Automation PC 910

User's Manual

Version: **1.05 (March 2013)**
Model no.: **MAAPC900-ENG**

Chapter 1 • General information

1 Manual history

Version	Date	Change
0.10 preliminary	12-Jun-12	• First version
1.00	26-Nov-12	• Chapter "Software" on page 108 updated • Chapter "Maintenance / Service" on page 224 updated • "Appendix A" on page 248 updated • Section "Organization of safety notices" on page 12 revised, descriptions for cautions and warnings updated • Terminology revised in German edition • Following sections updated in the chapter "Technical data": "Temperature specifications" on page 21, "Block diagrams" on page 30, "Humidity specifications" on page 25 • Following sections updated in the chapter "Installation": "Mounting orientation" on page 104, "Spacing for air circulation" on page 105, "Grounding concept" on page 107 • CPU boards 5PC900.TS77-00, 5PC900.TS77-01, 5PC900.TS77-05, 5PC900.TS77-06, 5PC900.TS77-07 and 5PC900.TS77-08 updated in section "CPU boards QM77" on page 60 and "CPU boards HM76" on page 62 • Updated the following drives: "5AC901.CSSD-00" on page 75, "5AC901.CSSD-01" on page 77, "5AC901.CSSD-02" on page 79, "5AC901.CCFA-00" on page 81 • Updated the following interface options: "5AC901.ICAN-00" on page 87, "5AC901.IHDA-00" on page 89, "5AC901.ISRM-00" on page 91 • Section "Monitor/Panel options" on page 92 updated • Updated the 5AC901.HS01-00 heat sink, see "5AC901.HS0x-00" on page 66 • Section "System components / configuration" on page 18 revised • Bus units 5AC901.BX01-01 and 5AC901.BX02-01 updated, see "Bus units" on page 65 • "CFast cards" on page 193 updated • USB media drive updated, see "5MD900.USB2-02" on page 198
1.05	3/19/2013	• Following sections updated in Chapter 2 "Technical data": "Monitor/Panel option" on page 45, "Slide-in slot 1" on page 49, "Uninterruptible power supply (UPS)" on page 96 • Updated the following drives: "5AC901.CHDD-01" on page 71, "5MMHDD.0500-00" on page 73, "5AC901.CHDD-99" on page 82 • Updated the service life of the battery, see "Battery" on page 48 • Sections "BIOS options" on page 108 and "Upgrade information" on page 170 updated in Chapter 4 "Software" • Sections "Changing the battery" on page 224, "Installing PCI / PCIe cards" on page 238 and "Connecting an external device to the mainboard" on page 245 updated in Chapter 6 "Maintenance / Service" • "Table 4: Ambient temperature with a fan kit" on page 22 and "Table 5: Ambient temperature without a fan kit" on page 23 revised • "Internal supply cable" on page 223 updated

2 Safety notices

2.1 Intended use

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

2.2 Protection against electrostatic discharge

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

2.2.1 Packaging

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

2.2.2 Guidelines for proper ESDhandling

Electrical components with a housing

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

Electrical components without a housing

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

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

Individual components

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

2.3 Policies and procedures

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

When using programmable logic controllers or operating/monitoring devices as control systems together with a Soft PLC (e.g. B&R Automation Runtime or comparable product) or Slot PLC (e.g. B&R LS251 or comparable product), 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 the installation, commissioning and servicing of devices are only permitted to be carried out by qualified personnel. Qualified personnel are those familiar with the transport, mounting, installation, commissioning and operation of of devices who also have the appropriate qualifications (e.g. IEC 60364). National accident prevention regulations must be observed.
The safety notices, connection descriptions (type plate and documentation) and limit values listed in the technical data are to be read carefully before installation and commissioning and must be observed.

2.4 Transport and storage

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

2.5 Installation

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

2.6 Operation

2.6.1 Protection against touching electrical parts

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

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

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

2.6.2 Environmental conditions - Dust, humidity, aggressive gases

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

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

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

2.6.3 Viruses and dangerous programs

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

2.7 Environmentally friendly disposal

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

2.7.1 Separation of materials

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

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

Table 1: Environmentally friendly separation of materials

Disposal must comply with applicable legal regulations.

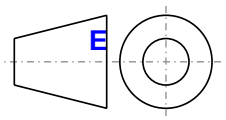
3 Organization of safety notices

Safety notices in this manual are organized as follows:

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

Table 2: Description of the safety notices used in this documentation

4 Guidelines



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

All dimensions are specified in mm.

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

Table 3: Range of nominal sizes

5 Overview

Product ID	Short description	on page
	Batteries	
0AC201.91	Lithium batteries 4 pieces, 3 V / 950 mAh button cell Hereby we declare that the Lithium cells contained in this shipment qualify as „partly regulated“. Handle with care. If the package is damaged, inspect cells, repack intact cells and protect cells against short circuits. For emergency information, call RENATA SA at + 41 61 319 28 27	192
4A0006.00-000	Lithium battery, 3 V / 950 mAh, button cell	192
	Bus units	
5AC901.BX01-00	APC910 bus, 1 PCI	65
5AC901.BX01-01	APC910 bus, 1 PCI Express (x4)	65
5AC901.BX02-00	APC910 bus, 2 PCI	65
5AC901.BX02-01	APC910 bus, 1 PCI, 1 PCI Express (x8)	65
	CFast cards	
5CFAST.016G-00	CFast 16 GB	193
5CFAST.032G-00	CFast 32 GB	193
5CFAST.2048-00	CFast 2 GB	193
5CFAST.4096-00	CFast 4 GB	193
5CFAST.8192-00	CFast 8 GB	193
	CPU boards	
5PC900.TS77-00	Intel Core i7 3615QE CPU board, 2.3 GHz, quad-core, 6 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	60
5PC900.TS77-01	Intel Core i7 3612QE CPU board, 2.1 GHz, quad-core, 6 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	60
5PC900.TS77-02	Intel Core i7 3555LE CPU board, 2.5 GHz, dual-core, 4 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	60
5PC900.TS77-03	Intel Core i7 3517UE CPU board, 1.7 GHz, dual-core, 4 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	60
5PC900.TS77-04	Intel Core i5 3610ME CPU board, 2.7 GHz, dual-core, 3 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	60
5PC900.TS77-05	Intel Core i3 3120ME CPU board, 2.4 GHz, dual-core, 3 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	60
5PC900.TS77-06	Intel Core i3 3217UE CPU board, 1.6 GHz, dual-core, 3 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (total memory max. 16 GB)	60
5PC900.TS77-07	Intel Celeron M 847E CPU board, 1.1 GHz, dual-core, 1 MB L2 cache; HM76 chipset; 2 sockets for SO-DIMM DDR3 modules (total memory max. 16 GB)	62
5PC900.TS77-08	Intel Celeron M 827E CPU board, 1.4 GHz, single-core, 1.5 MB L2 cache; HM76 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	62
	DVI cable	
5CADVI.0018-00	DVI-D cable, 1.8 m.	204
5CADVI.0050-00	DVI-D cable, 5 m.	204
5CADVI.0100-00	DVI-D cable, 10 m.	204
	Drives	
5AC901.CCFA-00	CFast adapter to operate a CFast card in a slide-in compact slot	81
5AC901.CHDD-00	250 GB SATA hard disk, Slide-in compact, 24/7 hard disk Remark: Please see manual for proper use of the hard disk.	69
5AC901.CHDD-01	500 GB SATA hard disk, Slide-in compact, 24/7 hard disk Remark: Please see manual for proper use of the hard disk.	71
5AC901.CHDD-99	Slide-in compact Kit	82
5AC901.CSSD-00	32 GB SATA SSD (SLC), Slide-in compact	75
5AC901.CSSD-01	60 GB SATA SSD (MLC), Slide-in compact	77
5AC901.CSSD-02	180 GB SATA SSD (MLC), Slide-in compact	79
5MMHDD.0500-00	500 GB SATA Hard Disk Spare part for 5AC801.HDDI-04, 5AC901.CHDD-01 and 5ACPCI.RAIC-06; Remark: Please see manual for proper use of the hard disk.	73
	Fan kits	
5AC901.FA01-00	APC910 fan kit for system unit 5PC910.SX01-00	67
5AC901.FA02-00	APC910 fan kit for system unit 5PC910.SX02-00	68
	Front cover	
5AC901.FF01-00	APC910 front cover, 1 slot, orange	102
5AC901.FF02-00	APC910 front cover, 2 slots, orange	102
	Heat sink	
5AC901.HS00-00	APC910 heat sink, active	66
5AC901.HS01-00	APC910 heat sink, passive	66
	Interface options	
5AC901.I485-00	RS232/422/485 interface option; for APC910	83
5AC901.ICAN-00	CAN interface option; for APC910	87
5AC901.IHDA-00	Audio interface option, connection for 1x MIC, 1x Line IN, 1x Line OUT; for APC910	89
5AC901.ISRM-00	SRAM interface option, 2 MB; for APC910	91
	Main memory	
5MMDDR.1024-03	SO-DIMM DDR3, 1024 MB	64
5MMDDR.2048-03	SO-DIMM DDR3, 2048 MB	64
5MMDDR.4096-03	SO-DIMM DDR3, 4096 MB	64
5MMDDR.8192-03	SO-DIMM DDR3, 8192 MB	64
	Monitor / Panel options	
5AC901.LDPO-00	DisplayPort transmitter	92
5AC901.LSDL-00	Smart Display Link/DVI transmitter	94

Product ID	Short description	on page
	RS232 cable	
9A0014.02	RS232 extension cable for remote operating of a display unit with touch screen, 1.8 m.	221
9A0014.05	RS232 extension cable for remote operating of a display unit with touch screen, 5 m.	221
9A0014.10	RS232 extension cable for remote operating of a display unit with touch screen, 10 m.	221
	SDL cable - 45° connector	
5CASDL.0018-01	SDL cable; 45° connector, 1.8 m.	210
5CASDL.0050-01	SDL cable; 45° connector, 5 m.	210
5CASDL.0100-01	SDL cable; 45° connector, 10 m.	210
5CASDL.0150-01	SDL cable; 45° connector, 15 m.	210
	SDL cables	
5CASDL.0018-00	SDL cable, 1.8 m.	207
5CASDL.0050-00	SDL cable, 5 m.	207
5CASDL.0100-00	SDL cable, 10 m.	207
5CASDL.0150-00	SDL cable, 15 m.	207
5CASDL.0200-00	SDL cable, 20 m.	207
5CASDL.0250-00	SDL cable, 25 m.	207
5CASDL.0300-00	SDL cable, 30 m.	207
	SDL flex cable	
5CASDL.0018-03	SDL Cable flex, 1.8 m.	213
5CASDL.0050-03	SDL cable flex, 5 m.	213
5CASDL.0100-03	SDL cable flex, 10 m.	213
5CASDL.0150-03	SDL cable flex, 15 m.	213
5CASDL.0200-03	SDL cable flex, 20 m.	213
5CASDL.0250-03	SDL cable flex, 25 m.	213
5CASDL.0300-03	SDL cable flex, 30 m.	213
5CASDL.0300-13	SDL cable flex with extender, 30 m.	216
5CASDL.0400-13	SDL cable flex with extender, 40 m.	216
5CASDL.0430-13	SDL Cable flex with extender, 43 m.	216
	System units	
5PC910.SX01-00	APC910 system unit, 1 slot (PCI Express / PCI, depending on the bus), 1 slide-in compact slot; Smart Display Link/DVI/monitor, DisplayPort, 1x RS232, 5x USB, 2x ETH 10/100/1000, 1 CFast slot, 24 VDC	50
5PC910.SX02-00	APC910 system unit, 2 slots (PCI Express / PCI, depending on the bus), 1 slot for monitor/panel option, 1 slide-in compact and 1 slide-in slot; Smart Display Link/DVI/Monitor, DisplayPort, 1x RS232, 5x USB, 2x ETH 10/100/1000, 1 CFast slot, 24 VDC	55
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm², protected against vibration by the screw flange	191
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm², protected against vibration by the screw flange	191
	USB accessories	
5A5003.03	Front cover, For Remote CD-ROM Drive 5A5003.02 and USB 2.0 drive combination 5MD900.USB2-00, 5MD900.USB2-01 and 5MD900.USB2-02.	202
5MD900.USB2-02	USB 2.0 Drives DVD-R/RW DVD+R/RW, CompactFlash slot (type II), USB connector (type A on front side, type B on back side); 24 VDC; (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	198
5MMUSB.2048-01	USB 2.0 flash drive 2048 MB B&R	196
	USB cable	
5CAUSB.0018-00	USB 2.0 connecting cable type A - type B, 1.8 m.	220
5CAUSB.0050-00	USB 2.0 connecting cable type A - type B, 5 m.	220
	Undefined	
5CAMSC.0001-00	APC620 internal power supply cable - Customized -	223
	Uninterruptible power supplies	
5AC901.BUPS-00	Battery unit 4,5 Ah; for APC910 UPS.	98
5AC901.IUPS-00	UPS interface option; for APC910 and 4.5 Ah battery.	97
5CAUPS.0005-01	UPS cable 0.5 m; for UPS 5AC901.IUPS-00.	101
5CAUPS.0030-01	UPS cable 3 m; for UPS 5AC901.IUPS-00.	101
	Windows 7 Professional/Ultimate	
5SWWI7.1100-ENG	Microsoft OEM Windows 7 Professional 32-bit, Service Pack 1, DVD, English. Only available with a new device.	177
5SWWI7.1100-GER	Microsoft OEM Windows 7 Professional 32-bit, Service Pack 1, DVD, German. Only available with a new device.	177
5SWWI7.1200-ENG	Microsoft OEM Windows 7 Professional 64-bit, Service Pack 1, DVD, English. Only available with a new device.	177
5SWWI7.1200-GER	Microsoft OEM Windows 7 Professional 64-bit, Service Pack 1, DVD, German. Only available with a new device.	177
5SWWI7.1300-MUL	Microsoft OEM Windows 7 Ultimate 32-bit, Service Pack 1, DVD, multilanguage. Only available with a new device.	177
5SWWI7.1400-MUL	Microsoft OEM Windows 7 Ultimate 64-bit, Service Pack 1, DVD, multilanguage. Only available with a new device.	177
	Windows Embedded Standard 2009	
5SWWXP.0740-ENG	Microsoft OEM Windows Embedded Standard 2009, English; for APC910 with QM77/HM76 chipset; please order CFast separately (minimum 2 GB).	183
	Windows Embedded Standard 7	
5SWWI7.1540-ENG	Microsoft OEM Windows Embedded Standard 7 32-bit, Service Pack 1, English; for APC910 with QM77/HM76 chipset; please order CFast separately (minimum 16 GB).	179
5SWWI7.1640-ENG	Microsoft OEM Windows Embedded Standard 7 64-bit, Service Pack 1, English; for APC910 with QM77/HM76 chipset; please order CFast separately (minimum 16 GB).	179
5SWWI7.1740-MUL	Microsoft OEM Windows Embedded Standard 7 Premium 32-bit, Service Pack 1, multilanguage; for APC910 with QM77/HM76 chipset; please order CFast separately (minimum 16 GB without language packages).	179
5SWWI7.1840-MUL	Microsoft OEM Windows Embedded Standard 7 Premium 64-bit, Service Pack 1, multilanguage; for APC910 with QM77/HM76 chipset; please order CFast separately (minimum 16 GB).	179
	Windows XP Professional	
5SWWXP.0600-ENG	Microsoft OEM Windows XP Professional Service Pack 3, CD, English. Only available with a B&R device.	181

Product ID	Short description	on page
5SWWXP.0600-GER	Microsoft OEM Windows XP Professional Service Pack 3, CD, German. Only available with a device.	181
5SWWXP.0600-MUL	Microsoft OEM Windows XP Professional Service Pack 3, CD, multilanguage. Only available with a B&R device.	181

Chapter 2 • Technical data

1 Introduction

1.1 Intel® Core™ i-series processors for the most demanding tasks

The APC910 is based on the latest Intel® Core™ i-series technology and offers maximum performance for demanding tasks such as those that involve vision systems. The proven standard design of the Automation PCs has been retained while adding many new details to keep up with the advancements being made on the PC market. Robust design for use in industrial applications around the world and long-term series availability continue to define the Automation PC series, a trend now being continued by the APC910.

1.2 Maximum performance

The APC910 has the latest Intel® Core™ i-series technology at its heart. By further reducing the structural size of the chip and implementing a new microprocessor architecture that now integrates graphics directly into the CPU, Intel® has been able to improve performance by leaps and bounds over their first Core™ i-series generation and Core™2 Duo systems. The rest of the PC infrastructure has also been streamlined for maximum computing performance and optimal data throughput. The APC910 now has a serial ATA-based CFast card to replace the previously used CompactFlash. And just like the APC810, hard disks and solid state drives are connected to the PC system via the high-speed SATA interface. These devices are also well-equipped when it comes to interface options. Two gigabit Ethernet ports, USB ports and onboard as well as modular serial interfaces round off the extensive capabilities of the APC910.

1.3 Availability and reliability for many productive years

Automation PCs are built for continuous operation over a period of many years. This starts with the robust welded housing that shields the electronics from the external environment, easily withstanding rough conditions. The industrial-grade paint can endure even the most aggressive environments so that even a well-seasoned Automation PC might be mistaken for new. Components have also been selected to provide many years of reliable service. These components have been designed specifically for use in industrial environments, can withstand high ambient temperatures and have guaranteed long-term availability. In addition, Automation PC generations are produced in excess of 10 years – quite the exception in the otherwise fast-paced PC sector and a significant advantage for the user. The third generation of Automation PCs, represented by the APC910, proves once again that innovation

and product continuity are not incompatible goals. From the ease of connecting cables to the interfaces on top of the device to the location of mounting holes, many details have stayed the same. For the many thousands of panels in the field – whether customized or in the standard design – there is always the proven SDL interface for easily connecting the PC to its display.

1.4 Features

- Latest processor technology - Intel® Core™ i-series (Generation 3 - Ivy Bridge)
- Up to 16 GB main memory (dual-channel memory support)
- 1 CFast slot[1)]
- 1 or 2 card slots (for PCI / PCI Express (PCIe) cards)
- SATA drives (slide-in and slide-in compact slots)
- 4x USB 3.0, 1x USB 2.0
- 2x Ethernet 10/100/1000 Mbit interfaces
- 1x RS232 interface, modem compatible
- Connections for a wide range of display devices to the monitor/panel and DisplayPort interfaces
- 24 VDC supply voltage
- Fan-free operation[2)]
- BIOS (AMI)
- Real-time clock (RTC, battery-backed)
- Wide range of interface options
- Wide range of monitor/panel options

1) A CFast adapter allows multiple CFast cards to be used. This depends on the respective system unit.
2) Depends on the device configuration and ambient temperature.

1.5 System components / configuration

The APC910 system can be assembled to meet individual requirements and operating conditions. The following components are absolutely essential for operation:

- System unit
- Bus unit
- CPU board
- Heat sink
- Fan kit[3)]
- Main memory
- Drive (mass storage device such as CFast card or hard disk) for the operating system
- Software

1.5.1 Configuration - Base system

System units can be operated with or without a fan kit. This choice plays a role in determining the various types of heat sink and main memory to be used.

Using a fan kit allows for operation at higher ambient temperatures. More information can be found under "Maximum ambient temperature" on page 22.

Configuration with a fan kit

Base system configuration with a fan kit (active)		
System unit	Select one	
A system unit consists of a housing and mainboard.	 5PC910.SX01-00	 5PC910.SX02-00
Bus unit	Select one	
	5AC901.BX01-00 - 1 PCI 5AC901.BX01-01 - 1 PCIe	5AC901.BX02-00 - 2 PCI 5AC901.BX02-01 - 1 PCI, 1 PCIe
CPU board / Heat sink / Fan kit / Main memory		
CPU board	Select one	
	**QM77 CPU boards** 5PC900.TS77-00 5PC900.TS77-04 5PC900.TS77-01 5PC900.TS77-05 5PC900.TS77-02 5PC900.TS77-06 5PC900.TS77-03	**HM76 CPU boards** 5PC900.TS77-07 5PC900.TS77-08
Heat sink	Select one	
	5AC901.HS00-00	
Fan kits	Select one	
	5AC901.FA01-00	5AC901.FA02-00
Main memory	Select one or two	
	5MMDDR.1024-03 5MMDDR.4096-03 5MMDDR.2048-03 5MMDDR.8192-03	

Figure 1: Base system configuration with a fan kit

3) A fan kit is only mandatory when using the 5AC901.HS00-00 heat sink. If a fan kit is not used, it is important to consider the more limited ambient temperature specifications (see "Maximum ambient temperature" on page 22).

Configuration without a fan kit

Base system configuration without a fan kit (passive)		
System unit	Select one	
A system unit consists of a housing and mainboard.	 5PC910.SX01-00	 5PC910.SX02-00
Bus unit	Select one	
	5AC901.BX01-00 - 1 PCI 5AC901.BX01-01 - 1 PCIe	5AC901.BX02-00 - 2 PCI 5AC901.BX02-01 - 1 PCI, 1 PCIe
CPU board / Heat sink / Main memory		
CPU board	Select one	
	**QM77 CPU boards** 5PC900.TS77-01 5PC900.TS77-04 5PC900.TS77-02 5PC900.TS77-05 5PC900.TS77-03 5PC900.TS77-06	**HM76 CPU boards** 5PC900.TS77-07 5PC900.TS77-08
Heat sink	Select one	
	5AC901.HS01-00	
Main memory	Select one or two	
	5MMDDR.1024-03 5MMDDR.4096-03 5MMDDR.2048-03 5MMDDR.8192-03	

Figure 2: Base system configuration without a fan kit

1.5.2 Accessory and software configuration

Accessory and software configuration		
System unit	Select one	
A system unit consists of a housing and mainboard.	 5PC910.SX01-00	 5PC910.SX02-00
Front cover	Select one	
	5AC901.FF01-00	5AC901.FF02-00
Slide-in compact drives	Select one	
	5AC901.CHDD-01 5MMHDD.0500-00 5AC901.CSSD-00	5AC901.CSSD-01 5AC901.CSSD-02 5AC901.CCFA-00
IF options	Select max. 2 [1]	
	5AC901.I485-00 5AC901.ICAN-00	5AC901.IHDA-00 5AC901.ISRM-00
Monitor/Panel options		Select one
		5AC901.LDPO-00 5AC901.LSDL-00
UPS	Select 1 each	
	**UPS module** 5AC901.IUPS-00 [2] + **Battery unit** 5AC901.BUPS-00 + **UPS cable** 5CAUPS.0005-01 5CAUPS.0030-01	
CFast cards	Select one	
	5CFAST.2048-00 5CFAST.4096-00 5CFAST.8192-00	5CFAST.016G-00 5CFAST.032G-00
USB accessories	Select one	
	5MMUSB.2048-01	
Terminal blocks	Select one	
	**Power connectors** 0TB103.9 0TB103.91	
Operating systems	Select one	
Windows 7 Windows Embedded Standard 2009 Windows Embedded Standard 7 Automation Runtime	**Windows 7** 5SWWI7.1100-ENG 5SWWI7.1100-GER 5SWWI7.1300-MUL 5SWWI7.1200-ENG 5SWWI7.1200-GER 5SWWI7.1400-MUL **Windows Embedded Standard 2009** 5SWWXP.0740-ENG	**Windows Embedded Standard 7** 5SWWI7.1540-ENG 5SWWI7.1640-ENG 5SWWI7.1740-MUL 5SWWI7.1840-MUL	**Automation Runtime** 1A4600.10-5 1A4601.06-5

1) Certain limitations must be taken into account when using IF options. For more information, please refer to the section "Device interfaces" in Chapter 2 "Technical data".
2) The UPS module can only be operated in the IF option 1 slot.

Figure 3: Accessory and software configuration

2 Fully assembled device

2.1 Temperature specifications

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

Information:

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

Information regarding worst-case conditions

- Thermal Analysis Tool (TAT V4.3) from Intel for simulating a 100% processor load
- BurnInTest tool (BurnInTest V4.0 Pro from Passmark Software) for simulating a 100% load on the interface via loop back adapters (serial interfaces, slide-in drives, USB ports, audio outputs)
- Maximum system expansion and power consumption

2.1.1 Maximum ambient temperature

Operation with a fan kit

Information:

The 5AC901.HS00-00 heat sink must be used when operating the Automation PC 910 with a fan kit.

	All temperature values are in degrees Celsius (°C) at 500 meters above sea level. The maximum ambient temperature is typically derated by 1°C per 1000 meters (starting at 500 meters above sea level).	Operation with a fan kit and 5AC901.HS00-00 heat sink									Temperature limits	Location of sensor(s)
		i7 3615QE 5PC900.TS77-00	i7 3612QE 5PC900.TS77-01	i7 3555LE 5PC900.TS77-02	i7 3517UE 5PC900.TS77-03	i5 3610ME 5PC900.TS77-04	i3 3120ME 5PC900.TS77-05	i3 3217UE 5PC900.TS77-06	CM 847E 5PC900.TS77-07	CM 827E 5PC900.TS77-08		
	Maximum ambient temperature	**55**	**55**	**55**	**55**	**55**	**55**	**55**	**55**	**55**		
	What else can also be operated at the max. ambient temperature, or are there limits?											
System units	5PC910.SX01-00	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	Power supply
	5PC910.SX02-00	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	
Main memory	5MMDDR.1024-03	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-
	5MMDDR.2048-03	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	
	5MMDDR.4096-03	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	
	5MMDDR.8192-03	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	
Slide-in compact drive	5AC901.CHDD-00	50	50	50	50	50	50	50	50	50	-	Slide-in compact drive
	5AC901.CHDD-01	50	50	50	50	50	50	50	50	50	-	
	5AC901.CSSD-00	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	
	5AC901.CSSD-01	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	
	5AC901.CSSD-02	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	
	5AC901.CCFA-00	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	
Interface options	5AC901.I485-00	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	Interface option
	5AC901.ICAN-00	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	
	5AC901.IHDA-00	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	
	5AC901.ISRM-00	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	
	5AC901.IUPS-00	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	
Monitor/Panel options	5AC901.LDPO-00	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	Monitor/Panel option
	5AC901.LSDL-00	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	
CFast cards	5CFAST.2048-00	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-
	5CFAST.4096-00	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	
	5CFAST.8192-00	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	
	5CFAST.016G-00	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	
	5CFAST.032G-00	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	

Table 4: Ambient temperature with a fan kit

Operation without a fan kit

Information:

The 5PC900.TS77-00 CPU board cannot be operated without a fan kit.

The 5AC901.HS01-00 heat sink must be used when operating the Automation PC 910 without a fan kit.

	All temperature values are in degrees Celsius (°C) at 500 meters above sea level. The maximum ambient temperature is typically derated by 1°C per 1000 meters (starting at 500 meters above sea level).	Operation without a fan kit and with 5AC901.HS01-00 heat sink									Temperature limits	Location of sensor(s)
		i7 3615QE 5PC900.TS77-00	i7 3612QE 5PC900.TS77-01	i7 3555LE 5PC900.TS77-02	i7 3517UE 5PC900.TS77-03	i5 3610ME 5PC900.TS77-04	i3 3120ME 5PC900.TS77-05	i3 3217UE 5PC900.TS77-06	CM 847E 5PC900.TS77-07	CM 827E 5PC900.TS77-08		
	Maximum ambient temperature	**-**	**35**	**40**	**50**	**35**	**35**	**50**	**50**	**50**		
	What else can also be operated at the max. ambient temperature, or are there limits?											
System units	5PC910.SX01-00	-	✓	✓	✓	✓	✓	✓	✓	✓	-	Power supply
	5PC910.SX02-00	-	✓	✓	✓	✓	✓	✓	✓	✓	-	
Main memory	5MMDDR.1024-03	-	✓	✓	✓	✓	✓	✓	✓	✓	-	-
	5MMDDR.2048-03	-	✓	✓	✓	✓	✓	✓	✓	✓	-	
	5MMDDR.4096-03	-	✓	✓	✓	✓	✓	✓	✓	✓	-	
	5MMDDR.8192-03	-	✓	✓	✓	✓	✓	✓	✓	✓	-	
Slide-in compact drive	5AC901.CHDD-00	-	✓	✓	45	✓	✓	45	45	45	-	Slide-in compact drive
	5AC901.CHDD-01	-	✓	✓	45	✓	✓	45	45	45	-	
	5AC901.CSSD-00	-	✓	✓	✓	✓	✓	✓	✓	✓	-	
	5AC901.CSSD-01	-	✓	✓	✓	✓	✓	✓	✓	✓	-	
	5AC901.CSSD-02	-	✓	✓	✓	✓	✓	✓	✓	✓	-	
	5AC901.CCFA-00	-	✓	✓	✓	✓	✓	✓	✓	✓	-	
Interface options	5AC901.I485-00	-	✓	✓	✓	✓	✓	✓	✓	✓	-	Interface option
	5AC901.ICAN-00	-	✓	✓	✓	✓	✓	✓	✓	✓	-	
	5AC901.IHDA-00	-	✓	✓	40	✓	✓	40	40	40	-	
	5AC901.ISRM-00	-	✓	✓	✓	✓	✓	✓	✓	✓	-	
	5AC901.IUPS-00	-	✓	✓	✓	✓	✓	✓	✓	✓	-	
Monitor/Panel options	5AC901.LDPO-00	-	✓	✓	✓	✓	✓	✓	✓	✓	-	Monitor/Panel option
	5AC901.LSDL-00	-	✓	✓	✓	✓	✓	✓	✓	✓	-	
CFast cards	5CFAST.2048-00	-	✓	✓	✓	✓	✓	✓	✓	✓	-	-
	5CFAST.4096-00	-	✓	✓	✓	✓	✓	✓	✓	✓	-	
	5CFAST.8192-00	-	✓	✓	✓	✓	✓	✓	✓	✓	-	
	5CFAST.016G-00	-	✓	✓	✓	✓	✓	✓	✓	✓	-	
	5CFAST.032G-00	-	✓	✓	✓	✓	✓	✓	✓	✓	-	

Table 5: Ambient temperature without a fan kit

How is the maximum ambient temperature determined?

1. The CPU board is selected (i.e. operation with or without a fan kit).
2. The "Maximum ambient temperature" row shows the maximum ambient temperature for the fully assembled device, including the respective CPU board.

Information:

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

3. Incorporating additional drives, main memory, interface options, etc. can change the temperature limits of an APC910 system.

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

If there is a specific temperature, for example "45", next to the component, then the ambient temperature of the fully assembled APC910 system cannot exceed this temperature.

2.1.2 Minimum ambient temperature

The minimum ambient temperature is 0°C.

2.1.3 Temperature monitoring

Sensors monitor temperature values at many different locations in the APC910. The location of these temperature sensors can be seen in "Figure 4: Temperature sensor locations" on page 24. The values listed in "Table 6: Temperature sensor locations" on page 24 represent the defined maximum temperature[4)] for the respective measurement point. An alarm is not triggered if this temperature is exceeded. These temperatures can be read in BIOS or approved Microsoft Windows operating systems from the B&R Control Center.

In addition, the hard disks for APC910 systems available from B&R are equipped with S.M.A.R.T, or Self-Monitoring, Analysis, and Reporting Technology. This makes it possible to read various parameters, e.g. temperature, using software (such as HDD Thermometer, a freeware program) on approved Microsoft operating systems (except Windows CE).

2.1.4 Temperature sensor locations

Sensors indicate temperature values at many different locations in the APC910. These temperatures[5)] can be read in BIOS (menu item Advanced - OEM features - System board features / CPU board features - Temperature values) or approved Microsoft Windows operating systems from the B&R Control Center[6)].

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

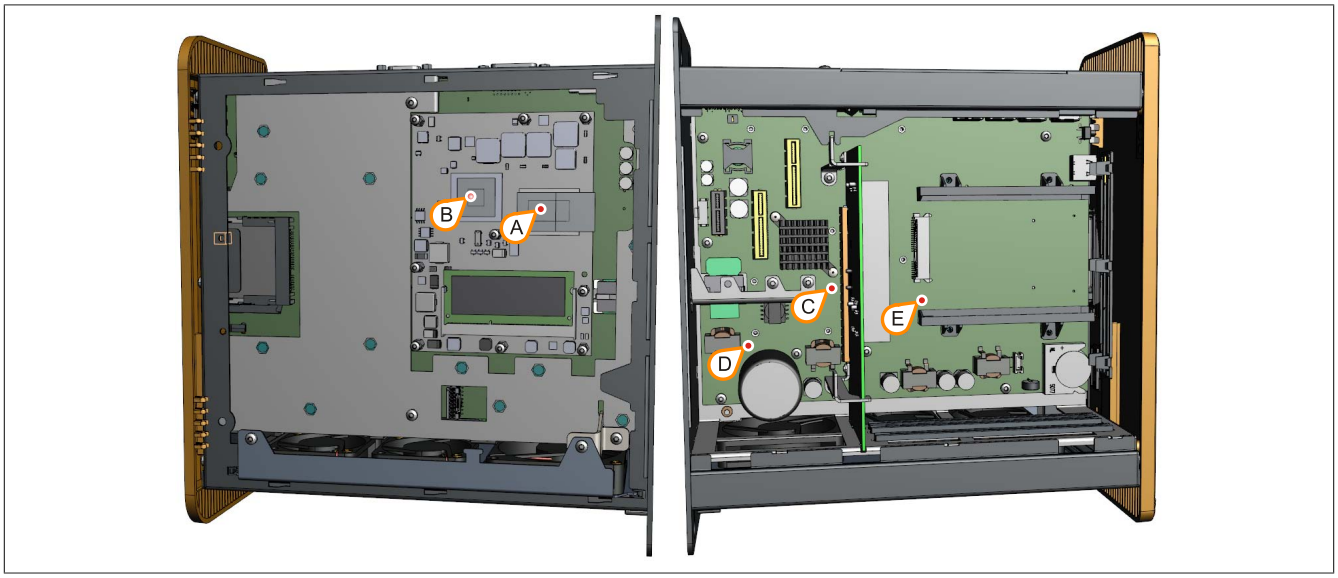


Figure 4: Temperature sensor locations

Position	Measurement point for	Measurement	Max. specified
A	CPU	Ambient temperature of the processor (sensor integrated in the processor)	95°C
B	Board controller	Board controller temperature (sensor integrated on the CPU board)	95°C
C	Main memory	Main memory proximity temperature (sensor integrated on the mainboard)	75°C
D	Board power supply	Board power supply temperature (sensor on the mainboard)	90°C
E	Slide-in compact	Slide-in compact drive proximity temperature (sensor on the mainboard)	Depends on the drive
F	Slide-in drive 1	Slide-in drive 1 temperature (sensor integrated in the slide-in slot)	Depends on the drive
H	Interface option	Interface option temperature (sensor integrated on the interface option)	Depends on the interface option
I	Monitor/Panel option	Monitor/Panel option temperature (sensor integrated on the monitor/panel option)	Depends on the monitor/panel option

Table 6: Temperature sensor locations

4) The temperature measured approximates the immediate ambient temperature but may also be influenced by neighboring components.
5) The temperature measured approximates the immediate ambient temperature but may also be influenced by neighboring components.
6) The ADI driver that includes the B&R Control Center is available in the Downloads section of the B&R website (www.br-automation.com).

2.2 Humidity specifications

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

Component		Operation	Storage / Transport
System units (all models)		5 to 90%	5 to 95%
QM77 / HM76 CPU boards		10 to 90%	5 to 95%
Main memory for CPU boards		10 to 90%	5 to 95%
Slide-in compact drives	5AC901.CHDD-00	5 to 95%	5 to 95%
	5AC901.CHDD-01	5 to 95%	5 to 95%
	5AC901.CSSD-00	5 to 95%	5 to 95%
	5AC901.CSSD-01	5 to 95%	5 to 95%
	5AC901.CSSD-02	5 to 95%	5 to 95%
	5AC901.CCFA-00	5 to 90%	5 to 95%
Interface options	5AC901.I485-00	5 to 90%	5 to 95%
	5AC901.ICAN-00	5 to 90%	5 to 95%
	5AC901.IHDA-00	5 to 90%	5 to 95%
	5AC901.ISRM-00	5 to 90%	5 to 95%
	5AC901.IUPS-00	5 to 90%	5 to 95%
Monitor/Panel options	5AC901.LDPO-00	5 to 90%	5 to 95%
	5AC901.LSDL-00	5 to 90%	5 to 95%
Accessories	5MMUSB.2048-01 flash drive	10 to 90%	5 to 90%
	5CFAST.xxxx-00 CFast cards	Max. 85%	Max. 85%
	5MD900.USB2-02 USB media drive	20 to 80%	5 to 90% / 5 to 95%

Table 7: Overview of humidity specifications for individual components

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

2.3 Power management

2.3.1 Supply voltage block diagram

The following block diagram illustrates the simplified structure of the APC910 supply voltage for system units.

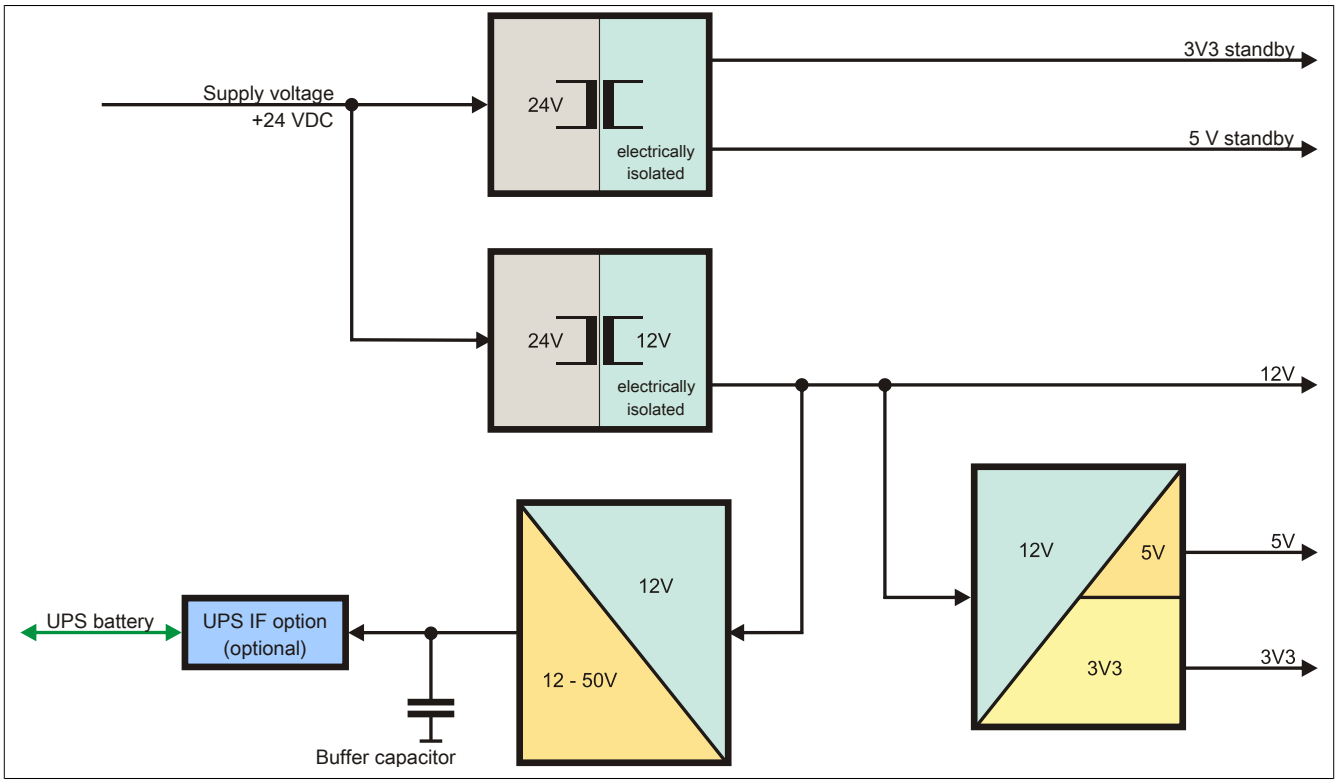


Figure 5: Supply voltage for system units

2.3.2 Power calculation table with 5PC910.SX01-00

Information:

The power supply's maximum total power of 130 watts must not be exceeded.

Information: All values are specified in **watts**. The values specified for the **producers** are maximum values. The values for the **consumers** are average maximum values, but not peak values.			**CPU board**								**Current system**
			5PC900.TS77-00	5PC900.TS77-01	5PC900.TS77-02	5PC900.TS77-03	5PC900.TS77-04	5PC900.TS77-05	5PC900.TS77-06	5PC900.TS77-07	5PC900.TS77-08	Enter values in this column
											Total power supply power (maximum)	**130**
Total power supply +12 V											**Maximum possible**	**130**
		CPU board, permanent consumers	53	43	33	25	43	43	25	25	25	
		1024 MB RAM, each 2 W, max. 2 pcs.										
		2048 MB RAM, each 2.5 W, max. 2 pcs.										
		4096 MB RAM, each 3 W, max. 2 pcs.										
		8192 MB RAM, each 3.5 W, max. 2 pcs.										
		Fan kit, optional	3	3	3	3	3	3	3	3	3	
		External consumers, optional	10	10	10	10	10	10	10	10	10	
		Power consumption of PCI cards, optional (max. 3 W without fan kit, max. 6 W with fan kit)[1]										
		Power consumption of PCIe x8 cards, optional (max. 3 W without fan kit, max. 20 W with fan kit)[1]										
											Consumers ∑	
	+5 V										**Maximum possible at +5V**	**45**
		Slide-in compact (HDD / SSD)	4	4	4	4	4	4	4	4	4	
		5x USB peripherals, each max. 5 W										
		Interface option, optional[2], max. 2 connections										
		External consumers, optional	5	5	5	5	5	5	5	5	5	
		Power consumption of PCI cards, optional (max. 3 W without fan kit, max. 20 W with fan kit)[1]										
											Maximum possible at -12V	**1.2**
	-12 V	Power consumption of PCI cards, optional (max. 1.2 W with or without fan kit)[1]										
											Consumers -12 V ∑	
											Consumers +5 V ∑	
											Maximum possible at 3V3	**30**
	3V3	System unit, permanent consumers	5	5	5	5	5	5	5	5	5	
		CFast card	1	1	1	1	1	1	1	1	1	
		Interface option, optional[2]										
		Power consumption of PCI cards, optional (max. 3 W without fan kit, max. 15 W with fan kit)[1]										
		Power consumption of PCIe x8 cards, optional (max. 3 W without fan kit, max. 10 W with fan kit)[1]										
											Consumers 3V3 ∑	
											Total power supply, permanent consumers ∑	

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

2) Power ratings for the interface options can be found in the table below.

Table 8: Power calculation table - 1-slot APC variant

In order to accurately determine the total power of the fully assembled device, the values in this table must be entered in the power calculation table if one or more of these options are connected to the system unit.

Model number	**+5 V**	**3V3**
Interface option		
5AC901.I485-00	1 W	-
5AC901.ICAN-00	1 W	-
5AC901.IHDA-00	0.2 W	0.2 W
5AC901.ISRM-00	-	2 W
5AC901.IUPS-00	0.1 W	-
Monitor/Panel option		
5AC901.LDPO-00	-	0.2 W
5AC901.LSDL-00	-	1 W

Table 9: Power rating table for interface and monitor/panel options

2.3.3 Power calculation table with 5PC910.SX02-00

Information:

The power supply's maximum total power of 130 watts must not be exceeded.

Information: All values are specified in **watts**. The values specified for the **producers** are maximum values. The values for the **consumers** are average maximum values, but not peak values.			**CPU board**								**Current system**
			5PC900.TS77-00	5PC900.TS77-01	5PC900.TS77-02	5PC900.TS77-03	5PC900.TS77-04	5PC900.TS77-05	5PC900.TS77-06	5PC900.TS77-07	5PC900.TS77-08	Enter values in this column
											Total power supply power (maximum)	**130**
											Maximum possible	**130**
		CPU board, permanent consumers	53	43	33	25	43	43	25	25	25	
		1024 MB RAM, each 2 W, max. 2 pcs.										
		2048 MB RAM, each 2.5 W, max. 2 pcs.										
		4096 MB RAM, each 3 W, max. 2 pcs.										
		8192 MB RAM, each 3.5 W, max. 2 pcs.										
		Fan kit, optional	3	3	3	3	3	3	3	3	3	
		External consumers, optional	10	10	10	10	10	10	10	10	10	
		Power consumption of PCI cards, optional (max. 3 W without fan kit, max. 6 W with fan kit)[1]										
		Power consumption of PCIe x8 cards, optional (max. 3 W without fan kit, max. 20 W with fan kit)[1]										
											Consumers ∑	
											Maximum possible at +5V	**45**
		Slide-in compact (HDD / SSD)	4	4	4	4	4	4	4	4	4	
		Slide-in (DVD / ...)	4	4	4	4	4	4	4	4	4	
		5x USB peripherals, each max. 5 W										
		Interface option, optional[2], max. 2 connections										
		Monitor/Panel option, optional[2]										
		External consumers, optional	5	5	5	5	5	5	5	5	5	
		Power consumption of PCI cards, optional (max. 3 W without fan kit, max. 20 W with fan kit)[1]										
											Maximum possible at -12V	**1.2**
		Power consumption of PCI cards, optional (max. 1.2 W with or without fan kit)[1]										
											Consumers -12 V ∑	
											Consumers +5 V ∑	
											Maximum possible at 3V3	**30**
		System unit, permanent consumers	5	5	5	5	5	5	5	5	5	
		CFast card	1	1	1	1	1	1	1	1	1	
		Interface option, optional[2]										
		Monitor/Panel option, optional[2]										
		Power consumption of PCI cards, optional (max. 3 W without fan kit, max. 15 W with fan kit)[1]										
		Power consumption of PCIe x8 cards, optional (max. 3 W without fan kit, max. 10 W with fan kit)[1]										
											Consumers 3V3 ∑	
											Total power supply, permanent consumers ∑	

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

2) Power ratings for the interface and monitor/panel options can be found in the table below.

Table 10: Power calculation table - 2-slot APC variant

In order to accurately determine the total power of the fully assembled device, the values in this table must be entered in the power calculation table if one or more of these options are connected to the system unit.

Model number	**+5 V**	**3V3**
Interface option		
5AC901.I485-00	1 W	-
5AC901.ICAN-00	1 W	-
5AC901.IHDA-00	0.2 W	0.2 W
5AC901.ISRM-00	-	2 W
5AC901.IUPS-00	0.1 W	-
Monitor/Panel option		
5AC901.LDPO-00	-	0.2 W
5AC901.LSDL-00	-	1 W

Table 11: Power rating table for interface and monitor/panel options

2.4 Serial number sticker

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

This information can also be found on the B&R website by entering the serial number of the fully assembled device in the search field (after selecting the "Serial number" option) tab at the top of the homepage www.br-automation.com. The search provides a detailed list of the installed components.

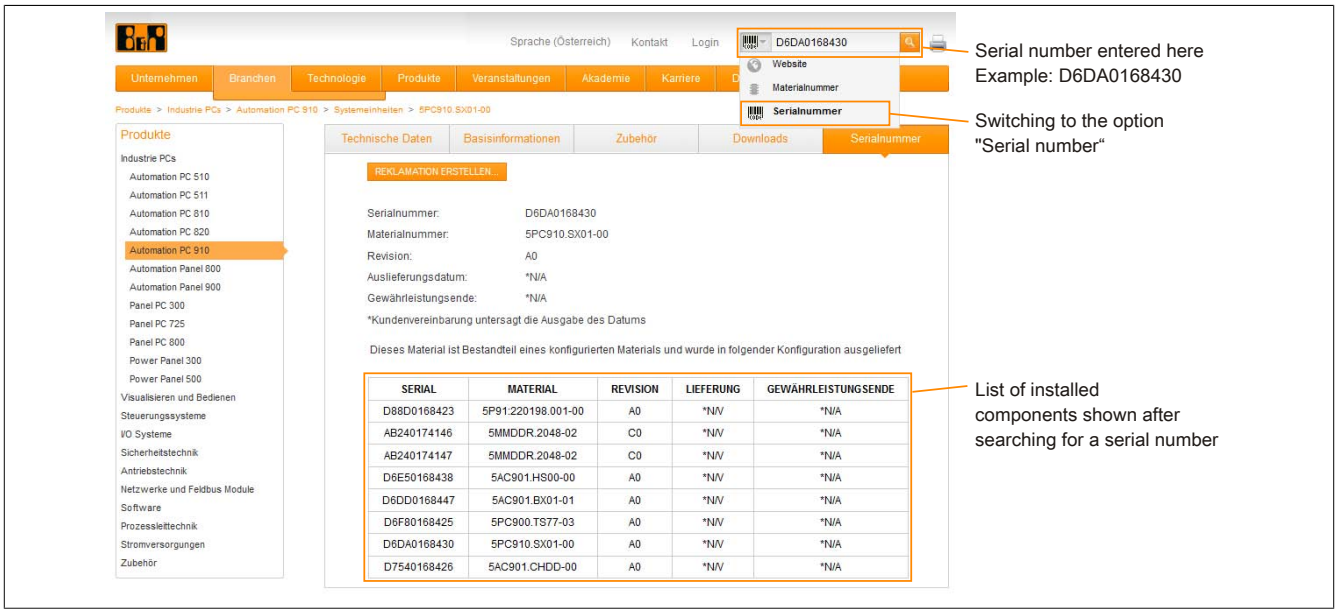


Figure 6: Searching for a serial number on the B&R website

2.5 Block diagrams

The following block diagrams show the simplified structure of system units with a CPU board together with the various bus units.

2.5.1 System unit 5PC910.SX01-00 and bus unit 5AC901.BX01-00

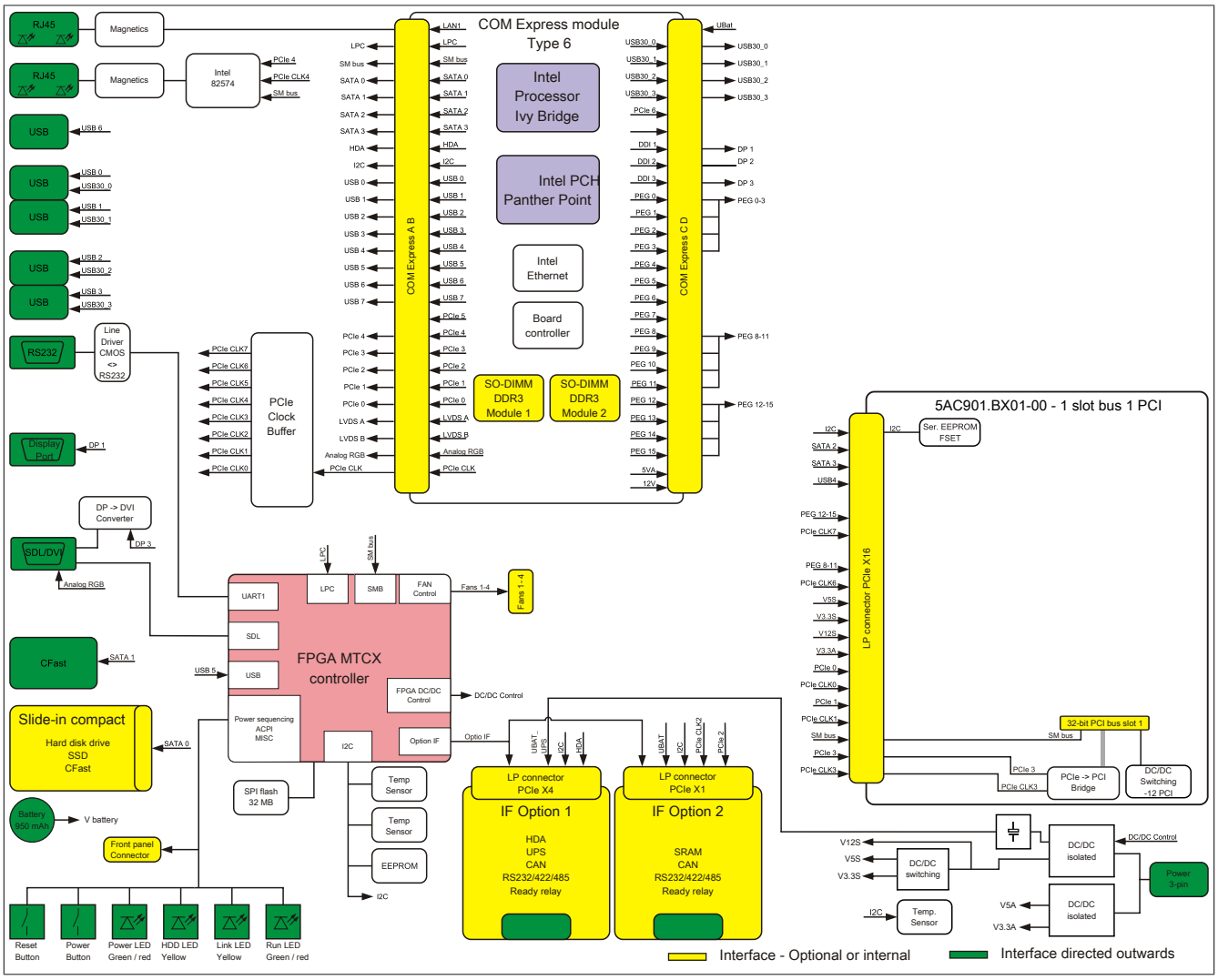


Figure 7: Block diagram of system unit 5PC910.SX01-00 and bus unit 5AC901.BX01-00

2.5.2 System unit 5PC910.SX01-00 and bus unit 5AC901.BX01-01

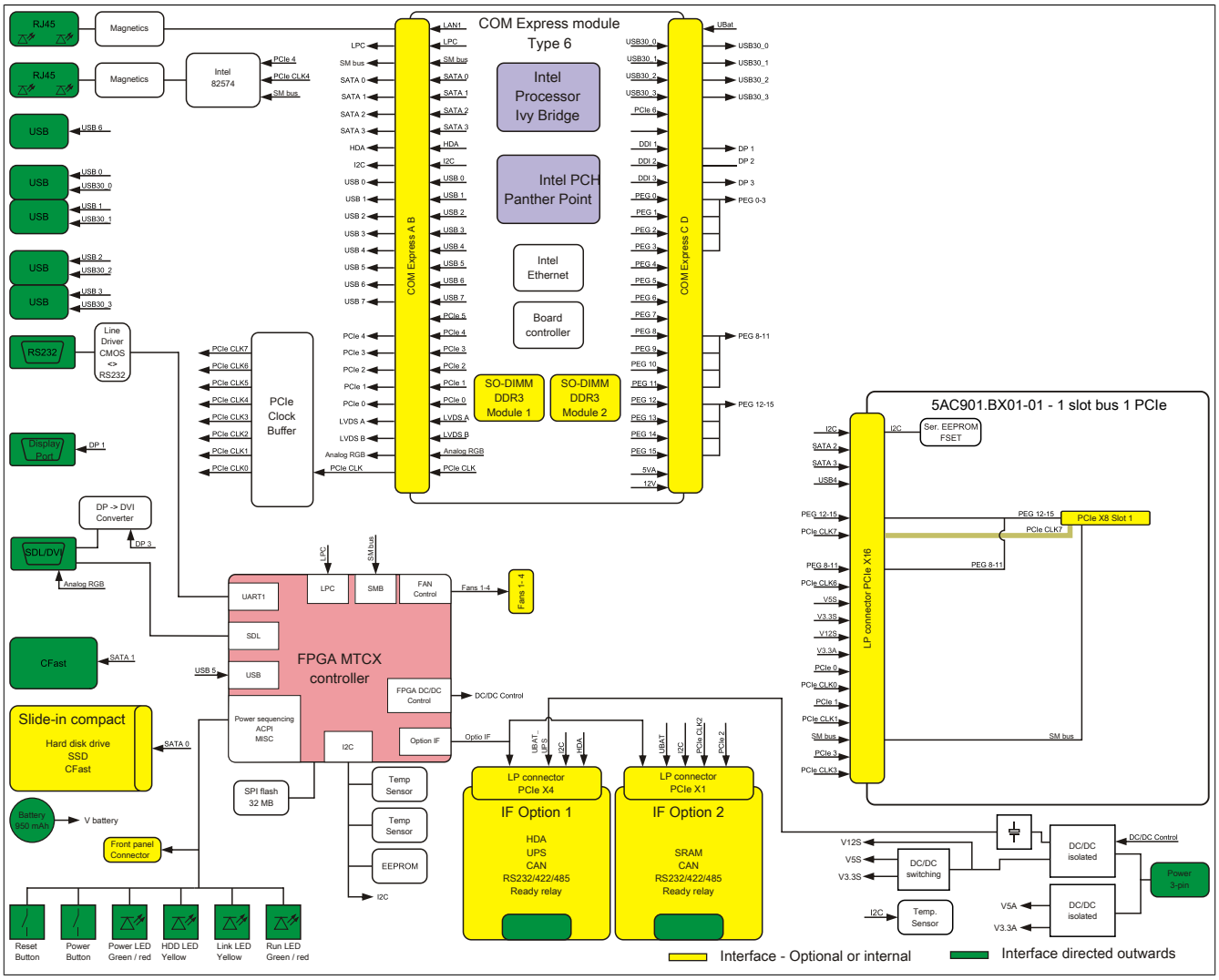


Figure 8: Block diagram of system unit 5PC910.SX01-00 and bus unit 5AC901.BX01-01

2.5.3 System unit 5PC910.SX02-00 and bus unit 5AC901.BX02-00

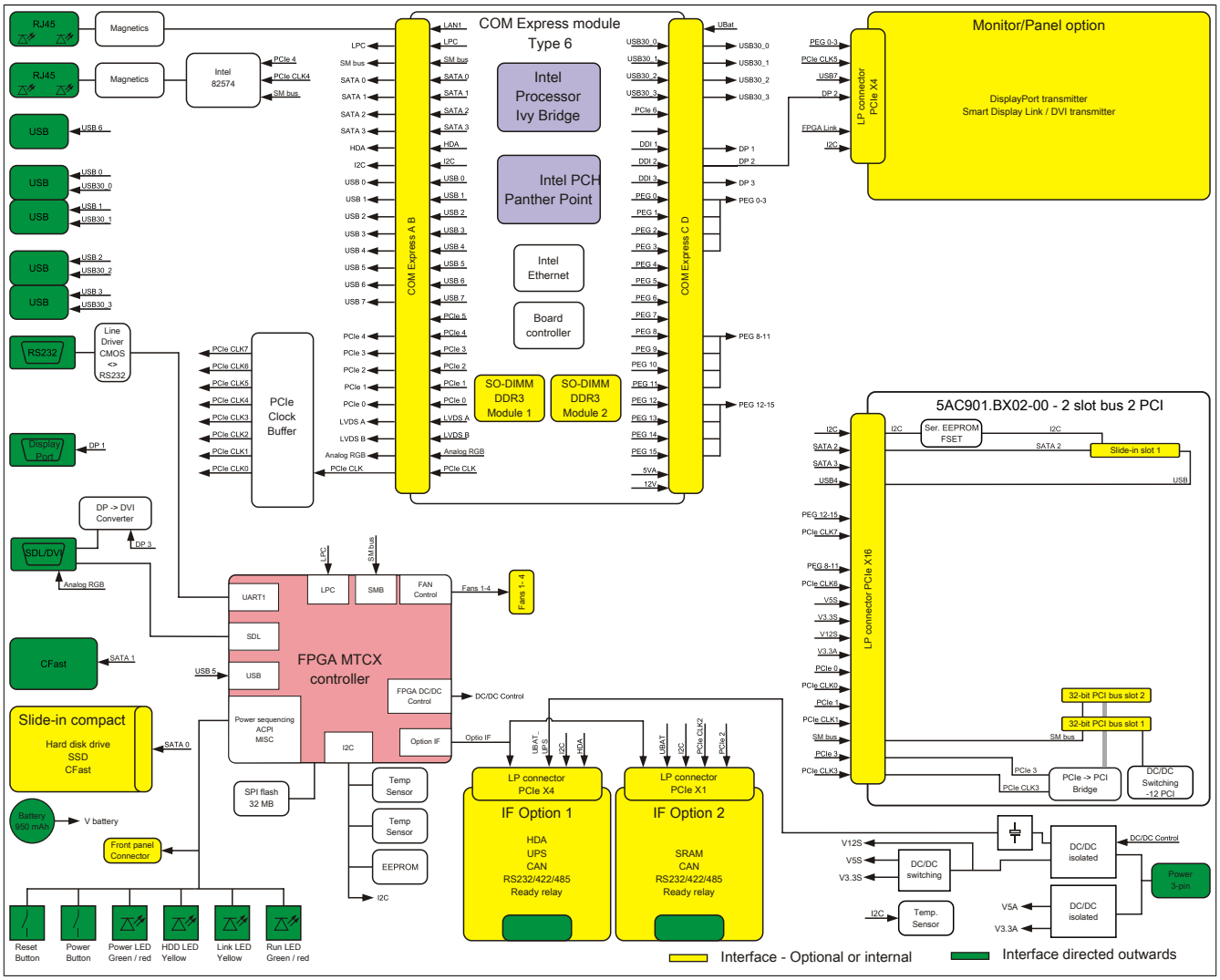


Figure 9: Block diagram of system unit 5PC910.SX02-00 and bus unit 5AC901.BX02-00

2.5.4 System unit 5PC910.SX02-00 and bus unit 5AC901.BX02-01

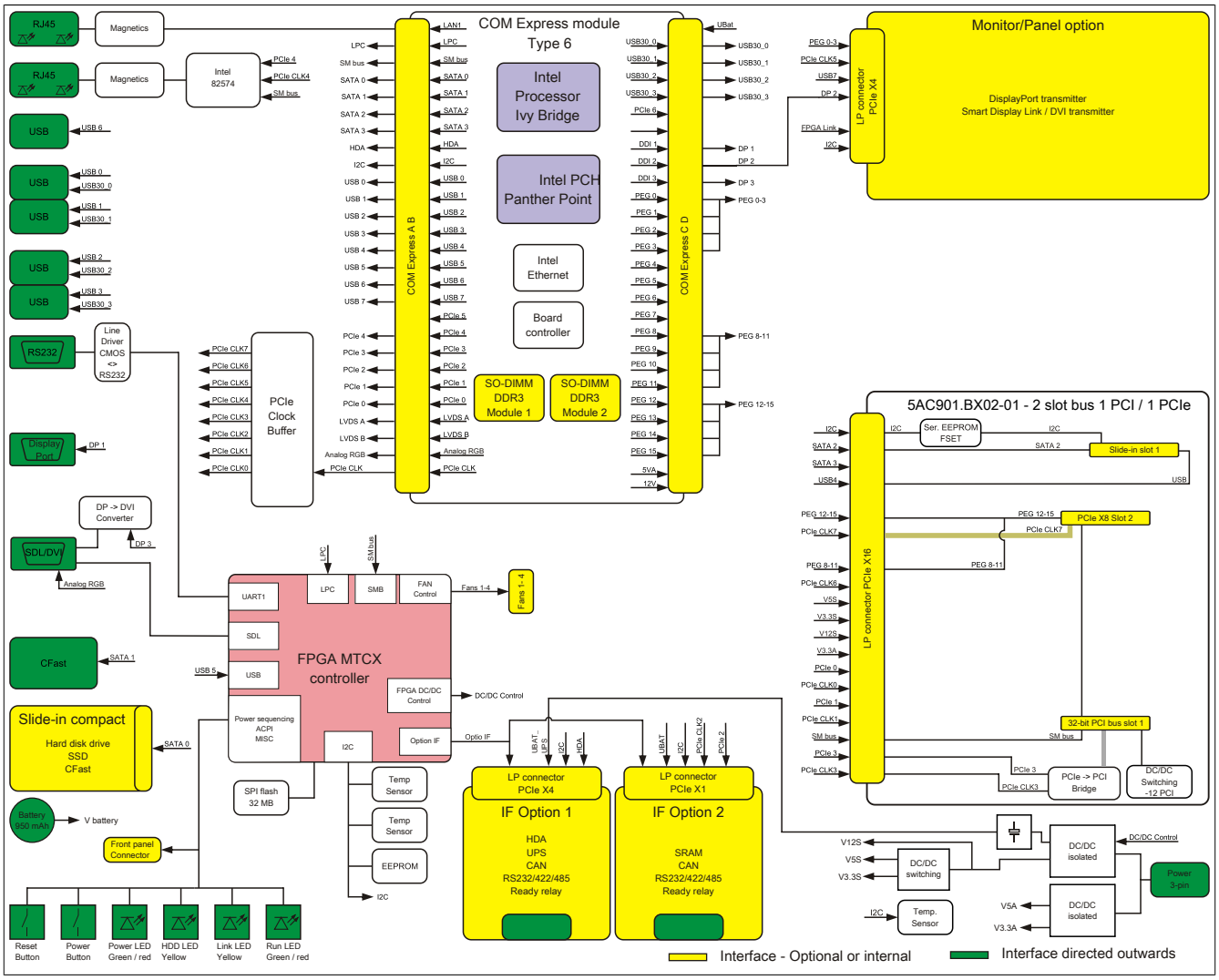


Figure 10: Block diagram of system unit 5PC910.SX02-00 and bus unit 5AC901.BX02-01

2.5.5 Monitor/Panel options

DisplayPort transmitter

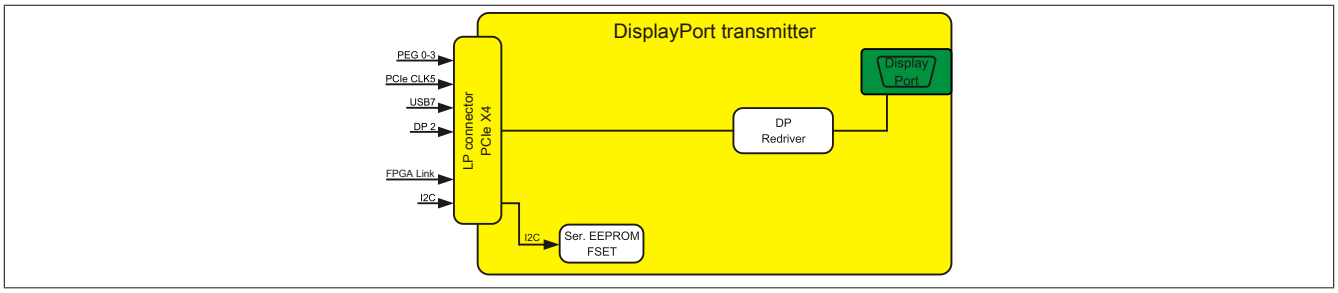


Figure 11: Block diagram of DisplayPort transmitter 5AC901.LDPO-00

SDL / DVI transmitter

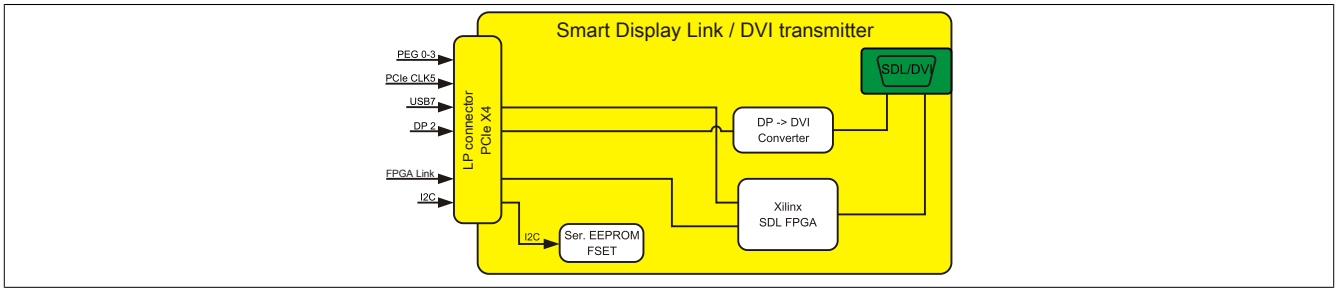


Figure 12: Block diagram of Smart Display Link/DVI transmitter 5AC901.LSDL-00

2.6 Device interfaces

2.6.1 Overview of device interfaces

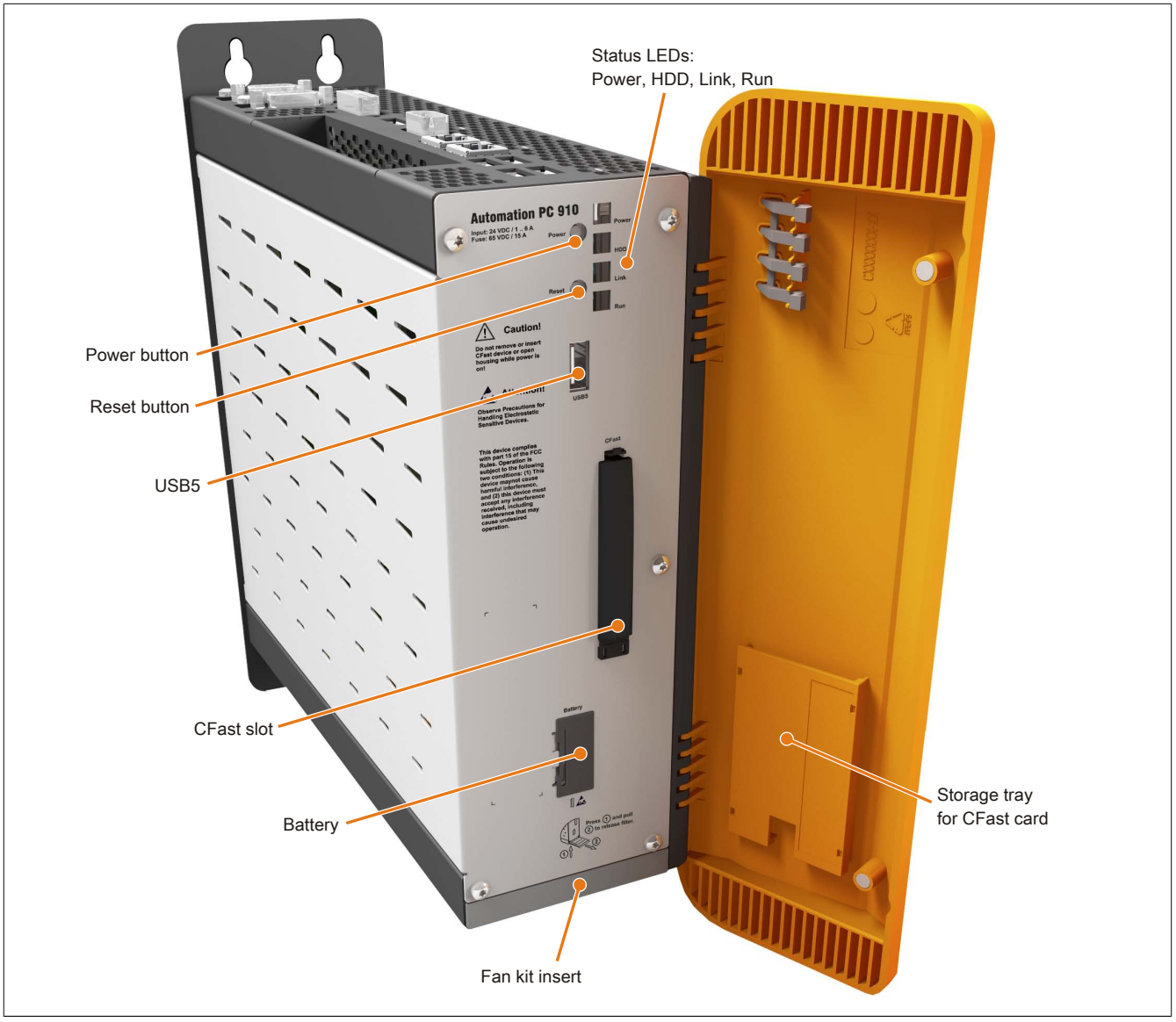


Figure 13: Device interfaces - Overview (front)

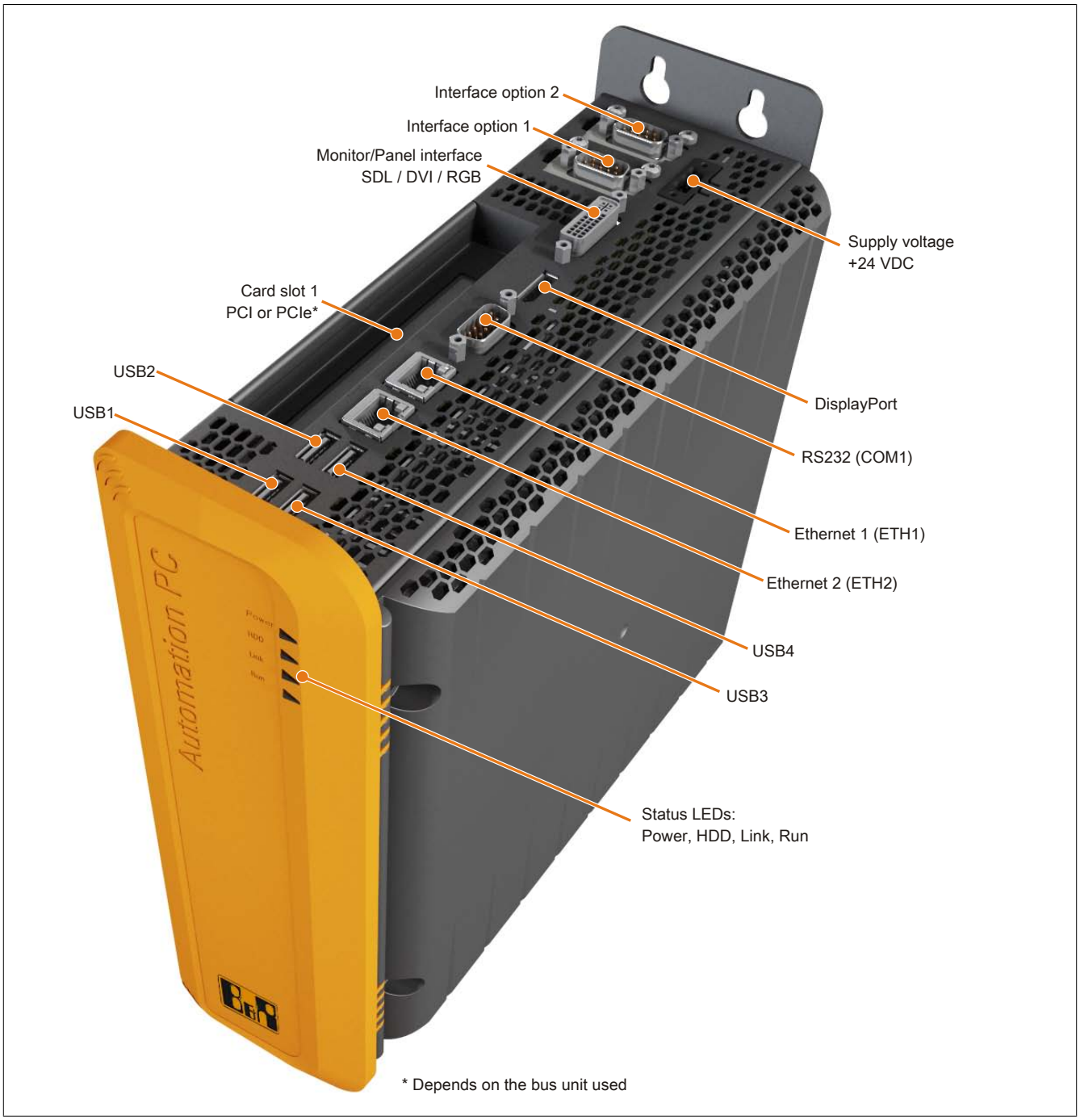


Figure 14: Device interfaces - Overview (top)

2.6.2 Supply voltage +24 VDC

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

The pinout can be found either in the following table or printed on the housing. The supply voltage is protected internally by a soldered fuse (15 A, fast-acting) to prevent damage to the device in the event of an overload (fuse replacement necessary) or if the voltage supply is connected incorrectly (reverse polarity protection - fuse replacement not necessary). The device must be returned to B&R for repairs if the fuse is blown in the event of an error.

Supply voltage		
Protected against reverse polarity		3-pin connector
Pin	**Description**	
1	+	
2	Functional ground	
3	-	
Model number	**Short description**	
	Terminal blocks	
0TB103.9	Connector 24 V 5.08 3-pin screw clamp	
0TB103.91	Connector 24 V 5.08 3-pin cage clamp	

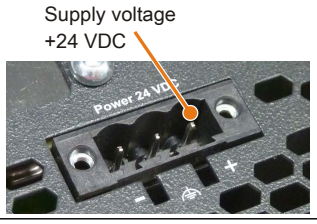


Table 12: Supply voltage connection 24 VDC

Grounding

Caution!

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

The grounding connection is located on the bottom of the APC910 system.

Figure 15: Grounding connection

The M4 self-locking nut can be used, for example, to fasten a copper strip to a central grounding point in the control cabinet or system where the APC910 is installed. The largest possible conductor cross section should be used (at least 2.5 mm²).

2.6.3 Serial interface COM1

Serial interface COM1[1)]	
	RS232
Type	RS232, modem-capable, not electrically isolated
UART	16550-compatible, 16-byte FIFO
Transfer rate	Max. 115 kbit/s
Bus length	Max. 15 m
Pin	**Assignment**
1	DCD
2	RXD
3	TXD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

9-pin DSUB plug

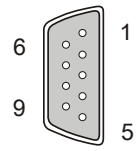


Table 13: Pinout - COM1

1) The interfaces, etc. available on the device or module have been numbered as such for easy identification. This numbering may differ from that used by the particular operating system.

2.6.4 Monitor/Panel interface

Monitor/Panel interface - RGB / SDL (Smart Display Link) / DVI	
The following is an overview of the video signals available on the monitor/panel output. For details, see the technical data for the CPU board being used.	
CPU board	**Video signals for all system unit types**
5PC900.TS77-00	RGB, DVI, SDL
5PC900.TS77-01	RGB, DVI, SDL
5PC900.TS77-02	RGB, DVI, SDL
5PC900.TS77-03	RGB, DVI, SDL
5PC900.TS77-04	RGB, DVI, SDL
5PC900.TS77-05	RGB, DVI, SDL
5PC900.TS77-06	RGB, DVI, SDL
5PC900.TS77-07	RGB, DVI, SDL
5PC900.TS77-08	RGB, DVI, SDL

Table 14: Monitor/Panel interface - RGB, DVI, SDL

Information:

The hardware and graphics drivers of approved operating systems support the hot-plugging of display devices to the monitor/panel interface for service purposes. The monitor/panel connector is specified for 100 connection cycles.

Information:

If a display device with a touch screen is connected to the monitor/panel interface and then disconnected again during operation (hot-plugging), it may be necessary to recalibrate the touch screen.

USB transfer rates in SDL and DVI modes

Information:

In SDL mode, the USB transfer rate is limited to USB 1.1.

In DVI mode, the USB transfer rate is determined by the USB interface and USB hub on the display device.

Pinout

Pin	Assignment	Description	Pin	Assignment	Description
1	TMDS data 2-	DVI lane 2 (negative)	16	HPD	Hot plug detect
2	TMDS data 2+	DVI lane 2 (positive)	17	TMDS data 0-	DVI lane 0 (negative)
3	TMDS data 2/4 SHIELD	Shield for data pair 2 and 4	18	TMDS data 0+	DVI lane 0 (positive)
4	SDL-	SDL lane (negative)	19	TMDS Data 0/ XUSB1 SHIELD	Shield for data pair 0 and USB1
5	SDL+	SDL lane (positive)	20	XUSB1-	USB lane 1 (negative)
6	DDC clock	DDC-based control signal (clock)	21	XUSB1+	USB lane 1 (positive)
7	DDC data	DDC-based control signal (data)	22	TMDS clock shield	Shield for clock pair
8	NC	Not connected	23	TMDS clock+	DVI clock (positive)
9	TMDS data 1-	DVI lane 1 (negative)	24	TMDS clock -	DVI clock (negative)
10	TMDS DATA 1+	DVI lane 1 (negative) HDMI clock (positive)	C1	NC	Not connected
11	TMDS DATA 1/ XUSB0 SHIELD	Shield for data pair 1 and USB0	c2	NC	Not connected
12	XUSB0-	USB lane 0 (negative)	C3	NC	Not connected
13	XUSB0+	USB lane 0 (positive)	C4	NC	Not connected
14	+5 V power[1)]	+5 V power supply	C5	NC	Not connected
15	Ground (return for +5 V, HSync and VSync)	Ground			

DVI 24-pin, female

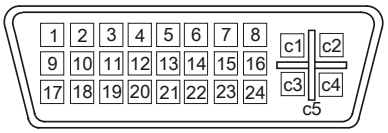


Table 15: Pinout - DVI connection

1) Protected internally by a multifuse.

Cable lengths and resolutions for SDL transmission

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

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

Table 16: Cable lengths and resolutions for SDL transmission

Cable lengths and resolutions for DVI transmission

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

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

Table 17: Cable lengths and resolutions for DVI transmission

2.6.5 DisplayPort

DisplayPort 1.1	
The following overview lists the video signals available on the DisplayPort 1.1 output. For details, see the technical data for the CPU board being used.	
CPU board	**Video signals for all system unit types**
5PC900.TS77-00	DisplayPort, DVI, HDMI
5PC900.TS77-01	DisplayPort, DVI, HDMI
5PC900.TS77-02	DisplayPort, DVI, HDMI
5PC900.TS77-03	DisplayPort, DVI, HDMI
5PC900.TS77-04	DisplayPort, DVI, HDMI
5PC900.TS77-05	DisplayPort, DVI, HDMI
5PC900.TS77-06	DisplayPort, DVI, HDMI
5PC900.TS77-07	DisplayPort, DVI, HDMI
5PC900.TS77-08	DisplayPort, DVI, HDMI

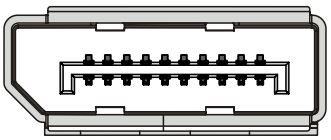


Table 18: DisplayPort 1.1

Information:

The hardware and graphics drivers of approved operating systems support the hot-plugging of display devices to the DisplayPort interface for service purposes. The DisplayPort connector is specified for 10,000 connection cycles.

Pinout - DisplayPort

Pin	Signal	Description	Pin	Signal	Description
1	DP_LANE0+	DisplayPort lane 0 (positive)	11	GND	Ground
2	GND	Ground	12	DP_LANE3-	DisplayPort lane 3 (negative)
3	DP_LANE0-	DisplayPort lane 0 (negative)	13	CONFIG1	Configuration pin 1 (connected to ground)
4	DP_LANE1+	DisplayPort lane 1 (positive)	14	CONFIG2	Configuration pin 2 (connected to ground)
5	GND	Ground	15	DP_AUX+	Auxiliary channel (positive)
6	DP_LANE1-	DisplayPort lane 1 (negative)	16	GND	Ground
7	DP_LANE2+	DisplayPort lane 2 (positive)	17	DP_AUX-	Auxiliary channel (negative)
8	GND	Ground	18	DP_HPD#	Hot plug detect
9	DP_LANE2-	DisplayPort lane 2 (negative)	19	RETURN	Return for power
10	DP_LANE3+	DisplayPort lane 3 (positive)	20	DP_PWR	Power for connector

DisplayPort (20-pin, female)

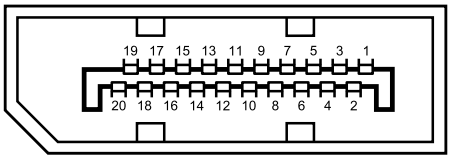


Table 19: Pinout - DisplayPort

2.6.6 Ethernet 1 (ETH1)

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

Ethernet 1 connection (ETH1[1])			
controller	Intel® 82579		RJ45 twisted pair (10BaseT/100BaseT), female
Cabling	S/STP (Cat 5e)		
Transfer rate	10/100/1000 Mbit/s[2]		
Cable length	Max. 100 m (min. Cat 5e)		
Speed LED	**On**	**Off**	
Green	100 Mbit/s	10 Mbit/s[3]	
Orange	1000 Mbit/s	-	
Link LED	**On**	**Off**	
Orange	Link (Ethernet network connection available)	Activity (blinking - data transfer in progress)	

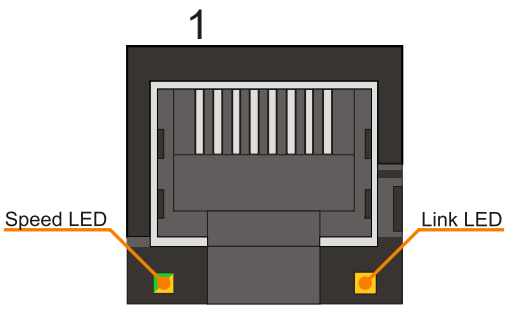


Table 20: Ethernet connection (ETH1)

1) The interfaces, etc. available on the device or module have been numbered as such for easy identification. This numbering may differ from that used by the particular operating system.
2) Switching takes place automatically.
3) The 10 Mbit/s transfer speed / connection only exists if the Link LED is also lit at the same time.

Driver support

A special driver is required in order to operate the Ethernet controller. Drivers for approved operating systems are available in the Downloads section of the B&R website (www.br-automation.com).

Information:

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

2.6.7 Ethernet 2 (ETH2)

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

Ethernet 2 connection (ETH2[1])			
controller	Intel® 82574L		RJ45 twisted pair (10BaseT/100BaseT), female
Cabling	S/STP (Cat 5e)		
Transfer rate	10/100/1000 Mbit/s[2]		
Cable length	Max. 100 m (min. Cat 5e)		
Speed LED	**On**	**Off**	
Green	100 Mbit/s	10 Mbit/s[3]	
Orange	1000 Mbit/s	-	
Link LED	**On**	**Off**	
Orange	Link (Ethernet network connection available)	Activity (blinking - data transfer in progress)	

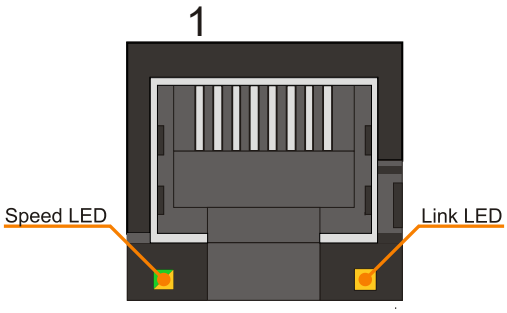


Table 21: Ethernet connection (ETH2)

1) The interfaces, etc. available on the device or module have been numbered as such for easy identification. This numbering may differ from that used by the particular operating system.
2) Switching takes place automatically.
3) The 10 Mbit/s transfer speed / connection only exists if the Link LED is also lit at the same time.

Driver support

A special driver is required in order to operate the Ethernet controller. Drivers for approved operating systems are available in the Downloads section of the B&R website (www.br-automation.com).

Information:

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

2.6.8 USB ports

The APC910 features a USB 3.0 (Universal Serial Bus) host controller with multiple USB ports, four of which are accessible externally for easy user access. The 4 USB ports (USB1-4) on the top are USB 3.0 ports. The USB port on the front (USB5) is a USB 2.0 port.

Warning!

Peripheral USB devices can be connected to these USB ports. Due to the vast number of USB devices available on the market, B&R cannot guarantee their performance. All USB devices provided by B&R are guaranteed to function properly.

Caution!

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

USB1, USB2, USB3, USB4

4 USB 3.0 ports are provided on the top of the APC910.

Universal Serial Bus (USB1, USB2, USB3, USB4)[1]		
Type	USB 2.0 / 3.0	4x USB type A, female
Design	Type A	
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s), super speed (5 Gbit/s)	
Current load[2] USB1, USB2 USB3, USB4	 Max. 1 A Max. 1 A	
Cable length USB 2.0 USB 3.0	 Max. 5 m (without hub) Max. 3 m (without hub)	

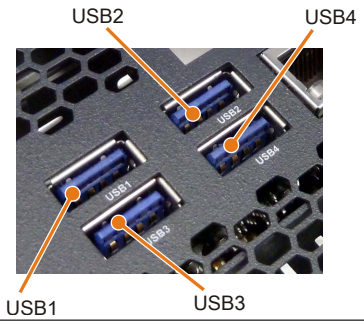


Table 22: USB1, USB2, USB3 and USB4 connections

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

USB5

A USB 2.0 port is provided on the APC910 behind the front cover.

Universal Serial Bus (USB5)[1]		
Type	USB 2.0	1x USB type A, female
Design	Type A	
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)	
Current load[2] USB5	 Max. 1 A	
Cable length	Max. 5 m (without hub)	

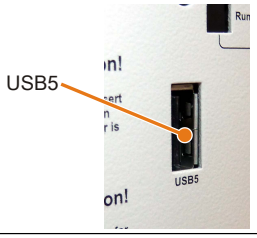


Table 23: USB5 connection

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

2.6.9 IF option 1 slot

Automation PC 910 system units include 2 slots for interface options.

The following table lists the interface options that can be used in the IF option 1 slot.

IF option 1 slot	
Model number	**Short description**
	Interface option
5AC901.I485-00	RS232/422/485 interface option, for installation in an APC910
5AC901.ICAN-00[1)]	CAN interface option, for installation in an APC910
5AC901.IHDA-00	Audio interface option, connection for 1x MIC, 1x Line IN, 1x Line OUT, for installation in an APC910
5AC901.IUPS-00	UPS interface option, for installation in an APC910

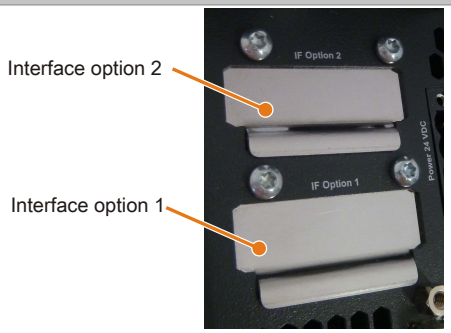


Table 24: IF option 1 slot

1) It is not possible to operate two 5AC901.ICAN interface options (in the IF option 1 and IF option 2 slots) at the same time.

Information:

For information about installing or replacing an interface option, please refer to the section "Installing interface options" on page 227.

2.6.10 IF option 2 slot

Automation PC 910 system units include 2 slots for interface options.

The following table lists the interface options that can be used in the IF option 2 slot.

IF option 2 slot	
Model number	**Short description**
	Interface option
5AC901.I485-00	RS232/422/485 interface option, for installation in an APC910
5AC901.ICAN-00[1)]	CAN interface option, for installation in an APC910
5AC901.ISRM-00	SRAM interface option, 2 MB, for installation in an APC910

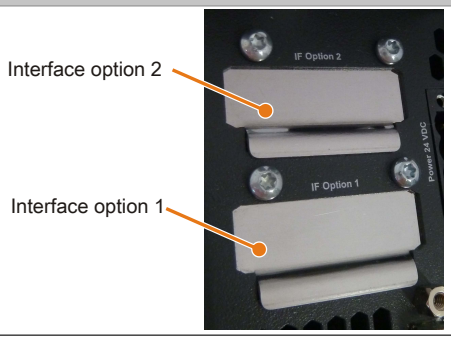


Table 25: IF option 2 slot

1) It is not possible to operate two 5AC901.ICAN interface options (in the IF option 1 and IF option 2 slots) at the same time.

Information:

For information about installing or replacing an interface option, please refer to the section "Installing interface options" on page 227.

2.6.11 Monitor/Panel option

The 2-slot variant of the APC910 (5PC910.SX02-00) offers the possibility of setting up a third graphics line. There are a variety of monitor/panel options available for this.

Monitor/Panel option	
Model number	**Short description**
	Monitor/Panel options
5AC901.LDPO-00	DisplayPort transmitter
5AC901.LSDL-00	Smart Display Link / DVI transmitter

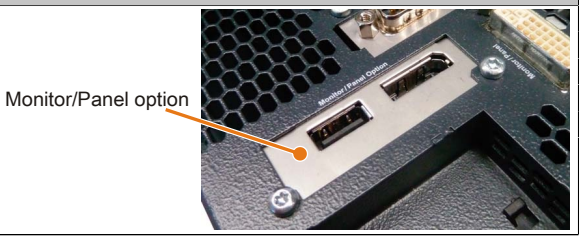


Table 26: Monitor/Panel option

Information:

For information about installing or replacing a monitor/panel option, please refer to the section "Installing monitor/panel options" on page 230.

2.6.12 Card slot (PCI / PCIe)

Standard PCI 2.2 half-size cards or PCI Express (PCIe) half-size cards can be installed depending on the type of bus unit. They cannot exceed the following dimensions.

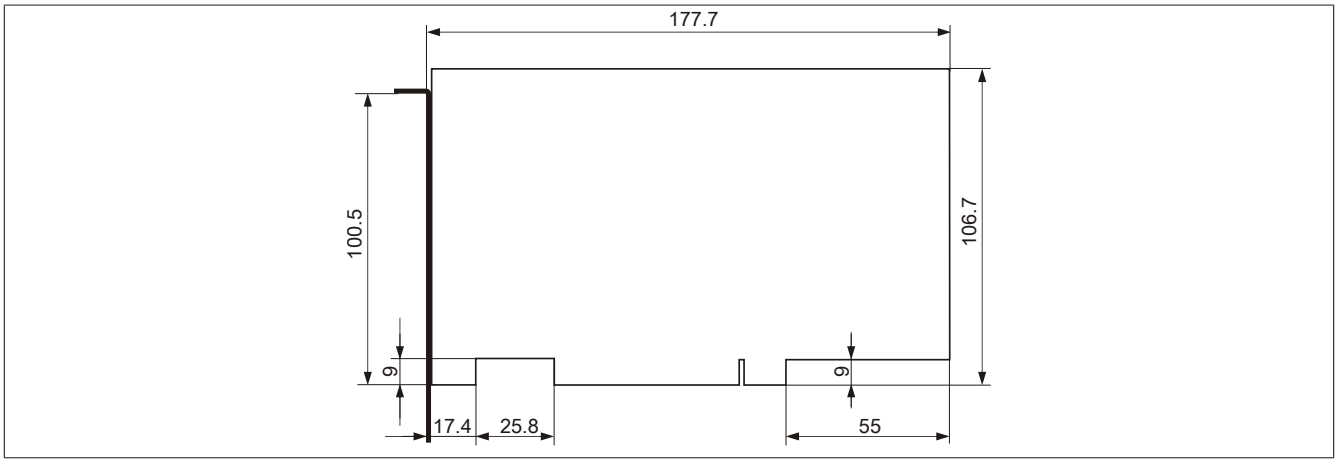


Figure 16: Standard half-size 32-bit PCI card - Dimensions

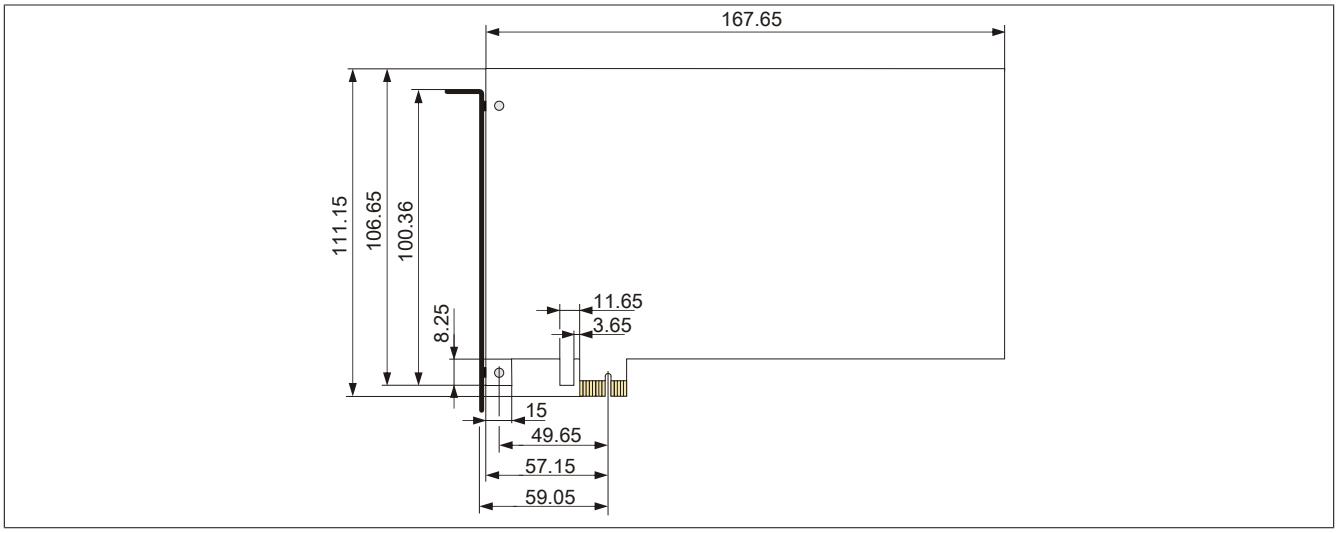
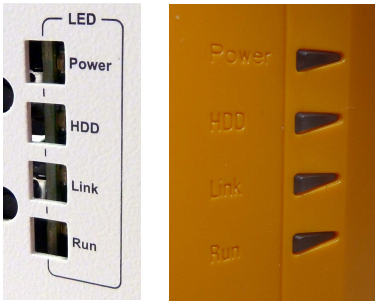


Figure 17: Standard half-size PCIe card - Dimensions

2.6.13 Status LEDs

Status LEDs are located on the front of the system unit.



