 Professional, English; for PPC700 with 945GME chipset; order CompactFlash separately (at least 128 MB)	
	<b>Required accessories</b>	
	<b>CompactFlash-cards</b>	
5CFCRD.0128-03	CompactFlash 128 MB Western Digital (SLC)	
5CFCRD.016G-06	CompactFlash 16 GB B&R (SLC)	
5CFCRD.0256-03	CompactFlash 256 MB Western Digital (SLC)	
5CFCRD.032G-06	CompactFlash 32 GB B&R (SLC)	
5CFCRD.0512-03	CompactFlash 512 MB Western Digital (SLC)	
5CFCRD.0512-06	CompactFlash 512 MB B&R (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 104: 5SWWCE.0829-ENG - Order data

### 8.3 Overview

Bestellnummer	Zielsystem	Chipsatz	Sprache	Vorinstalliert	Mindestgröße Datenträger	Mindestgröße Arbeitsspeicher
5SWWCE.0829-ENG	PPC700 PPC725	945GME	English		128 MB	128 MB

### 8.4 Windows CE 6.0 features

Detailed information about Windows CE for B&R devices is available in the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

Features	Windows CE 6.0
Supported screen resolutions	VGA (TFT), SVGA (TFT), XGA (TFT)
Chipset	Intel 945GME
Color depth	16-bit or 65,536 colors <sup>1)</sup>
Graphics card driver	Intel(R) embedded graphics driver
Main memory	Automatic detection and use of up to 512 MB RAM
Boot time / Startup time	Approx. 25 seconds
Screen rotation	Not supported
Web browser	Internet Explorer
.NET	Compact Framework
Image size	Approx. 38 MB <sup>2)</sup> , uncompressed
Custom keys	Supported
PVI	Supported
Automation Device Interface	Supported
Remote Desktop Protocol for thin clients	Supported
B&R VNC Viewer	Supported
B&R Task Manager	Supported
B&R Picture Viewer	Supported
Compatible with zenOn	Yes
Compatible with Wonderware	No
Serial interfaces for any use	3
DirectX	No
Audio ports	"Line OUT" and "MIC" are supported. "Line IN" is not supported.

Table 105: Windows CE 6.0 features

1) The color depth depends on the display used.

2) The "Compress Windows CE image" function in the B&R Embedded OS Installer can be used to reduce the image size.

## 8.5 Requirements

The device must fulfill the following criteria to be able run the Windows CE operating system.

- At least 128 MB main memory
- At least one 128 MB CompactFlash card (size should be specified when ordered)

## 8.6 Installation

Windows CE is usually preinstalled at B&R.

## 8.7 B&R Embedded OS Installer

The B&R Embedded OS Installer makes it possible to install existing B&R Windows CE images. The 4 files NK.BIN, BLDR, LOGOXRES.BMP and LOGOQVGA.BMP must be available from an already functioning B&R Windows CE installation.

The B&R Embedded OS Installer is available in the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)). Additional information is available in the online help documentation for the B&R Embedded OS Installer.

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

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

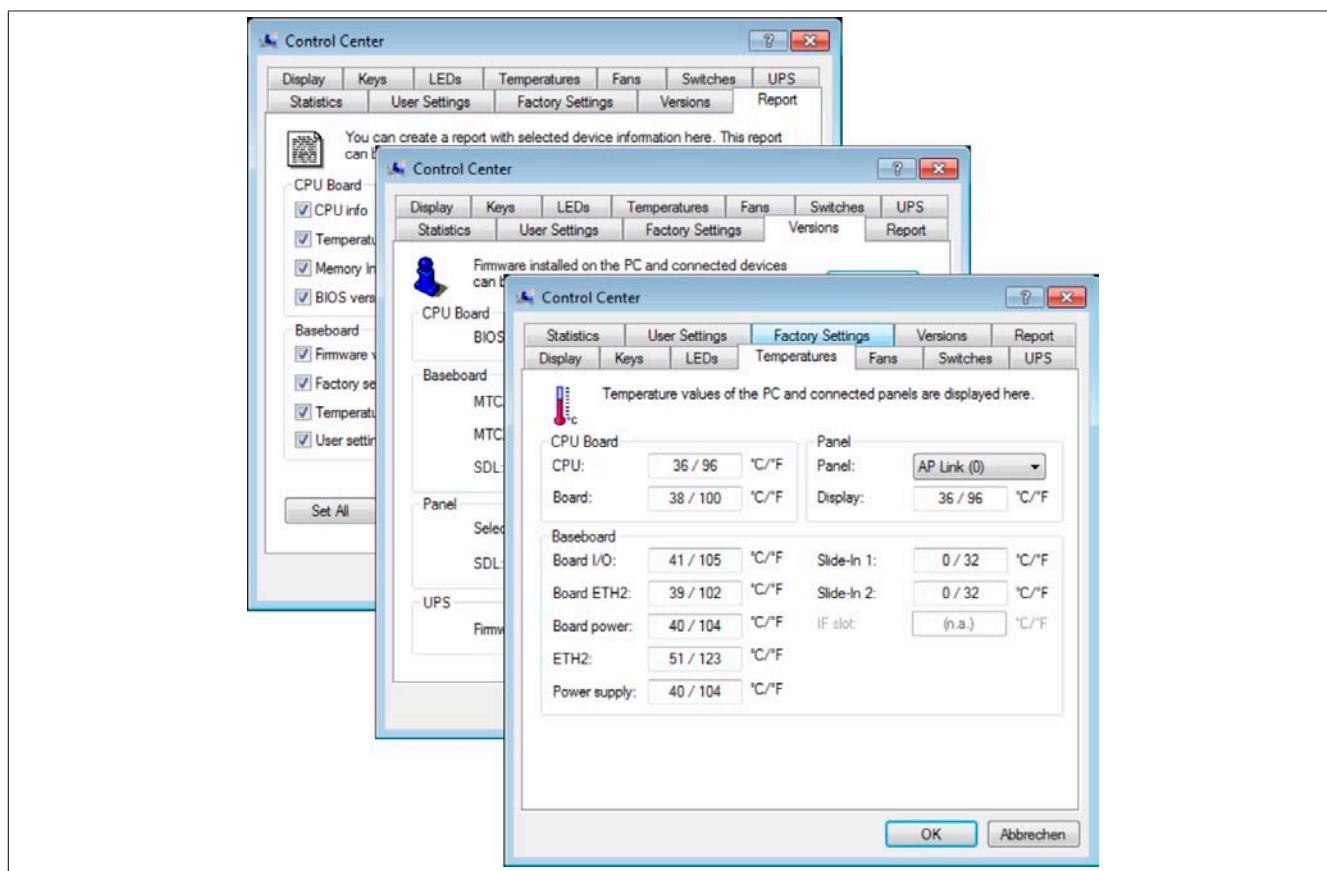


Figure 63: ADI Control Center screenshots - Examples

### Information:

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

### 9.1 Functions

### Information:

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

- Changing display-specific parameters
- Reading device-specific keys
- Updating the key configuration
- Enabling device-specific LEDs on a membrane keypad or keys
- Reading and calibrating control devices (e.g. key switches, handwheels, joysticks, potentiometers)
- Reading temperatures, fan speeds, statistical data and switch settings
- Reading operating hours (power-on hours)
- Reading user and factory settings
- Reading software versions
- Updating and backing up BIOS and firmware
- Creating reports about the current system (support assistance)
- Setting the SDL equalizer value when adjusting SDL cables
- Changing the user serial ID

Supports the following systems:

- Automation PC 510
- Automation PC 511
- Automation PC 620
- Automation PC 810
- Automation PC 820
- Automation PC 910
- Panel PC 300
- Panel PC 700
- Panel PC 725
- Panel PC 800
- Panel PC 900
- 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 help system. 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 B&R images of embedded operating systems.**

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



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

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

- Microsoft Visual C++ 6.0
- Microsoft Visual Basic 6.0
- Microsoft Embedded Visual C++ 4.0
- Microsoft Visual Studio 2008 (or newer)

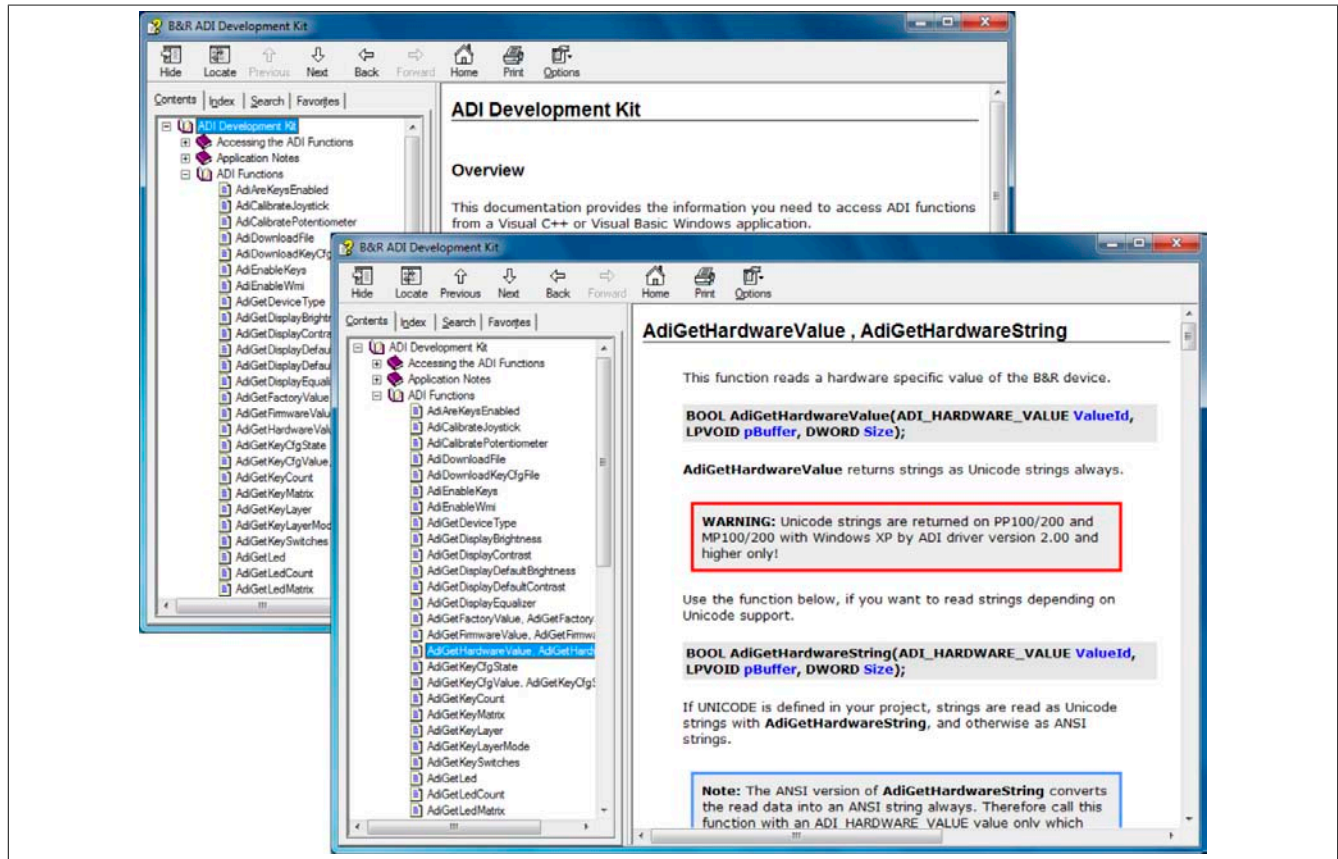


Figure 64: ADI Development Kit Screenshots (Version 3.70)

### 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)

The following systems are supported (version 3.70 and higher):

- Automation PC 510
- Automation PC 511
- Automation PC 620
- Automation PC 810
- Automation PC 820
- Automation PC 910
- Automation PC 2100
- Panel PC 300
- Panel PC 700
- Panel PC 800
- Panel PC 900
- Panel PC 2100



- Power Panel 100/200
- Power Panel 300/400
- Power Panel 500
- Mobile Panel 40/50
- Mobile Panel 100/200

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

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

The B&R Automation Device Interface (ADI) development kit is available at no cost in the Downloads section of the B&R website ([www.br-automation.com](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 directly from .NET applications created using Microsoft Visual Studio 2005 or later.

