Automation PC 620

User's Manual

Version: **2.20 (February 2007)**

Model No.: **MAAPC620-ENG**

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Chapter 1 • General information

Information:

B&R does its best 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
1.0 Preliminary	21.07.2004	- First version
1.1 Preliminary	12.11.2004	- Drilling templates for the APC620 1 and 2 PCI slot variations added. - New overview images added for the APC620 1 and 2 PCI slot variations. - New dimension diagrams added for the APC620 1 and 2 PCI slot variations. - Model number overview revised. - Interface descriptions added (behind the front cover). - "Software" chapter has been updated. - "Accessories" chapter has been updated. - System unit with 5 PCI slots added. - Technical data for all individual components was expanded.
1.2 Preliminary	23.11.2004	- Pictures of the interfaces from the front have been updated. - General descriptions of device interfaces have been revised. - New CPU boards and system units added. - USB media device and fitting front cover added.
1.3 Preliminary	27.12.2004	- New column "My settings" (815E and 855GME BIOS) added to the BIOS profile settings table. - Chapter 7 "Maintenance / servicing" on page 487 added. - APC620 Interface Cover 5AC600.ICOV-00 added (see section "Interface covers 5AC600.ICOV-00" on page 410). - Information for the maximum color depth for the CPU board added. - Error correction in the BIOS description for Legacy Devices Com D, COM E, LPT.

Table 1: Manual history

Version	Date	Change
1.4 Preliminary	07.03.2005	- Image of the slide-in USB diskette drive added (see Figure 56 "Slide-in USB FDD - 5AC600.FDDS-00" on page 137). - Chapter 4 (Software) updated for new BIOS versions. (815E BIOS Version 1.15, 855GME BIOS Version V1.14). - Fan kit (5PC600.HS05-00) for the APC620 system with 5 PCI slots (see section "Fan kit 5 PCI - 5PC600.FA05-00" on page 173) and installation (see section 2.3 "Procedure for APC620 with 5 PCI slots" on page 496) added. - Mounting orientation described more precisely, see chapter 3 "Commissioning", section 1.3 "Mounting orientation" on page 184. - Temperature specifications for the 815E CPU boards added. -Temperature specifications for the 855GME CPU boards added. - Power management of the APC620 system added (see section "Power management for APC620 systems with 1 and 2 PCI slots" on page 64). - RAID system added (see section "RAID system" on page 149).
1.5 Preliminary	16.03.2005	- Temperature and performance table design changed. - Mounting orientation more precisely specified.
1.6 Preliminary	04.07.2005	- System unit weights added. - Add-on interface cards CAN (5AC600.CANI-00) and RS232/422/485 (5AC600.485I-00) added. - Model numbers for Microsoft Windows XP embedded with SP2 added. - Cables (DVI, SDL, USB, RS232) added to accessories chapter. - AP Link cards added. - Slide-in CF 2-slot 5AC600.CFSS-00 added. - Configuration and selection help for APC620 systems added (see chapter 2 "Technical data", section 1.2 "System components / Configuration" on page 38). - Key Editor: brief info section added (see Appendix A, section "B&R Key Editor information" on page 530). - Automation Device Interface (ADI), Control Center, and Development Kit: brief info section added (see chapter 4 "Software", from page 372). - Information added: battery compartment, real-time clock (RTC). - Temperature sensor locations for APC620 devices added (see Appendix A, section "Temperature sensor locations" on page 525). - Ambient temperatures for PM 1600 (5PC600.E855-01) and PM 1800 (5PC600.E855-03) added. - Appendix A expanded. - Real-time clock (RTC) specifications about the system unit added. - Index modifications.
1.70	08.03.2006	- Conductor cross section and AWG changes for the supply plug - Meaning of standard and 24-hour hard disk operation specified more precisely. - Procedure for creating a bootable USB memory stick added (see section "Creating a bootable USB flash drive" on page 449). - Slide-in DVD-R/RW, DVD+R/RW drive 5AC600.DVRS-00 added (see section "Slide-in DVD-R/RW, DVD+R/RW - 5AC600.DVRS-00" on page 130). - Information about Maintenance Controller Extended (MTCX) added (see section "Maintenance Controller Extended (MTCX)" on page 527). - Technical data about the SDL cable (flex radius, AWG) modified due to new specifications. - Information about general tolerances according to DIN ISO 2768 added to dimension diagrams. - BIOS distribution of resources added (see section "Distribution of resources" on page 327). - Testing conditions added for the determined ambient temperature specifications. - Slide-in drive installation and replacement descriptions added (see section "Slide-in drive - installation and exchange" on page 501). - Information about the 5CAMSC.0001-00 cable for connecting external devices added (see section "APC620 internal supply cable 5CAMSC.0001-00" on page 455). - Information about connecting an external device added (see section "Connection of an external device to the main board" on page 526). - Filter clasp information added for the fan kits for 2 and 5 PCI system units. - Safety guidelines revised (EBG information). - Supply voltage fuse (type change to "non self healing").

Table 1: Manual history (Forts.)

Version	Date	Change
1.70	08.03.2006	- Environmental temperature adjustments for systems with 815E and 855GME CPU boards (temperature limits for slide-in DVD-R/RW and 24-hour hard disk). - Firmware upgrade information expanded (see section "Upgrading the firmware" on page 341). - Intel 815E CPU boards (5PC600.E815-0x) cancelled. - BIOS function "Max CPU frequency" described. - Description of the SDL timing for communication between display unit and MTCX added (see section "SDL timing" on page 528). - APC620 with 5 PCI slots with orange front cover (previously light gray) - photos modified. - Information about changing the battery revised (see section "Changing the battery" on page 487). - Pin assignments for the monitor / panel plug and the optional AP Link plug-in card added. - Important information added for installation of the touch screen driver (located under Software - Touch screen driver installation). - 1 GB flash drive (5MMUSB.1024-00) added (128 MB - 5MMUSB.0128-00 cancelled). - Silicon Systems CompactFlash cards 5CFCRD.xxxx-03 added (see section "USB Flash Drive 5MMUSB.0xxx-00" on page 446). - Serial number sticker information updated, (see section "Serial number sticker" on page 99). - Extended technical data about the PCI bus added. - A general device interface photo (version with 5 PCI slots) added (see section "Device Interfaces" on page 73). - Information about the minimum ambient temperature added (component-dependent). - Block diagrams of entire device for all system units with 855GME CPU boards added. - SDL cable with 45° plug 5CASDL.0018-01, 5CASDL.0050-01, 5CASDL.0100-01, 5CASDL.0150-01 added (see section "SDL cable with 45° plug 5CASDL.0xxx-01" on page 459). - SDL cable with extender 5CASD.0300-10 and 5CASDL.0400-10 added (see section "SDL cable with extender 5CASDL.0x00-10" on page 462). - System unit support for buffer (10 ms) with Automation Runtime added (see section "Automation PC 620 with Automation Runtime" on page 348). - Explanation of terminology added in the form of a glossary (see section "Glossary" on page 534). - Section "855GME -BIOS description" on page 276 adjusted to the BIOS version 1.21. - Section ""Upgrading the firmware" on page 341" adjusted to the APC620 / panel PC Firmware upgrade (MTCX, SDLR, SDLT) version 1.13. - Humidity table according to the individual components added (see section "Humidity specifications" on page 72.) - Information about starting current added. - Section about Automation PC 620 with Windows CE (9S0001.29-020) added (see section "Automation PC 620 with Windows CE" on page 369). - Chapter ""Standards and certifications" on page 381" added. - Known problems using MS-DOS added (see section "Known problems" on page 349). - Automation Panel 900 connection examples added (see "Connection examples - Automation Panel 900" on page 194). - Technical data table for all device versions (1, 2 and 5 PCI slots) added. - Progress information about the BIOS boot procedure added. - Topic "Power options and touch screen" added.
1.80	21.04.2006	- Corrections to chapter "Standards and Certifications". - The footnote "Depending on the process or batch, there may be visable deviations in the color and surface structure." was added for housing and color specifications. - PCI RAID hard disk 5ACPCI.RAIS-01 (60 GB) added. - Information regarding the new 512 MB and 1 GB SanDisk Cruzer Micro flash drives added. - Temperature specifications for the PCI RAID hard disk 5ACPCI.RAIS-00 added. - HMI Drivers & Utilities DVD 5SWHMI.0000-00 added.

Table 1: Manual history (Forts.)

Version	Date	Change
1.90	29.08.2006	- Corrections to chapter "Standards and Certifications" - section "Emission requirements" - standards were listed twice. - The manual history has been corrected. - Vibration values were switched for 'continuous' and 'occasional' operation. - Section "Cable connections" on page 193 (Flex radius) added. - Name change for CompactFlash short text. - Name change of chapter "Installation" to "Commissioning". - Restructuring of section "Automation Panel 900 - connection examples" - it is now located in chapter "Commissioning". - BIOS postcode messages added. - USB Media Drive 5MD900.USB2-00 added. - New technical data added for slide-in drive 5AC600.DVRS-00 Revision D0 and later. - New image for PCI routing. - List of delivery contents removed for some components (e.g. cable). - Vibration and shock values changed for the PCI RAID controller hard discs.
2.00	13.12.2006	- New configuration diagrams for Automation Panel 900 connection examples (USB information added). - Panel locking time information modified. - New model number for the APC620 documentation MAAPC620-ENG - Nominal current specification for 1, 2 and 5 PCI systems added. - Font symbol assigned to the character format symbol. - Description of the BIOS function "Legacy USB Support" updated. - Information about Ethernet cable lengthh support for ETH1 added. - Name modifications SDLT FPGA: from "Firmware on the AP Link SDL transceiver" to "SDLT FPGA Firmware on the AP Link SDL transmitter". SDLR FPGA: from "Firmware on the AP Link SDL receiver" to "Firmware on the AP Link SDL receiver and transceiver" - USB Memory Stick 2 GB SanDisk 5MMUSB.2048-00 added. - PCI SATA RAID controller 5ACPCI.RAIC-01 added (adjustment made to the ambient temperature determination with 855GME boards). - Add-on hard disk 40 GB ET, 24x7 - 5AC600.HDDI-05 added (adjustment made to the ambient termpature determination with 855GME boards). - Slide-in hard disk 40 GB ET, 24x7 - 5AC600.HDDS-02 added (adjustment made to the ambient termpature determination with 855GME boards).
2.10	23.01.2007	- New dimension diagram for the APC620 1 PCI variant with slot for add-on UPS module (see figure 6 "Dimensions - APC620, 1 PCI slot" on page 46). - New dimension diagram for the APC620 2 PCI variant with slot for add-on UPS module (see figure 9 "Dimensions - APC620, 2 PCI slots" on page 51). - New dimension diagram for the APC620 5 PCI variant with slot for add-on UPS module (see figure 12 "Dimensions - APC620, 5 PCI slots" on page 56). - SDL flex cable 5CASDL.0xxx-03 added (see section "SDL flex cable 5CASDL.0xxx-03" on page 465). - SDL flex cable with extender 5CASDL.0xxx-13 added (see section "SDL flex cable with extender 5CASDL.0x00-13" on page 469). - 8 GB CompactFlash card 5CFCRD.8192-03 added. - 5A5003.03 front cover description added to the 5MD900.USB2-00 and 5M900.USB2-01 product descriptions. - Document now includes the chm tag "Filename". - New Windows CE 5.0 model numbers added. - APC620 UPS model numbers added (UPS module, battery, cable). - APC620 overview images updated (with slot for UPS add-on module). - Descriptions of interfaces updated to include slot for add-on UPS module (see "Add-on UPS module slot" on page 87). - SATA RAID description updated (new image + new footnote for vibration and shock data (performance problems) + known limitations). - Figure "Selection guide - optional components" on page 40 updated.

Table 1: Manual history (Forts.)

Version	Date	Change
2.10	22.01.2007	- Graphic in sections "Power management for APC620 systems with 1 and 2 PCI slots" on page 64 and "Power management, APC620 systems with 5 PCI slots" on page 68 updated (add-on UPS module). - Status LED description on page 90 updated (battery operation). - Section "Upgrading the firmware" on page 341 updated (new APC620 / Panel PC firmware upgrade v1.16). - Section "B&R Automation Device Interface (ADI) driver - Control Center" moved from "Appendix A" to chapter 4 "Software" (see page 372). - Configuration of UPS with B&R Control Center added (see section "UPS configuration" on page 374).
2.20	12.02.2007	- Figure "ADI Control Center - UPS settings" on page 374 updated.

Table 1: Manual history (Forts.)

2. Safety guidelines

2.1 Intended use

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

2.2 Protection against electrostatic discharges

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

2.2.1 Packaging

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

2.2.2 Guidelines for proper ESD handling

Electrical components with housing

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

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

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

2.4 Transport and storage

During transport and storage, devices must be protected from excessive stress (mechanical load, temperature, humidity, aggressive atmosphere, etc.).

2.5 Installation

- Installation must take place according to the documentation using suitable equipment and tools.
- Devices may only be installed without voltage applied and by qualified personnel.
- 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, and uninterruptible power supplies, certain components must carry dangerous voltage levels of over 42 VDC. A life-threatening electrical shock could occur if you come into contact with these parts. This could result in death, severe injury, or material damage.

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

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

2.6.2 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.

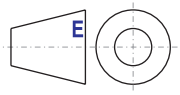
3. Organization of safety notices

The safety notices in this manual are organized as follows:

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

Table 2: Organization of safety notices

4. Guidelines



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

5. Model numbers

5.1 System units

Model number	Short description	Note
5PC600.SX01-00	**System 1 PCI** APC620 system unit 1 PCI slot, connection for 2 x RS232, 2 x USB 2.0, Short Display Link, 2 x ETH 10/100, AC97 sound, PS/2 keyboard/mouse, UPS module[1] ; 24 VDC.	
5PC600.SX02-00	**System 2 PCI, 1 disk drive slot, 1 AP Link slot** APC620 system unit 2 PCI slots, 1 drive slot, 1 slot for Automation Panel link transmitter, connections for 2 x RS232, 2 x USB 2.0, Short Display Link, 2 x ETH 10/100, AC97 sound, PS/2 keyboard/mouse, UPS module[2] ; 24 VDC.	
5PC600.SX02-01	**System 2 PCI, 1 disk drive slot** APC620 system unit 2 PCI slots, 1 drive slot; connection for 2 x RS232, 2 x USB 2.0, Short Display Link, 2 x ETH 10/100, AC97 sound, PS/2 keyboard/mouse, UPS module[1] ; 24 VDC.	
5PC600.SX05-00	**System 5 PCI, 2 disk drive slots, 1 AP Link slot** APC620 system unit 5 PCI slots, 2 drive slots, 1 slot for Automation Panel link transmitter; connections for 2 x RS232, 2 x USB 2.0, Short Display Link, 2 x ETH 10/100, AC97 sound, PS/2 keyboard/mouse, UPS module[3] ; 24 VDC.	
5PC600.SX05-01	**System 5 PCI, 2 disk drive slots** APC620 system unit 5 PCI slots, 2 drive slots; connections for 2 x RS232, 2 x USB 2.0, Short Display Link, 2 x ETH 10/100, AC97 sound, PS/2 keyboard/mouse, UPS module[3] ; 24 VDC.	

Table 3: Model numbers - system units

1) Slot only available on system units with Revision H0 or later.
2) Slot only available on system units with revision G0 or later.
3) Slot only available on system units with Revision F0 or later.

5.2 CPU boards 815E

Model number	Short description	Note
5PC600.E815-00	**CPU board 815E C3-400** Intel Celeron 3 CPU board, 400 MHz, 100 MHz FSB, 256 kB L2 cache, chipset 815E; 1 socket for SO-DIMM SDRAM module.	Cancelled since 10/2005 Replaced by: 855GME CPU boards
5PC600.E815-02	**CPU board 815E C3-733** Intel Celeron 3 CPU board, 733 MHz, 133 MHz FSB, 256 kB L2 cache, chipset 815E; 1 socket for SO-DIMM SDRAM module.	
5PC600.E815-03	**CPU board 815E C3-1000** Intel Celeron 3 CPU board, 1000 MHz, 133 MHz FSB, 256 kB L2 cache, chipset 815E; 1 socket for SO-DIMM SDRAM module.	

Table 4: Model numbers - CPU boards 815E

5.3 CPU boards 855GME

Model number	Short description	Note
5PC600.E855-00	**CPU board 855GME PM-1100** Intel Pentium M CPU board, 1100 MHz, 400 MHz FSB, 1 MB L2 cache; chipset 855GME; 1 socket for SO-DIMM DDR RAM module.	
5PC600.E855-01	**CPU board 855GME PM-1600** Intel Pentium M CPU board, 1600 MHz, 400 MHz FSB, 1 MB L2 cache; chipset 855GME; 1 socket for SO-DIMM DDR RAM module.	
5PC600.E855-02	**CPU board 855GME PM-1400** Intel Pentium M CPU Board, 1400 MHz, 400 MHz FSB, 2 MB L2 cache; chipset 855GME; 1 socket for SO-DIMM DDR RAM module.	
5PC600.E855-03	**CPU board 855GME PM-1800** Intel Pentium M CPU board, 1800 MHz, 400 MHz FSB, 2 MB L2 cache; chipset 855GME; 1 socket for SO-DIMM DDR RAM module.	
5PC600.E855-04	**CPU board 855GME CM-600** Intel Celeron M CPU Board, 600 MHz, 400 MHz FSB, 512 kB L2 cache; chipset 855GME, 1 socket for SO-DIMM DDR module.	
5PC600.E855-05	**CPU board 855GME CM-1000** Intel Pentium M CPU board, 1000 MHz, 400 MHz FSB, 1 MB L2 cache; chipset 855GME; 1 socket for SO-DIMM DDR RAM module.	

Table 5: Model numbers - CPU boards 855GME

5.4 Heat sink

Model number	Short description	Note
5AC600.HS01-00	**Heat sink 815E** For APC620 system units with Intel 815E CPU board (5PC600.E815-00, 5PC600.E815-02 and 5PC600.E815-03)	Cancelled since 10/2005 Replaced by: Heat sink for 855GME boards
5AC600.HS01-01	**Heat sink 855GME** For APC620 system units with Intel 855GME CPU board (5PC600.E855-00, 5PC600.E855-02, 5PC600.E855-04 and 5PC600.E855-05)	
5AC600.HS01-02	**Heat sink 855GME/2** For APC620 system units with Intel 855GME CPU board (5PC600.E855-01, 5PC600.E855-03)	

Table 6: Model numbers - heat sinks

5.5 Main memory

Model number	Short description	Note
5MMSDR.0128-01	**SO-DIMM SDRAM 128 MB PC133** SO-DIMM SDRAM 128 MB PC133 for 815E CPU boards.	Cancelled since 10/2005 Replaced by: Main memory for 855GME CPU boards
5MMSDR.0256-01	**SO-DIMM SDRAM 256 MB PC133** SO-DIMM SDRAM 256 MB PC133 for 815E CPU boards.	
5MMSDR.0512-01	**SO-DIMM SDRAM 512 MB PC133** SO-DIMM SDRAM 512 MB PC133 for 815E CPU boards.	

Table 7: Model numbers - main memory

Model number	Short description	Note
5MMDDR.0256-00	**SO-DIMM DDR-SDRAM 256 MB PC2700** SO-DIMM DDR-SDRAM 256 MB PC2700 for 855GME CPU boards.	
5MMDDR.0512-00	**SO-DIMM DDR-SDRAM 512 MB PC2700** SO-DIMM DDR-SDRAM 512 MB PC2700 for 855GME CPU boards.	
5MMDDR.1024-00	**SO-DIMM DDR-SDRAM 1024 MB PC2700** SO-DIMM DDR-SDRAM 1024 MB PC2700 for 855GME CPU boards.	

Table 7: Model numbers - main memory (Forts.)

5.6 Drives

Model number	Short description	Note
5AC600.CFSI-00	**Add-on CompactFlash slot** CompactFlash slot (add-on); for installation in an APC620 or PPC700.	
5AC600.HDDI-00	**Add-on hard disk 30 GB 24/7** 30 GB hard disk (add-on); ideal for 24-hour operation. For installation in an APC620 or PPC700.	
5AC600.HDDI-01	**Add-on hard disk 20 GB ET** 20 GB hard disk (add-on); with expanded temperature range. For installation in an APC620 or PPC700.	
5AC600.HDDI-05	**Add-on hard disk 40GB ET, 24x7** 40 GB hard disk (add-on); Suitable for 24-hour operation as well as for operation in the extended temperature range. For installation in an APC620 or PPC700.	
5AC600.CDXS-00	**Slide-in CD-ROM** CD-ROM drive (slide-in); for operation in a slide-in drive slot in an APC620 or PPC700 system.	
5AC600.CFSS-00	**Slide-in CF 2-slot** Slide-in CompactFlash adapter for 2 CompactFlash cards (via IDE and USB 2.0)	
5AC600.DVDS-00	**Slide-in DVD-ROM/CD-RW** DVD-ROM/CD-RW drive (slide-in); for operation in a slide-in drive slot in an APC620 or PPC700 system.	
5AC600.DVRS-00	**Slide-in DVD-R/RW, DVD+R/RW** DVD-RW drive (slide-in); for operation in a drive slot in an APC620 or PPC700 system.	
5AC600.FDDS-00	**Slide-in USB floppy disk drive** FDD drive (slide-in); for operation in a slide-in drive slot in an APC620 or PPC700 system.	
5AC600.HDDS-00	**Slide-in hard disk 30 GB 24x7** 30 GB hard disk (slide-in); ideal for 24-hour operation. For use in a slide-in drive slot in an APC620 or PPC700 system.	
5AC600.HDDS-01	**Slide-in hard disk 20 GB ET** 20 GB hard disk (slide-in); with expanded temperature range. For use in a slide-in drive slot in an APC620 or PPC700 system.	
5AC600.HDDS-02	**Slide-in hard disk 40 GB 24x7, ET** 40 GB hard disk (add-on); Suitable for 24-hour operation as well as for operation in the extended temperature range. For use in a slide-in drive slot in an APC620 or PPC700 system.	
5ACPCI.RAIC-00	**PCI RAID controller ATA/100** PCI Raid controller	
5ACPCI.RAIC-01	**PCI SATA RAID System 2x60 GB** PCI RAID controller + 2 x 60 GB SATA hard disks; requires a free PCI slot.	

Table 8: Model numbers - drives

Model number	Short description	Note
5ACPCI.RAIS-00	**PCI RAID storage 2x40 GB** PCI RAID hard disk 2 x 40 GB	Cancelled since 06/2006 Replaced by: 5ACPCI.RAIS-00
5ACPCI.RAIS-01	**PCI RAID storage 2x60 GB** PCI RAID hard disk 2 x 60 GB	Replacement for 5ACPCI.RAIS-00

Table 8: Model numbers - drives (Forts.)

5.7 Interface options

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

Table 9: Model numbers - interface

5.8 Fan kits

Model number	Short description	Note
5PC600.FA01-00	**Fan kit 1PCI** APC620 fan kit, for system units with 1 PCI slot.	
5PC600.FA02-00	**Fan kit 2PCI** APC620 fan kit + filter clasp for system units with 2 PCI slots.	
5PC600.FA05-00	**Fan kit 5PCI** APC620 fan kit + filter clasp for system units with 5 PCI slots.	

Table 10: Model numbers - fan kits

5.9 AP Link cards

Model number	Short description	Note
5AC600.SDL0-00	AP Link SDL transmitter	

Table 11: Model numbers - AP Link graphics adapter

5.10 Accessories

5.10.1 Batteries

Model number	Short description	Note
0AC201.9	**Lithium batteries (5x)** Lithium batteries, 5 pcs., 3 V / 950 mAh, button cell	
4A0006.00-000	**Lithium battery (1x)** Lithium battery, 1 pc., 3 V / 950 mAh, button cell	

Table 12: Model numbers - batteries

5.10.2 Supply voltage connectors

Model number	Short description	Note
0TB103.9	**Plug 24V 5.08 3-pin screw clamps** 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 clamps** 24 VDC 3-pin connector, female. Cage clamps, 2.5 mm², protected against vibration by the screw flange	

Table 13: Model numbers - supply voltage connectors

5.10.3 CompactFlash cards

Model number	Short description	Note
5CFCRD.0032-02	**CompactFlash 32 MB SanDisk/A** CompactFlash card with 32 MB NAND Flash, and IDE/ATA interface.	Cancelled since 12/2005 Replaced by: 5CFCRD.0064-03
5CFCRD.0064-02	**CompactFlash 64 MB SanDisk/A** CompactFlash card with 64 MB NAND Flash, and IDE/ATA interface.	Cancelled since 12/2005 Replaced by: 5CFCRD.0064-03
5CFCRD.0128-02	**CompactFlash 128 MB SanDisk/A** CompactFlash card with 128 MB NAND Flash, and IDE/ATA interface.	Cancelled since 12/2005 Replaced by: 5CFCRD.0128-03
5CFCRD.0256-02	**CompactFlash 256 MB SanDisk/A** CompactFlash card with 256 MB NAND Flash, and IDE/ATA interface.	Cancelled since 12/2005 Replaced by: 5CFCRD.0256-03
5CFCRD.0512-02	**CompactFlash 512 MB SanDisk/A** CompactFlash card with 512 MB NAND Flash, and IDE/ATA interface.	Cancelled since 12/2005 Replaced by: 5CFCRD.0512-03
5CFCRD.1024-02	**CompactFlash 1024 MB SanDisk/A** CompactFlash card with 1024 MB NAND Flash, and IDE/ATA interface.	Cancelled since 12/2005 Replaced by: 5CFCRD.1024-03
5CFCRD.2048-02	**CompactFlash 2048 MB SanDisk/A** CompactFlash card with 2048 MB NAND Flash, and IDE/ATA interface.	Cancelled since 12/2005 Replaced by: 5CFCRD.2048-03
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.	

Table 14: Model numbers - CompactFlash cards

Model number	Short description	Note
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.	
5CFCRD.8192-03	**CompactFlash 8192 MB SSI** CompactFlash card with 8192 MB SLC NAND Flash, and IDE/ATA interface.	

Table 14: Model numbers - CompactFlash cards (Forts.)

5.10.4 USB flash drives

Model number	Short description	Note
5MMUSB.0128-00	**USB flash drive 128 MB SanDisk** USB 2.0 flash drive 128 MB	Cancelled since 12/2005 Replaced by: 5MMUSB.0256-00
5MMUSB.0256-00	**USB flash drive 256 MB SanDisk** USB 2.0 flash drive 256 MB	
5MMUSB.0512-00	**USB flash drive 512 MB SanDisk** USB 2.0 flash drive 512 MB	
5MMUSB.1024-00	**USB flash drive 1 GB SanDisk** USB 2.0 flash drive 1 GB	
5MMUSB.2048-00	**USB flash drive 2 GB SanDisk** USB 2.0 flash drive 2 GB	

Table 15: Model numbers - USB flash drives

5.10.5 Cables

Model number	Description	Note
5CADVI.0018-00	**DVI-D cable 1.8 m / single** Single cable, DVI-D/m:DVI-D/m, length: 1.8 m	
5CADVI.0050-00	**DVI-D cable 5 m / single** Single cable, DVI-D/m:DVI-D/m, length: 5 m	
5CADVI.0100-00	**DVI-D cable 10 m / single** Single cable, DVI-D/m:DVI-D/m, length: 10 m	
5CAMSC.0001-00	**APC620 internal supply cable**	
5CASDL.0018-00	**SDL cable 1.8 m** SDL cable, length: 1.8 m	Cancelled since 12/2006 Replaced by: 5CASDL.0018-03
5CASDL.0018-01	**SDL cable 1.8 m 45°** SDL cable, length: 1.8 m; single sided 45° plug	
5CASDL.0018-03	**SDL flex cable 1.8 m** SDL cable, semi flexible, length: 1.8 m	

Table 16: Model numbers - cables

Model number	Description	Note
5CASDL.0050-00	**SDL cable 5 m** SDL cable, length: 5 m	Cancelled since 12/2006 Replaced by: 5CASDL.0050-03
5CASDL.0050-01	**SDL cable 5 m 45°** SDL cable, length: 5 m; single sided 45° plug	
5CASDL.0050-03	**SDL flex cable 5 m** SDL cable, semi flexible, length: 5 m	
5CASDL.0100-00	**SDL cable 10 m** SDL cable, length: 10 m	Cancelled since 12/2006 Replaced by: 5CASDL.0100-03
5CASDL.0100-01	**SDL cable 10 m 45°** SDL cable, length: 10 m; single sided 45° plug	
5CASDL.0100-03	**SDL flex cable 10 m** SDL cable, semi flexible, length: 10 m	
5CASDL.0150-00	**SDL cable 15 m** SDL cable, length: 15 m	Cancelled since 12/2006 Replaced by: 5CASDL.0150-03
5CASDL.0150-01	**SDL cable 15 m 45°** SDL cable, length: 15 m; single sided 45° plug	
5CASDL.0150-03	**SDL flex cable 15 m** SDL cable, semi flexible, length: 15 m	
5CASDL.0200-00	**SDL cable 20 m** SDL cable, length: 20 m	Cancelled since 12/2006 Replaced by: 5CASDL.200-03
5CASDL.0200-03	**SDL flex cable 20 m** SDL cable, semi flexible, length: 20 m	
5CASDL.0250-00	**SDL cable 25 m** SDL cable, length: 25 m	Cancelled since 12/2006 Replaced by: 5CASDL.0250-03
5CASDL.0250-03	**SDL flex cable 25 m** SDL cable, semi flexible, length: 25 m	
5CASDL.0300-00	**SDL cable 30 m** SDL cable, length: 30 m	Cancelled since 12/2006 Replaced by: 5CASDL.0300-03
5CASDL.0300-03	**SDL flex cable 30 m** SDL cable, semi flexible, length: 30 m	
5CASDL.0300-10	**SDL cable with extender 30 m** SDL cable, length: 30 m with extender	Cancelled since 12/2006 Replaced by: 5CASDL.0300-13
5CASDL.0300-13	**SDL flex cable with extender 30 m** SDL cable, semi flexible, length: 30 m with extender	
5CASDL.0400-10	**SDL cable with extender 40 m** SDL cable, length: 40 m with extender	Cancelled since 12/2006 Replaced by: 5CASDL.0400-13
5CASDL.0400-13	**SDL flex cable with extender 40 m** SDL cable, semi flexible, length: 40 m with extender	
5CAUSB.0018-00	**USB 2.0 cable A/m:B/m 1.8 m** USB 2.0 connection cable; Type A - Type B; 1.8 m	
5CAUSB.0050-00	**USB 2.0 cable A/m:B/m 5 m** USB 2.0 connection cable; Type A - Type B; 5 m	
9A0014.02	**RS232 cable DB9/f:DB9/m 1.8 m** RS232 extension cable for remote operation of a display unit with touch screen, length 1.8 m.	

Table 16: Model numbers - cables (Forts.)

Model number	Description	Note
9A0014.05	**RS232 cable DB9/f:DB9/m 5 m** RS232 extension cable for remote operation of a display unit with touch screen, length 5 m.	
9A0014.10	**RS232 cable DB9/f:DB9/m 10 m** RS232 extension cable for remote operation of a display unit with touch screen, length 10 m.	

Table 16: Model numbers - cables (Forts.)

5.10.6 UPS module + accessories

Model number	Short description	Note
5AC600.UPSI-00	**Add-on UPS module** Uninterruptible power supply for APC620	
5AC600.UPSB-00	**Battery unit 5 Ah** Battery unit	
5CAUPS.0005-00	**APC620 UPS cable 0.5 m**	
5CAUPS.0030-00	**APC620 UPS cable 3 m**	

Table 17: Model numbers - UPS module + accessories

5.10.7 Miscellaneous

Model number	Short description	Note
5A5003.03	**Front cover** Front cover for the USB 2.0 Media Drive 5MD900.USB2-00.	
5AC600.ICOV-00	**Interface covers** Interface covers for APC620 and PPC700 devices; 5 pieces	
5AC900.1000-00	**Adapter DVI-A/m to CRT DB15HD/f** Adapter DVI (plug) to CRT (socket), for connecting a standard monitor to a DVI-I interface.	
5MD900.USB2-00	**USB 2.0 drive DVD-ROM/CD-RW FDD CF USB** USB 2.0 drive combination, consists of DVD-ROM/CD-RW, FDD, CompactFlash slot (type II), USB connection (type A front, type B back); 24 V DC.	Cancelled since 10/2006 Replaced by: 5MD900.USB2-01
5MD900.USB2-01	**USB 2.0 drive DVD-RW/CD-RW FDD CF USB** USB 2.0 drive combination, consists of DVD-R/RW/DVD+R/RW/CD-RW, FDD, CompactFlash slot (type II), USB connection (type A front, type B back); 24 V DC.	Replacement for 5MD900.USB2-00

Table 18: Model numbers - other items

5.11 Software

Model number	Short description	Note
5SWHMI.0000-00	**HMI Drivers & Utilities DVD** Contains drivers, utilities, software upgrades and user manuals for B&R Panel system products (see B&R homepage – Industrial PCs, Visualization and Operation).	
9S0000.01-010	**OEM MS-DOS 6.22 German (disk)** OEM MS-DOS 6.22 German disks Only delivered with a new PC.	

Table 19: Model numbers - software

Model number	Short description	Note
9S0000.01-020	**OEM MS-DOS 6.22 English (disk)** OEM MS-DOS 6.22 English disks Only delivered with a new PC.	
9S0000.08-010	**OEM Microsoft Windows XP Professional** CD, German; Only delivered with a new PC.	
9S0000.08-020	**OEM Microsoft Windows XP Professional** CD, English; Only delivered with a new PC.	
9S0000.09-090	**OEM Microsoft Windows XP Professional Multilanguage** CDs; Only delivered with a new PC.	
9S0001.19-020	**OEM Microsoft Windows XP embedded APC620 815E w/CF, English** 512 MB CompactFlash with Windows XP embedded image for APC620 systems with a 815E CPU board. Only delivered with a new PC.	Cancelled since 10/2005 Replaced by: 9S0001.20-020
9S0001.20-020	**OEM Microsoft Windows XP embedded APC620 855GME w/CF, English** 512 MB CompactFlash with Windows XP embedded image for APC620 systems with a 855GME CPU board. Only delivered with a new PC.	
9S0001.27-020	**OEM Microsoft Windows XP embedded (incl. SP2) APC620 815E w/CF, English** 512 MB CompactFlash with Windows XP embedded image including SP2 for APC620 systems with a 815E CPU board. Only delivered with a new PC.	Cancelled since 10/2005 Replaced by: 9S0001.28-020
9S0001.28-020	**OEM Microsoft Windows XP embedded (incl. SP2) AC620 855GME w/CF, English** 512 MB CompactFlash with Windows XP embedded image including SP2 for APC620 systems with a 855GME CPU board. Only delivered with a new PC.	
9S0001.29-020	**WinCE5.0 Pro** OEM Microsoft Windows CE 5.0 Professional, English, license, only supplied together with a device.	
9S0001.32-020	**WinCE5.0 Pro APC620,PPC700** OEM Microsoft Windows CE 5.0 Professional; for APC620 and PPC700 with Intel 855GME chipset, English; preinstalled on 128 MB CompactFlash card.	
9S0001.34-020	**WinCE5.0 ProPlus APC620,PPC700** OEM Microsoft Windows CE 5.0 Professional plus; for APC620 and PPC700 with Intel 855GME chipset, English; preinstalled on 128 MB CompactFlash card.	
9S0001.36-020	**WinCE5.0 ProPlus** OEM Microsoft Windows CE 5.0 Professional plus, English, license, only supplied together with a device.	

Table 19: Model numbers - software (Forts.)

Chapter 2 • Technical data

1. Introduction

With its structure, its many slots and well thought-out placement of interfaces and drives, the APC620 provides optimal adaptability and ergonomics. The APC620 saves space in the switching cabinet. Drive inserts (hard disk, CD-ROM, DVD, burner, etc.) and up to two CompactFlash slots are hidden behind a cover on the front of the device.

Figure 1: Automation PC 620 system overview

The APC620 with an Intel® Pentium® M processor and Intel® 855GME chipset is available for high-performance applications that require a powerful processor. These processors, developed specially for mobile computing, offer many advantages for industrial applications as well. They combine a high computing capacity with low power consumption. The chipset contains an integrated graphic solution which provides optimal use of memory for the system and graphics.

1.1 Features

- Processors up to Pentium M 1.8 GHz
- CompactFlash slot (type I)
- Half-size PCI slots (PCI standard 2.2, 32-bit, PCI bus speed 33 MHz)
- AC97 sound
- USB 2.0
- 24 VDC supply voltage
- 2x Ethernet 10/100 MBit interfaces
- 2x RS232 interface, modem compatible
- PS/2 keyboard/mouse (combined)
- Optional CAN interface
- Optional RS232/422/485 interface
- Fan-free operation[1)]
- BIOS (Phoenix)
- Real-time clock, RTC (battery-buffered)
- Up to 1 GB main memory
- Connection of various display devices to the "Monitor/Panel" video output (supports RGB, DVI, and SDL - Smart Display Link - signals)
- Optional installation of add-on UPS APC620 module[2)]

1.2 System components / Configuration

The APC620 system can be assembled to meet individual requirements and operational conditions.

The following components are absolutely essential for operation:

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

1) Dependent on the device configuration and the ambient temperature.

2) Installation depends on the revision of the system unit: 5PC600.SX01-00 starting with Revision H0, 5PC600.SX02-00 starting with revision G0, 5PC600.SX02-01 starting with Revision H0, 5PC600.SX05-00 starting with Revision F0, 5PC600.SX05-01 starting with Revision H0.

1.2.1 Selection guide - basic system

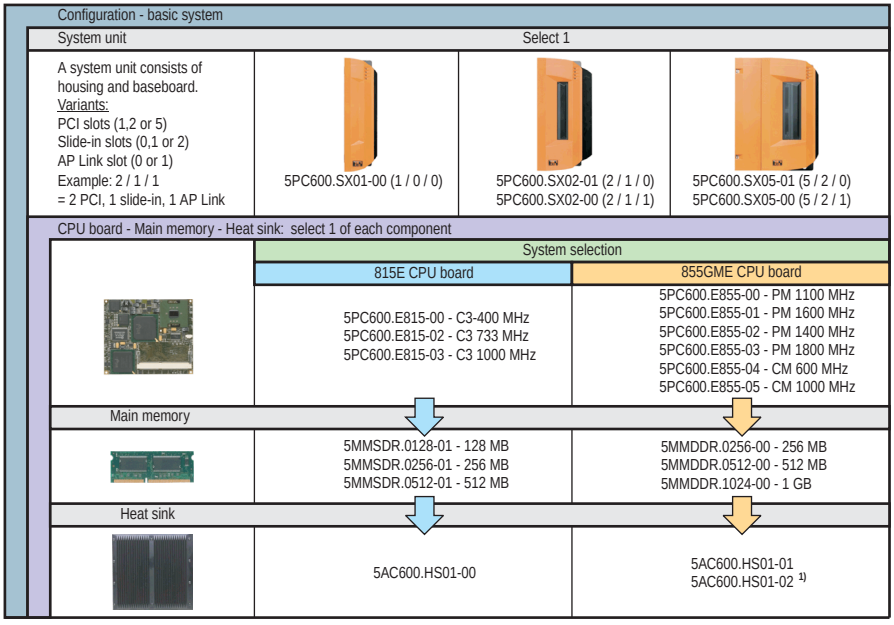


Figure 2: Configuration - basic system

Explanation:

1) Select one system unit.

2) System selection - choose a CPU board variant (815E or 855GME).

3) Select one each of main memory and heat sink, based on selected CPU board.

4) Select optional components, based on selected system unit (see section 1.2.2 "Selection guide - optional components" on page 40).

1.2.2 Selection guide - optional components

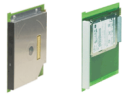
Configuration - optional			
System unit			
The system unit consists of housing and main board. Variants: PCI slots (1,2 or 5) Slide-in slots (0,1 or 2) AP Link slot (0 or 1) Example: 2 / 1 / 1 = 2 PCI, 1 slide-in, 1 AP Link	 5PC600.SX01-00 (1 / 0 / 0)	 5PC600.SX02-01 (2 / 1 / 0) 5PC600.SX02-00 (2 / 1 / 1)	 5PC600.SX05-01 (5 / 2 / 0) 5PC600.SX05-00 (5 / 2 / 1)
Fan kit (select 1)			
A fan kit is necessary for some system configurations.	 5PC600.FA01-00	 5PC600.FA02-00	 5PC600.FA05-00
Add-on drive	**Select 1**		
	5AC600.HDDI-00 (30 GB HDD - 24x7) 5AC600.HDDI-01 (20 GB HDD - extended temp. range) 5AC600.HDDI-05 (40 GB HDD - 24x7 and extended temp. range) 5AC600.CFSI-00 (CompactFlash slot)		
Slide-in drive	**Not possible**	**Select max. 1**	**Select max. 2**
		5AC600.CFSS-00 (2 CompactFlash slots) 5AC600.CDXS-00 (CD-ROM) 5AC600.DVDS-00 (DVD-ROM/CD-RW) 5AC600.DVRS-00 (DVD-R/RW DVD+R/RW) 5AC600.FDDS-00 (USB floppy) 5AC600.HDDS-00 (30 GB HDD - 24x7) 5AC600.HDDS-01 (20 GB HDD - extended temp. range) 5AC600.HDDS-02 (40 GB HDD - 24x7 and extended temp. range)	
AP Link cards	**Not possible**	**Select 1**	
		5AC600.SDL0-00 Only with 5PC600.SX02-00, 5PC600.SX05-00 and with an 855GME CPU board !	
RAID system			
	5ACPCI.RAIC-01 (occupies 1 PCI slot)	5ACPCI.RAIC-01 (occupies 1 PCI slot) or 5ACPCI.RAIC-00 with 5ACPCI.RAIS-00 or 5ACPCI.RAIS-01 (Combination, occupies 2 PCI slots)	
Optional interface	**Select 1**		
	5AC600.CANI-00 (CAN) 5AC600.485I-00 (combined RS232/RS422/RS485)		
UPS module			
	5AC600.UPSI-00 (Add-On USV Modul kann erst ab folgenden Revision der Systemeinheiten montiert werden: 5PC600.SX01-00 Rev. H0, 5PC600.SX02 Rev. G0, 5PC600.SX02-01 Rev. H0 5PC600.SX05-00 Rev. F0, 5PC600.SX05-01 Rev. H0		
Supply voltage connector	**Select 1**		
	0TB103.9 (screw clamp) 0TB103.91 (cage clamp)		

Figure 3: Configuration of optional components

Information:

- Depending on the system unit, a compatible fan kit can be installed in the APC620. Required for certain system configurations and ambient temperatures (see also sections 2.4 "Environmental temperatures for systems with an 815E CPU board" on page 57 and 2.5 "Environmental temperatures for systems with an 855GME CPU board" on page 60)
- Select optional drive(s) (add-on / slide-in), based on the system unit. One add-on drive can be installed in each system unit. Slide-in drives (1 or 2) are only available in certain system units.
- AP Link cards create a second graphics line (possibility of extended desktop or display clone operation) on the APC620. Only possible with system units 5PC600.SX02-00, 5PC600.SX05-00 and with an 855GME CPU board.
- An optional interface adds an additional connection possibility.
- Depending on the revision of the system unit (see graphic), an integrated add-on UPS module can be installed.
- The appropriate power supply plugs ensure simple connection to the power supply.

2. Entire device

2.1 APC620, 1 PCI slot

2.1.1 Interfaces

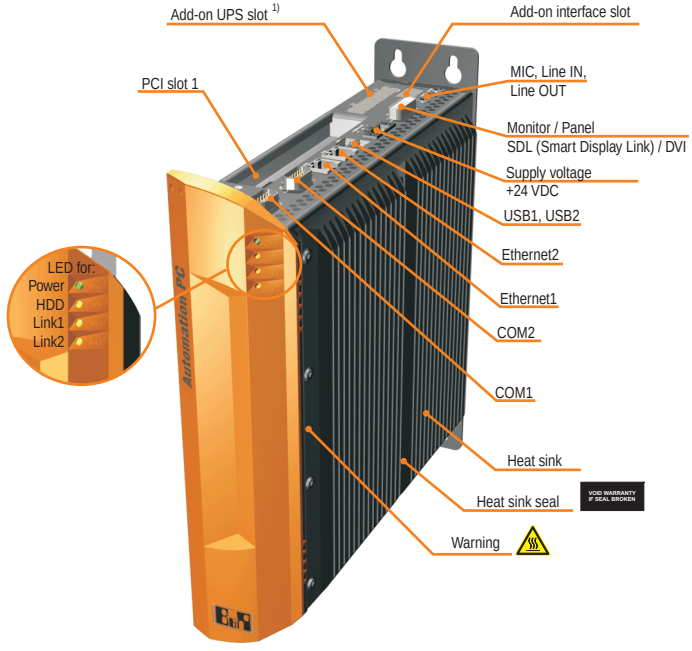


Figure 4: Interface overview - APC620, 1 PCI slot (top)

Warning!

Do not remove the mounting screws from the heat sink, as it is connected to the processor and chipset by a thermal coupling. Should this connection be broken, the APC620 must be sent for repair. Removal of the mounting screws, which can be determined by a broken seal, voids all warranty.

During operation, surface temperatures of the heat sink may reach 70°C (warning "hot surface").

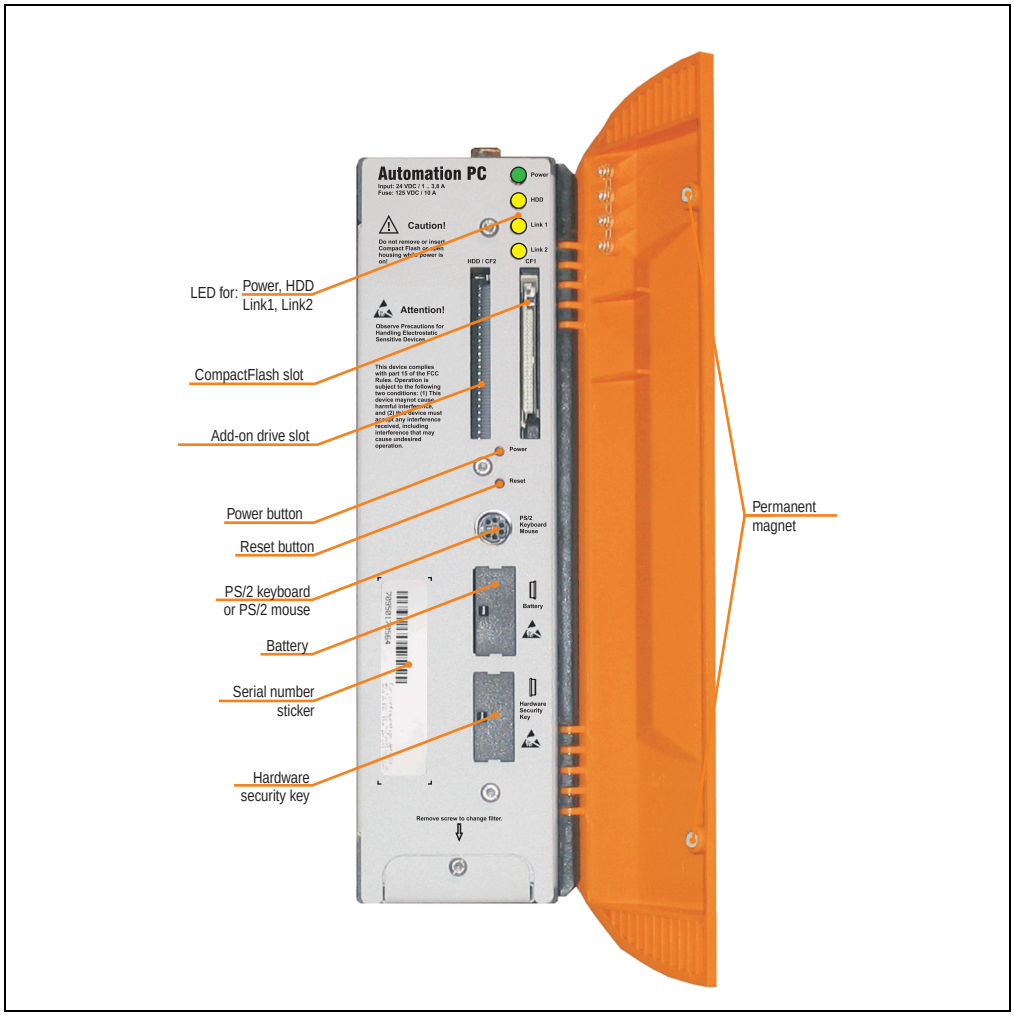


Figure 5: Interface overview - APC620, 1 PCI slot (front)

Information:

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

2.1.2 Technical data

Features	APC620, 1 PCI slot
Boot loader / Operating system	BIOS
Processor Cooling Type	Component-dependent, see technical data for the CPU board Passive via heat sink and optionally supported with an active fan kit
Main memory	Max. 512 MB with 815E CPU board, max. 1 GB with 855GME CPU board
Graphics Controller	 Component-dependent, see technical data for the CPU board
Power failure logic Controller Hold-up time	 MTCX[1] (see also page 527) 10 ms, dependent on the system unit revision (see page 348)
Real-time clock Battery-buffered Accuracy	 Yes Component-dependent, see technical data for the CPU board
Battery Type Removable Lifespan	See also page 95 Renata 950 mAh Yes, accessible behind the orange cover 4 years [2]
Ethernet Controller Number	 See also page 76 or page 77 2
CAN bus	Optional add-on interface (5AC600.CANI-00)
CompactFlash Type Number	See also page 91 or page 92 Type I 1 (max. 4 using optional components)
Serial interface Number Type UART Transfer rate Connection	See also page 74 or page 75 2 RS232, modem-capable, not electrically isolated 16550 compatible, 16 bytes FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	See also section"USB port" on page 78 USB 2.0 2 Low speed (1.5 MBit/s), full speed (12 MBit/s), to high speed (480 Mbit/s) Type A Max. 500 mA per connection
Reset button	Yes, accessible behind the orange cover
LEDs	4 directed outwards via fiber optic lines, see also section "Status LEDs" on page 90
PCI slots	1, see also section"PCI slots" on page 88
Electrical characteristics	
Power supply Rated voltage Rated current Starting current Power consumption	 24 VDC ±25% 3.8 A Typ. 7 A, max. 40 A for < 300 µs Component-dependent, see section 2.6 "Power management for APC620 systems with 1 and 2 PCI slots"

Table 20: Technical data - APC620, 1 PCI slot

Mechanical characteristics	APC620, 1 PCI slot
Housing[3]	
Material	Galvanized plate, plastic
Paint	Light gray (similar to Pantone 427CV), dark gray (similar to Pantone 432CV)
Front cover	Orange plastic (similar to Pantone 151CV)
Outer dimensions	See "Dimensions" on page 46.
Weight	Approx. 3.4 kg (component-dependent)
Environmental characteristics	
Ambient temperature	
Operation	Component-dependent, see the section about ambient temperature on page 57 and page 60
Storage	-20°C .. +60°C
Transport	-20°C .. +60°C
Relative humidity	
Operation	Component-dependent, see section "Humidity specifications" on page 72
Storage	Component-dependent, see section "Humidity specifications" on page 72
Transport	Component-dependent, see section "Humidity specifications" on page 72
Vibration[4]	
Operation (continuous)	5 - 9 Hz: 1.75 mm amplitude / 9 - 150 Hz: 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	5 - 9 Hz: 3 mm amplitude / 9 - 150 Hz: 1 g (9.8 m/s² 0-peak)
Storage	2 .. 8 Hz: 7.5 mm, 8 .. 200 Hz: 2 g, 200 .. 500 Hz: 4 g
Transport	2 .. 8 Hz: 7.5 mm, 8 .. 200 Hz: 2 g, 200 .. 500 Hz: 4 g
Shock[4]	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20
Altitude	
Operation	Max. 3,000 m (component-dependent)
Electromagnetic compatibility	
Emission	
Network-related emissions	EN 61000-6-4, EN 55022 A
Emissions	EN 61000-6-4, EN 55011 class A, EN 55022 class A, EN 61131-2, 47 CFR Part 15
Immunity	
Electrostatic discharge (ESD)	EN 61000-6-2, EN 61131-2, EN 55024
High-frequency electromagnetic fields	EN 61000-6-2, EN 61131-2, EN 55024
High-speed transient disturbances (Burst)	EN 61000-6-2, EN 61131-2, EN 55024
Surge voltages (Surge)	EN 61000-6-2, EN 61131-2, EN 55024
Conducted values	EN 61000-6-2, EN 61131-2, EN 55024
Magnetic fields with electrical frequencies	EN 61000-6-2, EN 61131-2, EN 55024
Voltage dips, interruptions	EN 61000-6-2, EN 61131-2, EN 55024
Damped vibration	EN 61000-6-2, EN 61131-2, EN 55024

Table 20: Technical data - APC620, 1 PCI slot (Forts.)

1) Maintenance Controller Extended.

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

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

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

2.1.3 Dimensions

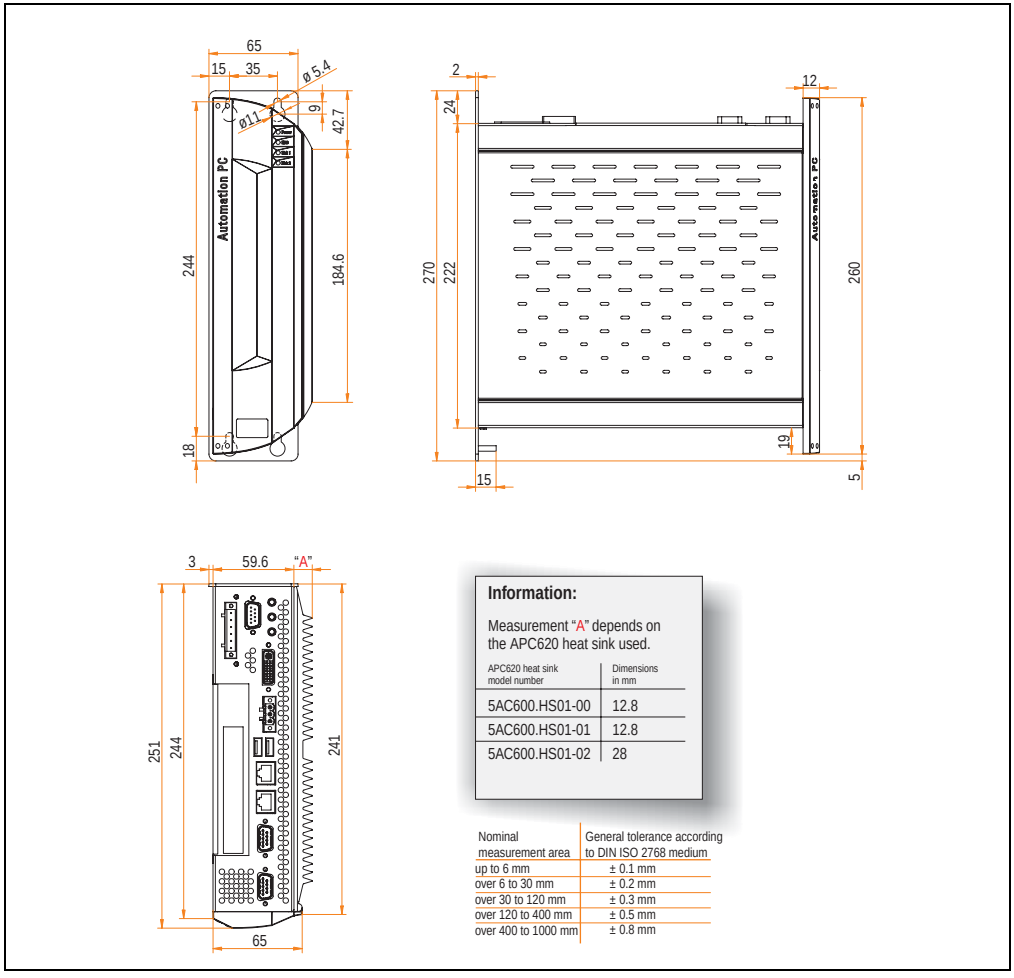
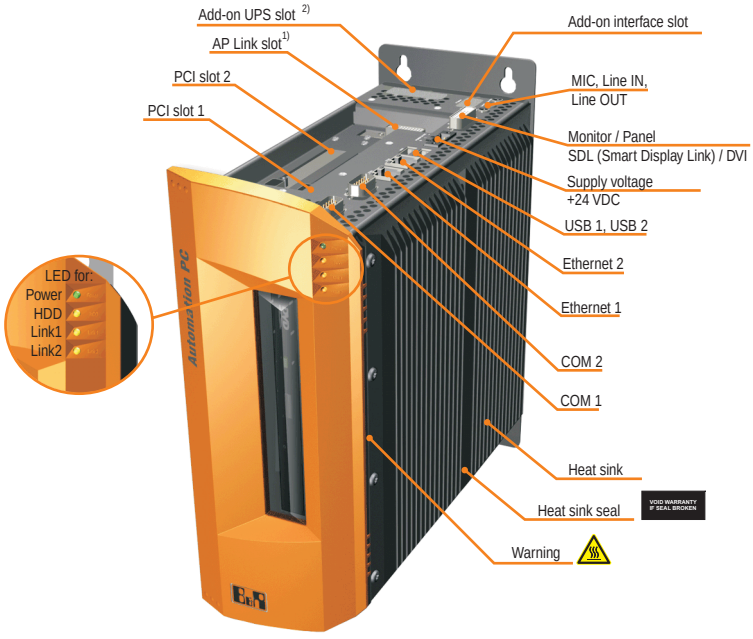


Figure 6: Dimensions - APC620, 1 PCI slot

2.2 APC620, 2 PCI slots

2.2.1 Interfaces



1) Can only be used with system unit 5PC600.SX02-00
2) Slot always present starting with 5PC600.SX02-00 Rev. G0 and 5PC600.SX02-01 Rev. H0.

Figure 7: Interface overview - APC620, 2 PCI slots (top)

Warning!

Do not remove mounting screws from the heat sink, as it is connected to the processor and chipset by a thermal coupling. Should this connection be broken, the APC620 must be sent for repair. Removal of the mounting screws, which can be determined by a broken seal, voids all warranty.

During operation, surface temperatures of the heat sink may reach 70°C (warning "hot surface").

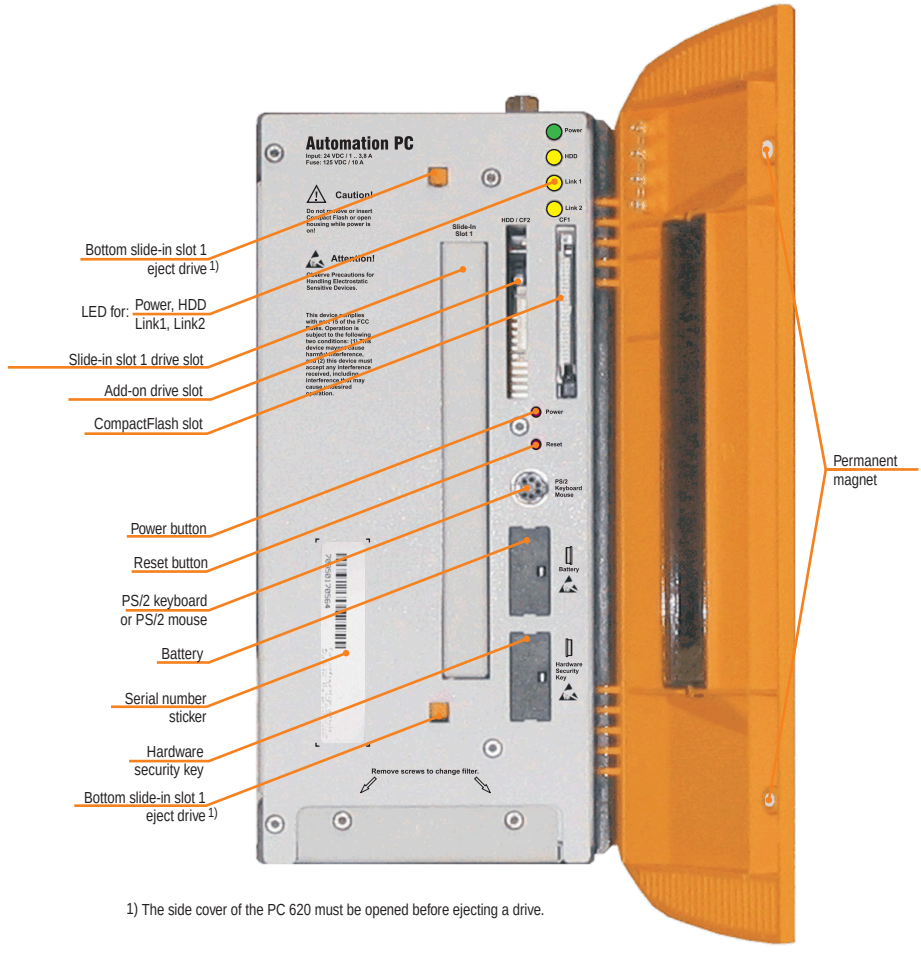


Figure 8: Interface overview - APC620, 2 PCI slots (front)

Information:

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

2.2.2 Technical data

Features	APC620, 2 PCI slots
Boot loader / Operating system	BIOS
Processor Cooling Type	Component-dependent, see technical data for the CPU board Passive via heat sink and optionally supported with an active fan kit
Main memory	Max. 512 MB with 815E CPU board, max. 1 GB with 855GME CPU board
Graphics Controller	 Component-dependent, see technical data for the CPU board
Power failure logic Controller Hold-up time	 MTCX[1] (see also page 527) 10 ms, dependent on the system unit revision (see page 348)
Real-time clock Battery-buffered Accuracy	 Yes Component-dependent, see technical data for the CPU board
Battery Type Removable Lifespan	See also page 95 Renata 950 mAh Yes, accessible behind the orange cover 4 years [2]
Ethernet Controller Number	 See also page 76 or page 77 2
CAN bus	Optional add-on interface (5AC600.CANI-00)
CompactFlash Type Number	See also page 91 or page 92 Type I 2 (max. 4 using optional components)
Serial interface Number Type UART Transfer rate Connection	See also page 74 or page 75 2 RS232, modem-capable, not electrically isolated 16550 compatible, 16 bytes FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	See also section"USB port" on page 78 USB 2.0 2 Low speed (1.5 MBit/s), full speed (12 MBit/s), to high speed (480 Mbit/s) Type A Max. 500 mA per connection
Reset button	Yes, accessible behind the orange cover
LEDs	4 directed outwards via fiber optic lines, see also section "Status LEDs" on page 90
PCI slots	1, see also section"PCI slots" on page 88
Electrical characteristics	
Power supply Rated voltage Rated current Starting current Power consumption	 24 VDC ±25% 3.8 A Typ. 7 A, max. 40 A for < 300 µs Component-dependent, see section 2.6 "Power management for APC620 systems with 1 and 2 PCI slots"

Table 21: Technical data - APC620, 2 PCI slots

Mechanical characteristics	APC620, 2 PCI slots
Housing[3]	
Material	Galvanized plate, plastic
Paint	Light gray (similar to Pantone 427CV), dark gray (similar to Pantone 432CV)
Front cover	Orange plastic (similar to Pantone 151CV)
Outer dimensions	See "Dimensions" on page 51.
Weight	Approx. 4.5 kg (component-dependent)
Environmental characteristics	
Ambient temperature	
Operation	Component-dependent, see the section about ambient temperature on page 57 and page 60
Storage	-20°C .. +60°C
Transport	-20°C .. +60°C
Relative humidity	
Operation	Component-dependent, see section "Humidity specifications" on page 72
Storage	Component-dependent, see section "Humidity specifications" on page 72
Transport	Component-dependent, see section "Humidity specifications" on page 72
Vibration[4]	
Operation (continuous)	5 - 9 Hz: 1.75 mm amplitude / 9 - 150 Hz: 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	5 - 9 Hz: 3 mm amplitude / 9 - 150 Hz: 1 g (9.8 m/s² 0-peak)
Storage	2 .. 8 Hz: 7.5 mm, 8 .. 200 Hz: 2 g, 200 .. 500 Hz: 4 g
Transport	2 .. 8 Hz: 7.5 mm, 8 .. 200 Hz: 2 g, 200 .. 500 Hz: 4 g
Shock[4]	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20
Altitude	
Operation	Max. 3,000 m (component-dependent)
Electromagnetic compatibility	
Emission	
Network-related emissions	EN 61000-6-4, EN 55022 A
Emissions	EN 61000-6-4, EN 55011 class A, EN 55022 class A, EN 61131-2, 47 CFR Part 15
Immunity	
Electrostatic discharge (ESD)	EN 61000-6-2, EN 61131-2, EN 55024
High-frequency electromagnetic fields	EN 61000-6-2, EN 61131-2, EN 55024
High-speed transient disturbances (Burst)	EN 61000-6-2, EN 61131-2, EN 55024
Surge voltages (Surge)	EN 61000-6-2, EN 61131-2, EN 55024
Conducted values	EN 61000-6-2, EN 61131-2, EN 55024
Magnetic fields with electrical frequencies	EN 61000-6-2, EN 61131-2, EN 55024
Voltage dips, interruptions	EN 61000-6-2, EN 61131-2, EN 55024
Damped vibration	EN 61000-6-2, EN 61131-2, EN 55024

Table 21: Technical data - APC620, 2 PCI slots (Forts.)

1) Maintenance Controller Extended.

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

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

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

2.2.3 Dimensions

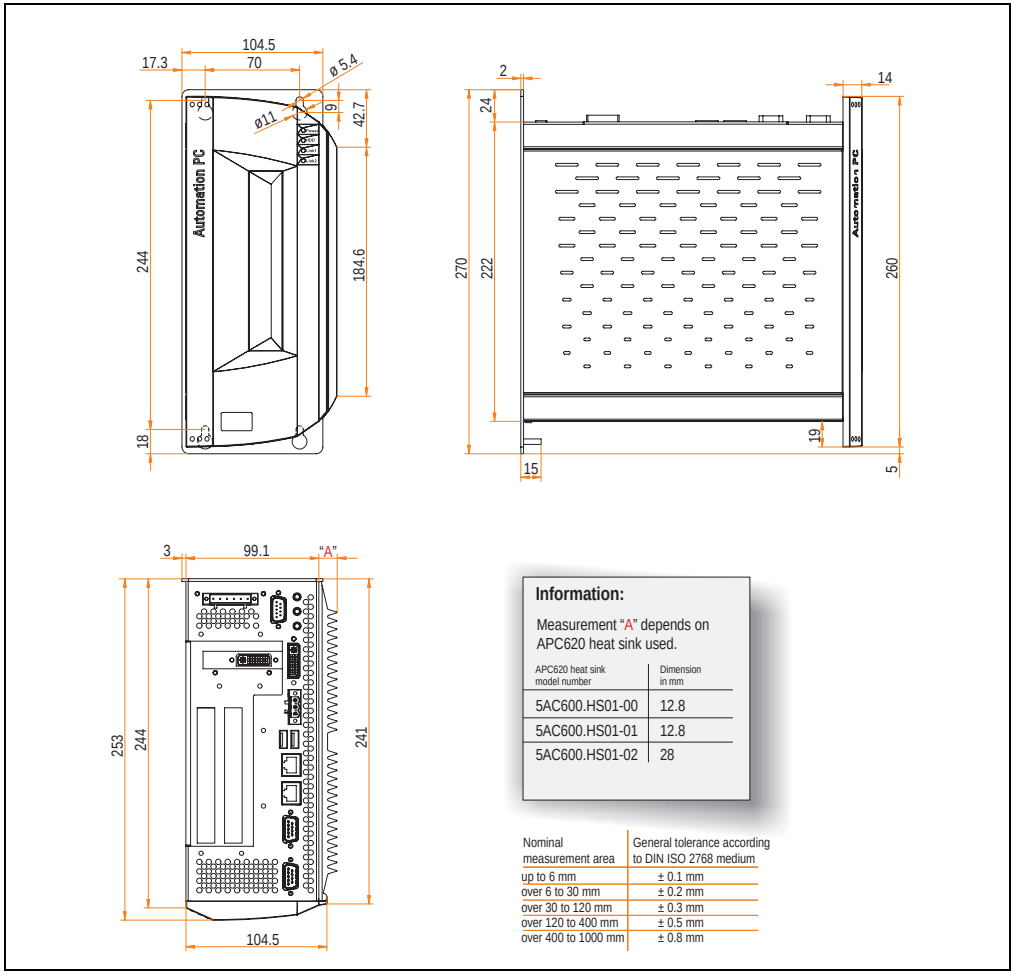
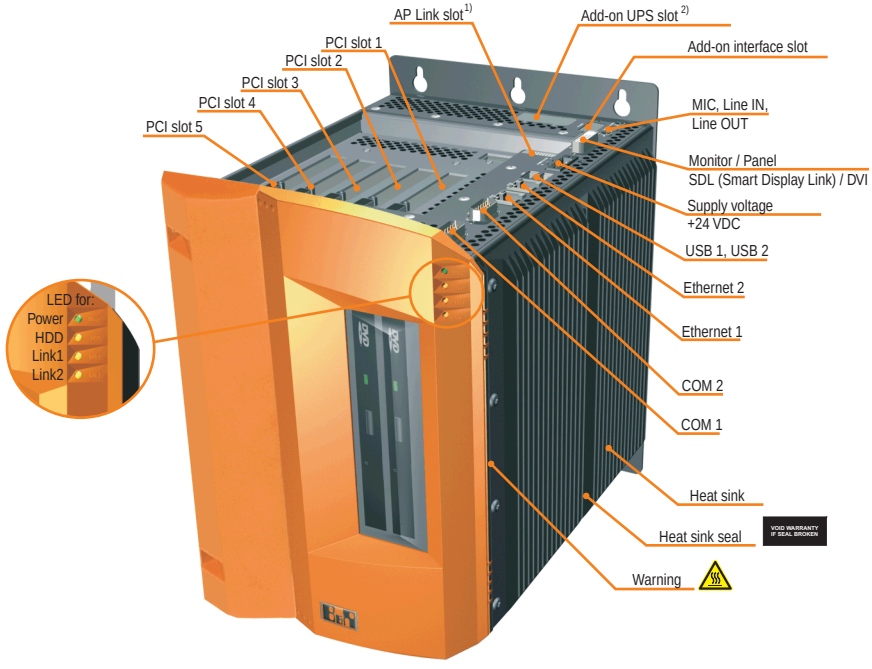


Figure 9: Dimensions - APC620, 2 PCI slots

2.3 APC620, 5 PCI slots

2.3.1 Interfaces



1) Can only be used with a 5PC600.SX05-00 system unit.
2) Slot always present starting with 5PC600.SX05-00 Rev. F0 and 5PC600.SX05-01 Rev. F0.

Figure 10: Interface overview - APC620, 5 PCI slots (top)

Warning!

Do not remove the mounting screws from the heat sink, as it is connected to the processor and chipset by a thermal coupling. Should this connection be broken, the APC620 must be sent for repair. Removal of the mounting screws, which can be determined by a broken seal, voids all warranty.

During operation, surface temperatures of the heat sink may reach 70°C (warning "hot surface").

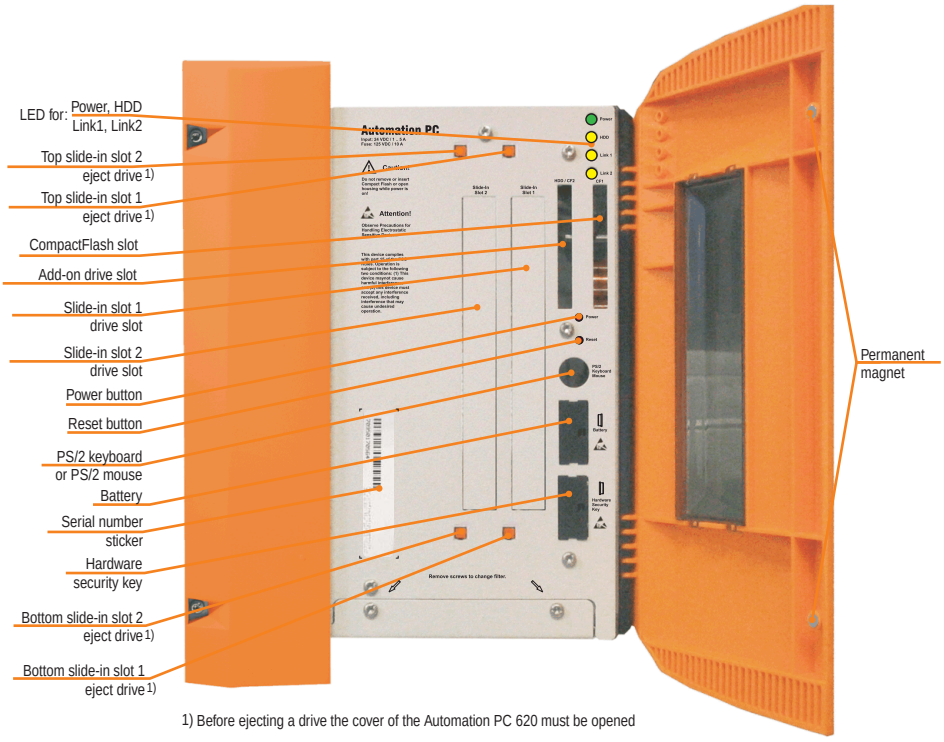


Figure 11: Interface overview - APC620, 5 PCI slots (front)

Information:

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

2.3.2 Technical data

Features	APC620, 5 PCI slots
Boot loader / Operating system	BIOS
Processor Cooling Type	Component-dependent, see technical data for the CPU board Passive via heat sink and optionally supported with an active fan kit
Main memory	Max. 512 MB with 815E CPU board, max. 1 GB with 855GME CPU board
Graphics Controller	 Component-dependent, see technical data for the CPU board
Power failure logic Controller Hold-up time	 MTCX[1] (see also page 527) 10 ms, dependent on the system unit revision (see page 348)
Real-time clock Battery-buffered Accuracy	 Yes Component-dependent, see technical data for the CPU board
Battery Type Removable Lifespan	See also page 95 Renata 950 mAh Yes, accessible behind the orange cover 4 years [2]
Ethernet Controller Number	 See also page 76 or page 77 2
CAN bus	Optional add-on interface (5AC600.CANI-00)
CompactFlash Type Number	See also page 91 or page 92 Type I 2 (max. 4 using optional components)
Serial interface Number Type UART Transfer rate Connection	See also page 74 or page 75 2 RS232, modem-capable, not electrically isolated 16550 compatible, 16 bytes FIFO Max. 115 kBaud 9-pin DSUB
USB interface Type Number Transfer rate Connection Current load	See also section"USB port" on page 78 USB 2.0 2 Low speed (1.5 MBit/s), full speed (12 MBit/s), to high speed (480 Mbit/s) Type A Max. 500 mA per connection
Reset button	Yes, accessible behind the orange cover
LEDs	4 directed outwards via fiber optic lines, see also section "Status LEDs" on page 90
PCI slots	1, see also section"PCI slots" on page 88
Electrical characteristics	
Power supply Rated voltage Rated current Starting current Power consumption	 24 VDC ±25% 5 A Typ. 10 A, max. 40 A for < 300 µs Component-dependent, see section 2.7 "Power management, APC620 systems with 5 PCI slots"

Table 22: Technical data - APC620, 5 PCI slots

Mechanical characteristics	APC620, 5 PCI slots
Housing[3]	
Material	Galvanized plate, plastic
Paint	Light gray (similar to Pantone 427CV), dark gray (similar to Pantone 432CV)
Front cover	Orange plastic (similar to Pantone 151CV)
Outer dimensions	See "Dimensions" on page 56.
Weight	Approx. 5.7 kg (component-dependent)
Environmental characteristics	
Ambient temperature	
Operation	Component-dependent, see the section about ambient temperature on page 57 and page 60
Storage	-20°C .. +60°C
Transport	-20°C .. +60°C
Relative humidity	
Operation	Component-dependent, see section "Humidity specifications" on page 72
Storage	Component-dependent, see section "Humidity specifications" on page 72
Transport	Component-dependent, see section "Humidity specifications" on page 72
Vibration[4]	
Operation (continuous)	5 - 9 Hz: 1.75 mm amplitude / 9 - 150 Hz: 0.5 g (4.9 m/s² 0-peak)
Operation (occasional)	5 - 9 Hz: 3 mm amplitude / 9 - 150 Hz: 1 g (9.8 m/s² 0-peak)
Storage	2 .. 8 Hz: 7.5 mm, 8 .. 200 Hz: 2 g, 200 .. 500 Hz: 4 g
Transport	2 .. 8 Hz: 7.5 mm, 8 .. 200 Hz: 2 g, 200 .. 500 Hz: 4 g
Shock[4]	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Protection type	IP20
Altitude	
Operation	Max. 3,000 m (component-dependent)
Electromagnetic compatibility	
Emission	
Network-related emissions	EN 61000-6-4, EN 55022 A
Emissions	EN 61000-6-4, EN 55011 class A, EN 55022 class A, EN 61131-2, 47 CFR Part 15
Immunity	
Electrostatic discharge (ESD)	EN 61000-6-2, EN 61131-2, EN 55024
High-frequency electromagnetic fields	EN 61000-6-2, EN 61131-2, EN 55024
High-speed transient disturbances (Burst)	EN 61000-6-2, EN 61131-2, EN 55024
Surge voltages (Surge)	EN 61000-6-2, EN 61131-2, EN 55024
Conducted values	EN 61000-6-2, EN 61131-2, EN 55024
Magnetic fields with electrical frequencies	EN 61000-6-2, EN 61131-2, EN 55024
Voltage dips, interruptions	EN 61000-6-2, EN 61131-2, EN 55024
Damped vibration	EN 61000-6-2, EN 61131-2, EN 55024

Table 22: Technical data - APC620, 5 PCI slots (Forts.)

1) Maintenance Controller Extended.

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

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

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

2.3.3 Dimensions

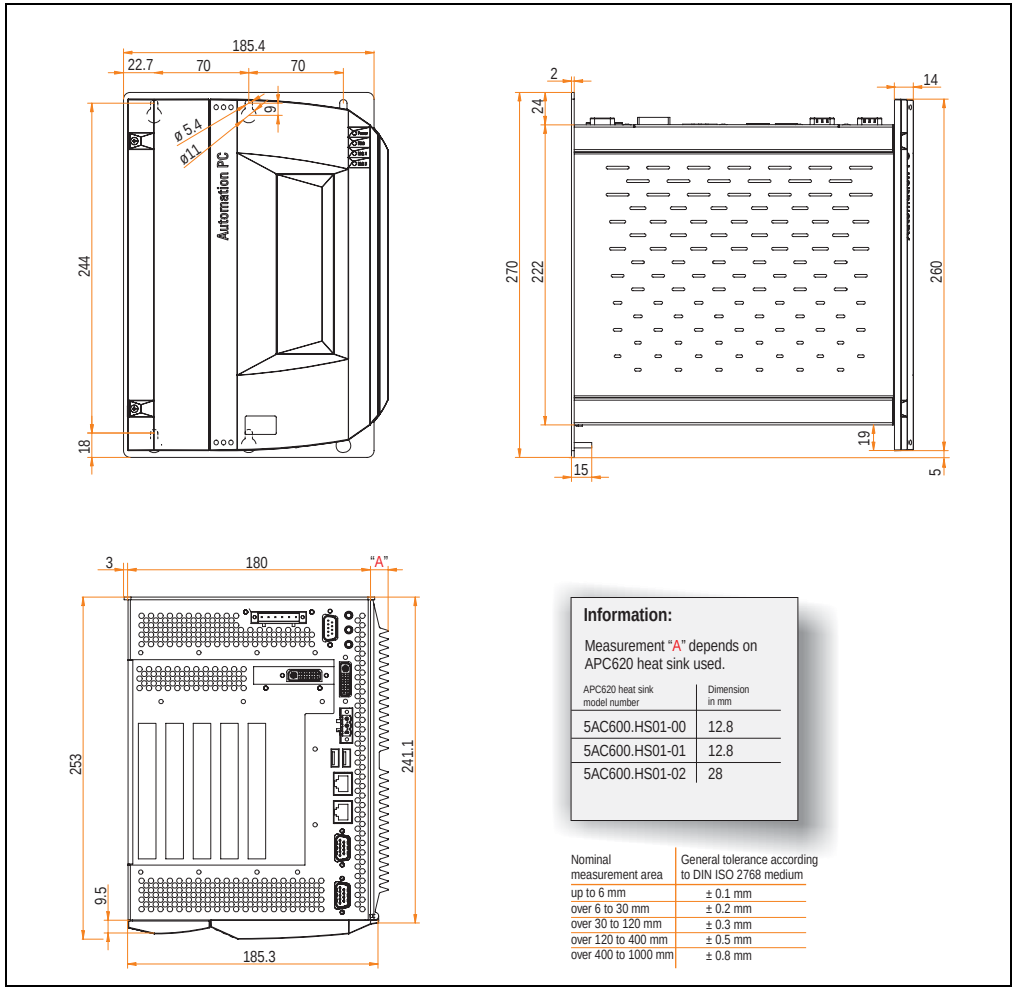


Figure 12: Dimensions - APC620, 5 PCI slots

2.4 Environmental temperatures for systems with an 815E CPU board

It is possible to combine CPU boards with various other components, such as drives, main memory, additional insert cards, etc. dependent on system unit and fan kit. The various configurations result in varying maximum possible ambient temperatures, which can be seen in the following graphic (see figure 14 "Environmental temperatures for systems with an 815E CPU board" on page 58).

Information:

The maximum specified ambient temperatures 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, see chapter 4 "Software" on page 223).

Worst-case conditions for systems with an 815E CPU board

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

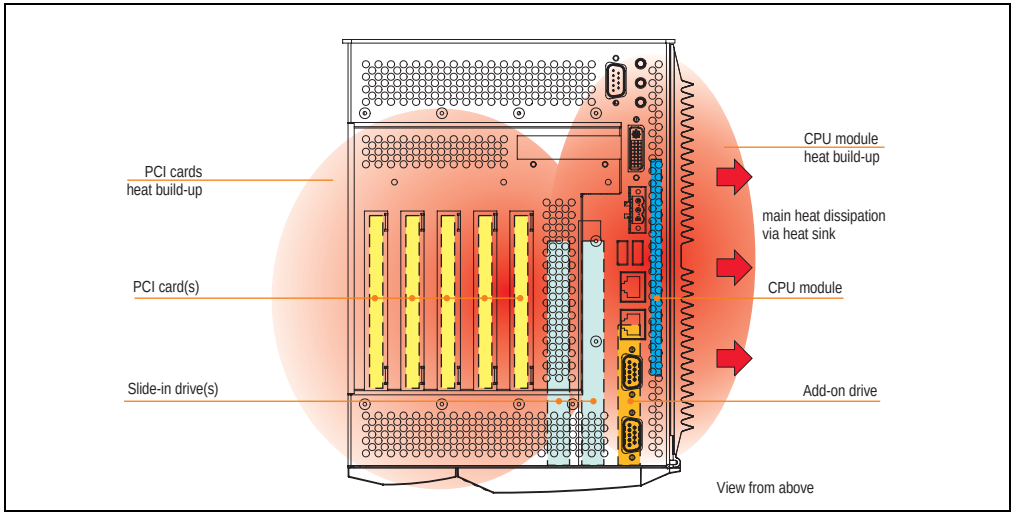


Figure 13: Example of worst-case conditions for temperature measurement

	All temperatures in (°C)	① 815E CPU board without fan kit and heat sink (5AC600.HS01-00)								① 815E CPU board with fan kit and heat sink (5AC600.HS01-00)								Temperature monitored by sensor(s) in these locations	
		C3 400 5PC600.E815-00	C3 733 5PC600.E815-02	C3 1000 5PC600.E815-03						C3 400 5PC600.E815-00	C3 733 5PC600.E815-02	C3 1000 5PC600.E815-03							
	② Max. ambient temperature	50	45	30						55	55	55							
③	What can still be operated at max. amb. temp., and what limits are there?																		
Add-on drive	On-board CompactFlash [1]	✓	✓	✓						✓	✓	✓						80	I/O
	5AC600.CFSI-00 [1]	✓	✓	✓						✓	✓	✓						80	
	5AC600.HDDI-01	✓	✓	✓						✓	✓	✓						80	
	5AC600.HDDI-00 (24-hour / standard)	-/30	-/25	-/25						35/45	35/45	35/45						45/55	
Slide-in drive	5AC600.CFSS-00 [1]	✓	✓	✓						✓	✓	✓						80	Slide-in srive 1 and 2
	5AC600.CDXS-00	45	✓	✓						50	50	50						55	
	5AC600.DVDS-00	35	35	✓						40	40	40						45	
	5AC600.DVRS-00	35	35	✓						40	40	40						45	
	5AC600.FDDS-00	35	35	✓						40	40	40						50	
	5AC600.HDDS-01	✓	✓	✓						✓	✓	✓						80	
	5AC600.HDDS-00 (24-hour / standard)	30/35	30/35	30/35						40/50	40/50	40/50						45/55	
Main memory	5MMSDR.0128-01	✓	✓	✓						✓	✓	✓						-	
	5MMSDR.0256-01	✓	✓	✓						✓	✓	✓						-	
	5MMSDR.0512-01	✓	✓	✓						✓	✓	✓						-	
System units	5PC600.SX01-00	✓	✓	✓						✓	✓	✓						95	Power supply
	5PC600.SX02-01	✓	✓	✓						✓	✓	✓						95	
	5PC600.SX02-00	✓	✓	✓						✓	✓	✓						95	
	5PC600.SX05-01	✓	✓	✓						✓	✓	✓						95	
	5PC600.SX05-00	✓	✓	✓						✓	✓	✓						95	
Additional IF slots	5AC600.CANI-00	✓	✓	✓						✓	✓	✓						-	
	5AC600.485I-00	✓	✓	✓						✓	✓	✓						-	
	5ACPCI.RAIS-00 (24-hour / standard)	30/35	30/35	30/35						40/50	40/50	40/50						-	
	5ACPCI.RAIS-01 (24-hour / standard)	30/35	30/35	30/35						40/50	40/50	40/50						-	

1) Only possible with a CompactFlash card (5CFCRD.xxxx-02 or 5CFCRD.xxxx-03) from B&R.

Figure 14: Environmental temperatures for systems with an 815E CPU board

See the following page for a description of the graphic.

For systems containing one of the following components, the minimum ambient temperature is +5°C: 5AC600.HDDI-00, 5AC600.CDXS-00, 5AC600.DVDS-00, 5AC600.DVRS-00, 5AC600.FDDS-00, 5AC600.HDDS-00, 5ACPCI.RAIS-00, 5ACPCI.RAIS-01.
If none of these components are used, then the minimum ambient temperature is 0°C.

2.4.1 How do you determine the maximum ambient temperature?

1) Select the CPU board (use **with** or **without** fan kit).

2) The "maximum ambient temperature" line shows the maximum ambient temperature for the entire system when using this CPU board.

3) Incorporating additional drives (add-on, slide-in), main memory, additional insert cards, etc. can change the temperature limits of an APC620 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 APC620 system cannot exceed this temperature.

Special case: 5AC600.HDDI-00, 5AC600.HDDS-00 and RAID hard disks

For these hard disks, the limits will depend on whether the system is intended for 24-hour[1)] or standard[1)] operation.

Example 1: A temperature limit of "30/35" means
30°C for 24-hour operation and 35°C for standard operation.

Example 2: A temperature limit of "-/25" means
not intended for 24-hour operation and 25°C for standard operation.

Information:

It is generally recommended to use a fan kit when using hard disks 5AC600.HDDI-00, 5AC600.HDDS-00 and the RAID hard disks.

2.4.2 Temperature monitoring

The APC620 has temperature sensors in various places (I/O, power supply, slide-in drive 1, slide-in drive 2). The locations of the temperature sensors can be found in figure "Temperature sensor locations" on page 525. The value listed in the table represents the defined maximum temperature for this measurement point[2)] . When this temperature is exceeded, an alarm is triggered. The temperatures[2)] can be read in BIOS (menu item "Advanced" - Baseboard/panel features - Baseboard monitor) or in Microsoft Windows XP/embedded, using the B&R Control Center.
Additionally, the hard disks for APC620 systems available from B&R are equipped with S.M.A.R.T, or Self Monitoring, Analysis, and Reporting Technology. This makes it possible to read various parameters, for example the temperature, using software (e.g. HDD thermometer - freeware) in Microsoft Windows XP/embedded.

1) 24-hour operation = 732 POH (Power On Hours) per month, standard operation = 250 POH or 333 POH (Power On Hours) per month.
2) The measured temperature is a guideline for the immediate ambient temperature, but can be influenced by neighboring components.

2.5 Environmental temperatures for systems with an 855GME CPU board

It is possible to combine CPU boards with various other components, such as drives, main memory, additional insert cards, etc. dependent on system unit and fan kit. The various configurations result in varying maximum possible ambient temperatures, which can be seen in the following graphic (see figure 16 "Environmental temperatures for systems with an 855GME CPU board" on page 61).

Information:

The maximum specified ambient temperatures 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, see chapter 4 "Software" on page 223).

Worst-case conditions for systems with an 855GME CPU board

- Thermal Analysis Tool V1.4 from Intel for simulating 100% processor load.
- BurnIn testing tool (BurnIn V4.0 Pro from Passmark Software) to simulate a 100% load on the interface via loop-back adapters (serial interfaces, add-on and slide-in drives, USB interfaces, audio outputs).
- Maximum system extension and power consumption.

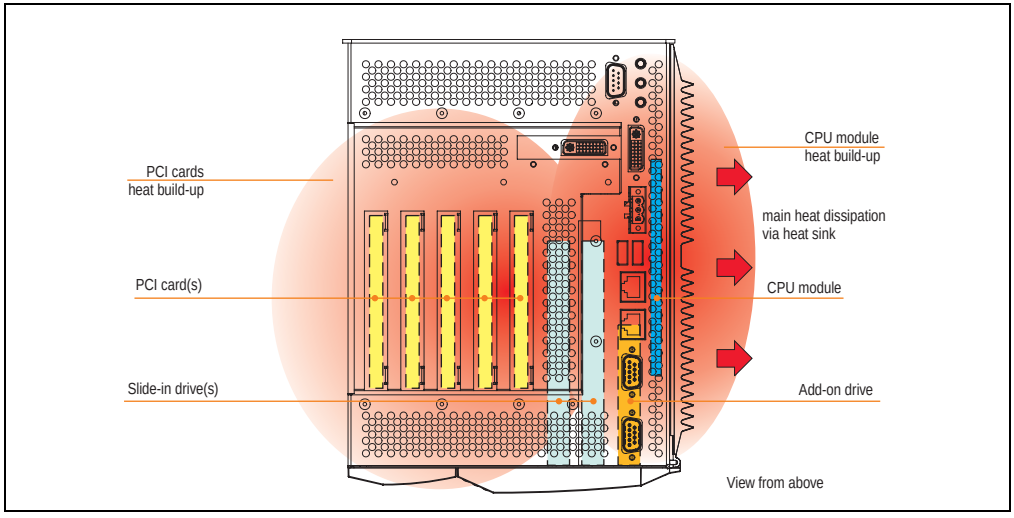


Figure 15: Example of worst-case conditions for temperature measurement

	All temperatures in Celsius (°C)	① 855GME CPU board without fan kit and heat sink 5AC600.HS01-01				and heat sink 5AC600.HS01-02				① 855GME CPU board with fan kit and heat sink 5AC600.HS01-01				and heat sink 5AC600.HS01-02				Temperature monitored by sensors in these locations	
		CM 600	CM 1000	PM 1100	PM 1400	PM 1600	PM 1800			CM 600	CM 1000	PM 1100	PM 1400	PM 1600	PM 1800				
		5PC600.E855-04	5PC600.E855-05	5PC600.E855-00	5PC600.E855-02	5PC600.E855-01	5PC600.E855-03			5PC600.E855-04	5PC600.E855-05	5PC600.E855-00	5PC600.E855-02	5PC600.E855-01	5PC600.E855-03				
	② Max. ambient temperature	50	45	45	45	/	/			55	55	55	55	45	45				
③	What can still be operated at max. env. temp., and what limitations are there?																		
Add-on drive	Onboard CompactFlash [1]	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓			80	I/O
	5AC600.CFSI-00 [1]	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓			80	
	5AC600.HDDI-01	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓			80	
	5AC600.HDDI-00 (24 hour / standard)	-/30	-/25	-/25	-/25					30/40	30/40	30/40	30/40	-/35	-/35			45/55	
	5AC600.HDDI-05	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓			80	
Slide-in drive	5AC600.CFSS-00 [1]	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓			80	Slide-in drive 1 and 2
	5AC600.CDXS-00	45	40	40	40					50	50	50	50	40	40			55	
	5AC600.DVDS-00	30	30	30	30					40	40	40	40	30	30			45	
	5AC600.DVRS-00	30	30	30	30					40	40	40	40	30	30			45	
	5AC600.FDDS-00	40	35	35	35					45	45	45	45	35	35			50	
	5AC600.HDDS-01	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓			80	
	5AC600.HDDS-00 (24 hour / standard)	35/45	30/40	30/40	30/40					40/50	40/50	40/50	40/50	30/40	30/40			45/55	
	5AC600.HDDS-02	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓			80	
Main memory	5MMDDR.0256-00	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓			-	
	5MMDDR.0512-00	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓			-	
	5MMDDR.1024-00	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓			-	
System units	5PC600.SX01-00	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓			95	Power supply
	5PC600.SX02-01	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓			95	
	5PC600.SX02-00	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓			95	
	5PC600.SX05-01	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓			95	
	5PC600.SX05-00	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓			95	
Additional slots interface / AP Link	5AC600.CANI-00	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓			-	
	5AC600.485I-00	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓			-	
	5AC600.SDL0-00	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓			-	
	5ACPCI.RAIS-00 (24-hour / standard)	35/45	30/40	30/40	30/40					40/50	40/50	40/50	40/50	30/40	30/40			-	
	5ACPCI.RAIS-01 (24-hour / standard)	35/45	30/40	30/40	30/40					40/50	40/50	40/50	40/50	30/40	30/40			-	
	5ACPCI.RAIC-01 (24-hour / standard)	35/45	30/40	30/40	30/40					40/50	40/50	40/50	40/50	30/40	30/40			-	

1) Only possible with a CompactFlash card (5CFCRD.xxxx-02 or 5CFCRD.xxxx-03) from B&R.

Figure 16: Environmental temperatures for systems with an 855GME CPU board

See the following page for a description of the graphic.

For systems containing one of the following components, the minimum ambient temperature is +5°C: 5AC600.HDDI-00, 5AC600.CDXS-00, 5AC600.DVDS-00, 5AC600.DVRS-00, 5AC600.FDDS-00, 5AC600.HDDS-00, 5ACPCI.RAIS-00, 5ACPCI.RAIS-01, 5ACPCI.RAIC-01. If none of these components are used, then the minimum ambient temperature is 0°C.

2.5.1 How do you determine the maximum ambient temperature?

1) Selection of the CPU board (use **with** or **without** fan kit).

2) The "maximum ambient temperature" line shows the maximum ambient temperature for the entire system when using this CPU board.

3) Incorporating additional drives (add-on, slide-in), main memory, additional insert cards, etc. can change the temperature limits of an APC620 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 APC620 system cannot exceed this temperature.

Special case: 5AC600.HDDI-00, 5AC600.HDDS-00 and RAID hard disks

For these hard disks, the limits will depend on whether the system is intended for 24-hour[1)] or standard[1)] operation.

Example 1: A temperature limit of "30/35" means
30°C for 24-hour operation and 35°C for standard operation.

Example 2: A temperature limit of "-/25" means
not intended for 24-hour operation and 25°C for standard operation.

Information:

It is generally recommended to use a fan kit when using hard disks (5ACPCI.RAIS-00, 5ACPCI.RAIS-01 and 5ACPCI.RAIC-01) and the RAID hard disks.

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

2.5.2 Temperature monitoring

The APC620 has temperature sensors in various places (I/O, power supply, slide-in drive 1, slide-in drive 2). The locations of the temperature sensors can be found in figure "Temperature sensor locations" on page 525. The value listed in the table represents the defined maximum temperature for this measurement point[1)] . When this temperature is exceeded, an alarm is triggered. The temperatures[1)] can be read in BIOS (menu item "Advanced" - Baseboard/panel features - Baseboard monitor) or in Microsoft Windows XP/embedded, using the B&R Control Center.
Additionally, the hard disks for APC620 systems available from B&R are equipped with S.M.A.R.T, or Self Monitoring, Analysis, and Reporting Technology. This makes it possible to read various parameters, for example the temperature, using software (e.g. HDD thermometer - freeware) in Microsoft Windows XP/embedded.

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

2.6 Power management for APC620 systems with 1 and 2 PCI slots

The following block diagram presents the simplified structure of the APC620 supply voltage for system units 5PC600.SX01-00, 5PC600.SX02-00 and 5PC600.SX02-01.

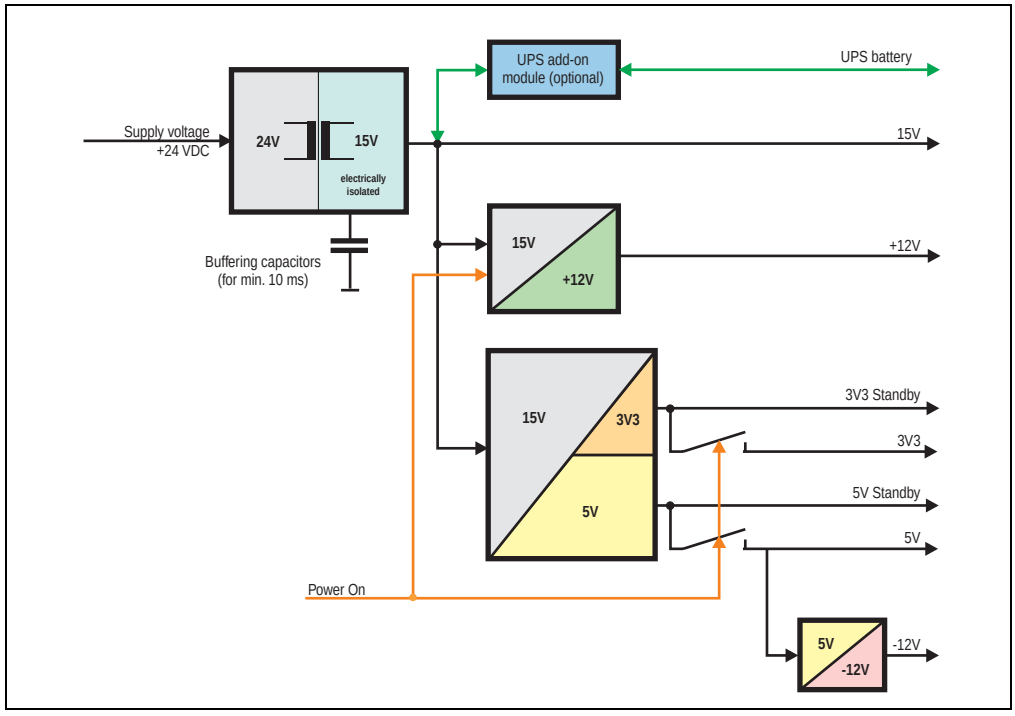


Figure 17: Supply voltage block diagram 1 and 2 PCI slots

Explanation:

The supply voltage is converted to 15 V with a DC/DC converter. These electrically isolated 15 volts feed two further DC/DC converters. One generates +12 V, and the other 3V3 and 5V standby.

After the system is turned on (e.g. using the power button), the voltages 3V3, 5 V, +12 V are placed on the bus. At the 5 V output, yet another DC/DC converter generates -12 V , and places these on the bus.

The optional APC620 add-on UPS and battery unit are supplied with 15 V and provide an uninterrupted power supply from the 15 V bus during power failures.

2.6.1 Power consumption with system unit 5PC600.SX01-00 1 PCI

All entries in watts		APC620 system unit 5PC600.SX01-00									This system
		C3 400 5PC600.E815-00	C3 733 5PC600.E815-02	C3 1000 5PC600.E815-03	CM 600 5PC600.E855-04	CM 1000 5PC600.E855-05	PM 1100 5PC600.E855-00	PM 1400 5PC600.E855-02	PM 1600 5PC600.E855-01	PM 1800 5PC600.E855-03	
Total power supply											Total power supply (max.) 70
	Add-on UPS module, optional	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	
	5V										max. possible at 5V 55
	CPU board, fixed device	14	18	25	17	21	23	23	37	37	
	Pro CompactFlash, optional (add-on, slide-in)	1	1	1	1	1	1	1	1	1	
	Hard disk, optional (add-on, slide-in)	4	4	4	4	4	4	4	4	4	
	External keyboard PS/2, optional	1	1	1	1	1	1	1	1	1	
	USB peripheral, optional (max. 2.5 watts per USB1 or USB2 connection)	5	5	5	5	5	5	5	5	5	
	Add-on interface, optional	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
	PCI card manufacturer limits, optional (max. 3 watts w/o fan kit, max. 17 watts w/ fan kit) [1]										
	External devices, optional (via BaseBoard)	5	5	5	5	5	5	5	5	5	
											Devices Σ
	3V3										max. possible at 3V3 23
	System unit, fixed device	4	4	4	4	4	4	4	4	4	
	Add-on interface, optional	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	
	PCI card manufacturer limits, optional (max. 3 watts w/o fan kit, max. 17 watts w/ fan kit) [1]										
											Devices Σ
	+12V										max. possible at +12V 12
	Fan kit, optional	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
	External device, optional (via BaseBoard)	10	10	10	10	10	10	10	10	10	
	PCI card manufacturer limits, optional (max. 3 watts w/o fan kit, max. 12 watts w/ fan kit) [1]										
											Devices Σ
	-12V										max. possible at -12V 1.2
	PCI card manufacturer, optional (max. 1.2 watts with or without fan kit) [1]										
											Devices Σ
											Total devices Σ

1) The total performance of one PCI card per PCI slot (= sum of power consumptions for each voltage area) may not exceed the limits stated for operation with or without a fan ki

Starting current with system unit 5PC600.SX01-00 1 PCI

The starting current is typically 7 A. The peak starting current is maximum 40 A in a time frame less than 300 µs.

2.6.2 Power consumption with system unit 5PC600.SX02-00 2 PCI

All entries in watts		APC620 system unit 5PC600.SX02-00									This system
		C3 400 5PC600.E815-00	C3 733 5PC600.E815-02	C3 1000 5PC600.E815-03	CM 600 5PC600.E855-04	CM 1000 5PC600.E855-05	PM 1100 5PC600.E855-00	PM 1400 5PC600.E855-02	PM 1600 5PC600.E855-01	PM 1800 5PC600.E855-03	
Total power supply											Total power supply (max.) 70
	Add-on UPS module, optional	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	
	5V										max. possible at 5V 55
	CPU board, fixed device	14	18	25	17	21	23	23	37	37	
	Pro CompactFlash, optional (add-on, slide-in)	1	1	1	1	1	1	1	1	1	
	Hard disk, optional (add-on, slide-in)	4	4	4	4	4	4	4	4	4	
	Pro drive, optional (slide-in CD,DVD CD-RW)	4	4	4	4	4	4	4	4	4	
	External keyboard PS/2, optional	1	1	1	1	1	1	1	1	1	
	USB peripheral, optional (max. 2.5 watts per USB1 or USB2 connection)	5	5	5	5	5	5	5	5	5	
	Add-on interface, optional	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
	Graphics adapter (AP Link), optional	5	5	5	5	5	5	5	5	5	
	PCI card manufacturer, optional (max. 3 watts w/o fan kit, max. 17 watts w/ fan kit) 1)										
	External device, optional (via BaseBoard)	5	5	5	5	5	5	5	5	5	
											Devices Σ
	3V3										max. possible at 3V3 23
	System unit, fixed device	4	4	4	4	4	4	4	4	4	
	Graphics adapter (AP Link), optional	5	5	5	5	5	5	5	5	5	
	Add-on interface, optional	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	
	PCI card manufacturer, optional (max. 3 watts w/o fan kit, max. 17 watts w/ fan kit) 1)										
											Devices Σ
	+12V										max. possible at +12V 12
	Fan kit, optional	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
	External device, optional (via BaseBoard)	10	10	10	10	10	10	10	10	10	
	PCI card manufacturer, optional (max. 3 watts w/o fan kit, max. 12 watts w/ fan kit) 1)										
											Devices Σ
	-12V										max. possible at -12V 1.2
	PCI card manufacturer, optional (max. 1.2 watts with or without fan kit) 1)										
											Devices Σ
											Total devices Σ

1) The total performance of one PCI card per PCI slot (= sum of power consumptions for each voltage area) may not exceed the limits stated for operation with or without a fan kit

Starting current with system unit 5PC600.SX02-00 2 PCI

The starting current is typically 7 A. The peak starting current is maximum 40 A in a time frame less than 300 µs.

2.6.3 Power consumption with system unit 5PC600.SX02-01 2 PCI

All entries in watts

		APC620 system unit 5PC600.SX02-01									This system
		C3 400 5PC600.E815-00	C3 733 5PC600.E815-02	C3 1000 5PC600.E815-03	CM 600 5PC600.E855-04	CM 1000 5PC600.E855-05	PM 1100 5PC600.E855-00	PM 1400 5PC600.E855-02	PM 1600 5PC600.E855-01	PM 1800 5PC600.E855-03	
Total power supply											Total power supply (max.) 70
	Add-on UPS module, optional	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	
											max. possible at 5V 55
5V	CPU board, fixed device	14	18	25	17	21	23	23	37	37	
5V	Pro CompactFlash, optional (add-on, slide-in)	1	1	1	1	1	1	1	1	1	
5V	Hard disk, optional (add-on, slide-in)	4	4	4	4	4	4	4	4	4	
5V	Pro drive, optional (slide-in CD,DVD CD-RW)	4	4	4	4	4	4	4	4	4	
5V	External keyboard PS/2, optional	1	1	1	1	1	1	1	1	1	
5V	USB peripheral, optional (max. 2.5 watts per USB1 or USB2 connection)	5	5	5	5	5	5	5	5	5	
5V	Add-on interface, optional	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
5V	PCI card manufacturer limits, optional (max. 3 watts w/o fan kit, max. 17 watts w/ fan kit) 1)										
5V	External device, optional (via BaseBoard)	5	5	5	5	5	5	5	5	5	
											Devices Σ
											max. possible at 3V3 23
3V3	System unit, fixed device	4	4	4	4	4	4	4	4	4	
3V3	Add-on Interface, optional	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	
3V3	PCI card manufacturer limits, optional (max. 3 watts w/o fan kit, max. 17 watts w/ fan kit) 1)										
											Devices Σ
											max. possible at +12V 12
+12V	Fan kit, optional	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
+12V	External device, optional (via BaseBoard)	10	10	10	10	10	10	10	10	10	
+12V	PCI card manufacturer, optional (max. 3 watts w/o fan kit, max. 12 watts w/ fan kit) 1)										
											Devices Σ
											max. possible at -12V 1.2
-12V	PCI card manufacturer limits, optional (max. 1.2 watts with or without fan kit) 1)										
											Devices Σ
											Total devices Σ

1) The total performance of one PCI card per PCI slot (= sum of power consumptions for each voltage area) may not exceed the limits stated for operation with or without a fan ki

Starting current with system unit 5PC600.SX02-01 2 PCI

The starting current is typically 7 A. The peak starting current is maximum 40 A in a time frame less than 300 µs.

2.7 Power management, APC620 systems with 5 PCI slots

The following block diagram presents the simplified structure of the APC620 supply voltage for system units 5PC600.SX05-00 and 5PC600.SX05-01.

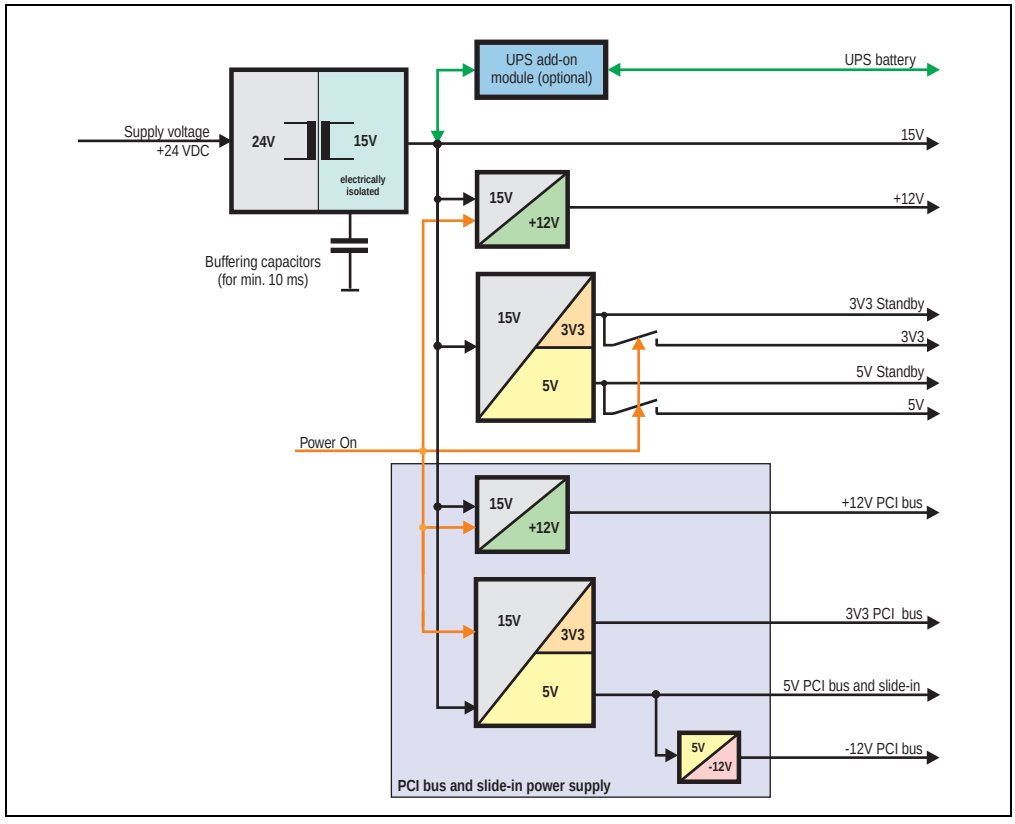


Figure 18: Supply voltage block diagram 5 PCI slots

Explanation:

Systems with 5 PCI slots have two additional power supplies for the PCI bus and the slide-in drives. The supply voltage is converted to 15 V with a DC/DC converter. These electrically isolated 15 V feed four further DC/DC converters. Two generate +12 V, and the others generate 3V3 and 5V standby. After the system is turned on (e.g. using the power button), the voltages 3V3, 5 V, +12 V are placed on the bus. At the 5 V output, yet another DC/DC converter generates -12 V , and places these on the bus.

The optional APC620 add-on UPS and battery unit are supplied with 15 V and provide an uninterrupted power supply from the 15 V bus during power failures.

2.7.1 Power consumption with system unit 5PC600.SX05-00 5 PCI

All entries in watts	APC620 system unit 5PC600.SX05-00									This system
	C3 400 5PC600.E815-00	C3 733 5PC600.E815-02	C3 1000 5PC600.E815-03	CM 600 5PC600.E855-04	CM 1000 5PC600.E855-05	PM 1100 5PC600.E855-00	PM 1400 5PC600.E855-02	PM 1600 5PC600.E855-01	PM 1800 5PC600.E855-03	
Total power supply (max)										110
Add-on UPS module, optional	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	
5V — max. possible at 5V										55
CPU board, fixed device	14	18	25	17	21	23	23	37	37	
Pro CompactFlash, optional (add-on)	1	1	1	1	1	1	1	1	1	
Hard disk, optional (add-on)	4	4	4	4	4	4	4	4	4	
External keyboard PS/2, optional	1	1	1	1	1	1	1	1	1	
USB peripheral, optional (max. 2.5 watts per USB1 or USB2 connection)	5	5	5	5	5	5	5	5	5	
Add-on interface, optional	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
Graphics adapter (AP Link), optional	5	5	5	5	5	5	5	5	5	
External device, optional (via BaseBoard)	5	5	5	5	5	5	5	5	5	
Devices Σ										
3V3 — max. possible at 3V3										23
System unit, fixed device	4	4	4	4	4	4	4	4	4	
Graphics adapter (AP Link), optional	5	5	5	5	5	5	5	5	5	
Add-on interface, optional	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	
Devices Σ										
+12V — max. possible at +12V										12
Fan kit, optional	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
External device, optional (via BaseBoard)	10	10	10	10	10	10	10	10	10	
Devices Σ										
PCI bus and slide-in power supply (max.)										50
5V — max. possible at 5V PCI bus and slide-in										50
Pro CompactFlash, optional (slide-in)	1	1	1	1	1	1	1	1	1	
Pro hard disk, optional (slide-in)	4	4	4	4	4	4	4	4	4	
Pro drive, optional (slide-in - CD/DVD)	4	4	4	4	4	4	4	4	4	
PCI card manufacturer limits, optional (max. 3 watts w/o fan kit, max. 17 watts w/ fan kit) [1]										
Devices Σ										
3V3 — max. possible at 3V3 PCI bus and slide-in										23
PCI card manufacturer, optional (max. 3 watts w/o fan kit, max. 17 watts w/ fan kit) [1]										
Devices Σ										
+12V — max. possible at +12V PCI bus and slide-in										12
PCI card manufacturer limits, optional (max. 3 watts w/o fan kit, max. 12 watts w/ fan kit) [1]										
Devices Σ										
-12V — max. possible at -12V PCI bus and slide-in										1.2
PCI card manufacturer limits, optional (max. 1.2 watts with or without fan kit) [1]										
Devices Σ										
Total PCI bus and slide-in Σ										
Total devices Σ										

1) The total performance of one PCI card per PCI slot (= sum of power consumptions for each voltage area) may not exceed the limits stated for operation with or without a fan

Starting current with system unit 5PC600.SX05-00 5 PCI

The starting current is typically 10 A. The peak starting current is maximum 40 A in a time frame less than 300 µs.

2.7.2 Power consumption with system unit 5PC600.SX05-01 5 PCI

All entries in watts

		APC620 system unit 5PC600.SX05-01									This system
		C3 400 5PC600.E815-00	C3 733 5PC600.E815-02	C3 1000 5PC600.E815-03	CM 600 5PC600.E855-04	CM 1000 5PC600.E855-05	PM 1100 5PC600.E855-00	PM 1400 5PC600.E855-02	PM 1600 5PC600.E855-01	PM 1800 5PC600.E855-03	
Total power supply											Total power supply (max.) 110
	Add-on UPS module, optional	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	
	5V: max. possible at 5V										55
	5V: CPU board, fixed device	14	18	25	17	21	23	23	37	37	
	5V: Pro CompactFlash, optional (add-on)	1	1	1	1	1	1	1	1	1	
	5V: Hard disk, optional (add-on)	4	4	4	4	4	4	4	4	4	
	5V: External keyboard PS/2, optional	1	1	1	1	1	1	1	1	1	
	5V: USB peripheral, optional (max. 2.5 watts per USB1 or USB2 connection)	5	5	5	5	5	5	5	5	5	
	5V: Add-on interface, optional	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
	5V: External device, optional (via BaseBoard)	5	5	5	5	5	5	5	5	5	
	5V: Devices Σ										
	3V3: max. possible at 3V3										23
	3V3: System unit, fixed device	4	4	4	4	4	4	4	4	4	
	3V3: Add-on interface, optional	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	
	3V3: Devices Σ										
	+12V: max. possible at +12V										12
	+12V: Fan kit, optional	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
	+12V: External device, optional (via BaseBoard)	10	10	10	10	10	10	10	10	10	
	+12V: Devices Σ										
PCI bus and slide-in power supply	PCI bus and slide-in power supply (max.)										50
	5V: max. possible at 5V PCI bus and slide-in										50
	5V: Pro CompactFlash, optional (slide-in)	1	1	1	1	1	1	1	1	1	
	5V: Pro hard disk, optional (slide-in)	4	4	4	4	4	4	4	4	4	
	5V: Pro drive, optional (slide-in - CD/DVD)	4	4	4	4	4	4	4	4	4	
	5V: PCI card manufacturer limit, optional (max. 3 watts w/o fan kit, max. 17 watts w/ fan kit) [1]										
	5V: Devices Σ										
	3V3: max. possible at 3V3 PCI bus and slide-in										23
	3V3: PCI card manufacturer limit, optional (max. 3 watts w/o fan kit, max. 17 watts w/ fan kit) [1]										
	3V3: Devices Σ										
	+12V: max. possible at +12V PCI bus and slide-in										12
	+12V: PCI card manufacturer limit, optional (max. 3 watts w/o fan kit, max. 12 watts w/ fan kit) [1]										
	+12V: Devices Σ										
	-12V: max. possible at -12V PCI bus and slide-in										1.2
	-12V: PCI card manufacturer limit, optional (max. 1.2 watts with or without fan kit) [1]										
	-12V: Devices Σ										
	Total PCI bus and slide-in Σ										
	Total devices Σ										

1) The total performance of one PCI card per PCI slot (= sum of power consumptions for each voltage area) may not exceed the limits stated for operation with or without a fan kit

Starting current with system unit 5PC600.SX05-01 5 PCI

The starting current is typically 10 A. The peak starting current is maximum 40 A in a time frame less than 300 µs.

2.8 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.

Humidity in %RH (non-condensing) at 30°C ambient temperature

Components		Operation	Storage / Transport
CPU boards 815E		10 - 90	5 - 95
CPU boards 855GME		10 - 90	5 - 95
System units with 1,2 and 5 PCI slots		5 - 90	5 - 95
Main memory for 815E and 855GME CPU boards		10 - 90	5 - 95
Add-on drives	5AC600.HDDI-01 (ET)	8 - 90	5 - 95
	5AC600.HDDI-00 (24-hour/standard)	8 - 90	5 - 95
	5AC600.HDDI-05 (ET, 24x7)	8 - 90	5 - 95
Slide-in drives	5AC600.CDXS-00	8 - 80	5 - 95
	5AC600.DVDS-00	8 - 80	5 - 95
	5AC600.DVRS-00	8 - 80	5 - 95
	5AC600.FDDS-00	20 - 80	10 - 95
	5AC600.HDDS-01 (ET)	8 - 90	5 - 95
	5AC600.HDDS-00 (24-hour/standard)	8 - 90	5 - 95
	5AC600.HDDS-02 (ET, 24x7)	8 - 90	5 - 95
Additional insert cards Interfaces AP Link	5AC600.CANI-00	5 - 90	5 - 95
	5AC600.485I-00	5 - 90	5 - 95
	5AC600.SDL0-00	5 - 90	5 - 95
	5ACPCI.RAIS-00 (24-hour/standard)	8 - 90	5 - 95
	5ACPCI.RAIS-00 (24-hour/standard)	8 - 90	5 - 95
	5ACPCI.RAIC-01 (24-hour/standard)	8 - 90	5 - 95
Accessories	CompactFlash cards 5CFCRD.xxxx-03	8 - 95	8 - 95
	Flash Drive 5MMUSB.xxxx-00	10 - 90	5 - 90
	USB Media Drive 5MD900.USB2-00	20 - 80	5 - 90

Figure 19: Overview of humidity specifications for individual components

The listed tasks 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 of the individual components.

2.9 Device Interfaces

The following image shows the general and optional device interfaces for an entire APC620 unit.

