Panel PC 725

User's Manual

Version: **1.03 (June 2011)**

Model no.: **MAPPC725-ENG**

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Chapter 1 • General information

Information:

B&R works hard to keep the printed versions of its user's manuals as current as possible. However, any newer versions of the User's Manual can always be downloaded in electronic form (pdf) from the B&R homepage www.br-automation.com.

1. Manual history

Version	Date	Change
1.00	2010-07-06	- First version
1.01	2010-10-22	- Flange dimensions, 15 "Dimensions - Flange 5AC725.FLGC-00", on page 52, corrected.
1.02	2011-02-09	- BIOS updated to version 1.14. - "Panel PC 725 with Windows 7", on page 145 updated. - "Panel PC 725 with Windows Embedded Standard 7", on page 149 updated. - Section 8 "Pixel error", on page 70 updated.
1.03	2011-03-04	- The Windows Embedded Standard 7 Model number 5SWWI7.0729-ENG was corrected to 5SWWI7.0729-MUL.
1.04	2011-06-15	- Chipset information in sections "X945 CPU boards", on page 49 and "Panel PC 725 with Windows CE", on page 152 corrected. - Information regarding the worst-case conditions on page 27 extended and version number of the Thermal Analysis Tool corrected. - Figure "Configuration - Software, accessories", on page 26 updated. - Sections "B&R Automation Device Interface (ADI) driver - Control Center", on page 155, "HMI Drivers & Utilities DVD 5SWHMI.0000-00", on page 179 and "B&R Automation Device Interface (ADI) development kit", on page 191 updated. - Section "B&R Automation Device Interface (ADI) .NET SDK", on page 193 added. - Information about Windows XP Mode in "Features with WES7 (Windows Embedded Standard 7)", on page 150 corrected.

Table 1: Manual history

2. Safety notices

2.1 Intended use

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

2.2 Protection against electrostatic discharge

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

2.2.1 Packaging

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

2.2.2 Guidelines for proper ESD handling

Electrical components with housing

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

Electrical components without housing

In addition to "Electrical components with housing", the following also applies:

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

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

Individual components

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

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

2.3 Policy and procedures

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

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

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

2.4 Transport and storage

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

2.5 Installation

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

2.6 Operation

2.6.1 Protection against touching electrical parts

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

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

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

2.6.2 Environmental conditions - dust, humidity, aggressive gases

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

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

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

2.6.3 Programs, viruses, and dangerous programs

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

2.7 Environmentally-friendly disposal

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

2.7.1 Separation of materials

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

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

Table 2: Environmentally-friendly separation of materials

Disposal must comply with the respective legal regulations.

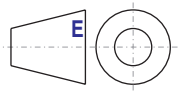
3. Organization of safety notices

The safety notices in this manual are organized as follows:

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

Table 3: Organization of safety notices

4. Directives



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

5. Model numbers

5.1 System units

Model number	Short description	Note
5PC725.1505-00	**PPC725 C TFT XGA 15" T IP65, flange mounting on the top** 15" XGA color TFT display with touch screen (resistive); connections for 1x RS232, 3x USB 2.0, 2x Ethernet 10/100, IP65 protection, flange mounting on the top, 24 VDC. Plug for power supply must be ordered separately (screw clamps: 0TB103.9; cage clamp: 0TB103.91)	See page 44
5PC725.1505-01	**PPC725 C TFT XGA 15" T IP65, flange mounting on the bottom** 15" XGA color TFT display with touch screen (resistive); connections for 1x RS232, 3x USB 2.0, 2x Ethernet 10/100, IP65 protection, flange mounting on the bottom, 24 VDC. Plug for power supply must be ordered separately (screw clamps: 0TB103.9; cage clamp: 0TB103.91)	See page 44

Table 4: Model numbers - system units

5.2 X945 CPU board

Model number	Short description	Note
5PC600.X945-00	**X945 CPU board** CPU board Intel Atom, 1,600 MHz, 533 MHz FSB, 512 KB L2 cache; 945GME chipset; 1 socket for an SO-DIMM DDR2 RAM module.	See page 49

Table 5: Model numbers - X945 CPU boards

5.3 Main memory

Model number	Short description	Note
5MMDDR.0512-01	**SO-DIMM DDR2 512MB PC2-5300**	See page 51
5MMDDR.1024-01	**SO-DIMM DDR2 1024MB PC2-5300**	See page 51
5MMDDR.2048-01	**SO-DIMM DDR2 2048MB PC2-5300**	See page 51

Table 6: Model numbers - Main memory

5.4 Flange

Model number	Short description	Note
5AC725.FLGC-00	**PPC725 flange coupling**	See page 52

Table 7: Model numbers - Flange

5.5 Drives

Model number	Short description	Note
5AC600.HDDI-05	**Add-on hard disk 40 GB ET, 24x7** 40 GB hard disk (add-on); With extended temperature range and also ideal for 24 hour operation. For installation in an APC620 or PPC700.	See page 53
5AC600.HDDI-06	**Add-on hard disk 80 GB ET, 24x7** 80 GB hard disk (add-on); With extended temperature range and also ideal for 24 hour operation. For installation in an APC620 or PPC700.	See page 56
5AC600.CFSI-00	**Add-on CompactFlash slot** CompactFlash slot (add-on); for installation in an APC620 or PPC700.	See page 59

Table 8: Model numbers - Drives

5.6 Accessories

5.6.1 Batteries

Model number	Short description	Note
0AC201.91	**Lithium batteries, 4 pcs**. Lithium batteries, 4 pcs., 3 V / 950 mAh, button cell	See page 161
4A0006.00-000	**Lithium battery, 1 pc.** Lithium battery, 1 pc., 3 V / 950 mAh, button cell	See page 161

Table 9: Model numbers - Batteries

5.6.2 Supply voltage connectors

Model number	Short description	Note
0TB103.9	**Plug 24V 5.08 3-pin screw clamp** 24 VDC 3-pin connector, female. Screw clamp, 3.31 mm², protected against vibration by the screw flange.	See page 163
0TB103.91	**Plug 24V 5.08 3-pin cage clamp** 24 VDC 3-pin connector, female. Cage clamps, 3.31 mm², protected against vibration by the screw flange.	See page 163

Table 10: Model numbers - Supply voltage connectors

5.6.3 CompactFlash cards

Model number	Short description	Note
5CFCRD.0512-04	**CompactFlash 512 MB B&R** CompactFlash card with 512 MB SLC NAND flash and IDE/ATA interface	See page 165
5CFCRD.1024-04	**CompactFlash 1024 MB B&R** CompactFlash card with 1024 MB SLC NAND flash and IDE/ATA interface	See page 165
5CFCRD.2048-04	**CompactFlash 2048 MB B&R** CompactFlash card with 2048 MB SLC NAND flash and IDE/ATA interface	See page 165
5CFCRD.4096-04	**CompactFlash 4096 MB B&R** CompactFlash card with 4096 MB SLC NAND flash and IDE/ATA interface	See page 165

Table 11: Model numbers - CompactFlash cards

Model number	Short description	Note
5CFCRD.8192-04	**CompactFlash 8192 MB B&R** CompactFlash card with 8192 MB SLC NAND flash and IDE/ATA interface	See page 165
5CFCRD.016G-04	**CompactFlash 16 GB B&R** CompactFlash card with 16 GB SLC NAND flash and IDE/ATA interface	See page 165
5CFCRD.0064-03	**CompactFlash 64 MB SSI** CompactFlash card with 64 MB SLC NAND flash and IDE/ATA interface	See page 170
5CFCRD.0128-03	**CompactFlash 128 MB SSI** CompactFlash card with 128 MB SLC NAND flash and IDE/ATA interface	See page 170
5CFCRD.0256-03	**CompactFlash 256 MB SSI** CompactFlash card with 256 MB SLC NAND flash and IDE/ATA interface	See page 170
5CFCRD.0512-03	**CompactFlash 512 MB SSI** CompactFlash card with 512 MB SLC NAND flash and IDE/ATA interface	See page 170
5CFCRD.1024-03	**CompactFlash 1024 MB SSI** CompactFlash card with 1024 MB SLC NAND flash and IDE/ATA interface	See page 170
5CFCRD.2048-03	**CompactFlash 2048 MB SSI** CompactFlash card with 2048 MB SLC NAND flash and IDE/ATA interface	See page 170
5CFCRD.4096-03	**CompactFlash 4096 MB SSI** CompactFlash card with 4096 MB SLC NAND flash and IDE/ATA interface	See page 170
5CFCRD.8192-03	**CompactFlash 8192 MB SSI** CompactFlash card with 8192 MB SLC NAND flash and IDE/ATA interface	See page 170

Table 11: Model numbers - CompactFlash cards (Forts.)

5.6.4 USB flash drives

Model number	Short description	Note
5MMUSB.2048-00	**USB flash drive 2 GB SanDisk** USB 2.0 flash drive 2 GB	See page 174
5MMUSB.2048-01	**USB flash drive 2 GB B&R** USB 2.0 flash drive 2 GB	See page 174

Table 12: Model numbers - USB flash drives

5.7 Software

Model number	Short description	Note
5SWHMI.0000-00	**HMI Drivers & Utilities DVD**	See page 179
9S0000.01-010	**OEM MS-DOS 6.22 German (disk)** OEM MS-DOS 6.22 German disks Only delivered with a new industrial PC.	See page 142
9S0000.01-020	**OEM MS-DOS 6.22 English (disk)** OEM MS-DOS 6.22 English disks Only delivered with a new industrial PC.	See page 142
5SWWXP.0600-GER	**WinXP Professional with SP3, GER** Microsoft OEM Windows XP Professional Service Pack 3, CD, German. Only available with a new device.	See page 143

Table 13: Model numbers - Software

Model number	Short description	Note
5SWWXP.0600-ENG	**WinXP Professional with SP3, ENG** Microsoft OEM Windows XP Professional Service Pack 3, CD, English. Only available with a new device.	See page 143
5SWWXP.0600-MUL	**WinXP Professional with SP3, MUL** Microsoft OEM Windows XP Professional Service Pack 3, CD, multi-language. Only available with a new device.	See page 143
5SWWXP.0500-GER	**WinXP Professional with SP 2c, GER** Microsoft OEM Windows XP Professional Service Pack 2c, CD, German. Only available with a new device.	See page 143
5SWWXP.0500-ENG	**WinXP Professional with SP 2c, ENG** Microsoft OEM Windows XP Professional Service Pack 2c, CD, English. Only available with a new device.	See page 143
5SWWXP.0500-MUL	**WinXP Professional with SP 2c, MUL** Microsoft OEM Windows XP Professional Service Pack 2c, CD, multi-language. Only available with a new device.	See page 143
5SWWI7.0100-GER	**Win7 Pro 32-bit DVD, GER** Microsoft OEM Windows 7 Professional 32-bit, DVD, German. Only available with a new device.	See page 145
5SWWI7.0100-ENG	**Win7 Pro 32-bit DVD, ENG** Microsoft OEM Windows 7 Professional 32-bit, DVD, English. Only available with a new device.	See page 145
5SWWI7.0300-MUL	**Win7 Ult 32-bit DVD, MUL** Microsoft OEM Windows 7 Ultimate 32-bit, DVD, Multilanguage. Only available with a new device.	See page 145
5SWWXP.0729-ENG	**WES2009 PPC700 945GME XTX** Microsoft OEM Windows Embedded, Standard 2009, English; for PPC700 with CPU board, 5PC600.X945-00; order CompactFlash separately (at least 1 GB).	See page 146
5SWWI7.0529-ENG	**Windows Embedded Standard 7 PPC700 945GME** Microsoft OEM Windows Embedded, Standard 7 32-bit, English; for PPC700 with CPU board, 5PC600.X945-00; order CompactFlash separately (at least 1 GB).	See page 149
5SWWI7.0729-MUL	**Windows Embedded Standard 7 Premium PPC700 945GME** Microsoft OEM Windows Embedded, Standard 7 Premium 32-bit, Multilanguage; for PPC700 with CPU board, 5PC600.X945-00; order CompactFlash separately (at least 1 GB).	See page 149
5SWWI7.0900-MUL	**WES7P 32bit Language Pack DVD**	See page 149
5SWWCE.0829-ENG	**WinCE6.0 Pro PPC700 945GME XTX** Microsoft OEM Windows CE 6.0, Professional, English; for PPC700 945GME; order CompactFlash separately (at least 128 MB).	See page 152

Table 13: Model numbers - Software (Forts.)

Chapter 2 • Technical data

1. Introduction

The Panel PC 725 is designed for on-site operation. Built with IP65 protection from all sides, it can easily handle splashed water, impacts and vibrations. Support arm system mounting allows flexible positioning and provides an ergonomic user interface even in cramped spaces. Panel PCs with IP65 protection usually implement all connections using expensive IP65 plugs, but the cabling for the Panel PC 725 is done via the flange. In this way, inexpensive standard cables can be used.

The Panel PC 725 offers 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 and across the company network. The interfaces are easy to access behind the flange cover. The battery and CompactFlash card are behind a separate cover, which makes servicing easy.

1.1 Features

- 15" diagonal
- Intel® Atom™ N270 1.6 GHz processor
- CompactFlash slot (type I)
- 24 VDC supply voltage
- 3x USB 2.0
- 2 x Ethernet 10/100 Mbit interfaces
- 1x RS232 interface, modem compatible
- Add-on interface operations
- Up to 2 GB main memory
- Optional built-in add-on drive
- Flange output on top or bottom
- BIOS
- Real-time clock, RTC (battery-buffered)
- Fan-free 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 (flange output on top or bottom)
- CPU board
- Main memory
- Drive (mass memory such as CompactFlash card or hard disk) for the operating system
- Flange
- Operating system

1.2.1 Selection guide - Basic system

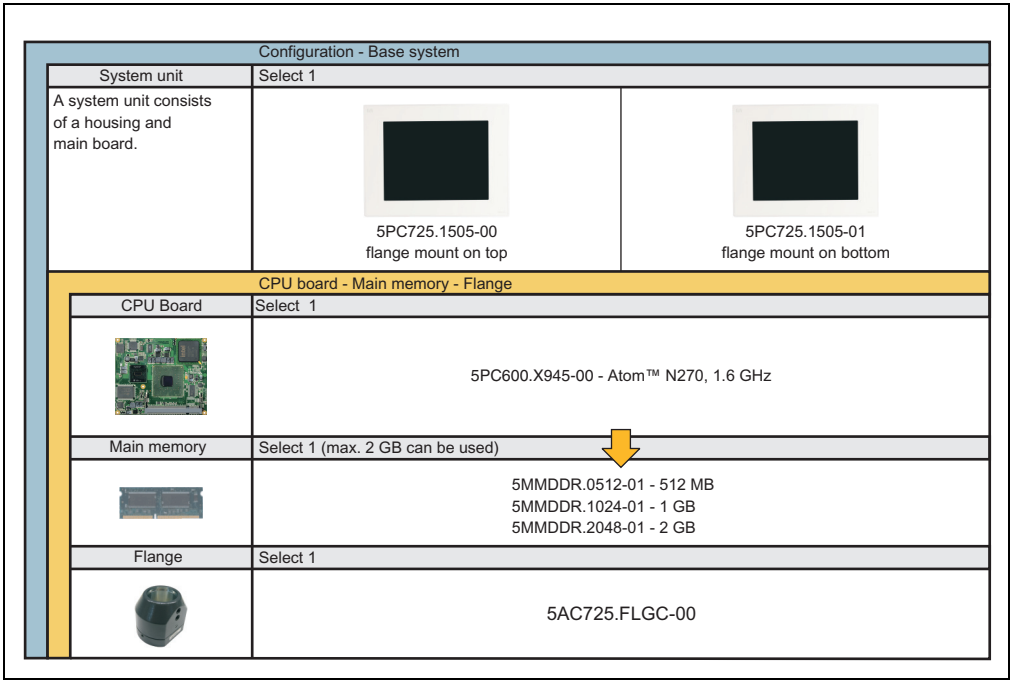


Figure 1: Configuration - Basic system

1.2.2 Configuration software, accessories

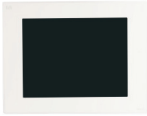
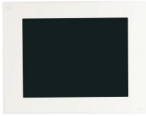
Configuration - Software, Accessories		
System unit	Select 1	
A system unit consists of a housing and main board.	 5PC725.1505-00 Flange mount on top	 5PC725.1505-01 Flange mount on bottom
Drives		
	5AC600.HDDI-05 (40 GB HDD - 24x7 hours and extended temperature range) 5AC600.HDDI-06 (80 GB HDD - 24x7 hours and extended temperature range) 5AC600.CFSI-00 (CompactFlash Slot)	
CompactFlash	Select 1 or 2	
	5CFCRD.0512-04, 5CFCRD.1024-04, 5CFCRD.2048-04, 5CFCRD.4096-04, 5CFCRD.8192-04, 5CFCRD.016G-04	5CFCRD.0064-03, 5CFCRD.0128-03, 5CFCRD.0256-03, 5CFCRD.0512-03, 5CFCRD.1024-03, 5CFCRD.2048-03, 5CFCRD.4096-03, 5CFCRD.8192-03
Supply voltage connector	Select 1	
	0TB103.9 (screw clamp) 0TB103.91 (cage clamp)	
Software	Select 1	
Microsoft Windows xp Professional	9S0000.01-010 (MS-DOS 6.22 German) 9S0000.01-020 (MS-DOS 6.22 English) 5SWWXP.0600-GER (XP Pro SP3 German) 5SWWXP.0600-ENG (XP Pro SP3 English) 5SWWXP.0600-MUL (XP Pro SP3 Multilanguage) 5SWWXP.0500-GER (XP Pro SP2c German) 5SWWXP.0500-ENG (XP Pro SP2c English) 5SWWXP.0500-MUL (XP Pro SP2c Multilanguage)	5SWWI7.0100-GER (Win7 German) 5SWWI7.0100-ENG (Win7 English) 5SWWI7.0300-MUL (Win7 Multilanguage) 5SWWXP.0729-ENG (WES2009 PPC700) 5SWWI7.0529-ENG (WES7 English) 5SWWI7.0729-MUL (WES7 Multilanguage) 5SWWCE.0829-ENG (WinCE 6.0 PPC700)

Figure 2: Configuration - Software, accessories

2. Entire device

2.1 Ambient temperature

It is possible to combine CPU boards with various other components, such as drives, main memory, add-on insert cards, etc. dependent on the system unit. The various configurations result in varying maximum possible ambient temperatures, which can be seen in the following graphic.

Information:

The maximum specified ambient temperatures for operation with and without a fan kit were determined under worst-case conditions. Experience has shown that higher ambient temperatures can be reached under typical conditions, e.g. using Microsoft Windows. The testing and evaluation is to be done on-site by the user (temperatures can be read in BIOS or using the B&R Control Center).

Information regarding the worst-case conditions

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

2.1.1 Maximum ambient temperature

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

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

		N270 5PC600.X945-00	Temperatue limits	Location of sensor(s)
	① Maximum ambient temperature	50		
②	What can also be operated at the max. ambient temperature, or are there limits?			
Add-on drive	On-board CompactFlash 1)	✓	80	I/O
	5AC600.CFSI-00 1)	✓	80	
	5AC600.HDDI-05	✓	80	
	5AC600.HDDI-06	✓	80	
Main memory	5MMDDR.0512-01	✓	-	
	5MMDDR.1024-01	✓	-	
	5MMDDR.2048-01	✓	-	
System units	5PC725.1505-00	✓	76	Power supply
	5PC725.1505-01	✓	76	

1) 24-hour operation = 732 POH (Power On Hours) per month, standard operation = 250 POH or 333 POH (Power On Hours) per month.

Figure 3: Ambient temperature

2.1.2 How is the the maximum ambient temperature determined?

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

2) Incorporating additional drives (add-on), main memory, additional insert cards, etc. can change the temperature limits of a Panel PC 725 system.

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

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

2.1.3 Temperature monitoring

Temperature sensors monitor the temperature at different places in the PPC725 (CPU internal, CPU board, power supply, board I/O). The locations of the temperature sensors can be found in the figure "Temperature sensor locations", on page 189. The value listed in the table represents the defined maximum temperature for this measurement point[1)]. An alarm is not triggered when this temperature is exceeded. The temperatures[1)] can be read in BIOS (menu item "Advanced" - Baseboard/panel features - Baseboard monitor) or in Microsoft Windows XP/Embedded or Windows Embedded Standard 2009, using the B&R Control Center.
Additionally, 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, for example the temperature, using software (e.g. HDD thermometer - freeware) in Microsoft Windows XP/Embedded and Windows Embedded Standard 2009.

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

2.2 Humidity specifications

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

Component		Operation	Storage / Transport
X945 CPU boards		10 - 90%	5 - 95%
Main memory for CPU board		10 - 90%	5 - 95%
Add-on drives	5AC600.HDDI-05	5 - 90%	5 - 95%
	5AC600.HDDI-06	5 - 90%	5 - 95%
Accessories	CompactFlash cards 5CFCRD.xxxx-04	85%	85%
	CompactFlash cards - 5CFCRD.xxxx-03	8 - 95%	8 - 95%
	Flash drive 5MMUSB.2048-00	10 - 90%	5 - 90%

Table 14: Overview of humidity specifications for individual components

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

2.3 Power management

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

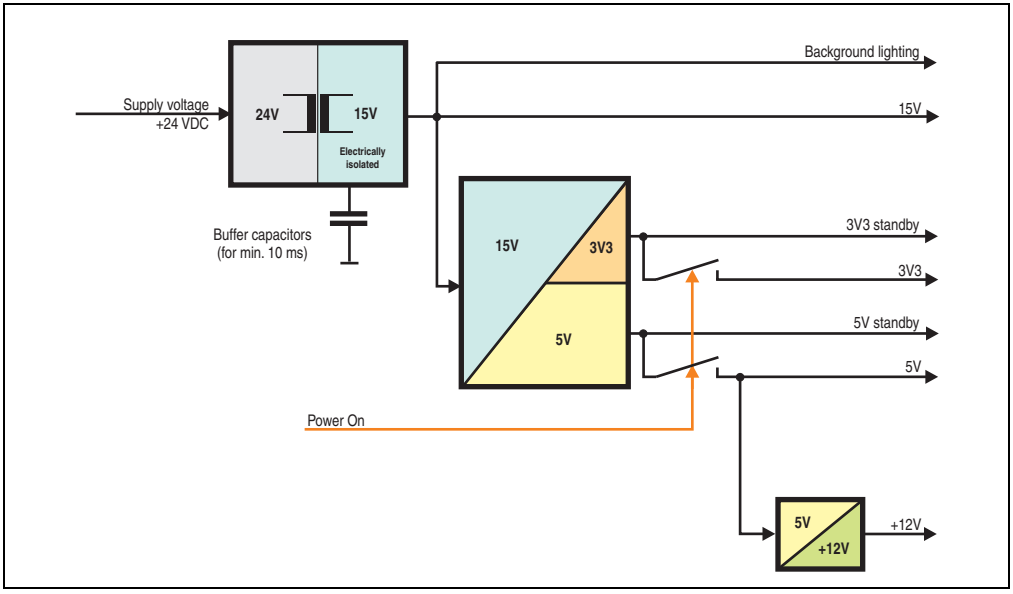


Figure 4: Block diagram - supply voltage

2.3.1 Description

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

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

2.4 Device interfaces

2.4.1 +24 VDC supply voltage

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

The 3-pin socket required for the supply voltage connection is not included in delivery. This can be ordered from B&R using the model number 0TB103.9 (screw clamp) or 0TB103.91 (cage clamp). Pin assignments can be found in the following table. The supply voltage is internally protected (10A, fast-acting), so that the device cannot be damaged if there is an overload (fuse replacement necessary) or if the voltage supply is connected incorrectly (reverse polarity protection - fuse replacement not necessary).

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

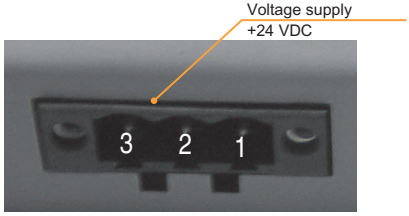


Figure 5: Supply voltage connection

Ground

Danger!

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

A functional grounding clip is located next to the supply voltage plug. The grounding clip (functional ground) must be connected with a central grounding point on the control cabinet using a 6.3 mm blade connector at the shortest distance and with as little resistance as possible (e.g. copper strip, but must be at least 2.5 mm²).

Figure 6: Grounding clip

2.4.2 Serial interface COM

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

Table 15: Pin assignments - COM

I/O address and IRQ

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

Table 16: COM1 - I/O address and IRQ

The setting for the I/O address and the IRQ can be changed in the BIOS setup (under "Advanced" - submenu "I/O interface configuration" setting "Serial port 2"). Please note any potential conflicts with other resources when changing this setting.

2.4.3 Ethernet connection ETH1

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

Ethernet connection (ETH1[1])			
Controller	Intel 82562		RJ45 twisted pair (10BaseT/100BaseT), female
Cabling	S/STP (Cat5e)		
Transfer rate	10/100 Mbit/s [2]		
Cable length	max. 100 m (min. Cat5e)		
LED	**On**	**Off**	
Green	100 Mbit/s	10 Mbit/s	
Orange	Link (Ethernet network connection available)	Activity (blinking) (Data transfer in progress)	

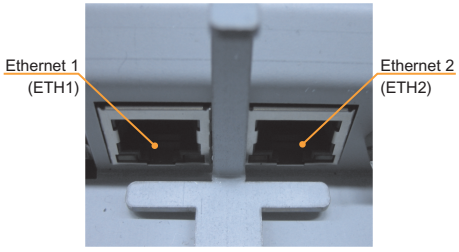


Table 17: Ethernet connection (ETH1)

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

2) Both operating modes possible. Switching takes place automatically.

Driver support

Special drivers are necessary for operating the Intel Ethernet controller 82562. Drivers for Windows XP Professional, Windows XP Embedded, and DOS are available for download on the B&R Homepage in the download area (www.br-automation.com).

Information:

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

2.4.4 Ethernet connection ETH2

This Ethernet connection is integrated in the system unit.

Ethernet connection (ETH1[1])			
Controller	Intel 82551ER		RJ45 twisted pair (10BaseT/100BaseT), female
Cabling	S/STP (Cat5e)		
Transfer rate	10/100 Mbit/s [2]		
Cable length	max. 100 m (min. Cat5e)		
LED	**On**	**Off**	
Green	100 Mbit/s	10 Mbit/s	
Orange	Link (Ethernet network connection available)	Activity (blinking) (Data transfer in progress)	

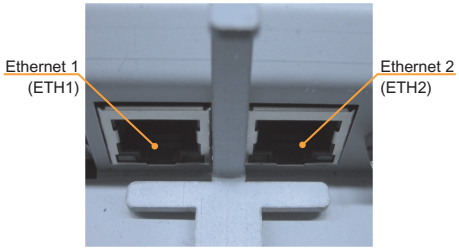


Table 18: Ethernet connection (ETH2)

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

2) Both operating modes possible. Switching takes place automatically.

Driver support

Special drivers are necessary for operating the Intel Ethernet controller 82551ER. Drivers for Windows XP Professional, Windows XP Embedded, and DOS are available for download on the B&R Homepage in the download area (**www.br-automation.com**).

Information:

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

2.4.5 USB ports

All PPC725 devices have a USB 2.0 (Universal Serial Bus) Host Controller with multiple USB ports, 3 of which (2x back, 1x on the side) are on the outside for easy user access.

Warning!

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

Warning!

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

USB1, 2

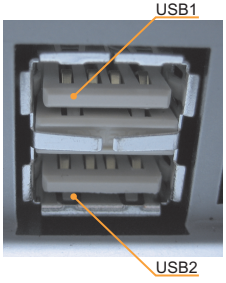
Universal Serial Bus (USB1 and UBS2)[1]		
Transfer rate	Low speed (1.5 Mbit/s), Full Speed (12 Mbit/s) to high speed (480 Mbit/s)	USB type A, female 
Power supply	Max. 500 mA per port[2]	
Maximum Cable length	5 m (not including hub)	

Table 19: USB port - back

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

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

USB3

Universal Serial Bus (USB3)[1]		
Transfer rate	Low speed (1.5 Mbit/s), Full Speed (12 Mbit/s) to high speed (480 Mbit/s)	USB type A, female
Power supply	Max. 500 mA per port[2]	
Maximum Cable length	5 m (not including hub)	

Table 20: USB connection on the side

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

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

Driver support

For optimal functionality of USB 2.0 (transfer speed up to 480 Mbit/s) with Windows XP, at least Service Pack 1 must be installed. Without the Service Pack, Windows XP will only support USB 1.1.
USB 2.0 comes already integrated in B&R's Windows XP Embedded and Windows Embedded Standard 2009 operating system.

Information:

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

2.4.6 CompactFlash slot (CF1)

This CompactFlash slot is a fixed component of an PPC725 system, and is defined in BIOS as the primary master drive.

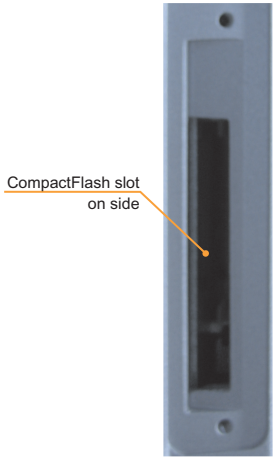
CompactFlash slot (CF1)		
Connection	Primary master IDE device	
CompactFlash Type	Type I	
Accessories	**Short description**	
5CFCRD.0512-04	CompactFlash 512 MB B&R	
5CFCRD.1024-04	CompactFlash 1024 MB B&R	
5CFCRD.2048-04	CompactFlash 2048 MB B&R	
5CFCRD.4096-04	CompactFlash 4096 MB B&R	
5CFCRD.8192-04	CompactFlash 8192 MB B&R	
5CFCRD.016G-04	CompactFlash 16 GB B&R	
5CFCRD.0064-03	CompactFlash 64 MB SSI	
5CFCRD.0128-03	CompactFlash 128 MB SSI	
5CFCRD.0256-03	CompactFlash 256 MB SSI	
5CFCRD.0512-03	CompactFlash 512 MB SSI	
5CFCRD.1024-03	CompactFlash 1024 MB SSI	
5CFCRD.2048-03	CompactFlash 2048 MB SSI	
5CFCRD.4096-03	CompactFlash 4096 MB SSI	
5CFCRD.8192-03	CompactFlash 8192 MB SSI	

Table 21: CompactFlash slot (CF1)

Warning!

Turn off power before inserting or removing the CompactFlash card!

2.4.7 Hard disk / CompactFlash slot (HDD/CF2)

This slot allows for installation of a hard disk or a second CompactFlash slot as so-called add-on drives. The add-on drive is referred to in BIOS as the primary slave drive.