Supported programming languages:

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

System requirements

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

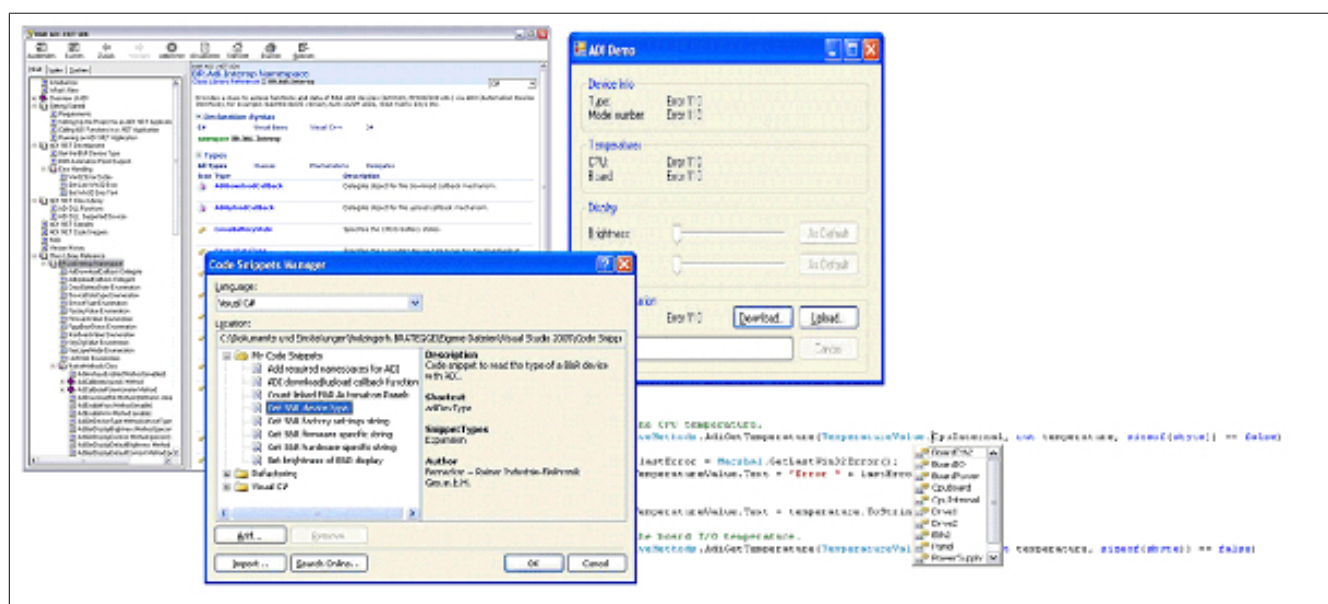


Figure 65: ADI .NET SDK screenshots (version 2.10)

Features (version 2.10 and higher)

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

The following systems are supported (version 2.10 and higher):

- Automation PC 510
- Automation PC 511
- Automation PC 620
- Automation PC 810
- Automation PC 820
- Automation PC 910
- Automation PC 2100
- Panel PC 300
- Panel PC 700
- Panel PC 800
- Panel PC 900
- Panel PC 2100
- Power Panel 100/200
- Power Panel 300/400

- Power Panel 500
- Mobile Panel 40/50
- Mobile Panel 100/200

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

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

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

## 12 B&R Key Editor

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

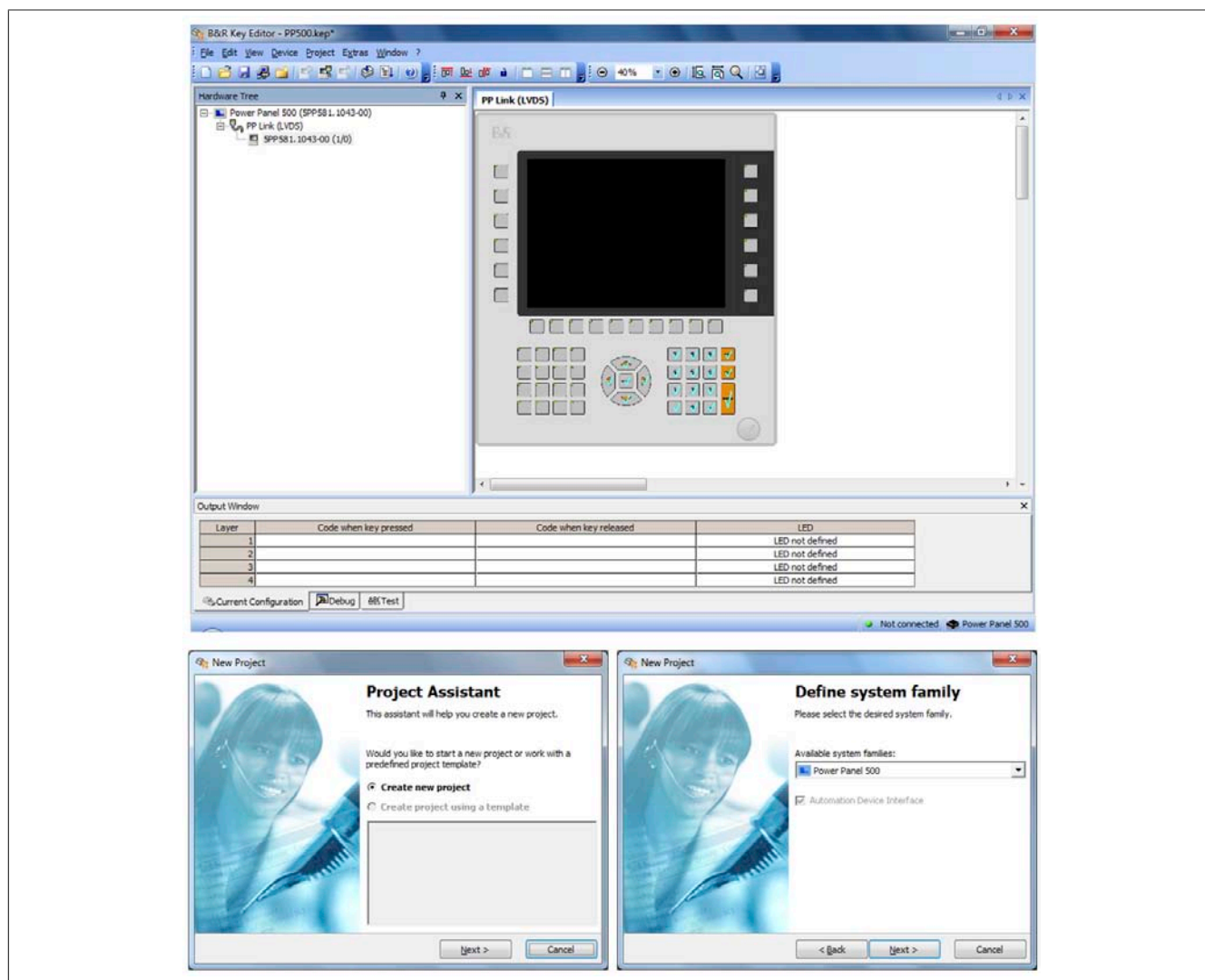


Figure 66: B&R Key Editor screenshots (version 3.50)

### Features:

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

The following systems are supported (version 3.50):

- Automation PC 510
- Automation PC 511
- Automation PC 620
- Automation PC 810
- Automation PC 820
- Automation PC 910
- Automation PC 2100
- Automation Panel 800
- Automation Panel 830

- Automation Panel 900
- Automation Panel 9x3 / 9xD
- IPC2000, IPC2001, IPC2002
- IPC5000, IPC5600
- IPC5000C, IPC5600C
- Mobile Panel 40/50
- Mobile Panel 100/200
- Panel PC 300
- Panel PC 700
- Panel PC 800
- Panel PC 900
- Panel PC 2100
- 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 help system. The B&R Key Editor is available at no cost 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

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### 1 Standards and guidelines

#### 1.1 CE mark



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

#### 1.2 EMC directive

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

EN 61131-2:2007	Programmable logic controllers - Part 2: Equipment requirements and tests
EN 61000-6-2:2005	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
EN 61000-6 -4:2007	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

#### 1.3 Low voltage directive

These devices satisfy the requirements of EC directive "2006/95/EC Low voltage directive" and are designed for the following areas:

EN 61131-2:2007	Programmable logic controllers - Part 2: Equipment requirements and tests
EN 60204-1:2006 + A1:2009	Safety of machinery - Electrical equipment of machines - Part 1: General requirements

## 2 Certifications

### Danger!

**A complete system can only receive certification if ALL of the individual components it includes have the applicable certifications. If an individual component is being used that DOES NOT have an applicable certification, then the complete system will NOT RECEIVE certification.**

B&R products and services comply with applicable standards. This includes international standards from organizations such as ISO, IEC and CENELEC, as well as national standards from organizations such as UL, CSA, FCC, VDE, ÖVE, etc. We are committed to ensuring the reliability of our products in an industrial environment.

Unless otherwise specified, the following certifications apply:

### 2.1 UL certification



Products with this label have been certified by Underwriters Laboratories and are listed as "Industrial Control Equipment". This mark is valid for the USA and Canada and simplifies the certification of your machines and systems in these areas.

Underwriters Laboratories (UL) in accordance with the UL508 standard - 17th Edition  
Canadian (CSA) standard in accordance with C22.2 No. 142-M1987

### 2.2 GOST-R



Products with this mark have been certified by an accredited certification body and have been approved for import to the Russian Federation.

## Chapter 6 • Accessories

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

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

### 1 Replacement CMOS batteries

#### 1.1 0AC201.91 / 4A0006.00-000

##### 1.1.1 General information

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

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

##### 1.1.2 Order data


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

Table 106: 0AC201.91, 4A0006.00-000 - Order data

##### 1.1.3 Technical data

#### Warning!

The battery must be replaced by a Type CR2477N Renata battery only. The use of another battery may present a risk of fire or explosion.

The battery may explode if handled improperly. Do not recharge, disassemble or dispose of in fire.

#### Information:

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

Product ID	0AC201.91	4A0006.00-000
General information		
Storage time	Max. 3 years at 30°C	
Certification		
CE	Yes	
cULus	Yes	
Electrical characteristics		
Capacity	950 mAh	
Self-discharging	<1% per year (at 23°C)	
Voltage range	3 V	

Table 107: 0AC201.91, 4A0006.00-000 - Technical data



Product ID	0AC201.91	4A0006.00-000
Environmental conditions		
Temperature Storage	-20 to 60°C	
Relative humidity Operation	0 to 95%	
Storage	0 to 95%	
Transport	0 to 95%	

Table 107: 0AC201.91, 4A0006.00-000 - Technical data

## 2 Power connectors

### 2.1 0TB103.9x

#### 2.1.1 General information

The single-row 3-pin terminal block 0TB103 is used to connect the supply voltage.

#### 2.1.2 Order data


Model number	Short description	Figure
	<b>Terminal blocks</b>	
0TB103.9	Connector, 24 VDC, 3-pin female, 3.31 mm <sup>2</sup> screw clamps, protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, 3.31 mm <sup>2</sup> cage clamps, protected against vibration by the screw flange	

Table 108: 0TB103.9, 0TB103.91 - Order data

#### 2.1.3 Technical data

##### Information:

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

Product ID	0TB103.9		0TB103.91	
General information				
Certification				
CE			Yes	
cULus			Yes	
cULus HazLoc Class 1 Division 2			Yes <sup>1)</sup>	
GL			Yes <sup>1)</sup>	
Terminal block				
Note	Protected against vibration by the screw flange Nominal values according to UL			
Number of pins	3 (female)			
Type of terminal clamp	Screw clamps		Cage clamps <sup>2)</sup>	
Cable type	Only copper wires (no aluminum wires!)			
Distance between contacts	5.08 mm			
Connection cross section				
AWG wire	26 to 14 AWG		26 to 12 AWG	
Wire end sleeves with plastic covering			0.20 to 1.50 mm²	
Solid wires			0.20 to 2.50 mm²	
Fine strand wires	0.20 to 1.50 mm²		0.20 to 2.50 mm²	
With wire end sleeves			0.20 to 1.50 mm²	
Tightening torque	0.4 Nm		-	
Electrical characteristics				
Nominal voltage	300 V			
Nominal current <sup>3)</sup>	10 A / contact			
Contact resistance	≤5 mΩ			

Table 109: 0TB103.9, 0TB103.91 - Technical data

- 1) Yes, although applies only if all components installed within the complete system have this certification
- 2) Cage clamp terminal blocks cannot be used side-by-side.
- 3) The limit data for each I/O module must be taken into consideration.

## 3 CompactFlash cards

### 3.1 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.

### 3.2 General information

In order to be suited for use in industrial automation, CompactFlash cards must be highly reliable. The following items are very important to achieving the necessary level of reliability:

- The flash technology used
- An efficient algorithm for maximizing service life
- Good mechanisms for detecting and fixing errors in the flash memory

#### 3.2.1 Flash technology

Currently, CompactFlash cards are available with MLC (multi-level cell) and SLC (single-level cell) flash blocks. SLC flash memory has a service life 10 times longer than MLC, which is why only CompactFlash cards with SLC flash blocks are suited for industrial applications.

#### 3.2.2 Wear leveling

Wear leveling is an algorithm that can be used to maximize the service life 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 disk so that the same areas don't have to be cleared and reprogrammed over and over again.

##### 3.2.2.1 No wear leveling

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

##### 3.2.2.2 Dynamic wear leveling

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

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

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

##### 3.2.2.3 Static wear leveling

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

#### 3.2.3 ECC error correction

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

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

Self-Monitoring, Analysis and Reporting Technology (S.M.A.R.T.) 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.

