Automation PC 810 with GM45 CPU board

User's Manual

Version: **1.20 (April 2012)**
Order no.: **MAAPC800A-ENG**

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Chapter 1 • General information

1 Manual history

Version	Date	Change
1.00	2010-01-18	• First version
1:05	2010-03-24	• Documentation "Automation PC 810 with BM45 CPU board" renamed to "Automation PC 810 with GM45 CPU board". • Table "Table 17: Monitor / Panel connection - RGB, DVI, SDL" on page 49 corrected. • Figure "Image 0: " on page 25 corrected. • - Section "Automation PC 810 with Windows XP Embedded" renamed to "Automation PC 810 with Windows Embedded Standard 2009", see page 245.
1:10	2010-07-26	• Chapter Chapter 5 "Standards and certifications" on page 265 revised. • CPU board name changed from BM45 to GM45. • The system unit 5PC810.SX03-00, the bus unit 5PC810.BX03-00, the fan kit 5PC810.FA03-00 and the replacement fan 5AC801.FA03-00 added. • CPU board 5PC800.BM45-01 added. • Main memory 5MMDDR.4096-02 added. • B&R ID codes for system units added. • Technical data "Remanent variables for AR (Automation Runtime) in Power Fail Mode" added for the APC810 system units. • Section 9 " B&R Automation Device Interface (ADI) - Control Center" on page 250 updated. • B&R 16 GB CompactFlash card (5CFCRD.016G-04) added. • Section 11 " Cable" on page 323 added to Chapter 6 " Accessories" . • B&R USB flash drive added to the chapter Chapter 6 " Accessories" on page 280. • Section 5 " Windows 7" on page 243 added to "Software" .
1.11	04-Nov-10	• Ready relay 5AC801.RDYR-01 updated in the chapter Chapter 6 " Accessories". • Section 12 " Installing the ready relay /2 in the add-on UPS slot" on page 374 added to Chapter 7 "Maintenance / Servicing" . • 104added. • 122 added. • 125 added. • Figure "Image 0: " on page 25 revised. • 5AC801.HDDI-03, 5ACPCI.RAIC-05 and 5MMHDD.0250-00 added to sections 2.1.1 "Maximum ambient temperature with a fan kit" on page 27 and 2.2 " Humidity specifications" on page 30.
1.12	18-Feb-11	• BIOS updated to Version 1.13. • Section 5 " CompactFlash cards" on page 284 updated. • Section 7 " Windows Embedded Standard 7" on page 247 added.
1.13	24-May-11	• Sections " Automation Runtime" on page 249, "B&R Automation Runtime Dongle", on page 378, and "B&R Automation Device Interface (ADI) .NET SDK" on page 261 added. • Sections "B&R Key Editor" on page 263, "B&R Automation Device Interface (ADI) Development Kit" on page 259, " B&R Automation Device Interface (ADI) - Control Center" on page 250 and " HMI Drivers & Utilities DVD" on page 308 revised. • Bus unit 5PC810.BX05-02 added • Figure "Image 0: " on page 25 revised. • 5SWWI7.0900-MUL and 5SWWI7.1000-MUL in section " Windows Embedded Standard 7" on page 247 added.
1.14	06-Jul-11	• USB 5 added in heading (" USB ports (USB1, 2, 3, 4, 5)" on page 52). • Section " Add-on UPS slot" on page 54 revised. • 5CFCRD.016G-04 added in table "Table 32: CompactFlash slot (CF1)" on page 60. • 5AC801.HDDI-03 added in table "Table 36: Slide-in compact slot" on page 62 and short description for 5AC801.HDDI-02 corrected. • Table entry "Charge duration when battery low“ added "Table 276: 5AC600.UPSB-00 - Technical data" on page 314. • Sections " B&R Automation Device Interface (ADI) - Control Center" on page 250, "B&R Automation Device Interface (ADI) Development Kit" on page 259 and "B&R Automation Device Interface (ADI) .NET SDK" on page 261 revised. • Information regarding "Special considerations for the 5PCI slot model" added to " Windows XP Professional" on page 241 and " Windows 7" on page 243. • Information on "Windows XP Mode" in section "Features with WES7 (Windows Embedded Standard 7)" on page 248 corrected. • Reference to external USV 24 VDC in section " Uninterruptible power supply" on page 311 revised.

Table 1: Manual history

Version	Date	Change
1.20	23-Apr-12	• Section " CompactFlash cards" on page 284 updated. • Section "B&R Automation Device Interface (ADI) Development Kit" moved to Software chapter. • Section "Temperature sensor locations" moved to Technical Data chapter. • New CompactFlash cards 5CFCRD.xxxx-06 added to chapter Chapter 6 " Accessories" - CompactFlash cards 5CFCRD.xxxx-04 discontinued. • Section "B&R Automation Runtime Dongle" removed, order data added to section " Automation Runtime" on page 249 . • BIOS Version updated (1.13 -> 1.15). • Information about Automation Device Interface and Key Editor updated. • Entire manual revised according to current formatting standards.

Table 1: Manual history

2 Safety notices

2.1 Intended use

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

2.2 Protection against electrostatic discharge

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

2.2.1 Packaging

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

2.2.2 Guidelines for ESD handling

Electrical components with housing

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

Electrical components without housing

The following applies in addition to "Electrical components with housing"

- Any persons handling electrical components or devices that will be installed in the electrical components must be grounded.
- Components can only be touched on the small sides or on the front plate.
- Components should always be stored in a suitable medium (ESD packaging, conductive foam, etc.). Metallic surfaces are not suitable storage surfaces!
- Electrostatic discharges should be avoided on the components (e.g. through charged plastics).
- A minimum distance of 10 cm must be kept from monitors and TV sets.
- Measurement devices and equipment must be grounded.
- Measurement probes on potential-free measurement devices must be discharged on sufficiently grounded surfaces before taking measurements.

Individual components

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

2.3 Policy and procedures

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

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

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

2.4 Transport and storage

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

2.5 Installation

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

2.6 Operation

2.6.1 Protection against touching electrical parts

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

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

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

2.6.2 Environmental conditions - Dust, humidity, aggressive gases

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

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

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

2.6.3 Programs, viruses, and dangerous programs

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

2.7 Environmentally-friendly disposal

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

2.7.1 Separation of materials

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

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

Table 2: Environmentally-friendly separation of materials

Disposal must comply with the respective legal regulations.

3 Organization of safety notices

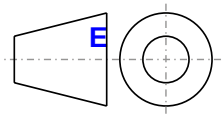
The safety notices in this manual are organized as follows:

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

Table 3: Organization of safety notices

4 Guidelines

All dimensions in mm.



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

Nominal measurement area	General tolerance according to DIN ISO 2768 medium
Up to 6 mm	± 0.1 mm
for 6 to 30 mm	± 0.2 mm
for 30 to 120 mm	± 0.3 mm
for 120 to 400 mm	± 0.5 mm
for 400 to 1000 mm	± 0.8 mm

Table 4: Nominal measurement areas

5 Overview

Product ID	Short description	on page
1A4600.10-2	B&R Automation Runtime ARwin, ARNC0	249
1A4600.10-3	B&R Automation Runtime ARwin+PVIControls incl. License Label and Security Key	249
1A4600.10-4	B&R Automation Runtime ARwin+ARNC0+PVIControls	249
1A4601.06-2	B&R Automation Runtime ARemb, ARNC0	249
5CAMSC.0001-00	APC620 internal power supply cable - Customized -	342
5CFCRD.016G-04	B&R CompactFlash 16 GB	290
5CFCRD.0512-04	B&R CompactFlash 512 MB	290
5CFCRD.1024-04	B&R CompactFlash 1 GB	290
5CFCRD.2048-04	B&R CompactFlash 2 GB	290
5CFCRD.4096-04	B&R CompactFlash 4 GB	290
5CFCRD.8192-04	B&R CompactFlash 8 GB	290
5MMUSB.2048-00	USB Memory Stick 2048MB	304
	APC620/PPC700	
1A4601.06	B&R Automation Runtime ARemb, incl. License Label and Security Key	249
	Accessories	
5AC801.FA01-00	Fan filter for APC810 5 pcs. (spare part), for 5PC810.SX01-00.	282
5AC801.FA02-00	Fan filter for APC810 5 pcs. (spare part), for 5PC810.SX02-00.	282
5AC801.FA03-00	Fan filter for APC810 5 pcs. (spare part), for 5PC810.SX03-00.	282
5AC801.FA05-00	Fan filter for APC810 5 pcs. (spare part), for 5PC810.SX05-00.	282
5AC801.RDYR-01	APC810 Ready Relay /2	345
	Automation Panel Link Steckkarten	
5AC801.RDYR-00	APC810 Ready Relais	133
5AC801.SDL0-00	APC810 AP Link SDL Transmitter	131
	Batteries	
0AC201.91	Lithium batteries 4 pcs., 3 V / 950 mAh button cell We hereby state that the lithium cells contained in this shipment qualify as "partly regulated". Handle with care. If the package is damaged, inspect cells, repack intact cells and protect cells against short circuits. For emergency information, call RENATA SA at + 41 61 319 28 27	280
4A0006.00-000	Lithium battery, 3 V / 950 mAh, button cell	280
	Bus units	
5PC810.BX01-00	APC810 bus, 1 PCI	95
5PC810.BX01-01	APC810 bus, 1 PCI Express (x4)	95
5PC810.BX02-00	APC810 bus, 2 PCI	95
5PC810.BX02-01	APC810 bus, 1 PCI, 1 PCI Express (x4)	95
5PC810.BX03-00	APC810 bus, 2 PCI, 1 PCI Express (x4)	95
5PC810.BX05-00	APC810 bus, 4 PCI, 1 PCI Express (x1)	95
5PC810.BX05-01	APC810 bus, 2 PCI, 3 PCI Express (x1)	95
5PC810.BX05-02	APC810 bus, 5 PCI	95
	CPU boards	
5PC800.BM45-00	CPU Board Intel Core2 Duo T9400, 2.53 GHz, 1066 MHz FSB, 6 MB L2 cache; chipset GM45; 2 sockets for SO-DIMM DDR3 RAM modules	96
5PC800.BM45-01	CPU Board Intel Core2 Duo P8400, 2.26 GHz, 1066 MHz FSB, 3 MB L2 Cache; chipset GM45; 2 sockets for SO-DIMM DDR3 RAM modules	96
	CompactFlash	
5CFCRD.0064-03	CompactFlash 64 MB Western Digital	294
5CFCRD.0128-03	CompactFlash 128 MB Western Digital	294
5CFCRD.016G-06	B&R CompactFlash 16 GB	286
5CFCRD.0256-03	CompactFlash 256 MB Western Digital	294
5CFCRD.0512-03	CompactFlash 512 MB Western Digital	294
5CFCRD.0512-06	B&R CompactFlash 512 MB	286
5CFCRD.1024-03	CompactFlash 1 GB Western Digital	294
5CFCRD.1024-06	B&R CompactFlash 1 GB	286
5CFCRD.2048-03	CompactFlash 2 GB Western Digital	294
5CFCRD.2048-06	B&R CompactFlash 2 GB	286
5CFCRD.4096-03	CompactFlash 4 GB Western Digital	294
5CFCRD.4096-06	B&R CompactFlash 4 GB	286
5CFCRD.8192-03	CompactFlash 8 GB Western Digital	294
5CFCRD.8192-06	B&R CompactFlash 8 GB	286
	DVI cables	
5CADVI.0018-00	DVI-D Cable, 1.8 m.	323
5CADVI.0050-00	DVI-D Cable, 5 m.	323
5CADVI.0100-00	DVI-D Cable, 10 m.	323
	Drives	
5AC801.HDDI-03	250 GB SATA hard disk (slide-in compact); 24/7 hard disk. Remark: Please see manual for proper use of the hard disk.	104
5ACPCI.RAIC-05	PCI RAID System SATA 2x 250 GB; Remark: Please see manual for proper use of the hard disk.	122
5MMHDD.0250-00	250 GB SATA Hard Disk Spare part for 5AC801.HDDI-03 and 5ACPCI.RAIC-05; Remark: Please see manual for proper use of the hard disk.	125
	Heat sinks	
5AC803.HS00-00	PPC800 heat sink for CPU boards with Dual Core processors L2400, L7400, U7500 and Celeron M 423.	97
5AC803.HS00-01	PPC800 heat sink for CPU boards with Dual Core processor T7400, T9400 and P8400.	97
5AC803.HS00-02	PPC800 heat sink for CPU board with Atom processor N270.	97
	Laufwerke	
5AC801.ADAS-00	APC810 Slide-In-C Adapter	109

Product ID	Short description	on page
5AC801.DVDS-00	APC810 Slide-In DVD-ROM	112
5AC801.DVRS-00	APC810 Slide-In DVD-R/RW	114
5AC801.HDDI-00	APC810 Slide-In-C HDD 40GB (EE25)	100
5AC801.HDDI-02	APC810 Slide-In-C HDD 160GB (M120)	102
5AC801.HDDS-00	APC810 Slide-In HDD 40GB (EE25)	110
5AC801.SSDI-00	APC810 Slide-In-C SSD SLC 32GB (X25E)	106
5ACPCI.RAIC-03	PCI RAID System SATA 2x160GB (M120)	116
5ACPCI.RAIC-04	Ersatz SATA-HDD 160GB (M120)	120
	Lüfter Kit	
5PC810.FA01-00	APC810 Lüfter Kit 1CS 40x40x10	127
5PC810.FA02-01	APC810 Lüfter Kit 2CS 70x70x15 /2	128
5PC810.FA03-00	APC810 Lüfter Kit 3CS 80x80x15	129
5PC810.FA05-00	APC810 Lüfter Kit 5CS 70x70x15	130
	MS-DOS	
9S0000.01-010	OEM Microsoft MS-DOS 6.22, German Floppy disks, only available with a new PC.	240
9S0000.01-020	OEM Microsoft MS-DOS 6.22, English Floppy disks, only available with a new PC.	240
	Main memory for GM45 CPU boards	
5MMDDR.2048-02	SO-DIMM DDR3 RAM 2048 MB PC3-8500	99
5MMDDR.4096-02	SO-DIMM DDR3 RAM 4096 MB PC3-8500	99
	Miscellaneous	
5SWHMI.0000-00	HMI Drivers & Utilities DVD	308
	RS232 cables	
9A0014.02	RS232 extension cable for remote operating of a display unit with touch screen, 1.8 m.	340
9A0014.05	RS232 extension cable for remote operating of a display unit with touch screen, 5 m.	340
9A0014.10	RS232 extension cable for remote operating of a display unit with touch screen, 10 m.	340
	SDL cables	
5CASDL.0018-00	SDL cable, 1.8 m.	326
5CASDL.0050-00	SDL cable, 5 m.	326
5CASDL.0100-00	SDL cable, 10 m.	326
5CASDL.0150-00	SDL cable, 15 m.	326
5CASDL.0200-00	SDL cable, 20 m.	326
5CASDL.0250-00	SDL cable, 25 m.	326
5CASDL.0300-00	SDL cable, 30 m.	326
	SDL cables: 45° connectors	
5CASDL.0018-01	SDL cable; 45° connector, 1.8 m.	329
5CASDL.0050-01	SDL cable; 45° connector, 5 m.	329
5CASDL.0100-01	SDL cable; 45° connector, 10 m.	329
5CASDL.0150-01	SDL cable; 45° connector, 15 m.	329
	SDL flex cables	
5CASDL.0018-03	SDL flex cable, 1.8 m.	332
5CASDL.0050-03	SDL flex cable, 5 m.	332
5CASDL.0100-03	SDL flex cable, 10 m.	332
5CASDL.0150-03	SDL flex cable, 15 m.	332
5CASDL.0200-03	SDL flex cable, 20 m.	332
5CASDL.0250-03	SDL flex cable, 25 m.	332
5CASDL.0300-03	SDL flex cable, 30 m.	332
5CASDL.0300-13	SDL cable with extender, 30 m.	335
5CASDL.0400-13	SDL flex cable with extender, 40 m.	335
5CASDL.0430-13	SDL flex cable with extender, 43 m.	335
	Serialadapter	
5AC600.485I-00	Add-On RS232/422/485 Interface	137
5AC600.CANI-00	Add-On CAN Interface	134
	Sonstiges	
5AC900.1000-00	Adapter DVI:CRT DVI-I/m:DB15HD/f	283
	Systemeinheiten	
5PC810.SX01-00	APC810 System 1CS 1SI	63
5PC810.SX02-00	APC810 System 2CS 2SI 1LS	71
5PC810.SX03-00	APC810 System 3CS 2SI 1LS	79
5PC810.SX05-00	APC810 System 5CS 3SI 1LS	87
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm², protected against vibration by the screw flange	281
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm², protected against vibration by the screw flange	281
	USB Zubehör	
5A5003.03	Controller R-IDE Frontklappe	302
5MD900.USB2-01	USB 2.0 Drive DVD-RW/CD-RW FDD CF USB	298
	USB accessories	
5MMUSB.2048-01	USB 2.0 flash drive 2048 MB B&R	306
	USB cables	
5CAUSB.0018-00	USB 2.0 connecting cable type A - type B, 1.8 m.	339
5CAUSB.0050-00	USB 2.0 connecting cable type A - type B, 5 m.	339
	Uninterruptible power supplies	
5CAUPS.0005-00	UPS cable 0.5 m; for USV 5AC600.UPSI-00.	317
5CAUPS.0030-00	UPS cable 3 m; for USV 5AC600.UPSI-00.	317

Product ID	Short description	on page
	Unterbrechungsfreie Stromversorgung	
5AC600.UPSB-00	APC Add-On USV Batterieeinheit 5Ah	314
5AC600.UPSI-00	APC Add-On USV Modul 80W	312
	Windows 7	
5SWWI7.0100-ENG	Microsoft OEM Windows 7 Professional 32-bit, DVD, English. Only available with a new device.	243
5SWWI7.0100-GER	Microsoft OEM Windows 7 Professional 32-bit, DVD, German. Only available with a new device.	243
5SWWI7.0200-ENG	Microsoft OEM Windows 7 Professional 64-bit, DVD, English. Only available with a new device.	243
5SWWI7.0200-GER	Microsoft OEM Windows 7 Professional 64-bit, DVD, German. Only available with a new device.	243
5SWWI7.0300-MUL	Microsoft OEM Windows 7 Ultimate 32-bit, DVD, multilaguange. Only available with a new device.	243
5SWWI7.0400-MUL	Microsoft OEM Windows 7 Ultimate 64-bit, DVD, multilaguange. Only available with a new device.	243
	Windows Embedded Standard 2009	
5SWWXP.0733-ENG	Microsoft OEM Windows Embedded Standard 2009, English; for APC810 with GM45 chipset; please order CompactFlash separately (minimum 1 GB).	245
	Windows Embedded Standard 7	
5SWWI7.0533-ENG	Microsoft OEM Windows Embedded Standard 7 32-bit, English; for APC810 with GM45 chipset; please order CompactFlash separately (minimum 8 GB).	247
5SWWI7.0633-ENG	Microsoft OEM Windows Embedded Standard 7 64-bit, English; for APC810 with GM45 chipset; please order CompactFlash separately (minimum 16 GB).	247
5SWWI7.0733-MUL	Microsoft OEM Windows Embedded Standard 7 Premium 32-bit, multilanguage; for APC810 with GM45 chipset; please order CompactFlash separately (minimum 8 GB).	247
5SWWI7.0833-MUL	Microsoft OEM Windows Embedded Standard 7 Premium 64-bit, multilanguage; for APC810 with GM45 chipset; please order CompactFlash separately (minimum 16 GB).	247
	Windows XP Professional	
5SWWXP.0500-ENG	Microsoft OEM Windows XP Professional Service Pack 2c, CD, English. Only available with a B&R device.	241
5SWWXP.0500-GER	Microsoft OEM Windows XP Professional Service Pack 2c, CD, German. Only available with a B&R device.	241
5SWWXP.0500-MUL	Microsoft OEM Windows XP Professional Service Pack 2c, CD, Multilaguange Only available with a B&R device.	241
5SWWXP.0600-ENG	Microsoft OEM Windows XP Professional Service Pack 3, CD, English. Only available with a B&R device.	241
5SWWXP.0600-GER	Microsoft OEM Windows XP Professional Service Pack 3, CD, German. Only available with a device.	241
5SWWXP.0600-MUL	Microsoft OEM Windows XP Professional Service Pack 3, CD, multilanguage. Only available with a B&R device.	241
	Windows-based Runtime	
1A4600.10	B&R Automation Runtime ARwin, incl. License Label and Security Key	249
	Zubehör	
5AC801.FRAM-00	APC810 HDD Ersatzablage	343
5ACPCI.ETH1-01	PCI Ethernet Card 10/100	318
5ACPCI.ETH3-01	PCI Ethernet Card 10/100 3port	321

Chapter 2 • Technical data

1 Introduction

The APC810 is the sophisticated upgrade to the APC620 product series. Based on the latest Intel® Core™2 Duo technology, the APC810 offers the highest level of performance for all applications that require maximum computing power.

The APC810 saves space in the switching cabinet. Drive inserts (DVD, HDD) and two CompactFlash slots are protected behind a cover on the front of the device (only one CF slot can be used with the GM45 CPU board). The modular plug-in technology makes it easy for the user to switch drives. All connections and interfaces are located on the top side of the housing. The installation depth is not increased by protruding connectors. The different APC810 sizes with one, two or five card slots (for PCI/PCI Express cards) provide the optimum design for every type of installation - a perfect fit without wasting valuable space in the switching cabinet.

1.1 Features

- Latest processor technology - Core 2 Duo
- Up to 8 GB main memory (Dual Channel Memory Support)
- 1 CompactFlash slot (type I)
- 1, 2, 3 or 5 card slots (for PCI / PCI Express (PCIe) cards)
- SATA drives (slide-in and slide-in compact slots)
- 5x USB 2.0
- 2x Ethernet 10/100/1000 MBit interfaces
- 2x RS232 Interface, modem compatible
- 24 VDC supply voltage
- BIOS (AMI)
- Real-time clock, RTC (battery-buffered)
- 512 KB SRAM (with battery back-up)
- Connection of various display devices to the "Monitor/Panel" video output (supports RGB, DVI, and SDL - Smart Display Link - signals)
- 2nd graphics line with installation of the optional AP Link card
- Easy slide-in drive exchange (SATA hot plug capable)
- Optional installation of the add-on UPS module
- Optional CAN interface
- Optional RS232/422/485 interface
- Optional RAID controller (requires an open PCI slot)

1.2 System components / configuration

The AP810 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
- Main memory
- Fan kits
- Drive (mass memory such as CompactFlash card or hard disk) for the operating system
- Software

1.3 Configuration - Basic system

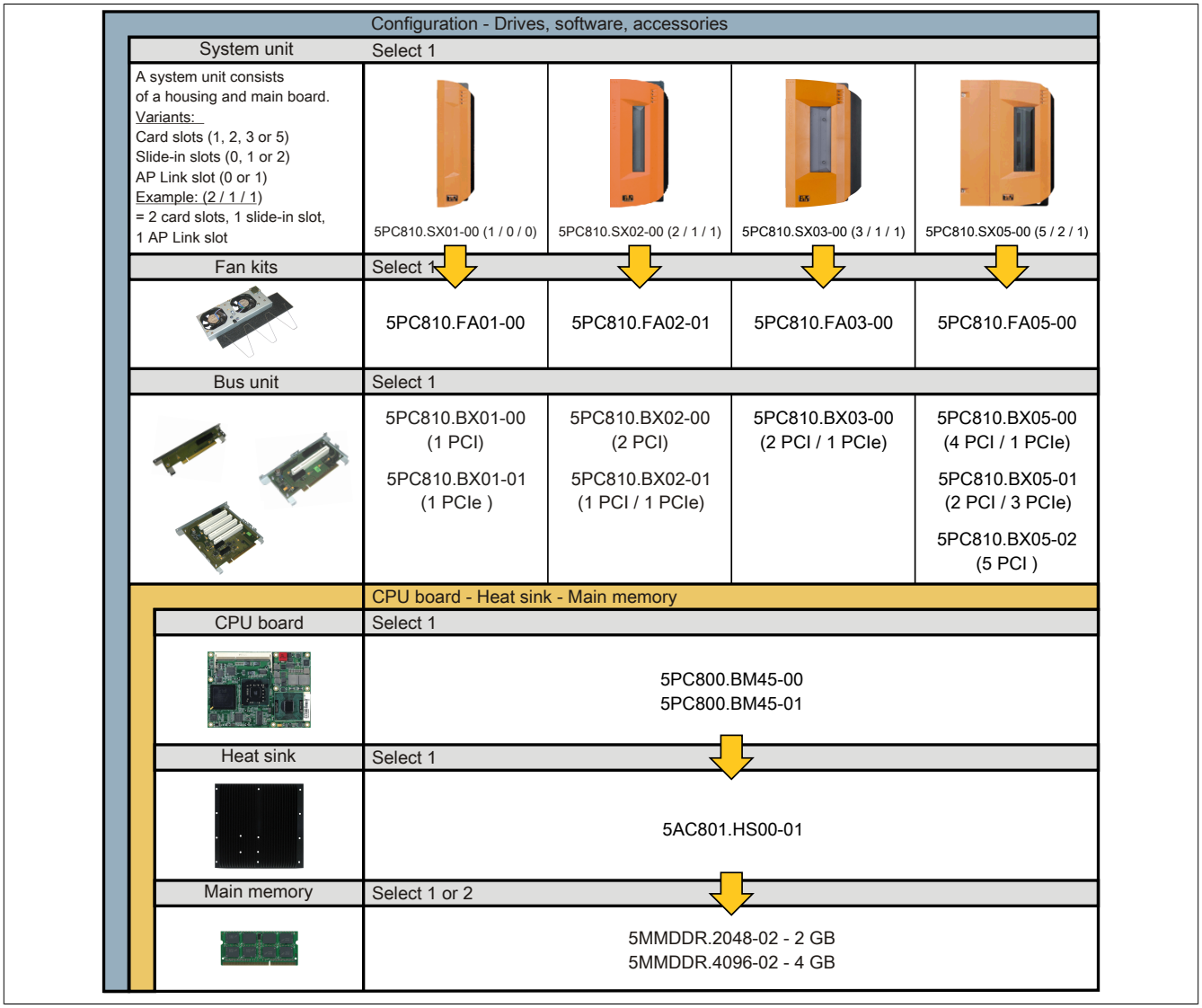


Image 1: Configuration - Basic system

1.4 Configuration - Drives, software, accessories

Configuration - Drives, software, accessories				
System unit				
A system unit consists of a housing and main board. Modes: Card slots (1,2,3 or 5) Slide-in slots (0,1 or 2) AP Link slot (0 or 1) Example: (2 / 1 / 1) = 2 Card Slots, 1 Slide-in Slot, 1 AP Link slot	 5PC810.SX01-00 (1 / 0 / 0)	 5PC810.SX02-00 (2 / 1 / 1)	 5PC810.SX03-00 (3 / 1 / 1)	 5PC810.SX05-00 (5 / 2 / 1)
Slide-in compact drive	Select 1			
	5AC801.HDDI-00 (40 GB) 5AC801.HDDI-02 (160 GB) 5AC801.SSDI-00 (32 GB)			
CompactFlash	Select 1 or 2			
	5CFCRD.0512-04, 5CFCRD.1024-04, 5CFCRD.2048-04, 5CFCRD.4096-04, 5CFCRD.8192-04, 5CFCRD.016G-04		5CFCRD.0064-03, 5CFCRD.0128-03, 5CFCRD.0256-03, 5CFCRD.0512-03, 5CFCRD.1024-03, 5CFCRD.2048-03, 5CFCRD.4096-03, 5CFCRD.8192-03	
Slide-in drive	Not possible	1 possible	2 possible	
	/	5AC801.HDDS-00 (40 GB) 5AC801.DVDS-00 (DVD drive) 5AC801.ADAS-00 (adapter) 5AC801.DVRS-00 (DVD writer)		
AP Link card		Select 1		
	/	5AC801.SDL0-00 (for 2nd graphics line) 5AC801.RDYR-00 (ready relay)		
RAID system	Select 1			
	5ACPCI.RAIC-03 (2x160 GB, uses 1 PCI slot) 5ACPCI.RAIC-04 (replacement SATA-HDD 160GB)			
Interface options	Select 1			
	5AC600.CANI-00 (CAN) 5AC600.485I-00 (combined RS232/RS422/RS485)			
UPS module + battery	Select 1			
	5AC600.UPSI-00 (add-on UPS module) +5AC600.UPSB-00 (UPS battery unit) APC connection cable -> Battery: 5CAUPS.0005-00 (0,5 m) or 5CAUPS.0030-00 (3 m)			
Supply voltage plug	Select 1			
	0TB103.9 (screw clamps) 0TB103.91 (cage clamps)			
Software	Select 1			
Windows Embedded Standard 2009 Windows XP Professional Windows 7	5SWWXP.0600-GER (XP Pro SP3 GER) 5SWWXP.0600-ENG (XP Pro SP3 ENG) 5SWWXP.0600-MUL (XP Pro SP3MUL) 5SWWXP.0733-ENG (WES 2009 ENG) 5SWWI7.0100-GER (Win7 Pro 32Bit GER)		5SWWI7.0100-ENG (Win7 Pro 32Bit ENG) 5SWWI7.0300-MUL (Win7 Ult 32Bit MUL) 5SWWI7.0200-GER (Win7 Pro 64Bit GER) 5SWWI7.0200-ENG (Win7 Pro 64Bit ENG) 5SWWI7.0400-MUL (Win7 Ult 64Bit MUL)	

2 Entire device

2.1 Temperature specifications

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

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

Information on the worst-case conditions

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

What must be considered when determining the maximum ambient temperature?

- Operation of the Ethernet interfaces (ETH1/ETH2) in 10/100Mbit or 1 Gbit mode
- Revision of heat sink being used

2.1.1 Maximum ambient temperature with a fan kit

Information:

- **Vertical and horizontal (minus 5°C) mounting orientations are permitted (1.3 " Mounting orientation" on page 141).**
- **The specifications in the following table are only valid for system units with with the heat sink 5AC801.HS00-01 ≥ Rev. D0.**

	All temperature values in degrees Celsius (°C) at 500 meters above sea level. The maximum ambient temperature must typically be derated by 1°C per 1000 meters (starting at 500 meters above sea level).	5PC800.B945-00	5PC800.B945-01	Temperature limits	Location of sensor(s)
	Maximum ambient temperature[1)]	**50**	**55**		
	What else can be operated at the max. ambient temperature, or are there any limits?				
Compact slide-in drives	Onboard CompactFlash[2)]	✓	✓	80	I/O
	5AC801.HDDI-00	✓	✓	80	
	5AC801.HDDI-02	✓	✓	80	
	5AC801.HDDI-03	✓	50	60	
	5AC801.SSDI-00	✓	✓	70	
Slide-in drives	5AC801.HDDS-00	✓	✓	80	Slide-in drive
	5AC801.DVDS-00	✓	✓	50	
	5AC801.DVRS-00	✓	✓	50	
Main memory	5MMDDR.2048-02	✓	✓	-	-
	5MMDDR.4096-02	✓	✓	-	
System units	5PC810.SX01-00	✓	✓	80	Power supply
	5PC810.SX02-00	✓	✓	80	
	5PC810.SX03-00	✓	✓	80	
	5PC810.SX05-00	✓	✓	80	
Additional insert cards Interfaces / AP Link	5AC600.CANI-00	✓	✓	-	-
	5AC600.485I-00	✓	✓	-	
	5AC801.SDL0-00	✓	✓	-	
	5AC801.RDYR-00	✓	✓	-	
	5ACPCI.RAIC-03 (24 hours / default)	✓	✓	-	
	5ACPCI.RAIC-05 (24 hours / default)	✓	50	-	

1) With horizontal mounting, the maximum ambient temperature must be reduced by 5°C!
2) Only possible with a CompactFlash card from B&R that is compatible with the device.

Table 5: Ambient temperature with a fan kit

2.1.2 Minimum ambient temperature

For systems containing one of the following components, the minimum ambient temperature is +5°C: 5AC801.DVDS-00, 5AC801.DVRS-00. If none of these components are used, then the minimum ambient temperature is 0°C.

2.1.3 How is the the maximum ambient temperature determined?

1. Selection of the CPU board (use with or without fan kit).
2. The "Maximum ambient temperature" row shows the maximum ambient temperature for the system as a whole, including the respective CPU board.

Information:

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

3. Incorporating additional drives (add-on, slide-in), main memory, additional insert cards, etc. can change the temperature limits of an APC810 system.

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

If there is a specific temperature, for example "35", next to the component, then the ambient temperature of the whole APC810 system cannot exceed this temperature.

2.1.4 Temperature monitoring

Sensors monitor temperature values in various places (CPU, board, board I/O, board ETH2, board power supply, ETH2 controller, power supply and slide-in drives 1/2) on the APC810. The locations of the temperature sensors can be found in the figure "Image 2: Temperature sensor locations" on page 29. The value listed in the table represents the defined maximum temperature[1)] for this measurement point. An alarm is not triggered when this temperature is exceeded. The temperatures can be read in BIOS (menu item "Advanced" - Baseboard/Panel Features - Baseboard Monitor) or in approved Microsoft operating systems using the B&R Control Center.

Additionally, the hard disks for PPC810 systems available from B&R are equipped with S.M.A.R.T, or Self Monitoring, Analysis, and Reporting Technology. This makes it possible to read various parameters, for example the temperature, using software (e.g. HDD thermometer - freeware) in approved Microsoft operating systems (except Windows CE).

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

2.1.5 Temperature sensor locations

Sensors provide temperature values for many different locations in the APC810 (CPU, I/O board, slide-in drive, etc). The temperatures[2)] can be read in BIOS (menu item "Advanced" - CPU Monitor) or in a Microsoft Windows operating system in the B&R Control Center[3)] .

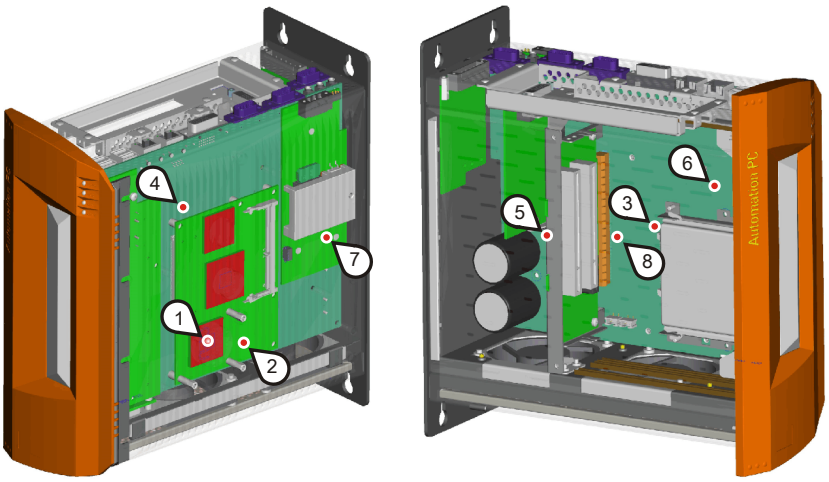


Image 2: Temperature sensor locations

Position	Measurement point for	Measurement	Max. specified
1	CPU	Processor temperature (sensor integrated on the processor).	100°C
2	Board	CPU board temperature (sensor integrated on the CPU board).	85°C
3	Board I/O	Board I/O area temperature (sensor on the baseboard).	85°C
4	Board ETH2	Baseboard temperature near the ETH2 controller (sensor on the baseboard).	80°C
5	Board power supply	Board power supply temperature (sensor on the baseboard).	80°C
6	ETH2 Controller	Temperature of ETH2 controller (sensor in the ETH2 controller).	125°C
7	Power supply	Power supply temperature (sensor on the power supply).	80°C
8	Slide-in drive 1	Temperature of a slide-in drive 1 (the sensor is integrated on the slide-in drive).	Drive-dependent
8	Slide-in drive 2	Temperature of a slide-in drive 2 (the sensor is integrated on the slide-in drive).	Drive-dependent

Table 6: Temperature sensor locations

2) The measured temperature approximates the immediate ambient temperature, but can be influenced by neighboring components.
3) The ADI driver containing 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 displays the minimum and maximum relative humidity for the individual components that are relevant for the humidity limitations of the entire device. The lowest and highest common values are always used when establishing these limits.

Component		Operation	Storage / Transport
CPU boards GM45 COM Express		10 to 90%	5 to 95%
System units (all models)		5 to 90%	5 to 95%
Main memory for CPU boards		10 to 90%	5 to 95%
Slide-in drives	5AC801.HDDI-00	5 to 90%	5 to 95%
	5AC801.HDDI-02	8 to 80%	5 to 95%
	5AC801.HDDI-03	5 to 95%	5 to 95%
	5AC801.HDDS-00	5 to 90%	5 to 90%
	5AC801.DVDS-00	8 to 90%	5 to 95%
	5AC801.DVRS-00	8 to 90%	5 to 95%
Additional insert cards Interfaces AP Link	5AC600.CANI-00	5 to 90%	5 to 95%
	5AC600.485I-00	5 to 90%	5 to 95%
	5AC801.SDL0-00	5 to 90%	5 to 95%
	5AC801.RDYR-00	5 to 90%	5 to 95%
	5ACPCI.RAIC-03 (24 hours/default)	8 to 90%	5 to 95%
	5ACPCI.RAIC-04 (24 hours/default)	8 to 90%	5 to 95%
	5ACPCI.RAIC-05 (24 hours / default)	5 to 95%	5 to 95%
	5MMHDD.0250-00 (24 hours / default)	5 to 95%	5 to 95%
Accessories	CompactFlash cards - 5CFCRD.xxxx-06	85%	85%
	CompactFlash cards 5CFCRD.xxxx-04	85%	85%
	CompactFlash cards - 5CFCRD.xxxx-03	8 to 95%	8 to 95%
	Flash drive 5MMUSB.2048-xx	10 to 90%	5 to 90%
	USB Media Drive 5MD900.USB2-01	20 to 80%	5 to 90%

Table 7: Overview of humidity specifications for individual components

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

2.3 Power management

2.3.1 Supply voltage block diagram

The following block diagram presents the simplified structure of the APC810 supply voltage for system units.

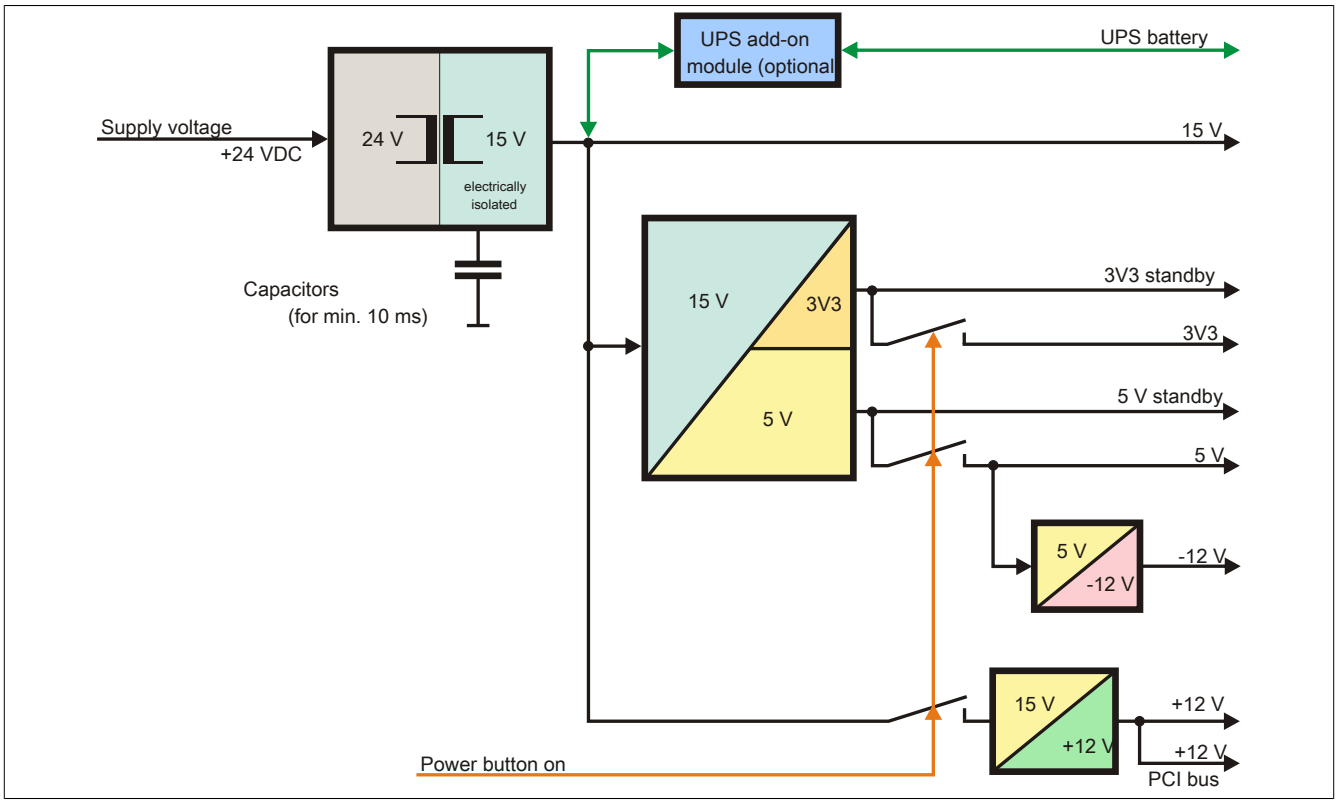


Image 3: Supply voltage for system units

Description

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

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

The optional Add-on UPS (with battery unit) is supplied with 15 V and provides an uninterrupted power supply from the 15 V bus during power failures.

2.3.2 Power calculation with 5PC810.SX01-00 revision >= D0

Information:			CPU board		Current system
All values in **watts** The values for the **suppliers** are maximum values. The values for the **consumers** are average maximum values, but not peak values.			5PC800.BM45-00	5PC800.BM45-01	Enter values in this column
		Total power supply power (maximum)			**130**
Total power supply		Add-on UPS module, optional	7.5	7.5	
	+12 V	**Maximum possible at +12V**			**75**
		CPU board, permanent consumers	43	36	
		2048 MB RAM, max. 2 with 3 W each			
		4096 MB RAM, max. 2 with 4 W each			
		Fan kits	1.8	1.8	
		External consumers, optional (via base board)	10	10	
		Power consumption of the PCI cards, optional, max. 6 W[1)]			
		Power consumption of the PCIe x4 cards, optional, max. 20 W[1)]			
		Consumers +12 V ∑			
	+5 V	**Maximum possible at +5V**			**65**
		System unit, permanent consumers	4	4	
		Hard disk (slide-in compact)	4	4	
		Slide-in drive (hard disk, DVD-ROM, etc.)	4	4	
		USB peripherals USB2 and USB4 with 2.5 W each			
		USB peripherals USB1, USB3 and USB5 with 5 W each			
		Interface option (add-on interface), optional	0.5	0.5	
		External consumers, optional (via base board)	5	5	
		Power consumption of the PCI cards, optional, max. 20 W[1)]			
	-12 V	**Maximum possible at -12V**			**1.2**
		Power consumption of the PCI cards, optional, max. 1.2 W[1)]			
		Consumers -12 V ∑			
		Consumers +5 V ∑			
	3V3	**Maximum possible at 3V3**			**40**
		System unit, permanent consumers	4	4	
		CompactFlash	1	1	
		Interface option (add-on interface), optional	0.25	0.25	
		Power consumption of the PCI cards, optional, max. 15 W[1)]			
		Power consumption of the PCIe x4 cards, optional, max. 10 W[1)]			
		Consumers 3V3 ∑			
		Consumers ∑			

1) The total performance of one PCI / PCIe card per PCI slot (= sum of power consumptions for each voltage area) may not exceed the limits stated for operation with a fan kit.

Table 8: Power calculation APC 1 slot

2.3.3 Power calculation with 5PC810.SX01-00 revision < D0

Information:	CPU board		Current system
All values in **watts** The values for the **suppliers** are maximum values. The values for the **consumers** are average maximum values, but not peak values.	5PC800.BM45-00	5PC800.BM45-01	Enter values in this column
Total power supply power (maximum)			**85**
Total power supply / Add-on UPS module, optional	7.5	7.5	
Maximum possible at +12V			**75**
+12 V / CPU board, permanent consumers	43	36	
2048 MB RAM, max. 2 with 3 W each			
4096 MB RAM, max. 2 with 4 W each			
Fan kits	1.8	1.8	
External consumers, optional (via base board)	10	10	
Power consumption of the PCI cards, optional, max. 6 W[1)]			
Power consumption of the PCIe x4 cards, optional, max. 20 W[1)]			
Consumers +12 V ∑			
Maximum possible at +5V			**65**
+5 V / System unit, permanent consumers	4	4	
Hard disk (slide-in compact)	4	4	
Slide-in drive (hard disk, DVD-ROM, etc.)	4	4	
USB peripherals USB2 and USB4 with 2.5 W each			
USB peripherals USB1, USB3 and USB5 with 5 W each			
Interface option (add-on interface), optional	0.5	0.5	
External consumers, optional (via base board)	5	5	
Power consumption of the PCI cards, optional, max. 20 W[1)]			
Maximum possible at -12V			**1.2**
-12 V / Power consumption of the PCI cards, optional, max. 1.2 W[1)]			
Consumers -12 V ∑			
Consumers +5 V ∑			
Maximum possible at 3V3			**40**
3V3 / System unit, permanent consumers	4	4	
CompactFlash	1	1	
Interface option (add-on interface), optional	0.25	0.25	
Power consumption of the PCI cards, optional, max. 15 W[1)]			
Power consumption of the PCIe x4 cards, optional, max. 10 W[1)]			
Consumers 3V3 ∑			
Consumers ∑			

1) The total performance of one PCI / PCIe card per PCI slot (= sum of power consumptions for each voltage area) may not exceed the limits stated for operation with a fan kit.

Table 9: Power calculation APC 1 slot

2.3.4 Power calculation with 5PC810.SX02-00 revision >= D0

Information:			CPU board		Current system
All values in **watts** The values for the **suppliers** are maximum values. The values for the **consumers** are average maximum values, but not peak values.			5PC800.BM45-00	5PC800.BM45-01	Enter values in this column
		Total power supply power (maximum)			**130**
Total power supply		Add-on UPS module, optional	7.5	7.5	
	+12 V	**Maximum possible at +12V**			**75**
		CPU board, permanent consumers	43	36	
		2048 MB RAM, max. 2 with 3 W each			
		4096 MB RAM, max. 2 with 4 W each			
		Fan kits	1.8	1.8	
		External consumers, optional (via base board)	10	10	
		Power consumption of the PCI cards, optional, max. 6 W[1)]			
		Power consumption of the PCIe x4 cards, optional, max. 20 W[1)]			
		Consumers +12 V ∑			
	+5 V	**Maximum possible at +5V**			**65**
		System unit, permanent consumers	4	4	
		Hard disk (slide-in compact)	4	4	
		Slide-in drive (hard disk, DVD-ROM, etc.)	4	4	
		USB peripherals USB2 and USB4 with 2.5 W each			
		USB peripherals USB1, USB3 and USB5 with 5 W each			
		Interface option (add-on interface), optional	0.5	0.5	
		Graphics adapter (AP Link), optional	5	5	
		External consumers, optional (via base board)	5	5	
		Power consumption of the PCI cards, optional, max. 20 W[1)]			
		Maximum possible at -12V			**1.2**
	-12 V	Power consumption of the PCI cards, optional, max. 1.2 W[1)]			
		Consumers -12 V ∑			
		Consumers +5 V ∑			
	3V3	**Maximum possible at 3V3**			**40**
		System unit, permanent consumers	4	4	
		CompactFlash	1	1	
		Interface option (add-on interface), optional	0.25	0.25	
		Graphics adapter (AP Link), optional	1.5	1.5	
		Power consumption of the PCI cards, optional, max. 15 W[1)]			
		Power consumption of the PCIe x4 cards, optional, max. 10 W[1)]			
		Consumers 3V3 ∑			
		Consumers ∑			

1) The total performance of one PCI / PCIe card per PCI slot (= sum of power consumptions for each voltage area) may not exceed the limits stated for operation with a fan kit.

Table 10: Power calculation APC 2 slot

2.3.5 Power calculation with 5PC810.SX02-00 revision < D0

Information:	CPU board		Current system
All values in **watts** The values for the **suppliers** are maximum values. The values for the **consumers** are average maximum values, but not peak values.	5PC800.BM45-00	5PC800.BM45-01	Enter values in this column
Total power supply power (maximum)			**85**
Add-on UPS module, optional	7.5	7.5	
Maximum possible at +12V			**75**
CPU board, permanent consumers	43	36	
2048 MB RAM, max. 2 with 3 W each			
4096 MB RAM, max. 2 with 4 W each			
Fan kits	1.8	1.8	
External consumers, optional (via base board)	10	10	
Power consumption of the PCI cards, optional, max. 6 W[1)]			
Power consumption of the PCIe x4 cards, optional, max. 20 W[1)]			
Consumers +12 V ∑			
Maximum possible at +5V			**65**
System unit, permanent consumers	4	4	
Hard disk (slide-in compact)	4	4	
Slide-in drive (hard disk, DVD-ROM, etc.)	4	4	
USB peripherals USB2 and USB4 with 2.5 W each			
USB peripherals USB1, USB3 and USB5 with 5 W each			
Interface option (add-on interface), optional	0.5	0.5	
Graphics adapter (AP Link), optional	5	5	
External consumers, optional (via base board)	5	5	
Power consumption of the PCI cards, optional, max. 20 W[1)]			
Maximum possible at -12V			**1.2**
Power consumption of the PCI cards, optional, max. 1.2 W[1)]			
Consumers -12 V ∑			
Consumers +5 V ∑			
Maximum possible at 3V3			**40**
System unit, permanent consumers	4	4	
CompactFlash	1	1	
Interface option (add-on interface), optional	0.25	0.25	
Graphics adapter (AP Link), optional	1.5	1.5	
Power consumption of the PCI cards, optional, max. 15 W[1)]			
Power consumption of the PCIe x4 cards, optional, max. 10 W[1)]			
Consumers 3V3 ∑			
Consumers ∑			

1) The total performance of one PCI / PCIe card per PCI slot (= sum of power consumptions for each voltage area) may not exceed the limits stated for operation with a fan kit.

Table 11: Power calculation APC 2 slot

2.3.6 Power calculation with 5PC810.SX03-00

Information:			CPU board		Current system
All values in **watts** The values for the **suppliers** are maximum values. The values for the **consumers** are average maximum values, but not peak values.			5PC800.BM45-00	5PC800.BM45-01	Enter values in this column
		Total power supply power (maximum)			**130**
Total power supply		Add-on UPS module, optional	7.5	7.5	
	+12 V	**Maximum possible at +12V**			**75**
		CPU board, permanent consumers	43	36	
		2048 MB RAM, max. 2 with 3 W each			
		4096 MB RAM, max. 2 with 4 W each			
		Fan kits	3.7	3.7	
		External consumers, optional (via base board)	10	10	
		Power consumption of the PCI cards, optional, max. 6 W[1)]			
		Power consumption of the PCIe x4 cards, optional, max. 20 W[1)]			
		Consumers +12 V ∑			
	+5 V	**Maximum possible at +5V**			**65**
		System unit, permanent consumers	4	4	
		Hard disk (slide-in compact)	4	4	
		Slide-in drive (hard disk, DVD-ROM, etc.)	4	4	
		USB peripherals USB2 and USB4 with 2.5 W each			
		USB peripherals USB1, USB3 and USB5 with 5 W each			
		Interface option (add-on interface), optional	0.5	0.5	
		Graphics adapter (AP Link), optional	5	5	
		External consumers, optional (via base board)	5	5	
		Power consumption of the PCI cards, optional, max. 20 W[1)]			
	-12 V	**Maximum possible at -12V**			**1.2**
		Power consumption of the PCI cards, optional, max. 1.2 W[1)]			
		Consumers -12 V ∑			
		Consumers +5 V ∑			
	3V3	**Maximum possible at 3V3**			**40**
		System unit, permanent consumers	4	4	
		CompactFlash	1	1	
		Interface option (add-on interface), optional	0.25	0.25	
		Graphics adapter (AP Link), optional	1.5	1.5	
		Power consumption of the PCI cards, optional, max. 15 W[1)]			
		Power consumption of the PCIe x4 cards, optional, max. 10 W[1)]			
		Consumers 3V3 ∑			
		Consumers ∑			

1) The total performance of one PCI / PCIe card per PCI slot (= sum of power consumptions for each voltage area) may not exceed the limits stated for operation with a fan kit.

Table 12: Power calculation APC 3 slot

2.3.7 Power calculation with 5PC810.SX05-00

Information:			CPU board		Current system
All values in **watts** The values for the **suppliers** are maximum values. The values for the **consumers** are average maximum values, but not peak values.			5PC800.BM45-00	5PC800.BM45-01	Enter values in this column
		Total power supply power (maximum)			**130**
Total power supply		Add-on UPS module, optional	7.5	7.5	
	+12 V	**Maximum possible at +12V**			**75**
		CPU board, permanent consumers	43	36	
		2048 MB RAM, max. 2 with 3 W each			
		4096 MB RAM, max. 2 with 4 W each			
		Fan kits	2.8	2.8	
		External consumers, optional (via base board)	10	10	
		Power consumption of the PCI cards, optional, max. 6 W[1)]			
		Power consumption of the PCIe x4 cards, optional, max. 20 W[1)]			
		Consumers +12 V ∑			
	+5 V	**Maximum possible at +5V**			**65**
		System unit, permanent consumers	4	4	
		Hard disk (slide-in compact)	4	4	
		Slide-in drive (hard disk, DVD-ROM, etc.)	4	4	
		USB peripherals USB2 and USB4 with 2.5 W each			
		USB peripherals USB1, USB3 and USB5 with 5 W each			
		Interface option (add-on interface), optional	0.5	0.5	
		Graphics adapter (AP Link), optional	5	5	
		External consumers, optional (via base board)	5	5	
		Power consumption of the PCI cards, optional, max. 20 W[1)]			
	-12 V	**Maximum possible at -12V**			**1.2**
		Power consumption of the PCI cards, optional, max. 1.2 W[1)]			
		Consumers -12 V ∑			
		Consumers +5 V ∑			
	3V3	**Maximum possible at 3V3**			**40**
		System unit, permanent consumers	4	4	
		CompactFlash	1	1	
		Interface option (add-on interface), optional	0.25	0.25	
		Graphics adapter (AP Link), optional	1.5	1.5	
		Power consumption of the PCI cards, optional, max. 15 W[1)]			
		Power consumption of the PCIe x4 cards, optional, max. 10 W[1)]			
		Consumers 3V3 ∑			
		Consumers ∑			

1) The total performance of one PCI / PCIe card per PCI slot (= sum of power consumptions for each voltage area) may not exceed the limits stated for operation with a fan kit.

Table 13: Power calculation APC 5 slot

2.4 Serial number sticker

Each B&R device is assigned a unique serial number label with a bar code (type 128), which allows the device to be clearly identified. This serial number represents all of the components built into the system (model number, name, revision, serial number, delivery date and duration of warranty).

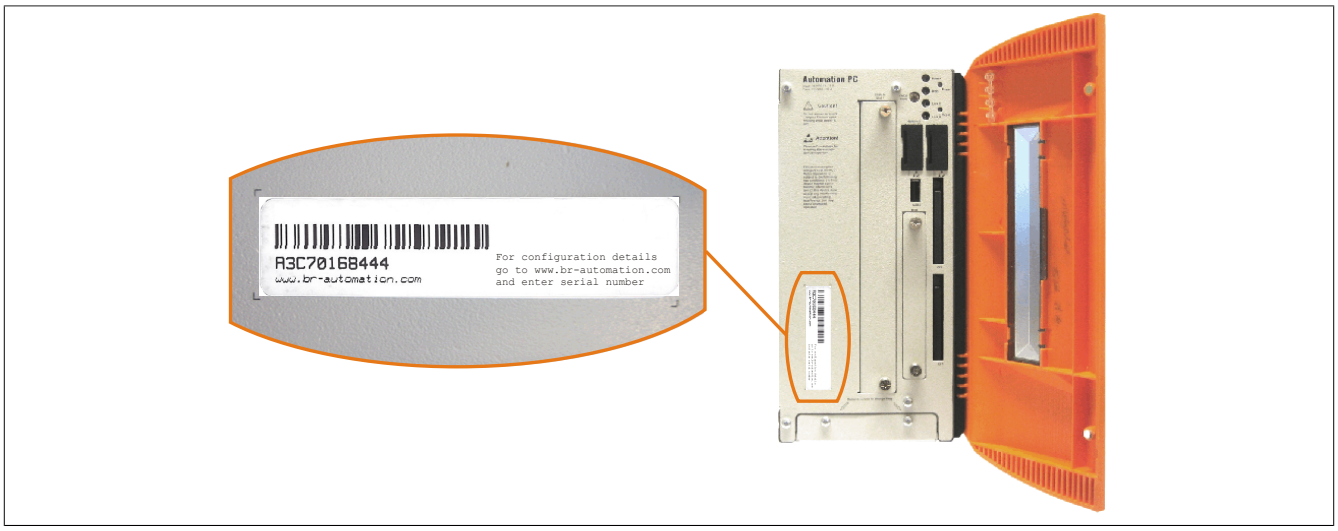


Image 4: Serial number sticker (front)

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

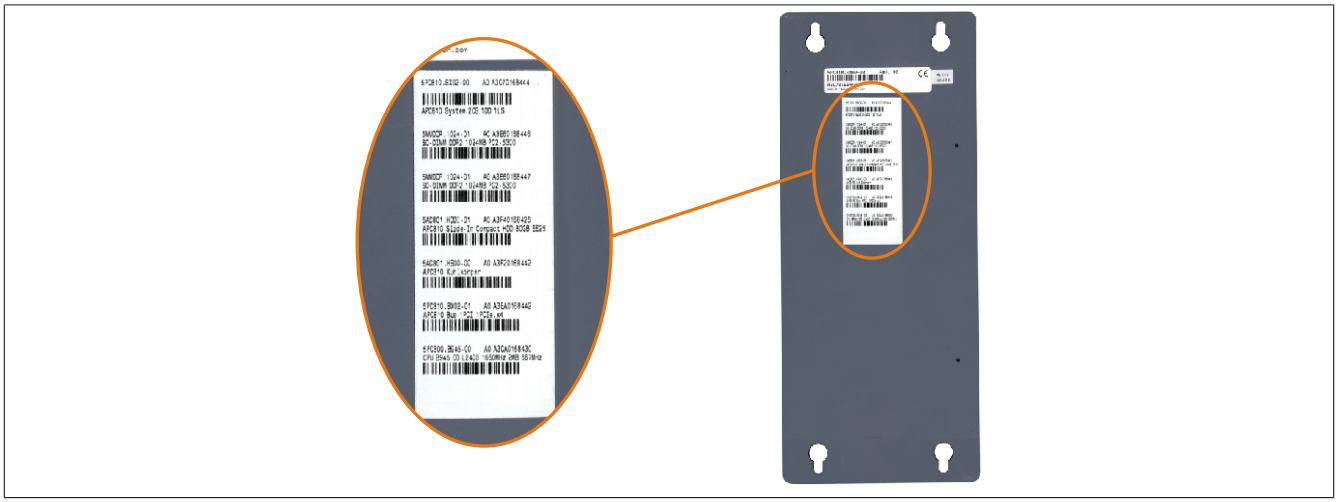


Image 5: Serial number sticker (back)

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

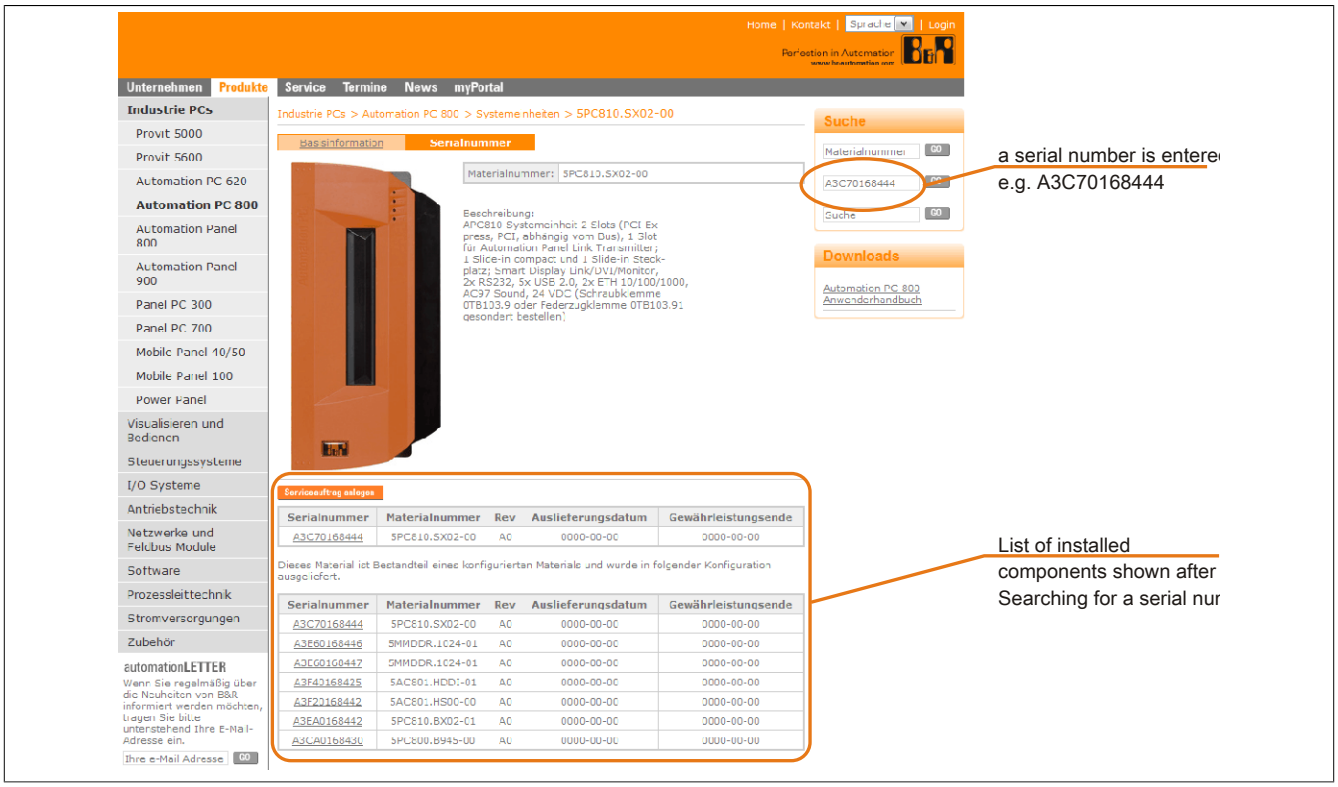
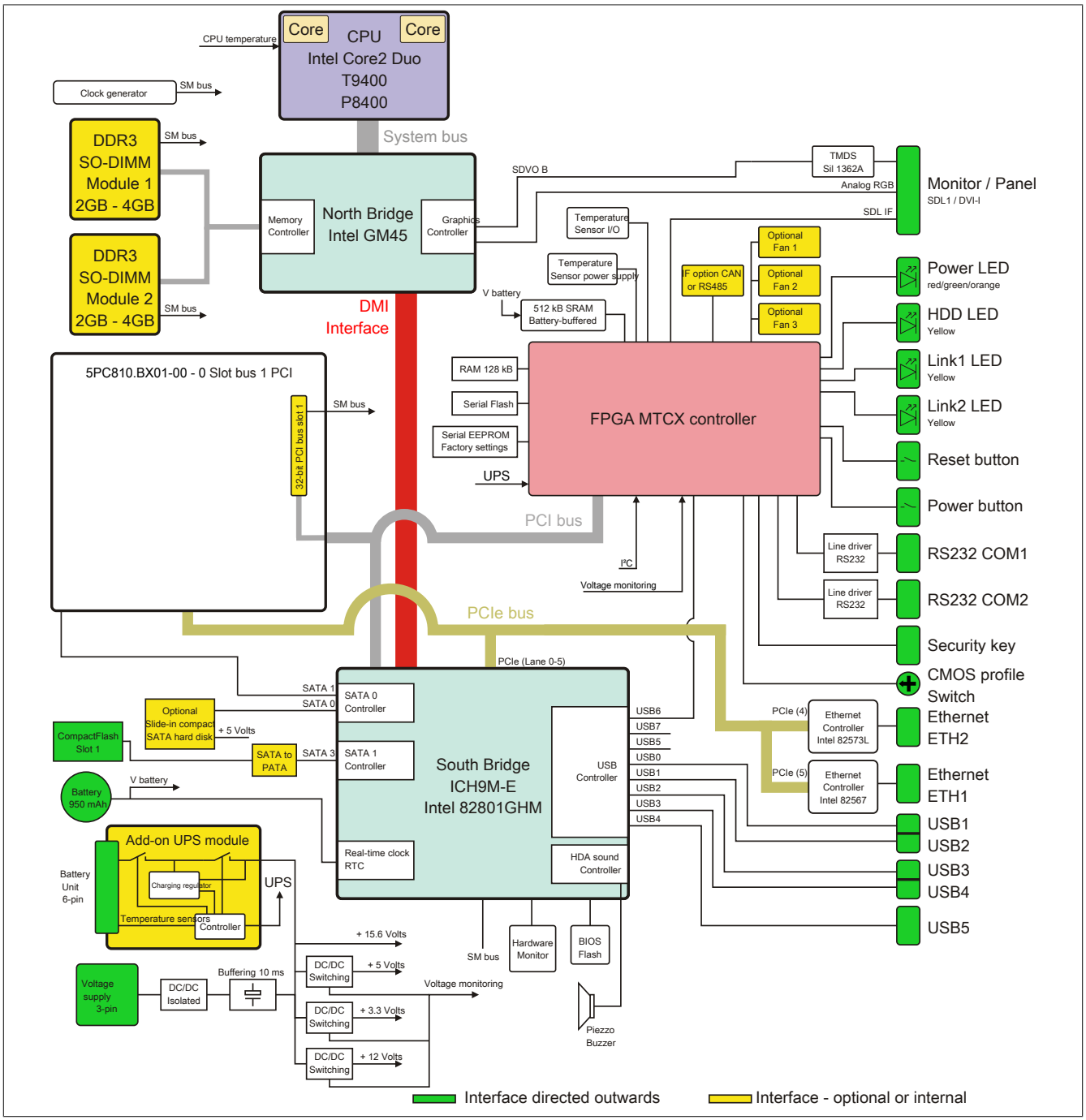


Image 6: Example of serial number search - A3C70168444

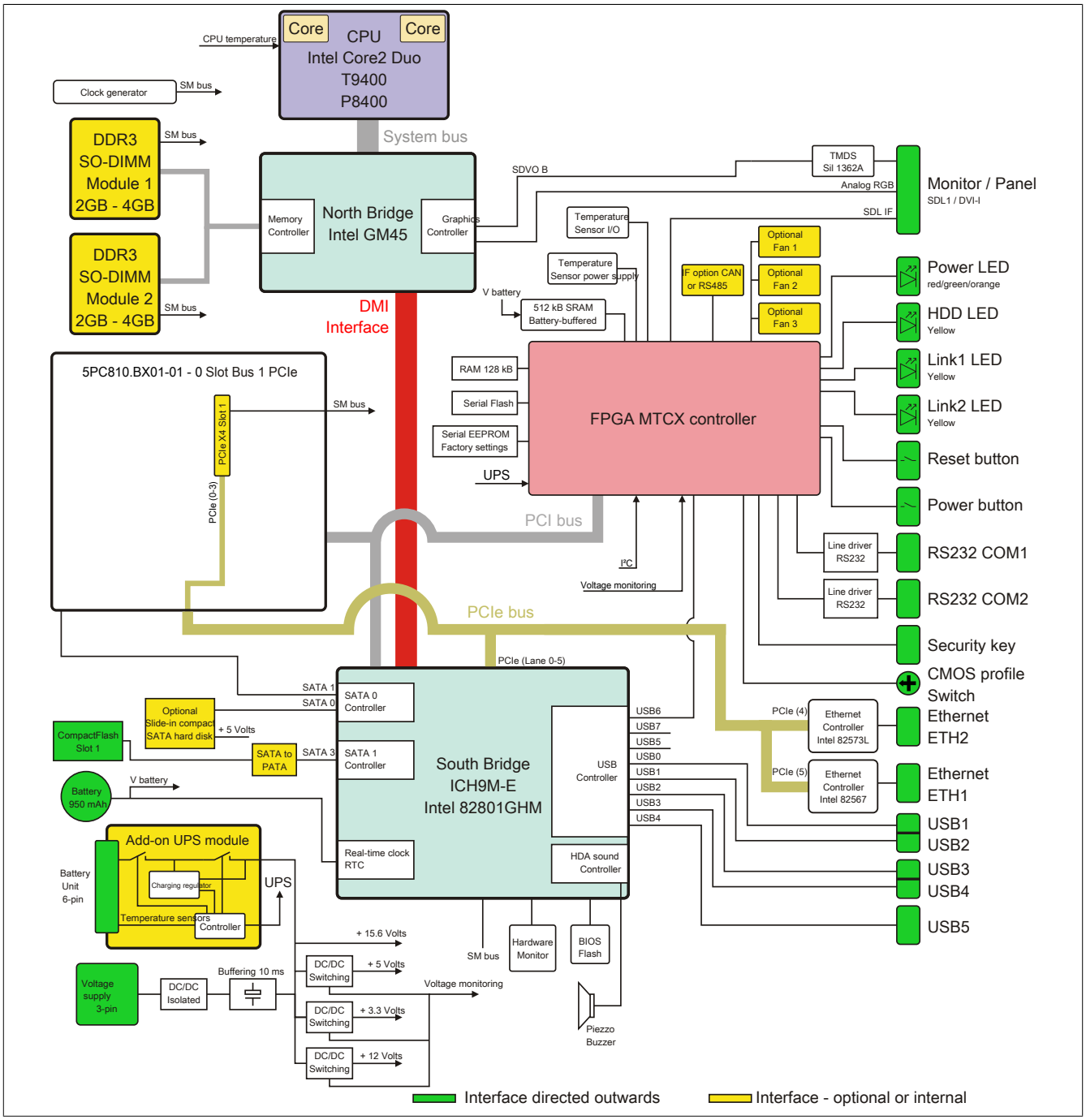
2.5 Block diagram

The following block diagrams show the simplified structure of system units with a CPU board that depend on different bus units.

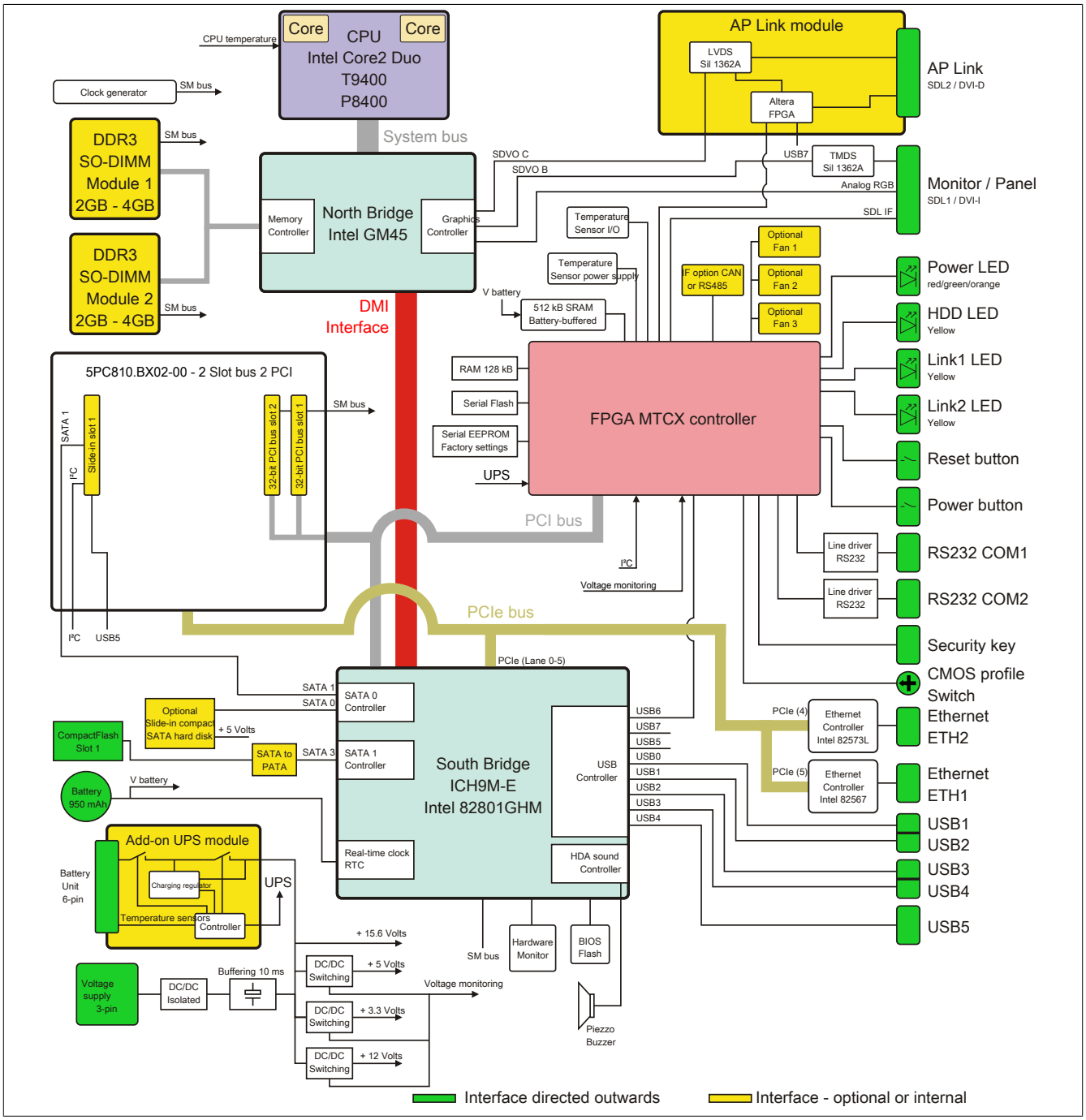
2.5.1 System unit 5PC810.SX01-00 + bus unit 5PC810.BX01-00



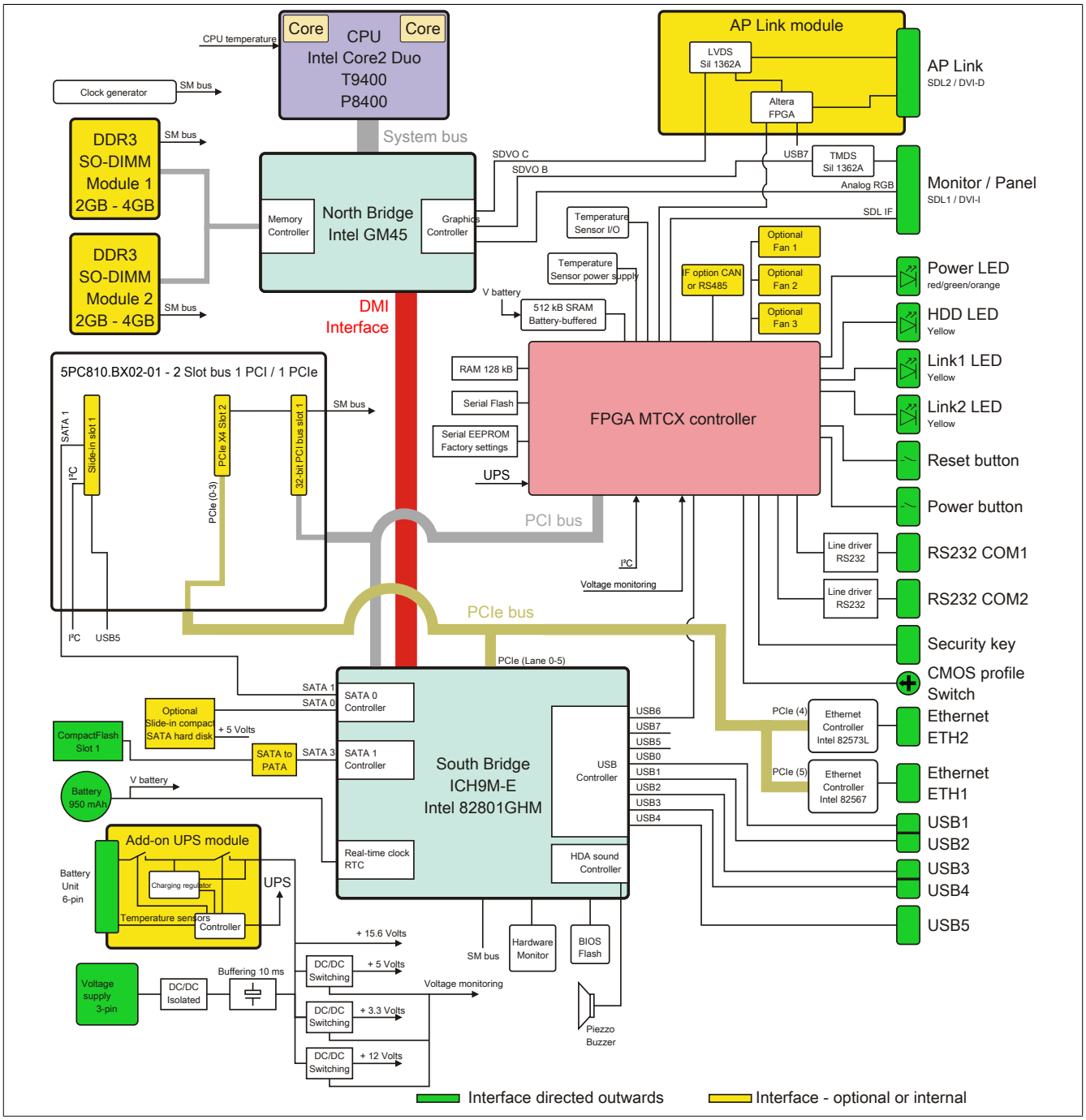
2.5.2 System unit 5PC810.SX01-00 + bus unit 5PC810.BX01-01



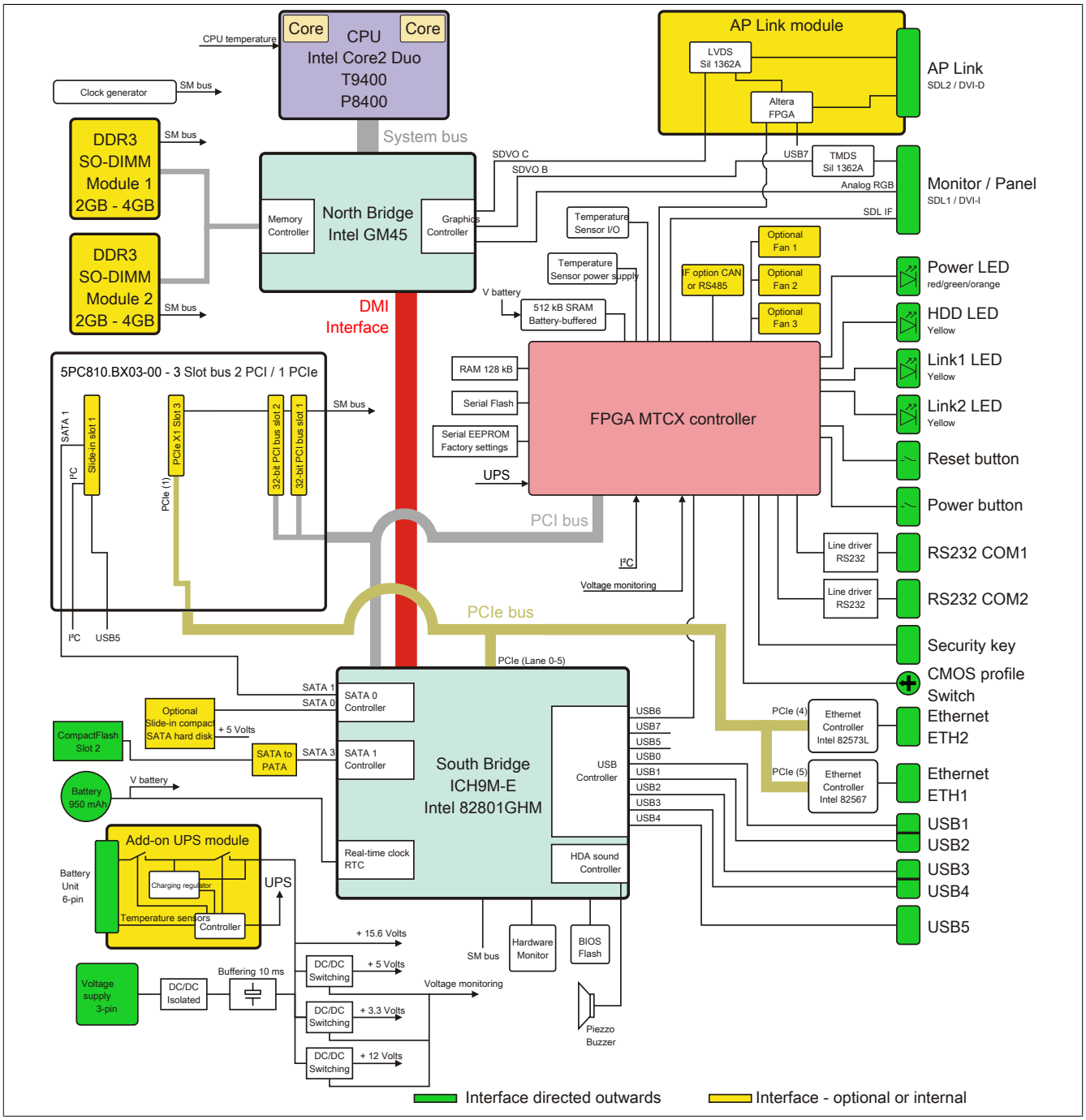
2.5.3 System unit 5PC810.SX02-00 + bus unit 5PC810.BX02-00



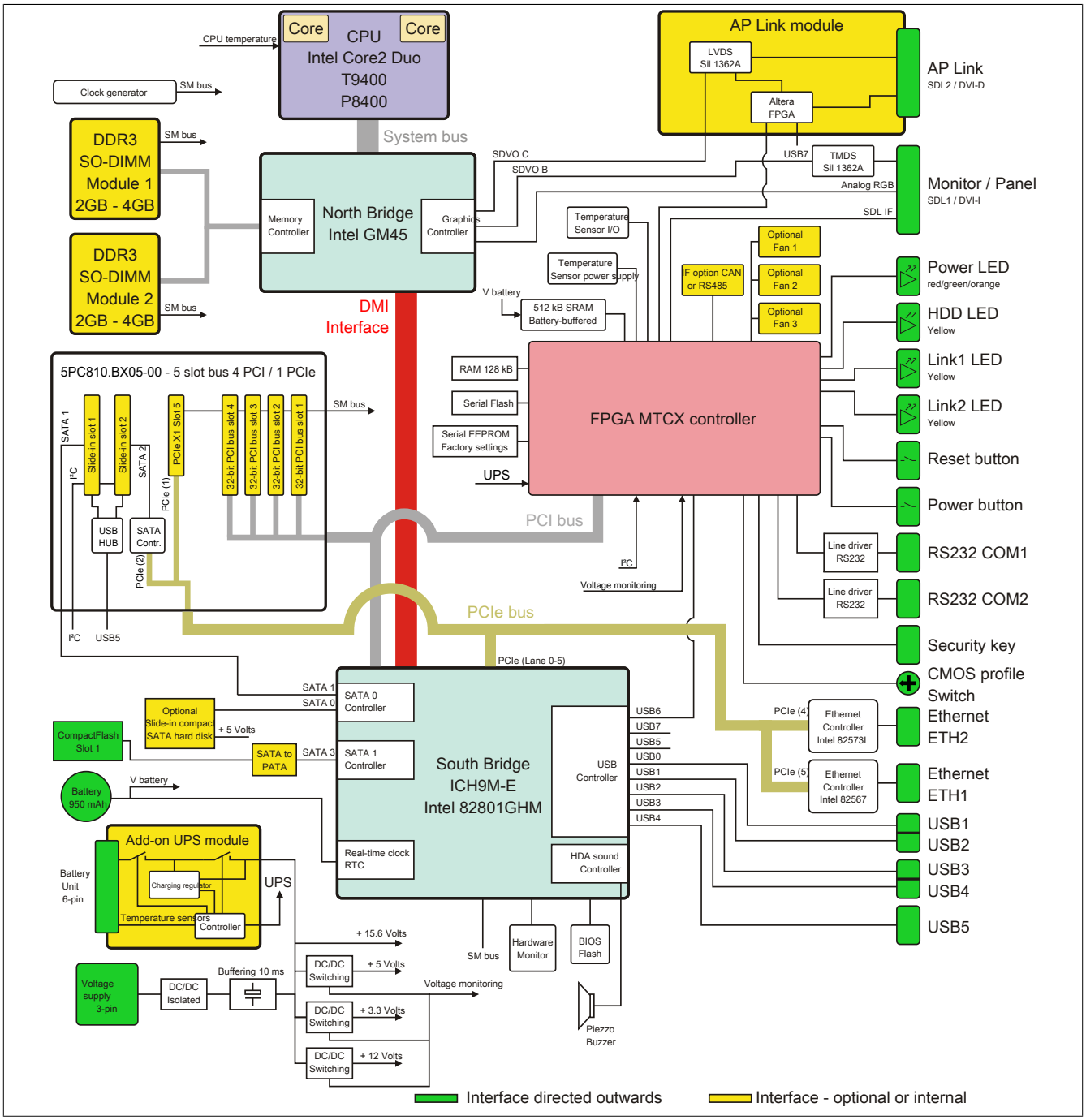
2.5.4 System unit 5PC810.SX02-00 + bus unit 5PC810.BX02-01



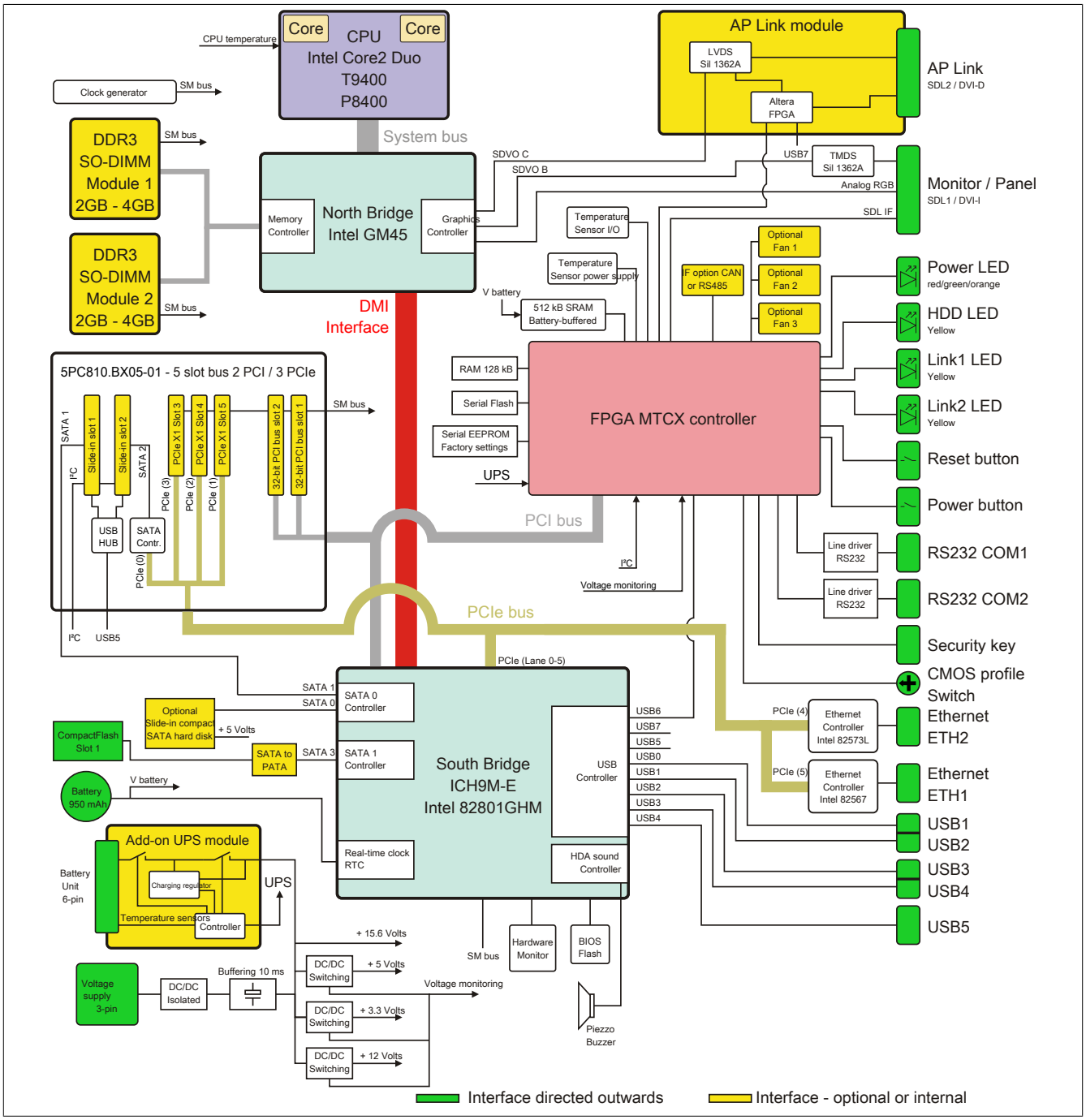
2.5.5 System unit 5PC810.SX03-00 + bus unit 5PC810.BX03-00



2.5.6 System unit 5PC810.SX05-00 + bus unit 5PC810.BX05-00



2.5.7 System unit 5PC810.SX05-00 + bus unit 5PC810.BX05-01



2.5.8 System unit 5PC810.SX05-00 + bus unit 5PC810.BX05-02

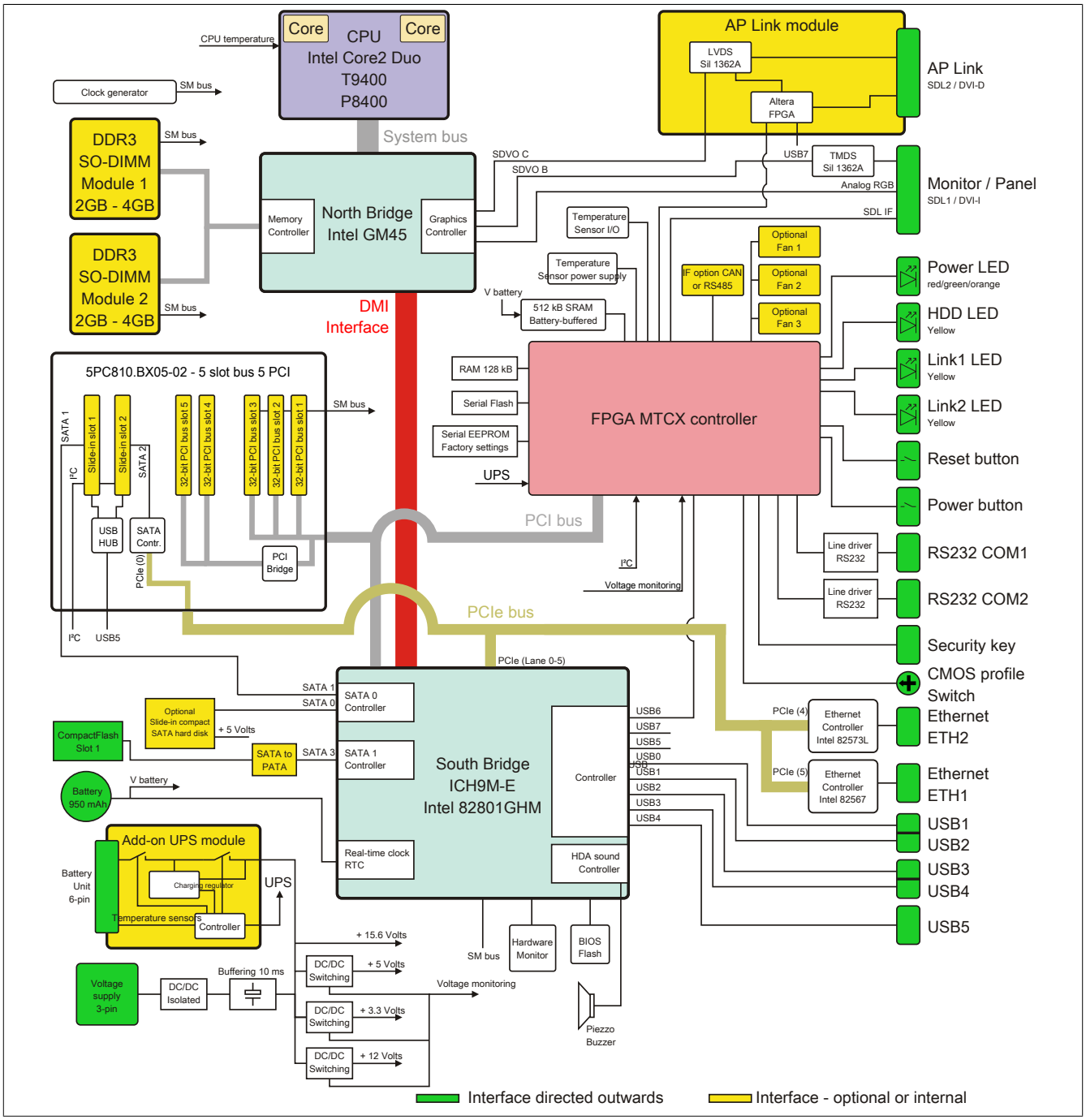


Image 7: Block diagram - 5PC810.SX05-00 + 5PC810.BX05-02

2.6 Device interfaces

2.6.1 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 the model number 0TB103.9 (screw clamps) or 0TB103.91 (cage clamps).

The pin assignments can be found either in the following table or printed on the APC810 housing. The supply voltage is protected internally by a soldered fuse (15A, fast-acting), so that the device cannot be damaged if there is an overload (fuse replacement necessary) or if the voltage supply is connected incorrectly (reverse polarity protection - fuse replacement not necessary). The device must be returned to B&R for repairs if the fuse is blown because of an error.

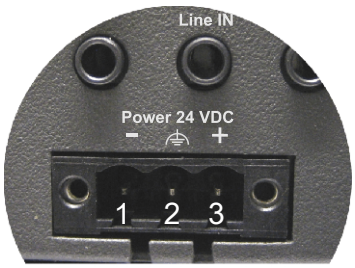
Supply voltage		
Protected against reverse polarity		3-pin, male
Pin	**Description**	
1	-	
2	Functional ground	
3	+	
Model number	**Short description**	
	Terminal blocks	
0TB103.9	Plug 24 V 5.08 3-pin screw clamps	
0TB103.91	Plug 24 V 5.08 3-pin cage clamps	

Table 14: Supply voltage connection + 24VDC

Ground

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

The grounding connection is located on the bottom of the APC810 systems.

The M4 self-locking nut can be used, for example, to fasten a copper strip that is built into the APC810 at a central grounding point in the switching cabinet or system. The largest possible conductor cross section should be used (at least 2.5 mm²).

2.6.2 Serial interface COM1

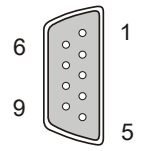
Serial interface COM1[1]		
	RS232	9-pin DSUB plug 
Type	RS232, modem-capable, not electrically isolated	
UART	16550-compatible, 16-byte FIFO	
Transfer rate	Max. 115 kBit/s	
Bus length	Max. 15 m	
Pin	**Assignment**	
1	DCD	
2	RXD	
3	TXD	
4	DTR	
5	GND	
6	DSR	
7	RTS	
8	CTS	
9	RI	

Table 15: Pin assignments - COM1

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

2.6.3 Serial interface COM2

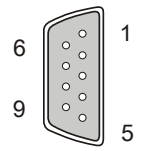
Serial interface COM2[1]		
	RS232	9-pin DSUB plug 
Type	RS232, modem-capable, not electrically isolated	
UART	16550-compatible, 16-byte FIFO	
Transfer rate	Max. 115 kBit/s	
Bus length	Max. 15 m	
Pin	**Assignment**	
1	DCD	
2	RXD	
3	TXD	
4	DTR	
5	GND	
6	DSR	
7	RTS	
8	CTS	
9	RI	

Table 16: Pin assignments - COM2

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

2.6.4 Monitor / Panel connection - SDL (Smart Display Link / DVI)

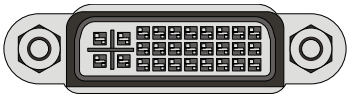
Monitor / Panel connection - SDL (Smart Display Link) / DVI		
The following will provide an overview of the video signals available on the monitor/panel output. For details, see technical data for the CPU board being used.		
CPU board	**Video signals with all system unit variations**	
5PC800.BM45-00	RGB, DVI, SDL	
5PC800.BM45-01	RGB, DVI, SDL	

Table 17: Monitor / Panel connection - RGB, DVI, SDL

2.6.5 Ethernet 1 (ETH1)

This Ethernet controller is integrated in the CPU board and is fed outwards via the system unit.

Ethernet 1 connection (ETH1[1])		
Controller	Intel 82567	
Cabling	S/STP (Cat5e)	
Transfer rate	10/100/1000 MBit/s[2]	
Cable length	max. 100 m (min. Cat5e)	
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)

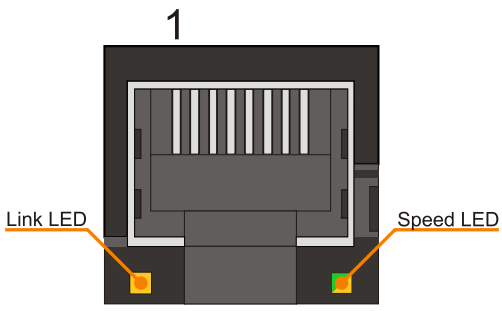


Table 18: Ethernet connection (ETH1)

1) The interfaces, etc. available on the device or module were numbered accordingly for easy identification.This numbering can differ from the numbering used by the particular operating system.
2) Change-over takes place automatically.
3) The 10 MBit/s transfer speed / connection is only present if the Link LED is simultaneously active.

Driver support

A special driver is required in order to operate the Realtek Ethernet controller 82567. The necessary drivers are available in the Downloads area of the B&R website (www.br-automation.com).

Information:

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

2.6.6 Ethernet 2 (ETH2)

This Ethernet controller is integrated in the main board and is fed outwards via the system unit.

Ethernet 2 connection (ETH2[1])		
Controller	Intel 82573L	
Cabling	S/STP (Cat5e)	
Transfer rate	10/100/1000 MBit/s[2]	
Cable length	max. 100 m (min. Cat5e)	
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)

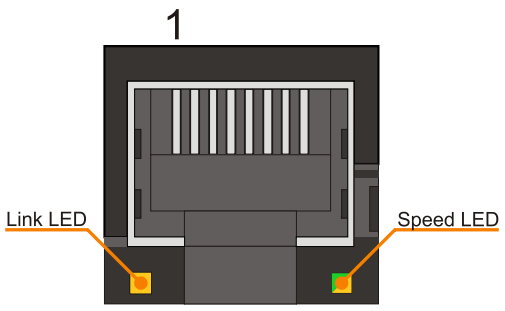


Table 19: Ethernet connection (ETH2)

1) The interfaces, etc. available on the device or module were numbered accordingly for easy identification. This numbering can differ from the numbering used by the particular operating system.
2) Change-over takes place automatically.
3) The 10 MBit/s transfer speed / connection is only present if the Link LED is simultaneously active.

Driver support

A special driver is required in order to operate the Intel Ethernet controller 82573L. The necessary drivers are available in the Downloads area of the B&R website (www.br-automation.com).

Information:

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

2.6.7 USB ports (USB1, 2, 3, 4, 5)

The APC810 devices have a USB 2.0 (Universal Serial Bus) host controller with multiple USB ports, two of which are on the outside for easy access.

Warning!

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

Information:

For more information see Chapter 3 "Commissioning", section "Connecting USB peripheral devices" on page 175.

Caution!

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

USB1,2,3,4

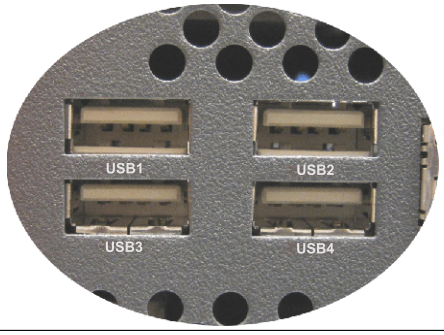
Universal Serial Bus (USB1, USB2, USB3, USB4[1])		
Type	USB 2.0	4 x USB type A, female
Design	Type A	
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s)	
Current load[2] USB1, USB3 USB2, USB4	 Max. 1 A max. 500 mA	
Cable length	max. 5 m (without hub)	

Table 20: USB1, USB2, USB3, USB4 connection

1) The interfaces, etc. available on the device or module were numbered accordingly for easy identification. This numbering can differ from the numbering used by the particular operating system.
2) For safety, every USB port is equipped with a maintenance free "USB current-limiting circuit breaker" (max. 500 mA or 1 A).

USB5

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

Table 21: USB5 connection

1) The interfaces, etc. available on the device or module were numbered accordingly for easy identification. This numbering can differ from the numbering used by the particular operating system.
2) For safety, the USB port is equipped with a maintenance free "USB current-limiting circuit breaker" (max. 1 A)

2.6.8 MIC, Line IN, Line OUT

Since the Intel GM45 chipset used in the 5PC800.BM45-0x doesn't support AC97 sound, the MIC, Line In and Line OUT connections are not supported.

MIC, Line IN, Line OUT
3.5 mm jack, female


Table 22: MIC, Line IN, Line OUT

2.6.9 Add-on interface slot

An optional add-on interface (e.g. CAN, RS485) can be installed here. See also "Add-on interfaces (IF option)" on page 134.

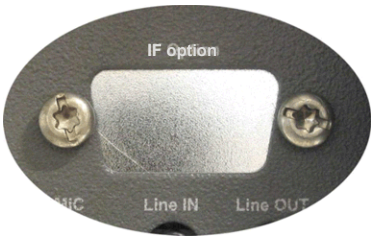
Add-on interface slot		
Model number	**Short description**	
	Serial port adapter	
5AC600.CANI-00	Add-on CAN interface	
5AC600.458I-00	Add-on RS232/422/458 interface	

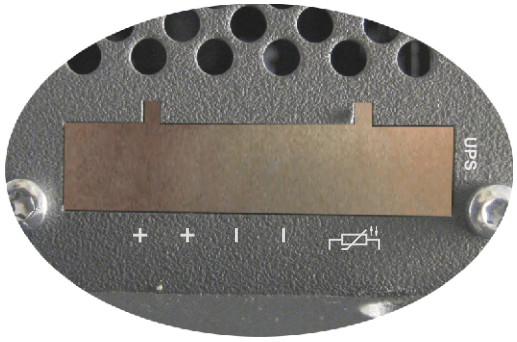
Table 23: Add-on interface slot

2.6.10 Add-on UPS slot

An optional Automation PC add-on UPS module or the APC810 ready relay /2 can be installed in this slot.

Add-on UPS slot

Pin assignments with mounted add-on UPS module	
1	+
2	+
3	-
4	-
5	NTC (for battery temperature measurement)
6	NTC (for battery temperature measurement)
Model number	**Short description**
	Uninterruptible power supply
5AC600.UPSI-00	Add-on UPS module
5AC600.UPSB-00	Battery unit 5 Ah
5CAUPS.0005-00	UPS cable 0.5 m
5CAUPS.0030-00	UPS cable 3 m
	APC810 Ready relay
5AC801.RDYR-01	APC810 Ready relay /2



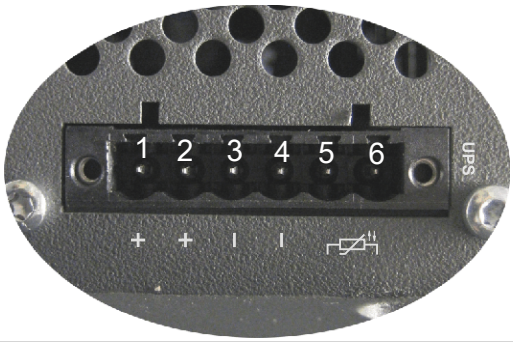


Table 24: Add-on UPS slot (with and without mounted UPS)

For more information about the UPS module, see chapter Chapter 6 " Accessories", section 311.

2.6.11 AP Link slot

When connected with the AP Link card 5AC801.SDL0-00, it is possible to implement a second graphic line with DVI and SDL, but without RGB signals. Furthermore, the APC810 ready relay 5AC801.RDYR-00 can also be mounted.

Information:

Installation of AP Link cards is only possible in connection with the system units 5PC810.SX02-00, 5PC810.SX03-00 and 5PC810.SX05-00.

2.6.12 Card slot (PCI / PCIe)

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

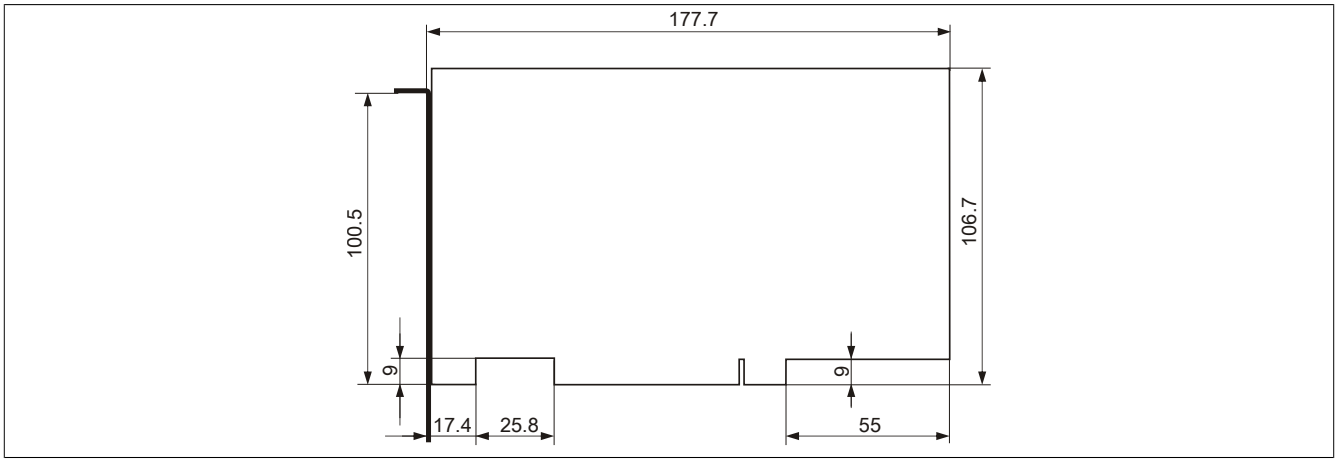


Image 8: Dimensions - Standard half-size PCI card

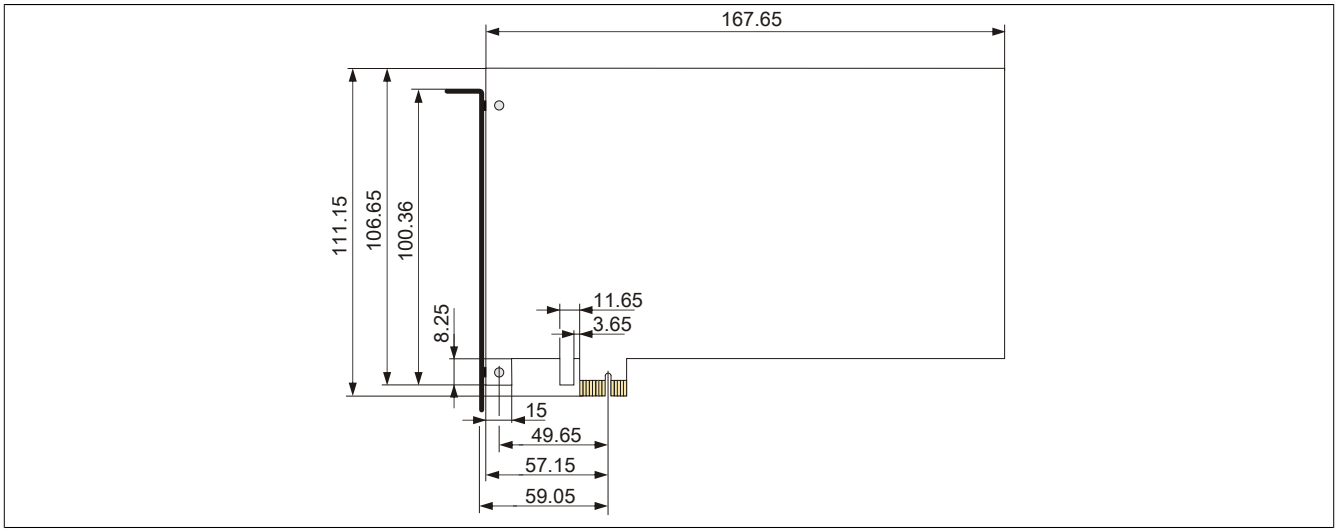


Image 9: Dimensions - Standard half-size PCIe card

2.6.13 Status LEDs

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

Status LEDs			
LED	**Color**	**Status**	**Meaning**
Power	Green	On	Supply voltage OK
	Red	On	The system is in standby mode (S5: soft-off mode or S4: hibernate mode - suspend-to-disk)
	Orange[1)]	On	Supply voltage not OK; the system is operating on battery power.
HDD	Yellow	On	Signals IDE drive access (CF, HDD, CD, etc.)
Link1	Yellow	On	Indicates an active SDL connection on the monitor / panel plug.
		Blinking	An active SDL connection has been interrupted by a loss of power in the display unit.
Link2	Yellow	On	Indicates an active SDL connection on the AP Link.
		Blinking	An active SDL connection on the AP link has been interrupted by a loss of power in the display unit.