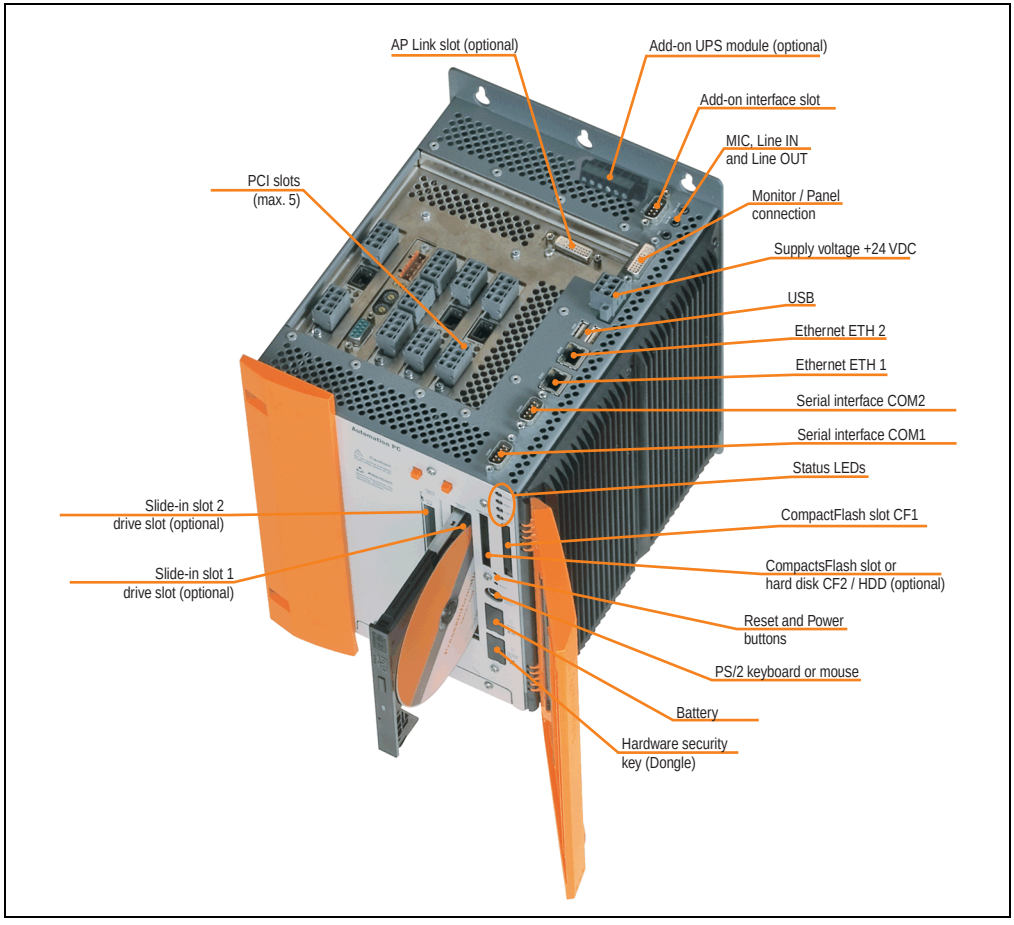


Figure 20: General device interfaces

Each individual device interface is explained in greater detail on the following pages.

2.9.1 Serial interfaces COM1

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

Table 23: Pin assignments - COM1

I/O address and IRQ

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

Table 24: 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 Device Configuration" setting "Serial port A"). Please note any potential conflicts with other resources when changing this setting.

2.9.2 Serial interfaces COM2

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

Table 25: Pin assignments - COM2

I/O address and IRQ

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

Table 26: COM2 - 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 device configuration" setting "Serial port B"). Please note any potential conflicts with other resources when changing this setting.

2.9.3 Ethernet connection ETH1

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

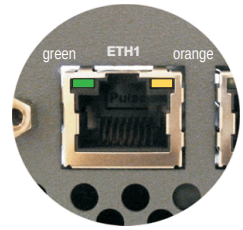
Ethernet connection (ETH1)			
Controller	Intel 82562		RJ45 twisted pair (10BaseT/100BaseT), female 
Cabling	S/STP (category 5)		
Transfer rate	10/100 MBit/s [1]		
LED	**On**	**Off**	
Green	100 MBit/s	10 MBit/s	
Orange	Link (Ethernet network connection available)	Activity (blinking) (Data transfer in progress)	

Table 27: Ethernet connection (ETH1)

1) Both operating modes possible. Change-over 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**).

Ethernet cable lengths

The supported cable length depends on the system unit revision when using Intel 855GME CPU boards (5PC600.E855-xx).

System unit	Cable length with CAT5e cable	
	Up to 50 meters	**Up to 80 meters[1]**
5PC600.SX01-00	Revision < H0	Starting with Revision H0
5PC600.SX02-00	Revision < F5	Starting with Revision F5
5PC600.SX02-01	Revision < G5	Starting with Revision G5
5PC600.SX05-00	Revision < G0	Starting with Revision G0
5PC600.SX05-01	Revision < G0	Starting with Revision G0

Table 28: Ethernet cable length support

1) Greater distances are possible when using higher quality cables (e.g.: category CAT7).

2.9.4 Ethernet connection ETH2

This Ethernet connection is integrated in the system unit.

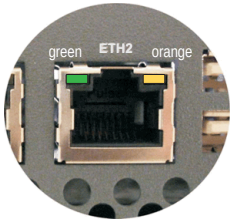
Ethernet connection (ETH2)			
Controller	Intel 82551ER		RJ45 twisted pair (10BaseT/100BaseT), female 
Cabling	S/STP (category 5)		
Transfer rate	10/100 MBit/s [1]		
LED	**On**	**Off**	
Green	100 MBit/s	10 MBit/s	
Orange	Link (Ethernet network connection available)	Activity (blinking) (Data transfer in progress)	

Table 29: Ethernet connection (ETH2)

1) Both operating modes possible. Change-over 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**).

2.9.5 USB port

The APC620 devices have a USB 2.0 (Universal Serial Bus) host controller with multiple USB ports, two of which are on the outside for easy user access.

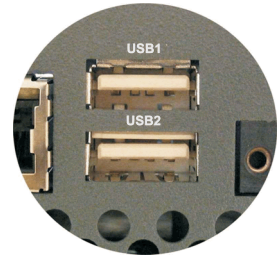
Universal serial bus		
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s), to high speed (480 Mbit/s)	2x USB Type A, female 
Power supply	Max. 500 mA per portt[1)]	
Maximum cable length	5 m (not including hub)	

Table 30: USB port

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

Warning!

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

Important!

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

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 XP embedded operating systems.

2.9.6 +24 VDC supply voltage

The Automation PC 620 has a 24 VDC ATX compatible power supply. Depending on the system unit, the power supply provides the following maximum power levels (in watts).

System unit	Max. power at + 5 V	Max. power at + 3V3	Max. power at + 12 V	Max. power at - 12 V	Max. total power
5PC600.SX01-00	55	23	12	1,2	70
5PC600.SX02-00	55	23	12	1,2	70
5PC600.SX02-01	55	23	12	1,2	70
5PC600.SX05-00	105	46	24	1,2	110
5PC600.SX05-01	105	46	24	1,2	110

Table 31: Power supply depending on the system unit

The 3-pin socket required for the supply voltage connection is not included in delivery. This can be ordered from B&R using the model number 0TB103.9 (screw clamp) or 0TB103.91 (cage clamp).

The pin assignments can be found either in the following table or printed on the Automation PC 620 housing. 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		3-pin, male
Pin	**Description**	
1	+	
2	Functional grounding	
3	-	
Accessories		
0TB103.9	Plug 24 V 5.08 3p screw clamps	
0TB103.91	Plug 24 V 5.08 3p cage clamps	

Figure 21: Supply voltage connection

Ground

Important!

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

The grounding connection can be found on the bottom of the APC620 systems. The M4 self-locking nut can be used, for example, to fasten a copper strip that is built into the APC620 to a central grounding point in the switching cabinet or system. The largest possible conductor cross section should be used (at least 2.5 mm²).

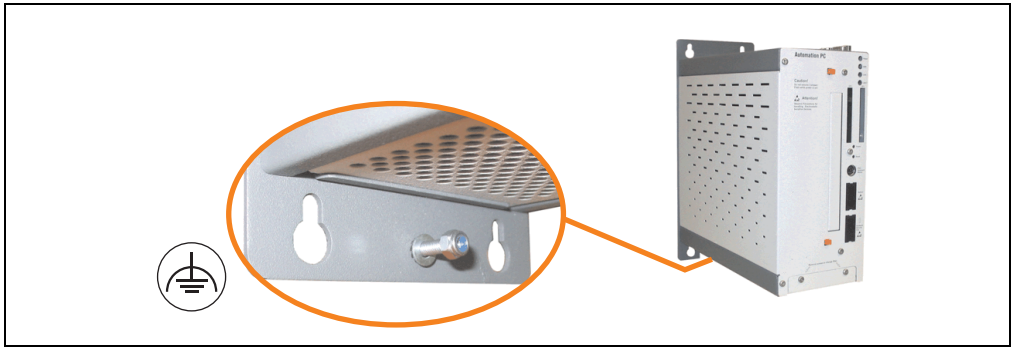


Figure 22: Ground connection

Quick switching on/off of the power supply

If the APC620 is in Standby mode (e.g. Windows XP shutdown), then buffering takes a little more time due to capacitors and low power consumption. If the "Power Loss Control" option is set to "Power On" or "Last State" in BIOS, then a system with one of the system unit revisions in table 32 "System unit revisions for at least 10 seconds standby time" might not restart because a Power Off/On was not detected. To make sure that these system units will restart after a Power Off/On, the standby time should be set to at least 10 seconds.

Model number	Description	Revision
5PC600.SX01-00	System 1 PCI	Starting with Revision B0
5PC600.SX02-00	System 2 PCI, 1 disk drive slot, 1 AP Link slot	Starting with Revision B0
5PC600.SX02-01	System 2 PCI, 1 disk drive slot	Starting with Revision B0
5PC600.SX05-00	System 5 PCI, 2 disk drive slots, 1 AP Link slot	Starting with Revision A0
5PC600.SX05-01	System 5 PCI, 2 disk drive slots	Starting with Revision A0

Table 32: System unit revisions for at least 10 seconds standby time

Thanks to a workaround, the standby time can be set as needed in systems with one of the following system unit revisions or higher.

Model number	Description	Revision
5PC600.SX01-00	System 1 PCI	Starting with Revision F0
5PC600.SX02-00	System 2 PCI, 1 disk drive slot, 1 AP Link slot	Starting with revision E0
5PC600.SX02-01	System 2 PCI, 1 disk drive slot	Starting with Revision F0
5PC600.SX05-00	System 5 PCI, 2 disk drive slots, 1 AP Link slot	Starting with Revision D0
5PC600.SX05-01	System 5 PCI, 2 disk drive slots	Starting with Revision D0

Table 33: System unit revisions for any standby times

2.9.7 Monitor / Panel connection

When using this video output, understand that the video signals that are available (RGB, DVI, and SDL - Smart Display Link) will vary depending on the system unit and CPU board.

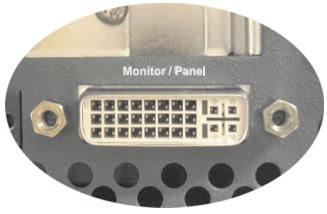
<table>
<tr><th colspan="3">Monitor / Panel</th></tr>
<tr><td colspan="2">The following will provide an overview of the video signals available with different system units and CPU boards.</td><td rowspan="6">24-pin DVI-I with special functions, female
 
</td></tr>
<tr><th>System unit</th><th>815E board</th><th>855GME board</th></tr>
<tr><td>5PC600.SX01-00</td><td>RGB, DVI, SDL</td><td>RGB, DVI, SDL</td></tr>
<tr><td>5PC600.SX02-00</td><td>RGB</td><td>RGB, DVI, SDL</td></tr>
<tr><td>5PC600.SX02-01</td><td>RGB, DVI, SDL</td><td>RGB, DVI, SDL</td></tr>
<tr><td>5PC600.SX05-00</td><td>RGB</td><td>RGB, DVI, SDL</td></tr>
<tr><td>5PC600.SX05-01</td><td>RGB, DVI, SDL</td><td>RGB, DVI, SDL</td></tr>
</table>

Figure 23: Monitor / Panel connection

Hotplug for a display device is not supported in any combination. The connection cycle value for the plug is specified at 100x.

Caution!

The RGB, DVI and SDL cables can only be plugged in and unplugged when the APC620 and display device (Automation Panel 900, monitor) are turned off.

See "Definitions for RGB, DVI, SDL" on page 84 for descriptions of RGB, DVI and SDL.

Pin assignments

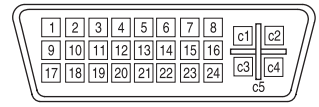
Pin	Assignment	Pin	Assignment	
1	T.M.D.S. data 2-	16	Hot Plug detect	DVI-I 24 pin, female 
2	T.M.D.S. data 2+	17	T.M.D.S. data 0-	
3	T.M.D.S. data 2/SDL shield	18	T.M.D.S. data 0+	
4	SDL-	19	T.M.D.S. DATA 0/XUSB1 shield	
5	SDL+	20	XUSB1-	
6	DDC clock	21	XUSB1+	
7	DDC data	22	T.M.D.S. clock shield	
8	Analog vertical sync	23	T.M.D.S. clock +	
9	T.M.D.S. DATA 1-	24	T.M.D.S. clock -	
10	T.M.D.S. DATA 1+	c1	Analog red video out	
11	T.M.D.S. DATA 1/XUBS0 shield	c2	Analog green video out	
12	XUSB0-	c3	Analog blue video out	
13	XUSB0+	c4	Analog horizontal sync	
14	+ 5 V Power [1)]	c5	Analog ground (analog R, G and B return)	
15	Ground (return for + 5V, HSync and VSync)			

Table 34: Pin assignments - monitor / panel connection

1) Protected internally by a multifuse

Cable lengths and resolutions for SDL transfer

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

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

Table 35: Segment lengths, resolutions and SDL cable

Cable Segment length [m]	Resolution				
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200
30	5CASDL.0300-00	5CASDL.0300-00	5CASDL.0300-10	5CASDL.0300-10	-
40	5CASDL.0400-10	5CASDL.0400-10	5CASDL.0400-10	5CASDL.0400-10	-

Table 35: Segment lengths, resolutions and SDL cable (Forts.)

The cable types and resolutions shown in blue in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Designation	Version	Note
MTCX FPGA	Firmware on the APC620	V 01.15	The version is read from BIOS - see the BIOS description. Supported starting with APC620 / PPC 700 firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	V 01.55	
SDLR FPGA	Firmware on the AP Link SDL receiver and transceiver	V 01.04	
SDLT FPGA	Firmware on the AP Link SDL transmitter	V 00.02	
Hardware	**Designation**	**Revision**	**Note**
5DLSDL.1000-00	AP Link SDL receiver	Rev. B0	
5DLSDL.1000-01	AP Link SDL transceiver	Rev. B0	

Table 36: Requirements for SDL cable with automatic cable adjustment (equalizer)

The cable types and resolutions shown in green in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Designation	Version	Note
MTCX FPGA	Firmware on the APC620	V 01.15	The version is read from BIOS - see the BIOS description. Supported starting with APC620 / PPC 700 firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	V 01.55	
SDLR FPGA	Firmware on the AP Link SDL receiver and transceiver	V 01.04	
SDLT FPGA	Firmware on the AP Link SDL transmitter	V 00.02	
Hardware	**Designation**	**Revision**	**Note**
5DLSDL.1000-00	AP Link SDL receiver	Rev. D0	
5DLSDL.1000-01	AP Link SDL transceiver	Rev. D0	
5AC600.SDL0-00	AP Link SDL transmitter	Rev. B3	
5PC600.SX01-00	System 1 PCI	Rev. E0	
5PC600.SX02-00	System 2 PCI, 1 disk drive slot, 1 AP Link slot	Rev. D0	
5PC600.SX02-01	System 2 PCI, 1 disk drive slot	Rev. E0	
5PC600.SX05-00	System 5 PCI, 2 disk drive slots, 1 AP Link slot	Rev. C0	
5PC600.SX05-01	System 5 PCI, 2 disk drive slots	Rev. C0	

Table 37: Requirements for SDL cable with extender and automatic cable adjustment (equalizer)

Definitions for RGB, DVI, SDL

RGB means:

- It is possible to connect RGB monitors (with adapter, model nr. 5AC900.1000-00) and office RGB TFT displays.

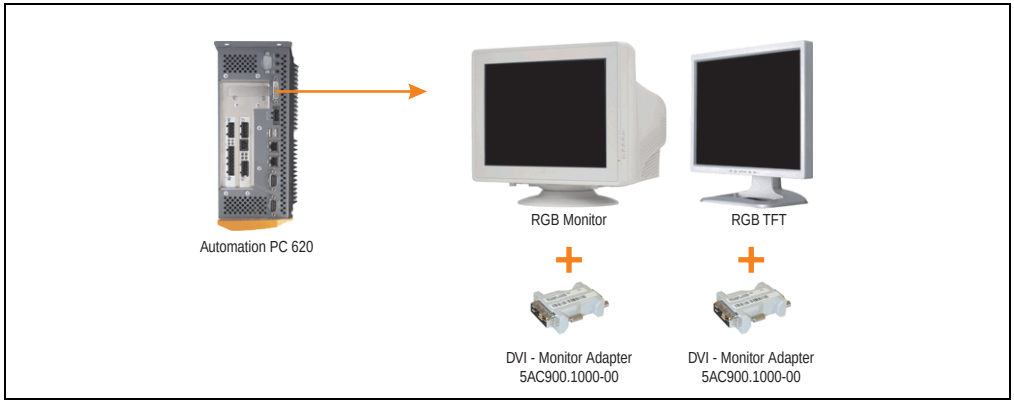


Figure 24: Monitor / Panel connection with RGB video signal

DVI means:

- Connection of B&R Automation Panel 900 display units with Automation Panel Link DVI receiver (model nr. 5DLDVI.1000-01), Office Digital/DVI monitors and Office DVI TFT displays is possible.

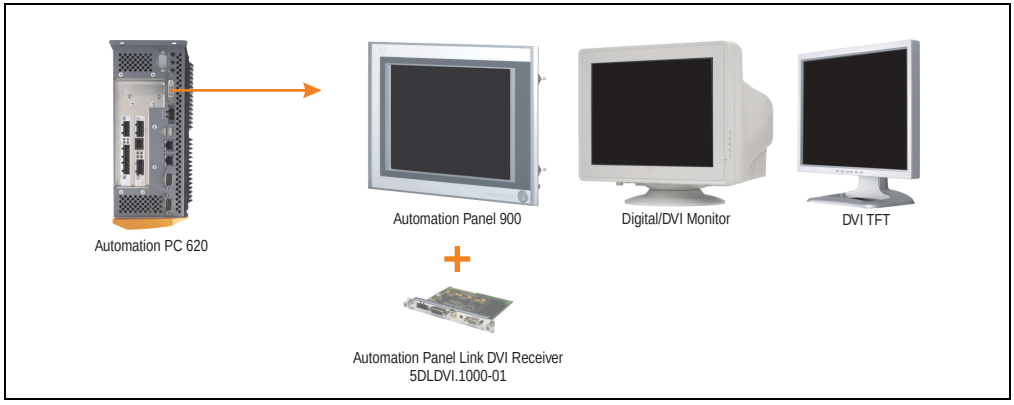


Figure 25: Monitor / Panel connection with DVI video signal

For examples and possibilities for connecting Automation Panel 900 display units via DVI, see Appendix A, chapter 3 "Commissioning", section 3 "Connection examples - Automation Panel 900", starting on page 194.

SDL (Smart Display Link) means:

- Connection of B&R Automation Panel 800 and Automation Panel 900 display units with Automation Panel Link SDL receiver (model nr. 5DLSDL.1000-01) or SDL transceiver (model nr. 5DLSDL.1000-01).

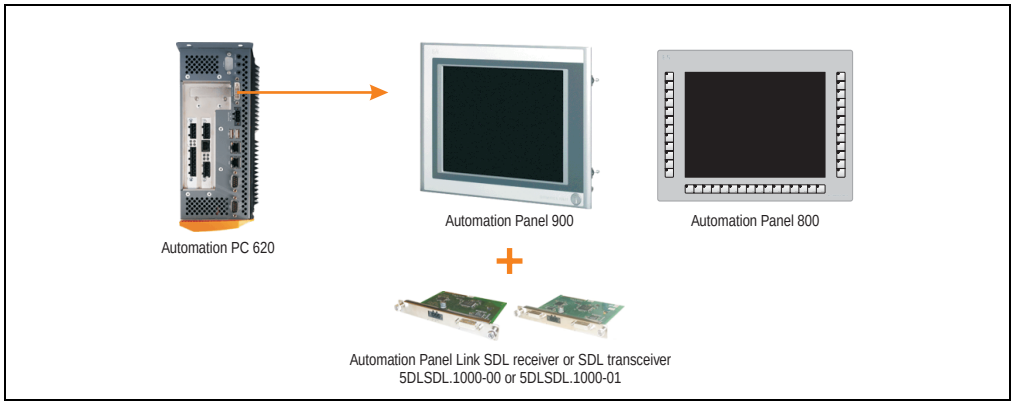


Figure 26: Monitor / Panel connection with SDL video signal

For examples and possibilities for connecting Automation Panel 900 display units via SDL, see Appendix A, chapter 3 "Commissioning", section 3 "Connection examples - Automation Panel 900", starting on page 194.

2.9.8 MIC, Line IN and Line OUT Port

All APC620 systems include an AC97 (specification 2.2) compatible sound chip with access to the channels MIC, Line IN and Line OUT from the outside.

MIC, Line IN and Line OUT		
Controller	Realtek AC97	3.5 mm socket, female
MIC	Connection of a mono microphone with a 3.5 mm stereo (headphone) jack.	
Line IN	Stereo Line IN signal supplied via 3.5 mm plug.	
Line OUT	Connection of a stereo sound reader (e.g. amplifier) via a 3.5 mm plug.	

Table 38: Technical data - MIC, Line IN and Line OUT port

Driver support

Special drivers are necessary for operating the AC97 sound chip (Realtek). Drivers for Windows XP Professional and Windows XP Embedded are available for download on the B&R homepage in the download area (**www.br-automation.com**).

2.9.9 Add-on interface slot

An optional add-on interface (e.g. CAN, RS485) can be installed here. See also section 3.8 "Optional interfaces" on page 163.

Add-on interface slot		
Available add-on interfaces		
5AC600.CANI-00	Add-on CAN interface	
5AC600.485I-00	Add-on RS232/422/485 interface	

Table 39: Add-on interface slot

Information:

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

2.9.10 Add-on UPS module slot

An optional APC620 add-on UPS module can be installed here.

Add-on UPS module slot	
APC620 add-on UPS module + accessories	
5AC600.UPSI-00	**Add-on UPS module**
5AC600.UPSB-00	**Battery unit 5 Ah**
5CAUPS.0005-00	**APC620 UPS cable 0.5 m**
5CAUPS.0030-00	**APC620 UPS cable 3 m**

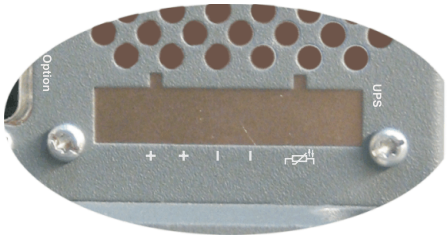


Table 40: Add-on UPS module slot

Information:

An add-on UPS module can be installed with the following system unit revisions or later:

- **5PC600.SX01-00 starting with H0**
- **5PC600.SX02-00 starting with G0**
- **5PC600.SX02-01 starting with H0**
- **5PC600.SX05-00 starting with F0**
- **5PC600.SX05-01 starting with F0**

For more on the UPS module, see chapter 6 "Accessories", section 13 "APC620 UPS" on page 477.

For info on configuring the UPS module, see chapter 4 "Software", section 7.2 "UPS configuration" on page 374.

For info on installing the UPS module, see chapter 7 "Maintenance / servicing", section 4 "Installation of the UPS module" on page 504.

2.9.11 AP Link slot

The option of inserting and using an AP Link card is only possible with system units 5PC600.SX02-00 and 5PC600.SX05-00.

For more information see section 3.10 "AP Link cards" on page 175.

2.9.12 PCI slots

Up to 5 PCI slots are available, depending on the system unit. 5-volt cards or universal cards that comply with the PCI half-size standard 2.2, and that do not exceed the following dimensions can be inserted.

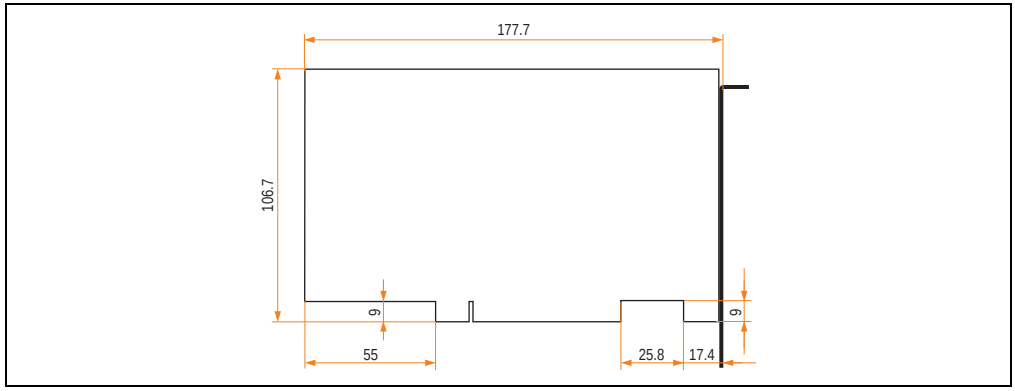


Figure 27: Dimensions - standard half-size PCI cards.

Information:

The total performance of one PCI card per PCI slot should not exceed the limit with or without a fan kit (see section "Power management for APC620 systems with 1 and 2 PCI slots" on page 64).

Technical data

Features	PCI bus properties
Standard	PCI 2.2
Design	Half-size PCI
PCI bus type	32-bit
PCI bus speed	33 MHz

Table 41: Technical data - PCI bus

Voltages on the PCI slot plug (plug-in PCI cards)

The plug design for the PCI slot is the same as the design for a 5-volt PCI plug. The supply is applied at 3.3 volts and 5 volts on the actual plug.

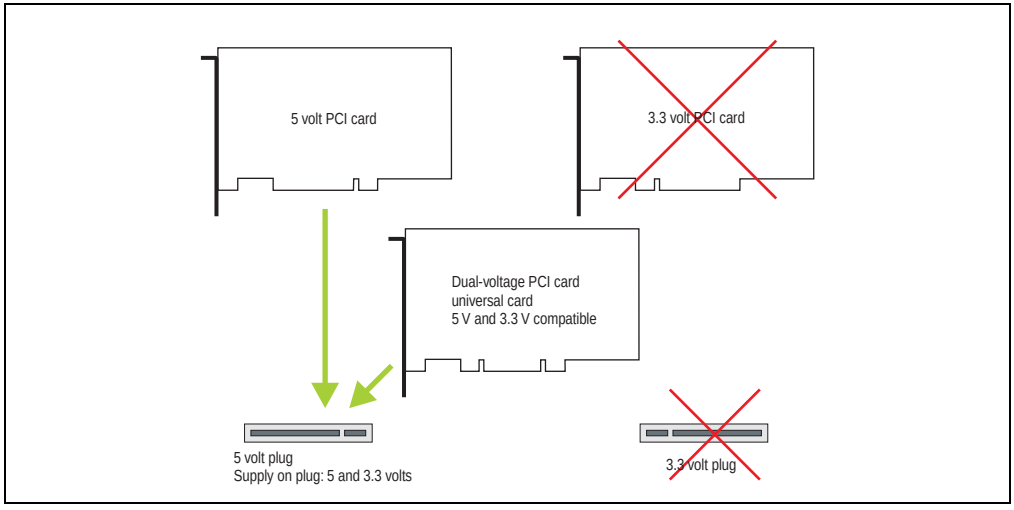


Figure 28: PCI connector type: 5 volt

2.9.13 Status LEDs

The status LEDs are integrated in the system unit behind the orange front cover.

Status LEDs				
LED	**Color**		**Meaning**	
Power	Green	On	Supply voltage OK	
	Red	On	The system is in standby mode (S5: soft-off mode or S4: hibernate mode - suspend-to-disk).	
	Orange[1)]	On	Supply voltage not OK; the system is operating on battery power.	
HDD	Yellow	On	Signals IDE drive access (CF, HDD, CD, etc.)	
Link 1	Yellow	On	Active SDL connection.	
		blinking	An active SDL connection has been interrupted by a loss of power in the display unit.	
Link 2	Yellow	-	In preparation	

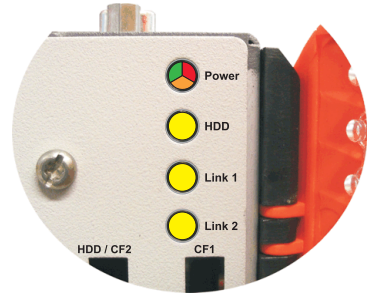


Table 42: Technical data - Status LEDs

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

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

Figure 29: Front-side status LEDs

2.9.14 CompactFlash slot (CF1)

This CompactFlash slot is a fixed component of an APC620 system, and is defined in BIOS as the primary master drive. Type I CompactFlash cards are supported. Available CompactFlash cards - see table 14 "Model numbers - CompactFlash cards" on page 32.

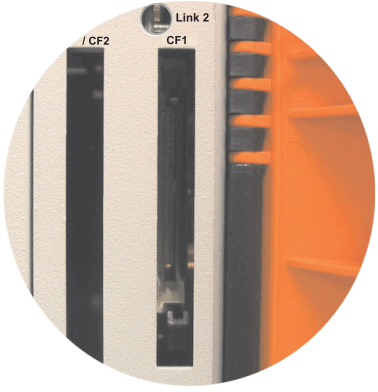
CompactFlash slot (CF1)		
Connection	Primary master IDE device	
CompactFlash Type	Type I	
Accessories	**Short description**	
5CFCRD.0064-03	CompactFlash 64 MB SSI	
5CFCRD.0128-03	CompactFlash 128 MB SSI	
5CFCRD.0256-03	CompactFlash 256 MB SSI	
5CFCRD.0512-03	CompactFlash 512 MB SSI	
5CFCRD.1024-03	CompactFlash 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 43: Technical data - CompactFlash slot (CF1)

Warning!

The power must be shut off before inserting or removing the CompactFlash card.

2.9.15 Hard disk / CompactFlash slot (HDD/CF2)

This slot allows for the installation of a hard disk or a second CompactFlash slot (type I CompactFlash card) as add-on drives (see table 5.6 "Drives" for available 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 the order.

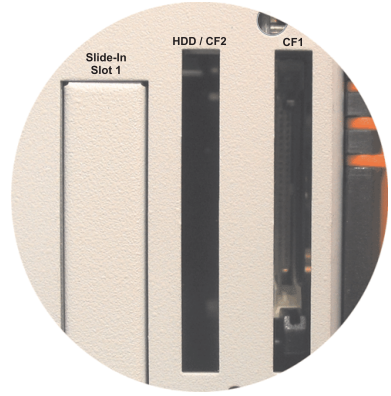
Hard disk / CompactFlash slot (HDD/CF2)		
Connection	Primary slave IDE device	
Add-on hard disks - 2.5" drive (internal)		
5AC600.HDDI-00	Add-on hard disk 30 GB 24/7	
5AC600.HDDI-01	Add-on hard disk 20 GB ET	
5AC600.HDDI-05	Add-on hard disk 40 GB ET, 24/7	
Add-on CompactFlash slot		
5AC600.CFSI-00	Add-on CompactFlash slot	
CompactFlash Type	Type I	
Accessories	**Short description**	
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 44: Technical data - hard disk / CompactFlash slot (HDD/CF2)

Warning!

The power must be shut off before inserting or removing the CompactFlash card.

2.9.16 Power button

Due to the complete ATX power supply support, the power button serves various functions. These functions can be configured either in the BIOS setup (see BIOS function "Power button function" in section "Power" on page 260 for 815E CPU boards, or section "Power" on page 311 for 855GME CPU boards) or, for example, in the operating system Windows XP.

Power button	
The power button can be pressed with a pointed object (i.e. paper clip or tip of a pen). The power button acts like the on/off switch on a normal desktop PC with ATX power supply: **press and release** ... Switches on APC620 or shuts down operating system and switches off the APC620. **press and hold** ... ATX power supply switches off without shutting down the APC620 (**data could be lost!**). Pressing the power button does not reset the MTCX processor.	

Table 45: Technical data - Power button

2.9.17 Reset button

Reset button	
The reset button can be pressed with a pointed object (i.e. paper clip or tip of a pen). Pushing the reset button results in a hardware-reset, PCI-reset. The Automation PC 620 restarts cold. The MTCX processor is not reset when the reset button is pressed.	

Table 46: Technical data - Reset button

Warning!

A system reset can cause data to be lost!

2.9.18 PS/2 keyboard/mouse

Slot for a standard PS/2 mouse or a PS/2 AT-Enhanced keyboard. BIOS automatically determines whether a mouse or a keyboard has been connected, and sends this information to the operating system.

With a PS/2 Y-cable, both keyboard and mouse can be operated simultaneously. They must be connected before the system is switched on.

This interface has a Hot-Plug function for PS/2 keyboards (only when no PS/2 mouse has ever been connected and used!).

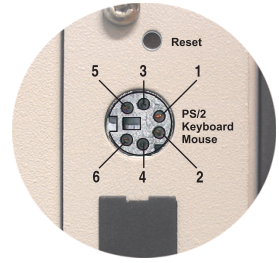
Connection for keyboard/mouse (PS/2)		
Pin	**Assignment**	PS/2 socket, female
1	DATA 0	
2	DATA 1	
3	GND	
4	+5 V[1)]	
5	CLK 0	
6	CLK 1	

Table 47: Technical data - PS/2 keyboard/mouse (external PS/2)

1) The PS/2 keyboard/mouse interface is protected by a multifuse (1 A).

Warning!

Because of general PC specifications, this interface should be used with extreme care concerning EMC, location of cables, etc.. It should therefore only be used for service!

Information:

The BIOS setup defaults only allow for the operation of a PS/2 keyboard. If a PS/2 mouse is connected, it must be activated in BIOS. In order to do this, set "PS/2 mouse" in the BIOS setup menu to "enabled" and save. (Located under Advanced - Miscellaneous - Item "PS/2 mouse").

2.9.19 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 black cover. The buffer duration of the battery is at least 4 years (at 50°C, 8.5 mA current requirements of the supplied components and a self discharge of 40%).

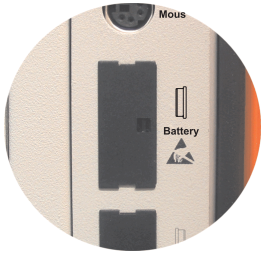
Battery		
Battery Type Removable Lifespan	 Renata 950 mAh Yes, accessible from the outside 4 years at 50°C	
Accessories	**Short description**	
0AC201.9	**Lithium batteries (5x)** Lithium batteries, 5 pcs., 3 V / 950 mAh, button cell	
4A0006.00-000	**Lithium battery (1x)** Lithium battery, 1 pc., 3 V / 950 mAh, button cell	

Table 48: Technical data - battery

For more on changing the lithium battery, see chapter 7 "Maintenance / servicing", section "Changing the battery" on page 487.

2.9.20 Hardware security key

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

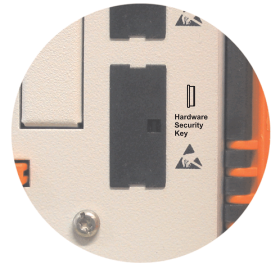
Hardware security key	
A hardware security key (dongle) can be inserted behind the black cover.	

Table 49: Technical data - hardware security key

Warning!

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

I/O address and IRQ

Resource	Default setting	Additional setting options
I/O address	378	278, 3BC
IRQ	-	-

Table 50: Hardware security key - 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 device configuration" setting "Parallel port").

2.9.21 Slide-in slot 1 drive slot

The "slide-in slot 1" drive slot exists only in APC620 system units with 2 or 5 PCI slots. It is possible to insert a number of slide-in drives into it. For available slide-in drives, see table 8 "Model numbers - drives" on page 30.

For instructions about installing and replacing a slide-in, see chapter 7 "Maintenance / servicing", section 3 "Slide-in drive - installation and exchange" on page 501.

The slide-in CD-ROM (5AC600.CDXS-00) and the slide-in DVD-ROM/CD-RW (5AC600.DVDS-00) and DVD-R/RW, DVD+R/RW (5AC600.DVRS-00) drive are referred to in BIOS as "secondary slave". The slide-in USB FDD drive (5AC600.FDDS-00) is referred to as USB.

Information:

- **It is possible to add, remove, or modify the slide-in drive at any time.**
- **In system units with 5 PCI slots, the slide-in USB FDD (5AC600.FDDS-00) drive must be inserted in slide-in slot 1 for mechanical reasons. The slide-in drive 5AC600.CFSS-00 (slide-in CF 2-slot) should only be operated in slide-in slot 2.**

Caution!

Turn off power before adding or removing a slide-in drive.

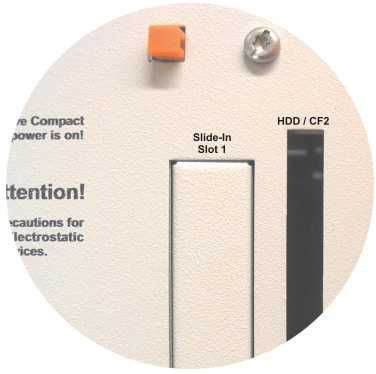
Slide-in slot 1		
Connection	Secondary slave IDE device	
Accessories	**Short description**	
5AC600.CDXS-00	Slide-in CD-ROM	
5AC600.CFSS-00	Slide-in CF 2-slot	
5AC600.DVDS-00	Slide-in DVD-ROM/CD-RW	
5AC600.DVRS-00	Slide-in DVD-R/RW, DVD+R/RW	
5AC600.FDDS-00	Slide-in USB FDD	
5AC600.HDDS-00	Slide-in hard disk 30 GB 24x7	
5AC600.HDDS-01	Slide-in hard disk 20 GB ET	
5AC600.HDDS-02	Slide-in hard disk 40 GB 24x7, ET	

Table 51: Technical data - slide-in slot 1

2.9.22 Slide-in slot 2 drive slot

The "slide-in slot 2" drive slot exists only in APC620 system units with 5 PCI slots. It is possible to insert a number of slide-in drives into it. For available slide-in drives, see table 8 "Model numbers - drives" on page 30.

For instructions about installing and replacing a slide-in, see chapter 7 "Maintenance / servicing", section 3 "Slide-in drive - installation and exchange" on page 501.

The slide-in CD-ROM (5AC600.CDXS-00) and the slide-in DVD-ROM/CD-RW (5AC600.DVDS-00) and DVD-R/RW, DVD+R/RW (5AC600.DVRS-00) drive are referred to in BIOS as "secondary master". The slide-in USB FDD drive (5AC600.FDDS-00) is referred to as USB.

Information:

- **It is possible to add or remove a slide-in drive at any time.**
- **In system units with 5 PCI slots, the slide-in USB FDD drive (5AC600.FDDS-00) must be inserted in slide-in slot 1.**
  The double CompactFlash slide-in drive (5AC600.CFSS-00) should only be used in slide-in slot 2.

Caution!

Turn off power before adding or removing a slide-in drive.

Slide-in slot 2		
Connection	Secondary master IDE device	
Accessories	**Short description**	
5AC600.CDXS-00	Slide-in CD-ROM	
5AC600.CFSS-00	Slide-in CF 2-slot	
5AC600.DVDS-00	Slide-in DVD-ROM/CD-RW	
5AC600.DVRS-00	Slide-in DVD-R/RW, DVD+R/RW	
5AC600.FDDS-00	Slide-in USB FDD	
5AC600.HDDS-00	Slide-in hard disk 30 GB 24x7	
5AC600.HDDS-01	Slide-in hard disk 20 GB ET	
5AC600.HDDS-02	Slide-in hard disk 40 GB 24x7, ET	

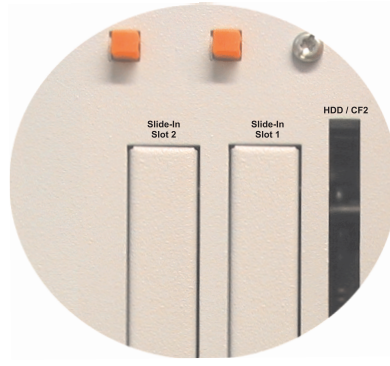


Table 52: Technical data - slide-in slot 2

2.10 Serial number sticker

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

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

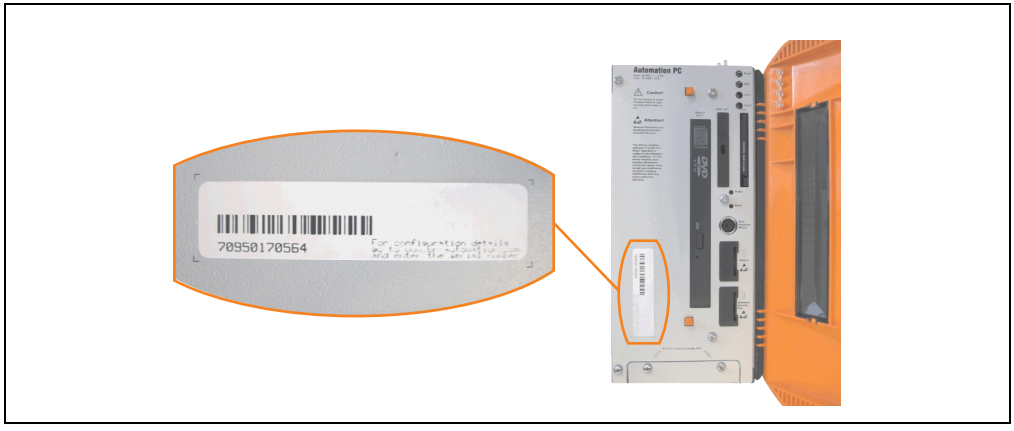


Figure 30: APC620 serial number sticker on front-side

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

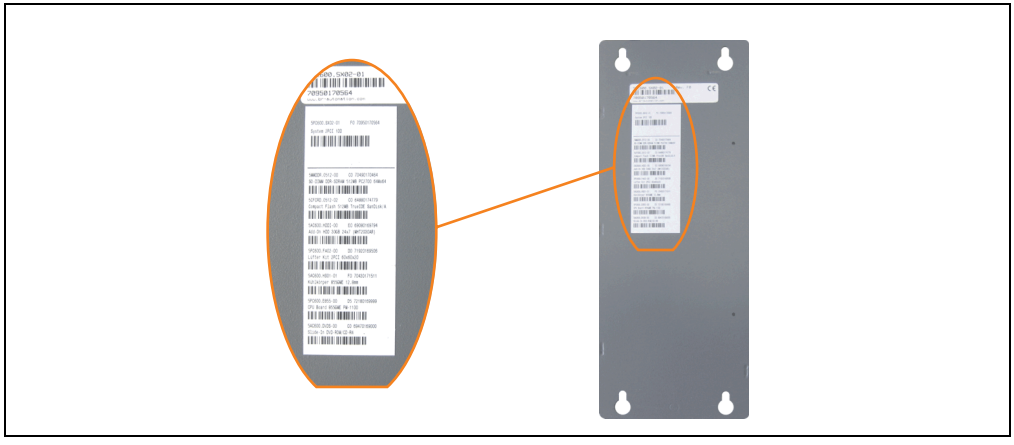


Figure 31: APC620 serial number sticker on back-side

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

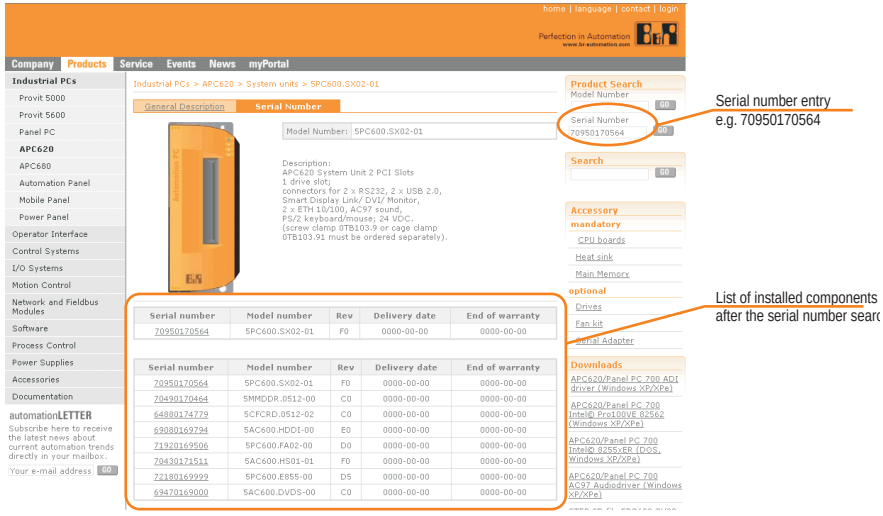


Figure 32: Example of serial number search: 70950170564

2.11 Block diagram

The following block diagrams show the simplified structure according to the system unit being used with a 855GME CPU board.

2.11.1 Entire device with system unit 5PC600.SX01-00

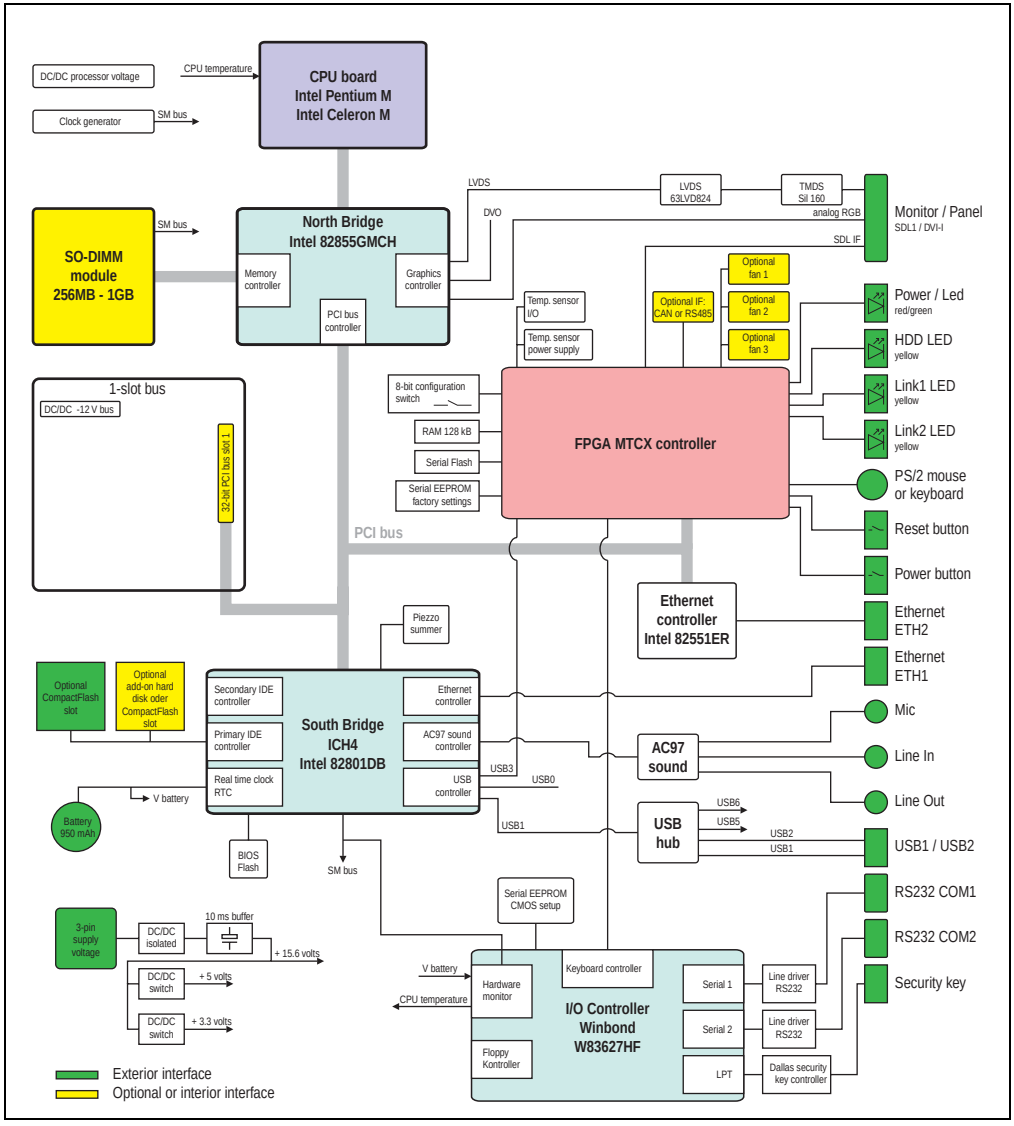


Figure 33: Block diagram of entire device with system unit 5PC600.SX01-00 and 855GME CPU board

2.11.2 Entire device with system unit 5PC600.SX02-00

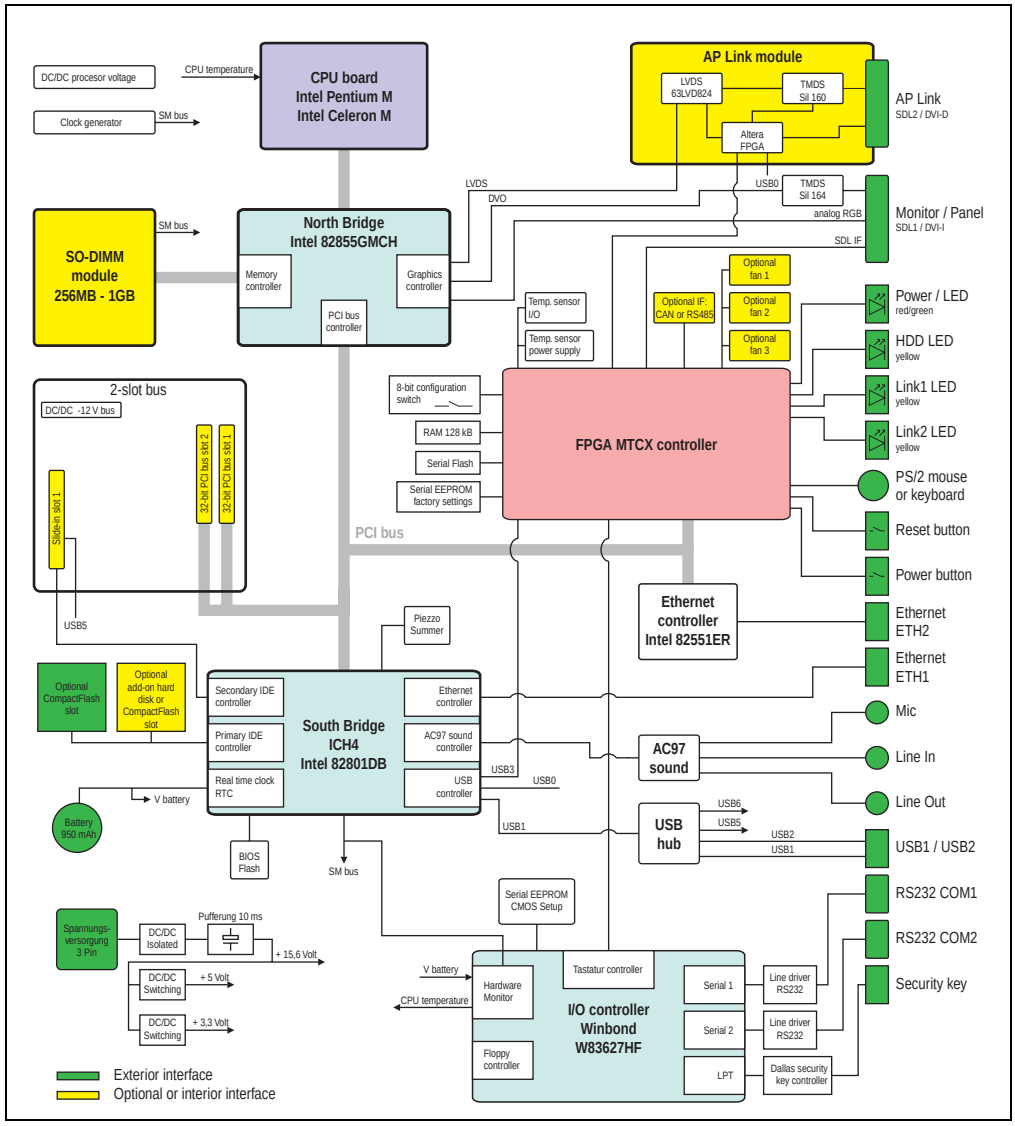


Figure 34: Block diagram of entire device with system unit 5PC600.SX02-00 and 855GME CPU board

2.11.3 Entire device with system unit 5PC600.SX02-01

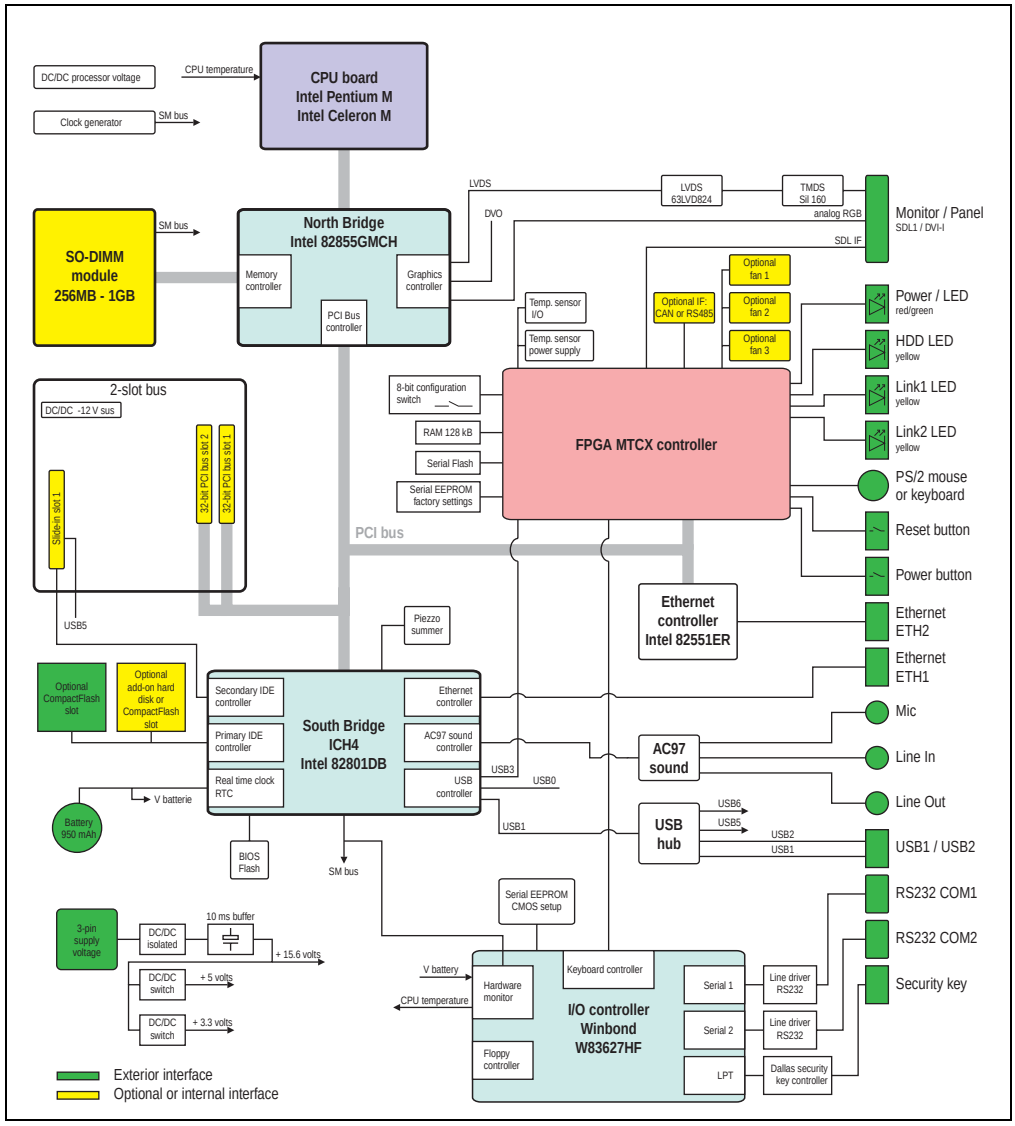


Figure 35: Block diagram of entire device with system unit 5PC600.SX02-01 and 855GME CPU board

2.11.4 Entire device with system unit 5PC600.SX05-00

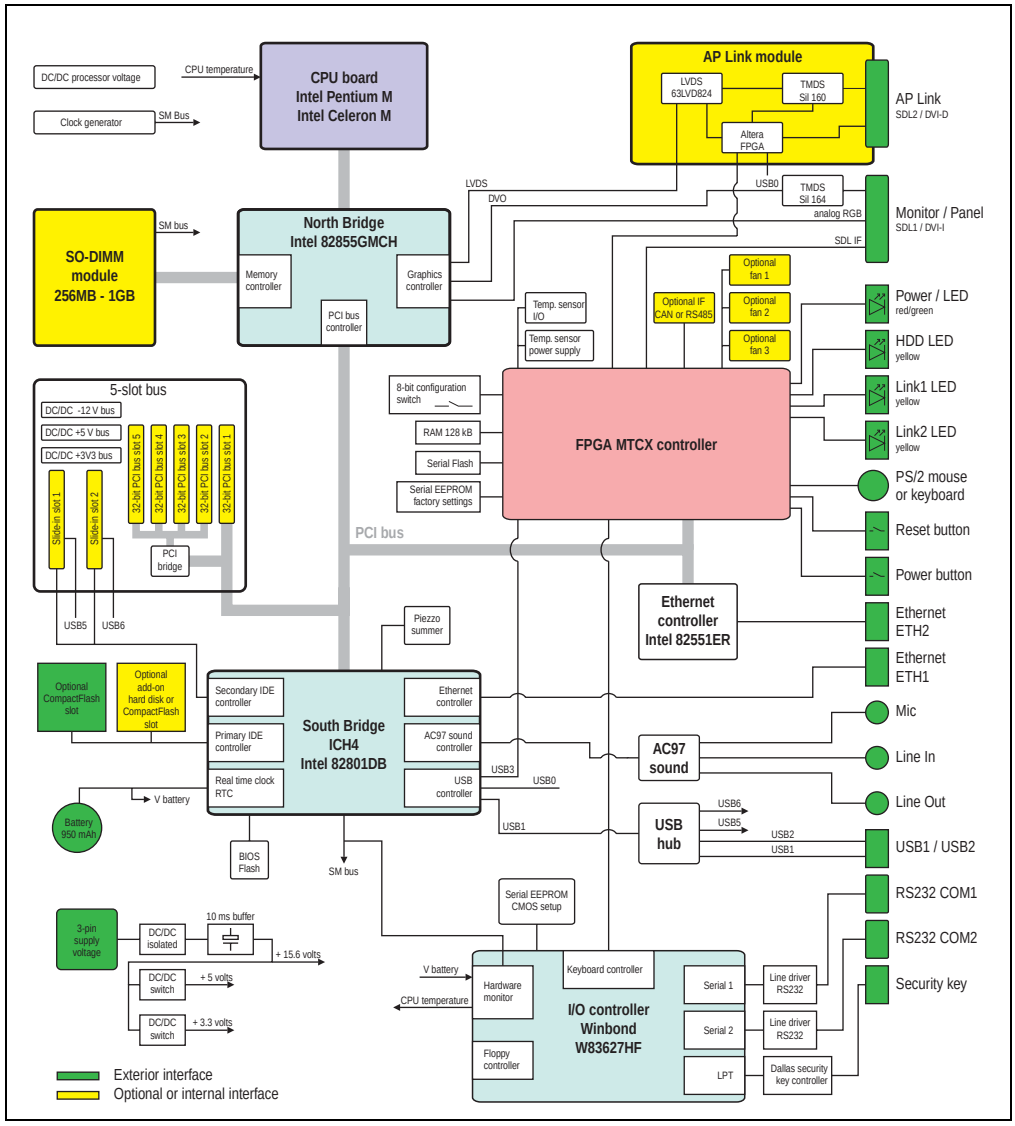


Figure 36: Block diagram of entire device with system unit 5PC600.SX05-00 and 855GME CPU board

2.11.5 Entire device with system unit 5PC600.SX05-01

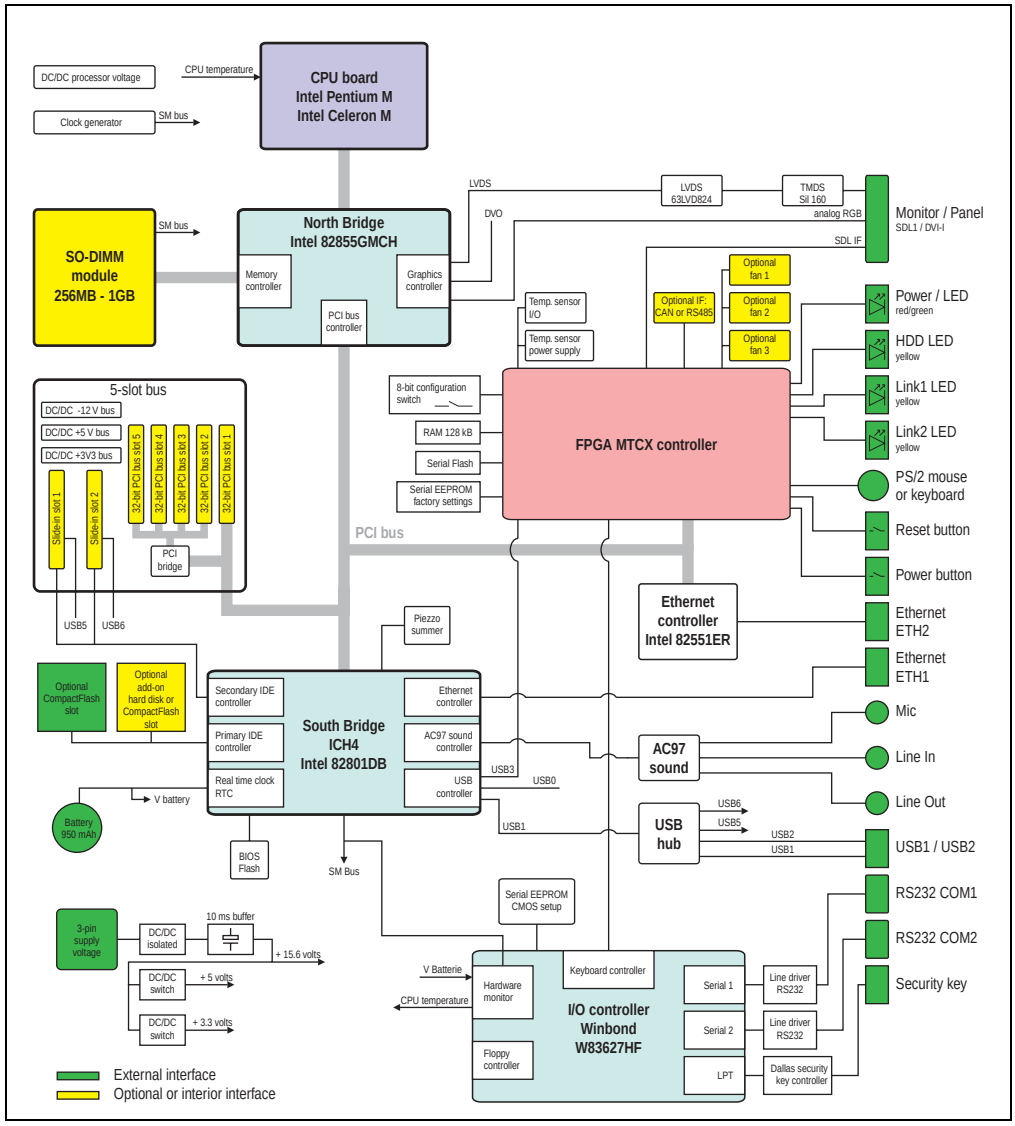


Figure 37: Block diagram of entire device with system unit 5PC600.SX05-01 and 855GME CPU board

3. Individual components

3.1 System units

All of the individual components of the Automation PC620 system come together inside the system unit. The system unit consists of an APC620 housing with an integrated main board. The housing comes in variants with 1, 2, or 5 PCI slots. Units with 2 or 5 PCI slots have an additional 1 or 2 slide-in drives, respectively.

3.1.1 Technical data

Features	5PC600.SX01-00	5PC600.SX02-00	5PC600.SX02-01	5PC600.SX05-00	5PC600.SX05-01
Serial interfaces Type Number UART Transfer rate Connection	RS232, modem capable 2 16550 compatible, 16 bytes FIFO Max. 115 kBaud 9-pin DSUB, male				
Ethernet Controller Transfer rate Connection	See "Ethernet connection ETH1" on page 76 and "Ethernet connection ETH2" on page 77 10/100 Mbit/s RJ45 twisted pair (10 BaseT / 100 BaseT)				
USB interface Type Number Transfer rate Connection	USB 2.0 2 Up to 480 MBit (high speed) Type A				
Monitor / Panel	DVI-I, female				
AC97 sound	Mic., line in, line out				
IF optional slot	1				
PCI slots (half-size) according to PCI half-size standard 2.2, PCI bus speed 33 MHz	1	2		5	
CompactFlash slot 1 (CF1) Internal organization	Integrated Primary master				
Combined CompactFlash slot 2 / hard disk (HDD/CF2) Internal organization	Yes, optional add-on CompactFlash slot or add-on hard disk Primary slave				
Insert for slide-in drive 1 Internal organization	-	Yes Secondary slave			

Table 53: Technical data - system units

Features	5PC600.SX01-00	5PC600.SX02-00	5PC600.SX02-01	5PC600.SX05-00	5PC600.SX05-01
Insert for slide-in drive 2 Internal organization	-	-	-	Yes Secondary master	
Reset button	Yes				
Power button	Yes				
PS/2 keyboard/mouse	Yes, combined, will be automatically detected				
Battery slot	Yes				
Hardware security key slot	Yes (DS1425 from MAXIM/Dallas)				
Fan slot	Yes				
Automation Panel link slot	-	1	-	1	-
Status LEDs	Power, HDD, Link1, Link2				
Real-time clock (RTC) Battery-buffered Accuracy	Yes See the technical data for CPU boards				
MTCX[1)]	Yes				
Electrical characteristics					
Power supply Rated voltage Starting current Power consumption	24 VDC ± 25% typically 7A maximum 40 A for < 300 µs See 2.6 "Power management for APC620 systems with 1 and 2 PCI slots".			24 VDC ± 25% typically 10 A maximum 40 A for < 300 µs See 2.7 "Power management, APC620 systems with 5 PCI slots".	
Mechanical characteristics					
Housing[2)] Material Paint Front cover	Galvanized steel plate Orange (similar to Pantone 151CV), dark gray (similar to Pantone 432CV) Colored plastic (similar to Pantone 151CV)				
Outer dimensions Width Length Height	65 mm 251 mm 270 mm	104.5 mm 253 mm 270 mm		185.4 mm 253 mm 270 mm	
Weight	Approx. 1.5 kg	Approx. 2.6 kg		Approx. 3.8 kg	
Mounting plates (for M4 screws)	4			6	
Drilling templates for mounting	(see chapter 3 "Commissioning", section 1.2 "Drilling templates")				

Table 53: Technical data - system units (Forts.)

1) **M**ain**t**enance **C**ontroller E**x**tended, for more information, see the section "Maintenance Controller Extended (MTCX)" on page 527.

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

3.2 CPU boards 815E

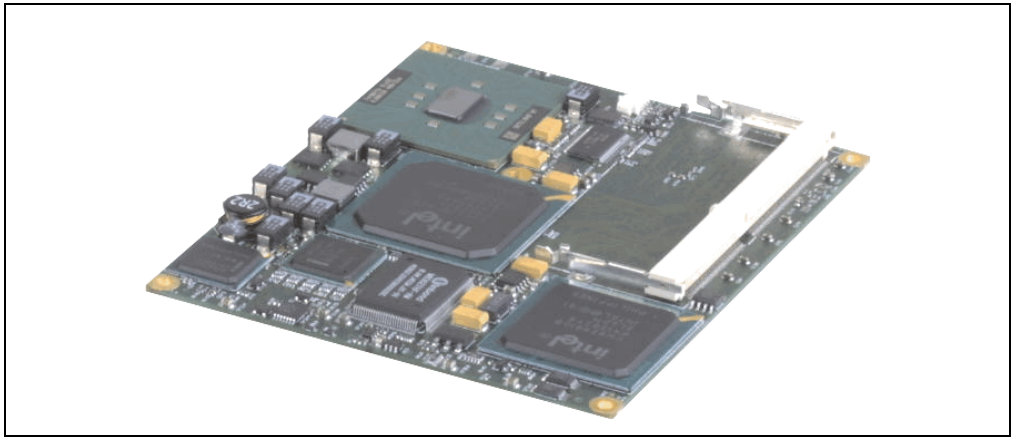


Figure 38: CPU boards 815E

Information:

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

3.2.1 Technical data

Features	5PC600.E815-00	5PC600.E815-02	5PC600.E815-03
Boot loader / Operating system	BIOS Phoenix		
Processor Architectures Type Expanded command set L1 cache L2 cache Floating Point Unit (FPU)	 0.13 µm Intel Celeron 3 400 MHz MMX technology, streaming SIMD extension 16 KB 256 KB Yes	 0.13 µm Intel Celeron 3 733 MHz MMX technology, streaming SIMD extension 16 KB 256 KB Yes	 0.13 µm Intel Celeron 1 GHz MMX technology, streaming SIMD extension 16 KB 256 KB Yes
Chipset	Intel 82815E (GMCH) Intel 82801DB (ICH4) - integrated real-time clock (RTC) [1)]		
Front side bus	100 MHz	133 MHz	133 MHz
IDE ports	2 IDE ports, UDMA 100		

Table 54: Technical data - 815E CPU boards

Features	5PC600.E815-00	5PC600.E815-02	5PC600.E815-03
Memory Type Size Socket	SDRAM Max. 512 MB SO-DIMM 144-pin		
Graphics Controller Memory Color depth	Support up to SXGA display units Intel 82815 (integrated in the chipset) 32 MB shared memory (reserved in the main memory) Max. 24-bit		

Table 54: Technical data - 815E CPU boards (Forts.)

1) The real-time clock (RTC) has an error of 2 seconds per day at 25°C and 6 seconds per day at 60°C.

Driver support

In order for the CPU board with the Intel 82815E chipset to work properly, it is necessary to install the Intel chipset driver (e.g. special USB driver) and the graphic chip. The necessary software can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).

3.3 CPU boards 855GME

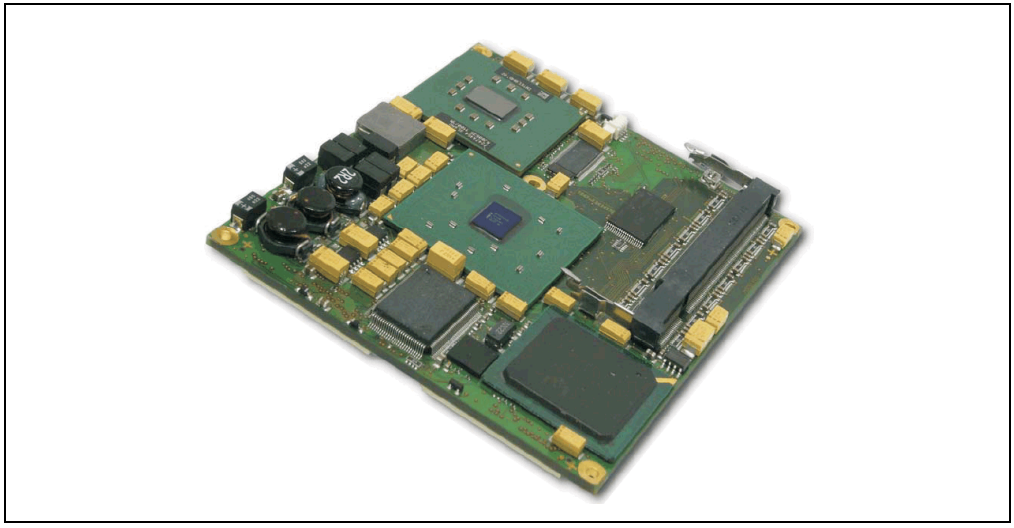


Figure 39: CPU boards 855GME

Information:

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

3.3.1 Technical data

Features	5PC600.E855-00	5PC600.E855-01	5PC600.E855-02	5PC600.E855-03	5PC600.E855-04	5PC600.E855-05
Boot loader / Operating system	BIOS Phoenix					
Processor						
Architectures	0.13 µm	0.13 µm	0.90 nm	0.90 nm	0.13 µm	0.90 nm
Type	Intel Pentium M 1,1 GHz	Intel Pentium M 1.6 GHz	Intel Pentium M 1.4 GHz	Intel Pentium M 1.8 GHz	Intel Celeron M 600 MHz	Intel Celeron M 1000 MHz
Expanded command set	MMX technology, streaming SIMD extension 2	MMX technology, streaming SIMD extension 2	MMX technology, streaming SIMD extension 2	MMX technology, streaming SIMD extension 2	MMX technology, streaming SIMD extension 2	MMX technology, streaming SIMD extension 2
L1 cache	32 KB	32 KB	32 KB	32 KB	32 KB	32 KB
L2 cache	1 MB	1 MB	2 MB	2 MB	512 kB	1 MB
Floating Point Unit (FPU)	Yes	Yes	Yes	Yes	Yes	Yes
Chipset	Intel 82855GME (GMHC) Intel 82801DB (ICH4) - integrated real-time clock (RTC) [1)]					

Table 55: Technical data - 855GME CPU boards

Features	5PC600.E855-00	5PC600.E855-01	5PC600.E855-02	5PC600.E855-03	5PC600.E855-04	5PC600.E855-05
Front side bus	400 MHz					
IDE ports	2 IDE ports, UDMA 100					
Memory Type Size Socket	 DDRAM Max. 1 GB SO-DIMM 200-pin					
Graphics Controller Memory Color depth	 Intel Extreme Graphics 2 (integrated in the chipset) 32 MB shared memory (reserved in the main memory) Max. 32 bit					

Table 55: Technical data - 855GME CPU boards (Forts.)

1) The quartz used has an accuracy of 10 ppm. This means after influences such as operating temperature have been taken into account, the inaccuracy is typically 2 seconds per day.

Driver support

In order for the CPU board with the Intel 82855GME chipset to work properly, it is necessary to install the Intel chipset driver (e.g. special USB driver) and the graphic chip. They can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).

3.4 Heat sink

There are a number of heat sink variants available to be used with different CPU boards.

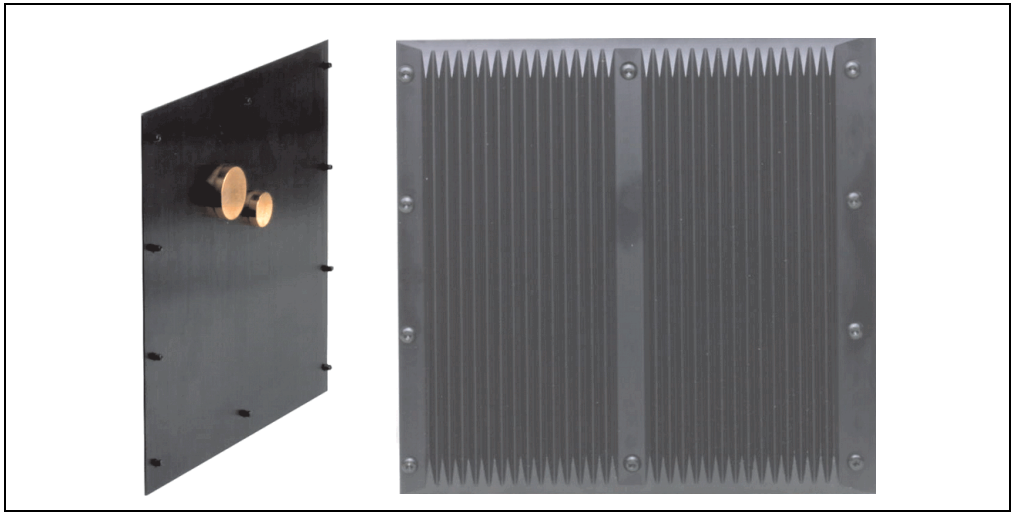


Figure 40: Heat sink

Information:

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

A heat sink can only be replaced at the B&R plant.

Mechanical characteristics	5AC600.HS01-00	5AC600.HS01-01	5AC600.HS01-02
Ideal for CPU boards	5PC600.E815-00 5PC600.E815-02 5PC600.E815-03	5PC600.E855-00 5PC600.E855-02 5PC600.E855-04 5PC600.E855-05	5PC600.E855-01 5PC600.E855-03
Material	Black-coated aluminum		
Outer dimensions Width Height Depth	228.7 mm 218 mm 12.8 mm		228.7 mm 218 mm 30 mm
Weight	1340 g		1640 g

Table 56: Technical data - heat sink

3.5 Main memory

The CPU boards (815E, 855GME) are each equipped with a socket for memory modules. When choosing a main memory, it is important to consider both the maximum memory capacity (for 815E CPU boards 512 MB, and for 855GME CPU boards 1 GB) and the correct type.

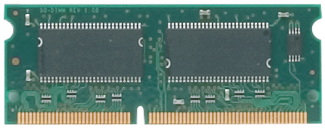


Figure 41: Main memory module

Information:

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

3.5.1 Technical data

Features	5MMSDR.0128-01	5MMSDR.0256-01	5MMSDR.0512-01	5MMDDR.0256-00	5MMDDR.0512-00	5MMDDR.1024-00
Ideal for CPU boards	815E			855GME		
Size Pins Type	128 MB 144-pin SO-DIMM SDRAM	256 MB 144-pin SO-DIMM SDRAM	512 MB 144-pin SO-DIMM SDRAM	256 MB 200-pin SO-DIMM DDR-SDRAM	512 MB 200-pin SO-DIMM DDR-SDRAM	1 GB 200-pin SO-DIMM DDR-SDRAM
Organization	16Mx64	32Mx64	64Mx64	32Mx64	64Mx64	128Mx64

Table 57: Technical data - main memory

Information:

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

3.6 Drives

3.6.1 Add-on hard disk 30 GB 24x7 - 5AC600.HDDI-00

This hard disk is specified for 24-hour operation. 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 the order.

Figure 42: Add-on hard disk 30 GB 24/7 - 5AC600.HDDI-00

Technical data

Information:

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

Features	5AC600.HDDI-00
Manufacturer's product ID	Fujitsu MHT2030AR
Formatted capacity	30 GB
Number of heads	2
Number of sectors (user)	58,605,120
Bytes per sector	512
Revolution speed	4200 rpm ± 1%
Access time (average)	7.14 ms

Table 58: Technical data - add-on hard disk 5AC600.HDDI-00

Features	5AC600.HDDI-00
Positioning time (seek, typical values) Minimum (track to track) Average (read access) Maximum	 1.5 ms 12 ms 22 ms
Starting time (0 rpm to read access)	5 seconds (typically)
Interface	ATA-6
Data transfer rate To the medium To / from host	 26.1 to 36.2 MB/s Max. 100 MB/s (ultra-DMA mode 5)
Cache	2 MB
Noise level (idle mode)	Approx. 24 dBA at 30 cm
Electrical characteristics	
Lifespan	5 years or 20,000 POH (Power-On Hours)
MTBF	300000 hours
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 Operation - standard [1)] Operation - 24-hour [2)] Storage Transport	 +5°C .. +55°C +5°C .. +44°C -40°C .. +65°C -40°C .. +65°C
Relative humidity Operation Storage Transport	 8 - 90% non-condensing 5 - 95% non-condensing 5 - 95% non-condensing
Vibration Operation Storage	 No non-recovered errors at max. 5 - 500 Hz and 1 g (9.8 m/s^2 0-peak) No damage at max. 5 - 500 Hz and 5 g (49 m/s^2 0-peak)
Shock (pulse with a sinus half-wave) Operation Storage	 No non-recovered errors at max. 225 g (2,207 m/s^2 0-peak) and 2 ms duration No damage at max. 900 g (8,820 m/s^2 0-peak) and 1 ms duration No damage at max. 120 g (1,176 m/s^2 0-peak) and 11 ms duration
Altitude Operation Storage	 - 300 to 3,000 meters - 300 to 12,000 meters

Table 58: Technical data - add-on hard disk 5AC600.HDDI-00 (Forts.)

1) Standard operation means 250 POH (power-on hours) per month.

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

Temperature humidity diagram for operation and storage

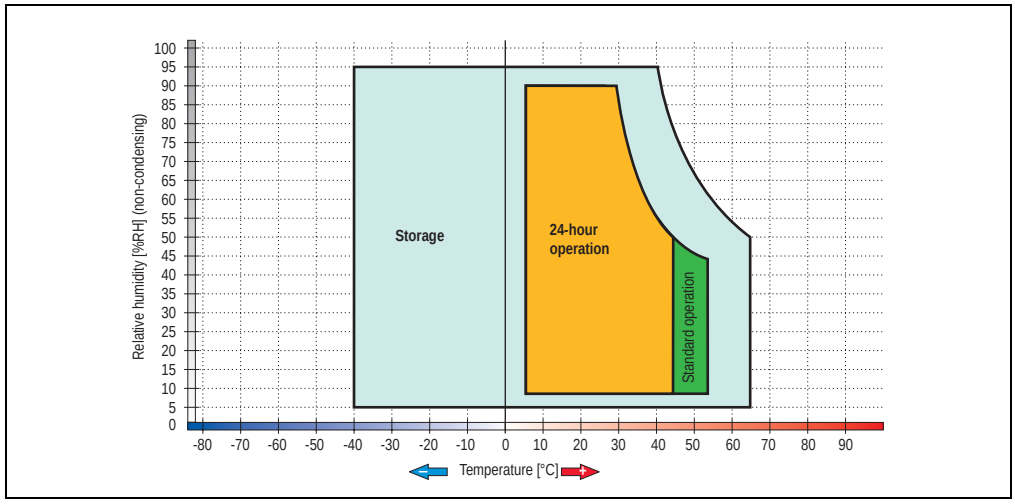


Figure 43: Temperature humidity diagram - add-on hard disk 5AC600.HDDI-00

3.6.2 Add-on hard disk 20 GB ET - 5AC600.HDDI-01

This hard disk has an extended temperature specification, but is not permitted for 24-hour operation. 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 the order.

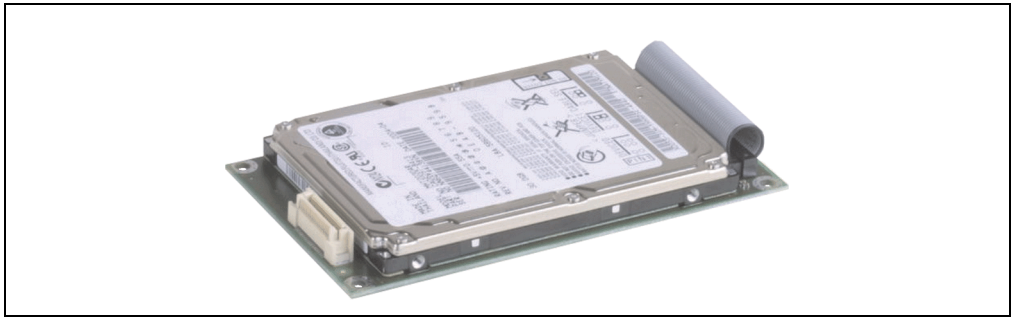


Figure 44: Add-on hard disk 20 GB - 5AC600.HDDI-01

Technical data

Information:

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

Features	5AC600.HDDI-01
Manufacturer's product ID	Fujitsu MHT2020AC
Formatted capacity	20 GB
Number of heads	2
Number of sectors (user)	39,070,080
Bytes per sector	512
Revolution speed	4200 rpm ± 1%
Access time (average)	7.14 ms

Table 59: Technical data - add-on hard disk 5AC600.HDDI-01

Features	5AC600.HDDI-01
Positioning time (seek, typical values) Minimum (track to track) Average (read access) Maximum	 1.5 ms 12 ms 22 ms
Starting time (0 rpm to read access)	5 seconds (typically)
Interface	ATA-6
Data transfer rate To the medium To / from host	 Up to 28.9 MB/s Max. 100 MB/s (ultra-DMA mode 5)
Cache	2 MB
Noise level (idle mode)	Approx. 22 dBA at 30 cm
Electrical characteristics	
Lifespan	5 years or 20,000 POH (Power-On Hours)
MTBF	300000 hours
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 Operation [1)] Storage Transport	 -20°C .. +80°C -40°C .. +85°C -40°C .. +85°C
Relative humidity Operation Storage Transport	 8 - 90% non-condensing 5 - 95% non-condensing 5 - 95% non-condensing
Vibration Operation Storage	 No non-recovered errors at max. 5 - 500 Hz and 1 g (9.8 m/s^2 0-peak) No damage at max. 5 - 500 Hz and 5 g (49 m/s^2 0-peak)
Shock (pulse with a sinus half-wave) Operation Storage	 No non-recovered errors at max. 225 g (2,207 m/s^2 0-peak) and 2 ms duration No damage at max. 900 g (8,820 m/s^2 0-peak) and 1 ms duration No damage at max. 120 g (1,176 m/s^2 0-peak) and 11 ms duration
Altitude Operation Storage	 - 300 to 3,000 meters - 300 to 12,000 meters

Table 59: Technical data - add-on hard disk 5AC600.HDDI-01 (Forts.)

1) Operation means 250 POH (power-on hours) per month.

Temperature humidity diagram for operation and storage

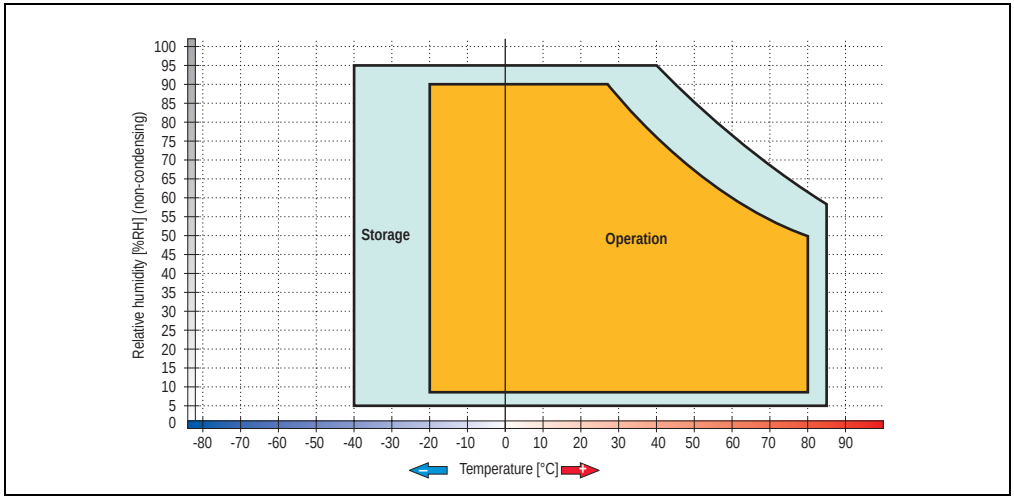


Figure 45: Temperature humidity diagram - add-on hard disk 5AC600.HDDI-01

3.6.3 Add-on hard disk 40 GB ET, 24x7 - 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 the order.

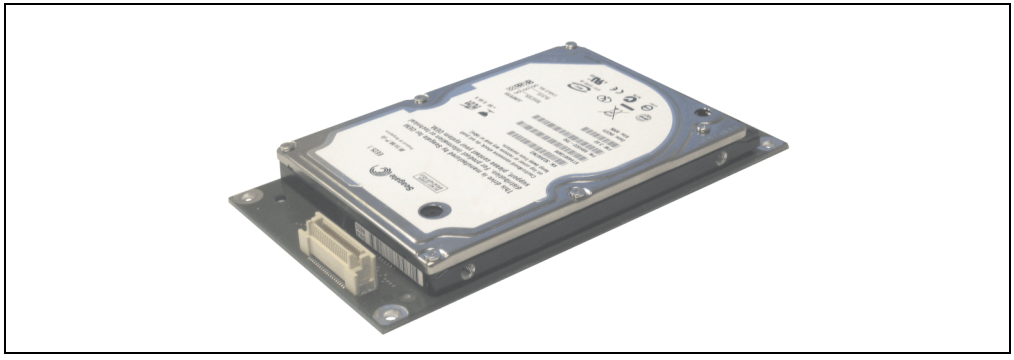


Figure 46: Add-on hard disk 40 GB - 5AC600.HDDI-05

Technical data

Information:

The following characteristics, features and limit values only apply to these individual components and can deviate from those for the entire device. For the entire device in which these individual components are 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%
Access time (average)	12.5 ms

Table 60: Technical data - add-on hard disk - 5AC600.HDDI-05

Features	5AC600.HDDI-05
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 To the medium To / from host	 Max. 321 MBits/sec Max. 100 MB/s (ultra-DMA mode 5)
Cache	8 MB
S.M.A.R.T. support	Yes
MTBF	550000 hours[1)]
Mechanical characteristics	
Add-on mounting	Fixed
Outer dimensions (without slide-in) 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°C .. +85°C -40°C .. +95°C -40°C .. +95°C
Relative humidity Operation Storage Transport	 5 - 90% non-condensing 5 - 95% non-condensing 5 - 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 sinus half-wave) Operation Storage	 Max. 200 g (1962 m/s^2 0-peak) and 2 ms duration, no non-recovered errors Max. 110 g (1079 m/s^2 0-peak) and 11 ms duration, no non-recovered errors Max. 800 g (7848 m/s^2 0-peak) and 2 ms duration, no damage Max. 400 g (3924 m/s^2 0-peak) and 0.5 ms duration, no damage
Altitude Operation Storage	 - 300 to 4419 meters - 300 to 12192 meters

Table 60: 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 elevation. 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 for operation and storage

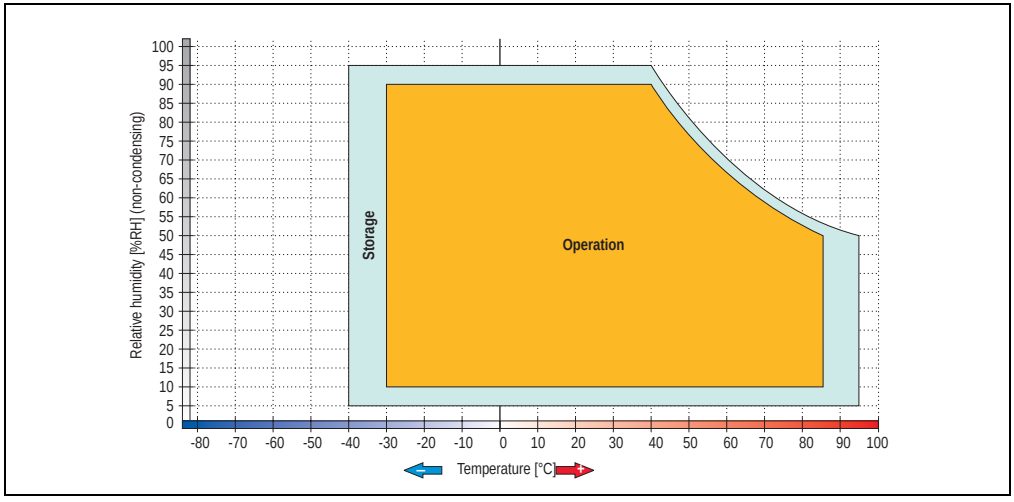


Figure 47: Temperature humidity diagram - add-on hard disk 5AC600.HDDI-05

3.6.4 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 the order.

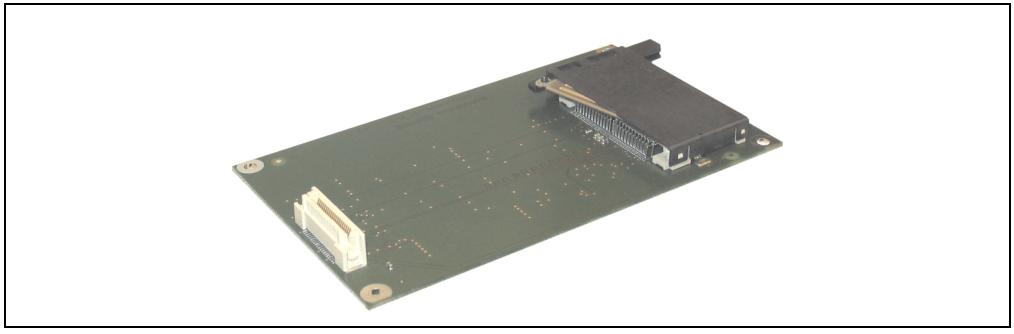


Figure 48: Add-on CompactFlash slot - 5AC600.CFSI-00

Technical data

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

Table 61: Technical data - add-on CompactFlash slot 5AC600.CFSI-00

Warning!

The power must be shut off before inserting or removing the CompactFlash card.

3.6.5 Slide-in CD-ROM - 5AC600.CDXS-00

The slide-in drive can be used in system units with 2 or 5 PCI slots. When inserted in slide-in slot 1 it is referred to internally as "secondary slave" and when in slide-in slot 2 as "secondary master."

Information:

It is possible to add or remove a slide-in drive at any time.

Caution!

Turn off power before adding or removing a slide-in drive.

Figure 49: Slide-in CD-ROM - 5AC600.CDXS-00

Technical data

Information:

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

Features	5AC600.CDXS-00
Reading rate	24x
Data transfer rate	Max. 33.3 MB/sec.
Access time (average)	115 ms
Revolution speed	Max. 5,136 rpm ± 1%
Starting time (0 rpm to read access)	10 seconds (maximum)
Host interface	IDE (ATAPI)
Readable CD media	CD/CD-ROM (12 cm, 8 cm), CD-R, CD-RW
Compatible formats	CD-DA, CD-ROM mode 1/mode 2 CD-ROM XA mode 2 (form 1, form 2) Photo CD (single/multi-session) Enhanced CD
Cache	128 kB
Noise level (complete read access)	Approx. 45 dBA at 50 cm
Lifespan Opening/closing the drawer	60,000 POH (Power-On Hours) > 10000 times
Environmental characteristics	
Ambient temperature Operation Storage Transport	 -5°C .. +60°C[1)] -20°C .. +60°C -40°C .. +65°C
Relative humidity Operation Storage Transport	 8 - 80% non-condensing 5 - 95% non-condensing 5 - 95% non-condensing
Vibration Operation Storage Transport	 At max. 5 - 500 Hz and 0.3 g At max. 5 - 500 Hz and 2 g At max. 5 - 500 Hz and 5 g
Shock (pulse with a sinus half-wave) Operation Storage Transport	 At max. 7 g for 11 ms At max. 60 g for 11 ms At max. 200 g for 2 ms At max. 60 g for 11 ms At max. 200 g for 2 ms

Table 62: Technical data - slide-in CD-ROM 5AC600.CDXS-00

1) Drive surface temperature

Temperature humidity diagram for operation and storage

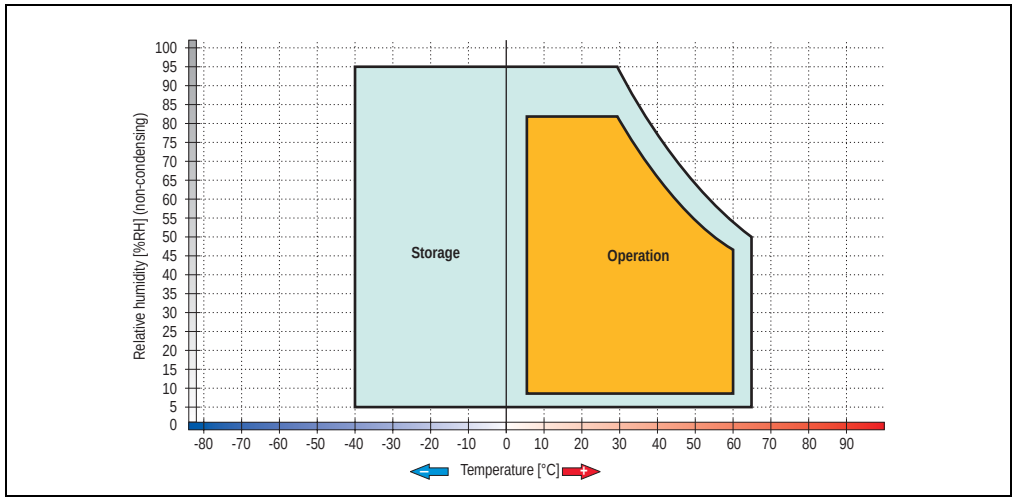


Figure 50: Temperature humidity diagram - slide-in CD-ROM - 5AC600.CDXS-00

3.6.6 Slide-in DVD-ROM/CD-RW - 5AC600.DVDS-00

The slide-in drive can be used in system units with 2 or 5 PCI slots. When inserted in slide-in slot 1 it is referred to internally as "secondary slave" and when in slide-in slot 2 as "secondary master."

Information:

It is possible to add or remove a slide-in drive at any time.

Caution!

Turn off power before adding or removing a slide-in drive.

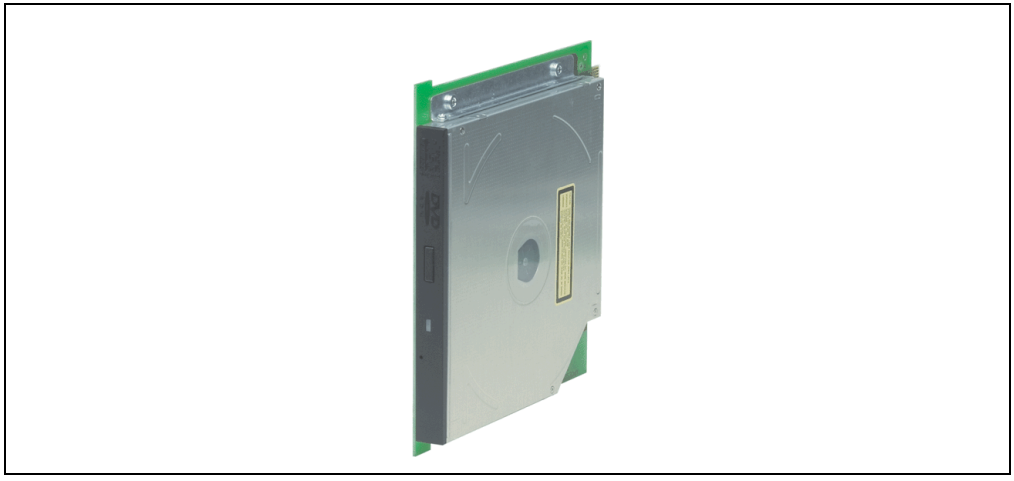


Figure 51: Slide-in DVD-ROM/CD-RW - 5AC600.DVDS-00

Technical data

Information:

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

Features	5AC600.DVDS-00
Write speed CD-R CD-RW	 24x, 16x, 10x and 4x 10x and 4x
Reading rate CD DVD	 24x 8x
Data transfer rate	Max. 33.3 MB/sec.
Access time (average) CD DVD	 85 ms 110 ms
Revolution speed	Max. 5,136 rpm ± 1%
Starting time (0 rpm to read access)	19 seconds (maximum)
Host interface	IDE (ATAPI)
Readable media CD DVD	 CD/CD-ROM (12 cm, 8 cm), CD-R, CD-RW DVD-ROM, DVD-R, DVD-RW, DVD-RAM
Non-write protected media CD	 CD-R, CD-RW
Compatible formats	CD-DA, CD-ROM mode 1/mode 2 CD-ROM XA mode 2 (form 1, form 2) Photo CD (single/multi-session) Enhanced CD, CD-text DVD-ROM, DVD-R, DVD-Video (double layer) DVD-RAM (4.7 GB, 2.6 GB)
Write-methods	Disc at once, session at once, packet write, track at once
Laser class	Class 1 laser
Data buffer capacity	2 MB
Noise level (complete read access)	Approx. 45 dBA at 50 cm
Lifespan Opening/closing the drawer	60,000 POH (Power-On Hours) > 10000 times
Environmental characteristics	
Ambient temperature Operation Storage Transport	 +5°C .. +50°C[1)] -20°C .. +60°C -40°C .. +65°C

Table 63: Technical data - slide-in DVD-ROM/CD-RW - 5AC600.DVDS-00

Features	5AC600.DVDS-00
Relative humidity	
Operation	8 - 80% non-condensing
Storage	5 - 95% non-condensing
Transport	5 - 95% non-condensing
Vibration	
Operation	At max. 5 - 500 Hz and 0.2 g
Storage	At max. 5 - 500 Hz and 2 g
Transport	At max. 5 - 500 Hz and 2 g
Shock (pulse with a sinus half-wave)	
Operation	At max. 5 g for 11 ms
Storage	At max. 60 g for 11 ms At max. 200 g for 2 ms
Transport	At max. 60 g for 11 ms At max. 200 g for 2 ms

Table 63: Technical data - slide-in DVD-ROM/CD-RW - 5AC600.DVDS-00 (Forts.)

1) Drive surface temperature

Temperature humidity diagram for operation and storage

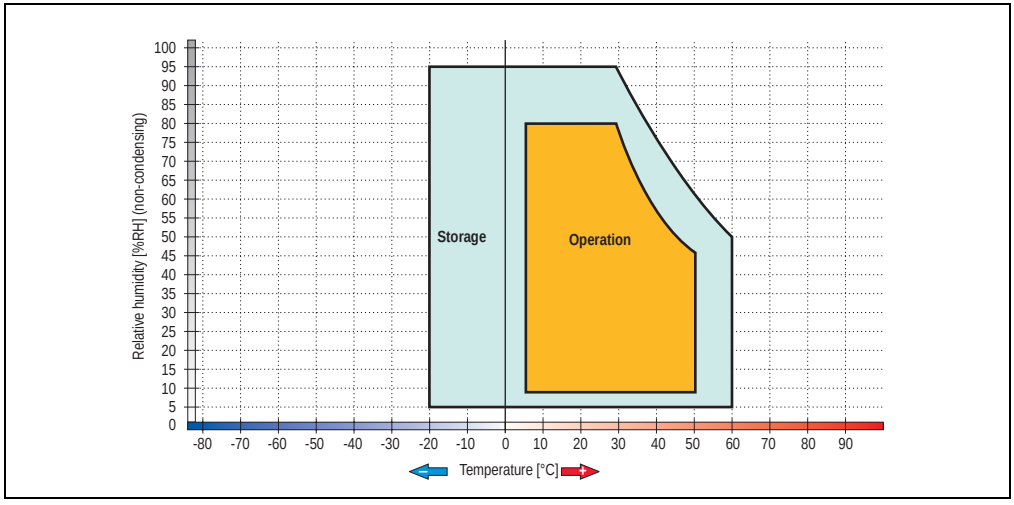


Figure 52: Temperature humidity diagram - slide-in DVD-ROM/CD-RW - 5AC600.DVDS-00

3.6.7 Slide-in DVD-R/RW, DVD+R/RW - 5AC600.DVRS-00

The slide-in drive can be used in system units with 2 or 5 PCI slots. When inserted in slide-in slot 1 it is referred to internally as "secondary slave" and when in slide-in slot 2 as "secondary master."

Information:

It is possible to add or remove a slide-in drive at any time.

Caution!

Turn off power before adding or removing a slide-in drive.

Figure 53: Slide-in DVD-R/RW, DVD+R/RW - 5AC600.DVRS-00

Technical data - Revision D0 and higher

Information:

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

Features	5AC600.DVRS-00 starting with Revision D0
Write speed CD-R CD-RW DVD-R DVD-RW DVD-RAM[1)] DVD+R DVD+R (double layer) DVD+RW	 24x, 16x, 10x and 4x 10x and 4x 8x, 4x and 2x 4x and 2x 3x and 2x 8x, 4x and 2x 2x,4x 4x and 2x
Reading rate CD DVD	 24x 8x
Data transfer rate	Max. 33.3 MB/sec.
Access time (average) CD DVD	 130 ms (24x) 130 ms (8x)
Revolution speed	Max. 5090 rpm ± 1%
Starting time (0 rpm to read access) CD DVD	 14 seconds (maximum) 15 seconds (maximum)
Host interface	IDE (ATAPI)
Readable media CD DVD	 CD/CD-ROM (12 cm, 8 cm), CD-R, CD-RW DVD-ROM, DVD-R, DVD-RW. DVD-RAM, DVD+R, DVD+R (double layer), DVD+RW
Non-write protected media CD DVD	 CD-R, CD-RW DVD-R/RW, DVD-RAM (4.7 GB), DVD+R/RW, DVD+R (double layer)
Compatible formats	CD-DA, CD-ROM mode 1/mode 2 CD-ROM XA mode 2 (form 1, form 2) Photo CD (single/multi-session), Enhanced CD, CD text DVD-ROM, DVD-R, DVD-RW, DVD video DVD-RAM (4.7 GB, 2.6 GB) DVD+R, DVD+R (double layer), DVD+RW
Write-methods CD DVD	 Disc at once, session at once, packet write, track at once Disc at once, Incremental, Over-write, sequential, multi-session
Laser class	Class 1 laser
Data buffer capacity	8 MB

Table 64: Technical data - slide-in DVD-R/RW, DVD+R/RW - 5AC600.DVRS-00 Revision D0 and higher

Features	5AC600.DVRS-00 starting with Revision D0
Noise level (complete read access)	Approx. 48 dBA at 50 cm
Lifespan Opening/closing the drawer	60,000 POH (Power-On Hours) > 10000 times
Environmental characteristics	
Ambient temperature Operation Storage Transport	 +5°C .. +55°C[2)] -20°C .. +60°C -40°C .. +65°C
Relative humidity Operation Storage Transport	 8 - 80% non-condensing 5 - 95% non-condensing 5 - 95% non-condensing
Vibration Operation Storage Transport	 At max. 5 - 500 Hz and 0.2 g At max. 5 - 500 Hz and 2 g At max. 5 - 500 Hz and 2 g
Shock (pulse with a sinus half-wave) Operation Storage Transport	 At max. 5 g for 11 ms At max. 60 g for 11 ms At max. 200 g for 2 ms At max. 60 g for 11 ms At max. 200 g for 2 ms

Table 64: Technical data - slide-in DVD-R/RW, DVD+R/RW - 5AC600.DVRS-00 Revision D0 and higher (Forts.)

1) RAM drivers are not provided by the manufacturer. Support of RAM function by the burning software "Nero" (model number 5SWUTI.0000-00) or other burning software packages and drivers from third party providers.

2) Drive surface temperature

Technical data - prior to Revision D0

Features	5AC600.DVRS-00 prior to Revision D0
Write speed CD-R CD-RW DVD-R DVD-RW DVD+R DVD+RW	 24x, 16x, 10x and 4x 10x and 4x 8x, 4x and 2x 4x and 2x 8x, 4x and 2x 4x and 2x
Reading rate CD DVD	 24x 8x
Data transfer rate	Max. 33.3 MB/sec.
Access time (average) CD DVD	 130 ms (24x) 130 ms (8x)
Revolution speed	Max. 5090 rpm ± 1%
Starting time (0 rpm to read access) CD DVD	 14 seconds (maximum) 15 seconds (maximum)

Table 65: Technical data - slide-in DVD-R/RW, DVD+R/RW - 5AC600.DVRS-00 prior to Revision D0

Features	5AC600.DVRS-00 prior to Revision D0
Host interface	IDE (ATAPI)
Readable media CD DVD	 CD/CD-ROM (12 cm, 8 cm), CD-R, CD-RW DVD-ROM, DVD-R, DVD-RW
Non-write protected media CD DVD	 CD-R, CD-RW DVD-R/RW, DVD+R/RW
Compatible formats	CD-DA, CD-ROM mode 1/mode 2 CD-ROM XA mode 2 (form 1, form 2) Photo CD (single/multi-session) Enhanced CD, CD-text DVD-ROM, DVD-R, DVD-Video (double layer), DVD-RW DVD+R, DVD+R (double layer), DVD+RW
Write-methods CD DVD	 Disc at once, session at once, packet write, track at once Disc at once, Incremental, Over-write, sequential, multi-session
Laser class	Class 1 laser
Data buffer capacity	8 MB
Noise level (complete read access)	Approx. 48 dBA at 50 cm
Lifespan Opening/closing the drawer	60,000 POH (Power-On Hours) > 10000 times
Environmental characteristics	
Ambient temperature Operation Storage Transport	 +5°C .. +55°C[1)] -20°C .. +60°C -40°C .. +65°C
Relative humidity Operation Storage Transport	 8 - 80% non-condensing 5 - 95% non-condensing 5 - 95% non-condensing
Vibration Operation Storage Transport	 At max. 5 - 500 Hz and 0.2 g At max. 5 - 500 Hz and 2 g At max. 5 - 500 Hz and 2 g
Shock (pulse with a sinus half-wave) Operation Storage Transport	 At max. 5 g for 11 ms At max. 60 g for 11 ms At max. 200 g for 2 ms At max. 60 g for 11 ms At max. 200 g for 2 ms

Table 65: Technical data - slide-in DVD-R/RW, DVD+R/RW - 5AC600.DVRS-00 prior to Revision D0 (Forts.)

1) Drive surface temperature

Temperature humidity diagram for operation and storage

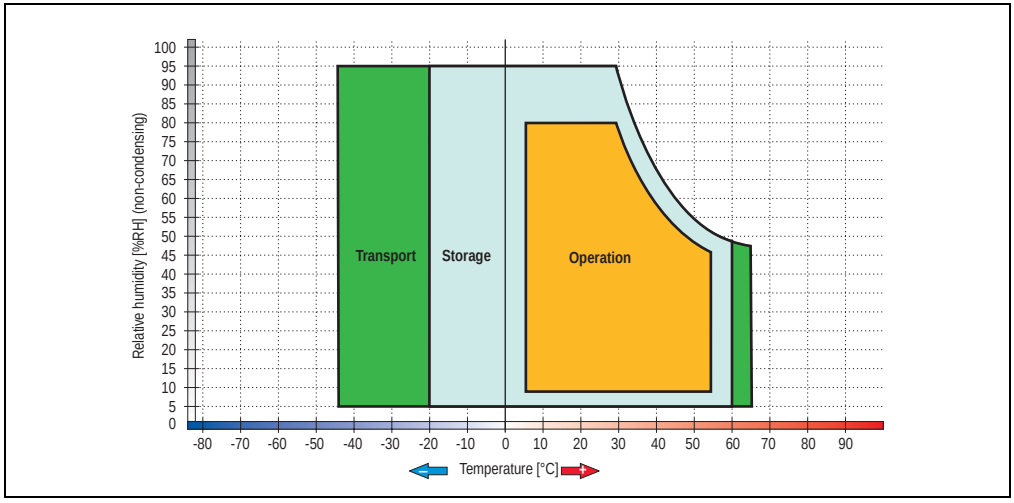


Figure 54: Temperature humidity diagram - slide-in DVD-R/RW, DVD+R/RW - 5AC600.DVRS-00

3.6.8 Slide-in CF 2 slot - 5AC600.CFSS-00

The slide-in drive can be used in system units with 2 or 5 PCI slots. When inserted in slide-in slot 1, the CompactFlash slot CF3 is referred to internally as "secondary slave" and when in slide-in slot 2 as "secondary master." CompactFlash slot CF4 is always accessed via USB.

Information:

- **It is possible to add or remove a slide-in drive at any time.**
- **In system units with 5 PCI slots, the slide-in USB FDD drive (5AC600.FDDS-00) must be inserted in slide-in slot 1.**
  The double CompactFlash slide-in drive (5AC600.CFSS-00) should only be used in slide-in slot 2.

Caution!

Turn off power before adding or removing a slide-in drive.

Warning!

The CompactFlash card can only be inserted in and removed from the CF3 IDE CompactFlash slot without power applied to the APC620!

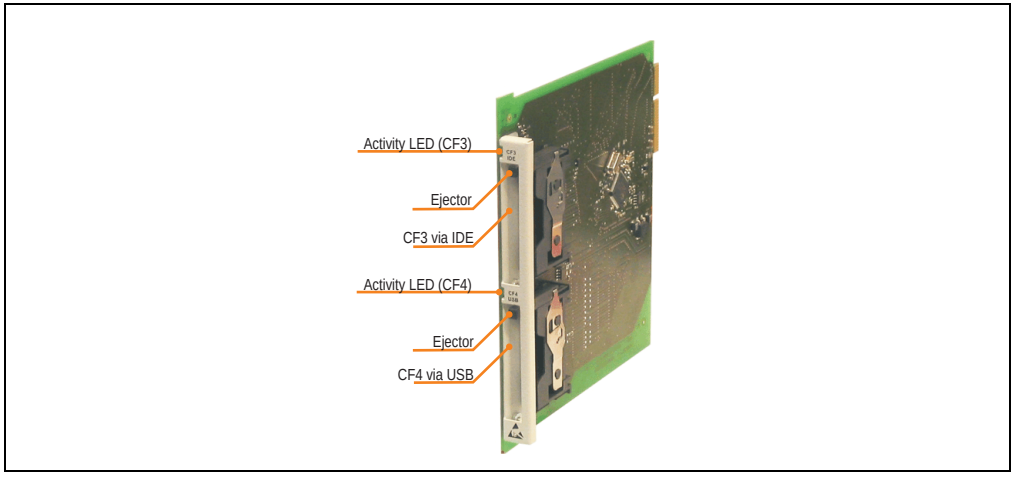


Figure 55: Slide-in CF 2-slot - 5AC600.CFSS-00

Technical data

Features	5AC600.CFSS-00
CompactFlash (CF3)	
Type	Type I and II
Number	1 slot
Connection	IDE - Secondary slave in slide-in slot 1 IDE - Secondary master in slide-in slot 2
Activity LED	Yes
CompactFlash (CF4)	
Type	Type I and II
Number	1 slot
Connection	Via USB 2.0
Activity LED	Yes

Table 66: Technical data - slide-in CF 2 slot - 5AC600.CFSS-00

3.6.9 Slide-in USB FDD - 5AC600.FDDS-00

The slide-in drive can be used in system units with 2 or 5 PCI slots. In these units it is connected to the system via USB.

Information:

- **It is possible to add, remove, or modify the slide-in drive at any time.**
- **In system units with 5 PCI slots, the slide-in USB FDD drive must be inserted in slide-in slot 1 for mechanical reasons.**

Caution!

Turn off power before adding or removing a slide-in drive.

Figure 56: Slide-in USB FDD - 5AC600.FDDS-00

Technical data

Information:

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

Features	5AC600.FDDS-00
Data capacity	720 KB / 1.25 MB / 1.44 MB (formatted)
USB transfer rate	Full speed (12 Mbps)
Data transfer rate	250 kbits (720 KB) or 500 kbits (1.25 MB and 1.44 MB)
Rotation speed	Up to 360 rpm
Diskette media	High density (2HD) or normal density (2DD) 3.5" diskettes
MTBF	30,000 POH (Power-On Hours)
Environmental characteristics	
Ambient temperature Operation Storage Transport	 +4°C .. +50°C -20°C .. +60°C -20°C .. +60°C
Relative humidity Operation Storage Transport	 20 - 80% non-condensing 5 - 90% non-condensing 5 - 90% non-condensing
Vibration Operation Storage Transport	 At max. 5 - 500 Hz and 0.3 g At max. 10 - 100 Hz and 2 g At max. 10 - 100 Hz and 2 g
Shock (pulse with a sinus half-wave) Operation Storage Transport	 At max. 5 g for 11 ms At max. 60 g for 11 ms At max. 60 g for 11 ms
Altitude	Max. 3,000 meters

Table 67: Technical data - slide-in USB diskette drive - 5AC600.FDDS-00

Temperature humidity diagram for operation and storage

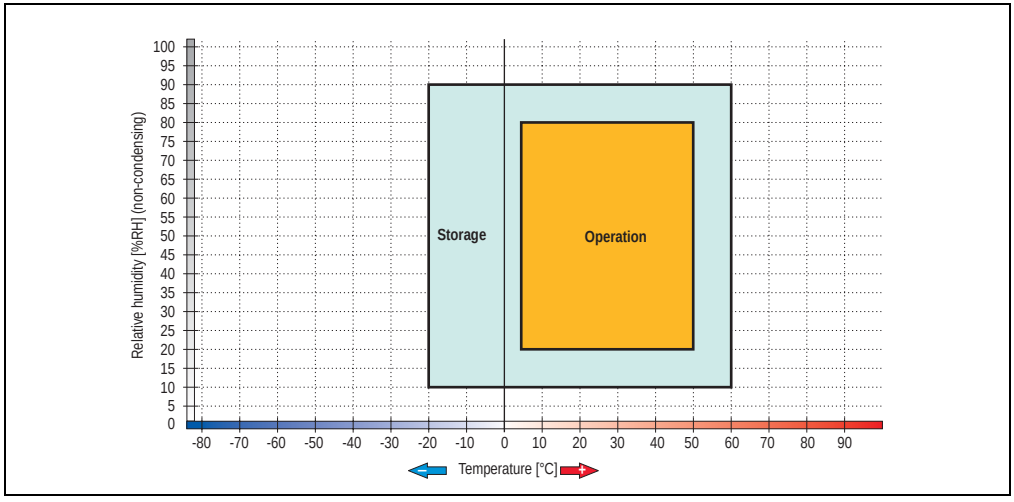


Figure 57: Temperature humidity diagram - slide-in USB diskette drive - 5AC600.FDDS-00

3.6.10 Slide-in hard disk 30 GB 24x7 - 5AC600.HDDS-00

This hard disk is specified for 24-hour operation. The slide-in drive can be used in system units with 2 or 5 PCI slots. When inserted in slide-in slot 1 it is referred to internally as "secondary slave" and when in slide-in slot 2 as "secondary master."

Information:

It is possible to add or remove a slide-in drive at any time.

Caution!

Turn off power before adding or removing a slide-in drive.

Figure 58: Slide-in hard disk 30 GB - 5AC600.HDDS-00

Technical data

Information:

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

Features	5AC600.HDDS-00
Manufacturer's product ID	Fujitsu MHT2030AR
Formatted capacity	30 GB
Number of heads	2
Number of sectors (user)	58,605,120
Bytes per sector	512
Revolution speed	4200 rpm ± 1%
Access time (average)	7.14 ms
Positioning time (seek, typical values) Minimum (track to track) Average (read access) Maximum	 1.5 ms 12 ms 22 ms
Starting time (0 rpm to read access)	5 seconds (typically)
Interface	ATA-6
Data transfer rate To the medium To / from host	 26.1 to 36.2 MB/s Max. 100 MB/s (ultra-DMA mode 5)
Cache	2 MB
Noise level (idle mode)	Approx. 24 dBA at 30 cm
Electrical characteristics	
Lifespan	5 years or 20,000 POH (Power-On Hours)
MTBF	300000 hours
Mechanical characteristics	
Slide-in mounting	Fixed
Outer dimensions (without slide-in) Width Length Height	 70 mm 100 mm 9.5 mm
Weight	120 g

Table 68: Technical data - slide-in hard disk - 5AC600.HDDS-00

Environmental characteristics	5AC600.HDDS-00
Ambient temperature	
Operation - standard [1]	+5°C .. +55°C
Operation - 24-hour [2]	+5°C .. +44°C
Storage	-40°C .. +60°C
Transport	-40°C .. +60°C
Relative humidity	
Operation	8 - 90% non-condensing
Storage	5 - 95% non-condensing
Transport	5 - 95% non-condensing
Vibration	
Operation	No non-recovered errors at max. 5 - 500 Hz and 1 g (9.8 m/s^2 0-peak)
Storage	No damage at max. 5 - 500 Hz and 5 g (49 m/s^2 0-peak)
Shock (pulse with a sinus half-wave)	
Operation	No non-recovered errors at max. 225 g (2,207 m/s^2 0-peak) and 2 ms duration
Storage	No damage at max. 900 g (8,820 m/s^2 0-peak) and 1 ms duration No damage at max. 120 g (1,176 m/s^2 0-peak) and 11 ms duration
Altitude	
Operation	- 300 to 3,000 meters
Storage	- 300 to 12,000 meters

Table 68: Technical data - slide-in hard disk - 5AC600.HDDS-00 (Forts.)