### **3.2.5 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.

### 3.3 5CFCRD.xxxx-06

#### 3.3.1 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 different boot times.

see "Known problems/issues" on page 154

##### Information:

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

#### 3.3.2 Order data


Model number	Short description	Figure
	<b>CompactFlash</b>	
5CFCRD.0512-06	CompactFlash 512 MB B&R (SLC) $\geq$ Rev. F0	
5CFCRD.1024-06	CompactFlash 1 GB B&R (SLC) $\geq$ Rev. F0	
5CFCRD.2048-06	CompactFlash 2 GB B&R (SLC) $\geq$ Rev. F0	
5CFCRD.4096-06	CompactFlash 4 GB B&R (SLC) $\geq$ Rev. F0	
5CFCRD.8192-06	CompactFlash 8 GB B&R (SLC) $\geq$ Rev. F0	
5CFCRD.016G-06	CompactFlash 16 GB B&R (SLC) $\geq$ Rev. E0	
5CFCRD.032G-06	CompactFlash 32 GB B&R (SLC) $\geq$ Rev. D0	

Table 110: 5CFCRD.0512-06, 5CFCRD.1024-06, 5CFCRD.2048-06, 5CFCRD.4096-06, 5CFCRD.8192-06, 5CFCRD.016G-06, 5CFCRD.032G-06 - Order data


Model number	Short description	Figure
	<b>CompactFlash</b>	
5CFCRD.0512-06	CompactFlash 512 MB B&R (SLC) $\leq$ Rev. E0	
5CFCRD.1024-06	CompactFlash 1 GB B&R (SLC) $\leq$ Rev. E0	
5CFCRD.2048-06	CompactFlash 2 GB B&R (SLC) $\leq$ Rev. E0	
5CFCRD.4096-06	CompactFlash 4 GB B&R (SLC) $\leq$ Rev. E0	
5CFCRD.8192-06	CompactFlash 8 GB B&R (SLC) $\leq$ Rev. E0	
5CFCRD.016G-06	CompactFlash 16 GB B&R (SLC) $\leq$ Rev. D0	
5CFCRD.032G-06	CompactFlash 32 GB B&R (SLC) $\leq$ Rev. C0	

Table 111: 5CFCRD.0512-06, 5CFCRD.1024-06, 5CFCRD.2048-06, 5CFCRD.4096-06, 5CFCRD.8192-06, 5CFCRD.016G-06, 5CFCRD.032G-06 - Order data

## 3.3.3 Technical data

**Caution!**

A sudden loss of power may result in data loss! In very rare cases, the mass storage device may also become damaged.

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

**Information:**

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

Product ID	5CFCRD. 0512-06 ≥ Rev. F0	5CFCRD. 1024-06 ≥ Rev. F0	5CFCRD. 2048-06 ≥ Rev. F0	5CFCRD. 4096-06 ≥ Rev. F0	5CFCRD. 8192-06 ≥ Rev. F0	5CFCRD. 016G-06 ≥ Rev. E0	5CFCRD. 032G-06 ≥ Rev. D0
General information							
Capacity	512 MB	1 GB	2 GB	4 GB	8 GB	16 GB	32 GB
Data retention	10 years						
Data reliability	<1 unrecoverable error in 10 <sup>14</sup> 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	50 MB/s	50 MB/s	59 MB/s	59 MB/s	59 MB/s	59 MB/s	58 MB/s
Maximum	53 MB/s	53 MB/s	65 MB/s	65 MB/s	65 MB/s	65 MB/s	65 MB/s
Continuous writing							
Typical	25 MB/s	25 MB/s	31 MB/s	31 MB/s	31 MB/s	31 MB/s	31 MB/s
Maximum	27 MB/s	27 MB/s	35 MB/s	35 MB/s	35 MB/s	35 MB/s	35 MB/s
Certification							
CE	Yes						
cULus	Yes						
cULus HazLoc Class 1 Division 2	-	-	-	-	-	Yes <sup>1)</sup>	-
ATEX Zone 22	-	-	-	-	-	Yes <sup>1)</sup>	-
GOST-R	Yes						
GL	Yes <sup>1)</sup>						
Endurance							
SLC flash	Yes						
Guaranteed data volume							
Guaranteed <sup>2)</sup>	50 TB	100 TB	200 TB	400 TB	800 TB	1600 TB	3200 TB
Over 5 years, equates to <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	1753.44 GB/day
Clear/Write cycles							
Guaranteed	100,000						
Wear leveling	Static						
Error correction coding (ECC)	Yes						
S.M.A.R.T. support	Yes						
Support							
Hardware	PP300/400, PP500, PPC300, PPC700, PPC725, PPC800, APC620, APC810, APC820						
Operating systems							
Windows 7 32-bit	No	No	No	No	No	Yes	Yes
Windows 7 64-bit	No	No	No	No	No	No	Yes
Windows Embedded Standard 7 32-bit	No	No	No	No	Yes	Yes	Yes
Windows Embedded Standard 7 64-bit	No	No	No	No	No	Yes	Yes
Windows XP Professional	No	No	No	Yes	Yes	Yes	Yes
Windows XP Embedded	Yes						
Windows Embedded Standard 2009	No	Yes	Yes	Yes	Yes	Yes	Yes
Windows CE 6.0	Yes	Yes	Yes	Yes	Yes	Yes <sup>3)</sup>	Yes <sup>3)</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)	≥ V4.0.0.8 (part of PVI Development Setup ≥ V3.0.2.3014)
B&R Embedded OS Installer	≥V3.10	≥V3.10	≥V3.10	≥V3.10	≥V3.10	≥V3.20	≥V3.21

Table 112: 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 ≥ Rev. F0	5CFCRD. 1024-06 ≥ Rev. F0	5CFCRD. 2048-06 ≥ Rev. F0	5CFCRD. 4096-06 ≥ Rev. F0	5CFCRD. 8192-06 ≥ Rev. F0	5CFCRD. 016G-06 ≥ Rev. E0	5CFCRD. 032G-06 ≥ Rev. D0
Environmental conditions							
Temperature							
Operation	0 to 70°C						
Storage	-50 to 100°C						
Transport	-50 to 100°C						
Relative humidity							
Operation	Max. 85% at 85°C						
Storage	Max. 85% at 85°C						
Transport	Max. 85% at 85°C						
Vibration							
Operation	20 g peak, 20 to 2000 Hz, 4 in each direction (JEDEC JESD22, method B103) 5.35 g RMS, 15 min per level (IEC 68-2-6)						
Storage	20 g peak, 20 to 2000 Hz, 4 in each direction (JEDEC JESD22, method B103) 5.35 g RMS, 15 min per level (IEC 68-2-6)						
Transport	20 g peak, 20 to 2000 Hz, 4 in each direction (JEDEC JESD22, method B103) 5.35 g RMS, 15 min per level (IEC 68-2-6)						
Shock							
Operation	1.5 kg peak, 0.5 ms 5 times (JEDEC JESD22, method B110) 30 g, 11 ms 1 times (IEC 68-2-27)						
Storage	1.5 kg peak, 0.5 ms 5 times (JEDEC JESD22, method B110) 30 g, 11 ms 1 times (IEC 68-2-27)						
Transport	1.5 kg peak, 0.5 ms 5 times (JEDEC JESD22, method B110) 30 g, 11 ms 1 times (IEC 68-2-27)						
Altitude							
Operation	Max. 4572 m						
Mechanical characteristics							
Dimensions							
Width	42.8 ±0.10 mm						
Length	36.4 ±0.15 mm						
Height	3.3 ±0.10 mm						
Weight	10 g						

Table 112: 5CFCRD.0512-06, 5CFCRD.1024-06, 5CFCRD.2048-06, 5CFCRD.4096-06, 5CFCRD.8192-06, 5CFCRD.016G-06, 5CFCRD.032G-06 - Technical data

- 1) Yes, although applies only if all components installed within the complete system have this certification
- 2) Endurance of B&R CFs (with linear written block size ≥128 kB).
- 3) Not supported by the B&R Embedded OS Installer.

## Caution!

**A sudden loss of power may result in data loss! In very rare cases, the mass storage device may also become damaged.**

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

## Information:

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

Product ID	5CFCRD. 0512-06 ≤ Rev. E0	5CFCRD. 1024-06 ≤ Rev. E0	5CFCRD. 2048-06 ≤ Rev. E0	5CFCRD. 4096-06 ≤ Rev. E0	5CFCRD. 8192-06 ≤ Rev. E0	5CFCRD. 016G-06 ≤ Rev. D0	5CFCRD. 032G-06 ≤ Rev. C0
<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						
Lifetime monitoring	Yes						
MTBF	>3,000,000 hours (at 25°C)						
Maintenance	None						
Supported operating modes	PIO Mode 0-6, Multiword DMA Mode 0-4, Ultra DMA Mode 0-4						
Continuous reading							
Typical	33 MB/s	33 MB/s	33 MB/s	33 MB/s	33 MB/s	36 MB/s	36 MB/s
Maximum	35 MB/s	35 MB/s	35 MB/s	34 MB/s	34 MB/s	37 MB/s	37 MB/s
Continuous writing							
Typical	15 MB/s	15 MB/s	15 MB/s	14 MB/s	14 MB/s	28 MB/s	28 MB/s
Maximum	18 MB/s	18 MB/s	18 MB/s	17 MB/s	17 MB/s	30 MB/s	30 MB/s

Table 113: 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 ≤ Rev. E0	5CFCRD. 1024-06 ≤ Rev. E0	5CFCRD. 2048-06 ≤ Rev. E0	5CFCRD. 4096-06 ≤ Rev. E0	5CFCRD. 8192-06 ≤ Rev. E0	5CFCRD. 016G-06 ≤ Rev. D0	5CFCRD. 032G-06 ≤ Rev. C0
Certification							
CE	Yes						
cULus	Yes						
cULus HazLoc Class 1 Division 2	-	-	-	-	-	Yes <sup>1)</sup>	-
ATEX Zone 22	-	-	-	-	-	Yes <sup>1)</sup>	-
GOST-R	Yes						
GL	Yes <sup>1)</sup>						
Endurance							
SLC flash	Yes						
Guaranteed data volume							
Guaranteed <sup>2)</sup>	50 TB	100 TB	200 TB	400 TB	800 TB	1600 TB	3200 TB
Over 5 years, equates to <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	1753.44 GB/day
Clear/Write cycles							
Guaranteed	100,000						
Wear leveling	Static						
Error correction coding (ECC)	Yes						
S.M.A.R.T. support	Yes						
Support							
Hardware	PP300/400, PP500, PPC300, PPC700, PPC725, PPC800, APC620, APC810, APC820						
Operating systems							
Windows 7 32-bit	No	No	No	No	No	Yes	Yes
Windows 7 64-bit	No	No	No	No	No	No	Yes
Windows Embedded Standard 7 32-bit	No	No	No	No	Yes	Yes	Yes
Windows Embedded Standard 7 64-bit	No	No	No	No	No	Yes	Yes
Windows XP Professional	No	No	No	Yes	Yes	Yes	Yes
Windows XP Embedded	Yes						
Windows Embedded Standard 2009	No	Yes	Yes	Yes	Yes	Yes	Yes
Windows CE 6.0	Yes	Yes	Yes	Yes	Yes	Yes <sup>3)</sup>	Yes <sup>3)</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)	≥ V4.0.0.8 (part of PVI Development Setup ≥ V3.0.2.3014)
B&R Embedded OS Installer	≥V3.10	≥V3.10	≥V3.10	≥V3.10	≥V3.10	≥V3.20	≥V3.21
Environmental conditions							
Temperature							
Operation	0 to 70°C						
Storage	-50 to 100°C						
Transport	-50 to 100°C						
Relative humidity							
Operation	Max. 85% at 85°C						
Storage	Max. 85% at 85°C						
Transport	Max. 85% at 85°C						
Vibration							
Operation	20 g peak, 20 to 2000 Hz, 4 in each direction (JEDEC JESD22, method B103) 5.35 g RMS, 15 min per level (IEC 68-2-6)						
Storage	20 g peak, 20 to 2000 Hz, 4 in each direction (JEDEC JESD22, method B103) 5.35 g RMS, 15 min per level (IEC 68-2-6)						
Transport	20 g peak, 20 to 2000 Hz, 4 in each direction (JEDEC JESD22, method B103) 5.35 g RMS, 15 min per level (IEC 68-2-6)						
Shock							
Operation	1.5 kg peak, 0.5 ms 5 times (JEDEC JESD22, method B110) 30 g, 11 ms 1 times (IEC 68-2-27)						
Storage	1.5 kg peak, 0.5 ms 5 times (JEDEC JESD22, method B110) 30 g, 11 ms 1 times (IEC 68-2-27)						
Transport	1.5 kg peak, 0.5 ms 5 times (JEDEC JESD22, method B110) 30 g, 11 ms 1 times (IEC 68-2-27)						
Altitude							
Operation	Max. 4572 m						
Mechanical characteristics							
Dimensions							
Width	42.8 ±0.10 mm						
Length	36.4 ±0.15 mm						
Height	3.3 ±0.10 mm						
Weight	10 g						

Table 113: 5CFCRD.0512-06, 5CFCRD.1024-06, 5CFCRD.2048-06, 5CFCRD.4096-06, 5CFCRD.8192-06, 5CFCRD.016G-06, 5CFCRD.032G-06 - Technical data

- 1) Yes, although applies only if all components installed within the complete system have this certification  
2) Endurance of B&R CFs (with linear written block size ≥128 kB).  
3) Not supported by the B&R Embedded OS Installer.



### 3.3.5 Dimensions



Technical drawing of a CompactFlash Type I card, showing dimensions in millimeters (mm).