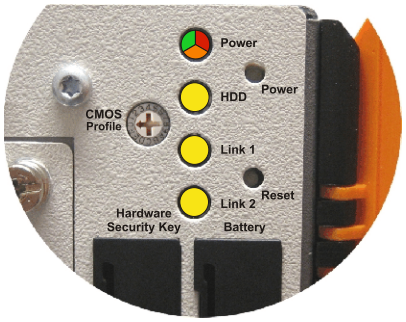


Table 25: Data - status LEDs

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

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

Image 10: Front-side status LEDs

2.6.14 CMOS profile switch

CMOS profile switch	
Different BIOS default value profiles can be defined using the 16-position CMOS profile switch.	
Switch position	**Description**
0	Profile 0: Default profile reserved.
1	**Profile 1: Optimized for system units 5PC810.SX01-00, 5PC810.SX02-00 and 5PC810.SX03-00**
2	**Profile 2: Optimized for 5PC810.SX05-00 system unit**
3	Profile 3: Optimized for system units 5PC820.SX01-00 and 5PC820.SX01-00
4	Profile 4: Reserved
5	Profile 5: Optimized for system units 5PC820.1505-00 and 5PC820.1906-00

Table 26: CMOS profile switch

Information:

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

The position of the CMOS profile switch is is displayed in the BIOS setup pages and in the B&R ADI Control Center, among other places.

2.6.15 Power button

The power button has a variety of functions due to full ATX power supply support.

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 ATX power supply: **Press and release** ... Switches on APC810 or shuts down operating system and switches off the APC810. **Press and hold** ... ATX power supply switches off without shutting down the APC810 (**data could be lost!**). Pressing the power button does not reset the MTCX processor.	

Table 27: Power button

2.6.16 Reset button

Information:

From MTCX PX32 firmware ≥ V00.11 and higher, the reset button is only triggered by edges. This means that the device boots even when the reset button is pressed. In MTCX PX32 firmware < V00.11, the system does not start after holding down (~ 10 seconds) and releasing the reset button.

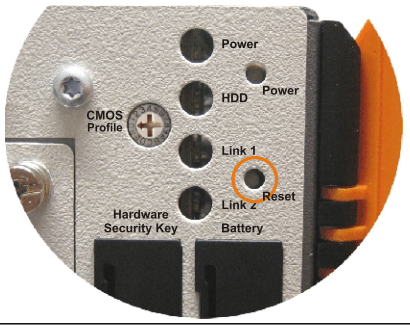
Reset button	
The reset button can be pressed with a pointed object (e.g. paper clip or tip of a pen). Pushing the reset button results in a hardware-reset, PCI-reset. The APC810 is restarted (cold restart). The MTCX processor is not reset when the reset button is pressed.	

Table 28: Reset button

Warning!

A system reset can cause data to be lost!

2.6.17 Battery

The lithium battery (3 V, 950 mAh) buffers the internal real-time clock (RTC) as well as the individually saved BIOS settings and data in the SRAM and is located behind the black cover. The buffer duration of the battery is at least 2½ years (at 50°C, 8.5 µA current requirements of the supplied components and a self discharge of 40%). The battery is subject to wear and should be replaced regularly (at least following the specified lifespan).

Battery		
Battery Type Removable Lifespan	 Renata 950 mAh Yes, accessible from the outside 2½ 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 pcs., 3 V, 950 mAh, button cell	

Table 29: Battery

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

Battery status evaluation

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

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

Table 30: Meaning of battery status

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

2.6.18 Hardware Security Key (Dongle)

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

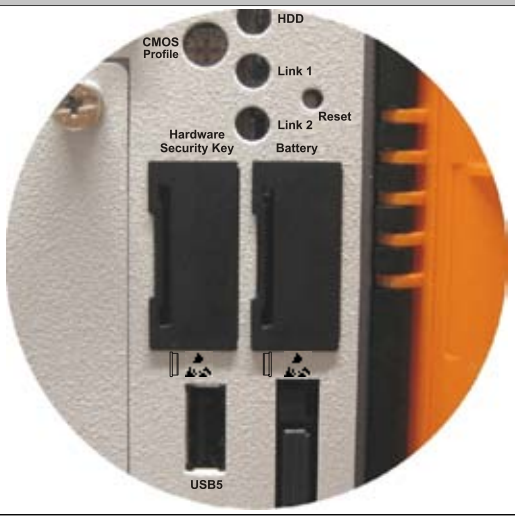
Hardware Security Key	
A hardware security key (dongle) can be inserted behind the black cover.	

Table 31: Hardware Security Key

Warning!

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

2.6.19 CompactFlash slot 1

This CompactFlash slot is a fixed part of an APC810 system and is internally connected with the chipset via SATA to PATA bridge. Type I CompactFlash cards are supported.

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

Table 32: CompactFlash slot (CF1)

Warning!

Turn off power before inserting or removing the CompactFlash card!

2.6.20 CompactFlash slot 2

Since the Intel GM45 chipset used on 5PC800.BM45-0x doesn't support an IDE (PATA) channel, the CF2 slot is not supported.

CompactFlash slot (CF2)


Table 33: CompactFlash slot (CF2)

2.6.21 Slide-in slot 1

The slide-in slot 1 is internally connected with the chipset via SATA I and USB.

Slide-in slot 1		
Connection	SATA I and USB	
Model number	**Short description**	
	Drives	
5AC801.ADAS-00	SATA hard disk adapter for operating a slide-in compact hard disk in a slide-in slot	
5AC801.HDDS-00	40 GB SATA hard disk (slide-in) 24/7 hard disk with extended temperature range. Note: Please consult the manual for info on using the hard disk.	
5AC801.DVRS-00	DVD-R/RW DVD+R/RW SATA drive (slide-in).	
5AC801.DVDS-00	DVD-ROM SATA drive (slide-in).	

Table 34: Slide-in slot 1

Information:

The SATA I interface allows data carriers to be exchanged during operation (hot-plug). To utilize this capability, it must be supported by the operating system.

2.6.22 Slide-in slot 2

The slide-in slot 2 is internally connected with the chipset via SATA I and USB.

Slide-in slot 2		
Connection	SATA I and USB	
Model number	**Short description**	
	Drives	
5AC801.HDDS-00	40 GB SATA hard disk (slide-in) 24/7 hard disk with extended temperature range. Note: Please consult the manual for info on using the hard disk.	
5AC801.DVRS-00	DVD-R/RW DVD+R/RW SATA drive (slide-in).	
5AC801.DVDS-00	DVD-ROM SATA drive (slide-in).	

Table 35: Slide-in slot 2

Information:

The APC810 slide-in compact adapter 5AC801.ADAS-00 can only be inserted into slide-in slot 1 for mechanical reasons (closing the front door).

Information:

The SATA I interface allows data carriers to be exchanged during operation (hot-plug). To utilize this capability, it must be supported by the operating system.

2.6.23 Slide-in compact slot

The slide-in compact slot is internally connected with the chipset via SATA I.

Slide-in compact slot		
Connection	SATA I	
Model number	**Short description**	
	Drives	
5AC801.HDDI-00	40 GB SATA hard disk (slide-in compact); 24/7 hard disk with extended temperature range. Note: Please consult the manual for info on using the hard disk.	
5AC801.HDDI-03	250 GB SATA hard disk (slide-in compact); 24/7 hard disk. Note: Please consult the manual for info on using the hard disk.	
5AC801.SSDI-00	32 GB SATA SSD (SLC) (slide-in compact).	

Table 36: Slide-in compact slot

Information:

The SATA I interface allows data carriers to be exchanged during operation (hot-plug). To utilize this capability, it must be supported by the operating system.

For information about installing / exchanging a slide-in compact drive, see see "Procedure" on page 350.

3 Individual components

3.1 System units

The system unit unites all of the individual components in one compact device. It consists of a housing with an integrated main board. The interfaces easily accessible on the front side, just behind the orange front doors or on the top. The system units are available in sizes with 1, 2, 3 or 5 card slots.

3.1.1 5PC810.SX01-00

General information

- Slot for a bus unit with 1 PCI or 1 PCIe slot
- 512 KB SRAM onboard
- Insert for 1 slide-in compact drive

Order data

Model number	Short description	Figure
	System units	
5PC810.SX01-00	APC810 system unit, 1 slot (PCI Express, PCI, depending on bus); 1 slide-in compact slot; Smart Display Link/DVI/Monitor, 2x RS232, 5x USB 2.0, 2x ETH 10/100/1000, AC97 sound, 24 VDC (order 0TB103.9 screw clamp or 0TB103.91 cage clamp terminals separately)	
	Required accessories	
5PC800.B945-10	CPU board Intel Core Duo L2400, 1.66 GHz, 667 MHz FSB, 2 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-11	CPU board Intel Core2 Duo L7400, 1.5 GHz, 667 MHz FSB, 2 MB L2 cache; 945GME chipset; 4 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-12	CPU board Intel Core2 Duo L7500 1.06 GHz, 533 MHz FSB, 2 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-13	CPU board Intel Celeron M 423, 1.06 GHz, 533 MHz FSB, 1 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-14	CPU board Intel Core2 Duo T7400, 2.16 GHz, 667 MHz FSB, 2 MB L2 cache; 945GM chipset; 4 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.BM45-01	CPU board Intel Core2 Duo P8400 2,26 GHz, 1066 MHz FSB, 3 MB L2 cache; GM45 chipset; 2 sockets for SO-DIMM DDR3 RAM modules	
	Bus units	
5PC810.BX01-00	APC810 bus, 1 PCI	
5PC810.BX01-01	APC810 bus, 1 PCI Express (x4)	
	CPU boards	
5PC800.B945-00	CPU board Intel Core Duo L2400, 1.66 GHz, 667 MHz FSB, 2 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-01	CPU board Intel Core2 Duo L7400, 1.5 GHz, 667 MHz FSB, 2 MB L2 cache; 945GME chipset; 4 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-02	CPU board Intel Core2 Duo L7500 1.06 GHz, 533 MHz FSB, 2 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-03	CPU board Intel Celeron M 423, 1.06 GHz, 533 MHz FSB, 1 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-04	CPU board Intel Core2 Duo T7400, 2.16 GHz, 667 MHz FSB, 2 MB L2 cache; 945GM chipset; 4 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-05	CPU board Intel Atom, 1.6 GHz, 533 MHz FSB, 512 KB L2 cache; 945GME chipset; 2 socket for a SO-DIMM DDR2 RAM module (max. total 3 GB)	
5PC800.BM45-00	CPU board Intel Core2 Duo T9400 2,53 GHz, 1066 MHz FSB, 6 MB L2 cache; GM45 chipset; 2 sockets for SO-DIMM DDR3 RAM modules	
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamp, 3.31 mm², protected against vibration by the screw flange	

Table 37: 5PC810.SX01-00 - Order data

Model number	Short description	Figure
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamp, 3.31 mm², protected against vibration by the screw flange	
	Main memory for B945 CPU boards	
5MMDDR.0512-01	SO-DIMM DDR2 RAM 512 MB PC2-5300	
5MMDDR.1024-01	SO-DIMM DDR2 RAM 1024 MB PC2-5300	
5MMDDR.2048-01	SO-DIMM DDR2 RAM 2048 MB PC2-5300	
	Main memory for GM45 CPU boards	
5MMDDR.2048-02	SO-DIMM DDR3 RAM 2048 MB PC3-8500	
5MMDDR.4096-02	SO-DIMM DDR3 RAM 4096 MB PC3-8500	
	Heat sink	
5AC801.HS00-00	APC810 heat sink for CPU boards with Dual Core processors L2400, L7400, U7500 and Celeron M 423.	
5AC801.HS00-01	APC810 heat sink for CPU boards with Dual Core processor T7400, T9400 and P8400.	
5AC801.HS00-02	APC810 heat sink for CPU board with Atom processor N270.	
	Optional accessories	
	Drives	
5AC801.HDDI-00	40 GB SATA hard disk (slide-in compact); 24/7 hard disk with extended temperature range. Note: Please consult the manual when using the hard disk.	
5AC801.HDDI-02	160 GB SATA hard disk (slide-in compact); 24/7 hard disk with extended temperature range. Note: Please consult the manual when using the hard disk.	
5AC801.SSDI-00	32 GB SATA SSD (SLC) (slide-in compact).	
5ACPCI.RAIC-03	PCI RAID system SATA 2x 160 GB; Note: Please consult the manual when using the hard disk.	
5ACPCI.RAIC-04	160 GB SATA hard disk, replacement part for 5ACPCI.RAIC-03; Note: Please consult the manual when using the hard disk.	
	Fan kits	
5PC810.FA01-00	APC810 fan kit for system unit 5PC810.SX01-00.	
	Serial port adapter	
5AC600.485I-00	RS232/422/485 interface, for installation in an APC620, APC810 or PPC700.	
5AC600.CANI-00	CAN interface; for installation in an APC620, APC810 or PPC700.	
	Uninterruptible power supply	
5AC600.UPSB-00	Battery unit 5Ah; for APC620, APC810 or PPC800 UPS.	
5AC600.UPSI-00	UPS module for APC620, APC810, PPC800; for system units 5PC600.SX01-00 (starting with Rev. H0), 5PC600.SX02-00 (starting with Rev. G0), 5PC600.SX02-01 (starting with Rev. H0), 5PC600.SX05-00 (starting with Rev. F0), 5PC600.SX05-01 (starting with Rev. F0), 5PC600.SF03-00 (starting with Rev. A0), 5PC810.SX*. 5PC820.1505-00, 5PC820.1906-00. Order cable (5CAUPS.0005-00 or 5CAUPS.0030-00) and battery unit (5AC600.UPSB-00) separately.	
5CAUPS.0005-00	UPS cable 0.5 m; for UPS 5AC600.UPSI-00.	
5CAUPS.0030-00	UPS cable 3 m; for UPS 5AC600.UPSI-00.	
	Accessories	
5ACPCI.ETH3-01	PCI Ethernet Card 3 x 10/100	

Table 37: 5PC810.SX01-00 - Order data

Interfaces

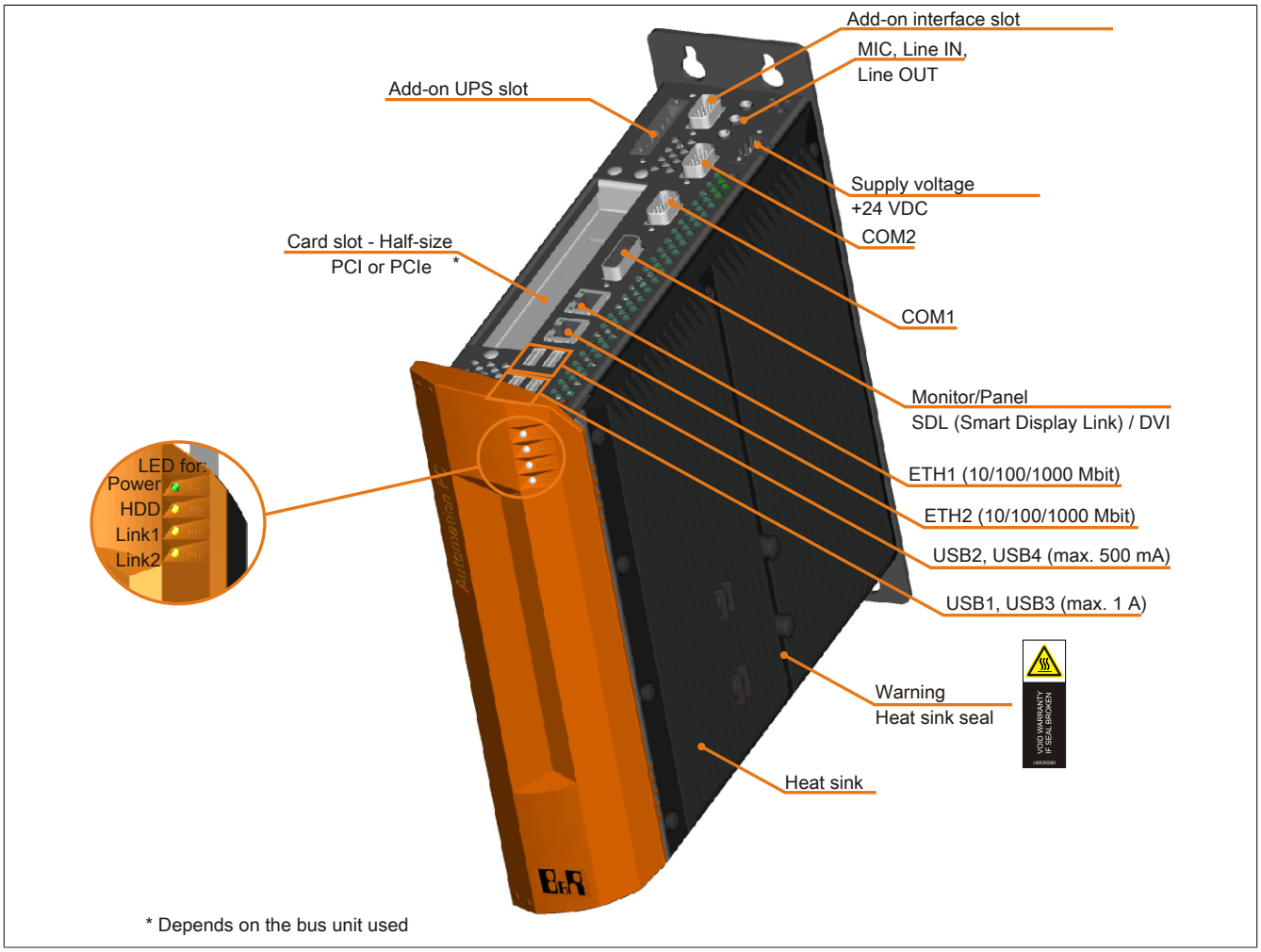


Image 11: 5PC810.SX01-00 - Interfaces on top

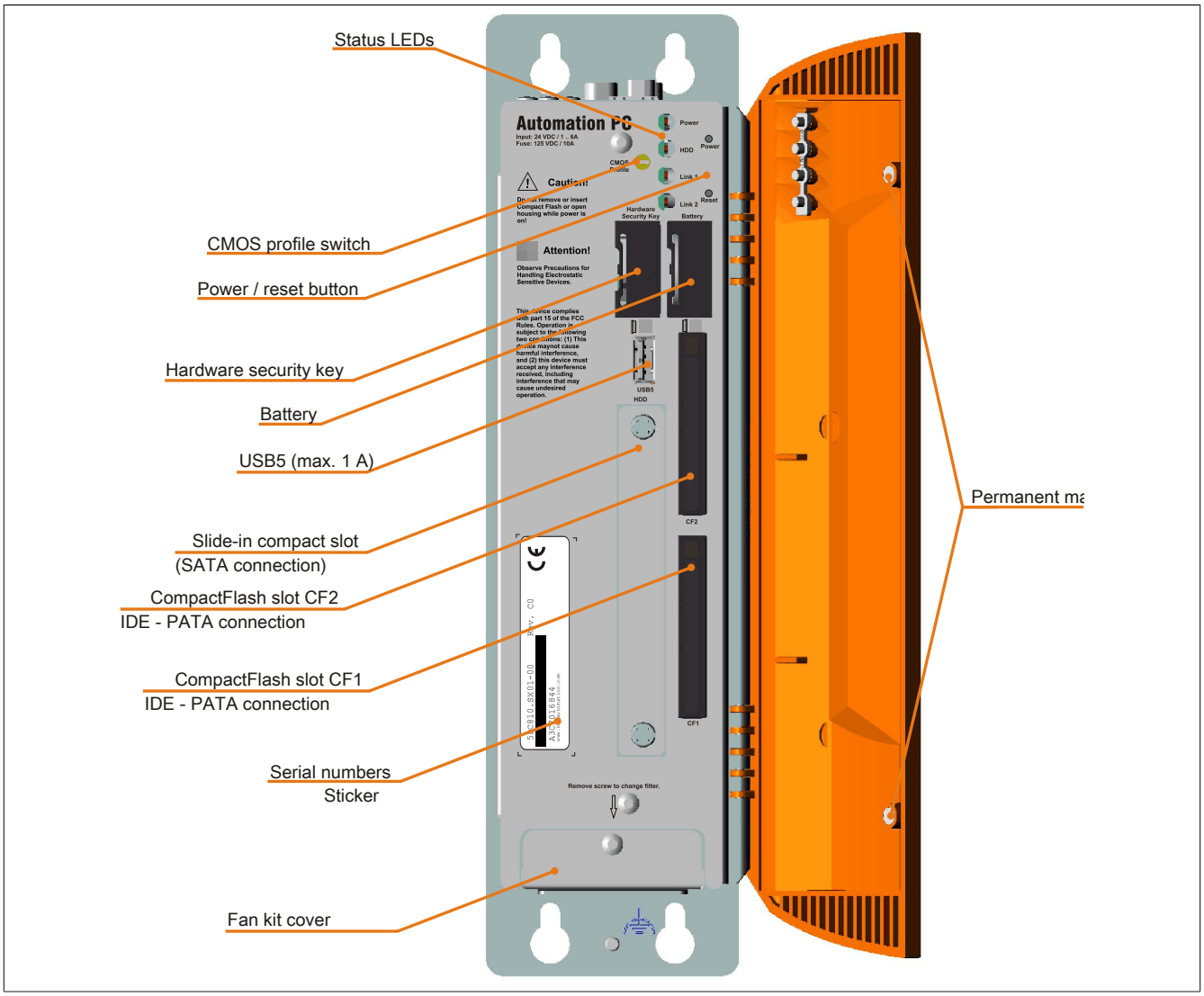


Image 12: 5PC810.SX01-00 - Interfaces on front

Technical data

Product ID	5PC810.SX01-00
General information	
B&R ID code	$A3ED
Certification	
C-UL-US	Yes
CE	Yes
Dongle port	Yes
Cooling	Passive via heat sink and optionally supported with an active fan kit
LEDs	4
Power button	Yes
Reset button	Yes
Buzzer	Yes
Battery	
Type	Renata 950 mAh
Method	Lithium Ion
Lifespan	2½ years[1)]
removable	Yes, accessible behind the orange front doors
Controller	
Bootloader	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
SRAM	

Table 38: 5PC810.SX01-00 - Technical data

Product ID	5PC810.SX01-00
Quantity	512 KB
Battery-buffered	Yes
Remanent variables for AR (Automation Runtime) in power fail mode	192 kB
Memory	
Type	Depending on the CPU board used
Quantity	Depending on the CPU board used
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
COM2	
Type	RS232, modem-capable, not electrically isolated
Design	9-pin DSUB plug
UART	16550-compatible, 16-byte FIFO
Max. baud rate	115 kbit/s
CompactFlash slot 1	
Type	Type I
Amount	1
CompactFlash slot 2	
Type	Type I
Amount	1
USB	
Type	USB 2.0
Amount	5
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s)
Current load	Max. 500 mA or 1 A per connection
Ethernet	
Amount	2
Design	10/100/1000 MBit/s
Max. baud rate	1 GBit/s
Panel/Monitor interface	
Design	DVI-I socket
Type	SDL/DVI/monitor
CAN	
Note	Optional
Audio	
Type	AC97 sound
Entrances	Microphone, Line in
Outputs	Line Out
Add-on interface slot	
Amount	1
Inserts	
PCI / PCIe slots	
Amount	1 PCI slot or 1 PCIe slot[3)]
Slide-in drives	No
Slide-in compact drives	1
Add-on drives	No
Automation Panel link slot	No
Add-on UPS slot	Yes
Insert for fan kit	Yes
Electrical characteristics	
Rated voltage	24 VDC ±25%
Rated current	6 A
Starting current	Typ. 7 A, max. 50 A for < 300 µs
Operational conditions	
EN 60529 protection	IP20
Environmental conditions	
Temperature	
Operation	Component-dependent
Bearings	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	Component-dependent
Bearings	Component-dependent
Transport	Component-dependent
Vibration[4)]	
Operation (continuous)	2 to 9 Hz: 1.75 mm amplitude / 9 to 200 Hz: 0.5 g
Operation (occasional)	2 to 9 Hz: 3.5 mm amplitude / 9 to 200 Hz: 1 g
Bearings	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[4)]	

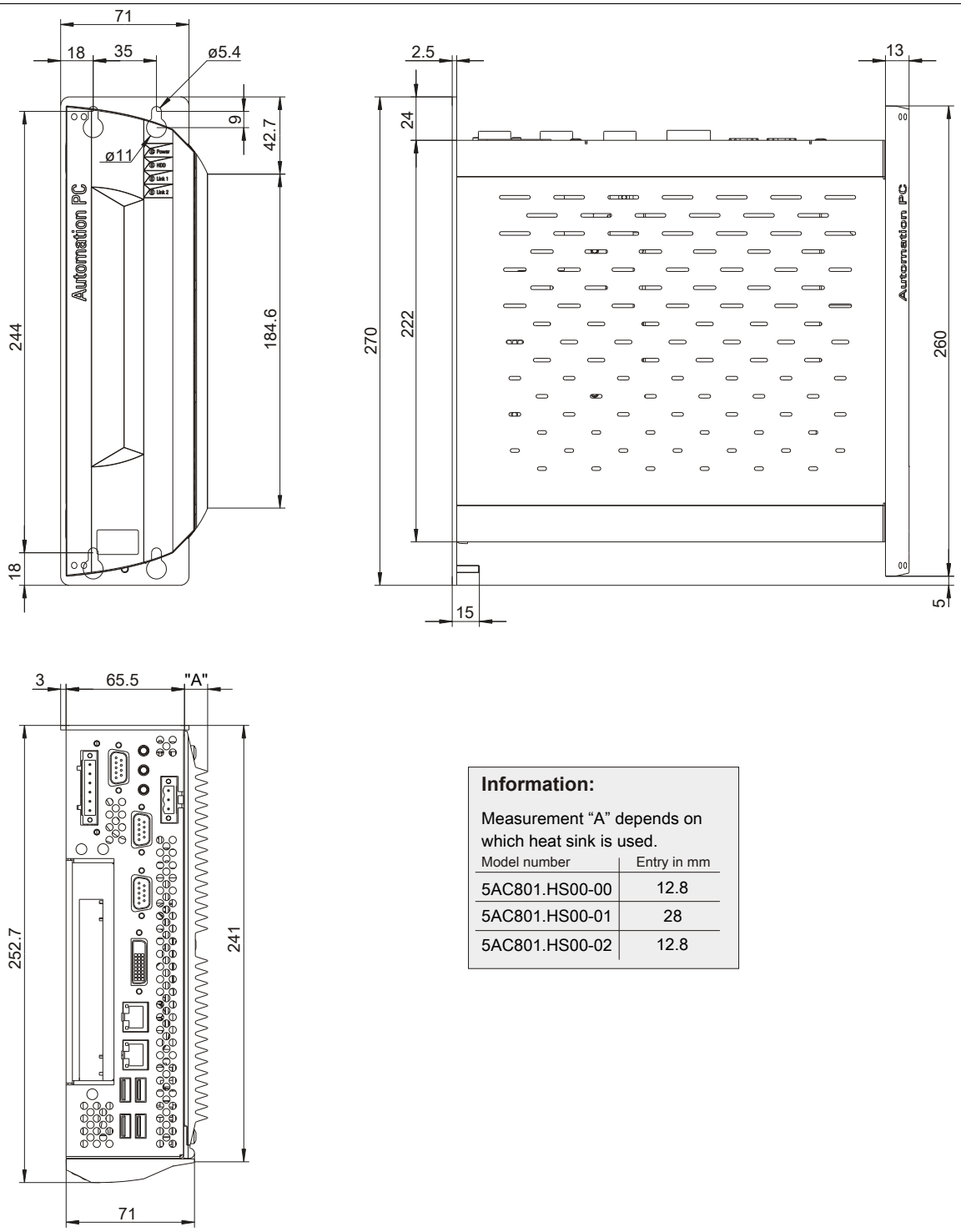
Table 38: 5PC810.SX01-00 - Technical data

Product ID	5PC810.SX01-00
Operation	15 g, 11 ms
Bearings	30 g, 15 ms
Transport	30 g, 15 ms
Altitude	
Operation	Max. 3000 m (component-dependent)[5]
Mechanical characteristics	
Housing[6]	
Item	Galvanized plate, plastic
Front cover	Colored orange plastic (similar to Pantone 144CV)
Paint	Light gray (similar to Pantone 427CV), dark gray (similar to Pantone 432CV)
Dimensions	
Width	81.3 mm with heat sink5AC801.HS00-00 and 5AC801.HS00-02 96.5 mm with heat sink 5AC801.HS00-01
Height	270 mm
Depth	252.7 mm
Weight	Approx. 2200 g (component-dependent)

Table 38: 5PC810.SX01-00 - Technical data

1) At 50°C, 8.5 µA of the supplied components and a self discharge of 40%.
2) Maintenance Controller Extended
3) The PCI slots and PCIe slots are dependent on the bus unit used 5PC810.BX01-00 and 5PC810.BX01-01.
4) Maximum values, as long as no other individual component specifies any other.
5) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).
6) Depending on the process or batch, there may be visible deviations in the color and surface structure.

Dimensions



Information:

Measurement “A” depends on which heat sink is used.

Model number	Entry in mm
5AC801.HS00-00	12.8
5AC801.HS00-01	28
5AC801.HS00-02	12.8

Image 13: 5PC810.SX01-00 - Dimensions

Drilling template

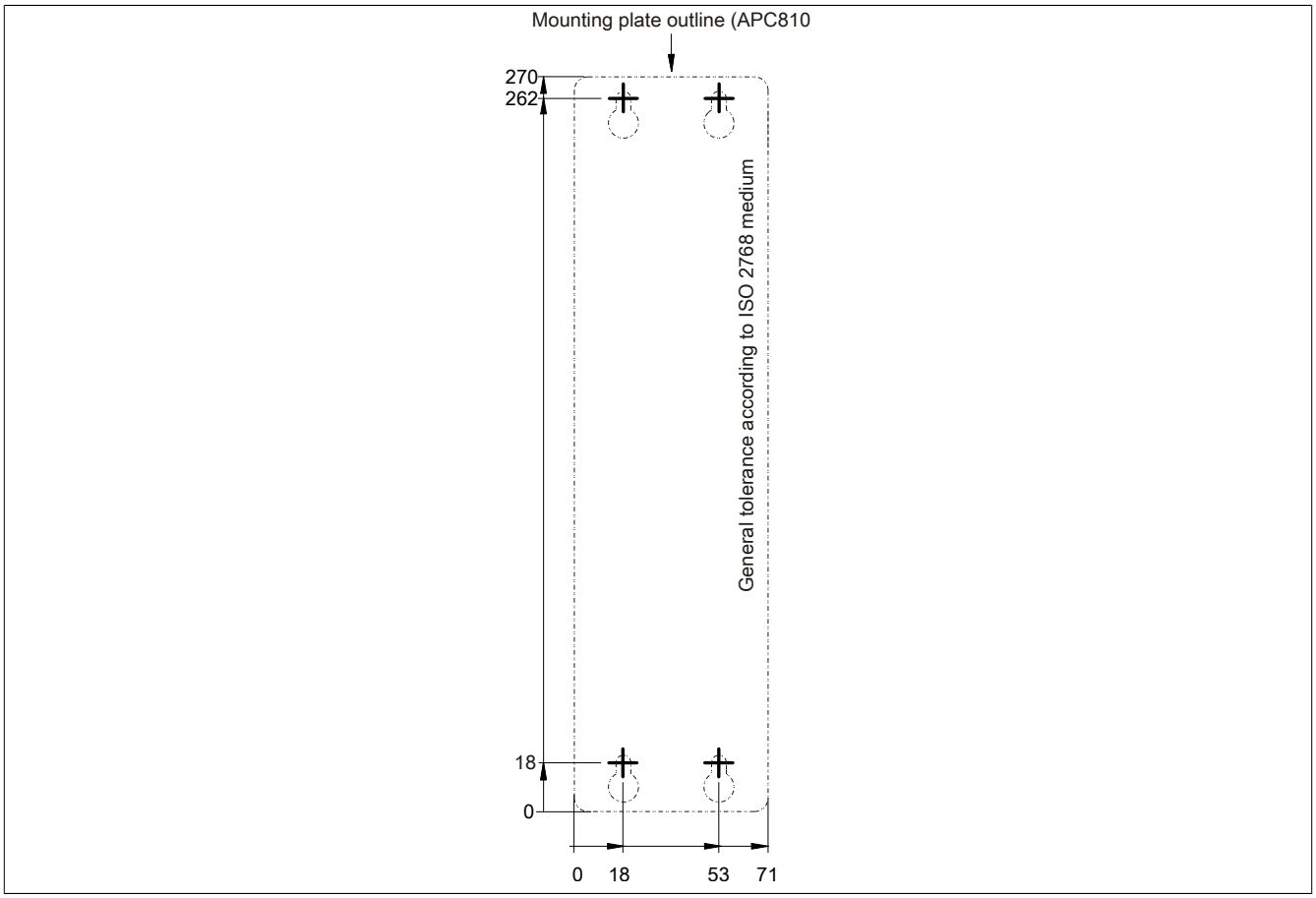


Image 14: 5PC810.SX01-00 - Drilling template

3.1.2 5PC810.SX02-00

General information

- Slot for a bus unit with 2 PCI slots or 1 PCI and 1 PCIe slots
- 512 KB SRAM onboard
- Insert for 1 slide-in compact drive and 1 slide-in drive
- Automation Panel Link slot for connecting Automation Panels via SDL

Order data

Model number	Short description	Figure
	System units	
5PC810.SX02-00	APC810 system unit, 2 slots (PCI Express, PCI, depending on bus); 1 slot for Automation Panel Link transmitter; 1 slide-in compact and 1 slide-in slot; Smart Display Link/DVI/Monitor, 2x RS232, 5x USB 2.0, 2x ETH 10/100/1000, AC97 sound, 24 VDC (order 0TB103.9 screw clamp or 0TB103.91 cage clamp terminals separately)	
	Required accessories	
5PC800.B945-10	CPU board Intel Core Duo L2400, 1.66 GHz, 667 MHz FSB, 2 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-11	CPU board Intel Core2 Duo L7400, 1.5 GHz, 667 MHz FSB, 2 MB L2 cache; 945GME chipset; 4 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-12	CPU board Intel Core2 Duo L7500 1.06 GHz, 533 MHz FSB, 2 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-13	CPU board Intel Celeron M 423, 1.06 GHz, 533 MHz FSB, 1 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-14	CPU board Intel Core2 Duo T7400, 2.16 GHz, 667 MHz FSB, 2 MB L2 cache; 945GM chipset; 4 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.BM45-01	CPU board Intel Core2 Duo P8400 2,26 GHz, 1066 MHz FSB, 3 MB L2 cache; GM45 chipset; 2 sockets for SO-DIMM DDR3 RAM modules	
	Bus units	
5PC810.BX02-00	APC810 bus, 2 PCI	
5PC810.BX02-01	APC810 bus, 1 PCI, 1 PCI Express (x4)	
	CPU boards	
5PC800.B945-00	CPU board Intel Core Duo L2400, 1.66 GHz, 667 MHz FSB, 2 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-01	CPU board Intel Core2 Duo L7400, 1.5 GHz, 667 MHz FSB, 2 MB L2 cache; 945GME chipset; 4 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-02	CPU board Intel Core2 Duo L7500 1.06 GHz, 533 MHz FSB, 2 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-03	CPU board Intel Celeron M 423, 1.06 GHz, 533 MHz FSB, 1 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-04	CPU board Intel Core2 Duo T7400, 2.16 GHz, 667 MHz FSB, 2 MB L2 cache; 945GM chipset; 4 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-05	CPU board Intel Atom, 1.6 GHz, 533 MHz FSB, 512 KB L2 cache; 945GME chipset; 2 socket for a SO-DIMM DDR2 RAM module (max. total 3 GB)	
5PC800.BM45-00	CPU board Intel Core2 Duo T9400 2,53 GHz, 1066 MHz FSB, 6 MB L2 cache; GM45 chipset; 2 sockets for SO-DIMM DDR3 RAM modules	
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamp, 3.31 mm², protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamp, 3.31 mm², protected against vibration by the screw flange	
	Main memory for B945 CPU boards	
5MMDDR.0512-01	SO-DIMM DDR2 RAM 512 MB PC2-5300	
5MMDDR.1024-01	SO-DIMM DDR2 RAM 1024 MB PC2-5300	
5MMDDR.2048-01	SO-DIMM DDR2 RAM 2048 MB PC2-5300	
	Main memory for GM45 CPU boards	
5MMDDR.2048-02	SO-DIMM DDR3 RAM 2048 MB PC3-8500	

Table 39: 5PC810.SX02-00 - Order data

Model number	Short description	Figure
5MMDDR.4096-02	SO-DIMM DDR3 RAM 4096 MB PC3-8500	
	Heat sink	
5AC801.HS00-00	APC810 heat sink for CPU boards with Dual Core processors L2400, L7400, U7500 and Celeron M 423.	
5AC801.HS00-01	APC810 heat sink for CPU boards with Dual Core processor T7400, T9400 and P8400.	
5AC801.HS00-02	APC810 heat sink for CPU board with Atom processor N270.	
	Optional accessories	
	Automation Panel Link insert cards	
5AC801.RDYR-00	APC810 Ready relay	
5AC801.SDL0-00	Smart Display Link/DVI-D transmitter	
	Drives	
5AC801.ADAS-00	SATA Hard Disk Adapter (slide-in compact).	
5AC801.DVDS-00	DVD-ROM SATA drive (slide-in).	
5AC801.DVRS-00	DVD-R/RW DVD+R/RW SATA drive (slide-in).	
5AC801.HDDI-00	40 GB SATA hard disk (slide-in compact); 24/7 hard disk with extended temperature range. Note: Please consult the manual when using the hard disk.	
5AC801.HDDI-02	160 GB SATA hard disk (slide-in compact); 24/7 hard disk with extended temperature range. Note: Please consult the manual when using the hard disk.	
5AC801.HDDS-00	40 GB SATA hard disk (slide-in) 24/7 hard disk with extended temperature range. Note: Please consult the manual when using the hard disk.	
5AC801.SSDI-00	32 GB SATA SSD (SLC) (slide-in compact).	
5ACPCI.RAIC-03	PCI RAID system SATA 2x 160 GB; Note: Please consult the manual when using the hard disk.	
5ACPCI.RAIC-04	160 GB SATA hard disk, replacement part for 5ACPCI.RAIC-03; Note: Please consult the manual when using the hard disk.	
	Fan kits	
5PC810.FA02-01	APC810 fan kit for system unit 5PC810.SX02-00 starting revision D0.	
	Serial port adapter	
5AC600.485I-00	RS232/422/485 interface, for installation in an APC620, APC810 or PPC700.	
5AC600.CANI-00	CAN interface; for installation in an APC620, APC810 or PPC700.	
	Uninterruptible power supply	
5AC600.UPSB-00	Battery unit 5Ah; for APC620, APC810 or PPC800 UPS.	
5AC600.UPSI-00	UPS module for APC620, APC810, PPC800; for system units 5PC600.SX01-00 (starting with Rev. H0), 5PC600.SX02-00 (starting with Rev. G0), 5PC600.SX02-01 (starting with Rev. H0), 5PC600.SX05-00 (starting with Rev. F0), 5PC600.SX05-01 (starting with Rev. F0), 5PC600.SF03-00 (starting with Rev. A0), 5PC810.SX*. 5PC820.1505-00, 5PC820.1906-00. Order cable (5CAUPS.0005-00 or 5CAUPS.0030-00) and battery unit (5AC600.UPSB-00) separately.	
5CAUPS.0005-00	UPS cable 0.5 m; for UPS 5AC600.UPSI-00.	
5CAUPS.0030-00	UPS cable 3 m; for UPS 5AC600.UPSI-00.	
	Accessories	
5ACPCI.ETH1-01	PCI Ethernet Card 1 x 10/100	
5ACPCI.ETH3-01	PCI Ethernet Card 3 x 10/100	

Table 39: 5PC810.SX02-00 - Order data

Interfaces

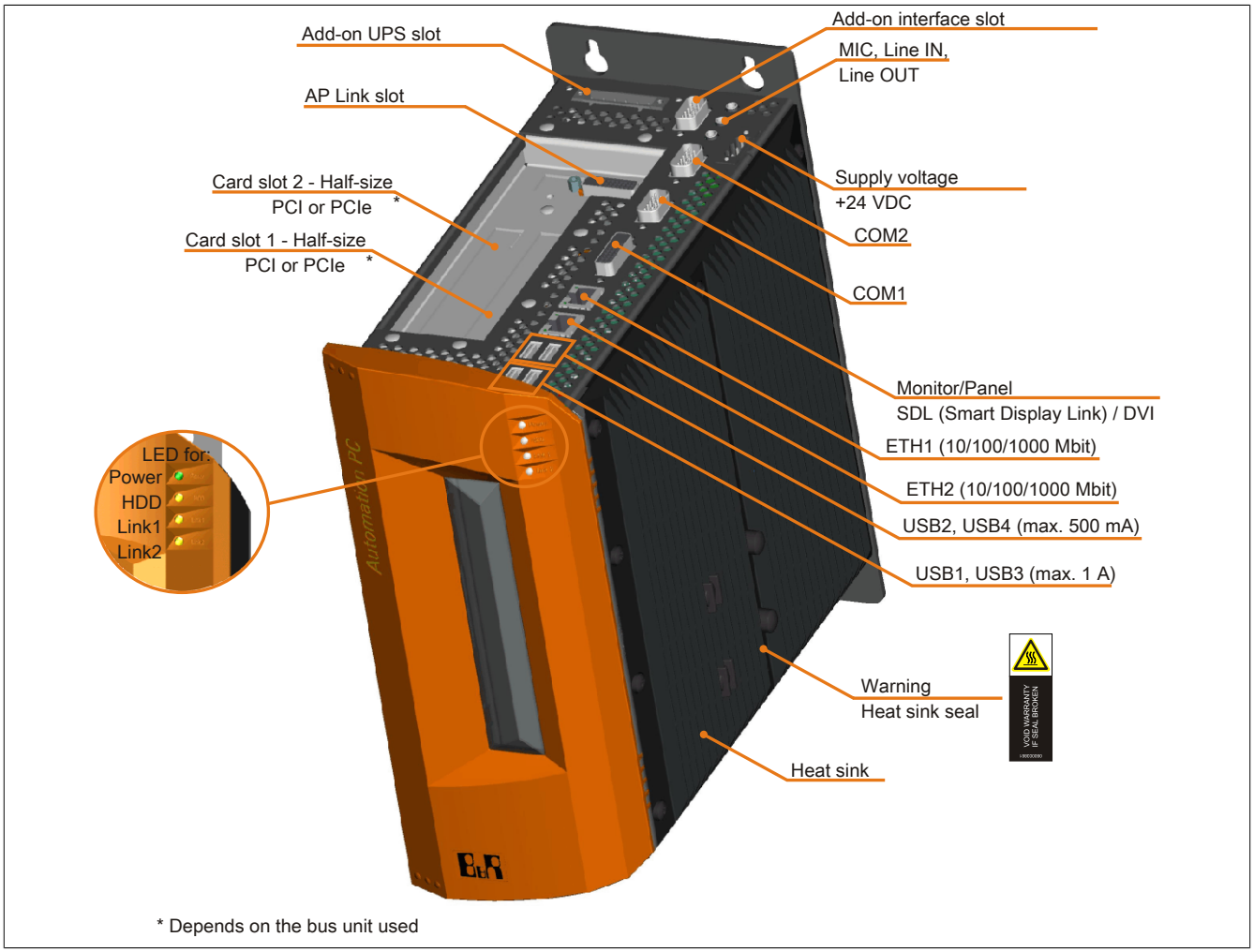


Image 15: 5PC810.SX02-00 - Interfaces on top

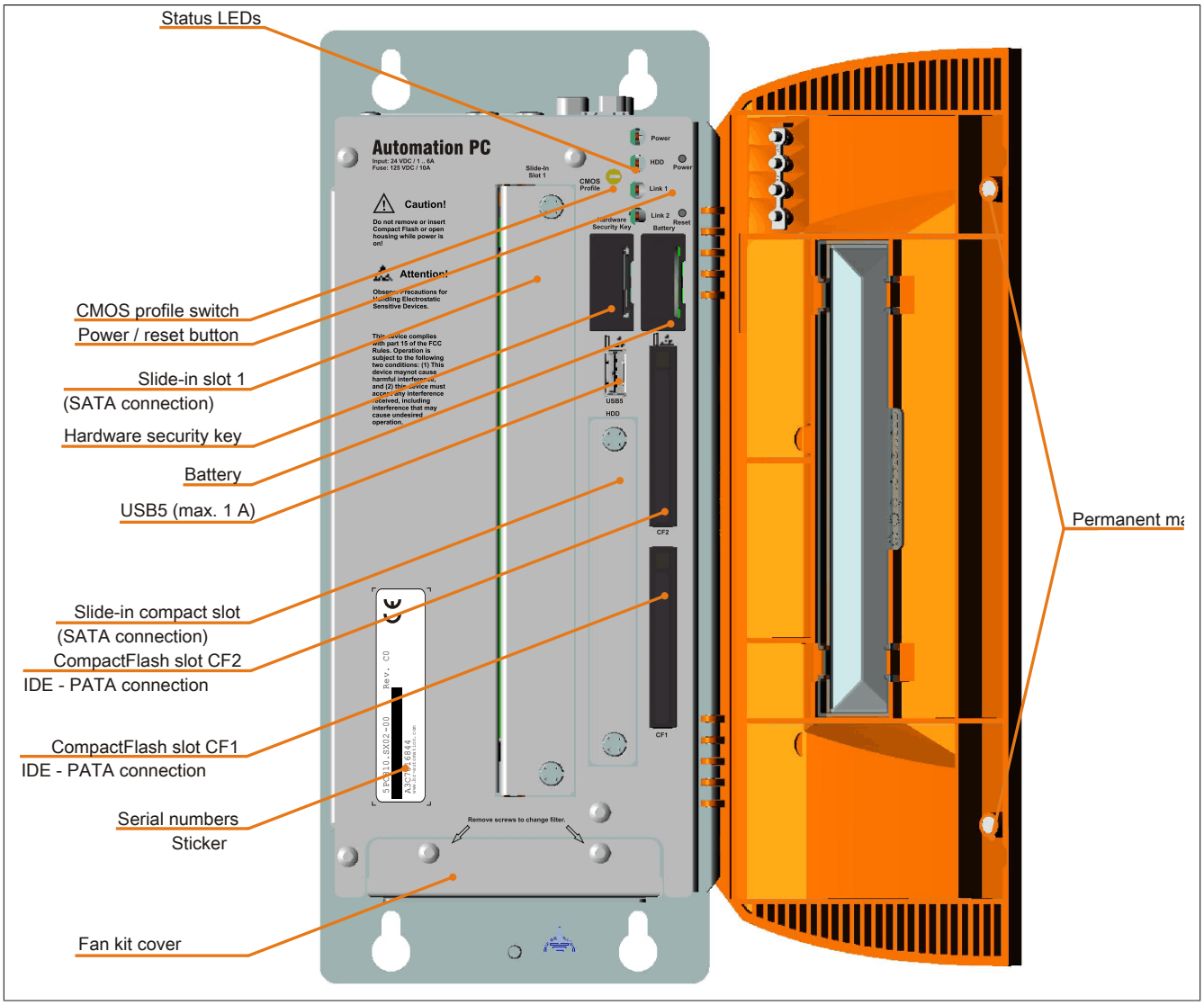


Image 16: 5PC810.SX02-00 - Interfaces on front

Technical data

Product ID	5PC810.SX02-00
General information	
B&R ID code	$A3C7
Certification C-UL-US CE	 Yes Yes
Dongle port	Yes
Cooling	Passive via heat sink and optionally supported with an active fan kit
LEDs	4
Power button	Yes
Reset button	Yes
Buzzer	Yes
Battery Type Method Lifespan removable	 Renata 950 mAh Lithium Ion 2½ years[1)] Yes, accessible behind the orange front doors
Controller	
Bootloader	BIOS
Real-time clock Battery-buffered	 Yes
Power failure logic Controller Buffer time	 MTCX[2)] 10 ms
Graphics Controller	 Depending on the CPU board used
SRAM	

Table 40: 5PC810.SX02-00 - Technical data

Product ID	5PC810.SX02-00
Quantity	512 KB
Battery-buffered	Yes
Remanent variables for AR (Automation Runtime) in power fail mode	192 kB
Memory	
Type	Depending on the CPU board used
Quantity	Depending on the CPU board used
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
COM2	
Type	RS232, modem-capable, not electrically isolated
Design	9-pin DSUB plug
UART	16550-compatible, 16-byte FIFO
Max. baud rate	115 kbit/s
CompactFlash slot 1	
Type	Type I
Amount	1
CompactFlash slot 2	
Type	Type I
Amount	1
USB	
Type	USB 2.0
Amount	5
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s)
Current load	Max. 500 mA or 1 A per connection
Ethernet	
Amount	2
Design	10/100/1000 MBit/s
Max. baud rate	1 GBit/s
Panel/Monitor interface	
Design	DVI-I socket
Type	SDL/DVI/monitor
CAN	
Note	Optional
Audio	
Type	AC97 sound
Entrances	Microphone, Line in
Outputs	Line Out
Add-on interface slot	
Amount	1
Inserts	
PCI / PCIe slots	
Amount	2 PCI slots or 1 PCI and1 PCIe slot[3)]
Slide-in drives	1
Slide-in compact drives	1
Add-on drives	No
Automation Panel link slot	Yes
Add-on UPS slot	Yes
Insert for fan kit	Yes
Electrical characteristics	
Rated voltage	24 VDC ±25%
Rated current	6 A
Starting current	Typ. 7 A, max. 50 A for < 300 µs
Operational conditions	
EN 60529 protection	IP20
Environmental conditions	
Temperature	
Operation	Component-dependent
Bearings	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	Component-dependent
Bearings	Component-dependent
Transport	Component-dependent
Vibration[4)]	
Operation (continuous)	2 to 9 Hz: 1.75 mm amplitude / 9 to 200 Hz: 0.5 g
Operation (occasional)	2 to 9 Hz: 3.5 mm amplitude / 9 to 200 Hz: 1 g
Bearings	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[4)]	

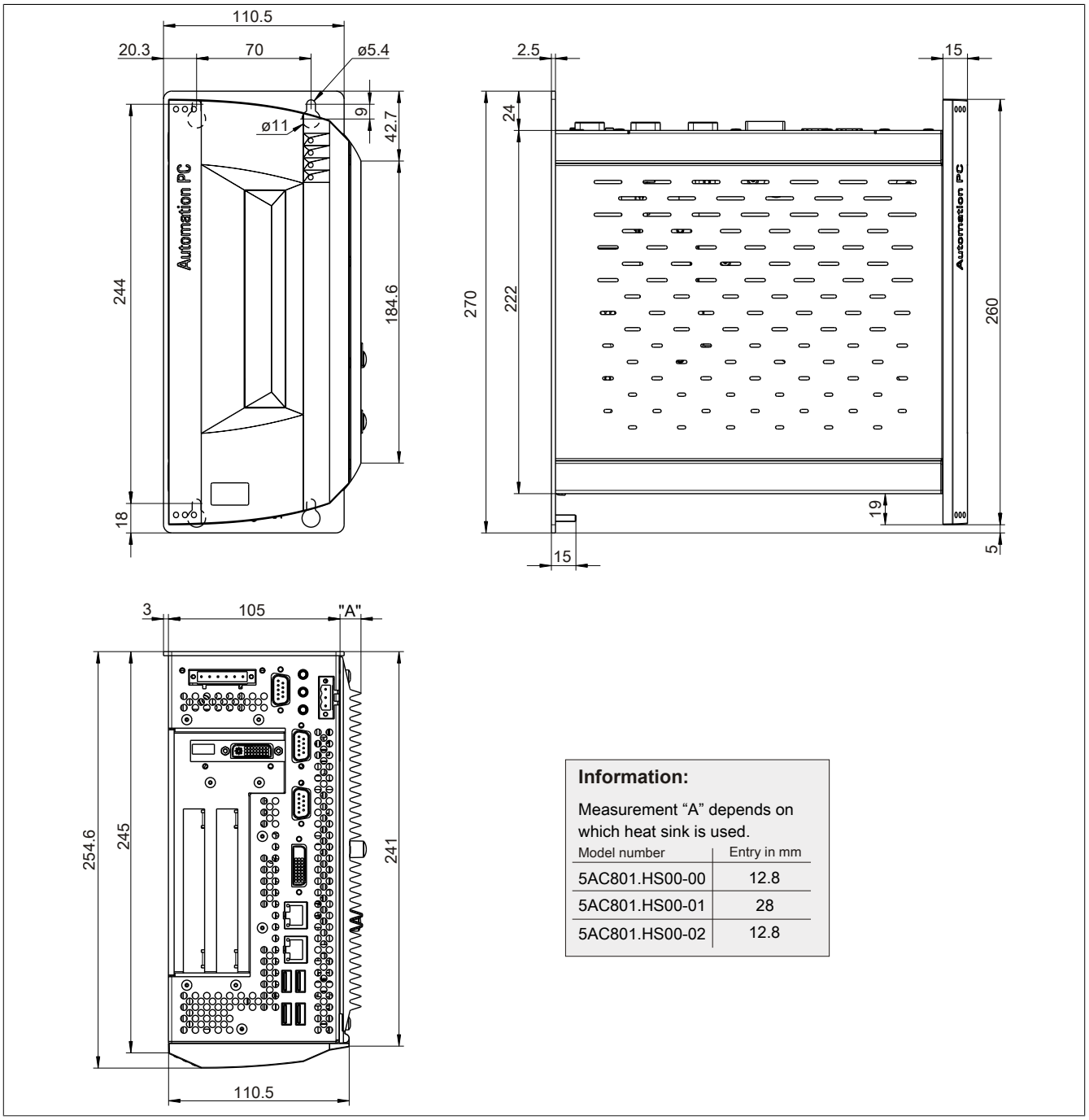
Table 40: 5PC810.SX02-00 - Technical data

Product ID	5PC810.SX02-00
Operation	15 g, 11 ms
Bearings	30 g, 15 ms
Transport	30 g, 15 ms
Altitude	
Operation	Max. 3000 m (component-dependent)[5]
Mechanical characteristics	
Housing[6]	
Item	Galvanized plate, plastic
Front cover	Colored orange plastic (similar to Pantone 144CV)
Paint	Light gray (similar to Pantone 427CV), dark gray (similar to Pantone 432CV)
Dimensions	
Width	120.8 mm with heat sink5AC801.HS00-00 and 5AC801.HS00-02 136 mm with heat sink 5AC801.HS00-01
Height	270 mm
Depth	254.6 mm
Weight	Approx. 2800 g (component-dependent)

Table 40: 5PC810.SX02-00 - Technical data

1) At 50°C, 8.5 µA of the supplied components and a self discharge of 40%.
2) Maintenance Controller Extended
3) The PCI slots and PCIe slots are dependent on the bus unit used 5PC810.BX02-00 and 5PC810.BX02-01.
4) Maximum values, as long as no other individual component specifies any other.
5) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).
6) Depending on the process or batch, there may be visible deviations in the color and surface structure.

Dimensions



Information:

Measurement “A” depends on which heat sink is used.

Model number	Entry in mm
5AC801.HS00-00	12.8
5AC801.HS00-01	28
5AC801.HS00-02	12.8

Image 17: 5PC810.SX02-00 - Dimensions

Drilling template

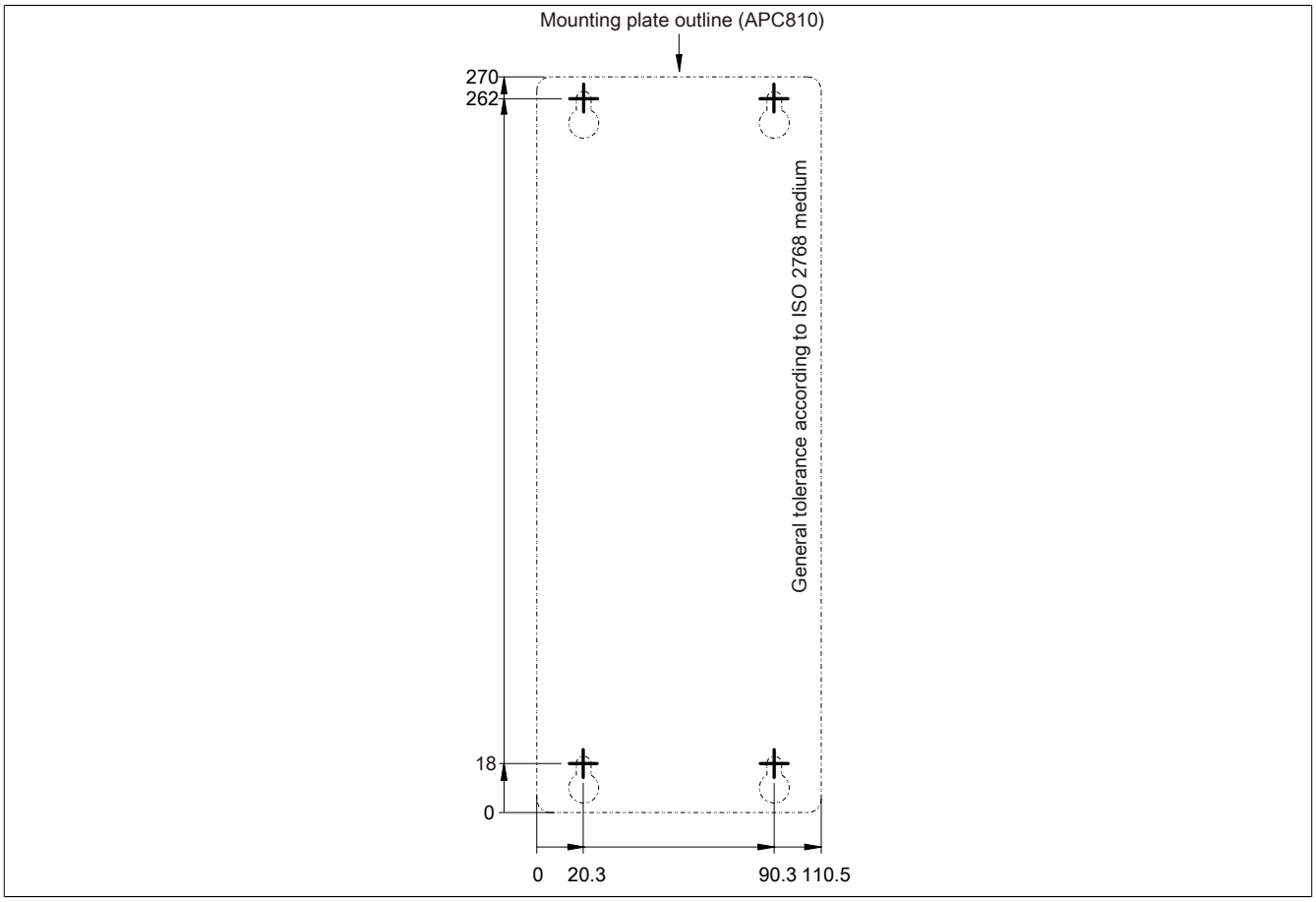


Image 18: 5PC810.SX02-00 - Drilling template

3.1.3 5PC810.SX03-00

General information

- Slot for a bus unit with 2 PCI and 1 PCIe slots
- 512 KB SRAM onboard
- Insert for 1 slide-in compact drive and 1 slide-in drive
- Automation Panel Link slot for connecting Automation Panels via SDL

Order data

Model number	Short description	Figure
	System units	
5PC810.SX03-00	APC810 system unit, 3 slots (PCI Express, PCI, depending on bus); 1 slot for Automation Panel Link transmitter; 1 slide-in compact and 1 slide-in slot; Smart Display Link/DVI/Monitor, 2x RS232, 5x USB 2.0, 2x ETH 10/100/1000, AC97 sound, 24 VDC (order 0TB103.9 screw clamp or 0TB103.91 cage clamp terminals separately)	
	Required accessories	
5PC800.B945-10	CPU board Intel Core Duo L2400, 1.66 GHz, 667 MHz FSB, 2 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-11	CPU board Intel Core2 Duo L7400, 1.5 GHz, 667 MHz FSB, 2 MB L2 cache; 945GME chipset; 4 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-12	CPU board Intel Core2 Duo L7500 1.06 GHz, 533 MHz FSB, 2 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-13	CPU board Intel Celeron M 423, 1.06 GHz, 533 MHz FSB, 1 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-14	CPU board Intel Core2 Duo T7400, 2.16 GHz, 667 MHz FSB, 2 MB L2 cache; 945GM chipset; 4 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.BM45-01	CPU board Intel Core2 Duo P8400 2,26 GHz, 1066 MHz FSB, 3 MB L2 cache; GM45 chipset; 2 sockets for SO-DIMM DDR3 RAM modules	
	Bus units	
5PC810.BX03-00	APC810 bus, 2 PCI, 1 PCI Express (x4)	
	CPU boards	
5PC800.B945-00	CPU board Intel Core Duo L2400, 1.66 GHz, 667 MHz FSB, 2 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-01	CPU board Intel Core2 Duo L7400, 1.5 GHz, 667 MHz FSB, 2 MB L2 cache; 945GME chipset; 4 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-02	CPU board Intel Core2 Duo L7500 1.06 GHz, 533 MHz FSB, 2 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-03	CPU board Intel Celeron M 423, 1.06 GHz, 533 MHz FSB, 1 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-04	CPU board Intel Core2 Duo T7400, 2.16 GHz, 667 MHz FSB, 2 MB L2 cache; 945GM chipset; 4 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-05	CPU board Intel Atom, 1.6 GHz, 533 MHz FSB, 512 KB L2 cache; 945GME chipset; 2 socket for a SO-DIMM DDR2 RAM module (max. total 3 GB)	
5PC800.BM45-00	CPU board Intel Core2 Duo T9400 2,53 GHz, 1066 MHz FSB, 6 MB L2 cache; GM45 chipset; 2 sockets for SO-DIMM DDR3 RAM modules	
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamp, 3.31 mm², protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamp, 3.31 mm², protected against vibration by the screw flange	
	Main memory for B945 CPU boards	
5MMDDR.0512-01	SO-DIMM DDR2 RAM 512 MB PC2-5300	
5MMDDR.1024-01	SO-DIMM DDR2 RAM 1024 MB PC2-5300	
5MMDDR.2048-01	SO-DIMM DDR2 RAM 2048 MB PC2-5300	
	Main memory for GM45 CPU boards	
5MMDDR.2048-02	SO-DIMM DDR3 RAM 2048 MB PC3-8500	
5MMDDR.4096-02	SO-DIMM DDR3 RAM 4096 MB PC3-8500	

Table 41: 5PC810.SX03-00 - Order data

Model number	Short description	Figure
	Heat sink	
5AC801.HS00-00	APC810 heat sink for CPU boards with Dual Core processors L2400, L7400, U7500 and Celeron M 423.	
5AC801.HS00-01	APC810 heat sink for CPU boards with Dual Core processor T7400, T9400 and P8400.	
5AC801.HS00-02	APC810 heat sink for CPU board with Atom processor N270.	
	Optional accessories	
	Automation Panel Link insert cards	
5AC801.RDYR-00	APC810 Ready relay	
5AC801.SDL0-00	Smart Display Link/DVI-D transmitter	
	Drives	
5AC801.ADAS-00	SATA Hard Disk Adapter (slide-in compact).	
5AC801.DVDS-00	DVD-ROM SATA drive (slide-in).	
5AC801.DVRS-00	DVD-R/RW DVD+R/RW SATA drive (slide-in).	
5AC801.HDDI-00	40 GB SATA hard disk (slide-in compact); 24/7 hard disk with extended temperature range. Note: Please consult the manual when using the hard disk.	
5AC801.HDDI-02	160 GB SATA hard disk (slide-in compact); 24/7 hard disk with extended temperature range. Note: Please consult the manual when using the hard disk.	
5AC801.HDDS-00	40 GB SATA hard disk (slide-in) 24/7 hard disk with extended temperature range. Note: Please consult the manual when using the hard disk.	
5AC801.SSDI-00	32 GB SATA SSD (SLC) (slide-in compact).	
5ACPCI.RAIC-03	PCI RAID system SATA 2x 160 GB; Note: Please consult the manual when using the hard disk.	
5ACPCI.RAIC-04	160 GB SATA hard disk, replacement part for 5ACPCI.RAIC-03; Note: Please consult the manual when using the hard disk.	
	Fan kits	
5PC810.FA03-00	APC810 fan kit for system unit 5PC810.SX03-00.	
	Serial port adapter	
5AC600.485I-00	RS232/422/485 interface, for installation in an APC620, APC810 or PPC700.	
5AC600.CANI-00	CAN interface; for installation in an APC620, APC810 or PPC700.	
	Uninterruptible power supply	
5AC600.UPSB-00	Battery unit 5Ah; for APC620, APC810 or PPC800 UPS.	
5AC600.UPSI-00	UPS module for APC620, APC810, PPC800; for system units 5PC600.SX01-00 (starting with Rev. H0), 5PC600.SX02-00 (starting with Rev. G0), 5PC600.SX02-01 (starting with Rev. H0), 5PC600.SX05-00 (starting with Rev. F0), 5PC600.SX05-01 (starting with Rev. F0), 5PC600.SF03-00 (starting with Rev. A0), 5PC810.SX*. 5PC820.1505-00, 5PC820.1906-00. Order cable (5CAUPS.0005-00 or 5CAUPS.0030-00) and battery unit (5AC600.UPSB-00) separately.	
5CAUPS.0005-00	UPS cable 0.5 m; for UPS 5AC600.UPSI-00.	
5CAUPS.0030-00	UPS cable 3 m; for UPS 5AC600.UPSI-00.	
	Accessories	
5ACPCI.ETH1-01	PCI Ethernet Card 1 x 10/100	
5ACPCI.ETH3-01	PCI Ethernet Card 3 x 10/100	

Table 41: 5PC810.SX03-00 - Order data

Interfaces

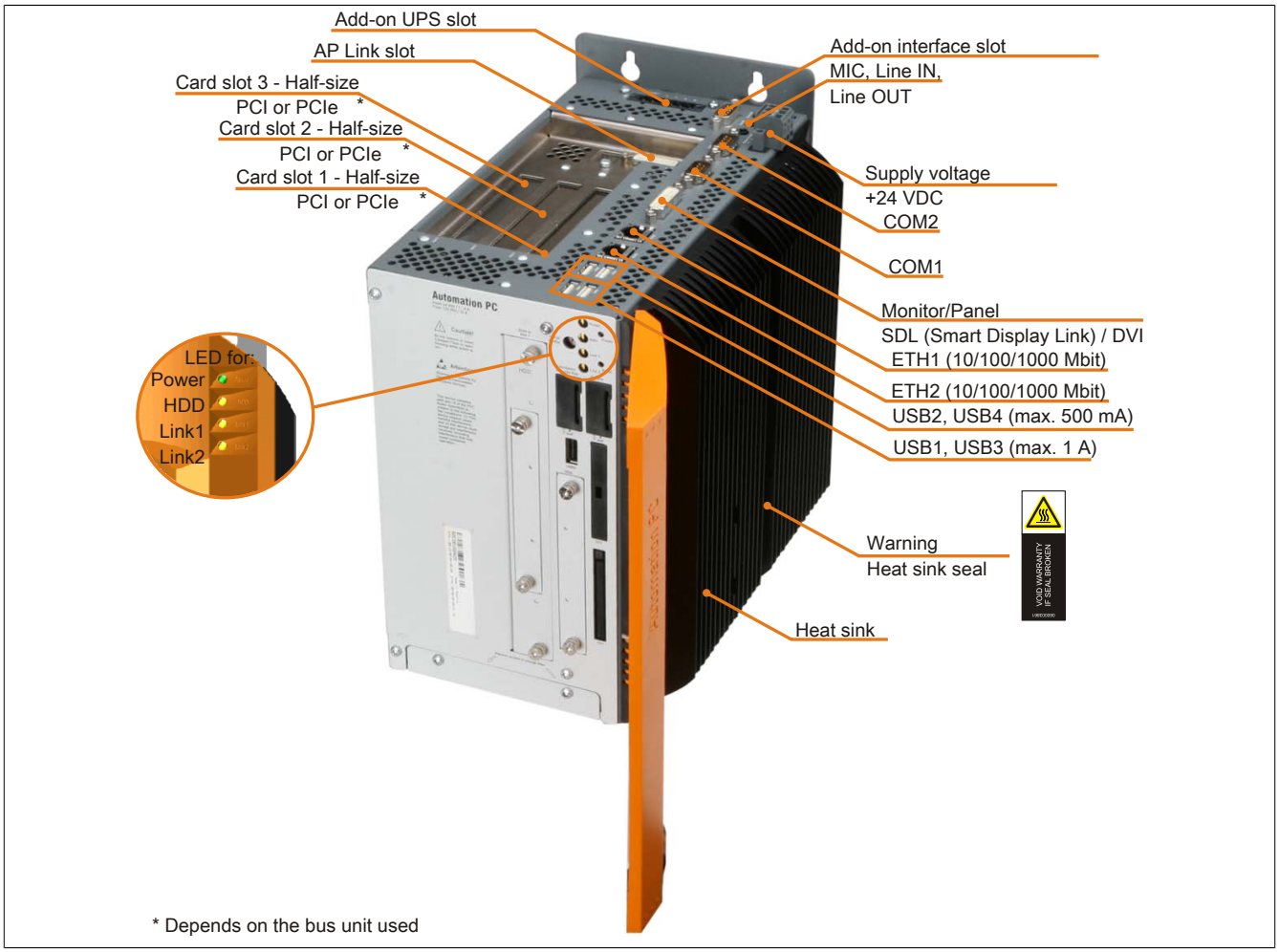


Image 19: 5PC810.SX03-00 - Interfaces on top

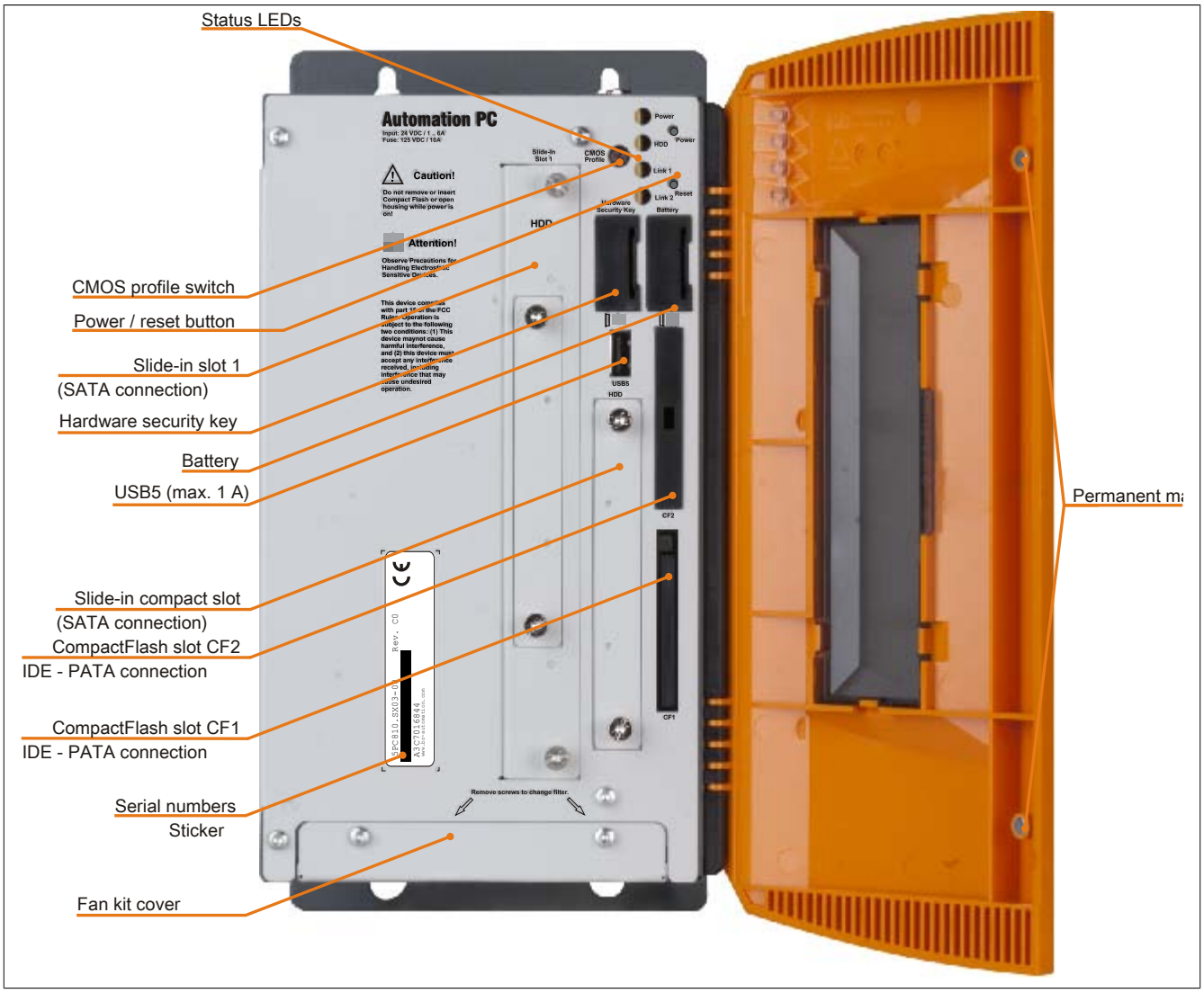


Image 20: 5PC810.SX03-00 - Interfaces on front

Technical data

Product ID	5PC810.SX03-00
General information	
B&R ID code	$B2C3
Certification	
C-UL-US	Yes
CE	Yes
Dongle port	Yes
Cooling	Passive via heat sink and optionally supported with an active fan kit
LEDs	4
Power button	Yes
Reset button	Yes
Buzzer	Yes
Battery	
Type	Renata 950 mAh
Method	Lithium Ion
Lifespan	2½ years[1)]
removable	Yes, accessible behind the orange front doors
Controller	
Bootloader	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
SRAM	

Table 42: 5PC810.SX03-00 - Technical data

Product ID	5PC810.SX03-00
Quantity	512 KB
Battery-buffered	Yes
Remanent variables for AR (Automation Runtime) in power fail mode	192 kB
Memory	
Type	Depending on the CPU board used
Quantity	Depending on the CPU board used
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
COM2	
Type	RS232, modem-capable, not electrically isolated
Design	9-pin DSUB plug
UART	16550-compatible, 16-byte FIFO
Max. baud rate	115 kbit/s
CompactFlash slot 1	
Type	Type I
Amount	1
CompactFlash slot 2	
Type	Type I
Amount	1
USB	
Type	USB 2.0
Amount	5
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s)
Current load	Max. 500 mA or 1 A per connection
Ethernet	
Amount	2
Design	10/100/1000 MBit/s
Max. baud rate	1 GBit/s
Panel/Monitor interface	
Design	DVI-I socket
Type	SDL/DVI/monitor
CAN	
Note	Optional
Audio	
Type	AC97 sound
Entrances	Microphone, Line in
Outputs	Line Out
Add-on interface slot	
Amount	1
Inserts	
PCI / PCIe slots	
Amount	2 PCI and 1 PCIe slot[3)]
Slide-in drives	1
Slide-in compact drives	1
Add-on drives	No
Automation Panel link slot	Yes
Add-on UPS slot	Yes
Insert for fan kit	Yes
Electrical characteristics	
Rated voltage	24 VDC ±25%
Rated current	6 A
Starting current	Typ. 7 A, max. 50 A for < 300 µs
Operational conditions	
EN 60529 protection	IP20
Environmental conditions	
Temperature	
Operation	Component-dependent
Bearings	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	Component-dependent
Bearings	Component-dependent
Transport	Component-dependent
Vibration[4)]	
Operation (continuous)	2 to 9 Hz: 1.75 mm amplitude / 9 to 200 Hz: 0.5 g
Operation (occasional)	2 to 9 Hz: 3.5 mm amplitude / 9 to 200 Hz: 1 g
Bearings	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[4)]	

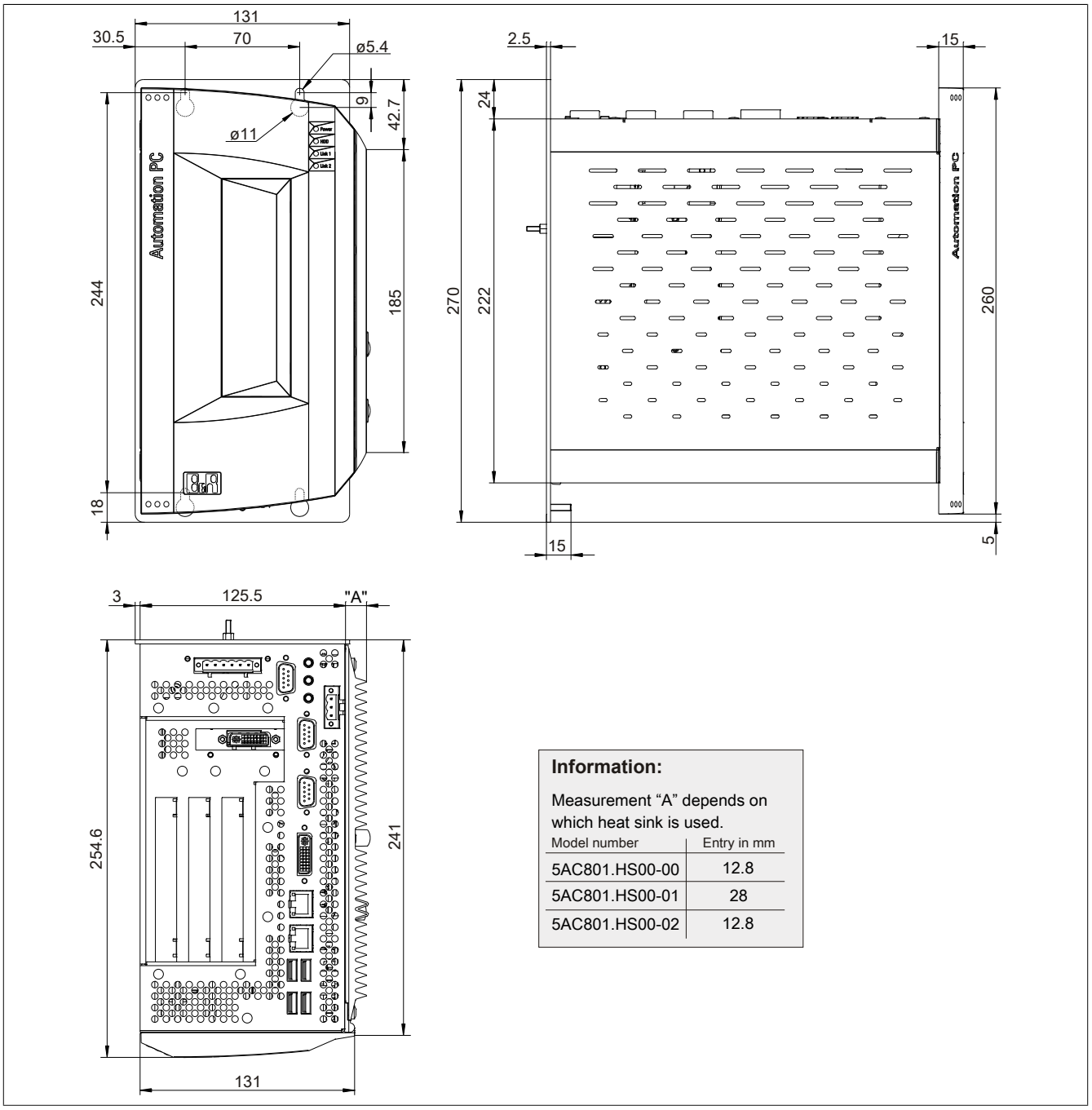
Table 42: 5PC810.SX03-00 - Technical data

Product ID	5PC810.SX03-00
Operation	15 g, 11 ms
Bearings	30 g, 15 ms
Transport	30 g, 15 ms
Altitude	
Operation	Max. 3000 m (component-dependent)[5]
Mechanical characteristics	
Housing[6]	
Item	Galvanized plate, plastic
Front cover	Colored orange plastic (similar to Pantone 144CV)
Paint	Light gray (similar to Pantone 427CV), dark gray (similar to Pantone 432CV)
Dimensions	
Width	140.8 mm with heat sink5AC801.HS00-00 and 5AC801.HS00-02 156.5 mm with heat sink 5AC801.HS00-01
Height	270 mm
Depth	254.6 mm
Weight	Approx. 3200 g (component-dependent)

Table 42: 5PC810.SX03-00 - Technical data

1) At 50°C, 8.5 µA of the supplied components and a self discharge of 40%.
2) Maintenance Controller Extended
3) Bus unit 5PC810.BX03-00 with 2 PCI and 1 PCIe slots can be used.
4) Maximum values, as long as no other individual component specifies any other.
5) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).
6) Depending on the process or batch, there may be visible deviations in the color and surface structure.

Dimensions



Information:

Measurement “A” depends on which heat sink is used.

Model number	Entry in mm
5AC801.HS00-00	12.8
5AC801.HS00-01	28
5AC801.HS00-02	12.8

Image 21: 5PC810.SX03-00 - Dimensions

Drilling template

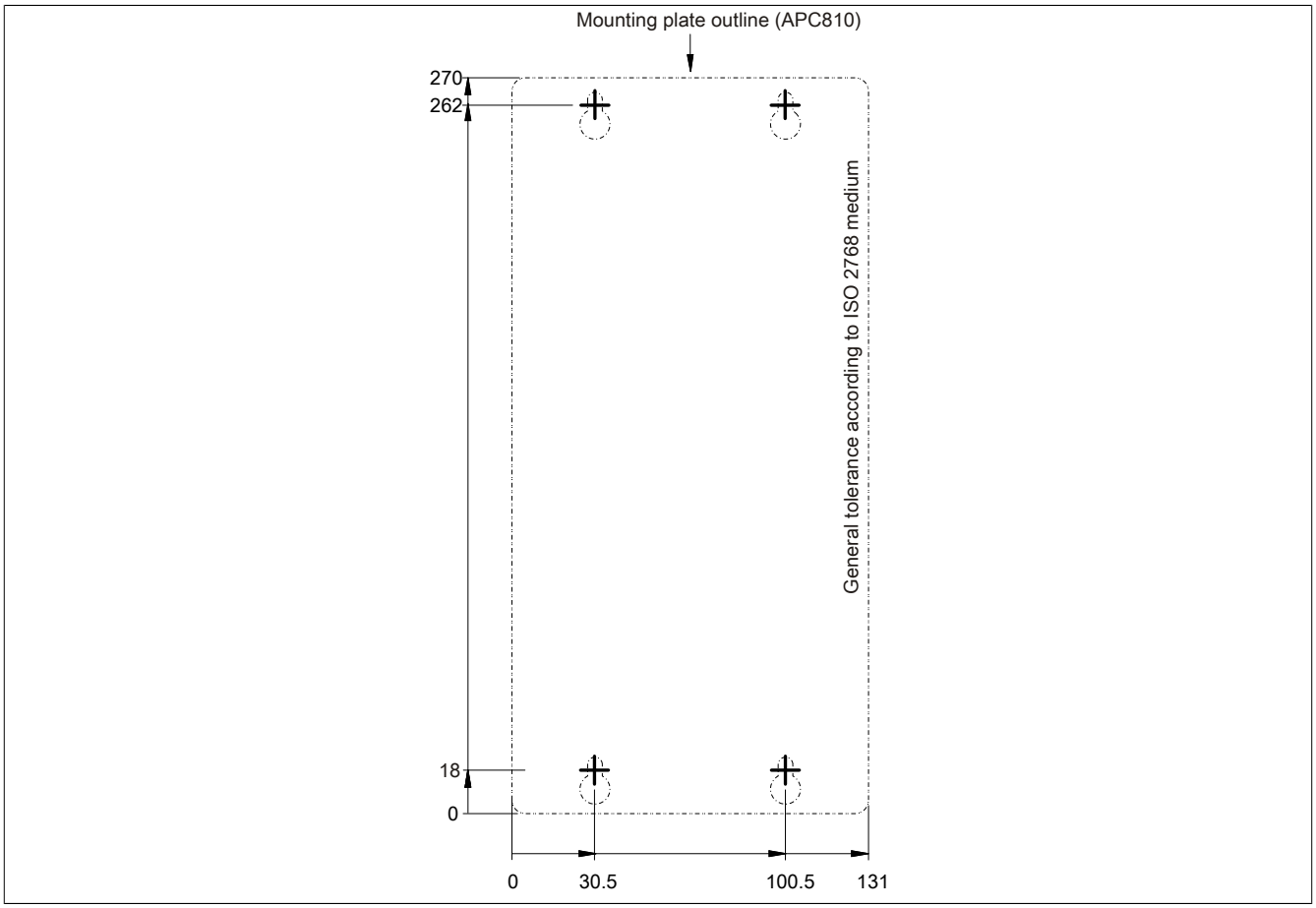


Image 22: 5PC810.SX03-00 - Drilling template

3.1.4 5PC810.SX05-00

General information

- Slot for a bus unit with 4 PCI and 1 PCIe slots or 2 PCI and 3 PCIe slots
- 512 KB SRAM onboard
- Insert for 1 slide-in compact drive and 2 slide-in drives
- Automation Panel Link slot for connecting Automation Panels via SDL

Order data

Model number	Short description	Figure
	System units	
5PC810.SX05-00	APC810 system unit, 5 slots (PCI Express, PCI, depending on bus); 1 slot for Automation Panel Link transmitter; 1 slide-in compact and 2 slide-in slots; Smart Display Link/DVI/Monitor, 2x RS232, 5x USB 2.0, 2x ETH 10/100/1000, AC97 sound, 24 VDC (order 0TB103.9 screw clamp or 0TB103.91 cage clamp terminals separately)	
	Required accessories	
5PC800.B945-10	CPU board Intel Core Duo L2400, 1.66 GHz, 667 MHz FSB, 2 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-11	CPU board Intel Core2 Duo L7400, 1.5 GHz, 667 MHz FSB, 2 MB L2 cache; 945GME chipset; 4 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-12	CPU board Intel Core2 Duo L7500 1.06 GHz, 533 MHz FSB, 2 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-13	CPU board Intel Celeron M 423, 1.06 GHz, 533 MHz FSB, 1 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-14	CPU board Intel Core2 Duo T7400, 2.16 GHz, 667 MHz FSB, 2 MB L2 cache; 945GM chipset; 4 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.BM45-01	CPU board Intel Core2 Duo P8400 2,26 GHz, 1066 MHz FSB, 3 MB L2 cache; GM45 chipset; 2 sockets for SO-DIMM DDR3 RAM modules	
	Bus units	
5PC810.BX05-00	APC810 bus, 4 PCI, 1 PCI Express (x1)	
5PC810.BX05-01	APC810 bus, 2 PCI, 3 PCI Express (x1)	
	CPU boards	
5PC800.B945-00	CPU board Intel Core Duo L2400, 1.66 GHz, 667 MHz FSB, 2 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-01	CPU board Intel Core2 Duo L7400, 1.5 GHz, 667 MHz FSB, 2 MB L2 cache; 945GME chipset; 4 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-02	CPU board Intel Core2 Duo L7500 1.06 GHz, 533 MHz FSB, 2 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-03	CPU board Intel Celeron M 423, 1.06 GHz, 533 MHz FSB, 1 MB L2 cache; 945GME chipset; 2 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-04	CPU board Intel Core2 Duo T7400, 2.16 GHz, 667 MHz FSB, 2 MB L2 cache; 945GM chipset; 4 sockets for SO-DIMM DDR2 modules (max. total of 3 GB)	
5PC800.B945-05	CPU board Intel Atom, 1.6 GHz, 533 MHz FSB, 512 KB L2 cache; 945GME chipset; 2 socket for a SO-DIMM DDR2 RAM module (max. total 3 GB)	
5PC800.BM45-00	CPU board Intel Core2 Duo T9400 2,53 GHz, 1066 MHz FSB, 6 MB L2 cache; GM45 chipset; 2 sockets for SO-DIMM DDR3 RAM modules	
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamp, 3.31 mm², protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamp, 3.31 mm², protected against vibration by the screw flange	
	Main memory for B945 CPU boards	
5MMDDR.0512-01	SO-DIMM DDR2 RAM 512 MB PC2-5300	
5MMDDR.1024-01	SO-DIMM DDR2 RAM 1024 MB PC2-5300	
5MMDDR.2048-01	SO-DIMM DDR2 RAM 2048 MB PC2-5300	
	Main memory for GM45 CPU boards	
5MMDDR.2048-02	SO-DIMM DDR3 RAM 2048 MB PC3-8500	

Table 43: 5PC810.SX05-00 - Order data

Model number	Short description	Figure
5MMDDR.4096-02	SO-DIMM DDR3 RAM 4096 MB PC3-8500	
	Heat sink	
5AC801.HS00-00	APC810 heat sink for CPU boards with Dual Core processors L2400, L7400, U7500 and Celeron M 423.	
5AC801.HS00-01	APC810 heat sink for CPU boards with Dual Core processor T7400, T9400 and P8400.	
5AC801.HS00-02	APC810 heat sink for CPU board with Atom processor N270.	
	Optional accessories	
	Automation Panel Link insert cards	
5AC801.RDYR-00	APC810 Ready relay	
5AC801.SDL0-00	Smart Display Link/DVI-D transmitter	
	Drives	
5AC801.ADAS-00	SATA Hard Disk Adapter (slide-in compact).	
5AC801.DVDS-00	DVD-ROM SATA drive (slide-in).	
5AC801.DVRS-00	DVD-R/RW DVD+R/RW SATA drive (slide-in).	
5AC801.HDDI-00	40 GB SATA hard disk (slide-in compact); 24/7 hard disk with extended temperature range. Note: Please consult the manual when using the hard disk.	
5AC801.HDDI-02	160 GB SATA hard disk (slide-in compact); 24/7 hard disk with extended temperature range. Note: Please consult the manual when using the hard disk.	
5AC801.HDDS-00	40 GB SATA hard disk (slide-in) 24/7 hard disk with extended temperature range. Note: Please consult the manual when using the hard disk.	
5AC801.SSDI-00	32 GB SATA SSD (SLC) (slide-in compact).	
5ACPCI.RAIC-03	PCI RAID system SATA 2x 160 GB; Note: Please consult the manual when using the hard disk.	
5ACPCI.RAIC-04	160 GB SATA hard disk, replacement part for 5ACPCI.RAIC-03; Note: Please consult the manual when using the hard disk.	
	Fan kits	
5PC810.FA05-00	APC810 fan kit for system unit 5PC810.SX05-00.	
	Serial port adapter	
5AC600.485I-00	RS232/422/485 interface, for installation in an APC620, APC810 or PPC700.	
5AC600.CANI-00	CAN interface; for installation in an APC620, APC810 or PPC700.	
	Uninterruptible power supply	
5AC600.UPSB-00	Battery unit 5Ah; for APC620, APC810 or PPC800 UPS.	
5AC600.UPSI-00	UPS module for APC620, APC810, PPC800; for system units 5PC600.SX01-00 (starting with Rev. H0), 5PC600.SX02-00 (starting with Rev. G0), 5PC600.SX02-01 (starting with Rev. H0), 5PC600.SX05-00 (starting with Rev. F0), 5PC600.SX05-01 (starting with Rev. F0), 5PC600.SF03-00 (starting with Rev. A0), 5PC810.SX*. 5PC820.1505-00, 5PC820.1906-00. Order cable (5CAUPS.0005-00 or 5CAUPS.0030-00) and battery unit (5AC600.UPSB-00) separately.	
5CAUPS.0005-00	UPS cable 0.5 m; for UPS 5AC600.UPSI-00.	
5CAUPS.0030-00	UPS cable 3 m; for UPS 5AC600.UPSI-00.	
	Accessories	
5ACPCI.ETH1-01	PCI Ethernet Card 1 x 10/100	
5ACPCI.ETH3-01	PCI Ethernet Card 3 x 10/100	

Table 43: 5PC810.SX05-00 - Order data

Interfaces

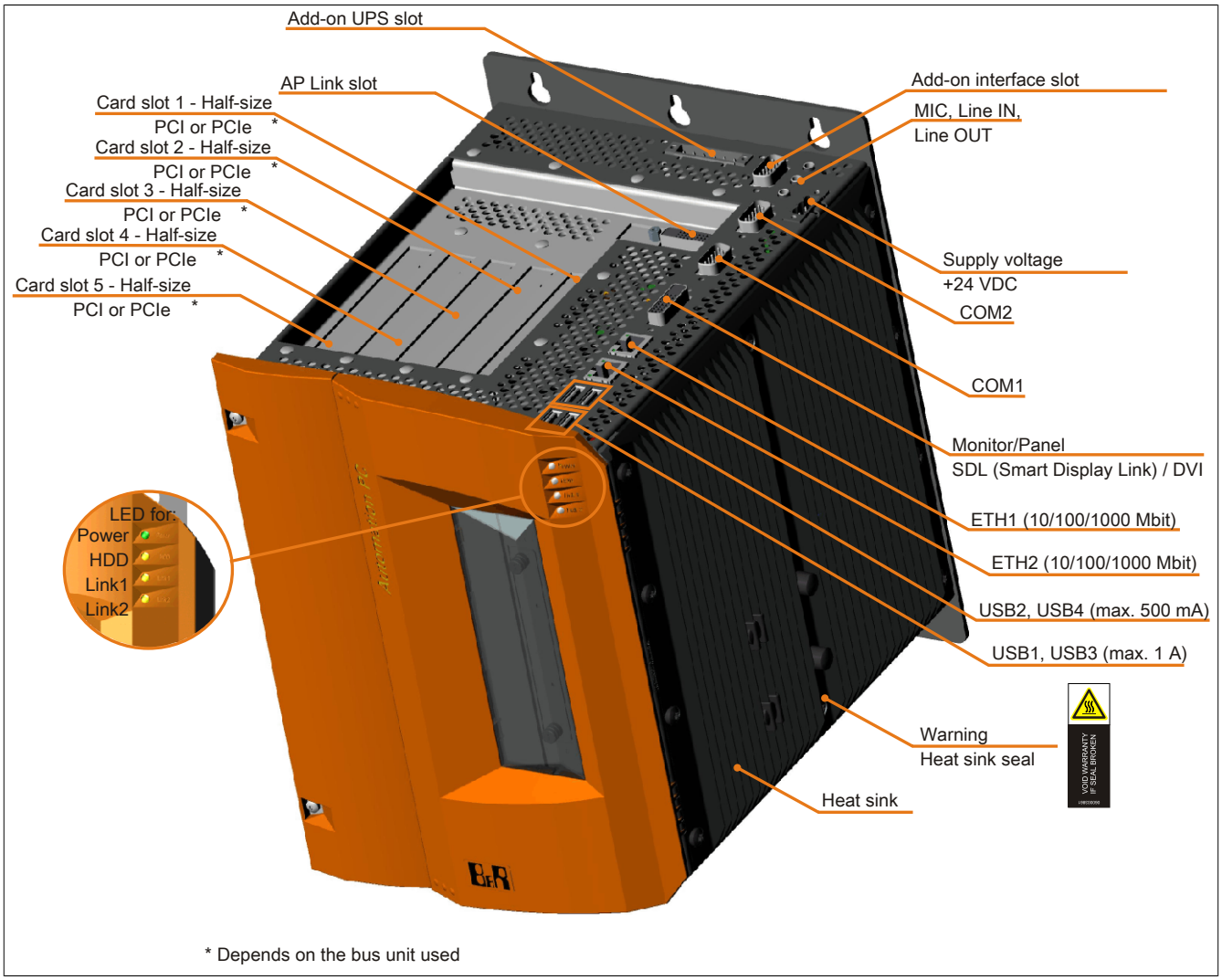


Image 23: 5PC810.SX05-00 - Interfaces on top

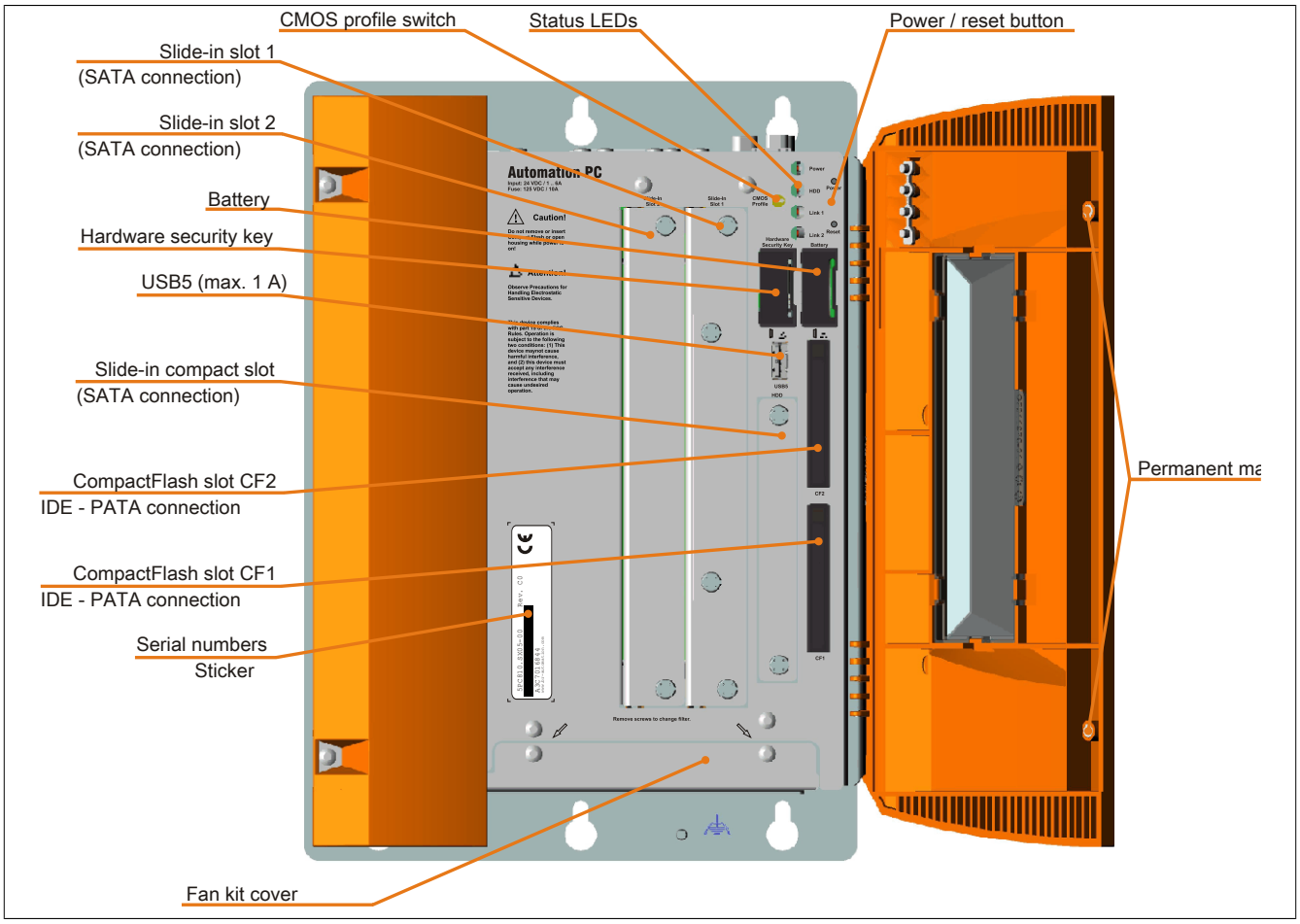


Image 24: 5PC810.SX05-00 - Interfaces on front

Technical data

Product ID	5PC810.SX05-00
General information	
B&R ID code	$A3EE
Certification	
C-UL-US	Yes
CE	Yes
Dongle port	Yes
Cooling	Passive via heat sink and optionally supported with an active fan kit
LEDs	4
Power button	Yes
Reset button	Yes
Buzzer	Yes
Battery	
Type	Renata 950 mAh
Method	Lithium Ion
Lifespan	2½ years[1)]
removable	Yes, accessible behind the orange front doors
Controller	
Bootloader	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
SRAM	
Quantity	512 KB
Battery-buffered	Yes
Remanent variables for AR (Automation Runtime) in power fail mode	192 kB
Memory	
Type	Depending on the CPU board used

Table 44: 5PC810.SX05-00 - Technical data

Product ID	5PC810.SX05-00
Quantity	Depending on the CPU board used
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
COM2	
Type	RS232, modem-capable, not electrically isolated
Design	9-pin DSUB plug
UART	16550-compatible, 16-byte FIFO
Max. baud rate	115 kbit/s
CompactFlash slot 1	
Type	Type I
Amount	1
CompactFlash slot 2	
Type	Type I
Amount	1
USB	
Type	USB 2.0
Amount	5
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s)
Current load	Max. 500 mA or 1 A per connection
Ethernet	
Amount	2
Design	10/100/1000 MBit/s
Max. baud rate	1 GBit/s
Panel/Monitor interface	
Design	DVI-I socket
Type	SDL/DVI/monitor
CAN	
Note	Optional
Audio	
Type	AC97 sound
Entrances	Microphone, Line in
Outputs	Line Out
Add-on interface slot	
Amount	1
Inserts	
PCI / PCIe slots	
Amount	4 PCI and 1 PCIe slots or 2 PCI and 3 PCIe slots[3)]
Slide-in drives	2
Slide-in compact drives	1
Add-on drives	No
Automation Panel link slot	Yes
Add-on UPS slot	Yes
Insert for fan kit	Yes
Electrical characteristics	
Rated voltage	24 VDC ±25%
Rated current	6 A
Starting current	Typ. 7 A, max. 50 A for < 300 µs
Operational conditions	
EN 60529 protection	IP20
Environmental conditions	
Temperature	
Operation	Component-dependent
Bearings	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	Component-dependent
Bearings	Component-dependent
Transport	Component-dependent
Vibration[4)]	
Operation (continuous)	2 to 9 Hz: 1.75 mm amplitude / 9 to 200 Hz: 0.5 g
Operation (occasional)	2 to 9 Hz: 3.5 mm amplitude / 9 to 200 Hz: 1 g
Bearings	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[4)]	
Operation	15 g, 11 ms
Bearings	30 g, 15 ms
Transport	30 g, 15 ms
Altitude	
Operation	Max. 3000 m (component-dependent)[5)]
Mechanical characteristics	

Table 44: 5PC810.SX05-00 - Technical data

Product ID	5PC810.SX05-00
Housing[6]	
Item	Galvanized plate, plastic
Front cover	Colored orange plastic (similar to Pantone 144CV)
Paint	Light gray (similar to Pantone 427CV), dark gray (similar to Pantone 432CV)
Dimensions	
Width	201.7 mm with heat sink5AC801.HS00-00 and 5AC801.HS00-02 216.9 mm with heat sink 5AC801.HS00-01
Height	270 mm
Depth	254.5 mm
Weight	Approx. 3900 g (component-dependent)

Table 44: 5PC810.SX05-00 - Technical data

1) At 50°C, 8.5 µA of the supplied components and a self discharge of 40%.
2) Maintenance Controller Extended
3) The PCI slots and PCIe slots are dependent on the bus unit used 5PC810.BX05-00 and 5PC810.BX05-01.
4) Maximum values, as long as no other individual component specifies any other.
5) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).
6) Depending on the process or batch, there may be visible deviations in the color and surface structure.

Dimensions

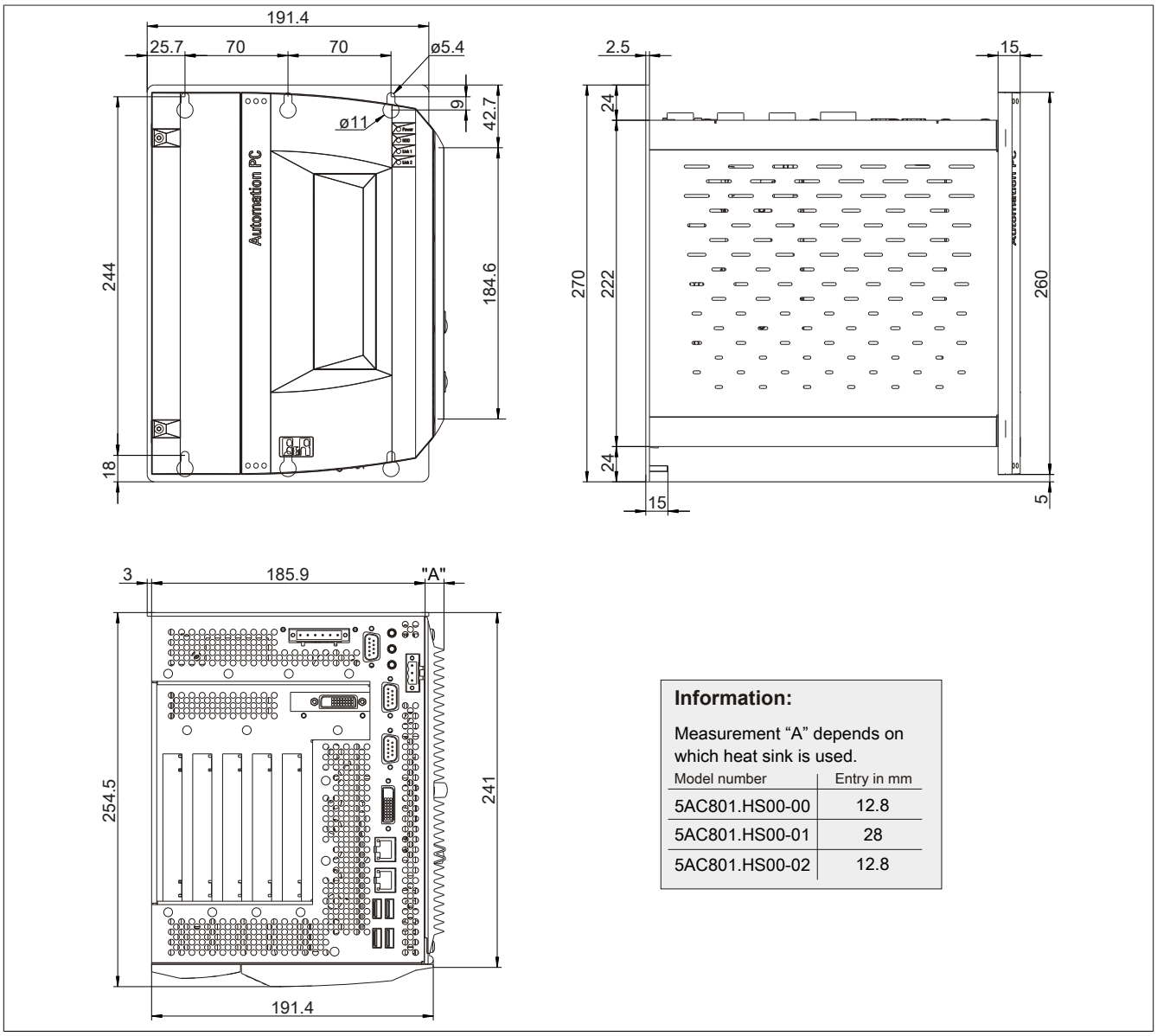


Image 25: 5PC810.SX05-00 - Dimensions

Drilling template

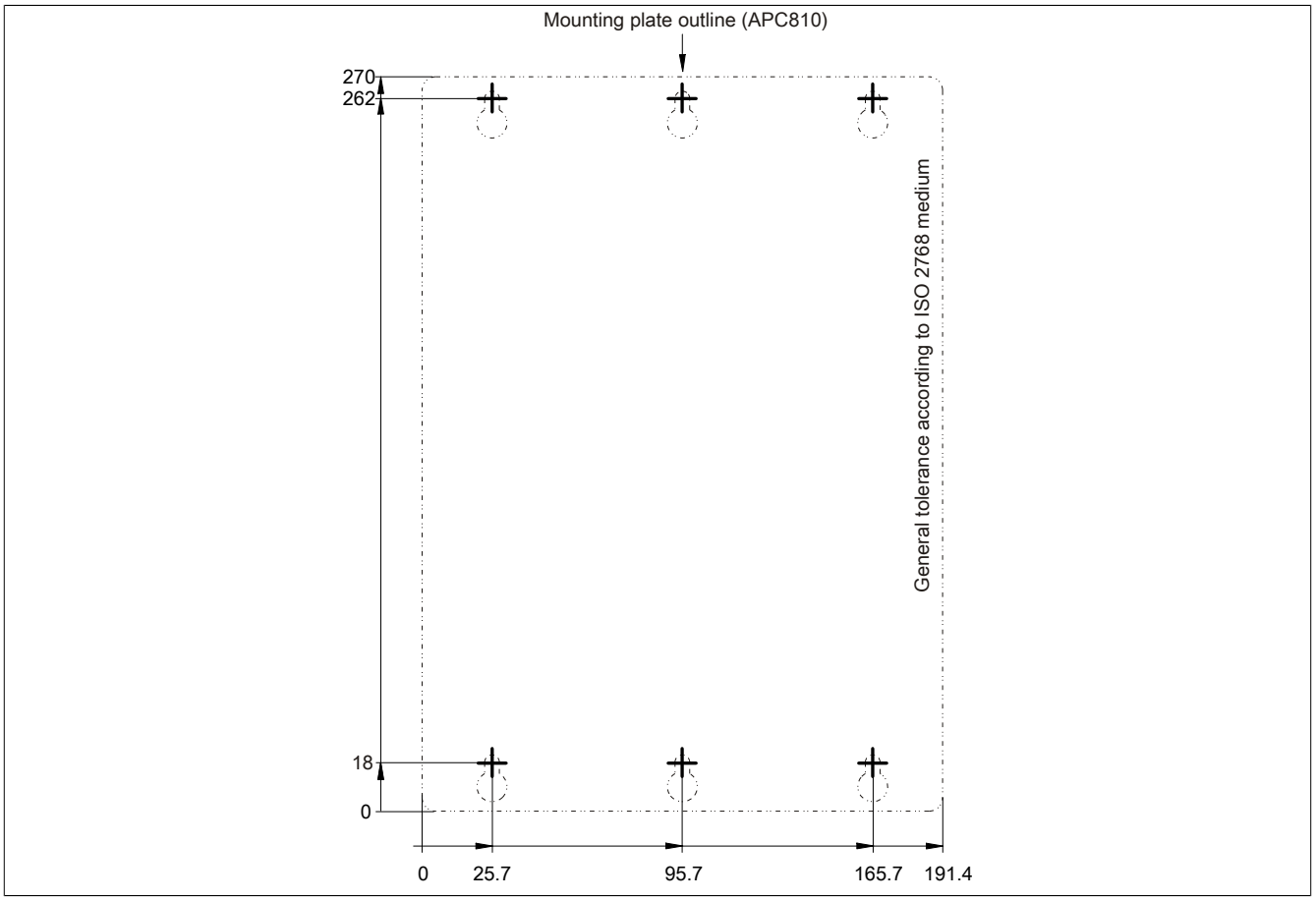


Image 26: 5PC810.SX05-00 - Driling template

3.2 Bus units

3.2.1 General information

The bus units are compatible with the system units in 1, 2, 3 or 5 card slot sizes, available with PCI and/or PCI Express support.

