Provit 5000

User's Manual

Version: **5.10 (May 2007)**

Model number: **MAPRV5000-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	Comment
4.0	31.08.2000	Changeover to a new layout
	03.10.2000	Changes / new features
4.1	18.10.2000	Changes / new features
4.2	27.10.2000	Changes / new features - Model numbers added - Pentium III / 600 MHz and associated system units added
4.3	30.11.2000	Changes / new features - Footnote changes for all tables - Display unit 5D5100.04 added - Display unit 5D5212.04 added - Panel flange adapter 5A5007.01 added - Provit Drivers & Utilities CD-ROM 5S0000.01-090 added and the therefore replaceable software cancelled. - Table format adjusted - Operating temperature table added for the IPC5000, IPC5600, IPC5000C and IPC5600C

Table 1: Manual history

Version	Date	Comment
4.4	24.01.2001	Changes / new features - New layout - Expansion of BIOS settings for Celeron system units because of BIOS upgrade version 1.04 and 1.05 - Celeron 433 5C5002.13 cancelled - PC card 220 MB 9A0009.07 cancelled - replaced by: CompactFlash 192 MB 9A0015.08 - OEM MS-WinNT-E Class2 DEV IPC5000/5600 9S0001.04-020 added - OEM MS-WinNT-E Class2 DEV IPC5000C/5600C 9S0001.05-020 added - Pentium III / 850 MHz 5C5002.16 added - 256 MB SDRAM 9A0004.14 added - Hard disk sales text has been changed (notes added) - Infrared touch screen 5D5211.06 added - Processor dependent temperature alarm and fan control description added - BIOS settings for booting different peripheral devices for IPC5600/IPC5600C added - Storage temperature for IPCs and display units added - Background lighting 9A0110.10 added (replacement part for 5D5212.02 and 5D5212.04) - Functional ground description added - Award BIOS error messages (alarm signal) added - Amendment of the IP20 specification for controllers and displays added - Display design/color definitions for the display units added
4.5	13.06.2001	Changes / new features - Provit 5600 cable set 5A5601.01 added - Section Revision: Provit 5600 IPC Configuration Options - Graphics Revision: MTC Function Libraries - Expansion of BIOS settings for Celeron system units because of BIOS upgrade version 1.06 and 1.07 - Description revision: BIOS upgrade - Description revision: Provit 5000 Utilities (MTC Diagnostics Tool) - Table revision: Current requirements / Power consumption of the components - Table revision: Power supply currents - Mains failure bridging table for Provit bus units added - Changeover to a new PCMCIA controller for interface boards (5A5000.01, 5A5000.05 and 5A5000.06) - Provit 5600 configuration options (CD-ROM, LS-120,...) revised - Model numbers for Mkey documentation MAMKEY-F added - Model numbers for Provit 5000 user documentation MAPRV500-F added - Dimension diagrams for IPC5000/5000C 5 slot and IPC5600/5600C added - Dimension diagrams for the external 19" keyboard 5E9600.01-010 and 5E9600.01-020 added - 320 MB CompactFlash 9A0015.09 added - 8 MB CompactFlash card 9A0015.07 status changed to release/series - Arcnet cards 5A1105.00-090, 5A1107.00-090, 5A1109.00-090 and 0TP360.04 added - Technical description of the CMOS battery 0AC201.9 (lithium battery added) - Remote CD ROM / LS-120 drive combination 5A5003.02 added - 2 slot bus units 5C5000.21, 5C5000.22 added - 5 slot bus units 5C5000.31, 5C5000.32, 5C5600.03 and 5C5600.04 added - System unit 5C5001.21 for remote CD ROM drive added - Model numbers for USV documentation MAUSV1-0, MAUSV1-E, MAUSV1-F added - Add-on CD ROM drive 5A5009.01 added - Glossary added - Power consumption data for individual components added - Controller FDD / DVD-ROM 5A5600.05 - Controller ZIP250 / CD-ROM 5A5600.06 added - Controller FDD / CD-RW 5A5600.07 added - Combination options for Provit 5600 drives added - Description of the maintenance that can be carried out has been added - Note for display units regarding installation template 5A9000.01 removed.

Table 1: Manual history (cont.)

Version	Date	Comment
4.6	30.06.2005	Changes / new features - Changeover to a new A5 book template V3.3 - Changes to text materials for CompactFlash cards, hard disks and interface cards - New component overview images: see figures 24 "IPC5000C components (bus unit with 2 slots + add-on controller)" on page 85, 26 "IPC5000C components (bus unit with 5 slots + add-on controller)" on page 86, and 28 "IPC5600C components (bus unit with 5 slots)" on page 88. - New dimension diagrams (PC5000C - 2 and 5 slot design with add-on drive 5A5009.0x) added - Sweep frequencies during simultaneous operation (Monitor/Display) added - New display dimensions for 5D5212.02 starting with rev. I0; for 5D5211.03 starting with rev. I0; and for 5D5213.01 starting with rev. F0 added - Safety guidelines updated - Technical data for display 5D5100.04 revised - Mounting instructions for the external diskette drive added - Add-on CD RW drive 5A5009.02 added - Product 9A0015.10 (256 MB CompactFlash card) added - Note regarding operation of an add-on drive 9A5009.0x with respective bus units 5C5001.2x and 5C5001.3x and dual CompactFlash adapter 5A5002.02 - Figures of USB connections for system units revised - New BIOS description for system unit with socket 370 - CompactFlash cards 5CFCRD.xxxx-02 added - System units 5C5001.32, 5C5001.42, 5C5601.32 and 5C5601.42 with the ATI mobility range M graphics chip and the 82551ER Ethernet controller added - Display kit 5D5001.03 added - Information regarding ATI graphics chip and display support added - 4A0006.00-000 1 piece 3 V / 950 mAh lithium battery added - UPS battery unit, type C 24V 4.5Ah added - Information regarding terminating resistor for CAN with B&R interface cards added. - Dimension diagram for the Panel flange adapter 5A5007.01 added. - Typical topologies of B&R industrial PCs added - Operating temperatures (Pentium III 600 and Pentium III 850) adjusted - Temperature sensor positions (board socket, CPU, board I/O) and B&R IPC diagnostics utility described (see section "B&R IPC Diagnostics Utility" on page 392) - Bus unit slot assignments added (see section "Bus units" on page 167) - Life span calculation (white paper) for the CompactFlash cards 5CFCRD.xxxx-02 added (see chapter 8 "Technical appendix")
4.70	26.04.2006	Changes / new features - Safety guidelines revised - Display unit protection updated (IP20 and IP65). - Connection error in image 175 "Connections 5D5600.0x and 5D5601.0x"corrected (display and touch screen connections were backwards). - Silicon Systems CompactFlash cards 5CFCRD.xxxx-03 added. - Elo touch screen specification updated (Chapter 8 - Technical appendix). - Accessories, "USB Memory Sticks - 5MMUSB.xxxx-00" added. - HMI Drivers & Utilities DVD 5SWHMI.0000-00 added. - WinXPe SP2 Images 9S0001.23-020 and 9S0001.24-020 added.
4.80	23.10.2006	Changes / new features - New model number for the manual. - Cover sheet info changed. - "Removing the bus unit" on page 503 added - "Exchanging the processor heat sink, including fan" on page 510 and "Replacing the processor fan" on page 515 added. - Graphics revised. - Glossary changed. - 2 USB flash drive 5MMUSB.2048-00 from SanDisk added.
4,90	08.02.2007	Changes / new features - Hard disks 5A5001.17 and 5A5001.18 added. - Technical data for the hard disks changed. - "Technical data - 30 GB hard disks 5A5001.17 and 5A5001.18" on page 499 added

Table 1: Manual history (cont.)

Version	Date	Comment
5.00	28.03.2007	Changes / new features - USB flash drive 5MMUSB.0256-00 and USB flash drive 5MMUSB.1024-00 cancelled - Table change: Table 119 "Technical data - CompactFlash cards 5CFCRD.xxxx-02" on page 191 Table 121 "Technical data - CompactFlash cards 5CFCRD.xxxx-03" on page 193 - "Exchanging the processor heat sink, including fan" on page 510 and "Replacing the processor fan" on page 515 updated.
5.10	14.05.2007	Changes / new features - Section "USB flash drive" on page 461 updated (quantity -> multitude, delivery contents).

Table 1: Manual history (cont.)

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.

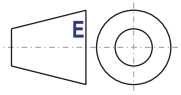
3. Organization of safety notices

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



All dimension diagrams (e.g. dimension diagrams, etc.) are drawn according to European dimension standards.

5. Chapter overview

Chapter	Contents
Chapter 1 "General information"	Overview of Provit industrial PCs, terminology and order/delivery information
Chapter 2 "Controllers"	Descriptions of the different controllers and their components and of all other IPC components.
Chapter 3 "Display units"	Technical data, dimensions and installation guidelines for Provit 5000 display units.
Chapter 4 "Display kits"	Description and data for all display kits (displays for self installation).
Chapter 5 "Keypad modules"	Explanation of Panelware keypad modules and description of all modules
Chapter 6 "Software"	Description of BIOS, BIOS upgrade, Provit 5000 Utilities and the allocation of system resources (interrupts, I/O addresses, etc.).
Chapter 7 "Accessories"	Overview of all accessories and devices available from B&R
Chapter 8 "Technical appendix"	Technical information for touch screen, hard disks, etc.

Table 3: Chapter overview

6. Terminology

Name	Explanation
BIOS	Basic Input and Output System
VGA	Video Graphics Array
MTC	Maintenance Controller
FPC	Flat Panel Controller
FPD	Flat Panel Display
CRT	Cathode Ray Tube (Monitor)
FDD	Floppy disk drive
HDD	Hard Disk Drive
IPC	Industrial PC
PnP	Plug & Play
Provit	Process Visualization Terminal

Table 4: Terminology

7. Provit 5000 industrial PCs

Provit industrial PCs offer the distinct advantage of a modular design for your computer controlled industrial workplace. You can select from a large range of controllers, displays and options which guarantees flexibility for your industrial PC. This includes modular and flexible installation options and fieldbus interfaces constructed for use in industrial environments.

Open architecture

B&R Provit industrial PCs offer you all the advantages of open architecture including performance. This guarantees that your individual requirements are met.

Operating systems

100% compatibility with the IBM AT standard makes it possible to run various operating systems.

Types

Essentially, you have a choice of two types of controller systems:

- IPC5000: The compact all-around model
- IPC5600: For even more flexibility

Within the IPC5000 and IPC5600 product ranges, you can also select between the different mainboards available.

- IPC5000**C** and IPC5600**C**: Intel 440BX chipset, socket 370

Detailed information regarding the system's configurations is available in the respective chapters.

IPCs from the IPC5000 and IPC5600 series represent the high performance end of the Provit IPC line and are divided into the following components:

- System unit
- Bus unit
- Processor
- Mass memory
- Main memory

Note:
For various reasons, diagrams in this manual may have slight differences from their actual appearance. Unless otherwise stated, these differences refer exclusively to design and not to their functionality.

8. Contents of delivery

All devices and accessories (processors, RAM, software, documentation etc.) must be ordered separately from B&R. This means for example, that a user manual is not delivered with the IPC unless it is ordered separately. This measure is taken to prevent bulk purchasers from automatically receiving a large amount of unwanted manuals. In this way, extra financial and logistical expenses can be avoided. A full listing of all IPC accessories available from B&R can be found in the model number overview of the accessories, starting on page 42 or in chapter 7 "Accessories" on page 417.

9. Model numbers

9.1 Bus units

Model number	Description	Note
5C5000.01	**Bus unit with 100 – 240 VAC supply voltage, 2 slots (1 PCI, 2 ISA)** Provit 5000 controller bus unit with 2 slots in total; 1 BR ISA and 1 half-size ISA / PCI. Supply voltage 100 – 240 VAC. For system units 5C5001.xx	*Cancelled since 01/2004 Replaced by: 5C5000.21*
5C5000.02	**Bus unit with 24 VDC power supply, 2 slots (1 PCI, 2 ISA)** Provit 5000 controller bus unit with 2 slots in total; 1 BR ISA and 1 half-size ISA / PCI. 24 VDC supply voltage. For system units 5C5001.xx	*Cancelled since 01/2004 Replaced by: 5C5000.22*
5C5000.11	**Bus unit with 100 – 240 VAC supply voltage, 4 slots (3 PCI, 4 ISA)** Provit 5000 controller bus unit with 4 slots in total; 1 BR ISA and 3 half-size ISA / PCI. Supply voltage 100 – 240 VAC. For system units 5C5001.xx	*Cancelled since 01/2004 Replaced by: 5C5000.31*
5C5000.12	**Bus unit with 24 VDC power supply, 4 slots (3 PCI, 4 ISA)** Provit 5000 controller bus unit with 4 slots in total; 1 BR ISA and 3 half-size ISA / PCI. 24 VDC supply voltage. For system units 5C5001.xx	*Cancelled since 01/2004 Replaced by: 5C5000.32*
5C5000.21	**Bus unit with power supply 100-240 VAC, 2 slots (1 PCI, 1 ISA/PCI combo) with the connection option of the add-on CD-ROM drives (9A5009.01 or 9A5009.02)** Provit 5000 controller bus unit with 2 slots in total; 1 BR ISA and 1 half-size ISA / PCI. Prepared for add-on CD-ROM drive 5A5009.01, or for add-on CD RW drive 9A5009.02. Supply voltage 100-240 V AC. For system units 5C5001.xx.	
5C5000.22	**Bus unit with power supply 24 V DC, 2 slots (1 PCI, 1 ISA/PCI combo) with the connection option of the add-on CD-ROM drives (9A5009.01 or 9A5009.02)** Provit 5000 controller bus unit with 2 slots in total; 1 BR ISA and 1 half-size ISA / PCI. Prepared for add-on CD-ROM drive 5A5009.01, or for add-on CD RW drive 9A5009.02. Supply voltage 24 V DC. For system units 5C5001.xx	
5C5000.31	**Bus unit with power supply 100-240 VAC, 5 slots (2 PCI, 1 ISA/PCI combo, 2 ISA) with the connection option of the add-on CD-ROM drives (9A5009.01 or 9A5009.02)** Provit 5000 controller bus unit with 5 slots in total; 1 BR ISA and 1 half-size ISA. ISA, 1 half-size ISA/PCI and 2 half-size PCI. Prepared for add-on CD-ROM drive 5A5009.01, or for add-on CD RW drive 9A5009.02. Supply voltage 100-240 V AC. For system units 5C5001.xx.	
5C5000.32	**Bus unit with power supply 24 V DC, 5 slots (2 PCI, 1 ISA/PCI combo, 2 ISA) with the connection option of the add-on CD-ROM drives (9A5009.01 or 9A5009.02)** Provit 5000 controller bus unit with 5 slots in total; 1 BR ISA and 1 half-size ISA. ISA, 1 half-size ISA/PCI and 2 half-size PCI. Prepared for add-on CD-ROM drive 5A5009.01, or for add-on CD RW drive 9A5009.02. Supply voltage 24 V DC. For system units 5C5001.xx.	
5C5600.01	**Bus unit with 115/230 VAC power supply, 4 slots (3 PCI, 4 ISA)** Provit 5600 controller bus unit with 4 slots in total; 1 half-size ISA and 3 full-size ISA/PCI. Supply voltage 100/240 VAC with Autoselect For system units 5C5601.xx.	*Cancelled since 10/2001 Replaced by: 5C5600.03*
5C5600.02	**Bus unit with 24 VDC power supply, 4 slots (3 PCI, 4 ISA)** Provit 5600 controller bus unit with 4 slots in total; 1 half-size ISA and 3 full-size ISA/PCI. 24 VDC supply voltage. For system units 5C5601.xx.	*Cancelled since 10/2001 Replaced by: 5C5600.04*

Table 5: Model numbers - bus units

Model number	Description	Note
5C5600.03	**Bus unit with 115/230 VAC power supply, 5 slots (3 PCI, 3 ISA)** Provit 5600 controller bus unit with 5 slots in total; 1 half-size ISA, 1 full size ISA, 1 full size ISA/PCI, 2 full size ISA. Supply voltage 100/240 VAC. For system units 5C5601.xx.	
5C5600.04	**Bus unit with 24 VDC power supply, 5 slots (3PCI, 3 ISA)** Provit 5600 controller bus unit with 5 slots in total; 1 half-size ISA, 1 full size ISA, 1 full size ISA/PCI, 2 full size ISA. Supply voltage 24 V DC. For system units 5C5601.xx.	
5C5600.11	**Bus unit with 115/230 VAC power supply, 6 slots (3 PCI, 6 ISA)** Provit 5600 controller bus unit with 6 slots in total; 1 half-size ISA, 2 full-size ISA and 3 full-size ISA/PCI. Supply voltage 100/240 VAC with Autoselect For system units 5C5601.xx.	*Cancelled since 10/2001 Replaced by: 5C5600.03*
5C5600.12	**Bus unit with 24 VDC power supply, 6 slots (3 PCI, 6 ISA)** Provit 5600 controller bus unit with 6 slots in total; 1 half-size ISA, 2 full-size ISA and 3 full-size ISA/PCI. 24 VDC supply voltage. For system units 5C5601.xx.	*Cancelled since 10/2001 Replaced by: 5C5600.04*

Table 5: Model numbers - bus units (cont.)

9.2 System units

Model number	Description	Note
5C5001.01	**System unit with an Intel 82430HX chipset, VGA, MTC, 2 SIMM slots** Provit 5000 controller system unit without processor. Intel 82430HX chipset, 512 kB PB cache, 2 PS/2 SIMM slots, 1 MB video memory, Award Elite BIOS, 2 serial interfaces and 1 parallel interface. Connections for FPD, monitor, PS/2 AT keyboard, PS/2 mouse, USB, Panelware keypad and external FDD.	*Cancelled since 07/2001*
5C5001.03	**System unit with an Intel 82430HX chipset, VGA, MTC, 2 SIMM slots** Provit 5000 controller system unit without processor. Intel 82430HX chipset, 512 kB PB cache, 2 PS/2 SIMM slots, 2 MB video memory, Award Elite BIOS, 2 serial interfaces and 1 parallel interface. Connections for the FPD, monitor, PS/2 AT keyboard, PS/2 mouse, USB, Panelware keypad modules and external FDD.	*Cancelled since 07/2001*
5C5001.11	**System unit with an Intel 82440BX chipset, VGA, MTC, 3 DIMM slots** Provit 5000 controller system unit for Intel Celeron and Pentium III processors, 2 MB video memory, Intel 82440 BX chipset, 3 DIMM slots, 2 serial interfaces, 1 parallel inter face. Connections for FPD, monitor, PS/2 AT keyboard, PS/2 mouse, USB, external FDD and Ethernet 10/100 (twisted pair), without processor.	*Cancelled since 01/2004 Replaced by: 5C5001.32*
5C5001.12	**System unit with an Intel 82440BX chipset, VGA, MTC, 3 DIMM slots** Provit 5000 controller system unit for Intel Celeron and Pentium III processors, 4 MB video memory, Intel 82440 BX chipset, 3 DIMM slots, 2 serial interfaces, 1 parallel interface. Connections for FPD, monitor, PS/2 AT keyboard, PS/2 mouse, USB, external FDD and Ethernet 10/100 (twisted pair), without processor.	*Cancelled since 01/2004 Replaced by: 5C5001.32*
5C5001.21	**System unit with an Intel 82440BX chipset, VGA, MTC, 3 DIMM slots, R-IDE** Provit 5000 controller system unit for Intel Celeron and Pentium III processors, 2 MB video memory, Intel 82440 BX chipset, 3 DIMM slots, 2 serial interfaces, 1 parallel inter face. Connections for FPD, monitor, PS/2 AT keyboard, PS/2 mouse, USB, remote IDE drive and Ethernet 10/100 (twisted pair), without processor.	*Cancelled since 01/2004 Replaced by: 5C5001.42*
5C5001.22	**System unit with an Intel 82440BX chipset, VGA, MTC, 3 DIMM slots, R-IDE** Provit 5000 controller system unit for Intel Celeron and Pentium III processors, 4 MB video memory, Intel 82440 BX chipset, 3 DIMM slots, 2 serial interfaces, 1 parallel inter face. Connections for FPD, monitor, PS/2 AT keyboard, PS/2 mouse, USB, remote IDE drive and Ethernet 10/100 (twisted pair), without processor.	*Cancelled since 01/2004 Replaced by: 5C5001.42*

Table 6: Model numbers - system units

Model number	Description	Note
5C5001.32	**System unit with an Intel 82440BX chipset, 4MB ATI, MTC, 2 DIMM slots** Provit 5000 controller system unit, for Intel Celeron and Pentium III processors, ATI rage mobility M graphics controller with 4 MB video RAM, Intel 82440 BX chipset , 2 DIMM slots, 2 serial, 1 parallel interfaces, connections for FPD, monitor, PS/2 AT keyboard, PS/2 mouse, USB, ext. FDD and Ethernet 10/100 (twisted pair), without processor.	
5C5001.42	**System unit with an Intel 82440BX chipset, 4 MB ATI, MTC, 2 DIMM slots, R-IDE** Provit 5000 controller system unit, for Intel Celeron and Pentium III processors, ATI rage mobility M graphics controller with 4 MB video RAM, Intel 82440 BX chipset , 2 DIMM slots, 2 serial, 1 parallel interfaces, connections for FPD, monitor, PS/2 AT keyboard, PS/2 mouse, USB, remote IDE drives, and Ethernet 10/100 (twisted pair), without processor	*On request*
5C5601.01	**System unit with an Intel 82430HX chipset, VGA, MTC, 2 SIMM slots** Provit 5600 controller system unit, for Intel Pentium processors, 2 MB video memory, Intel 82430HX chipset, 512 kB PB cache, 2 PS/2 SIMM slots, Award Elite BIOS, 2 serial interfaces and 1 parallel interface. Connections for FPD, monitor, PS/2 AT keyboard, PS/2 mouse, USB, Panelware keypad and external FDD, without processor.	*Cancelled since 07/2001*
5C5601.11	**System unit with an Intel 82440BX chipset, VGA, MTC, 3 DIMM slots** Provit 5600 controller system unit for Intel Celeron and Pentium III processors, 2 MB video memory, Intel 82440 BX chipset, 3 DIMM slots, 2 serial interfaces, 1 parallel interface. Connections for FPD, monitor, PS/2 AT keyboard, PS/2 mouse, USB, external FDD and Ethernet 10/100 (twisted pair), without processor.	*Cancelled since 01/2004 Replaced by: 5C5601.32*
5C5601.12	**System unit with an Intel 82440BX chipset, VGA, MTC, 3 DIMM slots** Provit 5600 controller system unit for Intel Celeron and Pentium III processors, 4 MB video memory, Intel 82440 BX chipset, 3 DIMM slots, 2 serial interfaces, 1 parallel interface. Connections for FPD, monitor, PS/2 AT keyboard, PS/2 mouse, USB, external FDD and Ethernet 10/100 (twisted pair), without processor.	*Cancelled since 01/2004 Replaced by: 5C5601.32*
5C5601.21	**System unit with an Intel 82440BX chipset, VGA, MTC, 3 DIMM slots, R-IDE** Provit 5600 controller system unit for Intel Celeron and Pentium III processors, 2 MB video memory, Intel 82440 BX chipset, 3 DIMM slots, 2 serial interfaces, 1 parallel interface. Connections for FPD, monitor, PS/2 AT keyboard, PS/2 mouse, USB, remote CD-ROM/SuperDisk drives, and Ethernet 10/100, without processor.	*Cancelled since 01/2004 Replaced by: 5C5601.42*
5C5601.22	**System unit with an Intel 82440BX chipset, VGA, MTC, 3 DIMM slots, R-IDE** Provit 5600 controller system unit for Intel Celeron and Pentium III processors, 4 MB video memory, Intel 82440 BX chipset, 3 DIMM slots, 2 serial interfaces, 1 parallel interface. Connections for FPD, monitor, PS/2 AT keyboard, PS/2 mouse, USB, remote CD-ROM/SuperDisk drives, and Ethernet 10/100, without processor.	*Cancelled since 01/2004 Replaced by: 5C5601.42*
5C5601.32	**System 440BX 4ATI MTC 2DIMM** Provit 5600 controller system unit, for Intel Celeron and Pentium III processors, ATI rage mobility M graphics controller with 4 MB video RAM, Intel 82440 BX chipset , 2 DIMM slots, 2 serial, 1 parallel interfaces, connections for FPD, monitor, PS/2 AT keyboard, PS/2 mouse, USB, ext. FDD and Ethernet 10/100 (twisted pair), without processor.	
5C5601.42	**System 440BX 4ATI MTC 2DIMM R-IDE** Provit 5600 controller system unit, for Intel Celeron and Pentium III processors, ATI rage mobility M graphics controller with 4 MB video RAM, Intel 82440 BX chipset , 2 DIMM slots, 2 serial, 1 parallel interfaces, connections for FPD, monitor, PS/2 AT keyboard, PS/2 mouse, USB, remote IDE drives, and Ethernet 10/100 (twisted pair), without processor	*On request*

Table 6: Model numbers - system units (cont.)

9.3 Processors

Model number	Description	Note
5C5002.01	**Pentium 100 processor** Intel Pentium ® processor 100 MHz. Only available together with a system unit.	*Cancelled since 07/2001*
5C5002.02	**Pentium 120 processor** Intel Pentium ® processor 120 MHz. Only available together with a system unit.	*Cancelled since 06/1999*
5C5002.03	**Pentium 133 processor** Intel Pentium® Processor 133 MHz. Only available together with a system unit.	*Cancelled since 04/1999*
5C5002.04	**Pentium 150 processor** Intel Pentium® Processor 150 MHz. Only available together with a system unit.	*Cancelled since 05/1999*
5C5002.05	**Pentium 166 processor** Intel Pentium® Processor 166 MHz. Only available together with a system unit.	*Cancelled since 07/2001*
5C5002.06	**Pentium 200 processor** Intel Pentium® Processor 200 MHz. Only available together with a system unit.	*Cancelled since 05/1999*
5C5002.07	**K6 166 processor** AMD K6 166 MHz processor with MMX technology. Only available together with a system unit.	*Cancelled since 05/1999*
5C5002.08	**Pentium 200 MMX processor** Intel Pentium® processor 200 MHz with MMX technology. Only available together with a system unit.	*Cancelled since 07/2001*
5C5002.09	**K6 266 processor** AMD K6 266 MHz processor. Only available together with a system unit.	*Cancelled since 12/1999*
5C5002.11	**Celeron 300/66 128k F1 processor** Intel Celeron ® processor 300/66, 32 kB L1 cache, 128 kB L2 cache. Only available together with system units 5C5001.1x and 5C5601.1x.	*Cancelled since 04/2004*
5C5002.12	**Celeron 366/66 128k F1 processor** Intel Celeron ® processor 366/66, 32 kB L1 cache, 128 kB L2 cache. Only available together with system units 5C5001.1x and 5C5601.1x.	*Cancelled since 04/2004*
5C5002.13	**Celeron 433/66 128k F1 processor** Intel Celeron ® processor 433/66, 32 kB L1 cache, 128 kB L2 cache. Only available together with system units 5C5001.1x and 5C5601.1x.	*Cancelled since 11/2000*
5C5002.14	**Celeron 566/66 128k F2 processor** Intel Celeron ® processor 566/66, 32 kB L1 cache, 128 kB L2 cache. Only available together with system units 5C5001.1x and 5C5601.1x.	
5C5002.15	**Pentium III 600/100 256k F2 processor** Intel Pentium ® processor III 600MHz, 32 kB L1 cache, 256 kB L2 cache. Only available together with system units 5C5001.1x and 5C5601.1x.	
5C5002.16	**Pentium III 850/100 256k F2 processor** Intel Pentium ® processor III 850 MHz, 32 kB L1 cache, 256 kB L2 cache. Only available together with system units 5C5001.1x and 5C5601.1x.	

Table 7: Model numbers - processors

9.4 Mass memory

Model number	Description	Note
5A5001.01	**Hard disk 420 MB w/DP (ST9420AG)** [1)] Hard disk 420 MB 2.5" (63.5 mm); removable hard disk with a storage capacity of 420 MB and rubber suspension.	*Cancelled since 01/1997*
5A5001.02	**Hard disk 1.44 GB w/DP (MK1403MAV)** [1)] Hard disk 1.44 GB 2.5" (63.5 mm); removable hard disk with a storage capacity of 1.44 GB and rubber suspension.	*Cancelled since 02/1999*
5A5001.03	**Hard disk 2.1 GB (MK2110MAT)** [1)] Hard disk 2.1 GB 2.5" (63.5 mm); removable hard disk with a storage capacity of 2.1 GB and fixed mounting.	*Cancelled since 02/2000*
5A5001.04	**Hard disk 4.3 GB (MK4309MAT)** [1)] Hard disk 4.3 GB 2.5" (63.5 mm); removable hard disk with a storage capacity of 4.3 GB and fixed mounting.	*Cancelled since 02/2000*
5A5001.05	**Hard disk 6 GB w/DP (MHK2060AT)** [1)] Hard disk 6 GB 2.5" (63.5 mm); removable hard disk with a storage capacity of 6 GB and rubber suspension.	*Cancelled since 11/2000*
5A5001.08	**Hard disk 6 GB (MHK2060AT)** [1)] Hard Disk 6 GB 2.5" (63.5 mm); removable hard disk with a storage capacity of 6 GB and fixed mounting.	*Cancelled since 06/2002*
5A5001.10	**Hard disk 20 GB (MHR2020AT#SV)** [1)] Hard Disk 20 GB 2.5" (63.5 mm); removable hard disk with a storage capacity of 20 GB and fixed mounting.	*Cancelled since 10/2002*
5A5001.12	**Hard disk 20 GB (MHS2020AT-ED)** [1)] Hard Disk 20 GB 2.5" (63.5 mm); removable hard disk with a storage capacity of 20 GB and fixed mounting.	*Cancelled since 11/2003 Replaced by: 5A5001.15*
5A5001.13	**Hard Disk 20 GB w/CF (MHS2020AT-ED)** Hard disk 20 GB 2.5" and slide-in CompactFlash slot, fixed mounting, 20 GB memory capacity, without CompactFlash card.	*Cancelled since 11/2003 Replaced by: 5A5001.16*
5A5001.15	**Hard disk 30 GB (MHT2030AR)** Hard disk 30 GB 2.5" (63.5 mm) removable hard disk with a storage capacity of 30 GB and fixed mounting.	
5A5001.16	**Hard disk 30 GB w/CF (MHT2030AR)** Hard disk 30 GB 2.5" and slide-in CompactFlash slot, fixed mounting, 30 GB memory capacity, without CompactFlash card.	
5A5001.17	**Hard disk 30 GB (ST930813AM)** Hard disk 30 GB 2.5" (63.5 mm) removable hard disk with a storage capacity of 30 GB and fixed mounting.	
5A5001.18	**Hard disk 30 GB w/CF (ST930813AM)** Hard disk 30 GB 2.5" and slide-in CompactFlash slot, fixed mounting, 30 GB memory capacity, without CompactFlash card.	
5CFCRD.0032-01	**CompactFlash 32 MB True IDE SanDisk/R2** CompactFlash card with 32 MB Flash PROM, and true IDE/ATA interface.	*Cancelled since 12/2003, replaced by: 5CFCRD.0064-03*

Table 8: Model numbers - mass memory

Model number	Description	Note
5CFCRD.0032-02	**CompactFlash 32 MB TrueIDE SanDisk/A** CompactFlash card with 32 MB Flash PROM, and true IDE/ATA interface.	*Cancelled since 12/2005, replaced by: 5CFCRD.0064-03*
5CFCRD.0064-01	**CompactFlash 64 MB True IDE SanDisk/R2** CompactFlash card with 64 MB Flash PROM, and true IDE/ATA interface.	*Cancelled since 12/2003, replaced by: 5CFCRD.0064-03*
5CFCRD.0064-02	**CompactFlash 64 MB TrueIDE SanDisk/A** CompactFlash card with 64 MB Flash PROM, and true IDE/ATA interface.	*Cancelled since 12/2005, replaced by: 5CFCRD.0064-03*
5CFCRD.0064-03	**CompactFlash 64 MB TrueIDE SSI** CompactFlash card with 64 MB SLC NAND Flash and True IDE/ATA interface	
5CFCRD.0128-01	**CompactFlash 128 MB True IDE SanDisk/R2** CompactFlash card with 128 MB flash PROM and True IDE/ATA interface	*Cancelled since 12/2003, replaced by: 5CFCRD.0128-03*
5CFCRD.0128-02	**CompactFlash 128 MB TrueIDE SanDisk/A** CompactFlash card with 128 MB flash PROM and True IDE/ATA interface	*Cancelled since 12/2005, replaced by: 5CFCRD.0128-03*
5CFCRD.0128-03	**CompactFlash 128 MB TrueIDE SSI** CompactFlash card with 128 MB SLC NAND flash and True IDE/ATA interface	
5CFCRD.0128-01	**CompactFlash 196 MB True IDE SanDisk/R2** CompactFlash card with 196 MB flash PROM and True IDE/ATA interface	*Cancelled since 07/2003*
5CFCRD.0256-01	**CompactFlash 256 MB True IDE SanDisk/R2** CompactFlash card with 256 MB flash PROM and True IDE/ATA interface	*Cancelled since 12/2003, replaced by: 5CFCRD.0256-03*
5CFCRD.0256-02	**CompactFlash 256 MB TrueIDE SanDisk/A** CompactFlash card with 256 MB flash PROM and True IDE/ATA interface	*Cancelled since 12/2005, replaced by: 5CFCRD.0256-03*
5CFCRD.0256-03	**CompactFlash 256 MB TrueIDE SSI** CompactFlash card with 256 MB SLC NAND flash and True IDE/ATA interface	
5CFCRD.0384-01	**CompactFlash 384 MB True IDE SanDisk/R2** CompactFlash card with 384 MB flash PROM and True IDE/ATA interface	*Cancelled since 07/2003*
5CFCRD.0512-01	**CompactFlash 512 MB True IDE SanDisk/R2** CompactFlash card with 512 MB flash PROM and True IDE/ATA interface	*Cancelled since 12/2003, replaced by: 5CFCRD.0512-03*
5CFCRD.0512-02	**CompactFlash 512 MB TrueIDE SanDisk/A** CompactFlash card with 512 MB flash PROM and True IDE/ATA interface	*Cancelled since 12/2005, replaced by: 5CFCRD.0512-03*
5CFCRD.0512-03	**CompactFlash 512 MB TrueIDE SSI** CompactFlash card with 512 MB SLC NAND flash and True IDE/ATA interface	

Table 8: Model numbers - mass memory (cont.)

Model number	Description	Note
5CFCRD.1024-02	**CompactFlash 1024 MB TrueIDE SanDisk/A** CompactFlash card with 1024 MB Flash PROM and true IDE/ATA interface	*Cancelled since 12/2005, replaced by: 5CFCRD.1024-03*
5CFCRD.1024-03	**CompactFlash 1024 MB TrueIDE SSI** CompactFlash card with 1024 MB SLC NAND flash and True IDE/ATA interface	
5CFCRD.2048-02	**CompactFlash 2048 MB TrueIDE SanDisk/A** CompactFlash card with 2048 MB Flash PROM and true IDE/ATA interface	*Cancelled since 12/2005, replaced by: 5CFCRD.2048-03*
5CFCRD.2048-03	**CompactFlash 2048 MB TrueIDE SSI** CompactFlash card with 2048 MB SLC NAND flash and True IDE/ATA interface	
5CFCRD.4096-03	**CompactFlash 4096 MB TrueIDE SSI** CompactFlash card with 4096 MB SLC NAND flash and True IDE/ATA interface	
9A0009.01	**PC card Flash 6MB True IDE** PC card ATA Flash 6 MB Type II PCMCIA card with 6 MB Flash PROM and true IDE/ATA mode	*Cancelled since 05/1999*
9A0009.02	**PC card Flash 40MB True IDE** PC card ATA Flash 40 MB Type II PCMCIA card with 40 MB Flash PROM and true IDE/ATA mode	*Cancelled since 04/2000*
9A0009.03	**PC card Flash 20MB True IDE** PC card ATA Flash 20 MB Type II PCMCIA card with 20 MB Flash PROM and true IDE/ATA mode	*Cancelled since 04/2000*
9A0009.04	**PC card Flash 110MB True IDE** PC card ATA Flash 110 MB Type II PCMCIA card with 110 MB Flash PROM and true IDE/ATA mode	*Cancelled since 04/2000*
9A0009.05	**PC card Flash 60MB True IDE** PC card ATA Flash 60 MB Type II PCMCIA card with 60 MB Flash PROM and true IDE/ATA mode	*Cancelled since 04/2000*
9A0009.06	**PC card Flash 220MB True IDE FMC** PC card ATA Flash 220 MB Type II PCMCIA card with 220 MB Flash PROM and true IDE/ATA mode	*Cancelled since 11/2000*
9A0009.07	**PC card Flash 220MB True IDE** PC card ATA Flash 220 MB Type II PCMCIA card with 220 MB Flash PROM and true IDE/ATA mode	*Cancelled since 11/2000*
9A0009.08	**PC card Flash 48MB True IDE** PC card ATA Flash 48 MB Type II PCMCIA card with 48 MB Flash PROM and true IDE/ATA mode	*Cancelled since 04/2000*
9A0009.09	**PC card Flash 440MB True IDE** PC card ATA Flash 440 MB Type II PCMCIA card with 440 MB Flash PROM and true IDE/ATA mode	*Cancelled since 10/2002*
9A0015.01	**CompactFlash 20MB TrueIDE** CompactFlash card with 20 MB Flash PROM, and true IDE/ATA interface.	*Cancelled since 05/2000*
9A0015.02	**CompactFlash 64MB TrueIDE** CompactFlash card with 64 MB Flash PROM, and true IDE/ATA interface.	*Cancelled since 07/2002*
9A0015.03	**CompactFlash 10MB TrueIDE** CompactFlash card with 10 MB Flash PROM, and true IDE/ATA interface.	*Cancelled since 09/1999*

Table 8: Model numbers - mass memory (cont.)

Model number	Description	Note
9A0015.04	**CompactFlash 48MB TrueIDE** CompactFlash card with 48 MB Flash PROM, and true IDE/ATA interface.	*Cancelled since 04/1999*
9A0015.05	**CompactFlash 128MB TrueIDE** CompactFlash card with 128 MB Flash PROM, and true IDE/ATA interface.	*Cancelled since 07/2002*
9A0015.06	**CompactFlash 32MB TrueIDE** Compact Flash card with 32 MB Flash PROM and true IDE/ATA interface	*Cancelled since 07/2002*
9A0015.07	**CompactFlash 8MB TrueIDE** Compact Flash card with 8 MB Flash PROM and true IDE/ATA interface	*Cancelled since 07/2002*
9A0015.08	**CompactFlash 192MB TrueIDE** Compact Flash card with 192 MB Flash PROM and true IDE/ATA interface	*Cancelled since 07/2002*
9A0015.09	**CompactFlash 320MB TrueIDE** Compact Flash card with 320 MB Flash PROM and true IDE/ATA interface	*Cancelled since 07/2002*
9A0015.10	**CompactFlash 256MB TrueIDE** Compact Flash card with 256 MB Flash PROM and true IDE/ATA interface	*Cancelled since 07/2002*

Table 8: Model numbers - mass memory (cont.)

1) **Note:**The use of a silicon disk is required in vibration and shock environments.

9.5 Main memory

Model number	Description	Note
9A0004.01	**SIM 1 MB (30pin)** 1 MB x 9 (30pin)	*Cancelled since 02/1999*
9A0004.02	**SIMM 4 MB (30 pin)** 4 MB x 9 (30pin)	*Cancelled since 02/1999*
9A0004.03	**PS/2 SIMM 4 MB 1 MB x 32 (72 pin)** PS/2 SIMM 4 MB, for 5C5001.01, 5C5001.03 and 5C5601.01 system units.	*Cancelled since 07/2001*
9A0004.04	**PS/2 SIMM 16 MB 4 MB x 32 (72 pin)** PS/2 SIMM 16 MB, for 5C5001.01, 5C5001.03 and 5C5601.01 system units.	*Cancelled since 07/2001*
9A0004.05	**PS/2 SIMM 8 MB 2 MB x 32 (72 pin)** PS/2 SIMM 8 MB, for 5C5001.01, 5C5001.03 and 5C5601.01 system units.	*Cancelled since 07/2001*
9A0004.06	**PS/2 SIMM 32 MB 8 MB x 32 (72 pin)** PS/2 SIMM 32 MB, for 5C5001.01, 5C5001.03 and 5C5601.01 system units.	*Cancelled since 07/2001*
9A0004.07	**PS/2 SIMM 64 MB 16 MB x 32 (72 pin)** PS/2 SIMM 64 MB, for 5C5001.01, 5C5001.03 and 5C5601.01 system units.	*Cancelled since 11/2000*
9A0004.11	**DIMM SDRAM - PC100 64 MB 8 MB x 64 (168-pin)** DIMM module 64 MB for system units 5C5001.1x, 5C5601.1x, 5C5001.32, 5C5001.42, 5C5601.32 and 5C5601.42.	
9A0004.12	**DIMM SDRAM - PC100 128 MB 16 MB x 64 (168-pin)** DIMM module 128 MB for system units 5C5001.1x, 5C5601.1x, 5C5001.32, 5C5001.42, 5C5601.32 and 5C5601.42.	
9A0004.14	**DIMM SDRAM - PC100 256 MB 32 MB x 64** DIMM module 256 MB for system units 5C5001.1x, 5C5601.1x, 5C5001.32, 5C5001.42, 5C5601.32 and 5C5601.42.	

Table 9: Model numbers - main memory

9.6 Interface boards

Model number	Description	Note
5A5000.01	**IF board 2COM CAN HSK SR PCMCIA** ISA 16-bit interface board, with 2 serial interfaces, Dallas hardware security key, CAN bus interface, 1 PC card slot (Type I, II and III), 256 kB SRAM (battery backed).	
5A5000.02	**IF board 2COM CAN HSK SR PCMCIA ETH** ISA 16-bit interface board, with 2 serial interfaces, Dallas hardware security key, CAN bus 1 PC card slot (Type I, II and III), 256 kB SRAM (battery backed), Ethernet connection (BNC, NE2000 compatible).	*Cancelled since 03/2000*
5A5000.05	**IF board 2COM CAN HSK SR PCMCIA ETHTP** ISA 16-bit interface board, with 2 serial interfaces, Dallas hardware security key, CAN bus interface, 1 PC card slot (Type I, II and III), 256 kB SRAM (battery backed), Ethernet connection (twisted pair).	*Cancelled since 07/2002*
5A5000.06	**IF board 2COM CAN HSK SR PCMCIA ETH** ISA 16-bit interface board, with 2 serial interfaces, Dallas hardware security key, CAN bus interface, 1 PC card slot (Type I, II and III), 256 kB SRAM (battery backed), Ethernet connection (BNC).	*Cancelled since 07/2002*
5A1105.00-090	**ARCNET PC130E ISA card** 8-bit ISA card for operating an Arcnet network. BNC connector. Needs a half-size slot.	*Cancelled since 04/1999*

Table 10: Model numbers - interface boards

Model number	Description	Note
5A1107.00-090	**ARCNET PCX20-CXB ISA card** ARCNET PCX20-CXB ISA card	
5A1109.00-090	**ARCNET PCX-CXB ISA card No: PCX-CXB :CCS** ARCNET PCX-CXB ISA card	
0TP360.04	**ARCNET card AN-520BT; A.111-620-XXX:BDT** ARCNET - card type AN-520BT	*Cancelled since 12/2003*

Table 10: Model numbers - interface boards (cont.)

9.7 Display units

Model number	Description	Note
5D5100.01	**Display unit 10.4" VGA color display (color LCD)** Provit 5000 display unit with LCD color display, 10.4" diagonal, protection IP65 (from front). Comes complete with accessories (cable). Outer dimensions 310 x 236 mm (WxH).	*Cancelled since 05/1999*
5D5100.04	**Display unit 10.4" VGA display (color TFT)** Provit 5000 display unit with VGA color TFT display, 10.4" diagonal, protection IP65 (from front). Comes complete with accessories (cable). Outer dimensions 310 x 236 mm (WxH).	
5D5200.01	**Display unit 10.4" VGA display (color TFT) with touch screen** Provit 5000 display unit with VGA color TFT display, 10.4" diagonal and integrated touch screen (resistive). IP65 protection (from front). Comes complete with accessories (cable). Outer dimensions 310 x 236 mm (WxH).	*Cancelled since 03/1999*
5D5200.04	**Display unit 13.8" VGA display (color TFT) with touch screen** Provit 5000 display unit with VGA color TFT display, 13.8" diagonal and integrated touch screen (resistive). IP65 protection (from front). Comes complete with accessories (cable). Outer dimensions 392 x 296 mm (WxH).	*Cancelled since 01/1999*
5D5201.02	**Display unit 10.4" SVGA display (color TFT) with touch screen** Provit 5000 display unit with SVGA color TFT display, 10.4" diagonal and integrated Touch Screen (resistive). IP65 protection (from front). Comes complete with accessories (cable). Outer dimensions 310 x 236 mm (WxH).	*Cancelled since 03/1999*
5D5201.03	**Display unit 12.1" SVGA display (color TFT) with touch screen** Provit 5000 display unit with SVGA color TFT display, 12.1" diagonal and integrated touch screen (resistive). IP65 protection (from front). Comes complete with accessories (cable). Outer dimensions 379 x 300 mm (WxH).	*Cancelled since 03/1999*
5D5202.01	**Display unit 13.8" XGA display (color TFT) with touch screen** Provit 5000 display unit with XGA color TFT display, 13.8" diagonal and integrated touch screen (resistive). IP65 protection (from front). Comes complete with accessories (cable). Outer dimensions 392 x 296 mm (WxH).	*Cancelled since 03/1999*
5D5202.03	**Display unit 13.8" XGA display (color TFT) with touch screen** Provit 5000 display unit with XGA color TFT display, 13.8" diagonal and integrated touch screen (resistive). IP65 protection (from front). Comes complete with accessories (cable). Outer dimensions 392 x 296 mm (WxH).	*Cancelled since 02/1999 Replaced by: 5D5212.02*
5D5210.01	**Display unit 10.4" VGA display (color TFT) with touch screen** Provit 5000 display unit with VGA color TFT display, 10.4" diagonal and integrated touch screen (resistive). IP65 protection (from front). Comes complete with accessories (cable). Outer dimensions 310 x 236 mm (WxH).	
5D5211.02	**Display unit 10.4" SVGA display (color TFT) with touch screen** Provit 5000 display unit with SVGA color TFT display, 10.4" (264 mm) diagonal and integrated touch screen (resistive) IP65 protection (from front). Comes complete with accessories (cable). Outer dimensions 310 x 236 mm (WxH).	

Table 11: Model numbers - display units

Model number	Description	Note
5D5211.03	**Display unit 12.1" SVGA display (color TFT) with touch screen** Provit 5000 display unit with SVGA color TFT display kit, 12.1" diagonal and integrated touch screen (resistive) Outer dimensions 379 x 300 mm (WxH).	
5D5211.06	**Display unit 12.1" SVGA display (color TFT) with touch screen (infrared)** Provit 5000 display unit 12.1" SVGA color TFT display with touch screen (infrared). IP65 protection (from front). Outer dimensions 379 x 300 mm (WxH).	
5D5212.01	**Display unit 13.8" XGA display (color TFT) with touch screen** Provit 5000 display unit with XGA color TFT display, 13.8" diagonal and integrated touch screen (resistive). IP65 protection (from front). Comes complete with accessories (cable). Outer dimensions 392 x 296 mm (WxH).	*Cancelled since 12/1999*
5D5212.02	**Display unit 15" XGA display (color TFT) with touch screen** Provit 5000 display unit with 15" XGA color TFT display, and integrated touch screen (resistive). IP65 protection (from front). Outer dimensions 435 x 330 mm (WxH).	
5D5212.04	**Display unit 15" XGA display (color TFT) with touch screen** Provit 5000 display unit with 15" XGA color TFT display with touch screen (resistive). IP65 protection (from front). Outer dimensions 420 x 330 mm (WxH).	
5D5213.01	**Display unit 18.1" SXGA display (color TFT) with touch screen** Provit 5000 display unit with 18.1" SXGA color TFT display, and integrated touch screen (resistive). IP65 protection (from front). 24 VDC supply voltage. Outer dimensions 482 x 399 mm (WxH).	*Cancelled since 10/2003*
5D5500.10	**Display unit 10.4" VGA display (color TFT) with keys.** Provit 5000 display unit with VGA color TFT display, 10.4" diagonal, 23 function keys with LED and 20 system keys. IP65 Protection (from front) Outer dimensions 310 x 387 mm (WxH).	*Cancelled since 03/1999*
5D5500.32	**Display unit 10.4" VGA display (color TFT) with keys.** Provit 5000 display unit with VGA color TFT display, 10.4" diagonal, 23 function keys with LED and 20 system keys. IP65 Protection (from front) Outer dimensions 310 x 387 mm (WxH).	*Cancelled since 02/1999 Replaced by: 5D5510.10*
5D5501.01	**Display unit 10.4" SVGA display (color TFT) with keys** Provit 5000 display unit with SVGA color TFT display, 10.4" diagonal, 23 function keys with LED and 20 system keys. IP65 Protection (from front) Outer dimensions 310 x 387 mm (WxH).	*Cancelled since 01/1999*
5D5510.10	**Display unit 10.4" VGA display (color TFT) with keys.** Provit 5000 display unit with VGA color TFT display, 10.4" diagonal, 23 function keys with LED and 20 system keys. Outer dimensions 310 x 387 mm (WxH).	*Replacement for: 5D5500.32*
5D5600.01	**Display unit 10.4" VGA display (color TFT) with keys.** Provit 5600 display unit with VGA color TFT, 10.4" diagonal, 46 function keys with LED and 26 system keys, DIN AT keyboard socket and status LEDs. Outer dimensions 19" x 7 HE (WxH).	
5D5600.02	**Display unit 10.4" VGA display (color TFT) with keys and touch pad.** Provit 5600 display unit with VGA color TFT, 10.4" diagonal, resistive touch pad, 46 function keys with LED and 26 system keys, DIN AT keyboard socket and status LEDs. Comes complete with accessories (cable). Outer dimensions 19" x 7 HE (WxH).	
5D5600.03	**Display unit 10.4" VGA display (color TFT) with keys and touch screen.** Provit 5600 display unit with VGA color TFT, 10.4" diagonal, resistive touch screen, 46 function keys with LED and 26 system keys, DIN AT keyboard socket and status LEDs. Outer dimensions 19" x 7 HE (WxH).	
5D5601.01	**Display unit 12.1" VGA display (color TFT) with keys.** Provit 5600 display unit with VGA color TFT, 12.1" diagonal, 46 function keys with LED and 26 system keys, DIN AT keyboard socket and status LEDs. Outer dimensions 19" x 7 HE (WxH).	

Table 11: Model numbers - display units (cont.)

Model number	Description	Note
5D5601.02	**Display unit 12.1" VGA display (color TFT) with keys and touch pad.** Provit 5600 display unit with VGA color TFT, 12.1" diagonal, resistive touch pad, 46 function keys with LED and 26 system keys, DIN AT keyboard socket and status LEDs. Comes complete with accessories (cable). Outer dimensions 19" x 7 HE (WxH).	
5D5601.03	**Display unit 12.1" VGA display (color TFT) with keys and touch screen.** Provit 5600 display unit with VGA color TFT, 12.1" diagonal, resistive touch screen, 46 function keys with LED and 26 system keys, DIN AT keyboard socket and status LEDs. Outer dimensions 19" x 7 HE (WxH).	
5D9200.01	**Display unit 20.1" display (color TFT) with touch screen** Provit display unit with color TFT display, 1280 x 1024 pixel resolution, 20.1" (510 mm) diagonal and integrated touch screen (resistive). The display unit is equipped with a standard RGB connector and can be operated on each PC with a VGA connector. Additionally, this display unit supports the emulation of VGA, SVGA and XGA resolution. IP65 protection (from front). Comes complete with accessories (cable, driver software and manual). Outer dimensions 566 x 466 mm (WxH).	*Cancelled since 03/2000*

Table 11: Model numbers - display units (cont.)

9.8 Display kits

Model number	Description	Note
5D5000.03	**Display kit with 10.4" VGA display (color TFT)** Provit 5000 display kit, with VGA color TFT display, 10.4" diagonal. Without housing.	
5D5000.10	**Display kit with 10.4" VGA display (color LCD)** Provit 5000 display kit, with VGA color LCD kit, 10.4" diagonal. Comes complete with accessories (approx. 250 mm cable) but without housing.	
5D5000.14	**Display kit with 13.8" VGA display (color TFT)** Provit 5000 display kit, with VGA color TFT display, 13.8" diagonal. Comes complete with accessories (approx. 250 mm cable) but without housing.	*Cancelled since 01/2000*
5D5000.18	**Display kit with 13.8" XGA display (color TFT)** Provit 5000 display kit, with XGA color TFT display, 13.8" diagonal. Comes complete with accessories (approx. 250 mm cable) but without housing.	*Cancelled since 01/2000*
5D5001.03	**Display kit with 12.1" SVGA display (color TFT) and touch screen** Provit 5000 display kit, with SVGA color TFT display, 12.1" diagonal, with touch screen. Comes complete with accessory cable, but without housing.	

Table 12: Model numbers - display kits

9.9 Accessories

Model number	Description	Note
0AC201.9	**Lithium batteries (5 pcs.)** Lithium batteries, 5 pcs., 3 V / 950 mAh	
4A0006.00-000	**Lithium battery (1 pcs.)** Lithium battery, 1 pcs., 3 V / 950 mAh	
4E0011.01-090	**Keypad module 16 keys, blue** Panelware keypad module, blue, 16 keys with LED	
4E0021.01-090	**Keypad module, numeric, blue** Panelware keypad module, blue, 12 keys as number block, 4 keys with LED.	

Table 13: Model numbers - accessories

Model number	Description	Note
4E0031.01-090	**Keypad module 8 keys, blue** Panelware keypad module, blue, 8 keys with LED, 1 field for company logo	
4E0041.01-090	**Keypad module 4 keys, blue** Panelware keypad module, blue, 4 keys with LED, 4 fields for additional information	
4E0050.01-090	**Dummy module, blue** Panelware special keypad module, blue, dummy module	
4E0060.01-090	**Emergency stop, blue** Panelware special keypad module, blue, E-stop button	
4E0070.01-090	**Key switch, blue** Panelware special keypad module, blue, 1 key switch, 1 On/Off switch	
4E0080.01-090	**START/STOP, blue** Panelware special keypad module, blue, 2 keys, labeled with START and STOP, 1 field for company logo	
5A1102.00-090	**RS232 ISA interface board** 16-bit ISA card with two electrically isolated interfaces RS232 connectors.	
5A1104.00-090	**Profibus ISA card** 16-bit ISA card with two Profibus network connectors. Needs a full size ISA slot.	*Cancelled since 06/2003*
5A1106.00-090	**4x RS232 ISA card C104P 4x9-pin** 4x RS232 ISA card, C104P, 16-bit ISA card with 4 serial interfaces (RS232).	
5A2001.01	**External floppy drive, 3.5" 1.44 MB, beige** External 3.5" floppy disk drive, beige front	
5A2001.02	**Floppy disk drive transparent door, lockable, IP55** Transparent door for external floppy disk drive 5A2001.01 and 5A2001.05. With lock, sealed with gasket, IP55 protection (from front).	
5A2001.05	**External floppy drive, 3.5" 1.44 MB, black** External 3.5" floppy disk drive, black front	
5A2500.01	**FDD extension** Front plate for installing an external floppy disk drive and two optional entry devices.	
5A2500.06	**A4 legend strips 10.4" black** Panel A4 legend strip template (10.4") for display units 5D2500.22 and 5D5501.01; 1 sheet, incl. CorelDraw file.	*Cancelled since 05/2003*
5A2500.09	**A4 legend strips 10.4" gray** A4 legend strip template for display unit 5D5510.10; 1 sheet, with CorelDraw file.	
5A5002.01	**Silicon disk adapter PC card** ATA/IDE adapter for operating a PC card ATA Flash disk as a silicon disk	*Cancelled since 10/2002*
5A5002.02	**Dual CompactFlash silicon disk adapter** Dual CompactFlash silicon disk adapter. With 2 slots for operation of CompactFlash in IPC5000, IPC5600, IPC5000C, IPC5600C.	
5A5003.02	**Remote CD ROM / SuperDisk 120** Incl. mounting bracket. Without front cover, for connection to a 5C5001.21x or 5C5601.2x system unit. Dimensions 156 x 52 x 164 mm (WxHxD)	*Cancelled since 07/2002*
5A5003.03	**Controller R-IDE front cover** For R-IDE CD-ROM controllers / LS120 5A5003.02 and R-IDE CD-ROM 5A5003.07	
5A5003.07	**Remote IDE CD-ROM** Incl. mounting bracket. Without front cover for connecting to system units 5C5001.2x and 5C5601.2xDimensions 156 x 52 x 164 mm (WxHxD)	

Table 13: Model numbers - accessories (cont.)

Model number	Description	Note
5A5003.08	**Remote CD ROM / SuperDisk 240** Incl. mounting bracket. Without front cover for connecting to system units 5C5001.2x and 5C5601.2xDimensions 156 x 52 x 164 mm (WxHxD)	*Cancelled since 08/2002*
5A5004.01	**Remote display cable (0.6 m)** Remote display cable (0.6 m) for Provit 5000/5600	
5A5004.02	**Remote display cable (1.8 m)** Remote display cable (1.8 m) for Provit 5000/5600	
5A5004.05	**Remote display cable (5 m)** Remote display cable 5 m for Provit 5000/5600	
5A5004.06	**Remote display cable (5 m) with angled plug.** Remote display cable (5 m) with angled plug (70°) for Provit 5000/5600.	
5A5004.10	**Remote display cable (10 m)** Remote display cable 10 m for Provit 5000/5600	
5A5004.11	**Remote display cable (10 m) with angled plug.** Remote display cable (10 m) with angled plug (70°) for Provit 5000/5600.	
5A5007.01	**Panel flange adapter, type A** Panel flange adapter type A for display unit 5D5212.04.	
5A5008.01	**Slot cover** Slot cover for bus units 5C5000.01/02.	
5A5008.02	**Slot cover** Slot cover for bus units 5C5000.11/12.	
5A5008.03	**Slot cover with CompactFlash for 5C5000.01/02** Slot cover for bus units 5C5000.01, 5C5000.02, 5C5000.21 and 5C5000.22. Cutout for 1 CompactFlash slot.	
5A5009.01	**Provit 5000 controller CD-ROM** Add-on CD-ROM drive for bus units 5C5000.2x and 5C5000.3x.	
5A5009.02	**Provit 5000 controller CD-RW** Add-on CD-RW drive for bus units 5C5000.2x and 5C5000.3x.	
5A5010.01	**Remote display adapter - local unit** Remote display adapter for connecting Provit 5000 / 5600 display units with GS link remote unit 5A5010.02; including cable (IPC – GS link local unit), 24 V DC supply voltage	
5A5010.02	**GS link remote unit** Remote display adapter for connecting Provit 5000 / 5600 display units to local unit 5A5010.01; cable 5CAGSM.xxxx-00 or 5CAGSG.xxxx-00 is required.	
5A5600.01	**FDD controller** FDD controller, for 5C5601.xx system units.	
5A5600.02	**FDD controller / CD-ROM** FDD controller and CD-ROM, for 5C5601.xx system units.	
5A5600.03	**FDD panel** FDD panel, for Provit 5600 display units.	
5A5600.04	**Controller LS120 CD-ROM** Controller LS120 and CD-ROM drive for system units 5C5601.xx	*Cancelled since 08/2002*
5A5600.05	**FDD controller / DVD-ROM** FDD controller and DVD-ROM drive, for system units 5C5601.xx.	
5A5600.06	**Controller ZIP250 CD ROM** Controller ZIP250 and CD-ROM drive for system units 5C5601.xx.	*on request*

Table 13: Model numbers - accessories (cont.)

Model number	Description	Note
5A5600.07	**FDD controller CD-RW** Controller FDD and DVD-ROM drive, for system units 5C5601.xx.	
5A5600.08	**Panel R-IDE CD-ROM / LS120** Remote panel CD-ROM/SuperDisk 120, for installation in 5D56xx.xx display units; for connection to system units 5C5001.2x or 5C5601.2x; without cable. Dimensions 145 x 45 x 140 mm (WxHxD).	*Cancelled since 07/2002*
5A5600.09	**LS240 controller CD-ROM** LS240 controller and CD-ROM drive for system units 5C5601.xx.	*Cancelled since 08/2002*
5A5600.10	**Remote panel CD-ROM/SuperDisk 240** For installation in display units 5D56xx.xx, for connection to system units 5C5001.2x or 5C5601.2x; without cable. Dimensions 145 x 45 x 140 mm (WxHxD).	*Cancelled since 08/2002*
5A5601.01	**IPC5000 cables** IPC 5000 cables for connecting display, touch screen and Panel FDD to the IPC 5000 (when installing the IPC 5000 on display units 5D560x.xx)	
5A5601.02	**IPC5600 cables** IPC5600 cables for connecting display and touch screen to an IPC5600 (when installing IPC5600/5600C on display units 5D5212.02 and 5D5213.01)	
5A5602.01	**A4 legend strips 10.4" gray** A4 legend strip template (10.4 in) for display units 5D5600.0x; 1 sheet, with CorelDraw file.	
5A5602.02	**A4 legend strips 12.1" gray** A4 legend strip template (12.1") for display units 5D5601.0x, 1 sheet, with CorelDraw file.	
5A5603.01	**Replacement filter for 5C5600.01/02 (10 pcs.)** Fan filters for 5C5600.0x (10 pcs.)	
5A5608.02	**Slot cover** Slot cover for system units 5C5600.11/12.	
5A9000.01	**Provit fitting template** Fitting template for all standard Provit 2000 Provit 5000.	*Cancelled since 11/2000*
5CAGSG.0150-00	**Flexible remote display cable (15 m)** For operating a display unit with GS Link to an IPC.	*Cancelled since 10/2003*
5CAGSG.0200-00	**Flexible remote display cable (20 m)** For operating a display unit with GS Link to an IPC.	*Cancelled since 10/2003*
5CAGSG.0250-00	**Flexible remote display cable (25 m)** For operating a display unit with GS Link to an IPC.	*Cancelled since 10/2003*
5CAGSG.0300-00	**Flexible remote display cable (30 m)** For operating a display unit with GS Link to an IPC.	*Cancelled since 10/2003*
5CAGSG.0350-00	**Flexible remote display cable (35 m)** For operating a display unit with GS Link to an IPC.	*Cancelled since 10/2003*
5CAGSM.0150-00	**Standard remote display cable (15 m)** For operating a display unit with GS Link to an IPC.	
5CAGSM.0200-00	**Standard remote display cable (20 m)** For operating a display unit with GS Link to an IPC.	
5CAGSM.0250-00	**Standard remote display cable (25 m)** For operating a display unit with GS Link to an IPC.	
5CAGSM.0300-00	**Standard remote display cable (30 m)** For operating a display unit with GS Link to an IPC.	

Table 13: Model numbers - accessories (cont.)

Model number	Description	Note
5CAGSM.0350-00	**Standard remote display cable (35 m)** For operating a display unit with GS Link to an IPC.	
5E9600.01-010	**AT keyboard 19" IP65 German** AT keyboard for front mount installation in the 19" format (482.6 mm). German keyboard layout.	
5E9600.01-020	**AT keyboard 19" IP65 English (US)** AT keyboard for front mount installation in the 19" format (482.6 mm). US keyboard layout.	
5MMUSB.0128-00	**USB flash drive 128 MB SanDisk** USB 2.0 flash drive 128 MB	*Cancelled since 12/2005 - Replaced by 5MMUSB.0512-00*
5MMUSB.0256-00	**USB flash drive 256 MB SanDisk** USB 2.0 flash drive 256 MB	*Cancelled since 03/2007 - Replaced by 5MMUSB.0512-00*
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	*Cancelled since 03/2007 - Replaced by 5MMUSB.2048-00*
5MMUSB.2048-00	**USB flash drive 2 GB SanDisk** USB 2.0 flash drive 2 GB	
7AC911.9	**Bus connector, CAN** CAN bus plug with integrated terminating resistance (120 Ohm)	
9A0001.03	**AC power cable with plug IPC 5000/5000C/5600/5600C (2 m)** Power cable with a suitable plug for the IPC 5000 (can be bolted together) and standard German wall plug at the other end. Length: 2 m.	
9A0002.02	**PS/2 Adapter AT female to the PS/2 male** PS/2 keyboard adapter, adapter for connecting an AT keyboard with DIN connector to an IPC2000/IPC5000 PS/2 socket	
9A0003.01	**Dallas keyring adapter** Dallas keyring adapter for operating the Dallas dongles on a parallel PC interface	
9A0005.01	**Centronics cable (1.8 m)** Centronics cable (1.8 m) for connecting a printer or external floppy disk drive to an IPC	
9A0005.03	**Centronics cable (0.5 m)** Centronics cable (0.5 m) for connecting a printer or external floppy disk drive to an IPC	
9A0007.01	**Provit IPC keypad module cable (90 cm)** Keypad module cable (90 cm) for connecting PANELWARE keypad modules to a Provit IPC	
9A0008.01	**Arcnet PC card PCM20-CXB** PC card PCM20-CXB, type II PCMCIA card COM20020, ARCNET controller and BNC connection, without PCMCIA software	*Cancelled since 11/2003*
9A0010.02	**PCI Ultra SCSI Adapter AHA 2940AU** PCI Ultra SCSI adapter; AHA 2940AU PCI card for operating SCSI devices to a PC including documentation and software without cable DB50mini connector.	*Cancelled since 12/2003*
9A0011.02	**External SCSI CDROM 100 – 240 VAC supply voltage DB (50m)** External SCSI CD-ROM, external 12 x CD-ROM drive in desktop housing. 100 – 240 VAC. supply voltage, with documentation and software. DB50mini connector.	*Cancelled since 12/2003*

Table 13: Model numbers - accessories (cont.)

Model number	Description	Note
9A0012.01	**SCSI cable DB50mini, length 1.8 m** SCSI cable DB50mini 1.8 m cable for operating the external SCSI CD-ROM drive to the PCI Ultra SCSI adapter.	*Cancelled since 12/2003*
9A0013.01	**Pen for resistive touch screen**	
9A0014.02	**RS232 extension cable (1.8 m)** RS232 extension cable e.g. for operating a discharged Provit 5000/5600 display unit with touch screen. Length: 1.8 m.	
9A0014.05	**RS232 extension cable (5 m)** RS232 extension cable e.g. for operating a discharged Provit 5000/5600 display unit with touch screen. Length: 5 m.	
9A0014.10	**RS232 extension cable (10 m)** RS232 extension cable e.g. for operating a discharged Provit 5000/5600 display unit with touch screen. Length: 10 m.	
9A0015.99	**CompactFlash adapter**	
9A0016.01	**PS/2 Extension Cable, length 2.0 m**	
9A0017.01	**RS232 null modem cable (0.6 m)** To connect UPS and IPC (9-pin DSUB socket - 9-pin DSUB socket)	
9A0017.02	**RS232 null modem cable (1.8 m)** To connect UPS and IPC (9-pin DSUB socket - 9-pin DSUB socket)	
9A0100.11	**UPS 24 VDC** 24 VDC input, 24 VDC output, serial interface	
9A0100.12	**UPS battery unit type A** 24 V; 7 Ah; including battery cage	
9A0100.13	**UPS battery unit type A (replacement part)** 2 x 12 V; 7 Ah; for battery unit 9A0100.12	
9A0100.14	**UPS battery unit type B** 24 V; 2.2 Ah; including battery cage	
9A0100.15	**UPS battery unit type B (replacement part)** 2 x 12 V; 2.2 Ah; for battery unit 9A0100.14	
9A0100.16	**UPS battery unit, type C 24V 4.5Ah** 24 V; 4.5 Ah; including battery cage	
9A0100.17	**UPS battery unit, type C 24V 4.5Ah (replacement part)** 2 x 12 V; 4.5 Ah; for battery unit 9A0100.16	
5A5011.01	**Replacement part, processor heat sink / fan** Contains one processor heat sink, one processor fan and heat conductive paste (2g packet) for Provit 5000 and Provit 5600.	
5A5011.02	**Replacement part, processor fan** Contains one processor fan for Provit 5000 and Provit 5600.	

Table 13: Model numbers - accessories (cont.)

9.10 Software

Model number	Description	Note
5S0000.01-090	**Provit Drivers & Utilities CD** Provit Drivers & Utilities CD ROM, contains driver (touch screen, graphics, etc.) and the latest BIOS upgrades for all Provit product lines	
5S5000.01-090	**Provit 5000 Utilities** Includes libraries, DLL's, for operating systems MS DOS®, MS Windows® 3.x , Windows 95, Windows NT for usage of the maintenance functions.	*Cancelled since 11/2000*
5S5000.02-090	**Provit 5000 Upgrade Disk** The Provit 5000 Upgrade Disk contains the latest versions of BIOS (Elite BIOS, VGA BIOS, MTC BIOS) for the IPC 5000.	*Cancelled since 11/2000*
5S5000.03-090	**Provit 5000 Graphics** Includes the current versions of graphics drivers for operating systems like MS-DOS® (VESA), MS- Windows ® 3.x, Windows 95, Windows NT and OS/2.	*Cancelled since 11/2000*
5S5000.04-090	**Provit 5000 Upgrade Service Disk** Provit 5000 Upgrade Service Disk	*Cancelled since 11/2000*
5S5001.01-090	**Provit Mkey Utilities** For configuring modular keypads to Provit IPCs, manual included.	*Cancelled since 11/2000*
5S5001.02-090	**Provit Mkey Utilities Development Kit** Implementation instructions for operating the modular keypad to an IPC. Example programs and description included.	*Cancelled since 11/2000*
5S0002.01-020	**Phoenix PC Card Manager** Provit PC card utilities software for operating PC card compatible cards, including card and socket services for PCMCIA cards.	*Cancelled since 05/2002*
5S0003.01-090	**Dynapro touch screen utilities** Touch screen utilities	*Cancelled since 05/1999*
5S0003.02-020	**Elo touch screen utilities** Elo touch screen utilities driver for display units 5D2210.xx, 5D520x.xx, 5D521x.xx,5D560x.03. For MS-DOS, Windows 3.x, Windows 95, Windows NT and OS/2	*Cancelled since 11/2000*
5S0003.04-020	**Interlink touch pad utilities** Interlink touch pad utilities for display units 5D560x.02	*Cancelled since 11/2000*
5S0004.01-090	**CAN XCI library + source** CAN XCI library + source	*Cancelled since 12/2001*
5S0010.01-020	**Intel EtherExpress Utilities** Driver for the Ethernet interface of the ISA card 5A5000.05 and 5A5000.06, for MS-DOS, Windows 3.x, Windows 95, Windows NT and OS/2	*Cancelled since 11/2000*
5SWHMI.0000-00	**HMI Drivers & Utilities DVD** Contains drivers, utilities, software upgrades and user's manuals for B&R panel system products (see B&R homepage – Industrial PCs, Visualization and Operation).	
5SWUTI.0000-00	**OEM Nero CD-RW software** OEM Nero CD-RW software Only available with a CD-RW drive.	
9S0000.01-010	**OEM MS-DOS 6.22, German diskette** OEM Microsoft MS-DOS 6.22, German diskettes Only delivered with a new IPC.	
9S0000.01-020	**OEM MS-DOS 6.22, English diskette** OEM Microsoft MS-DOS 6.22, English diskettes Only delivered with a new IPC.	

Table 14: Model numbers - Software

Model number	Description	Note
9S0000.02-010	**OEM MS-Win95, German CD** OEM Microsoft Windows 95, English CD Only delivered with a new IPC.	*Cancelled since 04/2004*
9S0000.02-020	**OEM MS-Win95, English CD** OEM MS-Windows 95, English CD, manual included. Only delivered with a new IPC.	*Cancelled since 04/2004*
9S0000.03-010	**OEM MS-DOS 6.22 / MS Win3.11, German diskette** OEM Microsoft MS-DOS and Windows 3.11, German diskettes Only delivered with a new IPC.	
9S0000.03-020	**OEM MS-DOS 6.22 / MS-Win3.11, English diskette** OEM Microsoft MS-DOS and Windows 3.11, English diskettes Only delivered with a new IPC.	
9S0000.04-010	**OEM MS-WinNT4.0 WS, German CD** OEM MS-Windows NT4.0 WS, German CD Only delivered with a new IPC.	
9S0000.04-020	**OEM MS-WinNT4.0 WS, English CD** OEM MS-Windows NT4.0 WS, English CD Only delivered with a new IPC.	
9S0000.05-010	**OEM MS-Win98, German CD** OEM MS Windows 98, German CD Only delivered with a new IPC.	
9S0000.05-020	**OEM MS-Win98, English CD** OEM MS Windows 98, English CD Only delivered with a new IPC.	
9S0000.06-010	**OEM MS-Win2000 Professional, German CD** OEM MS Windows 2000, German CD Only delivered with a new IPC.	
9S0000.06-020	**OEM MS-Win2000 Professional, English CD** OEM MS Windows 2000, English CD Only delivered with a new IPC.	
9S0000.08-010	**OEM MS-Win XP Professional, German CD** OEM MS-Win XP Professional, German CD Only delivered with a new IPC.	
9S0000.08-020	**OEM MS-Win XP Professional, English CD** OEM MS-Win XP Professional, English CD Only delivered with a new IPC.	
9S0001.04-020	**OEM MS-WinNT Embedded runtime IPC5000/IPC5600** OEM MS-WinNT Embedded runtime IPC5000 class 2 image (English) preinstalled on a CompactFlash card (192 MB). For IPC 5000 (5C5001.0x) and IPC 5600 (5C5601.0x)	*Cancelled since 01/2002*
9S0001.05-020	**OEM MS-WinNT Embedded runtime IPC5000C/IPC5600C** OEM MS-WinNT Embedded runtime IPC5000C class 2 image (English) preinstalled on a CompactFlash card (256 MB). For IPC5000C (5C5001.1x) and IPC5600C (5C5601.1x).	
9S0001.11-090	**OEM MS Windows XP Embedded Runtime** OEM MS Windows XP Embedded runtime license. Only available with a new IPC.	
9S0001.14-020	**OEM MS-WinXPe IPC5000C/5600C w/CF** OEM MS-WinXP Embedded Runtime IPC5000C, image (English) preinstalled on a Compact Flash card (512 MB). For IPC5000C (5C5001.1x, 5C5001.2x) and IPC5600C (5C5601.1x, 5C5601.2x). Only available with a new IPC.	

Table 14: Model numbers - Software (cont.)

Model number	Description	Note
9S0001.18-020	**OEM MS-WinXPe IPC5000C/5600C ATI w/CF** OEM MS-WinXP Embedded Runtime IPC5000C, image (English) preinstalled on a Compact Flash card (512 MB). For IPC5000C (5C5001.3x, 5C5001.4x) and IPC5600C (5C5601.3x). Only available with a new IPC.	
9S0001.23-020	**OEM MS-WinXPe SP2 IPC5000C/5600C** OEM MS-WinXP Embedded Runtime IPC5000C, image (English) with Windows XP Service Pack 2 preinstalled on a Compact Flash card (512 MB). For IPC5000C (5C5001.1x, 5C5001.2x) and IPC5600C (5C5601.1x, 5C5601.2x). Only available with a new IPC.	
9S0001.24-020	**OEM MS-WinXPe SP2 IPC5000C/5600C ATI** OEM MS-WinXP Embedded Runtime IPC5000C, image (English) with Windows XP Service Pack 2 preinstalled on a Compact Flash card (512 MB). For IPC5000C (5C5001.3x, 5C5001.4x) and IPC5600C (5C5601.3x). Only available with a new IPC.	

Table 14: Model numbers - Software (cont.)

9.11 Documentation

Model number	Description	Note
MAPRV5000-0	Provit 5000 user's manual, German	
MAPRV5000-E	Provit 5000 user's manual, English	
MAPRV5000-F	Provit 5000 user's manual, French	
MAMKEY-0	Provit Mkey User's Manual, German	
MAMKEY-E	Provit Mkey User's Manual, English	
MAMKEY-F	Provit Mkey User Manual, French	
MAUSV1-0	UPS Short Description, German	
MAUSV1-E	UPS Short Description, English	
MAUSV1-F	UPS Short Description, French	

Table 15: Model numbers - documentation

10. Typical topologies

10.1 Industrial PC as central controller and visualization

The control program runs on an industrial PC. The visualization project is integrated with Visual Components. A display unit is connected to the IPC either locally or remotely. The IPC is networked over Ethernet TCP/IP; additional Power Panel-based operator terminals can be also connected via Ethernet. Communication to I/O systems with axes is made using fieldbus systems (CAN, ETHERNET Powerlink).

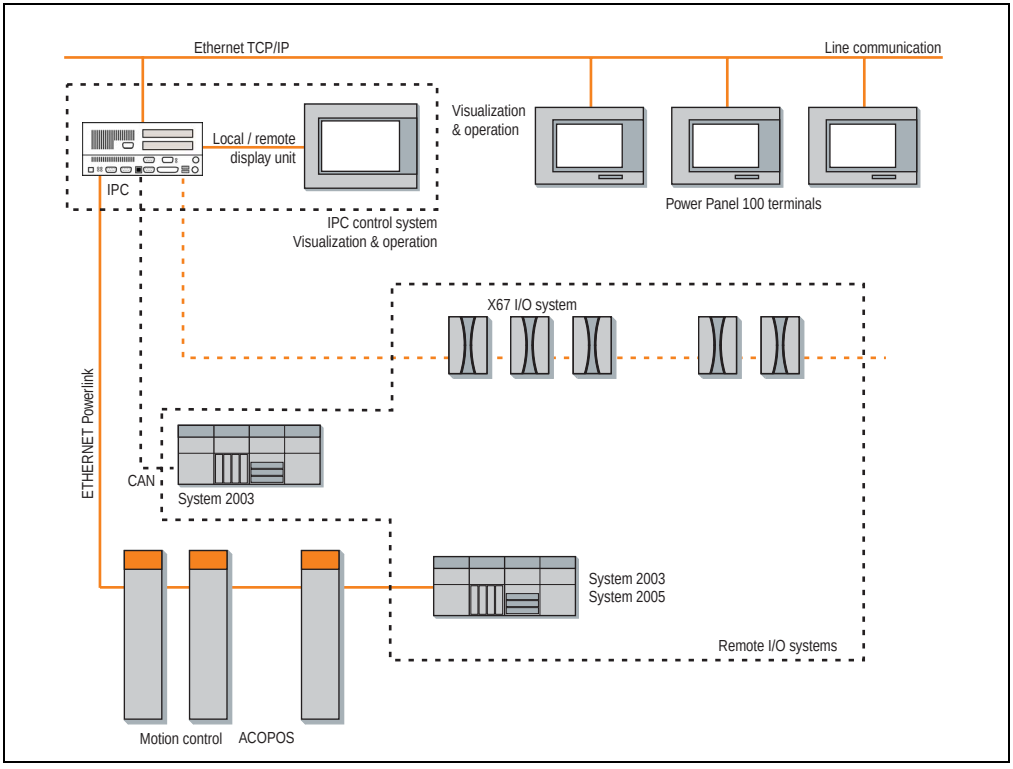


Figure 1: Industrial PC as central controller and visualization

10.2 Industrial PC as classic visualization device

The visualization runs on the Provit 5000/5600 industrial PC as a SCADA application. The display unit is connected to the IPC either locally or remotely. The control tasks interact with one or more underlying PLC stations where I/O systems and drives are connected locally or remotely over fieldbus systems. Additional SCADA stations can be networked via Ethernet TCP/IP.

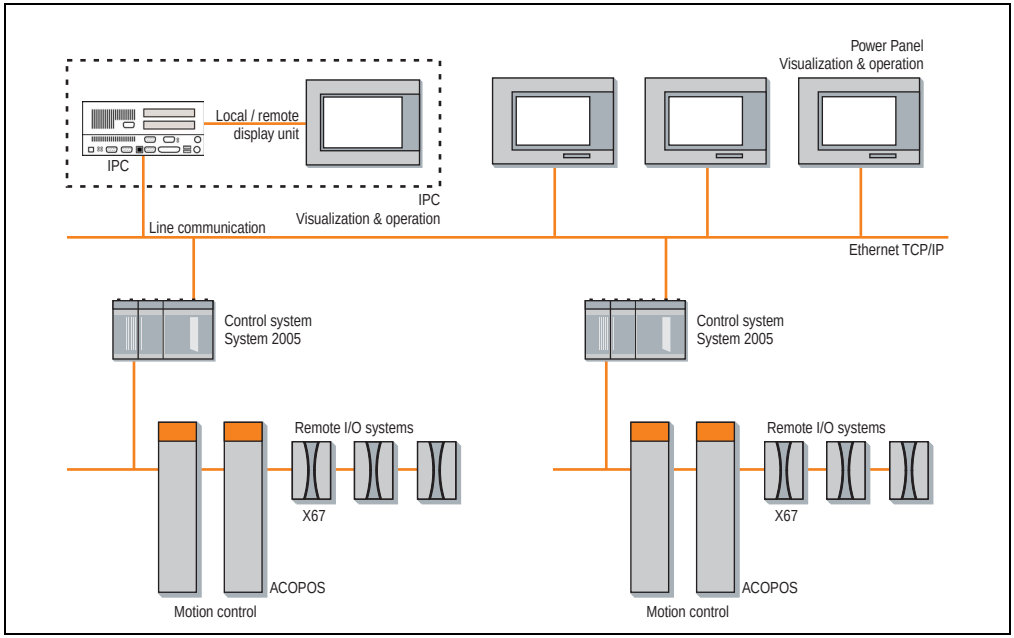


Figure 2: Industrial PC as classic visualization device

10.3 Industrial PC as a server

Windows XP Professional or Embedded runs on the industrial PC with real-time expansion for control and drive technology. Automation Runtime AR010 handles the control. Mobile Panel and Power Panel devices operate as thin clients using Windows CE. Communication to the industrial PC occurs via Ethernet TCP/IP and the remote desktop protocol.

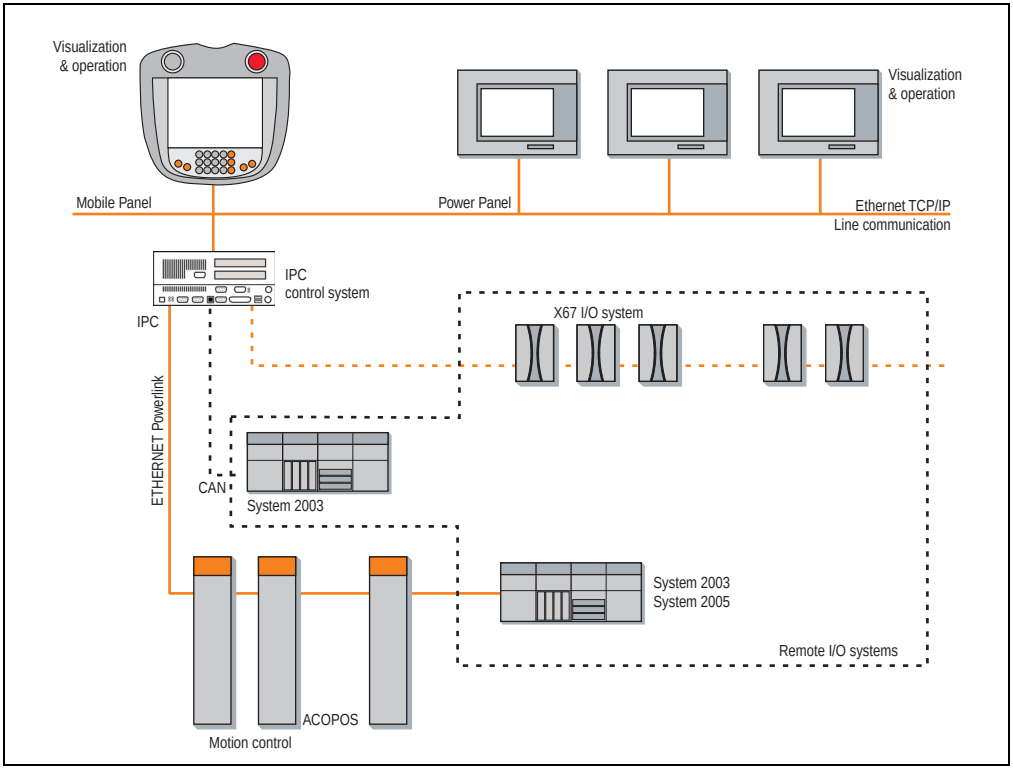


Figure 3: Industrial PC as a server

Chapter 2 • Controllers

1. Technical data

Caution!

IPCs should never be used in very dusty environments because the fans can get blocked up (bus unit and processor), and therefore no longer guarantee sufficient cooling.

1.1 Overview

Controller	IPC5000	IPC5600	IPC5000C	IPC5600C
Compatibility	100% IBM AT compatible			
Certification	Meets ISO 9001 production standards			
Standards Temperature Shock / tests carried out Vibration / tests carried out Emission / tests carried out Immunity / tests carried out	 IEC 61131-2 / IEC 60068-2-x IEC61131-2 / IEC60068-2-27 (except hard disk) 1) IEC61131-2 / IEC60068-2-6 (except hard disk) 1) EN 50081-2 / EN 55022+A1 IEC 61131-2 / IEC 61000-4-x			
Protection type	IP20 2)			
Mounting orientation	Vertical, ±45° 3)	Vertical, ±45° 4)	Vertical, ±45° 3)	Vertical, ±45° 4)
Ambient temperature Operation 5) Storage Transport	 See section "Operating temperature" on page 79. -20 to +60°C -20 to +60°C			
Relative humidity Operation 5) Storage / Transport	 5 to 95% (non-condensing) 5 to 95% (non-condensing)			
Weight 2-slot design 4-slot design 5-slot design 6-slot design	 Approx. 3.9 kg Approx. 4.9 kg Approx. 5 kg -	 - Approx. 7.8 kg Approx. 7.9 kg Approx. 8.4 kg	 Approx. 3.9 kg Approx. 4.9 kg Approx. 5 kg -	 - Approx. 7.8 kg Approx. 7.9 kg Approx. 8.4 kg
Dimensions (W x H x D in mm) 2-slot design 4-slot design 5-slot design 6-slot design	 270 x 92.4 x 196 270 x 157.4 x 196 270 x 157.4 x 196 -	 - 276.9 x 164.9 x 399.2 276.9 x 164.9 x 399.2 276.9 x 203.2 x 399.2	 270 x 92.4 x 196 270 x 157.4 x 196 270 x 157.4 x 196 -	 - 276.9 x 164.9 x 399.2 276.9 x 164.9 x 399.2 276.9 x 203.2 x 399.2

Table 16: Technical data - controllers

Controller	IPC5000	IPC5600	IPC5000C	IPC5600C
Altitude	Max. 3000 m			

Table 16: Technical data - controllers (cont.)

1) Values for the respective hard disks are included in section "Technical data - hard disks" on page 493.
2) Conforms to the IP20 standard with inserted interface boards 5A5000.02, 5A5000.05 or 5A5000.06 and a PCMCIA card plugged into the slot provided on the interface board.
3) Use of an additional add-on drive (see sections "Provit 5000 controller add-on CD ROM 5A5009.01" on page 438 and "Provit 5000 controller add-on CD RW 5A5009.02" on page 441) will determine the controller's mounting orientation.
4) The actual maximum tilt of the controller depends on the additional drive used (see sections 5A5600.0x starting on page 90).
5) Only applies to remote operation i.e. a display not mounted on the controller - remote mounting. For more details, see chapter 3 "Display units", section 3 "Mounting instructions" on page 78.

1.2 Bus units

1.2.1 IPC5000 and IPC5000C

Bus unit	5C5000.01	5C5000.02	5C5000.11	5C5000.12	5C5000.21	5C5000.22	5C5000.31	5C5000.32
Slots[1]								
Total	2		4		2		5	
B&R ISA 16-bit [2]	1		1		-		1	
Half-size ISA 16-bit	-		-		-		1	
Half s. ISA 16-bit / PCI 32-bit	1		3		-		1	
Half-size PCI 32-bit	-		-		-		2	
Full-size ISA 16-bit	-		-		-		-	
Full s. ISA 16-bit / PCI 32-bit	-		-		-		-	
Full-size PCI 32-bit	-		-		-		-	
Supply voltage [3]								
Rated	100 - 240 VAC	24 VDC	100 - 240 VAC	24 VDC	100 - 240 VAC	24 VDC	100 - 240 VAC	24 VDC
Tolerance range	85 - 264 VAC	18 - 30 VDC	85 - 264 VAC	18 - 30 VDC	85 - 264 VAC	18 - 30 VDC	85 - 264 VAC	18 - 30 VDC
Frequency	50-60 Hz	-	50-60 Hz	-	50-60 Hz	-	50-60 Hz	-
Fan type / Design	Ball bearings, analog control							
Number of fans								
∅ 40 mm	2		3	2	2		1	1
∅ 50 mm	-		-	-	-		2	1

Table 17: Technical data - IPC5000/5000C bus units

1) All PCI slots have an operating voltage of 5V and a clock frequency of 33MHz.
2) Standard 16-bit ISA interface; operation of standard ISA boards is not possible due to mechanical requirements.
3) AC power supply: A 3-pin cable with grounding contact plug is required for operation (model number 9A0001.03).
24 VDC power supply: A plug (with terminal blocks) for connecting to the supply, is contained in the delivery. The cable must be provided by the customer.

For more information see section 9 "Bus units" on page 167.

1.2.2 IPC5600 and IPC5600C

Bus unit	5C5600.01	5C5600.02	5C5600.03	5C5600.04	5C5600.11	5C5600.12
Slots[1)]						
Total	4		5		6	
B&R ISA 16-bit [2)]	-		-		-	
Half-size ISA 16-bit	1		1		1	
Half s. ISA 16-bit / PCI 32-bit	-		-		-	
Half-size PCI 32-bit	-		-		-	
Full-size ISA 16-bit	-		1		2	
Full s. ISA 16-bit / PCI 32-bit	3		1		3	
Full-size PCI 32-bit	-		2		-	
Supply voltage [3)]						
Nominal	115 / 230 VAC	24 VDC	115 / 230 VAC	24 VDC	115 / 230 VAC	24 VDC
Tolerance	85 - 132 VAC 170 - 264 VAC	18 - 30 VDC	85 - 132 VAC 170 - 264 VAC	18 - 30 VDC	85 - 132 VAC 170 - 264 VAC	18 - 30 VDC
Frequency	50 - 60 Hz		50 - 60 Hz		50 - 60 Hz	
Fan type / Design	Ball bearings, analog control					
Number of fans						
∅ 80 mm	1		1		-	
∅ 92 mm	-		-		1	

Table 18: Technical data - IPC5600/5600C bus units

1) All PCI slots have an operating voltage of 5V and a clock frequency of 33MHz.

2) Standard 16-bit ISA interface; operation of standard ISA cards is not possible due to mechanical requirements.

3) AC power supply: A 3-pin cable with grounding contact plug is required for operation (model number 9A0001.03).
24 VDC power supply: A plug (with terminal blocks) for connecting to the supply, is contained in the delivery. The cable must be provided by the customer.

For more information see section 9 "Bus units" on page 167.

1.3 System units

1.3.1 IPC5000 and IPC5600

System units	5C5001.01	5C5001.03	5C5601.01
Mainboard general information	Real-time clock [1)] CMOS backup in the FlashPROM Temperature monitoring (CPU, I/O, display unit)		
Math coprocessor	Integrated in the processor, no socket		
BIOS	AWARD Elite BIOS, Plug and Play compatible		
Chipset	Intel 430HX		
Processor socket	ZIF socket 7		
DRAM	2 x PS/2 SIMM, EDO or FPM [2)] Max. 128 MB		
2nd level cache	512 KB pipeline burst [3)]		
Interfaces COM1 COM2 LPT1 USB Panelware Keyboard Mouse External disk drive	 RS232, 16-byte FIFO RS232, 16-byte FIFO SPP, EPP and ECP modes 2 USB ports[4)] Up to 8 Panelware keypad modules (cascaded) Enhanced AT PS/2 PS/2 Yes		
VGA controller	Chips & Technologies C&T65550 [5)]		
Graphics memory	1 MB	2 MB	
Interfaces	FPD (Panellink) + CRT (15-pin VGA DSUB)		
Hard disk / Silicon disk Slots	-		2

Table 19: Technical data - IPC5000 and IPC5600 system units

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

2) When using SIMM modules with an operating voltage of 3.3 V and 5 V respectively.

3) Only the 256 KB L2 cache is available for IPCs with Revision ≤34.03.

4) Only for system units with Revision ≤34.03; otherwise not available.

5) The VGA controller C&T65548 with 1 MB graphics memory is used for a 5C5001.01 system unit with Revision ≤21.01.

1.3.2 IPC5000C

System units	5C5001.11	5C5001.12	5C5001.21 1)	5C5001.22 1)	5C50001.32	5C5001.42 1)
Mainboard general information	Real-time clock 2) CMOS backup in the FlashPROM Temperature monitoring (CPU, I/O, display unit)					
Math coprocessor	Integrated in the processor, no socket					
BIOS	AWARD Elite BIOS, Plug and Play compatible					
Chipset	Intel 440BX					
Processor socket	Socket 370					
DRAM	3 x DIMM PC100, max. 512 MB				2 x DIMM PC100, max. 512 MB	
2nd level cache	Integrated in processor					
Interfaces COM1 COM2 LPT1 USB Keyboard Mouse	 RS232, 16-byte FIFO RS232, 16-byte FIFO SPP, EPP and ECP modes 2 USB ports Enhanced AT PS/2 PS/2					
External disk drive	Yes		No		Yes	No
VGA controller	Chips & technologies 69000	Chips & technologies 69030	Chips & technologies 69000	Chips & technologies 69030	ATI Rage Mobility M	
Graphics memory	2 MB	4 MB	2 MB	4 MB	4 MB	
Interfaces	FPD (Panellink) + CRT (15-pin VGA DSUB)					
Remote IDE interface	No		Yes		No	Yes
Ethernet controller (onboard) Connection Compatibility Cabling	Intel 82559ER 10/100 Mbit/s RJ45 TP (10BaseT / 100BaseT) Not NE2000 compatible S/STP (category 5)				Intel 82551ER 10/100 Mbit/s RJ45 TP (10BaseT / 100BaseT) Not NE2000 compatible S/STP (category 5)	
E-IDE slots	1					

Table 20: Technical data - IPC5000C system units

1) With this system unit, it is possible to connect an optional remote CD-ROM/SuperDisk 120 or 240 drive.

2) The quartz used for the IPC has an accuracy of 20 ppm. This means after influences such as operating temperature and wiring of the quartz have been taken into account, the inaccuracy is typically 5 seconds per day.

1.3.3 IPC5600C

System units	5C5601.11	5C5601.12	5C5601.21 1)	5C5601.22 1)	5C5601.32	5C5601.42 1)
Mainboard general information	Real-time clock 2) CMOS backup in the FlashPROM Temperature monitoring (CPU, I/O, display unit)					
Math coprocessor	Integrated in the processor, no socket					
BIOS	AWARD Elite BIOS, Plug and Play compatible					
Chipset	Intel 440BX					
Processor socket	Socket 370					
DRAM	3 x DIMM PC100, max. 512 MB				2 x DIMM PC100, max. 512 MB	
2nd level cache	Integrated into the processor					
Interfaces COM1 COM2 LPT1 USB Keyboard Mouse	 RS232, 16-byte FIFO RS232, 16-byte FIFO SPP, EPP and ECP modes 2 USB ports Enhanced AT PS/2 PS/2					
External disk drive	Yes		No		Yes	No
VGA controller	Chips & technologies 69000	Chips & technologies 69030	Chips & technologies 69000	Chips & technologies 69030	ATI Rage Mobility M	
Graphics memory	2 MB	4 MB	2 MB	4 MB	4 MB	
Interfaces	FPD (Panellink) + CRT (15-pin VGA DSUB)					
Remote IDE interface	No		Yes		No	Yes
Ethernet controller (onboard) Connection Compatibility Cabling	Intel 82559ER 10/100 Mbit/s RJ45 TP (10BaseT / 100BaseT) Not NE2000 compatible S/STP (category 5)				Intel 82551ER 10/100 Mbit/s RJ45 TP (10BaseT / 100BaseT) Not NE2000 compatible S/STP (category 5)	
E-IDE slots	2					

Table 21: Technical data - IPC5600C system units

1) With this system unit it is possible to connect the optional controller R-IDE CD-ROM / LS120 5A5003.02 and R-IDE CD-ROM 5A5003.07.

2) The quartz used for the IPC has an accuracy of 20 ppm. This means after influences such as operating temperature and wiring of the quartz have been taken into account, the inaccuracy is typically 5 seconds per day.

1.4 Processors

1.4.1 IPC5000 and IPC5600

Processor[1)]	5C5002.01	5C5002.02	5C5002.03	5C5002.04	5C5002.05	5C5002.06
Manufacturer / Type	Intel / Pentium	Intel / Pentium	Intel / Pentium	Intel / Pentium	Intel / Pentium	Intel / Pentium
Clock frequency [MHz]	100	120	133	150	166	200
L1 cache	2 x 8 KB	2 x 8 KB	2 x 8 KB	2 x 8 KB	2 x 8 KB	2 x 8 KB
MMX technology	No	No	No	No	No	No
Fans	∅ 40 mm, ball bearings					
Processor[1)]	**5C5002.07**	**5C5002.08**	**5C5002.09**			
Manufacturer / Type	AMD / K6	Intel / Pentium	AMD / K6			
Clock frequency [MHz]	166	200	266 [2)]			
L1 cache	2 x 32 KB	2 x 16 KB	2 x 32 KB			
MMX technology	Yes	Yes	Yes			
Fans	∅ 40 mm, ball bearings					

Table 22: Technical data - IPC5000 and IPC5600 processors

1) For specifications regarding temperature limits, see section "Operating temperature" on page 79.

2) An AMD K6-266 processor can only be operated in system units with a revision number greater than or equal to 44.04.

1.4.2 IPC5000C and IPC5600C

Processor[1)]	5C5002.11	5C5002.12	5C5002.13	5C5002.14	5C5002.15	5C5002.16
Manufacturer / Type	Intel / Celeron				Intel / Pentium III	
Clock freq. CPU [MHz]	300	366	433	566	600	850
Clock freq. bus [MHz]	66				100	
L1 cache	2 x 16 KB					
L2 cache	128 KB				256 KB	
MMX technology	Yes					
Fans	∅ 40 mm, ball bearings				∅ 50 mm, ball bearings	

Table 23: Technical data - IPC5000C and IPC5600C processors

1) For specifications regarding temperature limits, see section "Operating temperature" on page 79.

1.5 Hard disks

Hard disk	Capacity	Shock (operation)	Vibration (operation)
5A5001.02	1,44 GB	150 G, 2 ms	0.5 G, 5 to 500 Hz
5A5001.03	2,1 GB	150 G, 2 ms	0.5 G, 5 to 500 Hz
5A5001.04	4,3 GB	150 G, 2 ms	0.5 G, 5 to 500 Hz
5A5001.05	6 GB	150 G, 2 ms	1 G, 5 to 400 Hz
5A5001.08	6 GB	150 G, 2 ms	1 G, 5 to 400 Hz
5A5001.10	20 GB	190 G, 2 ms	1 G, 5 to 400 Hz
5A5001.12	20 GB	190 G, 2 ms	1 G, 5 to 500 Hz
5A5001.13	20 GB	190 G, 2 ms	1 G, 5 to 500 Hz
5A5001.15	30 GB	225 G, 2 ms	1 G, 5 to 500 Hz
5A5001.16	30 GB	225 G, 2 ms	1 G, 5 to 500 Hz
5A5001.17	30 GB	225 G, 2 ms	1 G, 5 to 500 Hz
5A5001.18	30 GB	225 G, 2 ms	1 G, 5 to 500 Hz

Table 24: Technical data - hard disks

Information:

More detailed information regarding the hard disks can be found in chapter 8 "Technical appendix" on page 469.

1.6 Silicon disks

Information:

More detailed information regarding the silicon disks can be found in section 11.2 "Silicon disks" on page 189.

1.7 Main memory

1.7.1 IPC5000 and IPC5600

Main memory	9A0004.03	9A0004.05	9A0004.04	9A0004.06	9A0004.07
Slot	PS/2 SIMM (72-pin)				
Size	4 MB	8 MB	16 MB	32 MB	64 MB

Table 25: Technical data - IPC5000 and IPC5600 main memory

1.7.2 IPC5000C and IPC5600C

Main memory	9A0004.11	9A0004.12	9A0004.14
Slot	DIMM (168-pin)		
Size	64 MB	128 MB	256 MB

Table 26: Technical data - IPC5000C and IPC5600C main memory

1.8 Interface boards

Interface board	5A5000.01	5A5000.02	5A5000.05	5A5000.06
Slot	B&R 16 bit ISA [1)]			
COM3	Combined RS232 / RS422 interface, tri-state, electrically isolated, 16-byte FIFO			
COM4	Combined RS232 / RS422 interface, tri-state, electrically isolated, 16-byte FIFO			
CAN bus	CAN 2.0b specification, Intel 82527 controller			
PC card	1 PCMCIA slot, Type I, II or III			
SRAM	256 kB; can be addressed using PCMCIA socket 2, incl. lithium backup battery			
LPT2	Internal, for hardware security key (dongle)			
Ethernet Connection Controller Compatibility Cabling	-	10 Mbit/s BNC (10Base2) UMC 9008F NE2000-compatible RG58	10 Mbit/s RJ45 Tw. Pair (10BaseT) Intel 82595 Not NE2000 compatible S/STP (category 5)	10 Mbit/s BNC (10Base2) Intel 82595 Not NE2000 compatible RG58

Table 27: Technical data - interface boards

1) Cannot be operated in a standard ISA socket of a standard PC.

1.9 Arcnet interface boards

Arcnet board	5A1105.00-090	5A1107.00-090	5A1109.00-090	0TP360.04
Slot	ISA			
Arcnet Connection Controller Cabling	ISA 8-bit BNC SMC 0022063 RG62	ISA 8-bit BNC SMC COM20020 RG62	ISA 8-bit BNC SMC COM90C65 RG62	ISA 16-bit BNC, twisted pair SMC 90C66 RG62, UTP wire RJ-11

Table 28: Technical data - Arcnet interface boards

2. Dimensions

2.1 IPC5000 (2-slot design)

The following figure shows a Provit 5000 bus unit with 2 slots (5C5000.01 or 5C5000.02) operated with an IPC5000 system unit (5C5001.01 or 5C5001.03).

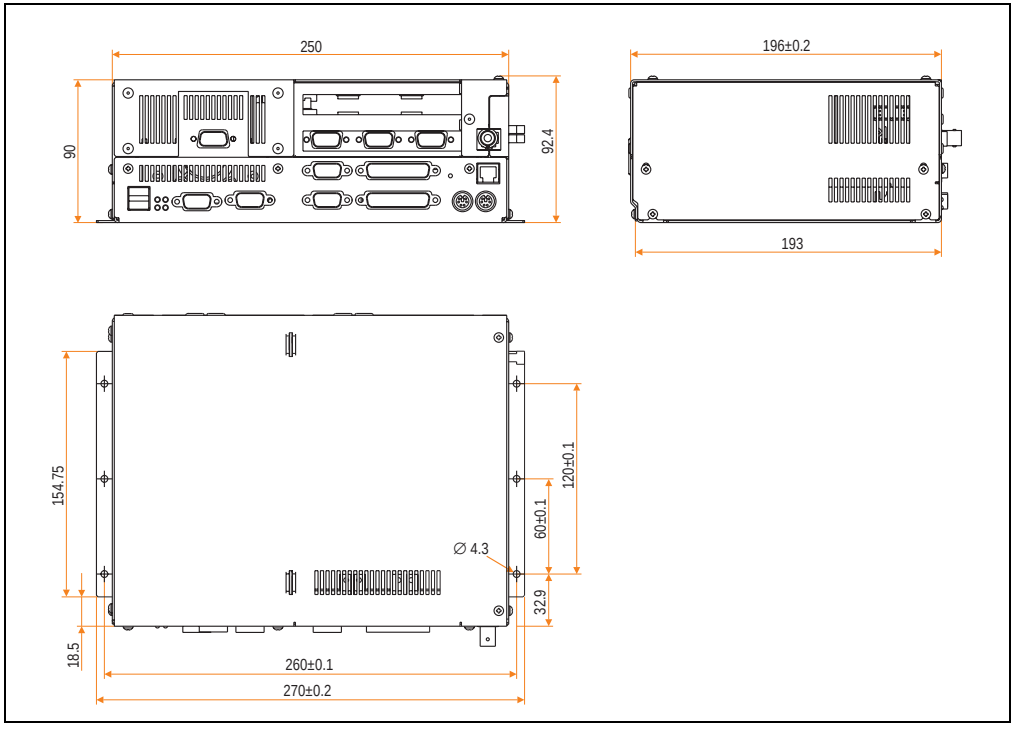


Figure 4: Dimensions - IPC5000 (2-slot design)

2.2 IPC5000C (2-slot design)

The following figure shows a Provit 5000 bus unit with 2 slots (5C5000.01 or 5C5000.02) operated with an IPC5000C system unit (5C5001.11, 5C5001.12, 5C5001.21, 5C5001.22, 5C5001.32 or 5C5001.42).

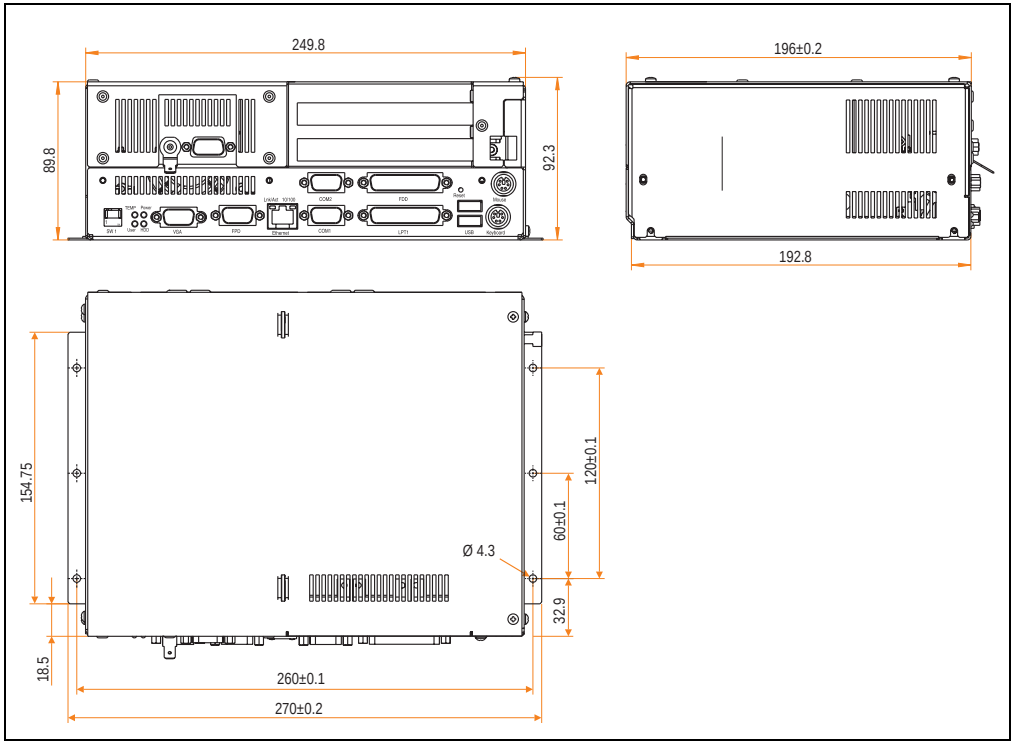


Figure 5: IPC5000C (2-slot design)

2.3 IPC5000C (2-slot design + optional add-on drive)

The following figure shows a Provit 5000 bus unit with 2 slots and an optional add-on drive (5C5000.21 or 5C5000.22) operated with an IPC5000C system unit (5C5001.11, 5C5001.12, 5C5001.21, 5C5001.22, 5C5001.32 or 5C5001.42).

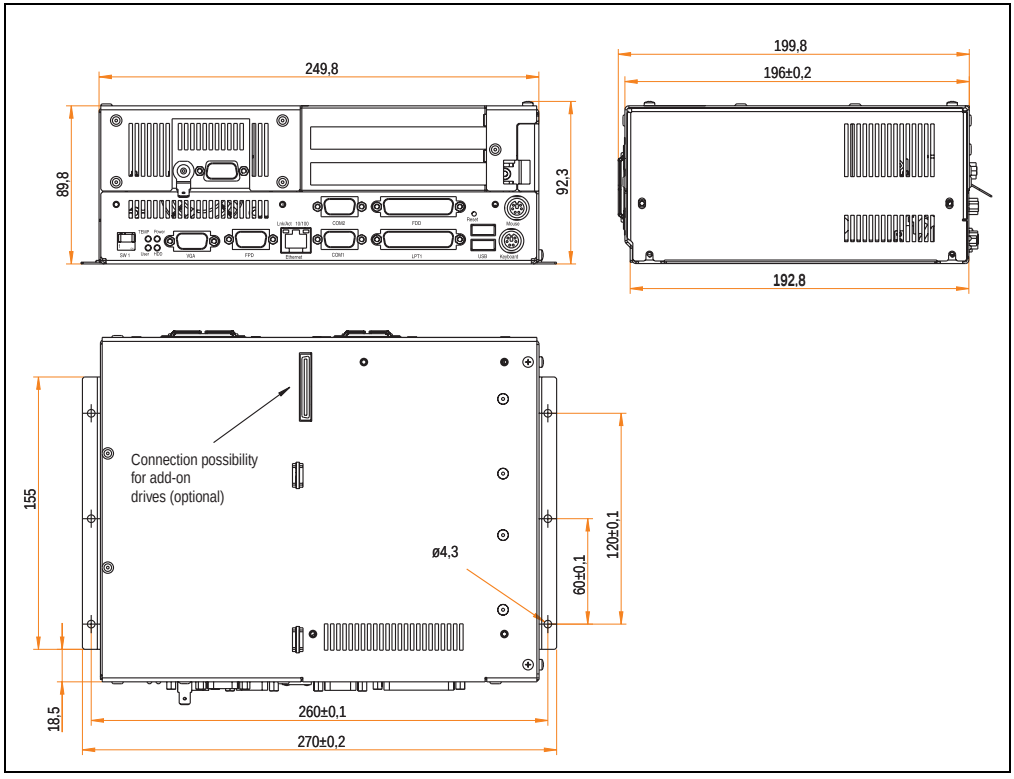


Figure 6: Dimensions - IPC5000C (2-slot design + optional add-on drive)

2.4 IPC5000C (2-slot design + add-on drive 5A5009.0x)

The following figure shows a Provit 5000 bus unit with 2 slots and an optional add-on drive (5C5000.21 or 5C5000.22) operated with an IPC5000C system unit (5C5001.11, 5C5001.12, 5C5001.21, 5C5001.22, 5C5001.32 or 5C5001.42) and a mounted add-on drive (5A5009.01 or 5A5009.02).

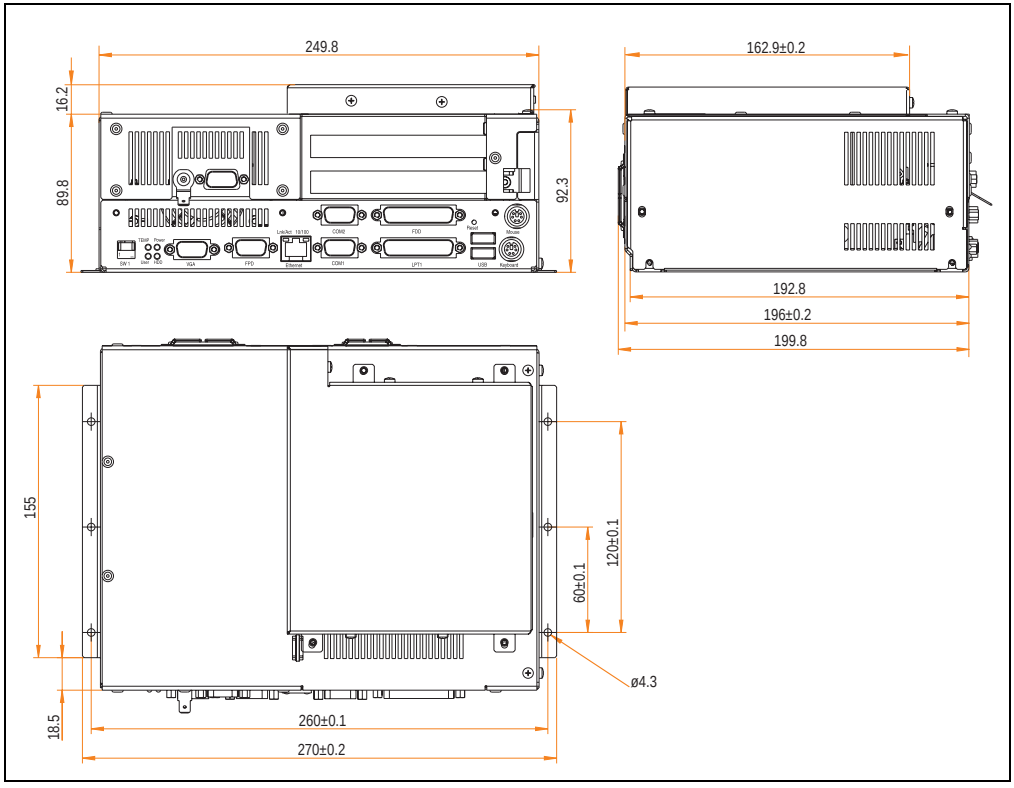


Figure 7: Dimensions - IPC5000C (2 slot design + add-on drive 5A5009.0x)

2.5 IPC5000 (4-slot design)

The following figure shows a Provit 5000 bus unit with 4 slots (5C5000.11 or 5C5000.12) operated with an IPC5000 system unit (5C5001.01 or 5C5001.03).