**Top View:**

- Overall width:  $3.30 \pm 0.1$
- Overall height:  $25.78 \pm 0.07$
- Notch width:  $1.65$
- Notch radius:  $4 \times R0.5 \pm 0.1$
- Pin pitch:  $2 \times 12 \pm 0.10$
- Pin length:  $2 \times 25.78 \pm 0.07$

**Front View:**

- Overall width:  $41.66 \pm 0.13$
- Overall height:  $36.4 \pm 0.15$
- Label: "CompactFlash Type I"
- Label: "Above"

**Side View:**

- Overall thickness:  $0.63 \pm 0.07$
- Notch depth:  $0.76 \pm 0.07$
- Notch width:  $2.44 \pm 0.07$
- Notch radius:  $2 \times 3 \pm 0.07$

**Pin Details:**

- Pin pitch:  $1.01 \pm 0.07$
- Pin length:  $1.60 \pm 0.05$
- Pin width:  $0.99 \pm 0.05$
- Pin count: 26 pins
- Pin spacing: 1.01 mm
- Pin width: 0.99 mm

Figure 68: Type I CompactFlash card - Dimensions

### 3.3.6 Benchmark

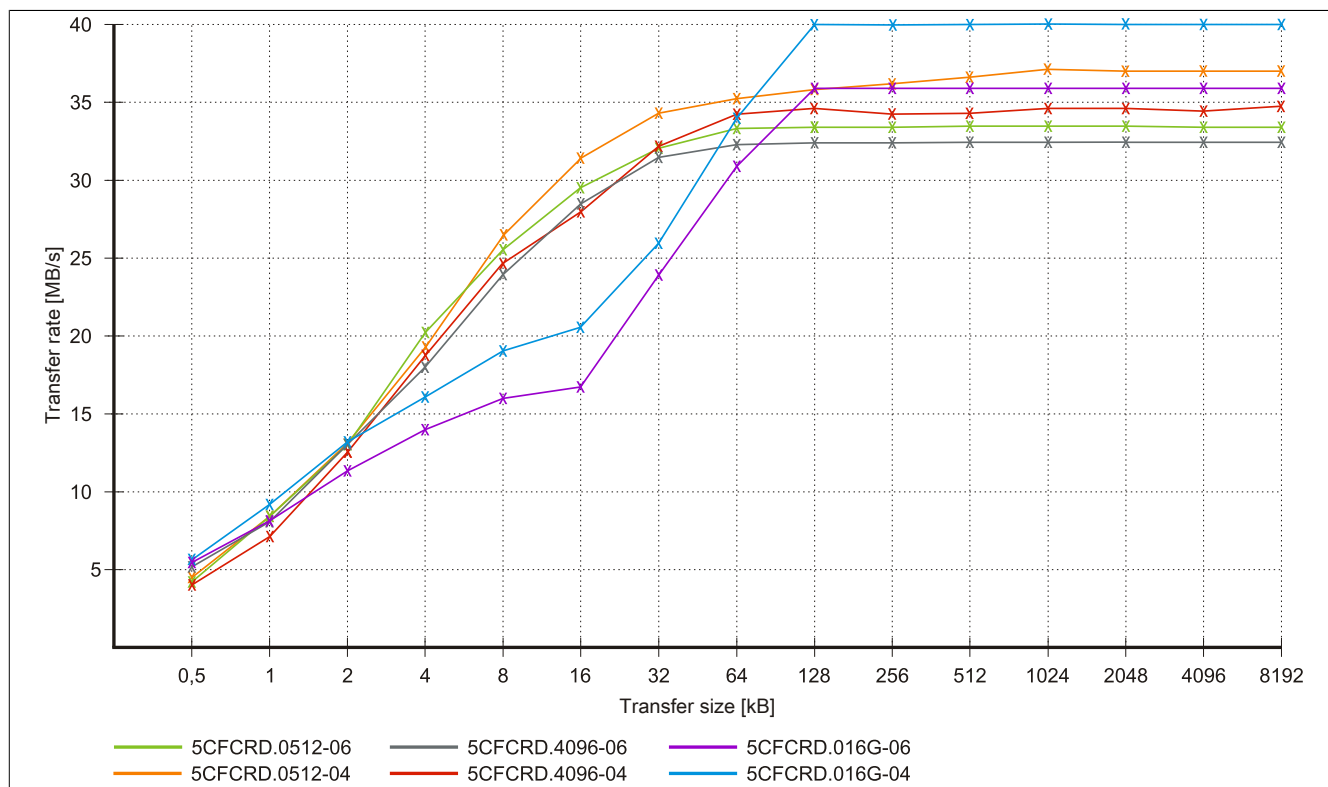


Figure 69: ATTO Disk Benchmark v2.34 read comparison - 5CFCRD.xxxx-04 and 5CFCRD.xxxx-06

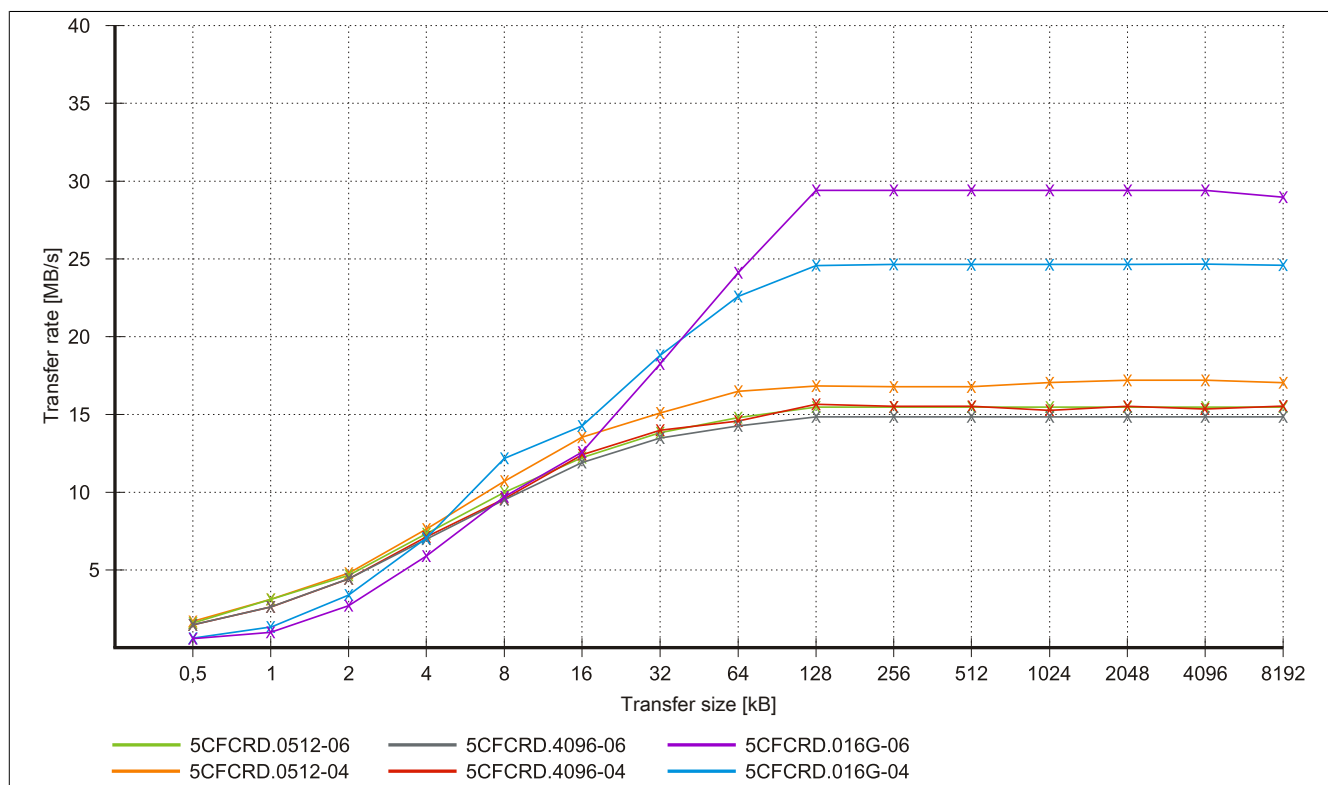


Figure 70: ATTO Disk Benchmark v2.34 write comparison - 5CFCRD.xxxx-04 and 5CFCRD.xxxx-06

### 3.4 5CFCRD.xxxx-04

#### 3.4.1 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 different boot times.

see "Known problems/issues" on page 154

##### Information:

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

#### 3.4.2 Order data


Model number	Short description	Figure
	<b>CompactFlash-cards</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 114: 5CFCRD.0512-04, 5CFCRD.1024-04, 5CFCRD.2048-04, 5CFCRD.4096-04, 5CFCRD.8192-04, 5CFCRD.016G-04 - Order data

#### 3.4.3 Technical data

##### Caution!

A sudden loss of power may result in data loss! In very rare cases, the mass storage device may also become damaged.

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

##### Information:

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

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 error in $10^{14}$ bit read accesses					
Lifetime monitoring	Yes					
MTBF	>3,000,000 hours (at 25°C)					
Maintenance	None					
Supported operating modes	PIO Mode 0-6, Multiword DMA Mode 0-4, Ultra DMA Mode 0-4					
Sequential read						
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>	36 MB/s (240X) <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>	37 MB/s (247X) <sup>1)</sup>

Table 115: 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
Sequential write						
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		
cULus				Yes		
GOST-R	-	Yes	Yes	Yes	Yes	Yes
GL				Yes <sup>2)</sup>		
Endurance						
SLC flash	Yes					
Guaranteed data volume						
Guaranteed <sup>3)</sup>	50 TB	100 TB	200 TB	400 TB	800 TB	1600 TB
Results for 5 years <sup>3)</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>4)</sup>	2,000,000					
Guaranteed	100,000					
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>5)</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 5 times (JEDEC JESD22, method B110) 30 g, 11 ms 1 times (IEC 68-2-27)					
Storage	1.5 kg peak, 0.5 ms 5 times (JEDEC JESD22, method B110) 30 g, 11 ms 1 times (IEC 68-2-27)					
Transport	1.5 kg peak, 0.5 ms 5 times (JEDEC JESD22, method B110) 30 g, 11 ms 1 times (IEC 68-2-27)					
Altitude						
Operation	Max. 4572 m					
Mechanical characteristics						
Dimensions						
Width	42.8 ±0.10 mm					
Length	36.4 ±0.15 mm					
Height	3.3 ±0.10 mm					
Weight	10 g					

Table 115: 5CFCRD.0512-04, 5CFCRD.1024-04, 5CFCRD.2048-04,  
5CFCRD.4096-04, 5CFCRD.8192-04, 5CFCRD.016G-04 - Technical data

- 1) Speed specification with 1X = 150 Kb/s. All specifications refer to Samsung flash chips, CompactFlash cards in UDMA mode 4 and 30 ns cycle time in True IDE mode with sequential write/read test.
- 2) Yes, although applies only if all components installed within the complete system have this certification

- 3) Endurance of B&R CFs (with linear written block size  $\geq 128$  kB).
- 4) Depends on the average file size.
- 5) Not supported by the B&R Embedded OS Installer.