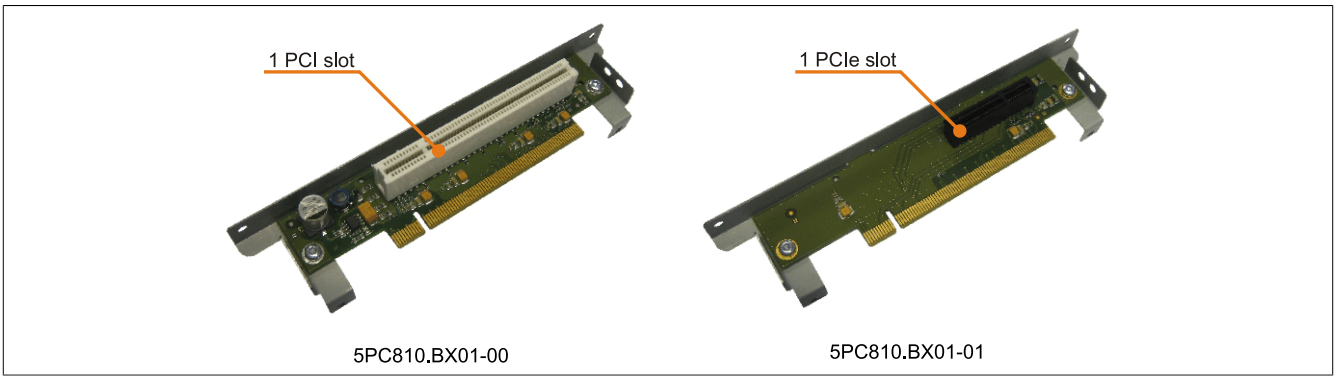


Image 27: 1 slot bus units

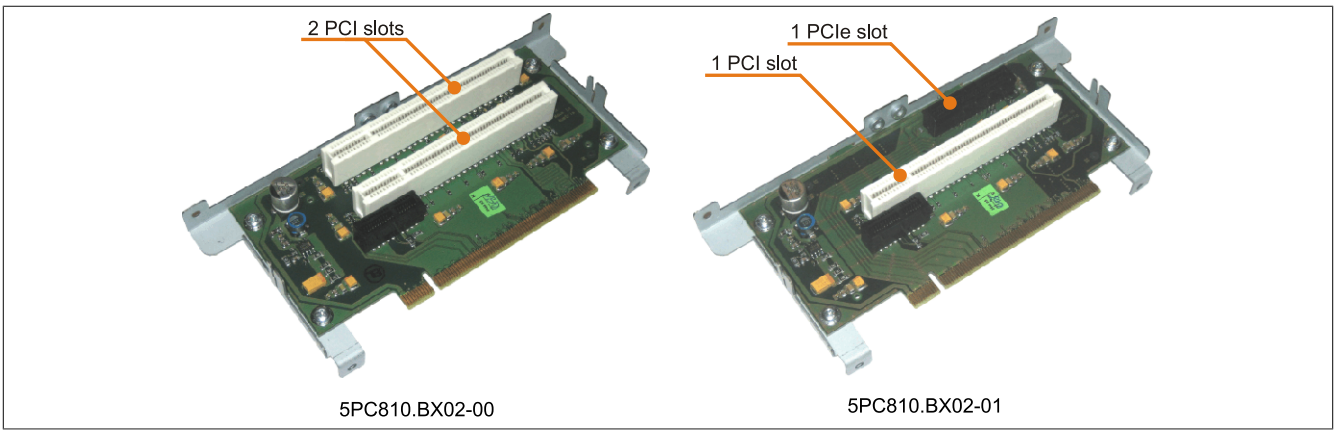


Image 28: 2 slot bus units

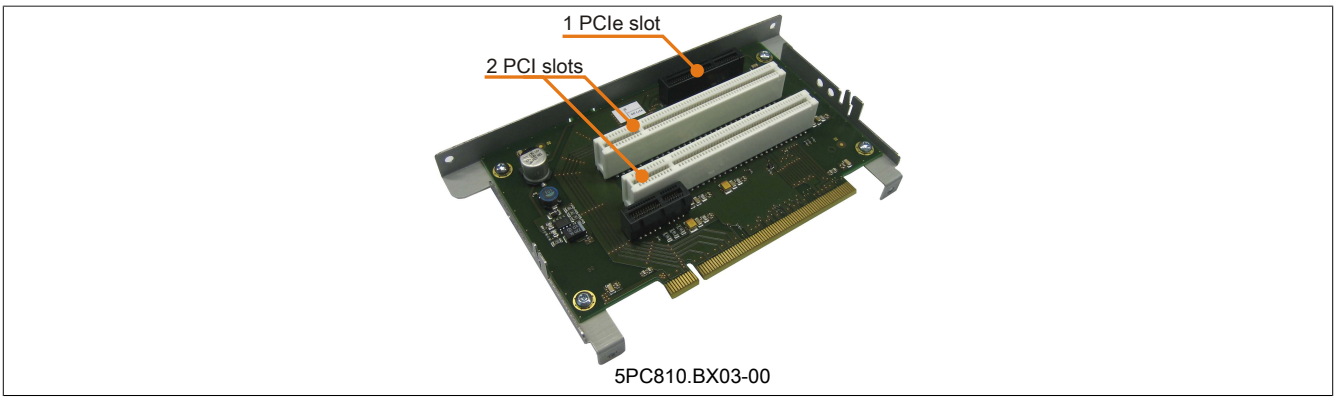


Image 29: 3 slot bus units

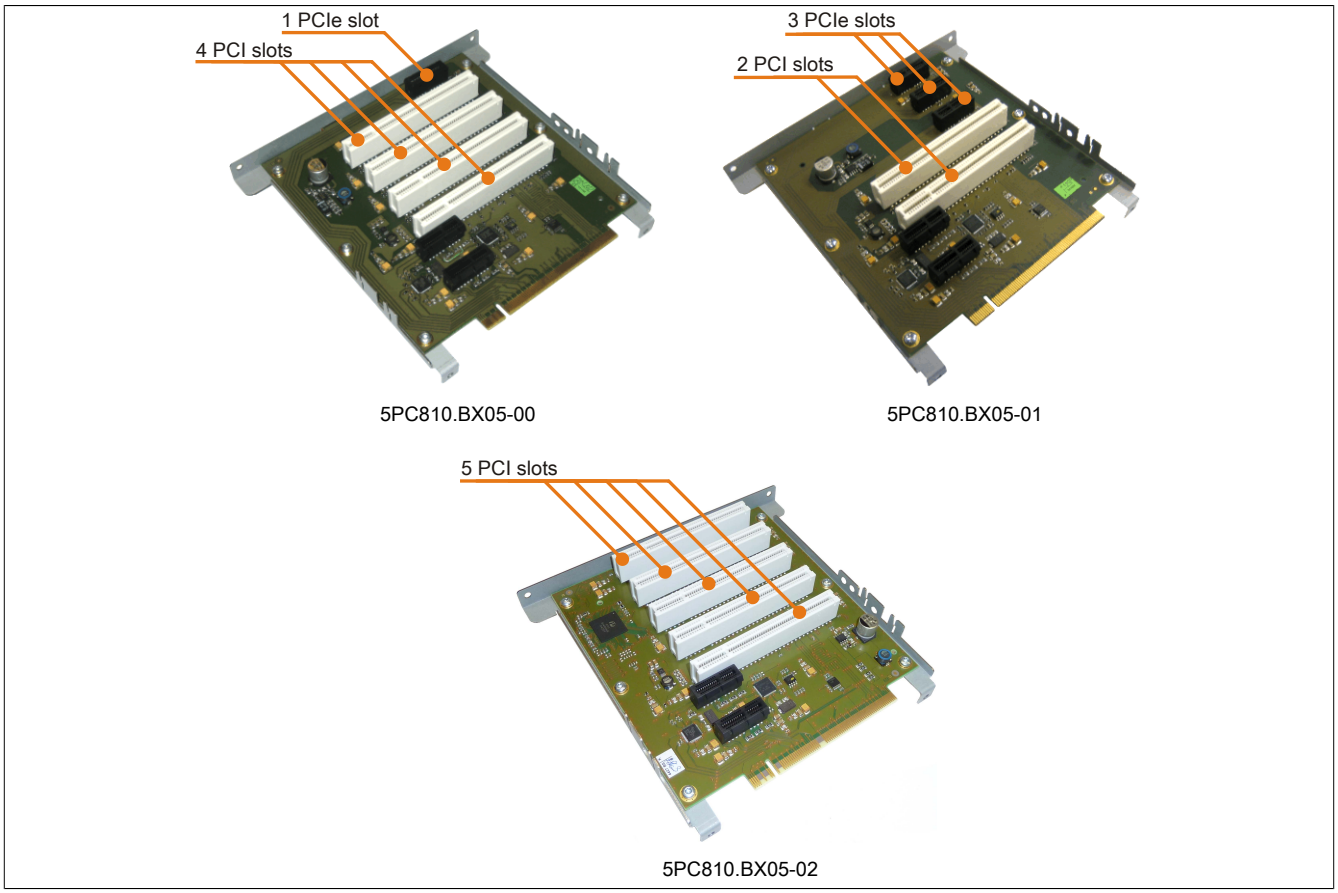


Image 30: 5 slot bus units

3.2.2 Order data

Model number	Short description	Figure
	Bus units	
5PC810.BX01-00	APC810 bus, 1 PCI	
5PC810.BX01-01	APC810 bus, 1 PCI Express (x4)	
5PC810.BX02-00	APC810 bus, 2 PCI	
5PC810.BX02-01	APC810 bus, 1 PCI, 1 PCI Express (x4)	
5PC810.BX03-00	APC810 bus, 2 PCI, 1 PCI Express (x4)	
5PC810.BX05-00	APC810 bus, 4 PCI, 1 PCI Express (x1)	
5PC810.BX05-01	APC810 bus, 2 PCI, 3 PCI Express (x1)	
5PC810.BX05-02	APC810 bus, 5 PCI	

Table 45: 5PC810.BX01-00, 5PC810.BX01-01, 5PC810.BX02-00, 5PC810.BX02-01, 5PC810.BX03-00, 5PC810.BX05-00, 5PC810.BX05-01, 5PC810.BX05-02 - Order data

3.2.3 Technical data

Product ID	5PC810. BX01-00	5PC810. BX01-01	5PC810. BX02-00	5PC810. BX02-01	5PC810. BX03-00	5PC810. BX05-00	5PC810. BX05-01	5PC810. BX05-02
Inserts								
PCIe slots								
Amount	-	1	-	1			3	-
Design	-	PCIe half-size	-	PCIe half-size				-
Default	-	1.0a	-	1.0a				-
Bus speed	-	x4 (10 GB/s)	-	x4 (10 GB/s)		x1 (2.5 GB/s)		-
PCI slots								
Amount	1	-	2	1	2	4	2	5
Type	32-bit	-	32-bit					
Design	PCI half-size	-	PCI half-size					
Default	2.2	-	2.2					
Bus speed	33 MHz	-	33 MHz					

Table 46: 5PC810.BX01-00, 5PC810.BX01-01, 5PC810.BX02-00, 5PC810.BX02-01, 5PC810.BX03-00, 5PC810.BX05-00, 5PC810.BX05-01, 5PC810.BX05-02 - Technical data

3.3 GM45 CPU boards

3.3.1 General information

The GM45 CPU boards contain two DDR3 memory sockets for a maximum of 8 GB and support dual channel memory technology. Additionally, the Intel® GMA 4500MDH is integrated with 384 MB memory and a maximum resolution of 2048 x 1537 pixels (QXGA).

- AMI BIOS
- Intel® GM45 chipset
- 2x DDR3 memory socket
- Dual channel memory
- Intel® GMA 4500MDH
- Gigabit Ethernet
- Intel® Core™ 2 Duo T9400, 2.53 GHz

3.3.2 Order data

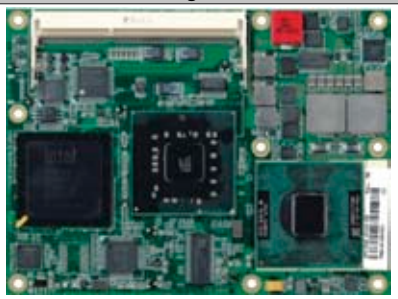
Model number	Short description	Figure
	CPU boards	
5PC800.BM45-00	CPU Board Intel Core2 Duo T9400, 2.53 GHz, 1066 MHz FSB, 6 MB L2 cache; chipset GM45; 2 sockets for SO-DIMM DDR3 RAM modules	
5PC800.BM45-01	CPU Board Intel Core2 Duo P8400, 2.26 GHz, 1066 MHz FSB, 3 MB L2 Cache; chipset GM45; 2 sockets for SO-DIMM DDR3 RAM modules	
	Mandatory accessories	
	Main memory for GM45 CPU boards	
5MMDDR.2048-02	SO-DIMM DDR3 RAM 2048 MB PC3-8500	
5MMDDR.4096-02	SO-DIMM DDR3 RAM 4096 MB PC3-8500	

Table 47: 5PC800.BM45-00, 5PC800.BM45-01 - Order data

3.3.3 Technical data

Product ID	5PC800.BM45-00	5PC800.BM45-01
General information		
Certification types		
CE	Yes	
Controllers		
Bootloader	Embedded AMI BIOS	
Processor		
Type	Intel® Core™2 Duo T9400	Intel® Core™2 Duo P8400
Clock frequency	2530 MHz	2260 MHz
Architectures	45 nm	
L1 cache	32 kB	
L2 cache	6 MB	3 MB
External bus	1066 MHz	
Intel 64 architecture	Yes	
Expanded command set	Intel® virtualization technology, G4 architecture, Enhanced SpeedStep technology SSE, SSE2, SSE3, Intel® 64 architecture	
Chipset	Intel® GM45 Intel® 82801 (ICH9M-E)	
Real-time clock		
Accuracy	At 25°C: typ. 12 ppm (1 seconds) per day[1)]	
Battery-buffered	Yes	
Memory socket		
Type	DDR3	
Size	Max. 8 GB	
Graphics		
Controllers	Intel® Graphics Media Accelerator 4500MDH	
Memory	Up to 384 MB[2)]	
Color depth	Max. 32-bit	
Resolution		
DVI	2x Intel compliant SDVO ports	
RGB	300 MHz RAMDAC, resolutions up to 2048 x 1536 @ 70 Hz (QXGA)	
Mass memory management	4x SATA	
Power management	ACPI 3.0 with battery support	

Table 48: 5PC800.BM45-00, 5PC800.BM45-01 - Technical data

1) At max. specified ambient temperature: typ. 58 ppm (5 seconds) - worst-case 220 ppm (19 seconds).
2) Allocated in main memory

3.4 Heat sink

3.4.1 Order data

Model number	Short description	Figure
	Heat sinks	
5AC803.HS00-00	PPC800 heat sink for CPU boards with Dual Core processors L2400, L7400, U7500 and Celeron M 423.	
5AC803.HS00-01	PPC800 heat sink for CPU boards with Dual Core processor T7400, T9400 and P8400.	
5AC803.HS00-02	PPC800 heat sink for CPU board with Atom processor N270.	
	Mandatory accessories	
	CPU boards	
5PC800.B945-00	CPU Board Intel Core Duo L2400, 1.66 GHz, 667 MHz FSB, 2 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111B.	
5PC800.B945-01	CPU Board Intel Core2 Duo L7400, 1.5 GHz, 667 MHz FSB, 4 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111B.	
5PC800.B945-02	CPU Board Intel Core2 Duo U7500, 1.06 GHz, 533 MHz FSB, 2 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111B.	
5PC800.B945-03	CPU Board Intel Celeron M 423, 1.06 GHz, 533 MHz FSB, 1 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111B.	
5PC800.B945-10	CPU board Intel Core Duo L2400, 1.66 GHz, 667 MHz FSB, 2 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	
5PC800.B945-11	CPU board Intel Core2 Duo L7400, 1.5 GHz, 667 MHz FSB, 4 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	
5PC800.B945-12	CPU board Intel Core2 Duo U7500, 1.06 GHz, 533 MHz FSB, 2 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	
5PC800.B945-13	CPU board Intel Celeron M 423, 1.06 GHz, 533 MHz FSB, 1 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	
5PC800.B945-04	CPU Board Intel Core2 Duo T7400, 2.16 GHz, 667 MHz FSB, 4 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111B.	
5PC800.B945-14	CPU board Intel Core2 Duo T7400, 2.16 GHz, 667 MHz FSB, 4 MB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 modules (total memory max. 3 GB), Realtek Ethernet controller RTL8111C.	
5PC800.BM45-00	CPU Board Intel Core2 Duo T9400, 2.53 GHz, 1066 MHz FSB, 6 MB L2 cache; chipset GM45; 2 sockets for SO-DIMM DDR3 RAM modules	
5PC800.BM45-01	CPU Board Intel Core2 Duo P8400, 2.26 GHz, 1066 MHz FSB, 3 MB L2 Cache; chipset GM45; 2 sockets for SO-DIMM DDR3 RAM modules	
5PC800.B945-05	CPU board Intel Atom N270, 1.6 GHz, 533 MHz FSB, 512 kB L2 cache; chipset 945GME; 2 sockets for SO-DIMM DDR2 RAM modules (total memory max. 3 GB)	

Table 49: 5AC803.HS00-00, 5AC803.HS00-01, 5AC803.HS00-02 - Order data

3.4.2 Technical data

Product ID	5AC803.HS00-00	5AC803.HS00-01	5AC803.HS00-02
General information			
Ideal for CPU boards	5PC800.B945-00 5PC800.B945-01 5PC800.B945-02 5PC800.B945-03	5PC800.B945-04 5PC800.B945-14 5PC800.BM45-00 5PC800.BM45-01	5PC800.B945-05
Suitable for the following system units	5PC820.1505-00 5PC820.1906-00		
Mechanical characteristics			
Material	Aluminum, black-coated with copper heat pipes		
Dimensions			

Table 50: 5AC803.HS00-00, 5AC803.HS00-01, 5AC803.HS00-02 - Technical data

Product ID	5AC803.HS00-00	5AC803.HS00-01	5AC803.HS00-02
Width		143 mm	
Height		183.5 mm	
Depth		60 mm	
Weight		1200 g	

Table 50: 5AC803.HS00-00, 5AC803.HS00-01, 5AC803.HS00-02 - Technical data

3.5 Main memory

3.5.1 General information

These 204-pin DDR3 main memory modules operate at 1066 MHz and are available in the sizes 2 GB and 4 GB.

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

If two 2 GB modules or one 4 GB module are installed on a 32-bit operating system, only 3 GB main memory can be used. With a 64-bit operating system, max. 8 GB main memory can be used.

3.5.2 Order data

Model number	Short description	Figure
	Main memory for GM45 CPU boards	
5MMDDR.2048-02	SO-DIMM DDR3 RAM 2048 MB PC3-8500	
5MMDDR.4096-02	SO-DIMM DDR3 RAM 4096 MB PC3-8500	

Table 51: 5MMDDR.2048-02, 5MMDDR.4096-02 - Order data

3.5.3 Technical data

Product ID	5MMDDR.2048-02	5MMDDR.4096-02
General information		
Type	SO-DIMM DDR3 SDRAM	
Memory size	2 GB	4 GB
Construction	204-pin	
Organization	256M x 64-bit	512M x 64-bit
Speed	DDR3-1066 (PC3-8500)	
Certification types CE	Yes	

Table 52: 5MMDDR.2048-02, 5MMDDR.4096-02 - Technical data

Information:

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

3.6 Drives

3.6.1 5AC801.HDDI-00

General information

This 40 GB slide-in compact hard disk is specified for 24-hour operation and also provides an extended temperature specification. The slide-in compact drive can be used in APC810 and PPC800 system units.

When used in an APC810

When inserted in the slide-in compact slot, the slide-in compact drive is referred to internally as SATA I.

Order data

Model number	Short description	Figure
	Drives	
5AC801.HDDI-00	40 GB SATA hard disk (slide-in compact); 24/7 hard disk with extended temperature range. Note: Please consult the manual when using the hard disk.	

Table 53: 5AC801.HDDI-00 - Order data

Technical data

Information:

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

Product ID	5AC801.HDDI-00
Hard Disk	
Capacity	40 GB
Number of heads	1
Number of sectors	78,140,160
Bytes per sector	512
Cache	8 MB
Speed	5400 rpm ±1%
Startup time	Typ. 3 s (from 0 rpm to read access)
MTBF	750,000 POH[1)]
S.M.A.R.T. Support	Yes
Interface	SATA
Access time	12.5 ms
Data transfer rate	
Internal	Max. 450 MBit/s
To/from host	Max. 150 MB/s (Ultra DMA mode 5)
Positioning time	
Maximum (read only)	23 ms
Minimum (track to track)	1 ms
Nominal (read only)	12.5 ms
Environmental conditions	
Temperature[1)]	
Operation[2)]	-30 to 85°C
Operation - 24-hour[4)]	-30 to 85°C
Bearings	-40 to 95°C
Transport	-40 to 95°C
Relative humidity[5)]	
Operation	5 to 90%

Table 54: 5AC801.HDDI-00 - Technical data

Product ID	5AC801.HDDI-00
Bearings	5 to 95%
Transport	5 to 95%
Vibration	
Operation	5 to 500 Hz: 2 g; no non-recovered errors
Bearings	5 to 500 Hz: 5 g; no non-recovered errors
Transport	5 to 500 Hz: 5 g; no non-recovered errors
Shock	
Operation	300 g and 2 ms duration; no non-recovered errors 150 g and 11 ms duration; no non-recovered errors
Bearings	800 g and 2 ms duration; no non-recovered errors 400 g and 0.5 ms duration; no non-recovered errors
Transport	800 g and 2 ms duration; no non-recovered errors 400 g and 0.5 ms duration; no non-recovered errors
Altitude	
Operation	-300 to 5000 m
Bearings	-300 to 12192 m
Mechanical characteristics	
Installation	Fixed[6)]
Dimensions	
Width	13 mm
Height	98 mm
Depth	105 mm
Weight	134 g
Manufacturer information	
Manufacturer	Seagate
Manufacturer's product ID	ST940817SM

Table 54: 5AC801.HDDI-00 - Technical data

1) With 8760 POH (Power On Hours) per year and 70 °C surface temperature.
2) Standard operation means 333 POH (power-on hours) per month.
3) 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.
4) 24-hour operation means 732 POH (power-on hours) per month.
5) Humidity gradient: Maximum 15% per hour.
6) Slide-in compact mounting.

Temperature humidity diagram

Image 31: 5AC801.HDDI-00 - Temperature humidity diagram

3.6.2 5AC801.HDDI-02

General information

This 160 GB slide-in compact hard disk is specified for 24-hour operation (24x7) and also provides an extended temperature specification. The slide-in compact drive can be used in APC810 and PPC800 system units.

When used in an APC810

When inserted in the slide-in compact slot, the slide-in compact drive is referred to internally as SATA I.

Order data

Model number	Short description	Figure
	Drives	
5AC801.HDDI-02	160 GB SATA hard disk (slide-in compact); 24/7 hard disk with extended temperature range. Note: Please consult the manual when using the hard disk.	

Table 55: 5AC801.HDDI-02 - Order data

Technical data

Information:

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

Product ID	5AC801.HDDI-02
Hard Disk	
Capacity	160 GB
Number of heads	3
Number of sectors	312,581,808
Bytes per sector	512
Cache	8 MB
Speed	5400 rpm ±1%
Startup time	Typ. 4 s (from 0 rpm to read access)
MTBF	300,000 POH[1)]
S.M.A.R.T. Support	Yes
Interface	SATA
Access time	12 ms
Data transfer rate	
Internal	Max. 84.6 MBit/s
To/from host	Max. 150 MB/s (Ultra DMA mode 5)
Positioning time	
Maximum (read only)	22 ms
Minimum (track to track)	1.5 ms
Nominal (read only)	12 ms
Environmental conditions	
Temperature[2)]	
Operation	-15 to 80°C
Operation - 24-hour[3)]	-15 to 80°C
Bearings	-40 to 95°C
Transport	-40 to 95°C
Relative humidity[5)]	
Operation	5 to 90%[4)]
Bearings	5 to 95%[4)]
Transport	5 to 95%[4)]
Vibration	

Table 56: 5AC801.HDDI-02 - Technical data

Product ID	5AC801.HDDI-02
Operation	5 to 500 Hz: 1 g; no unrecoverable errors
Bearings	5 to 500 Hz: 5 g, no damage
Transport	5 to 500 Hz: 5 g, no damage
Shock	
Operation	325 g, 2 ms; no unrecoverable errors
Bearings	900 g, 1 ms; no damage 120 g, 11 ms; no damage
Transport	900 g, 1 ms; no damage 120 g, 11 ms; no damage
Altitude	
Operation	-300 to 3000 m
Bearings	-300 to 12192 m
Mechanical characteristics	
Installation	Fixed[6)]
Dimensions	
Width	13 mm
Height	98 mm
Depth	105 mm
Weight	135 g
Manufacturer information	
Manufacturer	Fujitsu
Manufacturer's product ID	MHY2160BH-ESW

Table 56: 5AC801.HDDI-02 - Technical data

1) With 8760 POH (Power On Hours) per year and 70 °C surface temperature.
2) Standard operation means 333 POH (power-on hours) per month.
3) 24-hour operation means 732 POH (power-on hours) per month.
4) Maximum humidity at +29 °C.
5) Humidity gradient: Maximum 15% per hour.
6) Slide-in compact mounting.

Temperature humidity diagram

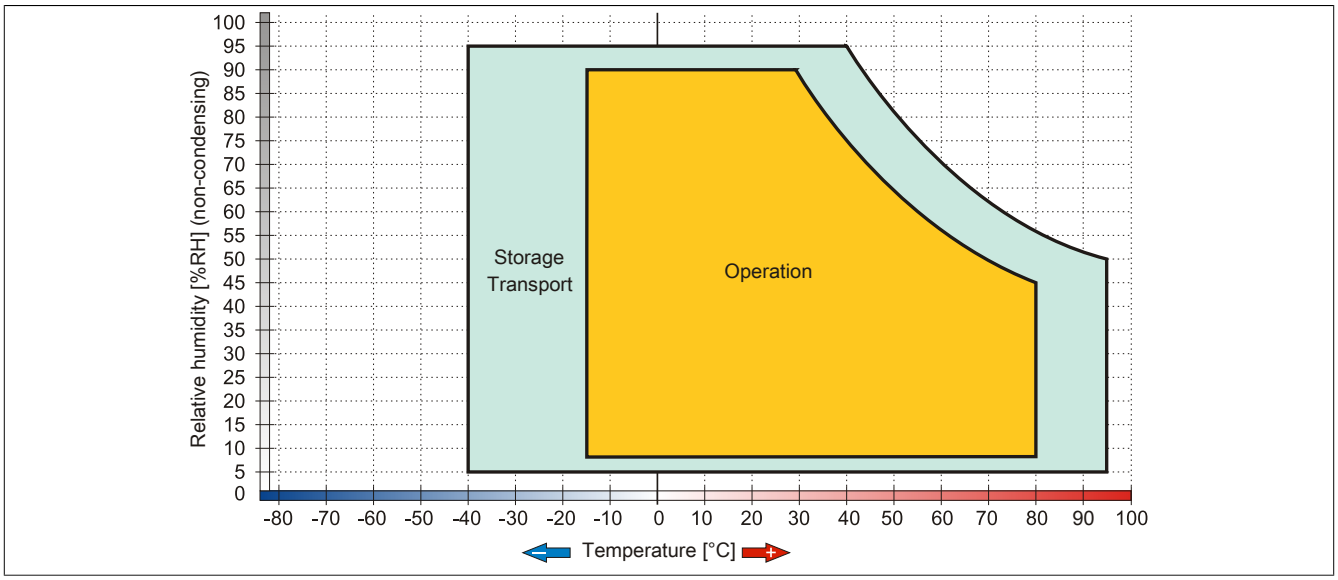


Image 32: 5AC801.HDDI-02 - Temperature humidity diagram

3.6.3 5AC801.HDDI-03

General information

This 250 GB slide-in compact hard disk is specified for 24-hour operation. The slide-in compact drive can be used in APC810 and PPC800 system units.

When used in a APC810

When inserted in the slide-in compact slot, the slide-in compact drive is referred to internally as SATA I.

Order data

Model number	Short description	Figure
	Drives	
5AC801.HDDI-03	250 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.0250-00	250 GB SATA Hard Disk Spare part for 5AC801.HDDI-03 and 5ACPCI.RAIC-05; Remark: Please see manual for proper use of the hard disk.	

Table 57: 5AC801.HDDI-03 - Order data

Technical data

Information:

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

Product ID	5AC801.HDDI-03
General information	
Certification types	
CE	Yes
Hard Disk	
Capacity	250 GB
Number of heads	1
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	5.56 ms
Supported transfer modes	SATA 1.0, Serial ATA Revision 2.6 PIO Modus 0-4, Multiword DMA Mode 0-2, UDMA Mode 0-6
Data transfer rate	
Internal	Max. 1175 Mbits/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[3)]	
Operation[2)]	0 to 60°C
Operation - 24-hour[4)]	0 to 60°C
Storage	-40 to 70°C
Transport	-40 to 70°C

Table 58: 5AC801.HDDI-03 - Technical data

Product ID	5AC801.HDDI-03
Relative humidity[5]	
Operation	5 to 95%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Vibration	
Operation	5 to 500 Hz: 0.5 g; no unrecoverable errors
Storage	5 to 500 Hz: 5 g; no unrecoverable errors
Transport	5 to 500 Hz: 5 g; no unrecoverable errors
Shock	
Operation	350 g and 2 ms duration; no unrecoverable errors
Storage	800 g and 2 ms duration, no unrecoverable errors 1000 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 1000 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	
Installation	Fixed[6]
Dimensions	
Width	13 mm
Height	98 mm
Depth	105 mm
Weight	134 g
Manufacturer information	
Manufacturer	Seagate
Manufacturer's product ID	ST9250315AS

Table 58: 5AC801.HDDI-03 - Technical data

1) With 8760 POH (Power On Hours) per year and 25°C surface temperature.
2) Standard operation means 333 POH (power-on hours) per month.
3) 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.
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

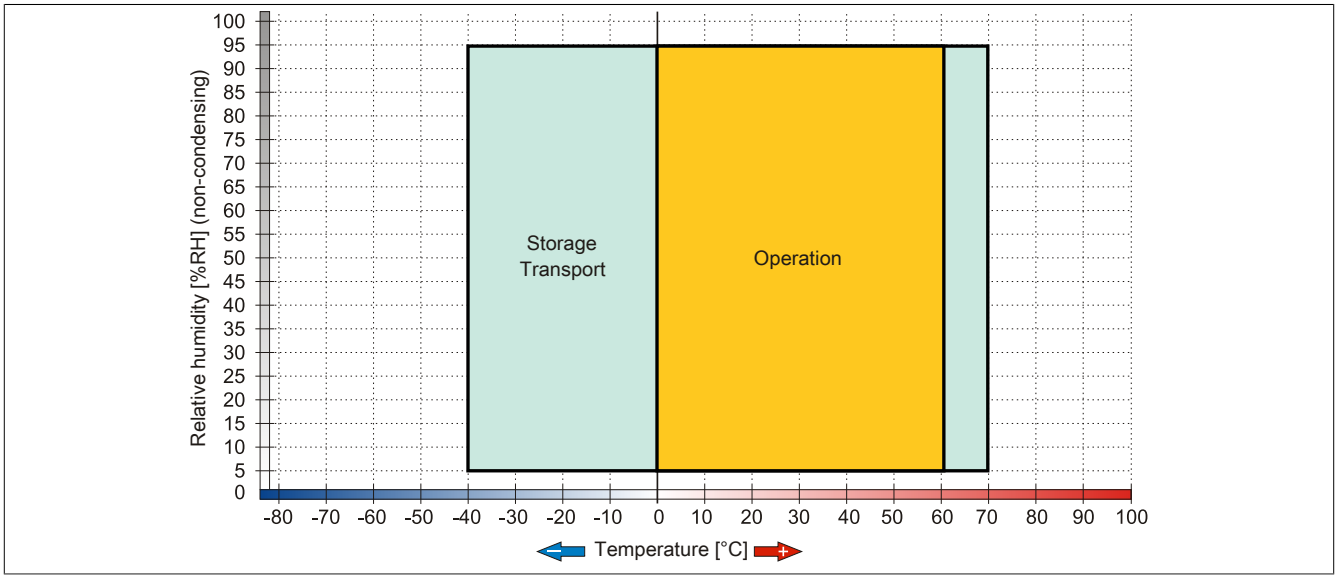


Image 33: 5AC801.HDDI-03 - Temperature humidity diagram

3.6.4 5AC801.SSDI-00

General information

This SSD (Solid State Drive) slide-in compact drive can be used in APC810 and PPC800 system units.

When used in an APC810

Information:

The slide-in compact SSD cannot be used in the 5 card slot version of the APC810 in slide-in slot 2 with the 5AC801.ADAS-00 adapter.

When inserted in the slide-in compact slot, the slide-in compact drive is referred to internally as SATA I.

Order data

Model number	Short description	Figure
	Drives	
5AC801.SSDI-00	32 GB SATA SSD (SLC) (slide-in compact).	

Table 59: 5AC801.SSDI-00 - Order data

Technical data

Caution!

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

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

Information:

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

Product ID	5AC801.SSDI-00
Solid state drive	
Capacity	32 GB
Data reliability	< 1 unrecoverable error in 10¹⁵ bit read accesses
MTBF	2,000,000 hours
Power on/off cycles	50,000
S.M.A.R.T. Support	Yes
Interface	SATA
Maintenance	None
Continuous reading	Max. 250 MB/s
Continuous writing	Max. 170 MB/s
IOPS[1)] 4k read 4k write	 35,000 3,300
Endurance	
Guaranteed amount of data Guaranteed Results in 5 years	 700 TB 350 GB/day
SLC-Flash	Yes

Table 60: 5AC801.SSDI-00 - Technical data

Product ID	5AC801.SSDI-00
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
Environmental conditions	
Temperature	
Operation	0 to 70°C
Bearings	-55 to 95°C
Transport	-55 to 95°C
Relative humidity	
Operation	5 to 95%
Bearings	5 to 95%
Transport	5 to 95%
Vibration	
Operation	7 to 800 Hz: 2.17 g
Bearings	10 to 500 Hz: 3.13 g
Transport	10 to 500 Hz: 3.13 g
Shock	
Operation	1000 g, 0.5 ms
Bearings	1000 g, 0.5 ms
Transport	1000 g, 0.5 ms
Altitude	
Operation	-300 to 12,192 m
Bearings	-300 to 12,192 m
Transport	-300 to 12,192 m
Mechanical characteristics	
Installation[2)]	Fixed
Dimensions	
Width	13 mm
Height	98 mm
Depth	105 mm
Weight	118 g
Manufacturer information	
Manufacturer	Intel
Manufacturer's product ID	SSDSA2SH032G1

Table 60: 5AC801.SSDI-00 - Technical data

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

Temperature humidity diagram

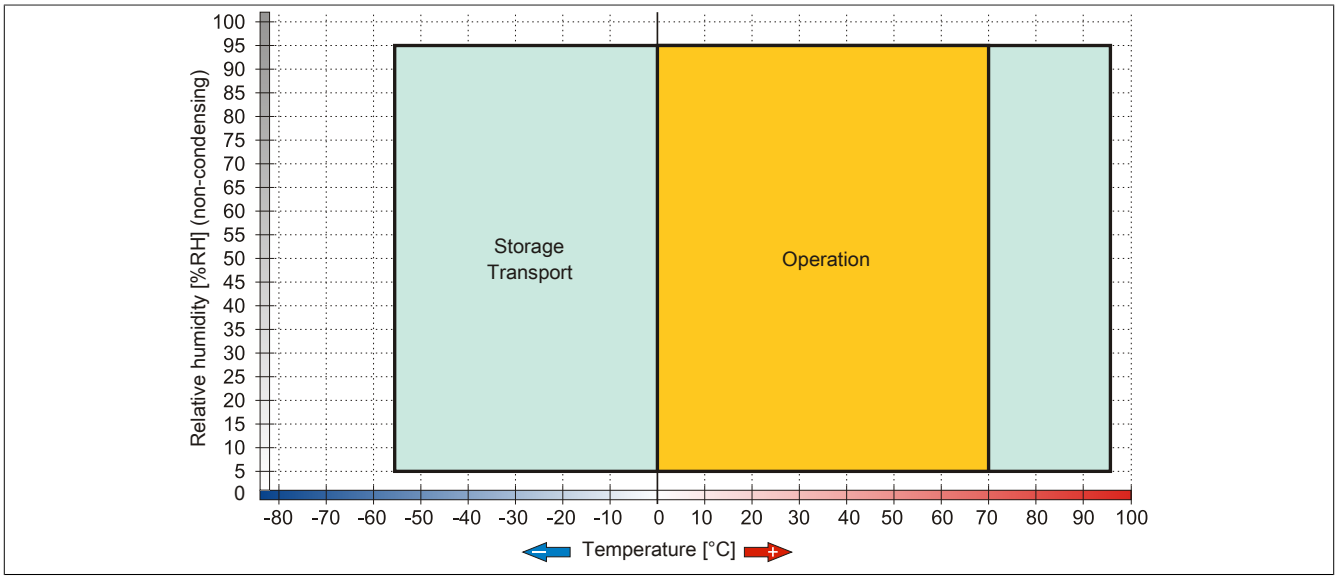


Image 34: 5AC801.SSDI-00 - Temperature humidity diagram

Benchmark

The following two benchmarks show a comparison of the Intel Solid State Drive (5AC801.SSDI-00) and the Seagate Hard Disk (5AC801.HDDI-00) for cyclic reading and writing.

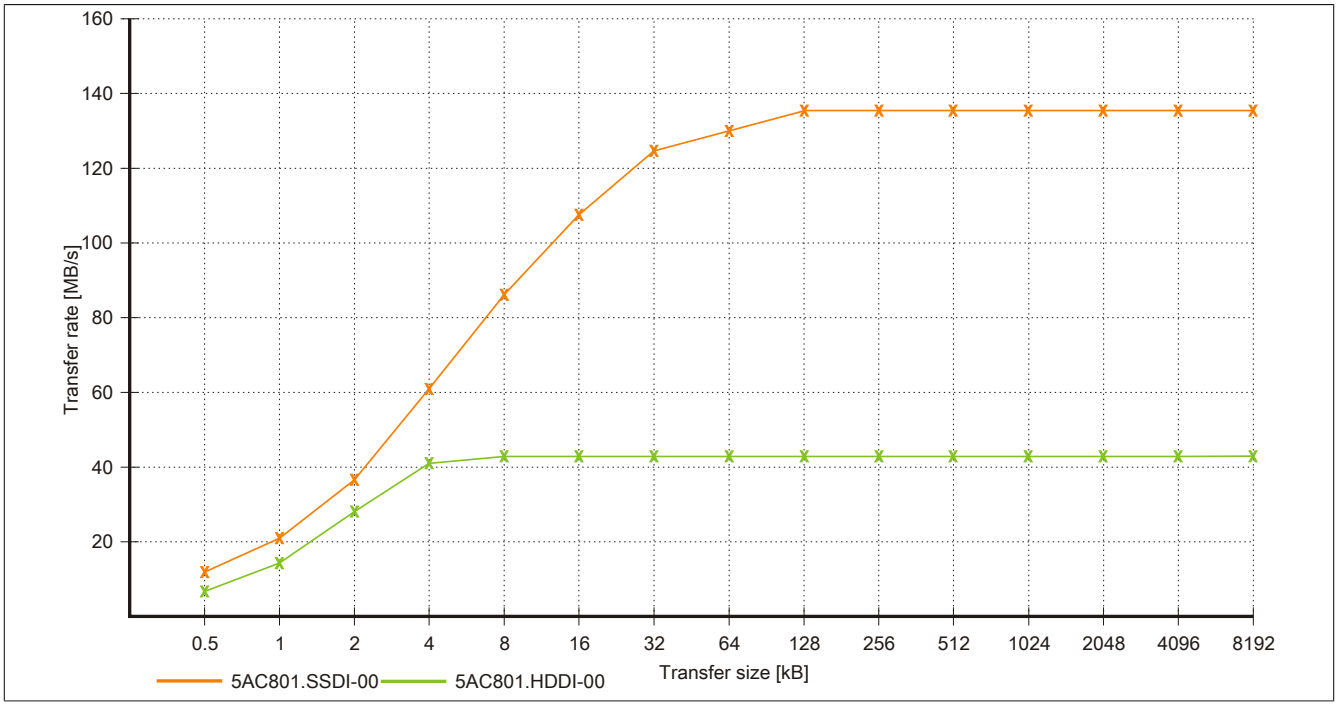


Image 35: 5AC801.SSDI-00 - ATTO disk benchmark v2.34 - Cyclic read

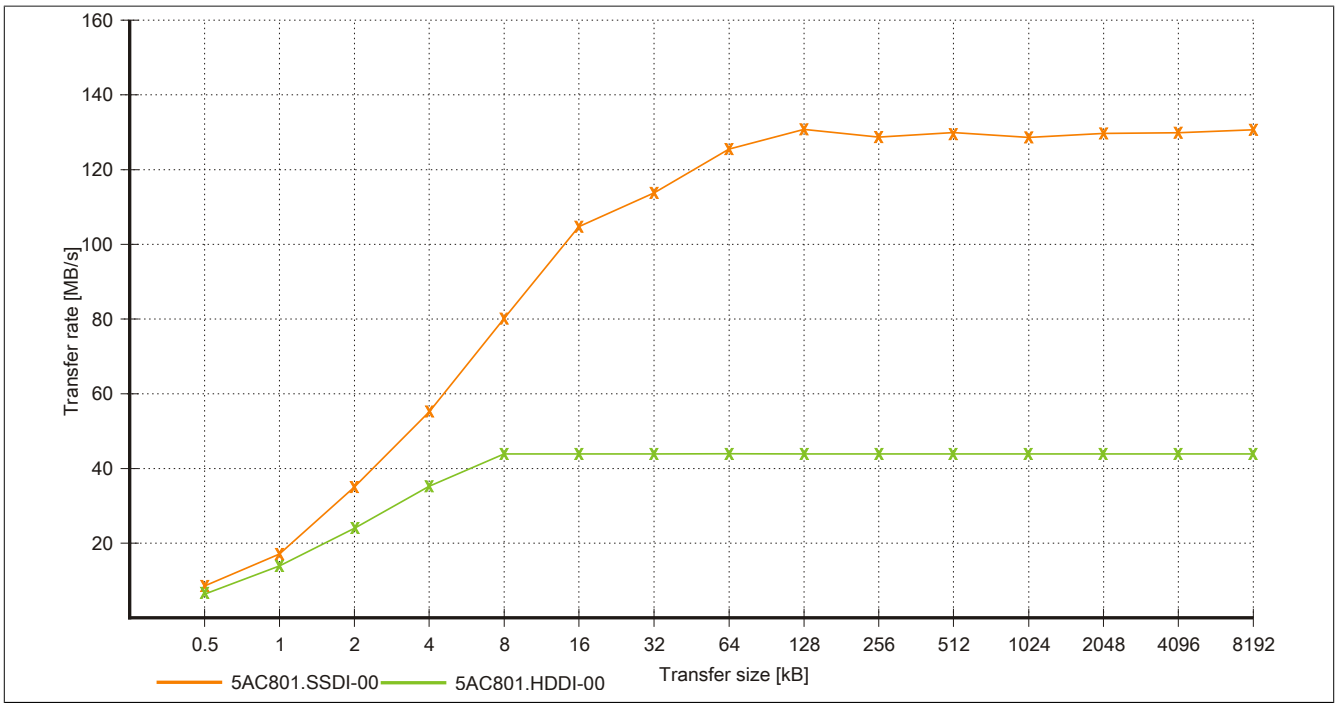


Image 36: 5AC801.SSDI-00 - ATTO disk benchmark v2.34 - Cyclic write

3.6.5 5AC801.ADAS-00

General information

The hard disk adapter is a slide-in adapter where slide-in compact drives can be installed and then operated on the B&R industrial PC. This adapter can be used in APC810 and PPC800 system units with slide-in drive slot.

When used in an APC810

Information:

The slide-in compact adapter can only be inserted into slide-in slot 1 for mechanical reasons (closing the front door).

Order data

Model number	Short description	Figure
	Drives	
5AC801.ADAS-00	SATA Hard Disk Adapter (slide-in compact).	

Table 61: 5AC801.ADAS-00 - Order data

Technical data

Product ID	5AC801.ADAS-00
Mechanical characteristics	
Dimensions	
Width	22 mm
Height	172.5 mm
Depth	150 mm
Weight	328 g

Table 62: 5AC801.ADAS-00 - Technical data

3.6.6 5AC801.HDDS-00

General information

This 40 GB hard disk is specified for 24-hour operation (24x7) and also provides an extended temperature specification (ET). The slide-in drive can be used in APC810 and PPC800 system units with slide-in drive slot.

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

When used in an APC810

When inserted in slide-in slot 1 or slide-in drive 2, the slide-in drive is referred to internally as SATA I and USB.

Order data

Model number	Short description	Figure
	Drives	
5AC801.HDDS-00	40 GB SATA hard disk (slide-in) 24/7 hard disk with extended temperature range. Note: Please consult the manual when using the hard disk.	

Table 63: 5AC801.HDDS-00 - Order data

Technical data

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

Product ID	5AC801.HDDS-00
Hard Disk	
Capacity	40 GB
Number of heads	1
Number of sectors	78,140,160
Bytes per sector	512
Cache	8 MB
Speed	5400 rpm ±1%
Startup time	Typ. 3 s (from 0 rpm to read access)
MTBF	750,000 POH[1)]
S.M.A.R.T. Support	Yes
Interface	SATA
Access time	12.5 ms
Data transfer rate	
Internal	Max. 450 MBit/s
To/from host	Max. 150 MB/s (Ultra DMA mode 5)
Positioning time	
Maximum (read only)	23 ms
Minimum (track to track)	1 ms
Nominal (read only)	12.5 ms
Environmental conditions	
Temperature[1)]	
Operation[2)]	-30 to 85°C
Operation - 24-hour[4)]	-30 to 85°C
Bearings	-40 to 95°C
Transport	-40 to 95°C

Table 64: 5AC801.HDDS-00 - Technical data

Product ID	5AC801.HDDS-00
Relative humidity[5]	
Operation	5 to 90%
Bearings	5 to 95%
Transport	5 to 95%
Vibration	
Operation	5 to 500 Hz: 2 g; no non-recovered errors
Bearings	5 to 500 Hz: 5 g; no non-recovered errors
Transport	5 to 500 Hz: 5 g; no non-recovered errors
Shock	
Operation	300 g and 2 ms duration; no non-recovered errors 150 g and 11 ms duration; no non-recovered errors
Bearings	800 g and 2 ms duration; no non-recovered errors 400 g and 0.5 ms duration; no non-recovered errors
Transport	800 g and 2 ms duration; no non-recovered errors 400 g and 0.5 ms duration; no non-recovered errors
Altitude	
Operation	-300 to 5000 m
Bearings	-300 to 12192 m
Mechanical characteristics	
Installation	Fixed[6]
Dimensions	
Width	22 mm
Height	172.5 mm
Depth	150 mm
Weight	387 g
Manufacturer information	
Manufacturer	Seagate
Manufacturer's product ID	ST940817SM

Table 64: 5AC801.HDDS-00 - Technical data

1) With 8760 POH (Power On Hours) per year and 70 °C surface temperature.
2) Standard operation means 333 POH (power-on hours) per month.
3) 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.
4) 24-hour operation means 732 POH (power-on hours) per month.
5) Humidity gradient: Maximum 15% per hour.
6) Slide-in compact mounting.

Temperature humidity diagram

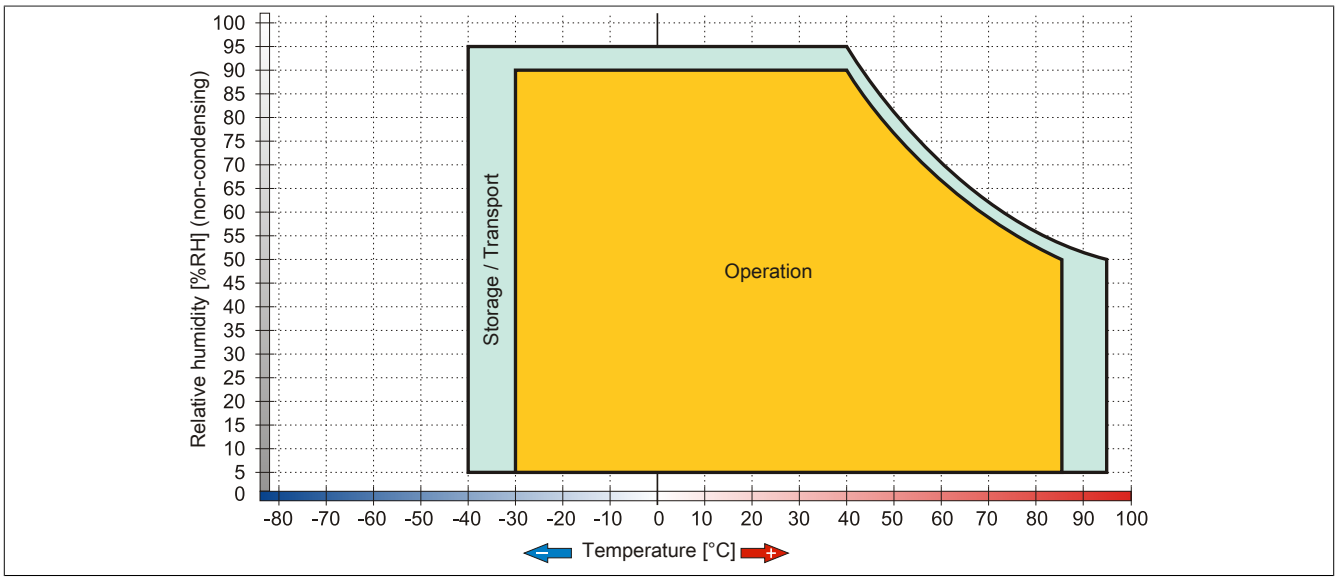


Image 37: 5AC801.HDDS-00 - Temperature humidity diagram

3.6.7 5AC801.DVDS-00

General information

The DVD-ROM slide-in drive can be used in APC810 and PPC800 system units with slide-in drive slot.

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

When used in an APC810

When inserted in slide-in slot 1 or slide-in drive 2, the slide-in drive is referred to internally as SATA I and USB.

Order data

Model number	Short description	Figure
	Drives	
5AC801.DVDS-00	DVD-ROM SATA drive (slide-in).	
	Optional accessories	
	Miscellaneous	
5SWUTI.0000-00	OEM Nero CD-RW Software, only available with a CD-RW drive..	

Table 65: 5AC801.DVDS-00 - Order data

Technical data

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

Product ID	5AC801.DVDS-00
CD / DVD drive	
Data buffer capacity	2 MB
Data transfer rate	Max. 1.5 GB/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-Video (Double Layer), DVD-R (Single/Multi-border), DVD-R DL (Single/Multi-border), DVD-RW (Single/Multi-border), DVD+R (Single/Multi session), DVD+R DL (Single/Multi session), DVD+RW (Single/Multi session), DVD-RAM (4.7 GB, 2.6 GB)
Laser class	Class 1 laser
Lifespan	60,000 POH (Power-On Hours)
Interface	SATA
Startup time CD DVD	 Max. 19 seconds (0 rpm to read access) Max. 19 seconds (0 rpm to read access)
Access time CD DVD	 Average of 130 ms Average of 140 ms
Readable media CD DVD	 CD-ROM (12 cm, 8 cm), CD-A CD-R, CD-RW DVD-ROM, DVD-R, DVD-R DL, DVD-RW, DVD+R DVD+R DL, DVD+RW, DVD-RAM
Reading rate CD	 24x

Table 66: 5AC801.DVDS-00 - Technical data

Product ID	5AC801.DVDS-00
DVD	8x
Environmental conditions	
Temperature[2]	
Operation	5 to 55°C[1]
Bearings	-20 to 60°C
Transport	-20 to 65°C
Relative humidity	
Operation	8 to 80%
Bearings	5 to 95%
Transport	5 to 95%
Vibration	
Operation	5 to 500 Hz: 0.2g
Bearings	5 to 500 Hz: 2g
Transport	5 to 500 Hz: 2g
Shock	
Operation	5 g and 11 ms duration
Bearings	60 g and 11 ms duration 200 g and 2 ms duration
Transport	60 g and 11 ms duration 200 g and 2 ms duration
Mechanical characteristics	
Dimensions	
Width	22 mm
Height	172.5 mm
Depth	150 mm
Weight	455 g

Table 66: 5AC801.DVDS-00 - Technical data

1) Drive surface temperature
2) 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).

Temperature humidity diagram

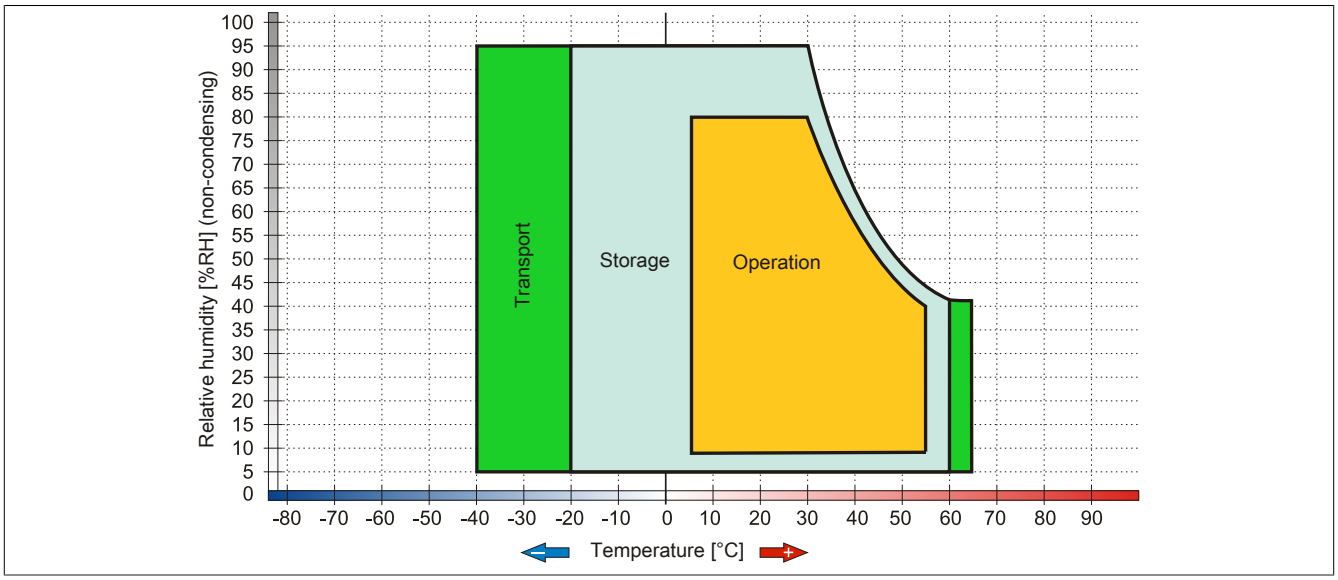


Image 38: 5AC801.DVDS-00 - Temperature humidity diagram

Hot plug capable

Hardware revision B0 of the slide-in DVD-ROM - 5AC801.DVDS-00 does not offer SATA hot plug capability. Other hardware revisions are hot plug capable.

3.6.8 5AC801.DVRS-00

General information

The DVD-R/RW slide-in drive can be used in APC810 and PPC800 system units with slide-in drive slot.

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

When used in an APC810

When inserted in slide-in slot 1 or slide-in drive 2, the slide-in drive is referred to internally as SATA I and USB.

Order data

Model number	Short description	Figure
	Drives	
5AC801.DVRS-00	DVD-R/RW DVD+R/RW SATA drive (slide-in).	
	Optional accessories	
	Miscellaneous	
5SWUTI.0000-00	OEM Nero CD-RW Software, only available with a CD-RW drive..	

Table 67: 5AC801.DVRS-00 - Order data

Technical data

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

Product ID	5AC801.DVRS-00
CD / DVD drive	
Data buffer capacity	2 MB
Data transfer rate	Max. 33.3 MB/s
Speed	Max. 5160 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-R (Double Layer), DVD-RW, DVD-Video DVD-RAM (4,7 GB, 2,6 GB) DVD+R, DVD+R (Double Layer), DVD+RW
Laser class	Class 1 laser
Lifespan	60,000 POH (Power-On Hours)
Interface	SATA
Startup time CD DVD	 Max. 14 seconds (0 rpm to read access) Max. 15 seconds (0 rpm to read access)
Access time CD DVD	 On average 140 ms (24x) On average 150 ms (8x)
Readable media CD DVD	 CD/CD-ROM (12 cm, 8 cm), CD-R, CD-RW DVD-ROM, DVD-R, DVD-R (double layer), DVD-RW. DVD-RAM, DVD+R, DVD+R (double layer), DVD+RW, DVD-RAM
Non-write protected media CD	 CD-R, CD-RW

Table 68: 5AC801.DVRS-00 - Technical data

Product ID	5AC801.DVRS-00
DVD	DVD-R/RW, DVD-R (double layer), DVD-RAM (4.7 GB), DVD+R/RW, DVD+R (double layer)
Reading rate	
CD	24x
DVD	8x
Write speed	
CD-R	24x, 16x, 10x and 4x
CD-RW	24x, 16x, 10x and 4x
DVD+R	8x, 4x and 2, 4x
DVD+R (double layer)	6x, 4x and 2, 4x
DVD+RW	4x and 2x
DVD-R	8x, 4x and 2x
DVD-R (Double Layer)	6x, 4x and 2x
DVD-RAM[1)]	5x, 3x and 2x
DVD-RW	6x, 4x and 2x
Write-methods	
CD	Disk at once, session at once, packet write, track at once
DVD	Disk at once, incremental, over-write, sequential, multi-session
Environmental conditions	
Temperature[3)]	
Operation	5 to 55°C[2)]
Bearings	-20 to 60°C
Transport	-40 to 65°C
Relative humidity	
Operation	8 to 80%
Bearings	5 to 95%
Transport	5 to 95%
Vibration	
Operation	5 to 500 Hz: 0.2g
Bearings	5 to 500 Hz: 2g
Transport	5 to 500 Hz: 2g
Shock	
Operation	At max. 5 g and 11 ms duration
Bearings	At max. 60 g and 11 ms duration At max. 200 g and 2 ms duration
Transport	At max. 60 g and 11 ms duration At max. 200 g and 2 ms duration
Mechanical characteristics	
Dimensions	
Width	22 mm
Height	172.5 mm
Depth	150 mm
Weight	400 g

Table 68: 5AC801.DVRS-00 - Technical data

1) RAM drivers are not provided by the manufacturer. Support of RAM function by the burning software "Nero" (model number 5SWUTI.0000-00) or other burning software packages and drivers from third party providers.
2) Drive surface temperature
3) 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).

Temperature humidity diagram

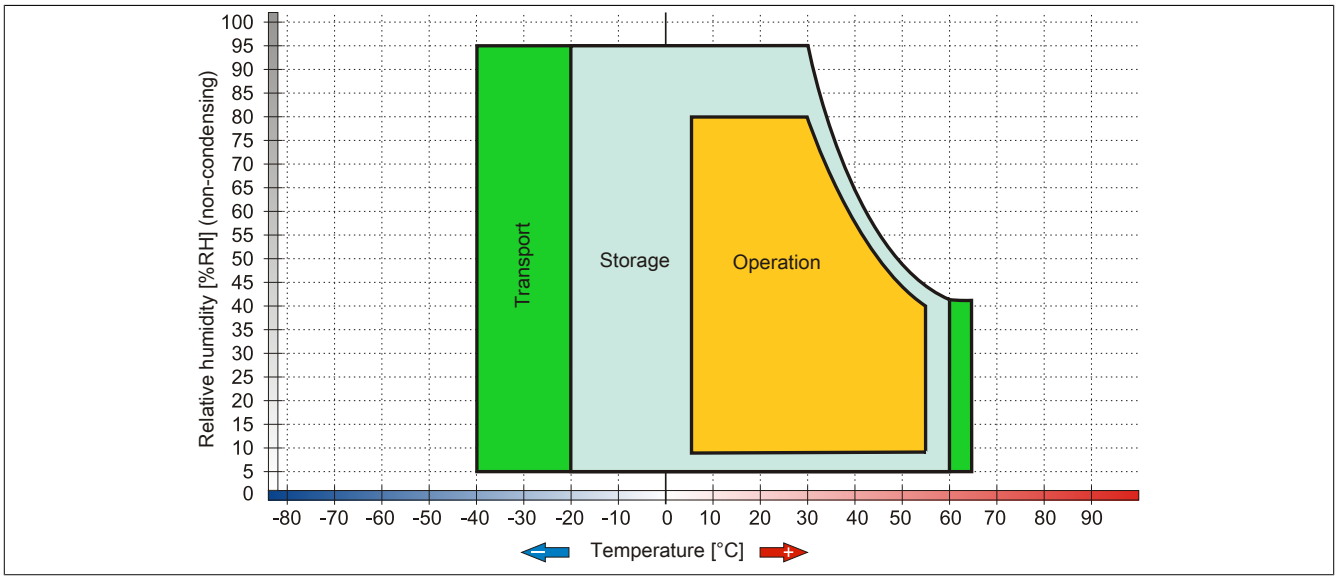


Image 39: 5AC801.DVRS-00 - Temperature humidity diagram

3.6.9 5ACPCI.RAIC-03

General information

This SATA RAID controller supports RAID level 0 and 1 and can be inserted in a PCI slot. The hard disks being used are specified for 24-hour operation (24x7) and also provides an extended temperature specification (ET).

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

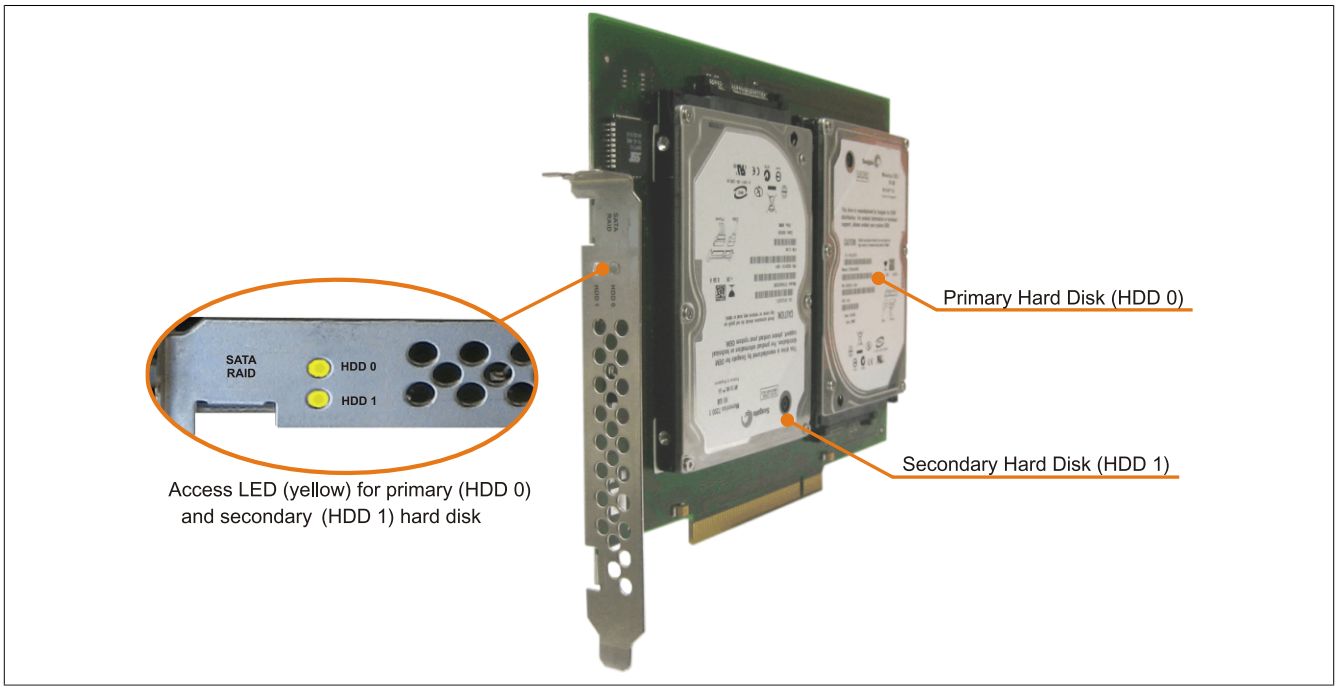


Image 40: PCI SATA RAID controller

Information:

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

Order data

Model number	Short description	Figure
	Drives	
5ACPCI.RAIC-03	PCI RAID system SATA 2x 160 GB; Note: Please consult the manual when using the hard disk.	
	Optional accessories	
	Drives	
5ACPCI.RAIC-04	160 GB SATA hard disk, replacement part for 5ACPCI.RAIC-03; Note: Please consult the manual when using the hard disk.	

Table 69: 5ACPCI.RAIC-03 - Order data

Technical data

Information:

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

Product ID	**5ACPCI.RAIC-03**
Controller	
BIOS Extension ROM - requirements	Approx. 32 KB
Data transfer rate	Max. 1.5 GBit/s (150 MB/s)
RAID level	Supports RAID 0, 1
Specifications	Serial ATA 1.0
Type	SiI 3512 SATA link
Hard Disk	
Capacity	160 GB
Number of heads	3
Number of sectors	312,581,808
Bytes per sector	512
Cache	8 MB
Speed	5400 rpm ±1%
Startup time	Typ. 4 s (from 0 rpm to read access)
Lifespan	5 years
S.M.A.R.T. Support	Yes
Access time	5.56 ms
Supported transfer modes	SATA 1.0, PIO mode 0-4, multiword DMA mode 0-2, UDMA 0-5
Data transfer rate Internal To/from host	 Max. 84.6 MBit/s Max. 150 MB/s
Positioning time Maximum (read only) Minimum (track to track) Nominal (read only)	 22 ms 1.5 ms 12 ms
Electrical characteristics	
Power consumption	0.3 A at 3.3 V (PCI bus) 1 A at 5 V (PCI bus)
Environmental conditions	
Temperature[1)] Operation[1)] Operation - 24-hour[3)] Bearings Transport	 -15 to 80°C -15 to 80°C -40 to 95°C -40 to 95°C
Relative humidity Operation Bearings Transport	 8 to 90%[4)] 5 to 95%[5)] 5 to 95%[5)]
Vibration[1)] Operation (continuous) Operation (occasional) Bearings Transport	 5 to 500 Hz: max. 0.125 g; duration 1 octave per minute; no unrecoverable errors 5 to 500 Hz: max. 0.25 g; duration 1 octave per minute; no unrecoverable errors 5 to 500 Hz: max. 5 g; duration 0.5 octaves per minute; no damage 5 to 500 Hz: max. 5 g; duration 0.5 octaves per minute; no damage
Shock Operation Bearings Transport	 Max. 125 g, 2 ms; no unrecoverable errors Max. 400 g, 2 ms; no damage max. 450 g, 1 ms; no damage max. 200 g, 0.5 ms; no damage Max. 400 g, 2 ms; no damage max. 450 g, 1 ms; no damage max. 200 g, 0.5 ms; no damage
Altitude Operation Bearings	 -300 to 3048 m -300 to 12192 m
Mechanical characteristics	
Installation[7)]	Fixed
Dimensions Width Length Height	 70 mm 100 mm 9.5 mm

Table 70: 5ACPCI.RAIC-03 - Technical data

Product ID	5ACPCI.RAIC-03
Weight	350 g
Manufacturer information	
Manufacturer	Fujitsu
Manufacturer's product ID	M120-ESW MHY2160BH-ESW

Table 70: 5ACPCI.RAIC-03 - Technical data

1) Standard operation means 333 POH (power-on hours) per month.
2) Temperature values for 305 meter altitude. The temperature specification must be reduced linearly by 1°C every 305 meters. The temperature increase and decrease can be a maximum of 3°C per minute.
3) 24-hour operation means 732 POH (power-on hours) per month.
4) Maximum humidity at +29 °C.
5) Maximum humidity at +40 °C.
6) Operation in areas prone to vibration and shock can affect performance negatively (reduction of transfer rate).
7) Mounted on PCI insert.

Temperature humidity diagram

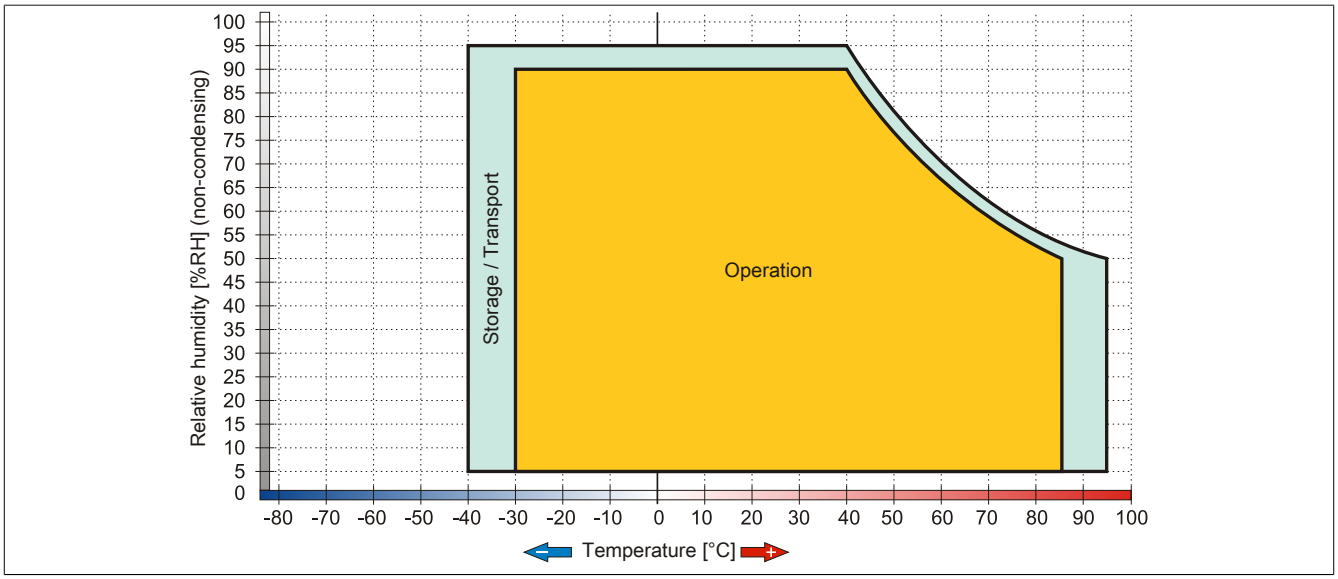


Image 41: 5ACPCI.RAIC-03 - Temperature humidity diagram

Driver support

Special drivers are necessary for operating the PCI SATA RAID controller. The necessary drivers can be downloaded from the download area on the B&R homepage for approved and supported operating systems (www.br-automation.com).

The .NET-based SATARaid™ serial ATA RAID management software can also be found on the B&R homepage.

Information:

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

Configuration

Configuring a SATA RAID network: see Chapter 3 "Commissioning", section 6 "Configuration of a SATA RAID array" on page 177.

Exchanging a HDD

A hard drive can be easily exchanged in the event of an error when using the RAID1 (mirroring) configuration without having to re-install the system. The replacement SATA HDD 160GB 5ACPCI.RAIC-04 is available as a replacement part for a HDD.

For instructions on exchanging the drive, see chapter Chapter 7 "Maintenance / Servicing", section 10 " Exchanging a PCI SATA RAID hard disk in a RAID 1 system" on page 371.

3.6.10 5ACPCI.RAIC-04

General information

The hard disk can be used as replacement for a HDD in a PCI SATA RAID controller 5ACPCI.RAIC-03.

Order data

Model number	Short description	Figure
	Drives	
5ACPCI.RAIC-04	160 GB SATA hard disk, replacement part for 5ACPCI.RAIC-03; Note: Please consult the manual when using the hard disk.	

Table 71: 5ACPCI.RAIC-04 - Order data

Technical data

Information:

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

Product ID	5ACPCI.RAIC-04
Hard Disk	
Manufacturer's product ID	Fujitsu M120-ESW MHY2160BH-ESW
Capacity	160 GB
Number of heads	3
Number of sectors	312,581,808
Bytes per sector	512
Cache	8 MB
Speed	5400 rpm ±1%
Startup time	Typ. 4 s (from 0 rpm to read access)
Lifespan	5 years
S.M.A.R.T. Support	Yes
Access time	5.56 ms
Supported transfer modes	SATA 1.0, PIO mode 0-4, multiword DMA mode 0-2, UDMA 0-5
Data transfer rate	
Internal	Max. 84.6 MBit/s
To/from host	Max. 150 MB/s
Positioning time	
Maximum (read only)	22 ms
Minimum (track to track)	1.5 ms
Nominal (read only)	12 ms
Electrical characteristics	
Power consumption	0.3 A at 3.3 V (PCI bus) 1 A at 5 V (PCI bus)
Environmental conditions	
Temperature[1)]	
Operation[1)]	-15 to 80°C
Operation - 24-hour[3)]	-15 to 80°C
Bearings	-40 to 95°C
Transport	-40 to 95°C
Relative humidity	
Operation	8 to 90%[4)]
Bearings	5 to 95%[5)]
Transport	5 to 95%[5)]
Vibration[1)]	
Operation (continuous)	5 to 500 Hz: max. 0.125 g; duration 1 octave per minute; no unrecoverable errors
Operation (occasional)	5 to 500 Hz: max. 0.25 g; duration 1 octave per minute; no unrecoverable errors
Bearings	5 to 500 Hz: max. 5 g; duration 0.5 octaves per minute; no damage
Transport	5 to 500 Hz: max. 5 g; duration 0.5 octaves per minute; no damage
Shock	
Operation	Max. 125 g, 2 ms; no unrecoverable errors
Bearings	Max. 400 g, 2 ms; no damage max. 450 g, 1 ms; no damage max. 200 g, 0.5 ms; no damage

Table 72: 5ACPCI.RAIC-04 - Technical data

Product ID	5ACPCI.RAIC-04
Transport	Max. 400 g, 2 ms; no damage max. 450 g, 1 ms; no damage max. 200 g, 0.5 ms; no damage
Altitude	
Operation	-300 to 3048 m
Bearings	-300 to 12192 m
Mechanical characteristics	
Dimensions	
Width	70 mm
Length	100 mm
Height	9.5 mm
Weight	350 g

Table 72: 5ACPCI.RAIC-04 - Technical data

1) Standard operation means 333 POH (power-on hours) per month.
2) Temperature values for 305 meter altitude. The temperature specification must be reduced linearly by 1°C every 305 meters. The temperature increase and decrease can be a maximum of 3°C per minute.
3) 24-hour operation means 732 POH (power-on hours) per month.
4) Maximum humidity at +29 °C.
5) Maximum humidity at +40 °C.
6) Operation in areas prone to vibration and shock can affect performance negatively (reduction of transfer rate).

Temperature humidity diagram

Image 42: 5ACPCI.RAIC-04 - Temperature humidity diagram

3.6.11 5ACPCI.RAIC-05

General information

This SATA RAID controller supports RAID level 0 and 1 and can be inserted in a PCI slot. The 250 GB hard disks being used are specified for 24-hour operation (24x7) and also provides an extended temperature specification (ET).

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

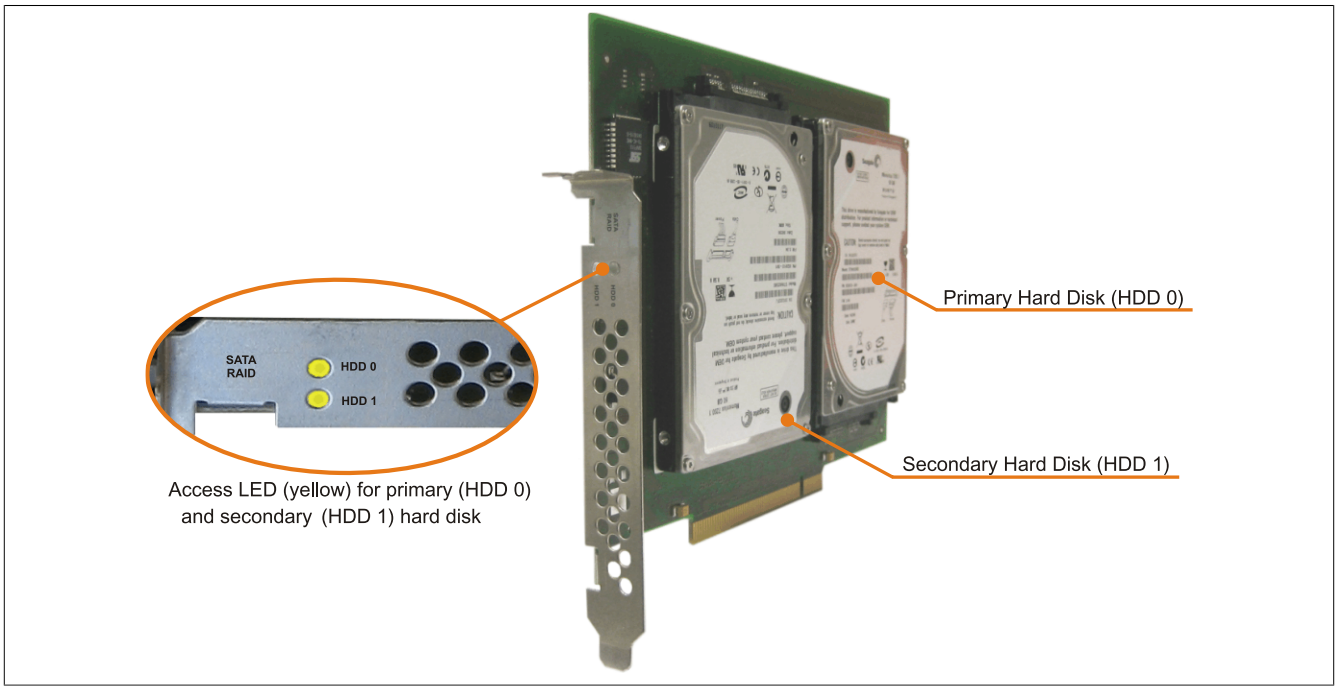


Image 43: PCI SATA RAID controller

Information:

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

Order data

Model number	Short description	Figure
	Drives	
5ACPCI.RAIC-05	PCI RAID System SATA 2x 250 GB; Remark: Please see manual for proper use of the hard disk.	
	Optional accessories	
	Drives	
5MMHDD.0250-00	250 GB SATA Hard Disk Spare part for 5AC801.HDDI-03 and 5ACPCI.RAIC-05; Remark: Please see manual for proper use of the hard disk.	

Table 73: 5ACPCI.RAIC-05 - Order data

Technical data

Product ID	5ACPCI.RAIC-05
General information	
Number of hard disks	2
Certification types CE	 Yes
Controllers	
Type	SiI 3512 SATA link
Specifications	Serial ATA 1.0
Data transfer rate	Max. 1.5 Gbit/s (150 MB/s)
RAID level	Supports RAID 0, 1
BIOS Extension ROM - requirements	Approx. 32 kB
Hard Disk	
Capacity	250 GB
Number of heads	1
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)
S.M.A.R.T. Support	Yes
Access time	5.56 ms
Supported transfer modes	SATA 1.0, Serial ATA Revision 2.6 PIO Modus 0-4, Multiword DMA Mode 0-2, UDMA Mode 0-6
Data transfer rate Internal To/from host	 Max. 1175 Mbits/s Max. 150 MB/s
Positioning time Minimum (track to track) Nominal (read only) Maximum (read only)	 1 ms 14 ms 30 ms
Electrical properties	
Power consumption	0.3 A at 3.3 V (PCI bus) 1 A at 5 V (PCI bus)
Environmental conditions	
Temperature[2)] Operation[1)] Operation - 24-hour[3)] Storage Transport	 0 to 60°C 0 to 60°C -40 to 70°C -40 to 70°C
Relative humidity[4)] Operation Storage Transport	 5 to 95%, non-condensing 5 to 95%, non-condensing 5 to 95%, non-condensing
Vibration[5)] Operation (continuous) Operation (occasional) Storage Transport	 5 to 500 Hz: max. 0.125 g; duration 1 octave per minute; no unrecoverable errors 5 to 500 Hz: max. 0.25 g; duration 1 octave per minute; no unrecoverable errors 5 to 500 Hz: 5 g; duration 0.5 octaves per minute; no damage 5 to 500 Hz: 5 g; duration 0.5 octaves per minute; no damage
Shock[5)] Operation Storage Transport	 Max. 125 g, 2 ms; no unrecoverable errors Max. 400 g, 2 ms; no damage Max. 500 g, 1 ms; no damage Max. 300 g, 0.5 ms; no damage Max. 400 g, 2 ms; no damage Max. 500 g, 1 ms; no damage Max. 300 g, 0.5 ms; no damage
Altitude Operation Storage	 - 300 to 3048 m - 300 to 12192 m
Mechanical characteristics	
Installation	Fixed[6)]
Weight	350 g
Manufacturer information	
Manufacturer	Seagate
Manufacturer's product ID	ST9250315AS

Table 74: 5ACPCI.RAIC-05 - Technical data

1) Standard operation means 333 POH (power-on hours) per month.
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) 24-hour operation means 732 POH (power-on hours) per month.
4) Humidity gradient: Maximum 30% per hour.
5) Operation in areas prone to vibration and shock can affect performance negatively (reduction of transfer rate).
6) Mounted on PCI insert.

Temperature humidity diagram

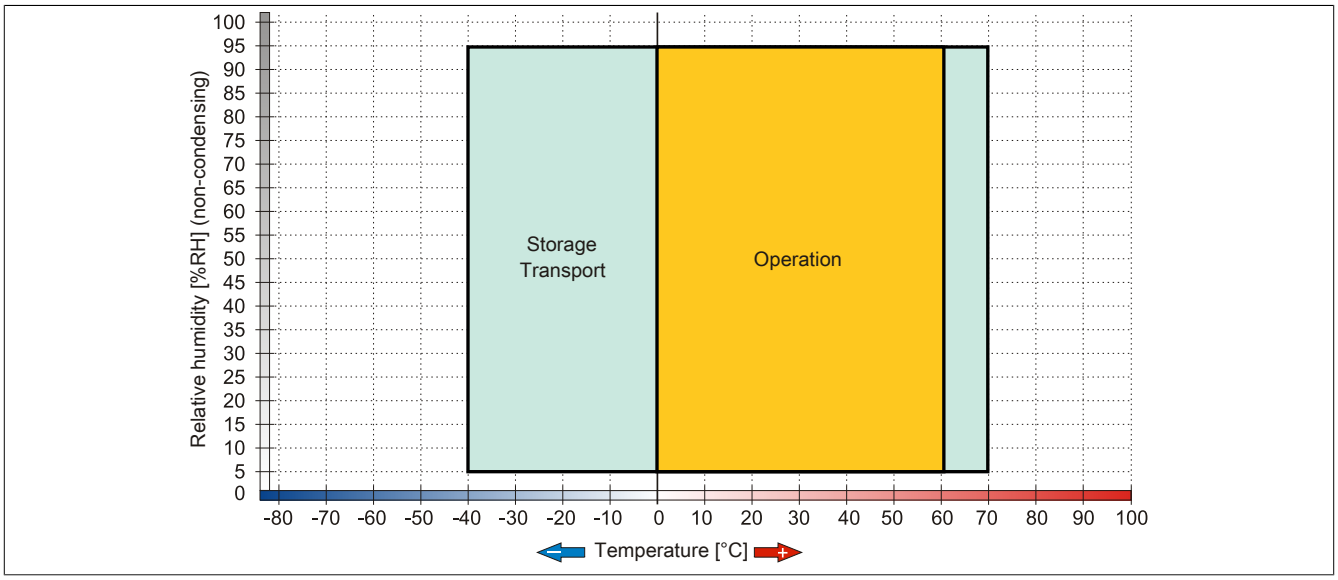


Image 44: 5ACPCI.RAIC-05 - Temperature humidity diagram

Driver support

Special drivers are necessary for operating the PCI SATA RAID controller. The necessary drivers can be downloaded from the download area on the B&R homepage for approved and supported operating systems (www.br-automation.com).

The .NET-based SATARaid™ serial ATA RAID management software can also be found on the B&R homepage.

Information:

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

Configuration

Configuring a SATA RAID network: see Chapter 3 "Commissioning", section 6 "Configuration of a SATA RAID array" on page 177.

Exchanging a HDD

A hard drive can be easily exchanged in the event of an error when using the RAID1 (mirroring) configuration without having to re-install the system. The replacement SATA HDD 250GB 5MMHDD.0250-00 is available as a replacement part for a HDD.

Instructions for exchange see "Maintenance / Servicing" on page 347.

3.6.12 5MMHDD.0250-00

General information

The hard disk can be used as replacement for a HDD in a PCI SATA RAID controller 5ACPCI.RAIC-05.

Order data

Model number	Short description	Figure
	Drives	
5MMHDD.0250-00	250 GB SATA Hard Disk Spare part for 5AC801.HDDI-03 and 5ACPCI.RAIC-05; Remark: Please see manual for proper use of the hard disk.	

Table 75: 5MMHDD.0250-00 - Order data

Technical data

Information:

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

Product ID	5MMHDD.0250-00
Hard Disk	
Capacity	250 GB
Number of heads	1
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	5.56 ms
Supported transfer modes	SATA 1.0, Serial ATA Revision 2.6 PIO Modus 0-4, Multiword DMA Mode 0-2, UDMA Mode 0-6
Data transfer rate	
Internal	Max. 1175 Mbits/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[3)]	
Operation[2)]	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
Vibration	
Operation	5 to 500 Hz: 0.5 g; no unrecoverable errors
Storage	5 to 500 Hz: 5 g; no unrecoverable errors
Transport	5 to 500 Hz: 5 g; no unrecoverable errors
Shock	
Operation	350 g and 2 ms duration; no unrecoverable errors
Storage	800 g and 2 ms duration, no unrecoverable errors 1000 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 1000 g and 1 ms duration, no unrecoverable errors 600 g and 0.5 ms duration, no unrecoverable errors

Table 76: 5MMHDD.0250-00 - Technical data

Product ID	5MMHDD.0250-00
Altitude	
Operation	-300 to 3048 m
Storage	-300 to 12192 m
Manufacturer information	
Manufacturer	Seagate
Manufacturer's product ID	ST9250315AS

Table 76: 5MMHDD.0250-00 - Technical data

1) With 8760 POH (Power On Hours) per year and 25°C surface temperature.
2) Standard operation means 333 POH (power-on hours) per month.
3) 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.
4) 24-hour operation means 732 POH (power-on hours) per month.
5) Humidity gradient: Maximum 30% per hour.

Temperature humidity diagram

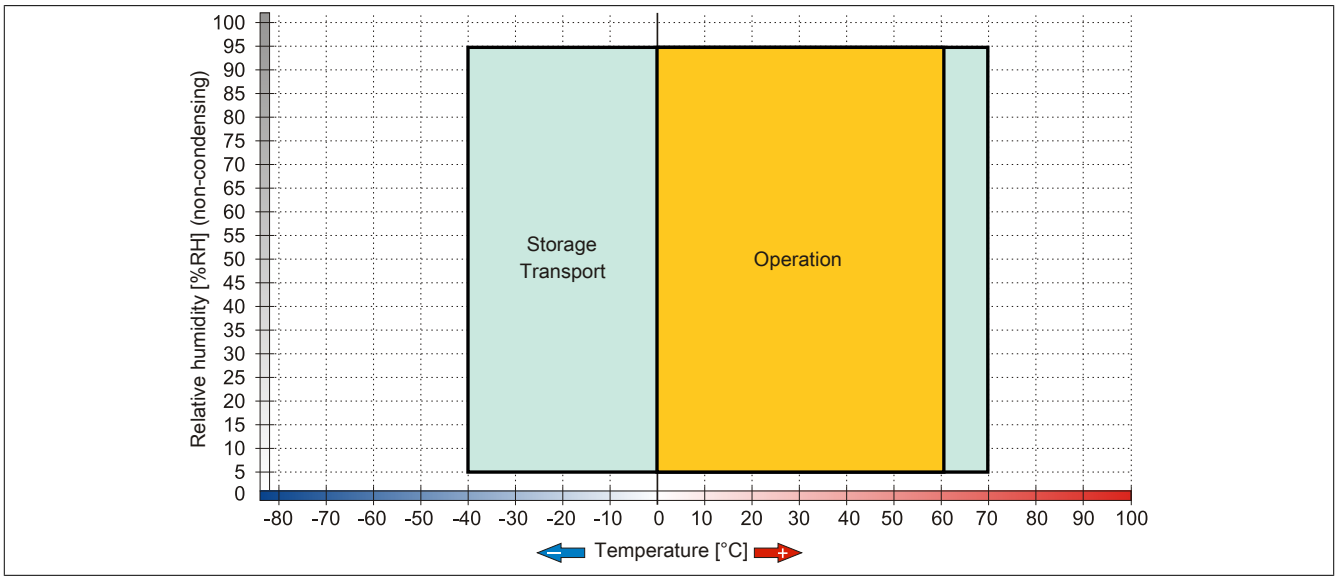


Image 45: 5MMHDD.0250-00 - Temperature humidity diagram

3.7 Fan kits

> **Information:**
>
> **Fans are necessary when using components which must work within certain temperature limits, e.g. RAID controller, DVD combos, PCI cards.**
>
> **The fan and dust filter 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 more information about fan switching limits, see .

3.7.1 5PC810.FA01-00

General information

This fan kit is an optional addition for system units with 1 card slots.

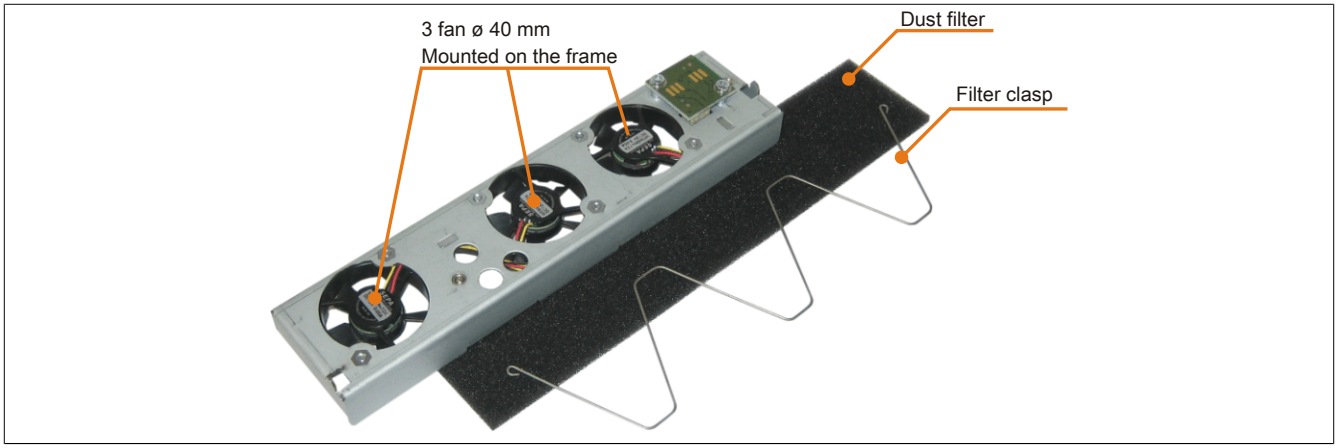


Image 46: 5PC810.FA01-00 - Fan kit

Order data

Model number	Short description	Figure
	Fan kits	
5PC810.FA01-00	APC810 fan kit for system unit 5PC810.SX01-00.	
	Optional accessories	
	Accessories	
5AC801.FA01-00	APC810 replacement fan filter for 5PC810.SX01-00; 5 pcs.	

Table 77: 5PC810.FA01-00 - Order data

Technical data

Product ID	5PC810.FA01-00
General information	
Number of fans	3
Speed	Max. 6100 rpm
Noise level	21 dB
Lifespan	29,000 hours at 70°C 95,000 hours at 20°C
Type	Double ball bearings
Mechanical characteristics	
Dimensions	
Width	40 mm
Length	40 mm
Height	10 mm

Table 78: 5PC810.FA01-00 - Technical data

For information on installing/exchanging the fan kit, see Chapter 7 "Maintenance / Servicing", Section 6 " Installing / exchanging the fan kit" on page 354.

3.7.2 5PC810.FA02-01

General information

These fan kits are an optional addition for system units with 2 card slots.

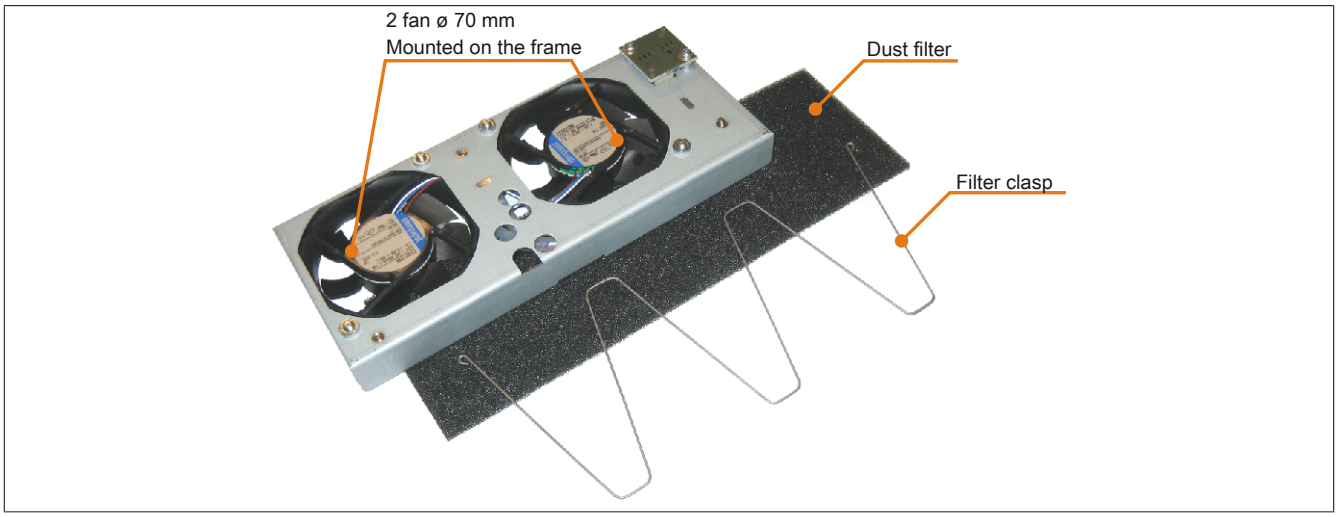


Image 47: 5PC810.FA02-01 - Fan kit

Order data

Model number	Short description	Figure
	Fan kits	
5PC810.FA02-01	APC810 fan kit for system unit 5PC810.SX02-00 starting revision D0.	
	Optional accessories	
	Accessories	
5AC801.FA02-00	APC810 replacement fan filter for 5PC810.SX02-00; 5 pcs.	

Table 79: 5PC810.FA02-01 - Order data

Technical data

Product ID	5PC810.FA02-01
General information	
Number of fans	2
Speed	Max. 4300 rpm ±12.5 %
Noise level	32 dB
Lifespan	60000 hours at 40°C
Type	Double ball bearings
Mechanical characteristics	
Dimensions	
Width	70 mm
Length	70 mm
Height	15 mm

Table 80: 5PC810.FA02-01 - Technical data

For information on installing/exchanging the fan kit, see Chapter 7 "Maintenance / Servicing", Section 6 " Installing / exchanging the fan kit" on page 354.

3.7.3 5PC810.FA03-00

General information

This fan kit is an optional addition for system units with 3 card slots.

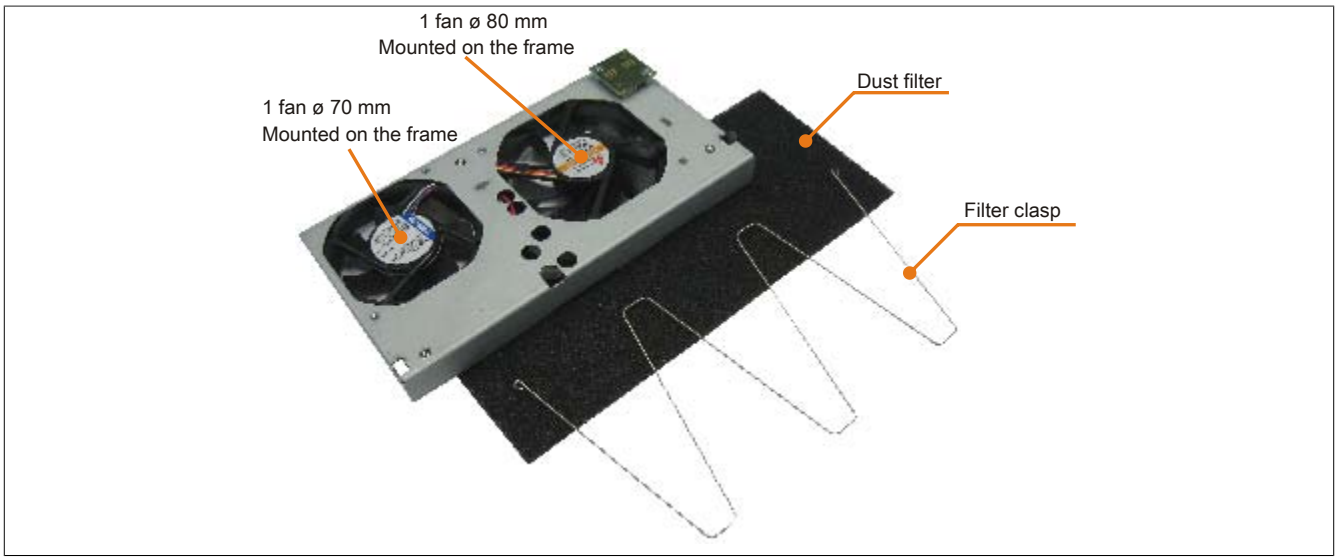


Image 48: 5PC810.FA03-00 - Fan kit

Order data

Model number	Short description	Figure
	Fan kits	
5PC810.FA03-00	APC810 fan kit for system unit 5PC810.SX03-00.	
	Optional accessories	
	Accessories	
5AC801.FA03-00	APC810 replacement fan filter for 5PC810.SX03-00; 5 pcs.	

Table 81: 5PC810.FA03-00 - Order data

Technical data

Product ID	5PC810.FA03-00
General information	
Number of fans	2
Speed	Fan 1: max. 4300 rpm ±12.5% Fan 2: max. 3200 rpm ±10%
Noise level	Fan 1: 32 dB Fan 2: 33 dB
Lifespan	Fan 1: 60,000 hours at 40°C Fan 2: 75000 hours at 40°C
Type	Double ball bearings
Mechanical characteristics	
Dimensions	
Width	Fan 1: 70 mm Fan 2: 80 mm
Length	Fan 1: 70 mm Fan 2: 80 mm
Height	Fan 1: 15 mm Fan 2: 15 mm

Table 82: 5PC810.FA03-00 - Technical data

For information on installing/exchanging the fan kit, see Chapter 7 "Maintenance / Servicing", Section 6 " Installing / exchanging the fan kit" on page 354.

3.7.4 5PC810.FA05-00

General information

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

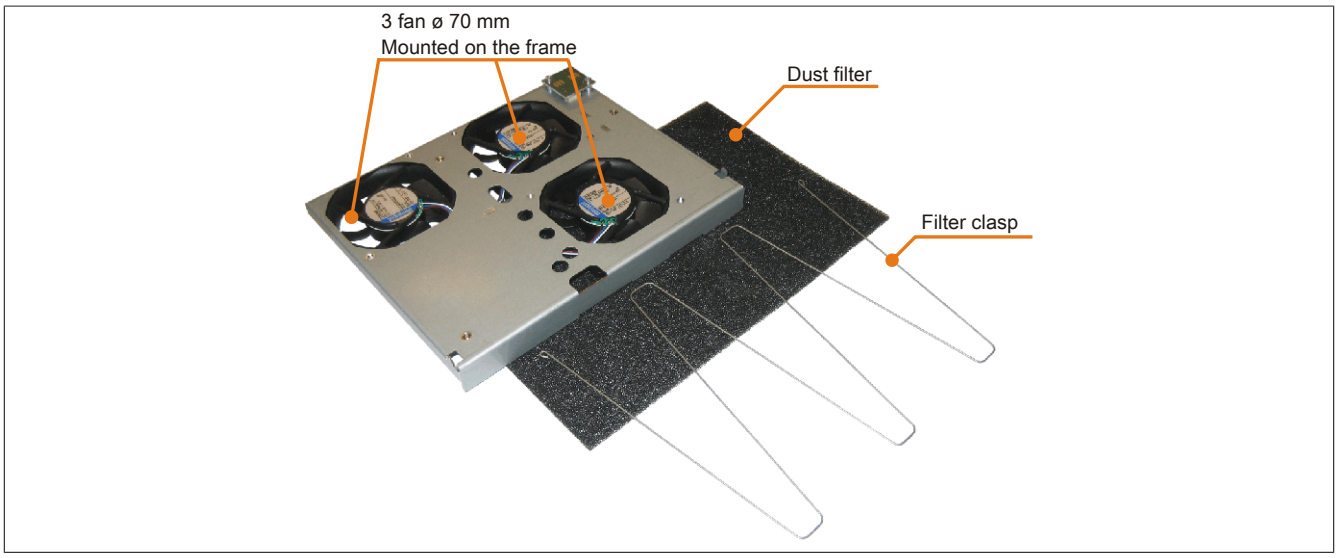


Image 49: 5PC810.FA05-00 - Fan kit

Order data

Model number	Short description	Figure
	Fan kits	
5PC810.FA05-00	APC810 fan kit for system unit 5PC810.SX05-00.	
	Optional accessories	
	Accessories	
5AC801.FA05-00	APC810 replacement fan filter for 5PC810.SX05-00; 5 pcs.	

Table 83: 5PC810.FA05-00 - Order data

Technical data

Product ID	5PC810.FA05-00
General information	
Number of fans	3
Speed	Max. 4300 rpm ±10 %
Noise level	32 dB
Lifespan	60000 hours at 40°C
Type	Double ball bearings
Mechanical characteristics	
Dimensions	
Width	70 mm
Length	70 mm
Height	15 mm

Table 84: 5PC810.FA05-00 - Technical data

For information on installing/exchanging the fan kit, see Chapter 7 "Maintenance / Servicing", Section 6 " Installing / exchanging the fan kit" on page 354.

3.8 AP Link cards

AP Link cards can be installed in the APC810 system units 5PC810.SX02-00, 5PC810.SX03-00 and 5PC810.SX05-00.

3.8.1 5AC801.SDL0-00

General information

A second graphics line can be created using an AP Link graphics adapter card. DVI and SDL signals are available with this. RGB signals are not supported. For details, see technical data for the CPU board being used.

> **Information:**
>
> **Installation of AP Link SDL transmitters is only possible in connection with the system units 5PC810.SX02-00, 5PC810.SX03-00 and 5PC810.SX05-00.**
>
> **You can find information on installing the AP Link SDL transmitter under " AP Link installation" on page 370.**

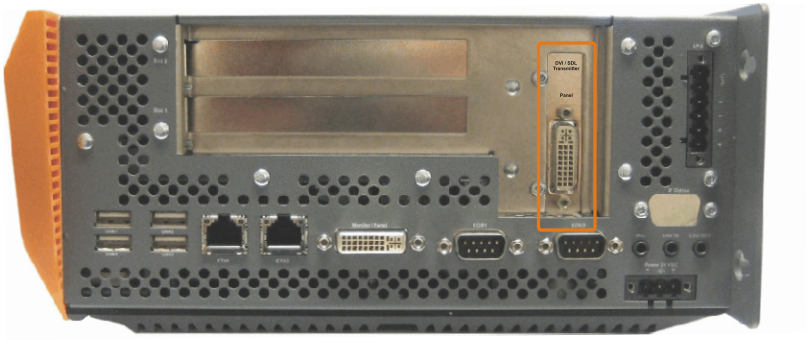


Image 50: 5PC810.SX02-00 - Mounting example with the system unit

Order data

Model number	Short description	Figure
	Automation Panel Link insert cards	
5AC801.SDL0-00	Smart Display Link/DVI-D transmitter	

Table 85: 5AC801.SDL0-00 - Order data

Pin assignments

Pin	Assignment	Pin	Assignment
1	T.M.D.S. Data 2-	16	Hot Plug detect
2	T.M.D.S. Data 2+	17	T.M.D.S. Data 0-
3	T.M.D.S. Data 2/SDL Shield	18	T.M.D.S. Data 0+
4	SDL-	19	T.M.D.S. DATA 0/XUSB1 Shield
5	SDL+	20	XUSB1-
6	DDC clock	21	XUSB1+
7	DDC data	22	T.M.D.S. Clock Shield
8	Analog vertical sync	23	T.M.D.S. Clock +
9	T.M.D.S. Data 1-	24	T.M.D.S. Clock -
10	T.M.D.S. Data 1+	C1	Analog red video out
11	T.M.D.S. DATA 1/XUSB0 shield	C2	Analog green video out
12	XUSB0-	C3	Analog blue video out
13	XUSB0+	C4	Analog horizontal sync
14	+5 V power[1)]	C5	Analog ground (analog R, G and B return)
15	Ground (return for +5 V, HSync and VSync)		

DVI-I 24 pin, female

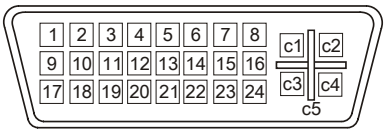


Table 86: Pin assignments - DVI-I connection

1) Protected internally by a multifuse

Cable lengths and resolutions for SDL transfer

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

Cables Segment length	Resolution				
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200
1.8	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	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
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
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	- - -
20	5CASDL.0200-00 5CASDL.0200-30	5CASDL.0200-00 5CASDL.0200-30	5CASDL.0200-00 5CASDL.0200-30	5CASDL.0200-00 5CASDL.0200-30	- -
25	5CASDL.0250-00 5CASDL.0250-30	5CASDL.0250-00 5CASDL.0250-30	5CASDL.0250-00 5CASDL.0250-30	- -	- -
30	5CASDL.0300-00 5CASDL.0300-03	5CASDL.0300-00 5CASDL.0300-03	5CASDL.0300-00 5CASDL.0300-03	5CASDL.0300-00 5CASDL.0300-03	- -
40	5CASDL.0400-13	5CASDL.0400-13	5CASDL.0400-13	5CASDL.0400-13	-

Table 87: Segment lengths, resolutions and SDL cables

3.8.2 5AC801.RDYR-00

General information

Information:

Installation of the ready relay is only possible in connection with the system units 5PC810.SX02-00, 5PC810.SX03-00 and 5PC810.SX05-00.