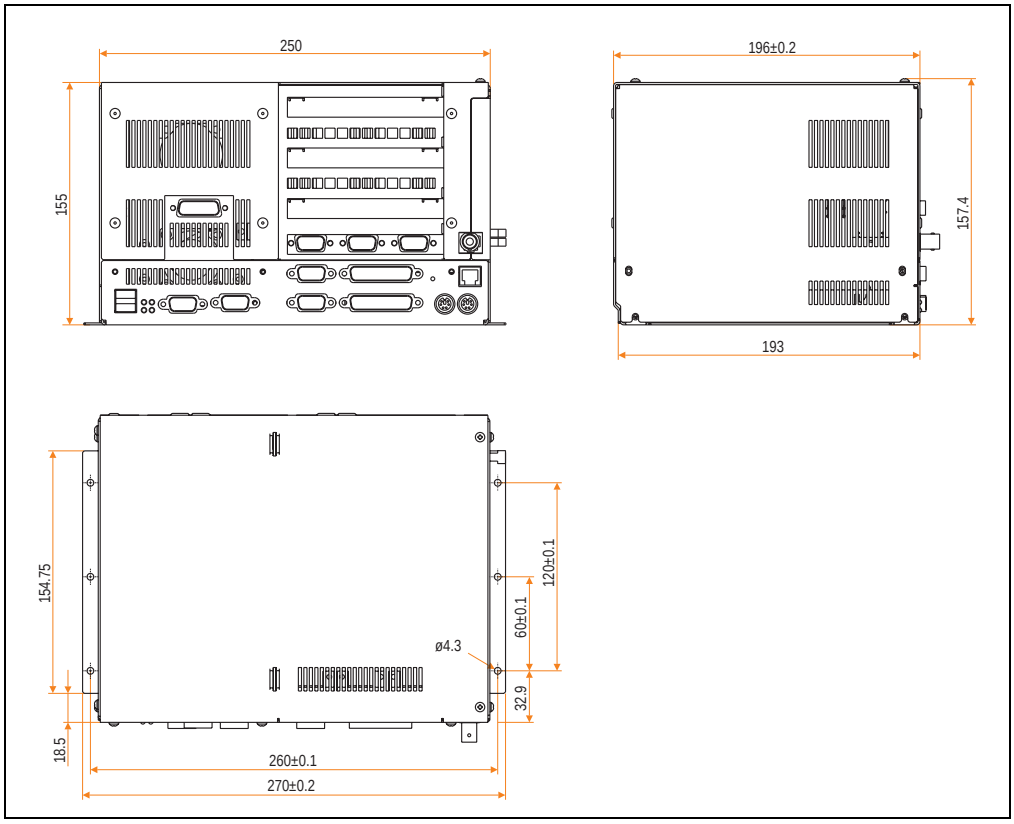


Figure 8: Dimensions - IPC5000 (4-slot design)

2.6 IPC5000C (4-slot design)

The following figure shows a Provit 5000 bus unit with 4 slots (5C5000.11 or 5C5000.12) operated with an IPC5000C system unit (5C5001.11, 5C5001.12, 5C5001.21, 5C5001.22, 5C5001.32 or 5C5001.42).

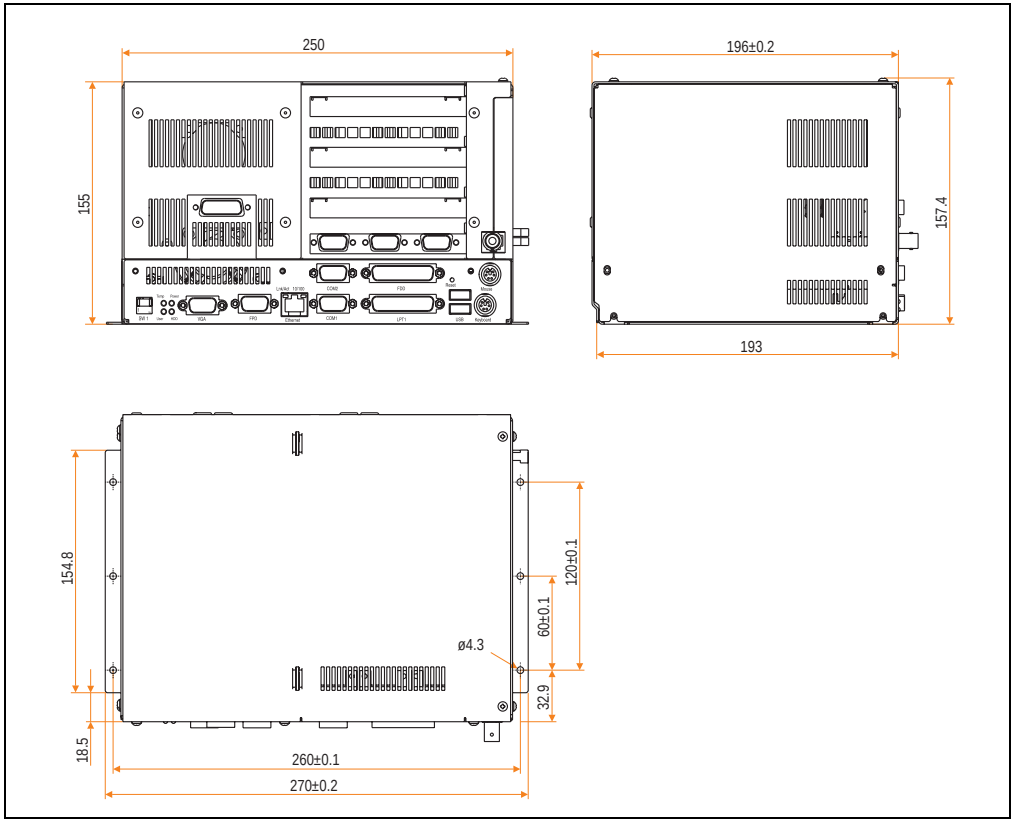


Figure 9: Dimensions - IPC5000C (4-slot design)

2.7 IPC5000C (5-slot design + optional add-on drive)

The following figure shows a Provit 5000 bus unit with 5 slots and an optional add-on drive (5C5000.31 or 5C5000.32) operated with an IPC5000C system unit (5C5001.11, 5C5001.12, 5C5001.21, 5C5001.22, 5C5001.32 or 5C5001.42).

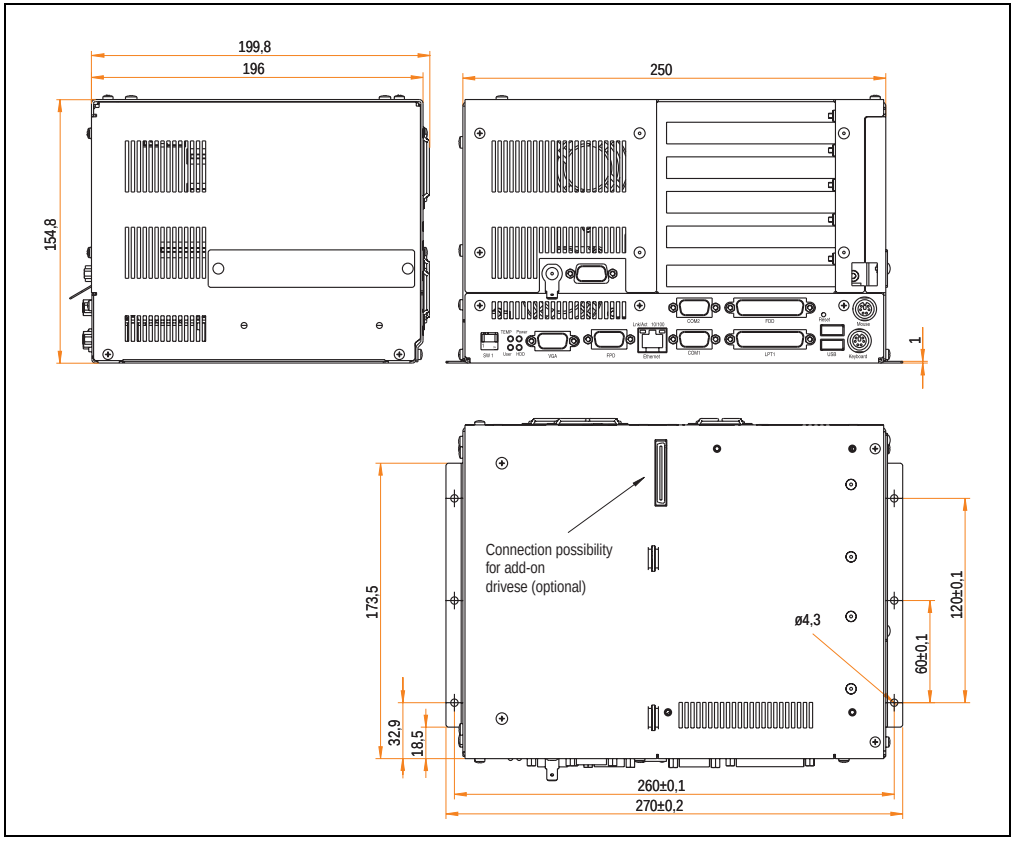


Figure 10: Dimensions - IPC5000C (5-slot design + optional add-on drive)

2.8 IPC5000C (5-slot design + add-on drive 5A5009.0x)

The following figure shows a Provit 5000 bus unit with 5 slots and an optional add-on drive (5C5000.31 or 5C5000.32) operated with an IPC5000C system unit (5C5001.11, 5C5001.12, 5C5001.21, 5C5001.22, 5C5001.32 or 5C5001.42) and a mounted add-on drive (5A5009.01 or 5A5009.02).

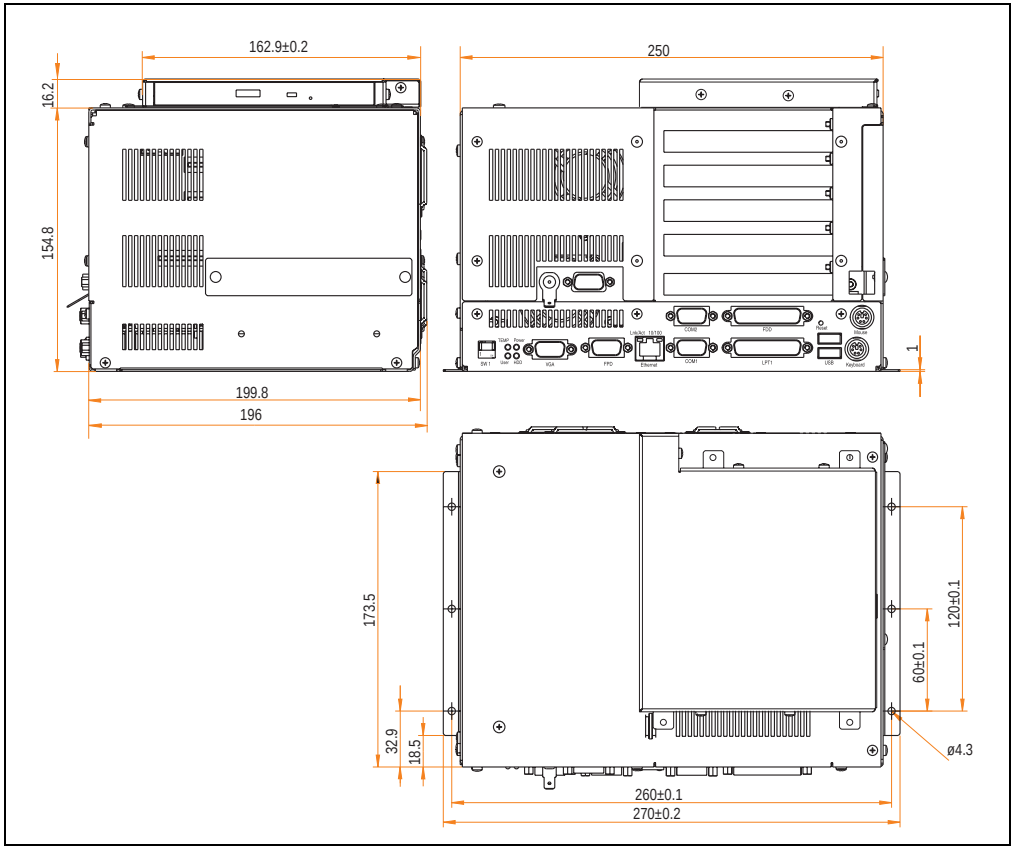


Figure 11: Dimensions - IPC5000C (5-slot design + add-on drive 5A5009.0x)

2.9 IPC5600 (4-slot design)

The following figure shows a Provit 5600 bus unit with 4 slots (5C5600.01 or 5C5600.02) operated with an IPC5000 system unit (5C5001.01).

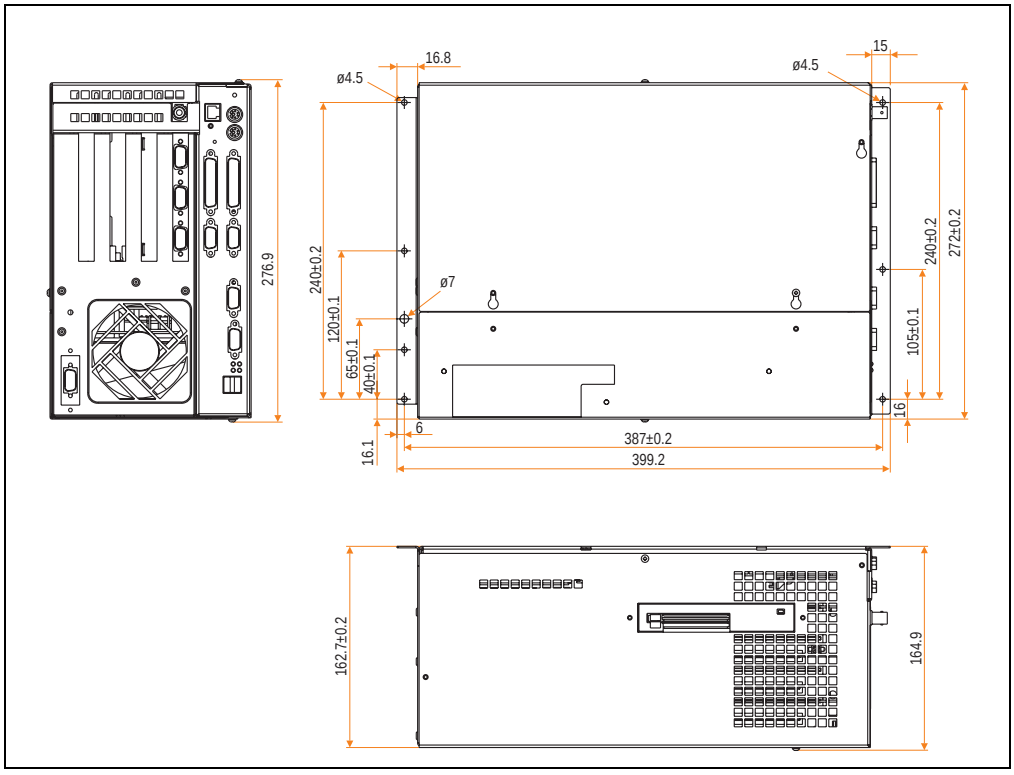


Figure 12: Dimensions - IPC5600 (4-slot design)

2.10 IPC5600C (4-slot design)

The following figure shows a Provit 5600 bus unit with 4 slots (5C5600.01 or 5C5600.02) operated with an IPC5600C system unit (5C5601.11, 5C5601.12, 5C5601.21, 5C5601.22, 5C5601.32 or 5C5601.42).

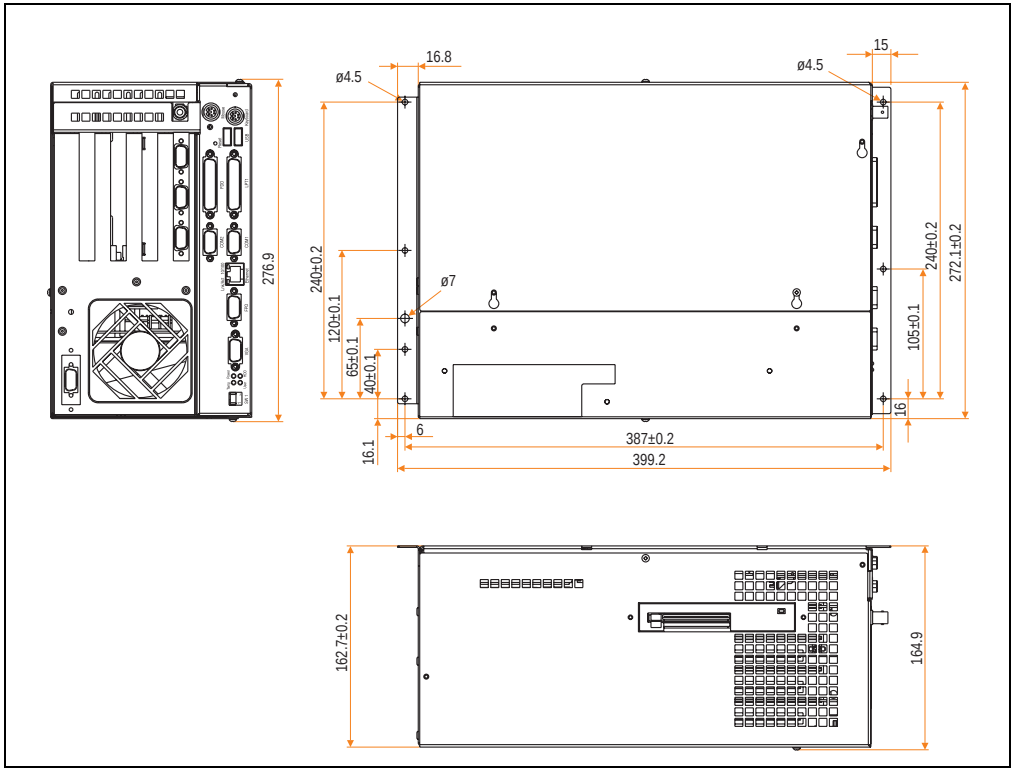


Figure 13: Dimensions - IPC5600C (4-slot design)

2.11 IPC5600 (5-slot design)

The following figure shows a Provit 5600 bus unit with 5 slots (5C5600.03 or 5C5600.04) operated with an IPC5000 system unit (5C5001.01).

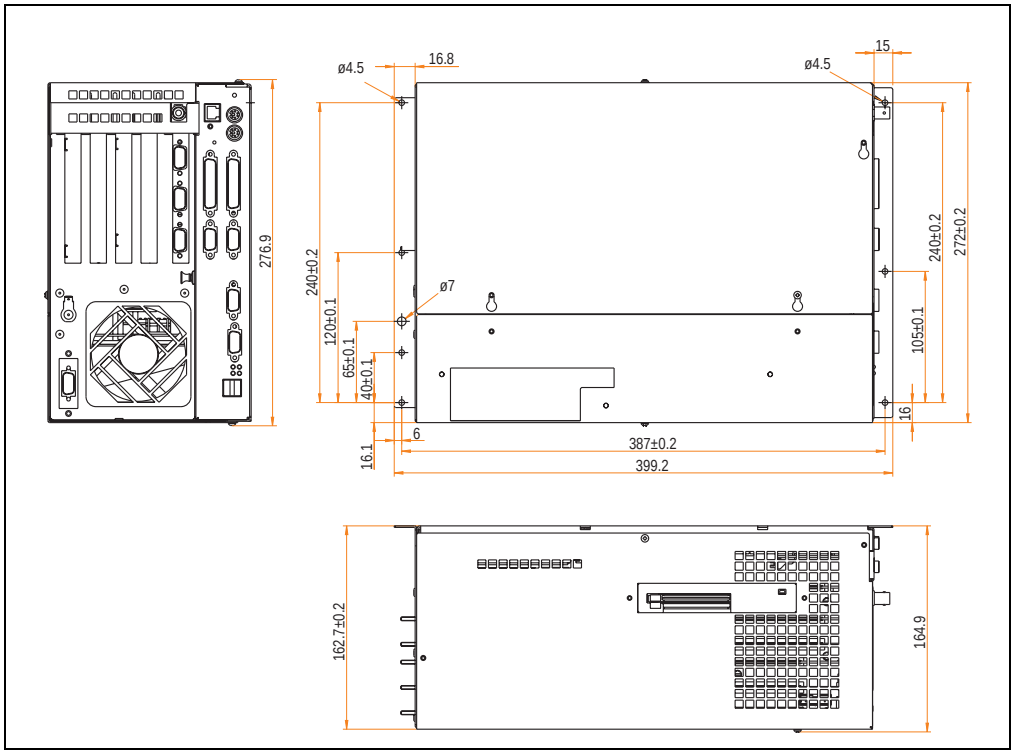


Figure 14: Dimensions - IPC5600 (5-slot design)

2.12 IPC5600C (5-slot design)

The following figure shows a Provit 5600 bus unit with 5 slots (5C5600.03 or 5C5600.04) operated with an IPC5600C system unit (5C5601.11, 5C5601.12, 5C5601.21, 5C5601.22, 5C5601.32 or 5C5601.42).

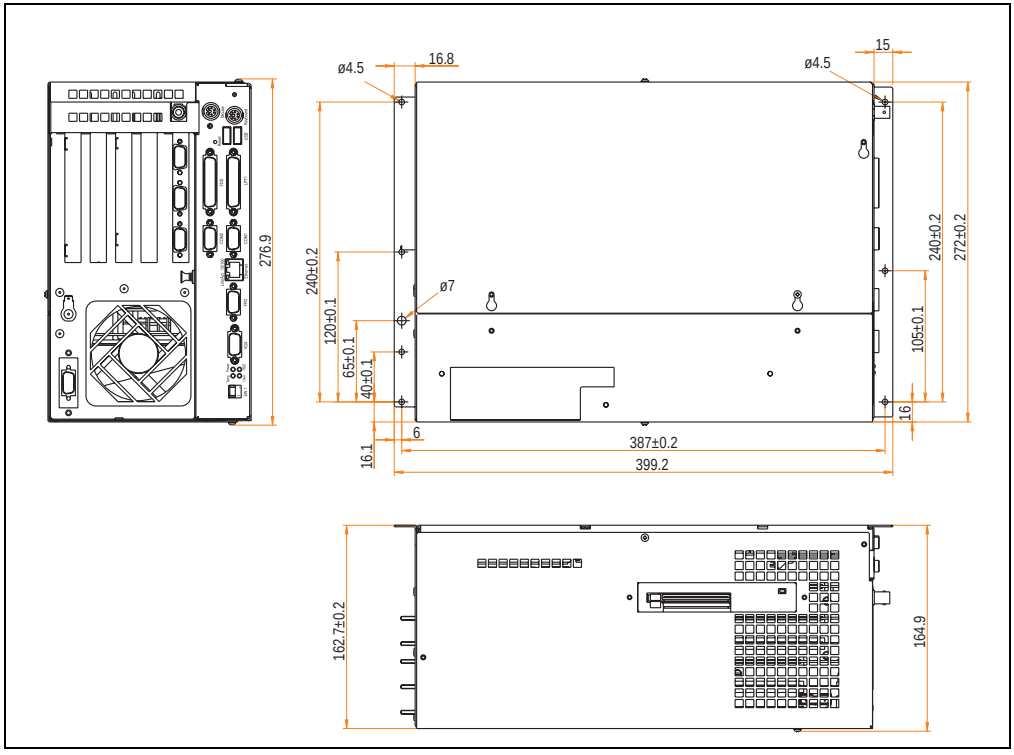


Figure 15: Dimensions - IPC5600C (5-slot design)

2.13 IPC5600 (6-slot design)

The following figure shows a Provit 5600 bus unit with 6 slots (5C5600.11 or 5C5600.12) operated with an IPC5000 system unit (5C5001.01).

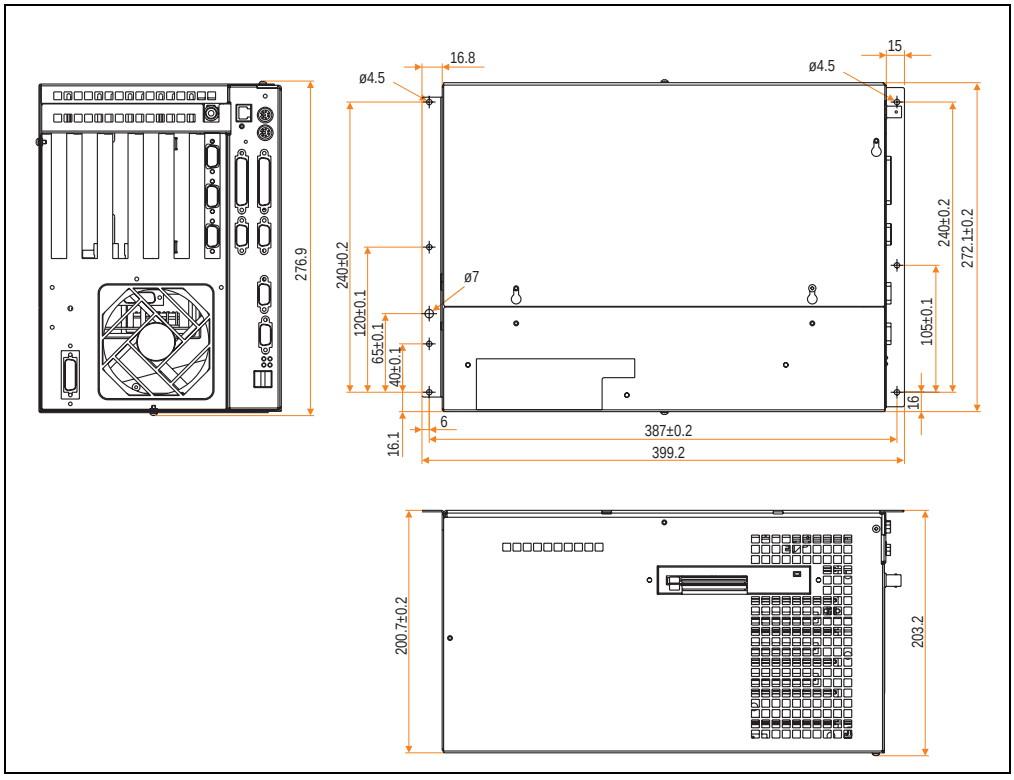


Figure 16: Dimensions - IPC5600 (6-slot design)

2.14 IPC5600C (6-slot design)

The following figure shows a Provit 5600 bus unit with 6 slots (5C5600.11 or 5C5600.12) operated with an IPC5600C system unit (5C5601.11, 5C5601.12, 5C5601.21, 5C5601.22, 5C5601.32 or 5C5601.42).

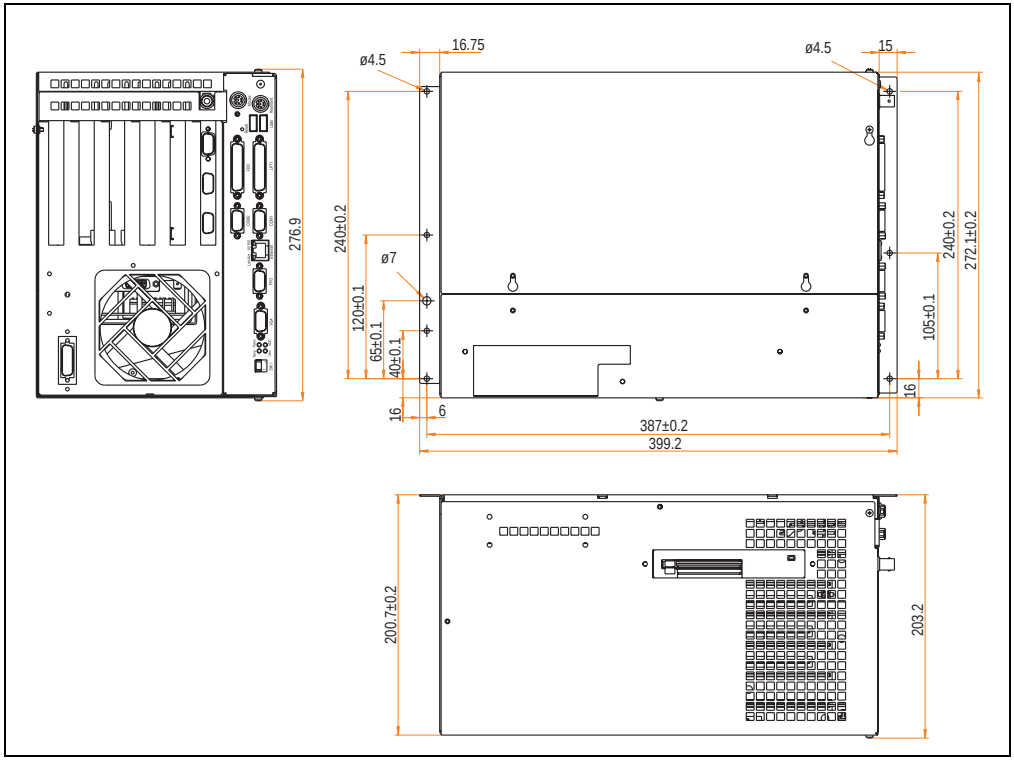


Figure 17: Dimensions - IPC5600C (6-slot design)

3. Mounting instructions

- As standard, the controller is mounted on the back of the display unit (standard mounting). The option of remote operation is also available (remote mounting), where a display can be operated by the controller, at a maximum distance of 10 m.
- For both standard and remote mounting, the screws contained in the delivery should be used.
- Make sure all connectors are pointing downwards when mounting the IPC5000/IPC5000C.
- The IPC5600/IPC5600C is mounted horizontally, i.e. all connectors must point to the right (when viewed from behind).
- In order to guarantee sufficient air circulation, allow a distance of at least 10 cm between the fans and all other objects.
- IPC5000/IPC5000C and IPC5600/IPC5600C controllers can be mounted at an angle of max. ±45°:

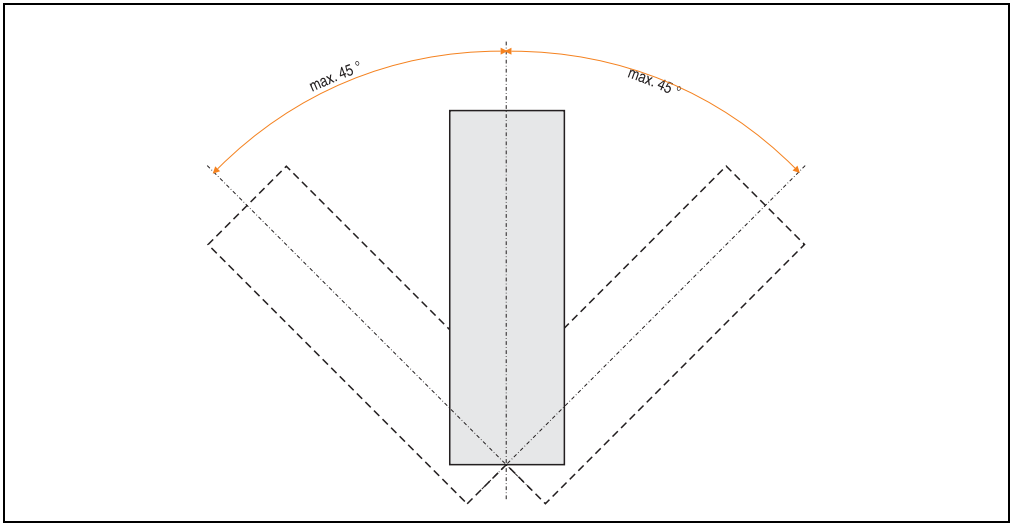


Figure 18: Mounting guidelines

Important!

If an optional drive (disk drive, CD-Rom, LS120, etc. or combination thereof) is being operated in a controller, consult the maximum mounting angles listed in section 6 "Configuration options - Provit 5600 IPCs".

4. Operating temperature

The maximum operating temperatures specified for the IPC5000, IPC5600, IPC5000C and IPC5600C systems are given in the following tables.
When combining one of these systems with a display unit or a display kit, consult the maximum operating temperatures listed in the respective chapter (3 "Display units" on page 211 or 4 "Display kits" on page 287).
If an additional drive is installed in an IPC5600 or IPC5600C (e.g. disk drive, CD-ROM, LS120, SuperDisk, etc.) or if an add-on drive is installed in an IPC5000C, the maximum operating temperatures for the individual drives may not be exceeded (see technical data for each drive).

Information:

The maximum ambient temperatures listed here were determined under worst-case conditions using the application software HiPower 3.0 from Intel and B&R Automation Runtime. Experience has shown, however, 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 (reading the temperatures in BIOS for IPC5000C and IPC56000C - see chapter 6 "Software", section 3.6.2 "Statistic motherboard", or under Windows for IPC5000, IPC5600, IPC5000C and IPC5600C see chapter 6 "Software", section 5.2 "B&R IPC Diagnostics Utility").

4.1 IPC5000 and IPC5600

IPC5000 / IPC5600	Intel Pentium (<200 MHz)	Intel Pentium (200 MHz)	AMD K6 (266 MHz)
Without HDD	0 - 55 °C	0 - 50 °C	0 - 50 °C
With HDD	5 - 47 °C	5 - 47 °C	5 - 47 °C
With 24 hr HDD operation	5 - 40 °C	5 - 40 °C	5 - 40 °C

Table 29: Operating temperatures - IPC5000 and IPC5600

4.2 IPC5000C

IPC5000C	Intel Celeron 300 / 366 MHz	Intel Celeron 433 MHz	Intel Celeron 566 MHz	Intel Pentium III 600 MHz	Intel Pentium III 850 MHz
Without HDD	0 - 50 °C	0 - 45 °C	0 - 45 °C 1) 0 - 55 °C 2)	0 - 45 °C 0 - 50 °C 3)	0 - 40 °C 0 - 45 °C 4)
With HDD	5 - 47 °C	5 - 45 °C	5 - 47 °C	5 - 45 °C 5 - 47 °C 5)	5 - 40 °C 4 - 45 °C 6)
With 24 hr HDD operation	5 - 40 °C	5 - 40 °C	5 - 40 °C	5 - 40 °C	5 - 40 °C

Table 30: Operating temperatures - IPC5000C

1) Only with 5C5002.14, Revision < D0
2) Only with 5C5002.14 starting with Revision D0
3) With the IPC5000C/IPC5600C BIOS upgrade diskette set, Version > 1.14 and 5C5002.15 Revision D0.
4) With the IPC5000C/IPC5600C BIOS upgrade diskette set, Version > 1.18 and 5C5002.16 Revision D0.
5) With the IPC5000C/IPC5600C BIOS upgrade diskette set, Version > 1.14 and 5C5002.15 Revision D0.
6) With the IPC5000C/IPC5600C BIOS upgrade diskette set, Version > 1.18 and 5C5002.16 Revision D0.

4.3 IPC5600C

IPC5600C	Intel Celeron 300 / 366 MHz	Intel Celeron 433 MHz	Intel Celeron 566 MHz	Intel Pentium III 600 MHz	Intel Pentium III 850 MHz
Without HDD	0 - 55 °C	0 - 50 °C	0 - 50 °C 1) 0 - 55 °C 2)	0 - 50 °C 0 - 55 °C 3)	0 - 45 °C 0 - 50 °C 4)
With HDD	5 - 47 °C	5 - 47 °C	5 - 47 °C	5 - 47 °C	5 - 45 °C 0 - 47 °C 5)
With 24 hr HDD operation	5 - 40 °C	5 - 40 °C	5 - 40 °C	5 - 40 °C	5 - 40 °C

Table 31: Operating temperatures - IPC5600C

1) Only with 5C5002.14, Revision < D0
2) Only with 5C5002.14 starting with Revision D0
3) With the IPC5000C/IPC5600C BIOS upgrade diskette set, Version > 1.14 and 5C5002.15 Revision D0.
4) With the IPC5000C/IPC5600C BIOS upgrade diskette set, Version > 1.18 and 5C5002.16 Revision D0.
5) With the IPC5000C/IPC5600C BIOS upgrade diskette set, Version > 1.18 and 5C5002.16 Revision D0.

5. Components overview

5.1 IPC5000 (2-slot design)

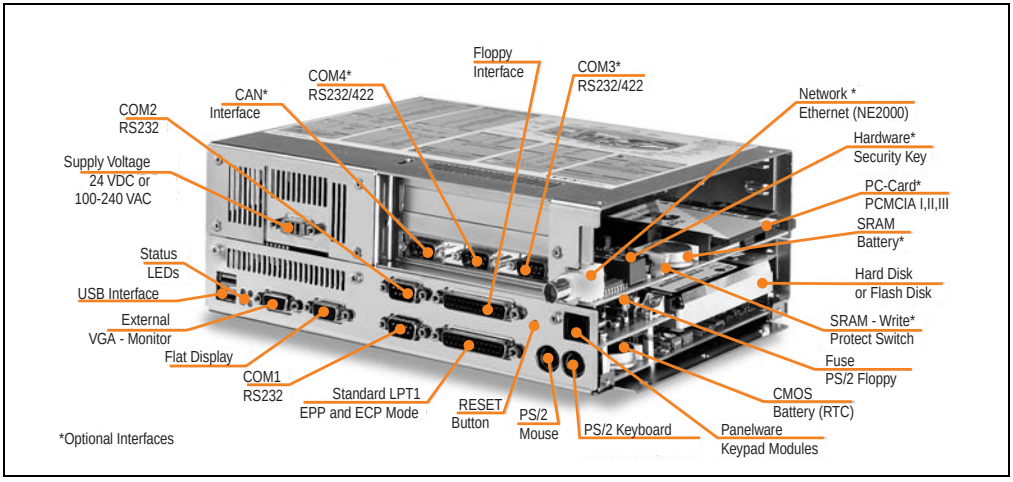


Figure 19: IPC5000 components (bus unit with 2 slots)

5.2 IPC5000 (4-slot design)

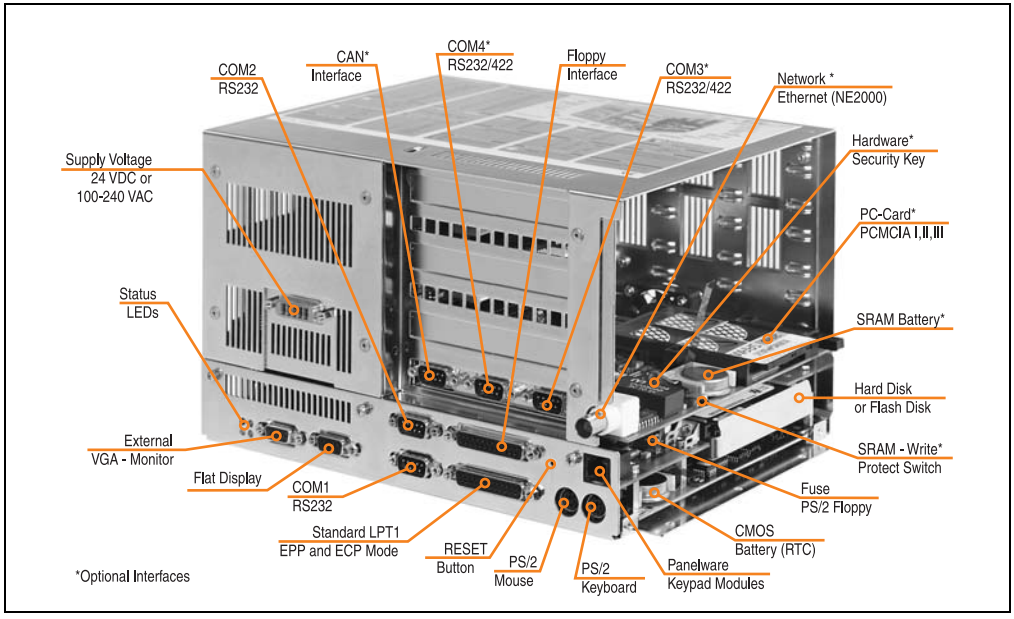


Figure 20: IPC5000 components (bus unit with 4 slots)

5.3 IPC5600 (4-slot design)

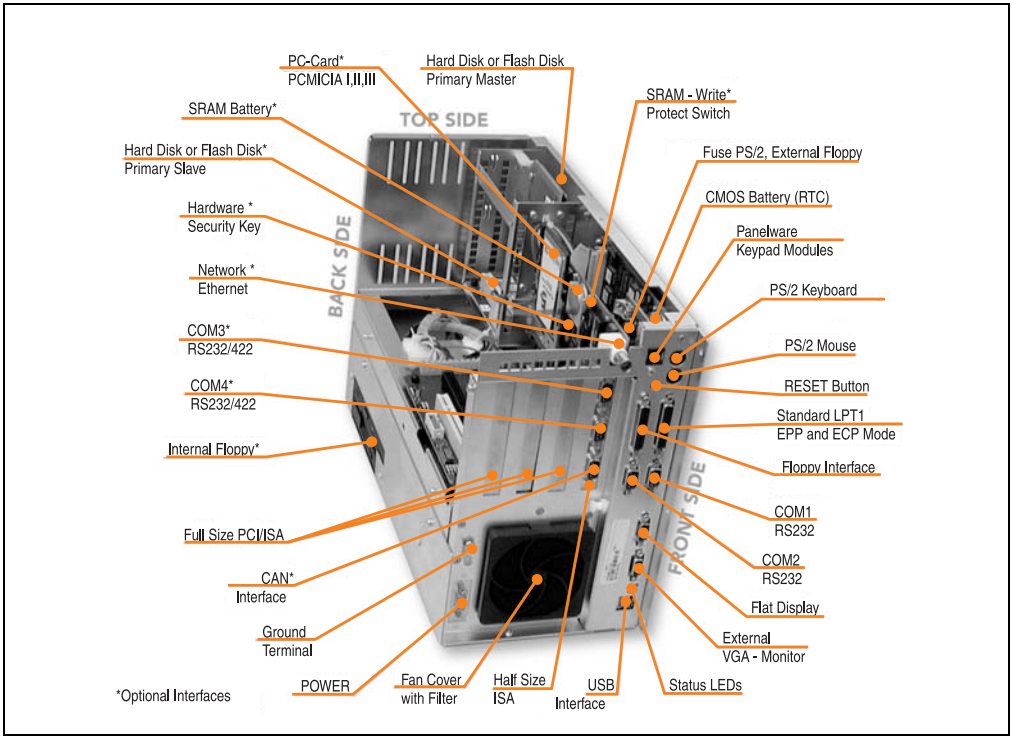


Figure 21: IPC5600 components (bus unit with 4 slots)

5.4 IPC5600 (6-slot design)

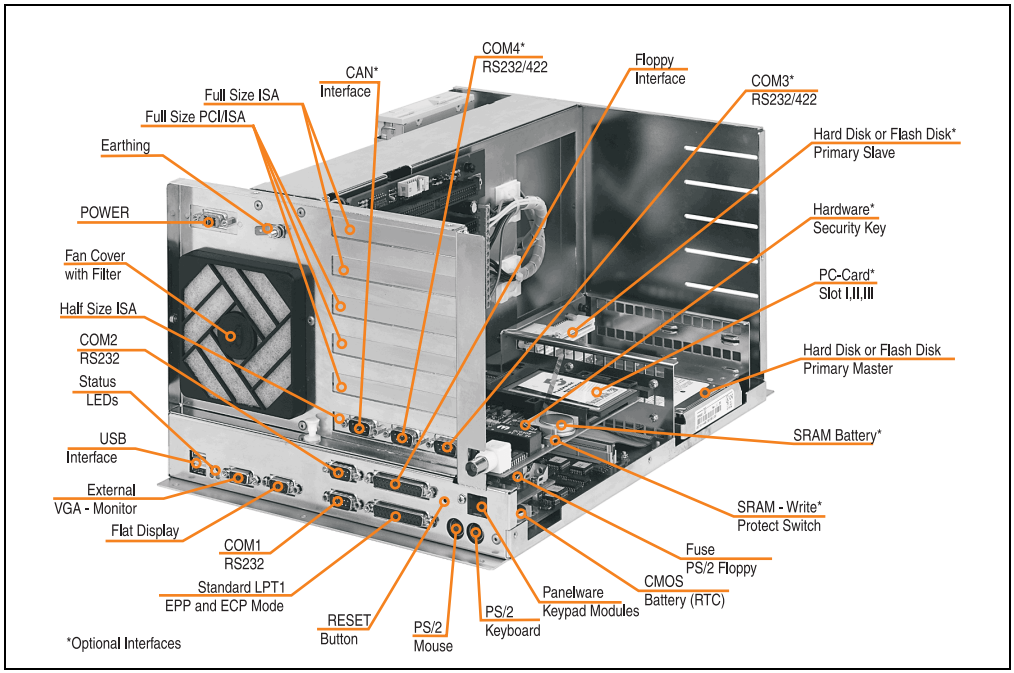


Figure 22: IPC5600 components (bus unit with 6 slots)

5.5 IPC5000C (2-slot design)

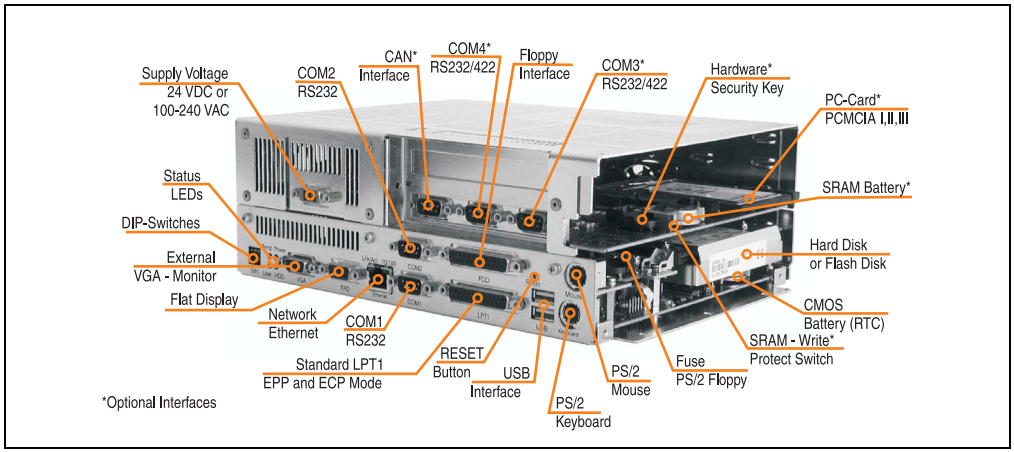


Figure 23: IPC5000C components (bus unit with 2 slots)

5.6 IPC5000C (2-slot design + optional add-on drive)

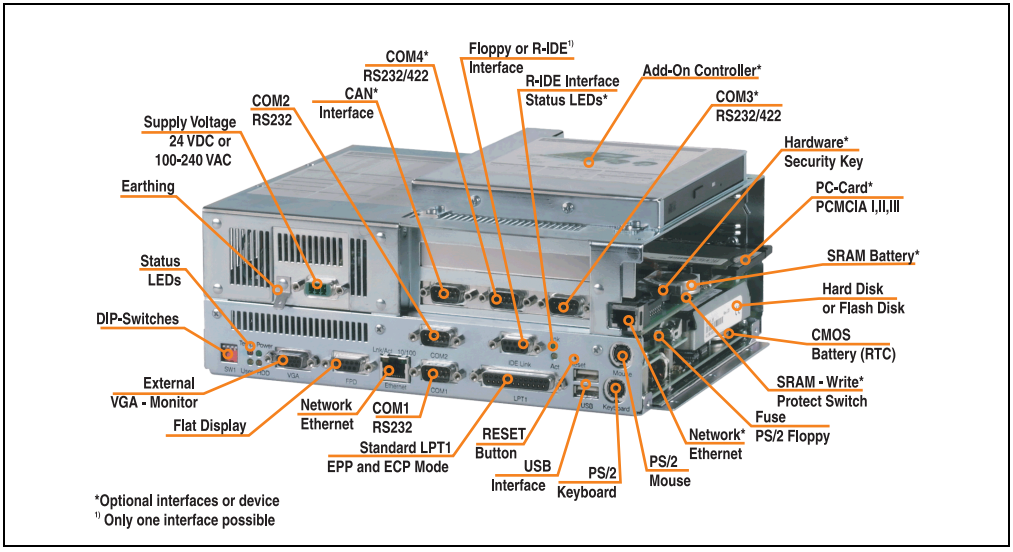


Figure 24: IPC5000C components (bus unit with 2 slots + add-on controller)

5.7 IPC5000C (4-slot design)

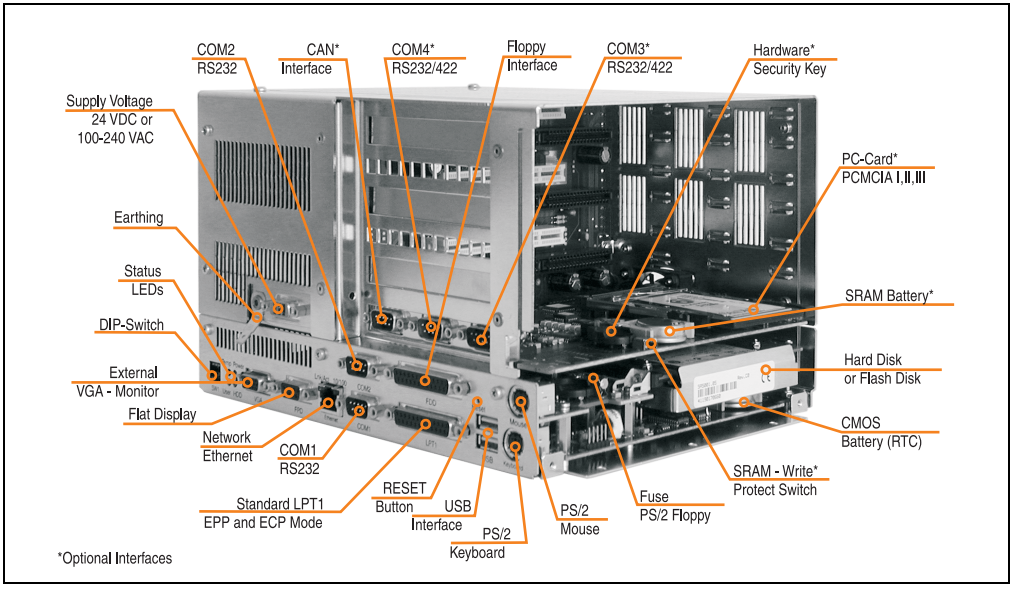


Figure 25: IPC5000C components (bus unit with 4 slots)

5.8 IPC5000C (5-slot design + add-on controller)

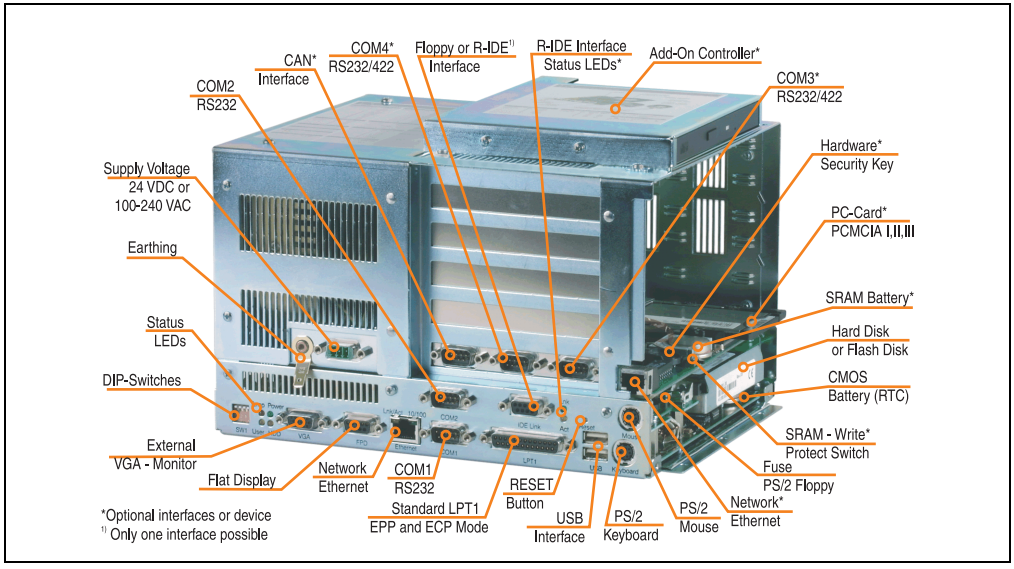


Figure 26: IPC5000C components (bus unit with 5 slots + add-on controller)

5.9 IPC5600C (4-slot design)

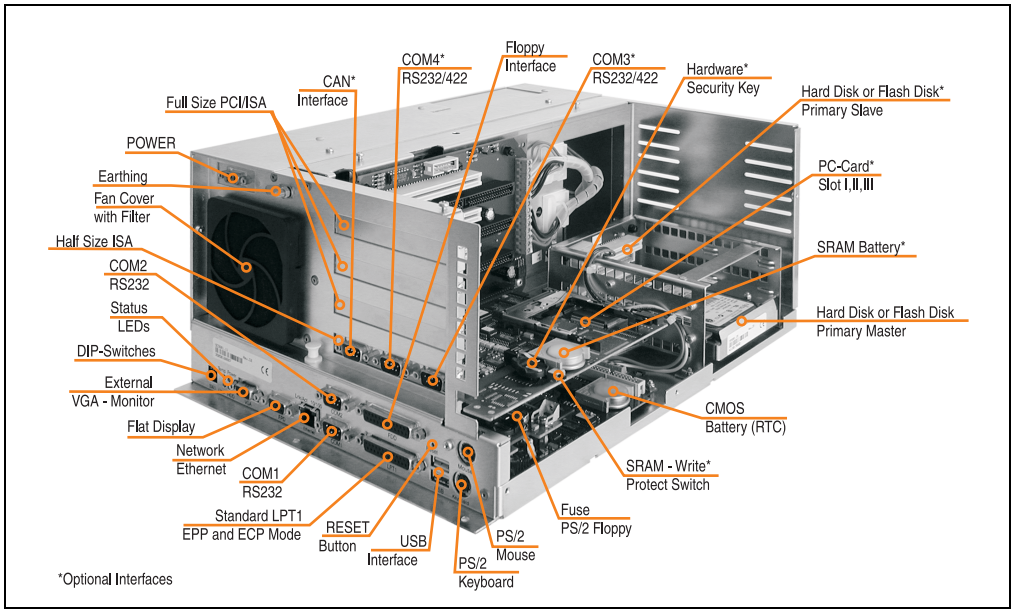


Figure 27: IPC5600C components (bus unit with 4 slots)

5.10 IPC5600C (5-slot design)

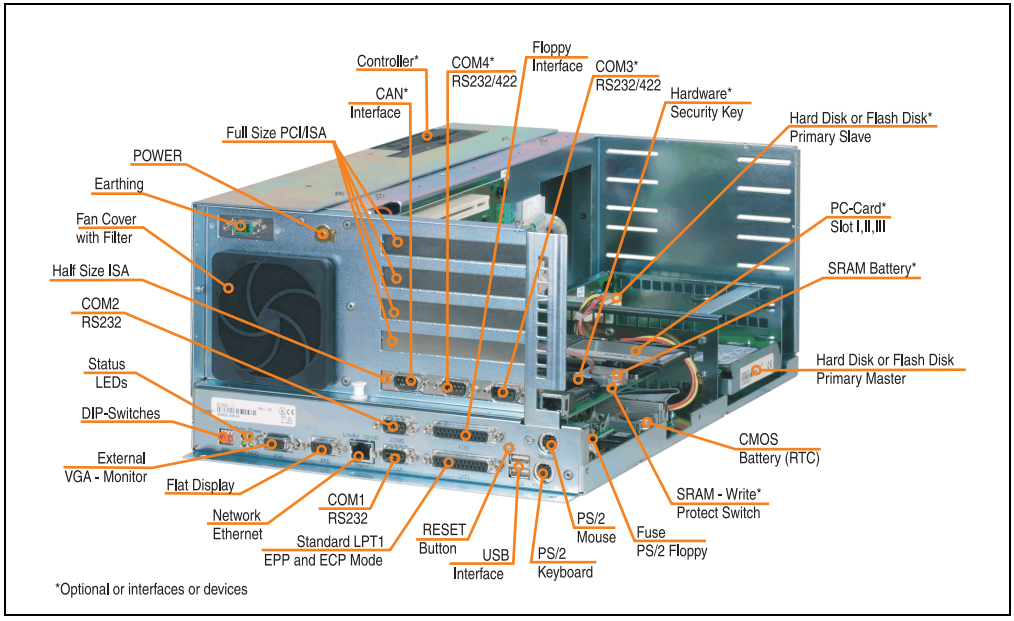


Figure 28: IPC5600C components (bus unit with 5 slots)

5.11 IPC5600C (6-slot design)

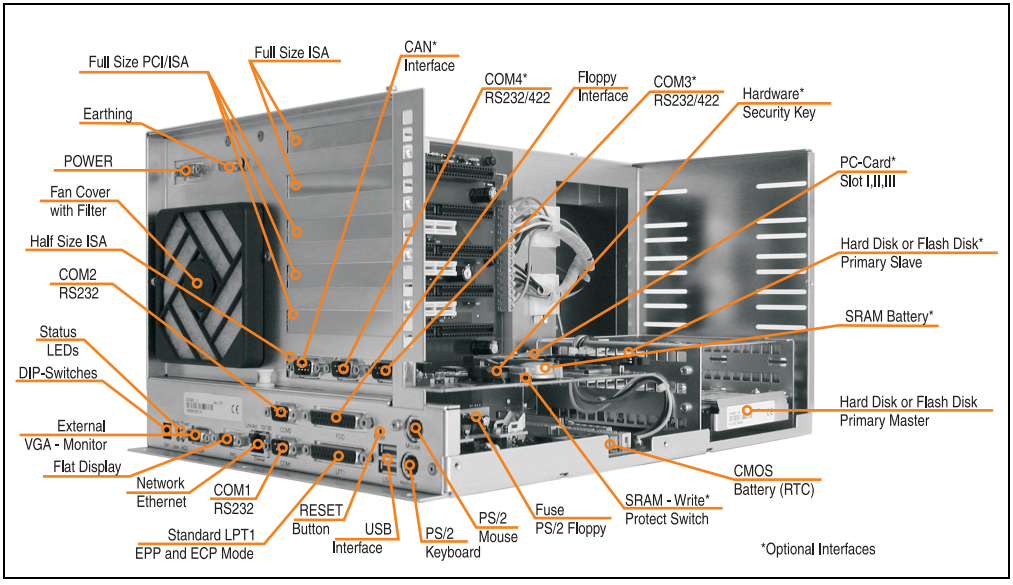


Figure 29: IPC5600C components (bus unit with 6 slots)

6. Provit 5600 IPC - configuration options

It is possible to use different drives (floppy disk, CD-ROM, DVD ROM) with a 5C5601.* system unit. These drives can be installed in the system unit in various ways, subject to the specific mounting guidelines for each individual drive (see 6.12 "Mounting guidelines" on page 107).

Several types of drives can be selected:

Model number	Description	Note
5A5600.01	Controller FDD, for system units 5C5601.xx	
5A5600.02	Controller FDD and CD-ROM, for system units 5C5601.xx	
5A5600.03	FDD panel, for Provit 5600 display units.	
5A5600.04	LS120 controller and CD-ROM drive, for system units 5C5601.xx	*Cancelled since 08/2002*
5A5600.05	Controller FDD and DVD-ROM drive, for system units 5C5601.xx	
5A5600.06	Controller ZIP250 and CD-ROM drive for system units 5C5601.xx	On request
5A5600.07	FDD controller CD-RW	
5A5600.09	LS240 controller CD-ROM	

Table 32: Model numbers - controller accessories

6.1 5A5600.01

Figure 30: 5A5600.01 flush with a display unit 5D560x.0x

The figure shows the 5A5600.01 controller installed flush with a 5D560x.0x display unit.

6.1.1 Mounting guidelines - 5A5600.01

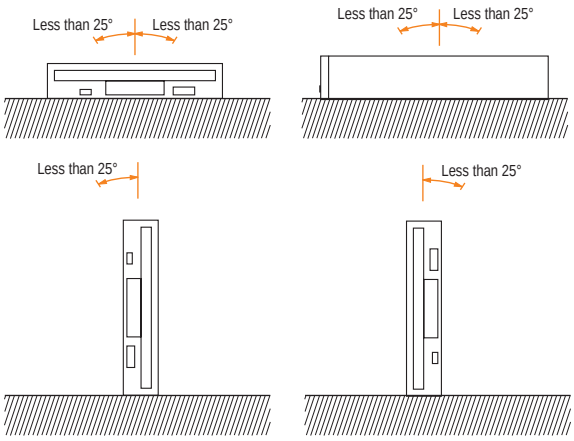


Figure 31: Mounting guidelines - 5A5600.01

6.1.2 Technical data - 5A5600.01

5A5600.01	
Disk drive	3.5" drive 1.44 MB
Color	Black
Drivers	Not required
Operation Temperature Relative humidity	 4 - 51.7 °C 20 - 80%, non-condensing
Storage Temperature Relative humidity	 - 22 to + 60 °C 5 - 90 %, non-condensing
Vibration Operation Storage	 Max. 1.5 G at 10 - 100 Hz, 1 octave/min Max. 1 G at 100 - 200 Hz, 1 octave/min Max. 0.5 G at 200 - 600 Hz, 1 octave/min No information available
Shock Operation Storage	 Read/write: Max. 5 G for 11 ms (half sine wave) Write: Max. 10 G for 11 ms (half sine wave) No information available

Table 33: Technical data - 5A5600.01

6.2 5A5600.02

Figure 32: 5A5600.02 flush with a display unit 5D560x.0x

The figure shows the 5A5600.02 controller installed flush with a 5D560x.0x display unit.

6.2.1 Mounting guidelines - 5A5600.02

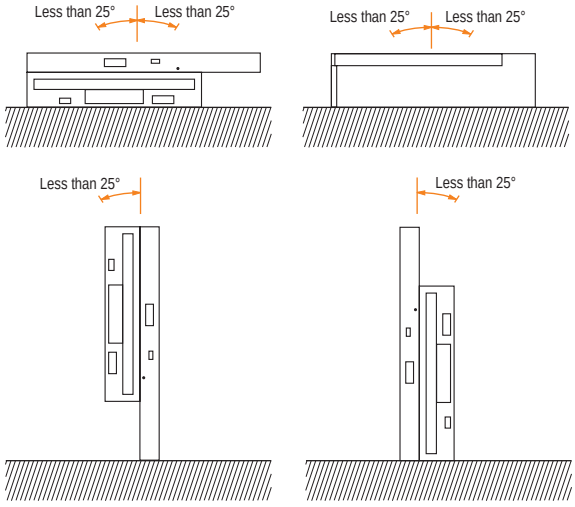


Figure 33: Mounting guidelines - 5A5600.02

6.2.2 Technical data - 5A5600.02

5A5600.02	
Disk drive	3.5" drive 1.44 MB data carrier
CD-ROM drive	24x
Color	Black

Table 34: Technical data - 5A5600.02

5A5600.02	
Drivers	Found on the Provit Drivers & Utilities CD-ROM 5S0000.01-090 or can be downloaded directly from B&R's homepage (www.br-automation.com).
Operation Temperature Relative humidity	 5 - 51.7 °C 20 - 80%, non-condensing
Storage Temperature Relative humidity	 - 22 to + 60 °C 5 - 90 %, non-condensing
Vibration Operation CD-ROM storage	 Max. 0.3 G at 5 - 500 Hz, 1 octave/min Max. 2 G at 5 - 500 Hz, 1 octave/min
Shock Operation CD-ROM storage	 Max. 5 G for 11 ms (half sine wave) Max. 60 G for 11 ms (half sine wave)

Table 34: Technical data - 5A5600.02

6.3 5A5600.03

This type of controller can be mounted on the back of display units 5D5600.0x and 5D5601.0x using the installation slot provided on the display unit.

Figure 34: Figure 5A5600.03

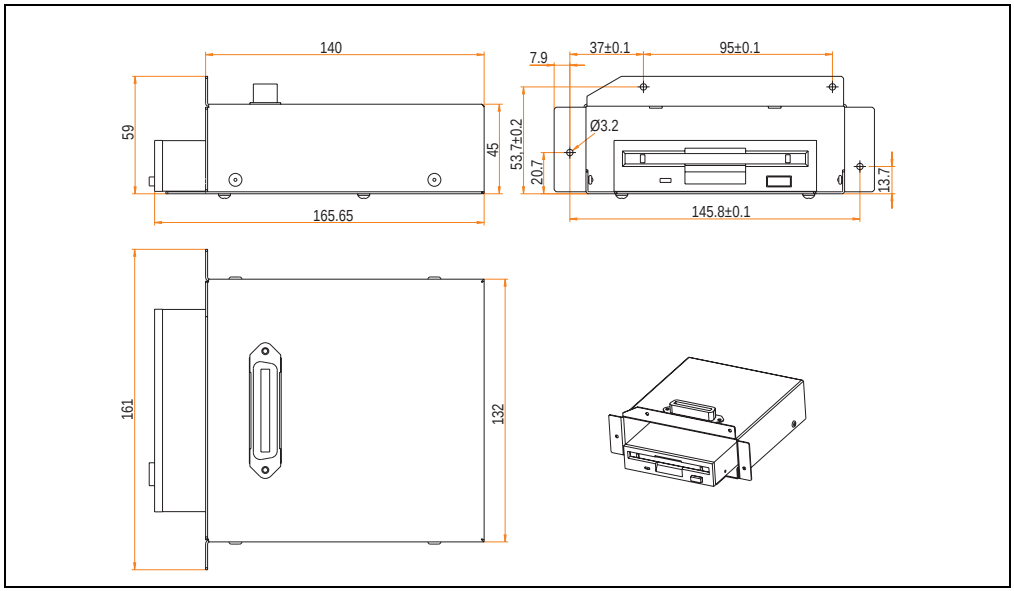


Figure 35: Dimensions - FDD 5A5600.03

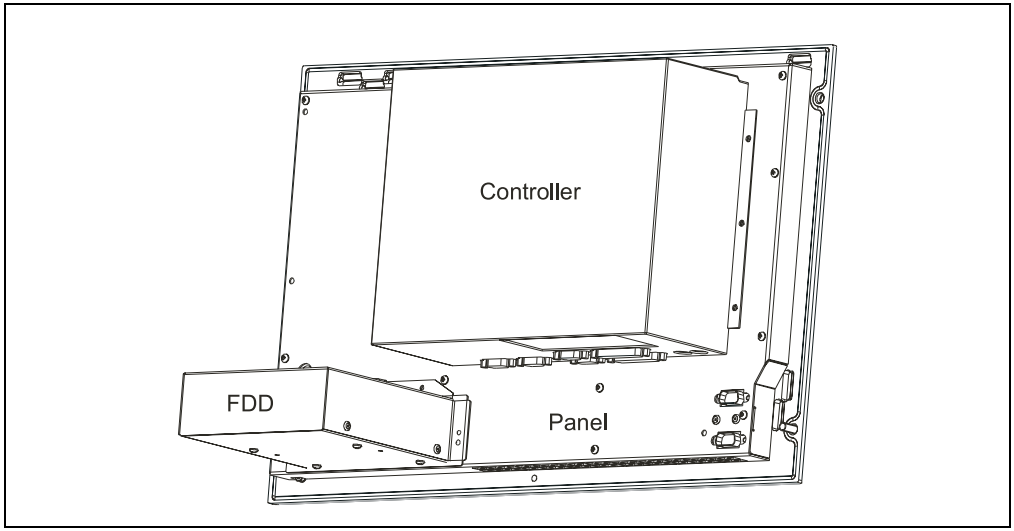


Figure 36: Mounting example of an FDD 5A5600.03 with controller on a panel

The connection is made using a standard Centronics cable via a 25-pin DSUB socket. B&R offers a separate 50 cm long connection cable (model number 5A5601.01) for mounting the FDD (as shown in Figure 22). A longer 1.8 m cable is also available (model no: 9A9005.01).

6.3.1 Mounting guidelines - 5A5600.03

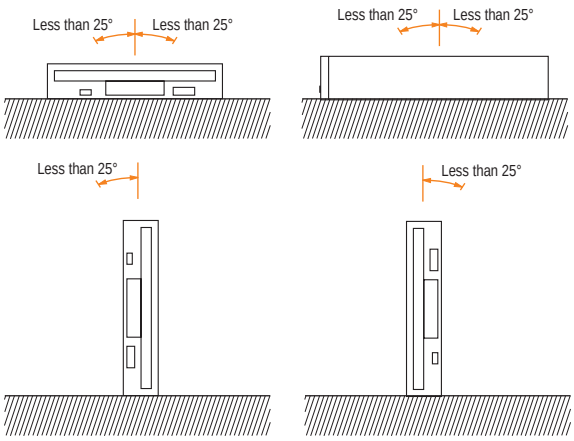


Figure 37: Mounting guidelines - 5A5600.03

6.3.2 Technical data - 5A5600.03

5A5600.03	
Disk drive	3.5" drive 1.44 MB data carrier
Color	Black
Drivers	Not required
Operation Temperature Relative humidity	 4 - 51.7 °C 20 - 80% (non-condensing)
Storage Temperature Relative humidity	 - 22 to + 60 °C 5 - 90 %, non-condensing
Vibration Operation Storage	 Max. 1.5 G at 10 - 100 Hz, 1 octave/min Max. 1 G at 100 - 200 Hz, 1 octave/min Max. 0.5 G at 200 - 600 Hz, 1 octave/min TBD
Shock Operation Storage	 Read/write: Max. 5 G for 11 ms (half sine wave) Write: Max. 10 G for 11 ms (half sine wave) TBD

Table 35: Technical data - 5A5600.03

6.4 5A5600.04

Figure 38: 5A5600.04 flush with a display unit 5D560x.0x

The figure shows the 5A5600.04 controller installed flush with a 5D560x.0x display unit.

6.4.1 Mounting guidelines - 5A5600.04

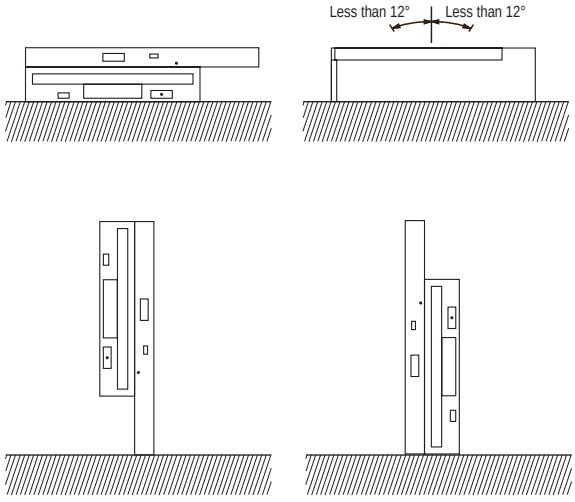


Figure 39: Mounting guidelines - 5A5600.04

6.4.2 Technical data - 5A5600.04

5A5600.04	
LS-120	3.5" drive 1.44 MB / 120 MB disks
CD-ROM drive	24x
Color	Beige

Table 36: Technical data - 5A5600.04

5A5600.04	
Drivers	Found on the Provit Drivers & Utilities CD-ROM 5S0000.01-090 or can be downloaded directly from B&R's homepage (www.br-automation.com).
Operation Temperature Relative humidity	 5 - 45 °C 20 - 80%, non-condensing
Storage Temperature Relative humidity	 - 20 to + 60 °C 8 - 90 %, non-condensing
Vibration Operation Storage	 Max. 0.25 G at 10 - 500 Hz, 1 octave/min Max. 2 G at 10 - 500 Hz, 1 octave/min
Shock Operation Storage	 5 G for 11 ms (half sine wave) 60 G for 11 ms (half sine wave)

Table 36: Technical data - 5A5600.04

6.5 5A5600.05

Figure 40: 5A5600.05 flush with a display unit 5D560x.0x

The figure shows the 5A5600.05 controller installed flush with a 5D560x.0x display unit.

6.5.1 Mounting guidelines - 5A5600.05

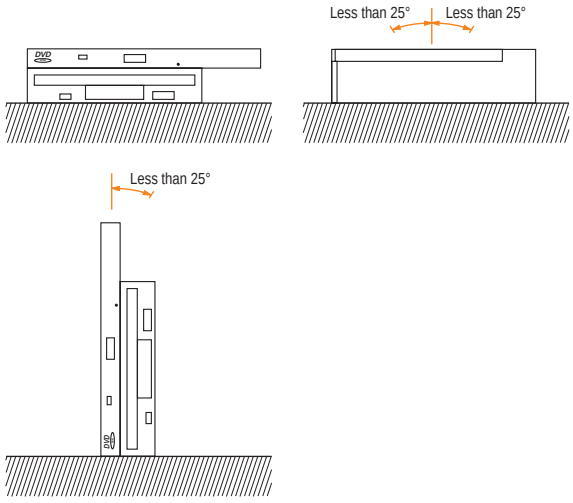


Figure 41: Mounting guidelines - 5A5600.05

6.5.2 Technical data - 5A5600.05

5A5600.05	
Disk drive	3.5" drive 1.44 MB data carrier
DVD drive	8x DVD read, 24x CD read
Color	Black
Drivers	Found on the Provit Drivers & Utilities CD-ROM 5S0000.01-090 or can be downloaded directly from B&R's homepage (www.br-automation.com).
Operation Temperature Relative humidity	 5 - 51.7 °C 20 - 80%, non-condensing
Storage Temperature Relative humidity	 - 22 to + 60 °C 5 - 90 %, non-condensing
Vibration Operation DVD drive storage	 Max. 0.2 G at 5 - 500 Hz, 1 octave/min Max. 2 G at 5 - 500 Hz, 1 octave/min
Shock Operation DVD drive storage	 Max. 5 G for 11 ms (half sine wave) Max. 60 G for 11 ms (half sine wave)

Table 37: Technical data - 5A5600.05

6.6 5A5600.07

Figure 42: 5A5600.07 flush with a display unit 5D560x.0x

The figure shows the 5A5600.07 controller installed flush with a 5D560x.0x display unit.

6.6.1 Mounting guidelines - 5A5600.07

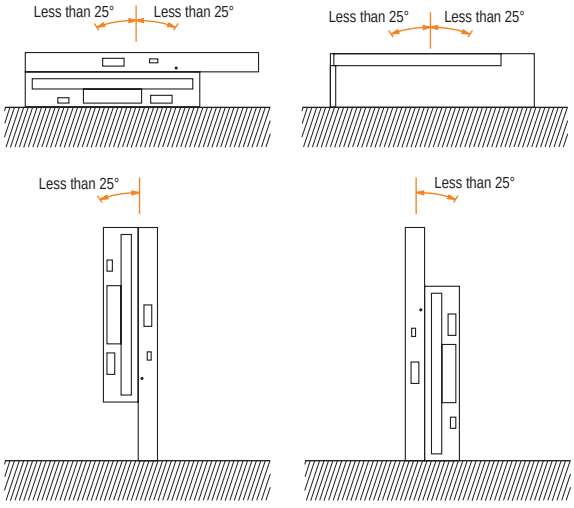


Figure 43: Mounting guidelines - 5A5600.07

6.6.2 Technical data - 5A5600.07 controller (Revision D0)

5A5600.07	
Disk drive	3.5" drive 1.44 MB data carrier
CD-RW drive	Technical data - CD - RW drive (see table 39 "Technical data - CD RW drive")
Color	Black

Table 38: Technical data - 5A5600.07

5A5600.07	
Drivers	Found on the Provit Drivers & Utilities CD-ROM 5S0000.01-090 or can be downloaded directly from B&R's homepage (www.br-automation.com).
Operation Temperature Relative humidity	 5 - 45 °C 20 - 80%, non-condensing
Storage Temperature Relative humidity	 - 22 to + 60 °C 5 - 90 %, non-condensing
Vibration Operation CD RW drive storage	 Max. 0.2 G at 5 - 500 Hz, 1 octave/min Max. 2 G at 5 - 500 Hz, 1 octave/min
Shock Operation CD RW drive storage	 Max. 5 G for 11 ms (half sine wave) Max. 60 G for 11 ms (half sine wave)

Table 38: Technical data - 5A5600.07

Technical data - CD RW drive	
Write speed	Recordable: 24x, 16x, 10x and 4x Rewriteable: 10x and 4x
Reading rate	24x
Color	Black
CDs to be used	CD-DA, CD-ROM (mode 1), CD-ROM XA mode 2 (form 1, form 2), Photo CD (Multisession) CD-I, Video CD, CD-Text, CD Extra (CD Plus)
Recording technique	Disc at once, session at once, track at once, packet write
CD diameter	12 cm, 8 cm
Rotation rate (24 x CAV)	5,140 min^{-1} (rpm)
Interface	IDE / ATAPI (UDMA33)
Data transfer rate (asynchronous transfer)	Continual access: 3.6 MB/s max. (tracks limit) 3.7 MB/s (average rate)
Access time	Typically 110 ms
Data buffer capacity	2 MB
Technology for avoidance of buffer under-runs	Ricoh Just Link
Charge mechanism	Drawer procedure
Power consumption	Standby: 0.25 watts Write 24x: 5.5 watts
MTBF	60,000 POH

Table 39: Technical data - CD RW drive

6.7 5A5600.09

Figure 44: 5A5600.09 flush with a display unit 5D560x.0x

The figure shows the 5A5600.09 controller installed flush with a 5D560x.0x display unit.

6.7.1 Mounting guidelines - 5A5600.09

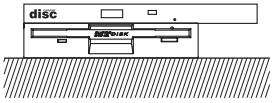


Figure 45: Mounting guidelines - 5A5600.09

6.7.2 Technical data - 5A5600.09

5A5600.09	
SuperDisk 240	3.5" drive 1.44 MB / 120 MB disks / 240 MB data carrier
CD-ROM drive	24x
Color	Beige
Drivers	Found on the Provit Drivers & Utilities CD-ROM 5S0000.01-090 or can be downloaded directly from B&R's homepage (www.br-automation.com).
Operation Temperature Relative humidity	 5 - 45 °C 20 - 80%, non-condensing
Storage Temperature Relative humidity	 - 20 to + 60 °C 5 - 90 %, non-condensing
Vibration Operation Storage	 Max. 0.25 G at 10 - 500 Hz, 1 octave/min Max. 2 G at 10 - 500 Hz, 1 octave/min
Shock Operation Storage	 5 G for 11 ms (half sine wave) 60 G for 11 ms (half sine wave)

Table 40: Technical data - 5A5600.09

Additional information regarding the SuperDisk 240 drive being used

- High capacity (240 MB per SuperDisk medium 240MB)
- Fully compatible with FDD and SuperDisk 120
- Storage of 32 MB on conventional 2HD 1.44 MB diskettes (only possible with special drivers)
- Data transfer rates:
  for 240 MB media between 1.06 and 1.91 MB/s
  for 120 MB media maximum 1 MB/s
  for 1.44 MB diskettes approx. 230 KB/s
- Average access time: 65 ms
- Disk rotation speed: 1500 revolutions per minute

6.8 Drive combinations

Information:

The following statements refer to B&R's product range at the time this manual went to print. Naturally it is also possible to use further drives in other combinations resulting from changes to the product range or modification of hardware components. Information regarding this can be received directly from B&R.

Since the IPC5600/5600C driver can also be operated remotely by the controller (e.g. in the display unit), the following configuration options arise:

Combinations	Location
Disk drive 5A5600.01	In the IPC5600/5600C
Disk drive 5A5600.03	External (e.g. in a display unit)
FDD / CD-ROM unit 5A5600.02	In the IPC5600/5600C
LS120 / CD-ROM unit 5A5600.04	In the IPC5600/5600C
FDD / DVD unit 5A5600.05	In the IPC5600/5600C
ZIP 250 / CD-ROM unit 5A5600.06	In the IPC5600/5600C
FDD / CD-RW unit 5A5600.07	In the IPC5600/5600C
Disk drive 5A5600.03 FDD / CD-ROM unit 5A5600.02	External (e.g. in a display unit) In the IPC5600/5600C
Disk drive 5A5600.03 LS120 / CD-ROM unit 5A5600.04	External (e.g. in a display unit) In the IPC5600/5600C
Disk drive 5A5600.01 Disk drive 5A5600.03	In the IPC5600/5600C External (e.g. in a display unit)
Disk drive 5A5600.03 FDD / DVD unit 5A5600.05	External (e.g. in a display unit) In the IPC5600/5600C
Disk drive 5A5600.03 ZIP 250 / CD-ROM unit 5A5600.06	External (e.g. in a display unit) In the IPC5600/5600C
Disk drive 5A5600.03 FDD / CD-RW unit 5A5600.07	External (e.g. in a display unit) In the IPC5600/5600C

Table 41: Combination options for Provit 5600 IPC drives

Connection to the controller is made via the external floppy disk drive interface for those versions whose floppy disk drives are operated remotely by the controller (e.g. in the display unit).

Warning!

The maximum distance allowed between controller and display is 1.8 m with FDD remote operation (e.g. as a Panel FDD 5A5600.03).

6.9 Operation of 3.5" disk drives

Combinations	Location
Disk drive 5A5600.01	In the IPC5600
Disk drive 5A5600.03	External (e.g. in a display unit)
FDD / CD-ROM unit 5A5600.02	FDD and CD-ROM in the IPC5600
Disk drive 5A5600.03 FDD / CD-ROM unit 5A5600.02	External (e.g. in a display unit) In the IPC5600
Disk drive 5A5600.01 Disk drive 5A5600.03	In the IPC5600 External (e.g. in a display unit)
Disk drive 5A5600.03 FDD / DVD unit 5A5600.05	External (e.g. in a display unit) In the IPC5600/5600C
Disk drive 5A5600.03 ZIP 250 / CD-ROM unit 5A5600.06	External (e.g. in a display unit) In the IPC5600/5600C
Disk drive 5A5600.03 FDD / CD-RW unit 5A5600.07	External (e.g. in a display unit) In the IPC5600/5600C

Table 42: Operation of disk drive

Information:

When using FDDs, please note that the drive on the external FDD is designated as drive A - as only drive A is bootable.

However if only one disk drive is available (installed in the IPC), then it is not possible to boot from this one, as it is operating as drive B. Therefore a second, physically non-existent drive must be registered in BIOS (see sections "Standard CMOS setup" on page 317 and 3.2 "Standard CMOS features" on page 340), so that "Swap Floppy Drive" (see section "BIOS features setup" on page 319 and 3.4 "Advanced chipset features" on page 350), can be used to designate the internal drive as drive A, allowing it to be used for booting.

Parallel operation of two 3.5" disk drives

As shown in the above table, it is possible to operate two disk drives simultaneously with the IPC5600/IPC5600C:

- One drive in the controller
- One drive on the interface for the external disk drive

Information:

Normally drive designation A is assigned to the external floppy disk drive. In order to boot the disk drive in the controller (e.g. during service work), the parameter "Swap Floppy Drive" must be switched to 'Enabled' (found under the menu item "BIOS features setup" in BIOS).

6.10 Operation of LS120 drives

Combinations	Location
LS120 / CD-ROM unit 5A5600.04	LS120 and CD-ROM in the IPC5600
Disk drive 5A5600.03 LS120 / CD-ROM unit 5A5600.04	External (e.g. in a display unit) In the IPC5600

Table 43: LS120 drive combination options

Note:
In the IPC5600/IPC5600C, BIOS enables the LS120 drives (which are actually IDE devices such as CD-ROM drives) to operate like a disk drive (drive letter A or B). However, it is only possible to use standard diskettes (360 KB, 720 KB, 1.44 MB) with the LS120 drive. The option to work with special 120 MB diskettes is not a built-in feature of BIOS and must be supported by the operating system.

If an LS120 drive is operated without a second disk drive (in BIOS "Floppy A = None" and "Floppy B = None", see sections "Standard CMOS setup" on page 317 and "Standard CMOS features" on page 340), then it can be accessed as the A drive and therefore can also be booted.

If another disk drive is being used (parallel to the LS120 drive) in addition to the external disk drive interface, then the disk drive is operated as drive A and the LS120 drive is operated as drive B. In this case, the expression "LS/Zip" (found in BIOS under the menu item "BIOS Features Setup") must be first in the "Boot Sequence" parameter so that the LS120 drive can be used for booting.

6.11 BIOS settings for booting an IPC5600/5600C with different peripheral devices

From the internal floppy disk drive	
Drive A	1.4 M, 3.5"
Drive B	1.4 M, 3.5"
Boot sequence	A, C, SCSI
Swap floppy drive	Enabled
On-chip secondary IDE	*Under these circumstances, this setting is irrelevant.*
From the internal CD-ROM drive	
Drive A	*Under these circumstances, this setting is irrelevant.*
Drive B	*Under these circumstances, this setting is irrelevant.*
Boot sequence	CD-ROM, C, A
Swap floppy drive	*Under these circumstances, this setting is irrelevant.*
On-chip secondary IDE	Enabled
From the internal LS drive	
Drive A	*Under these circumstances, this setting is irrelevant.*
Drive B	None
Boot sequence	LS/ZIP, C
Swap floppy drive	*Under these circumstances, this setting is irrelevant.*
On-chip secondary IDE	Enabled
From the external floppy disk drive	
Drive A	1.4 M, 3.5"
Drive B	None
Boot sequence	A, C, SCSI
Swap floppy drive	Enabled
On-chip secondary IDE	*Under these circumstances, this setting is irrelevant.*
From the internal floppy disk drive (=Drive A) with external floppy disk drive (= Drive B)	
Drive A	1.4 M, 3.5"
Drive B	1.4 M, 3.5"
Boot sequence	A, C, SCSI
Swap floppy drive	Enabled
On-chip secondary IDE	*Under these circumstances, this setting is irrelevant.*
From the external floppy disk drive (=Drive A) with internal floppy disk drive (=Drive B)	
Drive A	1.4 M, 3.5"
Drive B	1.4 M, 3.5"
Boot sequence	A, C, SCSI
Swap floppy drive	Disabled
On-chip secondary IDE	*Under these circumstances, this setting is irrelevant.*

Table 44: BIOS settings for booting an IPC5600/5600C with different peripheral devices

6.12 Mounting guidelines

There are three options available for installing drives with the IPC5600/IPC5600C (local operation requires the display and controller to be connected):

- Drives accessible from the back of the controller, flush with the back

Figure 46: Drives accessible from the back of the controller

Warning!

When installing an LS120 / CD-ROM unit 5A5600.04 and ZIP 250 / CD-ROM unit 5A5600.06, it is not possible to install it flush with the back of a 4-slot Provit 5600 bus unit (5C5600.01 and 5C5600.02) and 5-slot bus unit (5C5600.03 and 5C5600.04). It is only possible to install it flush with the back when using a 6-slot Provit 5600 bus unit (5C5600.11 and 5C5600.12).

- Drives accessible from the front, flush with the front of the controller

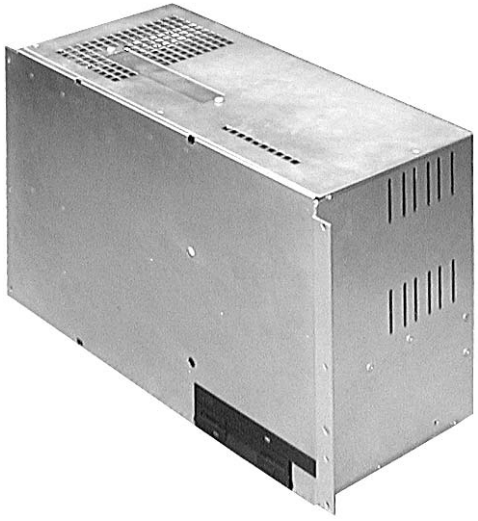


Figure 47: Drives accessible from the front of the IPC, flush with the front of the controller

Warning!

When installing an LS120 / CD-ROM unit 5A5600.04 and ZIP 250 / CD-ROM unit 5A5600.06, it is not possible to install it flush with the back of a 4-slot Provit 5600 bus unit (5C5600.01 and 5C5600.02) and 5-slot bus unit (5C5600.03 and 5C5600.04). It is only possible to install it flush with the back when using a 6-slot Provit 5600 bus unit (5C5600.11 and 5C5600.12).

- Drives accessible from the front, flush with the front of the display (with standard mounting)

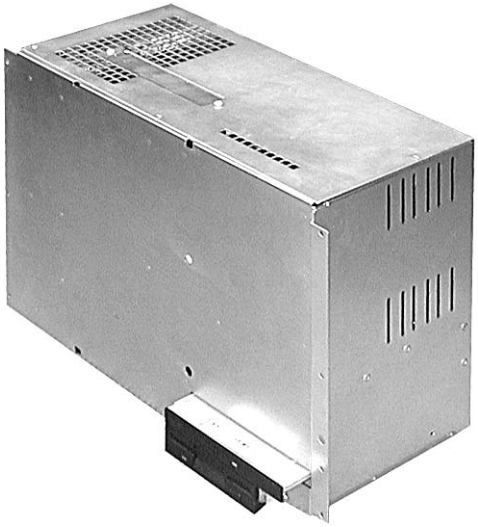


Figure 48: Drives accessible from the front of the IPC, flush with the front of the display unit

6.13 Modification instructions

Drives are installed before delivery according to the customer's wishes. However, easy step-by-step instructions are provided in case its necessary to make modifications:

a) Opening the housing

Remove the marked screws and detach the cover.

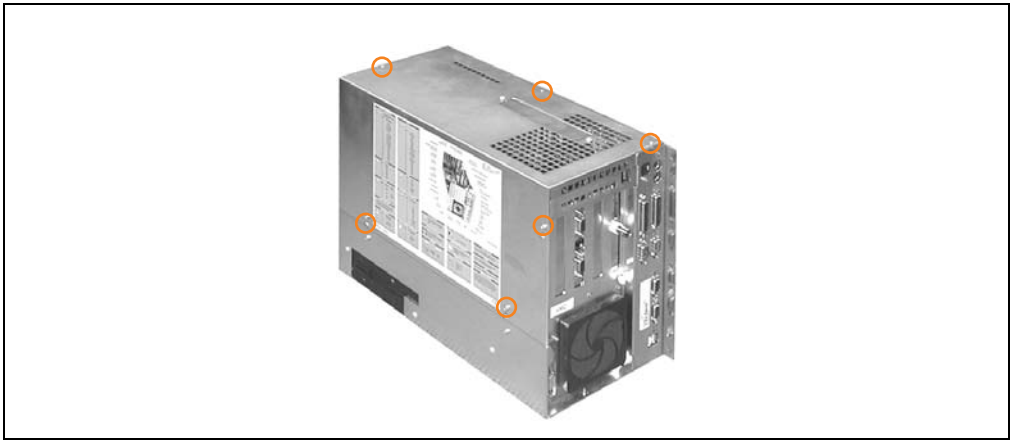


Figure 49: Opening the housing

b) Removing the bus unit

Remove the marked screws. The bus unit is now only connected to the system unit by the connector and the safety pins (white) marked.

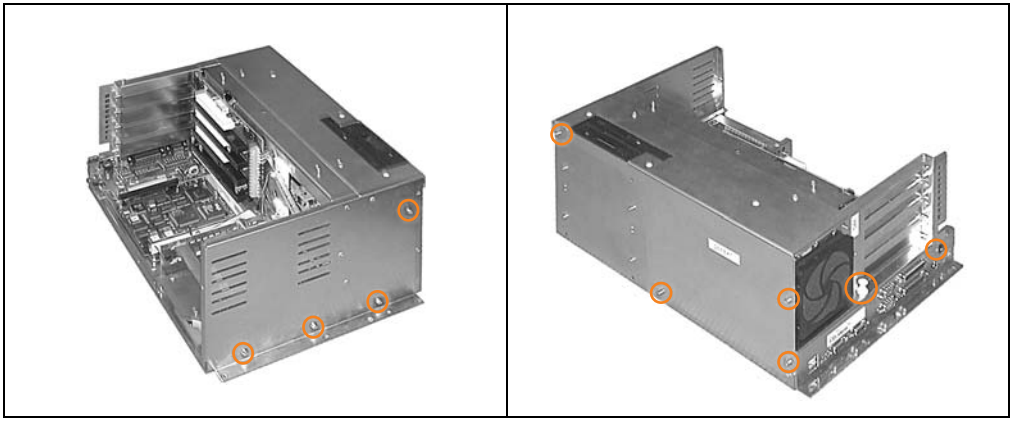


Figure 50: Removing the screws

The bus unit can now be detached.

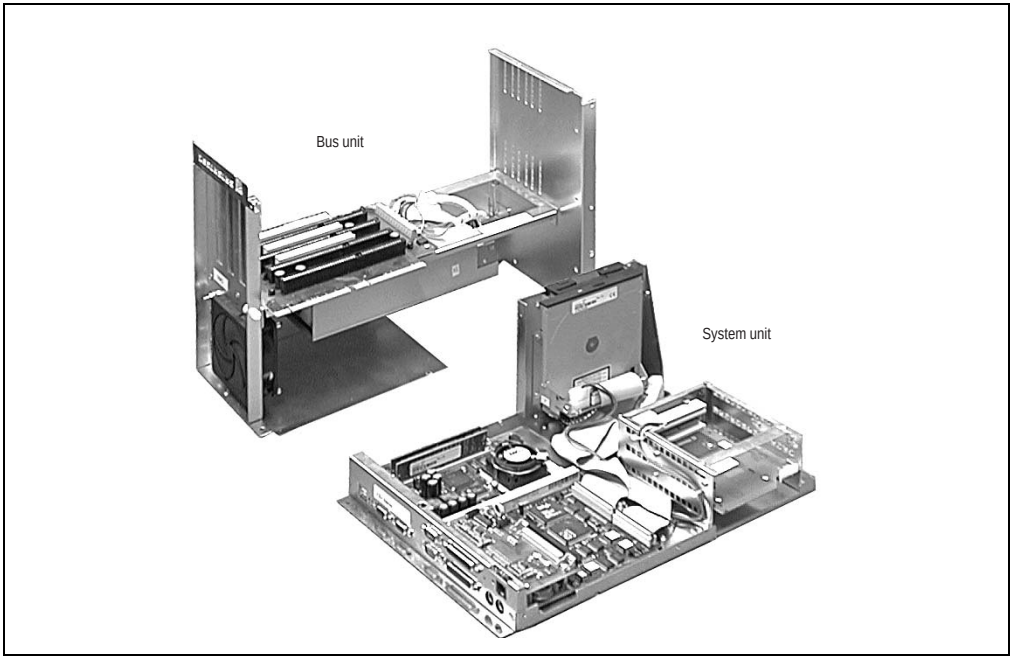


Figure 51: Detaching the bus unit

The bus unit (in the background) is not required for the remainder of the process.

c) Detaching the drive

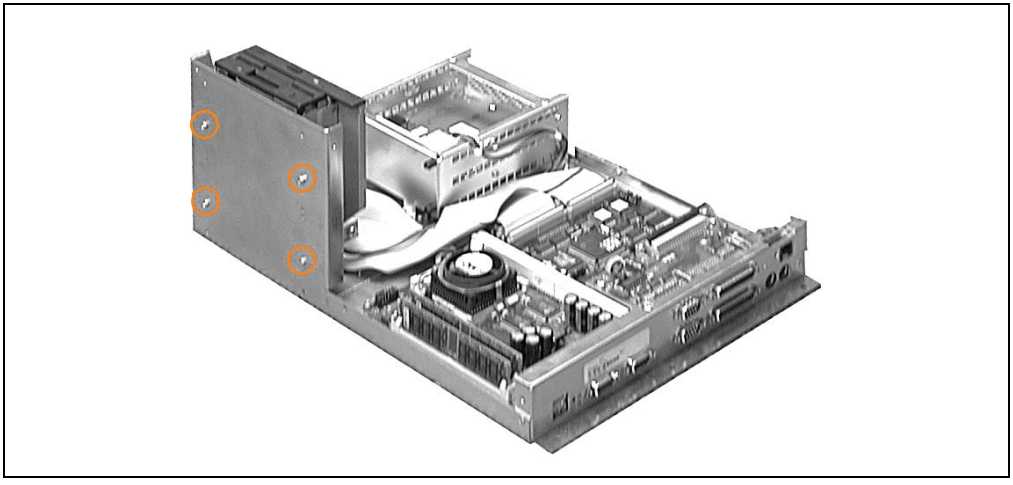


Figure 52: Detaching the drive

The drive can be detached from the mounting frame by removing the marked screws.

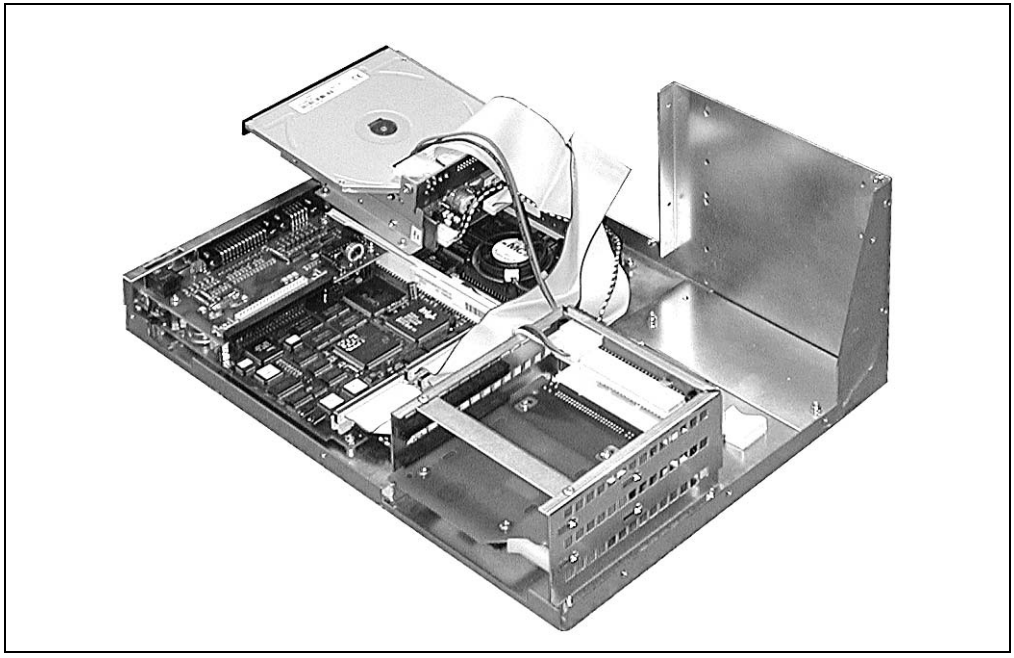


Figure 53: Detaching the drive

d) Reinstalling the drive

Depending on whether the drive in your IPC is accessible from the front or the back, you must now remove or install a cover plate on the opposite side, so that the unneeded opening in the housing is now closed. The drive can then be reinstalled on the mounting frame in the desired alignment.

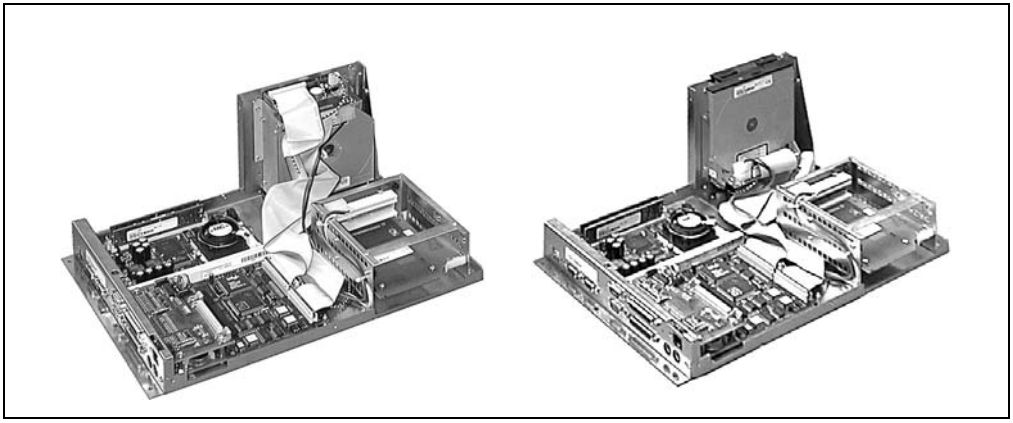


Figure 54: Aligning the drive to the front or the back

If the drives are accessible from the front of the IPC, they can be installed either flush with the front of the controller or flush with the front of a mounted display.

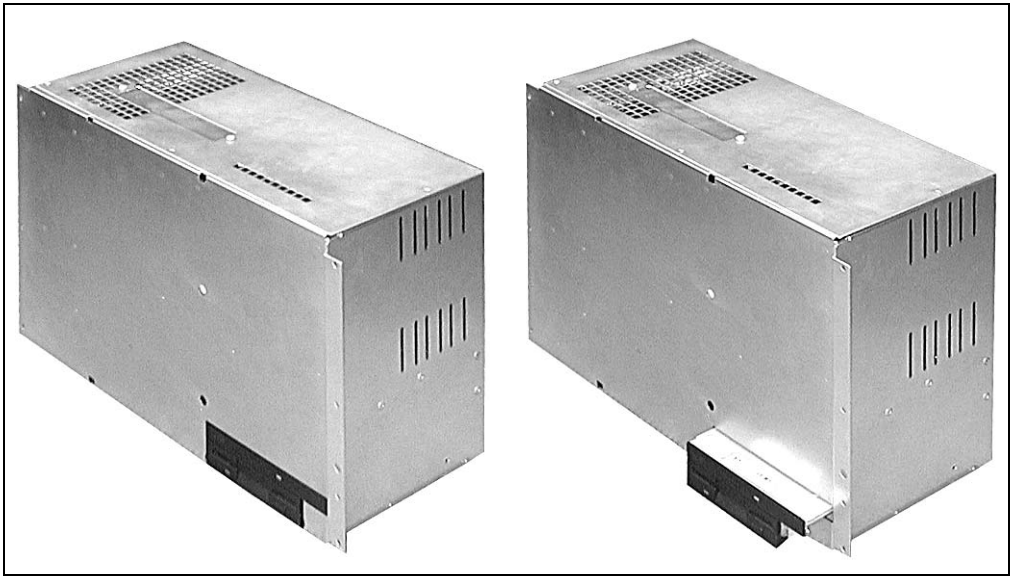


Figure 55: Mounting - flush or projecting

To reassemble your IPC, carry out the above steps in reverse.

7. System unit with socket 7 (ZIF)

7.1 General information

This section refers to the following system units:

Controller	System units
IPC5000	5C5001.01, 5C5001.03
IPC5600	5C5601.01

Table 45: System unit with socket 7 (ZIF)

The system unit is integrated into the lower housing with the mainboard and all peripheral interfaces:

IPC5000	IPC5600

Table 46: System unit with socket 7 (ZIF)

7.2 Technical data

Controller	IPC5000		IPC5600
System units	5C5001.01	5C5001.03	5C5601.01
Mainboard general information	Real-time clock [1)] CMOS backup in the FlashPROM Temperature monitoring (CPU, I/O, display unit)		
Math coprocessor	Integrated in the processor, no socket		
BIOS	AWARD Elite BIOS, Plug and Play compatible		
Chipset	Intel 430HX		
Processor socket	ZIF socket 7		
DRAM	2 x PS/2 SIMM, EDO or FPM [2)] Max. 128 MB		
2nd level cache	512 KB pipeline burst [3)]		

Table 47: Technical data - system units with socket 7 (ZIF)

Controller	IPC5000		IPC5600
Interfaces COM1 COM2 LPT1 USB Panelware Keyboard Mouse External disk drive	 RS232, 16-byte FIFO RS232, 16-byte FIFO SPP, EPP and ECP modes 2 USB ports[4)] Up to 8 Panelware keypad modules (cascaded) Enhanced AT PS/2 PS/2 Yes		
VGA controller	Chips & Technologies C&T65550 [5)]		
Graphics memory	1 MB	2 MB	
Interfaces	FPD (Panellink) + CRT (15-pin VGA DSUB)		
Hard disk / Silicon disk Slots	1		2

Table 47: Technical data - system units with socket 7 (ZIF) (cont.)

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

2) When using SIMM modules with an operating voltage of 3.3 V and 5 V respectively.

3) Only the 256 KB L2 cache is available for IPCs with Revision ≤34.03.

4) Only for system units with Revision ≤34.03; otherwise not available.

5) The VGA controller C&T65548 with 1 MB graphics memory is used for a 5C5001.01 system unit with Revision ≤21.01.

7.3 Mainboard

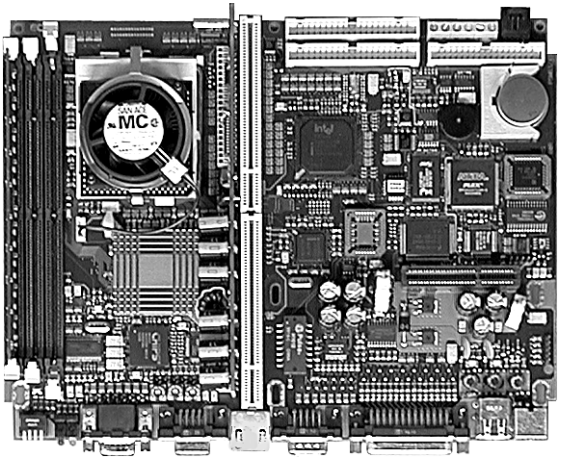


Figure 56: Mainboard of system units 5C5001.01, 5C5001.03 and 5C5601.01

All of the IPC's basic functions are implemented on the mainboard. These mainly include:

- Processor socket
- Chipset
- 2nd level cache
- DRAM socket
- Plug for the bus unit (power supply, ISA, PCI and IDE buses)
- Super I/O controller (COM1, COM2, LPT1, external FDD interface, PS/2 mouse, keyboard controller, USB interfaces, system clock)
- VGA controller (with CRT and FPD connection)
- Status LEDs
- Battery
- Reset button
- Recovery mode jumper
- MTC maintenance controller (Panelware module operation, keyboard operation, Panellink FPD interface, temperature monitoring with fan control)

Components listed here are described in detail in the following sections.

7.4 Processor socket

The following processors can be used in the system units listed:

Processor type	Intel Pentium	Intel Pentium MMX	AMD K6
Clock frequency [MHz]	100 / 120 / 133 / 150 / 166 / 200	200	166 / 266
1st level cache	2 x 8 KB	2 x 16 KB	2 x 32 KB
Socket	Socket 7 (ZIF socket)		
System units	5C5001.01, 5C5001.03, 5C5601.01		

Table 48: BIOS system for system units with socket 7 (ZIF)

Information:

Processors can only be ordered from B&R together with a corresponding system unit and vice versa. All system units supplied by B&R are therefore equipped with a processor. All installation and configuration work takes place at B&R. If processors are used which have not been supplied by B&R, the warranty claim is then void.

7.5 Jumper settings

Jumper settings for system units 5C5002.02, 5C5001.03 and 5C5601.01 can be made in the following places on the mainboard:

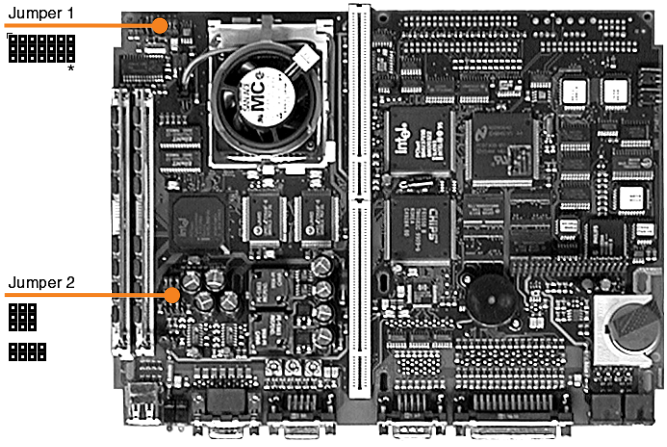


Figure 57: Jumper settings on mainboards with socket 7 (ZIF)

Jumper 1: Processor clock frequency

Jumper 2: Processor supply voltage

Caution!

The pins marked with * on the IPC5000 jumpers below (jumper 1) are only available on system units with Revision 44.04 and higher. They are only meaningful when using an AMD K6 266 processor.

The correct jumper settings for the processor used are made by B&R. If the jumper settings are changed, the warranty claim is then void.

Setting the processor clock frequency (jumper 1):

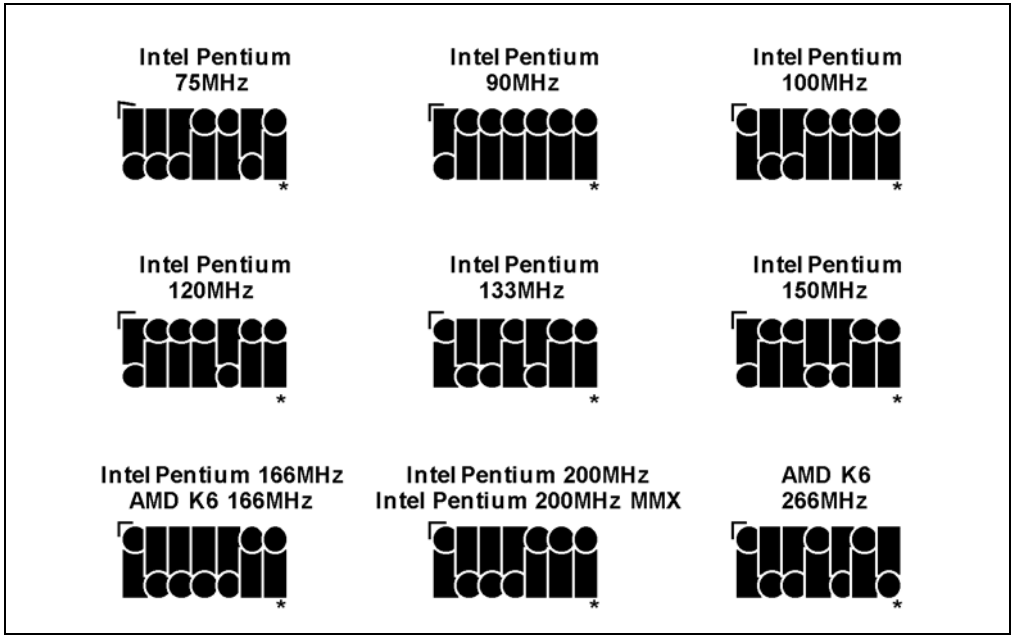


Figure 58: Setting the processor clock frequency (jumper 1):

* On the IPC5000, only in system units with Revision 44.04 and higher, otherwise not available.

Caution!

The defined clock frequency is not permitted to exceed the actual frequency specified for the processor.

Setting the processor power supply voltage (jumper 2):

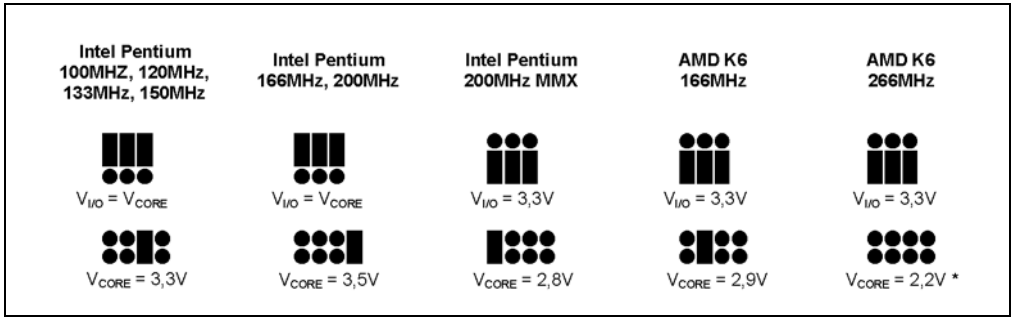


Figure 59: Setting the processor power supply voltage (jumper 2)

* On the IPC5000, only for system units with Revision 44.04 and higher, otherwise 2.5 V.

7.6 DRAM socket

System units	Chipset	Socket	Installation	Note
5C5001.01 5C5001.03 5C5601.01	Intel 430HX	2x PS/2 SIMM FPM or EDO	Max. 128 MB	When using the IPC5000, the SIMM modules are only allowed to be a maximum 29.5 mm high.

Table 49: DRAM socket

For detailed information about memory modules, see section 1.7 "Main memory" on page 63.

Information:

For the following system units, it is possible to alter the operating voltage of SIMM modules using a jumper:

System unit	Starting with Revision No.
5C5001.01	44.04
5C5001.03	44.04
5C5601.01	20.00

Table 50: Altering the operating voltage for SIMM modules

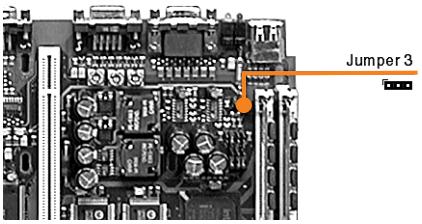


Figure 60: Location of the jumpers for DRAM operating voltage

Settings:

	Jumper	Connection	DRAM operating voltage
Jumper 3	1	1 - 2	3.3 V
		2 - 3	5 V (default setting)

Table 51: Jumper settings for DRAM operating voltage

7.7 Serial interfaces COM1 and COM2

There are two PC compatible serial interfaces with a 16-byte FIFO on the mainboard. They are UART16550 and Plug & Play compatible.

Serial interfaces COM1 and COM2	
RS232 interface Not electrically isolated Up to 115 kBaud	
Pin	**Assignment**
1	DCD
2	RXD
3	TXD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

9-pin DSUB plug

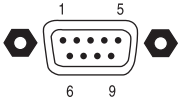


Table 52: Pin assignments - COM1 and COM2

Default setting	COM1	COM2
Interrupt	4	3
I/O address	3F8h - 3FFh	2F8h - 2FFh

Table 53: Default settings - COM1 and COM1

To change these settings see chapter 6 "Software", section 2.9 "Integrated peripherals" on page 328.

7.8 Parallel interface LPT1

The parallel interface LPT1 is a 25-pin DSUB socket. It supports EPP and ECP operating modes (Plug & Play compatible) as well as the standard SPP mode.

Parallel interface LPT1			
Pin	**Assignment**	**Pin**	**Assignment**
1	Data strobe	14	Auto-feed
2	Data 0	15	Error
3	Data 1	16	Printer init
4	Data 2	17	Printer select input
5	Data 3	18	GND
6	Data 4	19	GND
7	Data 5	20	GND
8	Data 6	21	GND
9	Data 7	22	GND
10	Acknowledge	23	GND
11	Busy	24	GND
12	Paper end	25	GND
13	Printer select status		

25-pin DSUB socket

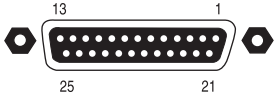


Table 54: Pin assignments - LPT1

Default setting	LPT1
Interrupt	7
I/O address	378h - 37Fh

Table 55: Default settings - LPT1

To change these settings see chapter 6 "Software", section 2.9 "Integrated peripherals" on page 328.