Information:

Add-on drives are only available factory-installed. Therefore, they need to be requested when placing an order.

Hard disk / CompactFlash slot (HDD/CF2)		
Connection	Primary slave IDE device	
Add-on 2.5" hard drives (internal)		
5AC600.HDDI-05	Add-on hard disk 40 GB ET, 24/7	
5AC600.HDDI-06	Add-on hard disk 80 GB ET, 24/7	
Add-on CompactFlash slot		
5AC600.CFSI-00	Add-on CompactFlash slot	
CompactFlash Type	Type I	
Accessories	**Short description**	
5CFCRD.0512-04	CompactFlash 512 MB B&R	
5CFCRD.1024-04	CompactFlash 1024 MB B&R	
5CFCRD.2048-04	CompactFlash 2048 MB B&R	
5CFCRD.4096-04	CompactFlash 4096 MB B&R	
5CFCRD.8192-04	CompactFlash 8192 MB B&R	
5CFCRD.016G-04	CompactFlash 16 GB B&R	
5CFCRD.0064-03	CompactFlash 64 MB SSI	
5CFCRD.0128-03	CompactFlash 128 MB SSI	
5CFCRD.0256-03	CompactFlash 256 MB SSI	
5CFCRD.0512-03	CompactFlash 512 MB SSI	
5CFCRD.1024-03	CompactFlash 1024 MB SSI	
5CFCRD.2048-03	CompactFlash 2048 MB SSI	
5CFCRD.4096-03	CompactFlash 4096 MB SSI	
5CFCRD.8192-03	CompactFlash 8192 MB SSI	

Table 22: Hard disk / CompactFlash slot (HDD/CF2)

2.4.8 Battery

The lithium battery (3 V, 950 mAh) buffers the internal real-time clock (RTC) as well as the individually saved BIOS settings and is located behind the CF battery cover. The buffer duration of the battery is at least 4 years (at 50°C, 8.5 µA current requirements of the supplied components and a self discharge of 40%). The battery is subject to wear and should be replaced regularly (at least in accordance with the specified buffer duration).

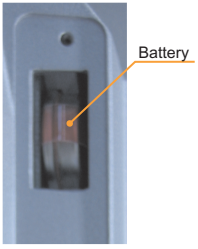
Battery		
Battery Type Removable Service life	 Renata 950 mAh Yes, accessible from the outside 4 years[1)]	
Accessories	**Short description**	
0AC201.91	**Lithium batteries, 4 pcs**. Lithium batteries, 4 pcs., 3 V / 950 mAh, button cell	
4A0006.00-000	**Lithium batteries, 1 pcs**. Lithium battery, 1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

Table 23: 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 chapter 6 "Maintenance / Servicing", section 1 "Changing the battery", on page 185.

For technical information on the lithium battery, see chapter 5 "Accessories", section 2 "Replacement CMOS batteries", on page 161.

Battery status evaluation

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

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

Table 24: Meaning of battery status

2.4.9 Add-on interface slot

An optional add-on interface can be installed here.

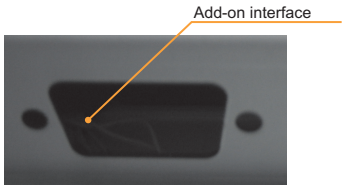
Add-on interface slot	
Available add-on interfaces	
Add-on interfaces are not currently available.	

Table 25: Add-on interface slot

Information:

An add-on interface module is only available factory-installed.

2.5 Serial number sticker

Each B&R device is assigned a unique serial number label with a bar code (type 128), which allows the device to be clearly identified.

The serial number for the entire device is located on the back of the device. This serial number represents all of the components built into the system (model number, name, revision, serial number, delivery date and duration of warranty).

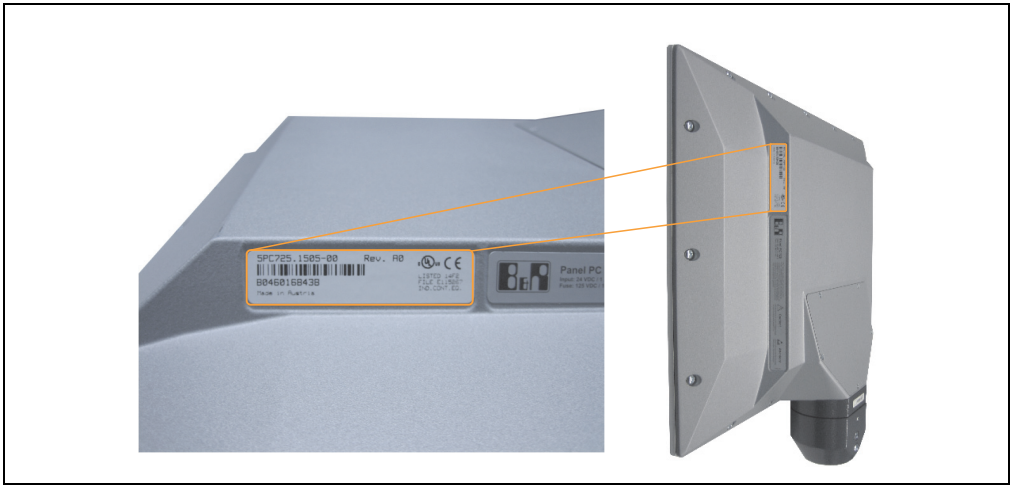


Figure 7: Serial number sticker for PPC725 assembly (back)

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

3. Individual components

3.1 System units

All components (CPU board, main memory, drive, flange) are connected together to form the system unit. The flange is not included in the system unit and must be ordered separately.
The only difference between the two system units is the position of the flange output.

3.1.1 Panel PC 725

Figure 8: Front view - Panel PC 725

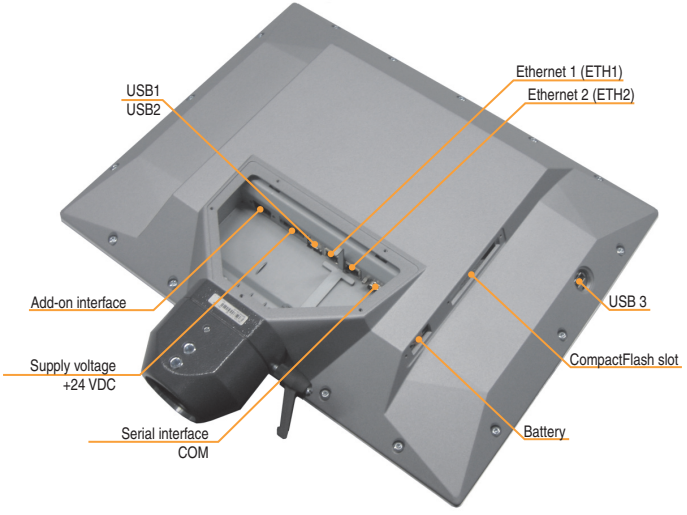


Figure 9: Rear view - Panel PC 725

Technical data

General Information	5PC725.1505-00	5PC725.1505-01
B&R ID code	$B046	$B0EC
Reset button	No	
Power button	No	
Buzzer	Yes	
LED Amount	None	
Controller		
Bootloader	BIOS	
Processor	Component-dependent, see section "X945 CPU boards", on page 49	
Main memory	Max. 2 GB	
Graphics Controller	Component-dependent, see section "X945 CPU boards", on page 49	
Power failure logic Controller Buffer time	MTCX 10 ms	
Battery Type Removable Service life	Yes, see also "Battery", on page 41 Renata 950 mAh Yes, accessible from the outside 4 years [1)]	
Interfaces		
Serial interfaces Type Amount UART Transfer rate Connection	See "Serial interface COM", on page 34 RS232, modem capable 1 16550 compatible, 16 byte FIFO Max. 115 kBaud 9-pin DSUB, male	
Ethernet Controller Transfer rate Connection	See "Ethernet connection ETH1", on page 35 and "Ethernet connection ETH2", on page 36 10/100 Mbit/s RJ45 twisted pair (10 Base T / 100 Base T)	
USB ports Type Amount Transfer rate Connection	See also "USB ports", on page 37 USB 2.0 3 (2x back side, 1x side) Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) Type A	
Add-on interface slot Amount	See also "Add-on interface slot", on page 42 1	
CompactFlash slot 1 (CF1) Internal organization	Yes, see also "CompactFlash slot (CF1)", on page 39 Primary master	
CompactFlash slot 2 / hard disk (HDD/CF2) Type Internal organization	Yes, see also "Hard disk / CompactFlash slot (HDD/CF2)", on page 40 Combined Primary slave	
SRAM internal slot options	No	

Table 26: Technical data - Panel PC 725

Display	5PC725.1505-00	5PC725.1505-01
Touch screen[2)] Touch screen type Technology Controller Degree of transmission	 Elo Accu Touch Analog, resistive Elo, serial, 12-bit Up to 78%	
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 198) Horizontal Vertical Background lighting Brightness Half-brightness time[3)]	 Color TFT 15 inch (381 mm) 16 million XGA, 1024 x 768 pixels 550:1 Direction R / direction L = 60° Direction U / direction D = 45° 250 cd/m² 50,000 hours	
Keys Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-	
Electrical characteristics		
Power supply Rated voltage Rated current Starting current Power consumption Electrical isolation	 24 VDC ±25% 1.4 A Typ. 10 A, max. 40 A for < 300 µs 28.5 W Yes	
Mechanical characteristics		
Front Frame Design Membrane Gasket	 Naturally anodized aluminum[4)] Gray Polyester Metamoll	
Flange output	Top	Bottom
Housing	Aluminum paint	
Outer dimensions Width Height Depth	Also see diagram "Dimensions", on page 48 426 mm 330 mm 58.7 mm	
Weight	6.27 kg (wihtout flange)	
Environmental characteristics	**5PC725.1505-00**	**5PC725.1505-01**
Ambient temperature Operation Storage Transport	 0 to +50°C -20 to +60°C -20 to +60°C	

Table 26: Technical data - Panel PC 725 (Forts.)

Environmental characteristics	5PC725.1505-00	5PC725.1505-01
Relative humidity Operation Storage Transport	 See "Temperature humidity diagram", on page 47 See "Temperature humidity diagram", on page 47 See "Temperature humidity diagram", on page 47	
Vibration Operation Storage Transport	 2 - 9 Hz: 3 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g	
Shock Operation Storage Transport	 15 g, 11 ms 30 g, 6 ms 30 g, 6 ms	
Protection	IP65 (from all sides, only with closed housing)	
Altitude	Max. 3,000 m	

Table 26: Technical data - Panel PC 725 (Forts.)

1) At 50°C, 8.5 µA of the supplied components and a self discharge of 40%.
2) Touch screen drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).
3) At 25°C ambient temperature. Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.
4) Depending on the process or batch, there may be visible deviations in the color and surface structure.

Temperature humidity diagram

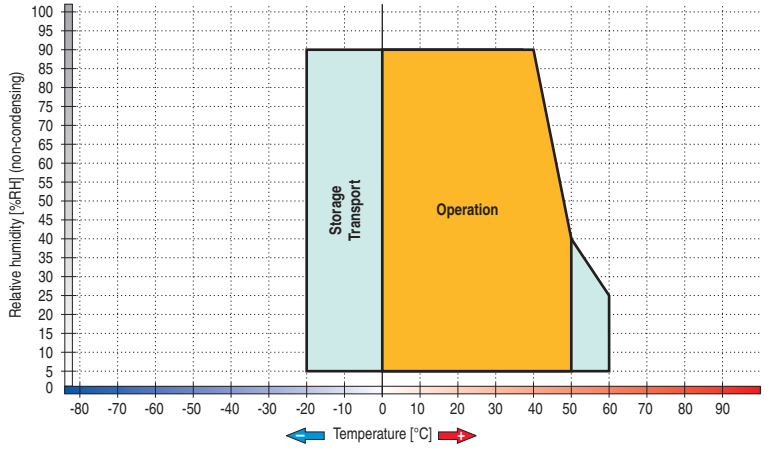
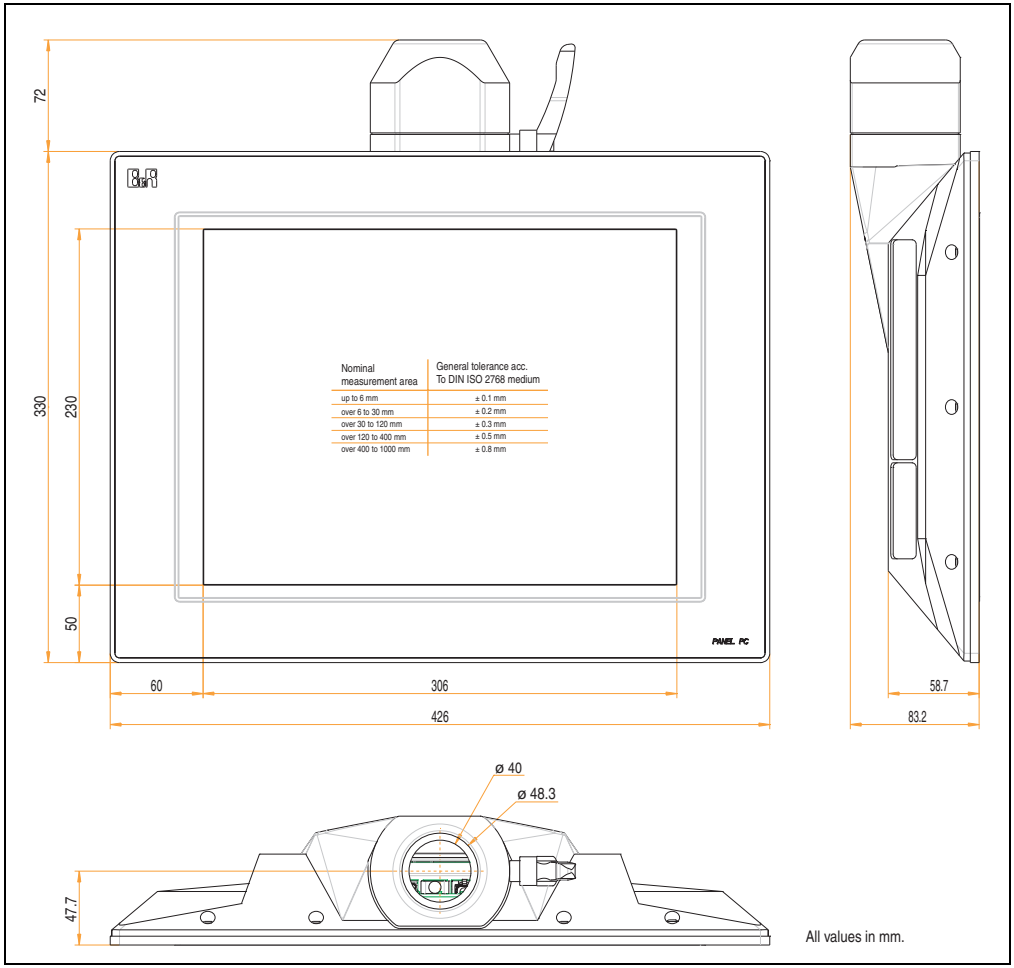


Figure 10: Temperature humidity diagram - PPC725

Dimensions



Nominal measurement area	General tolerance acc. To DIN ISO 2768 medium
up to 6 mm	± 0.1 mm
over 6 to 30 mm	± 0.2 mm
over 30 to 120 mm	± 0.3 mm
over 120 to 400 mm	± 0.5 mm
over 400 to 1000 mm	± 0.8 mm

Figure 11: Dimensions - Panel PC 725

3.2 X945 CPU boards

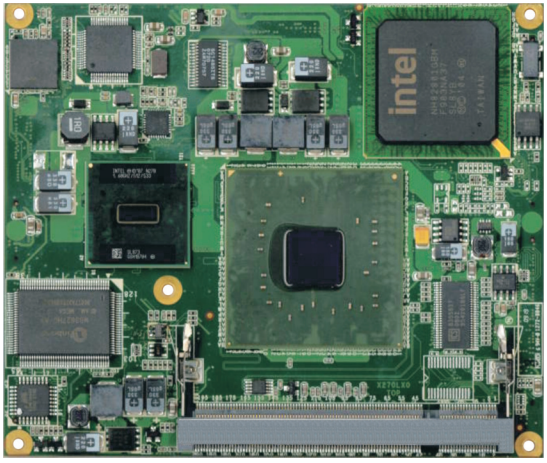


Figure 12: X945 CPU board

Information:

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

Technical data

Features	5PC600.X945-00
Boot loader / Operating system	BIOS AMI (see Section 1 "BIOS options", on page 71)
Processor Architectures Type Name Clock frequency Expanded command set L1 cache L2 cache Floating point unit (FPU)	 45 nm Intel® Atom™ N270 1.6 GHz Hyper-threading technology, enhanced speed step SSE, SSE2, SSE3 (Streaming SIMD extensions) 24 KB 512 KB Yes
Chipset	Intel® 945GME / Intel 82801GBM (ICH7-M)

Table 27: Technical data - CPU board X945

Features	5PC600.X945-00
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At 25°C, typically 12 ppm (1sec)[1] per day
Front side bus	533 MHz
Mass memory management	1x EIDE
Memory Type Size Socket	 DDR2 Max. 2 GB SO-DIMM 200-pin
Graphics Controller Memory Color depth Resolution RGB GE1 = Flat panel[2]	 Intel® Graphics Media Accelerator 950 Up to 224 MB (reserved from main memory) Max 32 Bit 400 MHz RAMDAC, up to 2048 x 1536 @75 Hz (QXGA) including 1920 x 1080 @ >85 Hz (HDTV) From 640 x 480 up to 1920 x 1200 (Embedded Panel Interface based on VESA EDID™ 1.3)

Table 27: Technical data - CPU board X945 (Forts.)

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

2) GE = Graphics Engine

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. The necessary software can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).

Information:

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

3.3 Main memory

When choosing a main memory, it is important to consider the 2 GB maximum memory capacity of the CPU boards.

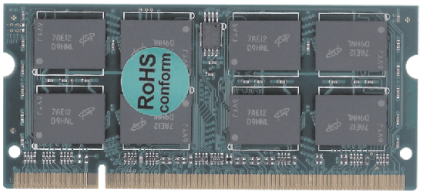


Figure 13: Main memory module

3.3.1 Technical data

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

Table 28: Technical data - Main memory

Information:

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

3.4 Flange

Figure 14: Flange 5AC725.FLGC-00

3.4.1 Technical data

Mechanical characteristics	5AC725.FLGC-00
Housing Material Color	 Zink die casting RAL 7024
Outer dimensions Width Height Depth	 90 mm 81 mm 71 mm
Weight	1,100 g

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

3.4.2 Dimensions

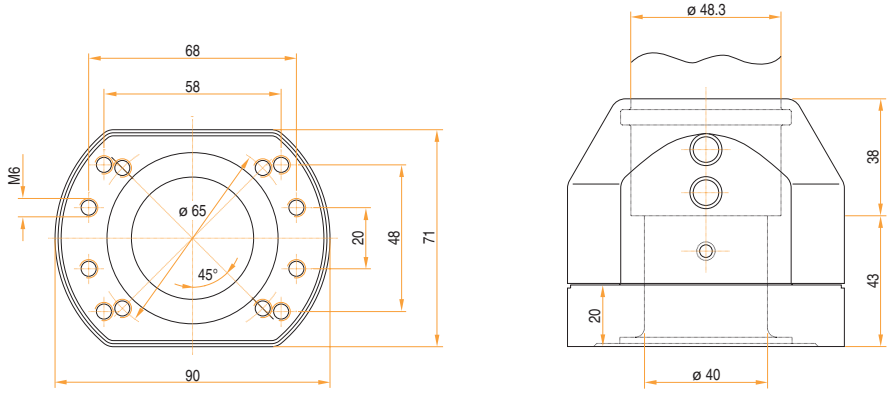


Figure 15: Dimensions - Flange 5AC725.FLGC-00

3.5 Drives

3.5.1 Add-on hard disk 40 GB - 5AC600.HDDI-05

This hard disk is specified for 24-hour operation and also provides an extended temperature specification. The add-on drive is referred to internally as the primary slave drive.

Information:

Add-on drives are only available factory-installed. Therefore, they need to be requested when placing an order.

Figure 16: Add-on hard disk 40 GB - 5AC600.HDDI-05

Technical data

Information:

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

Features	5AC600.HDDI-05
Manufacturer's product ID	Seagate ST940813AM
Formatted capacity	40 GB
Number of heads	2
Number of sectors (user)	78,140,160
Bytes per sector	512
Revolution speed	5400 rpm ±1%

Table 30: Technical data - Add-on hard disk 5AC600.HDDI-05

Features	5AC600.HDDI-05
Access time (average)	12.5 ms
Positioning time (seek, typical values) Minimum (track to track) Average (read access) Maximum (read access)	 1 ms 12.5 ms 22 ms
Starting time (0 rpm to read access)	3 seconds (typically)
Interface	ATA-6
Data transfer rate On the medium To/from host	 max. 321 Mbit/s Max. 100 MB/s (ultra-DMA mode 5)
Cache	8 MB
S.M.A.R.T. Support	Yes
MTBF	550,000 hours[1)]
Mechanical characteristics	
Add-on mounting	Fixed
Outer dimensions Width Length Height	 70 mm 100 mm 9.5 mm
Weight	100 g
Environmental characteristics	
Ambient temperature[2)] Operation - Standard / 24-hour Storage Transport	 -30 to +85°C -40 to +95°C -40 to +95°C
Relative humidity Operation Storage Transport	 5 to 90%, non-condensing 5 to 95%, non-condensing 5 to 95%, non-condensing
Vibration Operation Storage	 10 - 500 Hz: 1 g (9.8 m/s^2 0-peak) no non-recovered errors 5 - 500 Hz: 5 g (49 m/s^2 0-peak) no non-recovered errors
Shock (pulse with a sine half-wave) Operation Storage	 No non-recovered errors at max. 200 g (1962 m/s^2 0-peak) and 2 ms duration No non-recovered errors at max. 110 g (1079 m/s^2 0-peak) and 11 ms duration No damage at max. 800 g (7848 m/s^2 0-peak) and 2 ms duration No damage at max. 400 g (3924 m/s^2 0-peak) and 0.5 ms duration
Altitude Operation Storage	 - 300 to 4419 meters - 300 to 12,192 meters

Table 30: Technical data - Add-on hard disk 5AC600.HDDI-05 (Forts.)

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.

Temperature humidity diagram - Operation and storage

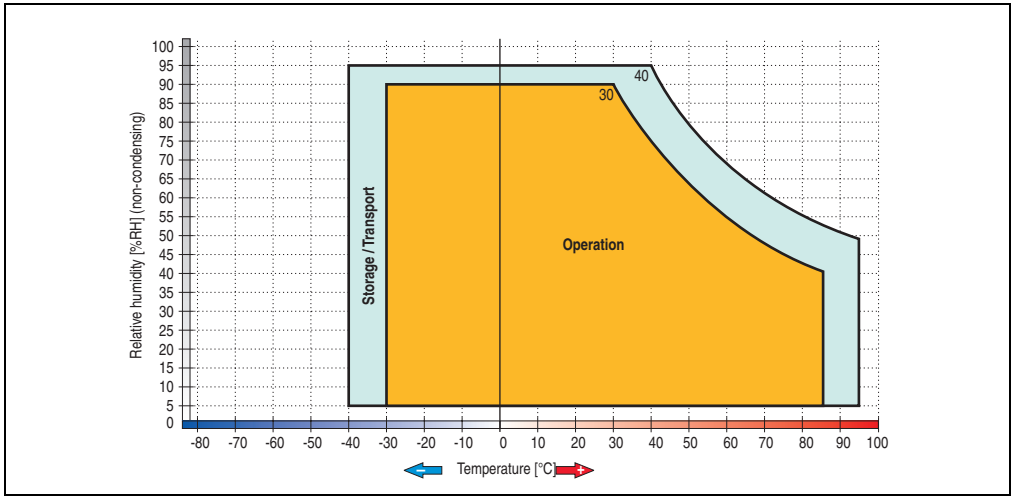


Figure 17: Temperature humidity diagram - Add-on hard disk 5AC600.HDDI-05

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

3.5.2 Add-on hard disk 80 GB 24x7 ET - 5AC600.HDDI-06

This hard disk is specified for 24-hour operation (24x7) and also provides an extended temperature specification (ET). The add-on drive is referred to internally as the primary slave drive.

Information:

Add-on drives are only available factory-installed. Therefore, they need to be requested when placing an order.

Figure 18: Add-on hard disk 80 GB - 5AC600.HDDI-06

Technical data

Information:

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

Features	5AC600.HDDI-06
Manufacturer's product ID	Seagate ST980817AM
Formatted capacity	80 GB
Number of heads	2
Number of sectors (user)	156,301,488
Bytes per sector	512
Revolution speed	5400 rpm ±1%
Access time (average)	10 ms

Table 31: Technical data - add-on hard disk - 5AC600.HDDI-06

Features	5AC600.HDDI-06
Positioning time (seek, typical values) Minimum (track to track) Average (read access) Maximum (read access)	 1 ms 12.5 ms 22 ms
Starting time (0 rpm to read access)	4 seconds (typically)
Interface	ATA-6
Data transfer rate On the medium To/from host	 Max. 450 Mbit/s Max. 100 MB/s (Ultra-DMA Mode 5)
S.M.A.R.T. Support	Yes
Cache	8 MB
MTBF	750,000 hours[1)]
Mechanical characteristics	
Add-on mounting	Fixed
Outer dimensions (without slide-in) Width Length Height	 70 mm 100 mm 9.5 mm
Weight	120 g
Environmental characteristics	
Ambient temperature[2)] Operation - Standard / 24-hour Storage Transport	 -30 to +85°C -40 to +95°C -40 to +95°C
Relative humidity Operation Storage Transport	 5 to 90%, non-condensing 5 to 95%, non-condensing 5 to 95%, non-condensing
Vibration Operation Storage	 5 - 500 Hz: 2 g; no non-recovered errors 5 - 500 Hz: 5 g; no non-recovered errors
Shock (pulse with a sine half-wave) Operation Storage	 Max. 300 g, 2 ms; no non-recovered errors Max. 150 g, 11 ms; no non-recovered errors Max. 800 g, 2 ms; no damage Max. 400 g, 0.5 ms; no damage
Altitude Operation Storage	 - 300 to 5000 meters - 300 to 12,192 meters

Table 31: Technical data - add-on hard disk - 5AC600.HDDI-06 (Forts.)

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.

Temperature humidity diagram - Operation and storage

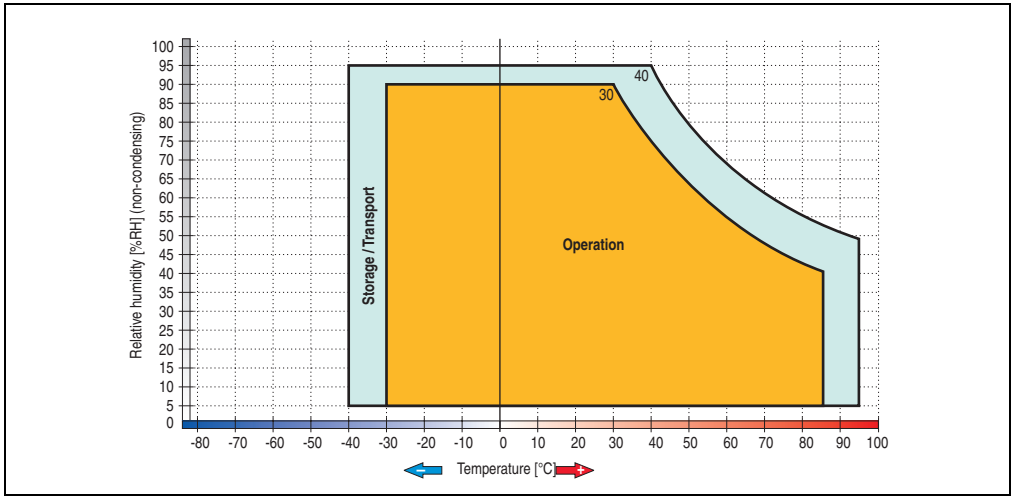


Figure 19: Temperature humidity diagram - Add-on hard disk 5AC600.HDDI-06

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.

3.5.3 Add-on CompactFlash slot - 5AC600.CFSI-00

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

Information:

Add-on drives are only available factory-installed. Therefore, they need to be requested when placing an order.

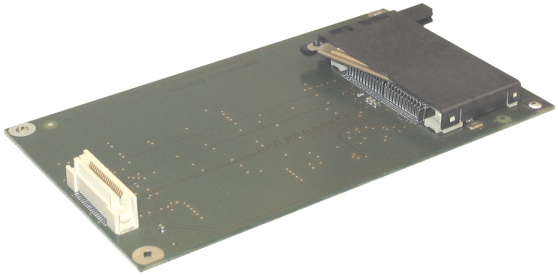


Figure 20: Add-on CompactFlash slot - 5AC600.CFSI-00

Technical data

Features	5AC600.CFSI-00
CompactFlash Type Amount Connection	 Type I 1 slot Primary slave
Weight	100 g

Table 32: Technical data - Add-on CompactFlash slot 5AC600.CFSI-00

Warning!

Turn off power before inserting or removing the CompactFlash card!

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.

Figure 21: Mounting on a swing arm system

1.1 Important mounting information

- This installation requires a swing arm system.
- The 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 start-up, see section 1.2 "Mounting the protective caps", on page 62.

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 start-up to ensure proper operation and IP65 protection.

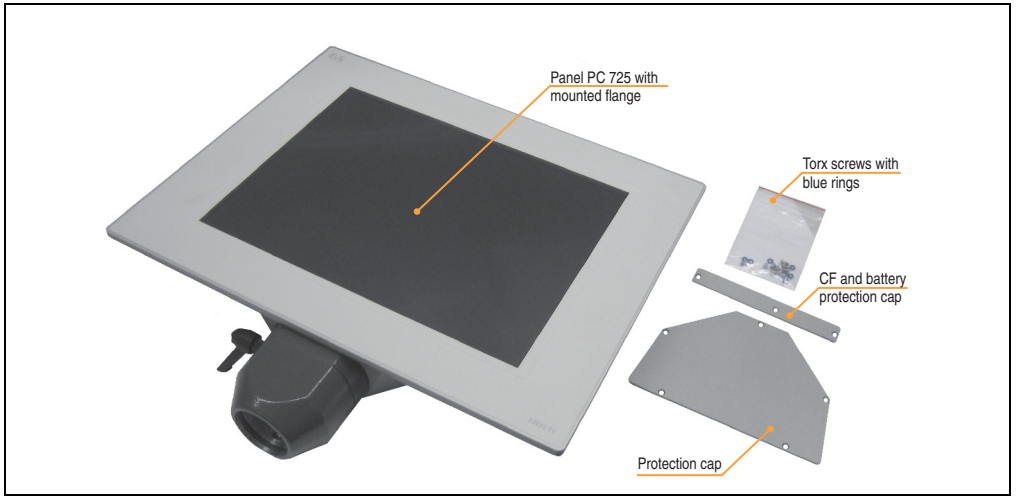


Figure 22: Contents of delivery

- 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.