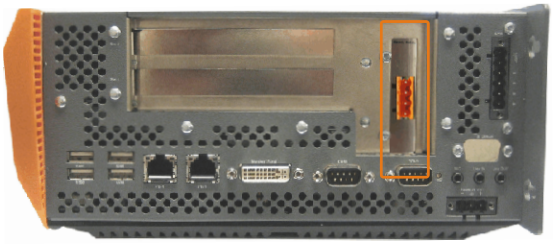


Image 51: Mounting example with the system unit 5PC810.SX02-00

The relay contacts are closed when the APC810 is powered on.

Order data

Model number	Short description	Figure
	Automation Panel Link insert cards	
5AC801.RDYR-00	APC810 Ready relay	

Table 88: 5AC801.RDYR-00 - Order data

Pin assignments

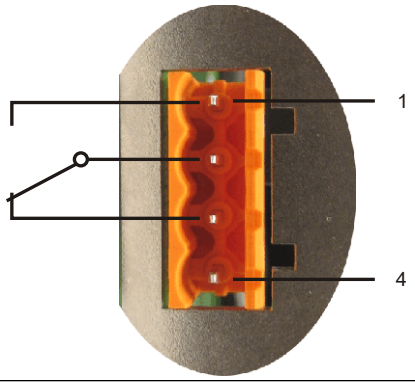
Ready relay pin assignments		
Pin assignments - 4-pin multipoint connector N.O. and N.C., max. 30 VDC, max. 10 A		
Pin	**Assignment**	
1	Normally open	
2	Root	
3	Normally closed	
4	n.c.	
Model number	**Short description**	
	Accessories	
0TB704.90	Terminal block, 4-pin, Screw clamp, 1.5 mm²	
TB704.91	Terminal block, 4-pin, Cage clamps, 2.5 mm²	

Table 89: Pin assignments - Ready relay 5AC801.RDYR-00

3.9 Add-on interfaces (IF option)

3.9.1 General information

An additional interface (CAN or combined RS232/422/485) can be installed in the APC810's IF optional slot.

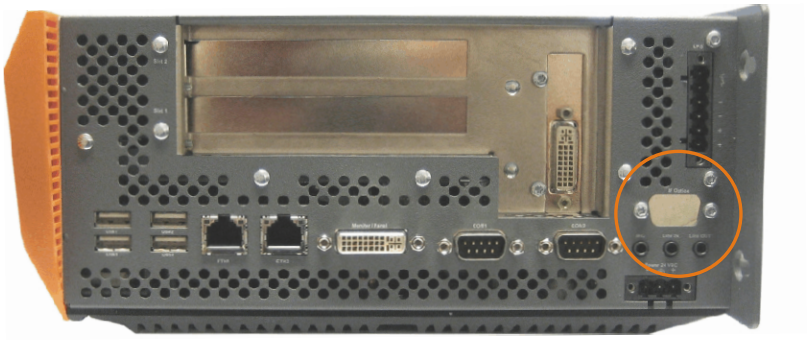


Image 52: Add-on interfaces (IF option)

Information:

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

Information:

Turn off power before adding or removing an add-on interface.

3.9.2 5AC600.CANI-00

General information

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

Order data

Model number	Short description	Figure
	Serial port adapter	
5AC600.CANI-00	CAN interface; for installation in an APC620, APC810 or PPC700.	

Table 90: 5AC600.CANI-00 - Order data

Technical data

Product ID	5AC600.CANI-00
Interfaces	
CAN	
Amount	1
Design	9-pin DSUB plug
Controller	Bosch CC770 (compatible with Intel 82527 CAN controller)
Terminating resistor	
Type	Can be activated and deactivated using a sliding switch
Default setting	Disabled

Table 91: 5AC600.CANI-00 - Technical data

Pin assignments

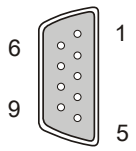
Add-on CAN		
Type	Electrically isolated	9-pin DSUB connector
Transfer rate	Max. 500 kBit/s	
Bus length	Max. 1000 meters	
Pin	**Assignment**	
1	n.c.	
2	CAN low	
3	GND	

Table 92: Pin assignments - CAN

Add-on CAN		
4	n.c.	
5	n.c.	
6	Reserved	
7	CAN high	
8	n.c.	
9	n.c.	

Table 92: Pin assignments - CAN

I/O address and IRQ

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

Table 93: Add-on CAN - I/O Adresse und IRQ

1 NMI = Non Maskable Interrupt.

The IRQ setting can be changed in the BIOS setup. Please note any potential conflicts with other resources when changing this setting.

I/O address	Register	Function
384h	Address register	Defines the register number to access.
385h	Data register	Access to the register defined in the address register.

Bus length and cable type

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

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

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

Table 94: Bus length and transfer rate - CAN

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

CAN cable	Property
Signal lines	
Cable cross section	2x 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 resistance	≤ 59 Ω / km
Outer sheathing	
Item	PUR mixture
Characteristics	Halogen free
Entire shielding	From tinned cu wires

Table 95: CAN cable requirements

Terminating resistor

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

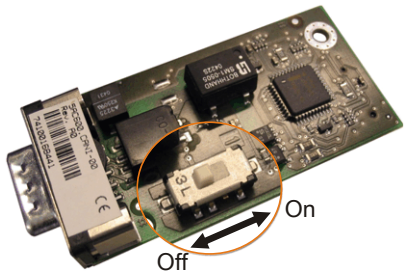


Image 53: 5AC600.CANI-00 - Terminating resistor for add-on CAN interface

Contents of delivery

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

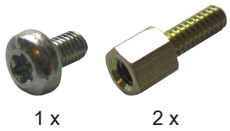


Image 54: 5AC600.CANI-00 - Contents of the delivery / mounting material

Driver support

Because of the Dual Core processors, the INACAN.SYS driver version 2.36, contained in the PVI setup 2.6.0.3105, is required for the operation.

Information:

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

3.9.3 5AC600.485I-00

General information

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

Order data

Model number	Short description	Figure
	Serial port adapter	
5AC600.485I-00	RS232/422/485 interface, for installation in an APC620, APC810 or PPC700.	

Table 96: 5AC600.485I-00 - Order data

Technical data

Product ID	5AC600.485I-00
Interfaces	
COM1	
Type	RS232, modem-capable, not electrically isolated
Design	9-pin DSUB plug
Max. baud rate	115 kbit/s

Table 97: 5AC600.485I-00 - Technical data

Pin assignments

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

9-pin DSUB connector

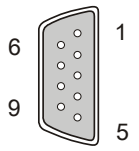


Table 98: Pin assignments - RS232/RS422

I/O address and IRQ

Resource	Default setting	Additional setting options
I/O address	2E8h	238, 2F8, 338, 3E8, 3F8
IRQ	IRQ10	IRQ 3, 4, 5, 7, 11, 12

Table 99: Add-on RS232/422/485 - I/O address and IRQ

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

Bus length and cable type RS232

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

Distance [m]	Transfer rate [kBit/s]
≤ 15	Typ. 64
≤ 10	Typ. 115
≤ 5	Typ. 115

Table 100: RS232 - Bus length and transfer rate

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

RS232 cable	
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	
Item	PUR mixture
Characteristics	Halogen free
Entire shielding	From tinned cu wires

Table 101: RS232 - Cable requirements

Bus length and cable type RS422

The RTS line must be switched on to activate the sender.

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

Distance [m]	Transfer rate [kBit/s]
1200	Typ. 115

Table 102: RS422 - Bus length and transfer rate

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

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 wires
Stranding	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	
Item	PUR mixture
Characteristics	Halogen free
Entire shielding	From tinned cu wires

Table 103: RS422 - Cable requirements

RS485 interface operation

The pins of the RS422 default interface (1, 4, 6 and 9) should be used for operation. The pins should be connected as shown.

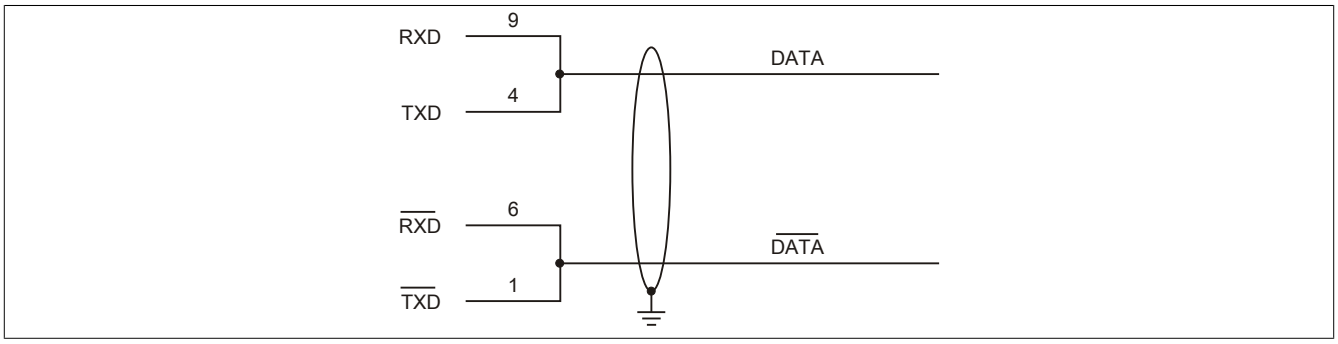


Image 55: Add-on RS232/422/485 interface - Operated in RS485 mode

The RTS line must be switched each time the driver is sent and received; there is no automatic switch back. This cannot be configured in Windows.

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

The line ends of the RS485 interface should (at least for longer line lengths or larger transfer rates) be closed. Normally a passive terminator can be used on the bus ends by connecting each of the signal lines with 120 Ω resistor.

Bus length and cable type RS485

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

Distance [m]	Transfer rate [kBit/s]
1200	Typ. 115

Table 104: RS485 - Bus length and transfer rate

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

RS485 cable	Property
Signal lines	
Cable cross section	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 resistance	≤ 59 Ω / km
Outer sheathing	
Item	PUR mixture
Characteristics	Halogen free
Entire shielding	From tinned cu wires

Table 105: RS422 - Cable requirements

Contents of delivery

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

Image 56: 5AC600.485I-00 - Contents of the delivery / mounting material

Chapter 3 • Commissioning

1 Installation

The devices are installed using the mounting plates found on the housing. The plates are designed for M5 screws.

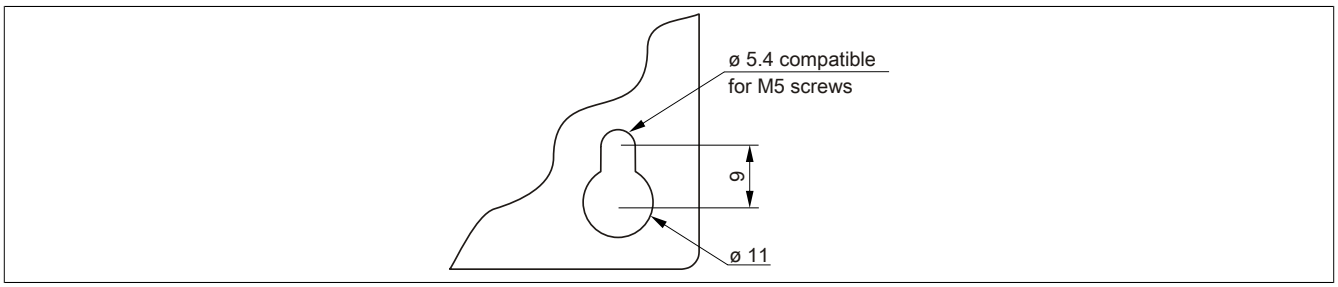


Image 57: Mounting plates

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

1.1 Procedure

1. Drill the necessary holes in the control cabinet. The exact positioning of the mounting holes can be seen in the drilling templates.
2. Mount the B&R Industrial PC to the control cabinet using M5 screws.

1.2 Important mounting information

- The 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.
- The ventilation holes must not be covered.
- This device must be mounted in one of the specified approved orientations.
- Be sure the wall or control cabinet can withstand four times the total weight of the device.
- When connecting cables (DVI, SDL, USB, etc.) do not exceed the flex radius.

1.3 Mounting orientation

The APC810 system must be mounted as described in the following sections.

1.3.1 Mounting orientation - Vertical

APC810 systems with and without fan kit can be mounted this way.

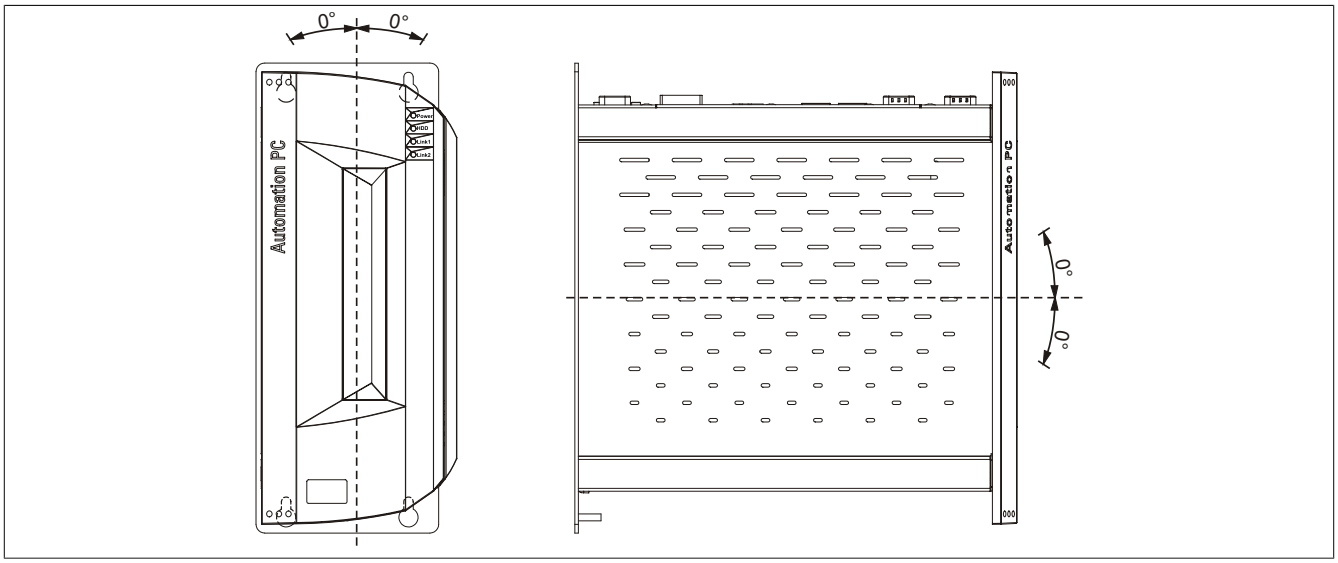


Image 58: Mounting orientation - Vertical

Mount the device so that the spacing is as indicated in section " Air circulation spacing" on page 142 in order to facilitate natural air circulation.

1.3.2 Mounting orientation - Horizontal

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

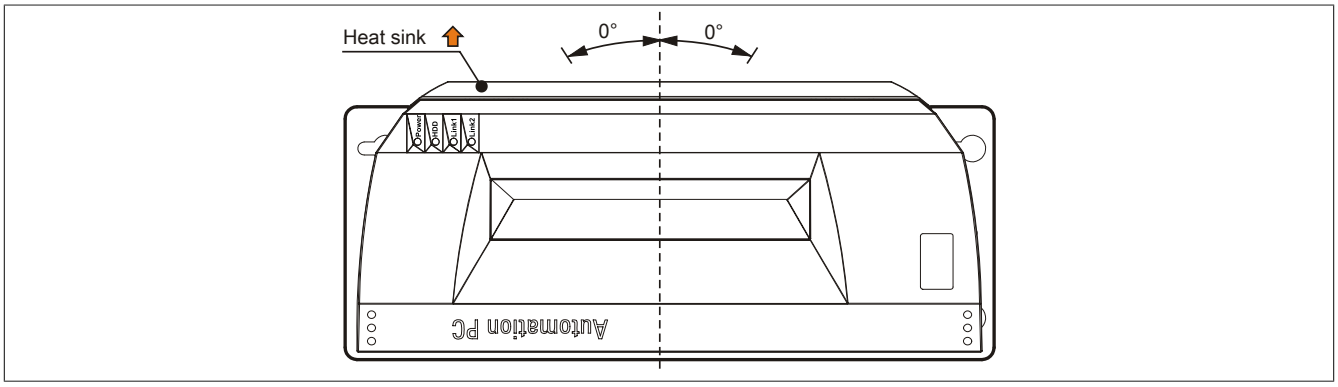


Image 59: Mounting orientation - Horizontal

Mount the device so that the spacing is as indicated in section " Air circulation spacing" on page 142 in order to facilitate natural air circulation.

1.4 Air circulation spacing

In order to ensure sufficient air circulation, allow the specified amount of space above, below, to the sides of and behind the Automation PC 810. The minimum specified spacing is indicated in the following diagrams. This applies for all Automation PC 810 variants.

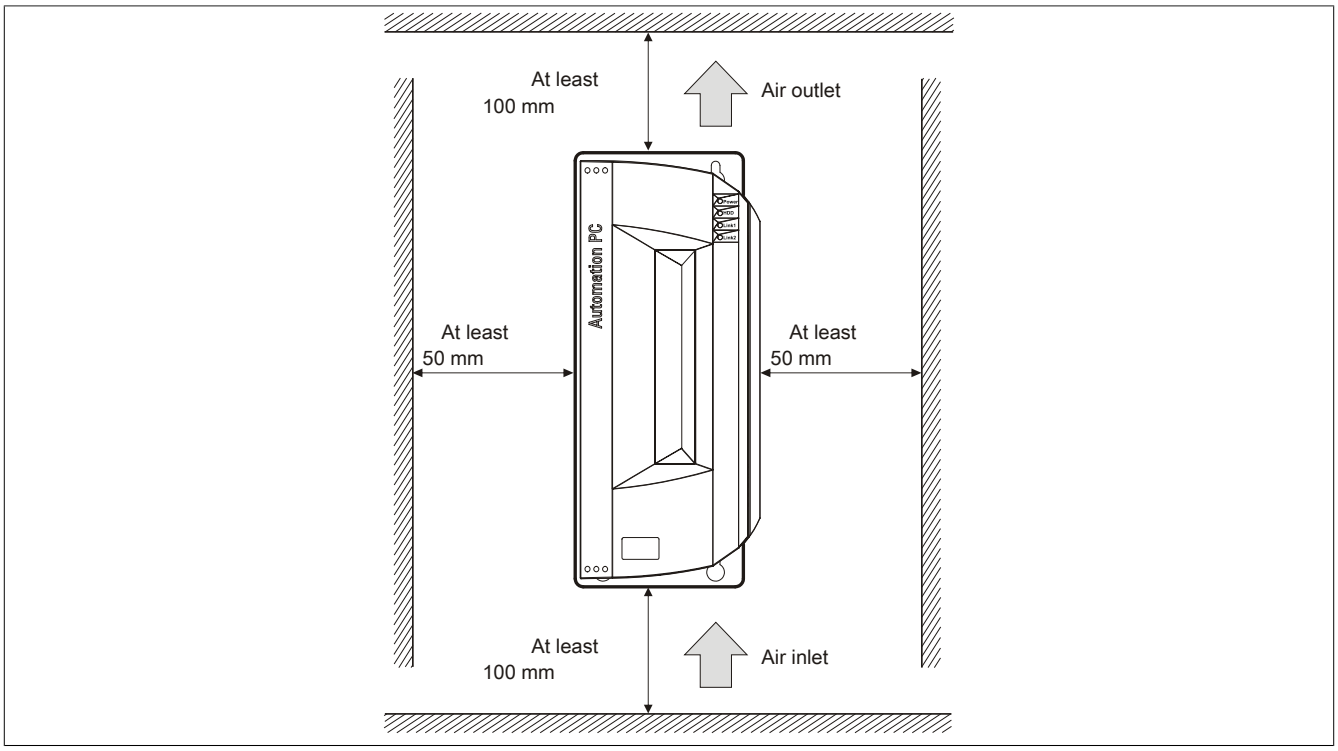


Image 60: Standard mounting - Mounting distances

These defined distances are valid for both vertical and horizontal mounting of the APC810.

2 Cable connections

When making cable connections and installing cables, it is not permitted to have a Flex radius smaller than the minimum value specified.

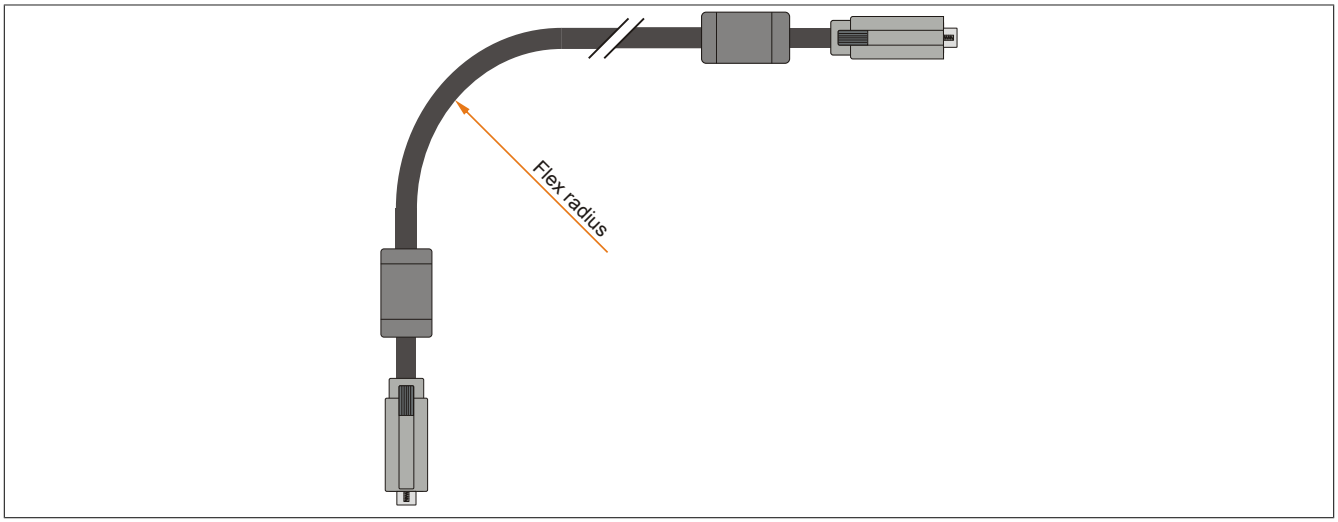


Image 61: Flex radius - Cable connection

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 homepage www.br-automation.com .

3 Grounding concept

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

The functional ground on the device has 2 connections:

- Supply voltage
- Ground connection

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

- The device should be connected to the ground using the shortest route possible.
- Use cable with a minimum cross section of 2.5 mm² per connection.
- Note the line shielding concept, all connected data cables are used as shielded lines.

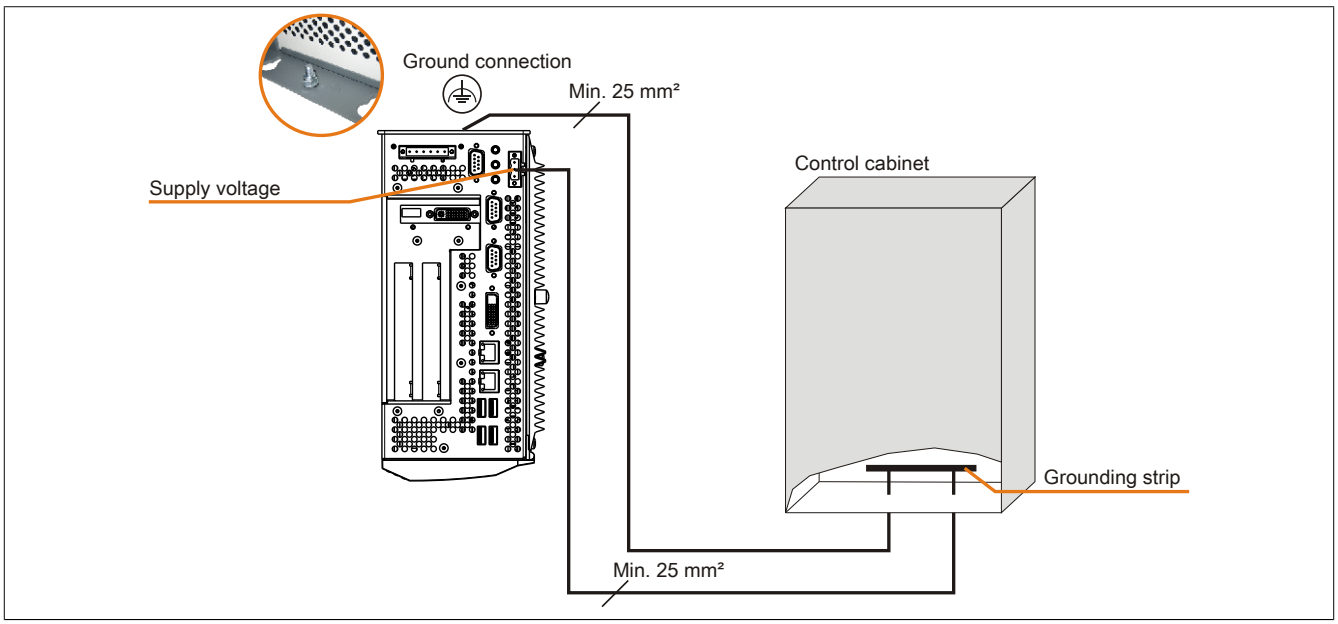


Image 62: Grounding concept

4 Connection examples

The following examples provide an overview of the configuration options for connecting Automation Panel 800 and Automation Panel 900 and/or Automation Panel 800 devices with the APC810. The following questions will be answered:

- How are Automation Panel 900 devices connected to the monitor / panel output of the APC810, and what needs to be considered?
- How are Automation Panel 800 devices connected to the monitor / panel output of the APC810, and what needs to be considered?
- How are Automation Panel 900 devices connected simultaneously to the Monitor / Panel output on the optional SDL AP Link of the APC810 and what needs to be considered?
- What are "Display Clone" and "Extended Desktop" modes?
- How many Automation Panel 900 devices can be connected per line?
- How many Automation Panel 900 devices can be connected to an Automation Panel 800 device per line?
- How are the connected devices internally numbered?
- Are there limitations to the segment length and if so, what are they?
- What cables and link modules are needed?
- Do BIOS settings have to be changed for a specific configuration?

4.1 Selecting the display units

If an Automation Panel 800 and an Automation Panel 900 should be connected on the same line, the devices must have the same display type. The following table lists the AP900 devices that can be connected on the same line with an AP800 device.

Automation Panel 800	Automation Panel 900
5AP820.1505-00	5AP920.1505-01 5AP951.1505-01 5AP980.1505-01 5AP981.1505-01
5AP880.1505-00	5AP920.1505-01 5AP951.1505-01 5AP980.1505-01 5AP981.1505-01

Table 106: Selecting the display units

4.2 One Automation Panel 900 via onboard DVI

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

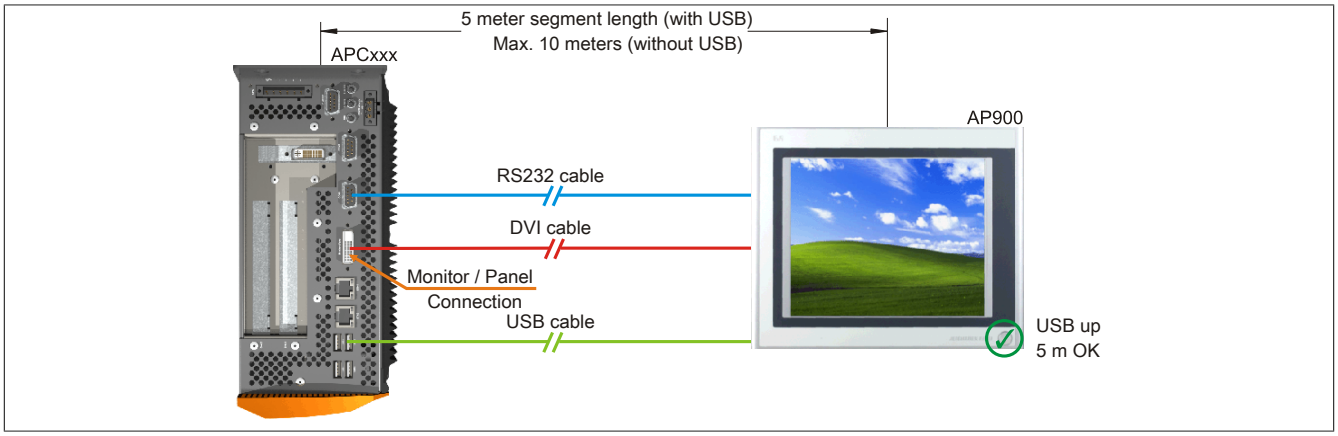


Image 63: One Automation Panel 900 via onboard DVI (sample photo)

4.2.1 Basic system requirements

The following table displays the possible combinations for the APC810 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in the following table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit				Limitations Resolution
	5PC810.SX01-00	5PC810.SX02-00	5PC810.SX03-00	5PC810.SX05-00	
5PC800.BM45-00	✓	✓	✓	✓	Max. SXGA
5PC800.BM45-01	✓	✓	✓	✓	Max. SXGA

Table 107: Possible combinations of system unit and CPU board

4.2.2 Link modules

Information:

A corresponding link module must be selected for every device used.

Model number	Description	Note
5DLDVI.1000-01	**Automation Panel Link DVI Receiver** connections for DVI-D, RS232 and USB 2.0 (Type B); 24VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900

Table 108: Link modules

4.2.3 Cables

Select one Automation Panel 900 cable each from the 3 required types.

Order number	Description	Length
5CADVI.0018-00	DVI-D Cable, 1.8 m.	1.8 m ±50 mm
5CADVI.0050-00	DVI-D Cable, 5 m.	5 m ±80 mm
5CADVI.0100-00	DVI-D Cable, 10 m.	10 m ±100 mm
9A0014.02	RS232 extension cable for remote operating of a display unit with touch screen, 1.8 m.	1.8 m ±50 mm
9A0014.05	RS232 extension cable for remote operating of a display unit with touch screen, 5 m.	5 m ±80 mm
9A0014.10	RS232 extension cable for remote operating of a display unit with touch screen, 10 m.	10 m ±100 mm
5CAUSB.0018-00	USB 2.0 connecting cable type A - type B, 1.8 m.	1.8 m ±30 mm
5CAUSB.0050-00	USB 2.0 connecting cable type A - type B, 5 m.	5 m ±50 mm

Table 109: Cables for DVI configurations

Information:

Detailed technical data about the cables can be found in the Automation Panel 900 User's Manual. This can be downloaded as a .pdf file from the B&R homepage www.br-automation.com .

4.2.4 Possible Automation Panel units, resolutions und segment lengths

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

Model number	Diagonal	Resolution	Touch screen	Keys	Max. segment length
5AP920.1043-01	10.4"	VGA	✓	-	5 m / 10 m[1]
5AP920.1214-01	12.1"	SVGA	✓	-	5 m / 10 m[1]
5AP920.1505-01	15.0"	XGA	✓	-	5 m / 10 m[1]
5AP920.1706-01	17.0"	SXGA	✓	-	5 m / 10 m[1]
5AP920.1906-01	19.0"	SXGA	✓	-	5 m / 10 m[1]

Table 110: Possible Automation Panel units, resolutions und segment lengths

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

Information:

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

4.2.5 BIOS settings

No special BIOS settings are necessary for operation.

4.3 One Automation Panel 900 via onboard SDL

An Automation Panel 900 is connected to the integrated SDL interface (onboard) via an SDL cable. USB devices can only be connected directly to the Automation Panel (without a hub).

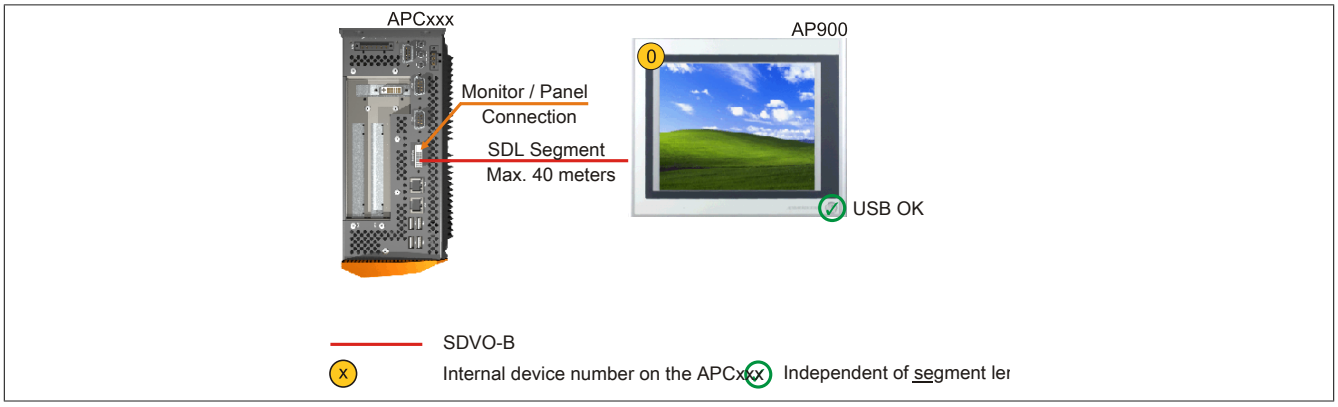


Image 64: One Automation Panel 900 via onboard SDL (sample photo)

4.3.1 Basic system requirements

The following table displays the possible combinations for the APC810 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in the following table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit				Limitations Resolution
	5PC810.SX01-00	5PC810.SX02-00	5PC810.SX03-00	5PC810.SX05-00	
5PC800.BM45-00	✓	✓	✓	✓	Max. UXGA
5PC800.BM45-01	✓	✓	✓	✓	Max. UXGA

Table 111: Possible combinations of system unit and CPU board

4.3.2 Link modules

Information:

A corresponding link module must be selected for every device used.

Model number	Description	Note
5DLSDL.1000-00	**Automation Panel Link SDL receiver** Connection for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900

Table 112: Link modules

4.3.3 Cables

Select an Automation Panel 900 cable from the following table.

Order number	Description	Length
5CASDL.0018-00	SDL cable, 1.8 m.	1.8 m ±30 mm
5CASDL.0050-00	SDL cable, 5 m.	5 m ±30 mm
5CASDL.0100-00	SDL cable, 10 m.	10 m ±50 mm
5CASDL.0150-00	SDL cable, 15 m.	15 m ±100 mm
5CASDL.0200-00	SDL cable, 20 m.	20 m ±100 mm
5CASDL.0250-00	SDL cable, 25 m.	25 m ±100 mm
5CASDL.0300-00	SDL cable, 30 m.	30 m ±100 mm
5CASDL.0018-03	SDL flex cable, 1.8 m.	1.8 m ±20 mm
5CASDL.0050-03	SDL flex cable, 5 m.	5 m ±45 mm
5CASDL.0100-03	SDL flex cable, 10 m.	10 m ±90 mm
5CASDL.0150-03	SDL flex cable, 15 m.	15 m ±135 mm
5CASDL.0200-03	SDL flex cable, 20 m.	20 m ±180 mm
5CASDL.0250-03	SDL flex cable, 25 m.	25 m ±225 mm
5CASDL.0300-03	SDL flex cable, 30 m.	30 m ±270 mm
5CASDL.0300-13	SDL cable with extender, 30 m.	30 m ±280 mm
5CASDL.0400-13	SDL flex cable with extender, 40 m.	40 m ±380 mm
5CASDL.0430-13	SDL flex cable with extender, 43 m.	43 m ±410 mm
5CASDL.0018-01	SDL cable; 45° connector, 1.8 m.	1,8 m ±30 mm
5CASDL.0050-01	SDL cable; 45° connector, 5 m.	5 m ±50 mm
5CASDL.0100-01	SDL cable; 45° connector, 10 m.	10 m ±100 mm
5CASDL.0150-01	SDL cable; 45° connector, 15 m.	15 m ±100 mm

Table 113: Cables for SDL configurations

Information:

Detailed technical data about the cables can be found in the Automation Panel 900 User's Manual. This can be downloaded as a .pdf file from the B&R homepage www.br-automation.com .

Cable lengths and resolutions for SDL transfer

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

Cables Segment length [m]	Resolution				
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200
1.8	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	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
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
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	- - -
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	- -
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	- -
40	5CASDL.0400-13	5CASDL.0400-13	5CASDL.0400-13	5CASDL.0400-13	-

Table 114: Cable lengths and resolutions for SDL transfer

4.3.4 BIOS settings

No special BIOS settings are necessary for operation.

For detailed information, see the user's manual for the B&R industrial PC used.

Touch screen functionality

The COM C must be enabled in BIOS in order to operate the connected panel touch screen on the monitor / panel connection (found in the BIOS menu under "Advanced - Main board / Panel Features - Legacy Devices").

4.4 One Automation Panel 800 via onboard SDL

An Automation Panel 800 is connected to the integrated SDL interface (onboard) via an SDL cable. USB devices can only be connected directly to the extension keyboard (without a hub).

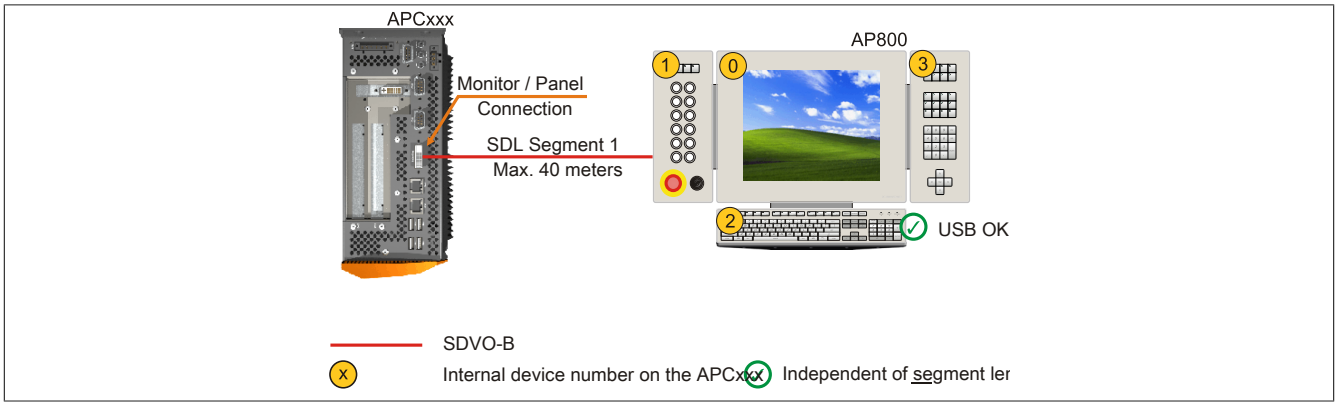


Image 65: One Automation Panel 800 via onboard SDL (sample photo)

4.4.1 Basic system requirements

The following table displays the possible combinations for the APC810 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in the following table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit				Limitations Resolution
	5PC810.SX01-00	5PC810.SX02-00	5PC810.SX03-00	5PC810.SX05-00	
5PC800.BM45-00	✓	✓	✓	✓	Max. UXGA
5PC800.BM45-01	✓	✓	✓	✓	Max. UXGA

Table 115: Possible combinations of system unit and CPU board

4.4.2 Cables

Select an Automation Panel 800 SDL cable from the following table.

Order number	Description	Length
5CASDL.0018-20	SDL flex cable for Automation Panel 800, 1.8 m.	1,8 m ±20 mm
5CASDL.0050-20	SDL flex cable for Automation Panel 800, 5 m.	5 m ±45 mm
5CASDL.0100-20	SDL flex cable for Automation Panel 800, 10 m.	10 m ±90 mm
5CASDL.0150-20	SDL flex cable for Automation Panel 800, 15 m.	15 m ±135 mm
5CASDL.0200-20	SDL flex cable for Automation Panel 800, 20 m.	20 m ±180 mm
5CASDL.0250-20	SDL flex cable for Automation Panel 800, 25 m.	25 m ±230 mm
5CASDL.0300-30	SDL flex cable for Automation Panel 800 with extender, 30 m.	30 m ±280 mm
5CASDL.0400-30	SDL flex cable for Automation Panel 800 with extender, 40 m.	40 m ±380 mm

Information:

Detailed technical data about the cables can be found in the Automation Panel 800 User's Manual. This can be downloaded as a .pdf file from the B&R homepage www.br-automation.com .

Cable lengths and resolutions for SDL transfer

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

Cables Segment length [m]	Resolution XGA 1024 x 768
1.8	5CASDL.0018-20
5	5CASDL.0050-20
10	5CASDL.0100-20
15	5CASDL.0150-20
20	5CASDL.0200-20
25	5CASDL.0250-20
30	5CASDL.0300-30
40	5CASDL.0400-30

Table 116: Cable lengths and resolutions for SDL transfer

4.4.3 BIOS settings

No special BIOS settings are necessary for operation.

For detailed information, see the user's manual for the B&R industrial PC used.

Touch screen functionality

The COM C must be enabled in BIOS in order to operate the connected panel touch screen on the monitor / panel connection (found in the BIOS menu under "Advanced - Main board / Panel Features - Legacy Devices").

4.5 One AP900 and one AP800 via onboard SDL

An Automation Panel 900 and an Automation Panel 800 are connected to the integrated SDL interface (onboard) via SDL.

USB is supported up to a maximum distance (segment 1 + segment 2) of 30 m on the two displays. Starting at a distance of 30 m, USB is only available on the first display (front and back) up to a maximum of 40 m. USB devices can only be connected directly to the Automation Panel 900 or extension keyboard (without a hub).

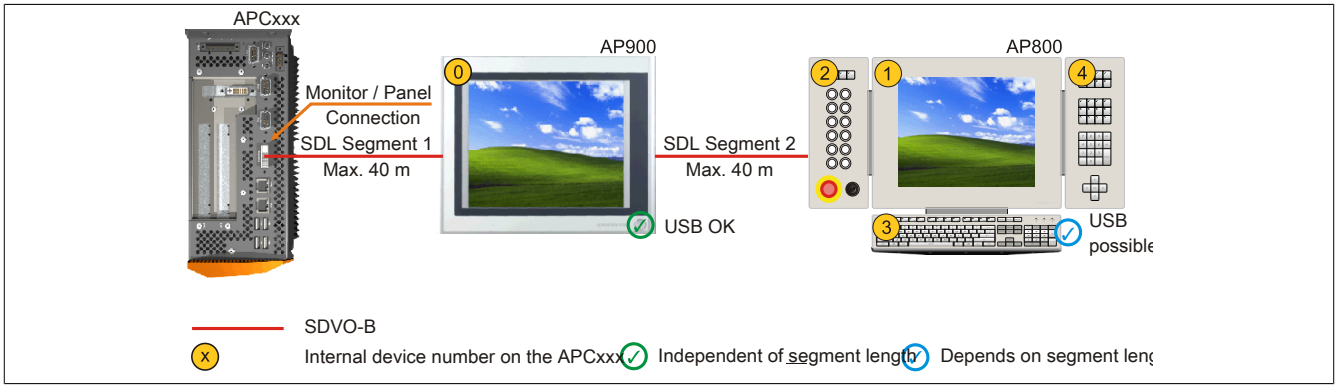


Image 66: One AP900 and one AP800 via onboard SDL (sample photo)

4.5.1 Basic system requirements

The following table displays the possible combinations for the APC810 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in the following table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit				Limitations Resolution
	5PC810.SX01-00	5PC810.SX02-00	5PC810.SX03-00	5PC810.SX05-00	
5PC800.BM45-00	✓	✓	✓	✓	Max. UXGA
5PC800.BM45-01	✓	✓	✓	✓	Max. UXGA

Table 117: Possible combinations of system unit and CPU board

4.5.2 Link modules

Information:

A corresponding link module must be selected for every device used.

Model number	Description	Note
5DLDVI.1000-01	**Automation Panel Link SDL transceiver** Connections for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900

Table 118: Link modules

4.5.3 Cables

Selection of SDL cables for connecting the AP900 display to the AP900 display see "Cables" on page 150

Selection of SDL cables for connecting the AP800 display to the AP900 display see "Cables" on page 153.

Information:

Detailed technical data about the cables can be found in chapter " Accessories".

4.5.4 BIOS settings

No special BIOS settings are necessary for operation.

For detailed information, see the user's manual for the B&R industrial PC used.

Touch screen functionality

The COM C must be enabled in BIOS in order to operate the connected panel touch screen on the monitor / panel connection (found in the BIOS menu under "Advanced - Main board / Panel Features - Legacy Devices").

4.6 Four Automation Panel 900 units via onboard SDL

An Automation Panel 900 is connected to the integrated SDL interface (onboard) via an SDL cable. Up to three other Automation Panels of the same type are connected to this Automation Panel and operated via SDL. All four panels show the same content (Display Clone).

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

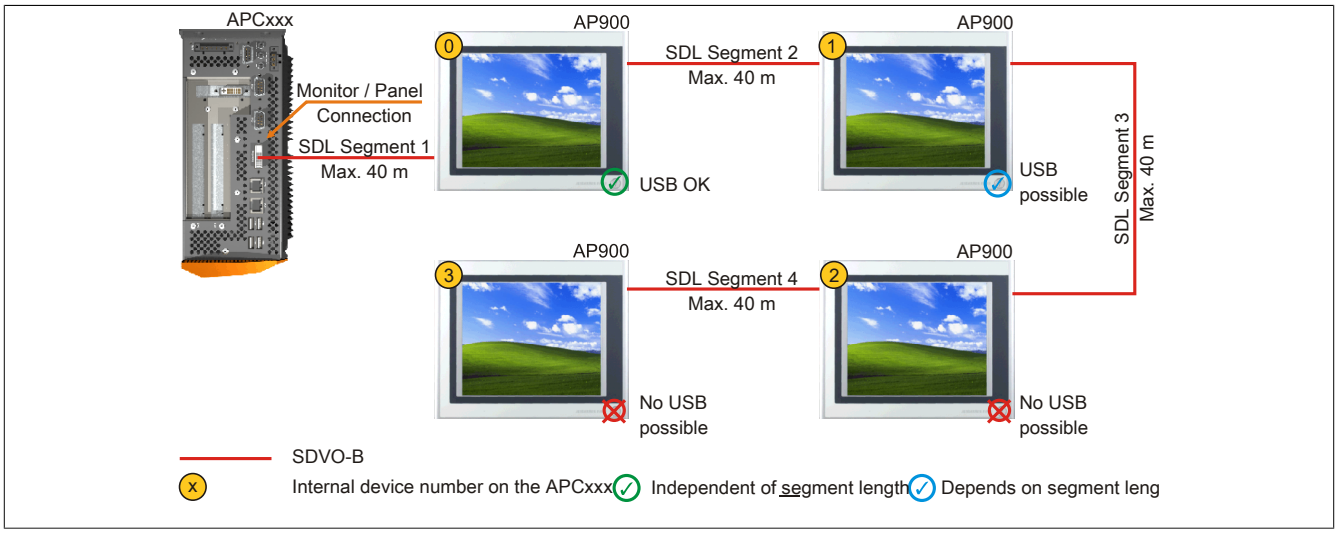


Image 67: Four Automation Panel 900 units via onboard SDL (sample photo)

4.6.1 Basic system requirements

The following table displays the possible combinations for the APC810 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in the following table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit				Limitations Resolution
	5PC810.SX01-00	5PC810.SX02-00	5PC810.SX03-00	5PC810.SX05-00	
5PC800.BM45-00	✓	✓	✓	✓	Max. UXGA
5PC800.BM45-01	✓	✓	✓	✓	Max. UXGA

Table 119: Possible combinations of system unit and CPU board

4.6.2 Link modules

Information:

A corresponding link module must be selected for every device used.

Model number	Description	Note
5DLDVI.1000-00	**Automation Panel Link SDL receiver** Connection for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900
5DLSDL.1000-01	**Automation Panel Link SDL transceiver** Connections for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900

Table 120: Link modules

4.6.3 Cables

Select an Automation Panel 900 cable from the following table.

Order number	Description	Length
5CASDL.0018-00	SDL cable, 1.8 m.	1.8 m ±30 mm
5CASDL.0050-00	SDL cable, 5 m.	5 m ±30 mm
5CASDL.0100-00	SDL cable, 10 m.	10 m ±50 mm
5CASDL.0150-00	SDL cable, 15 m.	15 m ±100 mm
5CASDL.0200-00	SDL cable, 20 m.	20 m ±100 mm
5CASDL.0250-00	SDL cable, 25 m.	25 m ±100 mm
5CASDL.0300-00	SDL cable, 30 m.	30 m ±100 mm
5CASDL.0018-03	SDL flex cable, 1.8 m.	1.8 m ±20 mm
5CASDL.0050-03	SDL flex cable, 5 m.	5 m ±45 mm
5CASDL.0100-03	SDL flex cable, 10 m.	10 m ±90 mm
5CASDL.0150-03	SDL flex cable, 15 m.	15 m ±135 mm
5CASDL.0200-03	SDL flex cable, 20 m.	20 m ±180 mm
5CASDL.0250-03	SDL flex cable, 25 m.	25 m ±225 mm
5CASDL.0300-03	SDL flex cable, 30 m.	30 m ±270 mm
5CASDL.0300-13	SDL cable with extender, 30 m.	30 m ±280 mm
5CASDL.0400-13	SDL flex cable with extender, 40 m.	40 m ±380 mm
5CASDL.0430-13	SDL flex cable with extender, 43 m.	43 m ±410 mm
5CASDL.0018-01	SDL cable; 45° connector, 1.8 m.	1,8 m ±30 mm
5CASDL.0050-01	SDL cable; 45° connector, 5 m.	5 m ±50 mm
5CASDL.0100-01	SDL cable; 45° connector, 10 m.	10 m ±100 mm
5CASDL.0150-01	SDL cable; 45° connector, 15 m.	15 m ±100 mm

Table 121: Cables for SDL configurations

Information:

Detailed technical data about the cables can be found in the Automation Panel 900 User's Manual. This can be downloaded as a .pdf file from the B&R homepage www.br-automation.com .

Cable lengths and resolutions for SDL transfer

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

Cables Segment length [m]	Resolution				
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200
1.8	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	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
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
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	- - -
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	- -

Table 122: Cable lengths and resolutions for SDL transfer

Cables Segment length [m]	Resolution				
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200
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	- -
40	5CASDL.0400-13	5CASDL.0400-13	5CASDL.0400-13	5CASDL.0400-13	-

Table 122: Cable lengths and resolutions for SDL transfer

4.6.4 BIOS settings

No special BIOS settings are necessary for operation.

For detailed information, see the user's manual for the B&R industrial PC used.

Touch screen functionality

The COM C must be enabled in BIOS in order to operate the connected panel touch screen on the monitor / panel connection (found in the BIOS menu under "Advanced - Main board / Panel Features - Legacy Devices").

4.7 One Automation Panel 900 via SDL AP Link

An Automation Panel 900 unit is connected to the optional SDL transmitter (AP Link) via an SDL cable. USB devices can only be connected directly to the Automation Panel (without a hub).

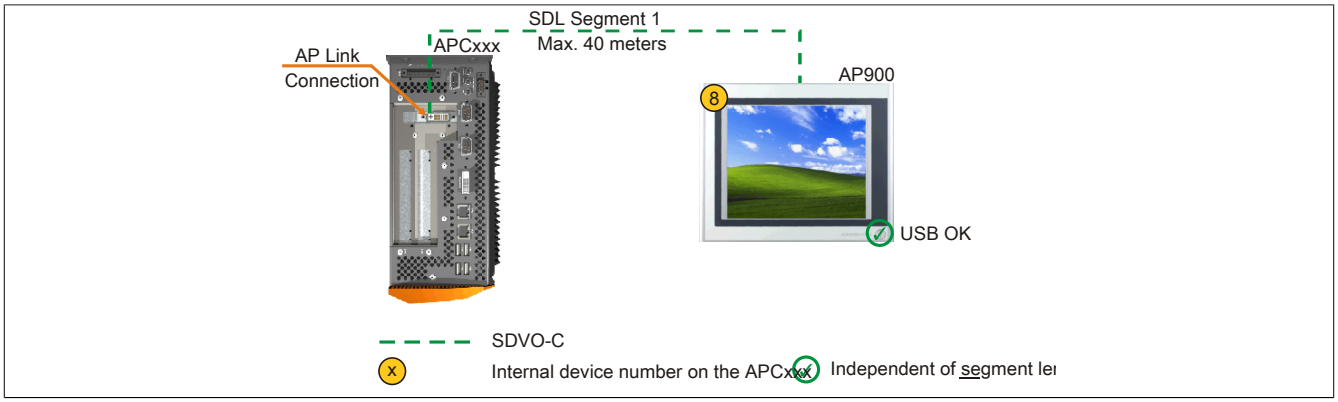


Image 68: One Automation Panel 900 via SDL AP Link (sample photo)

4.7.1 Basic system requirements

The following table displays the possible combinations for the APC810 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in the following table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit	Limitations Resolution			
	5PC810.SX01-00[1]		5PC810.SX02-00	5PC810.SX03-00	5PC810.SX05-00
5PC800.BM45-00	-	✓	✓	✓	Max. UXGA
5PC800.BM45-01	-	✓	✓	✓	Max. UXGA

Table 123: Possible combinations of system unit and CPU board

1) AP Link cannot be installed.

4.7.2 Link modules

Information:

A corresponding link module must be selected for every device used.

Model number	Description	Note
5DLSDL.1000-00	**Automation Panel Link SDL receiver** Connection for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900
5AC801.SDL0-00	**APC810 AP Link SDL transmitter** Automation Panel SDL link transmitter	For Automation PC 810

Table 124: Link modules

4.7.3 Cables

Select an Automation Panel 900 cable from the following table.

Order number	Description	Length
5CASDL.0018-00	SDL cable, 1.8 m.	1.8 m ±30 mm
5CASDL.0050-00	SDL cable, 5 m.	5 m ±30 mm
5CASDL.0100-00	SDL cable, 10 m.	10 m ±50 mm
5CASDL.0150-00	SDL cable, 15 m.	15 m ±100 mm
5CASDL.0200-00	SDL cable, 20 m.	20 m ±100 mm
5CASDL.0250-00	SDL cable, 25 m.	25 m ±100 mm
5CASDL.0300-00	SDL cable, 30 m.	30 m ±100 mm
5CASDL.0018-03	SDL flex cable, 1.8 m.	1.8 m ±20 mm
5CASDL.0050-03	SDL flex cable, 5 m.	5 m ±45 mm
5CASDL.0100-03	SDL flex cable, 10 m.	10 m ±90 mm
5CASDL.0150-03	SDL flex cable, 15 m.	15 m ±135 mm
5CASDL.0200-03	SDL flex cable, 20 m.	20 m ±180 mm
5CASDL.0250-03	SDL flex cable, 25 m.	25 m ±225 mm
5CASDL.0300-03	SDL flex cable, 30 m.	30 m ±270 mm
5CASDL.0300-13	SDL cable with extender, 30 m.	30 m ±280 mm
5CASDL.0400-13	SDL flex cable with extender, 40 m.	40 m ±380 mm

Table 125: Cables for SDL configurations

Order number	Description	Length
5CASDL.0430-13	SDL flex cable with extender, 43 m.	43 m ±410 mm
5CASDL.0018-01	SDL cable; 45° connector, 1.8 m.	1,8 m ±30 mm
5CASDL.0050-01	SDL cable; 45° connector, 5 m.	5 m ±50 mm
5CASDL.0100-01	SDL cable; 45° connector, 10 m.	10 m ±100 mm
5CASDL.0150-01	SDL cable; 45° connector, 15 m.	15 m ±100 mm

Table 125: Cables for SDL configurations

Information:

Detailed technical data about the cables can be found in the Automation Panel 900 User's Manual. This can be downloaded as a .pdf file from the B&R homepage www.br-automation.com .

Cable lengths and resolutions for SDL transfer

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

Cables Segment length [m]	Resolution				
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200
1.8	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	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
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
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	- - -
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	- -
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	- -
40	5CASDL.0400-13	5CASDL.0400-13	5CASDL.0400-13	5CASDL.0400-13	-

Table 126: Cable lengths and resolutions for SDL transfer

4.7.4 BIOS settings

No special BIOS settings are necessary for operation.

For detailed information, see the user's manual for the B&R industrial PC used.

Touch screen functionality

The COM D must be enabled in BIOS in order to operate the connected panel touch screen on the AP Link connection (found in the BIOS menu under "Advanced - Main board / Panel Features - Legacy Devices").

4.8 Four Automation Panel 900 units via SDL AP Link

An Automation Panel 900 unit is connected to the optional SDL transmitter (AP Link) via an SDL cable. Three other Automation Panels of the same type are connected to this Automation Panel and operated via SDL. All four panels show the same content (Display Clone).

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

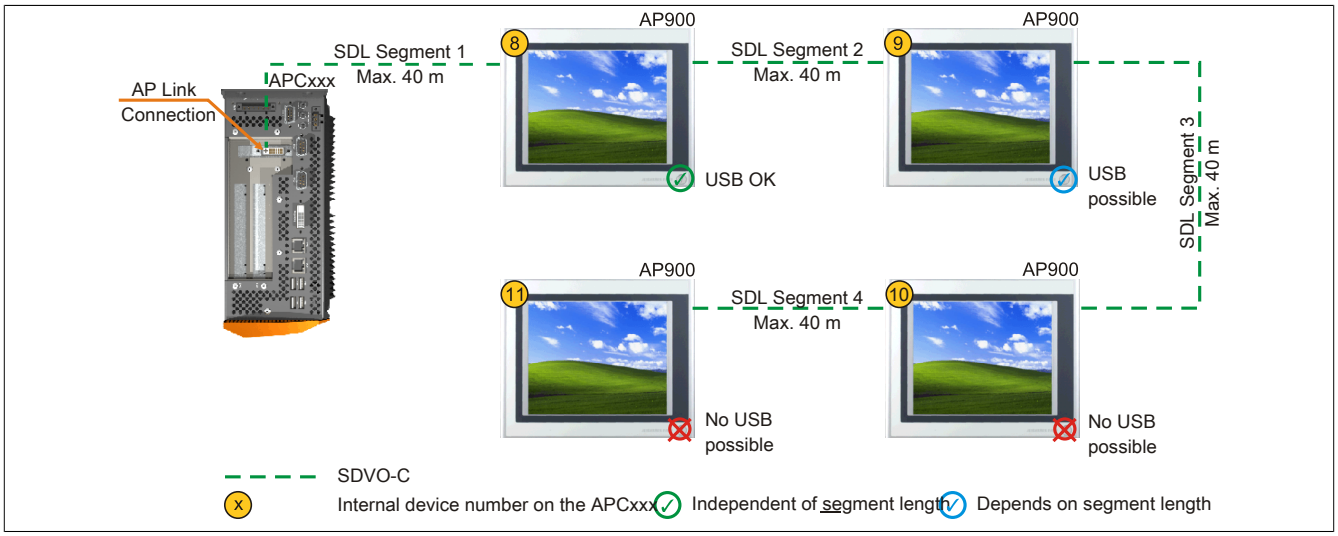


Image 69: Four Automation Panel 900 units via SDL AP Link (sample photo)

4.8.1 Basic system requirements

The following table displays the possible combinations for the APC810 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in the following table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit	Limitations Resolution			
	5PC810.SX01-00[1]		5PC810.SX02-00	5PC810.SX03-00	5PC810.SX05-00
5PC800.BM45-00	-	✓	✓	✓	Max. UXGA
5PC800.BM45-01	-	✓	✓	✓	Max. UXGA

Table 127: Possible combinations of system unit and CPU board

1) AP Link cannot be installed.

4.8.2 Link modules

Information:

A corresponding link module must be selected for every device used.

Model number	Description	Note
5DLSDL.1000-00	**Automation Panel Link SDL receiver** Connection for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900
5DLSDL.1000-01	**Automation Panel Link SDL transceiver** Connections for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900
5AC801.SDL0-00	**APC810 AP Link SDL transmitter** Automation Panel SDL link transmitter	For Automation PC 810

Table 128: Link modules

4.8.3 Cables

Select an Automation Panel 900 cable from the following table.

Order number	Description	Length
5CASDL.0018-00	SDL cable, 1.8 m.	1.8 m ±30 mm
5CASDL.0050-00	SDL cable, 5 m.	5 m ±30 mm
5CASDL.0100-00	SDL cable, 10 m.	10 m ±50 mm
5CASDL.0150-00	SDL cable, 15 m.	15 m ±100 mm
5CASDL.0200-00	SDL cable, 20 m.	20 m ±100 mm
5CASDL.0250-00	SDL cable, 25 m.	25 m ±100 mm
5CASDL.0300-00	SDL cable, 30 m.	30 m ±100 mm
5CASDL.0018-03	SDL flex cable, 1.8 m.	1.8 m ±20 mm
5CASDL.0050-03	SDL flex cable, 5 m.	5 m ±45 mm
5CASDL.0100-03	SDL flex cable, 10 m.	10 m ±90 mm
5CASDL.0150-03	SDL flex cable, 15 m.	15 m ±135 mm
5CASDL.0200-03	SDL flex cable, 20 m.	20 m ±180 mm
5CASDL.0250-03	SDL flex cable, 25 m.	25 m ±225 mm
5CASDL.0300-03	SDL flex cable, 30 m.	30 m ±270 mm
5CASDL.0300-13	SDL cable with extender, 30 m.	30 m ±280 mm
5CASDL.0400-13	SDL flex cable with extender, 40 m.	40 m ±380 mm
5CASDL.0430-13	SDL flex cable with extender, 43 m.	43 m ±410 mm
5CASDL.0018-01	SDL cable; 45° connector, 1.8 m.	1,8 m ±30 mm
5CASDL.0050-01	SDL cable; 45° connector, 5 m.	5 m ±50 mm
5CASDL.0100-01	SDL cable; 45° connector, 10 m.	10 m ±100 mm
5CASDL.0150-01	SDL cable; 45° connector, 15 m.	15 m ±100 mm

Table 129: Cables for SDL configurations

Information:

Detailed technical data about the cables can be found in the Automation Panel 900 User's Manual. This can be downloaded as a .pdf file from the B&R homepage www.br-automation.com .

Cable lengths and resolutions for SDL transfer

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

Cables Segment length [m]	Resolution				
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200
1.8	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	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
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
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	- - -
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	- -

Table 130: Cable lengths and resolutions for SDL transfer

Cables Segment length [m]	Resolution				
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200
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	- -
40	5CASDL.0400-13	5CASDL.0400-13	5CASDL.0400-13	5CASDL.0400-13	-

Table 130: Cable lengths and resolutions for SDL transfer

4.8.4 BIOS settings

No special BIOS settings are necessary for operation.

For detailed information, see the user's manual for the B&R industrial PC used.

Touch screen functionality

The COM D must be enabled in BIOS in order to operate the connected panel touch screen on the AP Link connection (found in the BIOS menu under "Advanced - Main board / Panel Features - Legacy Devices").

4.9 Two Automation Panel 900 units via onboard SDL and SDL AP Link

An Automation Panel 900 (max. UXGA) is connected to the integrated SDL interface (onboard) via an SDL cable. A second Automation Panel 900 (max. UXGA) is connected to the optional SDL transmitter (AP Link) via an SDL cable. The Automation Panels show different content (Extended Desktop) and can be different types.

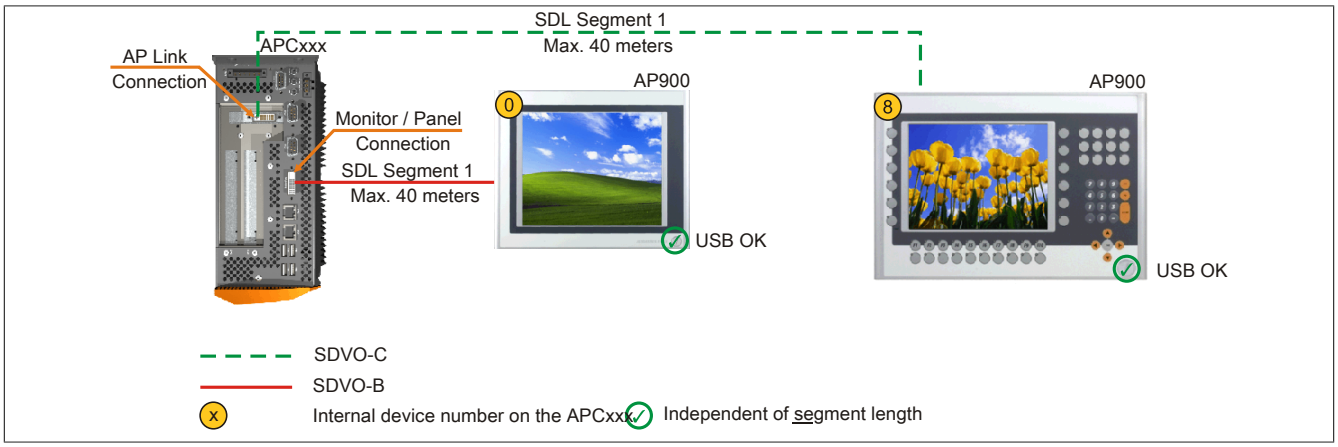


Image 70: Two Automation Panel 900 units via onboard SDL and SDL AP Link (sample photo)

4.9.1 Basic system requirements

The following table displays the possible combinations for the APC810 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in the following table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit	Limitations Resolution			
	5PC810.SX01-00[1]		5PC810.SX02-00	5PC810.SX03-00	5PC810.SX05-00
5PC800.BM45-00	-	✓	✓	✓	Max. UXGA
5PC800.BM45-01	-	✓	✓	✓	Max. UXGA

Table 131: Possible combinations of system unit and CPU board

1) AP Link cannot be installed.

4.9.2 Link modules

Information:

A corresponding link module must be selected for every device used.

Model number	Description	Note
5DLSDL.1000-00	**Automation Panel Link SDL receiver** Connection for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900
5AC801.SDL0-00	**APC810 AP Link SDL transmitter** Automation Panel SDL link transmitter	For Automation PC 810

Table 132: Link modules

4.9.3 Cables

Select an Automation Panel 900 cable from the following table.

Order number	Description	Length
5CASDL.0018-00	SDL cable, 1.8 m.	1.8 m ±30 mm
5CASDL.0050-00	SDL cable, 5 m.	5 m ±30 mm
5CASDL.0100-00	SDL cable, 10 m.	10 m ±50 mm
5CASDL.0150-00	SDL cable, 15 m.	15 m ±100 mm
5CASDL.0200-00	SDL cable, 20 m.	20 m ±100 mm
5CASDL.0250-00	SDL cable, 25 m.	25 m ±100 mm
5CASDL.0300-00	SDL cable, 30 m.	30 m ±100 mm
5CASDL.0018-03	SDL flex cable, 1.8 m.	1.8 m ±20 mm
5CASDL.0050-03	SDL flex cable, 5 m.	5 m ±45 mm
5CASDL.0100-03	SDL flex cable, 10 m.	10 m ±90 mm
5CASDL.0150-03	SDL flex cable, 15 m.	15 m ±135 mm
5CASDL.0200-03	SDL flex cable, 20 m.	20 m ±180 mm
5CASDL.0250-03	SDL flex cable, 25 m.	25 m ±225 mm
5CASDL.0300-03	SDL flex cable, 30 m.	30 m ±270 mm
5CASDL.0300-13	SDL cable with extender, 30 m.	30 m ±280 mm
5CASDL.0400-13	SDL flex cable with extender, 40 m.	40 m ±380 mm
5CASDL.0430-13	SDL flex cable with extender, 43 m.	43 m ±410 mm
5CASDL.0018-01	SDL cable; 45° connector, 1.8 m.	1,8 m ±30 mm
5CASDL.0050-01	SDL cable; 45° connector, 5 m.	5 m ±50 mm
5CASDL.0100-01	SDL cable; 45° connector, 10 m.	10 m ±100 mm
5CASDL.0150-01	SDL cable; 45° connector, 15 m.	15 m ±100 mm

Table 133: Cables for SDL configurations

Information:

Detailed technical data about the cables can be found in the Automation Panel 900 User's Manual. This can be downloaded as a .pdf file from the B&R homepage www.br-automation.com .

Cable lengths and resolutions for SDL transfer

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

Cables Segment length [m]	Resolution				
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200
1.8	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	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
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
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	- - -
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	- -

Table 134: Cable lengths and resolutions for SDL transfer

Cables Segment length [m]	Resolution				
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200
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	- -
40	5CASDL.0400-13	5CASDL.0400-13	5CASDL.0400-13	5CASDL.0400-13	-

Table 134: Cable lengths and resolutions for SDL transfer

4.9.4 BIOS settings

No special BIOS settings are necessary for operation.

For detailed information, see the user's manual for the B&R industrial PC used.

Touch screen functionality

The COM C or COM D must be enabled in BIOS in order to operate the connected panel touch screen on the monitor / panel or AP Link connection (found in the BIOS menu under "Advanced - Main board / Panel Features - Legacy Devices").

4.10 Eight Automation Panel 900 units via onboard SDL and SDL AP Link

Four Automation Panel 900 units (max. UXGA) are connected to the integrated SDL interface (onboard) via SDL. Four additional Automation Panel 900 units (max. UXGA) are connected to the optional SDL transmitter (AP Link). The Automation Panels in each line must be the same type. The two lines display different content (Extended Desktop), but panels in the same line show the same content (Display Clone).

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

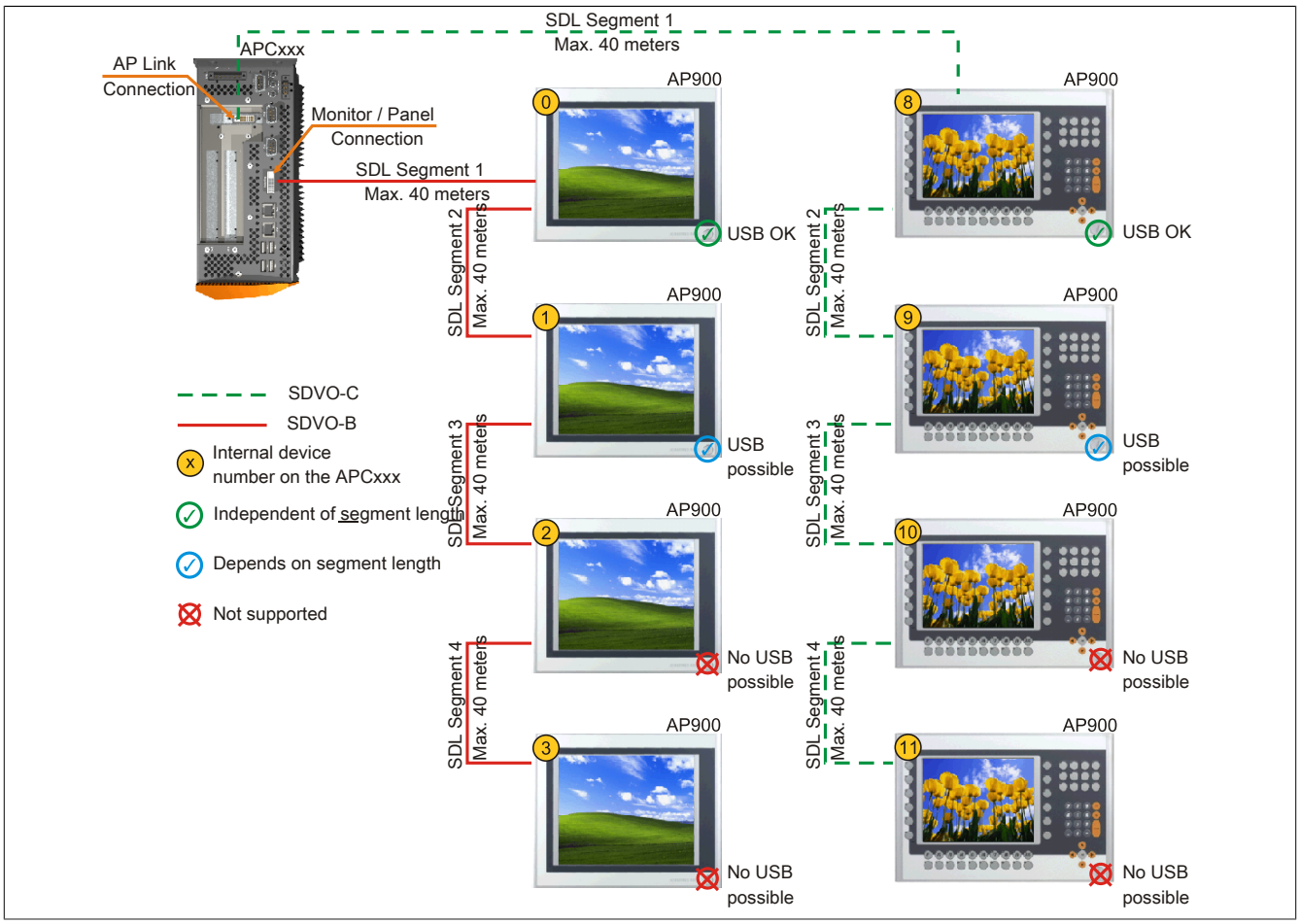


Image 71: Eight Automation Panel 900 units via onboard SDL and SDL AP Link (sample photo)

4.10.1 Basic system requirements

The following table displays the possible combinations for the APC810 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in the following table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit	Limitations Resolution			
	5PC810.SX01-00[1]		5PC810.SX02-00	5PC810.SX03-00	5PC810.SX05-00
5PC800.BM45-00	-	✓	✓	✓	Max. UXGA
5PC800.BM45-01	-	✓	✓	✓	Max. UXGA

Table 135: Possible combinations of system unit and CPU board

1) AP Link cannot be installed.

4.10.2 Link modules

Information:

A corresponding link module must be selected for every device used.

Model number	Description	Note
5DLSDL.1000-00	**Automation Panel Link SDL receiver** Connection for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900
5DLSDL.1000-01	**Automation Panel Link SDL transceiver** Connections for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900
5AC801.SDL0-00	**APC810 AP Link SDL transmitter** Automation Panel SDL link transmitter	For Automation PC 810

Table 136: Link modules

4.10.3 Cables

Select an Automation Panel 900 cable from the following table.

Order number	Description	Length
5CASDL.0018-00	SDL cable, 1.8 m.	1.8 m ±30 mm
5CASDL.0050-00	SDL cable, 5 m.	5 m ±30 mm
5CASDL.0100-00	SDL cable, 10 m.	10 m ±50 mm
5CASDL.0150-00	SDL cable, 15 m.	15 m ±100 mm
5CASDL.0200-00	SDL cable, 20 m.	20 m ±100 mm
5CASDL.0250-00	SDL cable, 25 m.	25 m ±100 mm
5CASDL.0300-00	SDL cable, 30 m.	30 m ±100 mm
5CASDL.0018-03	SDL flex cable, 1.8 m.	1.8 m ±20 mm
5CASDL.0050-03	SDL flex cable, 5 m.	5 m ±45 mm
5CASDL.0100-03	SDL flex cable, 10 m.	10 m ±90 mm
5CASDL.0150-03	SDL flex cable, 15 m.	15 m ±135 mm
5CASDL.0200-03	SDL flex cable, 20 m.	20 m ±180 mm
5CASDL.0250-03	SDL flex cable, 25 m.	25 m ±225 mm
5CASDL.0300-03	SDL flex cable, 30 m.	30 m ±270 mm
5CASDL.0300-13	SDL cable with extender, 30 m.	30 m ±280 mm
5CASDL.0400-13	SDL flex cable with extender, 40 m.	40 m ±380 mm
5CASDL.0430-13	SDL flex cable with extender, 43 m.	43 m ±410 mm
5CASDL.0018-01	SDL cable; 45° connector, 1.8 m.	1,8 m ±30 mm
5CASDL.0050-01	SDL cable; 45° connector, 5 m.	5 m ±50 mm
5CASDL.0100-01	SDL cable; 45° connector, 10 m.	10 m ±100 mm
5CASDL.0150-01	SDL cable; 45° connector, 15 m.	15 m ±100 mm

Table 137: Cables for SDL configurations

Information:

Detailed technical data about the cables can be found in the Automation Panel 900 User's Manual. This can be downloaded as a .pdf file from the B&R homepage www.br-automation.com .

Cable lengths and resolutions for SDL transfer

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

Cables Segment length [m]	Resolution				
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200
1.8	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	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
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
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	- - -
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	- -
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	- -
40	5CASDL.0400-13	5CASDL.0400-13	5CASDL.0400-13	5CASDL.0400-13	-

Table 138: Cable lengths and resolutions for SDL transfer

4.10.4 BIOS settings

No special BIOS settings are necessary for operation.

For detailed information, see the user's manual for the B&R industrial PC used.

Touch screen functionality

The COM C or COM D must be enabled in BIOS in order to operate the connected panel touch screen on the monitor / panel or AP Link connection (found in the BIOS menu under "Advanced - Main board / Panel Features - Legacy Devices").

4.11 Six AP900 and two AP800 units via onboard SDL and SDL AP Link

Three Automation Panel 900 (max. UXGA) units and one Automation Panel 800 are connected to the integrated SDL interface (onboard) via SDL. Additionally, three Automation Panel 900 (max. UXGA) units and one Automation Panel 800 are operated on the optional SDL transmitters. The Automation Panels in each line must be the same type. The two lines display different content (Extended Desktop), but displays in the same line show the same content (Display Clone).

USB is supported up to a maximum distance (segment 1 + segment 2) of 30 m on the first two displays. Starting at a distance of 30 m, USB is only available on the first display (front and back) up to a maximum of 40 m. USB devices can only be connected directly to Automation Panel 900 devices (without a hub).

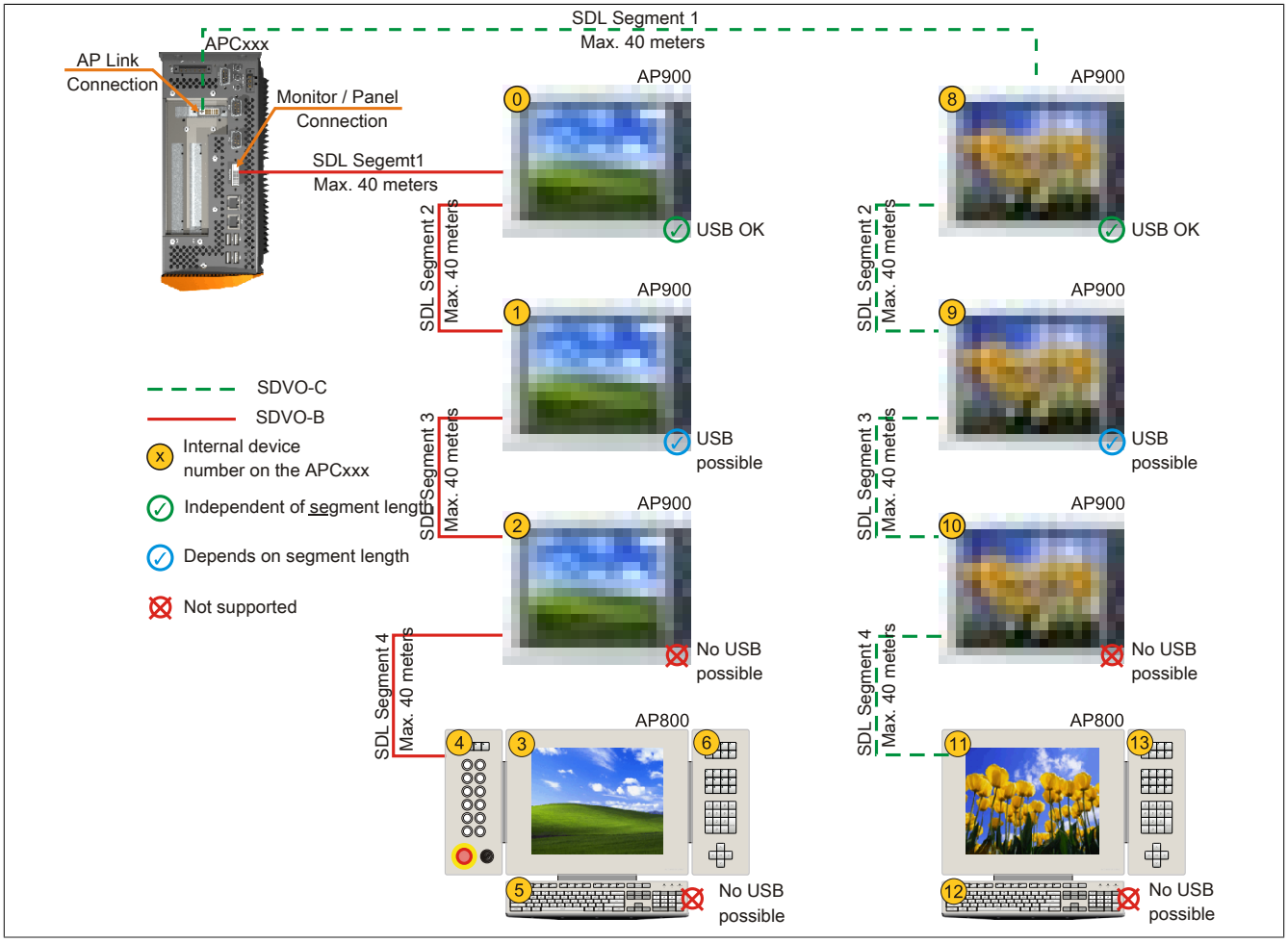


Image 72: Six AP900 and two AP800 units via onboard SDL and SDL AP Link (sample photo)

4.11.1 Basic system requirements

The following table displays the possible combinations for the APC810 system unit with CPU board to implement the configuration shown in the figure above. If the maximum resolution is limited when making the combination then it is also shown in the following table (e.g. for connecting a non-B&R Automation Panel 900 device).

CPU board	with system unit	Limitations Resolution			
	5PC810.SX01-00[1]		5PC810.SX02-00	5PC810.SX03-00	5PC810.SX05-00
5PC800.BM45-00	-	✓	✓	✓	Max. UXGA
5PC800.BM45-01	-	✓	✓	✓	Max. UXGA

Table 139: Possible combinations of system unit and CPU board

1) AP Link cannot be installed.

4.11.2 Link modules

Information:

A corresponding link module must be selected for every device used.

Model number	Description	Note
5DLSDL.1000-01	**Automation Panel Link SDL transceiver** Connections for SDL in, transfer of display data, touch screen, USB 1.1, matrix keys, and service data, 24 VDC (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately).	For Automation Panel 900
5AC801.SDL0-00	**APC810 AP Link SDL transmitter** Automation Panel SDL link transmitter	For Automation PC 810

Table 140: Link modules

4.11.3 Cables

Selection of SDL cables for connecting the AP900 display to the AP900 display see "Cables" on page 150

Selection of SDL cables for connecting the AP800 display to the AP900 display see "Cables" on page 153.

Information:

Detailed technical data about the cables can be found in chapter " Accessories".

Cable lengths and resolutions for SDL transfer

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

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

Table 141: Segment lengths, resolutions and SDL cables

4.11.4 BIOS settings

No special BIOS settings are necessary for operation.

For detailed information, see the user's manual for the B&R industrial PC used.

Touch screen functionality

The COM C or COM D must be enabled in BIOS in order to operate the connected panel touch screen on the monitor / panel or AP Link connection (found in the BIOS menu under "Advanced - Main board / Panel Features - Legacy Devices").

5 Connecting USB peripheral devices

Warning!

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

5.1 Local on the APC810

Many different peripheral USB devices can be connected to the 5 USB interfaces. This means that the USB interfaces USB1, USB3, USB5 can each handle a load of 1A and USB interfaces USB2 and USB4 can each handle a load of 500mA. The maximum transfer rate is USB 2.0.

Image 73: Local connection of USB peripheral devices on the APC810

5.2 Remote connection to Automation Panel 900 via DVI

Many different peripheral USB devices can be connected to the 2 or 3 USB interfaces on the Automation Panel 900. These can each handle a load of 500 mA. The maximum transfer rate is USB 2.0.

Information:

Only end devices (no hubs) can be connected to the Automation Panel 900.

Image 74: Remote connection of USB peripheral devices to the APC900 via DVI

5.3 Remote connection to Automation Panel 800 / 900 via SDL

Many different peripheral USB devices can be connected to the 2 or 3 USB interfaces on Automation Panel 900 and/or USB connections on the Automation Panel 800 devices. These can each handle a load of 500 mA. The maximum transfer rate is USB 1.1.

Information:

Only end devices (no hubs) can be connected to the Automation Panel 800/900.

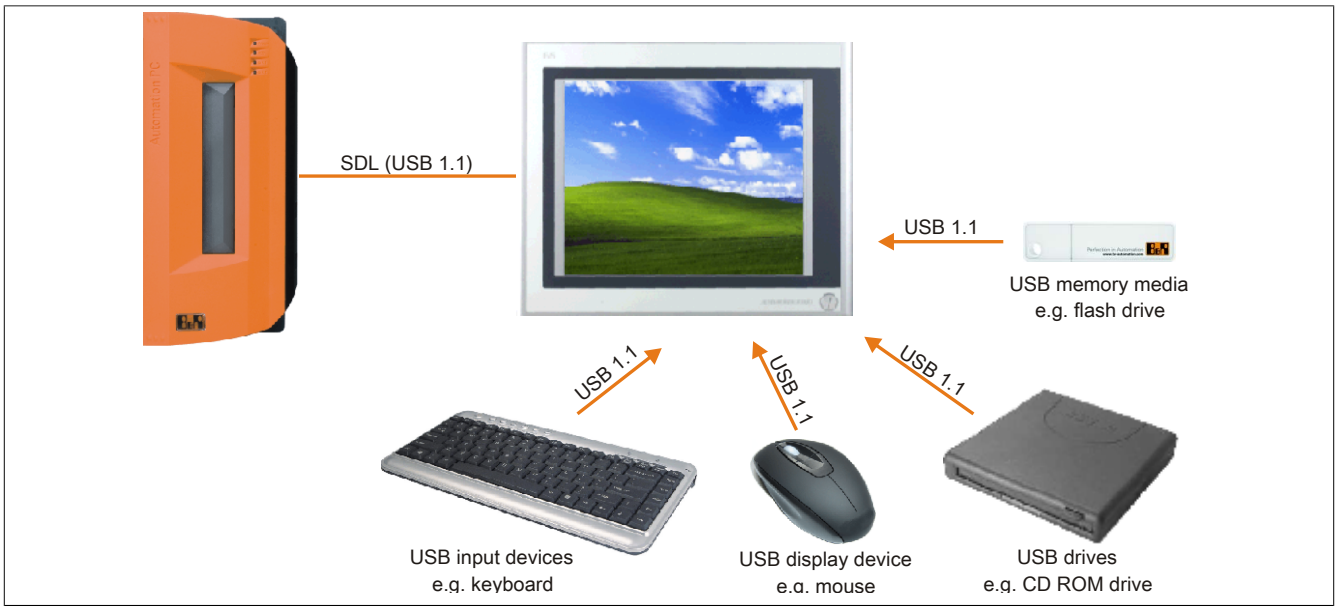


Image 75: Remote connection of USB peripheral devices to the APC800/900 via SDL

6 Configuration of a SATA RAID array

Information:

The following software description is valid for PCI SATA controllers 5ACPCI.RAIC-01 and 5ACPCI.RAIC-03.

You must enter the BIOS "RAID Configuration Utility" in order to make the necessary settings. After the POST, enter <Ctrl+S> or <F4> to open RAID BIOS.

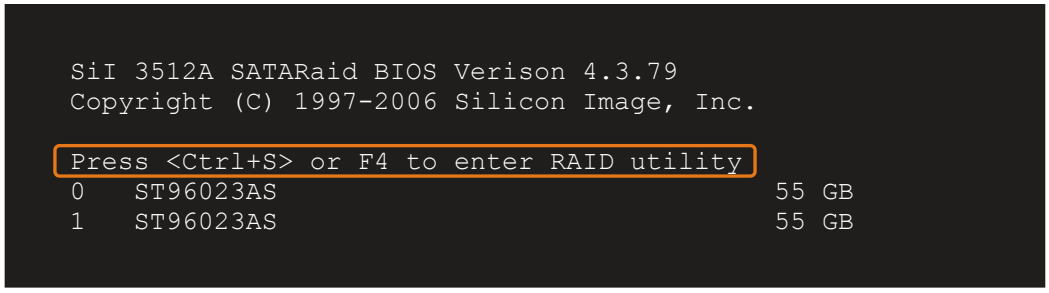


Image 76: Open the RAID Configuration Utility

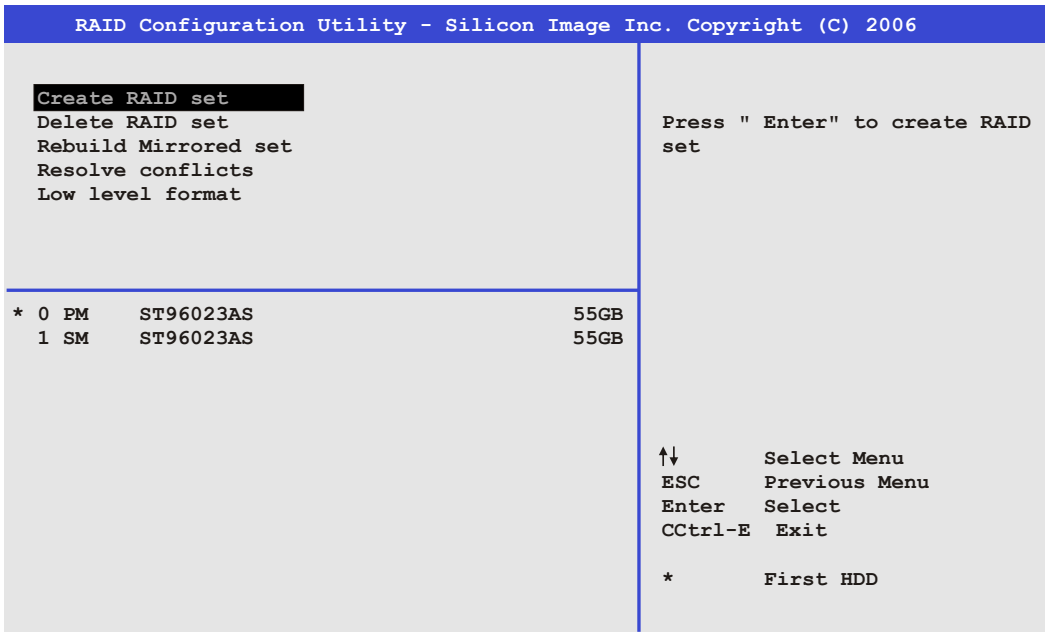


Image 77: RAID Configuration Utility - Menu

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

Key	Function
Cursor ↑	Go to previous item.
Cursor ↓	Go to the next item.
Enter	Select an item or open a submenu.
ESC	Go back to previous menu.
Ctrl+E	Exit setup and save the changed settings.

Table 142: BIOS-relevant keys in the RAID Configuration Utility

6.1 Create RAID set

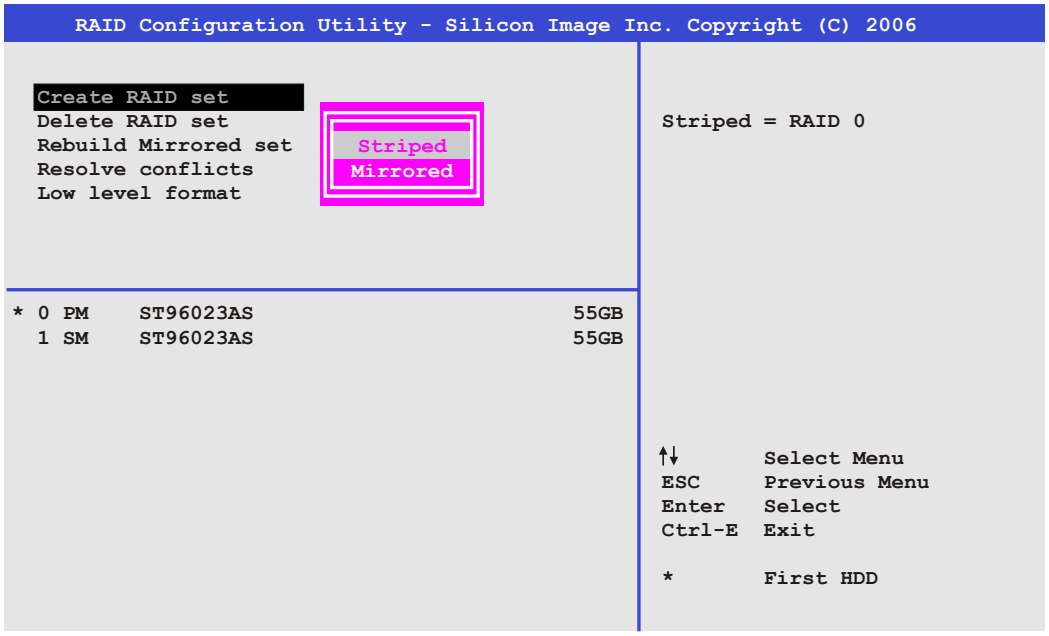


Image 78: RAID Configuration Utility - Menu

The RAID system can be recreated as "Striped" = RAID0 or "Mirrored" = RAID1 using the menu "Create RAID set".

6.2 Create RAID set - Striped

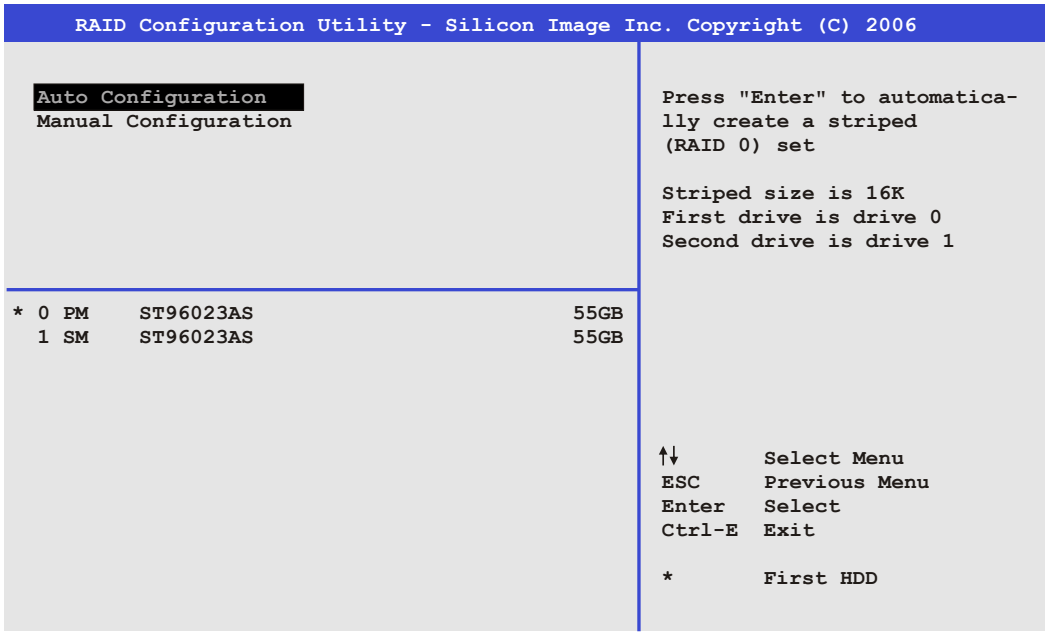


Image 79: RAID Configuration Utility - Create RAID set - Striped

"Auto Configuration"
Auto configuration optimizes all settings.

"Manual Configuration"
It is possible to specify the first and second HDD as well as the "Chunk Size" (= block size, application-dependent).

6.3 Create RAID set - Mirrored

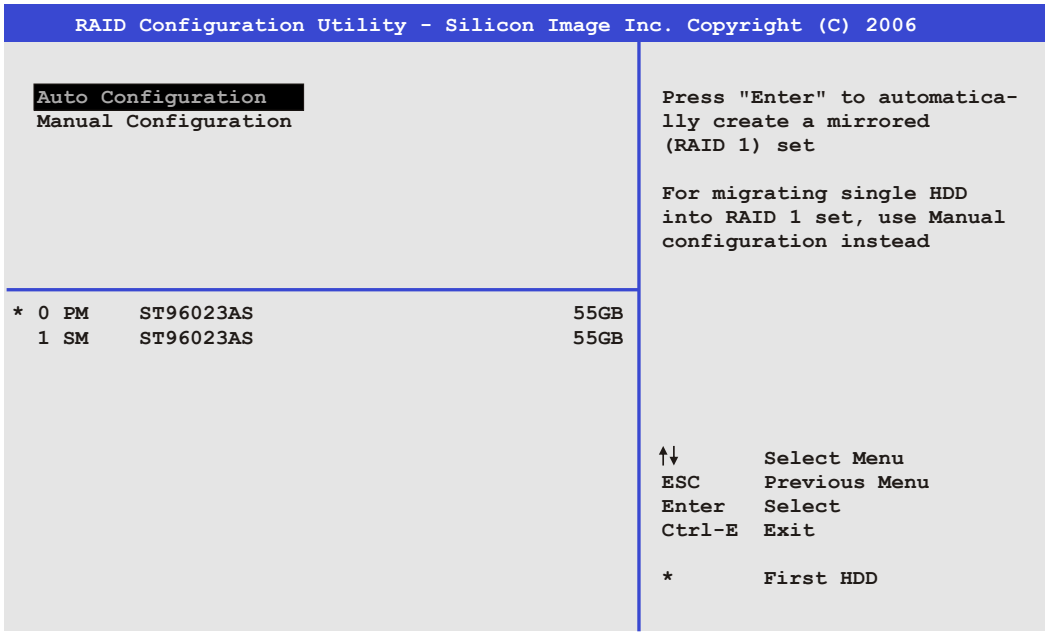


Image 80: RAID Configuration Utility - Create RAID set - Mirrored

"Auto Configuration"
Auto configuration optimizes all settings.

"Manual Configuration"
It is possible to specify the "Source" and "Target" HDD, and also to specify whether a rebuild (mirror) should be performed immediately (approx. 50 minutes).

6.4 Delete RAID set

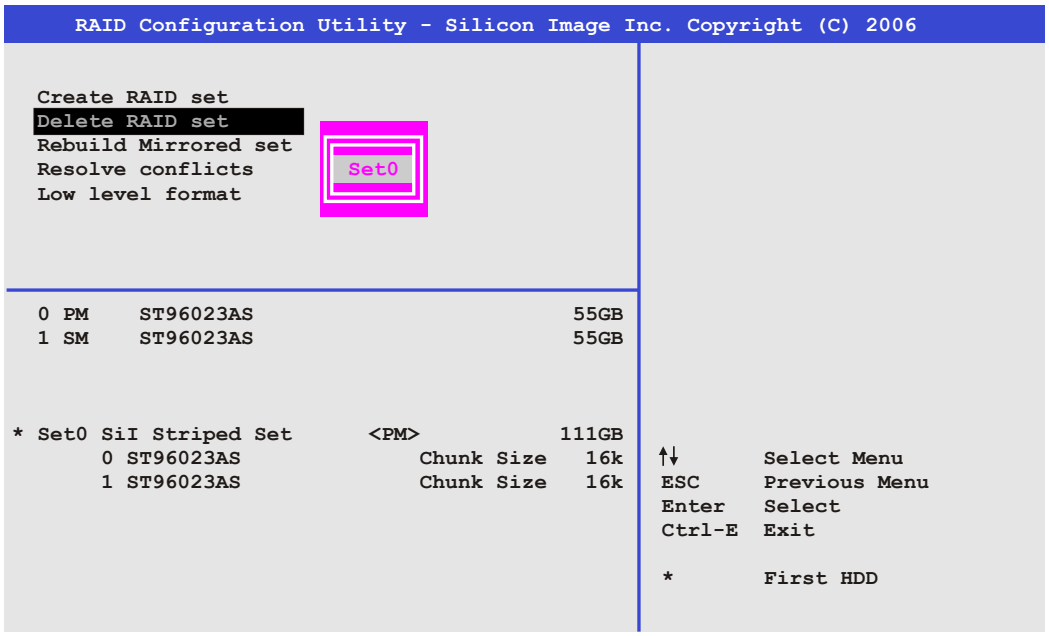


Image 81: RAID Configuration Utility - Delete RAID set

An existing RAID set can be deleted using the menu "Delete RAID set".

6.5 Rebuild mirrored set

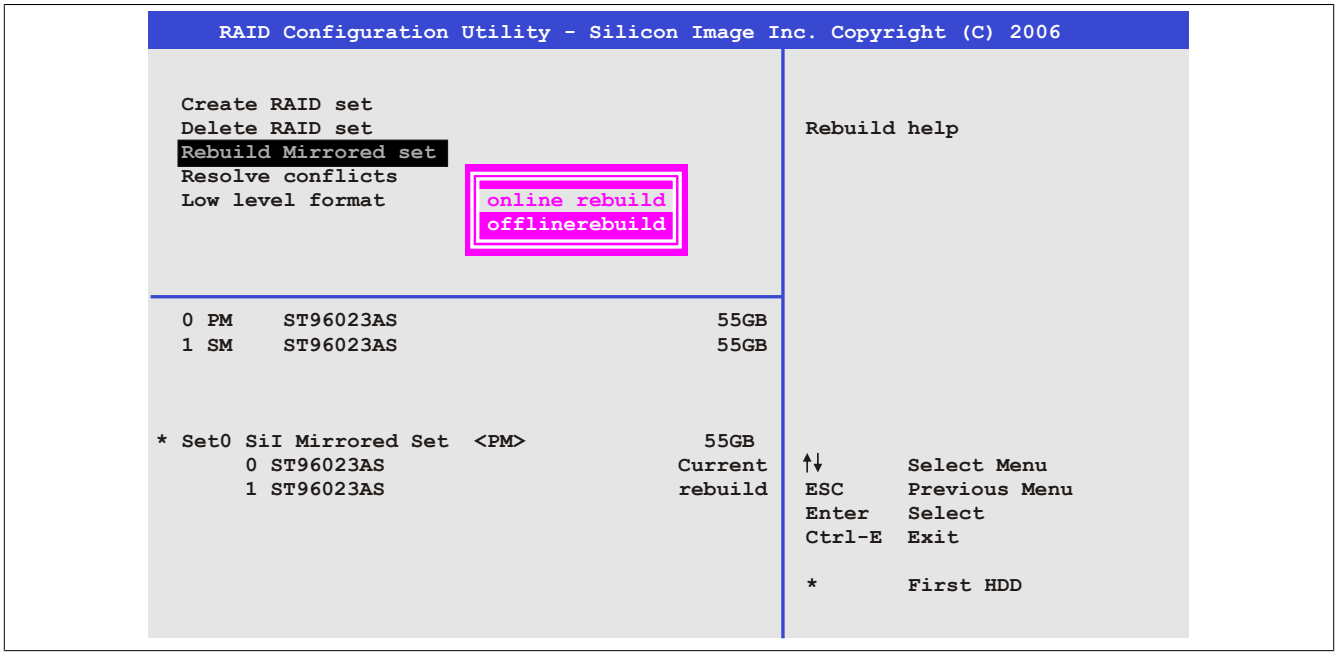


Image 82: RAID Configuration Utility - Rebuild mirrored set

The "Rebuild mirrored set" menu can be used to restart a rebuild procedure in a RAID 1 network if an error occurs, after first interrupting the rebuild procedure or when exchanging a hard disk.

If "onlinerebuild" is selected, then the rebuild is executed during operation after the system is booted. E.g. an event pop-up is displayed by the installed SATA RAID configuration program: `SATARaid detected a new event` and the rebuild is started. The entire rebuild lasts approximately 50 minutes.

If "offlinerebuild" is selected, then a rebuild is performed immediately before starting the operating system (lasts approximately 30 minutes).

6.6 Resolve conflicts

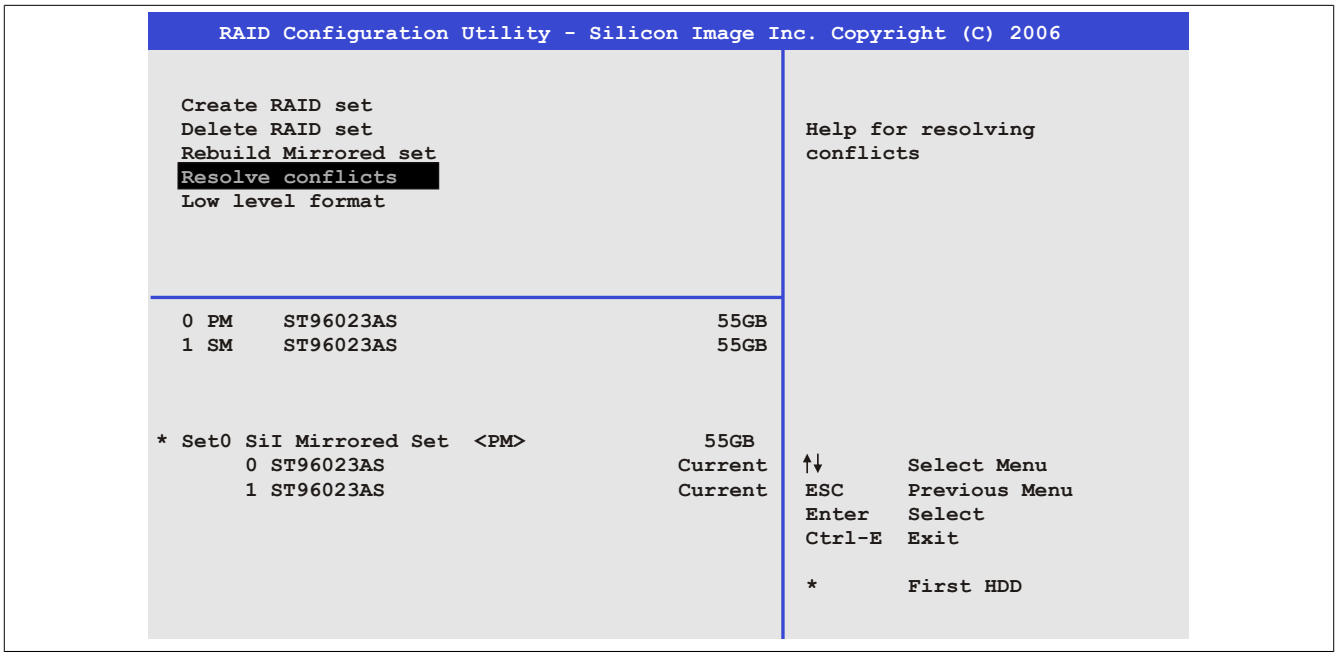


Image 83: RAID Configuration Utility - Resolve conflicts

Conflicts in a RAID set can be resolved using the "Resolve conflicts" menu. This function is only available if the status of the hard disk is "conflict".

6.7 Low level format

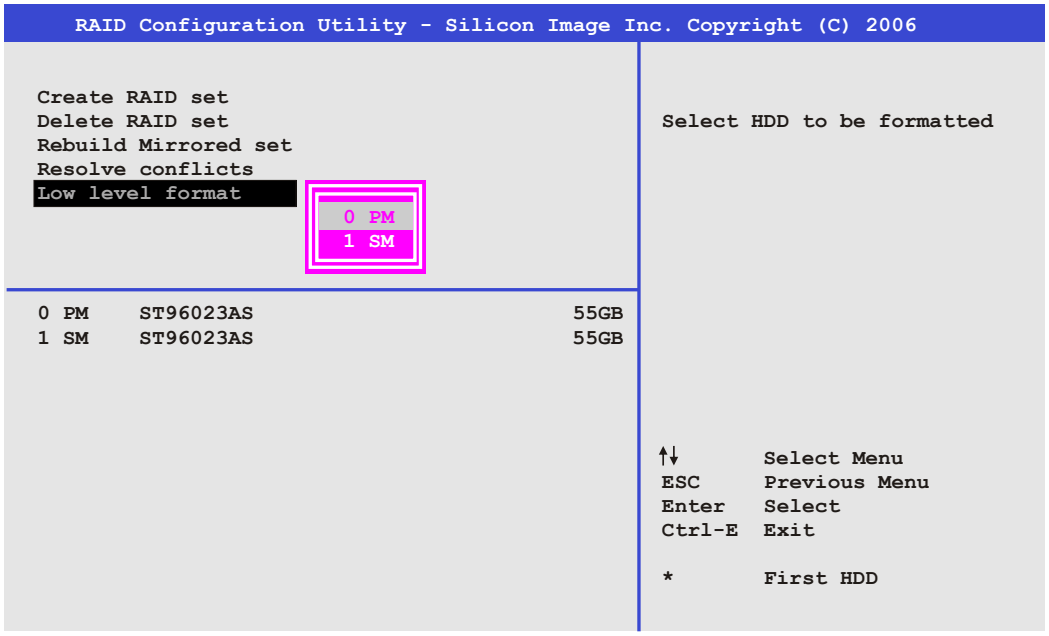


Image 84: RAID Configuration Utility - Low level format

Individual hard disks can be configured using the "Low Level Format" menu. This can only be done if a RAID set is not configured. A low level format of a hard disk takes approx. 40 minutes.