Note: Provit IPC parallel interfaces are equipped with a protective circuit in order to conform with requirements for operating in industrial environments. This can possibly lead to limitations in regard to the maximum transfer rate.

7.9 Interface for external disk drive

An external disk drive can be connected to the 25-pin DSUB socket.

Caution!

It is not possible to operate a second parallel device on this interface (LPT).

Interface for external disk drive (FDD)				
Pin	Assignment	Pin	Assignment	25-pin DSUB socket 13 1 25 21
1	n.c.	14	Density	
2	Index	15	Side select	
3	Track 0	16	Direction	
4	Write protect	17	Step	
5	Read data	18	GND	
6	Disk. chan.	19	GND	
7	n.c.	20	GND	
8	n.c.	21	GND	
9	+5 V	22	GND	
10	Drive select	23	GND	
11	Motor on	24	GND	
12	Write data	25	GND	
13	Write gate			

Table 56: Pin assignments - interface for external floppy disk drive

Setting	LPT1
Interrupt	6
I/O address	3F0h - 3F7h

Table 57: Default settings - external disk drive interface

These settings cannot be changed.

Warning!

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

7.10 USB interface

All Provit 5000 system units (for IPC5000 only with a Revision 34.03 or higher) have a USB (Universal Serial Bus) host controller with USB ports:

Figure 61: USB ports (5C5001.01, 5C5001.03 and 5C5601.01)

Warning!

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

7.11 AT keyboard connection (PS/2)

A PS/2 socket is used to connect an external AT keyboard. The external AT keyboard works parallel with connected Panelware keypad modules. The keyboard interface is operated by the MTC.

An external AT keyboard is available from B&R (see chapter 7 "Accessories", section 12 "Provit 5600 keyboard 5E9600.01-010 and 5E9600.01-020" on page 455).

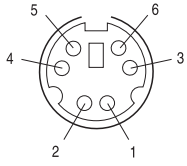
External AT keyboard connection (PS/2)		
Pin	Assignment	PS/2 socket
1	KBDATA	
2		
3	GND	
4	+5 V	
5	KBCLK	
6		

Table 58: External AT keyboard connection (PS/2)

Setting	PS/2 keyboard
Interrupt	1
I/O address	060h - 06Fh

Table 59: Default settings - AT keyboard interface

These settings cannot be changed.

Warning!

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

Make sure the connections for the PS/2 keyboard and PS/2 mouse are not swapped.

No devices that use the PS/2 keyboard supply as a power source are allowed to be connected.

7.12 Mouse connection (PS/2)

On the mainboard, an interface for connecting a standard PS/2 mouse is provided. This can be activated in the BIOS features setup menu (see chapter 6 "Software", section 2.3 "BIOS features setup" on page 319).

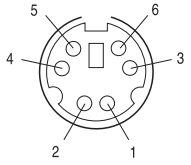
Mouse connection (PS/2)		
Pin	Assignment	PS/2 socket
1	Mouse data	
2		
3	GND	
4	+5 V	
5	Mouse CLK	
6		

Table 60: Mouse connection (PS/2)

Setting	PS/2 keyboard
Interrupt	12
I/O address	-

Table 61: Default settings - mouse interface (PS/2)

These settings cannot be changed.

Warning!

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

Make sure the connections for the PS/2 keyboard and PS/2 mouse are not swapped.

No devices that use the PS/2 keyboard supply as a power source are allowed to be connected.

7.13 VGA controller

Controller	Provit 5000		Provit 5600
System unit	5C5001.01	5C5001.03	5C5601.01
Manufacturer	Chips & Technologies		
Model	C&T 65550 1)		C&T 65550
Graphics memory	1MB	2MB	2MB
Interfaces	FPD (Panellink) + CRT (15-pin VGA DSUB)		FPD (Panellink) + CRT (15-pin VGA DSUB connector)

Table 62: VGA controller

1) The VGA controller C&T65548 with 1 MB graphics memory is used for a 5C5001.01 system unit with Revision ≤21.01.

The VGA controller is integrated onto the mainboard and offers high graphics performance through the connection with the PCI bus.

Outputs are available for two display devices:

7.13.1 FPD connection

A Provit 5000 flat panel display can be connected to this Panellink interface (see chapter 3 "Display units" on page 211).

Data (e.g. the operating hours of the display) is also transmitted simultaneously via the Panellink cable.

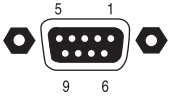
FPD interface		
Panellink		9-pin DSUB socket 
Pin	**Assignment**	
1	GND	
2	TXC+ / RS485A	
3	TX0+ / VCC	
4	TX1+ / +12V	
5	TX2+ / GND	
6	TXC- / RS485B	
7	TX0- / VCC	
8	TX1- / +12V	
9	TX2- / GND	

Table 63: Pin assignments - FPD interface

7.13.2 CRT connection

An external monitor can be connected to this interface.

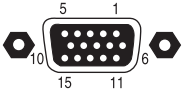
CRT connection				
Pin	**Assignment**	**Pin**	**Assignment**	15-pin DSUB socket 
1	R	9	+5V	
2	G	10	GND	
3	B	11	n.c.	
4	n.c.	12	DDC data	
5	GND	13	HSYNC	
6	GND	14	VSYNC	
7	GND	15	DDC CLK	
8	GND			

Table 64: Pin assignments - CRT connection

Monitor / Display

The built-in graphics controller allows a flat panel display and an external monitor to be operated simultaneously. Settings in this regard can either be changed in BIOS under the menu item "Additional Peripherals" or with software, using a graphics driver (online help for the driver).

The following table lists the frequencies that can be used with an external monitor when operated simultaneously with various display types:

LCD display		
Type	**Horizontal frequency**	**Vertical frequency**
VGA	31 kHz	60 Hz

TFT display		
Type	**Horizontal frequency**	**Vertical frequency**
VGA	31 kHz	60 Hz
SVGA	38 kHz	60 Hz
XGA	48 kHz	60 Hz
SXGA	38 kHz	36 Hz

Table 65: Sweep frequencies during simultaneous operation

Information:

When operating a monitor / display unit together, be sure that a multisync-monitor with a horizontal frequency of at least 25 kHz is used.

Note: The respective C&T graphics drivers for various operating systems can be found on the Provit Drivers & Utilities CD-ROM. Additionally, the driver can be downloaded directly from the B&R homepage www.br-automation.com.

Warning!

Display units developed for Provit 2000 series IPCs cannot be used with a Provit 5000 series IPC.

7.13.3 Using an external graphics card

It is possible to operate an external graphics card in a PCI slot on the mainboard. If such a card has been inserted, it is automatically recognized during the start-up procedure and the onboard VGA controller automatically switches itself off. It is not possible to switch the VGA controller on and off manually.

Caution!

An external graphics card cannot be operated in an ISA slot.

By deactivating the onboard VGA controller, it is not possible to operate a display or monitor on the IPC's FPD and CRT interfaces using an external graphics card because they are switched off.

7.13.4 Relationship between resolution, graphics memory and colors

The following table applies to all graphics controllers and display units. It should be noted that with high resolutions (XGA, SXGA), the number of colors is very limited.

Video memory	Resolution	Pixels	Number of colors
1MB	VGA	640 x 480	16 million (true color)
	SVGA	800 x 600	65535 (high color)
	XGA	1024 x 768	256
2MB	VGA	640 x 480	16 million (true color)
	SVGA	800 x 600	16 million (true color)
	XGA	1024 x 768	65535 (high color)
	SXGA	1280 x 1024	256

Table 66: Resolution, graphics memory and colors

7.14 Protection

There is a fuse provided on the mainboard for the supply voltage to the PS/2 keyboard, the PS/2 mouse and the external floppy disk drive. It is accessible after opening the housing:

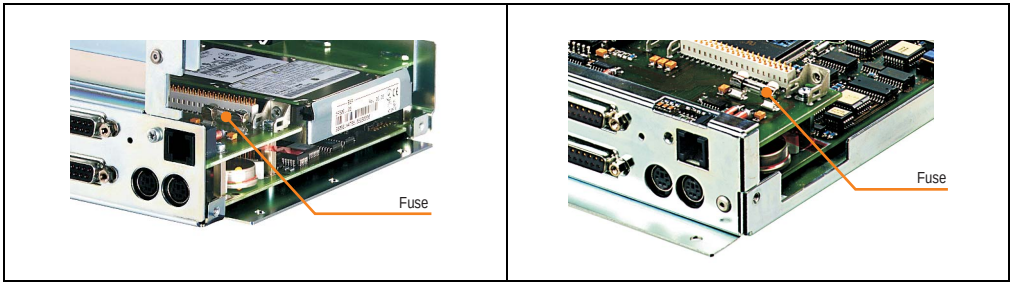


Figure 62: Fuse position for IPC5000 (left) and IPC5600 (right)

Fuse	
Rated voltage	250V
Rated current	1A
Type	Time lag

Table 67: Fuse type

7.15 Status LEDs

The Provit 5000 and 5600 IPCs are equipped with four LEDs which are visible on the outside of the controller:

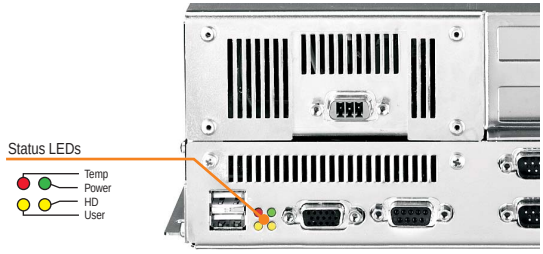


Figure 63: Status LEDs

LED	Color	Function
Power	Green	Supply voltage to the power supply is OK
User	Yellow	Can be programmed by the user (see section "MTC Function Libraries" on page 390)
HDD	Yellow	Signalized activity of the memory medium in the IDE slot.
Temp	Red	Indicates over-temperature (see the section 7.19.4 "Temperature monitoring with fan regulation" on page 137)

Table 68: Status LEDs

There are four status LEDs built into the front of the Provit display unit 5D560x.0x. They have the same functions as those on the controller.

7.16 Battery

The battery compartment is accessible after opening the housing:

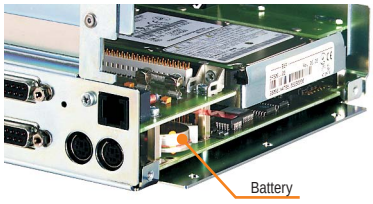


Figure 64: Battery compartment

The lithium battery (3 V, 950 mAh) keeps the CMOS memory and real-time clock running when the supply voltage for the IPC has been switched off. 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%).

The battery status can be monitored by the maintenance controller using software.

7.17 Reset button

The reset button is accessible through a small hole near the external floppy disk drive interface. In order to avoid accidental activation, a reset can only be triggered with a pointed object.

Figure 65: Reset button

7.18 Recovery jumper / User jumper

The recovery jumper / user jumper is easily accessible after opening the housing:

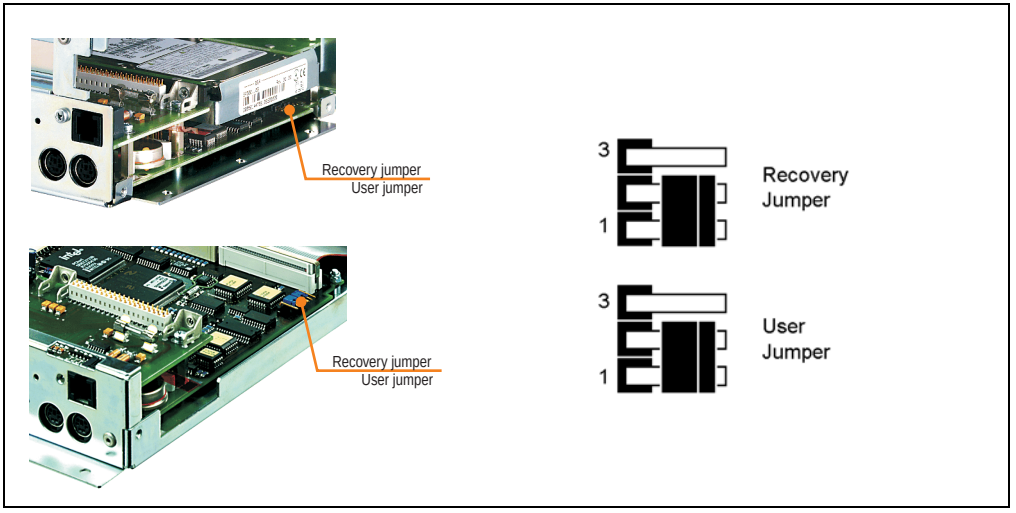


Figure 66: Recovery jumper / User jumper IPC5000 (above) and IPC5600 (below)

7.18.1 Recovery jumper

Recovery mode is available to the user when the IPC can no longer be booted; due to either an error in BIOS or a damaged BIOS (e.g. power failure during the BIOS upgrade).

This BIOS mode can be activated by making the following jumper settings:

Connection	Function
1 - 2	Standard mode
2 - 3	Recovery mode

Table 69: Recovery jumper

If the IPC has been switched to recovery mode, a special BIOS in the CMOS memory boot block is then used. This BIOS is permanently written by the manufacturer (Award) in the CMOS memory (cannot be modified) and initializes only those system components which are absolutely necessary for the execution of the upgrade.

When starting up in recovery mode, the operating system must be started from a bootable diskette, because no mass memory devices are initialized by BIOS.

After the IPC has been started in recovery mode, another fully functioning BIOS must be written using BIOS upgrade utilities (see section "BIOS upgrade" on page 383). After a successful upgrade, the IPC must be switched off and the recovery jumper returned to the standard setting. BIOS then boots again properly.

7.18.2 User jumper

The user jumper is not required for setting system functions. It can be utilized by the user and evaluated using Provit 5000 Utilities (see section "Provit 5000 Utilities" on page 390).

Connection	Function
1 - 2	Off (high)
2 - 3	On (low)

Table 70: User jumper

7.19 Maintenance controller (MTC)

The MTC is a standalone processor system, which provides additional functions that are not available with a "normal" PC. The MTC communicates with the PC via the ISA bus (using a couple register). The address can be stored under the menu item "Additional peripherals" (see section "Additional peripherals" on page 331).

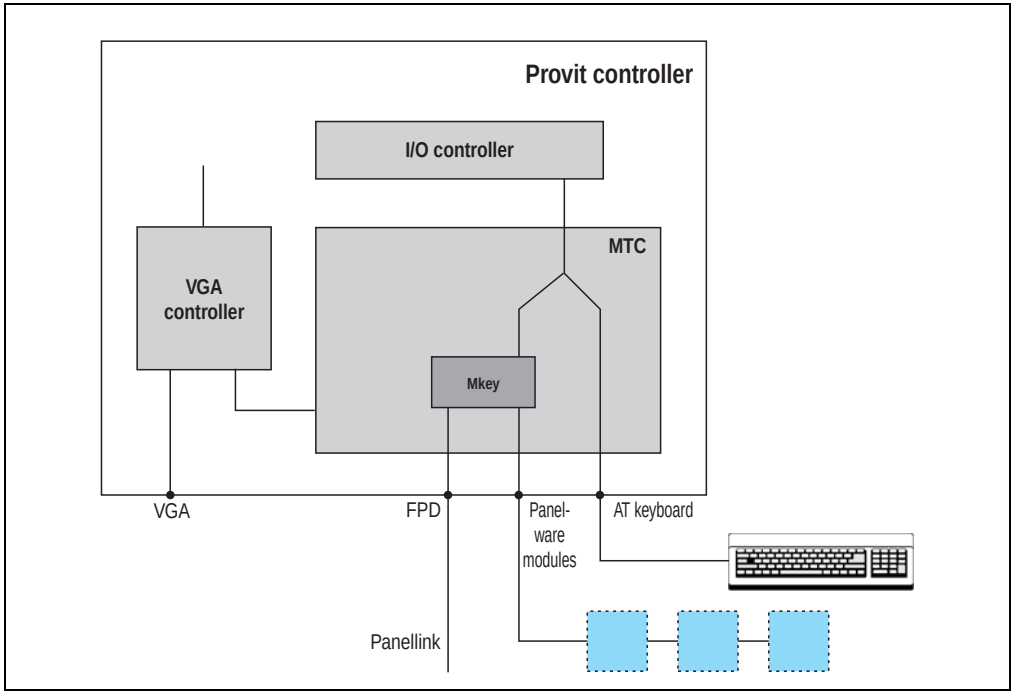


Figure 67: Maintenance Controller (MTC) block diagram

The MTC is responsible for the following tasks and components:

- AT PS/2 keyboard
- Panelware keypad modules
- Acquisition of operating data (controller and display unit)
- Temperature monitoring with fan regulation
- Qualitative evaluation of the condition of the battery (good/bad)

7.19.1 AT PS/2 keyboard

As shown in the block diagram, the keyboard is not operated directly by the keyboard controller in the I/O controller, but rather by the MTC. It is therefore possible to plug an AT keyboard in and out while the IPC is switched on (Hot Plug). Furthermore, the AT keyboard can be operated parallel to connected keypad modules or to a keyboard on a display unit (see also section "Using Panelware modules" on page 215).

7.19.2 Panelware keypad modules

Communication with connected Panelware keypad modules is handled completely by the MTC. Panelware keypad modules work parallel to a connected AT keyboard or function keys on the display unit (keys on the display should be treated like Panelware modules, also see the section "Using Panelware modules" on page 215).

Figure 68: Connecting Panelware keypad modules

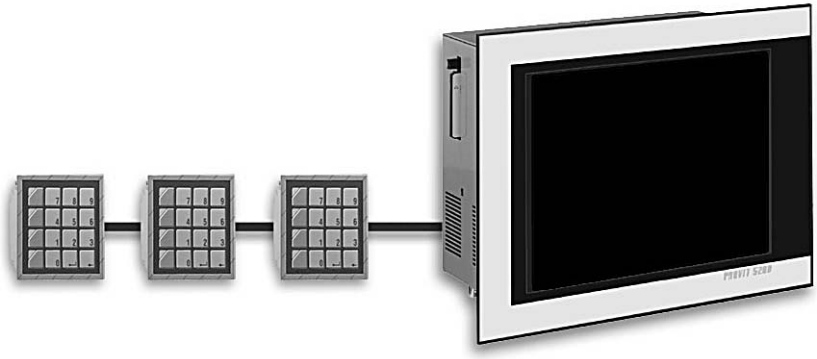


Figure 69: Cascading Panelware keypad modules

Cascading makes it possible to operate up to 8 Panelware modules in series. The following limitations apply to current requirements for Panelware modules:

	Keys	LEDs
Maximum number in the entire system (controller unit and display unit)	128	128 (max. 48 lit simultaneously)

Table 71: Connecting Panelware keypad modules

Caution!

Make sure that inputs and outputs are connected properly on the Panelware modules (labeled on the module) because connecting them incorrectly could damage the Panelware modules.

If a Provit 5600 series display unit is used, it is not possible to connect external keypad modules because the corresponding number of keys has already been integrated into these displays.

Configuration of the keys and evaluation of key strokes are made using Mkey Utilities and the Mkey driver (see the "Provit Mkey Utilities User's Manual").

7.19.3 Operating data coverage

It is possible to read certain controller and display unit statistical operating data using the MTC:

- Power-on cycles
- Operating hours
- Over-temperature hours
- Operating hours of the fans (fan cooler hours; for display units optional, both fans for controller units)

This data is stored in the controller and display in an EPROM memory. The sections of data are stored independently from each other and can therefore be read separately.

Operating hours are only updated every full hour. In other words, if a power failure occurs after 55 minutes, then the value of the counter is not raised by an hour. Operating data is transferred from the display to the MTC via the FPD interface (Panellink), as shown in the "Maintenance Controller Block Diagram".

Operating data is read either in BIOS in the menu item "Additional Peripherals" or using software (Provit 5000 Utilities) (see section "Provit 5000 Utilities" on page 390).

7.19.4 Temperature monitoring with fan regulation

The MTC constantly monitors the temperature using temperature sensors in the following areas:

- CPU socket
- I/O area
- Display unit

Temperature sensors	Alarm [1]		Fans		LED
	On	Off	On	Off	
CPU socket [2]	65 °C	63 °C	40 °C	37 °C	Yes
I/O area [3]	60 °C	58 °C	40 °C	37 °C	Yes
Display unit	[4]				Yes

Table 72: MTC temperature monitoring

1) The temperature LED on the controller and on the display (if available) is lit and an alarm bit is set in the MTC, which can be reacted to using software.

2) Starting with MTC firmware V00.21 (content of IPC5000/IPC5600 BIOS upgrade disk set V01.62), with MTC firmware < V00.21 other alarm limits (on: 60 °C, off: 58 °C).

3) Starting with MTC firmware V00.21 (content of IPC5000/IPC5600 BIOS upgrade disk set V01.62), with MTC firmware < V00.21 other alarm limits (on: 55 °C, off: 53 °C).

4) Temperature alarms depend on the display unit being used.

7.19.5 Battery monitoring

The CMOS battery can be evaluated (good or bad) using the MTC. Information is displayed either in BIOS under the menu item "Additional Peripherals" (see section "Additional peripherals" on page 331) or using software, Provit 5000 Utilities (see section "Provit 5000 Utilities" on page 390).

8. System units with socket 370

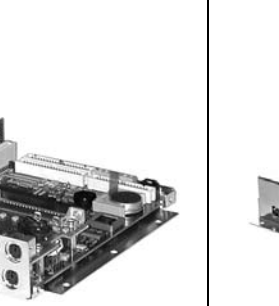
8.1 General information

This section refers to the following system units:

Controller	System units
IPC5000C	5C5001.11, 5C5001.12, 5C5001.21, 5C5001.22, 5C5001.32, 5C5001.42
IPC5600C	5C5601.11, 5C5601.12, 5C5601.21, 5C5601.22, 5C5601.32, 5C5601.42

Table 73: System units with socket 370

The system unit is integrated into the lower housing with the mainboard and all peripheral interfaces:

IPC5000C	IPC5600C
	

8.2 Technical data

8.2.1 IPC5000C

System units	5C5001.11	5C5001.12	5C5001.21 1)	5C5001.22 1)	5C5001.32	5C5001.42 1)
Mainboard general information	Real-time clock 2) CMOS backup in the FlashPROM Temperature monitoring (CPU, I/O, display unit)					
Math coprocessor	Integrated in the processor, no socket					
BIOS	AWARD Elite BIOS, Plug and Play compatible					
Chipset	Intel 440BX					
Processor socket	Socket 370					
DRAM	3 x DIMM PC100, max. 512 MB				2 x DIMM PC100, max. 512 MB	
2nd level cache	Integrated in processor					
Interfaces COM1 COM2 LPT1 USB Keyboard Mouse	 RS232, 16-byte FIFO RS232, 16-byte FIFO SPP, EPP and ECP modes 2 USB ports Enhanced AT PS/2 PS/2					
External disk drive	Yes		No		Yes	No
VGA controller	Chips & technologies 69000	Chips & technologies 69030	Chips & technologies 69000	Chips & technologies 69030	ATI Rage Mobility M	
Graphics memory	2 MB	4 MB	2 MB	4 MB	4 MB	
Interfaces	FPD (Panellink) + CRT (15-pin VGA DSUB)					
Remote IDE interface	No		Yes		No	Yes
Ethernet controller (onboard) Connection Compatibility Cabling	Intel 82559ER 10/100 Mbit/s RJ45 TP (10BaseT / 100BaseT) Not NE2000 compatible S/STP (category 5)				Intel 82551ER 10/100 Mbit/s RJ45 TP (10BaseT / 100BaseT) Not NE2000 compatible S/STP (category 5)	
E-IDE slots	1					

Table 74: Technical data - IPC5000C system units

1) With this system unit, it is possible to connect an optional remote CD-ROM/SuperDisk 120 or 240 drive.

2) The quartz used for the IPC has an accuracy of 20 ppm. This means after influences such as operating temperature and wiring of the quartz have been taken into account, the inaccuracy is typically 5 seconds per day.

8.2.2 IPC5600C

System units	5C5601.11	5C5601.12	5C5601.21 1)	5C5601.22 1)	5C5601.32	5C5601.42 1)
Mainboard general information	Real-time clock 2) CMOS backup in the FlashPROM Temperature monitoring (CPU, I/O, display unit)					
Math coprocessor	Integrated in the processor, no socket					
BIOS	AWARD Elite BIOS, Plug and Play compatible					
Chipset	Intel 440BX					
Processor socket	Socket 370					
DRAM	3 x DIMM PC100, max. 512 MB				2 x DIMM PC100, max. 512 MB	
2nd level cache	Integrated into the processor					
Interfaces COM1 COM2 LPT1 USB Keyboard Mouse	 RS232, 16-byte FIFO RS232, 16-byte FIFO SPP, EPP and ECP modes 2 USB ports Enhanced AT PS/2 PS/2					
External disk drive	Yes		No		Yes	No
VGA controller	Chips & technologies 69000	Chips & technologies 69030	Chips & technologies 69000	Chips & technologies 69030	ATI Rage Mobility M	
Graphics memory	2 MB	4 MB	2 MB	4 MB	4 MB	
Interfaces	FPD (Panellink) + CRT (15-pin VGA DSUB)					
Remote IDE interface	No		Yes		No	Yes
Ethernet controller (onboard) Connection Compatibility Cabling	Intel 82559ER 10/100 Mbit/s RJ45 TP (10BaseT / 100BaseT) Not NE2000 compatible S/STP (category 5)				Intel 82551ER 10/100 Mbit/s RJ45 TP (10BaseT / 100BaseT) Not NE2000 compatible S/STP (category 5)	
E-IDE slots	2					

Table 75: Technical data - IPC5600C system units

1) With this system unit it is possible to connect the optional controllers R-IDE CD-ROM / LS120 5A5003.02 and R-IDE CD-ROM 5A5003.07.

2) The quartz used for the IPC has an accuracy of 20 ppm. This means after influences such as operating temperature and wiring of the quartz have been taken into account, the inaccuracy is typically 5 seconds per day.

8.3 Mainboard

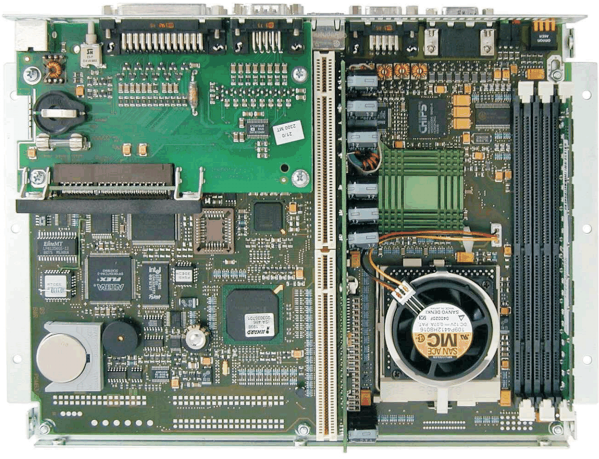


Figure 70: Mainboard system units with socket 370

All of the IPC's basic functions are implemented on the mainboard. These mainly include:

- Processor socket
- Chipset
- DRAM socket
- Plug for the bus unit (ISA, PCI and IDE bus + power supply)
- Super I/O controller (COM1, COM2, LPT1, external FDD interface, PS/2 mouse, keyboard controller, USB interface, system clock)
- VGA controller (with CRT and FPD connection)
- Status LEDs
- Battery
- Reset button
- Recovery mode switch
- MTC maintenance controller (keyboard operation, Panellink FPD interface, temperature monitoring with fan control)
- Ethernet controller
- Hardware security key

All components listed above are described in detail in the following sections.

8.4 Processor socket

The following processors can be used in the system units listed:

Processor type	Intel Celeron	Intel Pentium III
Clock frequency [MHz]	300 (5C5002.11) 366 (5C5002.12) 433 (5C5002.13) 566 (5C5002.14)	600 (5C5002.15) 850 (5C5002.16)
1st level cache	2x 16 KB	
2nd level cache (integrated in the processor)	128 KB	256 KB
Socket	Socket 370	
Compatible system units	5C5001.11, 5C5001.12, 5C5001.21, 5C5001.22, 5C5001.32, 5C5001.42, 5C5601.11, 5C5601.12, 5C5601.21, 5C5601.22, 5C5601.32, 5C5601.42	

Table 76: BIOS system for system units with socket 370

Information:

Processors can only be ordered from B&R together with a corresponding system unit and vice versa. All system units supplied by B&R are therefore equipped with a processor. All installation and configuration work takes place at B&R. If processors are used which have not been supplied by B&R, the warranty claim is then void.

8.5 Jumper settings

Information:

No jumper settings are required (or possible) for system units with socket 370 (5C5001.11, 5C5001.12, 5C5001.21, 5C5001.22, 5C5601.11, 5C5601.12, 5C5601.21 and 5C5601.22). The multiplier for the processor clock (bus clock 66 MHz or 100 MHz for Pentium III/600 or 850) and the core voltage for the processor are permanently set.

8.6 DRAM socket

System units	5C5001.1x	5C5001.2x	5C5001.01	5C5601.1x	5C5601.2x	5C5601.3x
Chipset	Intel 440BX					
Socket	3x DIMM PC100		2x DIM PC100	3x DIMM PC100		2x DIMM PC100
Installation	Max. 256 MB per module, max. 512 MB total					
Note	DIMM modules are allowed to be a maximum of 29.5 mm high if used in an IPC5000C!					

Table 77: DRAM socket

For detailed information about available main memory modules, see section 1.7 "Main memory" on page 63.

8.7 Serial interfaces COM1 and COM2

There are two PC compatible serial interfaces with a 16-byte FIFO on the mainboard. They are UART16550 and Plug & Play compatible.

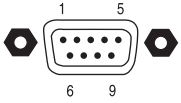
Serial interfaces COM1 and COM2	
RS232 interface Not electrically isolated Up to 115 kBaud	9-pin DSUB connector 
Pin	**Assignment**
1	DCD
2	RXD
3	TXD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

Table 78: Pin assignments - COM1 and COM2

Default setting	COM1	COM2
Interrupt	4	3
I/O address	3F8h - 3FFh	2F8h - 2FFh

Table 79: Default settings - COM1 and COM2

To change these settings, see section "Integrated peripherals" on page 352.

8.8 Parallel interface LPT1

The parallel interface LPT1 is a 25-pin DSUB socket. It supports EPP and ECP operating modes (Plug & Play compatible) and the standard SPP mode.

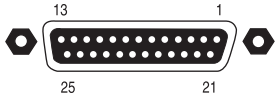
Parallel interface LPT1				
Pin	Assignment	Pin	Assignment	25-pin DSUB socket 
1	Data strobe	14	Auto-feed	
2	Data 0	15	Error	
3	Data 1	16	Printer init	
4	Data 2	17	Printer select input	
5	Data 3	18	GND	
6	Data 4	19	GND	
7	Data 5	20	GND	
8	Data 6	21	GND	
9	Data 7	22	GND	
10	Acknowledge	23	GND	
11	Busy	24	GND	
12	Paper end	25	GND	
13	Printer select status			

Table 80: Pin assignments - LPT1 interface

Default setting	LPT1
Interrupt	7
I/O address	378h - 37Fh

Table 81: Default settings LPT1

To change these settings, see section "Integrated peripherals" on page 352.

Note: Provit IPC parallel interfaces are equipped with a protective circuit in order to conform with requirements for operating in industrial environments. This can possibly lead to limitations in regard to the maximum transfer rate.

Warning!

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

8.9 Interface for external disk drive

An external floppy disk drive can be connected to the 25-pin DSUB socket (see chapter 7 "Accessories" on page 417).

Caution!

It is not possible to operate a second parallel device on this interface (LPT).

Interface for external disk drive (FDD)			
Pin	Assignment	Pin	Assignment
1	n.c.	14	Density
2	Index	15	Side select
3	Track 0	16	Direction
4	Write protect	17	Step
5	Read data	18	GND
6	Disk. chan.	19	GND
7	n.c.	20	GND
8	n.c.	21	GND
9	+5 V	22	GND
10	Drive select	23	GND
11	Motor on	24	GND
12	Write data	25	GND
13	Write gate		

25-pin DSUB socket

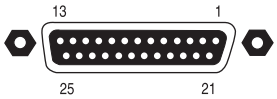


Table 82: Pin assignments - interface for external floppy disk drive

Setting	LPT1
Interrupt	6
I/O address	3F0h - 3F7h

Table 83: Interface settings for external floppy disk drive

These settings cannot be changed.

Warning!

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

8.10 USB interface

All Provit 5000C/5600C system units are equipped with a USB host controller with two USB ports:

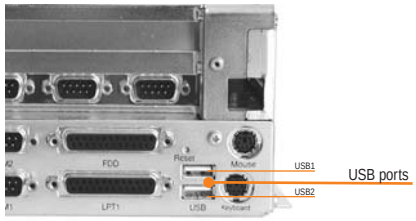


Figure 71: USB ports

Warning!

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

8.11 AT keyboard connection (PS/2)

A PS/2 socket is used to connect an external AT enhanced keyboard. The external AT keyboard works parallel with optional Panelware keypad modules on a display unit. The keyboard interface is operated by the MTC (see section 8.20.1 "AT keyboard (PS/2)" on page 160). An external PS/2 AT keyboard is available from B&R (see chapter 7 "Accessories", section 12 "Provit 5600 keyboard 5E9600.01-010 and 5E9600.01-020" on page 455).

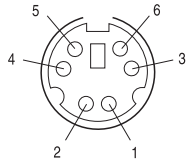
(PS/2) AT keyboard connection		
Pin	Assignment	PS/2 socket 
1	KBDATA	
2		
3	GND	
4	+5 V	
5	KBCLK	
6		

Table 84: Pin assignments - (PS/2) AT keyboard

Setting	PS/2 keyboard
Interrupt	1
I/O address	060h - 06Fh

Table 85: AT keyboard (PS/2) settings

These settings cannot be changed.

Warning!

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

Make sure the connections for the PS/2 keyboard and PS/2 mouse are not swapped.

No devices that use the PS/2 keyboard supply as a power source are allowed to be connected.

8.12 Mouse connection (PS/2)

An interface for the connecting a standard PS/2 mouse is provided on the mainboard. With BIOS versions ≥ 1.14 and up, this interface is set up automatically.

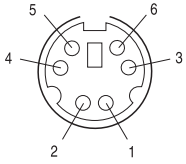
Mouse connection (PS/2)		
Pin	**Assignment**	PS/2 socket
1	Mouse data	
2		
3	GND	
4	+5 V	
5	Mouse CLK	
6		

Table 86: Pin assignments - mouse interface (PS/2)

Setting	PS/2 keyboard
Interrupt	12
I/O address	-

Table 87: Default settings - mouse interface (PS/2)

Warning!

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

Make sure the connections for the PS/2 keyboard and PS/2 mouse are not swapped.

No devices that use the PS/2 keyboard supply as a power source are allowed to be connected.

8.13 VGA controller

Controller	IPC5000C					
System unit	**5C5001.11**	**5C5001.12**	**5C5001.21**	**5C5001.22**	**5C5001.32**	**5C5001.42**
Manufacturer	Chips & Technologies				ATI technologies	
Model	C&T 69000 or 69030				ATI Rage Mobility M	
Interfaces	FPD (Panellink) + CRT (15-pin VGA DSUB)					
Graphics memory	2 MB	4 MB	2 MB	4 MB	4 MB	

Table 88: VGA controller - IPC5000C

Controller	IPC5600C					
System unit	**5C5601.11**	**5C5601.12**	**5C5601.21**	**5C5601.22**	**5C5601.32**	**5C5601.42**
Manufacturer	Chips & Technologies				ATI technologies	
Model	C&T 69000 or 69030 AGP				ATI Rage Mobility M	
Interfaces	FPD (Panellink) + CRT (15-pin VGA DSUB)					
Graphics memory	2 MB	4 MB	2 MB	4 MB	4 MB	

Table 89: VGA controller - IPC5600C

The VGA controller is integrated into the mainboard and offers high graphics performance through the connection with the AGP bus. Outputs are available for two display devices:

8.13.1 FPD connection

A Provit 5000 display unit can be connected to this Panellink interface (see chapter 3 "Display units" on page 211).

FPD interface	
Panellink	
Pin	**Assignment**
1	GND
2	TXC+ / RS485A
3	TX0+ / VCC
4	TX1+ / +12V
5	TX2+ / GND
6	TXC- / RS485B
7	TX0- / VCC
8	TX1- / +12V
9	TX2- / GND

9-pin DSUB socket

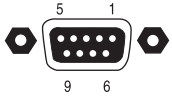


Table 90: Pin assignments - FPD interface

Data (e.g. the operating hours of the display) is also transmitted simultaneously via the Panellink cable. For a more detailed explanation see section 8.20.3 "Operating data coverage" on page 161.

8.13.2 CRT connection

An external monitor can be connected to this interface.

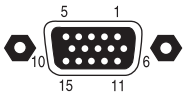
CRT interface				
Pin	Assignment	Pin	Assignment	15-pin DSUB socket 
1	R	9	+5V	
2	G	10	GND	
3	B	11	n.c.	
4	n.c.	12	DDC data	
5	GND	13	HSYNC	
6	GND	14	VSYNC	
7	GND	15	DDC CLK	
8	GND			

Table 91: Pin assignments - CRT interface

The built-in graphics controller allows a flat panel display and an external monitor to be operated simultaneously. Settings in this regard can either be changed in BIOS (see section "Special OEM features" on page 355) or by software using a graphics driver (see online help for the driver).

8.13.3 Driver support

There are drivers available for the following operating systems.

Operating system	Driver support for 69000/69030	Driver support for ATI Rage Mobility M	Source
MS Windows 3.11	Yes	No	Download area - B&R homepage
MS Windows 95	Yes	No	Download area - B&R homepage
MS Windows 98	Yes	Yes	Download area - B&R homepage
MS Windows 98SE	Yes	Yes	Download area - B&R homepage
MS Windows ME	Yes	Yes	Download area - B&R homepage
MS Windows NT4.0	Yes	Yes	Download area - B&R homepage
MS Windows 2000	Yes	Yes	Download area - B&R homepage
MS Windows XP	Yes	Yes	Download area - B&R homepage
MS Windows CE 3.0	Yes	No	B&R Automation Software
MS Windows CE 4.0	No	No	-
MS Windows CE 4.1	No	No	-
MS Windows NT Embedded	Yes	Yes [1)]	Download area - B&R homepage
MS Windows XP Embedded	Yes	Yes [1)]	Download area - B&R homepage
VxWorks	Yes	No	-
Linux	Yes	Yes	Linux drivers are available from 3rd party manufacturers. However, these drivers are not tested, and therefore there is no guarantee that they actually function properly.
QNX	Yes	No	3rd party

Table 92: C&T 69000/69030 driver support and ATI Rage Mobility M

1) There is no own component. The respective drivers can be installed at a later time.

8.13.4 Image compatibility

Operating system images based on the system units 5C5001.11, 5C5601.11, 5C5001.12, 5C5601.12, 5C5001.21, 5C5001.22 or 5C5601.21 must be created **AGAIN** when changing over to system units 5C5001.32, 5C5001.42, 5C5601.32 or 5C5601.42.

8.13.5 Simultaneous operation of monitor / display unit

The following table lists the frequencies that can be used with an external monitor when operated simultaneously with various display types:

LCD display		
Type	Horizontal frequency	Vertical frequency
VGA	31 kHz	60 Hz

TFT display		
Type	Horizontal frequency	Vertical frequency
VGA	31 kHz	60 Hz
SVGA	38 kHz	60 Hz
XGA	48 kHz	60 Hz
SXGA	38 kHz	36 Hz

Table 93: Sweep frequencies during simultaneous operation

Information:

When operating a monitor / display unit together, be sure that a multisync-monitor with a horizontal frequency of at least 25 kHz is used.

Note: The respective C&T or ATI graphics drivers for various operating systems can be found on the Provit Drivers & Utilities CD-ROM. Additionally, the driver can be downloaded directly from the B&R homepage www.br-automation.com.

Warning!

Display units developed for Provit 2000 series IPCs cannot be used with a Provit 5000 series IPC.

With BIOS V1.16 or higher

When using system units 5C5001.32, 5C5001.42, 5C5601.32 and 5C5601.42 with ATI Rage Mobility M graphics chip and IPC5000C/5600C BIOS (version V1.16 or higher), keep in mind:
If simultaneous mode is not configured in BIOS (FPD+CRT simultaneously), that is, only FPD or only CRT is set (see BIOS menu item "Special OEM features" on page 355), then the system is always started in simultaneous mode by the installed drivers during each boot procedure if it is connected with a CRT monitor and a display unit.
If the CRT monitor is switched off in the driver settings, only output takes place on the display unit. However, this setting is reset again each time the driver is rebooted.

This way, operating systems Windows 98, Windows 98SE, Windows ME, Windows NT4.0, Windows 2000, Windows XP, Windows NT embedded and Windows XP embedded with installed driver always boot in simultaneous mode.

8.13.6 VESA mode support

VESA mode support is available for the ATI graphics chip of the system units 5C5001.32, 5C5001.42, 5C5601.32 and 5C5601.42. However, with these system units we cannot guarantee that all previously defined VESA standards are supported (see www.vesa.org).

The following applications have been tested without problems:

- Interact
- VisiWin DOS

8.13.7 Using an external graphics card

It is possible to operate an external graphics card in a free PCI slot on the mainboard. If such a card has been inserted, it is automatically recognized during the start-up procedure and the onboard VGA controller automatically switches itself off. It is not possible to switch the VGA controller on and off manually.

Caution!

An external graphics card cannot be operated in an ISA slot.

By deactivating the onboard VGA controller, it is not possible to operate a display or monitor on the IPC's FPD and CRT interfaces using an external graphics card because they are switched off.

8.13.8 Relationship between resolution, graphics memory and colors

The following table applies to all graphics controllers and display units. It should be noted that with high resolutions (XGA, SXGA), the number of colors is very limited.

Video memory	Resolution	Pixels	Number of colors
2 MB	VGA	640 x 480	16 million (true color)
	SVGA	800 x 600	16 million (true color)
	XGA	1024 x 768	65535 (high color)
	SXGA	1280 x 1024	256
4 MB	VGA	640 x 480	16 million (true color)
	SVGA	800 x 600	16 million (true color)
	XGA	1024 x 768	16 million (true color)
	SXGA	1280 x 1024	65535 (high color)
		1600 x 1200	65535 (high color)

Table 94: Relationship between resolution, graphics memory, and color depth

8.13.9 Display support

System units with ATI Rage Mobility M graphics chip 5C5001.32, 5C5001.42, 5C5601.32 and 5C5601.42 and IPC5000C/5600C BIOS Version 1.16 and up were tested with the following displays.

Model number	Revision	Short text	Comment
5D5000.03	G0	Panel kit TFT C VGA 10.4"	-
5D5100.04	E0	Panel TFT C VGA 10.4"	-
5D5210.01	M0	iPanel TFT C VGA 10.4" T	-
5D5211.02	J0	iPanel TFT C SVGA 10.4" T	-
5D5211.03	D0	iPanel TFT C SVGA 12.1" T	-
5D5211.06	A5	iPanel TFT C SVGA 12.1" T-IR	-
5D5212.02	N0	iPanel TFT C XGA 15" T	-
5D5212.04	M0	iPanel TFT C XGA 15" CT	-
5D5600.01	I0	Panel TFT C VGA 10.4" F	-
5D5600.02	I0	Panel TFT C VGA 10.4" FM	-
5D5600.03	J0	Panel TFT C VGA 10.4" FT	-
5D5601.01	K0	Panel TFT C SVGA 12.1" F	-
5D5601.02	K0	Panel TFT C SVGA 12.1" FM	-
5D5601.03	L0	Panel TFT C SVGA 12.1" FT	-

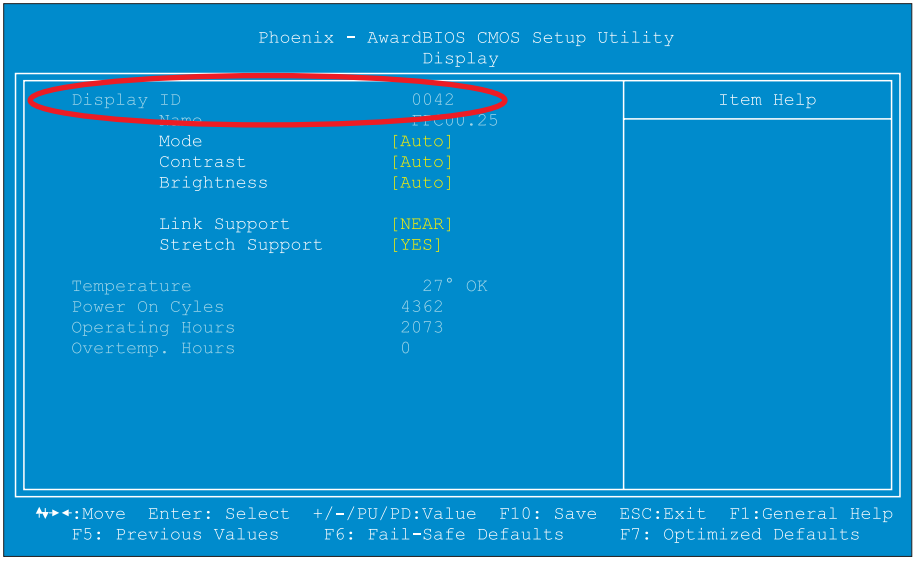
Table 95: Display compatibility - ATI Rage Mobility M graphics controller

8.13.10 No display support

The following B&R display units with the respective display ID cannot be operated properly together with system units with the ATI Rage Mobility M graphics chip (5C5001.32, 5C5001.42 and 5C5601.32) because the the display units flicker or remain blank.

Display ID	Type	Model numbers reference
20 to 2F h	Standard VGA (640*480), EL-display	Customized display units
30 to 3F h	LCD (passive, color), VGA (640*480)	5D5100.01 and customer specific display units
50 to 5F h	TFT XGA (1024*768) with special control	Customized display units
60 to 6F h	LCD (passive, b/w), VGA (640*480)	Customized display units

The display ID for the connected B&R display unit can be read in the BIOS setup menu item "Special OEM Features" and then "Display".



Information:

If the connected B&R display unit remains blank, then the display ID can be read by connecting an external CRT monitor. For this purpose, the BIOS Parameter Mode (found on the same page "BIOS Setup Menu Item" "Special OEM Features" under "Display") should not be set to "FDP".

8.14 Protection

A fuse is provided on the mainboard for the supply voltage to the keyboard, mouse and the external floppy disk drive. It is accessible after opening the housing:

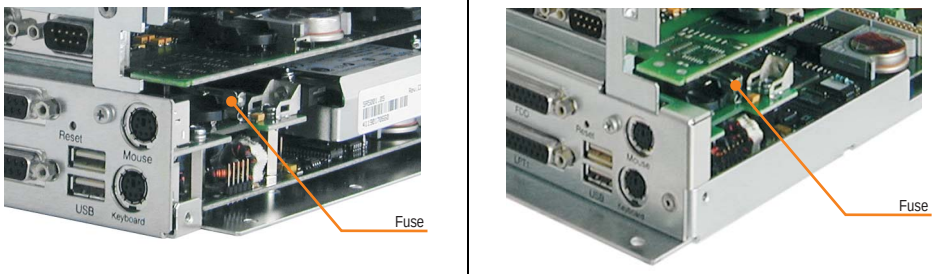


Figure 72: Fuse position for IPC5000C (left) and IPC5600C (right)

Fuse	
Rated voltage	250V
Rated current	1A
Type	Time lag

Table 96: Fuse type

8.15 LPT2 (hardware security key)

A Dallas hardware security key (dongle) can be found on the mainboard, which is required for software protection. The slot is found near the fuse and can be addressed as LPT2.

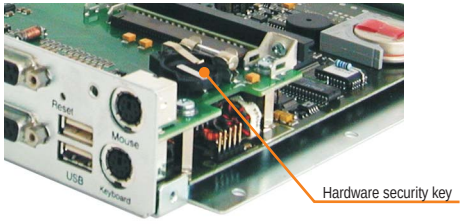


Figure 73: Hardware security key

Default setting	LPT2
Interrupt	-
I/O address	278h - 27Fh

Table 97: Hardware security key default settings

To change these settings, see section "Special OEM features" on page 355.

8.16 Status LEDs

The IPC 5000C and 5600C are equipped with four LEDs which are visible on the outside of the controller:

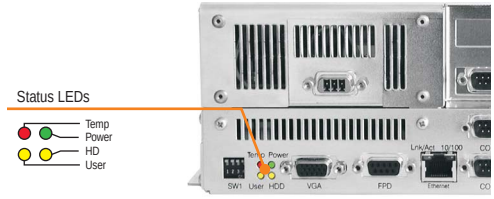


Figure 74: Status LEDs - IPC5000C and IPC5600C

LED	Color	Function
Power	Green	Supply voltage to the power supply is OK
User	Yellow	Can be programmed by the user (see section "MTC Function Libraries" on page 390)
HDD	Yellow	Signalized activity of the memory medium in the IDE slot.
Temp	Red	Indicates over-temperature (see the section "Temperature monitoring with fan regulation" on page 162).

Table 98: Status LED functions - IPC5000C and IPC5600C

There are four status LEDs built into the front of the Provit display unit 5D560x.0x. They have the same functions as those on the controller, and can be freely configured.

8.17 Battery

The battery compartment is accessible after opening the housing:

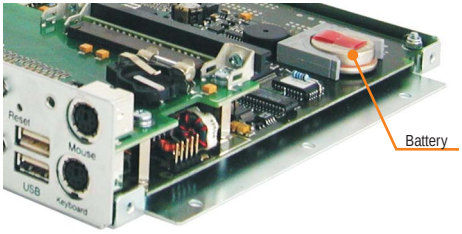


Figure 75: Battery holder - IPC5000C and IPC5600C

The lithium battery (3V, 950 mAh) keeps the CMOS memory and real-time clock running when the supply voltage for the IPC has been switched off. 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%) The battery voltage can be monitored by the maintenance controller using software (see the section 8.20 "Maintenance controller (MTC)" on page 159).

8.18 Reset button

The reset button is accessible through a small hole near the external floppy disk drive interface. In order to avoid accidental activation, a reset can only be triggered with a pointed object.

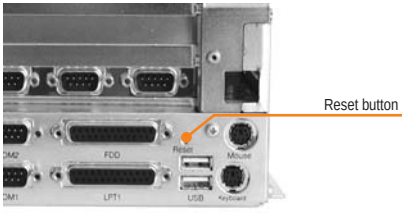


Figure 76: Reset button - IPC5000C and IPC5600C

8.19 DIP switch

The DIP switch is found on the front of the IPC5000C/5600C:

Figure 77: DIP switch - IPC5000C and IPC5600C

Switch	Position	Function
1	Off On	Boot block is write protected Boot block is not write protected
2	Off On	Normal mode Recovery mode
3	Off On	User Jumper = Low User Jumper = High
4		Reserved

Table 99: DIP switch functions - IPC5000C and IPC5600C

8.19.1 Boot block switch

The boot block write protect is turned on or off using the DIP switch 1. The boot block is a 16 KB memory area in BIOS, which normally is not write protected. In some cases (e.g. when upgrading the boot block for recovery mode), it is necessary to rewrite the boot block. This is possible after turning switch 1 on using BIOS Upgrade Utilities (see the section "BIOS upgrade" on page 383).

Caution!

Be very careful when changing the boot block. The system is no longer operational with damaged boot blocks and BIOS hardware must then be exchanged.

8.19.2 User switch

The user jumper is not required for setting system functions. It can be utilized by the user and evaluated using Provit 5000 Utilities (see section "Provit 5000 Utilities" on page 390).

8.20 Maintenance controller (MTC)

The MTC is a standalone processor system, which provides additional functions that are not available with a "normal" PC. The MTC communicates with the PC via an ISA bus (using a couple register; and also FIFO and Direct Access mode with the IPC5000C and IPC5600C).

The address can be stored under the menu item "Additional peripherals".

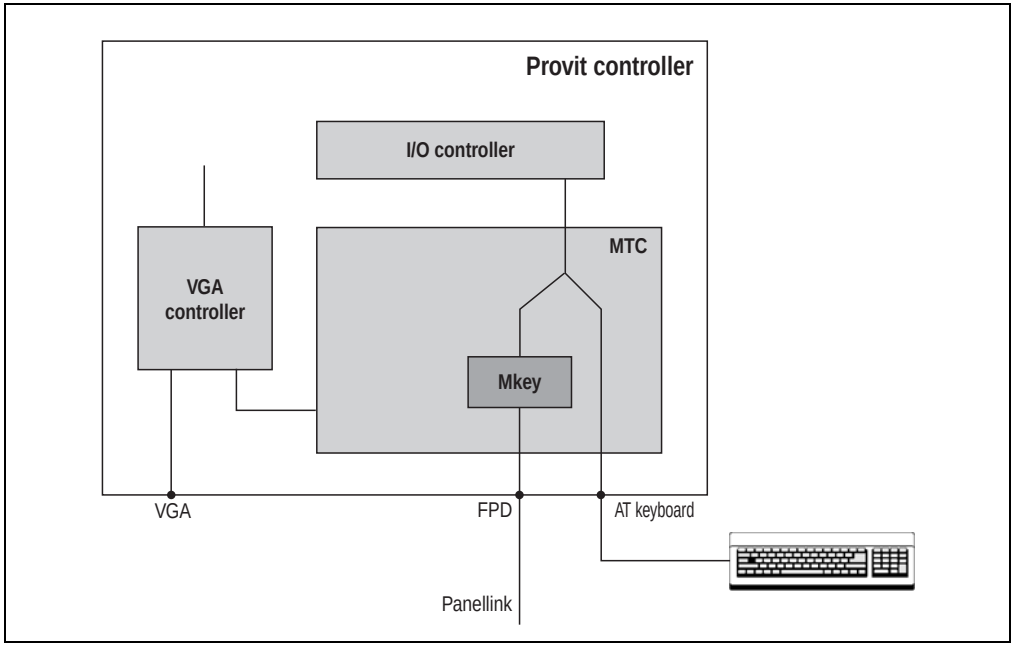


Figure 78: MTC block diagram

The MTC is responsible for the following tasks and components:

- AT keyboard (PS/2)
- Panelware keypad modules
- Acquisition of operating data (controller and display unit)
- Temperature monitoring with fan regulation
- Qualitative evaluation of the condition of the battery (good/bad)

8.20.1 AT keyboard (PS/2)

As shown in the block diagram, the keyboard is not directly operated by the keyboard controller in the I/O controller, but rather by the MTC. It is therefore possible to plug an AT keyboard in and out while the IPC is switched on (Hot Plug). Furthermore, the AT keyboard can be operated parallel to connected keypad modules or to a keyboard on a display unit (see the next section).

8.20.2 Panelware keypad modules

Communication with connected Panelware keypad modules is handled completely by the MTC. Panelware keypad modules work parallel to an AT keyboard connected to the controller or to a keyboard on the Provit 5000 series display unit.

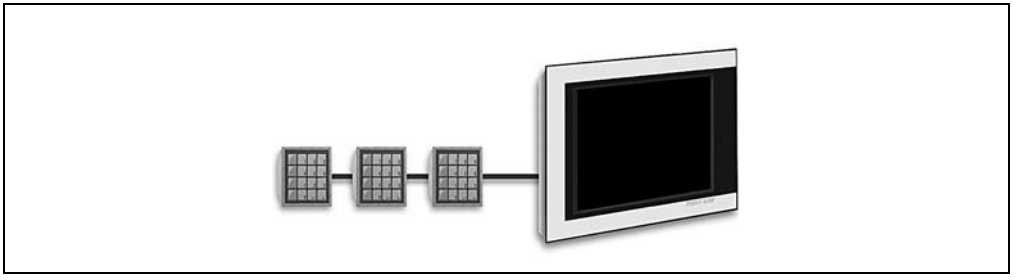


Figure 79: Connecting Panelware keypad modules

Information:

There is no connection available on the controller for Panelware modules with system units 5C5001.11, 5C5001.12, 5C5001.21, 5C5001.22, 5C5001.32, 5C5001.42, 5C5601.11, 5C5601.12, 5C5601.21, 5C5601.22, 5C5601.32 and 5C5601.42. For these system units, keypad modules can only be used with a Provit 5000 series display unit.

Cascading makes it possible to operate up to 8 Panelware modules in series. The following limitations apply to current requirements for Panelware modules:

	Keys	LEDs
Maximum amount in entire system (display unit)	128	128 (max. 32 lit simultaneously)

Table 100: Connection of Panelware keypad modules - keys and LEDs.

Caution!

Make sure that inputs and outputs are connected properly on the Panelware modules (labeled on the module) because connecting them incorrectly could damage the Panelware modules.

If a Provit 5600 series display unit is used, it is not possible to connect external keypad modules because the corresponding number of keys has already been integrated into these displays.

Configuration of the keys and evaluation of key strokes are made using Mkey Utilities and the Mkey driver (see the "Provit Mkey Utilities User's Manual").

8.20.3 Operating data coverage

It is possible to read certain controller and display unit statistical operating data using the MTC:

- Power-on cycles
- Operating hours
- Over-temperature hours
- Operating hours of the fans (fan cooler hours; for display units optional, both fans for controller units)

This data is stored in the controller and display in an EPROM memory. The sections of data are stored independently from each other and can therefore be read separately.

Operating hours are only updated every full hour. In other words, if a power failure occurs after 55 minutes, then the value of the counter is not raised by an hour. The transfer of the operation data from the display to the MTC is made with the FPD interface (Panellink).

Operating data is read either in BIOS in the menu item "Additional Peripherals" or using software (Provit 5000 Utilities).

8.20.4 Temperature monitoring with fan regulation

The MTC constantly monitors the temperature using temperature sensors in the following areas:

- CPU internal
- CPU socket
- I/O area
- Display unit

Fan RPM is constantly monitored and regulated separately by the MTC. The RPM depends on the temperature measured. The limit values depend on the BIOS version being used.

Limit values - IPC5000C and IPC5600C - BIOS Version < V1.15

				Alarm		Fans		LED	Beeper	
Short description	Processor type	Min[1]	Max	On	Off	On	Max		Pattern	kHz
Internal processor temperature	Default values	0 °C	127 °C	85 °C	83 °C	60 °C	76 °C	✓	0AAH	2
	Celeron 300[2]			85 °C	83 °C	60 °C	76 °C			
	Celeron 366[2]			85 °C	83 °C	60 °C	76 °C			
	Celeron 433[2]			85 °C	83 °C	60 °C	76 °C			
	Celeron 566[2]			87 °C	85 °C	62 °C	78 °C			
	Pentium III 600[2]			80 °C	78 °C	55 °C	61 °C			
	Pentium III 850[2]			78 °C	76 °C	53 °C	69 °C			
Processor socket temperature	Default values	0 °C	127 °C	80 °C	78 °C	55 °C	71 °C	✓	050H	1
	Celeron 300[2]			80 °C	78 °C	55 °C	71 °C			
	Celeron 366[2]			80 °C	78 °C	55 °C	71 °C			
	Celeron 433[2]			80 °C	78 °C	55 °C	71 °C			
	Celeron 566[2]			85 °C	83 °C	59 °C	75 °C			
	Pentium III 600[2]			78 °C	76 °C	52 °C	68 °C			
	Pentium III 850[2]			76 °C	74 °C	50 °C	66 °C			
I/O slot temperature		0 °C	127 °C	68 °C	66 °C	40 °C	56 °C	✓	050H	1
Processor fan (rated 5400 RPM)		0 RPM	6100 RPM	~70 %	~71 %			✓	0AEH	2
Display temperatures		0 °C	127 °C	[3]				✓	051H	1
RS485 isolation interrupted									033H	1

Table 101: MTC temperature monitoring IPC5000C and IPC5600C

1) Negative temperatures are set to 0°.
2) Starting with the BIOS upgrade disk set version 1.05, both temperature alarm and fan control depend on the processor.
3) Temperature alarms depend on the display unit being used.

Limit values - IPC5000C and IPC5600C - BIOS Version >= V1.15

				Alarm		Fans		LED	Beeper	
Short description	Processor type	Min[1]	Max	On	Off	On	Max		Pattern	kHz
Internal processor temperature	Default values	0 °C	127 °C	85 °C	83 °C	60 °C	76 °C	✓	0AAH	2
	Celeron 300[2]			93 °C	91 °C	60 °C	76 °C			
	Celeron 366[2]			93 °C	91 °C	60 °C	76 °C			
	Celeron 433[2]			85 °C	83 °C	60 °C	76 °C			
	Celeron 566[2]			94 °C	92 °C	62 °C	78 °C			
	Pentium III 600[2]			86 °C	84 °C	55 °C	71 °C			
	Pentium III 850[2]			84 °C[3]	82 °C[3]	55 °C	71 °C			
Processor socket temperature	Default values	0 °C	127 °C	80 °C	78 °C	55 °C	71 °C	✓	050H	1
	Celeron 300[2]			93 °C	91 °C	55 °C	71 °C			
	Celeron 366[2]			93 °C	91 °C	55 °C	71 °C			
	Celeron 433[2]			93 °C	91 °C	55 °C	71 °C			
	Celeron 566[2]			94 °C	92 °C	59 °C	75 °C			
	Pentium III 600[2]			86 °C	86 °C	52 °C	68 °C			
	Pentium III 850[2]			84 °C[3]	82 °C[3]	52 °C	68 °C			
I/O slot temperature		0 °C	127 °C	68 °C	66 °C	40 °C	56 °C	✓	050H	1
Processor fan (rated 5400 RPM)		0 RPM	6100 RPM	~70 %	~71 %			✓	0AEH	2
Display temperatures		0 °C	127 °C	[4]				✓	051H	1
RS485 isolation interrupted									033H	1

Table 102: MTC temperature monitoring IPC5000C and IPC5600C

1) Negative temperatures are set to 0°.
2) Starting with the BIOS upgrade disk set version 1.05, both temperature alarm and fan control depend on the processor.
3) For the BIOS upgrade disk set version < 1.19 the alarm limits are - on: 94 °C, off: 92 °C.
4) Temperature alarms depend on the display unit being used.

The following figure shows the different alarm signals. If 2 different alarms are triggered simultaneously, then the higher priority alarm is emitted first.

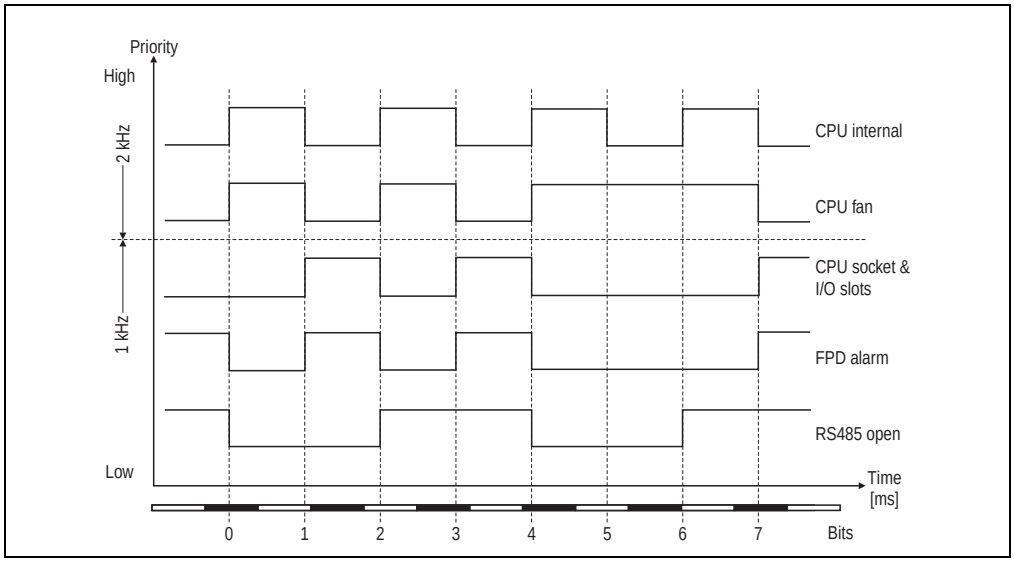


Figure 80: MTC alarms

8.21 Ethernet controller

8.21.1 System units 5C5001.1x, 5C5001.2x, 5C5601.1x, 5C5601.2x

Ethernet	10/100 Mbit/s [1]
Connection	RJ45 twisted pair (10BaseT/100BaseT)
Controller	Intel 82559ER
Compatibility	Not NE2000 compatible
Cabling	S/STP (category 5)

Table 103: Ethernet controllers 5C5001.1x, 5C5001.2x, 5C5601.1x, 5C5601.2x

1) Both operating modes are possible, as switching takes place automatically.

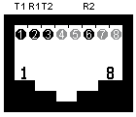
8.21.2 System units 5C5001.32, 5C5601.42, 5C5601.32, 5C5601.42

Ethernet	10/100 Mbit/s [1]
Connection	RJ45 twisted pair (10BaseT/100BaseT)
Controller	Intel 82551ER
Compatibility	Not NE2000 compatible
Cabling	S/STP (category 5)

Table 104: Ethernet controllers 5C5001.32, 5C5601.42, 5C5601.32, 5C5601.42

1) Both operating modes are possible, as switching takes place automatically.

Ethernet connection



RJ45 Twisted Pair

Figure 81: Ethernet connection

The onboard Ethernet controller on the system units provides an RJ45 Twisted Pair connection, to which 2 LED status indicators are attached:

LED	On	Off
Green	100 Mbit/s	10 Mbit/s
Orange	Link	Activity (blinking)

Table 105: Status LEDs - Ethernet controller

8.21.3 Driver support

Special drivers are necessary for operating the Ethernet controllers 82551ER and 82559ER. They are found on the Provit Drivers & Utilities CD ROM (model number 5S0000.01-090) or can be downloaded from B&R's homepage (www.br-automation.com).

Information:

The Ethernet controller 82551ER (used for system units 5C5001.32, 5C5001.42, 5C5601.32 and 5C5601.42) is driver compatible with Ethernet controller 82559ER.

There are drivers available for the following operating systems.

Operating system	Driver support for 82559ER	Driver support for 82559ER	Source
MS-DOS	Yes	Yes	Download area - B&R homepage
MS Windows 95	Yes	Yes	Download area - B&R homepage
MS Windows 98	Yes	Yes	Download area - B&R homepage
MS Windows 98SE	Yes	Yes	Download area - B&R homepage
MS Windows ME	Yes	Yes	Download area - B&R homepage
MS Windows NT4.0	Yes	Yes	Download area - B&R homepage
MS Windows 2000	Yes	Yes	Download area - B&R homepage
MS Windows XP	Yes	Yes	Download area - B&R homepage
MS Windows CE 3.0	Yes	No	B&R Automation Software
MS Windows CE 4.0	No	No	-
MS Windows CE 4.1	No	No	-
MS Windows NT Embedded	Yes	Yes [1)]	Download area - B&R homepage
MS Windows XP Embedded	Yes	Yes [1)]	Download area - B&R homepage

Table 106: Driver support - 82551ER and 82559ER

1) There is no own component. The respective drivers can be installed at a later time.

8.21.4 Image compatibility

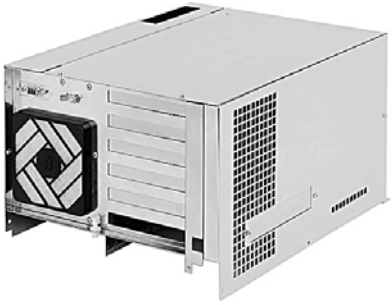
Operating system images based on the system units 5C5001.11, 5C5601.11, 5C5001.12, 5C5601.12, 5C5001.21, 5C5001.22 or 5C5601.21 must be created **AGAIN** when changing over to system units 5C5001.32, 5C5001.42, 5C5601.32 or 5C5601.42.

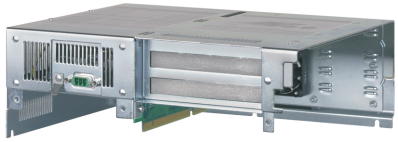
9. Bus units

9.1 General information

The bus unit contains the power supply (24 VDC, 100-240 VAC or 115/230 VAC), the system bus (ISA or PCI), IDE slots and one or two fans.

5C5000.01 and 5C5000.02	5C5000.11 and 5C5000.12

5C5600.01 and 5C5600.02	5C5600.11 and 5C5600.12
	

5C5000.21 and 5C5000.22	5C5000.31 and 5C5000.32
	
5C5600.03 and 5C5600.04	

9.2 Technical data

9.2.1 Bus units for IPC5000 / IPC5000C

Bus unit	5C5000.01	5C5000.02	5C5000.11	5C5000.12	5C5000.21	5C5000.22	5C5000.31	5C5000.32
Slots[1)]								
Total	2		4		2		5	
B&R ISA 16-bit [2)]	1		1		-		1	
Half-size ISA 16-bit	-		-		-		1	
Half s. ISA 16-bit / PCI 32-bit	1		3		-		1	
Half-size PCI 32-bit	-		-		-		2	
Full-size ISA 16-bit	-		-		-		-	
Full s. ISA 16-bit / PCI 32-bit	-		-		-		-	
Full-size PCI 32-bit	-		-		-		-	
Supply voltage [3)]								
Rated	100 - 240 VAC	24 VDC	100 - 240 VAC	24 VDC	100 - 240 VAC	24 VDC	100 - 240 VAC	24 VDC
Tolerance range	85 - 264 VAC	18 - 30 VDC	85 - 264 VAC	18 - 30 VDC	85 - 264 VAC	18 - 30 VDC	85 - 264 VAC	18 - 30 VDC
Frequency	50-60 Hz	-	50-60 Hz	-	50-60 Hz	-	50-60 Hz	-
Fan type / Design	Ball bearings, analog control							
Number of fans								
∅ 40 mm	2		3	2	2		1	1
∅ 50 mm	-		-	-	-		2	1

Table 107: Technical data - IPC5000/5000C bus units

1) All PCI slots have an operating voltage of 5V and a clock frequency of 33MHz.

2) Standard 16-bit ISA interface; operation of standard ISA boards is not possible due to mechanical requirements.

3) AC power supply: A 3-pin cable with grounding contact plug is required for operation (model number 9A0001.03).
24 VDC power supply: A plug (with terminal blocks) for connecting to the supply, is contained in the delivery. The cable must be provided by the customer.

The following graphic shows the slot assignments for the various Provit 5000 bus units.

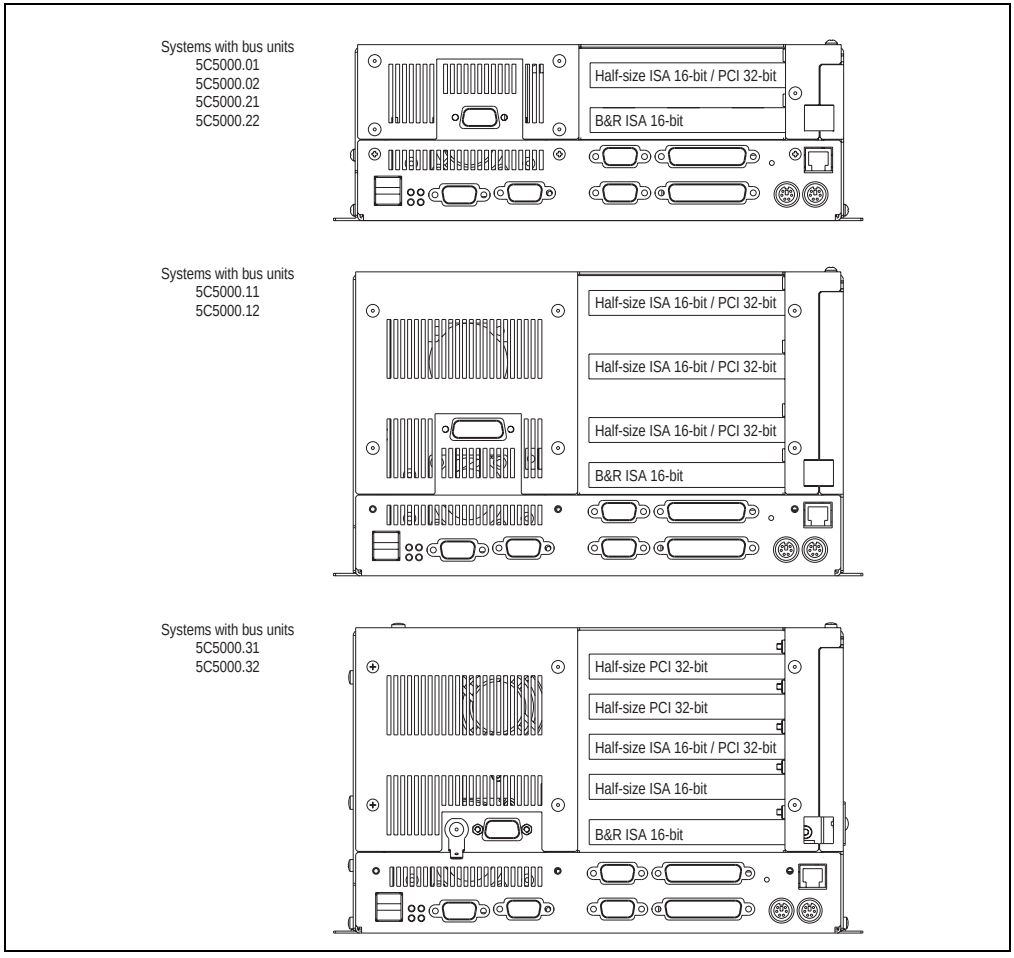


Figure 82: Slot assignments - Provit 5000 display units

9.2.2 Bus units for IPC5600 / IPC5600C

Bus unit	5C5600.01	5C5600.02	5C5600.03	5C5600.04	5C5600.11	5C5600.12
Slots[1)]						
Total	4		5		6	
B&R ISA 16-bit [2)]	-		-		-	
Half-size ISA 16-bit	1		1		1	
Half s. ISA 16-bit / PCI 32-bit	-		-		-	
Half-size PCI 32-bit	-		-		-	
Full-size ISA 16-bit	-		1		2	
Full s. ISA 16-bit / PCI 32-bit	3		1		3	
Full-size PCI 32-bit	-		2		-	
Supply voltage [3)]						
Nominal	115 / 230 VAC	24 VDC	115 / 230 VAC	24 VDC	115 / 230 VAC	24 VDC
Tolerance	85 - 132 VAC 170 - 264 VAC	18 - 30 VDC	85 - 132 VAC 170 - 264 VAC	18 - 30 VDC	85 - 132 VAC 170 - 264 VAC	18 - 30 VDC
Frequency	50 - 60 Hz		50 - 60 Hz		50 - 60 Hz	
Fan type / Design	Ball bearings, analog control					
Number of fans						
∅ 80 mm	1		1		-	
∅ 92 mm	-		-		1	

Table 108: Technical data - IPC5600/5600C bus units

1) All PCI slots have an operating voltage of 5V and a clock frequency of 33MHz.

2) Standard 16-bit ISA interface; operation of standard ISA cards is not possible due to mechanical requirements.

3) AC power supply: A 3-pin cable with grounding contact plug is required for operation (model number 9A0001.03).
24 VDC power supply: A plug (with terminal blocks) for connecting to the supply, is contained in the delivery. The cable must be provided by the customer.

Information:

A maximum of 3 ISA cards can be used simultaneously because of specifications for the Intel 440BX chipset.

The following graphic shows the slot assignments for the various Provit 5600 bus units.

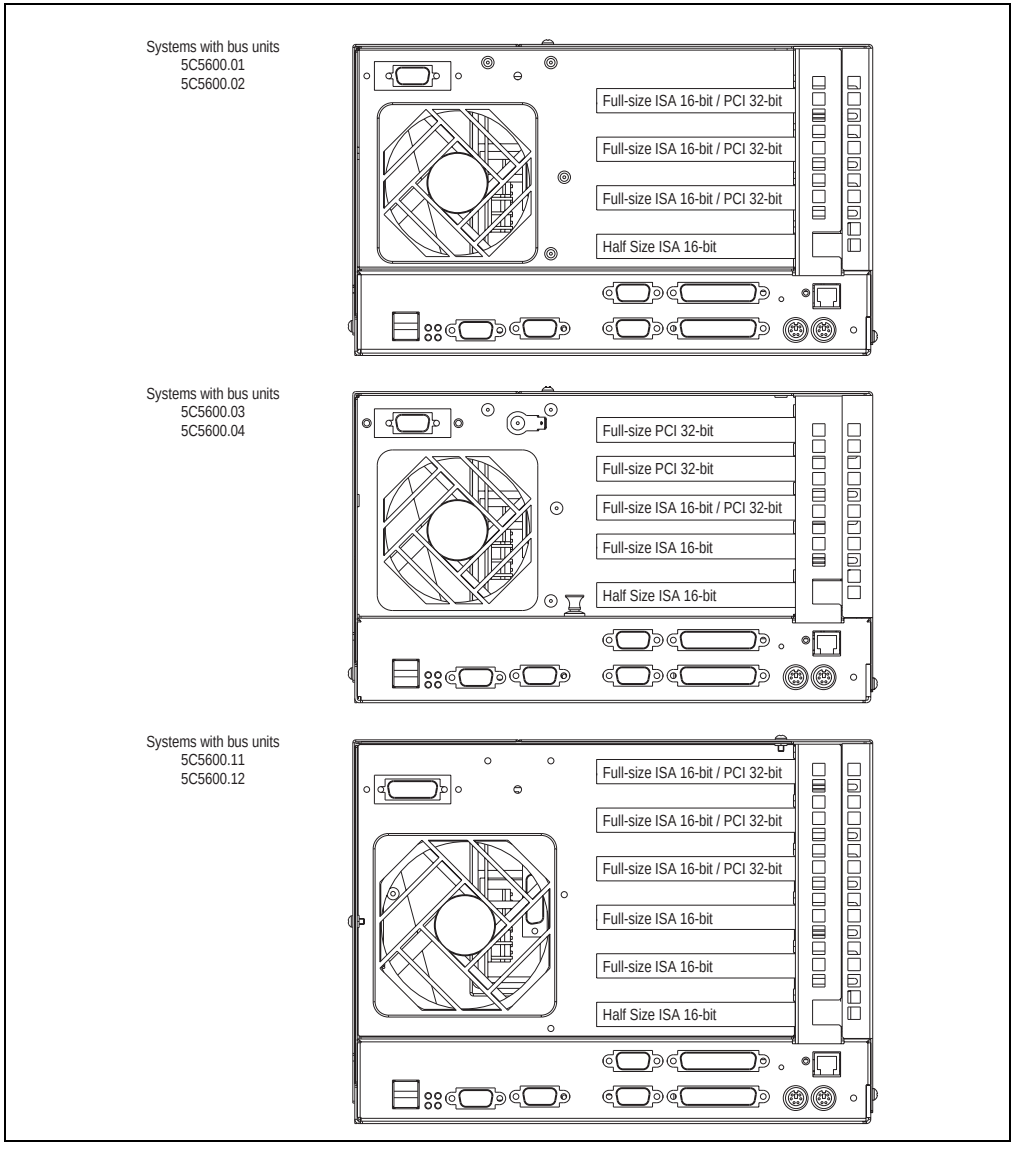


Figure 83: Slot assignments - Provit 5600 display units

9.3 ISA/PCI - slots

Provit 5000: All standard width 16-bit ISA and 32-bit PCI cards, in the half-size format, can be installed. It is not possible to use full-size cards.

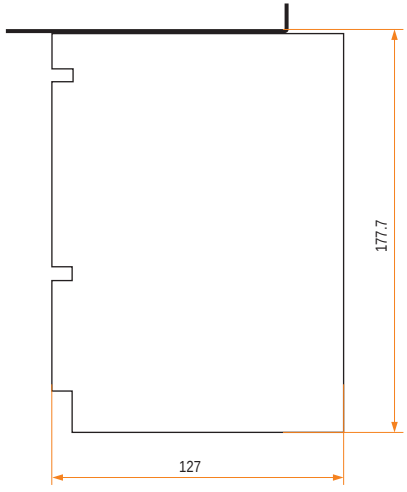
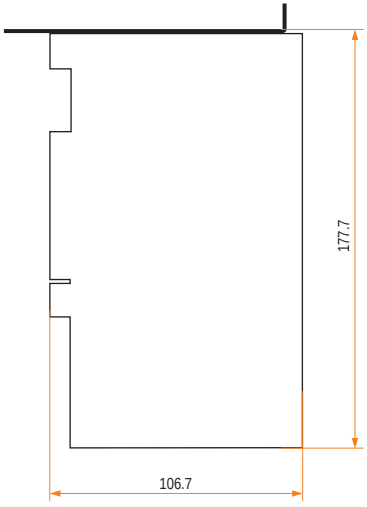
Provit 5600: All standard width 16-bit ISA and 32-bit PCI cards in either half-size or full-size format can be installed.

9.3.1 Maximum dimensions of insert cards

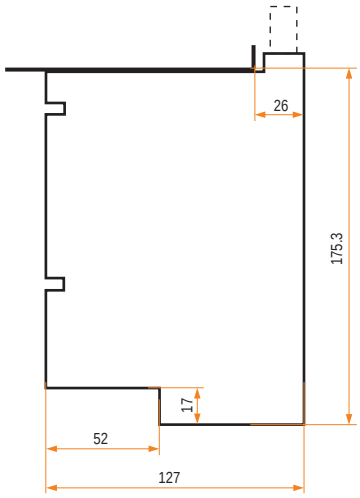
The following displayed dimensions refer to maximum dimensions for insert cards, which can be used in Provit Industrial PCs (as described above). These dimensions have no connection with existing standards or specifications for ISA and PCI cards.

a) Half-size cards

The size information refers to the size of the circuit board.

Standard ISA 16-bit half-size card	Standard PCI 32-bit half-size card
	

B&R ISA 16-bit half-size card



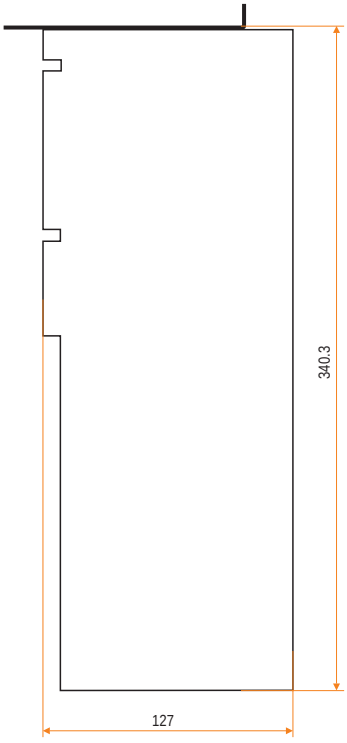
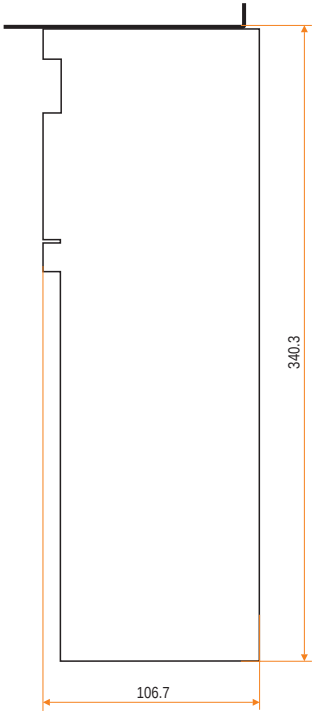
* Only for B&R interface boards with a BNC Ethernet connection.

Information:

B&R ISA cards are not standard width 16-bit ISA cards. Therefore they can only be used in B&R IPCs from the Provit 5000 and Provit 5600 series. One such card is the B&R interface board. Because of mechanical requirements it is also not possible to operate a standard half-size ISA card in the B&R ISA slot.

b) Full-size cards

The size information refers to the size of the circuit board.

Standard ISA 16-bit full-size card	Standard PCI 32-bit full-size card
	

9.3.2 Fasteners for full-size cards

Fasteners for full-size cards are contained in the delivery of Provit 5600 bus units (model numbers 5C56xx.xx). The fasteners consist of a guide rail and a mounting screw. They are connected by attaching the screws to openings in the housing, above and below the card, thus providing increased stability to the card.

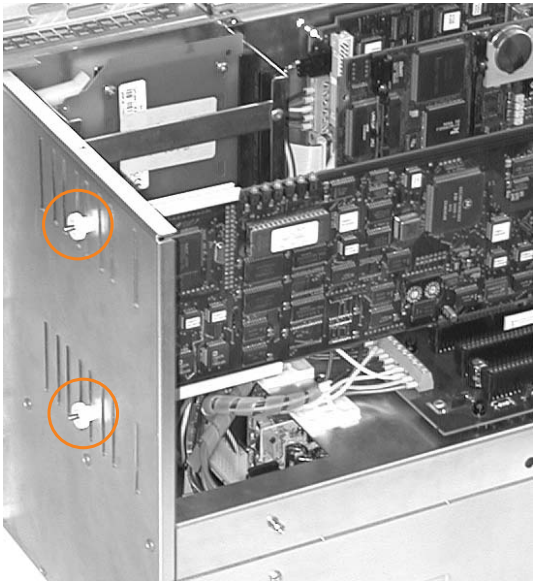


Figure 84: Fasteners for full-size cards

If components are positioned on the edge of the full size card, it is possible that the card will not fit in the guide rail correctly. In this case, the guide rail must be sawed off where required.

9.4 Hard disk / silicon disk slots

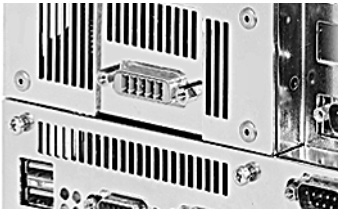
There is a slot available in the Provit 5000 controller to connect mass memory media using an IDE interface. Two IDE devices can be installed in the Provit 5600 controller.

Information:

A PCI plug is used to connect (mechanically and electrically) the hard drive to the IPC. However, the mass memory media does not possess a PCI interface and cannot operate on the PCI bus (see also the section "Mass memory" on page 185).

9.5 Power supply

The power supply is installed in the housing cover as a part of the bus unit. Its design allows it to be shielded from the other part of the bus board and the system unit.

3-pin connection (AC)	5-pin connection (DC)
	

All variations of the bus units are available either with a 240 VAC or 24 VDC power supply:

Controller	IPC5000				IPC5600			
Bus unit	**5C5000.01**	**5C5000.02**	**5C5000.11**	**5C5000.12**	**5C5600.01**	**5C5600.02**	**5C5600.03**	**5C5600.04**
Supply voltage	100 - 240 VAC	24 VDC	100 - 240 VAC	24 VDC	115 / 230 VAC	24 VDC	115 / 230 VAC	24 VDC
Bus unit	**5C5000.21**	**5C5000.22**	**5C5000.31**	**5C5000.32**	**5C5600.11**	**5C5600.12**		
Supply voltage	100 - 240 VAC	24 VDC	100 - 240 VAC	24 VDC	115 / 230 VAC	24 VDC		

Table 109: Supply voltages for the bus units

Note: 24 V power supplies have safeguards. If the plug is wired incorrectly, a diode prevents possible damage.

A 3-pin (AC power supply) or 5-pin (DC power supply) DSUB plug is used for the supply voltage (with stress relief and screws for fastening to the controller):

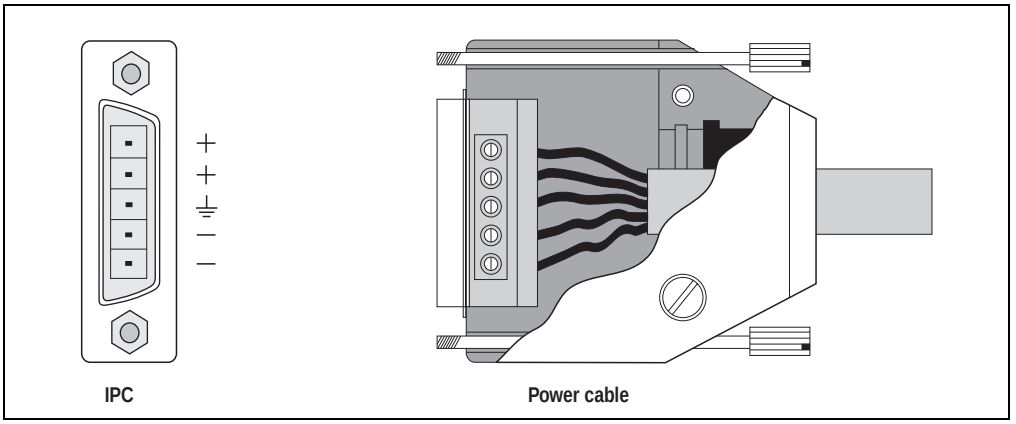


Figure 85: Plug and socket (5-pin) for DC supply

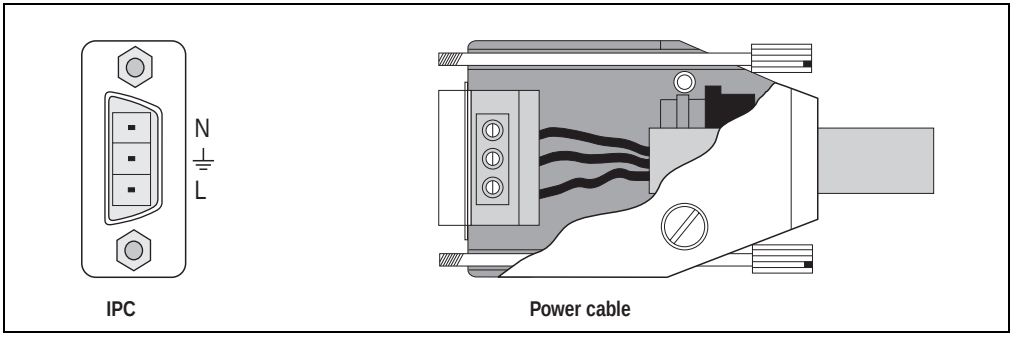


Figure 86: Plug and socket (3-pin) for AC supply

Criteria	Data
Standards	UL, CSA
Cable cross section	0.14 – 1.5 mm^2
AWG	28 - 16

Table 110: Power supply connection and cable specifications

9.6 IPC5000 and IPC5600 current requirements / power consumption

In order to calculate the power consumption of Provit IPCs, tables have been compiled with recommended values for power consumption for the individual components. The current requirements of the individual components are arranged according to the necessary supply voltages, showing the corresponding current requirements for each supply voltage (+5 V, -5 V, +12 V and -12 V).

Information:

The values given are typical values and have a certain tolerance. This depends on configuration details and cannot be determined exactly.

Component	Current requirements for supply voltage			
	+5 V	-5 V	+12 V	-12 V
Mainboard with 8 MB DRAM (SIMM)	2 A	-	0.1 A	0.1 A
Mainboard with 64 MB DRAM (SIMM)	2.2 A	-	0.1 A	0.1 A
Intel Pentium 100 MHz With 24 VDC supply With 240 VAC supply	 2 A -	 - -	 - Up to 0.9 A	 - -
Intel Pentium 166 MHz With 24 VDC supply With 240 VAC supply	 2.8 A -	 - -	 - 1.2 A	 - -
Intel Pentium 200 MHz With 24 VDC supply With 240 VAC supply	 3.1 A -	 - -	 - 1.3 A	 - -
Interface board	0.5 A	-	0.1 A	-
Hard drive	0.5 A	-	-	-
Disk drive	0.1 A	-	-	-
PC card	1)	-	-	-
Cards in the ISA or PCI slot	Max. 2 A 1)	Max. 0.3 A 1)	Max. 1 A 1)	Max. 0.4 A 1)
Panelware keypad modules	-	-	0.2 A	-
Display units - 5D5500 series	0.5 A	-	0.9 A	-
Display units - 5D5200 series 10.4" TFT	0.5 A	-	0.5 A	-
Display units - 5D5200 series 13.8" TFT	0.7 A	-	0.9 A	-
Display units - 5D5200 series 15" TFT	0.8 A	-	0.9 A	-
Display unit - 18.1" TFT	2.6 W IPC side 2)			
24 VDC supply Max. current requirements (total)	10 A	0.3 A	4 A	1 A
Max. power consumption (total)	60 W			

Table 111: Current requirements / power consumption of the components

240 VAC supply Max. current requirements (total)	15 A (6 A [3])	0.3 A	6 A (3 A [3])	1 A (0.7 A [3])
Max. power consumption (total)	100 W (60 W [3])			

Table 111: Current requirements / power consumption of the components

1) Can be found on the data sheet for the respective manufacturer.
2) 25.5 W on the side of the external supply voltage.
3) For bus unit 5C5000.01.

To calculate the IPC's current requirements and power consumption, select all installed components from this table and list them e.g. as shown below (a power supply with a 24 VDC supply voltage is required):

Component	Current requirements for supply voltage			
	+5 V	-5 V	+12 V	-12 V
Mainboard with 8 MB DRAM (SIMM)	2 A	-	0.1 A	0.1 A
Intel Pentium 100 MHz with 24 VDC supply	2 A	-	-	-
Interface board	0.5 A	-	0.1 A	-
Hard drive	0.5 A	-	-	-
Disk drive	0.1 A	-	-	-
Display units - 5D5200 series 10.4" TFT	0.5 A	-	0.5 A	-
Current requirements	5.6 A	-	0.7 A	0.1 A
Power consumption (P = U * I)	28 W	-	8.4 W	1.2 W
Total power consumption	**37.6 W**			

Table 112: Example for current requirements and power consumption

With this structure, you have four current values (one for each voltage supply), which are multiplied with the associated voltages to determine the power consumption (P = U * I).

You then add the power ratings for the respective supply voltages, which results in the total power consumption for the IPC.

Please note: maximum values for current requirements and power consumption listed in the "Current requirements - components" table must not be exceeded!

9.7 Current requirements / power consumption - IPC5000C and IPC5600C

Current requirements are arranged according to the bus units used for Provit IPCs with system units for socket 370 CPUs.

If you use bus units

- 5C5000.11 (IPC5000, 4 slots, 240 VAC)
- 5C5000.31 (IPC5000, 5 slots, 240 VAC) or
- 5C5600.* (IPC5600, Revision x.x and higher),

values for power consumption are found in the following table:

IPC configuration	Current requirements	
	For 5 V [1]	For 12 V [1]
Celeron 300, 64 MB DRAM Celeron 300, 640 MB DRAM	4.2 A 5.2 A	0.2 A 0.2 A
Celeron 366, 64 MB DRAM Celeron 366, 640 MB DRAM	4.8 A 5.8 A	0.2 A 0.2 A
Celeron 433, 64 MB DRAM Celeron 433, 640 MB DRAM	5.4 A 5.4 A	0.2 A 0.2 A
Celeron 566, 64 MB DRAM Celeron 566, 640 MB DRAM	4.2 A 5.2 A	0.2 A 0.2 A
Pentium III 600, 64 MB DRAM [2] Pentium III 600, 640 MB DRAM [2]	4.8 A 5.8 A	0.2 A 0.2 A
Pentium III 850, 64 MB DRAM Pentium III 850, 640 MB DRAM	5.4 A 5.4 A	0.2 A 0.2 A

Table 113: Current requirements - IPC5000C and IPC5600C

1) Current consumption on the corresponding voltage of the power supply (5 V or 12 V).
2) Only for IPC5600C.

If you use bus units

- 5C5000.01 (IPC5000, 2 slots, 240 VAC)
- 5C5000.02 (IPC5000, 2 slots, 24 VDC)
- 5C5000.12 (IPC5000, 4 slots, 24 VDC)
- 5C5000.21 (IPC5000, 2 slots, 240 VAC)
- 5C5000.22 (IPC5000, 2 slots, 24 VDC) or
- 5C5000.32 (IPC5000, 5 slots, 24 VDC),

values for power consumption are found in the following table:

IPC configuration	Current requirements	
	for 5 V	for 12 V
Celeron 300, 64 MB DRAM Celeron 300, 640 MB DRAM	3 A 3 A	0.7 A 1.0 A
Celeron 366, 64 MB DRAM Celeron 366, 640 MB DRAM	3.5 A 3.5 A	0.7 A 1.0 A
Celeron 433, 64 MB DRAM Celeron 433, 640 MB DRAM	4.2 A 4.2 A	0.7 A 1.0 A
Celeron 566, 64 MB DRAM Celeron 566, 640 MB DRAM	3 A 3 A	0.7 A 1.0 A

Table 114: Current requirements - IPC5000C and IPC5600C

Information:

The values given are typical values and have a certain tolerance. This depends on configuration details and cannot be determined exactly.

The values given are measured on IPCs with only an external floppy disk drive connected as a peripheral device (no hard disk, no cards etc.).

Power supplies can deliver the following currents:

Bus unit	Current for supply voltage				Max. total power
	+ 5 V	- 5 V	+12 V	+12 V	
5C5000.01	6	0.3 A	3 A	0.7 A	60 W
5C5000.02 5C5000.12 5C5000.22 5C5000.32 5C5600.02 5C5600.04 5C5600.12	10 A	0.3 A	4 A	1 A	60 W
5C5600.11 5C5000.21 5C5000.31 5C5600.01 5C5600.03 5C5600.11	15 A	0.3 A	6 A	1 A	100 W

Table 115: Power supply currents

9.8 Power failure bypass function on the bus units

Bus unit	Supply voltage	Power [1]	Power failure bypass
5C5000.01	100 - 240 VAC	60 W	20 ms for 60 W load
5C5000.02	24 VDC	60 W	1.5 ms for + 5 V and 1 ms for + 12 V with 150 W load
5C5000.11	100 - 240 VAC	100 W	20 ms for 80 W load
5C5000.12	24 VDC	60 W	1.5 ms for + 5 V and 1 ms for + 12 V with 150 W load
5C5000.21	100 - 240 VAC	100 W	20 ms for 80 W load
5C5000.22	24 VDC	60 W	1.5 ms for + 5 V and 1 ms for + 12 V with 150 W load
5C5000.31	100 - 240 VAC	100 W	20 ms for 80 W load
5C5000.32	24 VDC	60 W	1.5 ms for + 5 V and 1 ms for + 12 V with 150 W load
5C5600.01	115 / 230 VAC	100 W	20 ms for 100 W load
5C5600.02	24 VDC	60 W	1.5 ms for + 5 V and 1 ms for + 12 V with 150 W load
5C5600.03	115 / 230 VAC	100 W	20 ms for 100 W load
5C5600.04	24 VDC	60 W	1.5 ms for + 5 V and 1 ms for + 12 V with 150 W load
5C5600.11	115 / 230 VAC	100 W	20 ms for 100 W load
5C5600.12	24 VDC	60 W	1.5 ms for + 5 V and 1 ms for + 12 V with 150 W load

Table 116: Power failure bypass function for Provit bus units

1) The listed max. power values have been determined by B&R based on the construction of the controllers. Higher levels of power consumption are not permitted.

9.9 Functional ground connection

It is possible to connect the bus unit with functional ground, which supports the functions of the device and noise suppression. The connection is made with a cable to a part of the housing which is grounded (e.g. switching cabinet, etc.). A suitable cable with a connector must be supplied by the customer.

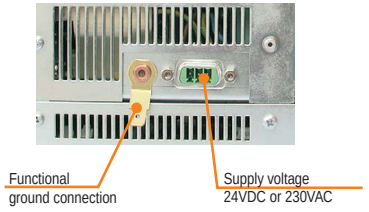


Figure 87: Functional ground connection - IPC5000 and IPC5000C (2, 4, and 5 slot designs)

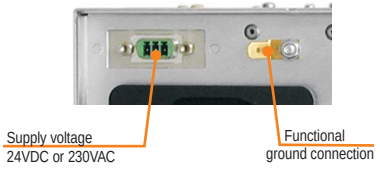


Figure 88: Functional ground connection - IPC5600 and IPC5600C (4, 5, and 6 slot designs)

It is possible to connect a functional ground for the following bus units with the following revision numbers:

Model number	Name	Starting with Rev. No.
5C5000.11	Bus unit 4-slot 100 - 240 VAC	D0
5C5000.21	Bus unit 2-slot 100 - 240 VAC	A0
5C5000.22	Bus unit 2-slot 24 VDC	A0
5C5000.31	Bus unit 5-slot 100 - 240 VAC	A0
5C5000.32	Bus unit 5-slot 24 VDC	A0
5C5600.01	Bus unit 4-slot 115 / 230 VAC	C0
5C5600.02	Bus unit 4-slot 24 VDC	C0
5C5600.03	Bus unit 5-slot 115 / 230 VAC	A0
5C5600.04	Bus unit 5-slot 24 VDC	A0
5C5600.11	Bus unit 6-slot 115 / 230 VAC	00
5C5600.12	Bus unit 6-slot 24 VDC	C0

10. Processors

See section 7.4 "Processor socket" on page 116 for processors for system units with socket 7 (ZIF) or section 8.4 "Processor socket" on page 142 for processors for system units with socket 370.

11. Mass memory

Caution!

A silicon disk (PC card, CompactFlash) is required when a hard disk is used in environments with vibration and shock. Hard disk drives are normally not designed for use in industrial environments. If excessive vibrations or shock occur during use, B&R is not liable for damage to a properly functioning hard disk. The limits specified by the respective manufacturers are displayed in the following tables.

Mass memory media are inserted in the bus unit in a hard disk / silicon disk slot (enhanced IDE interface), which is accessible after opening the housing (see also section 9.4 "Hard disk / silicon disk slots" on page 177).

Caution!

Mass memory media are installed on a special insert card. A PCI plug is used to connect (mechanically and electrically) the hard drive to the IPC. Please note however, that mass memory media do not have a PCI interface nor can they operate on the PCI bus.

There are two different mass memory media to choose from with the 5000 and 5600 IPC series:

- Hard disks
- Silicon disks

In contrast to conventional hard disks, silicon disks have no mechanical parts. Storage takes place in a FlashPROM on a pure semi conductor basis. This means they are free from nearly all mechanical influences such as shock or vibration.

Both the user's needs and the properties of the various types available influence the selection of a mass media.

Hard disks, for example, can only be used in a limited manner in environments with heavy vibrations or mechanical shock. Another characteristic is that hard disks have limited operating times, real 24-hour continuous operation is only possible under certain conditions.

Silicon disks however are almost immune to all mechanical and environmental influences. Nevertheless, the number of write/erase cycles is limited and the price is higher than conventional hard drives.

11.1 Hard disks

Caution!

A silicon disk (PC card, CompactFlash) is required when a hard disk is used in environments with vibration and shock. Hard disk drives are normally not designed for use in industrial environments. If excessive vibrations or shock occur during use, B&R is not liable for damage to a properly functioning hard disk. The limits specified by the respective manufacturers are displayed in the following tables.

Information:

More detailed information regarding the hard disks can be found in chapter 8 "Technical appendix" on page 469.

Hard drives in the 2.5" format are used exclusively.

See the section 7 "Distribution of resources" on page 413 for I/O addresses and interrupt settings.

Warning!

The top side of the hard drives should never be touched. Magnet heads can be damaged by even light pressure because the housing plate is very thin.

11.1.1 Hard disk 5A5001.03 and 5A5001.04

These hard disks are permanently mounted on the insert card.

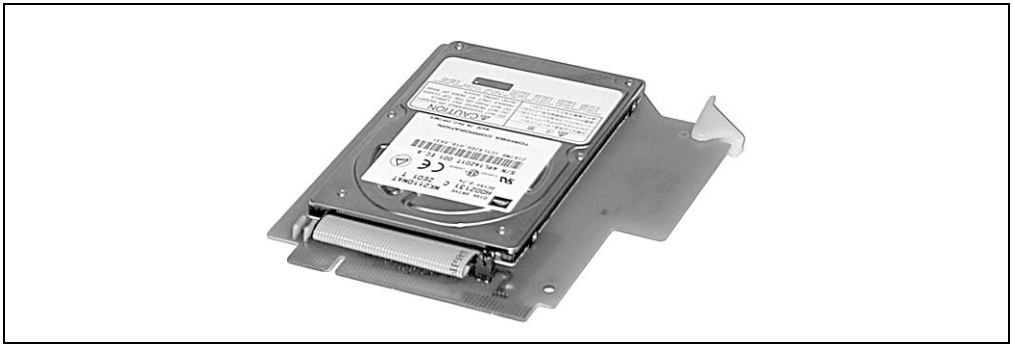


Figure 89: Hard disk - models 5A5001.03 and 5A5001.04

11.1.2 Hard disk 5A5001.05

This hard disk is mounted on the insert card with rubber suspension.

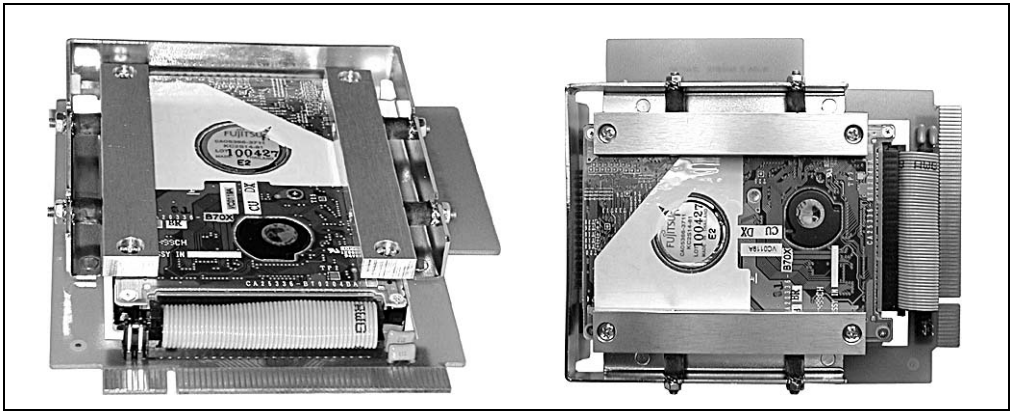


Figure 90: Hard disk - model 5A5001.05

11.1.3 Hard disk 5A5001.08, 5A5001.10, 5A5001.12, 5A5001.15 and 5A5001.17

These hard disks are permanently mounted on the insert card. If needed, they can be additionally attached to the slot cover with two screws.

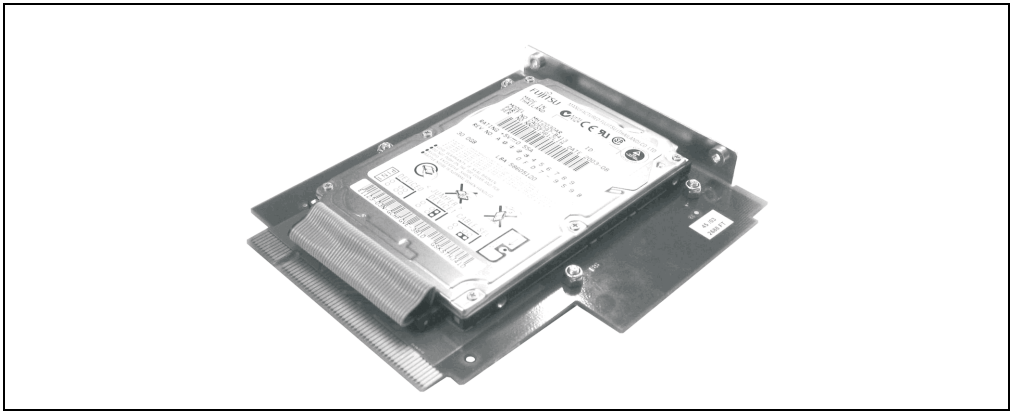


Figure 91: Hard disk - models 5A5001.08, 5A5001.10, 5A5001.12, 5A5001.15, 5A5001.17

11.1.4 Hard disk 5A5001.13, 5A5001.16 and 5A5001.18

These combinations of hard disks and CompactFlash are permanently mounted on the insert card. If needed, they can be additionally attached to the slot cover with two screws.
For the 2-slot bus unit variant of the IPC5000C, a special IPC side section (5A5008.03) is also available which provides access to the CompactFlash from the outside through a separate housing opening.

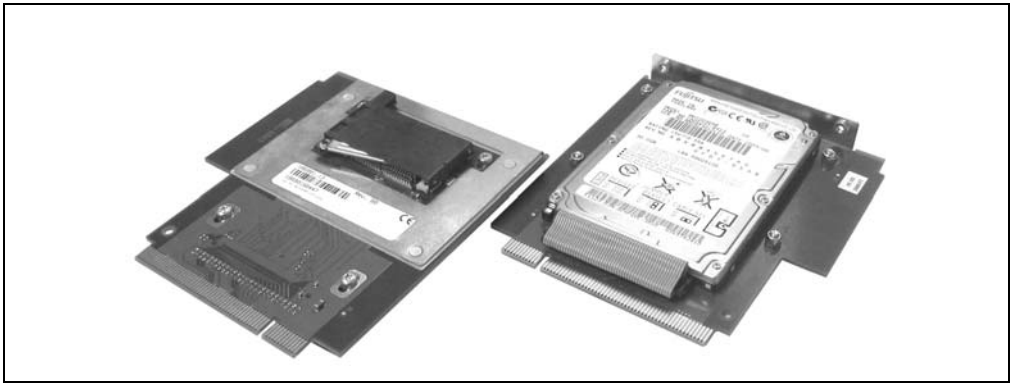


Figure 92: Hard disk - models 5A5001.13, 5A5001.16, 5A5001.18

11.2 Silicon disks

Silicon disks (memory media on a pure semi conductor basis) are available from B&R in two variations:

- PC cards
- CompactFlash cards

Silicon disks are installed on special adapter cards, which enable operation in a hard disk / silicon disk slot on a Provit industrial PC.

PC cards and CompactFlash cards can be used here as a real alternative to a hard disk, i.e. it is possible to boot from the silicon disk using a True-IDE/ATA interface.

Use without the adapter card is also possible. This is done by operating the PC card / CompactFlash card as normal, in a corresponding slot as pure data memory.

11.2.1 PC cards

Model number	Short text
9A0009.01	PC card Flash 6MB True IDE
9A0009.02	PC card Flash 40MB True IDE
9A0009.03	PC card Flash 20MB True IDE
9A0009.04	PC card Flash 110MB True IDE
9A0009.05	PC card Flash 60MB True IDE
9A0009.06 1)	PC card Flash 220MB True IDE FMC
9A0009.07	PC card Flash 220MB True IDE
9A0009.08	PC card Flash 48MB True IDE
9A0009.09	PC card Flash 440MB True IDE

Table 117: PC cards

1) Full metal card, i.e. the housing of the PC card is completely made of metal.

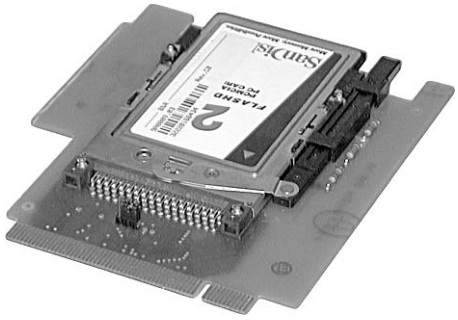


Figure 93: Silicon disk (PC card) on the adapter card

These memory media consist of PC cards in type II format with FlashPROM memory. The adapter card for using PC cards as "hard disk replacements" in the hard disk / silicon disk slot on the IPC is available under model no. 5A5002.01.

11.2.2 CompactFlash cards 5CFCRD.xxxx-02

Model number	Description	Image
5CFCRD.0032-02	CompactFlash 32 MB TrueIDE SanDisk/A	
5CFCRD.0064-02	CompactFlash 64 MB TrueIDE SanDisk/A	
5CFCRD.0128-02	CompactFlash 128 MB TrueIDE SanDisk/A	
5CFCRD.0256-02	CompactFlash 256 MB TrueIDE SanDisk/A	
5CFCRD.0512-02	CompactFlash 512 MB TrueIDE SanDisk/A	
5CFCRD.1024-02	CompactFlash 1024 MB TrueIDE SanDisk/A	
5CFCRD.2048-02	CompactFlash 2048 MB TrueIDE SanDisk/A	

Table 118: Order data - CompactFlash cards

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)	> 3000000 hours
Maintenance	None
Data reliability	< 1 unrecoverable error in 10^{14} bit read accesses < 1 faulty correction in 10^{20} bit read accesses
Write/erase procedures	> 2,000,000 times
Mechanics	
Dimensions Length Width Thickness	 36.4 ± 0.15 mm 42.8 ± 0.10 mm 3.3 mm ± 0.10 mm
Weight	11,4 g
Environment	
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)

Table 119: Technical data - CompactFlash cards 5CFCRD.xxxx-02

Environment	5CFCRD.xxxx-02
Shock Operation / Storage	Maximum 3,000 G
Altitude	24000 meters

Table 119: Technical data - CompactFlash cards 5CFCRD.xxxx-02 (cont.)

Dimensions

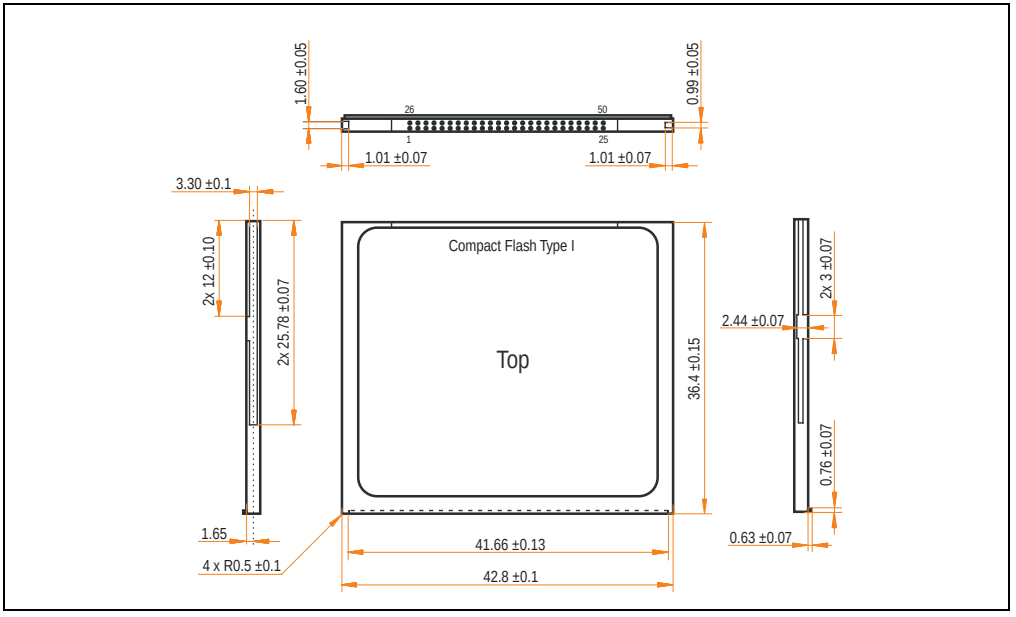


Figure 94: Dimensions - CompactFlash card Type I

Calculating the lifespan

See chapter 8 "Technical appendix", section 3 "Lifespan calculation - CompactFlash cards 5CFCRD.xxxx-02" on page 471.