The following timing pattern is used for the status LEDs:
Block size: 250 ms
Repeat interval: 500 ms, 2 boxes thus represent one interval

LED	Color	Status	Description	LED indicator
Power	Green	On	Supply voltage OK	
		Blinking	Device booted, battery status "BAD"	
			Information: **For more information, see "Battery" on page 48.**	
	Red	On	System in standby mode (S5: Soft-off mode or S4: Hibernation mode - suspend-to-disk)	
		Blinking	MTCX running, battery status "BAD". System in standby mode (S5: Soft-off mode or S4: Hibernation mode - suspend-to-disk)	
	Red / green	Blinking	Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery status OK, supply voltage OK	
			Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery status OK, standby mode (S5: Soft-off mode or S4: Hibernation mode - suspend-to-disk)	
			Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery status BAD, supply voltage OK	
			Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery status BAD, standby mode (S5: Soft-off mode or S4: Hibernation mode - suspend-to-disk)	
			Information: **An update must be performed again.**	
HDD	Yellow	On	Indicates drive access (HDD, CFast)	
Link	Yellow	On	Indicates an active SDL connection on the panel connector	
		Blinking	Indicates that an active SDL connection has been interrupted by a loss of power to the display unit	
			Information: **Check the supply voltage / power connector of the connected display unit.**	
Run	Green	Blinking	Automation Runtime booting Controlled by Automation Runtime (ARemb and ARwin)	
	Green	On	Application running Controlled by Automation Runtime (ARemb and ARwin)	
	Red	On	Application in service mode Controlled by Automation Runtime (ARemb and ARwin)	

Table 27: Data - Status LEDs

2.6.14 Power button

The power button provides a wide range of ATX power supply functions.

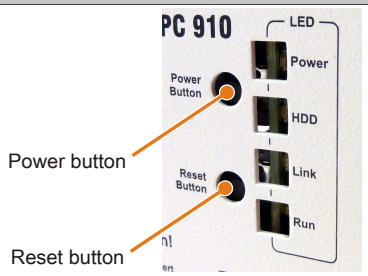
Power button	
The power button can be pressed with a pointed object (e.g. paper clip or tip of a pen). The power button acts like the on/off switch on a normal desktop PC with an ATX power supply: **Press and release** ... Switches on the APC910 or shuts down the operating system and switches off the APC910. **Press and hold** ... ATX power supply switches off without shutting down the APC910 (**data could be lost!**). Pressing the power button does not reset the MTCX processor.	

Table 28: Power button

2.6.15 Reset button

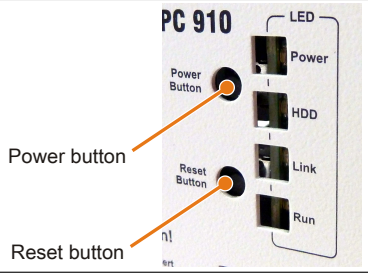
Reset button	
The reset button can be pressed with a pointed object (e.g. paper clip or tip of a pen). Pushing the reset button triggers a hardware and PCI reset. The APC910 is restarted (cold restart). Pressing the reset button does not reset the MTCX processor.	

Table 29: Reset button

Warning!

A system reset can result in lost data!

2.6.16 Battery

The lithium battery (3 V, 950 mAh) buffers the internal real-time clock (RTC). It is located behind the black cover on the front of the device. The battery's buffer lifespan is at least 4 years (at 50°C, 8.5 µA for the components being supplied and a self-discharge of 40%). If an SRAM interface option has been installed, this lifespan is reduced to 2½ years. The battery has a limited service life and should be replaced regularly (after the specified service life at the latest).

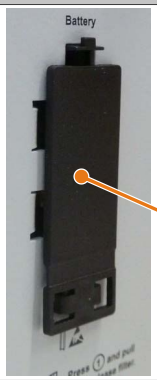
Battery		
Battery Type Removable Service life	 Renata 950 mAh Yes, accessible from the outside 4 years[1)]	
Model number	**Short description**	
	Batteries	
0AC201.91	Lithium batteries, 4 pcs., 3 V / 950 mAh, button cell	
4A0006.00-000	Lithium battery, 1 pc., 3 V / 950 mAh, button cell	

Table 30: Battery

1) At 50°C, 8.5 µA of the supplied components and a self-discharge of 40%. If an SRAM interface option has been installed, the service life is 2½ years.

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

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

Table 31: Battery status

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

2.6.17 CFast slot

The APC910 offers an easy-to-reach CFast slot behind its front cover so that a CFast card can be used as removable media for transferring data or performing upgrades.

This CFast slot is connected to the chipset internally via SATA 1.

CFast slot		
Connection	SATA 1	
Model number	**Short description**	
	CFast cards	
5CFAST.2048-00	CFast card, 2 GB	
5CFAST.4096-00	CFast card, 4 GB	
5CFAST.8192-00	CFast card, 8 GB	
5CFAST.016G-00	CFast card, 16 GB	
5CFAST.032G-00	CFast card, 32 GB	

Table 32: CFast slot

Warning!

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

2.6.18 Slide-in compact slot

The internal connection between the slide-in compact slot and the chipset is made via SATA 0.

Slide-in compact slot		
Connection	SATA 0	
Model number	**Short description**	
	Drives	
5AC901.CHDD-00	250 GB SATA slide-in compact hard disk, 24/7 hard disk with extended temperature range. Please see manual for information about using this hard disk.	
5AC901.CSSD-00	32 GB SATA SSD (SLC), slide-in compact drive	
5AC901.CSSD-01	60 GB SATA SSD (MLC), slide-in compact drive	
5AC901.CSSD-02	180 GB SATA SSD (MLC), slide-in compact drive	
5AC901.CCFA-00	CFast adapter for operating a CFast card in a slide-in compact slot	

Table 33: Slide-in compact slot

Information:

The slide-in compact slot cannot be accessed from the outside. The side panel must be removed in order to install or replace a drive. For information about installing or replacing a slide-in compact drive, please refer to the section "Installing and replacing slide-in compact drives" on page 233.

2.6.19 Slide-in slot 1

Slide-in slot 1 is only available on the 5PC910.SX02-00 2-slot system unit. The internal connection to the chipset is made via SATA 2 and USB.

Slide-in slot 1		
Connection	SATA 2 and USB	
Model number	**Short description**	
	Drives	
5AC901.SDVW-00	DVD-R/RW DVD+R/RW SATA slide-in drive	
5AC901.SSCA-00	Slide-in compact adapter for operating a slide-in compact drive in a slide-in slot	

Table 34: Slide-in slot 1

Information:

The slide-in slot cannot be accessed from the outside. The side panel must be removed in order to install or replace a drive. For information about installing or replacing a slide-in drive, please refer to the section "Installing and replacing slide-in drives" on page 236.

3 Individual components

3.1 System units

The system unit unites all of the individual components into one compact device. It consists of a housing and an integrated mainboard. Interfaces are easily accessible either on top of the device or behind the orange cover on the front. System units either have 1 or 2 card slots.

3.1.1 5PC910.SX01-00

General information

- Slot for a bus unit with 1 PCI or 1 PCIe slot
- Slot for 1 slide-in compact drive
- Slot for 2 interface options
- SDL/DVI/Monitor and DisplayPort interfaces
- CFast slot

Order data

Model number	Short description	Figure
	System units	
5PC910.SX01-00	APC910 system unit, 1 slot (PCI Express / PCI, depending on the bus), 1 slide-in compact slot; Smart Display Link/DVI/monitor, DisplayPort, 1x RS232, 5x USB, 2x ETH 10/100/1000, 1 CFast slot, 24 VDC	
	Required accessories	
	Bus units	
5AC901.BX01-00	APC910 bus, 1 PCI	
5AC901.BX01-01	APC910 bus, 1 PCI Express (x4)	
	CPU boards	
5PC900.TS77-00	Intel Core i7 3615QE CPU board, 2.3 GHz, quad-core, 6 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	
5PC900.TS77-01	Intel Core i7 3612QE CPU board, 2.1 GHz, quad-core, 6 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	
5PC900.TS77-02	Intel Core i7 3555LE CPU board, 2.5 GHz, dual-core, 4 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	
5PC900.TS77-03	Intel Core i7 3517UE CPU board, 1.7 GHz, dual-core, 4 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	
5PC900.TS77-04	Intel Core i5 3610ME CPU board, 2.7 GHz, dual-core, 3 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	
5PC900.TS77-05	Intel Core i3 3120ME CPU board, 2.4 GHz, dual-core, 3 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	
5PC900.TS77-06	Intel Core i3 3217UE CPU board, 1.6 GHz, dual-core, 3 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (total memory max. 16 GB)	
5PC900.TS77-07	Intel Celeron M 847E CPU board, 1.1 GHz, dual-core, 1 MB L2 cache; HM76 chipset; 2 sockets for SO-DIMM DDR3 modules (total memory max. 16 GB)	
5PC900.TS77-08	Intel Celeron M 827E CPU board, 1.4 GHz, single-core, 1.5 MB L2 cache; HM76 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	
	Heat sink	
5AC901.HS00-00	APC910 heat sink, active	
5AC901.HS01-00	APC910 heat sink, passive	
	Main memory	
5MMDDR.1024-03	SO-DIMM DDR3, 1024 MB	
5MMDDR.2048-03	SO-DIMM DDR3, 2048 MB	
5MMDDR.4096-03	SO-DIMM DDR3, 4096 MB	
5MMDDR.8192-03	SO-DIMM DDR3, 8192 MB	
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm², protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm², protected against vibration by the screw flange	

Table 35: 5PC910.SX01-00 - Order data

Model number	Short description	Figure
	Optional accessories	
	Drives	
5AC901.CCFA-00	CFast adapter to operate a CFast card in a slide-in compact slot	
5AC901.CHDD-01	500 GB SATA hard disk, Slide-in compact, 24/7 hard disk Remark: Please see manual for proper use of the hard disk.	
5AC901.CSSD-00	32 GB SATA SSD (SLC), Slide-in compact	
5AC901.CSSD-01	60 GB SATA SSD (MLC), Slide-in compact	
5AC901.CSSD-02	180 GB SATA SSD (MLC), Slide-in compact	
	Fan kits	
5AC901.FA01-00	APC910 fan kit for system unit 5PC910.SX01-00	
	Interface options	
5AC901.I485-00	RS232/422/485 interface option; for APC910	
5AC901.ICAN-00	CAN interface option; for APC910	
5AC901.IHDA-00	Audio interface option, connection for 1x MIC, 1x Line IN, 1x Line OUT; for APC910	
5AC901.ISRM-00	SRAM interface option, 2 MB; for APC910	
	Uninterruptible power supplies	
5AC901.IUPS-00	UPS interface option; for APC910 and 4.5 Ah battery.	

Table 35: 5PC910.SX01-00 - Order data

Technical data

Product ID	5PC910.SX01-00
General information	
Cooling	Passive via heat sink and optionally supported with an active fan kit
LEDs	Power, HDD, Link, Run
B&R ID code	$D6DA
Battery	
Type	Renata 950 mAh
Lifespan	4 years [1]
removable	Yes, accessible behind the orange front doors
Design	Lithium Ion
Power button	Yes
Reset button	Yes
Buzzer	Yes
Certification	
CE	Yes
Controller	
Boot loader	BIOS
Real-time clock	
Battery-buffered	Yes
Power failure logic	
Controller	MTCX [2]
Buffer time	10 ms
Graphics	
Controller	Depending on the CPU board used
Memory	
Type	SO-DIMM DDR3 SDRAM
Size	Max. 16 GB
Interfaces	
COM1	
Type	RS232, modem-capable, not electrically isolated
Design	9-pin DSUB plug
UART	16550-compatible, 16-byte FIFO
Max. baud rate	115 kbit/s
CFast slot	
Quantity	1
USB	
Quantity	5
Type	4x USB 3.0 (top) 1x USB 2.0 (front)
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s), super speed (5 Gbit/s) [3]
Current load	Max. 1 A per connection
Ethernet	
Quantity	2
Design	Shielded RJ45 port
Transfer rate	10/100/1000 Mbit/s
Max. baud rate	1 Gbit/s
DisplayPort	
Quantity	1
Version	1.1

Table 36: 5PC910.SX01-00 - Technical data

Product ID	5PC910.SX01-00
Panel/Monitor interface	
Design	DVI-I socket
Type	SDL/DVI/Monitor
Inserts	
PCI / PCIe slots	
Quantity	1 PCI slot or 1 PCIe slot [4]
Slide-in drives	No
Compact slide-in drive	1
Interface option	2
Monitor/Panel option	No
Add-on UPS slot	Yes [5]
Insert for fan kit	Yes
Electrical characteristics	
Nominal voltage	24 VDC ±25%
Nominal current	5.5 A
Starting current	Max. 60 A for < 300 µs
Electrical isolation	Yes
Operating conditions	
Protection in accordance with EN 60529	IP20 [6]
Environmental conditions	
Temperature	
Operation	Component-dependent [7]
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	Component-dependent
Storage	Component-dependent
Transport	Component-dependent
Vibration [8]	
Operation (continuous)	2 to 8 Hz: 1.75 mm amplitude / 9 to 200 Hz: 0.5 g
Operation (occasional)	2 to 8 Hz: 3.5 mm amplitude / 9 to 200 Hz: 1 g
Storage	2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g
Transport	2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g
Shock [8]	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Altitude	
Operation	-300 to 3000 m above sea level [9]
Mechanical characteristics	
Housing [10]	
Material	Galvanized plate, plastic
Paint	Anthracite gray
Dimensions	
Width	91 mm
Height	270 mm
Depth	254.75 mm
Weight	2050 g

Table 36: 5PC910.SX01-00 - Technical data

1) At 50°C, 8.5 µA of the supplied components and a self-discharge of 40%. If an SRAM interface option has been installed, the service life is 2½ years.
2) Maintenance Controller Extended
3) Super-speed transfer rate (5 GBit/s) is only possible with USB 3.0.
4) The PCI and PCIe slots available depend on the 5AC901.BX01-00 or 5AC901.BX01-01 bus unit being used.
5) This UPS module can only be operated in the IF option 1 slot.
6) Only when front cover and all interface covers are mounted.
7) Detailed information can be found in the temperature tables in the user's manual.
8) Maximum values, as long as no other individual component specifies any other.
9) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).
10) Depending on the process or batch, there may be visible deviations in the color and surface structure.

Dimensions

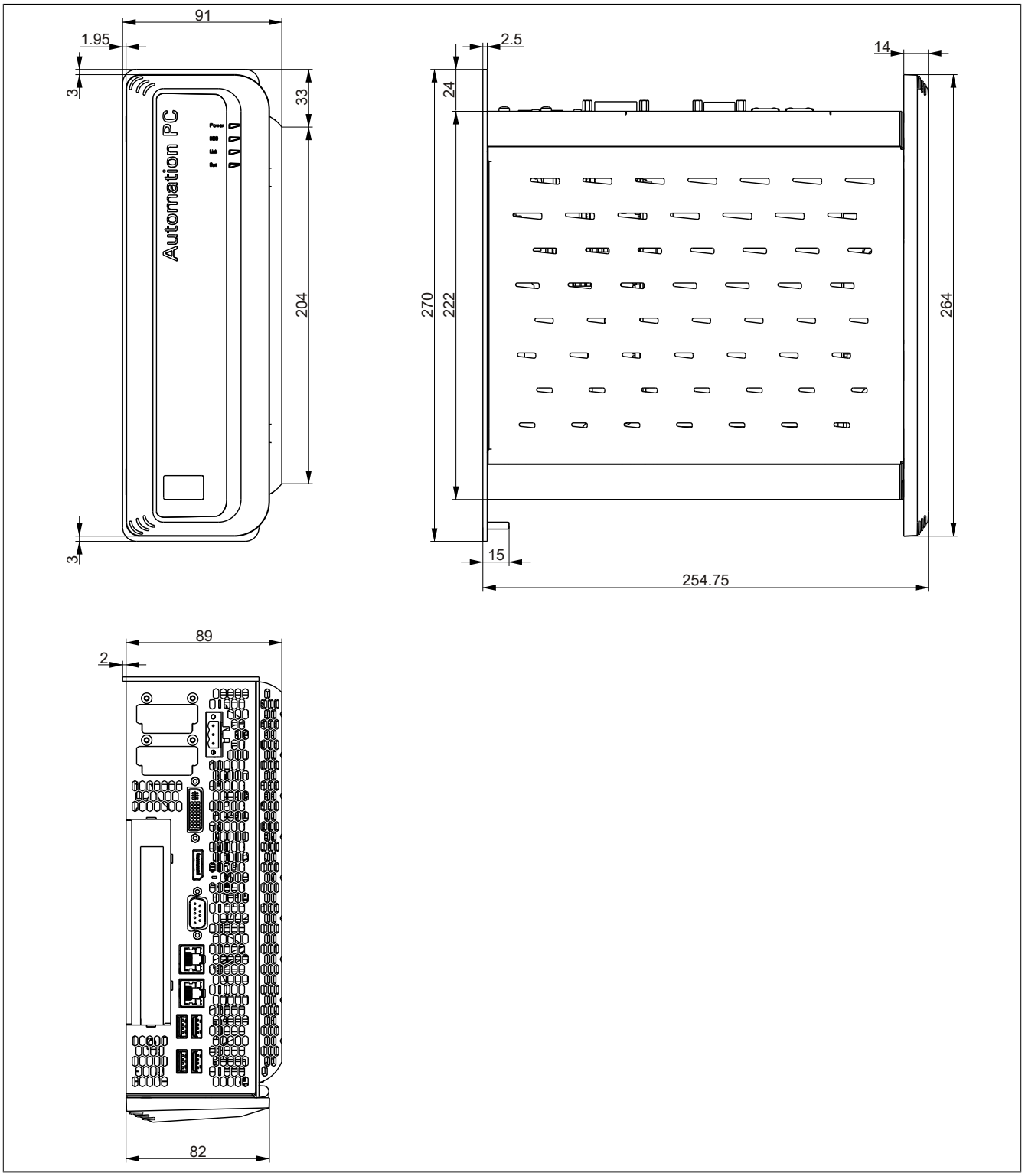


Figure 18: 5PC910.SX01-00 - Dimensions

Drilling template

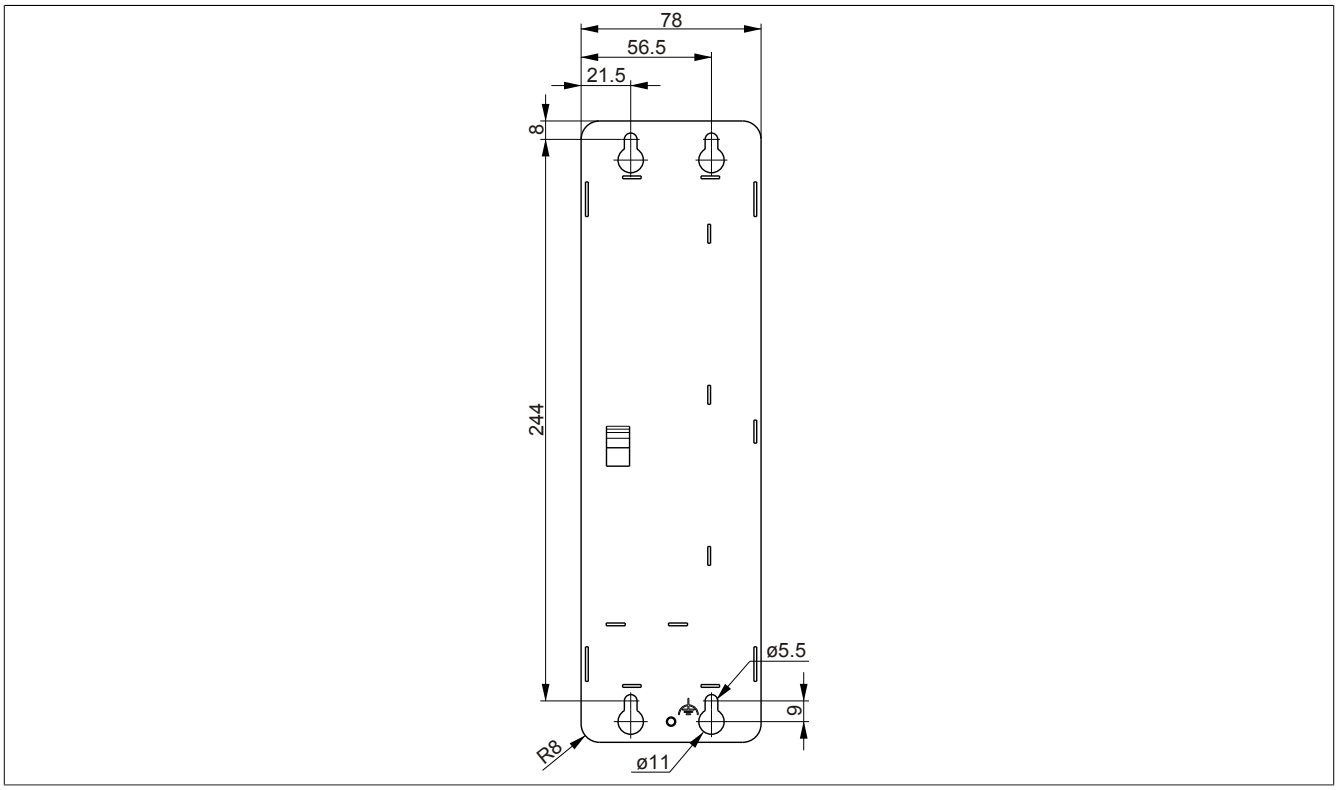


Figure 19: 5PC910.SX01-00 - Drilling template

3.1.2 5PC910.SX02-00

General information

- Slot for a bus unit with 2 PCI slots or 1 PCI and 1 PCIe slots
- Slot for 1 slide-in compact drive and 1 slide-in drive
- Slot for 2 interface options
- SDL/DVI/Monitor and DisplayPort interfaces
- Slot for monitor/panel option
- CFast slot

Order data

Model number	Short description	Figure
	System units	
5PC910.SX02-00	APC910 system unit, 2 slots (PCI Express / PCI, depending on the bus), 1 slot for monitor/panel option, 1 slide-in compact and 1 slide-in slot; Smart Display Link/DVI/Monitor, DisplayPort, 1x RS232, 5x USB, 2x ETH 10/100/1000, 1 CFast slot, 24 VDC	
	Required accessories	
	Bus units	
5AC901.BX02-00	APC910 bus, 2 PCI	
5AC901.BX02-01	APC910 bus, 1 PCI, 1 PCI Express (x8)	
	CPU boards	
5PC900.TS77-00	Intel Core i7 3615QE CPU board, 2.3 GHz, quad-core, 6 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	
5PC900.TS77-01	Intel Core i7 3612QE CPU board, 2.1 GHz, quad-core, 6 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	
5PC900.TS77-02	Intel Core i7 3555LE CPU board, 2.5 GHz, dual-core, 4 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	
5PC900.TS77-03	Intel Core i7 3517UE CPU board, 1.7 GHz, dual-core, 4 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	
5PC900.TS77-04	Intel Core i5 3610ME CPU board, 2.7 GHz, dual-core, 3 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	
5PC900.TS77-05	Intel Core i3 3120ME CPU board, 2.4 GHz, dual-core, 3 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	
5PC900.TS77-06	Intel Core i3 3217UE CPU board, 1.6 GHz, dual-core, 3 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (total memory max. 16 GB)	
5PC900.TS77-07	Intel Celeron M 847E CPU board, 1.1 GHz, dual-core, 1 MB L2 cache; HM76 chipset; 2 sockets for SO-DIMM DDR3 modules (total memory max. 16 GB)	
5PC900.TS77-08	Intel Celeron M 827E CPU board, 1.4 GHz, single-core, 1.5 MB L2 cache; HM76 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	
	Heat sink	
5AC901.HS00-00	APC910 heat sink, active	
5AC901.HS01-00	APC910 heat sink, passive	
	Main memory	
5MMDDR.1024-03	SO-DIMM DDR3, 1024 MB	
5MMDDR.2048-03	SO-DIMM DDR3, 2048 MB	
5MMDDR.4096-03	SO-DIMM DDR3, 4096 MB	
5MMDDR.8192-03	SO-DIMM DDR3, 8192 MB	
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm², protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm², protected against vibration by the screw flange	
	Optional accessories	
	Drives	
5AC901.CCFA-00	CFast adapter to operate a CFast card in a slide-in compact slot	
5AC901.CHDD-01	500 GB SATA hard disk, Slide-in compact, 24/7 hard disk Remark: Please see manual for proper use of the hard disk.	
5AC901.CSSD-00	32 GB SATA SSD (SLC), Slide-in compact	
5AC901.CSSD-01	60 GB SATA SSD (MLC), Slide-in compact	
5AC901.CSSD-02	180 GB SATA SSD (MLC), Slide-in compact	
5AC901.SDVW-00	DVD-R/RW DVD+R/RW SATA drive, Slide-in	

Table 37: 5PC910.SX02-00 - Order data

Model number	Short description	Figure
5AC901.SSCA-00		
	Fan kits	
5AC901.FA02-00	APC910 fan kit for system unit 5PC910.SX02-00	
	Interface options	
5AC901.I485-00	RS232/422/485 interface option; for APC910	
5AC901.ICAN-00	CAN interface option; for APC910	
5AC901.IHDA-00	Audio interface option, connection for 1x MIC, 1x Line IN, 1x Line OUT; for APC910	
5AC901.ISRM-00	SRAM interface option, 2 MB; for APC910	
	Monitor / Panel options	
5AC901.LDPO-00	DisplayPort transmitter	
5AC901.LSDL-00	Smart Display Link/DVI transmitter	
	Uninterruptible power supplies	
5AC901.IUPS-00	UPS interface option; for APC910 and 4.5 Ah battery.	

Table 37: 5PC910.SX02-00 - Order data

Technical data

Product ID	5PC910.SX02-00
General information	
Cooling	Passive via heat sink and optionally supported with an active fan kit
LEDs	Power, HDD, Link, Run
B&R ID code	$D6DB
Battery	
Type	Renata 950 mAh
Lifespan	4 years [1]
removable	Yes, accessible behind the orange front doors
Design	Lithium Ion
Power button	Yes
Reset button	Yes
Buzzer	Yes
Certification	
CE	Yes
Controller	
Boot loader	BIOS
Real-time clock	
Battery-buffered	Yes
Power failure logic	
Controller	MTCX [2]
Buffer time	10 ms
Graphics	
Controller	Depending on the CPU board used
Memory	
Type	SO-DIMM DDR3 SDRAM
Size	Max. 16 GB
Interfaces	
COM1	
Type	RS232, modem-capable, not electrically isolated
Design	9-pin DSUB plug
UART	16550-compatible, 16-byte FIFO
Max. baud rate	115 kbit/s
CFast slot	
Quantity	1
USB	
Quantity	5
Type	4x USB 3.0 (top) 1x USB 2.0 (front)
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s), super speed (5 Gbit/s) [3]
Current load	Max. 1 A per connection
Ethernet	
Quantity	2
Design	Shielded RJ45 port
Transfer rate	10/100/1000 Mbit/s
Max. baud rate	1 Gbit/s
DisplayPort	
Quantity	1
Version	1.1
Panel/Monitor interface	
Design	DVI-I socket
Type	SDL/DVI/Monitor

Table 38: 5PC910.SX02-00 - Technical data

Product ID	5PC910.SX02-00
Inserts	
PCI / PCIe slots	
Quantity	2 PCI slots, or 1 PCI and 1 PCIe slot [4]
Slide-in drives	1
Compact slide-in drive	1
Interface option	2
Monitor/Panel option	1
Add-on UPS slot	Yes [5]
Insert for fan kit	Yes
Electrical characteristics	
Nominal voltage	24 VDC ±25%
Nominal current	5.5 A
Starting current	Max. 60 A for < 300 µs
Electrical isolation	Yes
Operating conditions	
Protection in accordance with EN 60529	IP20 [6]
Environmental conditions	
Temperature	
Operation	Component-dependent [7]
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	Component-dependent
Storage	Component-dependent
Transport	Component-dependent
Vibration [8]	
Operation (continuous)	2 to 8 Hz: 1.75 mm amplitude / 9 to 200 Hz: 0.5 g
Operation (occasional)	2 to 8 Hz: 3.5 mm amplitude / 9 to 200 Hz: 1 g
Storage	2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g
Transport	2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g
Shock [8]	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Altitude	
Operation	-300 to 3000 m above sea level [9]
Mechanical characteristics	
Housing [10]	
Material	Galvanized plate, plastic
Paint	Anthracite gray
Dimensions	
Width	130 mm
Height	270 mm
Depth	254.75 mm
Weight	2550 g

Table 38: 5PC910.SX02-00 - Technical data

1) At 50°C, 8.5 µA of the supplied components and a self-discharge of 40%. If an SRAM interface option has been installed, the service life is 2½ years.
2) Maintenance Controller Extended
3) Super-speed transfer rate (5 GBit/s) is only possible with USB 3.0.
4) The PCI and PCIe slots available depend on the 5AC901.BX01-00 or 5AC901.BX01-01 bus unit being used.
5) This UPS module can only be operated in the IF option 1 slot.
6) Only when front cover and all interface covers are mounted.
7) Detailed information can be found in the temperature tables in the user's manual.
8) Maximum values, as long as no other individual component specifies any other.
9) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).
10) Depending on the process or batch, there may be visible deviations in the color and surface structure.

Dimensions

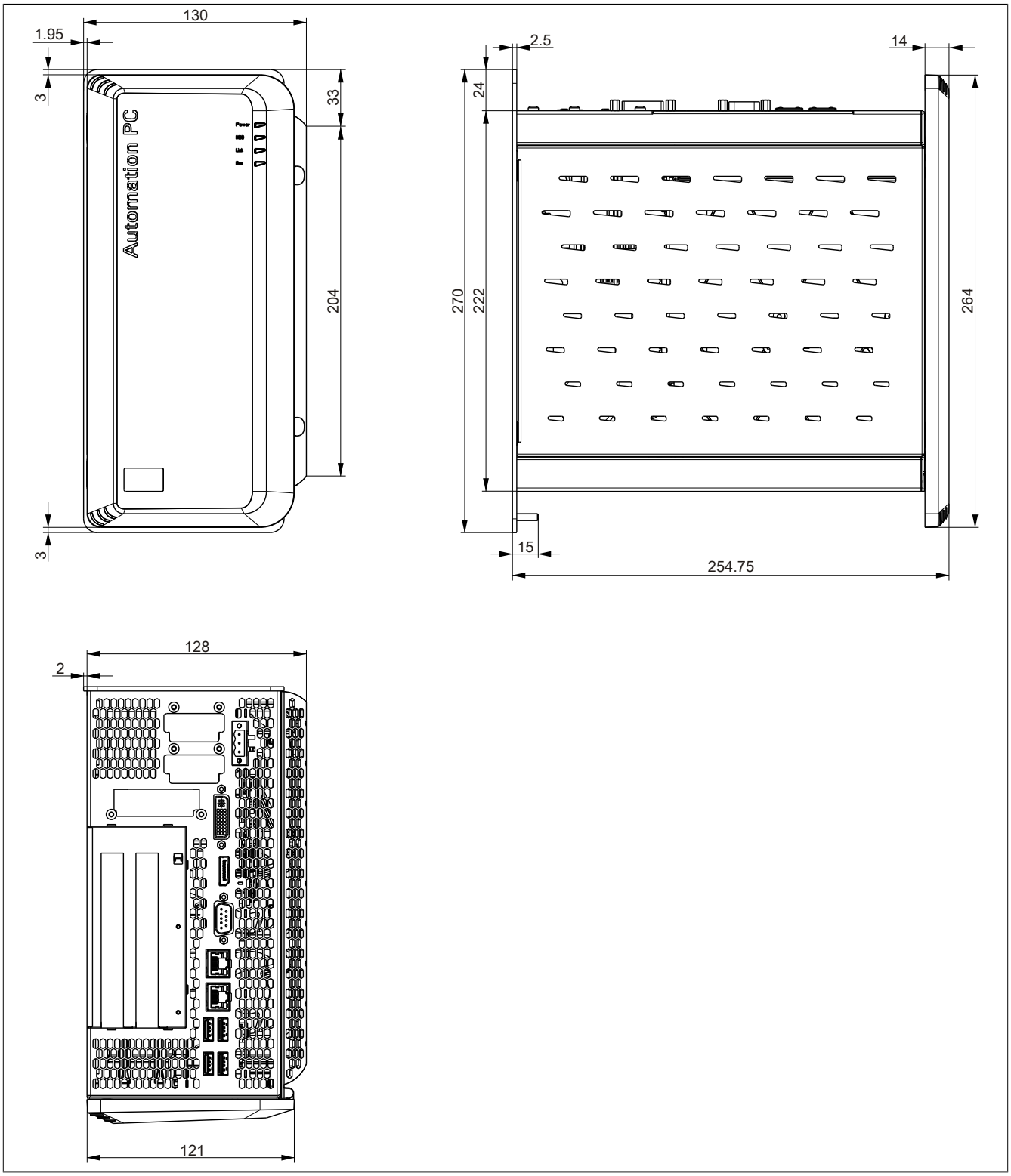


Figure 20: 5PC910.SX02-00 - Dimensions

Drilling template

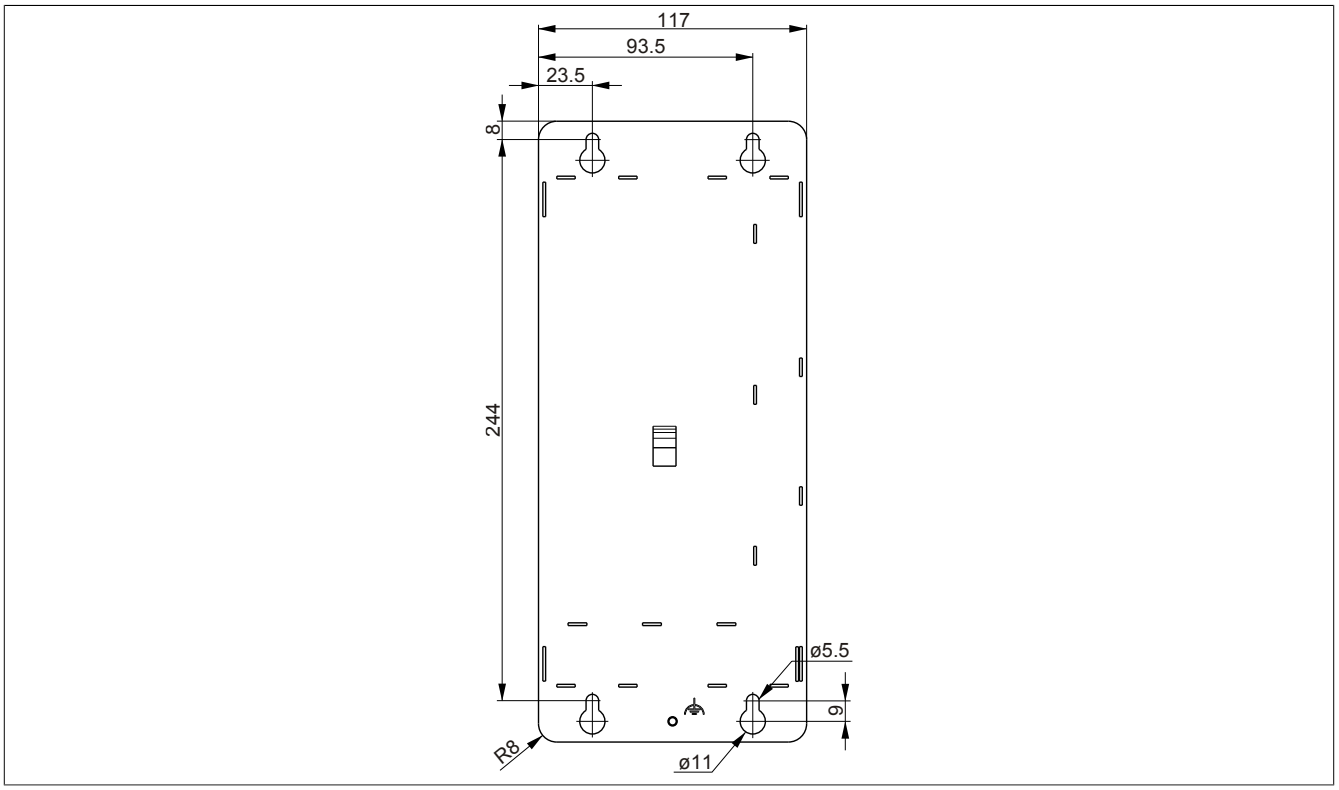


Figure 21: 5PC910.SX02-00 - Drilling template

3.2 CPU boards QM77

3.2.1 5PC900.TS77-0x

General information

- Intel® Core™ i-series processors
- Intel® QM77 chipset
- 2x DDR3 memory socket
- Intel® HD Graphics 4000
- AMI BIOS (UEFI)

Information:

A fan kit is required when using the 5PC900.TS77-00 CPU board.

Order data

Model number	Short description	Figure
	CPU boards	
5PC900.TS77-00	Intel Core i7 3615QE CPU board, 2.3 GHz, quad-core, 6 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	
5PC900.TS77-01	Intel Core i7 3612QE CPU board, 2.1 GHz, quad-core, 6 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	
5PC900.TS77-02	Intel Core i7 3555LE CPU board, 2.5 GHz, dual-core, 4 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	
5PC900.TS77-03	Intel Core i7 3517UE CPU board, 1.7 GHz, dual-core, 4 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	
5PC900.TS77-04	Intel Core i5 3610ME CPU board, 2.7 GHz, dual-core, 3 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	
5PC900.TS77-05	Intel Core i3 3120ME CPU board, 2.4 GHz, dual-core, 3 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	
5PC900.TS77-06	Intel Core i3 3217UE CPU board, 1.6 GHz, dual-core, 3 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (total memory max. 16 GB)	
	Required accessories	
	Heat sink	
5AC901.HS00-00	APC910 heat sink, active	
5AC901.HS01-00	APC910 heat sink, passive	
	Main memory	
5MMDDR.1024-03	SO-DIMM DDR3, 1024 MB	
5MMDDR.2048-03	SO-DIMM DDR3, 2048 MB	
5MMDDR.4096-03	SO-DIMM DDR3, 4096 MB	
5MMDDR.8192-03	SO-DIMM DDR3, 8192 MB	

Table 39: 5PC900.TS77-00, 5PC900.TS77-01, 5PC900.TS77-02, 5PC900.TS77-03, 5PC900.TS77-04, 5PC900.TS77-05, 5PC900.TS77-06 - Order data

Technical data

Product ID	5PC900.TS77-00	5PC900.TS77-01	5PC900.TS77-02	5PC900.TS77-03	5PC900.TS77-04	5PC900.TS77-05	5PC900.TS77-06
General information							
Certification							
CE	Yes						
Controller							
Boot loader	embedded AMI BIOS						
Processor							
Type	Intel® Core™ i7 3615QE	Intel® Core™ i7 3612QE	Intel® Core™ i7 3555LE	Intel® Core™ i7 3517UE	Intel® Core™ i5 3610ME	Intel® Core™ i3-3120ME	Intel® Core™ i3-3217UE
Clock frequency	2300 MHz	2100 MHz	2500 MHz	1700 MHz	2700 MHz	2400 MHz	1600 MHz
Number of cores	4	4	2	2	2	2	2
Architectures	22 nm						
Intel® Smart Cache	6 MB	6 MB	4 MB	4 MB	3 MB	3 MB	3 MB
External bus	DMI, 5 GT/s						
Intel® 64 Architecture	Yes						
Intel® Turbo Boost Technology	2.0	2.0	2.0	2.0	2.0	No	No
Intel® Hyper-Threading Technology	Yes						
Intel® Virtualization Technology (VT-x)	Yes						
Enhanced Intel SpeedStep® Technology	Yes						
Chipset	Intel® QM77						
Real-time clock							
Accuracy	At 25°C: typ. 12 ppm (1 seconds) per day [1]						
Battery-buffered	Yes						
Memory socket							
Number of memory channels	2						
Type	DDR3						
Size	Max. 16 GB						
Max. memory bandwidth	25.6 GB/s						
Graphics							
Controller	Intel® HD Graphics 4000						
Max. dynamic graphics frequency	1 GHz	1 GHz	1 GHz	1 GHz	950 MHz	900 MHz	900 MHz
Color depth	Max. 32-bit						
Resolution							
DVI	Resolution up to 1920 x 1200 (WUXGA)						
RGB	350 MHz RAMDAC, resolution up to 2048 x 1536 @ 75 Hz (QXGA)						
DisplayPort	Version 1.1						
Mass memory management	4x SATA						
Power management	ACPI 4.0 with battery support						

Table 40: 5PC900.TS77-00, 5PC900.TS77-01, 5PC900.TS77-02, 5PC900.TS77-03, 5PC900.TS77-04, 5PC900.TS77-05, 5PC900.TS77-06 - Technical data

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

3.3 CPU boards HM76

3.3.1 5PC900.TS77-0x

General information

- Intel® Celeron® processors
- Intel® HM76 chipset
- 2x DDR3 memory socket
- Intel® HD Graphics 3000
- AMI BIOS (UEFI)

Order data

Model number	Short description	Figure
	CPU boards	
5PC900.TS77-07	Intel Celeron M 847E CPU board, 1.1 GHz, dual-core, 1 MB L2 cache; HM76 chipset; 2 sockets for SO-DIMM DDR3 modules (total memory max. 16 GB)	
5PC900.TS77-08	Intel Celeron M 827E CPU board, 1.4 GHz, single-core, 1.5 MB L2 cache; HM76 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	
	Required accessories	
	Heat sink	
5AC901.HS00-00	APC910 heat sink, active	
5AC901.HS01-00	APC910 heat sink, passive	
	Main memory	
5MMDDR.1024-03	SO-DIMM DDR3, 1024 MB	
5MMDDR.2048-03	SO-DIMM DDR3, 2048 MB	
5MMDDR.4096-03	SO-DIMM DDR3, 4096 MB	
5MMDDR.8192-03	SO-DIMM DDR3, 8192 MB	

Table 41: 5PC900.TS77-07, 5PC900.TS77-08 - Order data

Technical data

Product ID	5PC900.TS77-07	5PC900.TS77-08
General information		
Certification		
CE	Yes	
Controller		
Boot loader	embedded AMI BIOS	
Processor		
Type	Intel® Celeron® M 847E	Intel® Celeron® M 827E
Clock frequency	1100 MHz	1400 MHz
Number of cores	2	1
Architectures	32 nm	
Intel® Smart Cache	2 MB	1.5 MB
External bus	TBD	
Intel® 64 Architecture	Yes	
Intel® Turbo Boost Technology	No	
Intel® Hyper-Threading Technology	No	
Intel® Virtualization Technology (VT-x)	Yes	
Enhanced Intel SpeedStep® Technology	Yes	
Chipset	Intel® HM76	
Real-time clock		
Accuracy	At 25°C: typ. 12 ppm (1 seconds) per day [1)]	
Battery-buffered	Yes	
Memory socket		
Number of memory channels	2	
Type	DDR3	
Size	Max. 16 GB	
Max. memory bandwidth	21.3 GB/s	

Table 42: 5PC900.TS77-07, 5PC900.TS77-08 - Technical data

Product ID	5PC900.TS77-07	5PC900.TS77-08
Graphics		
Controller	Intel® HD Graphics 3000	
Max. dynamic graphics frequency	800 MHz	
Color depth	Max. 32-bit	
Resolution		
DVI	Resolution up to 1920 x 1200 (WUXGA)	
RGB	350 MHz RAMDAC, resolution up to 2048 x 1536 @ 75 Hz (QXGA)	
DisplayPort	Version 1.1	
Mass memory management	4x SATA	
Power management	ACPI 4.0 with battery support	

Table 42: 5PC900.TS77-07, 5PC900.TS77-08 - Technical data

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

3.4 Main memory

3.4.1 5MMDDR.xxxx-03

General information

These 204-pin DDR3 main memory modules operate at 1600 MHz and range in size from 1 GB to 8 GB.

If two RAM modules with the same size (e.g. 2 GB) are inserted into the CPU board, then dual-channel memory technology is supported. This technology is not supported if two RAM modules of different sizes (e.g. 2 GB and 4 GB) are inserted.

If two 2 GB modules or one 4 GB module is installed when using a 32-bit operating system, only 3 GB of main memory can be used. On a 64-bit operating system, up to 16 GB of main memory can be used.

Order data

Model number	Short description	Figure
	Main memory	
5MMDDR.1024-03	SO-DIMM DDR3, 1024 MB	
5MMDDR.2048-03	SO-DIMM DDR3, 2048 MB	
5MMDDR.4096-03	SO-DIMM DDR3, 4096 MB	
5MMDDR.8192-03	SO-DIMM DDR3, 8192 MB	

Table 43: 5MMDDR.1024-03, 5MMDDR.2048-03, 5MMDDR.4096-03, 5MMDDR.8192-03 - Order data

Technical data

Product ID	5MMDDR.1024-03	5MMDDR.2048-03	5MMDDR.4096-03	5MMDDR.8192-03
General information				
Type	SO-DIMM DDR3 SDRAM			
Memory size	1 GB	2 GB	4 GB	8 GB
Construction	204-pin			
Organization	128M x 64-bit	256M x 64-bit	512M x 64-bit	1024M x 64 bits
Velocity	DDR3-1600 (PC3-12800)			
Certification CE	Yes			

Table 44: 5MMDDR.1024-03, 5MMDDR.2048-03, 5MMDDR.4096-03, 5MMDDR.8192-03 - Technical data

Information:

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

3.5 Bus units

3.5.1 5AC901.BX0x-0x

General information

These bus units are compatible with system units that support PCI and/or PCI Express.

Up to Revision A0, the PCI Express slots on the bus units 5AC901.BX01-01 and 5AC901.BX02-01 are equipped with the PCIe x4 standard

Order data

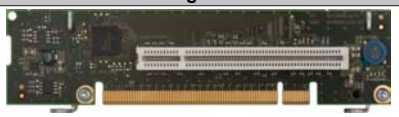
Model number	Short description	Figure
	Bus units	
5AC901.BX01-00	APC910 bus, 1 PCI	
5AC901.BX01-01	APC910 bus, 1 PCI Express (x4)	
5AC901.BX02-00	APC910 bus, 2 PCI	
5AC901.BX02-01	APC910 bus, 1 PCI, 1 PCI Express (x8)	

Table 45: 5AC901.BX01-00, 5AC901.BX01-01, 5AC901.BX02-00, 5AC901.BX02-01 - Order data

Technical data

Product ID	5AC901.BX01-00	5AC901.BX01-01	5AC901.BX02-00	5AC901.BX02-01
Inserts				
PCIe slots				
Quantity	-	1	-	1
Design	-	PCIe half-size	-	PCIe half-size
Default	-	1.0 a	-	1.0 a
Bus speed	-	x8 (2 GB/s)	-	x8 (2 GB/s)
PCI slots				
Quantity	1	-	2	1
Type	32-bit	-	32-bit	32-bit
Design	PCI half-size	-	PCI half-size	PCI half-size
Default	2.2	-	2.2	2.2
Bus speed	33 MHz	-	33 MHz	33 MHz
PCIe to PCI bridge	Yes	-	Yes	Yes

Table 46: 5AC901.BX01-00, 5AC901.BX01-01, 5AC901.BX02-00, 5AC901.BX02-01 - Technical data

Information:

By default, PCIe slots are limited to Gen1 in BIOS. However, this PCIe Gen setting can be changed in BIOS (Advanced - PCI Express configuration - PCI Express GEN 2 settings).

3.6 Heat sinks

3.6.1 5AC901.HS0x-00

General information

The 5AC901.HS00-00 heat sink has cooling fins and heat pipes for improved heat dissipation. It is only used together with system units that have fan kits.

The 5AC901.HS01-00 heat sink has cooling fins and heat pipes for improved heat dissipation. It is only used together with system units that do not have fan kits.

Order data

Model number	Short description	Figure
	Heat sink	Image not found for 5AC901.HS00-00!
5AC901.HS00-00	APC910 heat sink, active	
5AC901.HS01-00	APC910 heat sink, passive	
	Required accessories	
	CPU boards	
5PC900.TS77-00	Intel Core i7 3615QE CPU board, 2.3 GHz, quad-core, 6 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	
5PC900.TS77-01	Intel Core i7 3612QE CPU board, 2.1 GHz, quad-core, 6 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	
5PC900.TS77-02	Intel Core i7 3555LE CPU board, 2.5 GHz, dual-core, 4 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	
5PC900.TS77-03	Intel Core i7 3517UE CPU board, 1.7 GHz, dual-core, 4 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	
5PC900.TS77-04	Intel Core i5 3610ME CPU board, 2.7 GHz, dual-core, 3 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	
5PC900.TS77-05	Intel Core i3 3120ME CPU board, 2.4 GHz, dual-core, 3 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	
5PC900.TS77-06	Intel Core i3 3217UE CPU board, 1.6 GHz, dual-core, 3 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (total memory max. 16 GB)	
5PC900.TS77-07	Intel Celeron M 847E CPU board, 1.1 GHz, dual-core, 1 MB L2 cache; HM76 chipset; 2 sockets for SO-DIMM DDR3 modules (total memory max. 16 GB)	
5PC900.TS77-08	Intel Celeron M 827E CPU board, 1.4 GHz, single-core, 1.5 MB L2 cache; HM76 chipset; 2 sockets for SO-DIMM DDR3 modules (maximum memory 16 GB)	

Table 47: 5AC901.HS00-00, 5AC901.HS01-00 - Order data

3.7 Fan kits

Information:

Fan kits are subject to wear and must be checked with appropriate frequency and cleaned or replaced when not functioning properly (e.g. due to dirt and grime). For information about replacing fan filters, please refer to the section "Replacing fan filters" on page 242.

Information:

For information about installing or replacing a fan kit, please refer to the section "Replacing fan kits" on page 243.

3.7.1 5AC901.FA01-00

General information

This fan kit includes 3 fans that are installed in order to improve heat dissipation on APC910 1-slot system units.

- 3 fans for improved heat dissipation
- Simple mounting and removal

Order data

Model number	Short description	Figure
	Fan kits	
5AC901.FA01-00	APC910 fan kit for system unit 5PC910.SX01-00	
	Optional accessories	
	Accessories	
5AC901.FI01-00	Fan filter for APC910, 5 pcs. (replacement part), for 5AC901.FA01-00	

Table 48: 5AC901.FA01-00 - Order data

Technical data

Product ID	5AC901.FA01-00
General information	
Number of fans	3 (1x 50x50x15, 2x 70x70x15)
Speed	Max. 5000 ±10% rpm (50x50x15) Max. 2200 ±250 rpm (70x70x15)
Noise level	33.5 dB(A) (50x50x15) 28.3 dB(A) (70x70x15)
Lifespan	100,000 hours at 40°C (50x50x15) 100,000 hours at 40°C (70x70x15)
Mechanical characteristics	
Dimensions	
Fan	
Width	50 mm 70 mm
Height	50 mm 70 mm
Depth	15 mm 15 mm

Table 49: 5AC901.FA01-00 - Technical data

3.7.2 5AC901.FA02-00

General information

This fan kit includes 4 fans that are installed in order to improve heat dissipation on APC910 2-slot system units.

- 4 fans for improved heat dissipation
- Simple mounting and removal

Order data

Model number	Short description	Figure
	Fan kits	
5AC901.FA02-00	APC910 fan kit for system unit 5PC910.SX02-00	
	Optional accessories	
	Accessories	
5AC901.FI02-00	Fan filter for APC910, 5 pcs. (replacement part), for 5AC901.FA02-00	

Table 50: 5AC901.FA02-00 - Order data

Technical data

Product ID	5AC901.FA02-00
General information	
Number of fans	4 (3x 50x50x15, 1x 70x70x15)
Speed	Max. 5000 ±10% rpm (50x50x15) Max. 2200 ±250 rpm (70x70x15)
Noise level	33.5 dB(A) (50x50x15) 28.3 dB(A) (70x70x15)
Lifespan	100,000 hours at 40°C (50x50x15) 100,000 hours at 40°C (70x70x15)
Mechanical characteristics	
Dimensions	
Fan	
Width	50 mm 70 mm
Height	50 mm 70 mm
Depth	15 mm 15 mm

Table 51: 5AC901.FA02-00 - Technical data

3.8 Drives

3.8.1 5AC901.CHDD-00

General information

This 250 GB slide-in compact hard disk is specified for 24-hour operation and can be used in APC910 system units.

- 250 GB hard disk
- Slide-in compact
- Specified for 24-hour operation
- S.M.A.R.T. support

Order data

Model number	Short description	Figure
	Drives	
5AC901.CHDD-00	250 GB SATA hard disk, Slide-in compact, 24/7 hard disk Remark: Please see manual for proper use of the hard disk.	

Table 52: 5AC901.CHDD-00 - Order data

Technical data

Information:

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

Product ID	5AC901.CHDD-00
General information	
Certification	
CE	Yes
Hard disk drive	
Capacity	250 GB
Number of heads	2
Number of sectors	488,397,168
Bytes per sector	512
Cache	8 MB
Speed	5400 rpm ±0.2%
Startup time	Typ. 3.6 s (from 0 rpm to read access)
MTBF	550,000 POH [1]
S.M.A.R.T. support	Yes
Interface	SATA
Access time	5.6 ms
Supported transfer modes	SATA 1.0, Serial ATA Revision 2.6 PIO mode 0-4, multiword DMA mode 0-2, UDMA mode 0-6
Data transfer rate	
Internal	Max. 1175 Mbit/s
To/from host	Max. 150 MB/s (SATA I), max. 300 MB/s (SATA II)
Positioning time	
Minimum (track to track)	1 ms
Nominal (read only)	14 ms
Maximum (read only)	30 ms
Environmental conditions	
Temperature [2]	
Operation [3]	0 to 60°C
Operation - 24-hour [4]	0 to 60°C
Storage	-40 to 70°C
Transport	-40 to 70°C
Relative humidity [5]	
Operation	5 to 95%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing

Table 53: 5AC901.CHDD-00 - Technical data

Product ID	5AC901.CHDD-00
Vibration	
Operation (continuous)	5 to 500 Hz: 0.25 g; no unrecoverable errors
Operation (occasional)	5 to 500 Hz: 0.5 g; no unrecoverable errors
Storage	10 to 500 Hz: 5 g; no unrecoverable errors
Transport	10 to 500 Hz: 5 g; no unrecoverable errors
Shock	
Operation	350 g and 2 ms duration; no unrecoverable errors
Storage	800 g and 2 ms duration; no unrecoverable errors 800 g and 1 ms duration; no unrecoverable errors 600 g and 0.5 ms duration; no unrecoverable errors
Transport	800 g and 2 ms duration; no unrecoverable errors 800 g and 1 ms duration; no unrecoverable errors 600 g and 0.5 ms duration; no unrecoverable errors
Altitude	
Operation	-300 to 3048 m
Storage	-300 to 12192 m
Mechanical characteristics	
Mounting	Fixed [6]
Dimensions	
Width	13 mm
Height	75 mm
Depth	105 mm
Weight	134 g
Manufacturer information	
Manufacturer	Seagate
Manufacturer's product ID	ST9250311CS

Table 53: 5AC901.CHDD-00 - Technical data

1) With 8760 POH (power on hours) per year and 25°C surface temperature.
2) Temperature values for 305 meter altitude. The temperature specification must be reduced linearly by 1 °C every 305 meters. The temperature increase and decrease can be a maximum of 20 °C per hour.
3) Standard operation means 333 POH (power-on hours) per month.
4) 24-hour operation means 732 POH (power-on hours) per month.
5) Humidity gradient: Maximum 30% per hour.
6) Slide-in compact mounting

Temperature humidity diagram

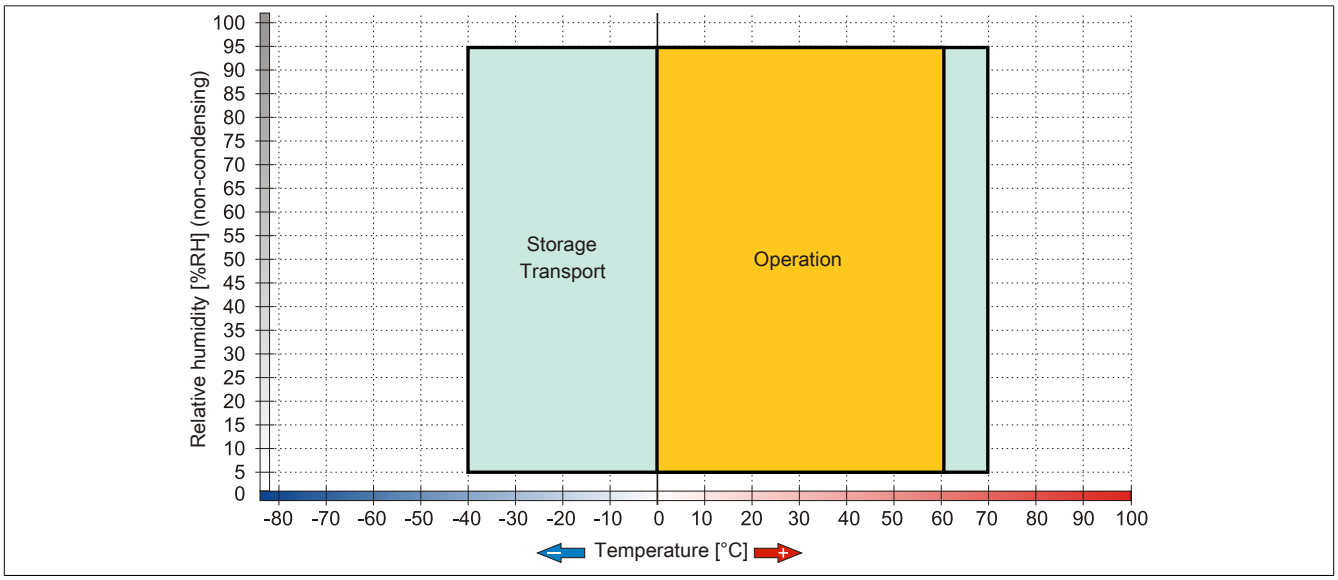


Figure 22: 5AC901.CHDD-00 - Temperature humidity diagram

3.8.2 5AC901.CHDD-01

General information

This 500 GB slide-in compact hard disk is specified for 24-hour operation and can be used in APC910 system units.

- 500 GB hard disk
- Slide-in compact
- Specified for 24-hour operation
- S.M.A.R.T. support

Order data

Model number	Short description	Figure
	Drives	
5AC901.CHDD-01	500 GB SATA hard disk, Slide-in compact, 24/7 hard disk Remark: Please see manual for proper use of the hard disk.	
	Optional accessories	
	Drives	
5MMHDD.0500-00	500 GB SATA Hard Disk Spare part for 5AC801.HDDI-04, 5AC901.CHDD-01 and 5ACPCI.RAIC-06; Remark: Please see manual for proper use of the hard disk.	

Table 54: 5AC901.CHDD-01 - Order data

Technical data

Information:

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

Product ID	5AC901.CHDD-01
General information	
Certification	
CE	Yes
Hard disk drive	
Capacity	500 GB
Number of heads	2
Number of sectors	976.773.168
Bytes per sector	512 (logical) / 4096 (physical)
Cache	16 MB
Speed	5400 rpm ±0.2%
Startup time	Typ. 3.5 s (from 0 rpm to read access)
Lifespan	5 years
MTBF	1,000,000 POH [1]
S.M.A.R.T. support	Yes
Interface	SATA
Access time	5.5 ms
Supported transfer modes	SATA II
Data transfer rate	
Internal	Max. 147 MB/s
To/from host	Max. 150 MB/s (SATA I), max. 300 MB/s (SATA II)
Positioning time	
Nominal (read only)	11 ms
Maximum (read only)	21 ms
Environmental conditions	
Temperature [2]	
Operation [3]	0 to 60°C
Operation - 24-hour [4]	0 to 60°C
Storage	-40 to 70°C
Transport	-40 to 70°C
Relative humidity [5]	
Operation	5 to 95%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing

Table 55: 5AC901.CHDD-01 - Technical data

Product ID	5AC901.CHDD-01
Vibration	
Operation (continuous)	5 to 500 Hz: 0.25 g; no unrecoverable errors
Operation (occasional)	5 to 500 Hz: 0.5 g; no unrecoverable errors
Storage	10 to 500 Hz: 5 g; no unrecoverable errors
Transport	10 to 500 Hz: 5 g; no unrecoverable errors
Shock	
Operation	400 g and 2 ms duration; no unrecoverable errors
Storage	1000 g and 2 ms duration; no unrecoverable errors
Transport	1000 g and 2 ms duration; no unrecoverable errors
Altitude	
Operation	-305 to 3048 m
Storage	-305 to 12192 m
Mechanical characteristics	
Mounting	Fixed [6]
Dimensions	
Width	10 mm
Height	75 mm
Depth	105 mm
Weight	134 g
Manufacturer information	
Manufacturer	Western Digital
Manufacturer's product ID	WD5000LUCT

Table 55: 5AC901.CHDD-01 - Technical data

1) With 8760 POH (power on hours) per year and 25°C surface temperature.
2) Temperature values for 305 meter altitude. The temperature specification must be reduced linearly by 1 °C every 305 meters. The temperature increase and decrease can be a maximum of 20 °C per hour.
3) Standard operation means 333 POH (power-on hours) per month.
4) 24-hour operation means 732 POH (power-on hours) per month.
5) Humidity gradient: Maximum 20% per hour.
6) Slide-in compact mounting

Temperature humidity diagram

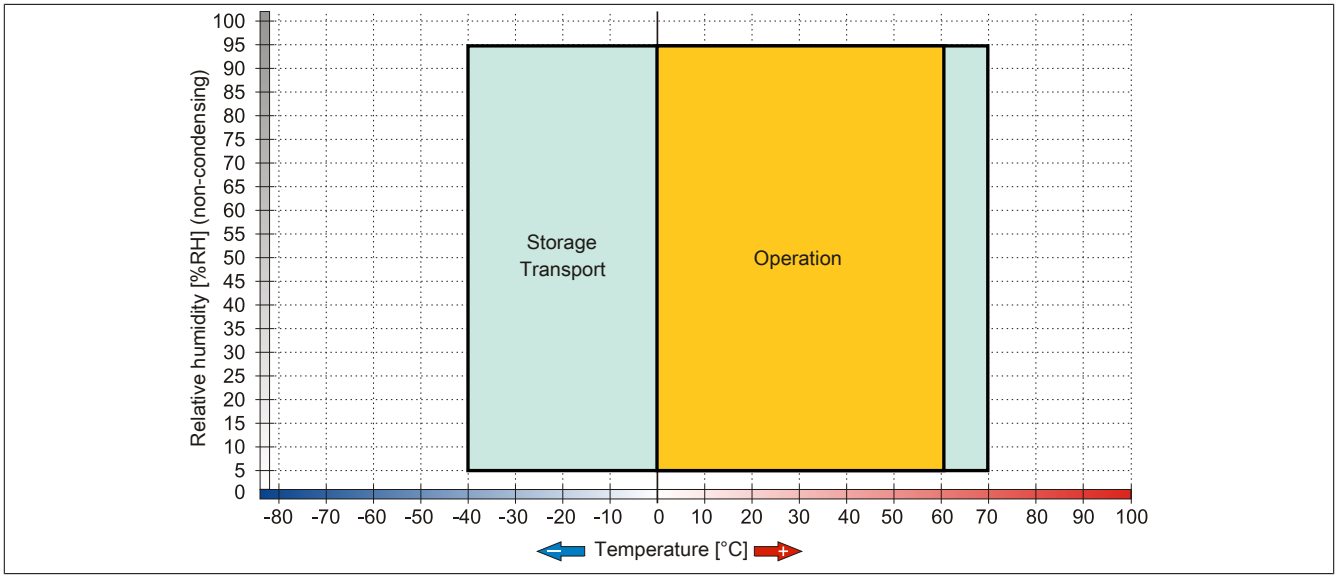


Figure 23: 5AC901.CHDD-01 - Temperature humidity diagram

3.8.3 5MMHDD.0500-00

General information

This 500 GB hard disk can be used as a replacement part or accessory.

- 500 GB hard disk
- Replacement hard disk for a 5AC801.HDDI-04 / 5AC901.CHDD-01 hard disk or a 5ACPCI.RAIC-05 RAID controller
- Specified for 24-hour operation
- S.M.A.R.T. support

Order data

Model number	Short description	Figure
	Drives	
5MMHDD.0500-00	500 GB SATA Hard Disk Spare part for 5AC801.HDDI-04, 5AC901.CHDD-01 and 5ACPCI.RAIC-06; Remark: Please see manual for proper use of the hard disk.	

Table 56: 5MMHDD.0500-00 - Order data

Technical data

Information:

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

Product ID	5MMHDD.0500-00
General information	
Certification	
CE	Yes
Hard disk drive	
Capacity	500 GB
Number of heads	2
Number of sectors	976.773.168
Bytes per sector	512 (logical) / 4096 (physical)
Cache	16 MB
Speed	5400 rpm ±0.2%
Startup time	Typ. 3.5 s (from 0 rpm to read access)
Lifespan	5 years
MTBF	1,000,000 POH [1]
S.M.A.R.T. support	Yes
Interface	SATA
Access time	5.5 ms
Supported transfer modes	SATA II
Data transfer rate	
Internal	Max. 147 MB/s
To/from host	Max. 150 MB/s (SATA I), max. 300 MB/s (SATA II)
Positioning time	
Nominal (read only)	11 ms
Maximum (read only)	21 ms
Environmental conditions	
Temperature [2]	
Operation [3]	0 to 60°C
Operation - 24-hour [4]	0 to 60°C
Storage	-40 to 70°C
Transport	-40 to 70°C

Table 57: 5MMHDD.0500-00 - Technical data

Product ID	5MMHDD.0500-00
Relative humidity [5]	
Operation	5 to 95%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Vibration	
Operation (continuous)	5 to 500 Hz: 0.25 g; no unrecoverable errors
Operation (occasional)	5 to 500 Hz: 0.5 g; no unrecoverable errors
Storage	10 to 500 Hz: 5 g; no unrecoverable errors
Transport	10 to 500 Hz: 5 g; no unrecoverable errors
Shock	
Operation	400 g and 2 ms duration; no unrecoverable errors
Storage	1000 g and 2 ms duration; no unrecoverable errors
Transport	1000 g and 2 ms duration; no unrecoverable errors
Altitude	
Operation	-305 to 3048 m
Storage	-305 to 12192 m
Mechanical characteristics	
Dimensions	
Width	7 mm
Height	69 mm
Depth	100 mm
Weight	100 g
Manufacturer information	
Manufacturer	Western Digital
Manufacturer's product ID	WD5000LUCT

Table 57: 5MMHDD.0500-00 - Technical data

1) With 8760 POH (power on hours) per year and 25°C surface temperature.
2) Temperature values for 305 meter altitude. The temperature specification must be reduced linearly by 1 °C every 305 meters. The temperature increase and decrease can be a maximum of 20 °C per hour.
3) Standard operation means 333 POH (power-on hours) per month.
4) 24-hour operation means 732 POH (power-on hours) per month.
5) Humidity gradient: Maximum 20% per hour.

Temperature humidity diagram

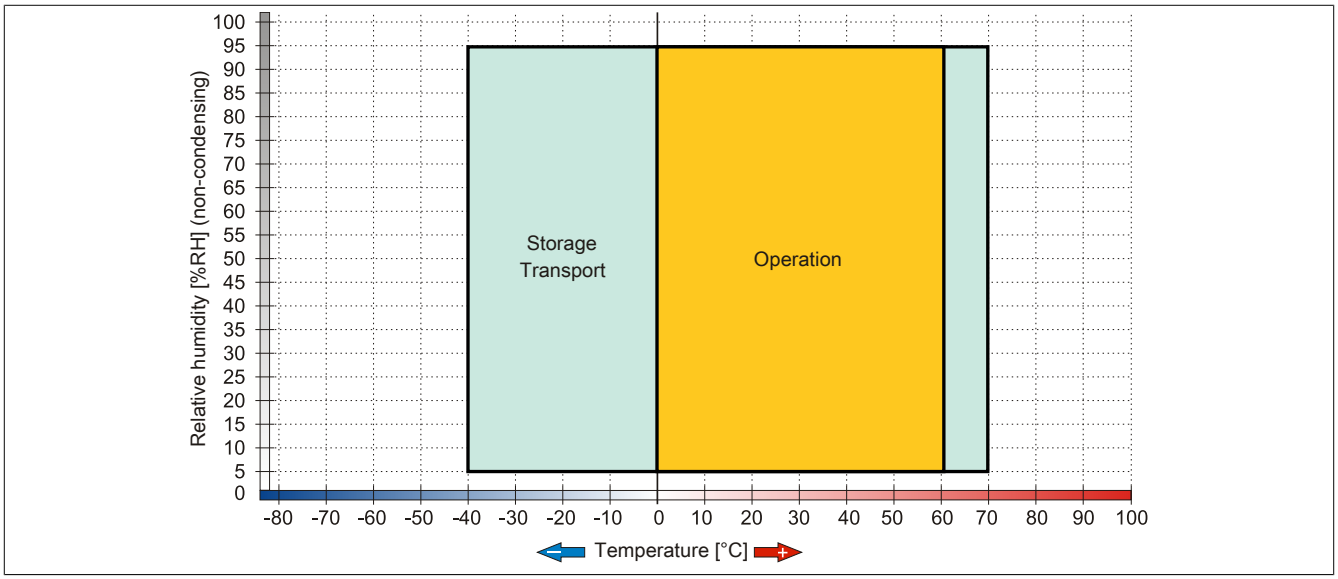


Figure 24: 5MMHDD.0500-00 - Temperature humidity diagram

3.8.4 5AC901.CSSD-00

General information

This 32 GB slide-in compact SSD (solid-state drive) is based on SLC (single-level cell) technology, is SATA 2.6 compatible and can be used in APC910 system units.

- 32 GB solid state drive
- SLC flash
- S.M.A.R.T. support
- Slide-in compact
- SATA 2.6 compatible

Order data

Model number	Short description	Figure
	Drives	
5AC901.CSSD-00	32 GB SATA SSD (SLC), Slide-in compact	

Table 58: 5AC901.CSSD-00 - Order data

Technical data

Caution!

A sudden loss of power may result in data loss! In very rare cases, mass memory may also be damaged.

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

Information:

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

Product ID	5AC901.CSSD-00
General information	
Certification	
CE	Yes
Solid state drive	
Capacity	32 GB
Data reliability	< 1 unrecoverable errors in 10^{16} bit read accesses
MTBF	2,000,000 hours
Power on/off cycles	50000
S.M.A.R.T. support	Yes
Interface	SATA
Maintenance	None
Continuous reading	Max. 250 MB/s
Continuous writing	Max. 195 MB/s
IOPS [1)]	
4k read	45,000
4k write	5,500
Endurance	
Guaranteed data volume	
Guaranteed	700 TB
Results for 5 years	350 GB/day
SLC Flash	Yes
Wear leveling	Static
Error Correction Coding (ECC)	Yes
Compatibility	SATA revision 2.6 compliant, compatible with SATA 1.5 Gbit/s and 3 Gbit/s interface rates ATA/ATAPI-7 SSD Enhanced SMART ATA feature set Native Command Queuing (NCQ) command

Table 59: 5AC901.CSSD-00 - Technical data

Product ID	5AC901.CSSD-00
Environmental conditions	
Temperature	
Operation	0 to 70°C
Storage	-55 to 95°C
Transport	-55 to 95°C
Relative humidity	
Operation	5 to 95%
Storage	5 to 95%
Transport	5 to 95%
Vibration	
Operation	5 to 700 Hz: 2.17 g
Storage	5 to 800 Hz: 3.13 g
Transport	5 to 800 Hz: 3.13 g
Shock	
Operation	1500 g, 0.5 ms
Storage	1500 g, 0.5 ms
Transport	1500 g, 0.5 ms
Altitude	
Operation	-300 to 12,192 m
Storage	-300 to 12,192 m
Transport	-300 to 12,192 m
Mechanical characteristics	
Mounting	Fixed [2]
Dimensions	
Width	13 mm
Height	98 mm
Depth	105 mm
Weight	118 g
Manufacturer information	
Manufacturer	Intel
Manufacturer's product ID	SSDSA2SH032G201

Table 59: 5AC901.CSSD-00 - Technical data

1) IOPS: Random read and write input/output operations per second
2) Slide-in compact mounting

Temperature humidity diagram

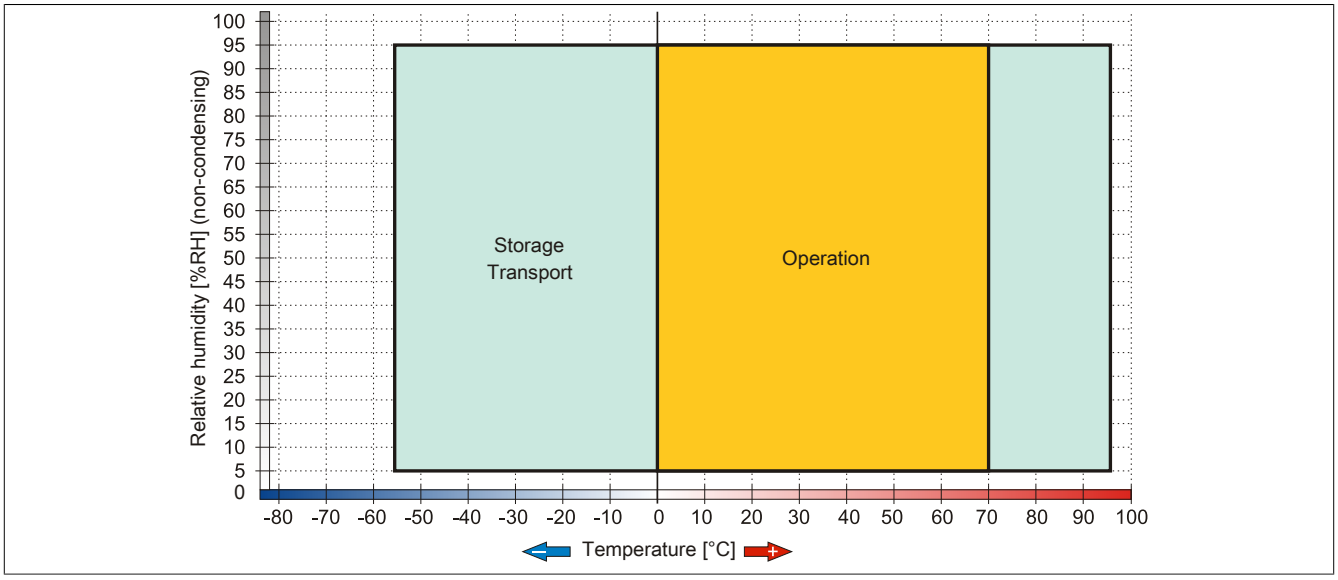


Figure 25: 5AC901.CSSD-00 - Temperature humidity diagram

3.8.5 5AC901.CSSD-01

General information

This 60 GB slide-in compact SSD (solid-state drive) is based on MLC (multi-level cell) technology, is SATA 3.0 compatible and can be used in APC910 system units.

- 60 GB solid state drive
- MLC flash
- S.M.A.R.T. support
- Slide-in compact
- SATA 3.0 compatible

Order data

Model number	Short description	Figure
	Drives	
5AC901.CSSD-01	60 GB SATA SSD (MLC), Slide-in compact	

Table 60: 5AC901.CSSD-01 - Order data

Technical data

Caution!

A sudden loss of power may result in data loss! In very rare cases, mass memory may also be damaged.

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

Information:

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

Product ID	5AC901.CSSD-01
General information	
Certification	
CE	Yes
Solid state drive	
Capacity	60 GB
Data reliability	< 1 unrecoverable errors in 10^{16} bit read accesses
MTBF	1,200,000 hours
S.M.A.R.T. support	Yes
Interface	SATA
Maintenance	None
Continuous reading	Max. 550 MB/s with SATA 6 Gbit/s Max. 280 MB/s with SATA 3 Gbit/s
Continuous writing	Max. 475 MB/s with SATA 6 Gbit/s Max. 245 MB/s with SATA 3 Gbit/s
IOPS [1)]	
4k read	15000
4k write	
Typical	23000
Maximum	80000
Endurance	
MLC flash	Yes
Compatibility	SATA Revision 3.0 compliant ACS-2 SSD Enhanced SMART ATA feature set Native Command Queuing (NCQ) command
Environmental conditions	
Temperature	
Operation	0 to 70°C
Storage	-55 to 95°C
Transport	-55 to 95°C

Table 61: 5AC901.CSSD-01 - Technical data

Product ID	5AC901.CSSD-01
Relative humidity	
Operation	5 to 95%
Storage	5 to 95%
Transport	5 to 95%
Vibration	
Operation	5 to 700 Hz: 2.17 g
Storage	5 to 800 Hz: 3.13 g
Transport	5 to 800 Hz: 3.13 g
Shock	
Operation	1500 g, 0.5 ms
Storage	1500 g, 0.5 ms
Transport	1500 g, 0.5 ms
Altitude	
Operation	-300 to 12,192 m
Storage	-300 to 12,192 m
Transport	-300 to 12,192 m
Mechanical characteristics	
Mounting	Fixed [2]
Dimensions	
Width	13 mm
Height	98 mm
Depth	105 mm
Weight	118 g
Manufacturer information	
Manufacturer	Intel
Manufacturer's product ID	SSDSC2CW060A3

Table 61: 5AC901.CSSD-01 - Technical data

1) IOPS: Random read and write input/output operations per second
2) Slide-in compact mounting

Temperature humidity diagram

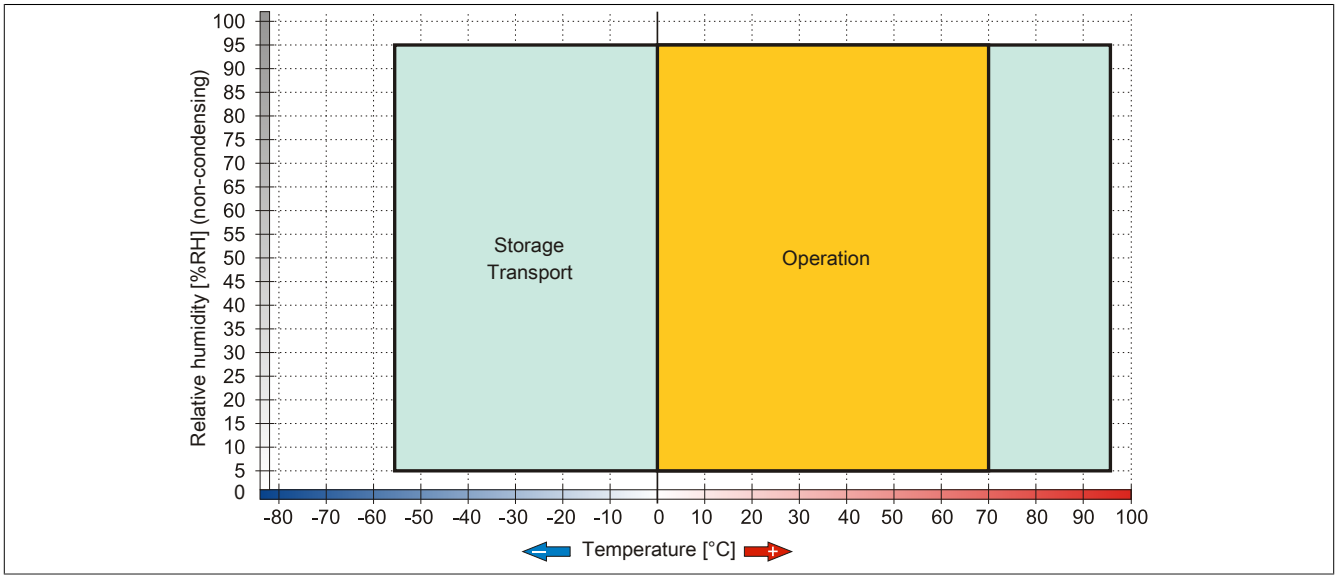


Figure 26: 5AC901.CSSD-01 - Temperature humidity diagram

3.8.6 5AC901.CSSD-02

General information

This 180 GB slide-in compact SSD (solid-state drive) is based on MLC (multi-level cell) technology, is SATA 3.0 compatible and can be used in APC910 system units.

- 180 GB solid state drive
- MLC flash
- S.M.A.R.T. support
- Slide-in compact
- SATA 3.0 compatible

Order data

Model number	Short description	Figure
	Drives	
5AC901.CSSD-02	180 GB SATA SSD (MLC), Slide-in compact	

Table 62: 5AC901.CSSD-02 - Order data

Technical data

Caution!

A sudden loss of power may result in data loss! In very rare cases, mass memory may also be damaged.

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

Information:

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

Product ID	5AC901.CSSD-02
General information	
Certification	
CE	Yes
Solid state drive	
Capacity	180 GB
Data reliability	< 1 unrecoverable errors in 10^{16} bit read accesses
MTBF	1,200,000 hours
S.M.A.R.T. support	Yes
Interface	SATA
Maintenance	None
Continuous reading	Max. 550 MB/s with SATA 6 Gbit/s Max. 280 MB/s with SATA 3 Gbit/s
Continuous writing	Max. 520 MB/s with SATA 6 Gbit/s Max. 260 MB/s with SATA 3 Gbit/s
IOPS [1)]	
4k read	50000
4k write	
Typical	60000
Maximum	80000
Endurance	
MLC flash	Yes
Compatibility	SATA Revision 3.0 compliant ACS-2 SSD Enhanced SMART ATA feature set Native Command Queuing (NCQ) command
Environmental conditions	
Temperature	
Operation	0 to 70°C
Storage	-55 to 95°C
Transport	-55 to 95°C

Table 63: 5AC901.CSSD-02 - Technical data

Product ID	5AC901.CSSD-02
Relative humidity	
Operation	5 to 95%
Storage	5 to 95%
Transport	5 to 95%
Vibration	
Operation	5 to 700 Hz: 2.17 g
Storage	5 to 800 Hz: 3.13 g
Transport	5 to 800 Hz: 3.13 g
Shock	
Operation	1500 g, 0.5 ms
Storage	1500 g, 0.5 ms
Transport	1500 g, 0.5 ms
Altitude	
Operation	-300 to 12,192 m
Storage	-300 to 12,192 m
Transport	-300 to 12,192 m
Mechanical characteristics	
Mounting	Fixed [2]
Dimensions	
Width	13 mm
Height	98 mm
Depth	105 mm
Weight	118 g
Manufacturer information	
Manufacturer	Intel
Manufacturer's product ID	SSDSC2CW180A3

Table 63: 5AC901.CSSD-02 - Technical data

1) IOPS: Random read and write input/output operations per second
2) Slide-in compact mounting

Temperature humidity diagram

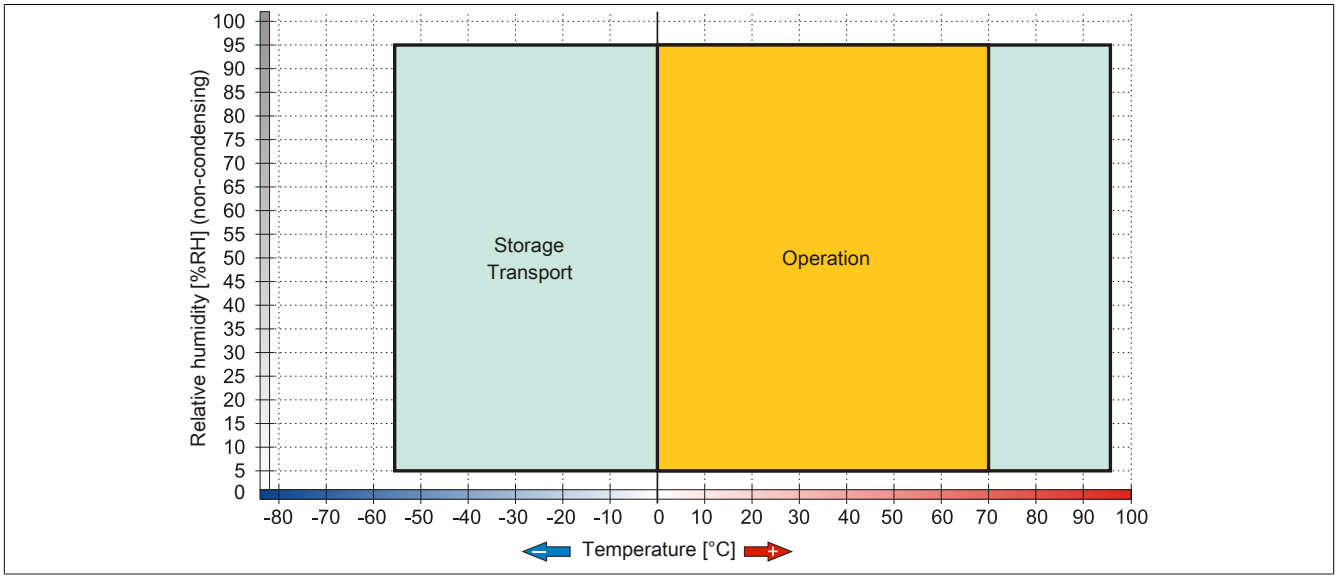


Figure 27: 5AC901.CSSD-02 - Temperature humidity diagram

3.8.7 5AC901.CCFA-00

General information

This CFast adapter is a slide-in compact adapter that allows a CFast card to be inserted and operated on a B&R Industrial PC. The CFast adapter can be used in APC910 system units.

- CFast slot
- Slide-in compact

Order data

Model number	Short description	Figure
	Drives	
5AC901.CCFA-00	CFast adapter to operate a CFast card in a slide-in compact slot	

Table 64: 5AC901.CCFA-00 - Order data

Technical data

Caution!

A sudden loss of power may result in data loss! In very rare cases, mass memory may also be damaged.

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

Information:

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

Product ID	5AC901.CCFA-00
General information	
Certification	
CE	Yes
Interfaces	
CFast slot	
Quantity	1
Environmental conditions	
Temperature	
Operation	Depending on the CFast card being used
Storage	Depending on the CFast card being used
Transport	Depending on the CFast card being used
Relative humidity	
Operation	Depending on the CFast card being used
Storage	Depending on the CFast card being used
Transport	Depending on the CFast card being used

Table 65: 5AC901.CCFA-00 - Technical data

3.8.8 5AC901.CHDD-99

General information

This slide-in compact installation kit consists of a removal strip and plastic guide rails for installing any 2.5" HDD or SSD drive in a slide-in compact slot for operation on an Automation PC 910.

Order data

Model number	Short description	Figure
	Drives	Image not found for 5AC901.CHDD-99!
5AC901.CHDD-99	Slide-in compact Kit	

Table 66: 5AC901.CHDD-99 - Order data

3.9 Interface options

Information:

Please note that not every interface option can be installed in interface slots 1 and 2. For more information, see "IF option 1 slot" on page 44 and "IF option 2 slot" on page 44.

Information:

For information about installing or replacing an interface option, please refer to the section "Installing interface options" on page 227.

3.9.1 5AC901.I485-00

General information

The 5AC901.I485-00 interface option is equipped with an RS232/422/485 interface. The operating mode (RS232/RS422/RS485) is selected automatically depending on the electrical connection.

- 1x RS232/422/485 interface
- Compatible with the APC910

Order data

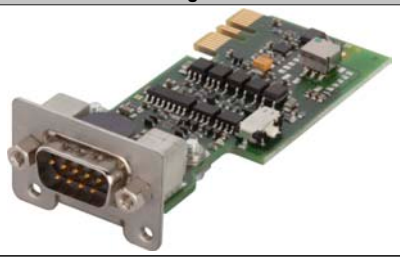
Model number	Short description	Figure
	Interface options	
5AC901.I485-00	RS232/422/485 interface option; for APC910	

Table 67: 5AC901.I485-00 - Order data

Technical data

Information:

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

Product ID	5AC901.I485-00
General information	
B&R ID code	$D84A
Certification	
CE	Yes
Interfaces	
COM1	
Type	RS232/422/485, electrically isolated
Design	9-pin DSUB plug
UART	16550-compatible, 16-byte FIFO
Max. baud rate	115 kbit/s
Electrical characteristics	
Power consumption	1 W
Environmental conditions	
Temperature	
Operation	0 to 55°C [1)]
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%
Storage	5 to 95%
Transport	5 to 95%

Table 68: 5AC901.I485-00 - Technical data

1) Detailed information can be found in the temperature tables in the user's manual.

Serial interface COM

Serial interface (COM)			
	RS232	**RS422/485**	
Type	RS232, not modem-capable, electrically isolated		
UART	16550-compatible, 16-byte FIFO		
Transfer rate	Max. 115 kbit/s		
Bus length	Max. 15 m	Max. 1200 m	
Pin	**RS232 pinout**	**RS422 pinout**	
1	NC	TXD\	
2	RXD	NC	
3	TXD	NC	
4	NC	TXD	
5	GND	GND	
6	NC	RXD\	
7	RTS	NC	
8	CTS	NC	
9	NC	RXD	

9-pin DSUB plug

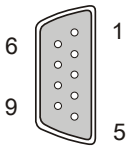


Table 69: COM - Pinout

RS232 - Bus length and cable type

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

Extension	Transfer rate
≤ 15 m	Typ. 64 kbit/s
≤ 10 m	Typ. 115 kbit/s
≤ 5 m	Typ. 115 kbit/s

Table 70: RS232 - Bus length and transfer rate

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

RS232 cables	Property
Signal lines	
Cable cross section	4x 0.16 mm² (26AWG), tinned Cu wire
Wire insulation	PE
Conductor resistance	≤82 Ω/ km
Stranding	Wires stranded in pairs
Shield	Paired shield with aluminum foil
Grounding line	
Cable cross section	1x 0,34 mm² (22AWG/19), tinned Cu wire
Wire insulation	PE
Conductor resistance	≤59 Ω/km
Outer sheathing	
Material	PUR mixture
Features	Halogen-free
Cable shielding	From tinned copper wires

Table 71: RS232 - Cable requirements

RS422 - Bus length and cable type

The RTS line must be switched on to switch the transmitter to active.

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

Extension	Transfer rate
1200 m	Typ. 115 kbit/s

Table 72: RS422 - Bus length and transfer rate

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

RS422 cable	Property
Signal lines	
Cable cross section	4x 0.25 mm² (24AWG/19), tinned Cu wire
Wire insulation	PE
Conductor resistance	≤82 Ω/km
Stranding	Wires stranded in pairs
Shield	Paired shield with aluminum foil

Table 73: RS422 - Cable requirements

RS422 cable	Property
Grounding line	
Cable cross section	1x 0,34 mm² (22AWG/19), tinned Cu wire
Wire insulation	PE
Conductor resistance	≤59 Ω/km
Outer sheathing	
Material	PUR mixture
Features	Halogen-free
Cable shielding	From tinned copper wires

Table 73: RS422 - Cable requirements

When operated as an RS485 interface

When operated in this mode, the pins of the RS422 default interface (1, 4, 6 and 9) must be used. Pins should be connected as shown.

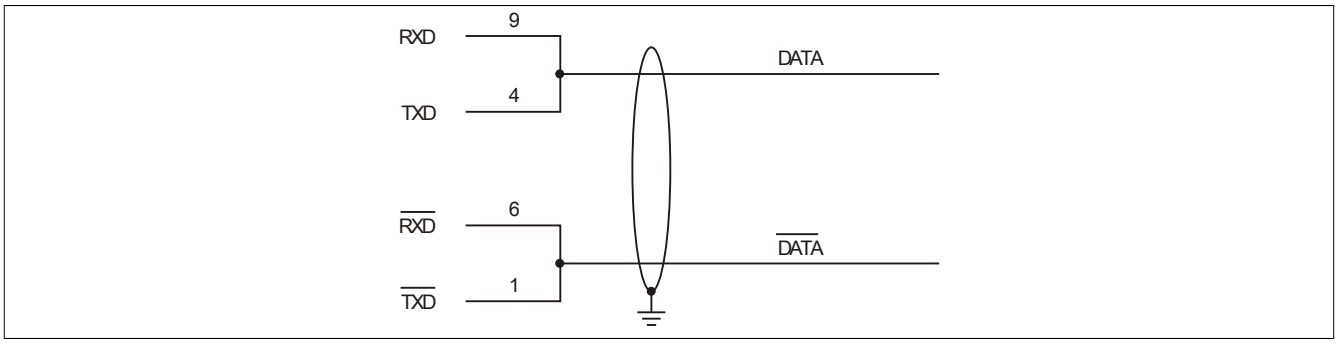


Figure 28: RS232/422/485 interface - Operation in RS485 mode

The RTS line must be switched by the driver for each transmission or reception; there is no automatic switch-back mechanism. This cannot be configured in Windows.

The voltage drop resulting from long cable lengths can lead to greater potential differences between bus stations, which can hinder communication. This can be improved by running ground wire with the others.