7 Known problems / issues

7.1 Problems and properties of the first production lot

The following points listed are known as of 2008-05-07 in the first production lot of APC800 devices:

- The hardware security key interface is supported beginning with MTXC FPGA version 00.06 and higher.
- Sporadically, it was possible that the ETH2 interface was not initialized during a power-on and therefore it would not function. The problem could be corrected by a reset or warm restart (Ctrl+Alt+Del). This problem is corrected in MTXC FPGA version 00.03.
- First Boot Agent Windows XP embedded and built-in SATA HDD drive The BIOS setting "Legacy IDE Channels" under "Advanced - IDE Configuration" must be set to "PATA only" before inserting a Compact-Flash card with a Windows XP embedded image and executing the First Boot Agent or the SATA drive can first be removed.
- When using two graphic lines, the Windows XP graphics driver assigns the labels "digital indicator" to the monitor / panel plug and "digital indicator 2" to the AP Link plug. In the "extended desktop" mode, the following behavior is observed: If the digital display device on the monitor / panel is removed (e.g. cable disconnected), digital display 2 is activated automatically, and the graphics driver settings also switch over accordingly. The next time the system is rebooted, the image content is diverted from the monitor / panel plug to the AP Link plug. If the BIOS option "SDVO/DVI Hotplug support" is set to "enabled" (found under the BIOS menu point "Advanced - Graphics - Configuration"), then the image content is automatically diverted from the separate monitor / panel plug to the second graphics line on the AP Link plug.
- Special features of "Quick Switching" - if the APC810 is in Standby mode - Power LED is red (e.g. Windows XP shutdown), then buffering takes a little more time due to capacitors and low power consumption. If the "Power Loss Control" option is set to "Power On" or "Last State" in BIOS, then the system might not restart because a Power Off/On was not detected. To make sure that these system units will restart after a Power Off/On, the turn-off time should be set to at least 10 seconds.
- From MTCX PX32 firmware ≥ V00.11 and higher, the reset button is only triggered by edges. This means that the device boots even when the reset button is pressed. In MTCX PX32 firmware < V00.11, the system does not start after pressing (ca. 10 seconds) and releasing the reset button.

7.2 Problems and properties of subsequent production lots

- Hardware revision B0 of the slide-in DVD-ROM - 5AC801.DVDS-00 does not offer SATA hot plug capability. Other hardware revisions are hot plug capable.
- The MIC, Line IN and Line OUT inputs/outputs are not supported due to the Intel GM45 chipset.
- The CompactFlash Slot 2 is not supported due to the Intel GM45 chipset.
- During daisy chain operation of multiple AP800/AP900 devices via SDL, it's possible that the touch controller status shows a red "X" in the Control Center applet for the touch screen driver when the touch controller is detected. The functionality of the touch system is not affected by this. This can be avoided by setting a panel locking time of 50 ms. The panel locking time can be configured with the B&R Key Editor.

Chapter 4 • Software

1 BIOS options

Information:

The following diagrams and BIOS menu items including descriptions refer to BIOS version 1.15. It is therefore possible that these diagrams and BIOS descriptions do not correspond with the installed BIOS version.

1.1 General information

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

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

The CMOS data is buffered by a battery (if present), and remains in 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 of the B&R industrial PC or pressing the power button. The system checks if the setup data from the EEPROM is "OK". If the data is "OK", then it is transferred to the CMOS. If the data is "not OK", then the CMOS data is checked for validity. An error message is output if the CMOS data contains errors and the boot procedure can be continued by pressing the <F1> key. To prevent the error message from appearing at each restart, open the BIOS setup by pressing the <Del> key and re-save the settings.

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

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

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

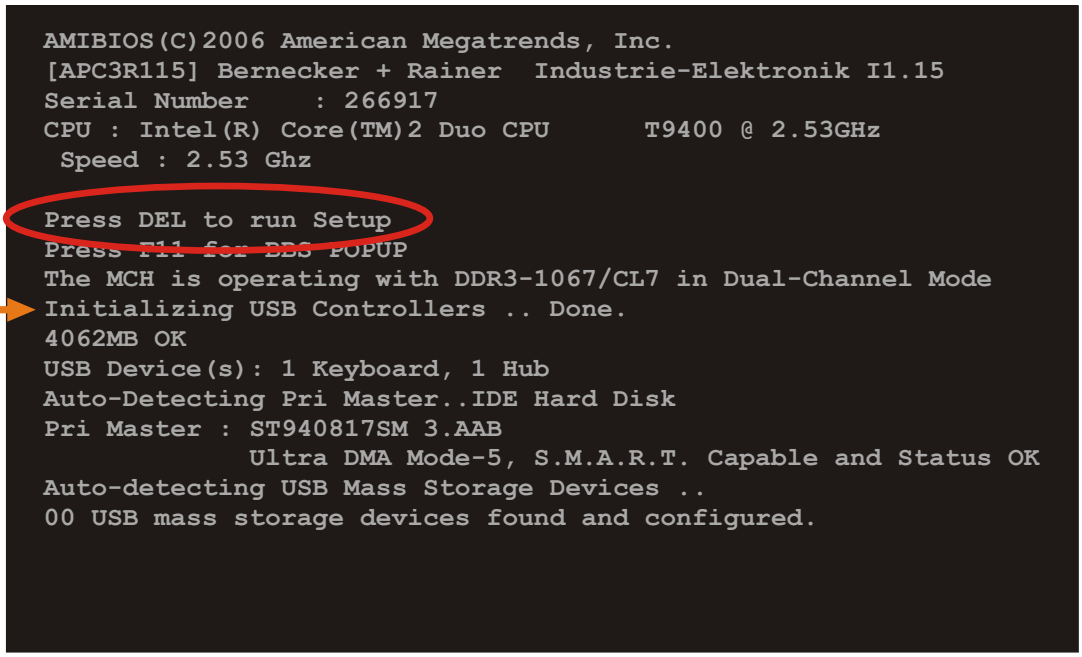


Image 85: GM45 Boot Screen

1.2.1 BIOS setup keys

The following keys are enabled during the POST:

> **Information:**
>
> **The key signals from the USB keyboard are only registered after the USB controller has been initialized.**

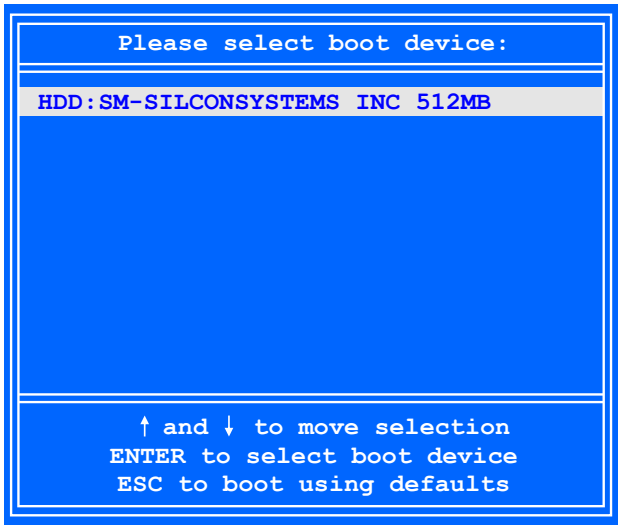
Keys	Function
Del	Enters the BIOS setup menu.
F12	Using the F12 key, you can boot from the network.
F11	Cues the boot menu. Lists all bootable devices that are connected to the system. Select the device to boot from with cursor ↑, cursor ↓ and <ENTER>. 
<Pause>	Pressing the <Pause> key stops the POST. Press any other key to resume the POST.

Table 143: BIOS-relevant keys for POST

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

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

Table 144: BIOS-relevant keys in the BIOS menu

1.3 Main

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

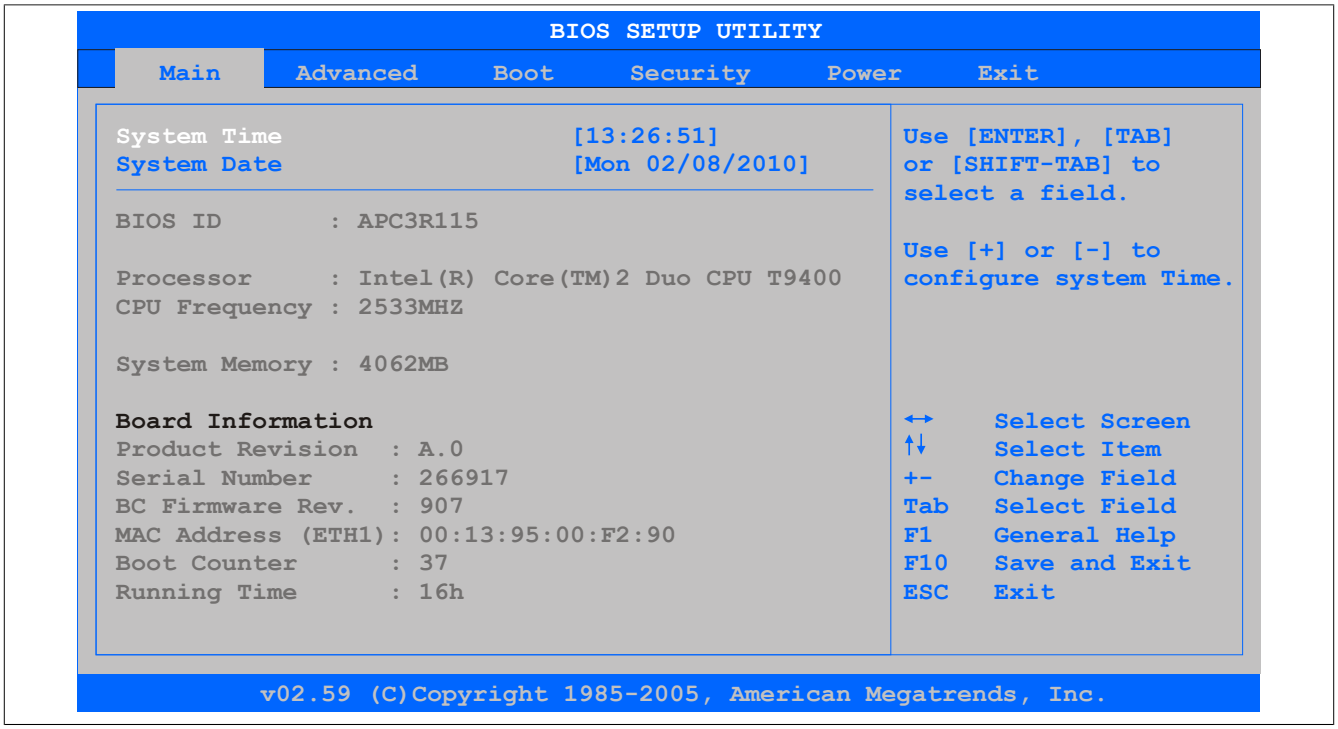


Image 86: GM45 Main menu

BIOS setting	Meaning	Setting options	Effect
System Time	This is the current system time setting. The time is buffered by a battery (CMOS battery) after the system has been switched off.	Adjustment of the system time	Set the system time in the format Hour:Minute:Second (hh:mm:ss).
System Date	This is the current system date setting. The time is buffered by a battery (CMOS battery) after the system has been switched off.	Changes to the system date	Sets the system date in the format Month:Day:Year (mm:dd:yyyy).
BIOS ID	Displays the BIOS recognition.	None	-
Processor	Displays the processor type.	None	-
CPU Frequency	Displays the processor frequency.	None	-
System Memory	Displays the system memory size.	None	-
Product Revision	Displays the CPU board HW revision.	None	-
Serial Number	Displays the CPU board serial number.	None	-
BC Firmware Rev.	Displays the CPU board controller firmware revision.	None	-
MAC Address (ETH1)	Displays the MAC addresses assigned for the ETH1 interface.	None	-
Boot Counter	Displays the boot counter - each restart increments the counter by one (max. 16777215).	None	-
Running Time	Displays the runtime in whole hours. (max. 65535).	None	-

Table 145: GM45 Main menu - Setting options

1.4 Advanced

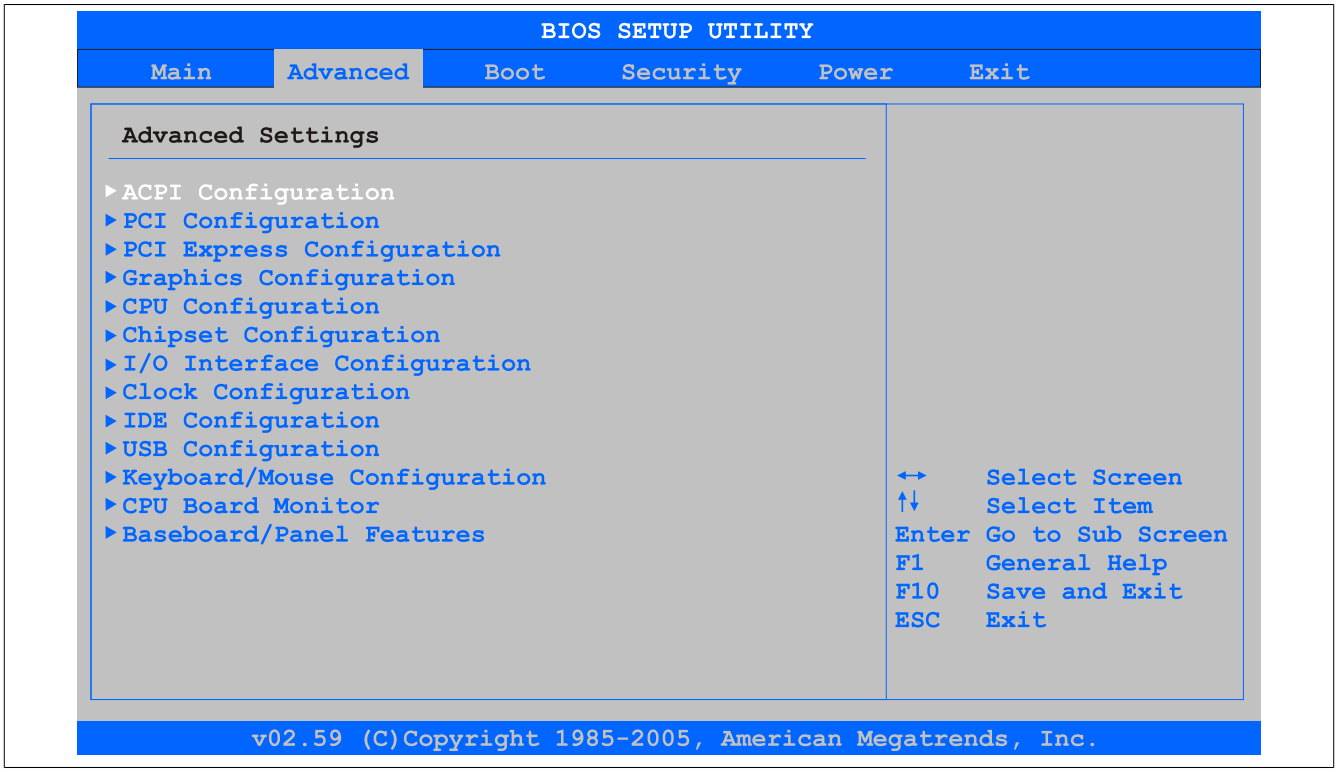


Image 87: GM45 Advanced menu

BIOS setting	Meaning	Setting options	Effect
ACPI configuration	Configures the APCI devices.	Enter	Opens the submenu See " ACPI Configuration" on page 188
PCI Configuration	Configures PCI devices.	Enter	Opens the submenu See " PCI Configuration" on page 189
PCI express configuration	Configures the PCI Express.	Enter	Opens the submenu See " PCI Express Configuration" on page 192
Graphics configuration	Configures the graphics settings.	Enter	Opens the submenu See " Graphics Configuration" on page 194
CPU configuration	Configures the CPU settings.	Enter	Opens the submenu See " CPU Configuration" on page 196
Chipset configuration	Configures the chipset functions.	Enter	Opens the submenu See " Chipset Configuration" on page 197
I/O interface configuration	Configures the I/O devices.	Enter	Opens the submenu See " I/O Interface Configuration" on page 198
Clock Configuration	Configures the clock settings.	Enter	Opens the submenu See " Clock Configuration" on page 199
IDE Configuration	Configures the IDE functions.	Enter	Opens the submenu See " IDE Configuration" on page 199
USB configuration	Configures the USB settings.	Enter	Opens the submenu See " USB configuration" on page 204
Keyboard/mouse configuration	Configures the keyboard/mouse options.	Enter	Opens the submenu See " Keyboard/Mouse configuration" on page 205
CPU board monitor	Displays the current voltages and temperature of the processor in use.	Enter	Opens the submenu See " CPU Board Monitor" on page 207
Main Board/Panel Features	Displays device specific information and setup of device specific values.	Enter	Opens the submenu See "Main Board/Panel Features" on page 208

Table 146: GM45 Advanced menu

1.4.1 ACPI Configuration

```
BIOS SETUP UTILITY
Advanced

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

ACPI Version Features             [ACPI v2.0]  ENABLE: If OS
ACPI APIC support                 [Enabled]    supports ACPI.
Suspend mode                      [S1 (POS)]
USB Device Wakeup from S3/S4      [Disabled]   DISABLE: If OS
                                               does not support
Active Cooling Trip Point         [Disabled]   ACPI.
Passive Cooling Trip Point        [Disabled]
Critical Trip Point               [105°C]
                                               ←→    Select Screen
                                               ↑↓    Select Item
                                               +-    Change Option
                                               F1    General Help
                                               F10   Save and Exit
                                               ESC   Exit

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```

Image 88: GM45 Advanced ACPI configuration

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

Table 147: GM45 Advanced ACPI Configuration - Setting options

1.4.2 PCI Configuration

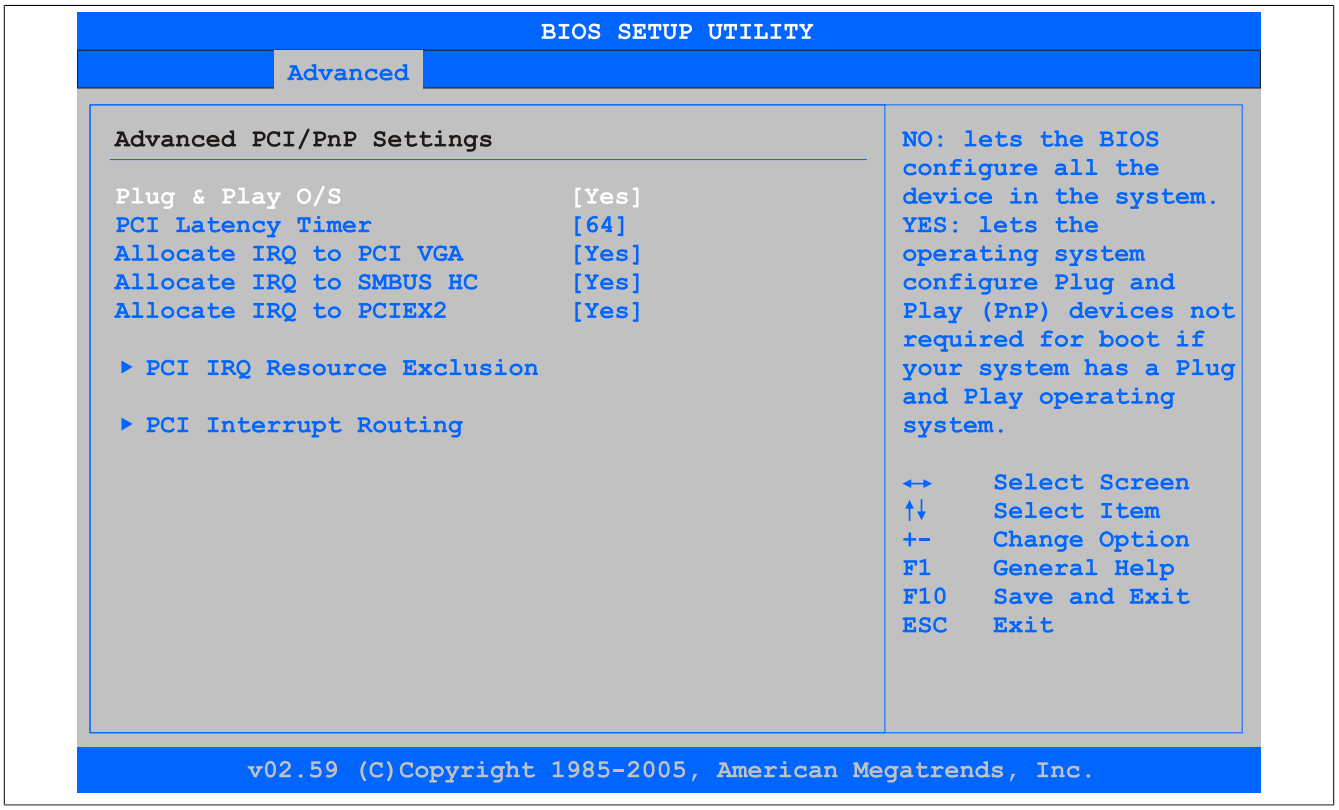

Image 89: GM45 Advanced PCI configuration

BIOS setting	Meaning	Setting options	Effect
Plug & Play O/S	BIOS is informed if Plug & Play is capable on the operating system.	Yes	The operating system handles the distribution of resources.
		No	BIOS handles the distribution of resources.
PCI Latency Timer	This option controls how long (in PCI ticks) one PCI bus card can continue to use the master after another PCI card has requested access.	32, 64, 96, 128, 160, 192, 224, 248	Manually sets the value in PCI ticks.
Allocate IRQ to PCI VGA	This function is used to determine if an interrupt is assigned to the PCI VGA.	Yes	Automatic assignment of an interrupt.
		No	No assignment of an interrupt.
Allocate IRQ to SMBUS HC	Use this function to set whether or not the SM (System Management) bus controller is assigned a PCI interrupt.	Yes	Automatic assignment of a PCI interrupt.
		No	No assignment of an interrupt.
Allocate IRQ to PCIEX2	Use this function to set whether or not the PCIEX2 is assigned a PCI interrupt.	Yes	Automatic assignment of a PCI interrupt.
		No	No assignment of an interrupt.
PCI IRQ Resource Exclusion	Configures the PCI IRQ resource settings for ISA Legacy devices.	Enter	Opens the submenu See "PCI IRQ Resource Exclusion" on page 190
PCI Interrupt Routing	Configures PCI interrupt routing	Enter	Opens the submenu See "PCI Interrupt Routing" on page 191

Table 148: GM45 Advanced PCI Configuration - Setting options

PCI IRQ Resource Exclusion

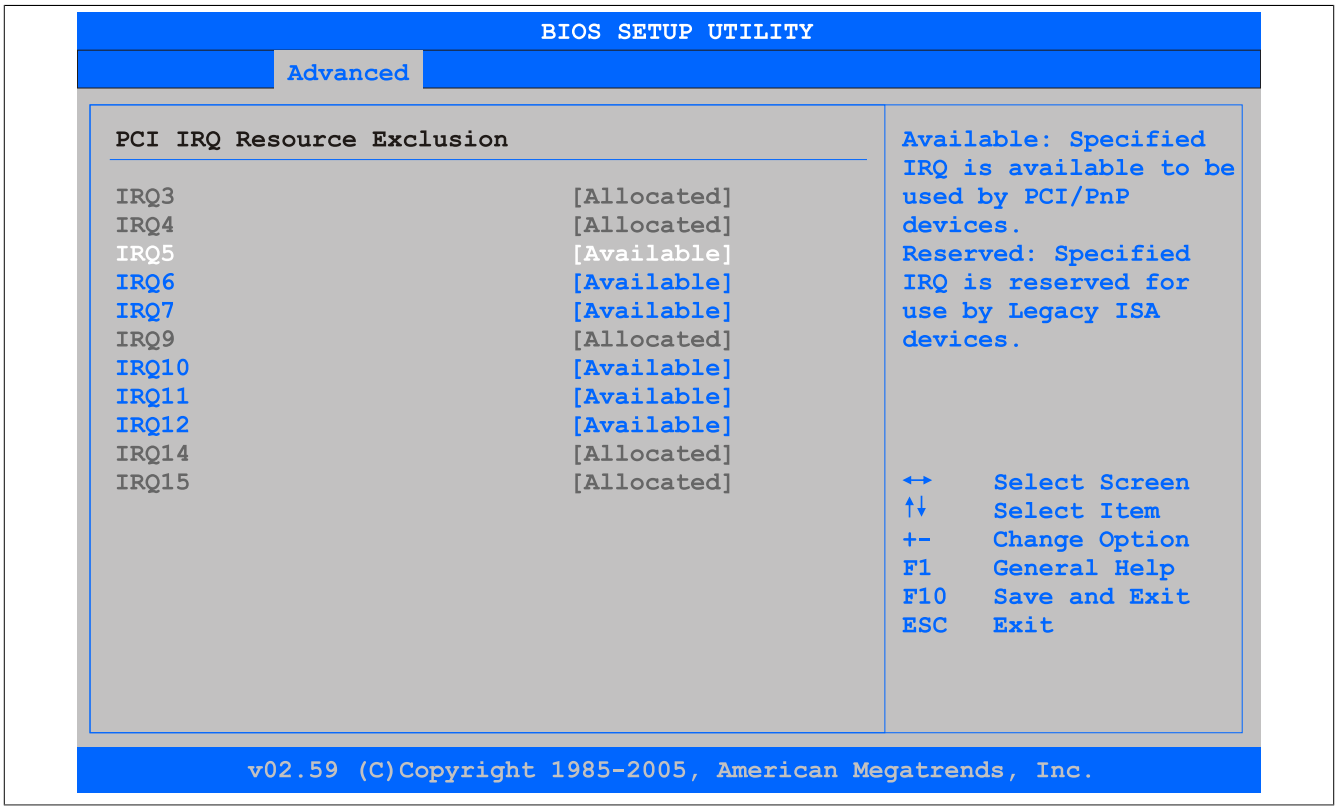

Image 90: GM45 Advanced PCI IRQ resource exclusion

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

Table 149: GM45 Advanced PCI IRQ Resource Exclusion - Setting options

PCI Interrupt Routing

```
BIOS SETUP UTILITY
Advanced

PCI Interrupt Routing                                  Select fixed IRQ for
                                                       set AUTO to let the
PIRQ A (VGA,UHCI2,PCIE0,ETH2)    [Auto]                BIOS and OS route an
PIRQ B (PCIE1,HDA,ETH1)          [Auto]                IRQ to this line.
PIRQ C (PCIE2)                   [Auto]
PIRQ D (UHCI1,PCIE3,SATA)        [Auto]                Make sure that the
PIRQ E (INTD,SMB,UHCI3,EHCI1)    [Auto]                selected IRQ is not
PIRQ F (INTA)                    [Auto]                assigned to legacy IO.
PIRQ G (INTB)                    [Auto]
PIRQ H (INTC,UHCI0,EHCI0)        [Auto]

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

PCIEn   : PCI Express Root Port n                      ↔    Select Screen
INTn    : External PCI Bus INTn Line                   ↑↓   Select Item
SMB     : System Management Bus Controller             +-   Change Option
HDA     : Intel High Definition Audio                  F1   General Help
                                                       F10  Save and Exit
                                                       ESC  Exit

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```

Image 91: GM45 Advanced PCI interrupt routing

BIOS setting	Meaning	Setting options	Effect
PIRQ A (VGA,UHCI2,PCIE0, ETH2)	Option for setting the PIRQ A.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment.
PIRQ B (PCIE1,HDA,ETH1)	Option for setting the PIRQ B.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment.
PIRQ C (PCIE2)	Option for setting the PIRQ C.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment.
PIRQ D (UHCI1,PCIE3, SATA)	Option for setting the PIRQ D.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment.
PIRQ E (INTD, SMB,UHCI3,EHCI1)	Option for setting the PIRQ E.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment.
PIRQ F (INTA)	Option for setting the PIRQ F.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment.
PIRQ G (INTB)	Option for setting the PIRQ G.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment.
PIRQ H (INTC,UHCI0, EHCI0)	Option for setting the PIRQ H.	Auto	Automatic assignment by the BIOS and operating system.
		5,6,7,9,10,11,12	Manual assignment.
1st Exclusive PCI	With this option you can determine if the IRQ assigned to the PIRQ x is handled exclusively (no IRQ sharing). **Information:** **Is only displayed if a PIRQ is manually set (e.g. 5).**	None	No interrupt is assigned.
		x	Assigns the PIRQ as 1st exclusive PCI IRQ.

Table 150: GM45 Advanced PCI Interrupt Routing - Setting options

BIOS setting	Meaning	Setting options	Effect
2nd Exclusive PCI	With this option you can determine if the IRQ assigned to the PIRQ x is handled exclusively (no IRQ sharing). **Information:** **Only displayed when two PIRQs are set manually.**	None	No interrupt is assigned.
		x	Assigns the PIRQ as 2nd exclusive PCI IRQ.

Table 150: GM45 Advanced PCI Interrupt Routing - Setting options

1.4.3 PCI Express Configuration

```
                          BIOS SETUP UTILITY
                          Advanced

PCI Express Configuration                          Enable/Disable
                                                   PCI Express L0s and
Active State Power-Management   [Disabled]         L1 link power
  PCIE Port 0                   [Auto]             states.
  PCIE Port 1                   [Auto]
  PCIE Port 2                   [Auto]
  PCIE Port 3                   [Auto]
  PCIE Port 4 (ETH2)            [Auto]
  PCIE High Priority Port       [Disabled]

Res. PCIE Hotplug Resources     [No]

                                                   ←→    Select Screen
  PCIE Port 0 IOxAPCI Enable    [Disabled]         ↑↓    Select Item
  PCIE Port 1 IOxAPCI Enable    [Disabled]         +-    Change Option
  PCIE Port 2 IOxAPCI Enable    [Disabled]         F1    General Help
  PCIE Port 3 IOxAPCI Enable    [Disabled]         F10   Save and Exit
                                                   ESC   Exit

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```

Image 92: GM45 Advanced PCI express configuration

BIOS setting	Meaning	Setting options	Effect
Active State Power Management	Option for setting a power saving function (L0s/L1) for PCIE slots if they do not require full power.	Enabled	Enables this function.
		Disabled	Disables this function.
PCIE Port 0	This option activates or deactivates the PCI Express connection function. **Information:** **If you are not using any PCI Express devices, this option should be deactivated.**	Auto	Automatic assignment by the BIOS and operating system.
		Enabled	Enables this function.
		Disabled	Disables this function.
PCIE Port 1	This option activates or deactivates the PCI Express connection function. **Information:** **If you are not using any PCI Express devices, this option should be deactivated.**	Auto	Automatic assignment by the BIOS and operating system.
		Enabled	Enables this function.
		Disabled	Disables this function.
PCIE Port 2	This option activates or deactivates the PCI Express connection function. **Information:** **If you are not using any PCI Express devices, this option should be deactivated.**	Auto	Automatic assignment by the BIOS and operating system.
		Enabled	Enables this function.
		Disabled	Disables this function.
PCIE Port 3	This option activates or deactivates the PCI Express connection function.	Auto	Automatic assignment by the BIOS and operating system.

Table 151: GM45 Advanced PCI Express Configuration - Setting options

BIOS setting	Meaning	Setting options	Effect
	Information: **If you are not using any PCI Express devices, this option should be deactivated.**	Enabled	Enables this function.
		Disabled	Disables this function.
PCIE Port 4 (ETH2)	This option activates or deactivates the PCI Express connection function. **Information:** **If you are not using any PCI Express devices, this option should be deactivated.**	Auto	Automatic assignment by the BIOS and operating system.
		Enabled	Enables this function.
		Disabled	Disables this function.
PCIE High Priority Port	This option activates or deactivates the priority port for PCIE.	Disabled	Disables this function.
		Port 0	Activates Port 0 as priority port.
		Port 1	Activates Port 1 as priority port.
		Port 2	Activates Port 2 as priority port.
		Port 3	Activates Port 3 as priority port.
		ETH2	Activates ETH2 as priority port.
		ETH1	Activates ETH1 as priority port.
Res. PCIE Hotplug Resource	This option can be used to reserve an I/O and memory resource for a free PCIE port. A PCIE port must be set to enabled and resources must be reserved to support ExpressCard hot-plugging on a port.	Yes	Resource is reserved.
		No	Resource is not reserved.
PCIE Port 0 IOxAPIC Enable	This option is used to enable or disable the APIC (Advanced Programmable Interrupt Controller) on the PCIE port 0. The IRQ resources available to the system are expanded when the APIC mode is enabled.	Enabled	Enables this function.
		Disabled	Disables this function.
PCIE Port 1 IOxAPIC Enable	This option is used to enable or disable the APIC (Advanced Programmable Interrupt Controller) on the PCIE port 1. The IRQ resources available to the system are expanded when the APIC mode is enabled.	Enabled	Enables this function.
		Disabled	Disables this function.
PCIE Port 2 IOxAPIC Enable	This option is used to enable or disable the APIC (Advanced Programmable Interrupt Controller) on the PCIE port 2. The IRQ resources available to the system are expanded when the APIC mode is enabled.	Enabled	Enables this function.
		Disabled	Disables this function.
PCIE Port 3 IOxAPIC Enable	This option is used to enable or disable the APIC (Advanced Programmable Interrupt Controller) on the PCIE port 3. The IRQ resources available to the system are expanded when the APIC mode is enabled.	Enabled	Enables this function.
		Disabled	Disables this function.

Table 151: GM45 Advanced PCI Express Configuration - Setting options

1.4.4 Graphics Configuration

```
BIOS SETUP UTILITY
Advanced

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

Internal Graphics Mode Select     [Enabled, 32MB]
DVMT Memory                       [256MB]

Boot Display Device               [Auto]
Boot Display Preference           [SDVO-B SDVO-C LFP]
Alway Try Auto Panel Detect       [No]
Local Flat Panel Type             [Auto]
SDVO Local Flat Panel Type        [Disabled]
Local Flat Panel Scaling          [Centering]
                                                        ←→    Select Screen
SDVO Port B Configuration         [SDVO DVI]            ↑↓    Select Item
SDVO Port C Configuration         [SDVO DVI]            +-    Change Option
                                                        F1    General Help
SDVO/DVI Hotplug Support          [Enabled]             F10   Save and Exit
Display Mode Persistence          [Enabled]             ESC   Exit

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```

Image 93: GM45 Advanced graphics configuration

BIOS setting	Meaning	Setting options	Effect
Primary Video Device	Option for selecting the primary video device.	Internal VGA	The internal graphics chip on the CPU board is used as video device (monitor / panel connection).
		PCI / Int. VGA	The graphics chip of a connected graphics card is used as video device.
Internal Graphics Mode Select	Option for setting the memory size that can be used for the internal graphics controller.	Disabled	No reservation - Disables the graphics controller.
		Enabled, 32MB	32MB main memory provided.
		Enabled, 64MB	64MB main memory provided.
		Enabled, 128MB	128MB main memory provided.
DVMT Memory	Option for setting the amount of memory used for the DVMT mode.	128MB	128MB of main memory can be used.
		256MB	256MB of main memory can be used.
		Maximum DVMT	The remaining available main memory can be used.
Boot Display Device	Determines which video channel should be enabled for a video device during the boot procedure.	Auto	Automatic selection.
		CRT only	Only use the CRT (Cathode Ray Tube) channel.
		TV only	Only use the TV channel.
		SDVO only	Only use the SDVO (Serial Digital Video Out) channel.
		CRT + SDVO	Use CRT and SDVO channel.
		LFP only	Only use the LFP (Local Flat Panel) channel.
		CRT + LFP	Use CRT + LFP channel.
Boot Display Preference	This option determines the order in which the devices on the connected channels LFP and SDVO should be checked and booted. **Information:** **The setting is only needed when the Boot Display Device option is set to "Auto".**	LFP SDVO-B SDVO-C	Local Flat Panel - Serial Digital Video B output - Serial Video C output.
		LFP SDVO-C SDVO-B	Local Flat Panel - Serial Digital Video C output - Serial Video B output.
		SDVO-B SDVO-C LFP	Serial Digital Video B output - Serial Digital Video C output - Local Flat Panel.
		SDVO-C SDVO-B LFP	Serial Digital Video C output - Serial Digital Video B output - Local Flat Panel.
Always Try Auto Panel Detect	This option first searches for EDID data in an external EEPROM to configure the LFP. If no EDID data is found, then the data selected under "Local Flat Panel Type" is used.	No	Disables this function.
		Yes	Enables this function.
Local Flat Panel Type	This option can be used to set a pre-defined profile for the LVDS channel.	Auto	Automatic detection and setting using the EDID data.
		VGA 1x18 (002h)	640 x 480
		VGA 1x18 (013h)	640 x 480
		SVGA 1x18 (01Ah)	800 x 600

Table 152: GM45 Advanced Graphics Configuration - Setting options

BIOS setting	Meaning	Setting options	Effect
		XGA 1x18 (006h)	1024 x 768
		XGA 2x18 (007h)	1024 x 768
		XGA 1x24 (008h)	1024 x 768
		XGA 2x24 (012h)	1024 x 768
		SXGA 2x24 (00Ah)	1280 x 1024
		SXGA 2x24 (018h)	1280 x 1024
		UXGA 2x24 (00Ch)	1600 x 1200
		Customized EDID 1	User-defined profile
		Customized EDID 2	User-defined profile
		Customized EDID 3	User-defined profile
SDVO local flat panel type	This option can be used to set a pre-defined profile for the SDVO LVDS channel. **Information:** **An SDVO LVDS transmitter must be connected to one of the SDVO ports, and the corresponding SDVO port device must be set to LVDS.**	Disabled	Deactivates this function.
		Auto	Automatic detection and setting using the EDID data.
		VGA 1x18 (002h)	640 x 480
		VGA 1x18 (013h)	640 x 480
		SVGA 1x18 (01Ah)	800 x 600
		XGA 1x18 (006h)	1024 x 768
		XGA 2x18 (007h)	1024 x 768
		XGA 1x24 (008h)	1024 x 768
		XGA 2x24 (012h)	1024 x 768
		SXGA 2x24 (00Ah)	1280 x 1024
		SXGA 2x24 (018h)	1280 x 1024
		UXGA 2x24 (00Ch)	1600 x 1200
		Customized EDID 1	User-defined profile
		Customized EDID 1	User-defined profile
		Customized EDID 1	User-defined profile
Local flat panel scaling	Determines the screen content should be output according to the defined Local Flat Panel Type.	Centering	The screen content is output centered on the display.
		Expand Text	The text is stretched across the entire surface of the display.
		Expand Graphics	The graphics are stretched across the entire surface of the display.
		Expand Text & Graphics	Text and graphics are stretched across the entire surface of the display.
SDVO Port B Configuration	Option for selecting the video device that is connected to the SDVO Port B, or to define the port as an HDMI or display port.	Disabled	No video device connected.
		HDMI Port	Port is configured as an HDMI port.
		Display Port	Port is configured as a display port.
		SDVO DVI	Video signal output is optimized for an SDVO DVI-compatible video device.
		SDVO TV	Video signal output is optimized for an SDVO TV-compatible video device.
		SDVO CRT	Video signal output is optimized for a SDVO CRT-compatible video device.
		SDVO LVDS	Video signal output is optimized for an SDVO LVDS-compatible video device.
		SDVO DVI-Analog	Video signal output is optimized for an analog SDVO DVI-compatible video device.
SDVO Port C Configuration	Option for selecting the video device that is connected to the SDVO Port C, or to define the port as an HDMI or display port.	Disabled	No video device connected.
		HDMI Port	Port is configured as an HDMI port.
		Display Port	Port is configured as a display port.
		SDVO DVI	Video signal output is optimized for an SDVO DVI-compatible video device.
		SDVO TV	Video signal output is optimized for an SDVO TV-compatible video device.
		SDVO CRT	Video signal output is optimized for a SDVO CRT-compatible video device.
		SDVO LVDS	Video signal output is optimized for an SDVO LVDS-compatible video device.
		SDVO DVI-Analog	Video signal output is optimized for an analog SDVO DVI-compatible video device.
SDVO/DVI Hotplug Support	If this option is set to enabled, the Windows XP graphics driver supports "hotplug" and "configuration mode persistence" for DVI monitors connected to a DVI SDVO transmitter. "Hotplug" support means that when a DVI monitor is connected while the operating system is running, it is detected automatically and activated. "Configuration mode persistence" means that, for example, a dual DVI configuration is automatically restored when both DVI monitors are reconnected, even if only one of them was connected and activated during a previous boot.	Enabled	"Hotplug" and "Configuration mode persistence" mode enabled.
		Disabled	"Hotplug" and "Configuration mode persistence" mode disabled.

Table 152: GM45 Advanced Graphics Configuration - Setting options

BIOS setting	Meaning	Setting options	Effect
Display Mode Persistence	"Display mode persistence" means that the operating system can remember and restore the previous display configuration. For example, a dual DVI configuration is automatically restored when both DVI monitors are reconnected, even if only one of them was connected and activated during a previous boot.	Enabled	Enables this function.
		Disabled	Disables this function.

Table 152: GM45 Advanced Graphics Configuration - Setting options

1.4.5 CPU Configuration

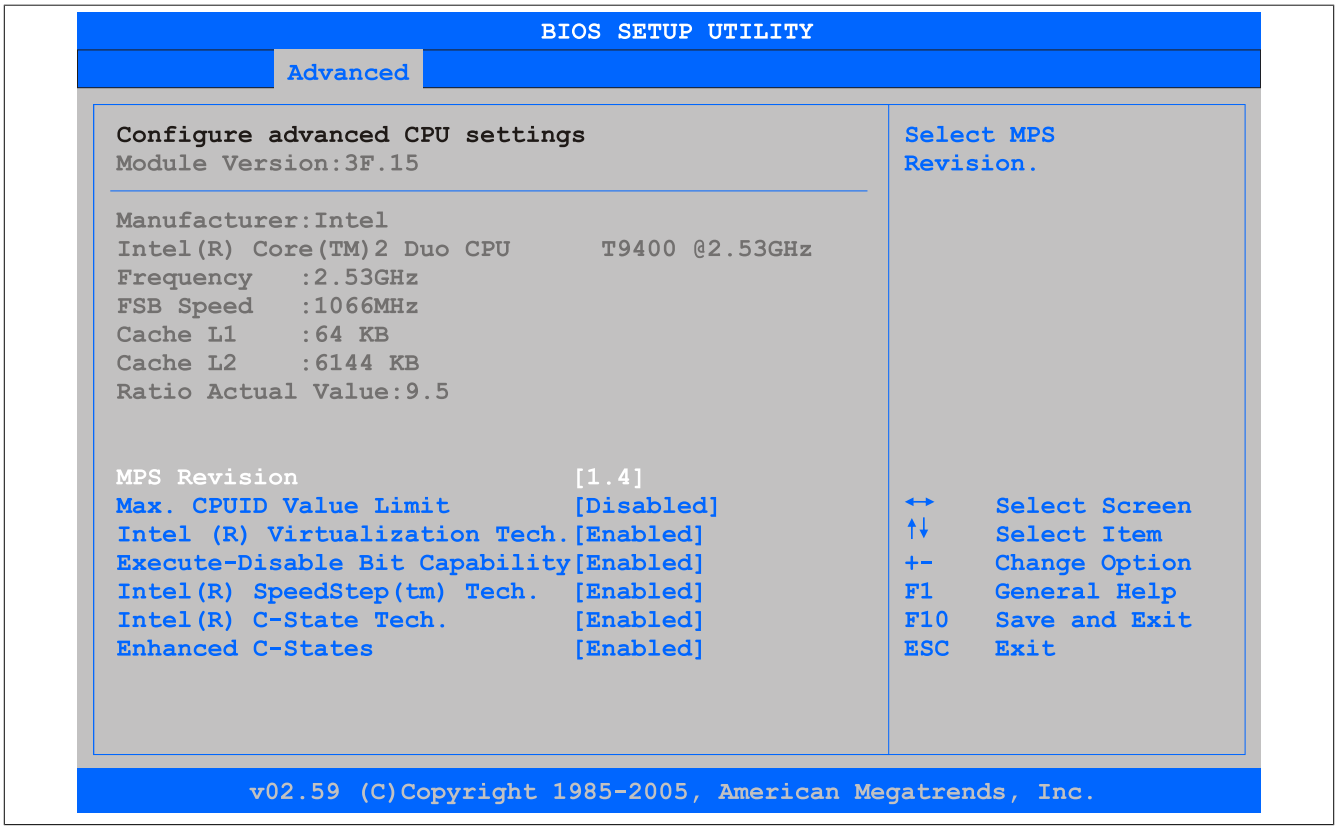

Image 94: GM45 Advanced CPU board monitor

BIOS setting	Meaning	Setting options	Effect
MPS Revision	This option supports the use of multiple CPUs (MPS=multi-processor system).	1.1	Sets MPS support Revision 1.1
		1.4	Sets MPS support Revision 1.4
Max CPUID value limit	Option for limiting the CPUID input value. This could be necessary for older operating systems.	Enabled	The processor limits the maximum CPUID input value to 03h if necessary when the the processor supports a higher value.
		Disabled	The processor returns the current maximum value upon request of the CPUID input value.
Intel(R) Virtualization Tech.	Option for activating or deactivating a virtual machine. **Information:** **You must restart in order to apply changes made to this setting.**	Disabled	Disables this function.
		Enabled	If the function is enabled, a virtual machine can use the additional hardware capacity.
Execute-Disable Bit Capability	Option for enabling or disabling hardware support for prevention of data execution.	Enabled	Enables this function.
		Disabled	Disables this function.
Intel(R) SpeedStep(tm) Tech.	Option for controlling the Intel(R) SpeedStep(TM) technology. The processor clock speed is increased or decreased according to the amount of calculations that must be made. As a result, the power consumption depends largely on the processor load.	Enabled	The processor speed is regulated by the operating system.
		Disabled	Disables SpeedStep technology.

Table 153: GM45 Advanced CPU Configuration - Setting options

BIOS setting	Meaning	Setting options	Effect
Intel(R) C-State Tech.	This setting allows the operating system to set processor clock rates on its own, thereby saving energy.	Disabled	Disables this function. Both processors are run at the same frequency.
		Enabled	Enables this function. The processors are run at different frequencies, thereby saving energy.
Enhanced C-States[1]	This setting allows the operating system to set processor clock rates on its own, thereby saving energy.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 153: GM45 Advanced CPU Configuration - Setting options

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

1.4.6 Chipset Configuration

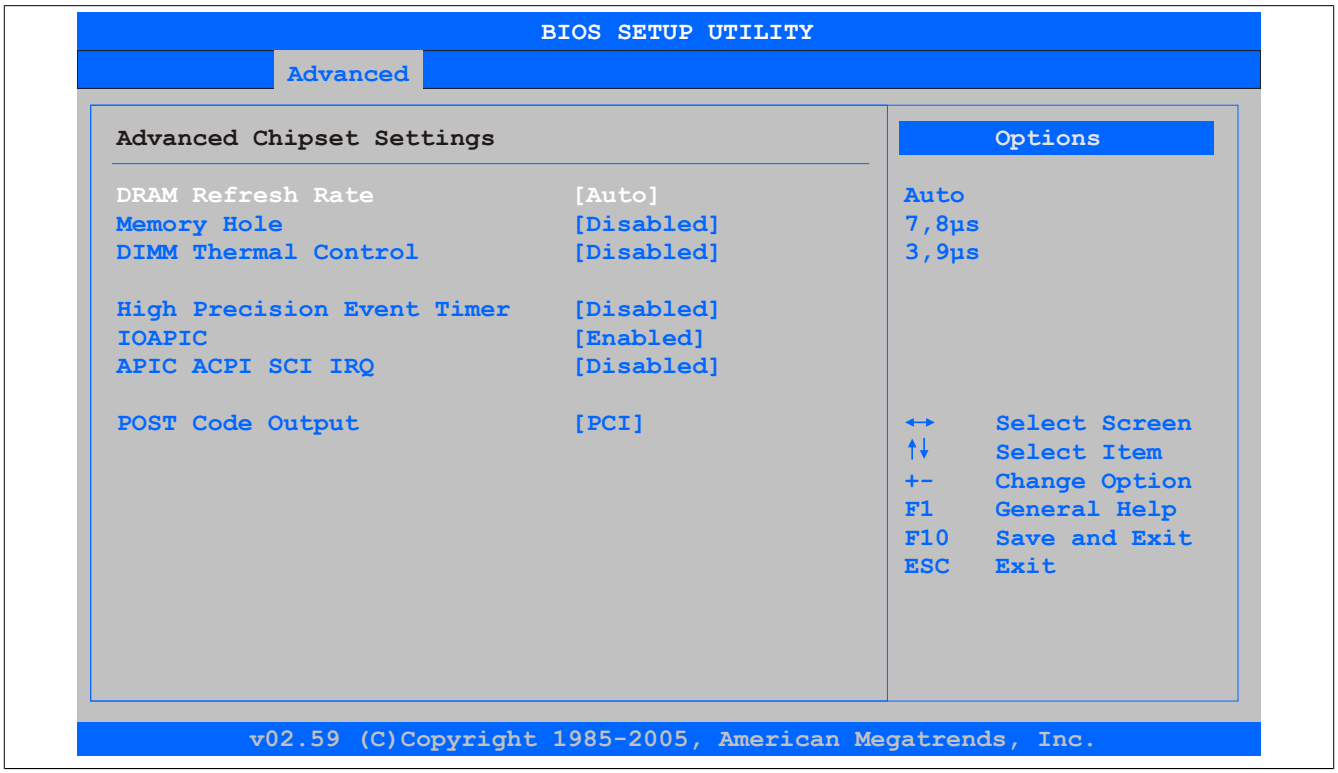

Image 95: GM45 Advanced Chipset Configuration

BIOS setting	Meaning	Setting options	Effect
DRAM Refresh Rate	Option for setting the DRAM refresh rate.	Auto	DRAM Refresh is read from the SPD data of the DRAM module.
		7.8 µs	Manual setting for the DRAM refresh rate.
		3.9 µs	Manual setting for the DRAM refresh rate.
Memory Hole	Option for ISA cards with frame buffer. Not relevant for a APC810.	Disabled	Disables this function.
		15MB-16MB	This address area is reserved.
DIMM Thermal Control	Option for setting the maximum surface temperature of the DIMM module. The module is cooled by limiting the memory bandwidth if the defined surface temperature is reached.	Disabled	Surface temperature not limited.
		40°C, 50°C, 60°C, 70°C, 80°C, 85°C, 90°C	Temperature limit value for the limitation.
High Precision Event Timer	The HPET is a timer inside the PC. It is able to trigger an interrupt with a high degree of accuracy, which allows other programs to better synchronize a variety of applications.	Enabled	Enables this function. This function is recommended for multimedia applications.
		Disabled	Disables this function.
IOAPIC	This option is used to activate or deactivate the APIC (Advanced Programmable Interrupt Controller). **Information:** **The IRQ resources available to the system are expanded when the APIC mode is enabled.**	Enabled	The IRQ resources available to the system are expanded when the APIC mode is enabled.
		Disabled	Disables this function.

Table 154: GM45 Advanced Chipset - Setting options

BIOS setting	Meaning	Setting options	Effect
APIC ACPI SCI IRQ	This option is used to modify the SCI IRQ when in APIC (Advanced Programmable Interrupt Controller) mode.	Enabled	IRQ20 is used for SCI.
		Disabled	IRQ9 is used for SCI.
POST Code Output	This option is used when the port 80h/84h BIOS POST code output should be routed to the PCI bus or the LPC bus.	PCI	Port 80h/84h is routed to the PCI bus.
		LPC	Port 80h/84h is routed to the LPC bus.

Table 154: GM45 Advanced Chipset - Setting options

1.4.7 I/O Interface Configuration

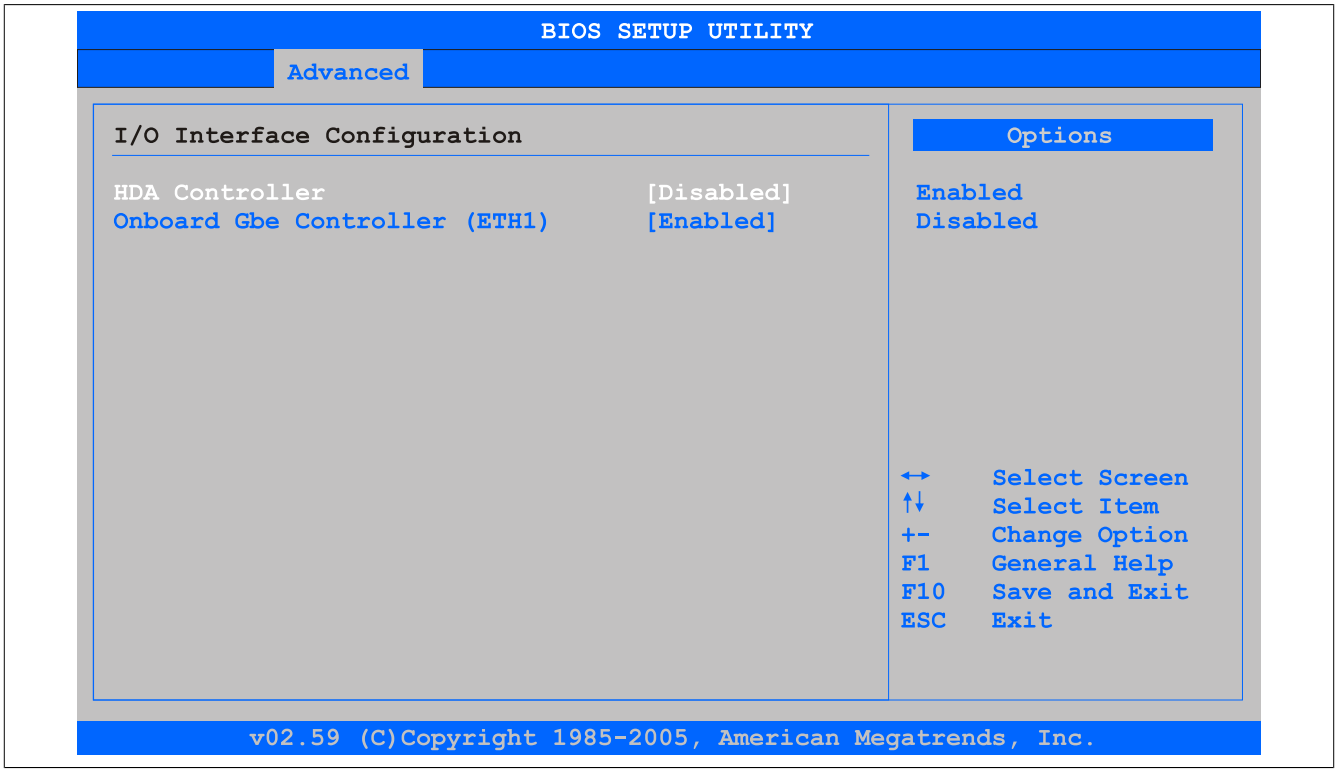

Image 96: GM45 Advanced I/O interface configuration

BIOS setting	Meaning	Setting options	Effect
HDA Controller	This option is used to turn the HDA controller on or off. **Information:** **The GM45 CPU board does not have a sound controller.**	Enabled	Enables the HDA controller.
		Disabled	Disables the HDA controller.
Onboard Gbe Controller (ETH1)	This option is used to turn the onboard Ethernet controller on or off.	Disabled	Onboard Ethernet controller is disabled.
		Enabled	Onboard Ethernet controller is enabled.

Table 155: GM45 Advanced I/O Interface Configuration - Setting options

1.4.8 Clock Configuration

```
BIOS SETUP UTILITY
Advanced

Clock Configuration                          Enable clock
                                             modulation to reduce
Spread Spectrum                [Disabled]    EMI.

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

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```

Image 97: GM45 Advanced clock configuration

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

Table 156: GM45 Advanced Clock Configuration - Setting options

1.4.9 IDE Configuration

```
BIOS SETUP UTILITY
Advanced

IDE Configuration                            Options

SATA Port 0/1                  [Compatible]  Disabled
SATA Port 2/3(opt. PATA Port)  [Enabled]     Compatible
PATA Detection Time Out (Sec)  [3]           Enhanced

▶ Primary IDE Master              : [Hard Disk]
▶ Secondary IDE Master            : [Not Detected]
▶ Third IDE Master                : [Not Detected]
▶ Fourth IDE Master               : [Not Detected]

Hard Disk Write Protect        [Disabled]
IDE Detect Time Out (Sec)      [35]          ←→    Select Screen
                                             ↑↓    Select Item
                                             +-    Change Option
                                             F1    General Help
                                             F10   Save and Exit
                                             ESC   Exit

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```

Image 98: GM45 Advanced IDE configuration

BIOS setting	Meaning	Setting options	Effect
SATA Port 0/1	Option for configuring the integrated SATA controller.	Compatible	The controller runs in Legacy or Compatible mode.
		Disabled	Disables the controller and both ports.
		Enhanced	The controller runs in Enhanced or Native mode.
Configure SATA Port 0/1 as[1]	The Serial ATA connections 0/1 supported by the Southbridge can be defined here.	IDE	The serial ATA hard drive is used as a parallel ATA physical memory drive.
		RAID	RAID 0, 1, 5, 10 or the Intel® Matrix storage technology can be configured here with the serial ATA hard drive.
		AHCI	The AHCI setting enables the internal memory driver for the SATA functions, which increase the storage performance for random read-write access by allowing the drive to determine the sequence of commands.
Hot Plug[2]	Option for turning SATA hotplug support on or off.	Disabled	Disables this function.
		Enabled	Enables this function.
SATA Port 2/3 (opt. PATA Port)	Option for turning integrated SATA controllers 2 and 3 on or off.	Disabled	Disables this function.
		Enabled	Enables this function.
PATA Detection Time Out (Sec)[3]	Configuring the time overrun limit value for the ATA/ATAPI device identification. This option only applies for PATA channels.	0,1,2,3,5,10,15.30	Time setting in seconds.
Primary IDE Master	The drive in the system that is connected to the primary IDE master port is configured here.	Enter	Opens the submenu See "Primary IDE Master" on page 200
Secondary IDE Master	The drive in the system that is connected to the secondary IDE master port is configured here.	Enter	Opens the submenu See "Secondary IDE Master" on page 201
Third IDE Master	The drive in the system that is connected to the third IDE master port is configured here.	Enter	Opens the submenu See "Third IDE Master" on page 202
Fourth IDE Master	The drive in the system that is connected to the fourth IDE master port is configured here.	Enter	Opens the submenu See "Fourth IDE Master" on page 203
Hard disk write protect	Write protection for the hard drive can be enabled/disabled here.	Enabled	Enables this function.
		Disabled	Disables this function.
IDE Detect Time Out (Sec)	Configuring the time overrun limit value for the ATA/ATAPI device identification. This option applies for SATA and PATA channels.	0, 5, 10, 15, 20, 25, 30, 35	Time setting in seconds.

Table 157: GM45 Advanced IDE Configuration - Setting options

1) These settings are only possible if *SATA Port 0/1* is set to *Enhanced*.
2) These settings are only possible if *Configure SATA Port 0/1 as* is set to *RAID* or *AHCI*.
3) These settings are only possible if *SATA Port 2/3 (opt. PATA Port)* is set to *Enabled*.

Primary IDE Master

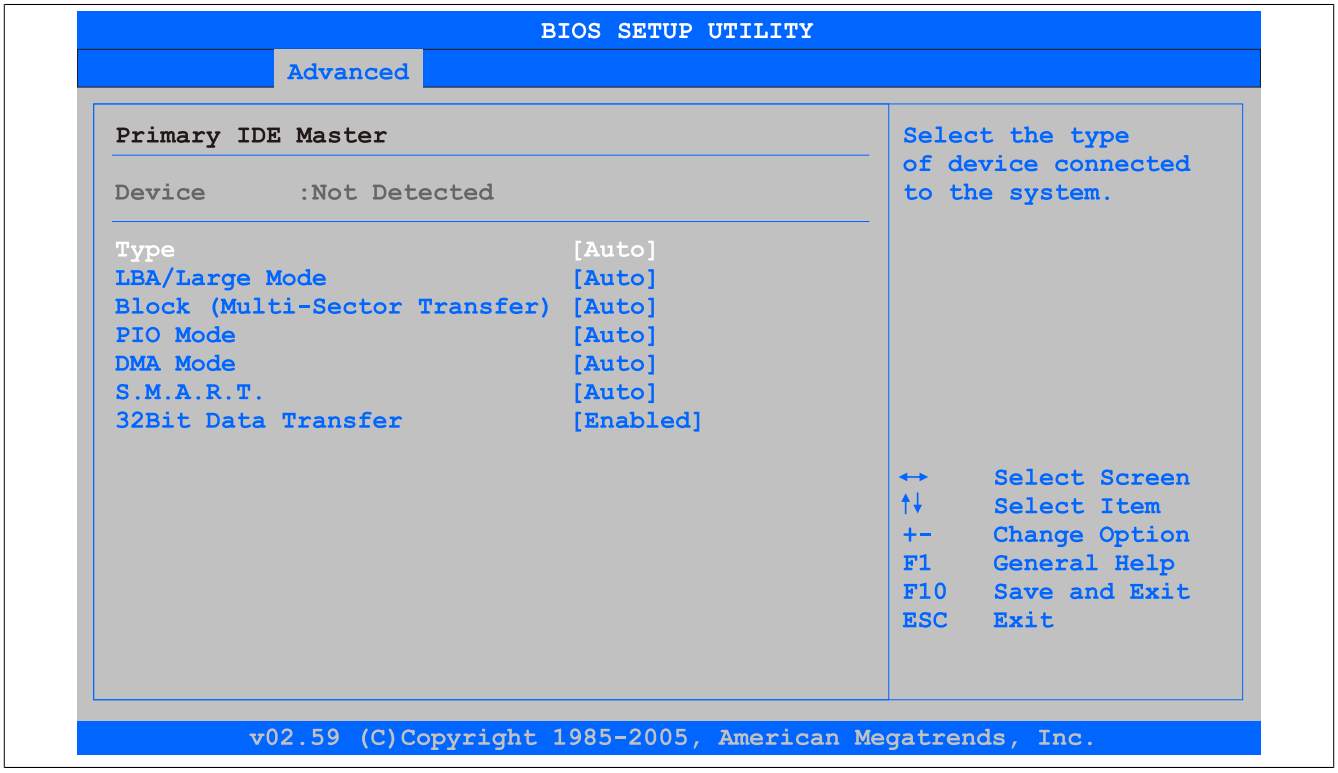

Image 99: GM45 Primary IDE master

BIOS setting	Meaning	Setting options	Effect
Type	The type of drive connected to the primary master is configured here.	Not installed	No drive installed.
		Auto	Automatic recognition of the drive and setup of appropriate values.
		CD/DVD	CD -/ DVD drive.
		ARMD	ARMD - drive (zip drive)
LBA/Large Mode	This option activates the logical block addressing / large mode for IDE.	Disabled	Disables this function.
		Auto	Automatic enabling of this function when supported by the system.
Block (Multi-Sector Transfer)	This option enables the block mode for IDE hard drives. When this option is enabled, the number of blocks per request from the configuration sector of the hard drive is read.	Disabled	Disables this function.
		Auto	Automatic enabling of this function when supported by the system.
PIO Mode	The PIO mode determines the data rate of the hard drive. **Information:** **This option is not available on the APC810. Therefore this setting is not relevant.**	Auto	Automatic configuration of PIO mode.
		0, 1, 2, 3, 4	Manual configuration of PIO mode.
DMA Mode	The data transfer rate to and from the primary master drive is defined here. The DMA mode must be activated in the Windows device manager in order to guarantee maximum performance. Only possible when manually setting up the drive.	Auto	Automatic definition of the transfer rate.
		Disabled	Manual definition of the transfer rate.
S.M.A.R.T.	Monitoring function of modern hard drives (self-monitoring, analysis and reporting technology).	Auto	Automatic detection and enabling.
		Enabled	Enables this function.
		Disabled	Disables this function.
32 Bit Data Transfer	This function enables 32-bit data transfer.	Enabled	Enables this function.
		Disabled	Disables this function.

Table 158: GM45 Primary IDE Master - Setting options

Secondary IDE Master

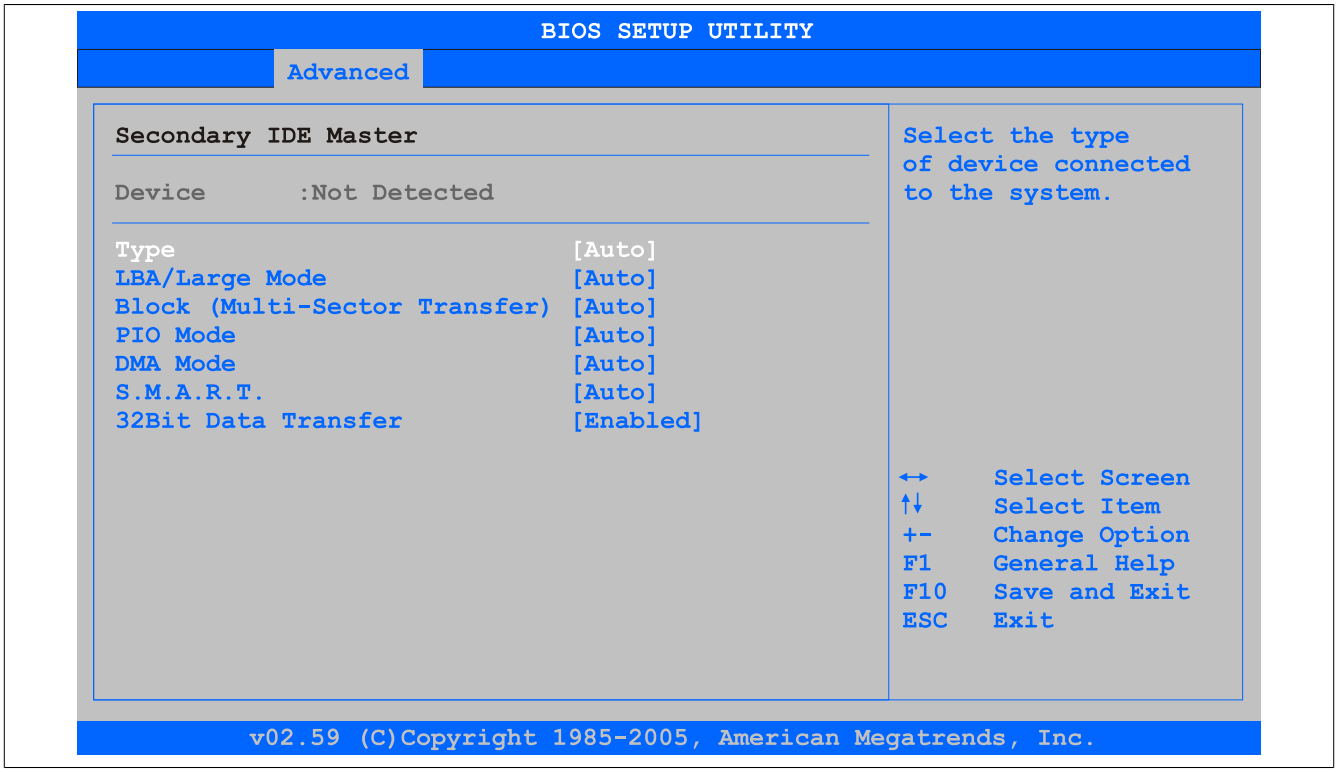

Image 100: GM45 Secondary IDE master

BIOS setting	Meaning	Setting options	Effect
Type	The type of drive connected to the secondary master is configured here.	Not installed	No drive installed.
		Auto	Automatic recognition of the drive and setup of appropriate values.
		CD/DVD	CD -/ DVD drive.
		ARMD	ARMD - drive (zip drive)

Table 159: GM45 Primary IDE Slave - Setting options

BIOS setting	Meaning	Setting options	Effect
LBA/Large Mode	This option activates the logical block addressing / large mode for IDE.	Disabled	Disables this function.
		Auto	Automatic enabling of this function when supported by the system.
Block (Multi-Sector Transfer)	This option enables the block mode for IDE hard drives. When this option is enabled, the number of blocks per request from the configuration sector of the hard drive is read.	Disabled	Disables this function.
		Auto	Automatic enabling of this function when supported by the system.
PIO Mode	The PIO mode determines the data rate of the hard drive. **Information:** **This option is not available on the APC810. Therefore this setting is not relevant.**	Auto	Automatic configuration of PIO mode.
		0, 1, 2, 3, 4	Manual configuration of PIO mode.
DMA Mode	The data transfer rate to and from the secondary master drive is defined here. The DMA mode must be activated in the Windows device manager in order to guarantee maximum performance. Only possible when manually setting up the drive.	Auto	Automatic definition of the transfer rate.
		Disabled	Manual definition of the transfer rate.
S.M.A.R.T.	Monitoring function of modern hard drives (self-monitoring, analysis and reporting technology).	Auto	Automatic detection and enabling.
		Enabled	Enables this function.
		Disabled	Disables this function.
32 Bit Data Transfer	This function enables 32-bit data transfer.	Enabled	Enables this function.
		Disabled	Disables this function.

Table 159: GM45 Primary IDE Slave - Setting options

Third IDE Master

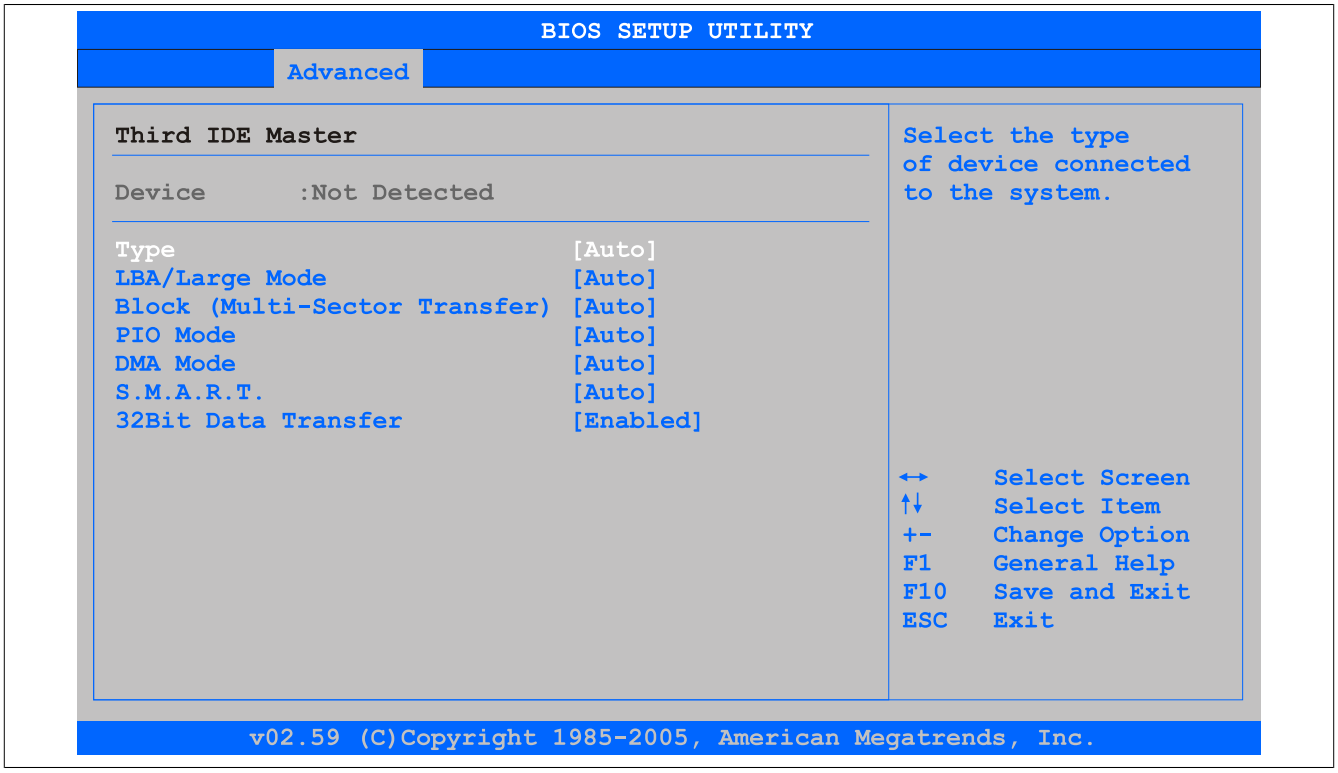

Image 101: GM45 Third IDE master

BIOS setting	Meaning	Setting options	Effect
Type	The type of drive connected to the third master is configured here.	Not installed	No drive installed.
		Auto	Automatic recognition of the drive and setup of appropriate values.
		CD/DVD	CD -/ DVD drive.
		ARMD	ARMD - drive (zip drive)
LBA/Large Mode	This option activates the logical block addressing / large mode for IDE.	Disabled	Disables this function.
		Auto	Automatic enabling of this function when supported by the system.

Table 160: GM45 - Secondary IDE master - Setting options

BIOS setting	Meaning	Setting options	Effect
Block (Multi-Sector Transfer)	This option enables the block mode for IDE hard drives. When this option is enabled, the number of blocks per request from the configuration sector of the hard drive is read.	Disabled	Disables this function.
		Auto	Automatic enabling of this function when supported by the system.
PIO Mode	The PIO mode determines the data rate of the hard drive. **Information:** **This option is not available on the APC810. Therefore this setting is not relevant.**	Auto	Automatic configuration of PIO mode.
		0, 1, 2, 3, 4	Manual configuration of PIO mode.
DMA Mode	The data transfer rate to and from the third master drive is defined here. The DMA mode must be activated in the Windows device manager in order to guarantee maximum performance. Only possible when manually setting up the drive.	Auto	Automatic definition of the transfer rate.
		Disabled	Manual definition of the transfer rate.
S.M.A.R.T.	Monitoring function of modern hard drives (self-monitoring, analysis and reporting technology).	Auto	Automatic detection and enabling.
		Enabled	Enables this function.
		Disabled	Disables this function.
32 Bit Data Transfer	This function enables 32-bit data transfer.	Enabled	Enables this function.
		Disabled	Disables this function.

Table 160: GM45 - Secondary IDE master - Setting options

Fourth IDE Master

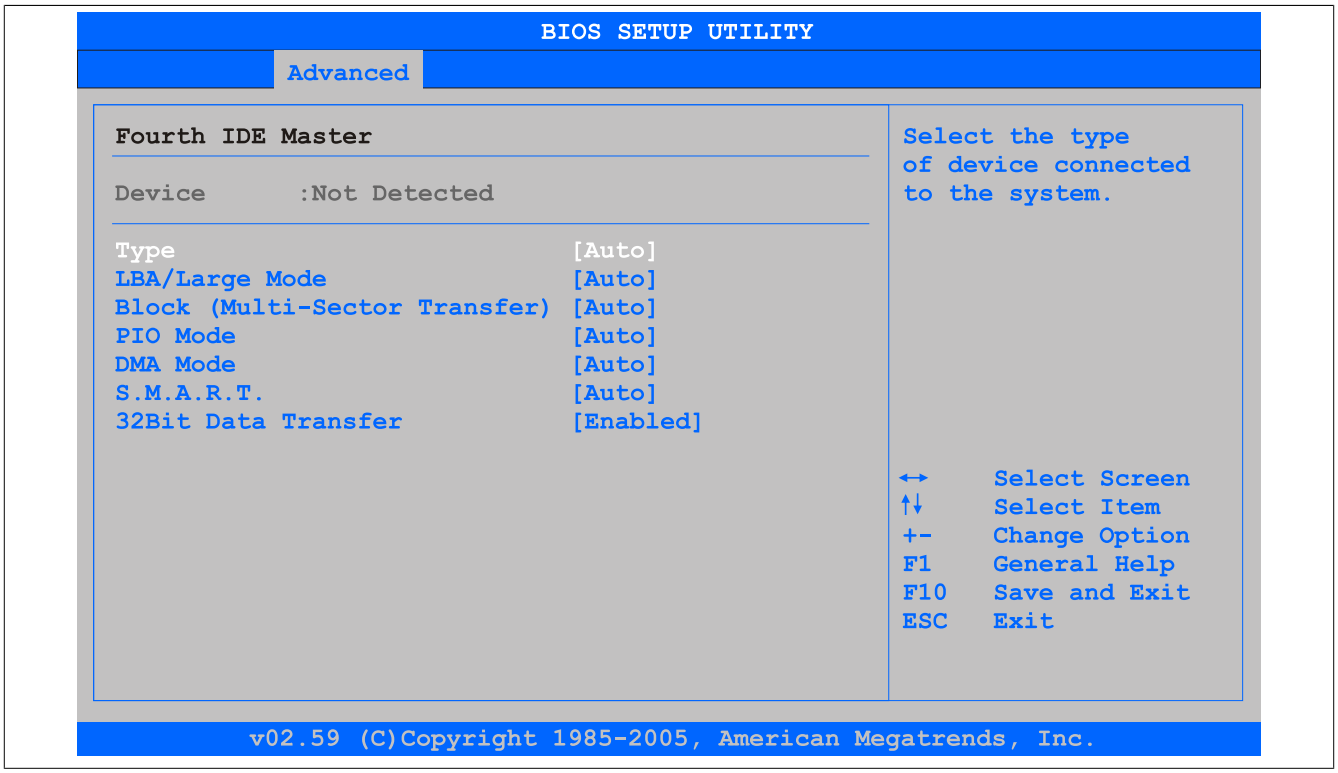

Image 102: GM45 Fourth IDE master

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

Table 161: GM45 Secondary IDE Slave - Setting options

BIOS setting	Meaning	Setting options	Effect
PIO Mode	The PIO mode determines the data rate of the hard drive. **Information:** **This option is not available on the APC810. Therefore this setting is not relevant.**	Auto	Automatic configuration of PIO mode.
		0, 1, 2, 3, 4	Manual configuration of PIO mode.
DMA Mode	The data transfer rate to and from the fourth master drive is defined here. The DMA mode must be activated in the Windows device manager in order to guarantee maximum performance. Only possible when manually setting up the drive.	Auto	Automatic definition of the transfer rate.
		Disabled	Manual definition of the transfer rate.
S.M.A.R.T.	Monitoring function of modern hard drives (self-monitoring, analysis and reporting technology).	Auto	Automatic detection and enabling.
		Enabled	Enables this function.
		Disabled	Disables this function.
32 Bit Data Transfer	This function enables 32-bit data transfer.	Enabled	Enables this function.
		Disabled	Disables this function.

Table 161: GM45 Secondary IDE Slave - Setting options

1.4.10 USB configuration

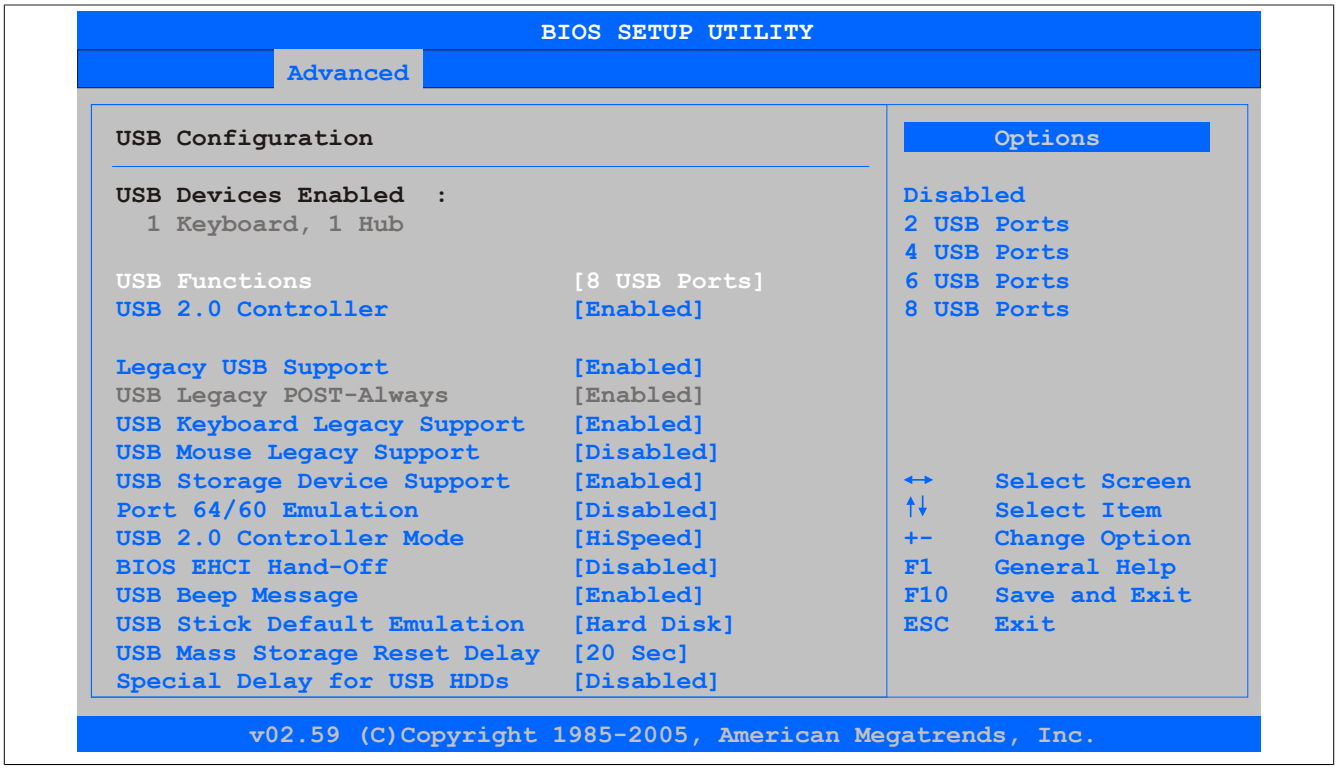

Image 103: GM45 Advanced USB configuration

BIOS setting	Meaning	Setting options	Effect
USB Function	USB ports can be enabled/disabled here. The USB numbers (e.g. USB1, USB3, etc.) are printed on the APC810 housing).	Disabled	Disables the USB port.
		2 USB Ports	USB1, USB3 are enabled.
		4 USB Ports	USB1, USB2, USB3, USB4 are enabled.
		6 USB Ports	USB1, USB2, USB3, USB4, USB5 are enabled.
		8 USB Ports	USB1, USB2, USB3, USB4, USB5, USB are enabled on an AP via SDL.
USB 2.0 Controller	Option for enabling or disabling USB 2.0 mode.	Enabled	All USB interfaces run in USB 2.0 mode.
		Disabled	All USB interfaces run in USB 1.1 mode.
Legacy USB Support	Legacy USB support can be enabled/disabled here. USB ports do not function during startup. USB is supported again after the operating system has started. A USB keyboard is still recognized during the POST.	Enabled	Enables this function.
		Disabled	Disables this function.
		Auto	Automatic enabling.
USB Legacy POST-Always	Legacy USB support is enabled during the POST (Power On Self Test) regardless of the Legacy USB support setting.	None (automatically enabled)	The BIOS Setup can be called up during the POST using a USB keyboard.
USB Keyboard Legacy Support	USB keyboard support can be enabled/disabled here.	Enabled	Enables this function.
		Disabled	Disables this function.

Table 162: GM45 Advanced USB Configuration - Setting options

BIOS setting	Meaning	Setting options	Effect
USB Mouse Legacy Support	USB mouse support can be enabled/disabled here.	Enabled	Enables this function.
		Disabled	Disables this function.
USB Storage Device Support	USB memory device support can be enabled/disabled here.	Enabled	Enables this function.
		Disabled	Disables this function.
Port 64/60 Emulation	Port 64/60 emulation can be enabled/disabled here.	Enabled	USB keyboard functions in Windows NT.
		Disabled	USB keyboard functions in all systems excluding Windows NT.
USB 2.0 Controller Mode	Settings can be made for the USB controller here.	Full Speed	12 MBps
		Hi Speed	480 MBps
BIOS EHCI Hand-Off	The support for the operating system can be set up without the fully automatic EHCI function.	Enabled	Enables this function.
		Disabled	Disables this function.
USB Beep Message	Option for outputting a tone each time a USB device is detected by the BIOS during the POST.	Enabled	Enables this function.
		Disabled	Disables this function.
USB Stick Default Emulation	You can set how the USB device is to be used.	Auto	USB devices with fewer than 530MB of memory are simulated as floppy disk drives and devices with larger capacities are simulated as hard drives.
		Hard Disk	An HDD-formatted drive can be used as an FDD (e.g. zip drive) for starting the system.
USB Mass Storage Reset Delay	The waiting time that the USB device POST requires after the device start command can be set. **Information:** **The message "No USB mass storage device detected" is displayed if no USB memory device has been installed.**	10 Sec, 20 Sec, 30 Sec, 40 Sec	Value set manually.
Special Delay for USB HDDs	Option for setting a boot delay prior to counting USB 2.0 devices, which allows slow-booting USB devices (e.g. USB hard disks) to boot. **Information:** **This option should only be used when required, since it would otherwise unnecessarily extend the boot process by the configured time.**	Disabled	Disables this function. No boot delay is added.
		1 Sec, 2 Sec, 3 Sec, 4 Sec, 5 Sec, 7 Sec, 10 Sec	A boot delay of 1, 2, 3, 4, 5, 7 or 10 seconds is added.

Table 162: GM45 Advanced USB Configuration - Setting options

1.4.11 Keyboard/Mouse configuration

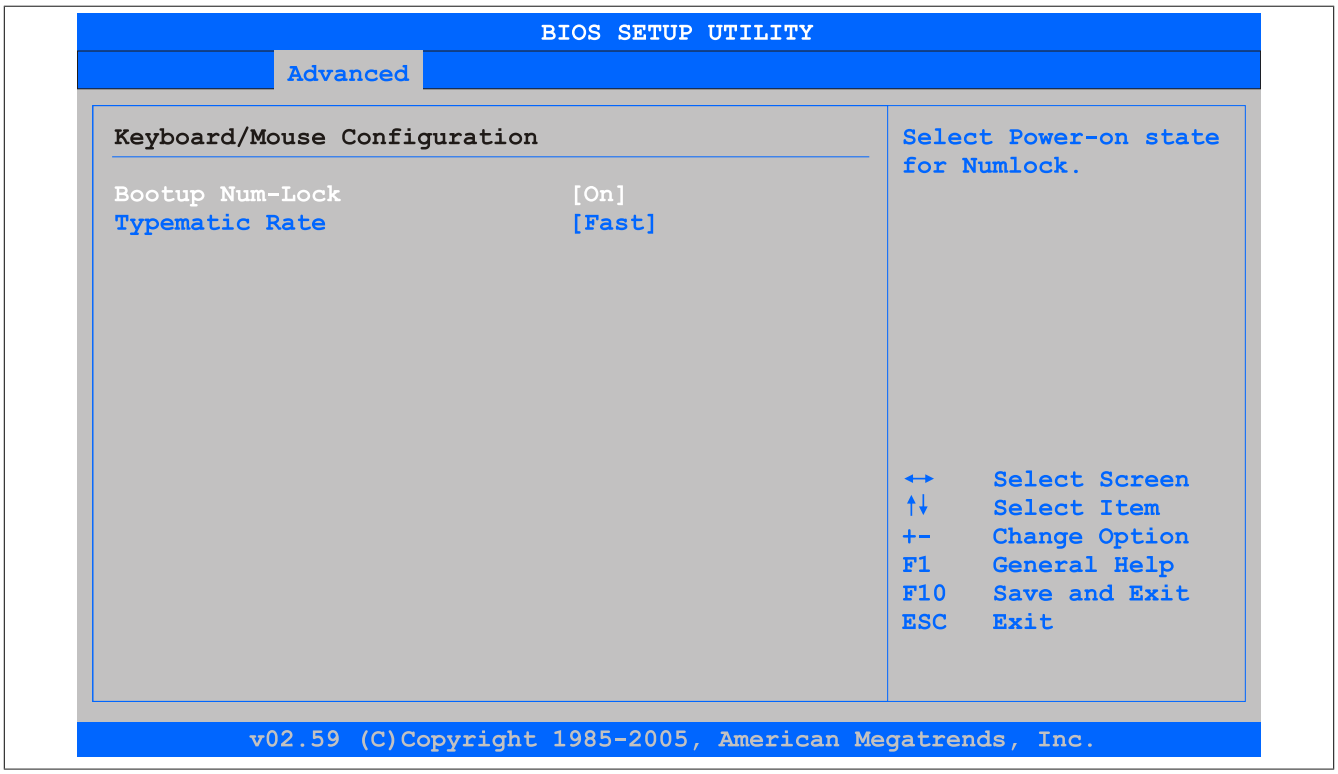

Image 104: GM45 Advanced keyboard/mouse configuration

BIOS setting	Meaning	Setting options	Effect
Boot-up Num-lock	With this field you can define the state of the Num-Lock key when booting.	Off	Only the cursor functions of the numerical keypad are activated.
		On	Numeric keypad is enabled.
Typematic rate	The key repeat function is set here.	Slow	Slow key repeat.
		Fast	Fast key repeat.

Table 163: GM45 Advanced Keyboard/Mouse Configuration - Setting options

1.4.12 CPU Board Monitor

Information:

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

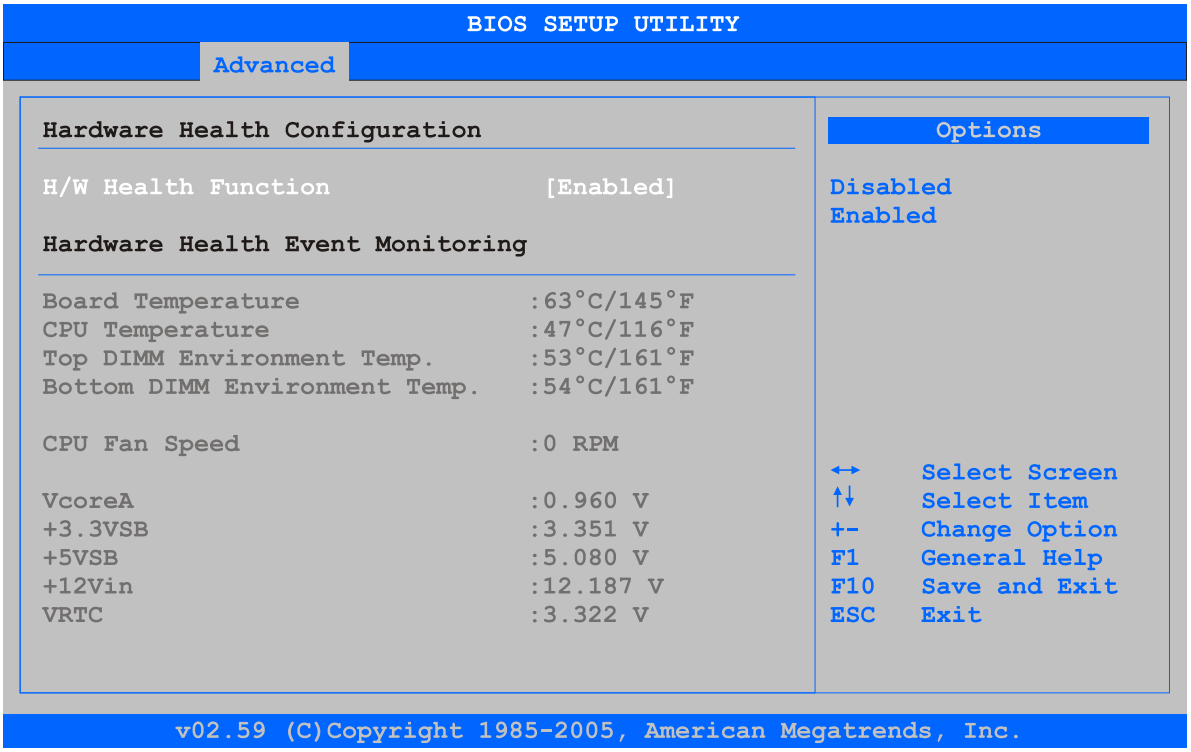

Image 105: GM45 Advanced CPU board monitor

BIOS setting	Meaning	Setting options	Effect
H/W Health Function	Option for displaying all values on this page.	Enabled	Displays all values.
		Disabled	No values are shown on this page.
Board temperature	Displays the board temperature in degrees Celsius and Fahrenheit.	None	-
CPU temperature	Displays the processor's temperature (in degrees Celsius and Fahrenheit).	None	-
Top DIMM Environment Temp.	Displays the temperature of the first DRAM module.	None	-
Bottom DIMM Environment Temp.	Displays the temperature of the second DRAM module.	None	-
CPU Fan Speed	Displays the rotating speed of the processor fan.	None	-
VcoreA	Displays the processor's core voltage A in volts.	None	-
+3.3VSB	Displays the current voltage of the 3.3 volt supply.	None	-
+5VSB	Displays the current voltage of the 5 volt supply.	None	-
+12Vin	Displays the current voltage of the 12 volt supply.	None	-
VRTC	Displays the battery voltage (in volts).	None	-

Table 164: GM45 Advanced CPU Board Monitor - Setting options

1.4.13 Main Board/Panel Features

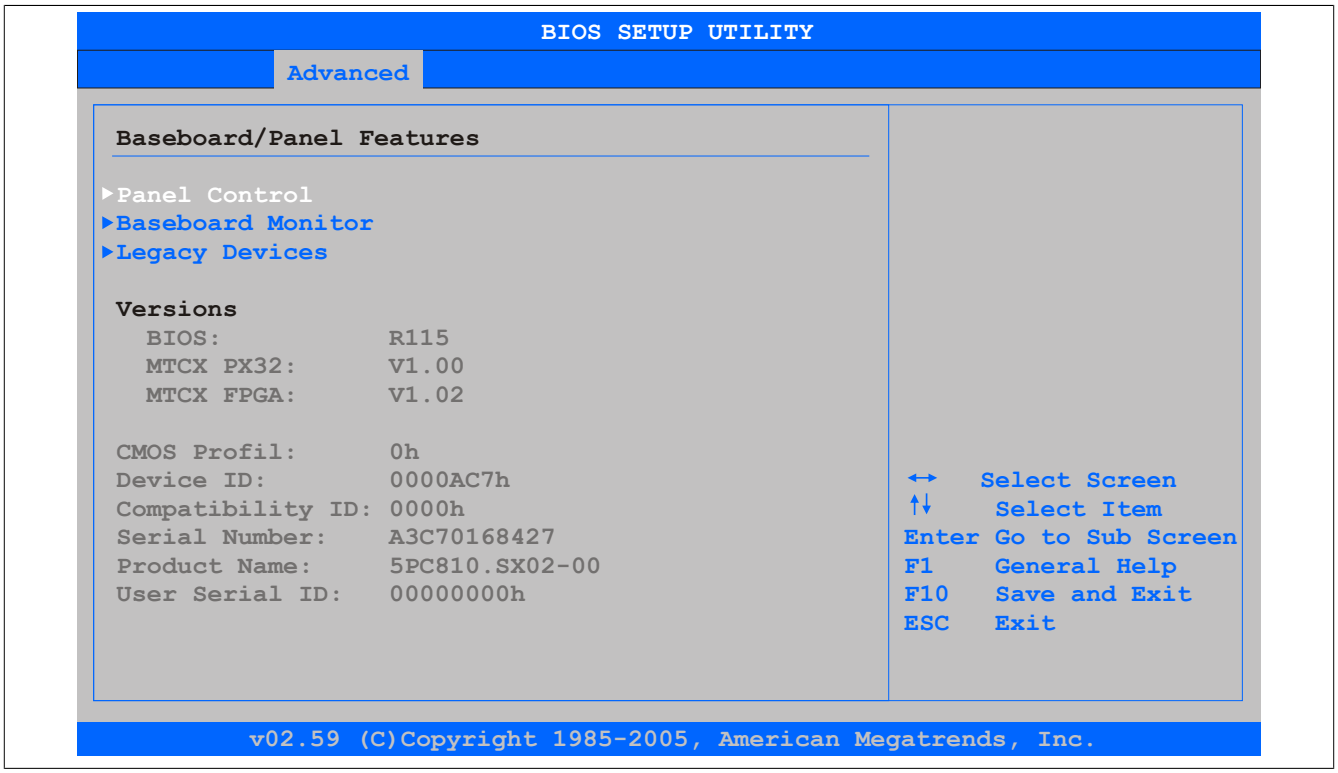

Image 106: GM45 Advanced Baseboard/Panel Features

BIOS setting	Meaning	Setting options	Effect
Panel control	For special setup of connected panels (display units).	Enter	Opens the submenu See " Panel control" on page 209
Main board monitor	Display of various temperatures and fan speeds.	Enter	Opens the submenu See " Baseboard Monitor" on page 210
Legacy devices	Special settings for the interface can be changed here.	Enter	Opens the submenu See " Legacy Devices" on page 211
BIOS	Displays the BIOS version.	None	-
MTCX PX32	Displays the MTCX PX32 firmware version.	None	-
MTCX FPGA	Displays the MTCX FPGA firmware version.	None	-
CMOS profile	Shows the CMOS profile number.	None	-
Device ID	Displays the hexadecimal value of the hardware device ID.	None	-
Compatibility ID	Displays the version of the device within the same B&R device code. This ID is needed for Automation Runtime.	None	-
Serial Number	Displays the B&R serial number.	None	-
Product name	Displays the B&R model number.	None	-
User serial ID	Displays the user serial ID. This 8 digit hex value can be freely assigned by the user (e.g. to give the device a unique ID) and can only be changed with using the "B&R Control Center" via the ADI driver.	None	-

Table 165: GM45 Advanced Baseboard/Panel Features - Setting options

Panel control

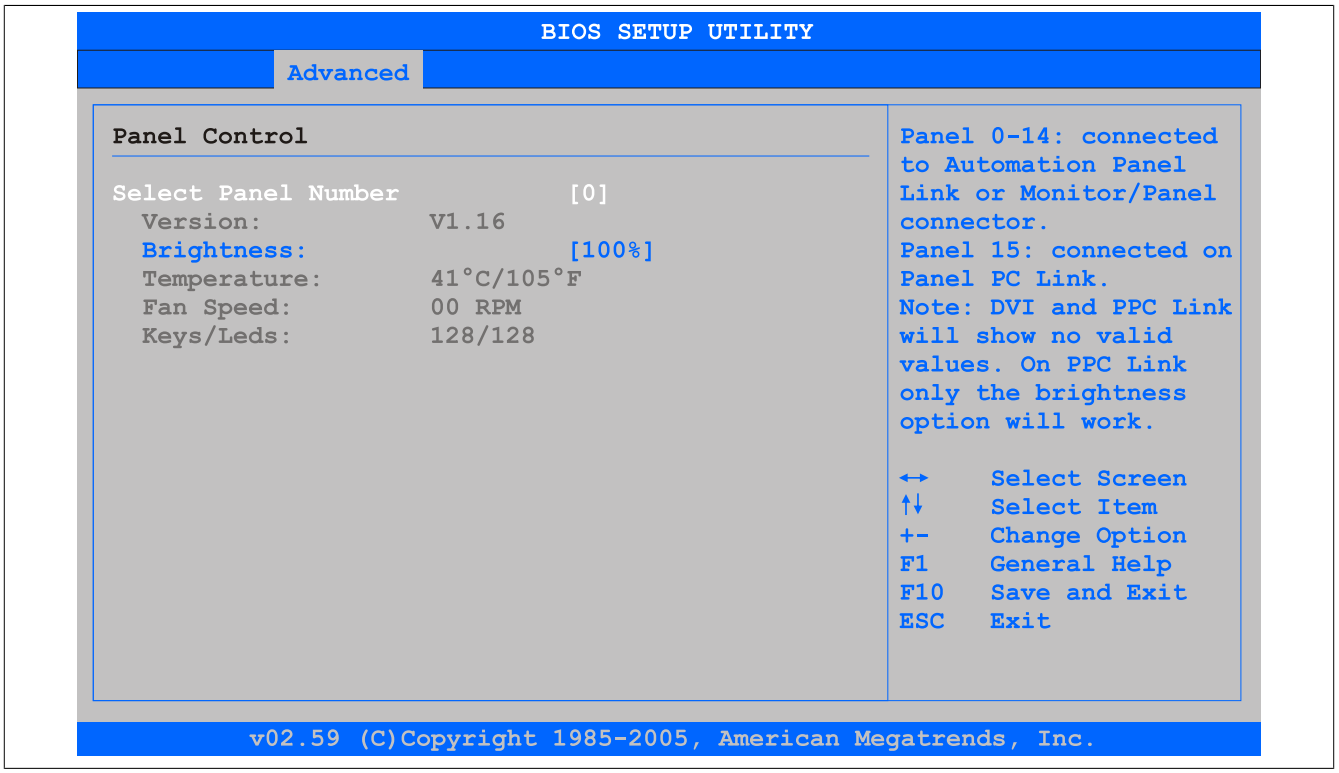

Image 107: GM45 Panel control

BIOS setting	Meaning	Setting options	Effect
Select panel number	Selection of the panel number for which the values should be read out and/or changed.	0...15	Selection of panel 0 ... 15. Panel 15 is specifically intended for panel PC 800 systems.
Version	Displays the firmware version of the SDLR controller.	None	-
Brightness	For setting the brightness of the selected panel.	0%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 100%	For setting the brightness (in %) of the selected panel. Changes take effect after saving and restarting the system (e.g. by pressing <F10>).
Temperature	Displays the selected panel's temperature (in degrees Celsius and Fahrenheit).	None	-
Fan speed	Displays fan speed for the selected panel.	None	-
Keys/LEDs	Displays the available keys and LEDs on the selected panel.	None	-

Table 166: GM45 Panel Control - Setting options

Baseboard Monitor

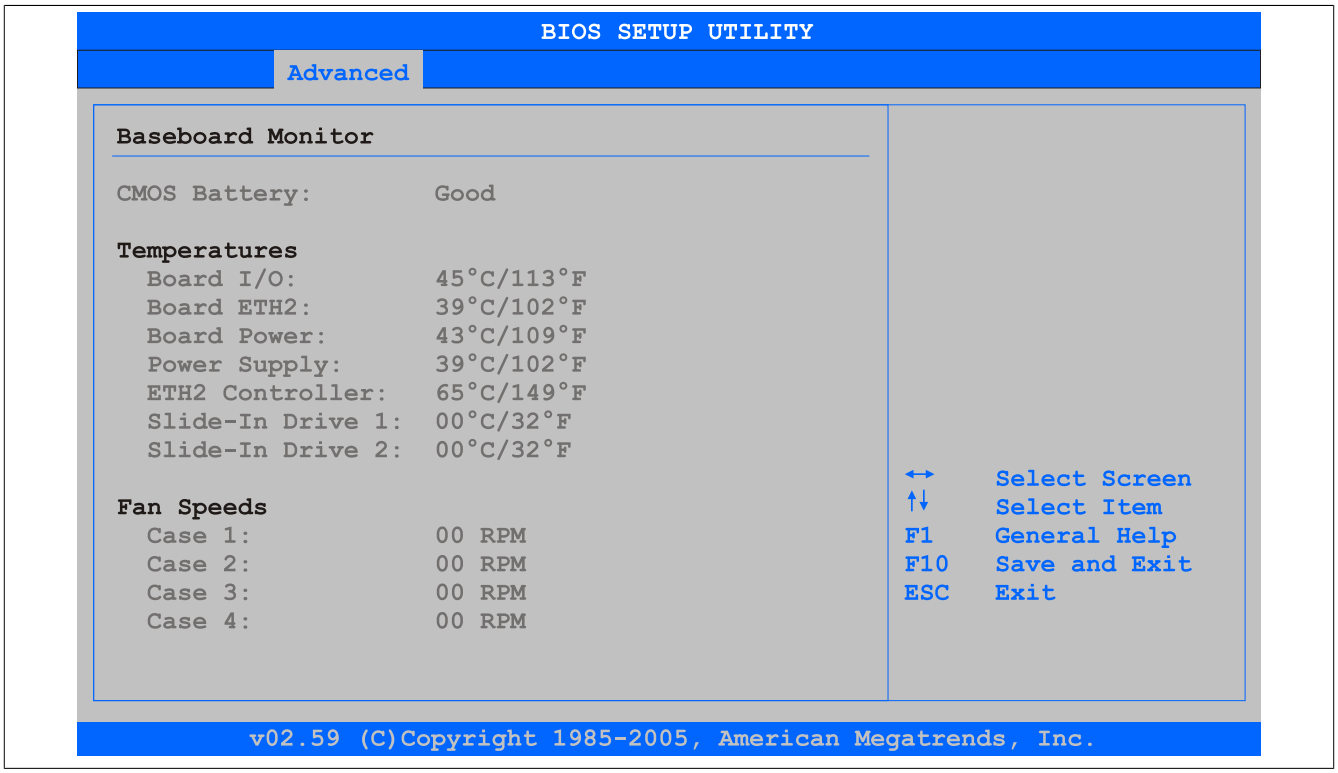

Image 108: GM45 Baseboard monitor

BIOS setting	Meaning	Setting options	Effect
CMOS battery	Displays the battery status. **n.a.** - not available **Good** - Battery is OK. **Bad** - Battery is dead.	None	-
Board I/O	Displays the temperature in the I/O area in degrees Celsius and Fahrenheit.	None	-
Board ETH2	Displays the temperature in the ETH2 controller chip area in degrees Celsius and Fahrenheit.	None	-
Board Power	Displays the power supply temperature in degrees Celsius and Fahrenheit.	None	-
Power supply	Displays the temperature in the power supply in degrees Celsius and Fahrenheit.	None	-
ETH2 Controller	Displays the temperature of the ETH2 controller in degrees Celsius and Fahrenheit.	None	-
Slide-in drive 1	Displays the temperature of the slide-in drive 1 in degrees Celsius and Fahrenheit.	None	-
Slide-in drive 2	Displays the temperature of the slide-in drive 2 in degrees Celsius and Fahrenheit.	None	-
Case 1	Displays the fan speed of housing fan 1.	None	-
Case 2	Displays the fan speed of housing fan 2.	None	-
Case 3	Displays the fan speed of housing fan 3.	None	-
Case 4	Displays the fan speed of housing fan 4.	None	-