### 3.4.4 Temperature/Humidity diagram

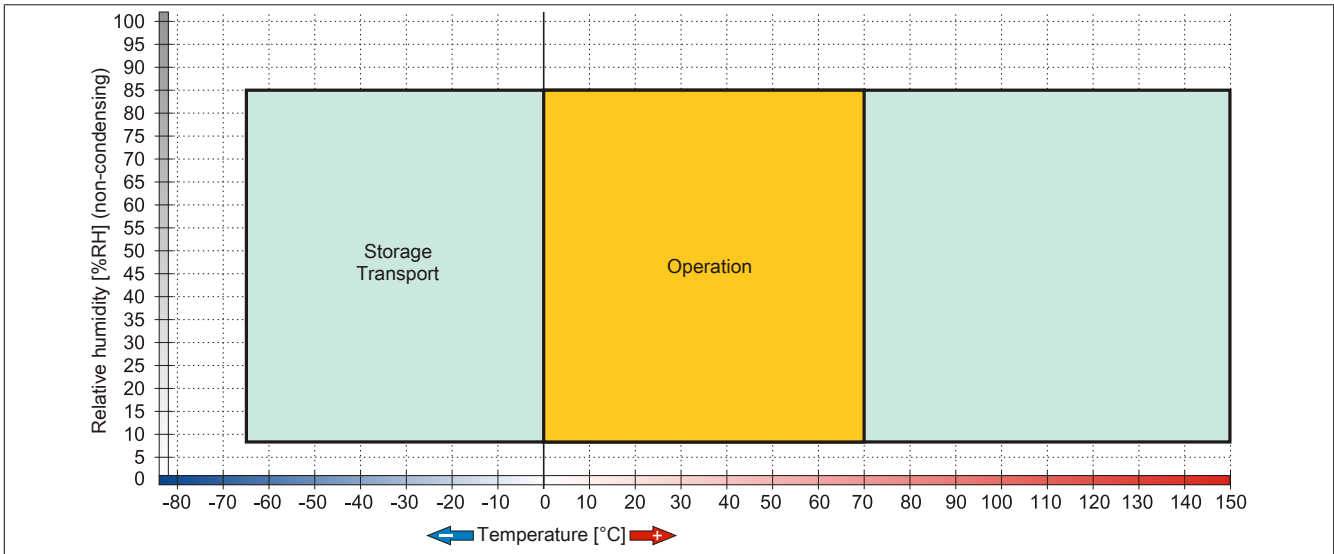


Figure 71: 5CFCRD.xxxx-04 - Temperature/Humidity diagram for CompactFlash cards

### 3.4.5 Dimensions

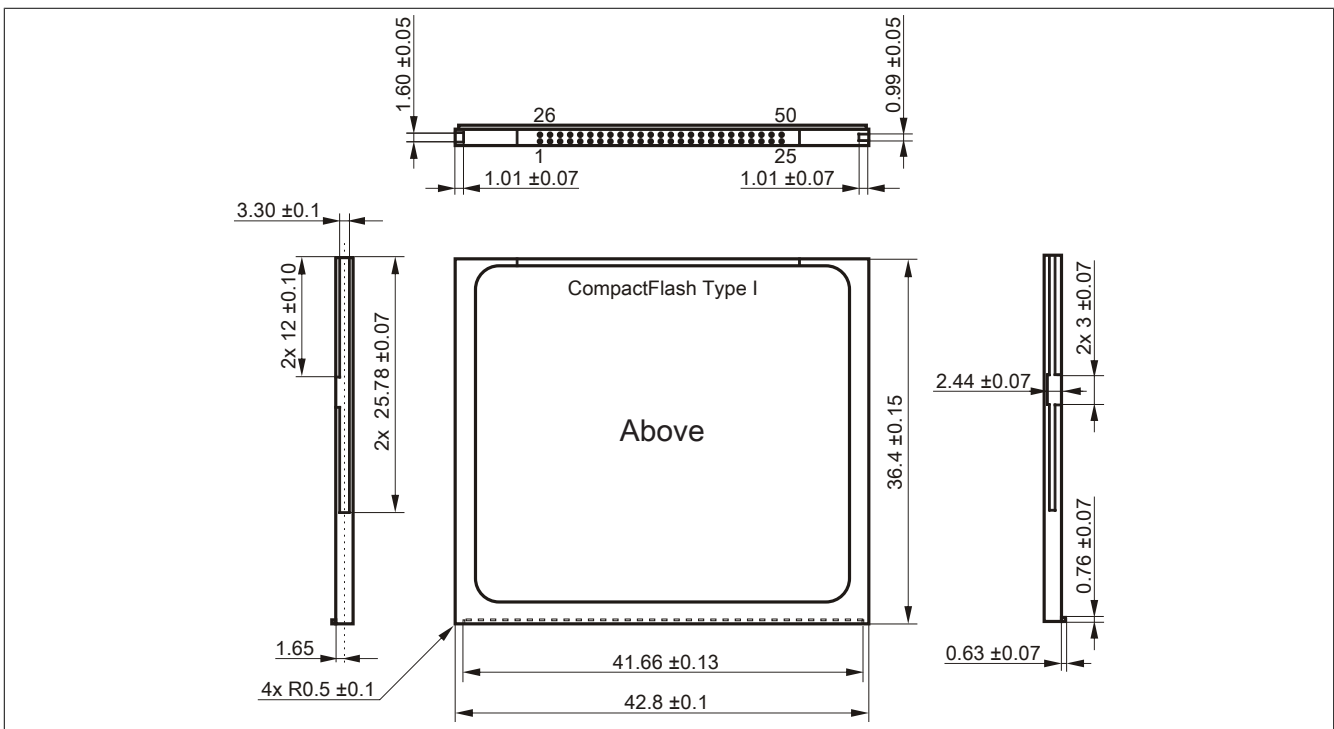


Figure 72: Type I CompactFlash card - Dimensions

## 3.4.6 Benchmark

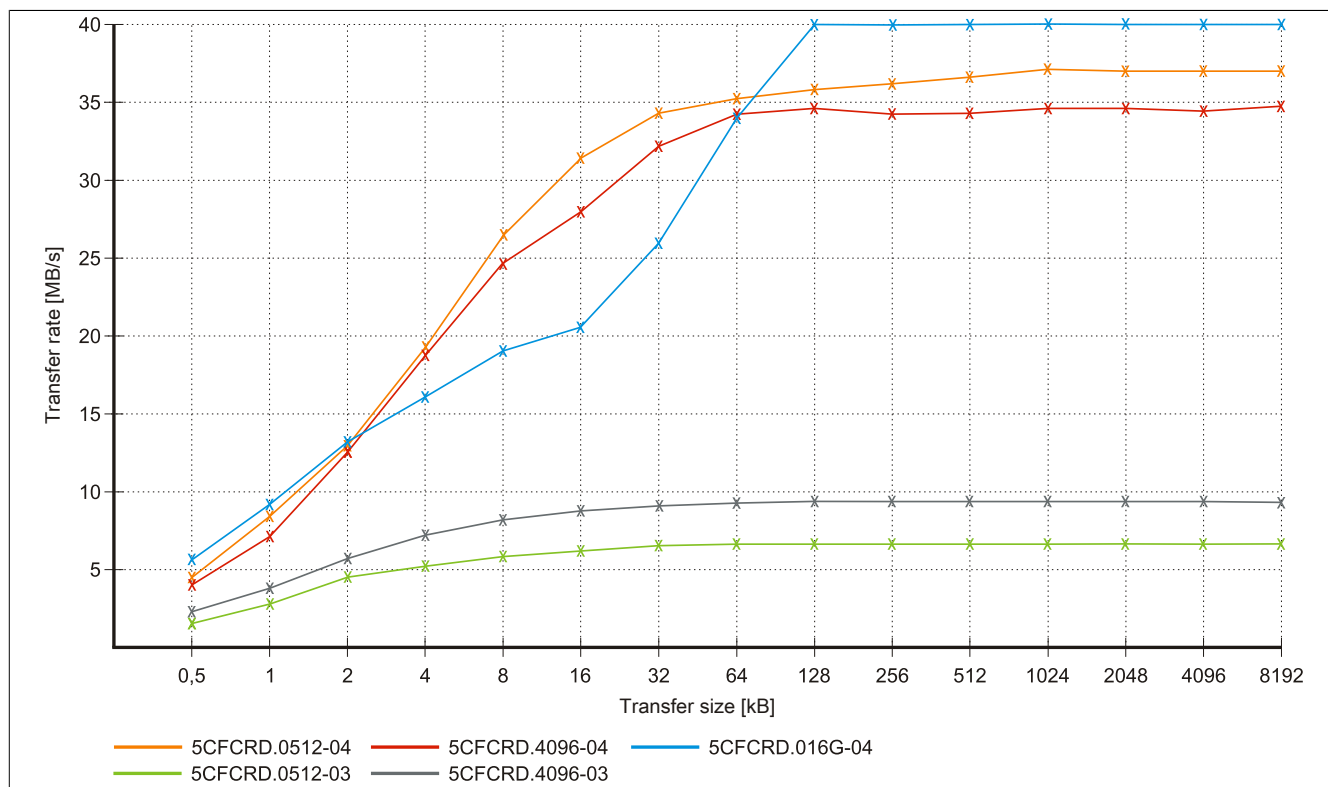


Figure 73: ATTO Disk Benchmark v2.34 read comparison - 5CFCRD.xxxx-03 and 5CFCRD.xxxx-04

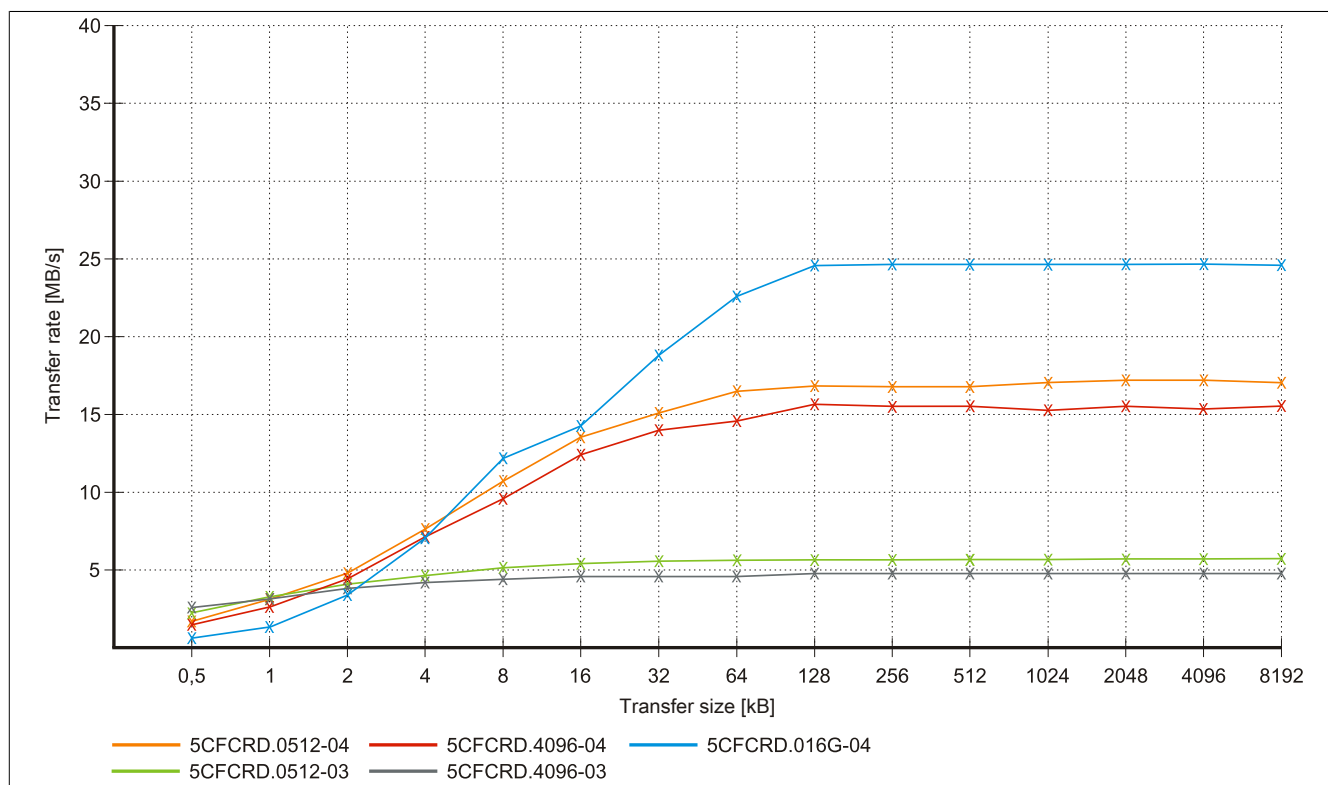


Figure 74: ATTO Disk Benchmark v2.34 write comparison - 5CFCRD.xxxx-03 and 5CFCRD.xxxx-04

### 3.5 5CFCRD.xxxx-03

#### 3.5.1 General information

##### Information:

Western Digital CompactFlash cards 5CFCRD.xxxx 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 different boot times.

see "Known problems/issues" on page 154

##### 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.

#### 3.5.2 Order data


Model number	Short description	Figure
	<b>CompactFlash-cards</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 116: 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

#### 3.5.3 Technical data

##### Caution!

A sudden loss of power may result in data loss! In very rare cases, the mass storage device may also become damaged.

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

##### Information:

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

Product ID	5CFCRD.0064-03	5CFCRD.0128-03	5CFCRD.0256-03	5CFCRD.0512-03	5CFCRD.1024-03	5CFCRD.2048-03	5CFCRD.4096-03	5CFCRD.8192-03
<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 error in 10 <sup>14</sup> bit read accesses							
Lifetime monitoring	Yes							

Table 117: 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
MTBF	>4,000,000 hours (at 25°C)							
Maintenance	None							
Supported operating modes	PIO Mode 0-4, Multiword DMA Mode 0-2							
Sequential read Typical	8 MB/s							
Sequential write Typical	6 MB/s							
Certification CE cULus GOST-R GL	Yes Yes Yes Yes <sup>1)</sup>							
Endurance								
SLC flash	Yes							
Clear/Write cycles Typical	>2,000,000							
Wear leveling	Static							
Error correction coding (ECC)	Yes							
S.M.A.R.T. support	No							
Support								
Hardware	MP100/200, PP100/200, PP300/400, PP500, PPC300, PPC700, PPC725, PPC800, Provit 2000, Provit 5000, APC620, APC680, APC810, APC820							
Operating systems Windows 7 32-bit Windows 7 64-bit Windows Embedded Standard 7, 32-bit Windows Embedded Standard 7, 64-bit Windows XP Professional Windows XP Embedded Windows Embedded Standard 2009 Windows CE 6.0 Windows CE 5.0	No	No	No	No	No	No	No	Yes
				No				
	No	No	No	No	No	No	Yes	Yes
	No	No	No	Yes	Yes	Yes	Yes	Yes
	No	No	No	No	Yes	Yes	Yes	Yes
	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes <sup>2)</sup>
	Yes	Yes	Yes	Yes	Yes	No	No	No
Software PVI Transfer B&R Embedded OS Installer	≥V2.57 (part of PVI Development Setup ≥ V2.5.3.3005) ≥V2.21							
Environmental conditions								
Temperature Operation Storage Transport	0 to 70°C -50 to 100°C -50 to 100°C							
Relative humidity Operation Storage Transport	8 to 95%, non-condensing 8 to 95%, non-condensing 8 to 95%, non-condensing							
Vibration Operation Storage Transport	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)							
Shock Operation Storage Transport	Max. 1000 g (9810 m/s² 0-peak) Max. 3000 g (29430 m/s² 0-peak) Max. 3000 g (29430 m/s² 0-peak)							
Altitude Operation	Max. 24383 m							
Mechanical characteristics								
Dimensions Width Length Height	42.8 ±0.10 mm 36.4 ±0.15 mm 3.3 ±0.10 mm							
Weight	11.4 g							

Table 117: 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) Yes, although applies only if all components installed within the complete system have this certification  
2) Not supported by the B&R Embedded OS Installer.