RS485 - Bus length and cable type

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

Extension	Transfer rate
1200 m	Typ. 115 kbit/s

Table 74: RS485 - Bus length and transfer rate

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

RS485 cable	Property
Signal lines	
Cable cross section	4x 0.25 mm² (24AWG/19), tinned Cu wire
Wire insulation	PE
Conductor resistance	≤82 Ω/km
Stranding	Wires stranded in pairs
Shield	Paired shield with aluminum foil
Grounding line	
Cable cross section	1x 0,34 mm² (22AWG/19), tinned Cu wire
Wire insulation	PE
Conductor cross section	≤59 Ω/km
Outer sheathing	
Material	PUR mixture
Features	Halogen-free
Cable shielding	From tinned copper wires

Table 75: RS485 - Cable requirements

terminating resistor

A terminating resistor for the serial interface is already integrated in the IF option. There is a switch to activate or deactivate the terminating resistor, but the system unit needs to be opened in order to reach it. An active terminating resistor is indicated by a yellow LED.

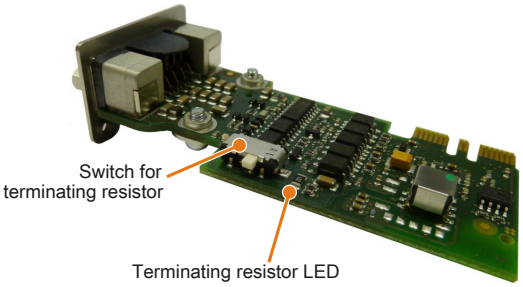


Figure 29: 5AC901.I485-00 - Terminating resistor

3.9.2 5AC901.ICAN-00

General information

The 5AC901.ICAN-00 interface option is equipped with a CAN master interface.

- 1x CAN master interface
- Compatible with the APC910

It is not possible to operate two 5AC901.ICAN interface options (in the IF option 1 and IF option 2 slots) at the same time.

Order data

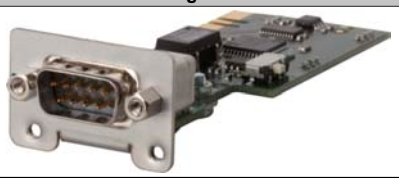
Model number	Short description	Figure
	Interface options	
5AC901.ICAN-00	CAN interface option; for APC910	

Table 76: 5AC901.ICAN-00 - Order data

Technical data

Information:

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

Product ID	5AC901.ICAN-00
General information	
B&R ID code	$D84B
Certification	
CE	Yes
Interfaces	
CAN	
Quantity	1
Design	9-pin DSUB plug
Transfer rate	Max. 500 kbit/s
Electrical characteristics	
Power consumption	1 W
Environmental conditions	
Temperature	
Operation	0 to 55°C [1]
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%
Storage	5 to 95%
Transport	5 to 95%

Table 77: 5AC901.ICAN-00 - Technical data

1) Detailed information can be found in the temperature tables in the user's manual.

CAN interface

CAN bus		
Type	Electrically isolated	
Transfer rate	Max. 500 kbit/s	
Bus length	Max. 1000 meters	
Pin	**Assignment**	9-pin DSUB plug
1	NC	
2	CAN low	
3	GND	
4	NC	
5	NC	
6	Reserved	
7	CAN high	
8	NC	
9	NC	

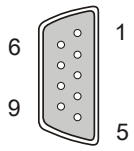


Table 78: 5AC901.ICAN-00 - CAN pinout

terminating resistor

A terminating resistor for the CAN interface is already integrated in the IF option. There is a switch to activate or deactivate the terminating resistor, but the side cover must be removed from the system unit in order to reach it (see Installing interface options, steps 1 to 4). An active terminating resistor is indicated by a yellow LED.

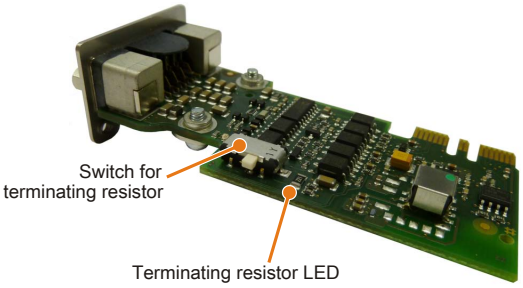


Figure 30: 5AC901.ICAN-00 - Terminating resistor

3.9.3 5AC901.IHDA-00

General information

The 5AC901.IHDA-00 interface option has an HDA sound chip with externally accessible MIC, Line IN and Line OUT channels.

- 1x MIC
- 1x Line IN
- 1x Line OUT
- Compatible with the APC910

The interface option 5AC901.IHDA-00 can only be operated in the IF option 1 slot.

Order data

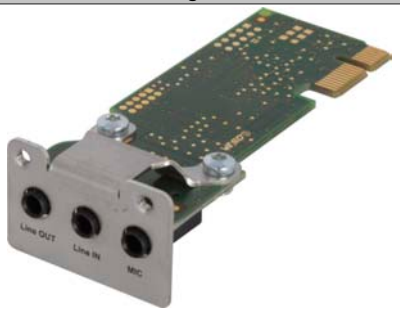
Model number	Short description	Figure
	Interface options	
5AC901.IHDA-00	Audio interface option, connection for 1x MIC, 1x Line IN, 1x Line OUT; for APC910	

Table 79: 5AC901.IHDA-00 - Order data

Technical data

Information:

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

Product ID	5AC901.IHDA-00
General information	
B&R ID code	$D84E
Certification	
CE	Yes
Interfaces	
Audio	
Type	HDA sound
Controller	Realtek ALC 662
Inputs	Microphone, Line in
Outputs	Line OUT
Electrical characteristics	
Power consumption	0.4 W
Environmental conditions	
Temperature	
Operation	0 to 55°C [1]
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%
Storage	5 to 95%
Transport	5 to 95%

Table 80: 5AC901.IHDA-00 - Technical data

1) Detailed information can be found in the temperature tables in the user's manual.

MIC, Line IN, Line OUT

MIC, Line IN, Line OUT		
Controller	Realtek ALC 662	3.5mm socket, female
MIC	Connection of a mono microphone with a 3.5 mm jack	
Line IN	Stereo Line IN signal supplied via a 3.5 mm jack	
Line OUT	Connection of a stereo playback device (e.g. amplifier) via a 3.5 mm jack	

Table 81: MIC, Line IN, Line OUT

A special driver is required in order to operate the audio controller. Drivers for approved operating systems are available in the Downloads section of the B&R website (www.br-automation.com).

Information:

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

3.9.4 5AC901.ISRM-00

General information

The 5AC901.ISRM-00 interface option has 2 MB SRAM.

- 2 MB SRAM
- Compatible with the APC910

The SRAM interface option 5AC901.ISRM-00 can only be operated in the IF option 2 slot.

Information:

When writing, reading or accessing SRAM, "non-aligned-accesses" are not supported by the AVLON bus (internal bus in the PCI Express core).

Order data

Model number	Short description	Figure
	Interface options	
5AC901.ISRM-00	SRAM interface option, 2 MB; for APC910	

Table 82: 5AC901.ISRM-00 - Order data

Technical data

Information:

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

Product ID	5AC901.ISRM-00
General information	
Connection to system	via PCI Express bus
B&R ID code	$D850
Certification	
CE	Yes
Controller	
SRAM	
Size	2 MB
Battery-buffered	Yes
Remanent variables in power fail mode	512 kB (e.g. for Automation Runtime, see AS help documentation)
Electrical characteristics	
Power consumption	2 W
Environmental conditions	
Temperature	
Operation	0 to 55°C [1]
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%
Storage	5 to 95%
Transport	5 to 95%

Table 83: 5AC901.ISRM-00 - Technical data

1) Detailed information can be found in the temperature tables in the user's manual.

3.10 Monitor/Panel options

Information:

Monitor/Panel options can only be connected to system units with 2 PCI/PCIe slots.

Information:

For information about installing or replacing a monitor/panel option, please refer to the section "Installing monitor/panel options" on page 230.

3.10.1 5AC901.LDPO-00

General information

The 5AC901.LDPO-00 monitor/panel option is equipped with a DisplayPort 1.1 and a USB 2.0 interface.

- DisplayPort interface
- USB 2.0 port

Order data

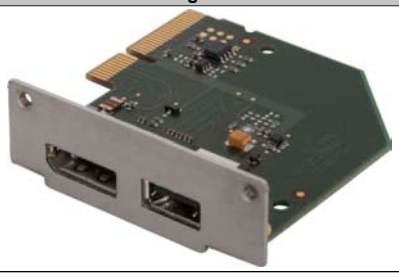
Model number	Short description	Figure
	Monitor / Panel options	
5AC901.LDPO-00	DisplayPort transmitter	

Table 84: 5AC901.LDPO-00 - Order data

Technical data

Information:

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

Product ID	5AC901.LDPO-00
General information	
B&R ID code	$D852
Certification	
CE	Yes
Interfaces	
USB	
Quantity	1
Type	USB 2.0
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Current load	Max. 1 A
DisplayPort	
Quantity	1
Version	1.1
Electrical characteristics	
Power consumption	0.2 W
Environmental conditions	
Temperature	
Operation	0 to 55°C [1)]
Storage	-20 to 60°C
Transport	-20 to 60°C

Table 85: 5AC901.LDPO-00 - Technical data

Product ID	5AC901.LDPO-00
Relative humidity	
Operation	5 to 90%
Storage	5 to 95%
Transport	5 to 95%

Table 85: 5AC901.LDPO-00 - Technical data

1) Detailed information can be found in the temperature tables in the user's manual.

Information:

The hardware and graphics drivers of approved operating systems support the hot-plugging of display devices to the DisplayPort interface for service purposes. The DisplayPort connector is specified for 10,000 connection cycles.

DisplayPort

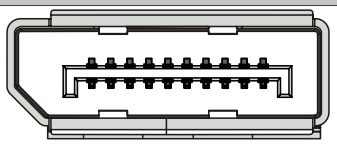
DisplayPort 1.1	
The following overview lists the video signals available on the DisplayPort 1.1 output.	
Monitor/Panel option	**Video signals for all system unit types**
5AC901.LDPO-00	DisplayPort, DVI, HDMI

Table 86: DisplayPort 1.1

Information:

The hardware and graphics drivers of approved operating systems support the hot-plugging of display devices to the DisplayPort interface for service purposes. The DisplayPort connector is specified for 10,000 connection cycles.

Pinout - DisplayPort

Pin	Signal	Description	Pin	Signal	Description
1	DP_LANE0+	DisplayPort lane 0 (positive)	11	GND	Ground
2	GND	Ground	12	DP_LANE3-	DisplayPort lane 3 (negative)
3	DP_LANE0-	DisplayPort lane 0 (negative)	13	CONFIG1	Configuration pin 1 (connected to ground)
4	DP_LANE1+	DisplayPort lane 1 (positive)	14	CONFIG2	Configuration pin 2 (connected to ground)
5	GND	Ground	15	DP_AUX+	Auxiliary channel (positive)
6	DP_LANE1-	DisplayPort lane 1 (negative)	16	GND	Ground
7	DP_LANE2+	DisplayPort lane 2 (positive)	17	DP_AUX-	Auxiliary channel (negative)
8	GND	Ground	18	DP_HPD#	Hot plug detect
9	DP_LANE2-	DisplayPort lane 2 (negative)	19	RETURN	Return for power
10	DP_LANE3+	DisplayPort lane 3 (positive)	20	DP_PWR	Power for connector

DisplayPort (20-pin, female)

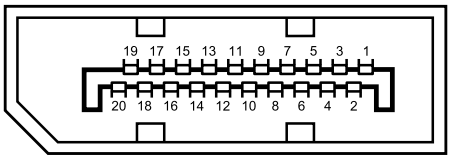


Table 87: Pinout - DisplayPort

3.10.2 5AC901.LSDL-00

General information

The 5AC901.LSDL-00 monitor/panel option is equipped with a monitor/panel interface for connecting additional panels via SDL or DVI.

- DVI/SDL interface

Order data

Model number	Short description	Figure
	Monitor / Panel options	Image not found for 5AC901.LSDL-00!
5AC901.LSDL-00	Smart Display Link/DVI transmitter	

Table 88: 5AC901.LSDL-00 - Order data

Technical data

Information:

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

Product ID	5AC901.LSDL-00
General information	
B&R ID code	$D853
Certification	
CE	Yes
Interfaces	
Panel/Monitor interface	
Design	DVI-D socket
Type	SDL/DVI
Electrical characteristics	
Power consumption	1 W
Environmental conditions	
Temperature	
Operation	0 to 55°C 1)
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%
Storage	5 to 95%
Transport	5 to 95%

Table 89: 5AC901.LSDL-00 - Technical data

1) Detailed information can be found in the temperature tables in the user's manual.

Monitor/Panel interface

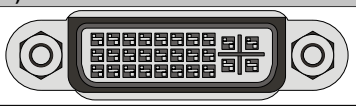
Monitor/Panel connection - SDL (Smart Display Link) / DVI		
The following is an overview of the video signals available on the monitor/panel output.		
Monitor/Panel option	**Video signals**	
5AC901.LSDL-00	DVI, SDL	

Table 90: Monitor/Panel connection - DVI, SDL

Information:

The hardware and graphics drivers of approved operating systems support the hot-plugging of display devices to the monitor/panel interface for service purposes. The monitor/panel connector is specified for 100 connection cycles.

Information:

If a display device with a touch screen is connected to the monitor/panel interface and then disconnected again during operation (hot-plugging), it may be necessary to recalibrate the touch screen.

USB transfer rates in SDL and DVI modes

Information:

In SDL mode, the USB transfer rate is limited to USB 1.1.

In DVI mode, the USB transfer rate is determined by the USB interface and USB hub on the display device.

Pinout

Pin	Assignment	Description	Pin	Assignment	Description
1	TMDS data 2-	DVI lane 2 (negative)	16	HPD	Hot plug detect
2	TMDS data 2+	DVI lane 2 (positive)	17	TMDS data 0-	DVI lane 0 (negative)
3	TMDS data 2/4 SHIELD	Shield for data pair 2 and 4	18	TMDS data 0+	DVI lane 0 (positive)
4	SDL-	SDL lane (negative)	19	TMDS Data 0/ XUSB1 SHIELD	Shield for data pair 0 and USB1
5	SDL+	SDL lane (positive)	20	XUSB1-	USB lane 1 (negative)
6	DDC clock	DDC-based control signal (clock)	21	XUSB1+	USB lane 1 (positive)
7	DDC data	DDC-based control signal (data)	22	TMDS clock shield	Shield for clock pair
8	NC	Not connected	23	TMDS clock+	DVI clock (positive)
9	TMDS data 1-	DVI lane 1 (negative)	24	TMDS clock -	DVI clock (negative)
10	TMDS DATA 1+	DVI lane 1 (negative) HDMI clock (positive)	C1	NC	Not connected
11	TMDS DATA 1/ XUSB0 SHIELD	Shield for data pair 1 and USB0	c2	NC	Not connected
12	XUSB0-	USB lane 0 (negative)	C3	NC	Not connected
13	XUSB0+	USB lane 0 (positive)	C4	NC	Not connected
14	+5 V power[1)]	+5 V power supply	C5	NC	Not connected
15	Ground (return for +5 V, HSync and VSync)	Ground			

DVI 24-pin, female

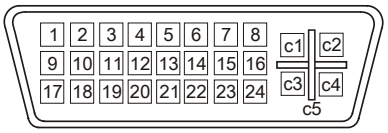


Table 91: Pinout - DVI connection

1) Protected internally by a multifuse.

3.11 Uninterruptible power supply (UPS)

With an optionally integrated UPS, the B&R Industrial PC makes sure that the PC system completes write operations even when a power failure occurs. When the UPS detects a power failure, it switches to battery operation immediately without interruption. This means that all running programs are shut down properly by the UPS software. This prevents the possibility of inconsistent data (only functions if the UPS is already configured and the driver is activated).

Information:

- **The monitor/panel is not buffered by the UPS and will shut off when the power fails.**
- **More detailed information about uninterruptible power supplies can be found in the user's manual for the external UPS, which can be downloaded from the B&R website.**

Because the charging circuit is integrated in the housing of the B&R Industrial PC, installation has been simplified to merely attaching the connection cable to the battery unit mounted next to the PC.

Special emphasis was placed on ease of maintenance when the battery unit was designed. Batteries are easily accessible from the front and can be replaced in just a few moments when servicing.

3.11.1 Requirements

- A suitable system unit
- Add-on UPS module 5AC901.IUPS-00
- Battery unit 5AC901.BUPS-00
- UPS connection cable 0.5 m (5CAUPS.0005-00) or 3 m (5CAUPS.0030-00)
- Configuration of the B&R UPS in the ADI Control Center

Information:

For information about installation and connecting to the UPS IF option, see "Installing and connecting the UPS battery unit" on page 241.

3.11.2 5AC901.IUPS-00

General information

The 5AC901.IUPS-00 UPS IF option, together with the 5AC901.BUPS-00 battery unit, allows the B&R Industrial PC to shut down without any loss of data during a power failure.

The 5AC901.IUPS-00 UPS interface option can only be operated in the IF option 1 slot.

Order data

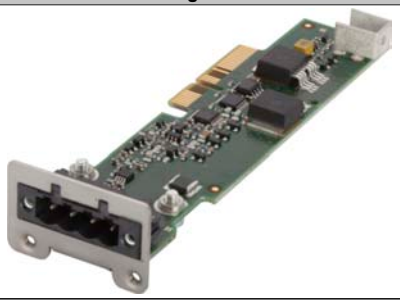
Model number	Short description	Figure
	Uninterruptible power supplies	
5AC901.IUPS-00	UPS interface option; for APC910 and 4.5 Ah battery.	
	Required accessories	
	Uninterruptible power supplies	
5AC901.BUPS-00	Battery unit 4,5 Ah; for APC910 UPS.	
5CAUPS.0005-01	UPS cable 0.5 m; for UPS 5AC901.IUPS-00.	
5CAUPS.0030-01	UPS cable 3 m; for UPS 5AC901.IUPS-00.	

Table 92: 5AC901.IUPS-00 - Order data

Technical data

Information:

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

Product ID	5AC901.IUPS-00
General information	
Certification	
CE	Yes
Electrical characteristics	
Power consumption	Max. 15 Watts at 0.5 A
Deep discharge protection	Yes
Short circuit proof	Yes [1]
Battery Charging Rating	
Charging current	Typ. 0.5 A / Max. 1 A (adjustable)
Environmental conditions	
Temperature	
Operation	0 to 55°C [2]
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%
Storage	5 to 95%
Transport	5 to 95%

Table 93: 5AC901.IUPS-00 - Technical data

1) The interface option has short circuit protection. This does not apply to the connected battery unit.
2) Detailed information can be found in the temperature tables in the user's manual.

Installation

This module is installed using the materials included in delivery. For more information regarding installation, see "Installing interface options" on page 227.

3.11.3 5AC901.BUPS-00

General information

- Single cell rechargeable battery
- 2 Hawker Cyclon 12 V 4.5 Ah rechargeable batteries connected in series
- Rated voltage: 24 V
- Capacity: 4.5 Ah

The battery unit has a limited service life and should be replaced regularly (after the specified service life at the latest).

Order data

Model number	Short description	Figure
	Uninterruptible power supplies	
5AC901.BUPS-00	Battery unit 4,5 Ah; for APC910 UPS.	
	Required accessories	
	Uninterruptible power supplies	
5CAUPS.0005-01	UPS cable 0.5 m; for UPS 5AC901.IUPS-00.	
5CAUPS.0030-01	UPS cable 3 m; for UPS 5AC901.IUPS-00.	

Table 94: 5AC901.BUPS-00 - Order data

Technical data

Product ID	5AC901.BUPS-00
General information	
Battery	
Type	Hawker Cyclon 12V 4.5 Ah; two rechargeable batteries connected in series
Lifespan	Up to 15 years
Design	Single cell
Certification	
CE	Yes
c-UL-us	Yes
Electrical characteristics	
Nominal voltage	24 V
Capacity	4.5 Ah
Battery Charging Rating	
Charging current [1]	2.88 A
Environmental conditions	
Temperature	
Operation	-30 to 60°C [2]
Storage	-65 to 80°C
Transport	-65 to 80°C
Relative humidity	
Operation	5 to 95%
Storage	5 to 95%
Transport	5 to 95%
Altitude	
Operation	Max. 3000 m
Mechanical characteristics	
Dimensions	
Width	223.2 mm
Height	78.2 mm
Depth	145 mm
Weight	Approx. 5000 g

Table 95: 5AC901.BUPS-00 - Technical data

1) Maximum charging current
2) If the temperature goes below the minimum or goes above the maximum, battery buffering is no longer possible. This results in the battery no longer being charged since this could lead to battery damage.

Dimensions

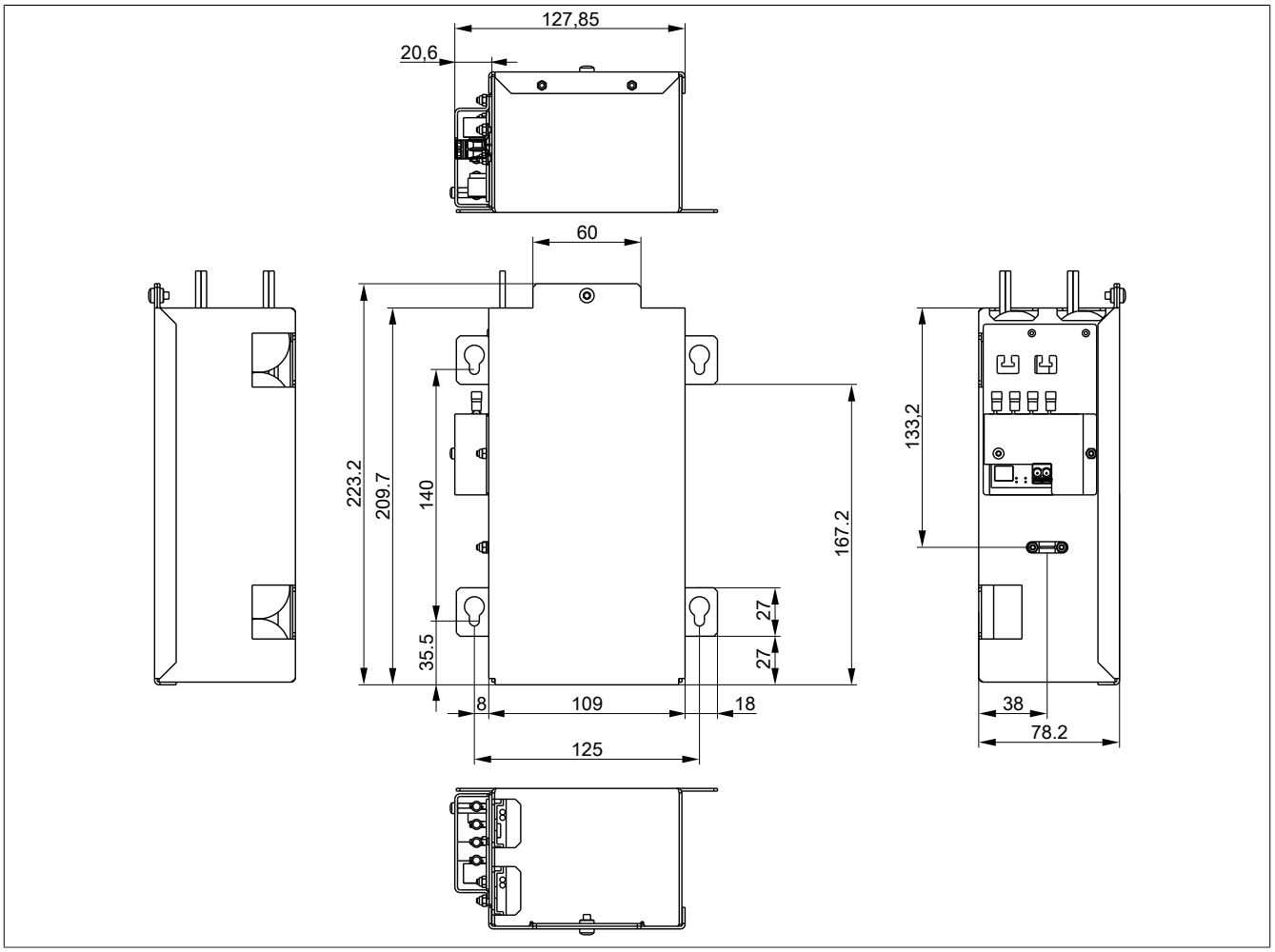


Figure 31: 5AC901.BUPS-00 - Dimensions

Drilling template

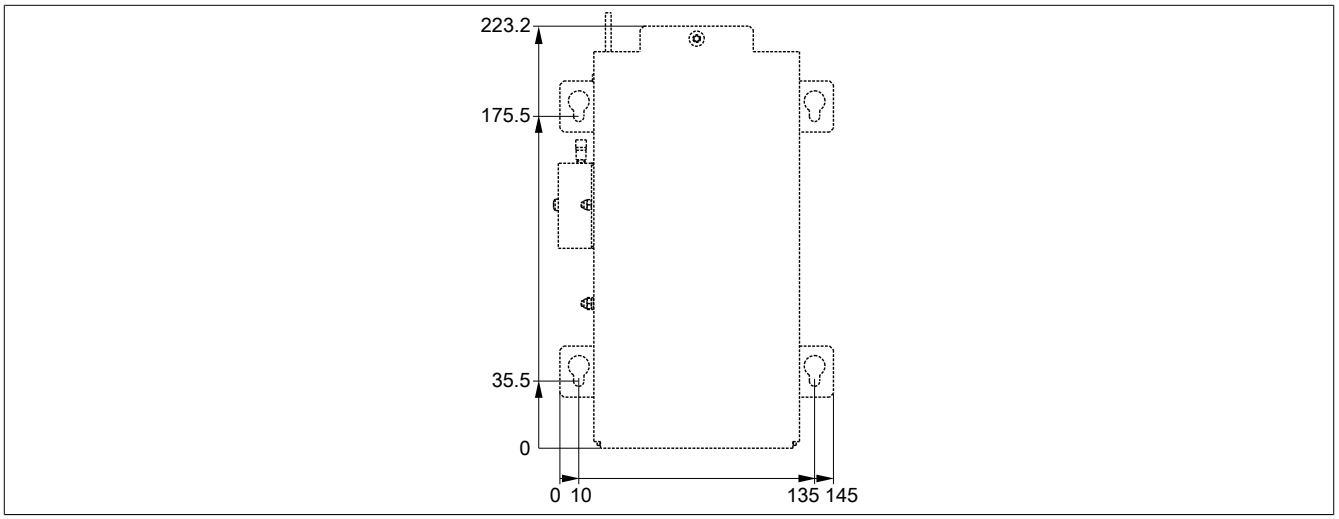


Figure 32: Drilling template - 5AC901.BUPS-00

Installation

For information about installation and connecting to the UPS IF option, see "Installing and connecting the UPS battery unit" on page 241.

Precautions for handling and use

Spills and leaks:

Any further spillage or leakage must be prevented. Smaller spills must be bonded with dry sand, dirt and vermiculite. The use of flammable materials is prohibited. If possible, neutralize acids with sodium bicarbonate, chalk, etc. Acid-resistant clothing, shoes, gloves and face protection must be worn. The disposal of unneutralized acid in the sewage system is prohibited!

Waste disposal:

Used batteries must be disposed of in an environmentally friendly recycling process.

Neutralized mud must be stored in closed containers and stored/disposed of in accordance with applicable regulations. After neutralization and testing, larger spills diluted with water must be disposed of in accordance with applicable regulations.

Handling and storage:

- Batteries must be kept in cool, dry and well ventilated rooms with impermeable surfaces and appropriate containment conditions in case of leakage.
- Batteries must be protected from adverse weather conditions and separated from incompatible materials during storage and transport.
- A sufficient supply of water must be located nearby.
- Damage to containers where batteries are stored and transported must be prevented.
- Keep away from fire, sparks and excessive heat.

3.11.4 5CAUPS.xxxx-01

General information

The UPS connection cable is either 0.5 or 3 m in length and establishes the connection between the add-on UPS module (5AC901.IUPS-00) and the battery unit (5AC901.BUPS-00).

Order data

Model number	Short description	Figure
	Uninterruptible power supplies	Image not found for 5CAUPS.0005-01!
5CAUPS.0005-01	UPS cable 0.5 m; for UPS 5AC901.IUPS-00.	
5CAUPS.0030-01	UPS cable 3 m; for UPS 5AC901.IUPS-00.	

Table 96: 5CAUPS.0005-01, 5CAUPS.0030-01 - Order data

Technical data

Product ID	5CAUPS.0005-01	5CAUPS.0030-01
General information		
Certification		
CE	Yes	
Cable structure		
Wire cross section	2x 0.5 mm² (AWG 20) 2x 2.5 mm² (AWG 13)	
Conductor resistance	At 0.5 mm² max. 39 Ω/km At 2.5 mm² max. 7.98 Ω/km 1)	
Outer sheathing		
Material	Thermoplastic PVC-based material	
Color	Window gray (similar to RAL 7040)	
Connector		
Type	Screw clamps 4-pin 2)	
Electrical characteristics		
Operating voltage	Max. 30 VDC	
Peak operating voltage	Typ. 30 VDC	
Test voltage		
Wire/wire	1500 V	
Current load	10 A at 20°C	
Environmental conditions		
Temperature		
Moving	-5 to 70°C	
Static	-30 to 70°C	
Mechanical characteristics		
Dimensions		
Length	0.5 m	3 m
Diameter	7 mm	
Flex radius		
Moving	10x wire cross-section	
Fixed installation	5x wire cross-section	
Weight	Approx. 55 g	Approx. 250 g

Table 97: 5CAUPS.0005-01, 5CAUPS.0030-01 - Technical data

1) At an ambient temperature of 20°C.
2) Tightening torque: min. 0.4 Nm; max. 0.5 Nm

Information:

The maximum length of the UPS connection cable depends on:

- **Power**
- **Voltage drop**
- **Wire cross section**
- **Sensor lines**

3.12 Front covers

3.12.1 5AC901.FF0x-00

General information

The front cover on the APC910 keeps the ports on the front of the device free of dust, dirt and other contaminants. A front cover is available for each APC910 system unit model.

Order data

Model number	Short description	Figure
	Front cover	
5AC901.FF01-00	APC910 front cover, 1 slot, orange	
5AC901.FF02-00	APC910 front cover, 2 slots, orange	

Table 98: 5AC901.FF01-00, 5AC901.FF02-00 - Order data

Technical data

Product ID	5AC901.FF01-00	5AC901.FF02-00
Mechanical characteristics		
Housing		
Front cover	Colored orange plastic (similar to Pantone 144CV)	
Material	Plastics	
Dimensions		
Width	82 mm	120.9 mm
Height	264 mm	
Depth	14 mm	
Weight	Approx. 84 g	Approx. 117 g

Table 99: 5AC901.FF01-00, 5AC901.FF02-00 - Technical data

Chapter 3 • Installation

1 Installation

Devices are installed using the mounting plates found on the housing. These plates are designed for M5 screws.

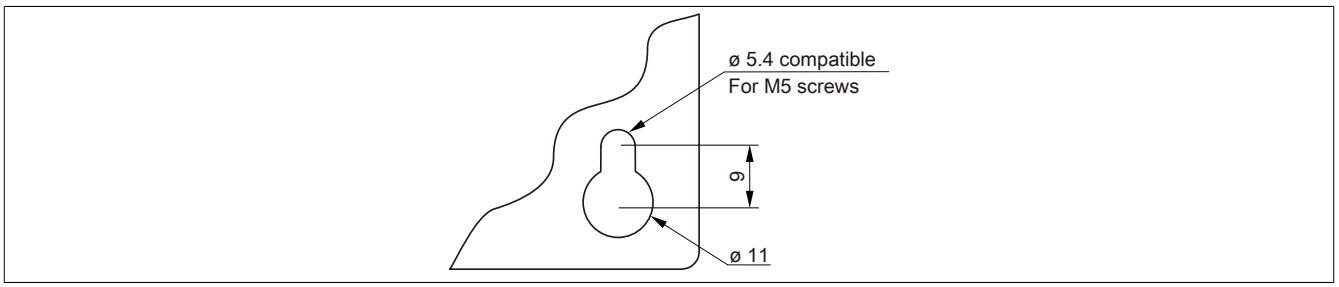


Figure 33: Mounting plates

The exact positioning of the mounting holes can be seen in the drilling templates in Chapter 2 "Technical data", section "Individual components" on page 50.

1.1 Important mounting information

- Environmental conditions must be taken into consideration.
- This device must be mounted to a flat surface.
- This device is only certified for operation in closed rooms.
- This device must not be subjected to direct sunlight.
- Ventilation holes must not be covered.
- This device must be mounted in one of the approved orientations.
- The wall or control cabinet must be able to withstand four times the total weight of the device.
- The flex radius of connected cables (DVI, SDL, USB, etc.) must not be exceeded.

1.2 Procedure

1. Drill the necessary holes in the control cabinet. The exact position of the mounting holes is illustrated in the drilling templates.
2. Mount the B&R Industrial PC to the control cabinet using M5 screws.

1.3 Mounting orientation

The following diagrams show the approved mounting orientations for the Automation PC 910. The APC910 must be mounted as described in the following sections.

1.3.1 Vertical mounting orientation

APC910 systems with or without a fan kit can be mounted in this orientation.

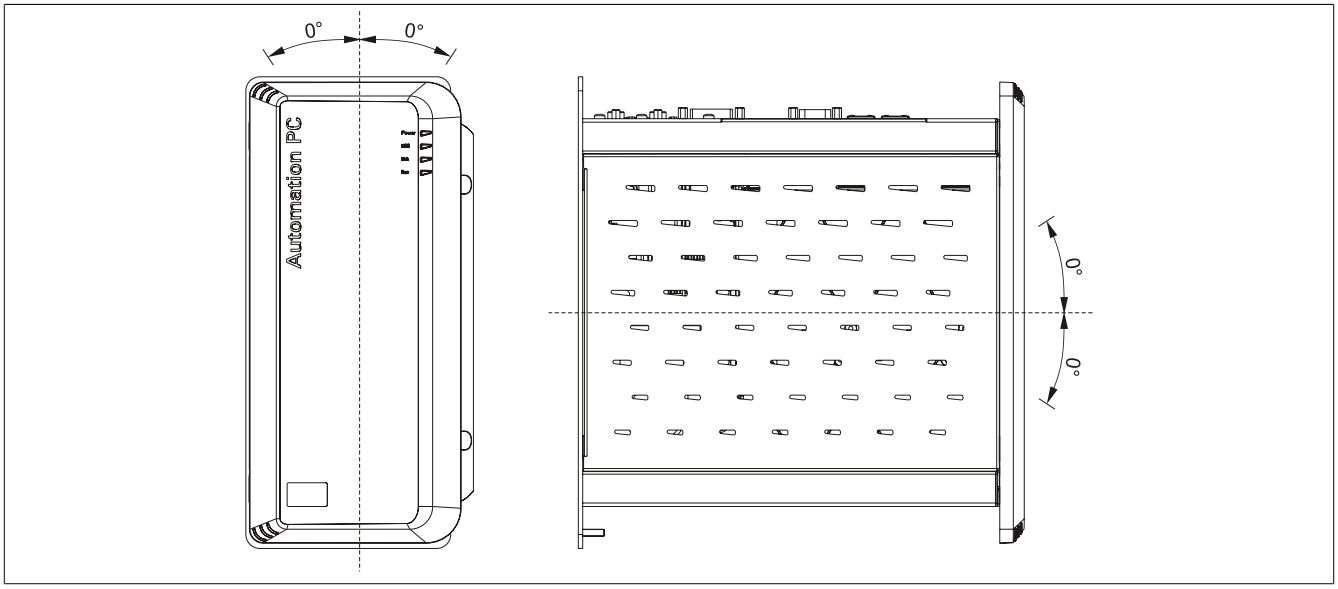


Figure 34: Vertical mounting orientation

In order to facilitate natural air circulation, devices must be mounted according to the spacing indicated in the section "Spacing for air circulation" on page 105.

1.3.2 Horizontal mounting orientation

Operation in the horizontal mounting orientation (heat sink on top) requires the use of a fan kit. The maximum ambient temperature specification must be reduced by 5°C.

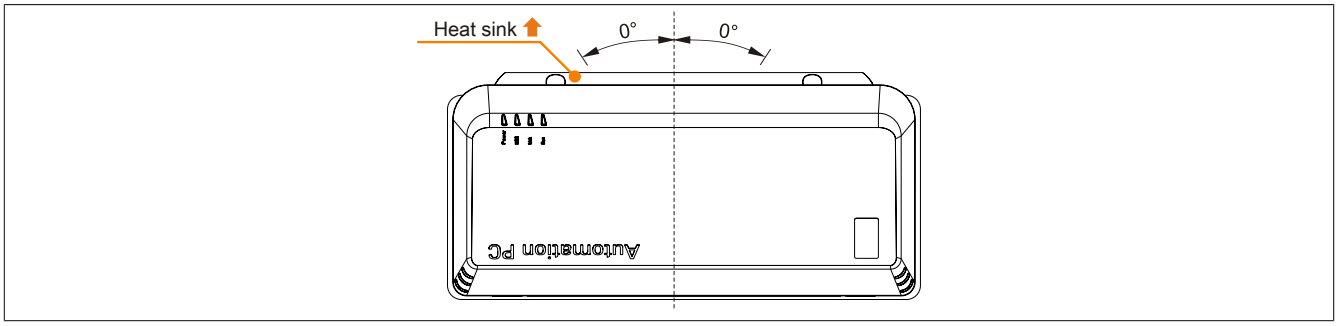


Figure 35: Horizontal mounting orientation

In order to facilitate natural air circulation, devices must be mounted according to the spacing indicated in the section "Spacing for air circulation" on page 105.

1.4 Spacing for air circulation

In order to guarantee sufficient air circulation, allow the specified amount of space above, below, to the side and behind the Automation PC 910 device. The minimum specified spacing is indicated in the following diagram. This is valid for all Automation PC 910 variants.

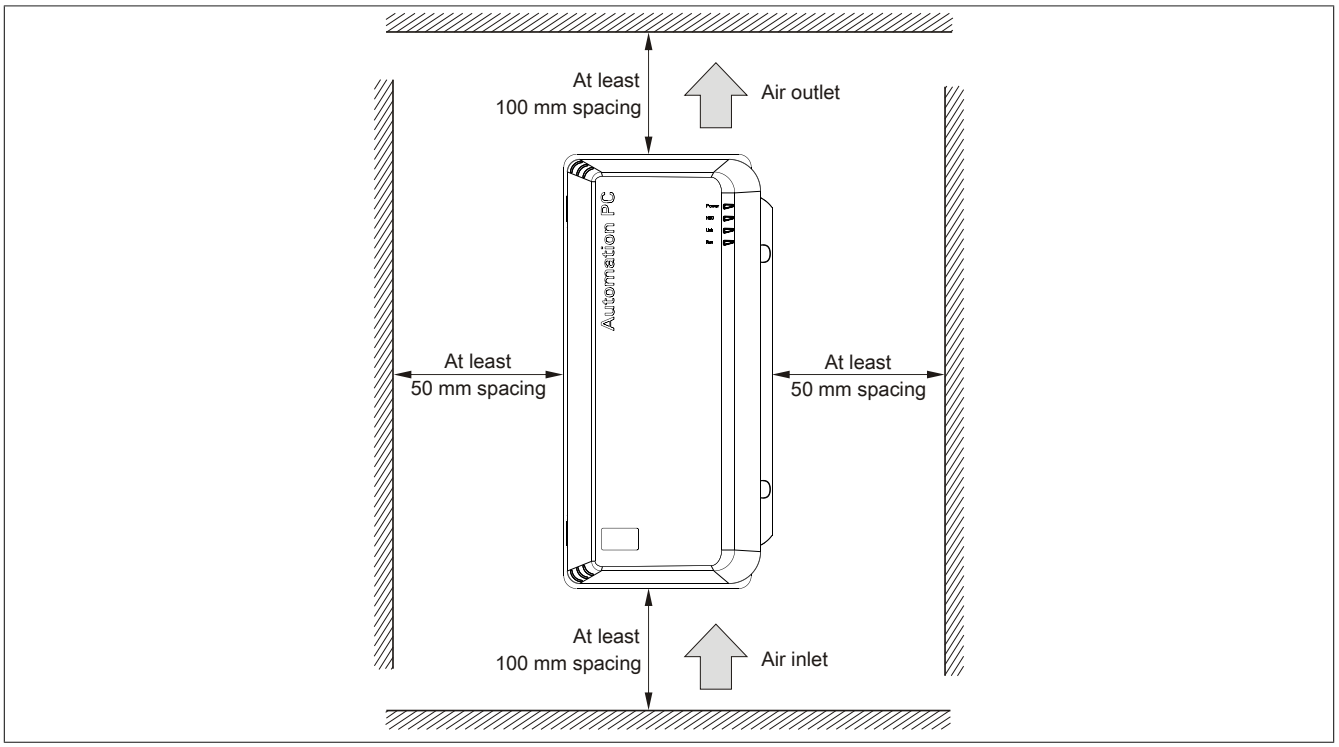


Figure 36: Standard mounting - Spacing

These defined distances are valid for both the vertical and horizontal mounting orientations for the APC910.

Information:

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

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

2 Cable connections

Flex radius specifications must be taken into account when installing or connecting cables.

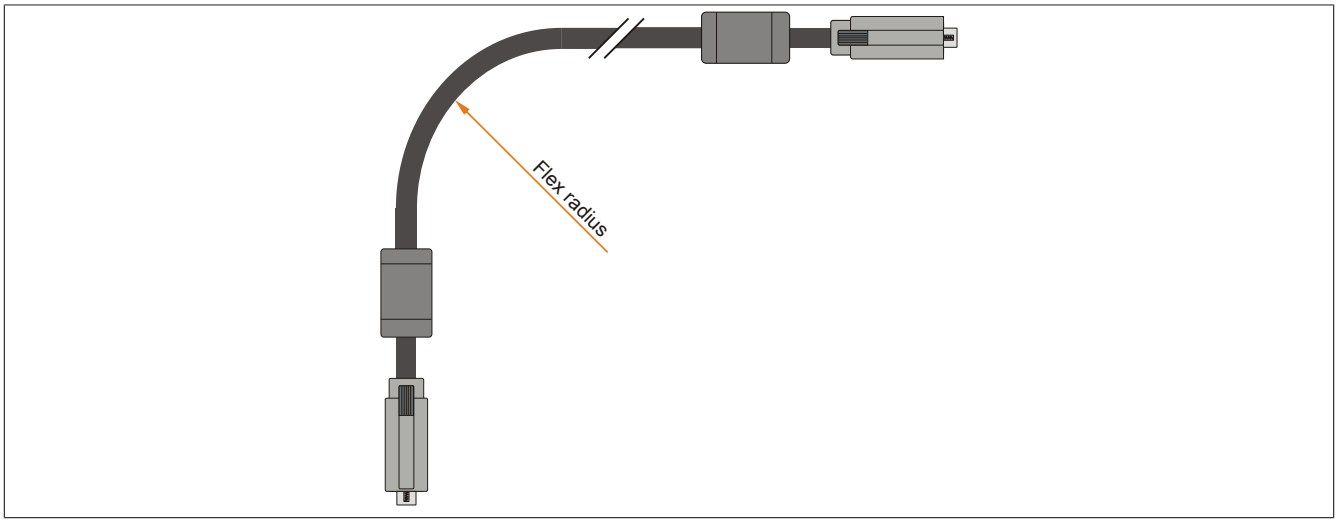


Figure 37: Flex radius - Cable connection

Information:

The specified flex radius can be found in the Automation Panel 800 or Automation Panel 900 user's manual, which can be downloaded as a PDF file from the B&R website at www.br-automation.com.

3 Grounding concept

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

The functional ground on the device has 2 connections:

- Supply voltage
- Grounding connection

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

- The device should be connected to the central grounding point in the control cabinet using the shortest route possible.
- A cable with a minimum cross section of 2.5 mm² per connection should be used. If a cable with wire tip sleeves is connected to the 0TB103.9 or 0TB103.91 terminal block, then a cable with maximum 1.5 mm² per connection is possible.
- Note the line shielding concept; all connected data cables are used as shielded lines.

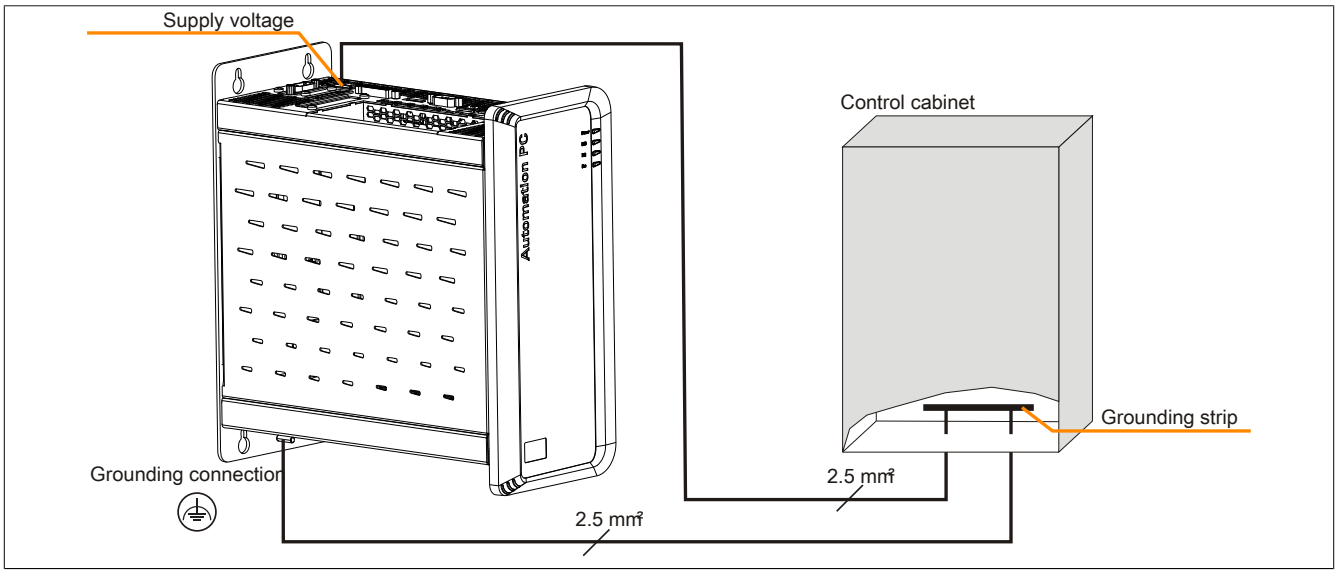


Figure 38: Grounding concept

Chapter 4 • Software

1 BIOS options

Information:

The following diagrams, BIOS menu items and their descriptions refer to BIOS version 1.12. It is therefore possible that these diagrams and BIOS descriptions will not correspond with the BIOS version actually installed.

1.1 General information

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

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

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

1.2 BIOS Setup and boot procedure

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

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

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

BIOS Setup is accessed by pressing the <Del> key after the USB controller has been initialized and as soon as the following message appears on the screen (during POST): "Press DEL to enter SETUP".

Figure 39: Boot screen

1.2.1 BIOS setup keys

The following keys are enabled during POST:

Information:

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

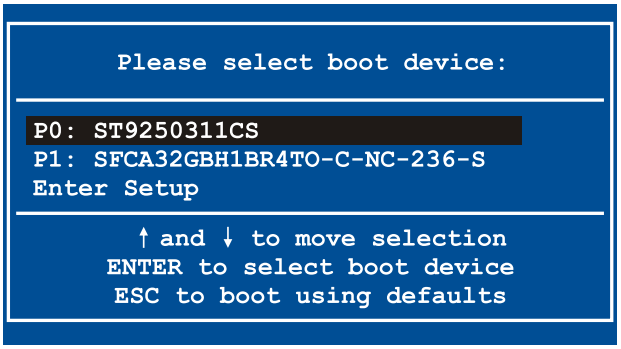
Keys	Function
Del, F2	Opens the main BIOS Setup screen
F12	Network boot
F11	Opens the boot menu. This list all bootable devices that are connected to the system. Selecting a device with cursor ↑, cursor ↓ and the pressing <ENTER> will boot from that device. 
<Pause>	Pauses POST. Pressing any other key resumes POST.

Table 100: BIOS-relevant keys for POST

The following keys can be used once inside BIOS Setup:

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

Table 101: BIOS-relevant keys

1.3 Main

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

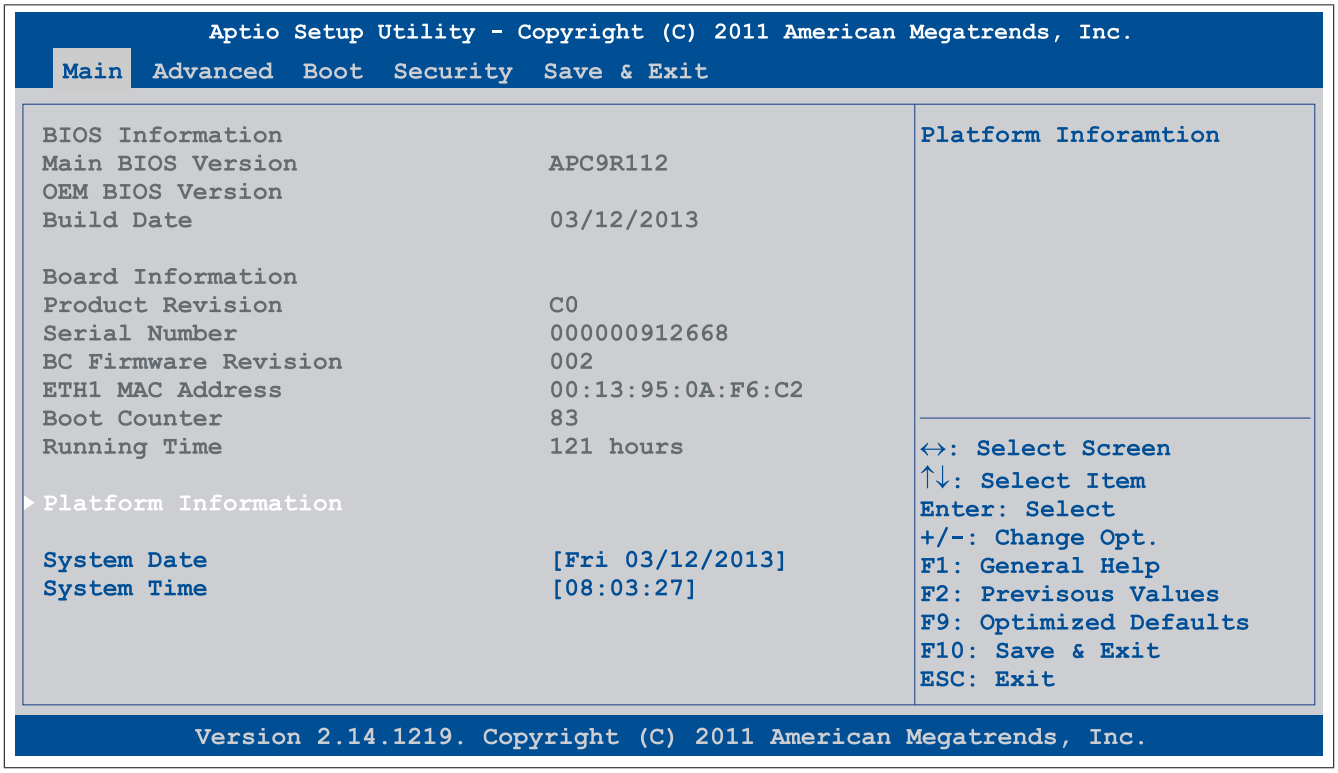


Figure 40: Main

BIOS setting	Description	Configuration options	Effect
BIOS information			
Main BIOS version	Displays the BIOS version	None	-
OEM BIOS version	Displays the OEM BIOS version	None	
Build date	Displays the date the BIOS was created	None	-
Board information			
Product revision	Displays the hardware revision of the CPU board	None	-
Serial number	Displays the serial number of the CPU board	None	-
BC firmware revision	Displays the firmware revision of the CPU board controller	None	-
ETH1 MAC address	Displays the assigned MAC address for the ETH interface	None	-
Boot counter	Displays the boot counter. Each restart increases the counter by one (max. 16777215).	None	-
Running time	Displays the runtime in hours (max. 65535)	None	-
Platform information	Displays information about the chipset, CPU board and main memory	Enter	Opens the submenu See "Platform information" on page 111
System date	The currently configured system date. This is buffered by the CMOS battery when the system is switched off.	Changes the system date	Sets the system date in the format Month:Day:Year (mm:dd:yyyy)
System time	The currently configured system time setting. This is buffered by the CMOS battery when the system is switched off.	Changes the system time	Sets the system time in the format Hour:Minute:Second (hh:mm:ss)

Table 102: Main - Configuration options

1.3.1 Platform information

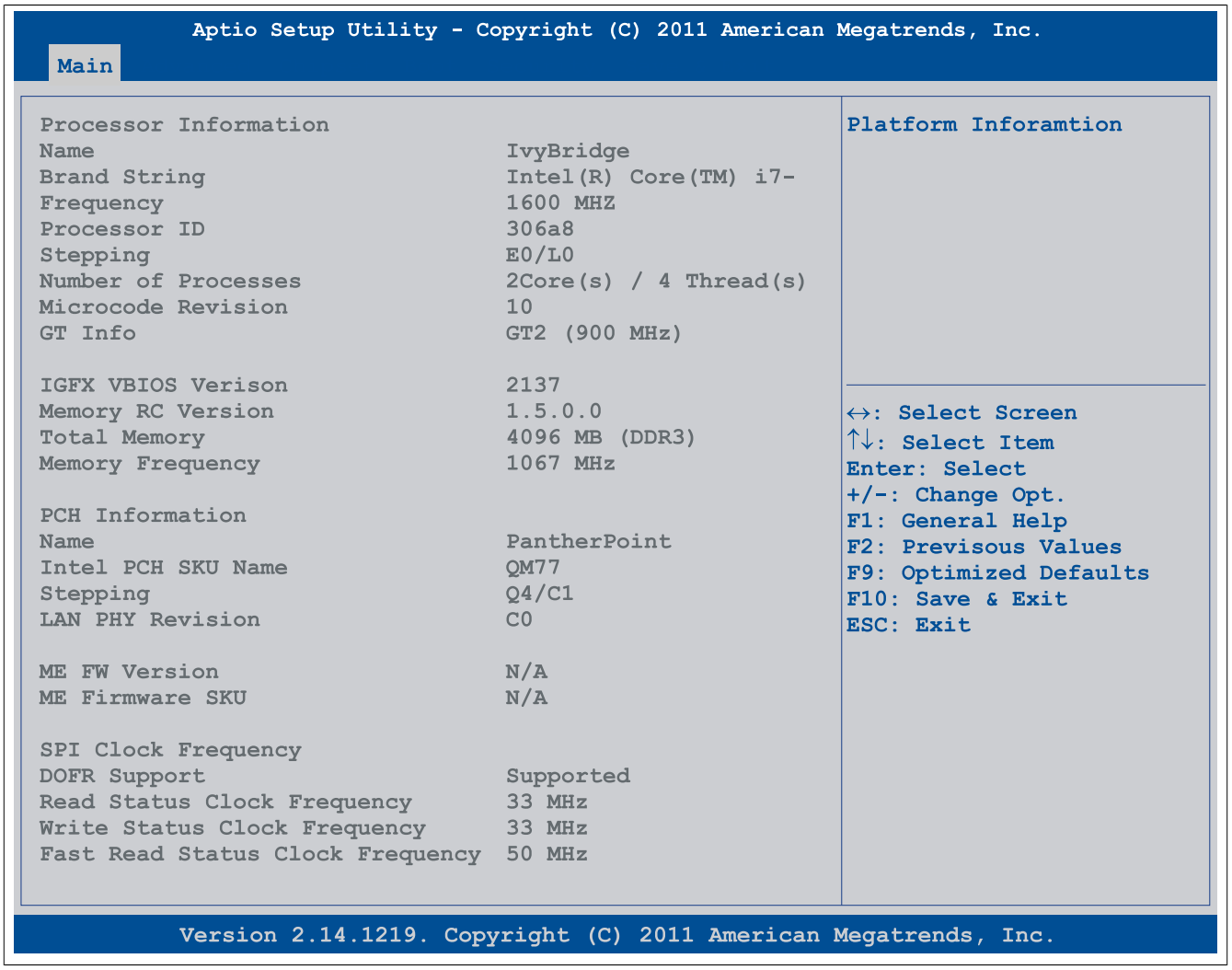


Figure 41: Main - Platform information

BIOS setting	Description	Configuration options	Effect
Processor information			
Name	Displays the processor architecture	None	-
Brand string	Displays the processor type	None	-
Frequency	Displays the processor frequency	None	-
Processor ID	Displays the processor ID	None	-
Stepping	Displays the processor stepping version	None	-
Number of processors	Displays the number of processor cores/threads	None	-
Microcode revision	Displays the processor microcode revision	None	-
GT info	Displays GT information	None	-
IGFX VBIOS version	Displays the IGFX VBIOS version	None	-
Memory RC version	Displays the memory RC version	None	-
Total memory	Displays the system memory size	None	-
Memory frequency	Displays the RAM frequency	None	-
PCH information			
Name	Displays the platform controller hub	None	-
Intel PCH SKU name	Displays the chipset on the CPU board	None	-
Stepping	Displays the chipset stepping version	None	-
LAN PHY revision	Displays the LAN revision	None	-
ME FW version	Displays the Intel management engine firmware version	None	-
ME firmware SKU	Displays the Intel management stock-keeping unit version	None	-
SPI clock frequency			
DOFR support	Displays information about DOFR support	None	-
Read status clock frequency	Displays the read status clock frequency	None	-

Table 103: Main - Platform information overview

BIOS setting	Description	Configuration options	Effect
Write status clock frequency	Displays the write status clock frequency	None	-
Fast read status clock frequency	Displays the fast read status clock frequency	None	-

Table 103: Main - Platform information overview

1.4 Advanced

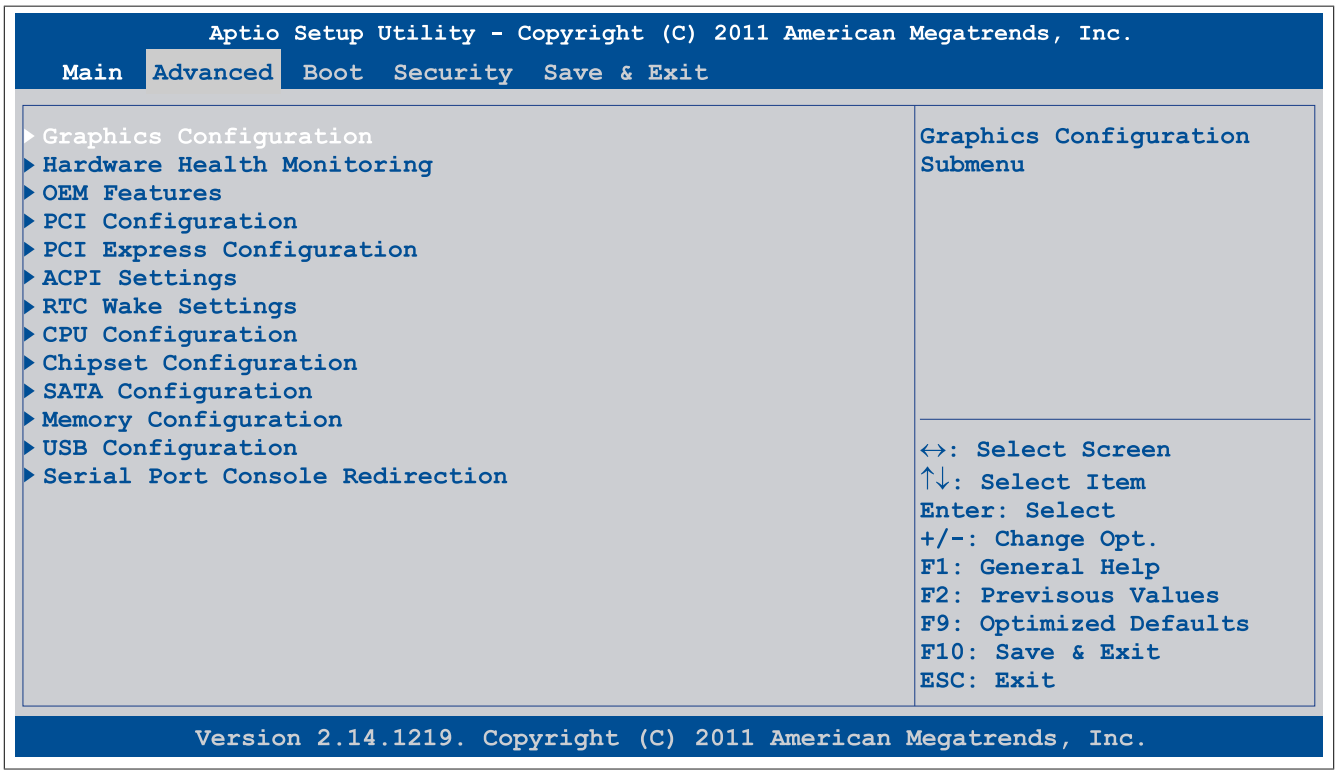


Figure 42: Advanced - Overview

BIOS setting	Description	Configuration options	Effect
Graphics configuration	Configures graphics settings	Enter	Opens the submenu See "Graphics configuration" on page 113
Hardware health monitoring	Displays the current voltage levels as well as the CPU and mainboard temperatures	Enter	Opens the submenu See "Hardware health monitoring" on page 115
OEM features	Configures OEM features	Enter	Opens the submenu See "OEM features" on page 116
PCI configuration	Configures PCI devices	Enter	Opens the submenu See "PCI configuration" on page 133
PCI Express configuration	Configures PCI Express devices	Enter	Opens the submenu See "PCI Express configuration" on page 135
ACPI settings	Configures ACPI settings	Enter	Opens the submenu See "ACPI settings" on page 141
RTC wake settings	Configures the wake up time when switched off	Enter	Opens the submenu See "RTC wake settings" on page 142
CPU configuration	Configures CPU settings	Enter	Opens the submenu See "CPU configuration" on page 143
Chipset configuration	Configures chipset settings	Enter	Opens the submenu See "Chipset configuration" on page 146
SATA configuration	Configures SATA settings	Enter	Opens the submenu See "SATA configuration" on page 147
Memory configuration	Configures main memory settings	Enter	Opens the submenu See "Memory configuration" on page 150
USB configuration	Configures USB settings	Enter	Opens the submenu See "USB configuration" on page 153
Serial port console redirection	Configures the remote console	Enter	Opens the submenu See "Serial port console redirection" on page 156

Table 104: Advanced - Overview

1.4.1 Graphics configuration

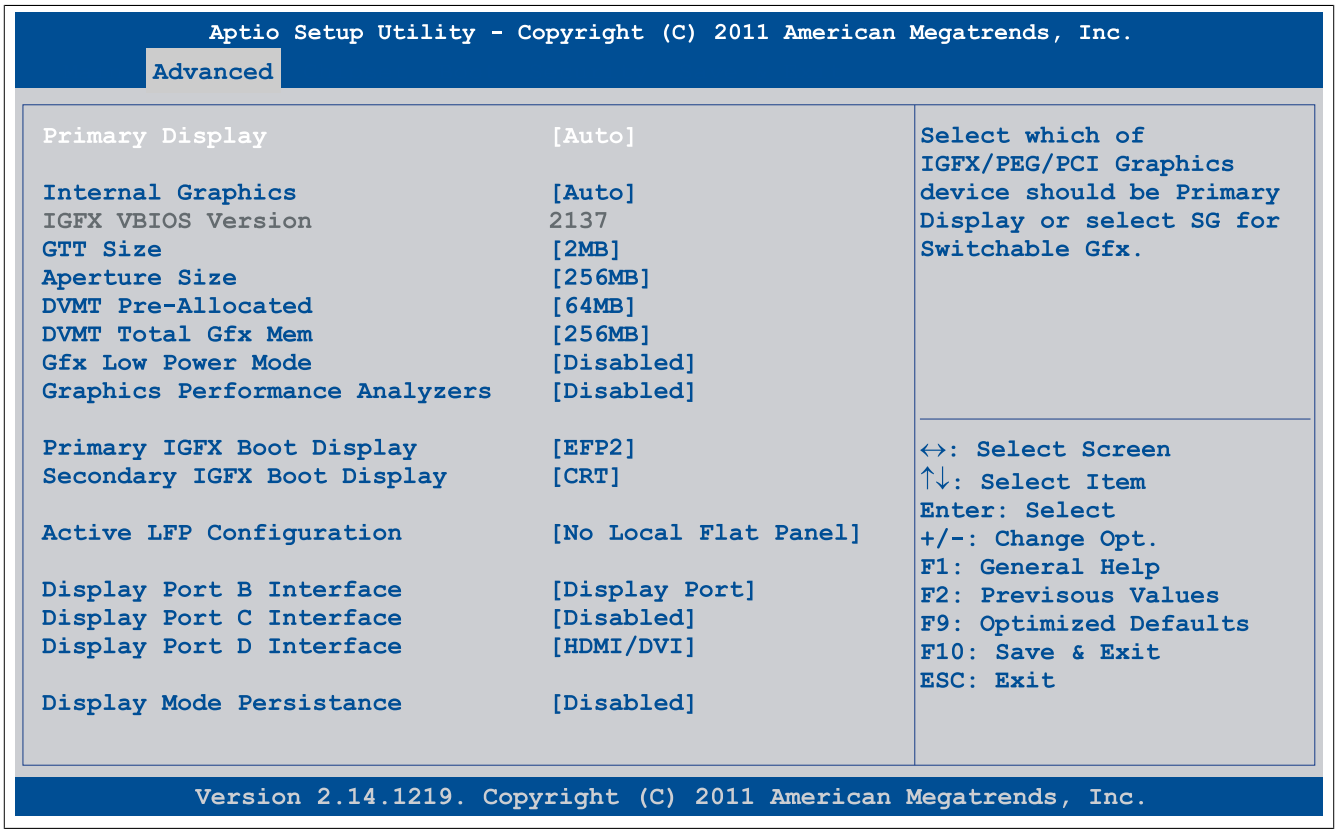


Figure 43: Advanced - Graphics configuration

BIOS setting	Description	Configuration options	Effect
Primary display	Option for selecting the primary display device	Auto	Configures the display device automatically
		IGD	Uses the internal graphics chip on the CPU board as the display device
		PEG	Uses an external PCI Express graphics card connected to the x16 PEG port as the display device
		PCI	Uses the graphics chip of a connected graphics card as the display device
Internal graphics	Option for configuring the internal graphics chip	Auto	Enables the internal graphics chip
		Disabled	Disables the internal graphics chip
		Enabled	Enables the internal graphics chip
IGFX VBIOS version	Displays the IGFX BIOS version	None	-
GTT size	Option for setting the GTT size	1 MB	1 MB GTT
		2 MB	2 MB GTT
Aperture size	Option for configuring the maximum amount of RAM made available to the main memory when graphics memory is full	128 M	Reserves 128 MB
		256 M	Reserves 256 MB
		512 M	Reserves 512 MB
DVMT pre-allocated	Option for setting the fixed amount of memory used for the internal graphics controller	32 MB, 64 MB, 96 MB up to 1024 MB	Defines the fixed graphic memory as a value between 32 and 1024 MB
DVMT total gfx mem	Option for setting the amount of memory that can be used for the internal graphics controller. Memory over the permanently assigned graphics memory is assigned dynamically according to the DVMT 5.0 standard.	128 M	Allocates 128 MB of main memory
		256 M	Allocates 256 MB of main memory
		MAX	Allocates the entire main memory
Gfx low power mode	Option for setting the power saving function for the graphics controller **Information:** **This option can only be used for SFF.**	Enabled	Enables low power mode. The graphics controller does not operate at full speed.
		Disabled	Disables low power mode
Graphics performance analyzers	Option for enabling/disabling the Intel graphics performance analyzers	Enabled	Enables this function
		Disabled	Disables this function
Primary IGFX boot display	Option for defining the primary enabled display device during booting.	VBIOS default	Uses the default setting from IGFX BIOS
		CRT	Uses the CRT (cathode ray tube) channel
		LFP	Uses the LFP (local flat panel) channel
		EFP	Uses the EFP (external flat panel) channel

Table 105: Advanced - Graphics configuration options

BIOS setting	Description	Configuration options	Effect
	Information: **The numbering of EFP occurs dynamically depending on the DisplayPort interface (B/C/D).**	EFP2	Uses the EFP2 (external flat panel 2) channel
		EFP3	Uses the EFP3 (external flat panel 3) channel
Secondary IGFX boot display	Option for defining the secondary enabled panel during POST **Information:** **The numbering of EFP occurs dynamically depending on the DisplayPort interface (B/C/D).** **Information:** **After the BIOS boot screen, nothing more is shown on this display until the graphics driver is reloaded by the operating system.**	Disabled	Disables this function. Only shows POST on one display.
		CRT	Uses the CRT (cathode ray tube) channel
		LFP	Uses the LFP (local flat panel) channel
		EFP	Uses the EFP (external flat panel) channel
		EFP2	Uses the EFP2 (external flat panel 2) channel
		EFP3	Uses the EFP3 (external flat panel 3) channel
Active LFP configuration	Option for selecting the active LFP (local flat panel) channel **Information:** **This option has no effect on the Automation PC 910.**	No local flat panel	Does not use the LVDS channel
		Integrated LVDS	Uses the integrated LVDS channel
Display port B interface	Option for selecting the display device that is connected to the DisplayPort interface	Disabled	Disables the DisplayPort interface
		Display port	Configures the DisplayPort interface as a DisplayPort interface
		HDMI/DVI	Configures the DisplayPort interface as an HDMI/DVI interface
Display Port C interface	Option for selecting the display device that is connected to the monitor/panel option	Disabled	Disables the monitor/panel option
		Display port	Configures the monitor/panel option as a DisplayPort interface
		HDMI/DVI	Configures the monitor/panel option as an HDMI/DVI interface
Display Port D interface	Option for selecting the display device that is connected to the monitor/panel interface	Disabled	Disables the monitor/panel interface
		Display port	Configures the monitor/panel interface as a DisplayPort interface **Information:** **This setting disables the monitor/panel interface.**
		HDMI/DVI	Configures the monitor/panel interface as an HDMI/DVI interface
Display mode persistence	"Display mode persistence" means that the operating system can remember and restore past display configurations. For example, a dual DVI configuration is automatically restored when both DVI monitors are reconnected, even if only one of them was connected and enabled during a previous boot.	Disabled	Disables this function
		Enabled	Enables this function

Table 105: Advanced - Graphics configuration options

1.4.2 Hardware health monitoring

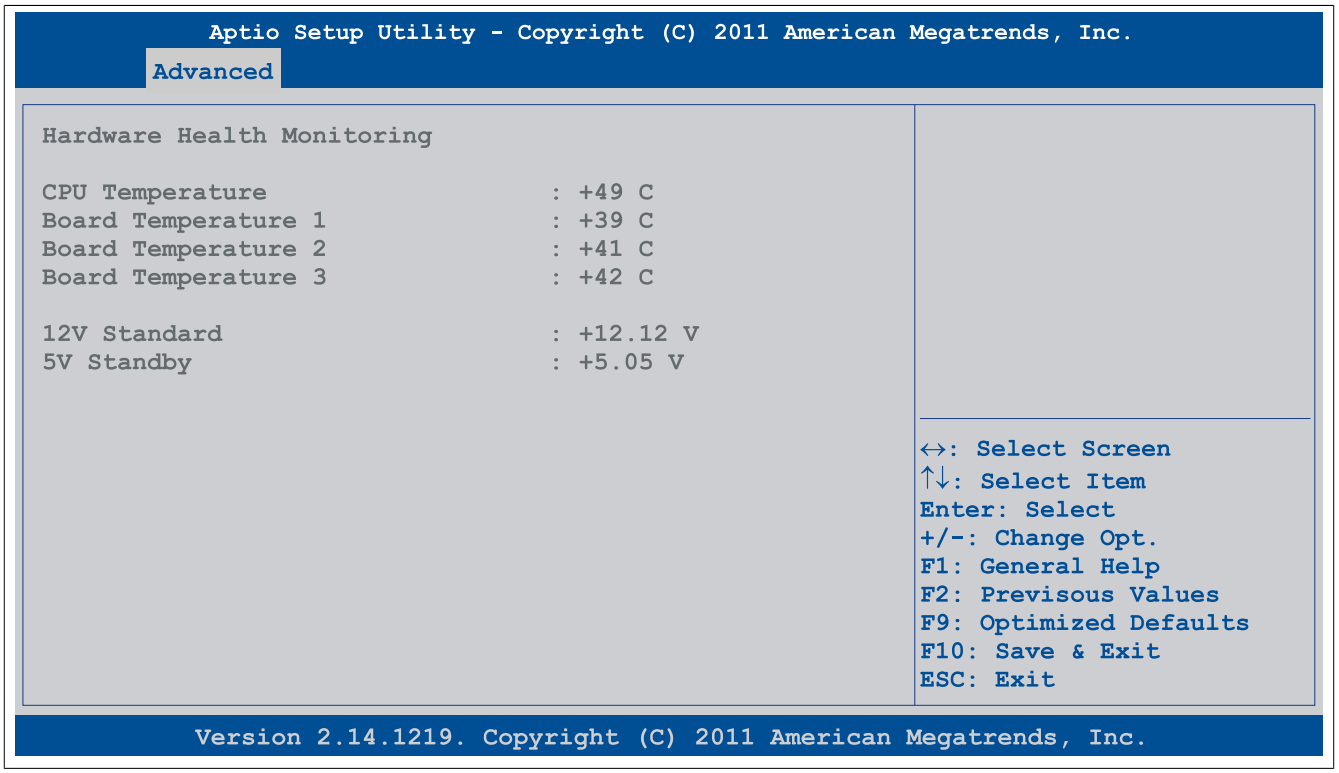


Figure 44: Advanced - Hardware health monitoring

BIOS setting	Description	Configuration options	Effect
CPU temperature	Displays the current temperature of the CPU sensor in °C	None	-
Board temperature 1	Displays the current temperature of board sensor 1 in °C	None	-
Board temperature 2	Displays the current temperature of board sensor 2 in °C	None	-
Board temperature 3	Displays the current temperature of board sensor 3 in °C	None	-
12 V (default)	Displays the current voltage of the 12 volt supply	None	-
5 V standby	Displays the current voltage of the 5 volt supply	None	-

Table 106: Advanced - Hardware health monitoring

1.4.3 OEM features

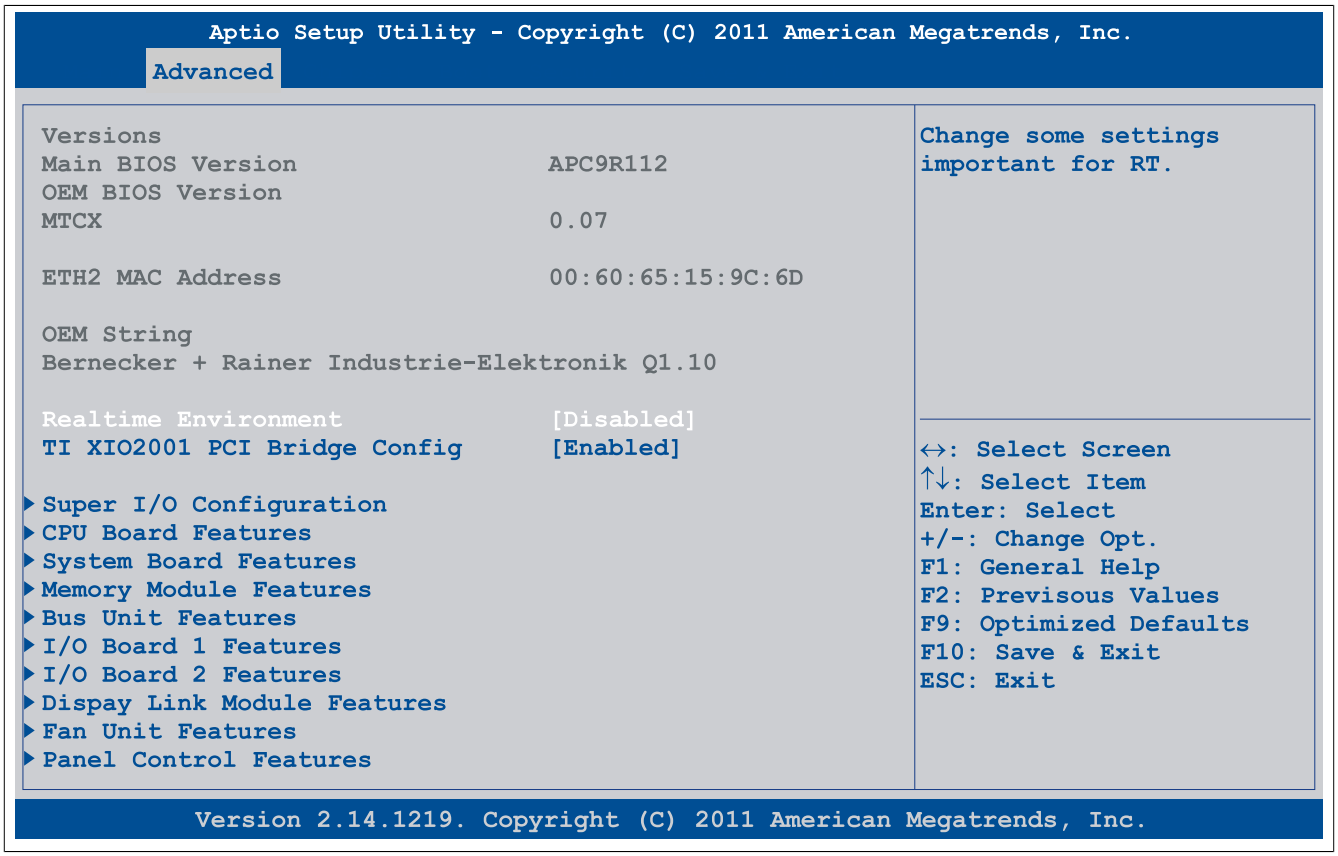


Figure 45: Advanced - OEM features

BIOS setting	Description	Configuration options	Effect
Main BIOS version	Displays the installed B&R BIOS version	None	-
OEM BIOS version		None	-
MTCX	Displays the installed MTCX version	None	-
ETH2 MAC address	Displays the assigned MAC address for the ETH2 interface	None	-
Real-time environment	Configures settings for real-time operating systems such as ARwin	Disabled	Disables this function
		Enabled	Disables hyper-threading, turbo mode and EIST. Also disables ASPM and the IRQ of root ports 2 and 3.
TI XIO2001 PCI bridge config	Option for setting DMA access	Enabled	Optimizes DMA access
		Disabled	Disables this function
Super I/O configuration	Configures special interface settings	Enter	Opens the submenu See "Super I/O configuration" on page 117
CPU board features	Displays device-specific information for the CPU board	Enter	Opens the submenu See "CPU board features" on page 118
System board features	Displays device-specific information for the system unit	Enter	Opens the submenu See "System board features" on page 119
Memory module features	Displays device-specific information for the main memory	Enter	Opens the submenu See "Memory module features" on page 122
Bus unit features	Displays device-specific information for the bus unit	Enter	Opens the submenu See "Bus unit features" on page 123
I/O board 1 features[1)]	Displays device-specific information for interface option 1	Enter	Opens the submenu See "I/O board 1 features" on page 124
I/O board 2 features[1)]	Displays device-specific information for interface option 2	Enter	Opens the submenu See "I/O board 2 features" on page 126
Display link module features[1)]	Displays device-specific information for the monitor/panel option	Enter	Opens the submenu See "Display link module features" on page 127
Fan unit features[2)]	Displays device-specific information for the fan kit	Enter	Opens the submenu See "Fan unit features" on page 129
Panel control features	Displays device-specific information for the connected panel	Enter	Opens the submenu See "Panel control features" on page 131

Table 107: Advanced - OEM features screen

1) This option is only shown if the corresponding option is installed in the system unit.
2) This option is only shown if a fan kit is installed in the system unit.

Super I/O configuration

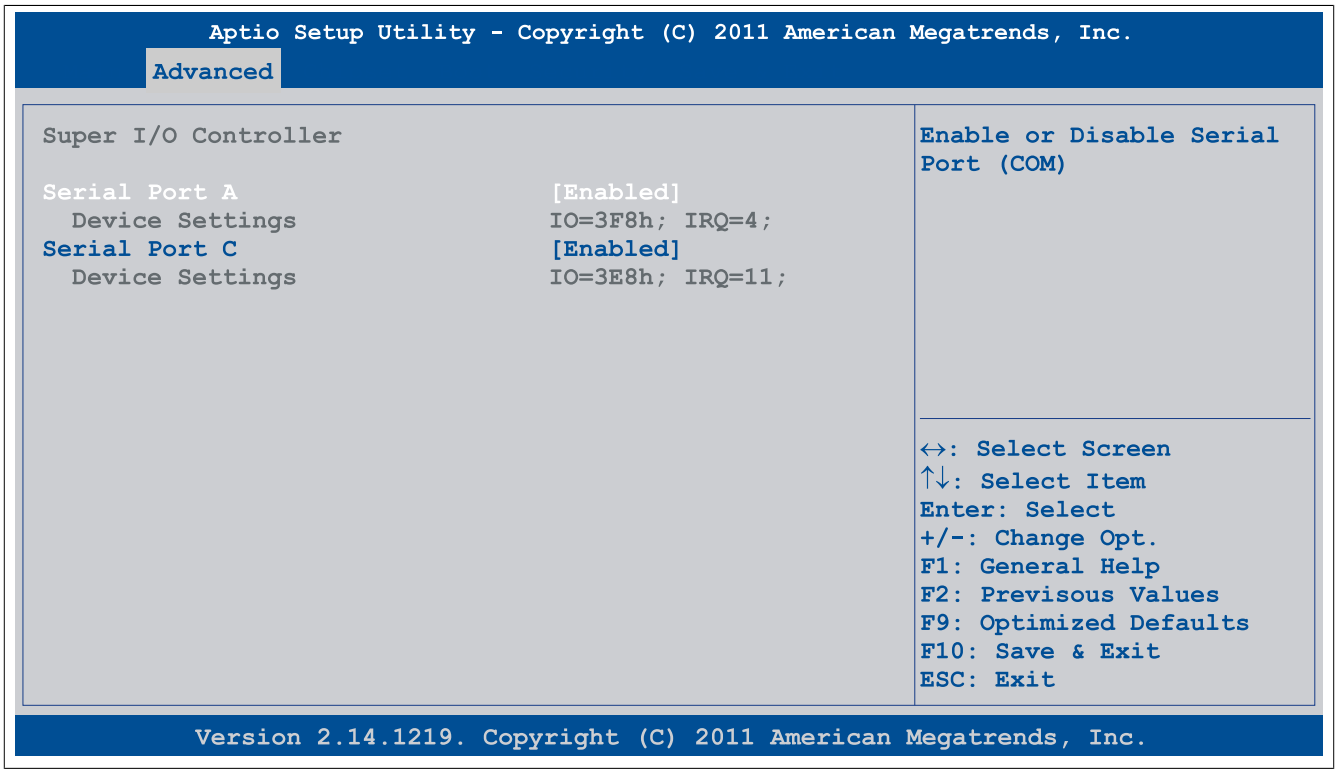


Figure 46: Advanced - OEM features - Super I/O configuration

BIOS setting	Description	Configuration options	Effect
Serial port A	Setting for the COM1 serial interface	Enabled	Enables this interface
		Disabled	Disables this interface
Device settings	Displays the I/O address and interrupt of the COM1 interface	None	-
Serial port B	Setting for the monitor/panel option	Enabled	Enables this interface
		Disabled	Disables this interface
Device settings	Displays the I/O address and interrupt for the monitor/panel option	None	-
Serial port C	Setting for the monitor/panel interface	Enabled	Enables this interface
		Disabled	Disables this interface
Device settings	Displays the I/O address and interrupt for the monitor/panel interface	None	-
Serial port E	Setting for the RS232 IF option in IF option slot 1	Enabled	Enables this interface
		Disabled	Disables this interface
Device settings	Displays the I/O address and interrupt for the RS232 IF option in IF option slot 1	None	-
Serial port F	Setting for the RS232 IF option in IF option slot 2	Enabled	Enables this interface
		Disabled	Disables this interface
Device settings	Displays the I/O address and interrupt for the RS232 IF option in IF option slot 2	None	-

Table 108: Advanced - OEM features - Super I/O configuration - Configuration options

CPU board features

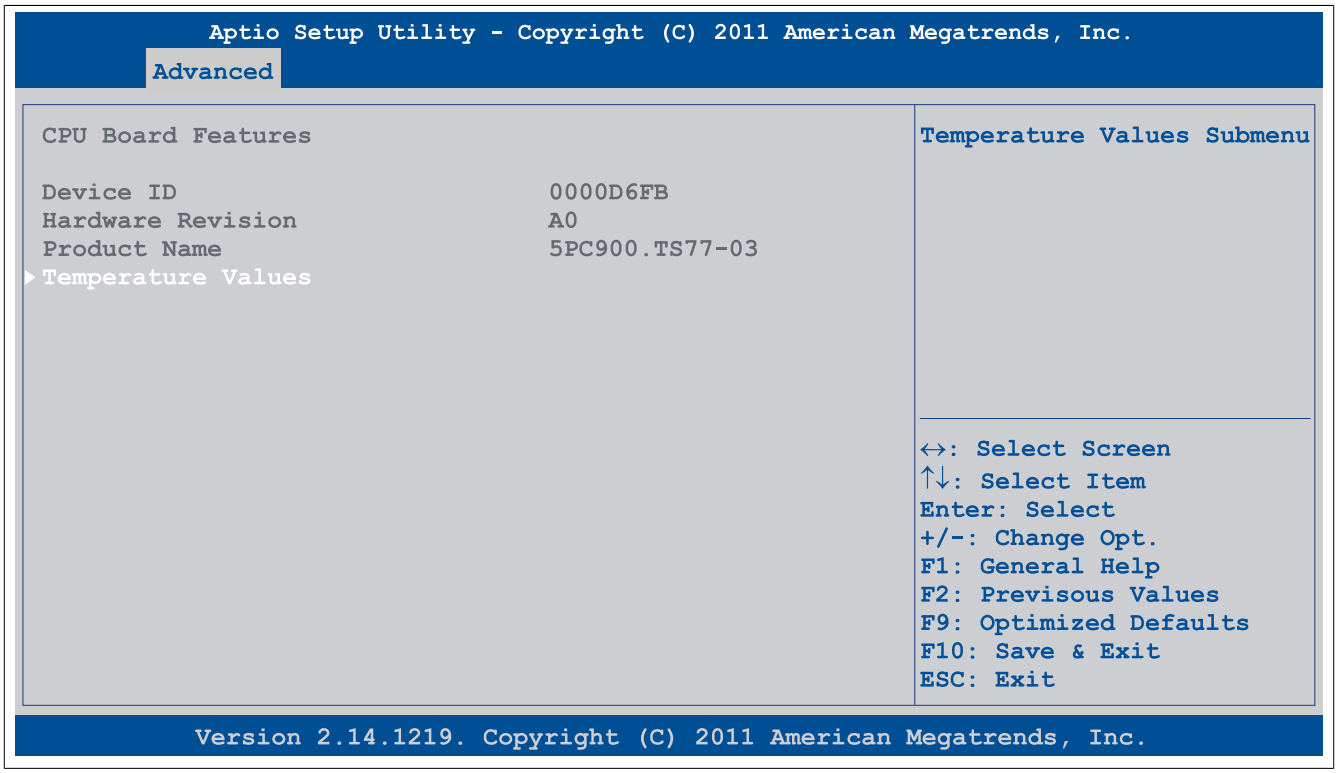


Figure 47: Advanced - OEM features - CPU board features

BIOS setting	Description	Configuration options	Effect
Device ID	Displays the device ID of the CPU board	None	-
Hardware revision	Displays the CPU board hardware revision	None	-
Product name	Displays the B&R model number	None	-
Temperature values	Displays current temperature values	Enter	Opens the submenu See "Temperature values" on page 118

Table 109: Advanced - OEM features - CPU board features

Temperature values

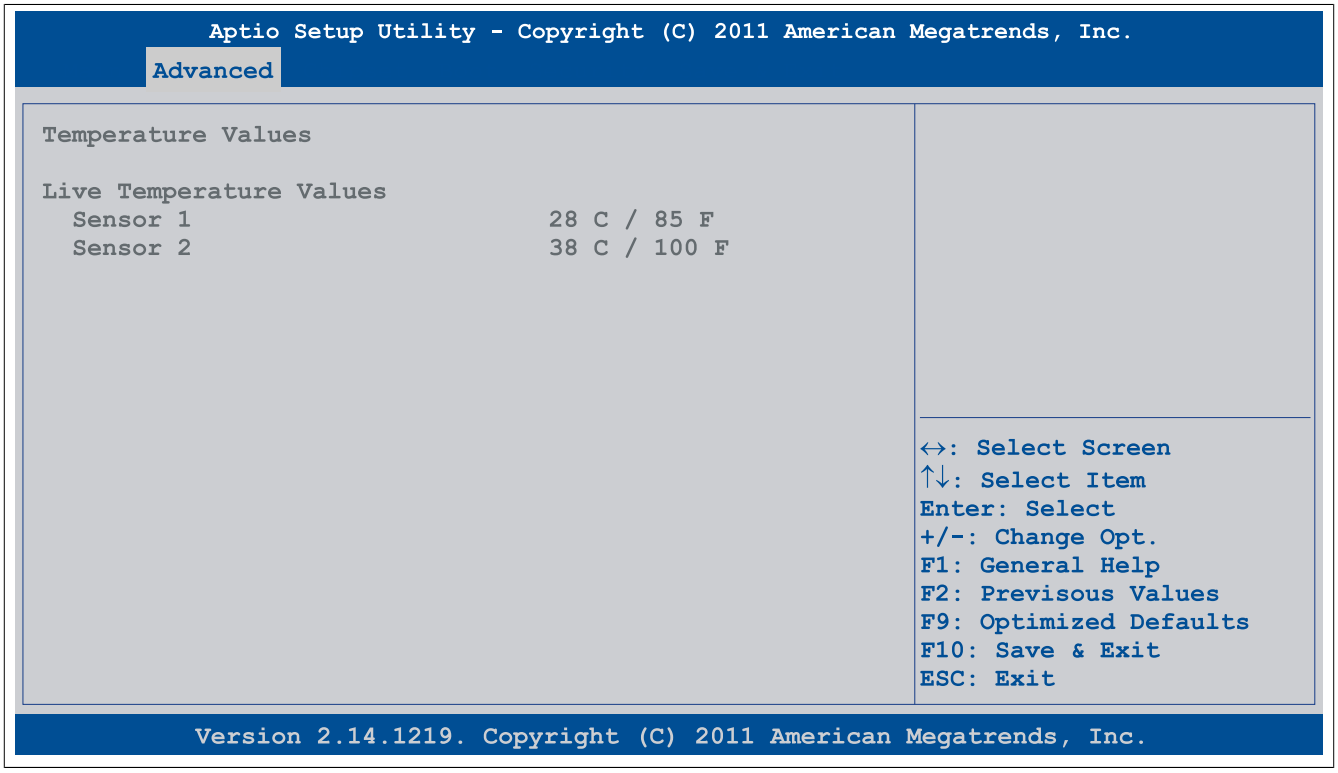


Figure 48: Advanced - OEM features - CPU board features - Temperature values

BIOS setting	Description	Configuration options	Effect
Sensor 1	Displays the current temperature of sensor 1 (board controller) in °C and °F	None	-
Sensor 2	Displays the current temperature of sensor 2 (CPU) in °C and °F	None	-

Table 110: Advanced - OEM features - CPU board features - Temperature values

System board features

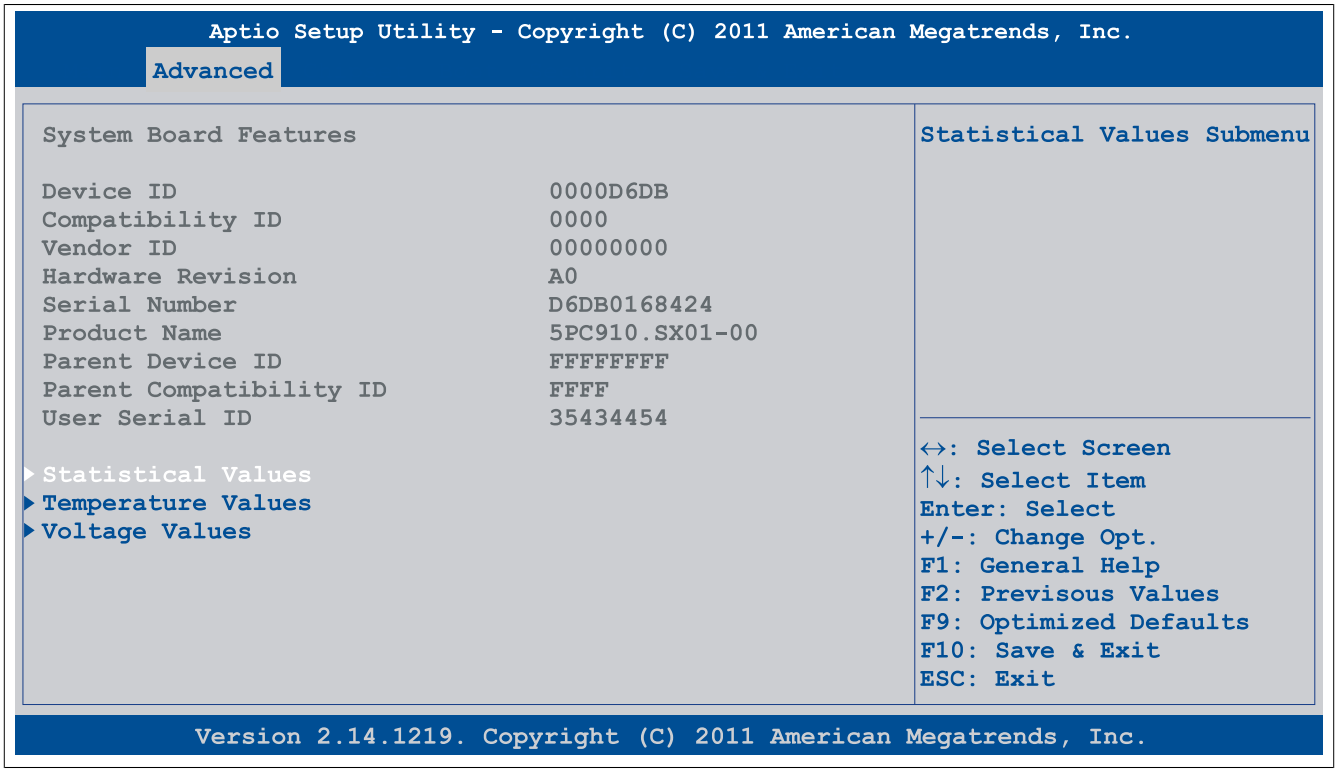


Figure 49: Advanced - OEM features - System board features

BIOS setting	Description	Configuration options	Effect
Device ID	Displays the device ID of the system board	None	-
Compatibility ID	Displays the version of the device within the same B&R device ID. This ID is needed for Automation Runtime.	None	-
Vendor ID	Displays the vendor ID	None	-
Hardware revision	Displays the system board hardware revision	None	-
Serial number	Displays the B&R serial number	None	-
Product name	Displays the B&R model number	None	-
Parent device ID	Displays the manufacturer number	None	-
Parent compatibility ID	Displays the manufacturer ID	None	-
User serial ID	Displays the user serial ID. This 8-digit hexadecimal value can be freely specified by the user (e.g. to give the device a unique ID) and can only be changed using the "B&R Control Center" included with the ADI driver.	None	-
Statistical values	Displays statistical values	Enter	Opens the submenu See "Statistical values" on page 120
Temperature values	Displays current temperature values	Enter	Opens the submenu See "Temperature values" on page 120
Voltage control	Displays current battery properties	Enter	Opens the submenu See "Voltage values" on page 121