1) Standard operation means 250 POH (power-on hours) per month.

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

Temperature humidity diagram for operation and storage

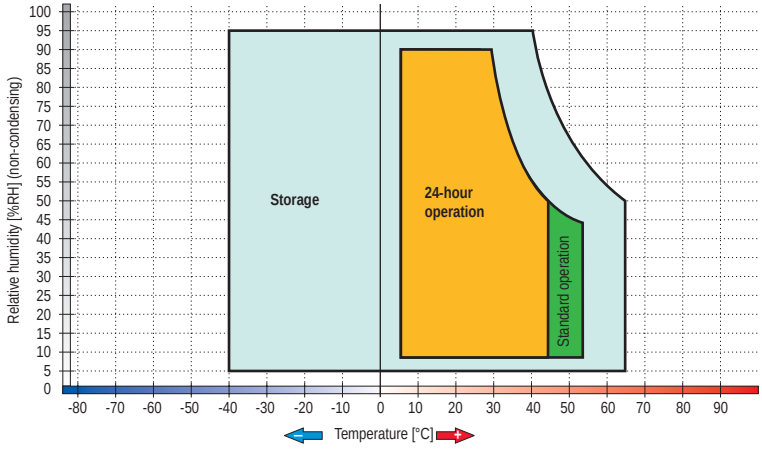


Figure 59: Temperature humidity diagram - slide-in hard disk - 5AC600.HDDS-00

3.6.11 Slide-in hard disk 20 GB ET - 5AC600.HDDS-01

This hard disk has an extended temperature specification, but is not permitted for 24-hour operation. The slide-in drive can be used in system units with 2 or 5 PCI slots. When inserted in slide-in slot 1 it is referred to internally as "secondary slave" and when in slide-in slot 2 as "secondary master."

Information:

It is possible to add or remove a slide-in drive at any time.

Caution!

Turn off power before adding or removing a slide-in drive.

Figure 60: Slide-in hard disk 20 GB - 5AC600.HDDS-01

Technical data

Information:

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

Features	5AC600.HDDS-01
Manufacturer's product ID	Fujitsu MHT2020AC
Formatted capacity	20 GB
Number of heads	2
Number of sectors (user)	39,070,080
Bytes per sector	512
Revolution speed	4200 rpm ± 1%
Access time (average)	7.14 ms
Positioning time (seek, typical values) Minimum (track to track) Average (read access) Maximum	 1.5 ms 12 ms 22 ms
Starting time (0 rpm to read access)	5 seconds (typically)
Interface	ATA-6
Data transfer rate To the medium To / from host	 Up to 28.9 MB/s Max. 100 MB/s (ultra-DMA mode 5)
Cache	2 MB
Noise level (idle mode)	Approx. 22 dBA at 30 cm
Electrical characteristics	
Lifespan	5 years or 20,000 POH (Power-On Hours)
MTBF	300000 hours
Mechanical characteristics	
Slide-in mounting	Fixed
Outer dimensions (without slide-in) Width Length Height	 70 mm 100 mm 9.5 mm
Weight	120 g
Environmental characteristics	
Ambient temperature Operation [1)] Storage Transport	 -20°C .. +80°C -40°C .. +85°C -40°C .. +85°C

Table 69: Technical data - slide-in hard disk - 5AC600.HDDS-01

Features	5AC600.HDDS-01
Relative humidity Operation Storage Transport	 8 - 90% non-condensing 5 - 95% non-condensing 5 - 95% non-condensing
Vibration Operation Storage	 No non-recovered errors at max. 5 - 500 Hz and 1 g (9.8 m/s^2 0-peak) No damage at max. 5 - 500 Hz and 5 g (49 m/s^2 0-peak)
Shock (pulse with a sinus half-wave) Operation Storage	 No non-recovered errors at max. 225 g (2,207 m/s^2 0-peak) and 2 ms duration No damage at max. 900 g (8,820 m/s^2 0-peak) and 1 ms duration No damage at max. 120 g (1,176 m/s^2 0-peak) and 11 ms duration
Altitude Operation Storage	 - 300 to 3,000 meters - 300 to 12,000 meters

Table 69: Technical data - slide-in hard disk - 5AC600.HDDS-01 (Forts.)

1) Operation means 250 POH (power-on hours) per month.

Temperature humidity diagram for operation and storage

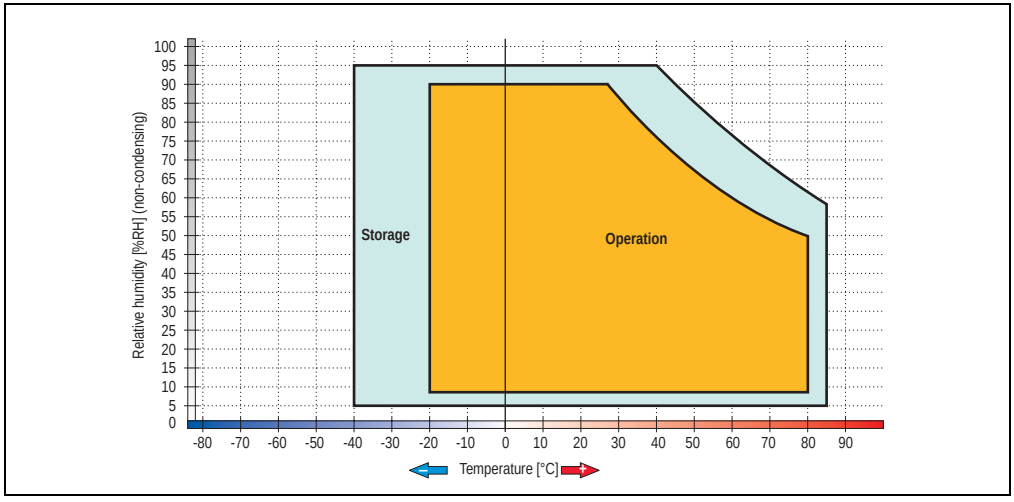


Figure 61: Temperature humidity diagram - slide-in hard disk - 5AC600.HDDS-01

3.6.12 Slide-in hard disk 40 GB ET, 24x7 - 5AC600.HDDS-02

This hard disk is specified for 24-hour operation and also provides an extended temperature specification. The slide-in drive can be used in system units with 2 or 5 PCI slots. When inserted in slide-in slot 1 it is referred to internally as "secondary slave" and when in slide-in slot 2 as "secondary master."

Information:

It is possible to add or remove a slide-in drive at any time.

Caution!

Turn off power before adding or removing a slide-in drive.

Figure 62: Slide-in hard disk 40 GB - 5AC600.HDDS-02

3.6.13 Technical data

Information:

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

Features	5AC600.HDDS-02
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%
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 To the medium To / from host	 Max. 321 MBits/sec Max. 100 MB/s (ultra-DMA mode 5)
Cache	8 MB
S.M.A.R.T. support	Yes
MTBF	550000 hours[1)]
Mechanical characteristics	
Add-on mounting	Fixed
Outer dimensions (without slide-in) 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°C .. +85°C -40°C .. +95°C -40°C .. +95°C

Table 70: Technical data for slide-in hard disk - 5AC600.HDDS-02

Environmental characteristics	5AC600.HDDS-02
Relative humidity	
Operation	5 - 90% non-condensing
Storage	5 - 95% non-condensing
Transport	5 - 95% non-condensing
Vibration	
Operation	10 - 500 Hz: 1 g (9.8 m/s^2 0-peak), no non-recovered errors
Storage	5 - 500 Hz: 5 g (49 m/s^2 0-peak), no non-recovered errors
Shock (pulse with a sinus half-wave)	
Operation	Max. 200 g (1962 m/s^2 0-peak) and 2 ms duration, no non-recovered errors Max. 110 g (1079 m/s^2 0-peak) and 11 ms duration, no non-recovered errors
Storage	Max. 800 g (7848 m/s^2 0-peak) and 2 ms duration, no damage Max. 400 g (3924 m/s^2 0-peak) and 0.5 ms duration, no damage
Altitude	
Operation	- 300 to 4419 meters
Storage	- 300 to 12192 meters

Table 70: Technical data for slide-in hard disk - 5AC600.HDDS-02 (Forts.)

1) With 8760 POH (power on hours) per year and 70°C surface temperature.

2) Temperature values for 305 meter elevation. 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 for operation and storage

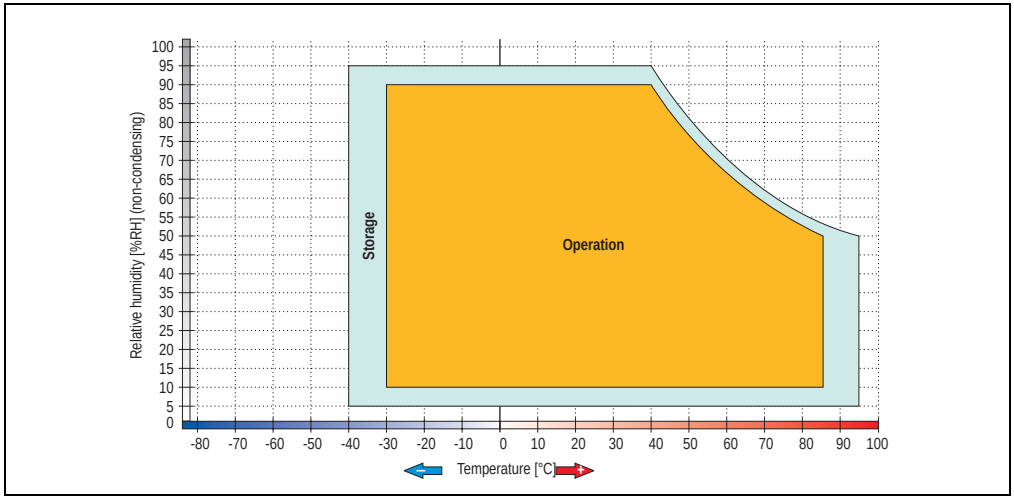


Figure 63: Temperature humidity diagram - slide-in hard disk - 5AC600.HDDS-02

3.7 RAID system

Sometimes it is simply not possible to avoid using hard disks due to the amount of data that needs to be saved. In this case, a RAID provides high system availability. All data is simultaneously and automatically stored on two hard drives. This double data storage means that when one hard disk fails, the system will continue to run on the second hard disk.

Advantages for the user:

- No data loss when hard drive fails.
- The system continues to run with a hard disk.
- Data redundancy is automatically restored by the system when the faulty hard disk has been replaced.

Depending on the type, the RAID 1 system is designed in the form of 1 or 2 PCI cards.

1 PCI slot: PCI SATA RAID controller 5ACPCI.RAIC-01 (controller + 2 SATA HDD hard drives)

2 PCI slots: PCI RAID controller (5ACPCI.RAIC-00) and PCI card with two hard disks (5ACPCI.RAIS-00 or 5ACPCI.RAIS-01).

The system can be flexibly implemented in all APC620 und PPC700s with 1 free PCI slot (depending on the RAID system design). The system also supports RAID 0 applications. As a result, parallel access to two hard drives with a relatively high data throughput is the main focus, in addition to the high availability.

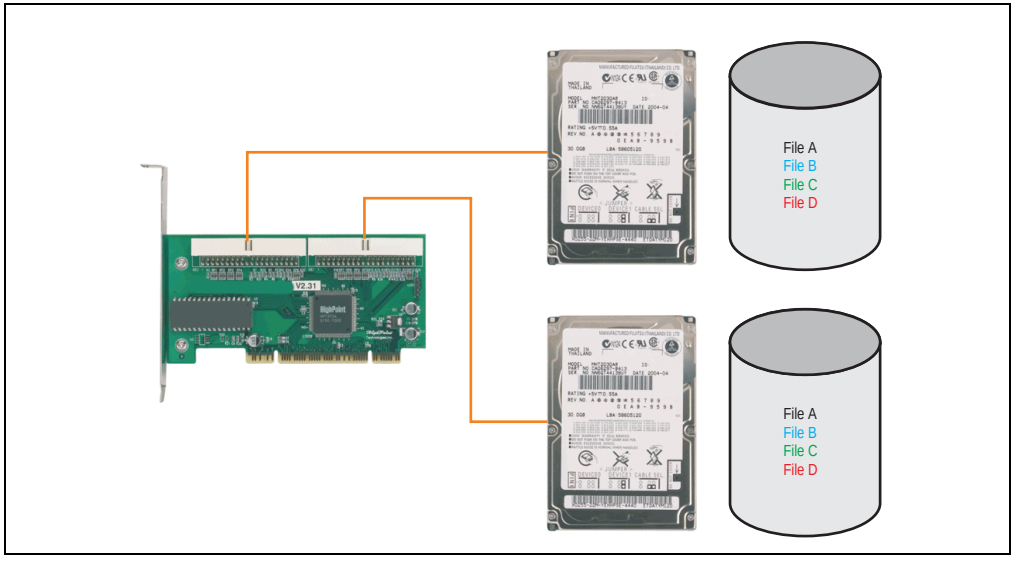


Figure 64: RAID 1 System schematic

3.7.1 PCI RAID controller ATA/100 - 5ACPCI.RAIC-00

Information:

PCI RAID controllers are only available factory-installed. Therefore, they need to be requested when placing the order.

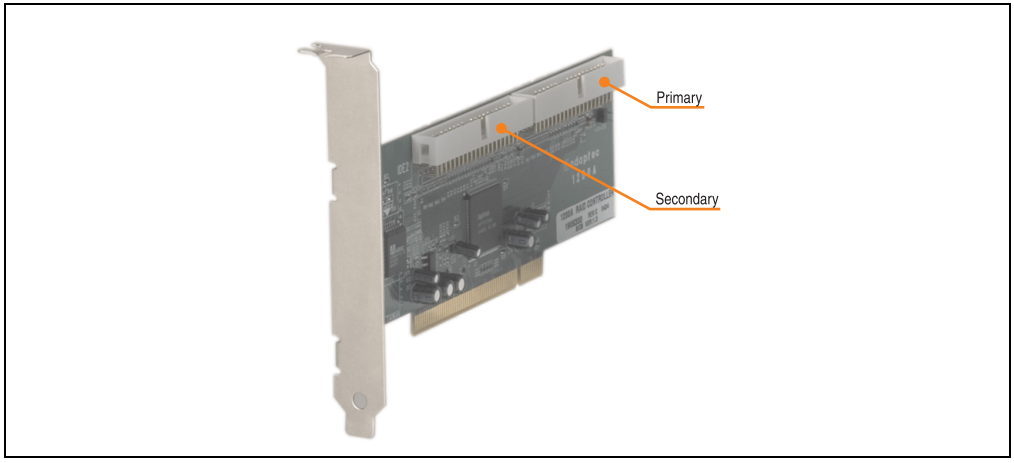


Figure 65: RAID controller - 5ACPCI.RAIC-00

Technical data

Information:

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

Features	5ACPCI.RAIC-00
Manufacturer's product ID	Adaptec ATA RAID 1200A
Data transfer rate	Up to 100 MB/s per channel
RAID level	Supports RAID 0, 1, 0/1 and JBOD
Internal connections	Two 40-pin connections
Electrical characteristics	
Power consumption	0.15 A at 5 V (PCI bus)
Mechanical characteristics	
Outer dimensions Length Height	 168 mm 64 mm
Environmental characteristics	
Ambient temperature Operation Storage Transport	 0°C .. +55°C -20°C .. +60°C -20°C .. +60°C

Table 71: Technical data - RAID controller - 5ACPCI.RAIC-00

Driver support

Drivers for the approved operating systems can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).

Contents of delivery

Number	Component
1	Adaptec ATA RAID 1200A controller
2	ATA RAID connection cable (length 130 mm)

Table 72: Contents of delivery - 5ACPCI.RAIC-00

3.7.2 PCI RAID storage 2 x 40 GB - 5ACPCI.RAIS-00

Information:

PCI RAID storage drives are only available factory-installed. Therefore, they need to be requested when placing the order.

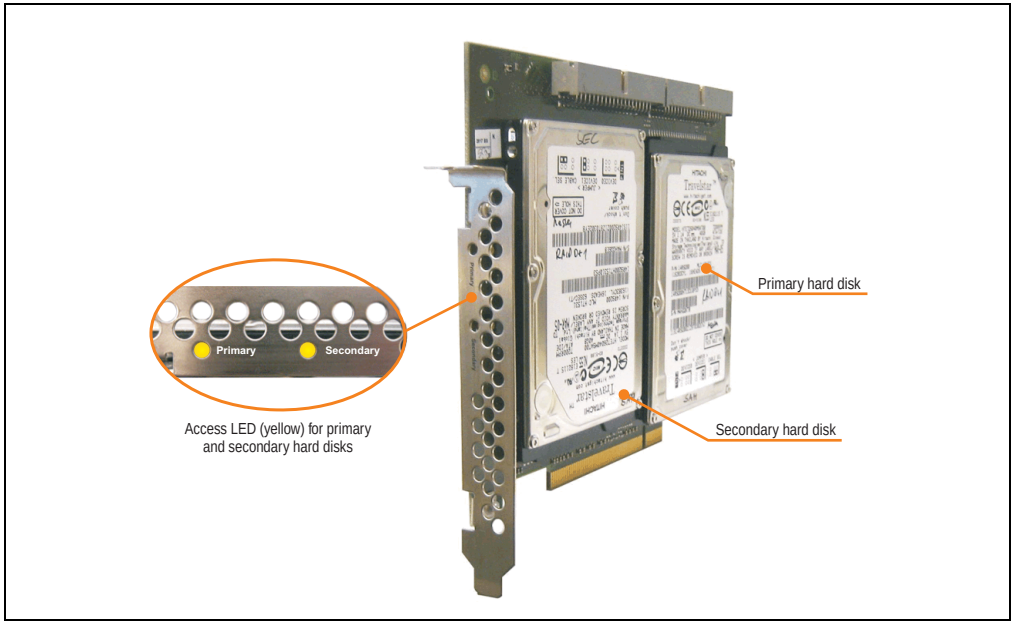


Figure 66: PCI RAID storage - 5ACPCI.RAIS-00

Technical data

Information:

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

Features	5ACPCI.RAIS-00
Manufacturer's product ID	Hitachi Travelstar HTE726040M9AT00
Formatted capacity	40 GB
Number of heads	4
Number of sectors (user)	78,140,160
Bytes per sector	512
Revolution speed	7200 rpm ± 1%
Access time (average)	4.2 ms
Positioning time (seek, typical values) Minimum (track to track) Average (read access) Maximum (read access)	 1 ms 10 ms 16 ms
Starting time (0 rpm to read access)	4 seconds (typically)
Interface	ATA-6
Data transfer rate To the medium To / from host	 236 to 507 MBits/sec Max. 100 MB/s (ultra-DMA mode 5)
Cache	8 MB
Electrical characteristics	
Lifespan	5 years or 30000 POH (Power-On Hours)
MTBF	477,000 hours[1)]
Mechanical characteristics	
Mounted on PCI insert	Fixed
Outer dimensions (without PCI card) Width Length Height	 70 mm 100 mm 9.5 mm
Weight	350 g
Environmental characteristics	
Ambient temperature Operation - standard [2)] Operation - 24-hour [3)] Storage Transport	 +5°C .. +55°C +5°C .. +40°C -40°C .. +65°C -40°C .. +65°C

Table 73: Technical data - RAID hard disk - 5ACPCI.RAIS-00

Environmental characteristics	5ACPCI.RAIS-00
Relative humidity	
Operation	8 - 90% non-condensing
Storage	5 - 95% non-condensing
Transport	5 - 95% non-condensing
Vibration	
Operation (continuous)	No damage at max. 5 - 500 Hz and 0.125 g (1.225 m/s^2 0-peak) duration 1 oct/min
Operation (occasional)	No damage at max. 5 - 500 Hz and 0.25 g (2.45 m/s^2 0-peak) duration 1 oct/min
Storage	Max. 10 - 500 Hz and 5 g (49 m/s^2 0-peak) 0.5 oct/min duration, no damage
Transport	Max. 10 - 500 Hz and 5 g (49 m/s^2 0-peak) 0.5 oct/min duration, no damage
Shock (pulse with a sinus half-wave)	
Operation	No non-recovered errors at max. 80 g (784 m/s^2 0-peak) and 1 ms duration No non-recovered errors at max. 150 g (1450 m/s^2 0-peak) and 2 ms duration No non-recovered errors at max. 7 g (68 m/s^2 0-peak) and 11 ms duration
Storage	No damage at max. 500 g (4900 m/s^2 0-peak) and 1 ms duration No damage at max. 60 g (588 m/s^2 0-peak) and 11 ms duration
Altitude	
Operation	- 300 to 3048 meters
Storage	- 300 to 12192 meters

Table 73: Technical data - RAID hard disk - 5ACPCI.RAIS-00 (Forts.)

1) Manufacturer specification at + 40°C ambient temperature.

2) Standard operation means 333 POH (power-on hours) per month.

3) 24-hour operation means 732 POH (power-on hours) per month.

Temperature humidity diagram for operation and storage

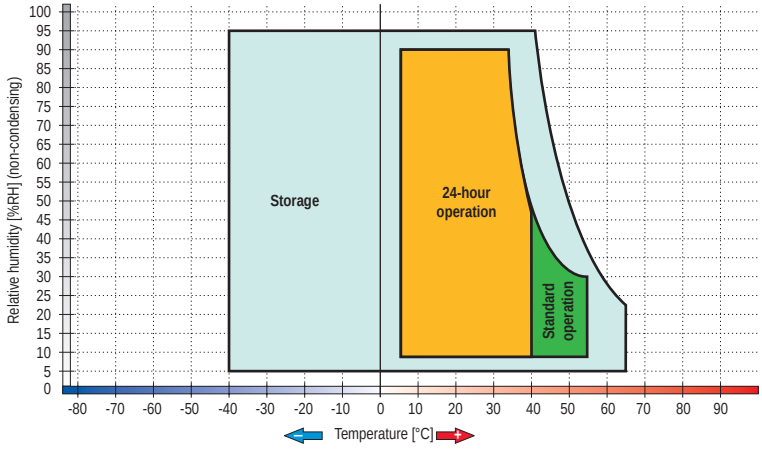


Figure 67: Temperature humidity diagram - RAID hard disk - 5ACPCI.RAIS-00

3.7.3 PCI RAID storage 2 x 60 GB - 5ACPCI.RAIS-01

Information:

PCI RAID storage drives are only available factory-installed. Therefore, they need to be requested when placing the order.

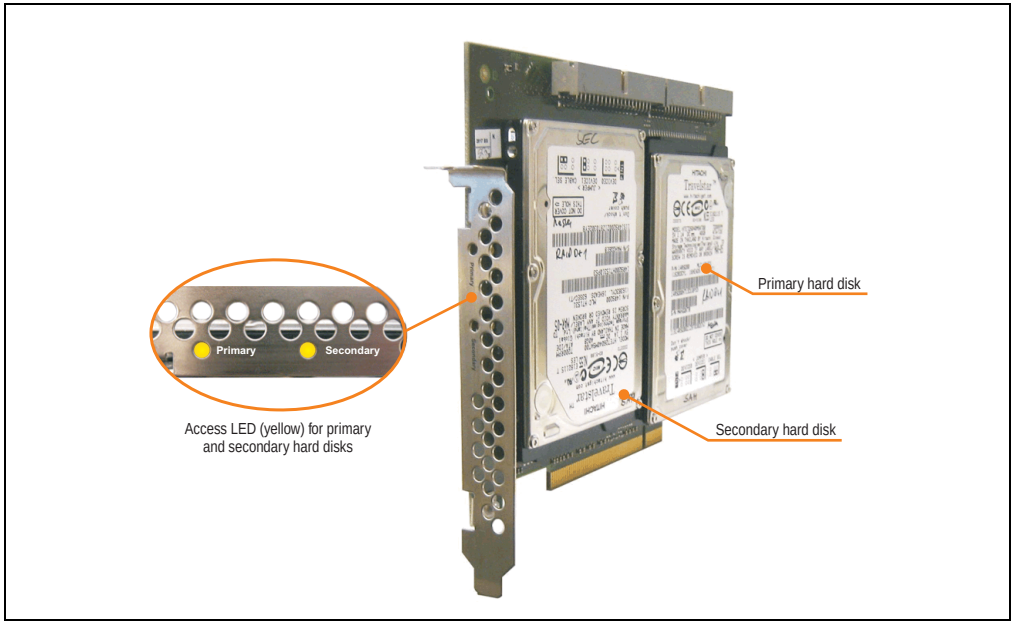


Figure 68: PCI RAID storage - 5ACPCI.RAIS-01

Technical data

Information:

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

Features	5ACPCI.RAIS-01
Manufacturer's product ID	Hitachi HTE721060G9AT00
Formatted capacity	60 GB
Number of heads	3
Number of sectors (user)	117,210,240
Bytes per sector	512
Revolution speed	7200 rpm ± 1%
Access time (average)	10 ms
Positioning time (seek, typical values) Minimum (track to track) Average (read access) Maximum (read access)	 1 ms 10 ms 16 ms
Starting time (0 rpm to read access)	4 seconds (typically)
Interface	ATA-6
Data transfer rate To the medium To / from host	 267 to 629 MBits/sec Max. 100 MB/s (ultra-DMA mode 5)
Cache	8 MB
Electrical characteristics	
Lifespan	5 years or 30000 POH (Power-On Hours)
MTBF	550000 hours[1)]
Mechanical characteristics	
Mounted on PCI insert	Fixed
Outer dimensions (without PCI card) Width Length Height	 70 mm 100 mm 9.5 mm
Weight	120 g
Environmental characteristics	
Ambient temperature Operation - standard [2)] Operation - 24-hour [3)] Storage Transport	 +5°C .. +55°C +5°C .. +40°C -40°C .. +65°C -40°C .. +65°C

Table 74: Technical data - RAID hard disk - 5ACPCI.RAIS-01

Environmental characteristics	5ACPCI.RAIS-01
Relative humidity	
Operation	8 - 90% non-condensing
Storage	5 - 95% non-condensing
Transport	5 - 95% non-condensing
Vibration	
Operation (continuous)	No damage at max. 5 - 500 Hz and 0.125 g (1.225 m/s^2 0-peak) duration 1 oct/min
Operation (occasional)	No damage at max. 5 - 500 Hz and 0.25 g (2.45 m/s^2 0-peak) duration 1 oct/min
Storage	Max. 10 - 500 Hz and 5 g (49 m/s^2 0-peak) 0.5 oct/min duration, no damage
Transport	Max. 10 - 500 Hz and 5 g (49 m/s^2 0-peak) 0.5 oct/min duration, no damage
Shock (pulse with a sinus half-wave)	
Operation	No non-recovered errors at max. 80 g (784 m/s^2 0-peak) and 1 ms duration No non-recovered errors at max. 150 g (1450 m/s^2 0-peak) and 2 ms duration No non-recovered errors at max. 7 g (68 m/s^2 0-peak) and 11 ms duration
Storage	No damage at max. 500 g (4900 m/s^2 0-peak) and 1 ms duration No damage at max. 60 g (588 m/s^2 0-peak) and 11 ms duration
Altitude	
Operation	- 300 to 3048 meters
Storage	- 300 to 12192 meters

Table 74: Technical data - RAID hard disk - 5ACPCI.RAIS-01 (Forts.)

1) Manufacturer specification at + 40°C ambient temperature.

2) Standard operation means 333 POH (power-on hours) per month.

3) 24-hour operation means 732 POH (power-on hours) per month.

Temperature humidity diagram for operation and storage

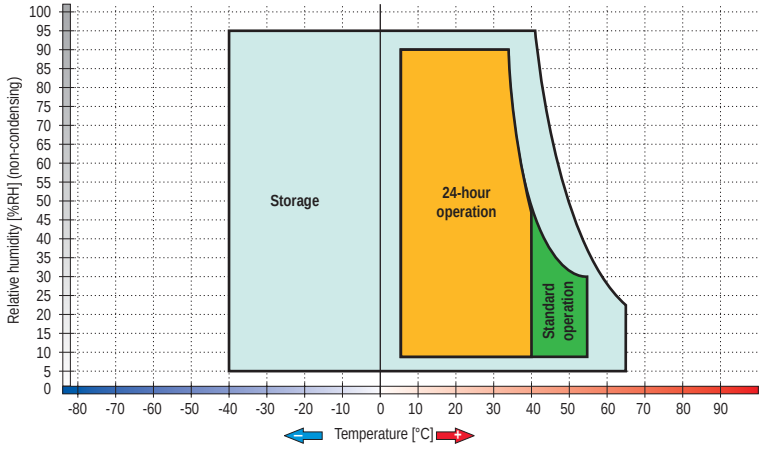


Figure 69: Temperature humidity diagram - RAID hard disk - 5ACPCI.RAIS-01

3.7.4 PCI SATA RAID controller 5ACPCI.RAIC-01

Features

- SATA RAID controller
- RAID Level 0 (striped) and 1 (mirrored)
- 2 SATA hard disk drives (suitable for 24-hour operation)
- Only requires 1 PCI slot
- Transfer rates up to 150 MB/s

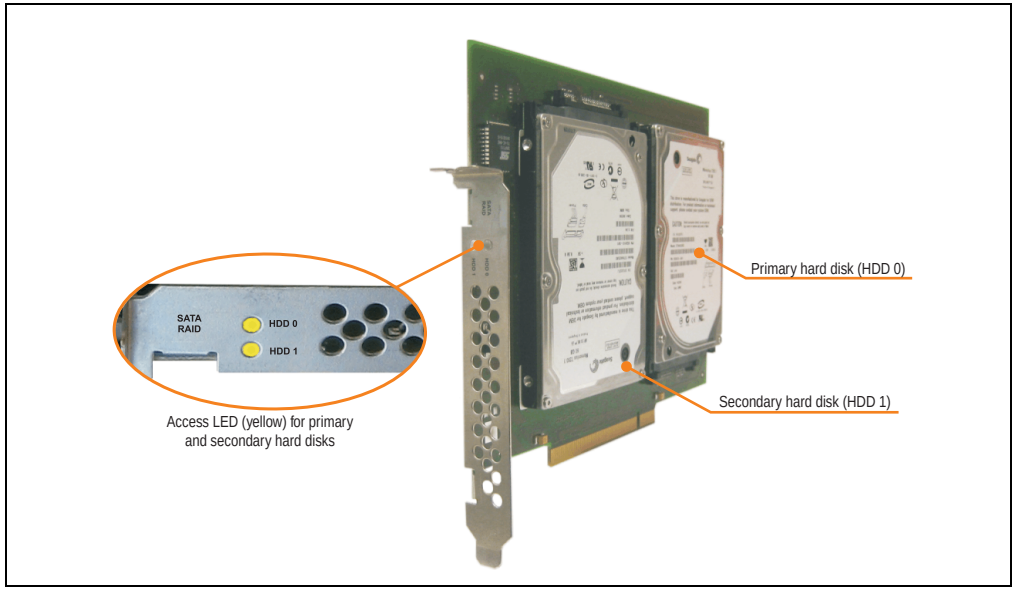


Figure 70: PCI SATA RAID controller - 5ACPCI.RAIC-01

Information:

The PCI SATA RAID controller can not be used in place of a Universal Power Supply (UPS). If the operating system is shut down improperly, the next time it is started it is detected as an error by the RAID 1, and a complete rebuild is executed. This generally takes at least 50 minutes (configurable) to complete.

Technical data

Information:

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

Features	5ACPCI.RAIC-01
SATA RAID controller Type Specifications Data transfer rate RAID level BIOS Extension ROM - requirements	 SiI 3512 SATA link Serial ATA 1.0 Max. 1.5 GB/s (150 MB/s) Supports RAID 0, 1 ca. 32 KB
Hard disks Number	Seagate Momentus 7200.1 ST96023AS 2
Formatted capacity (512 bytes/sector)	60 GB
Number of heads	3
Number of sectors (user)	117,210,240
Bytes per sector	512
Revolution speed	7200 rpm ± 1%
Access time (average)	4.2 ms
Positioning time (seek, typical values) Minimum (track to track) Average (read access) Maximum (read access)	 1.5 ms 10.5 ms 22 ms
Starting time (0 rpm to read access)	4 seconds (typically)
Supported transfer mode	SATA 1.0, PIO mode 0-4, multiword DMA mode 0-2, UDMA 0-5
Data transfer rate To the medium To / from host	 Max. 539 MBits/sec Max. 150 MB/s
Cache	8 MB
S.M.A.R.T. support	Yes
Lifespan	5 years
Electrical characteristics	
Power consumption	0.3 A at 3.3 V (PCI bus) 1 A at 5 V (PCI bus)
Mechanical characteristics	
Mounted on PCI insert	Fixed
Weight	350 g

Table 75: Technical data - RAID hard disk - 5ACPCI.RAIC-01

Environmental characteristics	5ACPCI.RAIC-01
Ambient temperature[1)]	
Operation - standard [2)]	+5°C .. +55°C
Operation - 24-hour [3)]	+5°C .. +40°C
Storage	-40°C .. +70°C
Transport	-40°C .. +70°C
Relative humidity	
Operation	5 - 90% non-condensing
Storage	5 - 95% non-condensing
Transport	5 - 95% non-condensing
Vibration[4)]	
Operation (continuous)	No damage at max. 5 - 500 Hz and 0.125 g (1.225 m/s^2 0-peak) duration 1 oct/min
Operation (occasional)	No damage at max. 5 - 500 Hz and 0.25 g (2.45 m/s^2 0-peak) duration 1 oct/min
Storage	Max. 5 - 500 Hz and 5 g (49 m/s^2 0-peak) 0.5 oct/min duration, no damage
Transport	Max. 5 - 500 Hz and 5 g (49 m/s^2 0-peak) 0.5 oct/min duration, no damage
Shock [4)] (pulse with a sinus half-wave)	
Operation	No non-recovered errors at max. 125 g (1226 m/s^2 0-peak) and 2 ms duration
Storage	No damage at max. 400 g (3924 m/s^2 0-peak) and 2 ms duration
	No damage at max. 450 g (4424 m/s^2 0-peak) and 1 ms duration
	No damage at max. 200 g (1962 m/s^2 0-peak) and 0.5 ms duration
Altitude	
Operation	- 300 to 3048 meters
Storage	- 300 to 12192 meters

Table 75: Technical data - RAID hard disk - 5ACPCI.RAIC-01 (Forts.)

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

2) Standard operation means 333 POH (power-on hours) per month.

3) 24-hour operation means 732 POH (power-on hours) per month.

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

Temperature humidity diagram for operation and storage

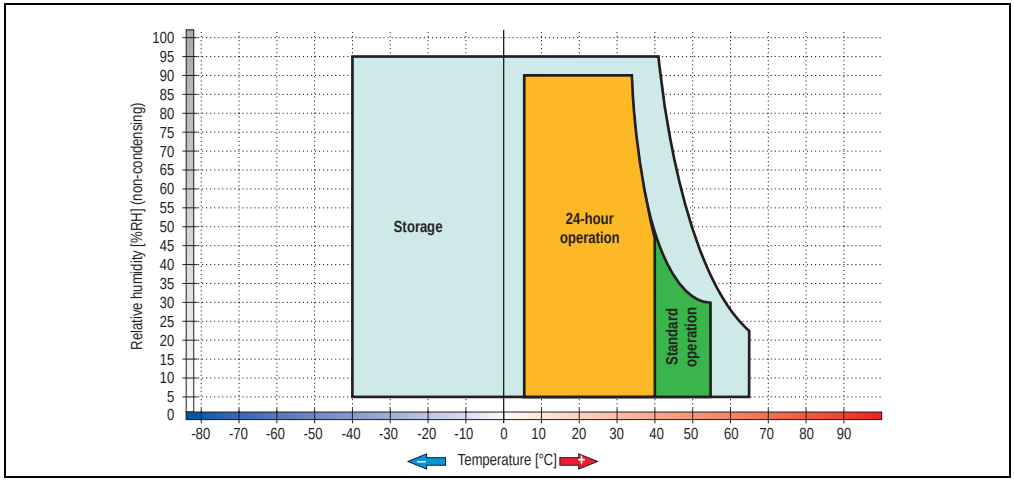


Figure 71: Temperature humidity diagram - SATA RAID hard disk - 5ACPCI.RAIC-01

Driver support

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

The JAVA-based SATA Raid™ Serial ATA RAID management software can also be found on the B&R homepage.

Known limitations in a RAID 1 configuration

If one of the two hard disks is physically damaged, when the system is booted the SATA RAID BIOS displays the following error message for approx. 5 seconds: "RAID1 set is in critical status". After this time the operating system is automatically started on the functioning hard disk. The installed SATA Raid™ serial ATA RAID management software does not detect this error status. After the cause of the error is repaired (e.g. hard disk replaced), the SATA Raid™ management software automatically executes a rebuild (mirroring of the hard disk). This process takes approximately 50 minutes to complete, regardless of the amount of data and with the highest possible setting for "Rebuild rate".

A hard disk that becomes faulty during operation is detected by the SATA Raid™ Serial ATA RAID management software and indicated with an error message.

Important notes / BIOS Extension ROM

For PCI cards with BIOS Extension ROM, there is a limited area of 64 KB available in the Phoenix BIOS. A B&R PCI SATA RAID controller requires a free area of approx. 32 KB. The remaining area can be used as desired.

If a PCI card requiring BIOS extension ROM is plugged into PCI slot 1 on an AP620 with 5 PCI slots (see figure 72 "PCI slot numbering on APC620 systems with 5 PCI slots") and the B&R PCI SATA RAID controller is plugged-in at a different position (e.g. PCI slot 4), then the BIOS menu item *Advanced - PCI/PnP Configuration - PCI Device, Slot #2* must be set from "*Option ROM Scan*" to "*Disabled*" so that this device can be used for booting. The BIOS default setting is to always attempt to load the BIOS Extension ROM from the PCI slot 1. Alternatively, the two PCI cards can be switched.

This setting does not have to be changed if a PCI card without BIOS extension ROM is plugged-in.

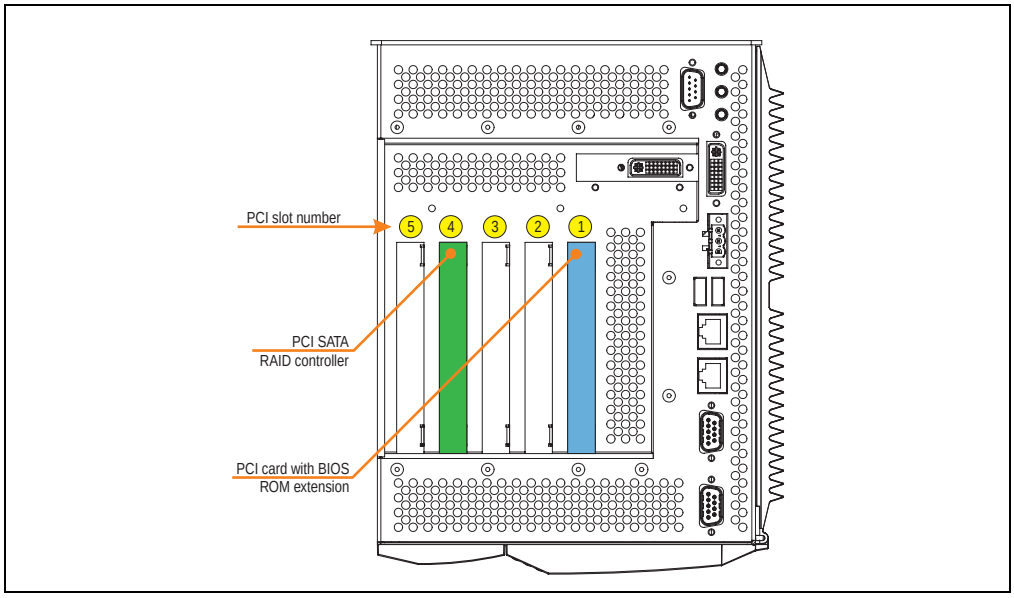


Figure 72: PCI slot numbering on APC620 systems with 5 PCI slots

3.8 Optional interfaces

Another interface can be added using one of the optional interfaces (CAN or combined RS232/422/485) .

Information:

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

Caution!

Turn off power before adding or removing an optional interface.

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

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

Order data

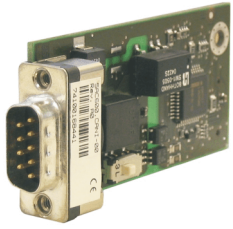
Model number	Description	Image
5AC600.CANI-00	**Add-on CAN interface** CAN interface for installation in an APC620 or PPC700.	

Table 76: Add-on CAN interface - 5AC600.CANI-00

Technical data

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

Table 77: Technical data - add-on CAN interface - 5AC600.CANI-00

Pin assignments

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

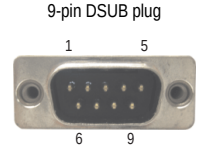


Table 78: Pin assignments - CAN

I/O address and IRQ

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

Table 79: Add-on CAN - I/O address and IRQ

1) NMI = Non Maskable Interrupt.

The setting for the IRQ can be changed in the BIOS setup (under "Advanced" - submenu "Baseboard/Panel Features" - submenu "Legacy Devices", setting "CAN"). Please note any potential conflicts with other resources when changing this setting.

Bus length and cable type

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

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

Distance [m]	Transfer rate [kBit/s]
≤ 1000	Type 50
≤ 200	Type 250
≤ 60	Type 500

Table 80: CAN bus length and transfer rate

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

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

Table 81: CAN cable requirements

Terminating resistance

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

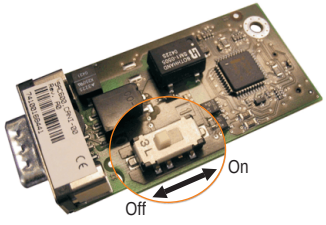


Figure 73: Terminating resistor for add-on CAN interface 5AC600.CANI-00

Contents of delivery

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

Figure 74: Contents of the delivery / mounting material - 5AC600.CANI-00

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

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

Order data

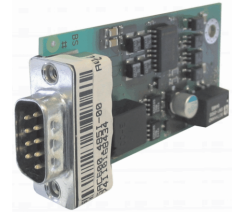
Model number	Description	Image
5AC600.485I-00	**Add-on RS232/422/485 interface** Add-on RS232/422/485 interface for installation in an APC620 and PPC700.	

Table 82: Add-on RS232/422/485 interface - 5AC600.485I-00

Pin assignments

Add-on RS232/422/485			
	RS232	RS422/485	
Type	RS232 not modem compatible; electrically isolated		
UART	16550 compatible, 16 byte FIFO		
Transfer rate	Max. 115 kBit/s		
Bus length	Max. 15 meters	Max. 1200 meters	
Pin	**Assignment RS232**	**Assignment RS422**	
1	n.c.	$\overline{\text{TXD}}$	
2	RXD	n.c.	
3	TXD	n.c.	
4	n.c.	TXD	
5	GND	GND	
6	n.c.	$\overline{\text{RXD}}$	
7	RTS	n.c.	
8	CTS	n.c.	
9	n.c.	RXD	

9-pin DSUB plug

Table 83: Pin assignments - RS232/RS422

I/O address and IRQ

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

Table 84: Add-on RS232/422/485 - I/O address and IRQ

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

Bus length and cable type RS232

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

Length [m]	Transfer rate [kBit/s]
≤ 15	Type 64
≤ 10	Type 115
≤ 5	Type 115

Table 85: RS232 bus length and transfer rate

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

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

Table 86: RS232 cable requirements

Bus length and cable type RS422

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

Length [m]	Transfer rate [kBit/s]
1200	Type 115

Table 87: Bus length and transfer rate RS422

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

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

Table 88: RS422 cable requirements

RS485 interface operation

In RS422 mode, the interface can also be operated as an RS485 interface. This is possible using TriState switching, which is achieved using RTS (Request To Send).

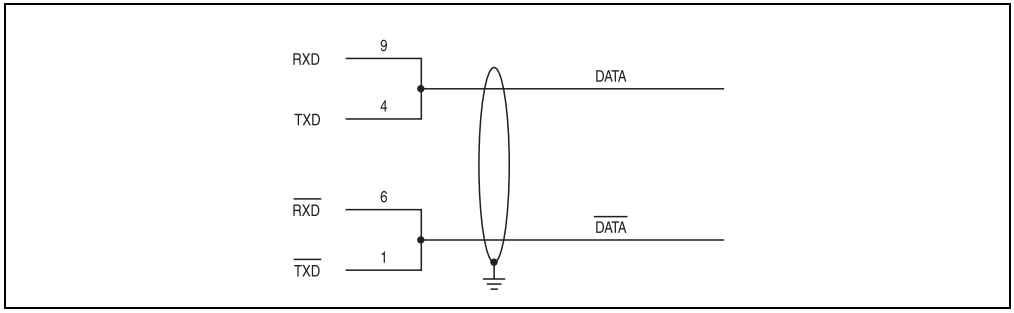


Figure 75: Add-on RS232/422/485 interface - operated in RS485 mode

Bus length and cable type RS485

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

Length [m]	Transfer rate [kBit/s]
1200	Type 115

Table 89: RS485 bus length and transfer rate

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

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

Table 90: RS485 cable requirements

Contents of delivery

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

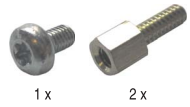


Figure 76: Contents of the delivery / mounting material - 5AC600.485I-00

3.9 Fan kit

Information:

Fans are necessary when using components which must work within certain temperature limits, e.g. hard disks, DVD combos, PCI cards, etc.

3.9.1 Fan kit 1 PCI - 5PC600.FA01-00

This fan kit is an optional addition for system units with 1 PCI slot.

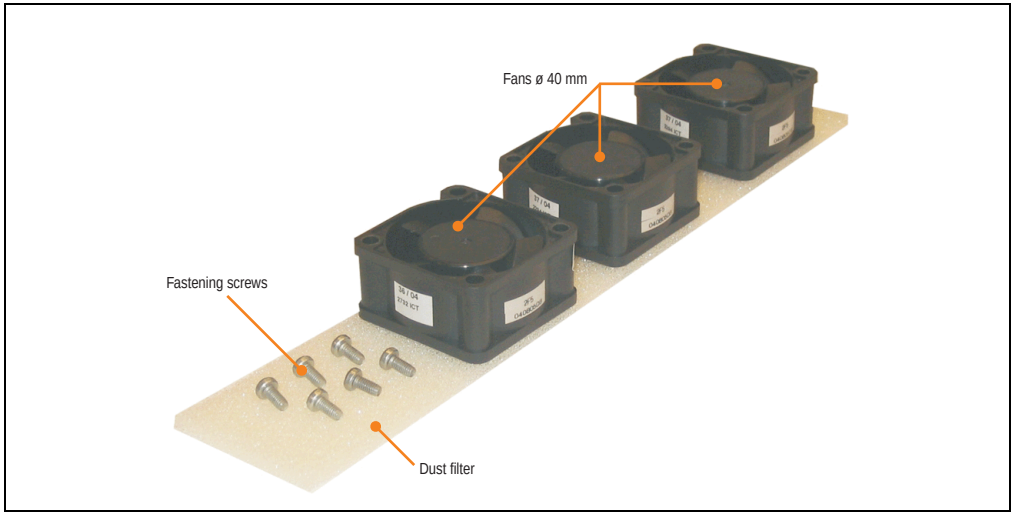


Figure 77: Fan kit - 5PC600.FA01-00

Technical data

Features	5PC600.FA01-00
Fan type Width Length Height	Double ball bearings 40 mm 40 mm 20 mm
Revolution speed	5600 rpm ± 10%
Noise level	24 dB
Lifespan	80,000 hours at 30°C
Maintenance interval	Depending on the work environment, the dust filter should be checked with appropriate frequency to determine whether the air flow provides sufficient cooling. An exchange or cleaning of the filter kit is appropriate at that time.

Table 91: Technical data - 5PC600.FA01-00

Contents of delivery

Number	Component
3	Fans with 40 mm diameter
1	Dust filter
6	Mounting screws

Table 92: Contents of delivery - 5PC600.FA01-00

Installation

For a description of how to install the fan kit, see chapter 7 "Maintenance / servicing", section 2 "Fan kit installation and replacement", starting on page 490.

3.9.2 Fan kit 2 PCI - 5PC600.FA02-00

This fan kit is an optional addition for system units with 2 PCI slots.

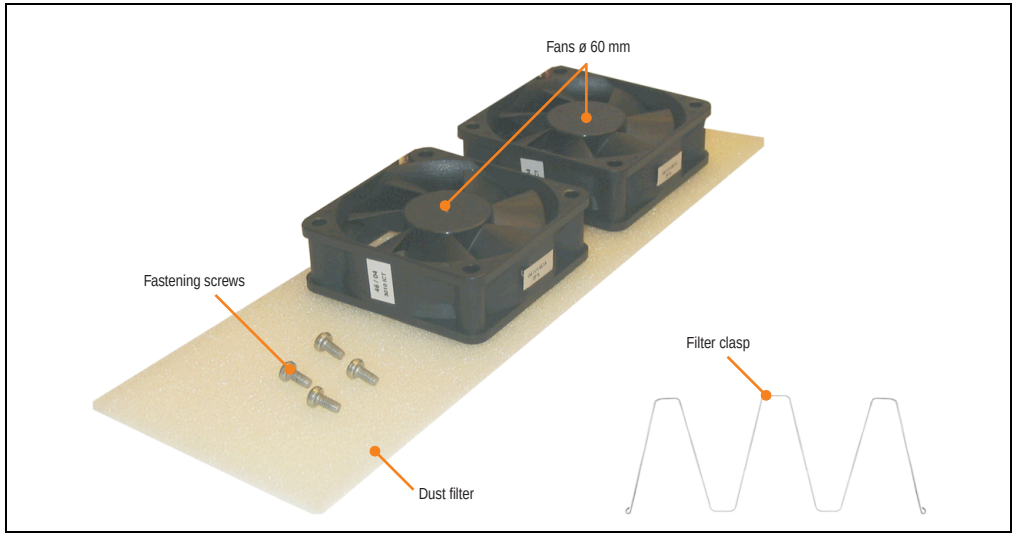


Figure 78: Fan kit - 5PC600.FA02-00

Technical data

Features	5PC600.FA02-00
Fan type Width Length Height	Double ball bearings 60 mm 60 mm 20 mm
Revolution speed	3600 rpm ± 10%

Table 93: Technical data - 5PC600.FA02-00

Features	5PC600.FA02-00
Noise level	30.5 dB
Lifespan	80,000 hours at 30°C
Maintenance interval	Depending on the work environment, the dust filter should be checked with appropriate frequency to determine whether the air flow provides sufficient cooling. An exchange or cleaning of the filter kit is appropriate at that time.

Table 93: Technical data - 5PC600.FA02-00 (Forts.)

Contents of delivery

Number	Component
2	Fans with 60 mm diameter
1	Dust filter
1	Filter clasp
4	Mounting screws

Table 94: Contents of delivery - 5PC600.FA02-00

Installation

For a description of how to install the fan kit, see chapter 7 "Maintenance / servicing", section 2 "Fan kit installation and replacement", starting on page 490.

3.9.3 Fan kit 5 PCI - 5PC600.FA05-00

This fan kit is an optional addition for system units with 5 PCI slots.

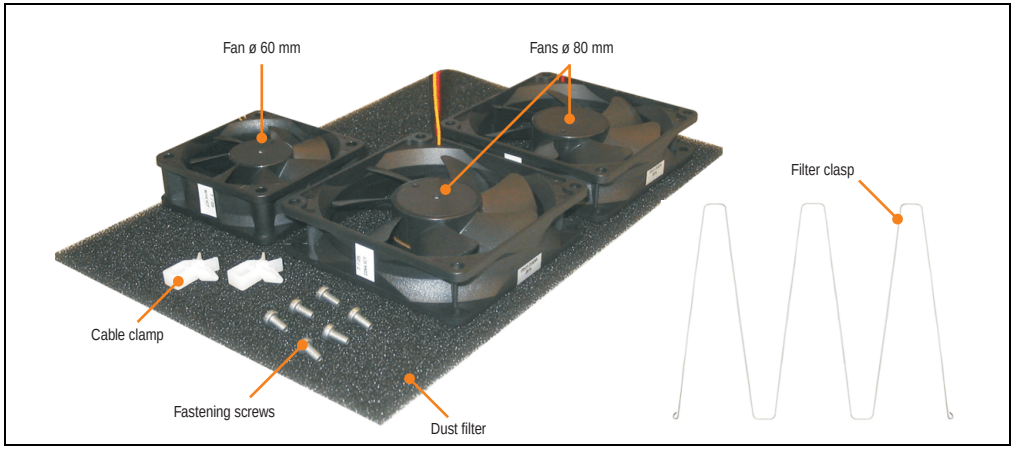


Figure 79: Fan kit - 5PC600.FA05-00

Technical data

Features	5PC600.FA05-00	
Fan type Number Width Length Height	Double ball bearings 1 60 mm 60 mm 20 mm	Double ball bearings 2 80 mm 80 mm 20 mm
Revolution speed	3600 rpm ± 10%	2600 rpm ± 10%
Noise level	30.5 dB	27 dB
Lifespan	80,000 hours at 30°C	
Maintenance interval	Depending on the work environment, the dust filter should be checked with appropriate frequency to determine whether the air flow provides sufficient cooling. An exchange or cleaning of the filter kit is appropriate at that time.	

Table 95: Technical data - 5PC600.FA05-00

Contents of delivery

Number	Component
1	Fans with 60 mm diameter
2	Fans with 80 mm diameter
1	Dust filter
1	Filter clasp
4	Mounting screws
2	Cable fastener

Table 96: Contents of delivery - 5PC600.FA05-00

Installation

For a description of how to install the fan kit, see chapter 7 "Maintenance / servicing", section 2 "Fan kit installation and replacement", starting on page 490.

3.10 AP Link cards

For the APC620 system units 5PC600.SX02-00 and 5PC600.SX05-00 and an 855GME CPU board, a 2 graphics line can be created using the AP Link graphics adapter cards.

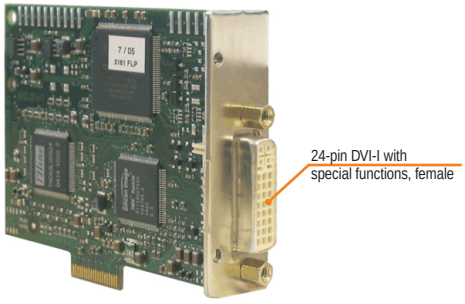


Figure 80: AP Link card

Model number	Short description	Note
5AC600.SDL0-00	AP Link SDL transmitter	

Table 97: Model numbers - AP Link graphics adapter

The following video signals are available via AP Link and monitor/panel output. The connection cycle value for the plug is specified at 100x.

AP Link slot (AP Link card inserted)		
AP Link card	Signal with 855GME board on	
	AP Link	Monitor / Panel
5AC600.SDL0-00	DVI, SDL	RGB, DVI, SDL

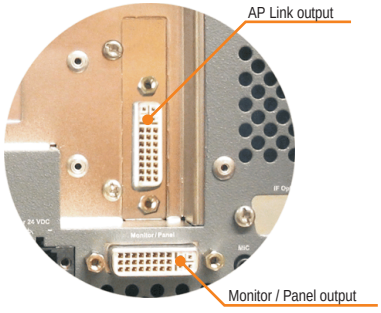


Table 98: AP Link slot (AP Link card inserted)

Hotplug for a display device is not supported in any combination.

Caution!

The RGB, DVI and SDL cables can only be plugged in and unplugged when the APC620 and display device (Automation Panel 900, monitor) are turned off.

Pin assignments

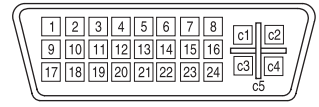
Pin	Assignment	Pin	Assignment	
1	T.M.D.S. data 2-	16	Hot Plug detect	DVI-I 24 pin, female 
2	T.M.D.S. data 2+	17	T.M.D.S. data 0-	
3	T.M.D.S. data 2/SDL shield	18	T.M.D.S. data 0+	
4	SDL-	19	T.M.D.S. DATA 0/XUSB1 shield	
5	SDL+	20	XUSB1-	
6	DDC clock	21	XUSB1+	
7	DDC data	22	T.M.D.S. clock shield	
8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

Table 99: Pin assignments - AP Link connection

1) Protected internally by a multifuse

Cable lengths and resolutions for SDL transfer

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

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

Table 100: Segment lengths, resolutions and SDL cable

The cable types and resolutions shown in blue in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Designation	Version	Note
MTCX FPGA	Firmware on the APC620	V 01.15	The version is read from BIOS - see the BIOS description. Supported starting with APC620 / PPC 700 firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	V 01.55	
SDLR FPGA	Firmware on the AP Link SDL receiver and transceiver	V 01.04	
SDLT FPGA	Firmware on the AP Link SDL transmitter	V 00.02	
Hardware	**Designation**	**Revision**	**Note**
5DLSDL.1000-00	AP Link SDL receiver	Rev. B0	
5DLSDL.1000-01	AP Link SDL transceiver	Rev. B0	

Table 101: Requirements for SDL cable with automatic cable adjustment (equalizer)

The cable types and resolutions shown in green in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Designation	Version	Note
MTCX FPGA	Firmware on the APC620	V 01.15	The version is read from BIOS - see the BIOS description. Supported starting with APC620 / PPC 700 firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	V 01.55	
SDLR FPGA	Firmware on the AP Link SDL receiver and transceiver	V 01.04	
SDLT FPGA	Firmware on the AP Link SDL transmitter	V 00.02	
Hardware	**Designation**	**Revision**	**Note**
5DLSDL.1000-00	AP Link SDL receiver	Rev. D0	
5DLSDL.1000-01	AP Link SDL transceiver	Rev. D0	
5AC600.SDL0-00	AP Link SDL transmitter	Rev. B3	
5PC600.SX02-00	System 2 PCI, 1 disk drive slot, 1 AP Link slot	Rev. D0	
5PC600.SX05-00	System 5 PCI, 2 disk drive slots, 1 AP Link slot	Rev. C0	

Table 102: Requirements for SDL cable with extender and automatic cable adjustment (equalizer)

DVI, SDL description

DVI means:

- Connection of B&R Automation Panel 900 display units with Automation Panel Link DVI Receiver (model nr. 5DLDVI.1000-01), Office Digital/DVI Monitors and Office DVI TFT Displays is possible.

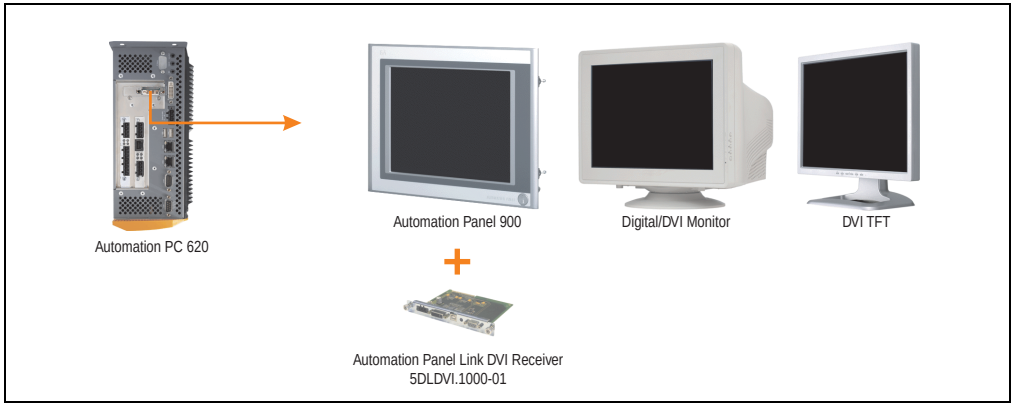


Figure 81: AP Link device connection with DVI video signal

For examples and possibilities for connecting Automation Panel 900 display units via DVI, see Appendix A, chapter 3 "Commissioning", section 3 "Connection examples - Automation Panel 900", starting on page 194.

SDL (Smart Display Link) means:

- Connection of B&R Automation Panel 900 display units with Automation Panel Link SDL receiver (model nr. 5DLSDL.1000-01) or SDL transceiver (model nr. 5DLSDL.1000-01).

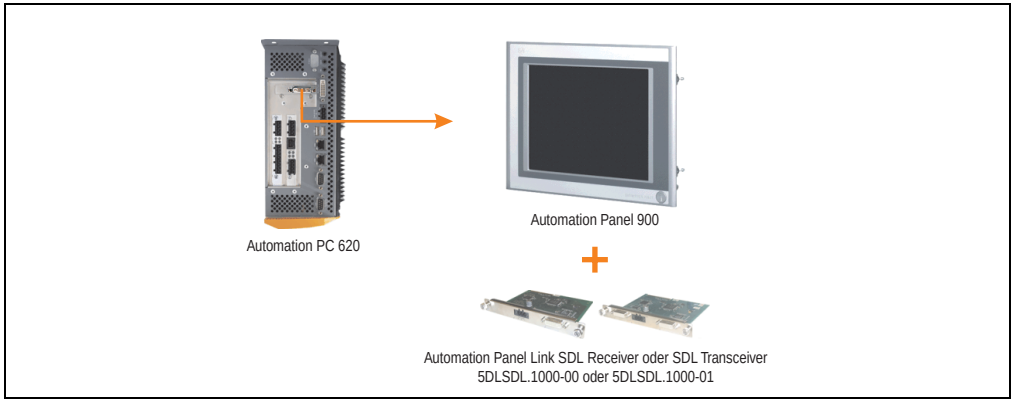


Figure 82: AP Link device connection with SDL video signal

For examples and possibilities for connecting Automation Panel 900 display units via SDL, see Appendix A, chapter 3 "Commissioning", section 3 "Connection examples - Automation Panel 900", starting on page 194.

Chapter 3 • Commissioning

1. Installation

The APC620 systems are mounted with the mounting plates found on the housing. The plates are designed for M5 screws.

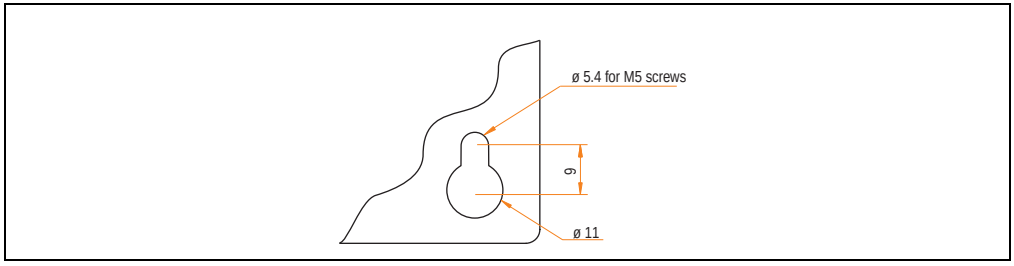


Figure 83: Mounting plates for the APC620

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

1.1 Important mounting information

- The environmental conditions must be taken into consideration (see chapter 2 "Technical data", section 2.4 "Environmental temperatures for systems with an 815E CPU board" on page 57, and section 2.5 "Environmental temperatures for systems with an 855GME CPU board" on page 60).
- The APC620 is only for operation in closed rooms.
- The APC620 cannot be situated in direct sunlight.
- The ventilation holes cannot be covered.
- When mounting the device, be sure to use the allowed mounting orientations (see section 1.3 "Mounting orientation" on page 184).
- Be sure the wall or switching cabinet can withstand four times the total weight of the the PC620.
- When connecting certain cable types (DVI, SDL, USB, etc.), keep the flex radius in mind. (see section 2 "Cable connections" on page 193).

1.2 Drilling templates

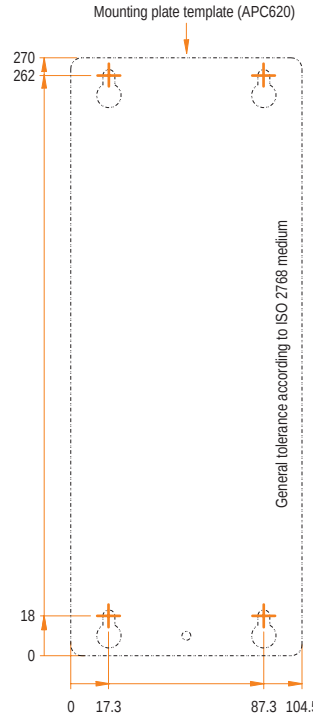
APC620 with 1 PCI slot	APC620 with 2 PCI slots
	

Table 103: Drilling templates - 1 and 2 PCI slots

APC620 with 5 PCI slots

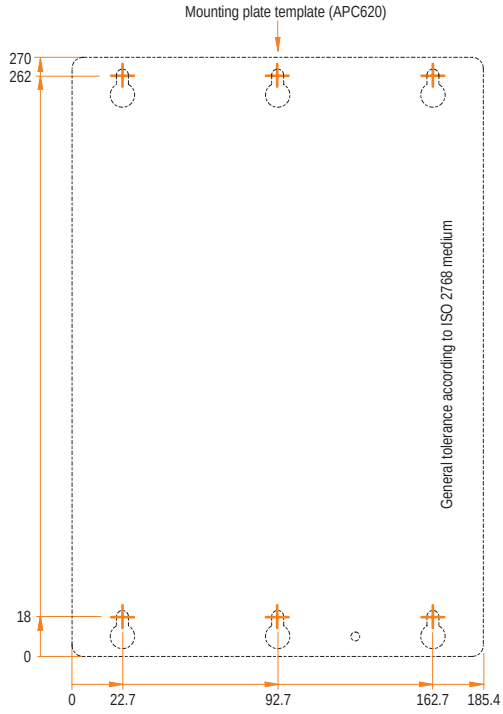


Table 104: Drilling templates - 5 PCI slots

1.3 Mounting orientation

The Automation PC620 system must be mounted as described in the following sections.

1.3.1 Standard mounting

Standard mounting refers to vertical mounting orientation.

APC620 systems with and without fan kit can be mounted this way.

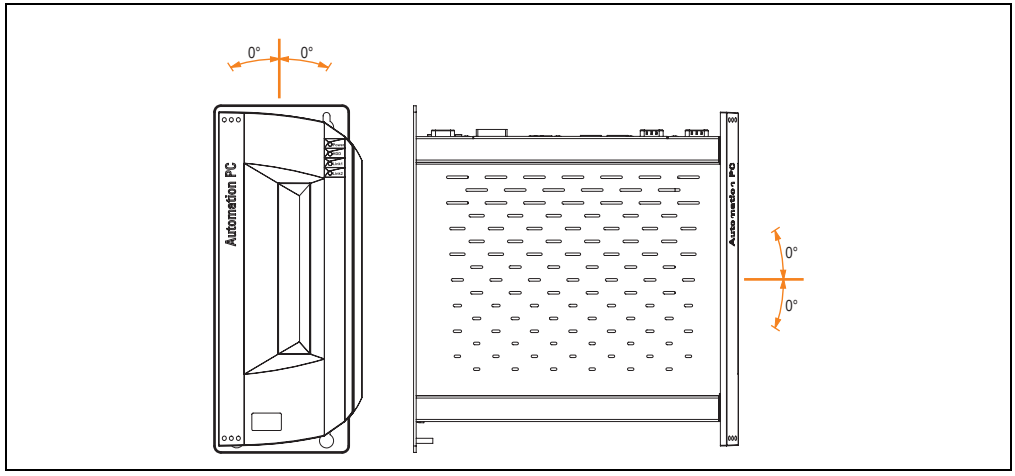


Figure 84: Mounting orientation - standard

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

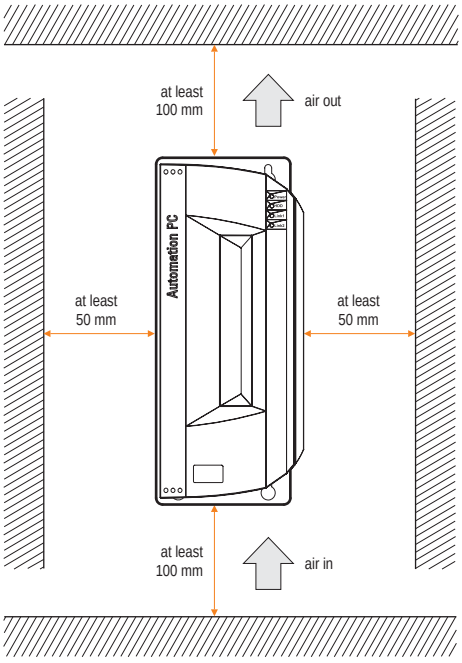


Figure 85: Air circulation spacing - standard

1.3.2 Optional mounting orientations

Caution!

A fan kit must be used if the system is mounted in the following orientations. In addition, it is important to be sure that the components used are installed in a way that complies with the specifications of the drives being used (CD-ROM, DVD/CD-RW, hard disk, etc.). See the following pages for information regarding the specifications for mounting orientation.

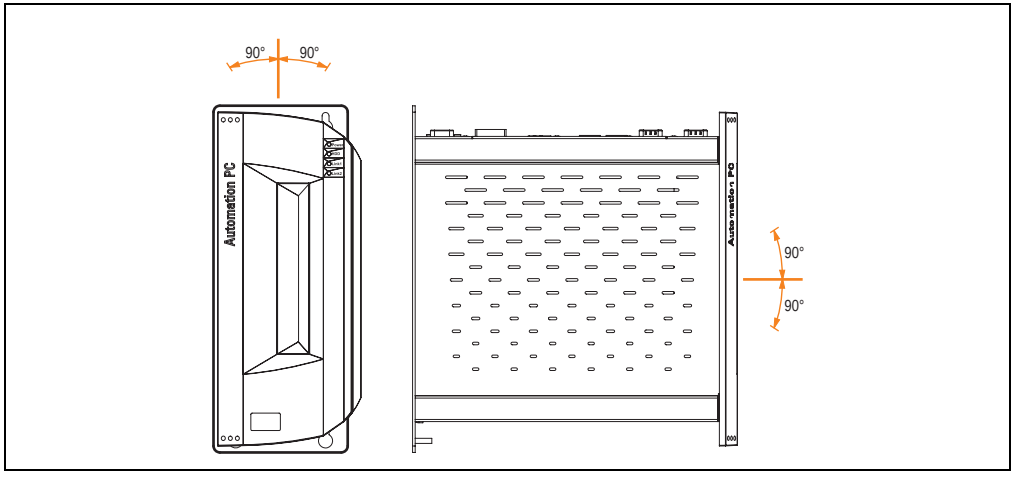


Figure 86: Optional mounting orientations

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

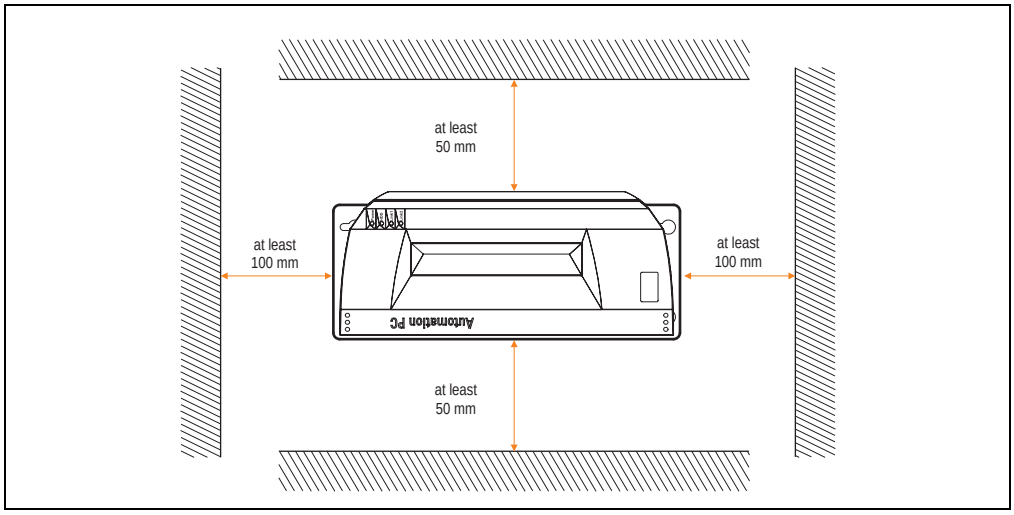


Figure 87: Optional circulation spacing

CompactFlash slot, add-on or slide-in

No limitation on mounting orientation. Permissible mounting orientations are shown in Figure 86 "Optional mounting orientations" on page 186.

Add-on or slide-in hard disks 20, 30 and 40 GB.

The following figure shows the possible mounting orientations for an APC620 device with an add-on (5AC600.HDDI-00 or 5AC600.HDDI-01) or slide-in hard disk (5AC600.HDDS-00 or 5AC600.HDDS-02).

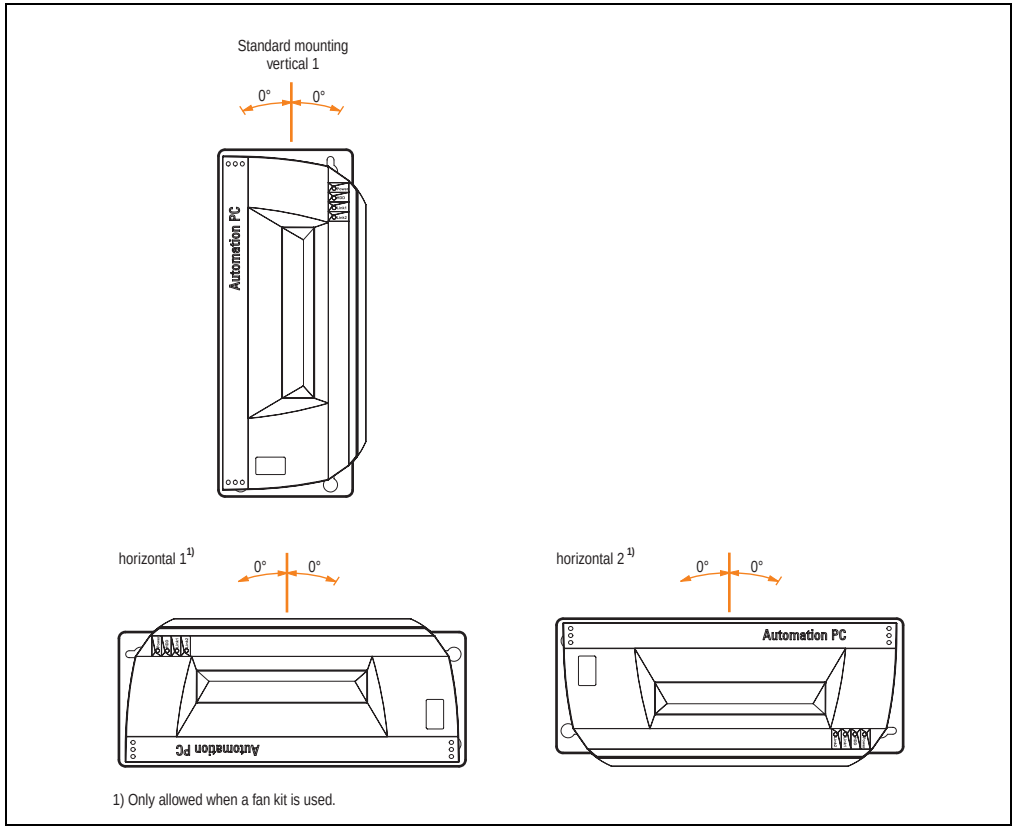
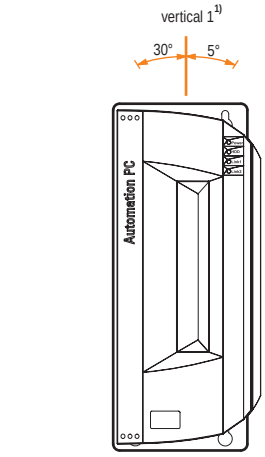


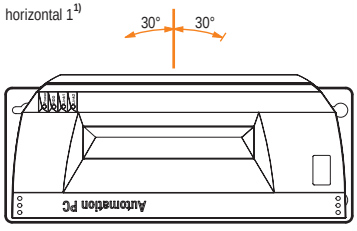
Figure 88: Mounting orientations for an APC620 with hard disk drive.

The mounting orientations "horizontal 1" and "horizontal 2" require the use of a fan kit.

Slide-in CD-ROM drive

The following figure shows the possible mounting orientations for an APC620 device with a slide-in CD-ROM drive (5AC600.CDXS-00).





1) Only allowed when fan kit is used.

Figure 89: Mounting orientations for an APC 620 with a slide-in CD-ROM drive

The mounting orientation "horizontal 1" requires the use of a fan kit.

Mounting orientation "vertical 1" can also be used at 0° without a fan kit.

Slide-in DVD-ROM/CD-RW drive

The following figure shows the possible mounting orientations for an APC620 device with a slide-in DVD-ROM/CD-RW drive 5AC600.DVDS-00).

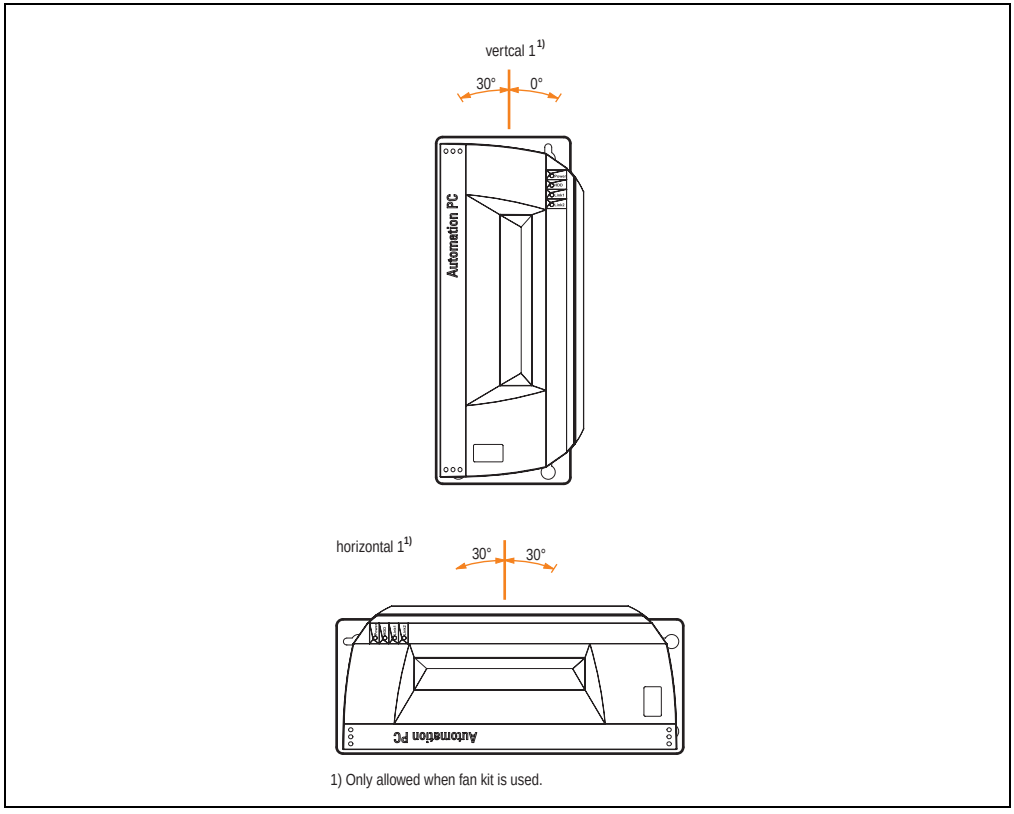


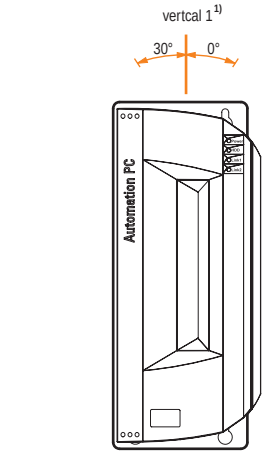
Figure 90: Mounting orientations for an APC620 with a slide-in DVD-ROM/CD-RW drive

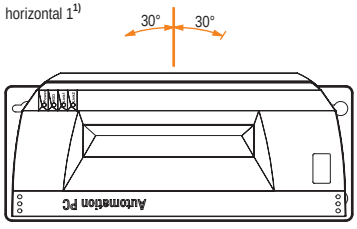
The mounting orientation "horizontal 1" requires the use of a fan kit.

Mounting orientation "vertical 1" can also be used at 0° without a fan kit.

Slide-in DVD-R/RW/DVD+R/RW

The following figure shows the possible mounting orientations for an APC620 device with a slide-in DVD-R/RW / DVD+R/RW drive (5AC600.DVRS-00).





1) Only allowed when fan kit is used.

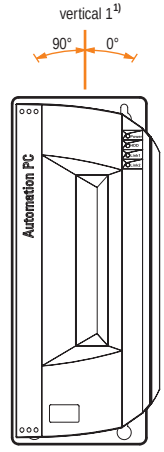
Figure 91: Mounting orientations for an APC620 with a slide-in DVD-R/RW / DVD+R/RW drive

The mounting orientation "horizontal 1" requires the use of a fan kit.

Mounting orientation "vertical 1" can also be used at 0° without a fan kit.

Slide-in USB FDD

The following figure shows the possible mounting orientations for an APC620 device with a slide-in USB FDD drive (5AC600.FDDS-00).



1) Only allowed when a fan kit is used.

Figure 92: Mounting orientations for an APC620 with a slide-in USB FDD drive

Mounting orientation "vertical 1" can also be used at 0° without a fan kit.

2. Cable connections

When making cable connections and installing cables, the flex radius must be larger than the minimum value specified.

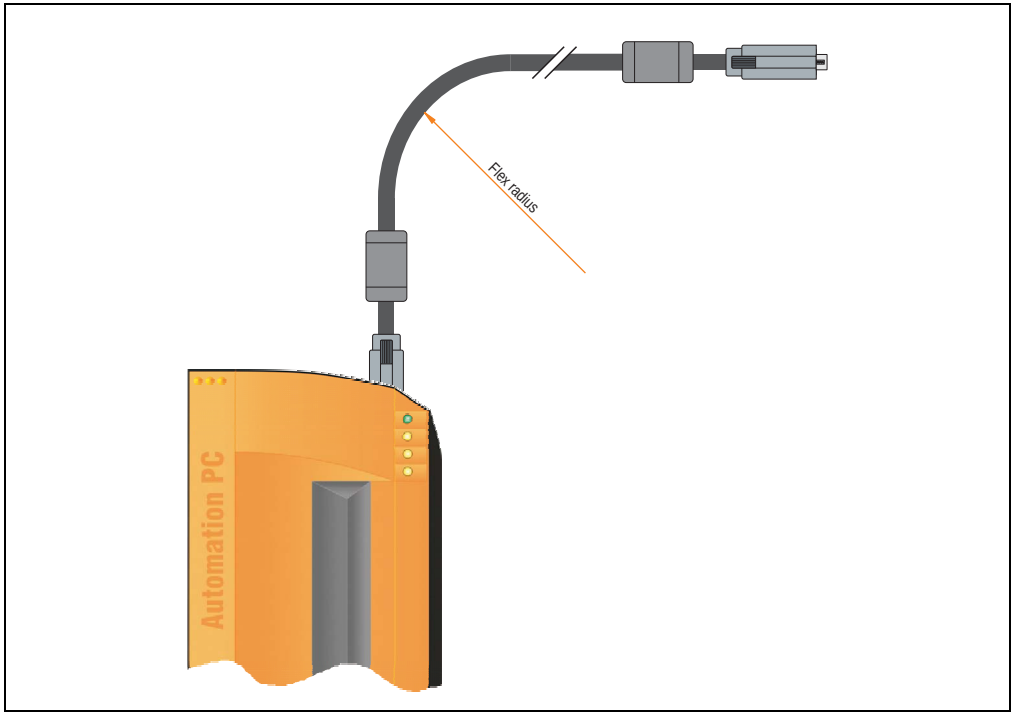


Figure 93: Flex radius - cable connection

Information:

The value specified for the minimum flex radius can be found in the technical data for the cable that is being used.

2.1 Ethernet cable lengths for ETH1

More information can be found in section "Ethernet connection ETH1" on page 76.

3. Connection examples - Automation Panel 900

The following examples provide an overview of the configuration options for connecting Automation Panel 900 units with the APC620. The following questions will be answered:

- How are Automation Panel 900 devices connected to the monitor / panel output of the APC620, and what needs to be considered?
- How are Automation Panel 900 devices connected to the AP Link output of the APC620, and what needs to be considered?
- How are Automation Panel 900 devices connected simultaneously to the Monitor / Panel output on the optional SDL AP Link of the APC620 and what needs to be considered?
- What are "Display Clone" and "Extended Desktop" modes?
- How many Automation Panel 900 devices can be connected per line?
- How are the connected Automation Panel 900 devices numbered internally?
- Are there limitations to the segment length and if so, what are they?
- What cables and link modules are needed?
- Do BIOS settings have to be changed for a specific configuration?

Information:

An RGB monitor / flat-screen can always be connected to the monitor / panel output of the APC620 (necessary DVI to CRT adapter can be ordered under the model number 5AC900.1000-00).

3.1 One Automation Panel via DVI (onboard)

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

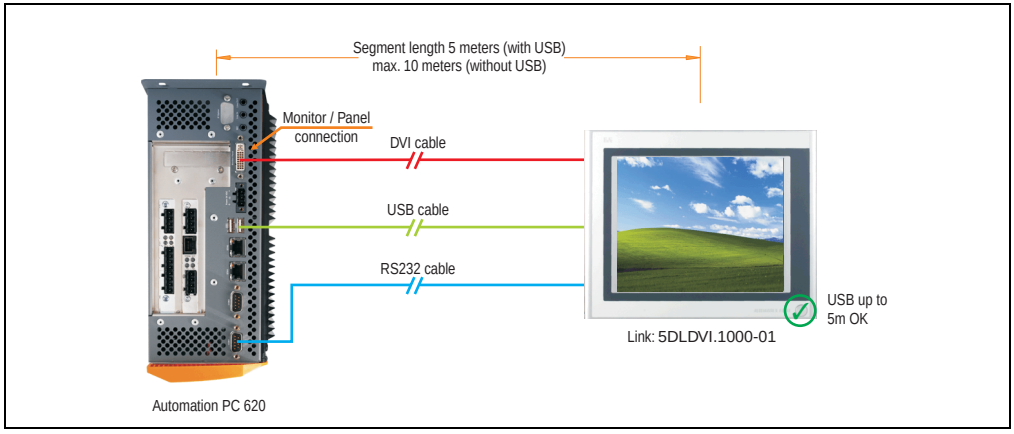


Figure 94: Configuration - One Automation Panel via DVI (onboard)

3.1.1 Basic system requirements

The following table displays the possible combinations for the APC620 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in this table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit					Limitation
	5PC600.SX01-00	5PC600.SX02-00	5PC600.SX02-01	5PC600.SX05-00	5PC600.SX05-01	Resolution
5PC600.E855-00	✓	✓	✓	✓	✓	Max. SXGA
5PC600.E855-01	✓	✓	✓	✓	✓	Max. SXGA
5PC600.E855-02	✓	✓	✓	✓	✓	Max. SXGA
5PC600.E855-03	✓	✓	✓	✓	✓	Max. SXGA
5PC600.E855-04	✓	✓	✓	✓	✓	Max. SXGA
5PC600.E855-05	✓	✓	✓	✓	✓	Max. SXGA

Table 105: Possible combinations of system unit and CPU board

3.1.2 Link modules

Model number	Description	Note
5DLDVI.1000-01	**Automation Panel Link DVI receiver**	for Automation Panel 900

Table 106: Link module for the configuration - One Automation Panel via DVI

3.1.3 Cables

Select one cable each from the 3 required types.

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

Table 107: Cables for DVI configurations

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

3.1.4 Possible Automation Panel units, resolutions und segment lengths

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

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

Table 108: Possible Automation Panel units, resolutions und segment lengths

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

Information:

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

3.1.5 BIOS settings

No special BIOS settings are necessary for operation.

3.1.6 Windows graphics driver settings

See chapter 4 "Software", section 4 "Automation PC 620 with Windows XP Professional" on page 351.

3.1.7 Windows touch screen driver settings

See chapter 4 "Software", section 4 "Automation PC 620 with Windows XP Professional" on page 351.

3.2 An Automation Panel via SDL (onboard)

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

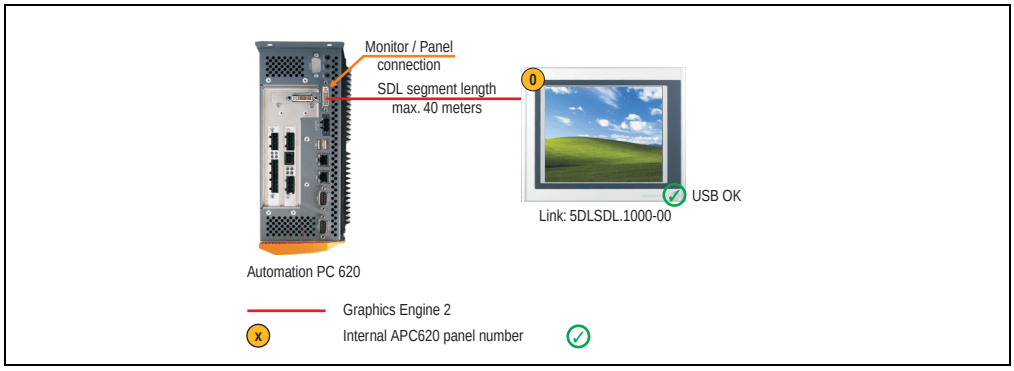


Figure 95: Configuration - One Automation Panel via SDL (onboard)

3.2.1 Basic system requirements

The following table displays the possible combinations for the APC620 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in this table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit					Limitation Resolution
	5PC600.SX01-00	5PC600.SX02-00	5PC600.SX02-01	5PC600.SX05-00	5PC600.SX05-01	
5PC600.E855-00	✓	✓	✓	✓	✓	Max. UXGA
5PC600.E855-01	✓	✓	✓	✓	✓	Max. UXGA
5PC600.E855-02	✓	✓	✓	✓	✓	Max. UXGA
5PC600.E855-03	✓	✓	✓	✓	✓	Max. UXGA
5PC600.E855-04	✓	✓	✓	✓	✓	Max. UXGA
5PC600.E855-05	✓	✓	✓	✓	✓	Max. UXGA

Table 109: Possible combinations of system unit and CPU board

3.2.2 Link modules

Model number	Description	Note
5DLSDL.1000-00	**Automation Panel Link SDL receiver**	for Automation Panel 900

Table 110: Link module for the configuration - One Automation Panel via SDL

3.2.3 Cables

Select a cable from the following table.

Model number	Type	Length
5CASDL.0018-00	SDL w/o extender	1.8 m
5CASDL.0018-01	SDL without extender with 45° plug	1.8 m
5CASDL.0050-00	SDL w/o extender	5 m
5CASDL.0050-01	SDL without extender with 45° plug	5 m
5CASDL.0100-00	SDL w/o extender	10 m
5CASDL.0100-01	SDL without extender with 45° plug	10 m
5CASDL.0150-00	SDL w/o extender	15 m
5CASDL.0150-01	SDL without extender with 45° plug	15 m
5CASDL.0200-00	SDL w/o extender	20 m
5CASDL.0250-00	SDL w/o extender	25 m
5CASDL.0300-00	SDL w/o extender	30 m
5CASDL.0300-10	SDL w/ extender	30 m
5CASDL.0400-10	SDL w/ extender	40 m

Table 111: Cables for SDL configurations

Cable lengths and resolutions for SDL transfer

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

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

Table 112: Segment lengths, resolutions and SDL cable

The cable types and resolutions shown in blue in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Designation	Version	Note
MTCX FPGA	Firmware on the APC620	V 01.15	The version is read from BIOS - see the BIOS description. Supported starting with APC620 / PPC 700 firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	V 01.55	
SDLR FPGA	Firmware on the AP Link SDL receiver and transceiver	V 01.04	
SDLT FPGA	Firmware on the AP Link SDL transmitter	V 00.02	
Hardware	**Designation**	**Revision**	**Note**
5DLSDL.1000-00	AP Link SDL receiver	Rev. B0	
5DLSDL.1000-01	AP Link SDL transceiver	Rev. B0	

Table 113: Requirements for SDL cable with automatic cable adjustment (equalizer)

The cable types and resolutions shown in green in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Designation	Version	Note
MTCX FPGA	Firmware on the APC620	V 01.15	The version is read from BIOS - see the BIOS description. Supported starting with APC620 / PPC 700 firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	V 01.55	
SDLR FPGA	Firmware on the AP Link SDL receiver and transceiver	V 01.04	
SDLT FPGA	Firmware on the AP Link SDL transmitter	V 00.02	
Hardware	**Designation**	**Revision**	**Note**
5DLSDL.1000-00	AP Link SDL receiver	Rev. D0	
5DLSDL.1000-01	AP Link SDL transceiver	Rev. D0	
5AC600.SDL0-00	AP Link SDL transmitter	Rev. B3	
5PC600.SX01-00	System 1 PCI	Rev. E0	
5PC600.SX02-00	System 2 PCI, 1 disk drive slot, 1 AP Link slot	Rev. D0	
5PC600.SX02-01	System 2 PCI, 1 disk drive slot	Rev. E0	
5PC600.SX05-00	System 5 PCI, 2 disk drive slots, 1 AP Link slot	Rev. C0	
5PC600.SX05-01	System 5 PCI, 2 disk drive slots	Rev. C0	

Table 114: Requirements for SDL cable with extender and automatic cable adjustment (equalizer)

3.2.4 BIOS settings

No special BIOS settings are necessary for operation.

3.2.5 Windows graphics driver settings

"Digital display" must be defined as output device in the graphics driver.

For more information on this, see chapter 4 "Software", section 4 "Automation PC 620 with Windows XP Professional" on page 351.

3.2.6 Windows touch screen driver settings

For more information on this, see chapter 4 "Software", section 4 "Automation PC 620 with Windows XP Professional" on page 351.

3.3 Four Automation Panels via SDL (onboard)

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

USB is supported up to a maximum distance (SDL segment 1 + SDL segment 2) of 30 m on the first two panels (front and back side). From a distance of 30 m and longer, USB is only available for the first panel (front and back side). USB devices can only be connected directly to the Automation Panel 900 (without a hub).

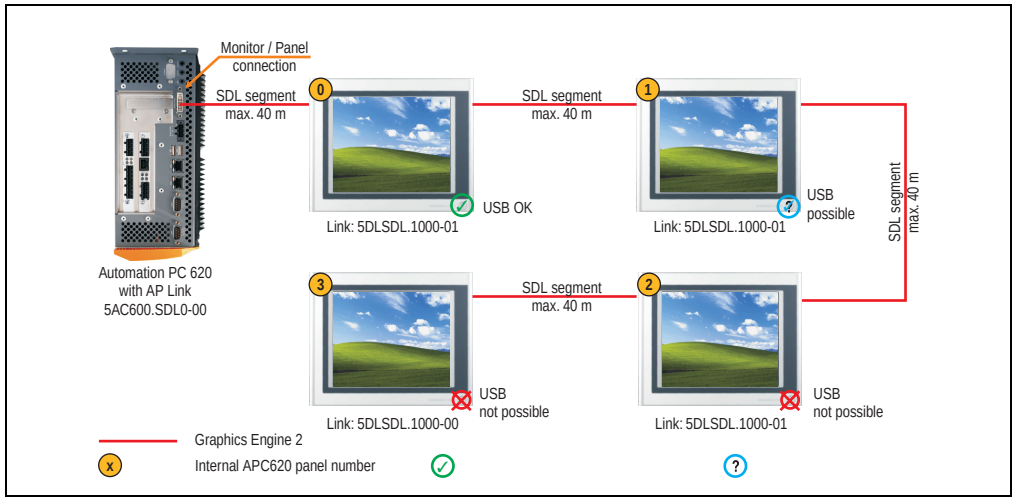


Figure 96: Configuration - Four Automation Panel 900 units via SDL (onboard)

3.3.1 Basic system requirements

The following table displays the possible combinations for the APC620 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in this table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit					Limitation Resolution
	5PC600.SX01-00	5PC600.SX02-00	5PC600.SX02-01	5PC600.SX05-00	5PC600.SX05-01	
5PC600.E855-00	✓	✓	✓	✓	✓	Max. UXGA
5PC600.E855-01	✓	✓	✓	✓	✓	Max. UXGA
5PC600.E855-02	✓	✓	✓	✓	✓	Max. UXGA
5PC600.E855-03	✓	✓	✓	✓	✓	Max. UXGA
5PC600.E855-04	✓	✓	✓	✓	✓	Max. UXGA
5PC600.E855-05	✓	✓	✓	✓	✓	Max. UXGA

Table 115: Possible combinations of system unit and CPU board

3.3.2 Link modules

Model number	Description	Note
5DLSDL.1000-00	**Automation Panel Link SDL receiver**	for Automation Panel 900
5DLSDL.1000-01	**Automation Panel Link SDL transceiver**	for Automation Panel 900 3 pieces required

Table 116: Link modules for the configuration - Four Automation Panels via SDL on one line

3.3.3 Cables

Select 4 cables from the following tables.

Model number	Type	Length
5CASDL.0018-00	SDL w/o extender	1.8 m
5CASDL.0018-01	SDL without extender with 45° plug	1.8 m
5CASDL.0050-00	SDL w/o extender	5 m
5CASDL.0050-01	SDL without extender with 45° plug	5 m
5CASDL.0100-00	SDL w/o extender	10 m
5CASDL.0100-01	SDL without extender with 45° plug	10 m
5CASDL.0150-00	SDL w/o extender	15 m
5CASDL.0150-01	SDL without extender with 45° plug	15 m
5CASDL.0200-00	SDL w/o extender	20 m
5CASDL.0250-00	SDL w/o extender	25 m
5CASDL.0300-00	SDL w/o extender	30 m
5CASDL.0300-10	SDL w/ extender	30 m
5CASDL.0400-10	SDL w/ extender	40 m

Table 117: Cables for SDL configurations

Cable lengths and resolutions for SDL transfer

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

Cable Segment length [m]	Resolution				
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200
1.8	5CASDL.0018-00 5CASDL.0018-01	5CASDL.0018-00 5CASDL.0018-01	5CASDL.0018-00 5CASDL.0018-01	5CASDL.0018-00 5CASDL.0018-01	5CASDL.0018-00 5CASDL.0018-01
5	5CASDL.0050-00 5CASDL.0050-01	5CASDL.0050-00 5CASDL.0050-01	5CASDL.0050-00 5CASDL.0050-01	5CASDL.0050-00 5CASDL.0050-01	5CASDL.0050-00 5CASDL.0050-01
10	5CASDL.0100-00 5CASDL.0100-01	5CASDL.0100-00 5CASDL.0100-01	5CASDL.0100-00 5CASDL.0100-01	5CASDL.0100-00 5CASDL.0100-01	5CASDL.0100-00 5CASDL.0100-01

Table 118: Segment lengths, resolutions and SDL cable

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

Table 118: Segment lengths, resolutions and SDL cable (Forts.)

The cable types and resolutions shown in blue in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Designation	Version	Note
MTCX FPGA	Firmware on the APC620	V 01.15	The version is read from BIOS - see the BIOS description. Supported starting with APC620 / PPC 700 firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	V 01.55	
SDLR FPGA	Firmware on the AP Link SDL receiver and transceiver	V 01.04	
SDLT FPGA	Firmware on the AP Link SDL transmitter	V 00.02	
Hardware	**Designation**	**Revision**	**Note**
5DLSDL.1000-00	AP Link SDL receiver	Rev. B0	
5DLSDL.1000-01	AP Link SDL transceiver	Rev. B0	

Table 119: Requirements for SDL cable with automatic cable adjustment (equalizer)

The cable types and resolutions shown in green in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Designation	Version	Note
MTCX FPGA	Firmware on the APC620	V 01.15	The version is read from BIOS - see the BIOS description. Supported starting with APC620 / PPC 700 firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	V 01.55	
SDLR FPGA	Firmware on the AP Link SDL receiver and transceiver	V 01.04	
SDLT FPGA	Firmware on the AP Link SDL transmitter	V 00.02	
Hardware	**Designation**	**Revision**	**Note**
5DLSDL.1000-00	AP Link SDL receiver	Rev. D0	
5DLSDL.1000-01	AP Link SDL transceiver	Rev. D0	
5AC600.SDL0-00	AP Link SDL transmitter	Rev. B3	
5PC600.SX01-00	System 1 PCI	Rev. E0	
5PC600.SX02-00	System 2 PCI, 1 disk drive slot, 1 AP Link slot	Rev. D0	
5PC600.SX02-01	System 2 PCI, 1 disk drive slot	Rev. E0	
5PC600.SX05-00	System 5 PCI, 2 disk drive slots, 1 AP Link slot	Rev. C0	
5PC600.SX05-01	System 5 PCI, 2 disk drive slots	Rev. C0	

Table 120: Requirements for SDL cable with extender and automatic cable adjustment (equalizer)

3.3.4 BIOS settings

No special BIOS settings are necessary for operation.

3.3.5 Windows graphics driver settings

"Display Clone" must be defined as output device in the graphics driver, with "Digital Display" as primary device.

For more information on this, see chapter 4 "Software", section 4 "Automation PC 620 with Windows XP Professional" on page 351.

3.3.6 Windows touch screen driver settings

For more information on this, see chapter 4 "Software", section 4 "Automation PC 620 with Windows XP Professional" on page 351.

3.4 One Automation Panel via SDL (optional)

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

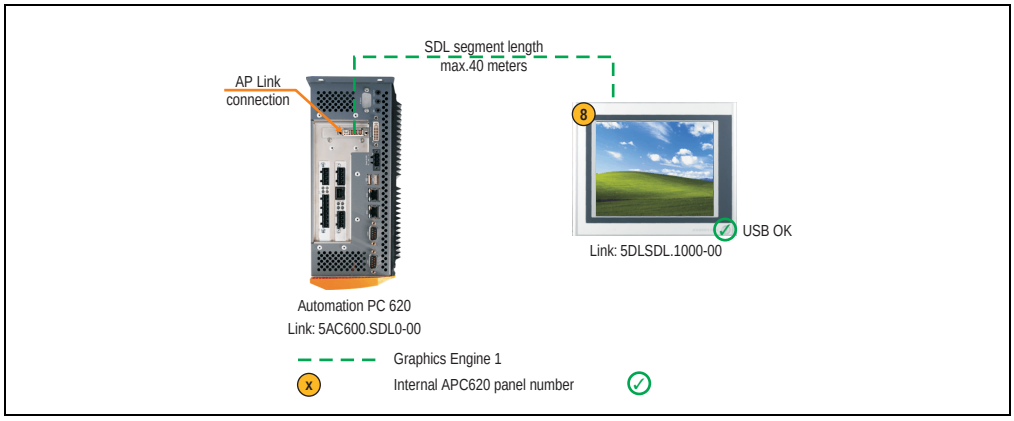


Figure 97: Configuration - One Automation Panel 900 via SDL (AP Link)

3.4.1 Basic system requirements

The following table displays the possible combinations for the APC620 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in this table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit					Limitation
	5PC600.SX01-00	5PC600.SX02-00	5PC600.SX02-01	5PC600.SX05-00	5PC600.SX05-01	Resolution
5PC600.E855-00	-	✓	-	✓	-	Max. UXGA
5PC600.E855-01	-	✓	-	✓	-	Max. UXGA
5PC600.E855-02	-	✓	-	✓	-	Max. UXGA
5PC600.E855-03	-	✓	-	✓	-	Max. UXGA
5PC600.E855-04	-	✓	-	✓	-	Max. UXGA
5PC600.E855-05	-	✓	-	✓	-	Max. UXGA

Table 121: Possible combinations of system unit and CPU board

3.4.2 Link modules

Model number	Description	Note
5DLSDL.1000-00	**Automation Panel Link SDL receiver**	for Automation Panel 900
5AC600.SDL0-00	**Automation Panel Link SDL transmitter**	for Automation PC 620

Table 122: Link modules for the configuration - One Automation Panel via SDL (optional)

3.4.3 Cables

Select a cable from the following table.

Model number	Type	Length
5CASDL.0018-00	SDL w/o extender	1.8 m
5CASDL.0018-01	SDL without extender with 45° plug	1.8 m
5CASDL.0050-00	SDL w/o extender	5 m
5CASDL.0050-01	SDL without extender with 45° plug	5 m
5CASDL.0100-00	SDL w/o extender	10 m
5CASDL.0100-01	SDL without extender with 45° plug	10 m
5CASDL.0150-00	SDL w/o extender	15 m
5CASDL.0150-01	SDL without extender with 45° plug	15 m
5CASDL.0200-00	SDL w/o extender	20 m
5CASDL.0250-00	SDL w/o extender	25 m
5CASDL.0300-00	SDL w/o extender	30 m
5CASDL.0300-10	SDL w/ extender	30 m
5CASDL.0400-10	SDL w/ extender	40 m

Table 123: Cables for SDL configurations

Cable lengths and resolutions for SDL transfer

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

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

Table 124: Segment lengths, resolutions and SDL cable

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

Table 124: Segment lengths, resolutions and SDL cable (Forts.)

The cable types and resolutions shown in blue in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Designation	Version	Note
MTCX FPGA	Firmware on the APC620	V 01.15	The version is read from BIOS - see the BIOS description. Supported starting with APC620 / PPC 700 firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	V 01.55	
SDLR FPGA	Firmware on the AP Link SDL receiver and transceiver	V 01.04	
SDLT FPGA	Firmware on the AP Link SDL transmitter	V 00.02	
Hardware	**Designation**	**Revision**	**Note**
5DLSDL.1000-00	AP Link SDL receiver	Rev. B0	
5DLSDL.1000-01	AP Link SDL transceiver	Rev. B0	

Table 125: Requirements for SDL cable with automatic cable adjustment (equalizer)

The cable types and resolutions shown in green in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Designation	Version	Note
MTCX FPGA	Firmware on the APC620	V 01.15	The version is read from BIOS - see the BIOS description. Supported starting with APC620 / PPC 700 firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	V 01.55	
SDLR FPGA	Firmware on the AP Link SDL receiver and transceiver	V 01.04	
SDLT FPGA	Firmware on the AP Link SDL transmitter	V 00.02	
Hardware	**Designation**	**Revision**	**Note**
5DLSDL.1000-00	AP Link SDL receiver	Rev. D0	
5DLSDL.1000-01	AP Link SDL transceiver	Rev. D0	
5AC600.SDL0-00	AP Link SDL transmitter	Rev. B3	
5PC600.SX01-00	System 1 PCI	Rev. E0	
5PC600.SX02-00	System 2 PCI, 1 disk drive slot, 1 AP Link slot	Rev. D0	
5PC600.SX02-01	System 2 PCI, 1 disk drive slot	Rev. E0	
5PC600.SX05-00	System 5 PCI, 2 disk drive slots, 1 AP Link slot	Rev. C0	
5PC600.SX05-01	System 5 PCI, 2 disk drive slots	Rev. C0	

Table 126: Requirements for SDL cable with extender and automatic cable adjustment (equalizer)

3.4.4 BIOS settings

No special BIOS settings are necessary for operation.

3.4.5 Windows graphics driver settings

"Notebook" must be defined as output device in the graphics driver.

For more information on this, see chapter 4 "Software", section 4 "Automation PC 620 with Windows XP Professional" on page 351.

3.4.6 Windows touch screen driver settings

For more information on this, see chapter 4 "Software", section 4 "Automation PC 620 with Windows XP Professional" on page 351.

3.5 Four Automation Panels via SDL (AP Link)

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

USB is supported up to a maximum distance (SDL segment 1 + SDL segment 2) of 30 m on the first two panels (front and back side). From a distance of 30 m and longer, USB is only available for the first panel (front and back side). USB devices can only be connected directly to the Automation Panel 900 (without a hub).

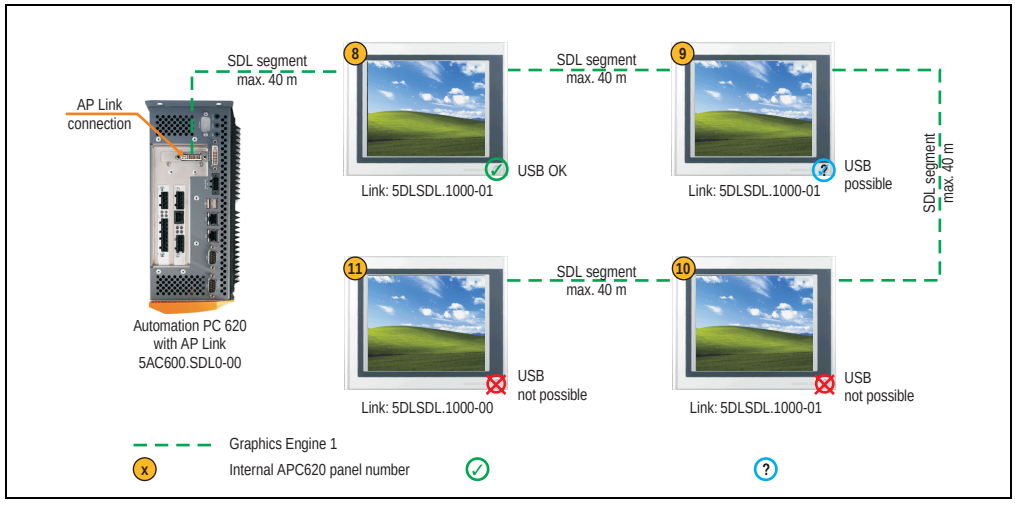


Figure 98: Configuration - Four Automation Panel 900 units via SDL (AP Link)

3.5.1 Basic system requirements

The following table displays the possible combinations for the APC620 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in this table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit					Limitation
	5PC600.SX01-00	5PC600.SX02-00	5PC600.SX02-01	5PC600.SX05-00	5PC600.SX05-01	Resolution
5PC600.E855-00	-	✓	-	✓	-	Max. UXGA
5PC600.E855-01	-	✓	-	✓	-	Max. UXGA
5PC600.E855-02	-	✓	-	✓	-	Max. UXGA
5PC600.E855-03	-	✓	-	✓	-	Max. UXGA
5PC600.E855-04	-	✓	-	✓	-	Max. UXGA
5PC600.E855-05	-	✓	-	✓	-	Max. UXGA

Table 127: Possible combinations of system unit and CPU board

3.5.2 Link modules

Model number	Description	Note
5DLSDL.1000-00	**Automation Panel Link SDL receiver**	for Automation Panel 900
5DLSDL.1000-01	**Automation Panel Link SDL transmitter**	for Automation Panel 900 3 pieces required
5AC600.SDL0-00	**Automation Panel Link SDL transmitter**	for Automation PC 620

Table 128: Link modules for the configuration: 4 Automation Panel 900 units via SDL (optional) on 1 line

3.5.3 Cables

Select 4 cables from the following tables.

Model number	Type	Length
5CASDL.0018-00	SDL w/o extender	1.8 m
5CASDL.0018-01	SDL without extender with 45° plug	1.8 m
5CASDL.0050-00	SDL w/o extender	5 m
5CASDL.0050-01	SDL without extender with 45° plug	5 m
5CASDL.0100-00	SDL w/o extender	10 m
5CASDL.0100-01	SDL without extender with 45° plug	10 m
5CASDL.0150-00	SDL w/o extender	15 m
5CASDL.0150-01	SDL without extender with 45° plug	15 m
5CASDL.0200-00	SDL w/o extender	20 m
5CASDL.0250-00	SDL w/o extender	25 m
5CASDL.0300-00	SDL w/o extender	30 m
5CASDL.0300-10	SDL w/ extender	30 m
5CASDL.0400-10	SDL w/ extender	40 m

Table 129: Cables for SDL configurations

Cable lengths and resolutions for SDL transfer

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

Cable	Resolution				
Segment length [m]	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200
1.8	5CASDL.0018-00 5CASDL.0018-01	5CASDL.0018-00 5CASDL.0018-01	5CASDL.0018-00 5CASDL.0018-01	5CASDL.0018-00 5CASDL.0018-01	5CASDL.0018-00 5CASDL.0018-01
5	5CASDL.0050-00 5CASDL.0050-01	5CASDL.0050-00 5CASDL.0050-01	5CASDL.0050-00 5CASDL.0050-01	5CASDL.0050-00 5CASDL.0050-01	5CASDL.0050-00 5CASDL.0050-01
10	5CASDL.0100-00 5CASDL.0100-01	5CASDL.0100-00 5CASDL.0100-01	5CASDL.0100-00 5CASDL.0100-01	5CASDL.0100-00 5CASDL.0100-01	5CASDL.0100-00 5CASDL.0100-01

Table 130: Segment lengths, resolutions and SDL cable

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

Table 130: Segment lengths, resolutions and SDL cable (Forts.)

The cable types and resolutions shown in blue in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Designation	Version	Note
MTCX FPGA	Firmware on the APC620	V 01.15	The version is read from BIOS - see the BIOS description. Supported starting with APC620 / PPC 700 firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	V 01.55	
SDLR FPGA	Firmware on the AP Link SDL receiver and transceiver	V 01.04	
SDLT FPGA	Firmware on the AP Link SDL transmitter	V 00.02	
Hardware	**Designation**	**Revision**	**Note**
5DLSDL.1000-00	AP Link SDL receiver	Rev. B0	
5DLSDL.1000-01	AP Link SDL transceiver	Rev. B0	

Table 131: Requirements for SDL cable with automatic cable adjustment (equalizer)

The cable types and resolutions shown in green in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Designation	Version	Note
MTCX FPGA	Firmware on the APC620	V 01.15	The version is read from BIOS - see the BIOS description. Supported starting with APC620 / PPC 700 firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	V 01.55	
SDLR FPGA	Firmware on the AP Link SDL receiver and transceiver	V 01.04	
SDLT FPGA	Firmware on the AP Link SDL transmitter	V 00.02	
Hardware	**Designation**	**Revision**	**Note**
5DLSDL.1000-00	AP Link SDL receiver	Rev. D0	
5DLSDL.1000-01	AP Link SDL transceiver	Rev. D0	
5AC600.SDL0-00	AP Link SDL transmitter	Rev. B3	
5PC600.SX01-00	System 1 PCI	Rev. E0	
5PC600.SX02-00	System 2 PCI, 1 disk drive slot, 1 AP Link slot	Rev. D0	
5PC600.SX02-01	System 2 PCI, 1 disk drive slot	Rev. E0	
5PC600.SX05-00	System 5 PCI, 2 disk drive slots, 1 AP Link slot	Rev. C0	
5PC600.SX05-01	System 5 PCI, 2 disk drive slots	Rev. C0	

Table 132: Requirements for SDL cable with extender and automatic cable adjustment (equalizer)

3.5.4 BIOS settings

No special BIOS settings are necessary for operation.

3.5.5 Windows graphics driver settings

"Notebook" must be defined as output device in the graphics driver.

For more information on this, see chapter 4 "Software", section 4 "Automation PC 620 with Windows XP Professional" on page 351.

3.5.6 Windows touch screen driver settings

For more information on this, see chapter 4 "Software", section 4 "Automation PC 620 with Windows XP Professional" on page 351.

3.6 Two Automation Panels via SDL (onboard) and SDL (AP Link)

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

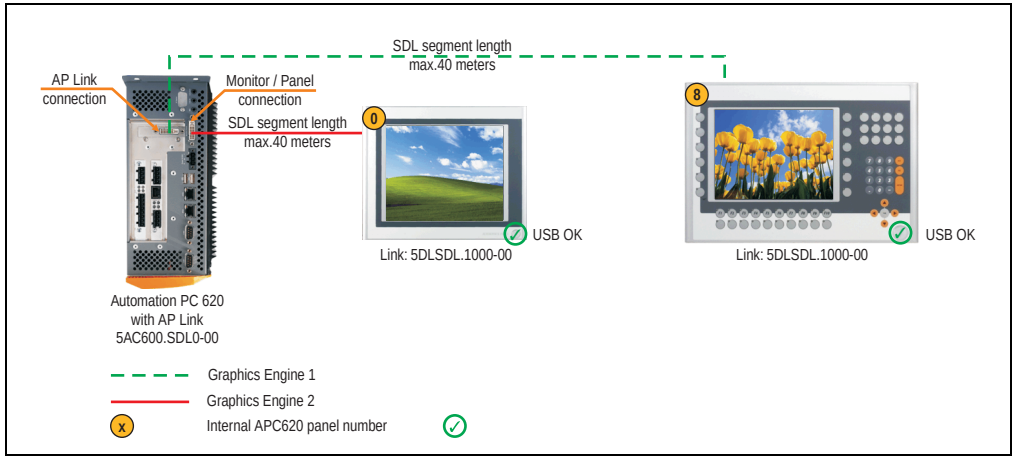


Figure 99: Configuration - Two Automation Panels via SDL (onboard) and SDL (AP Link)

3.6.1 Basic system requirements

The following table displays the possible combinations for the APC620 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in this table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit					Limitation
	5PC600.SX01-00	5PC600.SX02-00	5PC600.SX02-01	5PC600.SX05-00	5PC600.SX05-01	Resolution
5PC600.E855-00	-	✓	-	✓	-	Max. UXGA
5PC600.E855-01	-	✓	-	✓	-	Max. UXGA
5PC600.E855-02	-	✓	-	✓	-	Max. UXGA
5PC600.E855-03	-	✓	-	✓	-	Max. UXGA
5PC600.E855-04	-	✓	-	✓	-	Max. UXGA
5PC600.E855-05	-	✓	-	✓	-	Max. UXGA

Table 133: Possible combinations of system unit and CPU board

3.6.2 Link modules

Model number	Description	Note
5DLSDL.1000-00	**Automation Panel Link SDL receiver**	for Automation Panel 900 2 pieces required
5AC600.SDL0-00	**Automation Panel Link SDL transmitter**	for Automation PC 620

Table 134: Link modules for the configuration - Two Automation Panels via SDL and SDL (optional)

3.6.3 Cables

Select 2 cables from the following tables.