11.2.3 CompactFlash cards 5CFCRD.xxxx-03

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

Table 120: Order data - CompactFlash cards

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
Environmental characteristics	
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

Environmental characteristics	5CFCRD.xxxx-03

Table 121: Technical data - CompactFlash cards 5CFCRD.xxxx-03

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 121: Technical data - CompactFlash cards 5CFCRD.xxxx-03 (cont.)

Temperature humidity diagram - operation and storage

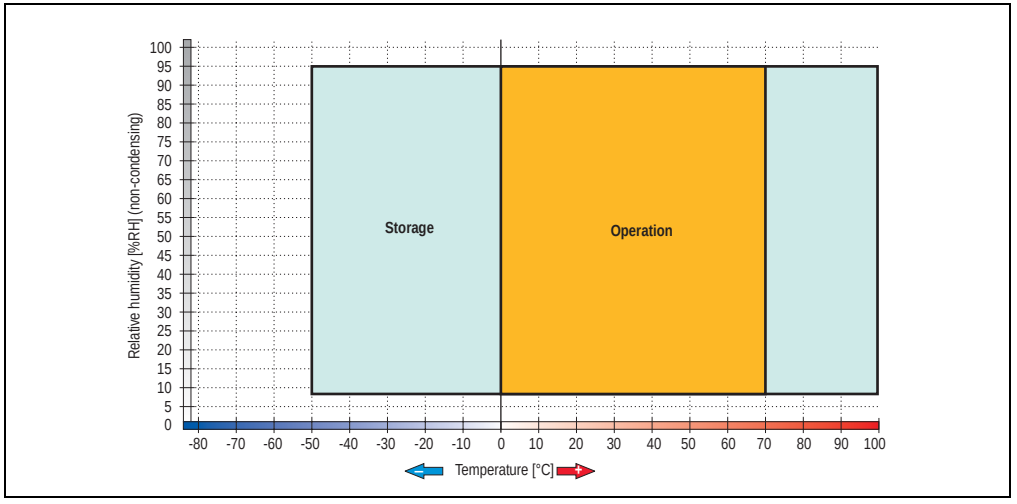


Figure 95: Temperature humidity diagram - CompactFlash cards 5CFCRD.xxxx-03

Contents of delivery

Amount	Component
1	CompactFlash card in desired size

Table 122: Contents of delivery - CompactFlash cards 5CFCRD.xxxx-03

Dimensions

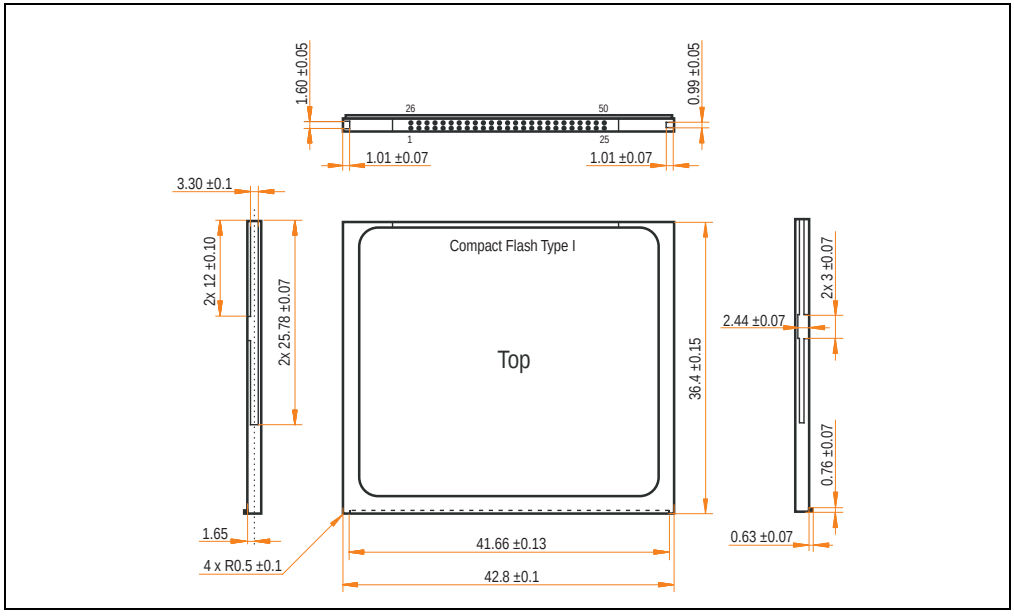


Figure 96: Dimensions - CompactFlash card Type I

Calculating the lifespan

See chapter 8 "Technical appendix", section 4 "Lifespan calculation for CompactFlash cards 5CFCRD.xxxx-03" on page 477.

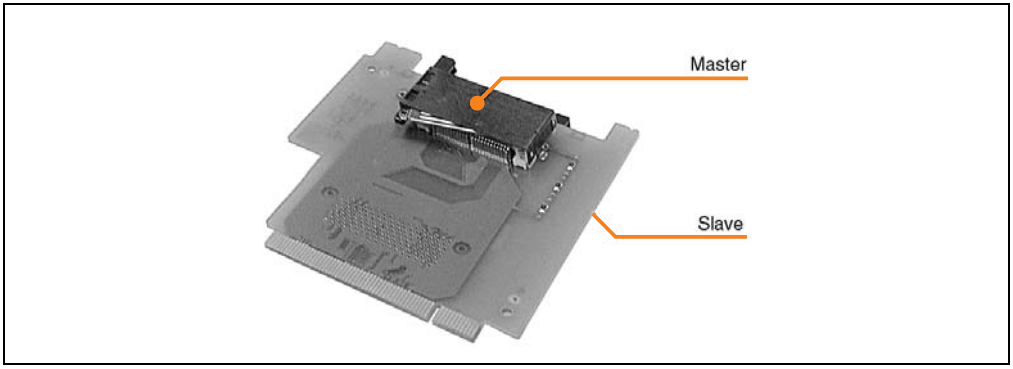


Figure 97: Silicon disk (CompactFlash card) on the adapter card

Differences between PC cards and CompactFlash cards are only noticeable in regards to mechanical dimensions and the number of pins. CompactFlash cards also contain a FlashPROM memory.

The adapter card for using PC cards and CompactFlash cards as "hard disk replacements" in the hard disk / silicon disk slot on the IPC5000/IPC5000C is available under model no. 5A5002.02. On this adapter card, there are 2 CompactFlash slots (top or bottom of the circuit board).

Warning!

The silicon disk adapter CF 2-slot 5A5002.02 should not be used with a Provit 5600, and add-on CD ROM 5A5009.01, or an add-on CD RW 5A5009.02 on a Provit 5000 controller.

12. Lifespan of silicon disks (CompactFlash, PC card)

Information:

For a lifespan calculation of the CompactFlash cards 5CFCRD.xxxx-02 see chapter 8 "Technical appendix", section 3 "Lifespan calculation - CompactFlash cards 5CFCRD.xxxx-02" on page 471.

12.1 General information

The silicon disks used in the IPCs are from SanDisk. They are 100% compatible with all operating systems because of their ATA industry standard design.

12.2 Construction

A silicon disk is divided internally into individual sectors, whereby one sector corresponds to 512 bytes. (Example: 48 MB = 48 * 1,024,000 bytes [1] = 49,152,000 bytes / 512 bytes = 96,000 sectors) These e.g. 96,000 sectors, are named "user sectors" and can be freely chosen by the user.

CompactFlash and PC cards possess over 1% of spare sectors. Additionally they possess user sectors, which are also based on their memory capacity. In the example, this corresponds to 960 spare sectors.

This additional memory is run automatically and therefore cannot be accessed by the user. The necessity for these sectors is due to the limited number of write/erase cycles per sector, currently estimated to be at least 300,000 accesses (typically 1,000,000 accesses). If a user sector can no longer be successfully written to and checked, it is automatically replaced with a spare sector.

12.3 Organization of data in an application

a) Ring buffer storage

With ring buffer storage, data is always saved on the same sectors, e.g. from an application that always writes the same amount of data (file size does not change). The date and time information is also updated for the designated sectors.

1) SanDisk uses the following conversion formulas: 1 sector = 512 bytes, 1 MB = 1,024,000 bytes

b) Continuous storage

With continuous storage, the data is continually saved at the end of the last defined sector (continuous writing e.g. trending). Date, time and file size information (changed with every write cycle) is thereby updated for the designated sectors.

12.4 Calculation of the lifespan

12.4.1 Example 1: Ring buffer data storage

An application records the data every minute for the previous 5 hours. The data is saved on the same sectors (ring buffer).

Specifications: 64 MB silicon disk, 10 KB per minute i.e. 10 *1,024 bytes / 512 bytes = 20 sectors per minute

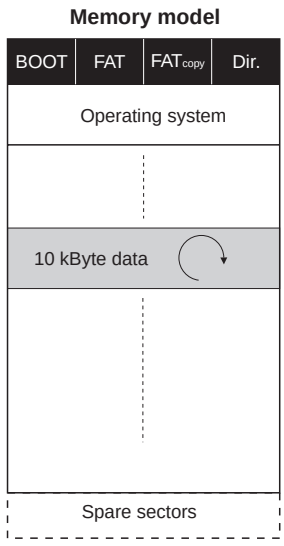


Figure 98: Ring buffer example

1. Calculation of the sectors

User sectors: 64 * 1,024,000 byte / 512 byte = 128,000 sectors

Spare sectors: 1% of user sectors = 1,280 sectors

2. Write cycles per year

23 sectors per minute (20 data + 2 FAT + 1 directory)

(20 + 2 + 1) sectors x 60 minutes x 24 hours x 365 days = 12,088,800 write cycles per year.

3. Possible number of write/erase cycles per year

(1,280 spare sectors + 23 sectors) x 300,000 accesses = 390,900,000 write/erase cycles per year

4. Lifespan

390,900,000 write erase cycles per year / 12,088,800 write cycles per year = a guaranteed lifespan of 32 years

Typical lifespan: 32 years x 3.3 = 105.6 years

12.4.2 Example 2: Continuous data storage

An application writes consecutively a data amount on a PC card (e.g. trending).

Specifications: 40 MB PC card, with 20 MB system data (operating system, application,…)and 20 MB data (application memory), 20 KB per minute i.e. 20 * 1,024 bytes / 512 bytes = 40 sectors per minute

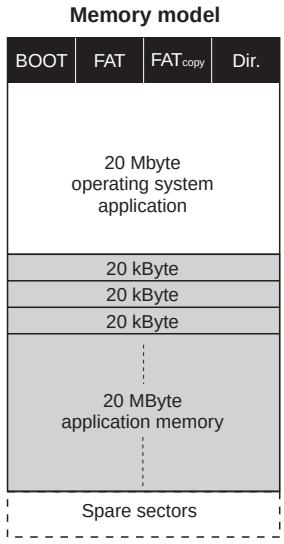


Figure 99: Continuous data storage

1. Calculation of the sectors

User sectors (system data): 20 * 1,024,000 bytes / 512 bytes = 40,000 sectors (are not changed)

User sectors: 20 * 1,024,000 bytes / 512 bytes = 40,000 sectors

Spare sectors: 1% of user sectors = 800 sectors

2. Write cycles per year

3 sectors (2 FAT + 1 directory) are always upgraded every minute.

(2 + 1) sectors x 60 minutes x 24 hours x 365 days = 1,576,800 write cycles per year.

3. Possible number of write/erase cycles per year

3 user sectors + 800 spare sectors = 803 sectors

803 sectors * 300,000 accesses = 240,900,000 write/erase cycles per year

4. Lifespan

The lifespan is then determined by 2 factors:

a) Memory capacity depleted (20 KB are continually written)

20 MB application memory / 20 KB per minute = 16.67 hours

b) Spare sectors depleted (3 sectors are continually specified)

240,900,000 write erase cycles per year / 1,576,800 write cycles per year = a guaranteed lifespan of 152.8 years

Typical lifespan: 152.8 years x 3.3 = 504.24 years

Information:

Because of the amount of data written every minute, the memory capacity is depleted before the lifespan is reached, and no further data can be saved.

13. Main memory

The type of DRAM modules which can be used, depends on the system unit or controller:

Controller	IPC5000 / IPC5600				
System units	5C5001.01 5C5001.03 5C5601.01				
Slots	2 x PS/2 SIMM (72-pin) FPM or EDO				
Size	9A0004.03 4 MB	9A0004.05 8 MB	9A0004.04 16 MB	9A0004.06 32 MB	9A0004.07 64 MB

Table 123: Main memory IPC5000 and IPC5600

Controller	IPC5000C / IPC5600C		
System units	5C5001.11, 5C5001.12, 5C5001.21, 5C5001.22, 5C5001.32, 5C5001.42 5C5601.11, 5C5601.12, 5C5601.21, 5C5601.22, 5C5601.32, 5C5601.42		
Slots	3 x DIMM (168-pin) PC100 SDRAM		
Size	9A0004.11 64 MB	9A0004.12 128 MB	9A0004.14 256 MB

Table 124: Main memory IPC5000C and IPC5600C

Slots for DRAM modules are accessible after opening the housing.

Warning!

DRAM modules can only be a maximum of 29.5 mm high if used in IPC5000/IPC5000C!

13.1 System units with SIMM slots

The mainboards of system units 5C5001.01, 5C5001.03 and 5C5601.01 are equipped with two 72-pin standard PS/2 SIMM slots.

Because of the chipset used (Intel 430HX), two identical SIMM module (size and organization) must always be used.

The total size of the SIMM module used can be a maximum of 128 MB. Therefore the following memory configurations are possible :

SIMM modules (two at a time)		Memory size (total)
Size	Organization	
4 MB	1 MB x 32/36	8 MB
8 MB	2 MB x 32/36	16 MB
16 MB	4 MB x 32/36	32 MB
32 MB	8 MB x 32/36	64 MB
64 MB	16 MB x 32/36	128 MB

Table 125: Possible memory configurations with SIMM modules

SIMM modules with the correct operating voltage must be used.

13.2 System units with DIMM slots

Two or three 168-pin standard DIMM slots for PC100 SDRAM memory modules are found on the mainboards of system units 5C5001.11, 5C5001.12, 5C5001.21, 5C5001.22, 5C5001.32, 5C5001.42, 5C5601.11, 5C5601.12 5C5601.21, 5C5601.22, 5C5601.32, and 5C5601.42 (see the technical data for the individual system units).

The size and number of memory modules used in the different DIMM slots are limited by the following conditions:

- Max. 256 MB per module
- Total max. 512MB

14. Interface board

Interface board	5A5000.01	5A5000.02	5A5000.05	5A5000.06
Slot	B&R 16 Bit ISA			
COM3	Combined RS232 / RS422 / RS485 interface, tri-state, electrically isolated, 16-byte FIFO			
COM4	Combined RS232 / RS422 / RS485 interface, tri-state, electrically isolated, 16-byte FIFO			
CAN bus	CAN 2.0b specification, Intel 82527 controller			
PC card	1 PCMCIA slot, Type I, II or III			
SRAM	256 KB; can be addressed via PCMCIA socket 2 Own lithium backup battery			
LPT2	Internal, for hardware security key (dongle)			
Ethernet Connection Controller Manufacturer Compatibility Cabling	-	BNC (10Base2) UMC 9008F NE2000-compatible RG58	RJ45 Tw. Pair (10BaseT) Intel 82595 Not NE2000 compatible S/STP (category 5)	BNC (10Base2) Intel 82595 Not NE2000 compatible RG58

Table 126: Technical data - interface board

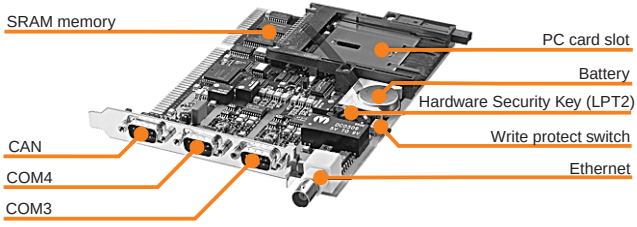


Figure 100: Interface board

Information:

The B&R interface board is not a standard width ISA card. They can therefore only be used in Provit 5000 and 5600 series IPCs.

The following interface boards with the following revisions are equipped with a new PCMCIA controller (VG469): 5A5000.01 starting with Revision E0, 5A5000.05 starting with Revision G0 and 5A5000.06 starting with Revision E0. To guarantee that the controller operates properly, the following BIOS versions must be used: IPC5000/5600 with BIOS V1.57 or higher,
IPC5000C/5600C with BIOS V1.06 or higher.

All current deliveries are equipped with the previously mentioned BIOS versions or higher. Systems with an older BIOS version must be upgraded.

14.1 Dimensions

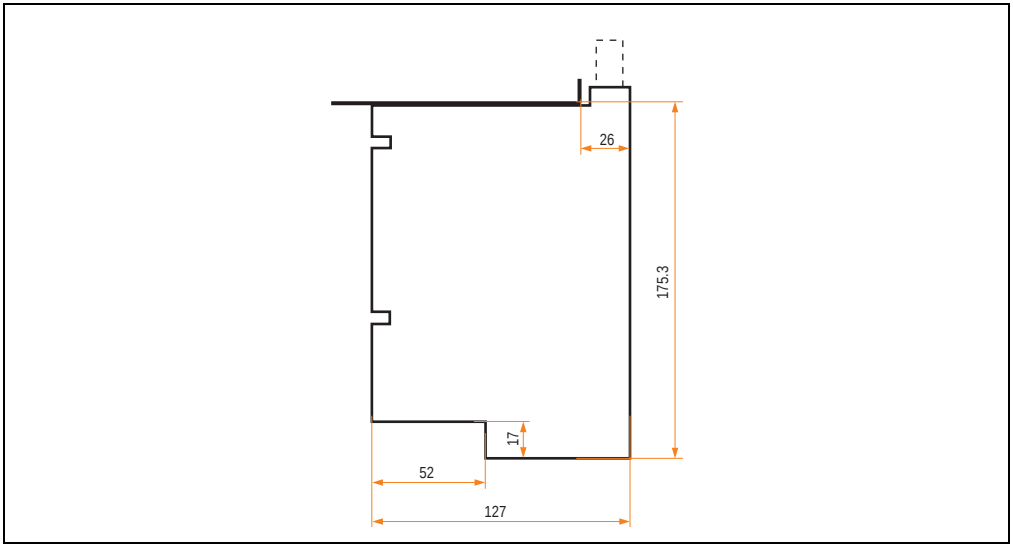


Figure 101: Dimensions - interface board

* Only for B&R interface boards with a BNC Ethernet connection.

14.2 Serial interfaces COM3 and COM4

Two combined RS232/RS422/RS485 interfaces are available on the interface board. The operating mode (RS232/RS422/RS485) is selected automatically, depending on the electrical connection. Both interfaces are equipped with a 16-byte FIFO memory and are Plug & Play and UART16550 compatible.

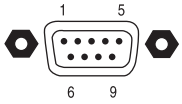
COM3, COM4			
RS232/RS422 interface Electrically isolated RS232 up to 115 kBaud, RS422/485 up to mode 115.2 kBaud			9-pin DSUB plug 
Pin	**Assignments (RS232)**	**Assignments (RS422)**	
1		$\overline{\text{TXD}}$	
2	RXD		
3	TXD		
4		TXD	
5	GND	GND	
6		$\overline{\text{RXD}}$	
7	RTS		
8	CTS		
9		RXD	

Table 127: Pin assignments - COM3 and COM4

Resource settings (I/O address, interrupt) are made during the system start by the Plug & Play BIOS and cannot be manually changed by the user (only with an ISA configuration utility or Windows 95/98). If a resource is already assigned, BIOS attempts to assign configurations to the interfaces COM3 and COM4 in the following order:

Setting	COM3		COM4	
	Interrupt	I/O address	Interrupt	I/O address
Basic configuration 1 (Default)	11	3E8h	12	2E8h
Basic configuration 2	3, 4, 7, 9, 10, 11, 12, 14, 15	3E8h	3, 4, 7, 9, 10, 11, 12, 14, 15	2E8h
Basic configuration 3	3, 4, 7, 9, 10, 11, 12, 14, 15	200h - 3F8h	3, 4, 7, 9, 10, 11, 12, 14, 15	200h - 3F8h
Basic configuration 4	3, 4, 5, 7, 9, 10, 11, 12, 14, 15	200h - 3F8h	3, 4, 5, 7, 9, 10, 11, 12, 14, 15	200h - 3F8h

Table 128: Configurations - COM3 and COM4

14.2.1 RS485 interface operation

COM3 and COM4 interfaces can also be operated in RS422 mode as RS485 interfaces. This is possible by a TriState switching, which is made using RTS.

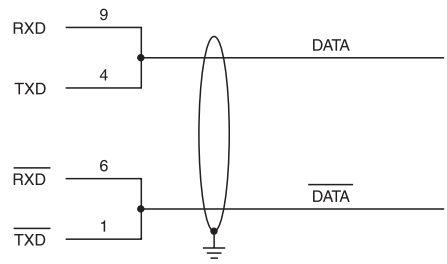


Figure 102: Operation of COM3 or COM4 interface in RS485 mode

14.3 CAN interface

The B&R interface board is equipped with an Intel 82527 CAN controller, which conforms to CAN specifications 2.0b. It is thereby possible to use standard protocols CAN and extended CAN. B&R software supports the standard CAN identifier (11 bit).

The CAN controller can trigger an NMI (non-maskable interrupt).

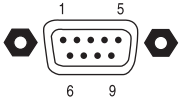
CAN	
Electrically isolated from the system ground Assignment according to CiA DS 102-1	9-pin DSUB plug 
Pin	**Assignment**
1	
2	CAN low
3	GND
4	
5	
6	Reserved
7	CAN high
8	
9	

Table 129: Pin assignments - CAN

Default setting	CAN
Interrupt	None [1]
I/O address	384h = Address register 385h = Data register

Table 130: Default settings - CAN

1) Either IRQ10, NMI or no interrupt (see the sections "Additional peripherals" on page 331 and "IF board setting" on page 360)

Settings for the I/O addresses cannot be changed.

14.3.1 Wiring

Bus cable - station connection

A 4 conductor twisted pair cable should be used for the bus cable.

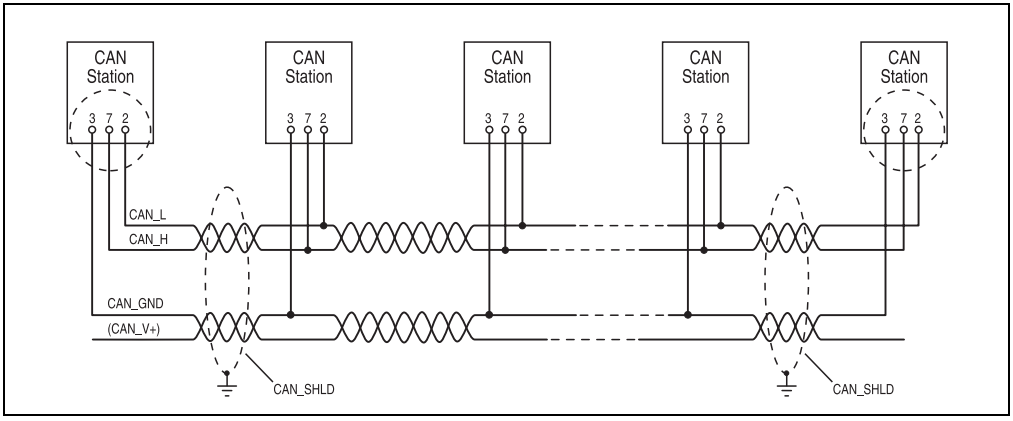


Figure 103: Bus cable - station connection

CAN signals for CiA/CAL

CAN signal	B&R product ID	Description
CAN_GND	CAN⊥	CAN ground
CAN_L	CAN_L	CAN low
(CAN_SHLD)	SHLD	Shield
CAN_H	CAN_H	CAN high
(CAN_V+)	---	CAN supply 8 - 15 V, optional

Table 131: CAN signals for CiA/CAL

All CAN interfaces from B&R are supplied internally, therefore CAN_V+ does not have to be connected in CAN networks which do not contain devices from other manufacturers.

Branch lines

Branch lines should be avoided if possible. However, it is possible to connect nodes to the bus with a branch line as long as the distance is less than 30 cm.

14.3.2 Terminating resistors

CAN networks are cabled using a bus structure where both ends of the bus are equipped with terminating resistors.

9-pin DSUB plug

For B&R interface cards using a CAN interface, terminating resistor pins are assigned in the 9-pin DSUB plug as shown in the following diagram.

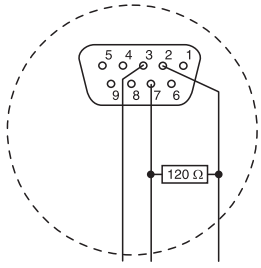


Figure 104: Terminating resistor connections for 9-pin DSUB plug

The terminating resistor is already integrated in the CAN bus plug 7AC911.9 available from B&R. The terminating resistor can be turned on or off.

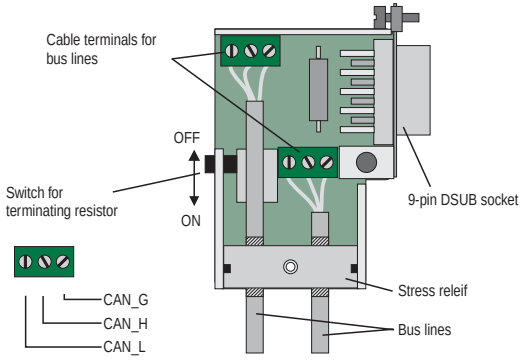


Figure 105: CAN bus connector 7AC911.9

14.4 PC card slot/ SRAM

A PC card slot which can be accessed with the housing closed is available on the interface board. Type I, II or III cards can be used in this slot. The slot is compatible with PCMCIA release 2.0 and JEIDA V4.1 standards and is operated as PC card socket 1. We recommend use of memory cards with Tuple (also known as CIS).

Default setting	PC card slot
Interrupt	Depends on card
I/O address	3E0h - 3E1h

Table 132: PC card slot resources

The I/O address is permanently set. The assignment of an interrupt is made - if necessary (depending on card) - using Plug & Play (see section "Interrupt assignments" on page 416).

A 256 KB SRAM integrated in the interface board can be accessed via PC card slot 2. To the user, this memory looks like an inserted PC Card.

Buffering takes place with a lithium battery on the interface board (3 V, 950 m Ah). The lifespan of this battery is at least 1.5 years, but typically 4 years (at 50°C and
256 KB SRAM).

It is possible to protect the internal SRAM from being written to unintentionally by using a write protect switch. This switch is accessible from the outside through a small opening. If the switch is pointing in the direction of the PC card slot, then write protection is activated.

Information:

On some operating systems, a PC card compatible insert card cannot be operated without a corresponding driver (e.g. Cardware for Windows NT 4.0).

14.5 LPT2 (hardware security key)

A Dallas hardware security key (dongle), required for software protection, is found on the mainboard. The slot is found near the SRAM backup battery and is addressable as LPT2.

Default setting	LPT2
Interrupt	-
I/O address	278h - 27Fh

Table 133: Default settings LPT2

To change these settings see sections "Additional peripherals" on page 331 and "Special OEM features" on page 355.

14.6 Ethernet controller

Interface board	5A5000.01	5A5000.02	5A5000.05	5A5000.06
Ethernet	-	10 Mbit/s	10 Mbit/s	10 Mbit/s
Connection	-	BNC (10Base2)	RJ45 Twisted Pair (10BaseT)	BNC (10Base2)
Controller	-	UMC 9008F	Intel 82595	Intel 82595
Compatibility	-	NE2000-compatible	Not NE2000 compatible	Not NE2000 compatible
Cabling	-	RG58	S/STP (category 5)	RG58

Table 134: Ethernet controller interface board

Model 5A5000.02 guarantees that all software and protocols on the market can be used because of its compatibility with the NE2000 standard.

An Intel manufactured Ethernet controller is used for models 5A5000.05 and 5A5000.06, which requires a special software driver. They are found on the Provit Drivers & Utilities CD ROM (model number 5S0000.01-090) or can be downloaded from B&R's homepage (www.br-automation.com).

Resource settings (I/O address, interrupt) are made during the system start by the Plug & Play BIOS and cannot be manually changed by the user (only with an ISA configuration utility or Windows 95/98).

If a resource is already assigned, the BIOS attempts to assign other configurations to the Ethernet controller in the following order:

Setting	5A5000.02 (UMC Ethernet NE2000)		5A5000.05 and .06 (Intel Ethernet, not NE2000)	
	Interrupt	I/O address	Interrupt	I/O address
Basic configuration 1 (Default)	5	300h	3, 4, 5, 7, 9, 10, 11, 12	200h - 390h
Basic configuration 2	3, 4, 5, 10, 11, 12, 15	300h	-	-
Basic configuration 3	3, 4, 5, 10, 11, 12, 15	200h - 3E0h	-	-

Table 135: Ethernet controller configurations

Connections

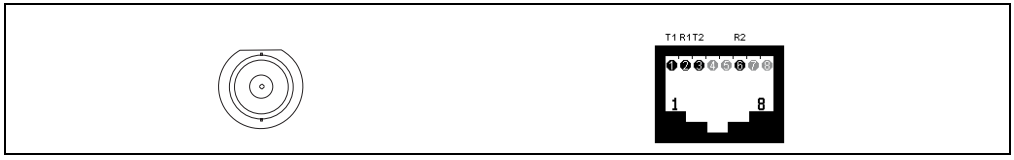


Figure 106: BNC socket (IEEE 802.3) - left, RJ45 Twisted Pair socket (EN 50173) - right

Chapter 3 • Display units

1. Overview

10.4" display units		
Model number	**Short description**	**Note**
5D5100.01	Display unit 10.4" LCD color display (color VGA)	*Cancelled since 05/1999*
5D5100.04	Display unit 10.4" TFT display (color VGA)	
5D5200.01	Display unit 10.4" TFT display (color VGA) with touch screen	*Cancelled since 03/1999*
5D5201.02	Display unit 10.4" TFT display (color SVGA) with touch screen	*Cancelled since 03/1999*
5D5210.01	Display unit 10.4" TFT display (color VGA) with touch screen in light gray design	
5D5211.02	Display unit 10.4" TFT display (color SVGA) with touch screen in light gray design	
5D5500.10	Display unit 10.4" TFT display (color VGA) with keys	*Cancelled since 03/1999*
5D5500.32	Display unit 10.4" TFT display (color VGA) with keys in light gray design	*Cancelled since 02/1999* *Replaced by: 5D5510.10*
5D5501.01	Display unit 10.4" TFT display (color SVGA) with keys	*Cancelled since 01/1999*
5D5510.10	Display unit 10.4" TFT display (color VGA) with keys	*Replacement for: 5D5500.32*
5D5600.01	Display unit 10.4" TFT display (color VGA) with keys	
5D5600.02	Display unit 10.4" TFT display (color VGA) with keys and touch pad	
5D5600.03	Display unit 10.4" TFT display (color VGA) with keys around the touch screen	

12.1" display units		
Model number	**Short description**	**Note**
5D5201.03	Display unit 12.1" TFT display (color SVGA) with touch screen	*Cancelled since 03/1999*
5D5211.03	Display unit 12.1" TFT display (color SVGA) with touch screen in light gray design	
5D5211.06	Display unit 12.1" TFT display (color SVGA) with touch screen (infrared) in light gray design.	
5D5601.01	Display unit 12.1" TFT display (color SVGA) with keys	
5D5601.02	Display unit 12.1" TFT display (color SVGA) with keys and touch pad	
5D5601.03	Display unit 12.1" TFT display (color SVGA) with keys and touch screen	

13.8" display units		
Model number	**Short description**	**Note**
5D5200.04	Display unit 13.8" TFT display (color VGA) with touch screen	*Cancelled since 01/1999*

Table 136: Overview of display units

Model number	Short description	Note
5D5202.01	Display unit 13.8" TFT display (color XGA) with touch screen	Cancelled *since 03/1999*
5D5202.03	Display unit 13.8" TFT display (color XGA) with touch screen in light gray design	*Cancelled since 02/1999* *Replaced by: 5D5212.02*
5D5212.01	Display unit 13.8" TFT display (color XGA) with touch screen in light gray design	*Cancelled since 12/1999*

15" display units		
Model number	**Short description**	**Note**
5D5212.02	Display unit 15" TFT display (color XGA) with touch screen in light gray design	
5D5212.04	Display unit 15" TFT display (color XGA) with touch screen in light gray design	

18.1" display units		
Model number	**Short description**	**Note**
5D5213.01	Display unit 18.1" TFT display (color SXGA) with touch screen in bright gray design.	*Cancelled since 10/2003*

20.1" display units		
Model number	**Short description**	**Note**
5D9200.01	Display unit 20.1" TFT display (color SXGA) SXGA 20.1" with touch screen	*Cancelled since 03/2000*

Table 136: Overview of display units (cont.)

Information:

Display units developed for Provit 2000 series IPCs cannot be used with a Provit 5000 series IPC.

2. Mounting guidelines

The display unit can either be fastened directly to the controller unit (standard mounting) or operated remotely (remote mounting):

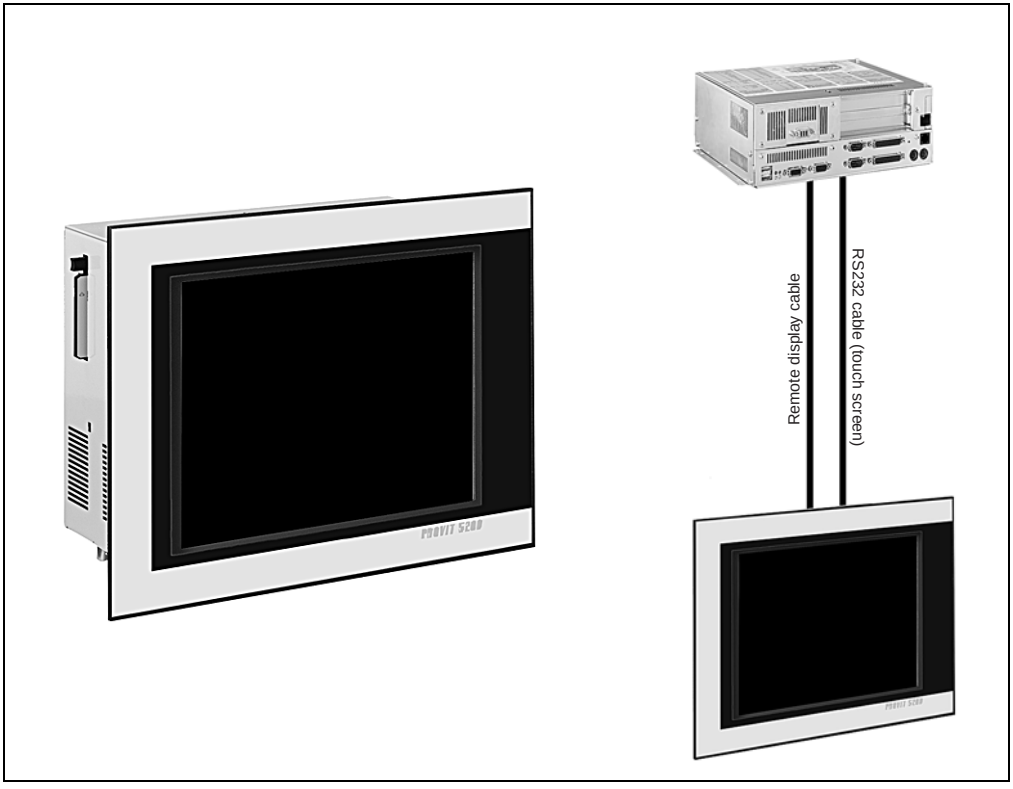


Figure 107: Standard mounting (left) and remote mounting (right)

If the controller unit is fastened on the back of the display, care must be taken that all connections are pointing downwards.

With remote mounting, the maximum permitted distance of the display unit from the controller unit depends on the respective display unit. Information regarding this is given in the respective sections by technical data tables for the display.

Information:

Remote display and RS232 cable (touch screen) must be ordered separately.

Model number	Short text
5A5004.01	Remote panel cable 0.6 m
5A5004.02	Remote panel cable 1.8 m
5A5004.05	Remote panel cable 5 m
5A5004.06	Remote Panel cable 5 m 1 x 70°
5A5004.10	Remote panel cable 10 m
5A5004.11	Remote Panel cable 10 m 1 x 70°
9A0014.02	RS232 extension cable 1.8 m

Table 137: Remote cable and RS232 cable overview

2.1 Distance for remote operation

A maximum distance of 5 m is standard for remote operation of the display by the controller. A distance of up to 10 m depends on the revision numbers for the system and the display units:

System units		
Model No.:	**Short text**	**10 m distance starting with Revision**
5C5001.01	System 430HX 1VGA MTC 2SIMM	E0
5C5001.03	System 430HX 2VGA MTC 2SIMM	E0
5C5601.01	System 430HX 2VGA MTC 2SIMM	F0
Display units		
Model No.:	**Short text**	**10 m distance starting with Revision**
5D5000.03	Panel kit TFT C VGA 10.4"	D0
5D5000.10	Panel kit LCD C VGA 10.4"	D0
5D5000.14	Panel kit TFT C VGA 13.8"	D0
5D5000.18	Panel kit TFT color XGA 13.8"	D0
5D5210.01	iPanel TFT C VGA 10.4" T	D0
5D5211.02	iPanel TFT C SVGA 10.4" T	D0
5D5211.03	iPanel TFT C SVGA 12.1" T	E0
5D5212.02	iPanel TFT C XGA 15" T	D0
5D5212.04	iPanel TFT C XGA 15" T	C0
5D5510.10	iPanel TFT C VGA 10.4" F	D0
5D5600.01	Panel TFT C VGA 10.4" F	D0
5D5600.02	Panel TFT C VGA 10.4" FM	D0
5D5600.03	Panel TFT C VGA 10.4" FT	D0
5D5601.01	Panel TFT C VGA 12.1" F	D0
5D5601.02	Panel TFT C VGA 12.1" FM	D0
5D5601.03	Panel TFT C VGA 12.1" FT	D0

Table 138: Distance with remote operation

3. Using Panelware modules

Optional Panelware keypad modules can be connected to Provit 5000 controllers (with the exception of 5C5001.11, 5C5001.12, 5C5001.21, 5C5001.22, 5C5001.32, 5C5001.42, 5C5601.11, 5C5601.12, 5C5601.21, 5C5601.22, 5C5601.32 and 5C5601.42), and all Provit 5000 displays:

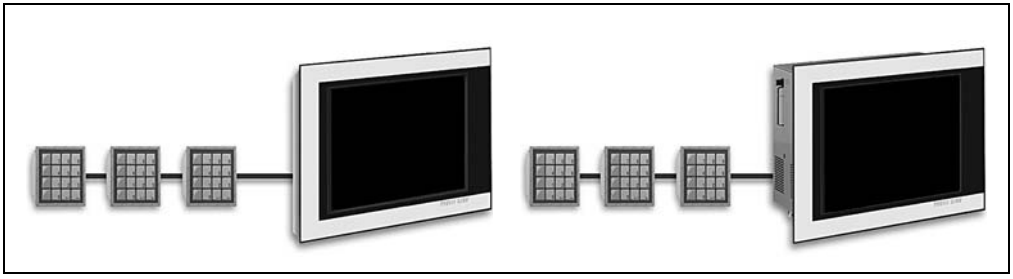


Figure 108: Connection of Panelware modules

The following limitations apply to current requirements for Panelware modules:

	Keys	LEDs
Maximum number in the entire system (controller unit and display unit)	128	128 (max. 48 lit simultaneously)
Maximum Amount on the Display Unit	128	128 (max. 32 lit simultaneously)

Table 139: Current requirements limitations

When connecting Panelware modules to a display unit, it is not possible to operate 128 keys or 128 LEDs on all display units. For the following modules, this depends on the revision number (on models with a lower revision than the ones shown, only 64 keys or 64 LEDs can be operated):

Display unit	128 Keys / 128 LEDs starting with Revision	Note
5D5100.01	11.20	
5D5200.01	34.20	
5D5200.04	23.20	
5D5201.02	22.20	
5D5201.03	20.20	
5D5202.01	11.20	
5D5202.03		Cancelled; replacement type 5D5212.01
5D5500.10	34.20	
5D5501.01	31.20	

Table 140: Number of keys and LEDs on the display unit

This also applies to all display kits (see chapter 4 "Display kits" on page 287):

Display unit	128 Keys / 128 LEDs starting with Revision	Note
5D5000.03	21.20	
5D5000.10	10.20	
5D5000.14	22.20	
5D5000.18	10.20	

Table 141: Number of keys and LEDs on the display unit

Warning!

With 5600 series display units, it is not possible to connect external keypad modules because the respective number of keys is already integrated into these displays.

Function keys and keypad modules work parallel to a connected AT keyboard. Up to 8 Panelware modules can be cascaded in series (taking the maximum amounts of keys and LEDs into account).

Warning!

Make sure that inputs and outputs are connected properly on the Panelware modules (labeled on the module) because connecting them incorrectly could damage the Panelware modules.

The specific connection options to the displays are found in the respective chapters.

Configuration of the keys and evaluation of key strokes are made using Mkey Utilities and the Mkey driver (see the "Provit Mkey Utilities User's Manual").

4. Brightness/contrast

The brightness (background lighting) and the contrast of Provit display units can be set in the following ways:

- in BIOS in the menu item "Additional peripherals" on page 331 and "Display" on page 356.
- using Mkey utilities (see "Provit Mkey Utilities User's Manual")
- using Provit 5000 Utilities (see section "Provit 5000 Utilities" on page 390)

Information:

It is not possible to set the contrast for TFT displays.

5. Relationship between resolution, graphics memory and colors

The following table is valid for all display units. Please note that the number of colors are limited with high resolutions (XGA,SXGA).

Video memory	Resolution	Pixels	Number of colors
1MB	VGA	640 x 480	16 million (true color)
	SVGA	800 x 600	65535 (high color)
	XGA	1024 x 768	256
2MB	VGA	640 x 480	16 million (true color)
	SVGA	800 x 600	16 million (true color)
	XGA	1024 x 768	65535 (high color)
	SXGA	1280 x 1024	256
4 MB	VGA	640 x 480	16 million (true color)
	SVGA	800 x 600	16 million (true color)
	XGA	1024 x 768	16 million (true color)
	SXGA	1280 x 1024	65535 (high color)

Table 142: Relationship between graphics memory, resolution and color depth

6. Block diagram for controller, display and peripherals

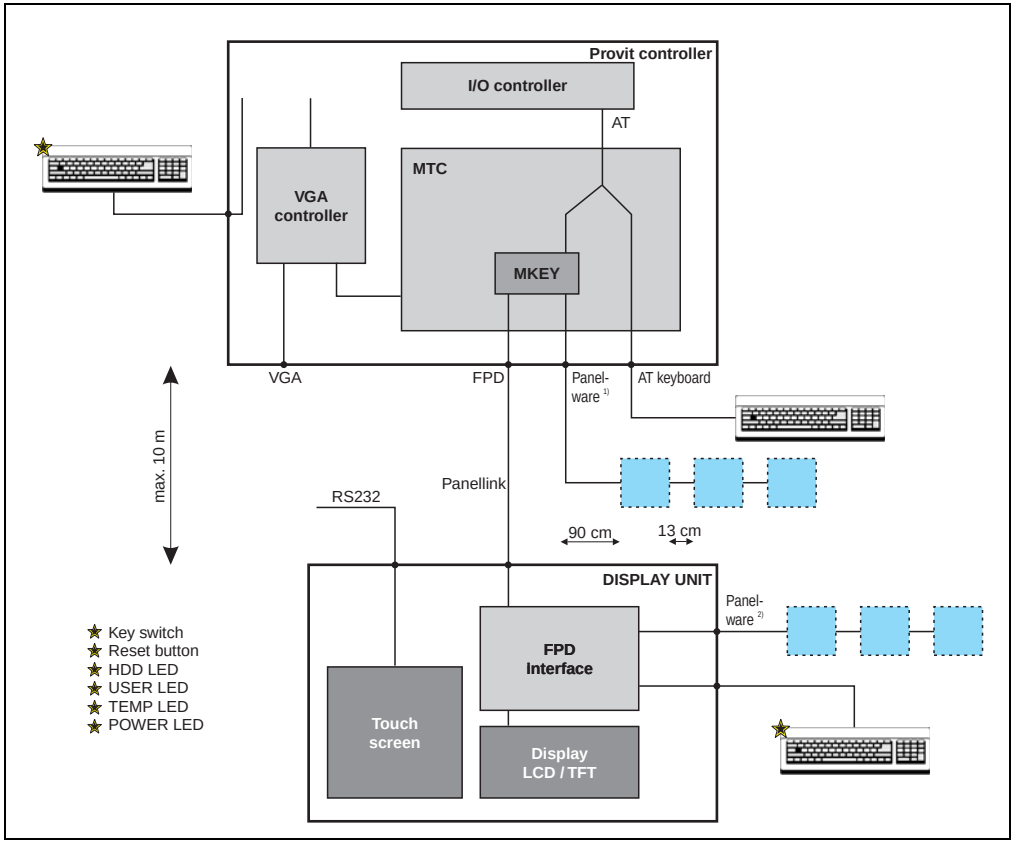


Figure 109: Block diagram for controller, display and peripherals

1) Panelware modules can only be connected directly to system units 5C5001.01, 5C5001.03 and 5C5601.01.

2) Panelware modules can only be directly connected to Provit 5000 displays.

7. Display unit 5D5100.01 and 5D5100.04

7.1 Photo

Figure 110: Display units 5D5100.01 and 5D5100.04

7.2 Dimensions

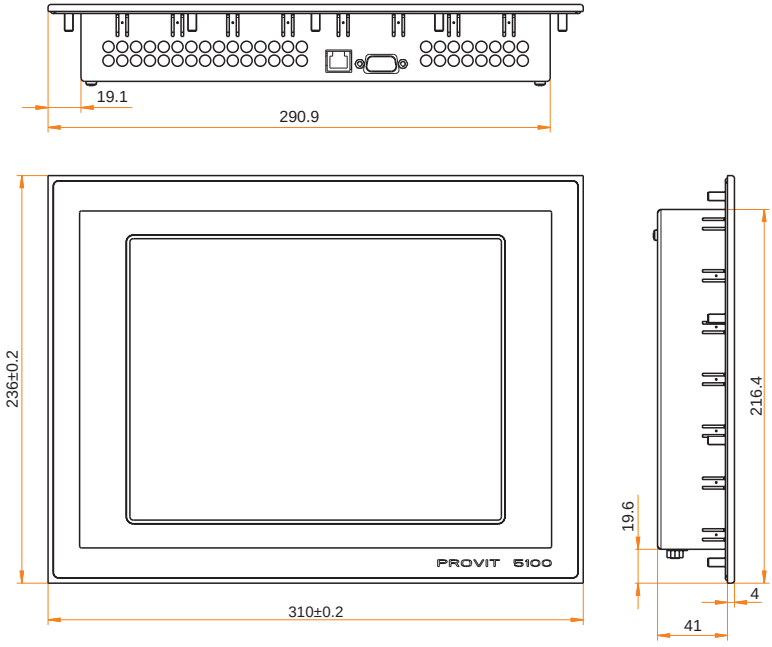


Figure 111: Dimensions - 5D5100.01 and 5D5100.04

7.3 Technical data

Model number	5D5100.01	5D5100.04
Short text	Panel LCD C VGA 10.4"	Panel LCD C VGA 10.4"
Controller Remote operation	IPC5000, IPC5600 [1] Max. 10 m [2]	
Display type Colors [3]	LCD color, CFL background lighting 262,144 colors	TFT color, background lighting 262,144 colors
Resolution	VGA, 640 x 480 pixels	
Display diagonal	10,4" (264 mm)	
Front Filter glass Frame Membrane [4] Gasket	 Non-reflective Aluminum anodized Polyester Flat gasket around display front	
Design	Black	
Background lighting (typ.) Brightness Lifespan [5] [6]	 70 cd/m² 10,000 hours	 250 cd/m² 40,000 hours
Temperature Operation Storage	 0 - 40 °C, depending on installation -20 to +60° C	 0 - 50 °C, depending on installation -20 to +60° C
Relative humidity Operation Storage	 5 - 85 %, non-condensing T ≤40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing	
Weight	Approx. 2.2 kg	
Outer dimensions (W x H x D) [7]	310 x 270 x 45 mm	
Protection type	IP20 back side IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Display design / colors	Black	
Accessories Remote panel cable 0.6 m Remote panel cable 1.8 m Remote panel cable 5 m Remote panel cable 5 m 1 x 70° Remote panel cable 10 m Remote panel cable 10 m 1 x 70° Background lighting	 5A5004.01 5A5004.02 5A5004.05 5A5004.06 5A5004.10 5A5004.11 Available	

Table 143: Technical data - 5D5100.01 and 5D5100.04

1) Only remote operation is possible with the IPC 5600 because of mechanical dimensions.
2) Distance depends on the revision number; see section 2.1 "Distance for remote operation" on page 214.
3) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.
4) Resistant according to DIN 42 115 part 2, see section "Chemical resistance" on page 492.
5) Decrease in brightness of 50 %.
6) At 25 °C operating temperature.
7) Without controller.

7.4 Cutout installation

The cutout and drill holes are to be made according to the following dimensions for cutout installation.

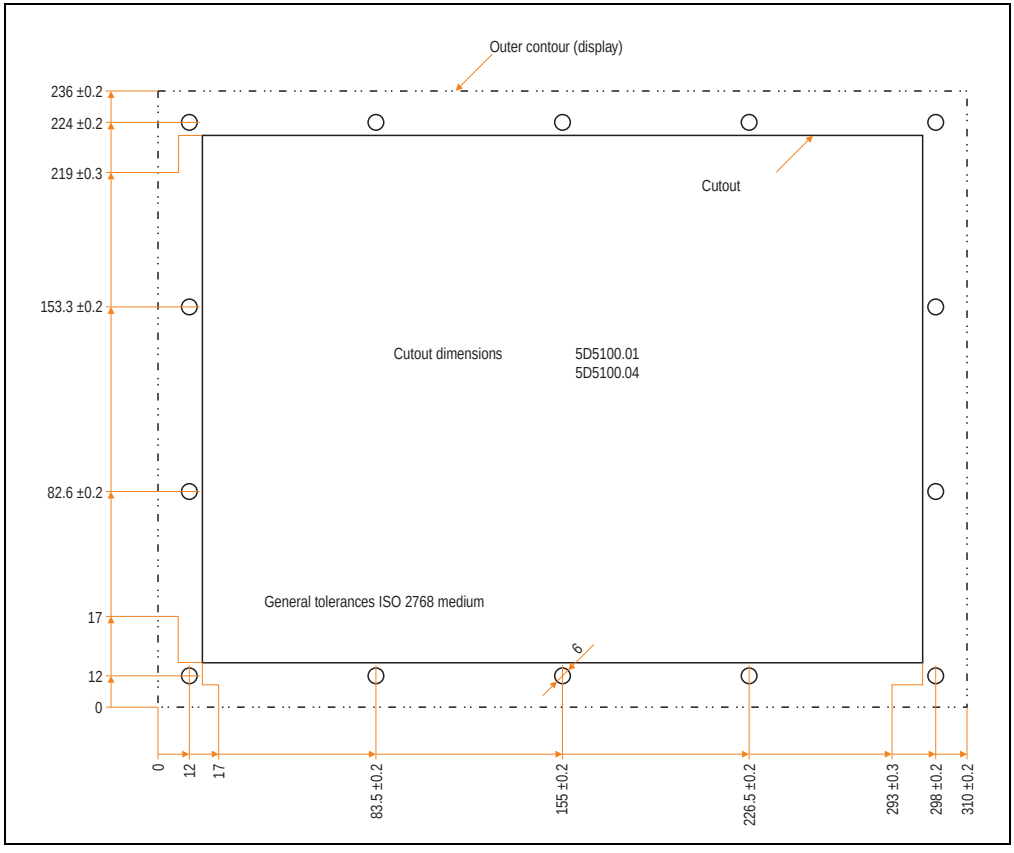


Figure 112: Cutout installation 5D5100.01 and 5D5100.04

7.5 Mounting guidelines

When mounting the display unit on the controller unit (standard mounting) the display is fastened on the controller with the six screws included in the delivery. The FPD connection cable for standard mounting is also included in the delivery.

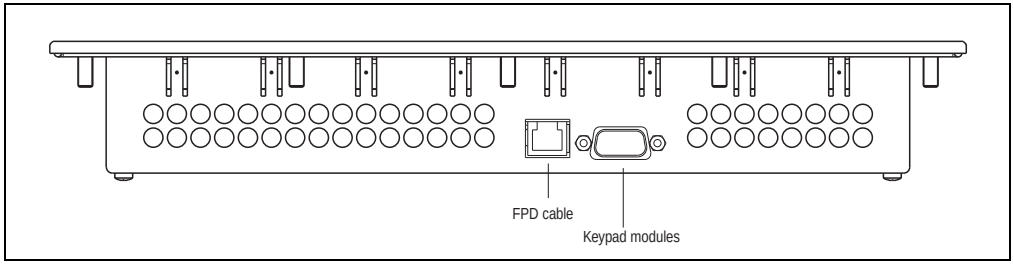


Figure 113: Connections 5D5100.01 and 5D5100.04

8. Display units 5D5200.01 and 5D5210.01

These display units are equipped with a touch screen (see section 8.3 "Technical data" on page 224).

8.1 Photo

Figure 114: Display units 5D5200.01 (left) and 5D5210.01 (right)

8.2 Dimensions

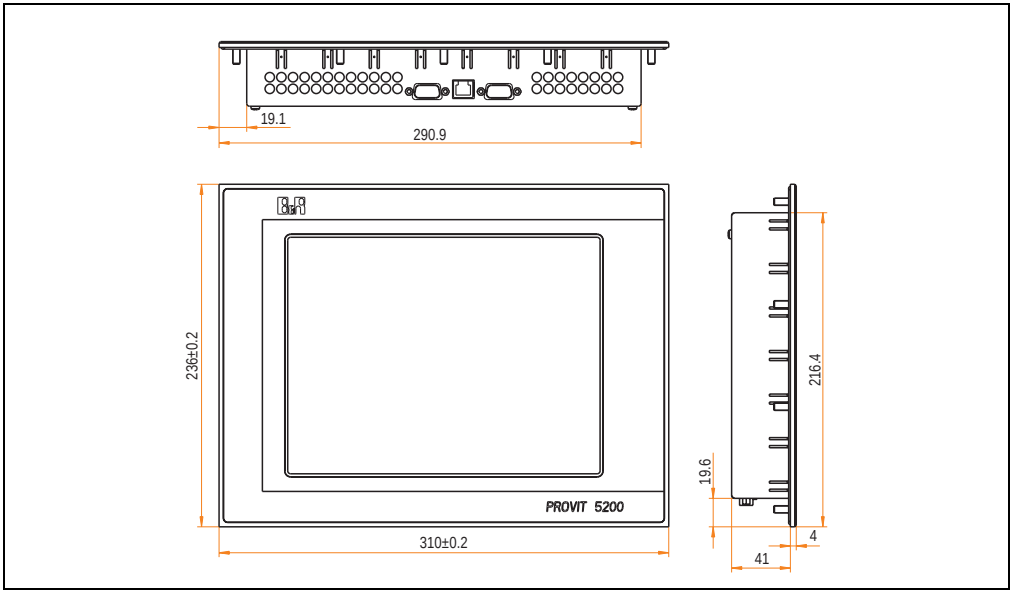


Figure 115: Dimensions - 5D5200.01 and 5D5210.01

8.3 Technical data

Model number	5D5200.01	5D5210.01
Short text	Panel TFT C VGA 10.4" T	iPanel TFT C VGA 10.4" T
Controller Remote operation	IPC5000, IPC5600 [1)] Max. 10 m [2)]	
Display type Colors [3)]	TFT color, CFL background lighting 262144	
Resolution	VGA, 640 x 480 pixels	
Display diagonal	10.4" (264 mm)	
Front Frame Membrane [4)] Gasket	 Aluminum anodized Polyester Flat gasket around display front	
Design	Black	Light gray
Touch screen [5)] Technology	Accu Touch Analog, resistive	
Background lighting (typ.) Brightness Lifespan [6) 7)]	 200 cd/m^2 50,000 hours	 450 cd/m^2[8)] 55,000 hours [8)]
Temperature Operation Storage	 0 - 50 °C, depending on installation -20 to +60° C	
Relative humidity Operation Storage	 5 - 85 %, non-condensing T ≤40° C: 5% to 90%, non-condensing T > 40° C: < 90 %, non-condensing	
Weight	Approx. 2.5 kg	
Outer dimensions (W x H x D) [9)]	310 x 236 x 45 mm	
Protection type	IP20 back side IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Display design / colors Dark gray border around the display Background	Black	 Similar to Pantone 432CV Similar to Pantone 427CV
Accessories Remote panel cable 0.6 m Remote panel cable 1.8 m Remote panel cable 5 m Remote panel cable 5 m 1 x 70° Remote panel cable 10 m Remote panel cable 10 m 1 x 70° RS232 extension 1.8 m (touch screen) RS232 extension 5 m (touch screen) RS232 extension 10 m (touch screen) Background lighting Touch screen drivers	 5A5004.01 5A5004.02 5A5004.05 5A5004.06 5A5004.10 5A5004.11 9A0014.02 9A0014.05 9A0014.10 Available 5S0000.01-090	

Table 144: Technical data - 5D5200.01 and 5D5210.01

1) Only remote operation is possible with the IPC 5600 because of mechanical dimensions.

2) Distance depends on the revision number; see section 2.1 "Distance for remote operation" on page 214.

3) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.

4) Resistant according to DIN 42 115 part 2, see section "Chemical resistance" on page 492.
5) See chapter "Technical appendix" on page 469
6) Decrease in brightness of 50 %.
7) At 25 °C operating temperature.
8) With Revision < N0 brightness = 200 cd/m^2, lifespan = 50,000 hours.
9) Without controller.

8.4 Cutout installation

The cutout and drill holes are to be made according to the following dimensions for cutout installation.

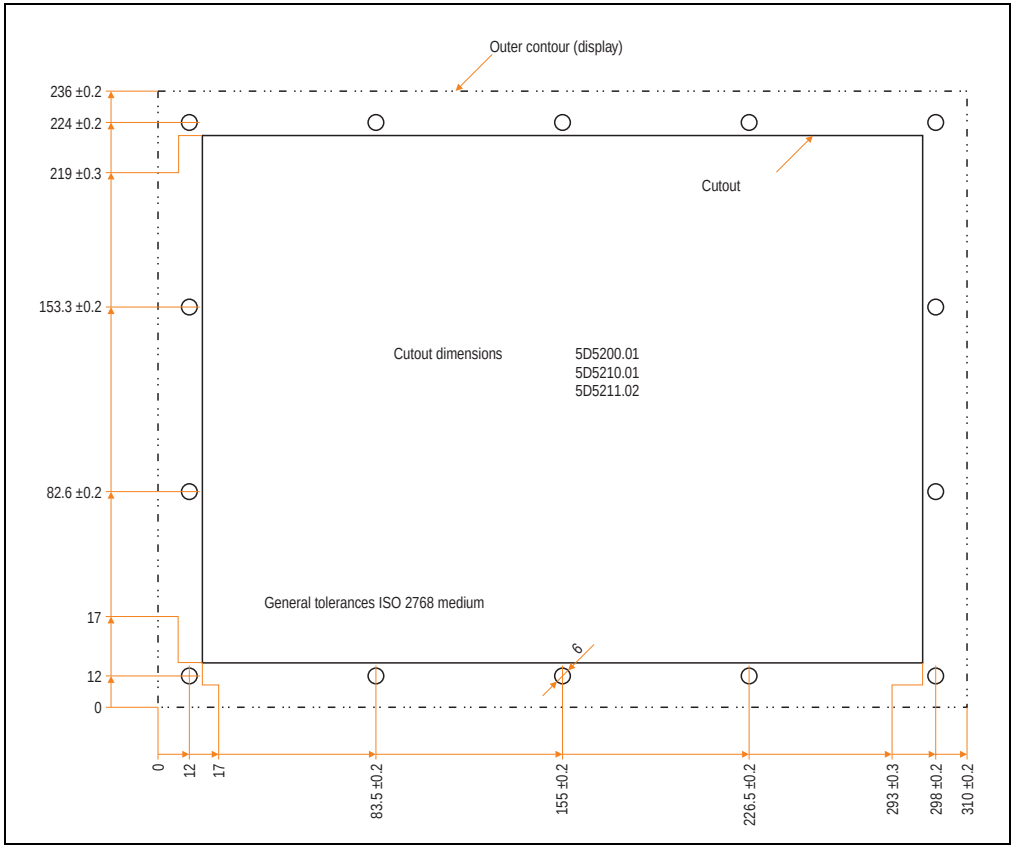


Figure 116: Cutout installation - 5D5200.01 and 5D5210.01

8.5 Mounting guidelines

When mounting the display unit on the controller unit (standard mounting) the display is fastened on the controller with the six screws included in the delivery. The FPD and touch screen connection cables for standard mounting are also included in the delivery. The touch screen cable is connected to a controller's RS232 interface. Depending on the revision, the connectors are organized as follows:

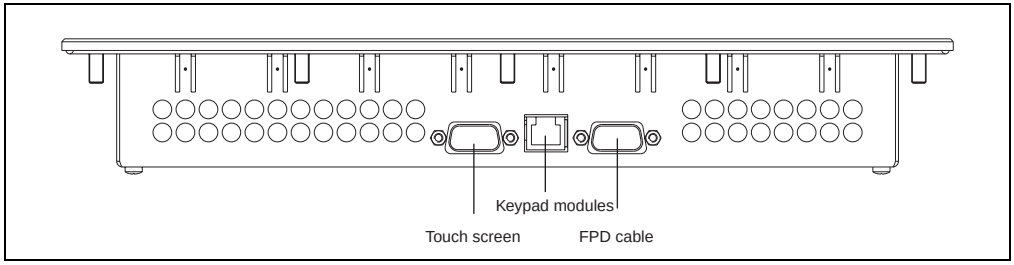


Figure 117: Connections 5D5200.01 and 5D5210.01 revision >= G0

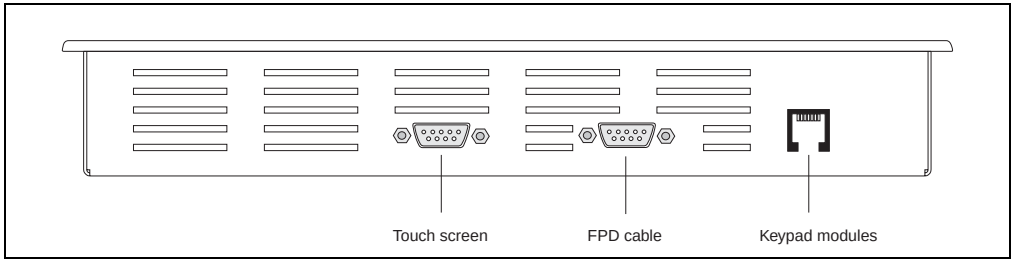


Figure 118: Connections 5D5200.01 and 5D5210.01 revision <G0

9. Display unit 5D5200.04

This display unit is equipped with a touch screen (see section 9.3 "Technical data" on page 228).

9.1 Photo

Figure 119: Display unit 5D5200.04

9.2 Dimensions

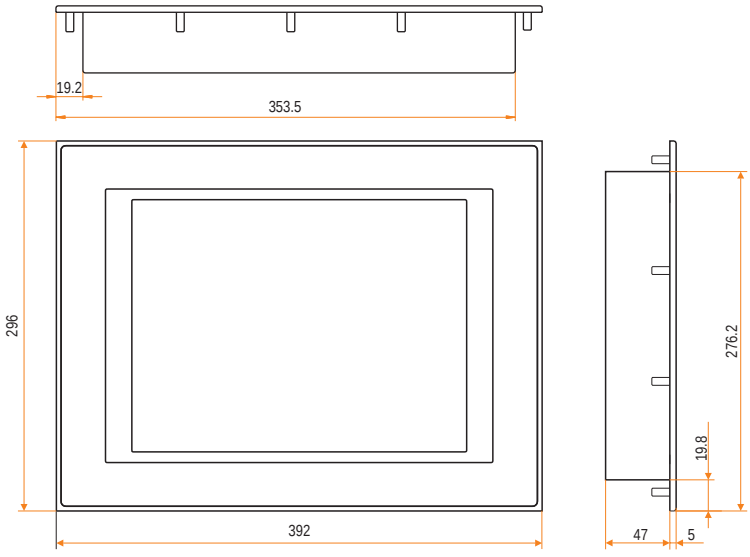


Figure 120: Measurements 5D5200.04

9.3 Technical data

Model number	5D5200.04
Short text	Panel TFT C VGA 13.8" T
Controller Remote operation	IPC5000, IPC5600 [1)] Max. 10 m [2)]
Display type Colors [3)]	TFT color, CFL background lighting 16 million
Resolution	VGA, 640 x 480 pixels
Display diagonal	13.8" (350 mm)
Front Frame Membrane [4)] Gasket	 Aluminum anodized Polyester Flat gasket around display front
Design	Black
Touch screen [5)] Technology	Accu Touch Analog, resistive
Background lighting (typ.) Brightness Lifespan [6) 7)]	 180 cd/m^2 10,000 hours
Temperature Operation Storage	 0 - 50 °C, depending on installation -20 to +60° C
Relative humidity Operation Storage	 5 - 85 %, non-condensing T ≤40° C: 5% to 90%, non-condensing T > 40° C: < 90 %, non-condensing
Weight	Approx. 6.3 kg
Outer dimensions (W x H x D) [8)]	392 x 296 x 52 mm
Protection type	IP20 back side IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Accessories Remote panel cable 0.6 m Remote panel cable 1.8 m Remote panel cable 5 m Remote panel cable 5 m 1 x 70° Remote panel cable 10 m Remote panel cable 10 m 1 x 70° RS232 extension 1.8 m (touch screen) RS232 extension 5 m (touch screen) RS232 extension 10 m (touch screen) Background lighting Touch screen drivers	 5A5004.01 5A5004.02 5A5004.05 5A5004.06 5A5004.10 5A5004.11 9A0014.02 9A0014.05 9A0014.10 Available 5S0000.01-090

Table 145: Technical data - 5D5200.04

1) Only remote operation is possible with the IPC 5600 because of mechanical dimensions.

2) Distance depends on the revision number; see section 2.1 "Distance for remote operation" on page 214.

3) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.

4) Resistant according to DIN 42 115 part 2, see section "Chemical resistance" on page 492.

5) See chapter "Technical appendix" on page 469.

6) Decrease in brightness of 50 %.

7) At 25 °C operating temperature.
8) Without controller.

9.4 Cutout installation

The cutout and drill holes are to be made according to the following dimensions for cutout installation.

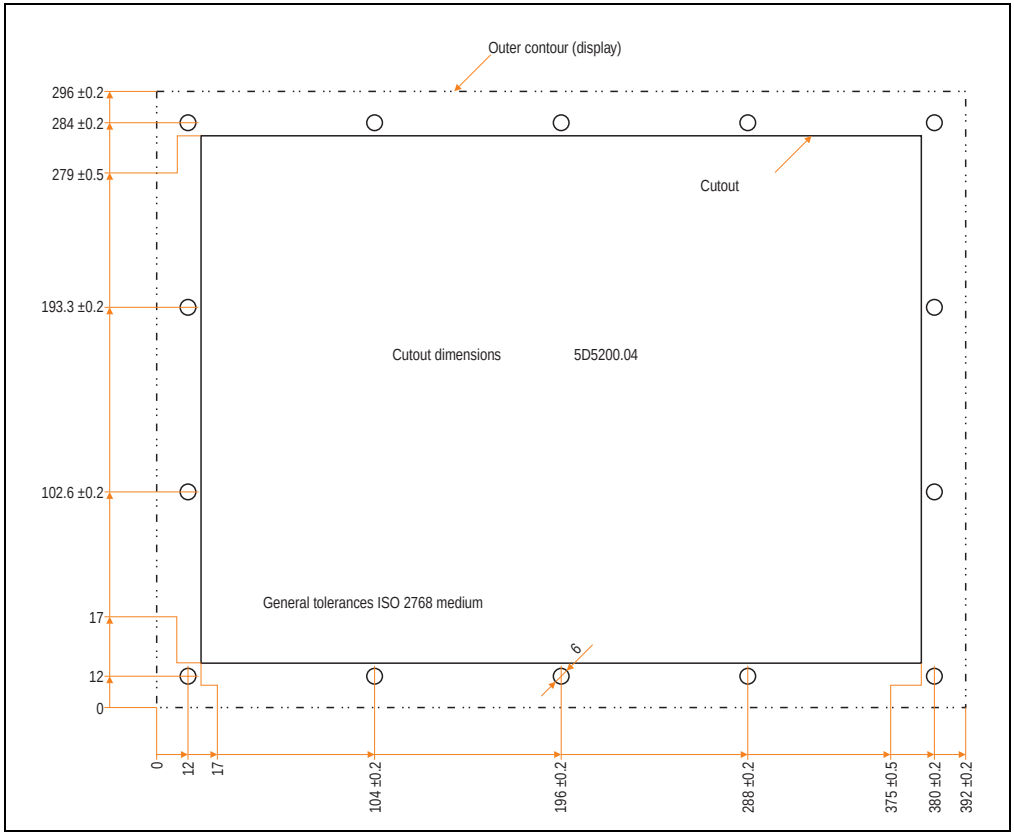


Figure 121: Cutout installation - 5D5200.04

9.5 Mounting guidelines

When mounting the display unit on the controller unit (standard mounting) the display is fastened on the controller with the six screws included in the delivery. The FPD and touch screen connection cables for standard mounting are also included in the delivery. The touch screen cable is connected to a controller's RS232 interface.

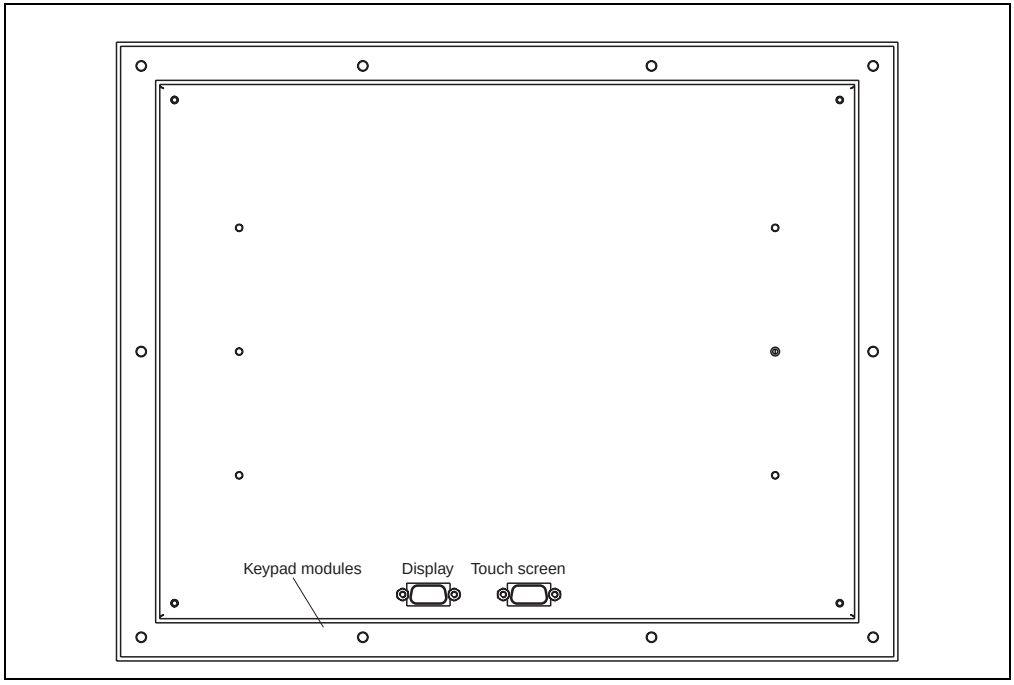


Figure 122: Connections 5D5200.04

10. Display units 5D5201.02 and 5D5211.02

These display units are equipped with a touch screen (see section 10.4 "Technical data" on page 232).

10.1 Photo

Figure 123: Display units 5D5201.02 (left) and 5D5211.02 (right)

10.2 Dimensions

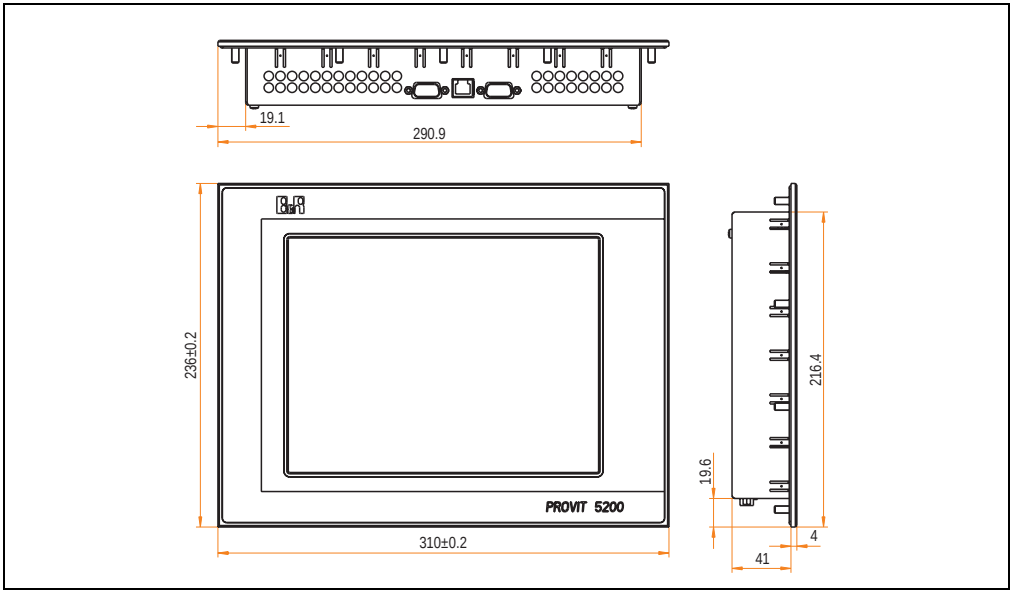


Figure 124: Dimensions - 5D5201.02 and 5D5211.02

10.3 Dimensions - 5D5211.02 Revision >= F0

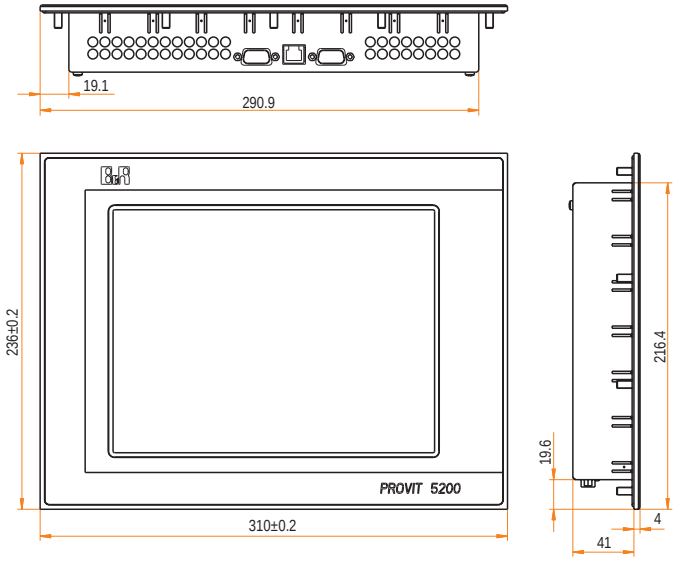


Figure 125: Dimensions - 5D5211.02 Revision >= F0

10.4 Technical data

Model number	5D5201.02	5D5211.02
Short text	Panel TFT C SVGA 10.4" T	iPanel TFT C SVGA 10.4" T
Controller Remote operation	IPC5000, IPC5600 [1] Max. 10 m [2]	
Display type Colors [3]	TFT color, CFL background lighting 262144	
Resolution	SVGA, 800 x 600 pixels	
Display diagonal	10.4" (264 mm)	
Front Frame Membrane [4] Gasket	 Aluminum anodized Polyester Flat gasket around display front	
Design	Black	Light gray
Touch screen [5] Technology	Accu Touch Analog, resistive	
Background lighting (typ.) Brightness Lifespan [6] [7]	 180 cd/m^2 10,000 hours	 280 cd/m^2 [8] 55,000 hours [8]

Table 146: Technical data - 5D5201.02 and 5D5211.02

Model number	5D5201.02	5D5211.02
Temperature Operation Storage	0 - 50 °C, depending on installation -20 to +60° C	
Relative humidity Operation Storage	5 - 85 %, non-condensing T ≤40° C: 5% to 90 %, non-condensing T > 40° C: < 90 %, non-condensing	
Weight	Approx. 3.5 kg	
Outer dimensions (W x H x D) 9)	310 x 236 x 45 mm	
Protection type	IP20 back side IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Display design / colors Dark gray border around the display Background	Black	 Similar to Pantone 432CV Similar to Pantone 427CV
Accessories Remote panel cable 0.6 m Remote panel cable 1.8 m Remote panel cable 5 m Remote panel cable 5 m 1 x 70° Remote panel cable 10 m Remote panel cable 10 m 1 x 70° RS232 extension 1.8 m (touch screen) RS232 extension 5 m (touch screen) RS232 extension 10 m (touch screen) Background lighting Touch screen drivers	 5A5004.01 5A5004.02 5A5004.05 5A5004.06 5A5004.10 5A5004.11 9A0014.02 9A0014.05 9A0014.10 Available 5S0000.01-090	

Table 146: Technical data - 5D5201.02 and 5D5211.02

1) Only remote operation is possible with the IPC 5600 because of mechanical dimensions.
2) Distance depends on the revision number; see section 2.1 "Distance for remote operation" on page 214.
3) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.
4) Resistant according to DIN 42 115 part 2, see section "Chemical resistance" on page 492.
5) See chapter 8 "Technical appendix" on page 469.
6) Decrease in brightness of 50 %.
7) At 25 °C operating temperature.
8) With Revision < F0 brightness = 180 cd/m^2, lifespan = 10,000 hours.
9) Without controller.

10.5 Cutout installation

The cutout and drill holes are to be made according to the following dimensions for cutout installation.

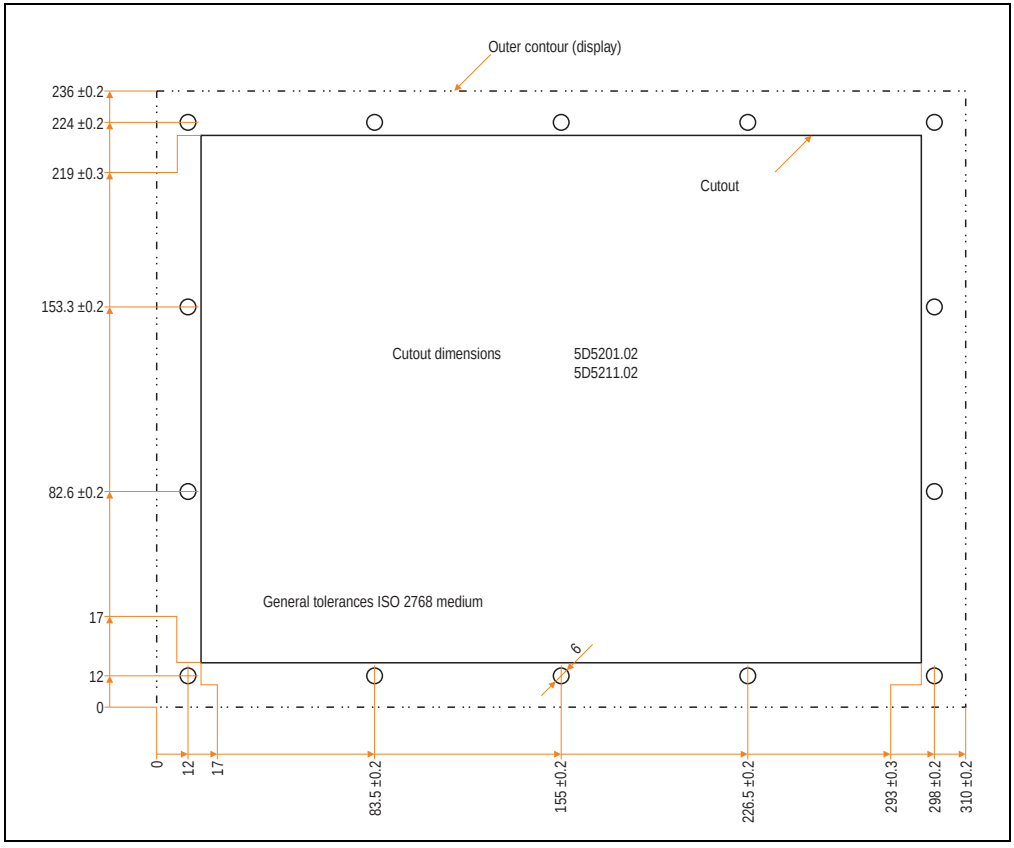


Figure 126: Cutout installation - 5D5201.02 and 5D5211.02

10.6 Mounting guidelines

When mounting the display unit on the controller unit (standard mounting) the display is fastened on the controller with the six screws included in the delivery. The FPD and touch screen connection cables for standard mounting are also included in the delivery. The touch screen cable is connected to a controller's RS232 interface. Depending on the revision, the connectors are organized as follows:

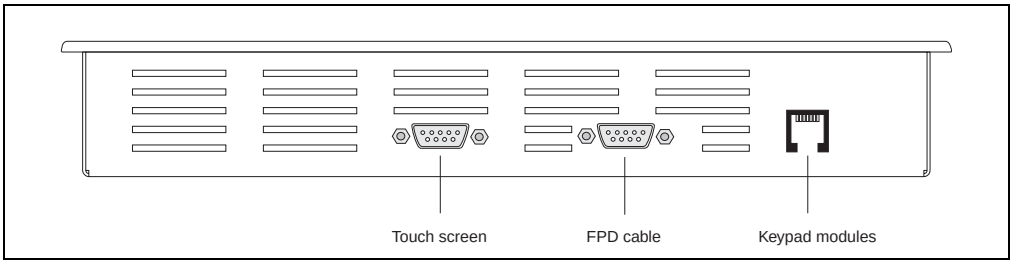


Figure 127: Connections 5D5201.02 and 5D5211.02

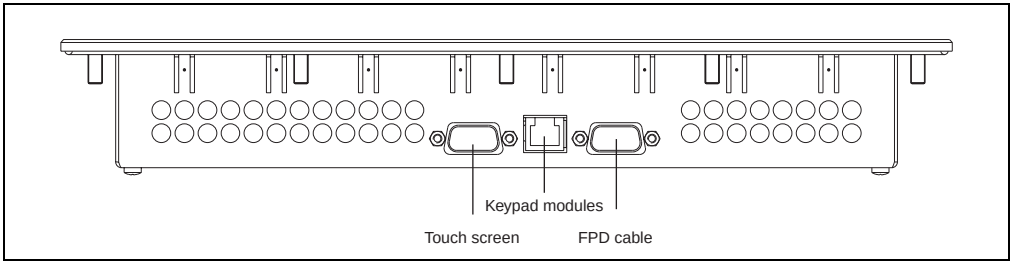


Figure 128: Connections - 5D5211.02 revision >= F0

11. Display units 5D5201.03 and 5D5211.03

These display units are equipped with a touch screen (see section 11.5 "Technical data" on page 238).

11.1 Photo

Figure 129: Display units 5D5201.03 (left) and 5D5211.03 (right)

11.2 Dimensions

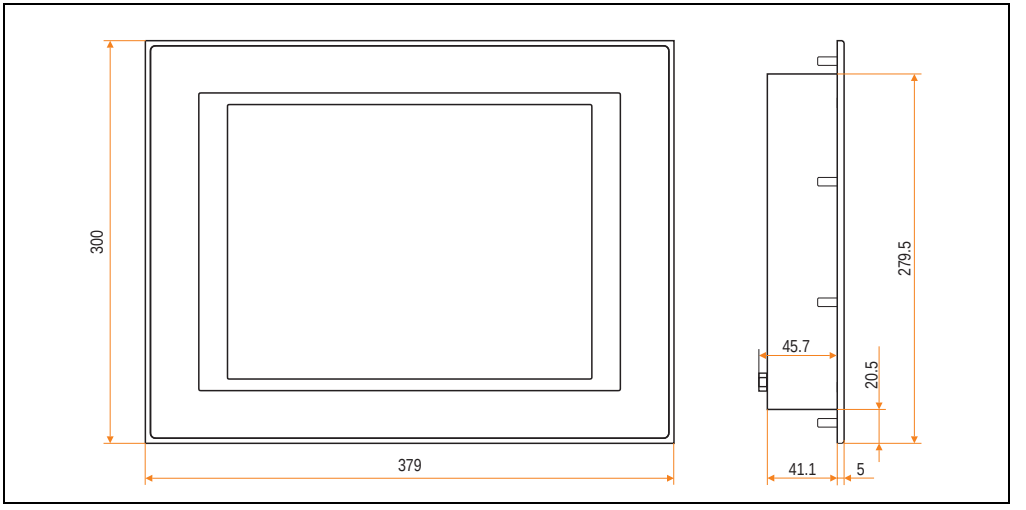


Figure 130: Measurements 5D5201.03 and 5D5211.03

11.3 Dimensions - 5D5211.03 Revision I0

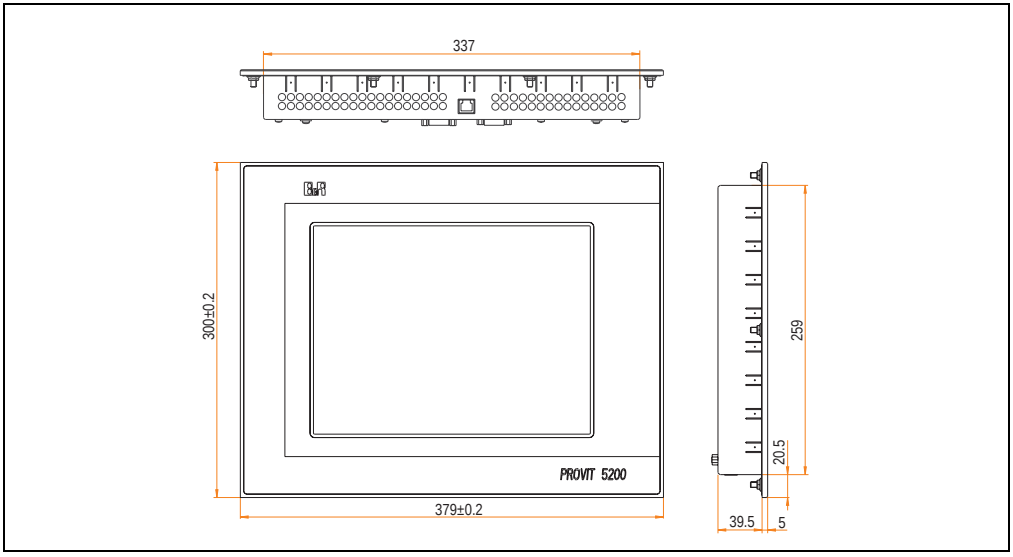


Figure 131: Dimensions - 5D5211.03 Revision I0

11.4 Dimensions - 5D5211.03 starting with Revision J0

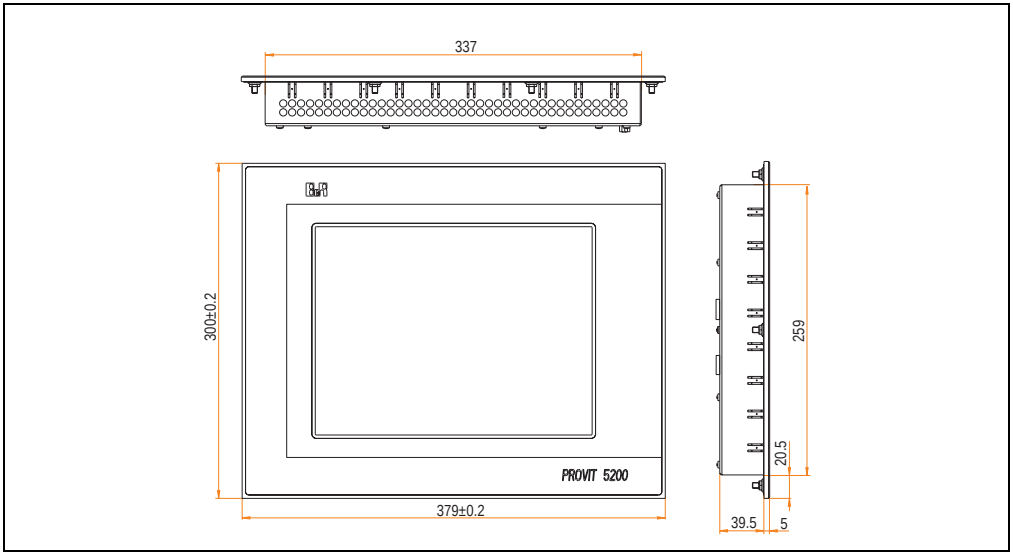


Figure 132: Dimensions - 5D5211.03 starting with Revision J0

11.5 Technical data

Model number	5D5201.03	5D5211.03
Short text	Panel TFT C SVGA 12.1" T	iPanel TFT C SVGA 12.1" T
Controller Remote operation	IPC5000, IPC5600 [1)] Max. 10 m [2)]	
Display type Colors [3)]	TFT color, CFL background lighting 262,144	
Resolution	SVGA, 800 x 600 pixels	
Display diagonal	12.1" (307 mm)	
Front Frame Membrane [4)] Gasket	 Aluminum anodized Polyester Flat gasket around display front	
Design	Black	Light gray
Touch screen [5)] Technology	Accu Touch Analog, resistive	
Background lighting (typ.) Brightness Lifespan [6) 7)]	 300 cd/m^2 [8)] 50,000 hours[8)]	
Temperature Operation Storage	 0 - 50 °C, depending on installation -20 to +60° C	
Relative humidity Operation Storage	 5 - 85 %, non-condensing T ≤40° C: 5% to 90%, non-condensing T > 40° C: < 90 %, non-condensing	
Weight	Approx. 5.7 kg	
Outer dimensions (W x H x D) [9)]	379 x 300 x 50 mm	
Protection type	IP20 back side IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Display design / colors Dark gray border around the display Background	Black	 Similar to Pantone 432CV Similar to Pantone 427CV
Accessories Remote panel cable 0.6 m Remote panel cable 1.8 m Remote panel cable 5 m Remote panel cable 5 m 1 x 70° Remote panel cable 10 m Remote panel cable 10 m 1 x 70° RS232 extension 1.8 m (touch screen) RS232 extension 5 m (touch screen) RS232 extension 10 m (touch screen) Background lighting Touch screen drivers	 5A5004.01 5A5004.02 5A5004.05 5A5004.06 5A5004.10 5A5004.11 9A0014.02 9A0014.05 9A0014.10 Available 5S0000.01-090	

Table 147: Technical data - 5D5201.03 and 5D5211.03

1) Only remote operation is possible with the IPC 5600 because of mechanical dimensions.

2) Distance depends on the revision number; see section 2.1 "Distance for remote operation" on page 214.

3) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.

4) Resistant according to DIN 42 115 part 2, see also "Chemical resistance" on page 492.
5) See chapter 7.1 "Chemical resistance" on page 492.
6) Decrease in brightness of 50 %.
7) At 25 °C operating temperature.
8) Starting with Revision < G0: Brightness = 140 cd/m², lifespan = 10,000 hours.
9) Without controller.

11.6 Cutout installation

The cutout and drill holes are to be made according to the following dimensions for cutout installation.

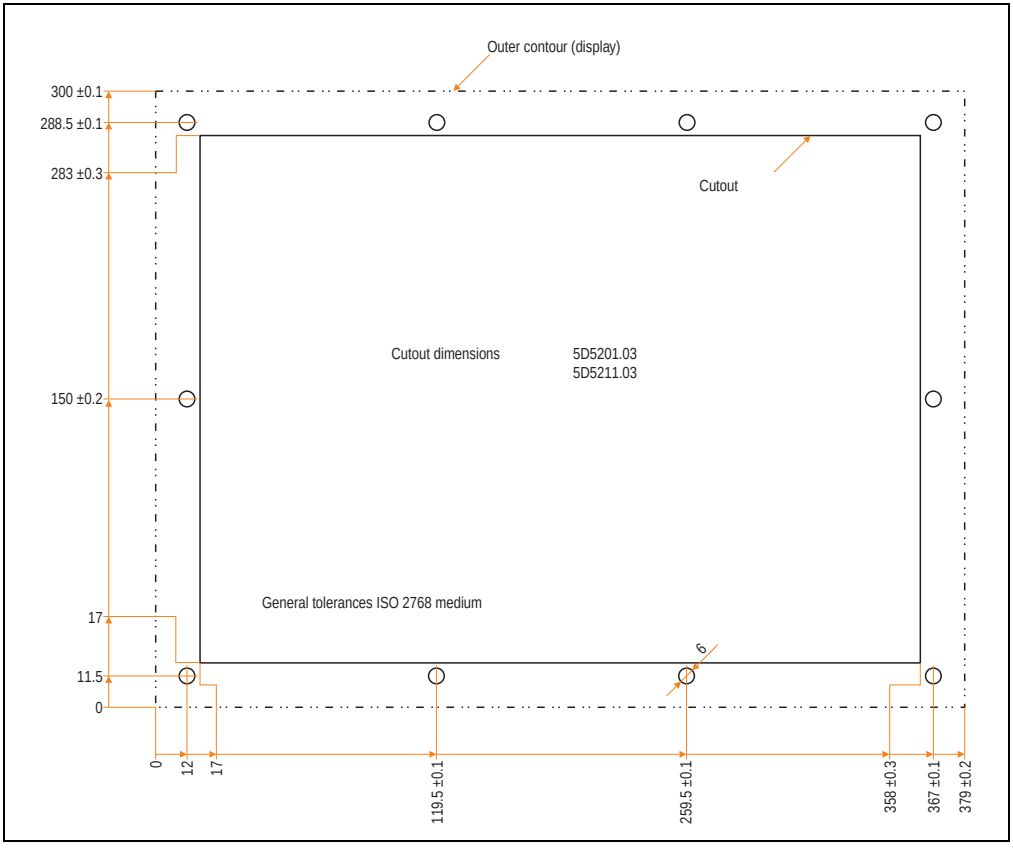


Figure 133: Cutout installation - 5D5201.03 and 5D5211.03

11.7 Mounting guidelines

When mounting the display unit on the controller unit (standard mounting) the display is fastened on the controller with the six screws included in the delivery. The FPD and touch screen connection cables for standard mounting are also included in the delivery. The touch screen cable is connected to a controller's RS232 interface.

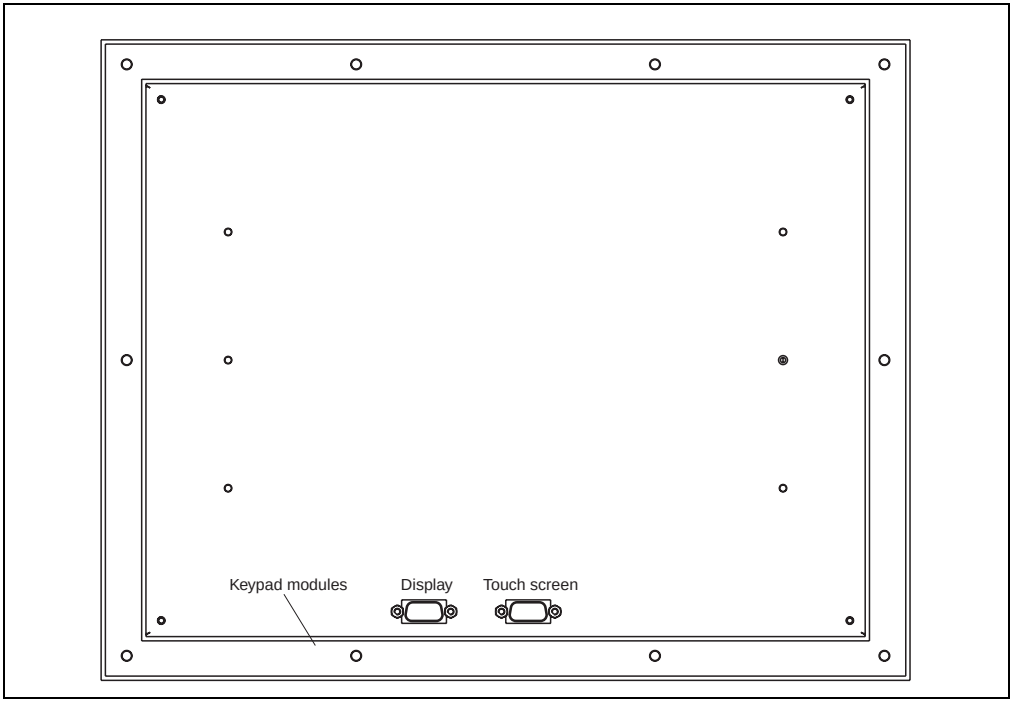


Figure 134: Connections - 5D5201.03 and 5D5211.03

11.8 Mounting guidelines - 5D5211.03 Revision I0

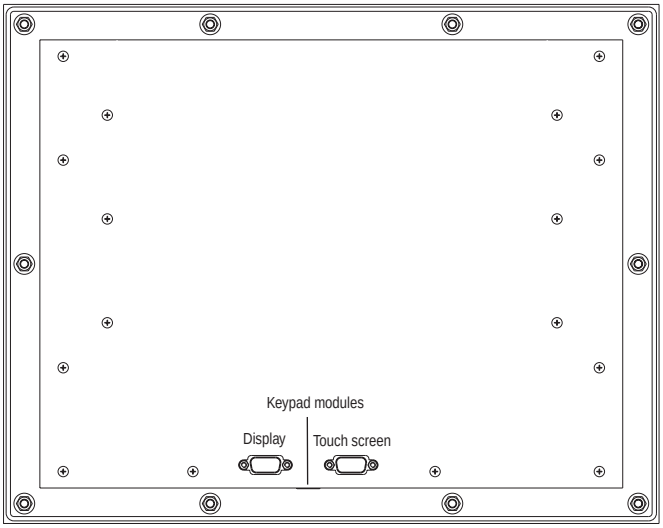


Figure 135: Connections - 5D5211.03 revision I0

11.9 Mounting guidelines - 5D5211.03 Revision J0

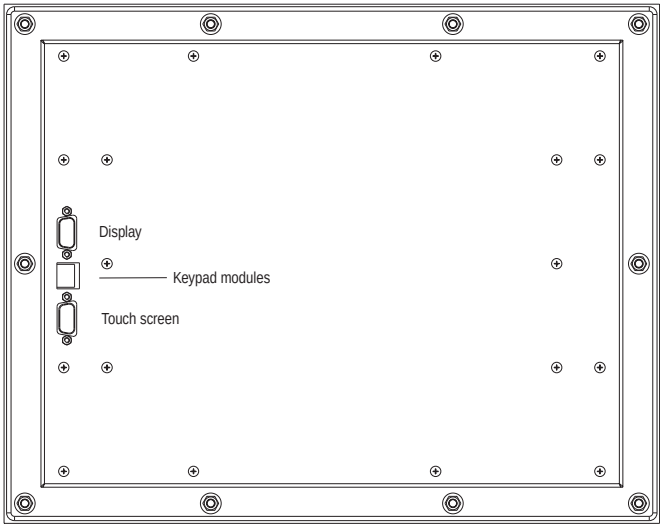


Figure 136: Connections - 5D5211.03 revision J0

12. Display unit 5D5211.06

This display unit is equipped with a touch screen with infrared technology (see section 12.3 "Technical data" on page 243).

12.1 Photo

Figure 137: Display unit 5D5211.06

12.2 Dimensions

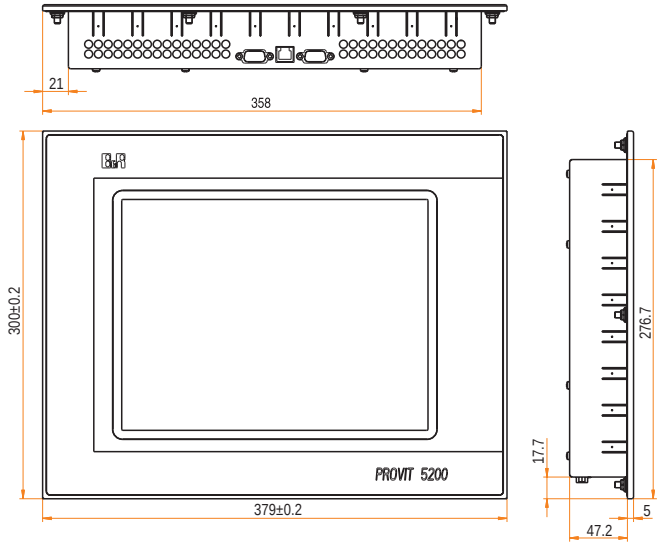


Figure 138: Dimensions - 5D5211.06

12.3 Technical data

Model number	5D5211.06
Short text	iPanel TFT C SVGA 12.1" T
Controller Remote operation	IPC5000, IPC5600 [1)] Max. 10 m [2)]
Display type Colors [3)]	TFT Color, C 262,144
Resolution	SVGA, 800 x 600 pixels
Display diagonal	12.1" (307 mm)
Front Frame Membrane [4)] Gasket	 Aluminum anodized Polyester Flat gasket around display front
Design	Light gray
Touch screen [5)] Technology	Citron Infrared
Background lighting (typ.) Brightness Lifespan [6)] [7)]	 300 cd/m^2 50,000 hours
Temperature Operation Storage	 0 - 50 °C, depending on installation -20 to +60° C
Relative humidity Operation Storage	 5 - 85 %, non-condensing T ≤40° C: 5% to 90%, non-condensing T > 40° C: < 90 %, non-condensing
Weight	Approx. 3.7 kg
Outer dimensions (W x H x D) [8)]	379 x 300 x 50 mm
Protection type	IP20 back side IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Display design / colors Background	 Similar to Pantone 427CV
Accessories Remote panel cable 0.6 m Remote panel cable 1.8 m Remote panel cable 5 m Remote panel cable 5 m 1 x 70° Remote panel cable 10 m Remote panel cable 10 m 1 x 70° RS232 extension 1.8 m (touch screen) RS232 extension 5 m (touch screen) RS232 extension 10 m (touch screen) Background lighting Touch screen drivers	 5A5004.01 5A5004.02 5A5004.05 5A5004.06 5A5004.10 5A5004.11 9A0014.02 9A0014.05 9A0014.10 Available 5S0000.01-090

Table 148: Technical data - 5D5211.06

1) Only remote operation is possible with the IPC 5600 because of mechanical dimensions.

2) Distance depends on the revision number; see section 2.1 "Distance for remote operation" on page 214.

3) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.

4) Resistant according to DIN 42 115 part 2, see also section "Chemical resistance" on page 492.

5) See chapter 8 "Technical appendix" on page 469.
6) Decrease in brightness of 50 %.
7) At 25 °C operating temperature.
8) Without controller.

12.4 Cutout installation

When mounting the display unit on the controller unit (standard mounting) the display is fastened on the controller with the six screws included in the delivery. The FPD and touch screen connection cables for standard installation are included in the delivery. The touch screen cable is connected to a controller's RS232 interface.

The cutout and drill holes are to be made according to the following measurements for cutout installation.

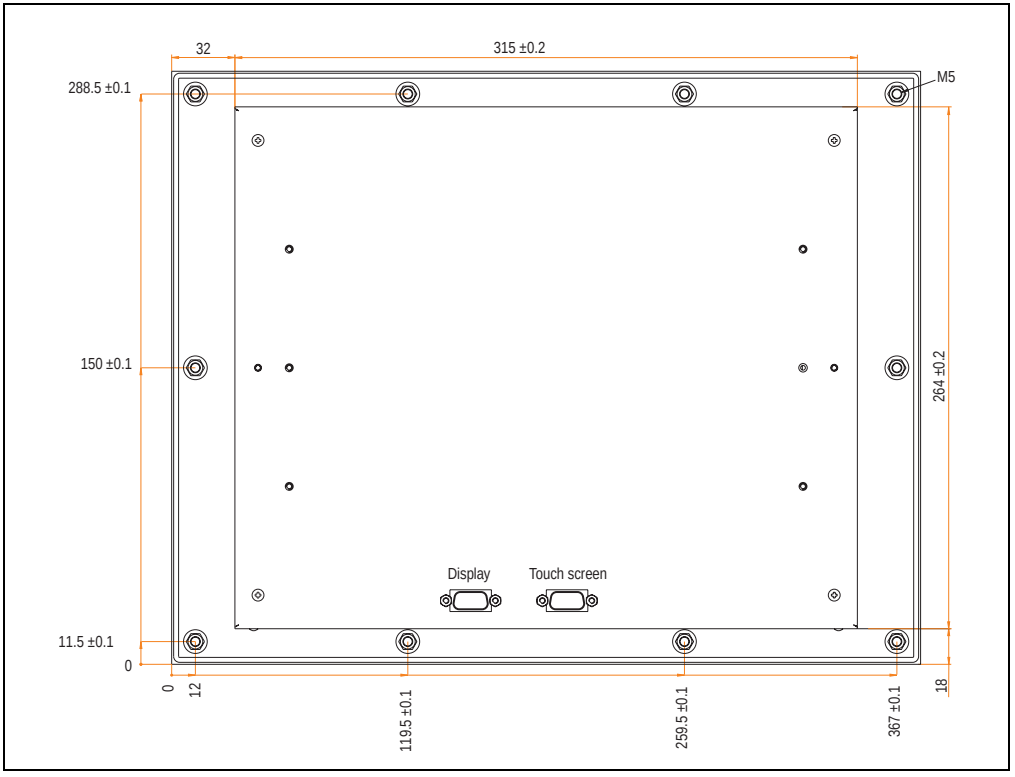


Figure 139: Cutout installation - 5D5211.06

13. Display units 5D5202.01, 5D5202.03 and 5D5212.01

These display units are equipped with a touch screen (see section 13.3 "Technical data" on page 246).

13.1 Photo

Figure 140: Display units 5D5202.01, 5D5202.03 (left) and 5D5212.01 (right)

13.2 Dimensions

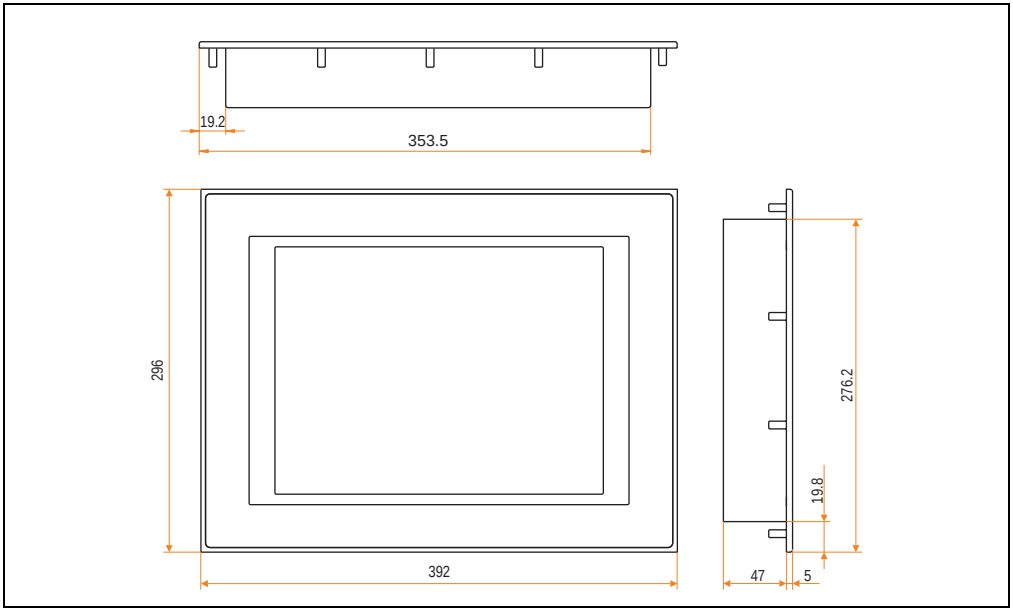


Figure 141: Measurements 5D5202.01, 5D5202.03 and 5D5212.01

13.3 Technical data

Model number	5D5202.01	5D5202.03	5D5212.01
Short text	Panel TFT C XGA 13.8" T	iPanel TFT C XGA 13.8" T	iPanel TFT C XGA 13.8" T
Controller Remote operation	IPC5000, IPC5600 [1)] Max. 10 m [2)]		
Display type Colors [3)]	TFT color, CFL background lighting 262,144		
Resolution	XGA, 1024 x 768 pixels		
Display diagonal	13.8" (351 mm)		
Front Frame Membrane [4)] Gasket	 Aluminum anodized Polyester Flat gasket around display front		
Design	Black	Light gray	Light gray
Touch screen [5)] Technology	Accu Touch Analog, resistive		
Background lighting (typ.) Brightness Lifespan [6) 7)]	 180 cd/m^2 10000 hours		
Temperature Operation Storage	 0 - 50 °C, depending on installation -20 to +60° C		
Relative humidity Operation Storage	 5 - 85 %, non-condensing T ≤40° C: 5% to 90%, non-condensing T > 40° C: < 90 %, non-condensing		
Weight	Approx. 4.5 kg		
Outer dimensions (W x H x D) [8)]	392 x 296 x 52 mm		
Protection type	IP20 back side IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)		
Display design / colors Dark gray border around the display Background	Black	 Similar to Pantone 432CV Similar to Pantone 427CV	
Accessories Remote panel cable 0.6 m Remote panel cable 1.8 m Remote panel cable 5 m Remote panel cable 5 m 1 x 70° Remote panel cable 10 m Remote panel cable 10 m 1 x 70° RS232 extension 1.8 m (touch screen) RS232 extension 5 m (touch screen) RS232 extension 10 m (touch screen) Background lighting Touch screen drivers	 5A5004.01 5A5004.02 5A5004.05 5A5004.06 5A5004.10 5A5004.11 9A0014.02 9A0014.05 9A0014.10 Available 5S0000.01-090		

Table 149: Technical data 5D5202.01, 5D5202.03 and 5D5212.01

1) Only remote operation is possible with the IPC 5600 because of mechanical dimensions.

2) Distance depends on the revision number; see section 2.1 "Distance for remote operation" on page 214.

3) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.

4) Resistant according to DIN 42 115 part 2, see also section "Chemical resistance" on page 492.
5) See chapter 8 "Technical appendix" on page 469.
6) Decrease in brightness of 50 %.
7) At 25 °C operating temperature.
8) Without controller.

13.4 Cutout installation

The cutout and drill holes are to be made according to the following dimensions for cutout installation.

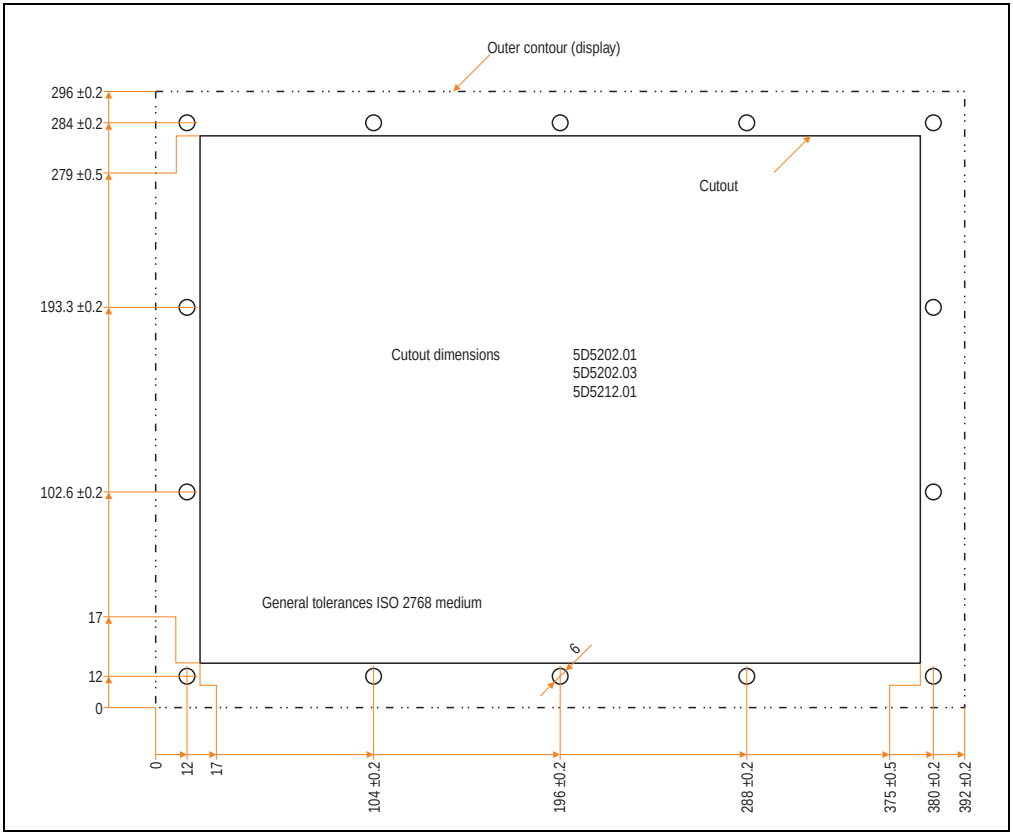


Figure 142: Cutout installation - 5D5202.01, 5D5202.03 and 5D5212.01

13.5 Mounting guidelines

When mounting the display unit on the controller unit (standard mounting) the display is fastened on the controller with the six screws included in the delivery. The FPD and touch screen connection cables for standard mounting are also included in the delivery. The touch screen cable is connected to a controller's RS232 interface.