Table 111: Advanced - OEM features - System board features

Statistical values

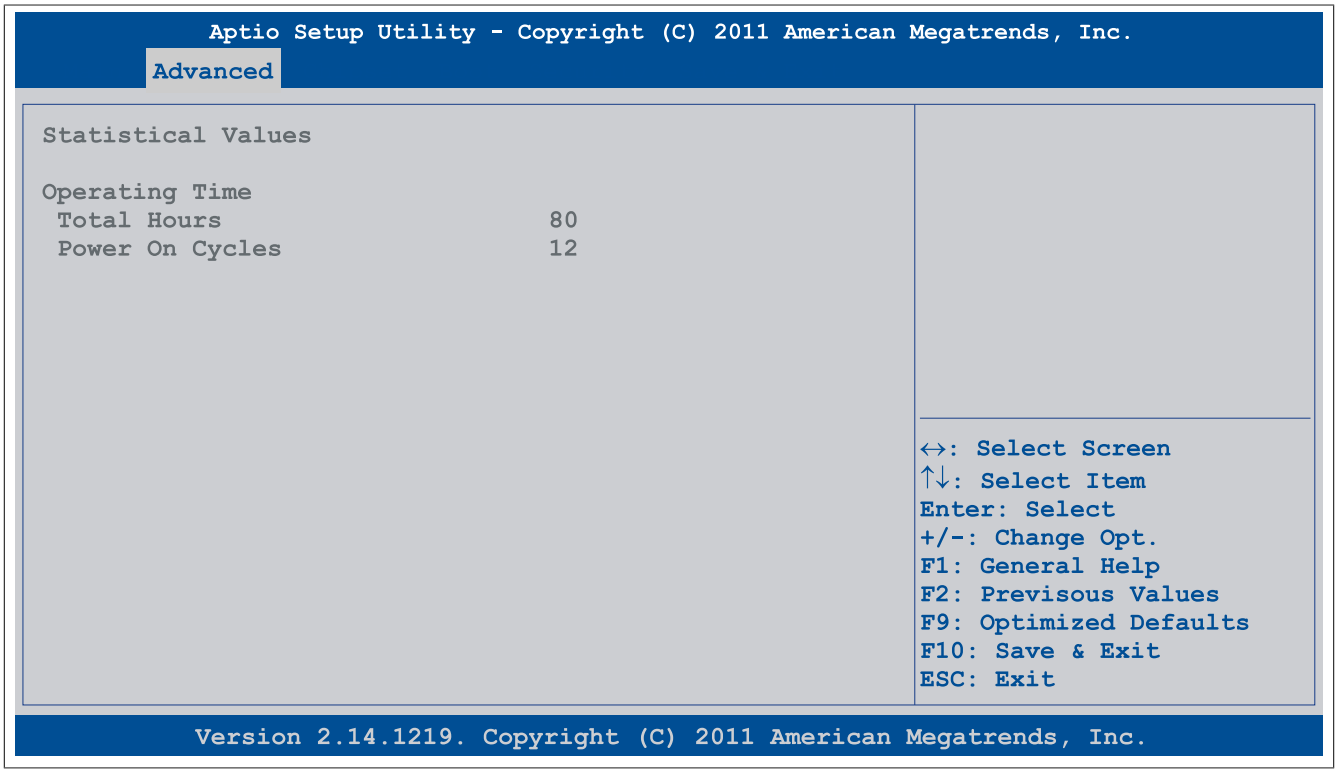


Figure 50: Advanced - OEM features - System board features - Statistical values

BIOS setting	Description	Configuration options	Effect
Total hours	Displays the runtime in hours	None	-
Power on cycles	Displays the number of power-on cycles. Each restart increases the counter by one.	None	-

Table 112: Advanced - OEM features - System board features - Statistical values

Temperature values

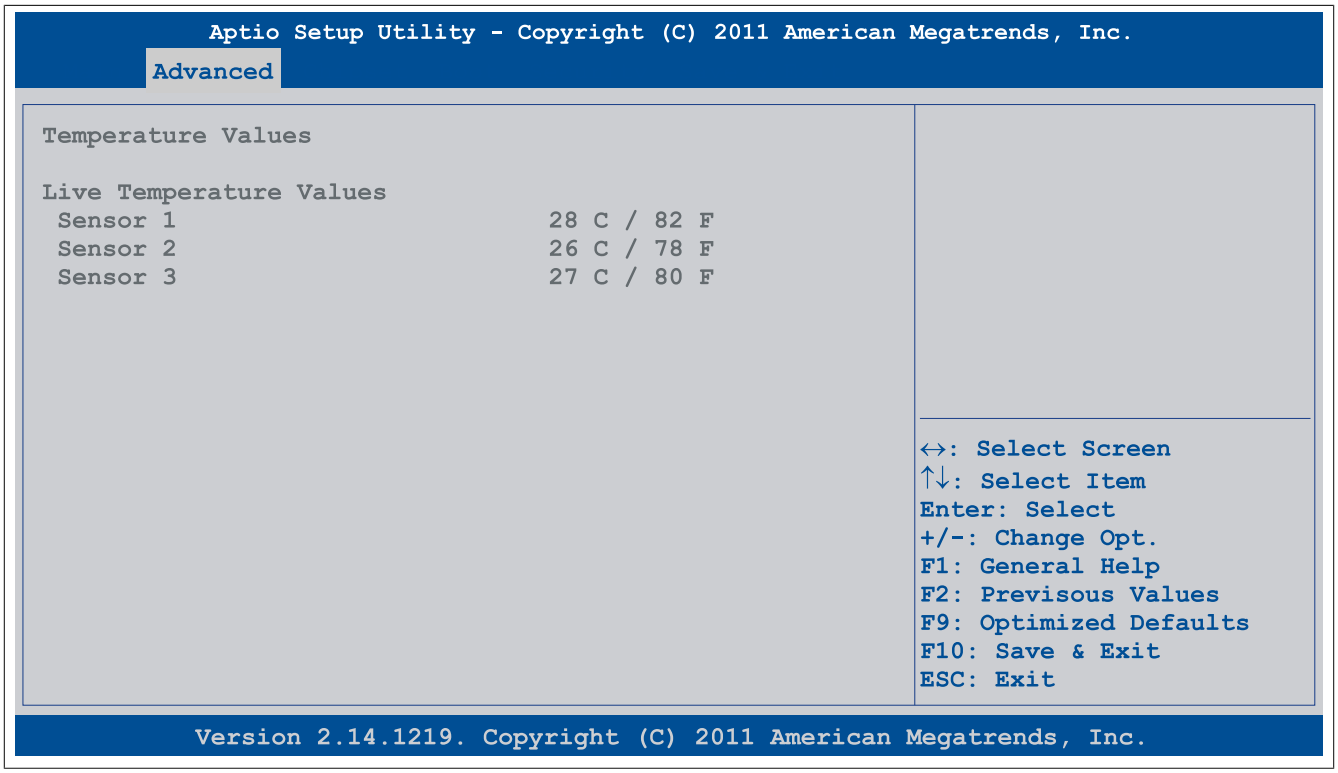


Figure 51: Advanced - OEM features - System board features - Temperature values

BIOS setting	Description	Configuration options	Effect
Sensor 1	Displays the current temperature of sensor 1 (board power supply) in °C and °F	None	-
Sensor 2	Displays the current temperature of sensor 2 (near slide-in compact slot) in °C and °F	None	-
Sensor 3	Displays the current temperature of sensor 3 (near main memory) in °C and °F	None	-

Table 113: Advanced - OEM features - System board features - Temperature values

Voltage values

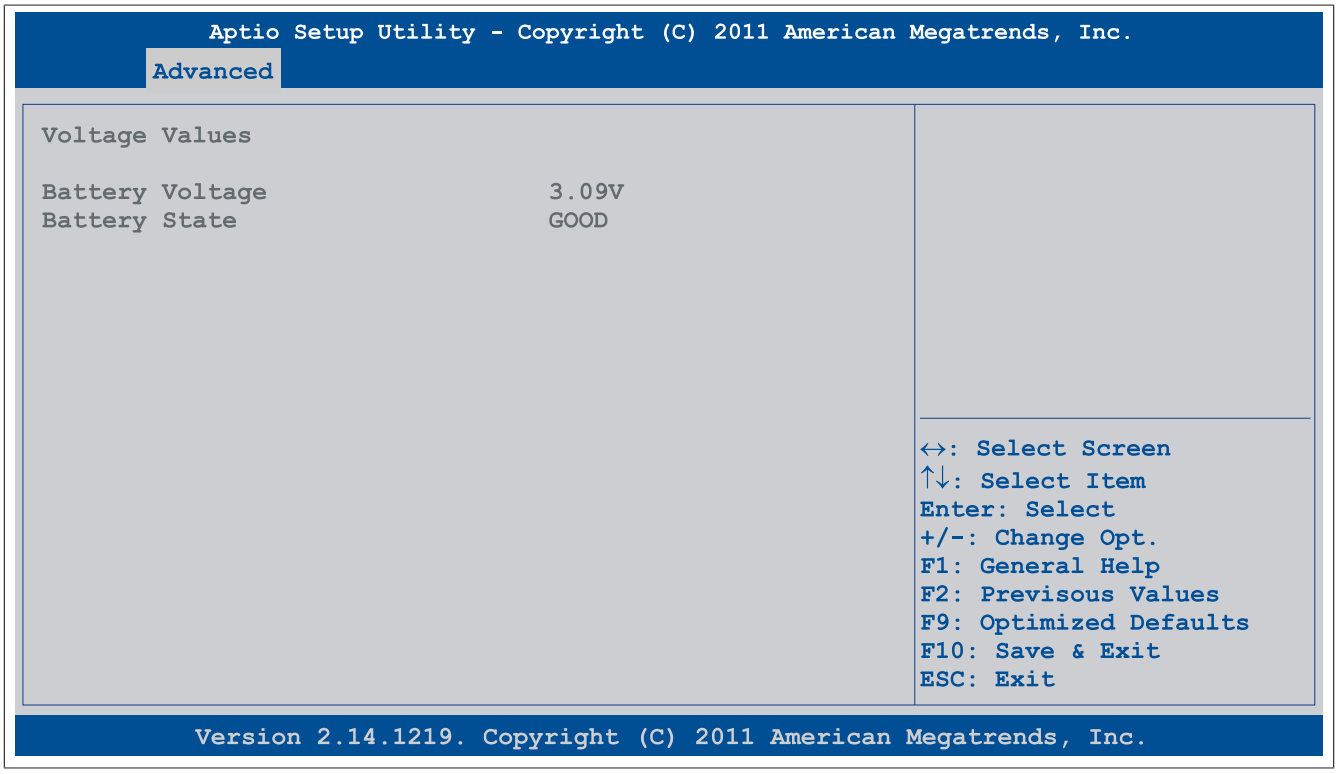


Figure 52: Advanced - OEM features - System board features - Voltage values

BIOS setting	Description	Configuration options	Effect
Battery voltage	Displays the battery voltage in volts	None	-
Battery state	Displays the status of the battery	None	-

Table 114: Advanced - OEM features - System board features - Voltage values

Memory module features

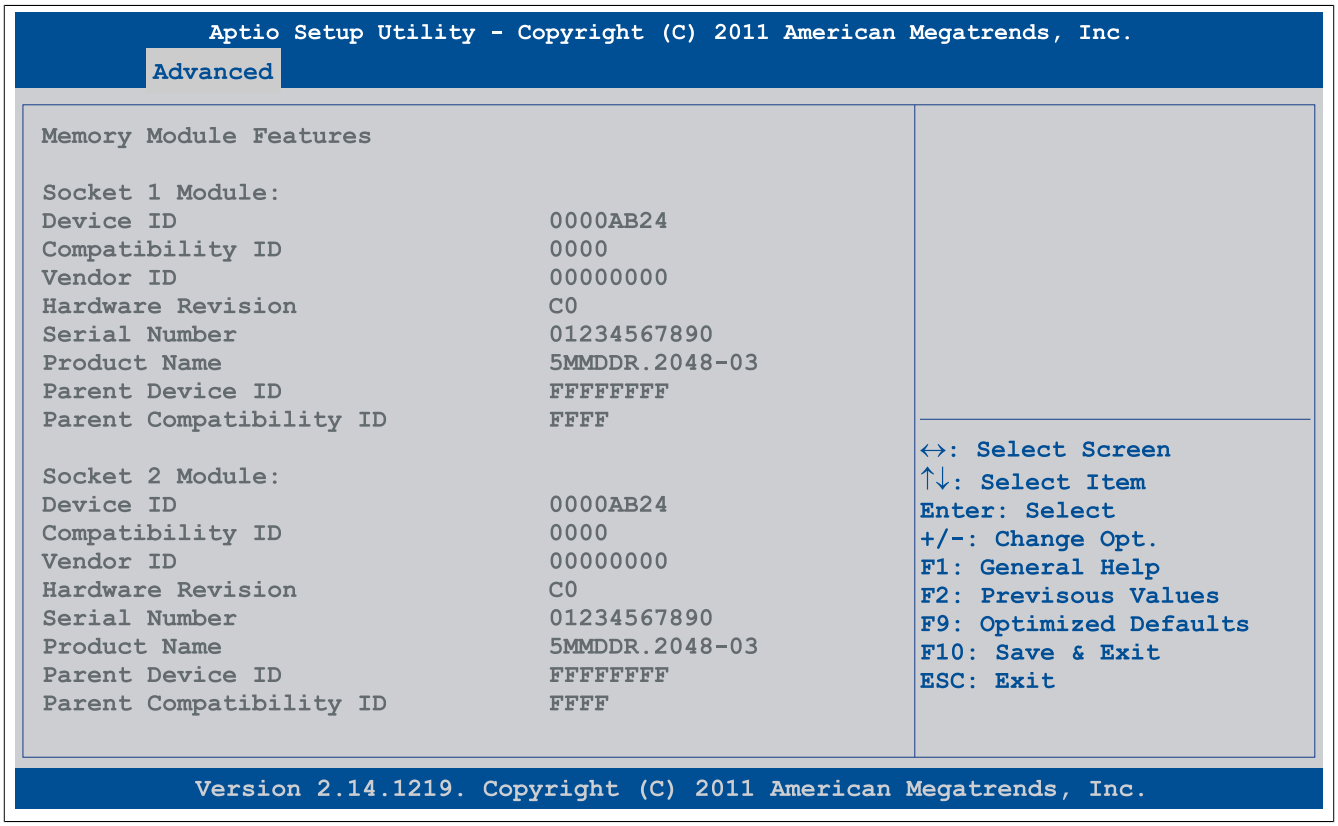


Figure 53: Advanced - OEM features - Memory module features

BIOS setting	Description	Configuration options	Effect
Socket 1 module			
Device ID	Displays the device ID of the memory module	None	-
Compatibility ID	Displays the version of the device within the same B&R device ID. This ID is needed for Automation Runtime.	None	-
Vendor ID	Displays the vendor ID	None	-
Hardware revision	Displays the hardware revision of the memory module	None	-
Serial number	Displays the B&R serial number	None	-
Product name	Displays the B&R model number	None	-
Parent device ID	Displays the manufacturer number	None	-
Parent compatibility ID	Displays the manufacturer ID	None	-
Socket 2 module			
Device ID	Displays the device ID of the memory module	None	-
Compatibility ID	Displays the version of the device within the same B&R device ID. This ID is needed for Automation Runtime.	None	-
Vendor ID	Displays the vendor ID	None	-
Hardware revision	Displays the hardware revision of the memory module	None	-
Serial number	Displays the B&R serial number	None	-
Product name	Displays the B&R model number	None	-
Parent device ID	Displays the manufacturer number	None	-
Parent compatibility ID	Displays the manufacturer ID	None	-

Table 115: Advanced - OEM features - Memory module features

Bus unit features

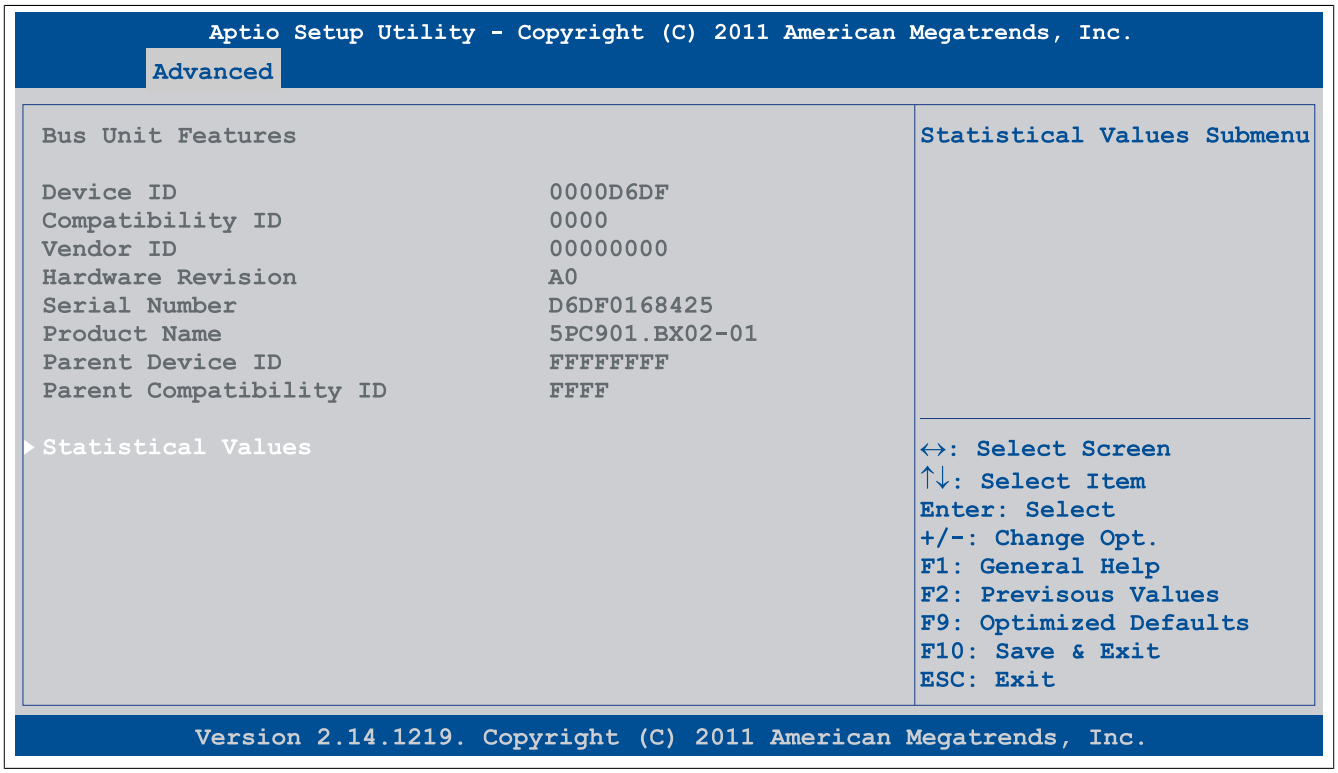


Figure 54: Advanced - OEM features - Bus unit features

BIOS setting	Description	Configuration options	Effect
Device ID	Displays the device ID of the bus unit	None	-
Compatibility ID	Displays the version of the device within the same B&R device ID. This ID is needed for Automation Runtime.	None	-
Vendor ID	Displays the vendor ID	None	-
Hardware revision	Displays the hardware revision of the bus unit	None	-
Serial number	Displays the B&R serial number	None	-
Product name	Displays the B&R model number	None	-
Parent device ID	Displays the manufacturer number	None	-
Parent compatibility ID	Displays the manufacturer ID	None	-
Statistical values	Displays statistical values	Enter	Opens the submenu See "Statistical values" on page 124

Table 116: Advanced - OEM features - Bus unit features

Statistical values

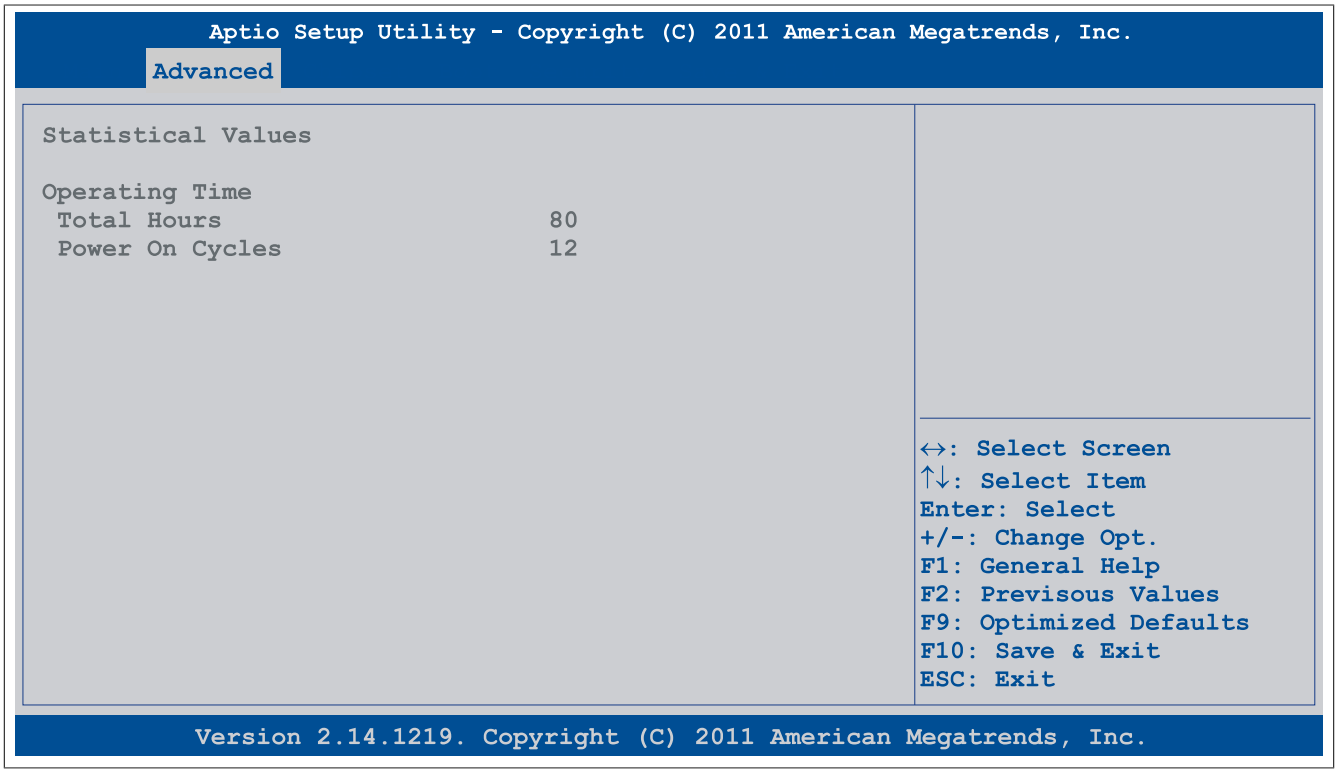


Figure 55: Advanced - OEM features - Bus unit features - Statistical values

BIOS setting	Description	Configuration options	Effect
Total hours	Displays the runtime in hours	None	-
Power on cycles	Displays the number of power-on cycles. Each restart increases the counter by one.	None	-

Table 117: Advanced - OEM features - Bus unit features - Statistical values

I/O board 1 features

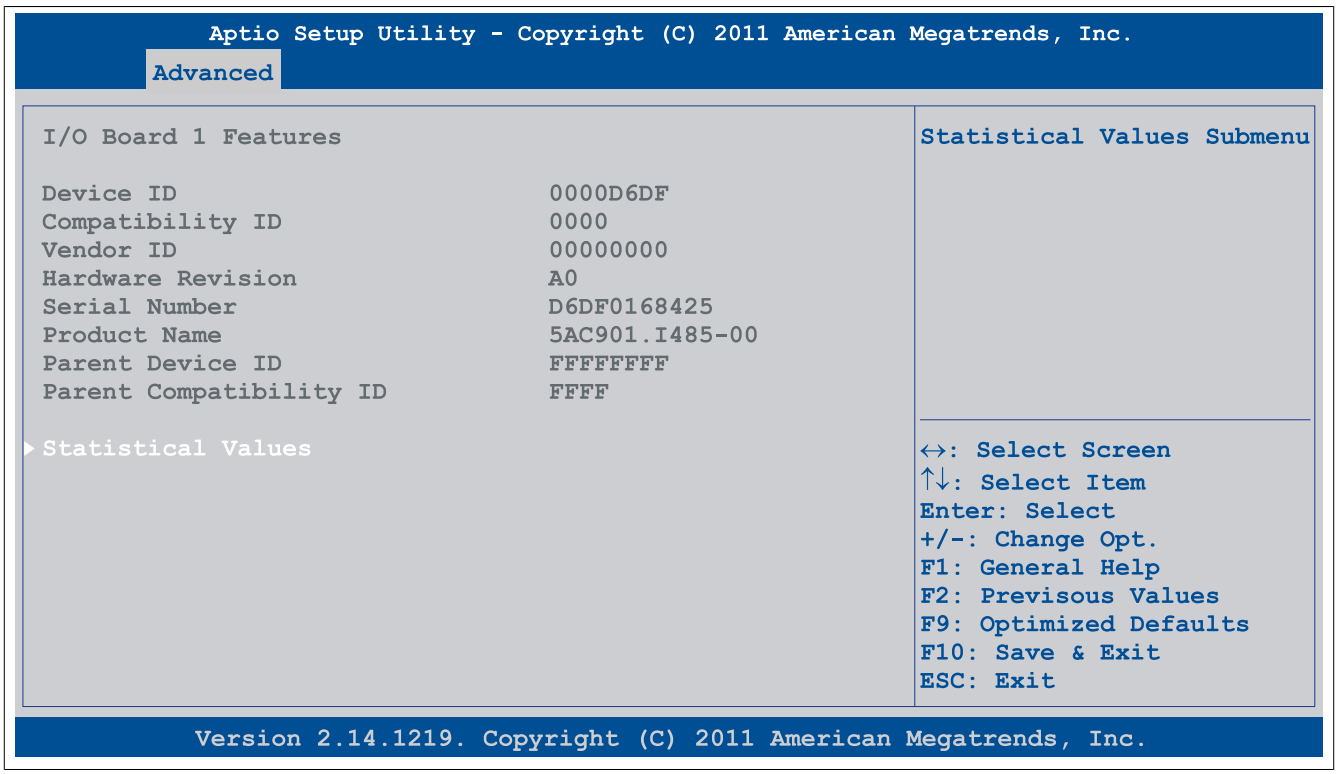


Figure 56: Advanced - OEM features - I/O board 1 features

BIOS setting	Description	Configuration options	Effect
Device ID	Displays the device ID of IF option 1	None	-
Compatibility ID	Displays the version of the device within the same B&R device ID. This ID is needed for Automation Runtime.	None	-
Vendor ID	Displays the vendor ID	None	-
Hardware revision	Displays the hardware revision of IF option 1	None	-
Serial number	Displays the B&R serial number	None	-
Product name	Displays the B&R model number	None	-
Parent device ID	Displays the manufacturer number	None	-
Parent compatibility ID	Displays the manufacturer ID	None	-
Statistical values	Displays statistical values	Enter	Opens the submenu See "Statistical values" on page 125

Table 118: Advanced - OEM features - I/O board 1 features

Statistical values

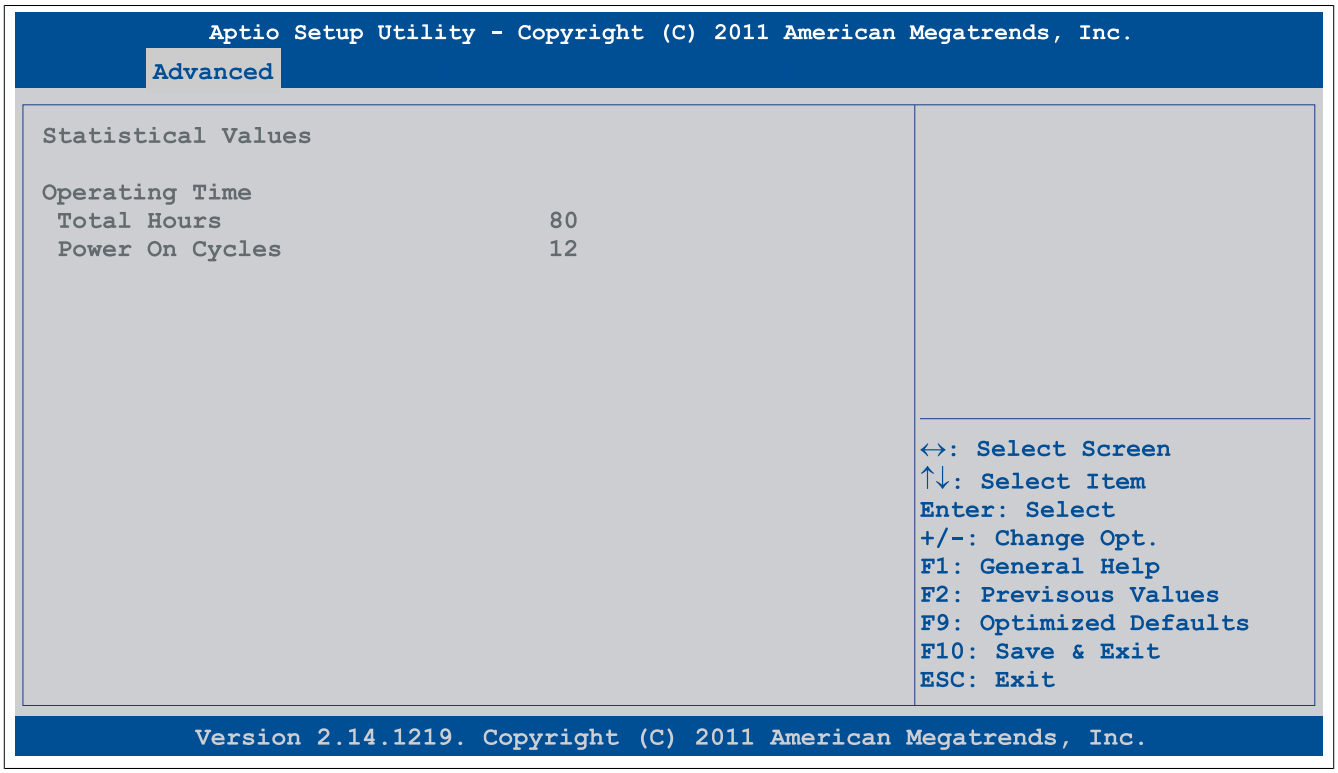


Figure 57: Advanced - OEM features - I/O board 1 features - Statistical values

BIOS setting	Description	Configuration options	Effect
Total hours	Displays the runtime in hours	None	-
Power on cycles	Displays the number of power-on cycles. Each restart increases the counter by one.	None	-

Table 119: Advanced - OEM features - I/O board 1 features - Statistical values

I/O board 2 features

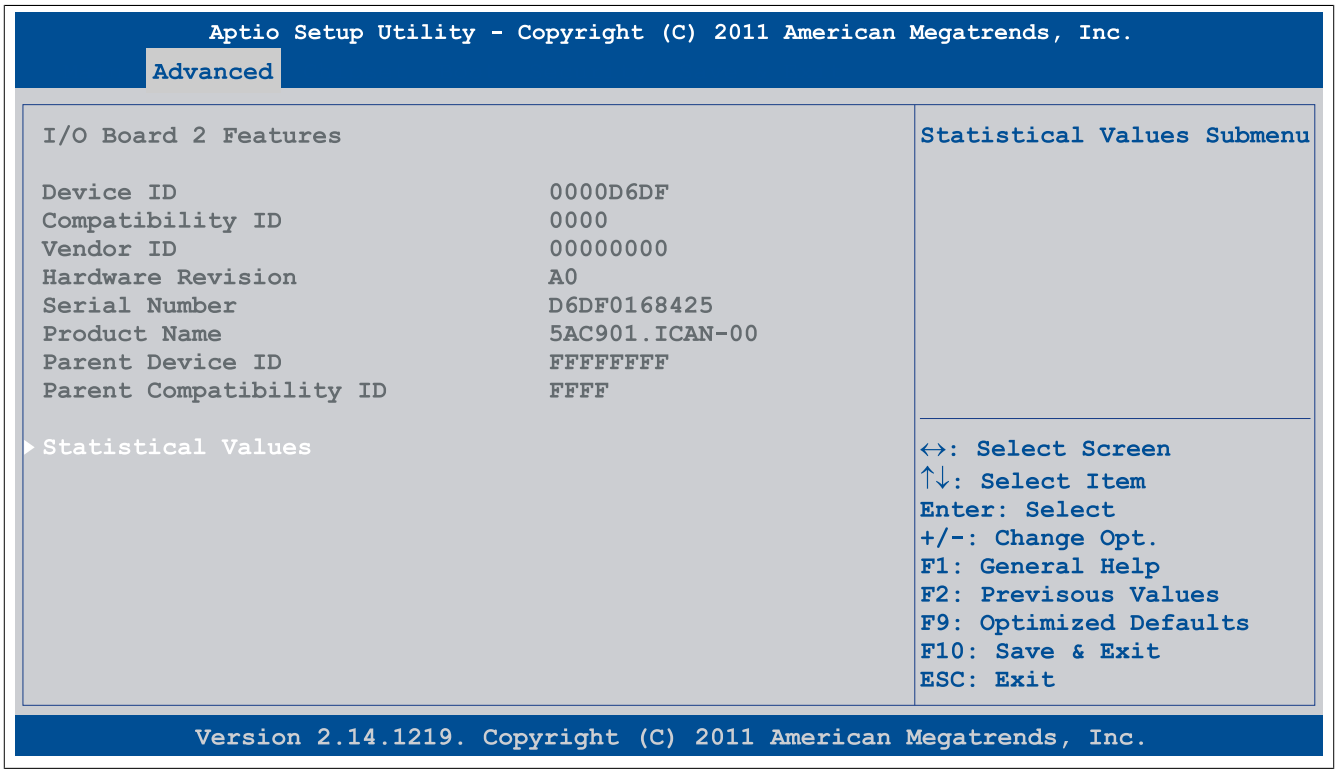


Figure 58: Advanced - OEM features - I/O board 2 features

BIOS setting	Description	Configuration options	Effect
Device ID	Displays the device ID of IF option 2	None	-
Compatibility ID	Displays the version of the device within the same B&R device ID. This ID is needed for Automation Runtime.	None	-
Vendor ID	Displays the vendor ID	None	-
Hardware revision	Displays the hardware revision of IF option 2	None	-
Serial number	Displays the B&R serial number	None	-
Product name	Displays the B&R model number	None	-
Parent device ID	Displays the manufacturer number	None	-
Parent compatibility ID	Displays the manufacturer ID	None	-
Statistical values	Displays statistical values	Enter	Opens the submenu See "Statistical values" on page 127

Table 120: Advanced - OEM features - I/O board 2 features

Statistical values

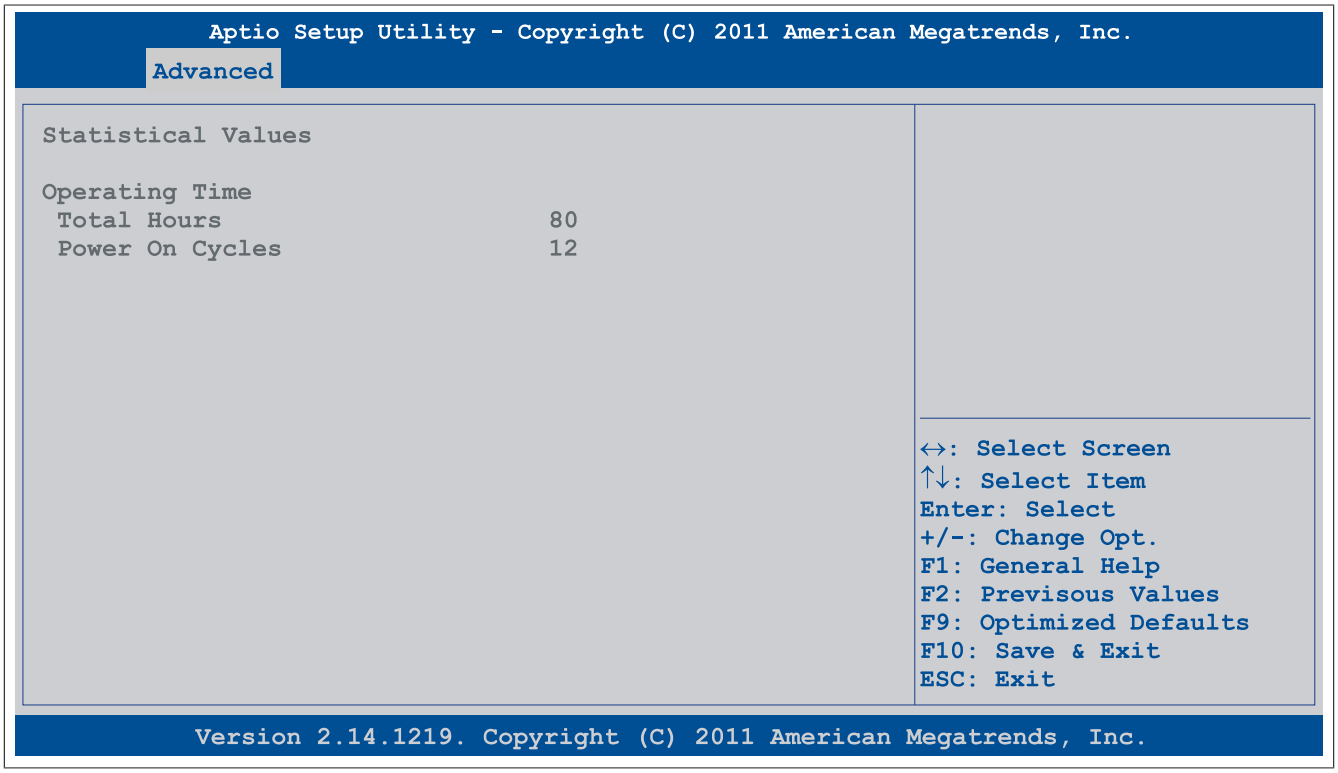


Figure 59: Advanced - OEM features - I/O board 2 features - Statistical values

BIOS setting	Description	Configuration options	Effect
Total hours	Displays the runtime in hours	None	-
Power on cycles	Displays the number of power-on cycles. Each restart increases the counter by one.	None	-

Table 121: Advanced - OEM features - I/O board 2 features - Statistical values

Display link module features

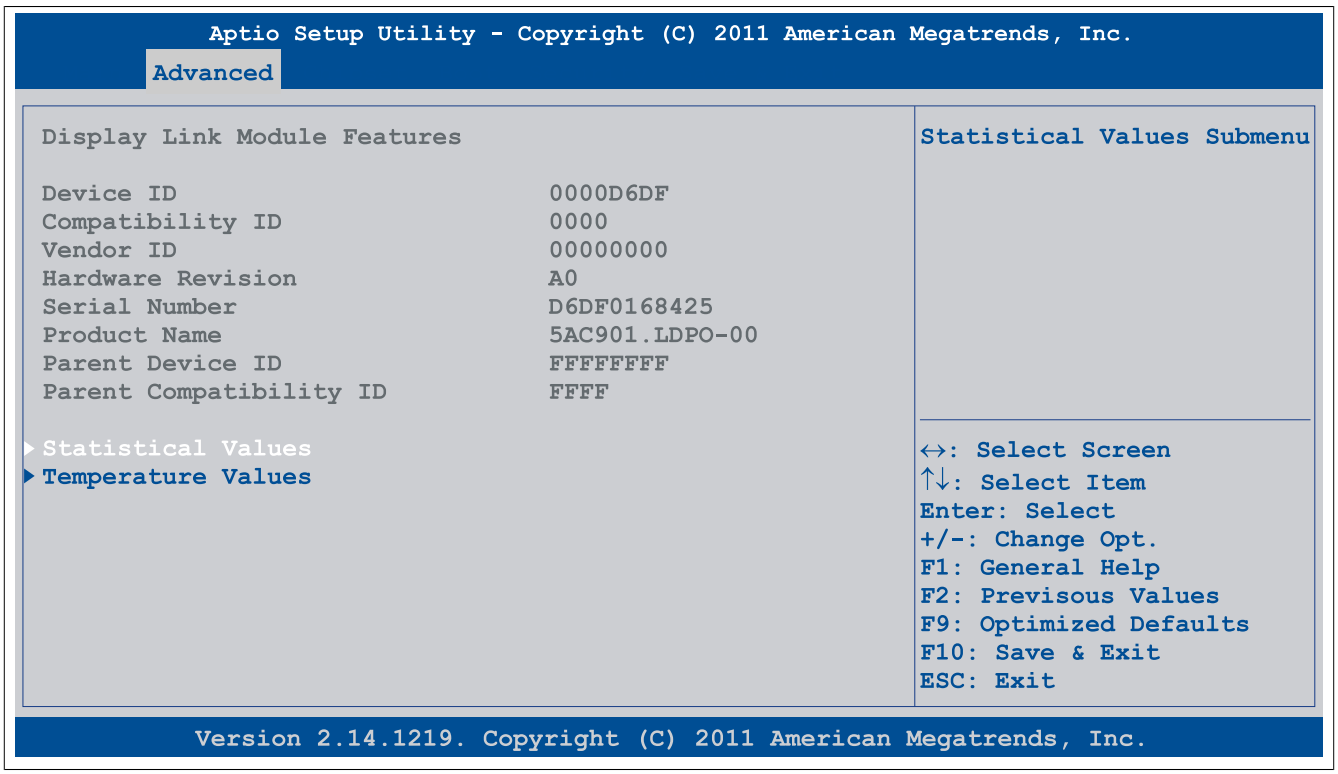


Figure 60: Advanced - OEM features - Display link module features

BIOS setting	Description	Configuration options	Effect
Device ID	Displays the device ID of the monitor/panel option	None	-
Compatibility ID	Displays the version of the device within the same B&R device ID. This ID is needed for Automation Runtime.	None	-
Vendor ID	Displays the vendor ID	None	-
Hardware revision	Displays the hardware revision of the monitor/panel option	None	-
Serial number	Displays the B&R serial number	None	-
Product name	Displays the B&R model number	None	-
Parent device ID	Displays the manufacturer number	None	-
Parent compatibility ID	Displays the manufacturer ID	None	-
Statistical values	Displays statistical values	Enter	Opens the submenu See "Statistical values" on page 128
Temperature values	Displays current temperature values	Enter	Opens the submenu See "Temperature values" on page 129

Table 122: Advanced - OEM features - Display link module features

Statistical values

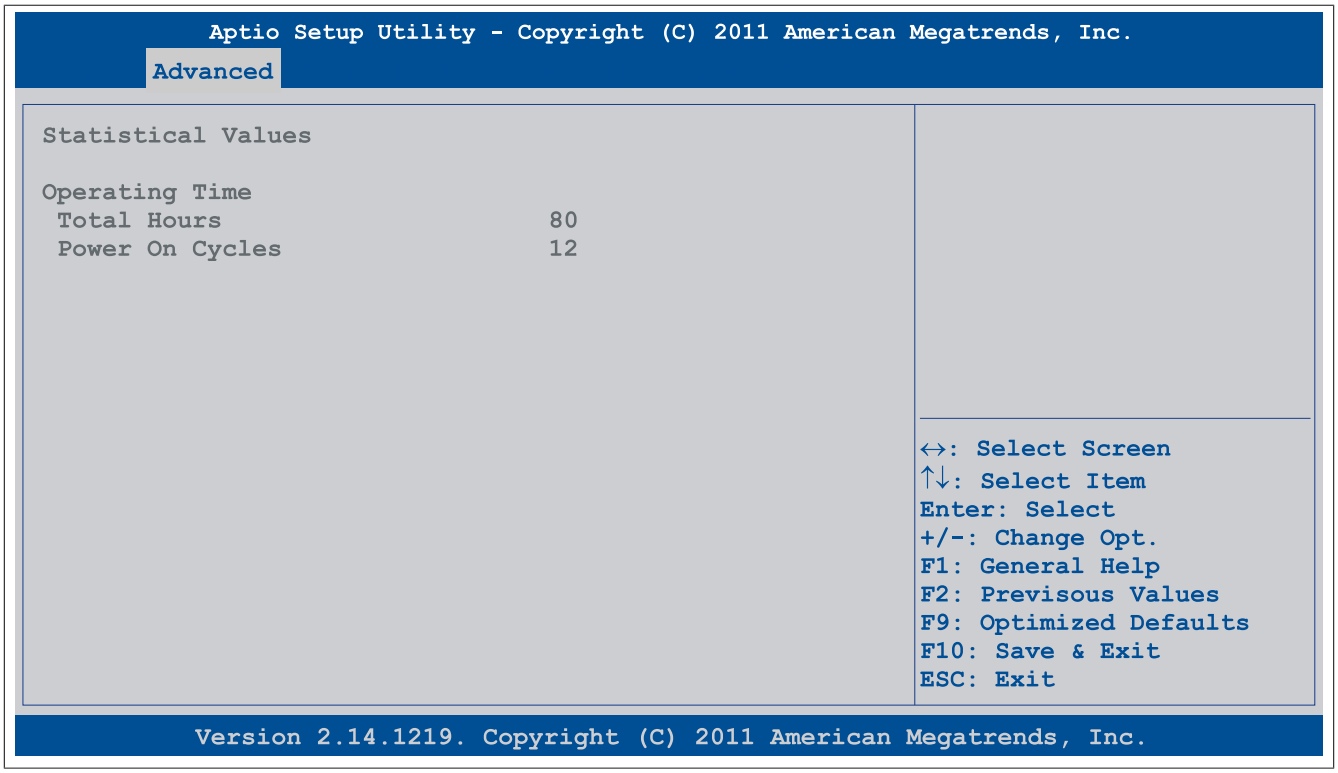


Figure 61: Advanced - OEM features - Display link module features - Statistical values

BIOS setting	Description	Configuration options	Effect
Total hours	Displays the runtime in hours	None	-
Power on cycles	Displays the number of power-on cycles. Each restart increases the counter by one.	None	-

Table 123: Advanced - OEM features - Display link module features - Statistical values

Temperature values

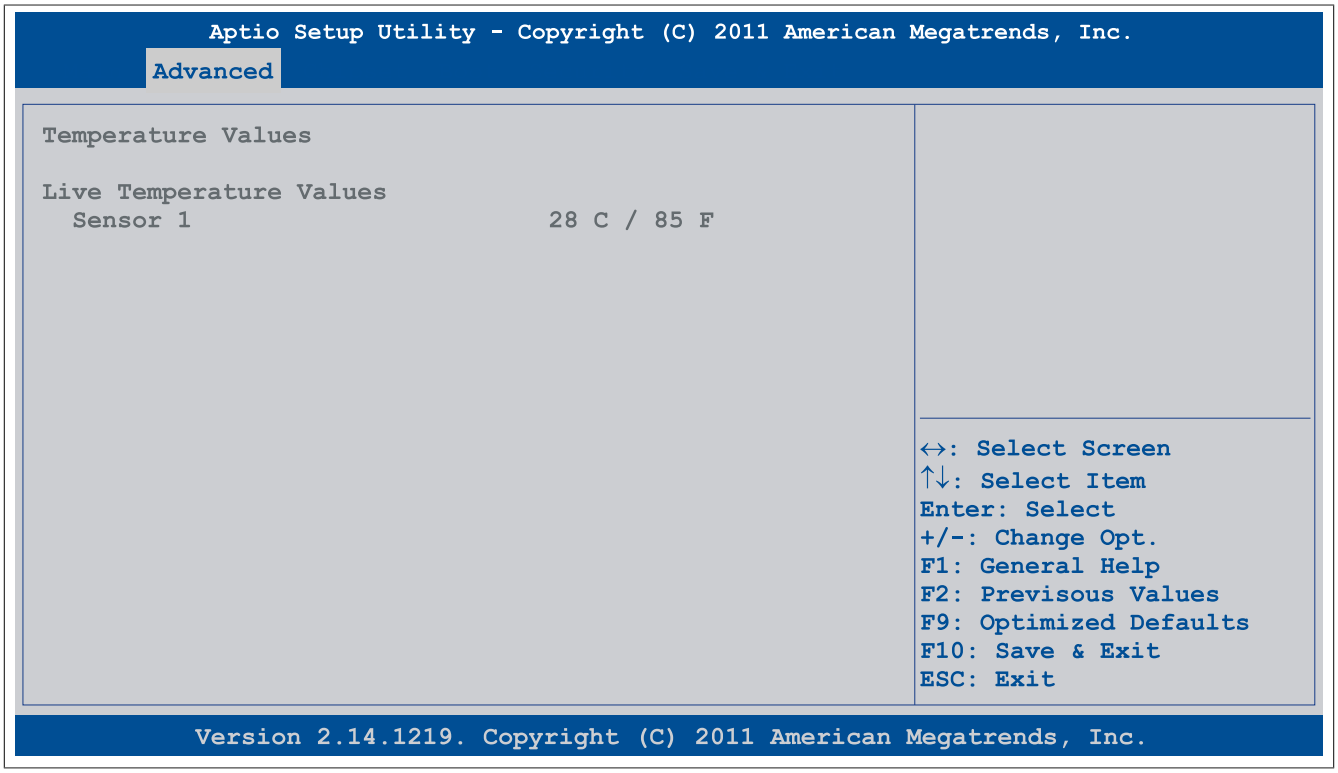


Figure 62: Advanced - OEM features - Display link module features - Temperature values

BIOS setting	Description	Configuration options	Effect
Sensor 1	Displays the current temperature of sensor 1 (monitor/panel option) in °C and °F	None	-

Table 124: Advanced - OEM features - Display link module features - Temperature values

Fan unit features

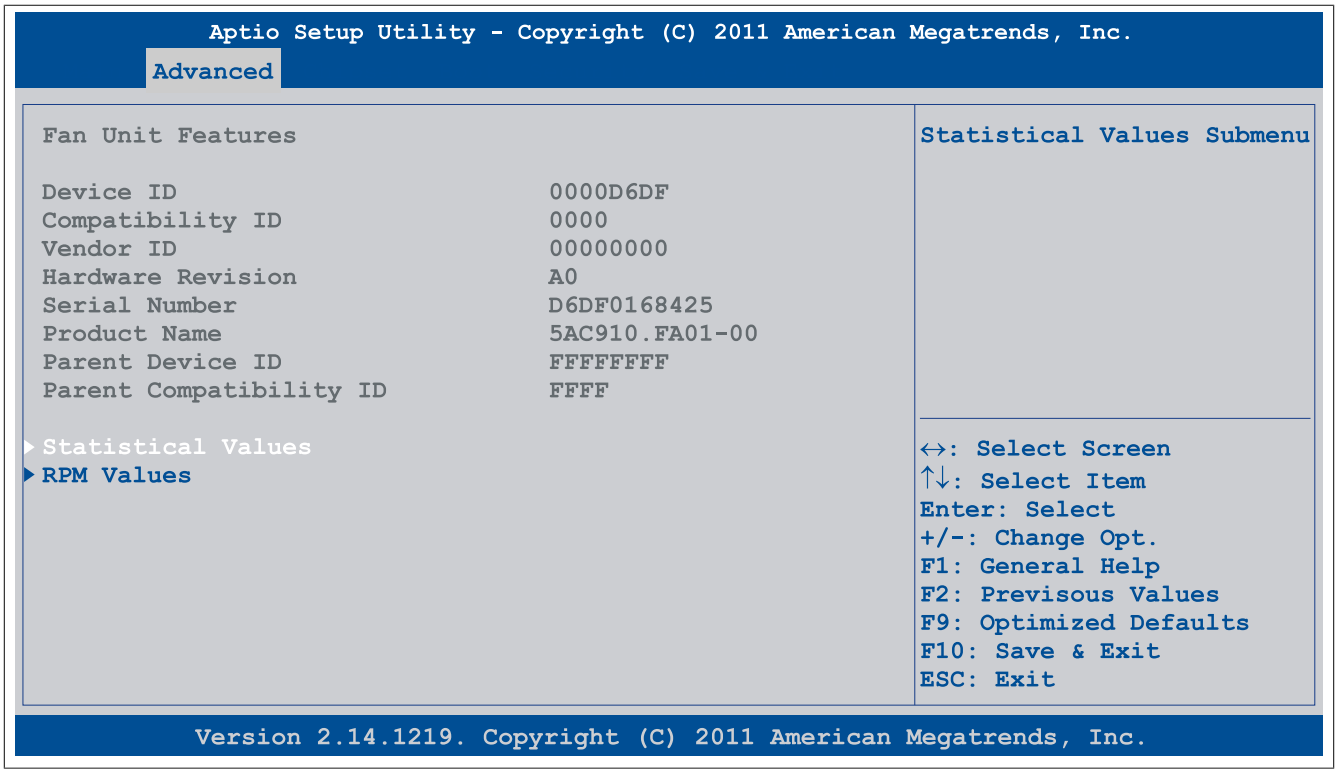


Figure 63: Advanced - OEM features - Fan unit features

BIOS setting	Description	Configuration options	Effect
Device ID	Displays the device ID of the fan kit	None	-
Compatibility ID	Displays the version of the device within the same B&R device ID. This ID is needed for Automation Runtime.	None	-
Vendor ID	Displays the vendor ID	None	-
Hardware revision	Displays the hardware revision of the fan kit	None	-
Serial number	Displays the B&R serial number	None	-
Product name	Displays the B&R model number	None	-
Parent device ID	Displays the manufacturer number	None	-
Parent compatibility ID	Displays the manufacturer ID	None	-
Statistical values	Displays statistical values	Enter	Opens the submenu See "Statistical values" on page 130
RPM values	Displays the speed (in rpm) of the individual fans in the fan kit	Enter	Opens the submenu See "RPM values" on page 131

Table 125: Advanced - OEM features - Fan unit features

Statistical values

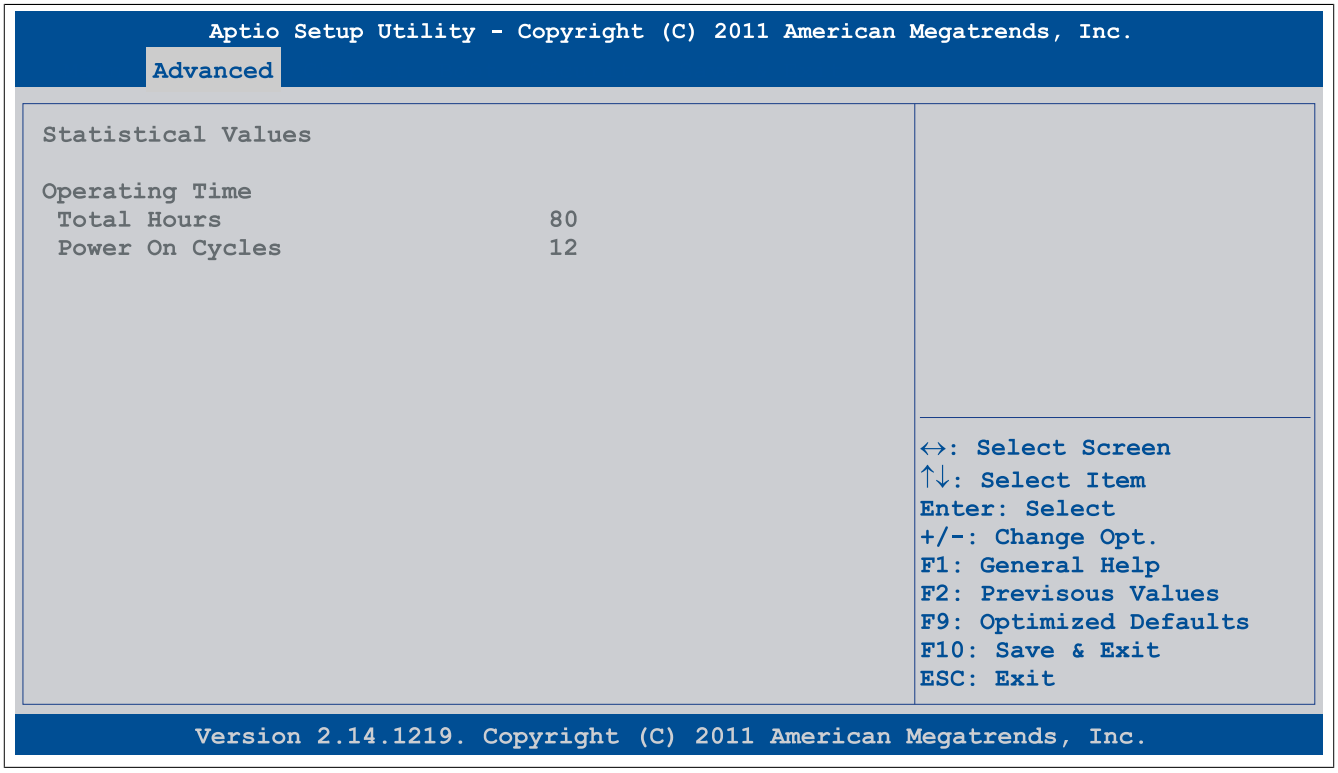


Figure 64: Advanced - OEM features - Fan unit features - Statistical values

BIOS setting	Description	Configuration options	Effect
Total hours	Displays the runtime in hours	None	-
Power on cycles	Displays the number of power-on cycles. Each restart increases the counter by one.	None	-

Table 126: Advanced - OEM features - Fan unit features - Statistical values

RPM values

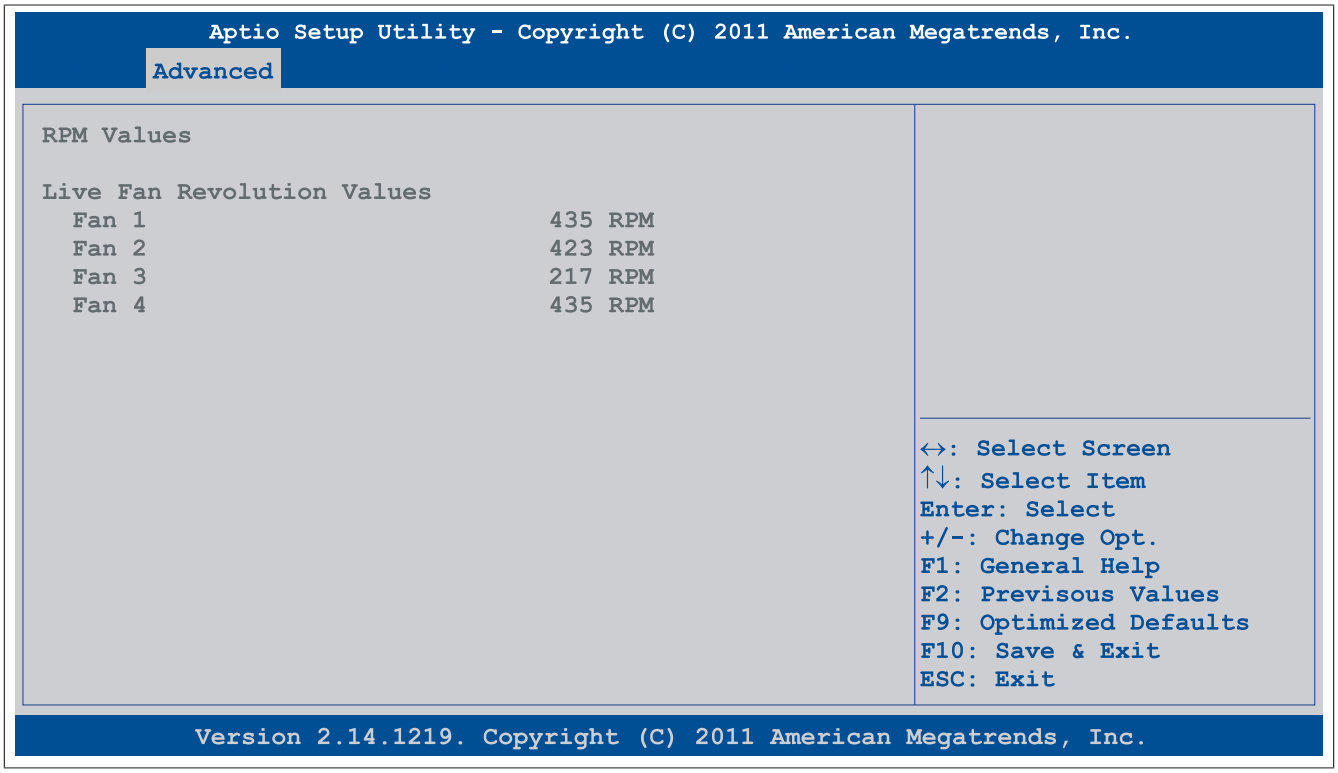


Figure 65: Advanced - OEM features - Fan unit features - RPM values

BIOS setting	Description	Configuration options	Effect
Fan 1	Displays the current speed of fan 1 in rpm	None	-
Fan 2	Displays the current speed of fan 2 in rpm	None	-
Fan 3	Displays the current speed of fan 3 in rpm	None	-
Fan 4	Displays the current speed of fan 4 in rpm	None	-

Table 127: Advanced - OEM features - Fan unit features - RPM values

Panel control features

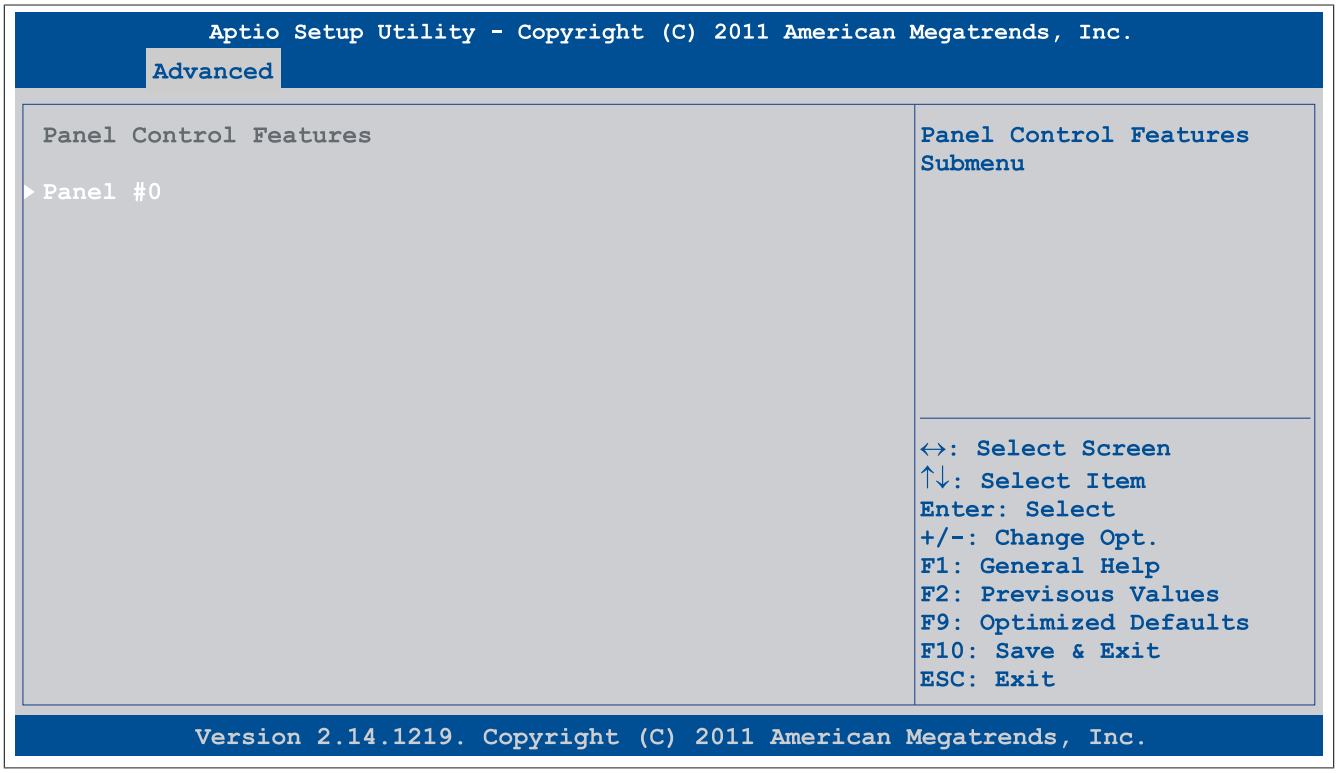


Figure 66: Advanced - OEM features - Panel control features

BIOS setting	Description	Configuration options	Effect
Panel #X	Displays the properties of the connected panel	Enter	Opens the submenu See "Panel #X" on page 132

Table 128: Advanced - OEM features - Panel control features

Panel #X

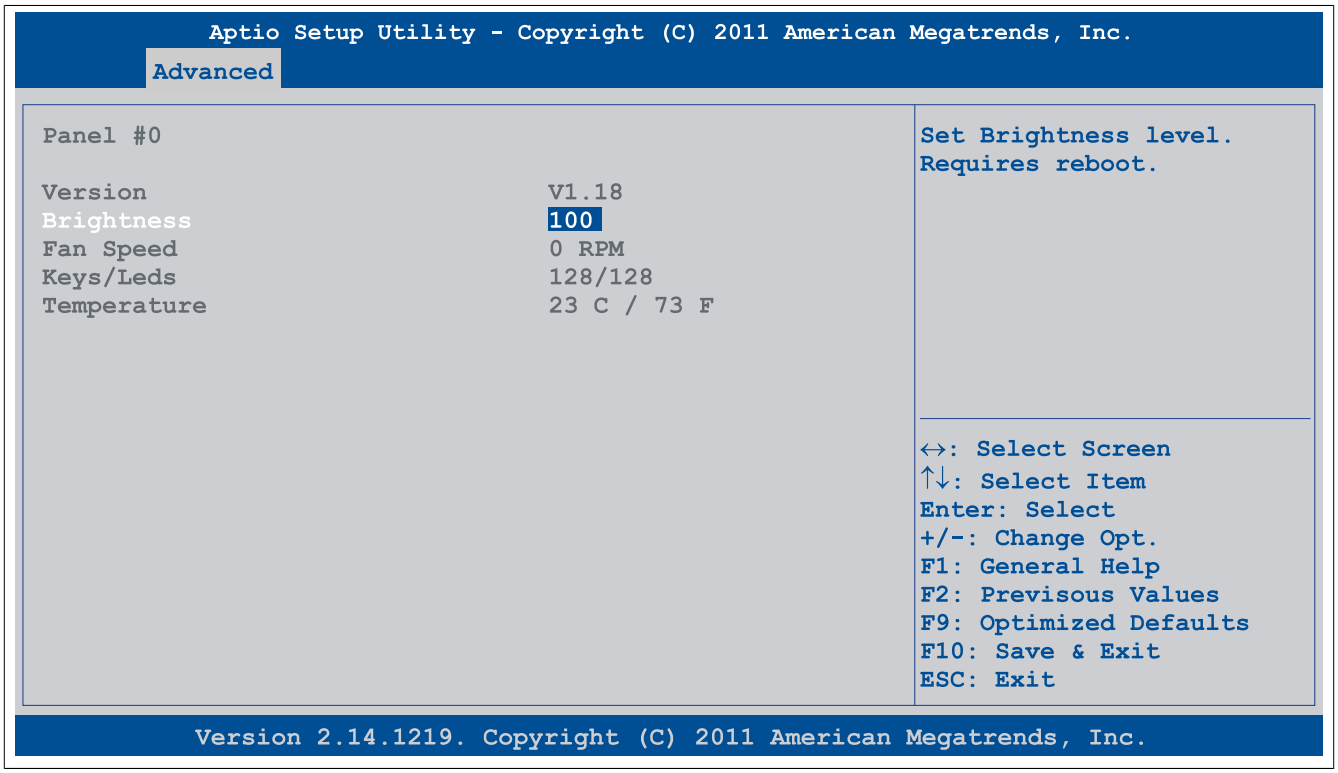


Figure 67: Advanced - OEM features - Panel control features - Panel #X

BIOS setting	Description	Configuration options	Effect
Version	Displays the firmware version of the SDLR controller	None	-
Brightness	Setting for the brightness of the panel	0 to 100	Sets the brightness (in %) of the selected panel. Settings take effect immediately.
Fan speed	Displays the fan speed of the panel	None	-
Keys/LEDs	Displays the available keys and LEDs for the panel	None	-
Temperature	Displays the temperature of the panel in °C and °F	None	-

Table 129: Advanced - OEM features - Panel control features - Panel #X

1.4.4 PCI configuration

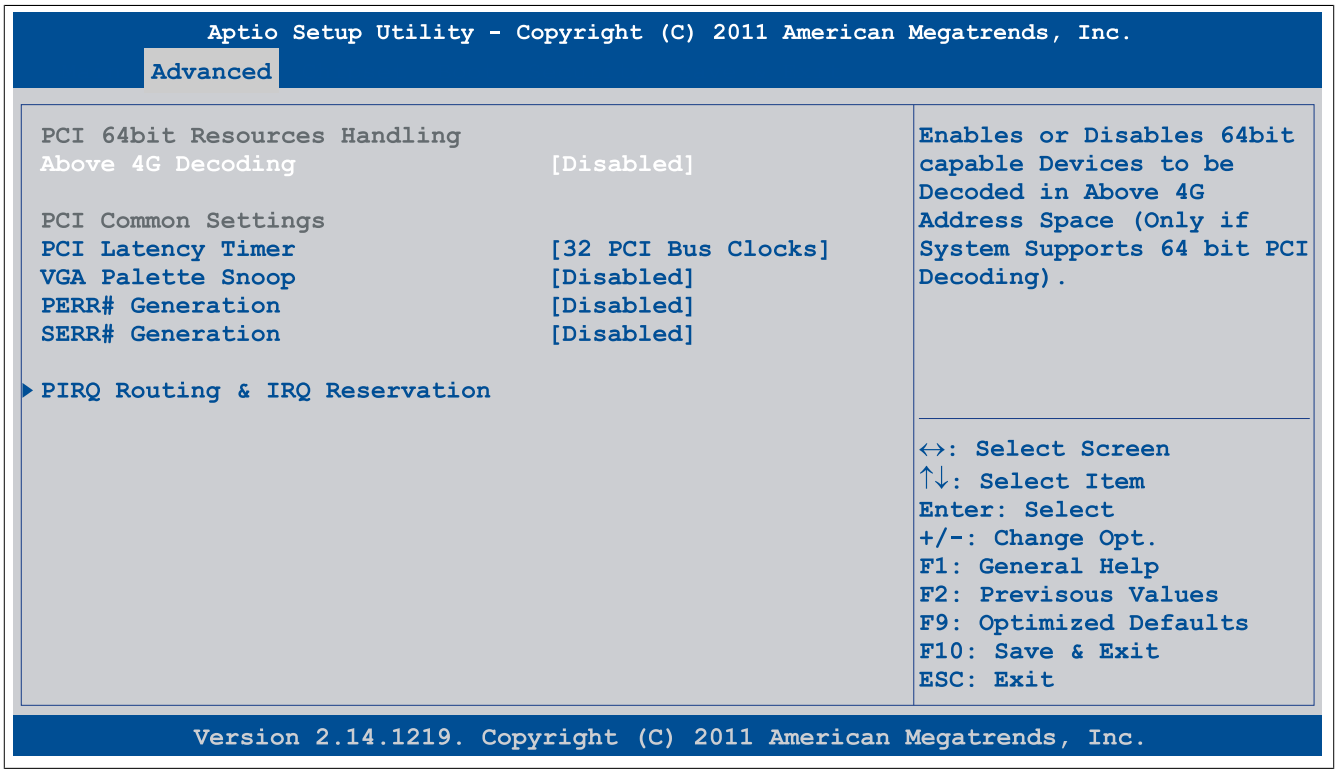


Figure 68: Advanced - PCI configuration

BIOS setting	Description	Configuration options	Effect
Above 4G decoding	Option for enabling/disabling 64-bit capable devices so that they can be decoded in the address space above 4 GB (only if the system supports 64-bit decoding)	Disabled	Disables this function
		Enabled	Enables this function
PCI latency timer	Option for controlling how long (in PCI ticks) one PCI bus card can continue to use the master after another PCI card has requested access	32 PCI bus clocks to 248 PCI bus clocks	Manually sets the value in PCI ticks
VGA palette snoop	Option for supporting graphics cards with 256 colors. This option should only be set to "Enabled" if colors are not displayed correctly.	Disabled	Disables this function
		Enabled	Enables this function
PERR# generation	Option for generating a PERR signal (parity error) This signal indicates a data parity error one cycle after *PAR*.	Disabled	Disables this function
		Enabled	Enables this function
SERR# generation	Option for generating a SERR signal (system error) This signal indicates a data error or other type of system error when executing a special cycle command.	Disabled	Disables this function
		Enabled	Enables this function
PIRQ routing & IRQ reservation	Configures PIRQ routing	Enter	Opens the submenu See "PIRQ routing & IRQ reservation" on page 134

Table 130: Advanced - PCI configuration - Configuration options

PIRQ routing & IRQ reservation

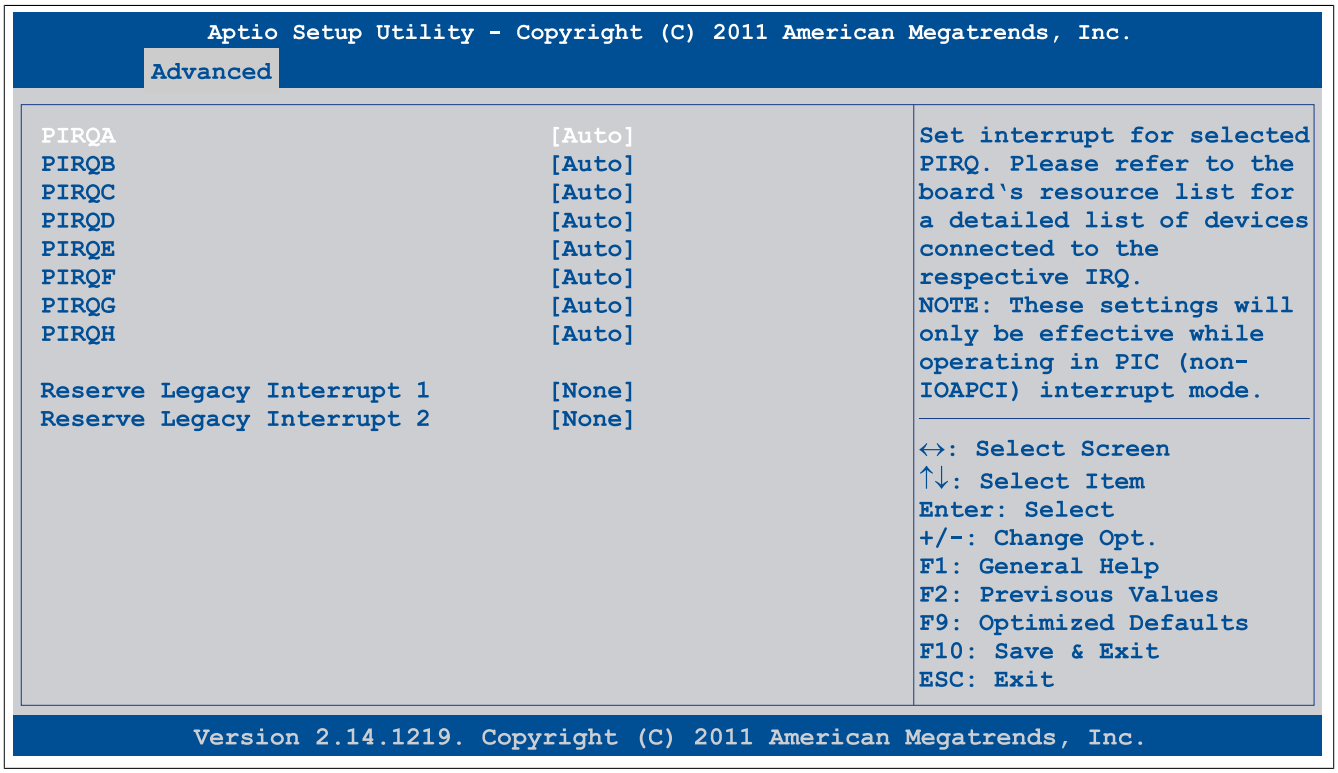


Figure 69: Advanced - PCI configuration - PIRQ routing & IRQ reservation

BIOS setting	Description	Configuration options	Effect
PIRQA	Option for configuring PIRQ A	Auto	Automatic assignment by BIOS and the operating system
		IRQ3, IRQ4, IRQ5, IRQ6, IRQ10, IRQ11, IRQ14, IRQ15	Manual assignment
PIRQB	Option for configuring PIRQ B	Auto	Automatic assignment by BIOS and the operating system
		IRQ3, IRQ4, IRQ5, IRQ6, IRQ10, IRQ11, IRQ14, IRQ15	Manual assignment
PIRQC	Option for configuring PIRQ C	Auto	Automatic assignment by BIOS and the operating system
		IRQ3, IRQ4, IRQ5, IRQ6, IRQ10, IRQ11, IRQ14, IRQ15	Manual assignment
PIRQD	Option for configuring PIRQ D	Auto	Automatic assignment by BIOS and the operating system
		IRQ3, IRQ4, IRQ5, IRQ6, IRQ10, IRQ11, IRQ14, IRQ15	Manual assignment
PIRQE	Option for configuring PIRQ E	Auto	Automatic assignment by BIOS and the operating system
		IRQ3, IRQ4, IRQ5, IRQ6, IRQ10, IRQ11, IRQ14, IRQ15	Manual assignment
PIRQF	Option for configuring PIRQ F	Auto	Automatic assignment by BIOS and the operating system
		IRQ3, IRQ4, IRQ5, IRQ6, IRQ10, IRQ11, IRQ14, IRQ15	Manual assignment
PIRQG	Option for configuring PIRQ G	Auto	Automatic assignment by BIOS and the operating system
		IRQ3, IRQ4, IRQ5, IRQ6, IRQ10, IRQ11, IRQ14, IRQ15	Manual assignment
PIRQH	Option for configuring PIRQ H	Auto	Automatic assignment by BIOS and the operating system
		IRQ3, IRQ4, IRQ5, IRQ6, IRQ10, IRQ11, IRQ14, IRQ15	Manual assignment
Reserve legacy interrupt 1	The interrupt reserved here is not made available to a PCI or PCI Express device.	None	No interrupt assigned
		IRQ3, IRQ4, IRQ5, IRQ6, IRQ10, IRQ11, IRQ14, IRQ15	Reserves IRQx
Reserve legacy interrupt 2	The interrupt reserved here is not made available to a PCI or PCI Express device.	None	No interrupt assigned
		IRQ3, IRQ4, IRQ5, IRQ6, IRQ10, IRQ11, IRQ14, IRQ15	Reserves IRQx

Table 131: Advanced - PCI configuration - PIRQ routing & IRQ reservation - Configuration options

1.4.5 PCI Express configuration

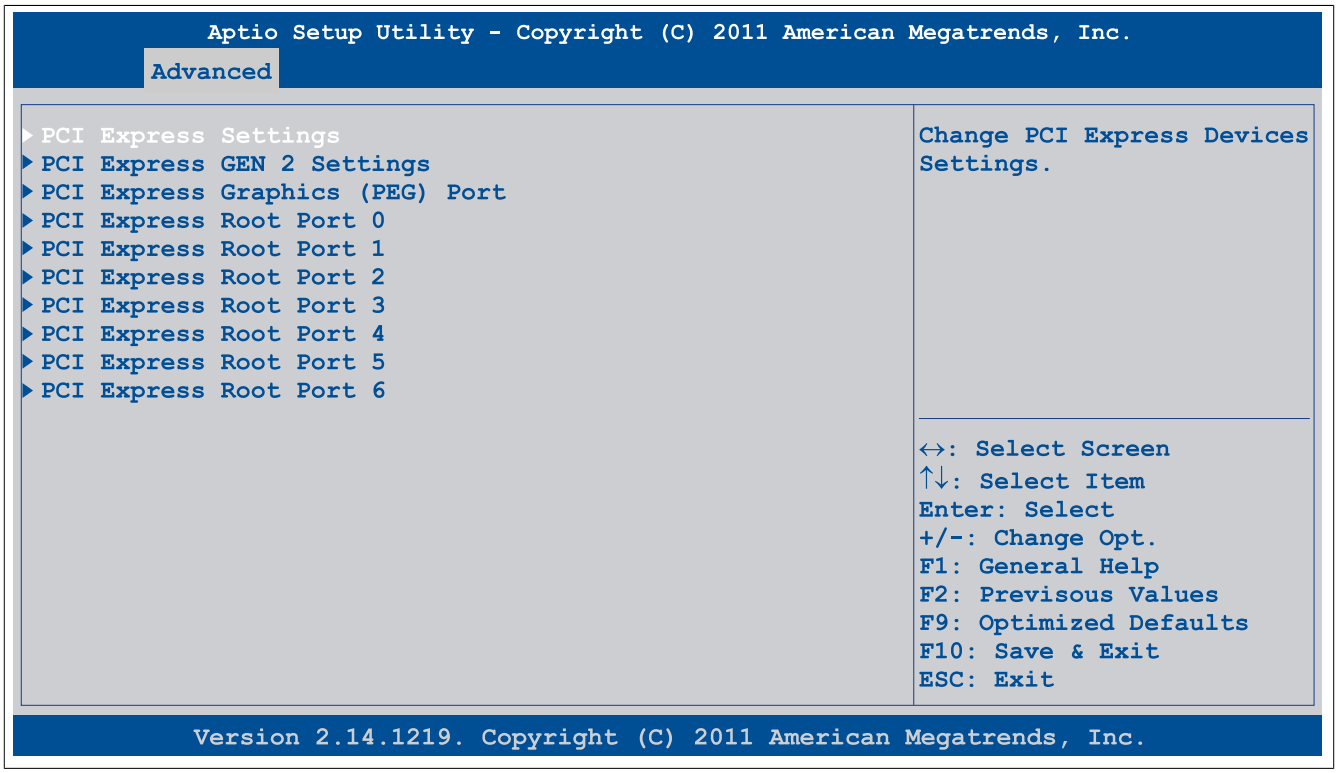


Figure 70: Advanced - PCI express configuration

BIOS setting	Description	Configuration options	Effect
PCI Express settings	Configures PCI Express settings	Enter	Opens the submenu See "PCI Express settings" on page 136
PCI Express GEN 2 settings	Configures PCI Express GEN2 settings	Enter	Opens the submenu See "PCI Express GEN 2 settings" on page 137
PCI Express graphics (PEG) port	Configures PCI Express graphics settings	Enter	Opens the submenu See "PCI Express graphics (PEG) port" on page 138
PCI Express root port 0	Configures PCI Express settings on port 0	Enter	Opens the submenu See "PCI Express root port" on page 140
PCI Express root port 1	Configures PCI Express settings on port 1	Enter	Opens the submenu See "PCI Express root port" on page 140
PCI Express root port 2	Configures PCI Express settings on port 2	Enter	Opens the submenu See "PCI Express root port" on page 140
PCI Express root port 3	Configures PCI Express settings on port 3	Enter	Opens the submenu See "PCI Express root port" on page 140
PCI Express root port 4	Configures PCI Express settings on port 4	Enter	Opens the submenu See "PCI Express root port" on page 140
PCI Express root port 5	Configures PCI Express settings on port 5	Enter	Opens the submenu See "PCI Express root port" on page 140
PCI Express root port 6	Configures PCI Express settings on port 6	Enter	Opens the submenu See "PCI Express root port" on page 140

Table 132: Advanced - PCI Express configuration - Menu

PCI Express settings

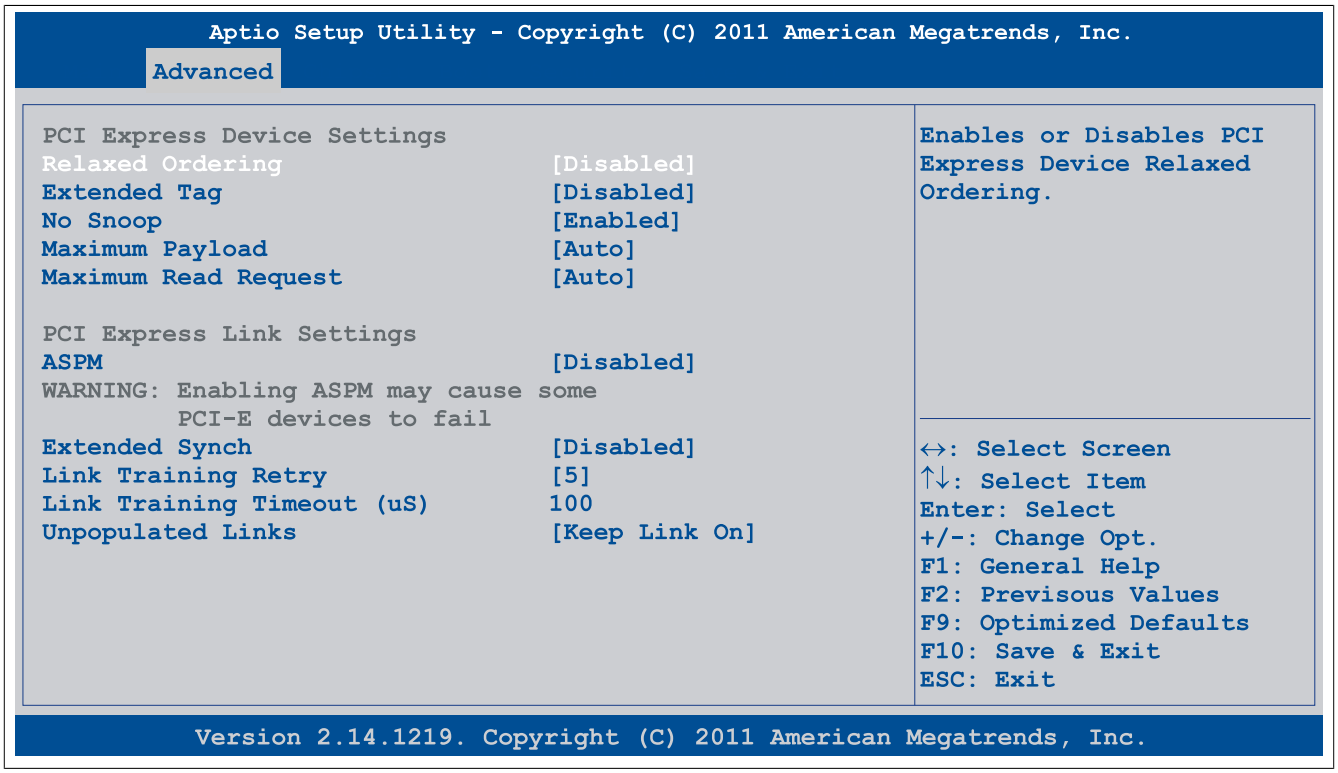


Figure 71: Advanced - PCI Express configuration - PCI Express settings

BIOS setting	Description	Configuration options	Effect
Relaxed ordering	Option for enabling/disabling relaxed ordering	Disabled	Disables this function
		Enabled	Enables this function
Extended tag	Option for enabling/disabling the extended tag	Disabled	Disables this function. Only 5 bits can be used.
		Enabled	Enables this function. Devices with 8 bits in the requester transaction ID field can be used.
No snoop	Option for enabling/disabling the "No snoop" option	Disabled	Disables this function
		Enabled	Enables this function
Maximum payload	Option for setting the maximum surface packet size for data transfers	Auto	Automatically assigns the packet size
		128 bytes to 4096 bytes	Manual maps the packet size
Maximum read request	Option for setting the maximum read request	Auto	Automatic assignment
		128 bytes to 4096 bytes	Manual assignment
ASPM[1)]	Option for setting a power saving function (L0s/L1) for PCIe slots if they do not require full power	Disabled	Disables the energy saving function
		Auto	Maximum energy savings. The energy saving function is set to L0 or L1.
		Force L0s	Enables L0 mode
Extended synch	Option for setting an extended synchronization pattern to improve system performance	Disabled	Disables this function
		Enabled	Enables this function
Link training retry	Option for defining the number of times the software should attempt to reroute a link if the previous training attempt was unsuccessful	Disabled	Disables this function
		2	2 link training attempts
		3	3 link training attempts
		5	5 link training attempts
Link training timeout (µS)	Option for defining how many microseconds the software waits before the link training bit in the link status register is queried	10 to 1000	Time setting in µs
Unpopulated links	Option for enabling/disabling PCIe slots where no devices are connected	Keep link on	Keeps PCIe slots where no devices are connected enabled
		Disable link	Disables PCIe slots where no devices are connected to save power

Table 133: Advanced - PCI Express configuration - PCI Express settings - Configuration options

1) ASPM = Active State Power Management

PCI Express GEN 2 settings

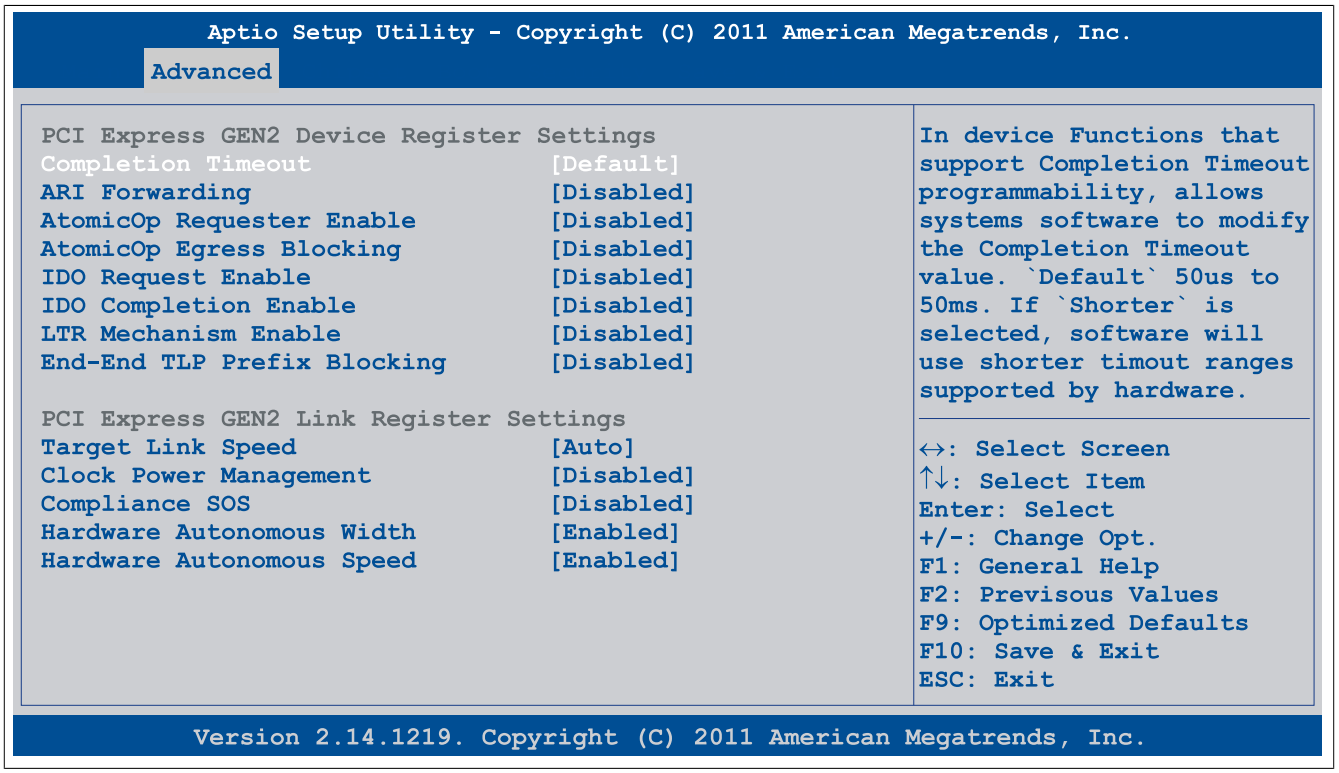


Figure 72: Advanced - PCI Express configuration - PCI Express GEN 2 settings

BIOS setting	Description	Configuration options	Effect
Completion timeout	Option for allowing software to modify the completion timeout value if supported by device functions	Default	Timeout range: 50 µs - 50 ms
		Shorter	The software uses shorter timeout ranges than are supported by the hardware.
		Longer	The software uses longer timeout ranges than are supported by the hardware.
		Disabled	Disables this function
ARI forwarding	If supported by hardware and set to "Enabled", the downstream port disables its traditional "Device number" field being 0 enforcement when turning a Type1 configuration request into a Type0 configuration request, permitting access to extended functions in an ARI device immediately below the port.	Disabled	Disables this function
		Enabled	Enables this function
AtomicOp requester enable	Option for enabling/disabling the AtomicOp requester	Disabled	Disables this function
		Enabled	Enables this function AtomicOp queries are only initiated if the bus master enable bit is set in the command register.
AtomicOp egress blocking	Option for enabling/disabling AtomicOp egress blocking If supported by hardware and set to "Enabled", outbound AtomicOp requests via egress ports will be locked.	Disabled	Disables this function
		Enabled	Enables this function Blocks outbound AtomicOp requests via the egress port
IDO request enable	If supported by hardware and set to "Enabled", this option permits setting the number of ID-based ordering (IDO) bit (Attribute[2]) requests to be initiated.	Disabled	Disables this function
		Enabled	Enables this function
IDO completion enable	If supported by hardware and set to "Enabled", this option permits setting the number of ID-based ordering (IDO) bit (Attribute[2]) requests to be initiated.	Disabled	Disables this function
		Enabled	Enables this function
LTR mechanism enable	If supported by hardware and set to "Enabled", this enables the Latency Tolerance Reporting (LTR) mechanism.	Disabled	Disables this function
		Enabled	Enables this function
End-End TLP prefix blocking	If supported by hardware and set to "Enabled", this function will block forwarding of TLPs containing End-End TLP prefixes.	Disabled	Disables this function
		Enabled	Enables this function
Target link speed	If supported by hardware and set to "Force to 2.5 GT/s" for downstream ports, this sets an upper limit on Link operational speed by redistricting the values advertised by the upstream component in its training sequences. When "Auto" is selected, hardware-initialized data will be used.	Auto	TBD
		Force to 2.5 GT/s	TBD
		Force to 5.0 GT/s	TBD

Table 134: Advanced - PCI Express configuration - PCI Express GEN 2 settings - Configuration options

BIOS setting	Description	Configuration options	Effect
Clock power management	If supported by hardware and set to "Enabled", the device is permitted to use the CLKREQ# signal for power management of the Link clock in accordance with the protocol defined in the appropriate form factor specification.	Disabled	Disables this function
		Enabled	Enables this function
Compliance SOS	If supported by hardware and set to "Enabled", this will force LTSSM to send SKP ordered sets between sequences when sending compliance patterns or modified compliance patterns.	Disabled	Disables this function
		Enabled	Enables this function
Hardware autonomous width	If supported by hardware and set to "Disabled", this will disable the hardware's ability to change link width except width size reduction for the purpose of correcting unstable link operation.	Disabled	Disables this function
		Enabled	Enables this function
Hardware autonomous speed	If supported by hardware and set to "Disabled", this will disable the hardware's ability to change link speed except speed size reduction for the purpose of correcting unstable link operation.	Disabled	Disables this function The PCIe device can no longer change the link speed except to correct unstable operation.
		Enabled	Enables this function

Table 134: Advanced - PCI Express configuration - PCI Express GEN 2 settings - Configuration options

PCI Express graphics (PEG) port

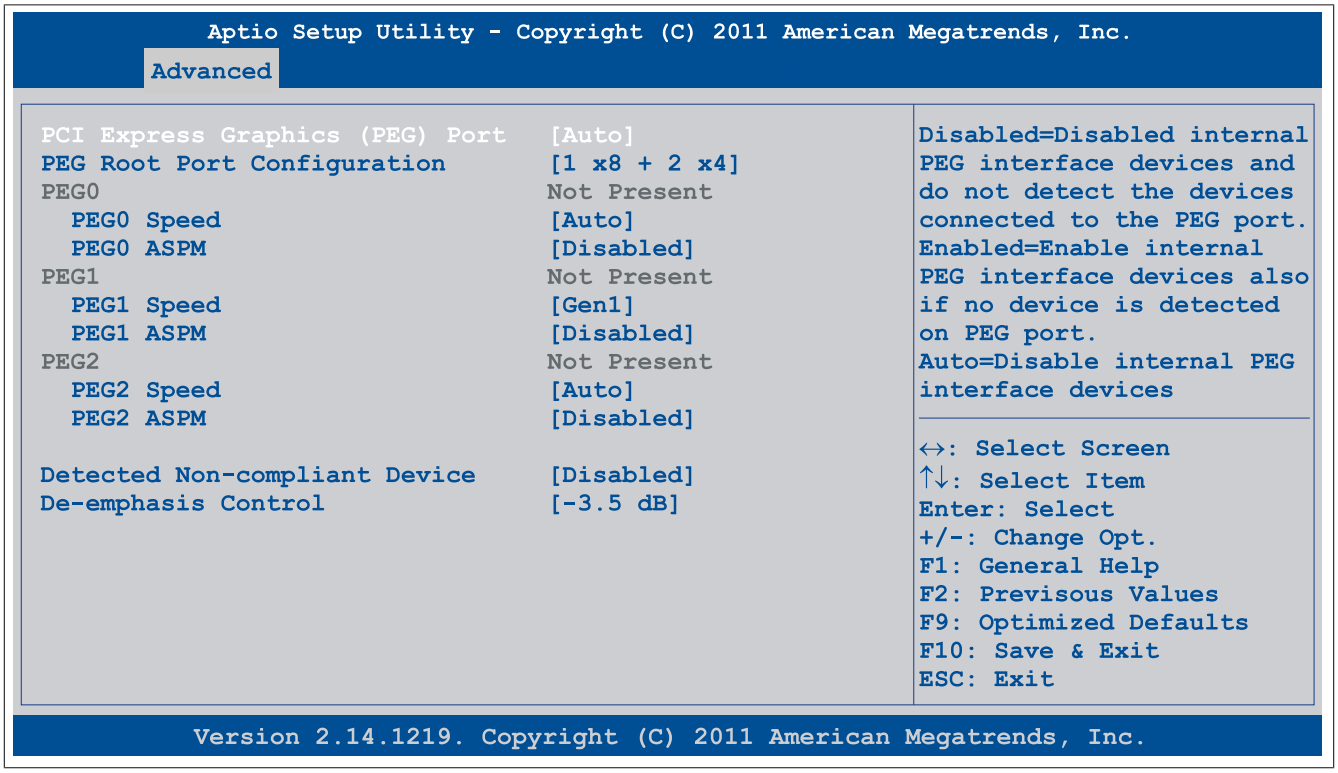


Figure 73: Advanced - PCI Express configuration - PCI Express graphics (PEG) port

BIOS setting	Description	Configuration options	Effect
PCI Express graphics (PEG) port	Option for configuring the PCI Express graphics port	Disabled	Disables internal PEG interface devices. Devices connected to the PEG port are not detected.
		Enabled	Enables internal PEG interface devices even if no device is detected on the PEG port
		Auto	Disables internal PEG interface devices if no device is detected on the PEG port
PEG root port configuration	Option for selecting the root port configuration on the 16 PCIe channels of the PEG port	1 x 16	Configuration with 1 x 16
		2 x 8	Configuration with 2 x 8
		1 x 8 + 2 x 4	Configuration with 1 x 8 and 2 x 4
PEG0	Displays the mode in which the device connected to the PEG0 port is being operated	None	-
PEG0 speed	Option for setting the maximum transfer rate of the PEG0 port	Auto	Selects the maximum transfer rate
		Gen1	Maximum transfer rate = 2.5 GT/s
		Gen2	Maximum transfer rate = 5 GT/s
		Gen3	Maximum transfer rate = 8 GT/s
PEG0 ASPM[1)]	Option for configuring a power saving function for the PEG0 port if it does not require full power	Disabled	Disables this function
		Auto	Automatic assignment by BIOS and the operating system
		ASPM L0s	Enables the L0 energy saving function

Table 135: Advanced - PCI Express configuration - PCI Express graphics (PEG) port - Configuration options

BIOS setting	Description	Configuration options	Effect
		ASPM L1	Enables the L1 energy saving function. Power consumption is lower than with L0, but the exit latency is higher.
		ASPM L0sL1	Automatic assignment of L0s or L1 power saving function by the PCIe device
ASPM L0s[2]	Option for configuring the L0 power saving function	Disabled	Disables this function
		Root port only	Enables the power saving function for the root port
		Endpoint only	Enables the power saving function for the endpoint port
		Both root and endpoint ports	Enables the power saving function for the root and endpoint ports
PEG1	Displays the mode in which the device connected to the PEG1 port is being operated	None	-
PEG1 speed	Option for setting the maximum transfer rate for the PEG1 port	Auto	Selects the maximum transfer rate
		Gen1	Maximum transfer rate = 2.5 GT/s
		Gen2	Maximum transfer rate = 5 GT/s
		Gen3	Maximum transfer rate = 8 GT/s
PEG1 ASPM[1]	Option for configuring a power saving function for the PEG1 port if it does not require full power	Disabled	Disables this function
		Auto	Automatic assignment by BIOS and the operating system
		ASPM L0s	Enables the L0 energy saving function
		ASPM L1	Enables the L1 energy saving function. Power consumption is lower than with L0, but the exit latency is higher.
		ASPM L0sL1	Automatic assignment of L0s or L1 power saving function by the PCIe device
ASPM L0s[3]	Option for configuring the L0 power saving function	Disabled	Disables this function
		Root port only	Enables the power saving function for the root port
		Endpoint only	Enables the power saving function for the endpoint port
		Both root and endpoint ports	Enables the power saving function for the root and endpoint ports
PEG2	Displays the mode in which the device connected to the PEG2 port is being operated	None	-
PEG2 speed	Option for setting the maximum transfer rate for the PEG2 port	Auto	Selects the maximum transfer rate
		Gen1	Maximum transfer rate = 2.5 GT/s
		Gen2	Maximum transfer rate = 5 GT/s
		Gen3	Maximum transfer rate = 8 GT/s
PEG2 ASPM[1]	Option for configuring a power saving function for the PEG2 port if it does not require full power	Disabled	Disables this function
		Auto	Automatic assignment by BIOS and the operating system
		ASPM L0s	Enables the L0 energy saving function
		ASPM L1	Enables the L1 energy saving function. Power consumption is lower than with L0, but the exit latency is higher.
		ASPM L0sL1	Automatic assignment of L0s or L1 power saving function by the PCIe device
ASPM L0s[4]	Option for configuring the L0 power saving function	Disabled	Disables this function
		Root port only	Enables the power saving function for the root port
		Endpoint only	Enables the power saving function for the endpoint port
		Both root and endpoint ports	Enables the power saving function for the root and endpoint ports
Detect non-compliant device	Option for detecting incompatible PCI Express devices on the PEG port	Disabled	Disables this function
		Enabled	Enables this function. Even incompatible PCI Express devices are detected on the PEG port.
De-emphasis control	Option for configuring de-emphasis on the PEG port	-6 dB	-6 dB de-emphasis
		-3.5 dB	-3.5 dB de-emphasis

Table 135: Advanced - PCI Express configuration - PCI Express graphics (PEG) port - Configuration options

1) ASPM = Active State Power Management
2) This setting is only possible if *PEG0 ASPM* is set to *ASPM L0s* or *ASPM L0sL1*.
3) This setting is only possible if *PEG1 ASPM* is set to *ASPM L0s* or *ASPM L0sL1*.
4) This setting is only possible if *PEG2 ASPM* is set to *ASPM L0s* or *ASPM L0sL1*.