Table 167: GM45 Baseboard Monitor - Setting options

Legacy Devices

```
BIOS SETUP UTILITY
Advanced

Legacy Devices                                  Enable/Disable the
                                                COM 1 port.
COM A:                          [Enabled]
  Base I/O address:             [3F8]
  Interrupt:                    [IRQ 4]
COM B:                          [Enabled]
  Base I/O address:             [2F8]
  Interrupt:                    [IRQ 3]
COM C:                          [Disabled]
COM D:                          [Disabled]
COM E:                          [Disabled]
CAN:                            [Disabled]
                                                ←→    Select Item
                                                ↑↓    Select Screen
Hardware Security Key:          [Enabled]       +-    Change Option
  Base I/O address              [378]           F1    General Help
                                                F10   Save and Exit
ETH2 LAN controller:            [Enabled]       ESC   Exit
ETH2 MAC Address:               00:60:65:07:70:F2

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```

Image 109: GM45 Legacy devices

BIOS setting	Meaning	Setting options	Effect
COM A	Settings for the **COM1** serial interface in the system.	Enabled	Enables the interface.
		Disabled	Disables the interface.
Base I/O address	Selection of the base I/O address for the COM port.	238, 2E8, 2F8, 328, 338, 3E8, 3F8	Selected base I/O address is assigned.
Interrupt	Selection of the interrupt for the COM port.	IRQ 3, IRQ 4, IRQ 5, IRQ 6, IRQ 7, IRQ 10, IRQ 11, IRQ 12	Selected interrupt is assigned.
COM B	Settings for the **COM2** serial interface in the system.	Disabled	Disables the interface.
		Enabled	Enables the interface.
Base I/O address	Selection of the base I/O address for the COM port.	238, 2E8, 2F8, 328, 338, 3E8, 3F8	Selected base I/O address is assigned.
Interrupt	Selection of the interrupt for the COM port.	IRQ 3, IRQ 4, IRQ 5, IRQ 6, IRQ 7, IRQ 10, IRQ 11, IRQ 12	Selected interrupt is assigned.
COM C	Setting the COM port for the **touch screen on the monitor/panel** connector.	Enabled	Enables the interface.
		Disabled	Disables the interface.
Base I/O address	Selection of the base I/O address for the COM port.	238, 2E8, 2F8, 328, 338, 3E8, 3F8	Selected base I/O address is assigned.
Interrupt	Selection of the interrupt for the COM port.	IRQ 3, IRQ 4, IRQ 5, IRQ 6, IRQ 7, IRQ 10, IRQ 11, IRQ 12	Selected interrupt is assigned.
COM D	Setting of the COM port for the **touch screen on the AP Link** connector.	Enabled	Enables the interface.
		Disabled	Disables the interface.
Base I/O address	Selection of the base I/O address for the COM port.	238, 2E8, 2F8, 328, 338, 3E8, 3F8	Selected base I/O address is assigned.
Interrupt	Selection of the interrupt for the COM port.	IRQ 3, IRQ 4, IRQ 5, IRQ 6, IRQ 7, IRQ 10, IRQ 11, IRQ 12	Selected interrupt is assigned.
COM E	Setting the COM port for the **B&R add-on interface option** 5AC600.485I-00 (IF option).	Enabled	Enables the interface.
		Disabled	Disables the interface.
Base I/O address	Selection of the base I/O address for the COM port.	238, 2E8, 2F8, 328, 338, 3E8, 3F8	Selected base I/O address is assigned.
Interrupt	Selection of the interrupt for the COM port.	IRQ 3, IRQ 4, IRQ 5, IRQ 6, IRQ 7, IRQ 10, IRQ 11, IRQ 12	Selected interrupt is assigned.
CAN	Setting the CAN port for the **B&R add-on CAN interface card** 5AC600.CANI- 00 (IF option).	Disabled	Disables the interface.
		Enabled	Enables the interface.
Base I/O address	Selection of the base I/O address for the CAN port.	None	-
Interrupt	Selection of the interrupt for the CAN port.	IRQ 10, NMI	Selected interrupt is assigned.
Hardware Security Key	Settings for the hardware security key (Dongle) are made here.	Disabled	Disables the interface.
		Enabled	Enables the interface.

Table 168: GM45 Legacy Devices - Setting options

BIOS setting	Meaning	Setting options	Effect
Base I/O address	Selection of the base I/O address for the hardware security interface.	278, 378, 3BC	Selection of the base I/O address for the parallel port.
ETH2 LAN controller	For turning the onboard LAN controller (ETH2) on and off.	Enabled	Enables the controller.
		Disabled	Disables the controller.
ETH2 MAC Address	Displays the Ethernet 2 controller MAC address.	None	-

Table 168: GM45 Legacy Devices - Setting options

1.5 Boot

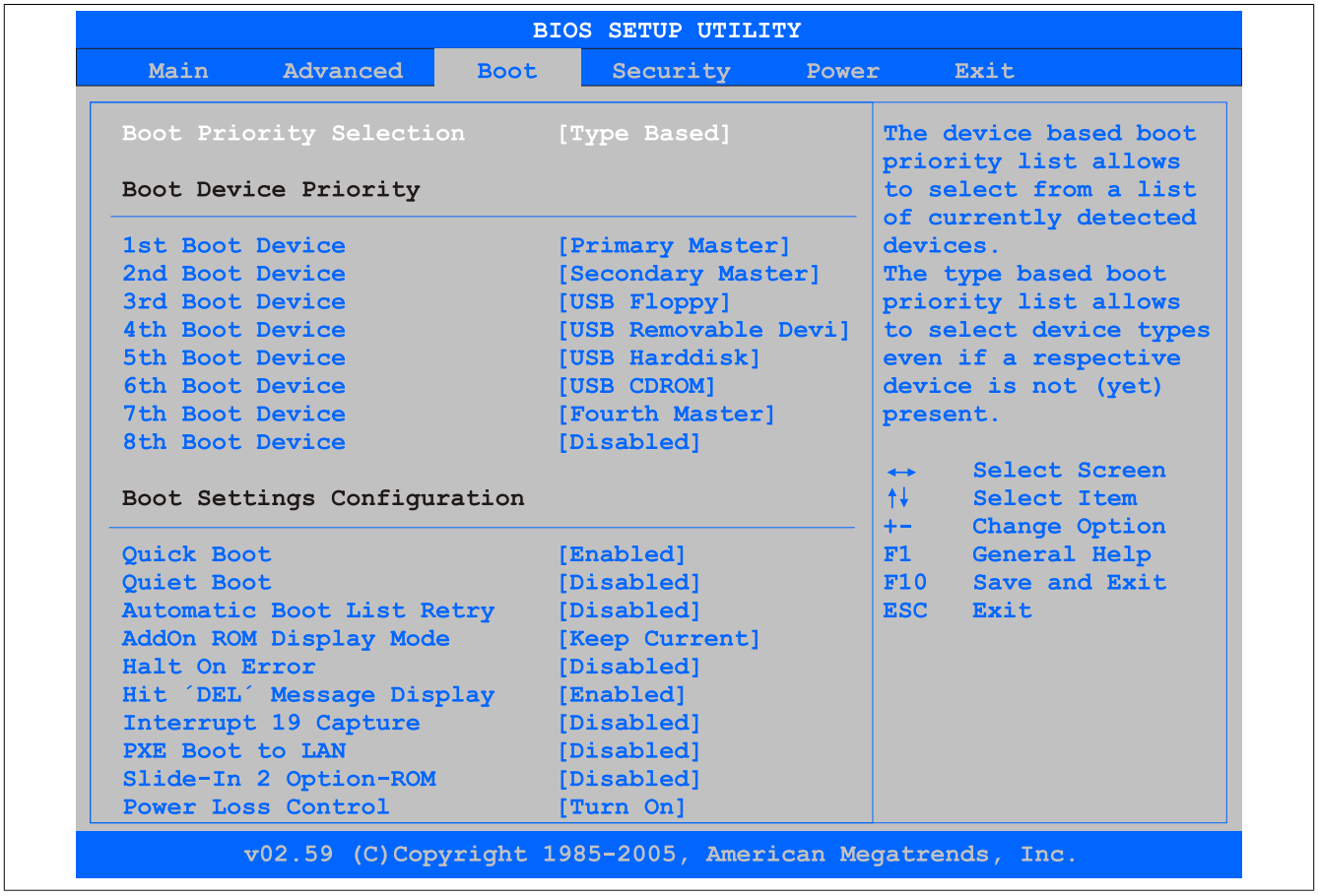


Image 110: GM45 Boot menu

BIOS setting	Meaning	Setting options	Effect
Boot Priority Selection	The method for when the drives should be booted can be set here.	Device Based	Only the devices that are recognized by the system are listed. The sequence of this list can be changed. **Information:** **Either "device based" or "type based" must be used. Mixed operation is not permitted.**
		Type Based	The boot sequence of a device type list can be changed. Device types that are not connected can also be entered to this list. **Information:** **Either "device based" or "type based" must be used. Mixed operation is not permitted.**

Table 169: GM45 Boot menu - Setting options

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

Table 169: GM45 Boot menu - Setting options

1.6 Security

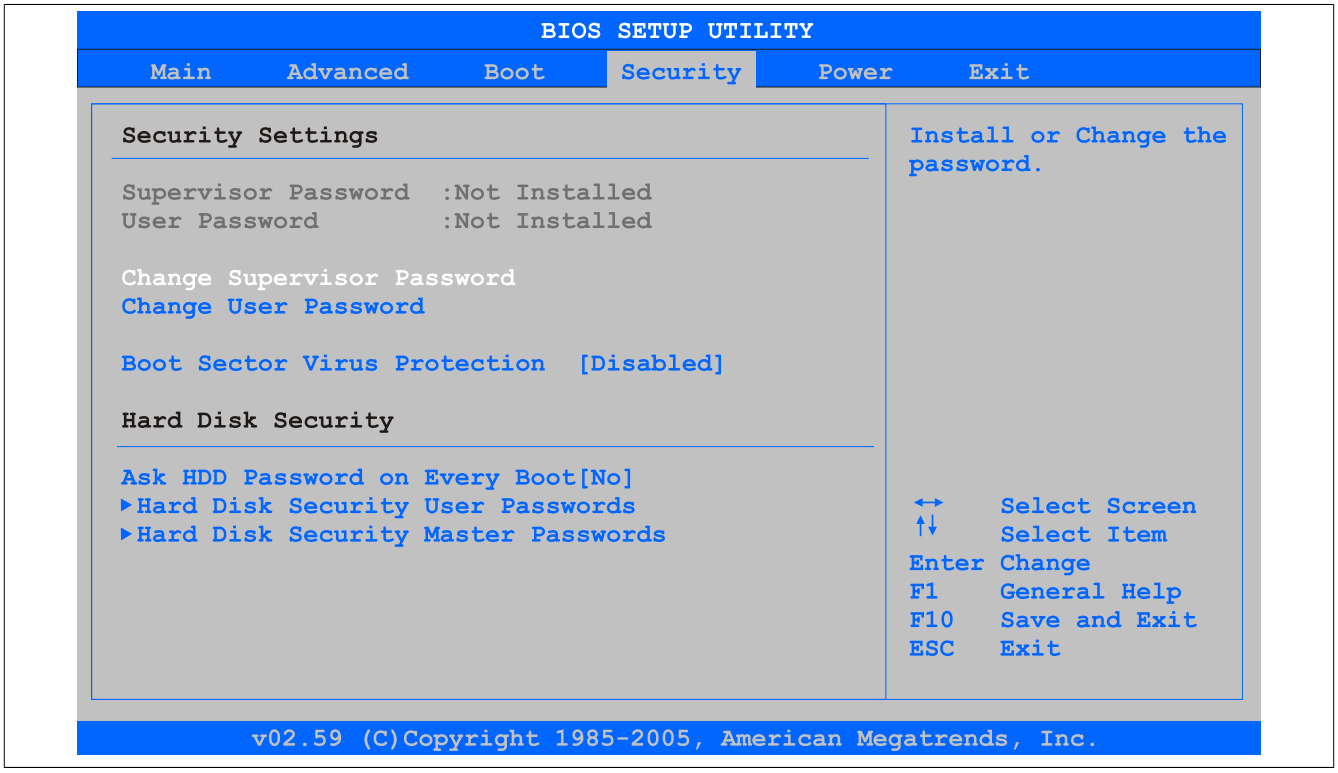


Image 111: GM45 Security menu

BIOS setting	Meaning	Setting options	Effect
Supervisor Password	Displays whether or not a supervisor password has been set.	None	-
User Password	Displays whether or not a user password has been set.	None	-
Change Supervisor Password	To enter/change a supervisor password. A supervisor password is necessary to edit all BIOS settings.	Enter	Enter password.
Change User Password	To enter/change a user password. A user password allows the user to edit only certain BIOS settings.	Enter	Enter password.
Boot Sector Virus Protection	With this option, a warning is issued when the boot sector is accessed through a program or virus. **Information:** **With this option, only the boot sector is protected, not the entire hard drive.**	Enabled	Enables this function.
		Disabled	Disables this function.
Ask HDD Password on Every Boot	This option can be used to select whether the hard disk password must be entered each time the system boots. **Information:** **This option only makes sense if a hard disk user security password is set.**	Yes	The hard disk password must be entered when booting.
		No	The hard disk password doesn't have to be entered when booting.
Hard Disk Security User Passwords	The hard disk security user password can be created here.	Enter	Opens the submenu See " Hard Disk Security User Password" on page 214
Hard Disk Security Master Passwords	The hard disk security master password can be created here.	Enter	Opens the submenu See " Hard Disk Security Master Password" on page 215

Table 170: GM45 Security menu - Setting options

1.6.1 Hard Disk Security User Password

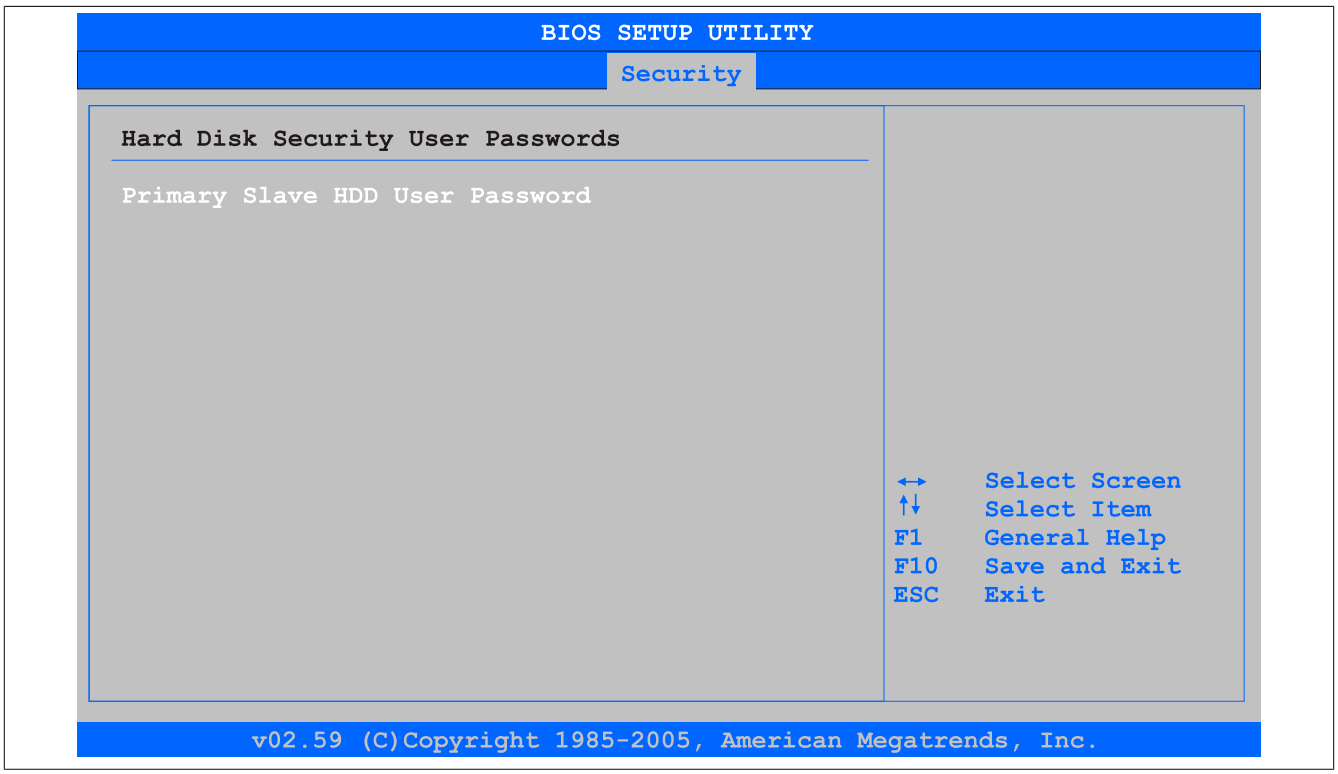


Image 112: GM45 Hard Disk Security User Password

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

Table 171: GM45 Hard Disk Security User Password

1.6.2 Hard Disk Security Master Password

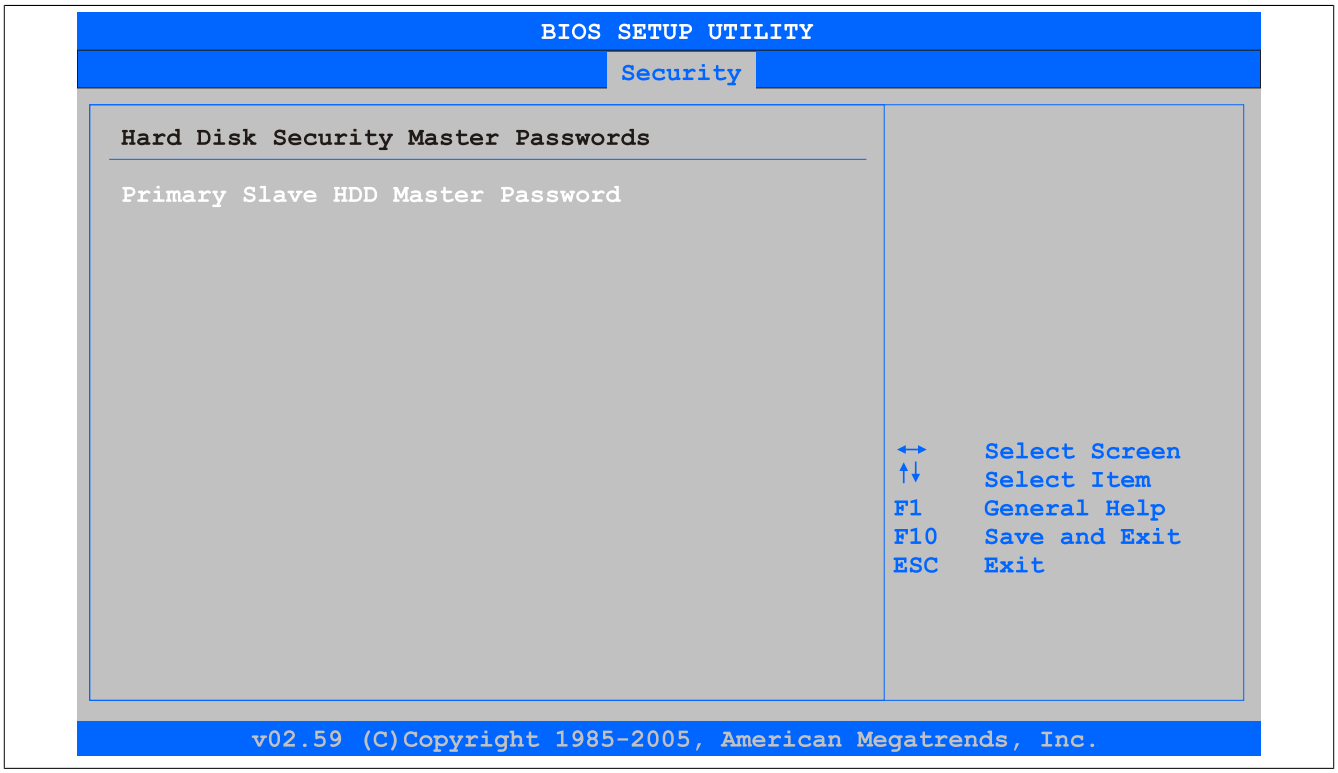


Image 113: GM45 Hard Disk Security Master Password

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

Table 172: GM45 Hard Disk Security Master Password

1.7 Power

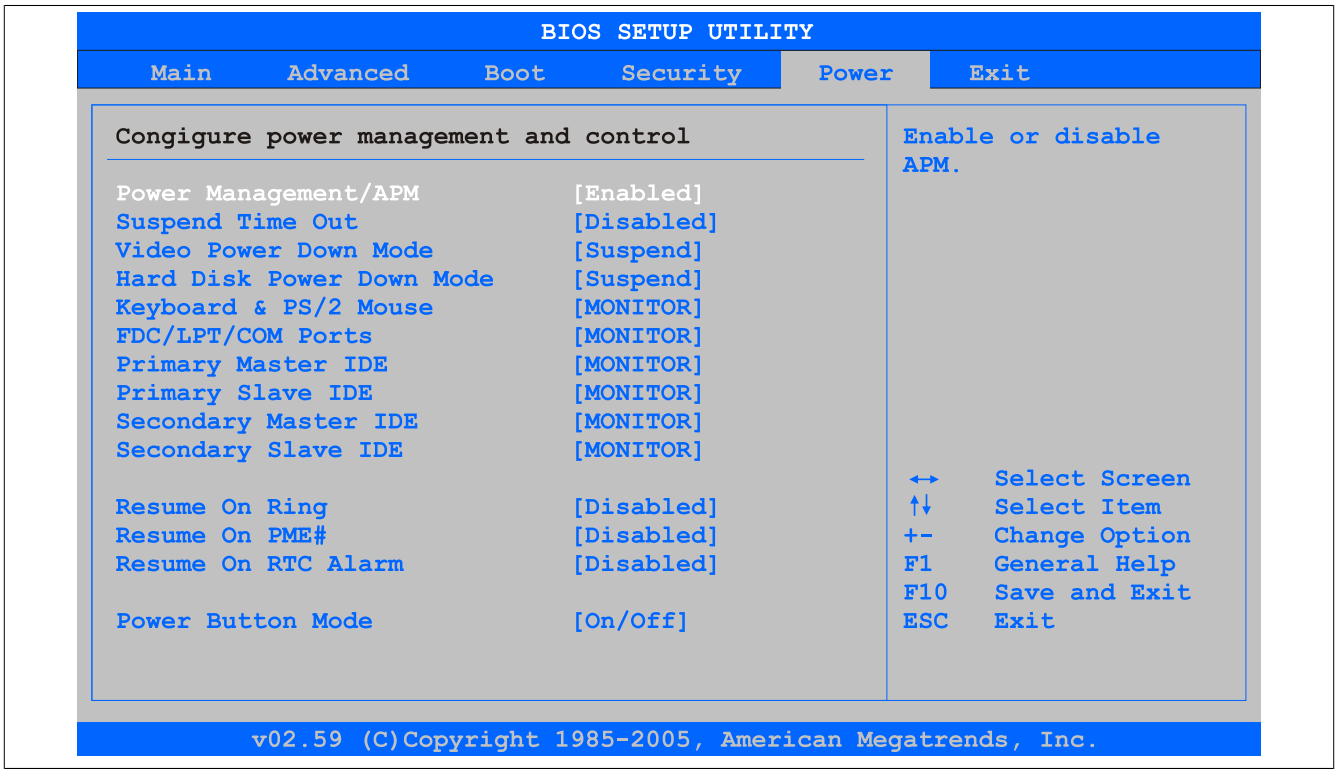


Image 114: GM45 Power menu

BIOS setting	Meaning	Setting options	Effect
Power Management / APM	This option switches the APM function on or off. This is an advanced plug & play and power management functionality.	Enabled	Enables this function.
		Disabled	Disables this function.
Suspend Time Out	Using this option, you can configure how long the system stays inactive (all components but the CPU are shut off, if possible) before entering suspend mode.	1 min, 2 min, 4 min, 8 min, 10 min, 20 min 30 min, 40 min, 50 min, 60 min;	Value set manually.
		Disabled	Disables this function.
Video Power Down Mode	This option allows you to set the energy saving mode for the monitor.	Disabled	Do not switch off the monitor.
		Standby	Monitor goes to standby mode.
		Suspend	Monitor goes to suspend mode.
Hard Disk Power Down Mode	This option allows you to set the energy saving mode for the hard drive.	Disabled	Do not switch off the monitor.
		Standby	Monitor goes to standby mode.
		Suspend	Monitor goes to suspend mode.
Keyboard & PS/2 Mouse	The monitoring of activities during power saving mode is determined here.	MONITOR	Keyboard or PS/2 mouse activities return the system to its normal state from a particular energy saving mode.
		IGNORE	Activities are ignored.
FDC/LPT/COM ports	The monitoring of activities during power saving mode is determined here.	MONITOR	Activity on the parallel port, the serial 1&2 port, or the floppy port returns the system to its normal state from an energy saving mode.
		IGNORE	Activities are ignored.
Primary Master IDE	The monitoring of activities during power saving mode is determined here.	MONITOR	Activities in the IRQ of specific connections or devices return the system to its normal state from power saving mode.
		IGNORE	Activities are ignored.
Primary Slave IDE	The monitoring of activities during power saving mode is determined here.	MONITOR	Activities in the IRQ of specific connections or devices return the system to its normal state from power saving mode.
		IGNORE	Activities are ignored.
Secondary Master IDE	The monitoring of activities during power saving mode is determined here.	MONITOR	Activities in the IRQ of specific connections or devices return the system to its normal state from power saving mode.
		IGNORE	Activities are ignored.
Secondary Slave IDE	The monitoring of activities during power saving mode is determined here.	MONITOR	Activities in the IRQ of specific connections or devices return the system to its normal state from power saving mode.
		IGNORE	Activities are ignored.
Resume On Ring	When the modem receives an incoming call, the PC is brought out of power saving mode.	Enabled	Enables this function.
		Disabled	Disables this function.
Resume on PME#	With this option, you can switch the PME wakeup function on or off.	Enabled	Enables this function.
		Disabled	Disables this function.
Resume On RTC Alarm	With this option, you can activate the alarm and enter the date and time for the system start.	Enabled	Enables this function.
		Disabled	Disables this function.
Power Button Mode	This function determines the function of the power button.	On/Off	Power button switches on/off.
		Suspend	Suppresses the function.

Table 173: GM45 Power menu - Setting options

1.8 Exit

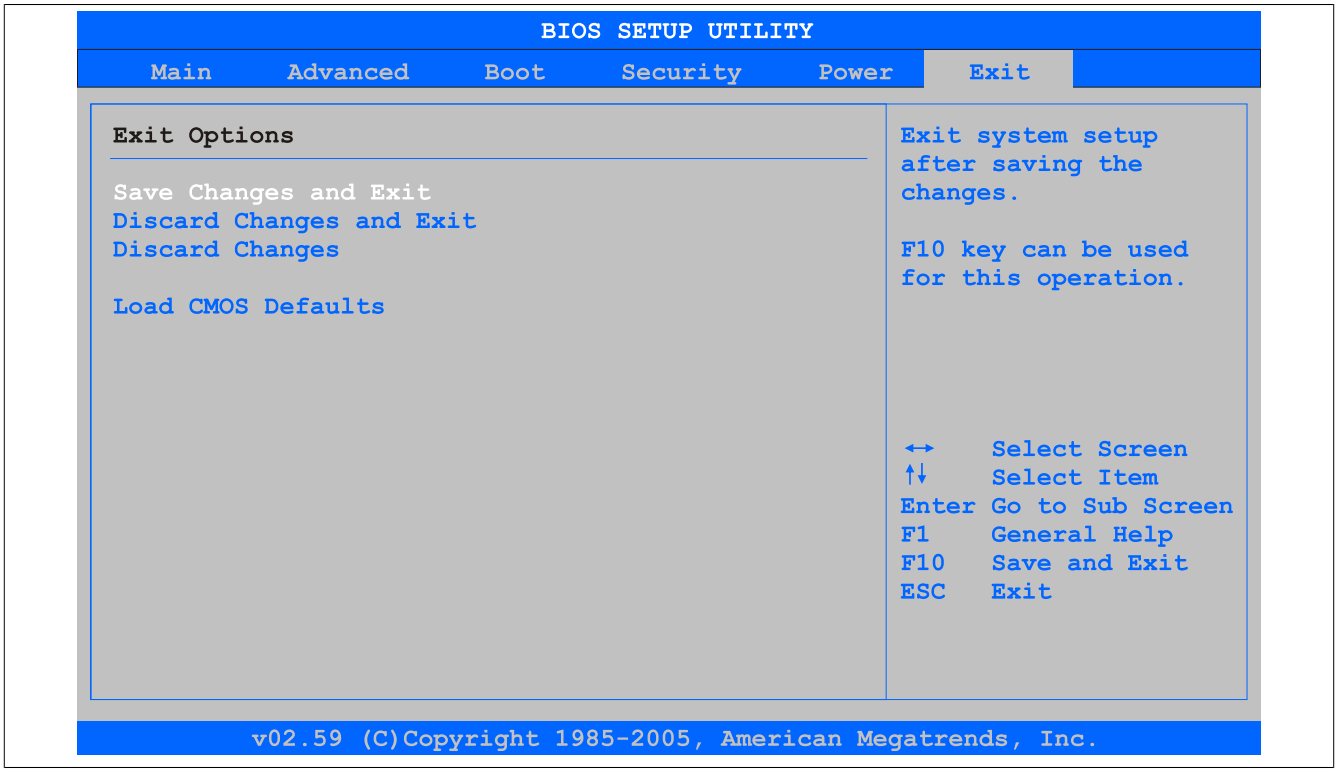


Image 115: GM45 Exit menu

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

Table 174: GM45 Exit menu - Setting options

1.9 BIOS default settings

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

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

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

Profile number	Optimized for	Switch position	Note
Profile 0	Reserved	0	
Profile 1	System unit 5PC810.SX01-00 / 5PC810.SX02-00 / 5PC810.SX03-00	1	The default settings for this profile can be found in the APC810 user's manual. This can be downloaded for free from the B&R homepage.
Profile 2	System unit 5PC810.SX05-00	2	
Profile 3	System unit 5PC820.SX01-00/ 5PC820.SX01-01	3	The default settings for this profile can be found in the APC820 User's Manual. This can be downloaded for free from the B&R homepage.
Profile 4	Reserved	4	
Profile 5	System unit 5PC820.1505-00 / 5PC820.1906-00	5	The default settings for this profile can be found in the APC800 user's manual. This can be downloaded for free from the B&R homepage.

Table 175: Profile overview

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

1.9.1 Main

Setting / View	Profile 0	Profile 1	Profile 2	My setting
System Time	-	-	-	
System Date	-	-	-	
BIOS ID	-	-	-	
Processor	-	-	-	
CPU Frequency	-	-	-	
System Memory	-	-	-	
Product Revision	-	-	-	
Serial Number	-	-	-	
BC Firmware Rev.	-	-	-	
MAC Address (ETH1)	-	-	-	
Boot Counter	-	-	-	
Running Time	-	-	-	

Table 176: GM45 Main profile setting overview

1.9.2 Advanced

ACPI configuration

Setting / View	Profile 0	Profile 1	Profile 2	My setting
ACPI Aware O/S	Yes	Yes	Yes	
ACPI Version Features	ACPI v2.0	ACPI v2.0	ACPI v2.0	
ACPI APIC support	Enabled	Enabled	Enabled	
Suspend mode	S1 (POS)	S1 (POS)	S1 (POS)	
USB Device Wakeup from S3/S4	Disabled	Disabled	Disabled	
Active Cooling Trip Point	Disabled	Disabled	Disabled	
Passive Cooling Trip Point	Disabled	Disabled	Disabled	
Critical Trip Point	105°C	105°C	105°C	

Table 177: GM45 Advanced - ACPI Configuration profile setting overview

PCI Configuration

Setting / View	Profile 0	Profile 1	Profile 2	My setting
Plug & Play O/S	No	**Yes**	**Yes**	
PCI Latency Timer	64	64	64	
Allocate IRQ to PCI VGA	Yes	Yes	Yes	
Allocate IRQ to SMBUS HC	Yes	Yes	Yes	
PCI IRQ Resource Exclusion				

Table 178: GM45 Advanced - PCI Configuration profile setting overview

Setting / View	Profile 0	Profile 1	Profile 2	My setting
IRQ3	Allocated	Allocated	Allocated	
IRQ4	Allocated	Allocated	Allocated	
IRQ5	Available	Available	Available	
IRQ6	Available	Available	Available	
IRQ7	Available	Available	Available	
IRQ9	Allocated	Allocated	Allocated	
IRQ10	Available	Available	Available	
IRQ11	Available	Available	Available	
IRQ12	Available	Available	Available	
IRQ14	Allocated	Allocated	Allocated	
IRQ15	Allocated	Allocated	Allocated	
PCI Interrupt Routing				
PIRQ A (VGA,UHCI2,PCIE0, ETH2)	Auto	Auto	Auto	
PIRQ B (PCIE1,HDA,ETH1)	Auto	Auto	Auto	
PIRQ C (PCIE2)	Auto	Auto	Auto	
PIRQ D (UHCI1,PCIE3, SATA)	Auto	Auto	Auto	
PIRQ E (INTD,UHCI3,PATA)	Auto	Auto	Auto	
PIRQ F (INTA)	Auto	Auto	Auto	
PIRQ G (INTB)	Auto	Auto	Auto	
PIRQ H (INTC,UHCI0, EHCI0)	Auto	Auto	Auto	
1st Exclusive PCI	-	-	-	
2nd Exclusive PCI	-	-	-	

Table 178: GM45 Advanced - PCI Configuration profile setting overview

PCI express configuration

Setting / View	Profile 0	Profile 1	Profile 2	My setting
Active State Power-Management	Disabled	Disabled	Disabled	
PCIE Port 0	Auto	Auto	Auto	
PCIE Port 1	Auto	Auto	Auto	
PCIE Port 2 (IF slot)	Auto	Auto	Auto	
PCIE Port 3	Auto	Auto	Auto	
PCIE Port 4 (ETH2)	Auto	Auto	Auto	
PCIE High Priority Port	Disabled	Disabled	Disabled	
Res. PCIE Hotplug Resource	No	No	No	
PCIE Port 0 IOxAPIC Enable	Disabled	Disabled	Disabled	
PCIE Port 1 IOxAPIC Enable	Disabled	Disabled	Disabled	
PCIE Port 2 IOxAPIC Enable	Disabled	Disabled	Disabled	
PCIE Port 3 IOxAPIC Enable	Disabled	Disabled	Disabled	

Table 179: GM45 Advanced - PCI Express Configuration profile setting overview

Graphics configuration

Setting / View	Profile 0	Profile 1	Profile 2	My setting
Primary Video Device	Internal VGA	Internal VGA	Internal VGA	
Internal Graphics Mode Select	Enabled, 32MB	Enabled, 32MB	Enabled, 32MB	
DVMT Memory	256MB	256MB	256MB	
Boot Display Device	Auto	Auto	Auto	
Boot Display Preference	SDVO-B SDVO-C LFP	SDVO-B SDVO-C LFP	SDVO-B SDVO-C LFP	
Always Try Auto Panel Detect	No	No	No	
Local Flat Panel Type	Auto	Auto	Auto	
SDVO local flat panel type	Disabled	Disabled	Disabled	
Local flat panel scaling	Centering	Centering	Centering	
SDVO Port B Configuration	SDVO DVI	SDVO DVI	SDVO DVI	
SDVO Port C Configuration	SDVO DVI	SDVO DVI	SDVO DVI	
SDVO/DVI Hotplug Support	Enabled	Enabled	Enabled	
Display Mode Persistence	Enabled	Enabled	Enabled	

Table 180: GM45 Advanced - Graphics Configuration profile setting overview

CPU configuration

Setting / View	Profile 0	Profile 1	Profile 2	My setting
MPS Revision	1.4	1.4	1.4	
Max CPUID value limit	Disabled	Disabled	Disabled	
Intel(R) Virtualization Tech	Enabled	Enabled	Enabled	
Execute-Disable Bit Capability	Enabled	Enabled	Enabled	
Intel(R) SpeedStep(tm) tech.	Enabled	Enabled	Enabled	
Intel(R) C-State Tech.	Disabled	Disabled	Disabled	
Enhanced C-States	Disabled	Disabled	Disabled	

Table 181: GM45 Advanced - CPU Configuration profile setting overview

Chipset configuration

Setting / View	Profile 0	Profile 1	Profile 2	My setting
DRAM Refresh Rate	Auto	Auto	Auto	
Memory Hole	Disabled	Disabled	Disabled	
DIMM Thermal Control	Disabled	Disabled	Disabled	
TMRC Mode	Disabled	Disabled	Disabled	
TS on DIMM	Disabled	Disabled	Disabled	
High Precision Event Timer	Disabled	Disabled	Disabled	
IOAPIC	Enabled	Enabled	Enabled	
APIC ACPI SCI IRQ	Disabled	Disabled	Disabled	
POST Code Output	PCI	PCI	PCI	

Table 182: GM45 Advanced - Chipset Configuration profile setting overview

I/O interface configuration

Setting / View	Profile 0	Profile 1	Profile 2	My setting
HDA Controller	Disabled	Disabled	Disabled	
Onboard Gbe Controller (ETH1)	Enabled	Enabled	Enabled	

Table 183: GM45 Advanced - I/O Interface Configuration profile setting overview

Clock Configuration

Setting / View	Profile 0	Profile 1	Profile 2	My setting
Spread spectrum	Disabled	Disabled	Disabled	

Table 184: GM45 Advanced - Clock Configuration profile setting overview

IDE Configuration

Setting / View	Profile 0	Profile 1	Profile 2	My setting
SATA Port 0/1	Compatible	Compatible	Compatible	
SATA Port 2/3 (opt. PATA Port)	Enabled	Enabled	Enabled	
PATA Detection Time Out (Sec)	3	3	3	
Hard disk write protect	Disabled	Disabled	Disabled	
IDE Detect Time Out (Sec)	35	35	35	
Primary IDE Master				
Type	Auto	Auto	Auto	
LBA/Large Mode	Auto	Auto	Auto	
Block (Multi-Sector Transfer)	Auto	Auto	Auto	
PIO Mode	Auto	Auto	Auto	
DMA Mode	Auto	Auto	Auto	
S.M.A.R.T.	Auto	Auto	Auto	
32Bit data transfer	Enabled	Enabled	Enabled	
Secondary IDE Master				
Type	Auto	Auto	Auto	
LBA/Large Mode	Auto	Auto	Auto	
Block (Multi-Sector Transfer)	Auto	Auto	Auto	
PIO Mode	Auto	Auto	Auto	
DMA Mode	Auto	Auto	Auto	
S.M.A.R.T.	Auto	Auto	Auto	
32Bit data transfer	Enabled	Enabled	Enabled	
Third IDE Master				
Type	Auto	Auto	Auto	
LBA/Large Mode	Auto	Auto	Auto	
Block (Multi-Sector Transfer)	Auto	Auto	Auto	

Table 185: GM45 Advanced - IDE Configuration profile setting overview

Setting / View	Profile 0	Profile 1	Profile 2	My setting
PIO Mode	Auto	Auto	Auto	
DMA Mode	Auto	Auto	Auto	
S.M.A.R.T.	Auto	Auto	Auto	
32Bit data transfer	Enabled	Enabled	Enabled	
Fourth IDE Master				
Type	Auto	Auto	Auto	
LBA/Large Mode	Auto	Auto	Auto	
Block (Multi-Sector Transfer)	Auto	Auto	Auto	
PIO Mode	Auto	Auto	Auto	
DMA Mode	Auto	Auto	Auto	
S.M.A.R.T.	Auto	Auto	Auto	
32Bit data transfer	Enabled	Enabled	Enabled	

Table 185: GM45 Advanced - IDE Configuration profile setting overview

USB configuration

Setting / View	Profile 0	Profile 1	Profile 2	My setting
USB Function	8 USB Ports	8 USB Ports	8 USB Ports	
USB 2.0 Controller	Enabled	Enabled	Enabled	
Legacy USB Support	Enabled	Enabled	Enabled	
USB Legacy POST-Always	-	-	-	
USB Keyboard Legacy Support	Enabled	Enabled	Enabled	
USB Mouse Legacy Support	Disabled	Disabled	Disabled	
USB Storage Device Support	Enabled	Enabled	Enabled	
Port 64/60 Emulation	Disabled	Disabled	Disabled	
USB 2.0 Controller Mode	HiSpeed	HiSpeed	HiSpeed	
BIOS EHCI Hand-Off	Disabled	Disabled	Disabled	
USB Beep Message	Enabled	Enabled	Enabled	
USB Stick Default Emulation	Hard Disk	Hard Disk	Hard Disk	
USB Mass Storage Reset Delay	20 Sec	20 Sec	20 Sec	

Table 186: GM45 Advanced - USB Configuration profile setting overview

Keyboard/mouse configuration

Setting / View	Profile 0	Profile 1	Profile 2	My setting
Boot-up Num-lock	On	On	On	
Typematic rate	Fast	Fast	Fast	

Table 187: GM45 Advanced - Keyboard/Mouse Configuration profile setting overview

CPU board monitor

Setting / View	Profile 0	Profile 1	Profile 2	My setting
H/W Health Function	Enabled	Enabled	Enabled	

Table 188: GM45 Advanced - CPU Board Monitor profile setting overview

Main Board/Panel Features

Setting / View	Profile 0	Profile 1	Profile 2	My setting
Panel control				
Select panel number	-	-	-	
Version	-	-	-	
Brightness	100%	100%	100%	
Temperature	-	-	-	
Fan speed	-	-	-	
Keys/LEDs	-	-	-	
Baseboard monitor				
CMOS battery	-	-	-	
Board I/O	-	-	-	
Board ETH2	-	-	-	
Board Power	-	-	-	
Power supply	-	-	-	
Slide-in drive 1	-	-	-	
Slide-in drive 2	-	-	-	
ETH2 Controller	-	-	-	
Case 1	-	-	-	
Case 2	-	-	-	

Table 189: GM45 Advanced - Baseboard/Panel Features profile setting overview

Setting / View	Profile 0	Profile 1	Profile 2	My setting
Case 3	-	-	-	
Case 4	-	-	-	
Legacy devices				
COM A	Enabled	Enabled	Enabled	
Base I/O address	3F8	3F8	3F8	
Interrupt	IRQ4	IRQ4	IRQ4	
COM B	Enabled	Enabled	Enabled	
Base I/O address	2F8	2F8	2F8	
Interrupt	IRQ3	IRQ3	IRQ3	
COM C	Enabled	**Disabled**	**Disabled**	
Base I/O address	3E8	-	-	
Interrupt	IRQ11	-	-	
COM D	Disabled	Disabled	Disabled	
Base I/O address	-	-	-	
Interrupt	-	-	-	
COM E	Disabled	Disabled	Disabled	
Base I/O address	-	-	-	
Interrupt	-	-	-	
CAN	Disabled	Disabled	Disabled	
Hardware Security Key	Enabled	Enabled	Enabled	
Base I/O address	378	378	378	
ETH2 LAN Controller	Enabled	Enabled	Enabled	
ETH2 MAC Address	-	-	-	

Table 189: GM45 Advanced - Baseboard/Panel Features profile setting overview

1.9.3 Boot

Setting / View	Profile 0	Profile 1	Profile 2	My setting
Boot Priority Selection	Type Based	Type Based	Type Based	
1st Boot Device	Onboard LAN	**Primary master**	**Primary master**	
2nd Boot Device	Primary master	**Secondary master**	**Secondary master**	
3rd Boot Device	Primary slave	**USB floppy**	**USB floppy**	
4th Boot Device	USB floppy	**USB removable device**	**USB removable device**	
5th Boot Device	USB removable device	**USB hard disk**	**USB hard disk**	
6th Boot Device	USB CDROM	USB CDROM	USB CDROM	
7th Boot Device	Fourth Master	Fourth Master	Fourth Master	
8th Boot Device	Disabled	Disabled	Disabled	
Quick Boot	Enabled	Enabled	Enabled	
Quiet Boot	Disabled	Disabled	Disabled	
Automatic Boot List Retry	Disabled	Disabled	Disabled	
Add-on ROM Display Mode	Keep Current	Keep Current	Keep Current	
Halt On Error	Disabled	Disabled	Disabled	
Hit "DEL" Message Display	Enabled	Enabled	Enabled	
Interrupt 19 Capture	Disabled	Disabled	Disabled	
PXE Boot to LAN	Enabled	**Disabled**	**Disabled**	
Slide-in 2 optional ROM	Enabled	**Disabled**	Enabled	
Power Loss Control	Turn On	Turn On	Turn On	

Table 190: GM45 Main profile setting overview

1.9.4 Security

Setting / View	Profile 0	Profile 1	Profile 2	My setting
Supervisor Password	-	-	-	
User Password	-	-	-	
Boot Sector Virus Protection	Disabled	Disabled	Disabled	
Ask HDD Password on Every Boot	No	No	No	
Hard disk security user password	-	-	-	
Hard disk security master password	-	-	-	

Table 191: GM45 Security profile setting overview

1.9.5 Power

Setting / View	Profile 0	Profile 1	Profile 2	My setting
Power Management/APM	Enabled	Enabled	Enabled	
Suspend Time Out	Disabled	Disabled	Disabled	
Video Power Down Mode	Suspend	Suspend	Suspend	
Hard Disk Power Down Mode	Suspend	Suspend	Suspend	
Keyboard & PS/2 Mouse	MONITOR	MONITOR	MONITOR	
FDC/LPT/COM ports	MONITOR	MONITOR	MONITOR	

Table 192: GM45 Power profile setting overview

Setting / View	Profile 0	Profile 1	Profile 2	My setting
Primary Master IDE	MONITOR	MONITOR	MONITOR	
Primary Slave IDE	MONITOR	MONITOR	MONITOR	
Secondary Master IDE	MONITOR	MONITOR	MONITOR	
Secondary Slave IDE	MONITOR	MONITOR	MONITOR	
Resume On Ring	Disabled	Disabled	Disabled	
Resume on PME#	Disabled	Disabled	Disabled	
Resume On RTC Alarm	Disabled	Disabled	Disabled	
Power Button Mode	On/Off	On/Off	On/Off	

Table 192: GM45 Power profile setting overview

1.10 BIOS Error signals (Beep codes)

While the B&R industrial PC is booting, the following messages and errors can occur with BIOS. These errors are signaled by different beeping codes.

Beeping code	Meaning	Necessary User Action
1x short	Memory refresh failed.	Load BIOS defaults. In the event that the error persists, send industrial PC to B&R for testing.
2x short	Parity error: POST error (error in one of the hardware testing procedures)	Check the placement of the inserted card. In the event that the error persists, send industrial PC to B&R for testing.
3x short	Base 64 KB memory failure: Basic memory defect, RAM error within the initial 64 KB.	Send industrial PC to B&R for checking.
4x short	Timer not operational: System timer.	Send industrial PC to B&R for checking.
5x short	Processor error: Processor defect.	Send industrial PC to B&R for checking.
6x short	8042 gate A20 failure: Keyboard controller defect (block 8042/ A20 gate). Processor cannot switch to protected mode.	Send industrial PC to B&R for checking.
7x short	Processor exception interrupt error: Virtual mode exception error (CPU generated an interrupt error).	Send industrial PC to B&R for checking.
8x short	Display memory read/write error: Video memory not accessible; graphic card defect or not built in (no fatal error).	Check inserted graphic card position and eventually exchange. In the event that the error persists, send industrial PC to B&R for testing.
9x short	ROM-checksum error: ROM-BIOS-checksum incorrect, EPROM, EEPROM or Flash-ROM component defect, BIOS defect or incorrectly updated.	Send industrial PC to B&R for checking.
10x short	CMOS shutdown register read/write error: CMOS cannot be read/ written.	Send industrial PC to B&R for checking.
11x short	Cache Error / external Cache bad: L2 - Cache on the mainboard is defected.	Send industrial PC to B&R for checking.

Table 193: BIOS post code messages BIOS BM45

1.11 Distribution of resources

1.11.1 RAM address assignment

RAM address	Address in Hex	Resource
(TOM - 384 kB) – TOM[1]	N.A.	ACPI reclaim, MPS and NVS area[2]
(TOM - 128 MB - 384 kB) – (TOM - 384 kB)	N.A.	VGA frame buffer[3]
1024 kB – (TOM - 128 MB - 384 kB)	100000h - N.A.	Extended memory
869 kB – 1024 kB	0E0000h - 0FFFFFh	Runtime BIOS
832 kB – 869 kB	0D0000h - 0DFFFFh	Upper memory
640 kB – 832 kB	0A0000h - 0CFFFFh	Video memory and BIOS
639 kB – 640 kB	09FC00h - 09FFFFh	Extended BIOS data
0 – 639 kB	000000h - 09FC00h	Conventional memory

Table 194: RAM address assignment

1) TOM - Top of memory: max. installed DRAM
2) Only if ACPI Aware OS is set to "YES" in the setup.
3) The VGA frame buffer can be reduced to 32 MB in the setup.

1.11.2 I/O address assignment

I/O address	Resource
0000h - 00FFh	Motherboard resources
0170h - 0177h	Secondary IDE channel
01F0h - 01F7h	Primary IDE channel
0238h - 023Fh	COM5
0278h - 027Fh	Hardware Security Key (LPT2)
02E8h - 02EFh	COM4
02F8h - 02FFh	COM2
0376h - 0376h	Secondary IDE channel command port
0377h - 0377h	Secondary IDE channel status port
0378h - 037Fh	Hardware Security Key (LPT1)
0384h - 0385h	CAN controller
03B0h - 03DFh	Video system
03E8h - 03EFh	COM3
03F6h - 03F6h	Primary IDE channel command port
03F7h - 03F7h	Primary IDE channel status port
03F8h - 03FFh	COM1
04D0h - 04D1h	Motherboard resources
0500h - 053Fh	Motherboard resources
0800h - 087Fh	Motherboard resources
0A00h - 0A7Fh	Motherboard resources
0CF8h - 0CFBh	PCI config address register
0CFCh - 0CFFh	PCI config data register
0D00h - FFFFh	PCI / PCI Express bus[1]
4100h - 417Fh	MTCX
FF00h - FF07h	IDE bus master register

Table 195: I/O address assignment

1) The BIOS assigns the PCI and PCI Express Bus I/O resources from FFF0h downward. Devices that are not compatible with PnP/PCI/PCI Express cannot use the I/O resources in this area.

1.11.3 Interrupt assignments in PIC mode

IRQ		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	NMI	NONE
System timer		●																	
Keyboard			●																
IRQ cascade				●															
COM1 (Serial port A)					○	●	○	○	○			○	○	○					
COM2 (Serial port B)					●	○	○	○	○			○	○	○					
ACPI[1]											●								
Real-time clock										●									
Coprocessor (FPU)															●				
Primary IDE channel[2]																●			
Secondary IDE channel[2]																	●		
B&R	COM3 (COM C)				○	○	○	○	○			○	○	○					●
	COM4 (COM D)				○	○	○	○	○			○	○	○					●
	COM5 (COM E)				○	○	○	○	○			○	○	○					●
	CAN				○	○	○	○	○			○	○	○				○	●

Table 196: IRQ interrupt assignments in PCI mode

1) **A**dvanced **C**onfiguration and **P**ower **I**nterface.
2) If the SATA configuration in BIOS is set to Enhanced mode for all SARA ports, IRQs 14 and 15 are enabled for the system and the SATA ports use other IRQs.

● ... Standard setting
○ ... Optional setting

1.11.4 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 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	NMI	NONE
System timer		●																									
Keyboard			●																								
IRQ cascade				●																							
COM1 (Serial port A)					○	●	○	○	○			○	○	○													
COM2 (Serial port B)					●	○	○	○	○			○	○	○													
ACPI[1]											●																
Real-time clock										●																	
Coprocessor (FPU)															●												
Primary IDE channel[2]																●											
Secondary IDE channel[2]																	●										
B&R	COM3 (COM C)				○	○	○	○	○			○	○	○													●
	COM4 (COM D)				○	○	○	○	○			○	○	○													●
	COM5 (COM E)				○	○	○	○	○			○	○	○													●
	CAN				○	○	○	○	○			○	○	○												○	●
PIRQ A[2]																		●									
PIRQ B[4]																			●								
PIRQ C[5]																				●							
PIRQ D[6]																					●						
PIRQ E[7]																						●					
PIRQ F[8]																							●				
PIRQ G[9]																								●			
PIRQ H[10]																									●		

Table 197: IRQ interrupt assignments in APIC mode

1) **A**dvanced **C**onfiguration and **P**ower **I**nterface.
2) If the SATA configuration in BIOS is set to Enhanced mode for all SARA ports, IRQs 14 and 15 are enabled for the system and the SATA ports use other IRQs.
3) PIRQ A: for PCIe; UHCI host controller 2, VGA controller, PCI express root port 0, PCI-EX to SATA bridge
4) PIRQ B: for PCIe; HDA audio, PCI express root port 1, onboard gigabit LAN controller
5) PIRQ C: for PCIe; PCI express root port 2
6) PIRQ D: for PCIe; UHCI host controller 1, serial ATA controller 0 + 1 in enhanced/native mode, PCI express root port 3
7) PIRQ E: PCI bus INTD, UHCI host controller 3, EHCI host controller 1, SM bus controller
8) PIRQ F: PCI bus INTA
9) PIRQ G: PCI bus INTB
10) PIRQ H: PCI bus INTC, UHCI host controller 0, EHCI host controller 0

● ... Standard setting
○ ... Optional setting

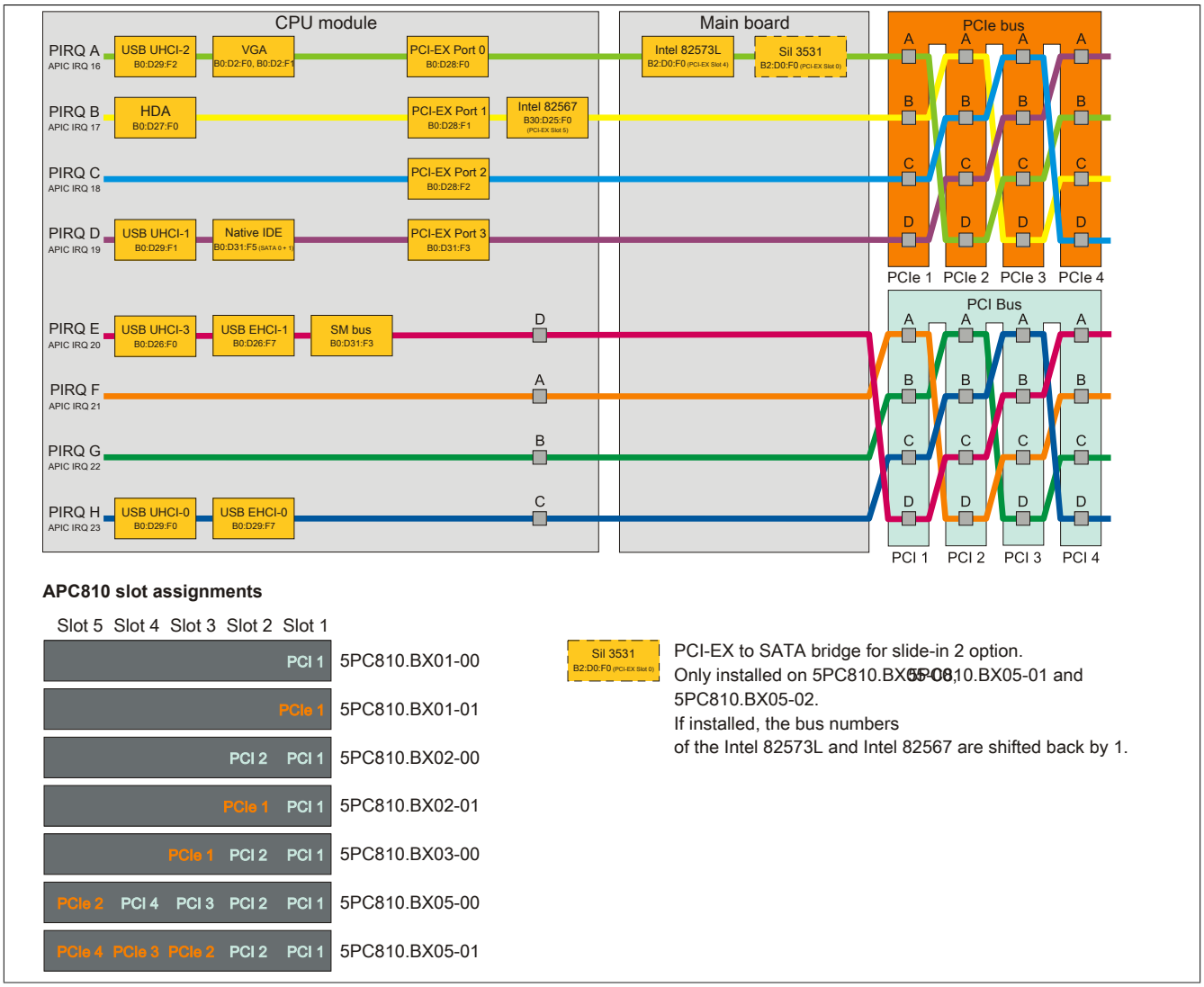


Image 116: PCI and PCIe routing with activated APIC CPU boards GM45 (bus units 5PC810.BX0x-0x)

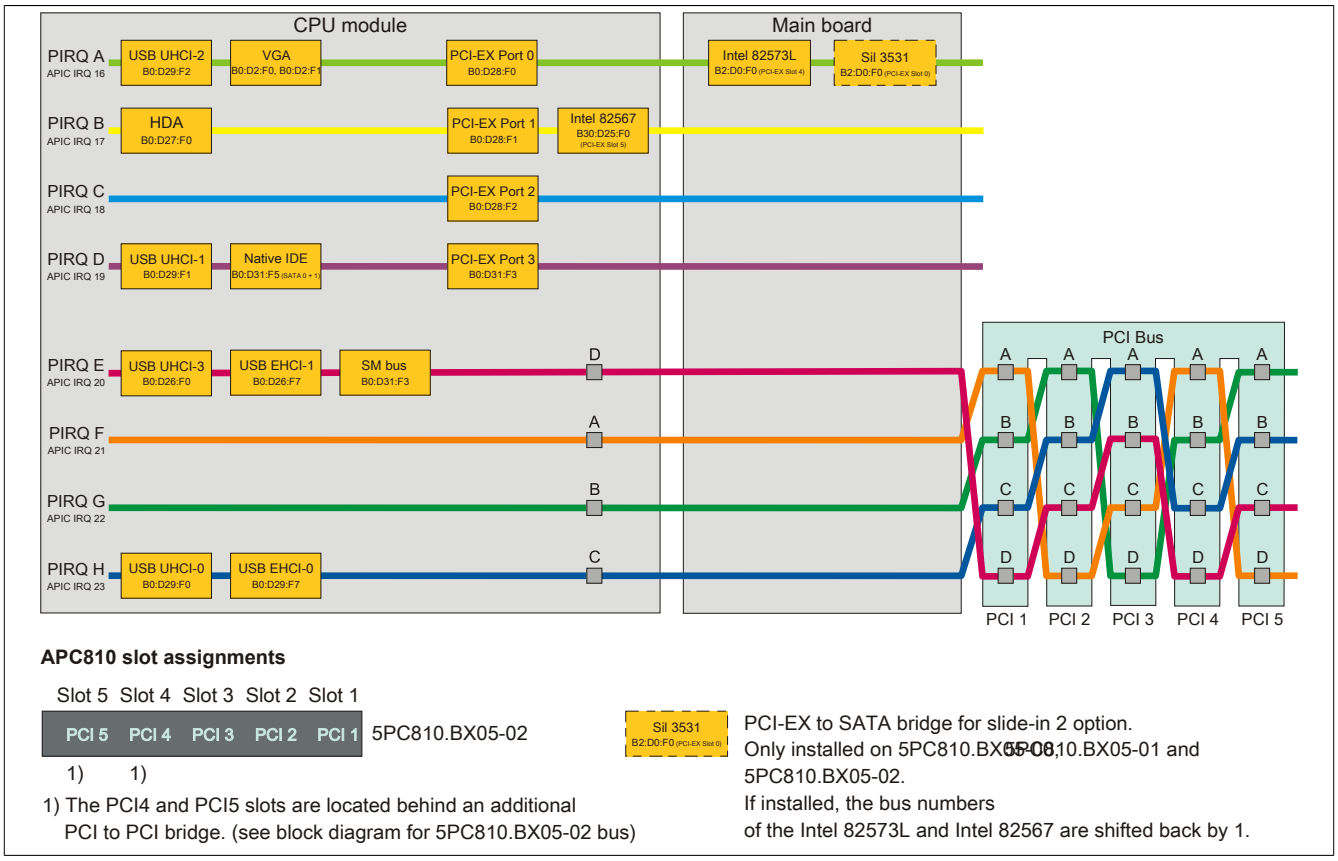


Image 117: PCI and PCIe routing with activated APIC CPU boards GM45 (bus unit 5PC810.BX05-02)

2 Upgrade information

Warning!

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

2.1 BIOS upgrade

An upgrade might be necessary for the following reason:

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

2.1.1 What information do I need?

Information:

Individually saved BIOS settings are deleted when upgrading the BIOS.

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

Which BIOS version and firmware are already installed on the APC810?

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

- After switching on the APC810, you can get to the BIOS Setup by pressing "Del".
- From the BIOS main menu "Advanced", select "Main board/panel features".

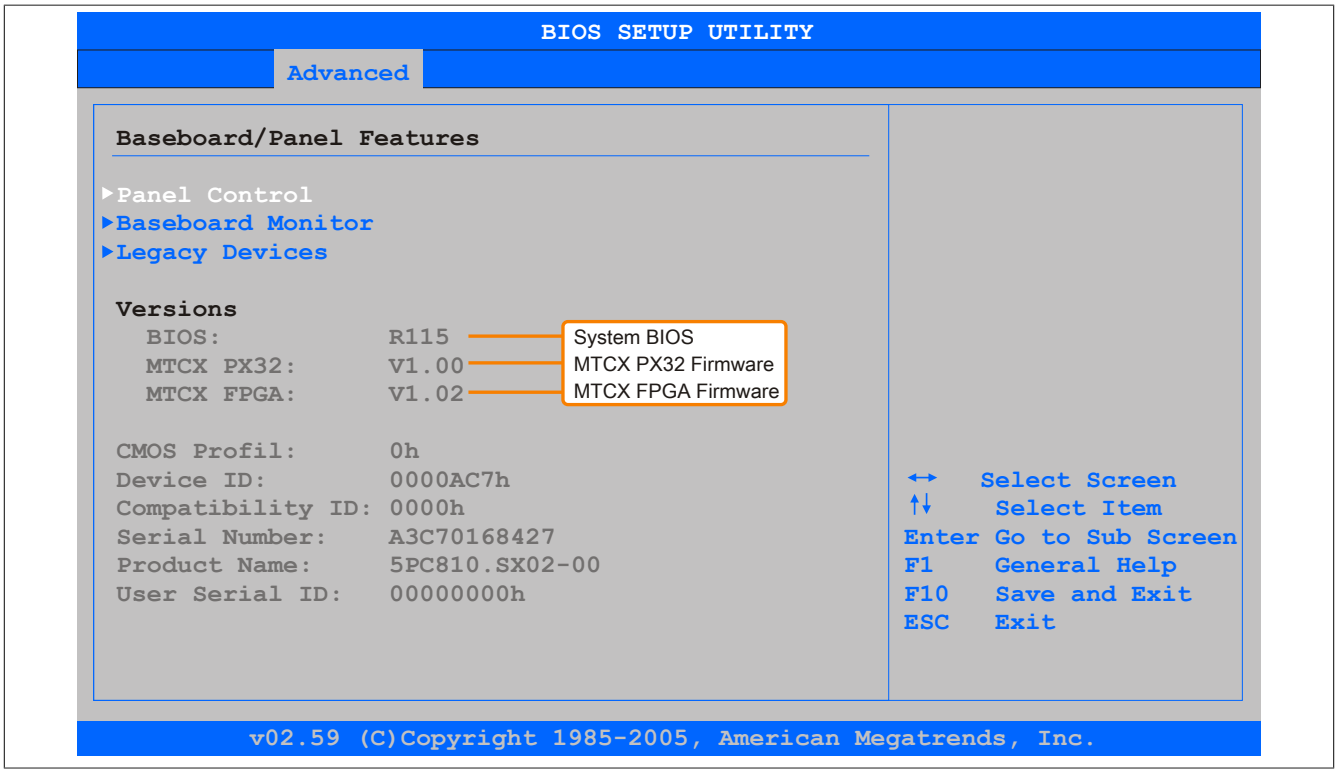


Image 118: Software version

Which firmware is installed on the Automation Panel Link transmitter?

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

- After switching on the APC810, you can get to the BIOS Setup by pressing "Del".
- From the BIOS main menu "Advanced", select "Main board/panel features" and then "Panel control".

Information:

The version can only be displayed when an Automation Panel with an AP Link SDL transmitter (5AC801.SDL0-00) is connected.

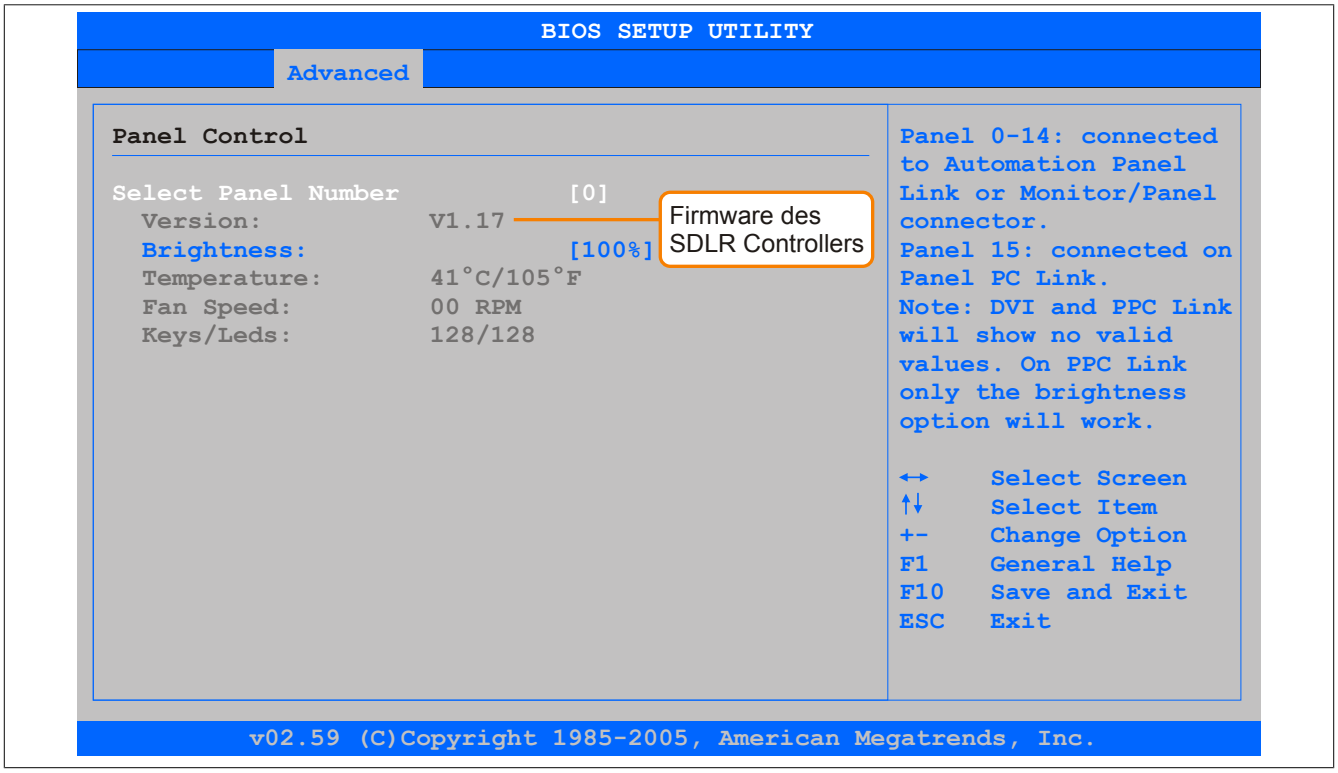


Image 119: Firmware version of the AP Link SDL transmitter

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 using the command line command "sys a:" or "format a: /s".
Information on creating a bootable diskette in Windows XP can be found on page 236.

Information on creating a USB flash drive for a B&R upgrade can be found on page 238.

Information on creating a CompactFlash card for a B&R upgrade can be found on page 239.

3. Copy the contents of the *.zip file to the bootable media. If the B&R upgrade was already added when the bootable media was created using the B&R Embedded OS Installer, then this step is not necessary.
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 BM45 (5PC800.BM45-00, -01)

2. Exit
```

Concerning item 1:

BIOS is automatically upgraded (default after 5 seconds).

Concerning item 2:

Return to the shell (MS-DOS).

Information:

If you do not press a button within 5 seconds, then step 1 "Upgrade AMI BIOS for BM45" is automatically carried out and the APC810 is automatically updated.

6. The system must be rebooted after a successful upgrade.
7. Reboot and press "Del" to enter the BIOS setup menu and load the setup defaults, then select "Save Changes and Exit".

2.1.3 Using the Control Center

1. Download the zip file from the B&R homepage (www.br-automation.com).
2. Go to Control Panel and **open the Control Center** .
3. Open the **Versions tab** .
4. Go to **CPU board,** BIOS **and** click on **update** . The dialog 'Open' is opened.
5. Go to **file name** and enter the name of the BIOS file or select a file.
6. Click **on** open. The dialog 'Open' is opened.

The transfer can be canceled by clicking on **Cancel** in the Download dialog box. Cancel is disabled when the flash memory is being written to.

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

Information:

The system must be restarted for the BIOS to take effect and for the updated version to be displayed. The user is prompted to restart the system when closing the Control Center.

Information:

For more information about saving and updating the BIOS, please refer to the help files for the Control Center.

2.2 Firmware upgrade

The "Upgrade APC800 MTCX" software makes it possible to update the firmware for multiple controllers (MTCX, SDLT, SDLR, UPSI), depending on the structure of the APC810 system.

Current "APC800 MTCX Upgrade" software can be downloaded directly from the service portal on the B&R homepage (www.br-automation.com).

2.2.1 Procedure

To carry out a firmware upgrade, the following steps should be taken:

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 using the command line command "sys a:" or "format a: /s".**
> **Information on creating a bootable diskette in Windows XP can be found on page 236.**
>
> **Information on creating a USB flash drive for a B&R upgrade can be found on page 238.**
>
> **Information on creating a CompactFlash card for a B&R upgrade can be found on page 239.**

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

> **Information:**
>
> **The following boot menu options including descriptions are based on Version 1.00 of the APC800 upgrade (MTCX, SDLR, SDLT, UPSI) disk. In some cases, these descriptions might not match the version you are currently using.**

```
1. Upgrade MTCX (APC810) PX32 and FPGA
2. Upgrade SDLT (APC810) only
3. Upgrade SDLR (AP800/AP900) on monitor/panel
3.1 Upgrade SDLR on AP 0 (AP800/AP900)
3.2 Upgrade SDLR on AP 1 (AP800/AP900)
3.3 Upgrade SDLR on AP 2 (AP800/AP900)
3.4 Upgrade SDLR on AP 3 (AP800/AP900)
3.5 Upgrade all SDLR (AP800/AP900)
3.6 Return to main menu
4. Upgrade SDLR (AP800/AP900) on AP link slot
4.1 Upgrade SDLR on AP 8 (AP800/AP900)
4.2 Upgrade SDLR on AP 9 (AP800/AP900)
4.3 Upgrade SDLR on AP 10 (AP800/AP900)
4.4 Upgrade SDLR on AP 11 (AP800/AP900)
4.5 Upgrade all SDLR (AP800/AP900)
4.6 Return to main menu
5. Upgrade add-on UPS (firmware and battery settings)
5.1 Upgrade Add-on UPS Firmware (5AC600.UPSI-00)
5.2 Upgrade Battery Settings (5AC600.UPSB-00)
5.3 Return to main menu
6. Exit
```

Concerning item 1:
Automatically upgrade PX32 and FPGA for MTCX (default after 5 seconds).

Concerning item 2:
The FPGA of the SDLT controller on the AP Link slot is automatically updated.

Concerning item 3:
Submenu 1 is opened for upgrading the SDLR controller on the Monitor/Panel plug.

3.1. Upgrade SDLR on AP 0 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 0.

3.2. Upgrade SDLR on AP 1 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 1.

3.3 Upgrade SDLR on AP 2 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 2.

3.4. Upgrade SDLR on AP 3 (AP800/AP900)

The SDLR controller is automatically updated on Automation Panel 3.

3.5 Upgrade all SDLR (AP800/AP900)
All SDLR controllers are automatically updated on all Automation Panels on the Monitor/Panel (by default, after 5 sec).

3.6 Return to Main Menu

Go back to the main menu

Concerning item 4:
Submenu 2 is opened for upgrading the SDLR controller on the AP Link slot.

4.1. Upgrade SDLR on AP 8 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 8.

4.2. Upgrade SDLR on AP 9 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 9.

4.3. Upgrade SDLR on AP 10 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 10.

4.4. Upgrade SDLR on AP 11 (AP800/AP900)
The SDLR controller is automatically updated on Automation Panel 11.

4.5 Upgrade all SDLR (AP800/AP900)
All SDLR controllers are automatically updated on all Automation Panels on the AP Link Slot (by default, after 5 sec).

4.6 Return to Main Menu

Go back to the main menu

Concerning item 5:
Submenu 3 for the add-on UPS firmware and upgrade and the battery settings upgrade is opened.

5.1 Upgrade Add-on UPS Firmware (5AC600.UPSI-00)
The firmware for the add-on UPSI is updated.

5.2. Upgrade battery settings (5AC600.UPSB-00)
The battery settings for 5AC600.UPSB-00 are automatically updated.

5.3 Return to Main Menu

Go back to the main menu

Concerning item 6:
Returns to the shell (MS-DOS).

Information:

The system must be powered off and on again after a successful upgrade.

2.2.2 Possible upgrade problems and software dependencies (for V1.00)

- The SDLR firmware can only be updated if an Automation Panel with Automation Panel Link Transceiver (5DLSDL.1000-01) and Automation Panel Link Receiver (5DLSDL.1000-00) is connected.
- Automation Panel Link transceivers (5DLSDL.1000-01) or Automation Panel Link receivers (5DLSDL.1000-00) with a Firmware version lower than or equal to V00.10 can no longer be combined with Automation Panel Link transceivers (5DLSDL.1000-01) or Automation Panel Link receivers (5DLSDL.1000-00) with a Firmware higher than or equal to V01.04. Daisy Chain mode is not possible with such a combination.
- If a UPS (e.g. 5AC600.UPSI-00) + battery unit (e.g. 5AC600.UPSB-00) is connected to the system and operable, then after an upgrade of the MTCX or SDLT you must either disconnect the battery or push the Power button (to put the system in Standby mode), before executing the required power off/on. If not, the firmware upgrade will not work because the UPS buffers the system.
- The function Legacy Mouse Support and Keyboard Controller Reset is only provided with the combination of MTCX PX32 V00.12 and MTCX FPGA V00.09 (included in APC810 MTCX upgrade disk V00.05).

2.3 Creating an MS-DOS boot diskette in Windows XP

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

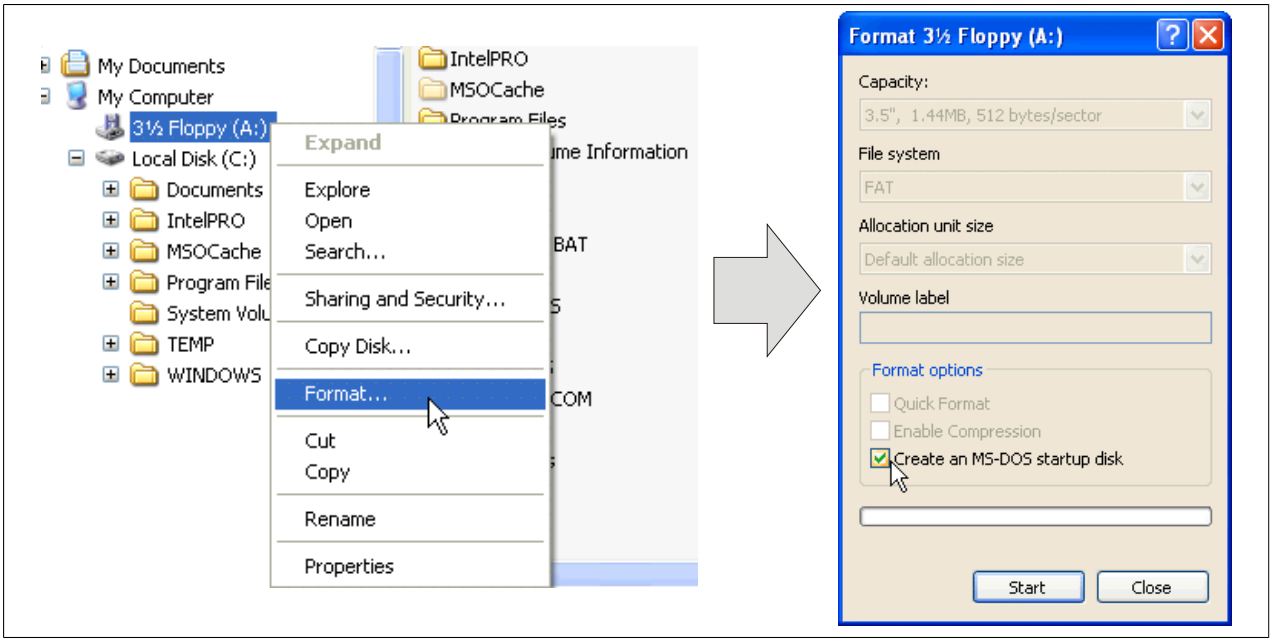


Image 120: Creating a bootable diskette in Windows XP - step 1

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

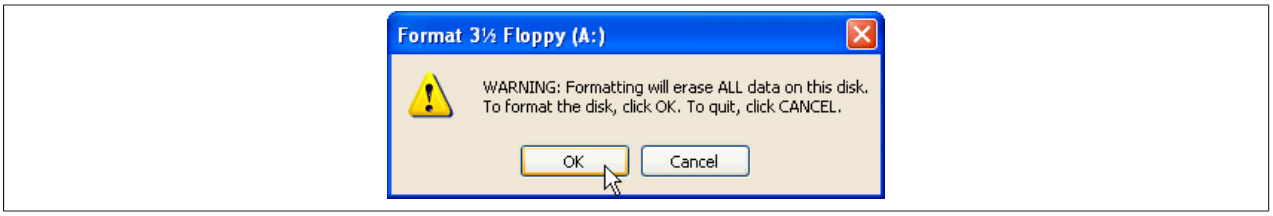


Image 121: Creating a bootable diskette in Windows XP - step 2

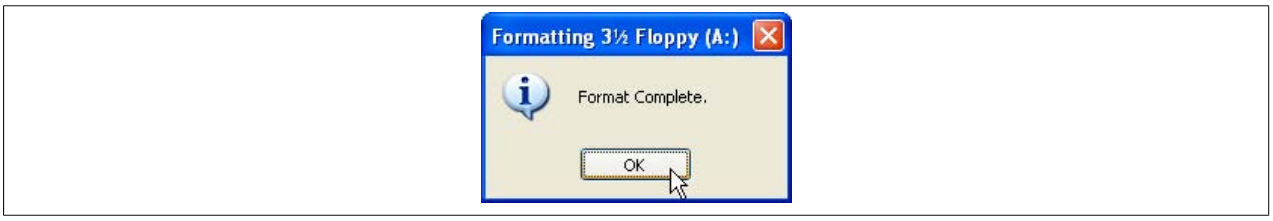


Image 122: Creating a bootable diskette in Windows XP - step 3

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

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

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

before

Name	Size	Type	Date Modified
DISPLAY.SYS	17 KB	System file	6/8/2000 5:00 PM
EGA2.CPI	58 KB	CPI File	6/8/2000 5:00 PM
EGA3.CPI	58 KB	CPI File	6/8/2000 5:00 PM
EGA.CPI	58 KB	CPI File	6/8/2000 5:00 PM
KEYB.COM	22 KB	MS-DOS Application	6/8/2000 5:00 PM
KEYBOARD.SYS	34 KB	System file	6/8/2000 5:00 PM
KEYBRD2.SYS	32 KB	System file	6/8/2000 5:00 PM
KEYBRD3.SYS	31 KB	System file	6/8/2000 5:00 PM
KEYBRD4.SYS	13 KB	System file	6/8/2000 5:00 PM
MODE.COM	29 KB	MS-DOS Application	6/8/2000 5:00 PM

after

Name	Size	Type	Date Modified
AUTOEXEC.BAT	0 KB	MS-DOS Batch File	3/22/2006 10:08 AM
COMMAND.COM	91 KB	MS-DOS Application	6/8/2000 5:00 PM
CONFIG.SYS	0 KB	System file	3/22/2006 10:08 AM
DISPLAY.SYS	17 KB	System file	6/8/2000 5:00 PM
EGA2.CPI	58 KB	CPI File	6/8/2000 5:00 PM
EGA3.CPI	58 KB	CPI File	6/8/2000 5:00 PM
EGA.CPI	58 KB	CPI File	6/8/2000 5:00 PM
IO.SYS	114 KB	System file	5/15/2001 6:57 PM
KEYB.COM	22 KB	MS-DOS Application	6/8/2000 5:00 PM
KEYBOARD.SYS	34 KB	System file	6/8/2000 5:00 PM
KEYBRD2.SYS	32 KB	System file	6/8/2000 5:00 PM
KEYBRD3.SYS	31 KB	System file	6/8/2000 5:00 PM
KEYBRD4.SYS	13 KB	System file	6/8/2000 5:00 PM
MODE.COM	29 KB	MS-DOS Application	6/8/2000 5:00 PM
MSDOS.SYS	1 KB	System file	4/7/2001 1:40 PM

Image 123: Creating a bootable diskette in Windows XP - step 4

Name	Size	Type	Date Modified
AUTOEXEC.BAT	0 KB	MS-DOS Batch File	3/22/2006 10:08 AM
COMMAND.COM	91 KB	MS-DOS Application	6/8/2000 5:00 PM
CONFIG.SYS	0 KB	System file	3/22/2006 10:08 AM
DISPLAY.SYS	17 KB	System file	6/8/2000 5:00 PM
EGA2.CPI	58 KB	CPI File	6/8/2000 5:00 PM
EGA3.CPI	58 KB	CPI File	6/8/2000 5:00 PM
EGA.CPI	58 KB	CPI File	6/8/2000 5:00 PM
IO.SYS	114 KB	System file	5/15/2001 6:57 PM
KEYB.COM	22 KB	MS-DOS Application	6/8/2000 5:00 PM
KEYBOARD.SYS	34 KB	System file	6/8/2000 5:00 PM
KEYBRD2.SYS	32 KB	System file	6/8/2000 5:00 PM
KEYBRD3.SYS	31 KB	System file	6/8/2000 5:00 PM
KEYBRD4.SYS	13 KB	System file	6/8/2000 5:00 PM
MODE.COM	29 KB	MS-DOS Application	6/8/2000 5:00 PM
MSDOS.SYS	1 KB	System file	4/7/2001 1:40 PM

Image 124: Creating a bootable diskette in Windows XP - step 5

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

2.4 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 for free from the B&R homepage (www.br-automation.com).

2.4.1 Requirements

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

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

2.4.2 Procedure

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

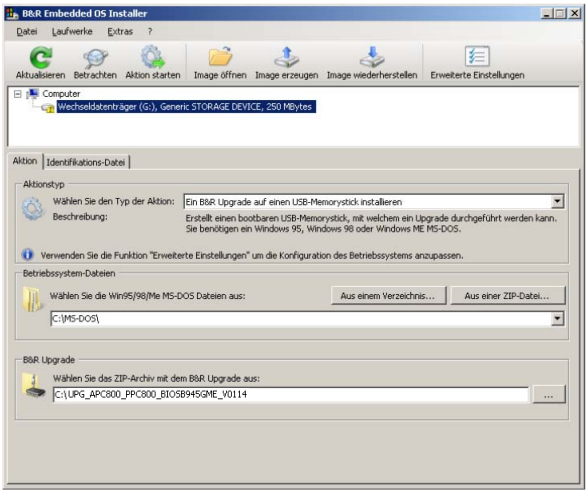


Image 125: Creating a USB flash drive for B&R upgrade files

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 236. Then the files from the diskette are to be copied to your hard drive.

2.5 Creating a bootable CompactFlash card for B&R upgrade files

When used in connection with a B&R industrial PC, it is possible to upgrade (e.g. upgrade BIOS) from one of the CompactFlash cards available from B&R. To do this, the CompactFlash card must be prepared accordingly. This is done with the B&R Embedded OS Installer, which can be downloaded for free from the B&R homepage (www.br-automation.com).

2.5.1 Requirements

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

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

2.5.2 Procedure

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

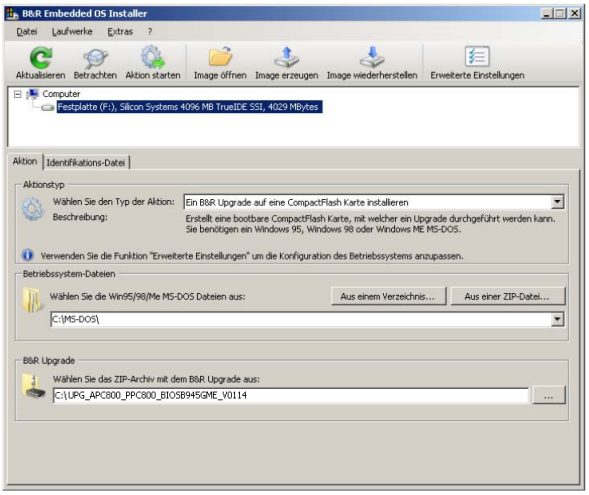


Image 126: Creating a CompactFlash card for B&R upgrade files

2.5.3 Where do I get MS-DOS?

Information on creating an MS-DOS boot diskette can be found in section see "Creating an MS-DOS boot diskette in Windows XP" on page 236. Then the files from the diskette are to be copied to your hard drive.

2.6 Upgrade problems

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

3 Microsoft DOS

3.1 Order data

Image not found for 9S0000.01-010-9S0000.01-020!	
Model number	**Short description**
	MS-DOS
9S0000.01-010	OEM Microsoft MS-DOS 6.22, German Floppy disks, only available with a new PC.
9S0000.01-020	OEM Microsoft MS-DOS 6.22, English Floppy disks, only available with a new PC.

Table 198: 9S0000.01-010, 9S0000.01-020 - Order data

3.2 Known problems

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

- AC97 Sound - no support
- USB 2.0 - only USB 1.1 rates can be achieved.
- A second graphics line (and therefore Extended Desktop mode) also cannot be used.
- A few "ACPI control" BIOS functions cannot be used.

3.3 Resolutions and color depths

The following table shows the tested resolutions and color depths on the Monitor / Panel connector with 945GME CPU boards.

	Color depth		
Resolutions for DVI	**8-bit**	**16-bit**	**24-bit**
640 x 480	✓	✓	✓
800 x 600	✓	✓	✓
1024 x 768	✓	✓	✓
1280 x 1024	✓	✓	✓

Table 199: Tested resolutions and color depths for DVI signals

	Color depth		
Resolutions for RGB	**8-bit**	**16-bit**	**24-bit**
640 x 480	✓	✓	✓
800 x 600	✓	✓	✓
1024 x 768	✓	✓	✓
1280 x 1024	✓	✓	✓
1600 x 1200	✓	✓	✓
1920 x 1440	✓	✓	✓

Table 200: Tested resolutions and color depths for RGB signals

4 Windows XP Professional

4.1 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.	
5SWWXP.0500-ENG	Microsoft OEM Windows XP Professional Service Pack 2c, CD, English. Only available with a B&R device.	
5SWWXP.0500-GER	Microsoft OEM Windows XP Professional Service Pack 2c, CD, German. Only available with a B&R device.	
5SWWXP.0500-MUL	Microsoft OEM Windows XP Professional Service Pack 2c, CD, Multilaguange Only available with a B&R device.	
	Erforderliches Zubehör	
	CompactFlash	
5CFCRD.016G-04	CompactFlash 16 GB B&R	
5CFCRD.4096-03	CompactFlash 4 GB Western Digital	
5CFCRD.4096-04	CompactFlash 4 GB B&R	
5CFCRD.8192-03	CompactFlash 8 GB Western Digital	
5CFCRD.8192-04	CompactFlash 8 GB B&R	

Table 201: 5SWWXP.0600-ENG, 5SWWXP.0600-GER, 5SWWXP.0600-MUL, 5SWWXP.0500-ENG, 5SWWXP.0500-GER, 5SWWXP.0500-MUL - Order data

4.2 Overview

Model number	Edition	Target system	Chipset	Service Pack	Language	Preinstalled	Memory required on CF/HDD	Minimum amount of RAM
5SWWXP.0600-ENG	Professional	APC510 APC511 APC620 APC810 APC820 PPC700 PPC725 PPC800 PP500	945GME GM45 US15W	SP3	English	Optional	≤ 2.1 GB	128 MB
5SWWXP.0600-GER	Professional	APC510 APC511 APC620 APC810 APC820 PPC700 PPC725 PPC800 PP500	945GME GM45 US15W	SP3	German	Optional	≤ 2.1 GB	128 MB
5SWWXP.0600-MUL	Professional	APC510 APC511 APC620 APC810 APC820 PPC700 PPC725 PPC800 PP500	945GME GM45 US15W	SP3	Multilanguage	Optional	≤ 2.1 GB	128 MB
5SWWXP.0500-ENG	Professional	APC620 APC810 APC820 PPC700 PPC725 PPC800	945GME GM45	SP2c	English	Optional	≤ 2.1 GB	128 MB
5SWWXP.0500-GER	Professional	APC620 APC810 APC820 PPC700 PPC725 PPC800	945GME GM45	SP2c	German	Optional	≤ 2.1 GB	128 MB
5SWWXP.0500-MUL	Professional	APC620 APC810 APC820 PPC700 PPC725 PPC800	945GME GM45	SP2c	Multilanguage	Optional	≤ 2.1 GB	128 MB

4.3 Installation

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

4.3.1 Installation on PCI SATA RAID controller - 5ACPCI.RAIC-03, 5ACPCI.RAIC-05

4.3.2 For 5PCI slot model

The following steps are necessary when installing to a slide-in HDD being operated in the slide-in slot 2 (located behind the PCI to SATA Bridge) on the APC810:

1. Download the Si3531 SATA 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 or 5MD900.USB2-00) to the USB port.
3. Insert the diskette and Windows XP Professional CD in the the Media Drive and boot from the CD.
4. Press the F6 key during setup to install a third-party SCSI or a driver.
5. Press the "s" key when asked about installing an additional drive. Insert the disk in the floppy drive. Press "Enter" and select the driver.
6. Follow the setup instructions.
7. The setup copies the files to the Windows XP Professional folder and restarts the Automation PC 810.

Information:

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

4.4 Drivers

The latest drivers for all released operating systems can be found in the Download area of the B&R website (www.br-automation.com).

Information:

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

5 Windows 7

5.1 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 German and English are available in Windows® 7 Professional, while Windows® 7 Ultimate supports up to 35 different languages. 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 when compared to products offered on the consumer market.

5.2 Order data

Model number	Short description	Figure
	Windows 7	
5SWWI7.0100-ENG	Microsoft OEM Windows 7 Professional 32-bit, DVD, English. Only available with a new device.	
5SWWI7.0100-GER	Microsoft OEM Windows 7 Professional 32-bit, DVD, German. Only available with a new device.	
5SWWI7.0300-MUL	Microsoft OEM Windows 7 Ultimate 32-bit, DVD, multilaguange. Only available with a new device.	
5SWWI7.0200-ENG	Microsoft OEM Windows 7 Professional 64-bit, DVD, English. Only available with a new device.	
5SWWI7.0200-GER	Microsoft OEM Windows 7 Professional 64-bit, DVD, German. Only available with a new device.	
5SWWI7.0400-MUL	Microsoft OEM Windows 7 Ultimate 64-bit, DVD, multilaguange. Only available with a new device.	

Table 202: 5SWWI7.0100-ENG, 5SWWI7.0100-GER, 5SWWI7.0300-MUL, 5SWWI7.0200-ENG, 5SWWI7.0200-GER, 5SWWI7.0400-MUL - Order data

5.3 Overview

Model number	Edition	Target system	Chipset	Architectures	Language	Preinstalled	Minimum size of CF/HDD	Minimum amount of RAM
5SWWI7.0100-ENG	Professional	APC510 APC511 APC810 PPC800 PP500	945GME GM45 US15W	32-bit	English	Optional	16 GB	1 GB
5SWWI7.0100-GER	Professional	APC510 APC511 APC810 PPC800 PP500	945GME GM45 US15W	32-bit	German	Optional	16 GB	1 GB
5SWWI7.0300-MUL	Ultimate	APC510 APC511 APC810 PPC800 PP500	945GME GM45 US15W	32-bit	Multilan-guage	Optional	16 GB	1 GB
5SWWI7.0200-ENG	Professional	PPC800 APC810	945GME Intel® Core™2 Duo GM45	64-bit	English	Optional	20 GB	2 GB
5SWWI7.0200-GER	Professional	PPC800 APC810	945GME Intel® Core™2 Duo GM45	64-bit	German	Optional	20 GB	2 GB
5SWWI7.0400-MUL	Ultimate	PPC800 APC810	945GME Intel® Core™2 Duo GM45	64-bit	Multilan-guage	Optional	20 GB	2 GB

5.4 Installation

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

5.4.1 Installation on PCI SATA RAID controller - 5ACPCI.RAIC-03, 5ACPCI.RAIC-05

5.4.2 For 5PCI slot model

The following steps are necessary when installing to a slide-in HDD being operated in the slide-in slot 2 (located behind the PCI to SATA Bridge) on the APC810:

1. Download the Sil3531 SATA driver for Windows 7 from the B&R homepage ()www.br-automation.com and copy the data to a folder on a USB flash drive.
2. Boot using the Windows7 DVD.
3. Follow the installation steps until a page appears asking "Where do you want to install Windows?".
4. Plug the USB flash drive with the RAID drivers into an available USB port.
5. Click on "Load driver", and navigate to the directory containing the RAID drivers. Then click Next to continue.
6. Remove the USB flash drive.
7. The Windows 7 installation can now be performed as usual.

Information:

Depending on the system it could be neccesary to change the boot order in BIOS.

5.5 Special considerations, limitations

- Windows 7 does not contain a Beep.sys file, which means that audible signal is no longer played (i.e. when touching a key or button).
- Windows 7 system classification is not currently supported (does not apply to PP500, APC510 and APC511 devices).

5.6 Drivers

The latest drivers for all released operating systems can be found in the Download area of the B&R website (www.br-automation.com).

Information:

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

6 Windows Embedded Standard 2009

6.1 General information

Windows® Embedded Standard 2009 is the modular version of Windows® XP Professional. It's used if XP applications require a smaller operating system size to run. 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 multilingual.

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

6.2 Order data

Model number	Short description	Figure
	Windows Embedded Standard 2009	
5SWWXP.0733-ENG	Microsoft OEM Windows Embedded Standard 2009, English; for APC810 with GM45 chipset; please order CompactFlash separately (minimum 1 GB).	
	Mandatory accessories	
	CompactFlash	
5CFCRD.016G-06	B&R CompactFlash 16 GB	
5CFCRD.1024-03	CompactFlash 1 GB Western Digital	
5CFCRD.1024-06	B&R CompactFlash 1 GB	
5CFCRD.2048-03	CompactFlash 2 GB Western Digital	
5CFCRD.2048-06	B&R CompactFlash 2 GB	
5CFCRD.4096-03	CompactFlash 4 GB Western Digital	
5CFCRD.4096-06	B&R CompactFlash 4 GB	
5CFCRD.8192-03	CompactFlash 8 GB Western Digital	
5CFCRD.8192-06	B&R CompactFlash 8 GB	

Table 203: 5SWWXP.0733-ENG - Order data

6.3 Overview

Model number	Type	Target system	Chipset	Language	Preinstalled	Minimum size of CF/HDD	Minimum amount of RAM
5SWWXP.0733-ENG	WES2009 APC810 GM45	APC810	GM45	English	Yes	1 GB	256 MB

6.4 Features with WES2009 (Windows Embedded Standard 2009)

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

Function	Present
Enhanced write filter (EWF)	✓
File Based Write Filter (FBWF)	✓
Page file	Configurable
Administrator account	✓
User account	Configurable
Explorer shell	✓
Registry filter	✓
Internet Explorer 7.0	✓
Internet information service (IIS)	-
Terminal service	✓
Windows Firewall	✓
MSN-Explorer	-
Outlook Express	-
Administrative Tools	✓
Remote Desktop	✓
Remote Assistance	-

Table 204: Device functions in Windows Embedded Standard 2009

Function	Present
.NET Framework	-
ASP.NET	-
Local Network Bridge	✓
Codepages/User Locale/Keyboard	✓
Disk Management Service	✓
Windows Installer Service	✓
Class Installer	✓
CoDevice Installer	✓
Media Player 6.4	✓
DirectX 9.0c	✓
Accessories	✓
Number of fonts	89

Table 204: Device functions in Windows Embedded Standard 2009

6.5 Installation

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

6.6 Drivers

All drivers required for operation are preinstalled on the operating system. If an older version of the driver is installed, the latest version can be downloaded from the B&R website (www.br-automation.com) and installed. Be sure to check whether the "Enhanced Write Filter (EWF)" is enabled.

6.6.1 Touch screen drivers

In order to operate Automation Panel 800 or Automation Panel 900 touch screen devices, you need to either install the touch screen driver manually and update the touch screen interface in the device manager. The driver is available in the Download area of the B&R website (www.br-automation.com). Be sure to check whether the Enhanced Write Filter (EWF) is enabled.

Information:

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

7 Windows Embedded Standard 7

7.1 General information

The successor to Windows® XP Embedded has been given the name Windows® Embedded Standard 7. As with previous versions, this embedded operating system offers full system support of Automation PC 810, Panel PC 800 and Power Panel 500 devices. In addition to brand new features that are also included in Windows® 7 Professional, Windows® Embedded Standard 7 includes 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 also made substantial improvements in the area of security. The AppLocker program, available in the premium version, can prevent the execution of unknown or potentially unwanted applications that should be installed over a network or from drives that are directly connected. A tiered approach allows the differentiation between scripts (.ps1, .bat, .cmd, .vbs and .js), installer files (.msi, .msp) and libraries (.dll, .ocx). AppLocker can also be configured to record undesired activity and display it in the Event Viewer. Windows® Embedded Standard 7 is available in both 32-bit and 64-bit versions. This also provides support for challenging 64-bit applications.

7.2 Order data

Model number	Short description	Figure
	Windows Embedded Standard 7	
5SWWI7.0533-ENG	Microsoft OEM Windows Embedded Standard 7 32-bit, English; for APC810 with GM45 chipset; please order CompactFlash separately (minimum 8 GB).	
5SWWI7.0633-ENG	Microsoft OEM Windows Embedded Standard 7 64-bit, English; for APC810 with GM45 chipset; please order CompactFlash separately (minimum 16 GB).	
5SWWI7.0733-MUL	Microsoft OEM Windows Embedded Standard 7 Premium 32-bit, multilanguage; for APC810 with GM45 chipset; please order CompactFlash separately (minimum 8 GB).	
5SWWI7.0833-MUL	Microsoft OEM Windows Embedded Standard 7 Premium 64-bit, multilanguage; for APC810 with GM45 chipset; please order CompactFlash separately (minimum 16 GB).	
	Mandatory accessories	
	CompactFlash	
5CFCRD.016G-06	B&R CompactFlash 16 GB	
5CFCRD.8192-06	B&R CompactFlash 8 GB	
	Optional accessories	
	Windows Embedded Standard 7	
5SWWI7.0900-MUL	WES7P 32bit Language Pack DVD	
5SWWI7.1000-MUL	WES7P 64bit Language Pack DVD	

Table 205: 5SWWI7.0533-ENG, 5SWWI7.0633-ENG, 5SWWI7.0733-MUL, 5SWWI7.0833-MUL - Order data

7.3 Overview

Model number	Edition	Target system	Chipset	Architectures	Language	Preinstalled	Minimum size of CF/HDD	Minimum amount of RAM
5SWWI7.0533-ENG	Embedded	APC810	GM45	32-bit	English	Optional	8 GB	1 GB
5SWWI7.0633-ENG	Embedded	APC810	GM45	64-bit	English	Optional	16 GB	1 GB
5SWWI7.0733-MUL	Premium	APC810	GM45	32-bit	Multilanguage	Optional	8 GB	1 GB
5SWWI7.0833-MUL	Premium	APC810	GM45	64-bit	Multilanguage	Optional	16 GB	1 GB

7.4 Features with WES7 (Windows Embedded Standard 7)

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

Function	Windows Embedded Standard 7	Windows Embedded Standard 7 Premium
Enhanced Write Filter (EWF)	✓	✓
File Based Write Filter (FBWF)	✓	✓
Administrator account	✓	✓
User account	Configurable	Configurable
Windows Explorer Shell	✓	✓
Registry filter	✓	✓
Internet Explorer 8.0	✓	✓
Internet Information Service (IIS) 7.0	✓	✓
AntiMalware (Windows Defender)	-	✓
Add-ons (Snipping tool, Sticky Notes)	-	✓
Windows Firewall	✓	✓
.NET Framework 3.5	✓	✓
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 Stick	✓	✓
Accessories	✓	✓
Page file	Configurable	Configurable
Number of fonts	134	134

Table 206: Device functions in Windows Embedded Standard 7

7.5 Installation

Upon request, Windows Embedded Standard 7 can be preinstalled at B&R Austria on a suitable CompactFlash 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, and the device will be rebooted a number of times.

7.6 Drivers

All drivers required for operation are preinstalled on the operating system. If an older version of the driver is installed, the latest version can be downloaded from the B&R website (www.br-automation.com) and installed. Be sure to check whether the Enhanced Write Filter (EWF) is enabled.

7.6.1 Touch screen drivers

A touch screen driver will be automatically installed if a touch controller is detected during the Windows Embedded Standard 7 setup. If a touch controller is not detected during Windows Embedded Standard 7 setup, or if an Automation Panel 800/900 is connected later on, the touch screen driver needs to be installed or the additional touch screen interface needs to be selected in the touch screen settings in the Windows Control Panel. The driver is available in the Download area of the B&R website (www.br-automation.com). When doing so, be sure that the Enhanced Write Filter (EWF) or File Based Write Filter (FBWF) are not enabled.

Information:

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

8 Automation Runtime

8.1 General information

A integral component of Automation Studio is the real-time operating system. This real-time operating system makes up the software kernel which allows applications to run on a target system.

- Guaranteed highest possible performance for the hardware being used
- Runs on all B&R target systems
- Makes the application hardware-independent
- Applications can be easily ported between B&R target systems
- Cyclic runtime system guarantees deterministic behavior
- Multitasking according to deterministic runtime rules
- Configure priorities, time classes, and jitter tolerance
- Up to eight different time classes with any subprograms
- Guaranteed response to time violations and exceeding jitter tolerances
- Exception handling
- Configurable jitter tolerance in all task classes
- Supports all relevant programming language such as IEC 61131-3 and ANSI C
- Extensive function library conforming to IEC 61131-3 as well as the expanded Automation library
- Access to all networks and bus systems via function calls or the Automation Studio configuration

B&R Automation Runtime™ is fully embedded in the corresponding target system (this is the hardware where Automation Runtime™ is installed). It allows application programs to access I/O systems (e.g. via fieldbus) and other devices (interfaces, networks, etc.).

8.2 Order data

Model number	Short description	Figure
	Windows-based Runtime	
1A4600.10	B&R Automation Runtime ARwin, incl. License Label and Security Key	
1A4600.10-2	B&R Automation Runtime ARwin, ARNC0	
1A4600.10-3	B&R Automation Runtime ARwin+PVIControls incl. License Label and Security Key	
1A4600.10-4	B&R Automation Runtime ARwin+ARNC0+PVIControls	
1A4601.06	B&R Automation Runtime ARemb, incl. License Label and Security Key	
1A4601.06-2	B&R Automation Runtime ARemb, ARNC0	

Table 207: 1A4600.10, 1A4600.10-2, 1A4600.10-3, 1A4600.10-4, 1A4601.06, 1A4601.06-2 - Order data

8.3 Automation Runtime Windows (ARwin)

The system is supported by ARwin with an AS 2.7 / AR 2.xx upgrade.

8.4 Automation Runtime Embedded (ARemb)

The system is supported by ARemb with an AS 3.0.90 / AR 4.00 upgrade.

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

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

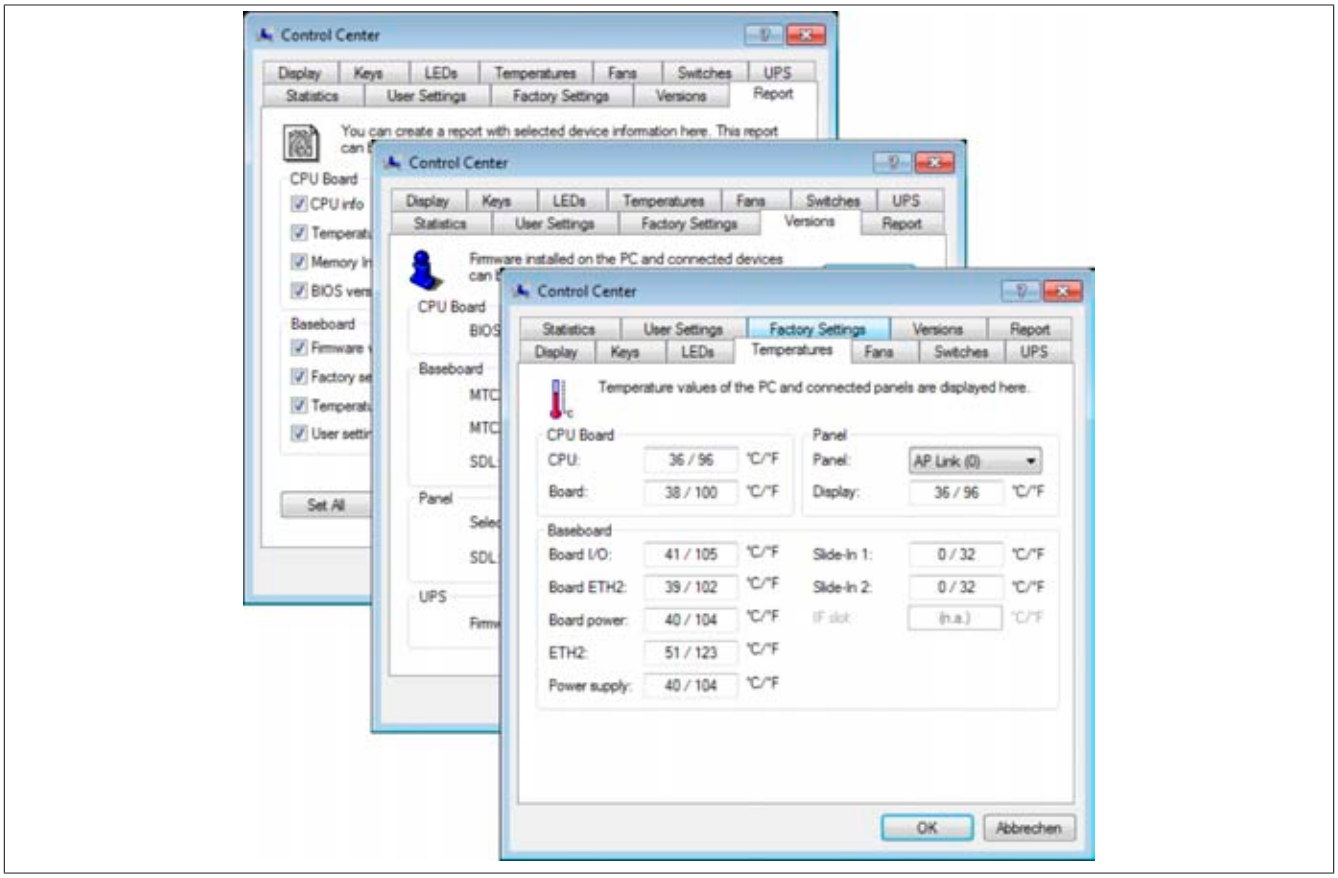


Image 127: ADI Control Center screenshots - Examples (symbol photo)

Information:

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

9.1 Functions

Information:

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

- Changing display-specific parameters
- Reading of device-specific keys
- Updating the key configuration
- Activation of device specific LEDs on a foil keypad
- Read or calibrate the entry devices (e.g. key switch, handwheel, joystick, potentiometer)
- Reading temperatures, fan speeds, statistical data, and switch settings
- Read the operating hours (power on hours)
- Reading user settings and factory settings
- Reading Software versions
- Updating and securing BIOS and firmware
- Creating reports about the current system (support assistance)
- Setting the SDL equalizer value for the SDL cable adjustment
- Changing the User serial ID

Supports following systems:

- Automation PC 510
- Automation PC 511
- Automation PC 620
- Automation PC 810
- Automation PC 820
- 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

9.2 Installation

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

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

Information:

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

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

9.3 SDL equalizer setting

1. Open the **Control Center** in the **Control Panel**.
2. Select **Display** tab.
3. Click on **Settings**. This opens the following dialog box:

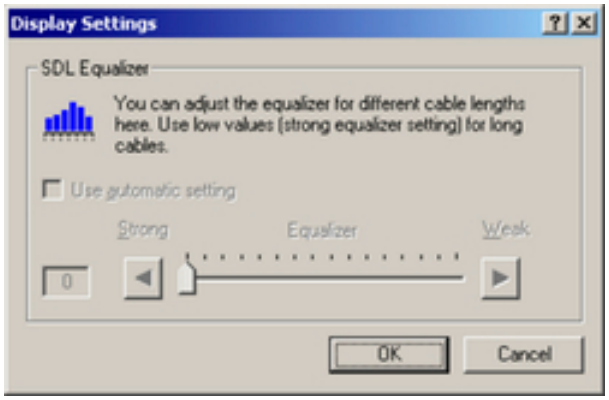


Image 128: ADI Control Center - SDL equalizer settings

You can change the display's SDL equalizer settings in this dialog box. The equalizer is integrated into Automation Panel devices and adapts the DVI signal to various cable lengths. The equalizer value is automatically calculated based on the cable length. It is possible to set a different equalizer value in order to obtain the best possible display quality (e.g. in case of low-quality cables or poor DVI signal quality).

The value is optimally defined for the cable length when using the "Automatic setting".

The equalizer value can only be changed if the function is supported by Automation Panel 900 (starting with Panel Firmware version 1.04 or higher).

9.4 UPS configuration

Here you can view the status values for an optionally installed B&R APC add-on UPS as well as change, update or save the battery settings for the UPS. You can also configure the system settings for the UPS.

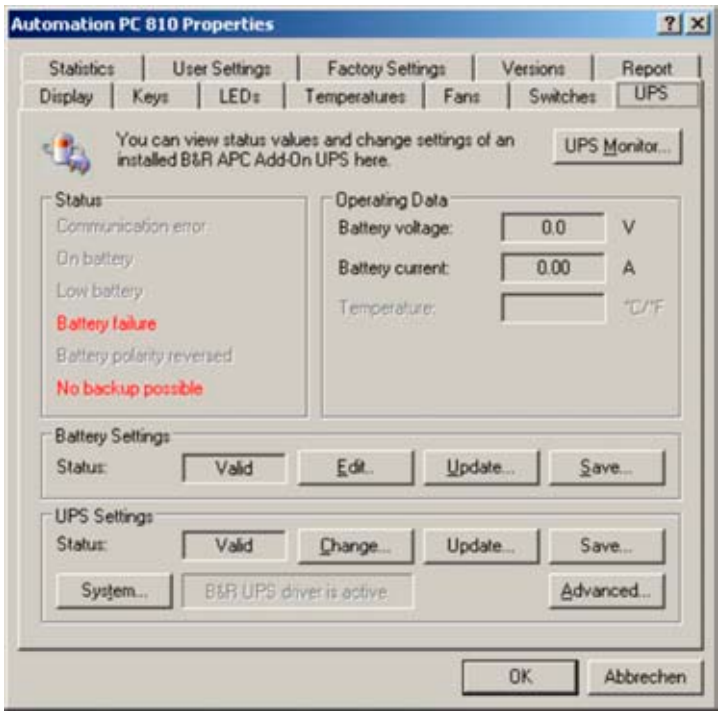


Image 129: ADI Control Center - UPS settings

Caution!