Model number	Type	Length
5CASDL.0018-00	SDL w/o extender	1.8 m
5CASDL.0018-01	SDL without extender with 45° plug	1.8 m
5CASDL.0050-00	SDL w/o extender	5 m
5CASDL.0050-01	SDL without extender with 45° plug	5 m
5CASDL.0100-00	SDL w/o extender	10 m
5CASDL.0100-01	SDL without extender with 45° plug	10 m
5CASDL.0150-00	SDL w/o extender	15 m
5CASDL.0150-01	SDL without extender with 45° plug	15 m
5CASDL.0200-00	SDL w/o extender	20 m
5CASDL.0250-00	SDL w/o extender	25 m
5CASDL.0300-00	SDL w/o extender	30 m
5CASDL.0300-10	SDL w/ extender	30 m
5CASDL.0400-10	SDL w/ extender	40 m

Table 135: Cables for SDL configurations

Cable lengths and resolutions for SDL transfer

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

Cable Segment length [m]	Resolution				
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200
1.8	5CASDL.0018-00 5CASDL.0018-01	5CASDL.0018-00 5CASDL.0018-01	5CASDL.0018-00 5CASDL.0018-01	5CASDL.0018-00 5CASDL.0018-01	5CASDL.0018-00 5CASDL.0018-01
5	5CASDL.0050-00 5CASDL.0050-01	5CASDL.0050-00 5CASDL.0050-01	5CASDL.0050-00 5CASDL.0050-01	5CASDL.0050-00 5CASDL.0050-01	5CASDL.0050-00 5CASDL.0050-01
10	5CASDL.0100-00 5CASDL.0100-01	5CASDL.0100-00 5CASDL.0100-01	5CASDL.0100-00 5CASDL.0100-01	5CASDL.0100-00 5CASDL.0100-01	5CASDL.0100-00 5CASDL.0100-01

Table 136: Segment lengths, resolutions and SDL cable

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

Table 136: Segment lengths, resolutions and SDL cable (Forts.)

The cable types and resolutions shown in blue in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Designation	Version	Note
MTCX FPGA	Firmware on the APC620	V 01.15	The version is read from BIOS - see the BIOS description. Supported starting with APC620 / PPC 700 firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	V 01.55	
SDLR FPGA	Firmware on the AP Link SDL receiver and transceiver	V 01.04	
SDLT FPGA	Firmware on the AP Link SDL transmitter	V 00.02	
Hardware	**Designation**	**Revision**	**Note**
5DLSDL.1000-00	AP Link SDL receiver	Rev. B0	
5DLSDL.1000-01	AP Link SDL transceiver	Rev. B0	

Table 137: Requirements for SDL cable with automatic cable adjustment (equalizer)

The cable types and resolutions shown in green in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Designation	Version	Note
MTCX FPGA	Firmware on the APC620	V 01.15	The version is read from BIOS - see the BIOS description. Supported starting with APC620 / PPC 700 firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	V 01.55	
SDLR FPGA	Firmware on the AP Link SDL receiver and transceiver	V 01.04	
SDLT FPGA	Firmware on the AP Link SDL transmitter	V 00.02	
Hardware	**Designation**	**Revision**	**Note**
5DLSDL.1000-00	AP Link SDL receiver	Rev. D0	
5DLSDL.1000-01	AP Link SDL transceiver	Rev. D0	
5AC600.SDL0-00	AP Link SDL transmitter	Rev. B3	
5PC600.SX01-00	System 1 PCI	Rev. E0	
5PC600.SX02-00	System 2 PCI, 1 disk drive slot, 1 AP Link slot	Rev. D0	
5PC600.SX02-01	System 2 PCI, 1 disk drive slot	Rev. E0	
5PC600.SX05-00	System 5 PCI, 2 disk drive slots, 1 AP Link slot	Rev. C0	
5PC600.SX05-01	System 5 PCI, 2 disk drive slots	Rev. C0	

Table 138: Requirements for SDL cable with extender and automatic cable adjustment (equalizer)

3.6.4 BIOS settings

No special BIOS settings are necessary for operation.

To operate Automation Panel 900 panels with a touch screen (Extended Desktop or Dual Display Clone), the serial interfaces COM C and COM D must be activated in BIOS (BIOS default setting = disabled).

3.6.5 Windows graphics driver settings

See chapter 4 "Software", section 4 "Automation PC 620 with Windows XP Professional" on page 351.

If all connected Automation Panel 900 panels (line 1 + line 2) should display the same content, then "Dual Display Clone" mode must be set in the graphics driver (see chapter 4 "Software", section 4.2.4 "Graphics settings for Dual Display Clone" on page 356).

If all connected Automation Panel 900 panels (line 1 + line 2) should display the same content, then "Dual Display Clone" mode must be set in the graphics driver (see chapter 4 "Software", section 4.2.3 "Graphics settings for Extended Desktop" on page 355).

3.6.6 Windows touch screen driver settings

See chapter 4 "Software", section 4 "Automation PC 620 with Windows XP Professional" on page 351.

3.7 Eight Automation Panels via SDL (onboard) and SDL (AP Link)

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

USB is supported up to a maximum distance (SDL segment 1 + SDL segment 2) of 30 m on the first two panels (front and back side). From a distance of 30 m and longer, USB is only available for the first panel on each line. In this case, USB devices can only be connected directly to the Automation Panel 900 (without a hub).

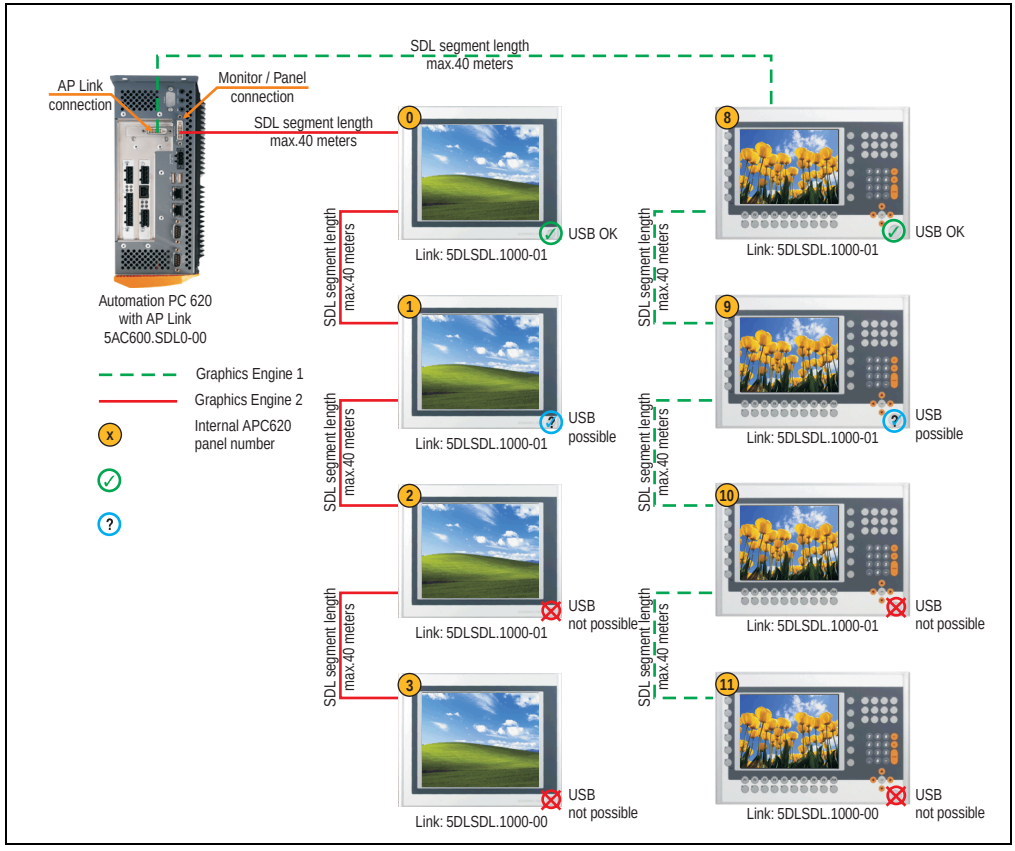


Figure 100: Configuration - Eight Automation Panels via SDL (onboard) and SDL (AP Link)

3.7.1 Basic system requirements

The following table displays the possible combinations for the APC620 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in this table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit					Limitation
	5PC600.SX01-00	5PC600.SX02-00	5PC600.SX02-01	5PC600.SX05-00	5PC600.SX05-01	Resolution
5PC600.E855-00	-	✓	-	✓	-	Max. UXGA
5PC600.E855-01	-	✓	-	✓	-	Max. UXGA
5PC600.E855-02	-	✓	-	✓	-	Max. UXGA
5PC600.E855-03	-	✓	-	✓	-	Max. UXGA
5PC600.E855-04	-	✓	-	✓	-	Max. UXGA
5PC600.E855-05	-	✓	-	✓	-	Max. UXGA

Table 139: Possible combination of system unit and CPU board

3.7.2 Link modules

Model number	Description	Note
5DLSDL.1000-00	**Automation Panel Link SDL receiver**	for Automation Panel 900 2 pieces required
5DLSDL.1000-01	**Automation Panel Link SDL transceiver**	for Automation Panel 900 6 pieces required
5AC600.SDL0-00	**Automation Panel Link SDL transmitter**	for Automation PC 620 2 pieces required

Table 140: Link modules for the configuration: Eight Automation Panels via SDL and SDL (optional)

3.7.3 Cable

Selection of 8 cables from the following tables.

Model number	Type	Length
5CASDL.0018-00	SDL w/o extender	1.8 m
5CASDL.0018-01	SDL without extender with 45° plug	1.8 m
5CASDL.0050-00	SDL w/o extender	5 m
5CASDL.0050-01	SDL without extender with 45° plug	5 m
5CASDL.0100-00	SDL w/o extender	10 m
5CASDL.0100-01	SDL without extender with 45° plug	10 m
5CASDL.0150-00	SDL w/o extender	15 m
5CASDL.0150-01	SDL without extender with 45° plug	15 m
5CASDL.0200-00	SDL w/o extender	20 m

Table 141: Cables for SDL configurations

Model number	Type	Length
5CASDL.0250-00	SDL w/o extender	25 m
5CASDL.0300-00	SDL w/o extender	30 m
5CASDL.0300-10	SDL w/ extender	30 m
5CASDL.0400-10	SDL w/ extender	40 m

Table 141: Cables for SDL configurations

Cable lengths and resolutions for SDL transfer

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

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

Table 142: Segment lengths, resolutions and SDL cable

The cable types and resolutions shown in blue in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Designation	Version	Note
MTCX FPGA	Firmware on the APC620	V 01.15	The version is read from BIOS - see the BIOS description. Supported starting with APC620 / PPC 700 firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	V 01.55	
SDLR FPGA	Firmware on the AP Link SDL receiver and transceiver	V 01.04	
SDLT FPGA	Firmware on the AP Link SDL transmitter	V 00.02	
Hardware	**Designation**	**Revision**	**Note**
5DLSDL.1000-00	AP Link SDL receiver	Rev. B0	
5DLSDL.1000-01	AP Link SDL transceiver	Rev. B0	

Table 143: Requirements for SDL cable with automatic cable adjustment (equalizer)

The cable types and resolutions shown in green in the previous table can only be implemented starting with the following firmware and hardware versions:

Firmware	Designation	Version	Note
MTCX FPGA	Firmware on the APC620	V 01.15	The version is read from BIOS - see the BIOS description. Supported starting with APC620 / PPC 700 firmware upgrade (MTCX, SDLR, SDLT) **V01.10**, available in the download area of the B&R homepage.
MTCX PX32	Firmware on the APC620	V 01.55	
SDLR FPGA	Firmware on the AP Link SDL receiver and transceiver	V 01.04	
SDLT FPGA	Firmware on the AP Link SDL transmitter	V 00.02	
Hardware	**Designation**	**Revision**	**Note**
5DLSDL.1000-00	AP Link SDL receiver	Rev. D0	
5DLSDL.1000-01	AP Link SDL transceiver	Rev. D0	
5AC600.SDL0-00	AP Link SDL transmitter	Rev. B3	
5PC600.SX01-00	System 1 PCI	Rev. E0	
5PC600.SX02-00	System 2 PCI, 1 disk drive slot, 1 AP Link slot	Rev. D0	
5PC600.SX02-01	System 2 PCI, 1 disk drive slot	Rev. E0	
5PC600.SX05-00	System 5 PCI, 2 disk drive slots, 1 AP Link slot	Rev. C0	
5PC600.SX05-01	System 5 PCI, 2 disk drive slots	Rev. C0	

Table 144: Requirements for SDL cable with extender and automatic cable adjustment (equalizer)

3.7.4 BIOS settings

No special BIOS settings are necessary for operation.

To operate Automation Panel 900 panels with a touch screen (Extended Desktop or Dual Display Clone), the serial interfaces COM C and COM D must be activated in BIOS (BIOS default setting = disabled).

3.7.5 Windows graphics driver settings

See chapter 4 "Software", section 4 "Automation PC 620 with Windows XP Professional" on page 351.

If all connected Automation Panel 900 panels (line 1 + line 2) should display the same content, then "Dual Display Clone" mode must be set in the graphics driver (see chapter 4 "Software", section 4.2.4 "Graphics settings for Dual Display Clone" on page 356).

3.7.6 Windows touch screen driver settings

See chapter 4 "Software", section 4 "Automation PC 620 with Windows XP Professional" on page 351.

Chapter 4 • Software

1. Automation PC 620 with BIOS

1.1 815E BIOS description

Information:

- **The following diagrams, BIOS menu items, and descriptions refer to BIOS Version R115. 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 1.1.10 "Profile overview" on page 267).**

1.1.1 General information

BIOS stands for "Basic Input Output System." It is the most basic standardized communication between the user and the system (hardware). The BIOS system used in the Automation PC 620 systems is produced by Phoenix.

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 APC620 even when the power is turned off (no 24 VDC supply) .

1.1.2 BIOS setup and boot procedure

BIOS is immediately activated when switching on the power supply of the Automation PC 620 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 <F2> 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 "preliminary steps" are finished, BIOS searches for 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 F2 key must be pressed as soon as the following message appears on the lower margin of the display (during POST):

"Press <F2> to enter SETUP"

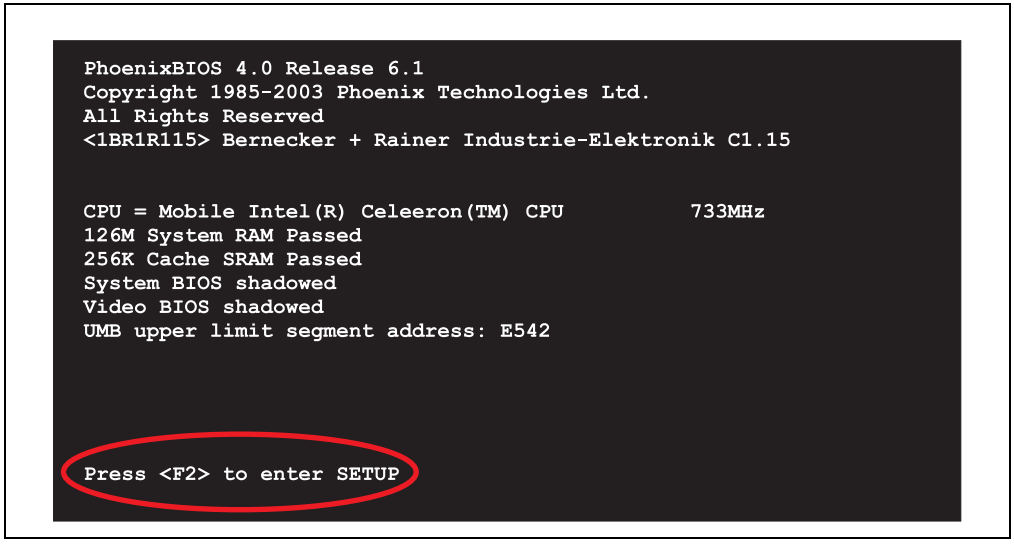


Figure 101: 815E - BIOS diagnostic screen

Summary screen

After the POST, the summary screen displays the most important system characteristics.

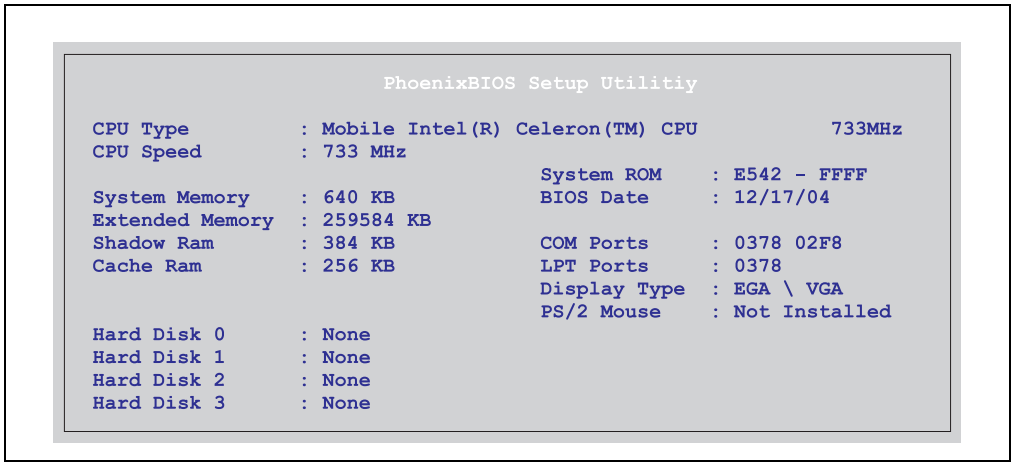


Figure 102: 815E - BIOS summary screen

1.1.3 BIOS setup keys

The following keys are active during the POST:

Key	Function
F2	Enters the BIOS setup menu.
ESC	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.
<Spacebar>	Pressing the spacebar skips the system RAM check.
<Pause>	Pressing the <pause> key stops the POST. Press any other key to resume the POST.

Table 145: Keys relevant to BIOS during POST

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

Key	Function
Cursor ↑	Moves to previous item.
Cursor ↓	Moves to next item.
Cursor ←	Move to the item on the left.
Cursor →	Move to the item on the right.
<ESC>	Exits the submenu.
PgUp↑	Moves the cursor to the top of the current BIOS setup page.
PgDn ↓	Moves the cursor to the bottom of the current BIOS setup page.
<F1> or <Alt+H>	Opens a help window showing the key assignments.
<F5> or <->	Scrolls to the previous option for the selected BIOS setting.
<F6> or <+> or <spacebar>	Scrolls to the next option for the selected BIOS setting.

Table 146: Keys relevant to BIOS

Key	Function
<F9>	Loads setup defaults for the current BIOS setup screen.
<F10>	Saves settings and closes BIOS setup.
<Enter>	Opens submenu for a BIOS setup menu item, or displays the configurable values of a BIOS setup item.

Table 146: Keys relevant to BIOS

The following sections explain the individual BIOS setup menu items in detail.

BIOS setup menu Item	Function	From page
Main	The basic system configurations (e.g. time, date, hard disk parameters) can be set in this menu.	227
Advanced	Advanced BIOS options such as cache areas, PnP, keyboard repeat rate, as well as settings specific to B&R integrated hardware, can be configured here.	234
Security	For setting up the system's security functions.	258
Power	Setup of various APM (Advanced Power Management) options.	260
Boot	The boot order can be set here.	265
Exit	To end the BIOS setup.	266

Table 147: Overview of BIOS menu items

1.1.4 Main

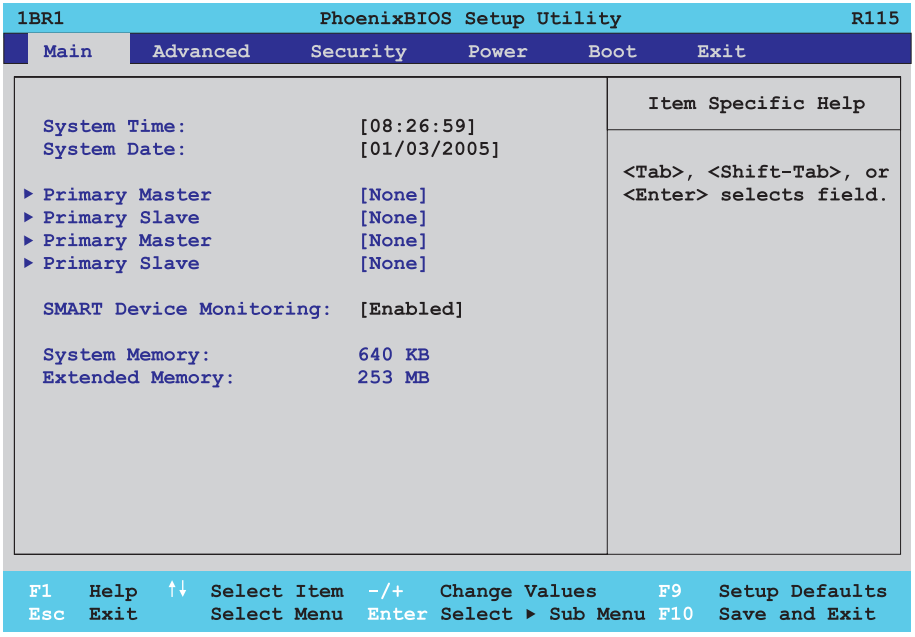


Figure 103: 815E - main menu

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.	Adjustment of the system time	Set the system time in the format (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 to the system date	Set the system date in the format (mm:dd:yyyy).
Primary master	The drive in the system that is connected to the IDE primary master port is configured here.	Enter	Opens submenu see "Primary master" on page 228.
Primary slave	The drive in the system that is connected to the IDE primary slave port is configured here.	Enter	Opens submenu see "Primary slave" on page 230.
Secondary master	The drive in the system that is connected to the IDE secondary master port is configured here.	Enter	Opens submenu see "Secondary master" on page 231.
Secondary slave	The drive in the system that is connected to the IDE secondary slave port is configured here.	Enter	Opens submenu see "Secondary slave" on page 233.

Table 148: 815E - main setting options

BIOS setting	Meaning	Setting options	Effect
Smart device monitoring	S.M.A.R.T. (Self Monitoring Analysis and Reporting Technology) is implemented in the today's hard drives. This technology allows you to detect reading or rotational problems with the hard drive, and much more.	Enabled	Activates this function. In the future, a message regarding impending errors is produced.
		Disabled	Deactivates this function.
System memory	Displays the amount of main memory installed. Between 0 and 640 KB.	None	-
Extended memory	Displays the available main memory from the first MB to the maximum memory capacity.	None	-

Table 148: 815E - main setting options (Forts.)

Primary master

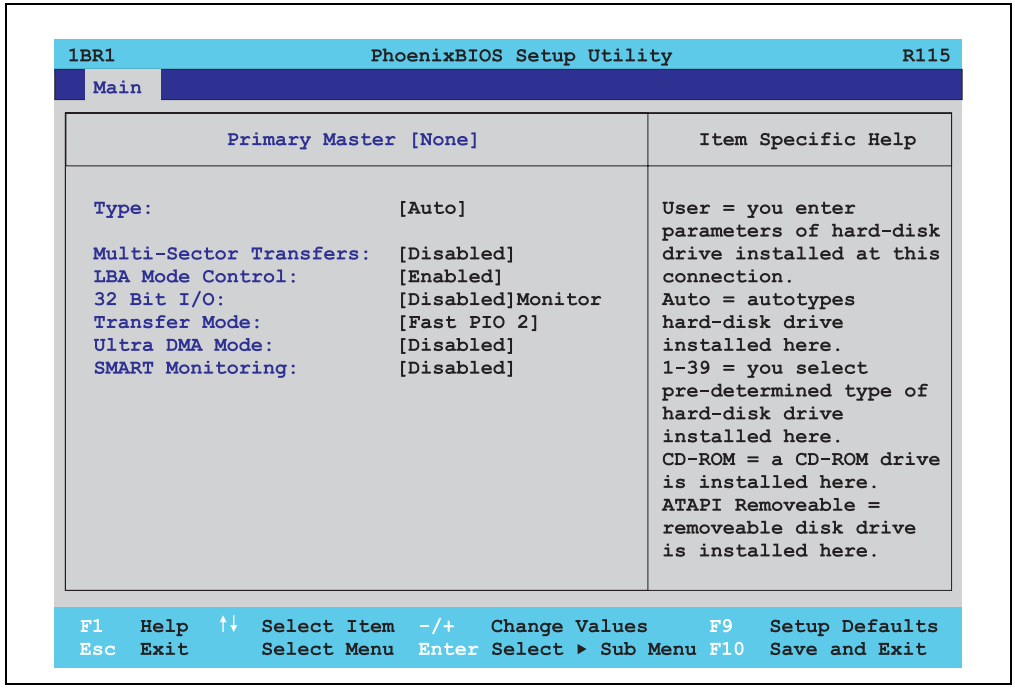


Figure 104: 815E - primary master setup

BIOS setting	Meaning	Setting options	Effect
Type	The type of drive connected to the primary master is configured here.	Auto	Automatic recognition of the drive and setup of appropriate values.
		User	Manual setup of the drive (number of cylinders, heads, and sectors).
		Other ATAPI	Use this option for IDE disk drives that are not mentioned here.
		CD-ROM	CD-ROM = CD-ROM drive
		ATAPI removable	The removable media drive is treated as a hard drive or floppy drive.
		IDE removable	The IDE removable drive is treated as a hard drive.
Multi-sector transfer	This option determines the number of sectors per block. Only possible when manually setting up the drive.	Disabled	Disables this function.
		2, 4, 8 or 16 sectors	Number of sectors per block.
LBA mode control	This option activates the logical block addressing for IDE. This function enables support of drives larger than 540 MB. Only possible when manually setting up the drive.	Disabled	Disables this function.
		Enabled	Enables this function.
32-bit I/O	This function enables 32-bit data transfer.	Disabled	Disables this function.
		Enabled	Enables this function.
Transfer mode	The communication path between the primary master drive and the system memory is defined here. Only possible when manually setting up the drive.	Standard	Default setting
		Fast PIO 1 - Fast PIO 4 / DMA2	Manual configuration of PIO mode.
Ultra 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.	Disabled	Disables this function. Do not use UDMA mode.
		Mode 0 - Mode 5	Manual setting option for UDMA mode.
SMART monitoring	Indicates whether the primary master drive supports SMART technology.	Disabled	No drive support, and function is deactivated.
		Enabled	Drive support present, and function is activated.

Table 149: 815E - primary master setting options

Primary slave

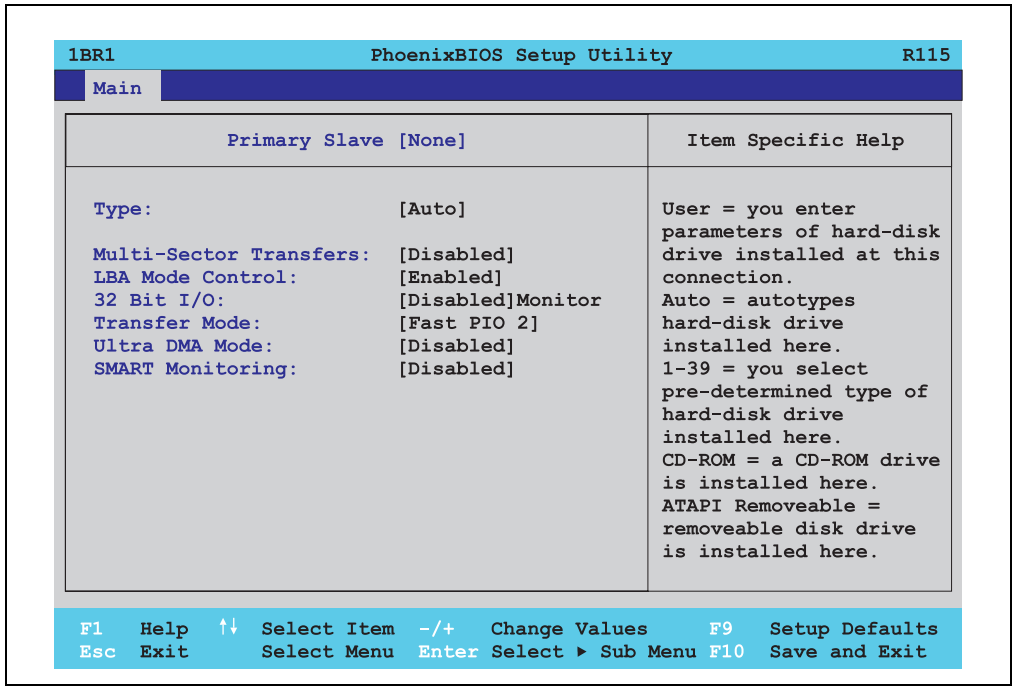


Figure 105: 815E - primary slave setup

BIOS setting	Meaning	Setting options	Effect
Type	The type of drive connected to the primary slave is configured here.	Auto	Automatic recognition of the drive and setup of appropriate values.
		User	Manual setup of the drive (number of cylinders, heads, and sectors).
		Other ATAPI	Use this option for IDE disk drives that are not mentioned here.
		CD-ROM	CD-ROM = CD-ROM drive
		ATAPI removable	The removable media drive is treated as a hard drive or floppy drive.
		IDE removable	The IDE removable drive is treated as a hard drive.
Multi-sector transfer	This option determines the number of sectors per block. Only possible when manually setting up the drive.	Disabled	Disables this function.
		2, 4, 8 or 16 sectors	Number of sectors per block.
LBA mode control	This option activates the logical block addressing for IDE. This function enables support of drives larger than 540 MB. Only possible when manually setting up the drive.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 150: 815E - primary slave setting options

BIOS setting	Meaning	Setting options	Effect
32-bit I/O	This function enables 32-bit data transfer.	Disabled	Disables this function.
		Enabled	Enables this function.
Transfer mode	The communication path between the primary slave drive and the system memory is defined here. Only possible when manually setting up the drive.	Standard	Default setting
		Fast PIO 1 - Fast PIO 4 / DMA2	Manual configuration of PIO mode.
Ultra DMA mode	The data transfer rate to and from the primary slave drive is defined here. The DMA mode must be activated in the Windows device manager in order to guarantee maximum performance. Only possible when manually setting up the drive.	Disabled	Disables this function. Do not use UDMA mode.
		Mode 0 - Mode 5	Manual setting option for UDMA mode.
SMART monitoring	Indicates whether the primary slave drive supports SMART technology.	Disabled	No drive support, and function is deactivated.
		Enabled	Drive support present, and function is activated.

Table 150: 815E - primary slave setting options (Forts.)

Secondary master

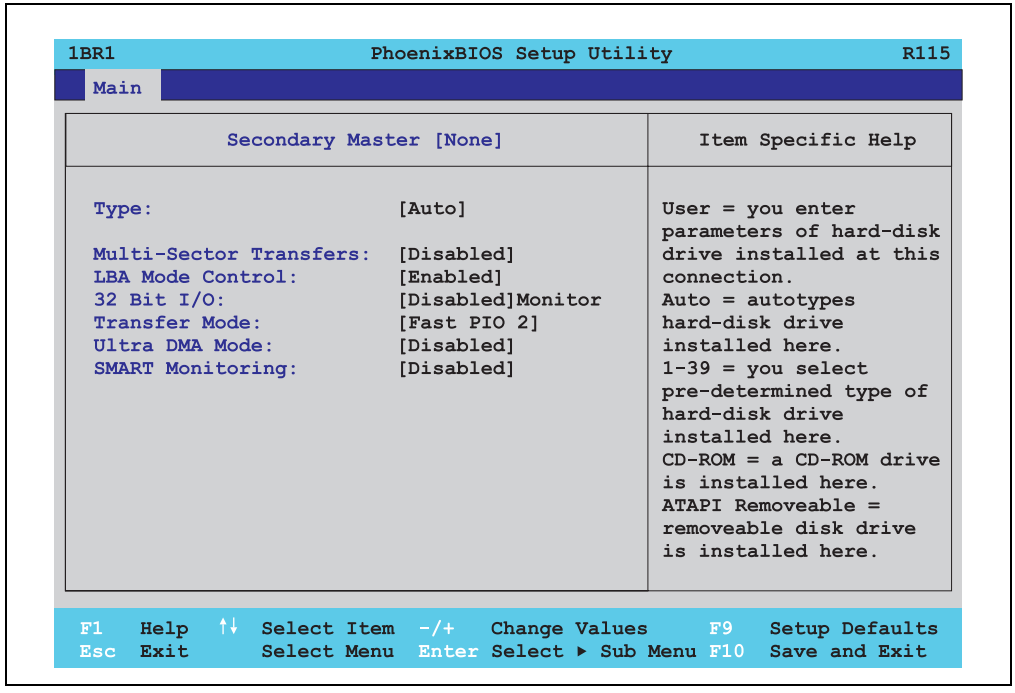


Figure 106: 815E - secondary master setup

BIOS setting	Meaning	Setting options	Effect
Type	The type of drive connected to the secondary master is configured here.	Auto	Automatic recognition of the drive and setup of appropriate values.
		User	Manual setup of the drive (number of cylinders, heads, and sectors).
		Other ATAPI	Use this option for IDE disk drives that are not mentioned here.
		CD-ROM	CD-ROM = CD-ROM drive
		ATAPI removable	The removable media drive is treated as a hard drive or floppy drive.
		IDE removable	The IDE removable drive is treated as a hard drive.
Multi-sector transfer	This option determines the number of sectors per block. Only possible when manually setting up the drive.	Disabled	Disables this function.
		2, 4, 8 or 16 sectors	Number of sectors per block.
LBA mode control	This option activates the logical block addressing for IDE. This function enables support of drives larger than 540 MB. Only possible when manually setting up the drive.	Disabled	Disables this function.
		Enabled	Enables this function.
32-bit I/O	This function enables 32-bit data transfer.	Disabled	Disables this function.
		Enabled	Enables this function.
Transfer mode	The communication path between the secondary master drive and the system memory is defined here. Only possible when manually setting up the drive.	Standard	Default setting
		Fast PIO 1 - Fast PIO 4 / DMA2	Manual configuration of PIO mode.
Ultra DMA mode	The data transfer rate to and from the secondary master drive is defined here. The DMA mode must be activated in the Windows device manager in order to guarantee maximum performance. Only possible when manually setting up the drive.	Disabled	Disables this function. Do not use UDMA mode.
		Mode 0 - Mode 5	Manual setting option for UDMA mode.
SMART monitoring	Indicates whether the secondary master drive supports SMART technology.	Disabled	No drive support, and function is deactivated.
		Enabled	Drive support present, and function is activated.

Table 151: 815E - secondary master setting options

Secondary slave

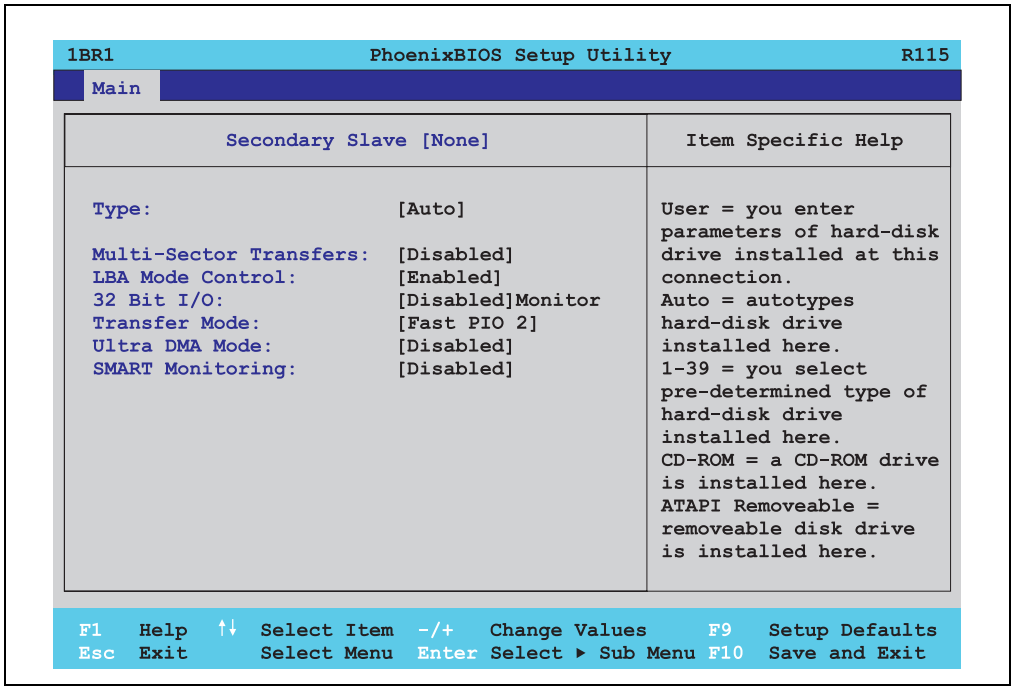


Figure 107: 815E - secondary slave setup

BIOS setting	Meaning	Setting options	Effect
Type	The type of drive connected to the secondary slave is configured here.	Auto	Automatic recognition of the drive and setup of appropriate values.
		User	Manual setup of the drive (number of cylinders, heads, and sectors).
		Other ATAPI	Use this option for IDE disk drives that are not mentioned here.
		CD-ROM	CD-ROM = CD-ROM drive
		ATAPI removable	The removable media drive is treated as a hard drive or floppy drive.
		IDE removable	The IDE removable drive is treated as a hard drive.
Multi-sector transfer	This option determines the number of sectors per block. Only possible when manually setting up the drive.	Disabled	Disables this function.
		2, 4, 8 or 16 sectors	Number of sectors per block.
LBA mode control	This option activates the logical block addressing for IDE. This function enables support of drives larger than 540 MB. Only possible when manually setting up the drive.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 152: 815E - secondary slave setting options

BIOS setting	Meaning	Setting options	Effect
32-bit I/O	This function enables 32-bit data transfer.	Disabled	Disables this function.
		Enabled	Enables this function.
Transfer mode	The communication path between the secondary slave drive and the system memory is defined here. Only possible when manually setting up the drive.	Standard	Default setting
		Fast PIO 1 - Fast PIO 4 / DMA2	Manual configuration of PIO mode.
Ultra DMA mode	The data transfer rate to and from the secondary slave is defined here. The DMA mode must be activated in the Windows device manager in order to guarantee maximum performance. Only possible when manually setting up the drive.	Disabled	Disables this function. Do not use UDMA mode.
		Mode 0 - Mode 5	Manual setting option for UDMA mode.
SMART monitoring	Indicates whether the secondary slave drive supports SMART technology.	Disabled	No drive support, and function is deactivated.
		Enabled	Drive support present, and function is activated.

Table 152: 815E - secondary slave setting options (Forts.)

1.1.5 Advanced

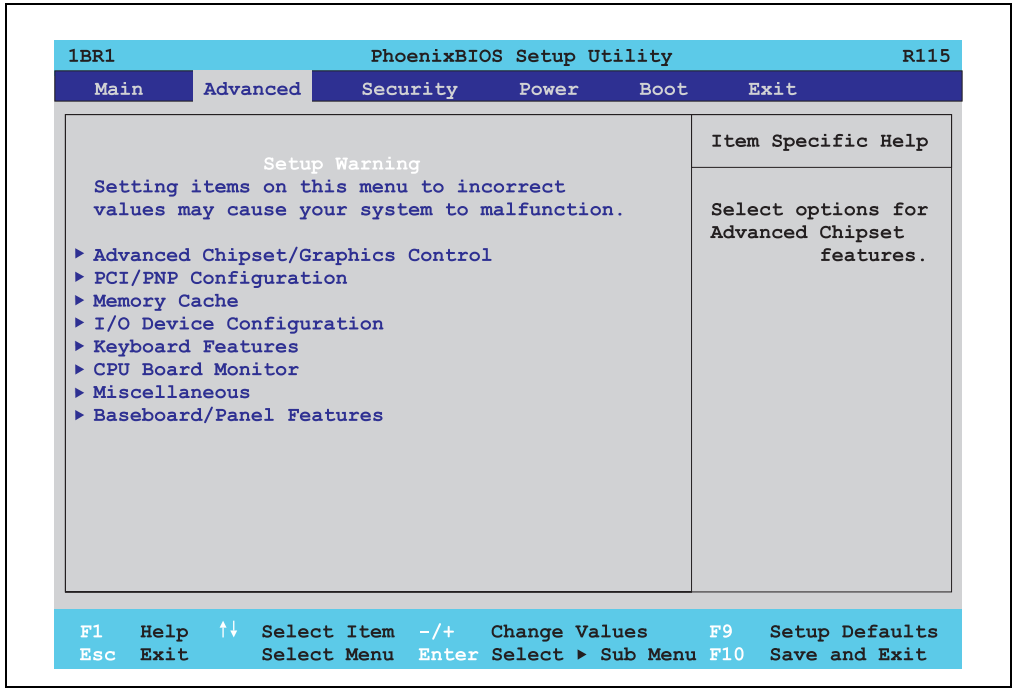


Figure 108: 815E - advanced menu

BIOS setup menu	Meaning	Setting options	Effect
Advanced chipset/graphics control	Setup of advanced chipset and graphics functions.	Enter	Opens submenu see "Advanced chipset/graphics control" on page 235.
PCI/PNP configuration	Configures PCI devices.	Enter	Opens submenu see "PCI/PNP configuration" on page 237.
Memory cache	Configuration of the memory cache resources.	Enter	Opens submenu see "Memory cache" on page 244.
I/O device configuration	Configuration of the I/O devices.	Enter	Opens submenu see "I/O device configuration" on page 246.
Keyboard features	Configuration of the keyboard options.	Enter	Opens submenu see "Keyboard features" on page 249.
CPU board monitor	Displays the current voltages and temperature of the processor in use.	Enter	Opens submenu see "CPU board monitor" on page 250.
Miscellaneous	Configuration of various BIOS settings (summary screen, halt on errors, etc.).	Enter	Opens submenu see "Miscellaneous" on page 251.
Baseboard/panel features	Display of device specific information and setup of device specific values.	Enter	Opens submenu see "Baseboard/panel features" on page 252.

Table 153: 815E - advanced menu setting options

Advanced chipset/graphics control

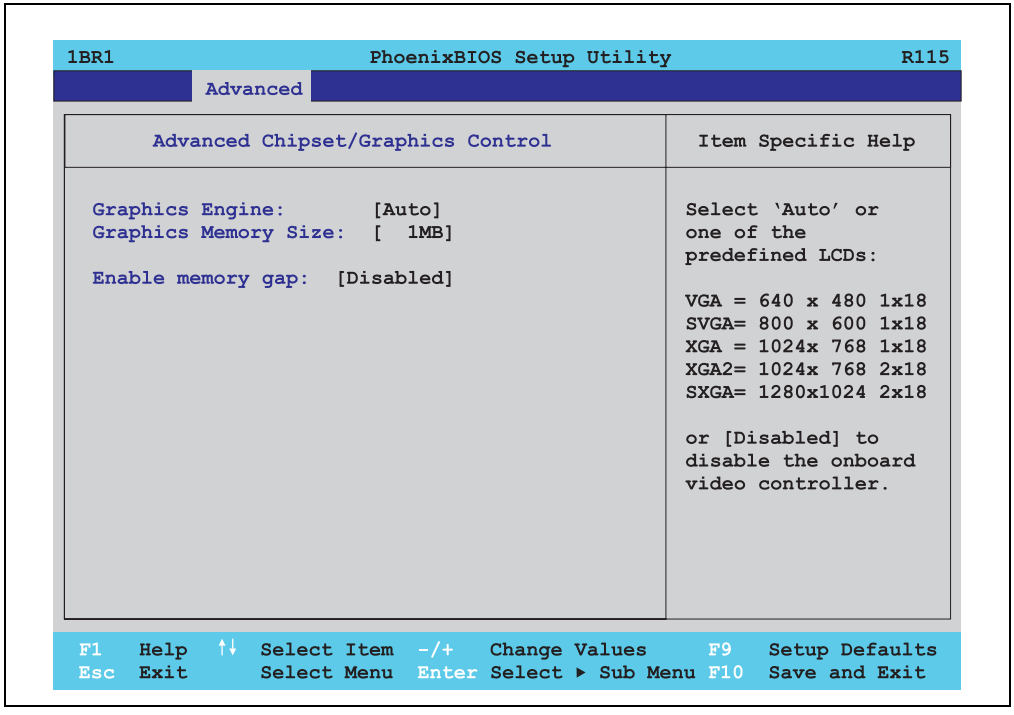


Figure 109: 815E - advanced chipset/graphics control

BIOS setting	Meaning	Setting options	Effect
Graphics engine	Settings can be made for the onboard video controller.	Auto	Automatic setting of the resolution (using a read-out of the connected panel's EDID data).
		VGA, SVGA, XGA, XGA2, SXGA	VGA = 640 x 480 resolution SVGA = 800 x 600 resolution XGA = 1024 x 768 resolution XGA2 = 1024 x 768 resolution SXGA = 1280 x 1024 resolution
		Disabled	**Important!** **The onboard video must be activated to make video output possible. Deactivate only for use of an external PCI graphics card.**
Graphics memory size	Reserves a memory location in the RAM for the onboard graphics controller, into which the memory access will be directed.	1 MB	1 MB main memory is reserved for the onboard video controller.
		512kB	512 k main memory is reserved for the onboard video controller.
Enable memory gap	Specific settings for an inserted PCI graphics card can be activated here.	Disabled	Disables this function.
		Extended	A memory location is reserved in the main memory: 128 kB (for cards with 512 kB or more) or 1 MB (for cards with 15 MB or more) .

Table 154: 815E - advanced chipset/graphics control setting options

PCI/PNP configuration

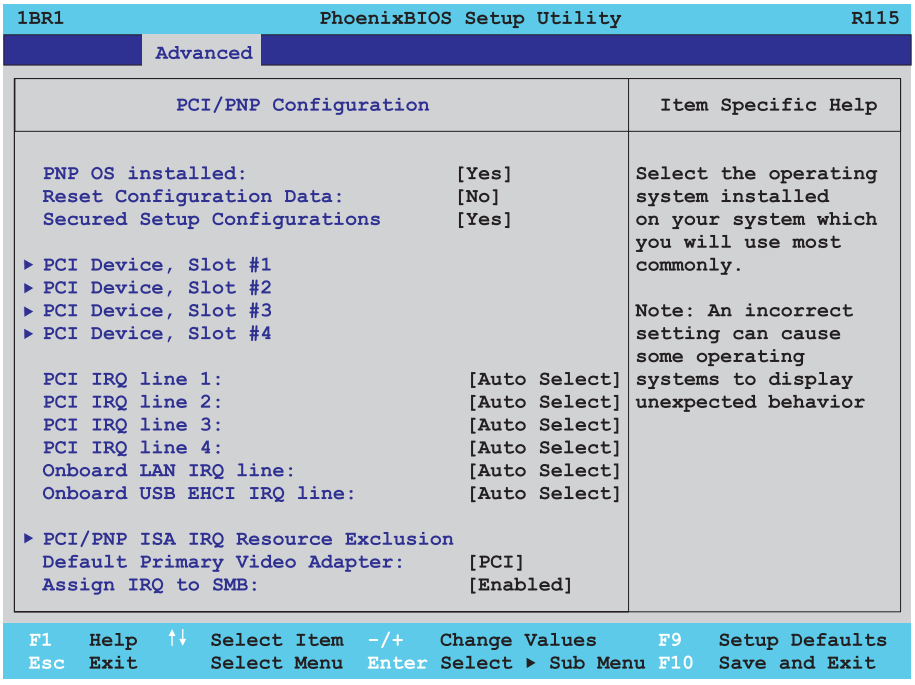


Figure 110: 815E - PCI/PNP configuration

BIOS setting	Meaning	Setting options	Effect
PNP OS installed	If the operating system is plug & play capable, then this option informs BIOS that the operating system will handle the distribution of resources in the future.	Yes	The ISA PnP resources are not assigned. The resource assignment sequence is as follows: 1. Motherboard devices 2. PCI devices
		No	The resource assignment sequence is as follows: 1. Motherboard devices 2. ISA PnP devices 3. PCI devices
Reset configuration data	During booting, the assigned resources are stored in Flash (ESCD).	Yes	When the system is reset after leaving the BIOS setup, all ECSD entries (extended system configuration data) are deleted.
		No	Disables this function. Resources are not reset.
Secured setup configuration	This option protects the setup configuration from interference from a PnP operating system.	Yes	Prevents a PnP operating system from changing system settings.
		No	Disables this function. Changes are allowed.

Table 155: 815E - PCI/PNP configuration options

BIOS setting	Meaning	Setting options	Effect
PCI device, slot #1	Advanced configuration of the PCI slot number 1.	Enter	Opens submenu See "PCI device, slot #1" on page 239
PCI device, slot #2	Advanced configuration of the PCI slot number 2.	Enter	Opens submenu See "PCI device, slot #2" on page 240
PCI device, slot #3	Advanced configuration of the PCI slot number 3.	Enter	Opens submenu See "PCI device, slot #3" on page 241
PCI device, slot #4	Advanced configuration of the PCI slot number 4.	Enter	Opens submenu See "PCI device, slot #4" on page 242
PCI IRQ line 1	Under this option, the external PCI interrupt 1 is assigned to an ISA interrupt.	Auto-select	The interrupt is automatically assigned according to the Plug & Play guidelines.
		Disabled	Disables this function. No assignment.
		3, 4, 5, 7, 8, 9, 10, 11, 12, 14, 15	Manual configuration of the IRQ.
PCI IRQ line 2	Under this option, the external PCI interrupt 2 is assigned to an ISA interrupt.	Auto-select	The interrupt is automatically assigned according to the Plug & Play guidelines.
		Disabled	Disables this function. No assignment.
		3, 4, 5, 7, 8, 9, 10, 11, 12, 14, 15	Manual configuration of the IRQ.
PCI IRQ line 3	Under this option, the external PCI interrupt 3 is assigned to an ISA interrupt.	Auto-select	The interrupt is automatically assigned according to the Plug & Play guidelines.
		Disabled	Disables this function. No assignment.
		3, 4, 5, 7, 8, 9, 10, 11, 12, 14, 15	Manual configuration of the IRQ.
PCI IRQ line 4	Under this option, the external PCI interrupt 4 is assigned to an ISA interrupt.	Auto-select	The interrupt is automatically assigned according to the Plug & Play guidelines.
		Disabled	Disables this function. No assignment.
		3, 4, 5, 7, 8, 9, 10, 11, 12, 14, 15	Manual configuration of the IRQ.
Onboard LAN IRQ line	Under this option, the onboard LAN interrupt is assigned to an ISA interrupt.	Auto-select	The interrupt is automatically assigned according to the Plug & Play guidelines.
		Disabled	Disables this function. No assignment.
		3, 4, 5, 7, 8, 9, 10, 11, 12, 14, 15	Manual configuration of the IRQ.
Onboard USB EHCI IRQ line	Under this option, the USB EHCI interrupt is assigned to an ISA interrupt.	Auto-select	The interrupt is automatically assigned according to the Plug & Play guidelines.
		Disabled	Disables this function. No assignment.
		3, 4, 5, 7, 8, 9, 10, 11, 12, 14, 15	Manual configuration of the IRQ.
PCI/PNP ISA IRQ resource exclusion	This option reserves IRQs that are not being used by plug & play capable ISA devices.	Enter	Opens submenu See "PCI/PNP ISA IRQ resource exclusion" on page 243
Default primary video adapter	This option sets the default graphics card (either an existing AGP or the PCI graphic card).	PCI	A PCI graphics card is set as the default display device.
		AGP	An AGP graphics card is set as the default display device.
Assign IRQ to SMB	Use this function to set whether or not the SM (System Management) bus controller is assigned a PCI interrupt.	Enabled	Automatic assignment of a PCI interrupt.
		Disabled	No assignment of an interrupt.

Table 155: 815E - PCI/PNP configuration options (Forts.)

PCI device, slot #1

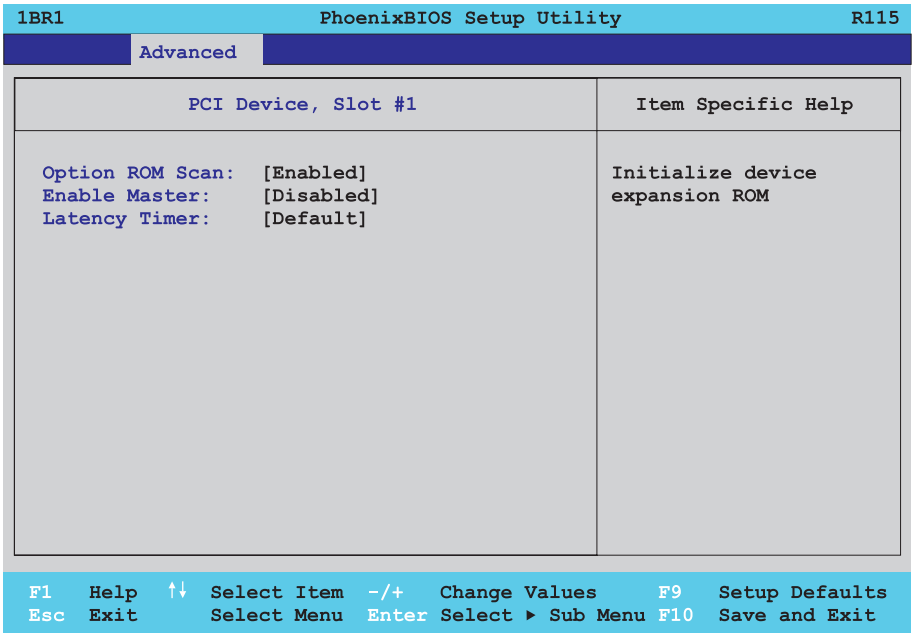


Figure 111: 815E - PCI device, slot #1

BIOS setting	Meaning	Setting options	Effect
ROM scan option	Setting for the initialization of a device's ROM.	Enabled	Enables this function.
		Disabled	Disables this function.
Enable master	Sets the PCI device to be treated as the PCI bus master. Not all PCI devices can function as PCI bus master! Check device description.	Enabled	Enables this function.
		Disabled	Disables this function.
Latency timer	This option controls how long one card can continue to use the PCI bus master after another PCI card has requested access.	Default	Default setting. Standard.
		0020h, 0040h, 0060h, 0080h, 00A0h, 00C0h, 00E0h	Manual configuration of the setting.

Table 156: 815E - PCI device, slot #1 - setting options

PCI device, slot #2

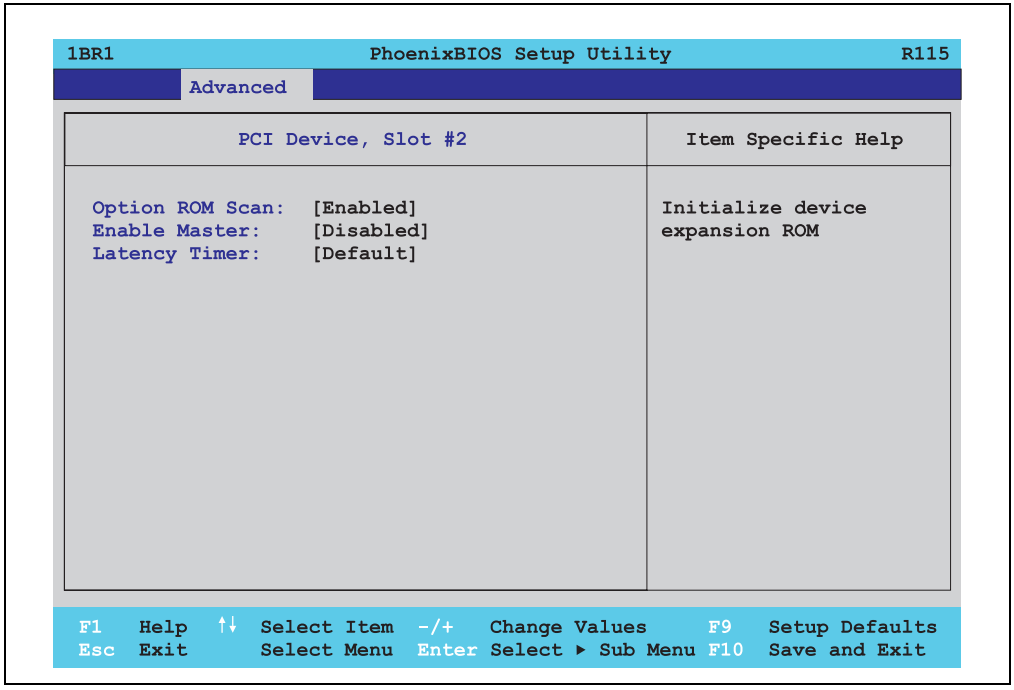


Figure 112: 815E - PCI device, slot #2

BIOS setting	Meaning	Setting options	Effect
ROM scan option	Setting for the initialization of a device's ROM.	Enabled	Enables this function.
		Disabled	Disables this function.
Enable master	Sets the PCI device to be treated as the PCI bus master. Not all PCI devices can function as PCI bus master! Check device description.	Enabled	Enables this function.
		Disabled	Disables this function.
Latency timer	This option controls how long one card can continue to use the PCI bus master after another PCI card has requested access.	Default	Default setting.
		0020h, 0040h, 0060h, 0080h, 00A0h, 00C0h, 00E0h	Manual configuration of the setting.

Table 157: 815E - PCI device, slot #2 - setting options

PCI device, slot #3

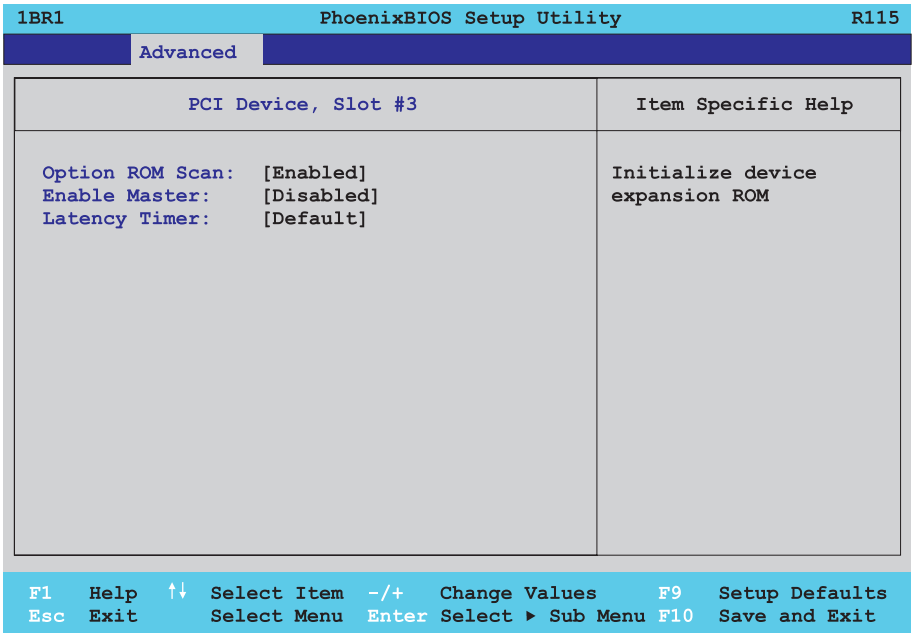


Figure 113: 815E - PCI device, slot #3

BIOS setting	Meaning	Setting options	Effect
ROM scan option	Setting for the initialization of a device's ROM.	Enabled	Enables this function.
		Disabled	Disables this function.
Enable master	Sets the PCI device to be treated as the PCI bus master. Not all PCI devices can function as PCI bus master! Check device description.	Enabled	Enables this function.
		Disabled	Disables this function.
Latency timer	This option controls how long one card can continue to use the PCI bus master after another PCI card has requested access.	Default	Default setting.
		0020h, 0040h, 0060h, 0080h, 00A0h, 00C0h, 00E0h	Manual configuration of the setting.

Table 158: 815E - PCI device, slot #3 - setting options

PCI device, slot #4

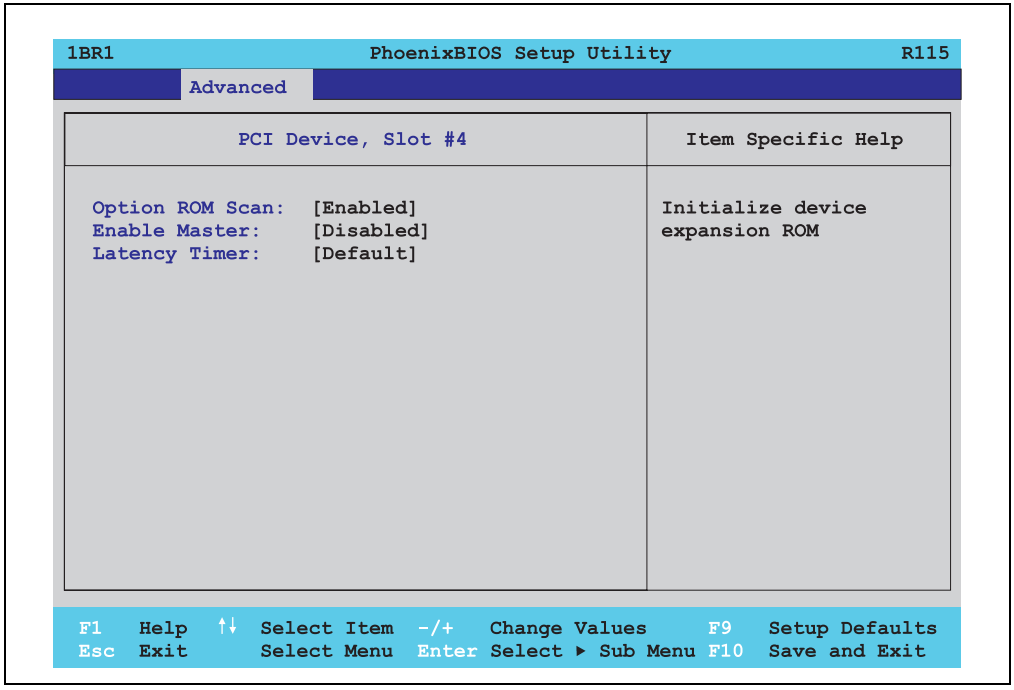


Figure 114: 815E - PCI device, slot #4

BIOS setting	Meaning	Setting options	Effect
ROM scan option	Setting for the initialization of a device's ROM.	Enabled	Enables this function.
		Disabled	Disables this function.
Enable master	Sets the PCI device to be treated as the PCI bus master. Not all PCI devices can function as PCI bus master! Check device description.	Enabled	Enables this function.
		Disabled	Disables this function.
Latency timer	This option controls how long one card can continue to use the PCI bus master after another PCI card has requested access.	Default	Default setting.
		0020h, 0040h, 0060h, 0080h, 00A0h, 00C0h, 00E0h	Manual configuration of the setting.

Table 159: 815E - PCI device, slot #4 - setting options

PCI/PNP ISA IRQ resource exclusion

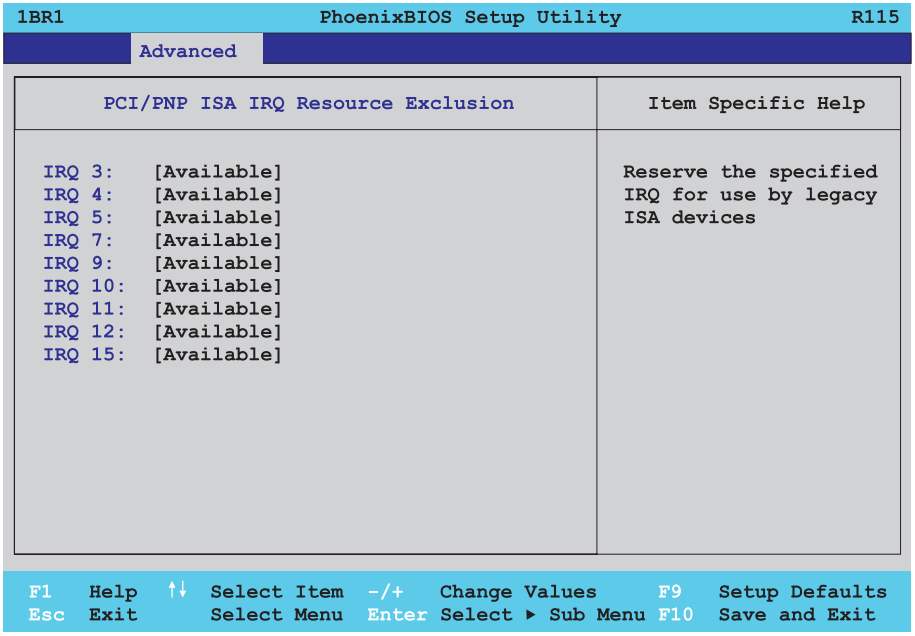


Figure 115: 815E - PCI/PNP ISA IRQ resource exclusion

BIOS setting	Meaning	Setting options	Effect
IRQ 3	This setting determines whether the IRQ 3 is reserved for legacy ISA devices.	Available	It is available for PCI devices.
		Reserved	It is reserved for ISA devices.
IRQ 4	This setting determines whether the IRQ 4 is reserved for legacy ISA devices.	Available	It is available for PCI devices.
		Reserved	It is reserved for ISA devices.
IRQ 5	This setting determines whether the IRQ 5 is reserved for legacy ISA devices.	Available	It is available for PCI devices.
		Reserved	It is reserved for ISA devices.
IRQ 7	This setting determines whether the IRQ 7 is reserved for legacy ISA devices.	Available	It is available for PCI devices.
		Reserved	It is reserved for ISA devices.
IRQ 9	This setting determines whether the IRQ 9 is reserved for legacy ISA devices.	Available	It is available for PCI devices.
		Reserved	It is reserved for ISA devices.
IRQ 10	This setting determines whether the IRQ 10 is reserved for legacy ISA devices.	Available	It is available for PCI devices.
		Reserved	It is reserved for ISA devices.
IRQ 11	This setting determines whether the IRQ 11 is reserved for legacy ISA devices.	Available	It is available for PCI devices.
		Reserved	It is reserved for ISA devices.

Table 160: 815E - PCI/PNP ISA IRQ resource exclusion - setting options

BIOS setting	Meaning	Setting options	Effect
IRQ 12	This setting determines whether the IRQ 12 is reserved for legacy ISA devices.	Available	It is available for PCI devices.
		Reserved	It is reserved for ISA devices.
IRQ 15	This setting determines whether the IRQ 15 is reserved for legacy ISA devices.	Available	It is available for PCI devices.
		Reserved	It is reserved for ISA devices.

Table 160: 815E - PCI/PNP ISA IRQ resource exclusion - setting options (Forts.)

Memory cache

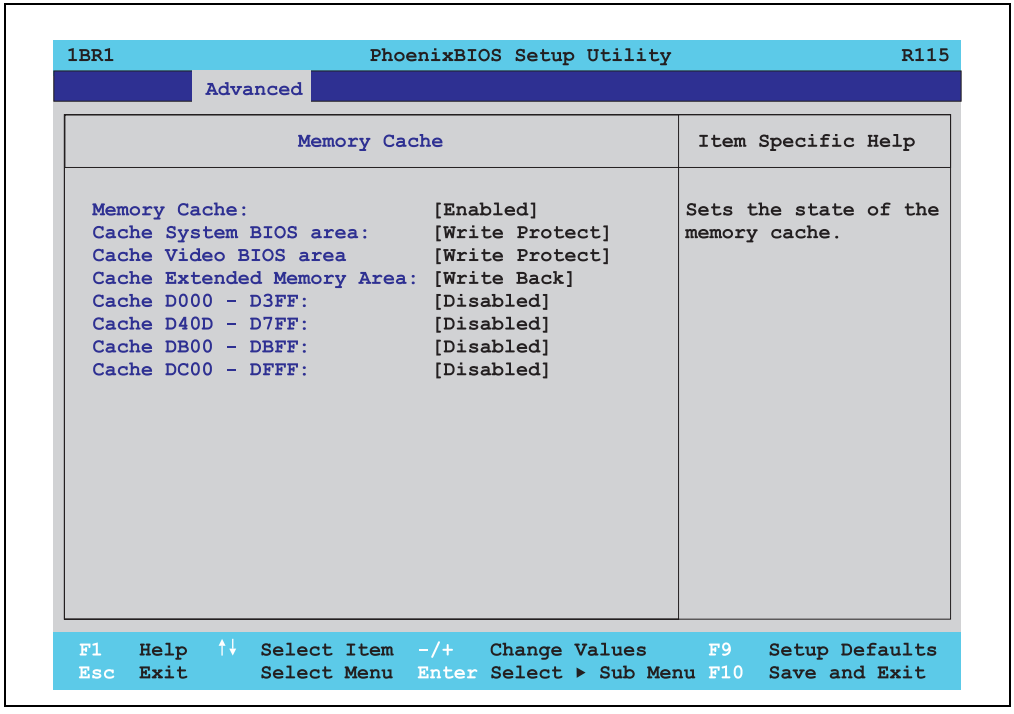


Figure 116: 815E - memory cache

BIOS setting	Meaning	Setting options	Effect
Memory cache	Enable/ disable utilization of the L2 cache.	Enabled	Enables this function.
		Disabled	Disables this function.
Cache system BIOS area	Set whether or not the system BIOS should be buffered.	Write protect	System BIOS is mapped in the cache.
		Uncached	System BIOS is not mapped in the cache.
Cache video BIOS area	Set whether or not the video BIOS should be buffered.	Write protect	Video BIOS is mapped in the cache.
		Uncached	Video BIOS is not mapped in the cache.

Table 161: 815E - memory cache - setting options

BIOS setting	Meaning	Setting options	Effect
Cache extended memory area	Configure how the memory content of the system memory above 1MB should be mapped.	Uncached	No mapping.
		Write through	Memory content is simultaneously mapped in the cache and written to the main memory.
		Write protect	Memory content is mapped in the cache.
		Write back	Memory content is mapped only when necessary.
Cache D000 - D3FF	Configure how the memory content of D000-D3FF should be mapped.	Uncached	No mapping.
		Write through	Memory content is simultaneously mapped in the cache and written to the main memory.
		Write protect	Memory content is mapped in the cache.
		Write back	Memory content is mapped only when necessary.
Cache D400 - D7FF	Configure how the memory content of D400-D7FF should be mapped.	Uncached	No mapping.
		Write through	Memory content is simultaneously mapped in the cache and written to the main memory.
		Write protect	Memory content is mapped in the cache.
		Write back	Memory content is mapped only when necessary.
Cache D800 - DBFF	Configure how the memory content of D800-DBFF should be mapped.	Uncached	No mapping.
		Write through	Memory content is simultaneously mapped in the cache and written to the main memory.
		Write protect	Memory content is mapped in the cache.
		Write back	Memory content is mapped only when necessary.
Cache DC00 - DFFF	Configure how the memory content of DC00-DFFF should be mapped.	Uncached	No mapping.
		Write through	Memory content is simultaneously mapped in the cache and written to the main memory.
		Write protect	Memory content is mapped in the cache.
		Write back	Memory content is mapped only when necessary.

Table 161: 815E - memory cache - setting options (Forts.)

I/O device configuration

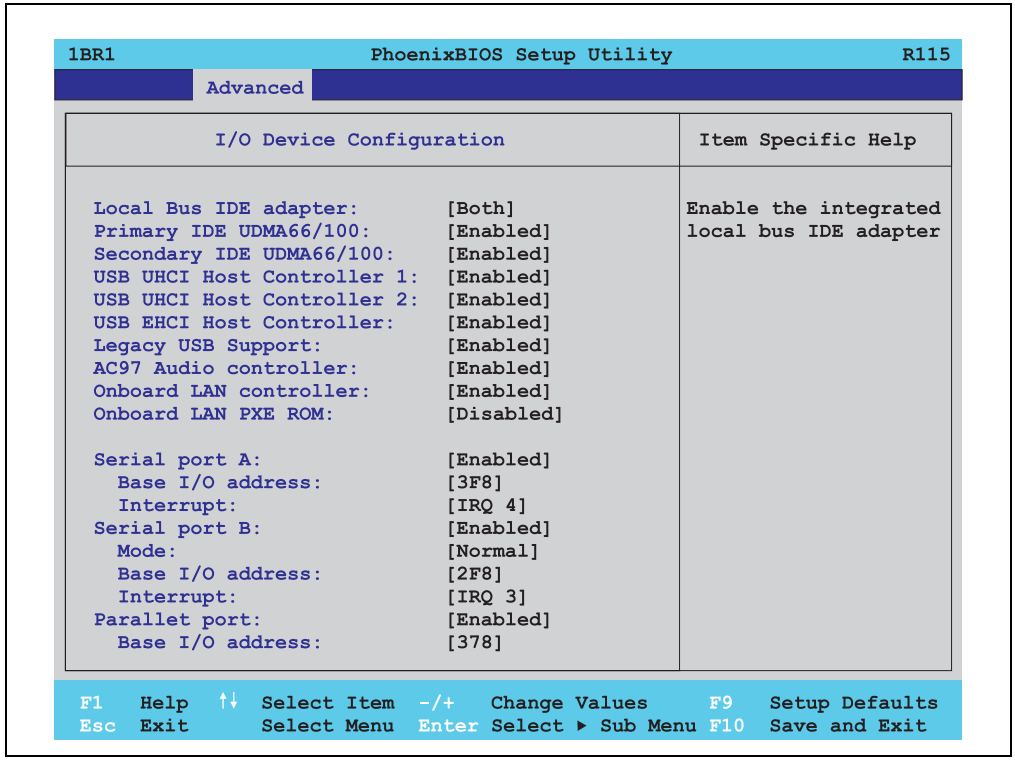


Figure 117: 815E - I/O device configuration

BIOS setting	Meaning	Setting options	Effect
Local bus IDE adapter	Enable or disable one or both of the PCI IDE controllers (primary and secondary).	Disabled	Deactivates both PCI IDE controllers (primary and secondary).
		Primary	Activates the primary IDE controller only.
		Secondary	Activates the secondary IDE controller only.
		Both	Activates both PCI IDE controllers (primary and secondary).
Primary IDE UDMA66/100	Setup the data transfer rate for a device connected to the primary IDE channel. This option is only available when a primary IDE drive is connected.	Disabled	The maximum data transfer rate is UDMA33.
		Enabled	The maximum data transfer rate is UDMA66 or higher.
Secondary IDE UDMA66/100	Setup the data transfer rate for a device connected to the secondary IDE channel. This option is only available when a secondary IDE drive is connected.	Disabled	The maximum data transfer rate is UDMA33.
		Enabled	The maximum data transfer rate is UDMA66.

Table 162: 815E - I/O device configuration - setting options

BIOS setting	Meaning	Setting options	Effect
USB UHCI host controller 1	Configuration of USB UHCI controller 1 for USB port 0 und 1.	Disabled	Deactivates the USB support.
		Enabled	Activates the USB support.
USB UHCI host controller 2	Configuration of the USB UHCI controller 1 for USB port 2 and 3. Can only be configured if the USB UHCI controller 1 is activated.	Disabled	Deactivates the USB support.
		Enabled	Activates the USB support.
USB UHCI host controller	Configuration of the USB EHCI controller. Can only be configured if the USB UHCI controller 1 is activated.	Disabled	Deactivates the USB support.
		Enabled	When enabled, the USB 2.0 support is activated as soon as a USB 2.0 device is connected to the interface.
Legacy USB support	Here IRQs are assigned to the USB connections.	Disabled	No IRQ assigned. It is not possible to boot from a USB device (USB stick, USB floppy, USB CD ROM, etc.)! However, a connected USB keyboard can be used to access and configure the BIOS setup, boot menu or optional RAID boot menu. USB devices will not function after completing the BIOS POST routine. USB devices only work after starting the operating system with USB support (e.g. Windows XP). MS-DOS does not support the use of USB devices.
		Enabled	IRQ assigned. Booting from USB devices is now possible. Supported USB devices work with MS-DOS (e.g. USB keyboard, etc).
AC97 audio controller	For turning the AC97 audio controller on and off.	Disabled	AC97 sound is deactivated.
		Enabled	AC97 sound is activated.
Onboard LAN controller	For turning the ICH4 on-board LAN controller (for ETH1) on and off.	Disabled	Deactivates the LAN controller or the ETH1 interface.
		Enabled	Activates the LAN controller or the ETH1 interface.
Onboard LAN PXE ROM	For turning the remote boot BIOS extension for the on-board LAN controller (ETH1) on and off.	Disabled	Disables this function.
		Enabled	Enables this function.
Serial port A	For the configuration of serial port A (COM1).	Disabled	Port A deactivated.
		Enabled	Port A activated. The base I/O addresses and the interrupt must then be configured manually.
		Auto	Either BIOS or the operating system configures the port automatically.
Base I/O address	Selection of the base I/O address for port A. A yellow star indicates a conflict with another device.	3F8, 2F8, 3E8, 2E8	Base I/O address is manually assigned.
Interrupt	Selection of the interrupt for port A. A yellow star indicates a conflict with another device.	IRQ 3, IRQ 4	Manual assignment of the interrupt.

Table 162: 815E - I/O device configuration - setting options (Forts.)

BIOS setting	Meaning	Setting options	Effect
Serial port B	For the configuration of serial port B (COM2).	Disabled	Port B deactivated.
		Enabled	Port A activated. The base I/O addresses and the interrupt must then be configured manually.
		Auto	Either BIOS or the operating system configures the port automatically.
Mode	This option is for setting the serial port B as either a standard interface or as an infrared interface.	Normal	Serial port B is used as a standard interface.
		IR	The serial interface is used as an infrared interface, and allows data transfers up to 115 kBit/s.
Base I/O address	Selection of the base I/O address for port B. A yellow star indicates a conflict with another device.	3F8, 2F8, 3E8, 2E8	Selected base I/O address is manually assigned.
Interrupt	Selection of the interrupt for port B. A yellow star indicates a conflict with another device.	IRQ 3, IRQ 4	Selected interrupt is manually assigned.
Parallel port	For configuring the hardware security key (dongle), which accessed internally through the parallel interface.	Disabled	Deactivates the port.
		Enabled	Activates the port. The base I/O address must then be set.
		Auto	First BIOS and then the operating system configure the port automatically.
Base I/O address	Selection of the base I/O address for the parallel port.	378, 278, 3BC	Base I/O address is manually assigned.

Table 162: 815E - I/O device configuration - setting options (Forts.)

Keyboard features

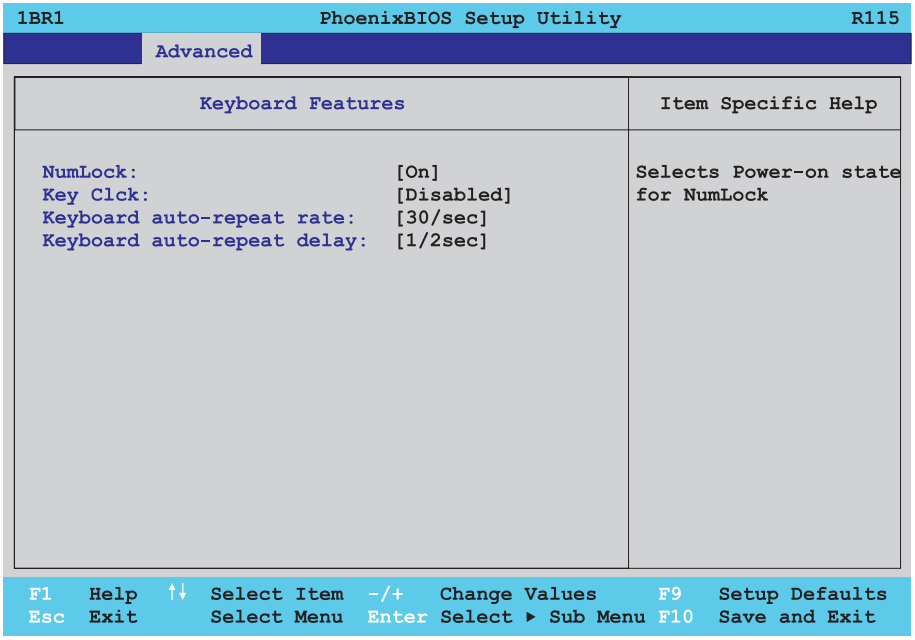


Figure 118: 815E - keyboard features

BIOS setting	Meaning	Setting options	Effect
NumLock	This option sets the status of the numeric keypad when the the system is booted.	On	Numeric keypad is activated.
		Off	Only the cursor functions of the numerical keypad are activated.
		Auto	Numeric keypad is activated, if present.
Key click	Using this option, the clicking of the keys can be turned on or off.	Disabled	Disables this function.
		Enabled	Enables this function.
Keyboard auto-repeat rate	For setting the speed of repetition when a key is held down.	30/sec, 26.7/sec, 21.8/sec, 18.5/sec, 13.3/sec, 10/sec, 6/sec, 2/sec	Settings from 2 to 30 characters per second.
Keyboard auto-repeat delay	For setting the amount of delay after the key is pressed before the auto-repeat begins.	1/4 sec, 1/2 sec, 3/4 sec, 1 sec	Setting of the desired delay.

Table 163: 815E - keyboard features - setting options

CPU board monitor

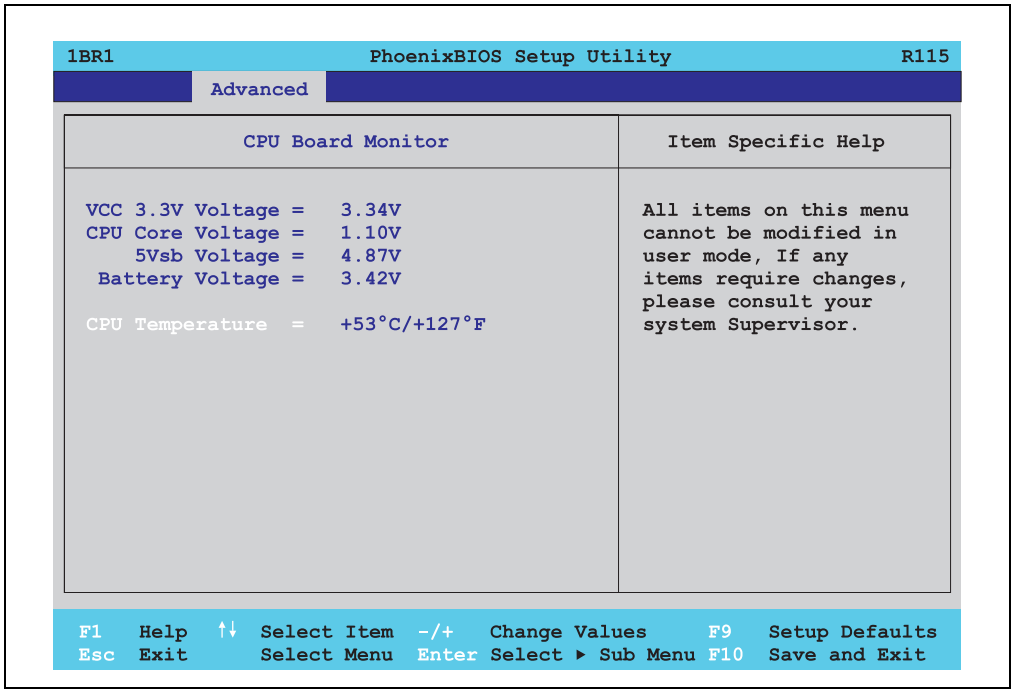


Figure 119: 815E - CPU board monitor

BIOS setting	Meaning	Setting options	Effect
VCC 3.3V voltage	Displays the current voltage of the 3.3 volt supply (in volts).	None	
CPU core voltage	Displays the processor's core voltage (in volts).	None	
5Vsb voltage	Displays the 5 V standby voltage (in volts).	None	
Battery voltage	Displays the battery voltage (in volts).	None	
CPU temperature	Displays the processor's temperature (in degrees Celsius and Fahrenheit).	None	

Table 164: 815E - CPU board monitor - setting options

Miscellaneous

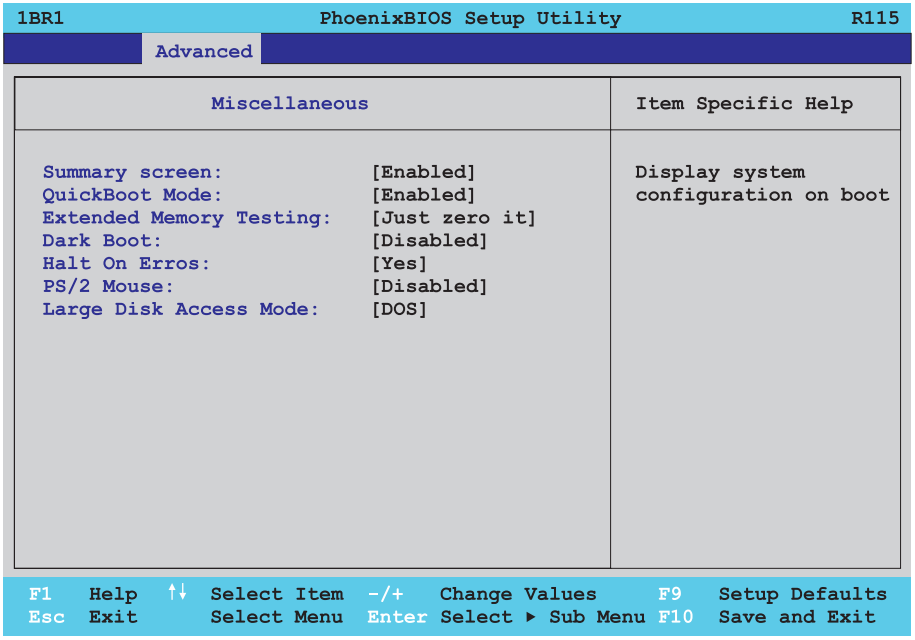


Figure 120: 815E - miscellaneous

BIOS setting	Meaning	Setting options	Effect
Summary screen	Set whether or not the system summary screen should open when the system is started (see figure 102 "815E - BIOS summary screen" on page 225).	Enabled	Enables this function.
		Disabled	Disables this function.
QuickBoot mode	Speeds up the booting process by skipping several tests.	Enabled	Enables this function.
		Disabled	Disables this function.
Extended memory testing	This function determines the method by which the main memory over 1 MB is tested.	Just zero it	The main memory is quickly tested.
		None	The main memory is not tested at all.
		Normal	This option is only available when the function "QuickBoot mode" has been set to "disabled." The main memory is tested more slowly than with "Just zero It."
Dark boot	Sets whether the diagnostics screen (see figure 101 "815E - BIOS diagnostic screen" on page 224) should be displayed when the system is started.	Enabled	Enables this function. The diagnostics screen is displayed.
		Disabled	Disables this function. The diagnostics screen is not displayed.

Table 165: 815E - miscellaneous setting options

BIOS setting	Meaning	Setting options	Effect
Halt on errors	This option sets whether the system should pause the Power On Self Test (POST) when it encounters an error.	Yes	The system pauses. The system pauses every time an error is encountered.
		No	The system does not pause. All errors are ignored.
PS/2 mouse	Sets whether the PS/2 mouse port should be activated.	Disabled	Deactivates the port.
		Enabled	Activates the port. The IRQ12 is reserved, and is not available for other components.
Large disk access mode	This option is intended for hard discs with more than 1024 cylinders, 16 heads, and more than 63 sectors per track. Setting options: DOS	Other	For non-compatible access (e.g. Novell, SCO Unix.)
		DOS	For MS DOS compatible access.

Table 165: 815E - miscellaneous setting options (Forts.)

Baseboard/panel features

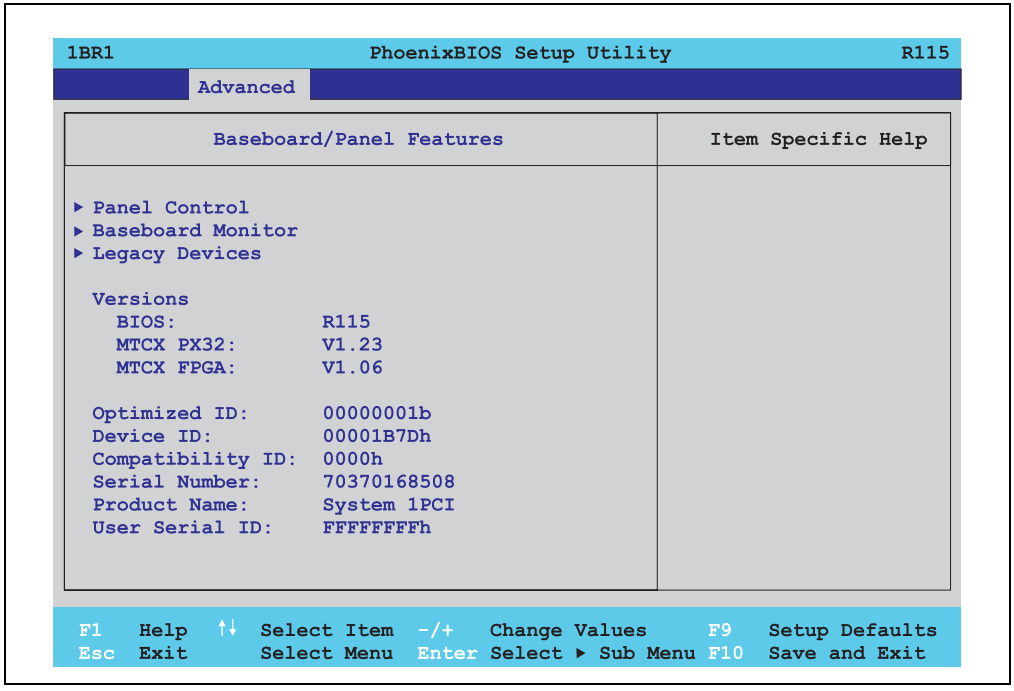


Figure 121: 815E - baseboard / panel features

BIOS setting	Meaning	Setting options	Effect
Panel control	For special setup of connected panels (display units).	Enter	Opens submenu See "Panel control" on page 254
Baseboard monitor	Display of various temperatures and fan speeds.	Enter	Opens submenu See "Baseboard monitor" on page 255

Table 166: 815E - baseboard / panel features - setting options

BIOS setting	Meaning	Setting options	Effect
Legacy devices		Enter	Opens submenu See "Legacy devices" on page 256
BIOS	Displays the BIOS version.	None	
MTCX PX32	Displays the MTCX PX32 firmware version.	None	
MTCX FPGA	Displays the MTCX FPGA firmware version.	None	
Optimized ID	Displays the DIP switch setting of the configuration switch.	None	
Device ID	Displays the hexadecimal value of the hardware device ID.	None	
Compatibility ID	Displays the version of the device within the same B&R device 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 hexadecimal value of the user serial ID number. This number can only be changed with "control center," available from B&R.	None	

Table 166: 815E - baseboard / panel features - setting options

Panel control

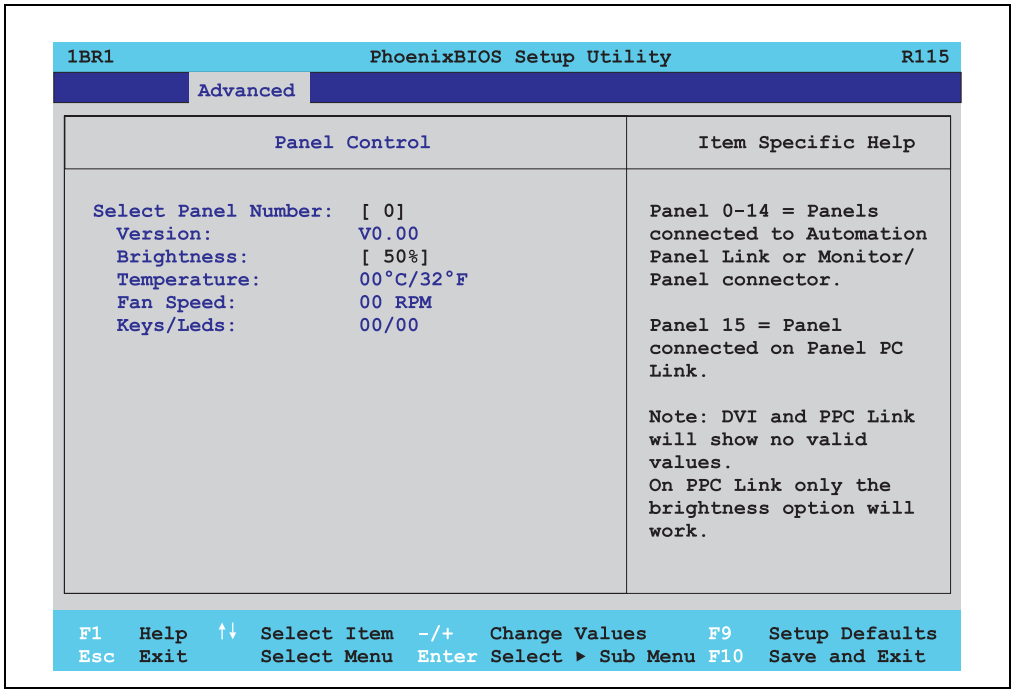


Figure 122: 815E - panel control

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%, 25%, 50%, 75%, 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 167: 815E - panel control - setting options

Baseboard monitor

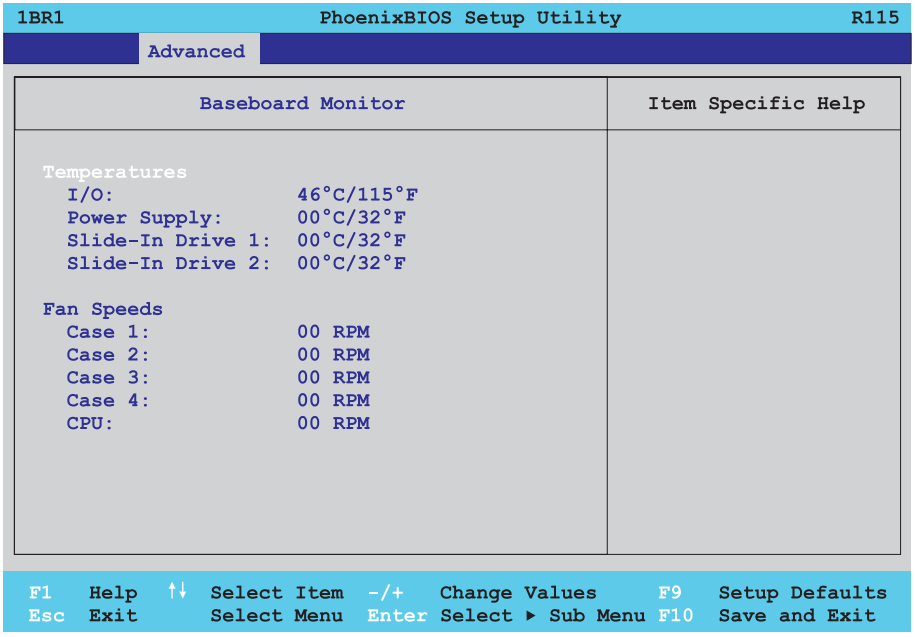


Figure 123: 815E - baseboard monitor

BIOS setting	Meaning	Setting options	Effect
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 area 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 fan speed of the processor fan.	None	

Table 168: 815E - baseboard monitor - setting options

Legacy devices

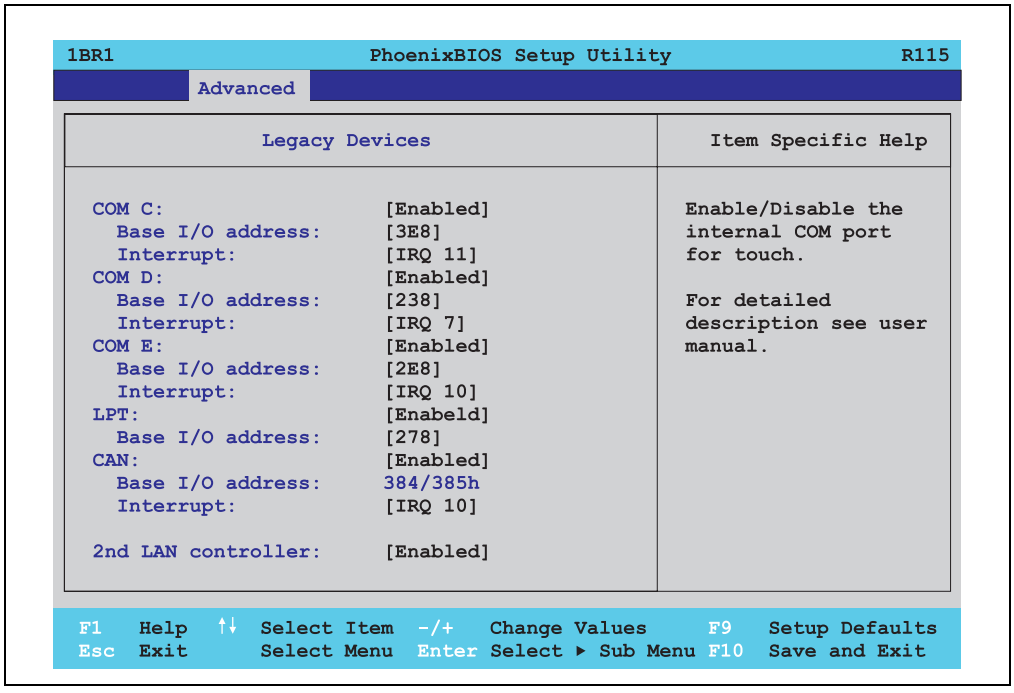


Figure 124: 815E - Legacy devices

BIOS setting	Meaning	Setting options	Effect
COM C	Settings for the internal serial interfaces in the system. This setting activates the touch screen in panel PC 700 systems, and, using SDL transfer technology, also in Automation Panel 900 display units.	Disabled	Deactivates the interface.
		Enabled	Activates the interface.
Base I/O address	Selection of the base I/O address for the COM C port. A yellow star indicates a conflict with another device.	238, 2E8, 2F8, 328, 338, 3E8, 3F8	Selected base I/O address is assigned.
Interrupt	Selection of the interrupt for the COM C port. A yellow star indicates a conflict with another device.	IRQ 3, IRQ 4, IRQ 5, IRQ 10, IRQ 11, IRQ 12, IRQ 15	Selected interrupt is assigned.
COM D	Configuration of the COM D port for the serial interface of an automation panel link slot. The interface is used to operate the touch screen on connected Automation Panel 900 units.	Disabled	Deactivates the interface.
		Enabled	Activates the interface.

Table 169: 815E - Legacy devices - setting options

BIOS setting	Meaning	Setting options	Effect
Base I/O address	Configuration of the base I/O address for the serial COM D port. A yellow star indicates a conflict with another device.	238, 2E8, 2F8, 328, 338, 3E8, 3F8	Selected base I/O address is assigned.
Interrupt	Selection of the interrupt for the COM D port. A yellow star indicates a conflict with another device.	IRQ 3, IRQ 4, IRQ 5, IRQ 10, IRQ 11, IRQ 12, IRQ 15	Selected interrupt is assigned.
COM E	Configuration of the optional COM E port of a B&R add-on optional interface (IF option).	Disabled	Deactivates the interface.
		Enabled	Activates the interface.
Base I/O address	Configuration of the base I/O address for the serial COM E port. A yellow star indicates a conflict with another device.	238, 2E8, 2F8, 328, 338, 3E8, 3F8	Selected base I/O address is assigned.
Interrupt	Selection of the interrupt for the COM E port. A yellow star indicates a conflict with another device.	IRQ 3, IRQ 4, IRQ 5, IRQ 10, IRQ 11, IRQ 12, IRQ 15	Selected interrupt is assigned.
LPT	This setting is specific to B&R and should not be changed.	Disabled	Deactivates the interface.
		Enabled	Activates the interface.
Base I/O address	Configuration of the base I/O address for the optional LPT. A yellow star indicates a conflict with another device.	278, 378, 3BC	Selected base I/O address is assigned.
CAN	Configuration of the CAN port of a B&R add-on CAN interface card (IF option).	Disabled	Deactivates the interface.
		Enabled	Activates the interface.
Base I/O address	384/385h	None	-
Interrupt	Selection of the interrupt for the CAN port.	IRQ 10	Selected interrupt is assigned.
		NMI	NMI interrupt is assigned.
2nd LAN controller	For turning the on-board LAN controller (ETH2) on and off.	Disabled	Deactivates the controller.
		Enabled	Activates the controller.

Table 169: 815E - Legacy devices - setting options (Forts.)

1.1.6 Security

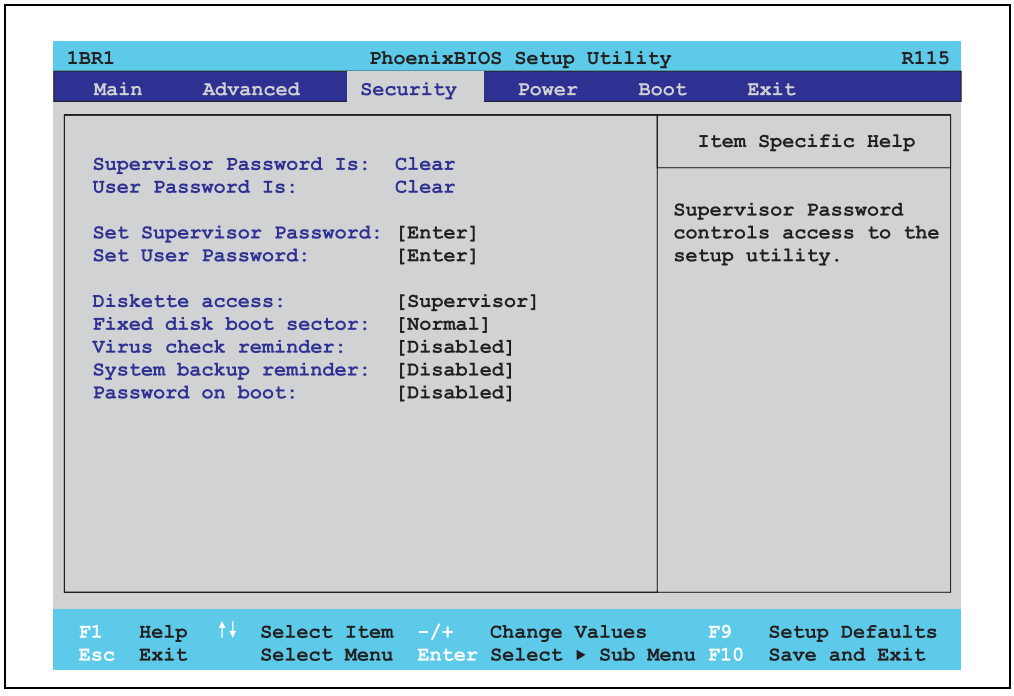


Figure 125: 815E - security menu

BIOS setting	Meaning	Setting options	Effect
Supervisor password is	Displays whether or not a supervisor password has been set.	None	Display **set**: A supervisor password has been set. Display **clear**: No supervisor password has been set.
User password is	Displays whether or not a user password has been set.	None	Display **set**: A user password has been set. Display **clear**: No user password has been set.
Set supervisor password	To enter/change a supervisor password. A supervisor password is necessary to edit all BIOS settings.	Enter maximum 7 alphanumeric characters - not case sensitive.	Press Enter and enter password two times. The password must be 7 alphanumeric characters or less. Needed to enter BIOS setup. To change the password, enter the old password once and then the new password twice.
Set user password	To enter/change a user password. A user password allows the user to edit only certain BIOS settings.	Enter maximum 7 alphanumeric characters - not case sensitive.	Press Enter and enter password two times. The password must be 7 alphanumeric characters or less. Needed to enter BIOS setup. To change the password, enter the old password once and then the new password twice.

Table 170: 815E - security - setting options

BIOS setting	Meaning	Setting options	Effect
Diskette access	Access to the diskette drive is controlled here. Either or the supervisor or the user has access to it. Does not work with USB diskette drives.	Supervisor	Supervisor password is needed to access a diskette drive.
		User	User password is needed to access a diskette drive.
Fixed disk boot sector	The boot sector of the primary hard drive can be write protected against viruses with this option.	Normal	Write access allowed.
		Write protect	Boot sector is write protected.
Virus check reminder	This function opens a reminder when the system is started to scan for viruses.	Disabled	Disables this function.
		Daily	A reminder appears every day when the system is started.
		Weekly	A reminder appears the first time the system is started after every Sunday.
		Monthly	A reminder appears the first time the system is started each month.
System backup reminder	This function opens a reminder when the system is started to create a system backup.	Disabled	Disables this function.
		Daily	A reminder appears every day when the system is started.
		Weekly	A reminder appears the first time the system is started after every Sunday.
		Monthly	A reminder appears the first time the system is started each month.
Password at boot	This function requires a supervisor or user password when the system is started. Only possible when a supervisor or user password is enabled.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 170: 815E - security - setting options (Forts.)

1.1.7 Power

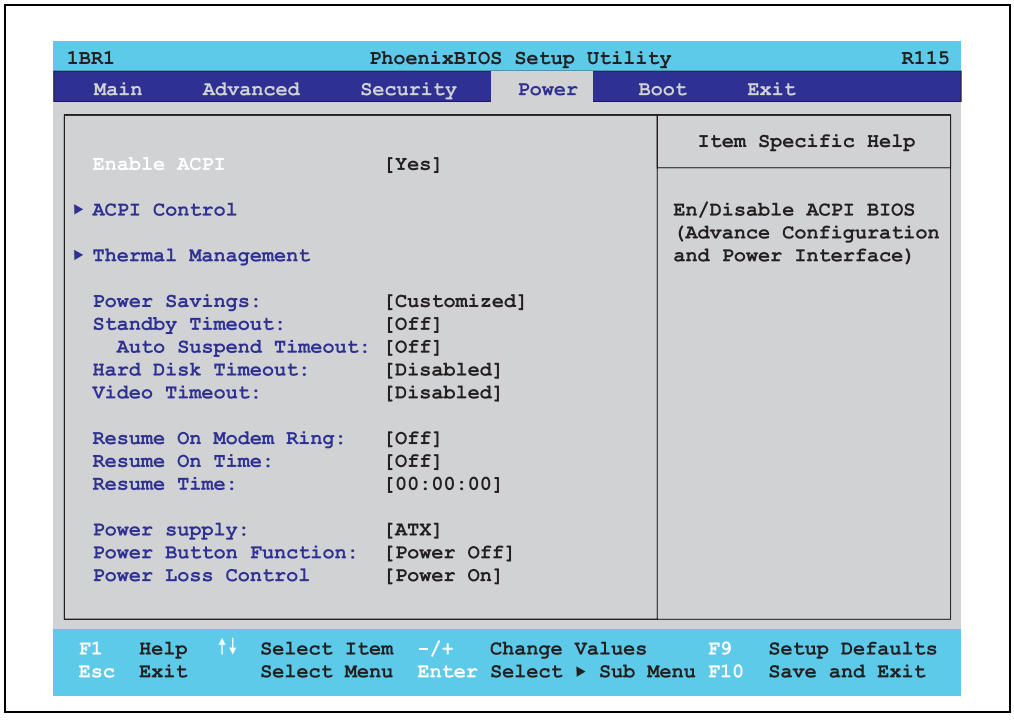


Figure 126: 815E - power menu

BIOS setting	Meaning	Setting options	Effect
Enable ACPI	This option turns the ACPI function (Advanced Configuration and Power Interface) on or off. This is an advanced plug & play and power management functionality.	Yes	Enables this function.
		No	Disables this function.
ACPI control	Configuration of specific limits.	Enter	Opens submenu See "ACPI control" on page 262
Thermal management	Configuration of specific CPU limits.	Enter	Opens submenu See "Thermal management" on page 263
Power savings	This function determines if and how the power save function is used.	Disabled	Deactivates the power save function.
		Customized	Power management is configured by adjusting the individual settings.
		Maximum power savings	Maximum power savings function.
		Maximum performance	Energy savings function to maximize performance.

Table 171: 815E - power - setting options

BIOS setting	Meaning	Setting options	Effect
Standby timeout	Set here when the system should enter standby mode. During standby, various devices and the display will be deactivated. This option only available when "power savings" is set to customized.	Off	No standby.
		1, 2, 4, 8 minutes	Time in minutes until standby.
Auto suspend timeout	Set here when the system should enter suspend mode to save electricity. This option only available when "power savings" is set to customized.	Off	No standby.
		5, 10, 15, 20, 30, 40, 60 minutes	Time in minutes until standby.
Hard disk timeout	Set here how long after the last access the hard disk should enter standby mode. This option only available when "power savings" is set to customized.	Disabled	Disables this function.
		10, 15, 30, 45 seconds	Time in seconds until standby.
		1, 2, 4, 6, 8, 10, 15 minutes	Time in minutes until standby.
Video timeout		Disabled	
Resume on modem ring	If an external modem is connected to a serial port and the telephone rings, the system starts up.	Off	Disables this function.
		On	Enables this function.
Resume on time	This function enables the system to start at the time set under "resume time."	Off	Disables this function.
		On	Enables this function.
Resume time	Time setting for the option "resume on time" (when the system should start up).	[00:00:00]	Personal setting of the time in the format (hh:mm:ss).
Power supply	The type of power supply being used can be entered here.	ATX	An ATX compatible power supply is being used. **Since the APC620 contains an ATX power supply, ATX should be selected.**
		AT	An AT compatible power supply is being used.
Power button function	This option determines the function of the power button.	Power off	Shuts down the system.
		Sleep	The system enters sleep mode.
Power loss control	This option determines how the system reacts to a power outage.	Stay off	The system does not turn back on. The system remains off until the power button is pressed.
		Power-on	The system turns back on.
		Last state	The system resumes the last state it was in before the power outage.

Table 171: 815E - power - setting options (Forts.)

ACPI control

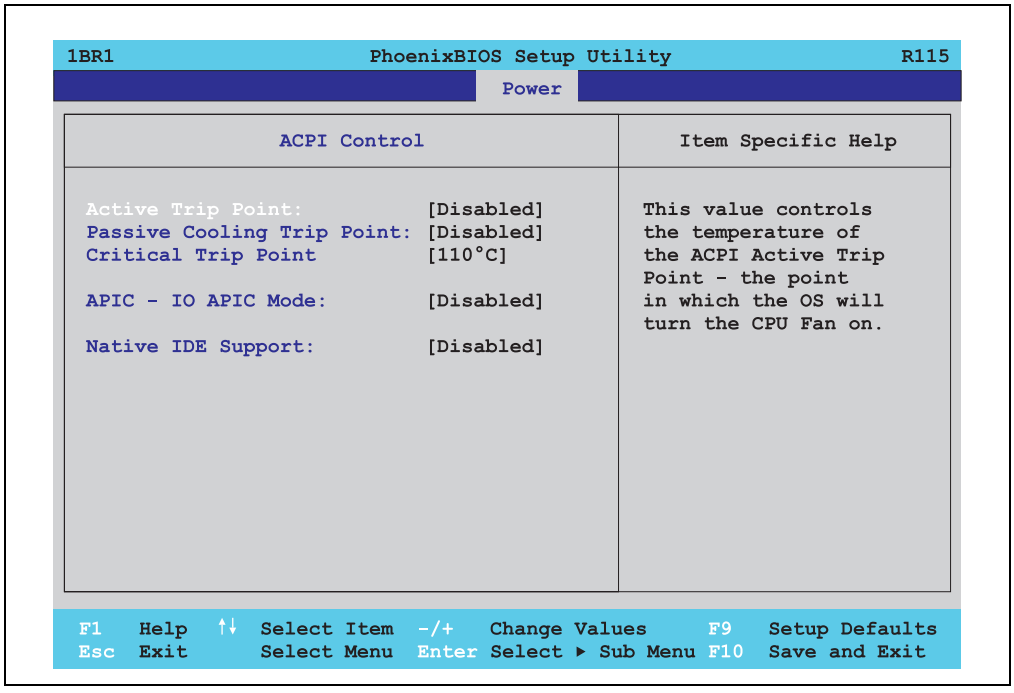


Figure 127: 815E - ACPI control

BIOS setting	Meaning	Setting options	Effect
Active trip point	With this function, an optional CPU fan above the operating system can be set to turn on when the CPU reaches the set temperature.	Disabled	Disables this function.
		40°C... 100°C	Temperature setting for the active trip point. Can be set in 5 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.
		40°C... 100°C	Temperature setting for the passive cooling trip point. Can be set in 5 degree increments.
Critical trip point	With this function, a temperature can be set at which the operating system automatically shuts itself down. **Warning!** **This function should never be deactivated, as this would allow the CPU to rise above the temperature specifications.**	Disabled	Disables this function.
		40°C... 110°C	Temperature setting for the critical trip point. Can be set in 5 degree increments.

Table 172: 815E - ACPI control - setting options

BIOS setting	Meaning	Setting options	Effect
APIC - I/O APIC mode	This option controls the functionality of the advanced interrupt controller in the processor.	Disabled	Deactivates the function
		Enabled	Enables this function. 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.
Native IDE support	The native IDE support offers the possibility to make 4 hard disk controllers (2 x primary ATA for a total of 4 devices, and 2 x secondary ATA for another 2 devices) accessible through Windows XP.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 172: 815E - ACPI control - setting options (Forts.)

Thermal management

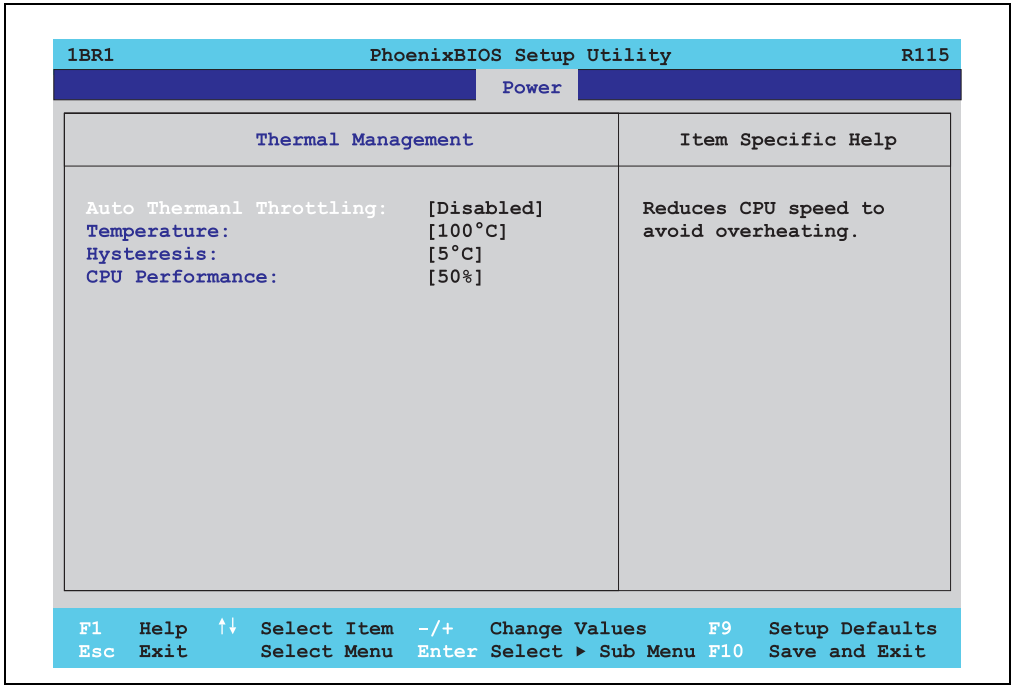


Figure 128: 815E - thermal management

BIOS setting	Meaning	Setting options	Effect
Auto thermal throttling	Reduces the CPU speed when it exceeds the limit set in the "temperature" option by the amount set in the "CPU performance" option.	Enabled	Enables this function.
		Disabled	Disables this function.

Table 173: 815E - thermal management

BIOS setting	Meaning	Setting options	Effect
Temperature	Temperature limit for the setting "auto thermal throttling."	75°C ... 110°C	Can be set in increments of 5°C.
Hysteresis	When auto thermal throttling has been activated and the temperature sinks by the number of degrees in this setting, the processor resumes 100% performance.	3°C ... 6°C	Can be set in increments of 1°C.
CPU performance	When the CPU reaches the temperature set in the "temperature" option, the CPU is throttled by the amount (%) set in this option.	13%, 25%, 50%, 75%	CPU performance throttled by amount selected, in percent.

Table 173: 815E - thermal management (Forts.)

1.1.8 Boot

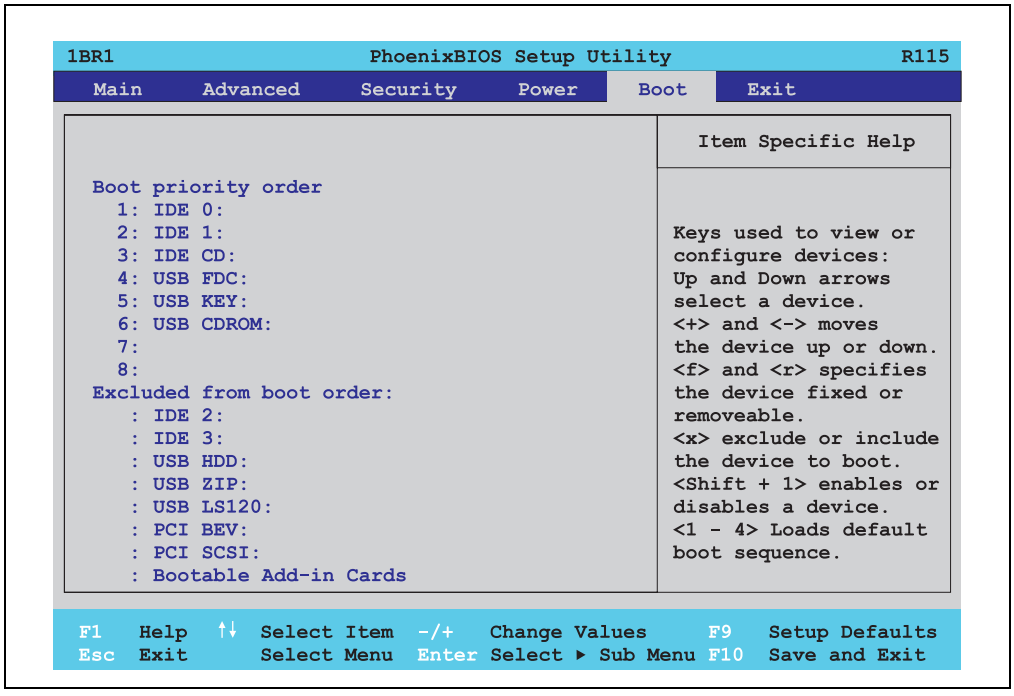


Figure 129: 815E - boot menu

BIOS setting	Meaning	Setting options	Effect
1:		IDE 0, IDE 1, IDE 2, IDE 3, IDE CD USB FDC, USB KEY USB CDROM USB HDD, USB ZIP USB LS120, PCI BEV, PCI SCSI, bootable add-in cards	Use the up arrow ↑ and down arrow ↓, to select a device. Then, use the <+> und <-> keys to change the boot priority of the drive. To add a device to the "boot priority order" list from the "excluded from boot order" list, use the <x> key. In the same way, the <x> key can move boot devices down out of the boot priority order. The keys 1 - 4 can load preset boot sequences.
2:			
3:			
4:			
5:			
6:			
7:			
8:			

Table 174: 815E - boot menu - setting options

1.1.9 Exit

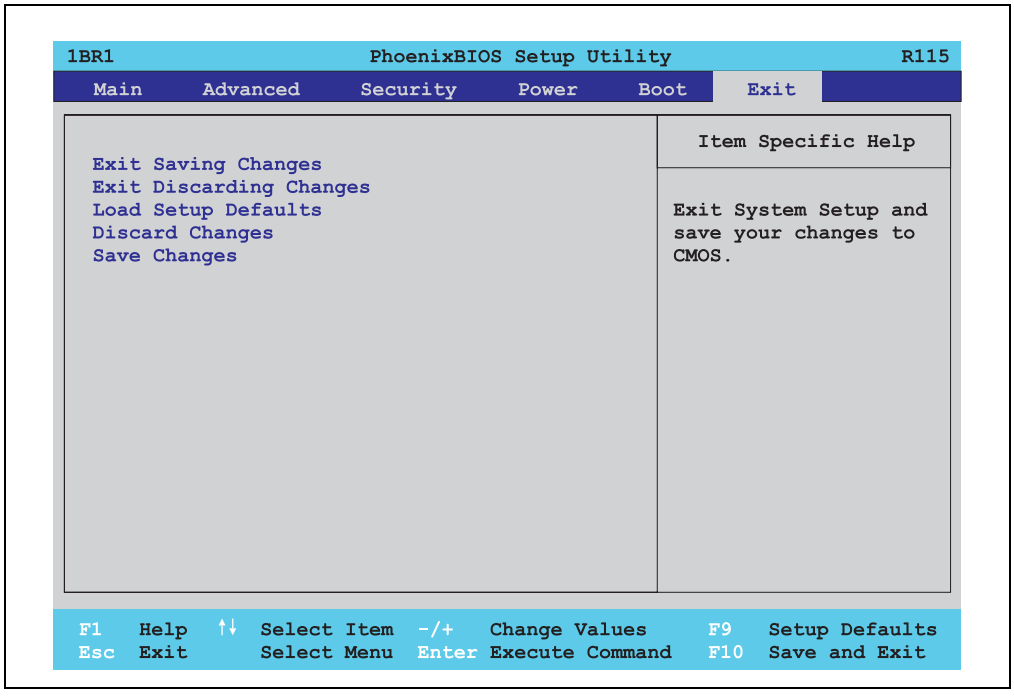


Figure 130: 815E - exit menu

BIOS setting	Meaning	Setting options	Effect
Exit saving changes	BIOS setup is closed with this item. Changes made are saved in CMOS after confirmation, and the system is rebooted.	Yes / No	
Exit discarding changes	With this item you can close BIOS setup without saving the changes made. The system is then rebooted.	Yes / No	
Load setup defaults	This item loads the BIOS setup defaults, which are defined by the DIP switch settings. These settings are loaded for all BIOS configurations.	Yes / No	
Discard changes	Should unknown changes have been made and not yet saved, they can be discarded.	Yes / No	
Save changes	Settings are saved, and the system is not restarted.	Yes / No	

Table 175: 815E - exit menu - setting options

1.1.10 Profile overview

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

DIP switch position see Section 1.8 "Position of the DIP switch for APC620 system units" on page 347).