PCI Express root port

Warning!

Improper settings can cause instability or device problems. It is therefore strongly recommended that these settings only be changed by experienced users.

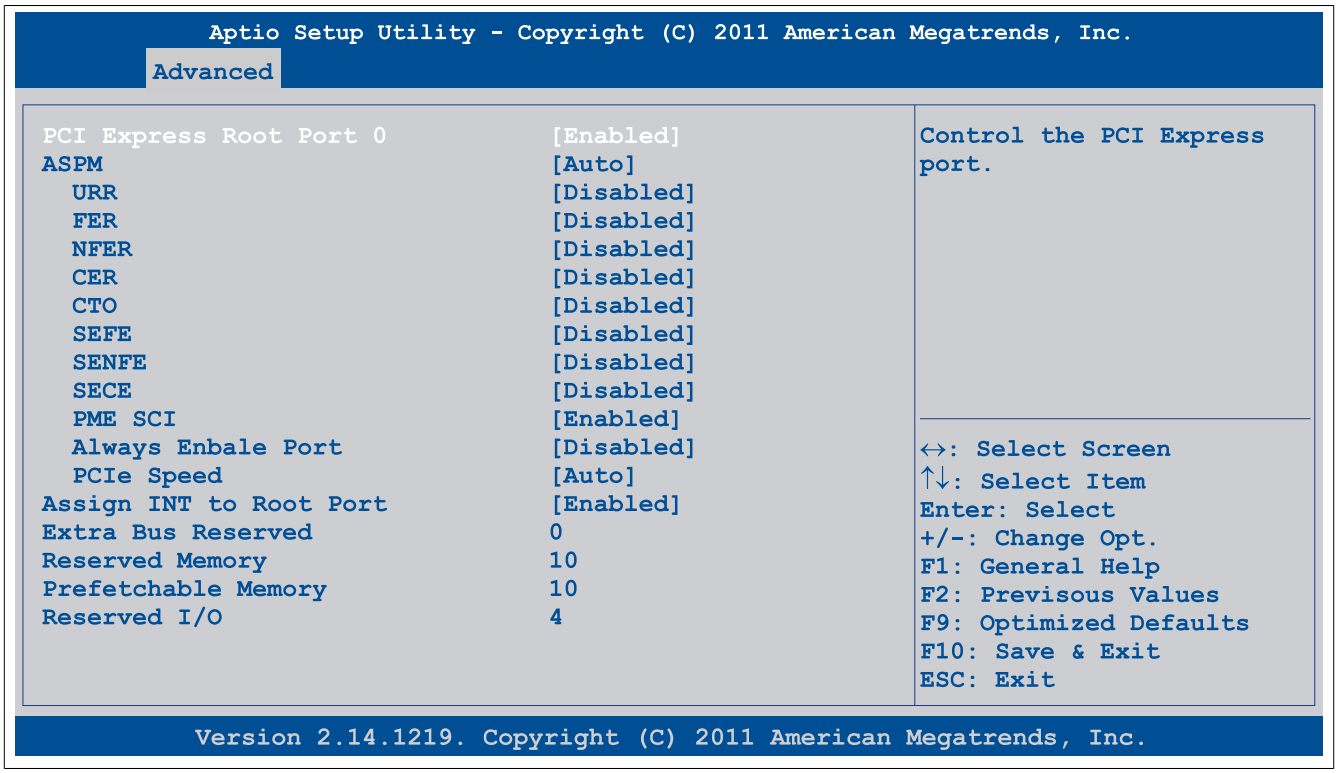


Figure 74: Advanced - PCI Express configuration - PCI Express root port

BIOS setting	Description	Configuration options	Effect
PCI Express root port x	Option for enabling/disabling the PCI Express root port	Enabled	Enables PCI Express root port 1
		Disabled	Disables PCI Express root port 1 and 2
ASPM	*Active State Power Management* Option for configuring a power saving function (L0s/L1) for PCIe devices if they do not require full power	Disabled	Disables this function
		L0s	Enables the L0 energy saving function
		L1	Enables the L1 energy saving function. Power consumption is lower than with L0, but the exit latency is higher.
		L0sL1	Automatic assignment of L0s or L1 power saving function by the PCIe device
		Auto	Automatic assignment by BIOS and the operating system
URR	*Unsupported Request (UR) reporting* Option for reporting unsupported requests. Logging of error messages received by the root port is controlled exclusively by the root control register.	Enabled	Enables this function
		Disabled	Disables this function
FER	*Fatal error reporting* Option for reporting fatal errors. All of the functions of a multifunction device will be monitored. The report for the root port takes place internally inside the root complex.	Enabled	Enables this function
		Disabled	Disables this function
NFER	*Non-fatal error reporting* Option for reporting non-fatal errors. All of the functions of a multifunction device will be monitored. The report for the root port takes place internally inside the root complex.	Enabled	Enables this function
		Disabled	Disables this function
CER	*Correctable error reporting* Option for reporting non-fatal errors. All of the functions of a multifunction device will be monitored. The report for the root port takes place internally inside the root complex.	Enabled	Enables this function
		Disabled	Disables this function
CT0	*PCI Express completion timer T0*	Enabled	Enables this function

Table 136: Advanced - PCI Express configuration - PCI Express root port - Configuration options

BIOS setting	Description	Configuration options	Effect
	Option for enabling/disabling the PCI Express completion timer **Information:** **This setting should be set to "Enabled" if the system detected an ROB (processor reorder buffer) timeout.**	Disabled	Disables this function
SEFE	*System error on fatal error* Option for generating a system error if a fatal error is registered by a device on the root port or by the root port itself	Enabled	Enables this function
		Disabled	Disables this function
SENFE	*System error on non-fatal error* Option for generating a system error if a non-fatal error is registered by a device on the root port or by the root port itself	Enabled	Enables this function
		Disabled	Disables this function
SECE	*System error on correctable error* Option for generating a system error if a correctable error is registered by a device on the root port or by the root port itself	Enabled	Enables this function
		Disabled	Disables this function
PME SCI	Option for generating an SCI if power management is detected	Enabled	Enables this function Enables the root port to generate an SCI if power management is detected
		Disabled	Disables this function
Always enable port	Option for keeping the port enabled constantly	Enabled	Enables this function
		Disabled	Disables this function
PCIe speed	Option for setting the PCI Express transfer rate	Auto	Automatically sets the transfer rate
		Gen1	Maximum transfer rate = 2.5 GT/s
		Gen2	Maximum transfer rate = 5 GT/s
Assign INT to root port	Option for enabling/disabling the IRQ for the root port	Disabled	Disables this function
		Enabled	Enables this function
Extra bus reserved	Option for reserving the extra bus to bridges behind this root bridge	0 to 7	
Reserved memory	Option for configuring reserved memory for this root bridge	0 to 20	
Prefetchable memory	Option for configuring prefetchable memory for this root bridge	1 to 20	
Reserved I/O	Option for configuring a reserved I/O range (4K/8K/12K/16K/20K) for this root bridge	4 to 20	

Table 136: Advanced - PCI Express configuration - PCI Express root port - Configuration options

1.4.6 ACPI settings

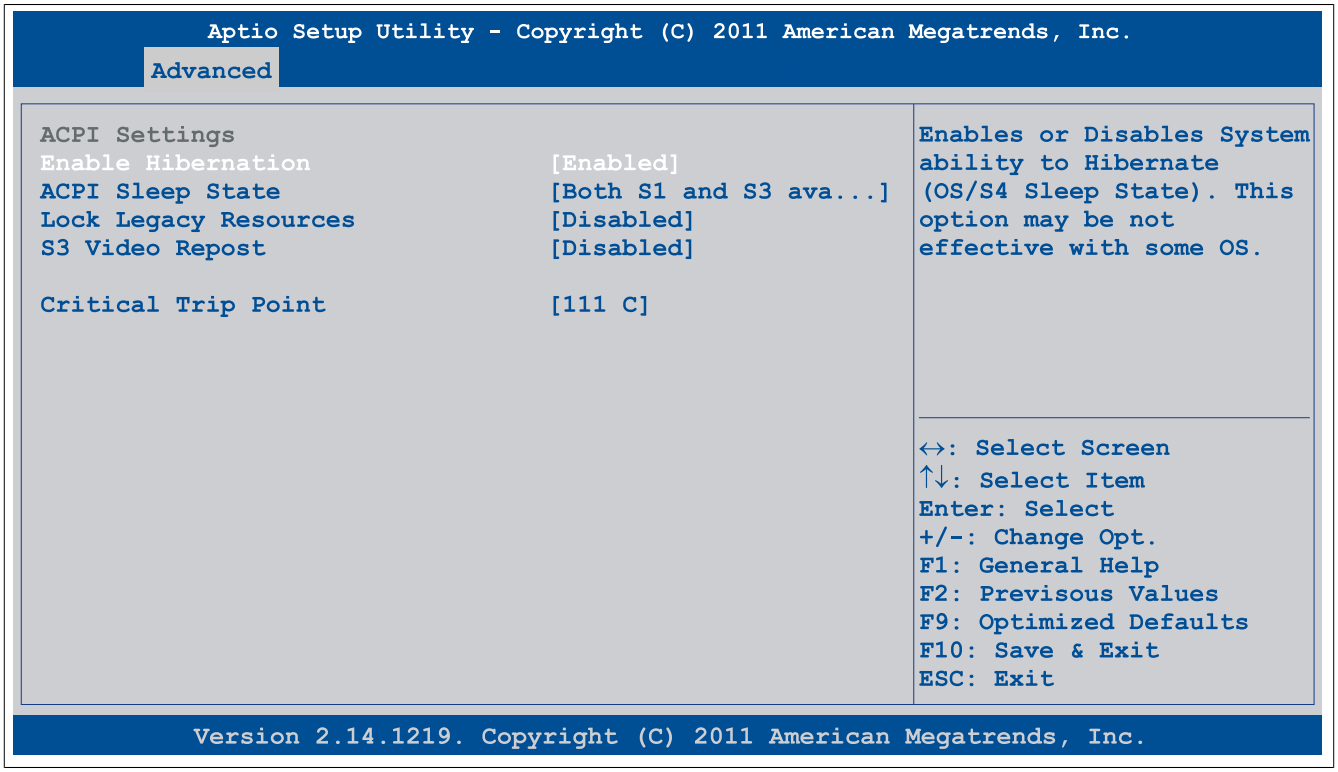


Figure 75: Advanced - ACPI settings

BIOS setting	Description	Configuration options	Effect
Enable hibernation	Option for enabling/disabling the hibernate function. This can put the operating system into the S4 state. This option may not have any effect on some operating systems.	Disabled	Disables this function
		Enabled	Enables this function
ACPI sleep state	Selects the ACPI status to be used when Suspend mode is enabled	Suspend disabled	Disables this function
		S1 only (CPU stop clock)	Sets S1 as Suspend mode. Only a few functions are disabled and are available again at the touch of a button.
		S3 only (Suspend to RAM)	Sets S3 as Suspend mode. The current state of the operating system is written to RAM, which is then the only component to receive power.
		Both S1 and S3 available for OS to choose from	Enables S1 and S3. The states can then be selected by the operating system.
Lock legacy resources	Option for configuring whether the operating system is permitted to configure legacy resources	Disabled	Disables this function
		Enabled	Enables this function
S3 video repost	Option for configuring whether the graphic ROM should be reposted after starting in the S3 status	Disabled	Disables this function
		Enabled	Enables this function
Critical trip point	Option for configuring a CPU temperature at which the operating system automatically shuts down	POR	Sets the critical trip point to 105°C
		87 C, 95 C, 103 C, 111 C, 119 C, 127 C	Temperature setting for the critical trip point. Configurable in increments of 5°C.

Table 137: Advanced - ACPI settings - Configuration options

1.4.7 RTC wake settings

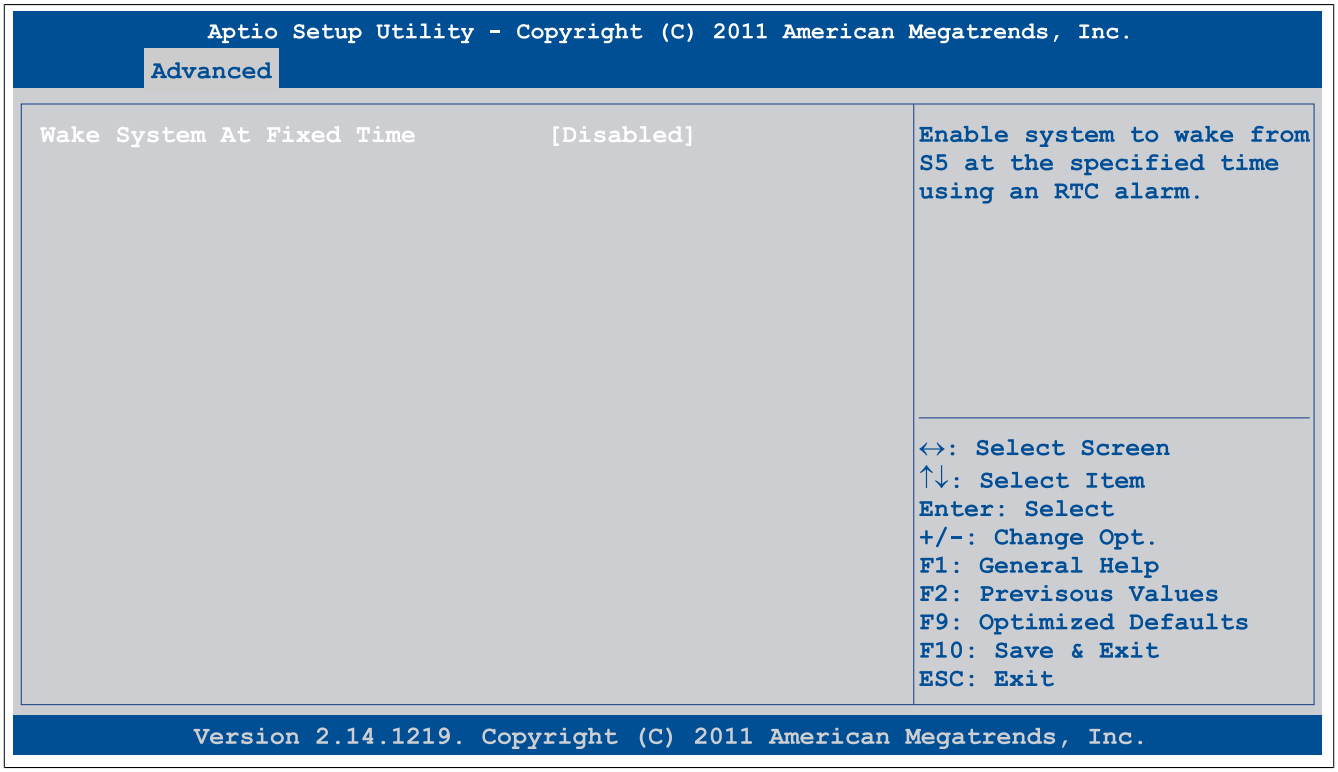


Figure 76: Advanced - RTC wake settings

BIOS setting	Description	Configuration options	Effect
Wake system at fixed time	Option for setting the time (to the second) when the system should boot from a switched-off state (ACPI S5)	Disabled	Disables this function
		Enabled	Enables this function
Wake up hour	Option for setting the hour	0 to 23	Example: If set to 3, the system will start up at 3 AM. If set to 15, the system will start up at 3 PM.
Wake up minute	Option for setting the minute	0 to 59	Example: If set to 15, the system will start up at minute 15.
Wake up second	Option for setting the second	0 to 59	Example: If set to 32, the system will start up at second 32.

Table 138: Advanced - RTC wake settings - Configuration options

1.4.8 CPU configuration

Information:

The settings shown may vary depending on the CPU board being used.

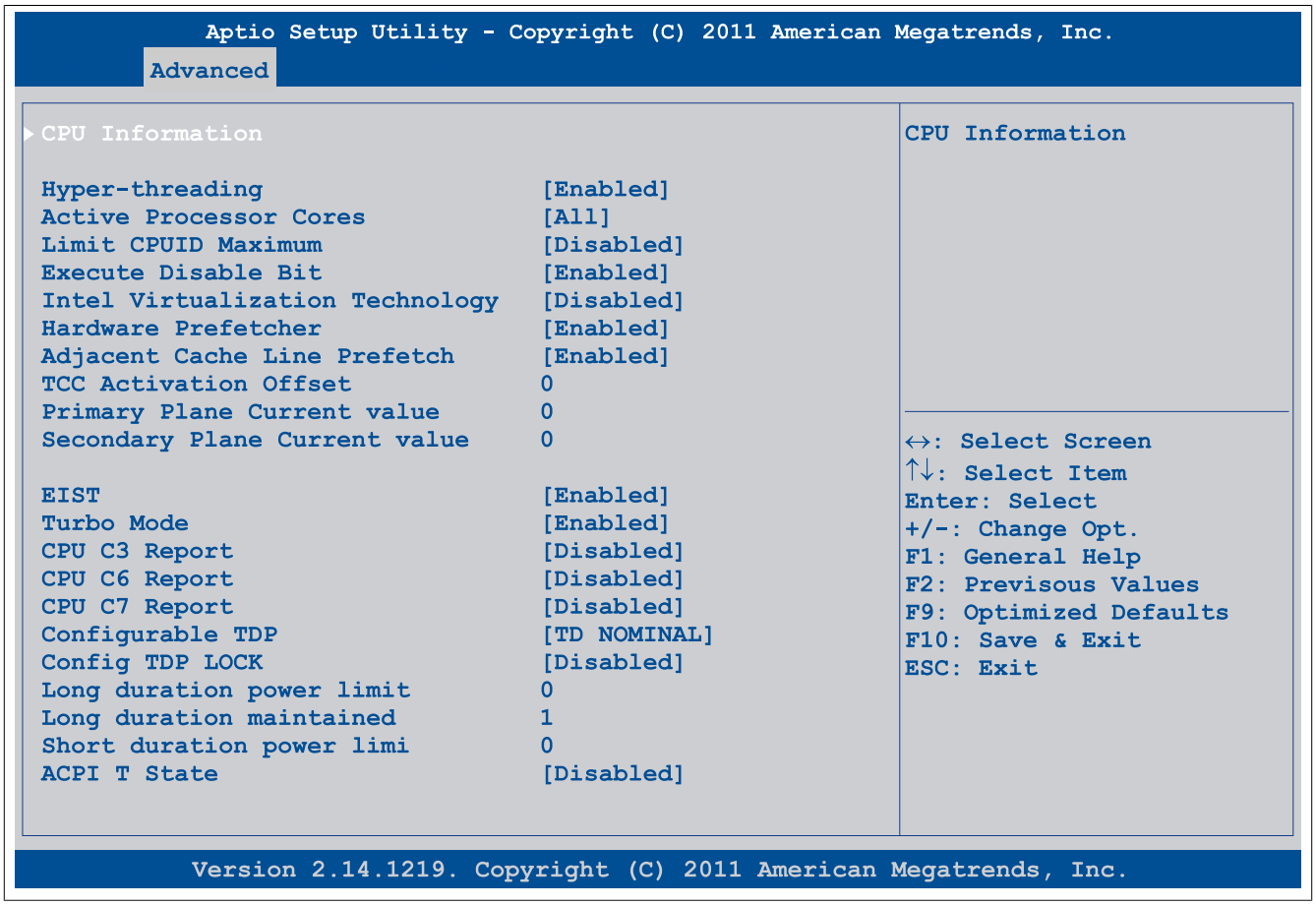


Figure 77: Advanced - CPU configuration

BIOS setting	Description	Configuration options	Effect
CPU information	Displays CPU properties	Enter	Opens the submenu See "CPU information" on page 145
Hyper-threading	Option for enabling/disabling Intel Hyper-Threading Technology	Disabled	Disables this function
		Enabled	Enables this function Each processor core can execute multiple tasks (threads) at the same time. Intel Hyper-Threading Technology increases processor throughput and improves the overall performance of multi-thread software.
Active processor cores	Option for configuring which processor cores are to be used	All	Uses all processor cores
		1	Only uses one processor core
Limit CPUID maximum	Option for limiting the CPUID value. This may be necessary for older operating systems. **Information:** **This option must be set to *Disabled* when using Windows XP.**	Disabled	The processor returns the current maximum value when the CPUID value is requested.
		Enabled	The processor limits the maximum CPUID value to 03h if necessary if the the processor supports a higher value.
Execute disable bit	Option for enabling/disabling hardware support for prevention of data execution	Disabled	Disables this function
		Enabled	Enables this function
Intel virtualization technology	Option for enabling/disabling a virtual machine **Information:** **A restart is required in order to apply changes made to this setting.**	Disabled	Disables this function
		Enabled	Allows a virtual machine to use the additional hardware capacity
Hardware prefetcher	Option for enabling/disabling the hardware prefetcher	Disabled	Disables this function
		Enabled	Enables this function. Data is buffered in a cache, which increases performance.

Table 139: Advanced - CPU configuration - Configuration options

BIOS setting	Description	Configuration options	Effect
Adjacent cache line prefetch	Option for enabling/disabling the adjacent cache line prefetcher	Disabled	Disables this function
		Enabled	Enables this function. Loads the current and next line to cache in order to accelerate the read process.
TCC[1] activation offset	Option for configuring the offset of the thermal control circuit (TCC) at temperatures below the TCC activation temperature	0 to 50	Sets the offset value
Primary plane current value	Option for configuring the maximum current on the primary plane at any single time	0 to 255	Setting from 0 to 255
Secondary plane current value	Option for configuring the maximum current on the secondary plane at any single time	0 to 255	Setting from 0 to 255
EIST	Option for enabling/disabling Intel® SpeedStep™ Technology	Disabled	Disables Intel® SpeedStep™ Technology
		Enabled	Enables Intel® SpeedStep™ Technology
Turbo mode	Option for enabling/disabling Intel® Turbo Boost Technology	Disabled	Disables Intel® Turbo Boost Technology
		Enabled	Enables Intel® Turbo Boost Technology
CPU C3 report	Option for enabling/disabling the CPU C3 (ACPI C2) report to the operating system	Disabled	Disables this function. No report is sent to the operating system.
		Enabled	Enables this function
CPU C6 report	Option for enabling/disabling the CPU C6 (ACPI C3) report to the operating system	Disabled	Disables this function. No report is sent to the operating system.
		Enabled	Enables this function
CPU C7 report	Option for enabling/disabling the CPU C7 (ACPI C3) report to the operating system	Disabled	Disables this function. No report is sent to the operating system.
		Enabled	Enables this function
Configurable TDP[2]	Option for configuring the TDP level	TDP NOMINAL	Value remains at the TDP level
		TDP DOWN	Value falls below the TDP level, with the CPU running at lower power
		TDP UP	Value rises above the TDP level, with the CPU running at higher power
		Disabled	Disables this function
Config TDP LOCK	Option for locking and configuring the TDP control register		Disables this function
		Enabled	Enables this function
Long duration power limit	Long duration power limit in watts	0 to 255	Setting from 0 to 255
Long duration maintained	Time period during which the "Long duration power" option is enabled	0 to 120	Setting from 0 to 120
Short duration power limit	Short duration power limit in watts	0 to 255	Setting from 0 to 255
ACPI T state	Option for enabling/disabling ACPI T state support.	Disabled	Disables this function
		Enabled	Enables this function

Table 139: Advanced - CPU configuration - Configuration options

1) TCC = Thermal control circuit
2) TDP = Thermal design power

CPU information

Information:

The settings shown may vary depending on the CPU board being used.

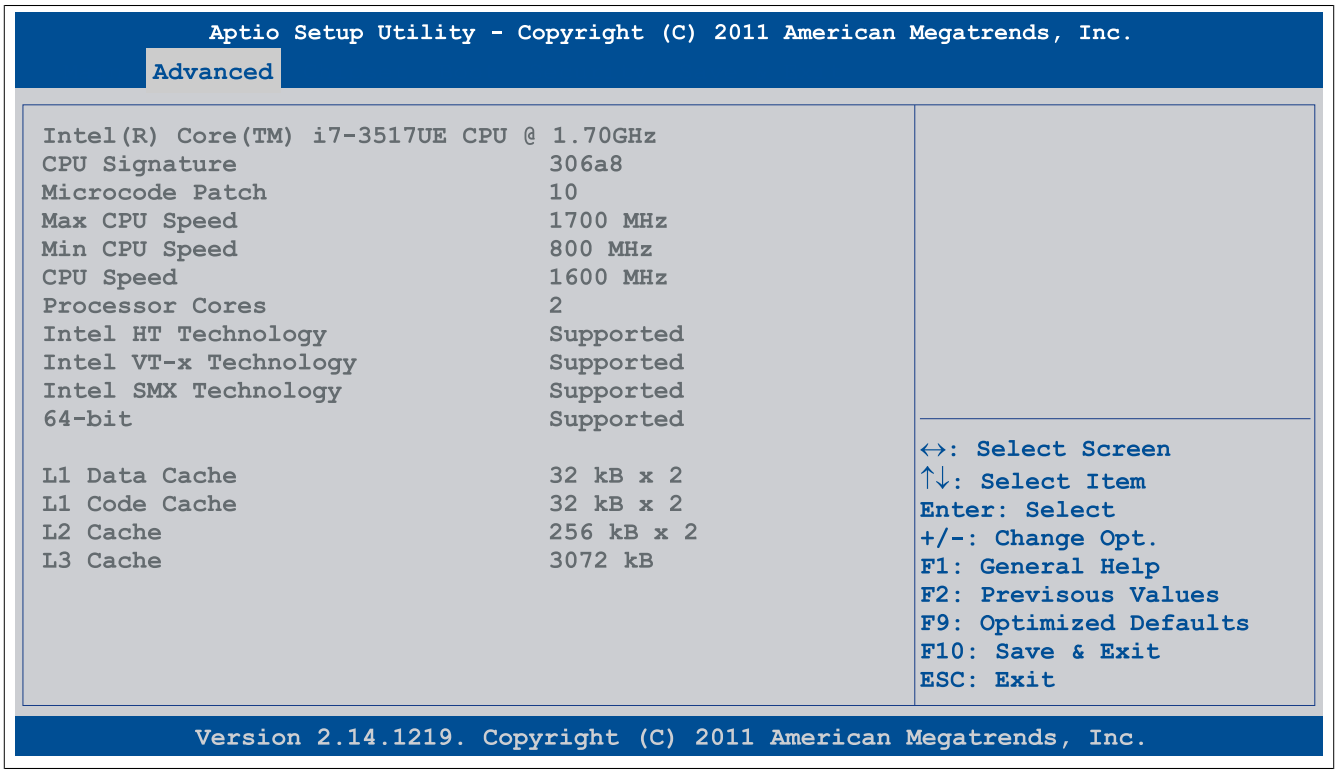


Figure 78: Advanced - CPU Configuration - CPU information

BIOS setting	Description	Configuration options	Effect
CPU signature	Displays the CPU ID	None	-
Microcode patch	Displays the microcode patch ID	None	-
Max CPU speed	Displays the maximum processor frequency	None	-
Min CPU speed	Displays the minimum processor frequency	None	-
CPU speed	Displays the processor frequency	None	-
Processor cores	Displays the number of processor cores	None	-
Intel HT technology	Displays whether the processor supports HT technology	None	-
Intel VT-x technology	Displays whether the processor supports VT-x technology	None	-
Intel SMX technology	Displays whether the processor supports SMX technology	None	-
64-bit	Displays whether the processor supports Intel 64-bit architectures	None	-
L1 data cache	Displays the size of the L1 data cache	None	-
L1 code cache	Displays the size of the L1 code cache	None	-
L2 cache	Displays the size of the L2 code cache	None	-
L3 cache	Displays the size of the L3 cache	None	-

Table 140: Advanced - CPU configuration - CPU information - Configuration options

1.4.9 Chipset configuration

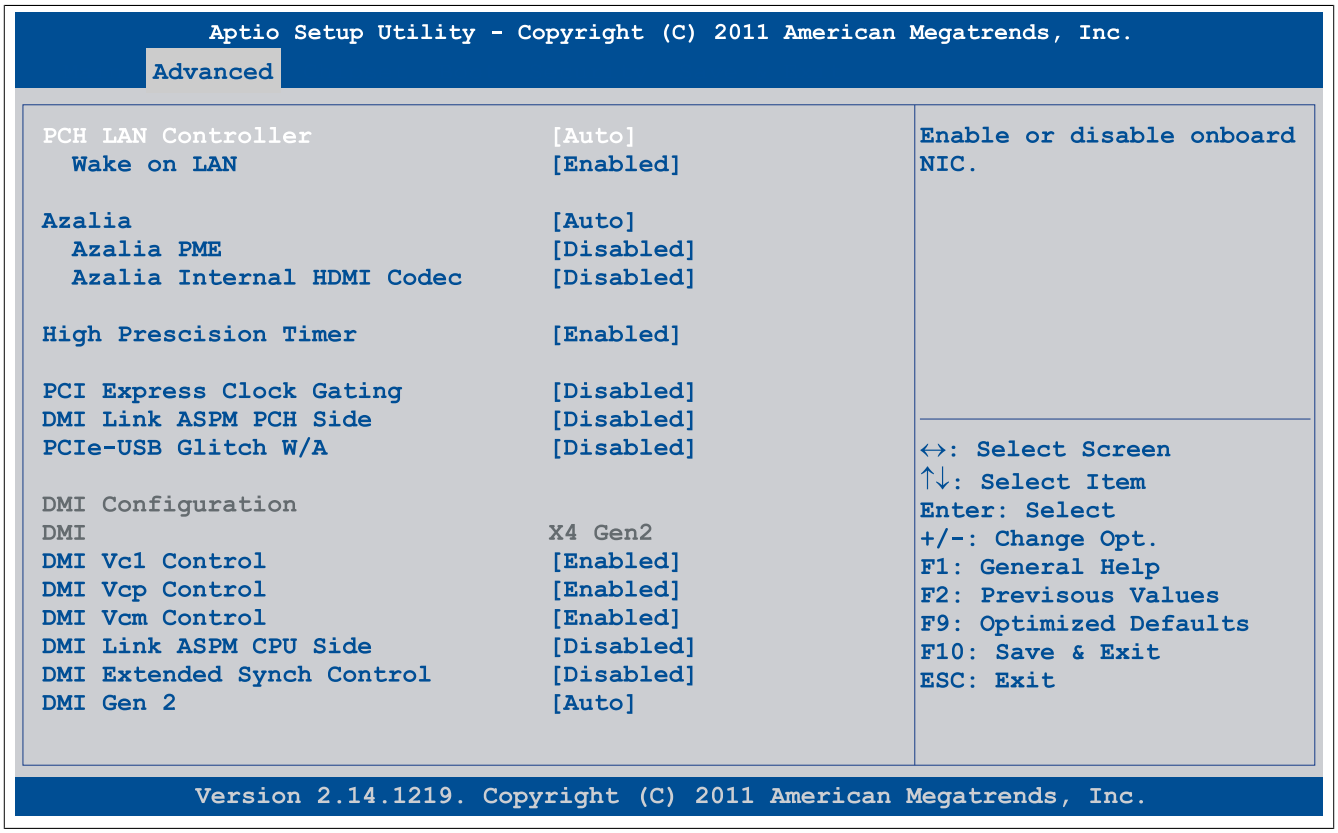


Figure 79: Advanced - Chipset configuration

BIOS setting	Description	Configuration options	Effect
PCH LAN controller	Option for turning the onboard LAN controller (ETH1) on and off	Disabled	Disables the controller
		Enabled	Enables the controller
Wake on LAN	Option for switching on the system via the on-board LAN controller (ETH1)	Enabled	Enables this function. The LAN controller can switch on the system.
		Disabled	Disables this function. The LAN controller cannot switch on the system.
Azalia	Option for enabling/disabling the audio controller	Disabled	Disables the audio controller
		Enabled	Enables the audio controller
		Auto	Only enables the audio controller if a device is connected
Azalia PME	Option for enabling/disabling power management for the audio controller	Disabled	Disables this function
		Enabled	Enables this function
Azalia internal HDMI codec	Option for enabling/disabling the internal HDMI codec for Azalia	Disabled	Disables audio output
		Enabled	Enables audio output
High-precision timer	The HPET is a timer inside the PC. It is able to trigger an interrupt with a high degree of accuracy, which allows other programs to better synchronize a variety of applications.	Disabled	Disables this function
		Enabled	Enables this function. This function is recommended for multimedia applications.
PCI Express clock gating	Option for enabling/disabling PCI Express clock gating for each individual root port	Disabled	Disables this function
		Enabled	Enables this function
DMI link ASPM PCH side	Option for enabling/disabling Active State Power Management (ASPM) for the DMI link on the PCH side	Disabled	Disables this function
		Enabled	Enables this function
PCIe USB glitch W/A	Option for enabling/disabling the PCIe USB glitch if a malfunctioning USB device is connected after the PCIe/PEG port	Disabled	Disables this function
		Enabled	Enables this function
DMI	Displays the DMI version / generation	None	-
DMI Vc1 control	Option for enabling/disabling DMI Vc1	Enabled	Enables this function
		Disabled	Disables this function
DMI Vcp control	Option for enabling/disabling DMI Vcp	Enabled	Enables this function
		Disabled	Disables this function
DMI Vcm control	Option for enabling/disabling DMI Vcm.	Enabled	Enables this function
		Disabled	Disables this function
DMI link ASPM CPU side	Option for enabling/disabling Active State Power Management (ASPM) for the DMI link on the CPU side	Disabled	Disables this function
		L0s	Enables the L0 energy saving function
		L1	Enables the L1 energy saving function. Power consumption is lower than with L0, but the exit latency is higher.

Table 141: Advanced - Chipset configuration - Configuration options

BIOS setting	Description	Configuration options	Effect
		L0sL1	Automatic assignment of L0s or L1 power saving function by the PCIe device
DMI extended synch control	Option for enabling/disabling DMI extended synchronization	Enabled	Enables this function
		Disabled	Disables this function
DMI Gen 2	Option for enabling/disabling DMI Gen 2	Auto	Disabled for IVB A0 MB/DT and IVB B0 MB, enabled for other CPUs
		Enabled	Enables this function
		Disabled	Disables this function

Table 141: Advanced - Chipset configuration - Configuration options

1.4.10 SATA configuration

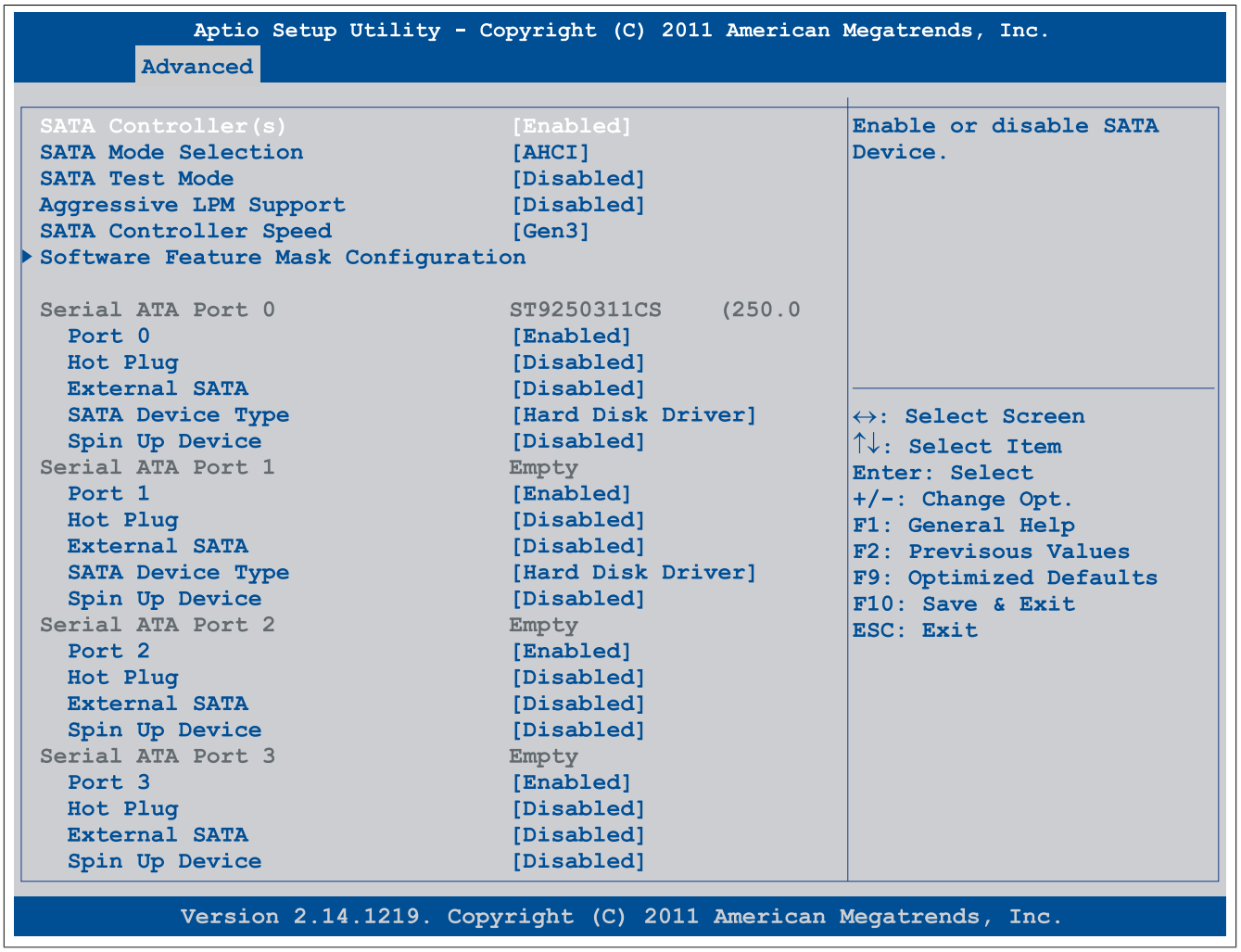


Figure 80: Advanced - SATA configuration

BIOS setting	Description	Configuration options	Effect
SATA controller(s)	Option for configuring SATA support	Enabled	Provides support for SATA devices
		Disabled	No support for SATA devices
SATA mode selection	Option for configuring supported serial ATA connections	IDE	The serial ATA hard drive is used as a parallel ATA physical drive. It is not possible to configure the SATA port.
		AHCI	The AHCI setting enables the internal memory driver for SATA functions, which increases the storage performance for random read-write access by allowing the drive itself to determine the sequence of commands.
		RAID	RAID 0, 1, 5, 10 or Intel® Matrix Storage technology can be configured here with the serial ATA hard drive.
SATA test mode	Option for configuring the test function. This is only used for test measurements.	Enabled	Enables this function
		Disabled	Disables this function
Aggressive LPM support	Aggressive Link Power Management (ALPM) is a power saving method for SATA drives.	Enabled	Enables this function
		Disabled	Disables this function
SATA controller speed	Option for setting the maximum SATA transfer rate	Gen1	Maximum SATA transfer rate = 1.5 Gbit/s
		Gen2	Maximum SATA transfer rate = 3.0 Gbit/s

Table 142: Advanced - SATA configuration - Configuration options

BIOS setting	Description	Configuration options	Effect
	The transfer rate is also dependent on the maximum possible transfer rate of the drive.	Gen3	Maximum SATA transfer rate = 6.0 Gbit/s
Software feature mask configuration	Configuration of various drive settings	Enter	Opens the submenu See "Software feature mask configuration" on page 149
Alternate ID[1)]	Option for enabling/disabling a report of the alternate device ID	Enabled	Enables this function
		Disabled	Disables this function
Serial ATA port 0	Displays the device connected to SATA port 0	None	-
Port 0	Option for enabling/disabling SATA port 0	Disabled	Disables SATA port 0
		Enabled	Enables SATA port 0
Hot plug	Option for configuring hot plugging for SATA port 0	Disabled	SATA port 0 not hotpluggable
		Enabled	SATA port 0 hotpluggable. Devices can be connected/disconnected during operation.
External SATA	Option for configuring the external SATA port	Disabled	Uses the port externally as eSATA
		Enabled	Uses the port internally as SATA
Mechanical presence switch[2)]	Option for enabling/disabling the report if this port has a mechanical presence switch	Disabled	Disables this function
		Enabled	Enables this function
SATA device type	Identifies whether a solid state or hard disk drive is connected to this SATA port	Hard disk drive	A hard disk is connected to the SATA port.
		Solid state drive	A solid state drive is connected to the SATA port.
Spin up device	Option for configuring an initialization sequence for the device connected to this SATA port during startup	Disabled	Disables this function
		Enabled	Enables this function
Serial ATA port 1	Displays the device connected to SATA port 1	None	-
Port 1	Option for enabling/disabling SATA port 1	Disabled	Disables SATA port 1
		Enabled	Enables SATA port 1
Hot plug	Option for configuring hot plugging for SATA port 1	Disabled	SATA port 1 not hotpluggable
		Enabled	SATA port 1 hotpluggable. Devices can be connected/disconnected during operation.
External SATA	Option for configuring the external SATA port	Disabled	Uses the port externally as eSATA
		Enabled	Uses the port internally as SATA
Mechanical presence switch[2)]	Option for enabling/disabling the report if this port has a mechanical presence switch	Disabled	Disables this function
		Enabled	Enables this function
SATA device type	Identifies whether a solid state or hard disk drive is connected to this SATA port	Hard disk drive	A hard disk is connected to the SATA port.
		Solid state drive	A solid state drive is connected to the SATA port.
Spin up device	Option for configuring an initialization sequence for the device connected to this SATA port during startup	Disabled	Disables this function
		Enabled	Enables this function
Serial ATA port 2	Displays the device connected to SATA port 2	None	-
Port 2	Option for enabling/disabling SATA port 2	Disabled	Disables SATA port 2
		Enabled	Enables SATA port 2
Hot plug	Option for configuring hot plugging for SATA port 2	Disabled	SATA port 2 not hotpluggable
		Enabled	SATA port 2 hotpluggable. Devices can be connected/disconnected during operation.
External SATA	Option for configuring the external SATA port	Disabled	Uses the port externally as eSATA
		Enabled	Uses the port internally as SATA
Mechanical presence switch[2)]	Option for enabling/disabling the report if this port has a mechanical presence switch	Disabled	Disables this function
		Enabled	Enables this function
SATA device type	Identifies whether a solid state or hard disk drive is connected to this SATA port	Hard disk drive	A hard disk is connected to the SATA port.
		Solid state drive	A solid state drive is connected to the SATA port.
Spin up device	Option for configuring an initialization sequence for the device connected to this SATA port during startup	Disabled	Disables this function
		Enabled	Enables this function
Serial ATA port 3	Displays the device connected to SATA port 3	None	-
Port 3	Option for enabling/disabling SATA port 3	Disabled	Disables SATA port 3
		Enabled	Enables SATA port 3
Hot plug	Option for configuring hot plugging for SATA port 3	Disabled	SATA port 3 not hotpluggable
		Enabled	SATA port 3 hotpluggable. Devices can be connected/disconnected during operation.
External SATA	Option for configuring the external SATA port	Disabled	Uses the port externally as eSATA
		Enabled	Uses the port internally as SATA
Mechanical presence switch[2)]	Option for enabling/disabling the report if this port has a mechanical presence switch	Disabled	Disables this function
		Enabled	Enables this function
SATA device type	Identifies whether a solid state or hard disk drive is connected to this SATA port	Hard disk drive	A hard disk is connected to the SATA port.
		Solid state drive	A solid state drive is connected to the SATA port.
Spin up device	Option for configuring an initialization sequence for the device connected to this SATA port during startup	Disabled	Disables this function
		Enabled	Enables this function

Table 142: Advanced - SATA configuration - Configuration options

1) This setting is only possible if *SATA mode selection* is set to *RAID*.
2) This setting is only possible if *Hot plug* is set to *Enabled*.

Software feature mask configuration

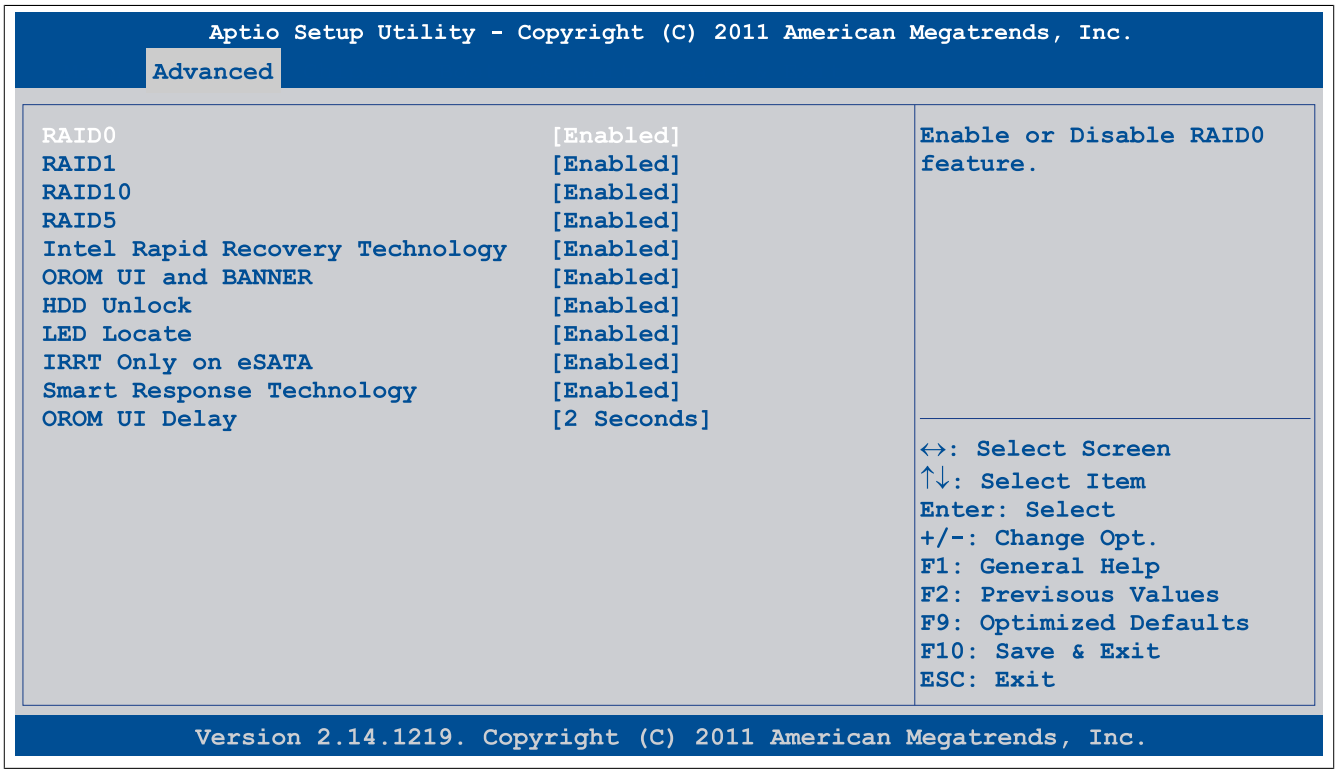


Figure 81: Advanced - SATA configuration - Software feature mask configuration

BIOS setting	Description	Configuration options	Effect
RAID0	Option for enabling/disabling a RAID0 system	Disabled	Disables this function
		Enabled	Enables this function
RAID1	Option for enabling/disabling a RAID1 system	Disabled	Disables this function
		Enabled	Enables this function
RAID10	Option for enabling/disabling a RAID10 system	Disabled	Disables this function
		Enabled	Enables this function
RAID5	Option for enabling/disabling a RAID5 system	Disabled	Disables this function
		Enabled	Enables this function
Intel Rapid Recovery Technology	Option for enabling/disabling Intel® Rapid Recovery Technology	Disabled	Disables this function
		Enabled	Enables this function
OROM UI and BANNER	Option for displaying the OROM UI	Disabled	Does not display the OROM UI or banner
		Enabled	Displays the OROM UI
HDD unlock	Option for enabling/disabling the HDD password unlock mechanism in the operating system	Disabled	Disables the HDD password unlock mechanism
		Enabled	Enables the HDD password unlock mechanism
LED locate	Option for displaying the LED/SGPIO when a drive is connected	Disabled	Disables this function
		Enabled	Enables an indicator for when a drive is connected
IRRT only on eSATA[1)]	Option for configuring Intel® Rapid Recovery Technology	Disabled	Every RAID system can use internal and eSATA drives.
		Enabled	Only IRRT systems can use internal eSATA drives.
Smart Response Technology	Option for enabling/disabling Intel® Smart Response Technology	Disabled	Disables this function
		Enabled	Enables this function
OROM UI delay	Option for displaying the delay time for the OROM UI splash screen	2 seconds, 4 seconds, 6 seconds, 8 seconds	Setting in seconds

Table 143: Advanced - SATA configuration - Software feature mask configuration - Configuration options

1) IRRT = Intel Rapid Recovery Technology

1.4.11 Memory configuration

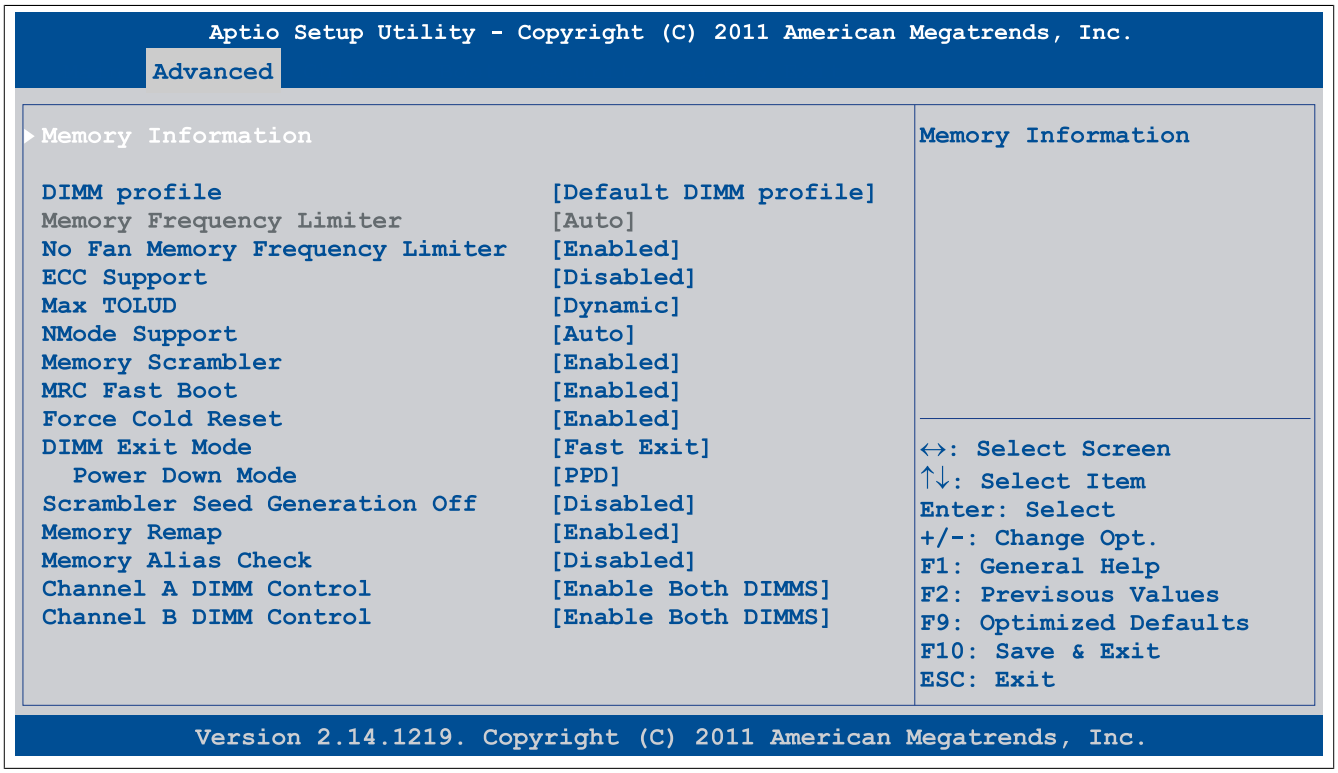


Figure 82: Advanced - Memory configuration

BIOS setting	Description	Configuration options	Effect
Memory information	Displays main memory properties	Enter	Opens the submenu See "Memory information" on page 151
DIMM profile	Option for configuring the main memory timing profile	Default DIMM profile	Uses the default profile
		Custom profile	Uses a user-defined profile
		XMP Profile 1	Uses XMP profile 1
		XMP Profile 2	Uses XMP profile 2
Custom profile control[1)]	Configuration of the main memory timing profile	Enter	Opens the submenu See "Custom profile control" on page 152
No fan memory frequency limiter	Option for automatically throttling down the main memory frequency when the system unit has no fan	Disabled	Disables this function
		Enabled	Enables this function
ECC support	Option for enabling/disabling main memory ECC support	Disabled	Disables this function
		Enabled	Enables this function
Max TOLUD[2)]	Option for configuring the maximum "Top Of Low Usable DRAM"	Dynamic	Automatically adjusts the TOLUD based on the MMIO length of the graphics controller
		1 GB, 1.25 GB, 1.5 GB, 1.75 GB, 2 GB, 2.25 GB, 2.5 GB, 2.75 GB, 3 GB, 3.25 GB	Manual setting of the TOLUD
NMode support	Option for configuring NMode support	Auto	Sets automatically
		1N mode	Sets 1N mode
		2N mode	Sets 2N mode
Memory scrambler	Option for enabling/disabling memory scrambler support	Enabled	Enables this function
		Disabled	Disables this function
MRC fast boot	Option for enabling/disabling MRC fast booting	Enabled	Enables this function
		Disabled	Disables this function
Force cold reset	Option for enabling/disabling force cold resets	Enabled	Enables this function
		Disabled	Disables this function
DIMM exit mode	Option for configuring the DIMM exit mode	Auto	Sets automatically
		Slow exit	Enables slow exit mode
		Fast exit	Enables fast exit mode
Power down mode	Option for setting the power saving function for main memory	No power down	TBD
		APD	TBD
		PPD	TBD
		APD-PPD	TBD
Scrambler seed generation off	Option for enabling/disabling the scrambler seed generation off function	Enabled	Enables this function
		Disabled	Disables this function
Memory remap	Option for enabling/disabling memory remapping over 4 GB	Enabled	Enables this function
		Disabled	Disables this function
Memory alias check	Option for enabling/disabling the memory alias check function	Enabled	Enables this function
		Disabled	Disables this function

Table 144: Advanced - Memory configuration - Configuration options

BIOS setting	Description	Configuration options	Effect
Channel A DIMM control	Option for configuring main memory channel A	Enable both DIMMS	Enables both channel A main memory modules
		Disable DIMM0	Disables channel A DIMM0 main memory
		Disable DIMM1	Disables channel A DIMM1 main memory
		Disable both DIMMS	Disables both channel A main memory modules
Channel B DIMM control	Option for configuring main memory channel B	Enable both DIMMS	Enables both channel B main memory modules
		Disable DIMM0	Disables channel B DIMM0 main memory
		Disable DIMM1	Disables channel B DIMM1 main memory
		Disable both DIMMS	Disables both channel B main memory modules

Table 144: Advanced - Memory configuration - Configuration options

1) This setting is only shown if *DIMM profile* is set to *Custom profile*.
2) TOLUD = Top of Low Usable DRAM

Memory information

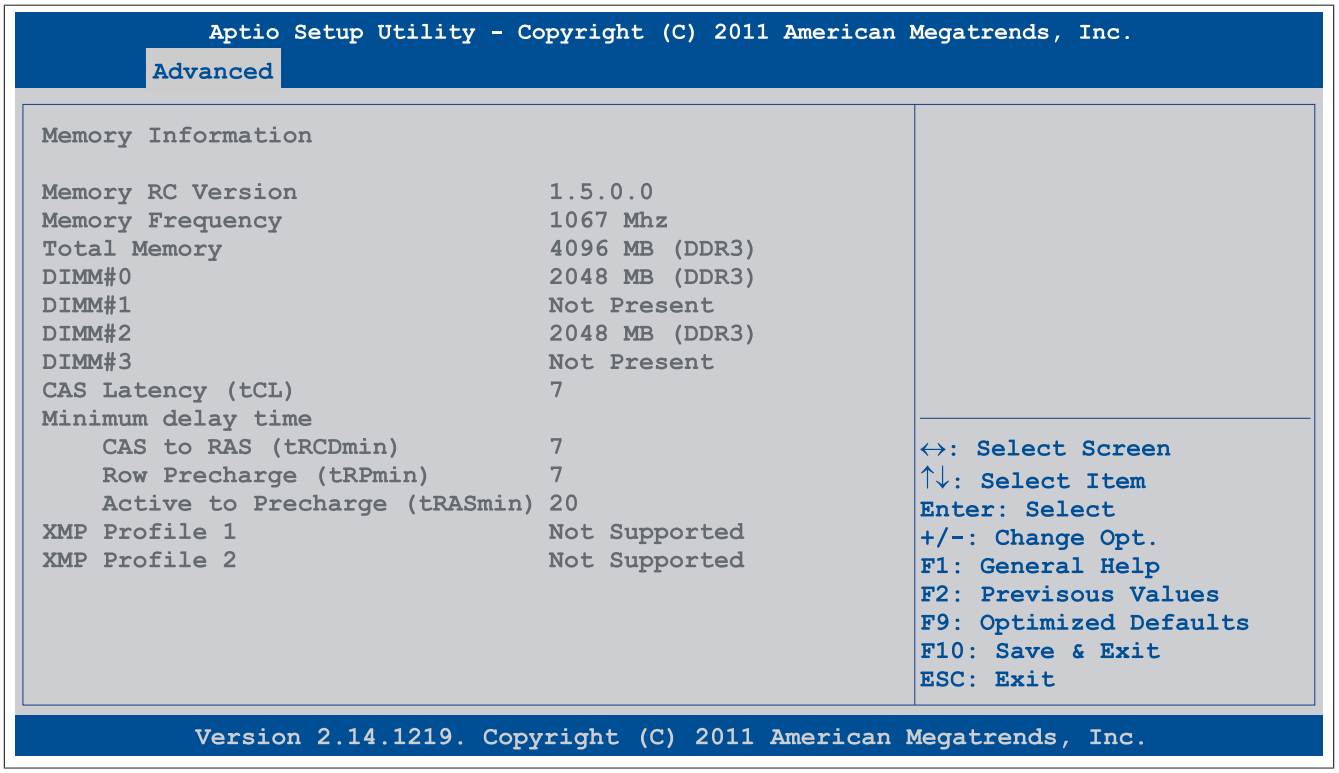


Figure 83: Advanced - Memory configuration - Memory information

BIOS setting	Description	Configuration options	Effect
Memory RC version	Displays the main memory RC version	None	-
Memory frequency	Displays the main memory frequency	None	-
Total memory	Displays the total amount of main memory	None	-
DIMM#0	Displays the amount of main memory in DIMM slot 0	None	-
DIMM#1	Displays the amount of main memory in DIMM slot 1	None	-
DIMM#2	Displays the amount of main memory in DIMM slot 2	None	-
DIMM#3	Displays the amount of main memory in DIMM slot 3	None	-
CAS latency (tCL)	Displays the CAS latency	None	-
Minimum delay time			
CAS to RAS (tRCDmin)	Displays the delay time between CAS# and RAS#	None	-
Row precharge (tRPmin)	Displays the row precharge time	None	-
Active to precharge (tRASmin)	Displays the minimum active RAS# time	None	-
XMP Profile 1	Displays XMP profile 1	None	-
XMP Profile 2	Displays XMP profile 2	None	-

Table 145: Advanced - Memory configuration - Memory information

Custom profile control

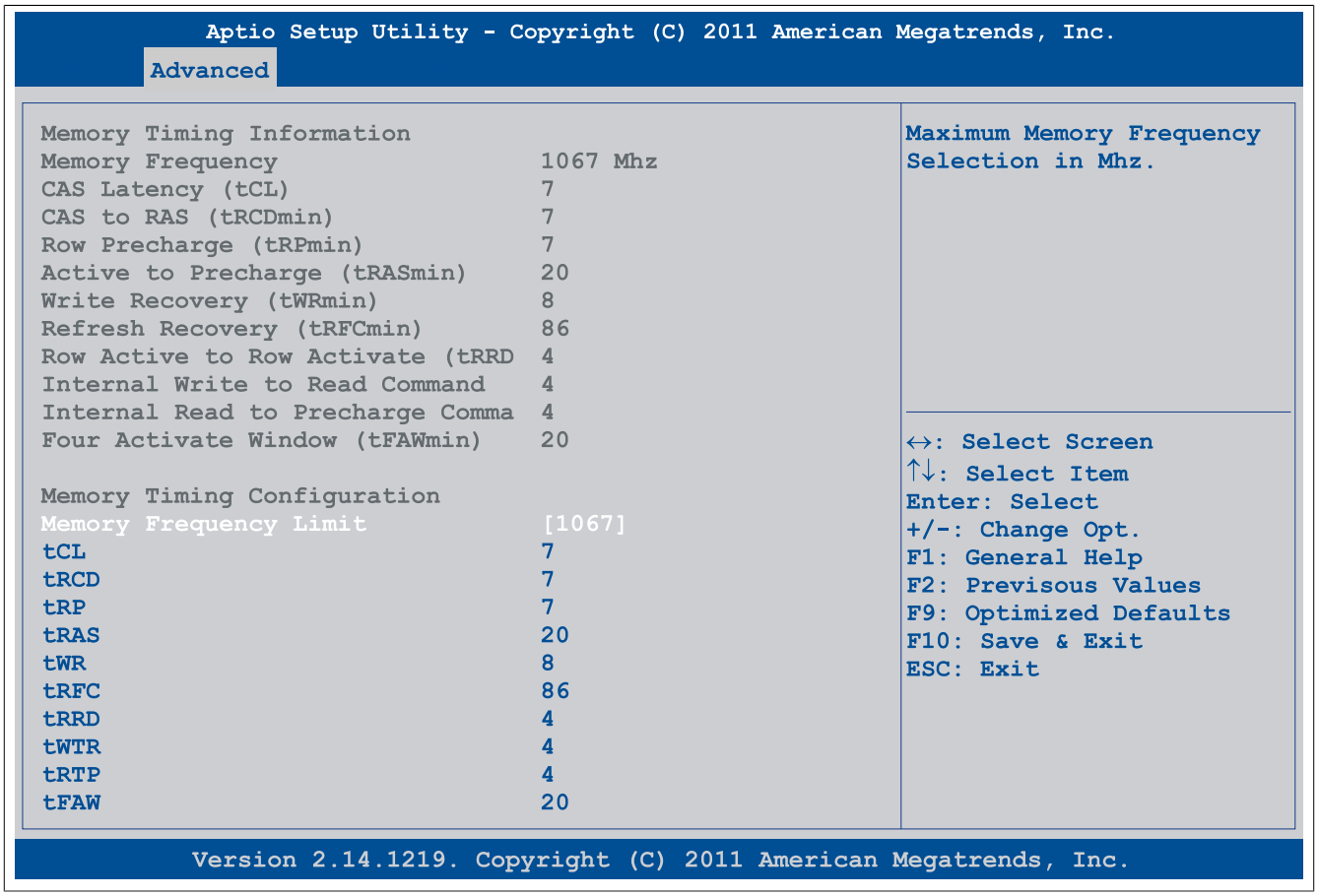


Figure 84: Advanced - Memory configuration - Custom profile control

BIOS setting	Description	Configuration options	Effect
Memory frequency limiter	Sets the maximum main memory frequency in MHz	1067, 1333, 1600, 1867, 2133, 2400, 2667	
tCL	Sets the CAS latency	4 to 18	
tRCD	Sets the minimum "CAS to RAS" time	1 to 38	
tRP	Sets the minimum "Row precharge" time	1 to 38	
tRAS	Sets the minimum "Active to precharge" time	1 to 586	
tWR	Sets the minimum "Write recovery" time	1 to 38	
tRFC	Sets the minimum "Refresh recovery" time	1 to 9363	
tRRD	Sets the minimum "Row active to row active" time	1 to 38	
tWTR	Sets the minimum "Internal write to read command" time	1 to 38	
tRTP	Sets the minimum "Internal read to precharge command" time	1 to 38	
tFAW	Sets the minimum "Four active window" time	1 to 586	

Table 146: Advanced - Memory configuration - Custom profile control - Configuration options

1.4.12 USB configuration

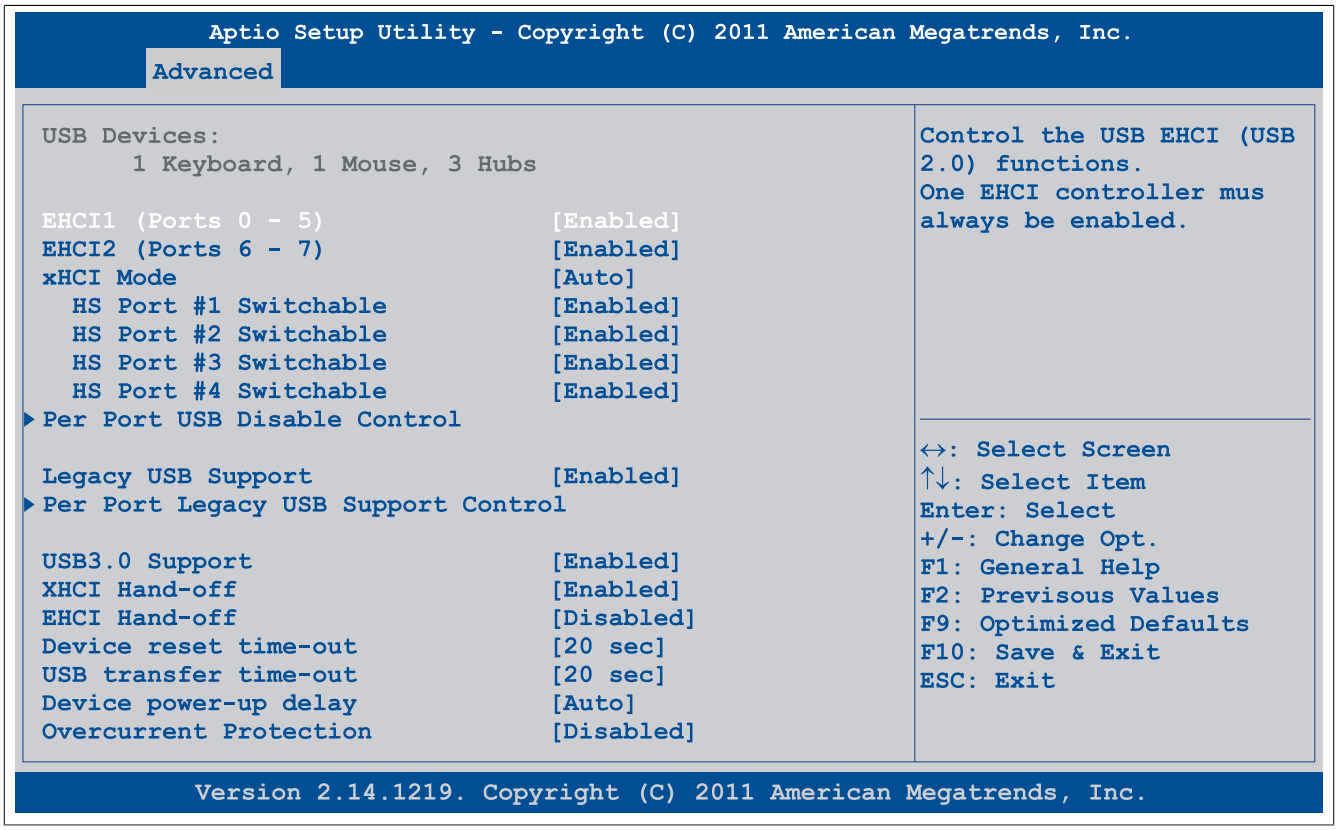


Figure 85: Advanced - USB configuration

BIOS setting	Description	Configuration options	Effect
EHCI1 (ports 0-5)	Sets USB EHCI controller 1 for USB ports #0 through #5 (USB1 through USB4 on the system unit, USB on the monitor/panel interface and the bus unit)	Enabled	Enables EHCI controller 1
		Disabled	Disables EHCI controller 1
EHC2 (ports 6-7)	Sets USB EHCI controller 1 for USB ports #6 through #7 (USB5 on the system unit and USB on the monitor/panel option)	Enabled	Enables EHCI controller 2
		Disabled	Disables EHCI controller 2
xHCI mode	Option for configuring the xHCI controller	Smart auto	The USB 3.0 ports are not handled as USB 3.0 until after the operating system has started. Before that, they are handled as USB 2.0 ports. If the APC910 is rebooted, then the USB 3.0 ports are handled as USB 3.0 during booting.
		Auto	During the BIOS boot procedure, USB 3.0 ports are handled as USB 2.0 ports. They are not handled as USB 3.0 ports until after the operating system has started and the USB 3.0 driver has been loaded.
		Enabled	Enables the xHCI controller so that USB 3.0 ports are always identified as such
		Disabled	Disables the xHCI controller. All USB 3.0 ports become USB 2.0 ports.
HS port #1 switchable	Option to switch HS port 1 between xHCI and EHCI	Disabled	Routes port 1 to EHCI and operates it as USB 2.0.
		Enabled	Routes port 1 to xHCI. The corresponding SS port is enabled.
HS port #2 switchable	Option to switch HS port 2 between xHCI and EHCI	Disabled	Routes port 2 to EHCI and operates it as USB 2.0.
		Enabled	Routes port 2 to xHCI. The corresponding SS port is enabled.
HS port #3 switchable	Option to switch HS port 3 between xHCI and EHCI	Disabled	Routes port 3 to EHCI and operates it as USB 2.0.
		Enabled	Routes port 3 to xHCI. The corresponding SS port is enabled.
HS port #4 switchable	Option to switch HS port 4 between xHCI and EHCI	Disabled	Routes port 4 to EHCI and operates it as USB 2.0.
		Enabled	Routes port 4 to xHCI. The corresponding SS port is enabled.
Per port USB disable control	Option for enabling/disabling individual USB ports	Enter	Opens the submenu See "Per port USB disable control" on page 154

Table 147: Advanced - USB configuration - Configuration options

BIOS setting	Description	Configuration options	Effect
Legacy USB support	Option for configuring legacy USB support. USB ports do not function during startup. USB support is available again after the operating system has started. A USB keyboard is still recognized during POST.	Enabled	Enables this function
		Disabled	Disables this function
		Auto	Automatic enabling
Per port legacy USB support control	Option for enabling/disabling legacy support for individual USB ports	Enter	Opens the submenu See "Per port legacy USB support control" on page 155
USB 3.0 support	Option for enabling or disabling USB 3.0 mode	Enabled	Uses USB 3.0 for all USB 3.0 ports
		Disabled	Uses USB 2.0 or 1.1 for all USB ports
XHCI hand-off	Option for configuring support for operating systems without a fully automated XHCI function	Enabled	Enables USB 3.0 support
		Disabled	Disables this function. On operating systems that do not have a fully automated XHCI function, only USB 2.0 is used with USB devices.
EHCI hand-off	Option for configuring support for operating systems without a fully automated EHCI function	Disabled	Disables this function. On operating systems that do not have a fully automated EHCI function, only USB 1.1 is used with USB devices.
		Enabled	Enables USB 2.0 support
Device reset time-out	Option for configuring the time that POST waits for USB memory storage devices after the device start command is issued	10 sec, 20 sec, 30 sec, 40 sec	Value in seconds
USB transfer time-out	Option for configuring the timeout value for control, bulk and interrupt transfers	1 sec, 5 sec, 10 sec, 20 sec	Value in seconds
Device power-up delay	Option to set the maximum time to wait for a USB device to report to the host controller	Auto	Sets the maximum time automatically. For a root port, 100 ms is set; for a hub port, the data from the hub descriptor is used.
		Manual	Allows the maximum time to be entered manually using the "Device power-up delay in seconds" option
Device power-up delay in seconds[1)]	Option for setting the device power-up delay time manually	1 to 40	Value in seconds
Overcurrent protection	Option for configuring overcurrent protection for all USB ports	Disabled	Disables this function
		Enabled	Enables this function

Table 147: Advanced - USB configuration - Configuration options

1) This setting is only possible if *Device power-up delay* is set to *Manual*.

Per port USB disable control

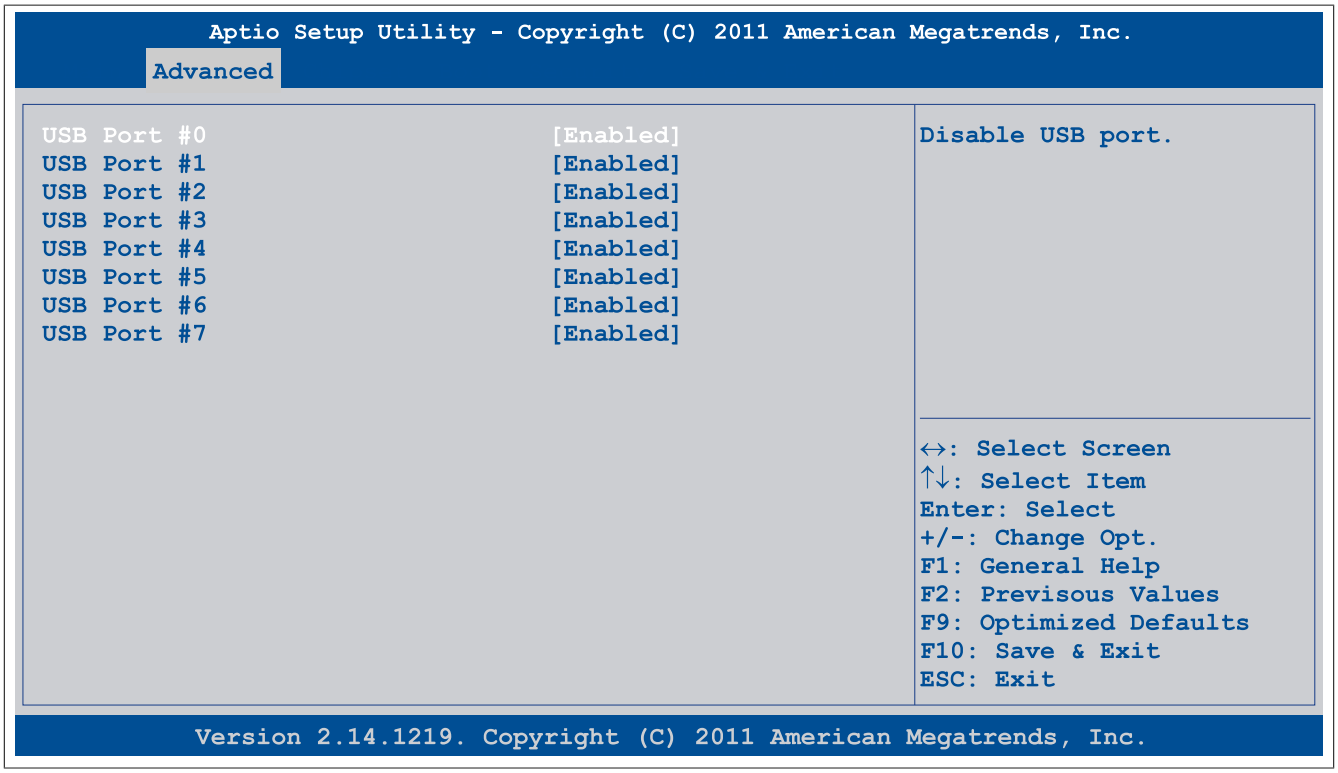


Figure 86: Advanced - USB configuration - Per port USB disable control

BIOS setting	Description	Configuration options	Effect
USB port #0	Option for enabling/disabling the USB4 port	Disabled	Disables this USB port
		Enabled	Enables this USB port
USB port #1	Option for enabling/disabling the USB2 port	Disabled	Disables this USB port
		Enabled	Enables this USB port
USB port #2	Option for enabling/disabling the USB3 port	Disabled	Disables this USB port
		Enabled	Enables this USB port
USB port #3	Option for enabling/disabling the USB1 port	Disabled	Disables this USB port
		Enabled	Enables this USB port
USB port #4	Option for enabling/disabling the USB port on the bus unit	Disabled	Disables this USB port
		Enabled	Enables this USB port
USB port #5	Option for enabling/disabling the USB port on the monitor/panel interface	Disabled	Disables this USB port
		Enabled	Enables this USB port
USB port #6	Option for enabling/disabling the USB5 port	Disabled	Disables this USB port
		Enabled	Enables this USB port
USB port #7	Option for enabling/disabling the USB port on the monitor/panel option	Disabled	Disables this USB port
		Enabled	Enables this USB port

Table 148: Advanced - USB configuration - Per port USB disable control - Configuration options

Per port legacy USB support control

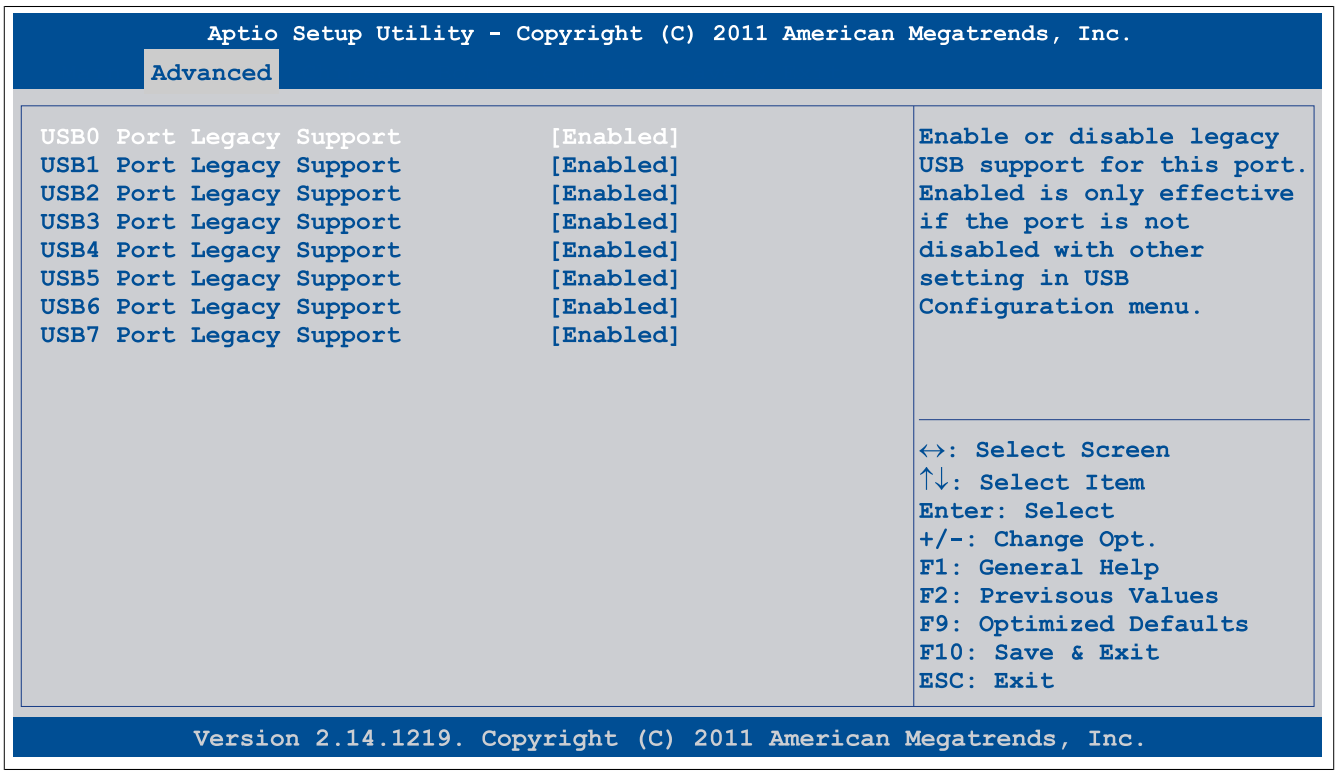


Figure 87: Advanced - USB configuration - Per port legacy USB support control

BIOS setting	Description	Configuration options	Effect
USB0 port legacy support	Option for enabling/disabling legacy support for the USB4 port	Disabled	Disables this USB port
		Enabled	Enables this USB port
USB1 port legacy support	Option for enabling/disabling legacy support for the USB2 port	Disabled	Disables this USB port
		Enabled	Enables this USB port
USB2 port legacy support	Option for enabling/disabling legacy support for the USB3 port	Disabled	Disables this USB port
		Enabled	Enables this USB port
USB3 port legacy support	Option for enabling/disabling legacy support for the USB1 port	Disabled	Disables this USB port
		Enabled	Enables this USB port
USB4 port legacy support	Option for enabling/disabling legacy support for the USB port on the bus unit	Disabled	Disables this USB port
		Enabled	Enables this USB port
USB5 port legacy support	Option for enabling/disabling legacy support for the USB port on the monitor/panel interface	Disabled	Disables this USB port
		Enabled	Enables this USB port
USB6 port legacy support	Option for enabling/disabling legacy support for the USB5 port	Disabled	Disables this USB port
		Enabled	Enables this USB port
USB7 port legacy support	Option for enabling/disabling legacy support for the USB port on the monitor/panel option	Disabled	Disables this USB port
		Enabled	Enables this USB port

Table 149: Advanced - USB configuration - Per port legacy USB support control - Configuration options

1.4.13 Serial port console redirection

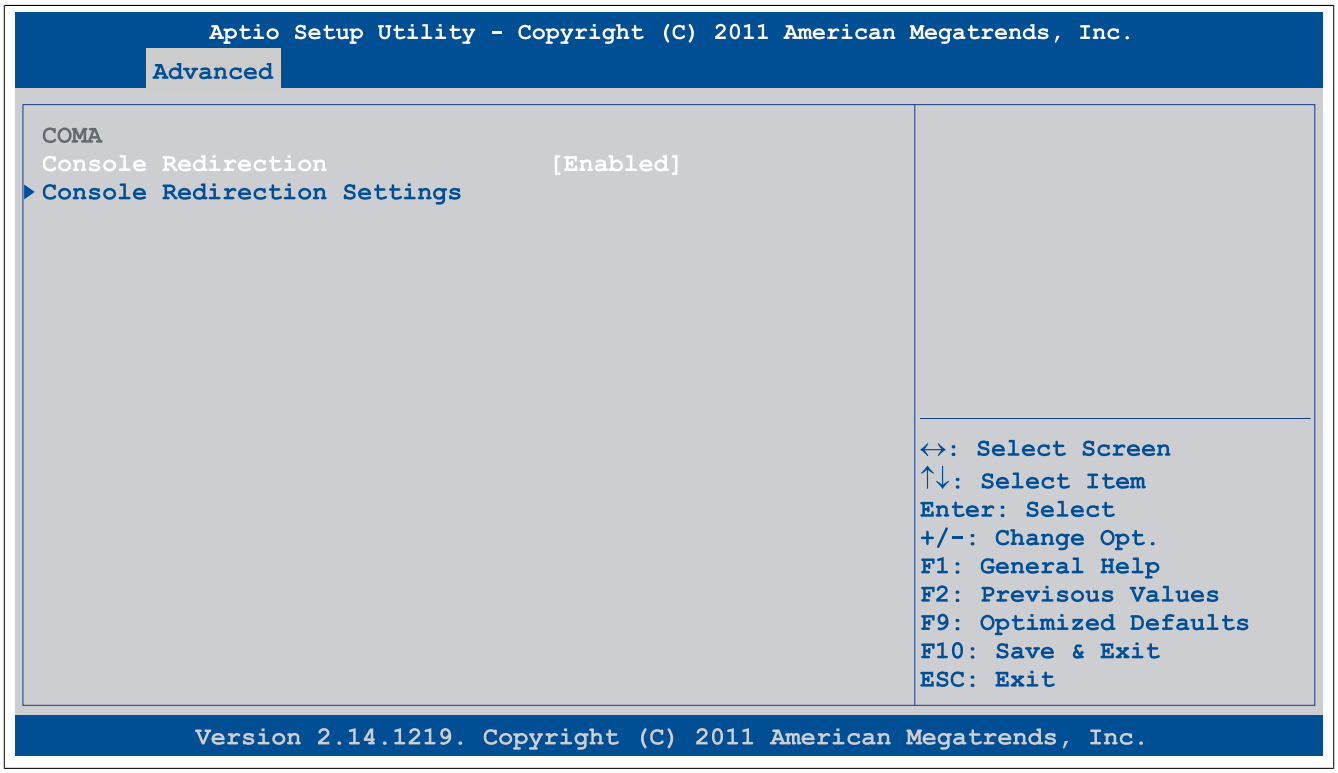


Figure 88: Advanced - Serial port console redirection

BIOS setting	Description	Configuration options	Effect
Console redirection	Option for enabling/disabling console redirection	Disabled	Disables this function
		Enabled	Enables this function
Console redirection settings	Configures the remote console	Enter	Opens the submenu See "Console redirection settings" on page 157

Table 150: Advanced - Serial port console redirection - Configuration options

1) This setting is only possible if *Device power-up delay* is set to *Manual*.