The installed UPS must be selected and configured in the Control Panel using the energy options in order for battery operation to be supported.

Information:

The UPS service is supported starting with B&R Windows Embedded Version 2.10 or higher.

9.4.1 Installing the UPS service for the B&R APC add-on UPS

1. Open the **Control Center** in the **Control Panel**.
2. Select the **UPS** tab.
3. Under **UPS settings**, click on **System**. This opens the **Power Options** in the Control Panel. (The **Power Options** can also be opened directly from the **Control Panel**.)
4. Go to the **UPS** tab and click **Select....**
5. Choose 'Bernecker + Rainer' as the manufacturer and 'APC Add-on UPS' as the model and then click **Finish**. The value for the COM connection is only required for a serially connected UPS and is ignored by the APC add-on UPS driver.
6. Click on **Apply** to start the UPS service. After a few seconds the UPS status and details are displayed.
7. Click **OK**.

The text field beside **System** (on the **UPS** tab in the **Control Center**) also indicates whether the B&R UPS driver is active.

Information:

Administrator rights are required in order to change the energy options or display the UPS status.

9.4.2 Displaying UPS status values

1. Open the **Control Center** in the **Control Panel**.
2. Select the **UPS** tab.

The displayed values are updated automatically.

Information:

The "reversed battery polarity " status is only displayed in UPS firmware Version 1.08 or higher.

In UPS firmware Version 1.07 or smaller, a change between battery operation and normal operation can lead to communication errors.

3. Select UPS monitor to display UPS status changes since the last time the system or UPS driver was started.

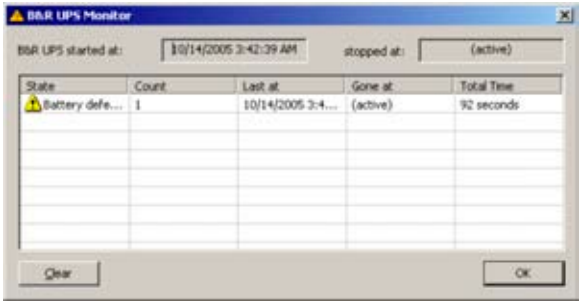


Image 130: ADI Control Center - UPS monitor

The dialog box is updated automatically when the status changes.

To remove a status from the list, click on **delete**.

Information:

The current status of the UPS is also displayed when the UPS service is started in the Windows Control Panel on the UPS page in the energy options.

Information:

In a German version of Windows XP Professional the battery status is displayed as "low" in the energy options, even if the battery is OK (Windows error). In an English version, three battery status levels are displayed: unknown, OK, replace A low battery status is never displayed.

9.4.3 Changing UPS battery settings

1. Open the **Control Center** in the **Control Panel**.
2. Select the **UPS** tab.
3. Under **Battery settings**, click on **Edit**. This opens the "Open" dialog box.
4. Select and **open** the file containing the battery settings.

Image 131: ADI Control Center - UPS battery settings

In this dialog box you can change the settings for the UPS battery.

The changed settings are written to the file by clicking on the **OK** button. The battery settings for the UPS can then be updated with this file.

none

To make settings for batteries not from B&R, it is best to make a copy of a file with battery settings from B&R under a new name and make adjust the settings in this file for the battery being used.

Current files with settings for batteries from B&R can be updated using B&R's "Upgrade PPC800 MTCX" software.

Information:

- **The current UPS firmware version 1.10 does not use charge end voltage, deep discharge voltage, lifespan and deep discharge cycles.**
- **Lifespan is only included in version 2 (and higher) of the UPS battery settings and only valid for B&R UPS batteries at 25°C ambient temperature.**
- **Deep discharge cycles are only included in version 3 (and higher) of the UPS battery settings and only valid for B&R UPS batteries.**

Information:

If you would like to change the current battery settings on the UPS, they must first be saved in a file.

9.4.4 Updating UPS battery settings

1. Open the **Control Center** in the **Control Panel**.
2. Select the **UPS** tab.
3. Under **Battery settings**, click on **Update**. Clicking on "Open" opens a dialog box.
4. Select and **open** the file containing the battery settings. The "Download" dialog box is opened.

The transfer can be aborted by clicking on **Cancel** in the Download dialog box. Cancel is disabled when the flash memory is being written to.

Information:

- **The UPS cannot be operated while updating the battery settings.**
- **If the transfer is interrupted, then the procedure must be repeated until the battery settings have been updated successfully. Otherwise battery operation will no longer be possible.**

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

Information:

The UPS is automatically restarted after a successful download. This can cause a brief failure in the UPS communication.

9.4.5 Saving UPS battery settings

1. Open the **Control Center** in the **Control Panel**.
2. Select the **UPS** tab.
3. Under Battery settings, click on **Save**. "Save under" dialog box opened.
4. Enter a file name or select an existing file and click on **Save**.

Information:

UPS settings can only be saved using UPS firmware version 1.10 and higher.

The transfer can be aborted by clicking on **Cancel** in the "Download" dialog box.

9.4.6 UPS system settings configure

1. Open the **Control Center** in the **Control Panel**.
2. Select the **UPS** tab.
3. Under **UPS settings**, click on **Change**. This opens the following dialog box:

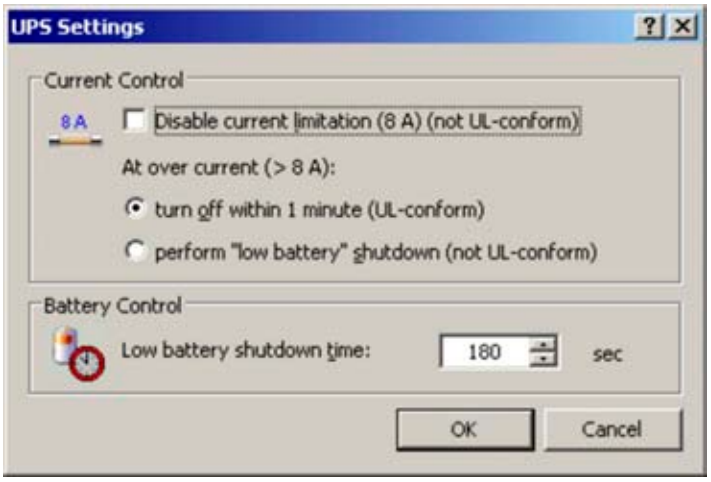


Image 132: ADI Control Center - UPS settings

Further information regarding the UPD system settings can be found in the Windows help.

Information:

- **UPS settings can only be changed using UPS firmware version 1.10 and higher. If there are no changed settings on the UPS, then the factory or default settings are used.**
- **The UPS is automatically restarted after UPS settings have been changed. This can cause a brief disruption in communication with the UPS.**
- **Administrator rights are required in order to change the energy options or display the UPS status.**

Disabling 8 A current limitation

> **Information:**
>
> **It is not UL compliant to switch off the 8 A current limitation on devices during battery operation!**
>
> **"Low Battery" shutdown caused by an over-current > 8 A on devices during battery operation is not UL compliant!**

Select the checkbox **Disable current limitation (8 A)**.

If current limitation is enabled (checkbox deselected), then the UPS uses battery operation to check whether the UPS battery is discharged with 8 A for longer than 16 seconds. If so, then an overcurrent alarm is sent to the PC.

> **Information:**
>
> **Current limitation is only supported with UPS firmware version 1.10 and higher.**

Enabling one of the two following options determines how the UPS should perform when an overcurrent alarm occurs:

If **Turn-off within 1 minute** is selected, then the UPS will turn-off within one when an overcurrent alarm occurs.

> **Warning!**
>
> **The operating system will not be properly shut down if an overcurrent alarm occurs!**

If **Perform "low battery" shutdown** is selected, then the UPS will also signal a "Low battery alarm" in addition to the overcurrent alarm and will turn off after the defined **Low battery shutdown time**. This will allow the operating system to shut down properly when UPS service is enabled.

Changing the shutdown time of the UPS when battery is low

Enter the **"Low Battery"shutdown time** in seconds. This is the amount of time that the UPS will wait before shutting off the power supply when the battery level is low.

This prevents the UPS battery from becoming too discharged if the Windows UPS service is not enabled and the UPS is therefore not turned off by the operating system.

If the UPS service is enabled, then the UPS will be turned off by the operating system when the battery level is low, based on the Windows UPS service **shutdown time** (see "Changing additional UPS settings", on page 309). The **low battery shutdown time** will then be ignored.

> **Information:**
>
> - **The low battery shutdown time must be set to at least 60 seconds, so that the operating system has enough time to send the shutdown command to the UPS when the battery level is low (normally occurs after approximately 30 seconds).**
> - **The low battery shutdown time can only be set in UPS firmware version 1.10 and later. UPS firmware version 1.08 always uses a turn off delay time of 180 seconds. UPS firmware versions earlier than 1.08 do not shut down automatically when the battery level is low.**

9.4.7 Changing additional UPS settings

UPS turn-off time - change

Under **Windows UPS Service**, you can enter the **turn-off time** in seconds. This is the length of time that the UPS waits before switching off the power supply. When a critical alarm occurs (e.g. at low battery level), the Windows UPS service will send a shutdown command with the turn off delay time to the UPS and will shut down the system.

> **Information:**
>
> **This time is evaluated by the Windows UPS Service, but can not be set in the UPS system settings of the energy options. This value should only be changed if the system requires longer than the default setting of 180 seconds to shut down.**

Caution!

The time entered must be longer than the time required to shut down the operating system.

Activate UPS messages

Under **B&R UPS driver**, activate the checkbox **UPS status messages**. Any changes to the UPS status will then trigger a message from the B&R UPS driver.

Information:

Shutting down the system is only reported by the Windows UPS Service. The UPS Service also sends other messages if they are activated in the UPS system settings energy options. These messages are only displayed when the Windows Alerter (Messenger)[1] active and the PC is connected to a network. Additionally, some conditions of the B&R APC add-on UPS are not detected by the Windows UPS Service, and are therefore do not trigger messages (e.g. when there are no battery settings on the UPS). The Windows services can be found by opening the Control Panel and selecting "Services" from the Administrative Tools.

If the checkbox **Display UPS status with UPS monitor** is also activated, a new message is not displayed for every change, but only a general message and request for you to start the B&R UPS monitor. As long as the UPS monitor is active, no new messages are displayed.

Information:

Regardless of these options, all changes to the UPS status are logged in Windows event protocol (under "Application").

9.4.8 Procedure following power failure

Over current shutdown

If an over-current > 8 A is present during battery operation for a duration of 16 seconds, the over-current shutdown is executed. A turn-off time of one minute is available to the system.

If the supply is regenerated during this time, then the shut down process is aborted.

Information:

The over-current shutdown has the highest priority.

Low battery shutdown

If the LowBatteryFlag is set during power failure, then the "Low Battery" shutdown is executed. This prevents the rechargeable battery from dying. Once the turn-off time expires (3 minutes by default), the UPS shuts down.

If an "over-current" shutdown or "standard" shutdown is detected during the shutdown process, the "low battery" shutdown is replaced by the respective process.

Standard shutdown

The standard shutdown is effective when the UPS service is active, the turn-off time is 3 minutes by default.

If the supply voltage returns during the turn-off time, then the shutdown procedure will be stopped.

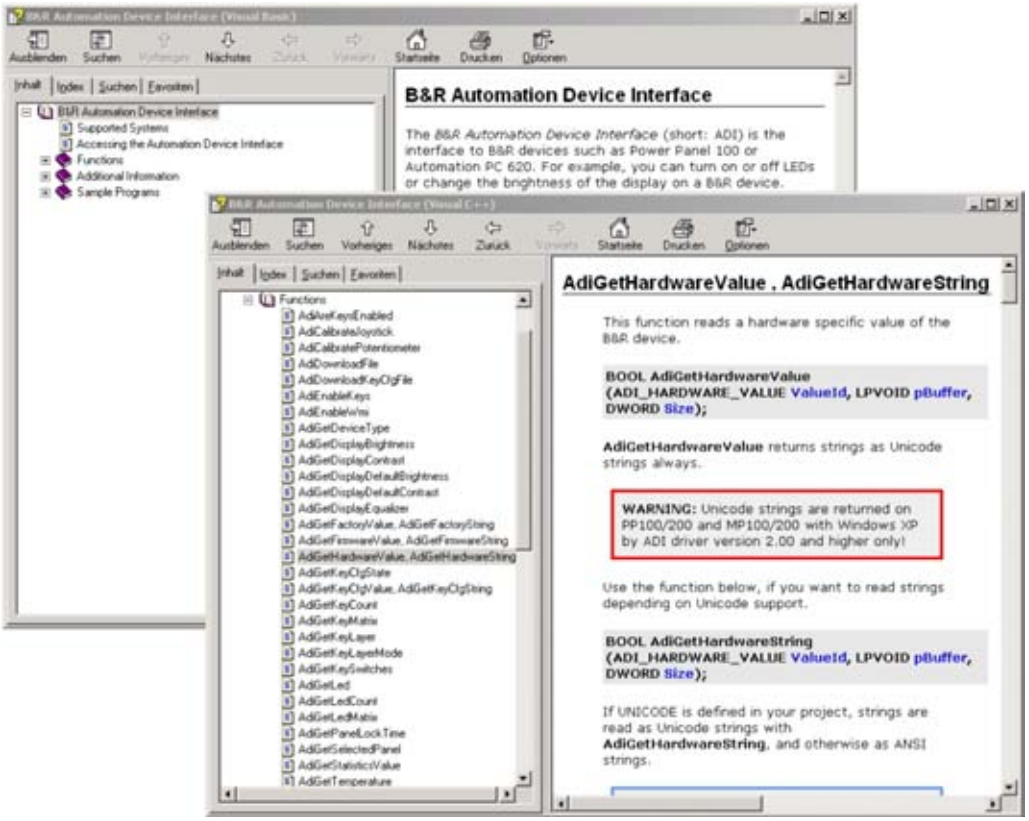
If the supply voltage returns during the shutdown process, then the shutdown timer will run until the APC810 enters standby mode and will then reboot the system.

1) The Windows Alerter is supported starting with B&R Windows Embedded Version 2.10 or higher.

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

This software can be used to activate functions in the B&R Automation Device Interface (ADI) from Windows applications, which were created using a development environment such as one of the following.

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



Features:

- One Microsoft Visual Basic module with declarations for the ADI functions
- 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 testing the applications, if no ADI drive is installed)

Supports following systems (Version 3.10 and higher):

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

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

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

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

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

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

Supported programming languages:

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

System requirements:

- 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)

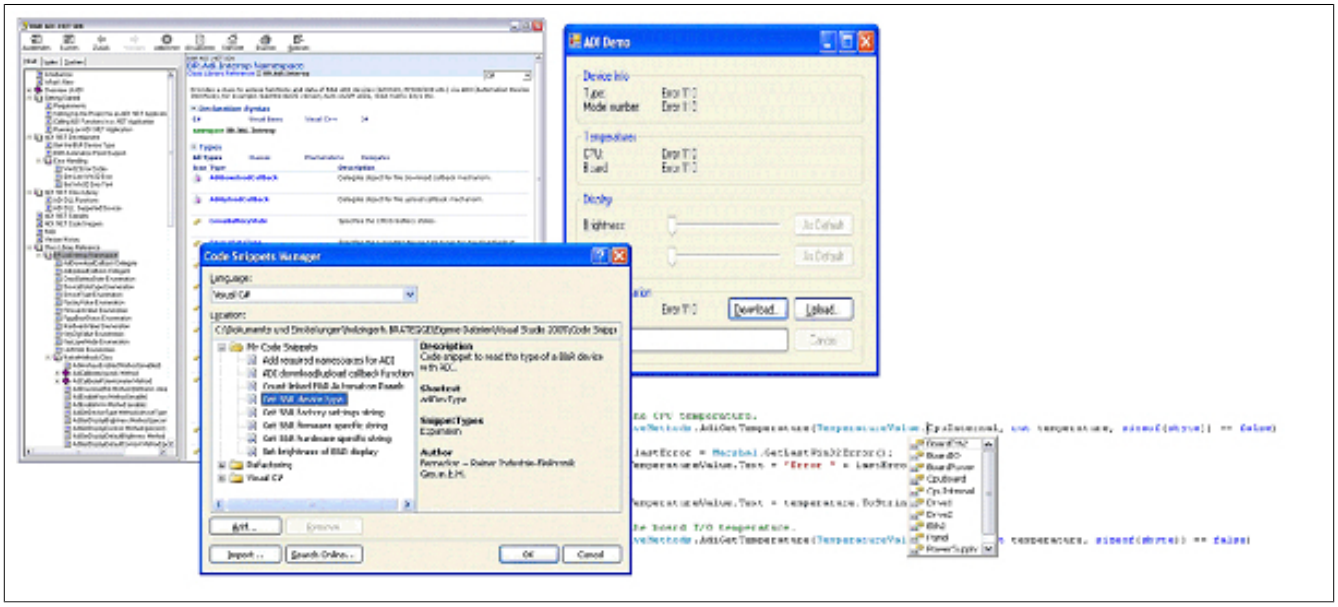


Image 133: ADI .NET SDK screenshots (Version 1.50)

Features:

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

Supports following systems (Version 1.50 and higher):

- Automation PC 620
- Automation PC 810
- Automation PC 820
- 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

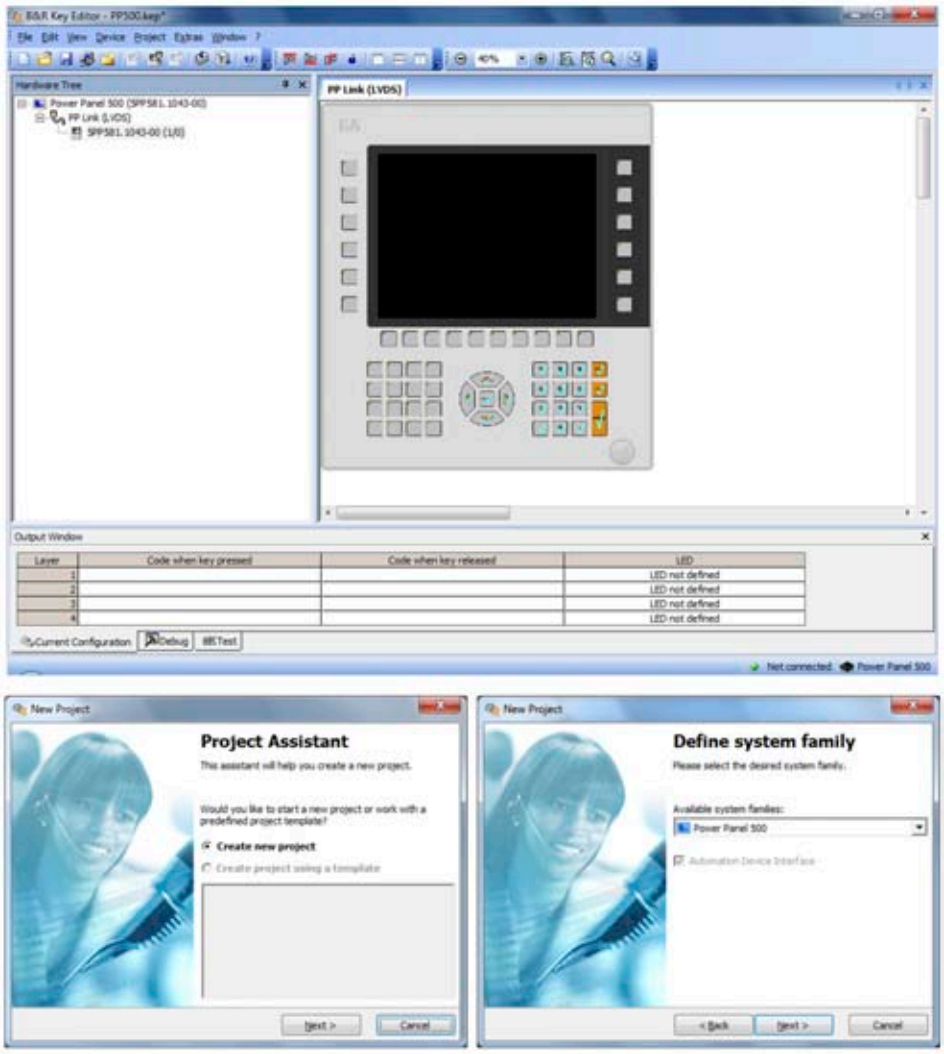
The ADI driver suitable for the device must be installed on the stated product series. The ADI driver is already included in the B&R images of embedded operating systems.

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

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

12 B&R Key Editor

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



Features:

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

Supports following systems (Version 3.20):

- Automation PC 510
- Automation PC 511
- Automation PC 620
- Automation PC 810
- Automation PC 820
- Automation Panel 800
- Automation Panel 900
- IPC2000, IPC2001, IPC2002
- IPC5000, IPC5600
- IPC5000C, IPC5600C

- Mobile Panel 40/50
- Mobile Panel 100/200
- Panel PC 300
- Panel PC 700
- Panel PC 800
- Power Panel 100/200
- Power Panel 300/400
- Power Panel 500

A detailed guide for configuring keys and LEDs can be found in the B&R Key Editor's online help. The B&R Key Editor can be downloaded for free from the download area on the B&R homepage (www.br-automation.com). Additionally, it can also be found on the B&R HMI Drivers & Utilities DVD (model number 5SWHMI.0000-00).

Chapter 5 • Standards and certifications

1 Applicable European Directives

- EMC directive 2004/108/EG
- Low-voltage directive 2006/95/EC

2 Overview of standards

Standard	Description
EN 55011 Class A	Electromagnetic compatibility (EMC), radio disturbance product standard, industrial, scientific, and medical high-frequency devices (ISM devices), limit values and measurement procedure; group 1 (devices that do not create HF during material processing) and group 2 (devices that create HF during material processing)
EN 55022 Class A	Electromagnetic compatibility (EMC), radio disturbance characteristics, information technology equipment (ITE devices), limits and methods of measurement
EN 60060-1	High-voltage test techniques - part 1: General specifications and testing conditions
EN 60068-2-1	Environmental testing - part 2: Tests; test A: Dry cold
EN 60068-2-2	Environmental testing - part 2: Tests; test B: Dry heat
EN 60068-2-3	Environmental testing - part 2: Tests; test and guidance: Damp heat, constant
EN 60068-2-6	Environmental testing - part 2: Tests; test: Vibration (sinusoidal)
EN 60068-2-14	Environmental testing - part 2: Tests; test N: Change of temperature
EN 60068-2-27	Environmental testing - part 2: Tests; test and guidance: Shock
EN 60068-2-30	Environmental testing - part 2: Tests; test and guidance: Damp heat, cyclic
EN 60068-2-31	Environmental testing - part 2: Tests; test: Drop and topple, primarily for equipment-type specimens
EN 60068-2-32	Environmental testing - part 2: Tests; test: Free fall
EN 60204-1	Safety of machinery, electrical equipment on machines - part 1: General requirements
EN 60529	Degrees of protection provided by enclosures (IP code)
EN 60664-1	Insulation coordination for equipment within low-voltage systems - part 1: Principles, requirements and tests
EN 60721-3-2	Classification of environmental conditions - part 3: Classification of groups of environmental parameters and their severities, section 2: Transport
EN 60721-3-3	Classification of environmental conditions - part 3: Classification of groups of environmental parameters and their severities, section 3: Stationary use at weather-protected locations
EN 61000-3-2	Electromagnetic compatibility (EMC) - part 3-2: Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
EN 61000-3-3	Electromagnetic compatibility (EMC) - part 3-3: Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, equipment with rated current ≤ 16 A per phase, and not subject to conditional connection.
EN 61000-3-11	Electromagnetic compatibility (EMC) - part 3-11: Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, equipment with rated current ≤ 75 A per phase, and subject to conditional connection.
EN 61000-4-2	Electromagnetic compatibility (EMC) - part 4-2: Testing and measuring techniques; electrostatic discharge immunity test
EN 61000-4-3	Electromagnetic compatibility (EMC) - part 4-3: Testing and measuring techniques; radiated radio-frequency electromagnetic field immunity test
EN 61000-4-4	Electromagnetic compatibility (EMC) - part 4-4: Testing and measuring techniques; electrical fast transient/burst immunity test
EN 61000-4-5	Electromagnetic compatibility (EMC) - part 4-5: Testing and measuring techniques; surge immunity test
EN 61000-4-6	Electromagnetic compatibility (EMC) - part 4-6: Testing and measuring techniques; immunity to conducted disturbances, induced by radio-frequency fields
EN 61000-4-8	Electromagnetic compatibility (EMC) - part 4-8: Testing and measuring techniques; power frequency magnetic field immunity test
EN 61000-4-18	Electromagnetic compatibility (EMC) - part 4-18: Testing and measuring techniques; damped oscillatory waves immunity test
EN 61000-4-29	Electromagnetic compatibility (EMC) - part 4-29: Testing and measuring techniques; voltage dips, short interruptions and voltage variations on DC input power port immunity tests
EN 61000-6-2	Electromagnetic compatibility (EMC), generic immunity standard - part 2: industrial environment
EN 61000-6-4	Electromagnetic compatibility (EMC), generic emission standard - part 2: industrial environment
EN 61131-2	Product standard, programmable logic controllers - part 2: Equipment requirements and tests
Germanischer Lloyd 2003	Germanischer Lloyd 2003: Supplementary provisions and guidelines - Part 7: Guidelines for type testing
UL 508	Industrial control equipment (UL = Underwriters Laboratories)
47 CFR	Federal Communications Commission (FCC), 47 CFR Part 15 Subpart B Class A

Table 208: Overview of standards

3 Emission requirements

Emissions	Test carried out in accordance with	Limits in accordance with
Network-related emissions	EN 55011 / EN 55022	EN 61000-6-4: Generic standard (industrial areas)
		EN 55011: Industrial, scientific, and medical (ISM) radio-frequency equipment, class A (industrial areas)
		EN 55022: Information technology equipment (ITE devices), class A (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 50091-2: Uninterruptible power systems (UPS), class A
		47 CFR Part 15 Subpart B Class A (FCC)
		Germanischer Lloyd 2003
Emissions, electromagnetic emissions	EN 55011 / EN 55022	EN 61000-6-4: Generic standard (industrial areas)
		EN 55011: Industrial, scientific, and medical (ISM) radio-frequency equipment, class A (industrial areas)
		EN 55022: Information technology equipment (ITE devices), class A (industrial areas)
		EN 61131-2: Programmable logic controllers
		EN 50091-2: Uninterruptible power systems (UPS), class A
		47 CFR Part 15 Subpart B Class A (FCC)
		Germanischer Lloyd 2003
Harmonic current emissions for equipment with input current ≤ 16 A per phase	EN 61000-3-2	EN 61000-3-2: Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
Voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, equipment with rated current ≤ 16 A per phase, and not subject to conditional connection.	EN 61000-3-3	EN 61000-3-3: Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, equipment with rated current ≤ 16 A per phase, and not subject to conditional connection Class A/D
Voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, equipment with rated current ≤ 75 A per phase, and subject to conditional connection.	EN 61000-3-11	EN 61000-3-11: Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, equipment with rated current ≤ 75 A per phase, and subject to conditional connection Class A/D

Table 209: Overview of limits and testing guidelines for emissions

3.1 Network-related emissions

Tests according to EN 55011 / EN 55022	Limit values according to EN 61000-6-4	Limit values according to EN 55011 Class A	Limit values according to EN 55022 Class A
Power mains connections 150 kHz - 500 kHz	-	79 dB (µV) quasi-peak value 66 dB (µV) average value	79 dB (µV) quasi-peak value 66 dB (µV) average value
Power mains connections 500 kHz - 30 MHz	-	73 dB (µV) quasi-peak value 60 dB (µV) average value	73 dB (µV) quasi-peak value 60 dB (µV) average value
AC mains connections 150 kHz - 500 kHz	79 dB (µV) quasi-peak value 66 dB (µV) average value	-	-
AC mains connections 500 kHz - 30 MHz	73 dB (µV) quasi-peak value 60 dB (µV) average value	-	-
Other connections 150 kHz - 500 kHz	-	-	97 - 87 dB (µV) and 53 - 43 dB (µA) quasi-peak value 84 - 74 dB (µV) and 40 - 30 dB (µA) average value
Other connections 500 kHz - 30 MHz	-	-	87 dB (µV) and 43 dB (µA) quasi-peak value 74 dB (µV) and 30 dB (µA) average value
Tests in accordance with EN 55011 / EN 55022	**Limit values in accordance with IEC 61131-2**	**Limits according to 47 CFR Part 15 Subpart B class A**	
AC mains connections 150 kHz - 500 kHz	79 dB (µV) quasi-peak value 66 dB (µV) average value	79 dB (µV) quasi-peak value 66 dB (µV) average value	
AC mains connections 500 kHz - 30 MHz	73 dB (µV) quasi-peak value 60 dB (µV) average value	73 dB (µV) quasi-peak value 60 dB (µV) average value	
Test carried out in accordance with CISPR 16-1, 16-2	**Limit value in accordance with Germanischer Lloyd 2003**		
Mains connections 10 kHz - 150 kHz	96 dB(µV) – 50 dB (µV)		
Mains connections 150 kHz - 500 kHz	60 dB(µV) – 50 dB (µV)		
Mains connections 500 kHz - 30 MHz	50 dB (µV)		

Table 210: Test requirements - Network-related emissions for industrial areas

3.2 Emissions, electromagnetic emissions

Tests according to EN 55011 / EN 55022	Limit values according to EN 61000-6-4	Limit values according to EN 55011 Class A	Limit values according to EN 55022 Class A
30 MHz - 230 MHz measured at a distance of 10 m	< 40 dB (µV/m) Quasi-peak value	< 40 dB (µV/m) Quasi-peak value	< 40 dB (µV/m) Quasi-peak value
230 MHz - 1 GHz measured at a distance of 10 m	< 47 dB (µV/m) Quasi-peak value	< 47 dB (µV/m) Quasi-peak value	< 47 dB (µV/m) Quasi-peak value
Tests according to EN 55011 / EN 55022	**Limit values according to EN 61131-2**	**Limit values according to EN 50091-2 class A**	
30 MHz - 230 MHz measured at a distance of 10 m	< 40 dB (µV/m) Quasi-peak value	< 40 dB (µV/m) Quasi-peak value	
230 MHz - 1 GHz measured at a distance of 10 m	< 47 dB (µV/m) Quasi-peak value	< 47 dB (µV/m) Quasi-peak value	
Test carried out	**Limits according to 47 CFR Part 15 Subpart B class A**		
30 MHz - 88 MHz measured at a distance of 10 m	< 90 dB (µV/m) Quasi-peak value		
88 MHz - 216 MHz measured at a distance of 10 m	< 150 dB (µV/m) Quasi-peak value		
216 MHz - 960 MHz measured at a distance of 10 m	< 210 dB (µV/m) Quasi-peak value		
>960 MHz measured at a distance of 10 m	< 300 dB (µV/m) Quasi-peak value		

Table 211: Test requirements - Electromagnetic emissions for industrial areas

4 Requirements for immunity to disturbances

Immunity	Test carried out according to	Limits according to
Electrostatic discharge (ESD)	EN 61000-4-2	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		Germanischer Lloyd 2003
Immunity to high-frequency electro-magnetic fields (HF field)	EN 61000-4-3	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		Germanischer Lloyd 2003
Immunity to high-speed transient elec-trical disturbances (burst)	EN 61000-4-4	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		Germanischer Lloyd 2003
Immunity to surge voltages	EN 61000-4-5	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		Germanischer Lloyd 2003
Immunity to conducted disturbances	EN 61000-4-6	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		Germanischer Lloyd 2003
Immunity against magnetic fields with electrical frequencies	EN 61000-4-8	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
Immunity to damped oscillatory waves	EN 61000-4-18	EN 61131-2: Programmable logic controllers
Immunity to voltage fluctuations	EN 61000-4-29	EN 61131-2: Programmable logic controllers
		Germanischer Lloyd 2003
Immunity to voltage dips	EN 61000-4-29	EN 61131-2: Programmable logic controllers
		Germanischer Lloyd 2003
Immunity to supply voltage changes	EN 61131-2	EN 61131-2: Programmable logic controllers
Immunity to gradual shutdown/startup	EN 61131-2	EN 61131-2: Programmable logic controllers

Table 212: Overview of limits and testing guidelines for immunity

Evaluation criteria according to EN 61000-6-2

Criteria A:
The operating equipment must continue to work as intended during the test. There should be no interference in the operating behavior and no system failures below a minimum operating quality as defined by the manufacturer.

Criteria B:
The operating equipment must continue to work as directed after the test. There should be no interference in the operating behavior and no system failures below a minimum operating quality as defined by the manufacturer.

Criteria C:
A temporary function failure is permitted if the function restores itself, or the function can be restored by activating configuration and control elements.

Criteria D:
Deterioration or failure of the function, which can no longer be established (operating equipment destroyed).

4.1 Electrostatic discharge (ESD)

Tests in accordance with IEC 61000-4-2	Limit values in accordance with EN 61000-6-2	Limit values in accordance with IEC 61131-2	Limit value in accordance with Germanischer Lloyd 2003
Contact discharge to powder-coated and bare metal housing parts	±4 kV, 10 discharges, criteria B	±4 kV, 10 discharges, criteria B	±6 kV, 10 discharges, criteria B
Discharge through the air to plastic housing parts	±8 kV, 10 discharges, criteria B	±8 kV, 10 discharges, criteria B	±8 kV, 10 discharges, criteria B

Table 213: Test requirements - Electrostatic discharge (ESD)

4.2 High-frequency electromagnetic fields (HF field)

Tests in accordance with IEC 61000-4-3	Limit values in accordance with EN 61000-6-2	Limit values in accordance with IEC 61131-2	Limit value in accordance with Germanischer Lloyd 2003
Housing, completely wired	80 MHz - 1 GHz, 10 V/m, 80% amplitude modulation with 1 kHz, 3 seconds duration, criteria A	2 GHz - 2.7 GHz, 1 V/m, 14 GHz - 2 GHz, 3 V/m, 80 MHz - 1 GHz, 10 V/m, 80% amplitude modulation with 1 kHz, 3 second duration, criteria A	80 MHz - 2 GHz, 10V/m, 80% amplitude modulation with 1kHz, 1%/3sec, criteria A

Table 214: Test requirements - High-frequency electromagnetic fields (HF field)

4.3 High-speed transient elect. disturbance value (burst)

Tests in accordance with IEC 61000-4-4	Limit values in accordance with EN 61000-6-2	Limit values in accordance with IEC 61131-2	Limit values in accordance with Germanischer Lloyd 2003
AC mains inputs/outputs	±2 kV, criteria B	±2 kV, criteria B	-
AC power inputs	-	±2 kV, criteria B	±2 kV, criteria B
DC mains inputs/outputs >3 m[1)]	±2 kV, criteria B	±2 kV, criteria B	-
DC power outputs	-	-	±2 kV, criteria B
Functional ground connections, signal lines and I/Os >3 m	±1 kV, criteria B	±1 kV, criteria B	±1 kV, criteria B
Unshielded AC inputs/outputs >3 m	±2 kV, criteria B	±2 kV, criteria B	-
Analog I/O	±1 kV, criteria B	±1 kV, criteria B	±1 kV, criteria B

Table 215: Test requirements - High-speed transient electrical disturbances (burst)

1) For EN 55024 without length limitation.

4.4 Surge voltages (surge)

Tests in accordance with IEC 61000-4-5	Limit values in accordance with EN 61000-6-2	Limit values in accordance with IEC 61131-2	Limit values in accordance with Germanischer Lloyd 2003
AC power I/O, L to L	±1 kV, criteria B	±1 kV, criteria B	-
AC power I/O, L to PE	±2 kV, criteria B	±2 kV, criteria B	-
DC mains inputs/outputs, L+ to L-, >30 m	±1 kV, criteria B	±1 kV, criteria B	-
DC mains inputs/outputs, L to PE, >30 m	±2 kV, criteria B	±2 kV, criteria B	-
DC power inputs, L+ to L-	-	-	±0.5 kV, Kriterium A
DC power inputs, L to PE	-	-	±1 kV, Kriterium A
Signal connections >30 m	±1 kV, criteria B	±1 kV, criteria B	-
All shielded cables	±1 kV, criteria B	±1 kV, criteria B	-

Table 216: Test requirements - Surge voltages

4.5 Conducted disturbances

Tests in accordance with IEC 61000-4-6	Limit values in accordance with EN 61000-6-2	Limit values in accordance with IEC 61131-2	Limit value in accordance with Germanischer Lloyd 2003
AC mains inputs/outputs	150 kHz - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, 3 seconds duration, criteria A	150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, 3 seconds duration, criteria A	150 kHz - 80 MHz, 10 V[1]80% amplitude modulation with 1 kHz, 3 second duration, criteria A
DC mains inputs/outputs	150 kHz - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, 3 seconds duration, criteria A	150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, 3 seconds duration, criteria A	150 kHz - 80 MHz, 10 V[1]80% amplitude modulation with 1 kHz, 3 second duration, criteria A
Functional ground connection	150 kHz - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, 3 seconds duration, criteria A	150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, 3 seconds duration, criteria A	150 kHz - 80 MHz, 10 V[1]80% amplitude modulation with 1 kHz, 3 second duration, criteria A
Signal connections >3 m	150 kHz - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, 3 seconds duration, criteria A	150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, 3 seconds duration, criteria A	150 kHz - 80 MHz, 10 V[1]80% amplitude modulation with 1 kHz, 3 second duration, criteria A

Table 217: Test requirements - Conducted disturbances

1) Increase carrier signal voltage to 10Veff in accordance with IEC 60945 at following frequencies:2MHz; 3MHz; 4MHz; 6,2 MHz; 8,2MHz; 12,6MHz; 16,5MHz; 18.8 MHz; 22MHz; 25MHz

4.6 Magnetic fields with electrical frequencies

Tests according to IEC 61000-4-8	Limit values according to EN 61000-6-2	Limit value according to IEC 61131-2	
Test direction x, test in the field of an induction coil 1m x 1m	30 A/m, criteria A	30 A/m, criteria A	
Test direction y, test in the field of an induction coil 1m x 1m	30 A/m, criteria A	30 A/m, criteria A	
Test direction z, test in the field of an induction coil 1m x 1m	30 A/m, criteria A	30 A/m, criteria A	

Table 218: Test requirements - Magnetic fields with electrical frequencies

4.7 Voltage fluctuations

Tests in accordance with IEC 61000-4-29	Limit values in accordance with IEC 61131-2	Limit value in accordance with Germanischer Lloyd 2003	
Power supply connections	30 min at 0.85 x U_e or 1.2 x U_e Constant ripple 0.05 x U_e	30 min at 0.75 x U_e or 1.3 x U_e	

Table 219: Test requirements - Voltage fluctuations

4.8 Voltage dips

Tests in accordance with IEC 61000-4-29	Limit values in accordance with IEC 61131-2	Limit value in accordance with Germanischer Lloyd 2003	
DC power inputs	20 interruptions for 10 ms (PS2)	3 interruptions for 30 s in 5 min	

Table 220: Test requirements - Voltage dips

4.9 Changed supply voltage

Tests in accordance with EN 61131-2	Limit values in accordance with IEC 61131-2		
Power supply connections	100% to 90% /60s - 90% to 100% /60s 100% to 0% /5s - 0% to 100% /5s		

Table 221: Test requirements - Changed supply voltage

4.10 Turning off and back on

Tests in accordance with EN 61131-2	Limit values in accordance with IEC 61131-2		
Supply voltage	100% to 0% /60s - 0% to 100% /60s		

Table 222: Test requirements - Turning off and back on

4.11 Damped oscillatory waves

Tests in accordance with IEC 61000-4-18	Limit values in accordance with IEC 61131-2		
Mains inputs/outputs, L to L	±1 kV, 1 MHz, repeat rate 400/sec, length 2 sec, connection lengths 2 m, criteria B		
Power I/O, L to PE	±2.5 kV, 1 MHz, repeat rate 400/sec, length 2 sec, connection lengths 2 m, criteria B		

Table 223: Test requirements - Damped oscillatory waves

5 Mechanical conditions

Vibration	Test carried out in accordance with	Limits in accordance with
Vibration operation	EN 60068-2-6	EN 61131-2: Programmable logic controllers
		EN 60721-3-3 class 3M4
Vibration during transport (packaged)	EN 60068-2-6	EN 60721-3-2 class 2M1
		EN 60721-3-2 class 2M2
		EN 60721-3-2 class 2M3
Shock during operation	EN 60068-2-27	EN 61131-2: Programmable logic controllers
		EN 60721-3-3 class 3M4
Shock during transport (packaged)	EN 60068-2-27	EN 60721-3-2 class 2M1
		EN 60721-3-2 class 2M2
		EN 60721-3-2 class 2M3
Toppling (packaged)	EN 60068-2-31	EN 60721-3-2 class 2M1
		EN 60721-3-2 class 2M2
		EN 60721-3-2 class 2M3
Free fall (packaged)	EN 60068-2-32	EN 61131-2: Programmable logic controllers

Table 224: Overview of limits and testing guidelines for vibration

5.1 Vibration operation

Tests according to IEC 60068-2-6	Limit value according to IEC 61131-2		Limit values according to EN 60721-3-3 Class 3M4		
Vibration during operation: Uninterrupted duty with moveable frequency in all 3 axes (x, y, z), 1 octave per minute	10 sweeps for each axis		10 sweeps for each axis		
	Frequency	**Limit value**	**Frequency**	**Limit value**	
	5 - 9 Hz	Amplitude 3.5 mm	2 - 9 Hz	Amplitude 3 mm	
	9 - 150 Hz	Acceleration 1 g	9 - 200 Hz	Acceleration 1 g	

Table 225: Test requirements - Vibration during operation

5.2 Vibration during transport (packaged)

Tests according to IEC 60068-2-6	Limit values according to EN 60721-3-2 Class 2M1		Limit values according to EN 60721-3-2 Class 2M2		Limit values according to EN 60721-3-2 Class 2M3	
Vibration during transport: Uninterrupted duty with moveable frequency in all 3 axes (x, y, z)	10 sweeps for each axis, packaged		10 sweeps for each axis, packaged		10 sweeps for each axis, packaged	
	Frequency	**Limit value**	**Frequency**	**Limit value**	**Frequency**	**Limit value**
	2 - 9 Hz	Amplitude 3.5 mm	2 - 9 Hz	Amplitude 3.5 mm	2 - 8 Hz	Amplitude 7.5 mm
	9 - 200 Hz	Acceleration 1 g	9 - 200 Hz	Acceleration 1 g	8 - 200 Hz	Acceleration 2 g
	200 - 500 Hz	Acceleration 1.5 g	200 - 500 Hz	Acceleration 1.5 g	200 - 500 Hz	Acceleration 4 g

Table 226: Test requirements - Vibration during transport (packaged)

5.3 Shock during operation

Tests in accordance with IEC 60068-2-27	Limit values in accordance with IEC 61131-2	Limit values in accordance with EN 60721-3-3 Class 3M4	
Shock during operation: Pulse (half-sine) stress in all 3 axes (x, y, z)	Acceleration 15 g, Duration 11 ms, 18 shocks	Acceleration 10 g, Duration 11 ms	

Table 227: Test requirements - Shock during operation

5.4 Shock during transport (packaged)

Tests according to IEC 60068-2-27	Limit values according to EN 60721-3-2 Class 2M1	Limit values according to EN 60721-3-2 Class 2M2	Limit values according to EN 60721-3-2 Class 2M3
Pulse (half-sine) stress in all 3 axes (x, y, z)	Acceleration 10 g, Duration 11 ms, each 3 shocks, packaged	Acceleration 30 g, Duration 6 ms, each 4 shocks, packaged	Acceleration 100 g, Duration 6 ms, each 3 shocks, packaged

Table 228: Test requirements - Shock during transport

5.5 Toppling

Tests according to IEC 60068-2-31	Limit values according to EN 60721-3-2 Class 2M1		Limit values according to EN 60721-3-2 Class 2M2		Limit values according to EN 60721-3-2 Class 2M3	
Drop and topple	Devices: Drop/topple on each edge. packaged		Devices: Drop/topple on each edge. packaged		Devices: Drop/topple on each edge. packaged	
	Weight	**Required**	**Weight**	**Required**	**Weight**	**Required**
	< 20 kg	Yes	< 20 kg	Yes	< 20 kg	Yes
	20 - 100 kg	-	20 - 100 kg	Yes	20 - 100 kg	Yes
	> 100 kg	-	> 100 kg	-	> 100 kg	Yes

Table 229: Test requirements - Toppling

5.6 Free fall (packaged)

Tests according to IEC 60068-2-32	Limit value according to IEC 61131-2		Limit values according to EN 60721-3-2 Class 2M1		Limit values according to EN 60721-3-2 Class 2M2		Limit values according to EN 60721-3-2 Class 2M3	
Free fall	Devices with delivery packaging each with 5 fall tests		Devices packaged		Devices packaged		Devices packaged	
	Weight	**Height**	**Weight**	**Height**	**Weight**	**Height**	**Weight**	**Height**
	< 10 kg	1.0 m	< 20 kg	0.25 m	< 20 kg	1.2 m	< 20 kg	1.5 m
	10 - 40 kg	0.5 m	20 - 100 kg	0.25 m	20 - 100 kg	1.0 m	20 - 100 kg	1.2 m
	> 40 kg	0.25 m	> 100 kg	0.1 m	> 100 kg	0.25 m	> 100 kg	0.5 m
	Devices with product packaging each with 5 fall tests							
	Weight	**Height**						
	< 10 kg	0.3 m						
	10 - 40 kg	0.3 m						
	> 40 kg	0.25 m						

Table 230: Test requirements - Free fall

6 Climate conditions

Temperature and humidity	Test carried out in accordance with	Limits in accordance with
Worst case operation	UL 508	UL 508: Industrial control equipment
		EN 61131-2: Programmable logic controllers
Dry heat	EN 60068-2-2	EN 61131-2: Programmable logic controllers
Dry cold	EN 60068-2-1	EN 61131-2: Programmable logic controllers
Large temperature fluctuations	EN 60068-2-14	EN 61131-2: Programmable logic controllers
Temperature fluctuations in operation	EN 60068-2-14	EN 61131-2: Programmable logic controllers
Humid heat, cyclic	EN 60068-2-30	EN 61131-2: Programmable logic controllers
Constant humid heat (storage)	EN 60068-2-3	EN 61131-2: Programmable logic controllers

Table 231: Overview of limits and testing guidelines for temperature and humidity

6.1 Worst case operation

Tests according to UL 508	Limit values according to UL 508	Limit values in accordance with IEC 61131-2	
Worst case during operation. Operation of the device with the max. ambient temperature specified in the data sheet at the max. specified load	3 hours at max. ambient temperature (min. +40°C) duration approx. 5 hours	3 hours at max. ambient temperature (min. +40°C) duration approx. 5 hours	

Table 232: Test requirements - Worst case during operation

6.2 Dry heat

Tests in accordance with IEC 60068-2-2	Limit values in accordance with IEC 61131-2		
Dry heat	16 hours at +70°C for 1 cycle, then 1 hour acclimatization and function testing, duration approximately 17 hours		

Table 233: Test requirements - Dry heat

6.3 Dry cold

Tests in accordance with IEC 60068-2-1	Limit values in accordance with IEC 61131-2		
Dry cold	16 hours at -40°C for 1 cycle, then 1 hour acclimatization and function testing, duration approximately 17 hours		

Table 234: Test requirements - Dry cold

6.4 Large temperature fluctuations

Tests in accordance with IEC 60068-2-14	Limit values in accordance with IEC 61131-2		
Large temperature fluctuations	3 hours at -40°C and 3 hours at +70°C, 5 cycles, then 2 hours acclimatization and function testing, duration approximately 14 hours		

Table 235: Test requirements - Large temperature fluctuations

6.5 Temperature fluctuations in operation

Tests in accordance with IEC 60068-2-14	Limit values in accordance with IEC 61131-2		
Open devices: These can also have a housing and are installed in control cabinets	3 hours at +5°C and 3 hours at 55°C, 5 cycles, temperature gradient 3°C / min, the unit is occasionally supplied with voltage during testing, duration approximately 30 hours		
Closed devices: These are devices whose data sheet specifies a surrounding housing (enclosure) with appropriate safety precautions	3 hours at +5°C and 3 hours at +55°C, 5 cycles, temperature gradient 3°C / min, the unit is occasionally supplied with voltage during testing, duration approximately 30 hours		

Table 236: Test requirements - Temperature fluctuations during operation

6.6 Humid heat, cyclic

Tests in accordance with IEC 60068-2-30	Limit values in accordance with IEC 61131-2		
Alternating climate	24 hours at +25°C / +55°C and 97% / 83% RH, 2 cycles, then 2 hours acclimatization, function testing and insulation, duration approximately 50 hours		

Table 237: Test requirements - Humid heat, cyclic

6.7 Humid heat, constant (Storage)

Tests in accordance with IEC 60068-2-3	Limit values in accordance with IEC 61131-2		
Constant humid heat (storage)	48 hours at +40°C and 92.5% RH, then insulation test within 3 hours, duration approximately 49 hours		

Table 238: Test requirements - Humid heat, constant (storage)

7 Safety

Safety	Test carried out according to	Limits according to
Ground resistance	EN 61131-2	EN 60204-1: Electrical equipment of machines
		EN 61131-2: Programmable logic controllers
Insulation resistance		EN 60204-1: Electrical equipment of machines
High voltage	EN 60060-1	EN 61131-2: Programmable logic controllers
		UL 508: Industrial control equipment
Residual voltage	EN 61131-2	EN 60204-1: Electrical equipment of machines
		EN 61131-2: Programmable logic controllers
Leakage current		VDE 0701-1: Service, changes and testing of electrical devices
Overload	UL 508	EN 61131-2: Programmable logic controllers
		UL 508: Industrial control equipment
Simulation component defect	UL 508	EN 61131-2: Programmable logic controllers
		UL 508: Industrial control equipment

Table 239: Overview of limits and testing guidelines for safety

7.1 Ground resistance

Tests according to EN 61131-2	Limit values in accordance with IEC 60204-1		Limit value according to IEC 61131-2
Ground resistance: housing (from any metal part to the ground terminal)	Smallest effective cross section of the protective ground conductor for the branch being tested	Maximum measured voltage drop at a test current of 10 A	Test current 30 A for 2 min, < 0.1 Ω
	1.0 mm²	3.3 V	
	1.5 mm²	2.6 V	
	2.5 mm²	1.9 V	
	4.0 mm²	1.4 V	
	> 6.0 mm²	1.0 V	

Table 240: Test requirements - Ground resistance

7.2 Insulation resistance

Test carried out	Limit values in accordance with IEC 60204-1		
Insulation resistance: main circuits to protective ground conductor	> 1 MΩ at 500 VDC		

Table 241: Test requirements - Insulation resistance

7.3 High voltage

Tests according to EN 60060-1	Limit values in accordance with IEC 61131-2				Limit values according to UL 508		
High voltage: Primary circuit to secondary circuit and to protective ground circuit (transformers, coils, varistors, capacitors and components used to protect against over-voltage can be removed before the test)	Input voltage	Test voltage			Input voltage	Test voltage	
		1.2/50 µs peak voltage surge	**AC, 1 min**	**DC, 1 min**		**AC, 1 min**	**AC, 1 min**
	0 - 50 VAC 0 - 60 VDC	850 V	510 V	720 V	≤ 50 V	500 V	707 V
	50 - 100 VAC 60 - 100 VDC	1360 V	740 V	1050 V	>50 V	1000 V + 2 x U_N	(1000 V + 2 x U_N) x 1.414
	100 - 150 VAC 100 - 150 VDC	2550 V	1400 V	1950 V			
	150 - 300 VAC 150 - 300 VDC	4250 V	2300 V	3250 V			
	300 - 600 VAC 300 - 600 VDC	6800 V	3700 V	5250 V			
	600 - 1000 VAC 600 - 1000 VDC	10200 V	5550 V	7850 V			

Table 242: Test requirements - High voltage

7.4 Residual voltage

Tests according to EN 61131-2	Limit value according to IEC 60204-1	Limit value according to IEC 61131-2	
Residual voltage after switching off	< 60 V after 5 sec (active parts) < 60 V after 1 sec (plug pins)	< 60 V after 5 sec (active parts) < 60 V after 1 sec (plug pins)	

Table 243: Test requirements - Residual voltage

7.5 Leakage current

Test carried out	Limit value according to VDE 0701-1		
Leakage current: Phase to ground	< 3.5 mA		

Table 244: Test requirements - Leakage current

7.6 Overload

Tests according to UL 508	Limit value according to IEC 61131-2	Limit values according to UL 508	
Overload of transistor outputs	50 switches, 1.5 I_N, 1 sec ON / 9 sec OFF	50 switches, 1.5 I_N, 1 sec ON / 9 sec OFF	

Table 245: Test requirements - Overload

7.7 Defective component

Tests according to UL 508	Limit value according to IEC 61131-2	Limit values according to UL 508	
Simulation of how components in power supply became defective	Non-flammable surrounding cloth No contact with conductive parts	Non-flammable surrounding cloth No contact with conductive parts	

Table 246: Test requirements - Defective component

8 Other tests

Other tests	Test carried out in accordance with	Limits in accordance with
Protection	-	EN 60529: Degree of protection provided by enclosures (IP code)
Degree of pollution	-	EN 60664-1: Insulation coordination for equipment within low-voltage systems - part 1: Principles, requirements and tests

Table 247: Overview of limits and testing guidelines for other tests

8.1 Protection type

Test carried out according to	Limit values according to EN 60529		
Protection of the operating equipment	IP2. Protection against large solid foreign bodies ≥ 12.5 mm diameter		
Protection of personnel	IP2. Protection against touching dangerous parts with fingers		
Protection against water permeation with damaging consequences	IP0. Not protected		

Table 248: Test requirements - Protection

9 International certifications

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

Certifications	
USA and Canada	All important B&R products are tested and listed by Underwriters Laboratories and checked quarterly by a UL inspector. This mark is valid for the USA and Canada and simplifies certification of your machines and systems in these areas.
Europe	All harmonized EN standards for the applicable directives are met.

Table 249: International certifications

Chapter 6 • Accessories

The following accessories have passed B&R's functional testing and are approved for use with this device. However, it is important to observe any limitations that apply to the overall device when operated with different components. When operating the overall device, all of the specifications for the individual components must be adhered to.

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

1 Replacement CMOS batteries

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

1.1.1 General information

The lithium battery is needed for buffering the BIOS CMOS data and real-time clock (RTC).

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

1.1.2 Order data

Model number	Short description	Figure
	Batteries	
0AC201.91	Lithium batteries 4 pcs., 3 V / 950 mAh button cell We hereby state that the lithium cells contained in this shipment qualify as "partly regulated". Handle with care. If the package is damaged, inspect 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 250: 0AC201.91, 4A0006.00-000 - Order data

1.1.3 Technical data

Warning!

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

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

Information:

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

Product ID	0AC201.91	4A0006.00-000
General information		
Storage time	Max. 3 years at 30°C	
Electrical properties		
Capacity	950 mAh	
Self discharging	<1% per year (at 23°C)	
Voltage range	3V	
Environmental conditions		
Temperature Storage	 -20 to 60°C	
Relative humidity Operation Storage Transport	 0 to 95% 0 to 95% 0 to 95%	

Table 251: 0AC201.91, 4A0006.00-000 - Technical data

2 Supply voltage connectors

2.1 0TB103.9x

2.1.1 General information

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

2.1.2 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 252: 0TB103.9, 0TB103.91 - Order data

2.1.3 Technical data

Information:

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

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	Screw clamps	Cage clamps[2]
Cable type	Copper wires only (no aluminum wires!)	
Distance between contacts	5.08 mm	
Connection cross section		
AWG wire	26 to 12 AWG	
Wire tip sleeves with plastic covering	0.20 to 1.50 mm²	
Solid wire line	0.20 to 2.50 mm²	
Fine wire line	0.20 to 1.50 mm²	0.20 to 2.50 mm²
With wire tip sleeves	0.20 to 1.50 mm²	
Mounting torque	0.4 Nm	-
Electrical properties		
Rated voltage	300 V	
Rated current[1]	10 A / contact	
Contact resistance	≤ 5 mΩ	

Table 253: 0TB103.9, 0TB103.91 - Technical data

1) Please take the respective limit data for the I/O modules into consideration!
2) The terminal block in the cage clamp design cannot be stringed together.

3 Replacement fan

3.1 General information

Information:

The fan filters are subject to wear, and should be checked with appropriate frequency to determine whether the air flow provides sufficient cooling. An exchange or cleaning of the filter kit is appropriate at that time.

3.2 Order data

Model number	Short description	Figure
	Accessories	
5AC801.FA01-00	Fan filter for APC810 5 pcs. (spare part), for 5PC810.SX01-00.	
5AC801.FA02-00	Fan filter for APC810 5 pcs. (spare part), for 5PC810.SX02-00.	
5AC801.FA03-00	Fan filter for APC810 5 pcs. (spare part), for 5PC810.SX03-00.	
5AC801.FA05-00	Fan filter for APC810 5 pcs. (spare part), for 5PC810.SX05-00.	

Table 254: 5AC801.FA01-00, 5AC801.FA02-00, 5AC801.FA03-00, 5AC801.FA05-00 - Order data

4 DVI - Monitor adapter

4.1 5AC900.1000-00

4.2 General information

This adapter enables a standard monitor to be connected to the DVI-I interface.

4.3 Order data

Model number	Short description	Figure
	Miscellaneous	
5AC900.1000-00	Adapter DVI (plug) to CRT (socket). For connecting a standard monitor to a DVI-I interface.	

Table 255: 5AC900.1000-00 - Order data

5 CompactFlash cards

5.1 General information

CompactFlash cards are easy-to-exchange storage media. Due to their robustness against environmental influences (e.g. temperature, shock, vibration, etc.), CompactFlash cards are ideal for use as storage media in industrial environments.

5.2 Basics

In order to be suited for use in industrial automation, CompactFlash cards must be highly reliable. To make this possible, the following is very important:

- Flash technology used
- Efficient algorithm for maximizing the lifespan
- Good mechanisms for detecting and fixing errors in the Flash memory

5.2.1 Flash technology

Currently, CompactFlash cards are available with MLC (Multi Level Cell) and SLC (Single Level Cell) flash blocks. SLC flash memory has a lifespan that is 10 times longer than MLC, which is why only CompactFlash cards with SLC flash blocks are suited for industrial applications.

5.2.2 Wear leveling

Wear leveling is an algorithm that can be used to maximize the lifespan of a CompactFlash card. There are three different algorithms:

- No Wear Leveling
- Dynamic Wear Leveling
- Static wear leveling

The basic idea behind wear leveling is to distribute data over a broad area of blocks or cells on the data carrier so that the same areas don't have to be cleared and reprogrammed over and over again.

No Wear Leveling

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

Dynamic Wear Leveling

Dynamic wear leveling makes it possible to utilize unused flash blocks when writing to a file.
If the data carrier is 80% full with files, then only 20% can be used for wear leveling.
The lifespan of the CompactFlash card is therefore dependent on the amount of unused flash blocks.

Static wear leveling

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

5.2.3 ECC error correction

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

5.2.4 S.M.A.R.T. Support

Self-Monitoring, Analysis and Reporting Technology (S.M.A.R.T. for short) is an industry standard for mass memory that has been introduced to monitor important parameters and quickly detect imminent failures. Critical performance and calibration data is monitored and stored in order to help predict the probability of errors.

5.2.5 Maximum reliability

CompactFlash cards used by B&R use SLC flash blocks and static wear leveling together with a powerful ECC algorithm to provide maximum reliability.

5.3 5CFCRD.xxxx-06

5.3.1 General information

Information:

B&R CompactFlash cards 5CFCRD.xxxx-06 and CompactFlash cards from a different manufacturer cannot be used in the same system at the same time. Due to differences in technology (older vs. newer technologies), problems can occur during system startup that are caused by the different boot times.

see "Known problems / issues" on page 297

Information:

The 5CFCRD.xxxx-06 CompactFlash cards are supported on B&R devices with WinCE wersion ≥ 6.0 or higher.

5.3.2 Order data

Model number	Short description	Figure
	CompactFlash	
5CFCRD.0512-06	B&R CompactFlash 512 MB	
5CFCRD.1024-06	B&R CompactFlash 1 GB	
5CFCRD.2048-06	B&R CompactFlash 2 GB	
5CFCRD.4096-06	B&R CompactFlash 4 GB	
5CFCRD.8192-06	B&R CompactFlash 8 GB	
5CFCRD.016G-06	B&R CompactFlash 16 GB	

Table 256: 5CFCRD.0512-06, 5CFCRD.1024-06, 5CFCRD.2048-06, 5CFCRD.4096-06, 5CFCRD.8192-06, 5CFCRD.016G-06 - Order data

5.3.3 Technical data

Caution!

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

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

Information:

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

Product ID	5CFCRD.0512-06	5CFCRD.1024-06	5CFCRD.2048-06	5CFCRD.4096-06	5CFCRD.8192-06	5CFCRD.016G-06
General information						
Capacity	512 MB	1 GB	2 GB	4 GB	8 GB	16 GB
Data retention	10 years					
Data reliability	< 1 unrecoverable error in 10¹⁴ bit read accesses					
Lifetime monitoring	Yes					
MTBF	> 3,000,000 hours (at 25°C)					
Maintenance	None					
Supported operating modes	PIO mode 0-6, Multiword DMA mode 0-4, Ultra DMA mode 0-4					
Continuous reading						
Typical	33 MB/s					36 MB/s
Maximum		35 MB/s		34 MB/s		37 MB/s
Continuous writing						
Typical		15 MB/s		14 MB/s		28 MB/s
Maximum		18 MB/s		17 MB/s		30 MB/s

Table 257: 5CFCRD.0512-06, 5CFCRD.1024-06, 5CFCRD.2048-06, 5CFCRD.4096-06, 5CFCRD.8192-06, 5CFCRD.016G-06 - Technical data

Product ID	5CFCRD.0512-06	5CFCRD.1024-06	5CFCRD.2048-06	5CFCRD.4096-06	5CFCRD.8192-06	5CFCRD.016G-06
Certification types						
CE	Yes					
Endurance						
Guaranteed amount of data						
Guaranteed[1]	50 TB	100 TB	200 TB	400 TB	800 TB	1600 TB
Results in 5 years[1]	27.40 GB/day	54.79 GB/day	109.9 GB/day	219.8 GB/day	438.6 GB/day	876.72 GB/day
Clear/write cycles						
Guaranteed	100,000					
SLC-Flash	Yes					
Wear leveling	Static					
Error Correction Coding (ECC)	Yes					
S.M.A.R.T. Support	Yes					
Support						
Hardware	PP300/400, PP500, PPC300, PPC700, PPC725, PPC800, APC620, APC810, APC820					
Operating systems						
Windows 7 32-bit	No					Yes
Windows 7 64-bit	No					
Windows Embedded Standard 7, 32-bit	No				Yes	
Windows Embedded Standard 7, 64-bit	No					Yes
Windows XP Professional	No			Yes		
Windows XP Embedded	Yes					
Windows Embedded Standard 2009	No	Yes				
Windows CE 6.0	Yes					Yes[2]
Windows CE 5.0	No					
Software						
PVI Transfer Tool	≥ V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011)					No
B&R Embedded OS Installer	≥ V3.10					≥ V3.20
Environmental conditions						
Temperature						
Operation	0 to 70°C					
Storage	-65 to 150°C					
Transport	-65 to 150°C					
Relative humidity						
Operation	Max. 85% at 85°C					
Storage	Max. 85% at 85°C					
Transport	Max. 85% at 85°C					
Vibration						
Operation	20 g peak, 20 to 2000 Hz, 4 in each direction (JEDEC JESD22, method B103) 5.35 g RMS, 15 min per level (IEC 68-2-6)					
Storage	20 g peak, 20 to 2000 Hz, 4 in each direction (JEDEC JESD22, method B103) 5.35 g RMS, 15 min per level (IEC 68-2-6)					
Transport	20 g peak, 20 to 2000 Hz, 4 in each direction (JEDEC JESD22, method B103) 5.35 g RMS, 15 min per level (IEC 68-2-6)					
Shock						
Operation	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)					
Storage	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)					
Transport	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)					
Altitude						
Operation	Max. 4.572 m					
Mechanical characteristics						
Dimensions						
Width	42.8 ± 0.10 mm					
Length	36.4 ± 0.15 mm					
Height	3.3 ± 0.10 mm					
Weight	10 g					

Table 257: 5CFCRD.0512-06, 5CFCRD.1024-06, 5CFCRD.2048-06, 5CFCRD.4096-06, 5CFCRD.8192-06, 5CFCRD.016G-06 - Technical data

1) Endurance of B&R CFs (with linear written block size ≥ 128 kB)
2) Not supported by B&R Embedded OS installer.

5.3.4 Temperature humidity diagram

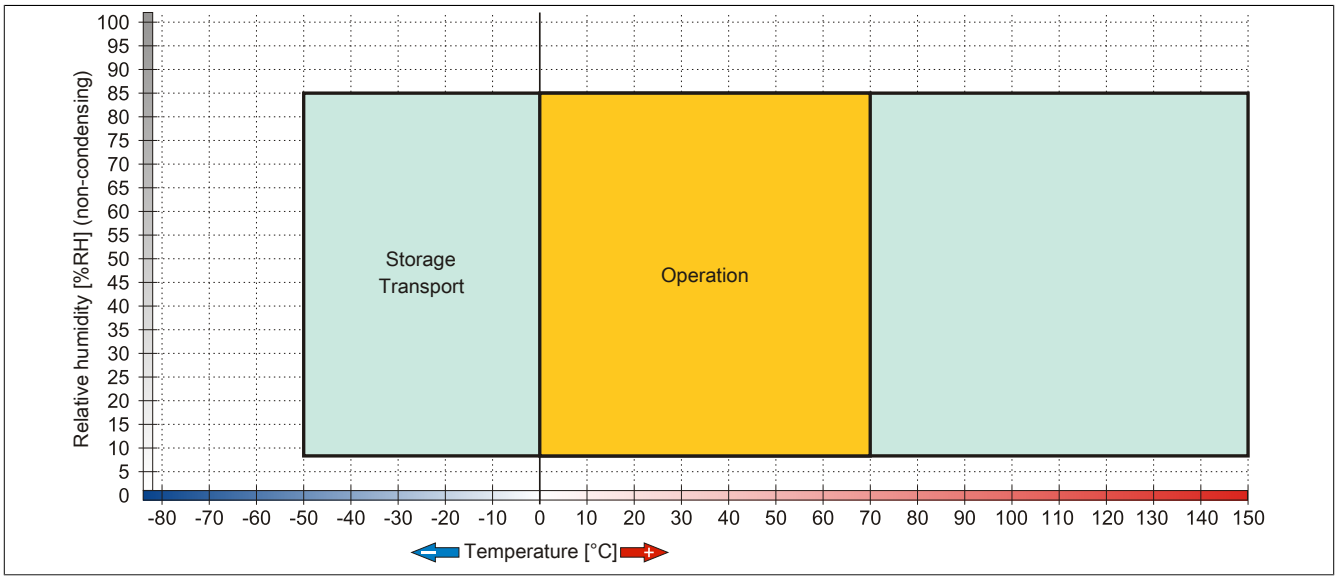


Image 134: 5CFCRD.xxxx-06 - Temperature humidity diagram for CompactFlash cards

5.3.5 Dimensions

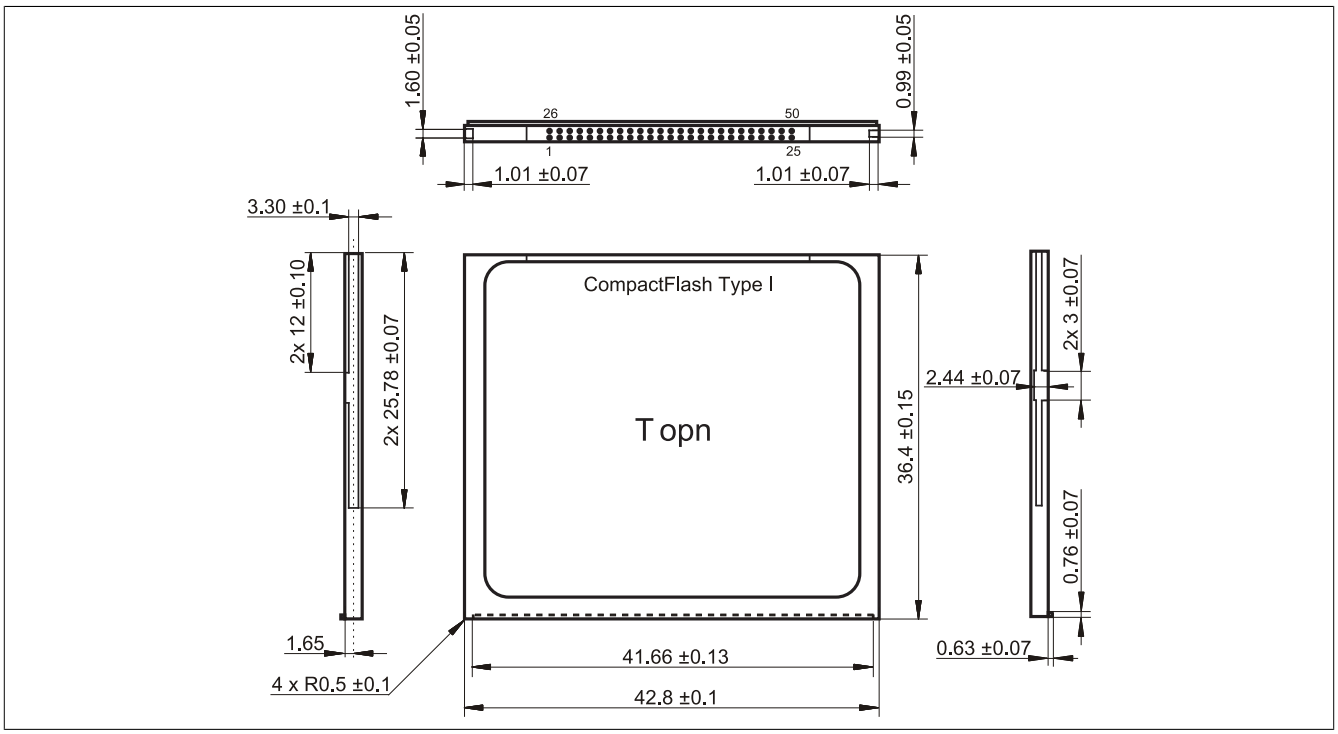


Image 135: Dimensions - CompactFlash card Type I

5.3.6 Benchmark

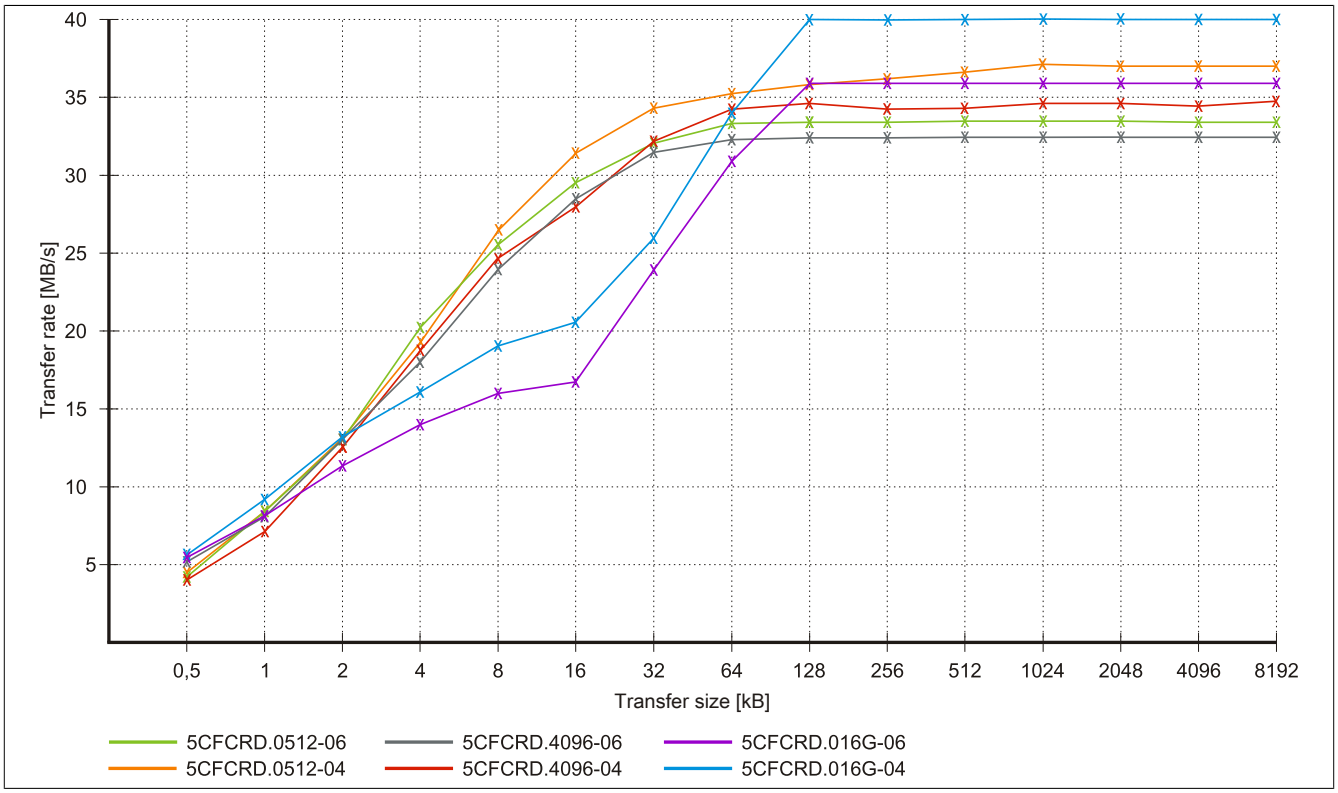


Image 136: ATTO Disk Benchmark v2.34 comparison when reading - 5CFCRD.xxxx-04 with 5CFCRD.xxxx-06

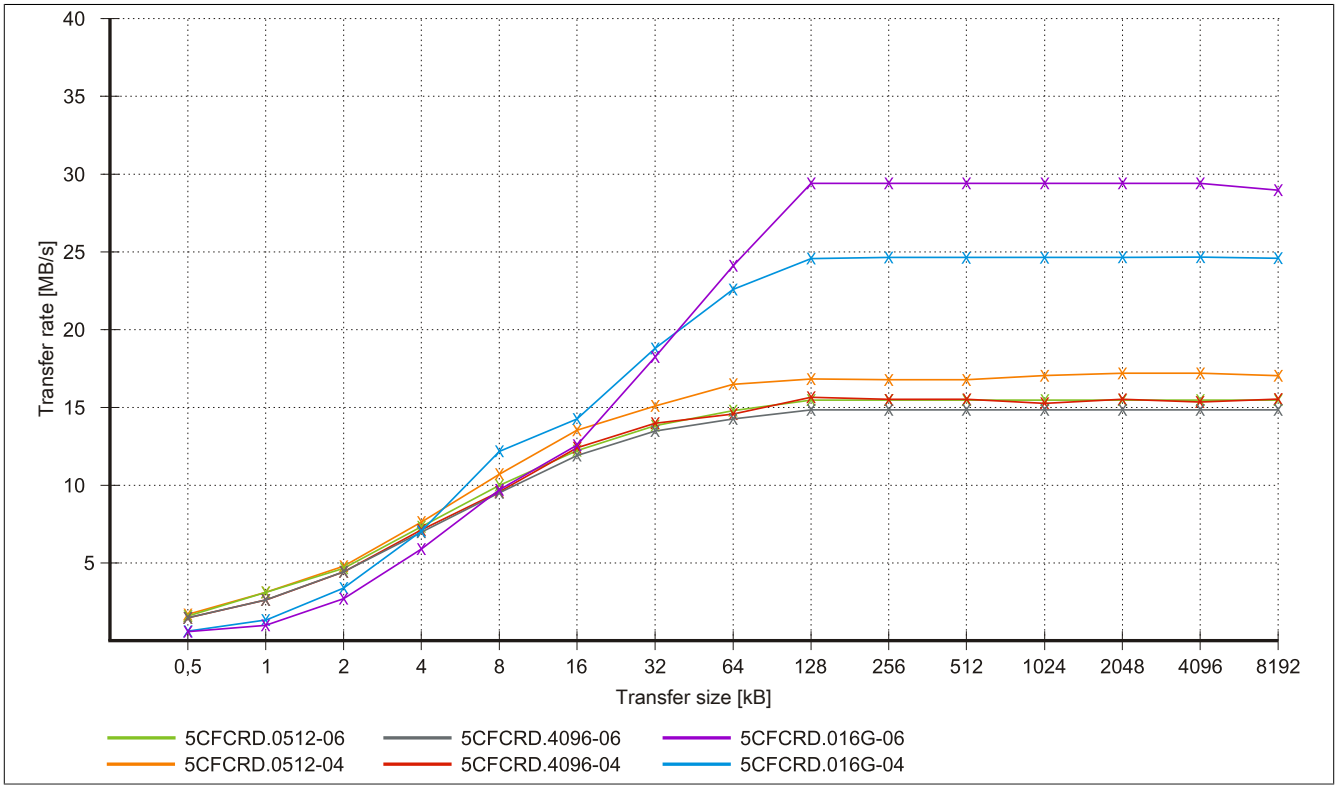


Image 137: ATTO Disk Benchmark v2.34 comparison when writing - 5CFCRD.xxxx-04 with 5CFCRD.xxxx-06

5.4 5CFCRD.xxxx-04

5.4.1 General information

Information:

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

see "Known problems / issues" on page 297

Information:

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

5.4.2 Order data

Model number	Short description	Figure
		
5CFCRD.0512-04	B&R CompactFlash 512 MB	
5CFCRD.1024-04	B&R CompactFlash 1 GB	
5CFCRD.2048-04	B&R CompactFlash 2 GB	
5CFCRD.4096-04	B&R CompactFlash 4 GB	
5CFCRD.8192-04	B&R CompactFlash 8 GB	
5CFCRD.016G-04	B&R CompactFlash 16 GB	

Table 258: 5CFCRD.0512-04, 5CFCRD.1024-04, 5CFCRD.2048-04, 5CFCRD.4096-04, 5CFCRD.8192-04, 5CFCRD.016G-04 - Order data

5.4.3 Technical data

Caution!

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

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

Information:

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

Product ID	5CFCRD.0512-04	5CFCRD.1024-04	5CFCRD.2048-04	5CFCRD.4096-04	5CFCRD.8192-04	5CFCRD.016G-04
General information						
Capacity	512 MB	1 GB	2 GB	4 GB	8 GB	16 GB
Data retention	10 years					
Data reliability	< 1 unrecoverable error in 10¹⁴ bit read accesses					
Lifetime monitoring	Yes					
MTBF	> 3,000,000 hours (at 25°C)					
Maintenance	None					
Supported operating modes	PIO mode 0-6, Multiword DMA mode 0-4, Ultra DMA mode 0-4					
Continuous reading						
Typical	35 MB/s (240X)[1)]			33 MB/s (220X)[1)]	27 MB/s (180X)[1)]	36 MB/s (240X)[1)]
Maximum	37 MB/s (260X)[1)]			34 MB/s (226X)[1)]	28 MB/s (186X)[1)]	37 MB/s (247X)[1)]
Continuous writing						

Table 259: 5CFCRD.0512-04, 5CFCRD.1024-04, 5CFCRD.2048-04, 5CFCRD.4096-04, 5CFCRD.8192-04, 5CFCRD.016G-04 - Technical data

Product ID	5CFCRD.0512-04	5CFCRD.1024-04	5CFCRD.2048-04	5CFCRD.4096-04	5CFCRD.8192-04	5CFCRD.016G-04
Typical	17 MB/s (110X)			16 MB/s (106X)	15 MB/s (100X)	18 MB/s (120X)
Maximum	20 MB/s (133X)			18 MB/s (120X)	17 MB/s (110X)	19 MB/s (126X)
Certification types						
CE	Yes					
Endurance						
Guaranteed amount of data						
Guaranteed[2)]	50 TB	100 TB	200 TB	400 TB	800 TB	1600 TB
Results in 5 years[2)]	27.40 GB/day	54.79 GB/day	109.9 GB/day	219.8 GB/day	438.6 GB/day	876.72 GB/day
Clear/write cycles						
Typical[3)]	2,000,000					
Guaranteed	100,000					
SLC-Flash	Yes					
Wear leveling	Static					
Error Correction Coding (ECC)	Yes					
S.M.A.R.T. Support	No					
Support						
Hardware	PP300/400, PP500, PPC300, PPC700, PPC725, PPC800, APC620, APC810, APC820					
Operating systems						
Windows 7 32-bit	No					Yes
Windows 7 64-bit	No					
Windows Embedded Standard 7, 32-bit	No				Yes	
Windows Embedded Standard 7, 64-bit	No					Yes
Windows XP Professional	No			Yes		
Windows XP Embedded	Yes					
Windows Embedded Standard 2009	No	Yes				
Windows CE 6.0	Yes					Yes[4)]
Windows CE 5.0	No					
Software						
PVI Transfer Tool	≥ V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011)					No
B&R Embedded OS Installer	≥ V3.10					≥ V3.20
Environmental conditions						
Temperature						
Operation	0 to 70°C					
Storage	-65 to 150°C					
Transport	-65 to 150°C					
Relative humidity						
Operation	Max. 85% at 85°C					
Storage	Max. 85% at 85°C					
Transport	Max. 85% at 85°C					
Vibration						
Operation	20 g peak, 20 to 2000 Hz, 4 in each direction (JEDEC JESD22, method B103) 5.35 g RMS, 15 min per level (IEC 68-2-6)					
Storage	20 g peak, 20 to 2000 Hz, 4 in each direction (JEDEC JESD22, method B103) 5.35 g RMS, 15 min per level (IEC 68-2-6)					
Transport	20 g peak, 20 to 2000 Hz, 4 in each direction (JEDEC JESD22, method B103) 5.35 g RMS, 15 min per level (IEC 68-2-6)					
Shock						
Operation	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)					
Storage	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)					
Transport	1.5 kg peak, 0-5 ms 5x (JEDEC JESD22, B110 method) 30 g, 11 ms 1x (IEC 68-2-27)					
Altitude						
Operation	Max. 4.572 m					
Mechanical characteristics						
Dimensions						
Width	42.8 ± 0.10 mm					
Length	36.4 ± 0.15 mm					
Height	3.3 ± 0.10 mm					
Weight	10 g					

Table 259: 5CFCRD.0512-04, 5CFCRD.1024-04, 5CFCRD.2048-04, 5CFCRD.4096-04, 5CFCRD.8192-04, 5CFCRD.016G-04 - Technical data

1) Speed specification with 1X = 150 kB/s. All specifications refer to the Samsung Flash chips, CompactFlash cards in UDMA mode 4, 30 ns cycle time in True-IDE mode with sequential write/read test.
2) Endurance of B&R CFs (with linear written block size ≥ 128 kB)
3) Depending on the average file size.
4) Not supported by B&R Embedded OS installer.

5.4.4 Temperature humidity diagram

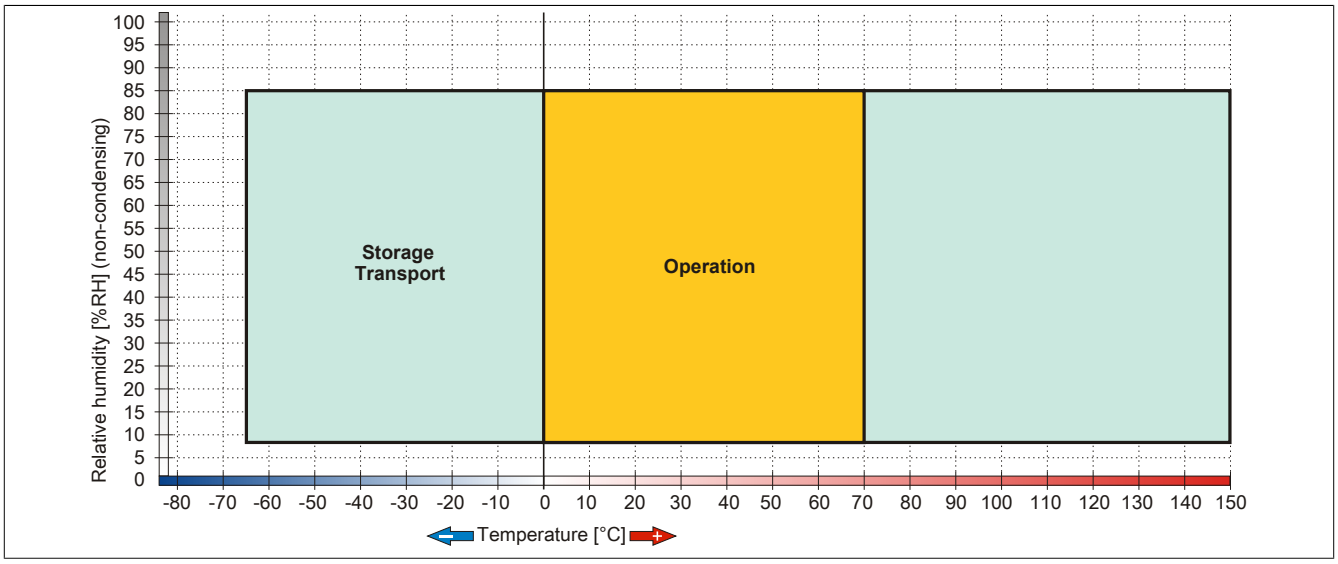


Image 138: 5CFCRD.xxxx-04 - Temperature humidity diagram for CompactFlash cards

5.4.5 Dimensions

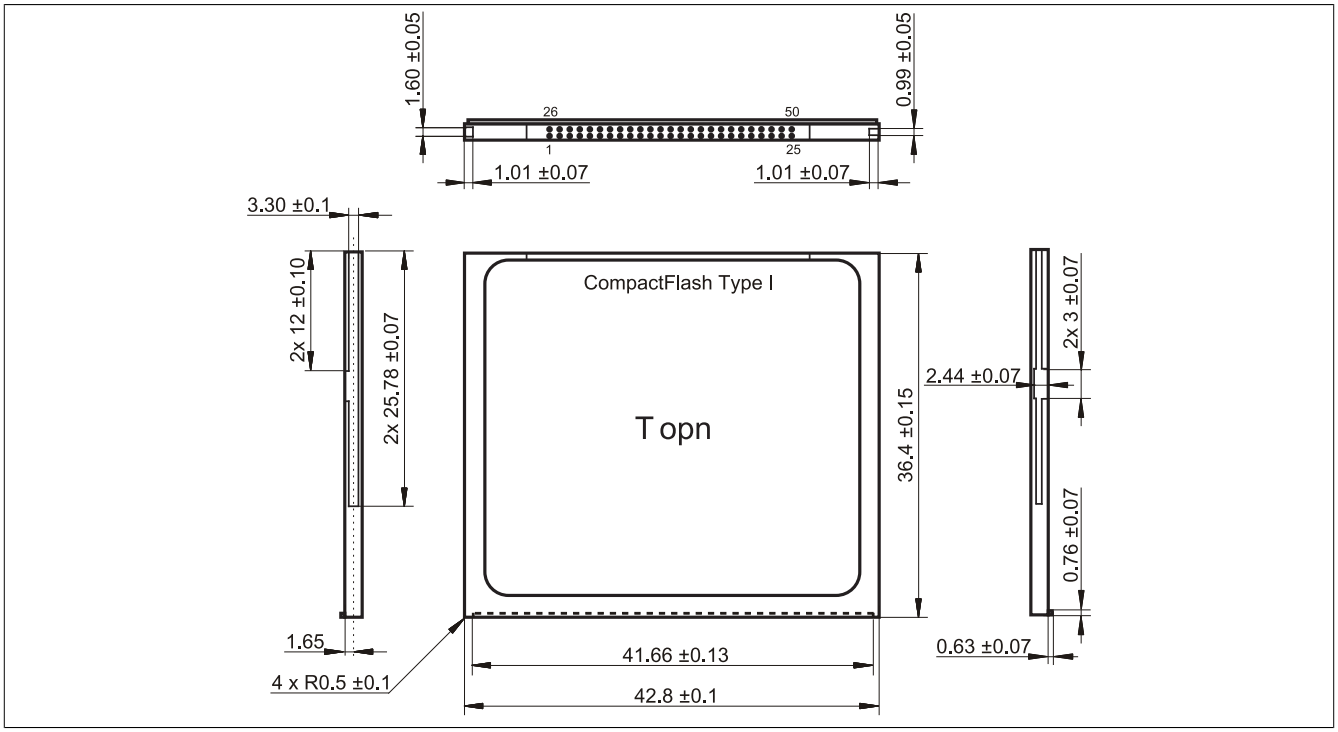


Image 139: Dimensions - CompactFlash card Type I

5.4.6 Benchmark

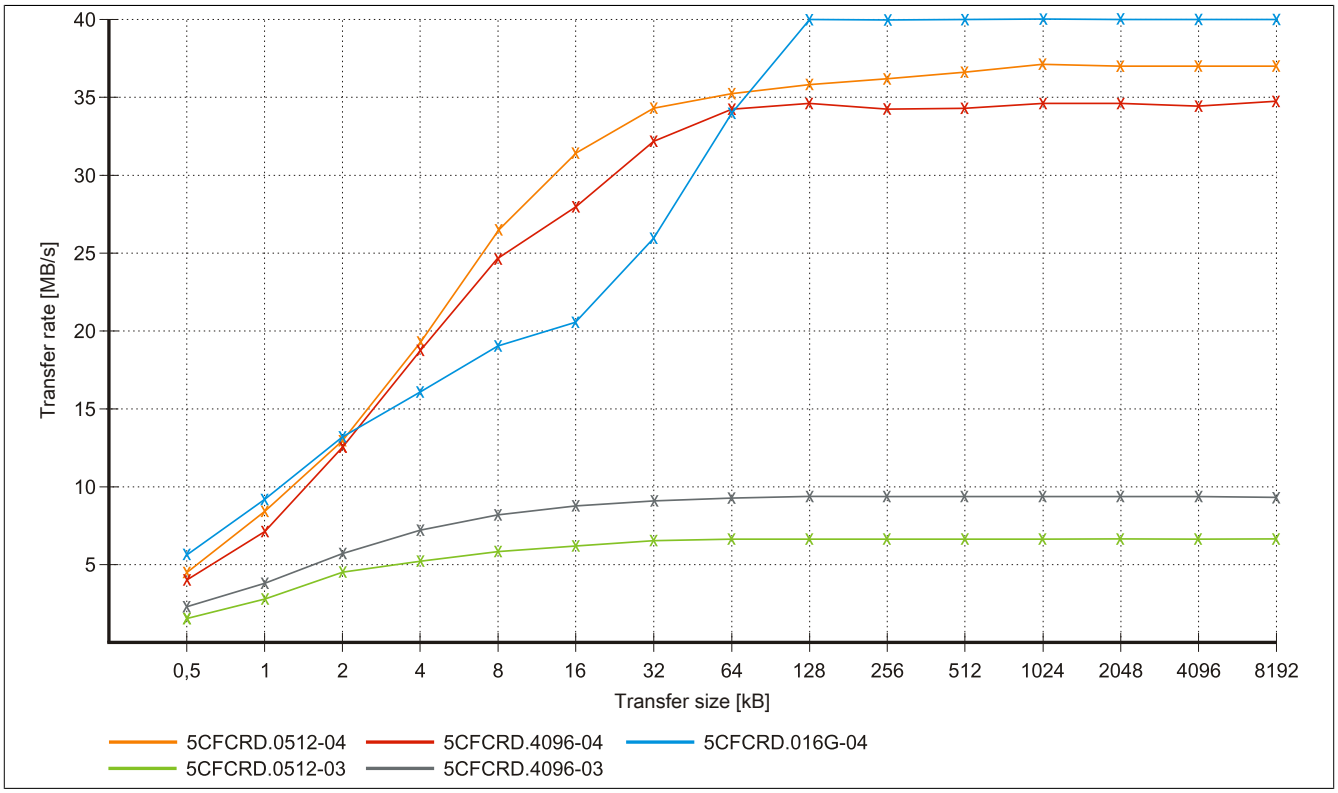


Image 140: ATTO Disk Benchmark v2.34 comparison when reading - 5CFCRD.xxxx-03 with 5CFCRD.xxxx-04

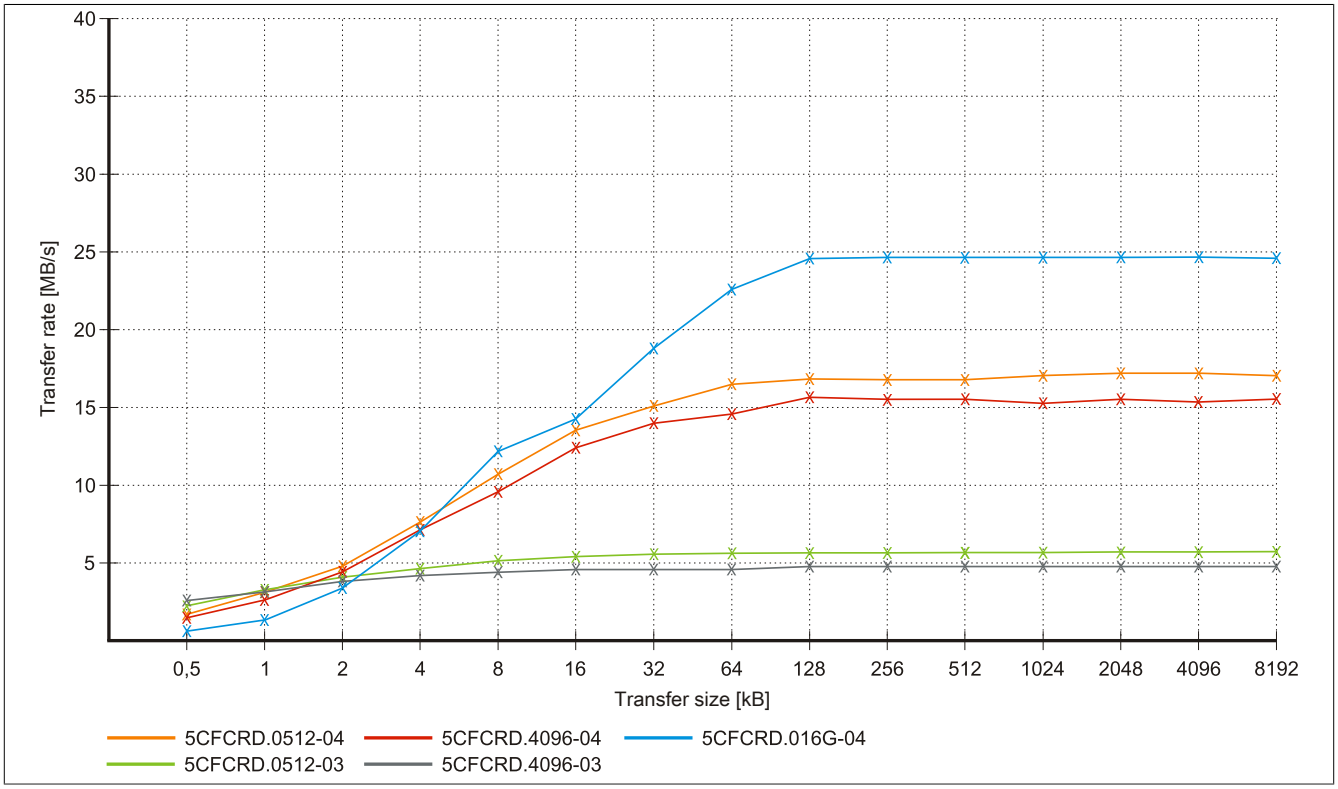


Image 141: ATTO Disk Benchmark v2.34 comparison when writing - 5CFCRD.xxxx-03 with 5CFCRD.xxxx-04

5.5 5CFCRD.xxxx-03

5.5.1 General information

Information:

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

see "Known problems / issues" on page 297

Information:

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

Information:

On CompactFlash cards 5CFCRD.xxxx-03, only the sticker and the description have changed. The technical data has not bee changed.

5.5.2 Order data

Model number	Short description	Figure
	CompactFlash	
5CFCRD.0064-03	CompactFlash 64 MB Western Digital	
5CFCRD.0128-03	CompactFlash 128 MB Western Digital	
5CFCRD.0256-03	CompactFlash 256 MB Western Digital	
5CFCRD.0512-03	CompactFlash 512 MB Western Digital	
5CFCRD.1024-03	CompactFlash 1 GB Western Digital	
5CFCRD.2048-03	CompactFlash 2 GB Western Digital	
5CFCRD.4096-03	CompactFlash 4 GB Western Digital	
5CFCRD.8192-03	CompactFlash 8 GB Western Digital	

Table 260: 5CFCRD.0064-03, 5CFCRD.0128-03, 5CFCRD.0256-03, 5CFCRD.0512-03, 5CFCRD.1024-03, 5CFCRD.2048-03, 5CFCRD.4096-03, 5CFCRD.8192-03 - Order data

5.5.3 Technical data

Caution!

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

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

Information:

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

Product ID	5CFCRD. 0064-03	5CFCRD. 0128-03	5CFCRD. 0256-03	5CFCRD. 0512-03	5CFCRD. 1024-03	5CFCRD. 2048-03	5CFCRD. 4096-03	5CFCRD. 8192-03
General information								
Capacity	64 MB	128 MB	256 MB	512 MB	1 GB	2 GB	4 GB	8 GB
Data retention	10 years							
Data reliability	< 1 unrecoverable error in 10¹⁴ bit read accesses							
Lifetime monitoring	Yes							
MTBF	> 4,000,000 hours (at 25°C)							

Table 261: 5CFCRD.0064-03, 5CFCRD.0128-03, 5CFCRD.0256-03, 5CFCRD.0512-03, 5CFCRD.1024-03, 5CFCRD.2048-03, 5CFCRD.4096-03, 5CFCRD.8192-03 - Technical data

Product ID	5CFCRD.0064-03	5CFCRD.0128-03	5CFCRD.0256-03	5CFCRD.0512-03	5CFCRD.1024-03	5CFCRD.2048-03	5CFCRD.4096-03	5CFCRD.8192-03
Maintenance	None							
Supported operating modes	PIO mode 0-4, Multiword DMA mode 0-2							
Continuous reading Typical	8 MB/s							
Continuous writing Typical	6 MB/s							
Certification types CE	Yes							
Endurance								
Clear/write cycles Typical	> 2.000.000							
SLC-Flash	Yes							
Wear leveling	Static							
Error Correction Coding (ECC)	Yes							
S.M.A.R.T. Support	No							
Support								
Hardware	MP100/200, PP100/200, PP300/400, PP500, PPC300, PPC700, PPC725, PPC800, Provit 2000, Provit 5000, APC620, APC680, APC810, APC820							
Operating systems								
Windows 7 32-bit	No							
Windows 7 64-bit	No							
Windows Embedded Standard 7, 32-bit	No							Yes
Windows Embedded Standard 7, 64-bit	No							
Windows XP Professional	No						Yes	
Windows XP Embedded	No					Yes		
Windows Embedded Standard 2009	No					Yes		
Windows CE 6.0	Yes							Yes[1)]
Windows CE 5.0	Yes					No		
Software								
PVI Transfer Tool	≥ V2.57 (part of PVI Development Setup ≥ V2.5.3.3005)							
B&R Embedded OS Installer	≥ V2.21							
Environmental conditions								
Temperature								
Operation	0 to 70°C							
Storage	-50 to 100°C							
Transport	-50 to 100°C							
Relative humidity								
Operation	8 to 95%, non-condensing							
Storage	8 to 95%, non-condensing							
Transport	8 to 95%, non-condensing							
Vibration								
Operation	Max. 16.3 g (159 m/s² 0-peak)							
Storage	Max. 30 g (294 m/s² 0-peak)							
Transport	Max. 30 g (294 m/s² 0-peak)							
Shock								
Operation	Max. 1000 g (9810 m/s² 0-peak)							
Storage	Max. 3000 g (29430 m/s² 0-peak)							
Transport	Max. 3000 g (29430 m/s² 0-peak)							
Altitude								
Operation	Max. 24.383 m							
Mechanical characteristics								
Dimensions								
Width	42.8 ± 0.10 mm							
Length	36.4 ± 0.15 mm							
Height	3.3 ± 0.10 mm							
Weight	11.4 g							

Table 261: 5CFCRD.0064-03, 5CFCRD.0128-03, 5CFCRD.0256-03, 5CFCRD.0512-03, 5CFCRD.1024-03, 5CFCRD.2048-03, 5CFCRD.4096-03, 5CFCRD.8192-03 - Technical data

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

5.5.4 Temperature humidity diagram

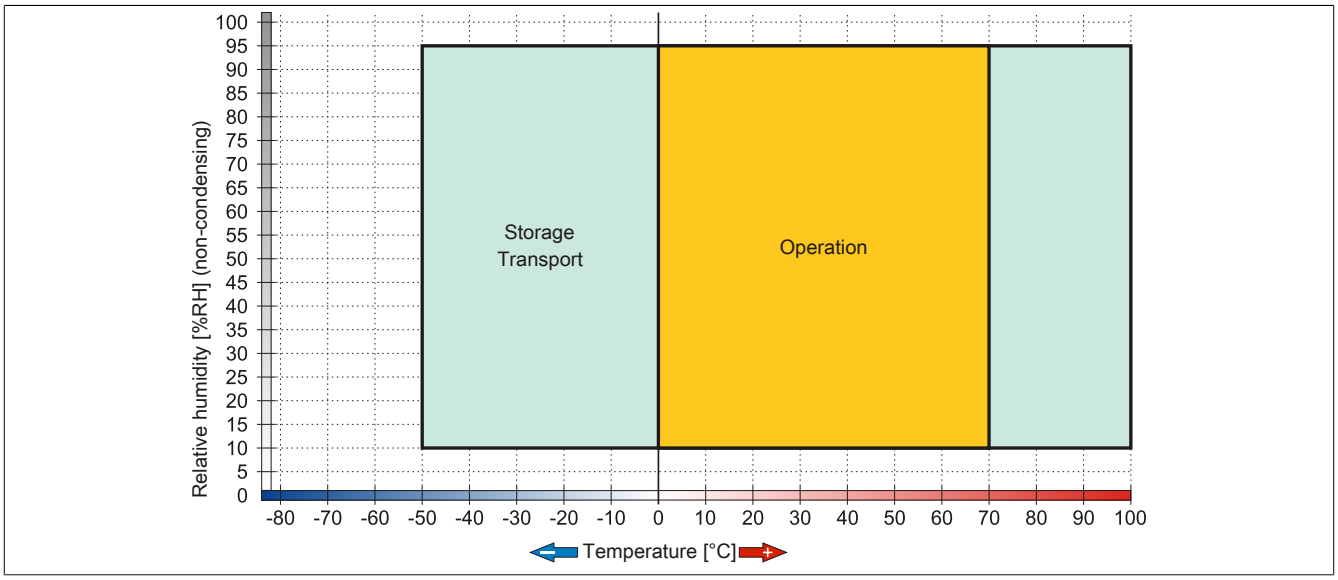


Image 142: 5CFCRD.xxxx-03 - Temperature humidity diagram for CompactFlash cards

5.5.5 Dimensions

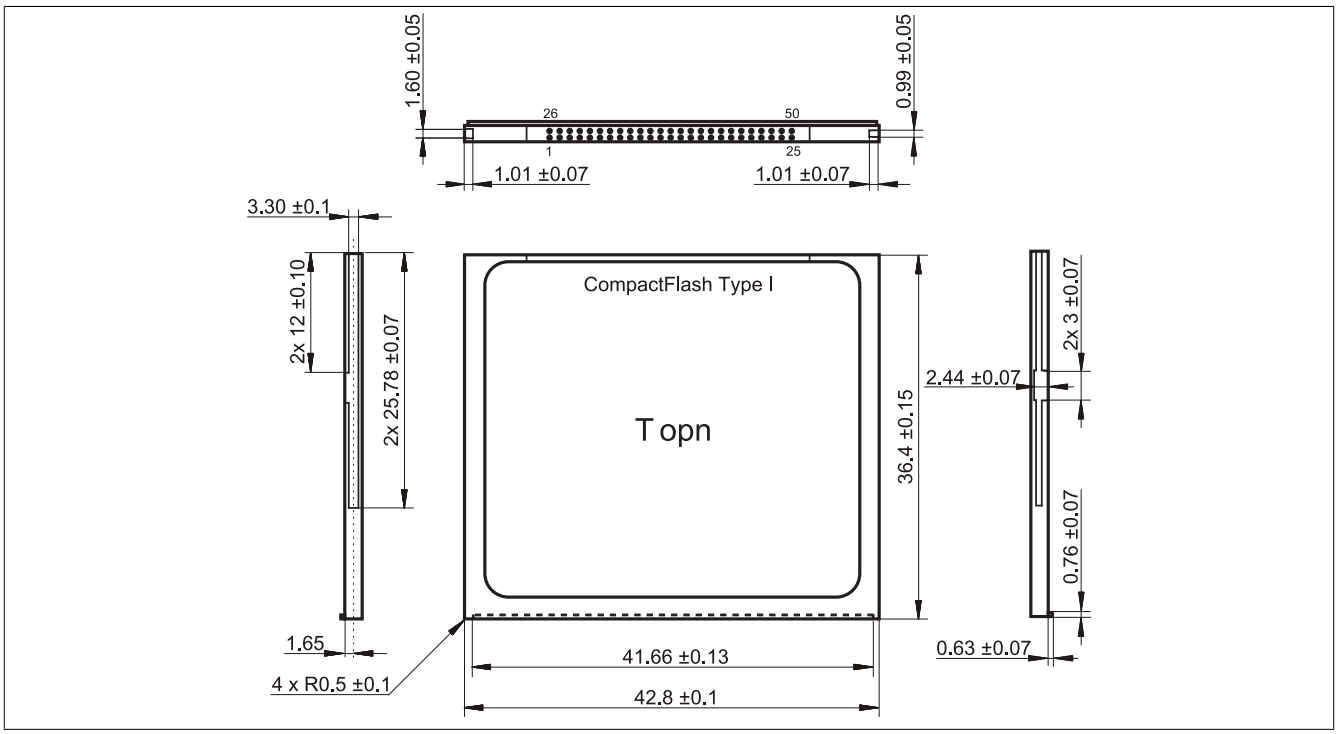


Image 143: Dimensions - CompactFlash card Type I

5.6 Known problems / issues

The following issue for devices with two CompactFlash slots is known:

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

6 USB Media Drive

6.1 5MD900.USB2-01

6.1.1 General information

The USB Media Drive is a drive combination with diskette, DVD-RW/CD-RW drive, CompactFlash slot and USB ports (front and back). It is connected to the USB port on the B&R industrial PC.