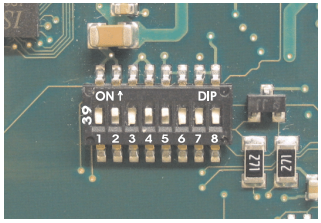


Figure 131: DIP switch on system unit

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

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.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	-	-

Table 176: 815E - profile overview

1) Reserved.

The following pages provide an overview of the BIOS default settings for the different DIP switch configurations.

Personal settings

If changes have been made to the BIOS defaults, they can be entered in the personal settings column of following tables for backup.

Main

	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Personal settings
System time	-	-	-	-	-	
System date	-	-	-	-	-	
SMART device monitoring	Enabled	Enabled	Enabled	Enabled	Enabled	
Primary master						
Type	Auto	Auto	Auto	Auto	Auto	
Multi-sector transfer	-	-	-	-	-	
LBA mode control	-	-	-	-	-	
32-bit I/O	Disabled	Disabled	Disabled	Disabled	Disabled	
Transfer mode	-	-	-	-	-	
Ultra DMA mode	-	-	-	-	-	
SMART monitoring	Disabled	Disabled	Disabled	Disabled	Disabled	
Primary slave						
Type	Auto	Auto	Auto	Auto	Auto	
Multi-sector transfer	-	-	-	-	-	
LBA mode control	-	-	-	-	-	
32-bit I/O	Disabled	Disabled	Disabled	Disabled	Disabled	
Transfer mode	-	-	-	-	-	
Ultra DMA mode	-	-	-	-	-	
SMART monitoring	Disabled	Disabled	Disabled	Disabled	Disabled	
Secondary master						
Type	Auto	Auto	Auto	Auto	Auto	
Multi-sector transfer	-	-	-	-	-	
LBA mode control	-	-	-	-	-	
32-bit I/O	Disabled	Disabled	Disabled	Disabled	Disabled	
Transfer mode	-	-	-	-	-	
Secondary master						
Ultra DMA mode	-	-	-	-	-	
SMART monitoring	Disabled	Disabled	Disabled	Disabled	Disabled	
Secondary slave						
Type	Auto	Auto	Auto	Auto	Auto	
Multi-sector transfer	-	-	-	-	-	
LBA mode control	-	-	-	-	-	
32-bit I/O	Disabled	Disabled	Disabled	Disabled	Disabled	
Transfer mode	-	-	-	-	-	
Ultra DMA mode	-	-	-	-	-	
SMART monitoring	Disabled	Disabled	Disabled	Disabled	Disabled	

Table 177: 815E - main profile setting overview

Advanced

Advanced chipset/graphics control

	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Personal settings
Graphics engine 1	Auto	Auto	Auto	Auto	Auto	
Graphics memory size	1MB	1MB	1MB	1MB	1MB	
Enable memory gap	Disabled	Disabled	Disabled	Disabled	Disabled	

Table 178: 815E - advanced chipset/graphics control - profile settings overview

PCI/PNP configuration

	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Personal settings
PNP OS installed	Yes	Yes	Yes	Yes	Yes	
Reset configuration data	No	No	No	No	No	
Secured setup configuration	Yes	Yes	Yes	Yes	Yes	
PCI IRQ line 1	Auto-select	Auto-select	Auto-select	Auto-select	Auto-select	
PCI IRQ line 2	Auto-select	Auto-select	Auto-select	Auto-select	Auto-select	
PCI IRQ line 3	Auto-select	Auto-select	Auto-select	Auto-select	Auto-select	
PCI IRQ line 4	Auto-select	Auto-select	Auto-select	Auto-select	Auto-select	
Onboard LAN IRQ line	Auto-select	Auto-select	Auto-select	Auto-select	Auto-select	
Onboard USB EHCI IRQ line	Auto-select	Auto-select	Auto-select	Auto-select	Auto-select	
Default primary video adapter	PCI	PCI	PCI	PCI	PCI	
Assign IRQ to SMB	Enabled	Enabled	Enabled	Enabled	Enabled	
PCI device, slot #1						
ROM scan option	Enabled	Enabled	Enabled	Enabled	Enabled	
Enable master	Disabled	Disabled	Disabled	Disabled	Disabled	
Latency timer	Default	Default	Default	Default	Default	
PCI device, slot #2						
ROM scan option	Enabled	Enabled	Enabled	Enabled	Enabled	
Enable master	Disabled	Disabled	Disabled	Disabled	Disabled	
Latency timer	Default	Default	Default	Default	Default	
PCI device, slot #3						
ROM scan option	Enabled	Enabled	Enabled	Enabled	Enabled	
Enable master	Disabled	Disabled	Disabled	Disabled	Disabled	
Latency timer	Default	Default	Default	Default	Default	

Table 179: 815E - PCI/PNP configuration - profile setting options

PCI device, slot #4	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Personal settings
ROM scan option	Enabled	Enabled	Enabled	Enabled	Enabled	
Enable master	Disabled	Disabled	Disabled	Disabled	Disabled	
Latency timer	Default	Default	Default	Default	Default	
PCI/PNP ISA IRQ resource exclusion						
IRQ 3	Available	Available	Available	Available	Available	
IRQ 4	Available	Available	Available	Available	Available	
IRQ 5	Available	Available	Available	Available	Available	
IRQ 7	Available	Available	Available	Available	Available	
IRQ 9	Available	Available	Available	Available	Available	
IRQ 10	Available	Available	Available	Available	Available	
IRQ 11	Available	Available	Available	Available	Available	
IRQ 12	Available	Available	Available	Available	Available	
IRQ 15	Available	Available	Available	Available	Available	

Table 179: 815E - PCI/PNP configuration - profile setting options (Forts.)

Memory cache

	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Personal settings
Memory cache	Enabled	Enabled	Enabled	Enabled	Enabled	
Cache system BIOS area	Write protect	Write protect	Write protect	Write protect	Write protect	
Cache video BIOS area	Write protect	Write protect	Write protect	Write protect	Write protect	
Cache extended memory area	Write back	Write back	Write back	Write back	Write back	
Cache D000 - D3FF	Disabled	Disabled	Disabled	Disabled	Disabled	
Cache D400 - D7FF	Disabled	Disabled	Disabled	Disabled	Disabled	
Cache D800 - DBFF	Disabled	Disabled	Disabled	Disabled	Disabled	
Cache DC00 - DFFF	Disabled	Disabled	Disabled	Disabled	Disabled	

Table 180: 815E - memory cache - profile setting overview

I/O device configuration

	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Personal settings
Local bus IDE adapter	Primary	**Both**	**Both**	Primary	**Both**	
Primary IDE UDMA66/100	Enabled	Enabled	Enabled	Enabled	Enabled	
USB UHCI host controller 1	Enabled	Enabled	Enabled	Enabled	Enabled	
USB UHCI host controller 2	Enabled	Enabled	Enabled	Enabled	Enabled	

Table 181: 815E - I/O device configuration - profile setting overview

	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Personal settings
USB UHCI host controller	Enabled	Enabled	Enabled	Enabled	Enabled	
Legacy USB support	Enabled	Enabled	Enabled	Enabled	Enabled	
AC97 audio controller	Enabled	Enabled	Enabled	Enabled	Enabled	
Onboard LAN controller	Enabled	Enabled	Enabled	Enabled	Enabled	
Onboard LAN PXE ROM	Disabled	**Enabled**	Disabled	Disabled	Disabled	
Serial port A	Enabled	Enabled	Enabled	Enabled	Enabled	
Base I/O address	3F8	3F8	3F8	3F8	3F8	
Interrupt	IRQ 4	IRQ 4	IRQ 4	IRQ 4	IRQ 4	
Serial port B	Enabled	Enabled	Enabled	Enabled	Enabled	
Mode	Normal	Normal	Normal	Normal	Normal	
Base I/O address	3F8	3F8	3F8	3F8	3F8	
Interrupt	IRQ 3	IRQ 3	IRQ 3	IRQ 3	IRQ 3	
Parallel port	Enabled	Enabled	Enabled	Enabled	Enabled	
Base I/O address	378	378	378	378	378	

Table 181: 815E - I/O device configuration - profile setting overview (Forts.)

Keyboard features

	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Personal settings
NumLock	On	On	On	On	On	
Key click	Disabled	Disabled	Disabled	Disabled	Disabled	
Keyboard auto-repeat rate	30/sec	30/sec	30/sec	30/sec	30/sec	
Keyboard auto-repeat delay	1/2 sec	1/2 sec	1/2 sec	1/2 sec	1/2 sec	

Table 182: 815E - keyboard features - profile setting overview

CPU board monitor

	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Personal settings
VCC 3.3V voltage	-	-	-	-	-	
CPU core voltage	-	-	-	-	-	
5Vsb voltage	-	-	-	-	-	
Battery voltage	-	-	-	-	-	
CPU temperature	-	-	-	-	-	

Table 183: 815E - CPU board monitor - profile setting overview

Miscellaneous

	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Personal settings
Summary screen	Enabled	Enabled	Enabled	Enabled	Enabled	
QuickBoot mode	Enabled	Enabled	Enabled	Enabled	Enabled	
Extended memory testing	Just zero it	Just zero it	Just zero it	Just zero it	Just zero it	
Dark boot	Disabled	Disabled	Disabled	Disabled	Disabled	
Halt on errors	Yes	Yes	Yes	Yes	Yes	
PS/2 mouse	Disabled	**Enabled**	Disabled	Disabled	Disabled	
Large disk access mode	DOS	DOS	DOS	DOS	DOS	

Table 184: 815E - miscellaneous - profile setting overview

Baseboard/panel features

	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Personal settings
Versions	-	-	-	-	-	
BIOS	-	-	-	-	-	
MTCX	-	-	-	-	-	
FPGA	-	-	-	-	-	
Optimized ID	-	-	-	-	-	
Device ID	-	-	-	-	-	
Compatibility ID	-	-	-	-	-	
Serial number	-	-	-	-	-	
Product name	-	-	-	-	-	
User serial ID	-	-	-	-	-	
Panel control						
Select panel number	0	0	0	**15**	**15**	
Version	-	-	-	-	-	
Brightness	100%	100%	100%	100%	100%	
Temperature	-	-	-	-	-	
Fan speed	-	-	-	-	-	
Keys/LEDs	-	-	-	-	-	
Baseboard monitor						
Temperatures	-	-	-	-	-	
I/O	-	-	-	-	-	
Power supply	-	-	-	-	-	
Slide-in drive 1	-	-	-	-	-	
Slide-in drive 2	-	-	-	-	-	

Table 185: 815E - baseboard/panel features - profile setting overview

Baseboard monitor	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Personal settings
Fan speeds	-	-	-	-	-	
Case 1	-	-	-	-	-	
Case 2	-	-	-	-	-	
Case 3	-	-	-	-	-	
Case 4	-	-	-	-	-	
CPU	-	-	-	-	-	
Legacy devices						
COM C	Disabled	Disabled	Disabled	**Enabled**	**Enabled**	
Base I/O address	-	-	-	**3E8h**	**3E8h**	
Interrupt	-	-	-	**11**	**11**	
COM D	Disabled	Disabled	Disabled	Disabled	Disabled	
Base I/O address	-	-	-	-	-	
Interrupt	-	-	-	-	-	
COM E	Disabled	Disabled	Disabled	Disabled	Disabled	
Base I/O address	-	-	-	-	-	
Interrupt	-	-	-	-	-	
LPT	Disabled	Disabled	Disabled	Disabled	Disabled	
Base I/O address	-	-	-	-	-	
CAN	Disabled	Disabled	Disabled	Disabled	Disabled	
Base I/O address	-	-	-	-	-	
Interrupt	-	-	-	-	-	
2nd LAN controller	Enabled	Enabled	Enabled	Enabled	Enabled	

Table 185: 815E - baseboard/panel features - profile setting overview (Forts.)

Security

	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Personal settings
Supervisor password is	Clear	Clear	Clear	Clear	Clear	
User password is	Clear	Clear	Clear	Clear	Clear	
Set supervisor password	-	-	-	-	-	
Set user password	-	-	-	-	-	
Diskette access	Supervisor	Supervisor	Supervisor	Supervisor	Supervisor	
Fixed disk boot sector	Normal	Normal	Normal	Normal	Normal	
Virus check reminder	Disabled	Disabled	Disabled	Disabled	Disabled	
System backup reminder	Disabled	Disabled	Disabled	Disabled	Disabled	
Password at boot	Disabled	Disabled	Disabled	Disabled	Disabled	

Table 186: 815E - security - profile setting overview

Power

	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Personal settings
Enable ACPI	Yes	Yes	Yes	Yes	Yes	
Power savings	Disabled	Disabled	Disabled	Disabled	Disabled	
Standby timeout	-	-	-	-	-	
Auto suspend timeout	-	-	-	-	-	
Hard disk timeout	Disabled	Disabled	Disabled	Disabled	Disabled	
Video timeout	Disabled	Disabled	Disabled	Disabled	Disabled	
Resume on modem ring	Off	Off	Off	Off	Off	
Resume on time	Off	Off	Off	Off	Off	
Resume time	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00	
Power supply	ATX	ATX	ATX	ATX	ATX	
Power button function	Power off	Power off	Power off	Power off	Power off	
Power loss control	Power-on	Power-on	Power-on	Power-on	Power-on	
ACPI control						
Active trip point	Disabled	Disabled	Disabled	Disabled	Disabled	
Passive cooling trip point	Disabled	Disabled	Disabled	Disabled	Disabled	
Critical trip point	110°C	110°C	110°C	110°C	110°C	
APIC - I/O APIC mode	Disabled	**Enabled**	Disabled	Disabled	Disabled	
Native IDE support	Disabled	Disabled	Disabled	Disabled	Disabled	
Thermal management						
Auto thermal throttling	Enabled	Enabled	Enabled	Enabled	Enabled	
Temperature	100°C	100°C	100°C	100°C	100°C	
Hysteresis	5°C	5°C	5°C	5°C	5°C	
CPU performance	50%	50%	50%	50%	50%	

Table 187: 815E - power - profile setting overview

Boot

	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Personal settings
Boot priority order						
1:	IDE 0	**PCI BEV**	IDE 0	IDE 0	IDE 0	
2:	IDE 1	**IDE 0**	IDE 1	IDE 1	IDE 1	
3:	IDE CD	**IDE 1**	IDE CD	IDE CD	IDE CD	
4:	USB FDC	**IDE CD**	USB FDC	USB FDC	USB FDC	
5:	USB KEY	**USB FDC**	USB KEY	USB KEY	USB KEY	
6:	USB CDROM	**USB KEY**	USB CDROM	USB CDROM	USB CDROM	
7:	-	**USB CDROM**	**IDE 2**	-	**IDE 2**	
8:	-	-	**IDE 3**	-	**IDE 3**	
Excluded from boot order						
:	IDE 2	IDE 2	**USB HDD**	IDE 2	**USB HDD**	
:	IDE 3	IDE 3	**USB ZIP**	IDE 3	**USB ZIP**	
:	USB HDD	USB HDD	**USB LS120**	USB HDD	**USB LS120**	
:	USB ZIP	USB ZIP	**PCI BEV**	USB ZIP	**PCI BEV**	
:	USB LS120	USB LS120	**PCI SCSI**	USB LS120	**PCI SCSI**	
:	PCI BEV	**PCI SCSI**	**Bootable add-in cards**	PCI BEV	**Bootable add-in cards**	
:	PCI SCSI	**Bootable add-in cards**		PCI SCSI		
:	Bootable add-in cards			Bootable add-in cards		

Table 188: 815E - boot - profile setting overview

1.2 855GME -BIOS description

Information:

- **The following diagrams and BIOS menu items including descriptions refer to BIOS Version 1.21. 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 1.2.10 "Profile overview" on page 317).**

1.2.1 General information

BIOS stands for "Basic Input Output System." It is the most basic standardized communication between the user and the system (hardware). The BIOS system used in the Automation PC 620 systems is produced by Phoenix.

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 APC620 even when the power is turned off (no 24 VDC supply) .

1.2.2 BIOS setup and boot procedure

BIOS is immediately activated when switching on the power supply of the Automation PC 620 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 <F2> 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 "preliminary steps" are finished, BIOS searches for 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 F2 key must be pressed as soon as the following message appears on the lower margin of the display (during POST):

"Press <F2> to enter SETUP"

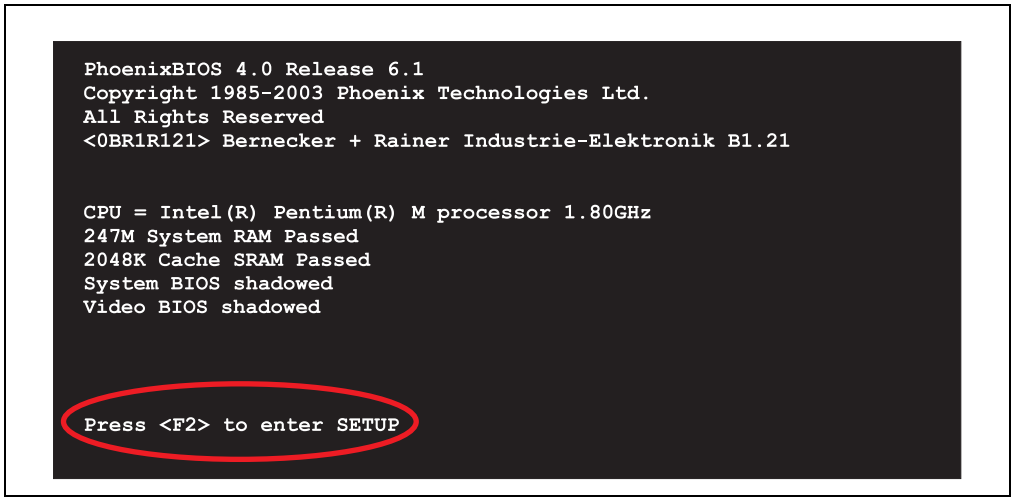


Figure 132: 855GME - BIOS diagnostics screen

Summary screen

After the POST, the summary screen displays the most important system characteristics.

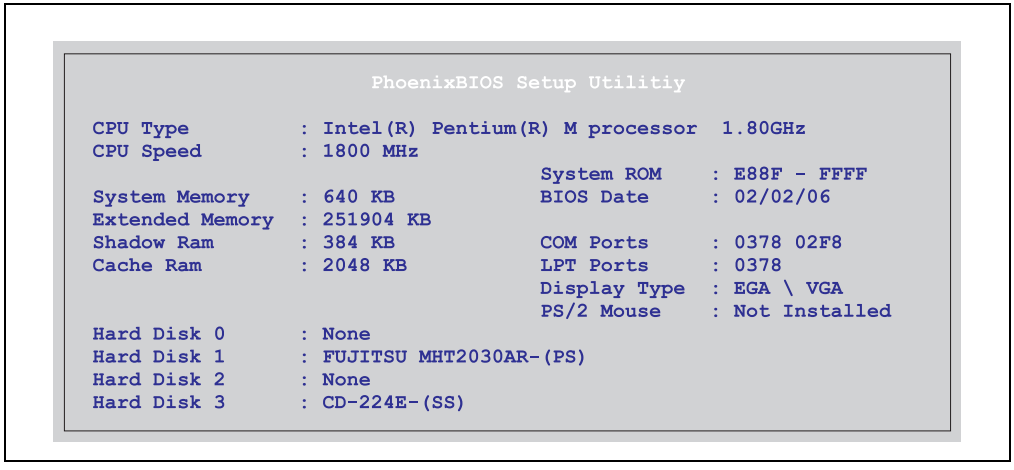


Figure 133: 855GME - BIOS summary screen

1.2.3 BIOS setup keys

The following keys are active during the POST:

Key	Function
F2	Enters the BIOS setup menu.
ESC	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.
<Spacebar>	Pressing the spacebar skips the system RAM check.
<Pause>	Pressing the <pause> key stops the POST. Press any other key to resume the POST.

Table 189: Keys relevant to BIOS during POST

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

Key	Function
Cursor ↑	Moves to previous item.
Cursor ↓	Moves to next item.
Cursor ←	Move to the item on the left.
Cursor →	Move to the item on the right.
<ESC>	Exits the submenu.
PgUp↑	Moves the cursor to the top of the current BIOS setup page.
PgDn ↓	Moves the cursor to the bottom of the current BIOS setup page.
<F1> or <Alt+H>	Opens a help window showing the key assignments.
<F5> or <->	Scrolls to the previous option for the selected BIOS setting.
<F6> or <+> or <spacebar>	Scrolls to the next option for the selected BIOS setting.
<F9>	Loads setup defaults for the current BIOS setup screen.
<F10>	Saves settings and closes BIOS setup.
<Enter>	Opens submenu for a BIOS setup menu item, or displays the configurable values of a BIOS setup item.

Table 190: Keys relevant to BIOS

The following sections explain the individual BIOS setup menu items in detail.

BIOS setup menu Item	Function	From page
Main	The basic system configurations (e.g. time, date, hard disk parameters) can be set in this menu.	279
Advanced	Advanced BIOS options such as cache areas, PnP, keyboard repeat rate, as well as settings specific to B&R integrated hardware, can be configured here.	286
Security	For setting up the system's security functions.	309
Power	Setup of various APM (Advanced Power Management) options.	311
Boot	The boot order can be set here.	315
Exit	To end the BIOS setup.	316

Table 191: Overview of BIOS menu items

1.2.4 Main

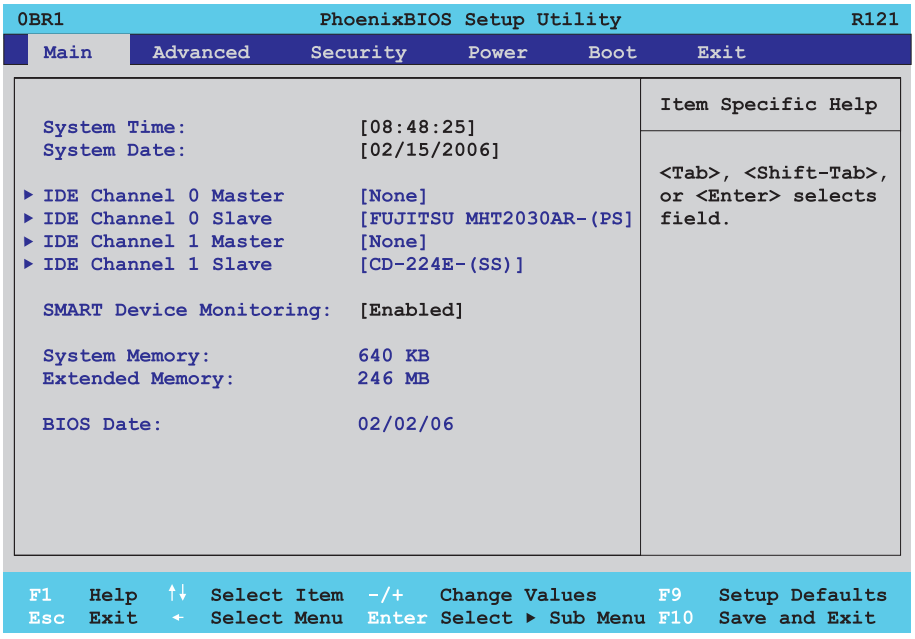


Figure 134: 855GME - main

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.	Adjustment of the system time	Set the system time in the format (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 to the system date	Set the system date in the format (mm:dd:yyyy).
IDE channel 0 master	The drive in the system that is connected to the IDE channel 0 master (previously "primary master") port is configured here.	Enter	Opens submenu see "IDE channel 0 master" on page 280.
IDE channel 0 slave	The drive in the system that is connected to the IDE channel 0 slave (previously "primary slave") port is configured here.	Enter	Opens submenu see "IDE channel 0 slave" on page 282.
IDE channel 1 master	The drive in the system that is connected to the IDE channel 1 master (previously "secondary master") port is configured here.	Enter	Opens submenu see "IDE channel 1 master" on page 283.

Table 192: 855GME - main - setting options

BIOS setting	Meaning	Setting options	Effect
IDE channel 1 slave	The drive in the system that is connected to the IDE channel 1 slave (previously "secondary slave") port is configured here.	Enter	Opens submenu see "IDE channel 1 slave" on page 285.
Smart device monitoring	S.M.A.R.T. (Self Monitoring Analysis and Reporting Technology) is implemented in the today's hard drives. This technology allows you to detect reading or rotational problems with the hard drive, and much more.	Enabled	Activates this function. In the future, a message regarding impending errors is produced.
		Disabled	Deactivates this function.
System memory	Displays the amount of main memory installed. Between 0 and 640 KB.	None	-
Extended memory	Displays the available main memory from the first MB to the maximum memory capacity.	None	-

Table 192: 855GME - main - setting options (Forts.)

IDE channel 0 master

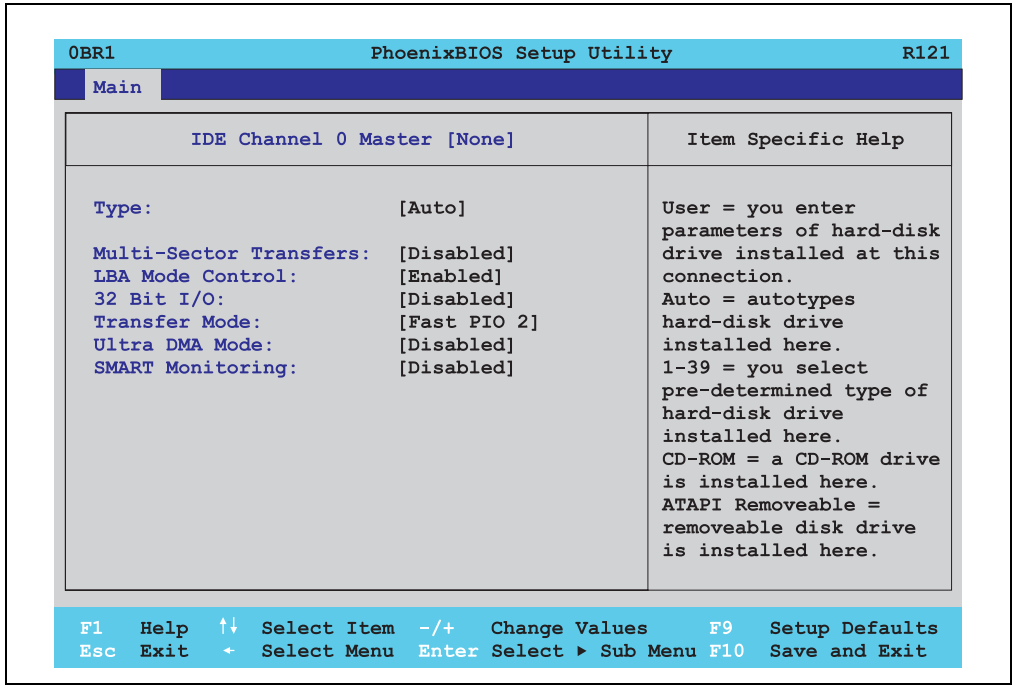


Figure 135: 855GME - IDE channel 0 master - setup

BIOS setting	Meaning	Setting options	Effect
Type	The type of drive connected to the IDE channel 0 master (previously "primary master") is configured here.	Auto	Automatic recognition of the drive and setup of appropriate values.
		User	Manual setup of the drive (number of cylinders, heads, and sectors).
		Other ATAPI	Use this option for IDE disk drives that are not mentioned here.
		CD-ROM	CD-ROM = CD-ROM drive
		ATAPI removable	The removable media drive is treated as a hard drive or floppy drive.
		IDE removable	The IDE removable drive is treated as a hard drive.
Multi-sector transfer	This option determines the number of sectors per block. Only possible when manually setting up the drive.	Disabled	Disables this function.
		2, 4, 8 or 16 sectors	Number of sectors per block.
LBA mode control	This option activates the logical block addressing for IDE. This function enables support of drives larger than 540 MB. Only possible when manually setting up the drive.	Disabled	Disables this function.
		Enabled	Enables this function.
32-bit I/O	This function enables 32-bit data transfer.	Disabled	Disables this function.
		Enabled	Enables this function.
Transfer mode	The communication path between the IDE channel 0 master drive and the system memory is defined here. Only possible when manually setting up the drive.	Standard	Default setting
		Fast PIO 1 - Fast PIO 4 / DMA2	Manual configuration of PIO mode.
Ultra DMA mode	The data transfer rate to and from the IDE channel 0 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.	Disabled	Disables this function. Do not use UDMA mode.
		Mode 0 - Mode 5	Manual setting option for UDMA mode.
SMART monitoring	Indicates whether the IDE channel 0 master drive supports SMART technology.	Disabled	No drive support, and function is deactivated.
		Enabled	Drive support present, and function is activated.

Table 193: 855GME - IDE channel 0 master - setting options

IDE channel 0 slave

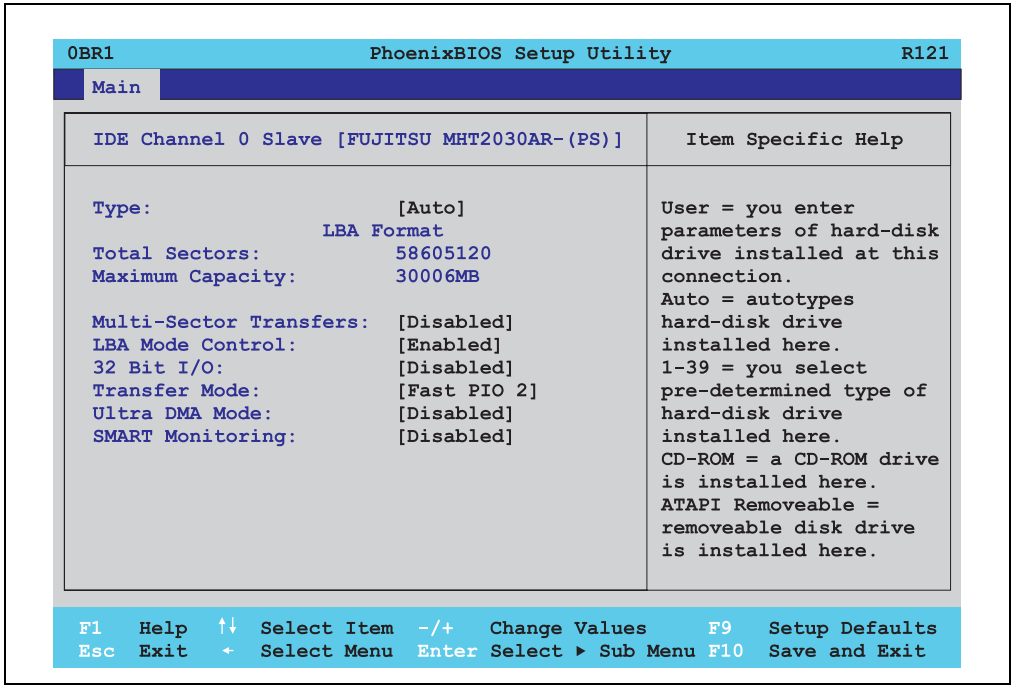


Figure 136: 855GME - IDE channel 0 slave - setup

BIOS setting	Meaning	Setting options	Effect
Type	The type of drive connected to the IDE channel 0 slave (previously "primary slave") is configured here.	Auto	Automatic recognition of the drive and setup of appropriate values.
		User	Manual setup of the drive (number of cylinders, heads, and sectors).
		Other ATAPI	Use this option for IDE disk drives that are not mentioned here.
		CD-ROM	CD-ROM = CD-ROM drive
		ATAPI removable	The removable media drive is treated as a hard drive or floppy drive.
		IDE removable	The IDE removable drive is treated as a hard drive.
Multi-sector transfer	This option determines the number of sectors per block. Only possible when manually setting up the drive.	Disabled	Disables this function.
		2, 4, 8 or 16 sectors	Number of sectors per block.
LBA mode control	This option activates the logical block addressing for IDE. This function enables support of drives larger than 540 MB. Only possible when manually setting up the drive.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 194: 855GME - IDE channel 0 slave - setting options

BIOS setting	Meaning	Setting options	Effect
32-bit I/O	This function enables 32-bit data transfer.	Disabled	Disables this function.
		Enabled	Enables this function.
Transfer mode	The communication path between the IDE channel 0 slave and the system memory is defined here. Only possible when manually setting up the drive.	Standard	Default setting
		Fast PIO 1 - Fast PIO 4 / DMA2	Manual configuration of PIO mode.
Ultra DMA mode	The data transfer rate to and from the IDE channel 0 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.	Disabled	Disables this function. Do not use UDMA mode.
		Mode 0 - Mode 5	Manual setting option for UDMA mode.
SMART monitoring	Indicates whether the IDE channel 0 slave drive supports SMART technology.	Disabled	No drive support, and function is deactivated.
		Enabled	Drive support present, and function is activated.

Table 194: 855GME - IDE channel 0 slave - setting options (Forts.)

IDE channel 1 master

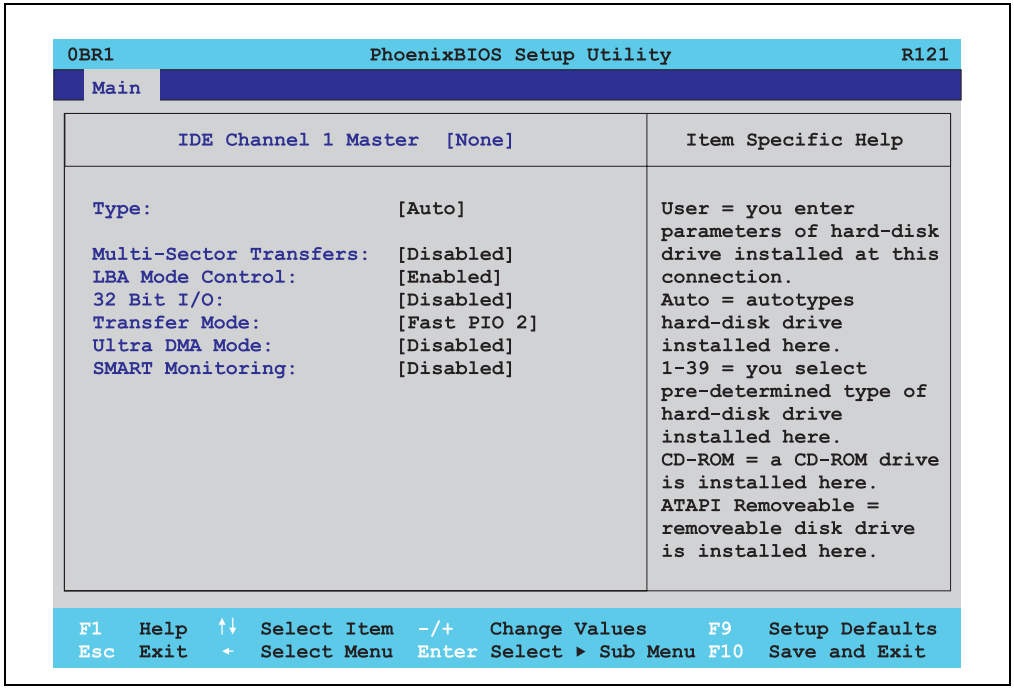


Figure 137: 855GME - IDE channel 1 master - setup

BIOS setting	Meaning	Setting options	Effect
Type	The type of drive connected to the IDE channel 1 master (previously "secondary master") is configured here.	Auto	Automatic recognition of the drive and setup of appropriate values.
		User	Manual setup of the drive (number of cylinders, heads, and sectors).
		Other ATAPI	Use this option for IDE disk drives that are not mentioned here.
		CD-ROM	CD-ROM = CD-ROM drive
		ATAPI removable	The removable media drive is treated as a hard drive or floppy drive.
		IDE removable	The IDE removable drive is treated as a hard drive.
Multi-sector transfer	This option determines the number of sectors per block. Only possible when manually setting up the drive.	Disabled	Disables this function.
		2, 4, 8 or 16 sectors	Number of sectors per block.
LBA mode control	This option activates the logical block addressing for IDE. This function enables support of drives larger than 540 MB. Only possible when manually setting up the drive.	Disabled	Disables this function.
		Enabled	Enables this function.
32-bit I/O	This function enables 32-bit data transfer.	Disabled	Disables this function.
		Enabled	Enables this function.
Transfer mode	The communication path between the IDE channel 1 master and the system memory is defined here. Only possible when manually setting up the drive.	Standard	Default setting
		Fast PIO 1 - Fast PIO 4 / DMA2	Manual configuration of PIO mode.
Ultra DMA mode	The data transfer rate to and from the IDE channel 1 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.	Disabled	Disables this function. Do not use UDMA mode.
		Mode 0 - Mode 5	Manual setting option for UDMA mode.
SMART monitoring	Indicates whether the IDE channel 1 master drive supports SMART technology.	Disabled	No drive support, and function is deactivated.
		Enabled	Drive support present, and function is activated.

Table 195: 855GME - IDE channel 1 master - setting options

IDE channel 1 slave

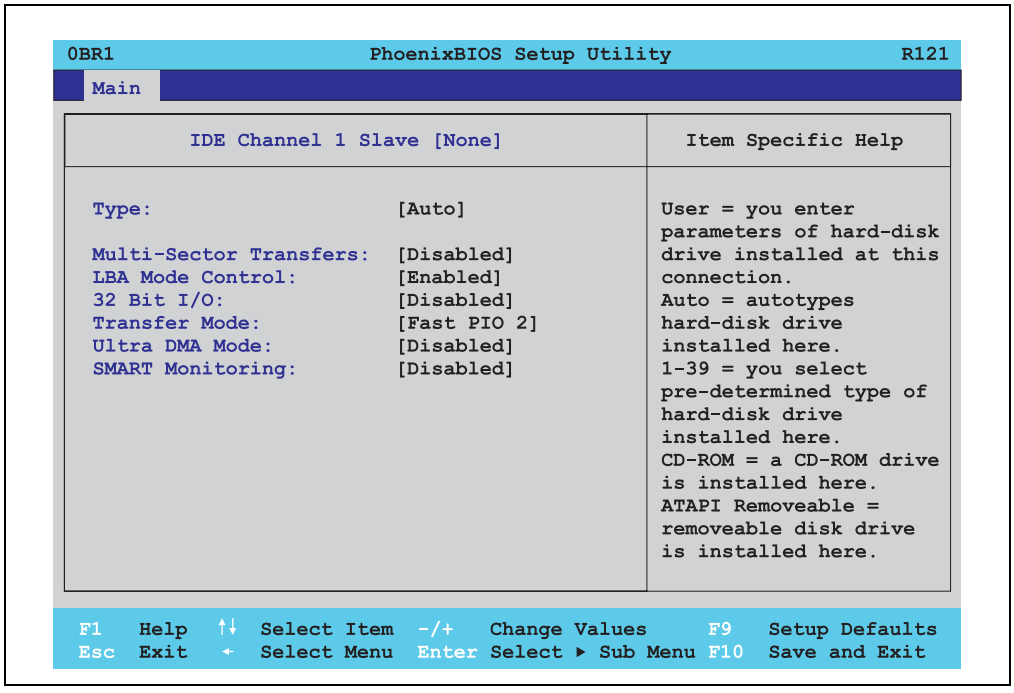


Figure 138: 855GME - IDE channel 1 slave - setup

BIOS setting	Meaning	Setting options	Effect
Type	The type of drive connected to the IDE channel 1 slave (previously "secondary slave") is configured here.	Auto	Automatic recognition of the drive and setup of appropriate values.
		User	Manual setup of the drive (number of cylinders, heads, and sectors).
		Other ATAPI	Use this option for IDE disk drives that are not mentioned here.
		CD-ROM	CD-ROM = CD-ROM drive
		ATAPI removable	The removable media drive is treated as a hard drive or floppy drive.
		IDE removable	The IDE removable drive is treated as a hard drive.
Multi-sector transfer	This option determines the number of sectors per block. Only possible when manually setting up the drive.	Disabled	Disables this function.
		2, 4, 8 or 16 sectors	Number of sectors per block.
LBA mode control	This option activates the logical block addressing for IDE. This function enables support of drives larger than 540 MB. Only possible when manually setting up the drive.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 196: 855GME - IDE channel 1 slave - setting options

BIOS setting	Meaning	Setting options	Effect
32-bit I/O	This function enables 32-bit data transfer.	Disabled	Disables this function.
		Enabled	Enables this function.
Transfer mode	The communication path between the IDE channel 1 slave drive and the system memory is defined here. Only possible when manually setting up the drive.	Standard	Default setting
		Fast PIO 1 - Fast PIO 4 / DMA2	Manual configuration of PIO mode.
Ultra DMA mode	The data transfer rate to and from the IDE channel 1 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.	Disabled	Disables this function. Do not use UDMA mode.
		Mode 0 - Mode 5	Manual setting option for UDMA mode.
SMART monitoring	Indicates whether the IDE channel 1 slave drive supports SMART technology.	Disabled	No drive support, and function is deactivated.
		Enabled	Drive support present, and function is activated.

Table 196: 855GME - IDE channel 1 slave - setting options (Forts.)

1.2.5 Advanced

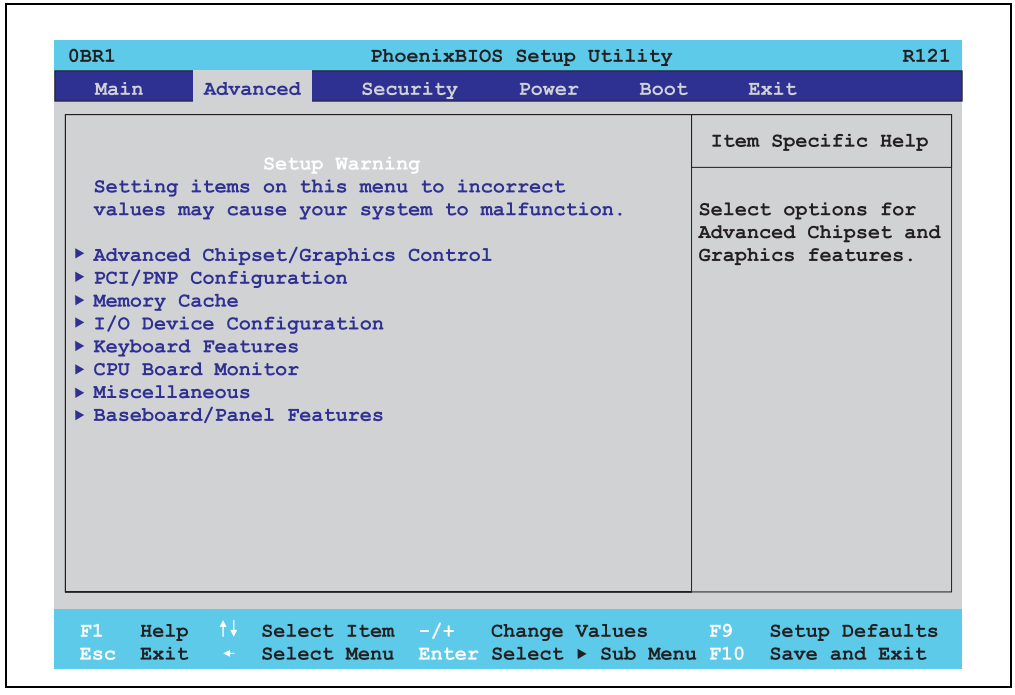


Figure 139: 855GME - advanced setup menu - overview

BIOS setup menu	Meaning	Setting options	Effect
Advanced chipset/graphics control	Setup of advanced chipset and graphics functions.	Enter	Opens submenu see "Advanced chipset/graphics control" on page 287.
PCI/PNP configuration	Configures PCI devices.	Enter	Opens submenu see "PCI/PNP configuration" on page 289.
Memory cache	Configuration of the memory cache resources.	Enter	Opens submenu see "Memory cache" on page 295.
I/O device configuration	Configuration of the I/O devices.	Enter	Opens submenu see "I/O device configuration" on page 297.
Keyboard features	Configuration of the keyboard options.	Enter	Opens submenu see "Keyboard features" on page 300.
CPU board monitor	Displays the current voltages and temperature of the processor in use.	Enter	Opens submenu see "CPU board monitor" on page 301.
Miscellaneous	Configuration of various BIOS settings (summary screen, halt on errors, etc.).	Enter	Opens submenu see "Miscellaneous" on page 302.
Baseboard/panel features	Display of device specific information and setup of device specific values.	Enter	Opens submenu see "Baseboard/panel features" on page 303.

Table 197: 855GME - advanced menu - setting options

Advanced chipset/graphics control

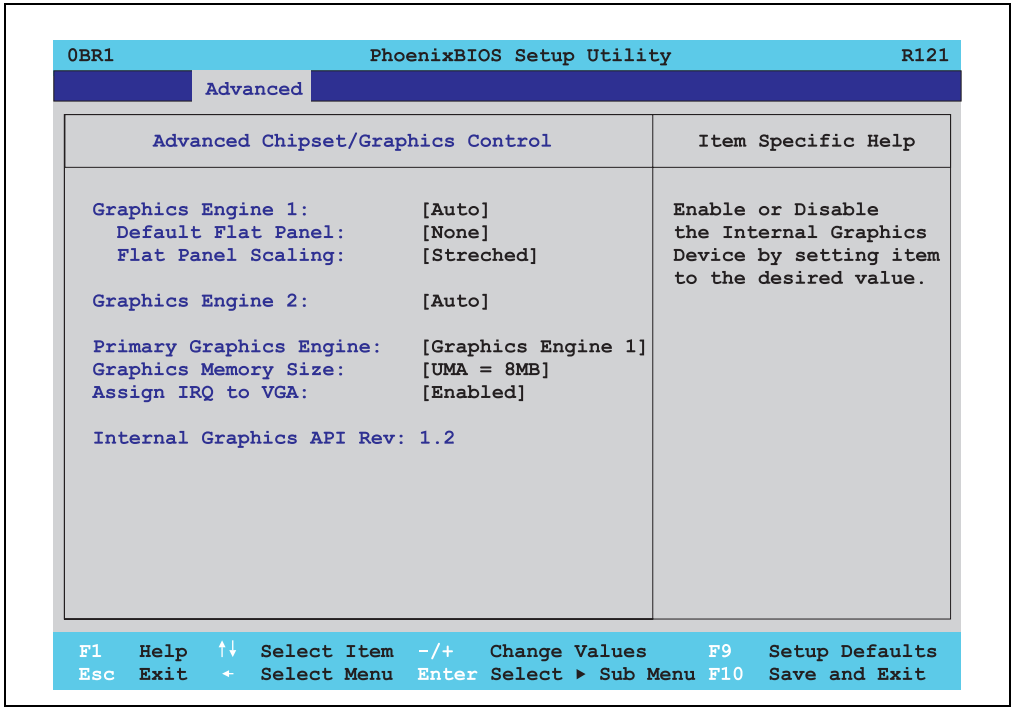


Figure 140: 855GME - advanced chipset control

BIOS setting	Meaning	Setting options	Effect
Graphics engine 1	Settings can be made for the onboard video controller (internal graphics device).	Auto	Automatic setting of the graphics engine 1. The resolution is set using a read-out of the panel's EDID data. **Information:** **EDID data older than V1.1 is not passed on to the VGA-BIOS.**
		Disabled	Disable graphics controller. **Important!** **The onboard video controller must be activated to make video output possible. Deactivate only for use of an external PCI graphics card.**
Default flat panel	Should the connected panel fail to be automatically recognized, a predefined resolution can be set manually here.	None	A predefined resolution has not been set.
		VGA, SVGA, XGA, XGA2, SXGA, UXGA	VGA = 640 x 480 resolution SVGA = 800 x 600 resolution XGA = 1024 x 768 resolution XGA2 = 1024 x 768 resolution SXGA = 1280 x 1024 resolution UXGA = 1600 x 1200 resolution
Flat panel scaling	For setting whether the video signal should be centered on the panel (stamp format), or fill the entire display (stretched).	Centered	Display is centered.
		Stretched	Display is stretched to fit screen.
Graphics engine 2	Settings can be made for the second onboard video controller (only with an AP Link card).	Auto	Automatic setting of the graphics engine 2. The resolution is set using a read-out of the panel's EDID data.
		Disabled	Deactivates the graphics interface.
Graphics engine	Selection of the primary video output line - depending on the system unit being used. with 5PC600.SX01-00, 5PC600.SX02-01 and 5PC600.SX05-01 - Graphics engine 1: Monitor / Panel - Graphics engine 2 : No support with 5PC600.SX02-00 and 5CP600.SX05-00 - Graphics engine 1 : AP Link output - Graphics engine 2: Monitor / Panel **Information:** **The "Primary graphics engine" setting is only relevant from the booting of the system until a graphics driver is started (e.g. in Windows).**	Graphics engine 1	The primary video outputs are the display devices on the monitor/panel plug with system units 5PC600.SX01-00, 5PC600.SX02-01 and 5PC600.SX05-01, or the AP Link output with system units 5PC600.SX02-00 and 5CP600.SX05-00.
		Graphics engine 2	The primary video outputs are the display devices on the monitor/panel plug with system units 5PC600.SX02-00 and 5CP600.SX05-00.
Graphics memory size	For setting how much of the main memory (in MB) the graphics controller can use.	1 MB	1 MB main memory to be used by graphics controller
		UMA = 8 MB	8 MB main memory to be used by graphics controller
		UMA = 16 MB	16 MB main memory to be used by graphics controller
		UMA = 32 MB	32 MB main memory to be used by graphics controller

Table 198: 855GME - advanced chipset control - setting options

BIOS setting	Meaning	Setting options	Effect
Assign IRQ to VGA	This is where an IRQ is reserved and automatically assigned for the CPU board's onboard graphics.	Enabled	Enables this function.
		Disabled	Disables this function.
Internal graphics API Rev	Displays the internal graphics API version number.	-	

Table 198: 855GME - advanced chipset control - setting options

PCI/PNP configuration

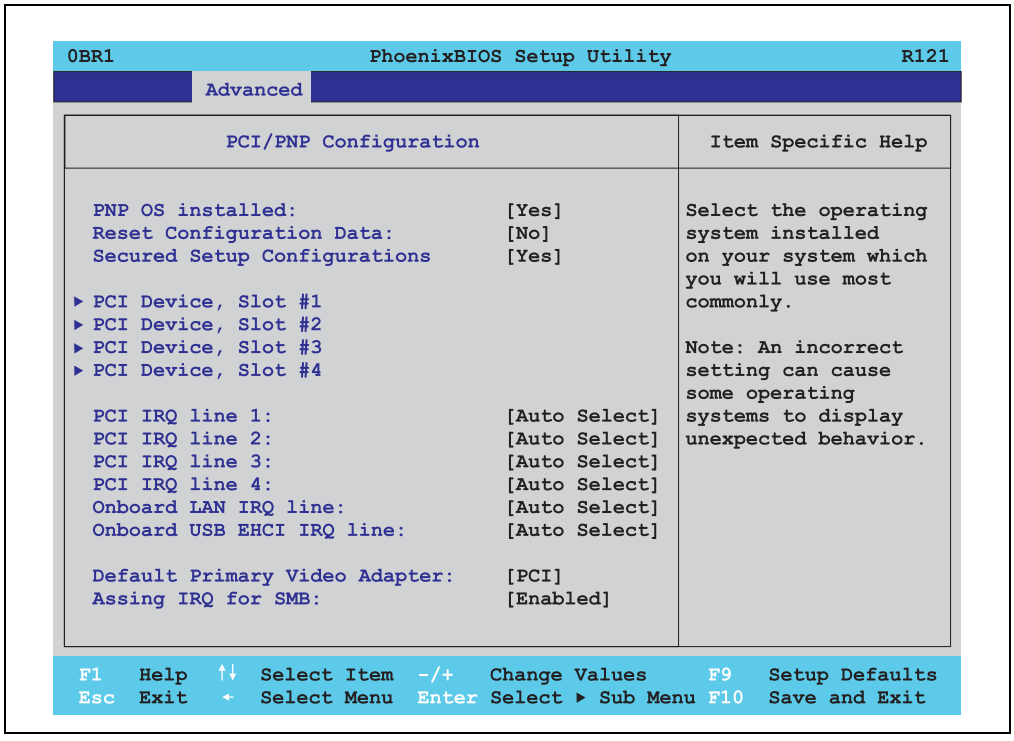


Figure 141: 855GME - PCI/PNP configuration

BIOS setting	Meaning	Setting options	Effect
PNP OS installed	If the operating system is plug & play capable, then this option informs BIOS that the operating system will handle the distribution of resources in the future.	Yes	The ISA PnP resources are not assigned. The resource assignment sequence is as follows: 1. Motherboard devices 2. PCI devices
		No	The resource assignment sequence is as follows: 1. Motherboard devices 2. ISA PnP devices 3. PCI devices

Table 199: 855GME - PCI/PNP configuration - setting options

BIOS setting	Meaning	Setting options	Effect
Reset configuration data	During booting, the assigned resources are stored in Flash (ESCD).	Yes	When the system is reset after leaving the BIOS setup, all ECSD entries (extended system configuration data) are deleted.
		No	Disables this function. Resources are not reset.
Secured setup configuration	This option protects the setup configuration from interference from a PnP operating system.	Yes	Prevents a PnP operating system from changing system settings.
		No	Disables this function. Changes are allowed.
PCI device, slot #1	Advanced configuration of the PCI slot number 1.	Enter	Opens submenu See "PCI device, slot #1" on page 291
PCI device, slot #2	Advanced configuration of the PCI slot number 2.	Enter	Opens submenu See "PCI device, slot #2" on page 292
PCI device, slot #3	Advanced configuration of the PCI slot number 3.	Enter	Opens submenu See "PCI device, slot #3" on page 293
PCI device, slot #4	Advanced configuration of the PCI slot number 4.	Enter	Opens submenu See "PCI device, slot #4" on page 294
PCI IRQ line 1	Under this option, the external PCI interrupt 1 is assigned to an ISA interrupt.	Auto-select	The interrupt is automatically assigned according to the plug & play guidelines.
		Disabled	Disables this function. No assignment.
		3, 4, 5, 7, 9, 10, 11, 12, 14, 15	Manual configuration of the IRQ.
PCI IRQ line 2	Under this option, the external PCI interrupt 2 is assigned to an ISA interrupt.	Auto-select	The interrupt is automatically assigned according to the plug & play guidelines.
		Disabled	Disables this function. No assignment.
		3, 4, 5, 7, 9, 10, 11, 12, 14, 15	Manual configuration of the IRQ.
PCI IRQ line 3	Under this option, the external PCI interrupt 3 is assigned to an ISA interrupt.	Auto-select	The interrupt is automatically assigned according to the plug & play guidelines.
		Disabled	Disables this function. No assignment.
		3, 4, 5, 7, 9, 10, 11, 12, 14, 15	Manual configuration of the IRQ.
PCI IRQ line 4	Under this option, the external PCI interrupt 4 is assigned to an ISA interrupt.	Auto-select	The interrupt is automatically assigned according to the plug & play guidelines.
		Disabled	Disables this function. No assignment.
		3, 4, 5, 7, 9, 10, 11, 12, 14, 15	Manual configuration of the IRQ.
Onboard LAN IRQ line	Under this option, the onboard LAN interrupt is assigned to an ISA interrupt.	Auto-select	The interrupt is automatically assigned according to the plug & play guidelines.
		Disabled	Disables this function. No assignment.
		3, 4, 5, 7, 9, 10, 11, 12, 14, 15	Manual configuration of the IRQ.
Onboard USB EHCI IRQ line	Under this option, the USB EHCI interrupt is assigned to an ISA interrupt.	Auto-select	The interrupt is automatically assigned according to the plug & play guidelines.
		Disabled	Disables this function. No assignment.
		3, 4, 5, 7, 9, 10, 11, 12, 14, 15	Manual configuration of the IRQ.
PCI/PNP ISA IRQ resource exclusion	This option reserves IRQs that are not being used by plug & play capable ISA devices.	Enter	Opens submenu See "Memory cache" on page 295

Table 199: 855GME - PCI/PNP configuration - setting options (Forts.)

BIOS setting	Meaning	Setting options	Effect
Default primary video adapter	This option sets the first activated graphics card (either an existing AGP or the PCI graphic card).	PCI	A PCI graphics card is set as default display device.
		AGP	An AGP graphics card is set as default display device.
Assign IRQ to SMB	Use this function to set whether or not SM (System Management) bus controller is assigned a PCI interrupt.	Enabled	Automatic assignment of a PCI interrupt.
		Disabled	No assignment of an interrupt.

Table 199: 855GME - PCI/PNP configuration - setting options (Forts.)

PCI device, slot #1

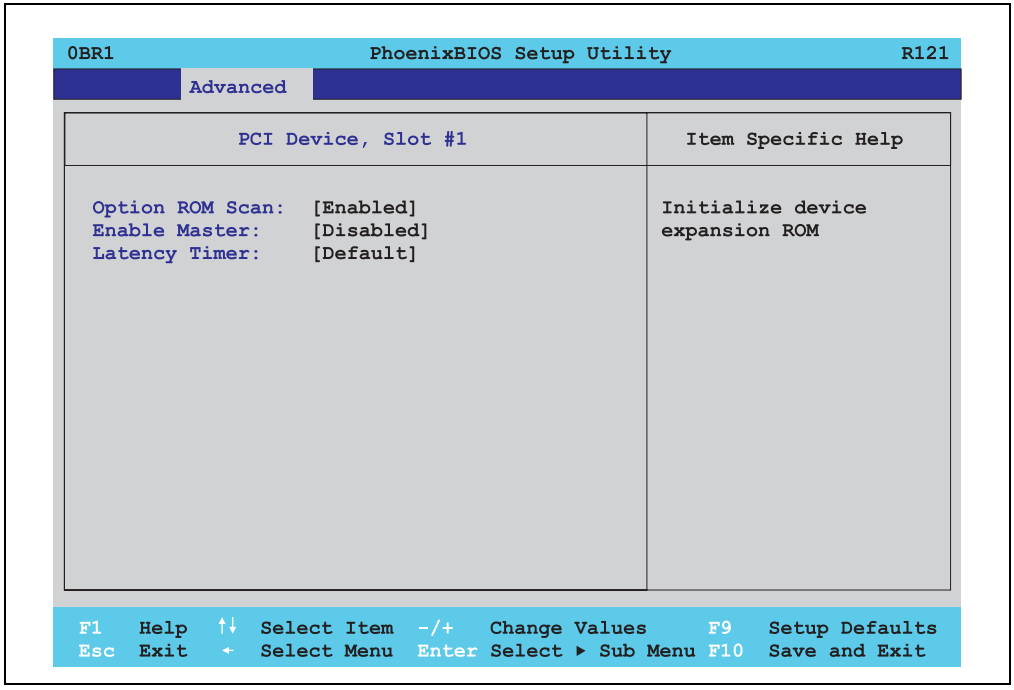


Figure 142: 855GME - PCI device, slot #1

BIOS setting	Meaning	Setting options	Effect
ROM scan option	Setting for the initialization of a device's ROM.	Enabled	Enables this function.
		Disabled	Disables this function.
Enable master	Sets the PCI device to be treated as the PCI bus master. Not all PCI devices can function as PCI bus master! Check device description.	Enabled	Enables this function.
		Disabled	Disables this function.

Table 200: 855GME - PCI device, slot #1 - setting options

BIOS setting	Meaning	Setting options	Effect
Latency timer	This option controls how long one card can continue to use the PCI bus master after another PCI card has requested access.	Default	Default setting.
		0020h, 0040h, 0060h, 0080h, 00A0h, 00C0h, 00E0h	Manual configuration of the setting.

Table 200: 855GME - PCI device, slot #1 - setting options

PCI device, slot #2

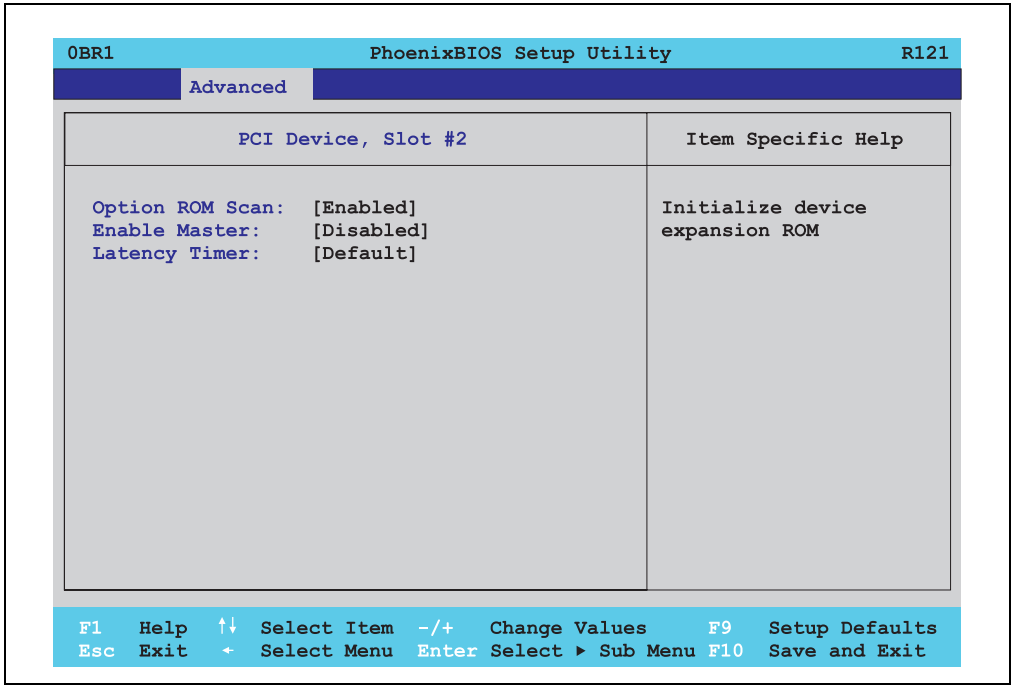


Figure 143: 855GME - PCI device, slot #2

BIOS setting	Meaning	Setting options	Effect
ROM scan option	Setting for the initialization of a device's ROM.	Enabled	Enables this function.
		Disabled	Disables this function.
Enable master	Sets the PCI device to be treated as the PCI bus master. Not all PCI devices can function as PCI bus master! Check device description.	Enabled	Enables this function.
		Disabled	Disables this function.
Latency timer	This option controls how long one card can continue to use the PCI bus master after another PCI card has requested access.	Default	Default setting.
		0020h, 0040h, 0060h, 0080h, 00A0h, 00C0h, 00E0h	Manual configuration of the setting.

Table 201: 855GME - PCI device, slot #2 - setting options

PCI device, slot #3

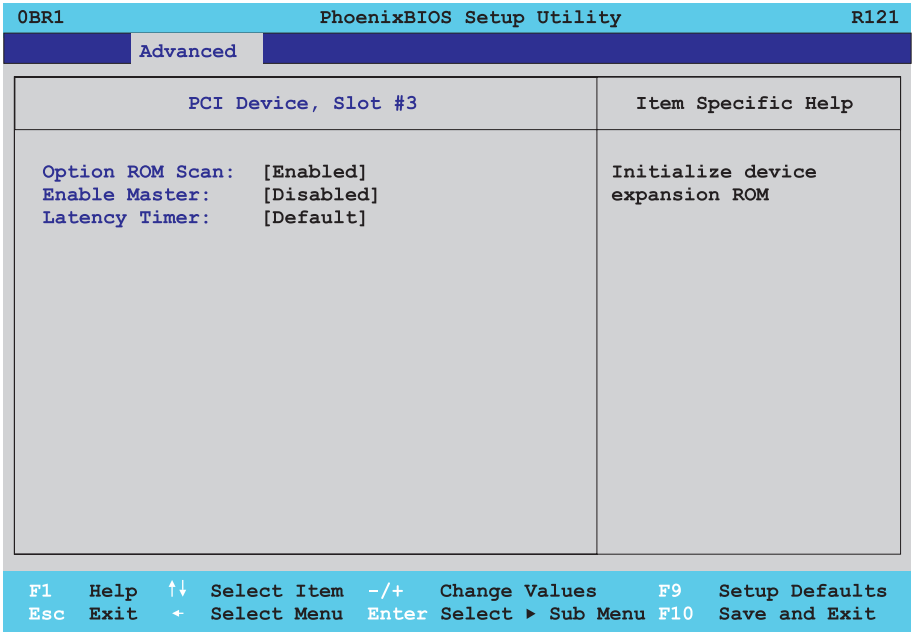


Figure 144: 855GME - PCI device, slot #3

BIOS setting	Meaning	Setting options	Effect
ROM scan option	Setting for the initialization of a device's ROM.	Enabled	Enables this function.
		Disabled	Disables this function.
Enable master	Sets the PCI device to be treated as the PCI bus master. Not all PCI devices can function as PCI bus master! Check device description.	Enabled	Enables this function.
		Disabled	Disables this function.
Latency timer	This option controls how long one card can continue to use the PCI bus master after another PCI card has requested access.	Default	Default setting.
		0020h, 0040h, 0060h, 0080h, 00A0h, 00C0h, 00E0h	Manual configuration of the setting.

Table 202: 855GME - PCI device, slot #3 - setting options

PCI device, slot #4

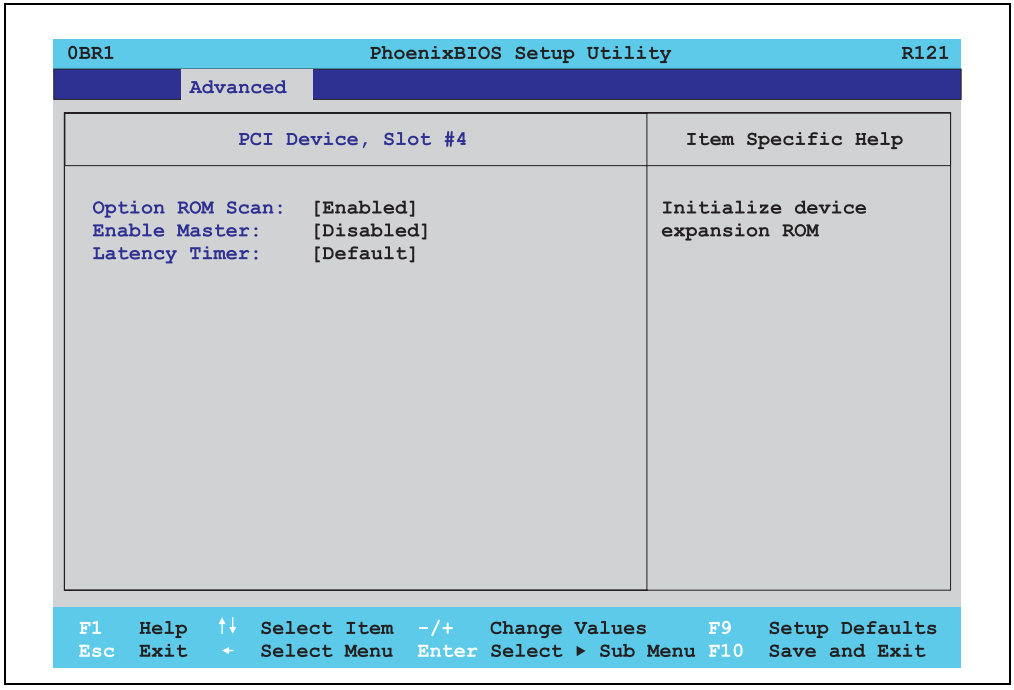


Figure 145: 855GME - PCI device, slot #4

BIOS setting	Meaning	Setting options	Effect
ROM scan option	Setting for the initialization of a device's ROM.	Enabled	Enables this function.
		Disabled	Disables this function.
Enable master	Sets the PCI device to be treated as the PCI bus master. Not all PCI devices can function as PCI bus master! Check device description.	Enabled	Enables this function.
		Disabled	Disables this function.
Latency timer	This option controls how long one card can continue to use the PCI bus master after another PCI card has requested access.	Default	Default setting.
		0020h, 0040h, 0060h, 0080h, 00A0h, 00C0h, 00E0h	Manual configuration of the setting.

Table 203: 855GME - PCI device, slot #4 - setting options

Memory cache

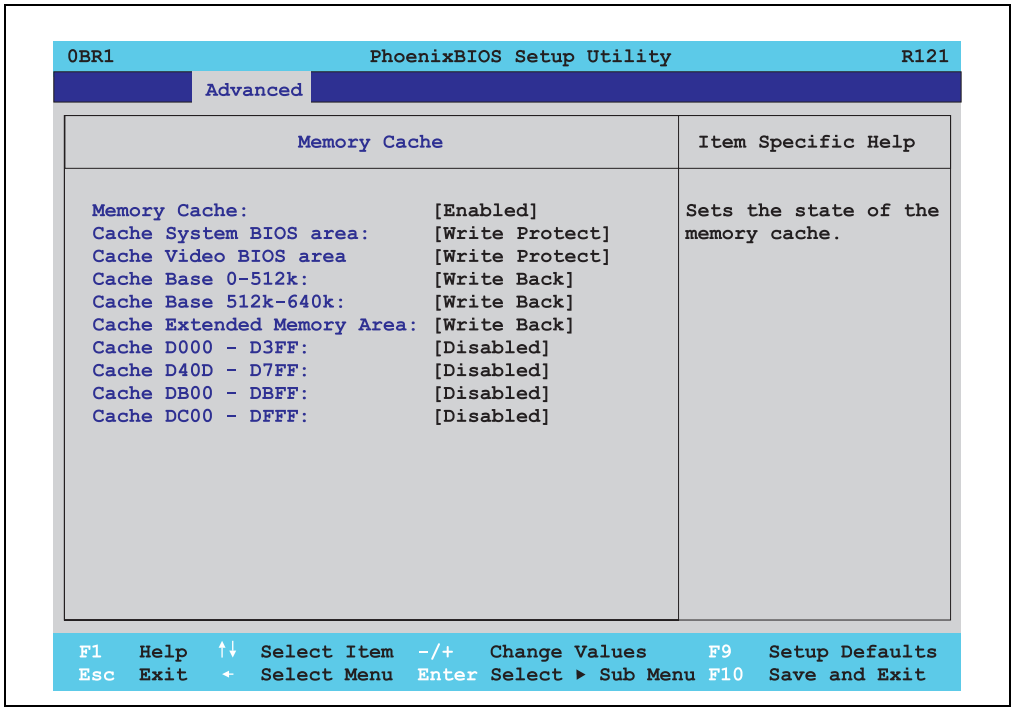


Figure 146: 855GME - memory cache

BIOS setting	Meaning	Setting options	Effect
Memory cache	Enable/ disable utilization of the L2 cache.	Enabled	Enables this function.
		Disabled	Disables this function.
Cache system BIOS area	Set whether or not the system BIOS should be buffered.	Write protect	System BIOS is mapped in the cache.
		Uncached	System BIOS is not mapped in the cache.
Cache video BIOS area	Set whether or not the video BIOS should be buffered.	Write protect	Video BIOS is mapped in the cache.
		Uncached	Video BIOS is not mapped in the cache.
Cache base 0-512k	Set whether the memory content should be mapped in the cache (0-512k), and when necessary, written in the main memory.	Uncached	No mapping.
		Write through	Memory content is simultaneously mapped in the cache and written to the main memory.
		Write protect	Memory content is mapped in the cache.
		Write back	Memory content is mapped only when necessary.

Table 204: 855GME - memory cache - setting options

BIOS setting	Meaning	Setting options	Effect
Cache base 512-640k	Set whether the memory content should be mapped in the cache (512-640k), and when necessary, written in the main memory.	Uncached	No mapping.
		Write through	Memory content is simultaneously mapped in the cache and written to the main memory.
		Write protect	Memory content is mapped in the cache.
		Write back	Memory content is mapped only when necessary.
Cache extended memory area	Configure how the memory content of the system memory above 1MB should be mapped.	Uncached	No mapping.
		Write through	Memory content is simultaneously mapped in the cache and written to the main memory.
		Write protect	Memory content is mapped in the cache.
		Write back	Memory content is mapped only when necessary.
Cache D000 - D3FF	Configure how the memory content of D000-D3FF should be mapped.	Uncached	No mapping.
		Write through	Memory content is simultaneously mapped in the cache and written to the main memory.
		Write protect	Memory content is mapped in the cache.
		Write back	Memory content is mapped only when necessary.
Cache D400 - D7FF	Configure how the memory content of D400-D7FF should be mapped.	Uncached	No mapping.
		Write through	Memory content is simultaneously mapped in the cache and written to the main memory.
		Write protect	Memory content is mapped in the cache.
		Write back	Memory content is mapped only when necessary.
Cache D800 - DBFF	Configure how the memory content of D800-DBFF should be mapped.	Uncached	No mapping.
		Write through	Memory content is simultaneously mapped in the cache and written to the main memory.
		Write protect	Memory content is mapped in the cache.
		Write back	Memory content is mapped only when necessary.
Cache DC00 - DFFF	Configure how the memory content of DC00-DFFF should be mapped.	Uncached	No mapping.
		Write through	Memory content is simultaneously mapped in the cache and written to the main memory.
		Write protect	Memory content is mapped in the cache.
		Write back	Memory content is mapped only when necessary.

Table 204: 855GME - memory cache - setting options (Forts.)

I/O device configuration

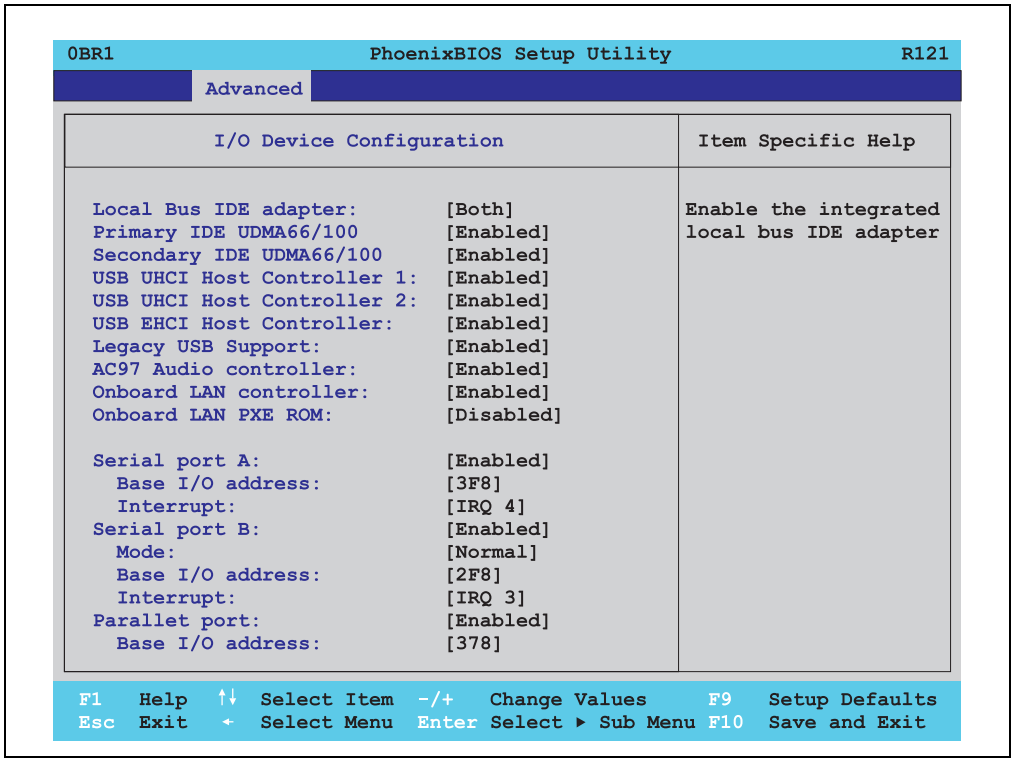


Figure 147: 855GME - I/O device configuration

BIOS setting	Meaning	Setting options	Effect
Local bus IDE adapter	Enable or disable one or both of the PCI IDE controllers (primary and secondary).	Disabled	Deactivates both PCI IDE controllers (primary and secondary).
		Primary	Activates the primary IDE controller only.
		Secondary	Activates the secondary IDE controller only.
		Both	Activates both PCI IDE controllers (primary and secondary).
Primary IDE UDMA66/100	Setup the data transfer rate for a device connected to the primary IDE channel. This option is only available when a primary IDE drive is connected.	Disabled	The maximum data transfer rate is UDMA33.
		Enabled	The maximum data transfer rate is UDMA66 or higher.
Secondary IDE UDMA66/100	Setup the data transfer rate for a device connected to the secondary IDE channel. This option is only available when a secondary IDE drive is connected.	Disabled	The maximum data transfer rate is UDMA33.
		Enabled	The maximum data transfer rate is UDMA66.

Table 205: 855GME - I/O device configuration - setting options

BIOS setting	Meaning	Setting options	Effect
USB UHCI host controller 1	Configuration of USB UHCI controller 1 for USB port 0 und 1.	Disabled	Deactivates the USB support.
		Enabled	Activates the USB support.
USB UHCI host controller 2	Configuration of the USB UHCI controller 1 for USB port 2 and 3. Can only be configured if the USB UHCI controller 1 is activated.	Disabled	Deactivates the USB support.
		Enabled	Activates the USB support.
USB UHCI host controller	Configuration of the USB EHCI controller. Can only be configured if the USB UHCI controller 1 is activated.	Disabled	Deactivates the USB support.
		Enabled	When enabled, the USB 2.0 support is activated as soon as a USB 2.0 device is connected to the interface.
Legacy USB support	Here IRQs are assigned to the USB connections.	Disabled	No IRQ assigned. It is not possible to boot from a USB device (USB stick, USB floppy, USB CD ROM, etc.)! However, a connected USB keyboard can be used to access and configure the BIOS setup, boot menu or optional RAID boot menu. USB devices will not function after completing the BIOS POST routine. USB devices only work after starting the operating system with USB support (e.g. Windows XP). MS-DOS does not support the use of USB devices.
		Enabled	IRQ assigned. Booting from USB devices is now possible. Supported USB devices work with MS-DOS (e.g. USB keyboard, etc).
AC97 audio controller	For turning AC97 audio controller on and off.	Disabled	AC97 sound is deactivated.
		Enabled	AC97 sound is activated.
Onboard LAN controller	For turning the ICH4 on-board LAN controller (for ETH1) on and off.	Disabled	Deactivates the LAN controller or the ETH1 interface.
		Enabled	Activates the LAN controller or the ETH1 interface.
Onboard LAN PXE ROM	For turning the remote boot BIOS extension for the on-board LAN controller (ETH1) on and off.	Disabled	Disables this function.
		Enabled	Enables this function.
Serial port A	For the configuration of serial port A (COM1).	Disabled	Port A deactivated.
		Enabled	Port A activated. The base I/O addresses and the interrupt must then be configured manually.
		Auto	Either BIOS or the operating system configures the port automatically.
Base I/O address	Selection of the base I/O address for port A. A yellow star indicates a conflict with another device.	3F8, 2F8, 3E8, 2E8	Base I/O address is manually assigned.
Interrupt	Selection of the interrupt for port A. A yellow star indicates a conflict with another device.	IRQ 3, IRQ 4	Manual assignment of the interrupt.

Table 205: 855GME - I/O device configuration - setting options (Forts.)

BIOS setting	Meaning	Setting options	Effect
Serial port B	For the configuration of serial port B (COM2).	Disabled	Port B deactivated.
		Enabled	Port A activated. The base I/O addresses and the interrupt must then be configured manually.
		Auto	Either BIOS or the operating system configures the port automatically.
Mode	This option is for setting the serial port B as either a standard interface or as an infrared interface.	Normal	Serial port B is used as a standard interface.
		IR	The serial interface is used as an infrared interface, and allows data transfers up to 115 kBit/s.
Base I/O address	Selection of the base I/O address for port B. A yellow star indicates a conflict with another device.	3F8, 2F8, 3E8, 2E8	Selected base I/O address is manually assigned.
Interrupt	Selection of the interrupt for port B. A yellow star indicates a conflict with another device.	IRQ 3, IRQ 4	Selected interrupt is assigned.
Parallel port	For configuring the hardware security key (dongle), which accessed internally through the parallel interface.	Disabled	Deactivates the port.
		Enabled	Activates the port. The base I/O address must then be set.
		Auto	First BIOS and then the operating system configure the port automatically.
Base I/O address	Selection of the base I/O address for the parallel port.	378, 278, 3BC	Base I/O address is manually assigned.

Table 205: 855GME - I/O device configuration - setting options (Forts.)

Keyboard features

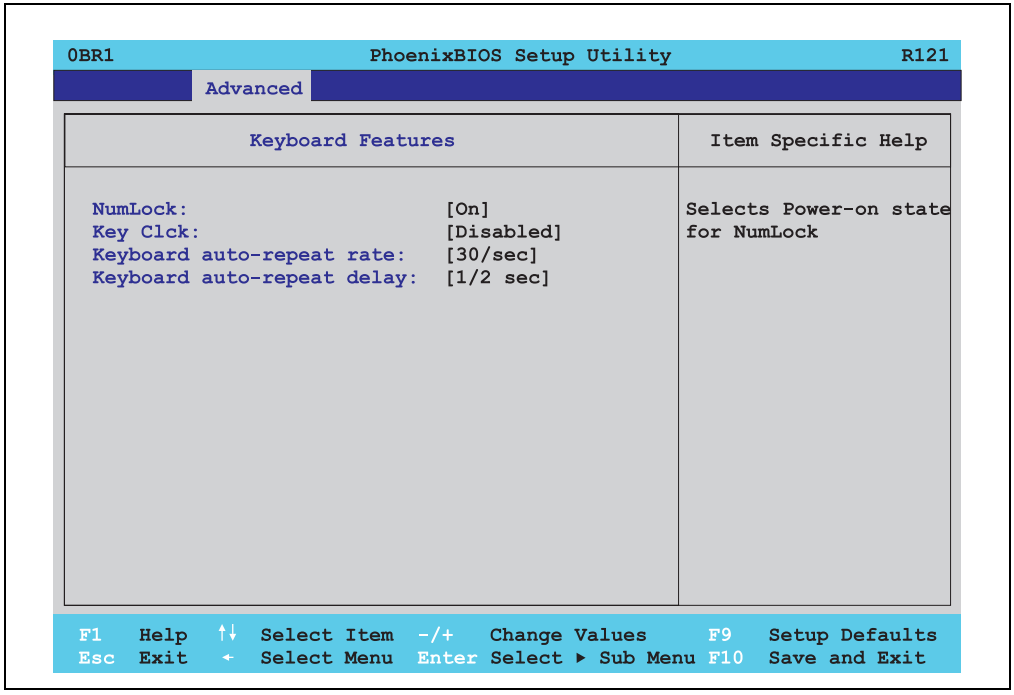


Figure 148: 855GME - keyboard features

BIOS setting	Meaning	Setting options	Effect
NumLock	This option sets the status of the numeric keypad when the the system is booted.	On	Numeric keypad is activated.
		Off	Only the cursor functions of the numerical keypad are activated.
		Auto	Numeric keypad is activated, if present.
Key click	Using this option, the clicking of the keys can be turned on or off.	Disabled	Disables this function.
		Enabled	Enables this function.
Keyboard auto-repeat rate	For setting the speed of repetition when a key is held down.	30/sec, 26.7/sec, 21.8/sec, 18.5/sec, 13.3/sec, 10/sec, 6/sec, 2/sec	Settings from 2 to 30 characters per second.
Keyboard auto-repeat delay	For setting the amount of delay after the key is pressed before the auto-repeat begins.	1/4 sec, 1/2 sec, 3/4 sec, 1 sec	Setting of the desired delay.

Table 206: 855GME - keyboard features - setting options

CPU board monitor

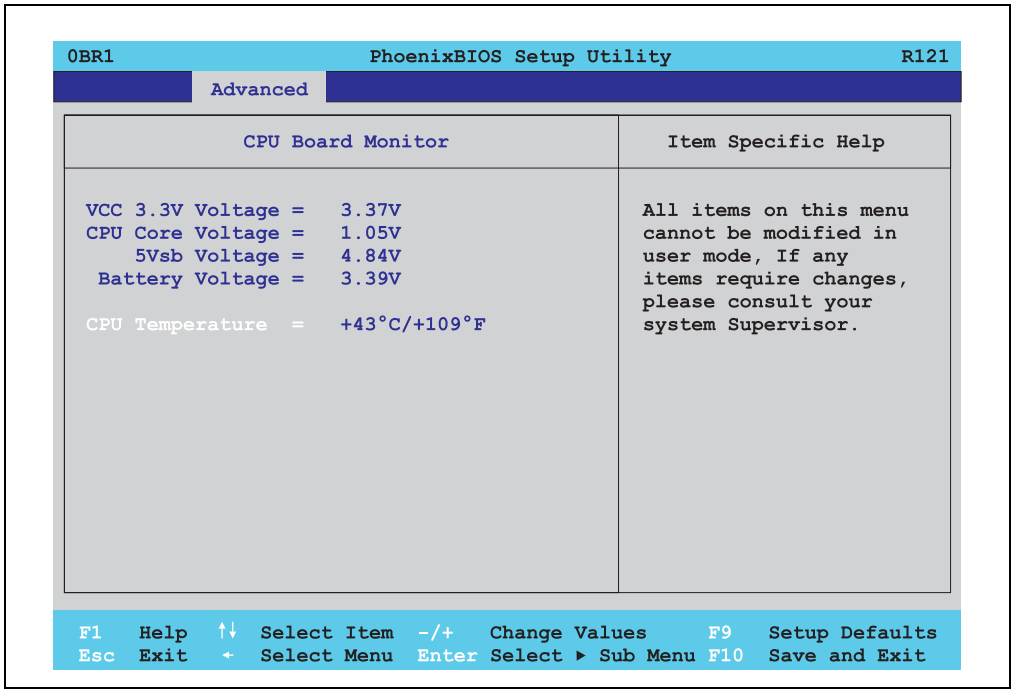


Figure 149: 855GME - CPU board monitor

BIOS setting	Meaning	Setting options	Effect
VCC 3.3V voltage	Displays the current voltage of the 3.3 volt supply (in volts).	None	
CPU core voltage	Displays the processor's core voltage (in volts).	None	
5Vsb voltage	Displays the 5 V standby voltage (in volts).	None	
Battery voltage	Displays the battery voltage (in volts).	None	
CPU temperature	Displays the processor's temperature (in degrees Celsius and Fahrenheit).	None	

Table 207: 855GME - CPU board monitor - setting options

Miscellaneous

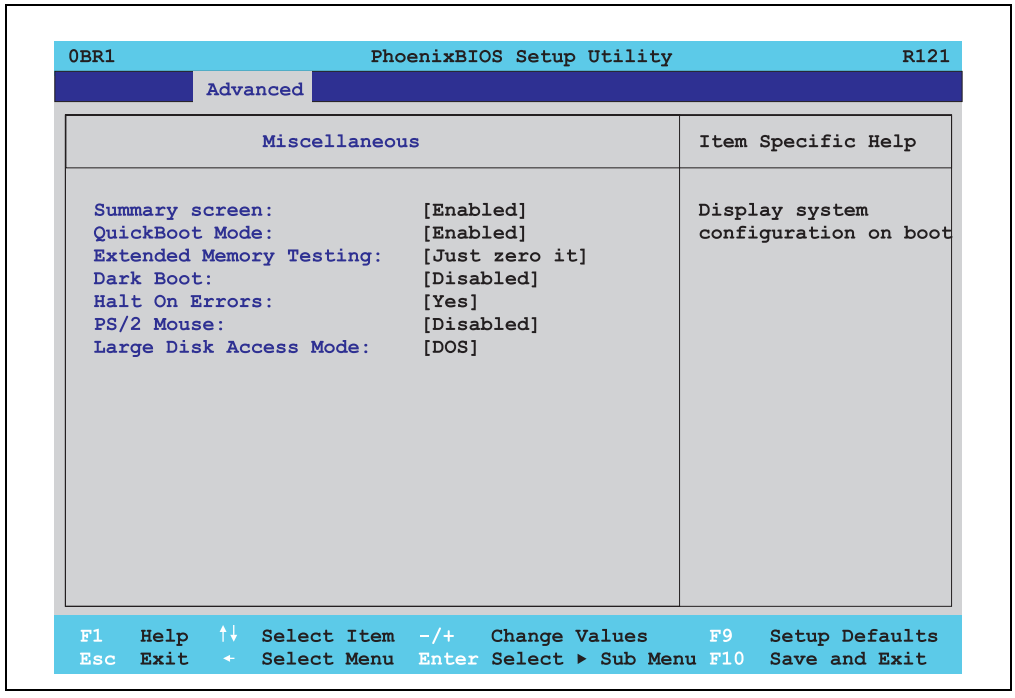


Figure 150: 855GME - miscellaneous

BIOS setting	Meaning	Setting options	Effect
Summary screen	Set whether or not the system summary screen should open when the system is started (see figure 133 "855GME - BIOS summary screen" on page 277).	Enabled	Enables this function.
		Disabled	Disables this function.
QuickBoot mode	Speeds up the booting process by skipping several tests.	Enabled	Enables this function.
		Disabled	Disables this function.
Extended memory testing	This function determines the method by which the main memory over 1 MB is tested.	Just zero it	The main memory is quickly tested.
		None	The main memory is not tested at all.
		Normal	This option is only available when the function "QuickBoot mode" has been set to "disabled." The main memory is tested more slowly than with "Just zero It."
Dark boot	Sets whether the diagnostics screen (see figure 132 "855GME - BIOS diagnostics screen" on page 277) should be displayed when the system is started.	Enabled	Enables this function. The diagnostics screen is displayed.
		Disabled	Disables this function. The diagnostics screen is not displayed.

Table 208: 855GME - miscellaneous - setting options

BIOS setting	Meaning	Setting options	Effect
Halt on errors	This option sets whether the system should pause the Power On Self Test (POST) when it encounters an error.	Yes	The system pauses. The system pauses every time an error is encountered.
		No	The system does not pause. All errors are ignored.
PS/2 mouse	Sets whether the PS/2 mouse port should be activated.	Disabled	Deactivates the port.
		Enabled	Activates the port. The IRQ12 is reserved, and is not available for other components.
Large disk access mode	This option is intended for hard discs with more than 1024 cylinders, 16 heads, and more than 63 sectors per track. Setting options: DOS	Other	For non-compatible access (e.g. Novell, SCO Unix.)
		DOS	For MS DOS compatible access.

Table 208: 855GME - miscellaneous - setting options

Baseboard/panel features

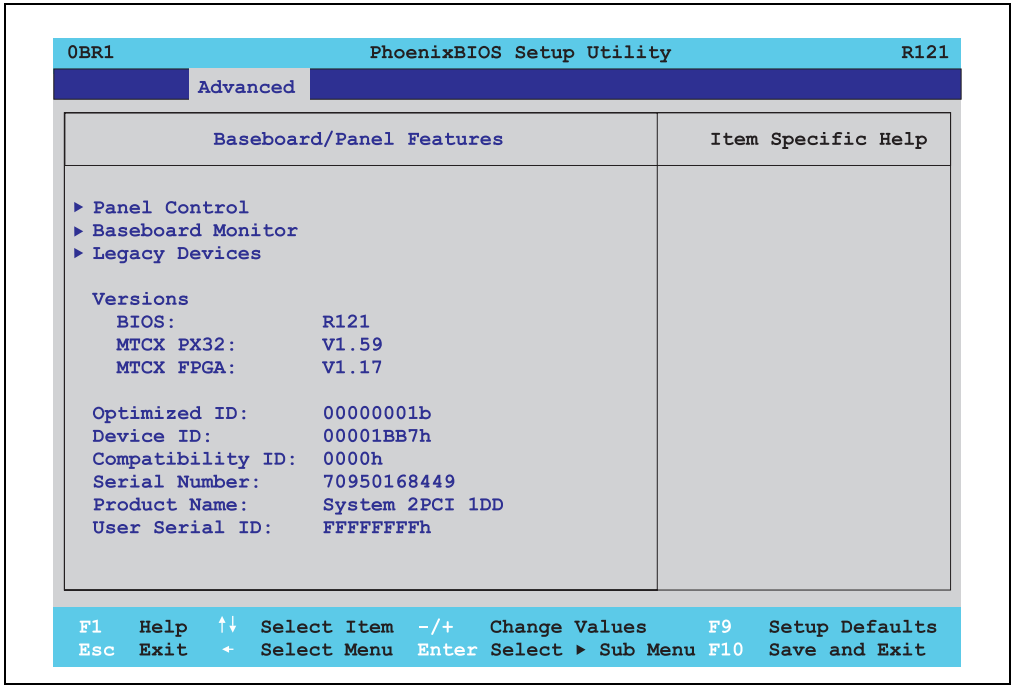


Figure 151: 855GME - baseboard/panel features

BIOS setting	Meaning	Setting options	Effect
Panel control	For special setup of connected panels.	Enter	Opens submenu see "Panel control" on page 305.
Baseboard monitor	Display of various temperatures and fan speeds.	Enter	Opens submenu see "Baseboard monitor" on page 306.

Table 209: 855GME - baseboard/panel features - setting options

BIOS setting	Meaning	Setting options	Effect
Legacy devices		Enter	Opens submenu see "Legacy devices" on page 307.
BIOS	Displays the BIOS version.	None	
MTCX PX32	Displays the MTCX PX32 firmware version.	None	
MTCX FPGA	Displays the MTCX FPGA firmware version.	None	
Optimized ID	Displays the DIP switch setting of the configuration switch.	None	
Device ID	Displays the hexadecimal value of the hardware device ID.	None	
Compatibility ID	Displays the version of the device within the same B&R device 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 hexadecimal value of the user serial ID number. This number can only be changed with "control center," available from B&R.	None	

Table 209: 855GME - baseboard/panel features - setting options (Forts.)

Panel control

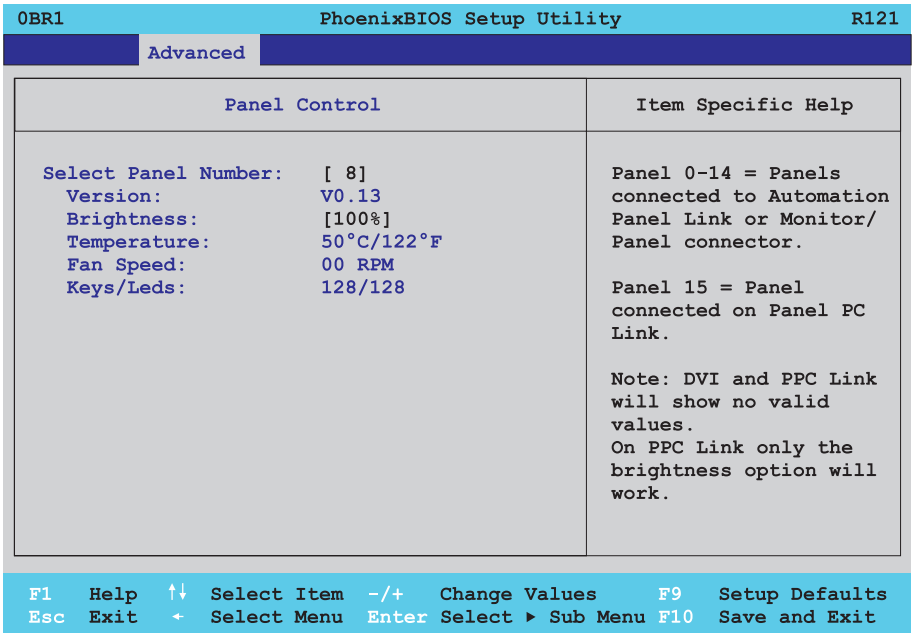


Figure 152: 855GME - panel control

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%, 25%, 50%, 75%, 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 210: 855GME - panel control - setting options

Baseboard monitor

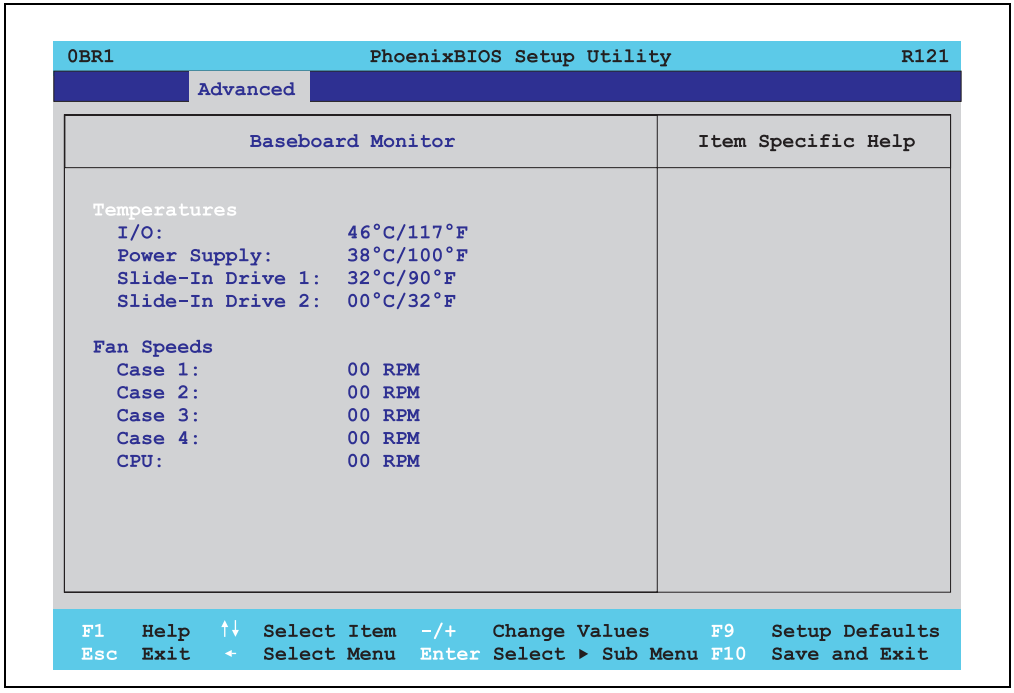


Figure 153: 855GME - baseboard monitor

BIOS setting	Meaning	Setting options	Effect
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 area 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 fan speed of the processor fan.	None	

Table 211: 855GME - baseboard monitor - setting options

Legacy devices

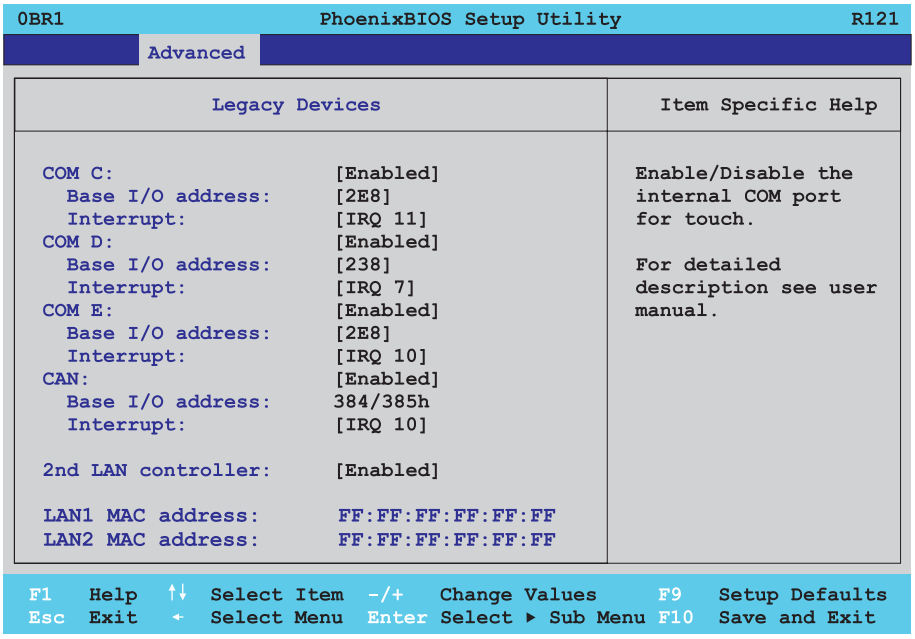


Figure 154: 855GME - Legacy devices

BIOS setting	Meaning	Setting options	Effect
COM C	Settings for the internal serial interfaces in the system. This setting activates the touch screen in panel PC 700 systems, and, using SDL transfer technology, also in Automation Panel 900 display units.	Disabled	Deactivates the interface.
		Enabled	Activates the interface.
Base I/O address	Selection of the base I/O address for the COM C port. A yellow star indicates a conflict with another device.	238, 2E8, 2F8, 328, 338, 3E8, 3F8	Selected base I/O address is assigned.
Interrupt	Selection of the interrupt for the COM C port. A yellow star indicates a conflict with another device.	IRQ 3, IRQ 4, IRQ 5, IRQ 7, IRQ 10, IRQ 11, IRQ 12	Selected interrupt is assigned.
COM D	Configuration of the COM D port for the serial interface of an automation panel link slot. The interface is used to operate the touch screen on connected Automation Panel 900 units.	Disabled	Deactivates the interface.
		Enabled	Activates the interface.

Table 212: 855GME - Legacy devices - setting options

BIOS setting	Meaning	Setting options	Effect
Base I/O address	Configuration of the base I/O address for the serial COM D port. A yellow star indicates a conflict with another device.	238, 2E8, 2F8, 328, 338, 3E8, 3F8	Selected base I/O address is assigned.
Interrupt	Selection of the interrupt for the COM D port. A yellow star indicates a conflict with another device.	IRQ 3, IRQ 4, IRQ 5, IRQ 7, IRQ 10, IRQ 11, IRQ 12	Selected interrupt is assigned.
COM E	Configuration of the optional COM E port of a B&R add-on optional interface.	Disabled	Deactivates the interface.
		Enabled	Activates the interface.
Base I/O address	Configuration of the base I/O address for the serial COM E port. A yellow star indicates a conflict with another device.	238, 2E8, 2F8, 328, 338, 3E8, 3F8	Selected base I/O address is assigned.
Interrupt	Selection of the interrupt for the COM E port. A yellow star indicates a conflict with another device.	IRQ 3, IRQ 4, IRQ 5, IRQ 7, IRQ 10, IRQ 11, IRQ 12	Selected interrupt is assigned.
LPT	This setting is specific to B&R and should not be changed.	Disabled	Deactivates the interface.
		Enabled	Activates the interface.
Base I/O address	Configuration of the base I/O address for the optional LPT. A yellow star indicates a conflict with another device.	278, 378, 3BC	Selected base I/O address is assigned.
CAN	Configuration of the CAN port of a B&R add-on interface card.	Disabled	Deactivates the interface.
		Enabled	Activates the interface.
Base I/O address	384/385h	None	-
Interrupt	Selection of the interrupt for the CAN port.	IRQ 10	Selected interrupt is assigned.
		NMI	NMI interrupt is assigned.
2nd LAN controller	For turning the on-board LAN controller (ETH2) on and off.	Disabled	Deactivates the controller.
		Enabled	Activates the controller.
LAN1 MAC address	Displays the MAC addresses for the ETH1 network controller.	-	-
LAN2 MAC address	Displays the MAC addresses for the ETH2 network controller.	-	-

Table 212: 855GME - Legacy devices - setting options (Forts.)

1.2.6 Security

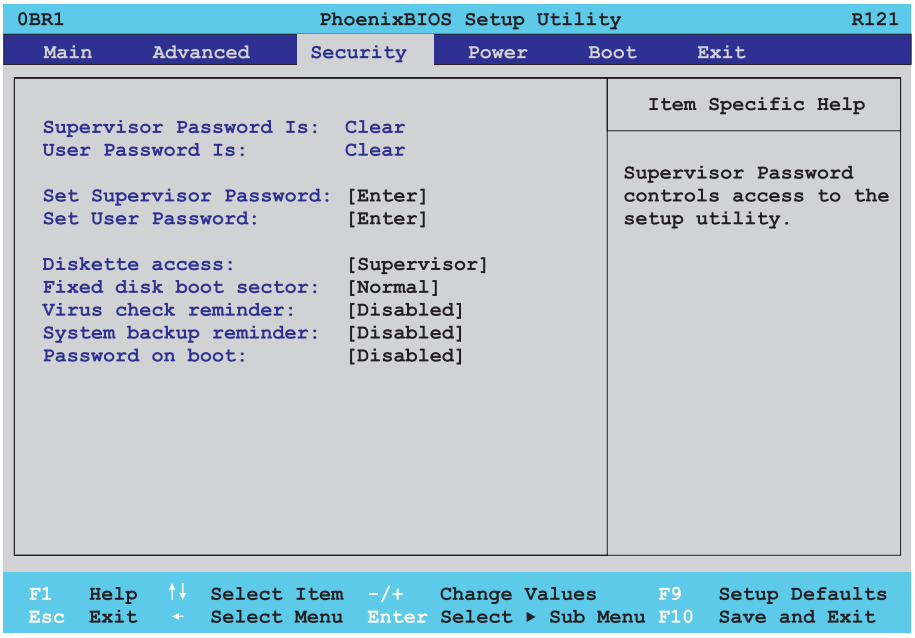


Figure 155: 855GME - security menu

BIOS setting	Meaning	Setting options	Effect
Supervisor password is	Displays whether or not a supervisor password has been set.	None	Display **set**: A supervisor password has been set. Display **clear**: No supervisor password has been set.
User password is	Displays whether or not a user password has been set.	None	Display **set**: A user password has been set. Display **clear**: No user password has been set.
Set supervisor password	To enter/change a supervisor password. A supervisor password is necessary to edit all BIOS settings.	Enter maximum 7 alphanumeric characters - not case sensitive.	Press Enter and enter password two times. The password must be 7 alphanumeric characters or less. Needed to enter BIOS setup. To change the password, enter the old password once and then the new password twice.
Set user password	To enter/change a user password. A user password allows the user to edit only certain BIOS settings.	Enter maximum 7 alphanumeric characters - not case sensitive.	Press Enter and enter password two times. The password must be 7 alphanumeric characters or less. Needed to enter BIOS setup. To change the password, enter the old password once and then the new password twice.

Table 213: 855GME - security - setting options

BIOS setting	Meaning	Setting options	Effect
Diskette access	Access to the diskette drive is controlled here. Either or the supervisor or the user has access to it. Does not work with USB diskette drives.	Supervisor	Supervisor password is needed to access a diskette drive.
		User	User password is needed to access a diskette drive.
Fixed disk boot sector	The boot sector of the primary hard drive can be write protected against viruses with this option.	Normal	Write access allowed.
		Write protect	Boot sector is write protected.
Virus check reminder	This function opens a reminder when the system is started to scan for viruses.	Disabled	Disables this function.
		Daily	A reminder appears every day when the system is started.
		Weekly	A reminder appears the first time the system is started after every Sunday.
		Monthly	A reminder appears the first time the system is started each month.
System backup reminder	This function opens a reminder when the system is started to create a system backup.	Disabled	Disables this function.
		Daily	A reminder appears every day when the system is started.
		Weekly	A reminder appears the first time the system is started after every Sunday.
		Monthly	A reminder appears the first time the system is started each month.
Password at boot	This function requires a supervisor or user password when the system is started. Only possible when a supervisor or user password is enabled.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 213: 855GME - security - setting options (Forts.)

1.2.7 Power

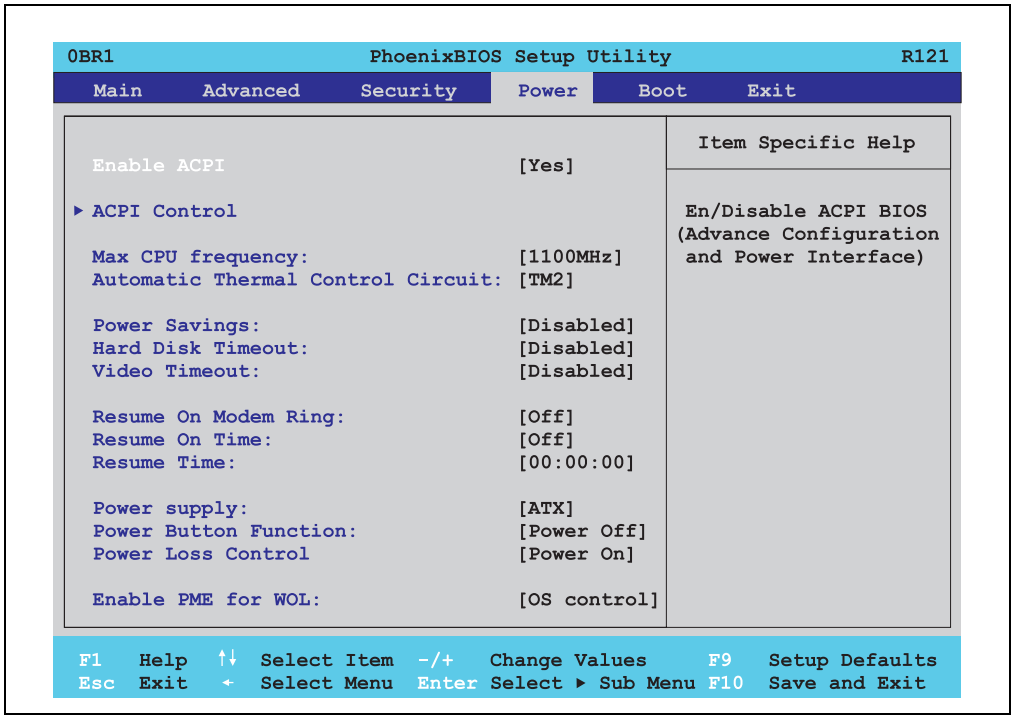


Figure 156: 855GME - power menu

BIOS setting	Meaning	Setting options	Effect
Enable ACPI	This option turns the ACPI function (Advanced Configuration and Power Interface) on or off. This is an advanced plug & play and power management functionality.	Yes	Enables this function.
		No	Disables this function.
ACPI control	Configuration of specific limits.	Enter	Opens submenu See "ACPI control" on page 313
Max CPU frequency	This option makes it possible to determine the maximum CPU frequency for Pentium M processors. This option is not shown for Celeron M processors.	MHz processor frequency steps - depending on the processor being used	Determining the frequency. Low heat build-up, therefore low processing power.
Automatic thermal control circuit	This function monitors the CPUs temperature. If the maximum operating temperature of the CPU is exceeded, the performance of the processor is throttled.	Disabled	Disables this function.
		TM1	Operation with 50% load.
		TM2	Operation in accordance with Intel's Geyserville specifications.

Table 214: 855GME - power - setting options

BIOS setting	Meaning	Setting options	Effect
Power savings	This function determines if and how the power save function is used.	Disabled	Deactivates the power save function.
		Customized	Power management is configured by adjusting the individual settings.
		Maximum power Savings	Maximum power savings function.
		Maximum performance	Energy savings function to maximize performance.
Standby timeout	Set here when the system should enter standby mode. During standby, various devices and the display will be deactivated. This option only available when "power savings" is set to customized.	Off	No standby.
		1, 2, 4, 8 minutes	Time in minutes until standby.
Auto suspend timeout	Set here when the system should enter suspend mode to save electricity. This option only available when "power savings" is set to customized.	Off	No standby.
		5, 10, 15, 20, 30, 40, 60 minutes	Time in minutes until standby.
Hard disk timeout	Set here how long after the last access the hard disk should enter standby mode. This option only available when "power savings" is set to customized.	Disabled	Disables this function.
		10, 15, 30, 45 seconds	Time in seconds until standby.
		1, 2, 4, 6, 8, 10, 15 minutes	Time in minutes until standby.
Video timeout		Disabled	
Resume on modem ring	If an external modem is connected to a serial port and the telephone rings, the system starts up.	Off	Disables this function.
		On	Enables this function.
Resume on time	This function enables the system to start at the time set under "resume time."	Off	Disables this function.
		On	Enables this function.
Resume time	Time setting for the option "resume on time" (when the system should start up).	[00:00:00]	Personal setting of the time in the format (hh:mm:ss).
Power supply	The type of power supply being used can be entered here.	ATX	An ATX compatible power supply is being used.
		AT	An AT compatible power supply is being used.
Power button function	This option determines the function of the power button.	Power off	Shuts down the system.
		Sleep	The system enters sleep mode.
Power loss control	This option determines how the system reacts to a power outage.	Stay off	The system does not turn back on. The system remains off until the power button is pressed.
		Power-on	The system turns back on.
		Last state	The system resumes the last state it was in before the power outage.

Table 214: 855GME - power - setting options (Forts.)

BIOS setting	Meaning	Setting options	Effect
Enable PME for WOL	This option enables the PME (Power Management Event) signal for controlling the WOL (Wake On LAN) function for the operating system. This setting affects both Ethernet interfaces (ETH1 and ETH2).	OS control	Evaluation of the PME signal is only active if it has been accordingly activated in the operating system driver. The system can only be woken up from the S4: hibernate mode - Suspend-to-Disk status.
		Enabled	The function, WOL and the evaluation of the PME signal is always enabled.
		Disabled	Disables the function - no WOL possible.

Table 214: 855GME - power - setting options (Forts.)

ACPI control

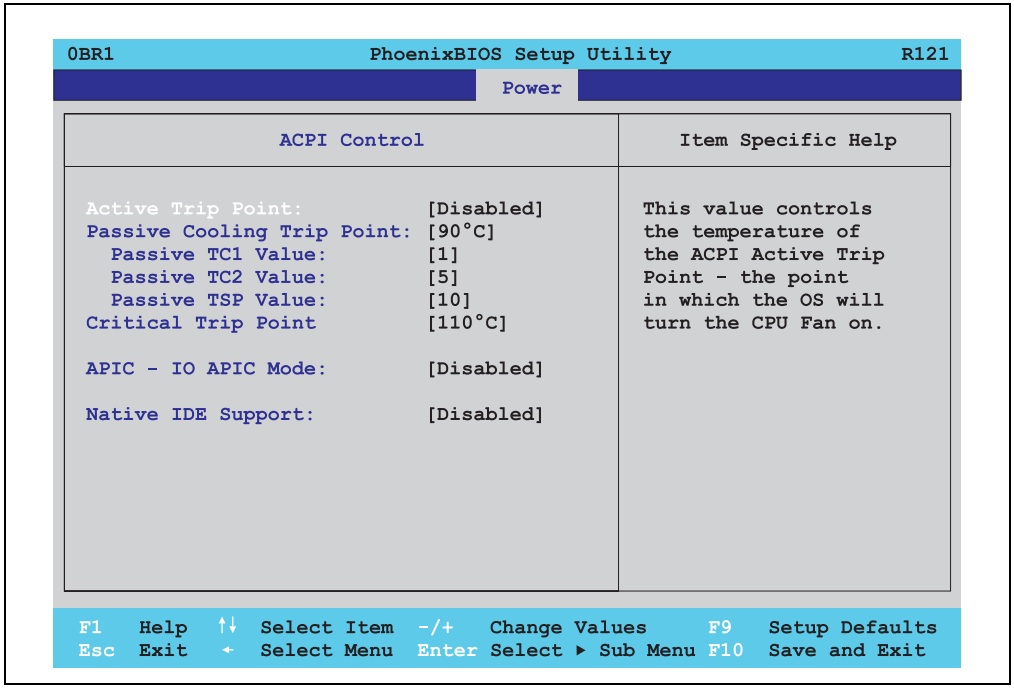


Figure 157: 855GME - ACPI control

BIOS setting	Meaning	Setting options	Effect
Active trip point	With this function, an optional CPU fan above the operating system can be set to turn on when the CPU reaches the set temperature. **Information:** **This function is not supported by MS-DOS.**	Disabled	Disables this function.
		40°C .. 100°C	Temperature setting for the active trip point. Can be set in 5 degree increments.

Table 215: 855GME - ACPI control - setting options

BIOS setting	Meaning	Setting options	Effect
Passive cooling trip point	With this function, a temperature can be set at which the CPU automatically reduces its speed. **Information:** **This function is not supported by MS-DOS.**	Disabled	Disables this function.
		40°C .. 100°C	Temperature setting for the passive cooling trip point. Can be set in increments of 5 degrees Celsius.
Passive TC1 Value	Can only be set if a value was defined manually under the item "Passive Cooling Trip Point".	1 .. 16	Can be defined in single steps
Passive TC2 Value	Can only be set if a value was defined manually under the item "Passive Cooling Trip Point".	1 .. 16	Can be defined in single steps
Passive TSP Value	Can only be set if a value was defined manually under the item "Passive Cooling Trip Point".	2 .. 30	Can be defined in double steps
Critical trip point	With this function, a temperature can be set at which the operating system automatically shuts itself down. **Information:** **This function is not supported by MS-DOS.**	40°C ... 110°C	Temperature setting for the critical trip point. Can be set in increments of 5 degrees Celsius.
APIC - I/O APIC mode	This option controls the functionality of the advanced interrupt controller in the processor.	Disabled	Deactivates the function
		Enabled	Enables this function. 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.
Native IDE support	The native IDE support offers the possibility to make 4 hard disk controllers (2 x primary ATA for a total of 4 devices, and 2 x secondary ATA for another 2 devices) accessible through Windows XP. **Information:** **This function is not supported by MS-DOS.**	Disabled	Disables this function.
		Enabled	Enables this function.

Table 215: 855GME - ACPI control - setting options (Forts.)