Console redirection settings

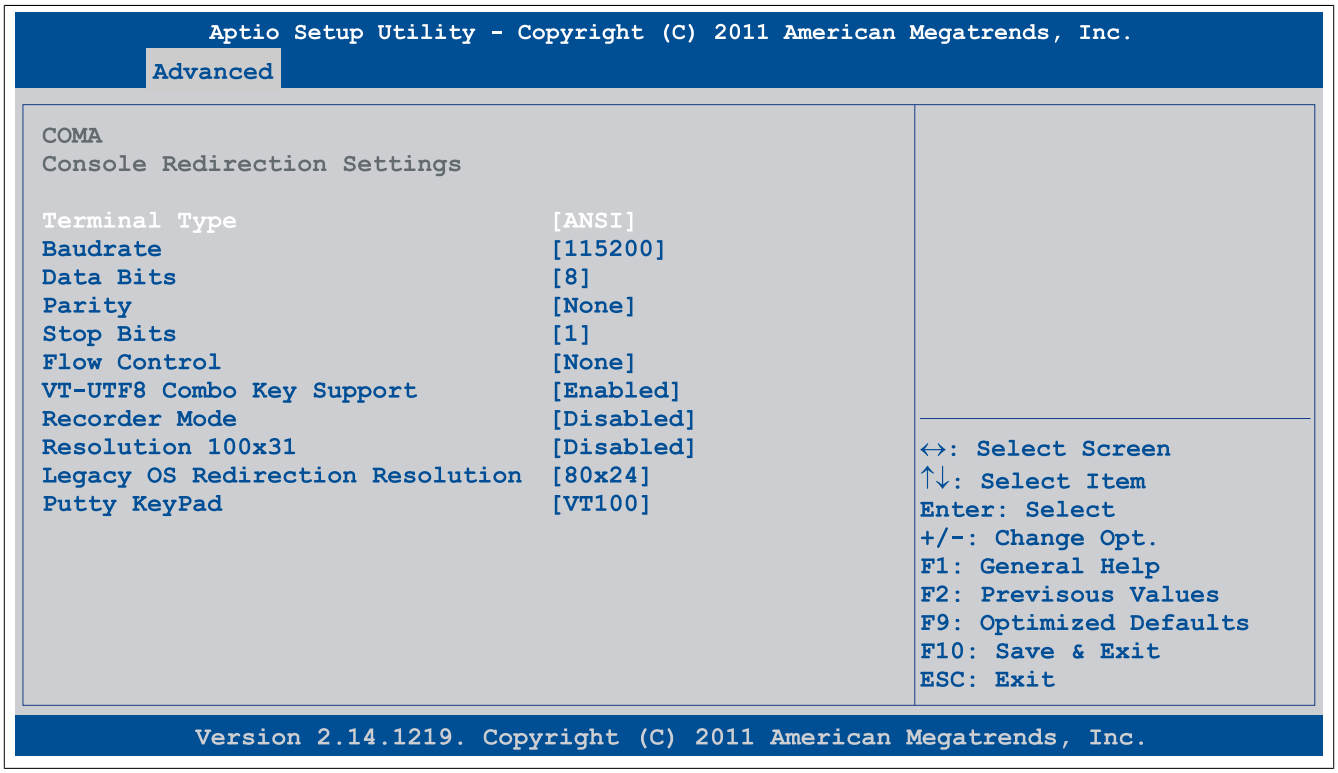


Figure 89: Advanced - Console redirection - Console redirection settings

BIOS setting	Description	Configuration options	Effect
Terminal type	Option for configuring keyboard input	VT100	Enables the VT100 convention (ASCII character set)
		VT100+	Enables the VT100+ convention (ASCII character set and support for color, function keys, etc)
		VT-UTF8	Enables the VT-UTF8 convention (uses UTF8 encoding to assign Unicode characters to one or more bytes)
		ANSI	Enables the ANSI convention (extended ASCII character set)
Baud rate	Option for setting the transfer rate of the serial interface (bits per second)	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200	Enables a transfer rate of x bits
Data bits	Option for configuring the character length (data bits) to use for serial communication	7	Character length with 7 bits
		8	Character length with 8 bits
Parity	Option for configuring the parity bit to use for serial communication	None	Parity bit not used
		Even	Uses an even number of parity bits
		Odd	Uses an odd number of parity bits
		Mark	Parity bit always 1
		Space	Parity bit always 0
Stop bits	Option for configuring the stop bits to use for serial communication	1	Uses 1 bit as the stop bit
		2	Uses 2 bits as the stop bit
Flow control	Option for configuring the data flow control	None	Data flow control not enabled
		Hardware RTS/CTS	Hardware handshake enabled
VT-UTF8 combo key support	Option for enabling/disabling VT-UTF8 combo key support for ANSI and VT100 connections	Disabled	Disables this function
		Enabled	Enables this function
Recorder mode	Option for enabling/disabling recorder mode	Disabled	Disables this function
		Enabled	Enables this function When this setting is used, all control escape sequences are suppressed from the serial redirection output. This may lead to incorrectly formatted screen output but makes automatic storage of the serial console output easier.
Resolution 100x31	Option for enabling/disabling extended terminal resolution	Disabled	Disables this function
		Enabled	Enables this function
Legacy OS redirection resolution	Option for configuring the number of lines and columns for legacy OS redirection	80x24	Resolution of 80x24
		80x25	Resolution of 80x25
Putty keypad	TBD	VT100	TBD
		LINUX	TBD
		XTERMR6	TBD
		SCO	TBD
		ESCN	TBD
		VT400	TBD

Table 151: Advanced - Console redirection - Console redirection settings - Configuration options

1.5 Boot

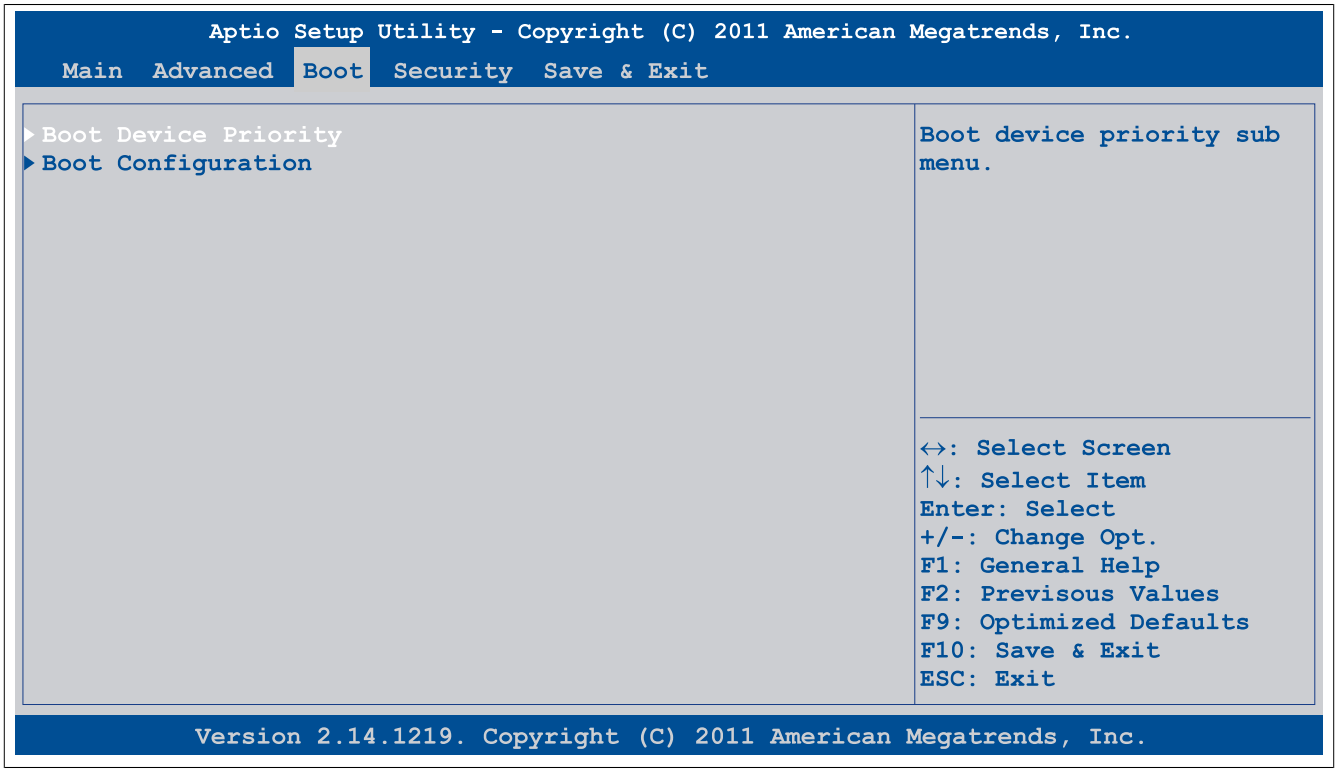


Figure 90: Boot

BIOS setting	Description	Configuration options	Effect
Boot device priority	Configures the boot order	Enter	Opens the submenu See "Boot device priority" on page 158
Boot configuration	Configures boot properties	Enter	Opens the submenu See "Boot configuration" on page 159

Table 152: Boot - Overview

1.5.1 Boot device priority

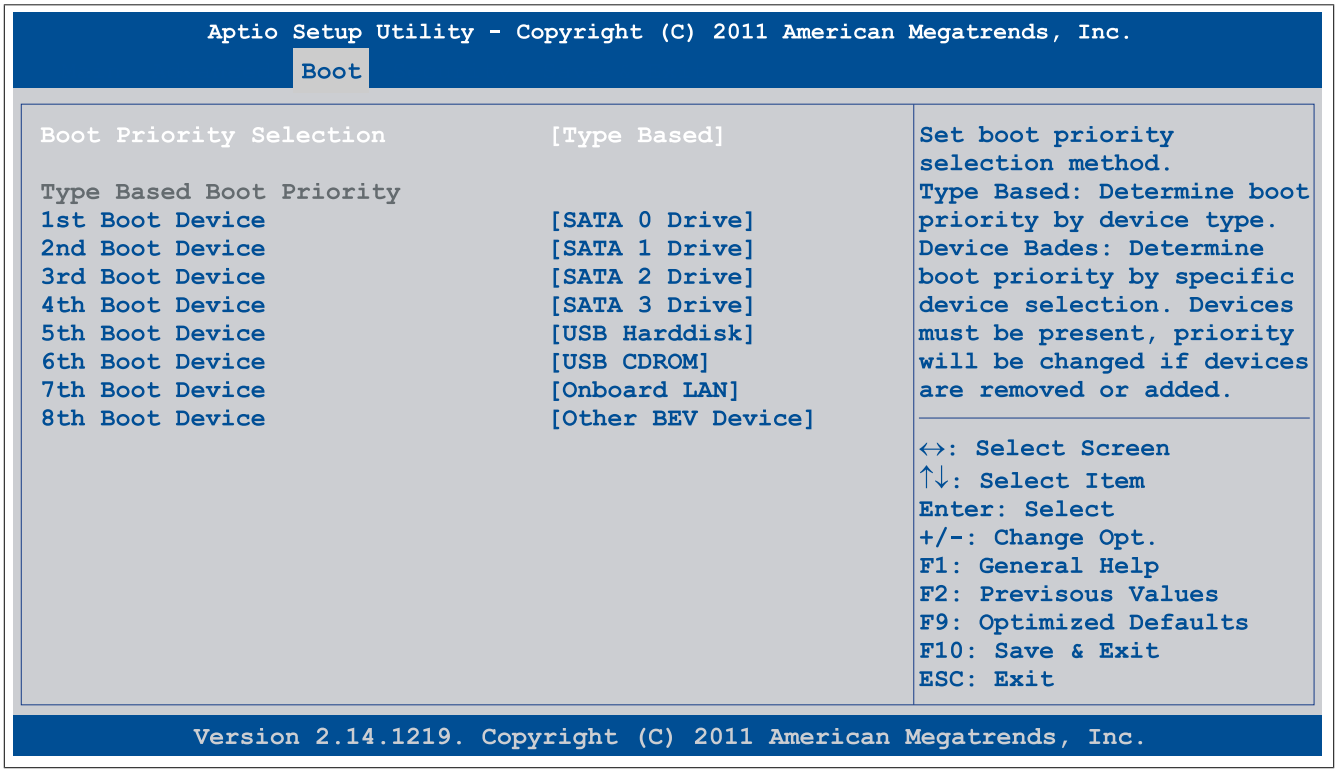


Figure 91: Boot - Boot device priority

BIOS setting	Description	Configuration options	Effect
Boot priority selection	Option for determining the method for how drives should be booted	Device based	Only lists devices that are recognized by the system. The order of devices in this list can be changed. **Information:** **It is only possible to use either "Device based" or "Type based". Using both together is not permitted.**
		Type based	The boot sequence of a device type list can be changed. It is also possible to add device types that are not connected to this list. **Information:** **It is only possible to use either "Device based" or "Type based". Using both together is not permitted.**
1st boot device 2nd boot device 3rd boot device 4th boot device 5th boot device 6th boot device 7th boot device 8th boot device	Option for selecting drives to be used for booting	Disabled, SATA 0 drive, SATA 1 drive, SATA 2 drive, SATA 3 drive, USB floppy, USB hard disk, USB CDROM, Onboard LAN, External LAN, Other BEV device	Specifies the desired boot sequence

Table 153: Boot - Boot device priority - Configuration options

1.5.2 Boot configuration

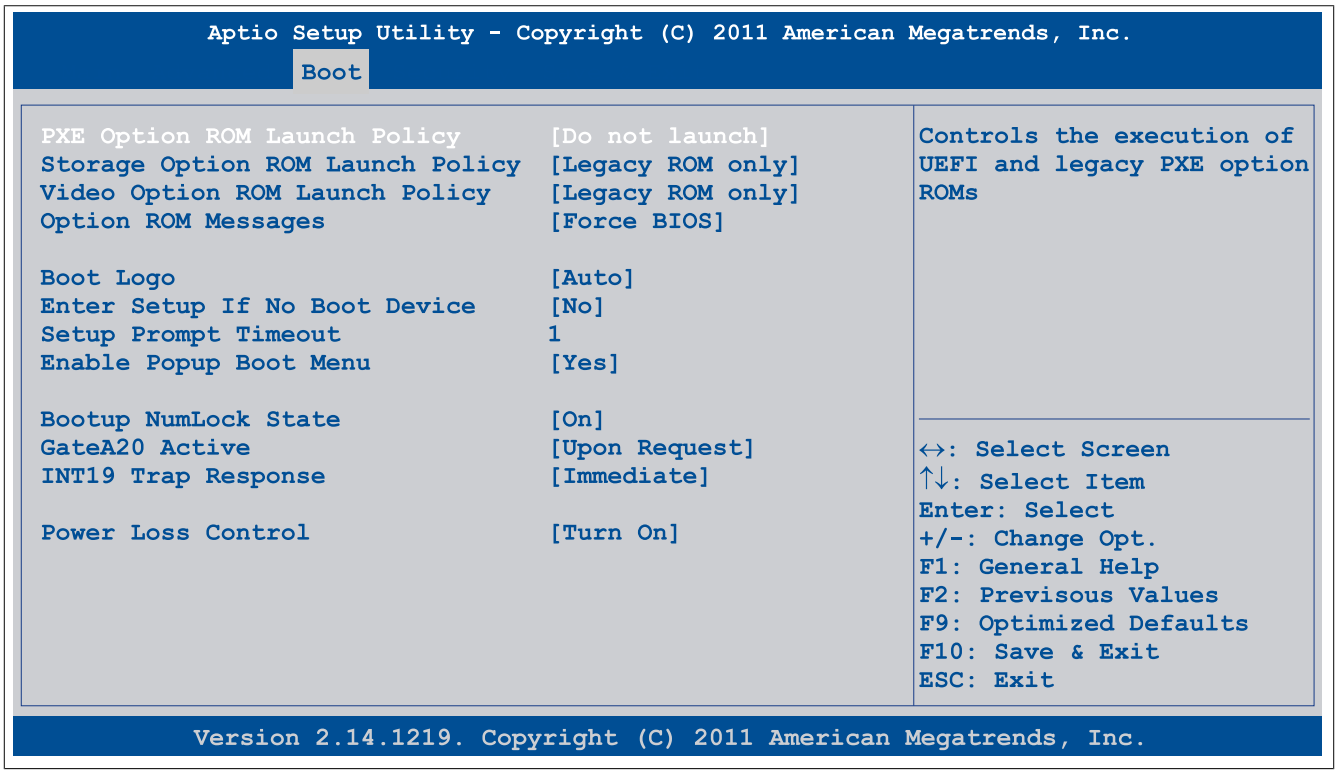


Figure 92: Boot - Boot configuration

BIOS setting	Description	Configuration options	Effect
PXE Option ROM launch policy	Option for booting from PXE Option ROM	Do not launch	Does not boot from PXE Option ROM
		UEFI ROM only	Boots from UEFI ROM
		Legacy ROM only	Boots from legacy ROM
Storage Option ROM launch policy	Option for booting from Storage Option ROM	Do not launch	Does not boot from Storage Option ROM
		UEFI ROM only	Boots from UEFI ROM
		Legacy ROM only	Boots from legacy ROM
Video Option ROM launch policy	Option for booting from Video Option ROM	Do not launch	Does not boot from Video Option ROM
		UEFI ROM only	Boots from UEFI ROM
		Legacy ROM only	Boots from legacy ROM

Table 154: Boot - Boot configuration - Configuration options

BIOS setting	Description	Configuration options	Effect
Option ROM messages	Option to display Option ROM messages during POST	Force BIOS	Displays Option ROM messages during POST
		Keep current	Does not display Option ROM messages during POST
Boot logo	Option for configuring the boot logo	Disabled	Does not display the boot logo
		Enabled	Displays the boot logo
		Auto	Displays the boot logo
Enter setup if no boot device	Option for configuring whether Setup is displayed when no bootable drive is connected	No	Does not display the Setup screen
		Yes	Displays the Setup screen
Setup prompt timeout	Option for configuring how long the Setup activation key (key for entering BIOS) is displayed	1 to 65534	Displays the Setup activation key for x seconds
		65535	Displays the Setup activation key for an unlimited amount of time
Enable popup boot menu	Option for enabling/disabling the popup boot menu	Yes	Enables this function. Pressing "F11" during POST allows a boot device to be selected.
		No	Disables this function. It is not possible to select a boot device during POST. Devices will boot in their configured order.
Bootup NumLock state	Option for configuring the numeric keypad when booting the system	On	Enables the numeric keypad
		Off	Only enables the cursor (movement) functions of the numeric keypad
GateA20 active	Option for defining how memory above 1 MB is accessed	Upon request	GA20 can be disabled.
		Always	GA20 is not disabled.
INT19 trap response	TBD	Immediate	TBD
		Postponed	TBD
Power loss control	Specifies whether the system should be on/off following power loss	Remain off	Keeps the APC910 turned off
		Turn on	Turns on the APC910
		Last state	Enables the previous state

Table 154: Boot - Boot configuration - Configuration options

1.6 Security

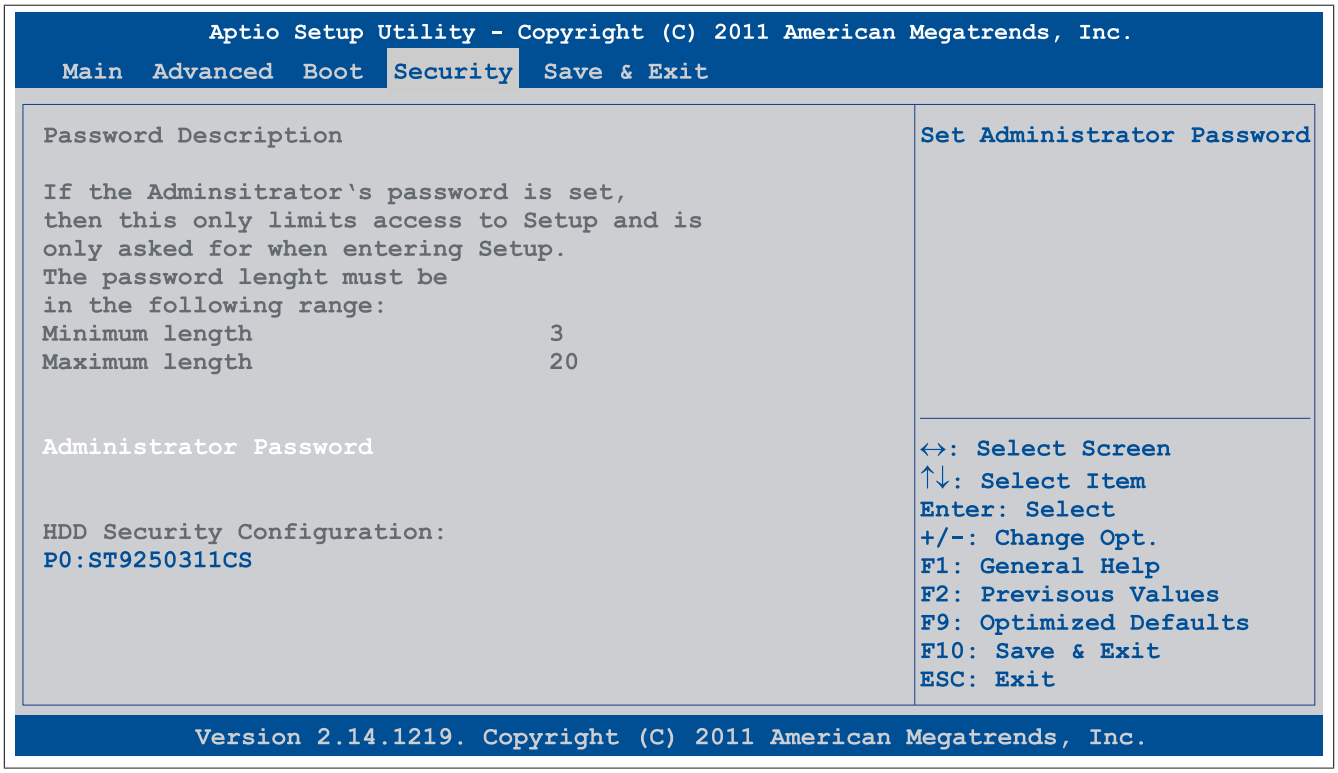


Figure 93: Security

BIOS setting	Description	Configuration options	Effect
Administrator password	Function for entering/changing the administrator password	Enter	Password entry

Table 155: Security menu - Configuration options

1.7 Save & Exit

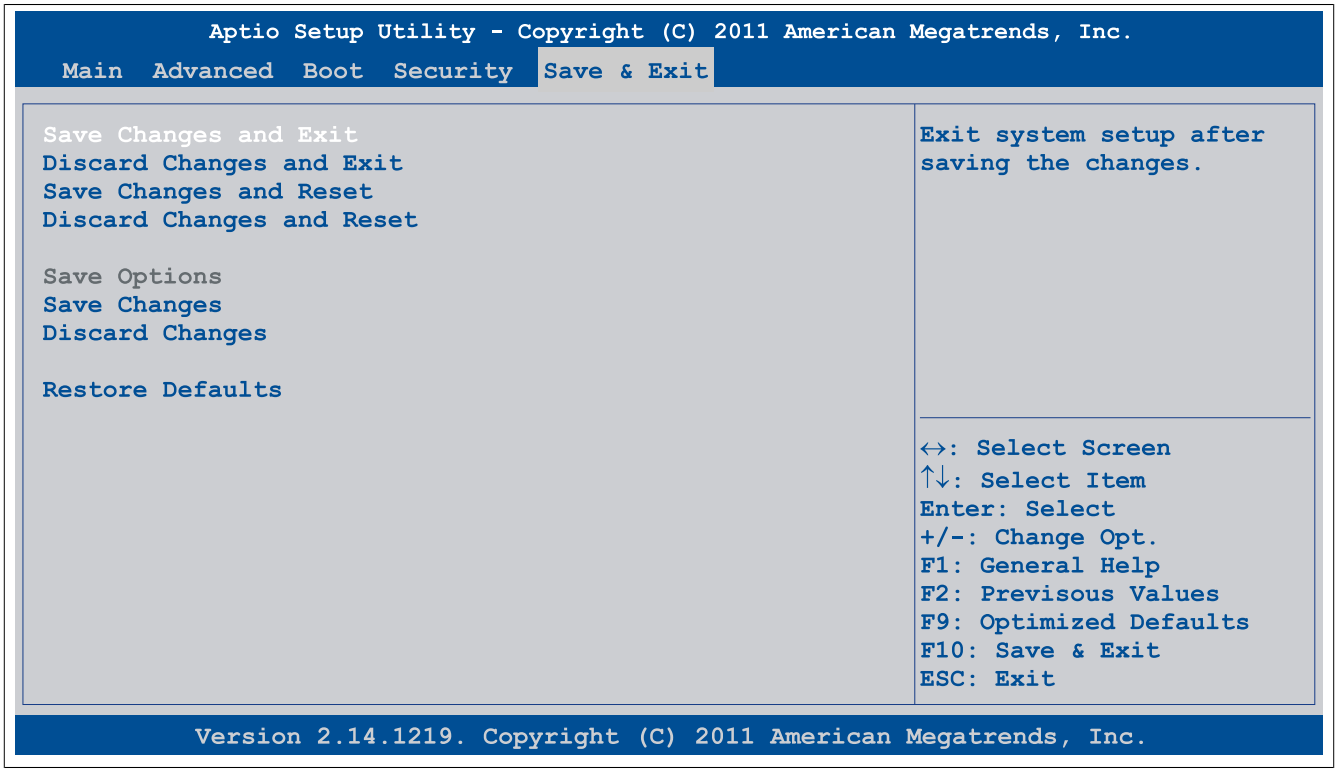


Figure 94: Save & Exit

BIOS setting	Description	Configuration options	Effect
Save changes and exit	Selecting this option closes BIOS Setup. Any changes made are saved to CMOS after confirmation.	Yes / No	
Discard changes and exit	Selecting this option closes BIOS Setup without saving any changes made.	Yes / No	
Save changes and reset	Selecting this option closes BIOS Setup. Any changes made are saved to CMOS after confirmation, and the system is rebooted.	Yes / No	
Discard changes and reset	Selecting this option closes BIOS Setup without saving any changes made. The system is then rebooted.	Yes / No	
Save changes	Any changes made are saved to CMOS after confirmation.	Yes / No	
Discard changes	This option can be used to reset any settings that may have been made but have been forgotten in the meantime (provided they have not yet been saved).	Yes / No	
Restore defaults	This option restores BIOS default values.	Yes / No	

Table 156: Save & Exit menu - Configuration options

1.8 BIOS default settings

BIOS default settings may vary depending on how the fully assembled device is configured.

1.8.1 Advanced

Graphics configuration

Setting / Option	Default profile	My setting
Primary display	Auto	
Internal graphics	Auto	
IGFX VBIOS version	-	
GTT size	2 MB	
Aperture size	256 M	
DVMT pre-allocated	64 M	
DVMT total gfx mem	256 M	
Gfx low power mode	Disabled	
Graphics performance analyzers	Disabled	
Primary IGFX boot display	EFP2	
Secondary IGFX boot display	CRT	
Active LFP configuration	No local flat panel	
Display port B interface	Display port	
Display Port C interface	Disabled	
Display Port D interface	HDMI/DVI	
Display mode persistence	Disabled	

Table 157: Advanced - Graphics configuration - Profile setting overview

OEM features

Setting / Option	Default profile	My setting
Main BIOS version	-	
OEM BIOS version	-	
MTCX	-	
ETH2 MAC address	-	
Real-time environment	Disabled	

Table 158: Advanced - OEM features - Profile settings overview

Super I/O configuration

Setting / Option	Default profile	My setting
Serial port A	Enabled	
Device settings	-	
Serial port C	Enabled	
Device settings	-	

Table 159: Advanced - OEM features - Super I/O configuration - Profile settings overview

PCI configuration

Setting / Option	Default profile	My setting
Above 4G decoding	Disabled	
PCI latency timer	32 PCI bus clocks	
VGA palette snoop	Disabled	
PERR# generation	Disabled	
SERR# generation	Disabled	
PIRQ routing & IRQ reservation		
PIRQA	Auto	
PIRQB	Auto	
PIRQC	Auto	
PIRQD	Auto	
PIRQE	Auto	
PIRQF	Auto	
PIRQG	Auto	
PIRQH	Auto	
Reserve legacy interrupt 1	None	
Reserve legacy interrupt 2	None	

Table 160: Advanced - PCI configuration - Profile setting overview

PCI Express configuration

PCI Express settings

Setting / Option	Default profile	My setting
Relaxed ordering	Disabled	
Extended tag	Disabled	
No snoop	Enabled	
Maximum payload	Auto	
Maximum read request	Auto	
ASPM	Disabled	
Extended synch	Disabled	
Link training retry	5	
Link training timeout (µS)	100	
Unpopulated links	Keep link on	

Table 161: Advanced - PCI Express configuration - PCI Express settings - Profile setting overview

PCI Express settings

Setting / Option	Default profile	My setting
Completion timeout	Default	
ARI forwarding	Disabled	
AtomicOp requester enable	Disabled	
AtomicOp egress blocking	Disabled	
IDO request enable	Disabled	
IDO completion enable	Disabled	
LTR mechanism enable	Disabled	
End-End TLP prefix blocking	Disabled	
Target link speed	Auto	
Clock power management	Disabled	
Compliance SOS	Disabled	
Hardware autonomous width	Enabled	
Hardware autonomous speed	Enabled	

Table 162: Advanced - PCI Express configuration - PCI Express GEN 2 settings - Profile setting overview

PCI Express graphics (PEG) port

Setting / Option	Default profile	My setting
PCI Express graphics (PEG) port	Auto	
PEG root port configuration	1 x 8 + 2 x 4	
PEG0	-	
PEG0 speed	Auto	
PEG0 ASPM	Disabled	
PEG1	-	
PEG1 speed	Gen1	
PEG1 ASPM	Disabled	
PEG2	-	
PEG2 speed	Auto	
PEG2 ASPM	Disabled	
Detect non-compliant device	Disabled	
De-emphasis control	-3.5 dB	

Table 163: Advanced - PCI Express configuration - PCI Express graphics (PEG) port - Profile setting overview

PCI Express root port

Setting / Option	Default profile	My setting
PCI Express root port x	Enabled	
ASPM	Auto	
URR	Disabled	
FER	Disabled	
NFER	Disabled	
CER	Disabled	
CT0	Disabled	
SEFE	Disabled	
SENFE	Disabled	
SECE	Disabled	
PME SCI	Enabled	
Always enable port	Disabled	
PCIe speed	Auto	
Assign INT to root port	Enabled	

Table 164: Advanced - PCI Express configuration - PCI Express root port - Profile setting overview

Setting / Option	Default profile	My setting
Extra bus reserved	0	
Reserved memory	10	
Prefetchable memory	10	
Reserved I/O	4	

Table 164: Advanced - PCI Express configuration - PCI Express root port - Profile setting overview

ACPI settings

Setting / Option	Default profile	My setting
Enable hibernation	Enabled	
ACPI sleep state	Both S1 and S3 available for OS to choose from	
Lock legacy resources	Disabled	
S3 video repost	Disabled	
Critical trip point	111 C	

Table 165: Advanced - ACPI settings - Profile setting overview

RTC wake settings

Setting / Option	Default profile	My setting
Wake system at fixed time	Disabled	

Table 166: Advanced - RTC wake settings - Profile settings overview

CPU configuration

Setting / Option	Default profile	My setting
Hyper-threading	Enabled	
Active processor cores	All	
Limit CPUID maximum	Disabled	
Execute disable bit	Enabled	
Intel virtualization technology	Disabled	
Hardware prefetcher	Enabled	
Adjacent cache line prefetch	Enabled	
TCC activation offset	0	
Primary plane current value	0	
Secondary plane current value	0	
EIST	Enabled	
Turbo mode	Enabled	
CPU C3 report	Disabled	
CPU C6 report	Disabled	
CPU C7 report	Disabled	
Configurable TDP	TDP NOMINAL	
Config TDP LOCK	Disabled	
Long duration power limit	0	
Long duration maintained	1	
Short duration power limit	0	
ACPI T state	Disabled	

Table 167: Advanced - CPU configuration - Profile settings overview

Chipset configuration

Setting / Option	Default profile	My setting
PCH LAN controller	Enabled	
Wake on LAN	Enabled	
Azalia	Auto	
Azalia PME	Disabled	
Azalia internal HDMI codec	Disabled	
High-precision timer	Enabled	
PCI Express clock gating	Disabled	
DMI link ASPM PCH side	Disabled	
PCIe USB glitch W/A	Disabled	
DMI	-	
DMI Vc1 control	Enabled	
DMI Vcp control	Enabled	

Table 168: Advanced - Chipset configuration - Profile setting overview

Setting / Option	Default profile	My setting
DMI Vcm control	Enabled	
DMI link ASPM CPU side	Disabled	
DMI extended synch control	Disabled	
DMI Gen 2	Auto	

Table 168: Advanced - Chipset configuration - Profile setting overview

SATA configuration

Setting / Option	Default profile	My setting
SATA controller(s)	Enabled	
SATA mode selection	AHCI	
SATA test mode	Disabled	
Aggressive LPM support	Disabled	
SATA controller speed	Gen3	
Alternate ID	Disabled	
Serial ATA port 0	-	
Port 0	Enabled	
Hot plug	Disabled	
External SATA	Disabled	
SATA device type	Hard disk drive	
Spin up device	Disabled	
Serial ATA port 1	-	
Port 1	Enabled	
Hot plug	Disabled	
External SATA	Disabled	
SATA device type	Hard disk drive	
Spin up device	Disabled	
Serial ATA port 2	-	
Port 2	Enabled	
Hot plug	Disabled	
External SATA	Disabled	
Spin up device	Disabled	
Serial ATA port 3	-	
Port 3	Enabled	
Hot plug	Disabled	
External SATA	Disabled	
Spin up device	Disabled	

Table 169: Advanced - SATA configuration - Profile setting overview

Memory configuration

Setting / Option	Default profile	My setting
DIMM profile	Default DIMM profile	
No fan memory frequency limiter	Enabled	
ECC support	Disabled	
Max TOLUD	Dynamic	
NMode support	Auto	
Memory scrambler	Enabled	
MRC fast boot	Enabled	
Force cold reset	Enabled	
DIMM exit mode	Fast exit	
Power down mode	PPD	
Scrambler seed generation off	Disabled	
Memory remap	Enabled	
Memory alias check	Disabled	
Channel A DIMM control	Enable both DIMMS	
Channel B DIMM control	Enable both DIMMS	

Table 170: Advanced - Memory configuration - Profile setting overview

USB configuration

Setting / Option	Default profile	My setting
EHCI1 (ports 0-5)	Enabled	
EHC2 (ports 6-7)	Enabled	
xHCI mode	Auto	
HS port #1 switchable	Enabled	
HS port #2 switchable	Enabled	
HS port #3 switchable	Enabled	

Table 171: Advanced - USB configuration - Profile setting overview

Setting / Option	Default profile	My setting
HS port #4 switchable	Enabled	
Legacy USB support	Enabled	
USB 3.0 support	Enabled	
XHCI hand-off	Enabled	
EHCI hand-off	Disabled	
Device reset time-out	20 sec	
USB transfer time-out	20 sec	
Device power-up delay	Auto	
Overcurrent protection	Disabled	
Per port USB disable control		
USB port #0	Enabled	
USB port #1	Enabled	
USB port #2	Enabled	
USB port #3	Enabled	
USB port #4	Enabled	
USB port #5	Enabled	
USB port #6	Enabled	
USB port #7	Enabled	
Per port legacy USB support control		
USB0 port legacy support	Enabled	
USB1 port legacy support	Enabled	
USB2 port legacy support	Enabled	
USB3 port legacy support	Enabled	
USB4 port legacy support	Enabled	
USB5 port legacy support	Enabled	
USB6 port legacy support	Enabled	
USB7 port legacy support	Enabled	

Table 171: Advanced - USB configuration - Profile setting overview

Serial port console redirection

Setting / Option	Default profile	My setting
Console redirection	Disabled	

Table 172: Advanced - Serial port console redirection - Profile setting overview

1.8.2 Boot

Boot device priority

Setting / Option	Default profile	My setting
Boot priority selection	Type based	
1st boot device	SATA 0 drive	
2nd boot device	SATA 1 drive	
3rd boot device	SATA 2 drive	
4th boot device	SATA 3 drive	
5th boot device	USB hard disk	
6th boot device	USB CDROM	
7th boot device	Onboard LAN	
8th boot device	Other BEV device	

Table 173: Boot - Boot device priority - Profile setting overview

Boot configuration

Setting / Option	Default profile	My setting
PXE Option ROM launch policy	Do not launch	
Storage Option ROM launch policy	Legacy ROM only	
Video Option ROM launch policy	Legacy ROM only	
Option ROM messages	Force BIOS	
Boot logo	Auto	
Enter setup if no boot device	No	
Setup prompt timeout	1	
Enable popup boot menu	Yes	
Bootup NumLock state	On	
GateA20 active	Upon request	
INT19 trap response	Immediate	
Power loss control	Turn on	

Table 174: Boot - Boot configuration - Profile setting overview

1.9 Distribution of resources

1.9.1 RAM address assignment

RAM address	Address in hexadecimal	Resource
(TOM - xxxx) - TOM[1)]	N.A.	ACPI reclaim, PCI memory range, video
1024 kB - (TOM - xxxx)	100000 - N.A.	Extended memory
869 kB - 1024 kB	0E0000h - 0FFFFFh	Runtime BIOS
768 kB - 896 kB	0C0000h - 0DFFFFh	Expansion area
640 kB - 768 kB	0A0000h - 0BFFFFh	Video memory and BIOS
639 kB - 640 kB	09FC00h - 09FFFFh	Extended BIOS data
0 – 639 kB	000000h - 09FC00h	Conventional memory

Table 175: RAM address assignment

1) TOM = Top of Memory: Max. installed DRAM

1.9.2 I/O address assignment

I/O address	Resource
0000h - 00FFh	Motherboard resources
0170h - 0177h	Secondary IDE channel
01F0h - 01F7h	Primary IDE channel
0228h - 022Fh	COMF (I/O board 2)
02E8h - 02EFh	COME (I/O board 1)
02F8h - 02FFh	COMB (SDL Link module)
0376h - 0376h	Secondary IDE channel command port
0377h - 0377h	Secondary IDE channel status port
0384h - 0385h	CAN controller
03B0h - 03DFh	Video system
03E8h - 03EFh	COMC (SDL onboard)
03F6h - 03F6h	Primary IDE channel command port
03F7h - 03F7h	Primary IDE channel status port
03F8h - 03FFh	COMA (COM1)
0400h - 047Fh	Motherboard resources
0500h - 057Fh	Motherboard resources
0CF8h - 0CFBh	PCI config address register
0CFCh - 0CFFh	PCI config data register
0D00h - FFFFh	PCI / PCI Express bus
4100h - 417Fh	MTCX
FF00h - FF07h	IDE bus master register

Table 176: I/O address assignment

1.9.3 Interrupt assignments in PIC mode

IRQ		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	NONE
System timer		●																
Keyboard			●															
IRQ cascade				●														
COMA (COM1)					○	●	○	○	○			○	○	○				
ACPI[1)]											●							
Real-time clock										●								
Coprocessor (FPU)															●			
Primary IDE channel																●		
Secondary IDE channel																	●	
B&R	COMB (SDL Link module)				●	○	○	○	○			○	○	○				
	COMC (SDL onboard)				○	○	○	○	○			○	●	○				
	COME (I/O board 1)				○	○	○	○	○			●	○	○				
	COMF (I/O board 2)				○	○	○	○	●			○	○	○				
	CAN				○	○	○	○	○			●	○	○				

Table 177: IRQ interrupt assignments in PIC mode

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

● ... Default setting
○ ... Optional setting

1.9.4 Interrupt assignments in APIC mode

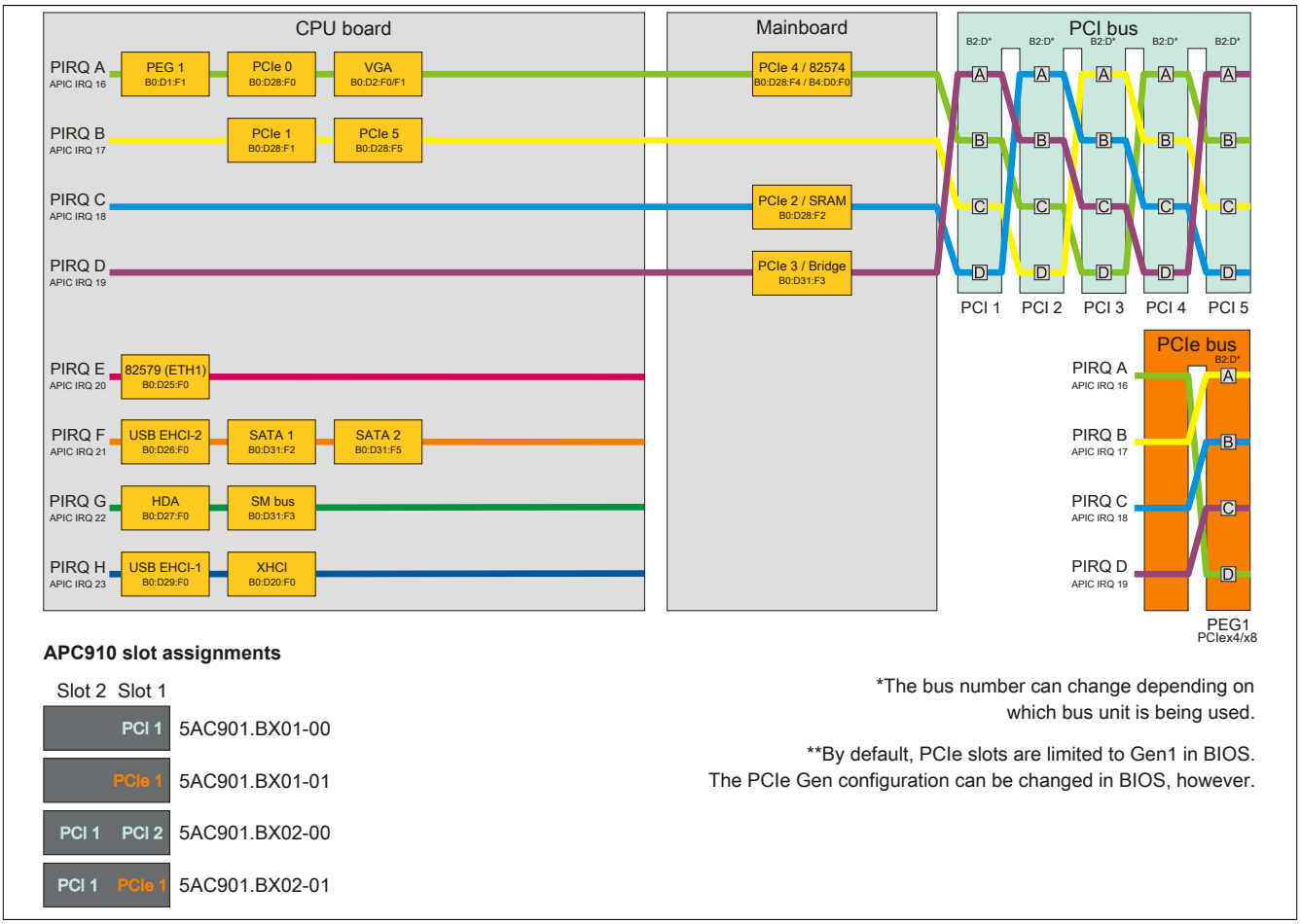
A total of 23 IRQs are available in APIC (**A**dvanced **P**rogrammable **I**nterrupt **C**ontroller) mode. Enabling this option is only effective if done before the Windows operating system is installed.

IRQ		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	NONE
System timer		●																								
Keyboard			●																							
IRQ cascade				●																						
COMA (COM1)					○	●	○	○	○			○	○	○												
ACPI[1]											●															
Real-time clock										●																
Coprocessor (FPU)															●											
Primary IDE channel																●										
Secondary IDE channel																	●									
B&R	COMB (SDL Link module)				●	○	○	○	○			○	○	○												
	COMC (SDL onboard)				○	○	○	○	○			○	●	○												
	COME (I/O board 1)				○	○	○	○	○			●	○	○												
	COMF (I/O board 2)				○	○	○	○	●			○	○	○												
	CAN				○	○	○	○	○			●	○	○												
PIRQ A[2]																		●								
PIRQ B[3]																			●							
PIRQ C[4]																				●						
PIRQ D[5]																					●					
PIRQ E[6]																						●				
PIRQ F[7]																							●			
PIRQ G[8]																								●		
PIRQ H[9]																									●	

Table 178: IRQ interrupt assignments in APIC mode

1) **A**dvanced **C**onfiguration and **P**ower **I**nterface.
2) PIRQ A: For PCIe; PEG 0/1/2, PCI Express root port 0, VGA controller, PCI Express root port 4 (ETH2)
3) PIRQ B: For PCIe; PCI Express root port 1, PCI Express root port 5
4) PIRQ C: For PCIe; PCI Express root port 2, SRAM
5) PIRQ D: For PCIe; PCI Express root port 3, PCIe to PCI bridge
6) PIRQ E: For PCIe; onboard gigabit LAN controller (ETH1)
7) PIRQ F: For PCIe; EHCI host controller 2, serial ATA controller 1, serial ATA controller 2
8) PIRQ G: For PCIe; Intel High Definition Audio controller, SMBus controller
9) PIRQ H: For PCIe; EHCI host controller 1, XHCI host controller

● ... Default setting
○ ... Optional setting



APC910 slot assignments

Slot 2 Slot 1

PCI 1	5AC901.BX01-00
PCIe 1	5AC901.BX01-01
PCI 1 PCI 2	5AC901.BX02-00
PCI 1 PCIe 1	5AC901.BX02-01

*The bus number can change depending on which bus unit is being used.

**By default, PCIe slots are limited to Gen1 in BIOS. The PCIe Gen configuration can be changed in BIOS, however.

Figure 95: PCI and PCIe routing with the QM77/HM76 APIC CPU board

2 Upgrade information

Warning!

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

2.1 BIOS upgrade

Upgrade may be necessary in order to accomplish the following:

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

2.1.1 Important information

Information:

Customized BIOS settings are deleted when upgrading BIOS.

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

Which BIOS version and firmware are already installed on the APC910?

This information can be found on the following BIOS Setup page:

- After switching on the APC910, the BIOS Setup screen can be accessed by pressing <Del>.
- From the "Advanced" menu in BIOS, select "OEM features".

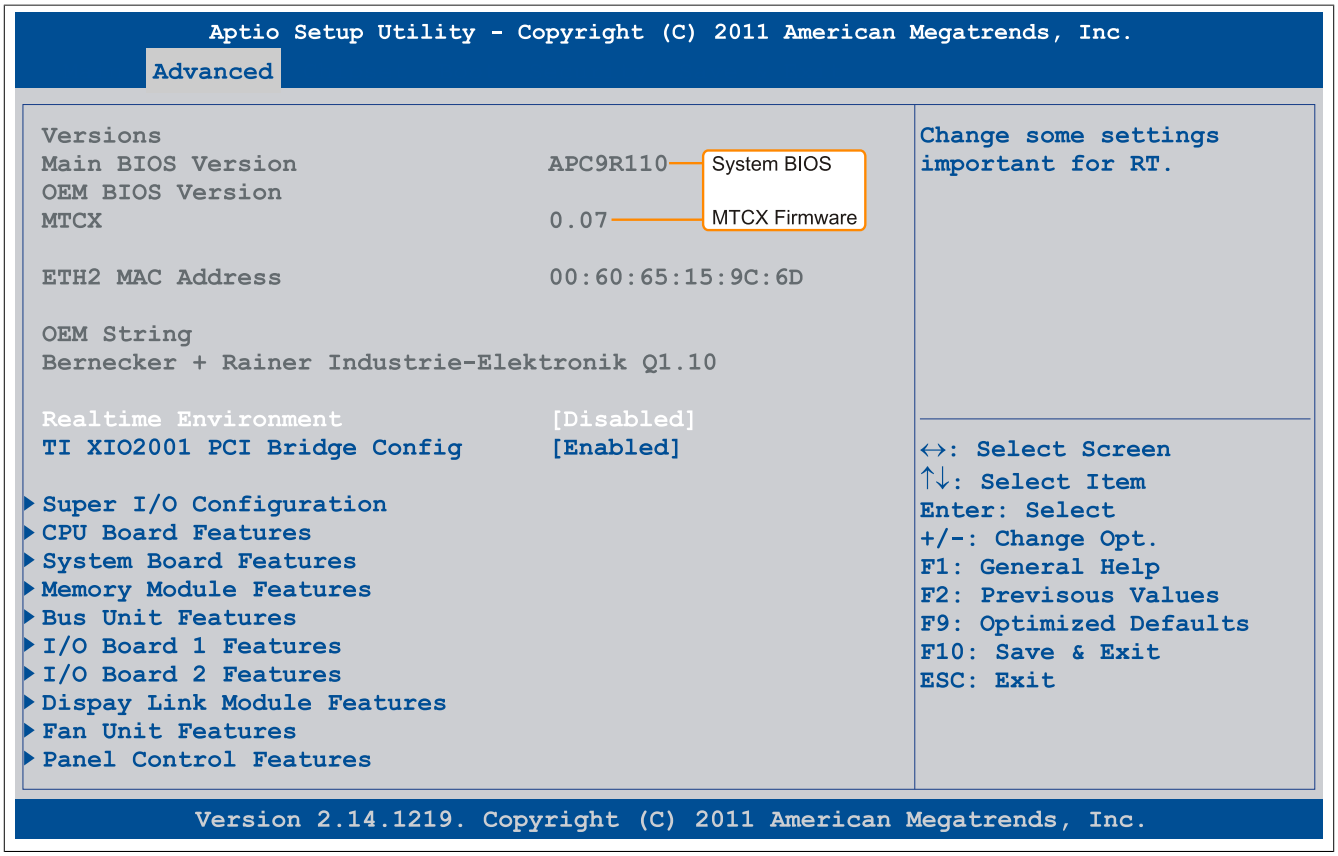


Figure 96: Software version

2.1.2 Procedure with MS-DOS

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

Information:

In MS-DOS, Win95 and Win98, a blank HD disk can be made bootable by typing "sys a:" or "format a: /s" on the command line.
Information about creating a bootable diskette in Windows XP can be found on page 173.

Information on creating a USB flash drive for a B&R upgrade can be found on page 175.

Information on creating a storage device for a B&R upgrade can be found on page 176.

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

```
1. Upgrade AMI BIOS for APC910 (5PC900.TS77-0x)
2. Exit
```

Item 1:
Automatically upgrades BIOS (default action after 5 seconds)

Item 2:
Returns to the shell (MS-DOS)

Information:

If a button is not pressed within 5 seconds, then item 1 "Upgrade AMI BIOS for APC910 (5PC900.TS77-0x)" is automatically carried out and the industrial PC is updated automatically.

6. The system must be rebooted after a successful upgrade.
7. Reboot and press <Del> to enter the BIOS Setup screen and load the setup defaults, then select "Save changes and exit".

2.2 Firmware upgrade

The "Firmware upgrade (MTCX, SDLR, SDLT, AP830)" software makes it possible to update the firmware for multiple controllers (MTCX, SDLT, SDLR, AP830) according to the APC910 system variant.

The latest firmware upgrade can be directly downloaded from the Downloads section of the B&R website (www.br-automation.com).

2.2.1 Procedure

1. Download the .zip file from the B&R website (www.br-automation.com).
2. Open the **Control Center** in the Control Panel.
3. Select the **Versions** tab.
4. Under **System unit**, click on **Update** for **MTCX**. This brings up the "Open" dialog box.
5. Enter the name of the firmware file or select the file under **Filename**.
6. Click on **Open**. This brings up the "Open" dialog box.

The transfer can be canceled by clicking on **Cancel**. **Cancel** is disabled when flash memory is being written to.

> **Warning!**
>
> **Do not press any panel keys while the firmware is being transferred! This can disrupt the procedure.**

Deleting the data in flash memory can take several seconds depending on the memory block being used. The progress indicator is not updated during this time.

> **Information:**
>
> **Power to the PC must be shut off and turned back on for the new firmware to take effect and for the updated version to be displayed. The user is prompted to do this when closing the Control Center.**

> **Information:**
>
> **For more information about saving and updating firmware, please refer to the help documentation for the Control Center.**

2.3 Creating an MS-DOS boot diskette in Windows XP

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

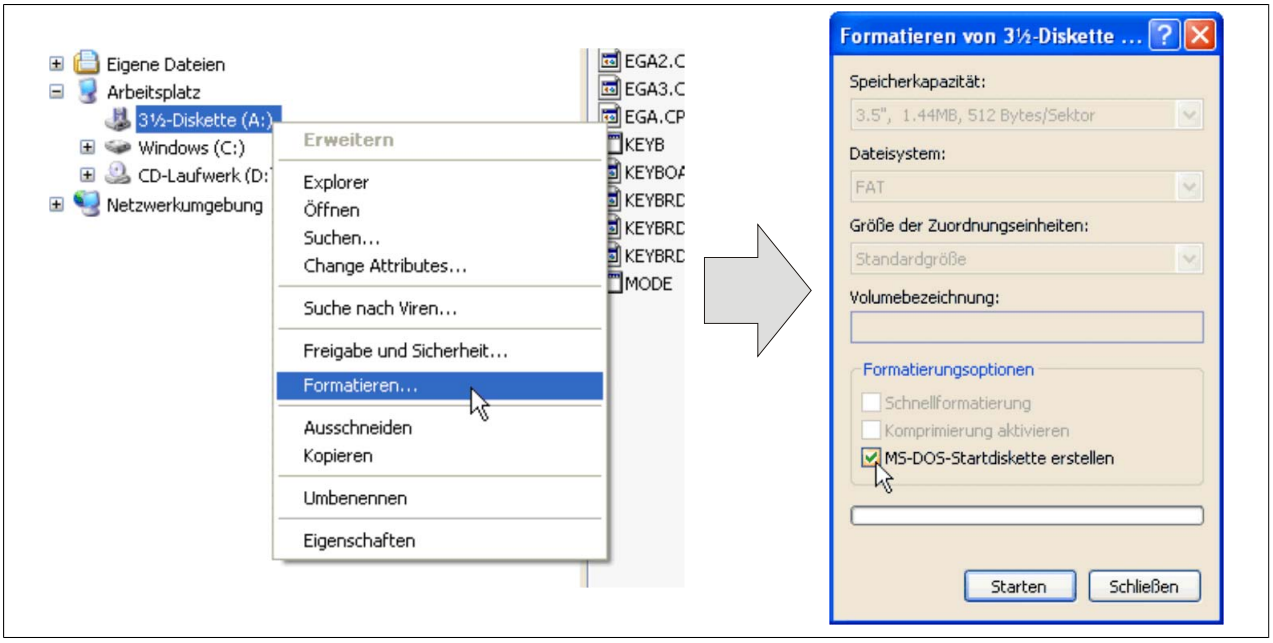


Figure 97: Creating a bootable diskette in Windows XP - Step 1

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

Figure 98: Creating a bootable diskette in Windows XP - Step 2

Figure 99: Creating a bootable diskette in Windows XP - Step 3

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

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

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

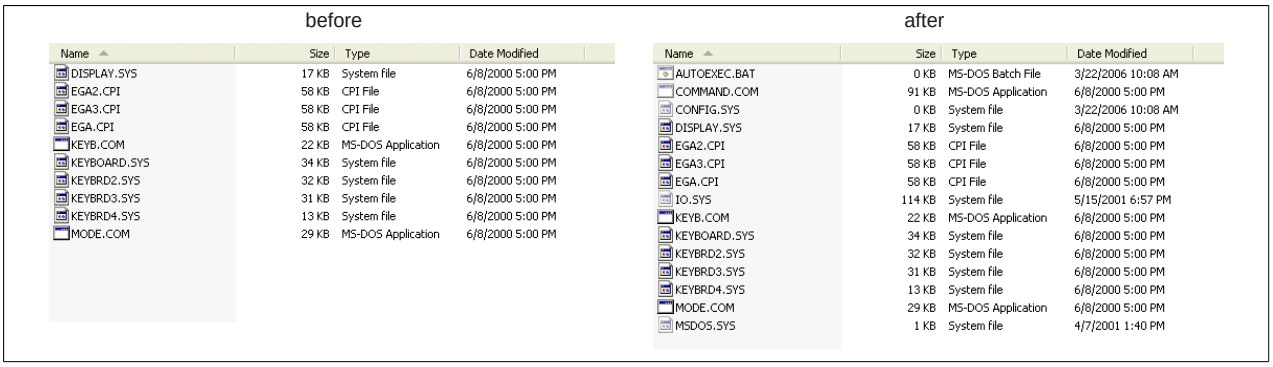


Figure 100: Creating a bootable diskette in Windows XP - Step 4

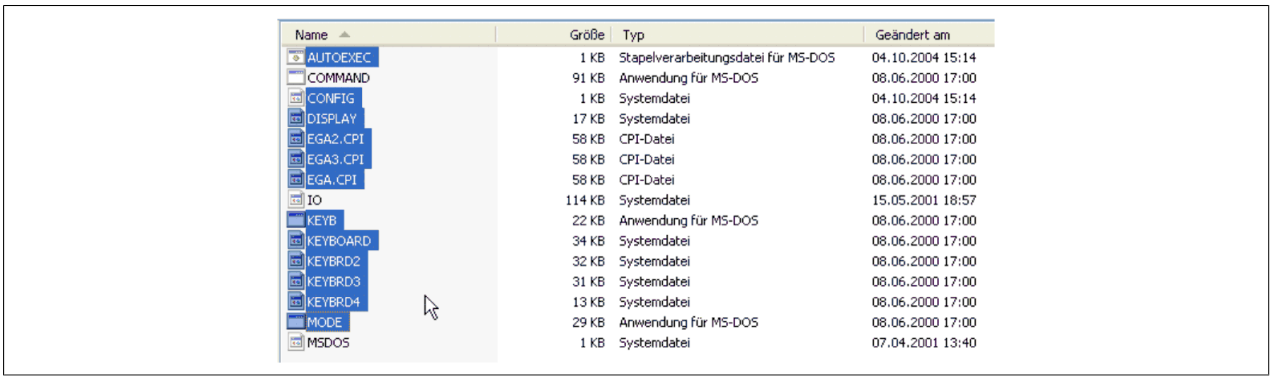


Figure 101: Creating a bootable diskette in Windows XP - Step 5

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

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

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

2.4.1 Requirements

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

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

2.4.2 Procedure

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

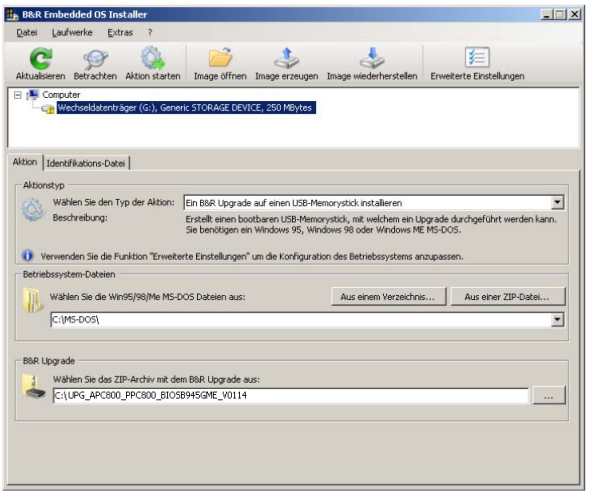


Figure 102: Creating a USB flash drive for B&R upgrade files

2.4.3 Where do I get MS-DOS?

Information on creating an MS-DOS boot diskette can be found in section see "Creating an MS-DOS boot diskette in Windows XP" on page 173. The files from the diskette are then copied to the hard drive.

2.5 Creating a bootable mass storage device for B&R upgrade files

When used in connection with a B&R Industrial PC, it is possible to upgrade (e.g. upgrade BIOS) from a mass storage device (e.g. CFast card) available from B&R. To do this, the mass storage device must be prepared accordingly. This is done with the B&R Embedded OS Installer, which can be downloaded at no cost from the B&R website (www.br-automation.com).

2.5.1 Requirements

The following is required to create a bootable mass storage device:

- B&R mass storage device (e.g. CFast card)
- PC with CFast slot
- B&R Embedded OS Installer (V3.00 or higher)

2.5.2 Procedure

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

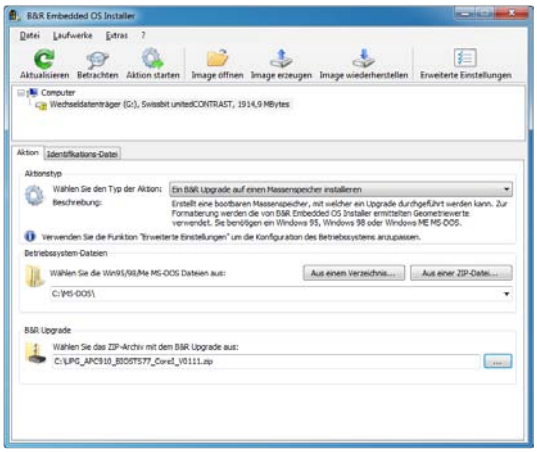


Figure 103: Creating a mass storage device for B&R upgrade files

2.5.3 Where do I get MS-DOS?

Information on creating an MS-DOS boot diskette can be found in section "Creating an MS-DOS boot diskette in Windows XP" on page 173. The files from the diskette are then copied to the hard drive.

3 Windows 7

3.1 General information

Windows® 7 offers a wealth of innovative features and performance improvements. The 64-bit variants can also exploit the full power of current PC architectures. Faster switching to power saving mode, quicker restores, less memory usage and high-speed detection of USB devices are just a few of the advantages provided by Windows® 7. Both English and German are available in Windows® 7 Professional, while Windows® 7 Ultimate supports up to 35 different languages (up to 36 languages in Service Pack 1). Product activation is not necessary on B&R PCs, which is a huge advantage for simple logistical procedures relating to machine automation.

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

3.2 Order data

Model number	Short description	Figure
	Windows 7 Professional/Ultimate	
5SWWI7.1100-GER	Microsoft OEM Windows 7 Professional 32-bit, Service Pack 1, DVD, German. Only available with a new device.	
5SWWI7.1100-ENG	Microsoft OEM Windows 7 Professional 32-bit, Service Pack 1, DVD, English. Only available with a new device.	
5SWWI7.1200-GER	Microsoft OEM Windows 7 Professional 64-bit, Service Pack 1, DVD, German. Only available with a new device.	
5SWWI7.1200-ENG	Microsoft OEM Windows 7 Professional 64-bit, Service Pack 1, DVD, English. Only available with a new device.	
5SWWI7.1300-MUL	Microsoft OEM Windows 7 Ultimate 32-bit, Service Pack 1, DVD, multilanguage. Only available with a new device.	
5SWWI7.1400-MUL	Microsoft OEM Windows 7 Ultimate 64-bit, Service Pack 1, DVD, multilanguage. Only available with a new device.	

Table 179: 5SWWI7.1100-GER, 5SWWI7.1100-ENG, 5SWWI7.1200-GER, 5SWWI7.1200-ENG, 5SWWI7.1300-MUL, 5SWWI7.1400-MUL - Order data

3.3 Overview

Model number	Edition	Target system	Chipset	Service Pack	Architecture	Language	Preinstalled	Minimum size of the disk	Minimum amount of RAM
5SWWI7.1100-GER	Professional	APC510 APC511 APC810 APC910 PPC800 PP500	945GME GM45 QM77/HM76 NM10 US15W	SP1	32-bit	German	Optional	16 GB	1 GB
5SWWI7.1100-ENG	Professional	APC510 APC511 APC810 APC910 PPC800 PP500	945GME GM45 QM77/HM76 NM10 US15W	SP1	32-bit	English	Optional	16 GB	1 GB
5SWWI7.1200-GER	Professional	APC810 APC910 PPC800	945GME Intel® Core™2 Duo GM45 QM77/HM76	SP1	64-bit	German	Optional	20 GB	2 GB
5SWWI7.1200-ENG	Professional	APC810 APC910 PPC800	945GME Intel® Core™2 Duo GM45 QM77/HM76	SP1	64-bit	English	Optional	20 GB	2 GB
5SWWI7.1300-MUL	Ultimate	APC510 APC511 APC810 APC910 PPC800 PP500	945GME GM45 QM77/HM76 NM10 US15W	SP1	32-bit	Multilingual	Optional	16 GB [1)]	1 GB
5SWWI7.1400-MUL	Ultimate	APC810 APC910 PPC800	945GME Intel® Core™2 Duo GM45 QM77/HM76	SP1	64-bit	Multilingual	Optional	20 GB [1)]	2 GB

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

3.4 Installation

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

3.5 Drivers

The latest drivers for all approved operating systems are available in the Downloads section (Service / Material-related downloads - BIOS / Drivers / Updates) of the B&R website at www.br-automation.com.

Information:

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

3.6 Special considerations and limitations

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

4 Windows Embedded Standard 7

4.1 General information

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

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

4.2 Order data

Model number	Short description	Figure
	Windows Embedded Standard 7	
5SWWI7.1540-ENG	Microsoft OEM Windows Embedded Standard 7 32-bit, Service Pack 1, English; for APC910 with QM77/HM76 chipset; please order CFast separately (minimum 16 GB).	
5SWWI7.1640-ENG	Microsoft OEM Windows Embedded Standard 7 64-bit, Service Pack 1, English; for APC910 with QM77/HM76 chipset; please order CFast separately (minimum 16 GB).	
5SWWI7.1740-MUL	Microsoft OEM Windows Embedded Standard 7 Premium 32-bit, Service Pack 1, multilanguage; for APC910 with QM77/HM76 chipset; please order CFast separately (minimum 16 GB without language packages).	
5SWWI7.1840-MUL	Microsoft OEM Windows Embedded Standard 7 Premium 64-bit, Service Pack 1, multilanguage; for APC910 with QM77/HM76 chipset; please order CFast separately (minimum 16 GB).	
	Required accessories	
	CFast cards	
5CFAST.016G-00	CFast 16 GB	
5CFAST.032G-00	CFast 32 GB	
	Optional accessories	
	Windows Embedded Standard 7	
5SWWI7.1900-MUL	Microsoft OEM Windows Embedded Standard 7 32-bit, Service Pack 1, Language Pack DVD	
5SWWI7.2000-MUL	Microsoft OEM Windows Embedded Standard 7 64-bit, Service Pack 1, Language Pack DVD	

Table 180: 5SWWI7.1540-ENG, 5SWWI7.1640-ENG, 5SWWI7.1740-MUL, 5SWWI7.1840-MUL - Order data

4.3 Overview

Model number	Edition	Target system	Chipset	Service Pack	Architecture	Language	Preinstalled	Minimum size of the disk	Minimum amount of RAM
5SWWI7.1540-ENG	Embedded	APC910	QM77 HM76	SP1	32-bit	English	Optional	16 GB	1 GB
5SWWI7.1640-ENG	Embedded	APC910	QM77 HM76	SP1	64-bit	English	Optional	16 GB	2 GB
5SWWI7.1740-MUL	Premium	APC910	QM77 HM76	SP1	32-bit	Multilingual	Optional	16 GB [1)]	1 GB
5SWWI7.1840-MUL	Premium	APC910	QM77 HM76	SP1	64-bit	Multilingual	Optional	16 GB [1)]	2 GB

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

7) 64-bit versions are not supported by all systems

4.4 Features with WES7 (Windows Embedded Standard 7)

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

Function	Windows Embedded Standard 7	Windows Embedded Standard 7 Premium
Enhanced Write Filter (EWF)	✓	✓
File-Based Write Filter (FBWF)	✓	✓
Administrator accounts	✓	✓
User accounts	Configurable	Configurable
Windows Explorer shell	✓	✓
Registry filter	✓	✓
Internet Explorer 8.0	✓	✓
Internet Information Service (IIS) 7.0	✓	✓
Anti-malware (Windows Defender)	-	✓
Add-ons (Snipping Tool, Sticky Notes)	-	✓
Windows Firewall	✓	✓
.NET Framework 3.5	✓	✓
32-bit and 64-bit	✓	✓
Remote Desktop Protocol 7.0	✓	✓
File Compression Utility	✓	✓
Windows Installer Service	✓	✓
Windows XP Mode	-	-
Media Player 12	✓	✓
DirectX	✓	✓
Multilingual user interface packs in the same image	-	✓
International components and language services	✓	✓
Language pack setup	✓	✓
Windows Update	Configurable	Configurable
Windows PowerShell 2.0	✓	✓
BitLocker	-	✓
AppLocker	-	✓
Tablet PC support	-	✓
Windows Touch	-	✓
Boot from USB flash drive	✓	✓
Accessories	✓	✓
Page file	Configurable	Configurable
Number of fonts	134	134

Table 181: Device functions in Windows Embedded Standard 7

4.5 Installation

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

4.6 Drivers

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

4.6.1 Touch screen driver

A touch screen driver will be installed automatically if a touch controller is detected during the Windows Embedded Standard 7 installation. If a touch controller is not detected during Windows Embedded Standard 7 installation, or if an Automation Panel 800/900 is connected later on, then the touch screen driver needs to be installed manually or the additional touch screen interface must be selected in the touch screen settings in the Windows Control Panel. The driver can be downloaded from the Downloads section of the B&R website (www.br-automation.com). It is important that both the Enhanced Write Filter (EWF) and the File Based Write Filter (FBWF) are disabled for this.

Information:

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

5 Windows XP Professional

5.1 Order data

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

Table 182: 5SWWXP.0600-ENG, 5SWWXP.0600-GER, 5SWWXP.0600-MUL - Order data

5.2 Overview

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

5.3 Installation

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

5.3.1 Installation on a PCI SATA RAID controller - 5ACPCI.RAIC-03, 5ACPCI.RAIC-05, 5ACPCI.RAIC-06

The following steps are necessary to install Windows XP Professional on a PCI SATA RAID controller:

1. Download the RAID driver from the B&R website www.br-automation.com and copy the files to a diskette.
2. Connect the media drive (5MD900.USB2-01) to the USB port.
3. Insert the diskette and Windows XP Professional CD in the media drive and boot from the CD.
4. Press the F6 key during installation to install a third-party SCSI or driver.
5. Press the "s" key when asked about installing an additional drive. Insert the diskette into the floppy drive. Press "Enter" and select the driver.
6. Follow the installation instructions.
7. The installer will copy the files to the Windows XP Professional folder and restart the Panel PC 800.

> **Information:**
>
> - **Not all USB FDD drives are supported by the Windows XP installer (see Microsoft KB 916196).**
> - **Depending on the system, the boot order may have to be changed in BIOS.**

5.4 Drivers

The latest drivers for all approved operating systems are available in the Downloads section (Service / Material-related downloads - BIOS / Drivers / Updates) of the B&R website at www.br-automation.com.

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

6 Windows Embedded Standard 2009

6.1 General information

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

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

6.2 Order data

Model number	Short description	Figure
	Windows Embedded Standard 2009	
5SWWXP.0740-ENG	Microsoft OEM Windows Embedded Standard 2009, English; for APC910 with QM77/HM76 chipset; please order CFast separately (minimum 2 GB).	
	Required accessories	
	CFast cards	
5CFAST.016G-00	CFast 16 GB	
5CFAST.032G-00	CFast 32 GB	
5CFAST.2048-00	CFast 2 GB	
5CFAST.4096-00	CFast 4 GB	
5CFAST.8192-00	CFast 8 GB	

Table 183: 5SWWXP.0740-ENG - Order data

6.3 Overview

Model number	Target system	Chipset	Language	Preinstalled	Minimum size of the disk	Minimum amount of RAM
5SWWXP.0740-ENG	APC910	QM77 HM76	English	Yes	2 GB	256 MB

6.4 Features with WES2009 (Windows Embedded Standard 2009)

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

Function	Available
Enhanced Write Filter (EWF)	✓
File-Based Write Filter (FBWF)	✓
Page file	Configurable
Administrator accounts	✓
User accounts	Configurable
Explorer shell	✓
Registry filter	✓
Internet Explorer 8.0	✓
Internet information service (IIS)	-
Terminal service	✓
Windows Firewall	✓
MSN Explorer	-
Outlook Express	-
Administrative Tools	✓
Remote Desktop	✓
Remote Assistance	-
.NET Framework	-
ASP.NET	-

Table 184: Device functions in Windows Embedded Standard 2009

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

Table 184: Device functions in Windows Embedded Standard 2009

6.5 Installation

Upon request, B&R can preinstall Windows Embedded Standard 2009 on a suitable CFast card (at least 2 GB necessary). The system is then automatically configured when it is switched on for the first time. This procedure takes approximately 10 minutes, with the device being rebooted a number of times.

6.6 Drivers

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

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

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

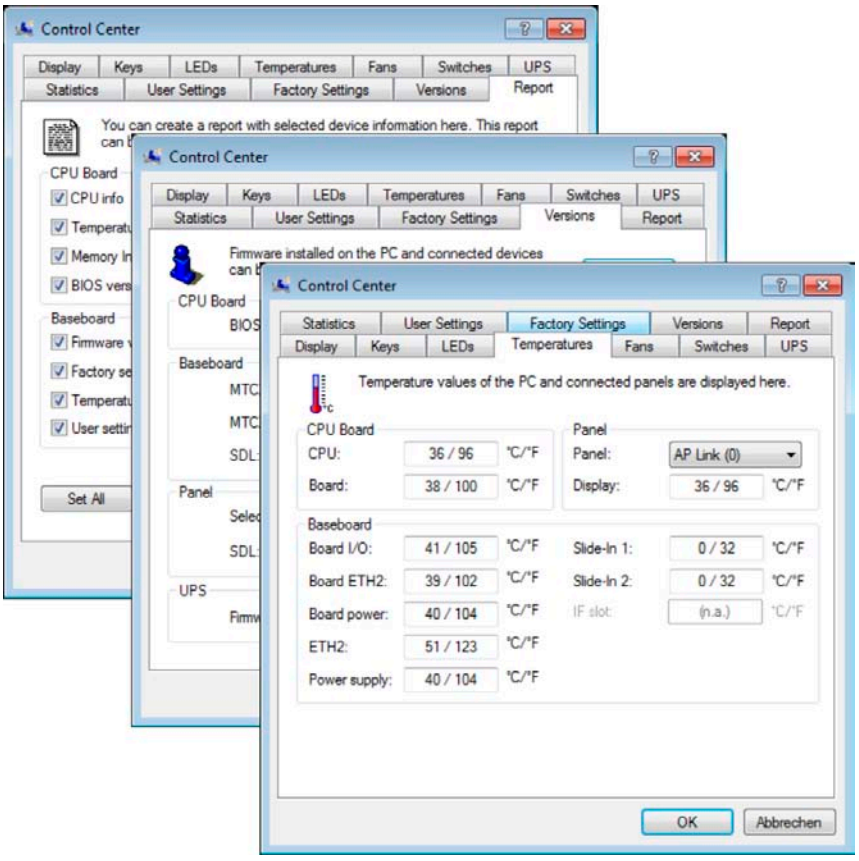


Figure 104: ADI Control Center screenshots - Examples

Information:

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

7.1 Functions

Information:

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

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

Supports the following systems:

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

7.2 Installation

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

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

Information:

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

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

8 B&R Automation Device Interface (ADI) Development Kit

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

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

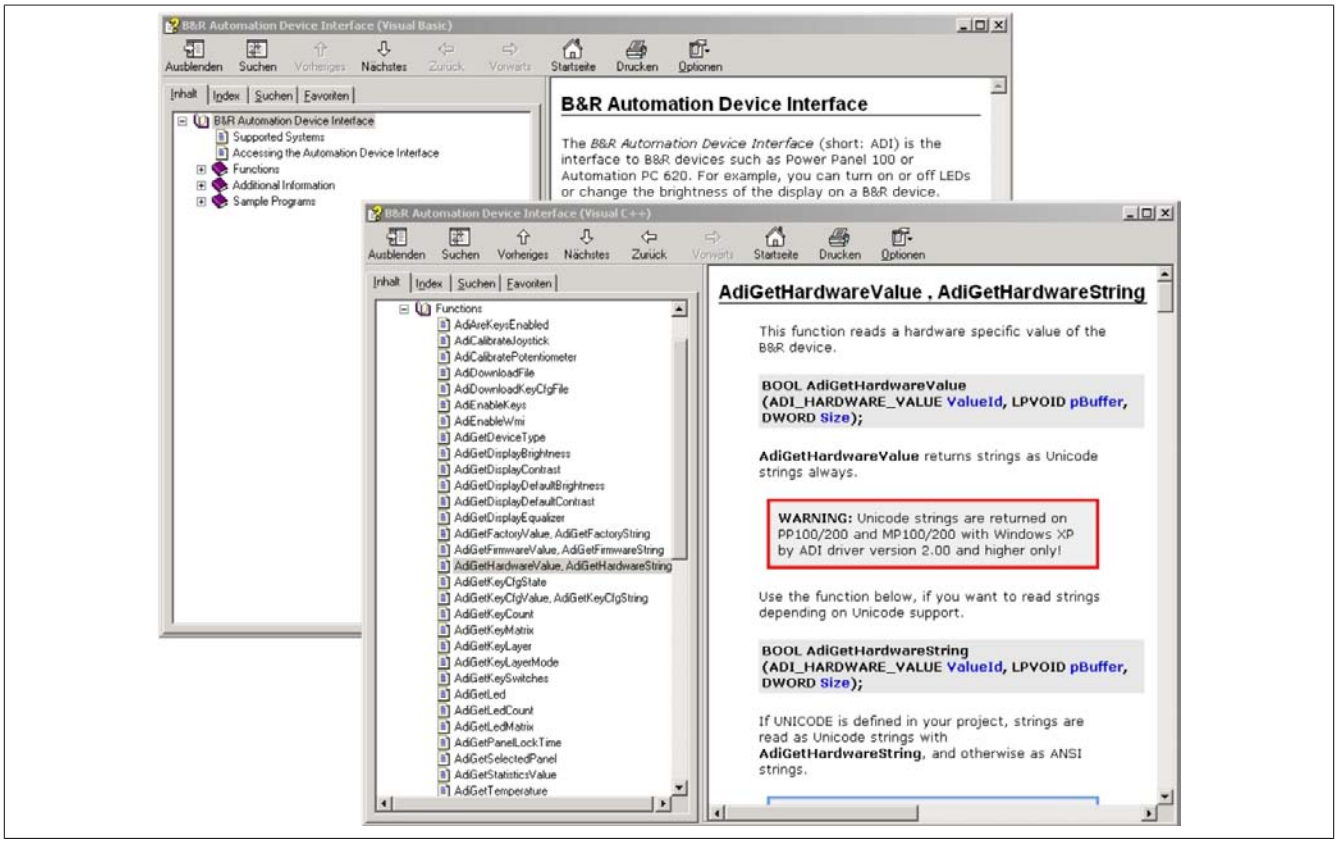


Figure 105: ADI Development Kit screenshots (version 3.40)

Features:

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

Supports the following systems (version 3.40 and higher):

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

- Mobile Panel 100/200

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

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

The B&R Automation Device Interface (ADI) development kit can be downloaded at no cost from the Downloads section of the B&R website (www.br-automation.com).

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

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

Supported programming languages:

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

System requirements

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

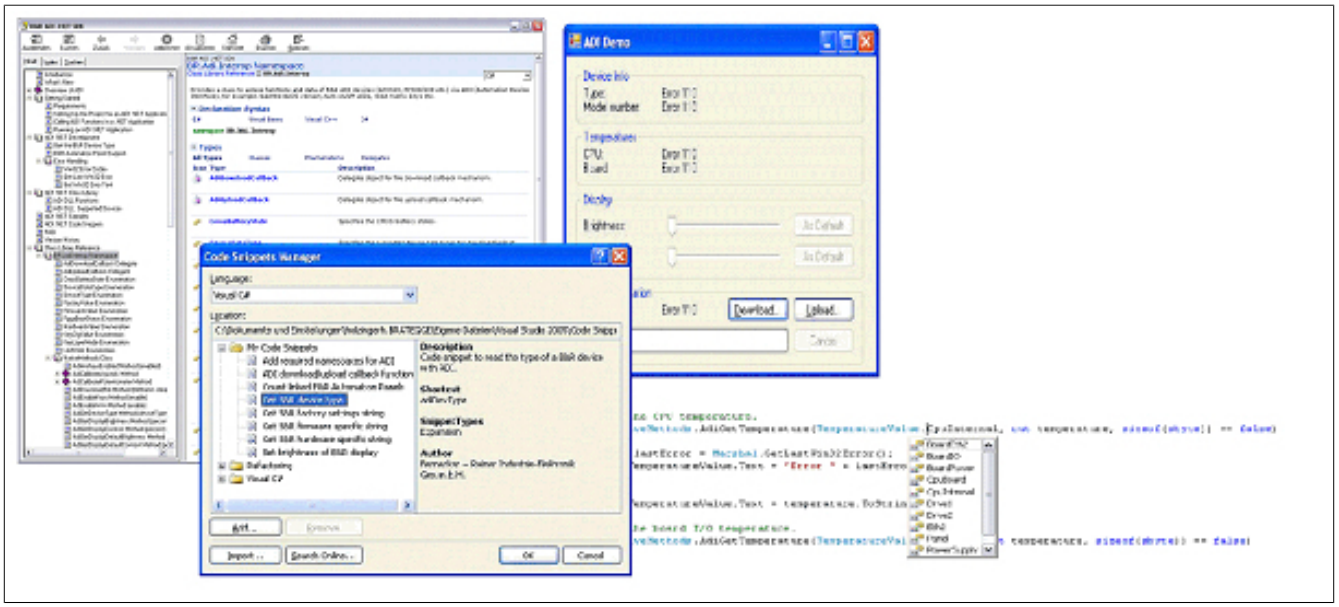


Figure 106: ADI .NET SDK screenshots (version 1.80)

Features (version 1.80 and higher)

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

Supports the following systems (version 1.80 and higher):

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

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

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

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

Chapter 5 • Accessories

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

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

1 Power connectors

1.1 0TB103.9x

1.1.1 General information

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

1.1.2 Order data

Model number	Short description	Figure
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm², protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm², protected against vibration by the screw flange	

Table 185: 0TB103.9, 0TB103.91 - Order data

1.1.3 Technical data

Information:

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

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

Table 186: 0TB103.9, 0TB103.91 - Technical data

1) The limit data for each I/O module must be taken into consideration.
2) The terminal block in the cage clamp design cannot be stringed together.

2 Replacement CMOS batteries

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

2.1.1 General information

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

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

2.1.2 Order data

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

Table 187: 0AC201.91, 4A0006.00-000 - Order data

2.1.3 Technical data

Warning!

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

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

Information:

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

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

Table 188: 0AC201.91, 4A0006.00-000 - Technical data

3 CFast cards

3.1 5CFAST.xxxx-00

3.1.1 General information

CFast cards are based on SLC (single-level cell) technology and are SATA 2.6 compatible. Their dimensions are identical to CompactFlash cards.

3.1.2 Order data

Model number	Short description	Figure
	CFast cards	
5CFAST.2048-00	CFast 2 GB	
5CFAST.4096-00	CFast 4 GB	
5CFAST.8192-00	CFast 8 GB	
5CFAST.016G-00	CFast 16 GB	
5CFAST.032G-00	CFast 32 GB	

Table 189: 5CFAST.2048-00, 5CFAST.4096-00, 5CFAST.8192-00, 5CFAST.016G-00, 5CFAST.032G-00 - Order data

3.1.3 Technical data

Information:

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

Product ID	5CFAST.2048-00	5CFAST.4096-00	5CFAST.8192-00	5CFAST.016G-00	5CFAST.032G-00
General information					
Capacity	2 GB	4 GB	8 GB	16 GB	32 GB
Data retention	10 years				
Data reliability	< 1 unrecoverable error in 10^{14} bit read accesses				
Lifetime monitoring	Yes				
MTBF	> 2,500,000 hours (at 25°C)				
Maintenance	None				
Supported operating modes	SATA 2.6, max. PIO Mode 4, Multiword DMA Mode 2, Ultra DMA Mode 6				
Continuous reading					
Typical					
With 128 kB block size	56 MB/s	107 MB/s	116 MB/s	116 MB/s	116 MB/s
With 4 kB block size	23 MB/s	26 MB/s	29 MB/s	29 MB/s	29 MB/s
Maximum					
With 128 kB block size	60 MB/s	110 MB/s	120 MB/s	120 MB/s	120 MB/s
With 4 kB block size	25 MB/s	30 MB/s	35 MB/s	35 MB/s	35 MB/s
Continuous writing					
Typical					
With 128 kB block size	24 MB/s	49 MB/s	93 MB/s	93 MB/s	93 MB/s
With 4 kB block size	17 MB/s	19 MB/s	21 MB/s	21 MB/s	21 MB/s
Maximum					
With 128 kB block size	30 MB/s	55 MB/s	100 MB/s	100 MB/s	100 MB/s
With 4 kB block size	20 MB/s	25 MB/s	25 MB/s	25 MB/s	25 MB/s
Certification					
CE	Yes				
Endurance					
SLC Flash	Yes				
Wear leveling	Static				
S.M.A.R.T. support	Yes				
Support					
Hardware	APC910				

Table 190: 5CFAST.2048-00, 5CFAST.4096-00, 5CFAST.8192-00, 5CFAST.016G-00, 5CFAST.032G-00 - Technical data

Product ID	5CFAST.2048-00	5CFAST.4096-00	5CFAST.8192-00	5CFAST.016G-00	5CFAST.032G-00
Operating systems					
Windows 7 32-bit	No	No	No	Yes	Yes
Windows 7 64-bit	No	No	No	No	Yes
Windows Embedded Standard 7, 32-bit	No	No	No	Yes	Yes
Windows Embedded Standard 7, 64-bit	No	No	No	Yes	Yes
Windows XP Professional	No	Yes	Yes	Yes	Yes
Windows Embedded Standard 2009			Yes		
Software					
PVI Transfer	≥ V4.0.0.8 (part of PVI Development Setup ≥ V3.0.2.3014)				
B&R Embedded OS Installer	≥ V3.10	≥ V3.10	≥ V3.10	≥ V3.20	≥ V3.21
Environmental conditions					
Temperature					
Operation	0 to 70°C				
Storage	-50 to 100°C				
Transport	-50 to 100°C				
Relative humidity					
Operation	Max. 85% at 70°C				
Storage	Max. 85% at 70°C				
Transport	Max. 85% at 70°C				
Vibration					
Operation	20 g peak, 10 to 2000 Hz				
Storage	20 g peak, 10 to 2000 Hz				
Transport	20 g peak, 10 to 2000 Hz				
Shock					
Operation	1.5 kg peak, 0.5 ms				
Storage	1.5 kg peak, 0.5 ms				
Transport	1.5 kg peak, 0.5 ms				
Altitude					
Operation	TBD				
Mechanical characteristics					
Dimensions					
Width	42.8 ±0.10 mm				
Length	36.4 ±0.10mm				
Depth	3.6 ±0.10mm				
Weight	10 g				

Table 190: 5CFAST.2048-00, 5CFAST.4096-00, 5CFAST.8192-00, 5CFAST.016G-00, 5CFAST.032G-00 - Technical data

3.1.4 Dimensions

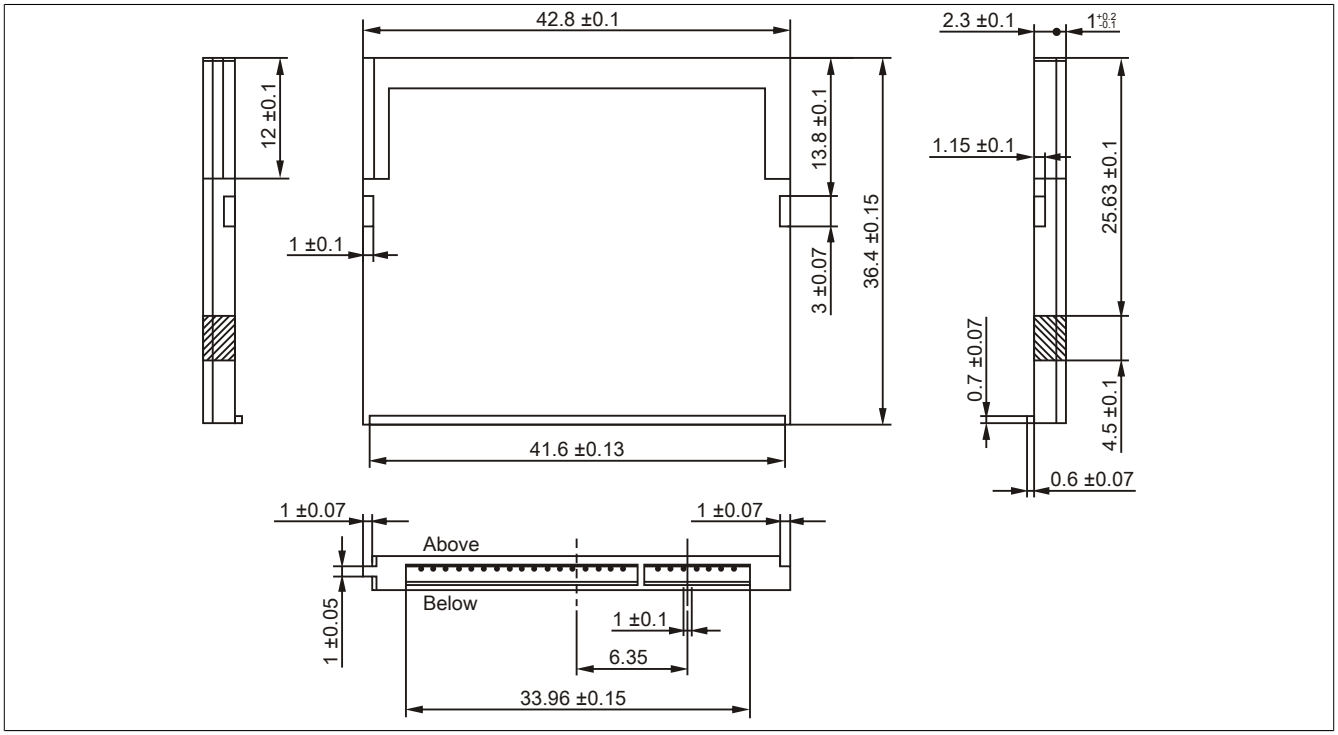


Figure 107: CFast card - Dimensions

3.1.5 Temperature humidity diagram

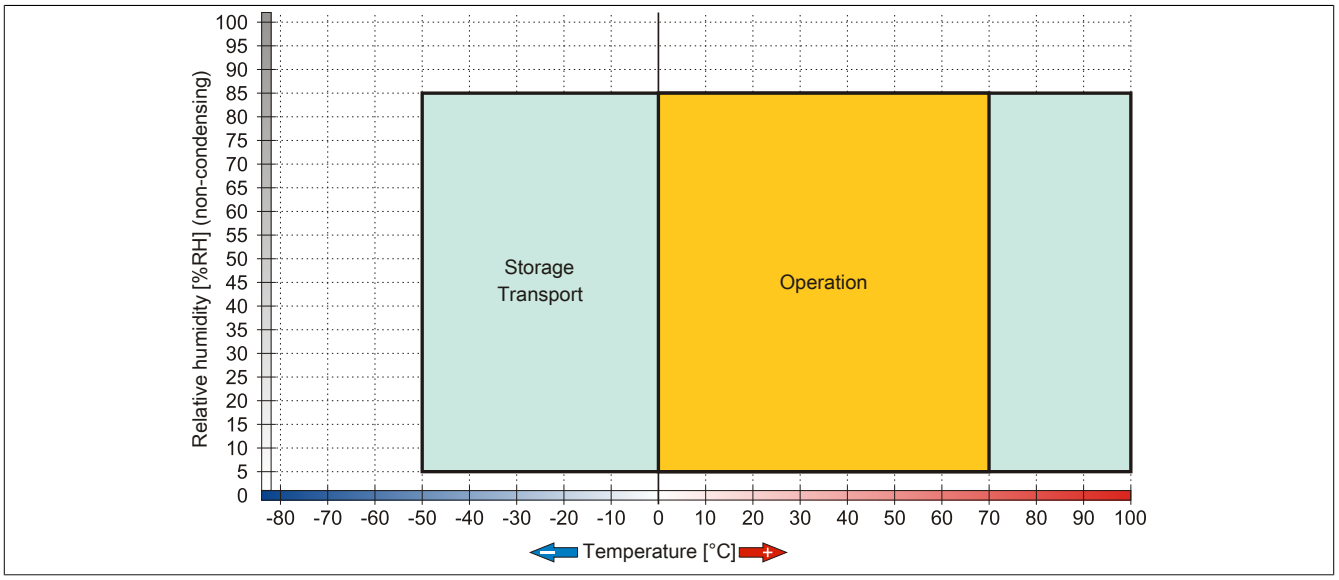


Figure 108: 5CFAST.xxxx-00 - Temperature humidity diagram

4 USB flash drives

4.1 5MMUSB.2048-01

4.1.1 General information

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

Information:

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

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

- USB 1.1, USB 2.0
- High transfer rate
- High data storage
- Ambient temperature during operation: 0 to 70°C

4.1.2 Order data

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

Table 191: 5MMUSB.2048-01 - Order data

4.1.3 Technical data

Product ID	5MMUSB.2048-01
General information	
Data retention	>10 years
LEDs	1 LED (green) [1)]
MTBF	>3,000,000 hours
Type	USB 1.1, USB 2.0
Maintenance	None
Certification	
CE	Yes
Interfaces	
USB	
Type	USB 1.1, USB 2.0
Connection	To each USB type A interface
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Sequential reading	Max. 31 MB/s
Sequential writing	Max. 30 MB/s
Support	
Operating systems	
Windows 7	Yes
Windows XP Professional	Yes
Windows XP Embedded	Yes
Windows ME	Yes
Windows 2000	Yes
Windows CE 5.0	Yes
Windows CE 4.2	Yes
Electrical characteristics	
Power consumption	Max. 500 µA sleep mode, max. 120 mA read/write

Table 192: 5MMUSB.2048-01 - Technical data

Product ID	5MMUSB.2048-01
Environmental conditions	
Temperature	
Operation	0 to 70°C
Storage	-50 to 100°C
Transport	-50 to 100°C
Relative humidity	
Operation	85%, non-condensing
Storage	85%, non-condensing
Transport	85%, non-condensing
Vibration	
Operation	20 to 2000 Hz: 20 g (peak)
Storage	20 to 2000 Hz: 20 g (peak)
Transport	20 to 2000 Hz: 20 g (peak)
Shock	
Operation	max. 1500g (peak)
Storage	max. 1500g (peak)
Transport	max. 1500g (peak)
Altitude	
Operation	Max. 3048 m
Storage	Max. 12192 m
Transport	Max. 12192 m
Mechanical characteristics	
Dimensions	
Width	17.97 mm
Length	67.85 mm
Height	8.35 mm

Table 192: 5MMUSB.2048-01 - Technical data

1) Signals data transfer (send and receive).