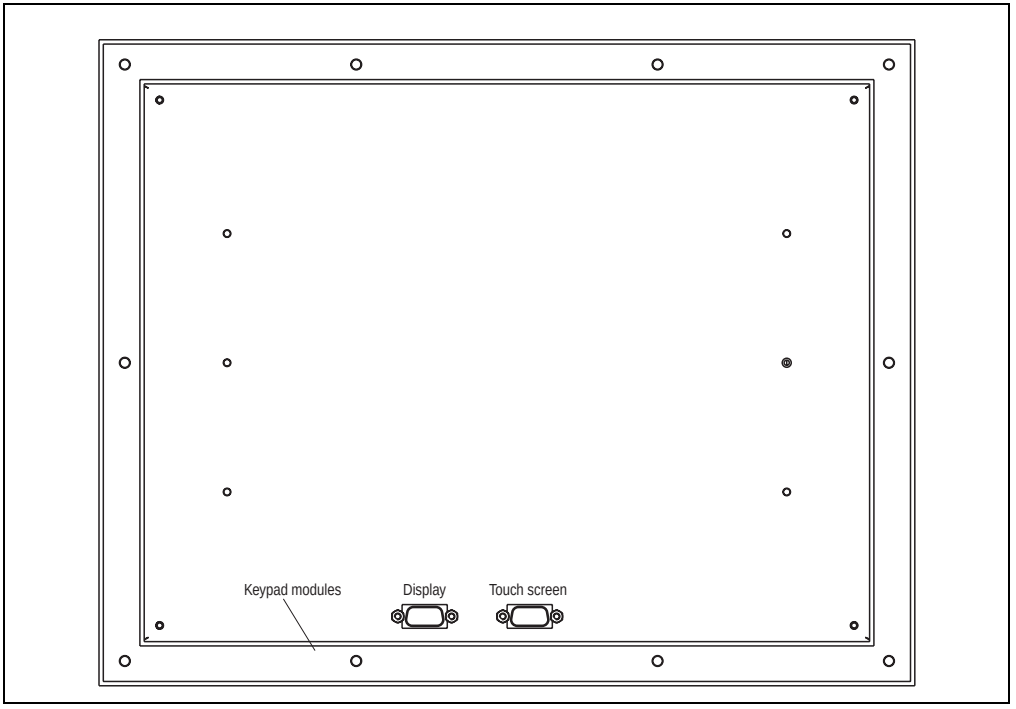


Figure 143: Connections 5D5202.01, 5D5202.03 and 5D5212.01

14. Display unit 5D5212.02

This display unit is equipped with a touch screen (see section 14.4 "Technical data" on page 250).

14.1 Photo

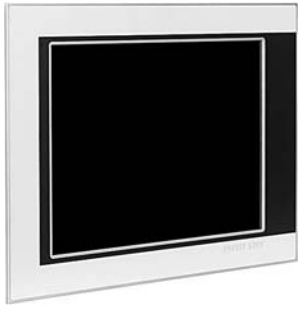


Figure 144: Display unit 5D5212.02

14.2 Dimensions - Revision >= I0

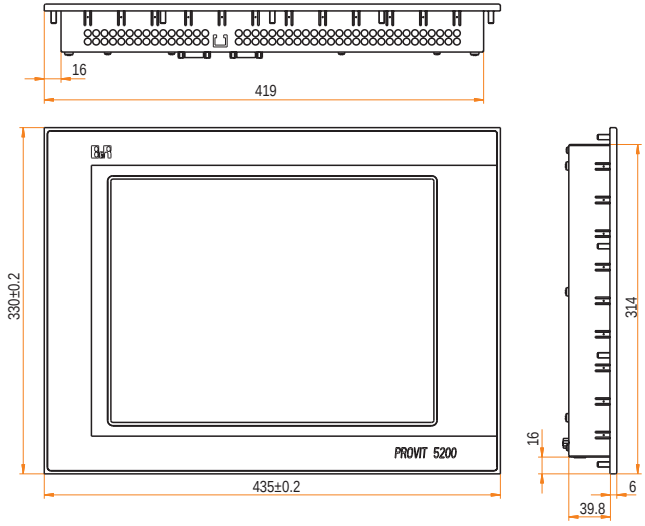


Figure 145: Dimensions - 5D5212.02 revision >= I0

14.3 Dimensions - Revision < I0

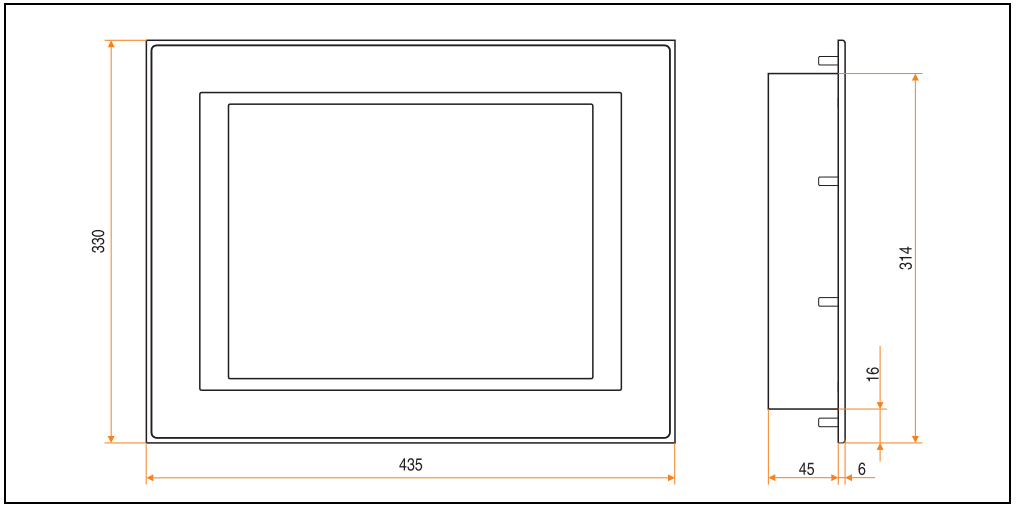


Figure 146: Dimensions - 5D5212.02 revision < I0

14.4 Technical data

Model number	5D5212.02
Short text	iPanel TFT C XGA 15" T
Controller Remote operation	IPC5000, IPC5600 [1] Max. 10 m [2]
Display type Colors [3]	TFT color, CFL background lighting 262,144
Resolution	XGA, 1024 x 768 pixels
Display diagonal	15" (381 mm)
Front Frame Membrane [4] Gasket	 Aluminum anodized Polyester Flat gasket around display front
Design	Light gray
Touch screen [5] Technology	Accu Touch Analog, resistive
Background lighting (typ.) Brightness Lifespan [6] [7]	 200 cd/m^2 50,000 hours
Temperature Operation Storage	 0 - 50 °C, depending on installation -20 to +60° C

Table 150: Technical data - 5D5212.02

Model number	5D5212.02
Relative humidity Operation Storage	 5 - 85 %, non-condensing T ≤40° C: 5% to 90%, non-condensing T > 40° C: < 90 %, non-condensing
Weight	Approx. 5.4 kg
Outer dimensions (W x H x D) [8]	435 x 330 x 51 mm
Protection type	IP20 back side IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Display design / colors Dark gray border around the display Background	 Similar to Pantone 432CV Similar to Pantone 427CV
Accessories Remote panel cable 0.6 m Remote panel cable 1.8 m Remote panel cable 5 m Remote panel cable 5 m 1 x 70° Remote panel cable 10 m Remote panel cable 10 m 1 x 70° RS232 extension 1.8 m (touch screen) RS232 extension 5 m (touch screen) RS232 extension 10 m (touch screen) Background lighting Touch screen drivers	 5A5004.01 5A5004.02 5A5004.05 5A5004.06 5A5004.10 5A5004.11 9A0014.02 9A0014.05 9A0014.10 Available 5S0000.01-090

Table 150: Technical data - 5D5212.02

1) Installation on IPC5600 only possible using a separate cable set (model number 5A5601.02).
2) Distance depends on the revision number; see section 2.1 "Distance for remote operation" on page 214.
3) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.
4) Resistant according to DIN 42 115 part 2, see also section "Chemical resistance" on page 492.
5) See chapter 8 "Technical appendix" on page 469.
6) Decrease in brightness of 50 %.
7) At 25 °C operating temperature.
8) Without controller.

14.5 Cutout installation

The cutout and drill holes are to be made according to the following dimensions for cutout installation.

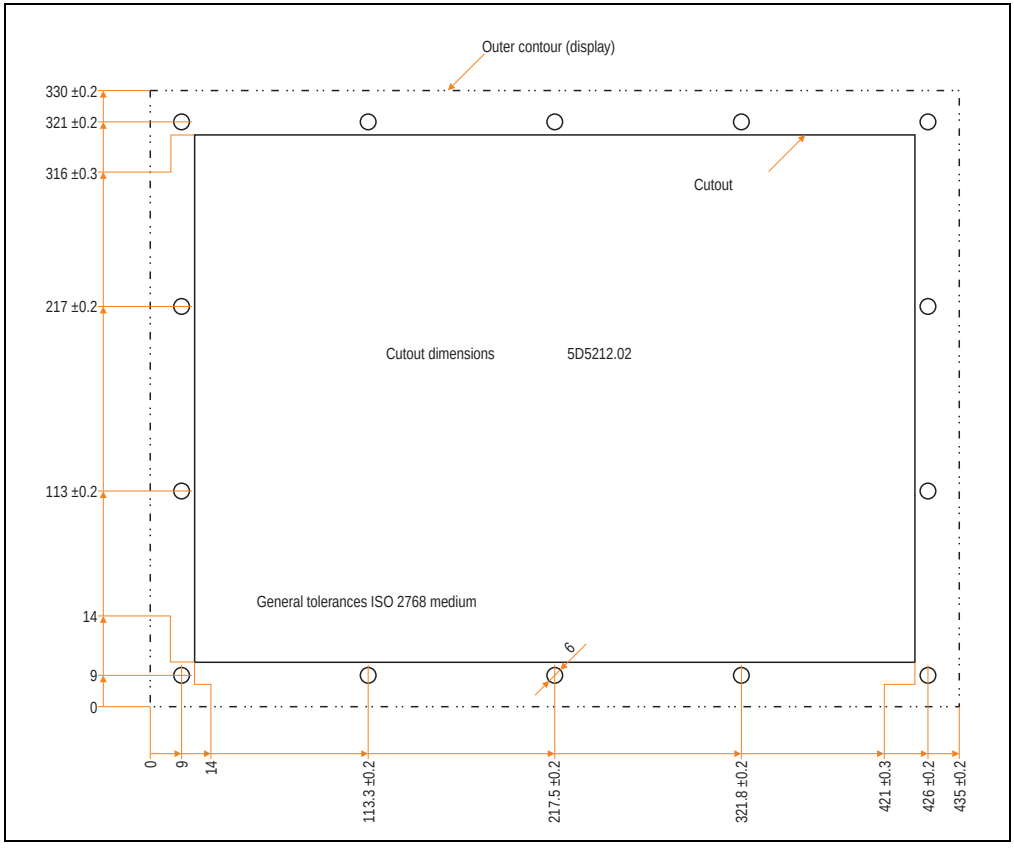


Figure 147: Cutout installation - 5D5212.02

14.6 Mounting guidelines

When mounting the display unit on the controller unit (standard mounting) the display is fastened on the controller with the six screws included in the delivery. The FPD and touch screen connection cables for standard mounting are also included in the delivery. The touch screen cable is connected to a controller's RS232 interface.

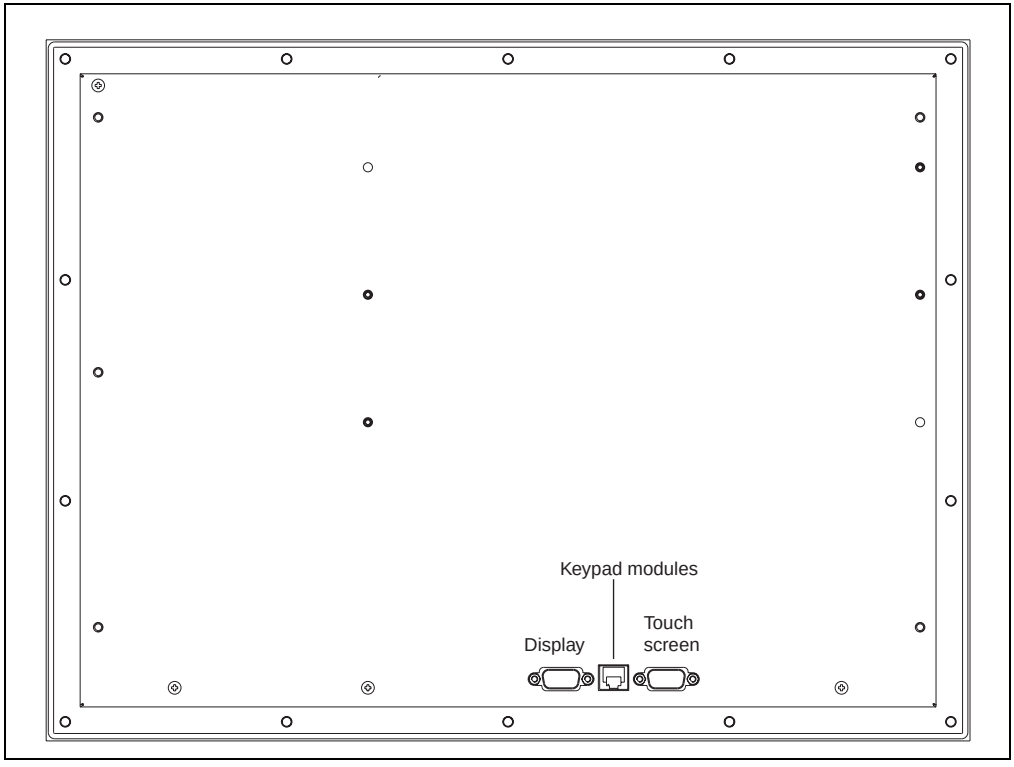


Figure 148: Connections - 5D5212.02 revision >= I0

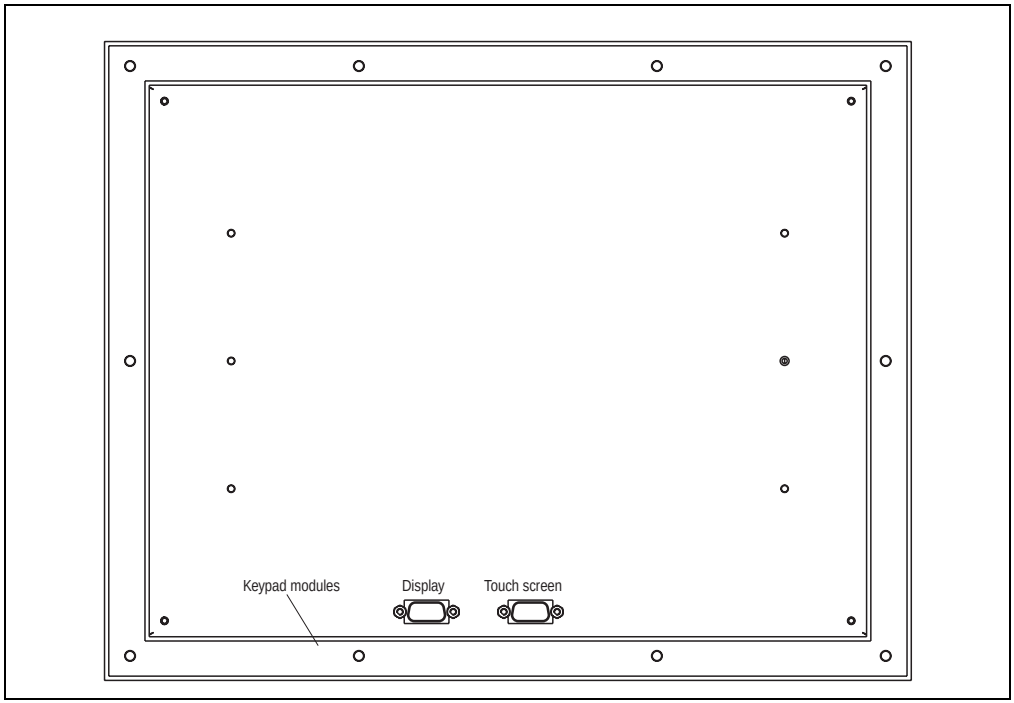


Figure 149: Connections - 5D5212.02 revision < I0

15. Display unit 5D5212.04

This display unit is equipped with a touch screen (see section 15.3 "Technical data" on page 256).

15.1 Photo

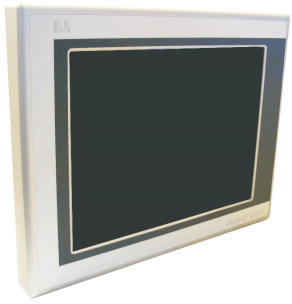


Figure 150: Display unit 5D5212.04

15.2 Dimensions

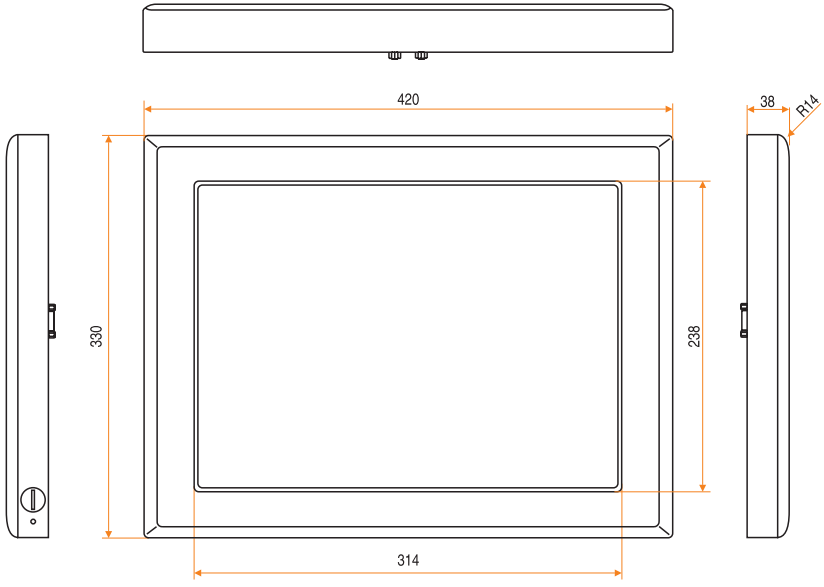


Figure 151: Measurements 5D5212.04

15.3 Technical data

Model number	5D5212.04
Short text	iPanel TFT XGA 15" T
Controller Remote operation	IPC5000 or IPC5600 Max. 10 m [1]
Display type Colors [2]	TFT color, CFL background lighting 262.144
Resolution	XGA, 1024 x 768 pixels
Display diagonal	15" (381 mm)
Front Frame Membrane [3]	 Aluminum anodized Polyester
Design	Light gray
Touch screen Technology	Accu Touch Analog, resistive
Background lighting (typ.) Brightness Lifespan [4] [5]	 200 cd/m^2 50,000 hours
Temperature Operation Storage	 0 - 50 °C, depending on installation -20 up to + 60 °C
Relative humidity Operation Storage	 5 - 85 %, non-condensing T ≤40° C: 5% to 90%, non-condensing T > 40° C: < 90 %, non-condensing
Weight	Approx. 5.5 kg
Outer dimensions (W x H x D) [6]	420 x 330 x 38 mm
Protection type	IP 20 rear-sided (with flange) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Display design / colors Dark gray border around the display Background	 Similar to Pantone 432CV Similar to Pantone 427CV
Accessories Remote panel cable 0.6m Remote panel cable 1.8m Remote panel cable 5m Remote Panel cable 5m 1x70° Remote panel cable 10m Remote Panel cable 10m 1x70° RS232 extension 1.8m (touch screen) RS232 extension 5m (touch screen) RS232 extension 10m (touch screen) Background lighting Touch screen drivers Panel flange adapter	 5A5004.01 5A5004.02 5A5004.05 5A5004.06 5A5004.10 5A5004.11 9A0014.02 9A0014.05 9A0014.10 Available 5S0000.01-090 5A5007.01

Table 151: Technical data - 5D5212.04

1) Distance depends on the revision number; see section 2.1 "Distance for remote operation" on page 214.

2) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.

3) Resistant according to DIN 42 115 part 2, see also section "Chemical resistance" on page 492.

4) Decrease in brightness of 50 %.
5) At 25 °C operating temperature.
6) Without controller.

15.4 Mounting guidelines

It is possible to install this display unit on a swing arm system. This is done using the panel flange adapter type A (model number 5A5007.01) for this display unit.

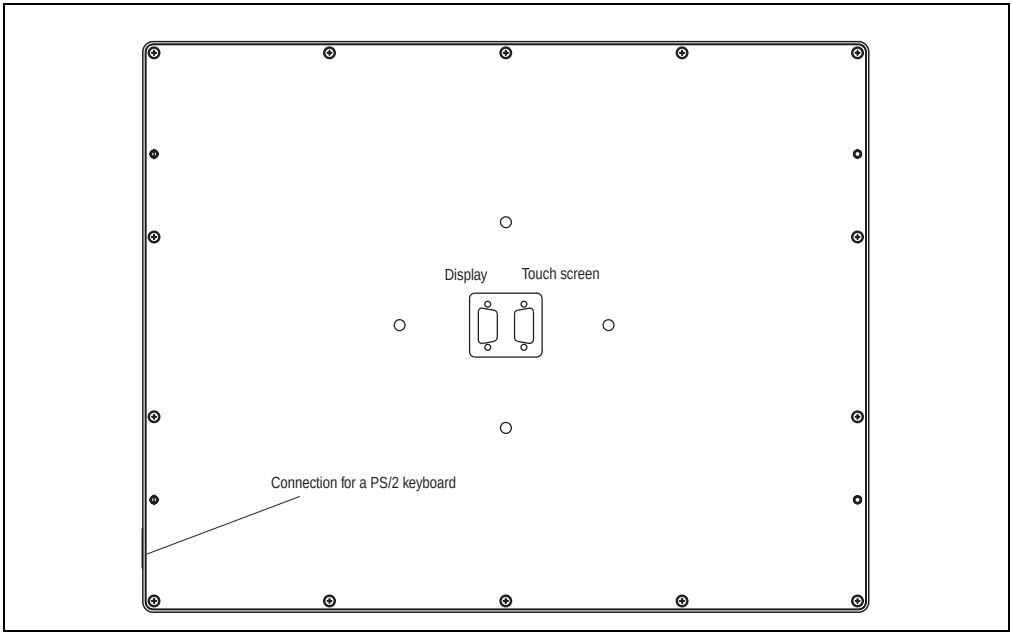


Figure 152: Connections - 5D5212.04 revision >= G0

For suspension, B&R offers a suitable panel flange adapter for this display unit. See section "Panel flange adapter for the display unit 5D5212.04" on page 460.

Model number	Description
5A5007.01	Panel flange adapter for display unit 5D5212.04, including screws to fasten the display unit.

Table 152: Order data - panel flange adapter

15.4.1 Flange mounting diagrams

When constructing an adapter for the display unit 5D5212.04 yourself, consult the following diagrams for positioning of drill holes (depending on the revision).

5D5212.04 Revision J0 and later

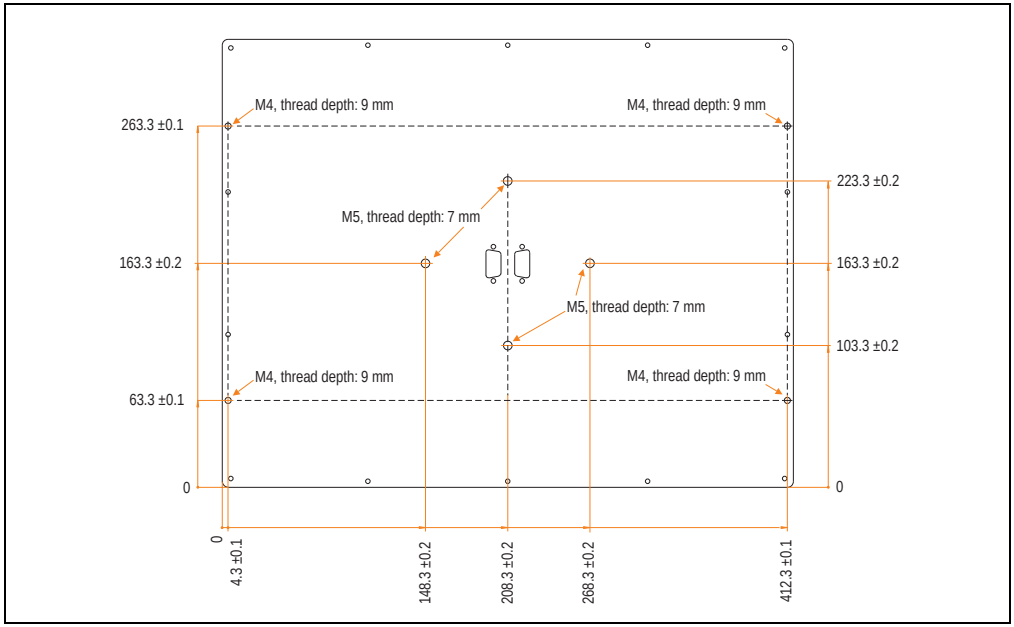


Figure 153: Flange drill holes - 5D5212.04 revision J0 and later

5D5212.04 Revision G0 and later

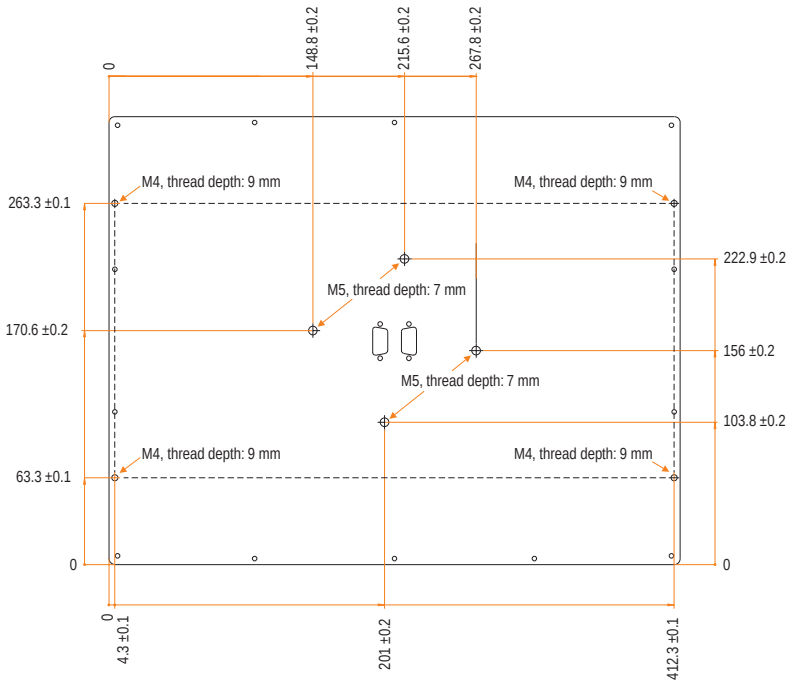


Figure 154: Flange drill holes - 5D5212.04 revision G0 and later

16. Display unit 5D5213.01

These display units are equipped with a touch screen (see section 16.4 "Technical data" on page 261).

16.1 Photo

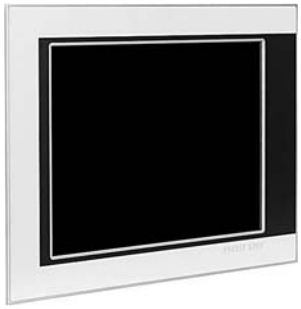


Figure 155: Display unit 5D5213.01

16.2 Dimensions - Revision >= F0

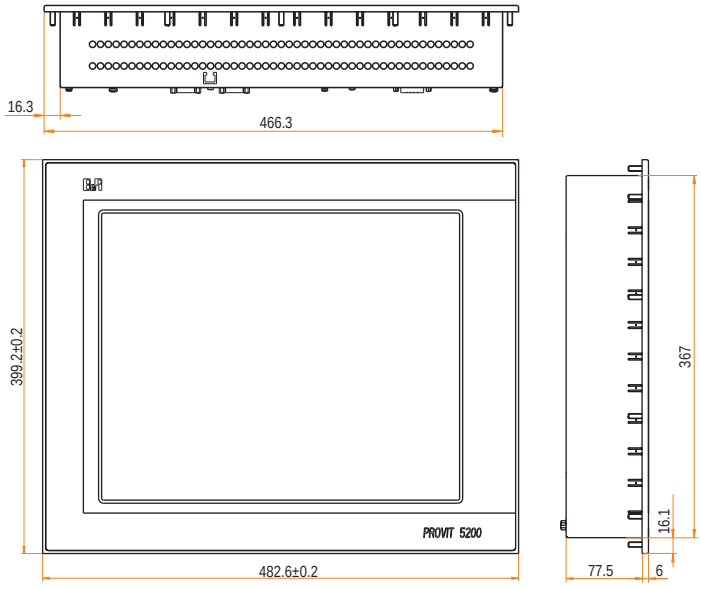


Figure 156: Dimensions - 5D5213.01 revision >= F0 and later

16.3 Dimensions - Revision <F0

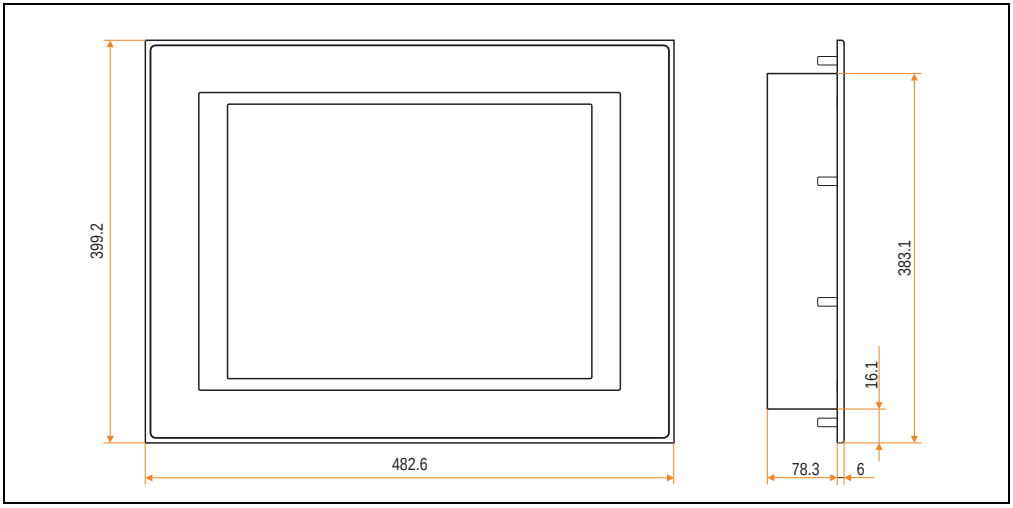


Figure 157: Dimensions - 5D5213.01

16.4 Technical data

Model number	5D5213.01
Short text	iPanel TFT C SXGA 18" T
Controller Remote operation	IPC5000, IPC5600 [1] Max. 10 m [2]
Display type Colors [3]	TFT color, CFL background lighting 16 million
Resolution	SXGA, 1280 x 1024 pixels
Display diagonal	18.1" (460 mm)
Protection type	IP 20 rear-sided
Front Frame Membrane [4] Gasket	 Aluminum anodized Polyester Flat gasket around display front
Design	Light gray
Touch screen [5] Technology	Accu Touch Analog, resistive
Background lighting (typ.) Brightness Lifespan [6] [7]	 200 cd/m^2 50,000 hours

Table 153: Technical data - 5D5213.01

Model number	5D5213.01
Temperature Operation Storage	 0 - 45 °C, depending on installation -20 to +60° C
Relative humidity Operation Storage	 5 - 85 %, non-condensing T ≤40° C: 5% to 90%, non-condensing T > 40° C: < 90 %, non-condensing
Weight	Approx. 10.2 kg
Outer dimensions (W x H x D) 8)	482.6 x 399.2 x 89 mm
Protection type	IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Display design / colors Dark gray border around the display Background	 Similar to Pantone 432CV Similar to Pantone 427CV
Accessories Remote panel cable 0.6 m Remote panel cable 1.8 m Remote panel cable 5 m Remote panel cable 5 m 1 x 70° Remote panel cable 10 m Remote panel cable 10 m 1 x 70° RS232 extension 1.8 m (touch screen) RS232 extension 5 m (touch screen) RS232 extension 10 m (touch screen) Background lighting Touch screen drivers	 5A5004.01 5A5004.02 5A5004.05 5A5004.06 5A5004.10 5A5004.11 9A0014.02 9A0014.05 9A0014.10 Available 5S0000.01-090

Table 153: Technical data - 5D5213.01 (cont.)

1) Installation on IPC5600 only possible using a separate cable set (model number 5A5601.02).
2) Distance depends on the revision number; see section 2.1 "Distance for remote operation" on page 214.
3) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used. With Revision < F0, a maximum of 262144 colors (18-bit) is possible.
4) Resistant according to DIN 42 115 part 2, see also section "Chemical resistance" on page 492.
5) See chapter 8 "Technical appendix" on page 469.
6) Decrease in brightness of 50 %.
7) At 25 °C operating temperature.
8) Without controller.

Information:

This display unit requires an external 24 VDC supply voltage (plug included with the delivery). The assignments for the plug are the same as those for display unit 5D9200.01 (see figure 164 "Connections - 5D9200.01" on page 270.)

Power consumption for the 24 VDC is approximately 25 watts at 100% brightness.

16.5 Cutout installation

The cutout and drill holes are to be made according to the following dimensions for cutout installation.

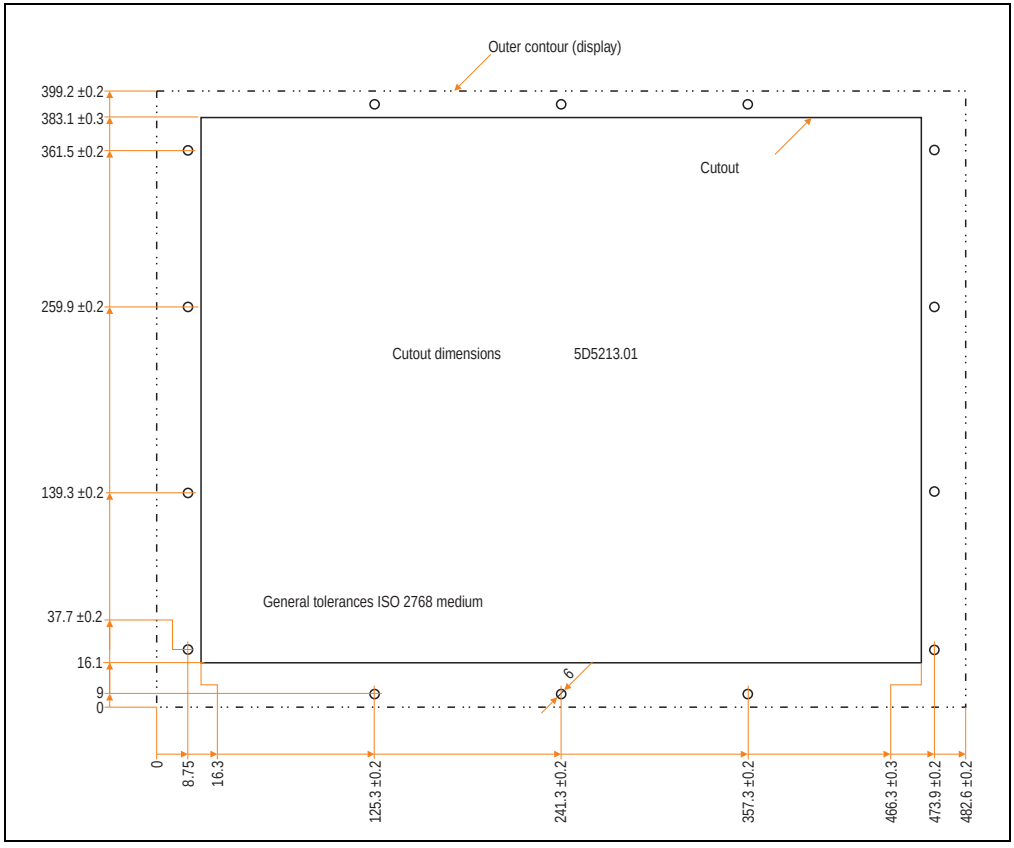


Figure 158: Cutout installation - 5D5213.01

16.6 Mounting guidelines

When mounting the display unit on the controller unit (standard mounting) the display is fastened on the controller with the six screws included in the delivery. The FPD and touch screen connection cables for standard mounting are also included in the delivery. The touch screen cable is connected to a controller's RS232 interface.

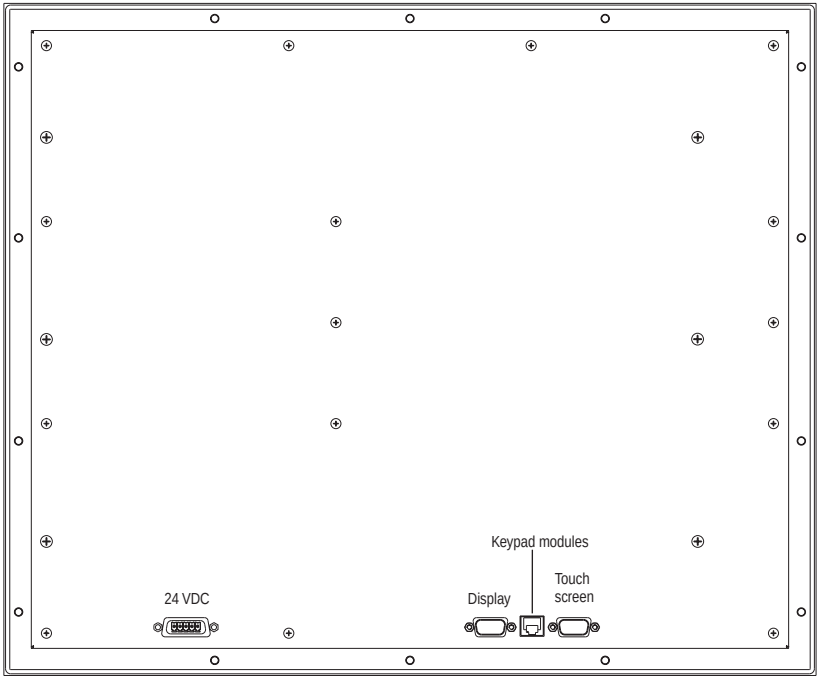


Figure 159: Dimensions - 5D5213.01 revision >= F0

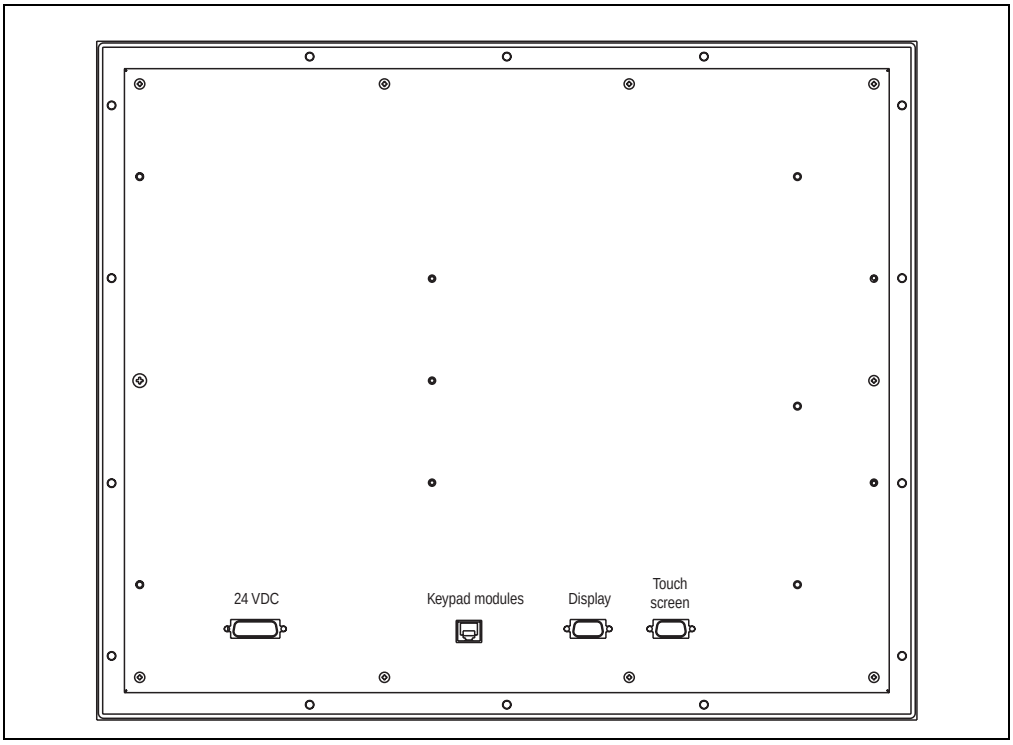


Figure 160: Connections - 5D5213.01 revision < F0

17. Display unit 5D9200.01

This display unit is equipped with a touch screen (see section 17.3 "Technical data" on page 267).

17.1 Photo

Figure 161: Display unit 5D9200.01

17.2 Dimensions

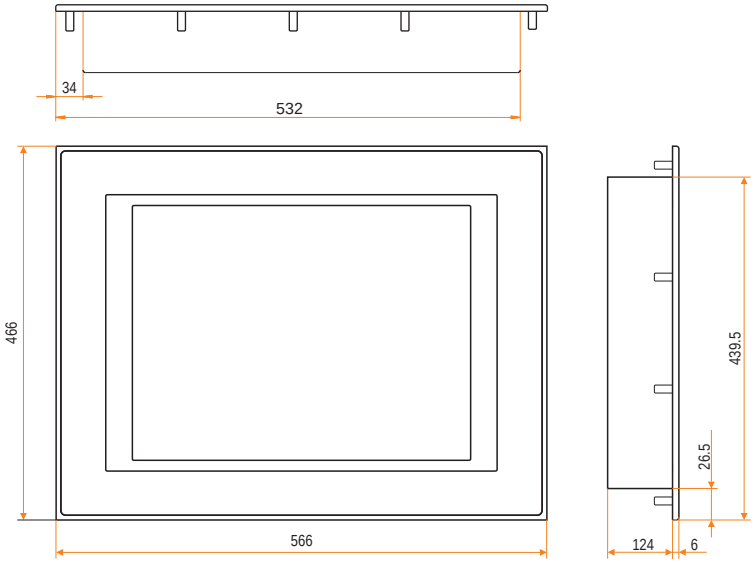


Figure 162: Measurements 5D9200.01

17.3 Technical data

Model number	5D9200.01
Short text	Panel TFT C SXGA 20.1" T RGB
Controller	IPC5000
Display type Colors [1]	TFT color, CFL background lighting 16.7 million
Connections VGA Touch screen Power supply	 Analog RGB connection, 15-pin DSUB standard VGA plug, for operation on a PC with a VGA connection 9 pin DSUB, RS232 +24 VDC, 5-pin DSUB
Resolution Emulations	SXGA, 1280 x 1024 pixels VGA (640 x 480), SVGA (800 x 600) and XGA (1024 x 768)
Display diagonal	20.1" (460 mm)
Protection type	IP 20 rear-sided
Front Frame Membrane [2] Gasket	 Aluminum anodized Polyester Flat gasket around display front
Design	Black
Touch screen [3] Technology	Accu Touch Analog, resistive
Background lighting (typ.) Brightness Lifespan [4] [5]	 150 cd/m^2 50,000 hours
Temperature Operation Storage	 0 - 50 °C, depending on installation -20 to +60° C
Relative humidity Operation Storage	 5 - 85 %, non-condensing T ≤40° C: 5% to 90%, non-condensing T > 40° C: < 90 %, non-condensing
Weight	Approx. 10.2 kg
Outer dimensions (W x H x D) [6]	566 x 466 x 130 mm
Protection type	IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Display design / colors Background	 Black

Table 154: Technical data - 5D9200.01

Model number	5D9200.01
Accessories	
Remote panel cable 0.6 m	5A5004.01
Remote panel cable 1.8 m	5A5004.02
Remote panel cable 5 m	5A5004.05
Remote panel cable 5 m 1 x 70°	5A5004.06
Remote panel cable 10 m	5A5004.10
Remote panel cable 10 m 1 x 70°	5A5004.11
RS232 extension 1.8 m (touch screen)	9A0014.02
RS232 extension 5 m (touch screen)	9A0014.05
RS232 extension 10 m (touch screen)	9A0014.10
Background lighting	Available
Touch screen drivers	5S0000.01-090

Table 154: Technical data - 5D9200.01 (cont.)

1) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.

2) Resistant according to DIN 42 115 part 2, see also section "Chemical resistance" on page 492.

3) see chapter 3 "Display units" on page 211.

4) Decrease in brightness of 50 %.

5) At 25 °C operating temperature.

6) Without controller.

Information:

This display unit requires an external 24 VDC supply voltage (plug included with the delivery). The 24 VDC power consumption is typically 37 watts.

17.4 Cutout installation

The cutout and drill holes are to be made according to the following measurements for cutout installation:

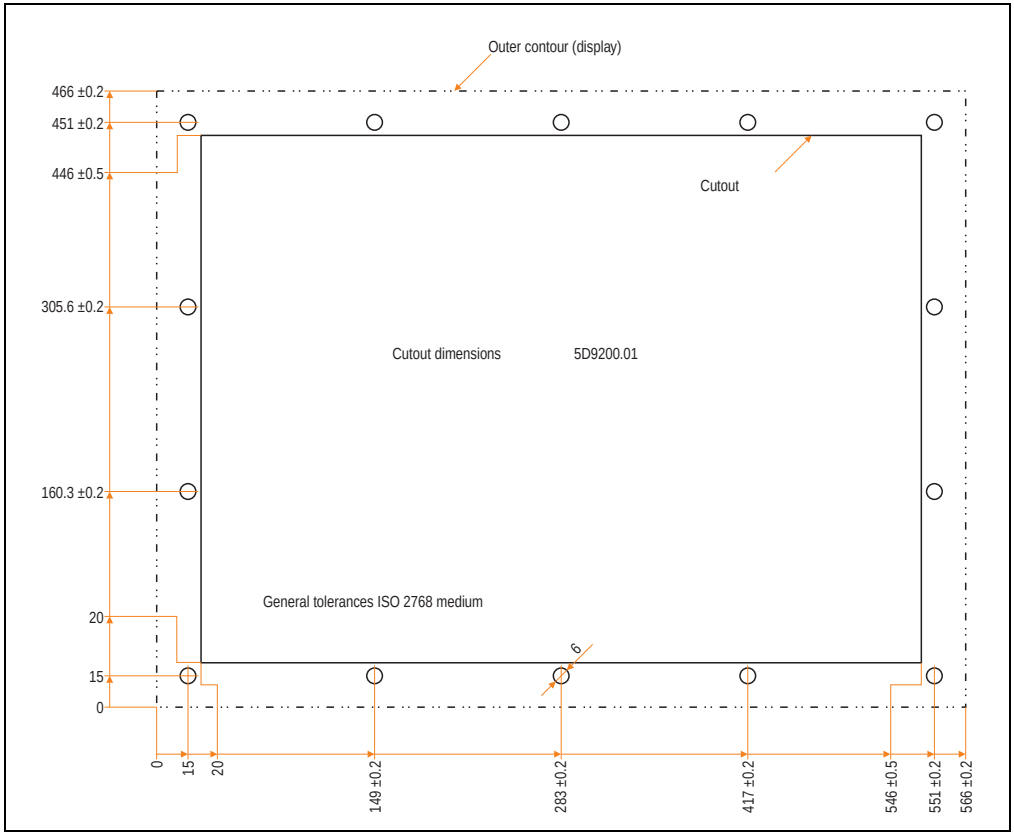


Figure 163: Cutout installation - 5D9200.01

17.5 Mounting guidelines

When mounting the display unit on the controller unit (standard mounting) the display is fastened on the controller with the six screws included in the delivery. VGA, touch screen and service connection cables for standard mounting are included with the delivery.

The touch screen and the service cable are both connected to RS232 interfaces (COM1 and COM2) on the controller. For standard mounting, the VGA connection is made using the cable delivered. A standard VGA cable is used for remote installation.

Display connections are accessible in a recess on the back, and are arranged as follows:

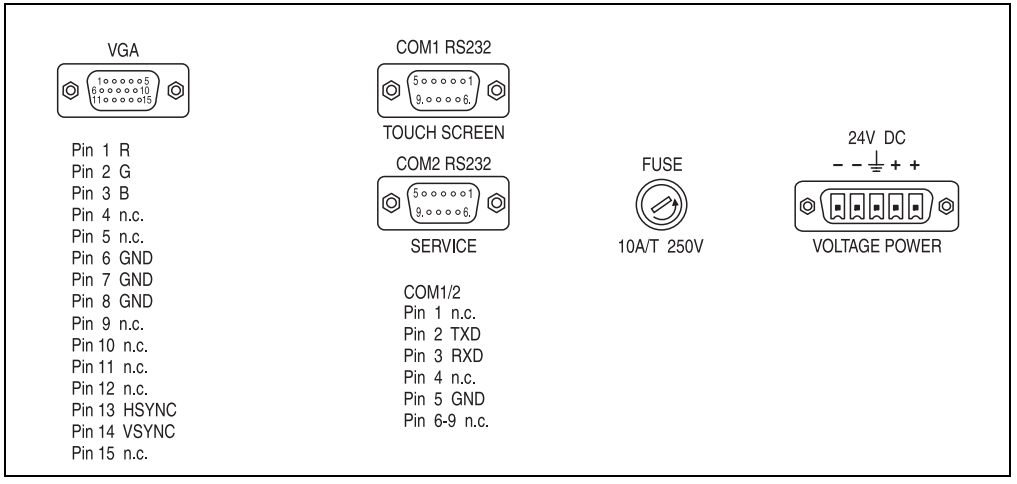


Figure 164: Connections - 5D9200.01

18. Display units 5D5500.10, 5D5500.32, 5D5501.01 and 5D5510.10

18.1 Photo

Figure 165: Display units 5D5500.10 and 5D5500.32 (left), 5D5501.01 and 5D5510.10 (right)

18.2 Dimensions

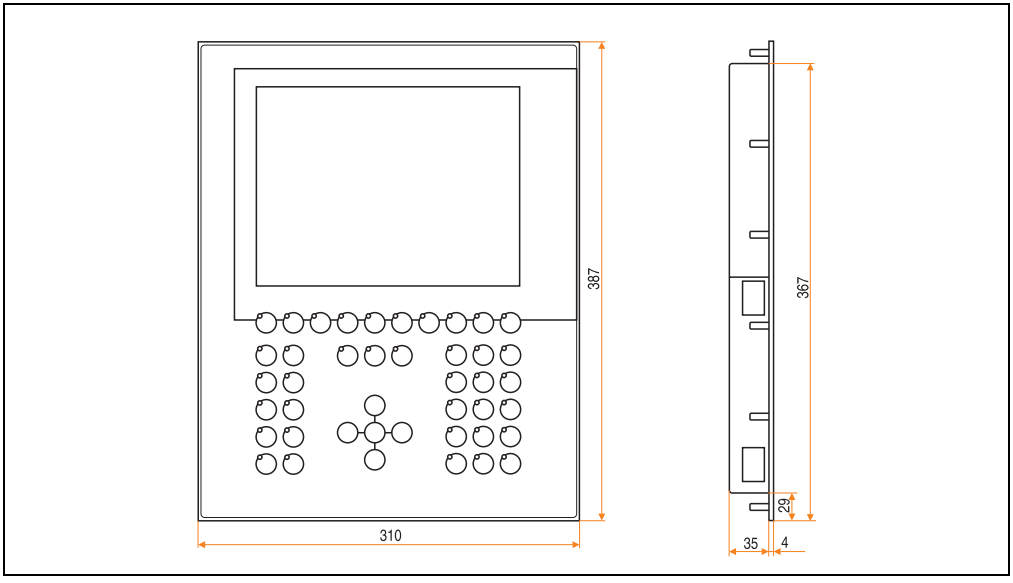


Figure 166: Dimensions - 5D55xx.xx

18.3 Dimensions - 5D5510.10 Revision F0 and later

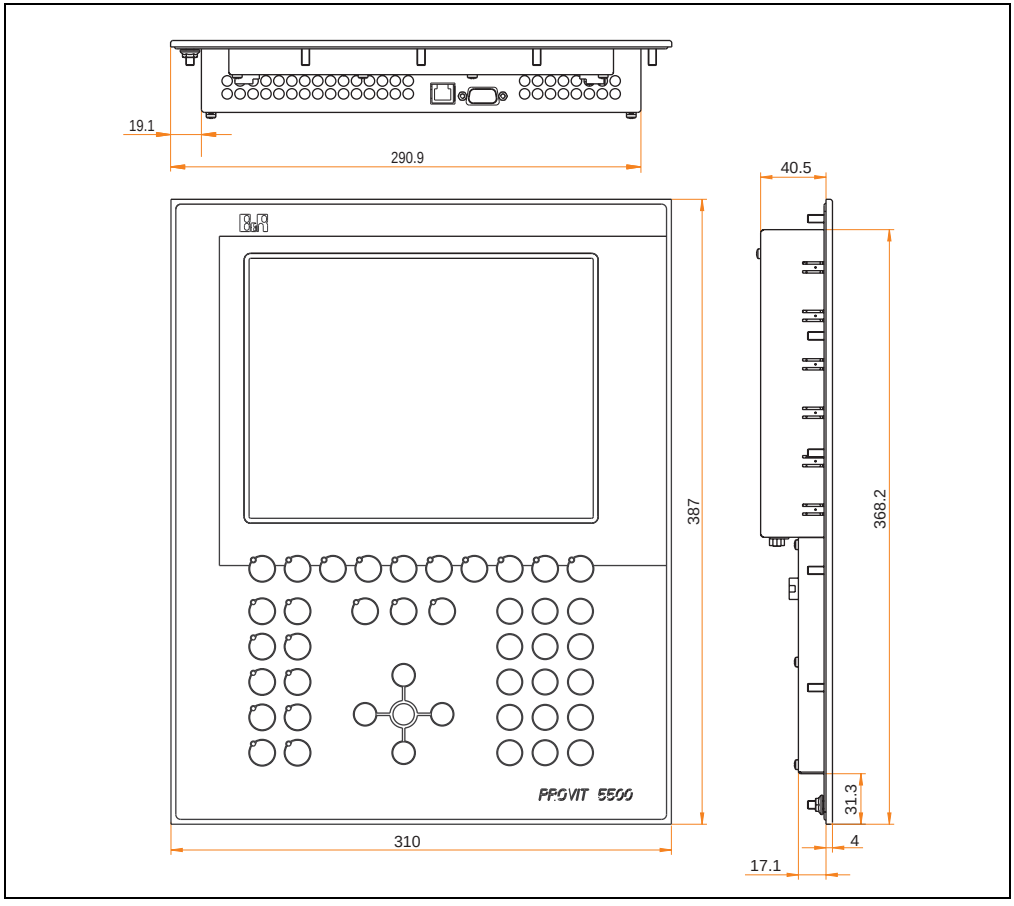


Figure 167: Dimensions - 5D5510 revision F0 and later

18.4 Technical data

Model number	5D5500.10	5D5500.32	5D5501.01	5D5510.10
Short text	Panel TFT C VGA 10.4" F	iPanel TFT C VGA 10.4" F	Panel TFT C SVGA 10.4" F	iPanel TFT C VGA 10.4" F
Controller[1)] Remote operation	IPC5000, IPC5600 Max. 10 m [2)]			
Display type Colors [3)]	TFT color, CFL background lighting 262,144			
Resolution	VGA, 640 x 480 pixels		SVGA, 800 x 600 pixels	VGA, 640 x 480 pixels
Display diagonal	10.4" (264 mm)			
Front Frame Membrane [4)] Gasket	Aluminum anodized Polyester Flat gasket around display front			
Design	Black	Light gray	Black	Light gray
Keys Function keys Function keys with LED Softkeys Softkeys with LEDs System keys System keys with LEDs	- 23 - - 20 -			
Background lighting (typ.) Brightness Lifespan [5)] [6)]	450 cd/m^2 [7)] 55,000 hours[7)]	200 cd/m^2 50,000 hours	180 cd/m^2 10,000 hours	450 cd/m^2[7)] 55,000 hours[7)]
Temperature Operation Storage	0 - 50 °C, depending on installation -20 to +60° C			
Relative humidity Operation Storage	5 - 85 %, non-condensing T ≤40° C: 5% to 90%, non-condensing T > 40° C: < 90 %, non-condensing			
Weight	Approx. 3.7 kg			
Outer dimensions (W x H x D) [8)]	310 x 387 x 38 mm			
Protection type	IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)			
Display design / colors Dark gray border around the display Light background Orange keys Dark gray keys Legend strips (gray)	Black Black	Similar Pantone 432C V Similar Pantone 427C V Similar Pantone 151C V Similar Pantone 431C V	Black Black	Similar Pantone 432C V Similar Pantone 427C V Similar Pantone 151C V Similar Pantone 431C V Similar Pantone 429C V

Table 155: Technical data - 5D55xx.xx

Model number	5D5500.10	5D5500.32	5D5501.01	5D5510.10
Accessories				
Remote panel cable 0.6 m	5A5004.01			
Remote panel cable 1.8 m	5A5004.02			
Remote panel cable 5 m	5A5004.05			
Remote panel cable 5 m 1 x 70°	5A5004.06			
Remote panel cable 10 m	5A5004.10			
Remote panel cable 10 m 1 x 70°	5A5004.11			
Background lighting	Available			
Legend strip templates	5A2500.06 (black) and 5A2500.09 (gray)			
Provit Mkey Utilities	5S0000.01-090			

Table 155: Technical data - 5D55xx.xx (cont.)

1) Only remote operation is possible with the IPC 5600 because of mechanical dimensions.
2) Distance depends on the revision number; see section 2.1 "Distance for remote operation" on page 214.
3) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.
4) Resistant according to DIN 42 115 part 2, see also section "Chemical resistance" on page 492.
5) Decrease in brightness of 50 %.
6) At 25 °C operating temperature.
7) With Revision < J0 brightness = 200 cd/m^2, lifespan = 50,000 hours.
8) Without controller.

18.5 Cutout installation

The cutout and drill holes are to be made according to the following dimensions for cutout installation.

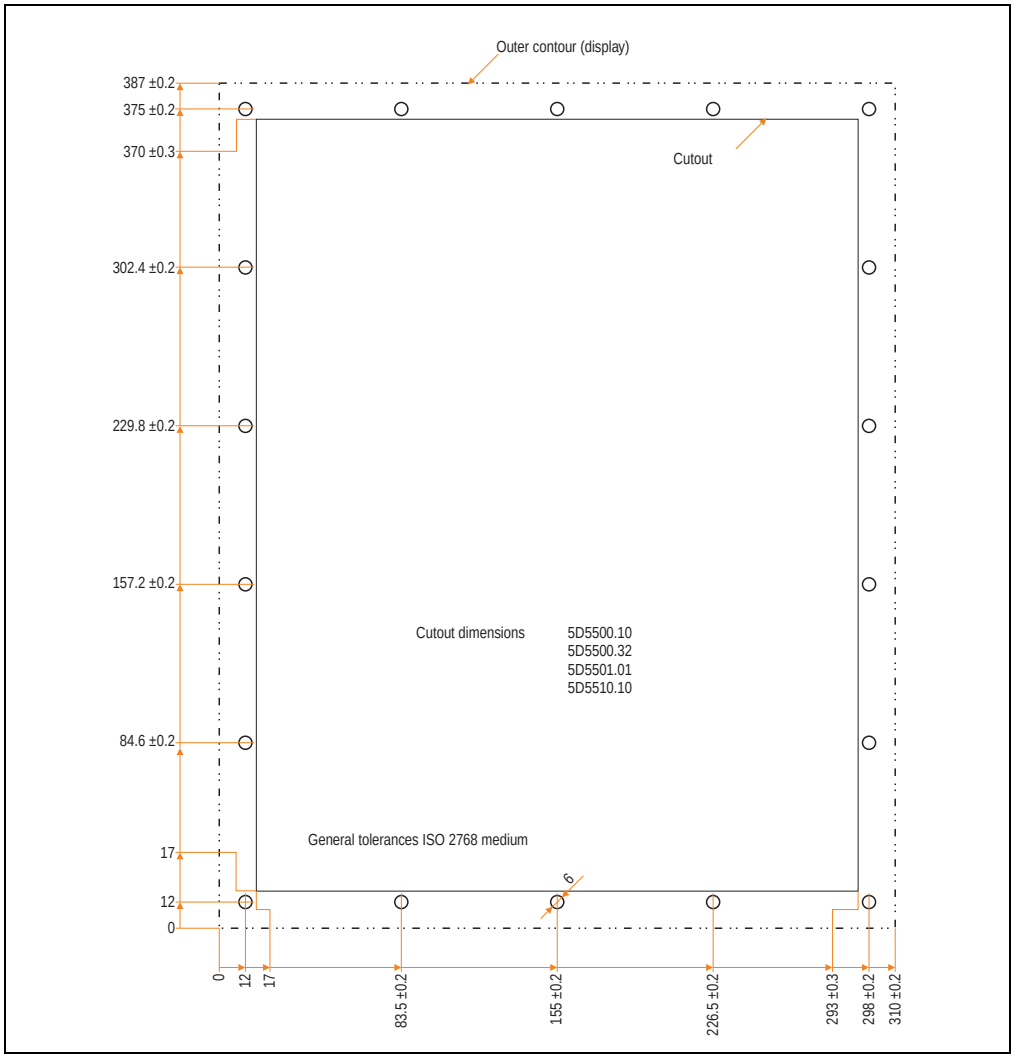


Figure 168: Cutout installation - 5D55xx.xx

18.6 Mounting guidelines

When mounting the display unit on the controller unit (standard mounting) the display is fastened on the controller with the six screws included in the delivery. The FPD connection cable and a cable for connecting further Panelware modules are included with the delivery.

The function keys are treated like Panelware modules. As a result, the same guidelines apply to the connection, particularly in regard to the maximum number of keys (see section 3 "Using Panelware modules" on page 215).

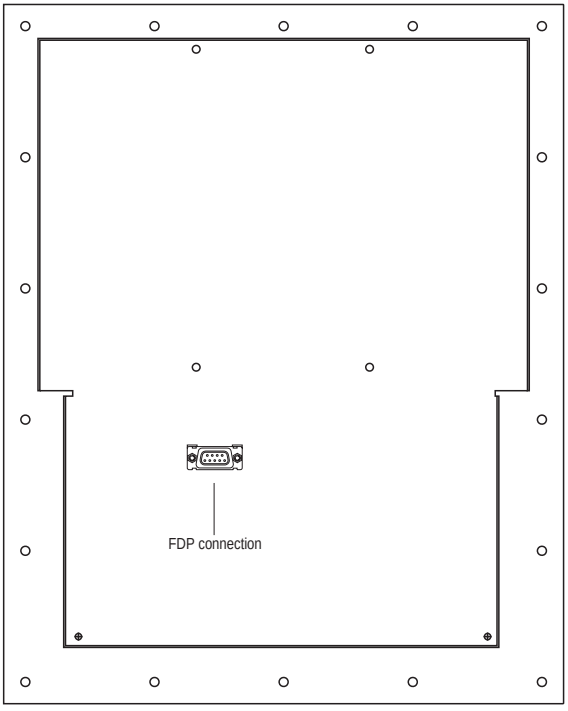


Figure 169: Connections - 5D55xx.xx

Warning!

The key codes are transferred from display to controller using the FPD cable and not with a separate cable. The existing Panelware cable on the display is used as output (for further Panelware modules) and not as input.

18.7 Integrated keys

Note: The function keys in the display represent the first Panelware module connected. Further modules can then be connected to the display.

Configuration of all keys and evaluation of key strokes is made using Mkey utilities and Mkey driver (see the Provit Mkey Utilities User Manual).

- Function keys

The function keys can be programmed by the user. Likewise, the integrated LEDs are available in every key. The letters (A to Z) are printed on the function keys. The area underneath can be labeled using legend strips.

Caution!

Pressing several function keys at the same time may trigger unintended actions.

18.8 Key labels

The keys on display units 5D5500.10, 5D5500.32, 5D5501.01 and 5D5510.10 can be labeled using legend strips. The legend strips can be inserted in the slits on the back of the display.

Two legend strips are required for the function keys ([F1] - [F5] and [F6] - [F0]). The legend strips for the small key block (3 keys) are inserted from the side, while the ones for the larger key block (10 keys) are inserted from below.

18.8.1 5D5500.10 and 5D5500.32

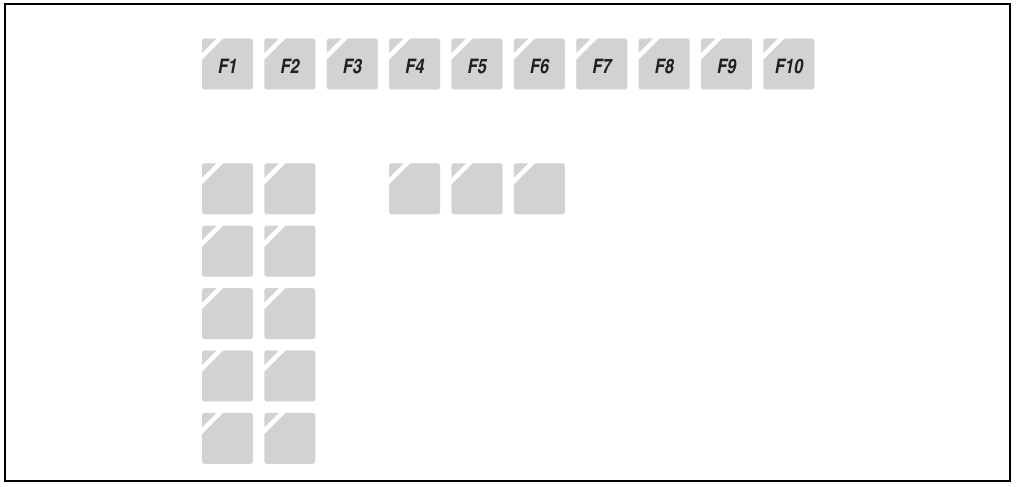


Figure 170: Key labels - 5D5500.10 and 5D5500.32

18.8.2 5D5501.01 and 5D5510.10

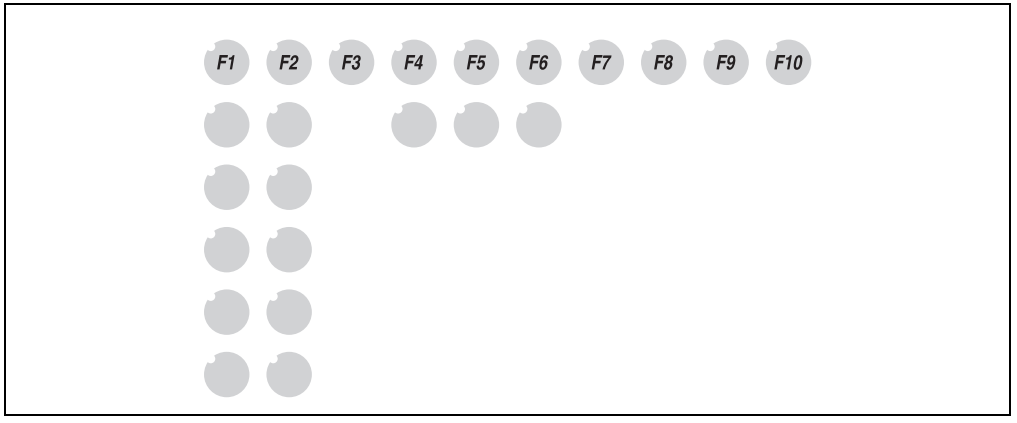


Figure 171: Key labels - 5D5501.01 and 5D5510.10

Displays are delivered with legend strips in place, and some of them are pre-printed.

Printable legend strips can be ordered from B&R (for model numbers, see table "Model numbers - accessories" on page 42). They can be printed using a standard laser printer.

19. Display units 5D5600.0x and 5D5601.0x

19.1 Photo

Figure 172: Display units 5D5600.0x and 5D5601.0x

19.2 Dimensions

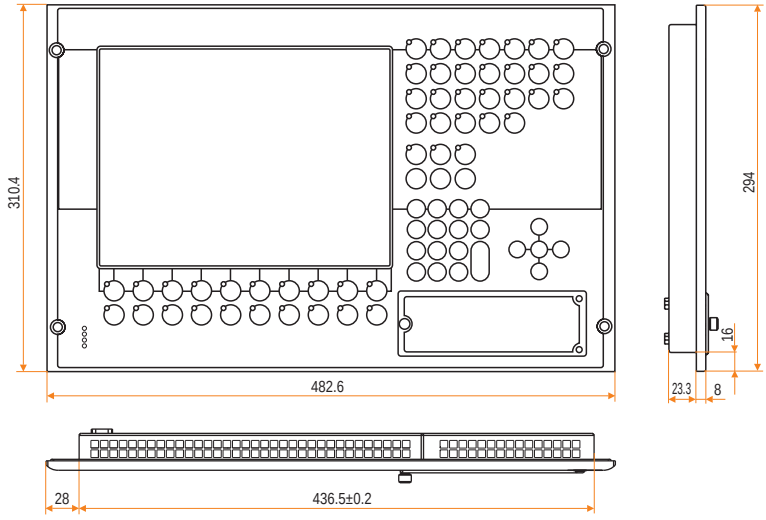


Figure 173: Dimensions - 5D5600.0x and 5D5601.0x

19.3 Technical data

Model number	5D5600.01	5D5600.02	5D5600.03	5D5601.01	5D5601.02	5D5601.03
Short text	Panel TFT C VGA 10.4" F	Panel TFT C VGA 10.4" FM	Panel TFT C VGA 10.4" FT	Panel TFT C SVGA 12.1" F	Panel TFT C SVGA 12.1" FM	Panel TFT C SVGA 12.1" FT
Controller Remote operation	IPC5000 [1], IPC5600 Max. 10 m [2]					
Display type Colors [3]	TFT color, CFL background lighting 262,144					
Resolution	VGA, 640 x 480 pixels			SVGA, 800 x 600 pixels		
Display diagonal	10.4" (264 mm)			12.1" (307 mm)		
Protection type	IP 20 rear-sided					
Front Frame Membrane [4] Gasket Accessible from the front Remote operation	 Anodized aluminum Polyester Flat gasket around display front AT keyboard socket (PS/2), FDD (Controller), CD-ROM AT keyboard socket (PS/2), FDD (Panel)					
Touch screen [5] Technology Touchpad	- - -	- - Yes	Accu Touch an./res. - -	- - -	- - Yes	Accu Touch an./res. - -
Miscellaneous Reset button AT keyboard (PS/2) Standard mounting FDD or LS120 CD-ROM Remote mounting 3.5" FDD	 Accessible behind front cover Socket accessible behind front cover Accessible behind front cover Accessible behind front cover Accessible behind front cover, max. 1.8 m distance					
Design	Light gray					
Keys Function keys Function keys with LED Softkeys Softkeys with LEDs System keys System keys with LEDs	 - 46 - - 25 1					
Background lighting (typ.) Brightness Lifespan [6] [7]	 200 cd/m² 50,000 hours			 300 cd/m² 50,000 hours		
Temperature Operation Storage	 0 - 50 °C, depending on installation -20 to +60° C					
Relative humidity Operation Storage	 5 - 85 %, non-condensing T ≤40° C: 5% to 90%, non-condensing T > 40° C: < 90 %, non-condensing					
Weight	Approx. 4.8 kg					
Outer dimensions (W x H x D) [8]	482 x 310 x 31 mm (19 inch x 7 HU)					

Table 156: Technical data - 5D5600.0x and 5D5601.0x

Model number	5D5600.01	5D5600.02	5D5600.03	5D5601.01	5D5601.02	5D5601.03
Protection type	IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)					
Display design / colors Dark grey Light background Orange keys Dark gray keys Legend strips (gray)	 Similar to Pantone 432CV Similar to Pantone 427CV Similar to Pantone 151CV Similar to Pantone 431CV Similar to Pantone 429CV					

Table 156: Technical data - 5D5600.0x and 5D5601.0x

1) Installation only possible with separate cable set (model number 5A5601.01).
2) Distance depends on the revision number; see section 2.1 "Distance for remote operation" on page 214.
3) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.
4) Resistant according to DIN 42 115 part 2, see also section "Chemical resistance" on page 492.
5) See chapter "Technical appendix" on page 469.
6) Decrease in brightness of 50 %.
7) At 25 °C operating temperature.
8) Without controller

19.4 Cutout installation

The cutout and drill holes are to be made according to the following dimensions for cutout installation.

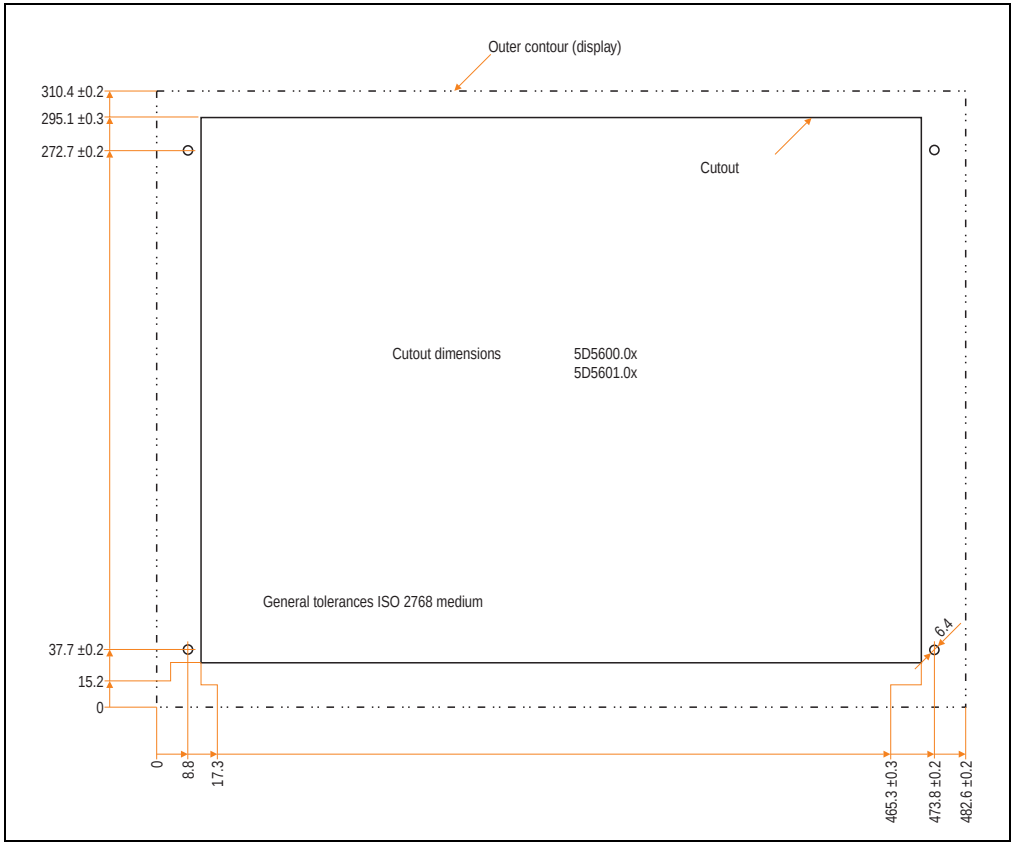


Figure 174: Cutout installation - 5D5600.0x and 5D5601.0x

19.5 Mounting guidelines

When mounting the display unit on the controller unit (standard mounting) the display is fastened on the controller with the six screws included in the delivery. The FPD and touch screen connection cables for standard mounting are also included in the delivery.

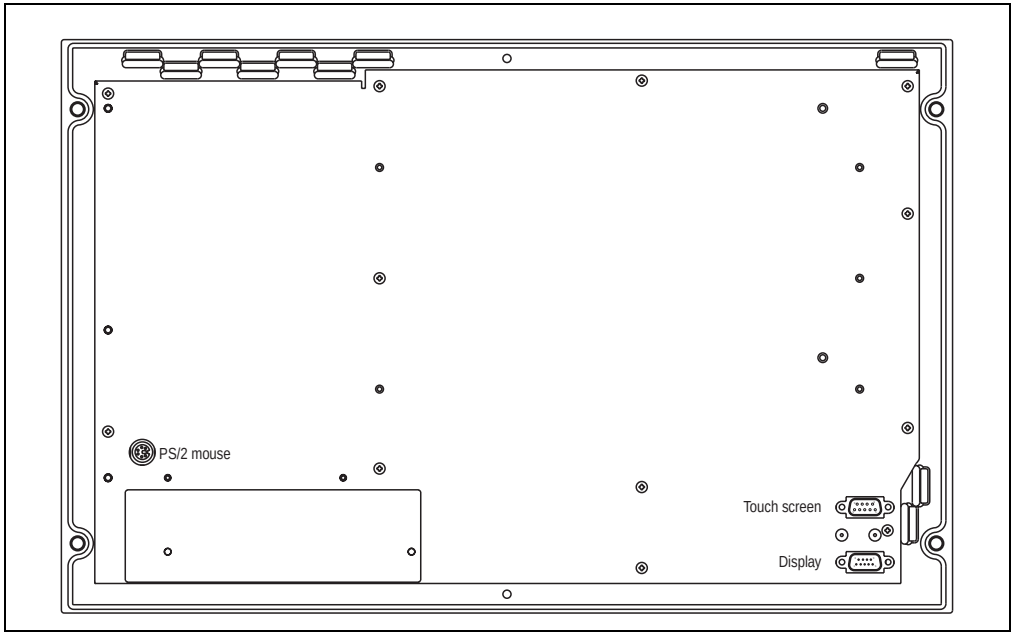


Figure 175: Connections 5D5600.0x and 5D5601.0x

Information:

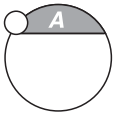
It is not possible to use Panelware modules with display units 5D5600.0x and 5D5601.0x, because the integrated keys in the display have already reached the maximum number of keys (see section 3 "Using Panelware modules" on page 215).

The dimensions of display units 5D5600.0x and 5D5601.0x allow for installation in standard 19" plug-in frames.

19.6 Integrated keys

Configuration of all keys and evaluation of key strokes is made using Mkey utilities and Mkey driver (see the Provit Mkey Utilities User Manual).

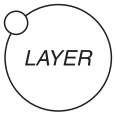
- Function keys



The function keys can be programmed by the user. Likewise, the integrated LEDs are available in every key. The letters (A to Z) are printed on the function keys. The area underneath can be labeled using legend strips.

> **Caution!**
>
> **Pressing several function keys at the same time may trigger unintended actions.**

- System keys



The functions of the system keys (number block, Ctrl, Alt, Del, Tab, Windows) are the same as with conventional PCs. An exception however is the [Layer] key, which allows multiple assignments for all existing keys (similar to the shift key). The display units 5D5600.0x and 5D5601.0x allow up to 4 levels to be used (multiple assignments). In this case, keys can be defined to switch levels (see the Provit Mkey Utilities User's Manual). The system keys are printed at B&R and cannot be labeled.

It is important to note that a maximum of 2 special keys can be pressed simultaneously, otherwise the key code can no longer be recognized correctly (with the exception of [Ctrl]+[Alt]+[Del]).

19.7 Reset button

A reset button is accessible through a small gap behind the front cover of the display unit.

> **Information:**
>
> **Triggering a reset is delayed by approximately 2 to 3 seconds after pressing the button. Do not attempt to initiate a reset by repeated or forced pressing!**

19.8 LED Displays

There are four status LEDs in the bottom left corner of the display unit:

- POWER (green): The controller's supply voltage is present
- USER (yellow): can be programmed by the user
- HDD (yellow): Signalizes hard disk activity
- TEMP (red): indicates over-temperature

19.9 Key labels

The display unit keys 5D5600.0x and 5D5601.0x can be labeled using legend strips. The designated strip slots can be accessed at the back of the display (from the side and from above).

Figure 176: Legend strips 5D5600.0x and 5D5601.0x

Displays are delivered with legend strips in place, and some of them are pre-printed. Printable legend strips can be ordered from B&R (for model numbers, see table 13 "Model numbers - accessories" on page 42). This can be printed using a standard laser printer.

The following keys can be labeled with legend strips:

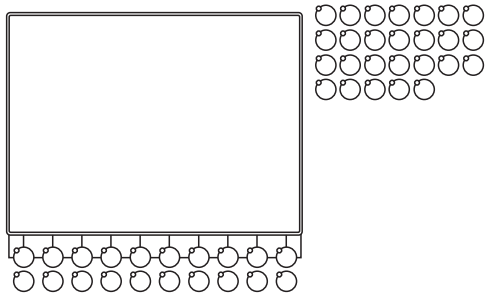


Figure 177: Keys that can be labeled - 5D5600.0x and 5D5601.0x

19.10 Accessories

Model number	Accessories
5A5004.01	Remote panel cable 0.6 m
5A5004.02	Remote panel cable 1.8 m
5A5004.05	Remote panel cable 5 m
5A5004.06	Remote panel cable 5 m 1 x 70°
5A5004.10	Remote panel cable 10 m
5A5004.11	Remote panel cable 10 m 1 x 70°
9A0014.02	RS232 extension 1.8 m (touch screen)
9A0014.05	RS232 extension 5 m (touch screen)
9A0014.10	RS232 extension 10 m (touch screen)
5S0000.01-090	HMI Drivers & Utilities CD-ROM contains the necessary drivers for the touch screen, Interlink touch pad, and Provit Mkey Utilities
5A5602.01	Legend strip templates 10.4"
5A5602.02	Legend strip templates 12.1"
Available	Background lighting

Table 157: Order data - accessories 5D5600.0x and 5D5601.0x

Chapter 4 • Display kits

1. General information

Display kits are designed to be installed by the customer (integrated into a machine). Display kits consist of the display and the corresponding cable (without housing).

1.1 Overview

Type	Short description	Note
5D5000.03	Panel kit TFT color VGA 10.4"	
5D5000.10	Panel kit LCD color VGA 10.4"	
5D5000.14	Panel kit TFT color VGA 13.8"	*Cancelled since 01/2000*
5D5000.18	Panel kit TFT color XGA 13.8"	*Cancelled since 01/2000*
5D5001.03	Panel kit TFT color SVGA 12.1" with touch screen	

Table 158: Display kits overview

1.2 Mounting guidelines

Display kits are supplied with a 10 cm (approx.) long Panellink cable (9-pin DSUB), which makes the connection to the controller.

Important!

Display kits can not be fastened to the controller as delivered. The customer is responsible for necessary installation and mounting.

If the display is to be remotely operated by the controller (remote mounting), then a separately ordered remote display cable is required (see section "Remote display cable 5A5004.xx" on page 457).

With remote mounting, the maximum distance between the display unit and the controller unit depends on the respective display unit. Information can be found in the respective chapters in the tables containing the technical data for the display kits.

1.3 Using Panelware modules

See chapter 3 "Display units", section 1.3 "Using Panelware modules" on page 287.

1.4 Brightness/contrast

See chapter 3 "Display units", section 1.4 "Brightness/contrast" on page 288.

2. Display kit 5D5000.03

2.1 Photo

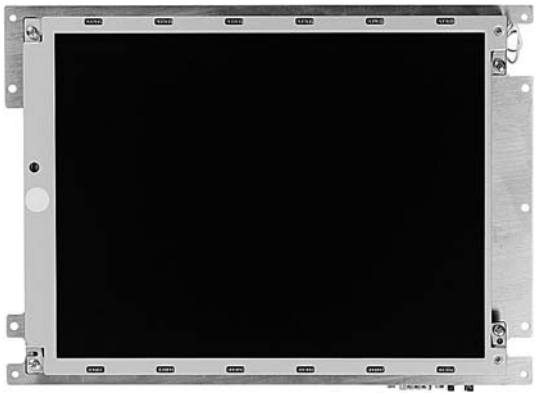


Figure 178: Display kit 5D5000.03

2.2 Dimensions

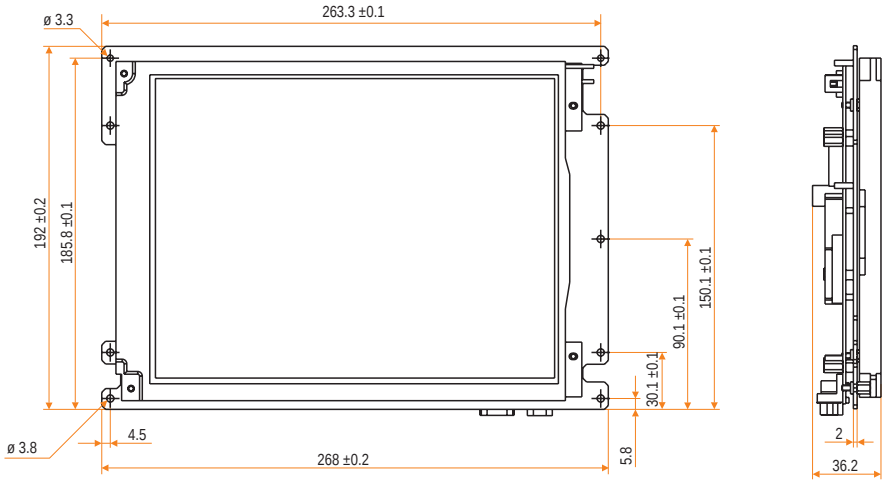


Figure 179: Dimensions - 5D5000.03

2.3 Technical data

Model number	5D5000.03
Short text	Panel kit TFT C VGA 10.4"
Controller	IPC5000, IPC5600 Max distance 10 m [1]
Display type Colors [2]	TFT color, CFL background lighting 262.144
Resolution	VGA (640 x 480 pixels)
Display diagonal	10.4" (264 mm)
Background lighting (typ.) Brightness Lifespan [3] [4]	 200 cd/m^2 50,000 h
Temperature Operation Storage	 0 - 50 °C, depending on installation -20 to +60 °C
Relative humidity Operation Storage	 5 - 85 %, non-condensing T ≤40° C: 5% to 90%, non-condensing T > 40° C: < 90 %, non-condensing
Weight	approx. 0.43 kg
Outer dimensions (W x H x D)	268 x 192 x 36.2 mm

Table 159: Technical data - 5D5000.03

1) Distance depends on the revision number; see section "Distance for remote operation" on page 214.

2) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.

3) Decrease in brightness of 50 %.

4) At 25°C operating temperature.

3. Display kit 5D5000.10

3.1 Photo

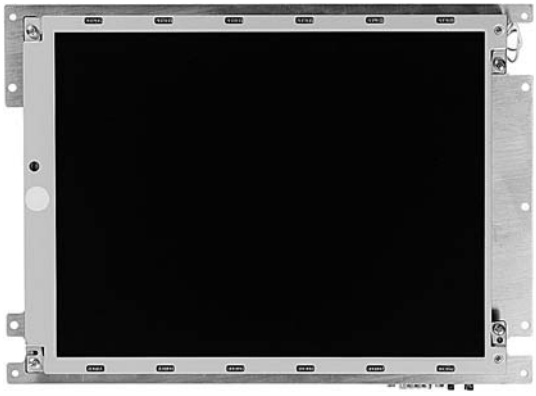


Figure 180: Display kit 5D5000.10

3.2 Dimensions

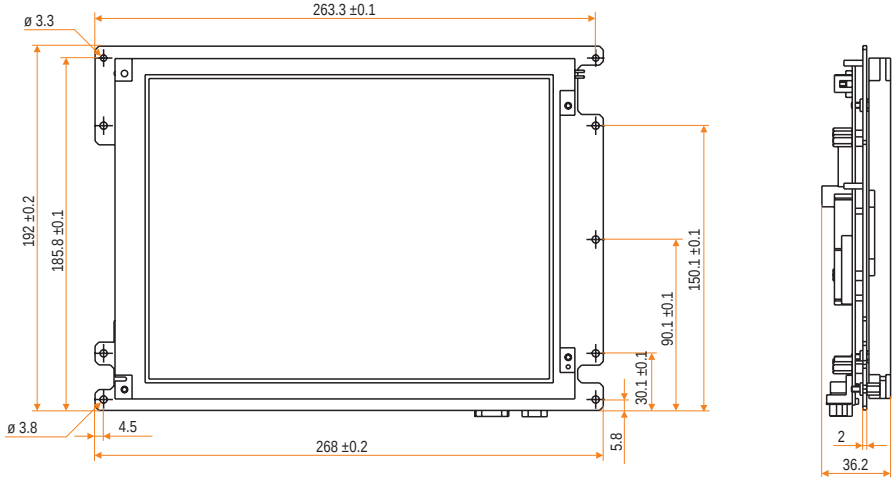


Figure 181: Dimensions - 5D5000.10

3.3 Technical data

Model number	5D5000.10
Short text	Panel kit LCD C VGA 10.4"
Controller	IPC5000, IPC5600 Max distance 10 m [1]
Display type Colors [2]	LCD color, CFL background lighting 262,144
Resolution	VGA (640 x 480 pixels)
Display diagonal	10.4" (264 mm)
Background lighting (typ.) Brightness Lifespan [3] [4]	 70 cd/m^2 10,000 h
Temperature Operation Storage	 5 - 40 °C, depending on installation -20 to +60 °C
Relative humidity Operation Storage	 5 - 85 %, non-condensing T ≤40° C: 5% to 90%, non-condensing T > 40° C: < 90 %, non-condensing
Weight	approx. 0.75 kg
Outer dimensions (W x H x D)	268 x 192 x 36.2 mm

Table 160: Technical data - 5D5000.10

1) Distance depends on the revision number; see section "Distance for remote operation" on page 214.

2) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.

3) Decrease in brightness of 50 %.

4) At 25°C operating temperature.

4. Display kit 5D5000.14

4.1 Photo

Figure 182: Display kit 5D5000.14

4.2 Dimensions

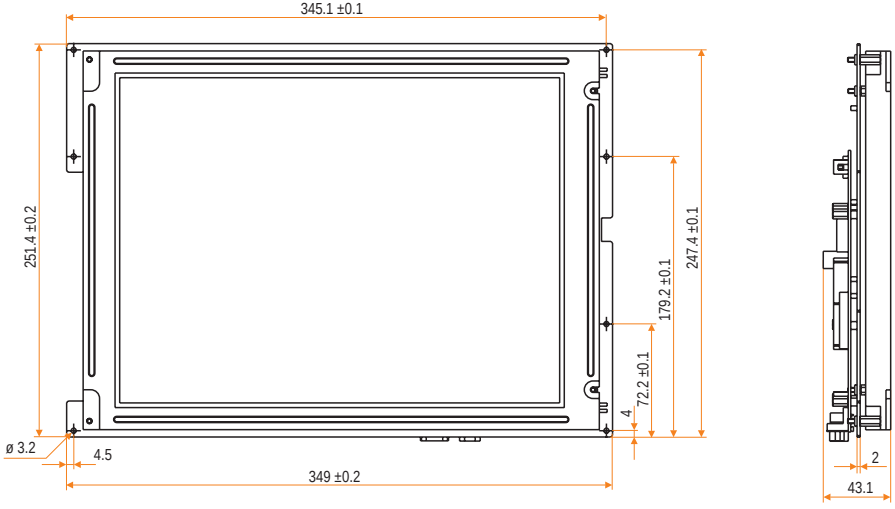


Figure 183: Dimensions - 5D5000.14

4.3 Technical data

Model number	5D5000.14
Short text	Panel kit TFT C VGA 13.8"
Controller	IPC5000, IPC5600 Max distance 10 m [1]
Display type Colors [2]	TFT color, CFL background lighting 16 million
Resolution	VGA (640 x 480 pixels)
Display diagonal	13.8" (351 mm)
Background lighting (typ.) Brightness Lifespan [3] [4]	 180 cd/m^2 10,000 h
Temperature Operation Storage	 0 - 50 °C, depending on installation -20 to +60 °C
Relative humidity Operation Storage	 5 - 85 %, non-condensing T ≤40° C: 5% to 90%, non-condensing T > 40° C: < 90 %, non-condensing
Weight	approx. 0.75 kg
Outer dimensions (W x H x D)	349 x 251.4 x 43.1 mm
Relative humidity	5 - 85 %, non-condensing

Table 161: Technical data - 5D5000.14

1) Distance depends on the revision number; see section "Distance for remote operation" on page 214.
2) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.
3) Decrease in brightness of 50 %.
4) At 25°C operating temperature.

5. Display kit 5D5000.18

5.1 Photo

Figure 184: Display kit 5D5000.18

5.2 Dimensions

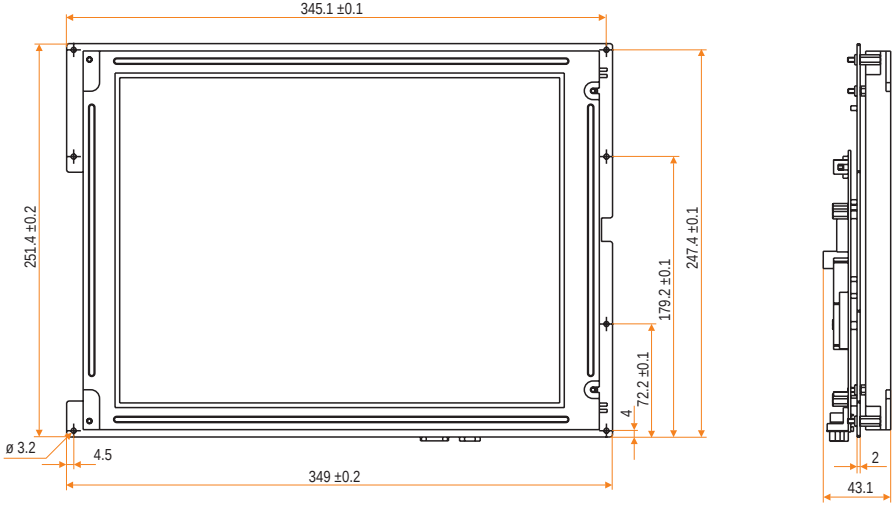


Figure 185: Dimensions - 5D5000.18

5.3 Technical data

Model number	5D5000.18
Short text	Panel kit TFT C XGA 13.8"
Controller	IPC5000, IPC5600 Max distance 10 m [1]
Display type Colors [2]	TFT color, CFL background lighting 16 million
Resolution	XGA (1024 x 768 pixels)
Display diagonal	13.8" (351 mm)
Background lighting (typ.) Brightness Lifespan [3] [4]	 180 cd/m^2 10,000 h
Temperature Operation Storage	 0 - 50 °C, depending on installation -20 to +60 °C
Relative humidity Operation Storage	 5 - 85 %, non-condensing T ≤40° C: 5% to 90%, non-condensing T > 40° C: < 90 %, non-condensing
Weight	approx. 0.75 kg
Outer dimensions (W x H x D)	349 x 251.4 x 43.1 mm

Table 162: Technical data - 5D5000.18

1) Distance depends on the revision number; see section "Distance for remote operation" on page 214.

2) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.

3) Decrease in brightness of 50 %.

4) At 25°C operating temperature.

6. Display kit 5D5001.03

6.1 Photo

Figure 186: Display kit 5D5001.03

6.2 Dimensions

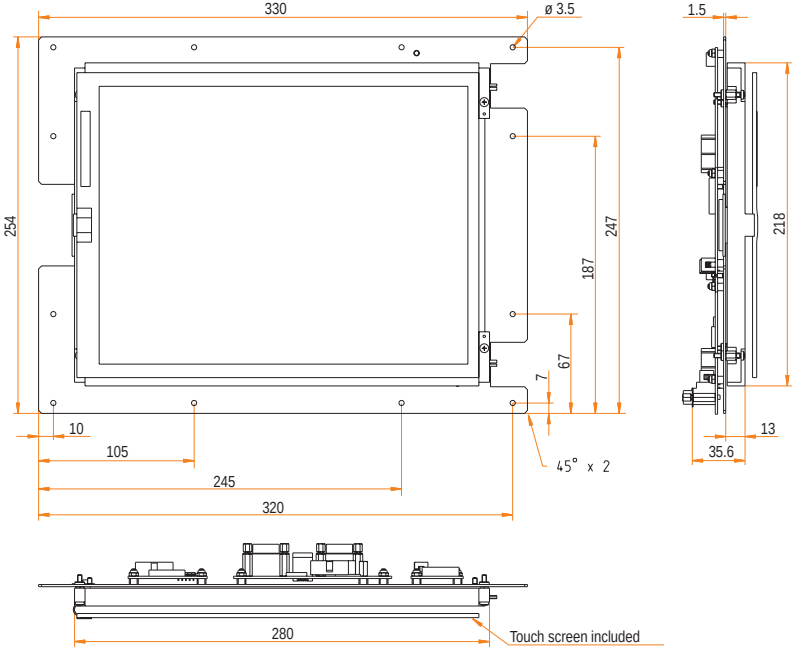


Figure 187: Dimensions - 5D5001.03

6.3 Technical data

Model number	5D5001.03
Short text	Panel kit TFT C SVGA 12.1" with touch screen
Controller	IPC5000, IPC5600 Max distance 10 m [1]
Display type Colors [2]	TFT color, CFL background lighting 262,144
Resolution	SVGA (800 x 600 pixels)
Display diagonal	12.1" (307 mm)
Touch screen [3] Technology	Accu Touch analog, resistive, comes with display kit
Background lighting (typ.) Brightness Lifespan [4] [5]	 300 cd/m^2 50,000 h
Temperature Operation Storage	 0 - 50 °C, depending on installation -20 °C to +60 °C
Relative humidity Operation Storage	 5 - 85 %, non-condensing T ≤40 °C: 5 % to 90 %, non-condensing T > 40 °C: < 90 %, non-condensing
Weight	Approx. 0.75 kg
Outer dimensions (W x H x D)	300 x 254 x 35.6 mm

Table 163: Technical data - 5D5001.03

1) Distance depends on the revision number; see section "Distance for remote operation" on page 214.
2) The actual number of colors depends on the graphics memory, the graphics mode set and the graphics driver used.
3) See chapter 7.1 "Chemical resistance" on page 492.
4) Decrease in brightness of 50 %.
5) At 25°C operating temperature.

Chapter 5 • Keypad modules

1. Overview

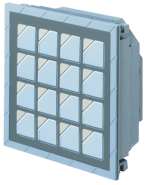
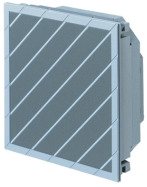
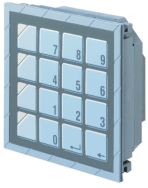
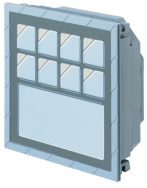
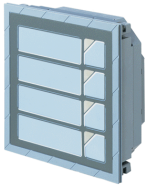
16 keys, 16 LEDs - 4E0011.01-090 	Dummy module, no keys - 4E0050.01-090 
12 keys, 4 LEDs - 4E0021.01-090 	E-stop switch - 4E0060.01-090
8 keys, 4 LEDs, 1 label field - 4E0031.01-090 	Key switch with ON/OFF switch - 4E0070.01-090
4 keys, 4 LEDs, 4 label fields - 4E0041.01-090 	Start/Stop button with label field - 4E0080.01-090

Figure 188: Overview of keypad modules - model numbers

2. General information

2.1 Dimensions

All standard keypad modules have the same dimensions, special keypad modules can be up to 60 mm deep.

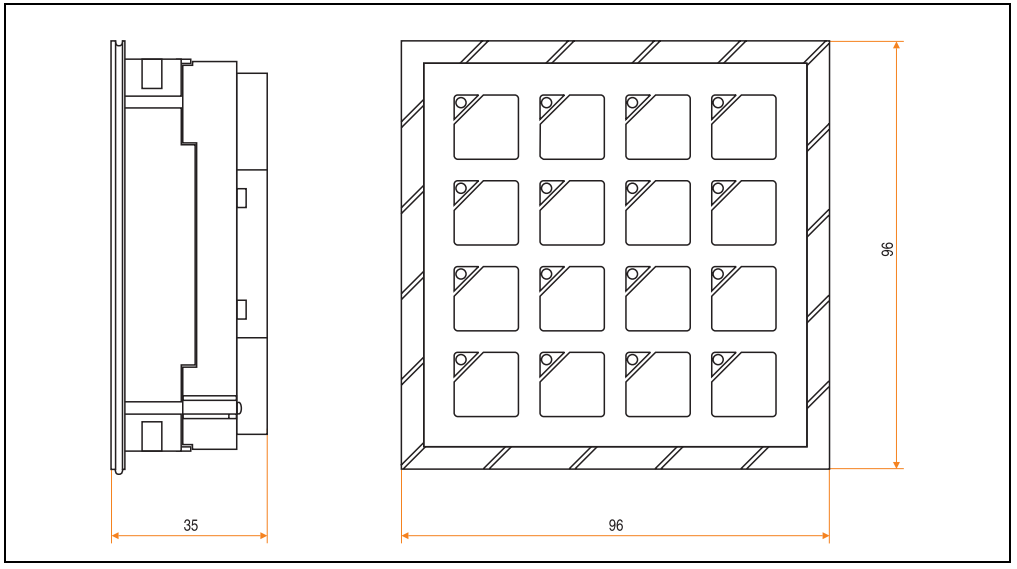


Figure 189: Dimensions for standard keypad modules

2.2 Standard and special keypad modules

Keypad modules are divided into two groups:

- Up to eight standard keypad modules can be cascaded and connected to a controller.
- Special keypad modules are identical to the rest of the keypad modules with respect to design. An electrical connection with a controller or standard keypad module is not possible. They are to be wired by an electrician according to their function (e.g. connecting an E-STOP button to an emergency stop circuit).

3. Standard keypad modules

3.1 Connecting to a controller or other keypad modules

All standard keypad modules can be connected to a controller or an another keypad module with a short connection cable. There are two sockets provided on the module for this purpose. The sockets are labeled as input or output with triangle arrows. An output is provided on the controller and on the display which can be connected to a keypad module input.

Important!

Make sure that an input is never connected to an input, or an output is never connected to an output, as this will damage the modules.

For more detailed information about connecting to a controller, see sections "Panelware keypad modules" on page 135 and "Panelware keypad modules" on page 160.

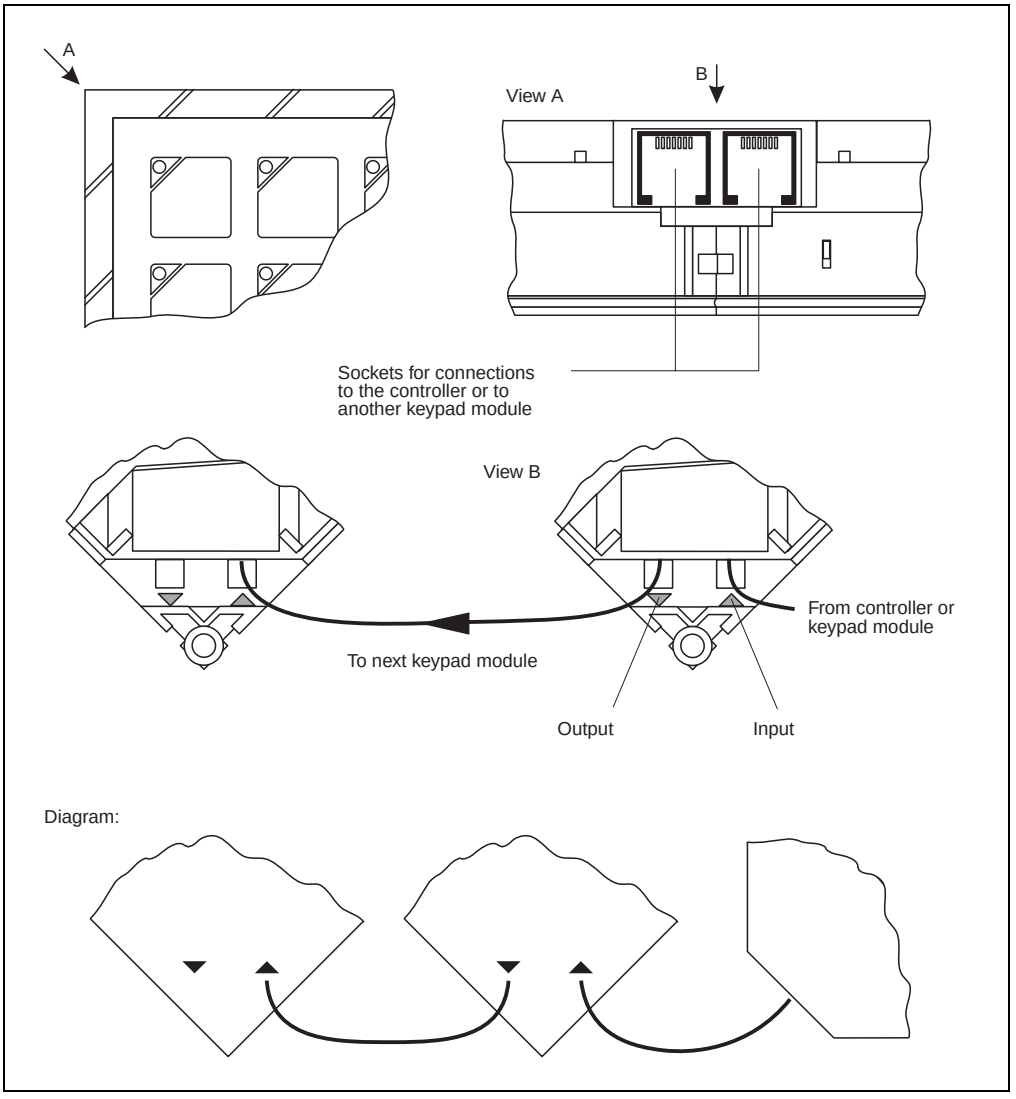


Figure 190: Connection to the controller or other keypad modules.

A 90 cm long keypad module cable can be ordered as an accessory.

Model number	Name
9A0007.01	Keypad module cable (90 cm)

Table 164: Order data for the keypad module cable (90 cm)

It can only be connected between the Provit 5000 controller and the first keypad module. The standard keypad module cable is to be used for connecting any additional keypad modules (13 cm long).

Information:

Only keypad modules with the following model numbers can be used:

Model number	Keypad Module
4E0011.01-090	16 keys
4E0021.01-090	12 + 4 keys
4E0031.01-090	8 keys
4E0041.01-090	4 keys

Table 165: Keypad modules to be used

3.2 Keypad module - 16 keys

3.2.1 Dimensions

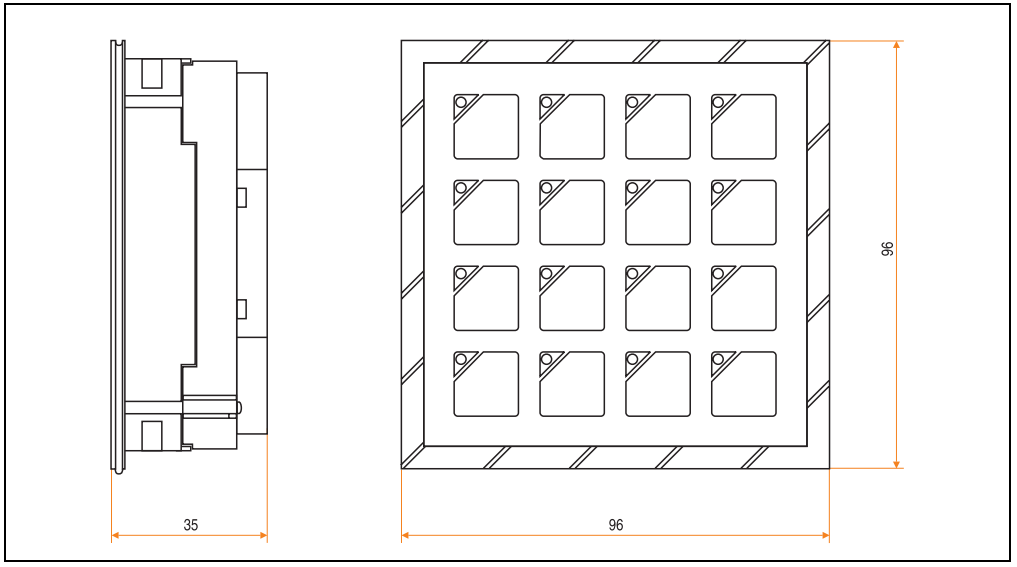


Figure 191: Dimensions - keypad module with 16 keys

3.2.2 Technical data

Model number	4E0011.01-090
Number of keys	16 short stroke keys
Number of LEDs	16 (yellow)
Label	Can be labeled by the user
Temperature range Operation Storage	 0 to 50 °C -20 to 60 °C
Relative humidity Operation Storage	 5 to 95 % (non-condensing) 5 to 95 % (non-condensing)
Shock	According to IEC 68-2-27
Vibration	According to IEC 06.02.68

Table 166: Technical data - keypad modules with 16 keys

3.3 Keypad module - 12+4 keys

3.3.1 Dimensions

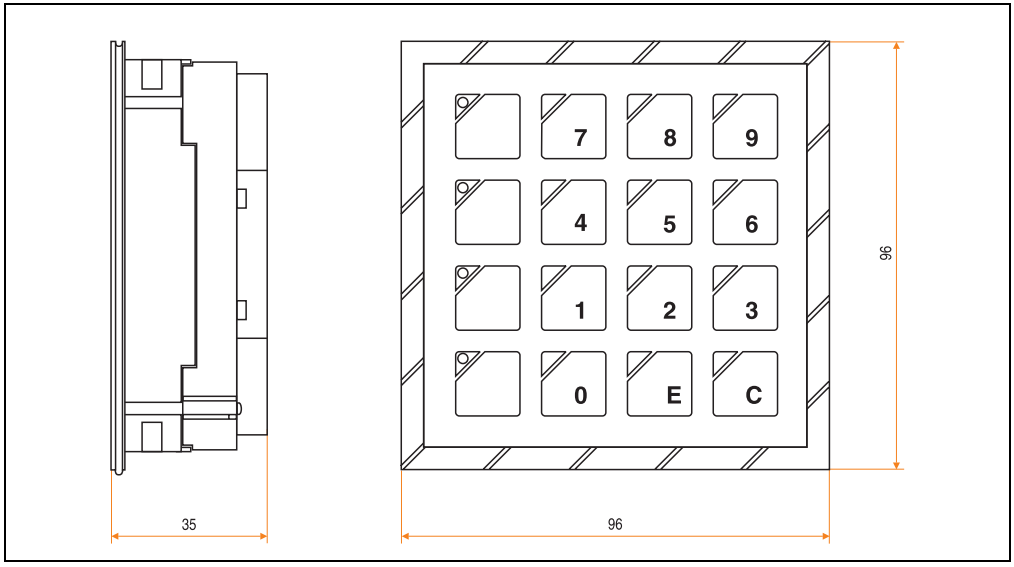


Figure 192: Dimensions - keypad module with 12+4 Keys

3.3.2 Technical data

Model number	4E0021.01-090
Number of keys	16 short stroke keys
Number of LEDs	4 (yellow)
Label	12 keys are labeled as a number block 4 keys can be labeled by the user
Temperature range Operation Storage	 0 to 50 °C -20 to 60 °C
Relative humidity Operation Storage	 5 to 95 % (non-condensing) 5 to 95 % (non-condensing)
Shock	According to IEC 68-2-27
Vibration	According to IEC 06.02.68

Table 167: Technical data - keypad modules with 12+4 keys

3.4 Keypad module - 8 keys

3.4.1 Dimensions

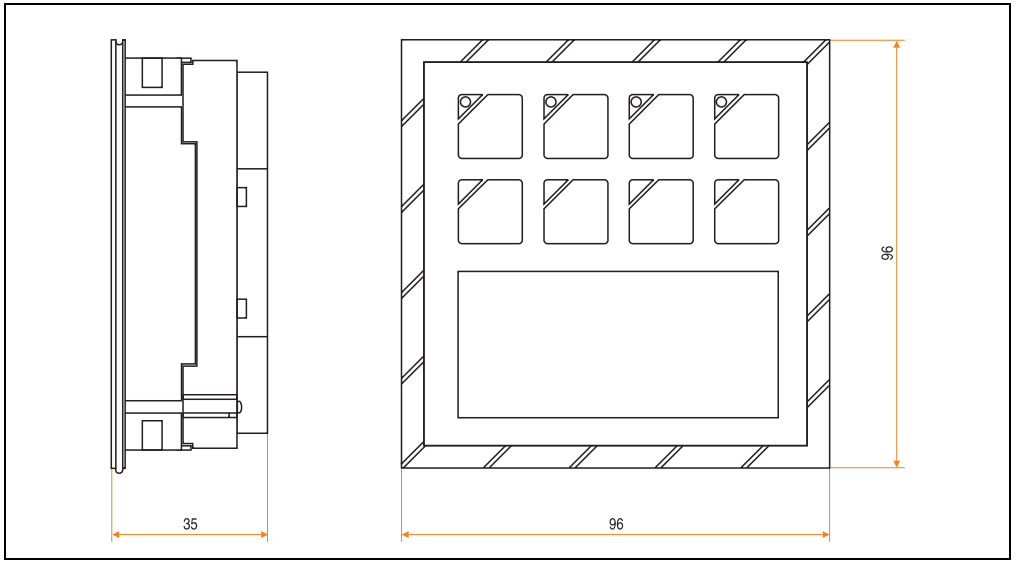


Figure 193: Dimensions - keypad module with 8 keys

3.4.2 Technical data

Model number	4E0031.01-090
Number of keys	8 short stroke keys
Number of LEDs	4 (yellow)
Label	Can be labeled by the user
Label fields	A field for additional information
Temperature range Operation Storage	 0 to 50 °C -20 to 60 °C
Relative humidity Operation Storage	 5 to 95 % (non-condensing) 5 to 95 % (non-condensing)
Shock	According to IEC 68-2-27
Vibration	According to IEC 06.02.68

Table 168: Technical data - keypad modules with 8 keys

3.5 Keypad module - 4 keys

3.5.1 Dimensions

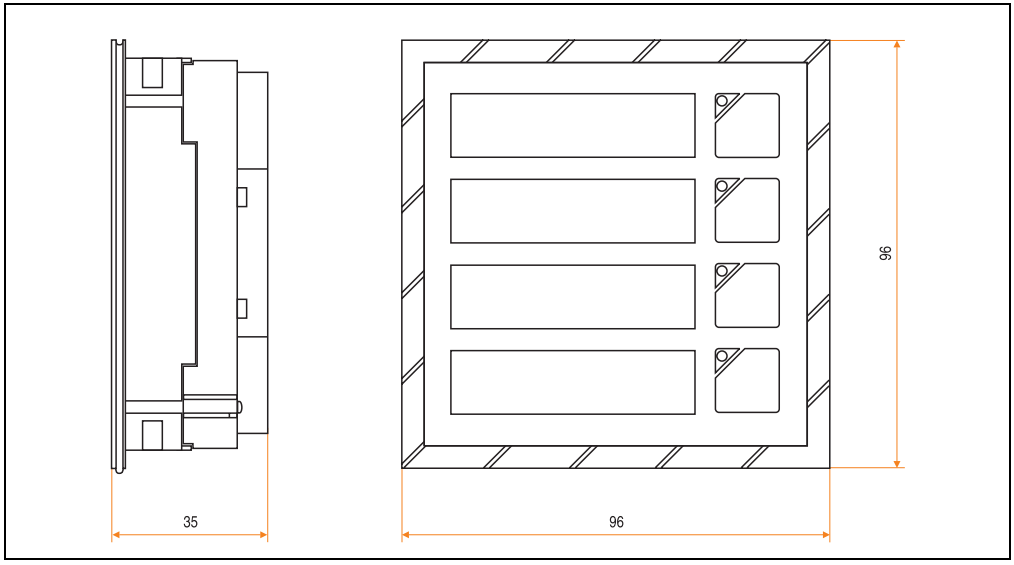


Figure 194: Dimensions - keypad module with 4 keys

3.5.2 Technical data

Model number	4E0041.01-090
Number of keys	4 short stroke keys
Number of LEDs	4 (yellow)
Label	Can be labeled by the user
Label fields	4 fields for additional information
Temperature range Operation Storage	 0 to 50 °C -20 to 60 °C
Relative humidity Operation Storage	 5 to 95 % (non-condensing) 5 to 95 % (non-condensing)
Shock	According to IEC 68-2-27
Vibration	According to IEC 06.02.68

Table 169: Technical data - keypad modules with 4 keys

4. Special keypad modules

4.1 Dummy module

4.1.1 Dimensions

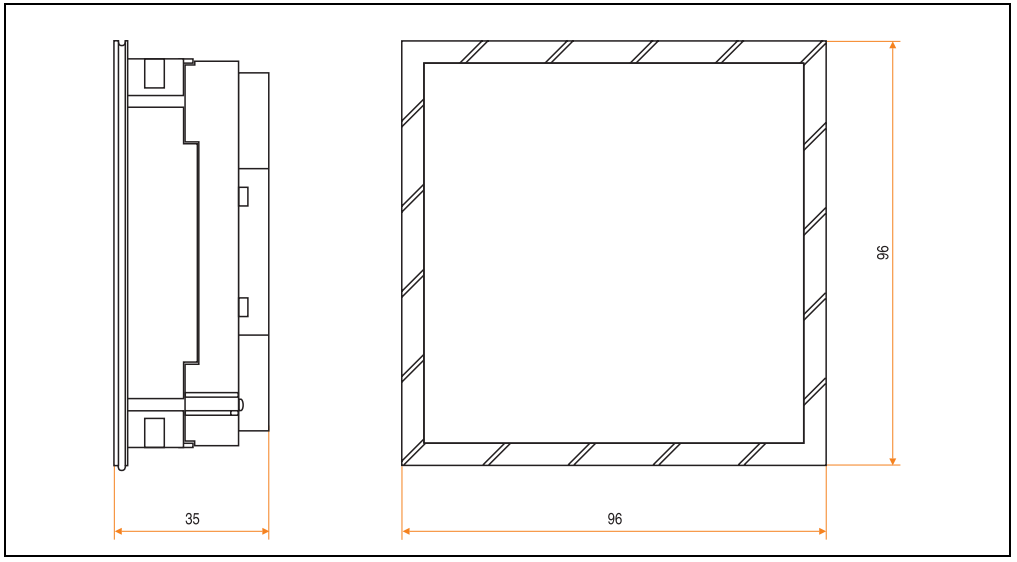


Figure 195: Dimensions - dummy module

4.1.2 Technical data

Model number	4E0050.01-090
Number of keys	None
Number of LEDs	None
Temperature range Operation Storage	 0 to 50 °C -20 to 60 °C
Relative humidity Operation Storage	 5 to 95 % (non-condensing) 5 to 95 % (non-condensing)
Shock	According to IEC 68-2-27
Vibration	According to IEC 06.02.68

Table 170: Technical data - dummy module

4.2 E-stop button

4.2.1 Dimensions

Note: No controller can be placed behind this module because of the depth of the module.