### 3.5.4 Temperature/Humidity diagram

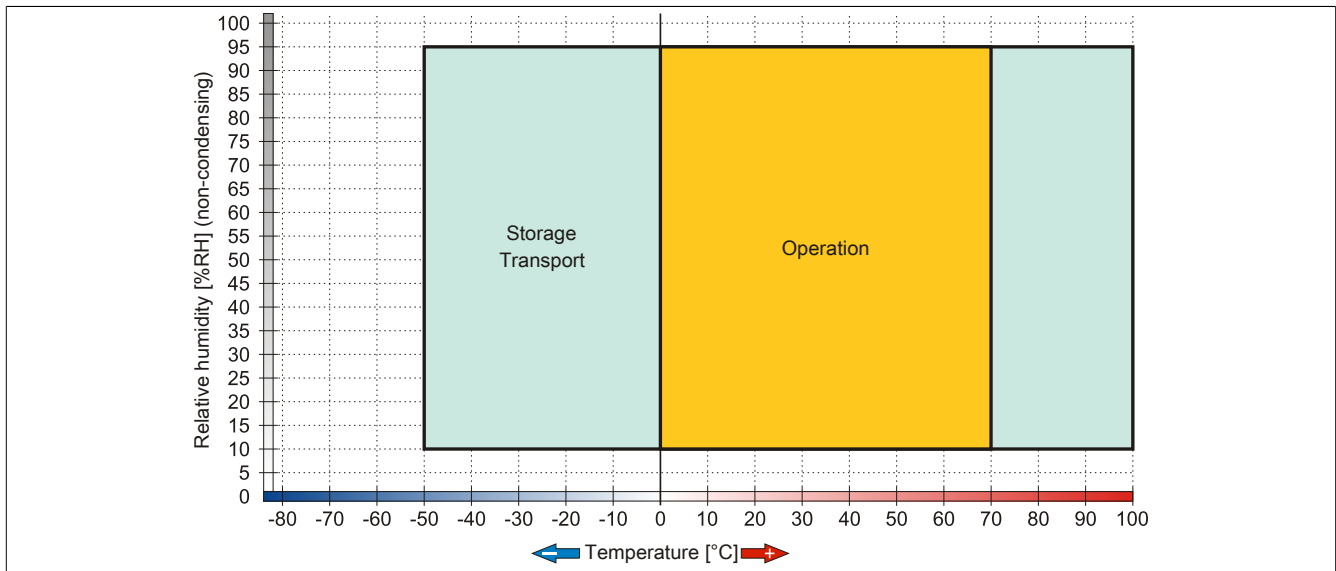


Figure 75: 5CFCRD.xxxx-03 - Temperature/Humidity diagram for CompactFlash cards

### 3.5.5 Dimensions

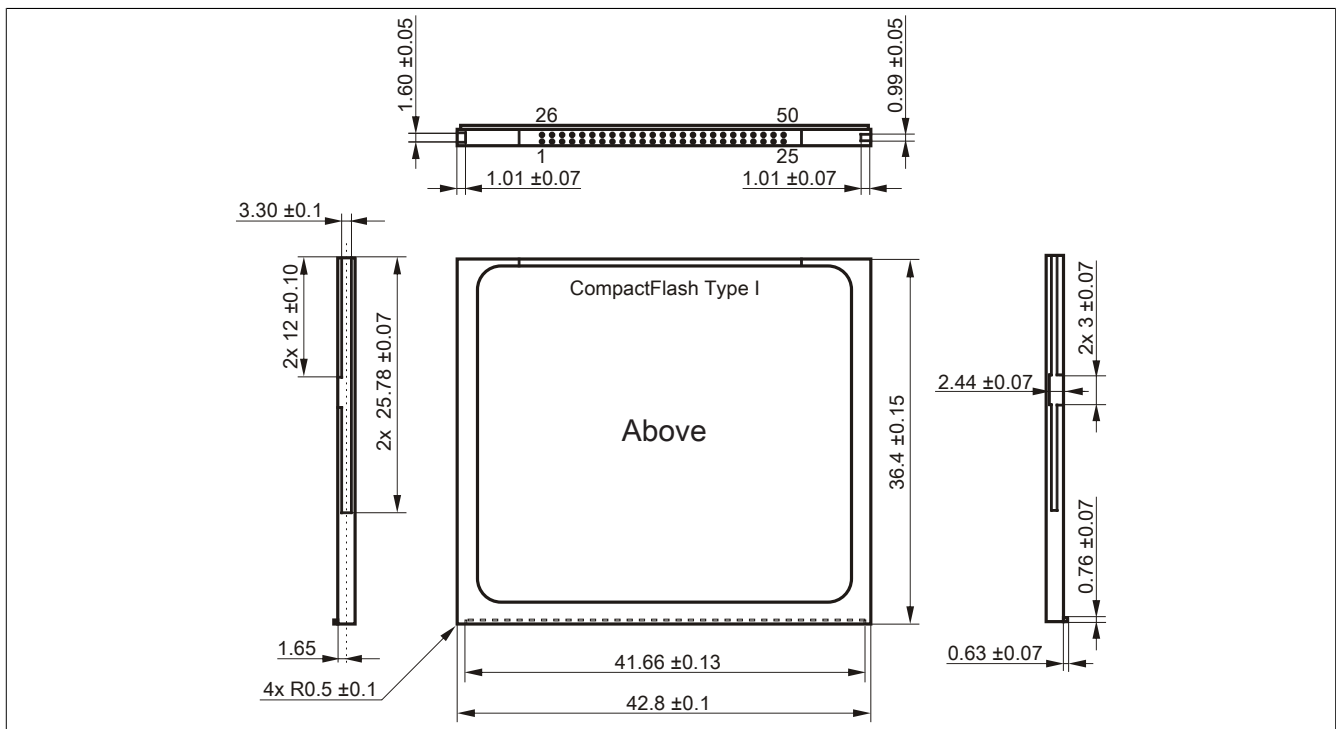


Figure 76: Type I CompactFlash card - Dimensions

### 3.6 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 with Automation PCs and Panel PCs. For example, it is possible that one of the two cards is not detected during system startup. This is caused by different 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 end of the time frame provided for startup. The problem described can occur because the startup time for the CompactFlash cards fluctuates due to the different components being used. Depending on the CompactFlash card being used, this error might never, sometimes or always occur.

## 4 USB flash drives

### 4.1 5MMUSB.2048-00

#### 4.1.1 General information

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

#### Information:

Due to the vast quantity of USB flash drives available on the market as well as their short product life cycle, we reserve the right to supply alternative products at any time. The following measures may therefore be necessary in order to boot from these flash drives as well:

- The flash drive must be reformatted or in some cases even repartitioned (set active partition).
- The flash drive must be the first bootable device in the BIOS boot order; alternatively, the IDE controllers can be disabled in BIOS. This can be avoided in most cases if the "fdisk /mbr" command is additionally executed on the USB flash drive.

#### 4.1.2 Order data


Model number	Short description	Figure
	<b>USB accessories</b>	
5MMUSB.2048-00	USB 2.0 flash drive, 2048 MB	

Table 118: 5MMUSB.2048-00 - Order data

#### 4.1.3 Technical data

#### Information:

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

Product ID	5MMUSB.2048-00
<b>General information</b>	
Data retention	10 years
LEDs	1 LED (green) <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 any USB type A interface
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Sequential reading	Max. 8.7 MB/s
Sequential writing	Max. 1.7 MB/s
<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 119: 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 duration
Storage	Max. 80 g (784 m/s <sup>2</sup> 0-peak) and 11 ms duration
Transport	Max. 80 g (784 m/s <sup>2</sup> 0-peak) and 11 ms duration
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 119: 5MMUSB.2048-00 - Technical data

1) Indicates data being transferred (sending and receiving).

#### 4.1.4 Temperature/Humidity diagram

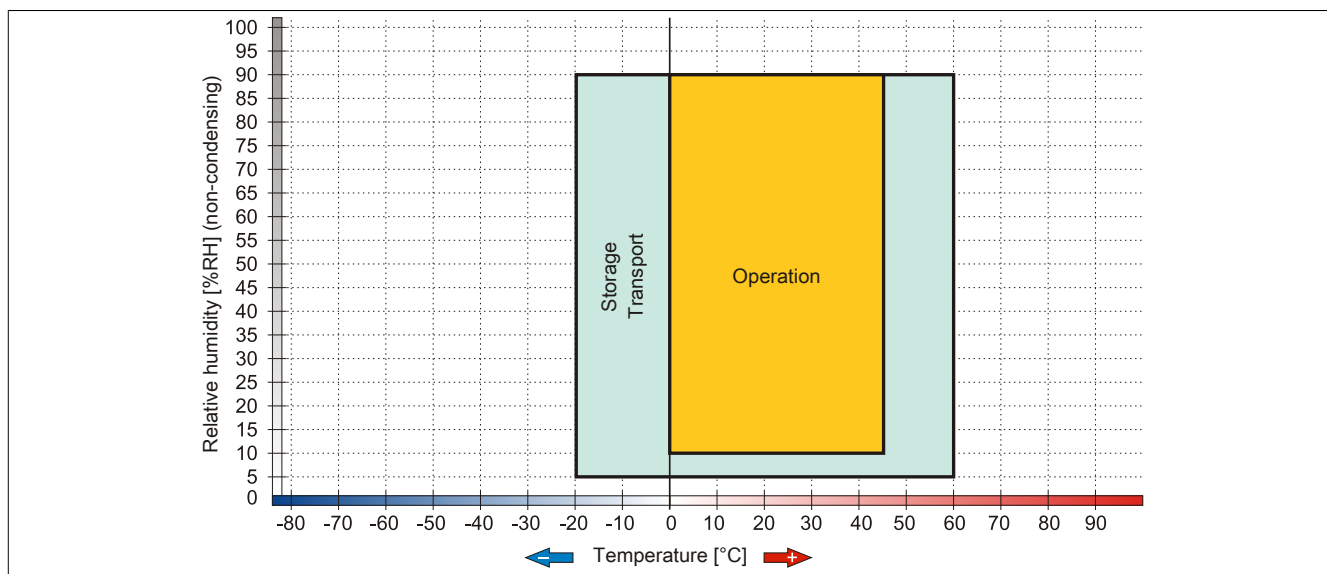


Figure 77: 5MMUSB.2048-00 - Temperature/Humidity diagram

## 4.2 5MMUSB.xxxx-01

### 4.2.1 General information

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

#### Information:

Due to the vast quantity of USB flash drives available on the market as well as their short product life cycle, we reserve the right to supply alternative products at any time. The following measures may therefore be necessary in order to boot from these flash drives as well:

- The flash drive must be reformatted or in some cases even repartitioned (set active partition).
- The flash drive must be the first bootable device in the BIOS boot order; alternatively, the IDE controllers can be disabled in BIOS. This can be avoided in most cases if the "fdisk /mbr" command is additionally executed on the USB flash drive.

### 4.2.2 Order data


Model number	Short description	Figure
	<b>USB accessories</b>	
5MMUSB.2048-01	USB 2.0 flash drive, 2048 MB, B&R	
5MMUSB.4096-01	USB 2.0 flash drive, 4096 MB, B&R	

Table 120: 5MMUSB.2048-01, 5MMUSB.4096-01 - Order data

### 4.2.3 Technical data

Product ID	5MMUSB.2048-01	5MMUSB.4096-01
General information		
Capacity	2 GB	4 GB
LEDs	1 LED (green) <sup>1)</sup>	
MTBF	>3,000,000 hours	
Type	USB 1.1, USB 2.0	
Maintenance	None	
Default file system	FAT16	FAT32
Certification		
CE	Yes	
GOST-R	Yes	
Interfaces		
USB		
Type	USB 1.1, USB 2.0	
Connection	To any USB type A interface	
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)	
Sequential reading	Full speed max. 1 MB/s, High speed max. 32 MB/s	
Sequential writing	Full speed max. 0.9 MB/s, High speed max. 23 MB/s	
Endurance		
SLC flash	Yes	
Data retention	>10 years	
Data reliability	<1 unrecoverable error in 10 <sup>14</sup> bit read accesses	
Connection cycles	>1500	
Support		
Operating systems		
Windows 7	Yes	
Windows XP Professional	Yes	
Windows XP Embedded	Yes	
Windows ME	Yes	
Windows 2000	Yes	
Windows CE 5.0	Yes	
Windows CE 4.2	Yes	
Electrical characteristics		
Power consumption	Max. 500 uA sleep mode, max. 120 mA read/write	

Table 121: 5MMUSB.2048-01, 5MMUSB.4096-01 - Technical data

Product ID	5MMUSB.2048-01	5MMUSB.4096-01
Environmental conditions		
Temperature		
Operation	0 to 70°C	
Storage	-50 to 100°C	
Transport	-50 to 100°C	
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 121: 5MMUSB.2048-01, 5MMUSB.4096-01 - Technical data

1) Indicates data being transferred (sending and receiving).