4.1.4 Temperature humidity diagram

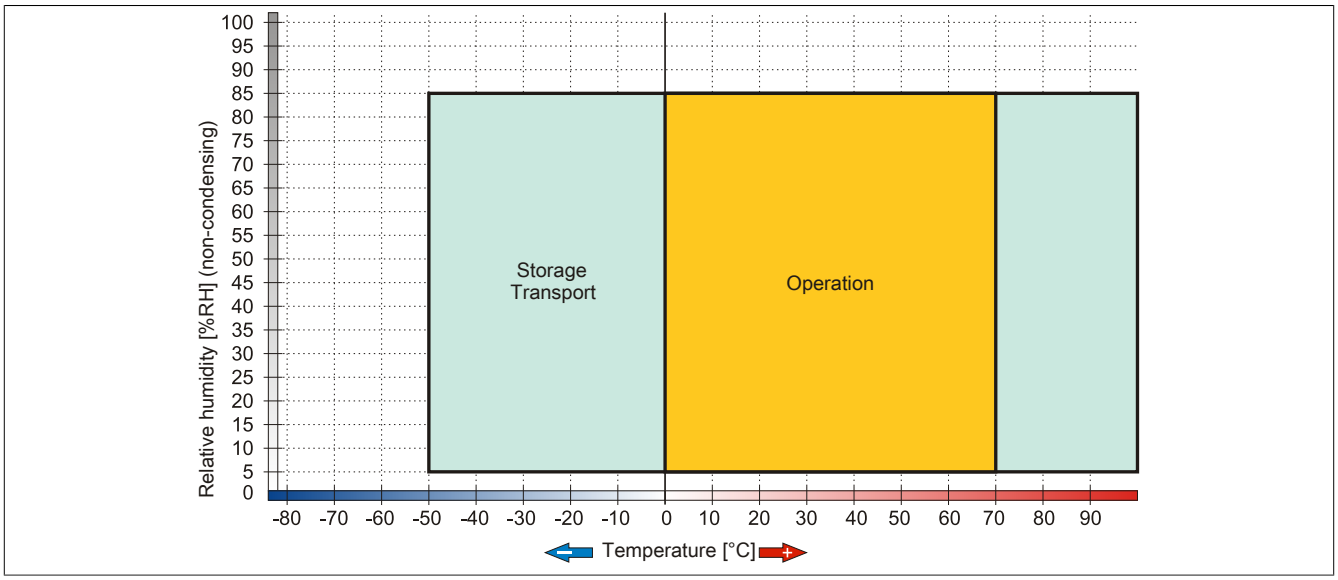


Figure 109: 5MMUSB.2048-01 - Temperature humidity diagram

5 USB media drive

5.1 5MD900.USB2-02

5.1.1 General information

The USB media drive features a DVD-R/RW DVD+R/RW drive, a CompactFlash slot and one USB port on both the front and back. It is connected to the USB port on the B&R Industrial PC.

- Desktop or rack-mounted operation (mounting rail brackets)
- Integrated DVD-R/RW DVD+R/RW drive
- Integrated IDE/ATAPI CompactFlash slot (hot pluggable)
- Integrated USB 2.0 connection
- +24 VDC supply (back)
- USB 2.0 connection (back)
- Optional front cover

5.1.2 Order data

Model number	Short description	Figure
	USB accessories	
5MD900.USB2-02	USB 2.0 Drives DVD-R/RW DVD+R/RW, CompactFlash slot (type II), USB connector (type A on front side, type B on back side); 24 VDC; (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately).	
	Required accessories	
	Other	
5SWUTI.0000-00	OEM Nero CD-RW Software, only available with a CD writer.	
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm², protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm², protected against vibration by the screw flange	
	USB cable	
5CAUSB.0018-00	USB 2.0 connecting cable type A - type B, 1.8 m.	
5CAUSB.0050-00	USB 2.0 connecting cable type A - type B, 5 m.	

Table 193: 5MD900.USB2-02 - Order data

5.1.3 Interfaces

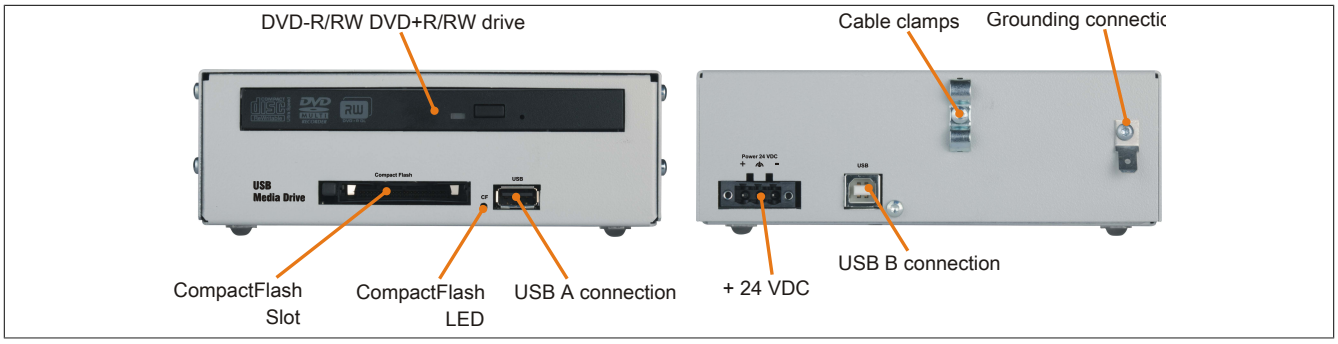


Figure 110: 5MD900.USB2-02 - Interfaces

5.1.4 Technical data

Product ID	5MD900.USB2-02
General information	
Max. cable length	5m (not including hub)
Certification	
CE	Yes
c-UL-us	Yes
Interfaces	
CompactFlash slot 1	
Type	Type I
Connection	IDE/ATAPI
Activity LED	Signals read or write access to an inserted CompactFlash card

Table 194: 5MD900.USB2-02 - Technical data

Product ID	5MD900.USB2-02
USB	
Type	USB 2.0
Design	Type A front Type B back
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Current load	Max. 500 mA
CD / DVD drive	
Data buffer capacity	2 MB
Data transfer rate	Max. 33.3 MB/s
Speed	Max. 5090 rpm ±1%
Noise level	Approx. 45 dBA in a distance of 50 cm (full read access)
Compatible formats	CD-DA, CD-ROM mode 1/mode 2 CD-ROM XA mode 2 (form 1, form 2) Photo CD (single/multi-session), Enhanced CD, CD text DVD-ROM, DVD-R, DVD-RW, DVD-Video DVD-RAM (4.7GB, 2.6GB) DVD+R, DVD+R (double layer), DVD+RW
Laser class	Class 1 laser
Lifespan	60000 POH (Power-On Hours)
Interface	IDE (ATAPI)
Startup time	
CD	Max. 14 seconds (0 rpm to read access)
DVD	Max. 15 seconds (0 rpm to read access)
Access time	
CD	Typ. 140 ms (24x)
DVD	Typ. 150 ms (8x)
Readable media	
CD	CD/CD-ROM (12 cm, 8 cm), CD-R, CD-RW
DVD	DVD-ROM, DVD-R, DVD-RW. DVD-RAM, DVD+R, DVD+R (double layer), DVD+RW
Non-write protected media	
CD	CD-R, CD-RW
DVD	DVD-R/RW, DVD-RAM (4.7 GB), DVD+R/RW, DVD+R (double layer)
Reading rate	
CD	24x
DVD	8x
Write speed	
CD-R	10 to 24x
CD-RW	10 to 24x
DVD+R	3.3 to 8x
DVD+R (Double Layer)	2.4 to 4x
DVD+RW	3.3 to 8x
DVD-R	2 to 6x
DVD-R (Double Layer)	2 to 4x
DVD-RAM	3 to 5x
DVD-RW	2 to 6x
Write-methods	
CD	Disk at once, session at once, packet write, track at once
DVD	Disk at once, incremental, over-write, sequential
Electrical characteristics	
Nominal voltage	24 VDC ±25%
Operating conditions	
Protection in accordance with EN 60529	IP65 front side (only with optional front cover), IP20 back side
Environmental conditions	
Temperature [1)]	
Operation	5 to 45°C
Storage	-20 to 60°C
Transport	-40 to 60°C
Relative humidity	
Operation	20 to 80%
Storage	5 to 90%
Transport	5 to 95%
Vibration	
Operation	5 to 500 Hz: 0.3 g (2.9 m/s² 0-peak)
Storage	10 to 100 Hz: 2 g (19.6 m/s² 0-peak)
Transport	10 to 100 Hz: 2 g (19.6 m/s² 0-peak)
Shock	
Operation	5 g, 11 ms
Storage	60 g, 11 ms
Transport	60 g, 11 ms
Altitude	
Operation	Max. 3000 m

Table 194: 5MD900.USB2-02 - Technical data

Product ID	5MD900.USB2-02
Mechanical characteristics	
Dimensions	
Width	156 mm
Height	52 mm
Depth	140 mm
Weight	Approx. 1100 g (without front cover)

Table 194: 5MD900.USB2-02 - Technical data

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

5.1.5 Dimensions

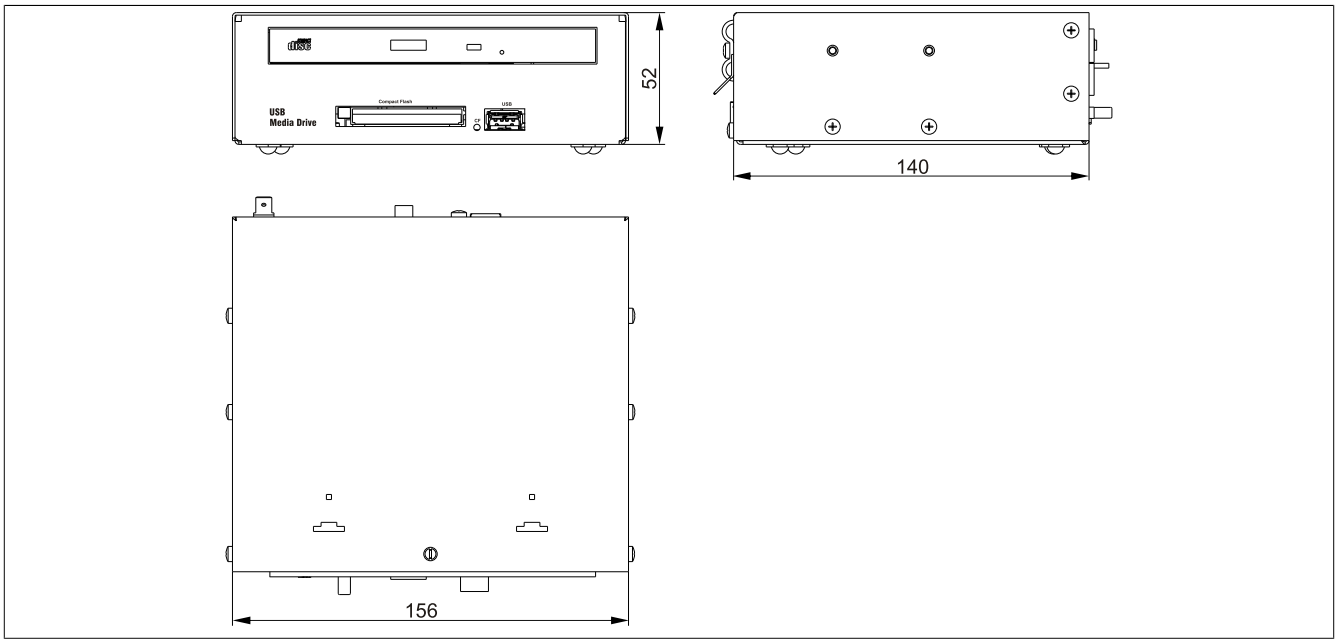


Figure 111: 5MD900.USB2-02 - Dimensions

5.1.6 Dimensions with front cover

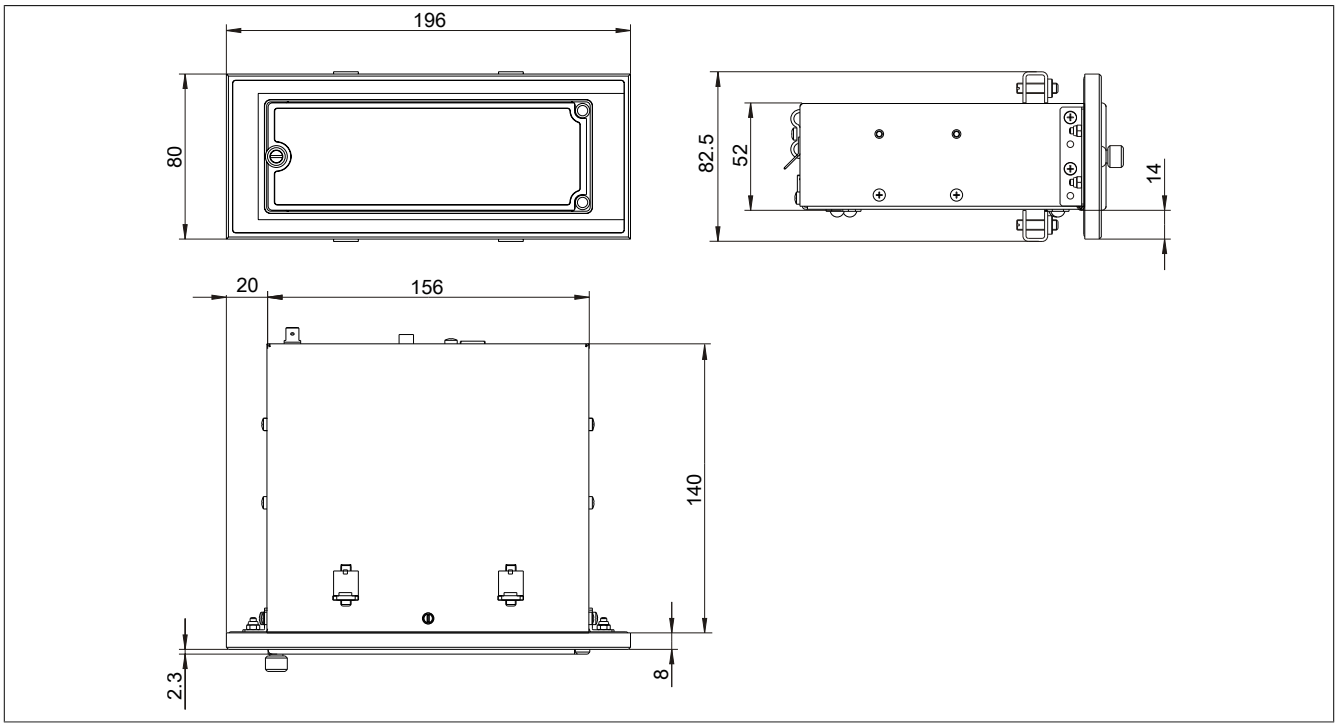


Figure 112: USB media drive with front cover - Dimensions

5.1.7 Cutout installation

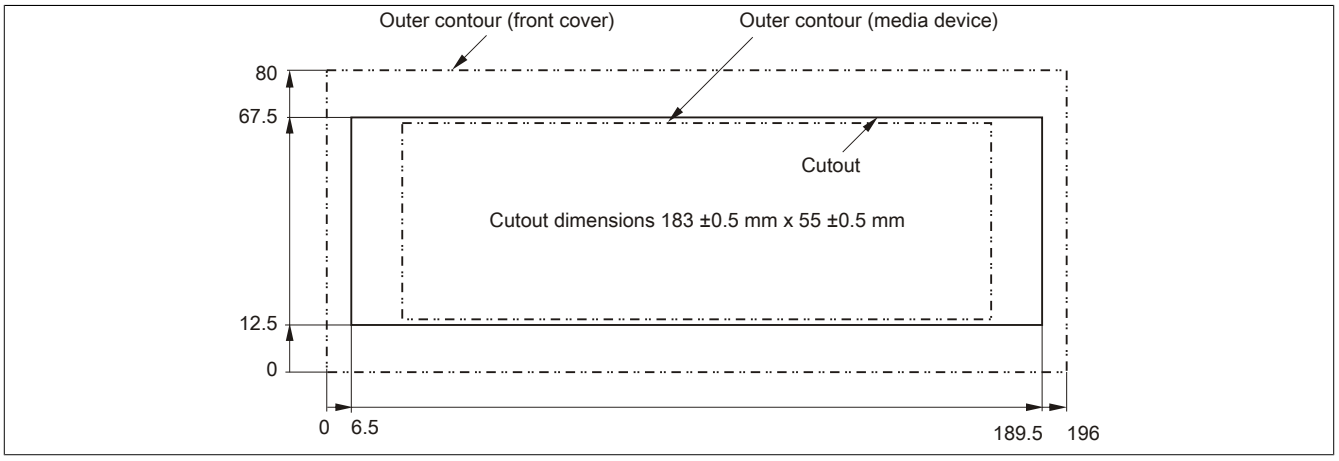


Figure 113: USB media drive with front cover - Installation cutout

5.1.8 Contents of delivery

Number	Component
1	USB media drive
2	Mounting rail brackets

Table 195: 5MD900.USB2-02 - Contents of delivery

5.1.9 Installation

The USB media drive can be operated as a desktop (rubber feet) or rack-mounted device (2 mounting rail brackets included).

Mounting orientation

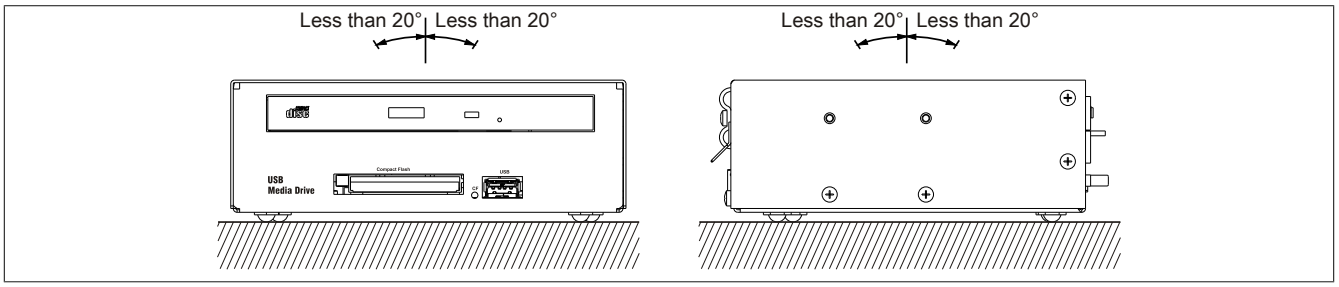


Figure 114: 5MD900.USB2-02 - Mounting orientation

5.2 5A5003.03

5.2.1 General information

This front cover can also be mounted on the front of the USB media drive (model number 5MD900.USB2-00, 5MD900.USB2-01 or 5MD900.USB2-02) to protect the interface.

5.2.2 Order data

Model number	Short description	Figure
	USB accessories	
5A5003.03	Front cover, For Remote CD-ROM Drive 5A5003.02 and USB 2.0 drive combination 5MD900.USB2-00, 5MD900.USB2-01 and 5MD900.USB2-02.	

Table 196: 5A5003.03 - Order data

5.2.3 Technical data

Product ID	5A5003.03
Mechanical characteristics	
Front	
Décor foil	
Light background	Similar to Pantone 427CV
Dimensions	
Width	196 mm
Height	80 mm
Depth	8 mm

Table 197: 5A5003.03 - Technical data

5.2.4 Dimensions

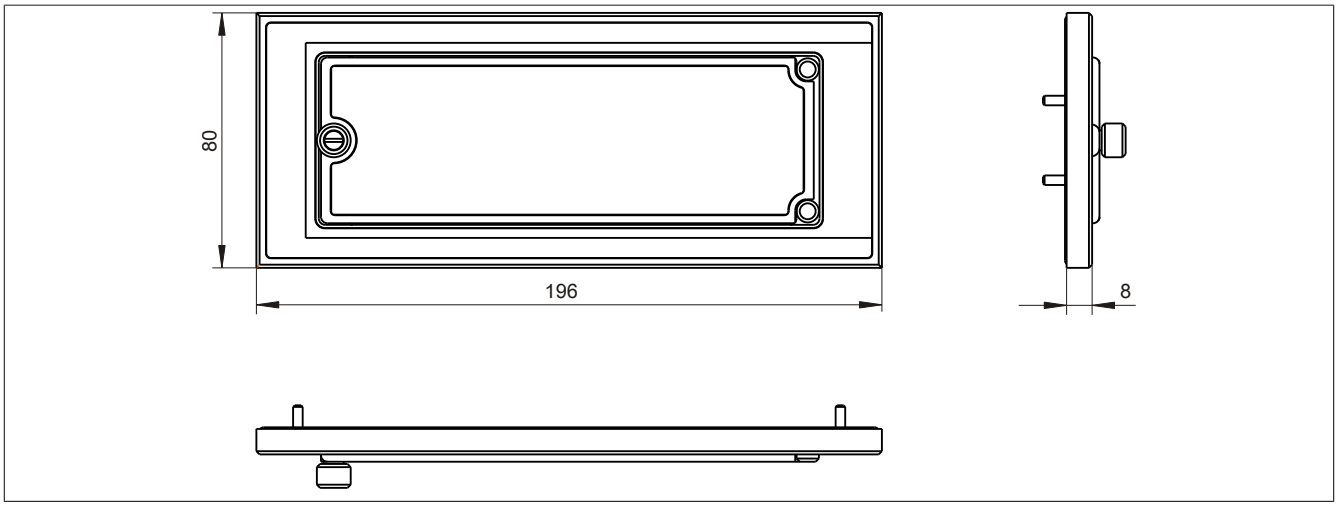


Figure 115: 5A5003.03 - Dimensions

5.2.5 Contents of delivery

Number	Component
1	Front cover 5A5003.03 for the USB media drive
4	M3 locknut
4	Cover retaining clip

Table 198: 5A5003.03 - Contents of delivery

5.2.6 Installation

The front cover is attached with 2 mounting rail brackets (included with the USB media drive) and 4 M3 locknuts. The 4 retaining clips provided can be used to mount the USB media drive and front cover as a whole, for example in a control cabinet door.

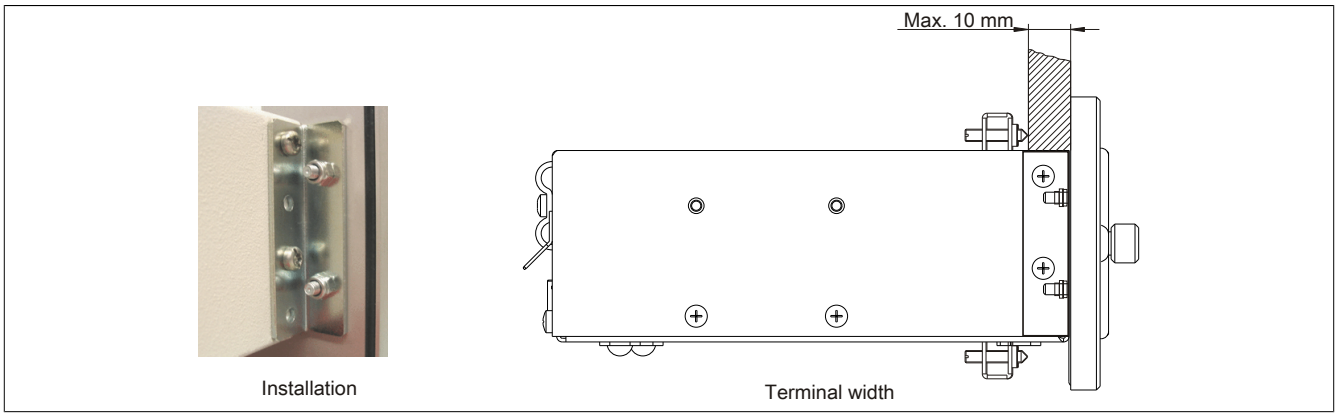


Figure 116: Front cover mounting and installation depth

Cutout installation

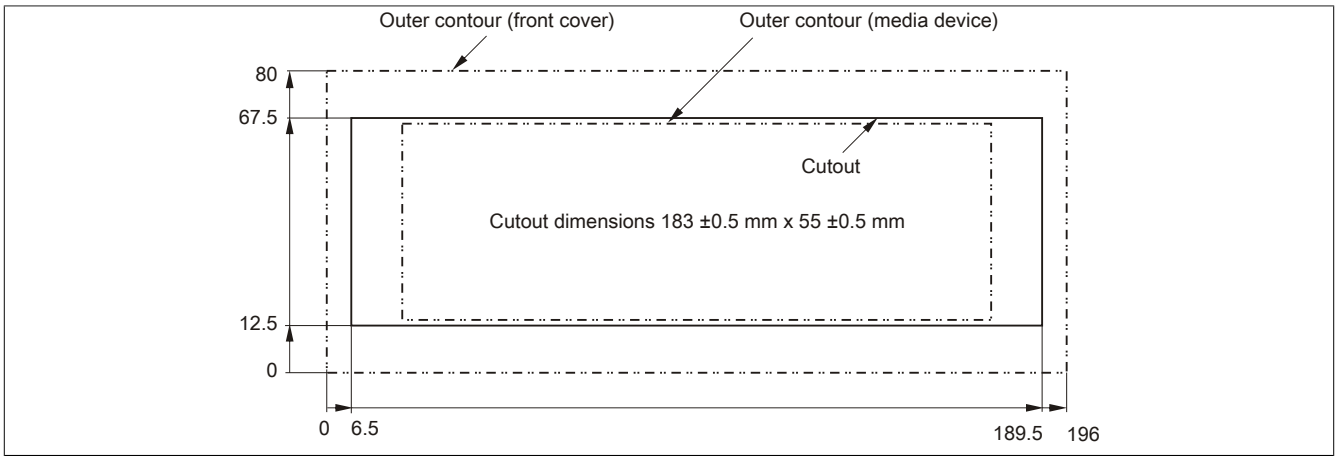


Figure 117: USB media drive with front cover - Installation cutout

6 Cables

6.1 DVI cables

6.1.1 5CADVI.0xxx-00

General information

5CADVI.0xxx-00 DVI cables are designed to be used for stationary applications.

> **Caution!**
>
> **Cables can only be plugged in and unplugged when the device is turned off.**

Order data

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

Table 199: 5CADVI.0018-00, 5CADVI.0050-00, 5CADVI.0100-00 - Order data

Technical data

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

Table 200: 5CADVI.0018-00, 5CADVI.0050-00, 5CADVI.0100-00 - Technical data

Flex radius specification

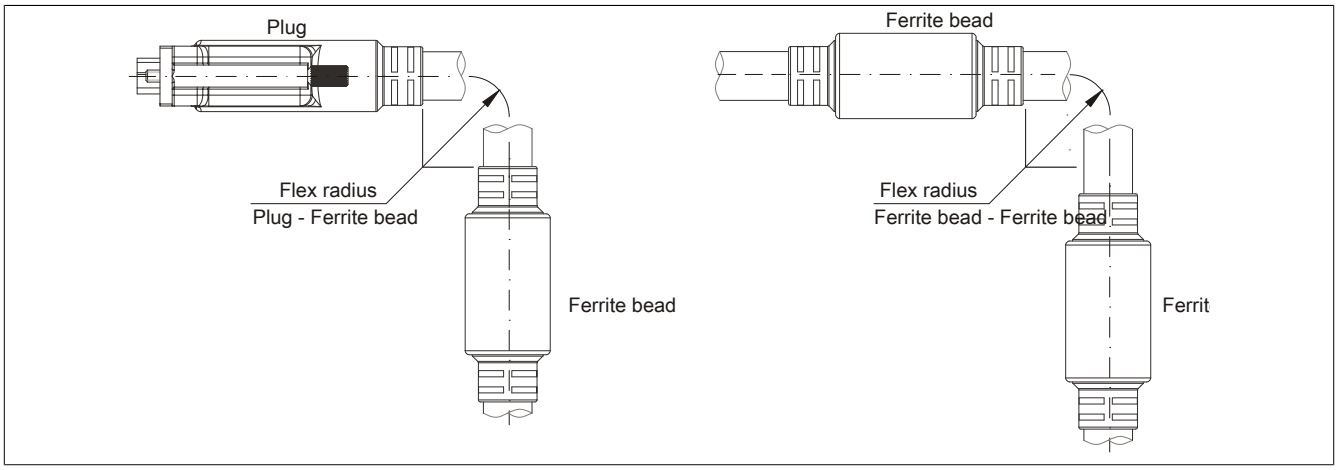


Figure 118: Flex radius specification

Dimensions

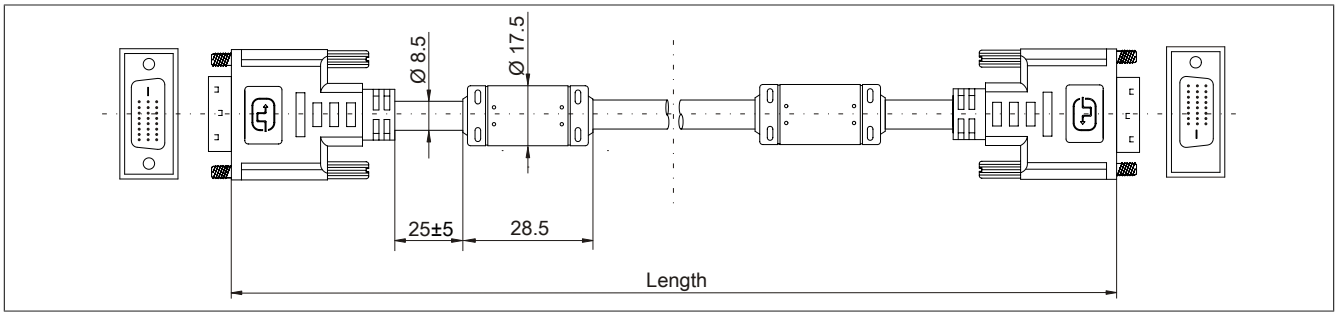


Figure 119: 5CADVI.0xxx-00 - Dimensions

Cable specifications

Warning!

If a suitable cable is to be assembled manually, it must be wired according to these specifications.

If a self-assembled cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly.

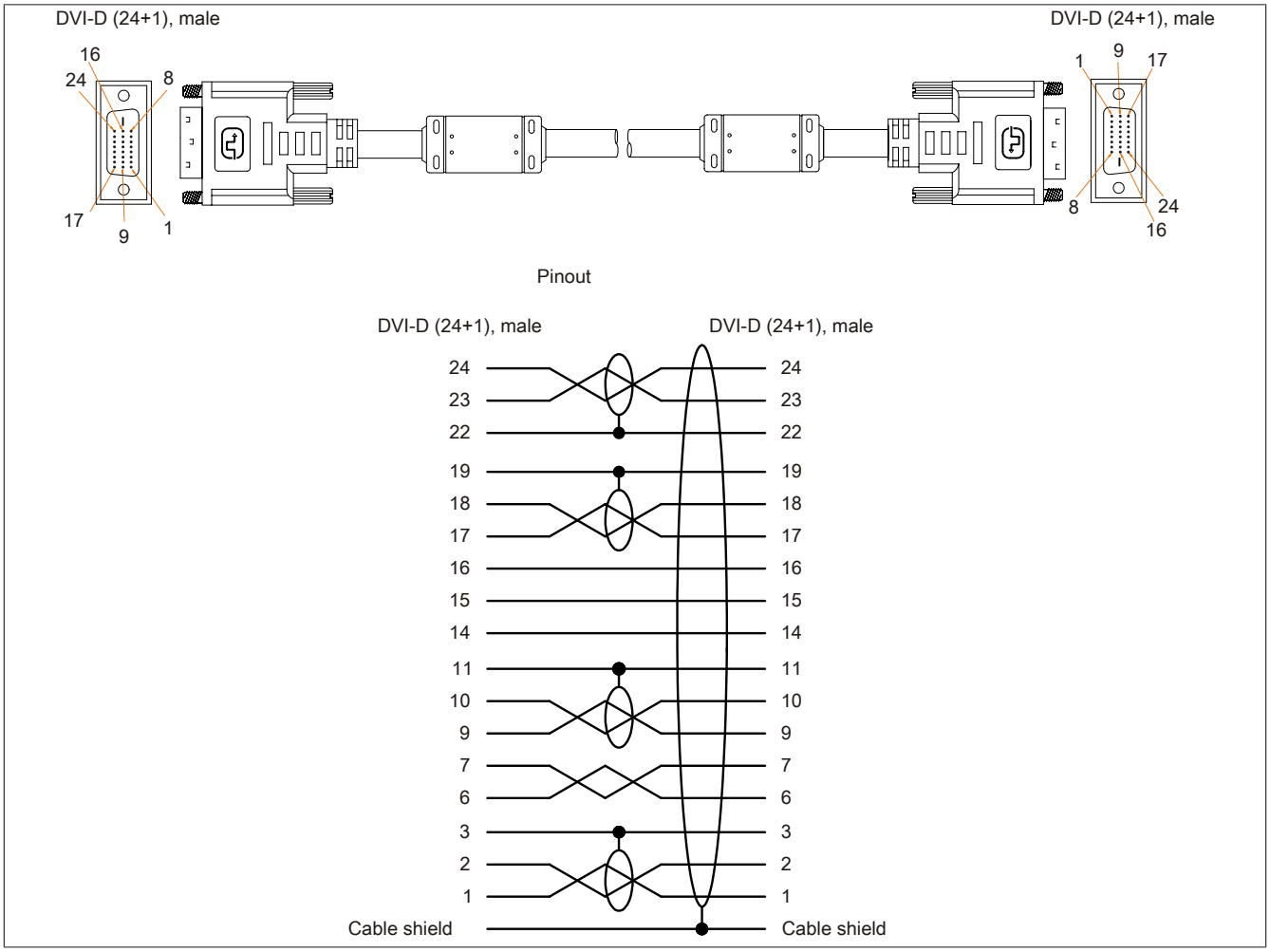


Figure 120: 5CADVI.0xxx-00 - Pinout

6.2 SDL cables

6.2.1 5CASDL.0xxx-00

General information

5CASDL.0xxx-00 SDL cables are designed to be used for stationary applications. Use of the SDL flex cable 5CASDL.0xxx-03 is required for flexible applications (e.g. swing arm systems).

> **Caution!**
>
> **Cables can only be plugged in and unplugged when the device is turned off.**

Order data

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

Table 201: 5CASDL.0018-00, 5CASDL.0050-00, 5CASDL.0100-00, 5CASDL.0150-00, 5CASDL.0200-00, 5CASDL.0250-00, 5CASDL.0300-00 - Order data

Technical data

Product ID	5CASDL. 0018-00	5CASDL. 0050-00	5CASDL. 0100-00	5CASDL. 0150-00	5CASDL. 0200-00	5CASDL. 0250-00	5CASDL. 0300-00
General information							
Certification							
CE	Yes						
c-UL-us	Yes						
Cable structure							
Wire cross section	AWG 28		AWG 24				
Shield	Individual cable pairs and entire cable						
Cable shielding	Tinned Cu mesh, optical coverage > 85%						
Outer sheathing							
Material	PVC						
Color	Black						
Labeling	E74020-C (UL) AWM STYLE 20176 80°C 30V VW-1 DVI DIGITAL LINK						
Connector							
Type	2x DVI-D (24+1), male						
Connection cycles	100						
Contacts	Gold plated						
Mechanical protection	Metal cover with crimped stress relief						
Electrical characteristics							
Conductor resistance							
AWG 24	-		≤93 Ω/km				
AWG 28	≤237 Ω/km		-				
Insulation resistance	Min. 10 MΩ/km						
Mechanical characteristics							
Dimensions							
Length	1.8 m ±30 mm	5 m ±30 mm	10 m ±50 mm	15 m ±100 mm	20 m ±100 mm	25 m ±100 mm	30 m ±100 mm
Diameter	Typ. 8.6 ±0.2 mm Max. 9 mm		Typ. 11 ±0.2 mm Max. 11.5 mm				
Flex radius	≥ 5x cable diameter (plug - ferrite magnet and ferrite magnet - ferrite magnet)						
Flexibility	Limited flexibility; valid for ferrite magnet - ferrite magnet (tested 100 cycles with 5x cable diameter, 20 cycles / minute)						
Weight	Approx. 300 g	Approx. 580 g	Approx. 1500 g	Approx. 2250 g	Approx. 2880 g	Approx. 4800 g	Approx. 5520 g

Table 202: 5CASDL.0018-00, 5CASDL.0050-00, 5CASDL.0100-00, 5CASDL.0150-00, 5CASDL.0200-00, 5CASDL.0250-00, 5CASDL.0300-00 - Technical data

Flex radius specification

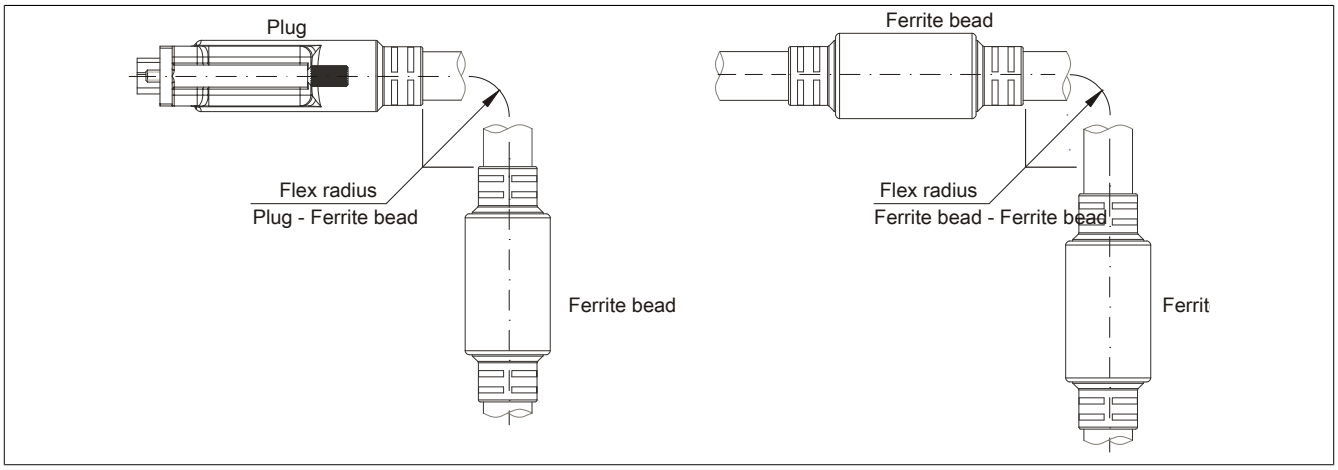


Figure 121: Flex radius specification

Dimensions

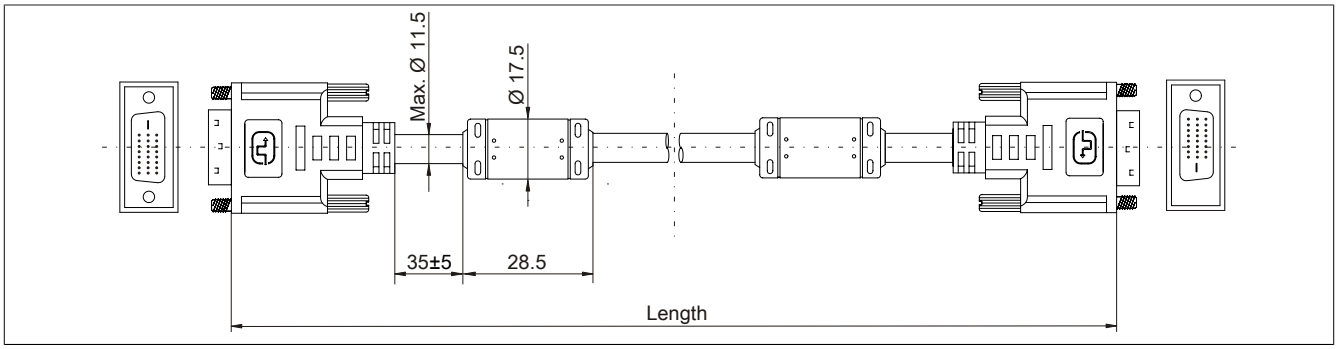


Figure 122: 5CASDL.0xxx-00- Dimensions

Cable specifications

Warning!

If a suitable cable is to be assembled manually, it must be wired according to these specifications.

If a self-assembled cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly.

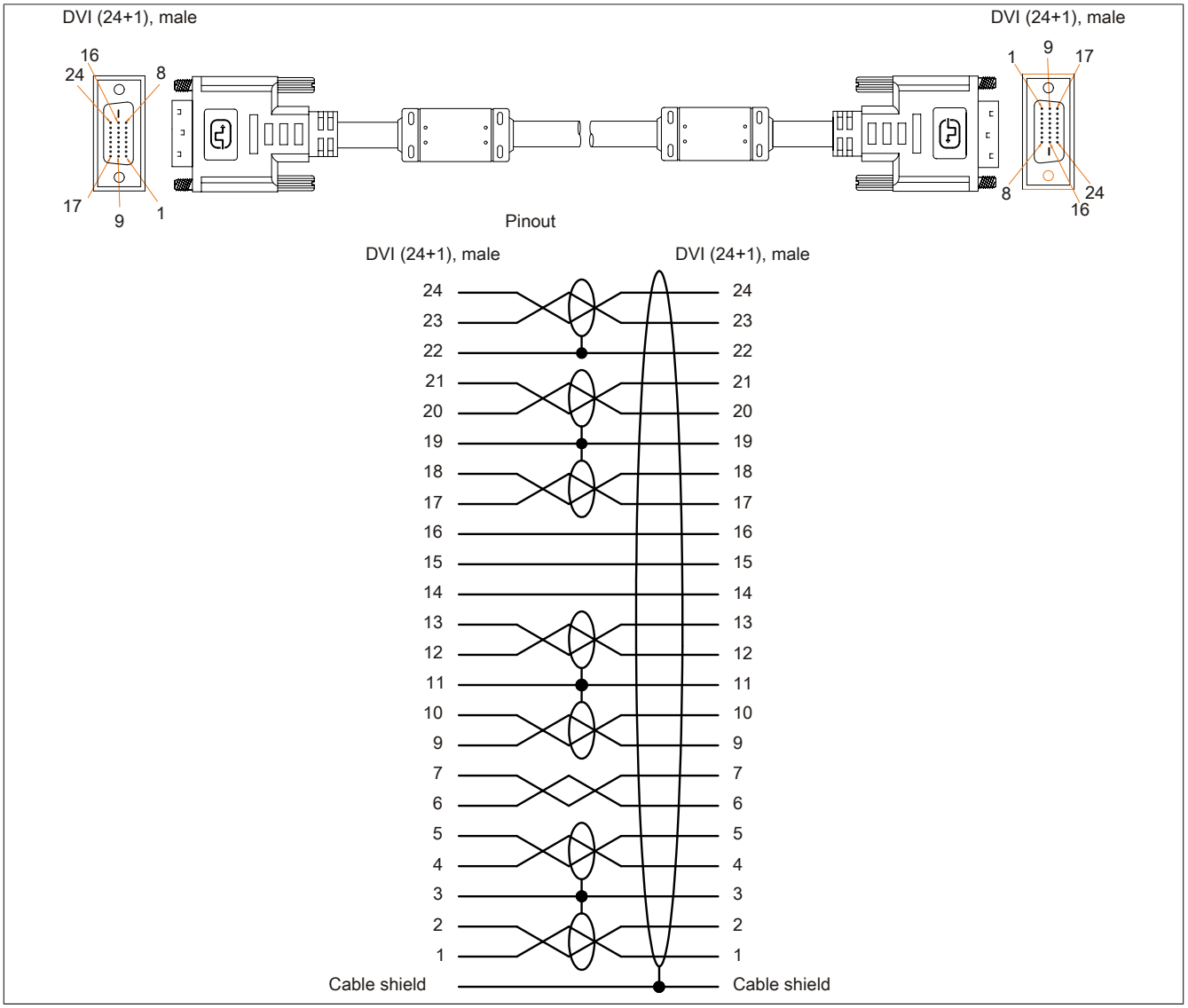


Figure 123: 5CASDL.0xxx-00 - Pinout

6.3 SDL cable with 45° plug

6.3.1 5CASDL.0xxx-01

General information

5CASDL.0xxx-01 SDL cables with 45° plugs are designed to be used for stationary applications.

> **Caution!**
>
> **Cables can only be plugged in and unplugged when the device is turned off.**

Order data

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

Table 203: 5CASDL.0018-01, 5CASDL.0050-01, 5CASDL.0100-01, 5CASDL.0150-01 - Order data

Technical data

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

Table 204: 5CASDL.0018-01, 5CASDL.0050-01, 5CASDL.0100-01, 5CASDL.0150-01 - Technical data

Flex radius specification

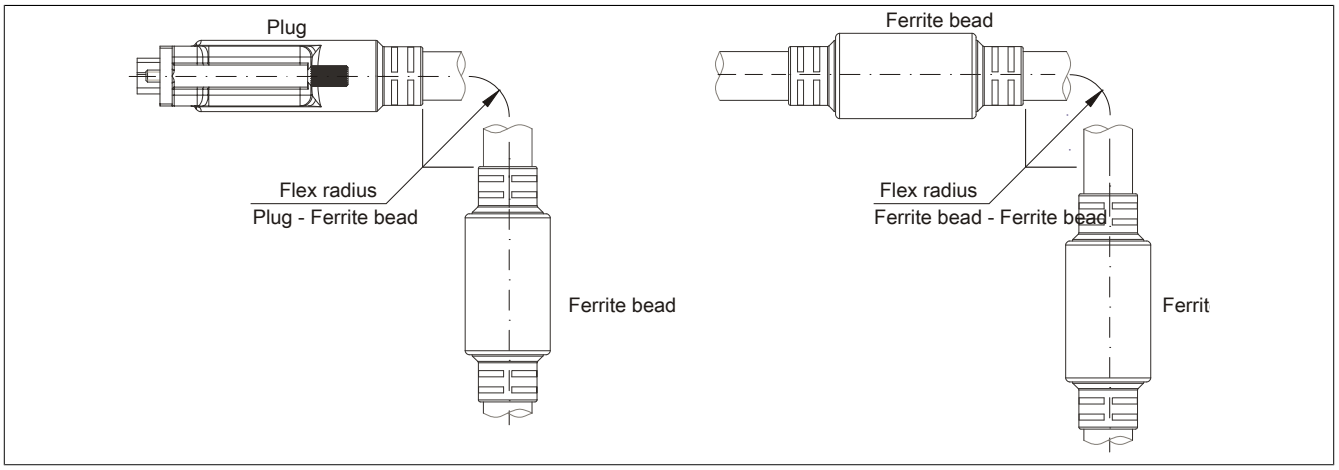


Figure 124: Flex radius specification

Dimensions

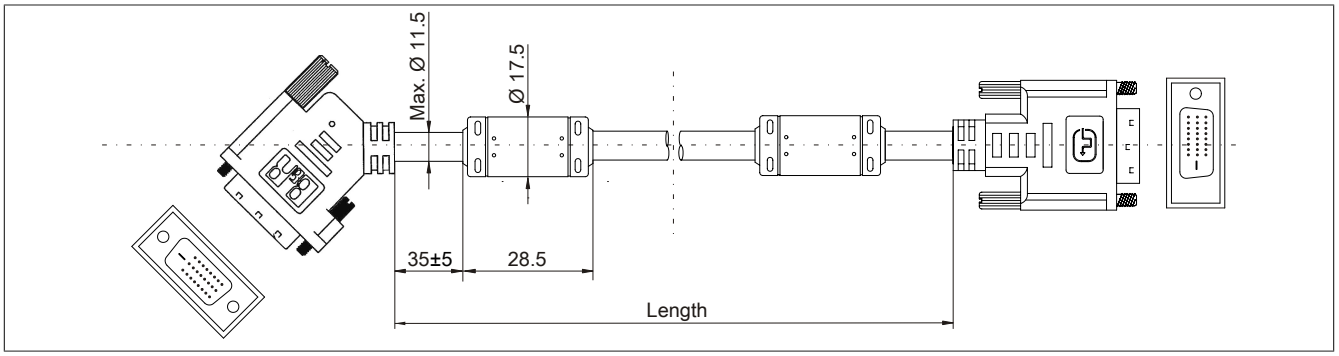


Figure 125: 5CASDL.0xxx-01 - Dimensions

Cable specifications

Warning!

If a suitable cable is to be assembled manually, it must be wired according to these specifications.

If a self-assembled cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly.

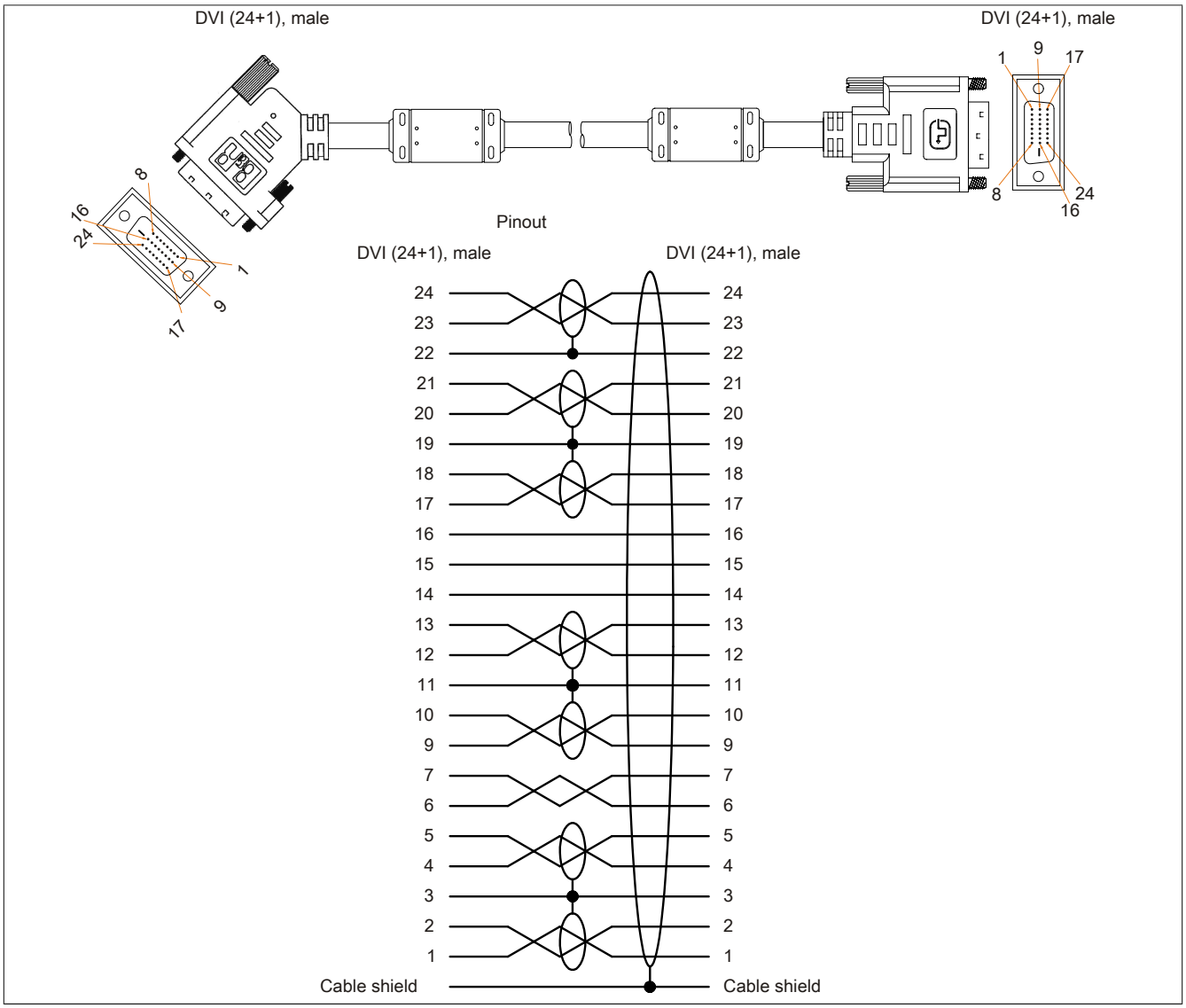


Figure 126: 5CASDL.0xxx-01 - Pinout

6.4 SDL flex cables

6.4.1 5CASDL.0xxx-03

General information

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

Caution!

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

Order data

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

Table 205: 5CASDL.0018-03, 5CASDL.0050-03, 5CASDL.0100-03, 5CASDL.0150-03, 5CASDL.0200-03, 5CASDL.0250-03, 5CASDL.0300-03 - Order data

Technical data

Product ID	5CASDL. 0018-03	5CASDL. 0050-03	5CASDL. 0100-03	5CASDL. 0150-03	5CASDL. 0200-03	5CASDL. 0250-03	5CASDL. 0300-03
General information							
Certification							
CE	Yes						
c-UL-us	Yes						
Cable structure							
Wire cross section	AWG 24 (control wires) AWG 26 (DVI, USB, data)						
Properties	Free of halogen and silicon						
Shield	Individual cable pairs and entire cable						
Cable shielding	Aluminum foil clad + tinned copper mesh						
Outer sheathing							
Material	Special TMPU - semi gloss						
Color	Black						
Labeling	(B&R) SDL Cable (UL) AWM 20236 80°C 30V E 63216						
Connector							
Type	2x DVI-D (24+1), male						
Connection cycles	Min. 200						
Contacts	Gold plated						
Mechanical protection	Metal cover with crimped stress relief						
Electrical characteristics							
Operating voltage	≤ 30 V						
Test voltage							
Wire/wire	1 kV						
Wire/shield	0.5 kV						
Wave impedance	100 ±10 Ω						
Conductor resistance							
AWG 24	≤95 Ω/km						
AWG 26	≤145 Ω/km						
Insulation resistance	> 200 MΩ/km						
Operating conditions							
Approbation	UL AWM 20236 80 °C 30 V						
Flame resistant	In accordance with UL758 (cable vertical flame test)						
Oil and hydrolysis resistance	According to VDE 0282-10						
Environmental conditions							
Temperature							
Storage	-20 to 80°C						
Moving	-5 to 60°C						
Fixed installation	-20 to 80°C						

Table 206: 5CASDL.0018-03, 5CASDL.0050-03, 5CASDL.0100-03, 5CASDL.0150-03, 5CASDL.0200-03, 5CASDL.0250-03, 5CASDL.0300-03 - Technical data

Product ID	5CASDL.0018-03	5CASDL.0050-03	5CASDL.0100-03	5CASDL.0150-03	5CASDL.0200-03	5CASDL.0250-03	5CASDL.0300-03
Mechanical characteristics							
Dimensions							
Length	1.8 m ±20 mm	5 m ±45 mm	10 m ±90 mm	15 m ±135 mm	20 m ±180 mm	25 m ±225 mm	30 m ±270 mm
Diameter	Max. 12 mm						
Flex radius							
Fixed installation	≥ 6x cable diameter (from plug - ferrite magnet) ≥ 10x cable diameter (from ferrite magnet - ferrite magnet)						
flexible installation	≥ 15x cable diameter (from ferrite magnet - ferrite magnet)						
Flexibility	Flexible; valid for ferrite magnet - ferrite magnet (tested 300,000 cycles with 15x cable diameter, 4800 cycles / hour)						
Drag chain data							
Flex cycles	300,000						
Velocity	4800 cycles/hour						
Flex radius	180 mm;15x cable diameter						
Hub	460 mm						
Weight	Approx. 460 g	Approx. 1020 g	Approx. 1940 g	Approx. 2840 g	Approx. 3740 g	Approx. 4560 g	Approx. 5590 g
Tension							
In operation	≤ 50 N						
During installation	≤ 400 N						

Table 206: 5CASDL.0018-03, 5CASDL.0050-03, 5CASDL.0100-03, 5CASDL.0150-03, 5CASDL.0200-03, 5CASDL.0250-03, 5CASDL.0300-03 - Technical data

Flex radius specification

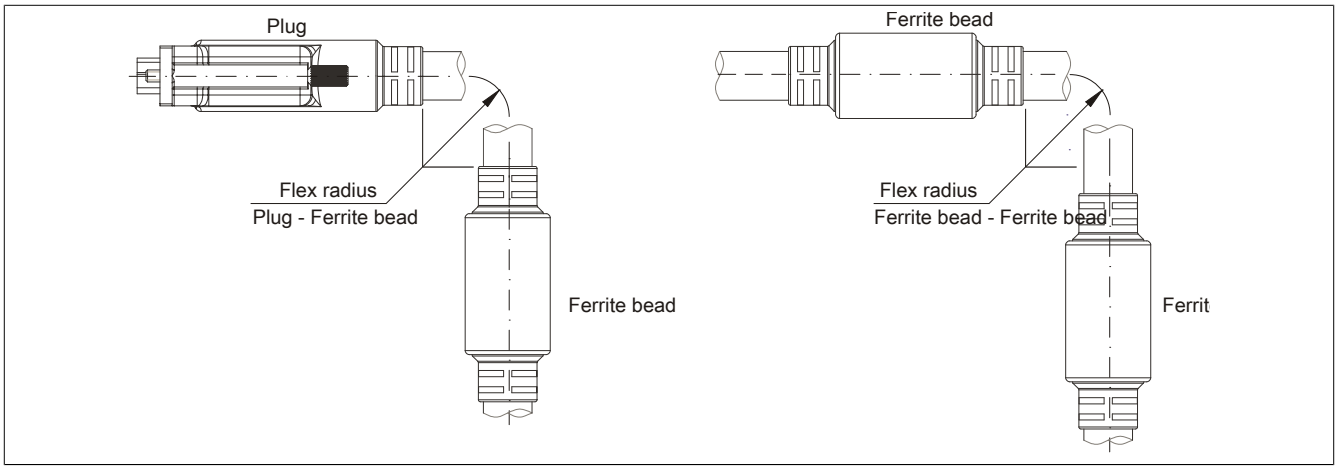


Figure 127: Flex radius specification

Dimensions

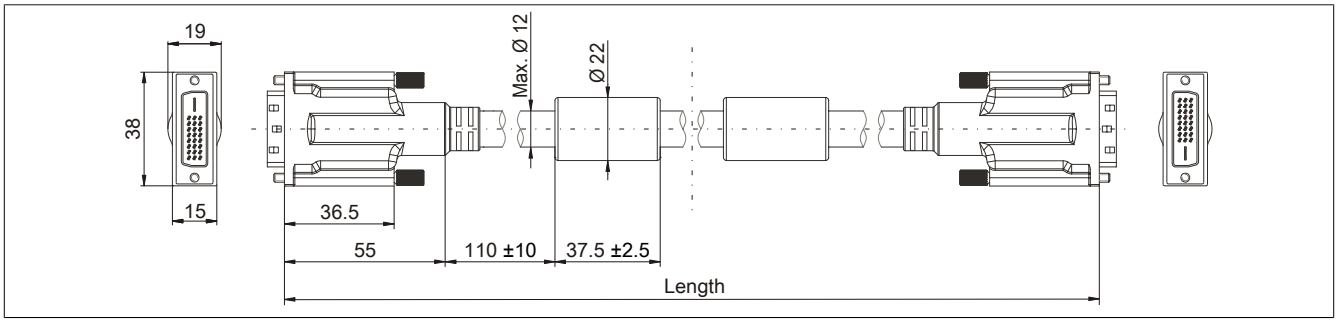


Figure 128: 5CASDL.0xxx-03 - Dimensions

Structure

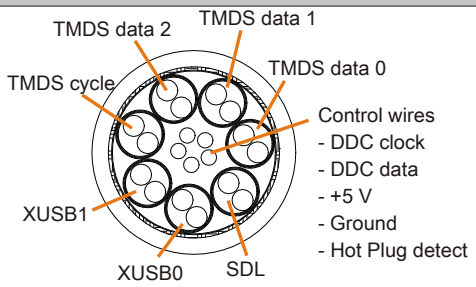
Element	Assignment	Cross section	
DVI	TMDS data 0	26 AWG	
	TMDS data 1	26 AWG	
	TMDS data 2	26 AWG	
	TMDS cycle	26 AWG	
USB	XUSB0	26 AWG	
	XUSB1	26 AWG	
Data	SDL	26 AWG	
Control wires	DDC cycle	24 AWG	
	DDC data	24 AWG	
	+5 V	24 AWG	
	Mass	24 AWG	
	Hot plug detect	24 AWG	

Table 207: Structure - SDL flex cable 5CASDL.0xxx-03

Cable specifications

Warning!

If a suitable cable is to be assembled manually, it must be wired according to these specifications.

If a self-assembled cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly.

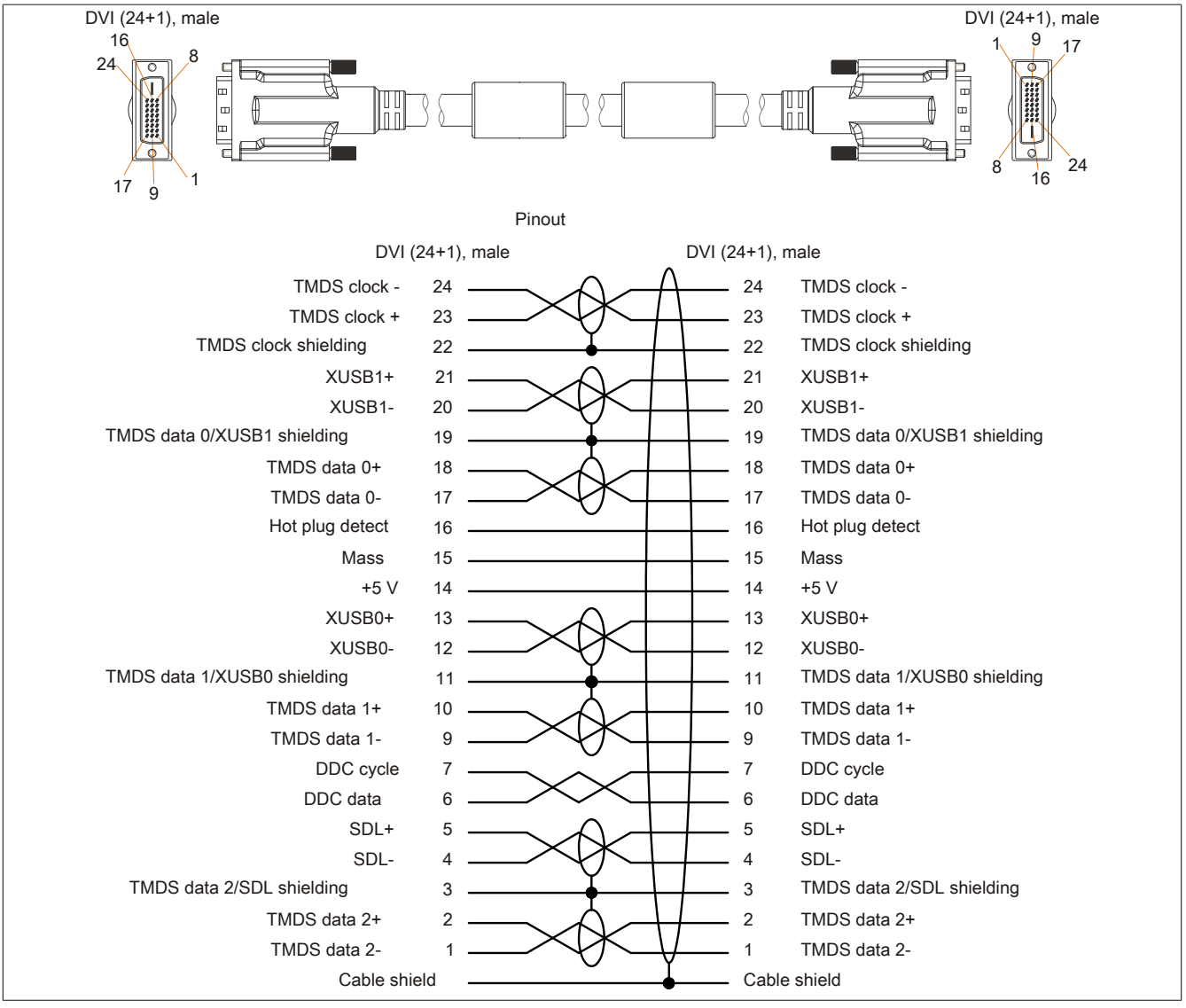


Figure 129: 5CASDL.0xxx-03 - Pinout

6.5 SDL flex cables with extender

6.5.1 5CASDL.0xx0-13

General information

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

> **Caution!**
>
> **Cables can only be plugged in and unplugged when the device is turned off.**

Order data

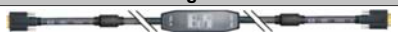
Model number	Short description	Figure
	SDL flex cable	
5CASDL.0300-13	SDL cable flex with extender, 30 m.	
5CASDL.0400-13	SDL cable flex with extender, 40 m.	
5CASDL.0430-13	SDL Cable flex with extender, 43 m.	

Table 208: 5CASDL.0300-13, 5CASDL.0400-13, 5CASDL.0430-13 - Order data

Technical data

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

Table 209: 5CASDL.0300-13, 5CASDL.0400-13, 5CASDL.0430-13 - Technical data

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

Table 209: 5CASDL.0300-13, 5CASDL.0400-13, 5CASDL.0430-13 - Technical data

Flex radius specification

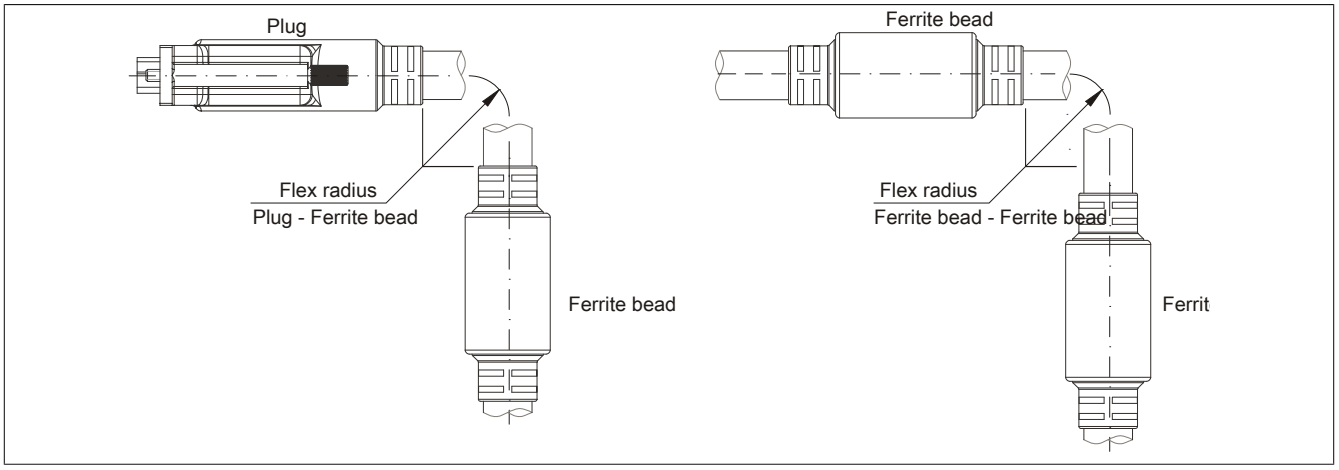


Figure 130: Flex radius specification

Dimensions

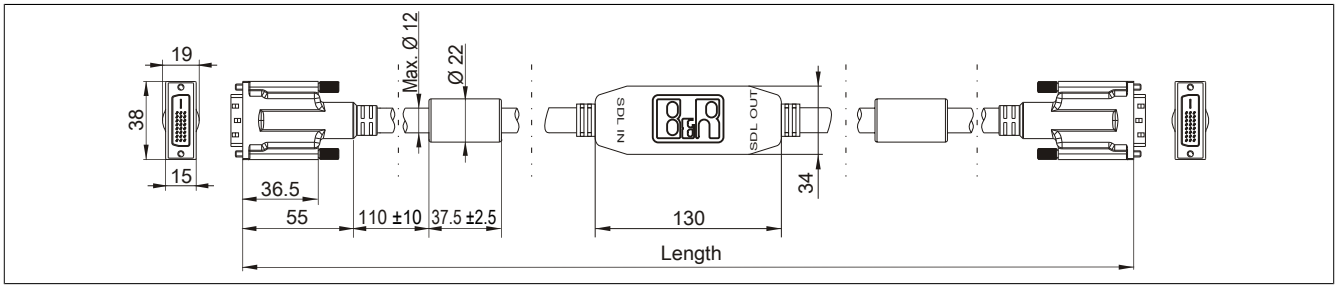


Figure 131: 5CASDL.0xx0-13 - Dimensions

Cable specifications

Warning!

If a suitable cable is to be assembled manually, it must be wired according to these specifications.

If a self-assembled cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly.

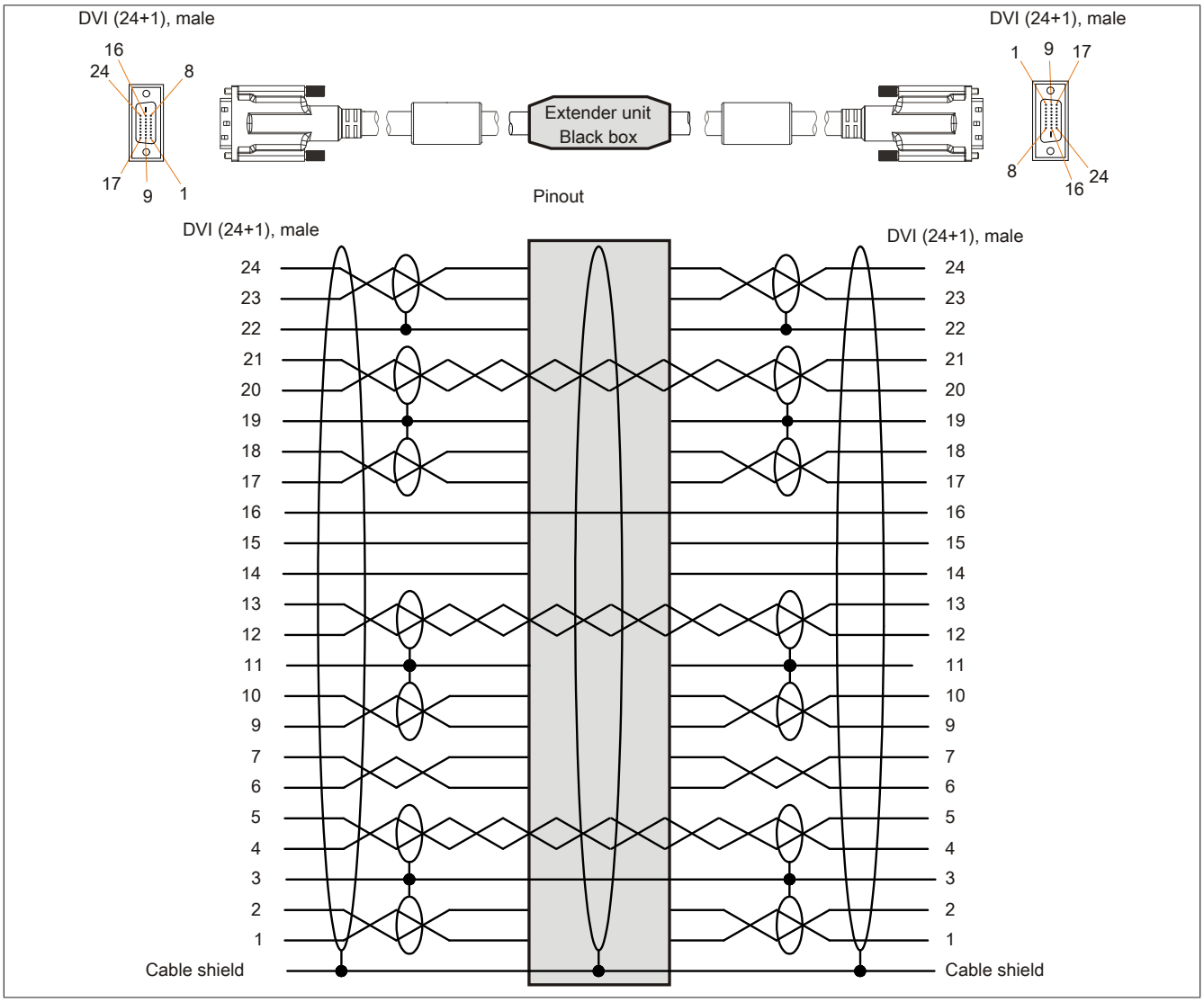


Figure 132: 5CASDL.0xx0-13 - Pinout

Cable connection

SDL flex cables with an extender must be connected between the B&R Industrial PC and the Automation Panel display unit in the correct direction. The signal direction is indicated on the extender for this purpose.

- Connect the end labeled "SDL IN" with the video output of the APC910 (monitor/panel output) or Panel OUT of an AP900 AP Link card.
- Connect the "SDL OUT" end to the display unit (e.g. Automation Panel 900) via the Automation Panel Link insert card (Panel IN).

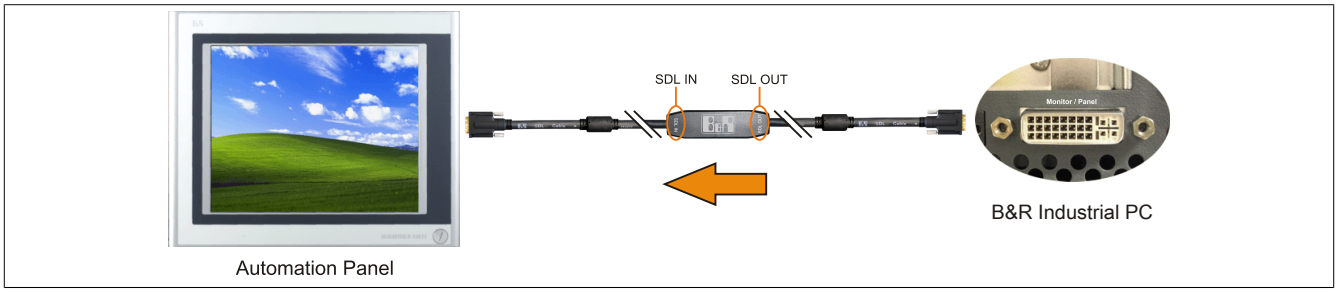


Figure 133: Example of the signal direction for an SDL flex cable with extender

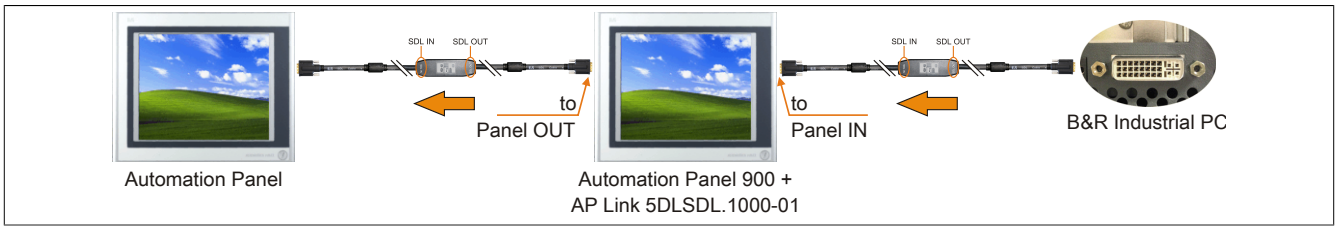


Figure 134: Example of the signal direction for an SDL flex cable with extender

6.6 USB cables

6.6.1 5CAUSB.00xx-00

General information

USB cables are designed to achieve USB 2.0 transfer speeds.

Order data

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

Table 210: 5CAUSB.0018-00, 5CAUSB.0050-00 - Order data

Technical data

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

Table 211: 5CAUSB.0018-00, 5CAUSB.0050-00 - Technical data

Cable specifications

Warning!

If a suitable cable is to be assembled manually, it must be wired according to these specifications.

If a self-assembled cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly.

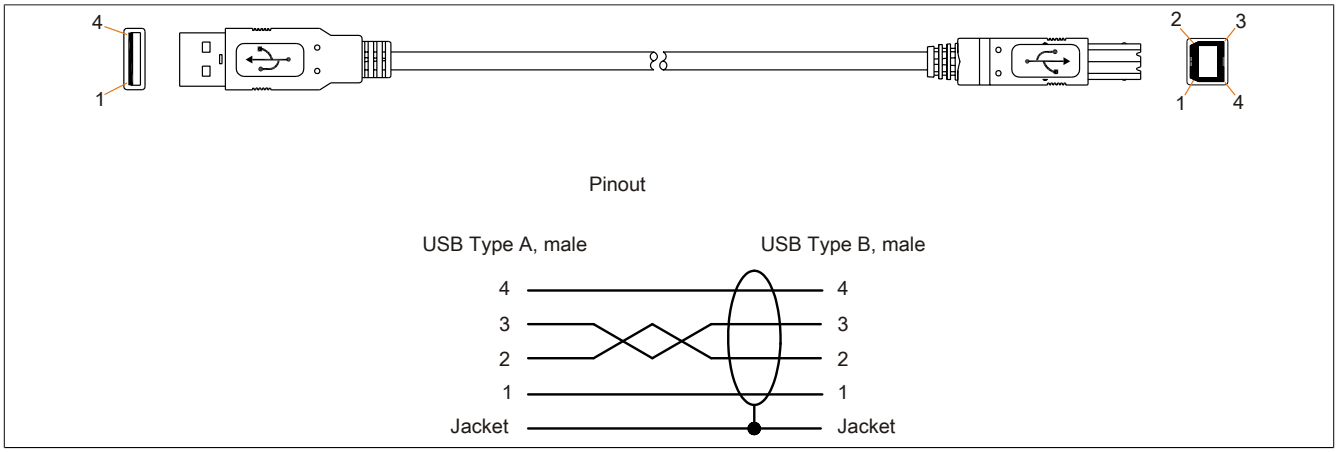


Figure 135: 5CAUSB.00xx-00 - USB cable pinout

6.7 RS232 cables

6.7.1 9A0014.xx

General information

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

Order data

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

Table 212: 9A0014.02, 9A0014.05, 9A0014.10 - Order data

Technical data

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

Table 213: 9A0014.02, 9A0014.05, 9A0014.10 - Technical data

Cable specifications

Warning!

If a suitable cable is to be assembled manually, it must be wired according to these specifications.

If a self-assembled cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly.

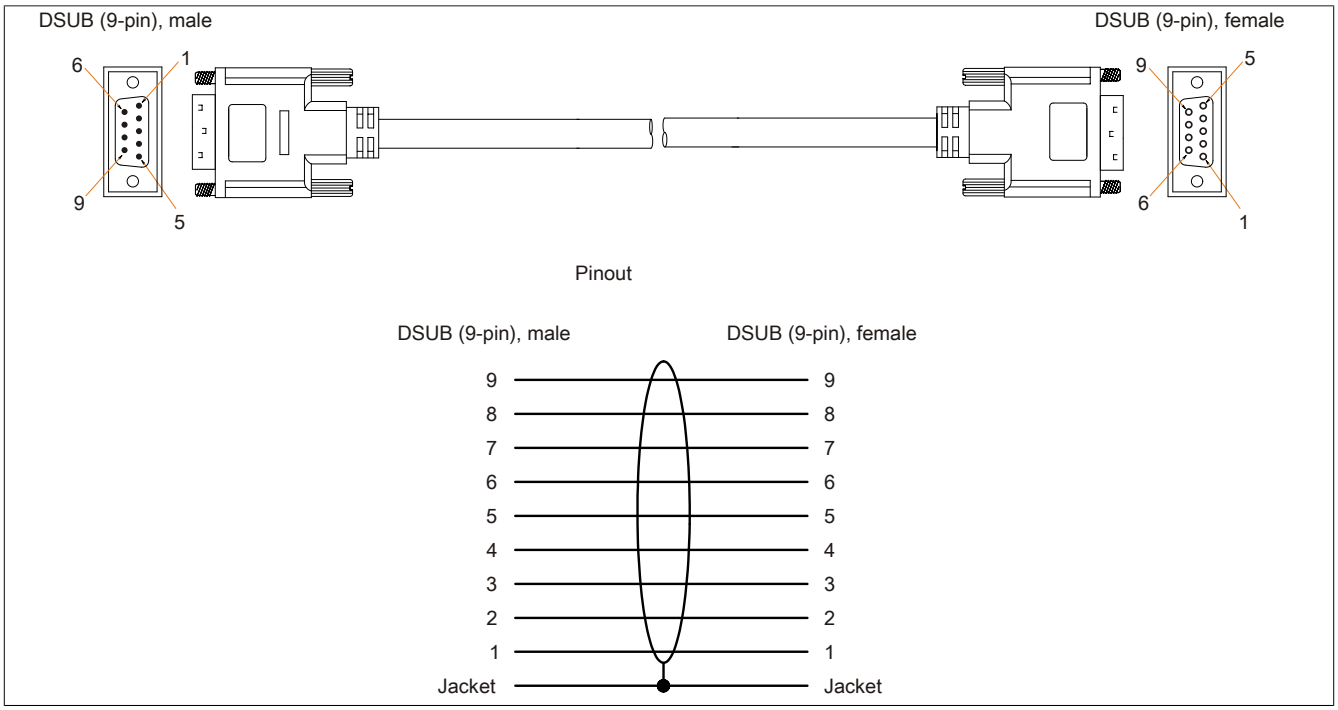


Figure 136: 9A0014.xx - RS232 cable pinout

6.8 Internal supply cable

6.8.1 5CAMSC.0001-00

General information

This supply cable is used internally, for example to supply special PCI cards. It is connected to the mainboard.

> **Caution!**
>
> **Cables can only be plugged in and unplugged when the device is turned off.**

Order data

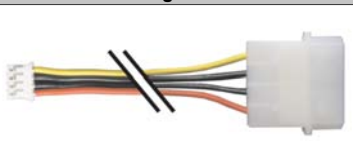
Model number	Short description	Figure
	Undefined	
5CAMSC.0001-00	APC620 internal power supply cable - Customized -	

Table 214: 5CAMSC.0001-00 - Order data

Technical data

Product ID	5CAMSC.0001-00
General information	
Certification	
CE	Yes
Cable structure	
Wire cross section	AWG 22
Connector	
Type	1x 4-pin male disk drive power plug, 1x 4-pin female plug housing
Mechanical characteristics	
Dimensions	
Length	100 mm ±5 mm
Flexibility	Flexible

Table 215: 5CAMSC.0001-00 - Technical data

Chapter 6 • Maintenance / Service

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

1 Changing the battery

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

Information:

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

Warning!

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

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

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

1.1 Battery status evaluation

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

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

Table 216: Battery status

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

1.2 Procedure

- Disconnect the power supply to the B&R Industrial PC.
- Touch the housing or ground connection in order to discharge any electrostatic charge from your body.
- Remove the cover from the battery compartment and carefully pull out the battery using the removal strips.
- The battery should not be held by its edges. Insulated tweezers may also be used to insert the battery.

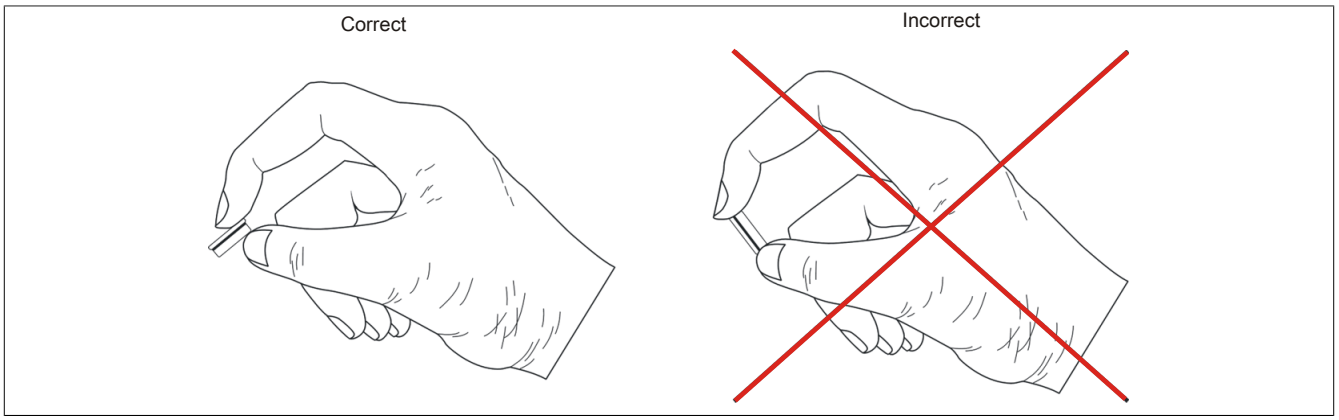


Figure 137: Battery handling

- Insert the new battery with the correct polarity.

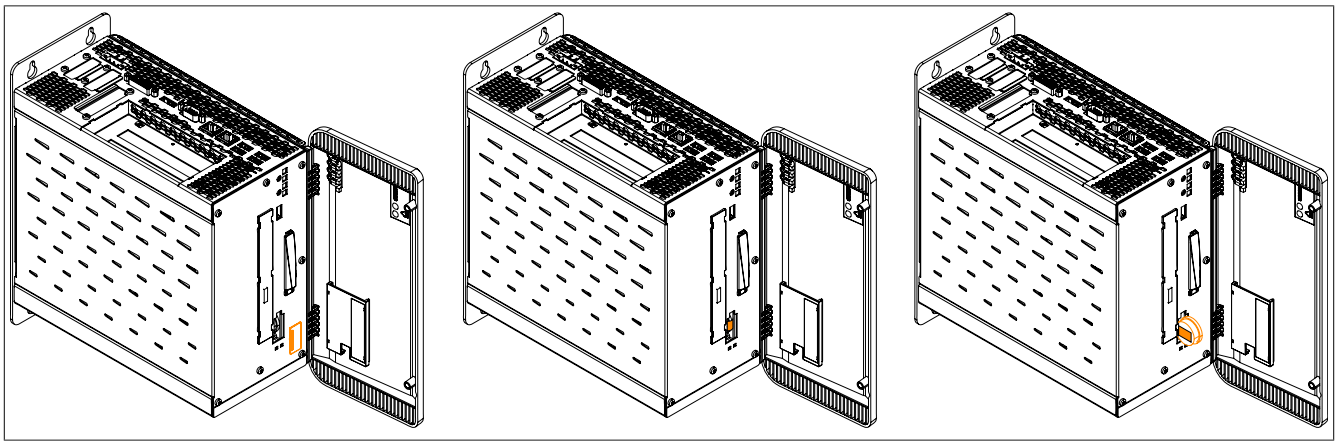


Figure 138: Changing the battery

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

Warning!

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

2 Replacing a CFast card

Caution!

Turn off the power before replacing the CFast card!

The CFast card can be replaced quickly and easily by pressing the ejector (see image) with a pointed object such as a pen.

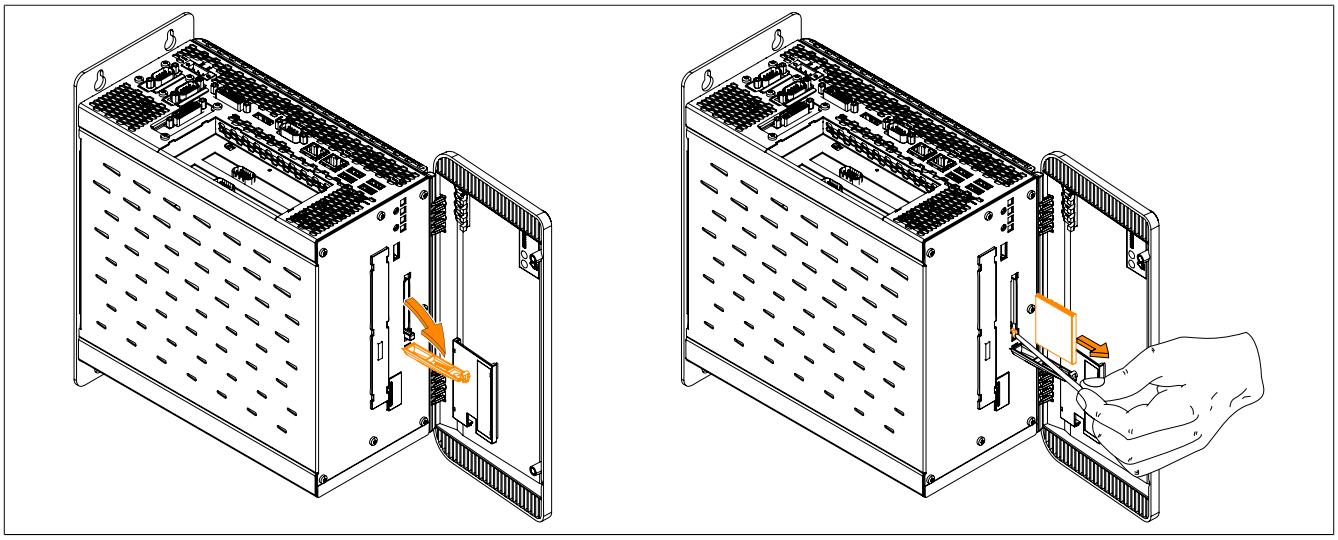


Figure 139: Replacing a CFast card

3 Installing interface options

Information:

Please note that not every interface option can be installed in interface slots 1 and 2. For more information, see "IF option 1 slot" on page 44 and "IF option 2 slot" on page 44.

1. Disconnect the power supply to the B&R Industrial PC.
2. Touch the housing or ground connection in order to discharge any electrostatic charge from your body.
3. Open the front cover. The torx screws (T10) behind the cover that are marked in the image must then be removed. The number of torx screws can vary depending on the system unit.

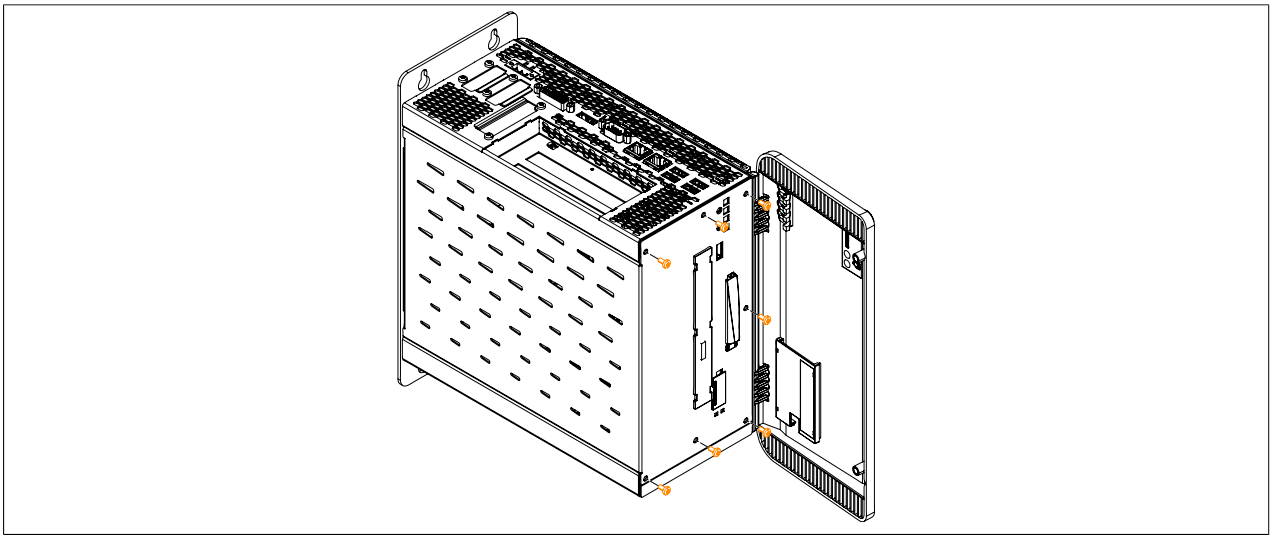


Figure 140: Removing the torx screws for the side cover

4. After the screws have been removed, the side cover can be removed by sliding it first toward the front and then to the side.