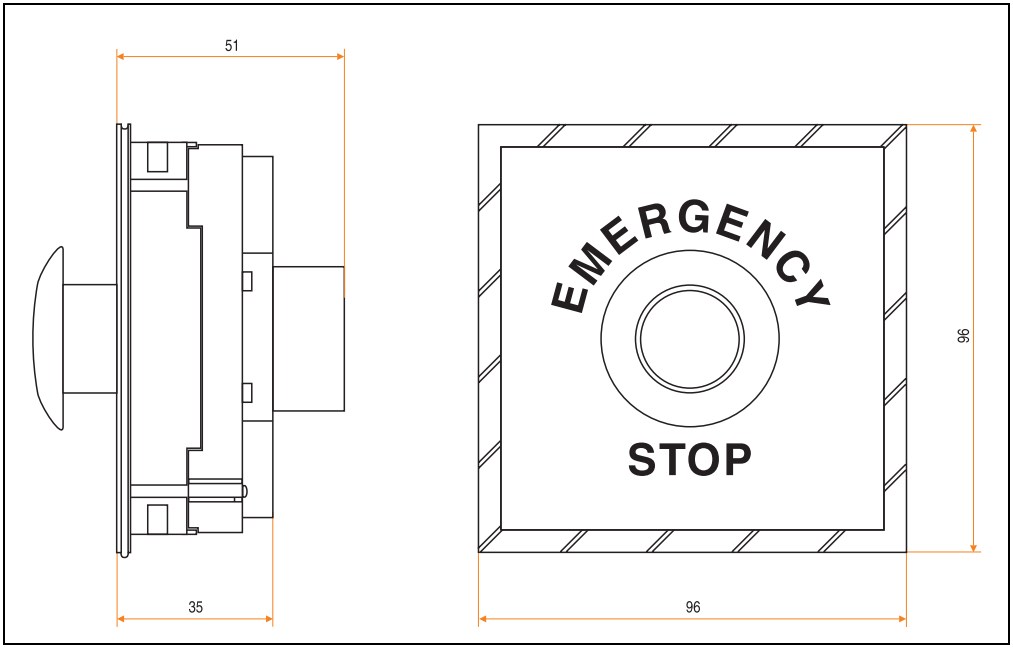


Figure 196: Dimensions - keypad module with E-stop button

4.2.2 Technical data

Model number	4E0060.01-090
Number of switches	1 E-stop button
Temperature range Operation Storage	 0 to 50 °C -20 to 60 °C
Relative humidity Operation Storage	 5 to 95 % (non-condensing) 5 to 95 % (non-condensing)
Shock	According to IEC 68-2-27
Vibration	According to IEC 06.02.68

Table 171: Technical data - keypad module with E-stop button

4.3 Key switch

Note: No controller can be placed behind this module because of the depth of the module.

4.3.1 Dimensions

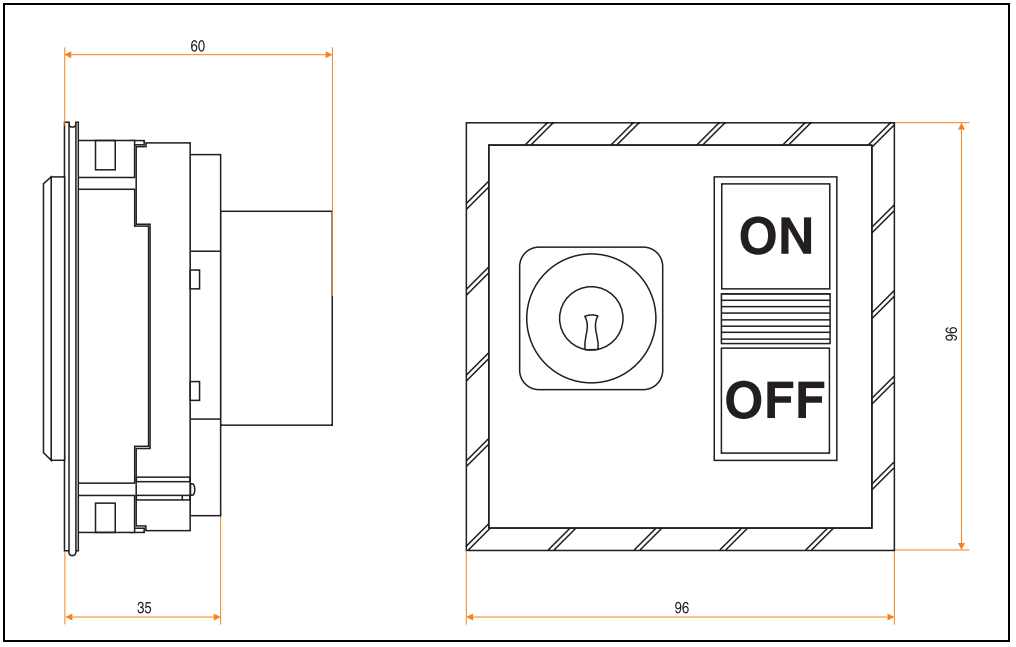


Figure 197: Dimensions - keypad module with key switch

4.3.2 Technical data

Model number	4E0070.01-090
Number of switches	1 key switch 1 ON/OFF switch
Temperature range Operation Storage	 0 to 50 °C -20 to 60 °C
Relative humidity Operation Storage	 5 to 95 % (non-condensing) 5 to 95 % (non-condensing)
Shock	According to IEC 68-2-27
Vibration	According to IEC 06.02.68

Table 172: Technical data - keypad module with key switch

4.4 START/STOP switch

Note: No controller can be placed behind this module because of the depth of the module.

4.4.1 Dimensions

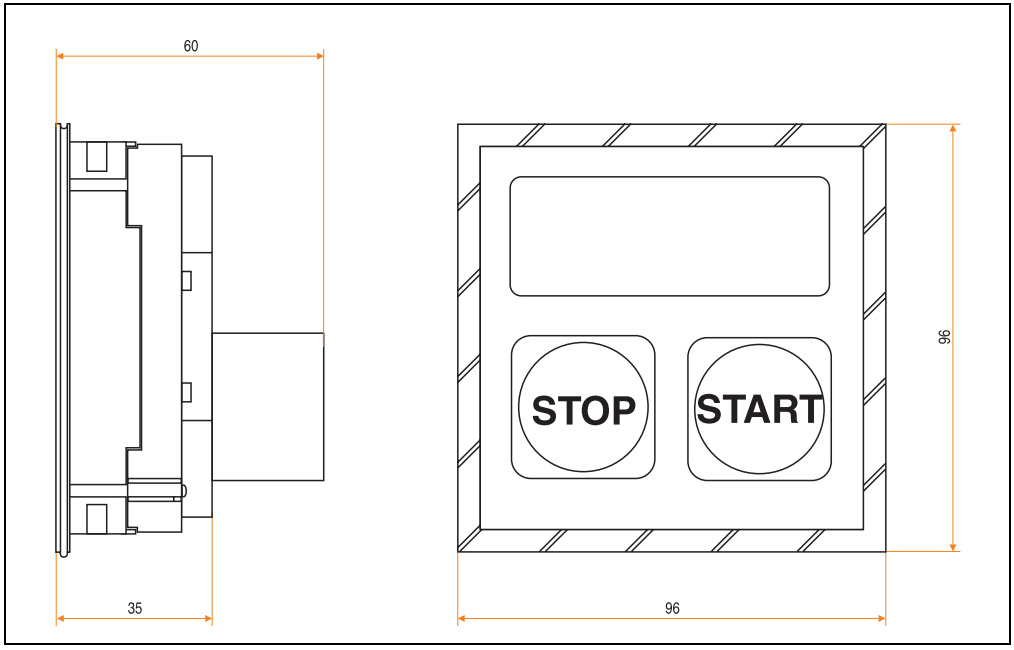


Figure 198: Dimensions - keypad module with Start/Stop switch

4.4.2 Technical data

Model number	4E0080.01-090
Number of keys	2 buttons (labeled with START and STOP)
Temperature range Operation Storage	 0 to 50 °C -20 to 60 °C
Relative humidity Operation Storage	 5 to 95 % (non-condensing) 5 to 95 % (non-condensing)
Shock	According to IEC 68-2-27
Vibration	According to IEC 06.02.68

Table 173: Technical data - keypad module with Start/Stop switch

5. Key legend sheets for keypad modules

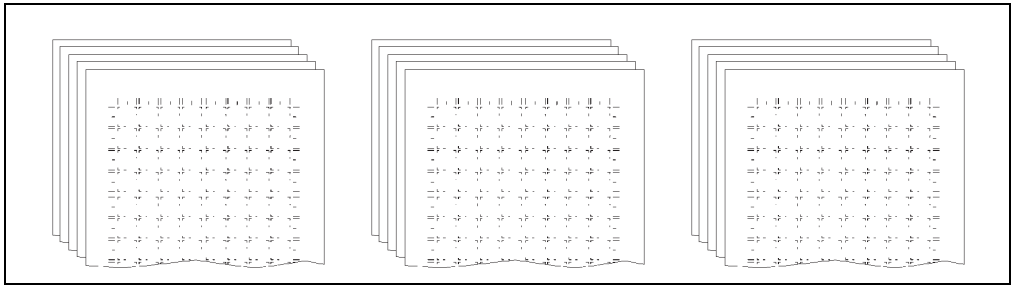


Figure 199: Key legend sheets for keypad modules

6. Accessories

Accessories are delivered with each keypad module. They are packed together with the module.

Accessories	Amount	
	Standard keypad module	Special keypad module
Connection elements	2	2
Cable covers	2	2
Keypad module cable (connection to a controller or a keypad module)	1	--
Clamps	2	2
Set of mounting bolts	1	1

Table 174: Accessories

Chapter 6 • Software

1. BIOS General Information

BIOS is an abbreviation for "**B**asic **I**nput and **O**utput **S**ystem". It is the most basic standardized communication between the user and the system (hardware).

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

The CMOS RAM is a nonvolatile battery backed memory which retains information when the power is turned off on the IPC.

The EliteBIOS used is a customized version of an industry-standard BIOS for IBM PC AT-compatible personal computers. It supports Intel x86 and compatible processors. BIOS provides critical low-level support for the central processing unit, memory and I/O subsystems.

It has been customized by B&R through the addition of important, but non standard, features such as virus and password protection, power management, and detailed fine-tuning of the chipset controlling the system.

1.1 BIOS setup

The EliteBIOS is immediately activated when switching on the power supply.

The BIOS reads system configuration information in CMOS RAM, compares it with the CMOS backup in FPROM and begins the process of checking the system and configuring it through the power-on self test (POST).

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

To enter setup, the delete key must be pressed as soon as the following message appears on the lower margin of the display (during POST):

"Press DEL to enter SETUP"

If the message disappears before DEL was pressed, then the system must be booted again in order to enter BIOS setup.

Warning

The following general rule applies: The best advice is to alter only those settings that you thoroughly understand. settings should not be changed in the chipset screen without a good reason. Chipset defaults have been carefully chosen by Award or B&R to guarantee ideal performance and reliability. Even a seemingly minor change to the chipset setup may cause the system to become unstable.

1.2 BIOS setup keys

The following keys help you navigate in BIOS Setup:

Key	Function
Cursor ↑	Move to previous item
Cursor ↓	Move to next item
Cursor ←	Move to the item on the left
Cursor →	Move to the item on the right
ESC	Main menu: Quit without saving changes to the CMOS RAM. Exit current page and return to Main Menu
PgUp↑	Increase the value / make changes
PgDn ↓	Decrease the value / make changes
+	Increase the value / make changes
-	Decrease the value / make changes
F1	A help window pops up that describes the appropriate keys to use and the possible selections for the highlighted item. Press F1 or ESC to exit the help window.
F2	"Item Help" - If a detailed help is available for a BIOS setting, pushing this key will display it in the right half of the BIOS screen.
F5	"Load previous values for this page" - This option will load all settings that were in place when BIOS setup was opened. This key is only available in the individual setup screens, and only the values for these screens are loaded.
F6	"Load fail-safe defaults for this page" - Default parameters are loaded, ensuring a stable system. This key is only available in the individual setup screens, and only the values for these screens are loaded.
F7	"Load optimized default for this page" - Factory settings are loaded into the system for optimal configuration. This key is only available in the individual setup screens, and only the values for these screens are loaded.
F10	"Save to CMOS and exit" - Save all changes to CMOS and exit setup.

Table 175: Keys relevant to BIOS

1.3 Booting procedure problems

If, after making and saving system changes in BIOS Setup, you discover that the IPC is no longer able to boot properly, the EliteBIOS supports an override to the CMOS settings that resets your system to its default configuration. You can invoke this override by immediately pressing INSERT when you restart your computer.

Note: You can restart by either using the ON/OFF switch, the RESET button or by pressing CTRL-ALT-DEL.

2. BIOS system for system units with socket 7 (ZIF)

Information:

- **The following diagrams and BIOS menu items including descriptions refer to BIOS Version 1.58. 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.**

2.1 BIOS setup main menu

The BIOS Setup main menu appears immediately by pressing the DEL button:

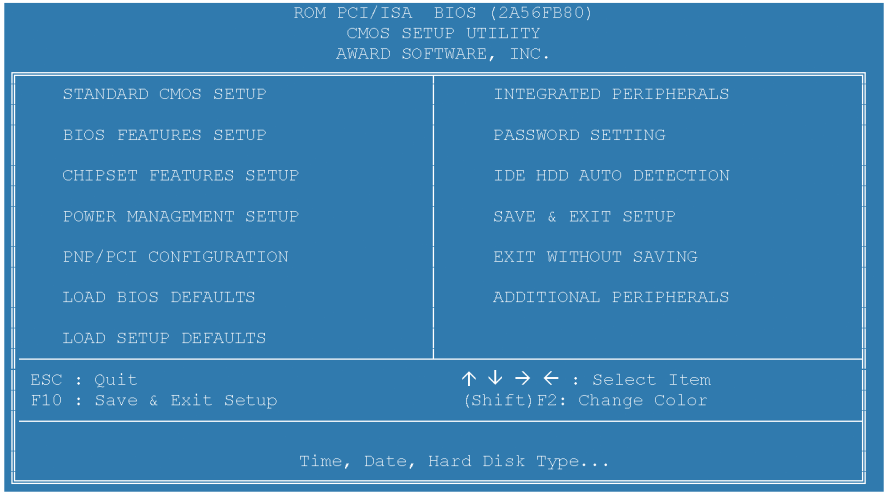


Figure 200: BIOS setup main menu

The individual menu points are explained in detail in the following sections.

BIOS setup menu	Function
Standard CMOS setup	Options in the original PC AT-compatible BIOS.
BIOS features setup	Enhanced BIOS options.
Chipset features setup	Specific options for the chipset system
Power management setup	Advanced Power Management (APM) options.
PnP/PCI configuration	Options for Plug & Play and PCI cards
Load BIOS defaults	Loads factory settings for the most stable minimal performance system operations.

Table 176: Overview of BIOS main menu functions

BIOS setup menu	Function
Load setup defaults	Loads factory settings for optimal system performance
Integrated peripherals	Peripheral subsystems for different I/O operations of the system
Password setting	Change, set or disable password protection.
IDE HDD auto detection	Automatic detection and configuration of IDE devices
Save & exit setup	Save settings in CMOS-RAM and exit BIOS Setup
Exit without saving	Abandon all changes and exit BIOS Setup.
Additional peripherals	B&R specific settings for integrated peripheral devices

Table 176: Overview of BIOS main menu functions (cont.)

2.2 Standard CMOS setup

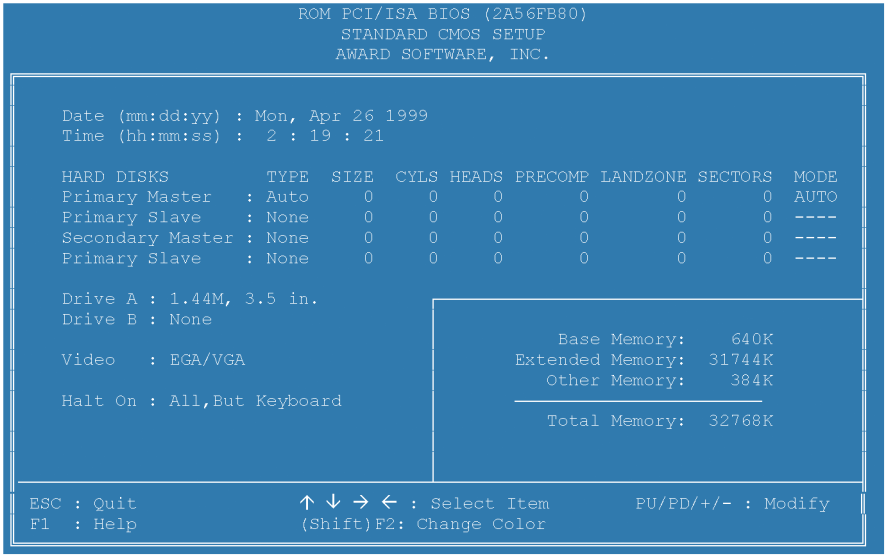


Figure 201: Standard CMOS setup

BIOS setting	Meaning	Setting options	Effect
Date (mm:dd:yy)	This is the current system date setting. The time is buffered by a battery (CMOS battery) after the system has been switched off.	Adjustment of the system date	Individual setting of the system date
Time (hh:mm:ss)	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	Individual setting of the system time

Table 177: Standard CMOS features - description of setting options

BIOS setting	Meaning	Setting options	Effect	
Hard disks	Parameters for existing hard disks in the IPC are set here. We recommend that you select "Auto". BIOS automatically detects the specifications and the optimal operating mode of almost all IDE hard drives.	Auto	When you select AUTO for a hard drive, those specifications are detected during POST, every time the system boots.	
		User	**Size** **Cyls** **Head** **Precomp** **Landzone** **Sector** **Mode**	Disk drive capacity. Note that this size is usually slightly greater than the size of a formatted disk given by a disk-checking program. Number of cylinders Number of heads Write precompensation cylinder Landing zone Number of sectors **Auto** BIOS automatically determines the optimal mode. **Normal** The following maximum values are supported: Number of cylinders = 1024 Number of heads = 16 Number of sectors = 64 **Large** For drives that do not support LBA and have more than 1024 cylinders. **LBA** Logical Block Addressing: For drives with more than 1024 cylinders. During drive accesses, the IDE controller transforms the data address described by sector, head, and cylinder number into a physical block address. This results in a significantly improved data transfer rate.
Drive A	Set the largest amount of memory permitted for a connected disk drive.	None 360K, 13.34cm 1.2M , 5.25" 720K, 8.89 cm 1.44M, 3.5 in	No diskette drive installed 5¼ " disk drive, 360kB capacity 5¼" disk drive, 1.2MB capacity 3½" disk drive, 720kB capacity 3½" disk drive, 1.44MB capacity	
Drive B	Set the largest amount of memory permitted for a connected disk drive.	None 360K, 13.34cm 1.2M , 5.25" 720K, 8.89 cm 1.44M, 3.5 in	No diskette drive installed 5¼ " disk drive, 360kB capacity 5¼" disk drive, 1.2MB capacity 3½" disk drive, 720kB capacity 3½" disk drive, 1.44MB capacity	
Video	The primary graphics subsystem can be setup here. BIOS usually detects the correct video type automatically.	EGA/VGA	Enhanced Graphics Adapter / Video Graphics Array For EGA, VGA, SAGA, SVGA or PGA monitor adapters	
		CGA 40	Color graphics adapter, power up in 40 column mode	
		CGA 80	Color graphics adapter, power up in 80 column mode	
		Mono	Monochrome adapter (includes high resolution monochrome adapter)	

Table 177: Standard CMOS features - description of setting options (cont.)

BIOS setting	Meaning	Setting options	Effect
Halt on	This option sets whether the system should pause the Power On Self Test (POST) when it encounters an error, and after which non-fatal errors the POST should be continued.	All errors	The system pauses every time an error is encountered.
		No errors	All errors are ignored.
		All but keyboard	System pauses for all errors except keyboard errors
		All but diskette	System pauses for all errors except disk drive errors
		All but disk/key	System pauses for all errors except keyboard or drive errors

Table 177: Standard CMOS features - description of setting options (cont.)

2.3 BIOS features setup

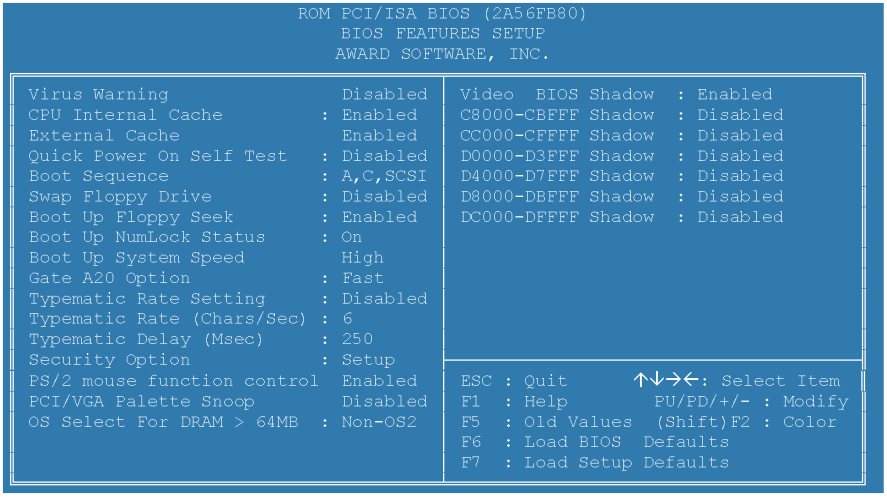


Figure 202: BIOS features setup

BIOS setting	Meaning	Setting options	Effect
Virus warning	When enabled, you receive a warning message if a program (especially a virus) attempts to alter the boot sector or the partition table of the boot drive (not the rest of the hard drive).	Disabled	Function is deactivated.
		Enabled	Function is activated.
CPU internal cache	Switching the L1 cache of the processor, on or off. Switching off the internal cache slows down the system to below 65%, and therefore is not advisable.	Enabled	Use of the L1 cache is activated.
		Disabled	No L1 cache is used.

Table 178: BIOS features setup - description of setting options

BIOS setting	Meaning	Setting options	Effect
External cache	Makes it possible to prevent the use of the integrated second level cache on the mainboard. Switching off the external cache slows down the system considerably, and is therefore not advisable.	Enabled	Use of the second level cache is activated.
		Disabled	No second level cache is used.
Quick Power On Self Test	Enabling this option speeds up the booting process. Up to 10 seconds can be taken off the booting process with 64 MB RAM or more. However, not all POST tests are carried out.	Enabled	Speeds up POST considerably by skipping the full memory test.
		Disabled	All self tests are carried out.
Boot sequence	Determines the order in which to boot the respective devices, offering different combination options. At the beginning of the sequence, an operating system is sought on the first device. If there is none found, BIOS continues down the list of devices. If an operating system is found on a device, then this drive is booted. However if the BIOS does not find an operating system, an error message appears on the screen. If the drive that is booted from is not a hard drive, then it is automatically assigned drive designation A. If a disk drive is also available, then it is automatically assigned the drive designation B.		
Swap floppy drive	Here you can switch floppy drives without moving the cable. This field is effective only in systems with two floppy drives.	Enabled	The drive letter B is assigned to the physical drive A and the drive letter A to the physical drive B.
		Disabled	When disabled, drive letter assignments are not changed.
Boot up floppy seek	When the PC is started, the disk drive is searched for the number of tracks (40 or 80). **Note:** Only 360 KByte diskettes have 40 tracks. All diskettes with 720 KByte, 1.2 MByte and 1.44 MByte have 80 tracks.	Enabled	BIOS searches the disk drives during POST.
		Disabled	Saves several seconds boot time.
Boot up NumLock status	With this field you can define the state of the NumLock key when booting.	On	The numeric keypad generates numbers instead of controlling cursor operations.
		Off	The control fields are used for the keys (cursor keys, Pos1, End, etc.).
Boot up system speed	The system speed at start up can be set here.	High	Select HIGH to boot the default CPU speed.
		Low	Select LOW to boot at the speed of the AT bus. Some older software requires this mode.
Gate A20 option	Determines how the memory above 1MB is accessed.	Fast	Gate A20 is controlled by the system chipset.
		Normal	Gate A20 is controlled by the keyboard controller.
Typematic rate Setting	Determines the typematic rate of the keyboard controller.	Disabled	When disabled, the next two options "typematic rate (char/sec)" and "typematic delay (Msec)" are irrelevant.
		Enabled	When enabled, you can select a typematic rate and typematic delay. This setting can also be made in Windows.
Typematic rate (chars/sec)	Can only be selected when typematic rate setting is enabled. Determines the speed that characters are repeated when a key is pressed and held down.	6, 8, 10, 12, 15, 20, 24 or 30	Number of characters repeated per second. The accuracy of this setting is ±20%.

Table 178: BIOS features setup - description of setting options (cont.)

BIOS setting	Meaning	Setting options	Effect
Typematic delay (ms)	Can only be selected when typematic rate setting is enabled. Sets the value for the delay between when a key is pressed and when its function takes effect.	250, 500, 750 or 1000	Delay setting in milliseconds. The accuracy of this setting is ±20%.
Security option	Select when a password is required.	System	Every time the system is booted, a defined password must be entered.
		Setup	A password is only needed when entering the BIOS Setup menu (e.g. with the DEL key during startup).
PS/2 mouse function control	If you are using a PS/2 pointing device select Enabled. When using a serial pointing device, please deactivate this option.	Enabled	Activates the function.
		Disabled	Deactivates the function
PCI/VGA palette snoop	This function enables BIOS to display the color table of a PCI graphics card and then, if necessary, to transmit this information to the video card.	Enabled	Enables this function.
		Disabled	This option is set as a default to Disabled and should not be changed.
OS Select For DRAM > 64 MB	Only relevant when the operating system OS/2 is installed with more than 64 MB RAM.	OS2	OS/2 is installed on the device, and it has 64 MB RAM.
		Non-OS2	An operating system other than OS/2 is installed on the device.
Video BIOS shadow	This option copies the video BIOS from the slow graphics card memory to the RAM. This increases the speed of DOS graphics applications if no graphics card driver is used. This option should be set to Enabled under DOS and Windows 3.x. If using higher versions of Windows, set it to Disabled.	Enabled	Enables this function.
		Disabled	Disables this function.
C8000-CBFFF shadow	This section of the RAM is reserved for another application.	Enabled	Enables this function.
		Disabled	Disables this function.
CC000-CFFFF shadow	This section of the RAM is reserved for another application.	Enabled	Enables this function.
		Disabled	Disables this function.
D0000-D3FFF shadow	This section of the RAM is reserved for another application.	Enabled	Enables this function.
		Disabled	Disables this function.
D4000-D7FFF shadow	This section of the RAM is reserved for another application.	Enabled	Enables this function.
		Disabled	Disables this function.
D8000-DBFFF shadow	This section of the RAM is reserved for another application.	Enabled	Enables this function.
		Disabled	Disables this function.
DC000-DFFFF shadow	This section of the RAM is reserved for another application.	Enabled	Enables this function.
		Disabled	Disables this function.

Table 178: BIOS features setup - description of setting options (cont.)

2.4 Chipset features setup

```
                    ROM PCI/ISA BIOS (2A56FB80)
                      CHIPSET FEATURES SETUP
                      AWARD SOFTWARE, INC.

Auto Configuration        : Enabled        Memory Parity/ECC Check   : Auto
DRAM Timing               : 70ns           Single Bit Error Report   : Enabled
DRAM RAS# Precharge Time: 4                L2 Cache Cacheable Size   : 64MB
DRAM R/W Leadoff Timing : 7/6              Chipset NA# Asserted      : Enabled
Fast RAS# to RAS# Delay : 3                Pipeline Cache Timing     : Faster
DRAM Read Burst EDO/FPM : x333/x444        Passive Release           : Enabled
DRAM Write Burst Timing : x333             Delayed Transaction       : Disabled
Turbo Read Leadoff        : Disabled
DRAM Speculative Leadoff: Disabled
Turn-Around Insertion     : Disabled
ISA Clock                 : PCICLK/4

System BIOS Cacheable     : Disabled
Video BIOS Cacheable      : Disabled
8 Bit I/O Recovery Time : 1
16 Bit I/O Recovery Time: 1                ESC : Quit        ↑↓→←: Select Item
Memory Hole At 15M-16M  : Disabled         F1  : Help         PU/PD/+/- : Modify
Peer Concurrency          : Enabled        F5  : Old Values  (Shift)F2 : Color
Chipset Special Features: Enabled          F6  : Load BIOS  Defaults
DRAM ECC/PARITY Select  : Parity           F7  : Load Setup Defaults
```

Figure 203: Chipset features setup

Warning!

The parameters in this screen are for system designers, service personnel, and technically competent users only. Only modify those settings that you completely understand.

BIOS setting	Meaning	Setting options	Effect
Auto configuration	The auto configuration option selects predetermined optimal values for the chipset parameters. When Disabled, chipset parameters revert to setup information stored in CMOS RAM.	Enabled	Enables this function.
		Disabled	Disables this function.
DRAM timing	The value in this field depends on performance parameters of the installed memory chips (DRAM). Do not change the value from the factory setting unless you install new memory that has a different performance rating than the original DRAM.	50 ns, 60 ns, 70 ns	
DRAM RAS# precharge time	The precharge time is the number of cycles it takes for the RAS to accumulate its charge before DRAM refresh. If insufficient time is allowed, refresh may be incomplete and the DRAM may fail to retain data. 4		

Table 179: Advanced chipset features - description of setting options

BIOS setting	Meaning	Setting options	Effect
DRAM R/W leadoff timing	This option lets you determine the number of CPU clocks required by DRAM for each read or write access. Changing the value from the setting determined by the board designer for the installed DRAM may cause memory errors.		
Fast RAS# to CAS# delay	When DRAM is refreshed, both rows and columns are addressed separately. This setup item allows you to determine the timing of the transition from RAS to Column Address Strobe (CAS).		
DRAM read burst (EDO / FPM)	Sets the timing for reads from EDO (Extended Data Output) or FPM (Fast Page Mode) memory. The lower the timing value, the faster the access is in RAM. Selecting timing values lower than the installed DRAM is able to support can result in memory errors.		
DRAM write burst timing	Sets the timing for writes to memory. The lower the timing value, the faster the access is in RAM. Selecting timing numbers lower than the installed DRAM is able to support can result in memory errors.		
Turbo read leadoff	Select Enabled to shorten the leadoff cycles and optimize performance in cacheless, 50-60 MHz, or single bank EDO DRAM systems.		
DRAM speculative leadoff	A read request from the CPU to the DRAM controller includes the memory address of the desired data. When enabled, speculative leadoff allows the DRAM controller to pass the read command to memory slightly before it has fully decoded the address, thus speeding up the read process.		
Turn-around insertion	When Enabled, the chipset inserts one extra clock to the turn-around of back-to-back DRAM cycles.		
ISA clock	You can set the speed of the AT bus to one-third or one-fourth of the CPU clock speed.		
System BIOS cacheable	Enabling this allows caching of the BIOS ROM at F0000h-FFFFFh, resulting in better system performance. However, if any program writes to this memory area, a system error may result.		
Video BIOS cacheable	Selecting Enabled allows caching of the Video BIOS ROM at C0000h-CBFFFh, resulting in better system performance. However, if any program writes to this memory area, a system error may result.		
8/ 16 bit I/O recovery time	The I/O recovery mechanism delays PCI I/O (created by PCI hardware), so that it can guarantee compatibility with the ISA bus. A delay of one or more bus clock cycles can be set. These two fields let you define recovery time (in bus clock cycles) for 16-bit and 8-bit I/O.		
Memory hole at 15M-16M	You can reserve this area of system memory for ROM memory on ISA cards. When this area is reserved, it cannot be cached. The user information for peripherals that need to use this area of system memory usually describes their memory requirements. **Information:** **If this option is activated, then the memory area of over 16MB cannot be used anymore.**		
Peer concurrency	"Enabled" means that more than one PCI device can be active at a time.		
Chipset special features	When disabled, the chipset behaves (for compatibility reasons) like an Intel 82430FX chipset. The Intel 82430FX chipset is the predecessor of the Intel 82430HX chipset.		
DRAM ECC/PARITY select	This option must be set according to the type of DRAM installed in your system: error-correcting code (ECC) or parity (default).		
Memory parity/ECC check	Select Enabled, Disabled, or Auto. In Auto mode, the BIOS enables memory checking automatically when it detects the presence of ECC or parity DRAM.		
Single bit error report	If this option or the memory parity/ECC check option is enabled, selecting Enabled here tells the system to report an error when a correctable single-bit error occurs.		
L2 cache cacheable size	This option defines those sizes of RAM, which can be read by the L2 cache. Should always be set to 512 MB.		
Chipset NA# asserted	Selecting enabled permits pipelining, in which the chipset signals the CPU for a new memory address before all data transfers for the current cycle are complete, resulting in faster performance.		
Pipeline cache timing	For secondary cache of one bank, select Faster. For a secondary cache of two banks, select Fastest.		
Passive release	When Enabled, CPU to PCI bus accesses are permitted during the Passive Release procedure. Otherwise, the arbiter only accepts another PCI master access to local DRAM.		

Table 179: Advanced chipset features - description of setting options (cont.)

BIOS setting	Meaning	Setting options	Effect
Delayed transaction	The chipset has an embedded 32 bit posted write buffer to support delay transactions cycles. Select Enabled to support compliance with PCI specification Version 2.1.		

Table 179: Advanced chipset features - description of setting options (cont.)

2.5 Power management setup

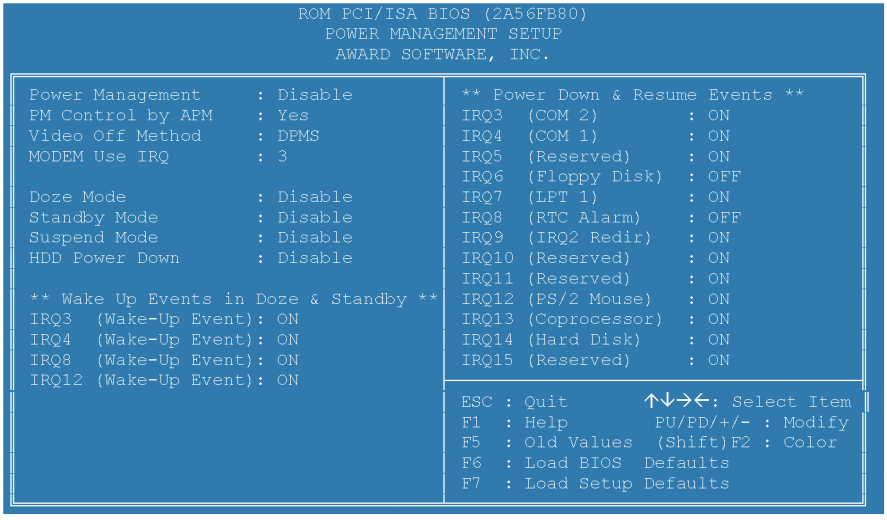


Figure 204: Power management setup

BIOS setting	Meaning	Setting options	Effect
Power management	This option allows you to define the type (or degree) of power saving, meaning that after a certain period of inactivity certain components of the system are switched off.	Disable	All power saving methods are deactivated
		User define	The values for Doze, Standby, Suspend and HDD power down mode can be set individually.
		Min saving	After an inactivity period of one hour, all system components that can be switched off go into energy saving mode.
		Max saving	This setting activates the highest level of energy savings. This mode is only available on SL-CPUs.
PM control by APM	If Advanced Power Management (APM) is installed on your system, selecting Yes gives better power savings.	Yes	Enables this function.
		No	Disables this function.
Video off method	Determines the condition of the monitor when it is in Standby mode.	Blank screen	This option causes older monitors to shut off.
		DPMS	With this option the energy saving mode is controlled by the graphics card, according to the VESA DPMS standard (**D**isplay **P**ower **M**anagement Signaling).
Modem use IRQ	The interrupt line (IRQ) of a modem, if one is present, can be entered here. Activities on this line can, for example, prepare the computer for fax reception.	NA	No interrupt is assigned.
		3, 4, 5, 7, 9, 10 or 11	One of these interrupts is assigned.

Table 180: Power management setup - description of setting options

BIOS setting	Meaning	Setting options	Effect
Doze mode	With this option you can set the period of time without user activity after which the processor will operate with reduced speed.	Disable	Deactivates the function
		8, 12, 16, 20, 24 or 28 seconds	
Standby mode	With this option you can set the period of time without user activity after which the built in disk drive and the graphics controller shut down.	Disable	Disables this function.
		1 min , 2 min , 4 min, 8 min , 12 min , 20 min , 30 min , 40 min , 1 hour	After this amount of time has elapsed the system BIOS switches to standby mode.
Suspend mode	With this option you can determine after which time of user inactivity all the system components (apart from the processor) should be switched off.	Disabled	Disables this function.
		1 min , 2 min , 4 min, 8 min , 12 min , 20 min , 30 min , 40 min , 1 hour	After this amount of time has elapsed the system BIOS switches to suspend mode.
HDD power down	With this option you can determine after which time of user inactivity the hard disk should be switched off (if there are a number of hard disks in the IPC, then all are switched off). Can only be set when the function "Power management" is set to "User define".	Disable	Disables this function.
		1 to 15 min	The hard disk is turned off after this time has passed.
Wake up events in doze & standby	ON determines the signal that can awake the listed IRQs from the IPC in Doze or Standby modes. OFF can prevent a given IRQ from being deleted in Doze or Standby modes. This is also possible for the following IRQs 3, 4, 8 and 12.		
Power down & resume events	Determine whether a signal can be awoken from one of the listed IRQs of the system from the suspend mode.		

Table 180: Power management setup - description of setting options

2.6 PNP/PCI configuration

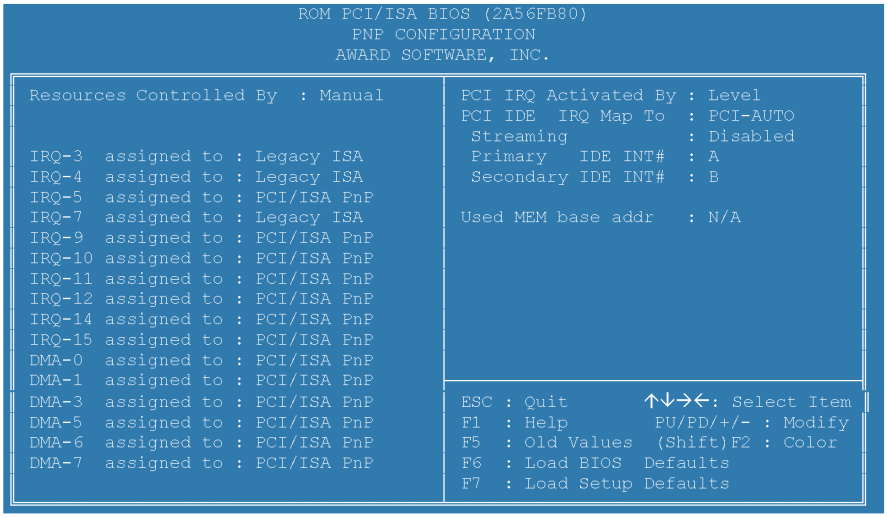


Figure 205: PnP/PCI configuration

BIOS setting	Meaning	Setting options	Effect
Resources controlled by	When set to "Auto", BIOS can automatically configure all Plug and Play compatible and bootable devices. When set to Manual, all IRQ and DMA settings can be made by the user. By default (Auto) during the BIOS system start, all ISA cards resources (I/O address, IRQ, DMA port, memory) are assigned first and afterwards all Plug & Play devices are then configured. No manual assignments can be made in the BIOS Setup for resources from Plug & Play devices. This is only possible with ICU (ISA Configuration Utility, available directly from Intel) or Windows 95/98/2000 as well as Linux.		
IRQ-n assigned to / DMA-n assigned to	The settings "Legacy ISA" and PCI/ISA PnP are possible. Legacy ISA is used, if ISA devices require a special interrupt or a special DMA channel. Plug & Play compatible devices work with the PCI/ISA PnP setting.		
PCI IRQ activated by	Leave the IRQ trigger set at Level unless the PCI card assigned to the interrupt specifies Edge-triggered interrupts (see documentation for the respective device).		
PCI IDE IRQ map to	This field lets you select PCI IDE IRQ mapping or PC AT (ISA) interrupts. If your system does not have one or two PCI IDE connectors on the system board, select values according to the type of IDE interface(s) installed in your system (PCI or ISA). Standard settings for ISA interrupts on IDE channels: IRQ14 for the primary channel and IRQ15 for the secondary channel.		
Primary/Secondary IDE INT#	Each PCI peripheral connection is capable of activating up to four interrupts: INT# A, INT# B, INT# C and INT# D. By default, a PCI connection is assigned INT# A. Assigning INT# B has no meaning unless the peripheral device requires two interrupt services instead of just one. For example, if the PCI IDE interface in the chipset has two channels, it then requires two interrupt services. The primary and secondary IDE INT# fields default to values appropriate for two PCI IDE channels, with the primary PCI IDE channel having a lower interrupt than the secondary.		
Used MEM base addr	This option makes it possible to reserve a main memory window in the upper memory area, e.g. for some older ISA network cards. If a starting address is specified instead of N/A (not available), the option "Used MEM Length" can be used to set the size of the memory area required.		

Table 181: PnP/PCI configuration - description of setting options

BIOS setting	Meaning	Setting options	Effect
Used MEM length	Sets the size of the memory area to be reserved, starting at the address defined in "Used MEM base addr".		

Table 181: PnP/PCI configuration - description of setting options (cont.)

2.7 Load BIOS defaults

Loads BIOS defaults. They are factory settings with standard values, which are defined by the BIOS manufacturer for the most stable minimal performance system operations.

2.8 Load setup defaults

Loads the setup defaults. These are factory settings which are defined by B&R for optimal performance of your IPC.

2.9 Integrated peripherals

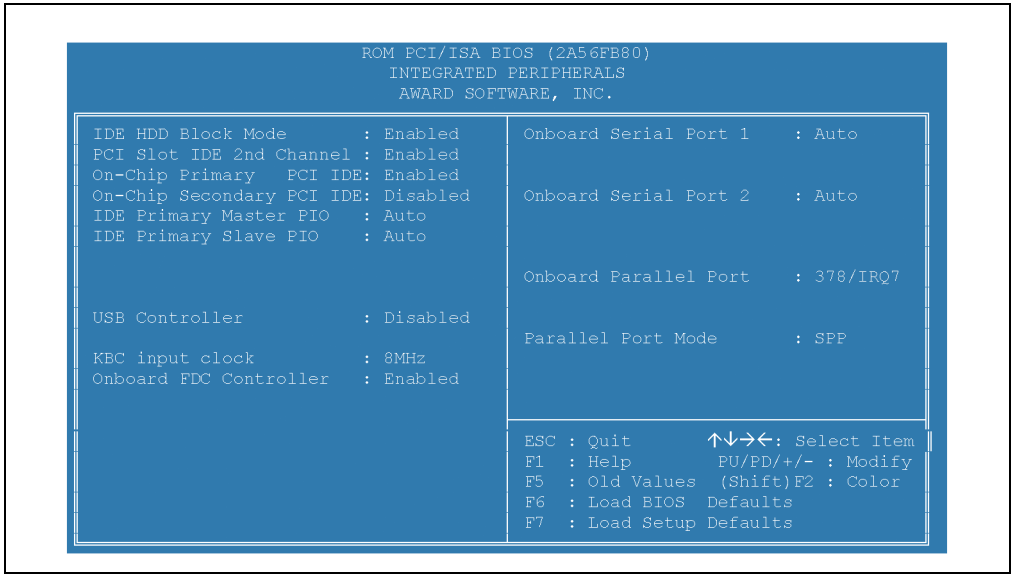


Figure 206: Integrated peripherals

BIOS setting	Meaning	Setting options	Effect
IDE HDD block mode	This option activates the block mode for IDE hard drives. If the drive supports this mode and it is enabled, the number of blocks per request from the configuration sector of the hard drive is read. The recommended setting is enabled. Only old hard drives do not support this mode.	Enabled	Enables this function.
		Disabled	Disables this function.

Table 182: Integrated peripherals - description of setting options

BIOS setting	Meaning	Setting options	Effect
PCI slot IDE 2nd channel	The second IDE channel can be manually deactivated here.		
On-chip primary/secondary IDE	The integrated IDE interface is equipped with two IDE channels, which can be switched on and off separately here.		
IDE primary master/slave PIO	The PIO (Programmed I/O) fields let you select a PIO mode (0 to 4), and the Auto mode for all connected IDE devices (theoretically four: two channels per interface). The PIO mode specifies the maximum transfer speed on the IDE bus. Modes 0 through 4 provide successively increased performance. The Auto setting automatically selects the best mode for each device.		
USB controller	Switches the On Board USB controller on or off. If the Enabled option is selected, then a further option appears:		
USB keyboard support	Enables the use of a USB keypad to the USB port. If you want to use a USB keypad and you are using an operating system other than Windows 98/2000, then the Power Management must be switched on for the USB keypad to function properly (see section "Power management setup" on page 325).		
KBC input clock	Clock frequency of the keypad controller.		
Onboard FDC controller	Switches the integrated floppy disk controller on/off.	Enabled	Activates this function.
		Disabled	No disk drives will function.
Onboard serial port 1	Here you can set the I/O addresses and interrupts for the COM1 interface. The options to choose from are Auto, Disabled, and some settings with predefined parameters. Normally the Auto setting is recommended. Default assignment for the Auto setting:	Disabled	Assign no resources.
		3F8h / IRQ4 2F8h / IRQ3 3E8h / IRQ4 2E8h / IRQ3	Use predefined values (addresses and interrupts).
		Auto	Automatic configuration
		Manual	Make settings manually.
Onboard serial port 2	Here you can set the I/O addresses and interrupts for the COM2 interface. The options to choose from are Auto, Disabled, and some settings with predefined parameters. Normally the Auto setting is recommended. Default assignment for the Auto setting:	Disabled	Assign no resources.
		3F8h / IRQ4 2F8h / IRQ3 3E8h / IRQ4 2E8h / IRQ3	Use predefined values (addresses and interrupts).
		Auto	Automatic configuration
		Manual	Make settings manually.
UR2 mode	This option allows you to enter an area of use for the second serial port.	Default	RS232 interface
		Sharp IRrDA	Compatible serial infrared interface
		IrDA SIRrDA	1.0 compatible serial infrared interface.
Onboard parallel port	The settings for the parallel interface LPT1 cannot be automatically detected. They are selected from a predefined range of values.	Disabled	Deactivates the parallel port.
		378h / IRQ7 278h / IRQ5 3BCh / IRQ7	Select the values to be used from a predefined list of values.

Table 182: Integrated peripherals - description of setting options (cont.)

BIOS setting	Meaning	Setting options	Effect
Parallel port mode	Here you can set the operating mode of the parallel interface. The following options can be selected: Please take note that the EPP and ECP modes must be supported by connected devices.	Default	
		SPP	Standard parallel port (max. 64 kByte/s unidirectional).
		EPP 1.7	Enhanced parallel port v1.7 (max. 2 MByte/s bidirectional).
		EPP 1.9	Enhanced parallel port v1.9 (max. 2 MByte/s bidirectional).
		ECP	Enhanced capability port (max. 2 MByte/s bidirectional).
		EPP+ECP	Combined EPP/ECP transfer.
ECP mode use DMA	A DMA channel is used from the parallel interface in the ECP mode.		

Table 182: Integrated peripherals - description of setting options (cont.)

2.10 Password setting

The system password can be set here (min. 4, max. 8 characters). If, when requested to enter password, you exit without pressing Enter, the password function is deactivated (see also section "BIOS features setup" on page 319).

Information:

The password entered is also saved in the CMOS backup, which makes it impossible to delete the password. If the password is forgotten, then the Flash ROM component must be replaced by B&R.

2.11 IDE HDD auto detection

All connected IDE devices are automatically recognized in this menu.

When using larger hard disks, you must select between the different data transfer methods (normal, LBA or large) according to each HDD type and size. The LBA Mode is preferred when using Windows systems (see also the topic hard disks in section "Standard CMOS setup" on page 317).

2.12 Save & exit setup

BIOS Setup Utility is closed with this item. Changes made are saved in CMOS after confirmation.

Note: In order to confirm, the Z key must be pressed when using a German keyboard (US keyboard layout).

2.13 Exit without saving

With this item you can close BIOS Setup Utility without saving the changes made in the CMOS.

Note: In order to confirm, the Z key must be pressed when using a German keyboard (US keyboard layout).

2.14 Additional peripherals

```
                    ROM PCI/ISA BIOS (2A56FB80)
                      ADDITIONAL PERIPHERALS
                       AWARD SOFTWARE, INC.

Controller Hardware ID:                  Controller Software ID:
                    0101.2001.0001         BIOS:00.31 VGA:10.03 MTC:00.14

Display Type ID     : 0042               Statistics              IPC   FPD
   Name             : FPC00.21             Power On Cycles     : 22590 00176
   Mode             : Auto                 Operating Hours     : 20823 00254
   FPD Contrast     : Auto                 Overtemp. Hours     : 00001 00019
   FPD Brighness    : Auto                 Fan Cooler Hours    : 00339

CAN detected I/O Port     : 384-385h     CMOS Battery Status  : OK
         assigned IRQ     : NONE
                                         User Serial ID       : 0000 0000
PCMCIA detected I/O Port  : 3E0-3E1h           Show           : No

Hardware Security Key
       detected I/O Port  : 278-27Fh     ESC : Quit        ↑↓→←: Select Item
                                         F1  : Help         PU/PD/+/- : Modify
MTC Communication                        F5  : Old Values  (Shift)F2 : Color
       detected I/O port  : 110-11Ah     F6  : Load BIOS  Defaults
                                         F7  : Load Setup Defaults
```

Figure 207: Additional peripherals

BIOS setting	Meaning	Setting options	Effect
Controller hardware ID	This twelve digit number is a code number for the system components included: 0001.1001.0001 I/O controller 0000 ... NSC308 0001 ... NSC307 / NSC308 VGA BIOS 0000 ... C&T65548 0001 ... C&T65548 1001 ... C&T65550 (with DRAM) 2001 ... C&T65550 with EDO RAM) Chipset 0000 ... Intel 430HX 0001 ... Intel 430HX		
Display ID	Every B&R display unit has a type ID identification, which is shown here. **Type ID Display** 0010 TFT VGA 10.4" 0011 TFT VGA 13.8" 0013 TFT VGA 10.4" 0014 TFT VGA 10.4" 0030 LCD VGA 10.4" 0040 TFT SVGA 10.4" 0041 TFT SVGA 12.1" 0042 TFT SVGA 12.1" 0050 TFT XGA 13.8" 0051 TFT XGA 14.5" 0070 TFT XGA 13.8" 0071 TFT XGA 14.5" 0072 TFT XGA 15" 0073 TFT XGA 15" 0080 TFT SXGA 18"	None	-
Name	Name of the display firmware version	None	-
Mode	This option allows you to select which display device should be active at startup.	AUTO	All connected display devices are automatically activated. If no display device is connected then the monitor is activated
		FPD	The video signal is output via the FPD interface on the IPC, where, for example, a B&R display unit can be connected.
		CRT	The video signal is output via the FPD interface on the IPC, where, for example, a B&R display unit can be connected.
		CRT&FPD	The video signal is output via the FPD and VGA interfaces on the IPC simultaneously.
FPD contrast	Set the contrast for a connected B&R display unit. **This is only possible for LCD displays.**	AUTO	Contrast is set automatically.
		0 - 100	Set contrast manually. from 0-100 %.
FPD brightness	Set the brightness of the connected display. Possible for both LCD as well as for TFT displays. If a value (e.g. 80%) is stored in BIOS Setup then BIOS uses these each time the system is started, also when another display is connected.	AUTO	Brightness is set automatically.
		0 - 100	Manual setting of brightness from 0-100 %.
CAN detected I/O port	If a B&R interface board is installed in your IPC, then the I/O range is shown here.		

Table 183: Additional peripherals - description of setting options

BIOS setting	Meaning	Setting options	Effect
CAN assigned IRQ	Here, an IRQ can be assigned to the CAN port of the interface board (disconnecting the interrupt line). You can choose between the options NONE, IRQ10 and NMI (Non Maskable Interrupt). See also the section "CAN Interface".		
PCMCIA detected I/O port	The I/O address range of the PCMCIA port (socket 1) is displayed on the interface board.		
Hardware security key detected I/O port	The I/O address range of the hardware security key is displayed on the interface board.		
MTC communication assigned I/O port	The I/O address can be set here for MTC communication. Important: Some ISA cards (e.g. network cards) always use the address range that the MTC normally uses for communication. In such cases, another MTC I/O address must be selected.		
Controller software ID	The version numbers of BIOS, VGA BIOS and MTC are given.		
Statistics	Displays the operating data that is collected using the MTC: Power-on cycles Operating hours Over-temperature hours Operating hours of the fans (fan cooler hours; for display units optional, both fans for controller units)		
CMOS battery status	It is displayed using the MTC, if the backup battery for the CMOS RAM is in order. If this option has the value "Bad" then the battery should be exchanged as soon as possible.		
User serial ID	A user serial number (32 bit, in hex format) can be entered here. It is stored in CMOS.		
Show	When set to "Yes" the user serial number (see "User Serial ID" above) is displayed in the device window when the system is started.		

Table 183: Additional peripherals - description of setting options (cont.)

2.15 Comparison of BIOS settings (BIOS defaults / Setup defaults)

2.15.1 BIOS features setup

Elite BIOS version	00.17		00.19	
Setting	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults
Virus warning	Enabled	Disabled	Enabled	Disabled
CPU internal cache	Enabled	Enabled	Enabled	Enabled
External cache	Enabled	Enabled	Enabled	Enabled
Quick Power On Self Test	Disabled	Disabled	Disabled	Disabled
Boot sequence	A,C,SCSI	A,C,SCSI	A,C,SCSI	A,C,SCSI
Swap floppy drive	Disabled	Disabled	Disabled	Disabled
Boot up floppy seek	Enabled	Enabled	Enabled	Enabled
Boot up NumLock status	On	On	On	On
Boot up system speed	High	High	High	High
Gate A20 option	Normal	Fast	Normal	Fast
Typematic rate setting	Disabled	Disabled	Disabled	Disabled
Typematic rate (chars/sec)	6	6	6	6
Typematic delay (ms)	250	250	250	250
Security option	Setup	Setup	Setup	Setup
PS/2 mouse function control	Enabled	Enabled	Enabled	Enabled
PCI/VGA palette snoop	Disabled	Disabled	Disabled	Disabled
OS Select For DRAM > 64 MB	Non-OS2	Non-OS2	Non-OS2	Non-OS2
Video BIOS shadow	Enabled	Enabled	Enabled	Enabled
C8000-CBFFF	Disabled	Disabled	Disabled	Disabled
CC000-CFFFF	Disabled	Disabled	Disabled	Disabled
D0000-D3FFF	Disabled	Disabled	Disabled	Disabled
D4000-D7FFF	Disabled	Disabled	Disabled	Disabled
D8000-DBFFF	Disabled	Disabled	Disabled	Disabled
DC000-DFFFF	Disabled	Disabled	Disabled	Disabled

Table 184: BIOS features setup

2.15.2 Chipset features setup

Elite BIOS version	00.17		00.19	
Setting	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults
Auto configuration	Enabled	Enabled	Enabled	Enabled
DRAM timing	70 ns	70 ns	70 ns	70 ns
DRAM RAS# precharge time	4	4	4	4

Table 185: Chipset features setup

Elite BIOS version	00.17		00.19	
Setting	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults
DRAM R/W leadoff timing	7/6	7/6	7/6	7/6
Fast RAS# to CAS# delay	3	3	3	3
DRAM read burst (EDO / FPM)	X333/x444	X333/x444	X333/x444	X333/x444
DRAM write burst timing	X333	X333	X333	X333
Turbo read leadoff	Disabled	Disabled	Disabled	Disabled
DRAM speculative leadoff	Disabled	Disabled	Disabled	Disabled
Turn-around insertion	Disabled	Disabled	Disabled	Disabled
ISA clock	PCICLK/4	PCICLK/4	PCICLK/4	PCICLK/4
System BIOS cacheable	Disabled	Disabled	Disabled	Disabled
Video BIOS cacheable	Disabled	Disabled	Disabled	Disabled
8-bit I/O recovery time	3	1	3	1
16-bit I/O recovery time	2	1	2	1
Memory hole at 15M-16M	Disabled	Disabled	Disabled	Disabled
Peer concurrency	Enabled	Enabled	Enabled	Enabled
Chipset special features	Disabled	Enabled	Disabled	Enabled
DRAM ECC/PARITY select	ECC	Parity	ECC	Parity
Memory parity/ECC check	Auto	Auto	Auto	Auto
Single bit error report	Enabled	Enabled	Enabled	Enabled
L2 cache cacheable size	512MB	512MB	512MB	512MB
Chipset NA# asserted	Enabled	Enabled	Enabled	Enabled
Pipeline cache timing	Faster	Faster	Faster	Faster
Passive release	Enabled	Enabled	Enabled	Enabled
Delayed transaction	Disabled	Disabled	Disabled	Disabled

Table 185: Chipset features setup (cont.)

2.15.3 Power management setup

Elite BIOS version	00.17		00.19	
Setting	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults
Power management	Disable	Disable	Disable	Disable
PM control by APM	Yes	Yes	Yes	Yes
Video off method	DPMS	DPMS	DPMS	DPMS
Modem use IRQ	3	3	3	3
Doze mode	Disable	Disable	Disable	Disable
Standby mode	Disable	Disable	Disable	Disable
Suspend mode	Disable	Disable	Disable	Disable
HDD power down	Disable	Disable	Disable	Disable

Table 186: Power management setup

Elite BIOS version	00.17		00.19	
Setting	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults
IRQ3 (wake-up event)	OFF	ON	OFF	ON
IRQ4 (wake-up event)	OFF	ON	OFF	ON
IRQ8 (wake-up event)	OFF	ON	OFF	ON
IRQ12 (wake-up event)	OFF	ON	OFF	ON
IRQ3 (COM 2)	OFF	ON	OFF	ON
IRQ4 (COM 1)	OFF	ON	OFF	ON
IRQ5 (reserved)	OFF	ON	OFF	ON
IRQ6 (floppy disk)	OFF	OFF	OFF	OFF
IRQ7 (LPT 1)	OFF	ON	OFF	ON
IRQ8 (RTC alarm)	OFF	OFF	OFF	OFF
IRQ9 (IRQ2 redir)	OFF	ON	OFF	ON
IRQ10 (reserved)	OFF	ON	OFF	ON
IRQ11 (reserved)	OFF	ON	OFF	ON
IRQ12 (PS/2 mouse)	OFF	ON	OFF	ON
IRQ13 (coprocessor)	OFF	ON	OFF	ON
IRQ14 (hard disk)	OFF	ON	OFF	ON
IRQ15 (reserved)	OFF	ON	OFF	ON

Table 186: Power management setup (cont.)

2.15.4 PNP/PCI configuration

Elite BIOS version	00.17		00.19	
Setting	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults
Resources controlled by	Auto	Manual	Auto	Manual
IRQ-3 assigned to		Legacy ISA		Legacy ISA
IRQ-4 assigned to		Legacy ISA		Legacy ISA
IRQ-5 assigned to		PCI/ISA PnP		PCI/ISA PnP
IRQ-7 assigned to		Legacy ISA		Legacy ISA
IRQ-9 assigned to		PCI/ISA PnP		PCI/ISA PnP
IRQ-10 assigned to		PCI/ISA PnP		PCI/ISA PnP
IRQ-11 assigned to		PCI/ISA PnP		PCI/ISA PnP
IRQ-12 assigned to		PCI/ISA PnP		PCI/ISA PnP
IRQ-14 assigned to		PCI/ISA PnP		PCI/ISA PnP
IRQ-15 assigned to		PCI/ISA PnP		PCI/ISA PnP
DMA-0 assigned to		PCI/ISA PnP		PCI/ISA PnP
DMA-1 assigned to		PCI/ISA PnP		PCI/ISA PnP
DMA-3 assigned to		PCI/ISA PnP		PCI/ISA PnP

Table 187: PnP/PCI configuration

Elite BIOS version	00.17		00.19	
Setting	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults
DMA-5 assigned to		PCI/ISA PnP		PCI/ISA PnP
DMA-6 assigned to		PCI/ISA PnP		PCI/ISA PnP
DMA-7 assigned to		PCI/ISA PnP		PCI/ISA PnP
PCI IRQ activated by	Level	Level	Level	Level
PCI IDE IRQ map to	PCI-Auto	PCI-Auto	PCI-Auto	PCI-Auto
Streaming	Disabled	Disabled	Disabled	Disabled
Primary IDE INT#:	A	A	A	A
Secondary IDE INT#	B	B	B	B
Used MEM base addr		N/A		N/A

Table 187: PnP/PCI configuration (cont.)

2.15.5 Integrated peripherals

Elite BIOS version	00.17		00.19	
Setting	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults
IDE HDD block mode	Disabled	Enabled	Disabled	Enabled
PCI slot IDE 2nd channel	Enabled	Enabled	Enabled	Enabled
On-chip primary PCI IDE	Enabled	Enabled	Enabled	Enabled
On-chip secondary PCI IDE	Disabled	Disabled	Disabled	Disabled
IDE primary master PIO	Auto	Auto	Auto	Auto
IDE primary slave PIO	Auto	Auto	Auto	Auto
USB controller	Disabled	Disabled	Disabled	Disabled
KBC input clock	8 MHz	8 MHz	8 MHz	8 MHz
Onboard FDC controller	Enabled	Enabled	Enabled	Enabled
Onboard serial port 1	Auto	Auto	Auto	Auto
Onboard serial port 2	Auto	Auto	Auto	Auto
Onboard parallel port	378/IRQ7	378/IRQ7	378/IRQ7	378/IRQ7
Parallel port mode	SPP	SPP	SPP	SPP

Table 188: Integrated peripherals

2.15.6 Additional peripherals

Elite BIOS version	00.17		00.19	
Setting	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults
Mode	AUTO	AUTO	AUTO	AUTO
FPD contrast	AUTO	AUTO	AUTO	AUTO
FPD brightness	AUTO	AUTO	AUTO	AUTO
CAN detected I/O port				
Assigned IRQ	NONE	NONE	NONE	NONE
MTC communication assigned I/O port	110-11A	110-11A	110-11A	110-11A
User serial ID	0000 0000	0000 0000	0000 0000	0000 0000
Show	No	No	No	No

Table 189: Additional peripherals

3. BIOS for system unit with socket 370

Information:

- **The following diagrams and BIOS menu items including descriptions refer to BIOS Version 1.16 (BURC145.bin - V1.45). 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.**

3.1 BIOS setup main menu

The BIOS Setup main menu appears immediately by pressing the DEL button:

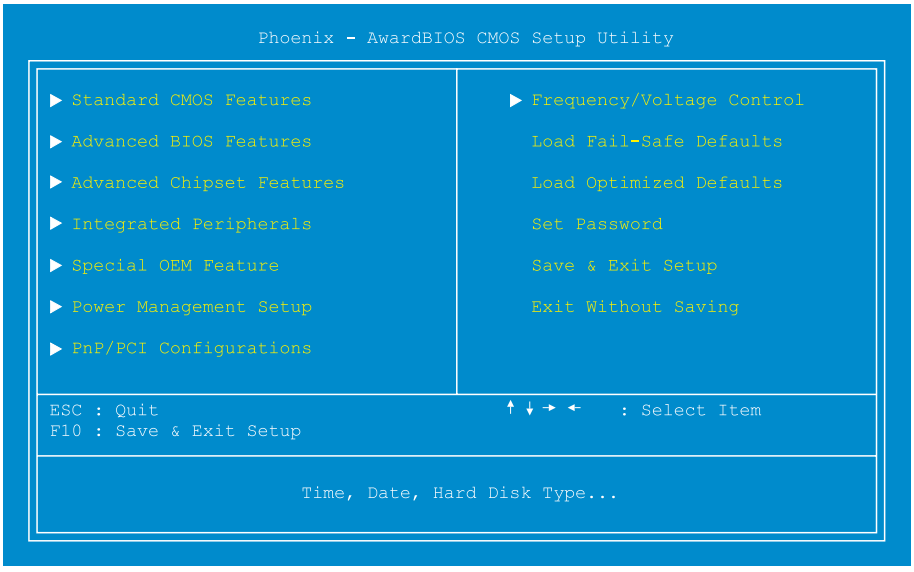


Figure 208: BIOS setup main menu

The individual menu items are explained in detail in the following sections.

BIOS setup menu	Function
Standard CMOS features	The basic system configurations (e.g. time, date, disk drives, hard disk parameters) can be set in this menu.
Advanced BIOS features	Advanced BIOS options such as cache areas and keyboard repeat rate, boot order etc. can be configured here.

Table 190: Overview of BIOS main menu functions

BIOS setup menu	Function
Advanced chipset features	Specific BIOS options for the system chipset can be changed here.
Integrated peripherals	Controller and interface settings for onboard peripheral subsystems.
Special OEM features	B&R specific settings for integrated peripheral devices.
Power management setup	Setup of various APM (Advanced Power Management) options.
PnP/PCI configurations	Setup of interrupts for PnP, PCI and ISA components.
Frequency / voltage control	These settings are helpful for the monitoring of all important system parameters.
Load fail-safe defaults	Load predefined settings to guarantee system operation.
Load optimized defaults	Load the optimal BIOS settings for best performance.
Set password	Here you can identify a password for the supervisor.
Save & exit setup	Settings are saved and the BIOS Setup is ended.
Exit without saving	End the setup without saving changes.

Table 190: Overview of BIOS main menu functions

3.2 Standard CMOS features

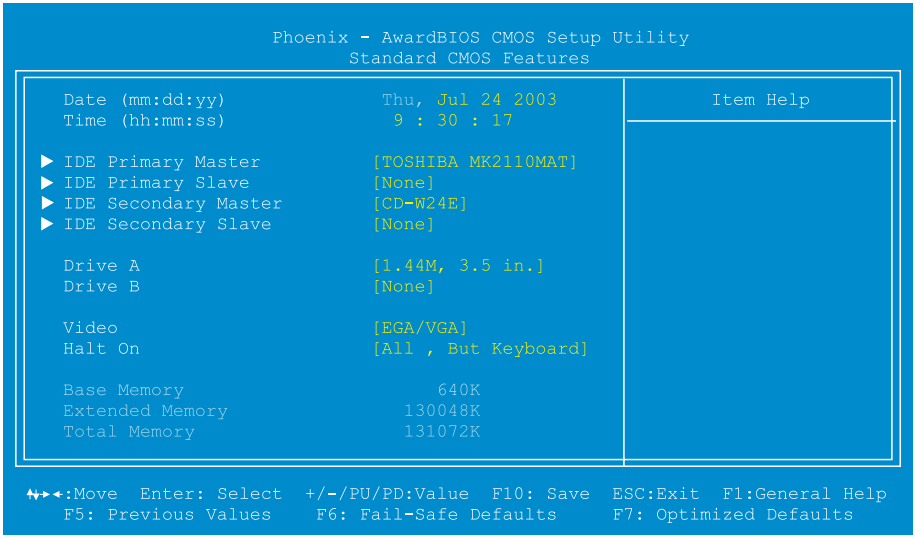


Figure 209: Standard CMOS features

BIOS setting	Meaning	Setting options	Effect
Date (mm:dd:yy)	This is the current system date setting. The time is buffered by a battery (CMOS battery) after the system has been switched off.	Adjustment of the system date	Individual setting of the system date

Table 191: Standard CMOS features - description of setting options

BIOS setting	Meaning	Setting options	Effect
Time (hh:mm:ss)	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	Individual setting of the system time
IDE primary master	The drives in the system that are connected to the IDE primary master port are configured here.	See "IDE primary master" on page 342	Pressing "ENTER" takes you to the configuration screen for the "IDE primary master" on page 342
IDE primary slave	The drives in the system that are connected to the IDE primary slave port are configured here.	See "IDE primary slave" on page 343	Pressing "ENTER" takes you to the configuration screen for the "IDE primary slave" on page 343
IDE secondary master	The drives in the system that are connected to the IDE secondary master port are configured here.	See "IDE secondary master" on page 344	Pressing "ENTER" takes you to the configuration screen for the "IDE secondary master" on page 344
IDE secondary slave	The drives in the system that are connected to the IDE secondary slave port are configured here.	See "IDE secondary slave" on page 345	Pressing "ENTER" takes you to the configuration screen for the "IDE secondary slave" on page 345
Drive A	Set the largest amount of memory permitted for a connected disk drive.	None 360K, 13.34cm 1.2M , 5.25" 720K, 8.89 cm 1.44M, 3.5 in	No diskette drive installed 5¼ " disk drive, 360kB capacity 5¼" disk drive, 1.2MB capacity 3½" disk drive, 720kB capacity 3½" disk drive, 1.44MB capacity
Drive B	Set the largest amount of memory permitted for a connected disk drive.	None 360K, 13.34cm 1.2M , 5.25" 720K, 8.89 cm 1.44M, 3.5 in	No diskette drive installed 5¼ " disk drive, 360kB capacity 5¼" disk drive, 1.2MB capacity 3½" disk drive, 720kB capacity 3½" disk drive, 1.44MB capacity
Video	The primary graphics subsystem can be setup here. BIOS usually detects the correct video type automatically.	EGA/VGA	Enhanced Graphics Adapter / Video Graphics Array For EGA, VGA, SAGA, SVGA or PGA monitor adapters
		CGA 40	Color graphics adapter, power up in 40 column mode
		CGA 80	Color graphics adapter, power up in 80 column mode
		Mono	Monochrome adapter (includes high resolution monochrome adapter)
Halt on	This option sets whether the system should pause the Power On Self Test (POST) when it encounters an error, and after which non-fatal errors the POST should be continued.	All errors	The system pauses every time an error is encountered.
		No errors	All errors are ignored.
		All but keyboard	System pauses for all errors except keyboard errors
		All but diskette	System pauses for all errors except disk drive errors
		All but disk/key	System pauses for all errors except keyboard or drive errors

Table 191: Standard CMOS features - description of setting options (cont.)

3.2.1 IDE primary master

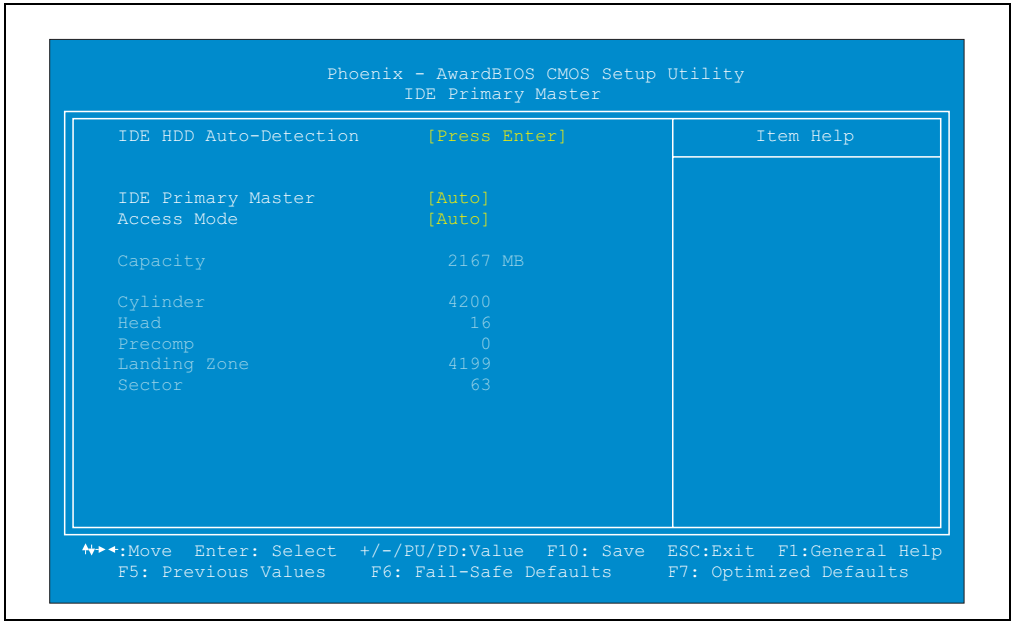


Figure 210: IDE primary master setup

BIOS setting	Meaning	Setting options	Effect
IDE HDD auto-detection	Automatic recognition of hard disk or drive.	Press Enter	Automatic recognition of hard drive and application of settings to BIOS.
IDE primary master	Determine here which PIO or DMA mode should be used for the IDE hard drive. Incorrect settings can lead to data loss. It is therefore recommended to make this setting with the option "Auto", or to closely follow the manufacturer's instructions.	None	No drive is connected.
		Auto	Automatic drive detection.
		Manual	Manual drive configuration.
Access mode	Determine here the type of access to the hard drive or CD ROM drive.	CHS	CHS access is used
		LBA	LBA access is used: This option activates the **L**ogical **B**lock **A**ddressing for IDE. For hard drives larger than 528 MB, this option must be selected.
		Large	Large access is used: If the hard drive has more than 1024 cylinders (CYLs) and DOS cannot support them, or if the operating system does not support LBA mode, select this option.
		Auto	The access type is controlled automatically.

Table 192: IDE primary master setup - description of setting options

3.2.2 IDE primary slave

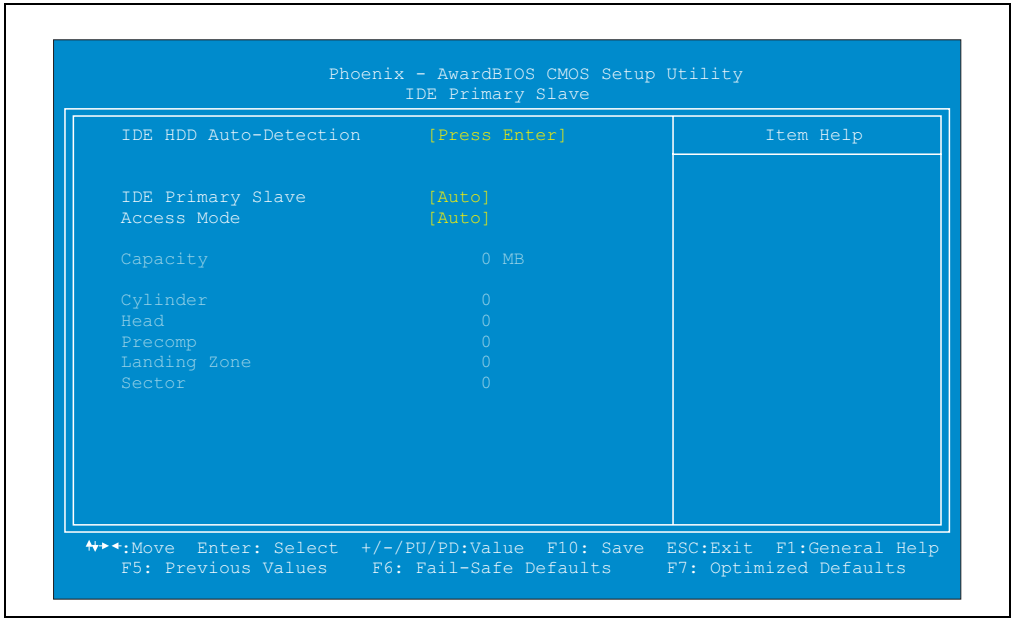


Figure 211: IDE primary slave setup

BIOS setting	Meaning	Setting options	Effect
IDE HDD auto-detection	Automatic recognition of hard disk or drive.	Press Enter	Automatic recognition of hard drive and application of settings to BIOS.
IDE primary slave	Determine here which PIO or DMA mode should be used for the IDE hard drive. Incorrect settings can lead to data loss. It is therefore recommended to make this setting with the option "Auto", or to closely follow the manufacturer's instructions.	None	No drive is connected.
		Auto	Automatic drive detection.
		Manual	Manual drive configuration.
Access mode	Determine here the type of access to the hard drive or CD ROM drive.	CHS	CHS access is used
		LBA	LBA access is used: This option activates the **L**ogical **B**lock **A**ddressing for IDE. For hard drives larger than 528 MB, this option must be selected.
		Large	Large access is used: If the hard drive has more than 1024 cylinders (CYLs) and DOS cannot support them, or if the operating system does not support LBA mode, select this option.
		Auto	The access type is controlled automatically.

Table 193: IDE primary slave setup - description of setting options

3.2.3 IDE secondary master

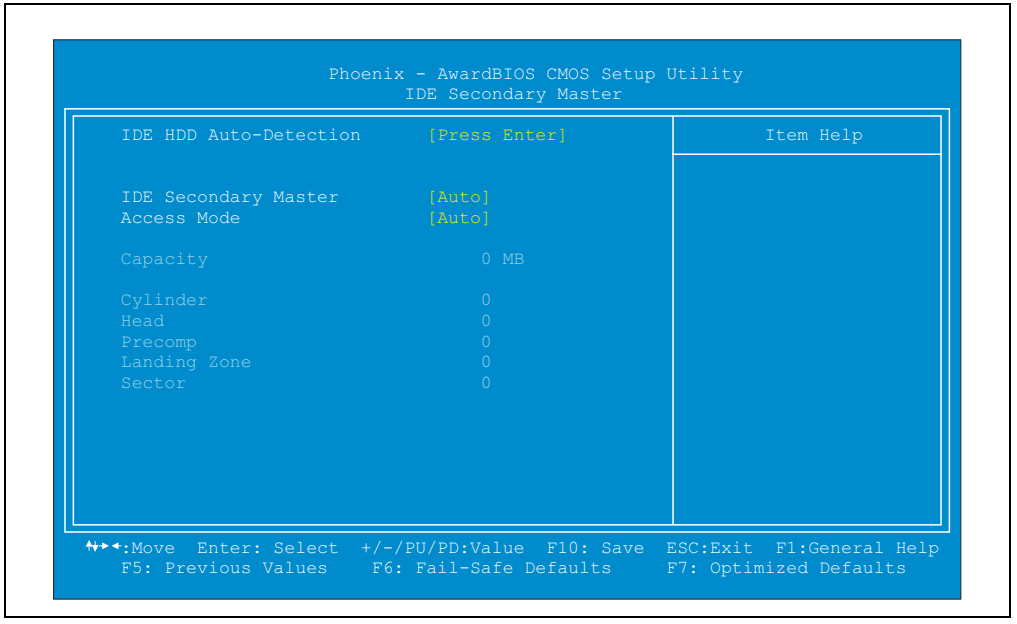


Figure 212: IDE secondary master setup

BIOS setting	Meaning	Setting options	Effect
IDE HDD auto-detection	Automatic recognition of hard disk or drive.	Press Enter	Automatic recognition of hard drive and application of settings to BIOS.
IDE secondary master	Determine here which PIO or DMA mode should be used for the IDE hard drive. Incorrect settings can lead to data loss. It is therefore recommended to make this setting with the option "Auto", or to closely follow the manufacturer's instructions.	None	No drive is connected.
		Auto	Automatic drive detection.
		Manual	Manual drive configuration.
Access mode	Determine here the type of access to the hard drive or CD ROM drive.	CHS	CHS access is used
		LBA	LBA access is used: This option activates the **L**ogical **B**lock **A**ddressing for IDE. For hard drives larger than 528 MB, this option must be selected.
		Large	Large access is used: If the hard drive has more than 1024 cylinders (CYLs) and DOS cannot support them, or if the operating system does not support LBA mode, select this option.
		Auto	The access type is controlled automatically.

Table 194: IDE secondary master setup - description of setting options

3.2.4 IDE secondary slave

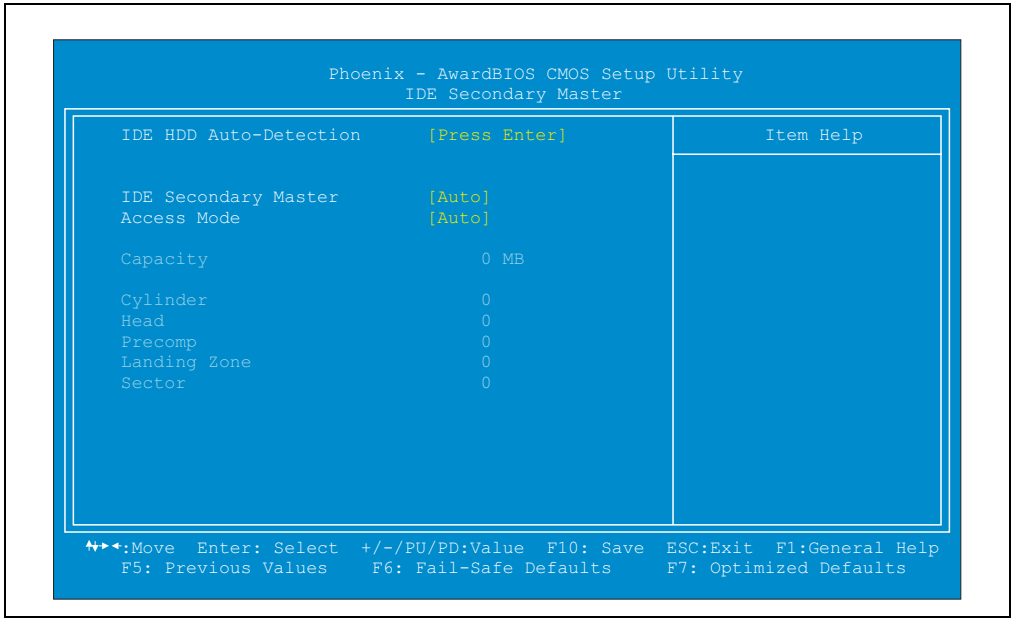


Figure 213: IDE secondary slave setup

BIOS setting	Meaning	Setting options	Effect
IDE HDD auto-detection	Automatic recognition of hard disk or drive.	Press Enter	Automatic recognition of hard drive and application of settings to BIOS.
IDE secondary slave	Determine here which PIO or DMA mode should be used for the IDE hard drive. Incorrect settings can lead to data loss. It is therefore recommended to make this setting with the option "Auto", or to closely follow the manufacturer's instructions.	None	No drive is connected.
		Auto	Automatic drive detection.
		Manual	Manual drive configuration.
Access mode	Determine here the type of access to the hard drive or CD ROM drive.	CHS	CHS access is used
		LBA	LBA access is used: This option activates the **L**ogical **B**lock **A**ddressing for IDE. For hard drives larger than 528 MB, this option must be selected.
		Large	Large access is used: If the hard drive has more than 1024 cylinders (CYLs) and DOS cannot support them, or if the operating system does not support LBA mode, select this option.
		Auto	The access type is controlled automatically.

Table 195: IDE secondary slave setup - description of setting options

3.3 Advanced BIOS features

```
                    Phoenix - AwardBIOS CMOS Setup Utility
                              Advanced BIOS Features

   Virus Warning                [Disabled]          Item Help
   CPU Internal Cache           [Enabled]
   External Cache               [Enabled]
   CPU L2 Cache ECC Checking    [Enabled]
   Quick Power On Self Test     [Enabled]
   First Boot Device            [Floppy]
   Second Boot Device           [HDD-0]
   Third Boot Device            [LS-120]
   Boot Other Device            [Enabled]
   Swap Floppy Drive            [Disabled]
   Boot Up Floppy Seek          [Enabled]
   Boot Up NumLock Status       [On]
   Gate A20 Option              [Fast]
   Typematic Rate Setting       [Disabled]
 x Typematic Rate (Chars/sec)    6
 x Typematic Delay (Msec)        250
   Security Option              [Setup]
   OS Select For DRAM > 64 MB   [Non-OS2]
   HDD S.M.A.R.T Capability     [Disabled]
   Report No FDD For WIN 95     [No]
   Video BIOS Shadow            [Enabled]
   C8000-CBFFF                  [Disabled]
   CC000-CFFFF                  [Disabled]
   D0000-D3FFF                  [Disabled]
   D4000-D7FFF                  [Disabled]
   D8000-DBFFF                  [Disabled]
   DC000-DFFFF                  [Disabled]
   Small Logo(EPA) Show         [Disabled]

↑↓→←:Move  Enter: Select  +/-/PU/PD:Value  F10: Save  ESC:Exit  F1:General Help
   F5: Previous Values    F6: Fail-Safe Defaults     F7: Optimized Defaults
```

Figure 214: Advanced BIOS features

BIOS setting	Meaning	Setting options	Effect
Virus warning	When enabled, you receive a warning message if a program (especially a virus) attempts to alter the boot sector or the partition table of the boot drive (not the rest of the hard drive).	Disabled	Function is deactivated.
		Enabled	Function is activated.
CPU internal cache	Switching the L1 cache of the processor, on or off. Switching off the internal cache slows down the system to below 65%, and therefore is not advisable.	Enabled	Use of the L1 cache is activated.
		Disabled	No L1 cache is used.
External cache	Makes it possible to prevent the use of the integrated second level cache on the mainboard. Switching off the external cache slows down the system considerably, and is therefore not advisable.	Enabled	Use of the second level cache is activated.
		Disabled	No second level cache is used.

Table 196: Advanced BIOS features - description of setting options

BIOS setting	Meaning	Setting options	Effect
CPU L2 cache ECC checking	With this option, error recognition and correction for the processor's L2 cache is continuously checked using ECC (Error Checking and Correction). Activating this option effects the systems speed. Deactivating it makes the system theoretically less reliable. With the Error Correction Code individual faulty Bits are automatically corrected when reading/writing the L2 cache memory.	Enabled	Function is activated.
		Disabled	Function is deactivated.
Quick Power On Self Test	Enabling this option speeds up the booting process. Up to 10 seconds can be taken off the booting process with 64 MB RAM or more. However, not all POST tests are carried out.	Enabled	Speeds up POST considerably by skipping the full memory test.
		Disabled	All self tests are carried out.
First boot device	Determine here which drive should be booted from first.	Floppy:, LS120, HDD-0, SCSI, CDROM, HDD-1, HDD-2, HDD-3, ZIP100, USB-FDD, USB-ZIP, USB-CDROM, USB-HDD, LAN, Disabled	The device attempts to boot from this drive first.
Second boot device	Determine here which drive should be booted from second.	Floppy:, LS120, HDD-0, SCSI, CDROM, HDD-1, HDD-2, HDD-3, ZIP100, USB-FDD, USB-ZIP, USB-CDROM, USB-HDD, LAN, Disabled	The device attempts to boot from this drive second.
Third boot device	Determine here which drive should be booted from third.	Floppy:, LS120, HDD-0, SCSI, CDROM, HDD-1, HDD-2, HDD-3, ZIP100, USB-FDD, USB-ZIP, USB-CDROM, USB-HDD, LAN, Disabled	The device attempts to boot from this drive third.
Boot other device	Option for booting another drive other than the standard boot drives (first, second, and third).	Enabled	Enables BIOS to try booting from the first, second, and third boot devices, and then to boot from a bootable drive.
		Disabled	Deactivates the function
Swap floppy drive	Here you can switch floppy drives without moving the cable. This field is effective only in systems with two floppy drives.	Enabled	The drive letter B is assigned to the physical drive A and the drive letter A to the physical drive B.
		Disabled	When disabled, drive letter assignments are not changed.
Boot up floppy seek	When the PC is started, the disk drive is searched for the number of tracks (40 or 80). **Note:** Only 360 KByte diskettes have 40 tracks. All diskettes with 720 KByte, 1.2 MByte and 1.44 MByte have 80 tracks.	Enabled	BIOS searches the disk drives during POST.
		Disabled	Saves several seconds boot time.
Boot up NumLock status	With this field you can define the state of the NumLock key when booting.	On	The numeric keypad generates numbers instead of controlling cursor operations.
		Off	The control fields are used for the keys (cursor keys, Pos1, End, etc.).
Gate A20 option	Determines how the memory above 1MB is accessed.	Fast	Gate A20 is controlled by the system chipset.
		Normal	Gate A20 is controlled by the keyboard controller.

Table 196: Advanced BIOS features - description of setting options (cont.)

BIOS setting	Meaning	Setting options	Effect
Typematic rate setting	Determines the typematic rate of the keyboard controller.	Disabled	When disabled, the next two options "typematic rate (char/sec)" and "typematic delay (Msec)" are irrelevant.
		Enabled	When enabled, you can select a typematic rate and typematic delay. This setting can also be made in Windows.
Typematic rate (chars/sec)	Can only be selected when typematic rate setting is enabled. Determines the speed that characters are repeated when a key is pressed and held down.	6, 8, 10, 12, 15, 20, 24 or 30	Number of characters repeated per second. The accuracy of this setting is ±20%.
Typematic delay (ms)	Can only be selected when typematic rate setting is enabled. Sets the value for the delay between when a key is pressed and when its function takes effect.	250, 500, 750 or 1000	Delay setting in milliseconds. The accuracy of this setting is ±20%.
Security option	Select when a password is required.	System	Every time the system is booted, a defined password must be entered.
		Setup	A password is only needed when entering the BIOS Setup menu (e.g. with the DEL key during startup).
OS Select For DRAM > 64 MB	Only relevant when the operating system OS/2 is installed with more than 64 MB RAM.	OS2	OS/2 is installed on the device, and it has 64 MB RAM.
		Non-OS2	An operating system other than OS/2 is installed on the device.
HDD S.M.A.R.T Capability	S.M.A.R.T. (Self Monitoring Analysis and Reporting Technology) is implemented in the today's hard drives. With the appropriate software, this technology allows you to determine problems with reading or spinning the hard drive, and much more. For example, if this option is enabled a message is given to notify the user about an impending crash. Norton Utilities 3.0 evaluates these results.	Enabled	Turns the function on.
		Disabled	Turns the function off.
Report no FDD for WIN 95	Set whether or not a floppy drive is present in the system. If no floppy drive is installed this option should be set to Yes.	Yes	This frees up the IRQ6 and the Windows logo is skipped.
		No	A floppy drive is present in the system. IRQ6 is used.
Video BIOS shadow	This option copies the video BIOS from the slow graphics card memory to the RAM. This increases the speed of DOS graphics applications if no graphics card driver is used. This option should be set to Enabled under DOS and Windows 3.x. If using higher versions of Windows, set it to Disabled.	Enabled	Enables this function.
		Disabled	Disables this function.
C8000-CBFFF shadow	This section of the RAM is reserved for another application.	Enabled	Enables this function.
		Disabled	Disables this function.
CC000-CFFFF shadow	This section of the RAM is reserved for another application.	Enabled	Enables this function.
		Disabled	Disables this function.

Table 196: Advanced BIOS features - description of setting options (cont.)

BIOS setting	Meaning	Setting options	Effect
D0000-D3FFF shadow	This section of the RAM is reserved for another application.	Enabled	Enables this function.
		Disabled	Disables this function.
D4000-D7FFF shadow	This section of the RAM is reserved for another application.	Enabled	Enables this function.
		Disabled	Disables this function.
D8000-DBFFF shadow	This section of the RAM is reserved for another application.	Enabled	Enables this function.
		Disabled	Disables this function.
DC000-DFFFF shadow	This section of the RAM is reserved for another application.	Enabled	Enables this function.
		Disabled	Disables this function.
Small logo (EPA) show	With this option you can set whether the EPA logo is displayed or not.	Enabled	The EPA logo is displayed every time the system starts up.
		Disabled	The EPA logo is not displayed.

Table 196: Advanced BIOS features - description of setting options (cont.)

3.4 Advanced chipset features

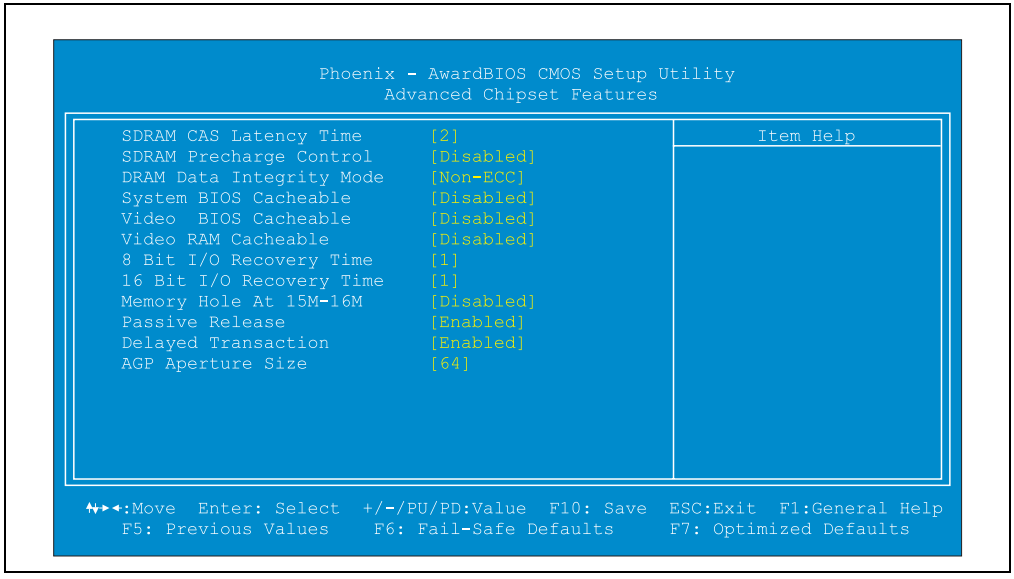


Figure 215: Advanced chipset features

Warning!

The parameters in this screen are for system designers, service personnel, and technically competent users only. Only modify those settings that you completely understand.

BIOS setting	Meaning	Setting options	Effect
SDRAM CAS latency time	With this option you can set the length of time after the SDRAM read command before the data are actually available for the processor.	2 or 3	Manual configuration of the cycle time.
SDRAM precharge control	If SDRAM is installed, the wait time before charging the RAS can be set here.	Disabled	Disables this function.
		Enabled	Enables this function.
DRAM data integrity mode		Non-ECC	
		ECC	
System BIOS cacheable	Enabling this allows caching of the BIOS ROM at F0000h-FFFFFh, resulting in better system performance. However, if any program writes to this memory area, a system error may result.	Enabled	Activates this function.
		Disabled	Deactivates this function.

Table 197: Advanced chipset features - description of setting options

BIOS setting	Meaning	Setting options	Effect
Video BIOS cacheable	Selecting Enabled allows caching of the Video BIOS RAM at C0000h to C7FFFh, resulting in better graphic performance. However, if any program writes to this memory area, a system error may result.	Enabled	Activates this function.
		Disabled	Deactivates this function.
Video RAM cacheable	Selecting Enabled allows caching of the Video RAM at A0000h to AFFFFh, resulting in better system performance. However, if any program writes to this memory area a system error may result.	Enabled	Activates this function.
		Disabled	Deactivates this function.
8-bit I/O recovery time	This option slows down the data transfer from PCI to ISA devices to enable cooperation.	NA	No waiting
		1 to 8	
16-bit I/O recovery time	This option slows down the data transfer from PCI to ISA devices to enable cooperation.	NA	No waiting
		1 to 4	
Memory hole at 15M-16M	You can reserve this area of system memory for ROM memory on ISA cards. When this area is reserved, it cannot be cached. The user information for peripherals that need to use this area of system memory usually describes their memory requirements. Memory over 16 MByte is no longer available.	Enabled	Activates this function.
		Disabled	Deactivates this function.
Passive release	This option establishes compatibility with PCI 2.1. It keeps an ISA insert card as bus master from blocking the PCI bus, resulting in a considerable increase in performance.	Enabled	Activates this function.
		Disabled	Deactivates this function.
Delayed transaction	The 32-bit write buffer, which functions like a cache during PCI transfers, is activated or deactivated here. To be fully compatible with PCI-2.1, this option should be enabled. This speeds up PCI access. This option should only be disabled when an older card is causing problems.	Enabled	Activates this function.
		Disabled	Deactivates this function.
AGP graphics aperture	Reserves a memory location in the RAM for AGP (accelerated graphic port), into which the memory access will be directed. AGP memory access (host cycles) to the reserved area are passed on without delay. The larger the value, the faster the textures stored in the main memory can be displayed. The value can be 4, 8, 16, 32, 64, 128 or 256 MB. The default value is 64 MB. The aperture size is a virtual size. It does not require the set amount of memory continuously, but only as required by the graphics card.	4, 8, 16, 32, 64, 128, 256 MB	A memory location of the selected size is reserved in the main memory for graphic access.

Table 197: Advanced chipset features - description of setting options (cont.)

3.5 Integrated peripherals

```
                    Phoenix - AwardBIOS CMOS Setup Utility
                              Integrated Peripherals

   On-Chip Primary   PCI IDE   [Enabled]                    Item Help
   On-Chip Secondary PCI IDE   [Enabled]
   IDE Primary Master PIO      [Auto]
   IDE Primary Slave  PIO      [Auto]
   IDE Secondary Master PIO    [Auto]
   IDE Secondary Slave  PIO    [Auto]
   IDE Primary Master UDMA     [Auto]
   IDE Primary Slave  UDMA     [Auto]
   IDE Secondary Master UDMA   [Auto]
   IDE Secondary Slave  UDMA   [Auto]
   USB Keyboard Support        [Disabled]
   Init Display First          [PCI Slot]
   IDE HDD Block Mode          [Enabled]
   Onboard FDC Controller      [Enabled]
   Onboard Serial Port 1       [3F8/IRQ4]
 x         Manual Port          3F8
 x         Manual IRQ           4
   Onboard Serial Port 2       [2F8/IRQ3]
 x         Manual Port          2F8
 x         Manual IRQ           3
   U2 Mode                     [Standard]
   Onboard Parallel Port       [378/IRQ7]
   Parallel Port Mode          [Standard]
 x ECP Mode Use DMA             3

 ↑↓→←:Move  Enter: Select  +/-/PU/PD:Value  F10: Save  ESC:Exit  F1:General Help
    F5: Previous Values    F6: Fail-Safe Defaults     F7: Optimized Defaults
```

Figure 216: Integrated peripherals

BIOS setting	Meaning	Setting options	Effect
On-chip primary PCI IDE	Enable or disable the primary PCI IDE controller.	Enabled	Activates the controller.
		Disabled	Deactivates the controller.
On-chip secondary PCI IDE	Enable or disable the secondary PCI IDE controller.	Enabled	Activates the controller.
		Disabled	Deactivates the controller.
IDE primary master PIO	Determine here which PIO mode should be used by the primary master IDE drive.	Auto	Automatic recognition of PIO mode.
		Mode 0 - Mode 4	Manual configuration of PIO mode.
IDE primary slave PIO	Determine here which PIO mode should be used by the primary slave IDE drive.	Auto	Automatic recognition of PIO mode.
		Mode 0 - Mode 4	Manual configuration of PIO mode.
IDE secondary master PIO	Determine here which PIO mode should be used by the secondary master IDE drive.	Auto	Automatic recognition of PIO mode.
		Mode 0 - Mode 4	Manual configuration of PIO mode.
IDE secondary slave PIO	Determine here which PIO mode should be used by the secondary slave IDE drive.	Auto	Automatic recognition of PIO mode.
		Mode 0 - Mode 4	Manual configuration of PIO mode.

Table 198: Integrated peripherals - description of setting options

BIOS setting	Meaning	Setting options	Effect
IDE primary master UDMA	This option allows you to switch UDMA mode (Ultra DMA) on or off for a primary master drive. If the drives support this mode, this option should definitely be enabled to take advantage of the higher transfer speed.	Auto	Automatic recognition of UDMA mode.
		Disabled	Do not use UDMA mode.
IDE primary slave UDMA	This option allows you to switch UDMA mode (Ultra DMA) on or off for a primary slave drive. If the drives support this mode, this option should definitely be enabled to take advantage of the higher transfer speed.	Auto	Automatic recognition of UDMA mode.
		Disabled	Do not use UDMA mode.
IDE secondary master UDMA	This option allows you to switch UDMA mode (Ultra DMA) on or off for a secondary master drive. If the drives support this mode, this option should definitely be enabled to take advantage of the higher transfer speed.	Auto	Automatic recognition of UDMA mode.
		Disabled	Do not use UDMA mode.
IDE secondary slave UDMA	This option allows you to switch UDMA mode (Ultra DMA) on or off for a secondary slave drive. If the drives support this mode, this option should definitely be enabled to take advantage of the higher transfer speed.	Auto	Automatic recognition of UDMA mode.
		Disabled	Do not use UDMA mode.
USB keyboard Support	Activate/deactivate BIOS USB keyboard driver, if present. This makes it possible to operate the USB keyboard during and after startup, even if the operating system does not have a USB driver.	Enabled	Activates the function.
		Disabled	Deactivates the function.
Init display first	This option allows you to set which graphics card should be initialized first. Either the PCI slot or the AGP card.	PCI slot	The graphics card in the PCI slot is initialized first.
		AGP	The graphics card in the AGP slot is initialized first.
IDE HDD block mode	This option activates the block mode for IDE hard drives. If the drive supports this mode and it is enabled, the number of blocks per request from the configuration sector of the hard drive is read. The recommended setting is enabled. Only old hard drives do not support this mode.	Enabled	Enables this function.
		Disabled	Disables this function.
Onboard FDC controller	Switches the integrated floppy disk controller on/off.	Enabled	Activates this function.
		Disabled	No disk drives will function.
Onboard serial port 1	Here you can set the I/O addresses and interrupts for the COM1 interface. The options to choose from are Auto, Disabled, and some settings with predefined parameters. Normally the Auto setting is recommended. Default assignment for the Auto setting:	Disabled	Assign no resources.
		3F8h / IRQ4 2F8h / IRQ3 3E8h / IRQ4 2E8h / IRQ3	Use predefined values (addresses and interrupts).
		Auto	Automatic configuration
		Manual	Make settings manually.

Table 198: Integrated peripherals - description of setting options (cont.)

BIOS setting	Meaning	Setting options	Effect
Onboard serial port 2	Here you can set the I/O addresses and interrupts for the COM2 interface. The options to choose from are Auto, Disabled, and some settings with predefined parameters. Normally the Auto setting is recommended. Default assignment for the Auto setting:	Disabled	Assign no resources.
		3F8h / IRQ4 2F8h / IRQ3 3E8h / IRQ4 2E8h / IRQ3	Use predefined values (addresses and interrupts).
		Auto	Automatic configuration
		Manual	Make settings manually.
UR2 mode	This option allows you to enter an area of use for the second serial port.	Default	RS232 interface
		Sharp IRrDA	Compatible serial infrared interface
		IrDA SIRrDA	1.0 compatible serial infrared interface.
Onboard parallel port	The settings for the parallel interface LPT1 cannot be automatically detected. They are selected from a predefined range of values.	Disabled	Deactivates the parallel port.
		378h / IRQ7 278h / IRQ5 3BCh / IRQ7	Select the values to be used from a predefined list of values.
Parallel port mode	Here you can set the operating mode of the parallel interface. The following options can be selected: Please take note that the EPP and ECP modes must be supported by connected devices.	Default	
		SPP	Standard parallel port (max. 64 kByte/s unidirectional).
		EPP 1.7	Enhanced parallel port v1.7 (max. 2 MByte/s bidirectional).
		EPP 1.9	Enhanced parallel port v1.9 (max. 2 MByte/s bidirectional).
		ECP	Enhanced capability port (max. 2 MByte/s bidirectional).
		EPP+ECP	Combined EPP/ECP transfer.

Table 198: Integrated peripherals - description of setting options (cont.)

3.6 Special OEM features

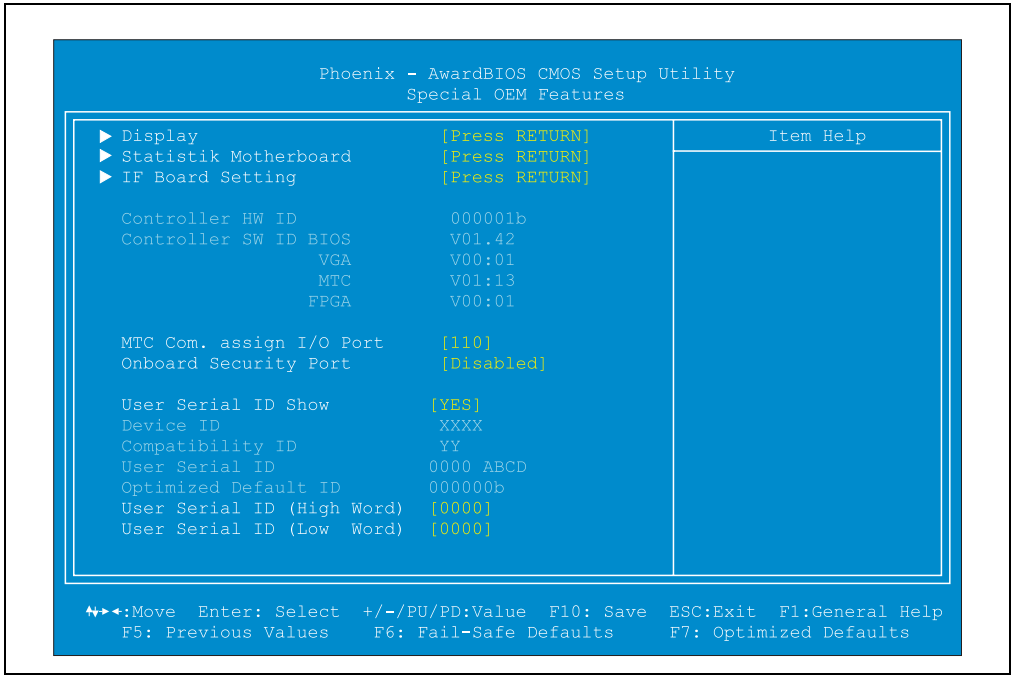


Figure 217: Special OEM features

BIOS setting	Meaning	Setting options	Effect
Display	Display specific values are displayed here.	Press RETURN	Pressing "ENTER" takes you to the configuration screen for the display on page 328.
Statistics motherboard	Motherboard specific values are displayed here.	Press RETURN	Pressing "ENTER" takes you to the configuration screen for the statistics motherboard on page 330.
IF board setting	This is where specific values from a B&R interface board (if present) are displayed.	Press RETURN	Pressing "ENTER" takes you to the configuration screen for the IF board setting on page 331.
Controller HW ID	Displays the current hardware identification number.	None	
Controller SW ID BIOS	Displays the currently installed BIOS software version.	None	
VGA	Displays the currently installed VGA BIOS software version.	None	
MTC	Displays the currently installed MTC software version.	None	
FPGA	Displays the currently installed FPGA software version.	None	

Table 199: Special OEM features - description of setting options

BIOS setting	Meaning	Setting options	Effect
MTC com. assigned I/O port	The I/O port address can be set here for MTC communication.	110, 120, 130, 140, 150, 160, 190, 1A0, 1B0, 1C0, 1D0, 1E0	
Onboard security port	The I/O address range of the hardware security key is can be set here.	Disabled	Deactivates the onboard security port.
		278	Use of this address area
		378	Use of this address area
		3BC	Use of this address area
User serial ID show	A user serial number can be displayed in the device listing window upon system startup.	YES	Displays the user serial ID.
		NO	Does not display the user serial ID.
Device ID		XXXX	
Compatibility ID		YY	
User serial ID (high word)	Enter the first 4 characters of a user serial ID.	0000 to FFFF	These first 4 characters are shown in the device listing window on system start.
(Low word)	Enter the second 4 characters of a user serial ID.	0000 to FFFF	These second 4 characters are shown in the device listing window on system start.

Table 199: Special OEM features - description of setting options

3.6.1 Display

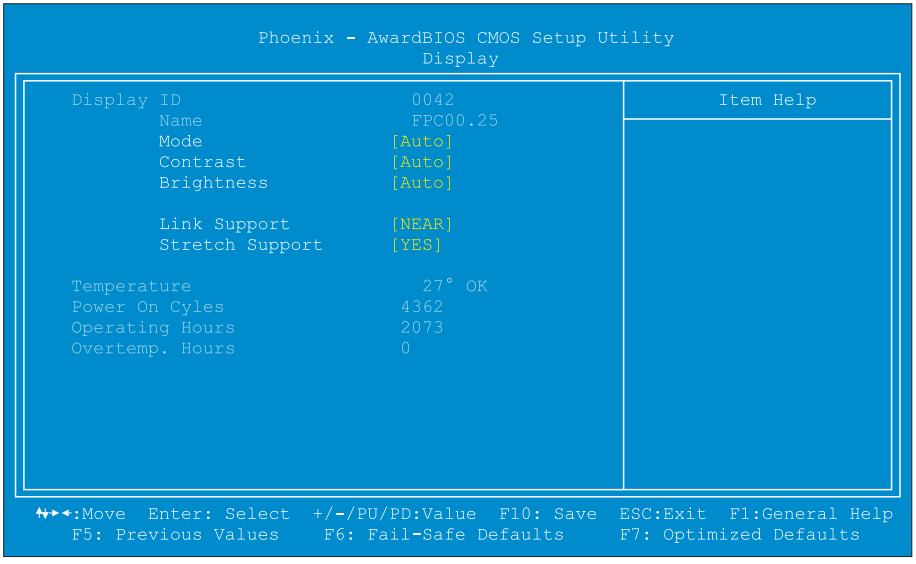


Figure 218: Special OEM features - display settings

BIOS setting	Meaning	Setting options	Effect
Display ID	Every B&R display unit has a type ID identification, which is shown here. **Type ID Display** 0010 TFT VGA 10.4" 0011 TFT VGA 13.8" 0013 TFT VGA 10.4" 0014 TFT VGA 10.4" 0030 LCD VGA 10.4" 0040 TFT SVGA 10.4" 0041 TFT SVGA 12.1" 0042 TFT SVGA 12.1" 0050 TFT XGA 13.8" 0051 TFT XGA 14.5" 0070 TFT XGA 13.8" 0071 TFT XGA 14.5" 0072 TFT XGA 15" 0073 TFT XGA 15" 0080 TFT SXGA 18"	None	-
Name	Name of the display firmware version	None	-
Mode	This option allows you to select which display device should be active at startup.	AUTO	All connected display devices are automatically activated. If no display device is connected then the monitor is activated
		FPD	The video signal is output via the FPD interface on the IPC, where, for example, a B&R display unit can be connected.
		CRT	The video signal is output via the FPD interface on the IPC, where, for example, a B&R display unit can be connected.
		CRT&FPD	The video signal is output via the FPD and VGA interfaces on the IPC simultaneously.
Contrast	Set the contrast for a connected B&R display unit. **This is only possible for LCD displays.**	AUTO	Contrast is set automatically.
		0 - 100	Set contrast manually. from 0-100 %.
Brightness	Set the brightness of the connected display. Possible for both LCD as well as for TFT displays. If a value (e.g. 80%) is stored in BIOS Setup then BIOS uses these each time the system is started, also when another display is connected.	AUTO	Brightness is set automatically.
		0 - 100	Manual setting of brightness from 0-100 %.
Link support [1)]	The user can configure the performance of the video signal to the FPD interface using the system unit. **Information:** **If the picture on the display unit is not sharp or otherwise unacceptable with this BIOS setting set to "NEAR", then it should be set to "FAR".**	NEAR	is also the BIOS Setup default setting. The display unit is directly connected to the controller using a B&R standard remote display cable smaller than 5 meters (5A5004.01 or 5A5004.02).
		FAR	This setting must be selected with remote operation of display units greater than or equal to 5 meters (5A5004.05, 5A5004.06, 5A5004.10 and 5A5004.11). The performance of the video signal is set to maximum.