1.2.8 Boot

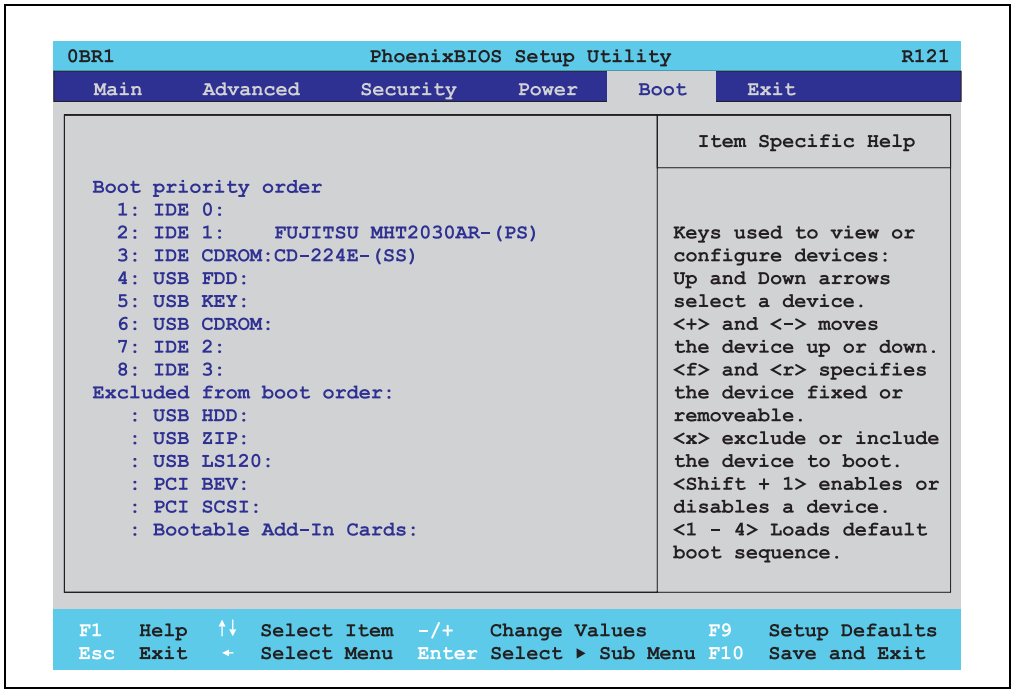


Figure 158: 855GME - boot menu

BIOS setting	Meaning	Setting options	Effect
1:		IDE 0, IDE 1, IDE 2, IDE 3, IDE CD USB FDC, USB KEY USB CDROM USB HDD, USB ZIP USB LS120, PCI BEV, PCI SCSI, bootable add-in cards	Use the up arrow ↑ and down arrow ↓, to select a device. Then, use the <+> und <-> keys to change the boot priority of the drive. To add a device to the "boot priority order" list from the "excluded from boot order" list, use the <x> key. In the same way, the <x> key can move boot devices down out of the boot priority order. The keys 1 - 4 can load preset boot sequences.
2:			
3:			
4:			
5:			
6:			
7:			
8:			

Table 216: 855GME - boot - setting options

1.2.9 Exit

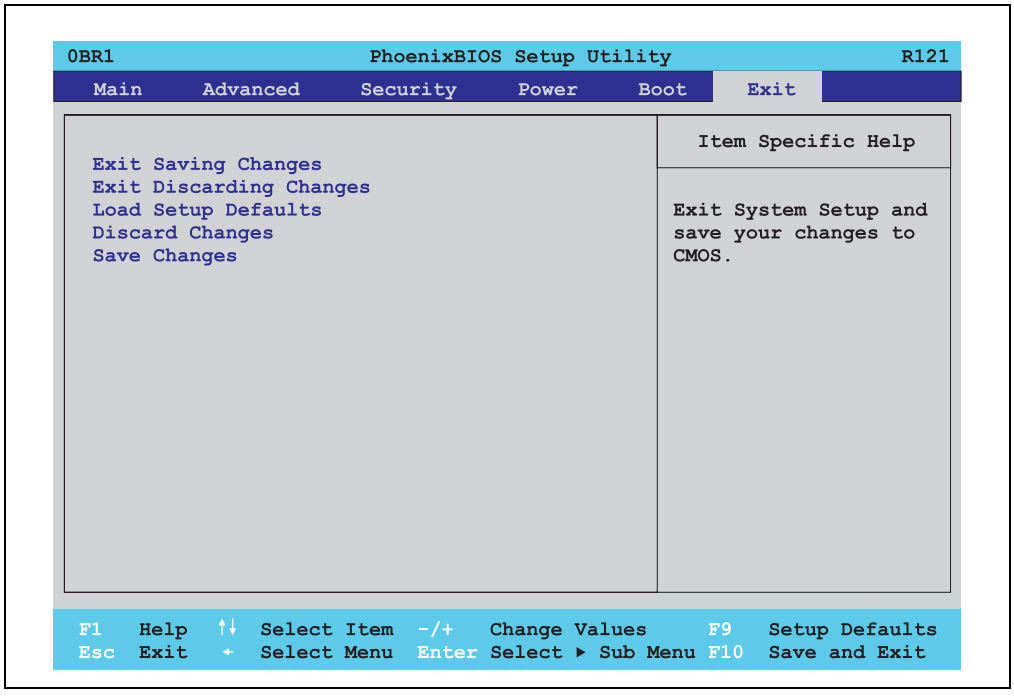


Figure 159: 855GME - exit menu

BIOS setting	Meaning	Setting options	Effect
Exit saving changes	BIOS setup is closed with this item. Changes made are saved in CMOS after confirmation, and the system is rebooted.	Yes / No	
Exit discarding changes	With this item you can close BIOS setup without saving the changes made. The system is then rebooted.	Yes / No	
Load setup defaults	This item loads the BIOS setup defaults, which are defined by the DIP switch settings. These settings are loaded for all BIOS configurations.	Yes / No	
Discard changes	Should unknown changes have been made and not yet saved, they can be discarded.	Yes / No	
Save changes	Settings are saved, and the system is not restarted.	Yes / No	

Table 217: 855GME - exit menu - setting options

1.2.10 Profile overview

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

DIP switch position see Section 1.8 "Position of the DIP switch for APC620 system units" on page 347).

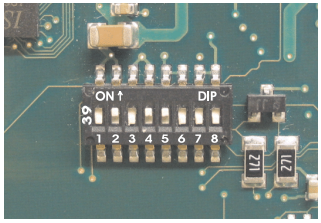


Figure 160: DIP switch on system unit

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

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.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	-	-

Table 218: 855GME - profile overview

1) Reserved.

The following pages provide an overview of the BIOS default settings for the different DIP switch configurations.

Personal settings

If changes have been made to the BIOS defaults, they can be entered in the personal settings column of the following tables for backup.

Main

	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Personal settings
System time	-	-	-	-	-	
System date	-	-	-	-	-	
SMART device monitoring	Enabled	Enabled	Enabled	Enabled	Enabled	
IDE channel 0 master						
Type	Auto	Auto	Auto	Auto	Auto	
Multi-sector transfer	-	-	-	-	-	
LBA mode control	-	-	-	-	-	
32-bit I/O	Disabled	Disabled	Disabled	Disabled	Disabled	
Transfer mode	-	-	-	-	-	
Ultra DMA mode	-	-	-	-	-	
SMART monitoring	Disabled	Disabled	Disabled	Disabled	Disabled	
IDE channel 0 slave						
Type	Auto	Auto	Auto	Auto	Auto	
Multi-sector transfer	-	-	-	-	-	
LBA mode control	-	-	-	-	-	
32-bit I/O	Disabled	Disabled	Disabled	Disabled	Disabled	
Transfer mode	-	-	-	-	-	
Ultra DMA mode	-	-	-	-	-	
SMART monitoring	Disabled	Disabled	Disabled	Disabled	Disabled	
IDE channel 1 master						
Type	Auto	Auto	Auto	Auto	Auto	
Multi-sector transfer	-	-	-	-	-	
LBA mode control	-	-	-	-	-	
32-bit I/O	Disabled	Disabled	Disabled	Disabled	Disabled	
Transfer mode	-	-	-	-	-	
Ultra DMA mode	-	-	-	-	-	
SMART monitoring	Disabled	Disabled	Disabled	Disabled	Disabled	
IDE channel 1 slave						
Type	Auto	Auto	Auto	Auto	Auto	
Multi-sector transfer	-	-	-	-	-	
LBA mode control	-	-	-	-	-	
32-bit I/O	Disabled	Disabled	Disabled	Disabled	Disabled	
Transfer mode	-	-	-	-	-	
Ultra DMA mode	-	-	-	-	-	
SMART monitoring	Disabled	Disabled	Disabled	Disabled	Disabled	

Table 219: 855GME - main - profile setting overview

Advanced

Advanced chipset/graphics control

	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Personal settings
Graphics engine 1	Auto	Auto	Auto	Auto	Auto	
Default flat panel	None	None	None	None	None	
Flat panel scaling	Stretched	Stretched	Stretched	Stretched	Stretched	
Graphics engine 2	Auto	Auto	Auto	Auto	Auto	
Graphics engine	Graphics engine 1	Graphics engine 1	Graphics engine 1	Graphics engine 1	Graphics engine 1	
Graphics memory size	UMA = 8 MB	UMA = 8 MB	UMA = 8 MB	UMA = 8 MB	UMA = 8 MB	
Assign IRQ to VGA	Enabled	Enabled	Enabled	Enabled	Enabled	
Internal Graphics API Rev	-	-	-	-	-	

Table 220: 855GME - advanced chipset/graphics control - profile settings overview

PCI/PNP configuration

	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Personal settings
PNP OS installed	Yes	Yes	Yes	Yes	Yes	
Reset configuration data	No	No	No	No	No	
Secured setup configuration	Yes	Yes	Yes	Yes	Yes	
PCI IRQ line 1	Auto-select	Auto-select	Auto-select	Auto-select	Auto-select	
PCI IRQ line 2	Auto-select	Auto-select	Auto-select	Auto-select	Auto-select	
PCI IRQ line 3	Auto-select	Auto-select	Auto-select	Auto-select	Auto-select	
PCI IRQ line 4	Auto-select	Auto-select	Auto-select	Auto-select	Auto-select	
Onboard LAN IRQ line	Auto-select	Auto-select	Auto-select	Auto-select	Auto-select	
Onboard USB EHCI IRQ line	Auto-select	Auto-select	Auto-select	Auto-select	Auto-select	
Default primary video adapter	PCI	PCI	PCI	PCI	PCI	
Assign IRQ to SMB	Enabled	Enabled	Enabled	Enabled	Enabled	
PCI device, slot #1						
ROM scan option	Enabled	Enabled	Enabled	Enabled	Enabled	
Enable master	Disabled	Disabled	Disabled	Disabled	Disabled	
Latency timer	Default	Default	Default	Default	Default	
PCI device, slot #2						
ROM scan option	Enabled	Enabled	Enabled	Enabled	Enabled	
Enable master	Disabled	Disabled	Disabled	Disabled	Disabled	
Latency timer	Default	Default	Default	Default	Default	

Table 221: 855GME - PCI/PNP configuration - profile setting overview

PCI device, slot #3	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Personal settings
ROM scan option	Enabled	Enabled	Enabled	Enabled	Enabled	
Enable master	Disabled	Disabled	Disabled	Disabled	Disabled	
Latency timer	Default	Default	Default	Default	Default	
PCI device, slot #4						
ROM scan option	Enabled	Enabled	Enabled	Enabled	Enabled	
Enable master	Disabled	Disabled	Disabled	Disabled	Disabled	
Latency timer	Default	Default	Default	Default	Default	

Table 221: 855GME - PCI/PNP configuration - profile setting overview (Forts.)

Memory cache

	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Personal settings
Memory cache	Enabled	Enabled	Enabled	Enabled	Enabled	
Cache system BIOS area	Write protect	Write protect	Write protect	Write protect	Write protect	
Cache video BIOS area	Write protect	Write protect	Write protect	Write protect	Write protect	
Cache base 0-512k	Write back	Write back	Write back	Write back	Write back	
Cache base 512-640k	Write back	Write back	Write back	Write back	Write back	
Cache extended memory area	Write back	Write back	Write back	Write back	Write back	
Cache D000 - D3FF	Disabled	Disabled	Disabled	Disabled	Disabled	
Cache D400 - D7FF	Disabled	Disabled	Disabled	Disabled	Disabled	
Cache D800 - DBFF	Disabled	Disabled	Disabled	Disabled	Disabled	
Cache DC00 - DFFF	Disabled	Disabled	Disabled	Disabled	Disabled	

Table 222: 855GME - memory cache - profile setting overview

I/O device configuration

	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Personal settings
Local bus IDE adapter	Primary	**Both**	**Both**	Primary	**Both**	
Primary IDE UDMA66/100	Enabled	Enabled	Enabled	Enabled	Enabled	
Secondary IDE UDMA66/100	Enabled	Enabled	Enabled	Enabled	Enabled	
USB UHCI host controller 1	Enabled	Enabled	Enabled	Enabled	Enabled	
USB UHCI host controller 2	Enabled	Enabled	Enabled	Enabled	Enabled	
USB UHCI host controller	Enabled	Enabled	Enabled	Enabled	Enabled	
Legacy USB support	Enabled	Enabled	Enabled	Enabled	Enabled	
AC97 audio controller	Enabled	Enabled	Enabled	Enabled	Enabled	
Onboard LAN controller	Enabled	Enabled	Enabled	Enabled	Enabled	
Onboard LAN PXE ROM	Disabled	**Enabled**	Disabled	Disabled	Disabled	
Serial port A	Enabled	Enabled	Enabled	Enabled	Enabled	
Base I/O address	3F8	3F8	3F8	3F8	3F8	
Interrupt	IRQ 4	IRQ 4	IRQ 4	IRQ 4	IRQ 4	
Serial port B	Enabled	Enabled	Enabled	Enabled	Enabled	
Mode	Normal	Normal	Normal	Normal	Normal	
Base I/O address	3F8	3F8	3F8	3F8	3F8	
Interrupt	IRQ 3	IRQ 3	IRQ 3	IRQ 3	IRQ 3	
Parallel port	Enabled	Enabled	Enabled	Enabled	Enabled	
Base I/O address	378	378	378	378	378	

Table 223: 855GME - I/O device configuration - profile setting overview

Keyboard features

	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Personal settings
NumLock	On	On	On	On	On	
Key click	Disabled	Disabled	Disabled	Disabled	Disabled	
Keyboard auto-repeat rate	30/sec	30/sec	30/sec	30/sec	30/sec	
Keyboard auto-repeat delay	1/2 sec	1/2 sec	1/2 sec	1/2 sec	1/2 sec	

Table 224: 855GME - keyboard features - profile setting overview

CPU board monitor

	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Personal settings
VCC 3.3V voltage	-	-	-	-	-	
CPU core voltage	-	-	-	-	-	
5Vsb voltage	-	-	-	-	-	
Battery voltage	-	-	-	-	-	
CPU temperature	-	-	-	-	-	

Table 225: 855GME - CPU board monitor - profile setting overview

Miscellaneous

	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Personal settings
Summary screen	Enabled	Enabled	Enabled	Enabled	Enabled	
QuickBoot mode	Enabled	Enabled	Enabled	Enabled	Enabled	
Extended memory testing	Just zero it	Just zero it	Just zero it	Just zero it	Just zero it	
Dark boot	Disabled	Disabled	Disabled	Disabled	Disabled	
Halt on errors	Yes	Yes	Yes	Yes	Yes	
PS/2 mouse	Disabled	**Enabled**	Disabled	Disabled	Disabled	
Large disk access mode	DOS	DOS	DOS	DOS	DOS	

Table 226: 855GME - miscellaneous - profile setting overview

Baseboard/panel features

	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Personal settings
Versions	-	-	-	-	-	
BIOS	-	-	-	-	-	
MTCX	-	-	-	-	-	
FPGA	-	-	-	-	-	
Optimized ID	-	-	-	-	-	
Device ID	-	-	-	-	-	
Compatibility ID	-	-	-	-	-	
Serial number	-	-	-	-	-	
Product name	-	-	-	-	-	
User serial ID	-	-	-	-	-	

Table 227: 855GME - baseboard/panel features - profile setting overview

Panel control	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Personal settings
Select panel number	0	0	0	0	0	
Version	-	-	-	-	-	
Brightness	100%	100%	100%	100%	100%	
Temperature	-	-	-	-	-	
Fan speed	-	-	-	-	-	
Keys/LEDs	-	-	-	-	-	
Baseboard monitor						
Temperatures	-	-	-	-	-	
I/O	-	-	-	-	-	
Power supply	-	-	-	-	-	
Slide-in drive 1	-	-	-	-	-	
Slide-in drive 2	-	-	-	-	-	
Fan speeds	-	-	-	-	-	
Case 1	-	-	-	-	-	
Case 2	-	-	-	-	-	
Case 3	-	-	-	-	-	
Case 4	-	-	-	-	-	
CPU	-	-	-	-	-	
Legacy devices						
COM C	Disabled	Disabled	Disabled	**Enabled**	**Enabled**	
Base I/O address	-	-	-	**3E8h**	**3E8h**	
Interrupt	-	-	-	**11**	**11**	
COM D	Disabled	Disabled	Disabled	Disabled	Disabled	
Base I/O address	-	-	-	-	-	
Interrupt	-	-	-	-	-	
COM E	Disabled	Disabled	Disabled	Disabled	Disabled	
Base I/O address	-	-	-	-	-	
Interrupt	-	-	-	-	-	
LPT	Disabled	Disabled	Disabled	Disabled	Disabled	
Base I/O address	-	-	-	-	-	
CAN	Disabled	Disabled	Disabled	Disabled	Disabled	
Base I/O address	-	-	-	-	-	
Interrupt	-	-	-	-	-	
2nd LAN controller	Enabled	Enabled	Enabled	Enabled	Enabled	
LAN1 MAC address	-	-	-	-	-	
LAN2 MAC address	-	-	-	-	-	

Table 227: 855GME - baseboard/panel features - profile setting overview (Forts.)

Security

	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Personal settings
Supervisor password is	Clear	Clear	Clear	Clear	Clear	
User password is	Clear	Clear	Clear	Clear	Clear	
Set supervisor password	-	-	-	-	-	
Set user password	-	-	-	-	-	
Diskette access	Supervisor	Supervisor	Supervisor	Supervisor	Supervisor	
Fixed disk boot sector	Normal	Normal	Normal	Normal	Normal	
Virus check reminder	Disabled	Disabled	Disabled	Disabled	Disabled	
System backup reminder	Disabled	Disabled	Disabled	Disabled	Disabled	
Password at boot	Disabled	Disabled	Disabled	Disabled	Disabled	

Table 228: 855GME - security - profile setting overview

Power

	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Personal settings
Enable ACPI	Yes	Yes	Yes	Yes	Yes	
Max CPU frequency	Dependant on processor	Dependant on processor	Dependant on processor	Dependant on processor	Dependant on processor	
Automatic thermal control circuit	TM2	TM2	TM2	TM2	TM2	
Power savings	Disabled	Disabled	Disabled	Disabled	Disabled	
Standby timeout	-	-	-	-	-	
Auto suspend timeout	-	-	-	-	-	
Hard disk timeout	Disabled	Disabled	Disabled	Disabled	Disabled	
Video timeout	Disabled	Disabled	Disabled	Disabled	Disabled	
Resume on modem ring	Off	Off	Off	Off	Off	
Resume on time	Off	Off	Off	Off	Off	
Resume time	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00	
Power supply	ATX	ATX	ATX	ATX	ATX	
Power button function	Power off	Power off	Power off	Power off	Power off	
Power loss control	Power-on	Power-on	Power-on	Power-on	Power-on	
Enable PME for WOL	OS control	OS control	OS control	OS control	OS control	
ACPI control						
Active trip point	Disabled	Disabled	Disabled	Disabled	Disabled	
Passive cooling trip point	Disabled	Disabled	Disabled	Disabled	Disabled	
Critical trip point	110°C	110°C	110°C	110°C	110°C	
APIC - I/O APIC mode	Disabled	**Enabled**	Disabled	Disabled	Disabled	
Native IDE support	Disabled	Disabled	Disabled	Disabled	Disabled	

Table 229: 855GME - power - profile setting overview

Boot

	Profile 0	Profile 1	Profile 2	Profile 3	Profile 4	Personal settings
Boot priority order						
1:	IDE 0	**PCI BEV**	IDE 0	IDE 0	IDE 0	
2:	IDE 1	**IDE 0**	IDE 1	IDE 1	IDE 1	
3:	IDE CD	**IDE 1**	IDE CD	IDE CD	IDE CD	
4:	USB FDC	**IDE CD**	USB FDC	USB FDC	USB FDC	
5:	USB KEY	**USB FDC**	USB KEY	USB KEY	USB KEY	
6:	USB CDROM	**USB KEY**	USB CDROM	USB CDROM	USB CDROM	
7:	-	**USB CDROM**	-	**IDE 2**	**IDE 2**	
8:	-	-	-	**IDE 3**	**IDE 3**	
Excluded from boot order						
:	IDE 2	IDE 2	IDE 2	**USB HDD**	**USB HDD**	
:	IDE 3	IDE 3	IDE 3	**USB ZIP**	**USB ZIP**	
:	USB HDD	USB HDD	USB HDD	**USB LS120**	**USB LS120**	
:	USB ZIP	USB ZIP	USB ZIP	**PCI BEV**	**PCI BEV**	
:	USB LS120	USB LS120	USB LS120	**PCI SCSI**	**PCI SCSI**	
:	PCI BEV	**PCI SCSI**	PCI BEV	**Bootable add-in cards**	**Bootable add-in cards**	
:	PCI SCSI	**Bootable add-in cards**	PCI SCSI			
:	Bootable add-in cards		Bootable add-in cards			

Table 230: 855GME - boot - profile setting overview

1.3 BIOS postcode messages

While the Automation PC 620 is booting, the following messages and errors can occur with BIOS. These errors are signaled by different beeping codes.

Beeping code	Meaning	Necessary user action
1	Everything OK	-
1-2	1x long 2x short - checksum error in the ROM	BIOS updates.
1-2-2-3	BIOS checksum error	BIOS updates.
1-3-1-1	Test DRAM refresh, DRAM module is not set properly.	Send industrial PC to B&R for checking.
1-3-1-3	Test 8742 keyboard controller, self test of the keyboard controller failed.	Send industrial PC to B&R for checking.
1-3-4-1	RAM error at address xxxx	Send industrial PC to B&R for checking.
1-3-4-3	RAM error at data bit xxxx, at the lowest bit of the memory bus	Send industrial PC to B&R for checking.
1-4-1-1	RAM error at data bit xxxx, at the highest bit of the memory bus	Send industrial PC to B&R for checking.
2-1-2-3	ROM copyright has an error	Send industrial PC to B&R for checking.
2-2-3-1	Unexpected interrupt	Check interrupt settings in BIOS.

Table 231: BIOS postcode messages

1.4 Distribution of resources

1.4.1 RAM address assignment

RAM address	Resource
000000h - 0003FFh	Interrupt vectors
000400h - 09FFFFh	MS-DOS program area
0A0000h - 0AFFFFh	VGA graphics
0B8000h - 0BBFFFh	VGA text mode
0C0000h - 0CFFFFh	VGA BIOS
0D0000h - 0CFFFFh	VGA BIOS freely available
0E0000h - 0EBFFFh	USB
0E4000h - 0FFFFFh	System BIOS (Phoenix)
100000h -	SDRAM

Table 232: RAM address assignment

1.4.2 DMA channel assignment

DMA channel	Resource
0	Available
1	Available
2	Floppy disk drive (FDC)
3	LPT (ECP) [1)]
4	Reserved
5	Available
6	Available
7	Available

Table 233: DMA channel assignment

1) Available if LPT is not being operated in ECP mode.

1.4.3 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
238h - 023F	COM5
278h - 27Fh	Hardware security key (LPT2)
2E8h - 2EFh	COM4
2F8h - 2FFh	COM2
376h - 376h	Secondary hard disk IDE channel
378h - 37Fh	LPT1 (printer connection)
384h - 385h	CAN controller
3B0h - 3BBh	VGA controller
3BCh - 3BFh	LPT3
3C0h - 3DFh	VGA controller
3E8h - 3EFh	COM3
3F6h - 3F6h	Primary hard disk IDE channel
3F0h - 3F7h	FDD controller
3F8h - 3FFh	COM1
LPT1 + 400h	ECP Port, LPT+400h
CF8h - CFBh	PCI config address register
CFCh - CFFh	PCI config data register
4100h - 417Fh	MTCX
FF00h - FF07h	IDE bus master register

Table 234: I/O address assignments

1.4.4 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				●															
COM1 (Serial port A)					❍	●													
COM2 (Serial port B)					●	❍													
LPT1					❍	❍	❍	❍	●		❍	❍	❍	❍		❍			❍
LPT2					❍	❍	❍	❍	❍		❍	❍	❍	❍		❍			●
LPT3					❍	❍	❍	❍	❍		❍	❍	❍	❍		❍			●
PS/2 mouse														●					
ACPI[1)]											●								
FDD								●											❍
Real-time clock										●									
Coprocessor (FPU)															●				
Primary IDE channel																●			
Secondary IDE channel																	●		
B&R	COM3 (COM C)				❍	❍	❍		❍			❍	❍	❍					●
	COM4 (COM D)				❍	❍	❍		❍			❍	❍	❍					●
	COM5 (COM E)				❍	❍	❍		❍			❍	❍	❍					●
	CAN											❍						❍	●

Table 235: IRQ interrupt assignments in PCI mode

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

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

1.4.5 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				●																							
COM1 (Serial port A)					❍	●																					
COM2 (Serial port B)					●	❍																					
LPT1					❍	❍	❍	❍	●		❍	❍	❍	❍		❍											❍
LPT2					❍	❍	❍	❍	❍		❍	❍	❍	❍		❍											●
PS/2 mouse														●													
ACPI[1)]											●																
FDD								●																			❍
Real-time clock										●																	
Coprocessor (FPU)															●												
Primary IDE channel																●											
Secondary IDE channel																	●										
B&R	COM3 (COM C)				❍	❍	❍		❍			❍	❍	❍													●
	COM4 (COM D)				❍	❍	❍		❍			❍	❍	❍													●
	COM5 (COM E)				❍	❍	❍		❍			❍	❍	❍													●
	CAN											❍														❍	●
PIRQ A [2)]																		●									
PIRQ B [3)]																			●								
PIRQ C [4)]																				●							
PIRQ D [5)]																					●						
PIRQ E [6)]																						●					
PIRQ F																							●				
PIRQ G																								●			
PIRQ H [7)]																									●		

Table 236: IRQ interrupt assignments in APIC mode

1) **A**dvanced **C**onfiguration and **P**ower **I**nterface.
2) PIRQ A: for PCI; PCI IRQ line 1 + USB UHCI controller #1 + graphics controller.
3) PIRQ B: for PCI; PCI IRQ line 2 + AC97 Audio controller.
4) PIRQ C: for PCI; PCI RIQ line 3 + USB UHCI controller #3 + native IDE.
5) PIRQ D: for PCI; PCI IRQ line 4 + USB UHCI controller #2.
6) PIRQ E: LAN controller.
7) PIRQ H: USB EHCI controller.

● ... 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.

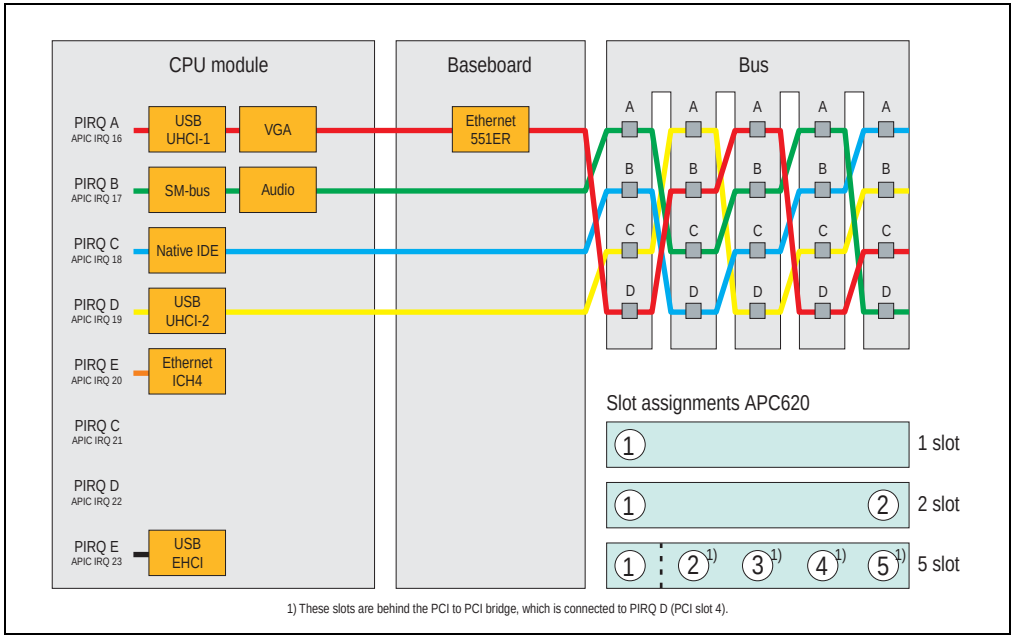


Figure 161: PCI routing with active APIC

1.4.6 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 237: Inter-IC (I²C) bus resources

1.4.7 System Management (SM) bus

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

Table 238: Inter-IC (I²C) bus resources

1.5 BIOS upgrade

Warning!

The upgrade procedures described in the following pages must be carried out for all APC620 systems with software versions lower than those listed in the following table.

CPU board software	815E	855GME
BIOS	< R017	< R007
MTCX PX32 firmware	< V1.19	< V1.19
MTCX FPGA firmware	< V1.06	< V1.06

Table 239: CPU board software versions

Automation Panel Link	Transceiver (5DLSDL.1000-01)	Receiver (5DLSDL.1000-00)
SDLR version	< V0.03	< V0.03

Table 240: Automation panel link software versions

1.5.1 Requirements

The following peripheral devices are needed for a software upgrade:

- USB floppy drive or USB flash drive
- 1.44 MB HDD diskette(s) (max. 3 diskettes)
- PS/2 or USB keyboard
- B&R upgrade software (**www.br-automation.com**)

1.5.2 What information do I need?

Information:

Individually saved BIOS settings are deleted when upgrading the BIOS.

Before starting the upgrade, you should know the CPU board type (815E and 855GME) and the various software versions.

Which CPU board do I have?

After switching on the APC620, the installed CPU board can be identified by the letters "B" and "C".

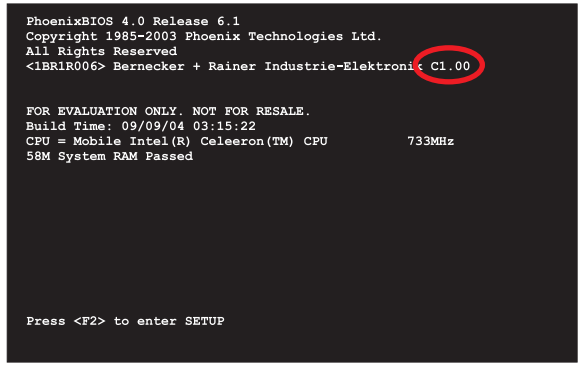


Figure 162: Differentiating between 815E and 855GME CPU boards

Letter	CPU board	Model number
B	855GME	5PC600.E855-00 5PC600.E855-01 5PC600.E855-02 5PC600.E855-03 5PC600.E855-04 5PC600.E855-05
C	815E	5PC600.E815-00 5PC600.E815-02 5PC600.E815-03

Table 241: Differentiating between 815E and 855GME CPU boards

Which BIOS version and firmware are already installed on the APC620?

This information can be found on the same BIOS setup page for both the 815E and the 855GME CPU boards:

- After switching on the APC620, you can get to the BIOS setup by pressing "F2".
- From the BIOS main menu "Advanced" (top), select "Baseboard/panel features" (bottom):

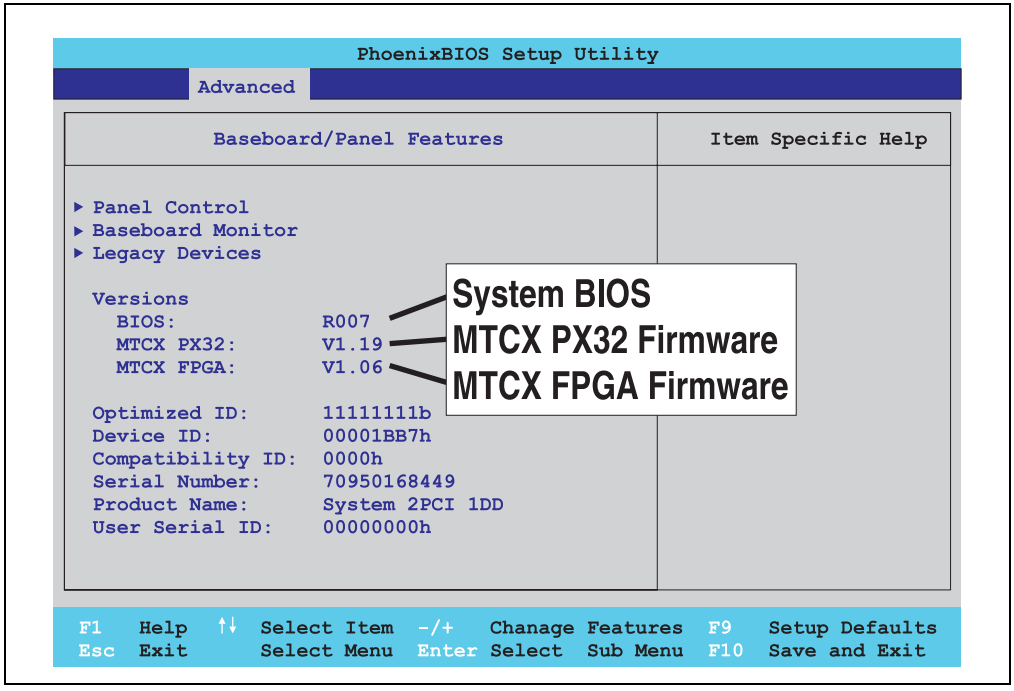


Figure 163: Software versions

Which firmware is installed on the Automation Panel Link transceiver/receiver?

This information can be found on the same BIOS setup page for both the 815E and the 855GME CPU boards:

- After switching on the APC620, you can get to the BIOS setup by pressing "F2".
- From the BIOS main menu "Advanced" (top), select "Baseboard/panel features" (bottom) and then "panel control":

Information:

The version can only be shown if an Automation Panel with Automation Panel Link SDL transceiver (5DLSDL.1000-01) and Automation Panel Link SDL receiver (5DLSDL.1000-00) are connected.

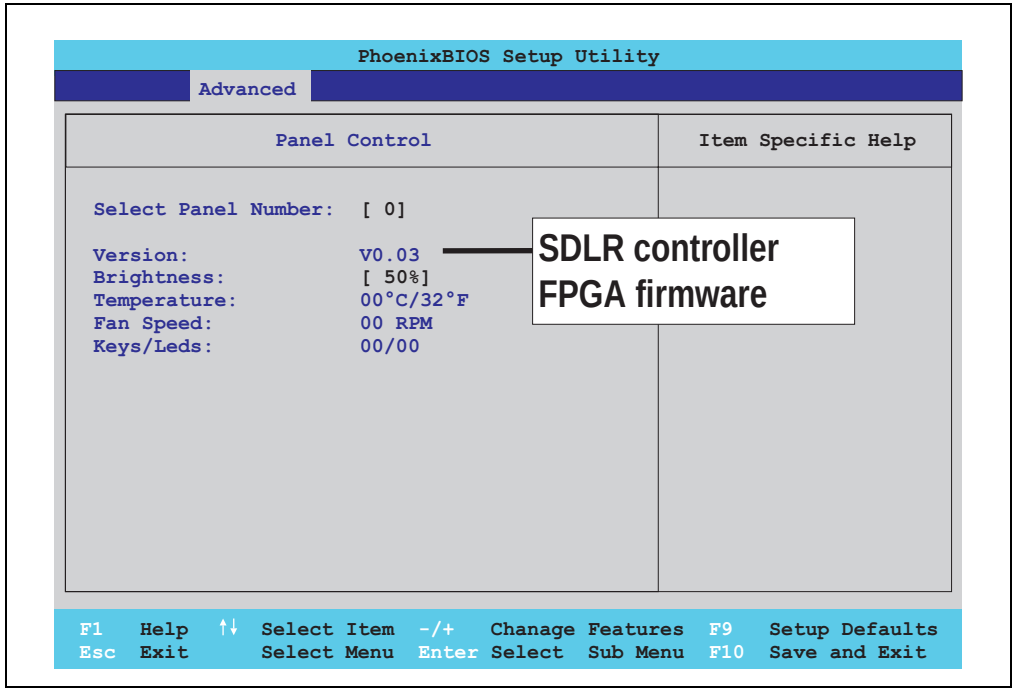


Figure 164: Firmware version of Automation Panel Link SDL transceiver/receiver

1.5.3 Upgrade BIOS for 815E

- Download and unzip the zip file from the B&R homepage.
- Copy the files to an MS-DOS startup disk (information about creating a bootable disk can be found in section 1.7 "Creating a DOS boot diskette in Windows XP" on page 345).
- Place the diskette in the USB floppy drive and reboot the APC620.
- The following boot menu will be shown after startup

```
1. Upgrade PHOENIX BIOS for 815E

2. Exit
```

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

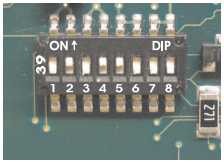
Option 2:
Return to the shell (MS-DOS).

- The system must be rebooted after a successful upgrade.

Information:

When the system has rebooted, setup default values must be reloaded after the message, "`System CMOS checksum bad`" (press F1 or select "load setup defaults" in the BIOS setup "exit" menu). Afterwards, the time and date must be set again.

When using a system unit with 2 PCI slots, the DIP switches on the system unit must be set to profile position 2. When using a system unit with 1 PCI slot, the DIP switches do not have to be changed.



Information:

The exact position and information about DIP switch settings can be found in section "Position of the DIP switch for APC620 system units" on page 347.

Figure 165: DIP switch on system unit (example)

Number	Optimized for device	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.SX05-00 and 5PC600.SX05-01.	Off	On	Off	Off	Off	Off	-	-

Table 242: Profile overview

Number	Optimized for device	DIP switch setting							
		1	2	3	4	5	6	7[1)]	8[1)]
Profile 3	Panel PC 700 system unit 5PC720.1043-00, 5PC720.1214-00, 5PC720.1505-00, 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, 5PC720.1505-01 and 5PC720.1505-02.	Off	Off	On	Off	Off	Off	-	-

Table 242: Profile overview (Forts.)

1) Not required. Free.

1.5.4 Upgrade BIOS for 855GME

- Download and unzip the zip file from the B&R homepage.
- Copy the files to a MS-DOS startup disk or USB stick (see the section 1.7 "Creating a DOS boot diskette in Windows XP" on page 345 for information about creating a bootable disk or Appendix A, section "Creating a bootable USB flash drive" on page 449 about creating a bootable USB Memory stick).
- Insert the diskette in the USB floppy drive or the USB stick in the USB port and reboot the APC620.
- The following boot menu will be shown after startup

```
1. Upgrade PHOENIX BIOS for 855GME

2. Exit
```

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

Option 2:
Return to the shell (MS-DOS).

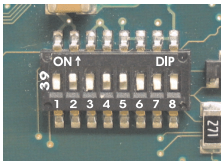
- The system must be rebooted after a successful upgrade.

Information:

When the system has rebooted, setup default values must be reloaded after the message, "`System CMOS checksum bad`" (press F1 or select "load setup defaults" in the BIOS setup "exit" menu).

Starting with BIOS version V1.15, the time and date no longer have to be set again after a BIOS upgrade (stay the same).

When using a system unit with 2 PCI slots, the DIP switches on the system unit must be set to profile position 2. When using a system unit with 1 PCI slot, the DIP switches do not have to be changed.



Information:

The exact position and information about DIP switch settings can be found in section "Position of the DIP switch for APC620 system units" on page 347.

Figure 166: DIP switch on system unit (example)

Number	Optimized for device	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.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, 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, 5PC720.1505-01 and 5PC720.1505-02.	Off	Off	On	Off	Off	Off	-	-

Table 243: Profile overview

1) Not required. Free.

1.5.5 Windows XP Embedded and BIOS upgrade

If the following error message appears after upgrading BIOS:

```
"Copy Error"
```

```
"Setup cannot copy the file Audio3d.dll"
```

then the audio driver must be reinstalled.

To do this, use the audio driver from the B&R homepage (**www.br-automation.com**).

During the installation of the audio driver, the following 2 files must be manually selected from the following directories.

ksuser.dll in the directory ...\Windows\system32

ks.sys in the directory ...\Windows\system32\drivers

This applies to 815E and 855ME CPU boards.

In order to be able to set up all possible resolutions when using an 815E CPU board, the graphics driver must be reinstalled (see 4.2.1 "Installing the graphics driver for 815E CPU boards").

1.6 Upgrading the firmware

With the APC620 / Panel PC firmware upgrade (MTCX, SDLR, SDLT), the firmware of a number of controllers (MTCX, SDLR, SDLT, UPS) can be updated, depending on the construction of the APC620 system.

1.6.1 Procedure

- Download and unzip the zip file from the B&R homepage.
- Copy the files to a MS-DOS startup disk (see the section 1.7 "Creating a DOS boot diskette in Windows XP" on page 345 for information about creating a bootable disk or Appendix A, section "Creating a bootable USB flash drive" on page 449 about creating a bootable USB Memory stick).
- Insert the diskette in the USB floppy drive or the USB stick in the USB port and reboot the APC620.
- The boot menu is shown after startup

Information:

- **The following boot menu options including descriptions are based on version 1.16 of the APC620 / Panel PC Firmware upgrade (MTCX, SDLR, SDLT) disk. In some cases, these descriptions might not match the version you are currently using.**

Boot menu options:

```
1. Upgrade MTCX (APC620/PPC700) PX32 and FPGA
2. Upgrade SDLT (APC620) only
3. Upgrade SDLR (AP800/AP900) on monitor/panel
   3.1 Upgrade SDLR on AP 0 (AP800/AP900)
   3.2 Upgrade SDLR on AP 1 (AP800/AP900)
   3.3 Upgrade SDLR on AP 2 (AP800/AP900)
   3.4 Upgrade SDLR on AP 3 (AP800/AP900)
   3.5 Upgrade all SDR (AP800/AP900)
   3.6 Return to main menu
4. Upgrade SDLR (AP800/AP900) on AP link slot
   4.1 Upgrade SDLR on AP 8 (AP800/AP900)
   4.2 Upgrade SDLR on AP 9 (AP800/AP900)
```

```
   4.3 Upgrade SDLR on AP 10 (AP800/AP900)

   4.4 Upgrade SDLR on AP 11 (AP800/AP900)

   4.5 Upgrade all SDLR (AP800/AP900)

   4.6 Return to main menu

5. Upgrade add-on UPS (firmware and battery settings)

   5.1 Upgrade add-on UPS firmware (5AC600.UPSI-00)

   5.2 Upgrade battery settings (5AC600.UPSB-00)

   5.3 Return to main menu

6. Exit
```

Option 1:
Automatically upgrades PX32 and FPGA for MTCX (default after 5 seconds).

Option 2:
The FPGA of the SDLT controller on the AP Link slot is automatically updated.

Option 3:
A submenu is opened for upgrading the SDLR controller on the Monitor/Panel plug.

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

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

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

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

3.5. Upgrade all SDLR (AP800/AP900)
All SDLR controllers are automatically updated on all Automation Panels on the Monitor/Panel.
(by default, after 5 seconds).

3.6. Return to main menu
Returns to the main menu.

Option 4:
A submenu is opened for upgrading the SDLR controller on the AP Link slot.

4.1. Upgrade SDLR on AP 8 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 8.

4.2. Upgrade SDLR on AP 9 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 9.

4.3 Upgrade SDLR on AP 10 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 10.

4.4 Upgrade SDLR on AP 11 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 11.

4.5 Upgrade all SDLR (AP800/AP900)
All SDLR controllers are automatically updated on all Automation Panels on the AP Link slot (by default, after 5 seconds).

4.6 Return to main menu
Returns to the main menu.

Option 5:
The submenu for the add-on UPS firmware and upgrade and the battery settings upgrade is opened.

5.1. Upgrade add-on UPS firmware (5AC600.UPSI-00)
The firmware for the add-on UPS 5AC600.UPSI-00 is automatically updated.

5.2. Upgrade battery settings (5AC600.UPSB-00)
The battery settings for 5AC600.UPSB-00 are automatically updated.

5.3 Return to main menu
Returns to the main menu.

Option 6:
Return to the shell (MS-DOS).

Information:

The system must be powered off and on again after a successful controller upgrade.

1.6.2 Possible upgrade problems and version dependencies

1. The SDLR firmware can only be updated if an Automation Panel with Automation Panel Link Transceiver (5DLSDL.1000-01) and Automation Panel Link Receiver (5DLSDL.1000-00) is connected. This update is only permitted in an office environment (clean environment - no disturbances) because a software error in versions older than V0.03 can cause errors. This error can cause the Automation Panel to remain off after an update. If this error occurs, the Automation Panel Link Transceiver (5DLSDL.1000-01) or Automation Panel Link Receiver (5DLSDL.1000-00) must be exchanged or sent in for repair.

2. Daisy chain operation of 2 Automation Panel 900 units is supported starting with SDLR version V00.08 or V01.01 and MTCX PX32 V01.33 and MTCX FPGA V01.11 (contents of the MTCX upgrade disk V01.04).

3. Operation of an SDLT adapter in the AP Link slot is supported starting with MTCX PX32 V01.50 and MTCX FPGA V01.12 (contents of the MTCX upgrade disk V01.07).

4. When using a functional SDL connection with an installed SDLR version V00.03 or lower, the SDLR must first be updated to version V00.05 or higher. Only then can the MTCX PX32 and FPGA be updated. If the MTCX PX32 and FPGA are updated first, then the SDLR firmware can no longer be updated.

5. Starting with SDLR version V00.05 or V01.01, the MTCX PX32 must be higher than or equal to V01.23 and the MTCX FPGA must higher than or equal to V01.09. Otherwise, full SDL functionality is not possible.

6. SDL with equalizer is first supported starting with SDLR version V01.04 and MTCX PX32 version V01.55 and MTCX FPGA version V01.15. An SDLT with version V00.02 is required on the AP Link slot (contents of the MTCX upgrade disk V01.10). SDL with equalizer allows longer distances (max. 40m) depending on the AP being used.

7. Automation Panel Link transceivers (5DLSDL.1000-01) or Automation Panel Link receivers (5DLSDL.1000-00) with a Firmware version lower than or equal to V00.10 can no longer be combined with Automation Panel Link transceivers (5DLSDL.1000-01) or Automation Panel Link receivers (5DLSDL.1000-00) with firmware higher than or equal to V01.04. Daisy chain operation is not possible with such a combination.

8. If an APC620 add-on UPS (e.g. 5AC600.UPSI-00) + battery unit (e.g. 5AC600.UPSB-00) is connected to the system and operable, then after an upgrade of the MTCX or SDLT you must either disconnect the battery or push the Power button (to put the system in Standby mode), before executing the required power off/on. If not, the firmware upgrade will not work because the UPS buffers the system.

1.7 Creating a DOS boot diskette in Windows XP

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

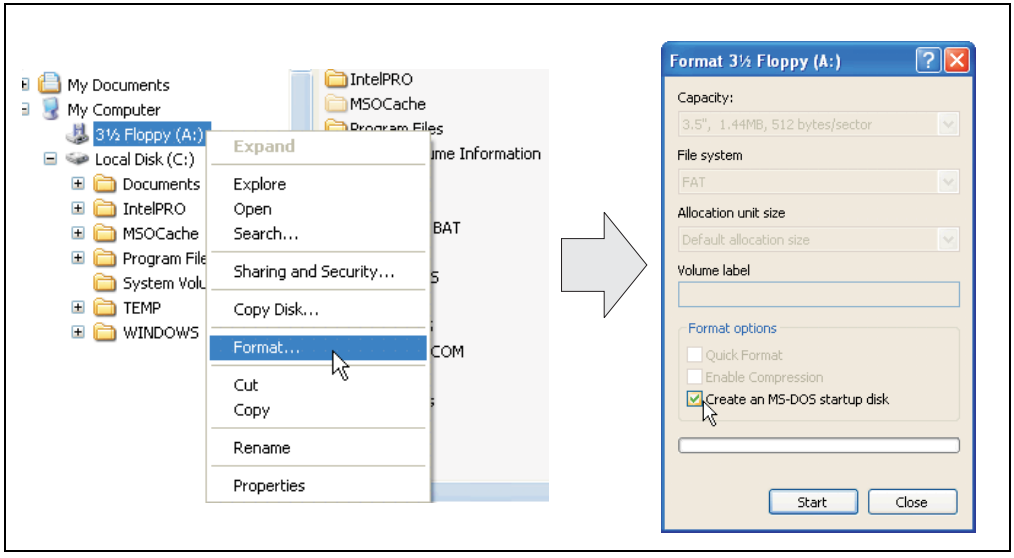


Figure 167: Creating a bootable diskette in Windows XP - step 1

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

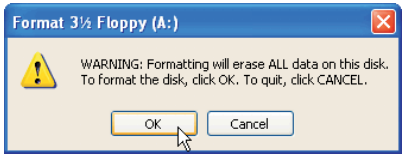


Figure 168: Creating a bootable diskette in Windows XP - step 2

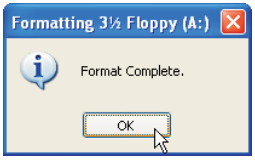


Figure 169: Creating a bootable diskette in Windows XP - step 3

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 uncheck the option "hide protected operating system files (recommended)" (checked as default) and check the option "show hidden files and folders".

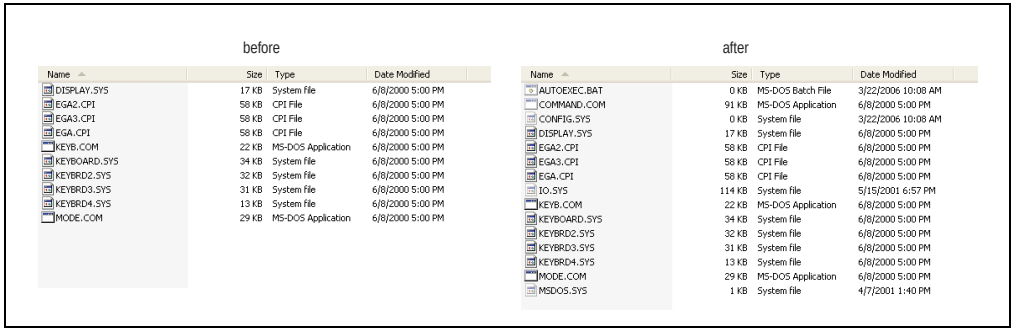


Figure 170: Creating a bootable diskette in Windows XP - step 4

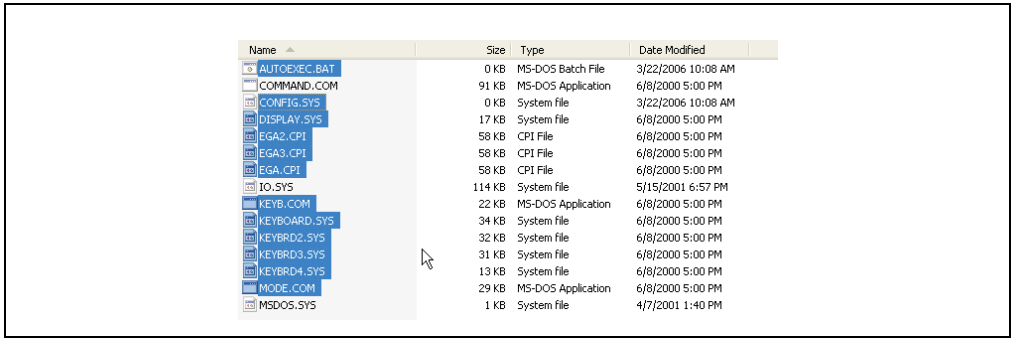


Figure 171: Creating a bootable diskette in Windows XP - step 5

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

1.8 Position of the DIP switch for APC620 system units

Warning!

The following procedure is only permitted with the power switched off and the supply voltage disconnected!

To get to the DIP switches, it is necessary to open the front cover. To do this, loosen the five Torx screws (T10) marked and pull the cover off towards the front. Then the DIP switches can be accessed at the location marked in yellow. The setting can now be made using a pointed object. If the system has a slide-in drive, it must be removed first to get to the DIP switches.

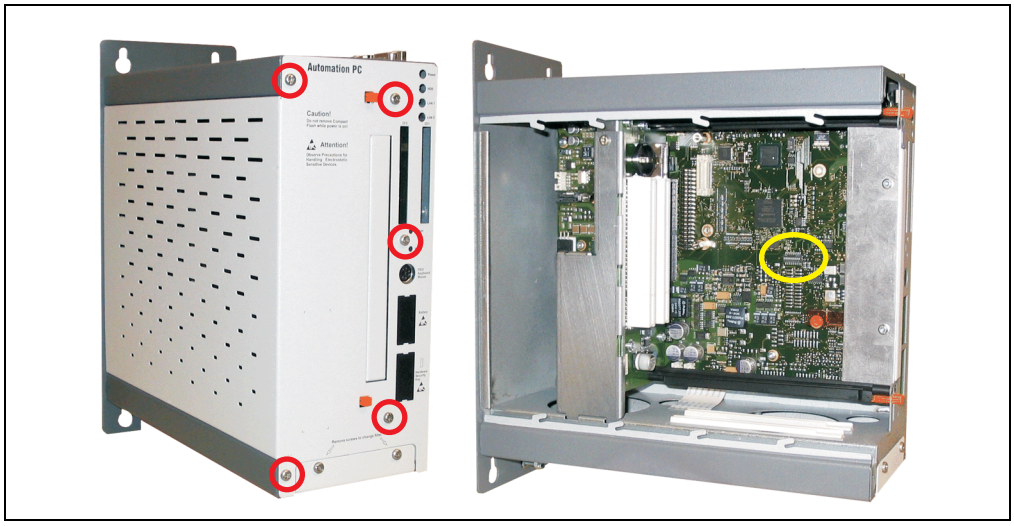


Figure 172: DIP switch position

2. Automation PC 620 with Automation Runtime

Power supply buffering of 10 ms is guaranteed starting with the following system unit revisions:

Model number	Description	Revision
5PC600.SX01-00	System 1 PCI	B0
5PC600.SX02-00	System 2 PCI, 1 disk drive slot, 1 AP Link slot	B0
5PC600.SX02-01	System 2 PCI, 1 disk drive slot	B0
5PC600.SX05-00	System 5 PCI, 2 disk drive slots, 1 AP Link slot	A0
5PC600.SX05-01	System 5 PCI, 2 disk drive slots	A0

Table 244: System unit support for buffering with Automation Runtime

3. Automation PC 620 with MS-DOS

Figure 173: Automation PC 620 with MS-DOS

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

Table 245: Model numbers - MS-DOS

3.1 Known problems

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

- AC97 Sound - no support
- USB 2.0 - only USB 1.1 rates can be reached.
- Limited drive support for the slide-in drives 5AC600.DVDS-00 and 5AC600.DVRS-00 - no write functions.
- "Graphics Engine 2" and therefore Extended Desktop mode also cannot be used.
- A few "ACPI control" BIOS functions cannot be used.

The following table shows the tested resolutions and color depths on the Monitor / Panel connector with 855GME CPU boards.

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

Table 246: Tested resolutions and color depths for DVI and RGB signals

4. Automation PC 620 with Windows XP Professional

Figure 174: Windows XP Professional Logo

Model number	Short description	Note
9S0000.08-010	**OEM Microsoft Windows XP Professional** CD, German; Only delivered with a new PC.	
9S0000.08-020	**OEM Microsoft Windows XP Professional** CD, English; Only delivered with a new PC.	
9S0000.09-090	**OEM Microsoft Windows XP Professional Multilanguage** CDs; Only delivered with a new PC.	

Table 247: Model numbers - Windows XP Professional

4.1 Installation

Generally, Windows XP Professional is already pre-installed by B&R on the desired mass memory (add-on hard disk, slide-in hard disk). All of the drivers required for operation (graphics, network, etc.) are also installed when doing so.

4.1.1 FAQ

How do I install Windows XP on systems with 815E CPU boards?

Windows XP can be installed on APC620 systems with 815E CPU boards **only** together with a connected **external monitor (RGB)**. An Automation Panel 900 is switched off in the Windows hardware recognition if connected via SDL or DVI during the installation. Video output via SDL and DVI is only supported after installing the 815E graphics driver.

4.2 Graphics drivers

For operation modes "extended desktop" and "dual display clone", the Intel Extreme graphics chip driver must be installed. Graphics drivers for 815E and 855GME CPU boards are available for approved operating systems in the download area (Service - Product Related Downloads - BIOS / Drivers / Updates) on the B&R homepage (**www.br-automation.com**).

4.2.1 Installing the graphics driver for 815E CPU boards

The following must be observed when installing the graphics chip driver for the graphics chip integrated in the 815E chip set:

- The driver available from Intel is NOT permitted to be used, only the driver available from B&R (**www.br-automation.com**).
- After unpacking the *.zip file, the driver must be updated using the Windows Device Manager "Start - Control Panel - System - Hardware - Device Manager - Update Driver". When doing this, use the file **i81xnt5.inf**.
- The initial installation of the driver can **only** be carried out with an **external monitor (RGB)** connected. After successfully installing the B&R driver, an Automation Panel 900 be operated via SDL or DVI without problems.

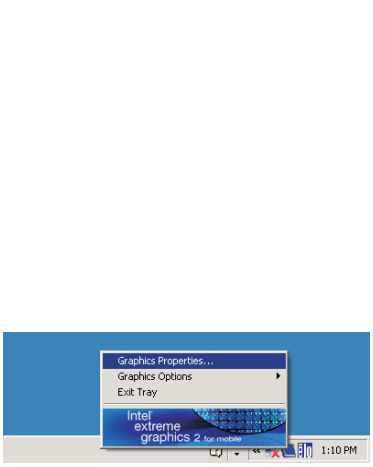
Caution!

Presently, this driver is only approved for the Windows XP Professional and Windows XP embedded operating systems.

Information:

The following screenshots and descriptions refer to the graphics driver Version 6.13.01.3175 for 815E CPU boards. Therefore, it is possible that the screenshots and descriptions might not correspond with the installed driver version.

After the driver is installed, it can be configured in the Control Panel (called up through the icon in the taskbar or Start - Control Panel - Display - Settings - Advanced).



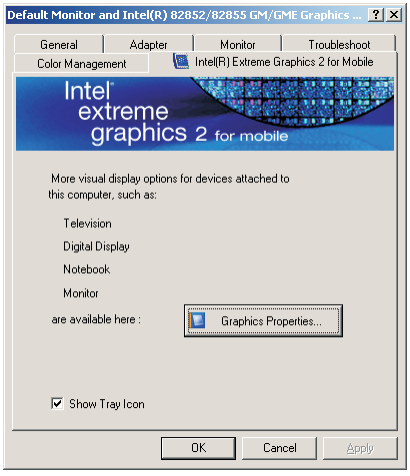


Figure 175: Graphics driver for 815E - Control Panel access

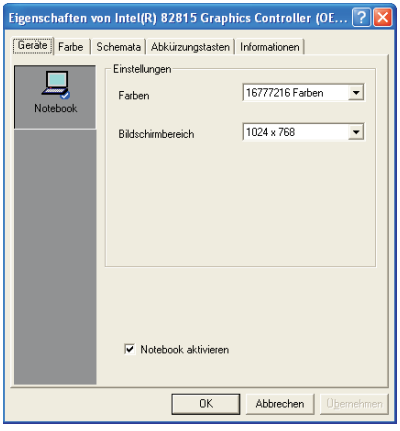


Figure 176: Graphics driver for 815E - settings

4.2.2 Installing the graphics driver for 855GME CPU boards

Information:

The following screenshots and descriptions refer to the graphics driver version 14.11 for 855GME CPU boards. Therefore, it is possible that the screenshots and descriptions might not correspond with the installed driver version.

After the driver is installed, it can be configured in the Control Panel (called up through the icon in the taskbar or Start - Control Panel - Display - Settings - Advanced).

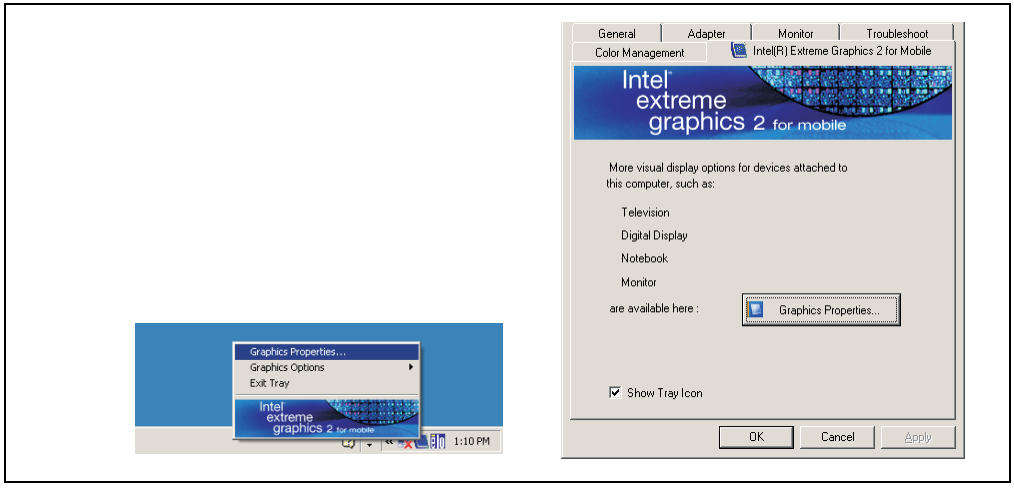


Figure 177: Accessing the graphics driver via Control Panel

Information:

The connected Automation Panel 900 is still not activated after installing the graphics driver.
See the FAQ for information on this topic. "My Automation Panel 900 is still not activated after installing the graphics driver." on page 358.

4.2.3 Graphics settings for Extended Desktop

Under the "Extended desktop" settings, "Notebook" can be set as the primary device (Graphics Engine 1) and "Digital display" as secondary device (Graphics Engine 2). The contents displayed on the two lines are different (Extended Desktop).

Driver settings		Effect on APC620	
Primary device	Notebook	AP Link output	Graphics engine 1
Secondary device	Digital display	Monitor / Panel	Graphics engine 2
Primary device	Digital display	Monitor / Panel	Graphics engine 2
Secondary device	Notebook	AP Link output	Graphics engine 1

Table 248: Relationship between driver settings and graphics engine

Resolution and color depth can be configured separately for each line via the device settings for notebook and digital display.

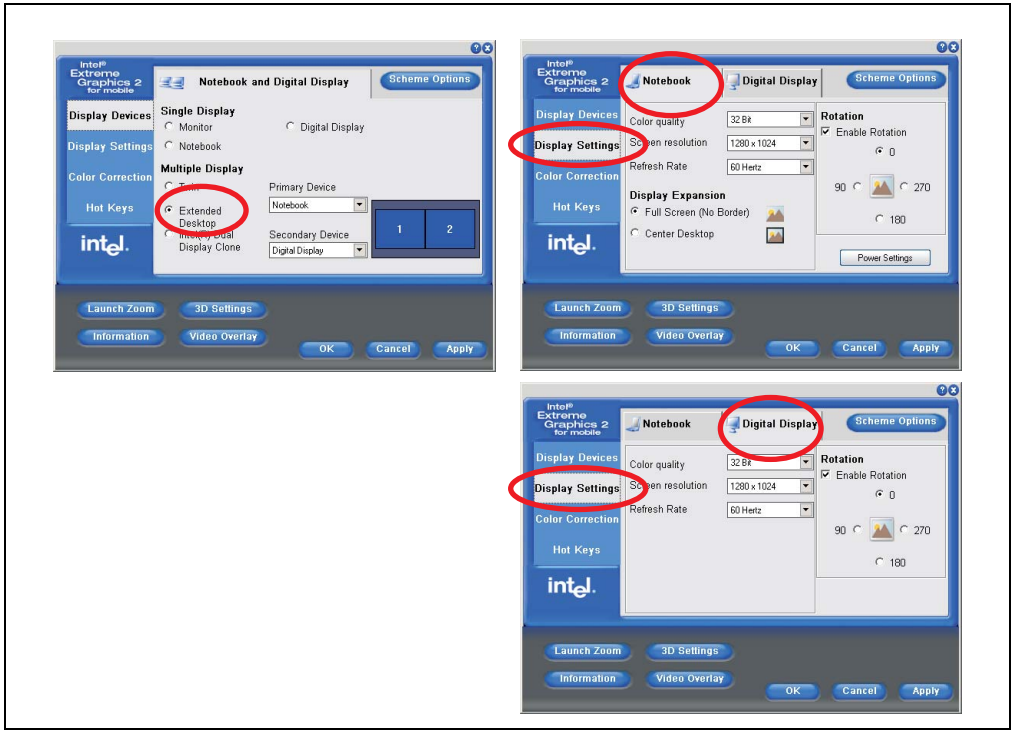


Figure 178: Extended desktop settings - primary and secondary device

Due to the operation of two different lines, for each line one of the internal serial interfaces COM C and COM D on the APC620 must be activated in BIOS (under Advanced - Baseboard/Panel Features - Legacy Devices) for the Automation 900 devices' touch screens. See section 4.3.1 "Installation for Extended Desktop" on page 360 for information about installing the touch screen driver.

4.2.4 Graphics settings for Dual Display Clone

In "Dual display clone" mode, the same content is displayed on every connected Automation Panel 900 unit on both lines (Graphics Engine 1 and Graphics Engine 2). This enables operation of the application from every display.

Driver settings		Effect on APC620	
Primary device	Notebook	AP Link output	Graphics engine 1
Secondary device	Digital display	Monitor / Panel	Graphics engine 2
Primary device	Digital display	Monitor / Panel	Graphics engine 2
Secondary device	Notebook	AP Link output	Graphics engine 1

Table 249: Relationship between driver settings and graphics engine

Resolution and color depth can only be set on the line designated as the primary device.

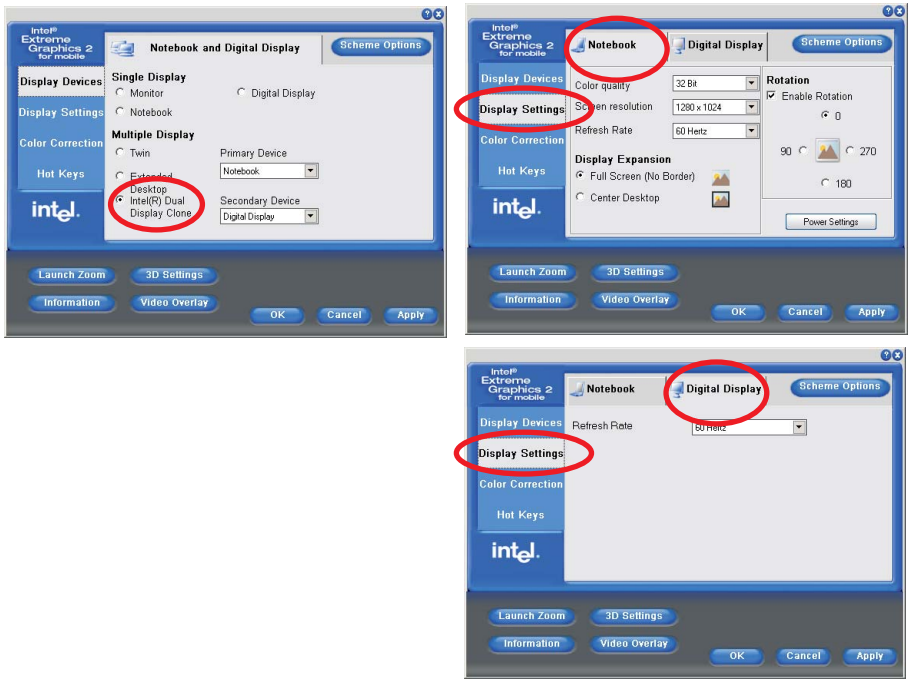


Figure 179: Dual display clone settings - primary and secondary device

The internal serial interface COM C on the APC620 must be activated in BIOS (under Advanced - Baseboard/Panel Features - Legacy Devices) for the Automation 900 devices' touch screens. See the section 4.3.2 "Installation for Dual Display Clone" on page 362 for information about installing the touch screen driver.

A panel locking time can be set in the B&R Control Center to prevent simultaneous operation of the Automation Panel 900 (see the .chm help file for the B&R Control Center).

Information:

- **The panel locking time is reset to the value configured in the key configuration (KCF - Key Configuration File) when the system is restarted.**

4.2.5 FAQ

My Automation Panel 900 is still not activated after installing the graphics driver.

After installation, the graphics driver is automatically set to the analog output - RGB (monitor). As a result, any Automation Panel 900 connected via SDL (Smart Display Link) or DVI remains switched-off after loading the Intel graphics driver in Windows XP.

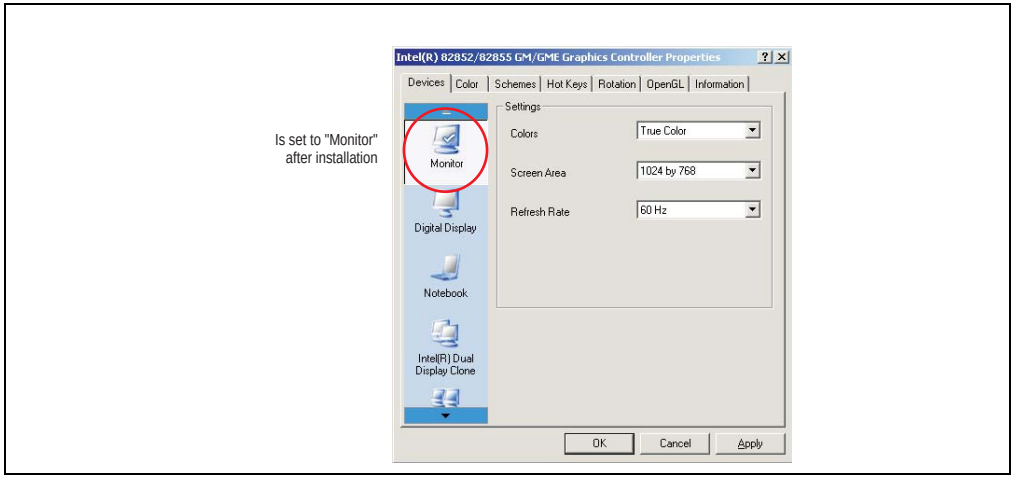
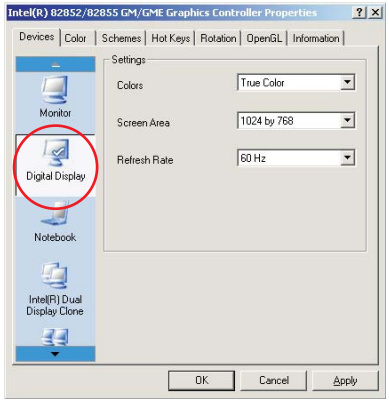
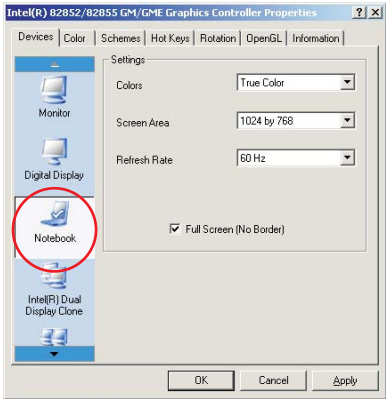


Figure 180: Settings after installing the graphics driver

To correct this problem, an analog monitor (RGB) must be connected to the monitor/panel, to re-activate the settings for digital output (digital display for the monitor/panel output or notebook for the AP Link output).



Digital display for Monitor / Panel output



Notebook for AP Link output

Figure 181: Settings for adjustment

4.3 Touch screen driver

For operation modes "extended desktop" and "dual display clone", the Elo touch screen driver must be installed. This can be found in the download area (Service - Product Related Downloads - BIOS / Drivers / Updates) on the B&R homepage (**www.br-automation.com**).

Information:

The touch screen drivers are based on the Windows mouse system. That means that either a mouse (USB or PS/2) must have been connected during the Windows installation or the mouse drivers must be installed additionally (e.g. automatically installed when later connecting a USB mouse). The BIOS function "PS/2 Mouse" must be set to "Enabled" when using a PS/2 mouse. This is located on the BIOS setup page "Advanced" - "Miscellaneous" (the default setting is "Disabled").

4.3.1 Installation for Extended Desktop

Information:

- Activate COM C and COM D in BIOS.
- During installation the panel locking time must be set to 0 ms ("Auto detect" or the driver could only recognize 1 touch screen).

- Executing setup
- The Automation Panel 900 unit's touch screen is connected with the APC620 serially, so the serial touch screen drivers must be installed.

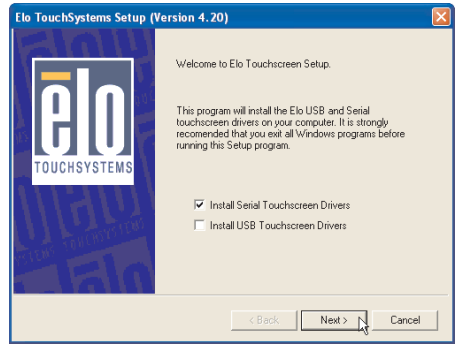


Figure 182: Touch screen driver - serial touch screen

- The driver's auto-detect function sends data packets to every existing serial interface. It then returns a list of all the ports on which an Elo touch screen is connected. The panel locking time must be set to 0 ms (auto-detect only found 1 touch screen)

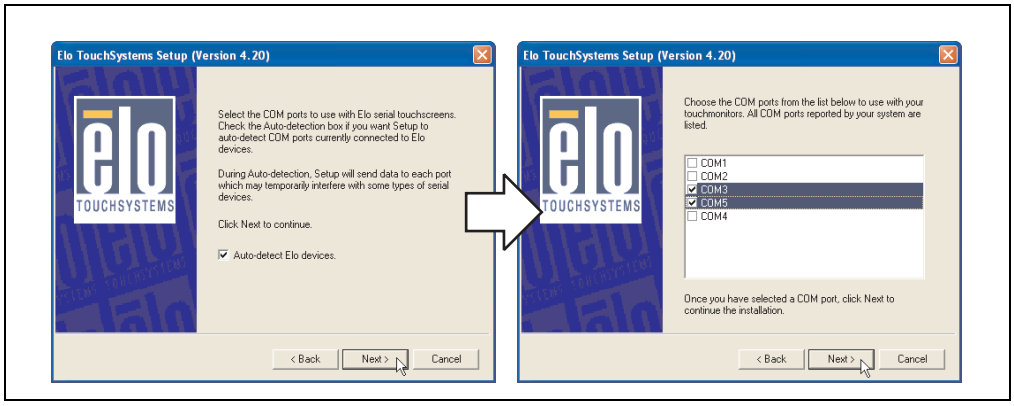


Figure 183: Touch screen driver - auto-detect

- After selecting the COM ports on which Elo touch screens are connected, the system must be rebooted.
- After restarting, each line of touch screens must be calibrated separately. This is done in the menus "Properties 1" and "Properties 2" with the "Align" button. When one touch screen is being calibrated, the others are automatically locked.

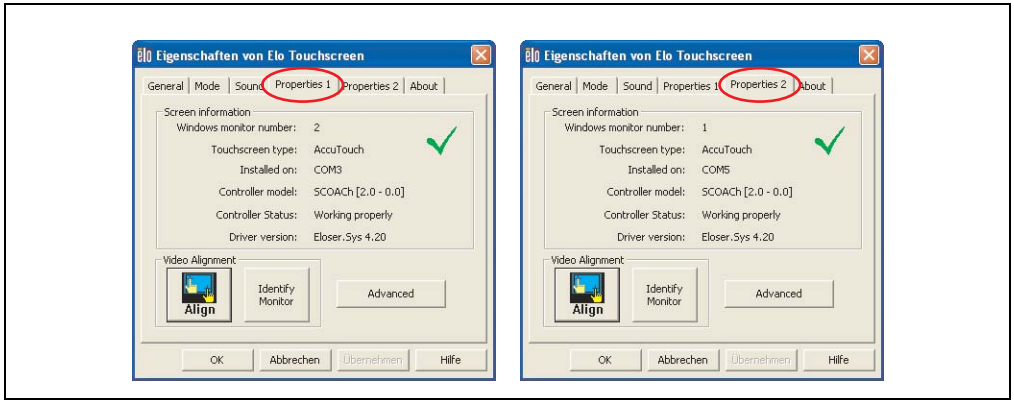


Figure 184: Touch screen calibration

4.3.2 Installation for Dual Display Clone

Information:

- Activate COM C in BIOS.
- During installation the panel locking time must be set to 0 ms ("Auto detect" or the driver could only recognize 1 touch screen).

- Executing setup
- The Automation Panel 900 unit's touch screen is connected with the APC620 serially, so the serial touch screen drivers must be installed.

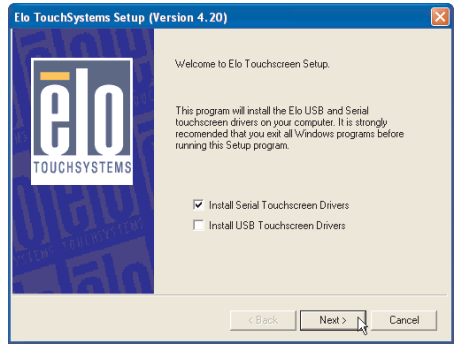


Figure 185: Touch screen driver - serial touch screen

- The driver's auto-detect function sends data packets to every existing serial interface. It then returns a list of all the ports on which an Elo touch screen is connected. The panel locking time must be set to 0 ms (auto-detect only found 1 touch screen)

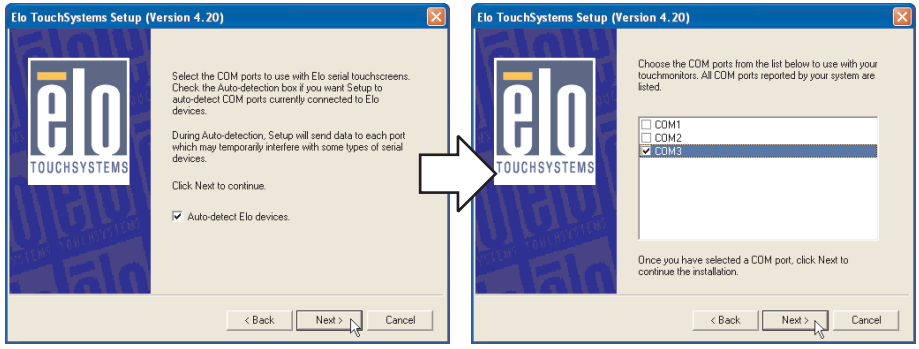


Figure 186: Touch screen driver - auto-detect

- After selecting the COM ports on which Elo touch screens are connected, the system must be rebooted.
- After restarting, only one touch screen must be calibrated. These settings are then applied to other touch screens.

Figure 187: Touch screen calibration

4.3.3 FAQ

Power options and touch screen

The power options allow a few different settings (e.g. Turn off monitor, Turn off hard disks and System standby for a Windows XP system).

Caution!

If the "Turn off monitor" function is enabled and a time has been set, then touching the dark touch display after the time has expired presents the risk of "blindly" activating one of the commands in the application and unintentionally triggering functions.

This can be avoided by activating a screen saver. As a result, the next time the touch screen is touched, the screen saver is deactivated.

4.4 Audio driver

An audio driver can be found in the download area (Service - Product Related Downloads - BIOS / Drivers / Updates) on the B&R homepage (**www.br-automation.com**).

See the section "MIC, Line IN and Line OUT Port" on page 86 for information about the audio driver type.

4.4.1 Installation

Execute the downloaded setup.

Information:

The option "AC97 Audio controller" must be set to "Enabled" (default setting) in BIOS under Advanced - I/O Device Configuration.

4.5 Network driver

The APC620 has 2 different network controllers. Drivers for both network connections (ETH1 and ETH2) are available for approved operating systems in the download area (Service - Product Related Downloads - BIOS / Drivers / Updates) on the B&R homepage (**www.br-automation.com**).

See the sections "Ethernet connection ETH1" on page 76 and "Ethernet connection ETH2" on page 77 for information about network controller types.

4.5.1 Installation ETH1

Execute the downloaded setup.

4.5.2 Installation ETH2

Installation is performed via the Windows device manager using the Net559ER.inf file.

5. Automation PC 620 with Windows XP embedded

Figure 188: Windows XP Embedded Logo

Model number	Short description	Note
9S0001.19-020	**OEM Microsoft Windows XP embedded APC620 815E w/CF, English** 512 MB CompactFlash with Windows XP embedded image for APC620 systems with a 815E CPU board. Only delivered with a new PC.	Cancelled since 10/2005 Replaced by: 9S0001.20-020
9S0001.20-020	**OEM Microsoft Windows XP embedded APC620 855GME w/CF, English** 512 MB CompactFlash with Windows XP embedded image for APC620 systems with a 855GME CPU board. Only delivered with a new PC.	
9S0001.27-020	**OEM Microsoft Windows XP embedded (incl. SP2) APC620 815E w/CF, English** 512 MB CompactFlash with Windows XP embedded image including SP2 for APC620 systems with a 815E CPU board. Only delivered with a new PC.	Cancelled since 10/2005 Replaced by: 9S0001.27-020
9S0001.28-020	**OEM Microsoft Windows XP embedded (incl. SP2) AC620 855GME w/CF, English** 512 MB CompactFlash with Windows XP embedded image including SP2 for APC620 systems with a 855GME CPU board. Only delivered with a new PC.	

Table 250: Model numbers - Windows XP Embedded

5.1 General information

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

The Windows XP Embedded available from B&R was developed for APC620 systems with 815E and 855GME CPU board units.

5.2 Installation

Windows XP Embedded is usually preinstalled at B&R Austria on a suitable CompactFlash card (min. 512 MB). The APC620 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.

Brief instructions for creating your own Windows XP Embedded images or a suitable Target Designer export file for 815E or 855GME CPU boards can be downloaded from the download area on the B&R homepage (www.br-automation.com).

5.3 Graphics drivers

Already included in the B&R Windows XP embedded image for 815E and 855GME CPU boards.

5.4 Touch screen driver

The touch screen driver must be manually installed in order to operate Automation Panel 900 touch screen devices. The driver installation is identical to the driver installation for Windows XP Professional Systems. For more information, see 4.3 "Touch screen driver" on page 360

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

5.5 Audio driver

Already integrated in the B&R Windows XP embedded image for 815E and 855GME CPU boards.

5.5.1 After a BIOS upgrade

If the following error message appears after upgrading BIOS:

```
"Copy Error"
```

```
"Setup cannot copy the file Audio3d.dll"
```

then the audio driver must be reinstalled.

To do this, use the audio driver from the B&R Homepage (**www.br-automation.com**).

During the installation of the audio driver, the following 2 files must be manually selected from the following directories.

ksuser.dll in the directory ...\Windows\system32

ks.sys in the directory ...\Windows\system32\drivers

This applies to 815E and 855ME CPU boards.

The graphics driver must be re-installed to enable all possible resolutions when using an 815E CPU board (see 4.2.1 "Installing the graphics driver for 815E CPU boards").

5.6 Network driver

Already integrated in the B&R Windows XP embedded image for 815E and 855GME CPU boards.

5.7 FAQ

If USB devices are connected with the APC620 and XP Embedded executes a restart during a shutdown, then the 3 "USB Root Hubs" under Properties ->Power Management-> Allow the computer to turn off this device to save power -> must be selected in the "Device manager" under "Universal Serial Bus controllers".

6. Automation PC 620 with Windows CE

Model number	Short description	Note
9S0001.29-020	**OEM Microsoft Windows CE 5.0 English** OEM Microsoft Windows CE 5.0 English license, only supplied together with a device.	

Table 251: Model numbers - Windows CE

6.1 General information

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.

Advantages

- Windows CE is a 32-bit operating system with multitasking and multithreading capabilities.
- In addition to being compact, it even offers high performance for configurations with limited RAM.
- Windows CE is best suited for integrated automation used in industrial systems.
- Windows CE is also less expensive than other Windows licenses.

6.2 Properties in connection with APC620 devices

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 5.0 for APC620
Supported screen resolutions	VGA, SVGA, XGA
Color depth	16 bit or 65536 colors
Graphics card driver	Intel® embedded graphics driver
Main memory	Automatic detection and use of up to 512 MB
Boot time / Startup time	Approx. 39 seconds [1)]
Included web browser	Internet Explorer 6 for Windows CE
.NET	Compact Framework V2.0
Image size	Approx. 29 MB[2)] (not compressed)
Custom keys	Supported
PVI	Supported

Table 252: Properties for Windows CE 5.0 and APC620

1) Measured with a 32 MB SanDisk 5CFCRD.0032-02, 2 partitions, no USB mass memory inserted, all servers disabled, BIOS options Summary Screen=Disabled, Extended Memory Testing=None and Dark Boot=Enabled, both network cards connected with one network and enabled, USB keyboard and USB mouse plugged-in.

2) Use the function "Compress Windows CE Image" in the B&R eMbedded OS Installer to reduce the image size.

6.3 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 32 MB CompactFlash card (size should be specified when ordered)

6.4 Installation

Windows CE is usually preinstalled at B&R Austria.

6.4.1 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 for free 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.

6.5 Known problems

- The ATAPI driver being used doesn't support DMA transfers. All devices (CompactFlash cards, hard drives, etc.) are operated in PIO mode.
- USB 2.0 (EHCI) fails sporadically.
- The graphics driver "Clone mode" only functions if the setting "Graphics Engine 2" has been made under the BIOS setting "Primary Graphics Engine".

7. 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.

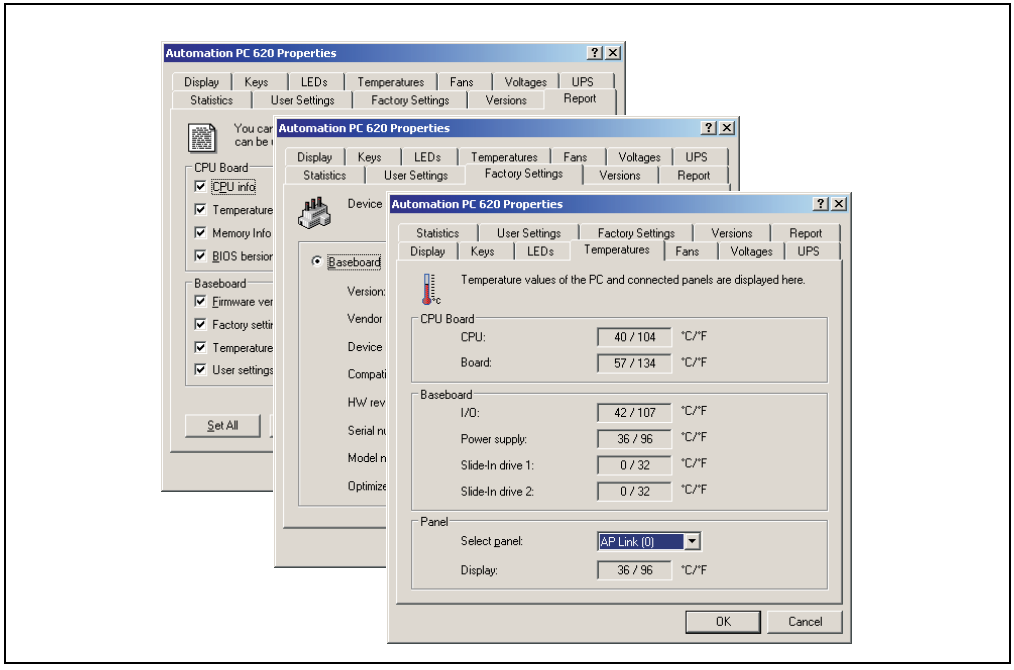


Figure 189: ADI Control Center screenshots (Version 1.60) - example

Features (device dependent)

- Adjusting the display brightness of connected Panels
- Reading device specific keys (in order for this to be possible, a key configuration must be installed that was created with the B&R Key Editor)
- Activation of device specific LEDs on a Mylar 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

Supports following systems:

System	Operating system	Note
Automation PC 620	Windows XP Professional Windows 2000	Installation using its own setup
	Windows XP Embedded	Content of B&R Windows XP Embedded image
Panel PC 700	Windows XP Professional Windows 2000	Installation using its own setup
	Windows XP Embedded	Content of B&R Windows XP Embedded image
Power Panel BIOS devices	Windows XP Embedded	Content of B&R Windows XP Embedded image
	Windows CE	Content of B&R Windows CE image
Mobile Panel BIOS devices	Windows XP Embedded	Content of B&R Windows XP Embedded image
	Windows CE	Content of B&R Windows CE image
Automation Panel 800	-	With Automation PC620 and Panel PC 700
Automation Panel 900	-	With Automation PC620 and Panel PC 700

Table 253: System support - ADI driver

A detailed description of the Control Center can be found in the integrated online help.

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

7.1 SDL equalizer setting

The equalizer makes it possible to adjust the strength of the video signal to the SDL cable length. This allows you to improve the visual representation on the display.

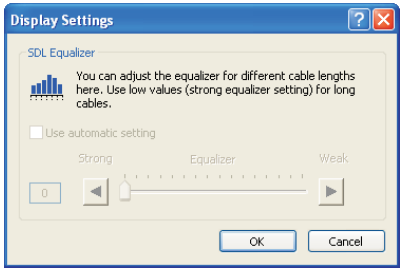


Figure 190: ADI Control Center - SDL equalizer settings

The value is optimally defined for the cable length when using the "Automatic setting".

The equalizer value can only be changed if the function is supported by Automation Panel 900 (starting with Panel Firmware Version 1.04 or higher) and if MTCX PX32 Version 1.54 or higher is installed. Otherwise, the dialog fields are disabled.

7.2 UPS configuration

Here, the status values for an installed B&R APC620 UPS can be displayed and the battery settings for the UPS can be changed, updated, and saved. The system settings for the UPS can also be configured.

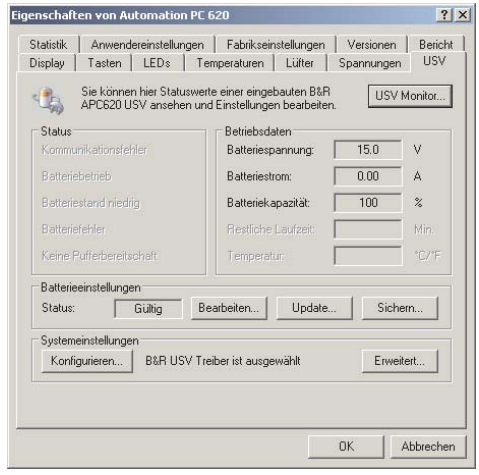


Figure 191: ADI Control Center - UPS settings

Caution!

The installed UPS must be selected and configured in the Control Panel using the energy options in order for battery operation to be supported.

7.2.1 Configuration of UPS operation for the B&R APC620 UPS

1) Open the energy options dialog box in the Control Panel.
2) Go to the UPS tab and click on "Select".
3) Set the manufacturer to "Bernecker + Rainer" and the model to "APC620 UPS" and click on "Finish". The value for the COM connection is only required for a serially connected UPS and is ignored by the APC620 UPS driver.
4) Click on "Apply" to begin UPS operation. After a few seconds the UPS status and details are displayed.

Information:

Administrator rights are required in order to change the energy options or display the UPS status.

7.2.2 Display status values for UPS

1) Open the Control Center in the Control Panel.
2) Select UPS tab.

The displayed values are updated automatically.

Select UPS monitor to display UPS status changes since the last time the system or UPS driver was started.

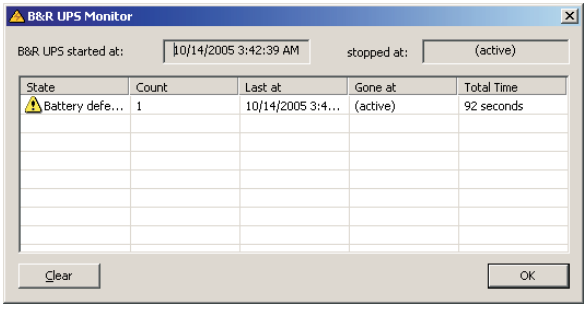


Figure 192: ADI Control Center - UPS monitor

The dialog box is updated automatically when the status changes.

To remove a status from the list, click on delete.

7.2.3 Change UPS battery settings

1) Open the Control Center in the Control Panel.
2) Select UPS tab.
3) Under "Battery settings", click on "Edit". Clicking on "Open" opens a dialog box.
4) Select and open the file containing the battery settings.

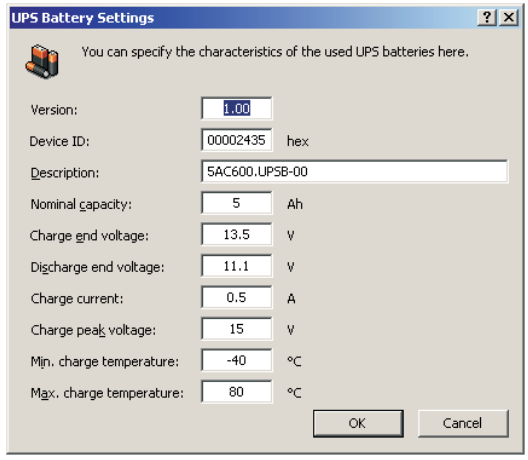


Figure 193: ADI Control Center - UPS battery settings

In this dialog box you can change the settings for the UPS battery.

Information:

To make settings for batteries not from B&R, it is best to make a copy of a file with battery settings from B&R under a new name and adjust the settings in this file for the battery being used.

Current files with settings for batteries from B&R can be found on the B&R APC620 / PPC700 firmware upgrade disk and can also be updated using these.

Information:

If you would like to change the current battery settings on the UPS, they must first be saved in a file.

7.2.4 Update UPS battery settings

1) Open the Control Center in the Control Panel.
2) Select the UPS tab.
3) Under "Battery settings", click on "Update". Clicking on "Open" opens a dialog box.
4) Select and open the file containing the battery settings. The "Download" dialog box is opened.

The transfer can be aborted by clicking on "Cancel" in the Download dialog box. "Cancel" is disabled when the flash memory is being written to.

Caution!

- **Battery operation is not possible during the update.**
- **If the transfer is interrupted, then the procedure must be repeated until the battery settings have been updated successfully. Otherwise battery operation will no longer be possible.**

Deleting the data in flash memory can take several seconds depending on the memory block being used. The progress indicator is not updated during this time.

Information:

The UPS is automatically restarted after a successful download. This can cause a brief interruption of the UPS communication.

7.2.5 Save UPS battery settings

1) Open the Control Center in the Control Panel.
2) Select UPS tab.
3) Under "Battery settings", click on "Save". Clicking on "Save under" opens a dialog box.
4) Enter a file name or select an existing file and click on "Save".

The transfer can be aborted by clicking on "Cancel" in the Download dialog box.

7.2.6 Configure UPS system settings

1) Open the Control Center in the Control Panel.
2) Select the UPS tab.
3) Under "System settings", click on "Configure". The energy options dialog box in the Control Panel is opened.

Further information regarding the UPS system settings can be found in the Windows help.

Information:

Administrator rights are required in order to change the energy options or display the UPS status.

7.2.7 Change additional UPS settings

1) Open the Control Center in the Control Panel.
2) Select the UPS tab.
3) Under "System settings", click on "Advanced". This opens the following dialog box:

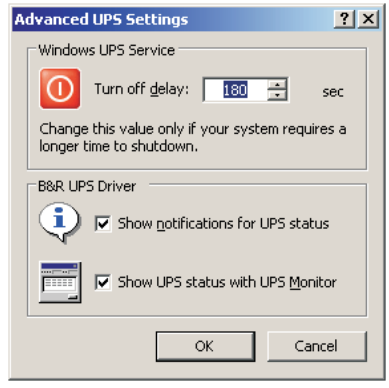


Figure 194: ADI Control Center - Advanced UPS settings

Information:

Administrator rights are required in order to display this dialog box.

Change delay time for UPS

Under "Windows UPS Service", you can enter the delay in seconds. This is the length of time that the UPS waits before switching off the power supply.

Information:

This time is evaluated by the Windows UPS Service, but can not be set in the UPS system settings of the energy options. This value should only be changed if the system requires longer than the default setting of 180 seconds to shut down.

Caution!

The time entered must be longer than the time required to shut down the operating system.

Activate UPS messages

Under "B&R UPS driver", activate the checkbox "UPS status messages". Any changes to the UPS status will then trigger a message from the B&R UPS driver.

Information:

Shutting down the system is only reported by the Windows UPS Service. The UPS Service also sends other messages if they are activated in the UPS system settings energy options. These messages are only displayed when the Windows Alerter and Windows Messenger are active and the PC is logged on to a network. Additionally, some conditions of the B&R APC620 UPS are not detected by the Windows UPS Service, and therefore do not trigger messages (e.g. when there are no battery settings on the UPS). The Windows Services can be found in the Control Panel under Administrative Tools - Services.

If the checkbox "Display UPS status with UPS monitor" is also activated, a new message is not displayed for every change, but only a general message and request for you to start the B&R UPS monitor. As long as the UPS monitor is active, no new messages are displayed.

Information:

Regardless of these options, all changes to the UPS status are logged in Windows event protocol (under "Application").

Chapter 5 • Standards and certifications

1. Applicable European guidelines

- EMC guidelines 89/336/EWG
- Low-voltage guidelines 73/23/EWG
- Machine guidelines 98/37/EG

2. Overview of standards

The Automation PC 620 as an entire device meets the following standards:

Standard	Description
EN 50081-2	Electromagnetic compatibility (EMC), generic emission standard - part 2: Industrial environments (EN 50081-2 has been replaced by EN 61000-6-4)
EN 50082-2	Electromagnetic compatibility (EMC), generic immunity standard - part 2: Industrial environments (EN 50082-2 has been replaced by EN 61000-6-2)
EN 55011 Class A	Electromagnetic compatibility (EMC), radio disturbance product standard, industrial, scientific, and medical high-frequency devices (ISM devices), limit values and measurement procedure; group 1 (devices that do not create HF during material processing) and group 2 (devices that create HF during material processing)
EN 55022 Class A	Electromagnetic compatibility (EMC), radio disturbance characteristics, information technology equipment (ITE devices), limits and methods of measurement
EN 55024 Class A	Electromagnetic compatibility (EMC), immunity characteristics, information technology equipment (ITE devices), limits and methods of measurement
EN 60060-1	High-voltage test techniques - part 1: General specifications and testing conditions
EN 60068-2-1	Environmental testing - part 2: Tests; test A: Dry cold
EN 68068-2-2	Environmental testing - part 2: Tests; test B: Dry heat
EN 60068-2-3	Environmental testing - part 2: Tests; test and guidance: Damp heat, constant
EN 60068-2-6	Environmental testing - part 2: Tests; test: Vibration (sinusoidal)
EN 60068-2-14	Environmental testing - part 2: tests; test N: Change of temperature
EN 60068-2-27	Environmental testing - part 2: Tests; test and guidance: Shock
EN 60068-2-30	Environmental testing - part 2: Tests; test and guidance: Damp heat, cyclic
EN 60068-2-31	Environmental testing - part 2: Tests; test: Drop and topple, primarily for equipment-type specimens
EN 60068-2-32	Environmental testing - part 2: Tests; test: Free fall
EN 60204-1	Safety of machinery, electrical equipment on machines - part 1: General requirements

Table 254: Overview of standards

Standard	Description
EN 60529	Degrees of protection provided by enclosures (IP code)
EN 60664-1	Insulation coordination for equipment within low-voltage systems - part 1: Principles, requirements and tests
EN 60721-3-2	Classification of environmental conditions - part 3: Classification of groups of environmental parameters and their severities, section 2: Transport
EN 60721-3-3	Classification of environmental conditions - part 3: Classification of groups of environmental parameters and their severities, section 3: Stationary use at weather-protected locations
EN 61000-4-2	Electromagnetic compatibility (EMC) - part 4-2: Testing and measuring techniques; electrostatic discharge immunity test
EN 61000-4-3	Electromagnetic compatibility (EMC) - part 4-3: Testing and measuring techniques; radiated radio-frequency electromagnetic field immunity test
EN 61000-4-4	Electromagnetic compatibility (EMC) - part 4-4: Testing and measuring techniques; electrical fast transient/burst immunity test
EN 61000-4-5	Electromagnetic compatibility (EMC) - part 4-5: Testing and measuring techniques; surge immunity test
EN 61000-4-6	Electromagnetic compatibility (EMC) - part 4-6: Testing and measuring techniques; immunity to conducted disturbances, induced by radio-frequency fields
EN 61000-4-8	Electromagnetic compatibility (EMC) - part 4-8: Testing and measuring techniques; power frequency magnetic field immunity test
EN 61000-4-11	Electromagnetic compatibility (EMC) - part 4-11: Testing and measuring techniques; voltage dips, short interruptions and voltage variations immunity tests
EN 61000-4-12	Electromagnetic compatibility (EMC) - part 4-12: Testing and measuring techniques; oscillatory waves immunity test
EN 61000-4-17	Electromagnetic compatibility (EMC) - part 4-12: Testing and measuring techniques; ripple on DC input power port immunity test
EN 61000-4-29	Electromagnetic compatibility (EMC) - part 4-29: Testing and measuring techniques; voltage dips, short interruptions and voltage variations on DC input power port immunity tests
EN 61000-6-2 (EN 50082-2)	Electromagnetic compatibility (EMC), generic immunity standard - part 2: industrial environments (EN 50082-2 has been replaced by EN 61000-6-2)
EN 61000-6-4 (EN 50081-2)	Electromagnetic compatibility (EMC), generic emission standard - part 2: industrial environments (EN 50081-2 has been replaced by EN 61000-6-4)
EN 61131-2 IEC 61131-2	Product standard, programmable logic controllers - part 2: equipment requirements and tests
UL 508	Industrial control equipment (UL = Underwriters Laboratories)
VDE 0701-1	Service, modification, and testing of electrical devices - part 1: General requirements
47 CFR	Federal Communications Commission (FCC), 47 CFR Part 15 Subpart B Class A

Table 254: Overview of standards (Forts.)

3. Requirements for emissions

Emission	Test carried out according to	Limits according to
Network-related emissions	EN 55011 / EN 55022	EN 61000-6-4: Generic standard (industrial areas)
		EN 55011: Industrial, scientific, and medical (ISM) radio-frequency equipment, class A (industrial areas)
		EN 55022: Information technology equipment (ITE devices), class A (industrial areas)
		EN 61131-2: Programmable logic controllers
		47 CFR Part 15 Subpart B Class A (FCC)
Emissions, electromagnetic emissions	EN 55011 / EN 55022	EN 61000-6-4: Generic standard (industrial areas)
		EN 55011: Industrial, scientific, and medical (ISM) radio-frequency equipment, class A (industrial areas)
		EN 55022: Information technology equipment (ITE devices), class A (industrial areas)
		EN 61131-2: Programmable logic controllers
		47 CFR Part 15 Subpart B Class A (FCC)

Table 255: Overview of limits and testing guidelines for emissions

3.1 Network related emissions

Test carried out according to EN 55011 / EN 55022	Limits according to EN 61000-6-4	Limits according to EN 55011 class A	Limits according to EN 55022 class A
Power mains connections 150 kHz - 500 kHz	-	79 dB (µV) quasi-peak value 66 dB (µV) average	79 dB (µV) quasi-peak value 66 dB (µV) average
Power mains connections 500 kHz - 30 MHz	-	73 dB (µV) quasi-peak value 60 dB (µV) average	73 dB (µV) quasi-peak value 60 dB (µV) average
AC mains connections 150 kHz - 500 kHz	79 dB (µV) quasi-peak value 66 dB (µV) average	-	-
AC mains connections 500 kHz - 30 MHz	73 dB (µV) quasi-peak value 60 dB (µV) average	-	-
Other connections 150 kHz - 500 kHz	-	-	97 - 87 dB (µV) and 53 - 43 dB (µA) quasi-peak value 84 - 74 dB (µV) and 40 - 30 dB (µA) average
Other connections 500 kHz - 30 MHz	-	-	87 dB (µV) and 43 dB (µA) quasi-peak value 74 dB (µV) and 30 dB (µA) average
Test carried out according to EN 55011 / EN 55022	**Limits according to EN 61131-2**	**Limits according to 47 CFR Part 15 Subpart B class A**	
Power mains connections [1)] 150 kHz - 500 kHz	79 dB (µV) quasi-peak value 66 dB (µV) average	-	
Power mains connections 500 kHz - 30 MHz	73 dB (µV) quasi-peak value 60 dB (µV) average	-	
AC mains connections 150 kHz - 500 kHz	-	79 dB (µV) quasi-peak value 66 dB (µV) average	
AC mains connections 500 kHz - 30 MHz	-	73 dB (µV) quasi-peak value 60 dB (µV) average	

Table 256: Test requirements - network-related emissions for industrial areas

Other connections 150 kHz - 500 kHz	Only informative for cable lengths > 10 m 40 - 30 dB (µA) quasi-peak value 30 - 20 dB (µA) average	-	-
Other connections 500 kHz - 30 MHz	Only informative for cable lengths > 10 m 30 dB (µA) quasi-peak value 20 dB (µA) average	-	-

Table 256: Test requirements - network-related emissions for industrial areas (Forts.)

1) AC network connections only with EN 61131-2

3.2 Emissions / Electromagnetic emissions

Test carried out according to EN 55011 / EN 55022	**Limits according to EN 61000-6-4**	**Limits according to EN 55011 class A**	**Limits according to EN 55022 class A**
30 MHz - 230 MHz measured at a distance of 10 m	< 40 dB (µV/m) quasi-peak value	< 40 dB (µV/m) quasi-peak value	< 40 dB (µV/m) quasi-peak value
230 MHz - 1 GHz measured at a distance of 10 m	< 47 dB (µV/m) quasi-peak value	< 47 dB (µV/m) quasi-peak value	< 47 dB (µV/m) quasi-peak value
Test carried out according to EN 55011 / EN 55022	**Limits according to EN 61131-2**		
30 MHz - 230 MHz measured at a distance of 10 m	< 40 dB (µV/m) quasi-peak value		
230 MHz - 1 GHz measured at a distance of 10 m	< 47 dB (µV/m) quasi-peak value		
Test carried out	**Limits according to 47 CFR Part 15 Subpart B class A**		
30 MHz - 88 MHz measured at a distance of 10 m	< 90 dB (µV/m) quasi-peak value		
88 MHz - 216 MHz measured at a distance of 10 m	< 150 dB (µV/m) quasi-peak value		
216 MHz - 960 MHz measured at a distance of 10 m	< 210 dB (µV/m) quasi-peak value		
>960 MHz measured at a distance of 10 m	< 300 dB (µV/m) quasi-peak value		

Table 257: : Test requirements - electromagnetic emissions for industrial areas

4. Requirements for immunity to disturbances

Immunity	Test carried out according to	Limits according to
Electrostatic discharge (ESD)	EN 61000-4-2	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 55024: Information technology equipment (ITE devices)
Immunity against high-frequency electromagnetic fields (HF field)	EN 61000-4-3	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 55024: Information technology equipment (ITE devices)
Immunity to high-speed transient electrical disturbances (burst)	EN 61000-4-4	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 55024: Information technology equipment (ITE devices)
Immunity to surge voltages	EN 61000-4-5	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 55024: Information technology equipment (ITE devices)
Immunity to conducted disturbances	EN 61000-4-6	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 55024: Information technology equipment (ITE devices)
Immunity against magnetic fields with electrical frequencies	EN 61000-4-8	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 55024: Information technology equipment (ITE devices)
Immunity to voltage dips, short-term interruptions and voltage fluctuations	EN 61000-4-11	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 55024: Information technology equipment (ITE devices)
Immunity to damped vibration	EN 61000-4-12	EN 61000-6-2: Generic standard (industrial areas)
		EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 55024: Information technology equipment (ITE devices)

Table 258: Overview of limits and testing guidelines for immunity

Evaluation criteria according to EN 61000-6-2

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

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

Criteria C:
A temporary function failure is permitted when the function restores itself, or the function can be restored by activating configuration and control elements.

Criteria D:
Impairment or failure of the function, which can no longer be established (operating equipment destroyed).

4.1 Electrostatic discharge (ESD)

Test carried out according to EN 61000-4-2	Limits according to EN 61000-6-2	Limits according to EN 61131-2	Limits according to EN 55024
Contact discharge to powder-coated and bare metal housing parts	± 4 kV, 10 discharges, criteria B	± 4 kV, 10 discharges, criteria B	± 4 kV, 10 discharges, criteria B
Discharge through the air to plastic housing parts	± 8 kV, 10 discharges, criteria B	± 8 kV, 10 discharges, criteria B	± 8 kV, 10 discharges, criteria B

Table 259: Test requirements - electrostatic discharge (ESD)

4.2 High-frequency electromagnetic fields (HF field)

Test carried out according to EN 61000-4-3	Limits according to EN 61000-6-2	Limits according to EN 61131-2	Limits according to EN 55024
Housing, completely wired	80 MHz - 1 GHz, 10 V/m, 80 % amplitude modulation with 1 kHz, length 3 seconds, criteria A	80 MHz - 1 GHz, 1,4 - 2 GHz, 10 V/m, 80 % amplitude modulation with 1 kHz, length 3 seconds, criteria A 800-960 MHz (GSM), 10 V/m, pulse modulation with 50 % duty cycle, criteria A	80 MHz - 1 GHz, 1,4 - 2 GHz, 3 V/m, 80 % amplitude modulation with 1 kHz, length 3 seconds, criteria A

Table 260: Test requirements - high-frequency electromagnetic fields (HF field)

4.3 High-speed transient electrical disturbances (Burst)

Test carried out according to EN 61000-4-4	Limits according to EN 61000-6-2	Limits according to EN 61131-2	Limits according to EN 55024
AC power I/O	± 2 kV, criteria B	-	± 1 kV, criteria B
AC power inputs	-	± 2 kV, criteria B	-
AC power outputs	-	± 1 kV, criteria B	-
DC power I/O >10 m [1)]	± 2 kV, criteria B	-	± 0.5 kV, criteria B
DC power inputs >10 m	-	± 2 kV, criteria B	-
DC power outputs >10 m	-	± 1 kV, criteria B	-
Functional ground connections, signal lines and I/Os >3 m	± 1 kV, criteria B	± 1 kV, criteria B	± 0.5 kV, criteria B
Unshielded AC I/O >3 m	-	± 2 kV, criteria B	-
Analog I/O	± 1 kV, criteria B	± 1 kV, criteria B	-

Table 261: Test requirements - high-speed transient electrical disturbances (burst)

1) For EN 55024 without length limitation.

4.4 Surge voltages (Surge)

Test carried out according to EN 61000-4-5	Limits according to EN 61000-6-2	Limits according to EN 61131-2	Limits according to EN 55024
AC power I/O, L to L	± 1 kV, criteria B	± 1 kV, criteria B	± 1 kV, criteria B
AC power I/O, L to PE	± 2 kV, criteria B	± 2 kV, criteria B	± 2 kV, criteria B
DC power I/O, L+ to L-, >10 m	± 0.5 kV, criteria B	-	-
DC power I/O, L to PE, >10 m	± 0.5 kV, criteria B	-	± 0.5 kV, criteria B
DC power inputs, L+ to L-	-	± 0.5 kV, criteria B	-
DC power inputs, L to PE	-	± 1 kV, criteria B	-
DC power outputs, L+ to L-	-	± 0.5 kV, criteria B	-
DC power outputs, L to PE	-	± 0.5 kV, criteria B	-
Signal connections >30 m	± 1 kV, criteria B	± 1 kV, criteria B	± 1 kV, criteria B
All shielded cables	-	± 1 kV, criteria B	-

Table 262: Test requirements - surge voltages

4.5 Conducted disturbances

Test carried out according to EN 61000-4-6	Limits according to EN 61000-6-2	Limits according to EN 61131-2	Limits according to EN 55024
AC power I/O	150 kHz - 80 MHz, 10 V, 80 % amplitude modulation with 1 kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80 % amplitude modulation with 1 kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80 % amplitude modulation with 1 kHz, criteria A

Table 263: Test requirements - conducted disturbances

Test carried out according to EN 61000-4-6	Limits according to EN 61000-6-2	Limits according to EN 61131-2	Limits according to EN 55024
DC power I/O	150 kHz - 80 MHz, 10 V, 80 % amplitude modulation with 1 kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80 % amplitude modulation with 1 kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80 % amplitude modulation with 1 kHz, criteria A
Functional ground connections	0.15 - 80 MHz, 10 V, 80 % amplitude modulation with 1 kHz, Length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80 % amplitude modulation with 1 kHz, length 3 seconds, criteria A	-
Signal connections >3 m	0.15 - 80 MHz, 10 V, 80 % amplitude modulation with 1 kHz, Length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80 % amplitude modulation with 1 kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80 % amplitude modulation with 1 kHz, criteria A

Table 263: Test requirements - conducted disturbances (Forts.)

4.6 Magnetic fields with electrical frequencies

Test carried out according to EN 61000-4-8	Limits according to EN 61000-6-2	Limits according to EN 61131-2	Limits according to EN 55024
Test direction x, test in the field of an induction coil 1 m x 1 m	30 A/m, criteria A	30 A/m, criteria A	50 Hz, 1 A/m, criteria A
Test direction y, test in the field of an induction coil 1 m x 1 m	30 A/m, criteria A	30 A/m, criteria A	50 Hz, 1 A/m, criteria A
Test direction z, test in the field of an induction coil 1 m x 1 m	30 A/m, criteria A	30 A/m, criteria A	50 Hz, 1 A/m, criteria A

Table 264: Test requirements - magnetic fields with electrical frequencies

4.7 Voltage dips, fluctuations and short-term interruptions

Test carried out according to EN 61000-4-11	Limits according to EN 61000-6-2	Limits according to EN 61131-2	Limits according to EN 55024
AC power inputs	Voltage dip 70 % (30 % reduction), 0.5 periods, criteria B	-	Voltage dip < 5% (> 95 % reduction), 0.5 half-oscillations, criteria B
AC power inputs	Voltage dip 40 % (60 % reduction), 5 periods, criteria C	-	Voltage dip 70 % (30 % reduction), 25 half-oscillations, criteria C
AC power inputs	Voltage dip 40 % (60 % reduction), 50 periods, criteria C	-	-
AC power inputs	Voltage interruptions < 5 % (> 95 % reduction), 250 periods, criteria C	-	Voltage interruptions < 5 % (> 95 % reduction), 250 half-oscillations, criteria C
AC power inputs	-	20 interruptions, 0.5 periods, criteria A	-
DC power inputs	-	20 interruptions for 10 ms < UN - 15 %, criteria A	-

Table 265: Test requirements - voltage dips, fluctuations, and short-term interruptions

4.8 Damped oscillations

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

Table 266: Test requirements - damped vibration

5. Mechanical conditions

Vibration	Test carried out according to	Limits according to
Vibration operation	EN 60068-2-6	EN 61131-2: Programmable logic controllers
		EN 60721-3-3 class 3M4
Vibration transport (packaged)	EN 60068-2-6	EN 60721-3-2 class 2M1
		EN 60721-3-2 class 2M2
		EN 60721-3-2 class 2M3
Shock during operation	EN 60068-2-27	EN 61131-2: Programmable logic controllers
		EN 60721-3-3 class 3M4
Shock transport (packaged)	EN 60068-2-27	EN 60721-3-2 class 2M1
		EN 60721-3-2 class 2M2
		EN 60721-3-2 class 2M3
Toppling (packaged)	EN 60068-2-31	EN 60721-3-2 class 2M1
		EN 60721-3-2 class 2M2
		EN 60721-3-2 class 2M3
Free fall (packaged)	EN 60068-2-32	EN 61131-2: Programmable logic controllers

Table 267: Overview of limits and testing guidelines for vibration

5.1 Vibration operation

Test carried out according to EN 60068-2-6	Limits according to EN 61131-2		Limits according to EN 60721-3-3 class 3M4		
Vibration operation: Uninterrupted duty with moveable frequency in all 3 axes (x, y, z), 1 octave per minute	10 sweeps for each axis		10 sweeps for each axis		
	Frequency	**Limit value**	**Frequency**	**Limit value**	
	5 - 9 Hz	Amplitude 3.5 mm	2 - 9 Hz	Amplitude 3 mm	
	9 - 150 Hz	Acceleration 1 g	9 - 200 Hz	Acceleration 1 g	

Table 268: Test requirements - vibration operation

5.2 Vibration during transport (packaged)

Test carried out according to EN 60068-2-6	Limits according to EN 60721-3-2 class 2M1		Limits according to EN 60721-3-2 class 2M2		Limits according to EN 60721-3-2 class 2M3	
Vibration during transport: Uninterrupted duty with moveable frequency in all 3 axes (x, y, z)	10 sweeps for each axis, packaged		10 sweeps for each axis, packaged		10 sweeps for each axis, packaged	
	Frequency	**Limit value**	**Frequency**	**Limit value**	**Frequency**	**Limit value**
	2 - 9 Hz	Amplitude 3.5 mm	2 - 9 Hz	Amplitude 3.5 mm	2 - 8 Hz	Amplitude 7.5 mm
	9 - 200 Hz	Acceleration 1 g	9 - 200 Hz	Acceleration 1 g	8 - 200 Hz	Acceleration 2 g
	200 - 500 Hz	Acceleration 1.5 g	200 - 500 Hz	Acceleration 1.5 g	200 - 500 Hz	Acceleration 4 g

Table 269: Test requirements - vibration during transport (packaged)

5.3 Shock during operation

Test carried out according to EN 60068-2-27	Limits according to EN 61131-2	Limits according to EN 60721-3-3 class 3M4	
Shock operation: Pulse shaped (half-sine) stress, all 3 axes (x, y, z)	Acceleration 15 g, length 11 ms, 18 shocks	Acceleration 15 g, length 11 ms	

Table 270: Test requirements - shock operation

5.4 Shock transport (packaged)

Test carried out according to EN 60068-2-27	Limits according to EN 60721-3-2 class 2M1	Limits according to EN 60721-3-2 class 2M2	Limits according to EN 60721-3-2 class 2M3
Pulse shaped (half-sine) stress in all 3 axes (x, y, z)	Acceleration 10 g, Length 11 ms, each 3 shocks, packaged	Acceleration 30 g, Length 6 ms, each 3 shocks, packaged	Acceleration 100 g, Length 6 ms, each 3 shocks, packaged

Table 271: Test requirements - shock transport

5.5 Toppling

Test carried out according to EN 60068-2-31	Limits according to EN 60721-3-2 class 2M1		Limits according to EN 60721-3-2 class 2M2		Limits according to EN 60721-3-2 class 2M3	
Toppling and knocking over	Devices: Toppling/knocking over on each edge		Devices: Toppling/knocking over on each edge		Devices: Toppling/knocking over on each edge	
	Weight	**Required**	**Weight**	**Required**	**Weight**	**Required**
	<20 kg	Yes	<20 kg	Yes	<20 kg	Yes
	20 - 100 kg	-	20 - 100 kg	Yes	20 - 100 kg	Yes
	>100 kg	-	>100 kg	-	>100 kg	Yes

Table 272: Test requirements - toppling

5.6 Free fall (packaged)

Test carried out according to EN 60068-2-32	Limits according to EN 61131-2		Limits according to EN 60721-3-2 class 2M1		Limits according to EN 60721-3-2 class 2M2		Limits according to EN 60721-3-2 class 2M3	
Free fall	Devices with delivery packaging each with 5 fall tests		Devices packaged		Devices packaged		Devices packaged	
	Weight	**Height**	**Weight**	**Height**	**Weight**	**Height**	**Weight**	**Height**
	<10 kg	1.0 m	<20 kg	0.25 m	<20 kg	1.2 m	<20 kg	1.5 m
	10 - 40 kg	0.5 m	20 - 100 kg	0.25 m	20 - 100 kg	1.0 m	20 - 100 kg	1.2 m
	>40 kg	0.25 m	>100 kg	0.1 m	>100 kg	0.25 m	>100 kg	0.5 m
	Devices with product packaging each with 5 fall tests							
	Weight	**Height**						
	<10 kg	0.3 m						
	10 - 40 kg	0.3 m						
	>40 kg	0.25 m						

Table 273: Test requirements - toppling

6. Climate conditions

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

Table 274: Overview of limits and testing guidelines - temperature and humidity

6.1 Worst case operation

Test carried out according to UL 508	Limits according to UL 508	Limits according to EN 61131-2	
Worst case operation. Operation of the device with the max. ambient temperature specified in the data sheet at the max. specified load	3 hours at max. ambient temperature (min. +40°C) duration approx. 5 hours	3 hours at max. ambient temperature (min. +40°C) duration approx. 5 hours	

Table 275: Test requirements - worst case operation

6.2 Dry heat

Test carried out according to EN 60068-2-2	Limits according to EN 61131-2		
Dry heat	16 hours at +70°C for 1 cycle, then 1 hour acclimatization and function testing, duration approximately 17 hours		

Table 276: Test requirements - dry heat

6.3 Dry cold

Test carried out according to EN 60068-2-1	Limits according to EN 61131-2		
Dry cold	16 hours at -40° C for 1 cycle, then 1 hour acclimatization and function testing, duration approximately 17 hours		

Table 277: Test requirements - dry cold

6.4 Large temperature fluctuations

Test carried out according to EN 60068-2-14	Limits according to EN 61131-2		
Large temperature fluctuations	3 hours at -40° C and 3 hours at +70°C, 2 cycles, then 2 hours acclimatization and function testing, duration approximately 14 hours		

Table 278: Test requirements - large temperature fluctuations

6.5 Temperature fluctuations in operation

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

Table 279: Test requirements - temperature fluctuations in operation

6.6 Humid heat, cyclical

Test carried out according to EN 60068-2-30	Limits according to EN 61131-2		
Alternating climate	24 hours at +25°C / +55°C and 97 % / 83 % RH, 2 cycles, then 2 hours acclimatization, function testing and insulation, duration approximately 50 hours		

Table 280: Test requirements - humid heat, cyclic

6.7 Humid heat, constant (storage)

Test carried out according to EN 60068-2-3	Limits according to EN 61131-2		
Humid heat, constant (storage)	48 hours at +40°C and 92.5 % RH, then insulation test within 3 hours, duration approximately 49 hours		

Table 281: Test requirements - humid heat, constant (storage)

7. Safety

Safety	Test carried out according to	Limits according to
Ground resistance	EN 61131-2	EN 60204-1: Electrical equipment of machines
		EN 61131-2: Programmable logic controllers
Insulation resistance		EN 60204-1: Electrical equipment of machines
High voltage	EN 60060-1	EN 61131-2: Programmable logic controllers
		UL 508: Industrial control equipment
Residual voltage	EN 61131-2	EN 60204-1: Electrical equipment of machines
		EN 61131-2: Programmable logic controllers
Leakage current		VDE 0701-1: Service, changes and testing of electrical devices
Overload	UL 508	EN 61131-2: Programmable logic controllers
		UL 508: Industrial control equipment
Simulation component defect	UL 508	EN 61131-2: Programmable logic controllers
		UL 508: Industrial control equipment
Voltage range		EN 61131-2: Programmable logic controllers

Table 282: Overview of limits and testing guidelines - safety

7.1 Ground resistance

Test carried out according to EN 61131-2	Limits according to EN 60204-1[1)]		Limits according to EN 61131-2
Ground resistance: housing (from any metal part to the ground terminal)	Smallest effective cross section of the protective ground conductor for the branch being tested	Maximum measured voltage drop at a test current of 10 A	Test current 30 A for 2 min, < 0.1 Ohm
	1.0 mm²	3.3 V	
	1.5 mm²	2.6 V	
	2.5 mm²	1.9 V	
	4.0 mm²	1.4 V	
	> 6.0 mm²	1.0 V	

Table 283: Test requirements - ground resistance

1) See EN 60204-1:1997 page 62, table 9.