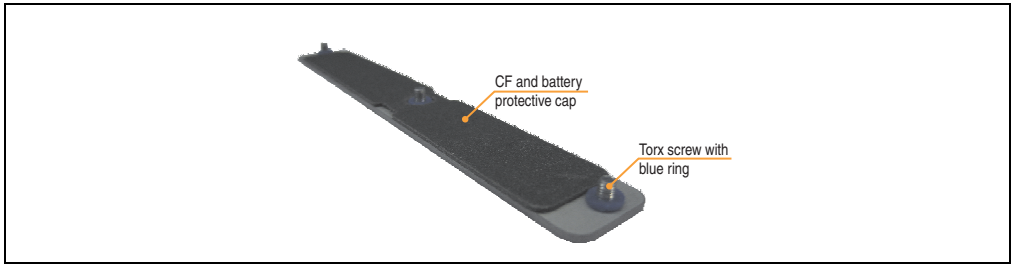


Figure 23: Cover with Torx screws and protection against getting lost

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

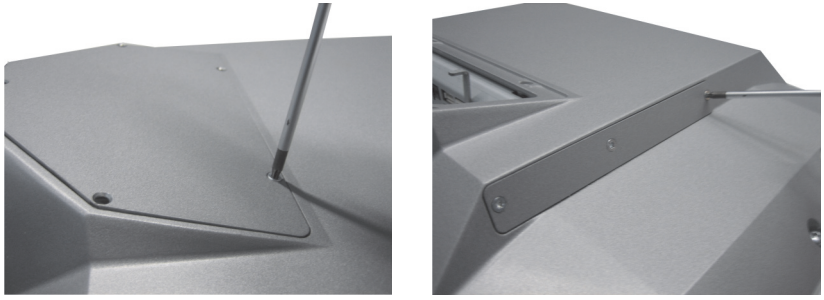


Figure 24: Mounting the protective caps

- 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 25: 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. Furthermore, air circulation must be ensured to prevent condensation.

3. Grounding concept

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

The PPC725 functional ground has 2 connections:

- Supply voltage
- Ground connection

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

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

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

4. Touch screen calibration

B&R touch screen devices are equipped with a touch controller that supports hardware calibration. This means that the devices are pre-calibrated from stock. This feature proves advantageous in the case of a replacement part because a new calibration is no longer required when exchanging devices (identical model / type). Nevertheless, we recommend calibrating the device in order to achieve the best results and to better readjust the touch screen to the user's preferences.

Regardless of this, the touch screen driver requires calibration following installation.

4.1 Windows XP Professional

After installing Windows XP Professional, the touch screen driver must be installed in the device in order to operate the touch screen. The corresponding drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**). The touch screen should be calibrated during driver installation.

4.2 Windows CE

Windows CE starts the touch screen calibration sequence during its first boot in the default configuration / delivered state.

4.3 Windows XP Embedded

After first starting Windows XP Embedded (First Boot Agent), the touch screen driver must be installed in the device in order to operate the touch screen. The corresponding drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**). The touch screen should be calibrated during driver installation.

4.4 Windows Embedded Standard 2009

After first starting Windows Embedded Standard 2009 (First Boot Agent), the touch screen driver must be installed in the device in order to operate the touch screen. The corresponding drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**). The touch screen should be calibrated during driver installation.

4.5 Automation Runtime / Visual Components

The first time the touch screen is used, it must be calibrated once in the customer application for the existing device and project.

5. Connection of USB peripheral devices

Warning!

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

5.1 Local on the PPC725

Many different peripheral USB devices can be connected to the 2 or 3 USB ports on the Panel PC 725. These can each handle a load of 1A. The maximum transfer rate is USB 2.0.

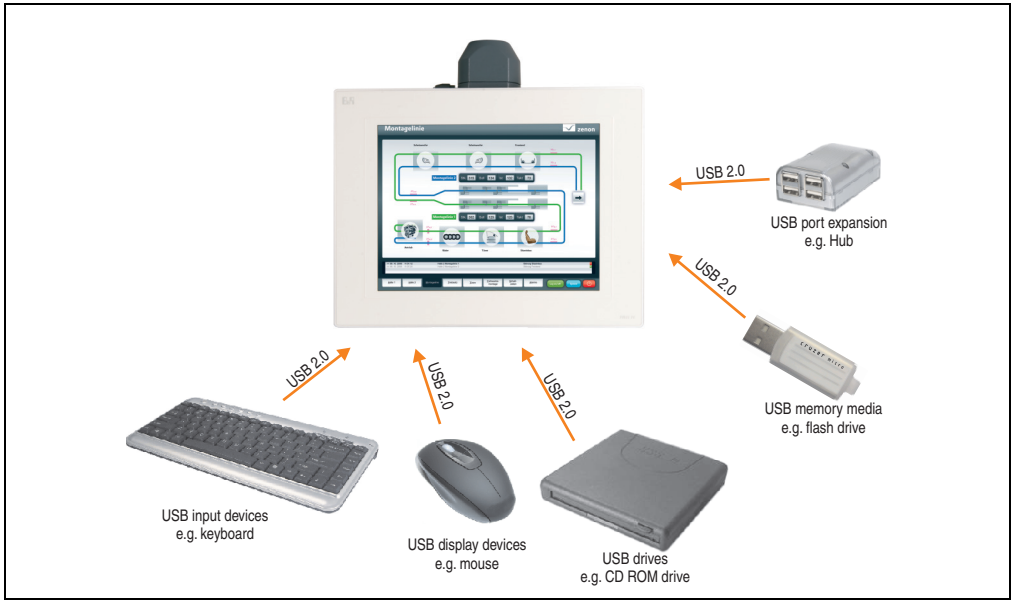


Figure 26: Local connection of USB peripheral devices on the PPC 725

6. Known problems / issues

The following issues for the PPC725 devices are 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 / Windows 7), 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 in Automation PCs and Panel PCs. This can result in one of the two cards not being detected during system startup. This is caused by varying startup speeds. CompactFlash cards with older technology require significantly more time during system startup than CompactFlash cards with newer technology. This behavior occurs near the limits of the time frame provided for startup. The problem described above can occur because the startup time for the CompactFlash cards fluctuates due to the variance of the components being used. Depending on the CompactFlash cards being used, this error might never, sometimes or always occur.

7. User tips for increasing the display lifespan

7.1 Backlight

The lifespan of the backlight is specified in "Half Brightness Time". An operating time of 50,000 hours would mean that the display brightness would still be 50% after this time.

7.1.1 How can the lifespan of backlights be extended?

- Set the display brightness to the lowest value that is still comfortable for the eyes
- Use dark images
- Reducing the brightness by 50% can result in an approximate 50% increase of the half-brightness time.

7.2 Image sticking

Image sticking is the "burning in" of a static image on a display after being displayed for a prolonged period of time. However, this does not only occur with static images. Image sticking is known in technical literature as the "burn-in effect", "image retention", "memory effect", "memory sticking" or "ghost image".

There are 2 types of this:

- Area type: This is seen with a dark gray image. The effect disappears if the display is switched off for a longer period of time.
- Line type: This can cause lasting damage.

7.2.1 What causes image sticking?

- Static images
- Screensaver not enabled
- Sharp contrast transitions (e.g. black / white)
- High ambient temperatures
- Operation outside of the specifications

7.2.2 How can image sticking be avoided?

- continual change between static and dynamic images
- avoiding excessive brightness contrast between foreground and background display
- use of colors with similar brightness
- use of complementary colors in subsequent images
- use of screensavers

8. Pixel error

Information:

Displays can contain dead pixels that result from the manufacturing process. These flaws are not grounds claiming reclamation or warranty.

Chapter 4 • Software

1. BIOS options

The BIOS settings available for the X945 CPU boards are described in the following sections.

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 do not correspond with the installed BIOS version.**
- **The setup defaults are the settings recommended by B&R. The setup defaults are dependant on the DIP switch configuration on the baseboard (see section 1.9 "BIOS default settings", on page 114).**

1.1 General Information

BIOS stands for "Basic Input Output System". It is the most basic standardized communication between the user and the system (hardware). The BIOS system used in the Panel PC 725 systems is produced by American Megatrends Inc.

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

The CMOS data is buffered by a battery, and remains in the PPC725 even when the power is turned off (no 24VDC supply).

1.2 BIOS setup and boot procedure

BIOS is immediately activated when switching on the power supply of the Panel PC 725 system or pressing the power button. The system checks if the setup data from the EEPROM is "OK". If the data is "OK", then it is transferred to the CMOS. If the data is "not OK", then the CMOS data is checked for validity. An error message is output if the CMOS data contains errors and the boot procedure can be continued by pressing the <F1> key. To prevent the error message from appearing at each restart, open the BIOS setup by pressing the <Del> key and re-save the settings.

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

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

To enter BIOS Setup, the DEL key must be pressed as soon as the following message appears on the monitor (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 BBS 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 27: X945 - BIOS diagnostics screen

1.2.1 BIOS setup keys

The following keys are enabled during the POST:

Key	Function
ESC	The system RAM check can be skipped by pressing ESC.
Del	Enters the BIOS setup menu.
F12	Using the F12 key, you can boot from the network.
F11	Cues the boot menu. Lists all bootable devices that are connected to the system. With cursor ↑ and cursor ↓ and by pressing <ENTER>, select the device from which will be booted.
<Break>	Pressing the <pause> key stops the POST. Press any other key to resume the POST.

Table 33: X945 bios-relevant keys at POST

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

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

Table 34: X945 bios-relevant keys in the BIOS menu

1.3 Main

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

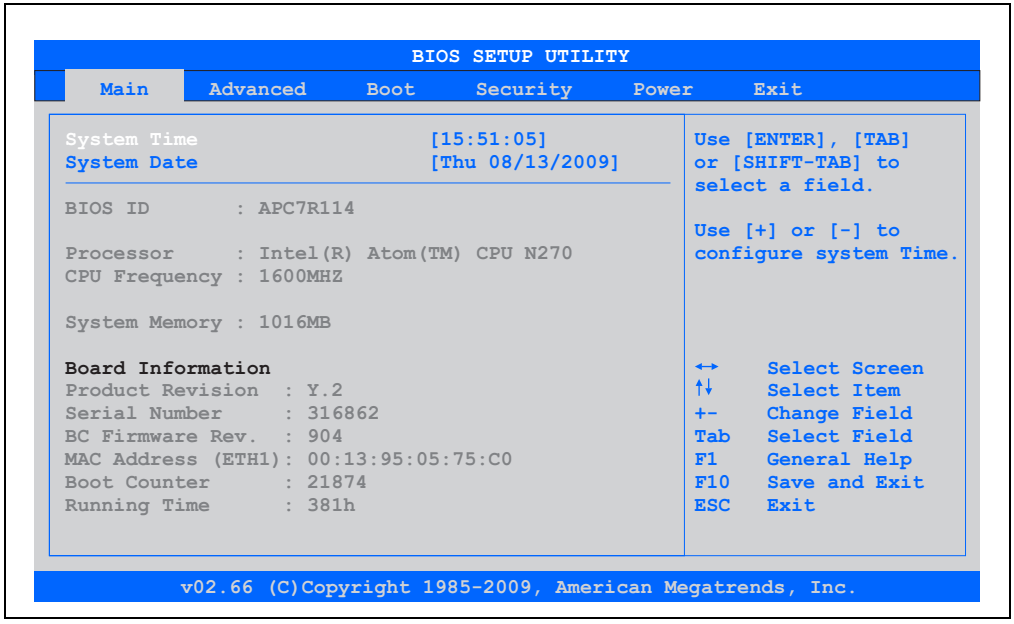


Figure 28: X945 BIOS Main Menu

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

Table 35: X945 Main Menu setting options

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

Table 35: X945 Main Menu setting options (Forts.)

1.4 Advanced

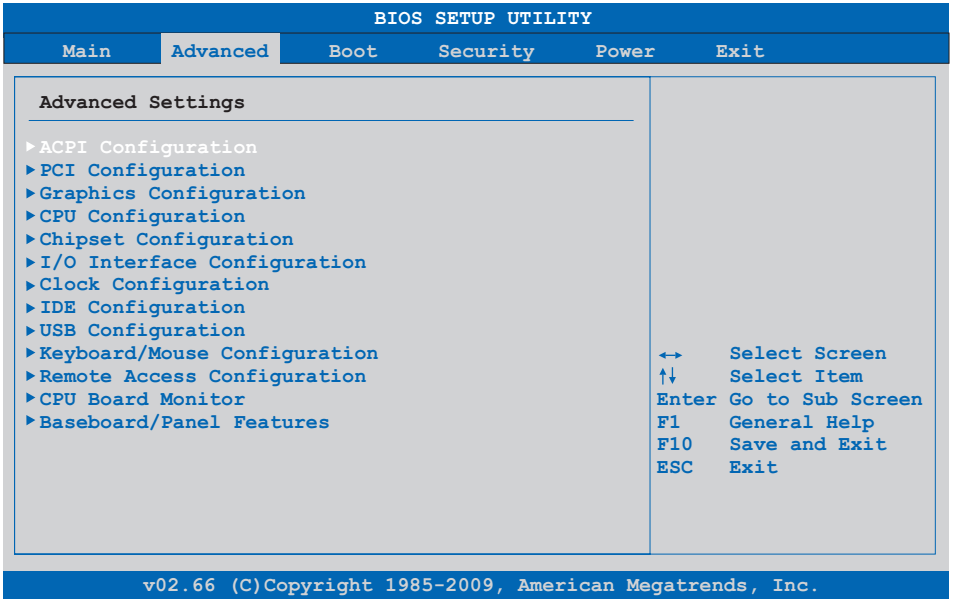


Figure 29: X945 Advanced Menu

BIOS setting	Meaning	Setting options	Effect
ACPI configuration	Configures the APCI devices.	Enter	Opens the submenu See "ACPI configuration", on page 76.
PCI Configuration	Configures PCI devices.	Enter	Opens the submenu See "PCI Configuration", on page 78.
Graphics configuration	Configures the graphics settings.	Enter	Opens the submenu See "Graphics configuration", on page 82.
CPU configuration	Configures the CPU settings.	Enter	Opens the submenu See "CPU configuration", on page 84.
Chipset configuration	Configures the chipset functions.	Enter	Opens the submenu See "Chipset configuration", on page 86.

Table 36: X945 Advanced Menu setting options

BIOS setting	Meaning	Setting options	Effect
I/O interface configuration	Configures the I/O devices.	Enter	Opens the submenu See "I/O interface configuration", on page 88.
Clock Configuration	Configures the clock settings.	Enter	Opens the submenu See "Clock Configuration", on page 89.
IDE Configuration	Configures the IDE functions.	Enter	Opens the submenu See "IDE Configuration", on page 90.
USB configuration	Configures the USB settings.	Enter	Opens the submenu See "USB configuration", on page 96.
Keyboard/mouse configuration	Configures the keyboard/mouse options.	Enter	Opens the submenu See "Keyboard/mouse configuration", on page 98.
Remote access configuration	Configures the remote access settings.	Enter	Opens the submenu See "Remote access configuration", on page 99.
CPU board monitor	Displays the current voltages and temperature of the processor in use.	Enter	Opens the submenu See "CPU board monitor", on page 101.
Main Board/Panel Features	Displays device specific information and setup of device specific values.	Enter	Opens the submenu See "Main Board/Panel Features", on page 102.

Table 36: X945 Advanced Menu setting options (Forts.)

1.4.1 ACPI configuration

```
BIOS SETUP UTILITY
Advanced

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

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

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

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```

Figure 30: X945 Advanced ACPI configuration

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

Table 37: X945 Advanced ACPI configuration setting options

1.4.2 PCI Configuration

```
BIOS SETUP UTILITY
Advanced

Advanced PCI/PnP Settings

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

▶ PCI IRQ Resource Exclusion

▶ PCI Interrupt Routing

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

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

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```

Figure 31: X945 Advanced PCI Configuration

BIOS setting	Meaning	Setting options	Effect
Plug & Play O/S	BIOS is informed if Plug & Play is capable on the operating system.	Yes	The operating system handles the distribution of resources.
		No	BIOS handles the distribution of resources.
PCI Latency Timer	This option controls how long (in PCI ticks) one PCI bus card can continue to use the master after another PCI card has requested access.	32, 64, 96, 128, 160, 192, 224, 248	Manually sets the value in PCI ticks.
Allocate IRQ to PCI VGA	This function is used to determine if an interrupt is assigned to the PCI VGA.	Yes	Automatic assignment of an interrupt.
		No	No assignment of an interrupt.
Allocate IRQ to SMBUS HC	Use this function to set whether or not the SM (System Management) bus controller is assigned a PCI interrupt.	Yes	Automatic assignment of a PCI interrupt.
		No	No assignment of an interrupt.
PCI IRQ Resource Exclusion	Configures the PCI IRQ resource settings for ISA Legacy devices.	Enter	Opens the submenu See "PCI IRQ Resource Exclusion", on page 79
PCI Interrupt Routing	Configures PCI interrupt routing	Enter	Opens the submenu See "PCI Interrupt Routing", on page 80

Table 38: X945 Advanced PCI configuration setting options

PCI IRQ Resource Exclusion

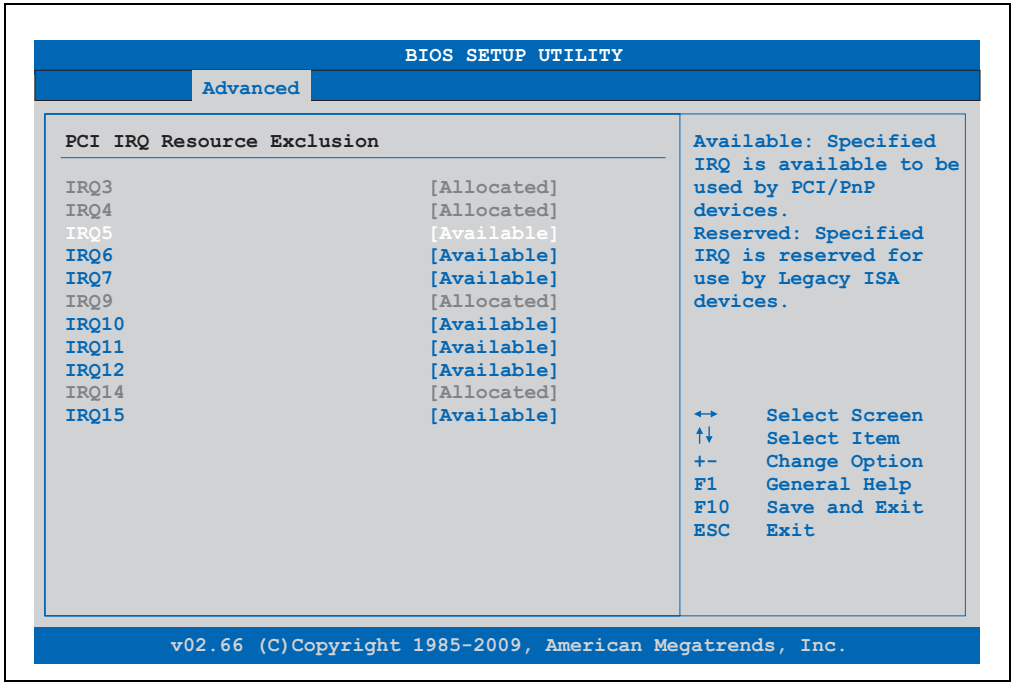

Figure 32: X945 Advanced PCI IRQ Resource Exclusion

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

Table 39: X945 Advanced PCI IRQ Resource Exclusion setting options

PCI Interrupt Routing

```
BIOS SETUP UTILITY
Advanced

PCI Interrupt Routing                          Select fixed IRQ or
                                               set AUTO to let the
PIRQ A (VGA)                    [Auto]         BIOS and OS route an
PIRQ B (AC97,INTD)              [Auto]         IRQ to this line.
PIRQ C (PATA,INTC)              [Auto]
PIRQ D (SATA,UHCI1,SMB)         [Auto]         Make sure that the
PIRQ E (ETH1)                   [Auto]         selected IRQ is not
PIRQ F (INTA,ETH2)              [Auto]         assigned to legacy IO.
PIRQ G (INTB)                   [5]
PIRQ H (UHCI0,EHCI)             [6]

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

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

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```

Figure 33: X945 Advanced PCI Interrupt Routing

BIOS setting	Meaning	Setting options	Effect
PIRQ A (VGA)	Option for setting the PIRQ A.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment
PIRQ B (AC97, INTD)	Option for setting the PIRQ B.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment.
PIRQ C (PATA,INTC)	Option for setting the PIRQ C.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment.
PIRQ D (SATA,UHCI1,SMB)	Option for setting the PIRQ D.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment.
PIRQ E (ETH1)	Option for setting the PIRQ E.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment.

Table 40: X945 Advanced PCI Interrupt Routing setting options

BIOS setting	Meaning	Setting options	Effect
PIRQ F (INTA, ETH2)	Option for setting the PIRQ F.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment.
PIRQ G (INTB)	Option for setting the PIRQ G.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment.
PIRQ H (UHCI0, EHCI)	Option for setting the PIRQ H.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment.
1st Exclusive PCI	With this option you can determine if the IRQ assigned to the PIRQ x is handled exclusively (no IRQ sharing). **Information:** **Is only displayed if a PIRQ is manually set (e.g. 5).**	None	No interrupt is assigned.
		x	Assigns the PIRQ as 1st exclusive PCI IRQ.
2nd Exclusive PCI	With this option you can determine if the IRQ assigned to the PIRQ x is handled exclusively (no IRQ sharing). **Information:** **Only displayed when two PIRQs are set manually.**	None	No interrupt is assigned.
		x	Assigns the PIRQ as 2nd exclusive PCI IRQ.
3rd Exclusive PCI	With this option you can determine if the IRQ assigned to the PIRQ x is handled exclusively (no IRQ sharing). **Information:** **Only displayed in connection with an APC620e and if three PIRQs are set manually.**	None	No interrupt is assigned.
		x	Assigns the PIRQ as 3rd exclusive PCI IRQ.

Table 40: X945 Advanced PCI Interrupt Routing setting options (Forts.)

1.4.3 Graphics configuration

```
BIOS SETUP UTILITY
Advanced

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

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

Boot Display Device               [Auto]
Always Try Auto Panel Detect      [No]
Local Flat Panel Type             [Auto]

Local Flat Panel Scaling          [Expand Text & Grap]  ←→    Select Screen
Display Mode Persistence          [Enabled]             ↑↓    Select Item
                                                        +-    Change Option
                                                        F1    General Help
                                                        F10   Save and Exit
                                                        ESC   Exit

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```

Figure 34: X945 Advanced Graphics configuration

BIOS setting	Meaning	Setting options	Effect
Primary Video Device	Option for selecting the primary video device.	Internal VGA	The internal graphics chip on the CPU board is used as video device (monitor / panel connection).
		PCI / Int. VGA	The graphics chip of a connected graphics card is used as video device.
Internal Graphics Mode Select	Option for setting the memory size that can be used for the internal graphics controller.	Disabled	No reservation - Disables the graphics controller.
		Enabled, 1MB	1MB main memory provided.
		Enabled, 8MB	8MB main memory provided.
DVMT Mode Select	Option for determining the DVMT mode (Dynamic Video Memory Technology) of the DVMT graphics driver.	Fixed Mode	A fixed amount of memory is allocated to the graphics chip, which is no longer available to the PC.
		DVMT Mode	Memory consumption is controlled dynamically by the DVMT graphics driver. Only the amount of memory that is required is used.
		Combo Mode	The DVMT graphics driver reserves at least 64MB, but can use up to 224MB if necessary.

Table 41: X945 Advanced Graphics configuration setting options

BIOS setting	Meaning	Setting options	Effect
DVMT/FIXED Memory	Option for setting the amount of memory used for the DVMT mode.	64MB	64MB of main memory can be used.
		128MB	128MB of main memory can be used.
		Maximum DVMT	The remaining available main memory can be used.
Boot Display Device	Determines which video channel should be enabled for a video device during the boot procedure.	Auto	Automatic selection.
		CRT only	Only use the CRT (Cathode Ray Tube) channel.
		LFP only	Only use the LFP (Local Flat Panel) channel.
		CRT + LFP	Use CRT + 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 pre-defined profile for the LVDS channel.	Auto	Automatic detection and setting using the EDID data.
		VGA 1x18 (002h)	640 x 480
		VGA 1x18 (013h)	640 x 480
		SVGA 1x18 (01Ah)	800 x 600
		XGA 1x18 (006h)	1024 x 768
		XGA 2x18 (007h)	1024 x 768
		XGA 1x24 (008h)	1024 x 768
		XGA 2x24 (012h)	1024 x 768
		SXGA 2x24 (00Ah)	1280 x 1024
		SXGA 2x24 (018h)	1280 x 1024
		UXGA 2x24 (00Ch)	1600 x 1200
		Customized EDID 1	User-defined profile
		Customized EDID 2	User-defined profile
		Customized EDID 3	User-defined profile
Local flat panel scaling	Determines the screen content should be output according to the defined Local Flat Panel Type.	Centering	The screen content is output centered on the display.
		Expand Text	The text is stretched across the entire surface of the display.
		Expand Graphics	The graphics are stretched across the entire surface of the display.
		Expand Text & Graphics	Text and graphics are stretched across the entire surface of the display.
Display Mode Persistence	When enabled, the operating system graphics driver attempts to restore the most recent configuration.	Enabled	Enables this function.
		Disabled	Disables this function.

Table 41: X945 Advanced Graphics configuration setting options (Forts.)

1.4.4 CPU configuration

```
BIOS SETUP UTILITY
Advanced

Configure advanced CPU settings
Module Version:3F.12

Manufacturer:Intel
Intel(R) Atom(TM) CPU N270  @ 1.60 GHz
Frequency    :1.60GHz
FSB Speed    :532MHz
Cache L1     :24 KB
Cache L2     :512 KB
Ratio Actual Value:12

MPS Revision                    [1.4]

Max CPUID Value Limit           [Disabled]
Execute-Disable Bit Capability  [Enabled]
Hyper Threading Technology      [Enabled]
Intel(R) SpeedStep(tm) tech     [Enabled]
Boot CPU Speed On AC            [Maximum]
Intel(R) C-STATE tech           [Enabled]
Enhanced C-States               [Enabled]

Select the revsion
of the multi processor
support interface that
should be offered by
the BIOS.

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

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```

Figure 35: X945 Advanced CPU Configuration

BIOS setting	Meaning	Setting 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	-
L1 cache	Displays first level cache memory area.	None	-
L2 cache	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=multi-processor system).	1.1	Sets MPS support Revision 1.1
		1.4	Sets MPS support Revision 1.4
Max CPUID value limit	Option for limiting the CPUID input value. This could be necessary for older operating systems.	Enabled	The processor limits the maximum CPUID input value to 03h if necessary when the the processor supports a higher value.
		Disabled	The processor returns the current maximum value upon request of the CPUID input value.

Table 42: X945 Advanced CPU Configuration setting options

BIOS setting	Meaning	Setting options	Effect
Execute-Disable Bit Capability	Option for enabling or 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. **Information:** **This setting should only be disabled when using an operating system older than Windows XP.**	Enabled	Enables this function.
		Disabled	Disables this function.
Intel (R) SpeedStep (tm) tech	Option for controlling the Intel(R) SpeedStep(TM) technology. The processor clock speed is increased or decreased according to the amount of calculations that must be made. As a result, the power consumption depends largely on the processor load.	Enabled	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 processor clock rates on its own, thereby saving energy.	Enabled	Enables this function. The processors are run at different frequencies, thereby saving energy.
		Disabled	Disables this function. Both processors are run at the same frequency.
Enhanced C-States[1)]	This setting allows the operating system to set processor clock rates on its own, thereby saving energy.	Enabled	Enables this function.
		Disabled	Disables this function.

Table 42: X945 Advanced CPU Configuration setting options

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

1.4.5 Chipset configuration

```
BIOS SETUP UTILITY
Advanced

Advanced Chipset Settings                    Options

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

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

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```

Figure 36: X945 Advanced Chipset Configuration

BIOS setting	Meaning	Setting options	Effect
DRAM Frequency	Option for setting the RAM frequency.	Auto	Frequency set automatically by the BIOS.
		400, 533 MHz	Desired clock frequency set manually.
DRAM Refresh Rate	Option for setting the DRAM refresh rate.	Auto	DRAM Refresh is read from the SPD data of the DRAM module.
		7.8 µs	Manual setting for the DRAM refresh rate.
		3.9 µs	Manual setting for the DRAM refresh rate.
Memory Hole	Option for ISA cards with frame buffer. Not relevant for a PPC725.	Disabled	Disables this function.
		15MB-16MB	This address area is reserved.
DIMM Thermal Control	Option for setting the maximum surface temperature of the DIMM module. The module is cooled by limiting the memory bandwidth if the defined surface temperature is reached.	Disabled	Surface temperature not limited.
		40°C, 50°C, 60°C, 70°C, 80°C, 85°C, 90°C	Temperature limit value for the limitation.
DT in SPD	Option to determine whether the GMCH (Graphics and Memory Controller Hub) supports DT (Delta Temperature) in the SPD (Serial Presence Detect) Management Algorithm of the DIMM module.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 43: X945 Advanced Chipset setting options

BIOS setting	Meaning	Setting options	Effect
TS on DIMM	Option to determine whether the GMCH (Graphics and Memory Controller Hub) supports TS (Thermal Sensor) in the Thermal Management Algorithm of the DIMM module.	Disabled	Disables this function.
		Enabled	Enables this function.
High Precision Event Timer	The HPET is a timer inside the PC. It is able to trigger an interrupt with a high degree of accuracy, which allows other programs to better synchronize a variety of applications.	Disabled	Disables this function.
		Enabled	Enables this function. This function is recommended for multimedia applications.
IOAPIC	This option is used to activate or deactivate the APIC (Advanced Programmable Interrupt Controller). **Information:** **The IRQ resources available to the system are expanded when the APIC mode is enabled.**	Disabled	Disables this function.
		Enabled	The IRQ resources available to the system are expanded when the APIC mode is enabled.
APIC ACPI SCI IRQ	This option is used to modify the SCI IRQ when in APIC (Advanced Programmable Interrupt Controller) mode.	Disabled	IRQ9 is used for SCI.
		Enabled	IRQ20 is used for SCI.
C4 On C3	Fine-tunes the power saving function on an ACPI operating system.	Disabled	Disables this function.
		Enabled	Processor is needed in C4 if the operating system is initiated in a C3 state.