#### 4.2.4 Temperature/Humidity diagram

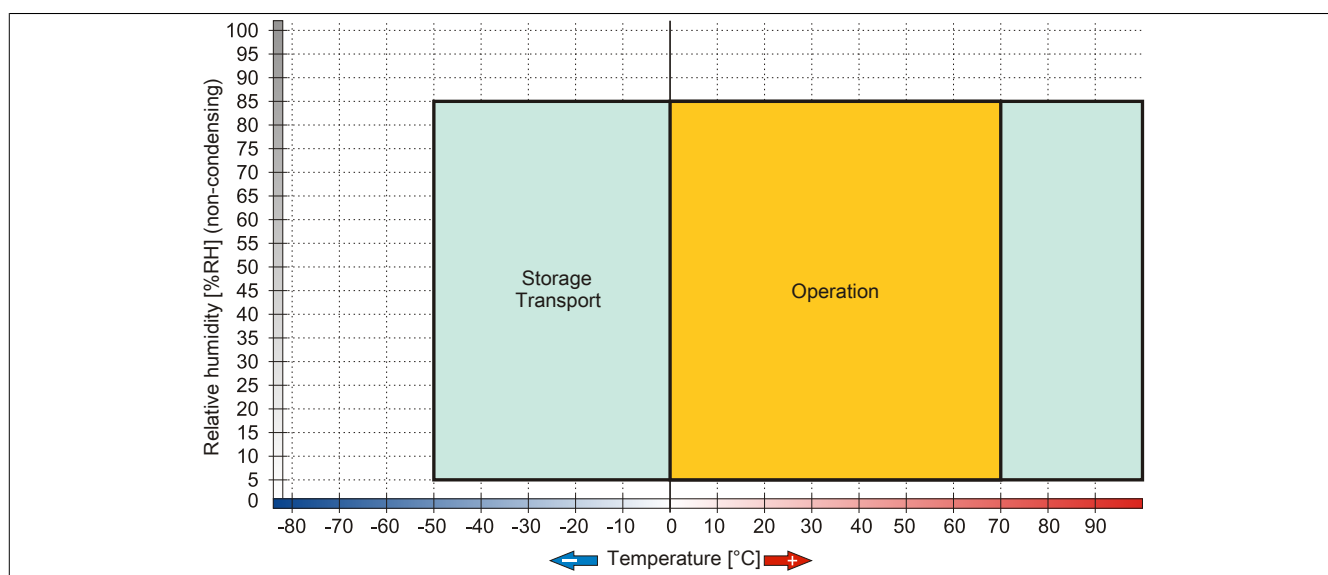


Figure 78: 5MMUSB.xxxx-01 - Temperature/Humidity diagram

5 Cables

5.1 USB cables

5.1.1 5CAUSB.00xx-00

5.1.1.1 General information

USB cables are designed to achieve USB 2.0 transfer speeds.

5.1.1.2 Order data


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

Table 122: 5CAUSB.0018-00, 5CAUSB.0050-00 - Order data

5.1.1.3 Technical data

Product ID	5CAUSB.0018-00	5CAUSB.0050-00
General information		
Certification		
CE	Yes	
cULus	Yes	
GOST-R	Yes	
Cable construction		
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 123: 5CAUSB.0018-00, 5CAUSB.0050-00 - Technical data

5.1.1.4 Cable pinout

Warning!

If you choose to make a suitable cable yourself, it should be wired according to these specifications. If a self-made cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly, however.

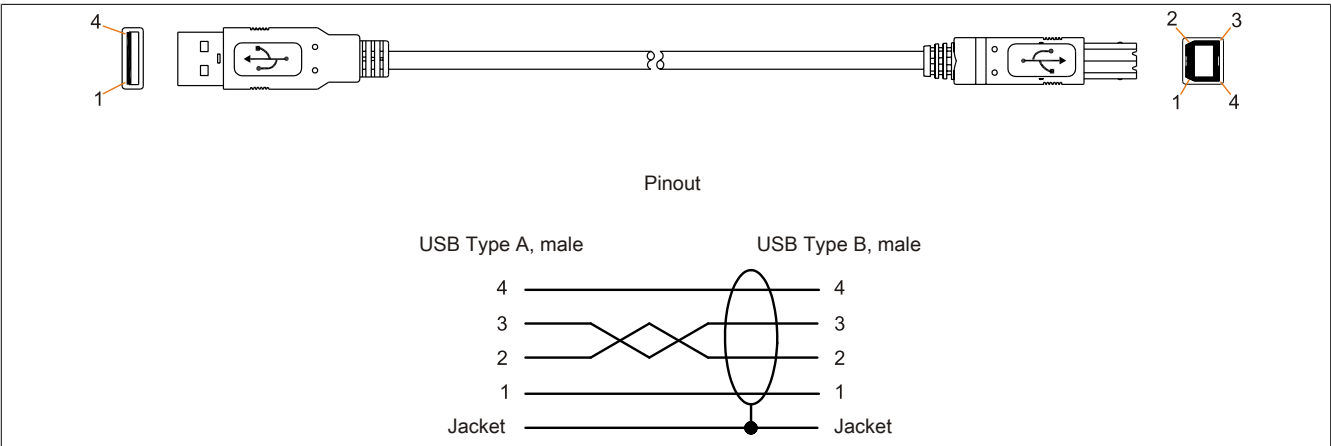


Figure 79: 5CAUSB.00xx-00 USB cables - Pinout

## 5.2 RS232 cables

### 5.2.1 9A0014.xx

#### 5.2.1.1 General information

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

#### 5.2.1.2 Order data


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

Table 124: 9A0014.02, 9A0014.05, 9A0014.10 - Order data

#### 5.2.1.3 Technical data

Product ID	9A0014.02	9A0014.05	9A0014.10
<b>General information</b>			
Certification CE GOST-R	-	Yes	Yes
<b>Cable construction</b>			
Wire cross section		AWG 26	
Shield		Entire cable	
Outer sheathing Color		Beige	
<b>Connector</b>			
Type		9-pin male/female DSUB connector	
Locating screw tightening torque		Max. 0.5 Nm	
<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 125: 9A0014.02, 9A0014.05, 9A0014.10 - Technical data



5.2.1.4 Cable pinout

Warning!

If you choose to make a suitable cable yourself, it should be wired according to these specifications. If a self-made cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly, however.

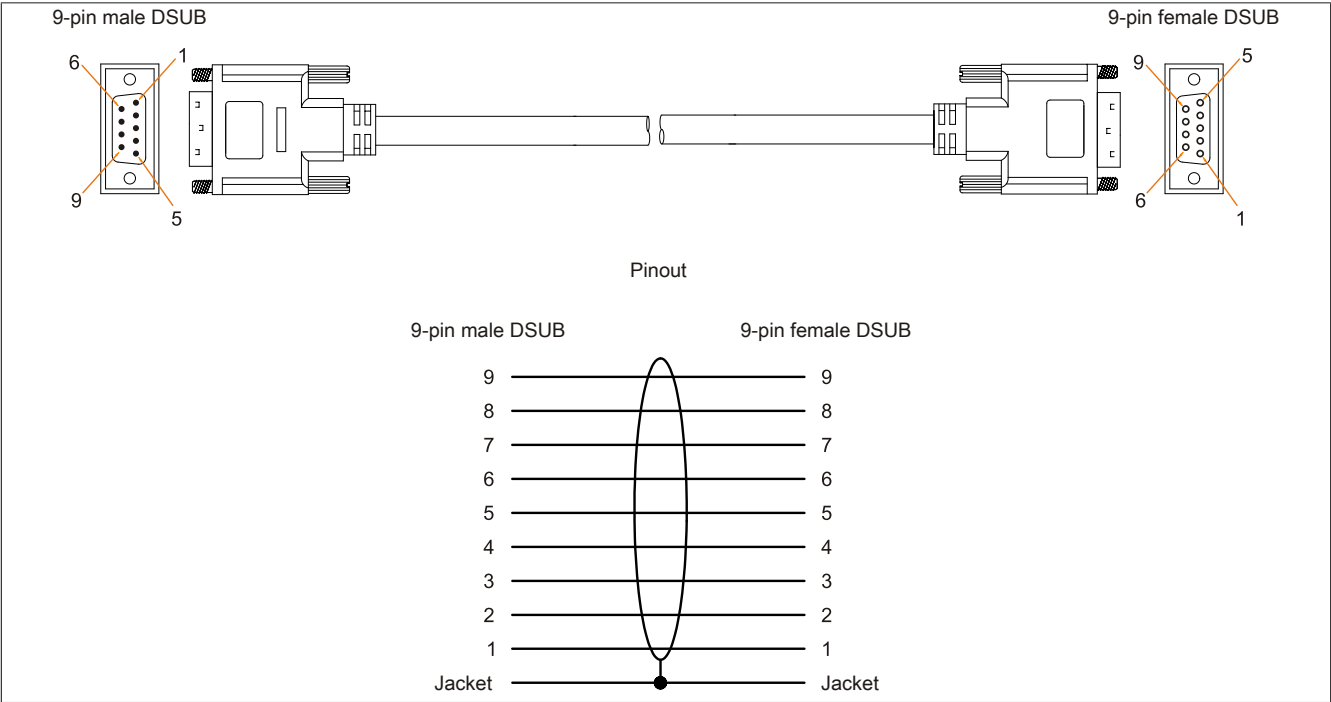


Figure 80: 9A0014.xx RS232 cables - Pinout

## 6 HMI Drivers & Utilities DVD

### 6.1 5SWHMI.0000-00

#### 6.1.1 General information

This DVD contains drivers, utilities, software upgrades and user's manuals for B&R panel system products (see the "Industrial PCs" or "Visualization and operation" section of the B&R website at [www.br-automation.com](http://www.br-automation.com)).

When the DVD is created, its contents are identical to the files found in the Downloads section of the B&R website (Service / Material-related downloads).

#### 6.1.2 Order data


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

Table 126: 5SWHMI.0000-00 - Order data

#### 6.1.3 Contents (V2.20)

##### BIOS product upgrades

- Automation PC 620 / Panel PC 700 CPU board 815E and 855GME BIOS
- Automation PC 620 / Panel PC 700 CPU board X855GME BIOS
- Automation PC 620 / Panel PC 700 CPU board 945GME 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
- Power Panel 500 / Automation PC 510 / Automation PC 511 BIOS
- Panel PC 310

##### Device drivers

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

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

### Firmware upgrades

- Automation PC 620 / Panel PC 700 (MTCX, SDLR, SDLT)
- Automation PC 810 (MTCX, SDLR, SDLT)
- Automation PC 820 (MTCX, SDLR, SDLT)
- Mobile Panel 100 (SMCX)
- Panel PC 300 (MTCX)
- Power Panel 100 (aPCI)
- Power Panel 300/400 (aPCI)
- Power Panel 300/400 (MTCX)
- Power Panel 500 / Automation PC 510 / Automation PC 511 (MTCX, SDLR, I/O board)
- Panel PC 800 (MTCX, SDLR, SDLT)
- UPS firmware

### Utilities/Tools

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

### Windows

- Windows CE 6.0
- Windows CE 5.0
- Windows CE 4.2
- Windows CE 4.1
- Windows CE Tools
- Windows Embedded Standard 2009
- Windows Embedded Standard 7
- Thin client
- Windows NT Embedded
- Windows XP Embedded
- VNC viewer

### MCAD templates for

- Industrial PCs

- Visualization and operating devices
- Slide-in label templates
- Custom designs

**ECAD templates for**

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

**Documentation for**

- Automation PC 511
- 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
- Power Panel 500
- 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 documentation
- Windows CE 6.0 help documentation
- 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 and service

This chapter describes service/maintenance work that can be carried out by a qualified end user.

## 1 Changing the battery

The lithium battery buffers the internal real-time clock (RTC) and CMOS data.

### Information:

- The product design allows the battery to be changed with the B&R device switched either on or off. In some countries, safety regulations do not allow batteries to be changed while the module is switched on.
- Any BIOS settings that have been made will remain when the battery is changed with the power turned off (stored in non-volatile EEPROM). The date and time must be reset later since this data is lost when the battery is changed.
- The battery should only be changed by qualified personnel.

### Warning!

The battery must be replaced by a Type CR2477N Renata battery only. The use of another battery may present a risk of fire or explosion.

The battery may explode if handled improperly. Do not recharge, disassemble or dispose of in fire.

The following replacement lithium batteries are available: 4A0006.00-000 (1 pc.) and 0AC201.91 (4 pcs.).

### 1.1 Evaluating the battery status

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

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

Table 127: Battery status

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

### 1.2 Procedure

- Disconnect the power supply to the B&R Industrial PC.
- Touch the housing or ground connection in order to discharge any electrostatic charge from your body.
- Remove the cover from the battery compartment and carefully pull out the battery using the removal strip.

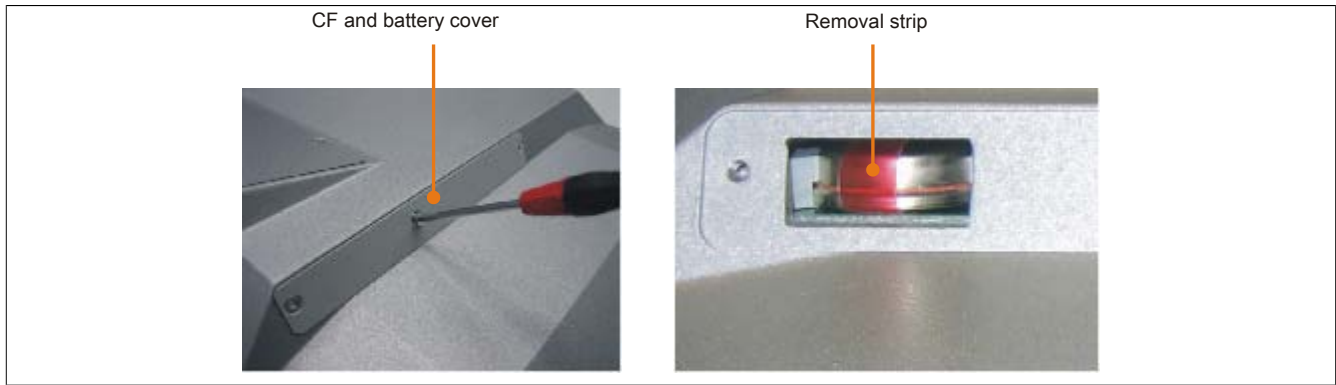


Figure 81: Removing the battery

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

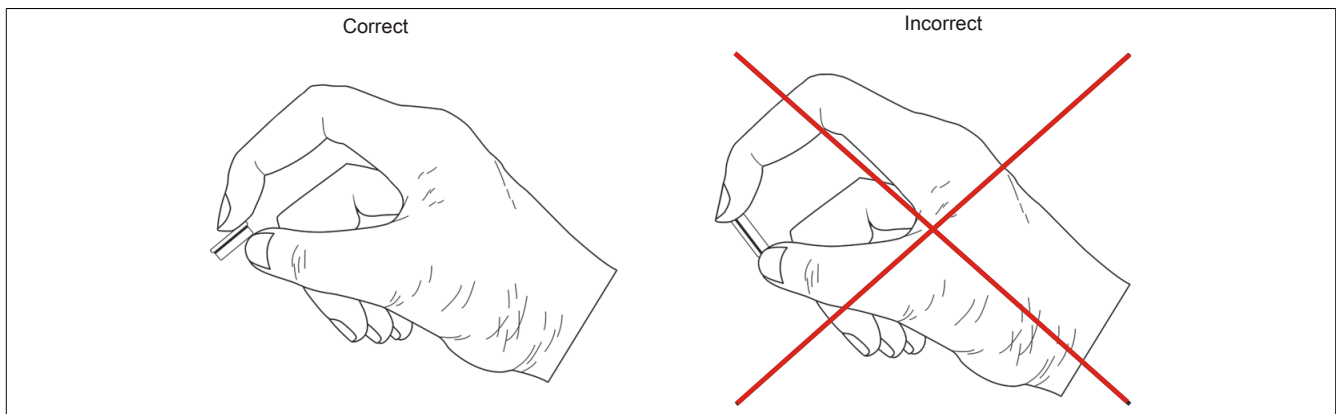


Figure 82: Battery handling

- Insert the new battery with the correct polarity.