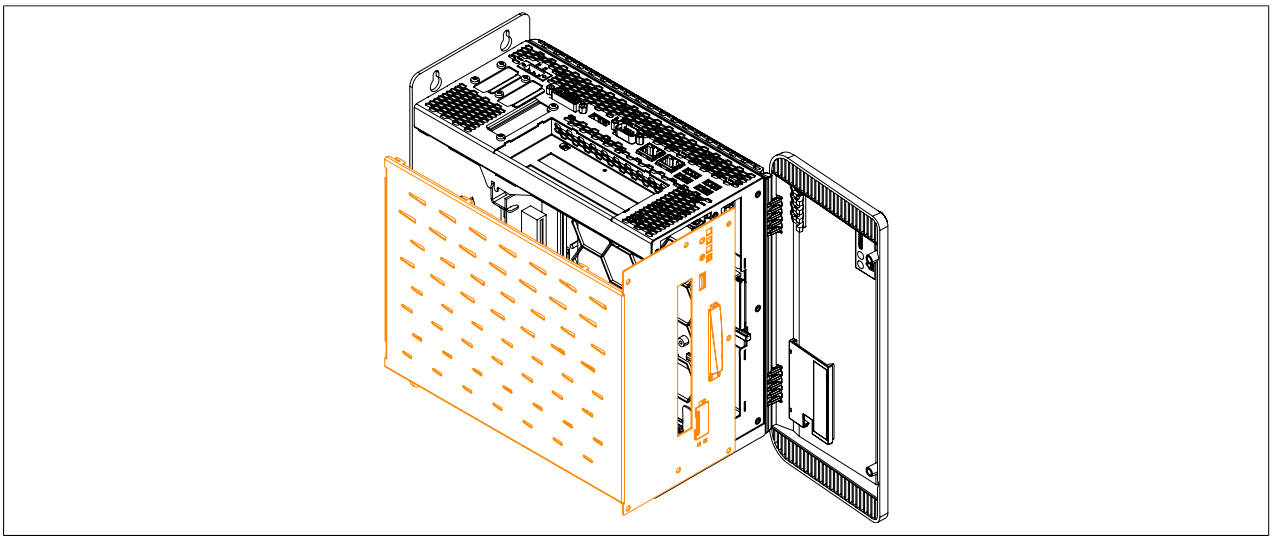


Figure 141: Removing the side cover

5. Remove the marked torx screws (T10) and the slot cover.

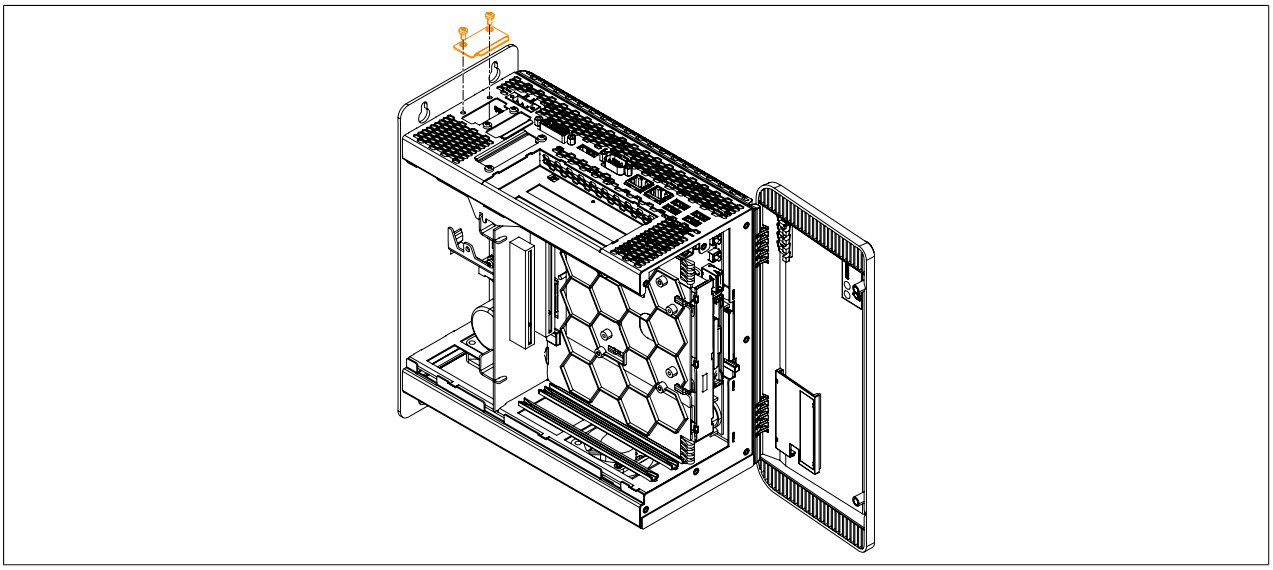


Figure 142: Removing the torx screws and slot cover

6. Insert the interface option into the slot.

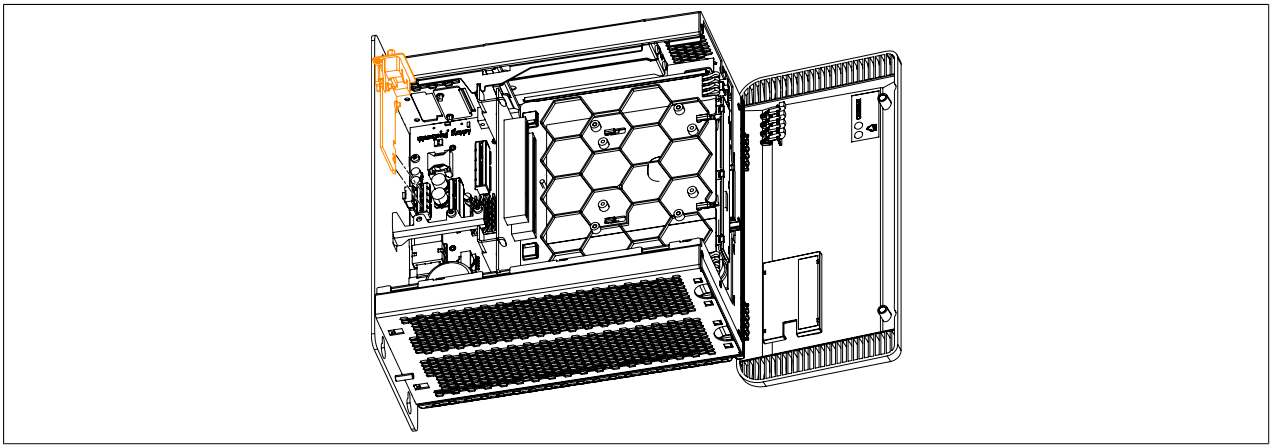


Figure 143: Installing the interface option

7. Secure the interface option to the B&R Industrial PC using the torx screws (T10).

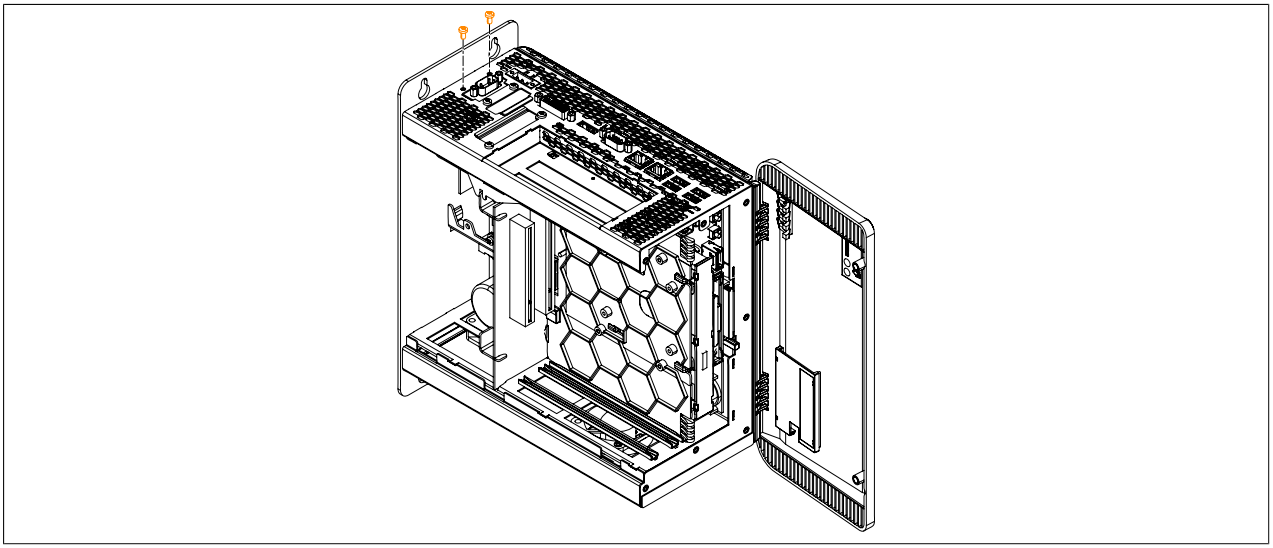


Figure 144: Securing the interface option

8. Attach the side cover.

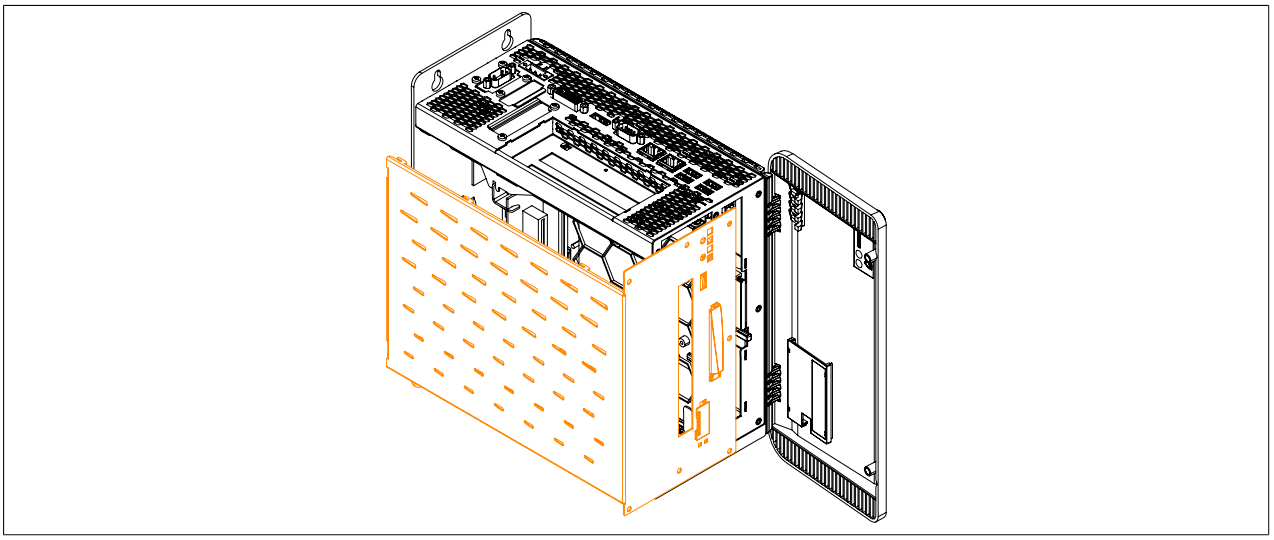


Figure 145: Replacing the side cover

9. Secure the side cover to the B&R Industrial PC using the same torx screws (T10) as before.

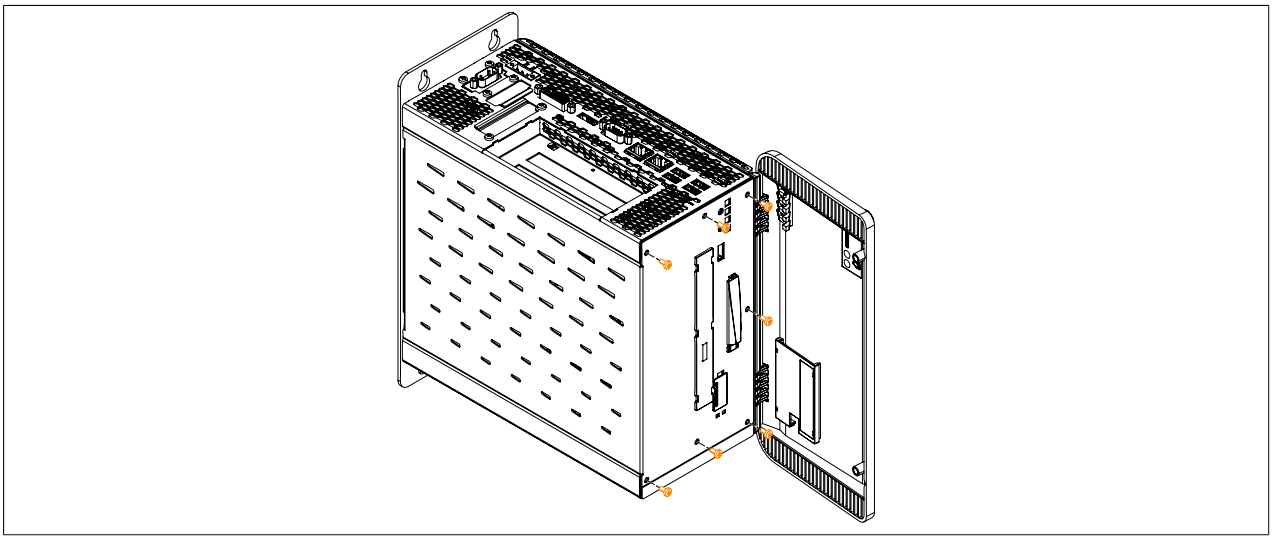


Figure 146: Securing the side cover

4 Installing monitor/panel options

1. Disconnect the power supply to the B&R Industrial PC.
2. Touch the housing or ground connection in order to discharge any electrostatic charge from your body.
3. Open the front cover. The torx screws (T10) behind the cover that are marked in the image must then be removed. The number of torx screws can vary depending on the system unit.

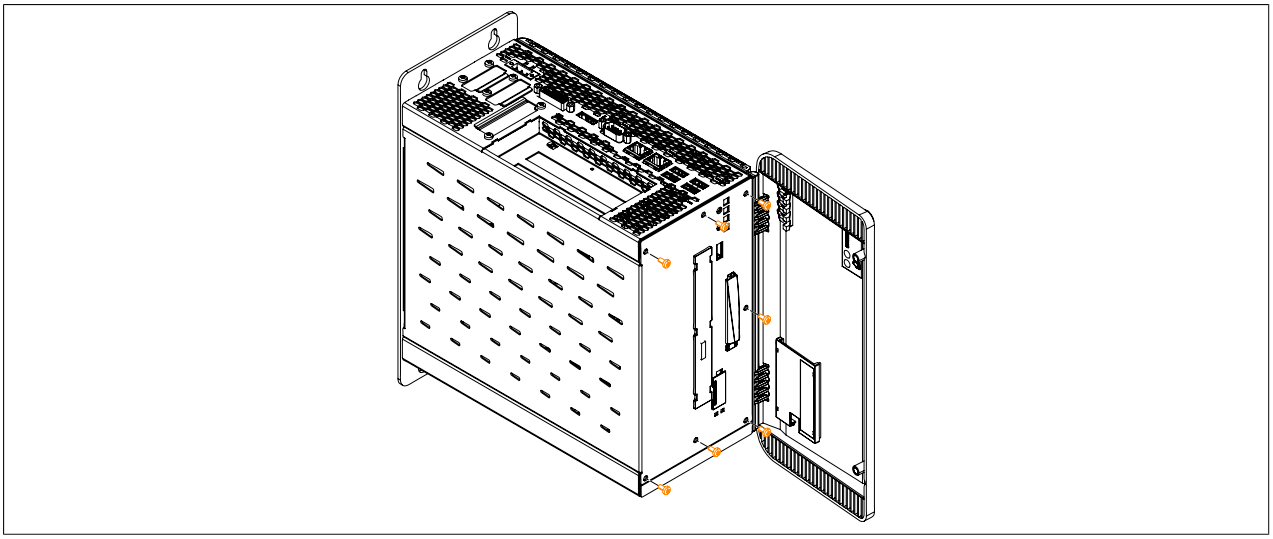


Figure 147: Removing the torx screws for the side cover

4. After the screws have been removed, the side cover can be removed by sliding it first toward the front and then to the side.

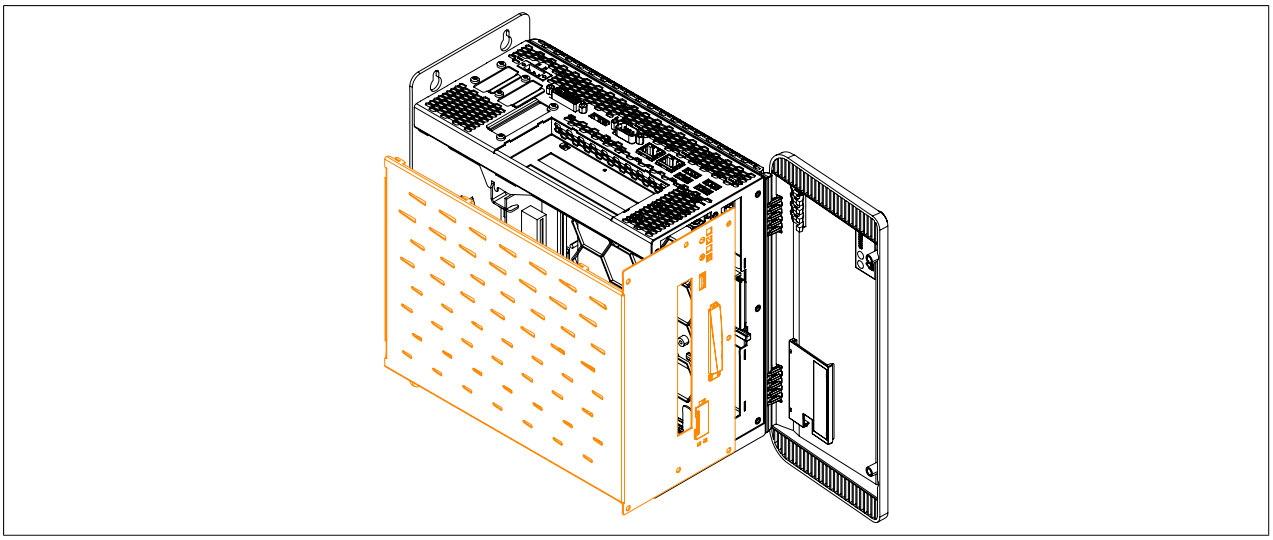


Figure 148: Removing the side cover

5. Remove the marked torx screws (T10) and the slot cover.

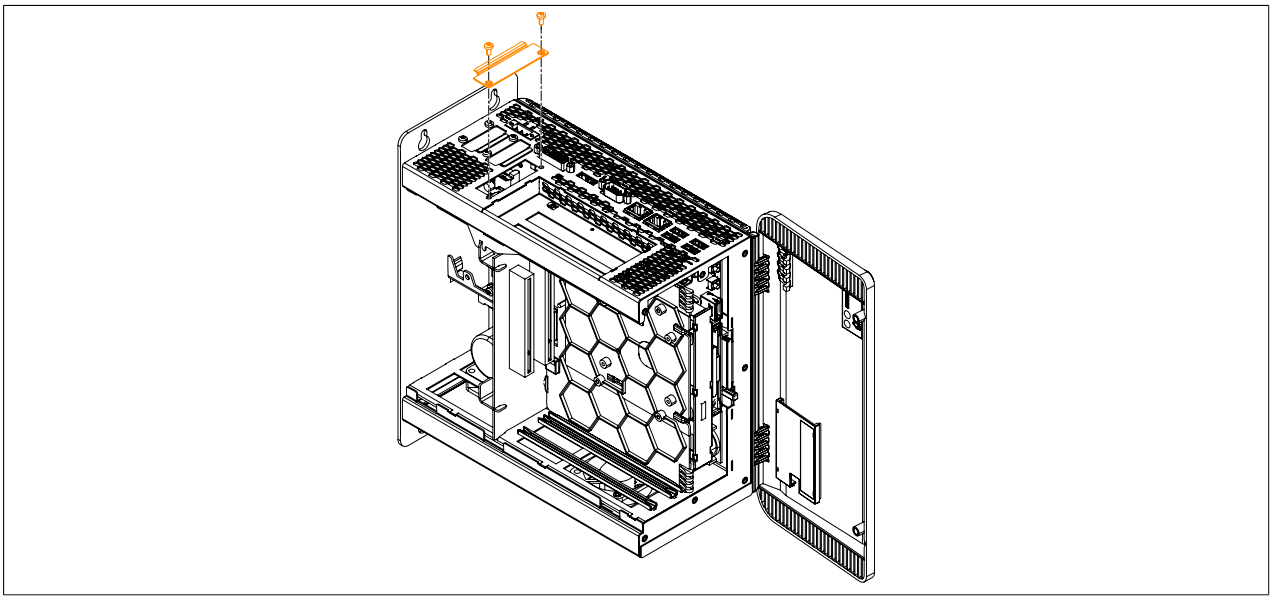


Figure 149: Removing the torx screws and slot cover

6. Insert the monitor/panel option into the slot.

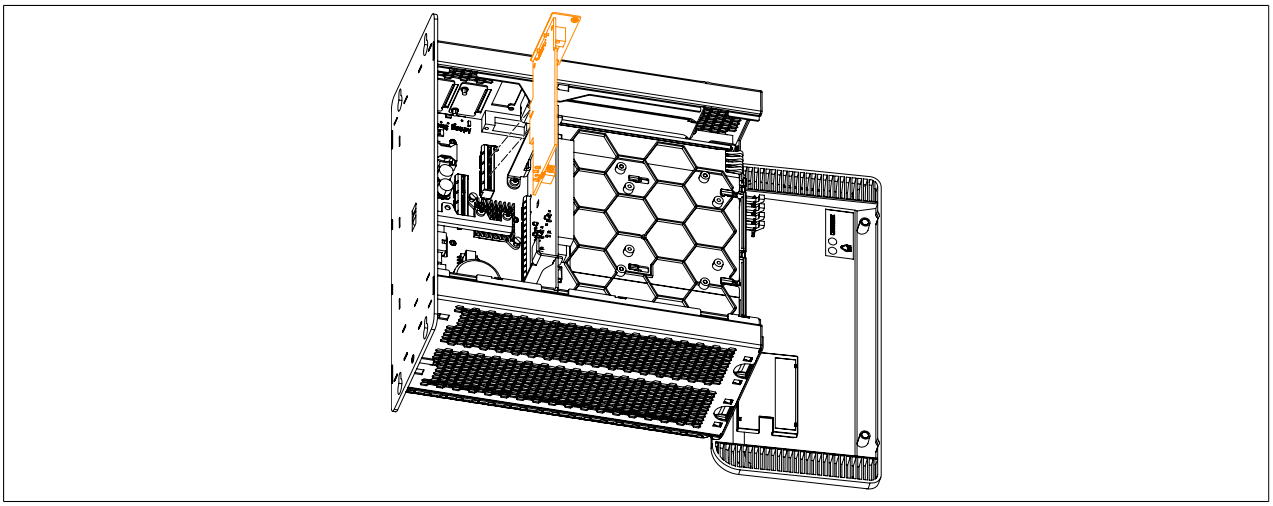


Figure 150: Inserting the monitor/panel option into the APC910

7. Secure the monitor/panel option to the B&R Industrial PC using the torx screws (T10).

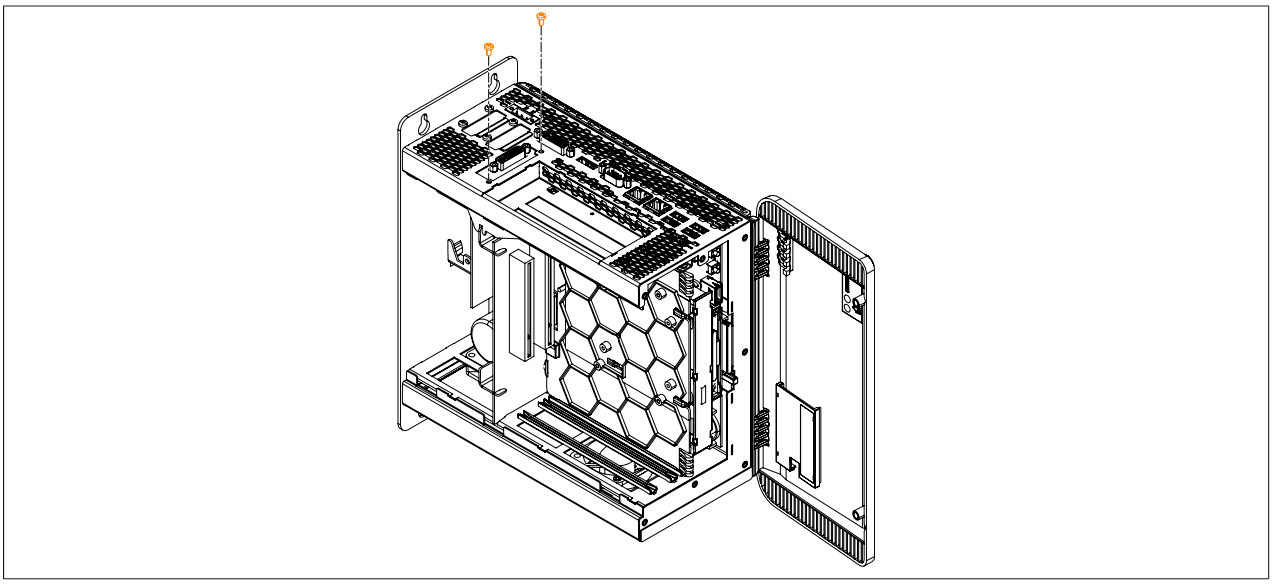


Figure 151: Securing the monitor/panel option using the torx screws

8. Attach the side cover.

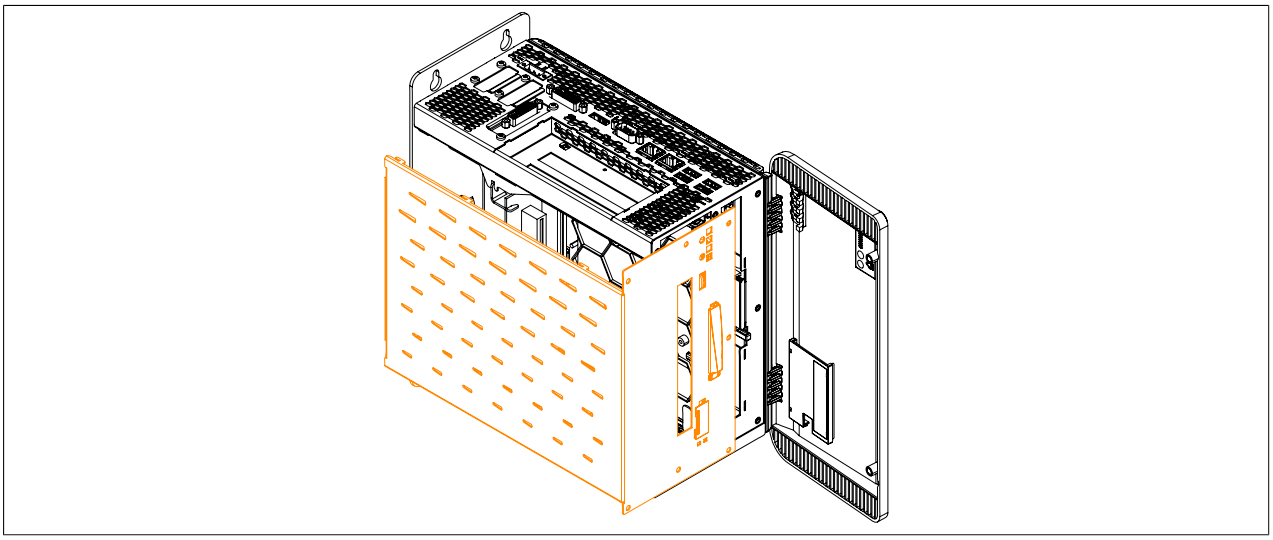


Figure 152: Replacing the side cover

9. Secure the side cover to the B&R Industrial PC using the same torx screws (T10) as before.

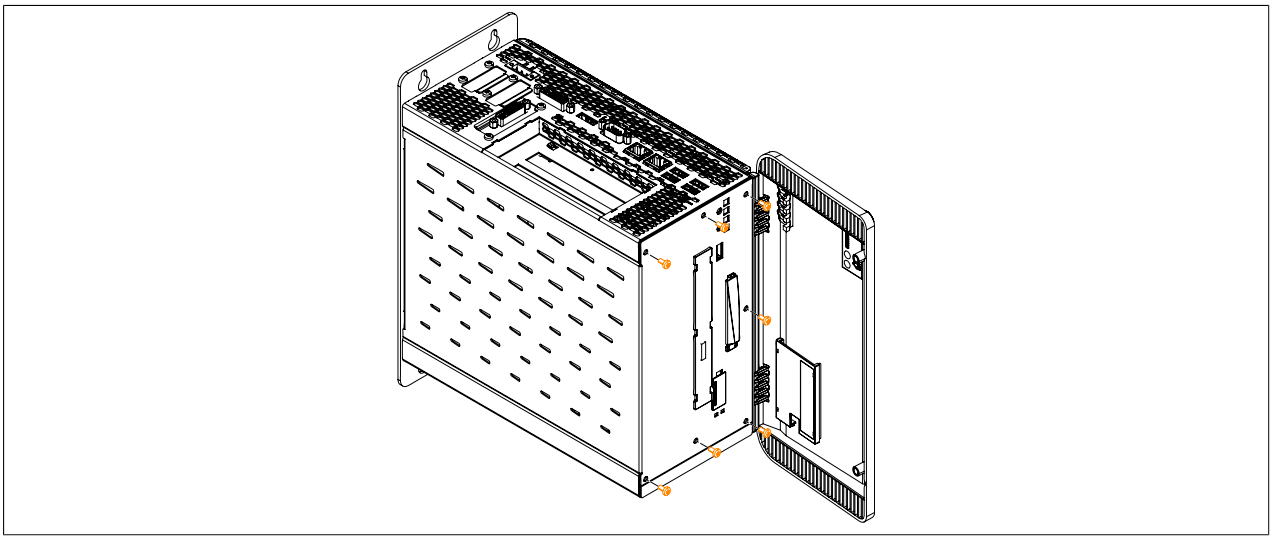


Figure 153: Securing the side cover

5 Installing and replacing slide-in compact drives

1. Disconnect the power supply to the B&R Industrial PC.
2. Touch the housing or ground connection in order to discharge any electrostatic charge from your body.
3. Open the front cover. The torx screws (T10) behind the cover that are marked in the image must then be removed. The number of torx screws can vary depending on the system unit.

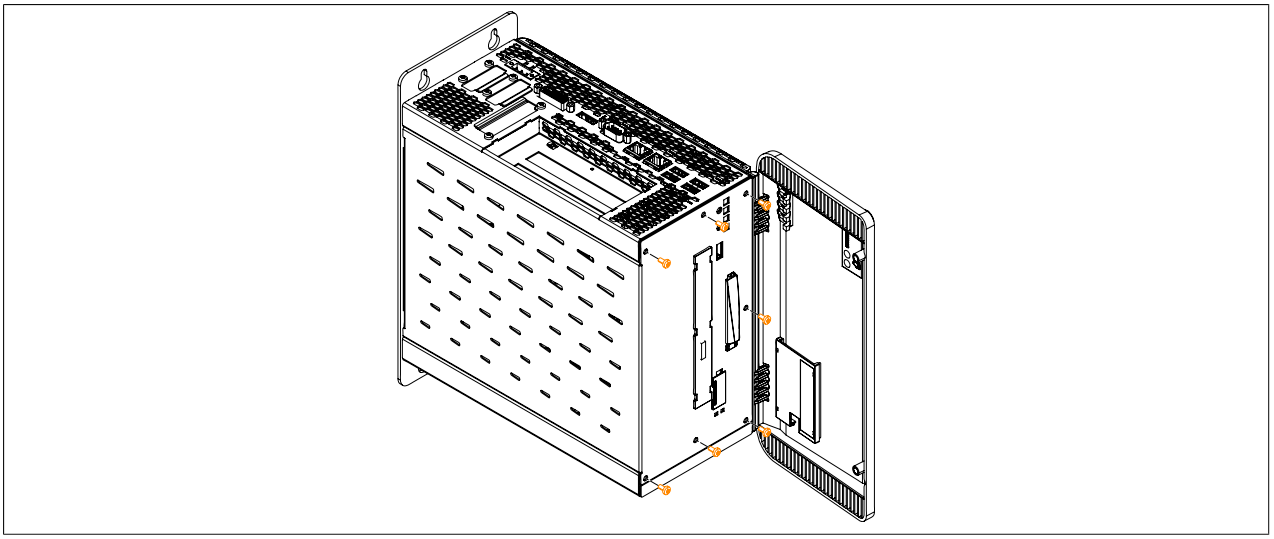


Figure 154: Removing the torx screws for the side cover

4. After the screws have been removed, the side cover can be removed by sliding it first toward the front and then to the side.

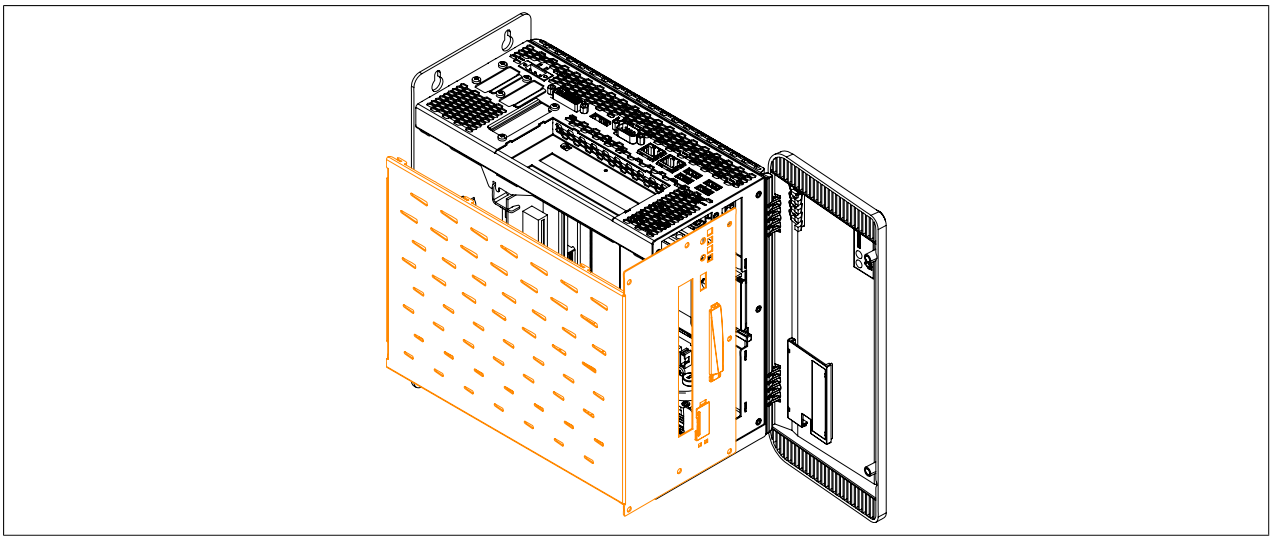


Figure 155: Removing the side cover

5. Free the plastic removal strip fastened to the side of the slide-in compact drive. Remove the slide-in compact drive from the Automation PC 910 by pulling firmly on the removal strip.
   When inserting a slide-in compact drive, be sure to align it with the guide rails. Tuck the removal strip back between the drive and the frame (as it was before it was pulled out).

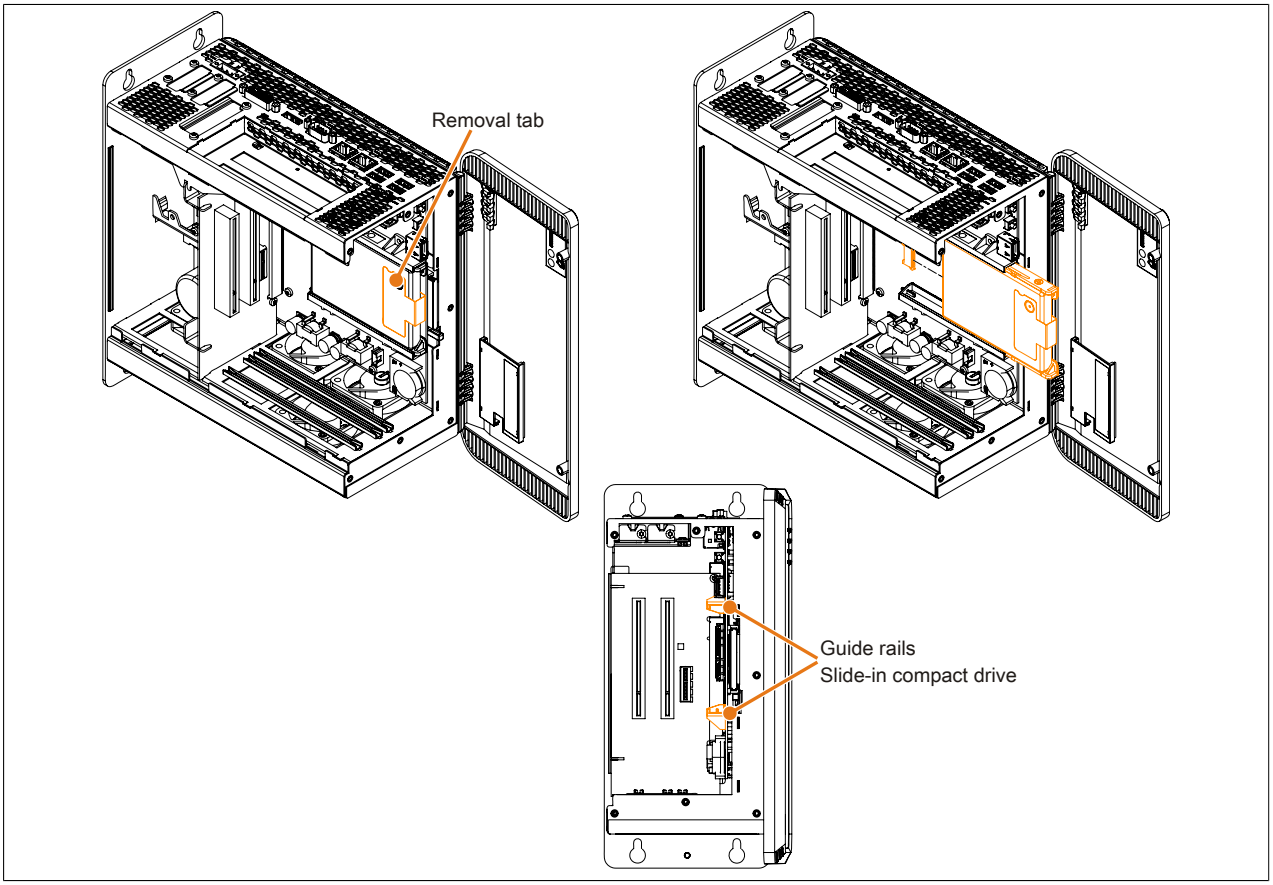


Figure 156: Installing / Replacing the slide-in compact drive

6. Attach the side cover.

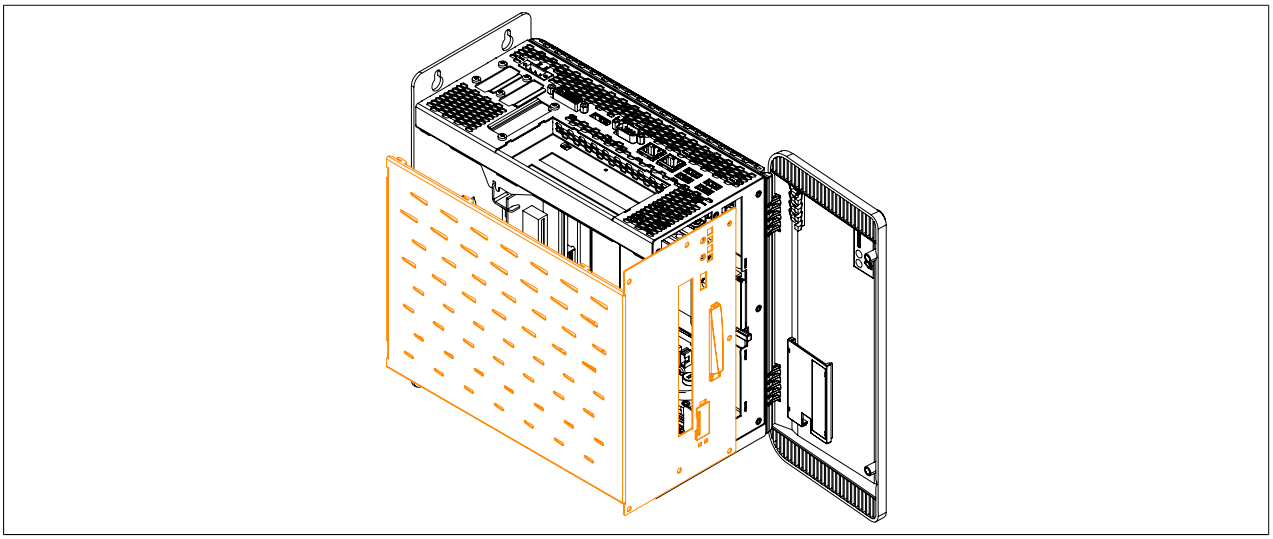


Figure 157: Replacing the side cover

7. Secure the side cover to the B&R Industrial PC using the same torx screws (T10) as before.

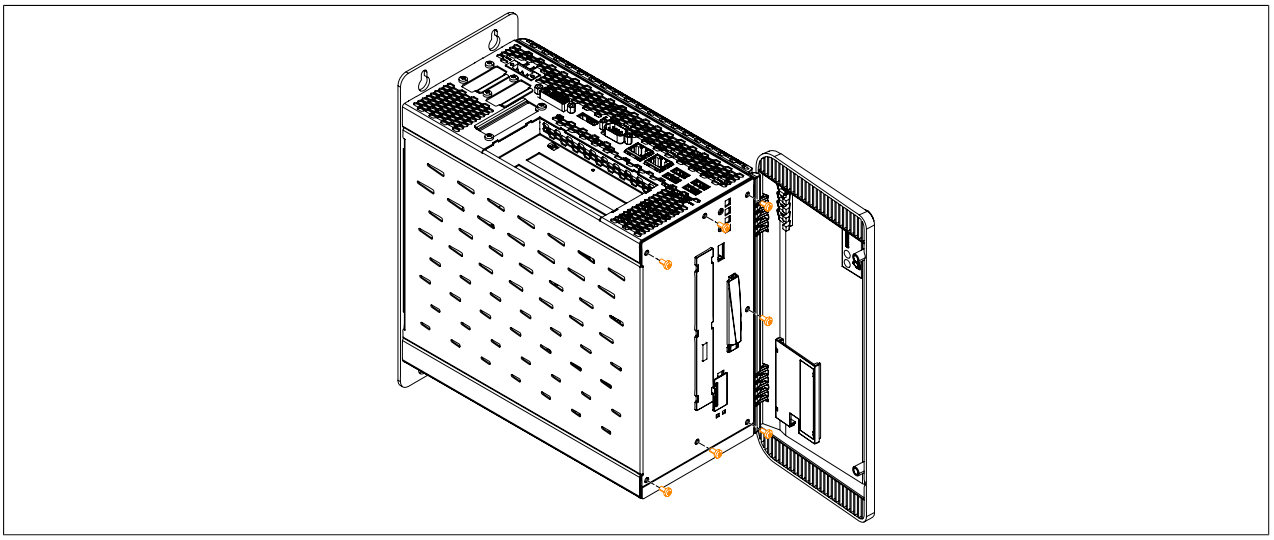


Figure 158: Securing the side cover

6 Installing and replacing slide-in drives

1. Disconnect the power supply to the B&R Industrial PC.
2. Touch the housing or ground connection in order to discharge any electrostatic charge from your body.
3. Open the front cover. The torx screws (T10) behind the cover that are marked in the image must then be removed. The number of torx screws can vary depending on the system unit.

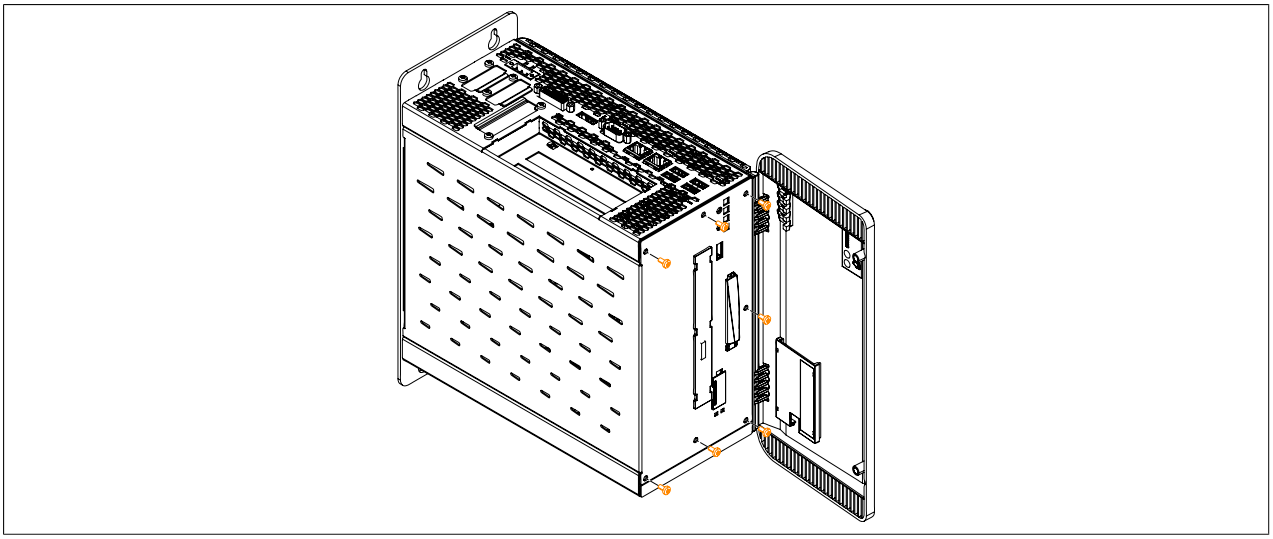


Figure 159: Removing the torx screws for the side cover

4. After the screws have been removed, the side cover can be removed by sliding it first toward the front and then to the side.

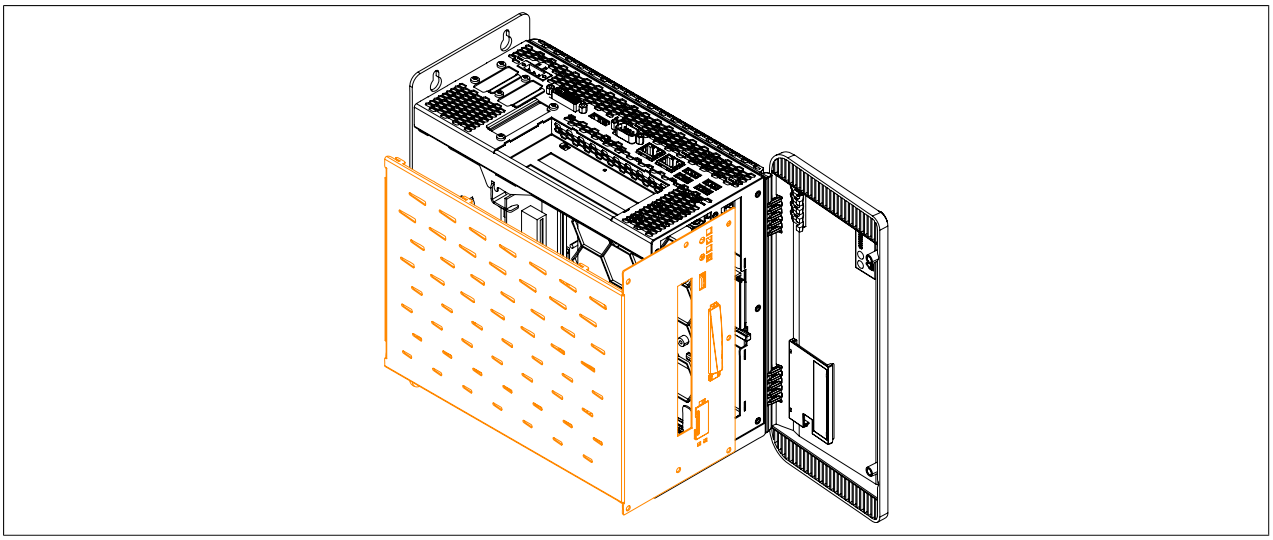


Figure 160: Removing the side cover

5. Install / replace the slide-in compact drive. The slide-in compact drive must slide into the guide rails and snap into the connector.

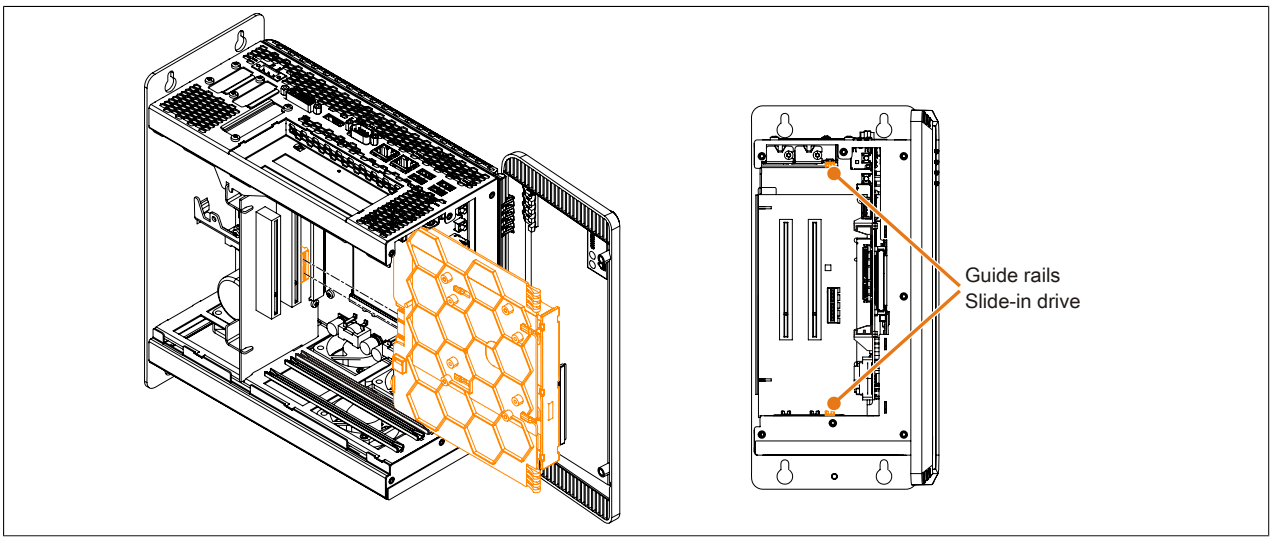


Figure 161: Installing / Replacing the slide-in drive

6. Attach the side cover.

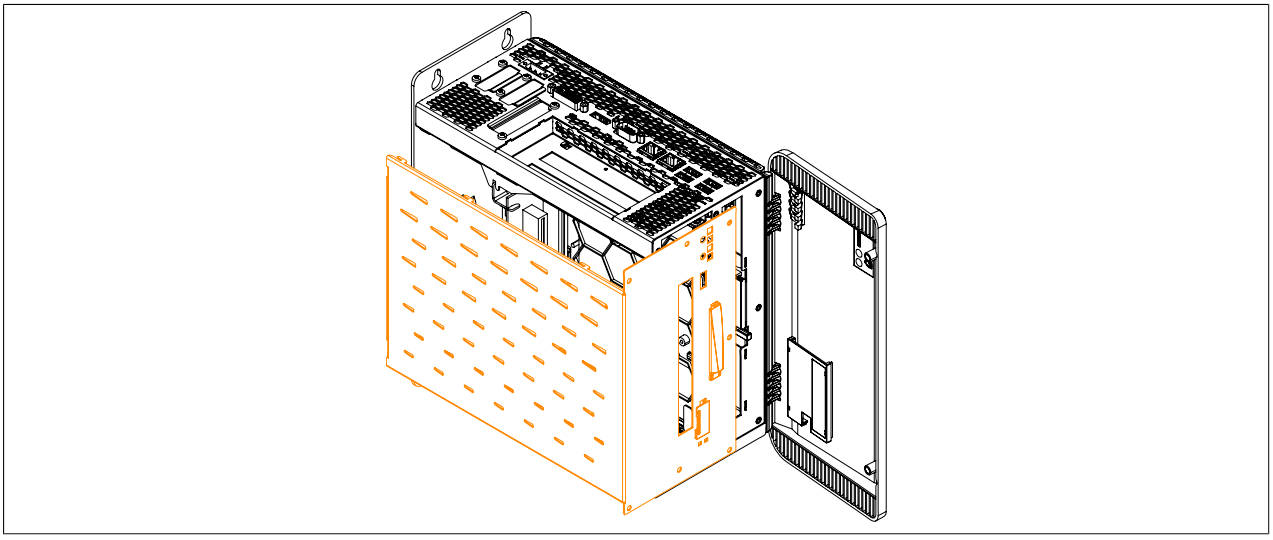


Figure 162: Replacing the side cover

7. Secure the side cover to the B&R Industrial PC using the same torx screws (T10) as before.

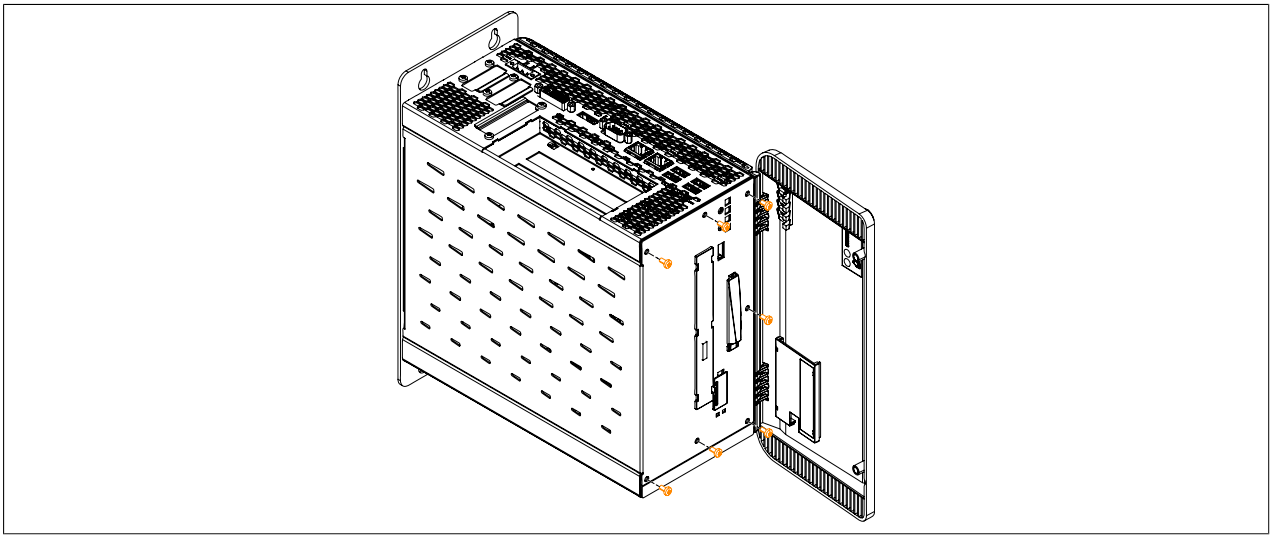


Figure 163: Securing the side cover

7 Installing PCI / PCIe cards

1. Disconnect the power supply to the B&R Industrial PC.
2. Touch the housing or ground connection in order to discharge any electrostatic charge from your body.
3. Open the front cover. The torx screws (T10) behind the cover that are marked in the image must then be removed. The number of torx screws can vary depending on the system unit.

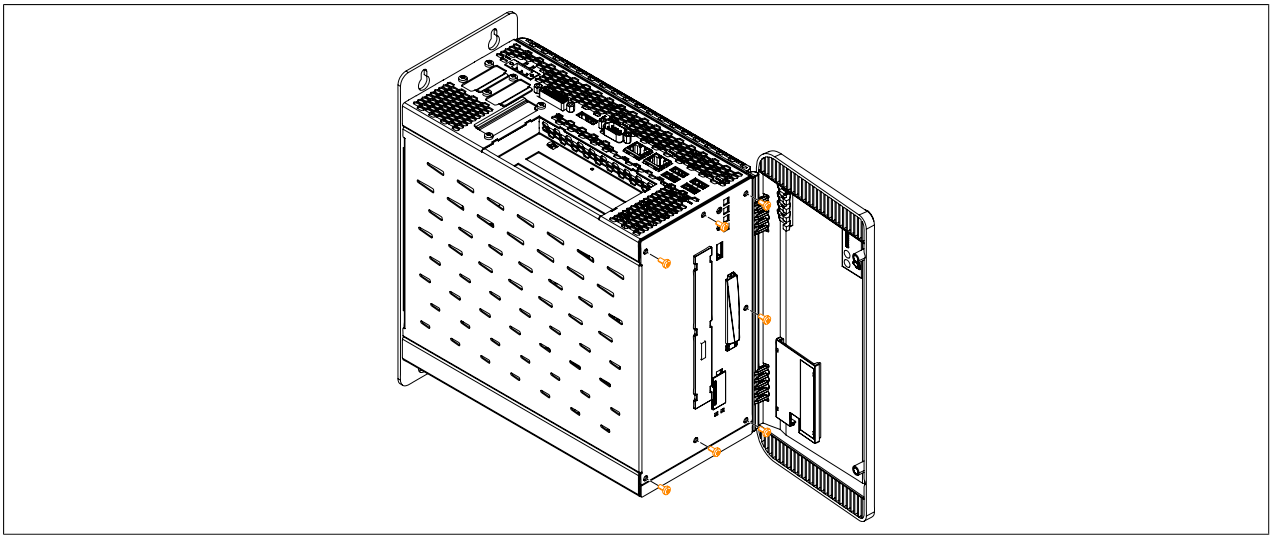


Figure 164: Removing the torx screws for the side cover

4. After the screws have been removed, the side cover can be removed by sliding it first toward the front and then to the side.

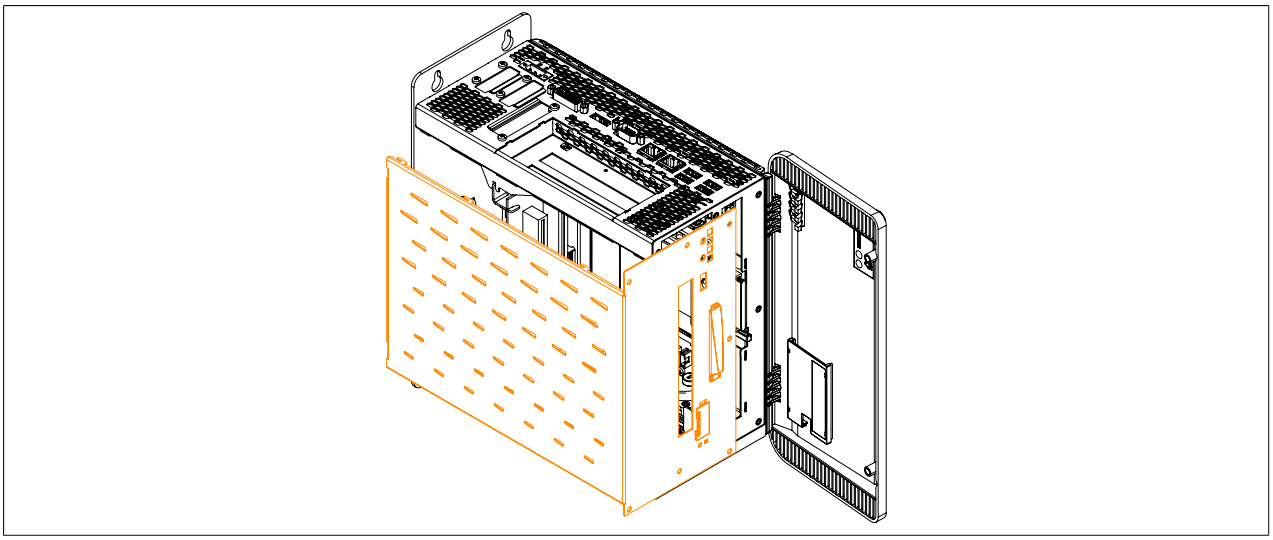


Figure 165: Removing the side cover

5. Remove the PCI slot cover. This is done by first removing the marked torx screws (T10) and then removing the cover.

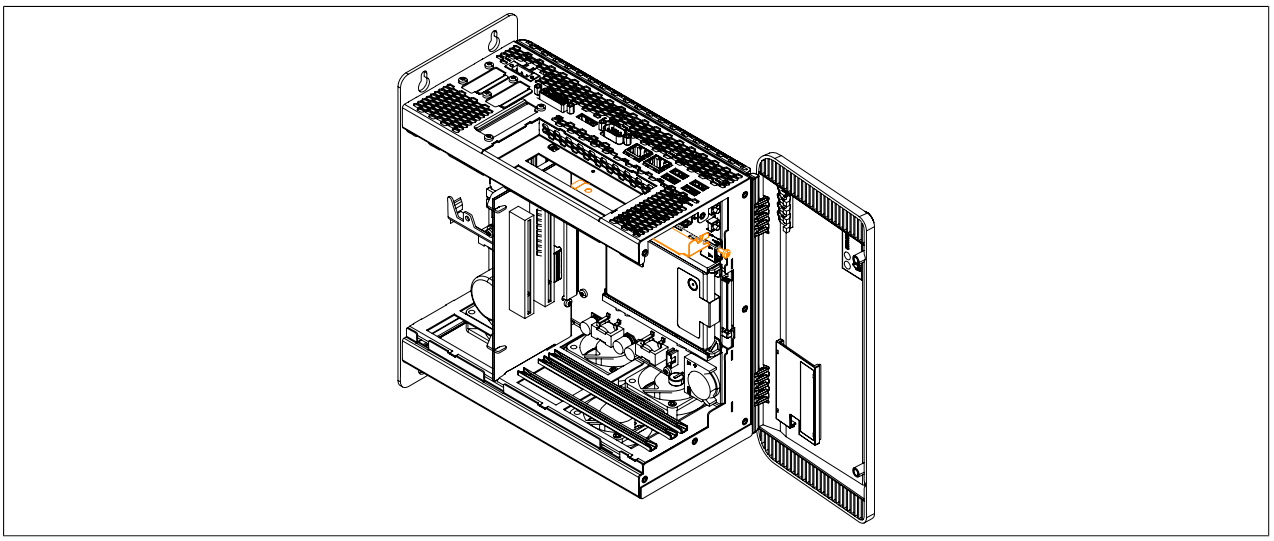


Figure 166: Removing the PCI / PCIe slot cover

6. Install or replace the PCI / PCIe card. Be sure to insert the PCI / PCIe card in the lower black guide rail. Fasten the PCI or PCIe card using the marked (previously removed) torx screws (T10).

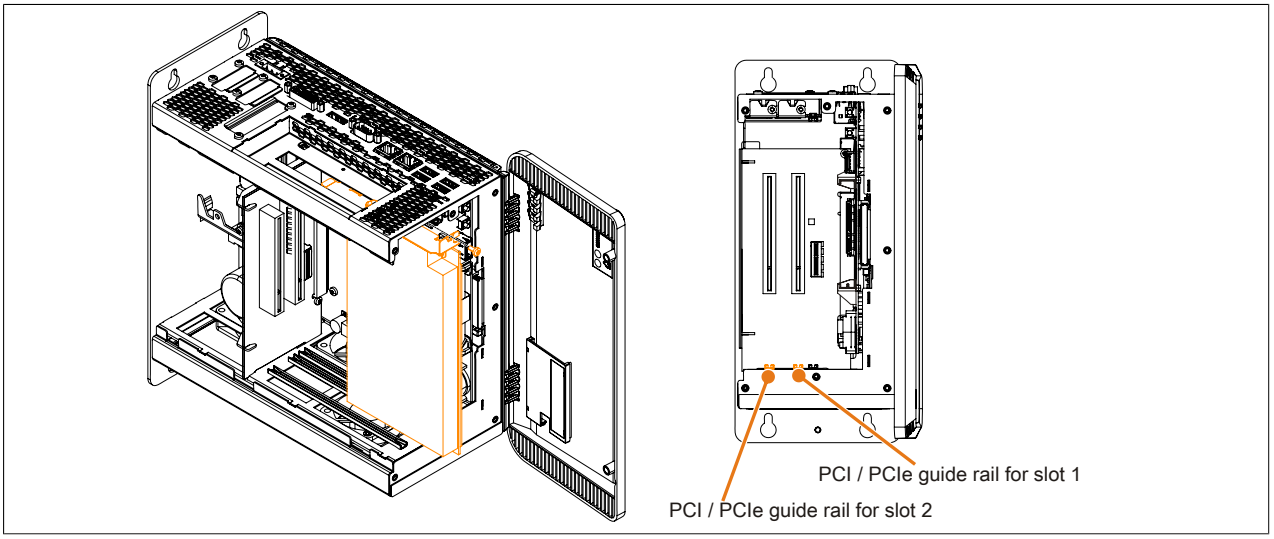


Figure 167: Installing / Replacing the PCI / PCIe card

7. Attach the side cover.

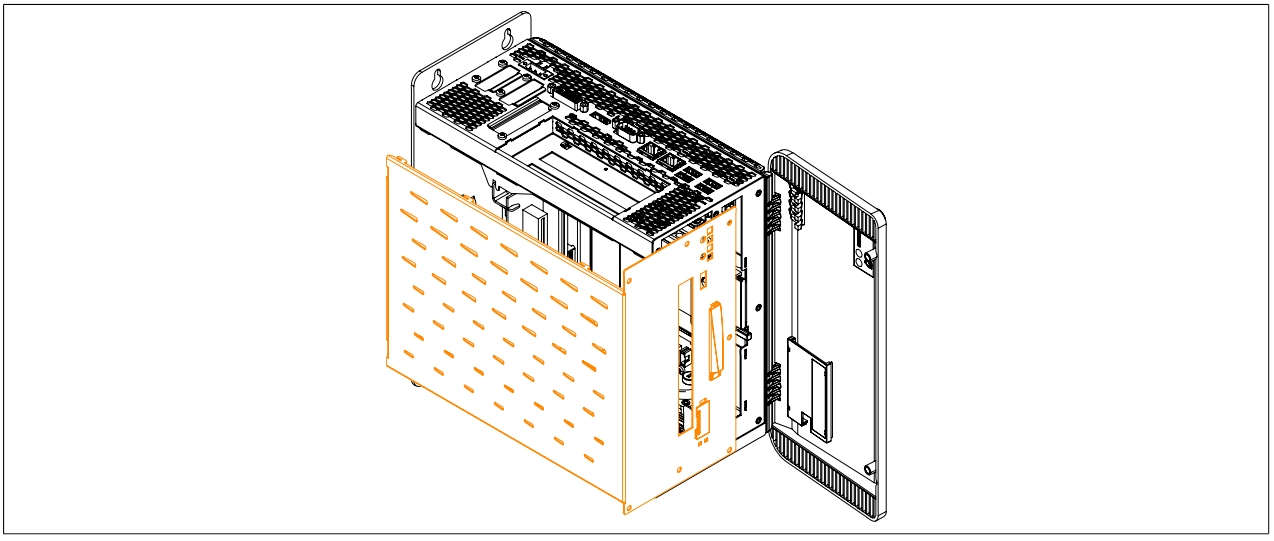


Figure 168: Replacing the side cover

8. Secure the side cover to the B&R Industrial PC using the same torx screws (T10) as before.

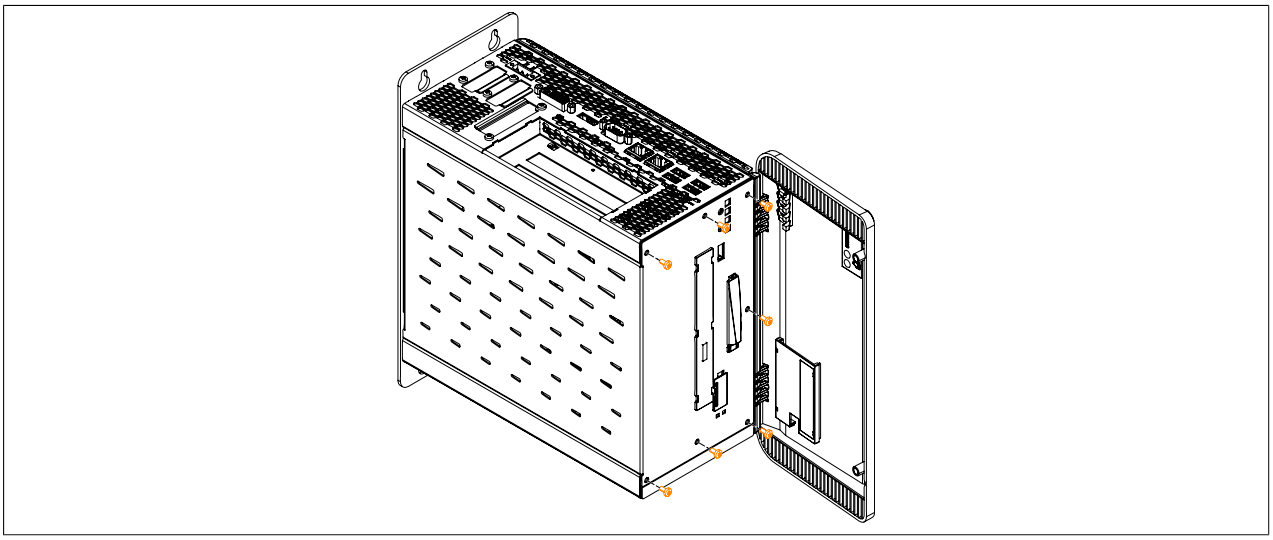


Figure 169: Securing the side cover

8 Installing and connecting the UPS battery unit

Information:

For information on installing the UPS IF option, see "Installing interface options" on page 227.

1. Disconnect the power supply to the B&R Industrial PC.
2. Install the 5AC901.BUPS-00 battery unit. The drilling template can be found under "Drilling template" on page 99. Ensure that the distance between the battery unit and the B&R Industrial PC allows them to be connected with the UPS cable (0.5 m or 3 m).
   Installation requires 4 M5 screws, 4 washers and 1 screw lock (min. torque 1.3 Nm; screw depth as per applicable DIN regulations and specific application). These are not included in delivery.
3. Connect the wire with the blue tip sleeves to the supply voltage (orange screw clamp), connect the wire with the red tip sleeves to the temperature sensor (green screw clamp) and tighten with a screwdriver (max. torque 0.4 Nm).
4. Connect the 4-pin screw clamp to the UPS IF option and tighten the two screws with a screwdriver (max. torque 0.4 Nm).

9 Replacing fan filters

1. Disconnect the power supply to the B&R Industrial PC.
2. Touch the housing or ground connection in order to discharge any electrostatic charge from your body.
3. Open the front cover.
4. To remove the fan filter from the B&R Industrial PC, push up on the locking mechanism while pulling the fan filter outward. The number of locking mechanisms may vary depending on the system unit.

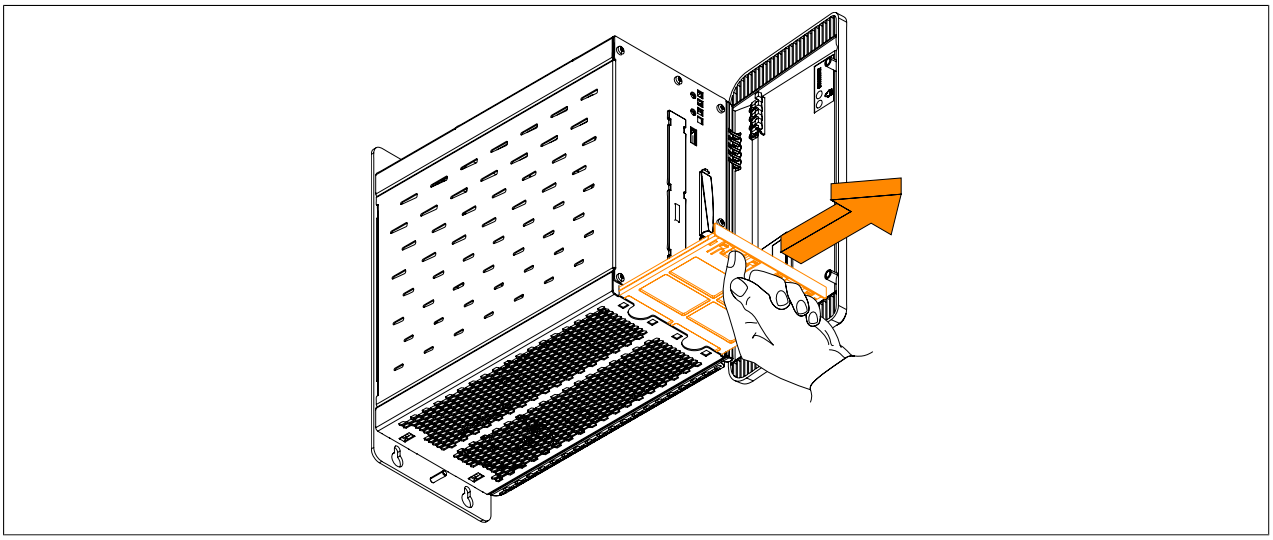


Figure 170: Removing the fan filter from the APC910

Information:

The dust filter must be inspected at regular intervals determined by the amount of dust in the operating environment.

10 Replacing fan kits

1. Disconnect the power supply to the B&R Industrial PC.
2. Touch the housing or ground connection in order to discharge any electrostatic charge from your body.
3. Open and remove the front cover.

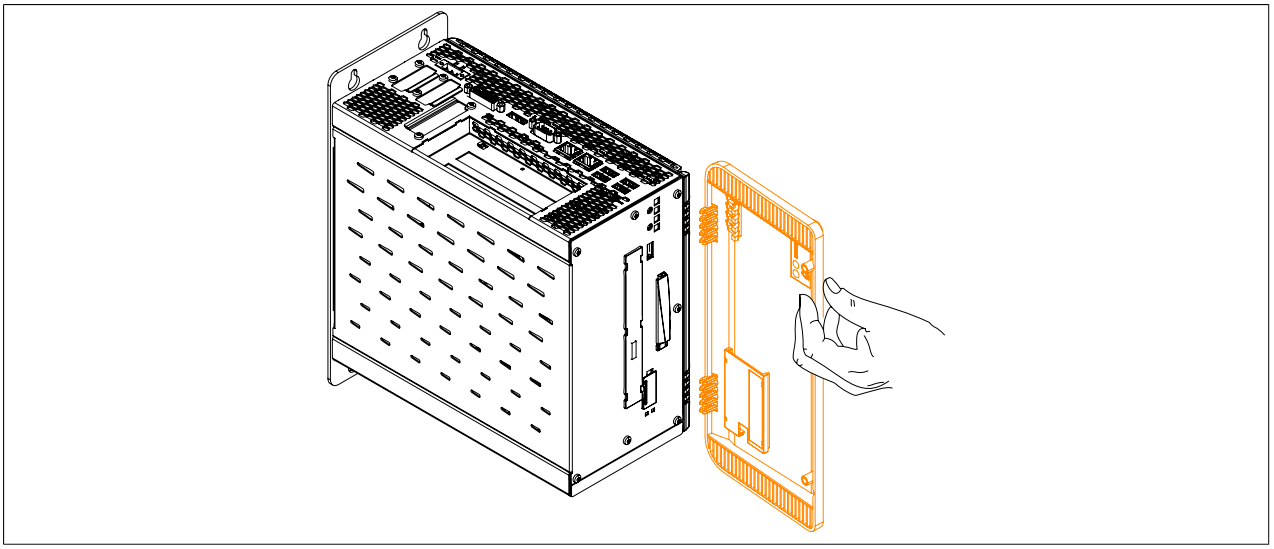


Figure 171: Removing the front cover

4. Remove the heat sink cover. The torx screws (T10) that are marked in the image must be removed.

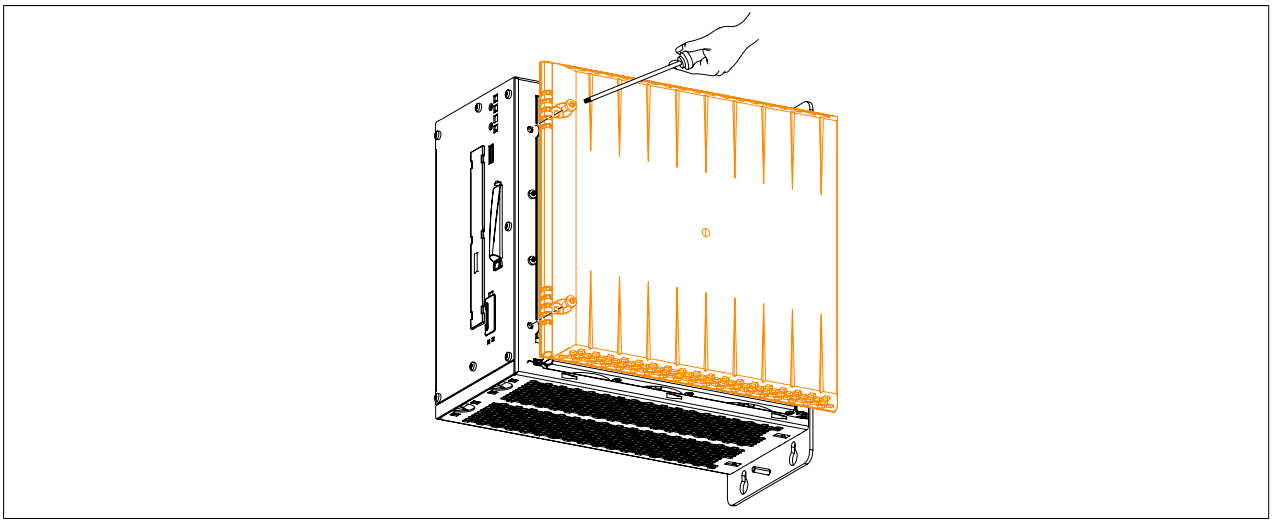


Figure 172: Removing the heat sink cover

5. Remove the torx screws (T10) from the fan kit that are marked in the following image and unplug the fan kit cable from the mainboard.

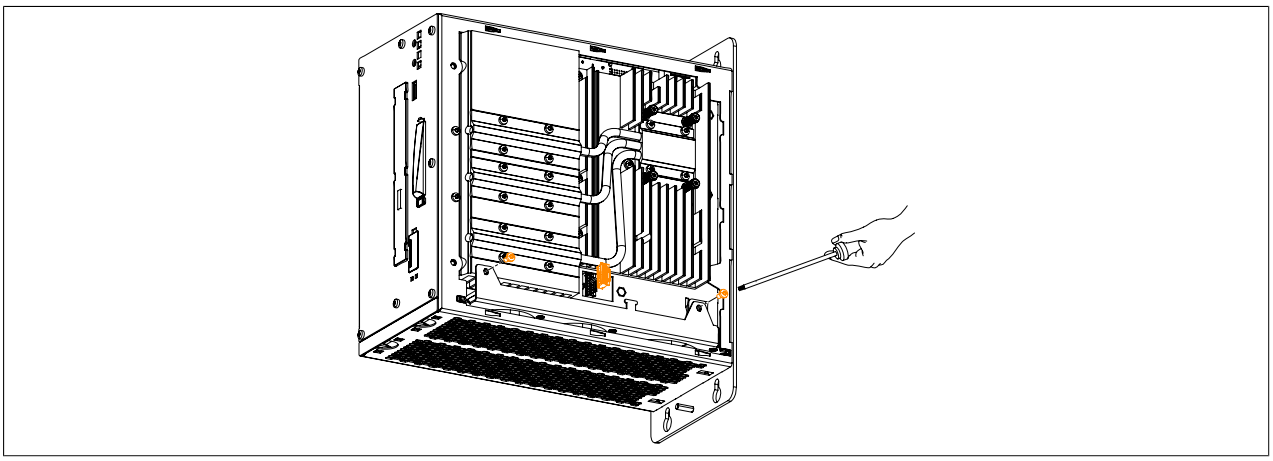


Figure 173: Removing the torx screws and fan cable

6. The fan kit can now be removed from the Automation PC 910.

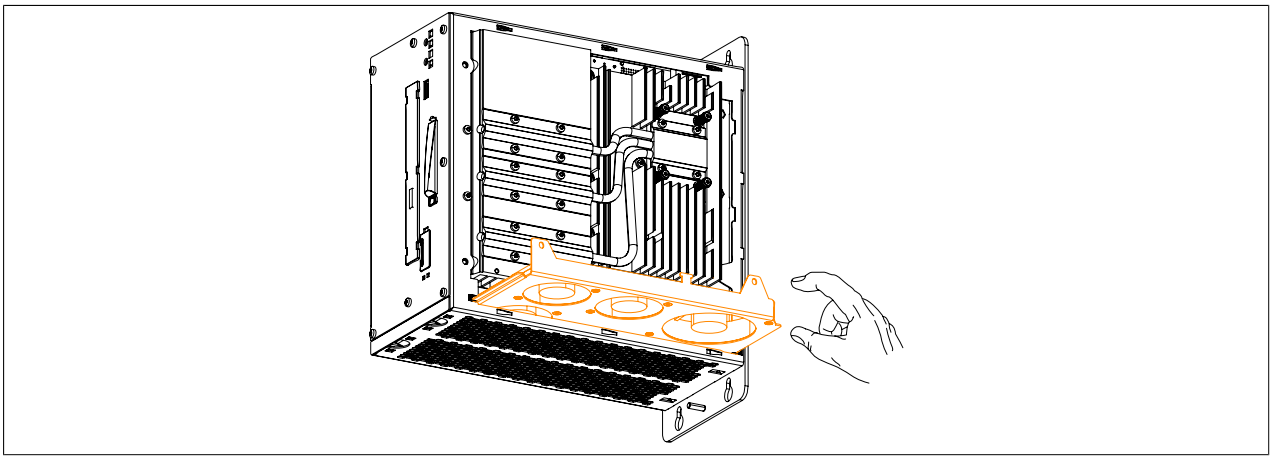


Figure 174: Removing the fan kit from the APC910

7. The Automation PC 910 can now be re-assembled by carrying out these instructions in reverse.

11 Connecting an external device to the mainboard

A plug on the mainboard allows +5 VDC and +12 VDC to be branched off in order to supply special PCI cards, for example.

This voltage can be accessed using the "Internal supply cable" on page 223. The multi-pin connector is located near the battery and slide-in compact drive.

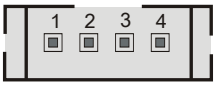
Multi-pin connector for external devices			
Pin	**Assignment**	**Power**	4-pin connector, male
1	+12 VDC	Max. 10 watts	
2	GND		
3	GND	Max. 5 watts	
4	+5 VDC		

Table 217: Pinout - Multi-pin connector on the mainboard

Connections are protected with a 1A multi-fuse.

1. Disconnect the power supply to the B&R Industrial PC.
2. Touch the housing or ground connection in order to discharge any electrostatic charge from your body.
3. Open the front cover. The torx screws (T10) behind the cover that are marked in the image must then be removed. The number of torx screws can vary depending on the system unit.

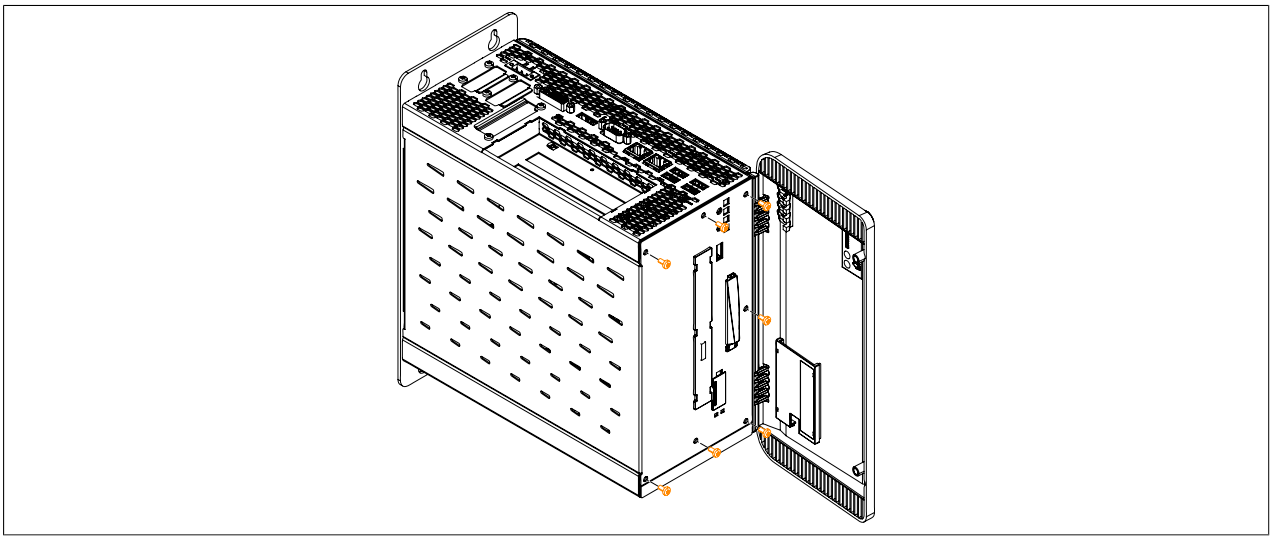


Figure 175: Removing the torx screws for the side cover

4. After the screws have been removed, the side cover can be removed by sliding it first toward the front and then to the side.

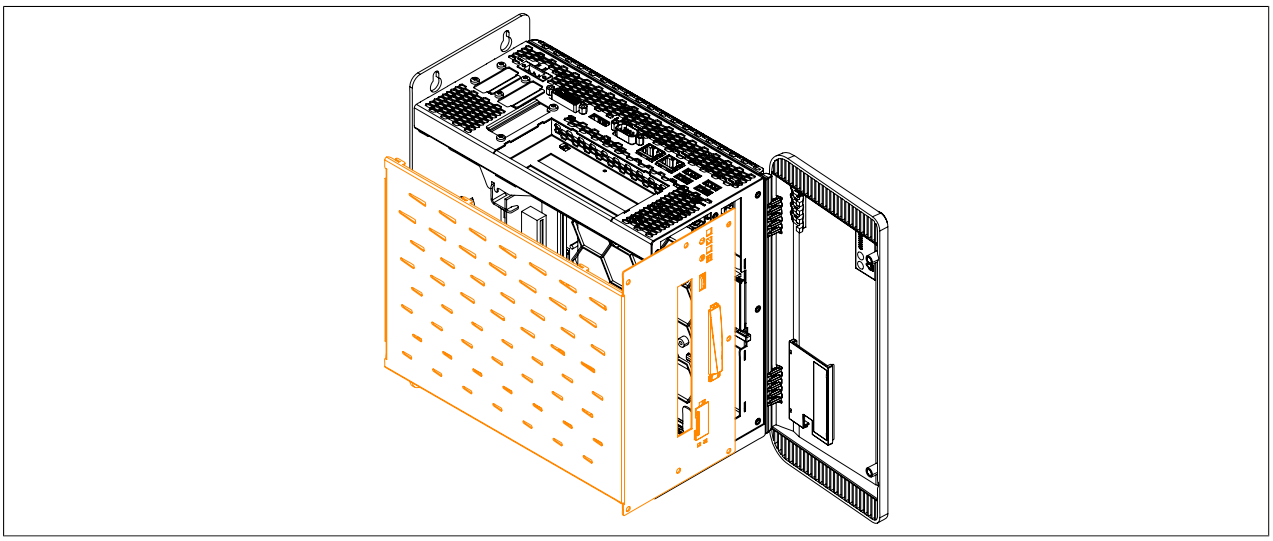


Figure 176: Removing the side cover

5. To access the multi-pin connector for external devices, it may be necessary to first remove any installed slide-in drives.

6. Plug the internal supply cable into the multi-pin connector for external devices on the mainboard. The springs on the supply cable plug must fit into the grooves of the multi-pin connector.

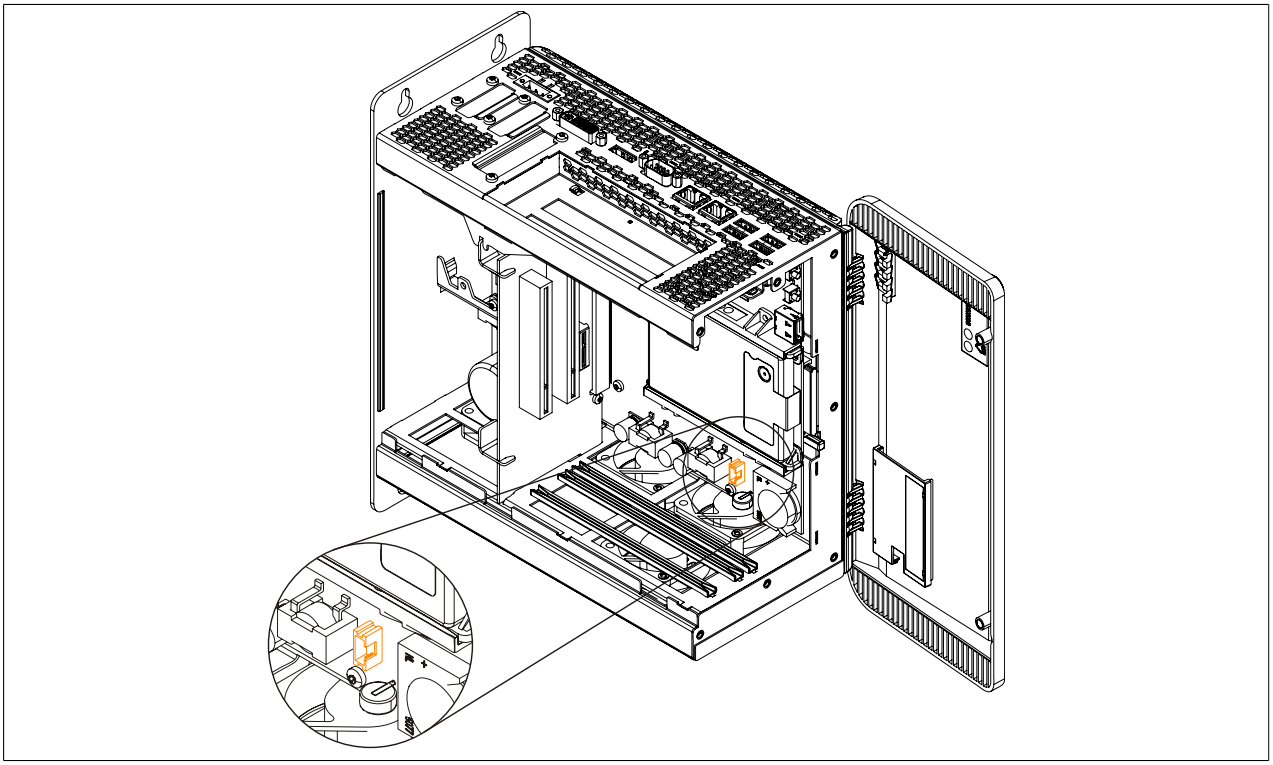


Figure 177: Connector location for external devices

7. Now connect the internal supply cable to the external device and replace any slide-in drives that were removed earlier.
8. Attach the side cover.

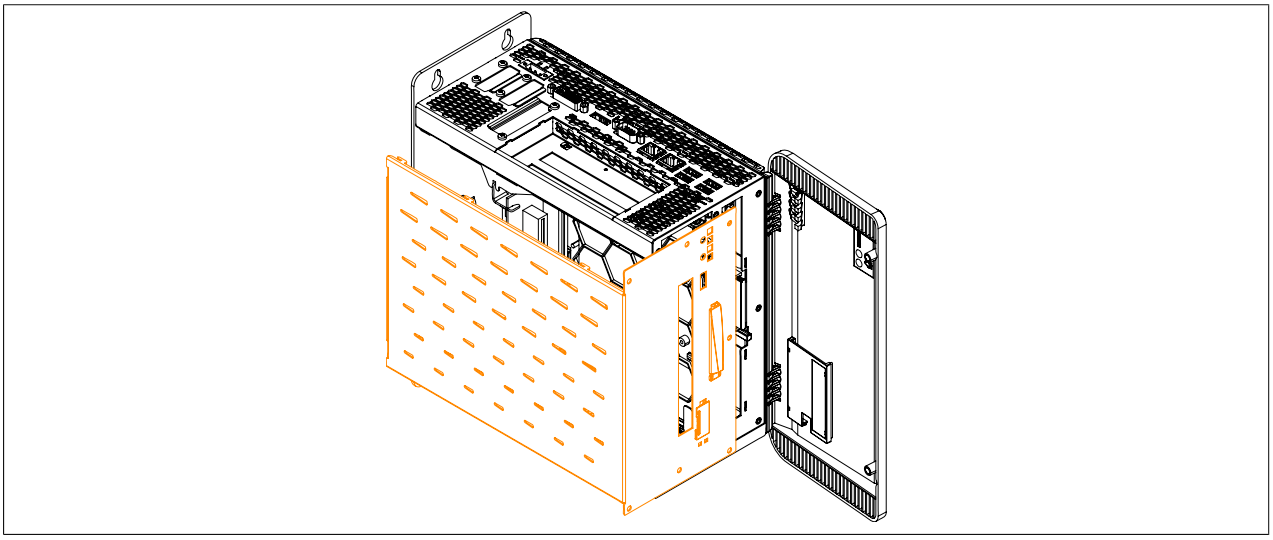


Figure 178: Replacing the side cover

9. Secure the side cover to the B&R Industrial PC using the same torx screws (T10) as before.

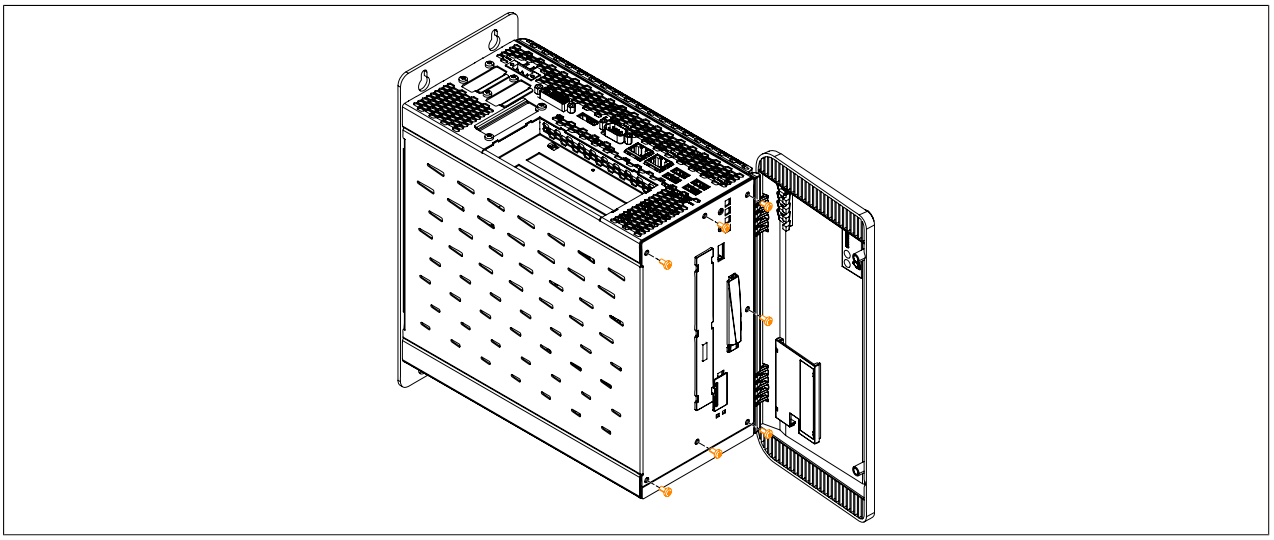


Figure 179: Securing the side cover

Appendix A

1 Abbreviations

Abbreviation	Stands for	Description
NC	Normally closed	A normally closed (N.C.) relay contact.
	Not connected	Used in pinout descriptions if a terminal or pin is not connected to a module
ND	Not defined	In data tables, this stands for a value that has not been defined. This may be because a cable manufacturer does not provide certain technical data, for example.
NO	Normally open	A normally open relay contact
TBD	To be defined	Used in technical data tables when certain information is not yet available. The value will be provided later.

Table 218: Abbreviations used in this user's manual

2 Glossary

Address	An address is a character string for identifying a memory location or a memory area, where data is stored and can be retrieved. It is also a symbol (e.g. with numerical controllers) for identifying a function unit for which subsequent geometrical or technological data are determined by the symbol.
ANSI	American National Standards Institute > this organization promotes and manages American industrial standards.
APC	Abbreviation for »Automation PC«
ASCII	American Standard Code for Information Interchange, used worldwide; numbers, letters, special characters and device controller characters are represented as 7-bit binary combinations. Standard ASCII-characters cover 27 = 128 characters in total. An eighth bit is used as a so-called parity bit for error detection when transferring ASCII files. During even parity checking, this bit is set to 0, when the number of ‘1s’ in the remaining seven bits is an even number. Otherwise, it is set to 1. The expanded ASCII character set does not use parity checking. The highest value bit is used here to switch from the standard character set to the expansion. This allows space for special regional characters e.g. umlauts in the German language. www.asciitable.com
Automation	According to Brockhaus: The application of technical means, using specific programs that (either partially or totally) do not require human intervention to perform operations.
Automation Runtime	A uniform runtime system for all B&R automation components.
Failure	Failure according to IEC 61508: A function unit loses the ability to perform a required function. In regards to safety-oriented systems, a distinction is made between dangerous and safe failures. This depends on whether the status of the system failure is considered dangerous or safe. The cause of the failure may be load related or age-related, and therefore a random failure, or related to a flaw inherent in the system. In this case, it is known as a systematic failure.

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