Table 43: X945 Advanced Chipset setting options

1.4.6 I/O interface configuration

```
BIOS SETUP UTILITY
Advanced

I/O Interface Configuration                    Options

Onboard AC'97 Audio                [Enabled]   Enabled
OnBoard LAN (ETH1)                 [Enabled]   Disabled

Serial Port1 Configuration         [3F8/IRQ4]
Serial Port1 Configuration         [2F8/IRQ3]
  Serial Port2 Mode                [Normal]
Parallel Port Adress               [378]

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

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```

Figure 37: X945 Advanced I/O Interface Configuration

BIOS setting	Meaning	Setting options	Effect
Onboard AC'97 Audio	For turning the AC97 Sound on and off. **Information:** **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). **Information:** **This setting is not relevant for the PPC725 because it only has one serial interface.**	Disabled	Port 1 deactivated.
		3F8/IRQ4	Assignment of the base I/O address and the interrupt.
		3E8 / IRQ4	Assignment of the base I/O address and the interrupt.

Table 44: X945 Advanced I/O Interface Configuration setting options

BIOS setting	Meaning	Setting options	Effect
Serial port 2 configuration	For the configuration of serial port 2 (COM1).	Disabled	Port 1 deactivated.
		2F8/IRQ3	Assignment of the base I/O address and the interrupt.
		2E8 / IRQ3	Assignment of the base I/O address and the 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. **Information:** **Address is automatically set, even if the function is disabled.**	Disabled	Deactivates the port.
		378, 278, 3BC	Manual assignment of the port address.

Table 44: X945 Advanced I/O Interface Configuration setting options

1.4.7 Clock Configuration

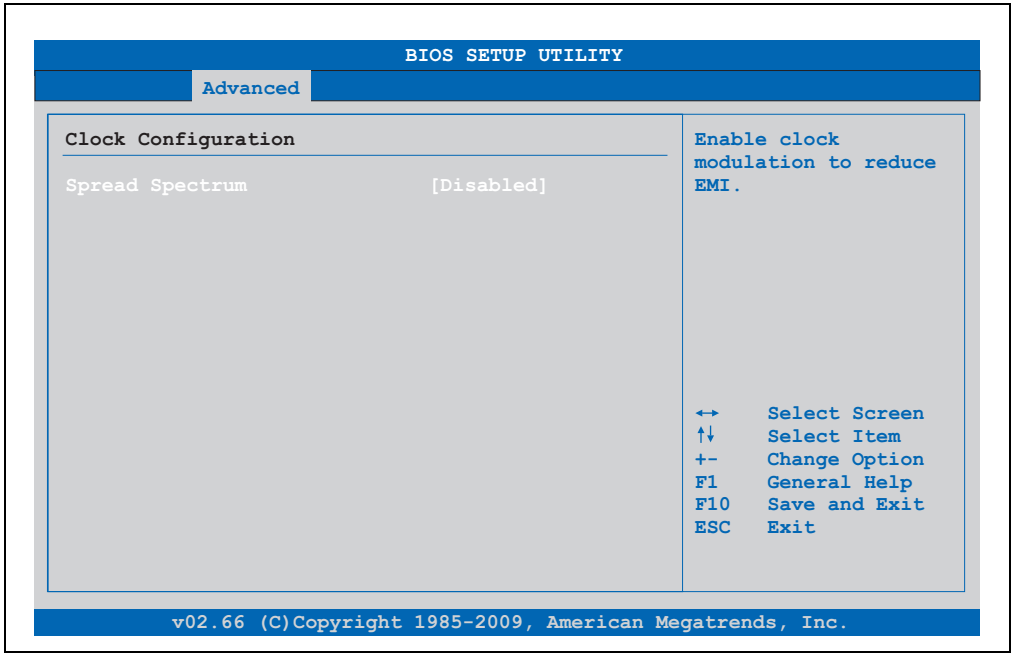

Figure 38: X945 Advanced Clock Configuration

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

Table 45: X945 Advanced Clock Configuration setting options

1.4.8 IDE Configuration

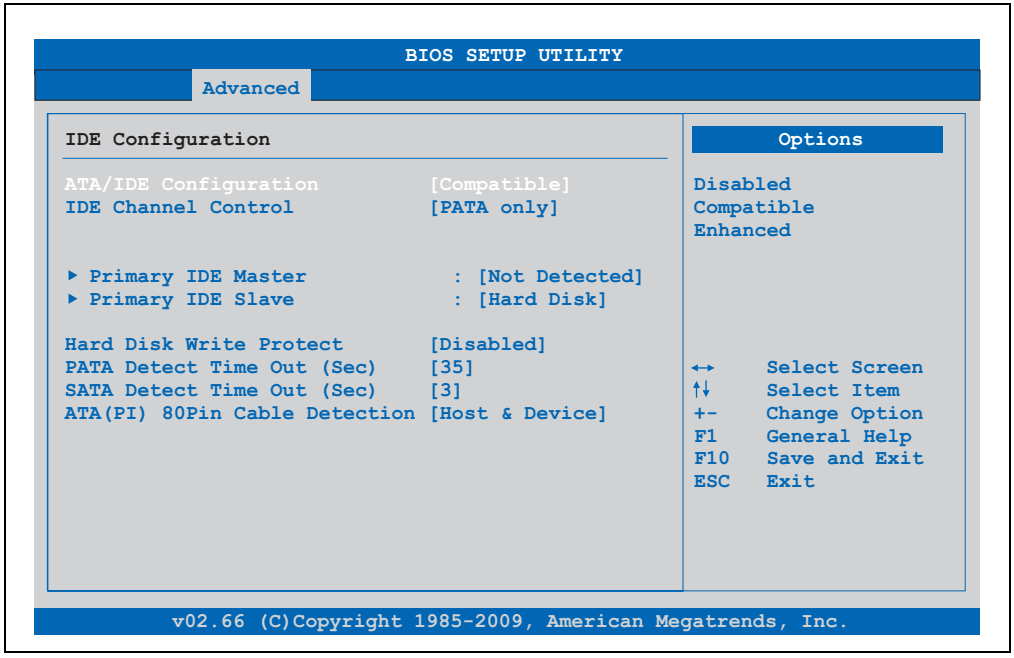

Figure 39: X945 Advanced IDE Configuration

BIOS setting	Meaning	Setting options	Effect
ATA/IDE Configuration	Option for configuring the integrated PATA and SATA controller.	Disabled	Both controllers disabled.
		Compatible	Both controllers run in Legacy or Compatible Mode.
		Enhanced	Both controllers run in Enhanced or Native Mode.
IDE Channel Control[1)]	Option for configuring the IDE channels in "Compatible" mode.	SATA only	Only use SATA drives.
		SATA Pri, PATA Sec	SATA drives are address primarily and PATA drive secondarily.
		PATA only[2)]	Only use PATA drives.
Primary IDE Master	The drive in the system that is connected to the IDE primary master port is configured here.	Enter	Opens the submenu See "Primary IDE Master", on page 92

Table 46: X945 Advanced IDE Configuration setting options

BIOS setting	Meaning	Setting options	Effect
Primary IDE slave	The drive in the system that is connected to the IDE primary slave port is configured here.	Enter	Opens the submenu See "Primary IDE slave", on page 94
Secondary IDE Master	The drive in the system that is connected to the IDE secondary master port is configured here.	Enter	Opens the submenu
Secondary IDE Slave	The drive in the system that is connected to the IDE secondary slave port is configured here.	Enter	Opens the submenu
Third IDE Master[3)]	The drive in the system that is connected to the IDE third master port is configured here.	Enter	Opens the submenu
Third IDE Slave[4)]	The drive in the system that is connected to the IDE third slave port is configured here.	Enter	Opens the submenu
Hard disk write protect	Write protection for the hard drive can be enabled/disabled here.	Disabled	Disables this function.
		Enabled	Enables this function.
PATA Detect Time Out (Sec)	Configuring the time overrun limit value for the PATA device identification.	0, 5, 10, 15, 20, 25, 30, 35	Value set manually.
SATA Detect Time Out (Sec)	Configuring the time overrun limit value for the SATA device identification.	0, 1, 2, 3, 5, 10, 15, 30	Value set manually.
ATA(PI) 80Pin Cable Detection	Detects whether an 80 pin cable is connected to the drive, the controller or to both. **Information:** **This option is not available on the PPC725 CPU board. Therefore this setting is not relevant.**	Host & device	Using both IDE controllers (motherboard, disk drive).
		Host	IDE controller motherboard used.
		Device	IDE disk drive controller used.

Table 46: X945 Advanced IDE Configuration setting 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*.

Primary IDE Master

```
BIOS SETUP UTILITY
Advanced

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

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

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

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```

Figure 40: X945 Primary IDE Master

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

Table 47: X945 Primary IDE Master setting options

BIOS setting	Meaning	Setting options	Effect
PIO Mode	The PIO mode determines the data rate of the hard drive. **Information:** **This option is not available on the PPC725. Therefore this setting is not relevant.**	Auto	Automatic configuration of PIO mode.
		0, 1, 2, 3, 4	Manual configuration of PIO mode.
DMA Mode	The data transfer rate to and from the primary master drive is defined here. The DMA mode must be activated in the Windows device manager in order to guarantee maximum performance. Only possible when manually setting up the drive.	Auto	Automatic definition of the transfer rate.
		Disabled	Manual definition of the transfer rate.
S.M.A.R.T.	Monitoring function of modern hard drives (self-monitoring, analysis and reporting technology).	Auto	Automatic detection and enabling.
		Disabled	Disables this function.
		Enabled	Enables this function.
32 Bit Data Transfer	This function enables 32-bit data transfer.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 47: X945 Primary IDE Master setting options (Forts.)

Primary IDE slave

```
BIOS SETUP UTILITY
Advanced

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

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

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

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```

Figure 41: X945 Primary IDE Slave

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

Table 48: X945 Primary IDE Slave setting options

BIOS setting	Meaning	Setting options	Effect
PIO Mode	The PIO mode determines the data rate of the hard drive. **Information:** **This option is not available on the PPC725. Therefore this setting is not relevant.**	Auto	Automatic configuration of PIO mode.
		0, 1, 2, 3, 4	Manual configuration of PIO mode.
DMA Mode	The data transfer rate to and from the secondary slave drive is defined here. The DMA mode must be activated in the Windows device manager in order to guarantee maximum performance. Only possible when manually setting up the drive.	Auto	Automatic definition of the transfer rate.
		Disabled	Manual definition of the transfer rate.
S.M.A.R.T.	Monitoring function of modern hard drives (self-monitoring, analysis and reporting technology).	Auto	Automatic detection and enabling.
		Disabled	Disables this function.
		Enabled	Enables this function.
32 Bit Data Transfer	This function enables 32-bit data transfer.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 48: X945 Primary IDE Slave setting options (Forts.)

1.4.9 USB configuration

```
BIOS SETUP UTILITY
Advanced

USB Configuration                                  Options

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

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

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```

Figure 42: X945 Advanced USB Configuration

BIOS setting	Meaning	Setting options	Effect
USB Function	USB ports can be enabled/disabled here.	Disabled	Disables the USB port.
		2 USB Ports	USB1, USB3 are enabled.
		4 USB Ports	USB1, USB2, USB3, USB4 are enabled.
		6 USB Ports	USB1, USB2, USB3, USB4, USB5 are enabled.
		8 USB Ports	USB1, USB2, USB3, USB4, USB5, USB are enabled on an AP via SDL.
USB 2.0 Controller	Option for enabling or disabling USB 2.0 mode.	Enabled	All USB ports run in USB 2.0 mode.
		Disabled	All USB ports run in USB 1.1 mode.
Legacy USB Support	Legacy USB support can be enabled/disabled here. USB ports do not function during startup. USB is supported again after the operating system has started. A USB keyboard is still recognized during the POST.	Disabled	Disables this function.
		Enabled	Enables this function.
		Auto	Automatic enabling.
USB Legacy POST-Always	Option to enable Legacy USB Support during the POST (Power On Self Test) the same as the Legacy USB Support setting.	Enabled	The BIOS Setup can be called up during the POST using a USB keyboard.
		Disabled	Disables this function.

Table 49: X945 Advanced USB Configuration setting options

BIOS setting	Meaning	Setting options	Effect
USB Keyboard Legacy Support	USB keyboard support can be enabled/disabled here.	Disabled	Disables this function.
		Enabled	Enables this function.
USB Mouse Legacy Support	USB mouse support can be enabled/disabled here.	Disabled	Disables this function.
		Enabled	Enables this function.
USB Storage Device Support	USB storage device support can be enabled/disabled here.	Disabled	Disables this function.
		Enabled	Enables this function.
Port 64/60 Emulation	Port 64/60 emulation can be enabled/disabled here.	Disabled	USB keyboard functions in all systems excluding Windows NT.
		Enabled	USB keyboard functions in Windows NT.
USB 2.0 Controller Mode	Settings can be made for the USB controller.	Full Speed	12 MBps
		Hi Speed	480 MBps
BIOS EHCI Hand-Off	The support for the operating system can be set up without the fully automatic EHCI function.	Disabled	Disables the function
		Enabled	Enables this function.
USB Beep Message	Option for outputting a tone each time a USB device is detected by the BIOS during the POST.	Disabled	Disables this function.
		Enabled	Enables this function.
USB Stick Default Emulation	You can set how the USB device is to be used.	Auto	USB devices with fewer than 530MB of memory are simulated as floppy disk drives and devices with larger capacities are simulated as hard drives.
		Hard disk	An HDD-formatted drive can be used as an FDD (e.g. zip drive) for starting the system.
USB Mass Storage Reset Delay	The waiting time that the USB device POST requires after the device start command can be set. **Information:** **The message "No USB mass storage device detected" is displayed if no USB memory device has been installed.**	10 Sec, 20 Sec, 30 Sec, 40 Sec	Value set manually.

Table 49: X945 Advanced USB Configuration setting options (Forts.)

1.4.10 Keyboard/mouse configuration

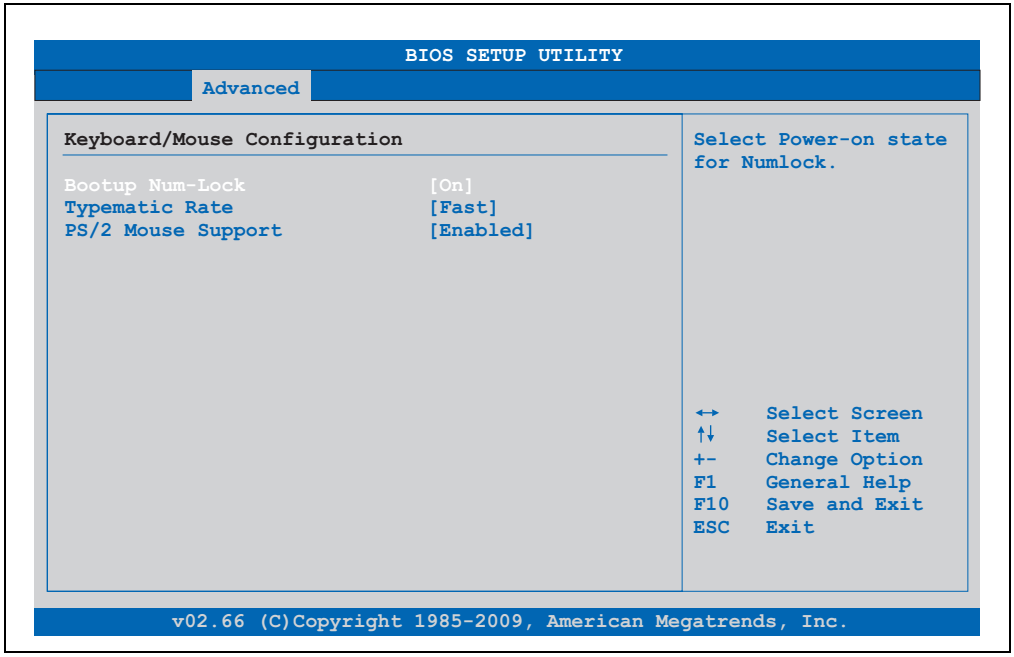

Figure 43: X945 Advanced Keyboard/Mouse Configuration

BIOS setting	Meaning	Setting options	Effect
Boot-up Num-lock	This option sets the status of the numeric keypad when the the system is booted.	Off	Only the cursor functions of the numerical keypad are enabled.
		On	Numeric keypad is enabled.
Typematic rate	The key repeat function is set here.	Slow	Slow key repeat.
		Fast	Fast key repeat.
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 50: X945 Advanced Keyboard/Mouse Configuration setting options

1.4.11 Remote access configuration

```
BIOS SETUP UTILITY
Advanced

Configure Remote Access type and parameters          Select Remote Access
                                                     type.
Remote Access                  [Enabled]

Serial Port number             [COM1]
     Base Address, IRQ         [3F8h, 4]
Serial Port Mode               [115200 8,n,1]
Flow Control                   [None]
Redirection After BIOS POST    [Always]
Terminal Type                  [ANSI]
VT-UTF8 Combo Key Support      [Enabled]
Sredir Memory Display Delay    [No Delay]

Serial Port BIOS Update        [Disabled]          ←→    Select Screen
                                                   ↑↓    Select Item
                                                   +-    Change Option
                                                   F1    General Help
                                                   F10   Save and Exit
                                                   ESC   Exit

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```

Figure 44: X945 Advanced Remote Access Configuration

BIOS setting	Meaning	Setting options	Effect
Remote access	The remote access function can be enabled/disabled here.	Disabled	Disables this function.
		Enabled	Enables this function.
Serial port number	The serial interface can be set using this option, as long as disabled is not entered in the *remote access* field.	COM1	Enables the COM1 interface as remote access interface.
		COM2	Enables the COM2 interface as remote access interface.
Base address, IRQ	Serial connection display for the logical address and interrupt, as long as disabled is not entered in the *remote access* field.	None	-
Serial port mode	The serial interface transfer rate is defined here, as long as disabled is not entered in the *remote access* field.	115200 8,n,1 57600 8,n,1 38400 8,n,1 19200 8,n,1 09600 8,n,1	Value set manually.
Flow control	This setting determines how the transfer is controlled via the interface. **Information:** **The setting must be the same on the terminal and the server.**	None	The interface is operated without transfer control.
		Hardware	The interface transfer control is carried out through hardware. This mode must be supported by a cable.
		Software	The interface transfer control is carried out through software.

Table 51: X945 Advanced Remote Access Configuration setting options

BIOS setting	Meaning	Setting options	Effect
Redirection after BIOS POST	The redirection after start up can be set here, as long as disabled is not entered in the *remote access* field.	Disabled	The redirection is switched off after start up.
		Boot loader	Redirection is enabled during system start up and charging.
		Always	Redirection is always enabled.
Terminal type	The type of connection can be chosen here, as long as disabled is not entered in the *remote access* field.	ANSI, VT100, VT-UTF8	Manual configuration of the connection type.
VT-UTF8 Combo Key Support	With this option, the VT-UTF8 Combo Key Support for the ANSI and VT100 connections can be enabled, as long as disabled is not entered in the *remote access* field.	Disabled	Disables this function.
		Enabled	Enables this function.
Sredir Memory Display Delay	The memory output delay can be set using this option, as long as disabled is not entered in the *remote access* field (Sredir -> serial redirection).	No delay	No delay.
		Delay 1 sec, Delay 2 sec, Delay 4 sec	Value set manually.
Serial port BIOS update	During system start up, the update is loaded via the serial interface in the processor. **Information:** **If this option is disabled, the boot time is reduced.**	Disabled	Disables this function.
		Enabled	Enables this function.

Table 51: X945 Advanced Remote Access Configuration setting options (Forts.)

1.4.12 CPU board monitor

Information:

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

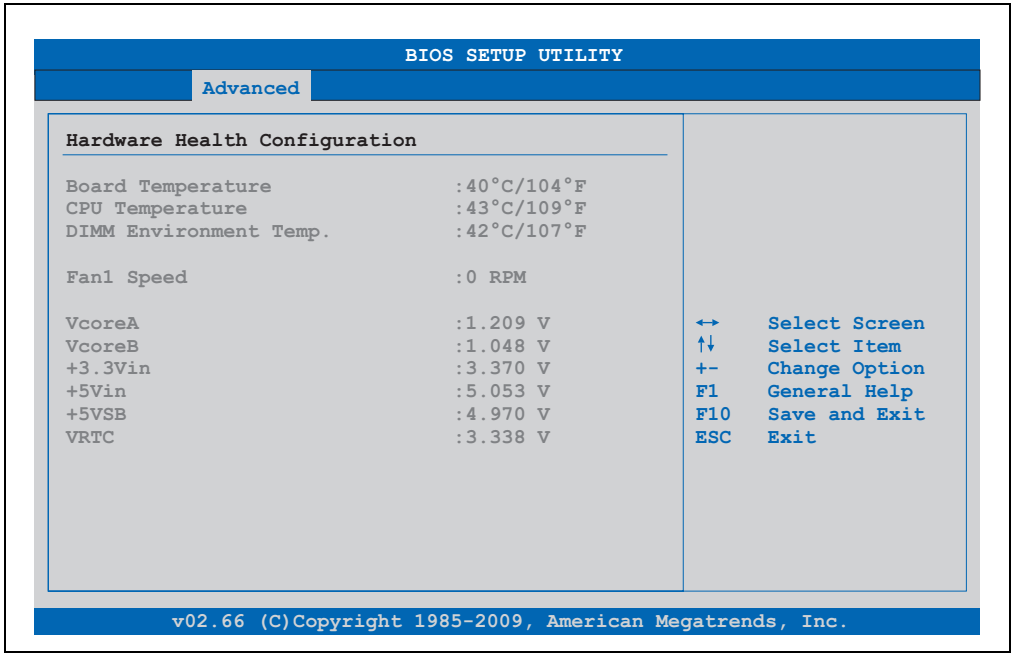

Figure 45: X945 Advanced CPU board monitor

BIOS setting	Meaning	Setting 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 rotating speed of the processor fan.	None	-
VcoreA	Displays the processor's core voltage A in volts.	None	-

Table 52: X945 Advanced Remote Access Configuration setting options

BIOS setting	Meaning	Setting options	Effect
VcoreB	Displays the DDR's core voltage B in volts.	None	-
+3.3Vin	Displays the current voltage of the 3.3 volt supply.	None	-
+5Vin	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 52: X945 Advanced Remote Access Configuration setting options (Forts.)

1.4.13 Main Board/Panel Features

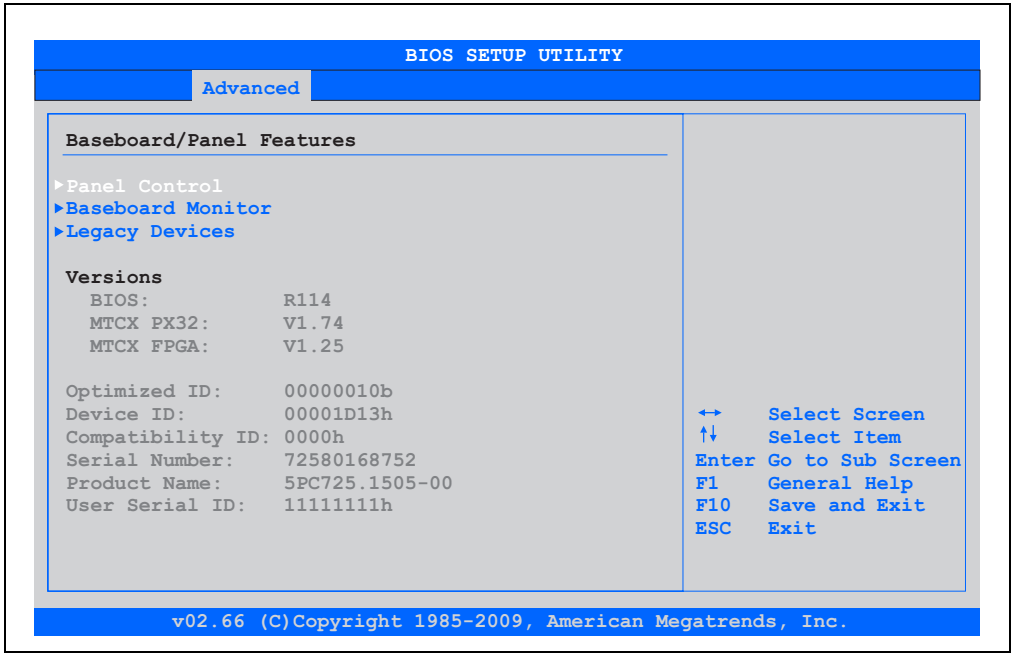

Figure 46: X945 Advanced Baseboard/Panel Features

BIOS setting	Meaning	Setting options	Effect
Panel control	For special setup of connected panels (display units).	Enter	Opens the submenu See "Panel control", on page 104
Baseboard monitor	Display of various temperatures and fan speeds.	Enter	Opens the submenu See "Baseboard monitor", on page 105
Legacy devices	Special settings for the interface can be changed here.	Enter	Opens the submenu See "Legacy devices", on page 106
BIOS	Displays the BIOS version.	None	-

Table 53: X945 Advanced Baseboard/Panel Features setting options

BIOS setting	Meaning	Setting options	Effect
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 code. This ID is needed for Automation Runtime.	None	-
Serial number	Displays the B&R serial number.	None	-
Product name	Displays the B&R model number.	None	-
User serial ID	Displays the user serial ID. This 8 digit hex value can be freely assigned by the user (e.g. to give the device a unique ID) and can only be changed with using the "B&R Control Center" via the ADI driver.	None	-

Table 53: X945 Advanced Baseboard/Panel Features setting options (Forts.)

Panel control

```
BIOS SETUP UTILITY
Advanced

Panel Control

Select Panel Number          [8]
  Version:           V1.17
  Brightness:                [100%]
  Temperature:       39°C/102°F
  Fan Speed:         00 RPM
  Keys/Leds:         128/128

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

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

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```

Figure 47: X945 Panel Control

BIOS setting	Meaning	Setting options	Effect
Select panel number	Selection of the panel number for which the values should be read out and/or changed.	0...15	Selection of panel 0 ... 15. Panel 15 is specifically intended for panel PC 700 systems. .
Version	Displays the firmware version of the SDLR controller.	None	-
Brightness	For setting the brightness of the selected panel.	0%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 100%	For setting the brightness (in %) of the selected panel. Changes take effect after saving and restarting the system (e.g. by pressing <F10>).
Temperature	Displays the selected panel's temperature (in degrees Celsius and Fahrenheit).	None	-
Fan speed	Displays fan speed for the selected panel.	None	-
Keys/LEDs	Displays the available keys and LEDs on the selected panel.	None	-

Table 54: X945 Panel Control setting options

Baseboard monitor

```
BIOS SETUP UTILITY
Advanced

Baseboard Monitor

CMOS Battery:          Good

Temperatures
  I/O:                 37°C/98°F
  Power Supply:        31°C/87°F
  Slide-In Drive 1:    00°C/32°F
  Slide-In Drive 2:    26°C/78°F

Fan Speeds
  Case 1:              1524 RPM
  Case 2:              2376 RPM
  Case 3:              1512 RPM
  Case 4:              00 RPM
  CPU:                 00 RPM

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

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```

Figure 48: X945 Baseboard Monitor

BIOS setting	Meaning	Setting options	Effect
CMOS battery	Displays the battery status. **n.a.** - not available **Good** - Battery is OK **Bad** - Battery is damaged.	None	-
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 the slide-in drive 1 in degrees Celsius and Fahrenheit.	None	-
Slide-in drive 2	Displays the temperature of the slide-in drive 2 in degrees Celsius and Fahrenheit.	None	-
Case 1	Displays the fan speed of housing fan 1.	None	-
Case 2	Displays the fan speed of housing fan 2.	None	-
Case 3	Displays the fan speed of housing fan 3.	None	-
Case 4	Displays the fan speed of housing fan 4.	None	-
CPU	Displays the rotational speed of the CPU fan.	None	-

Table 55: X945 Baseboard Monitor setting options

Legacy devices

```
BIOS SETUP UTILITY
Advanced

Legacy Devices                                  Enable/Disable the
                                                internal COM port
COM C:                    [Disabled]            for touch
COM D:                    [Disabled]
COM E:                    [Disabled]            Fot detailed
CAN:                      [Disabled]            descrpition see user
                                                manual.
ETH2 LAN controller:      [Enabled]
ETH2 MAC Address:         00:60:65:04:D0:F8

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

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```

Figure 49: X945 Legacy Devices

BIOS setting	Meaning	Setting options	Effect
COM C	Setting of the COM port for the **touch screen on the monitor/panel** connector.	Disabled	Disables the interface.
		Enabled	Enables the interface.
Base I/O address	Selection of the base I/O address for the COM port.	238, 2E8, 328, 338, 3E8	Selected base I/O address is assigned.
Interrupt	Selection of the interrupt for the COM port.	IRQ 5, IRQ 6, IRQ 7, IRQ 10, IRQ 11	Selected interrupt is assigned.
COM D	Setting of the COM port for the **touch screen on the AP Link** connector.	Disabled	Disables the interface.
		Enabled	Enables the interface.
Base I/O address	Selection of the base I/O address for the COM port.	238, 2E8, 328, 338, 3E8	Selected base I/O address is assigned.
Interrupt	Selection of the interrupt for the COM port.	IRQ 5, IRQ 6, IRQ 7, IRQ 10, IRQ 11	Selected interrupt is assigned.
COM E	Configuration of the COM port on the B&R add-on interface 5AC600.485I-00 (IF option).	Disabled	Disables the interface.
		Enabled	Enables the interface.
Base I/O address	Selection of the base I/O address for the COM port.	238, 2E8, 328, 338, 3E8	Selected base I/O address is assigned.

Table 56: X945 Legacy Devices setting options

BIOS setting	Meaning	Setting options	Effect
Interrupt	Selection of the interrupt for the COM port.	IRQ 5, IRQ 6, IRQ 7, IRQ 10, IRQ 11	Selected interrupt is assigned.
CAN	Configuration of the CAN port of the B&R add-on CAN interface card 5AC600.CANI-00 (IF option).	Disabled	Disables the interface.
		Enabled	Enables the interface.
Base I/O address	Selection of the base I/O address for the CAN port.	None	-
Interrupt	Selection of the interrupt for the CAN port.	IRQ 10, NMI	Selected interrupt is assigned.
ETH2 LAN controller	For turning the onboard LAN controller (ETH2) on and off.	Disabled	Disables the controller.
		Enabled	Enables the controller.
ETH2 MAC Address	Displays the Ethernet 2 controller MAC address.	None	-

Table 56: X945 Legacy Devices setting options (Forts.)