Table 200: Special OEM features - display settings

BIOS setting	Meaning	Setting options	Effect
Stretch support [1)]	BIOS and MS-DOS start firstly in 640x350 and then in 640x400 text mode.	YES	With Stretch Support “YES”, texts and graphics are increased to the maximum visibility for the display unit. Systems with an ATI graphics chip (5C5001.32, 5C5001.42, 5C5601.32 and 5C5601.42), this signal is converted internally.
		NO	With stretch support "NO", the resolutions are transferred pixel for pixel. This way, smaller resolutions can be shown on high resolution displays. The picture is then centered.
Temperature	Shows the display temperature of the connected B&R display unit.	None	-
Power on cycles	Shows the power-on cycles of the connected B&R display unit.	None	-
Operating hours	Shows the operating hours of the connected B&R display unit.	None	-
Overtemp. hours	Shows the over-temperature hours of the connected B&R display unit.	None	-

Table 200: Special OEM features - display settings (cont.)

1) This BIOS setting can only be configured in connection with the ATI graphic chip system units (5C5001.32, 5C5001.42, 5C5601.32 and 5C5601.42). For C&T graphic chip system units (5C5001.11, 5C5001.12, 5C5001.21, 5C5001.22, 5C5601.11, 5C5601.12, 5C5601.21 and 5C5601.22), these BIOS parameters can only be viewed. It is not possible to make changes.

3.6.2 Statistic motherboard

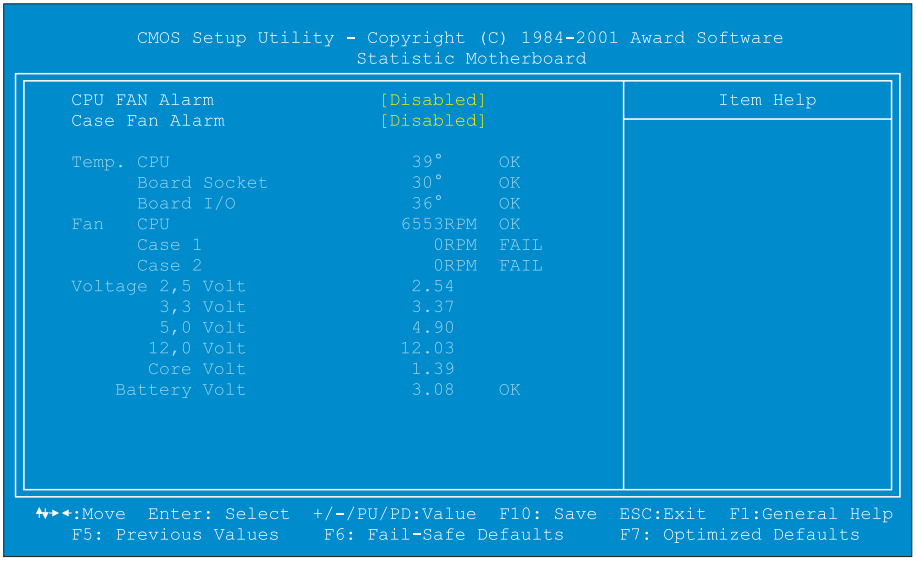


Figure 219: Special OEM features - statistic motherboard settings

BIOS setting	Meaning	Setting options	Effect
Skip CPU fan alarm	Controls the CPU fan alarm.	Enabled	Enables this function. No CPU fan alarm is signaled.
		Disabled	Disables this function. CPU fan alarm is signaled when one occurs.
Skip RS485 alarm	Controls the display connection alarm.	Enabled	Enables this function. No display connection alarm is signaled.
		Disabled	Disables this function. A display connection alarm is signaled if one occurs.
Temp. CPU	Indicates the current processor temperature.	None	
Temp. board socket	Indicates the current board socket temperature.	None	
Temp. board I/O	Indicates the current board I/O temperature.	None	
Fan CPU	Displays the current speed of the CPU fan.	None	
Voltage 2.5 volts	Displays the current voltage of the 2.5 volt supply.	None	
Voltage 3.3 volts	Displays the current voltage of the 3.3 volt supply.	None	
Voltage 5.0 volts	Displays the current voltage of the 5 volt supply.	None	
Voltage 12.0 volts	Displays the current voltage of the 12 volt supply.	None	
Voltage core volt	Displays the current level of the core voltage.	None	
Voltage battery volt	Displays the current level of the battery voltage.	None	
Power on cycles	Displays the power-on cycles of the IPC.	None	
Operating hours	Displays the number of operating hours for the IPC.	None	
Overtemp. hours	Displays the number of operating hours at over-temperature.	None	
Fan cooler hours	Operating hours of the fans (for display units optional, for controller units- both fans)	None	

Table 201: Special OEM features - statistic motherboard settings

3.6.3 IF board setting

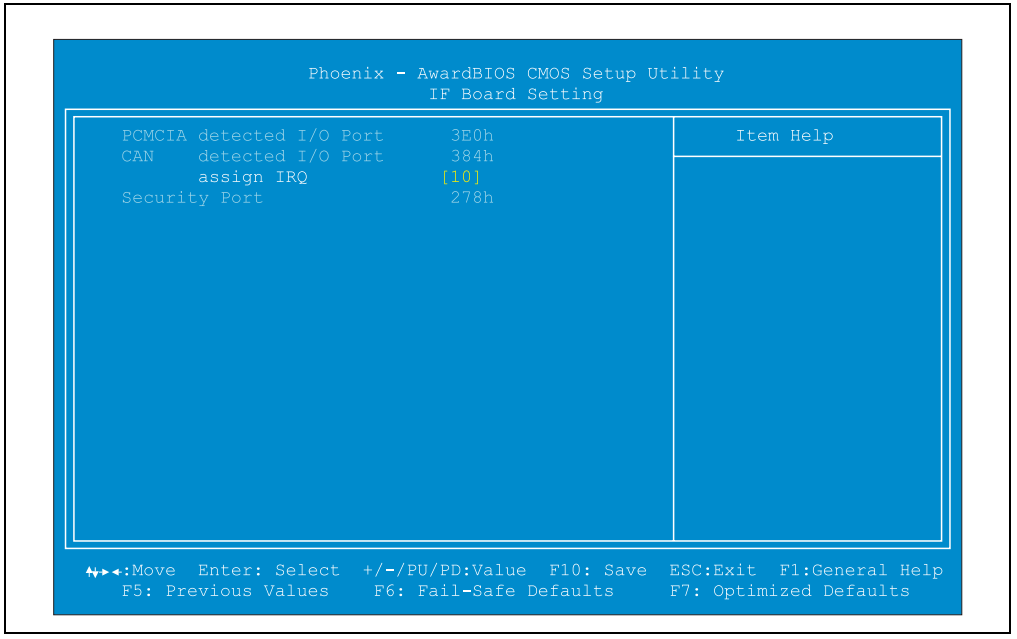


Figure 220: Special OEM features - IF board settings

BIOS setting	Meaning	Setting options	Effect
PCMCIA detected I/O port	The I/O address range of the PCMCIA port (socket 1) is displayed on the interface board.	None	
CAN detected I/O port	If a B&R interface board is installed in the IPC, then the I/O range is shown here.	None	
Assign IRQ	Here, an IRQ can be assigned to the CAN port of the interface board (disconnecting the interrupt line).	NA	No interrupt is assigned.
		10	IRQ 10 is assigned.
		NMI	An NMI (Non Maskable Interrupt) is assigned.
Security port	The I/O address range of the hardware security key is displayed on a B&R interface board.	None	

Table 202: Special OEM features - IF board settings

3.7 Power management setup

```
                    Phoenix - AwardBIOS CMOS Setup Utility
                          Power Management Setup

   Power Management              [User Define]          Item Help
   PM Control by APM             [Yes]
   Video Off Method              [DPMS]
   Video Off After               [Standby]
   MODEM Use IRQ                 [NA]
   Doze Mode                     [Disable]
   Standby Mode                  [Disable]
   Suspend Mode                  [Disable]
   HDD Power Down                [Disable]
   Throttle Duty Cycle           [62.5%]
   VGA Active Monitor            [Disabled]
   PowerOn by Ring               [Disabled]
   IRQ 8 Break Suspend           [Disabled]
   ** Reload Global Timer Events **
   IRQ[3-7, 9-15],NMI            [Disabled]
   Primary IDE 0                 [Disabled]
   Primary IDE 1                 [Disabled]
   Secondary IDE 0               [Disabled]
   Secondary IDE 1               [Disabled]
   Serial Port                   [Enabled]
   Parallel Port                 [Disabled]

↑↓→←:Move  Enter: Select  +/-/PU/PD:Value  F10: Save  ESC:Exit  F1:General Help
   F5: Previous Values    F6: Fail-Safe Defaults     F7: Optimized Defaults
```

Figure 221: Power management setup

BIOS setting	Meaning	Setting options	Effect
Power management	This option allows you to define the type (or degree) of power saving, meaning that after a certain period of inactivity certain components of the system are switched off.	User define	The values for Doze, Standby, Suspend and HDD power down mode can be set individually.
		Min saving	After an inactivity period of one hour, all system components that can be switched off go into energy saving mode.
		Max saving	This setting activates the highest level of energy savings. This mode is only available on SL-CPUs.
PM control by APM	If Advanced Power Management (APM) is installed on your system, selecting Yes gives better power savings.	Yes	Enables this function.
		No	Disables this function.
Video off method	Determines the condition of the monitor when it is in Standby mode.	Blank screen	This option causes older monitors to shut off.
		DPMS	With this option the energy saving mode is controlled by the graphics card, according to the VESA DPMS standard (**D**isplay **P**ower **M**anagement Signaling).

Table 203: Power management setup - description of setting options

BIOS setting	Meaning	Setting options	Effect
Video off after	Determines the degree of power saving at which the monitor goes into power saving mode.	NA	No shut-off in no save mode.
		Suspend	Shut-off only in suspend mode.
		Standby	Shut-off only in standby or suspend mode.
		Doze	Shut-off in all save modes.
Modem use IRQ	The interrupt line (IRQ) of a modem, if one is present, can be entered here. Activities on this line can, for example, prepare the computer for fax reception.	NA	No interrupt is assigned.
		3, 4, 5, 7, 9, 10 or 11	One of these interrupts is assigned.
Doze mode	With this option you can set the period of time without user activity after which the processor will operate with reduced speed.	Disable	Deactivates the function
		8, 12, 16, 20, 24 or 28 seconds	
Standby mode	With this option you can set the period of time without user activity after which the built in disk drive and the graphics controller shut down.	Disable	Disables this function.
		1 min , 2 min , 4 min, 8 min , 12 min , 20 min , 30 min , 40 min , 1 hour	After this amount of time has elapsed the system BIOS switches to standby mode.
Suspend mode	With this option you can determine after which time of user inactivity all the system components (apart from the processor) should be switched off.	Disabled	Disables this function.
		1 min , 2 min , 4 min, 8 min , 12 min , 20 min , 30 min , 40 min , 1 hour	After this amount of time has elapsed the system BIOS switches to suspend mode.
HDD power down	With this option you can determine after which time of user inactivity the hard disk should be switched off (if there are a number of hard disks in the IPC, then all are switched off). Can only be set when the function "Power management" is set to "User define".	Disable	Disables this function.
		1 to 15 min	The hard disk is turned off after this time has passed.
Throttle duty cycle	This option allows you to set the percentage to which the CPU should be throttled in Terminal mode.	Disable	Function is deactivated.
		87.5%, 75.0%, 62.5%, 50.0%, 37.5%, 25.0%, 12.5%	Processor performance in percent.
VGA active monitor	When this function is enabled, the timer for saving power can also be reset by VGA activities.	Disabled	Disables this function.
		Enabled	Enables this function.
Power on by ring	If an external modem is connected to the onboard serial port and the telephone rings, the system starts up.	Enabled	Enables this function.
		Disabled	Disables this function.
IRQ 8 break suspend	You can switch on or off monitoring of the IRQ8 (the Real Time Clock) in the Powersave mode.	Disabled	Disables this function.
		Enabled	Enables this function.
IRQ[3-7,9-15],NMI		Disabled	Disables this function.
		Enabled	Enables this function.
Primary IDE 0	If this option is enabled, the system activates the energy saving timer when there is no activity on the first drive of the first IDE/EIDE port.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 203: Power management setup - description of setting options

BIOS setting	Meaning	Setting options	Effect
Primary IDE 1	If this option is enabled, the system activates the energy saving timer when there is no activity on the second drive of the first IDE/EIDE port.	Disabled	Disables this function.
		Enabled	Enables this function.
Secondary IDE 0	If this option is enabled, the system activates the energy saving timer when there is no activity on the first drive of the second IDE/EIDE port.	Disabled	Disables this function.
		Enabled	Enables this function.
Secondary IDE 1	If this option is enabled, the system activates the energy saving timer when there is no activity on the second drive of the second IDE/EIDE port.	Disabled	Disables this function.
		Enabled	Enables this function.
Serial port	Activate/deactivate the ports that can cause the system to switch into or out of energy saving mode. The system will continue to monitor the activity on all enabled devices.	Disabled	Disables this function.
		Enabled	Enables this function.
Parallel port	This option influences the time control for power management. When this option is enabled a countdown begins that is interrupted as soon as the INTA~INTD signal becomes active. It is reset to zero.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 203: Power management setup - description of setting options

3.8 PnP/PCI configurations

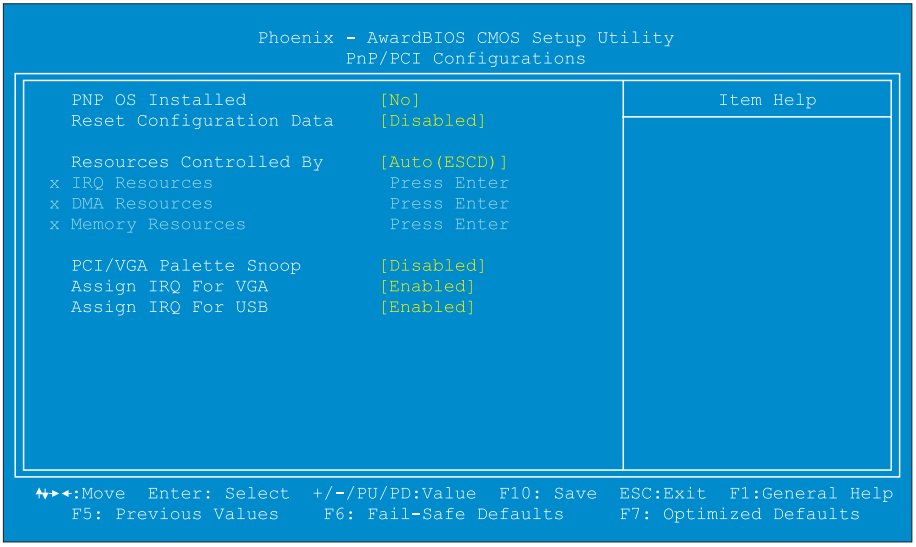


Figure 222: PnP/PCI configurations setup

BIOS setting	Meaning	Setting options	Effect
PNP OS installed	If the operating system is plug & play capable, the resources are distributed automatically.	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 the Flash (ESCD).	Disabled	Disables this function.
		Enabled	The ESCD area is rewritten before start-up. Then the option is reset to Disabled.
Resources controlled by	Determines whether individual resources (IRQ, DMA) are reserved.	Auto (ESCD)	When set to "Auto (ESCD)", all Plug & Play compatible and bootable devices are automatically configured by the BIOS.
		Manual	When set to Manual, all IRQ and DMA resource settings can be reserved.
IRQ resources	Only active when "Resources controlled by" is set to Manual.	Press Enter	Pressing "ENTER" takes you to the configuration screen for the IRQ resources on page 38.
DMA resources	Only active when "Resources controlled by" is set to Manual.	Press Enter	Pressing "ENTER" takes you to the configuration screen for the DMA resources on page 338.

Table 204: PnP/PCI configurations setup - description of setting options

BIOS setting	Meaning	Setting options	Effect
Memory resources	Only active when "Resources controlled by" is set to Manual.	Press Enter	Pressing "ENTER" takes you to the configuration screen for the memory resources on page 339.
PCI/VGA palette snoop	This function enables BIOS to display the color table of a PCI graphics card and then, if necessary, to transmit this information to the video card.	Disabled	Disables this function.
		Enabled	Enables this function.
Assign IRQ for VGA	Assignment of an interrupt for the VGA controller integrated in the chipset.	Disabled	Disables this function.
		Enabled	Enables this function.
Assign IRQ for USB	Assignment of an interrupt for the USB controller.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 204: PnP/PCI configurations setup - description of setting options (cont.)

3.8.1 IRQ resources

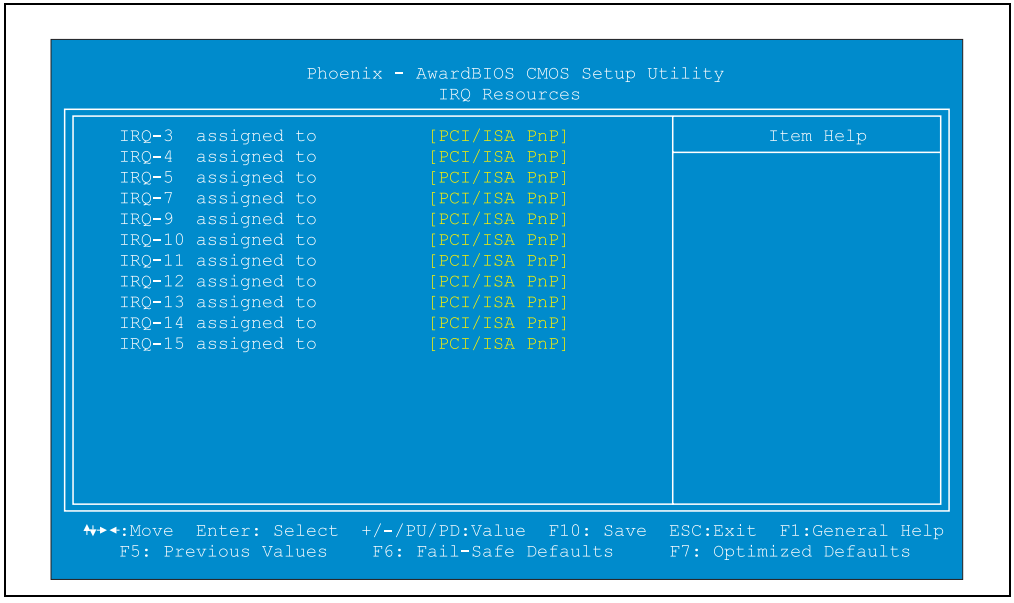


Figure 223: IRQ resources setup

BIOS setting	Meaning	Setting options	Effect
IRQ-3 assigned to	Assign an ISA or PCI slot to the IRQ 3.	PCI/ISA PnP	This resource is free for PCI or ISA-PnP.
		Legacy ISA	This resource is reserved for ISA.
IRQ-4 assigned to	Assign an ISA or PCI slot to the IRQ 4.	PCI/ISA PnP	This resource is free for PCI or ISA-PnP.
		Legacy ISA	This resource is reserved for ISA.
IRQ-5 assigned to	Assign an ISA or PCI slot to the IRQ 5.	PCI/ISA PnP	This resource is free for PCI or ISA-PnP.
		Legacy ISA	This resource is reserved for ISA.
IRQ-7 assigned to	Assign an ISA or PCI slot to the IRQ 7.	PCI/ISA PnP	This resource is free for PCI or ISA-PnP.
		Legacy ISA	This resource is reserved for ISA.
IRQ-9 assigned to	Assign an ISA or PCI slot to the IRQ 9.	PCI/ISA PnP	This resource is free for PCI or ISA-PnP.
		Legacy ISA	This resource is reserved for ISA.
IRQ-10 assigned to	Assign an ISA or PCI slot to the IRQ 10.	PCI/ISA PnP	This resource is free for PCI or ISA-PnP.
		Legacy ISA	This resource is reserved for ISA.
IRQ-11 assigned to	Assign an ISA or PCI slot to the IRQ 11.	PCI/ISA PnP	This resource is free for PCI or ISA-PnP.
		Legacy ISA	This resource is reserved for ISA.
IRQ-12 assigned to	Assign an ISA or PCI slot to the IRQ 12.	PCI/ISA PnP	This resource is free for PCI or ISA-PnP.
		Legacy ISA	This resource is reserved for ISA.

Table 205: IRQ resources setup - description of setting options

BIOS setting	Meaning	Setting options	Effect
IRQ-13 assigned to	Assign an ISA or PCI slot to the IRQ 13.	PCI/ISA PnP	This resource is free for PCI or ISA-PnP.
		Legacy ISA	This resource is reserved for ISA.
IRQ-14 assigned to	Assign an ISA or PCI slot to the IRQ 14.	PCI/ISA PnP	This resource is free for PCI or ISA-PnP.
		Legacy ISA	This resource is reserved for ISA.
IRQ-15 assigned to	Assign an ISA or PCI slot to the IRQ 15.	PCI/ISA PnP	This resource is free for PCI or ISA-PnP.
		Legacy ISA	This resource is reserved for ISA.

Table 205: IRQ resources setup - description of setting options (cont.)

3.8.2 DMA resources

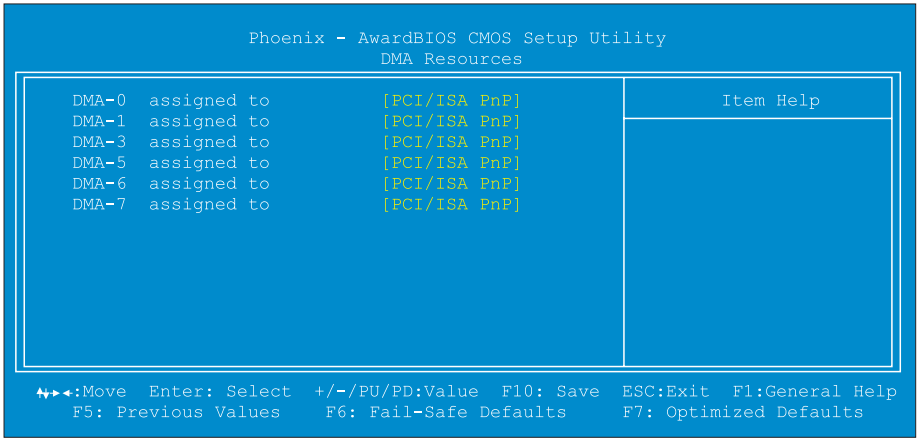


Figure 224: DMA resources setup

BIOS setting	Meaning	Setting options	Effect
DMA-0 assigned to	Assign an ISA or PCI slot to the DMA 0.	PCI/ISA PnP	This resource is free for PCI or ISA-PnP.
		Legacy ISA	This resource is reserved for ISA.
DMA-1 assigned to	Assign an ISA or PCI slot to the DMA 0.	PCI/ISA PnP	This resource is free for PCI or ISA-PnP.
		Legacy ISA	This resource is reserved for ISA.
DMA-3 assigned to	Assign an ISA or PCI slot to the DMA 3.	PCI/ISA PnP	This resource is free for PCI or ISA-PnP.
		Legacy ISA	This resource is reserved for ISA.
DMA-5 assigned to	Assign an ISA or PCI slot to the DMA 5.	PCI/ISA PnP	This resource is free for PCI or ISA-PnP.
		Legacy ISA	This resource is reserved for ISA.
DMA-6 assigned to	Assign an ISA or PCI slot to the DMA 6.	PCI/ISA PnP	This resource is free for PCI or ISA-PnP.
		Legacy ISA	This resource is reserved for ISA.

Table 206: DMA resources setup - description of setting options

BIOS setting	Meaning	Setting options	Effect
DMA-7 assigned to	Assign an ISA or PCI slot to the DMA 7.	PCI/ISA PnP	This resource is free for PCI or ISA-PnP.
		Legacy ISA	This resource is reserved for ISA.

Table 206: DMA resources setup - description of setting options (cont.)

3.8.3 Memory resources

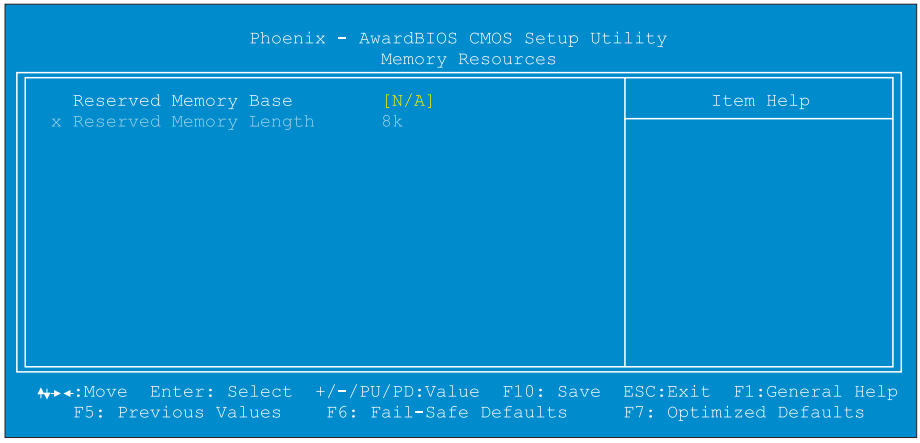


Figure 225: Memory resources

BIOS setting	Meaning	Setting options	Effect
Reserved memory base	Assign ISA or PCI slots for the memory to be reserved.	N/A	No assignment
		C800, CC00, D000, D400, D800 or DC00	This address is reserved.
Reserved memory length	Can only be selected if a value is set for the setting above.	8k, 16k, 32k or 64k	The selected amount is reserved.

Table 207: Memory resources setup - description of setting options

3.9 Frequency / voltage control

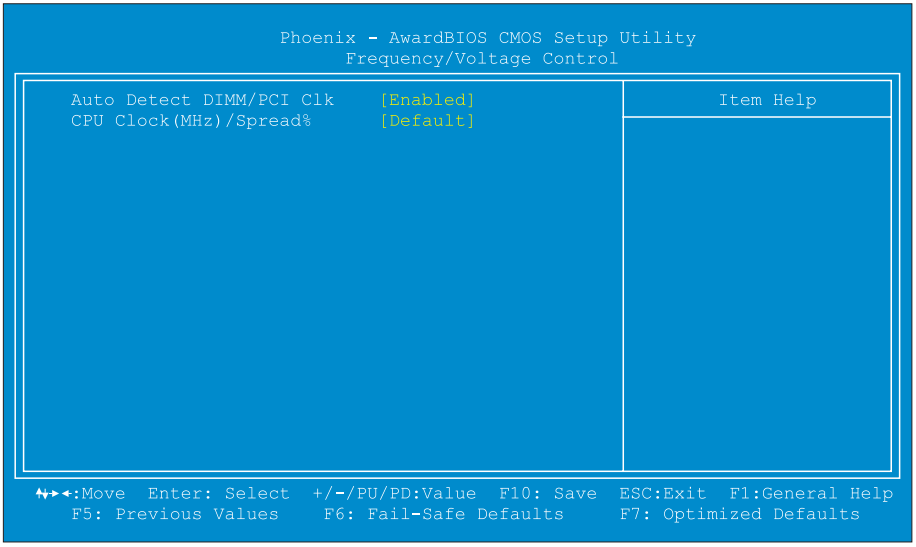


Figure 226: Frequency / voltage control setup

BIOS setting	Meaning	Setting options	Effect
Auto-detect DIMM/ PCI Clk	Unoccupied DIMM and PCI slots are separated from the clock generator with this option. This option influences the IPCs electromagnetic emissions.	Enabled	Activates the function.
		Disabled	Deactivates the function
CPU clock (MHz) / spread(%)		Default	
		66(+/-.5)	
		66(-.5)	

Table 208: Frequency / voltage control setup - description of setting options

3.10 Load fail-safe defaults

Load the minimum settings needed just to get the system running.

3.11 Load optimized defaults

Load specific BIOS defaults, depending on the positions of the configuration switches.

3.12 Set password

A supervisor password for BIOS setup can be set here.

3.13 Save & exit setup

BIOS Setup Utility is closed with this item. Changes made are saved in CMOS after confirmation.

Information:

In order to confirm, the "z" key must be pressed when using a German keyboard (US keyboard layout).

3.14 Exit without saving

With this item you can close BIOS Setup Utility without saving the changes made in the CMOS.

Information:

In order to confirm, the "z" key must be pressed when using a German keyboard (US keyboard layout).

3.15 Comparison of BIOS settings (BIOS defaults / Setup defaults)

3.15.1 BIOS features setup

Elite BIOS version	V01.08		V01.09		V01.10		V01.11	
Description	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults
Virus warning	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
CPU internal cache	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
External cache	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
CPU L2 cache ECC checking	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
Processor number Feature [1)]	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
Quick Power On Self Test	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Boot from LAN first	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Boot sequence	A,C,SCSI	A,C,SCSI	A,C,SCSI	A,C,SCSI	A,C,SCSI	A,C,SCSI	A,C,SCSI	A,C,SCSI
Swap floppy drive	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Boot up floppy seek	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
Boot up NumLock Status	On	On	On	On	On	On	On	On
Gate A20 option	Normal	Fast	Normal	Fast	Normal	Fast	Normal	Fast
Typematic rate setting	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Security option	Setup	Setup	Setup	Setup	Setup	Setup	Setup	Setup
PCI/VGA palette snoop	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Assign IRQ for VGA	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
OS select for DRAM > 64 MB	Non-OS2	Non-OS2	Non-OS2	Non-OS2	Non-OS2	Non-OS2	Non-OS2	Non-OS2
Report no FDD for WIN 95	No	Yes	No	Yes	No	Yes	No	Yes
Video BIOS shadow	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
C8000-CBFFF	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
CC000-CFFFF	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
D0000-D3FFF	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
D4000-D7FFF	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
D8000-DBFFF	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
DC000-DFFFF	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled

BIOS features setup V01.08 to V01.11

1) This function is available with a Coppermine Technology based processor (e.g. Celeron 566/66 or Pentium III 600/100 and Pentium III 850/100).

Elite BIOS version	V01.13		V01.14		V01.15	
Description	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults
Virus warning	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
CPU internal cache	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
External cache	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
CPU L2 cache ECC checking	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
Processor number feature 1)	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
Quick Power On Self Test	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Boot from LAN first	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Boot sequence	A,C,SCSI	A,C,SCSI	A,C,SCSI	A,C,SCSI	A,C,SCSI	A,C,SCSI
Swap floppy drive	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Boot up floppy seek	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
Boot up NumLock status	On	On	On	On	On	On
Gate A20 option	Normal	Fast	Normal	Fast	Normal	Fast
Typematic rate setting	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Security option	Setup	Setup	Setup	Setup	Setup	Setup
PCI/VGA palette snoop	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Assign IRQ for VGA	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
OS Select For DRAM > 64 MB	Non-OS2	Non-OS2	Non-OS2	Non-OS2	Non-OS2	Non-OS2
Report no FDD for WIN 95	No	Yes	No	Yes	No	Yes
Video BIOS shadow	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
C8000-CBFFF	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
CC000-CFFFF	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
D0000-D3FFF	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
D4000-D7FFF	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
D8000-DBFFF	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
DC000-DFFFF	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled

Table 209: BIOS features setup V01.13, V01.14 and V01.15

1) This function is available with a Coppermine Technology based processor (e.g. Celeron 566/66 or Pentium III 600/100 and Pentium III 850/100).

3.15.2 Chipset features setup

Elite BIOS version	V01.08		V01.09		V01.10		V01.11	
Description	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults
SDRAM control by	Manual	SPD	Manual	SPD	Manual	SPD	Manual	SPD
SDRAM RAS to CAS delay	3	2	3	2	3	2	3	2
SDRAM RAS precharge time	3	2	3	2	3	2	3	2
SDRAM CAS latency time	3	2	3	2	3	2	3	2
SDRAM precharge Control	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
DRAM data integrity mode	Non-ECC	Non-ECC	Non-ECC	Non-ECC	Non-ECC	Non-ECC	Non-ECC	Non-ECC
System BIOS cacheable	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Video BIOS cacheable	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Video RAM cacheable	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
8-bit I/O recovery time	3	1	3	1	3	1	3	1
16-bit I/O recovery time	2	1	2	1	2	1	2	1
Memory hole at 15M - 16M	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Passive release	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
Delayed transaction	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
AGP aperture size (MB)	64	64	64	64	64	64	64	64
Auto detect DIMM/PCI Clk	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
CPU clock (MHz) / spread(%)	Default	Default	Default	Default	Default	Default	Default	Default

Table 210: Chipset features setup V01.08 to V01.11

Elite BIOS version	V01.13		V01.14		V01.15	
Description	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults
SDRAM control by	Manual	SPD	Manual	SPD	Manual	SPD
SDRAM RAS to CAS delay	3	2	3	2	3	2
SDRAM RAS precharge time	3	2	3	2	3	2
SDRAM CAS latency time	3	2	3	2	3	2
SDRAM precharge control	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
DRAM data integrity mode	Non-ECC	Non-ECC	Non-ECC	Non-ECC	Non-ECC	Non-ECC
System BIOS cacheable	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Video BIOS cacheable	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Video RAM cacheable	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
8-bit I/O recovery time	3	1	3	1	3	1
16-bit I/O recovery time	2	1	2	1	2	1
Memory hole at 15M-16M	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Passive release	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
Delayed transaction	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
AGP aperture size (MB)	64	64	64	64	64	64
Auto detect DIMM/PCI Clk	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
CPU clock (MHz) / spread(%)	Default	Default	Default	Default	Default	Default

Table 211: Chipset features setup V01.13, V01.14 and V01.15

3.15.3 Power management setup

Elite BIOS version	V01.08		V01.09		V01.10		V01.11	
Description	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults
Power management	User define	User define	User define	User define	User define	User define	User define	User define
PM control by APM	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Video off method	DPMS	DPMS	DPMS	DPMS	DPMS	DPMS	DPMS	DPMS
Video off after	Standby	Standby	Standby	Standby	Standby	Standby	Standby	Standby
Modem use IRQ	3	3	3	3	3	3	3	3
Doze mode	Disable	Disable	Disable	Disable	Disable	Disable	Disable	Disable
Standby mode	Disable	Disable	Disable	Disable	Disable	Disable	Disable	Disable
Suspend mode	Disable	Disable	Disable	Disable	Disable	Disable	Disable	Disable
HDD power down	Disable	Disable	Disable	Disable	Disable	Disable	Disable	Disable
Throttle duty cycle	62.5%	62.5%	62.5%	62.5%	62.5%	62.5%	62.5%	62.5%
PCI/VGA act monitor	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
PowerOn by ring	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Resume by alarm	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
IRQ 8 break suspend	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
IRQ[3-7,9-15],NMI	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Primary IDE 0	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Primary IDE 1	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Secondary IDE 0	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Secondary IDE 1	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Floppy disk	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Serial port	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
Parallel port	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled

Table 212: Power management setup V01.08 to V01.11

Elite BIOS version	V01.13		V01.14		V01.15	
Description	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults
Power management	Disable	Disable	Disable	Disable	Disable	Disable
PM control by APM	Yes	Yes	Yes	Yes	Yes	Yes
Video off method	DPMS	DPMS	DPMS	DPMS	DPMS	DPMS
Video off after	Standby	Standby	Standby	Standby	Standby	Standby
Modem use IRQ	3	3	3	3	3	3
Doze mode	Disable	Disable	Disable	Disable	Disable	Disable
Standby mode	Disable	Disable	Disable	Disable	Disable	Disable
Suspend mode	Disable	Disable	Disable	Disable	Disable	Disable
HDD power down	Disable	Disable	Disable	Disable	Disable	Disable
Throttle duty cycle	62.5%	62.5%	62.5%	62.5%	62.5%	62.5%
PCI/VGA act monitor	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
PowerOn by ring	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Resume by alarm	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
IRQ 8 break suspend	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
IRQ[3-7,9-15],NMI	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Primary IDE 0	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Primary IDE 1	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Secondary IDE 0	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Secondary IDE 1	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Floppy disk	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Serial port	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
Parallel port	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled

Table 213: Power management setup V01.13, V01.14 and V01.15

3.15.4 PNP/PCI configuration

Elite BIOS version	V01.08		V01.09		V01.10		V01.11	
Description	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults
PNP OS installed	No	No	No	No	No	No	No	No
Resources controlled by	Auto	Manual	Auto	Manual	Auto	Manual	Auto	Manual
Reset configuration data	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
IRQ-3 assigned to		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP
IRQ-4 assigned to		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP
IRQ-5 assigned to		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP

Table 214: PnP/PCI configuration V01.08 to V01.11

Elite BIOS version	V01.08		V01.09		V01.10		V01.11	
Description	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults
IRQ-7 assigned to		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP
IRQ-9 assigned to		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP
IRQ-10 assigned to		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP
IRQ-11 assigned to		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP
IRQ-12 assigned to		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP
IRQ-14 assigned to		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP
IRQ-15 assigned to		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP
DMA-0 assigned to		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP
DMA-1 assigned to		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP
DMA-3 assigned to		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP
DMA-5 assigned to		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP
DMA-6 assigned to		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP
DMA-7 assigned to		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP
PCI IDE IRQ map to	PCI-AUTO	ISA	PCI-AUTO	ISA	PCI-AUTO	ISA	PCI-AUTO	ISA
Primary IDE INT#:	A		A		A		A	
Secondary IDE INT#	B		B		B		B	
Used MEM base addr		N/A		N/A		N/A		N/A
Assign IRQ for USB	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled

Table 214: PnP/PCI configuration V01.08 to V01.11 (cont.)

Elite BIOS version	V01.13		V01.14		V01.15	
Description	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults
PNP OS installed	No	No	No	No	No	No
Resources controlled by	Auto	Manual	Auto	Manual	Auto	Manual
Reset configuration data	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
IRQ-3 assigned to		Legacy ISA		Legacy ISA		Legacy ISA
IRQ-4 assigned to		Legacy ISA		Legacy ISA		Legacy ISA
IRQ-5 assigned to		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP
IRQ-7 assigned to		Legacy ISA		Legacy ISA		Legacy ISA
IRQ-9 assigned to		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP
IRQ-10 assigned to		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP
IRQ-11 assigned to		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP
IRQ-12 assigned to		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP
IRQ-14 assigned to		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP
IRQ-15 assigned to		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP
DMA-0 assigned to		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP
DMA-1 assigned to		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP
DMA-3 assigned to		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP
DMA-5 assigned to		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP
DMA-6 assigned to		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP
DMA-7 assigned to		PCI/ISA PnP		PCI/ISA PnP		PCI/ISA PnP
PCI IDE IRQ map to	PCI-AUTO	ISA	PCI-AUTO	ISA	PCI-AUTO	ISA
Primary IDE INT#:	A		A		A	
Secondary IDE INT#	B		B		B	
Used MEM base addr		N/A		N/A		N/A
Assign IRQ for USB	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled

Table 215: PnP/PCI Configuration V01.13, V01.14 and V01.15

3.15.5 Integrated peripherals

Elite BIOS version	V01.08		V01.09		V01.10		V01.11	
Description	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults
PCI IDE 2nd channel	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
IDE HDD block mode	Disabled	Enabled	Disabled	Enabled	Disabled	Enabled	Disabled	Enabled
On-chip primary PCI IDE	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
IDE primary master PIO	Auto	Auto	Auto	Auto	Auto	Auto	Auto	Auto
IDE primary slave PIO	Auto	Auto	Auto	Auto	Auto	Auto	Auto	Auto
IDE primary master UDMA	Disabled	Auto	Disabled	Auto	Disabled	Auto	Disabled	Auto
IDE primary slave UDMA	Disabled	Auto	Disabled	Auto	Disabled	Auto	Disabled	Auto
On-chip secondary PCI IDE	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
IDE secondary master PIO	Auto	Auto	Auto	Auto	Auto	Auto	Auto	Auto
IDE secondary slave PIO	Auto	Auto	Auto	Auto	Auto	Auto	Auto	Auto
IDE secondary master UDMA	Disabled	Auto	Disabled	Auto	Disabled	Auto	Disabled	Auto
IDE secondary slave UDMA	Disabled	Auto	Disabled	Auto	Disabled	Auto	Disabled	Auto
USB keyboard support	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Init display first	PCI slot	PCI slot	PCI slot	PCI slot	PCI slot	PCI slot	PCI slot	PCI slot
PS/2 Mouse Control	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
Onboard FDC controller	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
Onboard serial port 1	3F8/IRQ4	3F8/IRQ4	3F8/IRQ4	3F8/IRQ4	3F8/IRQ4	3F8/IRQ4	3F8/IRQ4	3F8/IRQ4
Onboard serial port 2	2F8 / IRQ3	2F8 / IRQ3	2F8 / IRQ3	2F8 / IRQ3	2F8 / IRQ3	2F8 / IRQ3	2F8 / IRQ3	2F8 / IRQ3
UR2 mode	Default	Default	Default	Default	Default	Default	Default	Default
Onboard parallel port	378/IRQ7	378/IRQ7	378/IRQ7	378/IRQ7	378/IRQ7	378/IRQ7	378/IRQ7	378/IRQ7
Parallel port mode	SPP	SPP	SPP	SPP	SPP	SPP	SPP	SPP

Table 216: Integrated peripherals V01.08 to V01.11

Elite BIOS version	V01.13		V01.14		V01.15	
Description	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults
PCI IDE 2nd channel	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
IDE HDD block mode	Disabled	Enabled	Disabled	Enabled	Disabled	Enabled
On-chip primary PCI IDE	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
IDE primary master PIO	Auto	Auto	Auto	Auto	Auto	Auto
IDE primary slave PIO	Auto	Auto	Auto	Auto	Auto	Auto
IDE primary master UDMA	Disabled	Auto	Disabled	Auto	Disabled	Auto
IDE primary slave UDMA	Disabled	Auto	Disabled	Auto	Disabled	Auto
On-chip secondary PCI IDE	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
IDE secondary master PIO						
IDE secondary slave PIO						
IDE secondary master UDMA						
IDE secondary slave UDMA						
USB keyboard support	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Init display first	PCI slot	PCI slot	PCI slot	PCI slot	PCI slot	PCI slot
PS/2 Mouse Control	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
Onboard FDC controller	Enabled	Enabled	Enabled	Enabled	Enabled	Enabled
Onboard serial port 1	3F8/IRQ4	3F8/IRQ4	3F8/IRQ4	3F8/IRQ4	3F8/IRQ4	3F8/IRQ4
Onboard serial port 2	2F8 / IRQ3	2F8 / IRQ3	2F8 / IRQ3	2F8 / IRQ3	2F8 / IRQ3	2F8 / IRQ3
UR2 mode	Default	Default	Default	Default	Default	Default
Onboard parallel port	378/IRQ7	378/IRQ7	378/IRQ7	378/IRQ7	378/IRQ7	378/IRQ7
Parallel port mode	SPP	SPP	SPP	SPP	SPP	SPP

Table 217: Integrated peripherals V01.13, V01.14 and V01.15

3.15.6 Additional peripherals

Elite BIOS version	V01.08		V01.09		V01.10		V01.11	
Description	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults
Display Type	1)							
Name								
Mode	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO
FPD contrast	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO
FPD brightness	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO
CAN detected I/O port Assigned IRQ								
PCMCIA detected I/O port								
Hardware security key assigned onboard [I/O]	Disable	Disable	Disable	Disable	Disable	Disable	Disable	Disable
Detected IF board [I/O]								
MTC communication Assigned I/O port	110h	110h	110h	110h	110h	110h	110h	110h
User serial ID	No	No	No	No	No	No	No	No
Show	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000
Show	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
Skip ext. Alarm	(not supported)	(not supported)	No	No	No	No	No	No

Table 218: Additional peripherals V01.08 to V01.11

1) Depends on the connected display type

Elite BIOS version	V01.13		V01.14		V01.15	
Description	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults
Display Type	1)					
Name						
Mode	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO
FPD contrast	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO
FPD brightness	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO
CAN detected I/O port						
Assigned IRQ						
PCMCIA detected I/O port						
Hardware security key assigned onboard [I/O]	Disable	Disable	Disable	Disable	Disable	Disable
Detected IF board [I/O]						

Table 219: Additional peripherals V01.13, V01.14 and V01.15

Elite BIOS version	V01.13		V01.14		V01.15	
Description	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults	BIOS defaults	Setup defaults
MTC communication assigned I/O port	110h	110h	110h	110h	110h	110h
User serial ID	No	No	No	No	No	No
Show	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000
Show	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
Skip ext. Alarm	No	No	No	No	No	No

Table 219: Additional peripherals V01.13, V01.14 and V01.15 (cont.)

1) Depends on the connected display type

4. BIOS upgrade

To upgrade your BIOS to a newer version, you will need the BIOS upgrade, which is found on the Provit Drivers & Utilities CD-ROM (model number 5S0000.01-090) or downloaded directly from the support area of the B&R homepage (www.br-automation.com).

An upgrade might be necessary for several reasons:

- BIOS was destroyed or damaged and the IPC can no longer be booted.
  (for booting in recovery mode and subsequent BIOS upgrade, see sections "Recovery jumper / User jumper" on page 132 and "DIP switch" on page 158).
- To upgrade functions implemented in BIOS Setup or to add new functions or components.
- To guarantee that the MTC function libraries run on Provit 5000 IPCs (see also section 5.1 "MTC Function Libraries" on page 390).

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

First, the diskette must be made bootable (command line "sys a:" or "format a: /s").

Insert diskette in the disk drive or LS-120 drive and boot from this. The BIOS settings that need to be made can be found in the table 46 "BIOS settings for booting an IPC5600/5600C with various peripheral devices," on page 91.
This appears after booting from the diskette in the following start menu:

```
Start menu for MS-DOS 6.22
==========================

1. Upgrade complete System (BIOS, VGA, MTC)
2. Upgrade VGA only
3. Upgrade ELITE BIOS only
4. Upgrade MTC only
5. Upgrade FPC only
6. Start Upgrde Utility
7. Exit to MS-DOS

Select the desired option
```

Figure 227: Start menu - BIOS upgrade IPC5000/5600 (V1.56 or higher)

```
Start menu for MS-DOS 6.22
==========================

1. Upgrade complete System (BIOS, VGA, MTC, FPGA)
2. Upgrade VGA only
3. Upgrade Elite BIOS only
4. Upgrade MTC only
5. Upgrade FPC only
6. Upgrade FPGA only
7. Start Upgrade Utiltity
8. Exit to MS-DOS

Select the desired option:
```

Figure 228: Start menu - BIOS upgrade IPC5000C/5600C (V1.05 or higher)

Information:

If you do not press a button within 5 seconds, then step 1 (upgrade complete system) is automatically carried out and the system independently updated.

If you want to upgrade the system BIOS, VGA-BIOS or MTC individually, then you can either select option 2, 3 or 4 in the start menu or the corresponding menu item in the start upgrade utility. With this utility, you can both manually carry out BIOS upgrades and also protect existing firmware on the diskette.

A more detailed description can be found in the readme files on the diskette.

4.1 Upgrade utility

If the start upgrade utility option (described in the above MS-DOS start menu) is selected, then the following screen content appears after a short while:

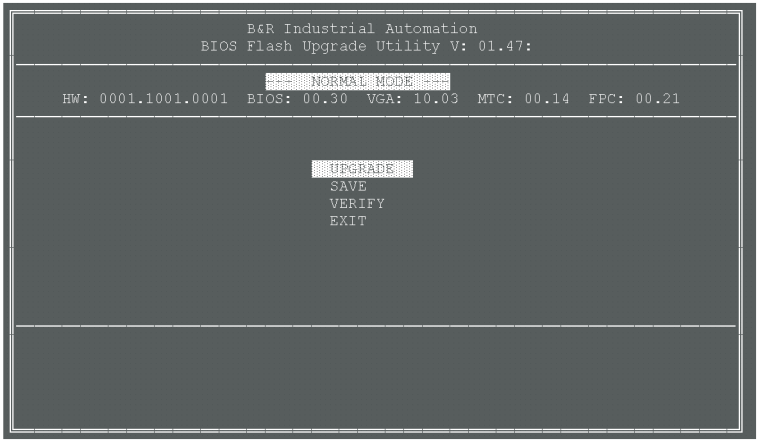


Figure 229: BIOS upgrade utility main menu

After selecting a respective function, a further menu shows the components in which the selected function can be used (in the example: Upgrade). The following figure shows the Upgrade Utility for IPC5000/5600 system units:

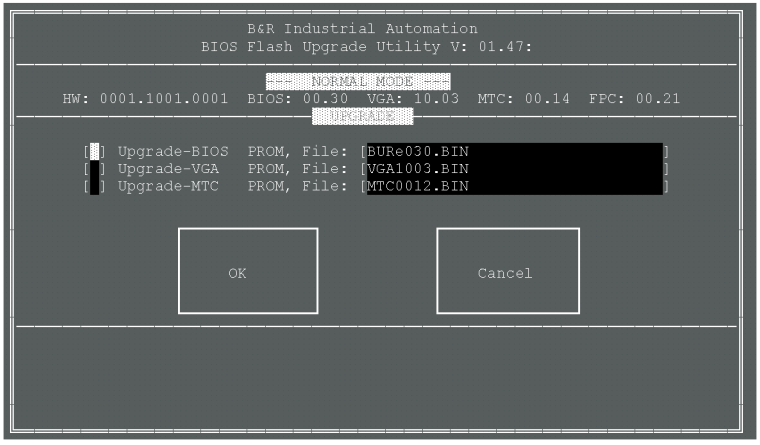


Figure 230: BIOS upgrade utility - upgrade

The components must be selected with the spacebar. This selection is confirmed with OK and then the procedure is started.

4.2 Upgrade without monitor / display

A BIOS upgrade can also be carried out, if there is no visualization device (display or monitor) available. The messages are emitted acoustically by the PC speaker. The following coding is used:

4.2.1 Status messages during upgrades

All status messages consist of a long beep sound followed by one or more short beeps.

Status messages	
Short beeps	**Meaning**
1	Beginning of a file load
2	Beginning the algorithm upgrade
3	Beginning deletion of the FlashPROM
4	Beginning of writing the data in FlashPROM
5	Programming is ended

Table 220: Acoustic status messages

4.2.2 General messages

General messages			
Long beeps	**Short beeps**	**Message**	**Necessary user action**
3	0	/h option specified for the non existent VGA	
4	4	The boot block write protect switch has not been set to "write enable" [1]	Set the DIP switch to "write enable" and press Enter to continue (see section "Boot block switch" on page 158)
1 [2]	-	Leave the diskette in the drive and press Reset. The system is completely upgraded after the reset.	Press the Reset button and let the system upgrade completely

Table 221: General acoustic messages

1) After approx. 20 seconds the upgrade tool tries to write again on the boot block. If this is unsuccessful, its repeats this procedure.
2) This continuous tone is emitted until a reset is triggered.

4.2.3 Error messages

All status messages consist of a long beep tone followed by one or more short beeps.

Error messages		
Short beeps	**Message**	**Necessary user action or cause**
1	Wrong memory model	Start "Flat DOS" 1)
2	Upgrade file not found	Error with opening a necessary file
3	Wrong or no answer from the flash identifier	Wrong flash – wrong upgrade program for this computer system
4	Error in the upgrade file (required code is missing or checksum is wrong)	Wrong file or a upgrade file from another computer system given
5	Error reserving memory	Too little base memory – start Flat DOS" 1)
6	Error reading the upgrade files	File is too short – wrong or defective
7	Error deleting flash	Flash defect, programming voltage not available
8	Error deleting flash	Flash defect, programming voltage not available
9	IPCXXUPG.CFG not found or error in opening	File not available or defective
10	Error in initializing the MTC communication	Wrong computer system or MTC defect
11	Error reading out the versions (MTC, FPGA)	Wrong computer system, MTC defect, MTC in recovery mode
12	Error writing to the MTC (wrong checksum)	Data is wrong
13	-	-
14	Error removing an MTC command	Wrong computer system, MTC defect
15	Wrong or missing answer from the MTC	Wrong computer system, MTC defect

Table 222: Acoustic error messages

1) "Flat DOS" = no driver device or program in "autoexec.bat" and "config.sys", i.e. only loaded in "command.com".

4.2.4 Award BIOS beep signal

While the Provit 5000 IPC is booting, errors can occur with Award BIOS (see table below). These errors are signaled by different beeping codes.

Long beeps	Short beeps	Meaning	Necessary User Action
-	1	Everything OK	
1	-	Memory problem, RAM components are not set correctly or are defective.	Check RAM components, replace if necessary
1	2	Video problem, graphic card or graphic chip defect or not sitting properly.	Check graphic card, replace if necessary

Table 223: Award BIOS error signals

4.3 IPC5000C/IPC5600C BIOS upgrade to Version 1.14 or higher

The IPC5000C and IPC5600C BIOS is based on a new code base from the BIOS manufacturer (starting with BIOS Version ≥ 1.14 (≥ BURC142.bin). The following are the differences from the previous version.

BIOS Setup screen	Settings in V ≤1.13	Settings in V ≥1.14	Result
Standard CMOS setup	Manual hard disk type setting.	Hard disk type automatically recognized.	No user settings necessary.
BIOS features setup	Select "Boot sequence" to change the boot order.	The boot order is now set to "first boot device, second boot device, third boot device, and other boot device".	Flexible configuration.
	BIOS Setup screen contains the BIOS parameter "PCI/VGA palette snoop".	The BIOS parameter "PCI/VGA palette snoop" is now located on the BIOS Setup screen "PnP/PCI configurations".	None. Located on another BIOS Setup screen.
	The BIOS parameter "HDD S.M.A.R.T capability" is not available.	The BIOS parameter "HDD S.M.A.R.T capability" can be set.	Additional BIOS parameter setting.
	The BIOS parameter "Small logo (EPA) show" is not available.	The BIOS parameter "Small logo (EPA) show" can be set.	Additional BIOS parameter setting.
Chipset features setup	Following BIOS parameters can be set • SDRAM control by • SDRAM RAS to CAS delay • SDRAM RAS precharge time	 • Set automatically • Set automatically • Set automatically	The setting for SDRAM main memory module control is now made automatically. Simplification of operation.
	BIOS Setup screen contains the BIOS parameter "Auto detect DIMM/PCI clk." and "CPU clock (MHz) / spread (%)".	The BIOS parameters "Auto detect DIMM/PCI clk." and "CPU clock (MHz) / spread (%)" are now located on the BIOS Setup screen "Frequency / voltage control".	None. Located on another BIOS Setup screen.
Power management setup	BIOS parameter "Resume by alarm" can be set.	Setting "Resume by alarm" is not available.	System not supported.
PnP/PCI configuration	BIOS parameter "PCI IDE IRQ map to" can be set.	The function is not available.	Not supported.
	The BIOS parameter "Assign IRQ for VGA" is not available.	The BIOS parameter "Assign IRQ for VGA" can be set.	Additional BIOS parameter setting.
Integrated peripherals	BIOS parameter "PS/2 mouse control" can be set manually.	Set automatically.	Simplification of operation.
	BIOS parameter "Onboard parallel port" can also be set manually.	Only predefined values can be selected for the BIOS parameter "Onboard parallel port".	No further manual settings possible. Only predefined standard addresses can be set.

Table 224: Differences between BIOS Versions 1.21 and 1.42

4.3.1 Additional information available upon switching to BIOS Version >= 1.42

- BIOS Versions >= 1.42 allow you to boot from USB devices (USB floppy, USB CD-ROM, USB HDD and USB ZIP). Settings for this can be found on the BIOS Setup screen "Advanced BIOS features" under the parameters "First boot device", "Second boot device", "Third boot device", and "Other boot device".
- After the BIOS upgrade, "Load optimized defaults" must be called up in BIOS Setup.
- If a CMOS backup with individual BIOS settings was created with a BIOS Version < V1.42, a new CMOS backup must be created with the new version.
- If operating system images are based on a BIOS Version < 1.42 they must be recreated when switching to a BIOS Version >= 1.42.
- When using the parallel port, the address area may need to be checked / adjusted.

5. Provit 5000 Utilities

Provit 5000 Utilities contain the following components which can be found on the Provit Drivers & Utilities CD-ROM or can be downloaded directly from B&R's homepage (www.br-automation.com).

- MTC function libraries

Only MTC function libraries are covered in this manual. Additional information on other topics is available in the Provit 5000 Utilities Software Packet.

5.1 MTC Function Libraries

The necessary libraries for all MTC service and safety functions are available in Provit 5000 Utilities (see sections "Maintenance controller (MTC)" on page 134 and "Maintenance controller (MTC)" on page 159). Examples of these functions are:

- Operating data coverage
- Collection of the temperature values in the IPC
- Display of the battery status
- Read out brightness and contrast values of the display and change etc.

The MTC libraries are available both in 16-bit and 32-bit technology. This means they can be used with 16-bit and 32-bit operating systems (MS DOS, MS Windows 3.x and MS Windows 95/98/ME/2000).

5.1.1 Function diagram

Firstly, a start address is determined (according to the 16-bit or 32-bit operating system) in the BIOS. If this is successful, then all necessary variables are stored internally, which makes communication possible between the MTC or the BIOS.

The following block diagram shows the MTC function libraries design:

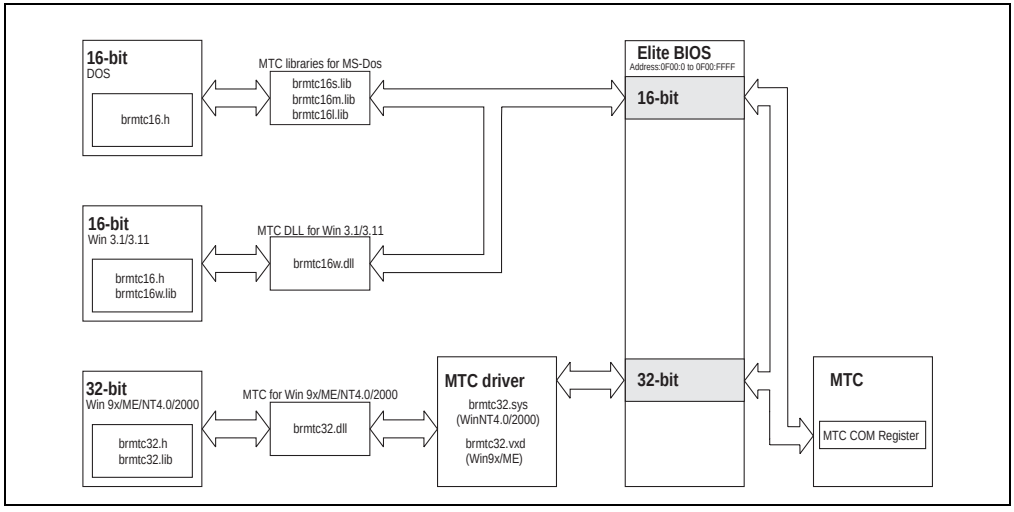


Figure 231: MTC function libraries

Further information and instructions about the specific application of these functions are included as documentation in the Provit 5000 Utilities Software Packet.

5.2 B&R IPC Diagnostics Utility

The following information about the IPC can be retrieved using the "IPC Diagnostics Utility":

- Type
- Temperatures
- Alarms
- Voltage
- Fan information
- User serial ID
- Display characteristics, etc.

The B&R Diagnostics Utility can be found on the HMI Drivers & Utilities CD-ROM (model number 5S0000.01-090) Version 1.49 and later, or downloaded from the B&R homepage (www.br-automation.com).

Info, controller, display unit, modular keyblock, and version pages are called up by selecting the appropriate tab (vary depending on IPC configuration).

5.2.1 Info

The "Info" tab provides information about the program being used. This can include the version and build numbers as well as the copyright. The controller being used is pictured on the left side.

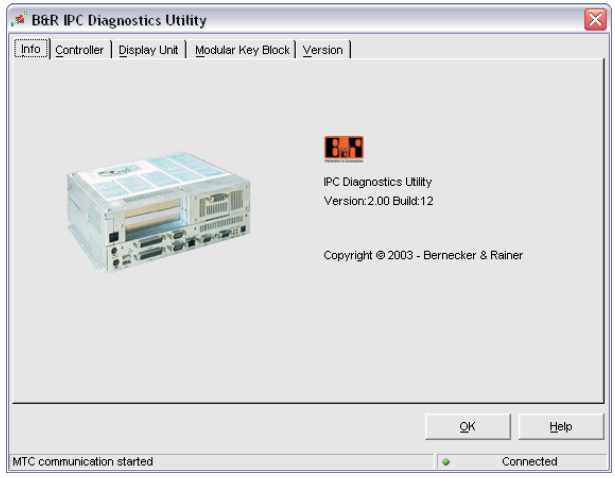


Figure 232: B&R IPC Diagnostics Utility - tab info

5.2.2 Controller

On the controller tab you will find additional information about the type, temperature, statistics, alarms, DIP switches, Watchdog, voltages, fans and user serial ID.

Controller - type

Shows the type and ID of the controller used.

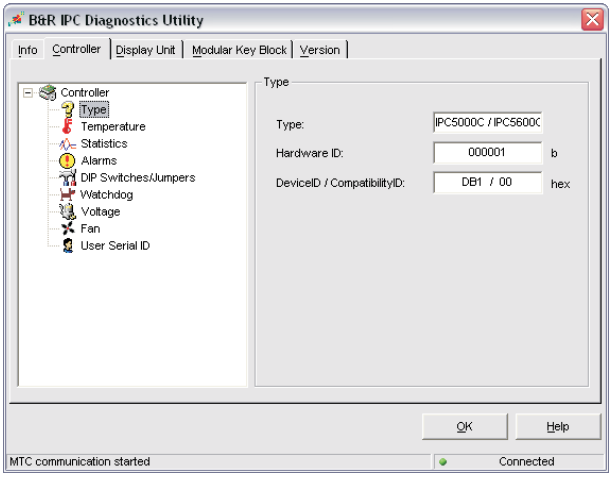


Figure 233: B&R IPC Diagnostics Utility - controller tab - info

Information about	Meaning
Type	APC680 for B&R slot CPU.
Hardware ID	Displays the B&R hardware ID.
Device ID	Displays the hexadecimal value of the hardware device ID.
Compatibility ID	Hardware device revision (e.g. 00) .

Table 225: Information shown on the controller tab - type

Controller - temperature

Shows the most important temperatures for the IPC.

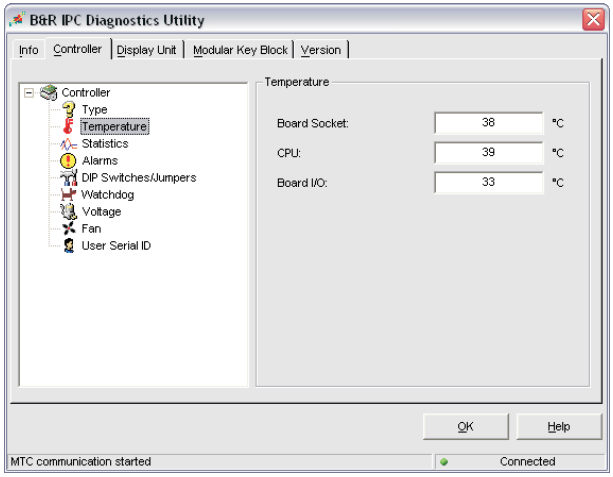


Figure 234: B&R IPC Diagnostics Utility - controller tab - temperature

The temperature sensors are found at the following locations (depending on system unit):

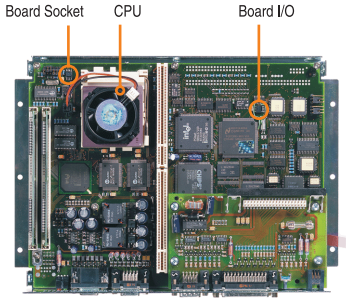
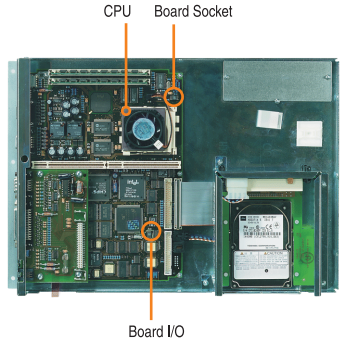
IPC5000	IPC5600
	

Table 226: Temperature sensor locations - IPC5000 / IPC5600

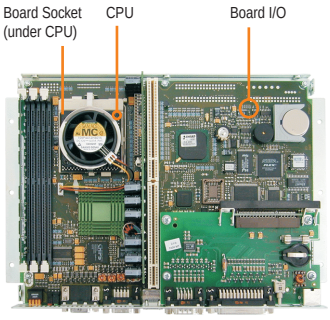
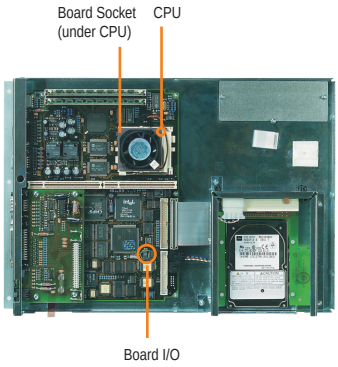
IPC5000C	IPC5600C
	

Table 227: Temperature sensor locations - IPC5000C / IPC5600C

Information about	Meaning
Board socket	Indicates the current processor board socket temperature.
CPU	Indicates the current processor temperature.
Board I/O	Indicates the current temperature of the I/O area

Table 228: Information shown on the controller tab - temperature

Controller - statistics

Shows operating data for the controller.

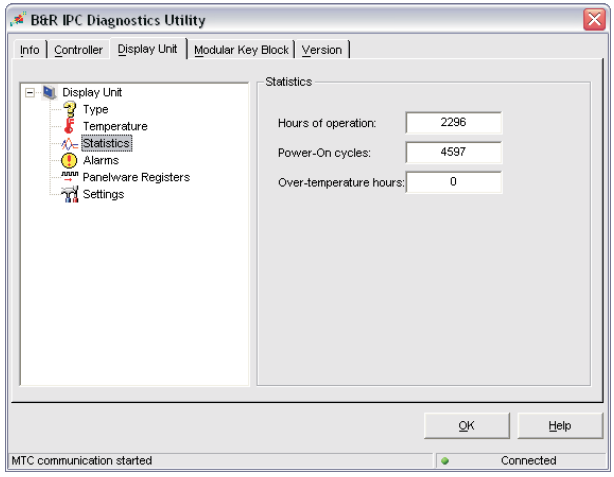


Figure 235: B&R IPC Diagnostics Utility - controller tab - statistics

Information:

Operating hours are only updated every full hour. In other words, if a power failure occurs after 55 minutes, then the value of the counter is not raised by an hour.

Controller - alarms

Shows the current controller alarms.

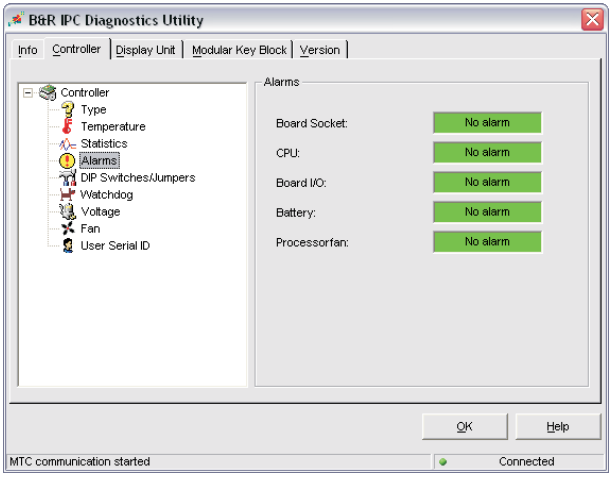


Figure 236: B&R IPC Diagnostics Utility - controller tab - alarms

Alarm thresholds depend on the controller and processor used:

IPC5000 / IPC5600

- CPU socket
- I/O area

Alarm range	Alarm [1]		Fans		LED
	On	Off	On	Off	
CPU socket [2]	65 °C	63 °C	40 °C	37 °C	Yes
I/O area [3]	60 °C	58 °C	40 °C	37 °C	Yes
Battery[4]	.	.	.	.	No

Table 229: Alarm thresholds - IPC5000/IPC5600

1) The temperature LED on the controller and on the display (if available) is lit and an alarm bit is set in the MTC, which can be reacted to using software.
2) With MTC firmware > V00.20, with MTC firmware < V00.21 different alarm thresholds (on: 60 °C, off: 58 °C).
3) With MTC firmware > V00.20, with MTC firmware < V00.21 different alarm thresholds (on: 55 °C, off: 53 °C).
4) The CMOS battery can be evaluated (good or bad) using the MTC.

IPC5000C / IPC5600C

Fan RPM is constantly monitored and regulated separately by the MTC. The RPM depends on the temperature measured.

				Alarm		Fans		LED
Alarm range	Processor type	Min[1)]	Max	On	Off	On	Max	
Internal processor temperature	Default values	0 °C	127 °C	85 °C	83 °C	60 °C	76 °C	Yes
	Celeron 300[2)]			93 °C	91 °C	60 °C	76 °C	
	Celeron 366[2)]			93 °C	91 °C	60 °C	76 °C	
	Celeron 433[2)]			93 °C	91 °C	60 °C	76 °C	
	Celeron 566[2)]			94 °C	92 °C	62 °C	78 °C	
	Pentium III 600[2)]			86 °C	86 °C	55 °C	71 °C	
	Pentium III 850[2)]			84 °C	82 °C	53 °C	69 °C	
Processor socket temperature	Default values	0 °C	127 °C	80 °C	78 °C	55 °C	71 °C	Yes
	Celeron 300[2)]			93 °C	91 °C	55 °C	71 °C	
	Celeron 366[2)]			93 °C	91 °C	55 °C	71 °C	
	Celeron 433[2)]			93 °C	91 °C	55 °C	71 °C	
	Celeron 566[2)]			94 °C	92 °C	59 °C	75 °C	
	Pentium III 600[2)]			86 °C	86 °C	52 °C	68 °C	
	Pentium III 850[2)]			84 °C	82 °C	53 °C	69 °C	
I/O slot temperature		0 °C	127 °C	68 °C	66 °C	40 °C	56 °C	Yes
Processor fan (rated 5400 RPM)		0 RPM	6100 RPM	~70 %	~71 %			Yes
Battery[3)]		.	.	.	-	-	-	No

Table 230: Alarm thresholds - IPC5000C/IPC5600C

1) Negative temperatures are set to 0°.

2) Starting with the new BIOS Version 1.05 for the IPC5000C and IPC5600C, both temperature alarm and fan control depends on the processor.

3) The CMOS battery can be evaluated (good or bad) using the MTC.

Controller - DIP switch

Shows the status of the user jumper or the user DIP switch.

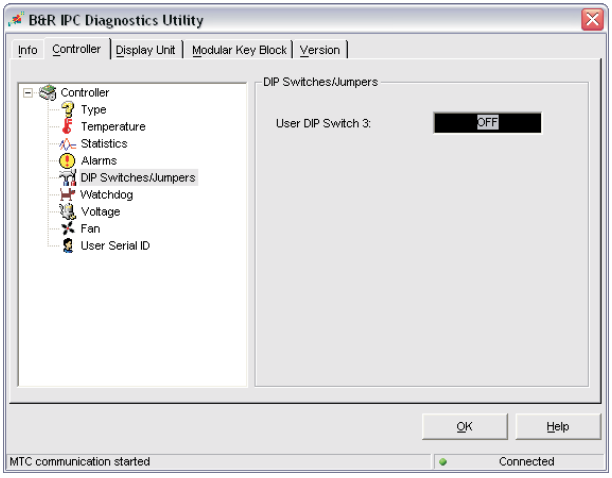


Figure 237: B&R IPC Diagnostics Utility - controller tab - DIP switch

IPC5000 / IPC5600

Controllers from the IPC5000 / IPC5600 series provide a jumper which can be set and queried by the user.

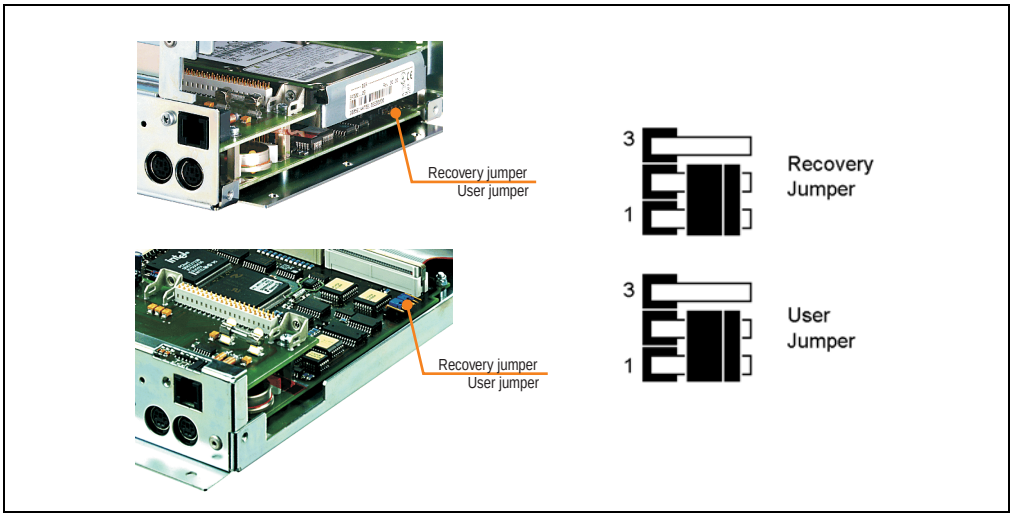


Figure 238: IPC5000 / IPC5600 recovery jumper

The user jumper is to the left of the recovery jumper.

IPC5000C / IPC5600C

Controllers from the IPC5000C / IPC5600C series have a DIP switch which can be set and queried by the user.

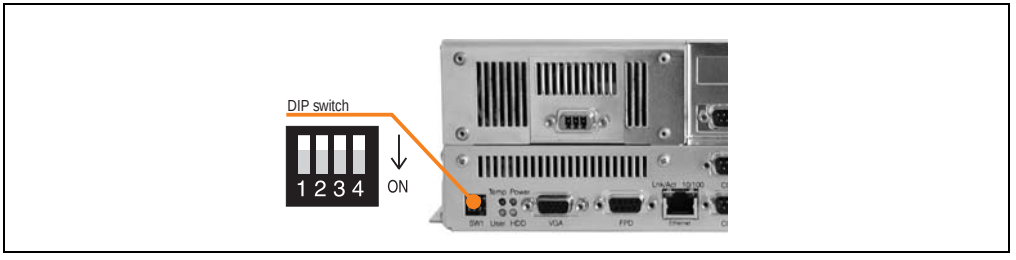


Figure 239: IPC5000C / IPC5600C recovery jumper

The user DIP switch is number 3.

Controller - watchdog

The watchdog for the controller can be tested under this tab. More detailed information regarding operation of the watchdog, see the Online Help for the B&R IPC Diagnostic Utilities.

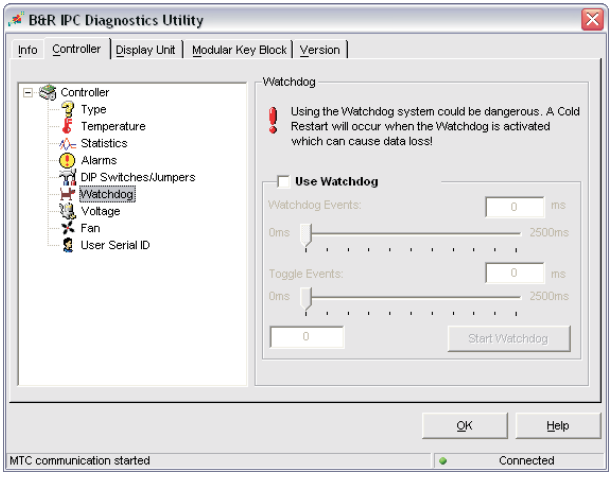


Figure 240: B&R IPC Diagnostics Utility - controller tab - watchdog

Controller - voltages

The actual values of the IPC's power supply for 2.5 V, 3.3 V, 5.0 V, 12.0 V, processor core and the CMOS battery are shown.

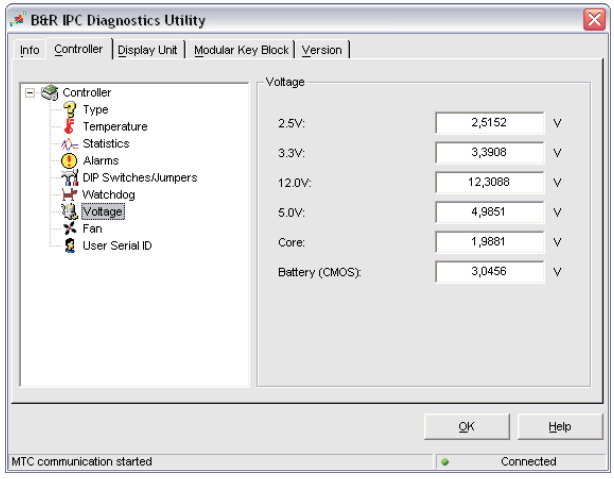


Figure 241: B&R IPC Diagnostics Utility - controller tab - voltages

Controller - fan

Shows the current revolutions of the fan in the IPC.

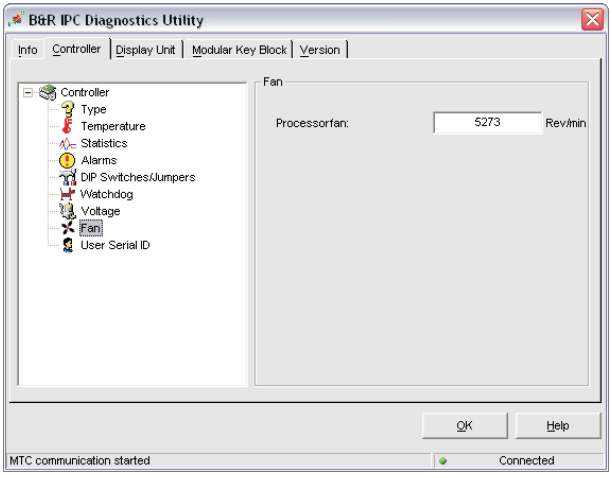


Figure 242: B&R IPC Diagnostics Utility - controller tab - fans

Controller - user serial ID

This tab displays the current user serial ID of the controller being used.

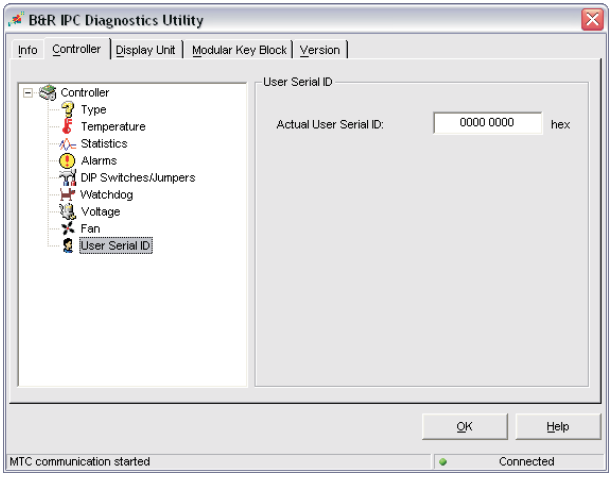


Figure 243: B&R IPC Diagnostics Utility - controller tab - user serial ID

5.2.3 Display unit

On the controller tab you will find additional information about the type, temperature, statistics, alarms, voltages, Panelware, and settings of the connected B&R display unit.

Display unit - type

This tab shows the type, name, ID, and name of the programmed display data of the B&R display unit attached to the controller.

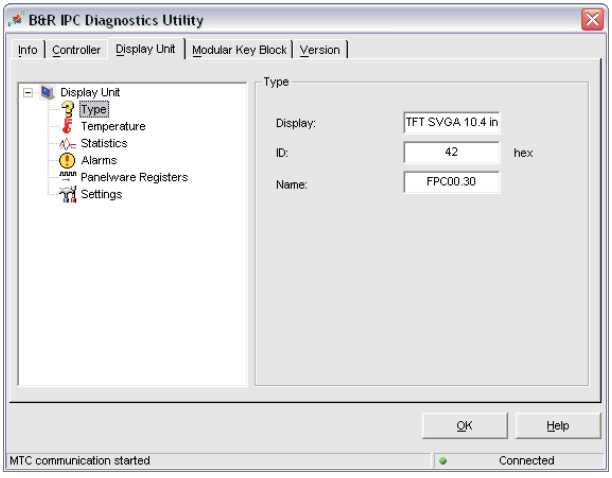


Figure 244: B&R IPC Diagnostics Utility - display unit tab - type

Display unit - temperature

This page shows the current temperature of the B&R display unit connected to the controller.

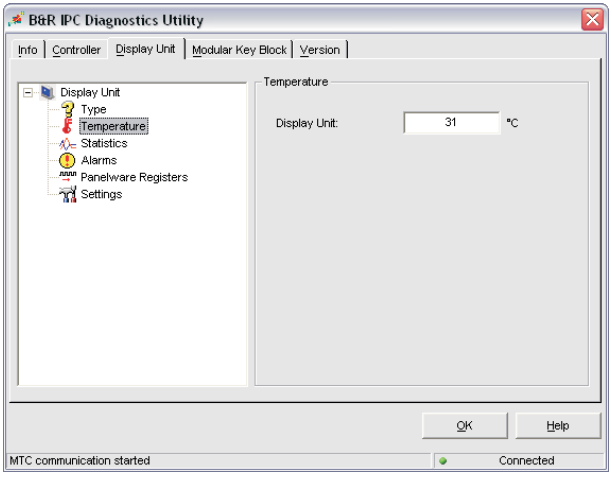


Figure 245: B&R IPC Diagnostics Utility - display unit tab - temperature

Display unit - statistics

This page shows the operating data of the B&R display unit connected to the controller.

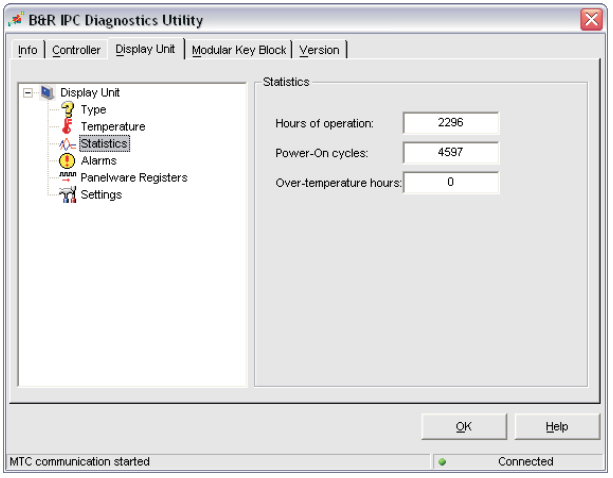


Figure 246: B&R IPC Diagnostics Utility - display unit tab - statistics

Display unit - alarms

This page shows the alarms (temperature) of the B&R display unit connected to the controller.

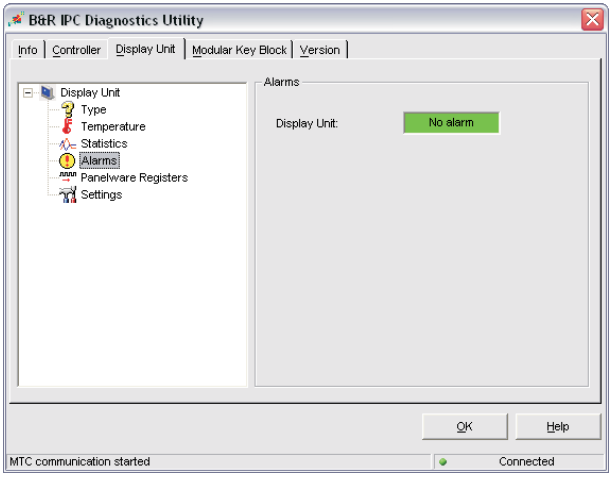


Figure 247: B&R IPC Diagnostics Utility - display unit tab - alarms

Display unit - Panelware registers

Indicates the number of available Panelware registers on the display unit. This is 0 if no keypad modules are connected and the display unit itself doesn't have any keys.

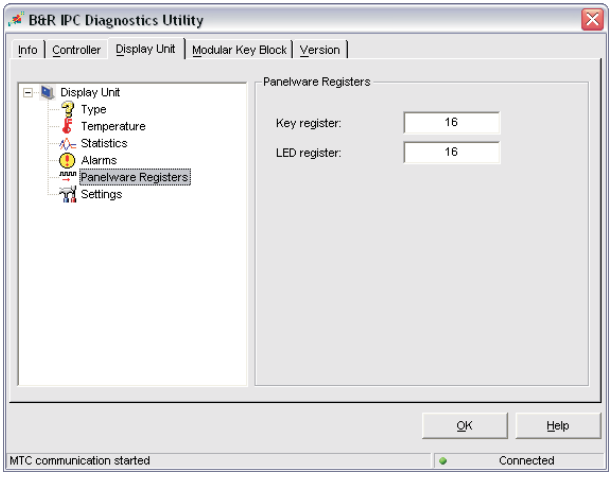


Figure 248: B&R IPC Diagnostics Utility - display unit tab - Panelware registers

Display unit - settings

You can set "Brightness" and "Contrast" values for the B&R display unit connected to the controller under this tab.

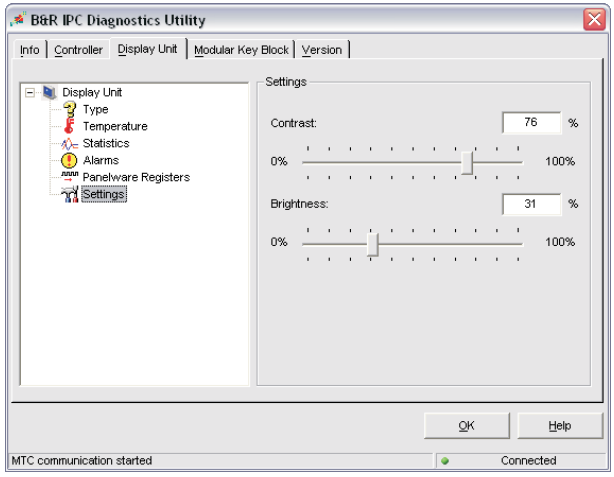


Figure 249: B&R IPC Diagnostics Utility - display unit tab - settings

Information:

The Contrast setting only works with B&R LCD display units.

5.2.4 Modular key block

This tab shows the current status of the Mkey configuration.

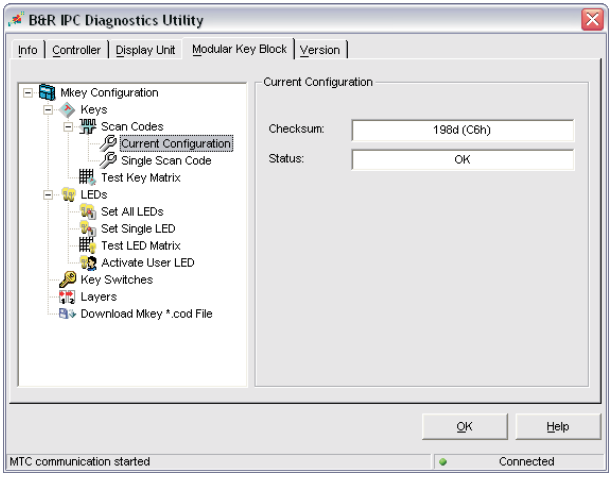


Figure 250: B&R IPC Diagnostics Utility - version tab

For additional information regarding individual settings and values, see the Online Help for the B&R IPC Diagnostic Utilities.

5.2.5 Version

This tab shows the version numbers of Mkey, MTC, and IPC software components installed on the system.

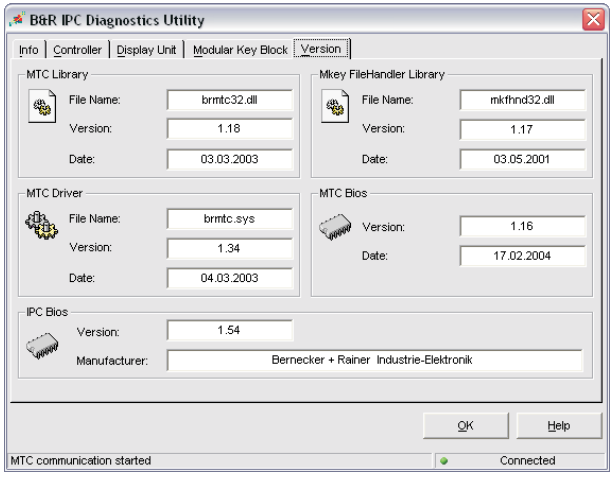


Figure 251: B&R IPC Diagnostics Utility - version tab

6. Remote Upgrade Utility

This tool is for upgrading the firmware for the receiver and sending unit using software. This can only be used with the remote CD-ROM / SuperDisk 120 (5A5003.02), the remote IDE CD-ROM (5A5003.07), and the remote CD-ROM / SuperDisk 240 (5A5003.08) and a system unit 5C5001.2x or 5C5601.2x (all of which must be Revision B0 or later).

The required Upgrade Utility with the firmware files can be found either in the support / download area of the B&R homepage (www.br-automation.com), or on the Provit Drivers & Utilities CD-ROM (5S0000.01-090) Version 1.40 and later.

6.1 Upgrade procedure

The files must be placed on a bootable diskette.

Insert the diskette in the SuperDisk drive of the system you would like to upgrade.

In the "BIOS features setup" under the item "Boot sequence", set the boot order to "LS/ZIP,C" and reboot.

After rebooting from the diskette, the following boot menu will appear:

```
1. Upgrade ALL (Local and Remote Unit)
2. Read Firmware Version from the Remote Unit
3. Read Firmware Version from the Local Unit
4. Exit to MS-DOS

Enter a choice:_
```

Figure 252: Remote Upgrade Utility - boot menu

Selection

1. Upgrade ALL (local and remote unit)
Starts the automatic upgrade of the entire system. The remote unit (5A5003.02, 5A5003.07 and 5A5003.08) and the local unit (system unit 5C5001.2x or 5C5601.2x) are both upgraded. If no other option is selected within 5 seconds, this option is executed automatically.

2. Read firmware version from the remote unit
You can read the firmware version of the remote unit (5A5003.02, 5A5003.07 and 5A5003.08).

3. Read firmware version from the local unit
You can read the firmware version of the local unit (system unit 5C5001.2x or 5C5601.2x).

4. Exit to MS-DOS
Ends the upgrade procedure.

Status messages

Depending on option selected, the software returns one of the following messages.

After successfully upgrading the firmware, the following message appears:

```
*********************************************
*         TURN OFF YOUR POWER SUPPLY        *
*********************************************
```

After unsuccessfully upgrading the firmware, the following message appears:

```
*********************************************
*         UPGRADE NOT SUCCESSFUL            *
*         TURN OFF YOUR POWER SUPPLY        *
*         AND TRY IT AGAIN                  *
*********************************************
```

After reading the firmware version (remote of local), the following message appears:

```
*********************************************
*                  REBOOT NOW               *
*********************************************
```

Manual operation

The upgrade can also be executed manually using the rideprg.exe file that comes with the software. This exe. can be started and used with the following parameters:

```
---------------------------------
Remote-IDE Upgrade Utilitiy V1.xx*
(c) 2001 Bernecker & Rainer
---------------------------------

RIDEPRG [/?] [/U:filename] [/V:filename] [/S:filename] [/G] [/L|/R]

/?    Helpscreen
/U    Update Prom from file
/V    Verify Prom from file
/S    Save Prom image to file
       Option /L for local or /R for remote needed
/G    Get Prom Version
       Option /L for local or /R for remote needed
/L    Option Local Prom, only needed for /S and /G
/R    Option Local Prom, only needed for /S and /G
```

7. Distribution of resources

7.1 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 - 0C9FFFh	VGA BIOS
0CA000h - 0CBFFFh	Reserved
0D0000h - 0DFFFFh	According to PnP standard, the expansion is placed at the first free position.
0E0000h - 0EFFFFh	Free
0F0000h - 0FFFFFh	Award Elite BIOS
100000h -	DRAM

Table 231: RAM address assignment

7.2 DMA channel assignment

DMA channel	Resource
0	Available
1	Available
2	Disk drive
3	LPT1 (ECP) [1)]
4	Reserved
5	Available
6	Available
7	Available

Table 232: DMA channel assignment

1) Default setting: Only valid when the setting ECP is selected in the BIOS Setup for LPT1 (see section 2.9 "Integrated peripherals" on page 328 and 3.5 "Integrated peripherals" on page 352). Otherwise, freely available.

7.3 UMA memory distribution

The Upper Memory Area (UMA) is the memory area in RAM from 640 KB to 1024 KB.

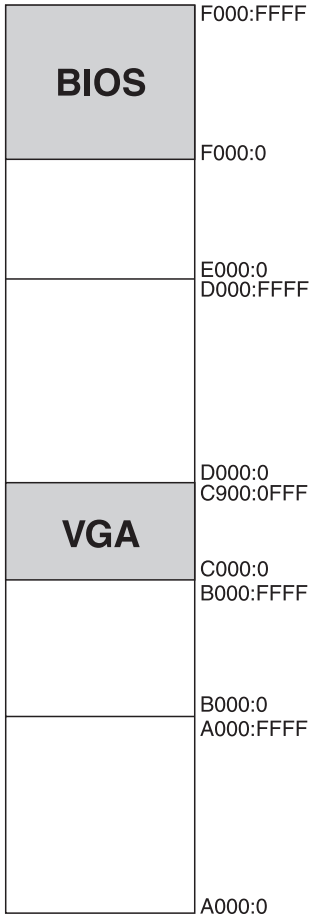


Figure 253: UMA memory distribution

7.4 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	Res. sec. hard disk
1F0h - 1F8h	Prim. Hard disk
278h - 27Fh	Hardware security key
2F8h - 2FFh	COM2 [1)]
376h - 377h	Res. sec. hard disk
378h - 37Fh	LPT1
384h - 385h	CAN controller
3B0h - 3BFh	Monochrome display
3C0h - 3DFh	VGA display
3E0h - 3E1h	PC card controller [2)]
3F0h - 3F7h	FDD controller
3F8h - 3FFh	COM1 [1)]
LPT1 + 400h	ECP port, LPT+400h [1)]
CF8h - CFBh	PCI config address register
CFCh - CFFh	PCI config data register
FF00h - FF07h	IDE bus master register

Table 233: I/O address assignment

1) Default setting
2) Only if a B&R interface board is present in the IPC (see section "Interface board" on page 203)

7.5 Interrupt assignments

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					❍	●	❍	❍	❍		❍	❍	❍	❍		❍			❍
COM2					●	❍	❍	❍	❍		❍	❍	❍	❍		❍			❍
LPT1					❍	❍	❍	❍	●		❍	❍	❍	❍		❍			❍
PS/2 mouse														●					
FDD								●											❍
Real-time clock										●									
Coprocessor															●				
Hard disk prim.																●			
Hard disk sec.																	❍		●
B&R	COM3 [1]				❍	❍	❍		❍		❍	❍	●	❍		❍	❍		❍
	COM4 [1]				❍	❍	❍		❍		❍	❍	❍	●		❍	❍		❍
	Ethernet[2]				❍	❍	●					❍	❍	❍			❍		❍
	PC card				❍	❍	❍		❍		❍	❍	❍	❍		❍	❍		●
	CAN											❍						❍	●

Table 234: Interrupt assignments

1) When assigning resources to PnP devices COM3 and COM4, see section "Serial interfaces COM3 and COM4" on page 204.
2) For the assignment of resources for the Plug&Play Ethernet controller see section "Ethernet controller" on page 210

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

Chapter 7 • Accessories

1. RS232 interface board 5A1102.00-090

1.1 General information

The RS232 interface board can be used in all AT compatible PCs. This interface board requires a small slot. It is equipped with two electrically isolated serial RS232 interfaces, which can be configured alternatively as COM1/COM2 or COM3/COM4. The two RS232 interfaces can be assigned interrupt numbers (IRQ 3, 4, 5, 7, 10 or 11) using the jumpers on the card.

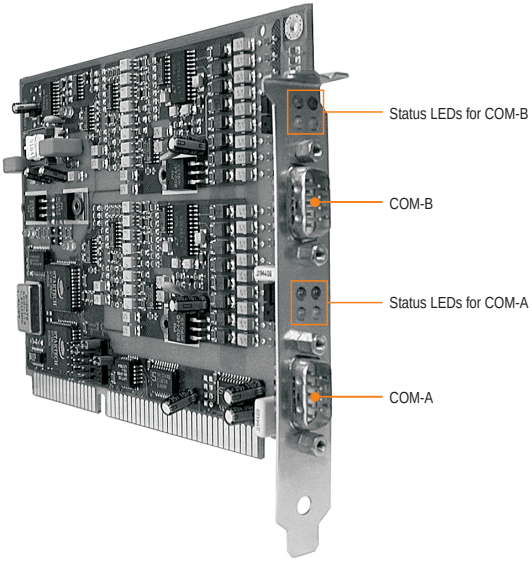


Figure 254: RS232 interface board

1.2 Pin assignments

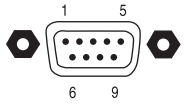
RS232 interface			
Pin	Name	Function	
1	DCD	Input	
2	RXD	Input	
3	TXD	Output	
4	DTR	Output	
5	GND	Electrically isolated from Chassis GND	
6	DSR	Input	
7	RTS	Output	
8	CTS	Input	
9	RI	Input	

Table 235: Pin assignments - RS232 interface

1.3 Status LEDs

The two RS232 interfaces are each equipped with four status LEDs for transmit, receive and handshake lines.

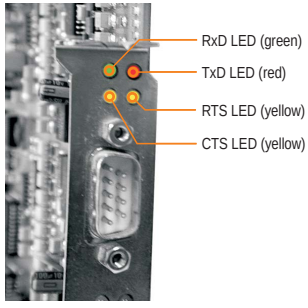


Figure 255: RS232 interface board LEDs

1.4 Jumper settings

With jumpers on the board, the following settings can be made:

- Interface description (COM1/COM2 or COM3/COM4)
- IRQ allocation (IRQ 3, 4, 5, 7, 10, or 11)

Jumper position:

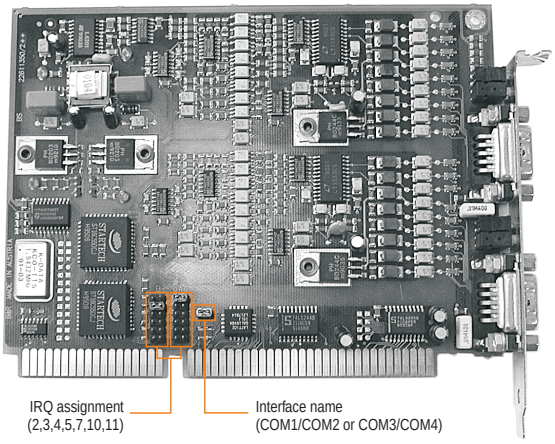


Figure 256: Jumper position

1.4.1 Interface description (COM1/COM2 or COM3/COM4)

If the jumper is inserted (default setting when the board is delivered), both RS232 interfaces are used as COM3 and COM4. The lower DSUB plug is COM3, the upper one is COM4. If the jumper is not inserted, the interfaces are used as COM1 and COM2 (COM1 below).

1.4.2 IRQ setting

The interfaces are assigned IRQ numbers using the two jumper rows (see picture on the previous page).

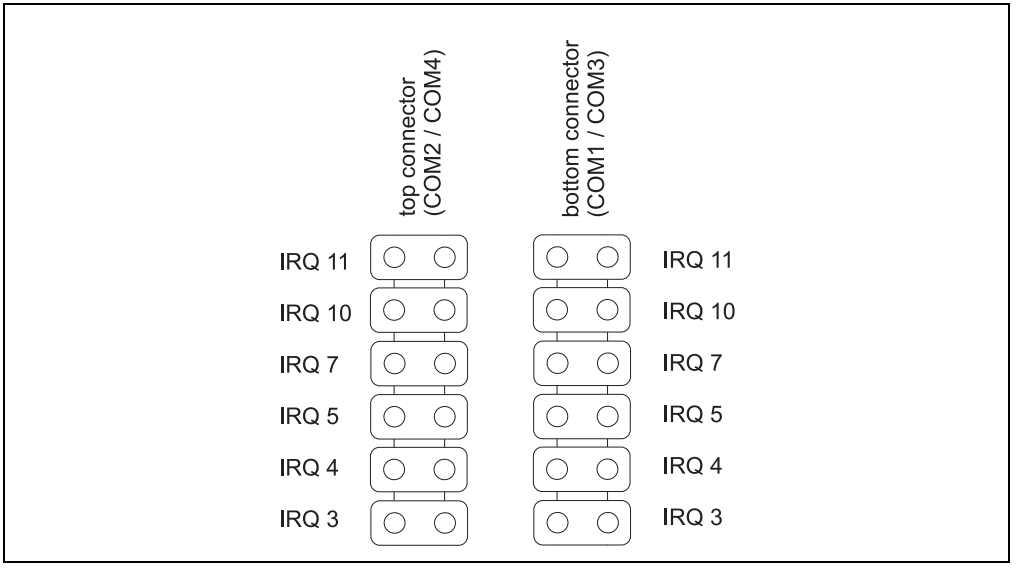


Figure 257: IRQ jumper

Important!

Only one jumper can be inserted in each jumper row. The IRQ numbers for the two interfaces must be different. The IRQs used are not allowed to be engaged with other boards in the system.

1.4.3 Example configurations

Example 1: The B&R RS232 board is the only interface board in a PC. Interface boards should be used as COM1 and COM2 (COM1 = IRQ 4 and COM2 = IRQ 3):

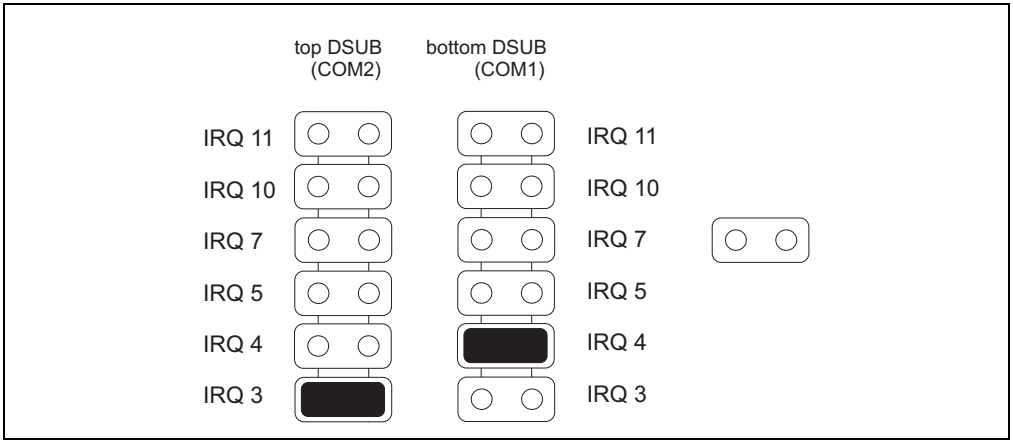


Figure 258: IRQ setting example 1

Example 2: A PC is already equipped with two serial RS232 interfaces, which are used as COM1 and COM2 (IRQ 4 and IRQ 3). B&R RS232 board interfaces are to be set as COM3 and COM4. The interrupt numbers 5 and 7 are already used for one network card and a parallel interface board. IRQ numbers 11 and 10 must be configured for COM3 and COM4.

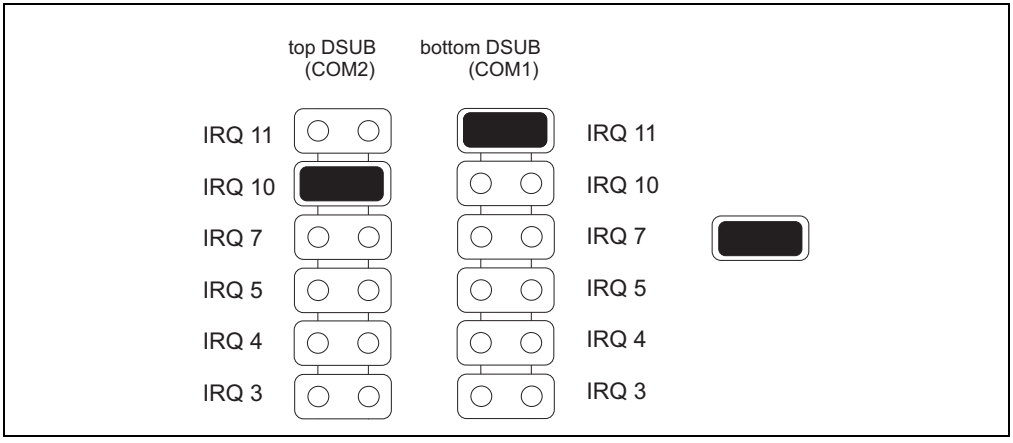


Figure 259: IRQ setting example 2

2. External disk drive 5A2001.01 and 5A2001.05

2.1 General information

An external FDD can be connected to a Provit 5000/5600 series IPC interface (see also sections "Interface for external disk drive" on page 121 and "Interface for external disk drive" on page 145).

2.2 Photo

Figure 260: External disk drive (beige front plate)

2.3 Connection

The connection is made using a standard Centronics cable via a 25-pin DSUB socket.

Information:

The length of the Centronics cable (the distance between controller and floppy disk drive) can be a maximum of 1.8 m.

2.4 Technical data

External disk drive	
Diskette format	3.5" (to 1.44 MB)
Dimensions (H x W x D)	72 x 144 x 163 mm
Cutout size	138+1 x 68 + 0.7 mm
Operating temperature	0 - 55 °C
Relative humidity	5 - 95%, non-condensing
Power consumption	2.9 W

Table 236: Technical data - external disk drive

An optional lockable transparent door (IP55 protection) is also available.

2.5 Installation

The disk drive is integrated into a housing, suitable for installation on a control panel. It can also be installed using an installation plate, which also provides space for two optional entry devices (e.g. switch):

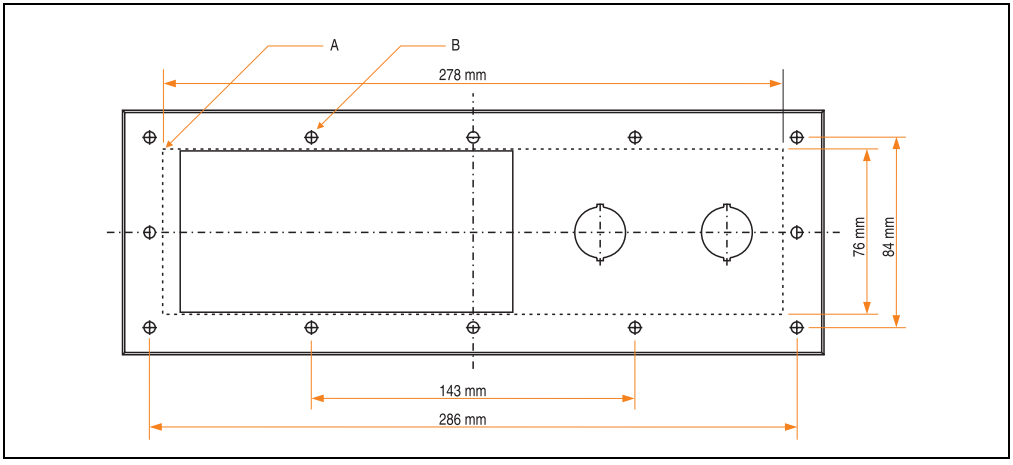


Figure 261: Front plate for external floppy disk drive

2.5.1 Mounting instructions

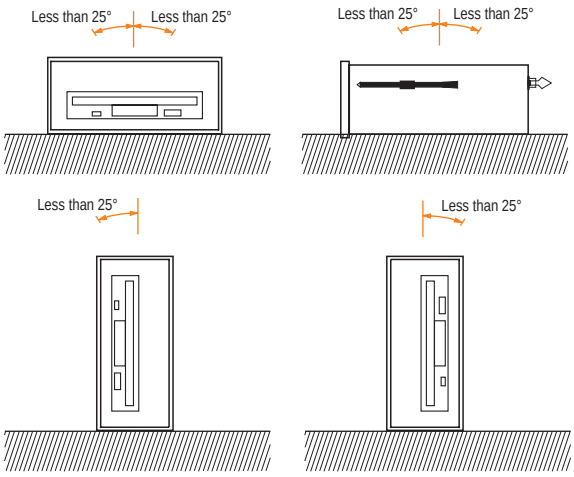


Figure 262: Mounting guidelines - external 3.5" FDD

2.6 Order data

Model number	Description
5A2001.01	External 3.5 inch (88.9 mm) 1.44 MB floppy disk drive (beige front) in a housing that is designed to be installed in a control panel. Color: PS/2 beige. No cable included in delivery (standard Centronics cable 9A0005.01 - 1.8 m or 9A0005.03 - 0.5 m).
5A2001.05	External 3.5 inch (88.9 mm) 1.44 MB floppy disk drive (black front) in a housing that is designed to be installed in a control panel. Color: Black No cable included in delivery (standard Centronics cable 9A0005.01 - 1.8 m or 9A0005.03 - 0.5 m).
5A2001.02	Transparent door for external floppy disk drive 5A2001.01 and 5A2001.05. With lock, sealed with gasket, IP55 protection (from front).
5A2500.01	Front plate for installing an external floppy drive and two optional entry devices.
9A0005.01	Centronics cable 1.8 m, cable to connect a printer or the external floppy disk drive to an IPC
9A0005.03	Centronics cable 0.5 m, cable to connect a printer or the external floppy disk drive to an IPC

Table 237: Order data - external FDD

3. External CD-ROM drive 9A0011.02

3.1 General information

If an SCSI adapter with an external DB50mini-connector (order no. 9A0010.02) is present in the IPC, it can be used to operate the external CD-ROM drive.

3.2 Photo

Figure 263: External CD-ROM drive

3.3 Supply voltage

The 40 slot CD-ROM drive is installed in a desktop housing and requires an external power supply (100 to 240 VAC).

3.4 Order data

Model number	Description
9A0010.02	PCI Ultra SCSI Adapter AHA 2940AU. PCI card for operating SCSI devices to a PC. Documentation and software (without cable) included. DB50mini connector.
9A0011.02	External SCSI CD-ROM; PS100-240 VAC External 40 slot CD-ROM drive in desktop housing. Power supply 100 – 240 VAC. Documentation and software included. DB50mini connector.
9A0012.01	SCSI cable DB50mini (1.8 m). Cable for operating an external SCSI CD-ROM drive to a PCI Ultra SCSI adapter.

Table 238: Order data - external CD-ROM drive

4. Remote CD-ROM / SuperDisk 120 5A5003.02

Figure 264: Symbol photo - 5A5003.02 with 5A5003.03

For IPCs with system units 5C5001.2x and 5C5601.2x, it is possible to connect an external remote CD ROM / SuperDisk 120 drive combination (5A5003.02) with a Mega Line cable (model number 5A5004.05 - 5 m and 5A5004.10 - 10 m) to the 9-pin DSUB socket present exclusively on the IPC. An external supply voltage is not necessary because the drive is supplied by the system unit. It is also possible to boot from this drive.

4.1 Dimensions

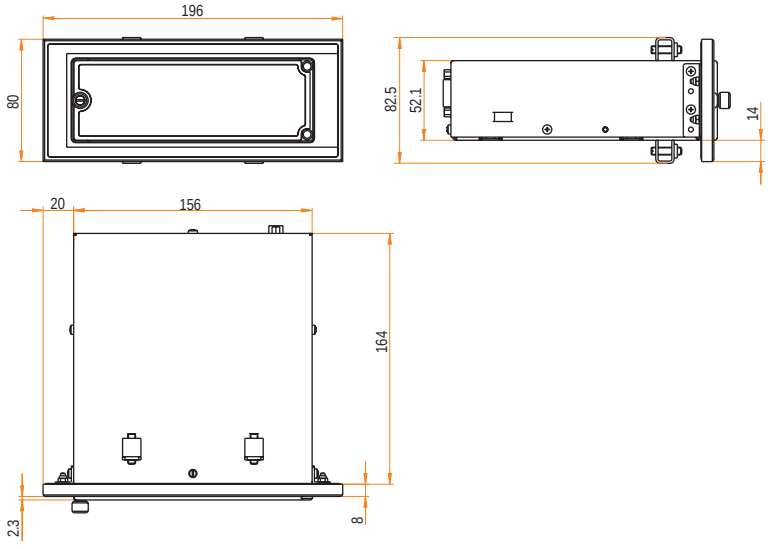


Figure 265: Dimensions - 5A5003.02 with front cover 5A5003.03

4.2 Technical data

Remote CD ROM / SuperDisk 120 drive	
SuperDisk - 120	3.5" drive 1.44 MB / 120 MB disks
CD-ROM	24x
Dimensions in mm (W x H x D) Remote IDE CD ROM LS-120	156 x 52 x 164
Dimensions in mm (W x H x D) Remote IDE CD ROM LS-120 with front cover	196 x 80 x 172
Operation Temperature Relative humidity	 5 - 45 °C 20 to 80 % (non-condensing)
Storage Temperature Relative humidity	 -20 to 60 °C 8 - 90 %, non-condensing
Power consumption	Approx. 8.4 watts (both drives in read mode)
Software	Found on the Provit Drivers & Utilities CD-ROM 5S0000.01-090 or can be downloaded directly from B&R's homepage (www.br-automation.com).