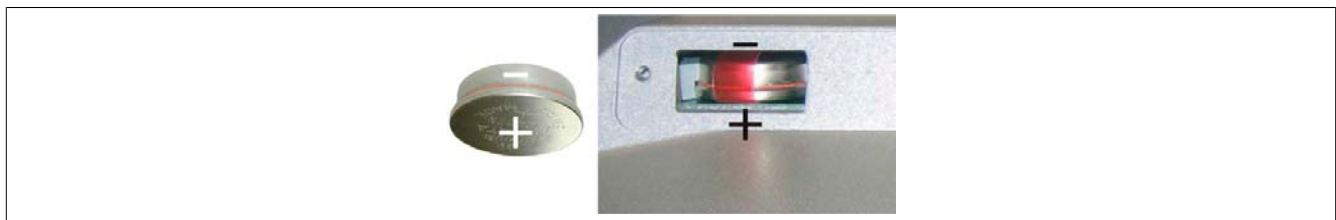


Figure 83: Battery polarity

- To make the next battery replacement easier, be sure the removal strip is in place when inserting the battery.
- Reconnect the power supply to the B&R Industrial PC (plug in the power cable).
- Reset the date and time in BIOS.

## Warning!

Lithium batteries are considered hazardous waste. Used batteries should be disposed of in accordance with applicable local regulations.

## 2 Cleaning

### **Danger!**

**This device can only be cleaned when switched off in order to prevent unintended functions from being triggered when handling the touch screen or pressing keys.**

This device should be cleaned with a moist cloth. The cloth should be moistened with water and detergent, a screen cleaning agent or alcohol (ethanol). The cleaning agent should be applied to the cloth beforehand, not sprayed directly on the device! Aggressive solvents, chemicals, scouring agents, pressurized air or steam jets should never be used.

### **Information:**

**Displays with a touch screen should be cleaned regularly.**

# Appendix A

## 1 Maintenance Controller Extended (MTCX)

The MTCX controller (FPGA processor) is located on the main board (part of every system unit) of Panel PC 725 devices.

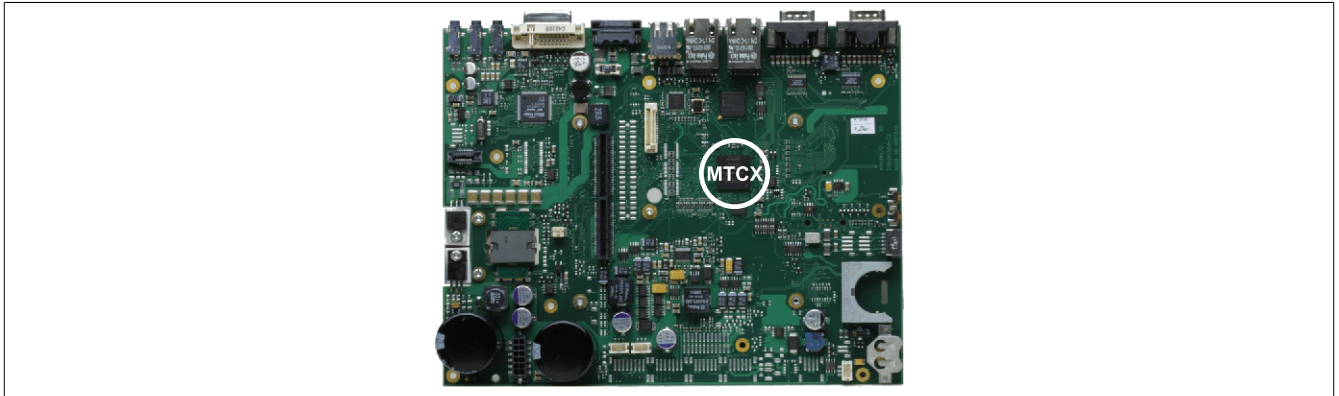


Figure 84: MTCX controller location

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

- Power on (power OK sequencing) and power failure logic
- Watchdog handling (NMI and reset handling)
- Temperature monitoring (CPU internal, CPU board, power supply, board I/O)
- Panel locking mechanism (can be configured using B&R Control Center - ADI driver)
- Statistical data recording (power cycles - records every switch-on, power on and fan hour; each full hour is counted, i.e. not increased at 50 minutes)

Extended MTCX functions are available by upgrading firmware <sup>1)</sup>. The version can be read in BIOS ("Advanced" - Baseboard/Panel Features) or in approved Microsoft Windows operating systems with the B&R Control Center.

<sup>1)</sup> Available in the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)).



## 2 5-wire AMT touch screen

### 2.1 Technical data

#### Information:

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

Product ID	5-wire AMT touch screen
<b>General information</b>	
Certification	
CE	Yes
c-UL-us	Yes
Manufacturer	AMT
Release pressure	<1 N
Light permeability	81 ±3%
<b>Environmental conditions</b>	
Temperature	
Operation	- 20 to 70°C
Storage	- 40 to 80°C
Transport	- 40 to 80°C
Relative humidity	
Operation	90% at max. 50°C
Storage	90% RH at max. 60°C for 504 hours
Transport	90% RH at max. 60°C for 504 hours
<b>Operating conditions</b>	
Service life	36 million touch operations at the same position (release pressure: 250 g, interval: 2x per second)
Chemical resistance <sup>1)</sup>	Acetone, methylene chloride, methyl ethyl ketone, isopropyl alcohol, hexane, turpentine, mineral spirits, unleaded gasoline, diesel, motor oil, gear lubricating oil, antifreeze, ammonia-based glass cleaner, chemical cleaning agents, household cleaning agents, vinegar, coffee, tea, lubricant, cooking oil, salt
Enabling	Finger, pointer, credit card, glove
Drivers	Touch screen drivers for approved operating systems are available in the Downloads section of the B&R website ( <a href="http://www.br-automation.com">www.br-automation.com</a> ).

Table 128: 5-wire AMT touch screen - Technical data

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

### 2.2 Temperature humidity diagram

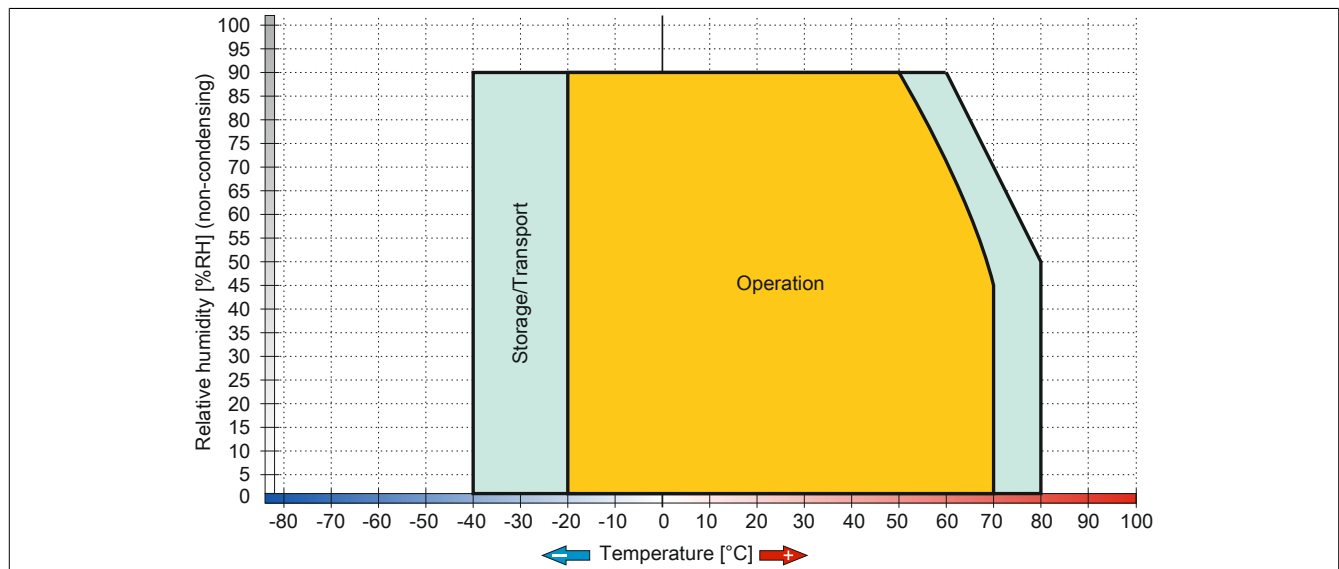


Figure 85: 5-wire AMT touch screen - Temperature humidity diagram

### 2.3 Cleaning

#### Danger!

This device can only be cleaned when switched off in order to prevent unintended functions from being triggered when handling the touch screen or pressing keys.

This device should be cleaned with a moist cloth. The cloth should be moistened with water and detergent, a screen cleaning agent or alcohol (ethanol). The cleaning agent should be applied to the cloth beforehand, not sprayed directly on the device! Aggressive solvents, chemicals, scouring agents, pressurized air or steam jets should never be used.

### **Information:**

**Displays with a touch screen should be cleaned regularly.**

### 3 Panel overlay

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

#### Information:

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

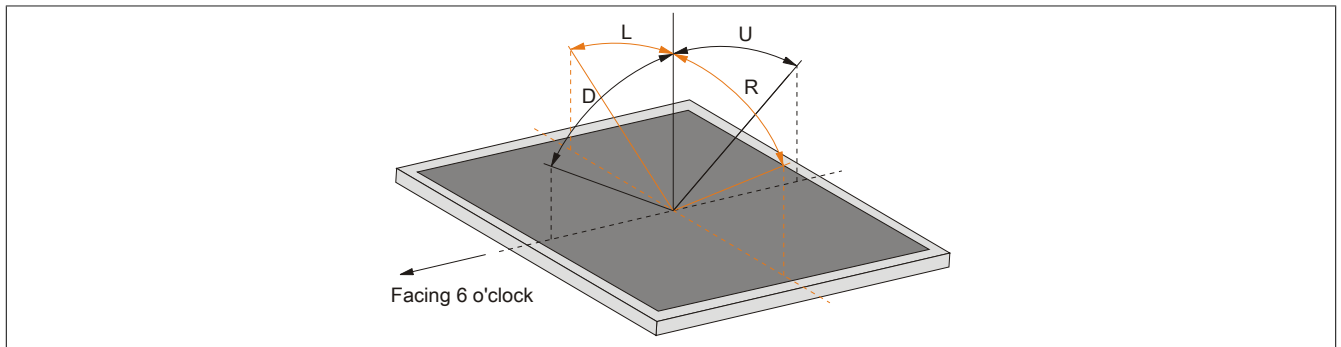
Ethanol Cyclohexanol Diacetone alcohol Glycol Isopropanol Glycerine Methanol Triacetin Dowandol DRM/PM	Formaldehyde 37 to 42% Acetaldehyde Aliphatic hydrocarbons Toluene Xylene White spirits	Trichloroethane Ethyl acetate Diethyl ether N-Butyl acetate Amyl acetate Butylcellosolve Ether
Acetone Methyl ethyl ketone Dioxan Cyclohexanone MIBK Isophorone	Formic acid < 50% Acetic acid < 50% Phosphoric acid < 30% Hydrochloric acid < 36% Nitric acid < 10% Trichloroacetic acid < 50% Sulphuric acid < 10%	Sodium hypochlorite < 20% Hydrogen peroxide < 25% Potassium carbonate Washing agents Tenside Fabric conditioner Ferrous chloride (FeCl <sub>2</sub> ) Ferrous chloride (FeCl <sub>3</sub> ) Dibutyl phthalate Dioctyl phthalate Sodium carbonate
Ammonia < 40% Caustic soda < 40% Potassium hydroxide Alkali carbonate Bichromate Potassium Acetonitrile Sodium bisulphate	Cutting oil Diesel oil Linseed oil Paraffin oil Blown castor oil Silicon oil Turpentine oil substitute Brake fluid Aviation fuel Gasoline Water Sea water Decon	

Table 129: Chemical resistance of the panel overlay

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

## 4 Viewing angles

Viewing angle specifications (R, L, U, D) for the display types are listed in the technical data for each device.



## 5 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>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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