1.5 Boot

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

 Boot Priority Selection        [Type Based]          The device based boot
                                                      priority list allows
 Boot Device Priority                                 to select from a list
 ---------------------------------------------------  of currently detected
 1st Boot Device                [Primary Master]      devices.
 2nd Boot Device                [Primary Slave]       The type based boot
 3rd Boot Device                [USB Floppy]          priority list allows
 4th Boot Device                [USB Removable Devi]  to select device types
 5th Boot Device                [USB Harddisk]        even if a respective
 6th Boot Device                [USB CDROM]           device is not (yet)
 7th Boot Device                [Disabled]            present.
 8th Boot Device                [Disabled]
                                                      ←→    Select Screen
 Boot Settings Configuration                          ↑↓    Select Item
 ---------------------------------------------------  +-    Change Option
 Quick Boot                     [Enabled]             F1    General Help
 Quiet Boot                     [Disabled]            F10   Save and Exit
 Automatic Boot List Retry      [Disabled]            ESC   Exit
 AddOn ROM Display Mode         [Keep Current]
 Halt On Error                  [Disabled]
 Hit ´DEL´ Message Display      [Enabled]
 Interrupt 19 Capture           [Disabled]
 PXE Boot to LAN (ETH1)         [Disabled]
 Power Loss Control             [Turn On]

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```

Figure 50: X945 Boot Menu

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

Table 57: X945 Boot Menu setting options

1.6 Security

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

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

 Change Supervisor Password
 Change User Password

 Boot Sector Virus Protection   [Disabled]
 HDD Security Freeze Lock

 Hard Disk Security
                                            ←→    Select Screen
 Ask HDD Password on Every Boot[No]         ↑↓    Select Item
 ▶Hard Disk Security User Passwords         Enter Change
 ▶Hard Disk Security Master Passwords       F1    General Help
                                            F10   Save and Exit
 END-Key Loads CMOS Defaults    [No]        ESC   Exit

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```

Figure 51: X945 Security Menu

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

Table 58: X945 Security Menu setting options

BIOS setting	Meaning	Setting 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 the POST.	Disabled	Deactivates this function.
		Enabled	Activates 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. **Information:** **Can only be used if a hard disk user password has been created.**	Yes	Deactivates this function.
		No	Activates this function.
Hard Disk Security User Passwords	The hard disk security user password can be created here.	Enter	Opens the submenu See "Hard disk security user password", on page 110
Hard Disk Security Master Passwords	The hard disk security master password can be created here.	Enter	Opens the submenu See "Hard disk security master password", on page 111
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 58: X945 Security Menu setting options (Forts.)

1.6.1 Hard disk security user password

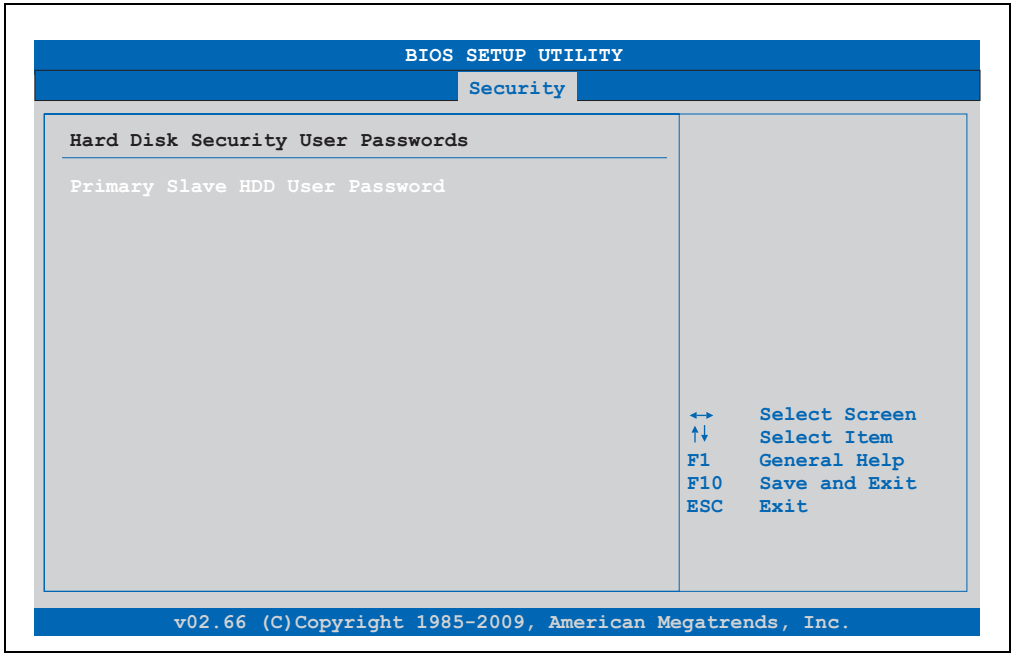

Figure 52: X945 Hard Disk Security User Password

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

Table 59: X945 Hard Disk Security User Password

1.6.2 Hard disk security master password

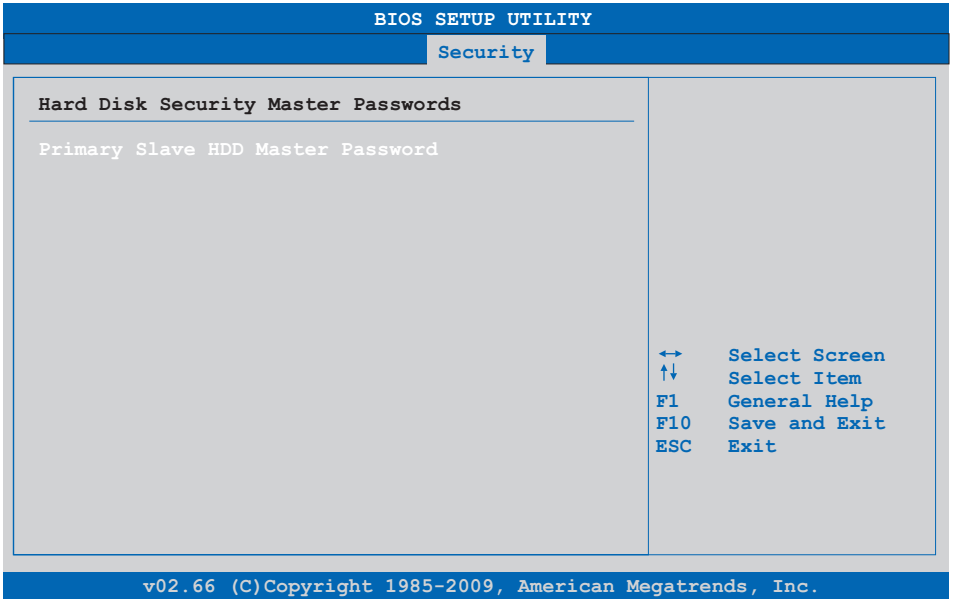

Figure 53: X945 Hard Disk Security Master Password

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

Table 60: X945 Hard Disk Security Master Password

1.7 Power

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

Congigure power management and control

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

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

Power Button Mode             [On/Off]

Enable or disable
APM.

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

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```

Figure 54: X945 Power Menu

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

Table 61: X945 Power Menu setting options

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

Table 61: X945 Power Menu setting options (Forts.)

1.8 Exit

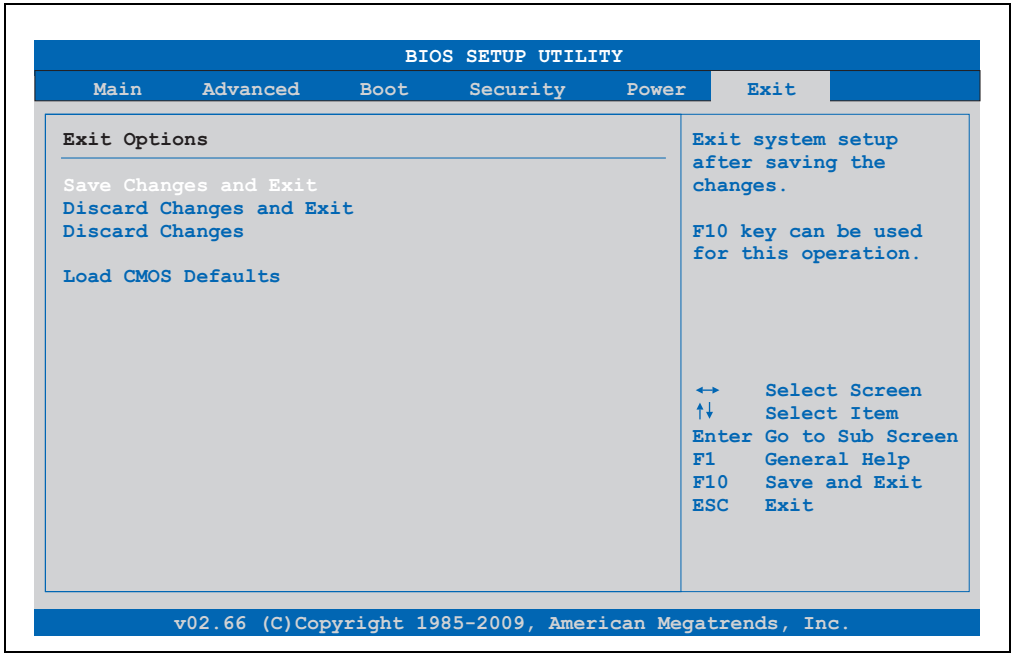


Figure 55: X945 Exit Menu

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

Table 62: X945 Exit Menu setting options

1.9 BIOS default settings

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

Information:

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

The 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[1)]	8[1)]
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 unit 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 unit 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 und 5PC600.SE00-01.	On	Off	On	Off	Off	Off	-	-
Profile 6	Panel PC 725 system unit 5PC725.1505-00, 5PC725.1505-01	Off	On	On	Off	Off	Off	-	-

Table 63: Profile overview

1) Reserved.

The following pages provide an overview of the BIOS default settings for the different DIP switch position. Settings highlighted in yellow are variations from the BIOS default profile (=profile 1).

1.9.1 Main

Setting / View	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 64: X945 - Main profile setting overview

1.9.2 Advanced

ACPI configuration

Setting / View	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 65: X945 Advanced - ACPI Configuration profile setting overview

PCI Configuration

Setting / View	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	
PCI IRQ Resource Exclusion								
IRQ3	Allocated	Allocated	Allocated	Allocated	Allocated	Allocated	Allocated	
IRQ4	Allocated	Allocated	Allocated	Allocated	Allocated	Allocated	Allocated	
IRQ5	Available	Available	Available	Available	Available	**Allocated**	Available	
IRQ6	Available	Available	Available	Available	Available	**Allocated**	Available	
IRQ7	Available	Available	Available	Available	Available	**Allocated**	Available	
IRQ9	Allocated	Allocated	Allocated	Allocated	Allocated	Allocated	Allocated	
IRQ10	Available	Available	Available	Available	Available	Available	Available	
IRQ11	Available	**Allocated**	Available	**Allocated**	**Allocated**	Available	Available	
IRQ12	Available	**Allocated**	Available	Available	Available	Available	Available	
IRQ14	Allocated	Allocated	Allocated	Allocated	Allocated	Allocated	Allocated	
IRQ15	Available	Available	Available	Available	Available	Available	Available	
PCI Interrupt Routing								
PIRQ A (VGA)	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
PIRQ B (AC97,INTD)	Auto	Auto	Auto	Auto	Auto	**7**	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	**5**	Auto	
PIRQ G (INTB)	Auto	Auto	Auto	Auto	Auto	**6**	Auto	
PIRQ H (UHCI0,EHCI)	Auto	Auto	Auto	Auto	Auto	Auto	Auto	
1st Exclusive PCI	-	-	-	-	-	**5**	-	
2nd Exclusive PCI	-	-	-	-	-	**6**	-	
3rd Exclusive PCI	-	-	-	-	-	**7**	-	

Table 66: X945 Advanced - PCI Configuration Profile setting overview

Graphics configuration

Setting / View	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	128MB	128MB	128MB	128MB	128MB	128MB	128MB	
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 67: X945 Advanced - Graphics Configuration Profile setting overview

CPU configuration

Setting / View	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
Module Version	-	-	-	-	-	-	-	
Manufacturer	-	-	-	-	-	-	-	
Frequency	-	-	-	-	-	-	-	
FSB speed	-	-	-	-	-	-	-	
L1 cache	-	-	-	-	-	-	-	
L2 cache	-	-	-	-	-	-	-	
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 68: X945 Advanced - CPU Configuration Profile setting overview

Chipset configuration

Setting / View	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 69: X945 Advanced - Chipset Configuration Profile setting overview

I/O interface configuration

Setting / View	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	**Disabled**	
Serial port 2 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	**Disabled**	

Table 70: X945 Advanced - I/O Interface Configuration profile setting overview

Clock Configuration

Setting / View	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 71: X945 Advanced - Clock Configuration Profile setting overview

IDE Configuration

Setting / View	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 Time Out (Sec)	35	35	35	35	35	35	35	

Table 72: X945 Advanced - IDE Configuration Profile setting overview

Setting / View	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
SATA Detect Time Out (Sec)	3	3	3	3	3	3	3	
ATA(PI) 80Pin Cable Detection	Host & device	Host & device	Host & device	Host & device	Host & device	Host & device	Host & device	
Primary IDE Master								
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	
Primary IDE slave								
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 72: X945 Advanced - IDE Configuration Profile setting overview (Forts.)

USB configuration

Setting / View	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	**6 USB Ports**	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	

Table 73: X945 Advanced - USB Configuration Profile setting overview

Setting / View	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
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	Hard disk	Hard disk	Hard disk	Hard disk	Hard disk	Hard disk	
USB Mass Storage Reset Delay	20 Sec	20 Sec	20 Sec	20 Sec	20 Sec	20 Sec	20 Sec	

Table 73: X945 Advanced - USB Configuration Profile setting overview (Forts.)

Keyboard/mouse configuration

Setting / View	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
Boot-up Num-lock	On	On	On	On	On	On	On	
Typematic rate	Fast	Fast	Fast	Fast	Fast	Fast	Fast	
PS/2 mouse support	Disabled	**Enabled**	Disabled	Disabled	Disabled	Disabled	Disabled	

Table 74: X945 Advanced Keyboard/Mouse Configuration profile setting overview

Remote access configuration

Setting / View	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 75: X945 Advanced Remote Access Configuration profile setting overview

CPU board monitor

Setting / View	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	-	-	-	-	-	-	-	
+3.3Vin	-	-	-	-	-	-	-	
+5Vin	-	-	-	-	-	-	-	
+5VSB	-	-	-	-	-	-	-	
VRTC	-	-	-	-	-	-	-	

Table 76: X945 Advanced CPU board monitor profile setting overview

Main Board/Panel Features

Setting / View	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	-	-	-	-	-	-	-	
Panel control								
Select panel number	-	-	-	-	-	-	-	
Version	-	-	-	-	-	-	-	
Brightness	100%	100%	100%	100%	100%	100%	100%	
Temperature	-	-	-	-	-	-	-	
Fan speed	-	-	-	-	-	-	-	
Keys/LEDs	-	-	-	-	-	-	-	
Baseboard monitor								
CMOS battery	-	-	-	-	-	-	-	
I/O	-	-	-	-	-	-	-	
Power supply								
Slide-in drive 1	-	-	-	-	-	-	-	
Slide-in drive 2	-	-	-	-	-	-	-	
Case 1	-	-	-	-	-	-	-	
Case 2	-	-	-	-	-	-	-	
Case 3	-	-	-	-	-	-	-	
Case 4	-	-	-	-	-	-	-	
CPU	-	-	-	-	-	-	-	
Legacy devices								
COM C	Disabled	**Enabled**	Disabled	**Enabled**	**Enabled**	Disabled	**Enabled**	
Base I/O address	-	**3E8**	-	**3E8**	**3E8**	-	**3E8**	
Interrupt	-	**11**	-	**11**	**11**	-	**11**	
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	-	-	-	-	-	-	-	

Table 77: X945 Advanced - Baseboard/Panel Features profile setting overview

Setting / View	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	-	-	-	-	-	-	-	
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 77: X945 Advanced - Baseboard/Panel Features profile setting overview (Forts.)

1.9.3 Boot

Setting / View	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	**Onboard LAN**	Primary master	Primary master	Primary master	Primary master	Primary master	
2nd Boot Device	Primary slave	**Primary master**	Primary slave	Primary slave	Primary slave	Primary slave	Primary slave	
3rd Boot Device	USB floppy	**Primary slave**	USB floppy	USB floppy	USB floppy	USB floppy	USB floppy	
4th Boot Device	USB removable device	**USB floppy**	USB removable device	USB removable device	USB removable device	USB removable device	USB removable device	
5th Boot Device	USB hard disk	**USB removable device**	USB hard disk	USB hard disk	USB hard disk	USB hard disk	USB hard disk	
6th Boot Device	USB CDROM	**USB HDD**	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	

Table 78: X945 Boot profile setting overview

Setting / View	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
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	**Enabled**	Disabled	Disabled	Disabled	Disabled	Disabled	
Power Loss Control	Turn On	Turn On	Turn On	Turn On	Turn On	Turn On	Turn On	

Table 78: X945 Boot profile setting overview

1.9.4 Security

Setting / View	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 79: X945 Security profile setting overview

1.9.5 Power

Setting / View	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	

Table 80: X945 Power profile setting overview

Setting / View	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	My setting
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 80: X945 Power profile setting overview

1.10 BIOS Error signals (beep codes)

While the Panel PC 725 is booting, the following messages and errors can occur with BIOS. These errors are signaled by different beeping codes.

1.10.1 BIOS X945

Beeping code	Meaning	Necessary user action
1 x short	Memory refresh failed.	Load BIOS defaults. In the event that the error persists, send industrial PC to B&R for testing.
2 x short	Parity error: POST error (error in one of the hardware testing procedures)	Load BIOS defaults. In the event that the error persists, send industrial PC to B&R for testing.
3 x short	Base 64 KB memory failure: Basic memory defect, RAM error within the initial 64 KB.	Check the placement of the inserted card. In the event that the error persists, send industrial PC to B&R for testing.
4 x short	Timer not operational: System timer.	Send industrial PC to B&R for checking.
5 x short	Processor error: Processor defect.	Send industrial PC to B&R for checking.
6 x short	8042 gate A20 failure: Keyboard controller defect (block 8042/ A20 gate). Processor cannot switch to protected mode.	Send industrial PC to B&R for checking.
7 x short	Processor exception interrupt error: Virtual mode exception error (CPU generated an interrupt error.	Send industrial PC to B&R for checking.
8 x short	Display memory read/write error: Video memory not accessible; graphic card defect or not built in (no fatal error).	Check inserted graphic card position and eventually exchange. In the event that the error persists, send industrial PC to B&R for testing.

Table 81: BIOS post code messages BIOS X945

1.11 Distribution 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 - 0FFFFFh	System BIOS (AMI)
100000h - (TOM[1)] -8MB-192kB)	SDRAM
(TOM-8MB-192kB) - (TOM-192kB)	VGA frame buffer[2)]
(TOM-192kB) - TOM	ACPI reclaim, MPS and NVS area[3)]

Table 82: RAM address assignment

1) T.O.M. = 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) [1)]
4	Reserved (Cascade DMA Controller)
5	Available
6	Available
7	Available

Table 83: DMA channel assignment

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

1.11.3 I/O address assignment

I/O address	Resource
000h -01Fh	DMA controller 1
020h - 03Fh	Interrupt controller 1
040h - 05Fh	Timer
060h - 06Fh	Keyboard controller
070h - 071h	Real-time clock, NMI mask, CMOS
080h	Debug port (POST code)
081h - 09Fh	Page register - DMA controller
0A0h - 0BFh	Interrupt controller 2
0C0h - 0DFh	DMA controller 2
0F0h - 0FFh	FPU
170h - 177h	Secondary Hard Disk IDE channel
1F0h - 1F7h	Primary Hard Disk IDE channel
2E8h - 2EFh	COM4
2F8h - 2FFh	COM2
376h - 376h	Secondary Hard Disk IDE channel
384h - 385h	CAN controller
3B0h - 3BBh	VGA controller
3C0h - 3DFh	VGA controller
3E8h - 3EFh	COM3
3F6h - 3F6h	Primary Hard Disk IDE channel
3F0h - 3F7h	FDD controller
CF8h - CFBh	PCI config address register
CFCh - CFFh	PCI config data register
4100h - 417Fh	MTCX
FF00h - FF07h	IDE bus master register

Table 84: I/O address assignment

1.11.4 Interrupt assignments in PCI mode

IRQ		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	NMI	NONE
System timer		●																	
Keyboard			●																
IRQ cascade				●															
COM2 (Serial port B)					●	❍													
ACPI[1)]											●								
FDD								❍											●
Real-time clock										●									
Coprocessor (FPU)															●				
Primary IDE channel																●			
Secondary IDE channel																	❍		
B&R	COM3 (COM C)				❍	❍	❍		❍			❍	❍	❍					●
	COM4 (COM E)				❍	❍	❍		❍			❍	❍	❍					●
	CAN											❍						❍	●

Table 85: IRQ interrupt assignments in PCI mode

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

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

1.11.5 Interrupt assignments in APIC mode

A total of 23 IRQs are available in the APIC mode (**A**dvanced **P**rogrammable **I**nterrupt **C**ontroller). The activation of this option is only effective if it takes place before the operating system (Windows XP) is activated. There are then 23 IRQs available.

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[1)]											●																
FDD								❍																			●
Real-time clock										●																	
Coprocessor (FPU)															●												
Primary IDE channel																●											
Secondary IDE channel																	❍										
B&R	COM3 (COM C)				❍	❍	❍		❍			❍	❍	❍													●
	COM4 (COM E)				❍	❍	❍		❍			❍	❍	❍													●
	CAN											❍														❍	●
PIRQ A [2)]																		●									
PIRQ B [3)]																			●								
PIRQ C [4)]																				●							
PIRQ D [5)]																					●						
PIRQ E [6)]																						●					
PIRQ F[7)]																							●				
PIRQ G[8)]																								●			
PIRQ H [9)]																									●		

Table 86: IRQ interrupt assignments in APIC mode

1) **A**dvanced **C**onfiguration and **P**ower **I**nterface.
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 (ETH1)
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.

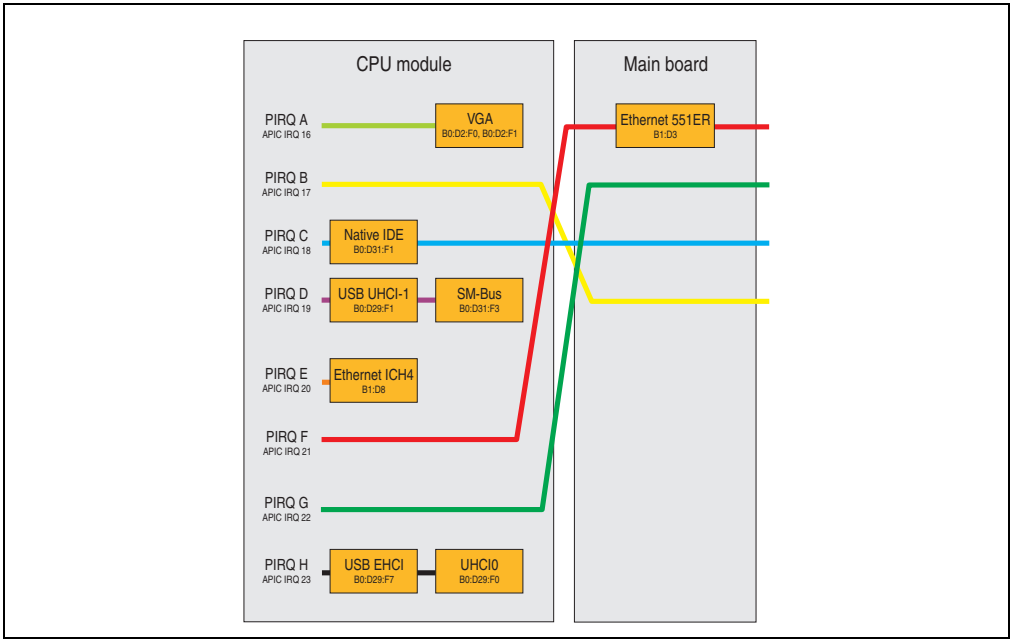


Figure 56: PCI Routing with activated APIC CPU board X945

1.11.6 Inter-IC (I²C) bus

I²C address	Resource	Note
A0h	EEPROM	EEPROM for CMOS data - cannot be used
B0h	Reserved	Cannot be used
58h	Reserved	Cannot be used

Table 87: Inter-IC (I²C) bus resources

1.11.7 System Management (SM) bus

SM Bus address	SM device	Note
12h	SMART_CHARGER	
14h	SMART_SELECTOR	

Table 88: Inter-IC (I²C) bus resources

SM Bus address	SM device	Note
16h	SMART_BATTERY	
D2h	Clock Generator	

Table 88: Inter-IC (I^2C) bus resources

2. Upgrade information

Warning!

The BIOS and firmware on PPC725 systems must be kept up to date. New versions can be downloaded from the B&R homepage (www.br-automation.com).

2.1 BIOS upgrade

An upgrade might be necessary for the following reason:

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

2.1.1 What information do I need?

Information:

Individually saved BIOS settings are deleted when upgrading the BIOS.

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

Which BIOS version and firmware are already installed on the 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):

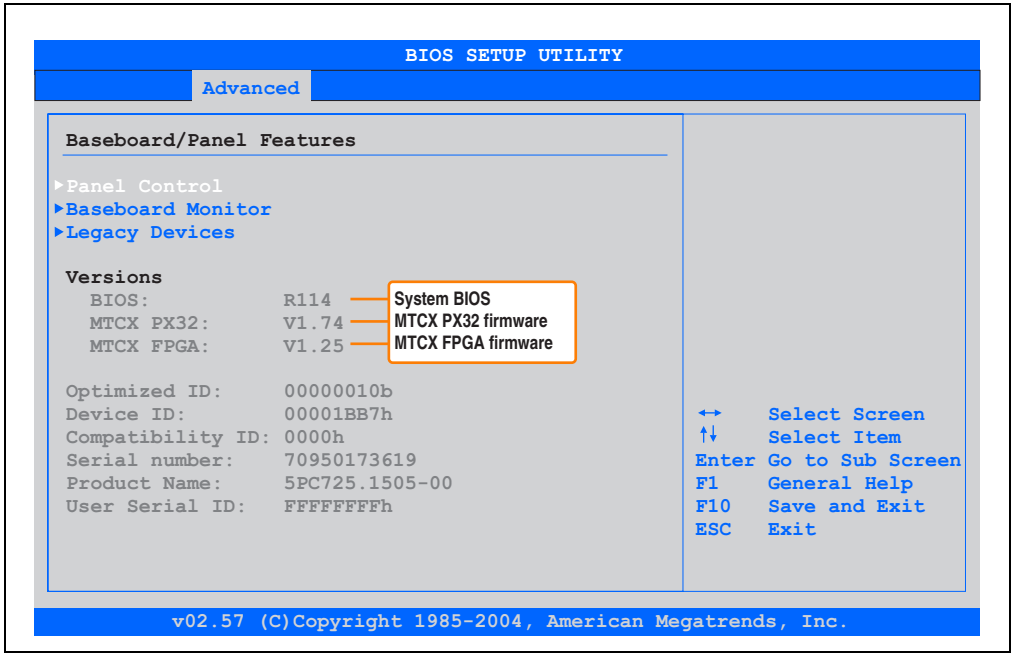


Figure 57: Software versions

2.1.2 Upgrade BIOS for X945

- Download ZIP file from the B&R homepage (www.br-automation.com)
- Create bootable media.

Information:

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

Information concerning creating a bootable diskette in Windows XP can be found on page 136.

Information concerning creating a USB flash drive for a B&R upgrade can be found on page 138.

Information concerning creating a CompactFlash card for a B&R upgrade can be found on page 140.

- Copy the contents of the *.zip file to the bootable media. If the B&R upgrade was already added when the bootable media was created using the B&R Embedded OS Installer, then this step is not necessary.
- Connect the bootable media to the PPC725 and reboot the device.
- The following boot menu will be shown after startup:

```
1. Upgrade AMI BIOS for X945/N270 (5PC600.X945-xx)

2. Exit to MS-DOS
```

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

Concerning item 2:
Returns to the shell (MS-DOS).

- The system must be rebooted after a successful upgrade.

Information:

After the system restart, the warning "CMOS checksum BAD" is displayed, but BIOS boots through it. The setup can be opened using the "Del" key and the setup defaults must be loaded again and saved using either the "F9" key or the menu item "Exit" - "Load CMOS defaults".