Table 239: Technical data - remote IDE CD ROM / LS120 drive

4.3 Mounting instructions

The remote CD ROM / SuperDisk 120 drive can be mounted either vertically or horizontally (tolerance 25°; see figure "Mounting guidelines - controller R-IDE CD-ROM/LS120 drive (horizontal / vertical)" on page 427).

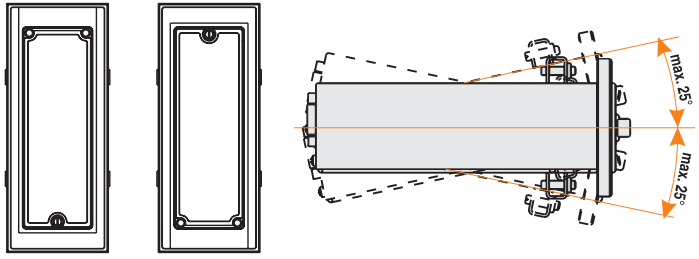


Figure 266: Mounting guidelines - controller R-IDE CD-ROM/LS120 drive (horizontal / vertical)

4.4 mounting options

It is possible to mount the remote CD ROM / SuperDisk 120 drive in two different ways.

4.4.1 Table mounting

Four rubber feet are included in the delivery for using this mounting option with standard devices (5A5003.02).

4.4.2 Mounting with front cover

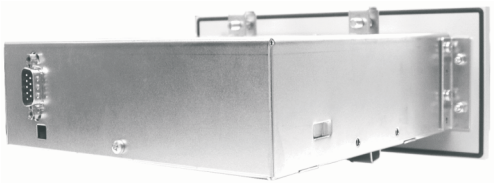


Figure 267: Mounting method with front cover

The front cover must be ordered separately (5A5003.03). The material for mounting is enclosed.

4.5 Accessories

The remote CD ROM / SuperDisk 120 drive can be also mounted using a front cover, which can be ordered from B&R (model number 5A5003.03).

Figure 268: Controller R-IDE front cover, 5A5003.03

4.6 Model numbers

Model numbers	Description
5A5003.02	**Remote CD ROM / SuperDisk 120** Incl. mounting bracket. Without front cover, for connection to a 5C5001.21x or 5C5601.2x system unit. Dimensions 156 x 52 x 164 mm (WxHxD)
5A5003.03	**Controller R-IDE front cover** For controller R-IDE CD-ROM / LS120 drive (5A5003.02 and 5A5003.08)
5A5004.05	Remote cable 5 m
5A5004.10	Remote cable 10 m

Table 240: Model numbers - external remote CD-ROM LS120 drive

4.7 Software

It is possible to upgrade the firmware for the receiver and sending unit using software. This can only be used with the remote CD ROM / SuperDisk 120 (5A5003.02) or the remote CD ROM / SuperDisk 240 (5A5003.08) and a system unit 5C5001.2x or 5C5601.2x (all of which must be Revision B0 or later).

Warning!

Before starting the upgrade, be sure that these two components are connected to each other and functioning.

A more detailed description of the upgrade process can be found in chapter 6 "Software", section 6 "Remote Upgrade Utility" on page 411.

5. Remote CD-ROM drive 5A5003.07

For IPCs with system units 5C5001.2x and 5C5601.2x, it is possible to connect a remote IDE CD ROM drive (5A5003.07) with a Mega Line cable (model number 5A5004.05 - 5 m and 5A5004.10 - 10 m) to the 9-pin DSUB socket present exclusively on the IPC. An external supply voltage is not necessary because the drive is supplied by the system unit. It is also possible to boot from this drive.

5.1 Dimensions

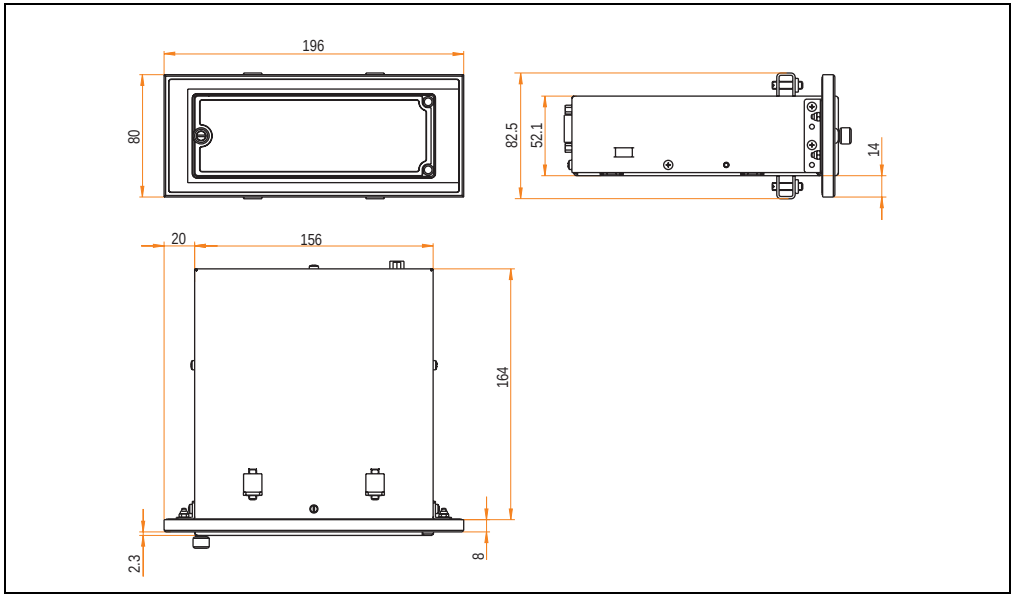


Figure 269: Dimensions - 5A5003.07 with front cover 5A5003.03

5.2 Technical data

Remote CD ROM / SuperDisk 120 drive	
SuperDisk - 120	3.5" drive 1.44 MB / 120 MB disks
CD-ROM	24x
Dimensions in mm (W x H x D) Remote IDE CD ROM LS-120	156 x 52 x 164
Dimensions in mm (W x H x D) Remote IDE CD ROM LS-120 with front cover	196 x 80 x 172

Table 241: Technical data - remote IDE CD ROM / LS120 drive

Remote CD ROM / SuperDisk 120 drive	
Operation Temperature Relative humidity	 5 - 45 °C 20 to 80 % (non-condensing)
Storage Temperature Relative humidity	 -20 to 60 °C 8 - 90 %, non-condensing
Power consumption	Approx. 8.4 watts (both drives in read mode)
Software	Found on the Provit Drivers & Utilities CD-ROM 5S0000.01-090 or can be downloaded directly from B&R's homepage (www.br-automation.com).

Table 241: Technical data - remote IDE CD ROM / LS120 drive (cont.)

5.3 Mounting instructions

The remote CD ROM / SuperDisk 120 drive can be mounted either vertically or horizontally (tolerance 25°; see figure "Mounting guidelines - controller R-IDE CD-ROM/LS120 drive (horizontal / vertical)" on page 431).

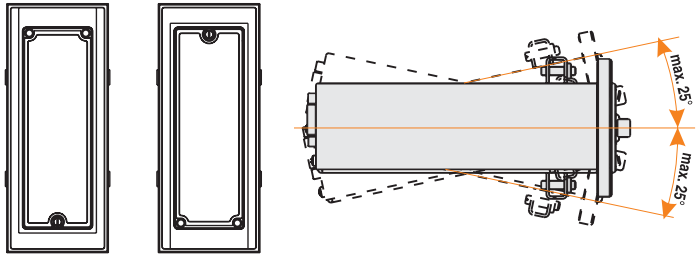


Figure 270: Mounting guidelines - controller R-IDE CD-ROM/LS120 drive (horizontal / vertical)

5.4 mounting options

It is possible to mount the remote CD ROM / SuperDisk 120 drive in two different ways.

5.4.1 Table mounting

Four rubber feet are included in the delivery for using this mounting option with standard devices (5A5003.02).

5.4.2 Mounting with front cover

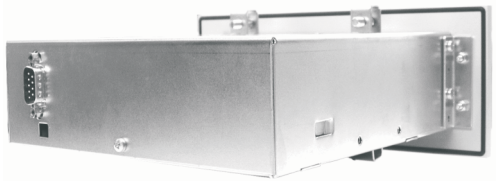


Figure 271: Mounting method with front cover

The front cover must be ordered separately (5A5003.03). The material for mounting is enclosed.

5.5 Accessories

The remote CD ROM / SuperDisk 120 drive can be also mounted using a front cover, which can be ordered from B&R (model number 5A5003.03).

Figure 272: Controller R-IDE front cover, 5A5003.03

5A5003.03	Controller R-IDE front cover
Front cover design / colors Dark gray border around the cover Light gray background	 Similar to Pantone 432CV Similar to Pantone 427CV

Table 242: R-IDE front cover - colors

5.6 Model numbers

Model numbers	Description
5A5003.02	**Remote CD ROM / SuperDisk 120** Incl. mounting bracket. Without front cover, for connection to a 5C5001.21x or 5C5601.2x system unit. Dimensions 156 x 52 x 164 mm (WxHxD)
5A5003.03	**Controller R-IDE front cover** For controller R-IDE CD-ROM / LS120 drive (5A5003.02 and 5A5003.08)

Table 243: Model numbers - external remote CD-ROM LS120 drive

Model numbers	Description
5A5004.05	Remote cable 5 m
5A5004.10	Remote cable 10 m

Table 243: Model numbers - external remote CD-ROM LS120 drive

5.7 Software

It is possible to upgrade the firmware for the receiver and sending unit using software. This can only be used with the remote CD ROM / SuperDisk 120 (5A5003.02) or the remote CD ROM / SuperDisk 240 (5A5003.08) and a system unit 5C5001.2x or 5C5601.2x (all of which must be Revision B0 or later).

Warning!

Before starting the upgrade, be sure that these two components are connected to each other and functioning.

A more detailed description of the upgrade process can be found in chapter 6 "Software", section 6 "Remote Upgrade Utility" on page 411.

6. Remote CD ROM / SuperDisk 240 5A5003.08

Figure 273: Symbol photo - 5A5003.08 with 5A5003.03

For IPCs with system units 5C5001.2x and 5C5601.2x, it is possible to connect an external remote CD ROM / SuperDisk 240 drive combination (5A5003.08) with a Mega Line cable (model number 5A5004.05 - 5 m and 5A5004.10 - 10 m) to the 9-pin DSUB socket present exclusively on the IPC. An external supply voltage is not necessary because the drive is supplied by the system unit. It is also possible to boot from this drive.

6.1 Dimensions

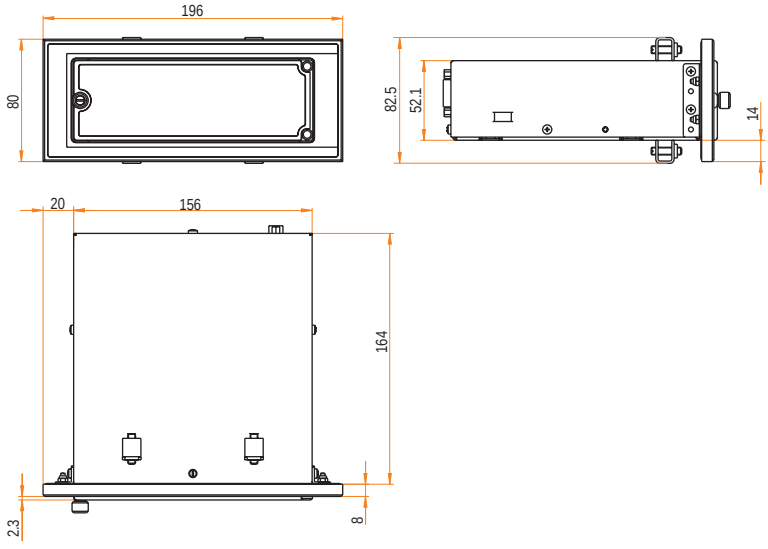


Figure 274: Dimensions - 5A5003.08 with 5A5003.03

6.2 Technical data

Remote CD ROM / SuperDisk 240 drive	
SuperDisk - 240	3.5" drive 1.44 MB / 120 MB / 240 MB data carrier
CD-ROM	24x
Dimensions in mm (W x H x D) Remote CD ROM / SuperDisk 240 drive	156 x 52 x 164
Dimensions in mm (W x H x D) Remote CD ROM / SuperDisk 240 drive with front cover	196 x 80 x 172
Operation Temperature Relative humidity	 5 - 45 °C 20 to 80 % (non-condensing)
Storage Temperature Relative humidity	 -20 to 60 °C 8 - 90 %, non-condensing
Power consumption	Approx. 8.4 watts (both drives in read mode)
Software	Found on the Provit Drivers & Utilities CD-ROM 5S0000.01-090 or can be downloaded directly from B&R's homepage (www.br-automation.com).

Table 244: Technical data - remote CD ROM / SuperDisk 240 drive

Additional information regarding the SuperDisk 240 drive being used

- High capacity (240 MB per SuperDisk medium 240MB)
- Fully compatible with FDD and SuperDisk 120
- Storage of 32 MB on conventional 2HD 1.44 MB diskettes (only possible with special drivers)
- Data transfer rates: for 240 MB media between 1.06 and 1.91 MB/s
  for 120 MB media maximum 1 MB/s
  for 1.44 MB diskettes approx. 230 KB/s
- Average access time: 65 ms
- Disk rotation speed: 1500 revolutions per minute

6.3 Mounting instructions

The remote CD ROM / SuperDisk 240 drive can only be mounted horizontally, due to the specifications of the SuperDisk 240 drive.

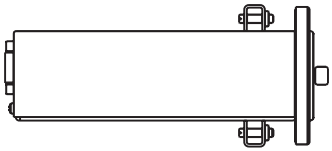


Figure 275: Mounting guidelines - remote CD ROM / SuperDisk 240 drive

6.4 mounting options

It is possible to mount the remote CD ROM / SuperDisk 240 drive in two different ways.

6.4.1 Table mounting

Four rubber feet are included in the delivery to facilitate this mounting option for standard devices (5A5003.08).

6.4.2 Mounting with front cover

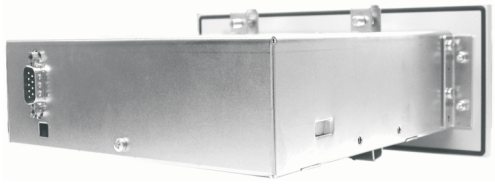


Figure 276: Mounting method with front cover

The front cover must be ordered separately (5A5003.03). The material for mounting is enclosed.

6.5 Accessories

The remote CD ROM / SuperDisk 240 drive can be also mounted using a front cover, which can be ordered from B&R (model number 5A5003.03).

Figure 277: Controller R-IDE front cover, 5A5003.03

6.6 Model numbers

Model numbers	Description
5A5003.08	**Remote CD ROM / SuperDisk 240** Incl. mounting bracket. Without front cover, for connection to a 5C5001.21x or 5C5601.2x system unit. Dimensions 156 x 52 x 164 mm (WxHxD)
5A5003.03	**Controller R-IDE front cover** For controller R-IDE CD-ROM / LS120 drive (5A5003.02 and 5A5003.08)
5A5004.05	Remote cable 5 m
5A5004.10	Remote cable 10 m

Table 245: Model numbers - external remote CD-ROM LS120 drive

6.7 Software

It is possible to upgrade the firmware for the receiver and sending unit using software. This can only be used with the remote CD ROM / SuperDisk 120 (5A5003.02) or the remote CD ROM / SuperDisk 240 (5A5003.08) and a system unit 5C5001.2x or 5C5601.2x (all of which must be Revision B0 or later).

Warning!

Before starting the upgrade, be sure that these two components are connected to each other and functioning.

A more detailed description of the upgrade process can be found in chapter 6 "Software", section 6 "Remote Upgrade Utility" on page 411.

7. Provit 5000 controller add-on CD ROM 5A5009.01

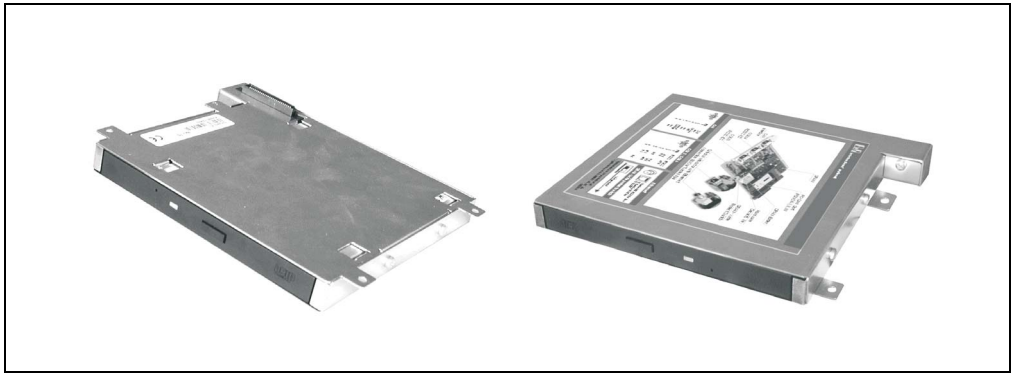


Figure 278: Provit 5000 controller add-on CD ROM 5A5009.01

This drive can be operated together with the bus units (5C5000.2x and 5C5000.3x), which are prepared on the back (see figure "Bus unit connector" on page 438). The add-on CD ROM drive is connected with the primary slave of the first IDE controller using this connector, and is recognized as the primary slave drive.

Information:

When using an add-on CD ROM drive (5A5009.01) with bus units 5C5000.2x or 5C5000.3x, the dual CompactFlash adapter 5A5002.02 may not be used.

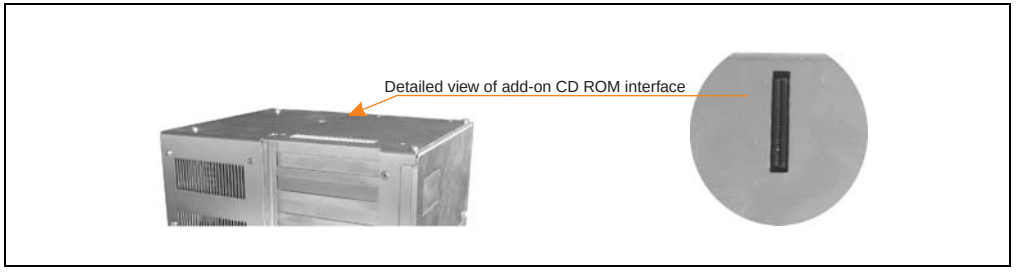


Figure 279: Bus unit connector

The add-on CD ROM drive is mounted on the bus unit with the 4 screws included in the delivery.

Figure 280: Provit 5000 controller add-on CD ROM 5A5009.01 (mounted)

By using a Slimline drive, installation depth is only marginally increased by 16 mm.

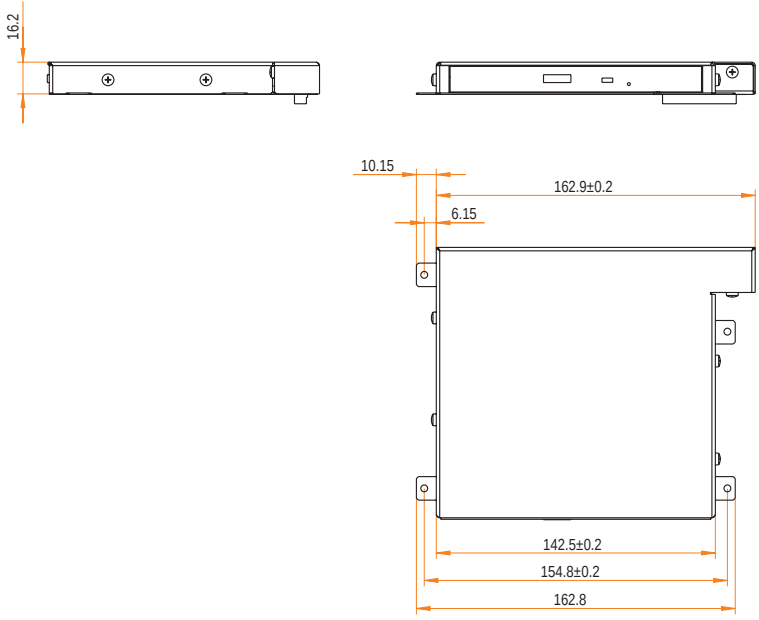


Figure 281: Dimensions - add-on CD ROM 5A5009.01

7.1 Mounting instructions - add-on CD ROM with controller

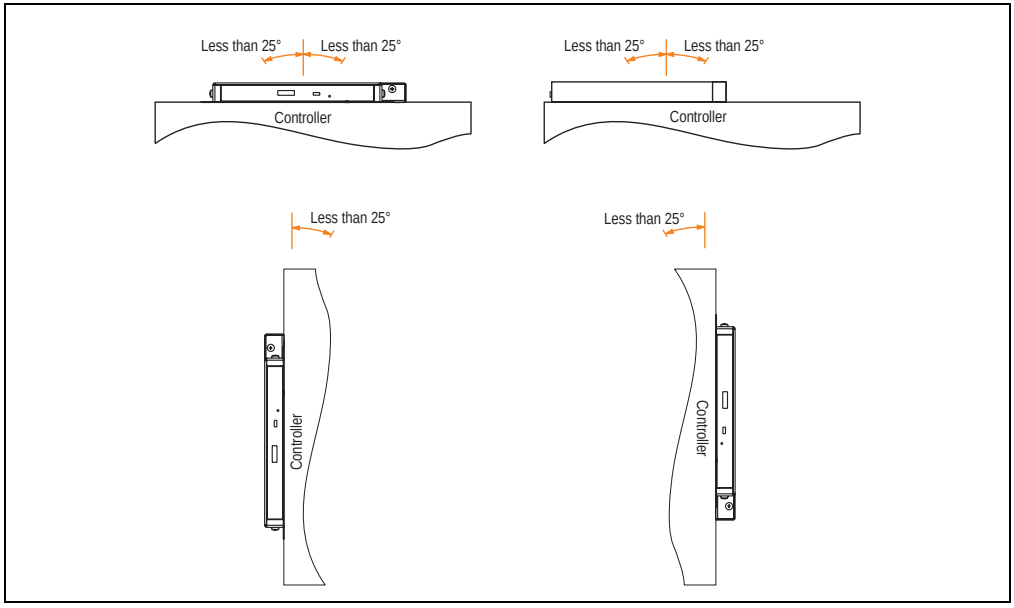


Figure 282: Mounting instructions - add-on CD ROM with controller

7.2 Technical data

Provit 5000 controller add-on CD ROM 5A5009.01 drive	
CD-ROM	24x
Dimensions	See figure 281 "Dimensions - add-on CD ROM 5A5009.01" on page 439
Operation Temperature Relative humidity	 5 - 55 °C 8 to 80 % (non-condensing)
Storage Temperature Relative humidity	 -20 to 60 °C 5 - 90 %, non-condensing
Power consumption	Stand By: 0.1 W Average: 4 W (Read) Peak: 7 W (ejection of CD)

Table 246: Technical data - add-on CD ROM 5A5009.01

7.3 Model number

Model number	Description
5A5009.01	Provit 5000 controller CD-ROM, for 5C5000.2x and 5C5000.3x bus units

Table 247: Model numbers - Provit 5000 controller CD-ROM

8. Provit 5000 controller add-on CD RW 5A5009.02

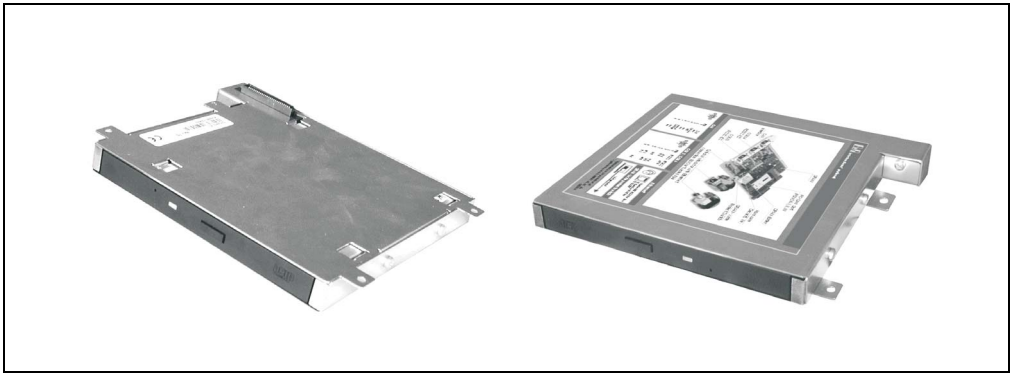


Figure 283: Provit 5000 controller add-on CD RW 5A5009.02

This drive can be operated together with the bus units (5C5000.2x and 5C5000.3x), which are prepared on the back (see figure 284 "Bus unit connector" on page 441). The add-on CD RW drive is connected with the primary slave of the first IDE controller using this connector, and is recognized as the primary slave drive.

Information:

When using an add-on CD RW drive (5A5009.02) with bus units 5C5000.2x or 5C5000.3x, the dual CompactFlash adapter 5A5002.02 may not be used.

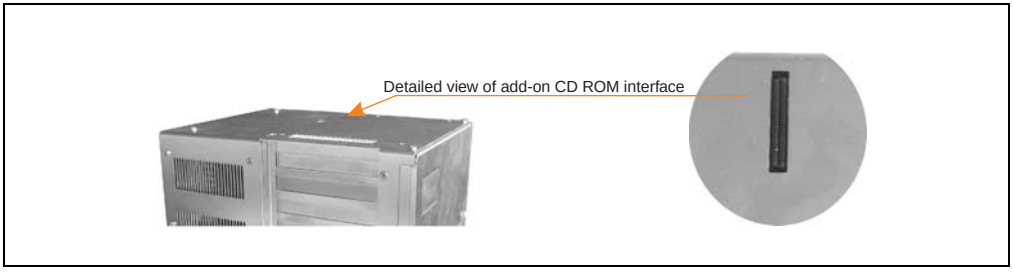


Figure 284: Bus unit connector

The add-on CD RW drive is mounted on the bus unit with the 4 screws included in the delivery.

Figure 285: Provit 5000 controller add-on CD RW 5A5009.02 (mounted)

By using a Slimline drive, installation depth is only marginally increased by 16 mm.

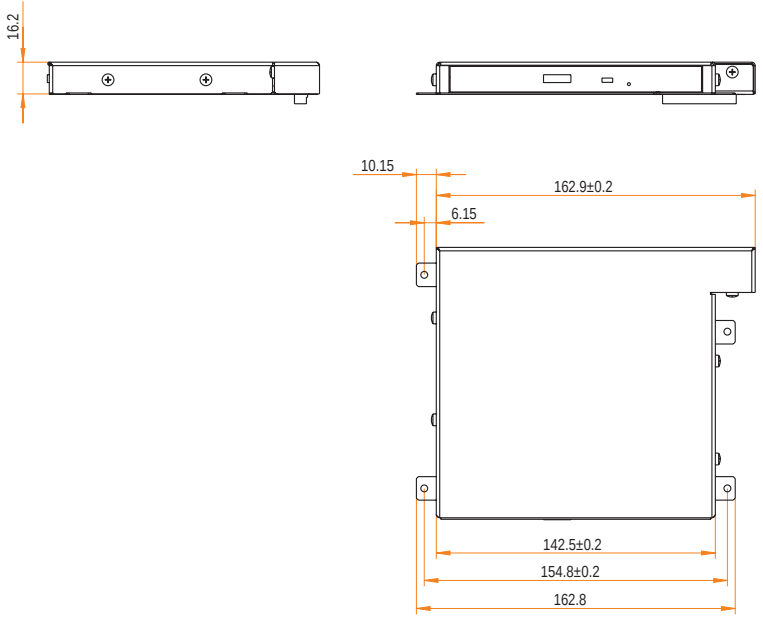


Figure 286: Dimensions - add-on CD RW 5A5009.02

8.1 Mounting instructions - add-on CD RW (Revision D0 and later) with controller

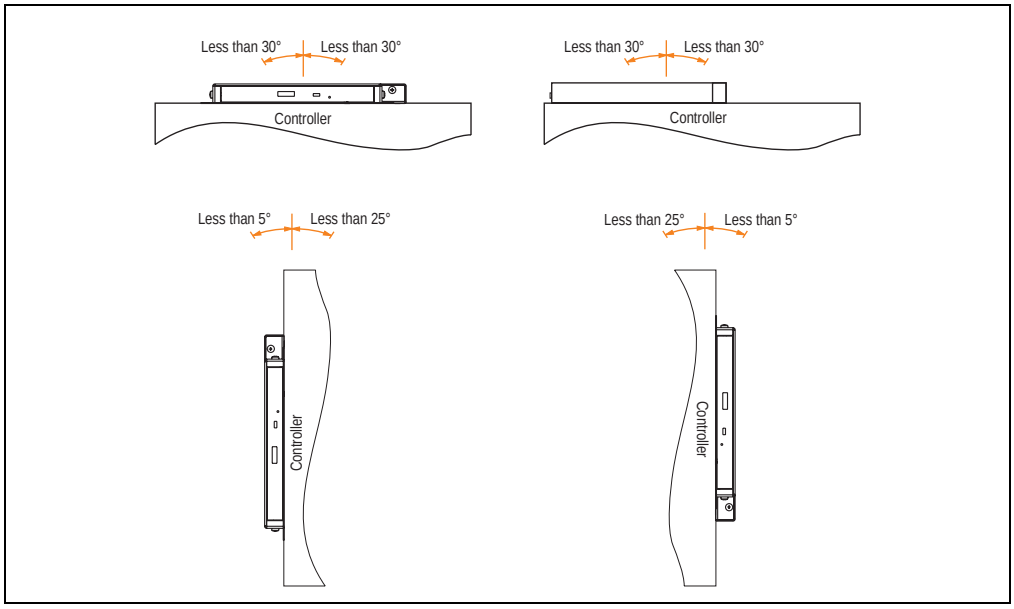


Figure 287: Mounting instructions - add-on CD RW (revision D0 and later) with controller

8.2 Technical data - 5A5009.02 Revision D0

Provit 5000 controller add-on CD RW drive	
Write speed	Recordable: 24x, 16x, 10x and 4x Rewriteable: 10x and 4x
Reading rate	24x
Color	Black
CDs to be used	CD-DA, CD-ROM (mode 1), CD-ROM XA mode 2 (form 1, form 2), Photo CD (Multisession) CD-I, Video CD, CD-Text, CD Extra (CD Plus)
Recording technique	Disc at once, session at once, track at once, packet write
CD diameter	12 cm, 8 cm
Rotation rate (24 x CAV)	5,140 min^{-1} (rpm)
Interface	IDE / ATAPI (UDMA33)
Data transfer rate (asynchronous transfer)	Continual access: 3.6 MB/s max. (tracks limit) 3.7 MB/s (average rate)
Access time	Typically 110 ms
Data buffer capacity	2 MB
Technology for avoidance of buffer under-runs	Ricoh Just Link

Table 248: Technical data - add-on CD-RW drive 5A5009.02 Revision D0

Provit 5000 controller add-on CD RW drive	
Charge mechanism	Drawer procedure
Power consumption	Standby: 0.25 watts Write 24x: 5.5 watts
MTBF	60,000 POH
Software	Drivers for MS-DOS CD ROM support can be found on the Provit Drivers & Utilities CD ROM 5S0000.01-090 or can be downloaded directly from B&R's homepage (www.br-automation.com).
Operation Temperature Relative humidity	 5 - 45 °C 8 - 80%, non-condensing
Storage Temperature Relative humidity	 - 20 to + 60 °C 5 - 90 %, non-condensing
Vibration Operation Storage	 Max. 0.2 G at 5 - 500 Hz, 1 octave/min Max. 2 G at 5 - 500 Hz, 1 octave/min
Shock Operation Storage	 Max. 5 G for 11 ms (half sine wave) Max. 60 G for 11 ms (half sine wave)

Table 248: Technical data - add-on CD-RW drive 5A5009.02 Revision D0 (cont.)

8.3 Model number

Model number	Description
5A5009.02	Provit 5000 controller CD-RW, for 5C5000.2x and 5C5000.3x bus units

Table 249: Model numbers - Provit 5000 controller CD RW

9. Remote display adapter - local unit 5A5010.01

With this transmitter adapter and a matching receiver adapter (see section 10 "GS link remote unit 5A5010.02" on page 450), a standard B&R TFT display unit can be operated over a longer distance (max. 35 meters) than the standard distance of 10 meters from the controller.

Features:

- Maximum possible distance: 35 meters (see figure "Mounting concept" on page 449).
- Compatible with B&R standard TFT displays (see "Compatibility list - display units" on page 453).
- 24 VDC supply to remote display possible.
- Mounting rail installation of local unit 5A5010.01
- Backside display mounting of remote unit 5A5010.02 (compatible display units)
- Flexible GS link cable with variable lengths

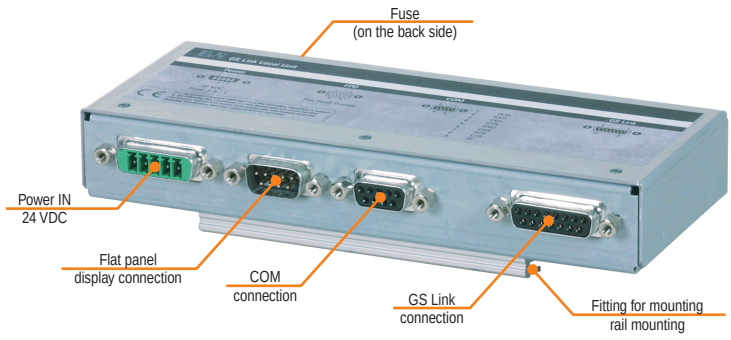


Figure 288: Remote display adapter - local unit 5A5010.01 - connections

The remote display adapter - local unit (5A5010.01) - is designed for standard installation on a mounting rail.

9.1 Dimensions

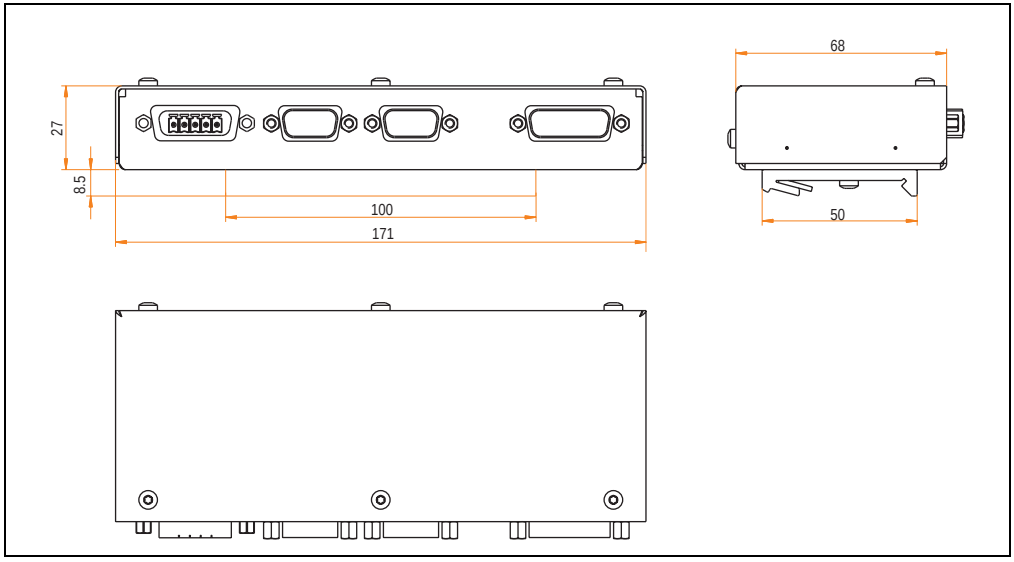


Figure 289: Remote display adapter - local unit 5A5010.01 - dimensions

9.2 Interface descriptions

9.2.1 24 VDC power IN

A 24 VDC power supply must be attached here, which supplies the local and remote GS link unit as well as the 24 VDC output of the GS link remote unit.

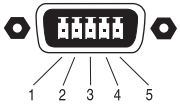
24 VDC power IN		
Pin	Assignment	
1	-	
2	-	
3	Ground	
4	+	
5	+	

Table 250: 5A5010.01 - supply voltage

The detailed allocation of the supply voltage can be found on the device's label.

The plug required to connect the cable is delivered with the device.

9.2.2 Fuse

The power supply is protected by a fuse found on the back of the adapter.

Fuse	
Rated voltage	250V
Rated current	2A
Type	Time lag

9.2.3 Flat panel display connection

This Panellink interface must be connected with the FPD output on the IPC.

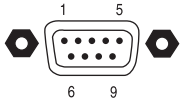
FPD interface		
Panellink		9-pin DSUB connector 
Pin	**Assignment**	
1	GND	
2	TXC+ / RS485A	
3	TX0+ / VCC	
4	TX1+ / +12V	
5	TX2+ / GND	
6	TXC- / RS485B	
7	TX0- / VCC	
8	TX1- / +12V	
9	TX2- / GND	

Table 251: Pin assignments - FPD interface 5A5010.01

The required cable is available separately from B&R. See section "Remote display cable 5A5004.xx" on page 457.

9.2.4 COM connection

This input allows the transfer of a serial signal to the GS link remote unit 5A5010.02. For example, the remote display unit with touch screen can be provided with the necessary serial touch screen signal.

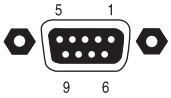
Serial interface (COM)		
Pin	Assignment	9-pin DSUB socket 
1	DCD	
2	RXD	
3	TXD	
4	DTR	
5	GND	
6	DSR	
7	RTS	
8	CTS	
9	RI	

Table 252: Pin assignments - COM 5A5010.01

The detailed allocation of the COM interface can be found on the device's label.

The required cable is available separately from B&R. See section "RS232 extension cable 9A0014.xx" on page 458.

9.2.5 GS link connection

The GS link remote unit 5A5010.02 is connected here using the GS link cable.

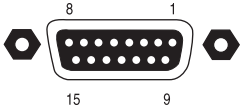
GS link
15-pin DSUB socket 

Table 253: GS link connection 5A5010.01

This cable transmits all signals to the GS link remote unit 5A5010.02, including FPD (display, keyboard, etc.), COM (e.g. touch screen), and supply (24 VDC).

The required cable is available separately from B&R. See section "GS link connection cable" on page 459.

9.3 Mounting concept

This image illustrates the possibility of combining the individual components.

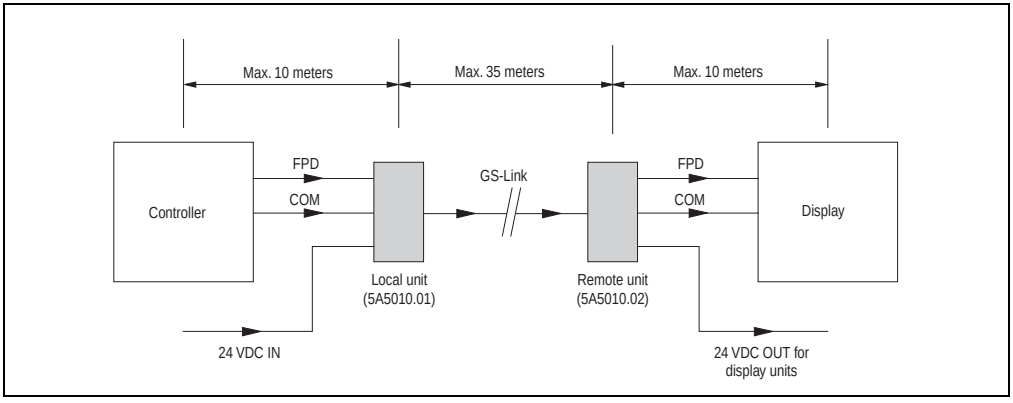


Figure 290: Mounting concept

10. GS link remote unit 5A5010.02

The adapter serving as the receiver unit of the "remote display adapter - local unit 5A5010.01" (on page 398) is designed to be mounted on the back of a B&R TFT standard display unit. This adapter can also be used up to 10 meters from the remote display unit (see figure "Mounting concept" on page 449).

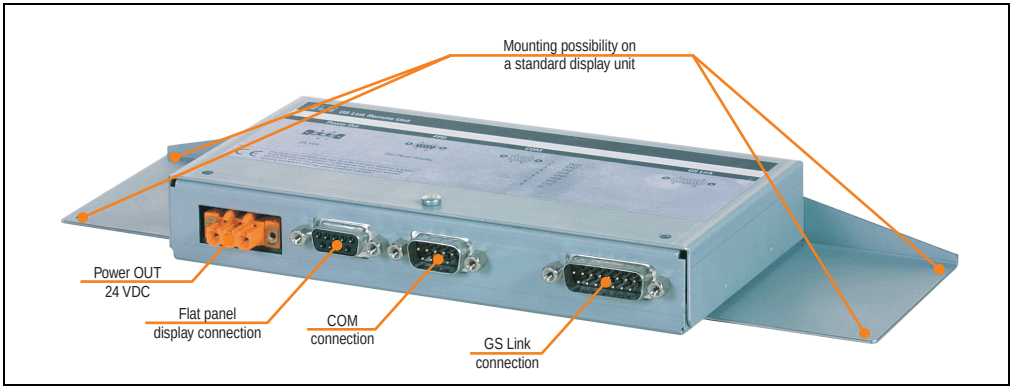


Figure 291: Components - GS link remote unit 5A5010.02

10.1 Dimensions

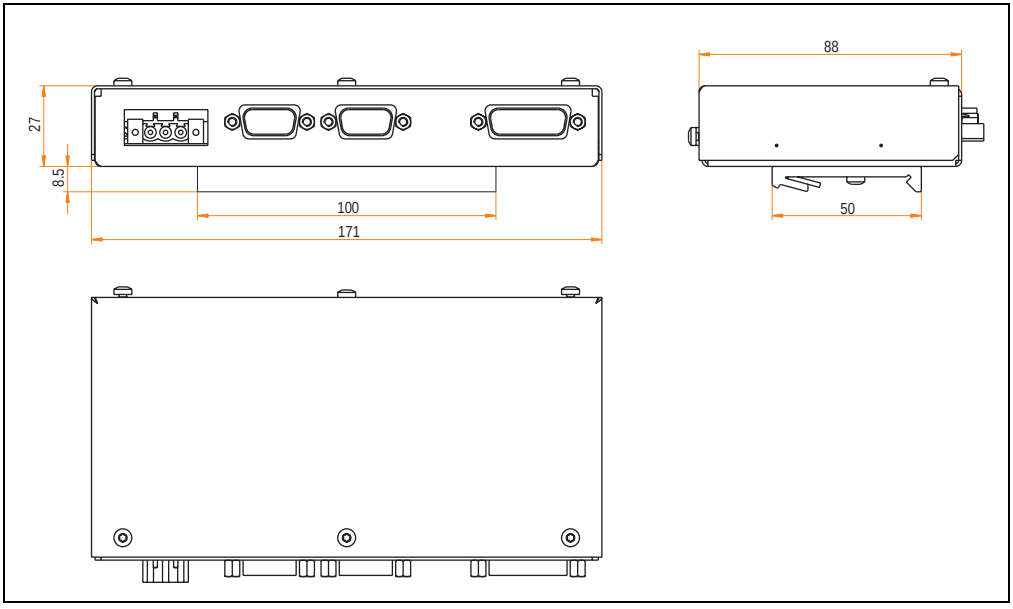


Figure 292: Dimensions - GS link remote unit 5A5010.02

10.2 Interface descriptions

10.2.1 24 VDC power OUT

A remote display unit that requires 24 VDC (like the 5D5213.01) can be supplied here for example.

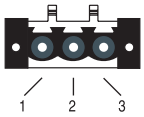
24 VDC power OUT		
		
Pin	Assignment	
1	-	
2	Ground	
3	+	

Table 254: 5A5010.02 - supply voltage output

Warning!

Only connect/supply display units from B&R.

The detailed allocation of the supply voltage can be found on the device's label.

The plug required to connect the cable is delivered with the device.

10.2.2 Flat panel display connection

This Panellink interface must be connected with the FPD output on the remote display unit.

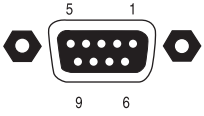
FPD interface		
Panellink		9-pin DSUB socket 
Pin	**Assignment**	
1	GND	
2	TXC+ / RS485A	
3	TX0+ / VCC	
4	TX1+ / +12V	
5	TX2+ / GND	
6	TXC- / RS485B	
7	TX0- / VCC	
8	TX1- / +12V	
9	TX2- / GND	

Table 255: Pin assignments - FPD interface 5A5010.02

The required cable is available separately from B&R. See section "Remote display cable 5A5004.xx" on page 457.

10.2.3 COM connection

This interface is for connecting the serial interface of a touch screen display unit.

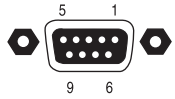
	Serial interface (COM)	
		9-pin DSUB connector 
Pin	**Assignment**	
1	DCD	
2	RXD	
3	TXD	
4	DTR	
5	GND	
6	DSR	
7	RTS	
8	CTS	
9	RI	

Table 256: Pin assignments - COM 5A5010.02

The required cable is available separately from B&R. See section "RS232 extension cable 9A0014.xx" on page 458.

The detailed allocation of the supply voltage can be found on the device's label.

10.2.4 GS link connection

The remote display adapter - local unit 5A5010.01 - must be connected here using a GS link cable.

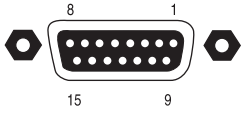
GS link
15-pin DSUB socket 

Table 257: 5A5010.02 GS link connection

The required cable is available separately from B&R. See section "GS link connection cable" on page 459.

10.3 Compatibility list - display units

This is a list of all B&R display units for which B&R has tested the compatibility for mounting on the back of GS link remote unit 5A5010.02.

Model number	Revision	Short description
5D5210.01	H0	Display unit 10.4" TFT display (color VGA) with touch screen in light gray design
5D5211.02	F0	Display unit 10.4" TFT display (color SVGA) with touch screen in light gray design
5D5212.02	J0	Display unit 15" TFT display (color XGA) with touch screen in light gray design
5D5213.01	F0	Display unit 18.1" TFT display (color SXGA) with touch screen in bright gray design.
5D5510.10	G0	Display unit 10.4" TFT display (color VGA) with keys
5D5600.01	E0, F0, G0	Display unit 10.4" TFT display (color VGA) with keys
5D5600.02	E0	Display unit 10.4" TFT display (color VGA) with keys and touch pad
5D5600.03	G0, F0	Display unit 10.4" TFT display (color VGA) with keys around the touch screen
5D5601.01	I0	Display unit 12.1" TFT display (color SVGA) with keys
5D5601.02	I0	Display unit 12.1" TFT display (color SVGA) with keys and touch pad
5D5601.03	I0	Display unit 12.1" TFT display (color SVGA) with keys and touch screen

Table 258: Compatibility list - display units

11. Hardware security key parallel adapter 9A0003.01

This adapter also allows the hardware security key (dongle) to be used externally on parallel ports.

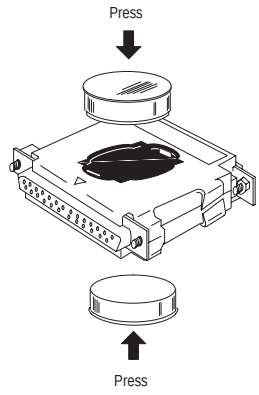


Figure 293: Hardware security key parallel adapter

Properties:

- Provides a parallel interface for Dallas hardware security keys
- Requires no external energy source
- Functions simultaneously with other parallel devices
- Supports the following operating systems: MS-DOS, OS/2, Windows, QNX, PC based UNIX
- Is used in order to protect installed applications in a system

Model number	Description
9A0003.01	Dallas keyring adapter for operating the Dallas dongle on a parallel PC interface

Table 259: Order data - hardware security key parallel adapter

12. Provit 5600 keyboard 5E9600.01-010 and 5E9600.01-020

The Provit 5600 keyboard is an IBM compatible AT enhanced keyboard for front mount installation in 19" format. The connection is made using the AT PS/2 socket of the Provit IPC (see sections "AT keyboard connection (PS/2)" on page 123 and "AT keyboard connection (PS/2)" on page 146). The keyboard is available in German and US English layouts.

Figure 294: AT keyboard (example - German keyboard layout)

Model number	5E9600.01-010 (German keyboard layout) 5E9600.01-010 (US keyboard layout)
Short text	IBM compatible AT enhanced keyboard for front mount installation in 19 inch (482.6 mm) format
Front	IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Frame	Aluminum anodized
Gasket	Flat gasket around display front
Weight	approx. 2.1 kg
Operating temperature	0 - 55°C
Relative humidity	5 - 95%, non-condensing
Outer dimensions (W x H x D)	482.6 x 177 x 35 (19 inch x 4 HE)

Table 260: Technical data - AT keyboard

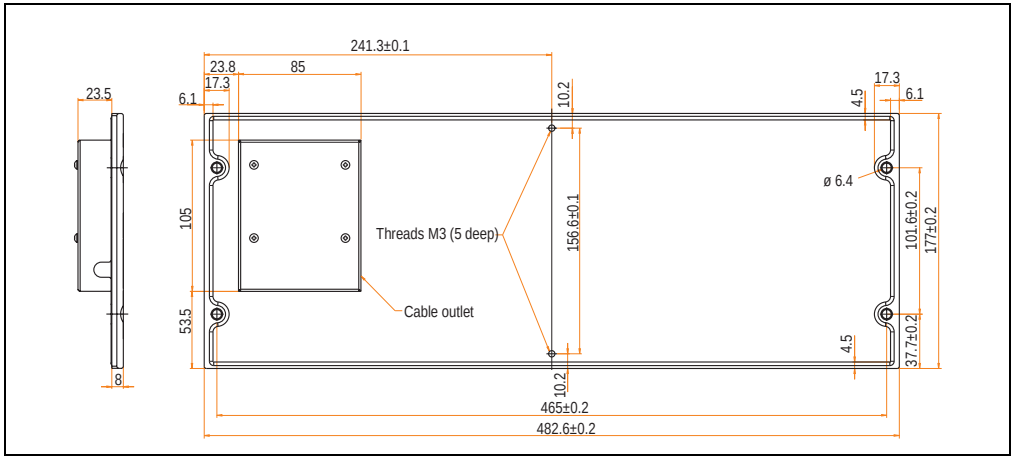


Figure 295: Installation dimensions 19" AT keyboard (figure overleaf)

13. Remote display cable 5A5004.xx

Model number	5A5004.01	5A5004.02	5A5004.05	5A5004.06	5A5004.10	5A5004.11
Length	0.6 m	1.8 m	5 m	5 m 1 x 70°	10 m	10 m 1 x 70°
Manufacturer's product ID	Kerpen Megaline 8					
Outer diameter	Max. 9.5 mm					
Cable category	S/STP					
Shielding	Each individual cable pair and entire cable					
Number of cable pairs	4					
Wave impedance	100 Ω					
Wire cross section	AWG 22					
Flex radius	Min. 8 x outer diameter during laying Min. 4 x outer diameter during installation					

Table 261: Technical data - remote display cable

The cables are equipped with 9-pin DSUB plugs (one plug, one socket) in metal plated housing. The DSUB connector housing can be a maximum of 32 mm wide (straight connector housing).

	DSUB socket	DSUB plug
1. Cable pair	2 6	2 6
2. Cable pair	3 7	3 7
3. Cable pair	4 8	4 8
4. Cable pair	5 9	5 9
Mass[1)]	1	1
Shield [1)]	Housing	Housing

Table 262: Pin Assignments for Remote Display cable

1) Shield and ground (pin 1) can be electrically connected

14. RS232 extension cable 9A0014.xx

This is a list of all B&R RS232 extension cables (e.g. for operating a discharged Provit 5000/5600 display unit with touch screen).

Model number	9A0014.02	9A0014.05	9A0014.10
Length	1.8 m	5 m	10 m

Table 263: RS232 extension cable 9A0014.xx

15. GS link connection cable

This cable is needed to connect the GS link local unit 5A5010.01 and the GS link remote unit 5A5010.02 to each other. The following cables can be ordered from B&R. The cables are equipped with 15-pin DSUB plugs (one plug, one socket) in metal plated housing.

Model number	Description	Note
5CAGSG.0150-00	**Flexible remote display cable (15 m)** For operating a display unit with GS Link to an IPC	
5CAGSG.0200-00	**Flexible remote display cable (20 m)** For operating a display unit with GS Link to an IPC	
5CAGSG.0250-00	**Flexible remote display cable (25 m)** For operating a display unit with GS Link to an IPC	
5CAGSG.0300-00	**Flexible remote display cable (30 m)** For operating a display unit with GS Link to an IPC	
5CAGSG.0350-00	**Flexible remote display cable (35 m)** For operating a display unit with GS Link to an IPC	
5CAGSM.0150-00	**Standard remote display cable (15 m)** For operating a display unit with GS Link to an IPC	
5CAGSM.0200-00	**Standard remote display cable (20 m)** For operating a display unit with GS Link to an IPC	
5CAGSM.0250-00	**Standard remote display cable (25 m)** For operating a display unit with GS Link to an IPC	
5CAGSM.0300-00	**Standard remote display cable (30 m)** For operating a display unit with GS Link to an IPC	
5CAGSM.0350-00	**Standard remote display cable (35 m)** For operating a display unit with GS Link to an IPC	

Table 264: Model numbers - GS link connection cable

15.1 Technical data - GS link connection cable

Model number	5CAGSG.xxxx-00	5CAGSM.xxxx-00
Length	Depends on model number	
Manufacturer	Gore	Kerpen
Flexibility	Flexible	Slightly inflexible
Outer diameter	Max. 11 mm	Max. 9.5 mm
Shielding	Each individual cable pair and entire cable	
Number of cable pairs	4	
Flex radius	Min. 66 mm	Min. 8 x outer diameter during laying Min. 4 x outer diameter during installation

Table 265: GS link connection cable

16. Panel flange adapter for the display unit 5D5212.04

Figure 296: Panel flange adapter

Model number	5A5007.01
Weight	2.4 kg

Table 266: Technical data - panel flange adapter 5A5007.01

The Panel Flange adapter is delivered with the screws needed for fastening it to the display unit 5D5212.04.

16.1 Dimensions

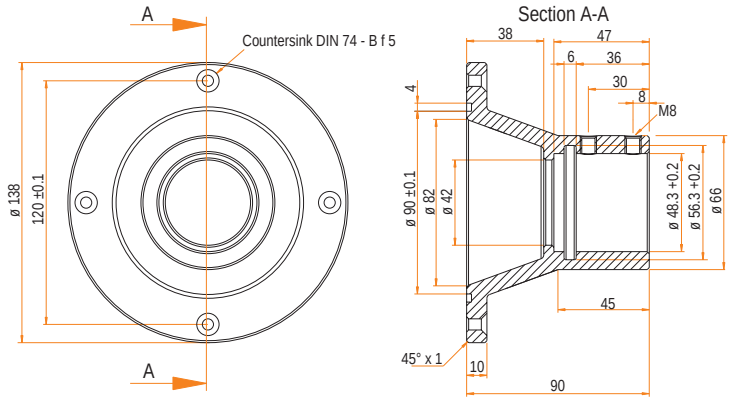


Figure 297: Dimensions - panel flange adapter 5A5007.01

17. USB flash drive

Information:

We reserve the right to supply alternative products due to the vast quantity of flash drives available on the market and their corresponding short product lifecycle. Therefore, the following measures might be necessary in order to boot from these flash drives (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 the BIOS. This can be avoided in most cases if a "`fdisk /mbr`" command is also executed on the USB flash drive.**

17.1 General information

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

17.2 Order data

Model number	Description	Image
5MMUSB.0128-00	USB flash drive 128 MB SanDisk Cruzer Mini	
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 2 GB SanDisk Cruzer Micro	

Table 267: Order data - USB flash drives

17.3 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 268: 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 Storage Transport	max. 40 g (392 m/s^2 0-peak) and 11 ms length max. 80 g (784 m/s^2 0-peak) and 11 ms length max. 80 g (784 m/s^2 0-peak) and 11 ms length				
Altitude Cruzer Mini / Cruzer Micro Operation Storage Transport	3,048 meters 12,192 meters 12,192 meters				

Table 268: Technical data - USB flash drive 5MMUSB.xxxx-00 (cont.)

1) For Win 98SE, a driver can be downloaded from the SanDisk homepage.

17.4 Temperature humidity diagram - operation and storage

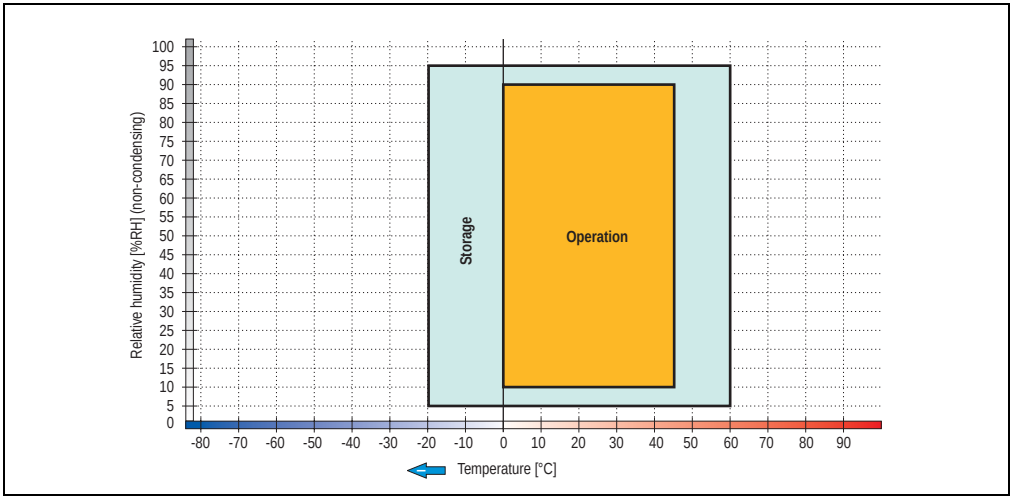


Figure 298: Temperature humidity diagram - USB flash drive - 5MMUSB.xxxx-00

17.5 Contents of delivery

SanDisk Cruzer Mini
1 USB flash drive in desired size + 1 strap
SanDisk Cruzer Micro

Table 269: Contents of delivery - USB flash drives 5MMUSB.xxxx-00

SanDisk Cruzer Mini
1 USB flash drive in desired size + 2 replacement covers (blue and pink) + 1 strap[1)]

Table 269: Contents of delivery - USB flash drives 5MMUSB.xxxx-00

1) Due to a change in the contents of delivery from the manufacturer, it is possible that the USB flash drive (with white cap) is delivered without the replacement covers or strap.

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

Figure 299: HMI Drivers & Utilities DVD 5SWHMI.0000-00

Model number	Short description	Note
5SWHMI.0000-00	**HMI Drivers & Utilities DVD** Contains drivers, utilities, software upgrades and user's manuals for B&R panel system products (see B&R homepage – Industrial PCs, Visualization and Operation).	

Table 270: Model number - HMI Drivers & Utilities DVD

This DVD contains drivers, utilities, software upgrades and user's manuals for B&R Panel system products (see B&R homepage – 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)

Chapter 8 • Technical appendix

1. Hardware security key

The hardware security key (dongle) protects the software. B&R recommends the DS1425 security key from Dallas Semiconductors.

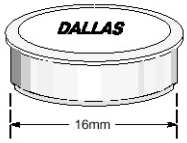


Figure 300: Dallas security key

Properties:

- Requires no external energy supply
- Universally applicable with different platforms
- Contains an intelligent reaction generator
- Has a unique 64-bit serial number and three 384-bit fields from a password protected RAM

2. Replacement CMOS battery

2.1 General information

The system units need the lithium battery for buffering BIOS and the real-time clock. 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%).

2.2 Order data

Model number	Description	Image
0AC201.9	Lithium batteries, 5 pcs., 3 / 950 mAh button cell	
4A0006.00-000	Lithium batteries, 1 pcs., 3 V / 950 mAh button cell	

Table 271: Order data - Lithium batteries

2.3 Technical data

Information:

The specified limits listed here, such as temperature, relative humidity, shock and vibration, only apply to his accessory and do not automatically apply to the whole terminal.

Name	0AC201.9 and 4A0006.00-000
Capacity	950 mAh
Voltage	3 V
Self discharge at 23°C	< 1% per year
Current requirements	8.5µA at 60 °C
Storage time	Max. 3 years at 30 °C
Storage temperature	-20 °C to +60 °C
Relative humidity	0 to 95 % (non-condensing)

Table 272: Technical data - lithium battery

3. Lifespan calculation - CompactFlash cards 5CFCRD.xxxx-02

SanDisk provides a 6-page "white paper" for calculating the lifespan of CompactFlash cards (see the 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 301: SanDisk white paper - Page 1

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Lit. No. 80-36-00278 10/03 Printed in U.S.A.

Figure 302: SanDisk white paper - Page 2

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 303: SanDisk white paper - Page 3

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 304: SanDisk white paper - Page 4

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:

$$lifetime = 2{,}000{,}000 \times \frac{\left(C_{tzone} - C_{fixed}\right) \times \left(1 - k_r \times \frac{32 - N_{cluster}}{32}\right)}{FS_{typ}} \times \frac{1}{f_w}$$

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 305: SanDisk white paper - Page 5

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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408-542-0500
FAX: 408-542-0503
URL: http://www.sandisk.com

Figure 306: SanDisk white paper - Page 6

4. Lifespan calculation for CompactFlash cards 5CFCRD.xxxx-03

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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Advanced Storage Technology

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ENDURANCE CONSIDERATIONS

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WP401
Revision D
January 2006

SILICONSYSTEMS, INC.

Figure 307: Silicon Systems white paper - page 1 of 9

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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.

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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.

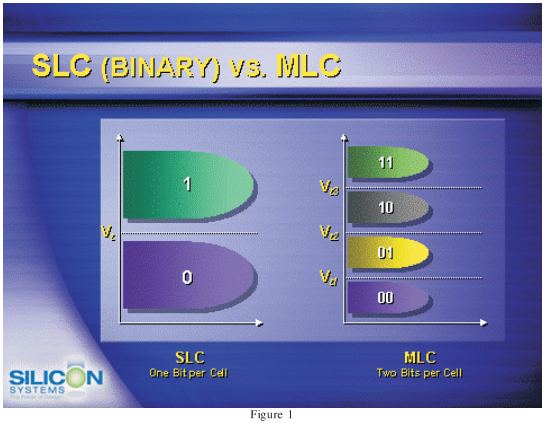

Figure 1

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.

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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.

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Figure 310: 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.

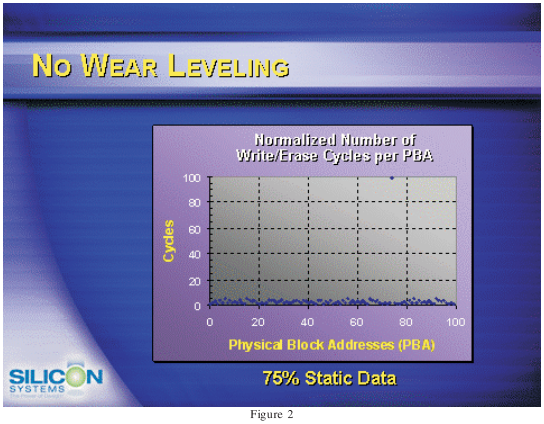

Figure 2

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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.

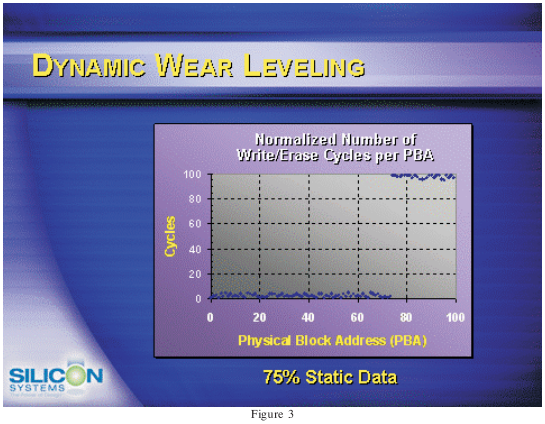

Figure 3

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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.

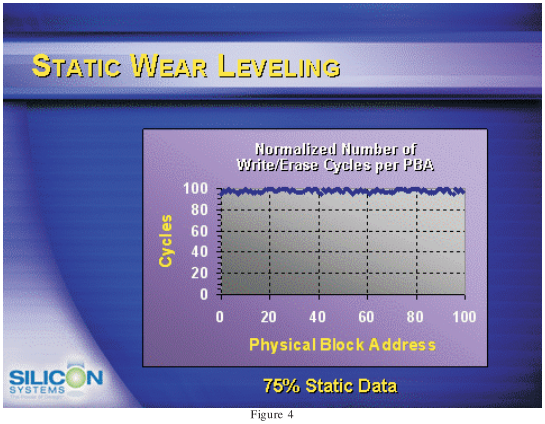

Figure 4

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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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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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5. CAN bus

5.1 General information

CAN stands for Controller Area Network protocol. CAN bus features:

- Fieldbus
- Low costs
- High noise immunity
- Bus structure
- Open system
- Fast data transfer for small data packages (up to 8 bytes)
- Error detection by means of CRC (Cyclic Redundancy Check) and frame testing - Hamming Distance 6
- Predictable transmission time for high-priority messages (real-time behavior)
- Easy to use

B&R and CAN

The controller used by B&R (Intel 82527) meets CAN bus specification 2.0B. Standards CAN and Extended CAN protocols can be used on a bus.

B&R software supports both the standard CAN identifier (11-bit identifier) and the extended CAN (29-bit identifier).

5.2 Bus length

The type of cable used depends largely on the required bus length and the number of nodes. Bus length is mainly determined by the bit rate.

The following table includes values for the maximum bus length, depending on the transfer speed and the Synchronization Jump Width (SJW). Permitted oscillator tolerances are given in the fourth column.

The synchronization jump width (SJW) is the factor that determines the range over which the CPU can be synchronized. The bigger the SJW, the shorter the maximum bus length.

Bit rate [kBit/s]	Synchronization Jump Width (SJW)	Bus length [m]	Permitted oscillator tolerance [%]
500	0	67	0.121
	1	56	0.242
	2	33	0.363
	3	10	0.485

Table 273: CAN bus length

Bit rate [kBit/s]	Synchronization Jump Width (SJW)	Bus length [m]	Permitted oscillator tolerance [%]
250	0 1 2 3	215 192 147 101	0.121 0.242 0.363 0.485
125	0 1 2 3	510 465 374 283	0.121 0.242 0.363 0.485
100	0 1 2 3	658 601 488 374	0.121 0.242 0.363 0.485
50	0 1 2 3	1397 1) 1284 1) 1056 1) 829	0.121 0.242 0.363 0.485
20	0 1 2 3	3613 1) 3329 1) 2761 1) 2193 1)	0.121 0.242 0.363 0.485
10	0 1 2 3	7306 1) 6738 1) 5602 1) 4456 1)	0.121 0.242 0.363 0.485

Table 273: CAN bus length

1) According to CiA (CAN in Automation) the maximum bus length is 1000 m.

Relationship between the number of nodes and the bus length for each cable type:

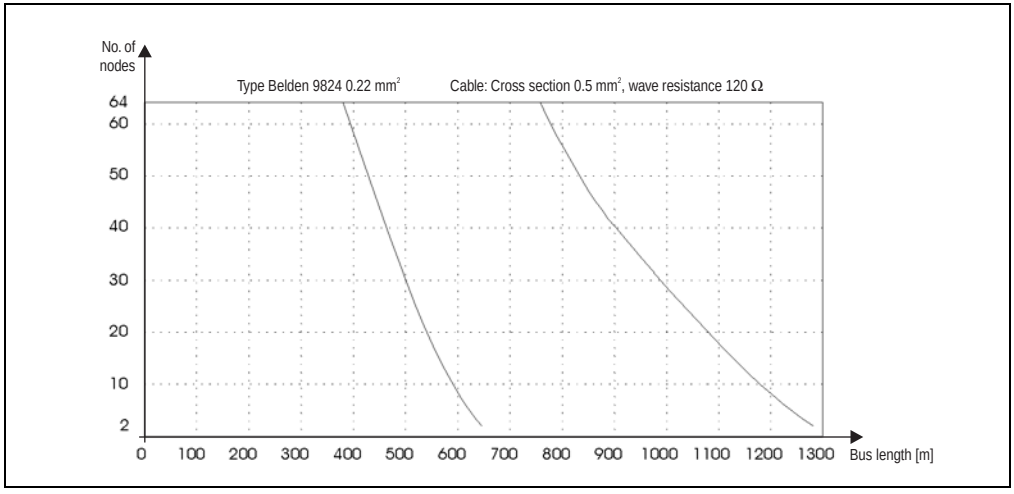


Figure 316: CAN - number of nodes / bus length

5.3 Operation information

CAN interface

Chip used: Intel 82527

Interrupt: IRQ10

I/O address: 384h - 385h

Access to the CAN data area

I/O address	Register	Function
384h	Address register	Defines the register number to access.
385h	Data register	Access to the register defined in the address register.

Table 274: Access to the CAN data area

Clock out data register (bit timing registers)

To set the baud rate, the bit timing registers 0 and 1 must be set to the values below. The PC and PLC columns show which B&R products the baud rate can be set for.

Bit timing register 1	Bit timing register 0	Baud rate	PC	PLC
80h	23h	1000 kBit/s	●	❍

Table 275: CAN clock out data register

Bit timing register 1	Bit timing register 0	Baud rate	PC	PLC
80h	25h	800 kBit/s	●	❍
80h	2Bh	500 kBit/s	●	●
81h	2Bh	250 kBit/s	●	●
83h	2Bh	125 kBit/s	●	●
84h	2Bh	100 kBit/s	●	❍
89h	2Bh	50 kBit/s	●	❍
98h	2Bh	20 kBit/s	●	●
B1h	2Bh	10 kBit/s	●	❍

Table 275: CAN clock out data register

6. Touch screen - Elo Accu Touch

Information:

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

Elo Accu touch screen	Specifications
Manufacturer	Elo
Accuracy For <18" diagonals For >18" diagonals	 typically < than 0.080 inches (2.032 mm) Maximum error in all directions 0,180 inches (4.752 mm) Maximum 1 % of the diagonal for the active area of the touch screens
Reaction time	< 10 ms
Release pressure	< 113 grams
Resolution	4096 x 4096 touch points
Light permeability	Up to 80 % ±5 %
Temperature Operation Storage Transport	 - 10 °C to + 50 °C - 40 °C to + 71 °C - 40 °C to + 71 °C
Relative humidity Operation Storage Transport	 Max. 90 % at max. 35 °C Max. 90 % at max. 35 °C for 240 hours, non-condensing Max. 90 % at max. 35 °C for 240 hours, non-condensing
Waterproofing	IP65
Lifespan	35 million contacts on the same point
Chemical resistance [1)]	Acetone, ammonia-based glass cleaner, normal food and drinks, hexane, methylene chloride, methyl ethyl ketone, mineral spirits, turpentine, isopropyl alcohol
Activation	Finger, pointer, credit card, glove

Table 276: Technical data - Elo Accu touch screen 5-wire

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

6.1 Temperature humidity diagram - operation and storage

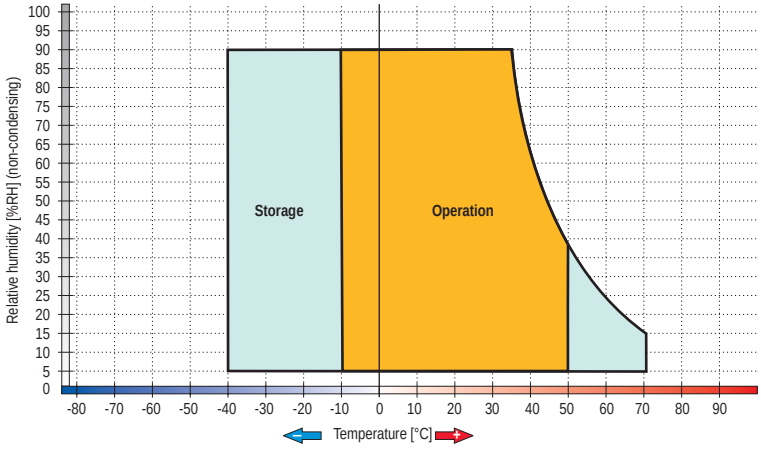


Figure 317: Temperature humidity diagram - Elo Accu touch screen 5-wire

6.2 Cleaning

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

Pin assignments - Elo touch screen	
9-pin DSUB socket	9-pin DSUB plug
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

Table 277: Pin assignments - Elo touch screen

Further information is available from the internet at www.elotouch.com.

7. Membrane (polyester foil)

7.1 Chemical resistance

The membrane used by B&R conforms to DIN 42 115 (section 2). This means it is resistant to exposure to the following chemicals for a 24 hour period with no visible signs of damage:

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

Table 278: Resistance to chemicals

The membrane conforms to DIN 42 115 (section 2) for exposure to glacial acetic acid for < 1 hour without any sign of visible damage.

8. Technical data - hard disks

Caution!

A silicon disk (PC card, CompactFlash) is required when a hard disk is used in environments with vibration and shock. Hard disk drives are normally not designed for use in industrial environments. If excessive vibrations or shock occur during use, B&R is not liable for damage to a properly functioning hard disk. The specified limit values can be read from the corresponding tables.

8.1 Technical data - 2.1 GB 5A5001.03 and 4.3 GB 5A5001.04 hard disks

Model number	5A5001.03	5A5001.04
Manufacturer's product ID	Toshiba MK2110MAT	Toshiba MK4309MAT
Capacity	2.16 GB	4.32 GB
Number of heads	2	4
Number of cylinders (user)	8910	8880
Bytes per sector	512	
Revolution speed	4,200 rpm	
Access time	7.14 ms	
Positioning time (seek, typical values) Minimum (track to track) Average Maximum	 3 ms 13 ms 25 ms	
Starting time (0 rpm to read access)	4 seconds (typically)	
Switch off time	3 seconds (typically)	
Adapter card mounting	Fixed	
Powersave	The hard disk is shut down regardless of the IPC's power management settings if no access is made after 45 minutes.	
Interface	AT (ATA-2/ATA-3/ATA-4)	
Data transfer rate To the medium To / from host	 12.5 to 22.3 MB/s Max. 33.3 MB/s (Ultra-DMA Mode 2)	
Cache	512 KB	
Noise level (idle mode)	Approx. 36 dBA	
Ambient temperature Operation 24-hour operation Storage	 5 - 47 °C 5 - 40 °C -20 to 60 °C	
Relative humidity Operation Storage	 8 - 90 %, non-condensing 5 - 95 %, non-condensing	

Table 279: Technical data - 2.1 and 4.3 GB hard disks

Model number	5A5001.03	5A5001.04
Vibration Operation Storage	 No non-recovered errors at max. 5 - 500 Hz and 0.5 G (4.9 m/s^2 0-peak) No non-recovered errors at max. 10 - 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. 150 G (1,470 m/s^2 0-peak) and 2 ms duration No non-recovered errors at max. 500 G (4,900 m/s^2 0-peak) and 2 ms duration No non-recovered errors at max. 150 G (1,470 m/s^2 0-peak) and 11 ms duration	
MTBF (hours)	300,000	
Lifespan	5 years or 20,000 POH	

Table 279: Technical data - 2.1 and 4.3 GB hard disks (cont.)

8.2 Technical data - 6 GB hard disks 5A5001.05 and 5A5001.08

Model number	5A5001.05	5A5001.08
Manufacturer's product ID	Fujitsu MHK2060AT (customized)	
Capacity	6 GB	
Number of heads	2	
Number of cylinders (user)	14.784	
Number of sectors (user)	11.733.120	
Bytes per sector	512	
Memory types	16/17 MTR	
Track density	24,300 TPI	
Bit density	383 kbpi	
Revolution speed	4,200 rpm ±1%	
Access time (average)	7.14 ms	
Positioning time (seek, typical values) Minimum (track to track) Average Maximum	 1.5 ms 13 ms 23 ms	
Starting time (0 rpm to read access)	5 seconds (typically)	
Switch off time	5 seconds (typically)	
Adapter card mounting	Rubber suspension	Fixed
Powersave	The hard disk is shut down regardless of the IPC's power management settings if no access is made after 30 minutes.	
Interface	ATA-5	
Data transfer rate To the medium To / from host	 12.5 to 22.3 MB/s Max. 66.6 MB/s (Ultra-DMA Mode 4)	
Cache	512 KB	
Noise level (idle mode)	Approx. 30 dBA in a distance of 1 m	
Ambient temperature Operation 24-hour operation Storage	 5 - 47 °C 5 - 40 °C -20 to 60 °C	
Relative humidity Operation Storage	 8 - 90 %, non-condensing 5 - 95 %, non-condensing	
Vibration Operation Storage	 No non-recovered errors at max. 5 - 400 Hz and 1.0 G (9.8 m/s^2 0-peak) No non-recovered errors at max. 5 - 400 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. 150 G (1,470 m/s^2 0-peak) and 2 ms duration No non-recovered errors at max. 700 G (6,860 m/s^2 0-peak) and 2 ms duration No non-recovered errors at max. 120 G (1,176 m/s^2 0-peak) and 11 ms duration	

Table 280: Technical data - 6 GB hard disk

8.3 Technical data - 20 GB hard disk 5A5001.10

Model number	5A5001.10
Manufacturer's product ID	Fujitsu MHR2020AT#SV
Capacity	20 GB
Number of heads	2
Number of cylinders (user)	35,968
Number of sectors (user)	39,070,080
Bytes per sector	512
Memory types	48 / 50 RLL
Track density	24,200 TPI
Bit density	592 kbpi
Revolution speed	4,200 rpm ±1%
Access time (average)	7.14 ms
Positioning time (seek, typical values) Minimum (track to track) Average Maximum	 1.5 ms 12 ms 22 ms
Starting time (0 rpm to read access)	5 seconds (typically)
Adapter card mounting	Fixed
Interface	ATA-5
Data transfer rate To the medium To / from host	 18.4 to 32.5 MB/s Max. 100 MB/s (Ultra-DMA Mode 5)
Cache	2 MB
Noise level (idle mode)	Approx. 24 dBA in a distance of 30 cm
MTBF (hours)	300.000
Lifespan	5 years or 20,000 POH
Ambient temperature Operation 24-hour operation Storage	 5 - 55 °C 5 - 50 °C -40 to +60 °C
Relative humidity Operation Storage	 8 - 90 %, non-condensing 5 - 95 %, non-condensing
Vibration Operation Storage	 No non-recovered errors at max. 5 - 500 Hz and 1.0 G (9.8 m/s^2 0-peak) No non-recovered errors 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. 190 G (1,862 m/s^2 0-peak) and 2 ms duration No non-recovered errors at max. 900 G (8,820 m/s^2 0-peak) and 1 ms duration No non-recovered errors at max. 120 G (1,176 m/s^2 0-peak) and 11 ms duration

Table 281: Technical data - 20 GB hard disk

8.4 Technical data - 20 GB hard disks 5A5001.12 and 5A5001.13

Model number	5A5001.12, 5A5001.13
Manufacturer's product ID	Fujitsu MHS2020AT-ED
Capacity	20 GB
Number of heads	2
Number of cylinders (user)	35,968
Number of sectors (user)	39,070,080
Bytes per sector	512
Memory types	48 / 50 RLL
Track density	24,200 TPI
Bit density	592 kbpi
Revolution speed	4,200 rpm ±1%
Access time (average)	7.14 ms
Positioning time (seek, typical values) Minimum (track to track) Average Maximum	 1.5 ms 12 ms 22 ms
Starting time (0 rpm to read access)	5 seconds (typically)
Adapter card mounting	Fixed
Interface	ATA-5
Data transfer rate To the medium To / from host	 18.4 to 32.5 MB/s Max. 100 MB/s (Ultra-DMA Mode 5)
Cache	2 MB
Noise level (idle mode)	Approx. 24 dBA in a distance of 30 cm
MTBF (hours)	300.000
Lifespan	5 years or 20,000 POH
Ambient temperature Operation 24-hour operation Storage Transport	 5 - 55 °C 5 - 50 °C -40 to +60 °C -40 to +60 °C
Relative humidity Operation Storage Transport	 8 - 90 %, non-condensing 5 - 95 %, non-condensing 5 - 95 %, non-condensing
Vibration Operation Storage Transport	 No non-recovered errors at max. 5 - 500 Hz and 1.0 G (9.8 m/s^2 0-peak) No non-recovered errors at max. 5 - 500 Hz and 5 G (49 m/s^2 0-peak) No non-recovered errors at max. 5 - 500 Hz and 5 G (49 m/s^2 0-peak)
Shock (pulse with a sinus half-wave) Operation Storage / Transport	 No non-recovered errors at max. 190 G (1,862 m/s^2 0-peak) and 2 ms duration No non-recovered errors at max. 900 G (8,820 m/s^2 0-peak) and 1 ms duration No non-recovered errors at max. 120 G (1,176 m/s^2 0-peak) and 11 ms duration

Table 282: Technical data - 20 GB hard disk

8.5 Technical data - 30 GB hard disks 5A5001.15 and 5A5001.16

Model number	5A5001.15, 5A5001.16
Manufacturer's product ID	Fujitsu MHT2030AR
Capacity	30 GB
Number of sectors (user)	58,605,120
Bytes per sector	512
Memory types	48 / 50 RLL
Track density	24,200 TPI
Bit density	592 kbpi
Revolution speed	4,200 rpm ±1%
Access time (average)	7.14 ms
Positioning time (seek, typical values) Minimum (track to track) Average Maximum	 1.5 ms 12 ms 22 ms
Starting time (0 rpm to read access)	5 seconds (typically)
Adapter card mounting	Fixed
Interface	ATA-6
Data transfer rate To / from medium To / from host	 Max. 36.2 MB/s Max. 100 MB/s (Ultra-DMA Mode 5)
Cache	2 MB
Noise level (idle mode)	Approx. 24 dBA in a distance of 30 cm
MTBF (hours)	300,000
Lifespan	5 years or 20,000 POH
Ambient temperature Operation 24-hour operation Storage Transport	 5 - 55 °C 5 - 44 °C -40 to +65 °C -40 to +65 °C
Relative humidity Operation Storage Transport	 8 - 90 %, non-condensing 5 - 95 %, non-condensing 5 - 95 %, non-condensing
Vibration Operation Storage Transport	 No non-recovered errors at max. 5 - 500 Hz and 1.0 G (9.8 m/s^2 0-peak) No non-recovered errors at max. 5 - 500 Hz and 5 G (49 m/s^2 0-peak) No non-recovered errors 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 (2,205 m/s^2 0-peak) and 2 ms duration No non-recovered errors at max. 900 G (8,820 m/s^2 0-peak) and 1 ms duration No non-recovered errors at max. 120 G (1,176 m/s^2 0-peak) and 11 ms duration

Table 283: Technical data - 30 GB hard disk

8.6 Technical data - 30 GB hard disks 5A5001.17 and 5A5001.18

Model number	5A5001.17, 5A5001.18
Manufacturer's product ID	SEAGATE ST930713AM
Capacity	30 GB
Number of sectors (user)	58,605,120
Bytes per sector	512
Revolution speed	5,400 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)
Adapter card mounting	Fixed
Interface	ATA-6
Data transfer rate To the medium To / from host	 Max. 32.1 MB/s Max. 100 MB/s (Ultra-DMA Mode 5)
Cache	8 MB
S.M.A.R.T. support	Yes
MTBF (hours)	550,000 h [1)]
Lifespan	5 years or 20,000 POH
Ambient temperature[2)] Operation (standard / 24-hour) Storage Transport	 -30 to +85 °C -40 to +95 °C -40 to +95 °C
Relative humidity Operation Storage Transport	 5 - 90 %, non-condensing 5 - 95 %, non-condensing 5 - 95 %, non-condensing
Vibration Operation Storage	 No non-recovered errors at max. 10 - 500 Hz and 1.0 G (9.8 m/s^2 0-peak) No non-recovered errors 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. 200 G (1,962 m/s^2 0-peak) and 2 ms duration No non-recovered errors at max. 110 G (1,079 m/s^2 0-peak) and 11 ms duration No non-recovered errors at max. 800 G (7,648 m/s^2 0-peak) and 2 ms duration No non-recovered errors at max. 400 G (3,924 m/s^2 0-peak) and 0.5 ms duration
Altitude Operation Storage	 -300 to 4,419 meters -300 to 12,192 meters

Table 284: Technical data - 30 GB hard disk

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.

8.7 Reliability

8.7.1 Mean Time Between Failure (MTBF)

300,000 hours under the following conditions:

Operating time: max. 250 hours per month or 3,000 hours per year

Working time (read or write accesses): max. 20% of operating time

CSS-hits (parking of the heads): max. 50 per day; a max. 50,000 in total

8.7.2 Data protection

In the event of power loss, all data stored on the hard disk is safe. This does not apply to a block which is just being written to during formatting and reorganization of data blocks, at the time of a power loss.

8.7.3 Error rate

With repeated read attempts and ECC corrections, non-recoverable read errors occur not more than 10 times when reading 1014 bits. Positioning errors which can be corrected within a new attempt, are triggered max. 10 times for every 107 accesses.

8.8 24-hour operation

8.8.1 5A5001.03, 5A5001.04, 5A5001.05, 5A5001.08

When setting environmental conditions for operating the hard disk, a differentiation is made in regard to continuous 24-hour operation. 24-hour operation of the hard disk is possible under the following conditions:

- The maximum ambient temperature range of the controller is 5 - 40 °C.
- 3 year lifespan or max. 15,000 operating hours
- MTBF is 200,000 hours

Information:

24-hour operation capability is a special feature for both the 5A5001.05 and 5A5001.08 hard disk. The hard disk is equipped with a special microcode to fulfill this purpose, which automatically carries out a spin-down/spin-up cycle every 24 hours (motor switched off and switched back on; duration is approx. 7 seconds). During this period of time, the magnet data carrier cannot be written to (write accesses are cached).

8.8.2 5A5001.10

24-hour operation of the hard disk is possible under the following condition:

- The maximum ambient temperature range of the controller is 5 - 50 °C.

No automatic spin-down / spin-up cycle is completed after 24 hours.

8.8.3 5A5001.12, 5A5001.13

24-hour operation of the hard disk is possible under the following condition:

- The maximum ambient temperature range of the controller is 5 - 50 °C.

No automatic spin-down / spin-up cycle is completed after 24 hours.

8.8.4 5A5001.15, 5A5001.16

24-hour operation of the hard disk is possible under the following condition:

- The maximum ambient temperature range of the controller is 5 - 44 °C.

No automatic spin-down / spin-up cycle is completed after 24 hours.

9. Maintenance work

The following section describes service/maintenance work which can be carried out by the user.

Maintenance work for	Maintenance work	Change interval [1)]
Mainboard	Battery	Every 4 years
	Fuse	---
	Processor heat sink with fan	---
	Processor fans	---
Interface board	Battery	Every 4 years

Table 285: Maintenance work

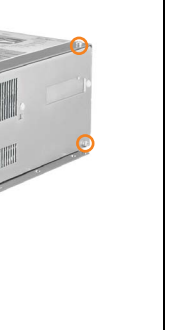
1) The change interval refers to the average life span and operating conditions and are recommended by B&R.

9.1 Removing the housing cover

Danger!

Before removing the housing, the power supply must be disconnected.

The housing cover must be removed in order to change the battery or the fuse. The marked screws must be removed.

IPC5000 / IPC5000C	IPC5000C / IPC5600C
	

9.2 Removing the bus unit

Danger!

Before removing the bus unit, the power supply must be disconnected.

The bus unit must be removed in order to exchange the processor fan or the processor heat sink including fan.

9.2.1 IPC5000C

1) Loosen the marked screws (using a Phillips head screwdriver).

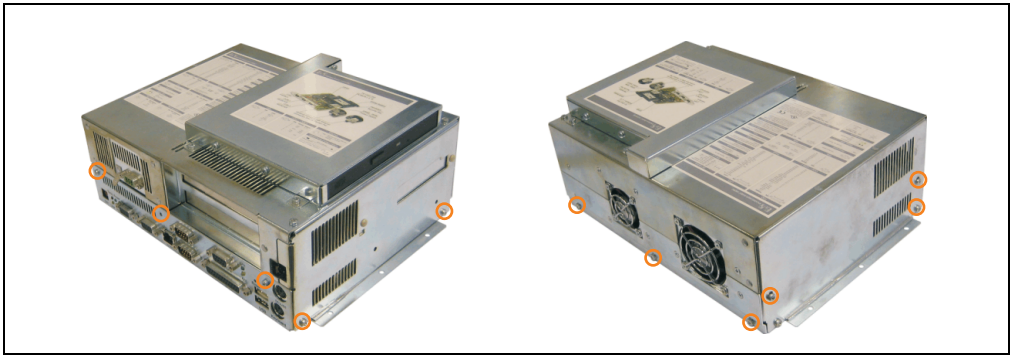


Figure 318: Removing the screws

2) Remove the side cover and take out the hard disk.
   Lift the bus unit to remove it.

Figure 319: Removing the cover and bus unit

3) For re-assembly, follow the steps in reverse order.

9.2.2 IPC5600C

1) Loosen the marked screws (using a Phillips head screwdriver).

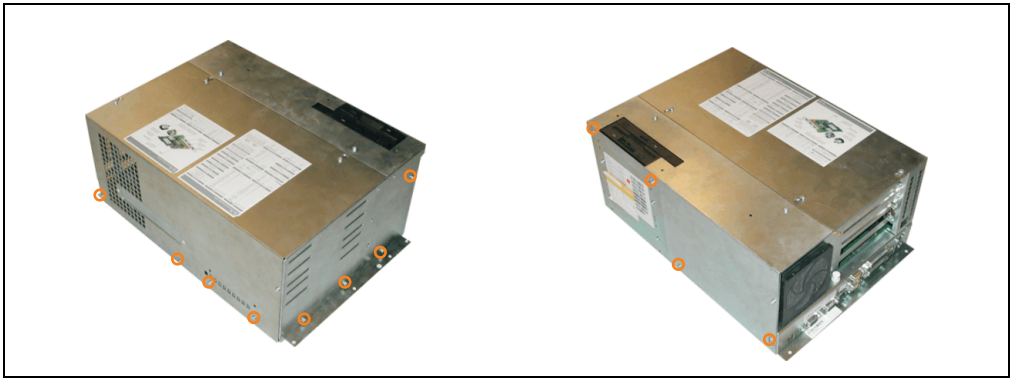


Figure 320: Removing the screws

2) Unlock the safety pins (white pin) and lift the bus unit to remove.

Figure 321: Unlocking the safety pins and removing the bus unit

3) For re-assembly, follow the steps in reverse order.

9.3 Maintenance work on the mainboard

9.3.1 CMOS battery

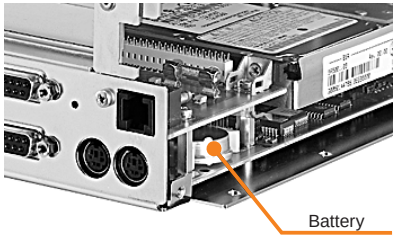
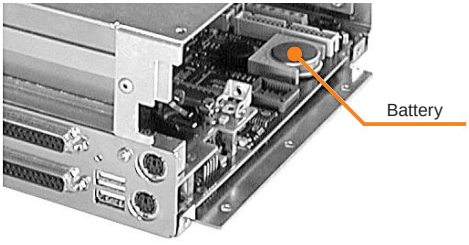
Provit 5000 controllers are equipped with a lithium battery (for technical data see section 2 "Replacement CMOS battery" on page 470).

Danger!

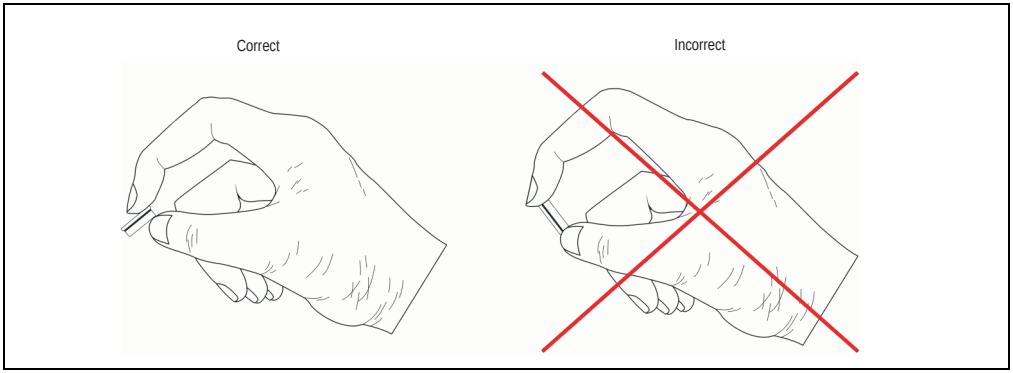
Before changing the battery, the power supply must be disconnected.

Changing the battery

1) Disconnect the power supply.
2) Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
3) Remove housing (see section 9.1 "Removing the housing cover" on page 502).
4) Battery position:

IPC5000 / IPC5600	IPC5000C / IPC5600C
	

5) Remove the battery from the holder by pulling the removal strip (do not use uninsulated tools -> risk of short circuiting). The battery should not be held by its edges. **Insulated** tweezers may also be used for removing the battery.



6) Insert the new battery with correct polarity. The removal strip should be protruding from the battery holder and the "+" side of the battery should be facing downward. In order to be able to
remove the battery again in future, the removal strip must protrude from the upper side of the battery.

7) Now wrap the end of the removal strip over the top of the battery and insert it underneath the battery so that it does not protrude from the battery holder.

8) Put on the housing cover and fasten the screws.

9) Connect the lines to the power supply.

10) Set the date and time.

Information:

Lithium batteries are considered hazardous waste. Used batteries should be disposed of accordingly.

9.3.2 Fuse

Provit 5000 controllers are protected by a fuse from overloading.

Type: Glass tube fuses 5 x 20 mm: T 1A / 250 V

Danger!

Before changing the fuse, the power supply must be disconnected.

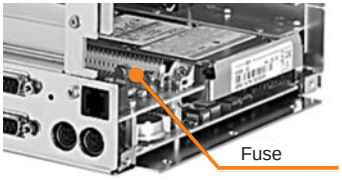
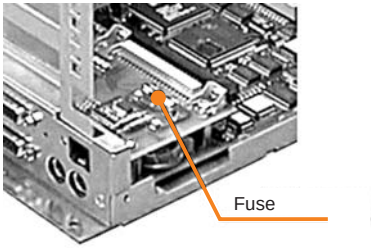
Changing the fuse

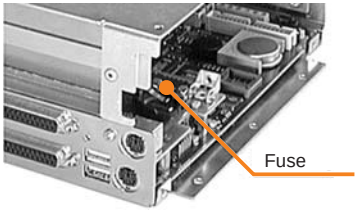
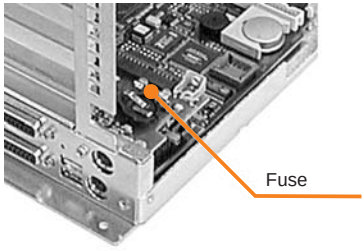
1) Disconnect the power supply.

2) Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.

3) Remove housing (see section 9.1 "Removing the housing cover" on page 502).

4) Fuse position:

IPC5000	IPC5600
	

IPC5000C	IPC5600C
	

5) Remove the old fuse.

6) Place the new fuse in the fuse holder.

7) Put on the housing cover and fasten the screws.

8) Connect the lines to the power supply.

9.4 Maintenance work on the interface board

Danger!

Before beginning maintenance on the interface board the power supply must be disconnected.

9.4.1 SRAM battery (RTC)

The SRAM on the interface board is buffered by a lithium battery (for technical data see section 2 "Replacement CMOS battery" on page 470).

SRAM

The content of the SRAM can be secured with MS-DOS drivers for SRAM and FlashPROM memory cards or standard PCMCIA card drivers available from B&R. These can either be found on the Provit Drivers & Utilities CD-ROM 5S0000.01-090 or downloaded directly from B&R's homepage (www.br-automation.com).

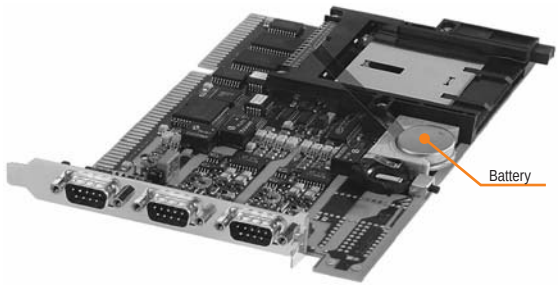
Changing the battery

1) Disconnect the power supply.

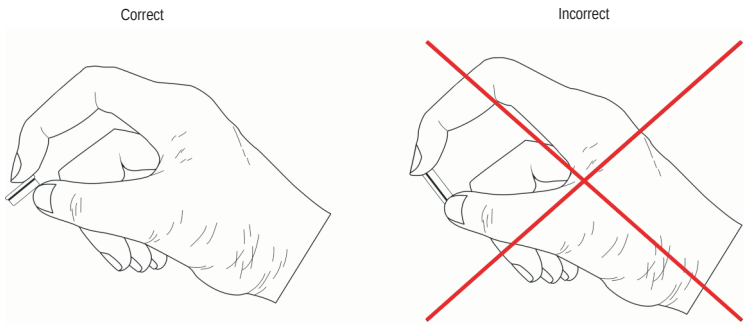
2) Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.

3) Remove housing (see section 9.1 "Removing the housing cover" on page 502).

4) Battery position:



5) Remove the battery from the holder by pulling the removal strip (do not use uninsulated tools -> risk of short circuiting). The battery should not be held by its edges. **Insulated** tweezers may also be used for removing the battery.



6) Insert the new battery with correct polarity. The removal strip should be protruding from the battery holder and the "+" side of the battery should be facing downward. In order to be able to remove the battery again in future, the removal strip must protrude from the upper side of the battery.

7) Now wrap the end of the removal strip over the top of the battery and insert it underneath the battery so that it does not protrude from the battery holder.

8) Put on the housing cover and fasten the screws.

9) Connect the lines to the power supply.

Information:

Lithium batteries are considered hazardous waste. Used batteries should be disposed of accordingly.

9.5 Exchanging the processor heat sink, including fan

Information:

The images used in the following section may differ from the installed components according to the device and revision.

1) Disconnect the power supply.
2) Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
3) Open the device (see section 9.2 "Removing the bus unit" on page 503).
4) Unplug the fan's power supply.

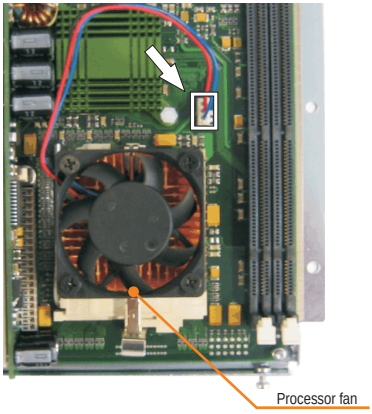


Figure 322: Disconnecting the plug

Information:

The retaining clap may also be glued with hot-melt adhesive. Carefully remove hot-melt adhesive using pliers before opening.

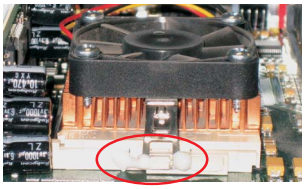


Figure 323: Hot-melt adhesive

5) Press down the spring and unthread the retaining clip. Tip up the heat sink and unthread the second retaining clip. Remove the heat sink.

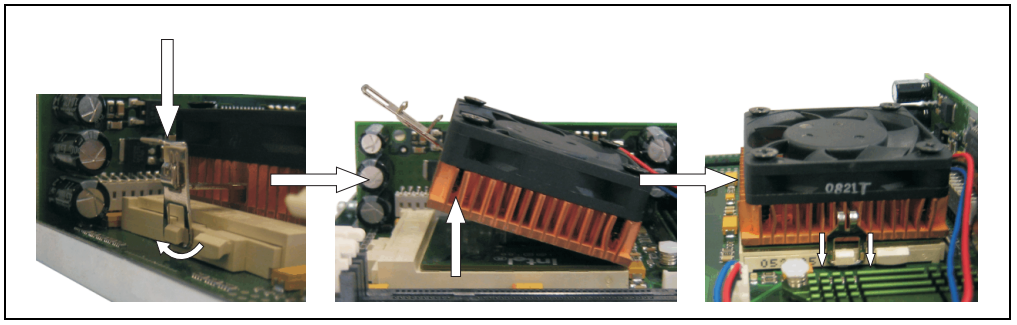


Figure 324: Removing the heat sink

6) Apply heat conductive paste (2g packet) in the middle of the heat sink. Apply just a thin layer on the processor contact surface.

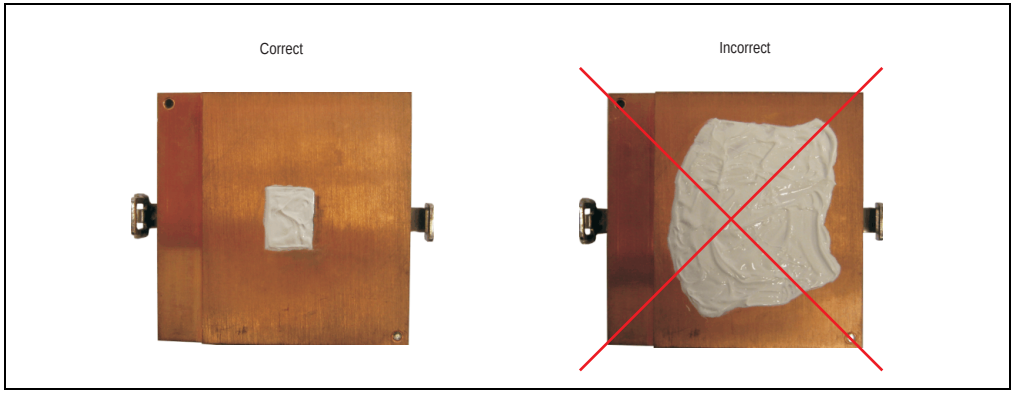


Figure 325: Applying heat conductive paste

7) Attach the new heat sink. Thread the retaining clip and clamp down the heat sink. Press down the spring and thread the second retaining clip.

Information:

Make sure that the heat sink is placed properly to ensure sufficient cooling (see items marked red in image 326 "Attaching the new heat sink").

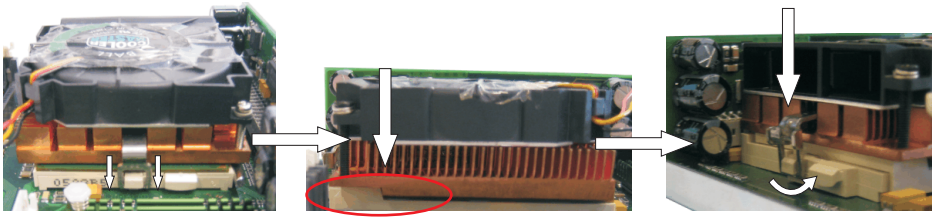


Figure 326: Attaching the new heat sink

8) Connect the fan's power supply.

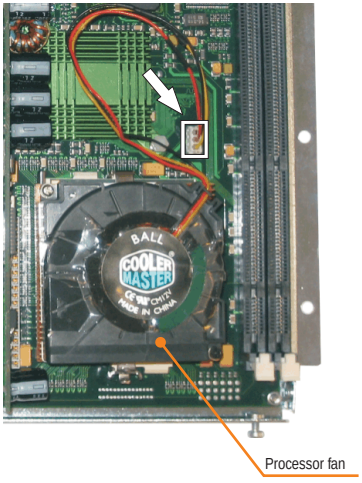


Figure 327: Connecting the plug

9) Close the device (see section 9.2 "Removing the bus unit" on page 503, item 3).

10) Connect the lines to the power supply.

11) There are then two ways to check if the fan is working properly.
- see chapter 6 "Software", "Controller - fan" on page 403;
- see chapter 6 "Software", "Statistic motherboard" on page 358;

9.5.1 Order data

Model number	Short description	Note
5A5011.01	**Replacement part, processor heat sink / fan** Contains one processor heat sink, one processor fan and heat conductive paste (2g packet) for Provit 5000 and Provit 5600.	

Table 286: Processor heat sink model numbers

The replacement part can be used with the following processors:

- 5C5002.11
- 5C5002.12
- 5C5002.13
- 5C5002.14
- 5C5002.15
- 5C5002.16

9.6 Replacing the processor fan

Information:

The images used in the following section may differ from the installed components according to the device and revision.

1) Disconnect the power supply.
2) Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
3) Open the device (see section 9.2 "Removing the bus unit" on page 503).
4) Loosen screws (using a Phillips head screwdriver) and unplug the fan's power supply. Remove fan.

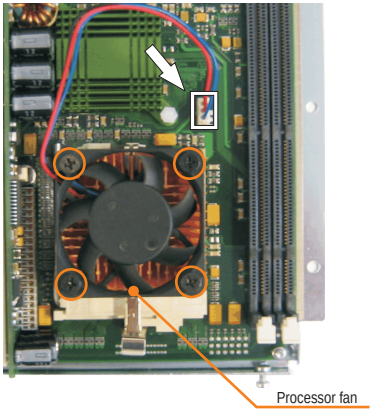


Figure 328: Removing the screws and plug

5) Set the replacement fan on the heat sink at a slight angle (see image). Place the screws in the specified order and (using a Phillips head screwdriver) tighten as shown in the following image (1, 2, 3). Use three of the screws from the previously removed fan. Connect the fan's power supply.

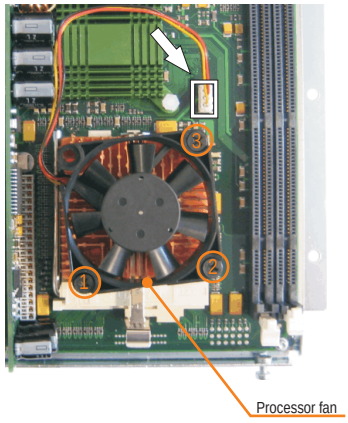


Figure 329: Fastening the fan and connecting the plug

6) Close the device (see section 9.2 "Removing the bus unit" on page 503, item 3).

7) Connect the lines to the power supply.

8) There are then two ways to check if the fan is working properly.
   - see chapter 6 "Software", "Controller - fan" on page 403;
   - see chapter 6 "Software", "Statistic motherboard" on page 358;

9.6.1 Order data

Model number	Short description	Note
5A5011.02	**Replacement part, processor fan** Contains one processor fan for Provit 5000 and Provit 5600.	

Table 287: Processor fan model numbers

The replacement part can be used with the following processors:

- 5C5002.14 Revision E0
- 5C5002.15 Revision lower than D0
- 5C5002.16 Revision lower than D0

10. Glossary

B

BIOS

An abbreviation for "**B**asic **I**nput/**O**utput **S**ystem". On computers conforming to the PC standard, a set of important software routines, which carry out a hardware test after start up, load the operating system and provide routines for data transfer between hardware components. BIOS is stored in ROM, so that the contents are not lost after the PC is switched off. Although BIOS is used to configure a system's performance, the user does not usually come into contact with it.

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.

Bus unit

Provit bus units consist of the housing, interface board slots and the power supply for the system units.

B&R Automation Runtime

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

C

CAN

An abbreviation for "**C**ontroller **A**rea **N**etwork" (serial bus system). CAN was developed by Bosch and was originally designed for use in motor vehicles. CAN is used in numerous applications.

CD-ROM

An abbreviation for »**C**ompact **D**isc **R**ead-**O**nly **M**emory« A data carrier which is distinguished by its high capacity (approx 650 megabytes) and its use of laser optics (instead of magnetic scanning) for reading data. Although CD-ROM drives can read and not write, they still have much in common with CD-R drives and optical WORM drives (which can write to a disk once). They are also similar to optical drives, which can write to a disk several times.

CMOS

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

COM

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

COM1

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

COM2

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

COM3

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

Compact IPC

The B&R Compact IPC is a very cost effective industrial PC with an integrated 10.4" TFT touch display. It is also known as the IPC2002.

Controller

A device component which allows access to other devices on a computer subsystem. A disk controller, for example, allows access to hard disks and disk drives and is responsible both for physical and logic drive access.

CPU

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

CRT

An abbreviation for "**C**athode **R**ay **T**ube". The main component of a television set or a standard computer screen. A cathode ray tube consists of a vacuum tube that contains one or more electron guns. Each electron gun creates a horizontal electron beam that appears on the front of the tube (the screen). The inner surface of the screen is coated with phosphor, which is lit when hit by the electrons. Each of the electron beams move in a line from top to bottom. In order to prevent flickering, the screen content is updated at least 25 times per second. The sharpness of the picture is determined by the number of pixels on the screen.

CTS

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

D

DCD

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

DRAM

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

DSR

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

DTR

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

DVD

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

E

EDO-RAM

An abbreviation for "**E**xtended **D**ata **O**ut **R**andom **A**ccess **M**emory". Dynamic RAM that provides data for the CPU while the next memory access is being initialized. This increases speed.

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.

Ethernet

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

F

FDD

An abbreviation for »**F**loppy **D**isk **D**rive«

FIFO

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

Floppy

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

FPC

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

FPD

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

H

HDD

An abbreviation for »**H**ard **D**isk **D**rive«

I

IDE

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

IPC

An abbreviation for "**I**ndustrial **PC**".

IPC2000

Product from the B&R industrial PC family.

IPC2001

Product from the B&R industrial PC family. A further development on the IPC2000

IPC2002

see Compact IPC

IPC5000

Product from the B&R industrial PC family. Pentium processors (100 MHz - 200 MHz) and AMD K6 (166 MHz or 266 MHz) can be used.

IPC5600

Product from the B&R industrial PC family. Pentium processors (100 MHz - 200 MHz) and AMD K6 (166 MHz or 266 MHz) can be used.

IPC5000C

Product from the B&R industrial PC family. Celeron (300, 366, 433, 566 MHz) and Pentium III (600 and 850 MHz) processors can be used.

IPC5600C

Product from the B&R industrial PC family. Celeron (300, 366, 433, 566 MHz) and Pentium III (600 and 850 MHz) processors can be used.

ISA

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

J

Jumper

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

K

Keypad modules

Keypad modules are divided into two groups: **Standard Keypad Modules** (can be cascaded to a controller) and **Special Keypad Modules** (must be connected by an electrician according to the function e.g. Emergency Stop)

L

LCD

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

LED

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

LPT

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

LS-120

A disk drive which holds up to 120 MB on a 3.5" diskette. LS-120 drives can be also used for other diskette formats.

M

Mkey

An abbreviation for "**M**odule **key**block". A common term given to keys found on Provit display units. They can be freely configured with Mkey utilities.

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 that are not available with a normal PC. The MTC communicates with the PC via the ISA bus (using a couple register).

P

Panel

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

Panelware

A generic term given for standard and special keypad modules offered by B&R.

PC card

A registered trademark from Personnel Computer Memory Card International Association (PCMCIA), which indicates the add-on card's conformity with PCMCIA specifications. A PC Card is approximately the size of a credit card and can be inserted into a PCMCIA slot. Version 1 (introduced in September 1990) specifies a Type I card with a thickness of 3.3 millimeters, which is intended mainly for use as external memory. PCMCIA specification version 2 (introduced in September 1991) defines a 5 mm thickness for a Type II card and a 10.5 mm thickness for a Type III card. Devices such as modems, fax and network cards can be implemented on Type II cards. Type III cards can accommodate devices with greater space requirements, such as wireless communication devices or rotating memory media (e.g. hard drives).

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.

PnP

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

POH

An abbreviation for »**P**ower **O**n **H**ours« see MTBF

POST

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

Power Panel

Power Panel is part of the B&R product family and is a combination of an operator panel and controller in one device. This covers products PP21 and PP41.

PP21

B&R Power Panel type. It is equipped with an RS232 interface, a CAN interface, a PCMCIA slot and integrated digital input/output channels. Additionally, up to six B&R SYSTEM 2003 screw-in modules can be connected. LCD 4 x 20 characters.

PP41

B&R Power Panel type. It is equipped with an RS232 interface, a CAN interface, a PCMCIA slot and integrated digital input/output channels. Additionally, up to six B&R SYSTEM 2003 screw-in modules can be connected. 5.7" QVGA b/w LCD

Provit

An abbreviation for »**PRO**cess**VI**sualization**T**erminal« Product family name for B&R industrial PCs.

Provit 2000

Product family name for B&R industrial PCs. It is divided into the following products: IPC2000, IPC2001, Compact IPC (IPC2002) and the display units belonging to them.

Provit 5000

Product family name for B&R industrial PCs. It is divided into the following products: IPC5000, IPC5600, IPC5000C, IPC5600C and the display units belonging to them.

R

RAM

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

ROM

An abbreviation for »Read-Only Memory« A semiconductor in which programs or data have already been permanently stored during the production process.

RTS

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

RXD

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

S

SDRAM

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

Special keypad modules

The following keypad modules are offered by B&R: Dummy module, emergency stop module, key switch module (made up of 1 key switch and 1 on /off switch) and a start/stop module (made up of 2 buttons and a label field).

SRAM

An abbreviation for "**S**tatic **R**andom **A**ccess **M**emory". A semiconductor memory (RAM) made up of certain logic circuits (flip-flop) that only keeps stored information while powered. In computers, static RAM is generally only used for cache memory.

Standard keypad module

The following keypad modules are offered by B&R: 16 keys with 16 LEDs, 12+4 keys with 4 LEDs, 8 keys with 4 LEDs and a label field and 4 keys with 4 LEDs and 4 label fields.

SVGA

An abbreviation for »**S**uper **V**ideo **G**raphics **A**rray« A graphics standard which was created in 1989 by the Video Electronics Standards Association (VESA) in order to offer the option of high resolution color screens for IBM compatible computers. Although SVGA is a single standard, compatibility problems can occur with the video BIOS.

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

TFT display

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

TXD

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

U

UART

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

UDMA

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

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, printers, modems as well as the mouse and keyboard). This is done by connecting the devices in a row. USB allows devices to be changed when the power supply is switched on (hot plugging) and multi-layered data flow.

UPS

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

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.

X

XGA

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

11. Year 2000 problem / Year 2000 compliance

With Provit 5000 IPCs, only the behavior of the BIOS used can be described, which is 100% year 2000 compatible for all models. An application's behavior is the responsibility of the author of the software. Make sure that the application is evaluating the year correctly, especially when using 2 digit values.

Contact person

If you have any further questions regarding the year 2000 issue, please contact your local B&R sales representative. In Eggelsberg, the International Support department is handling this issue (support@br-automation.com, Fax ext. 26).

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