7.2 Insulation resistance

Test carried out	Limits according to EN 60204-1[1)]		
Insulation resistance: main circuits to protective ground conductor	> 1 MOhm at 500 VDC voltage		

Table 284: Test requirements - insulation resistance

1) See EN 60204-1:1997 page 62, table 9.

7.3 High voltage

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

Table 285: Test requirements - high voltage

1) See EN 61131-2:2003 page 104, table 59.

7.4 Residual voltage

Test carried out according to EN 61131-2	Limits according to EN 60204-1	Limits according to EN 61131-2	
Residual voltage after switching off	< 60 V after 5 sec (active parts) < 60 V after 1 sec (plug pins)	< 60 V after 5 sec (active parts) < 60 V after 1 sec (plug pins)	

Table 286: Test requirements - residual voltage

7.5 Leakage current

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

Table 287: Test requirements - leakage current

7.6 Overload

Test carried out according to UL 508	Limits according to EN 61131-2	Limits according to UL 508	
Overload of transistor outputs	50 switches, 1.5 I_N, 1 sec on / 9 sec off	50 switches, 1.5 I_N, 1 sec on / 9 sec off	

Table 288: Test requirements - overload

7.7 Defective component

Test carried out according to UL 508	Limits according to EN 61131-2	Limits according to UL 508	
Simulation of how components in power supply became defective	Non-flammable surrounding cloth No contact with conductive parts	Non-flammable surrounding cloth No contact with conductive parts	

Table 289: Test requirements - defective component

7.8 Voltage range

Test carried out according to	Limits according to EN 61131-2			
Supply voltage	Measurement value	Tolerance min/max		
	24 VDC 48 VDC 125 VDC	-15 % +20 %		
	24 VAC 48 VAC 100 VAC 110 VAC 120 VAC 200 VAC 230 VAC 240 VAC 400 VAC	15 % +10 %		

Table 290: Test requirements - voltage range

8. Other tests

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

Table 291: Overview of limits and testing guidelines - other tests

8.1 Protection

Test carried out according to	Limits according to EN 60529	Limits according to EN 60529	
Protection of the operating equipment	IP2. Protection against large solid foreign bodies =12.5 mm diameter	IP6. Protection against large solid foreign bodies: dust-proof	
Protection of personnel	IP2. Protection against touching dangerous parts with finger	IP6. Protection against touching dangerous parts with conductor	
Protection against water permeation with damaging consequences	IP.0 Not protected	IP.5 Protected against sprayed water	

Table 292: Test requirements - protection

8.2 Degree of pollution

Test carried out according to	Limits according to EN 60664-1		
Definition	Degree of pollution II		

Table 293: Test requirements - degree of pollution

9. International certifications

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

Certifications	
USA and Canada	All important B&R products are tested and listed by Underwriters Laboratories and checked quarterly by a UL inspector. This mark is valid for the USA and Canada and simplifies certification of your machines and systems in these areas.
Europe	All harmonized EN standards for the valid guidelines are met.

Table 294: International certifications

Chapter 6 • Accessories

1. Overview

Model number	Short description	Note
0AC201.9	**Lithium batteries (5x)** Lithium batteries, 5 pcs., 3 V / 950 mAh, button cell	See page 409
0TB103.9	**Plug 24V 5.08 3-pin screw clamps** 24 VDC 3-pin connector, female. Screw clamps, 1.5 mm², protected against vibration by the screw flange	See page 407
0TB103.91	**Plug 24V 5.08 3-pin cage clamps** 24 VDC 3-pin connector, female. Cage clamps, 2.5 mm², protected against vibration by the screw flange	See page 407
4A0006.00-000	**Lithium battery (1x)** Lithium battery, 1 pc., 3 V / 950 mAh, button cell	See page 409
5A5003.03	**Front cover** Front cover for the USB 2.0 Media Drive 5MD900.USB2-00.	See page 437 and page 444
5AC600.ICOV-00	**Interface covers** Interface covers for APC620 and PPC700 devices; 5 pieces	See page 410
5AC600.UPSI-00	**Add-on UPS module** Uninterruptible power supply for APC620	See page 480
5AC600.UPSB-00	**Battery unit 5 Ah** Battery unit	See page 482
5AC900.1000-00	**Adapter DVI-A/m to CRT DB15HD/f** Adapter DVI (plug) to CRT (socket), for connecting a standard monitor to a DVI-I interface.	See page 411
5CADVI.0018-00	**DVI-D cable 1.8 m / single** Single cable, DVI-D/m:DVI-D/m, length: 1.8 m	See page 453
5CADVI.0050-00	**DVI-D cable 5 m / single** Single cable, DVI-D/m:DVI-D/m, length: 5 m	See page 453
5CADVI.0100-00	**DVI-D cable 10 m / single** Single cable, DVI-D/m:DVI-D/m, length: 10 m	See page 453
5CAMSC.0001-00	**APC620 internal supply cable**	See page 455
5CASDL.0018-00	**SDL cable 1.8 m** SDL cable, DVI-D/m:DVI-D/m, length: 1.8 m	See page 456
5CASDL.0018-01	**SDL cable 1.8 m 45°** SDL cable, DVI-D/m:DVI-D/m, length: 1.8 m; 1x 45° plug	See page 459
5CASDL.0018-03	**SDL flex cable 1.8 m** SDL cable, semi flexible, length: 1.8 m	See page 465
5CASDL.0050-00	**SDL cable 5 m** SDL cable, DVI-D/m:DVI-D/m, length: 5 m	See page 456

Table 295: Model numbers - accessories

Model number	Short description	Note
5CASDL.0050-01	**SDL cable 5 m 45°** SDL cable, DVI-D/m:DVI-D/m, length: 5 m; 1x 45° plug	See page 459
5CASDL.0050-03	**SDL flex cable 5 m** SDL cable, semi flexible, length: 5 m	See page 465
5CASDL.0100-00	**SDL cable 10 m** SDL cable, DVI-D/m:DVI-D/m, length: 10 m	See page 456
5CASDL.0100-01	**SDL cable 10 m 45°** SDL cable, DVI-D/m:DVI-D/m, length: 10 m; 1x 45° plug	See page 459
5CASDL.0100-03	**SDL flex cable 10 m** SDL cable, semi flexible, length: 10 m	See page 465
5CASDL.0150-00	**SDL cable 15 m** SDL cable, DVI-D/m:DVI-D/m, length: 15 m	See page 456
5CASDL.0150-01	**SDL cable 15 m 45°** SDL cable, DVI-D/m:DVI-D/m, length: 15 m; 1x 45° plug	See page 459
5CASDL.0150-03	**SDL flex cable 15 m** SDL cable, semi flexible, length: 15 m	See page 465
5CASDL.0200-00	**SDL cable 20 m** SDL cable, DVI-D/m:DVI-D/m, length: 20 m	See page 456
5CASDL.0200-03	**SDL flex cable 20 m** SDL cable, semi flexible, length: 20 m	See page 465
5CASDL.0250-00	**SDL cable 25 m** SDL cable, DVI-D/m:DVI-D/m, length: 25 m	See page 456
5CASDL.0250-03	**SDL flex cable 25 m** SDL cable, semi flexible, length: 25 m	See page 465
5CASDL.0300-00	**SDL cable 30 m** SDL cable, DVI-D/m:DVI-D/m, length: 30 m	See page 456
5CASDL.0300-03	**SDL flex cable 30 m** SDL cable, semi flexible, length: 30 m	See page 465
5CASDL.0300-10	**SDL cable with extender 30 m** SDL cable, DVI-D/m:DVI-D/m, length: 30 m ext.	See page 462
5CASDL.0300-13	**SDL flex cable with extender 30 m** SDL cable, semi flexible, length: 30 m with extender	See page 469
5CASDL.0400-10	**SDL cable with extender 40 m** SDL cable, DVI-D/m:DVI-D/m, length: 40 m ext.	See page 462
5CASDL.0400-13	**SDL flex cable with extender 40 m** SDL cable, semi flexible, length: 40 m with extender	See page 469
5CAUPS.0005-00	**APC620 UPS cable 0.5 m**	See page 475
5CAUPS.0030-00	**APC620 UPS cable 3 m**	See page 475
5CAUSB.0018-00	**USB 2.0 cable A/m:B/m 1.8 m** USB 2.0 connection cable; Type A - Type B; 1.8 m	See page 475
5CAUSB.0050-00	**USB 2.0 cable A/m:B/m 5 m** USB 2.0 connection cable; Type A - Type B; 5 m	See page 475

Table 295: Model numbers - accessories (Forts.)

Model number	Short description	Note
5CFCRD.0032-02	**CompactFlash 32 MB SanDisk/A** CompactFlash card with 32 MB Flash PROM, and IDE/ATA interface	Cancelled since 12/2005 Replaced by: 5CFCRD.0064-03 See page 412
5CFCRD.0064-02	**CompactFlash 64 MB SanDisk/A** CompactFlash card with 64 MB Flash PROM, and IDE/ATA interface	Cancelled since 12/2005 Replaced by: 5CFCRD.0064-03 See page 412
5CFCRD.0128-02	**CompactFlash 128 MB SanDisk/A** CompactFlash card with 128 MB Flash PROM, and IDE/ATA interface	Cancelled since 12/2005 Replaced by: 5CFCRD.0128-03 See page 412
5CFCRD.0256-02	**CompactFlash 256 MB SanDisk/A** CompactFlash card with 256 MB Flash PROM, and IDE/ATA interface	Cancelled since 12/2005 Replaced by: 5CFCRD.0256-03 See page 412
5CFCRD.0512-02	**CompactFlash 512 MB SanDisk/A** CompactFlash card with 512 MB Flash PROM, and IDE/ATA interface	Cancelled since 12/2005 Replaced by: 5CFCRD.0512-03 See page 412
5CFCRD.1024-02	**CompactFlash 1024 MB SanDisk/A** CompactFlash card with 1024 MB Flash PROM, and IDE/ATA interface	Cancelled since 12/2005 Replaced by: 5CFCRD.1024-03 See page 412
5CFCRD.2048-02	**CompactFlash 2048 MB SanDisk/A** CompactFlash card with 2048 MB Flash PROM, and IDE/ATA interface	Cancelled since 12/2005 Replaced by: 5CFCRD.2048-03 See page 412
5CFCRD.0064-03	**CompactFlash 64 MB SSI** CompactFlash card with 64 MB SLC NAND Flash, and IDE/ATA interface	See page 420
5CFCRD.0128-03	**CompactFlash 128 MB SSI** CompactFlash card with 128 MB SLC NAND Flash, and IDE/ATA interface	See page 420
5CFCRD.0256-03	**CompactFlash 256 MB SSI** CompactFlash card with 256 MB SLC NAND Flash, and IDE/ATA interface	See page 420
5CFCRD.0512-03	**CompactFlash 512 MB SSI** CompactFlash card with 512 MB SLC NAND Flash, and IDE/ATA interface	See page 420
5CFCRD.1024-03	**CompactFlash 1024 MB SSI** CompactFlash card with 1024 MB SLC NAND Flash, and IDE/ATA interface	See page 420
5CFCRD.2048-03	**CompactFlash 2048 MB SSI** CompactFlash card with 2048 MB SLC NAND Flash, and IDE/ATA interface	See page 420
5CFCRD.4096-03	**CompactFlash 4096 MB SSI** CompactFlash card with 4096 MB SLC NAND Flash, and IDE/ATA interface	See page 420
5CFCRD.8192-03	**CompactFlash 8192 MB SSI** CompactFlash card with 8192 MB SLC NAND Flash, and IDE/ATA interface	See page 420

Table 295: Model numbers - accessories (Forts.)

Model number	Short description	Note
5MD900.USB2-00	**USB 2.0 drive DVD-ROM/CD-RW FDD CF USB** USB 2.0 drive combination, consists of DVD-ROM/CD-RW, FDD, CompactFlash slot (type II), USB connection (type A front, type B back); 24 V DC	Cancelled since 10/2006 See page 432
5MD900.USB2-01	**USB 2.0 drive DVD-RW/CD-RW FDD CF USB** USB 2.0 drive combination, consists of DVD-R/RW/DVD+R/RW/CD-RW, FDD, CompactFlash slot (type II), USB connection (type A front, type B back); 24 V DC	See page 439
5MMUSB.0128-00	**USB flash drive 128 MB SanDisk** USB 2.0 flash drive 128 MB	Cancelled since 12/2005 Replaced by: 5MMUSB.0256-00 See page 446
5MMUSB.0256-00	**USB flash drive 256 MB SanDisk** USB 2.0 flash drive 256 MB	See page 446
5MMUSB.0512-00	**USB flash drive 512 MB SanDisk** USB 2.0 flash drive 512 MB	See page 446
5MMUSB.1024-00	**USB flash drive 1 GB SanDisk** USB 2.0 flash drive 1 GB	See page 446
5MMUSB.2048-00	**USB flash drive 2 GB SanDisk** USB 2.0 flash drive 2 GB	See page 446
5SWHMI.0000-00	**HMI Drivers & Utilities DVD**	See page 450
9A0014.02	**RS232 cable DB9/f:DB9/m 1.8 m** RS232 extension cable for remote operation of a display unit with touch screen, length 1.8 m	See page 473
9A0014.05	**RS232 cable DB9/f:DB9/m 5 m** RS232 extension cable for remote operation of a display unit with touch screen, length 5 m	See page 473
9A0014.10	**RS232 cable DB9/f:DB9/m 10 m** RS232 extension cable for remote operation of a display unit with touch screen, length 10 m	See page 473

Table 295: Model numbers - accessories (Forts.)

2. Supply voltage connector (TB103 3-pin)

2.1 General information

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

2.2 Order data

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

Table 296: Order data - TB103

2.3 Technical data

Information:

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

Designation	0TB103.9	0TB103.91
Number of pins	3	
Type of terminal	Screw clamps	Cage clamps
Distance between contacts	5.08 mm	
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 297: Technical data - TB103 supply plug

3. Replacement CMOS batteries

The lithium battery is needed for buffering the BIOS CMOS data, the real-time clock, and SRAM data.

3.1 Order data

Model number	Description	Image
0AC201.9	Lithium batteries, 5 pcs., 3 V / 950 mAh button cell	
4A0006.00-000	Lithium battery, 1 piece, 3 V / 950 mAh button cell	

Table 298: Order data - lithium batteries

3.2 Technical data

Information:

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

Features	0AC201.9	4A0006.00-000
Capacity	950 mAh	
Voltage	3 V	
Self discharge at 23°C	< 1% per year	
Storage time	Max. 3 years at 30°C	
Environmental characteristics		
Storage temperature	-20°C to +60°C	
Relative humidity	0 to 95% (non-condensing)	

Table 299: Technical data - lithium batteries

4. Interface covers 5AC600.ICOV-00

The interface covers protect interfaces from dirt and dust when not in use.

4.1 Order data

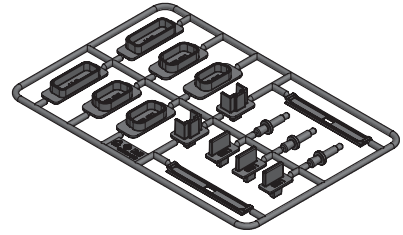
Model number	Description	Image
5AC600.ICOV-00	**Interface covers** Interface covers for APC620 and PPC700 devices; 5 pieces	

Table 300: Order data - APC620 interface covers

4.2 Contents of delivery

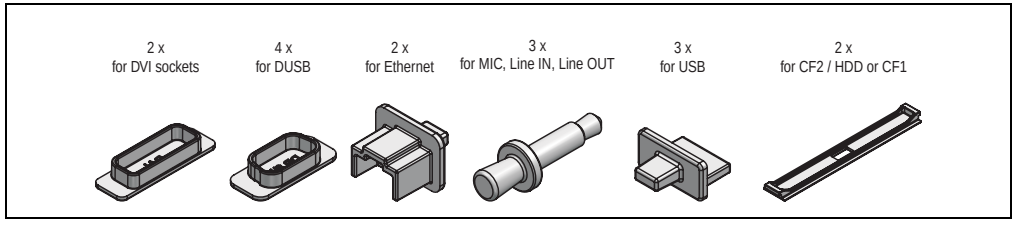


Figure 195: Contents of delivery - interface covers

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

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

5.1 Order data

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

Table 301: Order data - DVI - CRT adapter

6. CompactFlash cards 5CFCRD.xxxx-02

6.1 General information

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

6.2 Order data

Model number	Description	Image
5CFCRD.0032-02	CompactFlash 32 MB SanDisk/A	
5CFCRD.0064-02	CompactFlash 64 MB SanDisk/A	
5CFCRD.0128-02	CompactFlash 128 MB SanDisk/A	
5CFCRD.0256-02	CompactFlash 256 MB SanDisk/A	
5CFCRD.0512-02	CompactFlash 512 MB SanDisk/A	
5CFCRD.1024-02	CompactFlash 1024 MB SanDisk/A	
5CFCRD.2048-02	CompactFlash 2048 MB SanDisk/A	

Table 302: Order data - CompactFlash cards 5CFCRD.xxxx-02

6.3 Technical data

Information:

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

Features	5CFCRD.xxxx-02
MTBF (@ 25°C)	> 3,000,000 hours
Maintenance	None
Data reliability	< 1 unrecoverable error in 10^{14} bit read accesses < 1 faulty correction in 10^{20} bit read accesses
Features	
Write/erase procedures	> 2,000,000 times

Table 303: Technical data - 5CFCRD.xxxx-02 CompactFlash cards

Mechanical characteristics	5CFCRD.xxxx-02
Dimensions Length Width Thickness	 36.4 ± 0.15 mm 42.8 ± 0.10 mm 3.3 mm ± 0.10 mm
Weight	11.4 g
Environmental characteristics	
Ambient temperature Operation Storage Transport	 0°C to +70°C -25°C to +85°C -25°C to +85°C
Relative humidity Operation / Storage	 8% to 95%, non-condensing
Vibration Operation / Storage	 Maximum 30 g (point to point)
Shock Operation / Storage	 Maximum 3,000 g
Altitude	24,000 meters

Table 303: Technical data - 5CFCRD.xxxx-02 CompactFlash cards (Forts.)

6.4 Dimensions

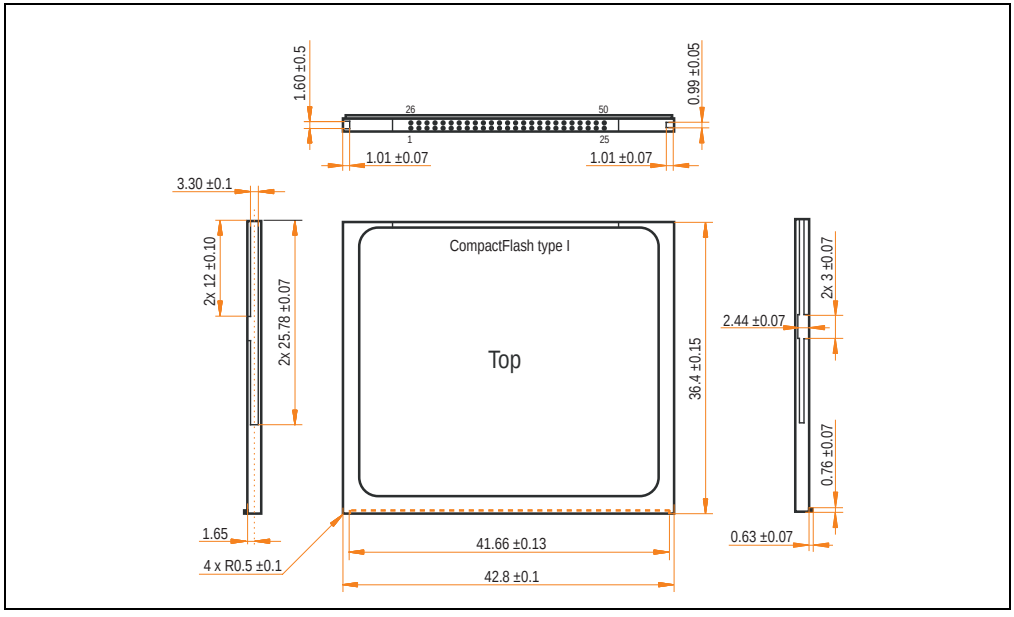
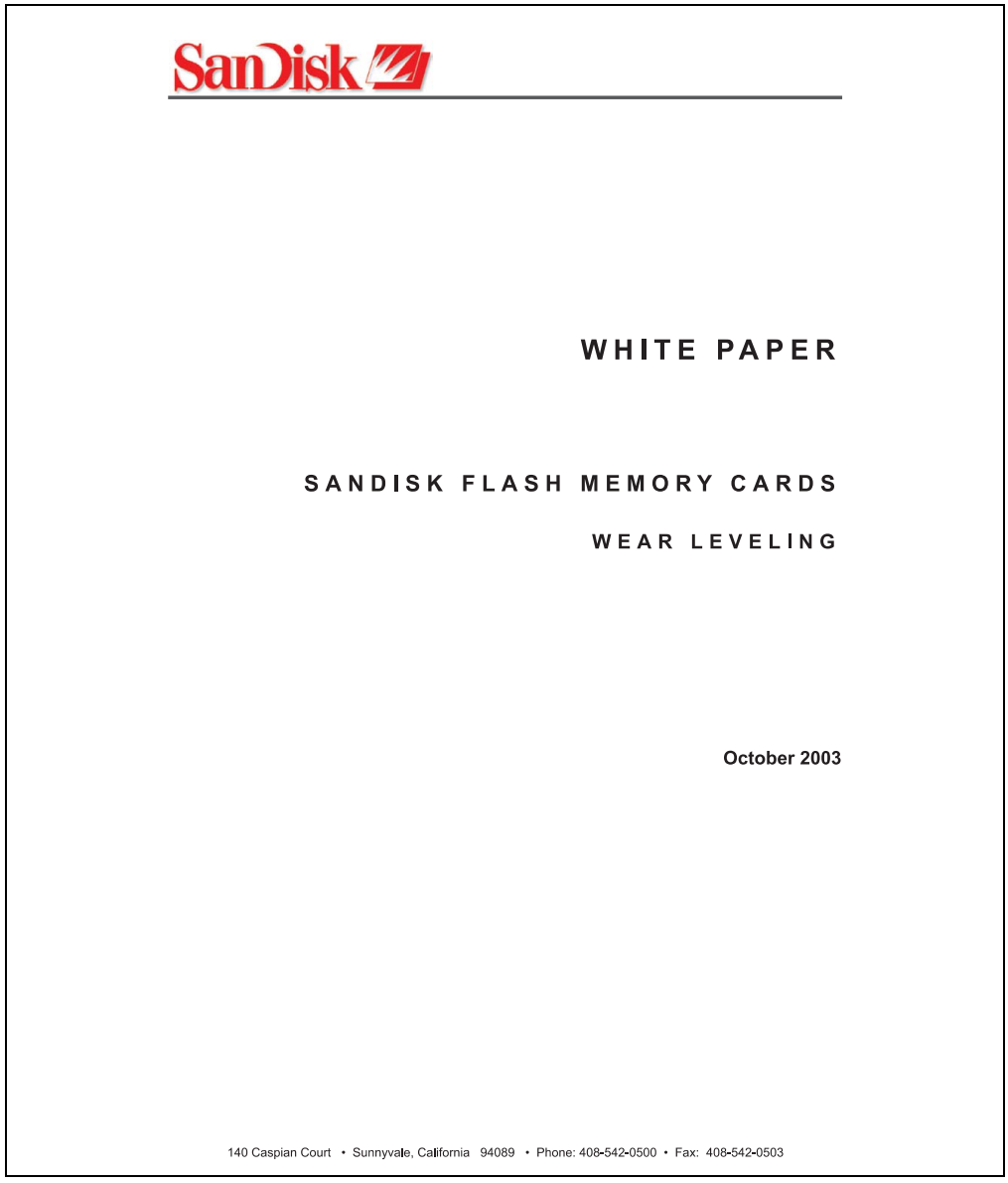


Figure 196: Dimensions - CompactFlash card type I

6.5 Calculating the lifespan

SanDisk provides a 6-page "white paper" for the lifespan calculation of CompactFlash cards (see following pages). This document can also be found on the SanDisk homepage.



SanDisk

WHITE PAPER

SANDISK FLASH MEMORY CARDS

WEAR LEVELING

October 2003

140 Caspian Court • Sunnyvale, California 94089 • Phone: 408-542-0500 • Fax: 408-542-0503

Figure 197: SanDisk white paper - page 1 of 6

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Lit. No. 80-36-00278 10/03 Printed in U.S.A.

Figure 198: SanDisk white paper - page 2 of 6

OVERVIEW

This purpose of this white paper is to help SanDisk customers understand the benefits of wear leveling and to assist customers in calculating life expectancy of SanDisk cards in specific applications.

Flash memory is susceptible to wear as a result of the repeated program and erase cycles that are inherent in typical data storage applications. Applications in which this is a major concern include hard disk replacement applications where write operations occur frequently. How a storage system manages the wear of the memory is key to understanding the extended reliability of the host that relies on these storage systems.

WEAR LEVELING METHODOLOGY

Current products available in the industrial channel use NAND flash memory. It is important to understand the NAND memory architecture to gain insight into the wear leveling mechanism.

Each memory chip is divided into blocks. A block is an array of memory cells organized as sectors. The number of blocks and sectors vary from product to product. The minimum unit for a write or read operation is a page (or sector). The minimum unit for an erase operation is a block. Physical blocks are logically grouped into zones. For the current technology, a typical zone size is 4 MB. However, this may change from product to product. Wear leveling is done within a zone. The current firmware does not spread the wear across the capacity of the card. Each zone has about 3% additional “spare blocks” beyond what is assigned to meet the logical capacity of the flash card. This group of blocks is commonly referred to as the “Erase Pool”.

With the introduction of SanDisk’s Write-before-Erase architecture, each time a host writes data to the same logical address (CHS or LBA), data is written into a newly assigned, empty physical block from the “Erase Pool”. The intrinsic nature of writing to a new physical location each time a logical address is written to is the basis for wear leveling found in SanDisk cards. This action spreads the writes over the zone, thus greatly extending the overall life of the card. The methodology of using a large number of physical addresses to manage a smaller logical address table allows for rotation of the physical addresses among the entire group of physical blocks within a zone. The resulting wear leveling optimizes the effective life of the media and avoids prematurely reaching the end of life on frequently written to host addresses.

When a card detects that a block has reached the end of its useful life, it removes that block from the blocks that are available for write operations. The result is a reduction of the size of the erase pool. This does not affect the capacity of the card as seen by the host. When the pool of blocks available for write operations has been exhausted due to wear, the card will reach the end of its useful life for write operations.

Figure 199: SanDisk white paper - page 3 of 6

Current SanDisk products do not preempt wear leveling events during normal operation of the card. Applications typically don't require such management beyond the natural wear leveling that occurs during normal host operations. As a result, the effectiveness of wear leveling in current SanDisk products is dependent upon host usage. It is important for customers whose applications do not fall into this typical usage pattern to understand how their applications will affect the lifetime of the card.

LIFE EXPECTANCY SCENARIOS

►best case analysis

In a typical application, large data files are written to the card occupying contiguous sequential logical address space. This results in optimal wear leveling and provides card life exceeding the specification for card endurance. This increased endurance is achieved as follows: The 2,000,000 endurance cycles specification (I-Grade only) is a result of large amounts of test data collected from a very large sample set that accounts for the extreme limits of the test population. With the 3% additional erase pool being used in an ideal fashion, the distribution is narrowed and the card will survive beyond its specified lifetime.

►worst case analysis

In the worst-case application, data will be written as single sectors to random addresses across the card. These single sector writes will exercise the erase pool more rapidly, requiring the system to perform a "garbage collection" operation to free up new blocks for subsequent write operations. At the extreme, each single sector write would cause one block to be programmed and erased. As a typical block size is 16kB or 32 sectors, the amount of wear is increased by a factor of 31 since 32 physical sectors are written and erased for each sector the host writes. Spreading this wear across the erase pool results in an effective 1/30 usable lifetime. This case is an extreme example and is only included to show the range of application dependence. This result is comparable to other vendor's cards based on memory with a 16kB erase block.

►analysis of host dependence

In assessing the life expectancy of a card in a given system several factors need to be understood. These factors include the types of files and their corresponding sizes, frequency of card write operations and file system behavior (including data structures). The types of files must be considered since some files, such as operating systems or executable files, typically remain in fixed locations once they are stored in the card. This limits the number of physical blocks available for circulation into the erase pool. The remaining capacity after these files have been accounted for can then be divided by the typical size of files that will be updated over the lifetime of the card. Related to this calculation is how the file system overwrites existing files. Typical operating system behavior, such as DOS, will allocate new blocks from the file allocation table, or FAT, and so repeated file writes will occupy a new set of addresses on the card. This is very beneficial in spreading wear across the card since it forces the card to cycle the entire physical

Figure 200: SanDisk white paper - page 4 of 6

area being used for such files. Special cases to consider include those where the files being updated are very small. Typically an operating system uses a minimum number of sectors to store a file, referred to as a cluster. Typical cluster sizes range from 8 to 64 sectors in size. The cluster size is important for files that are the same or smaller than the 32-sector block since these may trigger garbage collection operations. If these updates happen in a random fashion (sequential updates would not be affected by cluster size) lifetime may be reduced as a result. Finally, the frequency of such updates is then used to determine how long it will take before the card reaches its statistical limit for endurance. These factors can be combined in an equation that can be used to calculate the minimum time a card will function in that application:

$$lifetime = 2{,}000{,}000 \times \frac{\left(C_{zone} - C_{fixed}\right) \times \left(1 - k_r \times \frac{32 - N_{cluster}}{32}\right)}{FS_{typ}} \times \frac{1}{f_w}$$

where Czone is the total capacity of the zone, Cfixed is the capacity used by fixed files, Ncluster is the cluster size, FStyp is the average file size and fw is the average frequency at which files are updated. kr is a factor that is 0 for file sizes that are typically over 16kB or for applications that are not random in the order in which such files are updated.

Example 1

In this example 128 KB of data is updated once a day. The zone has 500 KB worth of fixed files. A 4 MB zone size is assumed.

$$lifetime = 2{,}000{,}000 \times \frac{(4000 - 500) \times (1 - 0)}{128} \times \frac{1}{1/day}$$

$$lifetime = 149828\,years$$

Example 2

This example is a data logging operation using a 1GB card where a 4kB file is updated every five seconds. This would result in sequential address being written.

$$lifetime = 2{,}000{,}000 \times \frac{4000}{4} \times \frac{1}{1/5\,\mathrm{sec}}$$

$$lifetime = 317\,years$$

Figure 201: SanDisk white paper - page 5 of 6

Example 3

This example is a data logging operation using the same 1GB card where a new 4kB file is written every five seconds. But in this case the cluster size is 4kB and it is expected that, due to file system fragmentation, the logical addresses will be written randomly.

$$lifetime = 2{,}000{,}000 \times \frac{4 \times \left(1 - 1 \times \frac{32-8}{32}\right)}{.004} \times \frac{1}{1/5\,\text{sec}}$$

$$lifetime = 79.3\,years$$

CONCLUSION

These examples are general in nature but show how the equation can be used as a guideline for calculating card lifetime in different applications. They also demonstrate that SanDisk card architecture exceeds reasonable life expectancy in typical applications. If a particular applications behaves in such a way that this equation cannot be applied, the SanDisk Applications Engineering group can assist in performing card lifetime analysis.

For more information, please visit the SanDisk Web site at: www.sandisk.com

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Figure 202: SanDisk white paper - page 6 of 6

7. CompactFlash cards 5CFCRD.xxxx-03

7.1 General information

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

7.2 Order data

Model number	Description	Image
5CFCRD.0064-03	CompactFlash 64 MB SSI	Example: 256 MB 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 304: Order data - CompactFlash cards

7.3 Technical data

Information:

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

Features	5CFCRD.xxxx-03
MTBF (at 25°C)	> 4,000,000 hours
Maintenance	None
Data reliability	< 1 unrecoverable error in 10^{14} bit read accesses
Write/erase procedures	> 2,000,000 times
Data retention	10 years
Mechanical characteristics	
Dimensions Length Width Thickness	 36.4 ± 0.15 mm 42.8 ± 0.10 mm 3.3 ± 0.10 mm
Weight	11.4 grams

Table 305: Technical data - 5CFCRD.xxxx-03 CompactFlash cards

Environmental characteristics	5CFCRD.xxxx-03
Ambient temperature Operation Storage Transport	 0°C to +70°C -50°C to +100°C -50°C to +100°C
Relative humidity Operation / Storage	 8% to 95%, non-condensing
Vibration Operation Storage / Transport	 Maximum 16.3 g (point to point) Maximum 30 g (point to point)
Shock Operation Storage / Transport	 Maximum 1000 g Maximum 3,000 g
Altitude	Maximum 80,000 feet (24,383 meters)

Table 305: Technical data - 5CFCRD.xxxx-03 CompactFlash cards (Forts.)

7.3.1 Temperature humidity diagram for operation and storage

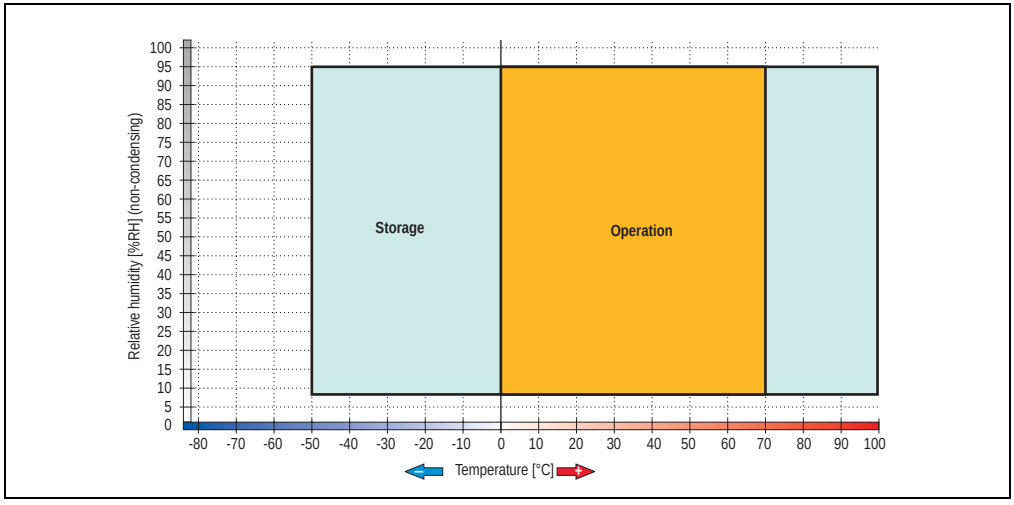

Figure 203: Temperature humidity diagram - CompactFlash cards 5CFCRD.xxxx-03

7.4 Dimensions

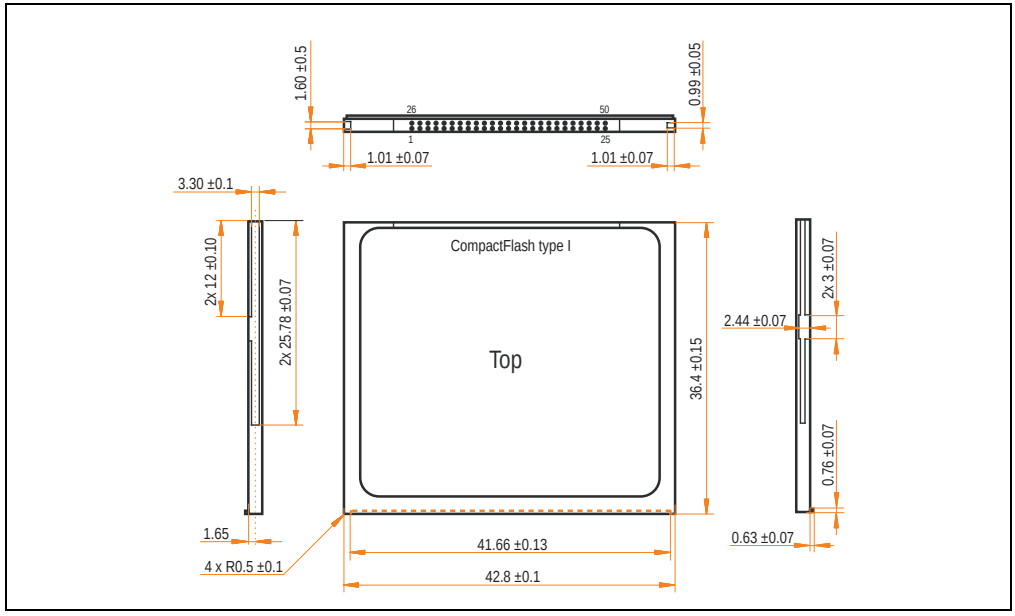

Figure 204: Dimensions for CompactFlash card type I

7.5 Calculating the lifespan

Silicon Systems provides a 9-page "white paper" for the lifespan calculation for CompactFlash cards (see following pages). This document can also be found on the Silicon Systems homepage (**www.siliconsystems.com**).

Information:

A software tool for calculating the statistical lifespan of the Silicon Systems CompactFlash cards in various settings can be downloaded from the B&R Homepage (www.br-automation.com).

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ENDURANCE CONSIDERATIONS

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WP401
Revision D
January 2006

Figure 205: Silicon Systems white paper - page 1 of 9

SILICONDRIVE™ WHITE PAPER
WP401D

INTRODUCTION

SiliconSystems' SiliconDrive™ technology is specifically designed to meet the high performance and high reliability requirements of Enterprise System OEMs in the netcom, military, industrial, interactive kiosk and medical markets. One of the measures of storage reliability in Enterprise System OEM applications is endurance – the number of write/erase cycles that can be performed before the storage product "wears out."

BACKGROUND

It is important to note that endurance is not just a function of the storage media. Rather, it is the combination of the storage media and the controller technology that determines the endurance. For example, magnetic media is an order of magnitude less reliable than NAND flash, yet the controller technology employed by rotating hard drives can compensate for this deficiency to yield reliability results that meet those of solid-state storage.

{NOTE: This is a completely different discussion from the mechanical reliability involving rotating hard drives versus solid-state storage that has no moving parts. This is just an example of how a controller, if it is good enough, can compensate for the deficiencies of the media}.

Write/erase cycle endurance for solid-state storage is specified in many ways by many different vendors. Some specify the endurance at the physical block level, while others specify at the logical block level. Still others specify it at the card or drive level. Since endurance is also related to data retention, endurance can be specified at a higher level if the data retention specification is lower. For these reasons, it is often difficult to make an "apples to apples" comparison of write/erase endurance by solely relying on these numbers in a datasheet.

A better way to judge endurance is to break the specification down into the main components that affect the endurance calculation:

1. Storage Media
2. Wear Leveling Algorithm
3. Error Correction Capabilities

Other factors that affect endurance include the amount of spare sectors available and whether or not the write is done using a file system or direct logical block addressing. While these issues can contribute to the overall endurance calculation, their effects on the resulting number is much lower than the three parameters above. Each of those factors will be examined individually, assuming ten-year data retention.

Figure 206: Silicon Systems white paper - page 2 of 9

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STORAGE MEDIA

The scope of this white paper is confined to non-volatile storage – systems that do not lose their data when the power is turned off. The dominant technology for non-volatile solid-state storage is NAND flash. While NOR flash is also a possible solution, implementation of NOR technology is generally confined to applications like cell phones that require the functionality of DRAM, boot PROM and storage component in a single chip. The economies of scale and component densities of NAND relative to NOR make it the ideal solution for non-volatile, solid-state storage subsystems.

The two dominant NAND technologies available today are SLC (single-level cell, sometimes called binary) and MLC (multi-level cell). SLC technology stores one bit per cell and MLC stores two bits. A comparison of SLC and MLC is shown in figure 1.

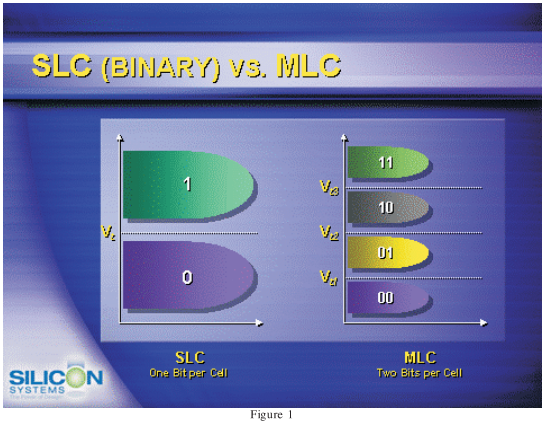

Figure 1

SLC NAND is generally specified at 100,000 write/erase cycles per block with 1-bit ECC (this is explained below). MLC NAND is specified at 10,000 write/erase cycles per block with ECC. The MLC datasheet does not specify a number of bits of ECC required. Therefore, when using the same controller, a storage device using SLC will have an endurance value roughly 10x that of a similar MLC-based product. In order to achieve maximum endurance, capacity and speed, SiliconSystems currently uses SLC NAND in our SiliconDrive technology.

Figure 207: Silicon Systems white paper - page 3 of 9

A more thorough discussion of SLC vs. MLC can be found from the component manufacturers:

Samsung: http://www.samsung.com
Toshiba: http://www.toshiba.com

WEAR LEVELING

Wear leveling is defined as the allowing data writes to be evenly distributed over the entire storage device. More precisely, wear leveling is an algorithm by which the controller in the storage device re-maps logical block addresses to different physical block addresses in the solid-state storage array. The frequency of this re-map, the algorithm to find the "least worn" area to which to write and any data swapping capabilities are generally considered proprietary intellectual property of the controller vendor.

It is important to note that the wear leveling is done in the solid-state memory controller and is independent of the host system. The host system performs its reads and writes to logical block addresses only, so as far as the host is concerned, the data stays in the same place.

To illustrate the effects of wear leveling on overall endurance, assume three different storage devices with the following characteristics:

1. Flash Card with No Wear Leveling
2. Flash Card with Dynamic Wear Leveling
3. SiliconDrive with Static Wear Leveling

In addition, assume that all three storage devices use the same solid-state storage technologies (SLC or MLC – for purposes of this discussion, it doesn't matter). All three devices will have 75% of the capacity as static data, which is defined below:

Static Data: Any data on a solid-state storage device that does not change. Examples include: operating system files, look-up tables and executable files.

Finally, the same type of write is performed to all three systems. The host system is writing a single block of data to the same logical block address over and over again.

Figure 208: Silicon Systems white paper - page 4 of 9

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No Wear Leveling

Figure 2 shows a normalized distribution of writes to a flash card that does not use wear leveling. In this instance, the data gets written to the same physical block. Once that physical block wears out and all spare blocks are exhausted (see discussion below), the device ceases to operate, even though only a small percentage of the card was used.

In this instance, the endurance of the card is only dependent on the type of flash used and any error correction capabilities in excess of one byte per sector. Early flash cards did not use wear leveling and thus failed in write-intensive applications. For this reason, flash cards with no wear leveling are only useful in consumer electronic applications.

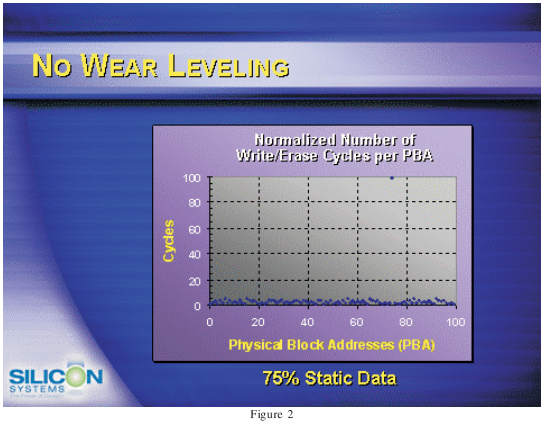

Figure 2

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Dynamic Wear Leveling

Figure 3 shows a normalized distribution of writes to a flash card that employs dynamic wear leveling. This algorithm only wear levels over "free" or "dynamic" data areas. That is to say, if there is static data as defined above, this area is never involved in the wear leveling process. In the current example, since 75% of the flash card is used for static data, only 25% of the card is available for wear leveling. The endurance of the card is calculated to be 25 times better than for the card with no wear leveling, but only one-fourth that of static wear leveling.

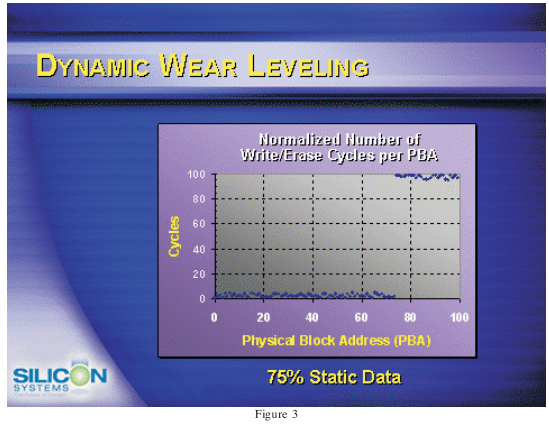

Figure 3

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Figure 210: Silicon Systems white paper - page 6 of 9

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WP401D

Static Wear Leveling

Figure 4 shows a normalized distribution of writes to a SiliconDrive that employs static wear leveling. This algorithm evenly distributes the data over the entire SiliconDrive. The algorithm searches for the least-used physical blocks and writes the data to that location. If that location is empty, the write occurs normally. If that location contains static data, the static data is moved to a more heavily-used location prior to the new data being written. The endurance of the SiliconDrive is calculated to be 100 times better than for the card with no wear leveling and four times the endurance of the card that uses dynamic wear leveling.

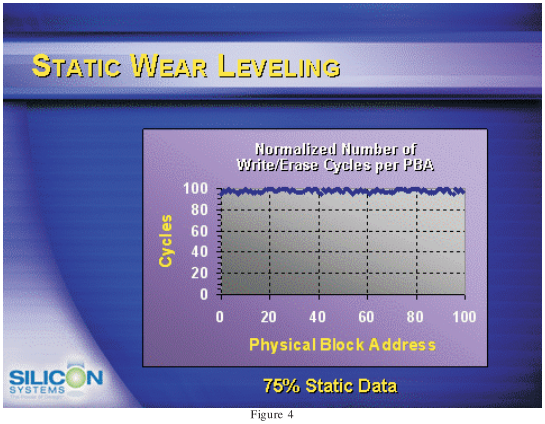

Figure 4

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ERROR CORRECTION

Part of the solid-state memory components specification is related to error correction. For example, SLC NAND components are specified at 100,000 write/erase cycles with one-bit ECC. It goes to reason that the specification increases with a better error correction algorithm. Most flash cards employ error correction algorithms ranging from two-bit to four-bit correction. SiliconSystems' SiliconDrive technology uses six-bit correction.

The term six-bit correction may be slightly confusing. Six-bit correction really defines the capability of correcting up to six bytes in a 512-byte sector. Since a byte is eight bits, this really means the SiliconDrive can correct 48 bits as long as those bits are confined to six bytes in the sector. The same definition holds for two-bit and four-bit correction.

The relationship between the number of bytes per sector the controller can correct does not appear to be directly proportional to the overall endurance, since the bit error rate of the NAND flash is not linear. To state it another way, six-bit error correction is not necessarily three times better than two-bit ECC. In most cases, it is significantly better than that.

SUMMARY OF MEDIA, WEAR LEVELING AND ECC

The matrix below summarizes the effects of the different items discussed above. In the table, a "1" indicates the best possible scenario, and a "10" indicates the least desirable in terms of endurance.

N = No Wear Leveling; D = Dynamic Wear Leveling; S = Static Wear Leveling

ECC	SLC NAND			MLC NAND		
	N	D	S	N	D	S
2-bit	6	5	4	10	9	8
4-bit	5	4	2	9	8	7
6-bit	4	3	1*	8	7	6

* = SiliconSystems' SiliconDrive Configuration

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Figure 212: Silicon Systems white paper - page 8 of 9

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ENDURANCE CALCULATIONS

To get an idea of how long a solid-state storage device will last in an application, the following calculations can be used. Note: These calculations are valid only for products that use either dynamic or static wear leveling. Use the solid-state memory component specifications for products that do not use wear leveling.

To calculate the expected life in years a product will last:

$$\text{Years} = \frac{(\alpha - \beta) \times \lambda \times (1 - \varphi)}{(\omega \times \xi) \times k}$$

Where:

- α = Capacity in MB (when converting from MB to GB, MB = GB x 1,024)
- β = Amount of Static Data in MB (this value should be 0 for static wear leveling)
- λ = Endurance Specification
- φ = Safety Margin
- ω = File Size in MB (when converting from KB to MB, KB = MB x 1,024)
- ξ = Number of Writes of file size ω per minute
- k = Number of minutes per year = 525,600

To calculate the number of data transactions:

$$\text{Transactions} = \frac{(\alpha - \beta) \times \lambda \times (1 - \varphi)}{\omega}$$

Where:

- α = Capacity in MB (when converting from MB to GB, MB = GB x 1,024)
- β = Amount of Static Data in MB (this value should be 0 for static wear leveling)
- λ = Endurance Specification
- φ = Safety Margin Percentage (usually 25%)
- ω = File Size in MB (when converting from KB to MB, KB = MB x 1,024)

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8. USB Media Drive 5MD900.USB2-00

Data carriers not included in delivery

Figure 214: USB Media Drive 5MD900.USB2-00

8.1 Features

- Desk-top or rack-mount operation (mounting rail brackets)
- Integrated USB diskette drive
- Integrated DVD-ROM/CD-RW drive
- Integrated CompactFlash slot IDE/ATAPI (Hot Plug capable)
- Integrated USB 2.0 connection (up to 480 MBit high speed)
- +24 VDC supply (back side)
- USB/B 2.0 connection (back side)
- Optional front cover (model number 5A5003.03 see also section 8.8 "Front cover 5A5003.03 for the USB Media Drive" on page 437)

8.2 Technical data

Information:

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

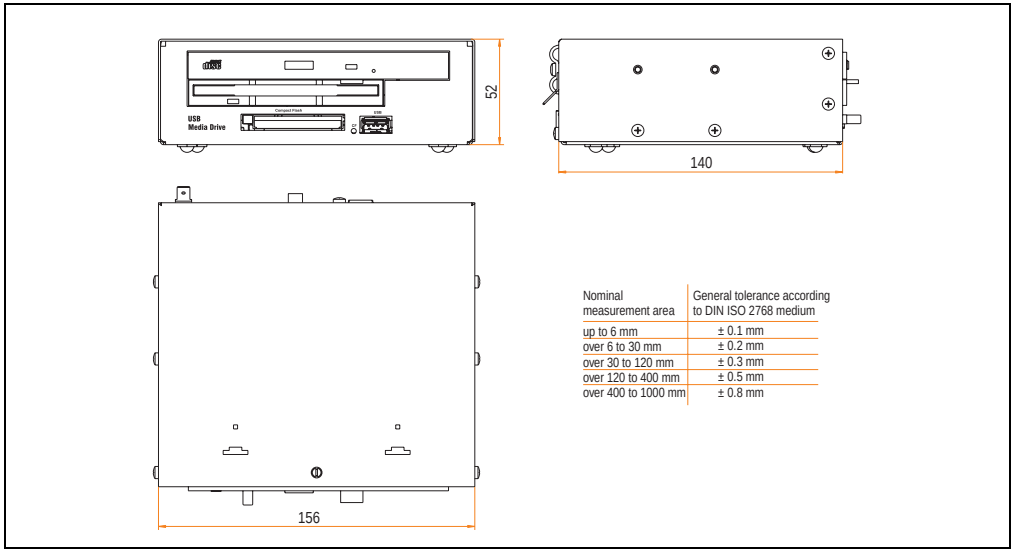
Features - entire device	5MD900.USB2-00
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s), to high speed (480 Mbit/s)
Maximum cable length	5 m (not including hub)
Power supply Rated voltage	 24 VDC ±25%
Features - diskette drive	
Data capacity	720 KB / 1.25 MB / 1.44 MB (formatted)
Data transfer rate	250 kbits (720 KB) or 500 kbits (1.25 MB and 1.44 MB)
Rotation speed	Up to 360 rpm
Diskette media	High density (2HD) or normal density (2DD) 3.5" diskettes
MTBF	30,000 POH (Power-On Hours)
Features - DVD-ROM/CD-RW drive	
Write speed CD-R CD-RW	 24x, 16x, 10x and 4x 10x and 4x
Reading rate CD DVD	 24x 8x
Data transfer rate	Max. 33.3 MB/sec.
Access time (average) CD DVD	 85 ms 110 ms
Revolution speed	Max. 5,136 rpm ± 1%
Starting time (0 rpm to read access)	19 seconds (maximum)
Host interface	IDE (ATAPI)
Readable media CD DVD	 CD/CD-ROM (12 cm, 8 cm), CD-R, CD-RW DVD-ROM, DVD-R, DVD-RW, DVD-RAM
Non-write protected media CD	 CD-R, CD-RW
Write-methods	Disk at once, session at once, packet write, track at once
Laser class	Class 1 laser
Data buffer capacity	2 MB

Table 306: Technical data - USB Media Drive 5MD900.USB2-00

Features - DVD-ROM/CD-RW drive	5MD900.USB2-00
Compatible formats	CD-DA, CD-ROM mode 1/mode 2 CD-ROM XA mode 2 (form 1, form 2) Photo CD (single/multi-session) Enhanced CD, CD-text DVD-ROM, DVD-R, DVD-Video (double layer) DVD-RAM (4.7 GB, 2.6 GB)
Noise level (complete read access)	Approx. 45 dBA at 50 cm
Lifespan Opening/closing the drawer	60,000 POH (Power-On Hours) > 10000 times
Features - CompactFlash slot	
CompactFlash Type Number Connection	 Type I 1 slot IDE / ATAPI
CompactFlash LED	Signals read or write access to an inserted CompactFlash card
Hot Plug capable	Yes
Features - USB connections	
USB A on the front side Power supply	Connection of further peripheral devices Max. 500 mA
USB B back side	Connection to the system
Mechanical characteristics	
Outer dimensions (without slide-in) Width Length Height	 70 mm 100 mm 9.5 mm
Weight	Approx. 1.1 kg (without front cover)
Environmental characteristics	
Ambient temperature Operation Storage Transport	 +5°C .. +45°C -20°C .. +60°C -40°C .. +60°C
Environmental characteristics	
Relative humidity Operation Storage Transport	 20 - 80% non-condensing 5 - 90% non-condensing 5 - 95% non-condensing
Vibration Operation Storage Transport	 At max. 5 - 500 Hz and 0.3 g At max. 10 - 100 Hz and 2 g At max. 10 - 100 Hz and 2 g
Shock (pulse with a sinus half-wave) Operation Storage (packaged) Transport (packaged)	 At max. 5 g for 11 ms At max. 60 g for 11 ms At max. 60 g for 11 ms
Altitude	Max. 3,000 meters

Table 306: Technical data - USB Media Drive 5MD900.USB2-00 (Forts.)

8.3 Dimensions



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

Figure 215: Dimensions - USB Media Drive 5MD900.USB2-00

8.4 Dimensions with front cover

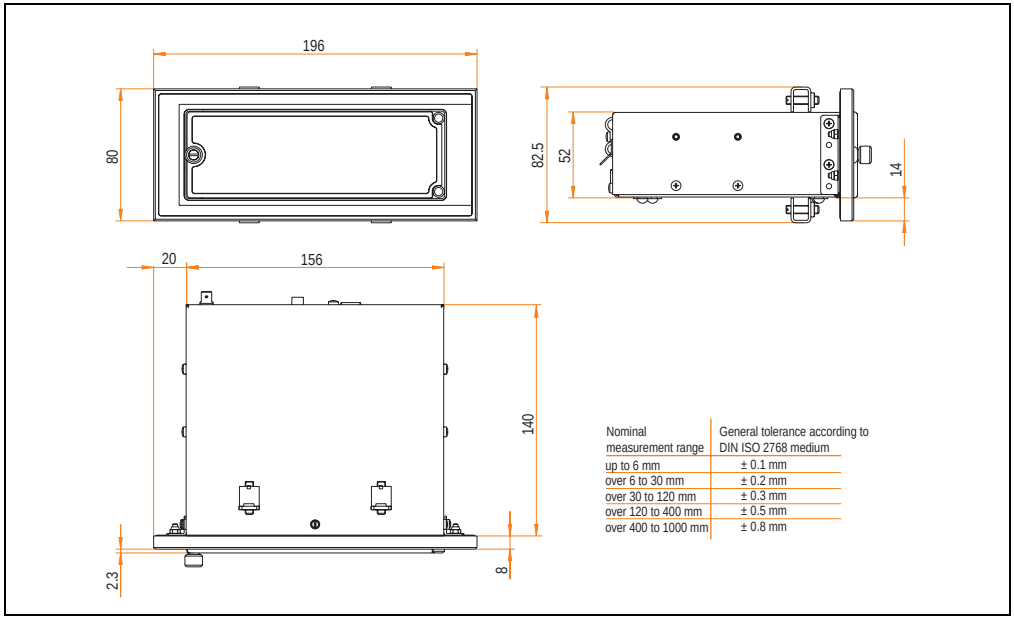


Figure 216: Dimensions - USB Media Drive with front cover

8.5 Contents of delivery

Number	Component
1	USB Media Drive complete unit
2	Mounting rail brackets

Table 307: Contents of delivery - USB Media Drive 5MD900.USB2-00

8.6 Interfaces

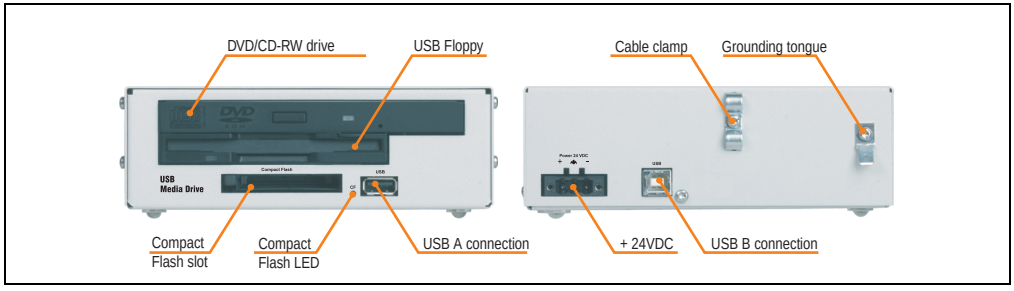


Figure 217: Interfaces for USB Media Drive 5MD900.USB2-00

8.7 Mounting

The USB Media Drive can be operated as a desk-top device (rubber feet) or as a rack-mount device (2 mounting rail brackets included).

8.7.1 Mounting orientation

Because of limits to the mounting orientation with the components used (floppy, DVD-CDRW drive), the USB media drive is only permitted to be mounted and operated as shown in the following figure.

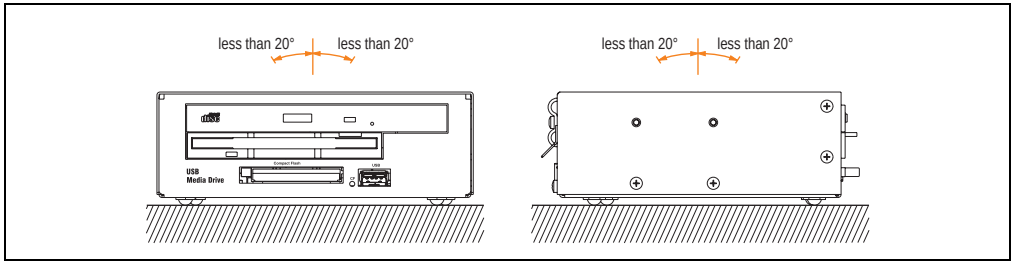


Figure 218: Mounting orientation of USB Media Drive 5MD900.USB2-00

8.8 Front cover 5A5003.03 for the USB Media Drive

This front cover can also be mounted on the front of the USB media drive (model number 5MD900.USB2-00 or 5MD900.USB2-01) to protect the interfaces.

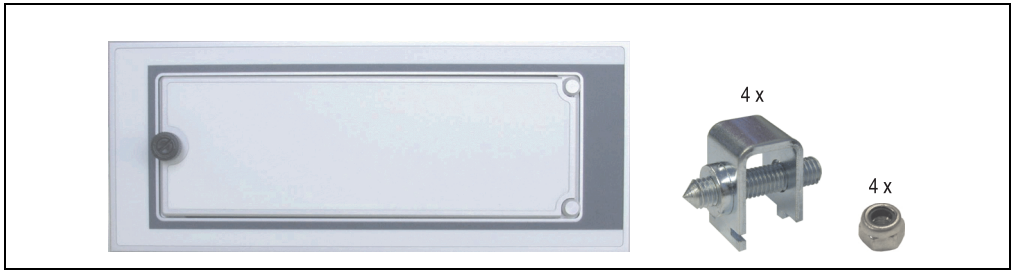


Figure 219: Front cover 5A5003.03

8.8.1 Technical data

Features	5A5003.03
Front cover design / colors Dark gray border around the cover Light gray background	 Similar to Pantone432CV Similar to Pantone427CV

Table 308: Technical data - 5A5003.03

8.8.2 Dimensions

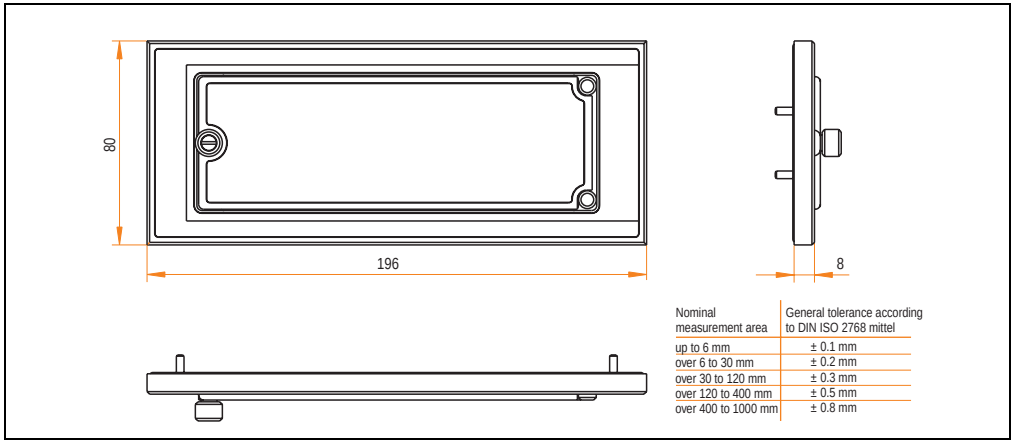


Figure 220: Dimensions - 5A5003.03

8.8.3 Installation

The front cover is attached with 2 mounting rail brackets (included with USB Media Drive) and 4 locknuts. The USB media drive and front cover can be mounted as a whole in (for example) a switching cabinet door.

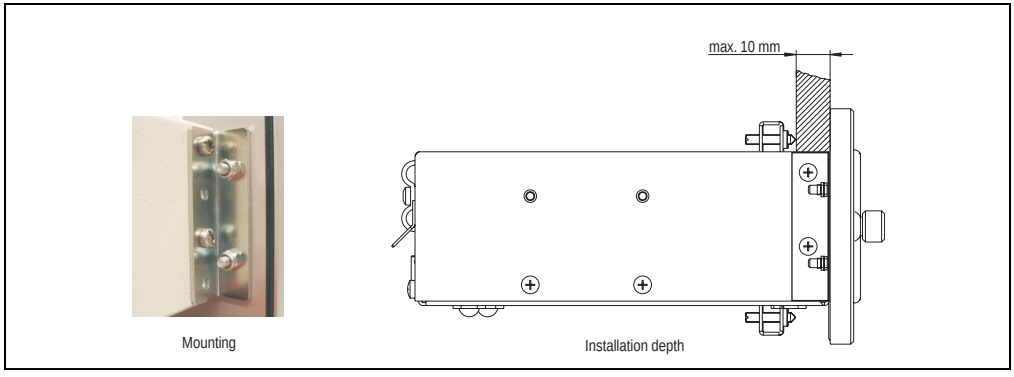


Figure 221: Front cover mounting and installation depth

9. USB Media Drive - 5MD900.USB2-01

Data carriers not included in delivery

Figure 222: USB Media Drive - 5MD900.USB2-01

9.1 Features

- Desk-top or rack-mount operation (mounting rail brackets)
- Integrated USB diskette drive
- Integrated DVD-RW/CD-RW drive
- Integrated CompactFlash slot IDE/ATAPI (Hot Plug capable)
- Integrated USB 2.0 connection (up to 480 MBit high speed)
- +24 VDC supply (back side)
- USB/B 2.0 connection (back side)
- Optional front cover (model number 5A5003.03 see also section 9.8 "Front cover 5A5003.03 for the USB Media Drive" on page 444)

9.2 Technical data

Information:

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

Features - entire device	5MD900.USB2-01
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s), to high speed (480 Mbit/s)
Maximum cable length	5 m (not including hub)
Power supply Rated voltage	 24 VDC ±25%
Features - diskette drive	
Data capacity	720 KB / 1.25 MB / 1.44 MB (formatted)
Data transfer rate	250 kbits (720 KB) or 500 kbits (1.25 MB and 1.44 MB)
Rotation speed	Up to 360 rpm
Diskette media	High density (2HD) or normal density (2DD) 3.5" diskettes
MTBF	30,000 POH (Power-On Hours)
Features - DVD-RW/CD-RW drive	
Write speed CD-R CD-RW DVD-R DVD-RW DVD-RAM[1)] DVD+R DVD+R (double layer) DVD+RW	 24x, 16x, 10x and 4x 10x and 4x 8x, 4x and 2x 4x and 2x 3x and 2x 8x, 4x and 2x 2x,4x 4x and 2x
Reading rate CD DVD	 24x 8x
Data transfer rate	Max. 33.3 MB/sec.
Access time (average) CD DVD	 130 ms (24x) 130 ms (8x)
Revolution speed	Max. 5090 rpm ± 1%
Starting time (0 rpm to read access) CD DVD	 14 seconds (maximum) 15 seconds (maximum)
Host interface	IDE (ATAPI)
Laser class	Class 1 laser

Table 309: Technical data - USB Media Drive 5MD900.USB2-01

Features - DVD-ROM/CD-RW drive	5MD900.USB2-01
Readable media CD DVD	 CD/CD-ROM (12 cm, 8 cm), CD-R, CD-RW DVD-ROM, DVD-R, DVD-RW. DVD-RAM, DVD+R, DVD+R (double layer), DVD+RW
Non-write protected media CD DVD	 CD-R, CD-RW DVD-R/RW, DVD-RAM (4.7 GB), DVD+R/RW, DVD+R (double layer)
Compatible formats	CD-DA, CD-ROM mode 1/mode 2 CD-ROM XA mode 2 (form 1, form 2) Photo CD (single/multi-session), Enhanced CD, CD text DVD-ROM, DVD-R, DVD-RW, DVD video DVD-RAM (4.7 GB, 2.6 GB) DVD+R, DVD+R (double layer), DVD+RW
Write-methods CD DVD	 Disc at once, session at once, packet write, track at once Disc at once, Incremental, Over-write, sequential, multi-session
Data buffer capacity	8 MB
Noise level (complete read access)	Approx. 48 dBA at 50 cm
Lifespan Opening/closing the drawer	60,000 POH (Power-On Hours) > 10000 times
Features - CompactFlash slot	
CompactFlash Type Number Connection	 Type I 1 slot IDE / ATAPI
CompactFlash LED	Signals read or write access to an inserted CompactFlash card
Hot Plug capable	Yes
Features - USB connections	
USB A on the front side Power supply Type Transfer rate	Connection of further peripheral devices Max. 500 mA 2.0 Low speed (1.5 MBit/s), full speed (12 MBit/s), to high speed (480 MBit/s)
USB B back side	Connection to the system
Mechanical characteristics	
Outer dimensions (without slide-in) Width Length Height	 70 mm 100 mm 9.5 mm
Weight	Approx. 1.1 kg (without front cover)
Environmental characteristics	
Ambient temperature Operation Storage Transport	 +5°C .. +45°C -20°C .. +60°C -40°C .. +60°C

Table 309: Technical data - USB Media Drive 5MD900.USB2-01 (Forts.)

Environmental characteristics	5MD900.USB2-01
Relative humidity Operation Storage Transport	 20 - 80% non-condensing 5 - 90% non-condensing 5 - 95% non-condensing
Vibration Operation Storage Transport	 At max. 5 - 500 Hz and 0.3 g At max. 10 - 100 Hz and 2 g At max. 10 - 100 Hz and 2 g
Shock (pulse with a sinus half-wave) Operation Storage (packaged) Transport (packaged)	 At max. 5 g for 11 ms At max. 60 g for 11 ms At max. 60 g for 11 ms
Altitude	Max. 3,000 meters

Table 309: Technical data - USB Media Drive 5MD900.USB2-01 (Forts.)

1) RAM drivers are not provided by the manufacturer. Support of RAM function by the burning software "Nero" (model number 5SWUTI.0000-00) or other burning software packages and drivers from third party providers.

9.3 Dimensions

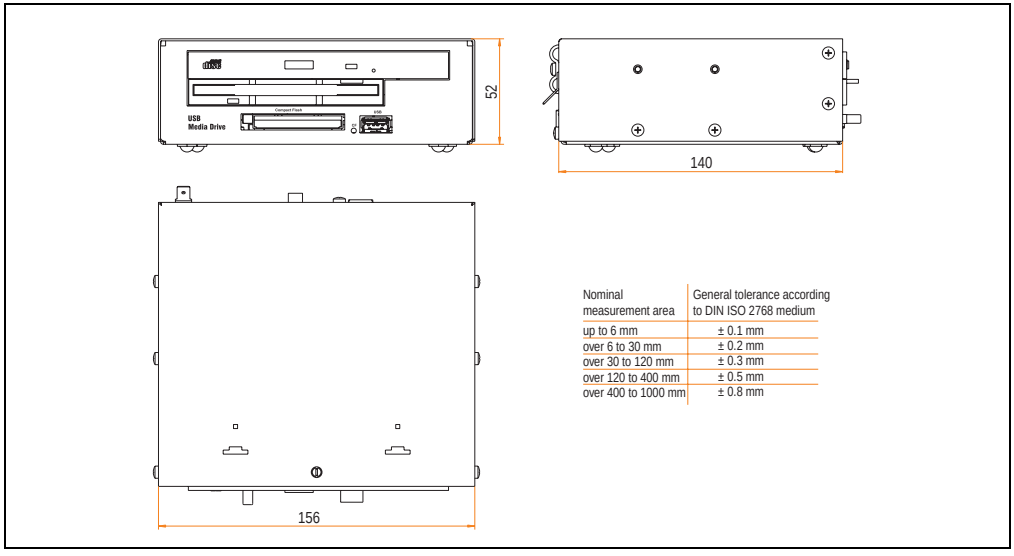


Figure 223: Dimensions - 5MD900.USB2-01

9.4 Dimensions with front cover

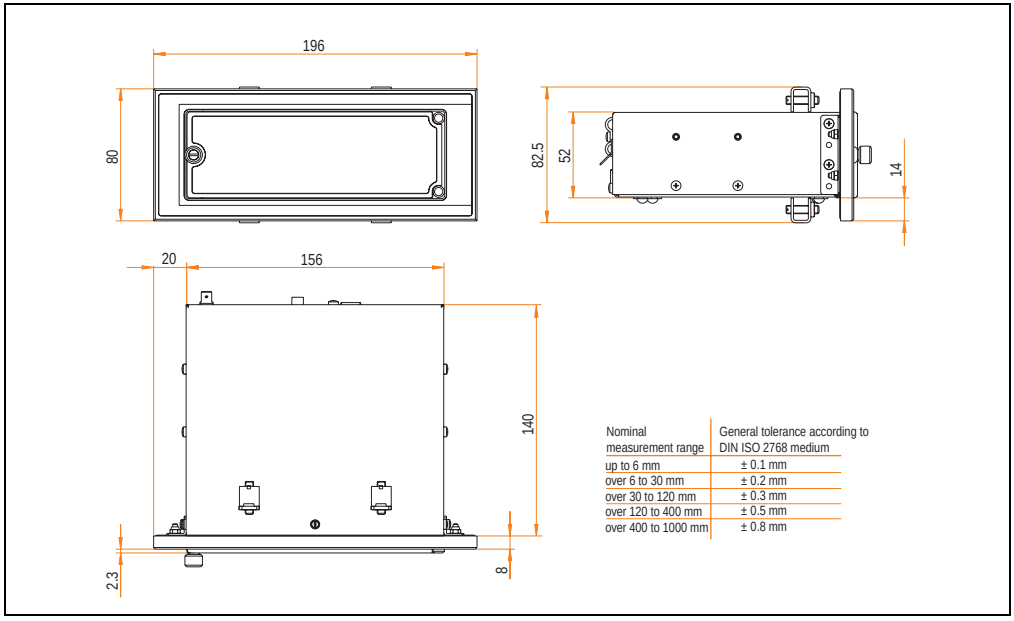


Figure 224: Dimensions - USB Media Drive with front cover

9.5 Contents of delivery

Number	Component
1	USB Media Drive complete unit
2	Mounting rail brackets

Table 310: Contents of delivery - USB Media Drive - 5MD900.USB2-01

9.6 Interfaces

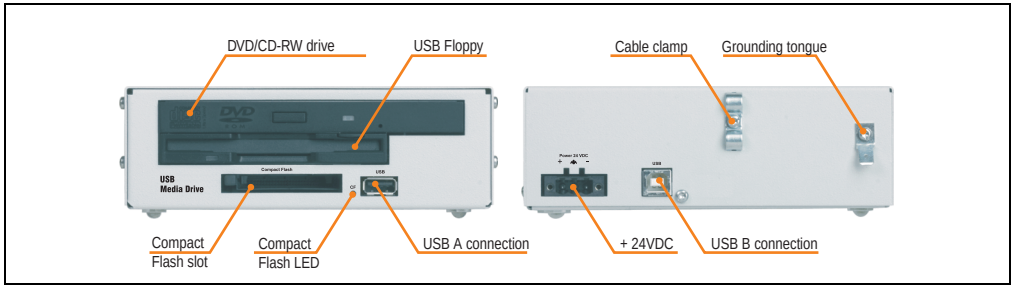


Figure 225: Interfaces - 5MD900.USB2-01

9.7 Mounting

The USB Media Drive can be operated as a desk-top device (rubber feet) or as a rack-mount device (2 mounting rail brackets included).

9.7.1 Mounting orientation

Because of limits to the mounting orientation with the components used (floppy, DVD-CDRW drive), the USB media drive is only permitted to be mounted and operated as shown in the following figure.

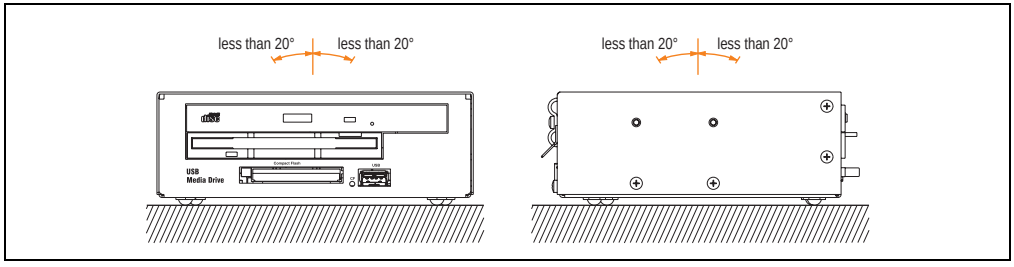


Figure 226: Mounting orientation - 5MD900.USB2-01

9.8 Front cover 5A5003.03 for the USB Media Drive

This front cover can also be mounted on the front of the USB media drive (model number 5MD900.USB2-00 or 5MD900.USB2-01) to protect the interface.

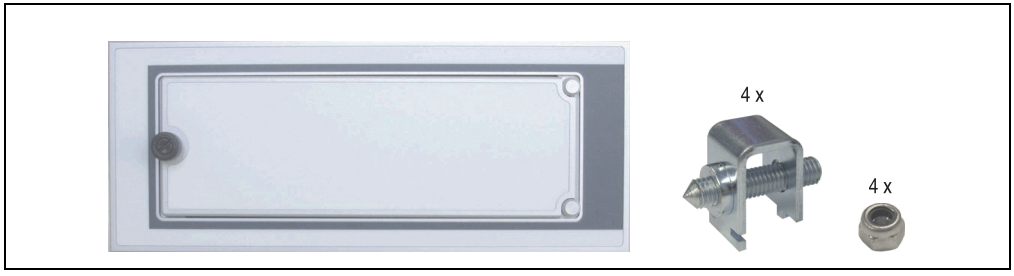


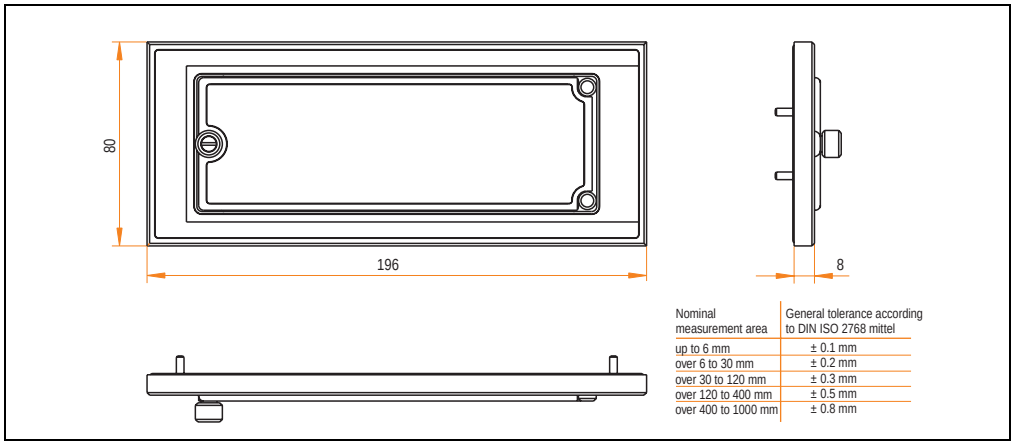
Figure 227: Front cover 5A5003.03

9.8.1 Technical data

Features	5A5003.03
Front cover design / colors	
Dark gray border around the cover	Similar to Pantone432CV
Light gray background	Similar to Pantone427CV

Table 311: Technical data - 5A5003.03

9.8.2 Dimensions



Nominal measurement area	General tolerance according to DIN ISO 2768 mittel
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 228: Dimensions - 5A5003.03

9.8.3 Installation

The front cover is attached with 2 mounting rail brackets (included with USB Media Drive) and 4 locknuts. The USB media drive and front cover can be mounted as a whole in (for example) a switching cabinet door.

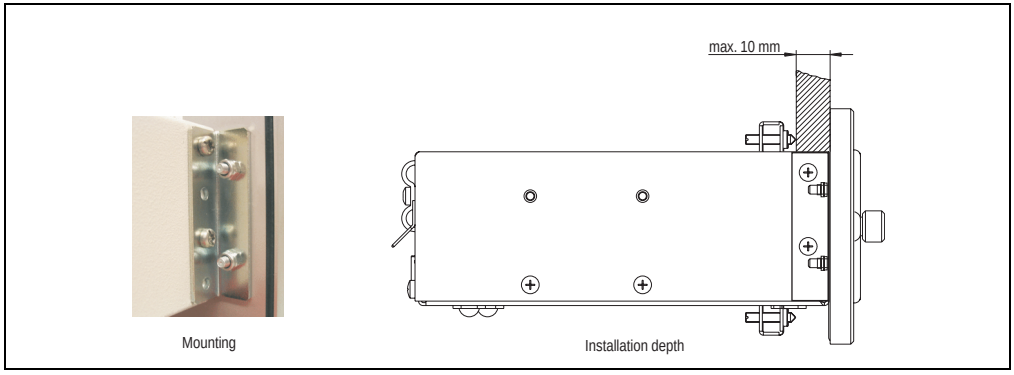


Figure 229: Front cover mounting and installation depth

10. USB Flash Drive 5MMUSB.0xxx-00

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 (e.g. the SanDisk Cruzer Micro Flash Drive with 512 MB):

- **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 BIOS. This can be avoided in most cases if a "`fdisk /mbr`" is also executed on the USB flash drive.**

10.1 General information

USB flash drives are easy-to-exchange memory media. Because of the fast data transfer provided by USB 2.0, 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. Only USB flash drives from the memory specialists SanDisk are being used.

10.2 Order data

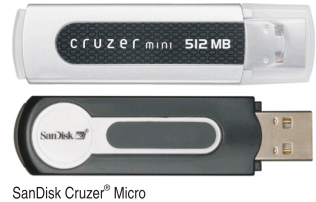
Model number	Description	Image
5MMUSB.0128-00	USB flash drive 128 MB SanDisk Cruzer Mini	SanDisk Cruzer® Mini  SanDisk Cruzer® Micro
5MMUSB.0256-00	USB flash drive 256 MB SanDisk Cruzer Mini	
5MMUSB.0512-00	USB flash drive 512 MB SanDisk Cruzer Mini up to Rev. E0 or Cruzer Micro starting with Rev. E0	
5MMUSB.1024-00	USB flash drive 1 GB SanDisk Cruzer Mini up to Rev. C0 or Cruzer Micro starting with Rev. C0	
5MMUSB.2048-00	USB flash drive 1 GB SanDisk Cruzer Micro	

Table 312: Order data - USB flash drives

10.3 Technical data

Information:

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

Features	5MMUSB.0128-00	5MMUSB.0256-00	5MMUSB.0512-00	5MMUSB.1024-00	5MMUSB.2048-00
LED Cruzer Mini / Cruzer Micro	1 LED (green), signals data transfer (send and receive)				
Power supply Current requirements Cruzer Mini / Cruzer Micro	via the USB port 650 µA sleep mode, 150 mA read/write				
Interface Cruzer Mini / Cruzer Micro 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) Cruzer Mini / Cruzer Micro	100,000 hours				
Data retention Cruzer Mini / Cruzer Micro	10 years				
Maintenance Cruzer Mini / Cruzer Micro	None				
Operating system support Cruzer Mini Cruzer Micro	Windows CE 4.1, CE 4.2, 98SE[1)] , ME, 2000, XP, Mac OS 9.1.x and Mac OS X 10.1.2 Windows CE 4.2, CE 5.0, ME, 2000, XP and Mac OS 9.1.x+, OS X v10.1.2+				
Mechanical characteristics					
Dimensions Height - Cruzer Mini / Cruzer Micro Width - Cruzer Mini / Cruzer Micro Depth - Cruzer Mini / Cruzer Micro	62 mm / 52.2 mm 19 mm / 19 mm 11 mm / 7.9 mm				
Environmental characteristics					
Environmental temperature Cruzer Mini / Cruzer Micro Operation Storage Transport	0°C .. +45°C -20°C .. +60°C -20°C .. +60°C				
Humidity Cruzer Mini / Cruzer Micro Operation Storage Transport	10% .. 90%, non-condensing 5% .. 90%, non-condensing 5% .. 90%, non-condensing				
Vibration Cruzer Mini / Cruzer Micro 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				

Table 313: Technical data - USB flash drive 5MMUSB.xxxx-00

Features	5MMUSB.0128-00	5MMUSB.0256-00	5MMUSB.0512-00	5MMUSB.1024-00	5MMUSB.2048-00
Shock Cruzer Mini / Cruzer Micro					
Operation	Max. 40 g (392 m/s^2 0-peak) and 11 ms length				
Storage	Max. 80 g (784 m/s^2 0-peak) and 11 ms length				
Transport	Max. 80 g (784 m/s^2 0-peak) and 11 ms length				
Altitude Cruzer Mini / Cruzer Micro					
Operation	3,048 meters				
Storage	12,192 meters				
Transport	12,192 meters				

Table 313: Technical data - USB flash drive 5MMUSB.xxxx-00 (Forts.)

1) For Win 98SE, a driver can be downloaded from the SanDisk homepage.

10.3.1 Temperature humidity diagram for operation and storage

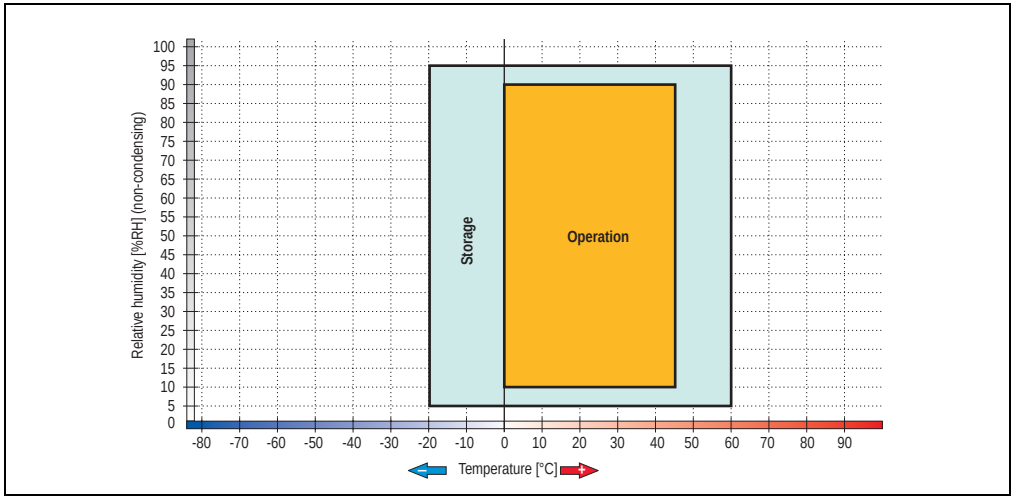


Figure 230: Temperature humidity diagram - flash drives 5MMUSB.xxxx-00

10.4 Contents of delivery

SanDisk Cruzer Mini
1 USB flash drive in desired size + 1 strap
SanDisk Cruzer Micro
1 USB flash drive in desired size + 2 replacement covers (blue and pink) + 1 strap

Table 314: Contents of delivery - USB flash drives 5MMUSB.xxxx-00

10.5 Creating a bootable USB flash drive

When used in connection with an Automation PC 620 / Panel PC 700, it is possible to boot the system from one of the flash drives available from B&R (5MMUSB.0128-00, 5MMUSB.0256-00, 5MMUSB.0512-00, 5MMUSB.1024-00). The flash drive must be specially prepared for this.

10.5.1 Requirements

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

- B&R USB flash drive (see model number "USB flash drives" on page 33)
- Automation PC 620 or Panel PC 700
- USB floppy drive (external or slide-in USB floppy 5AC600.FDDS-00)
- PS/2 or USB keyboard
- A start disk created using MS-DOS 6.22 or Windows 98 - 1.44MB HDD (Windows Millennium, NT4.0, 2000, XP start disks cannot be used).
  The tools "`format.com`" and "`fdisk.exe`" must be located on the diskette!

10.5.2 Procedure

- Plug in the flash drive and boot from the start disk.
- Set active partition on the flash drive using "`fdisk`" and follow the further instructions.
- Reboot the system from the start disk.
- Format and transfer system files to flash drive with the command "`format c: /s`".

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

Figure 231: HMI Drivers & Utilities DVD 5SWHMI.0000-00

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

Table 315: Model number - HMI Drivers & Utilities DVD

This DVD contains drivers, utilities, software upgrades and user manuals for B&R Panel system products (see B&R homepage – Industrial PCs, Visualization and Operation).
Information in detail:

BIOS upgrades for the products

- Automation PC 620
- Panel PC 700
- Automation PC 680
- Provit 2000 product family - IPC2000/2001/2002
- Provit 5000 product family - IPC5000/5600/5000C/5600C
- Power Panel 100 BIOS devices
- Mobile Panel 100 BIOS devices
- Power Panel 100 / Mobile Panel 100 User Boot Logo
- Power Panel 100 / Mobile Panel 100 REMHOST Utility

Drivers for the devices

- Automation Device Interface (ADI)
- Audio
- Chipset
- CD-ROM
- LS120
- Graphics
- Network
- PCI RAID Controller
- Touch screen
- Touchpad
- Interface board

Updates

- Firmware Upgrades (e.g. MTCX, SMXC)

Utilities/Tools

- Automation Device Interface (ADI)
- Miscellaneous
- MTC Utilities
- Key Editor
- MTC & Mkey Utilities
- Mkey Utilities
- UPS Configuration Software
- ICU ISA Configuration
- Intel PCI NIC Boot ROM
- Diagnostics
- CompactFlash lifespan calculation for Silicon Systems CompactFlash cards 5CFCRD.xxxx-03

Windows and embedded operating systems

- Thin client
- Windows CE
- Windows NT Embedded
- Windows XP Embedded

MCAD templates for

- Industrial PCs
- Visualization and operating devices
- Legend strip templates

Documentation for

- B&R Windows CE
- Automation PC 620
- Automation PC 680
- Automation Panel 900
- Panel PC 700
- Power Panel 15/21/35/41
- Power Panel 100/200
- Provit 2000
- Provit 3030
- Provit 4000
- Provit 5000
- Provit Benchmark
- Provit Mkey
- Windows NT Embedded Application Guide
- Windows XP Embedded Application Guide
- Uninterruptible power supply

Service tools

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

12. Cables

12.1 DVI cable 5CADVI.0xxx-00

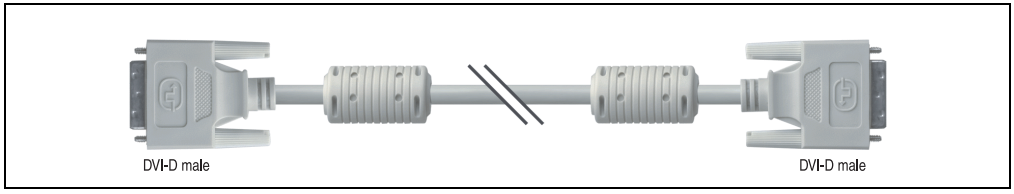


Figure 232: DVI extension cable (similar)

Caution!

DVI cables can only be plugged in and unplugged when the APC620 and display device (Automation Panel 900, monitor) are turned off.

12.1.1 Order data

Model number	Description	Note
5CADVI.0018-00	**DVI-D cable 1.8 m / single** Single cable, DVI-D/m:DVI-D/m, length: 1.8 m	
5CADVI.0050-00	**DVI-D cable 5 m / single** Single cable, DVI-D/m:DVI-D/m, length: 5 m	
5CADVI.0100-00	**DVI-D cable 10 m / single** Single cable, DVI-D/m:DVI-D/m, length: 10 m	

Table 316: Model numbers - DVI cables

12.1.2 Technical data

Features	5CADVI.0018-00	5CADVI.0050-00	5CADVI.0100-00
Length	1.8 m ± 30 mm	5 m ± 50 mm	10 m ± 100 mm
Outer diameter	Max. 8.5 mm		
Shielding	Individual cable pairs and entire cable		
Connector type	2x DVI-D (18+1), male		
Wire cross section	AWG 28		
Line resistance	Max. 237 Ω/km		
Insulation resistance	Min. 100 MΩ/km		
Flexibility	Flexible (not for use in drag chain installations)		
Flex radius	Min. 146 mm		
Plug connection cycles	100		

Table 317: Technical data - DVI cables

Features	5CADVI.0018-00	5CADVI.0050-00	5CADVI.0100-00
Weight	Approx. 300 g	Approx. 590 g	Approx. 2100 g

Table 317: Technical data - DVI cables

12.1.3 Cable specifications

The following figure shows the pin assignments for the DVI cable available at B&R. If you want to build a suitable cable yourself, it should be wired according to these specifications.

Warning!

If a self-built cable is used, B&R cannot guarantee that it will function properly.

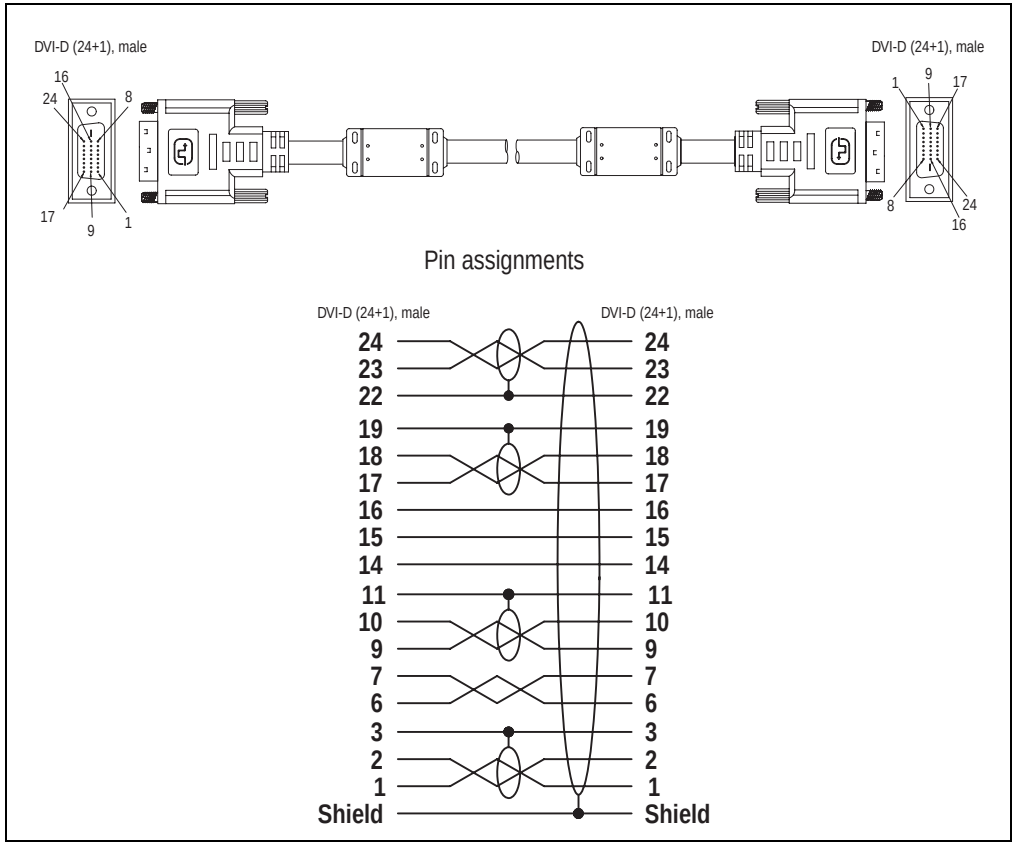


Figure 233: Pin assignments - DVI cable

12.2 APC620 internal supply cable 5CAMSC.0001-00

This supply cable is used internally e.g. to supply special PCI cards. It is connected to the APC620 main board. For requirements and procedures, see appendix A, section "Connection of an external device to the main board" on page 526.

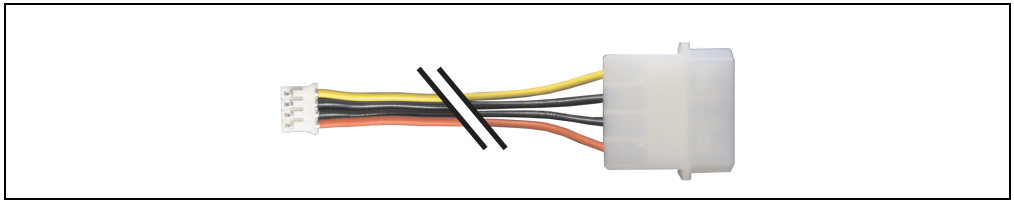


Figure 234: APC620 internal supply cable 5CAMSC.0001-00

12.2.1 Order data

Model number	Description	Note
5CAMSC.0001-00	**APC620 internal supply cable**	

Table 318: Model number - APC620 internal supply cable

12.2.2 Technical data

Features	5CAMSC.0001-00
Length	100 mm ± 5 mm
Connector type	1x disk drive power plug 4-pin male, 1x plug housing 4-pin female
Wire cross section	AWG 22
Flexibility	Flexible

Table 319: Technical data - 5CAMSC.0001-00

12.3 SDL cable 5CASDL.0xxx-00

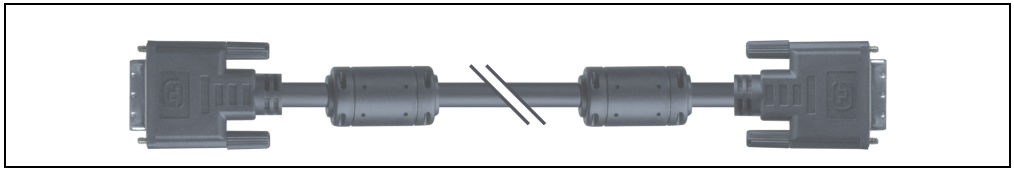


Figure 235: SDL extension cable (similar)

Caution!

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

12.3.1 Order data

Model number	Description	Note
5CASDL.0018-00	**SDL cable 1.8 m** SDL cable, DVI-D/m:DVI-D/m, length: 1.8 m	Cancelled since 12/2006 Replacement type 5CASDL.0018-03
5CASDL.0050-00	**SDL cable 5 m** SDL cable, DVI-D/m:DVI-D/m, length: 5 m	Cancelled since 12/2006 Replacement type 5CASDL.0050-03
5CASDL.0100-00	**SDL cable 10 m** SDL cable, DVI-D/m:DVI-D/m, length: 10 m	Cancelled since 12/2006 Replacement type 5CASDL.0100-03
5CASDL.0150-00	**SDL cable 15 m** SDL cable, DVI-D/m:DVI-D/m, length: 15 m	Cancelled since 12/2006 Replacement type 5CASDL.0150-03
5CASDL.0200-00	**SDL cable 20 m** SDL cable, DVI-D/m:DVI-D/m, length: 20 m	Cancelled since 12/2006 Replacement type 5CASDL.0200-03
5CASDL.0250-00	**SDL cable 25 m** SDL cable, DVI-D/m:DVI-D/m, length: 25 m	Cancelled since 12/2006 Replacement type 5CASDL.0250-03
5CASDL.0300-00	**SDL cable 30 m** SDL cable, DVI-D/m:DVI-D/m, length: 30 m	Cancelled since 12/2006 Replacement type 5CASDL.0300-03

Table 320: Model numbers - SDL cables

12.3.2 Technical data

Features	5CASDL.0018-00	5CASDL.0050-00	5CASDL.0100-00	5CASDL.0150-00	5CASDL.0200-00	5CASDL.0250-00	5CASDL.0300-00
Length	1.8 m ± 50 mm	5 m ± 80 mm	10 m ± 100 mm	15 m ± 120 mm	20 m ± 150 mm	25 m ± 200 mm	30 m ± 200 mm
Outer diameter	Max. 9 mm		Max. 11.5 mm				
Shielding	Individual cable pairs and entire cable						
Connector type	2x DVI-D (24+1), male						
Wire cross section	AWG 28		AWG 24				
Line resistance	Max. 237 Ω/km		Max. 93 Ω/km				
Insulation resistance	Min. 10 MΩ/km						
Flexibility	Flexible (not for use in drag chain installations)						
Flex radius	Min. 172 mm		Min. 220 mm				
Plug connection cycles	100						
Weight	Approx. 300 g	Approx. 590 g	Approx. 2100 g	Approx. 3,000 g	Approx. 4100 g	Approx. 5100 g	Approx. 6100 g

Table 321: Technical data - SDL cables 5CASDL.0xxx-00

12.3.3 Cable specifications

The following figure shows the pin assignments for the SDL cable available at B&R. If you want to build a suitable cable yourself, it should be wired according to these specifications.

Warning!

If a self-built cable is used, B&R cannot guarantee that it will function properly.

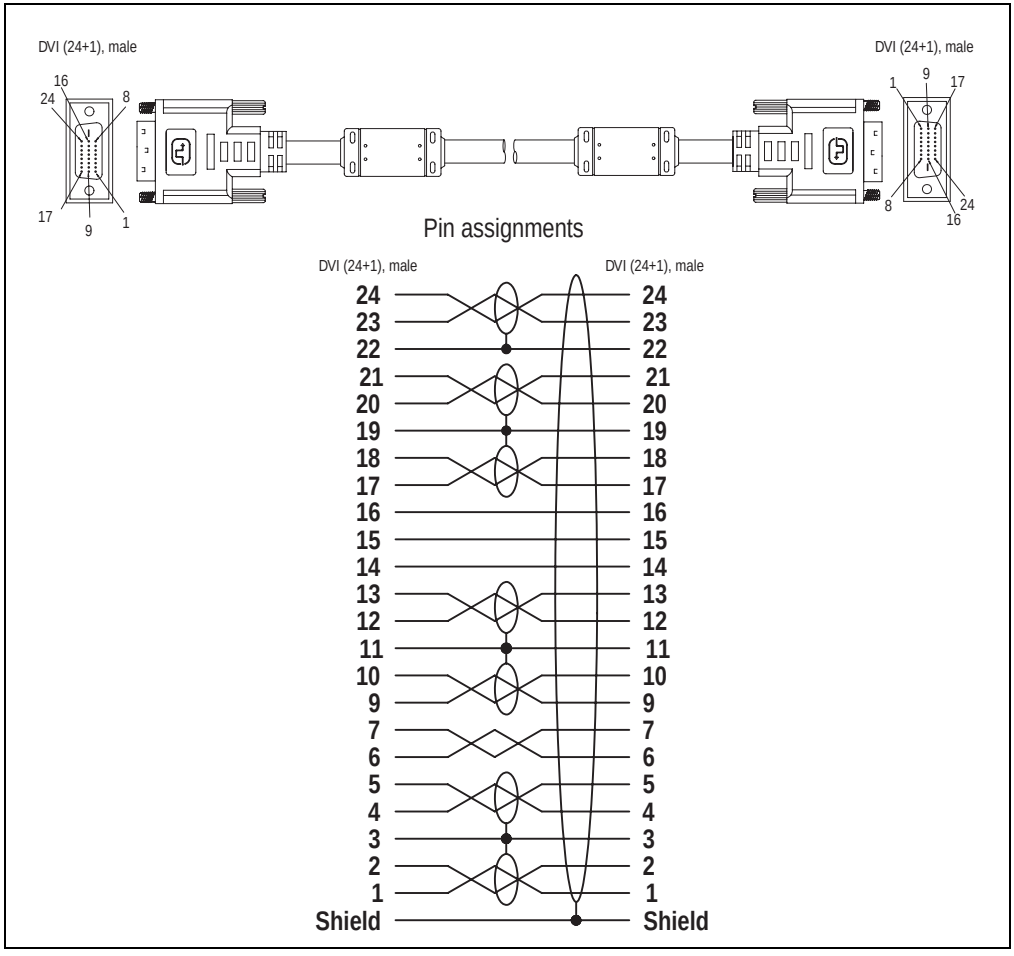


Figure 236: Pin assignments - SDL cable 5CASDL.0xxx-00

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

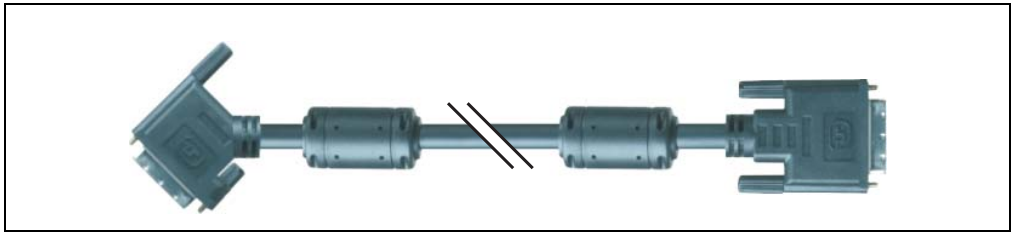


Figure 237: SDL cable with 45° plug (similar)

Caution!

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

12.4.1 Order data

Model number	Description	Note
5CASDL.0018-01	**SDL cable 1.8 m 45°** SDL cable, DVI-D/m:DVI-D/m, length: 1.8 m; 1x 45° plug	
5CASDL.0050-01	**SDL cable 5 m 45°** SDL cable, DVI-D/m:DVI-D/m, length: 5 m; 1x 45° plug	
5CASDL.0100-01	**SDL cable 10 m 45°** SDL cable, DVI-D/m:DVI-D/m, length: 10 m; 1x 45° plug	
5CASDL.0150-01	**SDL cable 15 m 45°** SDL cable, DVI-D/m:DVI-D/m, length: 15 m; 1x 45° plug	

Table 322: Model numbers - SDL cables with 45° plug

12.4.2 Technical data

Features	5CASDL.0018-01	5CASDL.0050-01	5CASDL.0100-01	5CASDL.0150-01
Length	1.8 m ± 50 mm	5 m ± 80 mm	10 m ± 100 mm	15 m ± 120 mm
Outer diameter	Max. 9 mm		Max. 11.5 mm	
Shielding	Individual cable pairs and entire cable			
Connector type	2x DVI-D (24+1), male			
Wire cross section	AWG 28		AWG 24	
Line resistance	Max. 237 Ω/km		Max. 93 Ω/km	
Insulation resistance	Min. 10 MΩ/km			
Flexibility	Flexible (not for use in drag chain installations)			
Flex radius	Min. 172 mm		Min. 220 mm	
Plug connection cycles	100			
Weight	Approx. 300 g	Approx. 590 g	Approx. 2100 g	Approx. 3,000 g

Table 323: Technical data - SDL cable with 45° plug 5CASDL.0xxx-01

12.4.3 Cable specifications

The following figure shows the pin assignments for the SDL cable available at B&R. If you want to build a suitable cable yourself, it should be wired according to these specifications.

Warning!

If a self-built cable is used, B&R cannot guarantee that it will function properly.

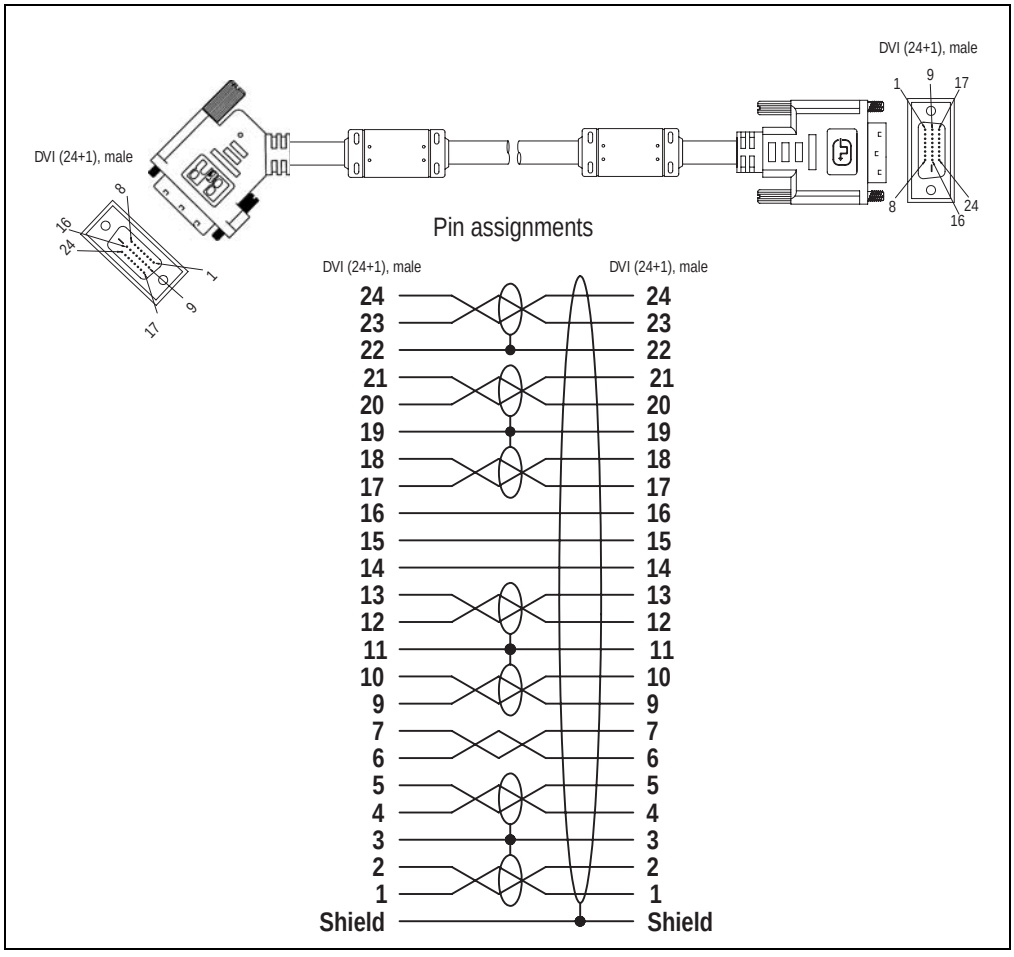


Figure 238: Pin assignments - SDL cable with 45° plug 5CASDL.0xxx-01

12.5 SDL cable with extender 5CASDL.0x00-10

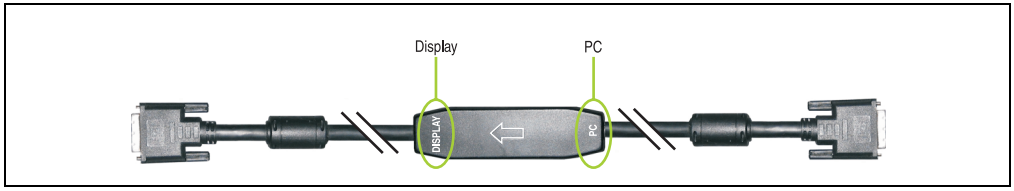


Figure 239: SDL cable with extender (similar)

Caution!

SDL cables with extender can only be plugged in and unplugged when the device is turned off. The correct direction of connection (Display, PC) for the wiring is illustrated on the middle of the extender.

12.5.1 Order data

Model number	Description	Note
5CASDL.0300-10	**SDL cable with extender 30 m** SDL cable, DVI-D/m:DVI-D/m, length: 30m ext.	Cancelled since 12/2006 Replaced by: 5CASDL.0300-10
5CASDL.0400-10	**SDL cable with extender 40 m** SDL cable, DVI-D/m:DVI-D/m, length: 40m ext.	Cancelled since 12/2006 Replaced by: 5CASDL.0400-10

Table 324: Model numbers for SDL cable with extender

12.5.2 Technical data

Features	5CASDL.0300-10	5CASDL.0400-10
Length	30 m ± 200 mm	40 m ± 200 mm
Dimensions of extender box	Height 18.5 mm, width 35 mm, length 125 mm	
Outer diameter	Max. 11.5 mm	
Shielding	Individual cable pairs and entire cable	
Connector type	2x DVI-D (24+1), male	
Wire cross section	AWG 24	
Line resistance	Max. 93 Ω/km	
Insulation resistance	Min. 10 MΩ/km	
Flexibility	Flexible (not for use in drag chain installations)	
Flex radius	Min. 220 mm	
Plug connection cycles	100	
Weight	Approx. 6100 g	Approx. 8100 g

Table 325: Technical data - SDL cable with extender 5CASDL.0x00-10

12.5.3 Cable connection

The SDL cable with extender must be connected between the Automation PC 620 and Automation Panel 900 display unit in the correct direction. The correct signal direction is indicated on the extender unit for this purpose:

- Connect the end labeled "PC" with the video output of the Automation PC 620.
- The "Display" end should be connected to the display unit Automation Panel 900.

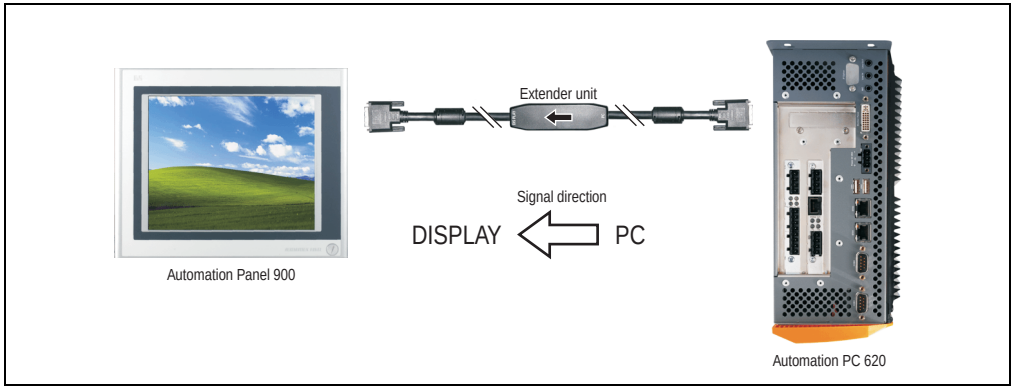


Figure 240: Example of the signal direction for the SDL cable with extender

12.5.4 Cable specifications

The following figure shows the pin assignments for the SDL cable with extender available at B&R.

Information:

Only B&R SDL cables with extender can be used.

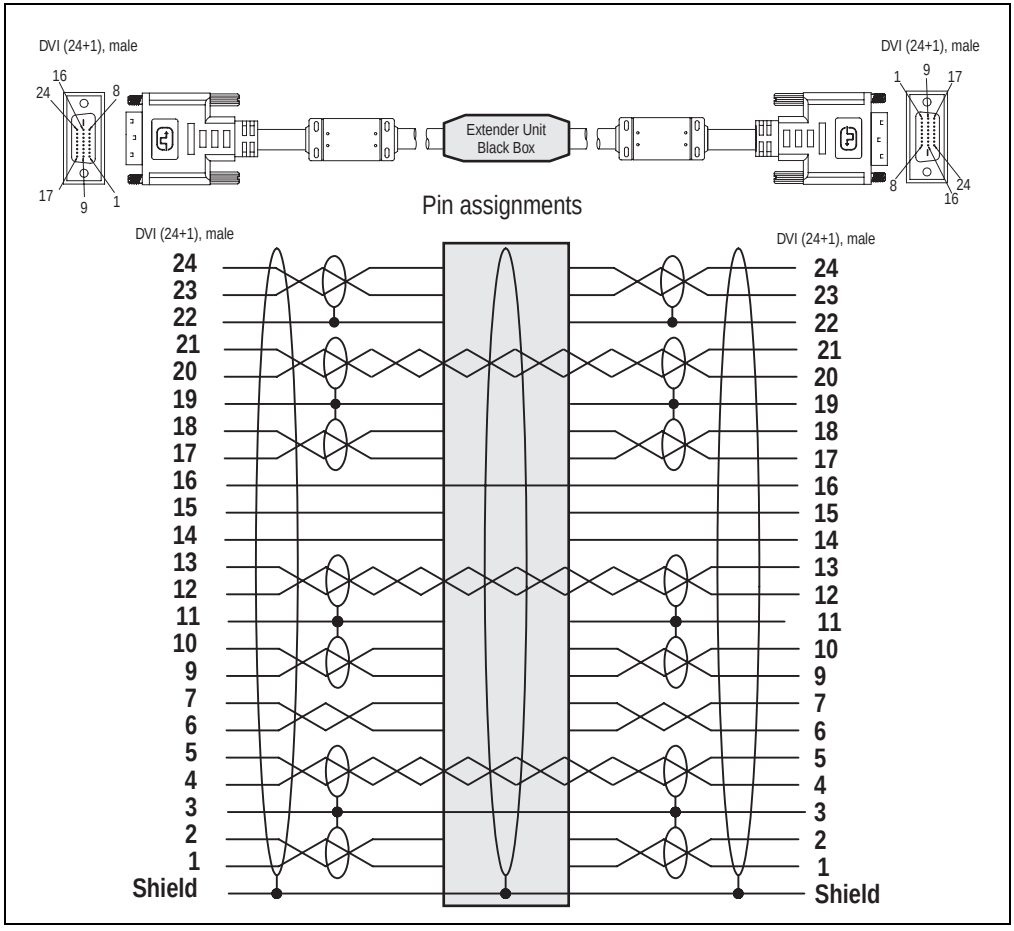


Figure 241: Pin assignments - SDL cable with extender 5CASDL.0x00-10

12.6 SDL flex cable 5CASDL.0xxx-03

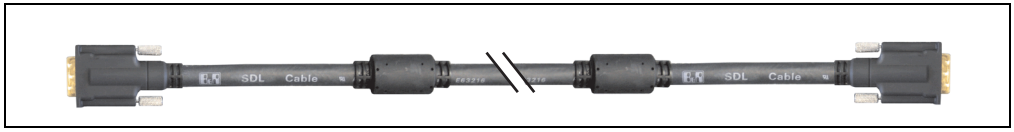


Figure 242: SDL cable 5CASDL.0xxx-03 (similar)

Caution!