2.2 Creating an MS-DOS boot diskette in Windows XP

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

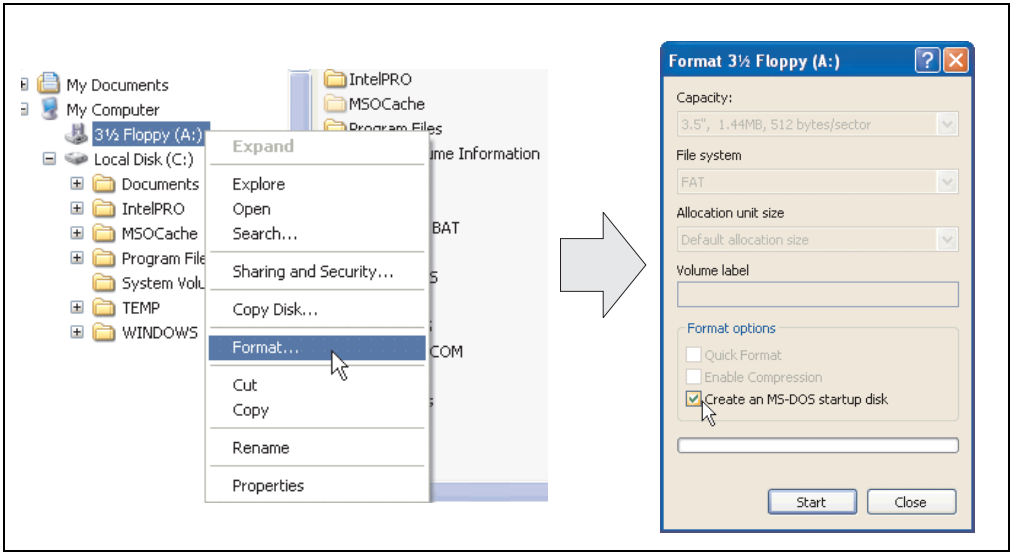


Figure 58: Creating a bootable diskette in Windows XP - step 1

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

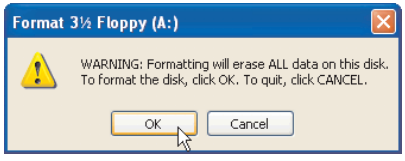


Figure 59: Creating a bootable diskette in Windows XP - step 2

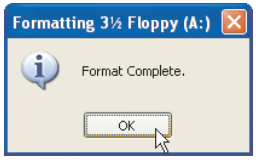
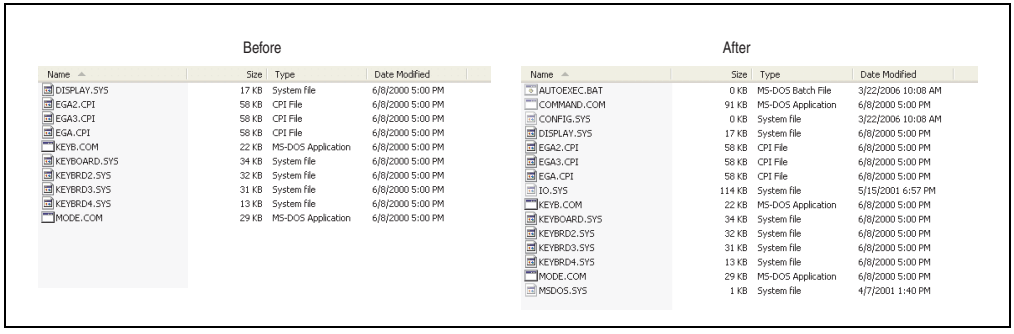


Figure 60: Creating a bootable diskette in Windows XP - step 3

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

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

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



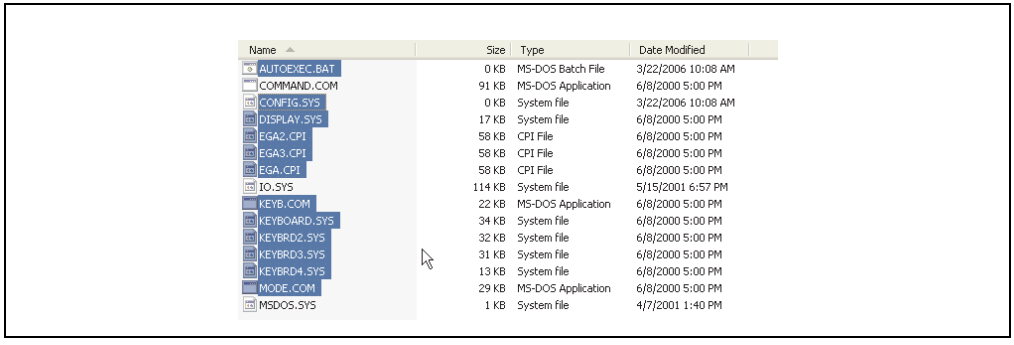
Before

Name	Size	Type	Date Modified
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
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

After

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 61: 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 62: Creating a bootable diskette in Windows XP - step 5

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

2.3 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 BIOS from one of the USB flash drives available from B&R. To do this, the USB flash drive must be prepared accordingly. This is done with the B&R Embedded OS Installer, which can be downloaded for free from the B&R homepage (www.br-automation.com).

2.3.1 Requirements

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

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

2.3.2 Procedure

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

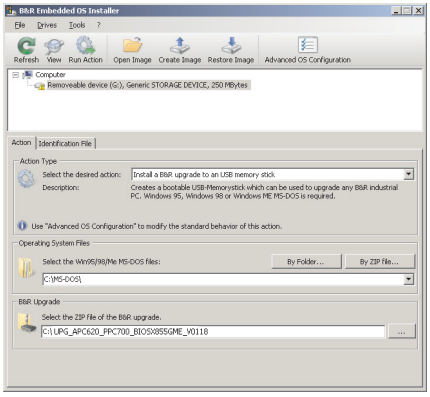


Figure 63: Creating a USB flash drive for B&R upgrade files

2.3.3 Where do I get MS-DOS?

Information concerning creating an MS-DOS boot diskette can be found in section 2.2 "Creating an MS-DOS boot diskette in Windows XP", on page 136. Then the files from the diskette are to be copied to your 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 BIOS from one of the CompactFlash cards available from B&R. To do this, the CompactFlash card must be prepared accordingly. This is done with the B&R Embedded OS Installer, which can be downloaded for free from the B&R homepage (**www.br-automation.com**).

2.4.1 Requirements

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

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

2.4.2 Procedure

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

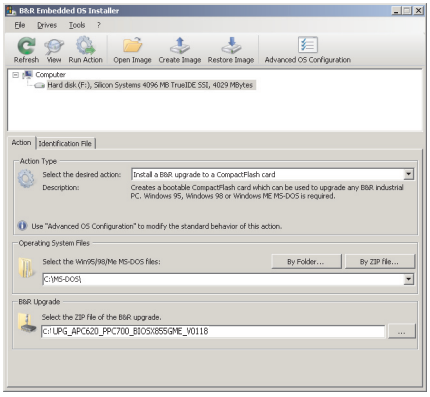


Figure 64: Creating a CompactFlash card for B&R upgrade files

2.4.3 Where do I get MS-DOS?

Information concerning creating an MS-DOS boot diskette can be found in section 2.2 "Creating an MS-DOS boot diskette in Windows XP", on page 136. Then the files from the diskette are to be copied to your hard drive.

2.5 Upgrade problems

Potential upgrade problems are listed in the Liesmich.txt or Readme.txt files on the upgrade disks.

3. Panel PC 725 with MS-DOS

Figure 65: Microsoft DOS

Model number	Short description	Note
9S0000.01-010	**OEM MS-DOS 6.22 German (disk)** OEM MS-DOS 6.22 German disks Only delivered with a new industrial PC.	
9S0000.01-020	**OEM MS-DOS 6.22 English (disk)** OEM MS-DOS 6.22 English disks Only delivered with a new industrial PC.	

Table 89: Model numbers - MS-DOS

3.1 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.
- A few "ACPI control" BIOS functions cannot be used.

4. Panel PC 725 with Windows XP Professional

Figure 66: Windows XP Professional Logo

Model number	Short description	Note
5SWWXP.0600-GER	**WinXP Professional with SP3, GER** Microsoft OEM Windows XP Professional Service Pack 3, CD, German. Only available with a new device.	
5SWWXP.0600-ENG	**WinXP Professional with SP3, ENG** Microsoft OEM Windows XP Professional Service Pack 3, CD, English. Only available with a new device.	
5SWWXP.0600-MUL	**WinXP Professional with SP3, MUL** Microsoft OEM Windows XP Professional Service Pack 3, CD, multi-language. Only available with a new device.	
5SWWXP.0500-GER	**WinXP Professional with SP 2c, GER** Microsoft OEM Windows XP Professional Service Pack 2c, CD, German. Only available with a new device.	
5SWWXP.0500-ENG	**WinXP Professional with SP 2c, ENG** Microsoft OEM Windows XP Professional Service Pack 2c, CD, English. Only available with a new device.	
5SWWXP.0500-MUL	**WinXP Professional with SP 2c, MUL** Microsoft OEM Windows XP Professional Service Pack 2c, CD, multi-language. Only available with a new device.	

Table 90: Model numbers - Windows XP Professional

4.1 Installation

Upon request, B&R can pre-install the required Windows XP Professional version on the desired mass memory (add-on hard disk). All of the drivers required for operation (graphics, network, etc.) are also installed when doing so.

4.2 Drivers

The latest drivers for all released operating systems can be found in the download area (Service - Material Related Downloads - BIOS / Drivers / Updates) on the B&R homepage (**www.br-automation.com**).

Information:

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

5. Panel PC 725 with Windows 7

Figure 67: Windows 7 Logo

Model number	Short description	Note
5SWWI7.0100-GER	**Win7 Pro 32-bit DVD, GER** Microsoft OEM Windows 7 Professional 32-bit, DVD, German. Only available with a new device.	
5SWWI7.0100-ENG	**Win7 Pro 32-bit DVD, ENG** Microsoft OEM Windows 7 Professional 32-bit, DVD, English. Only available with a new device.	
5SWWI7.0300-MUL	**Win7 Ult 32-bit DVD, MUL** Microsoft OEM Windows 7 Ultimate 32-bit, DVD, Multilanguage. Only available with a new device.	

Table 91: Model numbers - Windows 7

5.1 Installation

Upon request, B&R can pre-install the required Windows 7 version on the desired mass memory (add-on hard disk). All of the drivers required for operation (graphics, network, etc.) are also installed when doing so.

5.2 Drivers

The latest drivers for all released operating systems can be found in the download area (Service - Material Related Downloads - BIOS / Drivers / Updates) on the B&R homepage (**www.br-automation.com**).

Information:

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

5.3 Special considerations, limitations:

- Windows 7 system evaluation (system classification) is not currently supported.
- Windows 7 does not contain a Beep.sys file, which means that audible signal is no longer played (i.e. when touching a key or button).

6. Panel PC 725 with Windows Embedded Standard 2009

Figure 68: Windows Embedded Standard 2009 Logo

Model number	Short description	Note
5SWWXP.0729-ENG	**WES2009 PPC700 945GME XTX** Microsoft OEM Windows Embedded, Standard 2009, English; for PPC700 with CPU board, 5PC600.X945-00; order CompactFlash separately (at least 1 GB).	

Table 92: Model numbers - Windows Embedded Standard 2009

6.1 General Information

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

6.2 Features with WES2009 (Windows Embedded Standard 2009)

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

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

Table 93: Device functions in Windows Embedded Standard 2009

6.3 Installation

Upon request, Windows Embedded Standard 2009 can be preinstalled at B&R Austria on a suitable CompactFlash card (min. 1GB). The PPC725 system is then automatically configured after it has been switched on for the first time. This procedure takes approximately 30 minutes, and the device will be rebooted a number of times.

6.4 Drivers

All drivers required for operation are preinstalled on the operating system. If an older driver version is installed, the latest version can be downloaded from the B&R homepage (**www.br-automation.com**) and installed. A potentially activated "Enhanced Write Filter (EWF)" must be taken into consideration.

Information:

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

7. Panel PC 725 with Windows Embedded Standard 7

Figure 69: Windows Embedded Standard 7 Logo

Model number	Short description	Note
5SWWI7.0529-ENG	**Windows Embedded Standard 7 PPC700 945GME** Microsoft OEM Windows Embedded, Standard 7 32-bit, English; for PPC725 with CPU board, 5PC600.X945-00; order CompactFlash separately (at least 1 GB).	
5SWWI7.0729-MUL	**Windows Embedded Standard 7 Premium PPC700 945GME** Microsoft OEM Windows Embedded, Standard 7 Premium 32-bit, Multilanguage; for PPC725 with CPU board, 5PC600.X945-00; order CompactFlash separately (at least 1 GB).	
5SWWI7.0900-MUL	**WES7P 32bit Language Pack DVD**	

Table 94: Model numbers - Windows Embedded Standard 2009

7.1 General Information

The successor to Windows® XP Embedded has been given the name Windows® Embedded Standard 7. As with previous versions, this embedded operating system offers full system support of Automation PC 620, Automation PC 810, Panel PC 700, Panel PC 725, Panel PC 800 and Power Panel 500 devices. In addition to brand new features that are also included in Windows ® 7 Professional, Windows® Embedded Standard 7 includes embedded components such as Enhanced Write Filter, File-Based Write Filter, Registry Filter and USB Boot. Windows® Embedded Standard 7 is available in two different versions. The main difference between them has to do with multilanguage support. Windows® Embedded Standard 7 is only available in a single language, whereas Windows® Embedded Standard 7 Premium supports the installation of several languages simultaneously.

With Windows® Embedded Standard 7, Microsoft has made substantial improvements in the area of security. The AppLocker program, available in the premium version, can prevent the execution of unknown or potentially unwanted applications that should be installed over a network or from drives that are directly connected. A tiered approach allows the differentiation between scripts (.ps1, .bat, .cmd, .vbs and .js), installer files (.msi, .msp) and libraries (.dll, .ocx). AppLocker can also be configured to record undesired activity and display it in the Event Viewer. Windows® Embedded Standard 7 is available in both 32-bit and 64-bit versions, which ensures that even the most demanding applications have the level of support they need.

7.2 Features with WES7 (Windows Embedded Standard 7)

The feature list shows the most important device functions in Windows Embedded Standard 7.

Function	Windows Embedded Standard 7	Windows Embedded Standard 7 Professional
Enhanced write filter (EWF)	✓	✓
File Based Write Filter	✓	✓
Administrator account	✓	✓
User account	Configurable	Configurable
Windows Explorer Shell	✓	✓
Registry filter	✓	✓
Internet Explorer 8.0	✓	✓
Internet Information Service (IIS) 7.0	✓	✓
AntiMalware (Windows Defender)	-	✓
Add-ons (Snipping tool, Sticky Notes)	-	✓
Windows Firewall	✓	✓
.NET Framework 3.5	✓	✓
Remote Desktop Protocol 7.0	✓	✓
File Compression Utility	✓	✓
Windows Installer Service	✓	✓
Windows XP Mode	-	-
Media Player 12	✓	✓
DirectX	✓	✓
Multilingual User Interface Packs in the same image	-	✓
International Components and Language Services	✓	✓
Language Pack Setup	✓	✓
Windows Update	Configurable	Configurable
Windows PowerShell 2.0	✓	✓
Bitlocker	-	✓
Applocker	-	✓
Tablet PC Support	-	✓
Windows Touch	-	✓
Boot from USB Stick	✓	✓
Accessories	✓	✓
Page file	Configurable	Configurable
Number of fonts	134	134

Table 95: Device functions in Windows Embedded Standard 7

7.3 Installation

Upon request, Windows Embedded Standard 7 can be preinstalled at B&R Austria on a suitable CompactFlash card (min. 8 GB). The PPC725 system is then automatically configured after it has been switched on for the first time. This procedure takes approximately 30 minutes, and the device will be rebooted a number of times.

7.4 Drivers

All drivers required for operation are preinstalled on the operating system. If an older driver version is installed, the latest version can be downloaded from the B&R homepage (**www.br-automation.com**) and installed. A potentially activated "Enhanced Write Filter (EWF)" must be taken into consideration.

7.4.1 Touch screen driver

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

The touch screen driver must be installed manually if a touch controller was not detected during the Windows Embedded Standard 7 setup or if a an Automation Panel 800/900 has been connected after setup. The driver can be downloaded from the download area on the B&R homepage (**www.br-automation.com**). A potentially activated "Enhanced Write Filter (EWF)" must be taken into consideration.

Information:

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

8. Panel PC 725 with Windows CE

Model number	Short description	Note
5SWWCE.0829-ENG	**WinCE6.0 Pro PPC700 945GME XTX** Microsoft OEM Windows CE 6.0, Professional, English; for PPC700 945GME; order CompactFlash separately (at least 128 MB).	

Table 96: Model numbers - Windows CE

8.1 General Information

B&R Windows CE is an operating system which is optimally tailored to B&R's devices. It includes only the functions and modules which 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 Windows CE 6.0 features

Detailed information about Windows CE for B&R devices can be downloaded in the download area on the B&R homepage (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 65536 colors[1)]
Graphics card driver	Intel® embedded graphics driver
Main memory	Automatic detection and use of up to 512 MB RAM
Boot time / Startup time	Approx. 20 seconds
Screen rotation	not supported
Web browser	Internet Explorer
.NET	Compact Framework
Image size	Approx. 38 MB[2)] , 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 97: Windows CE 6.0 features

1) The color depth depends on the display used.
2) Use the function *"Compress Windows CE Image"* in the B&R Embedded OS Installer to reduce the image size.

8.3 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).

8.4 Installation

Windows CE is usually preinstalled at the B&R plant.

8.4.1 B&R Embedded OS Installer

The B&R Embedded OS Installer allows you to install existing B&R Windows CE images. The four files (NK.BIN, BLDR, LOGOXRES.BMP, and LOGOQVGA.BMP) must be provided from an already functioning B&R Windows CE installation.

The B&R Embedded OS Installer can be downloaded from the download area on the B&R homepage (**www.br-automation.com**). Further information is available in the online help for the B&R Embedded OS Installer.

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

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

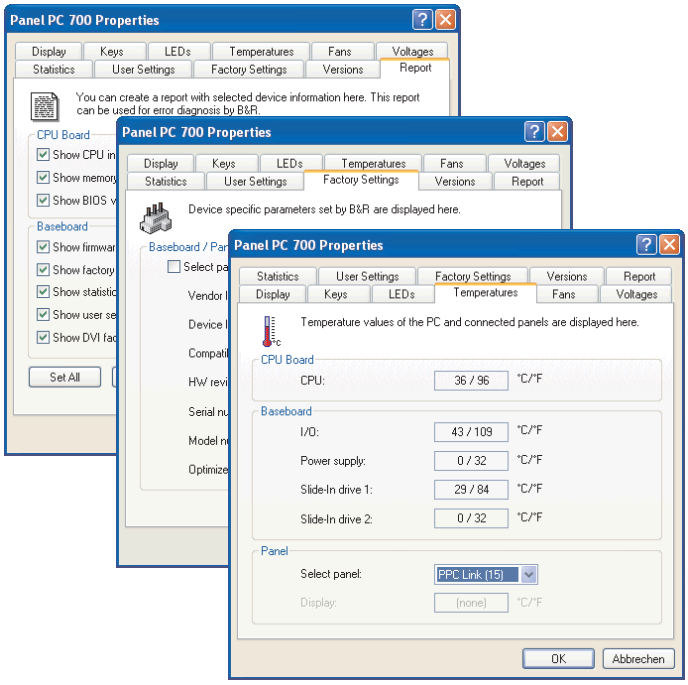


Figure 70: ADI Control Center screenshots (Version 1.50) - example

Information:

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

Features (device dependent):

- Adjusting the display brightness of connected Panels
- Reading of device-specific keys
- Activation of device specific LEDs on a foil keypad
- Reading temperatures, fan speeds, and statistical data
- Reading user settings and factory settings
- Reading software versions
- Updating and securing firmware
- Creating reports about the current system (support assistance)
- Setting the SDL equalizer value for the SDL cable adjustment
- Change the user serial ID.

Supports following systems:

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

9.1 Installation

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

1. Download and unzip the ZIP archive

2. Close all applications

3. Run BrSetup.exe (e.g. double-click on it in Explorer).

- or -

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

Information:

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

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

Chapter 5 • Accessories

1. Overview

Model number	Short description	Note
0AC201.91	**Lithium batteries, 4 pcs**. Lithium batteries, 4 pcs., 3 V / 950 mAh, button cell	
4A0006.00-000	**Lithium battery, 1 pc.** Lithium battery, 1 pc., 3 V / 950 mAh, button cell	
0TB103.9	**Plug 24V 5.08 3-pin screw clamp** 24 VDC 3-pin connector, female. Screw clamps, 2.5 mm², protected against vibration by the screw flange	
0TB103.91	**Plug 24V 5.08 3-pin cage clamp** 24 VDC 3-pin connector, female. Cage clamps, 2.5 mm², protected against vibration by the screw flange	
5CFCRD.0512-04	**CompactFlash 512 MB B&R** CompactFlash card with 512 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.1024-04	**CompactFlash 1024 MB B&R** CompactFlash card with 1024 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.2048-04	**CompactFlash 2048 MB B&R** CompactFlash card with 2048 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.4096-04	**CompactFlash 4096 MB B&R** CompactFlash card with 4096 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.8192-04	**CompactFlash 8192 MB B&R** CompactFlash card with 8192 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.016G-04	**CompactFlash 16 GB B&R** CompactFlash card with 16 GB SLC NAND flash and IDE/ATA interface	
5CFCRD.0064-03	**CompactFlash 64 MB SSI** CompactFlash card with 64 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.0128-03	**CompactFlash 128 MB SSI** CompactFlash card with 128 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.0256-03	**CompactFlash 256 MB SSI** CompactFlash card with 256 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.0512-03	**CompactFlash 512 MB SSI** CompactFlash card with 512 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.1024-03	**CompactFlash 1024 MB SSI** CompactFlash card with 1024 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.2048-03	**CompactFlash 2048 MB SSI** CompactFlash card with 2048 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.4096-03	**CompactFlash 4096 MB SSI** CompactFlash card with 4096 MB SLC NAND flash and IDE/ATA interface	

Table 98: Model numbers - Accessories

Model number	Short description	Note
5CFCRD.8192-03	**CompactFlash 8192 MB SSI** CompactFlash card with 8192 MB SLC NAND flash and IDE/ATA interface	
5MMUSB.2048-00	**USB flash drive 2 GB SanDisk** USB 2.0 flash drive 2 GB	
5MMUSB.2048-01	**USB flash drive 2 GB B&R** USB 2.0 flash drive 2 GB	
5SWHMI.0000-00	**HMI Drivers & Utilities DVD**	

Table 98: Model numbers - Accessories

2. Replacement CMOS batteries

The lithium battery is needed for buffering the BIOS and real-time clock.

The battery is subject to wear and must be replaced when the battery power ("Bad" status) is insufficient (see "Changing the battery", on page 185).

2.1 Order data

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

Table 99: Order data - Lithium batteries

2.2 Technical data

Warning!

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

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

Information:

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

Features	0AC201.91	4A0006.00-000
Capacity	950 mAh	
Voltage	3 V	
Self discharge at 23°C	< 1% per year	
Storage time	Max. 3 years at 30°C	

Table 100: Technical data - Lithium batteries

Environmental characteristics	0AC201.91	4A0006.00-000
Storage temperature	-20 to +60°C	
Relative humidity	0 to 95%, non-condensing	

Table 100: Technical data - Lithium batteries (Forts.)

3. Supply voltage connector (TB103 3-pin)

3.1 General Information

This single row 3-pin terminal block is mainly used to connect the supply voltage.

3.2 Order data

Model number	Description	Image
0TB103.9	Plug for the 24 V supply voltage (screw clamps)	0TB103.9
0TB103.91	Plug for the 24 V supply voltage (cage clamps)	0TB103.91

Table 101: Order data - TB103

3.3 Technical data

Information:

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

Name	0TB103.9	0TB103.91
Number of pins	3	
Type of terminal	Screw clamps	Cage clamps
Distance between contacts	5.08 mm	

Table 102: TB103 Technical data

Name	0TB103.9	0TB103.91
Resistance between contacts	≤ 5 mΩ	
Nominal voltage according to VDE / UL,CSA	250 V / 300 V	
Current load according to VDE / UL,CSA	14.5 A / 10 A per contact	
Terminal size	0.08 mm² - 3.31 mm²	
Cable type	Copper wires only (no aluminum wires!)	

Table 102: TB103 Technical data (Forts.)

4. CompactFlash cards 5CFCRD.xxxx-04

4.1 General Information

Information:

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

See chapter 3 "Commissioning", section 6 "Known problems / issues", on page 68.

Information:

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

4.2 Order data

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

Table 103: Order data - CompactFlash cards

4.3 Technical data

Caution!

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

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

Information:

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

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

Table 104: Technical data - CompactFlash cards 5CFCRD.xxxx-04

Support	5CFCRD.0512-04	5CFCRD.1024-04	5CFCRD.2048-04	5CFCRD.4096-04	5CFCRD.8192-04	5CFCRD.016G-04
Hardware	PP300/400, PPC300, PPC700, PPC725, PPC800, APC620, APC810, APC820					
Windows XP Professional	-	-	-	Yes	Yes	Yes
Windows XP Embedded	Yes	Yes	Yes	Yes	Yes	Yes
Windows Embedded Standard 2009	No	Yes	Yes	Yes	Yes	Yes
Windows CE 6.0	Yes	Yes	Yes	Yes	Yes	Yes [5)]
Windows CE 5.0	-	-	-	-	-	-
PVI Transfer Tool	V3.2.3.8 (part of PVI Development Setup V2.06.00.3011)					-
B&R Embedded OS Installer	V3.10					-
Mechanical characteristics						
Dimensions Length Width Thickness	 36.4 ±0.15 mm 42.8 ±0.10 mm 3.3 ±0.10 mm					
Weight	10 g					
Environmental characteristics						
Ambient temperature Operation Storage Transport	 0 to +70°C -65 to +150°C -65 to +150°C					
Relative humidity Operation/Storage/Transport	 Max. 85% at 85°C					
Vibration Operation/Storage/Transport	 20 G peak, 20- 2000 Hz, 4 in each direction (JEDEC JESD22, method B103) 5.35 G RMS, 15 min per level (IEC 68-2-6)					
Shock Operation/Storage/Transport	 1.5k G peak, 0.5 ms 5 times (JEDEC JESD22, method B110) 30 G, 11 ms 1 time (IEC 68-2-27)					
Altitude	Max. 15,000 feet (4,572 m)					

Table 104: Technical data - CompactFlash cards 5CFCRD.xxxx-04 (Forts.)

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

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

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

4) Depending on the average file size.

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

4.3.1 Temperature humidity diagram - Operation and storage

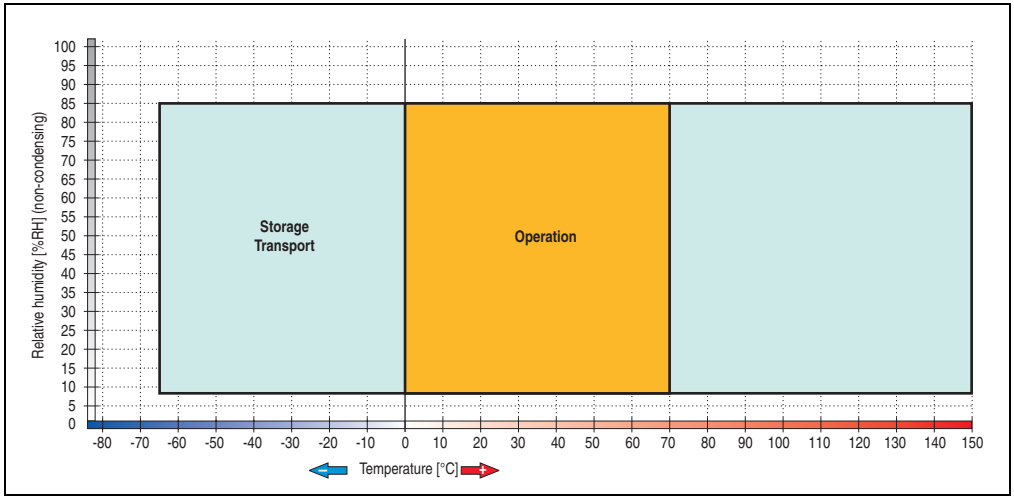


Figure 71: Temperature humidity diagram - CompactFlash cards 5CFCRD.xxxx-04

4.4 Dimensions

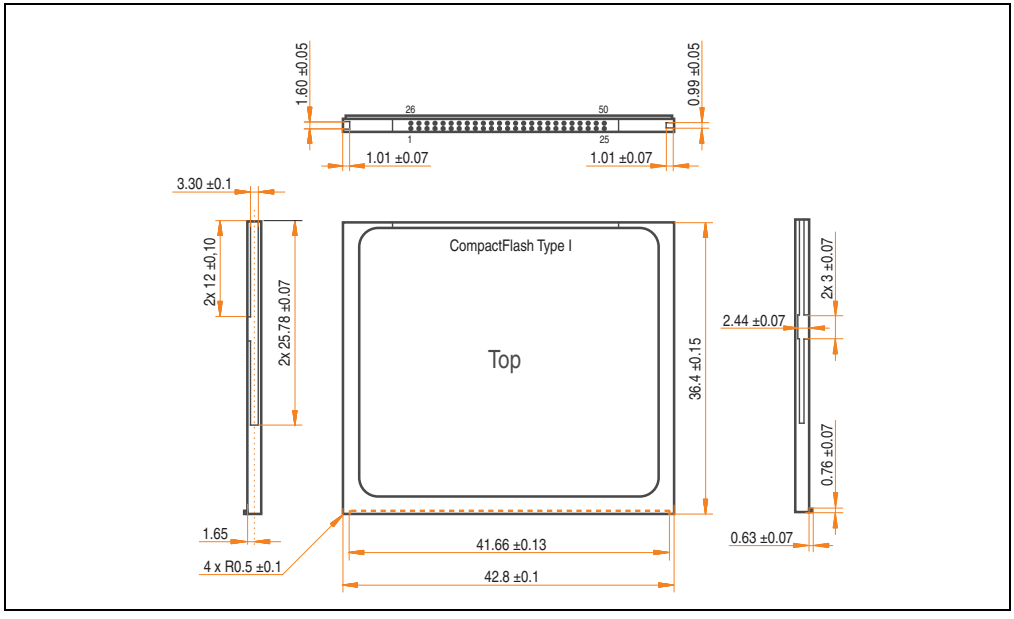


Figure 72: Dimensions - CompactFlash card Type I

4.5 Benchmark

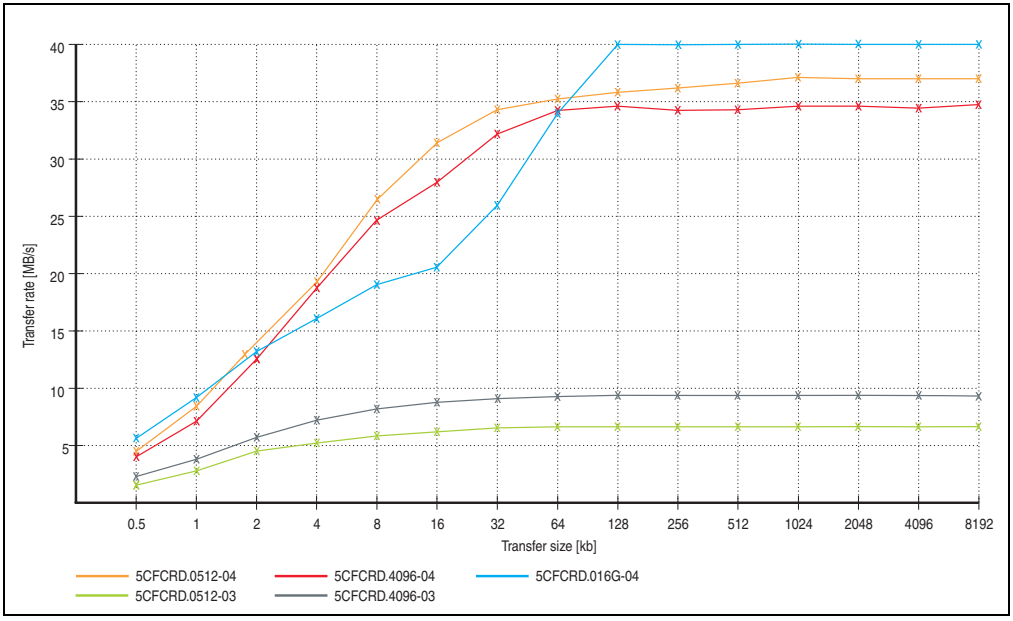


Figure 73: ATTO disk benchmark v2.34 comparison (reading)

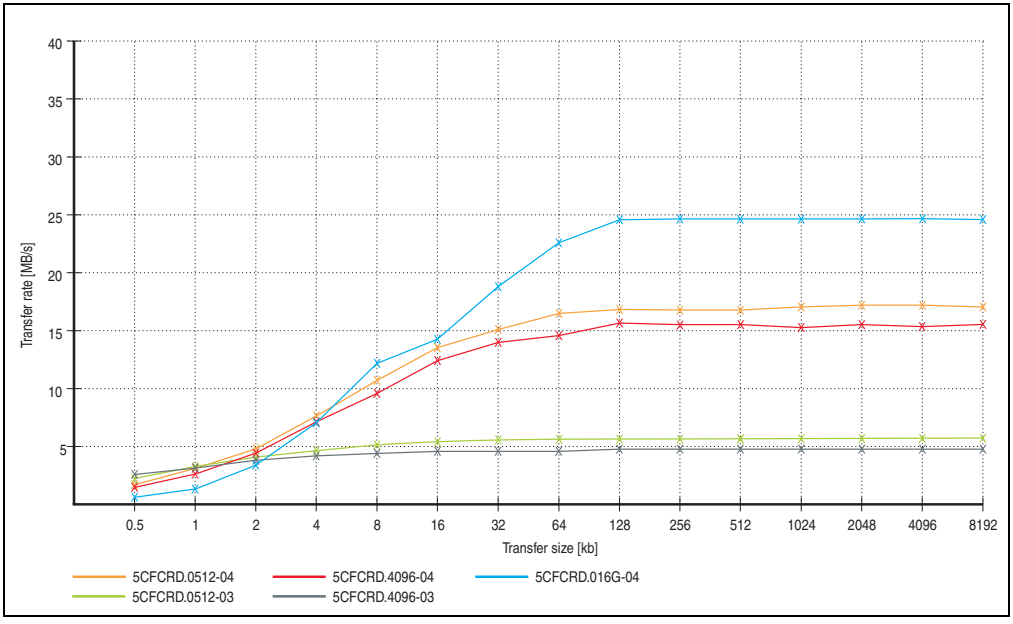


Figure 74: ATTO disk benchmark v2.34 comparison (writing)

5. CompactFlash cards - 5CFCRD.xxxx-03

5.1 General Information

Information:

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

See chapter 3 "Commissioning", section 6 "Known problems / issues", on page 68.