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

12.6.1 Order data

Model number	Description	Note
5CASDL.0018-03	**SDL flex cable 1.8 m** SDL cable, semi flexible, length: 1.8 m	
5CASDL.0050-03	**SDL flex cable 5 m** SDL cable, semi flexible, length: 5 m	
5CASDL.0100-03	**SDL flex cable 10 m** SDL cable, semi flexible, length: 10 m	
5CASDL.0150-03	**SDL flex cable 15 m** SDL cable, semi flexible, length: 15 m	
5CASDL.0200-03	**SDL flex cable 20 m** SDL cable, semi flexible, length: 20 m	
5CASDL.0250-03	**SDL flex cable 25 m** SDL cable, semi flexible, length: 25 m	
5CASDL.0300-03	**SDL flex cable 30 m** SDL cable, semi flexible, length: 30 m	

Table 326: Model numbers - SDL cable 5CASDL.0xxx-03

12.6.2 Technical data

Mechanical characteristics	5CASDL.0018-03	5CASDL.0050-03	5CASDL.0100-03	5CASDL.0150-03	5CASDL.0200-03	5CASDL.0250-03	5CASDL.0300-03
Length	1.8 m ± 20 mm	5 m ± 45 mm	10 m ± 90 mm	15 m ± 135 mm	20 m ± 180 mm	25 m ± 230 mm	30 m ± 280 mm
Weight	Approx. 450 g	Approx. 1000 g	Approx. 2000 g	Approx. 3,000 g	Approx. 4000 g	Approx. 5000 g	Approx. 6000 g
Cable diameter	12 mm ± 0.5 mm						
Connectors Connection cycles Contacts Mechanical protection	2x DVI-D (24+1), male Min. 200 gold plated Metal cover with crimped stress relief						
Flexibility[1)]	Semi-flexible, occasional movement (limited use in cable drag chains)						
Flex radius Single Moving	≥ 10 x cable diameter ≥ 15 x cable diameter						
Max. tension during installation during operation	≤ 400 N ≤ 50 N						
Materials Cable shielding Color	RoHS compliant Aluminum foil clad + tinned copper mesh Black (similar to RAL 9005)						
Shielding	Individual cable pairs and entire cable						
Electrical properties (at +20°C)							
Wire cross section	24 AWG (control wires) 26 AWG (DVI, USB, data)						
Line resistance 24 AWG 26 AWG	≤ 95 Ω/km ≤ 145 Ω/km						
Insulation resistance	> 200 MΩ/km						
Wave impedance	100 ± 10 Ω						
Test voltage Wire/wire Wire/shield	1 kV_{eff} 0.5 kV_{eff}						
Operating voltage	≤ 30 V						
Environmental characteristics							
Temperature resistance Fixed installation Moving Storage	-20°C .. +80°C -5°C .. +60°C -20°C .. +80°C						

Table 327: Technical data - SDL cable 5CASDL.0xxx-03

Standards and certifications	5CASDL.0018-03	5CASDL.0050-03	5CASDL.0100-03	5CASDL.0150-03	5CASDL.0200-03	5CASDL.0250-03	5CASDL.0300-03
Torsion load	TBD						
Bending resistance	TBD						
Approbation	UL AWM 20236 80°C 30 V						
Oil and hydrolysis resistance	According to VDE 0282-10						

Table 327: Technical data - SDL cable 5CASDL.0xxx-03 (Forts.)

1) 300,000 cycles tested at: flex radius 180 mm; stroke 460 mm; speed 4800 cycles/hours.

12.6.3 Dimensions

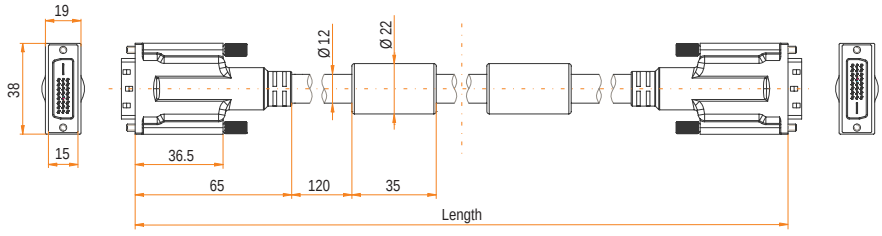
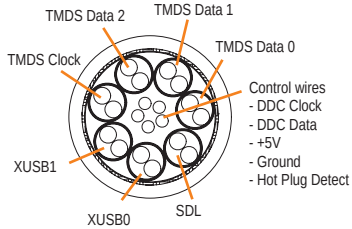


Figure 243: Dimensions - SDL cable 5CASDL.0xxx-03

12.6.4 Layering

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

Schematic display

Table 328: Design - SDL cable 5CASDL.0xxx-03

12.6.5 Cable specifications

The following figure shows the pin assignments for the SDL cable available at B&R. If you want to build a suitable cable yourself, it should be wired according to these specifications.

Warning!

If a self-built cable is used, B&R cannot guarantee that it will function properly.

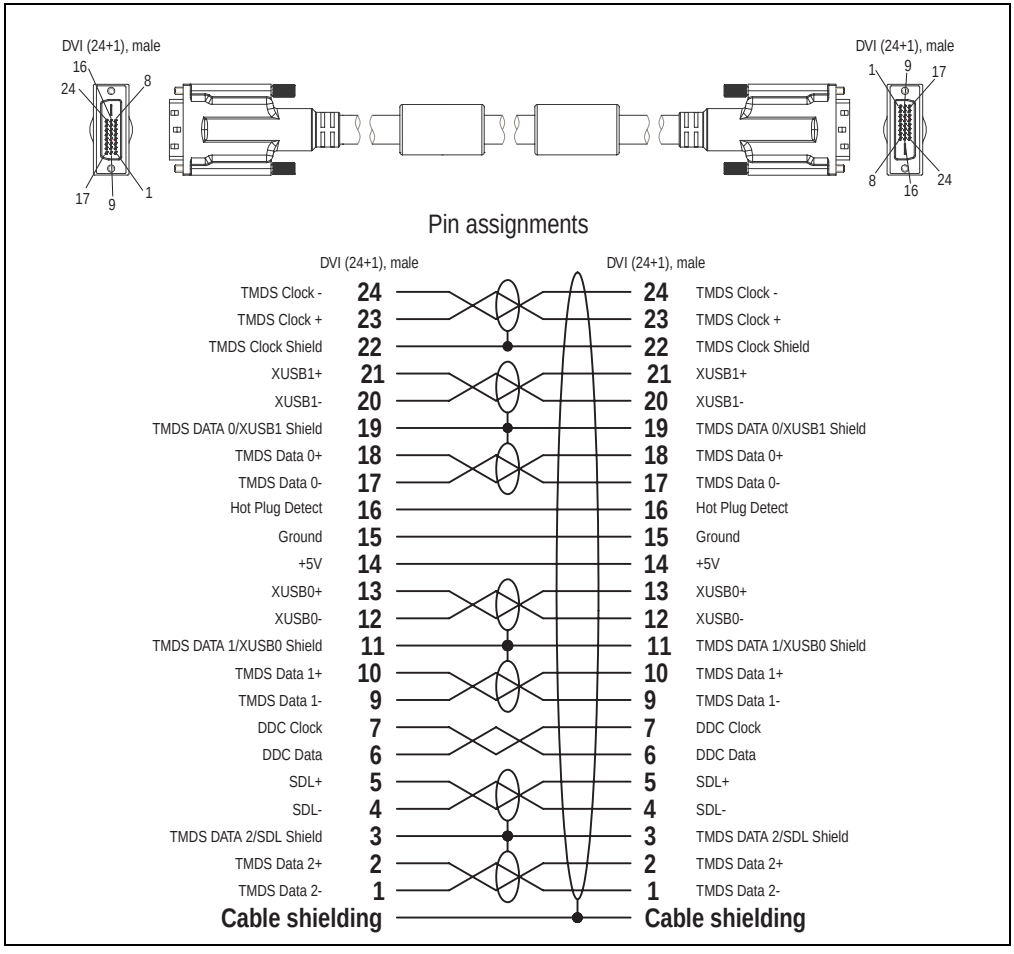


Figure 244: Pin assignments - SDL cable 5CASDL.0xxx-03

12.7 SDL flex cable with extender 5CASDL.0x00-13

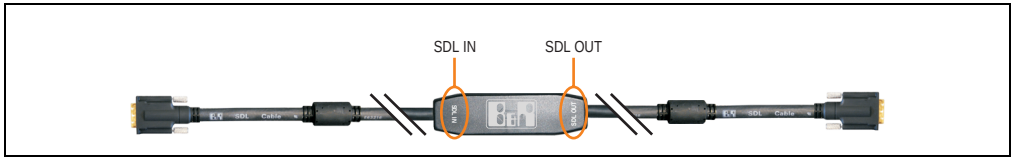


Figure 245: SDL flex cable with extender - 5CASDL.0x00-13 (similar)

Caution!

SDL cables with extender can only be plugged in and unplugged when the device is turned off. The correct direction of connection (SDL IN, SDL OUT) for the wiring is illustrated on the middle of the extender.

12.7.1 Order data

Model number	Description	Note
5CASDL.0300-13	**SDL flex cable with extender 30 m** SDL cable, semi flexible, length: 30 m with extender	
5CASDL.0400-13	**SDL flex cable with extender 40 m** SDL cable, semi flexible, length: 40 m with extender	

Table 329: Model numbers - SDL flex cable with extender

12.7.2 Technical data

Features	5CASDL.0300-13	5CASDL.0400-13
Length	30 m ± 200 mm	40 m ± 200 mm
Dimensions of extender box	Height 18.5 mm, width 35 mm, length 125 mm	
Cable diameter	12 mm ± 0.5 mm	
Connectors Connection cycles Contacts Mechanical protection	2x DVI-D (24+1), male Min. 200 gold plated Metal cover with crimped stress relief	
Flexibility[1)]	Semi-flexible, occasional movement (limited use in cable drag chains)	
Flex radius Single Moving	 ≥ 10 x cable diameter ≥ 15 x cable diameter	
Max. tension during installation during operation	 ≤ 400 N ≤ 50 N	
Materials Cable shielding Color	RoHS compliant Aluminum foil clad + tinned copper mesh Black (similar to RAL 9005)	

Table 330: Technical data - SDL flex cable with extender 5CASDL.0x00-13

Features	5CASDL.0300-13	5CASDL.0400-13
Shielding	Individual cable pairs and entire cable	
Electrical properties (at +20°C)		
Wire cross section	24 AWG (control wires) 26 AWG (DVI, USB, data)	
Line resistance 24 AWG 26 AWG	 ≤ 95 Ω/km ≤ 145 Ω/km	
Insulation resistance	> 200 MΩ/km	
Wave impedance	100 ± 10 Ω	
Test voltage Wire/wire Wire/shield	 1 kV_{eff} 0.5 kV_{eff}	
Operating voltage	≤ 30 V	
Environmental characteristics		
Temperature resistance Fixed installation Moving Storage	 -20°C .. +60°C -5°C .. +60°C -20°C .. +60°C	
Standards and certifications		
Torsion load	TBD	
Bending resistance	TBD	
Approbation	UL AWM 20236 80°C 30 V	
Standards and certifications		
Oil and hydrolysis resistance	According to VDE 0282-10	

Table 330: Technical data - SDL flex cable with extender 5CASDL.0x00-13 (Forts.)

1) 300,000 cycles tested at: flex radius 180 mm; stroke 460 mm; speed 4800 cycles/hours.

12.7.3 Dimensions

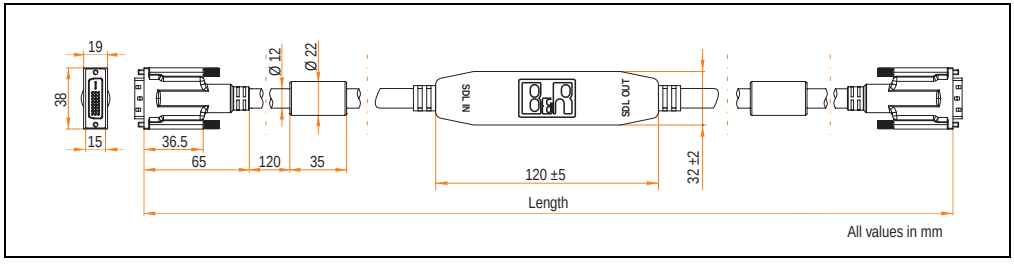


Figure 246: Dimensions - SDL flex cable with extender 5CASDL.0x00-13

12.7.4 Cable connection

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

- Connect the end labeled "SDL IN" with the video output of the Automation PC 620 or Panel PC 700 (monitor/panel output) or Panel OUT of an AP900 AP Link card.
- The "SDL OUT" end should be connected to the display unit (e.g. Automation Panel 900) via the Automation Panel Link insert card (Panel IN).

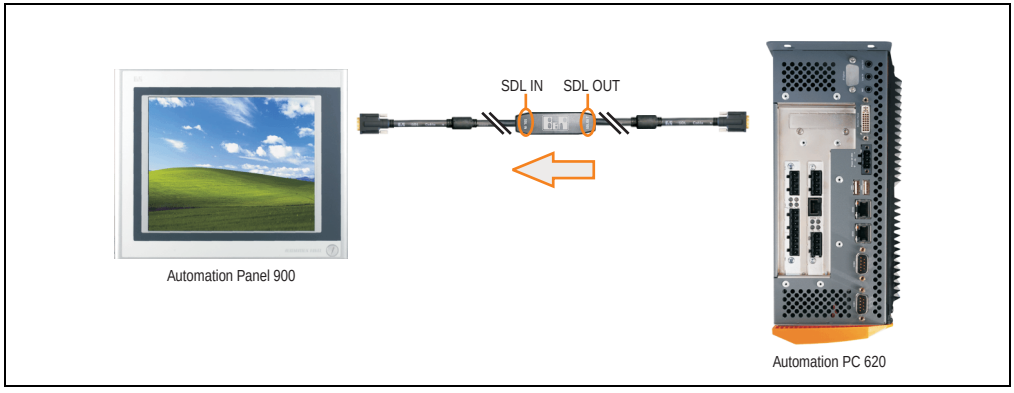


Figure 247: Example of the signal direction: SDL flex cable with extender - APC620

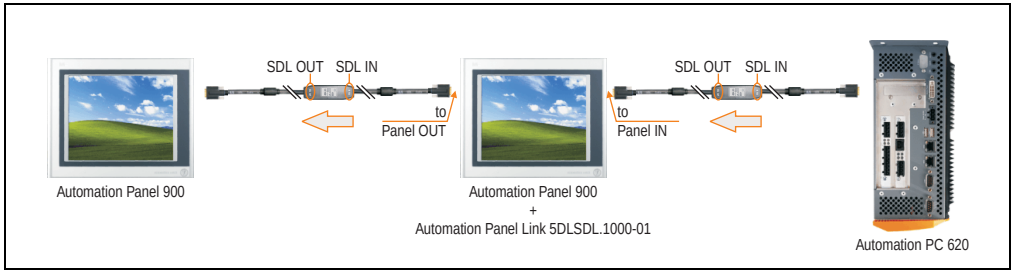


Figure 248: Example of the signal direction: display - SDL flex cable with extender - APC620

12.7.5 Cable specifications

The following figure shows the pin assignments for the SDL flex cable with extender available at B&R.

Information:

Only B&R SDL flex cables with extender can be used.

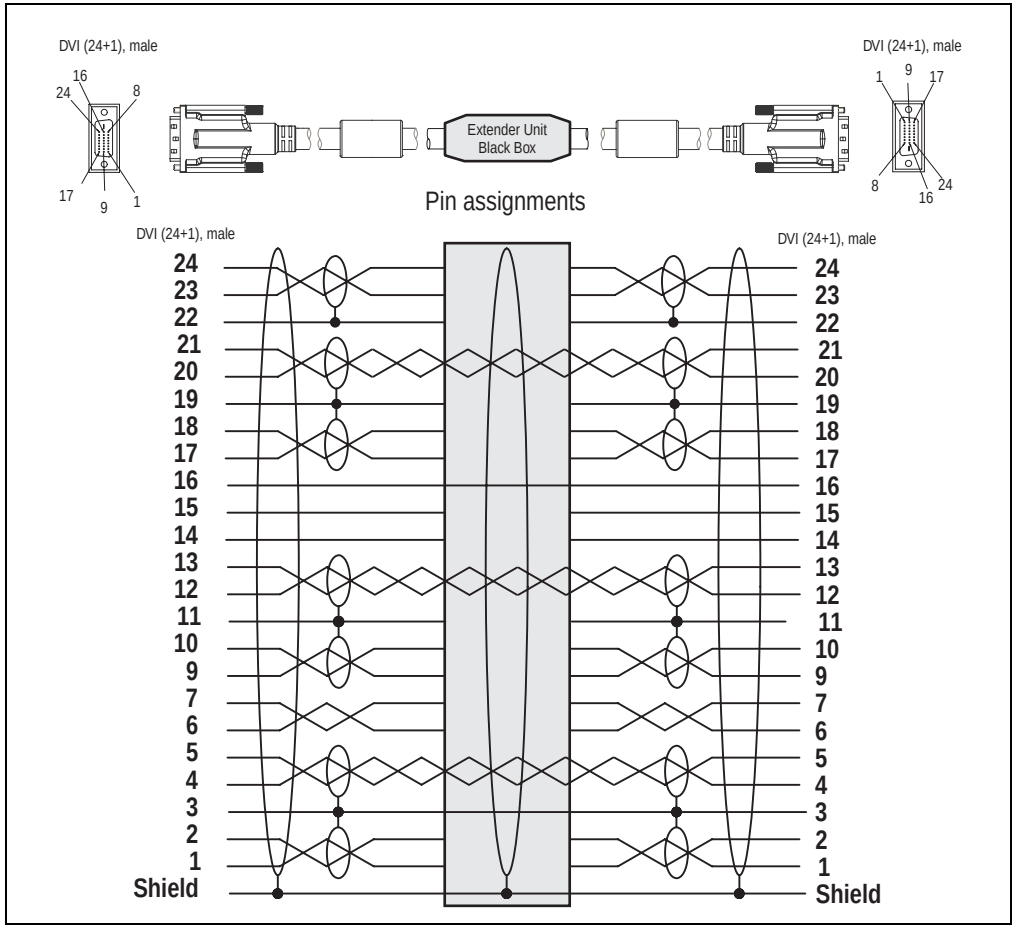


Figure 249: Pin assignments - SDL flex cable with extender 5CASDL.0x00-13

12.8 RS232 cable 9A0014-xx

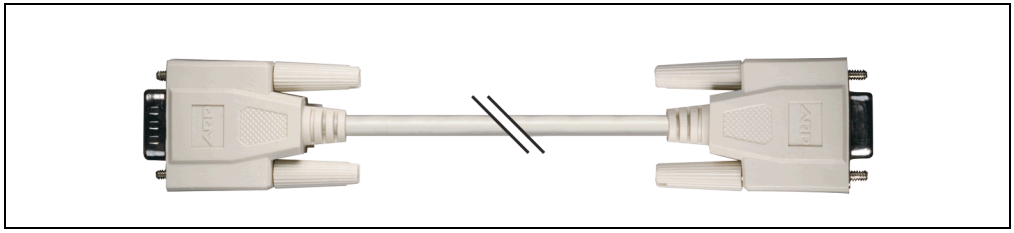


Figure 250: RS232 extension cable (similar)

12.8.1 Order data

Model number	Description	Note
9A0014.02	**RS232 cable DB9/f:DB9/m 1.8 m** RS232 extension cable for remote operation of a display unit with touch screen, length 1.8 m.	
9A0014.05	**RS232 cable DB9/f:DB9/m 5 m** RS232 extension cable for remote operation of a display unit with touch screen, length 5 m.	
9A0014.10	**RS232 cable DB9/f:DB9/m 10 m** RS232 extension cable for remote operation of a display unit with touch screen, length 10 m.	

Table 331: Model numbers - RS232 cables

12.8.2 Technical data

Features	9A0014.02	9A0014.05	9A0014.10
Length	1.8 m ± 50 mm	5 m ± 80 mm	10 m ± 100 mm
Outer diameter	Max. 5 mm		
Shielding	Entire cable		
Connector type	DSUB (9-pin), male / female		
Wire cross section	AWG 26		
Flexibility	Flexible		
Flex radius	Min. 70 mm		

Table 332: Technical data - RS232 cables

12.8.3 Cable specifications

The following figure shows the pin assignments for the RS232 cable available at B&R. If you want to build a suitable cable yourself, it should be wired according to these specifications.

Warning!

If a self-built cable is used, B&R cannot guarantee that it will function properly.

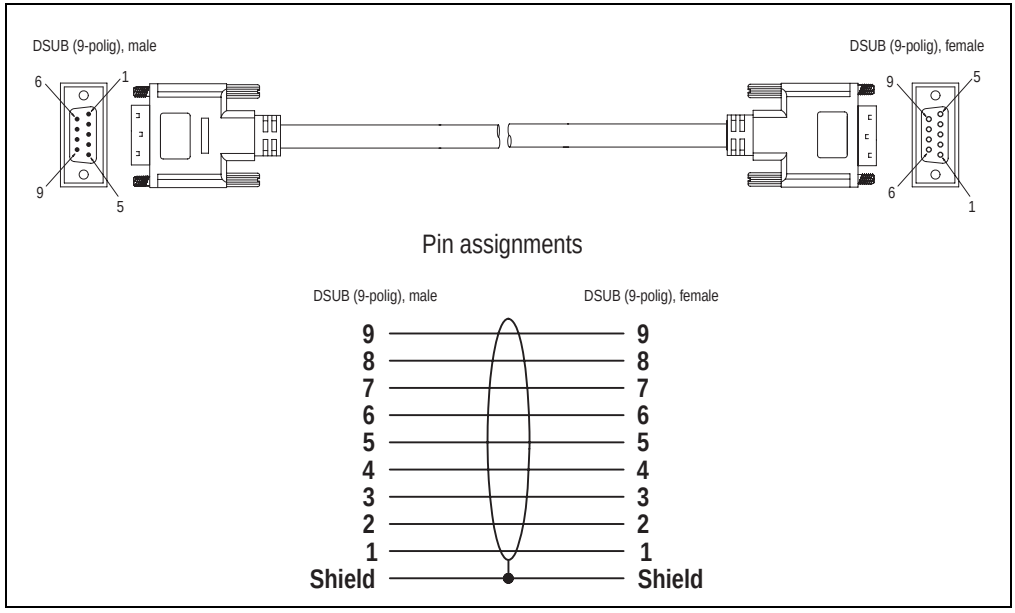


Figure 251: Pin assignments - RS232 cable

12.9 USB cable 5CAUSB.00xx-00

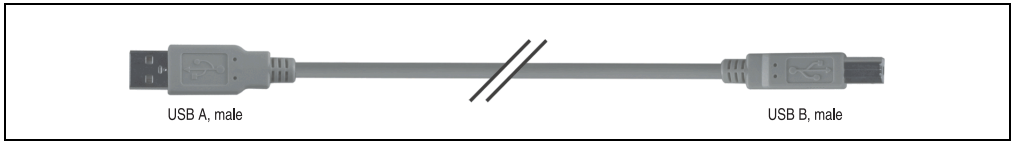


Figure 252: USB extension cable (similar)

12.9.1 Order data

Model number	Description	Note
5CAUSB.0018-00	**USB 2.0 cable A/m:B/m 1.8 m** USB 2.0 connection cable; Type A - Type B; 1.8 m	
5CAUSB.0050-00	**USB 2.0 cable A/m:B/m 5 m** USB 2.0 connection cable; Type A - Type B; 5 m	

Table 333: Model numbers - USB cables

12.9.2 Technical data

Features	5CAUSB.0018-00	5CAUSB.0050-00
Length	1.8 m ± 30 mm	5 m ± 50 mm
Outer diameter	Max. 5 mm	
Shielding	Entire cable	
Connector type	USB type A male and USB type B male	
Wire cross section	AWG 24, 28	
Flexibility	Flexible	
Flex radius	Min. 100 mm	

Table 334: Technical data - USB cables

12.9.3 Cable specifications

The following figure shows the pin assignments for the USB cable available at B&R. If you want to build a suitable cable yourself, it should be wired according to these specifications.

Warning!

If a self-built cable is used, B&R cannot guarantee that it will function properly.

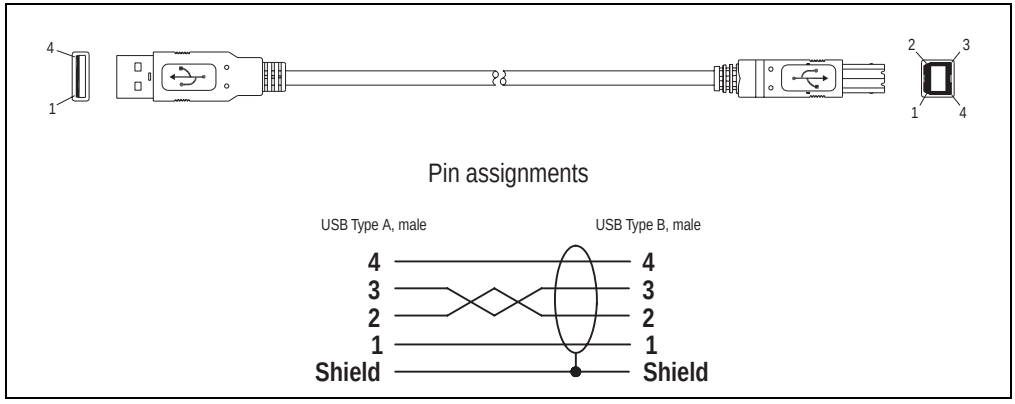


Figure 253: Pin assignments - USB cable

13. APC620 UPS

With the optionally integrated UPS, the Automation PC 620 makes sure that the PC system completes write operations even after a power failure occurs. When the UPS detects a power failure, it switches to battery operation immediately without interruption. This means that all running programs will be ended properly by the UPS software. This prevents inconsistant data.

By integrating the charging circuit in the Automation PC 620 housing, the installation has been reduced to merely attaching the connection cable to the battery unit mounted next to the PC.

Special emphasis was placed on ease of maintenance when the battery unit was designed. The batteries are easily accessible from the front and can be switched in just a few moments when servicing.

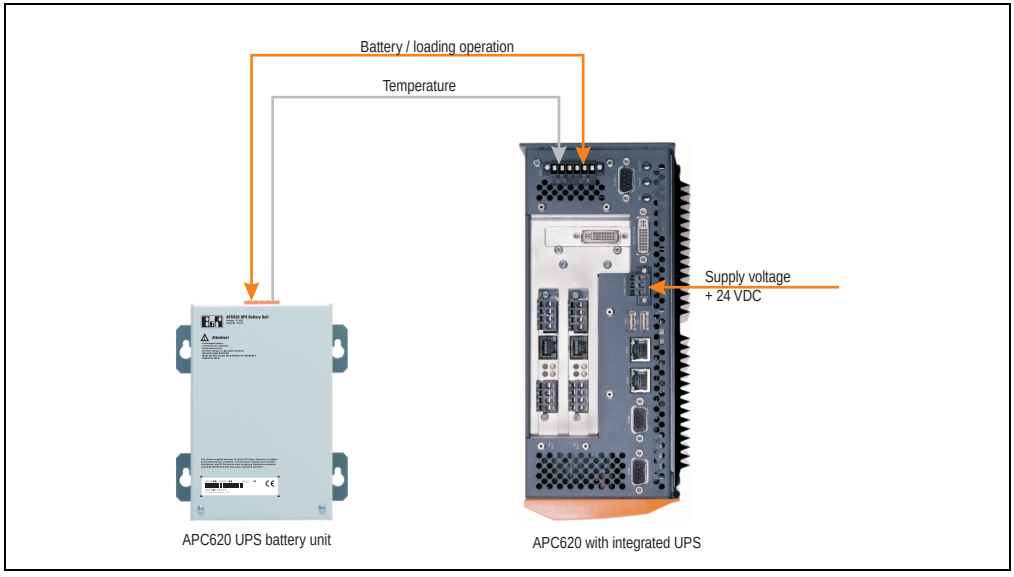


Figure 254: UPS principle

13.1 Features

- Long-lasting, maintenance-free rechargeable batteries
- Communication via integrated interfaces
- Temperature sensor
- Driver software
- Deep discharge protection

13.2 Requirements

1) An appropriate system unit.
   The add-on UPS module (5AC600.UPSI-00) can only be installed with the following APC620 system unit revisions:

System unit	Revision
5PC600.SX01-00	Starting with Revision H0
5PC600.SX02-00	Starting with Revision G0
5PC600.SX02-01	Starting with Revision H0
5PC600.SX05-00	Starting with Revision F0
5PC600.SX05-01	Starting with Revision F0

Table 335: System unit revisions - add-on UPS module

2) Add-on UPS module 5AC600.UPSI-00
   For more on installing the add-on modules, see chapter 7 "Maintenance / servicing", section 4 "Installation of the UPS module" on page 504.

3) Battery unit 5AC600.UPSB-00

4) UPS connection cable 0.5 m (5CAUPS.0005-00) or 3 m (5CAUPS.0030-00)

5) APC620 firmware versions:
   To read the status or make changes to the settings of the APC620 add-on UPS (5AC600.UPSI-00) and the APC620 battery unit (5AC600.UPSB-00), the following software components are necessary:

Software name	Type	Version
MTCX PX32[1)]	Firmware	1.61 or later
MTCX FPGA[1)]	Firmware	1.18 or later
ADI Control Center[1)]	Driver / Control Center	1.60 or later

Table 336: Firmware and software required for the UPS

1) The software can be downloaded from the B&R homepage (www.br-automation.com).

For info regarding upgrading the firmware, see chapter 4 "Software", section 1.6 "Upgrading the firmware" on page 341.

The APC620 firmware version can be read in BIOS under the main menu item "Advanced", submenu item "Baseboard/Panel Features", or in the B&R Control Center.

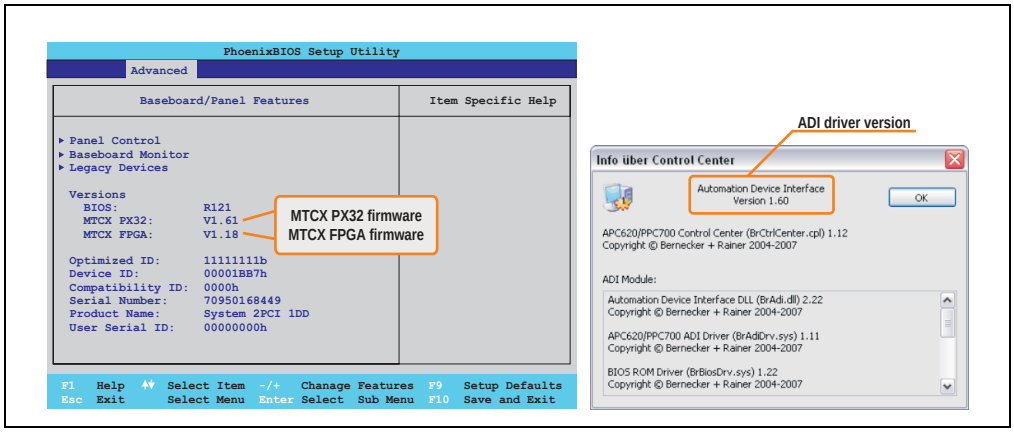


Figure 255: Firmware and software required for the UPS

The required firmware versions can be found in the APC620 / Panel PC firmware upgrade (MTCX, SDLR, SDLT) V1.16[1)] .

6) To configure: Automation Device Interface driver version 1.60 or higher (for the ADI Control Center)

   For info regarding configuration of the B&R UPS using the ADI Control Center, see chapter 4 "Software", section 7.2 "UPS configuration" on page 374.

1) The software can be downloaded from the B&R homepage (www.br-automation.com).

13.3 Individual components

13.3.1 Add-on UPS module 5AC600.UPSI-00

The add-on UPS module can easily be installed in an appropriate APC620 system unit (List of required revisions: see section "Requirements" on page 478).

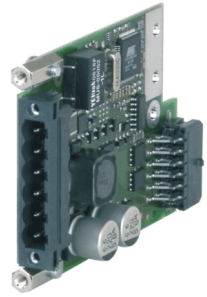


Figure 256: Add-on UPS module 5AC600.UPSI-00

Technical data

Features	5AC600.UPSI-00
Switching threshold mains / battery operation	15 / 13 V
Mains failure bridging	Max. 20 min at 150 W load
Charging current	Max. 0.5 A
Deep discharge protection	Yes, at 10.8 V of the battery unit
Short circuit protection	No
Power requirements	Max. 7.5 watts
Status indicators	Via the ADI Control Center
Parameter settings	Via the ADI Control Center

Table 337: Technical data - 5AC600.UPSI-00

Installation

The module is installed using the materials included in the delivery. For installation instructions, see section "Installation of the UPS module" on page 504.

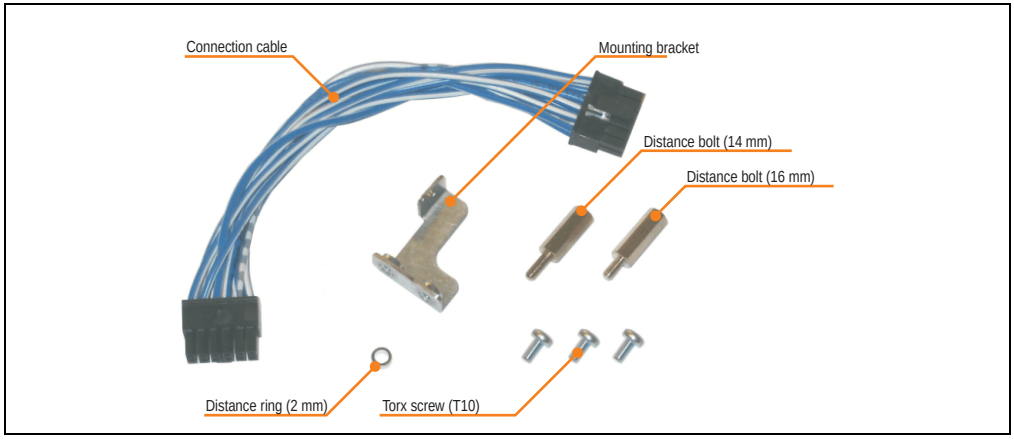


Figure 257: Add-on UPS module 5AC600.UPSI-00 - installation materials

13.3.2 Battery unit 5AC600.UPSB-00

Figure 258: Battery unit 5AC600.UPSB-00

Technical data

Features	5AC600.UPSB-00
Battery Type Type	 Hawker Cyclon 2 V 5 Ah; (6 connected in series) Single cell (X cell)
Dimensions (W x H x D)	Figure 259 "Dimensions - 5AC600.UPSB-00" on page 483
Temperature sensor	NTC resistance
Weight	Approx. 3.2 kg
Ambient temperature Operation Storage Transport	 -40°C .. +80°C -65°C .. +80°C -65°C .. +80°C
Relative humidity Operation Storage Transport	 5 - 95% (non-condensing) 5 - 95% (non-condensing) 5 - 95% (non-condensing)
Altitude	Max. 3,000 meters
Mounting instructions	See "Mounting instructions" on page 484.
Lifespan	10 years

Table 338: Technical data - 5AC600.UPSB-00

Dimensions

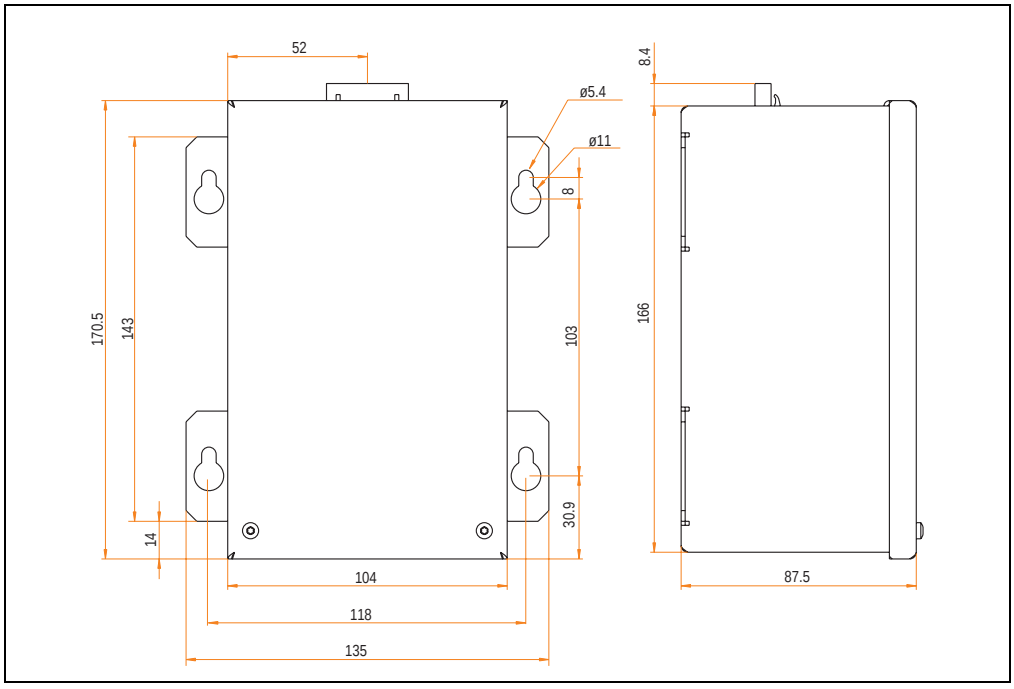


Figure 259: Dimensions - 5AC600.UPSB-00

Drilling template

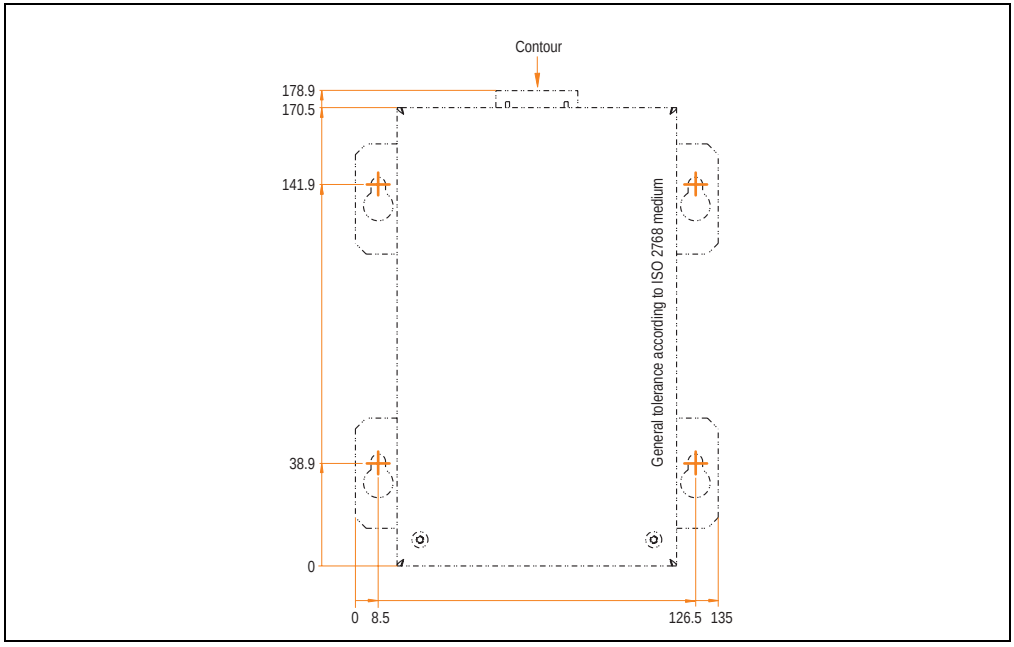


Figure 260: Drilling template for the battery unit

Mounting instructions

Due to the unique construction of these batteries, they can be stored and operated in any position.

13.3.3 UPS connection cable

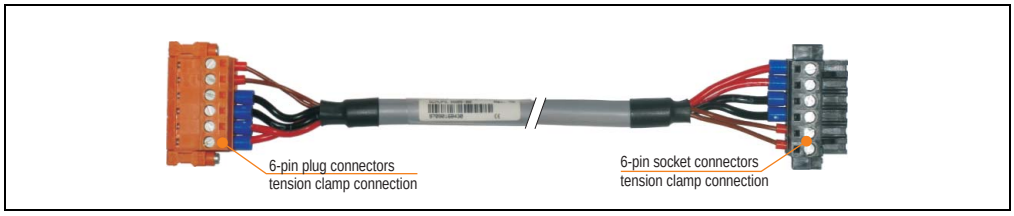


Figure 261: UPS connection cable

Technical data

Features	5CAUPS.0005-00	5CAUPS.0030-00
Length	0.5 m	3 m
Outer diameter	8.5 mm ± 0.2mm	
Connector type	6-pin plugs Zugbügelanschluss / 6-pin sockets Zugbügelanschluss	
Wire cross section Temperature sensor wire Voltage wire	 2 x 0.5 mm^2 (AWG 20) 4 x 2.5 mm^2 (AWG 13)	
Line resistance 0.5 mm^2 2. 5 mm^2	 Max. 39 Ω/km Max. 7.98 Ω/km	
Flex radius Fixed installation Free-moving	 5 x wire cross-section 10 x wire cross-section	
Temperature range Moving Non-moving	 -5°C ... +80°C -30°C ... +80°C	
Weight	Approx. 143 kg/km	
Materials Cable shielding Color	 Thermoplastic PVC-based material Gray (similar to RAL 7040)	
Peak operating voltage	12 V DC	
Testing AC voltage Wire/wire	 1500 V	
Operating voltage	Max. 300 V	
Current load	10 A at +20°C	

Table 339: Technical data - UPS connection cable

Chapter 7 • 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 guarantees buffering of 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 of the supplied components and a self discharge of 40%).

Information:

- **The product design allows the battery to be changed with the APC620 switched either on or off. In some countries, safety regulations do not allow batteries to be changed while the module is switched on.**
- **Any BIOS settings that have been made will remain when the battery is changed with the power turned off (stored in non-volatile EEPROM). The date and time must be reset later because this data is lost when the battery is changed.**
- **The battery should only be changed by qualified personnel.**

The following replacement lithium batteries are available: 4A0006.00-000 (single) and 0AC201.9 (5 pcs.).

1.1 Procedure

- Disconnect the power supply to the Automation PC 620 (also see information on page 487).
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Remove the black plastic cover from the battery compartment and carefully pull out the battery using the removal strips.

Figure 262: Battery removal

- 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.

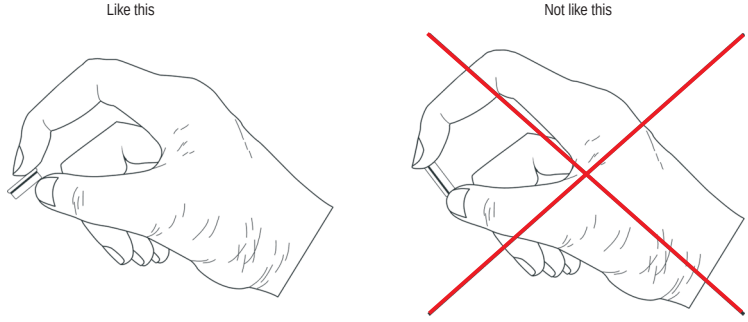


Figure 263: Battery handling

Figure 264: Battery polarity

- To make the next battery change easier, be sure the removal strip is in place when inserting battery.
- Reconnect the power supply to the APC 620 by plugging the power cable back in and pressing the power button (also see information on page 487).
- Reset the data and time in BIOS (see information on page 487).

Warning!

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

2. Fan kit installation and replacement

2.1 Procedure for APC620 with 1 PCI slot

- Disconnect the power supply to the Automation PC 620.
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Open the orange front cover. Remove the 4 Kombitorx screws (T10).

Figure 265: APC620 1PCI slot - Remove screws to install/ remove filter kit

- After the screws have been removed, the side cover and the fan kit cover can be removed toward the front.

Figure 266: APC620 1PCI slot - Remove side cover and fan kit cover

- If a PCI card is in place, it must be removed before moving on to the next step.

- There are two arrows on the fans that indicate the direction of air flow and the direction of fan rotation.

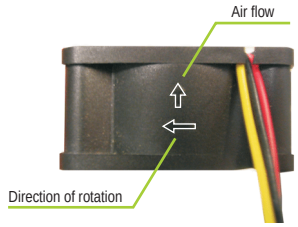


Figure 267: Markings for direction of airflow / fan rotation

Warning!

The fans must be inserted so that the air flows toward the inside of the housing.

- Align fans over the fastening bolts (see arrows). Feed cables through the openings in the housing (see circles) into the main board of the APC620.

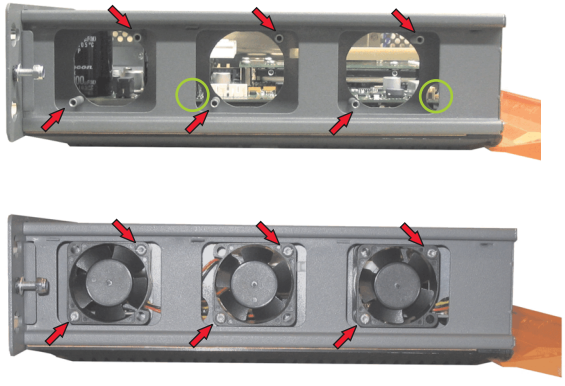


Figure 268: APC620 1PCI slot - Fan installation

- Secure fans with the 6 included Kombitorx (T10) screws.

- The fan connection cable must be connected to the main circuit board in the correct position (fan 1 at position 1, fan 2 at position 2, fan 3 at position 3).

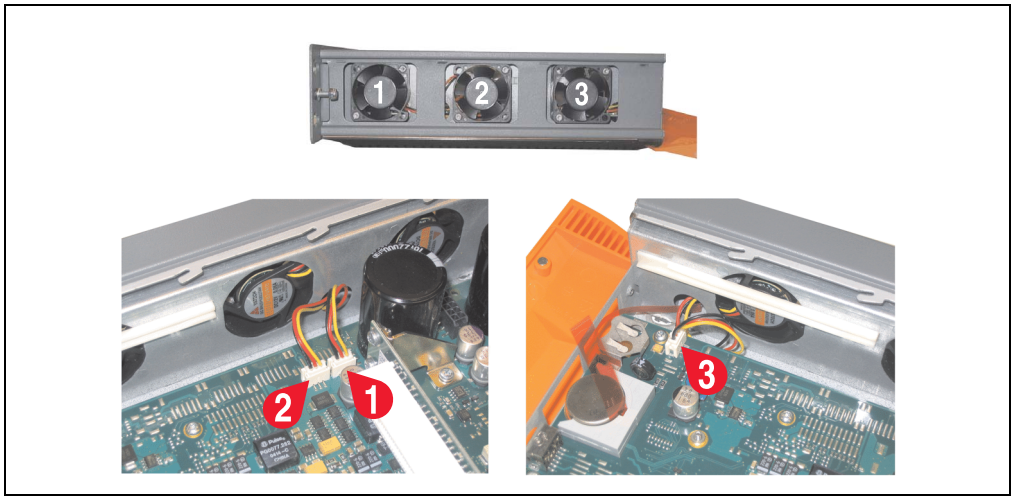


Figure 269: APC620 1PCI slot - Fan cable connection to the main board

- If a PCI card was previously in place, it can now be re-inserted.
- Place dust filter in the fan kit cover and replace removed components (filter kit cover, side cover) in reverse order.

2.2 Procedure for APC620 with 2 PCI slots

- Disconnect the power supply to the Automation PC 620.
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Open the orange front cover. Behind the cover there are 4 Kombitorx screws (T10) that must be removed.

Figure 270: APC620 2PCI slots - Remove screws to install/ remove filter kit

- After the screws have been removed, the side cover and the fan kit cover can be removed toward the front.

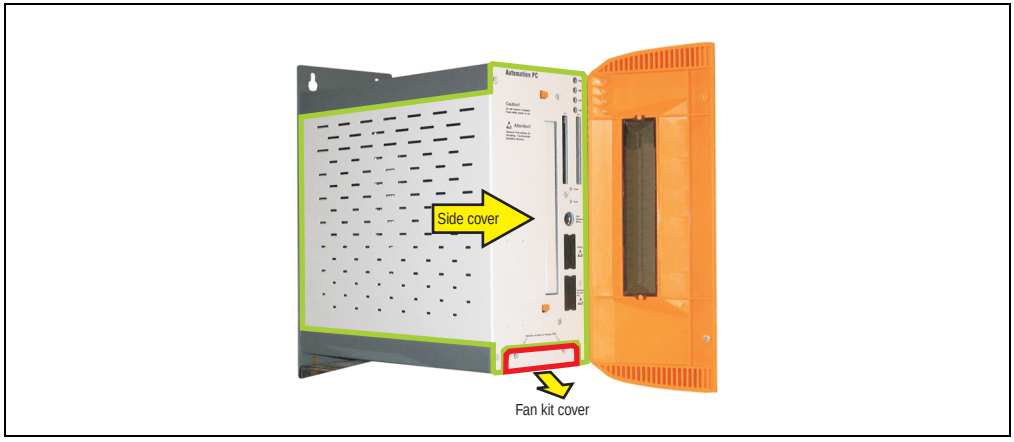


Figure 271: APC620 2PCI slots - Remove side cover and fan kit cover

- If one or more PCI cards are in place, they must be removed before moving on to the next step.
- If a slide-in drive is in place, it also must be removed before moving on to the next step.
- There are two arrows on the fans that indicate the direction of air flow and the direction of fan rotation.

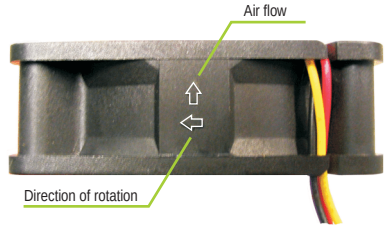


Figure 272: Markings for direction of airflow / fan rotation

Warning!

The fans must be inserted so that the air flows toward the inside of the housing.

- Align fans over the fastening bolts (see arrows). Feed cables through the openings in the housing (see circles) into the main board of the APC620.

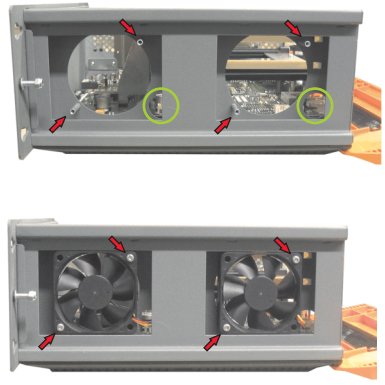


Figure 273: APC620 2PCI slots - Fan installation

- Secure fans with the 4 included Kombitorx (T10) screws.

- The fan connection cable must be connected to the main circuit board in the correct position (fan 1 at position 1, fan 2 at position 2).

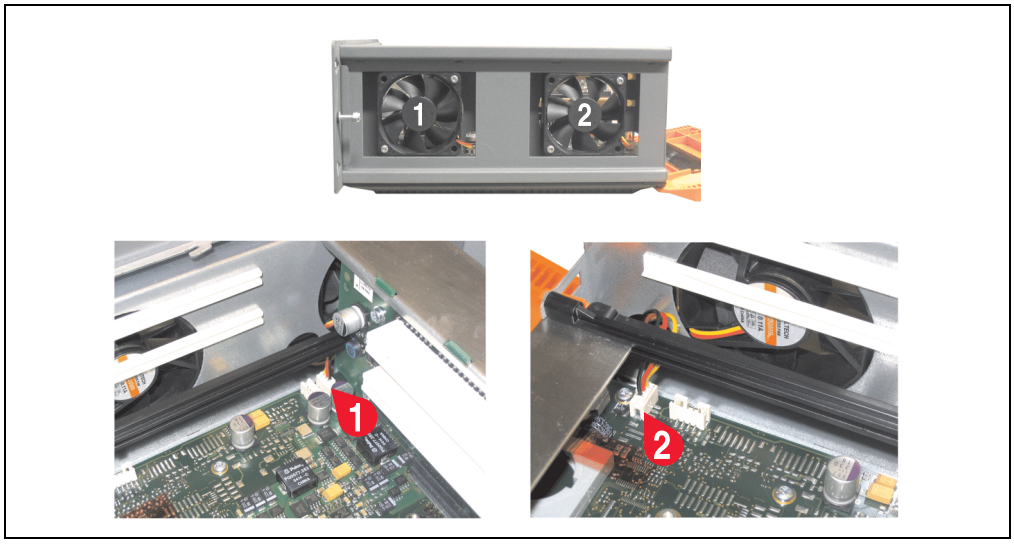


Figure 274: APC620 2PCI slots - Fan cable connection to the main board

- If one or more PCI cards were previously in place, they can now be re-inserted.
- If a slide-in drive was previously in place, it too can now be re-inserted.
- Place the dust filter in the fan kit cover and secure with the filter clasp.

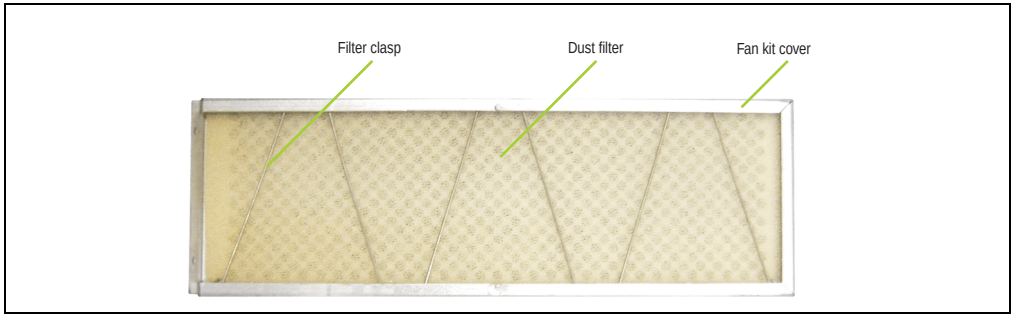


Figure 275: Dust filter in the fan kit cover and filter clasp

- Replace any removed components (filter kit cover, side cover) in the reverse order.

2.3 Procedure for APC620 with 5 PCI slots

- Disconnect the power supply to the Automation PC 620.
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Open the orange front cover. Behind the cover there are 4 Kombitorx screws (T10) that must be removed.

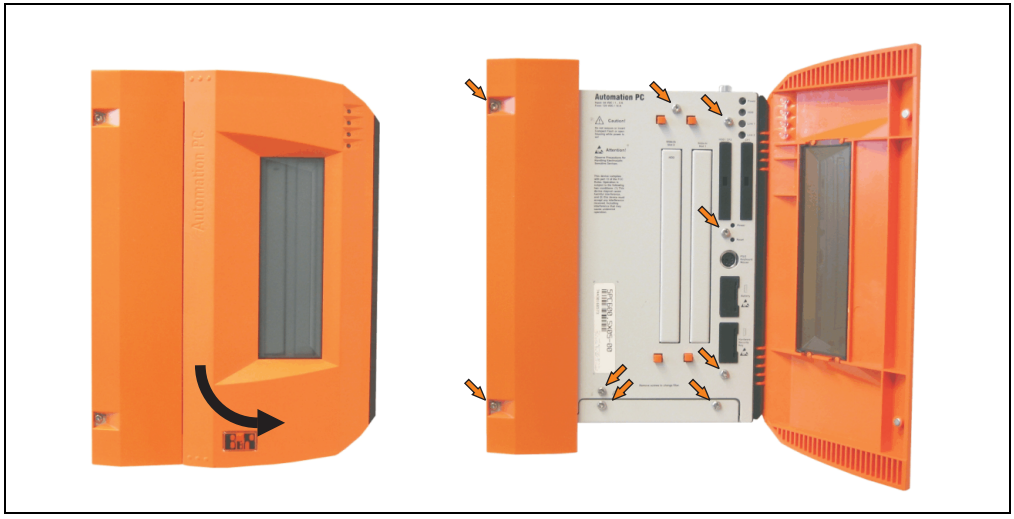


Figure 276: APC620 5PCI slots - Remove screws to install/ remove filter kit

- After the screws have been removed, the side cover and the fan kit cover can be removed toward the front.

Figure 277: APC620 5PCI slots - Remove side cover and fan kit cover

- If one or more PCI cards are in place, they must be removed before moving on to the next

step.

- If a slide-in drive is in place, it also must be removed before moving on to the next step.
- Attach the two included cable fasteners in the appropriate holes.

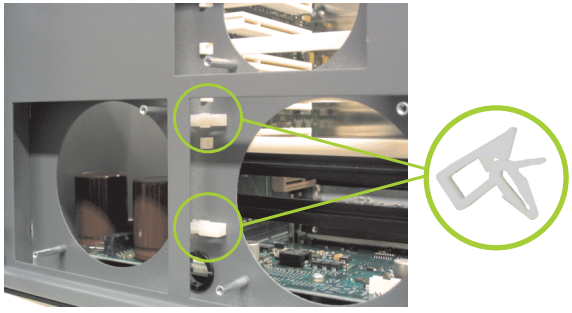


Figure 278: APC620 5PCI attach cable fasteners

- There are two arrows on the fans that indicate the direction of air flow and the direction of fan rotation.

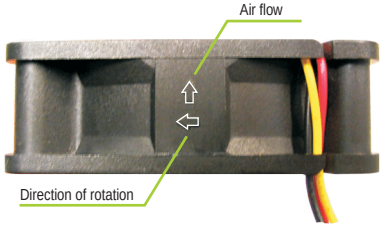


Figure 279: Markings for direction of airflow / fan rotation

Warning!

The fans must be inserted so that the air flows toward the inside of the housing.

- Align fans over the fastening bolts (see arrows). Feed cables through the openings in the housing (see circles) into the main board of the APC620.
  The fan connector cable for the 40 mm fan should be placed in the cable fastener.

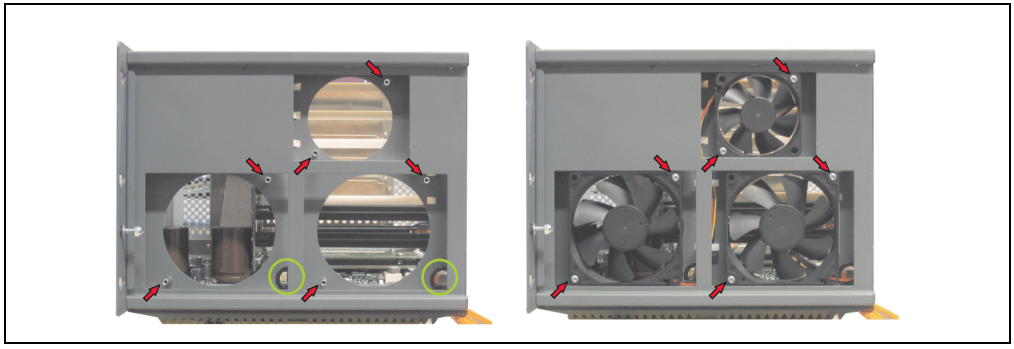


Figure 280: APC620 5PCI slots - Fan installation

- Secure fans with the 6 included Kombitorx (T10) screws.

- The fan connection cable must be connected to the main circuit board in the correct position (fan 1 at position 1, fan 2 at position 2, fan 3 at position 3).

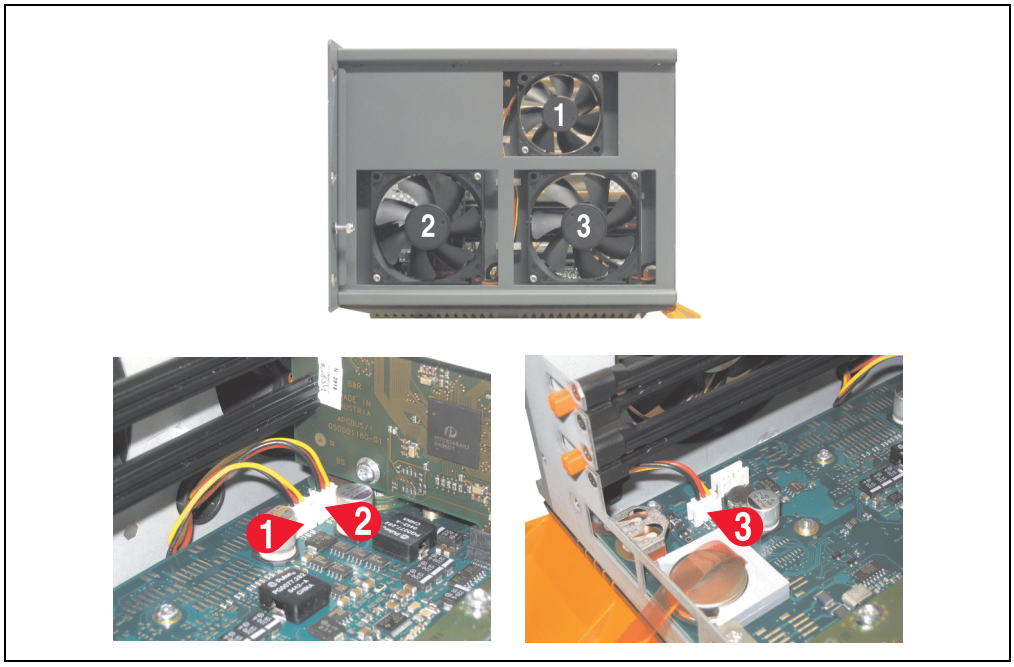


Figure 281: APC620 5PCI slots - Fan cable connection to the main board

- If one or more PCI cards were previously in place, they can now be re-inserted.
- If a slide-in drive was previously in place, it too can now be re-inserted.
- Place the dust filter in the fan kit cover and secure with the filter clasp.

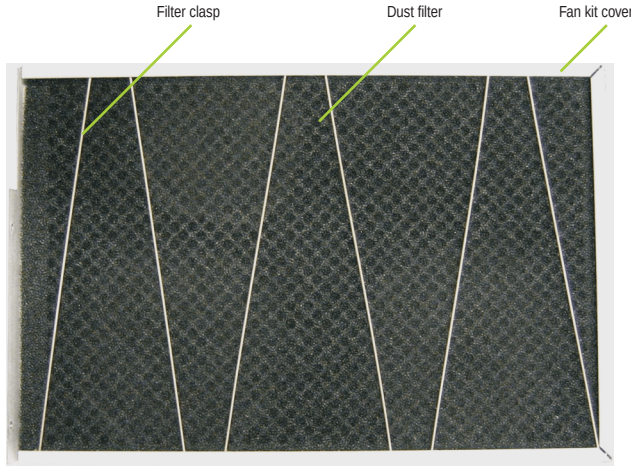


Figure 282: Dust filter in the fan kit cover and filter clasp

- Replace any removed components (filter kit cover, side cover) in the reverse order.

3. Slide-in drive - installation and exchange

Slide-in drives can be installed and exchanged in system units with 2 or 5 PCI slots.

3.1 Installation procedure

- Disconnect the power supply to the Automation PC 620.
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Remove the side cover, see section 5 "Mounting the side cover" on page 521.
- Remove the slide-in dummy module.

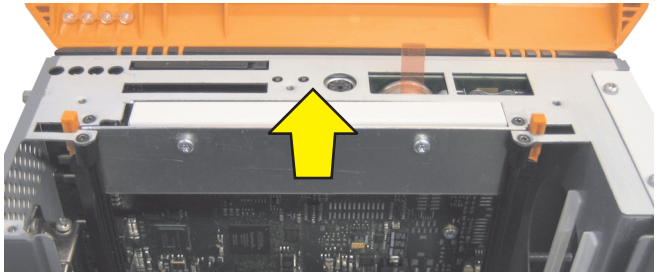


Figure 283: Removing the slide-in dummy module

- Insert the slide-in drive.

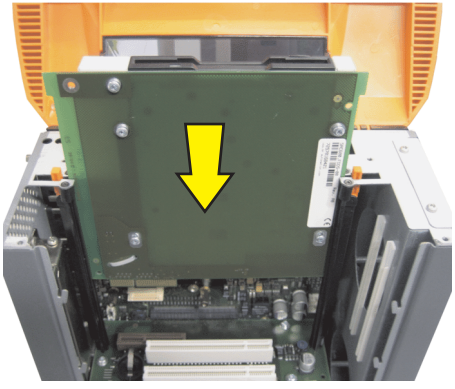


Figure 284: Installing the slide-in drive

- Attach the side cover.

3.2 Exchange procedure

- Disconnect the power supply to the Automation PC 620.
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Remove the side cover, see section 5 "Mounting the side cover" on page 521.
- Simultaneously remove both slide-in slot releasing mechanisms outwards. Push the slide-in drive a few mm upwards for easy removal.

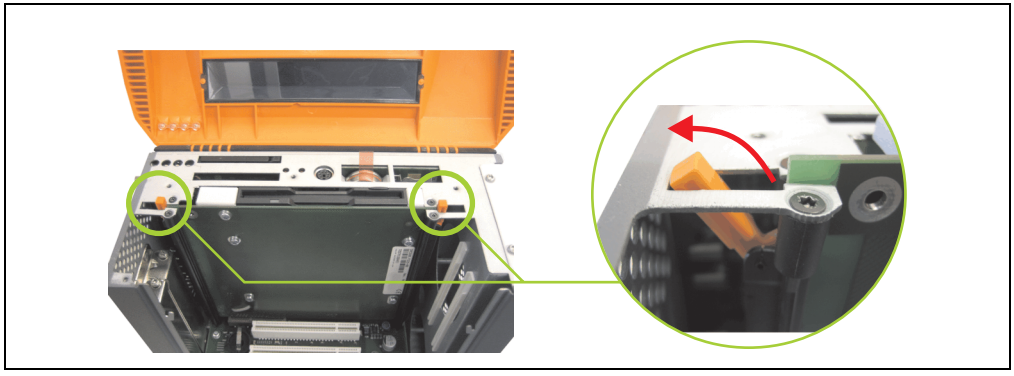


Figure 285: Release the slide-in slot releasing mechanisms

- Remove the slide-in drive.

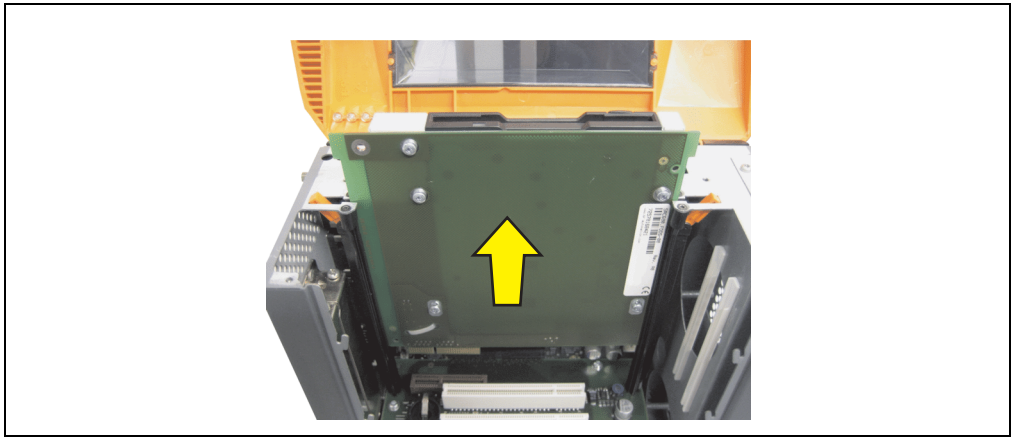


Figure 286: Removing the slide-in drive

- Move the slide-in slot releasing mechanisms to the start position.

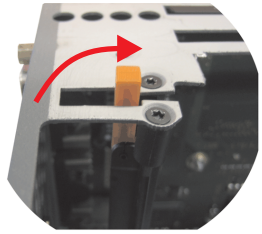


Figure 287: Slide-in slot releasing mechanism start position

- Insert the new slide-in drive or re-attach the side cover.

4. Installation of the UPS module

The module is installed using the materials included in the delivery. Different parts are used depending on the system unit and **installed** (description starting on page 513) or **not installed** (description follows) add-on interface module.

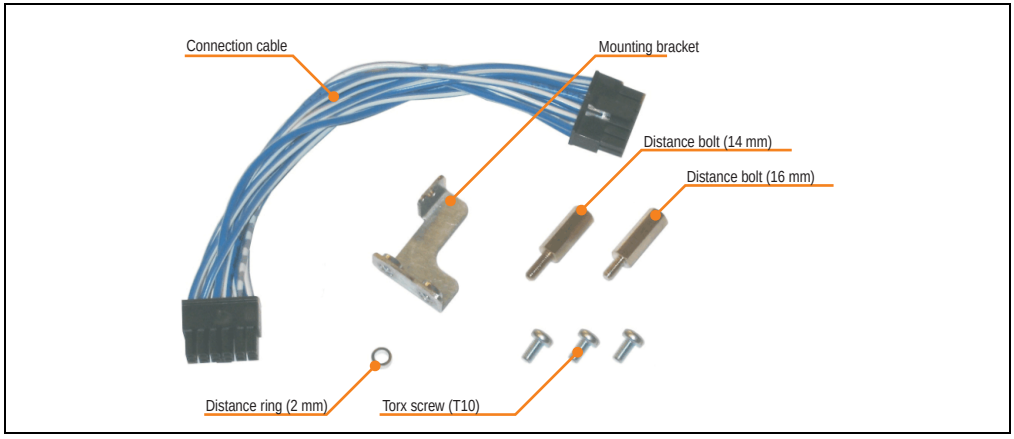


Figure 288: Add-on UPS module 5AC600.UPSI-00 - installation materials

4.1 Automation PC 620 without add-on interface module

4.1.1 APC620, 1 PCI slot

- Remove side cover (see section 5 "Mounting the side cover" on page 521).
- Remove UPS module cover by removing the 2 marked Kombitorx screws (T10).

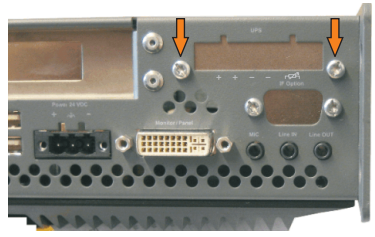


Figure 289: Remove UPS module cover

- Screw in distance bolt and distance ring (using M5 hex socket screwdriver).

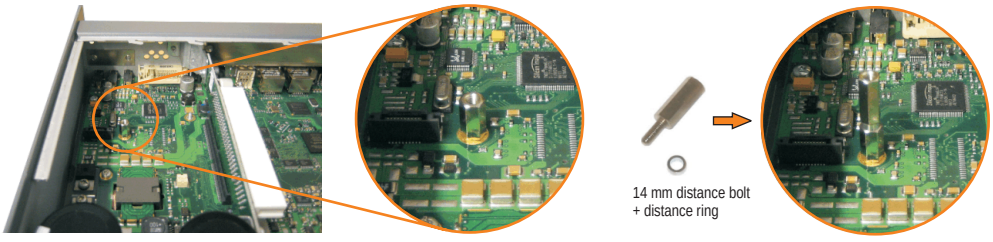


Figure 290: Screw in distance bolt and distance ring

- Install UPS module with 2 Kombitorx screws (T10) and 1 Torx screw (T10). Use the previously removed Kombitorx screws and one Torx screw from the mounting materials.

Figure 291: Install UPS module

- Plug in connection cable (see marked socket).

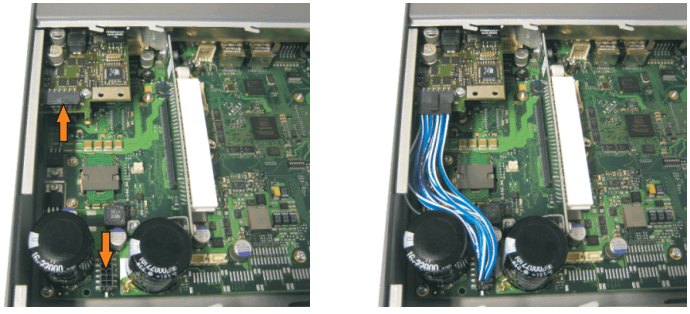


Figure 292: Plug in connection cable

Information:

When connecting the cable, make sure that the connector locking mechanism is engaged.

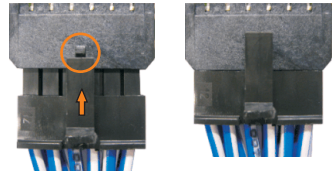


Figure 293: Connector locking mechanisim

- Attaching the side cover.

4.1.2 APC620, 2 PCI slot

- Remove side cover (see section 5 "Mounting the side cover" on page 521).
- Remove UPS module cover by removing the 2 marked Kombitorx screws (T10).

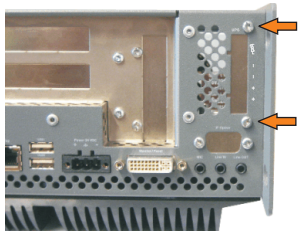


Figure 294: Remove UPS module cover

- Remove cover plate by removing the marked Kombitorx screw (T10).

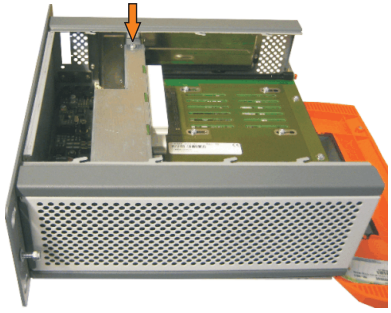


Figure 295: Remove cover plate

- Screw in distance bolt and distance ring (using M5 hex socket screwdriver).

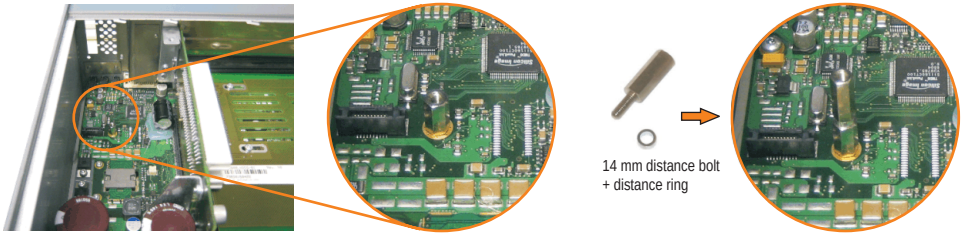


Figure 296: Screw in distance bolt and distance ring

- Install mounting bracket on UPS module using 2 Torx screws (T10).

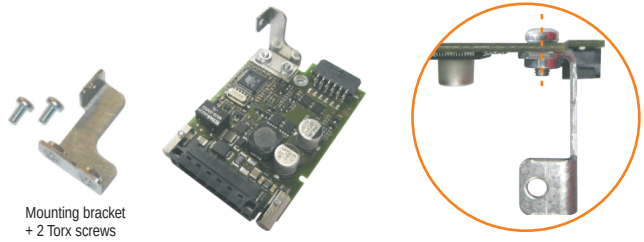


Figure 297: Install mounting bracket

- Install UPS module with 2 Kombitorx screws (T10) and 1 Torx screw (T10). Use the previously removed Kombitorx screws and one Torx screw from the mounting materials.

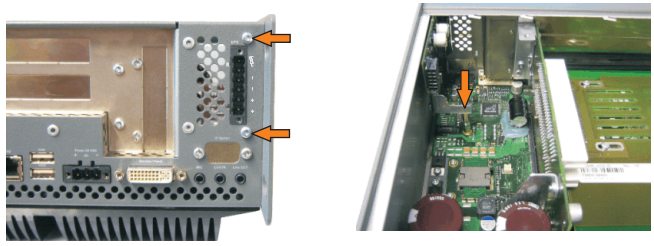


Figure 298: Install UPS module

- Plug in connection cable (see marked socket).

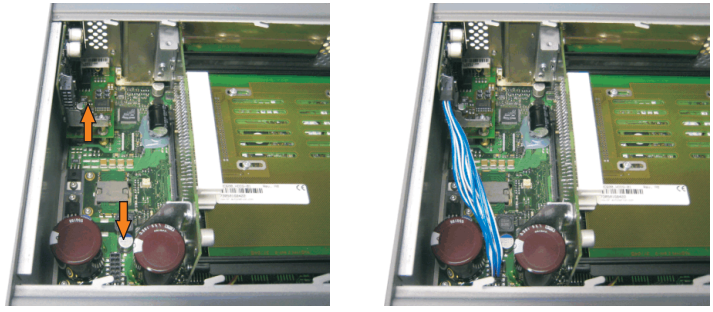


Figure 299: Plug in connection cable

Information:

When connecting the cable, make sure that the connector locking mechanism is engaged.

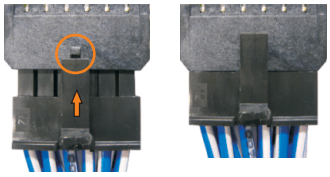


Figure 300: Connector locking mechanisim

- Attach cover plate and side cover.

4.1.3 APC620, 5 PCI slot

- Remove side cover (see section 5 "Mounting the side cover" on page 521).
- Remove UPS module cover by removing the 2 marked Kombitorx screws (T10).

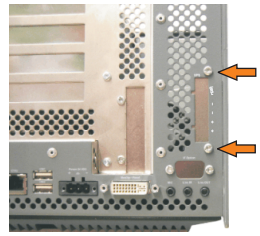


Figure 301: Remove UPS module cover

- Remove cover plate by removing the marked Kombitorx screw (T10).

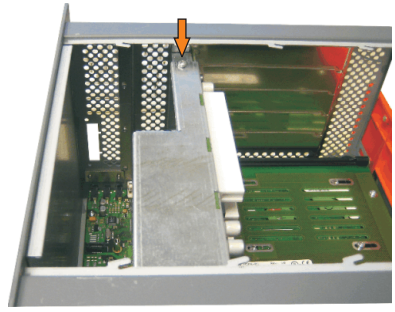


Figure 302: Remove cover plate

- Screw in distance bolt and distance ring (using M5 hex socket screwdriver).

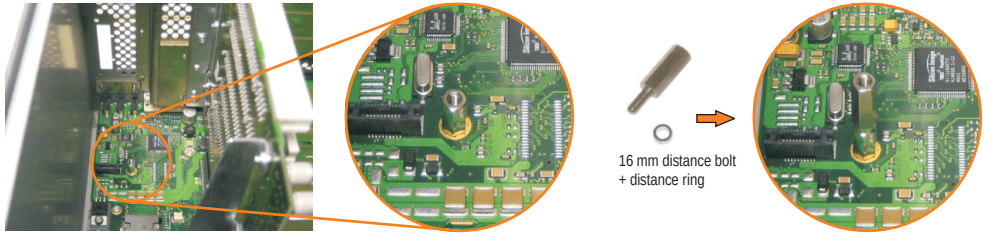


Figure 303: Screw in distance bolt and distance ring

- Install mounting bracket on UPS module using 2 Torx screws (T10).

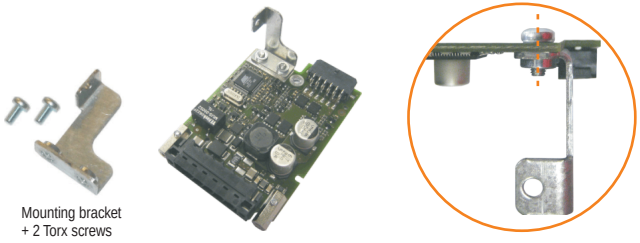


Figure 304: Install mounting bracket

- Install UPS module with 2 Kombitorx screws (T10) and 1 Torx screw (T10). Use the previously removed Kombitorx screws and one Torx screw from the mounting materials.

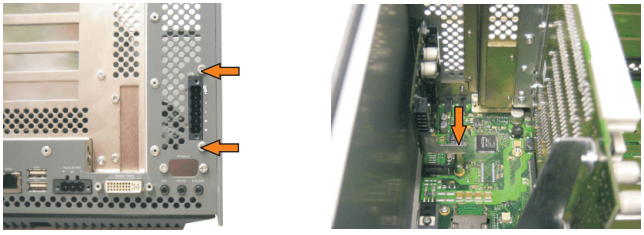


Figure 305: Install UPS module

- Attach connection cable (see marked socket).

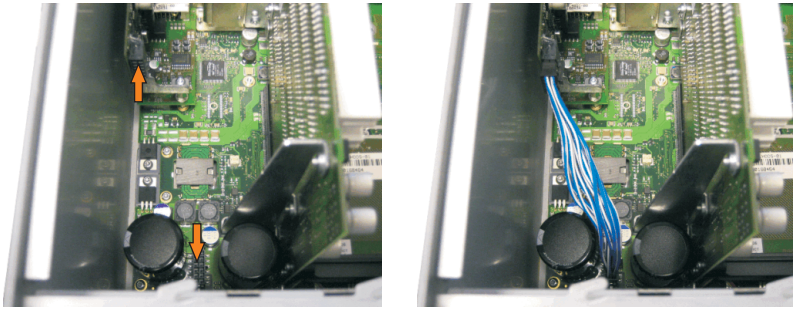


Figure 306: Plug in connection cable

Information:

When connecting the cable, make sure that the connector locking mechanism is engaged.

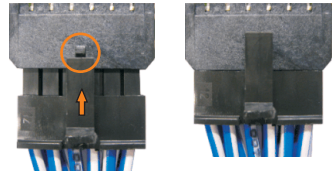


Figure 307: Connector locking mechanisim

- Attach cover plate and side cover.

4.2 Automation PC 620 with add-on interface module

4.2.1 APC620, 1 PCI slot

- Remove side cover (see section 5 "Mounting the side cover" on page 521).
- Remove UPS module cover by removing the 2 marked Kombitorx screws (T10).

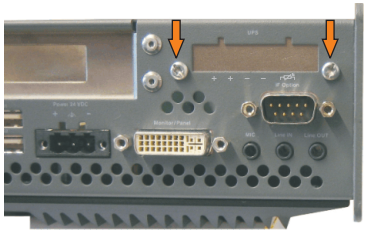


Figure 308: Remove UPS module cover

- Screw in distance bolt (using M5 hex socket screwdriver).

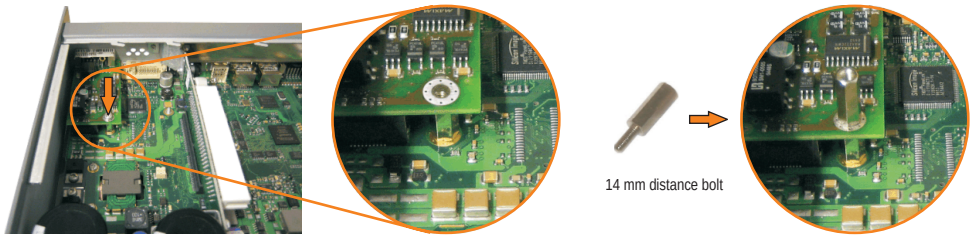


Figure 309: Screw in distance bolt

- Install UPS module with 2 Kombitorx screws (T10) and 1 Torx screw (T10). Use the previously removed Kombitorx screws and one Torx screw from the mounting materials.

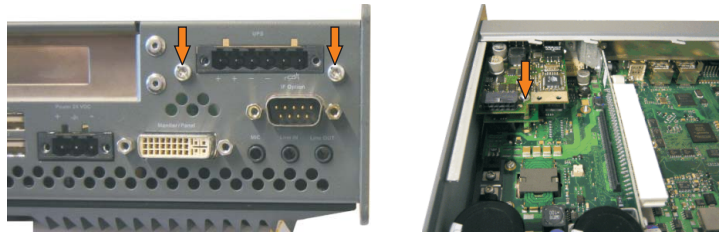


Figure 310: Install UPS module

- Plug in connection cable (see marked socket).

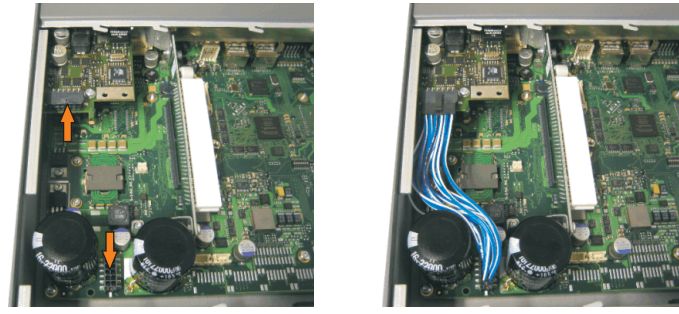


Figure 311: Plug in connection cable

Information:

When connecting the cable, make sure that the connector locking mechanism is engaged.

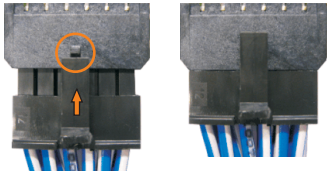


Figure 312: Connector locking mechanisim

- Attach the side cover.

4.2.2 APC620, 2 PCI slots

- Remove side cover (see section 5 "Mounting the side cover" on page 521).
- Remove UPS module cover by removing the 2 marked Kombitorx screws (T10).

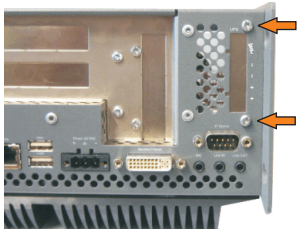


Figure 313: Remove UPS module cover

- Remove cover plate by removing the marked Kombitorx screw (T10).

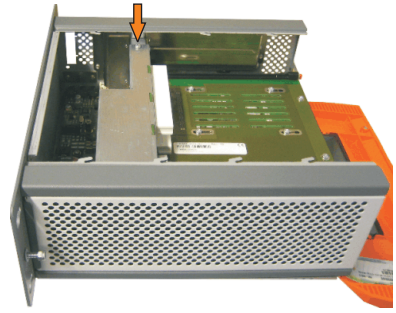


Figure 314: Remove cover plate

- Screw in distance bolt (using M5 hex socket screwdriver).

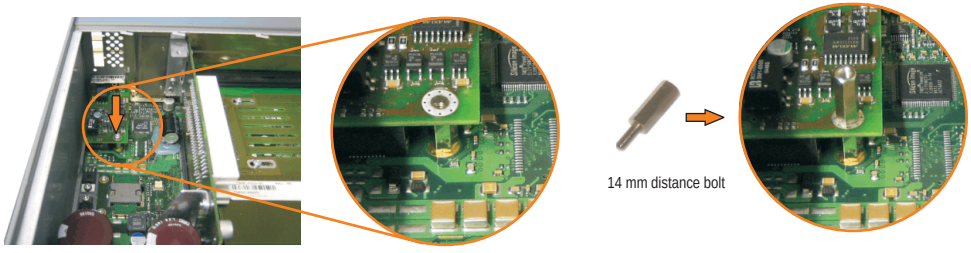


Figure 315: Screw in distance bolt

- Install mounting bracket on UPS module using 2 Torx screws (T10).

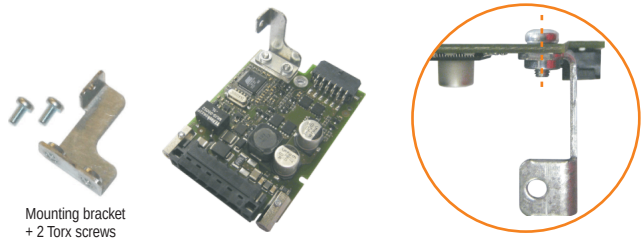


Figure 316: Install mounting bracket

- Install UPS module with 2 Kombitorx screws (T10) and 1 Torx screw (T10). Use the previously removed Kombitorx screws and one Torx screw from the mounting materials.

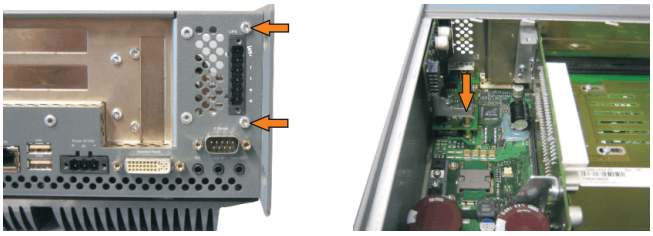


Figure 317: Install UPS module

- Plug in connection cable (see marked socket).

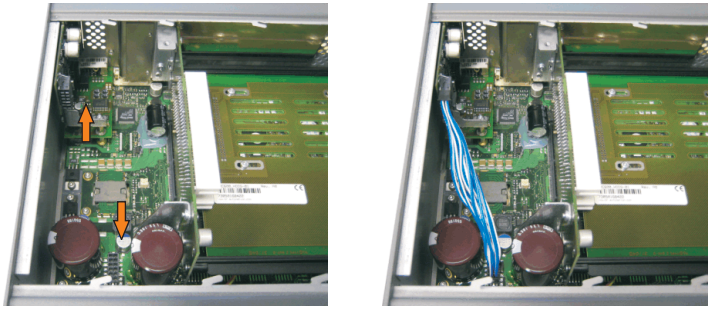


Figure 318: Plug in connection cable

Information:

When connecting the cable, make sure that the connector locking mechanism is engaged.

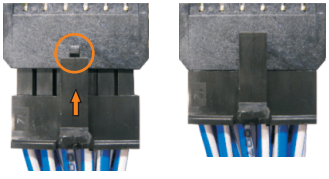


Figure 319: Connector locking mechanisim

- Attach cover plate and side cover.

4.2.3 APC620, 5 PCI slots

- Remove side cover (see section 5 "Mounting the side cover" on page 521).
- Remove UPS module cover by removing the 2 marked Kombitorx screws (using T10 screwdriver).

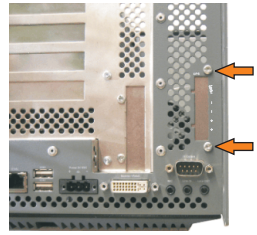


Figure 320: Remove UPS module cover

- Remove cover plate by removing the marked Kombitorx screw (T10).

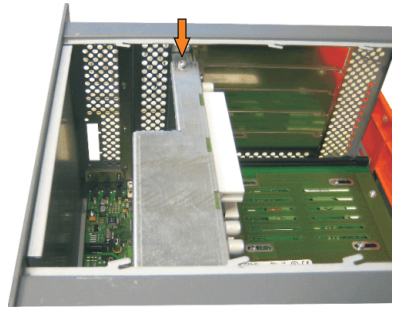


Figure 321: Remove cover plate

- Screw in distance bolt (using M5 hex socket screwdriver).

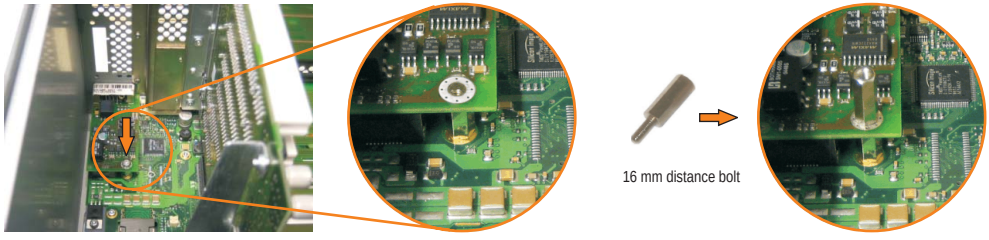


Figure 322: Screw in distance bolt

- Install mounting bracket on UPS module using 2 Torx screws (T10).

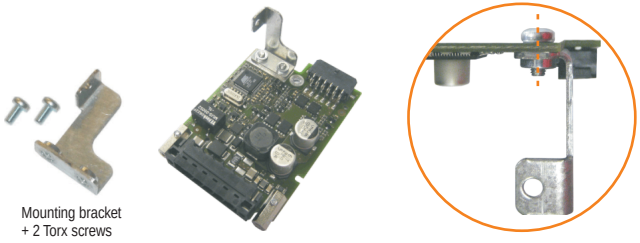


Figure 323: Install mounting bracket

- Install UPS module with 2 Kombitorx screws (T10) and 1 Torx screw (T10). Use the previously removed Kombitorx screws and one Torx screw from the mounting materials.

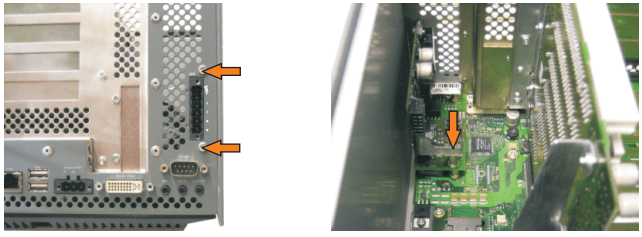


Figure 324: Install UPS module

- Plug in connection cable (see marked socket).

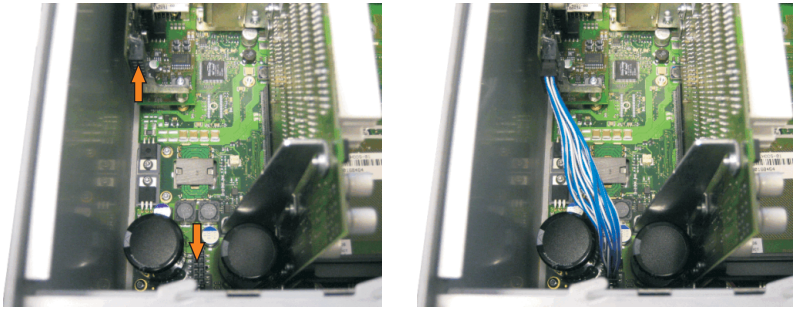


Figure 325: Plug in connection cable

Information:

When connecting the cable, make sure that the connector locking mechanism is engaged.

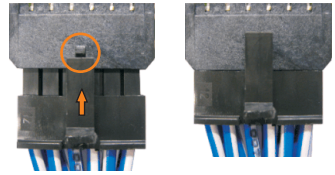


Figure 326: Connector locking mechanisim

- Attach cover plate and side cover.

5. Mounting the side cover

5.1 APC620 with 1 PCI slot

- Disconnect the power supply to the Automation PC 620.
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Open the orange front cover. Behind the cover there are 3 Kombitorx screws (T10) that must be removed.

Figure 327: Mounting the side cover - APC620, 1 PCI slot

- After the screws have been removed, the side cover can be removed by sliding it toward the front.

5.2 APC620 with 2 PCI slots

- Disconnect the power supply to the Automation PC 620.
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Open the orange front cover. Behind the cover there are 5 Kombitorx screws (T10) that must be removed.

Figure 328: Mounting the side cover - APC620, 2 PCI slot

- After the screws have been removed, the side cover can be removed by sliding it toward the front.

5.3 APC620 with 5 PCI slots

- Disconnect the power supply to the Automation PC 620.
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Open the orange front cover. Behind the cover there are 7 Kombitorx screws (T10) that must be removed.

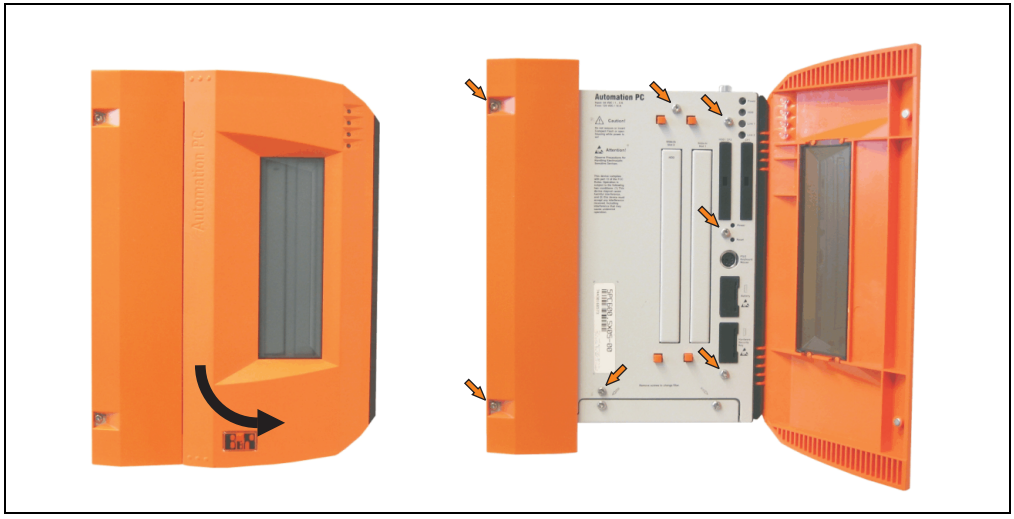


Figure 329: Mounting the side cover - APC620, 5 PCI slots

- After the screws have been removed, the side cover can be removed by sliding it toward the front.

Appendix A

1. Temperature sensor locations

The APC620 has temperature sensors in various places (CPU, power supply, slide-in drive 1, slide-in drive 2, I/O). The temperatures[1)] can be read in BIOS (menu item "advanced" - baseboard/panel features - baseboard monitor) or in Microsoft Windows XP/embedded, using B&R Control Center[2)] .

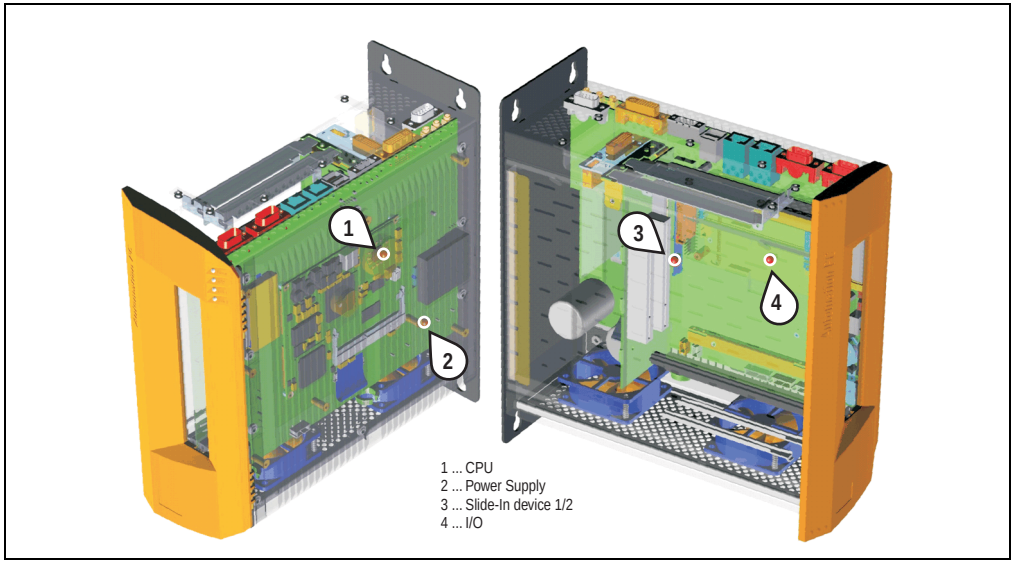


Figure 330: Temperature sensor locations

Range		Position
1	CPU	Processor temperature (sensor integrated on the CPU board)
2	Power supply	Power supply temperature (maximum 95°C)
3	Slide-in drive 1/2	Temperature of a slide-in drive (the sensor is integrated on the slide-in drive)
4	I/O	Temperature under an add-on drive

Table 340: 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. Connection of an external device to the main board

A plug on the main board enables branching of +5 VDC and +12 VDC for the internal supply of e.g. special PCI cards.

The connector is only provided starting with the following system unit revisions:

Model number	Short description	Starting with revision
5PC600.SX01-00	System 1 PCI	B7
5PC600.SX02-00	System 2 PCI, 1 disk drive slot, 1 AP Link slot	B0
5PC600.SX02-01	System 2 PCI, 1 disk drive slot	B9
5PC600.SX05-00	System 5 PCI, 2 disk drive slots, 1 AP Link slot	A0
5PC600.SX05-01	System 5 PCI, 2 disk drive slots	A0

Table 341: Revision information for connecting an external device

The voltage can be accessed using the "APC620 internal supply cable 5CAMSC.0001-00" on page 455. Depending on the system unit revision, the connector is located close to the fan connector. The APC620 side cover and possibly also the slide-in drive and PCI cards must be removed to reach the connector.

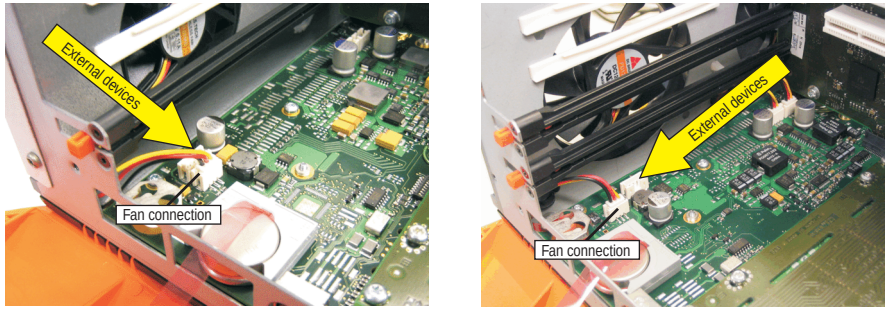


Figure 331: Connector location for external devices

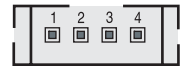
Connector for the external devices			
Pin	Assignment	Power	4-pin connector, male 
1	+12 VDC	Max. 10 watts	
2	GND		
3	GND	Max. 5 watts	
4	+5 VDC		

Table 342: Pin assignments - connector on main board

Connections are protected by a 1 A multi-fuse.

3. Maintenance Controller Extended (MTCX)

The MTCX controller (FPGA processor) is located on the main board (part of every system unit) of the APC620 device.

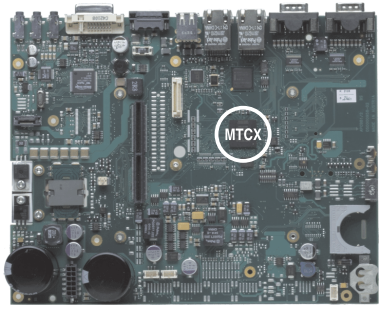


Figure 332: MTCX controller location

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

- Power on (power OK sequencing) and power fail logic
- Watchdog handling (NMI and reset handling)
- Temperature monitoring (I/O area, power supply, slide-in drive 1/2)
- Fan control (3 housing fans)
- Key handling / coordination (matrix keyboard on Automation Panel 900 devices configurable using B&R Key Editor, PS/2 keyboard)
- LED handling (matrix keyboard with LEDs on Automation Panel 900 devices configurable using B&R Key Editor)
- Advanced desktop operation (keys, USB forwarding)
- Daisy chain display operation (touch screen, USB forwarding)
- Panel locking mechanism (configurable using B&R Control Center - ADI driver)
- Backlight control for a connected B&R display
- Statistical data recording (power cycles - each power on, power on and fan hours are recorded - every full hour is counted e.g. 50 minutes no increase)
- SDL data transfer (display, matrix keyboard, touch screen, service data, USB)
- Status LEDs (HDD, panel lock, Link 1, Link 2)

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

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

3.1 SDL timing

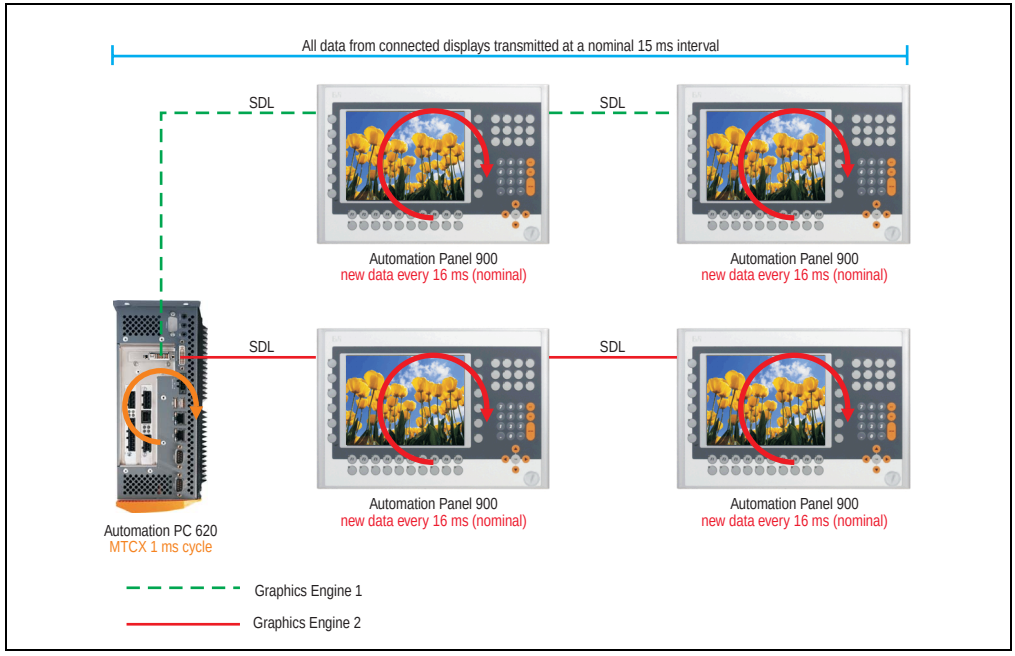


Figure 333: Sample configuration for SDL timing

Basic procedure:

1) On every Automation Panel 900 display unit, the data (button and LED, touch screen, service data) is nominally determined asynchronously every 16 ms, saved and made available.

2) The MTCX in the APC620 samples one display unit after another asynchronously in 1 ms increments. The status is requested within the 15 ms nominal cycle (maximum 15 display units x 1 ms), regardless of the total number of display units connected in the system (Graphics Engine 1 + Graphics Engine 2), and the information is saved in the MTCX's Dual-Ported RAM.

3) An application can access the MTXC data using the programming interface (API) ADI (Automation Device Interface). Reading or writing data does not affect the asynchronous acquisition of data from the connected display units.
Further information about this can be found in the "ADI Development Kit" and the "Automation PC 620 / Panel PC 700 Implementation Guide" (both available on the B&R Homepage).

Caution!

Due to safety requirements regulated by international standards, implementing an E-stop element via SDL (using Matrix) is NOT allowed. Instead, such an element must be wired according to the safety requirements.

Information:

Display data will not be updated and cannot be read by the MTCX while a display unit is in upgrade mode (e.g. SDL firmware upgrade).

The nominal time specifications are not guaranteed maximum lengths of time, but may be increased due to e.g. transfer disturbances and external influences.

Schematic diagram

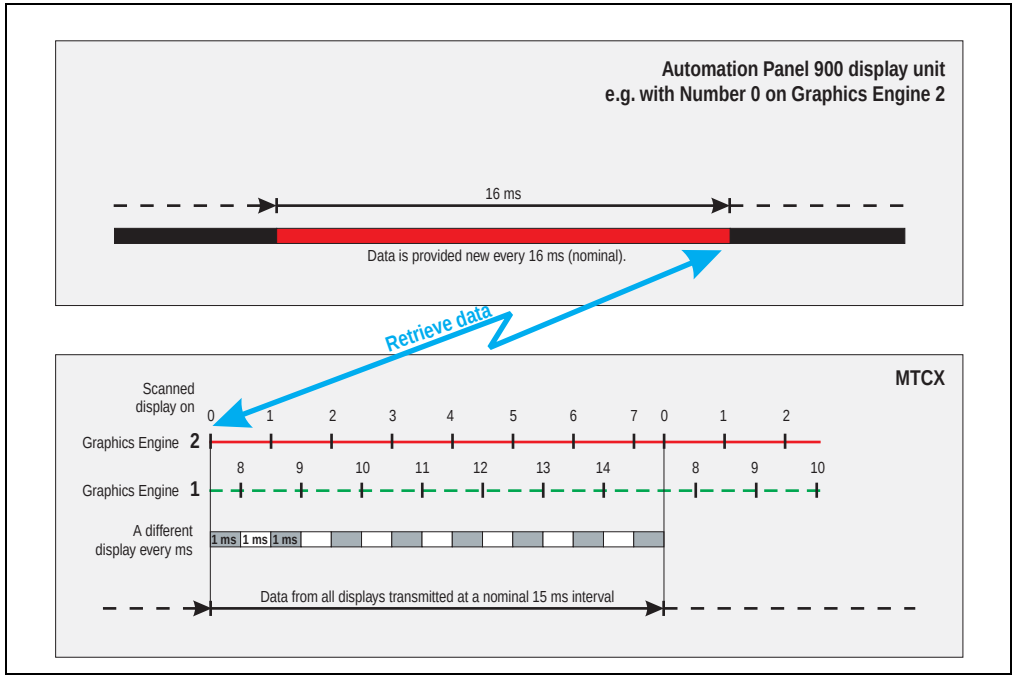


Figure 334: SDL timing – example for Automation Panel 900 with the number 0

4. B&R Key Editor information

On display units, it is often necessary to adjust the function keys and LEDs for the application software being used. With the B&R Key Editor, it is possible to quickly and easily set up the application individually.

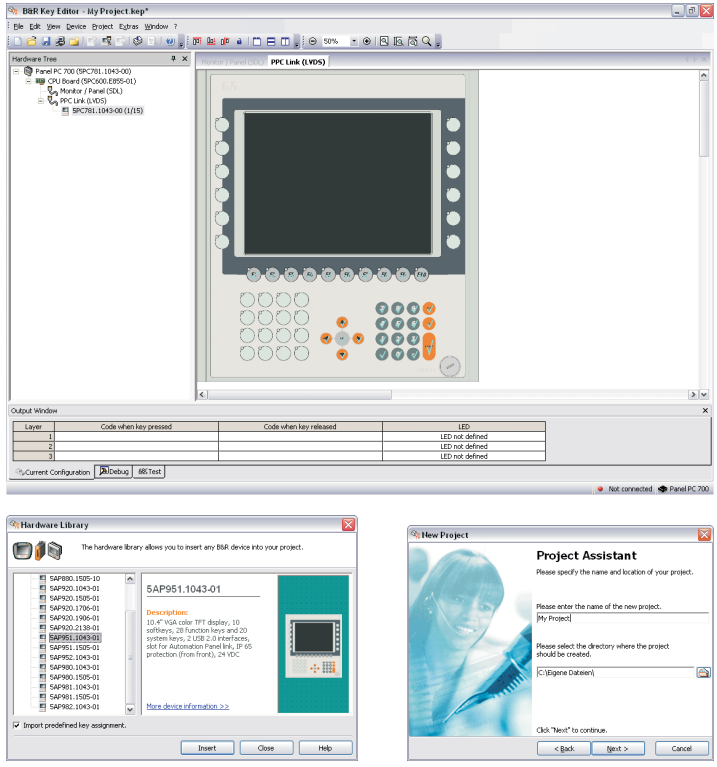


Figure 335: B&R Key Editor screenshots (Version 2.10)

Features:

- Configuration of normal keys like on a keyboard (A, B, C, etc.)
- Key combinations/shortcuts (CTRL+C, SHIFT+DEL, etc.) on one key
- Special key functions (change brightness, etc.)
- Assign functions to LEDs (HDD access, power, etc.)
- 4 assignments per key possible (using layer function)
- Configuration of panel locking time when multiple Automation Panel 900 devices are connected to Automation PC 620 and Panel PC 700 devices.

Supports following systems:

- Automation PC 620
- Panel PC 700
- Provit 2000
- Provit 5000
- Power Panel BIOS devices
- Mobile Panel BIOS devices

A detailed guide for configuring keys and LEDs can be found in the B&R Key Editor's online help.

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

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

The ADI development kit is used to access the functions of the ADI driver. The programming languages C (with import libraries for Microsoft Visual C++ 6.0 and Microsoft eMbedded Visual C++ 4.0) and Visual Basic (for Microsoft Visual Basic 6.0) are supported.

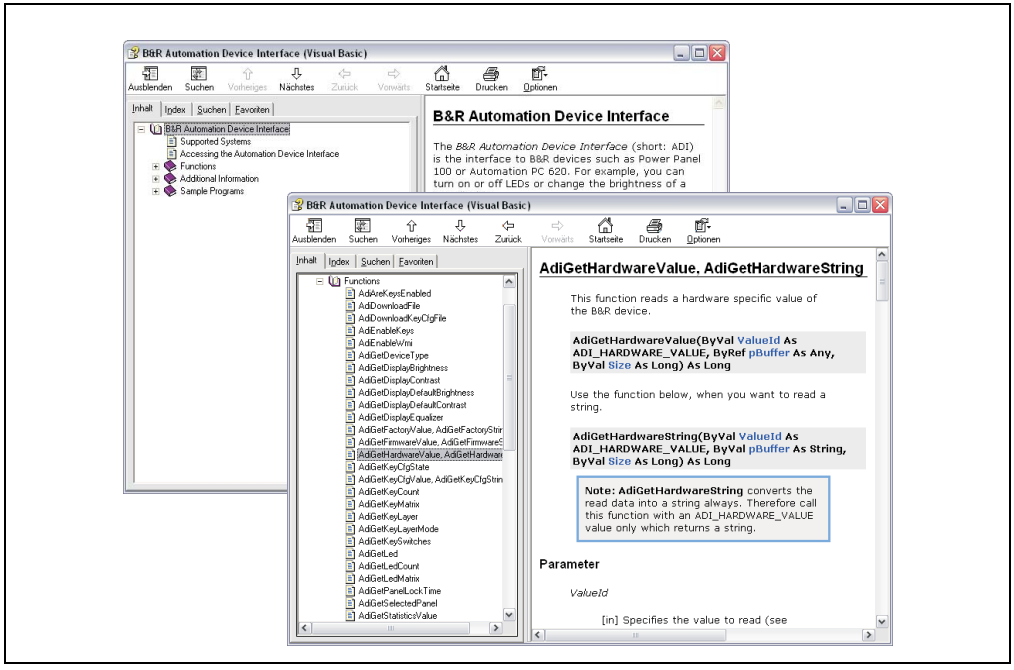


Figure 336: ADI development kit screenshots (Version 1.50)

Features:

- Extensive library of API functions
- Supported programming languages: Visual Basic, Visual C++
- Online documentation (German, English)
- Installation using its own setup

Supports following systems:

- Automation PC 620
- Panel PC 700
- Power Panel BIOS devices
- Mobile Panel BIOS devices
- Automation Panel 900

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

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

6. Glossary

A

ACPI

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

APC

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, binary digit smallest discrete information unit. 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 bit] 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. Data, which e.g. should be output to slower components by the working memory (e.g. disk storage, printers), is stored temporarily in the cache and output from there with 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-ranges below 40 m with a 1 MBit/sec data transfer rate. Maximum number of stations: Unlimited in theory, practically up to 64 with real-time capability, i.e. defined maximum queuing time 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 high 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 the 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. Typically, a modem, mouse or serial printer is 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 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 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 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 accommodated 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 8 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 which 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, which is connected with the motherboard of a computer via a connector.

DMA

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

DRAM

An abbreviation for »**D**ynamic **R**andom **A**ccess **M**emory« Dynamic RAM consists of an integrated semiconductor circuit, which 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, because 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, which 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 optic data carrier technology. Using this technology it is possible to code video, audio and computer data on CD. DVDs can store a higher volume of data than conventional CDs. Standard DVDs , which have a single coating, can hold 4.7 GB. Double coated DVDs can hold 8.5 GB. Double sided DVDs can 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 block 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** > (complete 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, optical fiber cables or twisted pair cabling. Data transfer on an Ethernet network takes place in frames of variable lengths, which 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

is an enhancement of standard Ethernet. It enables data exchange under strict real-time conditions with cycle times down to 200 µs and jitter under 1µs. This makes Ethernet power available on all communication levels of Automation technology – from control levels to I/O. Ethernet Powerlink was initialized 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, which are waiting to be printed.

Firmware

Programs stored permanently in read-only memory. Firmware is software used to operate computer-controlled devices, which 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, (i.e. 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, which 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, allowing 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 quasi standard for the transfer of data via 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 [coding, signal level, pin assignments], which 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 which can be inserted in the expansion slots provided in the PC.

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 200s and it actually occurs every 198 to 203s, then the jitter is 5s. 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.

Jumpers

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 which 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, which 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 lettering LPT was originally stood for "Line Printer Terminal".

M

MB

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

Microprocessor

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

MIPS

Million Instructions Per Second > Measurement for the computing speed of computers.

Motherboard

A circuit board, which 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, which 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

Abbreviation for »**M**ain**T**enance **C**ontroller E**X**tended«

Multitasking

Multitasking is an operating mode in an operating system, which allows several computer tasks to be executed parallel and simultaneously.

O

OEM

Original **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 of 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. 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 generation. It is basically a synchronous bus. The main clock of the CPU is used for synchronization. The PCI bus is microprocessor independent, compatible with 32-bit and 64-bit 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 is 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 which are stored in ROM on the computer and 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, which frequently accompanies a diagnosis value, on the standard output or standard error devices (generally the monitor). If POST runs successfully, control is transferred over to the system's bootstrap loader.

Powerlink

See "ETHERNET Powerlink".

PROFIBUS-DP

PROFIBUS for "decentralized peripherals". PROFIBUS-DP can be used to allow simply 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. Many used for time-critical factory automation applications.

Q

QVGA

Abbreviation for **Q**uarter **V**ideo **G**raphics **A**rray. Generally 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« A 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, however 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« A semiconductor in which programs or data have already been permanently stored during the production process.

RS232

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

RS422

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

RS485

Recommended **S**tandard **N**umber **485**; Interface standard upgraded from RS422; High level: 1.5 ...-6 V, Low level: +1.5 ... +6 V; 2-wire connection [half duplex operation] or 4-wire connection [full duplex operation]; cable lengths up to 1200 m, transfer rates up to 10 Mbit/s. Up to 32 participants can be connected to an RS485 bus [sender/receiver].

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 hardware specifications of the RS-232-C standard.

RXD

An abbreviation for »Receive (**RX**) **D**ata« A line for the transfer of 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), which 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 >; Used for graphic representation of sequential control, graphic input language for PLCs.

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.

SRAM

An abbreviation for »**S**tatic **R**andom **A**ccess **M**emory« A semiconductor memory (RAM) made up of certain logic circuits (flip-flop), which only keeps stored information while the operating voltage is active. In computers, static RAM is generally only used for the cache memory.

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**x**tended **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, which 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, 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

An 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) resulting in an active matrix. In the 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 activating an item with 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« Generally, a module consisting of a single integrated circuit, which combines the circuits required for asynchronous serial communication for both sending and receiving. UART represents the most common type of circuit in modems for connection 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 the recent times.
The UDMA33 mode transfers 33 megabytes per second.
The UDMA66 mode transfers 66 megabytes per second.
The UDMA100 mode transfers 100 megabytes per second.
A condition for modifications is that both the mainboard and the hard drive support the specification.

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« UPS supplies power to systems which 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 graphic controllers and monitors which was introduced by IBM in 1990. This standard supports a 640 * 480 resolution with 65,536 colors or a 1024 * 768 resolution with 256 colors. This standard is generally used in workstation systems.

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