Information:

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

5.2 Order data

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

Table 105: Order data - CompactFlash cards

5.3 Technical data

Caution!

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

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

Information:

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

Features	5CFCRD. 0064-03	5CFCRD. 0128-03	5CFCRD. 0256-03	5CFCRD. 0512-03	5CFCRD. 1024-03	5CFCRD. 2048-03	5CFCRD. 4096-03	5CFCRD. 8192-03
MTBF (at 25°C)	> 4,000,000 hours							
Maintenance	None							
Data reliability	< 1 unrecoverable error in 10^{14} bit read accesses							
Data retention	10 years							
Lifetime monitoring	Yes							
Supported operating modes	PIO Mode 0-4, Multiword DMA Mode 0-2							
Continuous reading	Typically 8 MB/s							
Continuous writing	Typically 6 MB/s							
Endurance								
Clear/write cycles Typical	> 2,000,000							
SLC flash	Yes							
Wear leveling	Static							
Error Correction Coding (ECC)	Yes							
Support								
Hardware	MP100/200, PP100/200, PP300/400, PPC300, PPC700, PPC725, PPC800 Provit 2000, Provit 5000, APC620, APC680, APC810, APC820							
Windows XP Professional	-	-	-	-	-	-	Yes	Yes
Windows XP Embedded	-	-	-	Yes	Yes	Yes	Yes	Yes
Windows Embedded Standard 2009	No	No	No	No	Yes	Yes	Yes	Yes
Windows CE 6.0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 106: Technical data - CompactFlash cards 5CFCRD.xxxx-03

Support	5CFCRD. 0064-03	5CFCRD. 0128-03	5CFCRD. 0256-03	5CFCRD. 0512-03	5CFCRD. 1024-03	5CFCRD. 2048-03	5CFCRD. 4096-03	5CFCRD. 8192-03
Windows CE 5.0	Yes	Yes	Yes	Yes	Yes	-	-	-
PVI Transfer Tool	V2.57 (part of PVI Development Setup V2.5.3.3005)							
B&R Embedded OS Installer	V2.21							
Mechanical characteristics								
Dimensions Length Width Thickness	 36.4 ±0.15 mm 42.8 ±0.10 mm 3.3 ±0.10 mm							
Weight	11.4 g							
Environmental characteristics								
Ambient temperature Operation Storage Transport	 0 to +70°C -50 to +100°C -50 to +100°C							
Relative humidity Operation/Storage/Transport	 8 to 95%, non-condensing							
Vibration Operation Storage/Transport	 Max. 16,3 g (159 m/s^2 0-peak) Max. 30 g (294 m/s^2 0-peak)							
Shock Operation Storage/Transport	 Max. 1000 g (9810 m/s^2 0-peak) Max. 3000 g (29430 m/s^2 0-peak)							
Altitude	Maximum 80,000 feet (24,383 meters)							

Table 106: Technical data - CompactFlash cards 5CFCRD.xxxx-03 (Forts.)

5.3.1 Temperature humidity diagram - Operation and storage

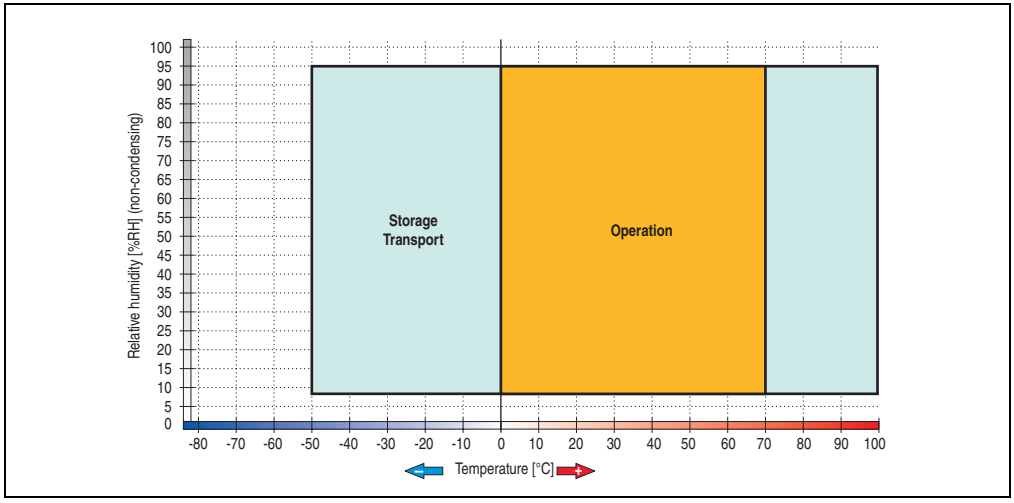


Figure 75: Temperature humidity diagram - CompactFlash cards 5CFCRD.xxxx-03

5.4 Dimensions

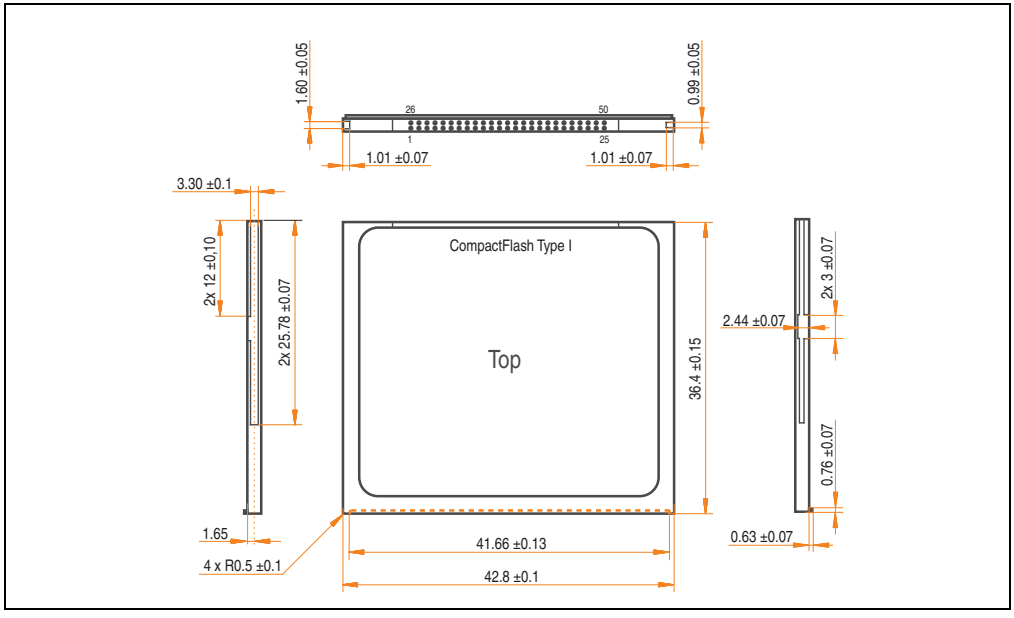


Figure 76: Dimensions - CompactFlash card Type I

6. USB flash drive

Information:

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

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

6.1 General Information

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

6.2 Order data

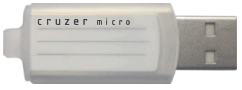
Model number	Description	Image
5MMUSB.2048-00	USB flash drive 2 GB SanDisk Cruzer Micro	
5MMUSB.2048-01	USB flash drive 2 GB B&R	

Table 107: Order data - USB flash drives

6.3 Technical data - 5MMUSB.2048-00

Information:

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

Features	5MMUSB.2048-00
LED	1 LED (green), signals data transfer (send and receive)
Power supply Power consumption	Via the USB port 650 µA in sleep mode, 150 mA read/write
Interface Type Transfer rate Sequential reading Sequential writing Connection	USB specification 2.0 high speed device, mass storage class, USB-IF and WHQL certified USB 1.1 and 2.0 compatible Up to 480 Mbit (high speed) Max. 8.7 MB/second Max. 1.7 MB/second To each USB type A interface
MTBF (at 25°C)	100,000 hours
Data retention	10 years
Maintenance	None
Operating system support	Windows CE 4.2, CE 5.0, ME, 2000, XP and Mac OS 9.1.x+, OS X v10.1.2+
Mechanical characteristics	
Dimensions Length Width Thickness	 52.2 mm 19 mm 7.9 mm
Environmental characteristics	
Ambient temperature Operation Storage Transport	 0 to +45°C -20 to +60°C -20 to +60°C
Relative humidity Operation Storage Transport	 10 to 90%, non-condensing 5 to 90%, non-condensing 5 to 90%, non-condensing
Vibration Operation Storage Transport	 at 10 500 Hz: 2 g (19.6 m/s^2 0-peak), oscillation rate 1/minute At 10 - 500 Hz: 4 g (39.2 m/s^2 0-peak), oscillation rate 1/minute At 10 - 500 Hz: 4 g (39.2 m/s^2 0-peak), oscillation rate 1/minute
Shock Operation Storage Transport	 Max. 40 g (392 m/s^2 0-peak) and 11 ms duration Max. 80 g (784 m/s^2 0-peak) and 11 ms duration Max. 80 g (784 m/s^2 0-peak) and 11 ms duration

Table 108: Technical data - USB flash drive 5MMUSB.2048-00

Features	5MMUSB.2048-00
Altitude	
Operation	3,048 meters
Storage	12,192 meters
Transport	12,192 meters

Table 108: Technical data - USB flash drive 5MMUSB.2048-00 (Forts.)

6.3.1 Temperature humidity diagram

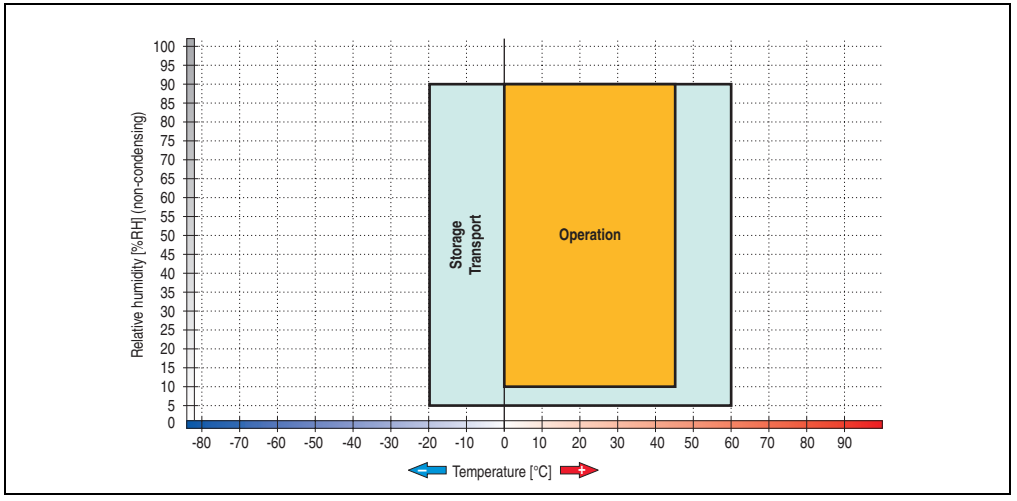


Figure 77: Temperature humidity diagram - USB flash drive - 5MMUSB.2048-00

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

6.4 Technical data - 5MMUSB.2048-01

Information:

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

Features	5MMUSB.2048-01
LED	1 LED (green), signals data transfer (send and receive)
Power supply Power consumption	Via the USB port max. 500 µA sleep mode, max. 120 mA read/write
Interface Type Transfer rate Sequential reading Sequential writing Connection	USB specification 2.0 high speed device, mass storage class, USB-IF and WHQL certified USB 1.1 and 2.0 compatible Up to 480 Mbit (high speed) Max. 31 MB/second Max. 30 MB/second To each USB type A interface
MTBF	> 3,000,000 hours
Data retention	> 10 years
Maintenance	None
Operating system support	Windows CE, ME, 2000, XP, Vista und Mac OS 9 or newer, Linux 2.4 or newer
Mechanical characteristics	
Dimensions Length Width Thickness	 67.85 mm 17.97 mm 8.35 mm
Environmental characteristics	
Ambient temperature Operation Storage Transport	 0 to +70°C -50 to +100°C -50 to +100°C
Relative humidity Operation Storage Transport	 85%, non-condensing 85%, non-condensing 85%, non-condensing
Vibration Operation Storage Transport	 At 20 - 2000 Hz: 20 g (peak) At 20 - 2000 Hz: 20 g (peak) At 20 - 2000 Hz: 20 g (peak)
Shock Operation Storage Transport	 max. 1500 g (peak) max. 1500 g (peak) max. 1500 g (peak)

Table 109: Technical data - USB flash drive 5MMUSB.2048-01

Features	5MMUSB.2048-01
Altitude	
Operation	3,048 meters
Storage	12,192 meters
Transport	12,192 meters

Table 109: Technical data - USB flash drive 5MMUSB.2048-01 (Forts.)

6.4.1 Temperature humidity diagram

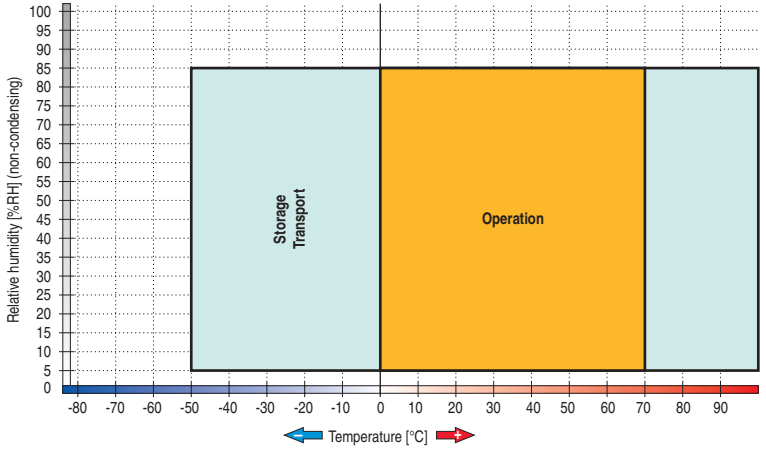


Figure 78: Temperature humidity diagram - USB flash drive - 5MMUSB.2048-01

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

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

Figure 79: HMI Drivers & Utilities DVD 5SWHMI.0000-00

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

Table 110: Model number - HMI Drivers & Utilities DVD

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

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

BIOS upgrades for the products

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

- Provit 5000 products - IPC5000/5600/5000C/5600C
- Power Panel 100 BIOS devices
- Mobile Panel 100 BIOS devices
- Power Panel 100 / Mobile Panel 100 User Boot Logo
- Power Panel 100 / Mobile Panel 100 REMHOST Utility
- Power Panel 300/400 BIOS devices
- Power Panel 300/400 BIOS User Boot Logo
- Panel PC 310

Drivers for the devices

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

Firmware Upgrades

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

Utilities / Tools

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

Windows

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

MCAD templates for

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

ECAD templates for

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

Documentation for

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

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

Service tools

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

Chapter 6 • Maintenance / Servicing

The following section describes service/maintenance work which can be carried out by a trained, qualified user.

1. Changing the battery

The lithium battery buffers the internal real-time clock (RTC) and the CMOS data. The buffer duration of the battery is at least 4 years (at 50°C, 8.5 µA current requirements of the supplied components and a self discharge of 40%).

Information:

- **The product design allows the battery to be changed with the PPC725 switched either on or off. In some countries, safety regulations do not allow batteries to be changed while the module is switched on.**
- **Any BIOS settings that have been made will remain when the battery is changed with the power turned off (stored in non-volatile EEPROM). The date and time must be reset later because this data is lost when the battery is changed.**
- **The battery should only be changed by qualified personnel.**

Warning!

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

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

1.1 Battery check

The battery status (good or bad) is checked every time the device is turned on, as well as every 24 hours. The check involves applying a load to the battery for a short time (approx. 1 second), followed by an evaluation. The evaluated battery status is displayed in the BIOS Setup pages and in the B&R Control Center (ADI driver), but can also be read in a customer application via the ADI Library.

Battery status	Meaning
OK	Data buffering is guaranteed
Bad	Data buffering is guaranteed for approx. another 500 hours from the point in time that the battery capacity is determined to be BAD (insufficient).

Table 111: Meaning of battery status OK - Bad

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

The following replacement lithium batteries are available:

- 4A0006.00-000 (1 piece)
- 0AC201.91 (4 pcs.)

1.2 Procedure

- Disconnect the power supply to the Panel PC 725 (also see information on page 185).
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Remove the CF battery cover and carefully pull out the battery using removal strips.
- Insert the new battery with correct polarity. The battery should not be held by its edges. Insulated tweezers may also be used for inserting the battery.

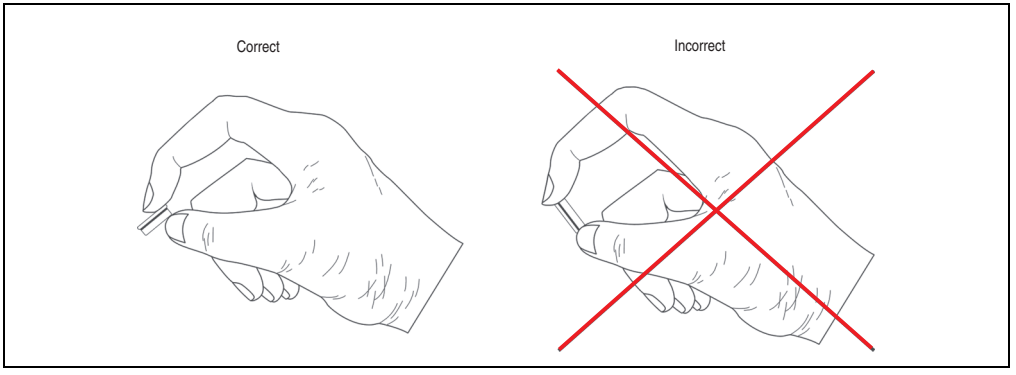


Figure 80: Battery handling

- To make the next battery change easier, be sure the removal strip is in place when inserting battery.
- Re-attach the CF battery cover.
- Reconnect the power supply to the Panel PC 725 by plugging the power cable back in and pressing the power button (also see information on page 185).
- Reset the data and time in BIOS (see information on page 185).

Warning!

Lithium batteries are considered hazardous waste. Used batteries should be disposed of according to local requirements.

Appendix A

1. Temperature sensor locations

Temperature sensors monitor the temperature at different places in the PPC725 (CPU internal, CPU board, power supply, board I/O). The temperatures[1)] can be read in BIOS (menu item "Advanced" - Baseboard/panel features - Baseboard monitor) or in Microsoft Windows XP/Embedded or Windows Embedded Standard 2009, using the B&R Control Center[2)] .

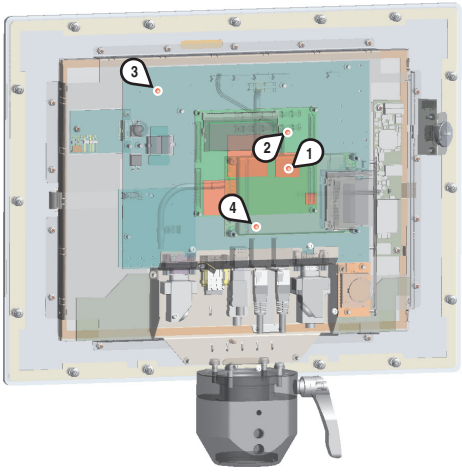


Figure 81: Temperature sensor locations

Position	Measurement point for	Monitoring	Max. specified
1	CPU internal	Processor temperature (sensor integrated on 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 112: Temperature sensor locations

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

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

2. Maintenance Controller Extended (MTCX)

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

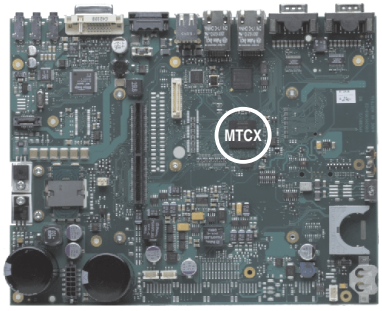


Figure 82: MTCX controller location

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

- Power on (power OK sequencing) and power fail logic
- Watchdog handling (NMI and reset handling)
- Temperature monitoring (CPU internal, CPU board, power supply, board I/O)
- Panel locking mechanism (configurable using B&R Control Center - ADI driver)
- Statistical data recording (power cycles - each power on, power on and fan hours are recorded - every full hour is counted e.g. 50 minutes no increase)

The functions of the MTCX can be expanded via Firmware upgrade[1)] . The version can be read in BIOS (menu item "advanced" - baseboard/panel features) or in Microsoft Windows XP/embedded, using B&R Control Center.

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

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

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

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

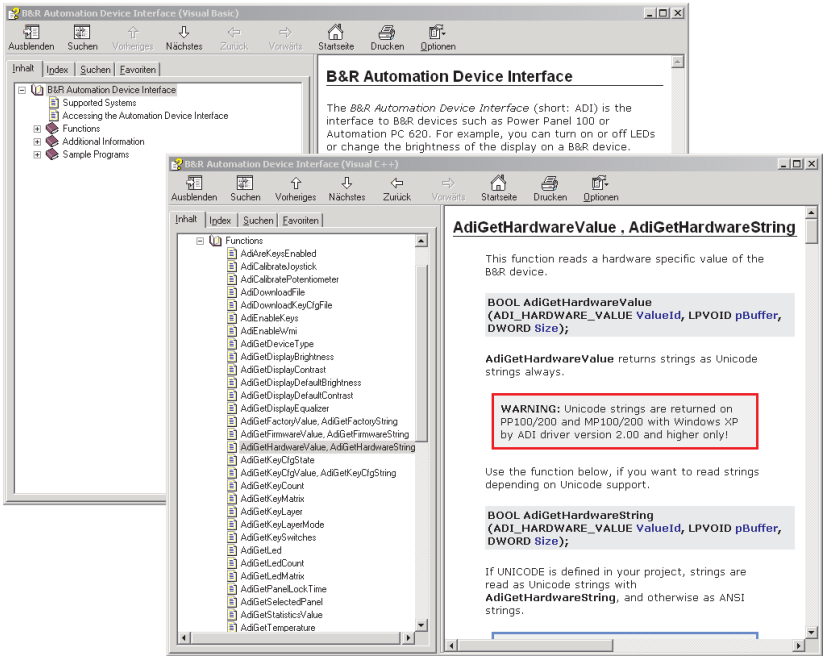


Figure 83: ADI development kit screenshots (Version 3.10)

Features:

- One Microsoft Visual Basic module with declarations for the ADI functions.
- Header files and import libraries for Microsoft Visual C++ 6.0 and Microsoft eMbedded Visual C++ 4.0.
- Help files for Visual Basic and Visual C++.
- Sample projects for Visual Basic and Visual C++.
- ADI DLL (for testing the applications, if no ADI driver is installed).

Supports following systems (Version 3.10 and higher):

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

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

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

The B&R Automation Device Interface (ADI) development kit can be downloaded for free from the download area on the B&R homepage (**www.br-automation.com**).

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

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

Supported programming languages:

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

System requirements:

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

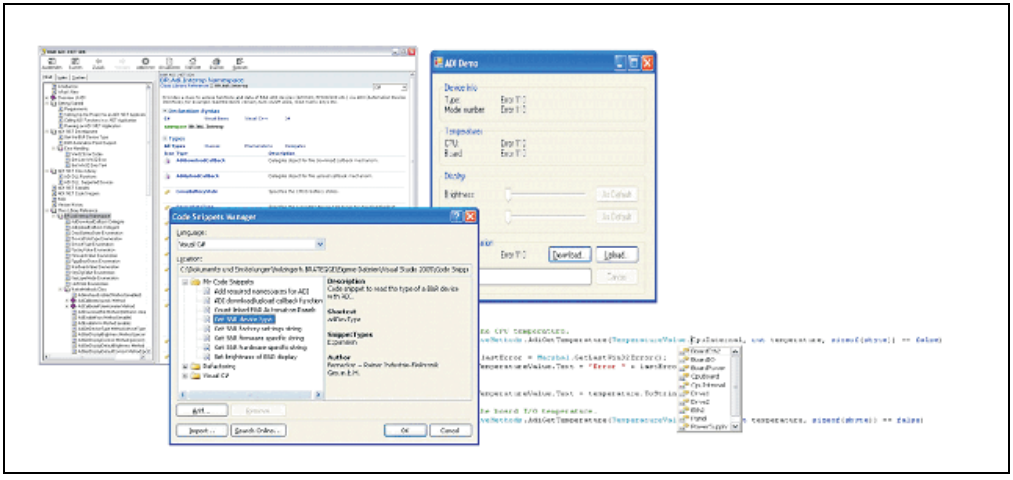


Figure 84: ADI .NET SDK Screenshots (Version 1.30)

Features:

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

Supports following systems (Version 1.30 and higher):

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

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

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

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

5. Touch Screen - Elo Accu Touch

Information:

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

Elo Accu touch screen	Specifications
Manufacturer	Elo
Accuracy For < 18" diagonals For > 18" diagonals	 Typically < than 0.080 inches (2.032 mm) Maximum error in all directions 0.180 inches (4.752 mm) Maximum 1% of the diagonal for the active area of the touch screens
Response time	< 10 ms
Release pressure	< 113 grams
Resolution	4096 x 4096 touch points
Light permeability	Up to 80% ± 5%
Temperature Operation Storage Transport	 - 10°C to + 50°C - 40°C to + 71°C - 40°C to + 71°C
Relative humidity Operation Storage Transport	 Max. 90% at max. 35°C Max. 90% at max. 35°C for 240 hours, non-condensing Max. 90% at max. 35°C for 240 hours, non-condensing
Waterproofing	IP65
Service life	35 million touch operations on the same point
Chemical resistance [1)]	Acetone, ammonia-based glass cleaner, normal food and drinks, hexane, methylene chloride, methyl ethyl ketone, mineral spirits, turpentine, isopropyl alcohol
Activation	Finger, pointer, credit card, glove
Drivers	Touch screen drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**). Additionally, they can also be found on the B&R HMI Drivers and Utilities DVD (Mod. No. 5SWHMI.0000-00).

Table 113: Technical data - Elo Accu Touch

1) The active area of the touch screen is resistant to these chemicals for a timeframe of one hour at 21°C.

5.1 Temperature humidity diagram - Operation and storage

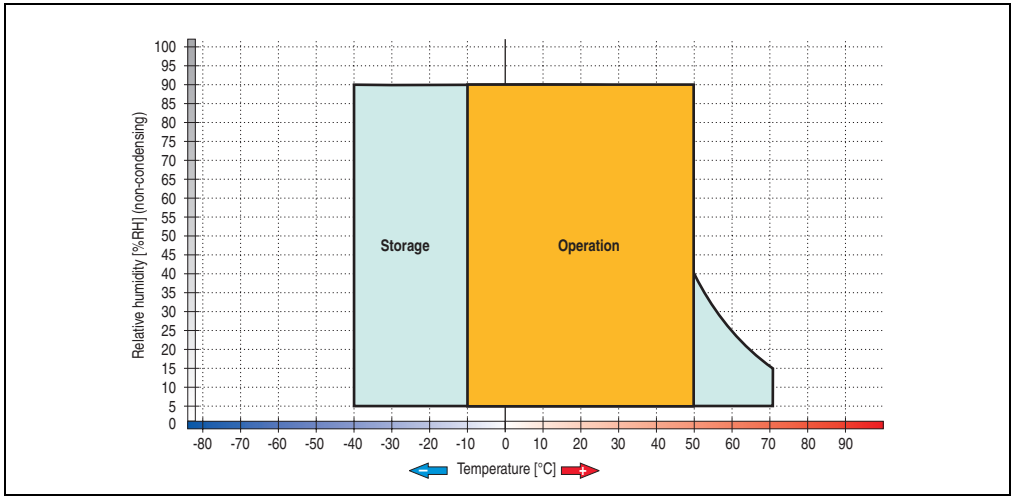


Figure 85: Temperature humidity diagram - Elo Accu touch screen 5-wire

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

5.2 Cleaning

The touch screen should be cleaned with a moist lint-free cloth. When moistening the cloth, use only water with detergent, screen cleaning agent, or alcohol (ethanol). The cleaning agent should be applied to the cloth beforehand and not sprayed directly onto the touch screen itself. Never use aggressive solvents, chemicals, or scouring agents.

6. Membrane

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

Information:

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

<table>
<tr><td>Ethanol
Cyclohexanol
Diacetone alcohol
Glycol
Isopropanol
Glycerine
Methanol
Triacetin
Dowandol
DRM/PM</td><td>Formaldehyde 37 - 42%
Acetaldehyde
Aliphatic hydrocarbons
Toluene
Xylene
White spirits</td><td>Trichloroethane
Ethyl acetate
Diethyl ether
N-Butyl acetate
Amyl acetate
Butylcellosolve
Ether</td></tr>
<tr><td>Acetone
Methyl ethyl ketone
Dioxan
Cyclohexanone
MIBK
Isophorone</td><td>Formic acid <50%
Acetic acid <50%
Phosphoric acid <30%
Hydrochloric acid <36%
Nitric acid <10%
Trichloracetic acid <50%
Sulphuric acid <10%</td><td rowspan="2">Sodium hypochlorite <20%
Hydrogen peroxide <25%
Potassium carbonate
Washing agents
Tenside
Fabric conditioner
Ferrous chloride (FeCl2)
Ferrous chloride (FeCl3)
Dibutyl phthalate
Dioctyl phthalate
Sodium carbonate</td></tr>
<tr><td>Ammonia <40%
Caustic soda <40%
Potassium hydroxide
Alkali carbonate
Bichromate
Potassium
Acetonitrile
Sodium bisulphate</td><td>Cutting oil
Diesel oil
Linseed oil
Paraffin oil
Blown castor oil
Silicon oil
Turpentine oil substitute
Universal brake fluid
Aviation fuel
Gasoline
Water
Sea water
Decon</td></tr>
</table>

Table 114: Chemical resistance of the décor foil

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

7. Viewing angles

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

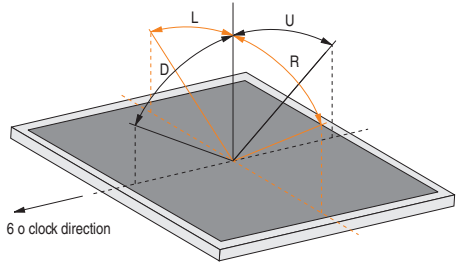


Figure 86: Viewing angle definition

8. Glossary

A

ACPI

Abbreviation for "**A**dvanced **C**onfiguration and **P**ower **I**nterface". Configuration interface that enables the operating system to control the power supply for each device connected to the PC. With ACPI, the computer's BIOS is only responsible for the details of communication with the hardware.

ADI

Abbreviation for »Automation Device Interface« The ADI interface allows access to specific functions (e.g. brightness control, firmware updates, static value read) of B&R devices. The settings can be read or changed in the Control Panel with the B&R Control Center Applet (already included in the B&R embedded operating system).

APC

An abbreviation for "**A**utomation **PC**".

API

Abbreviation for "**A**pplication **P**rogram **I**nterface" The interface, which allows applications to communicate with other applications or with the operating system.

Automation Runtime

A uniform runtime system for all B&R automation components.

B

Baud rate

Measurement unit for data transfer speed. It indicates the number of states for a transferred signal per second and is measured using the baud unit of measurement. 1 baud = 1 bit/sec or 1 bps.

BIOS

An abbreviation for "**B**asic **I**nput/**O**utput **S**ystem". Core software for computer systems with essential routines for controlling input and output processes on hardware components, for performing tests after system start and for loading the operating system. Although BIOS is used to configure a system's performance, the user does not usually come into contact with it.

Bit

Binary digit > binary position, binary character, smallest discrete unit of information. A bit can have the value 0 or 1.

Bit rate

The number of bits that can be transferred within a specified time unit. 1 bit/sec = 1 baud.

Bootstrap loader

A program that automatically runs when the computer is switched on or restarted. After some basic hardware tests have been carried out, the bootstrap loader starts a larger loader and hands over control to it, which in turn boots the operating system. The bootstrap loader is typically found in ROM on the computer.

Byte

Data format [1 byte = 8 bits] and a unit for characterizing information amounts and memory capacity. The following units are the commonly used units of progression: KB, MB, GB.

B&R Automation Runtime

Windows-based program for creating installation disks to install B&R Automation Runtime™ on the target system.

C

Cache

Background memory, also known as non-addressable memory or fast buffer memory. It is used to relieve the fast main memory of a computer. For example, data that should be output to slower components by the working memory (e.g. disk storage, printers) is stored temporarily in cache memory and output from there at an appropriate speed for the target devices.

CAN

An abbreviation for "**C**ontroller **A**rea **N**etwork" (serial bus system). Structure according to ISO 11898; Bus medium: twisted pair. Good transfer properties in short distances less than 40 m with a 1 Mbit/sec data transfer rate. Maximum number of stations: Theoretically unlimited, but practically limited up to 64. Real-time capable (i.e. defined maximum latency times for messages with high priority). High reliability using error detection, error handling, troubleshooting. Hamming distance.

CD-ROM

Abbreviation for "**C**ompact **D**isc **R**ead-**O**nly **M**emory". A removable data medium with a capacity of ~700 MB. CD-ROMs are optically scanned.

CE mark

A CE mark for a product. It consists of the letters "CE" and indicates conformity to all EU guidelines for the labeled product. It indicates that the individual or corporate body who has performed or attached the label assures that the product conforms to all EU guidelines for complete harmonization. It also indicates that all mandatory conformity evaluation procedures have taken place.

CMOS

"CMOS" is a battery powered memory area where fundamental parameters of an IBM (or compatible) personal computer are stored. Information such as the type of hard drive, size of the working memory and the current date and time are required when booting the computer. As the name suggests, the memory is based on CMOS technology standards.

COM

A device name used to access serial ports in MS-DOS. The first serial port can be accessed under COM1, the second under COM2, etc. A modem, mouse, or serial printer is typically connected to a serial port.

COM1

Device name for the first serial port in a PC system. The input/output area for COM1 is usually found at address 03F8H. Generally, the COM1 port is assigned to IRQ 4. In many systems, an RS232 serial mouse is connected to COM1.

COM2

Device name for the second serial port in a PC system. The input/output area for COM2 is usually found at address 02F8H. Generally, the COM2 port is assigned to IRQ 3. In many systems, a modem is connected to COM2.

COM3

Device name for a serial port in a PC system. The input/output area for COM3 is usually found at address 03E8H. Generally, the COM3 port is assigned to IRQ 4. In many systems, COM3 is used as an alternative for COM1 or COM2 if peripheral devices are already connected to COM1 and COM2.

CompactFlash®

CompactFlash memory cards [CF cards] are exchangeable nonvolatile mass memory systems with very small dimensions [43 x 36 x 3.3 mm, approximately half the size of a credit card]. In addition to the flash memory chips, the controller is also present on the cards. CF cards provide complete PC card / ATA functionality and compatibility. A 50-pin CF card can be simply inserted in a passive 68-pin type II adapter card. It conforms to all electrical and mechanical PC card interface specifications. CF cards were launched by SanDisk back in 1994. Currently, memory capacities reach up to 64 GB per unit. Since 1995, CompactFlash Association [CFA] has been looking after standardization and the worldwide distribution of CF technology

CPU

An abbreviation for "**C**entral **P**rocessing **U**nit". Interprets and executes commands. It is also known as a "microprocessor" or "processor" for short. A processor is able to receive, decode and execute commands, as well as transfer information to and from other resources via the computer bus.

CTS

An abbreviation for "**C**lear **T**o **S**end". A signal used when transferring serial data from modem to computer, indicating its readiness to send the data. CTS is a hardware signal which is transferred via line number 5 in compliance with the RS-232-C standard.

D

DCD

An abbreviation for "**D**ata **C**arrier **D**etected". A signal used in serial communication that is sent by the modem to the computer it is connected to, indicating that it is ready for transfer.

Dial-up

Data is transferred over the telephone network using a modem or an ISDN adapter.

DIMM

"Double In-line Memory Module" consisting of one or more RAM chips on a small circuit board that is connected with the motherboard of a computer.

DMA

Direct **M**emory **A**ccess > Accelerated direct access to a computer's RAM by bypassing the CPU.

DRAM

An abbreviation for "**D**ynamic **R**andom **A**ccess **M**emory". Dynamic RAM consists of an integrated semiconductor circuit that stores information based on the capacitor principle. Capacitors lose their charge in a relatively short time. Therefore, dynamic RAM circuit boards must contain a logic that allows continual recharging of RAM chips. Since the processor cannot access dynamic RAM while it is being recharged, one or more waiting states can occur when reading or writing data. Although it is slower, dynamic RAM is used more often than static RAM since the simple design of the circuits means that it can store four times more data than static RAM.

DSR

An abbreviation for "**D**ata **S**et **R**eady". A signal used in serial data transfer, which is sent by the modem to the computer it is connected to, indicating its readiness for processing. DSR is a hardware signal which is sent via line number 6 in compliance with the RS-232-C standard.

DTR

An abbreviation for "**D**ata **T**erminal **R**eady". A signal used in serial data transfer that is sent by the computer to the modem it is connected to, indicating the computer's readiness to accept incoming signals.

DVD

An abbreviation for "**D**igital **V**ersatile **D**isc". The next generation of optical data carrier technology. Using this technology it is possible to encode video, audio and computer data on CD. DVDs can store a higher volume of data than conventional CDs. Standard DVDs, which have a single layer, can hold 4.7 GB. Dual-layer DVDs can hold 8.5 GB. Double-sided DVDs can therefore hold up to 17 GB. A special drive is needed for DVDs. Conventional CDs can also be played on DVD drives.

DVI

Abbreviation for "**D**igital **V**isual **I**nterface" An interface for the digital transfer of video data.

DVI-A

Analog only

DVI-D

Digital only

DVI-I

Integrated, i.e. analog and digital

E

EDID data

Abbreviation for "**E**xtended **D**isplay **I**dentification **D**ata". EDID data contains the characteristics of monitors / TFT displays transferred as 128 KB data blocks to the graphics card via the Display Data Channel (DDC). This EDID data can be used to set the graphics card to the monitor properties.

EIDE

An abbreviation for "**E**nhanced **I**ntegrated **D**rive **E**lectronics". An expansion of the IDE standard. Enhanced IDE is considered the standard for hardware interfaces. This interface is designed for drives with an integrated drive controller.

EMC

"**E**lectro**m**agnetic **C**ompatibility" The ability of a device or a system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment [IEV 161-01-07].

EPROM

Erasable **PROM** > (completely with ultraviolet light).

Ethernet

An IEEE 802.3 standard for networks. Ethernet uses bus or star topology and controls the traffic on communication lines using the access procedure CSMA/CD (Carrier Sense Multiple Access with Collision Detection). Network nodes are connected using coaxial cables, fiber optic cables or twisted pair cabling. Data transfer on an Ethernet network takes place in frames of variable lengths that consist of supply and controller information as well as 1500 bytes of data. The Ethernet standard provides base band transfers at 10 megabit and 100 megabit per second.

Ethernet POWERLINK

An enhancement of standard Ethernet. It enables data exchange under strict real-time conditions with cycle times down to 200 µs and jitter under 1 µs. This makes Ethernet power available on all communication levels of automation technology – from control levels to I/O. Ethernet POWERLINK was initiated by the company B&R Industrie-Elektronik and is now managed by the open end user and vendor association, EPSG - Ethernet POWERLINK Standardization Group (**www.ethernet-powerlink.org**).

F

FDD

Abbreviation for "**F**loppy **D**isk **D**rive". Reading device for removable magnetic memory from the early days of PC technology. Due to their sensitivity and moving components, FDDs have been almost completely replaced by CompactFlash memory in modern automation solutions.

FIFO

An abbreviation for "**F**irst **I**n **F**irst **O**ut". A queuing organization method whereby elements are removed in the same order as they were inserted. The first element inserted is the first one removed. Such an organization method is typical for a list of documents that are waiting to be printed.

Firmware

Programs stored permanently in read-only memory. Firmware is software used to operate computer-controlled devices that generally stays in the device throughout its lifespan or over a long period of time. Such software includes operating systems for CPUs and application programs for industrial PCs as well as programmable logic controllers (e.g. the software in a washing machine controller). This software is written in read-only memory (ROM, PROM, EPROM) and cannot be easily replaced.

Floppy

Also known as a diskette. A round plastic disk with an iron oxide coating that can store a magnetic field. When the floppy disk is inserted in a disk drive, it rotates so that the different areas (or sectors) of the disk's surface are moved under the read/write head. This allows the magnetic orientation of the particle to be modified and recorded. Orientation in one direction represents binary 1, while the reverse orientation represents binary 0.

FPC

An abbreviation for "**F**lat **P**anel **C**ontroller".

FPD

An abbreviation for "**F**lat **P**anel **D**isplay".

FTP

"**F**ile **T**ransfer **P**rotocol" Rules for transferring data over a network from one computer to another computer. This protocol is based on TCP/IP, which has established itself as the standard for transferring data over Ethernet networks. FTP is one of the most used protocols on the Internet. It is defined in RFC 959 in the official regulations for Internet communication.

G

GB

Gigabyte (1 GB = 230 or 1,073,741,824 Bytes)

H

Handshake

Method of synchronization for data transfer when data is sent at irregular intervals. The sender signals that data can be sent, and the receiver signals when new data can be received.

HDD

An abbreviation for "**H**ard **D**isk **D**rive". Fixed magnetic mass memory with high capacities, e.g. 120 GB.

I

IDE

An abbreviation for "**I**ntegrated **D**rive **E**lectronics". A drive interface where the controller electronics are integrated in the drive.

Interface

From the hardware point of view, an interface is the connection point between two modules/devices/systems. The units on both sides of the interface are connected by the interface lines so that data, addresses, and control signals can be exchanged. The term interface includes all functional, electrical and constructive conditions [encoding, signal level, pin assignments] that characterize the connection point between the modules, devices, or systems. Depending on the type of data transfer, a differentiation is made between parallel [e.g. Centronics, IEEE 488] and serial interfaces [e.g. V.24, TTY, RS232, RS422, RS485], which are set up for different transfer speeds and transfer distances. From the point of view of software, the term "interface" describes the transfer point between program modules using specified rules for transferring the program data.

ISA

An abbreviation for "**I**ndustry **S**tandard **A**rchitecture". A term given for the bus design which allows expansion of the system with plug-in cards that can be inserted in PC expansion slots.

ISO

International Organization for Standardization > Worldwide federation of national standardization institutions from over 130 countries. ISO is not an acronym for the name of the organization; it is derived from the Greek word "isos", meaning "equal" (**www.iso.ch**).

J

Jitter

Jitter is a term that describes time deviations of cyclic events. If, for example, an event should take place every 200ìs and it actually occurs every 198 to 203ìs, then the jitter is 5ìs. Jitter has many causes. It originates in the components and transfer media of networks because of noise, crosstalk, electromagnetic interference and many other random occurrences. In automation technology, jitter is a measure of the quality of synchronization and timing.

Jumper

A small plug or wire link for adapting the hardware configuration used to connect the different points of an electronic circuit.

L

LCD

An abbreviation for "**L**iquid **C**rystal **D**isplay". A display type, based on liquid crystals that have a polarized molecular structure and are enclosed between two transparent electrodes as a thin layer. If an electrical field is applied to the electrodes, the molecules align themselves with the field and form crystalline arrangements that polarize the light passing through. A polarization filter, which is arranged using lamellar electrodes, blocks the polarized light. In this way, a cell (pixel) containing liquid crystals can be switched on using electrode gates, thus coloring this pixel black. Some LCD displays have an electroluminescent plate behind the LCD screen for lighting. Other types of LCD displays can use color.

LED

An abbreviation for "**L**ight **E**mitting **D**iode". A semiconductor diode which converts electrical energy into light. LEDs work on the principle of electroluminescence. They are highly efficient because they do not produce much heat in spite of the amount of light they emit. For example, "operational status indicators" on floppy disk drives are LEDs.

LPT

Logical device name for line printers. In MS-DOS, names are reserved for up to three parallel printer ports with the names LPT1, LPT2 and LPT3. The first parallel port (LPT1) is usually identical to the primary parallel output device PRN (in MS-DOS the logical device name for the printer). The abbreviation LPT stands for "Line Printer Terminal".

Fiber optics

Fiber optic cable

M

MB

Megabyte (1 MB = 220 or 1,048,576 bytes).

Microprocessor

Highly integrated circuit with the functionality of a CPU, normally housed on a single chip. It comprises a control unit, arithmetic and logic unit, several registers and a link system for connecting memory and peripheral components. The main performance features are the internal and external data bus and address bus widths, the command set and the clock frequency. Additionally, a choice can be made between CISC and RISC processors. The first commercially available worldwide microprocessor was the Intel 4004. It came on the market in 1971.

MIPS

Million instructions per second > Measurement for the computing speed of computers.

Motherboard

A circuit board that houses the main components of a computer such as the CPU switching circuit, co-processors, RAM, ROM for firmware, interface circuits, and expansion slots for hardware expansions.

MTBF

An abbreviation for "**M**ean **t**ime **b**etween **f**ailure". The average time which passes before a hardware component fails and repair is needed. This time is usually expressed in thousands or ten thousands of hours, sometimes known as power-on hours (POH).

MTC

An abbreviation for "**M**ain**t**enance **C**ontroller". The MTC is an independent processor system that provides additional functions for a B&R industrial PC that are not available with a normal PC. The MTC communicates with the B&R industrial PC via the ISA bus (using a couple register).

MTCX

An abbreviation for »**M**ain**t**enance **C**ontroller E**X**tended«. The MTCX is an independent processor system that provides additional functions for a B&R industrial PC that are not available with a normal PC. The MTC communicates with the B&R industrial PC via the ISA bus (using a couple register).

Multitasking

Multitasking is an operating mode in an operating system that allows several computer tasks to be executed virtually simultaneously.

O

OEM

Abbreviation for "**O**riginal **E**quipment **M**anufacturer"; A company that integrates third-party and in-house manufactured components into their own product range and then distributes these products under its own name.

OPC

OLE for Process Control > A communication standard for components in the area of automation. The goal of OPC development is to provide an open interface that builds on Windows-based technologies such as OLE, COM and DCOM. It allows problem-free standardized data transfer between controllers, operating and monitoring systems, field devices and office applications from different manufacturers. This development is promoted by the OPC Foundation, which is made up of over 200 companies from around the world, including Microsoft and other leading companies. Nowadays, OPC is also interpreted as a synonym for Openness, Productivity and Connectivity, symbolizing the new possibilities that this standard opens up.

OPC server

The missing link between connection modules for the Interbus and the visualization application. It communicates serially with the connection modules via the ISA or PCI bus or Ethernet.

P

Panel

A common term for B&R display units (with or without keys).

PCI Bus

Abbreviation for "**P**eripheral **C**omponent **I**nterconnect bus". Developed by Intel as an intermediary/local bus for the latest PC generations. It is basically a synchronous bus. The main clock of the CPU is used for synchronization. The PCI bus is microprocessor-independent, 32-bit and 64-bit compatible, and supports both 3.3 V and 5 V cards and devices.

PCMCIA

An abbreviation for "**P**ersonal **C**omputer **M**emory **C**ard **I**nternational **A**ssociation". An association of manufacturers and dealers who are dedicated to the cultivation and further development of common standards for peripheral devices based on PC cards with a slot for such cards. PC cards are mainly used for laptops, palmtops (and other portable computers), and intelligent electronic devices. Version 1 of the PCMCIA standard was introduced in 1990.

PLC

Programmable Logic Controller; Computer-based control device that functions using an application program. The application program is relatively easy to create using standardized programming languages [IL, FBD, LAD, AS, ST]. Because of its serial functionality, reaction times are slower compared to connection-oriented control. Today, PLCs are available in device families with matched modular components for all levels of an automation hierarchy.

PnP

An abbreviation for "**P**lug and **P**lay". Specifications developed by Intel. Using Plug and Play allows a PC to automatically configure itself so that it can communicate with peripheral devices (e.g. monitors, modems, and printers). Users can connect a peripheral device (plug) and it immediately runs (play) without having to manually configure the system. A Plug and Play PC requires a BIOS that supports Plug and Play and a respective expansion card.

POH

An abbreviation for "**P**ower **O**n **H**ours". See MTBF.

POST

An abbreviation for "**P**ower-**O**n **S**elf **T**est". A set of routines that are stored in ROM on the computer and that test different system components, e.g. RAM, disk drive and the keyboard in order to determine that the connection is operating correctly and ready for operation. POST routines notify the user of problems that occur. This is done using several signal tones or by displaying a message that frequently accompanies a diagnosis value on the standard output or standard error devices (generally the monitor). If the POST runs successfully, control is transferred over to the system's bootstrap loader.

POWERLINK

See "Ethernet POWERLINK".

PROFIBUS-DP

PROFIBUS for "decentralized peripherals". PROFIBUS DB can be used to allow simple digital and analog I/O modules as well as intelligent signal and data processing units to be installed in the machine room, which among other things can significantly reduce cabling costs. Often used for time-critical factory automation applications.

Protection

The type of protection specifies the protection offered by a housing against touching dangerous parts, penetration of large solid foreign bodies and/or against the entrance of water, verified by standardized testing procedures. In regard to suitability for different environmental conditions, the systems are divided into corresponding types of protection, referred to as *IP* codes. The abbreviation *IP* stands for *International Protection* according to DIN, but is also also known as "Ingress Protection". All of the standards cited here use the "International Protection" definition of IP.

Component	Numbers or letters	Protection of the operating equipment	Protection of personnel
Code letters	**IP**	**-**	**-**
First number		**Penetration of large solid foreign bodies**	**Touching dangerous parts**
	0	(not protected)	(not protected)
	1	50 mm diameter	Back of hand
	2	12.5 mm diameter	Finger
	3	2.5 mm diameter	Tool
	4	1 mm diameter	Line
	5	Protected against dust	Line
	6	Dust-proof	Line
Second number		**Water permeation with damaging consequences**	
	0	(not protected)	
	1	Vertical drops	
	2	Drops (15° slope)	
	3	Water spray	
	4	Water splash	
	5	Water jets	
	6	Strong water jets	
	7	Temporary submersion	
	8	Continual submersion	

Table 115: IP code table

Component	Numbers or letters	Protection of the operating equipment	Protection of personnel
Code letters	**IP**	**-**	**-**
Additional letter (optional)			**Touching dangerous parts with:**
	A		Back of hand
	B		Finger
	C		Tool
	D		Line
Supplemental letter (optional)		**Supplemental information, specially for**	
	H	High-voltage devices	
	M	Movement during water test	
	S	Standstill during water test	
	W	Weather conditions	

Table 115: IP code table

Q

QVGA

Abbreviation for "**Q**uarter **V**ideo **G**raphics **A**rray". Usually a screen resolution of 320 × 240 pixels.

QUXGA

Abbreviation for "**Q**uad **U**ltra E**x**tended **G**raphics **A**rray". Generally a screen resolution of 3200 × 2400 pixels (4:3). Quad implies the 4x greater pixel resolution compared to the UXGA.

QWUXGA

Abbreviation for "**Q**uad **WUXGA**"; Generally a screen resolution of 3840 × 2400 pixels (8:5, 16:10).

R

RAM

An abbreviation for "**R**andom **A**ccess **M**emory". Semiconductor memory which can be read or written to by the microprocessor or other hardware components. Memory locations can be accessed in any order. The various ROM memory types do allow random access, but they cannot be written to. The term RAM refers to a more temporary memory that can be written to as well as read.

Real time

A system is operating in real time or has real-time capability if the input sizes (e.g. signals, data) are received and processed in a defined time period, and the results are made available in real time for a partner system or the system environment. See also "real-time demands" and "real-time system".

ROM

An abbreviation for "**R**ead-**O**nly **M**emory". Semiconductor memory where programs or data were permanently stored during the production process.

RS232

Recommended **S**tandard **N**umber **232**. Oldest and most widespread interface standard, also called a V.24 interface. All signals are referenced to ground making this an unbalanced interface. High level: -3 to -30 V, low level: +3 to +30 V; cable lengths up to 15 m, transfer rates up to 20 kbit/s; for point-to-point connections between 2 stations.

RS422

Recommended **S**tandard **N**umber **422**. Interface standard, balanced operation, increased immunity to disturbances. High level: 2 to -6 V, low level: +2 to +6 V; four-line connection [inverted/non-inverted], permissible cable length up to 1200 m, transfer rates up to 10 Mbit/s, 1 sender can transfer simplex with up to 10 receivers.

RS485

Recommended **S**tandard **N**umber **485**. Interface standard upgraded from RS422. High level: 1.5 to -6 V, low level: +1.5 to +6 V; two-line connection [half-duplex mode] or four-line connection [full-duplex mode]; permissible cable length up to 1200 m, transfer rates up to 10 Mbit/s. Up to 32 stations (sender/receiver) can be connected to an RS485 bus.

RTS

An abbreviation for "**R**equest **T**o **S**end". A signal used in serial data transfer for requesting send permission. For example, it is sent from a computer to the modem connected to it. The RTS signal is assigned to pin 4 according to the hardware specifications of the RS-232-C standard.

RXD

An abbreviation for "Receive (**RX**) **D**ata". A line for transferring serial data received from one device to another, e.g. from a modem to a computer. For connections complying with the RS-232-C standard, the RXD is connected to pin 3 of the plug.

S

SDRAM

An abbreviation for "**S**ynchronous **D**ynamic **R**andom **A**ccess **M**emory". A construction of dynamic semiconductor components (DRAM) that can operate with higher clock rates than conventional DRAM switching circuits. This is made possible using block access. For each access, the DRAM determines the next memory addresses to be accessed.

SFC

Sequential function chart > Graphic input language for PLCs used to represent sequential control.

Slot PLC

PC insert card that has full PLC functionality. On the PC, it is coupled via a DPR with the process using a fieldbus connection. It is programmed externally or using the host PC.

SoftPLC

Synonym for SoftPLC.

SUXGA

Abbreviation for **S**uper **U**ltra **E**xtended **G**raphics **A**rray; Generally a screen resolution of 2048 × 1536 pixels (4:3). An alternative name is QXGA (**Q**uad **E**xtended **G**raphics **A**rray), which is 4x the pixel resolution of XGA.

SVGA

Abbreviation for "**S**uper **V**ideo **G**raphics **A**rray"; Graphics standard with a resolution of at least 800×600 pixels and at least 256 colors.

Switch

Device, similar to a hub, that takes data packets received in a network and, unlike a hub, does not pass them on to all network nodes, instead only to the respective addressee. Unlike a hub, a switch provides targeted communication within a network that only takes place between sender and receiver. Other network nodes are not involved.

SXGA

Abbreviation for Super Extended Graphics Array. Graphics standard with a screen resolution of 1280 × 1024 pixels (aspect ratio 5:4).

SXGA+

Abbreviation for SXGA Plus; Generally 1400 × 1050 pixels.

System units

Provit system units consist of a mainboard (without processor), slots for RAM modules, VGA controller, serial and parallel interfaces, and connections for the FPD, monitor, PS/2 AT keyboard, PS/2 mouse, USB, Ethernet (for system units with Intel Celeron and Pentium III processors), Panelware keypad modules and external FDD.

T

Task

Program unit that is assigned a specific priority by the real-time operating system. It contains a complete process and can consist of several modules.

TCP/IP

Transmission Control Protocol/Internet Suit of Protocols. Network protocol that has become the generally accepted standard for data exchange in heterogeneous networks. TCP/IP is used both in local networks for communication between various computer and also for LAN to WAN access.

TFT display

LCD (Liquid Crystal Display) technology where the display consists of a large grid of LCD cells. Each pixel is represented by a cell, whereby electrical fields produced in the cells are supported by thin film transistors (TFT) that result in an active matrix. In its simplest form, there is exactly one thin film transistor per cell. Displays with an active matrix are generally used in laptops and notebooks because they are thin, offer high-quality color displays and can be viewed from all angles.

Touch screen

Screen with touch sensors for selecting options in a displayed menu using the tip of the finger.

TXD

An abbreviation for "Transmit (**TX**) **D**ata". A line for the transfer of serial data sent from one device to another, e.g. from a computer to a modem. For connections complying with the RS-232-C standard, the TXD is connected to pin 2 of the plug.

U

UART

An abbreviation for "**U**niversal **A**synchronous **R**eceiver-**T**ransmitter". A module generally consisting of a single integrated circuit that combines the circuits required for asynchronous serial communication for both sending and receiving. UART represents the most common type of circuit in modems for connecting to a personal computer.

UDMA

An abbreviation for "**U**ltra **D**irect **M**emory **A**ccess". A special IDE data transfer mode that allows high data transfer rates for drives. There have been many variations in recent times.
UDMA33 mode transfers 33 megabytes per second.
UDMA66 mode transfers 66 megabytes per second.
UDMA100 mode transfers 100 megabytes per second.
Both the mainboard and the hard drive must support the specification to implement modifications.

UPS

Abbreviation for "**U**ninterruptible **P**ower **S**upply". See "UPS".

USB

An abbreviation for "**U**niversal **S**erial **B**us" A serial bus with a bandwidth of up to 12 megabits per second (Mbit/s) for connecting a peripheral device to a microcomputer. Up to 127 devices can be connected to the system using a single multipurpose connection, the USB bus (e.g. external CD drives, printer, modems as well as the mouse and keyboard). This is done by connecting the devices in a row. USB allows devices to be changed when the power supply is switched on (hot plugging) and multi-layered data flow.

UPS

An abbreviation for "**U**ninterruptible **P**ower **S**upply". The UPS supplies power to systems that cannot be connected directly to the power mains for safety reasons because a power failure could lead to loss of data. The UPS allows the PC to be shut down securely without losing data if a power failure occurs.

UXGA

Abbreviation for "**U**ltra **E**xtended **G**raphics **A**rray" Generally a screen resolution of 1600 × 1200 pixels (aspect ratio 4:3, 12:9).

V

VGA

An abbreviation for "**V**ideo **G**raphics **A**dapter". A video adapter which can handle all EGA (Enhanced Graphics Adapter) video modes and adds several new modes.

W

Windows CE

Compact 32-bit operating system with multitasking and multithreading that Microsoft developed especially for the OEM market. It can be ported for various processor types and has a high degree of real-time capability. The development environment uses proven, well-established development tools. It is an open and scalable Windows operating system platform for many different devices. Examples of such devices are handheld PCs, digital wireless receivers, intelligent mobile phones, multimedia consoles, etc. In embedded systems, Windows CE is also an excellent choice for automation technology.

WSXGA

Wide SXGA, generally 1600 × 900 pixels (16:9).

WUXGA

Wide UXGA, generally 1920 × 1200 pixels (16:10).

WXGA

Wide XGA, generally 1280 × 768 pixels.

X

XGA

An abbreviation for "E**X**tended **G**raphics **A**rray". An expanded standard for graphics controllers and monitors that was introduced by IBM in 1990. This standard supports 640x480 resolution with 65,536 colors or 1024x768 resolution with 256 colors. This standard is generally used in workstation systems.

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