- Desk-top or rack-mount operation (mounting rail brackets)
- Integrated USB diskette drive
- Integrated DVD-RW/CD-RW drive
- Integrated CompactFlash slot IDE/ATAPI (Hot Plug capable)
- Integrated USB 2.0 connection (up to 480 MBit high speed)
- +24 VDC supply (back side)
- USB/B 2.0 connection (back side)
- Optional front cover

6.1.2 Order data

Model number	Short description	Figure
	USB accessories	
5MD900.USB2-01	USB 2.0 drive combination, consists of DVD-R/RW DVD+R/RW, FDD, CompactFlash slot (type II), USB connection (type A front, type B back); 24V DC, (screw clamp 0TB103.9 or cage clamp 0TB103.91 sold separately)	
	Required accessories	
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, screw clamp, 3.31 mm², protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, cage clamp, 3.31 mm², protected against vibration by the screw flange	
	Miscellaneous	
5SWUTI.0000-00	OEM Nero CD-RW Software, only available with a CD-RW drive..	
	USB cable	
5CAUSB.0018-00	USB 2.0 connection cable type A - type B, 1.8 m.	
5CAUSB.0050-00	USB 2.0 connection cable type A - type B, 5 m.	
	USB accessories	
5A5003.03	Front cover, for Remote CD-ROM drive 5A5003.02 and USB 2.0 drive combination 5MD900.USB2-00 and 5MD900.USB2-01	

Table 262: 5MD900.USB2-01 - Order data

6.1.3 Interfaces

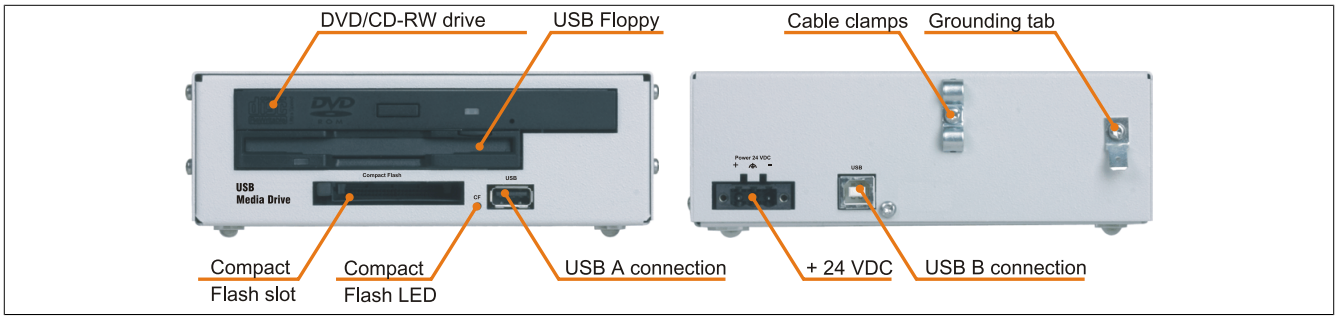


Image 144: 5MD900.USB2-01 - Interfaces

6.1.4 Technical data

Information:

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

Product ID	5MD900.USB2-01
General information	
Max. cable length	5 m (without hub)
Interfaces	
CompactFlash slot 1	
Type	Type I
Connection	IDE/ATAPI
Activity LED	Signals read or write access to an inserted CompactFlash card
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), to high speed (480 Mbit/s)
Current load	Max. 500 mA
CD / DVD drive	
Data buffer capacity	8 MB
Data transfer rate	Max. 33.3 MB/s
Speed	Max. 5090 rpm ±1 %
Noise level	Approx. 48 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 (4.7 GB, 2.6 GB) DVD+R, DVD+R (Double Layer), DVD+RW
Laser class	Class 1 laser
Lifespan	60,000 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	130 ms (24x)
DVD	130 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 - 8x
DVD+R (double layer)	2.4 - 4x
DVD+RW	3.3 - 8x
DVD-R	2 - 6x
DVD-R (Double Layer)	2 - 4x
DVD-RAM	3 - 5x
DVD-RW	2 - 6x
Write-methods	
CD	Disk at once, session at once, packet write, track at once
DVD	Disk at once, incremental, over-write, sequential, multi-session
Disk drive	
Data transfer rate	250 kBit/s (720 KB) or 500 kBit/s (1.25 MB and 1.44 MB)
Diskette media	High density (2HD) or normal density (2DD) 3.5" diskettes
Capacity	720 kB / 1.25 MB / 1.44 MB (formatted)
MTBF	30,000 POH (Power-On Hours)
Rotation speed	Up to 360 rpm
Electrical characteristics	
Rated voltage	24 VDC ±25%
Operational conditions	
EN 60529 protection	IP65 front side (only with optional front cover), IP20 back side
Environmental conditions	
Temperature[1)]	
Operation	5 to 45°C
Bearings	-20 to 60°C
Transport	-40 to 60°C
Relative humidity	
Operation	20 to 80%
Bearings	5 to 90%
Transport	5 to 95%
Vibration	

Table 263: 5MD900.USB2-01 - Technical data

Product ID	5MD900.USB2-01
Operation	5 to 500 Hz: 0.3 g (2.9 m/s² 0-peak)
Bearings	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
Bearings	60 g, 11 ms
Transport	60 g, 11 ms
Altitude	
Operation	Max. 3,000 m
Mechanical characteristics	
Dimensions	
Width	156 mm
Height	52 mm
Depth	140 mm
Weight	Approx. 1100 g (without front cover)

Table 263: 5MD900.USB2-01 - 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).

6.1.5 Dimensions

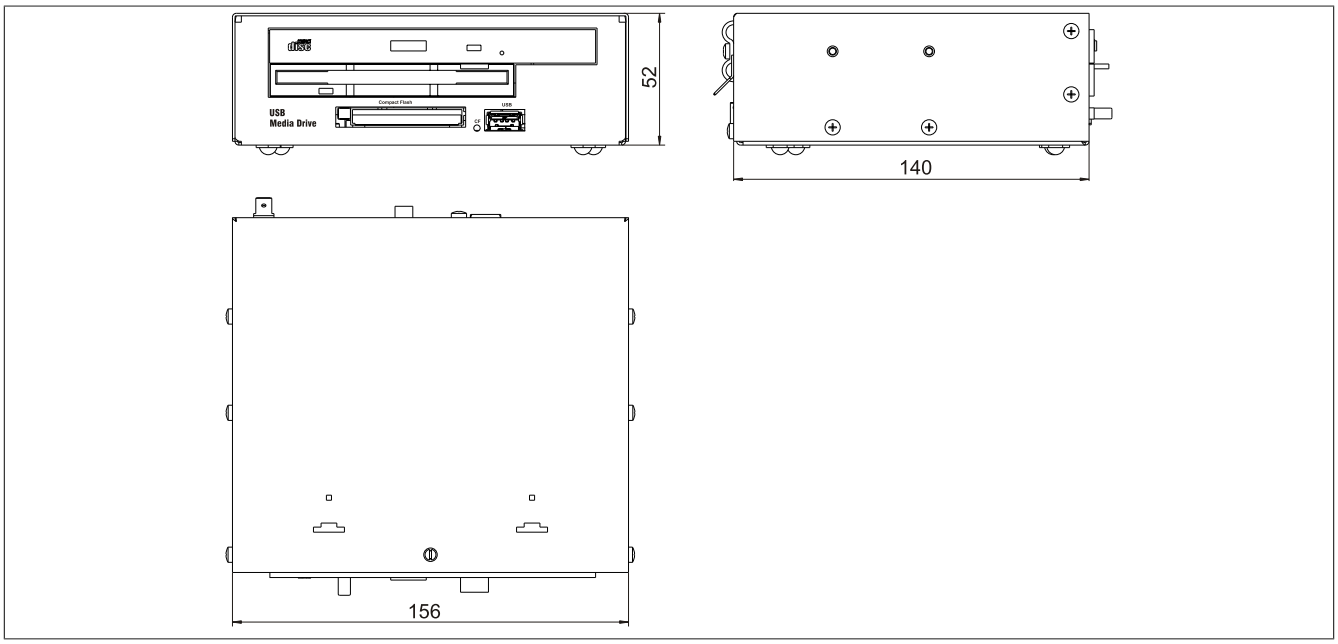


Image 145: 5MD900.USB2-01 - Dimensions

6.1.6 Dimensions with front cover

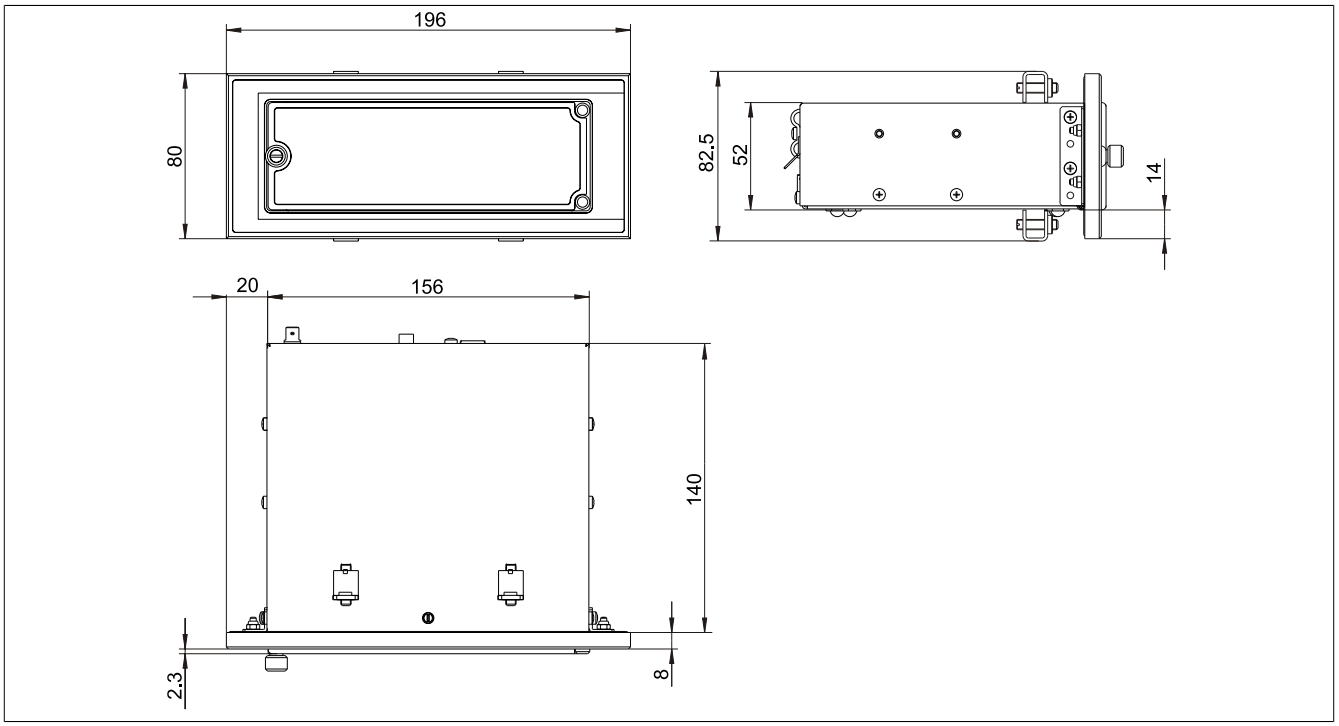


Image 146: Dimensions - USB Media Drive with front cover

6.1.7 Cutout installation

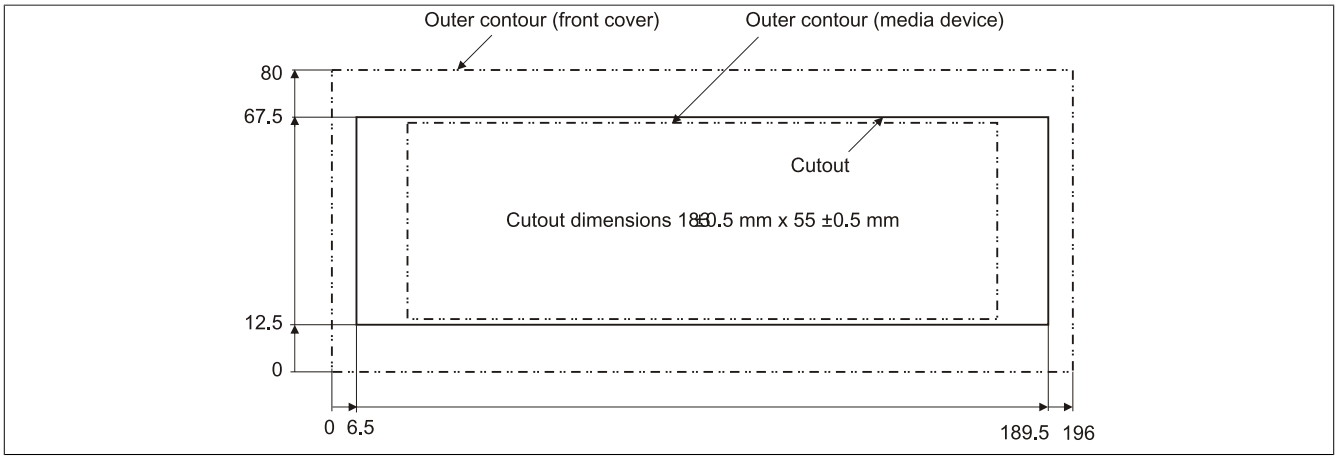


Image 147: Installation cutout - USB Media Drive with front cover

6.1.8 Contents of delivery

Amount	Component
1	USB Media Drive complete unit
2	Mounting rail brackets

Table 264: 5MD900.USB2-01 - Contents of delivery

6.1.9 Installation

The USB Media Drive can be operated as a desk-top device (rubber feet) or as a rack-mount device (2 mounting rail brackets included).

Mounting orientation

Because of limits to the mounting orientation with the components used (floppy, DVD-CDRW drive), the USB media drive is only permitted to be mounted and operated as shown in the following figure.

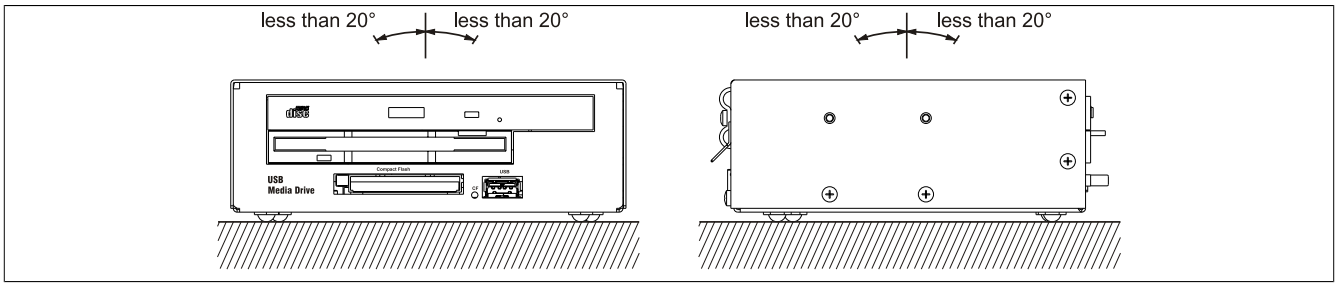


Image 148: 5MD900.USB2-01 - Mounting orientation

6.2 5A5003.03

6.2.1 General information

This front cover can also be mounted on the front of the USB media drive (model number 5MD900.USB2-00 or 5MD900.USB2-01) to protect the interface.

6.2.2 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 and 5MD900.USB2-01	

Table 265: 5A5003.03 - Order data

6.2.3 Technical data

Product ID	5A5003.03
Mechanical characteristics	
Front	
Membrane	
Light background	Similar to Pantone 427CV
Dimensions	
Width	196 mm
Height	80 mm
Depth	8 mm

Table 266: 5A5003.03 - Technical data

6.2.4 Dimensions

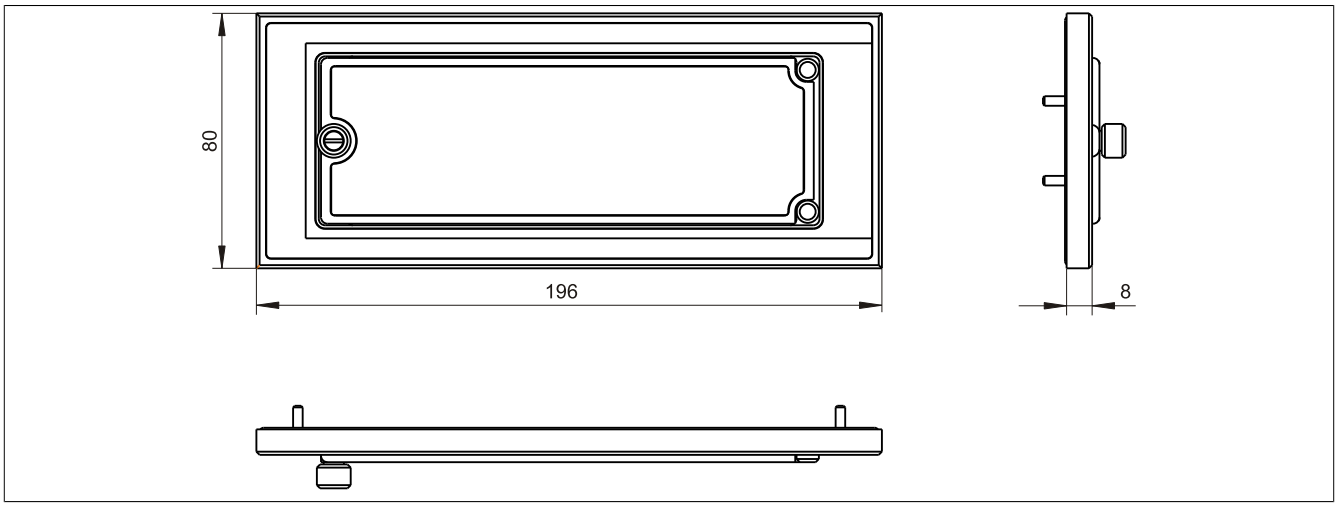


Image 149: 5A5003.03 - Dimensions

6.2.5 Contents of delivery

Amount	Component
1	Front cover 5A5003.03 for the USB Media Drive
4	M3 locknut
4	Cover retaining clip

Table 267: 5A5003.03 - Contents of delivery

6.2.6 Installation

The front cover is attached with 2 mounting rail brackets (included with USB Media Drive) and 4 M3 locknuts. The USB media drive and front cover can be mounted as a whole in (for example) a switching cabinet door.

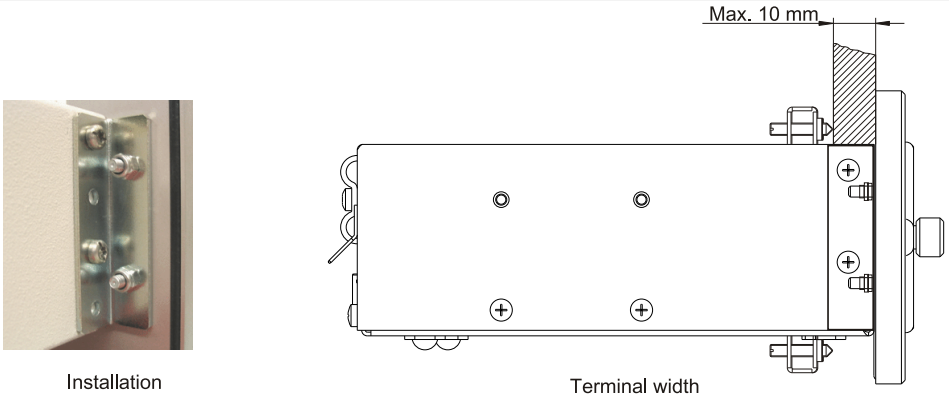


Image 150: Front cover mounting and installation depth

Cutout installation

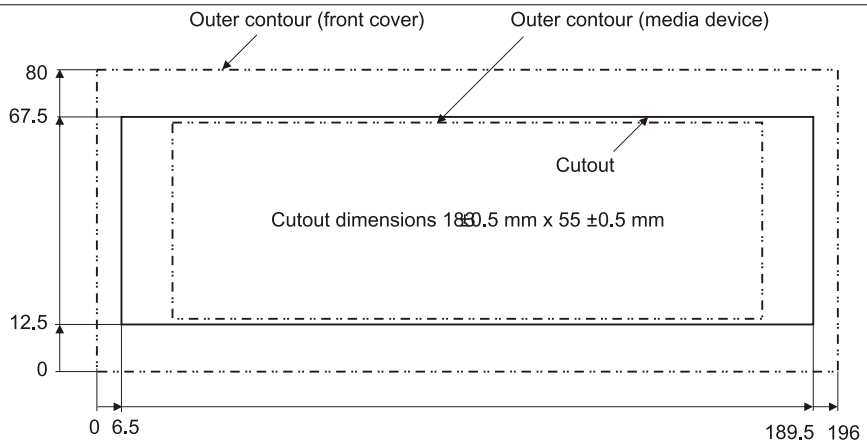


Image 151: Installation cutout - USB Media Drive with front cover

7 USB flash drives

7.1 5MMUSB.2048-00

7.1.1 General information

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

Information:

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

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

7.1.2 Order data

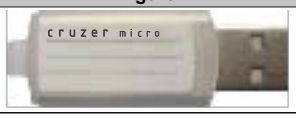
Model number	Short description	Figure
5MMUSB.2048-00	USB 2.0 flash drive, 2048 MB	

Table 268: 5MMUSB.2048-00 - Order data

7.1.3 Technical data

Information:

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

Product ID	5MMUSB.2048-00
General information	
Data retention	10 years
LEDs	1 LED (green), signals data transfer (send and receive)[1)]
MTBF	100,000 hours (at 25°C)
Type	USB 1.1 and 2.0 compatible
Maintenance	None
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), to high speed (480 Mbit/s)
Sequential reading	Max. 8.7 MB/s
Sequential writing	Max. 1.7 MB/s
Support	
Operating systems	
Windows 2000	Yes
Windows ME	Yes
Windows XP Professional	Yes
Windows XP Embedded	Yes
Windows CE 4.2	Yes
Windows CE 5.0	Yes
Electrical characteristics	
Current requirements	650 µA sleep mode, 150 mA read/write
Environmental conditions	
Temperature	
Operation	0 to 45°C
Bearings	-20 to 60°C
Transport	-20 to 60°C

Table 269: 5MMUSB.2048-00 - Technical data

Product ID	5MMUSB.2048-00
Relative humidity	
Operation	10 to 90%, non-condensing
Bearings	5 to 90%, non-condensing
Transport	5 to 90%, non-condensing
Vibration	
Operation	10 to 500 Hz: 2 g (19.6 m/s² 0-peak), oscillation rate 1/minute
Bearings	10 to 500 Hz: 2 g (19.6 m/s² 0-peak), oscillation rate 1/minute
Transport	10 to 500 Hz: 2 g (19.6 m/s² 0-peak), oscillation rate 1/minute
Shock	
Operation	Max. 40 g (392 m/s² 0-peak) and 11 ms length
Bearings	Max. 80 g (784 m/s² 0-peak) and 11 ms length
Transport	Max. 80 g (784 m/s² 0-peak) and 11 ms length
Altitude	
Operation	Max. 3048 m
Bearings	Max. 12192 m
Transport	Max. 12192 m
Mechanical characteristics	
Dimensions	
Width	19 mm
Length	52.2 mm
Height	7.9 mm

Table 269: 5MMUSB.2048-00 - Technical data

1) Signals data transfer (send and receive).

7.1.4 Temperature humidity diagram

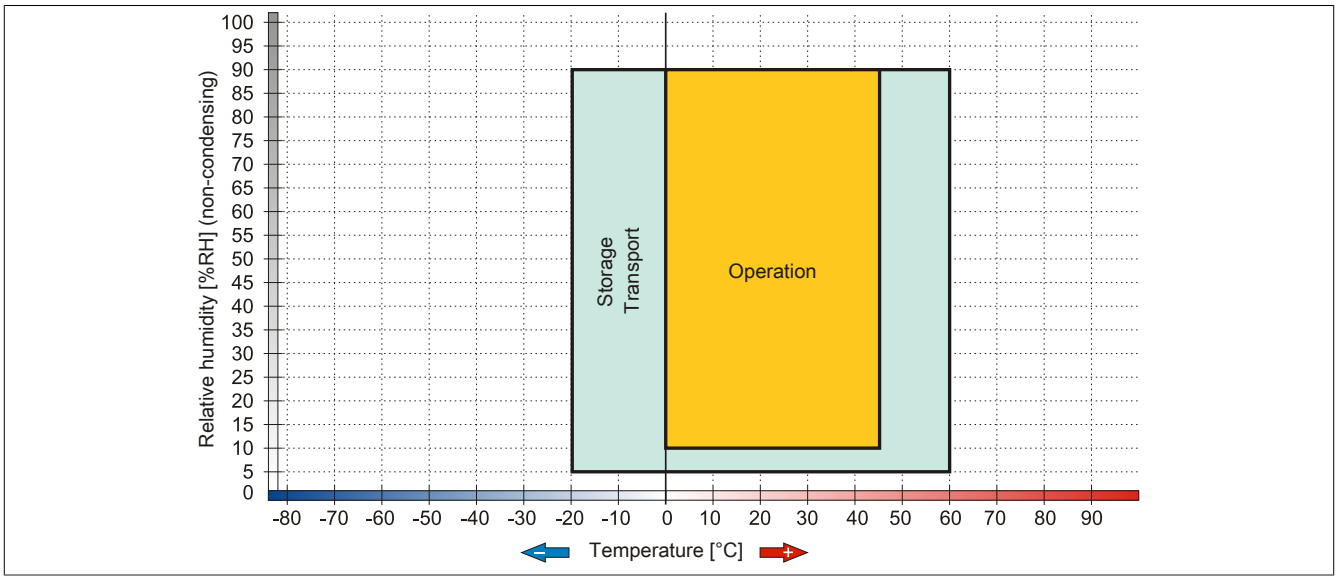


Image 152: 5MMUSB.2048-00 - Temperature humidity diagram

7.2 5MMUSB.2048-01

7.2.1 General information

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

> **Information:**
>
> **We reserve the right to supply alternative products due to the vast quantity of flash drives available on the market and their corresponding short product lifecycle. Therefore, the following measures might be necessary in order to boot from these flash drives:**
>
> - **The flash drive must be reformatted or in some cases even re-partitioned (set active partition).**
> - **The flash drive must be at the top of the BIOS boot order, or alternatively the IDE controllers can also be deactivated in the BIOS. This can be avoided in most cases if a "fdisk /mbr" command is also executed on the USB flash drive.**

- USB 1.1, USB 2.0
- High transfer rate
- High data storage
- Ambient temperature during operation: 0 to 70°C

7.2.2 Order data

Model number	Short description	Figure
	USB accessories	
5MMUSB.2048-01	USB 2.0 flash drive 2048 MB B&R	

Table 270: 5MMUSB.2048-01 - Order data

7.2.3 Technical data

Product ID	5MMUSB.2048-01
General information	
Data retention	> 10 years
LEDs	1 LED (green), signals data transfer (send and receive)[1)]
MTBF	> 3,000,000 hours
Type	USB 1.1, USB 2.0
Maintenance	None
Certification types	
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), to 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 properties	
Current requirements	Max. 500 µA sleep mode, max. 120 mA read/write
Environmental conditions	
Temperature	
Operation	0 to 70°C
Storage	-50 to 100°C
Transport	-50 to 100°C

Table 271: 5MMUSB.2048-01 - Technical data

Product ID	5MMUSB.2048-01
Relative humidity	
Operation	85%, non-condensing
Storage	85%, non-condensing
Transport	85%, non-condensing
Vibration	
Operation	20 to 2000 Hz: 20 g (peak)
Storage	20 to 2000 Hz: 20 g (peak)
Transport	20 to 2000 Hz: 20 g (peak)
Shock	
Operation	Max. 1500 g (peak)
Storage	Max. 1500 g (peak)
Transport	Max. 1500 g (peak)
Altitude	
Operation	Max. 3048 m
Storage	Max. 12192 m
Transport	Max. 12192 m
Mechanical characteristics	
Dimensions	
Width	17.97 mm
Length	67.85 mm
Height	8.35 mm

Table 271: 5MMUSB.2048-01 - Technical data

1) Signals data transfer (send and receive).

7.2.4 Temperature humidity diagram

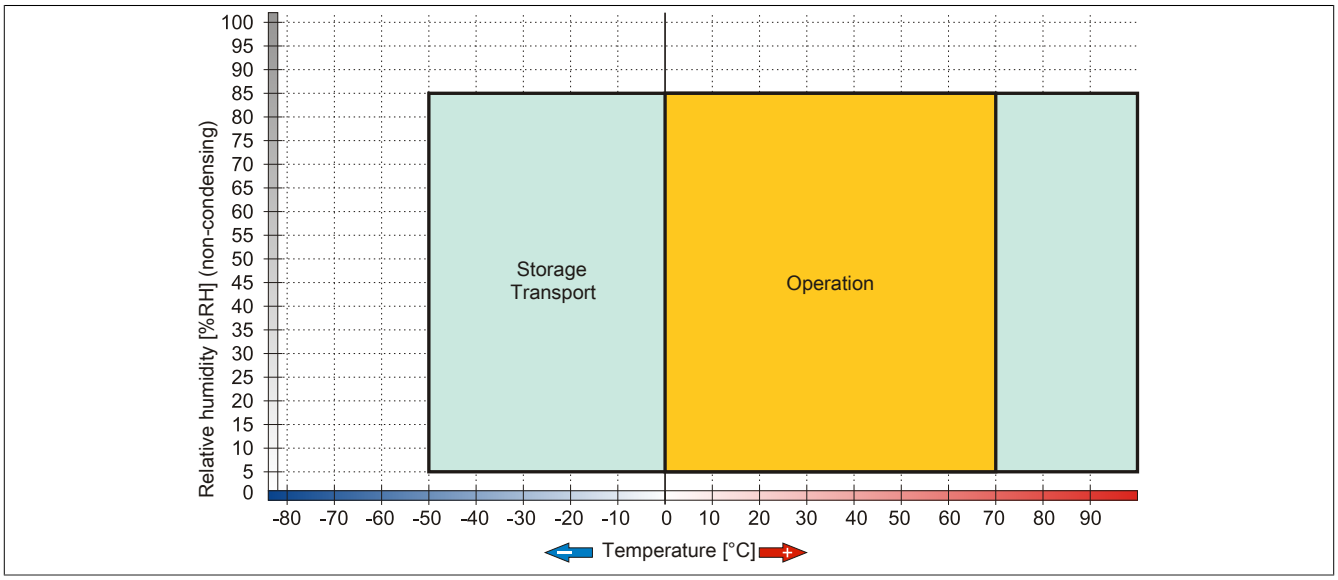


Image 153: 5MMUSB.2048-01 - Temperature humidity diagram

8 HMI Drivers & Utilities DVD

8.1 5SWHMI.0000-00

8.1.1 General information

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

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

8.1.2 Order data

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

Table 272: 5SWHMI.0000-00 - Order data

8.1.3 Contents (V2.10)

BIOS upgrades for the products

- Automation PC 620 / Panel PC 700 CPU Board 815E and 855GME BIOS
- Automation PC 620 / Panel PC 700 CPU Board X855GME BIOS
- Automation PC 620 / Panel PC 700 CPU Board 945GME N270 BIOS
- Automation PC 680
- Automation PC 810 / Automation PC 820 / Panel PC 800 B945GME BIOS
- Automation PC 810 / Panel PC 800 945GME N270 CPU Board BIOS
- Automation PC 810 / Panel PC 800 GM45 CPU Board BIOS
- Provit 2000 product family - IPC2000/2001/2002
- Provit 5000 product family - IPC5000/5600/5000C/5600C
- Power Panel 100 BIOS devices
- Mobile Panel 100 BIOS devices
- Power Panel 100 / Mobile Panel 100 user boot logo
- Power Panel 100 / Mobile Panel 100 REMHOST utility
- Power Panel 300/400 BIOS devices
- Power Panel 300/400 BIOS user boot logo
- Panel PC 310

Drivers for the devices

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

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

Firmware upgrades

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

Utilities / Tools

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

Windows

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

MCAD templates for

- Industrial PCs
- Visualization and operating devices
- Legend strip templates
- Custom designs

ECAD templates for

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

Documentation for

- Automation PC 620
- Automation PC 680
- Automation PC 810
- Automation PC 820
- Automation Panel 800
- Automation Panel 900
- Panel PC 310
- Panel PC 700
- Panel PC 725
- Panel PC 800
- Power Panel 15/21/35/41
- Power Panel 100/200
- Power Panel 300/400
- Mobile Panel 40/50
- Mobile Panel 100/200
- Mobile Panel connection box
- Provit 2000
- Provit 3030
- Provit 4000
- Provit 5000
- Provit Benchmark
- Provit Mkey
- Windows CE 5.0 Help
- Windows CE 6.0 Help
- Windows NT Embedded application guide
- Windows XP Embedded application guide
- Uninterruptible power supply
- Implementation guides
- B&R Hilscher fieldbus cards (CANopen, DeviceNet, PROFIBUS, PROFINET)

Service tools

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

9 Uninterruptible power supply

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

Information:

- **The monitor 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. This can be downloaded from the B&R homepage.**

By integrating the charging circuit in the housing of the B&R Industrial PC, the 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. The batteries are easily accessible from the front and can be switched in just a few moments when servicing.

9.1 Features

- Long-lasting, maintenance-free rechargeable batteries
- Communication via integrated interfaces
- Temperature sensor
- Driver software
- Deep discharge protection

9.2 Requirements

- An appropriate system unit.
- Add-on UPS module 5AC600.UPSI-00
- Battery unit 5AC600.UPSB-00
- UPS connection cable 0.5 m (5CAUPS.0005-00) or 3 m (5CAUPS.0030-00)
- For info regarding configuration of the B&R UPS using the ADI Control Center.

9.3 5AC600.UPSI-00

9.3.1 General information

The add-on UPS module can easily be installed in an appropriate system unit (List of required revisions: see section 9.2 "Requirements" on page 311).

9.3.2 Order data

Model number	Short description	Figure
	Uninterruptible power supply	
5AC600.UPSI-00	UPS module for APC620, APC810, PPC800; for system units 5PC600.SX01-00 (starting with Rev. H0), 5PC600.SX02-00 (starting with Rev. G0), 5PC600.SX02-01 (starting with Rev. H0), 5PC600.SX05-00 (starting with Rev. F0), 5PC600.SX05-01 (starting with Rev. F0), 5PC600.SF03-00 (starting with Rev. A0), 5PC810.SX*. 5PC820.1505-00, 5PC820.1906-00. Order cable (5CAUPS.0005-00 or 5CAUPS.0030-00) and battery unit (5AC600.UPSB-00) separately.	

Table 273: 5AC600.UPSI-00 - Order data

9.3.3 Technical data

Information:

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

Product ID	5AC600.UPSI-00
General information	
Certification types	
CE	Yes
c-UL-us	Yes
Electrical properties	
Power consumption	Max. 7.5 watts
Power failure bypass	Max. 20 min with 150 W load
Deep discharge protection	Yes, at 10 V on the battery unit
Short circuit protection	No
Battery charging rating	
Charging current	Max. 0.5 A
Switching threshold	
Battery operation	13 V
Mains operation	15 V

Table 274: 5AC600.UPSI-00 - Technical data

9.3.4 Installation

The module is installed using the materials included in the delivery.

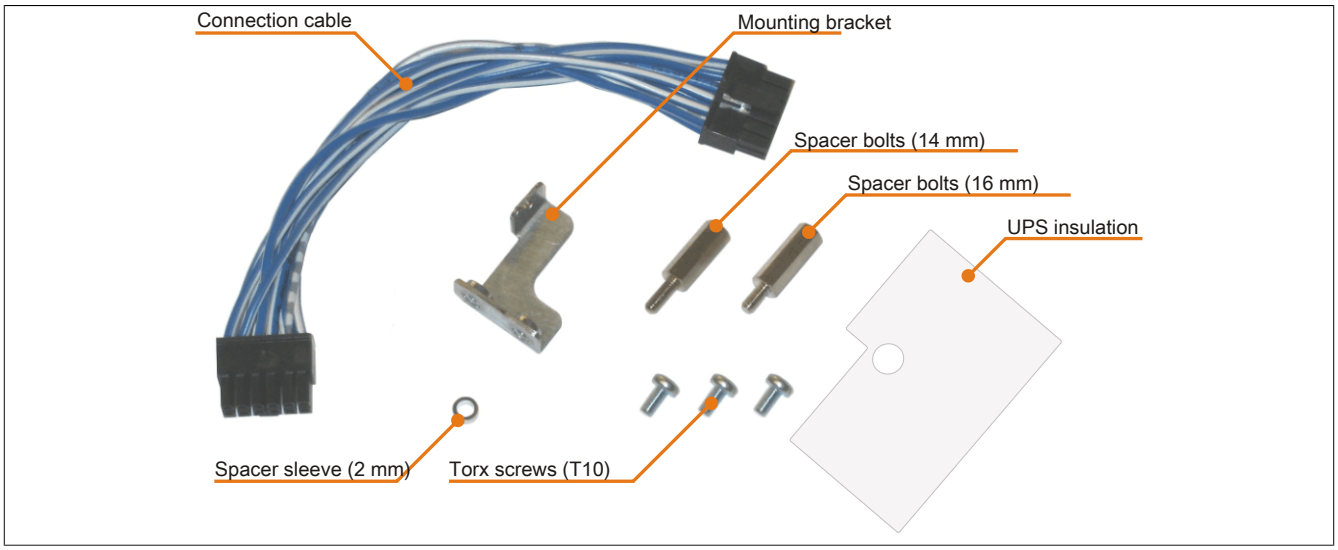


Image 154: 5AC600.UPSI-00 Add-on UPS module - Installation materials

9.4 5AC600.UPSB-00

9.4.1 General information

The battery unit is subject to wear and should be replaced regularly (at least following the specified lifespan).

9.4.2 Order data

Model number	Short description	Figure
	Uninterruptible power supply	
5AC600.UPSB-00	Battery unit 5Ah; for APC620, APC810 or PPC800 UPS.	

Table 275: 5AC600.UPSB-00 - Order data

9.4.3 Technical data

Information:

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

Product ID	5AC600.UPSB-00
General information	
Battery	
Type	Enersys Cyclon 12 V 5 Ah (6 connected in series)
Lifespan	10 years[1)]
Design	Single cell
Temperature sensor	NTC resistance
Maintenance interval during storage	Charge once every 6 months
Certification types	
CE	Yes
c-UL-us	Yes
Charge duration when battery low	Typ. 15 hours
Electrical properties	
Rated voltage	12 V
Battery current	Max. 8 A
Capacity	5 Ah
Deep discharge voltage	10 V
Environmental conditions	
Temperature	
Operation	-40 to 80°C
Storage	-65 to 80°C
Transport	-65 to 80°C
Relative humidity	
Operation	5 to 95%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Altitude	
Operation	Max. 3000 m
Mechanical characteristics	
Dimensions	
Width	104 mm[2)]
Length	170.5 mm
Height	87.5 mm
Weight	Approx. 3200 g

Table 276: 5AC600.UPSB-00 - Technical data

1) At 25°C (up to 80% battery capacity)
2) Dimensions without mounting clips

9.4.4 Temperature life span diagram up to 20% battery capacity.

Temperature	Lifespan in days
25	14600
30	9467
35	6139
40	3980
45	2581
50	1674
55	1085
60	704
65	456
70	296
75	192
80	124

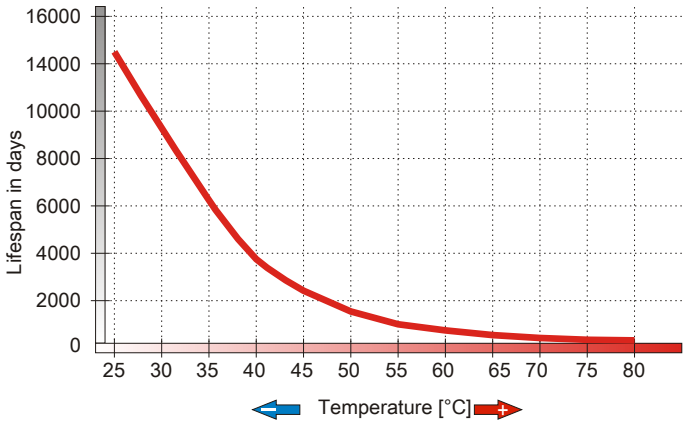


Image 155: Temperature life span diagram

9.4.5 Deep discharge cycles

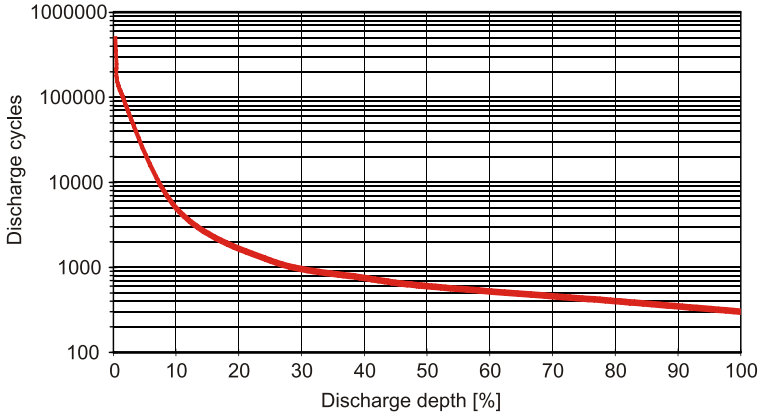


Image 156: Deep discharge cycles

9.4.6 Dimensions

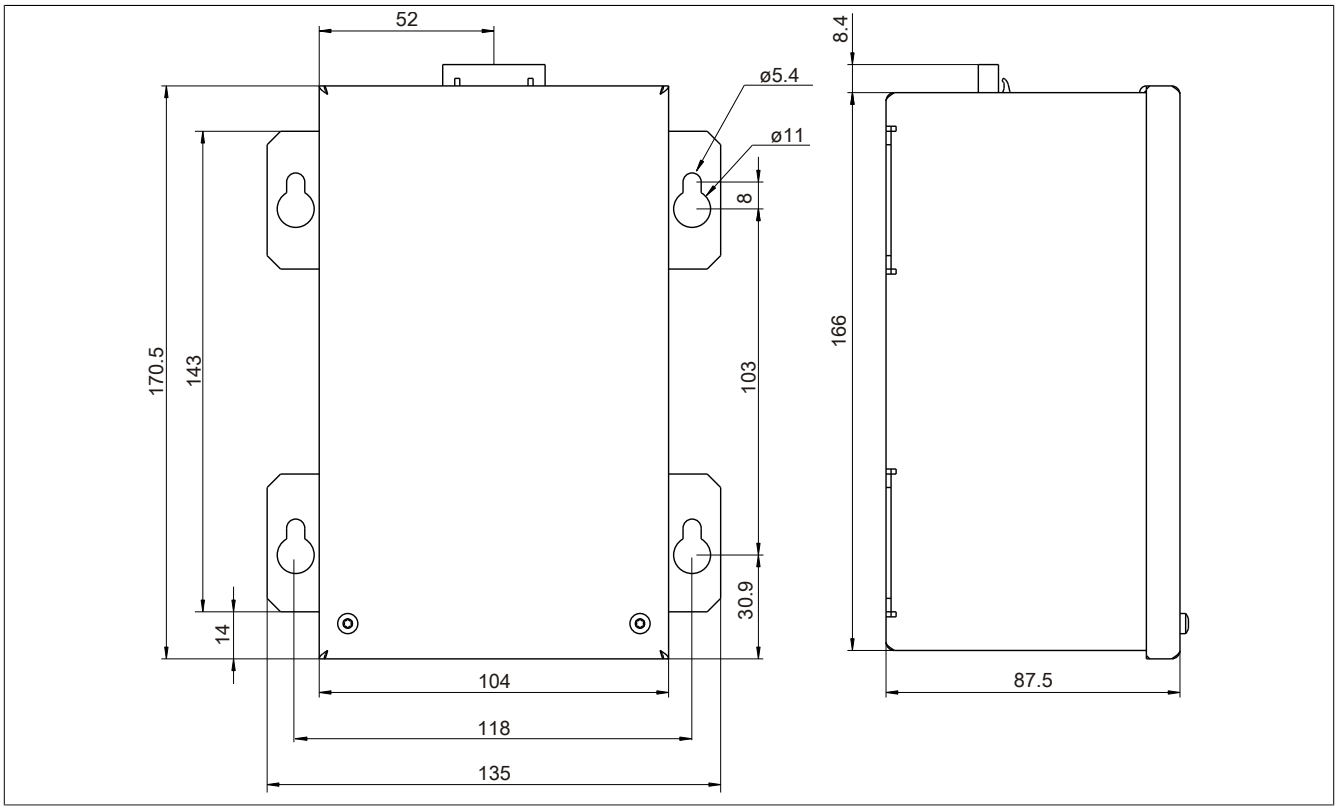


Image 157: 5PC600.UPSB-00 - Dimensions

9.4.7 Drilling template

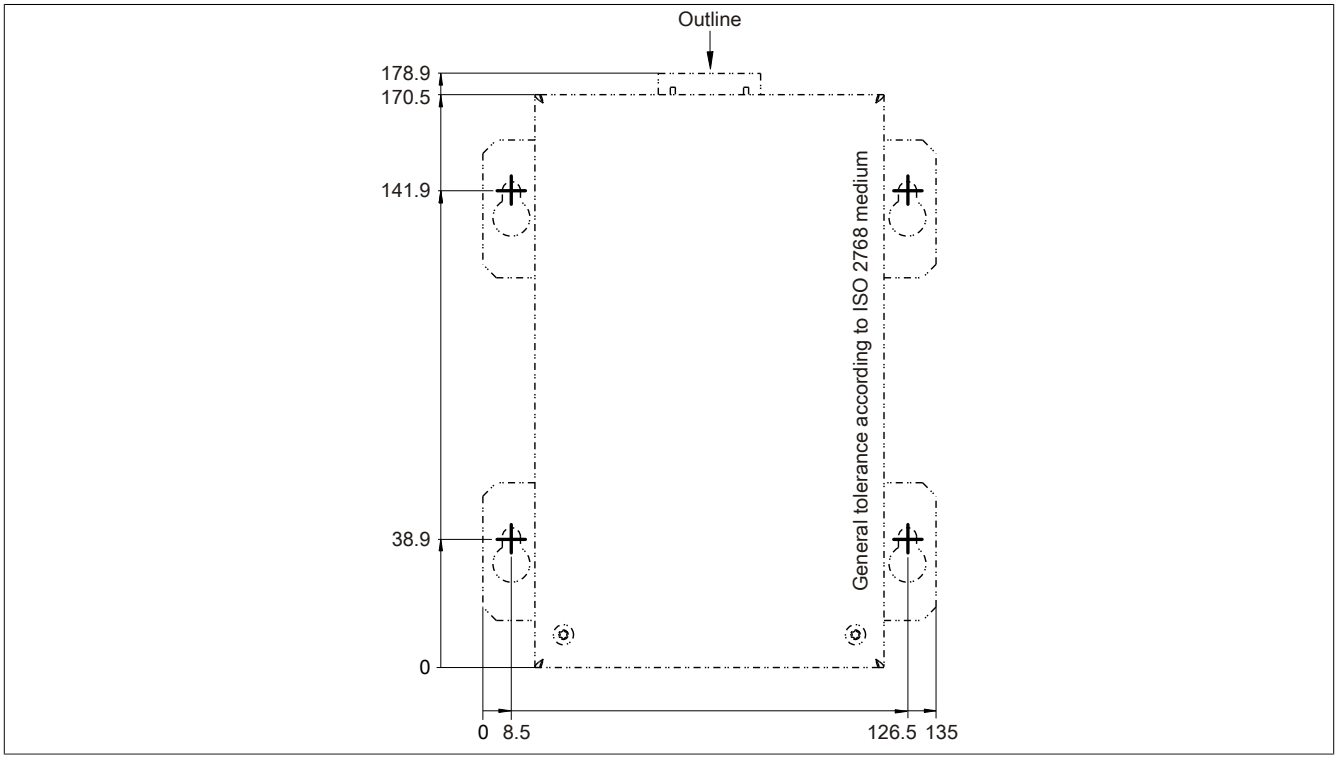


Image 158: 5PC600.UPSB-00 - Drilling template

9.4.8 Mounting instructions

Due to the unique construction of these batteries, they can be stored and operated in any position.

9.5 5CAUPS.00xx-00

9.5.1 General information

The UPS connection cable establishes the connection between the add-on UPS module (5AC600.UPSI-00) and the battery unit (5AC600.UPSB-00). It is available in lengths of 0.5 m and 3 m.

9.5.2 Order data

Model number	Short description	Figure
	Uninterruptible power supplies	
5CAUPS.0005-00	UPS cable 0.5 m; for USV 5AC600.UPSI-00.	
5CAUPS.0030-00	UPS cable 3 m; for USV 5AC600.UPSI-00.	

Table 277: 5CAUPS.0005-00, 5CAUPS.0030-00 - Order data

9.5.3 Technical data

Information:

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

Product ID	5CAUPS.0005-00	5CAUPS.0030-00
General information		
Certification types		
CE	Yes	
c-UL-us	Yes	
Cable structure		
Wire cross section	-	2x 0.5 mm² (AWG 20) 4x 2.5 mm² (AWG 13)
Conductor resistance	-	At 0.5 mm² 0.5 max. 39 Ω/km At 2.5 mm² max. 7.98 Ω/km
Outer sheathing		
Material	-	Thermoplastic PVC-based material
Color	-	Window gray (similar to RAL 7040)
Supply lines		
Conductor resistance	At 0.5 mm² 0.5 max. 39 Ω/km At 2.5 mm² max. 7.98 Ω/km	-
Connector		
Type	6-pin plug connectors, tension clamp connection / 6-pin socket connectors, tension clamp connection	
Electrical properties		
Operating voltage	Max. 300 V	
Peak operating voltage	12 VDC	
Test voltage		
Wire/wire	-	1500 V
Current load	10 A at 20°C	
Environmental conditions		
Temperature		
Moving	-5 to 80°C	
Static	-30 to 80°C	
Mechanical characteristics		
Dimensions		
Length	0.5 m	3 m
Diameter	8.5 mm ± 0.2 mm	
Flex radius		
Moving	10x wire cross-section	
Fixed installation	5x wire cross-section	
Weight	Approx. 100 g	Approx. 470 g

Table 278: 5CAUPS.0005-00, 5CAUPS.0030-00 - Technical data

10 PCI Plug-in cardn

10.1 5ACPCI.ETH1-01

10.1.1 General information

The universal (3.3 V and 5 V) half-size PCI Ethernet card has a 10/100 MBit/s network connection and can be inserted in a 16-bit PCI slot and operated as an additional network interface.

- PCI Ethernet card
- 1 network connection (10/100 MBit/s)

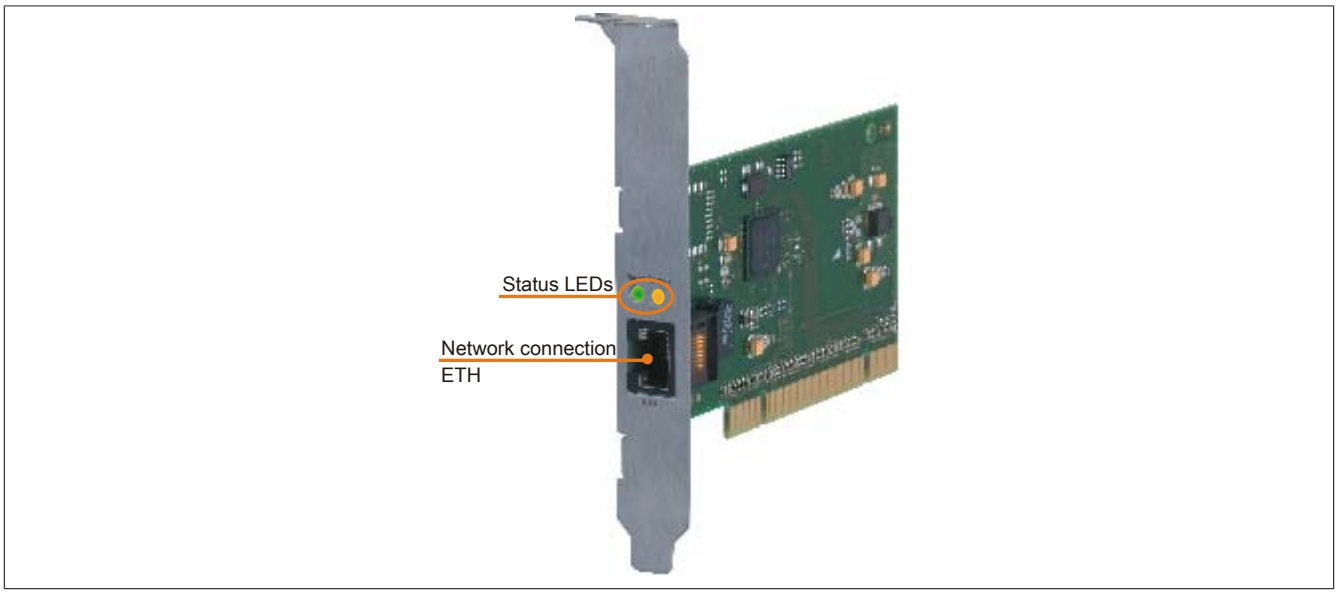


Image 159: Order data - PCI Ethernet Card 10/100

10.1.2 Order data

Model number	Short description	Figure
	Accessories	
5ACPCI.ETH1-01	PCI Ethernet Card 1 x 10/100	

Table 279: 5ACPCI.ETH1-01 - Order data

10.1.3 Technical data

Product ID	5ACPCI.ETH1-01
General information	
B&R ID code	$A58A
Diagnostics Data transfer	Yes, with status LED
Certification types CE	Yes
Interfaces	
Ethernet Amount	1

Table 280: 5ACPCI.ETH1-01 - Technical data

Product ID	5ACPCI.ETH1-01
Controllers	Intel 82551ER
Design	Shielded RJ45 port
Transfer rate	10/100 Mbit/s
Cable length	Max. 100 m between two stations (segment length)

Table 280: 5ACPCI.ETH1-01 - Technical data

Ethernet interface

Information:

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

Ethernet connection		
Controller	Intel 82551ER	
Power supply	Universal card (2 notches) for 3.3 V or 5 V	
Cabling	S/STP (Cat5e)	
Transfer rate	10/100 MBit/s	
Cable length	max. 100 m (min. Cat5e)	
LED	**On**	**Off**
Green	100 Mbit/s	10 Mbit/s
Orange	Link (Ethernet network connection available)	Activity (blinking - data transfer in progress)

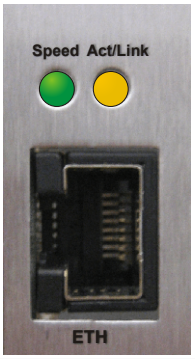


Table 281: 5ACPCI.ETH1-01 - Technical data

10.1.4 Driver support

A special driver is required in order to operate the Intel Ethernet controller 825551ER. Drivers for Windows XP Professional, Windows XP Embedded, and DOS 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 homepage, not from manufacturers' pages.

10.1.5 Dimensions

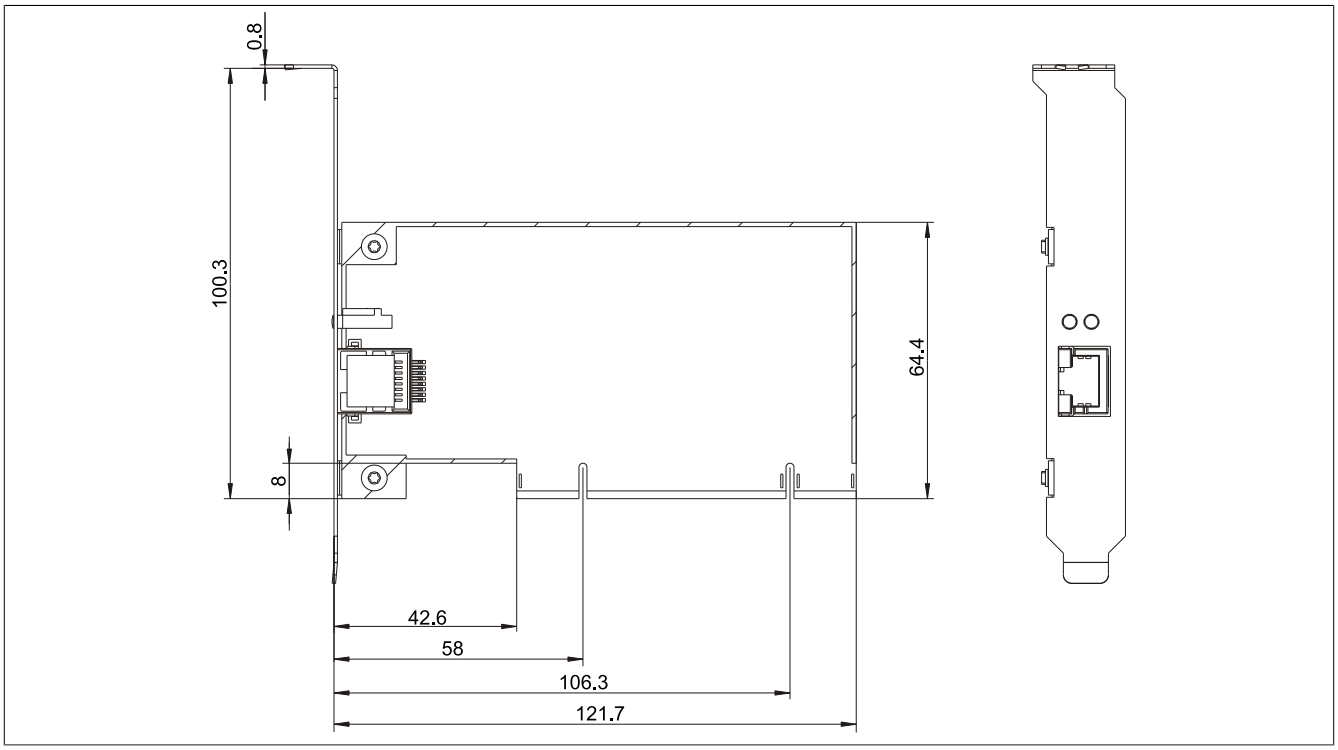


Image 160: 5ACPCI.ETH1-01 - Dimensions

10.2 5ACPCI.ETH3-01

10.2.1 General information

The universal (3.3 V and 5 V) half-size PCI Ethernet card has three 10/100 MBit/s network connections and can be inserted in a 16-bit PCI slot and operated as an additional network interface.

- PCI Ethernet card
- 3 network connections (10/100 MBit/s)

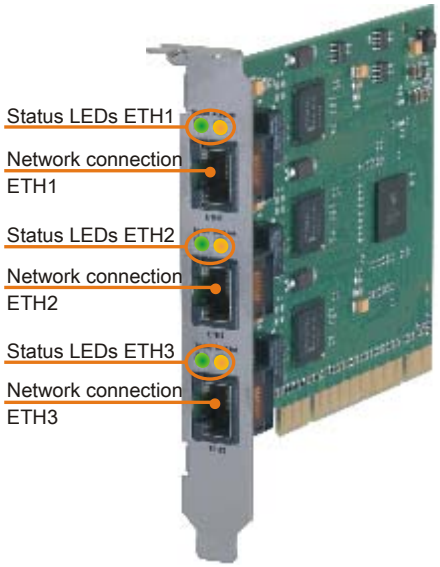


Image 161: 5ACPCI.ETH3-01 - PCI Ethernet card 10/100

10.2.2 Order data

Model number	Short description	Figure
	Accessories	
5ACPCI.ETH3-01	PCI Ethernet Card 3 x 10/100	

Table 282: 5ACPCI.ETH3-01 - Order data

10.2.3 Technical data

Product ID	5ACPCI.ETH3-01
General information	
B&R ID code	$A58B
Diagnostics Data transfer	 Yes, with status LED
Certification types CE	 Yes
Interfaces	
Ethernet Amount Controllers Design Transfer rate Cable length	 3 Intel 82551ER Shielded RJ45 port 10/100 Mbit/s Max. 100 m between two stations (segment length)

Table 283: 5ACPCI.ETH3-01 - Technical data

Ethernet interface

Information:

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

Ethernet connections		
Controller	each with Intel 82551ER	
Power supply	Universal card (2 notches) for 3.3 V or 5 V	
Cabling	S/STP (Cat5e)	
Transfer rate	10/100 MBit/s	
Cable length	max. 100 m (min. Cat5e)	
LED	**On**	**Off**
Green	100 Mbit/s	10 Mbit/s
Orange	Link (Ethernet network connection available)	Activity (blinking - data transfer in progress)

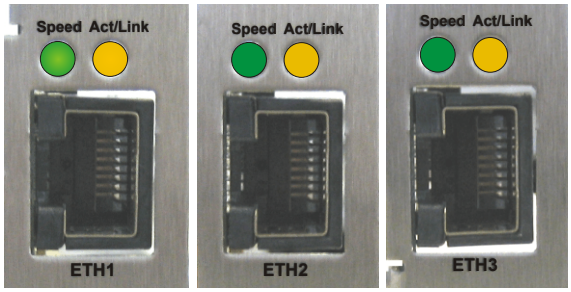


Table 284: 5ACPCI.ETH3-01 - Technical data

10.2.4 Driver support

A special driver is required in order to operate the Intel Ethernet controller 825551ER. Drivers for Windows XP Professional, Windows XP Embedded, and DOS 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 homepage, not from manufacturers' pages.

10.2.5 Dimensions

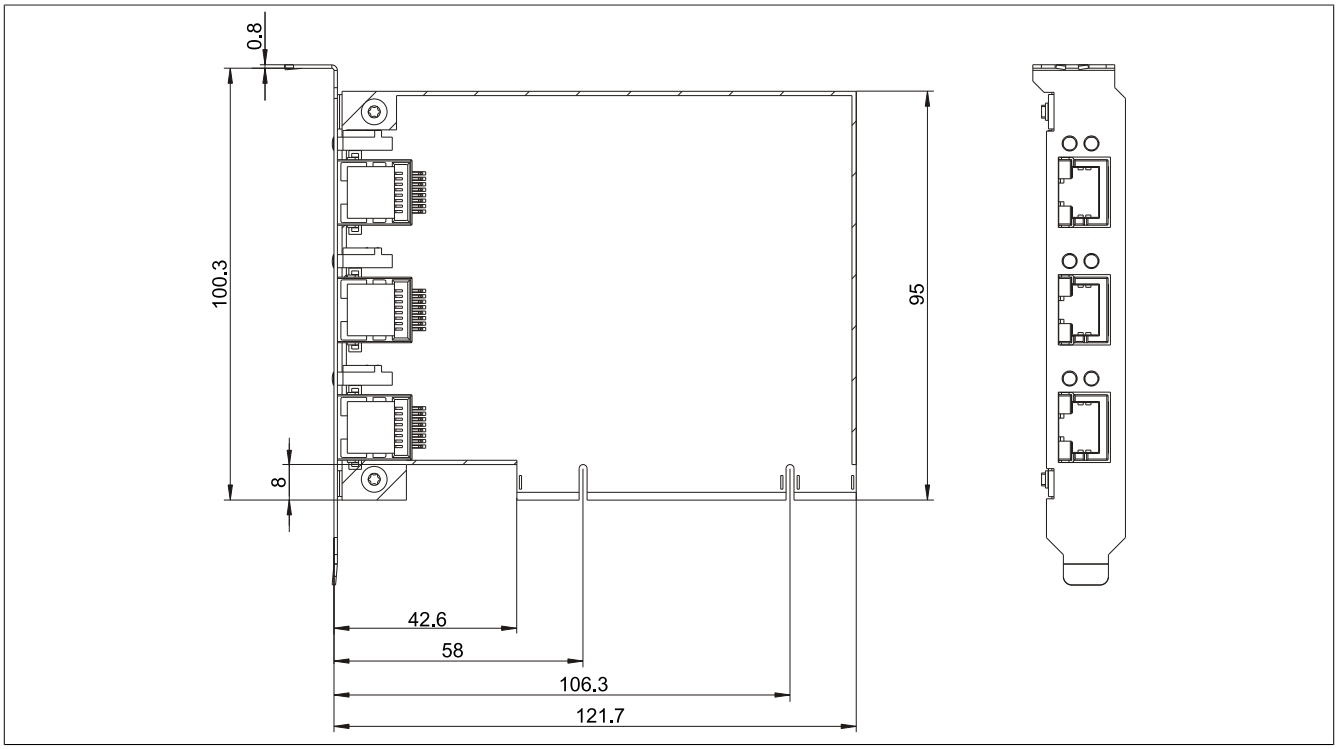


Image 162: 5ACPCI.ETH3-01 - Dimensions

11 Cable

11.1 DVI cable

11.1.1 5CADVI.0xxx-00

General information

The DVI cables 5CADVI.0xxx-00 are designed for fixed layout.

> **Caution!**
>
> **Cable can only be plugged in and unplugged when the device is turned off.**

Order data

Model number	Short description	Figure
	DVI cables	
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 285: 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 types			
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%		Tinned Cu mesh, optical coverage >86%
Outer sheathing			
Material		PVC	
Color		Beige	
Labeling		AWM STYLE 20276 80℃ 30V VW1 DVI DIGITAL SINGLE LINK DER AN	
Connector			
Type		2x DVI-D (18+1), male	
Connection cycles		100	
Electrical properties			
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 286: 5CADVI.0018-00, 5CADVI.0050-00, 5CADVI.0100-00 - Technical data

Flex radius specification

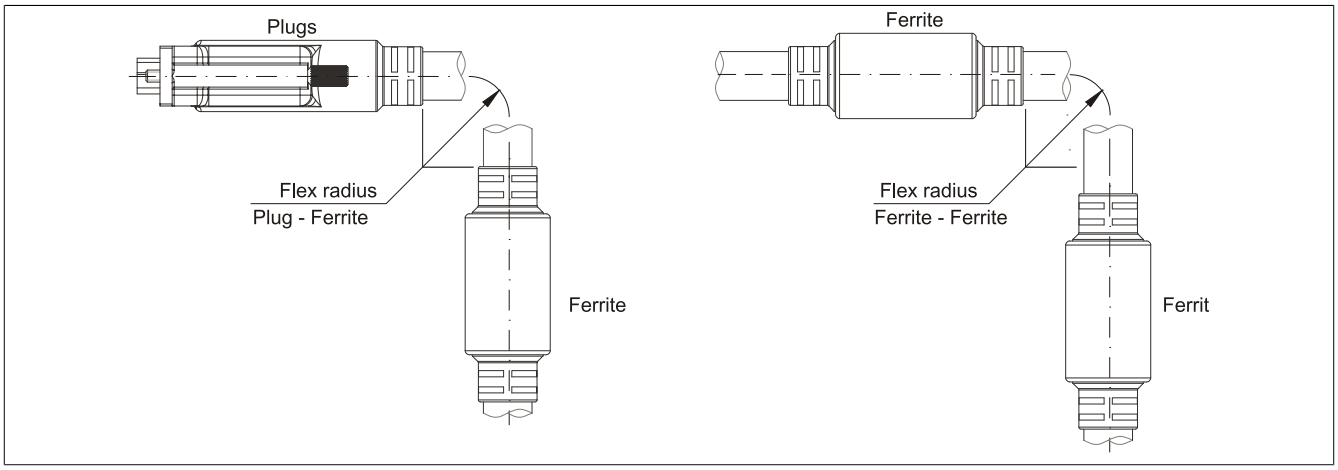


Image 163: Flex radius specification

Dimensions

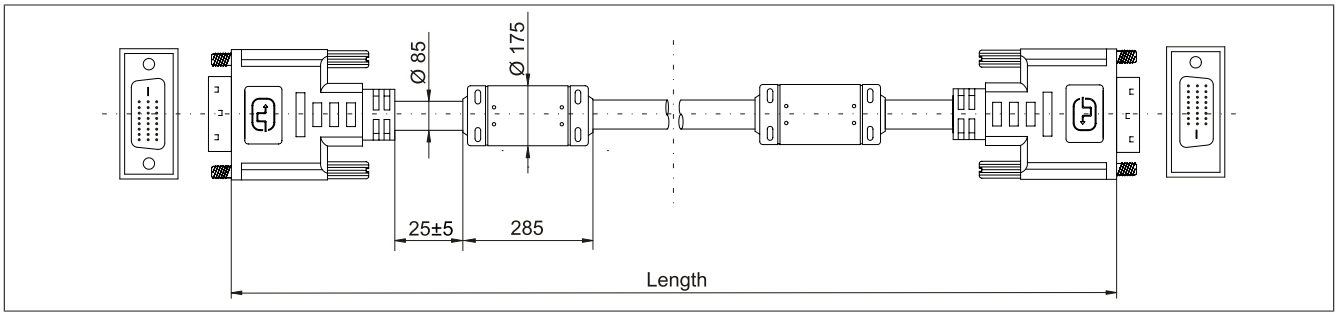


Image 164: 5CADVI.0xxx-00 - Dimensions

Cable specifications

Warning!

If you want to build a suitable cable yourself, it should be wired according to these specifications.

If a self-built cable is used, B&R cannot guarantee that it will function properly. B&R guarantees the performance of all cables that they provide.

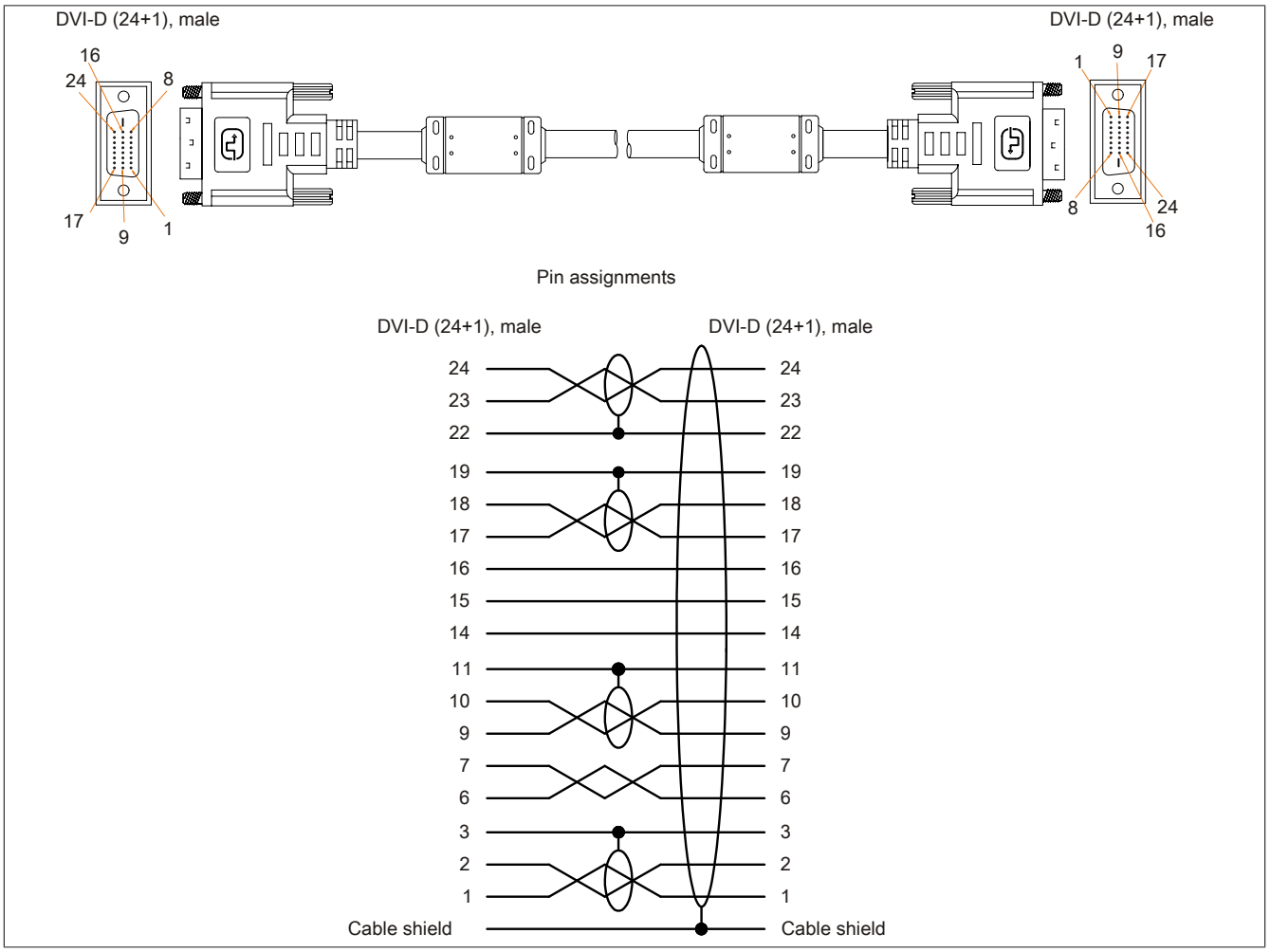


Image 165: 5CADVI.0xxx-00 - Pin assignments

11.2 SDL cables

11.2.1 5CASDL.0xxx-00

General information

The SDL cables 5CASDL.0xxx-00 are designed for fixed layout. Use of the SDL flex cable 5CASDL.0xxx-03 is required for a flexible installation (e.g. in swing arm systems).

> **Caution!**
>
> **Cable 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 287: 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. 0300-00	5CASDL. 0250-00	5CASDL. 0200-00	5CASDL. 0150-00
General information							
Certification types							
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 properties							
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	30 m ± 100 mm	25 m ± 100 mm	20 m ±100 mm	15 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. 5520 g	Approx. 4800 g	Approx. 2880 g	Approx. 2250 g

Table 288: 5CASDL.0018-00, 5CASDL.0050-00, 5CASDL.0100-00, 5CASDL.0300-00, 5CASDL.0250-00, 5CASDL.0200-00, 5CASDL.0150-00 - Technical data

Flex radius specification

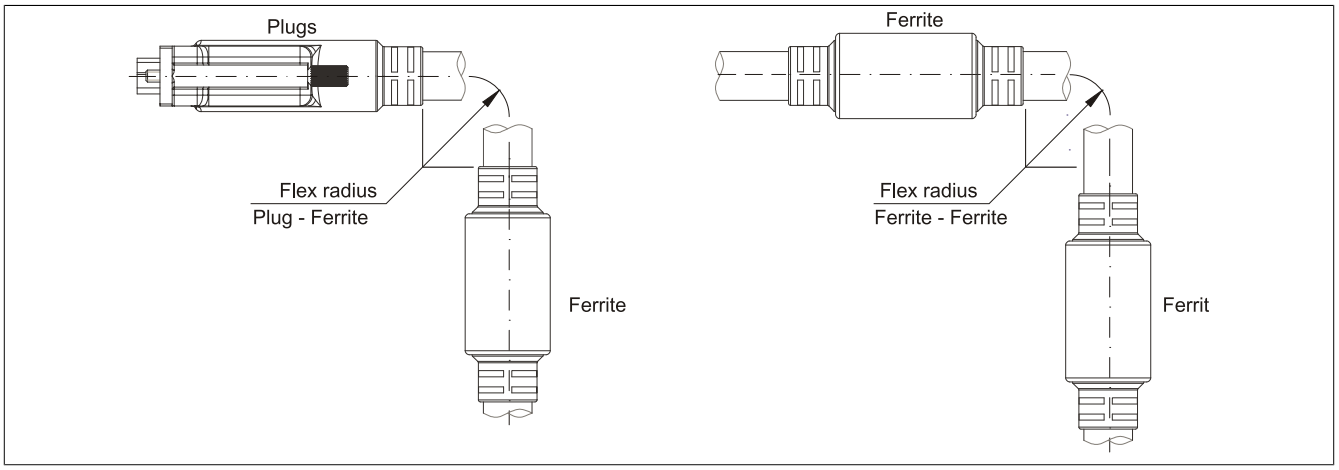


Image 166: Flex radius specification

Dimensions

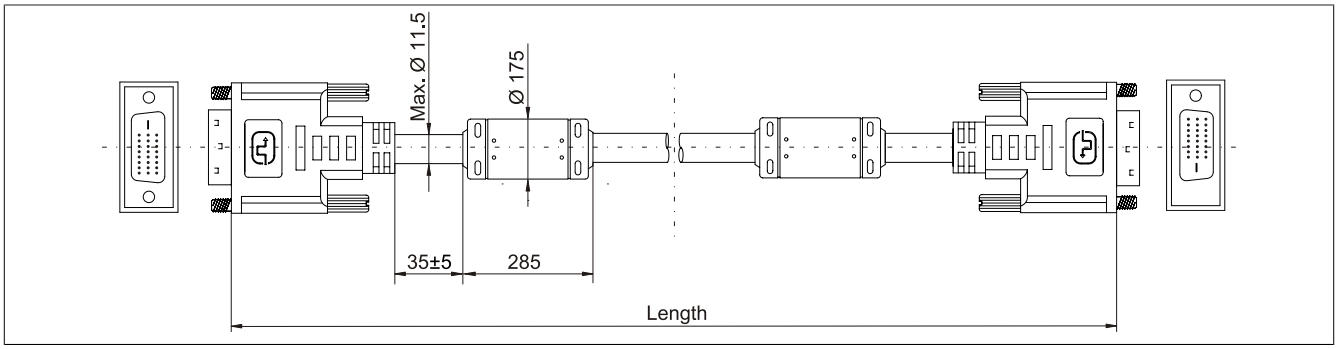


Image 167: 5CASDL.0xxx-00- Dimensions

Cable specifications

Warning!

If you want to build a suitable cable yourself, it should be wired according to these specifications.

If a self-built cable is used, B&R cannot guarantee that it will function properly. B&R guarantees the performance of all cables that they provide.

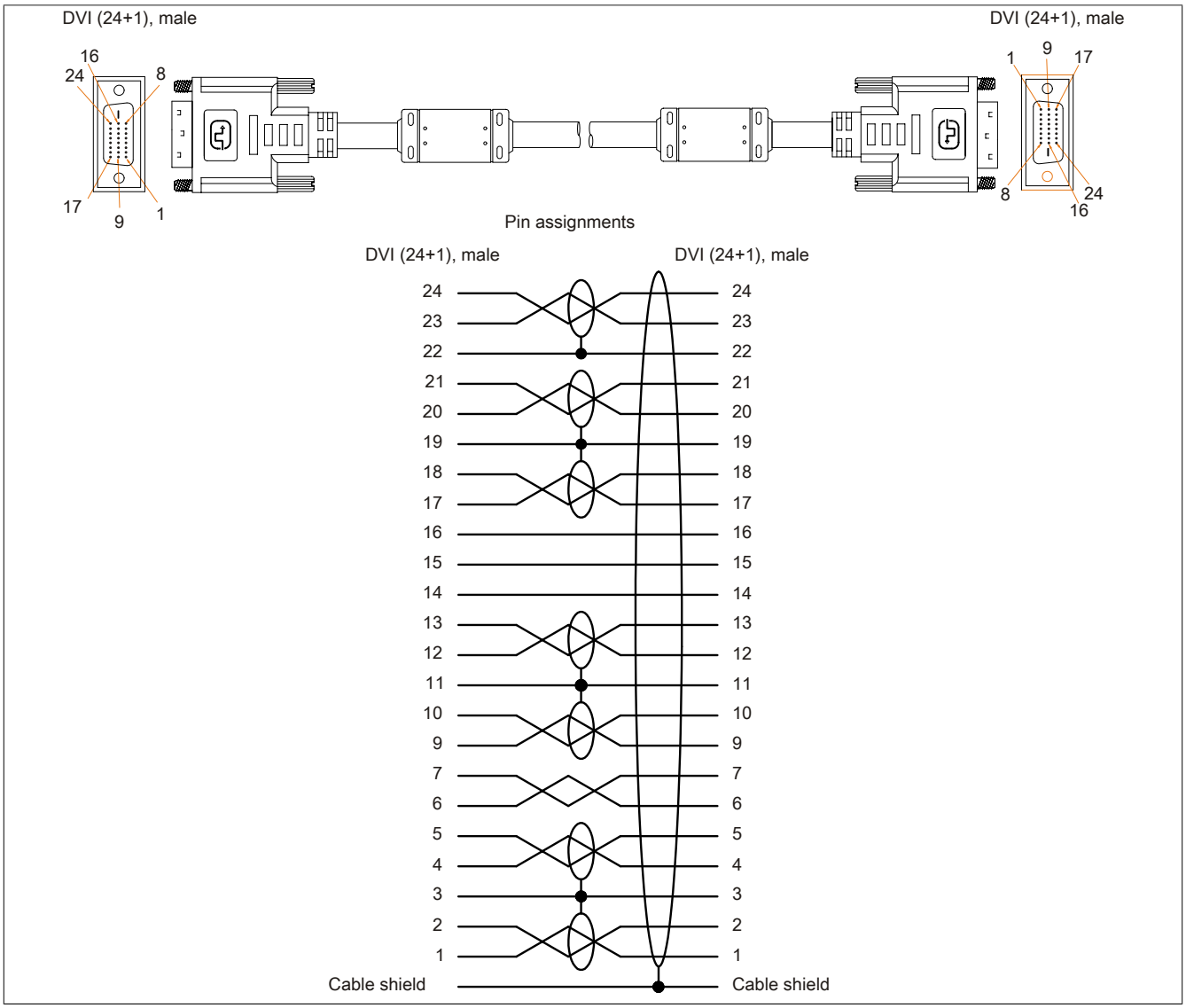


Image 168: 5CASDL.0xxx-00- Pin assignments

11.3 SDL cable with 45° plug

11.3.1 5CASDL.0xxx-01

General information

The 5CASDL.xxxx-01 SDL cables with 45° plug are designed for fixed layout.

> **Caution!**
>
> **Cable can only be plugged in and unplugged when the device is turned off.**

Order data

Model number	Short description	Figure
	SDL cables: 45° connectors	
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 289: 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 types				
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 properties				
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 290: 5CASDL.0018-01, 5CASDL.0050-01, 5CASDL.0100-01, 5CASDL.0150-01 - Technical data

Flex radius specification

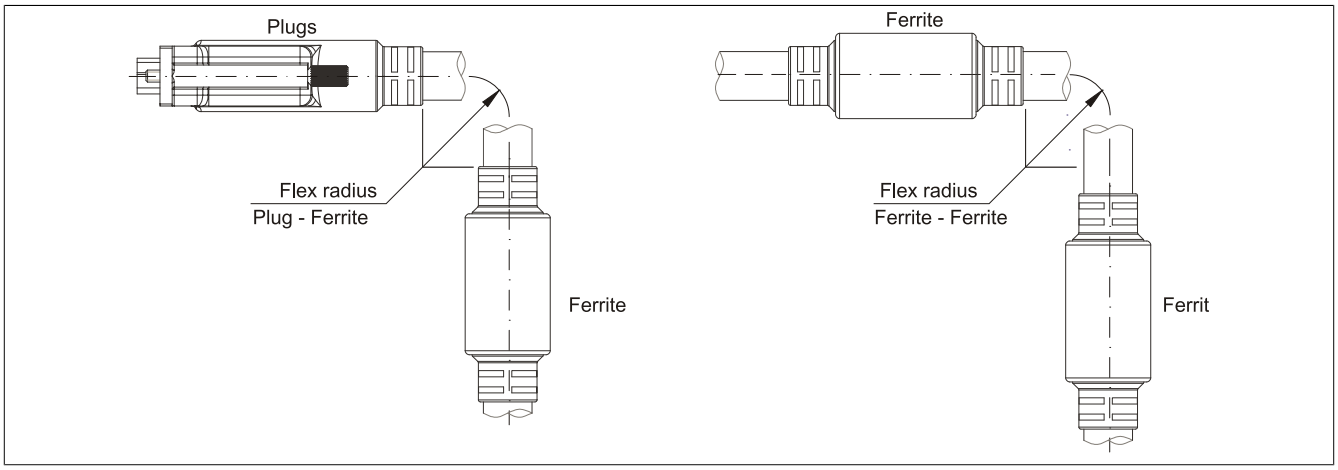


Image 169: Flex radius specification

Dimensions

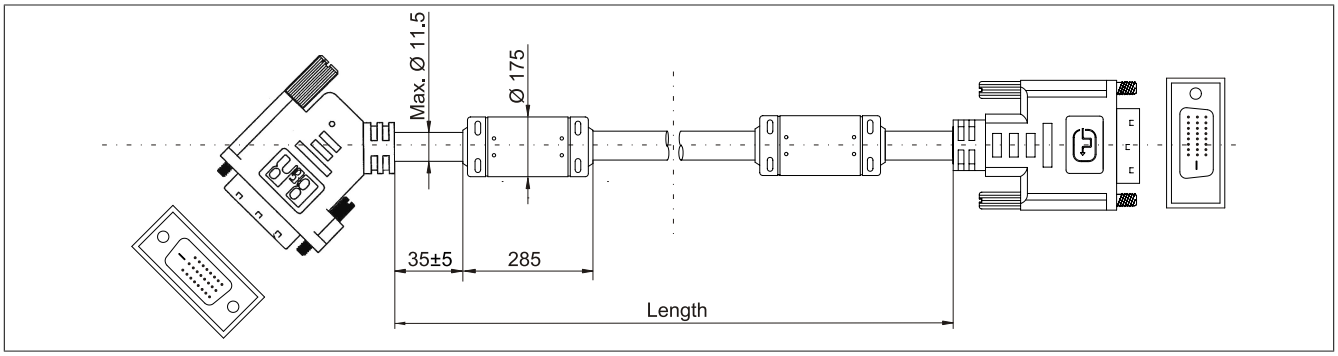


Image 170: 5CASDL.0xxx-01 - Dimensions

Cable specifications

Warning!

If you want to build a suitable cable yourself, it should be wired according to these specifications.

If a self-built cable is used, B&R cannot guarantee that it will function properly. B&R guarantees the performance of all cables that they provide.

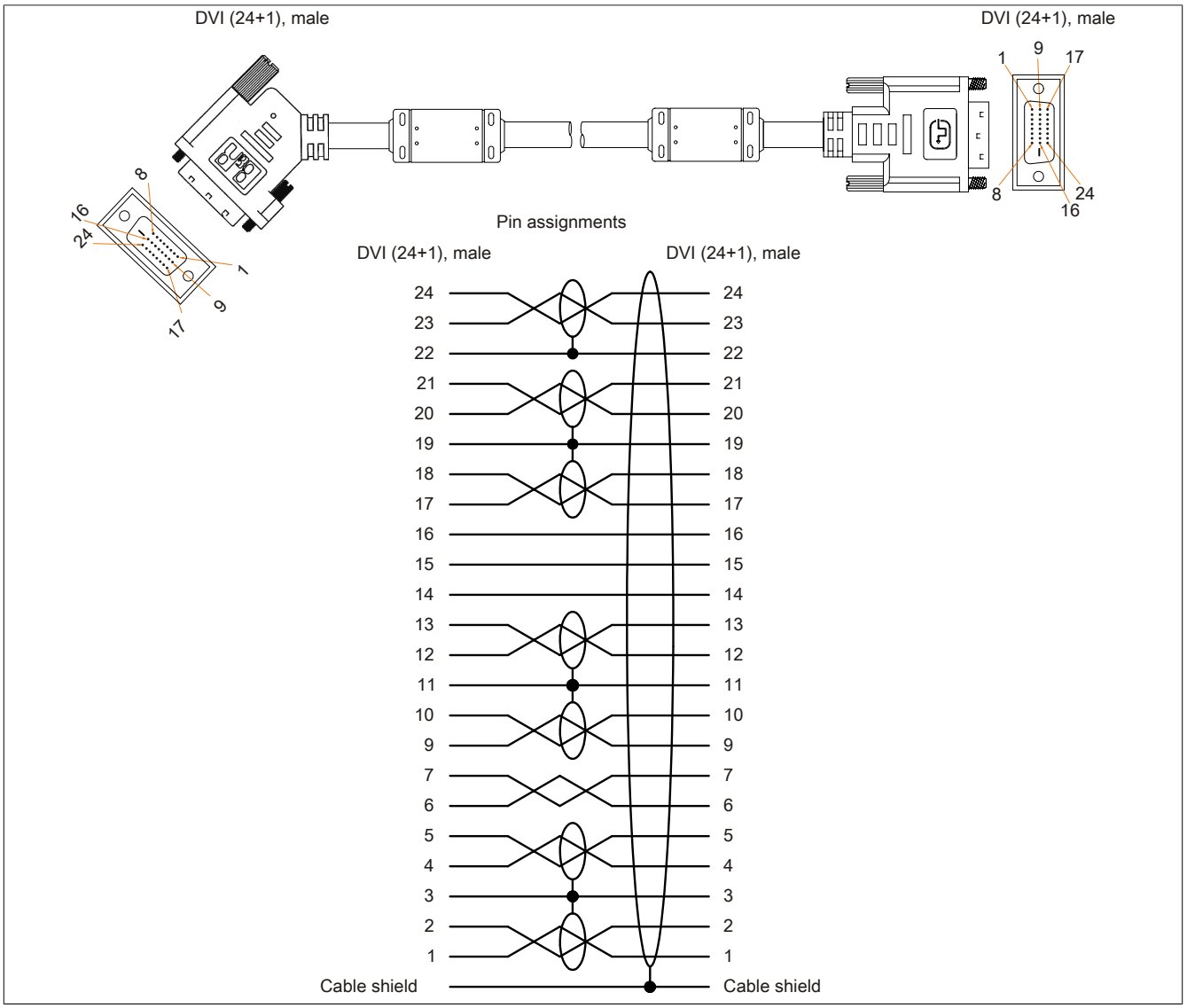


Image 171: 5CASDL.0xxx-01 - Pin assignments

11.4 SDL flex cable

11.4.1 5CASDL.0xxx-03

General information

The 5CASDL.0xxx-03 SDL flex cables are designed for use in both fixed and flexible installations (e.g. in swing arm systems).

> **Caution!**
>
> **Cable can only be plugged in and unplugged when the device is turned off.**

Order data

Model number	Short description	Figure
	SDL flex cables	
5CASDL.0018-03	SDL flex cable, 1.8 m.	
5CASDL.0050-03	SDL flex cable, 5 m.	
5CASDL.0100-03	SDL flex cable, 10 m.	
5CASDL.0150-03	SDL flex cable, 15 m.	
5CASDL.0200-03	SDL flex cable, 20 m.	
5CASDL.0250-03	SDL flex cable, 25 m.	
5CASDL.0300-03	SDL flex cable, 30 m.	

Table 291: 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 types							
CE	Yes						
c-UL-us	Yes						
Cable structure							
Wire cross section	26 AWG (control wires) 26 AWG (DVI, USB, data)						
Characteristics	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 properties							
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 30V						
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 292: 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						
Speed	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 292: 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

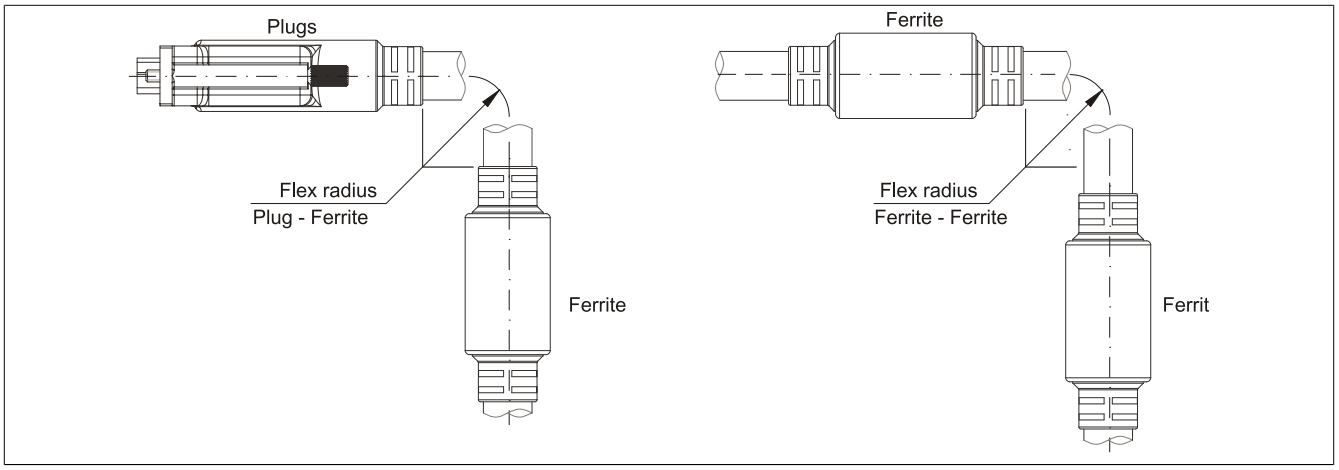


Image 172: Flex radius specification

Dimensions

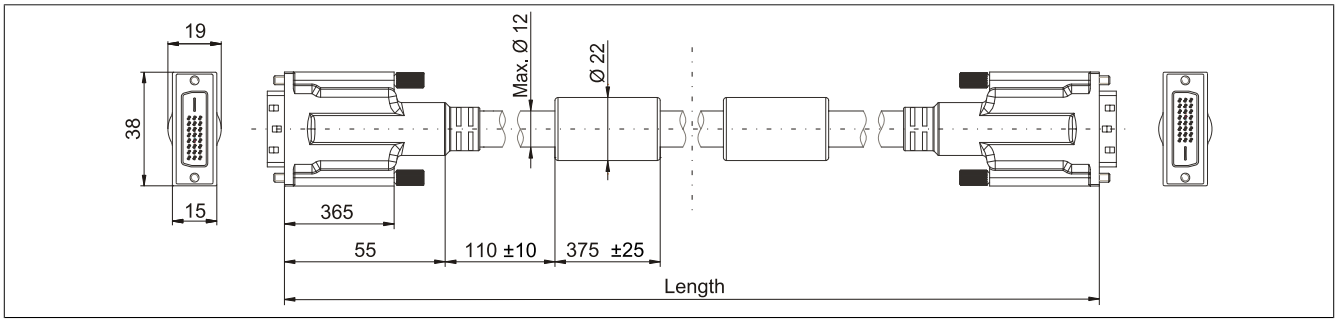


Image 173: 5CASDL.0xxx-03 - Dimensions

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

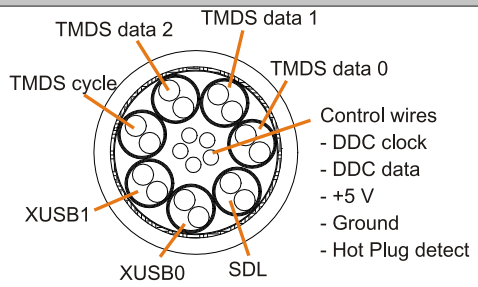


Table 293: Structure - SDL flex cable 5CASDL.0xxx-03

Cable specifications

Warning!

If you want to build a suitable cable yourself, it should be wired according to these specifications.

If a self-built cable is used, B&R cannot guarantee that it will function properly. B&R guarantees the performance of all cables that they provide.

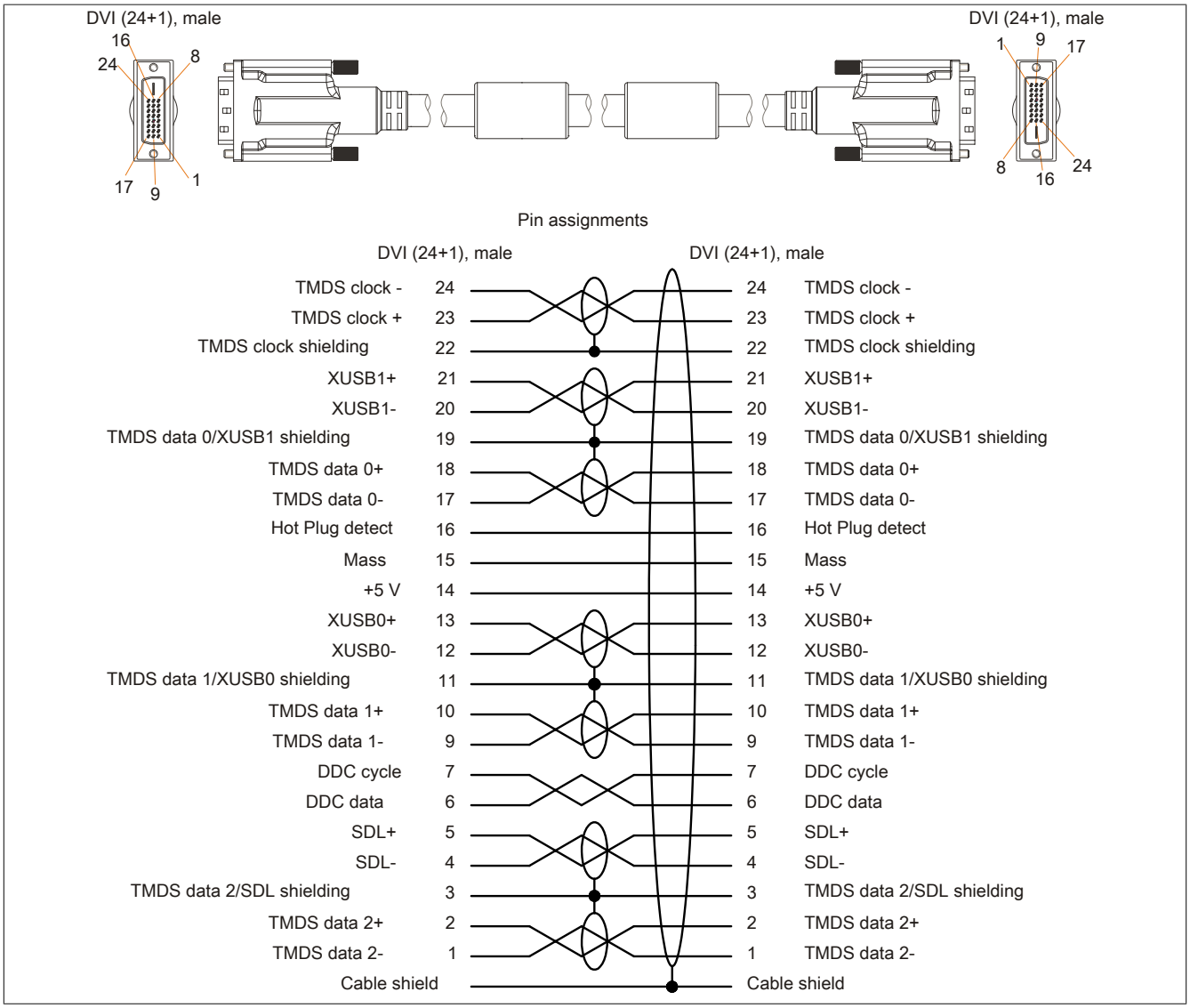


Image 174: 5CASDL.0xxx-03- Pin assignments

11.5 SDL flex cable with extender

11.5.1 5CASDL.0xx0-13

General information

The 5CASDL.xxxx-13 SDL flex cables with extender are designed for use in both fixed and flexible installations (e.g. in swing arm systems).

> **Caution!**
>
> **Cable can only be plugged in and unplugged when the device is turned off.**

Order data

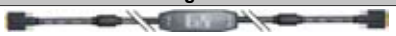
Model number	Short description	Figure
	SDL flex cables	
5CASDL.0300-13	SDL cable with extender, 30 m.	
5CASDL.0400-13	SDL flex cable with extender, 40 m.	
5CASDL.0430-13	SDL flex cable with extender, 43 m.	

Table 294: 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 types			
CE		Yes	
c-UL-us		Yes	
Cable structure			
Wire cross section		26 AWG (control wires) 26 AWG (DVI, USB, data)	
Characteristics		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 properties			
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 30V	
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	
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	

Table 295: 5CASDL.0300-13, 5CASDL.0400-13, 5CASDL.0430-13 - Technical data

Product ID	5CASDL.0300-13	5CASDL.0400-13	5CASDL.0430-13
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		
Speed	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 295: 5CASDL.0300-13, 5CASDL.0400-13, 5CASDL.0430-13 - Technical data

Flex radius specification

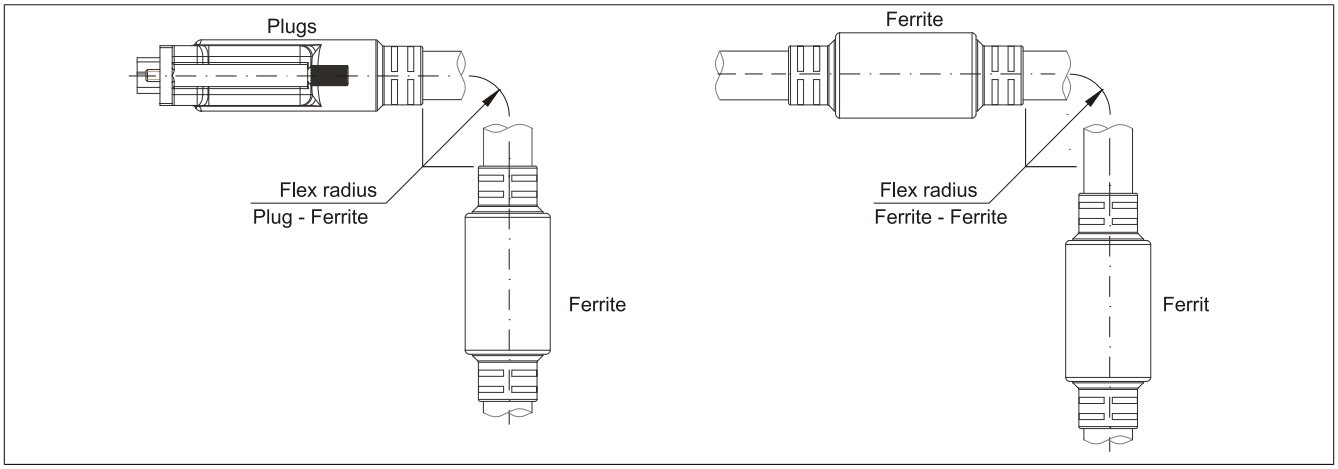


Image 175: Flex radius specification

Dimensions

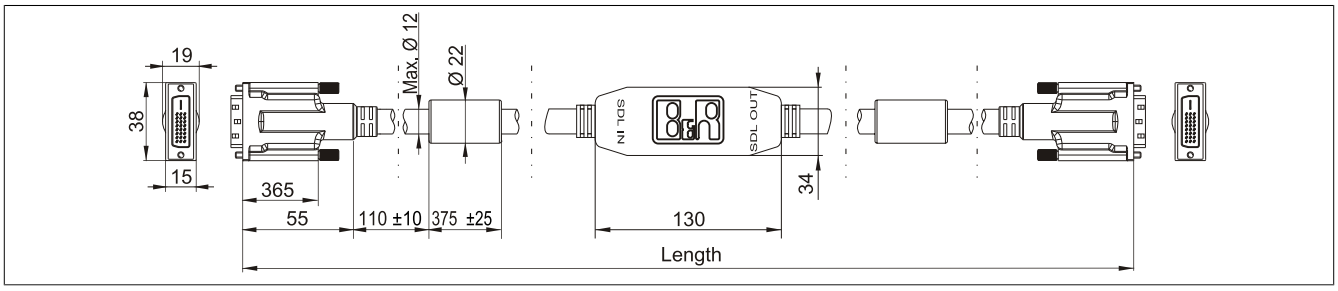


Image 176: 5CASDL.0xx0-13- Dimensions

Cable specifications

Warning!

If you want to build a suitable cable yourself, it should be wired according to these specifications.

If a self-built cable is used, B&R cannot guarantee that it will function properly. B&R guarantees the performance of all cables that they provide.

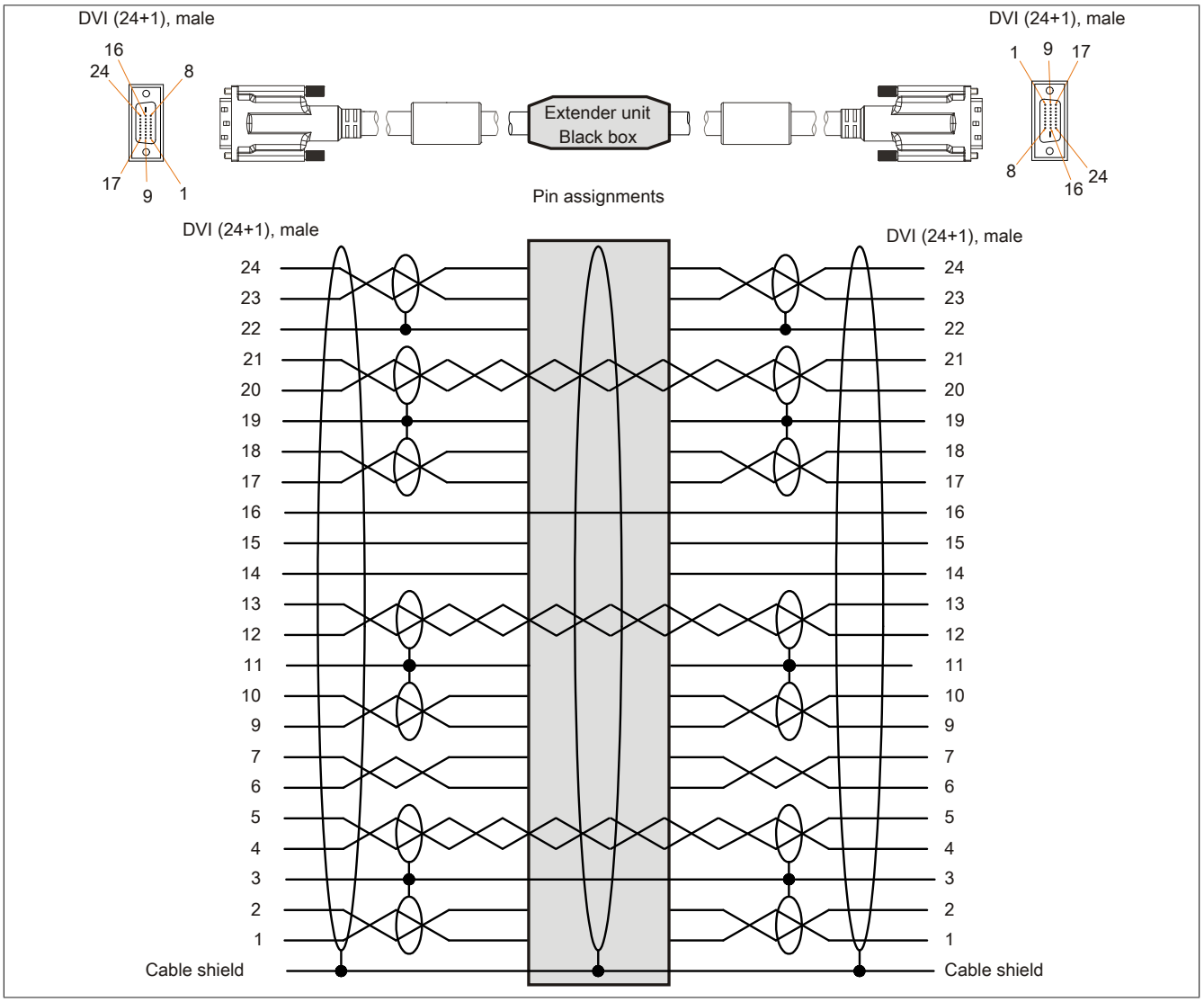


Image 177: 5CASDL.0xx0-13 - Pin assignments

Cable connection

The SDL flex cable with extender must be connected between the Industrial PC and Automation Panel 900 display unit in the correct direction. The signal direction is indicated on the extender unit for this purpose:

• Connect the end labeled "SDL IN" with the video output of e.g. the APC820 (monitor/panel output) or Panel OUT of an AP900 AP Link card.

• The "SDL OUT" end should be connected to the display unit (e.g. Automation Panel 900) via the Automation Panel Link insert card (Panel IN).

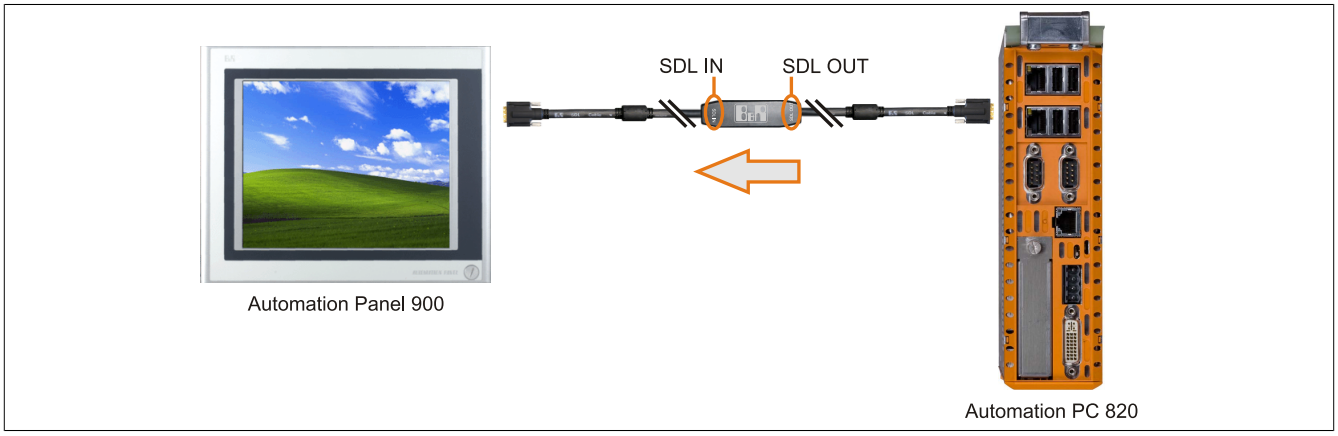


Image 178: Example of signal direction for the SDL flex cable with extender - APC820

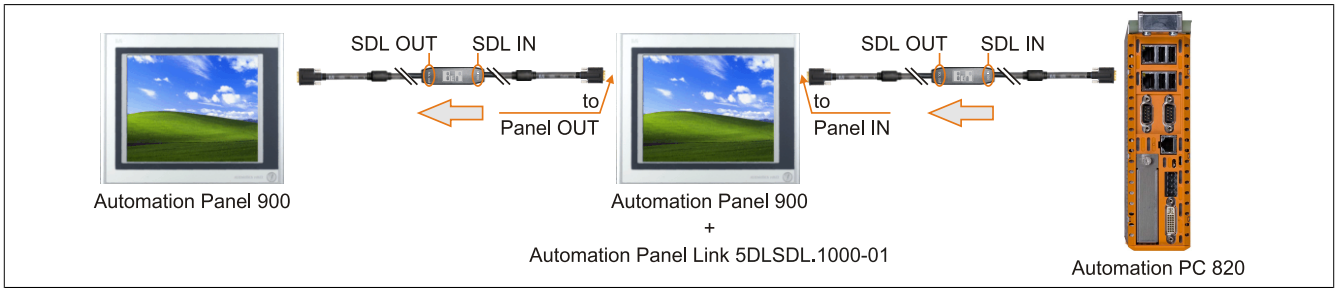


Image 179: Example of signal direction display - SDL flex cable with extender

11.6 USB cable

11.6.1 5CAUSB.00xx-00

General information

USB cables are designed for USB 2.0 transfer speed.

Order data

Model number	Short description	Figure
	USB cables	
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 296: 5CAUSB.0018-00, 5CAUSB.0050-00 - Order data

Technical data

Product ID	5CAUSB.0018-00	5CAUSB.0050-00
General information		
Certification types		
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 297: 5CAUSB.0018-00, 5CAUSB.0050-00 - Technical data

Cable specifications

Warning!

If you want to build a suitable cable yourself, it should be wired according to these specifications.

If a self-built cable is used, B&R cannot guarantee that it will function properly. B&R guarantees the performance of all cables that they provide.

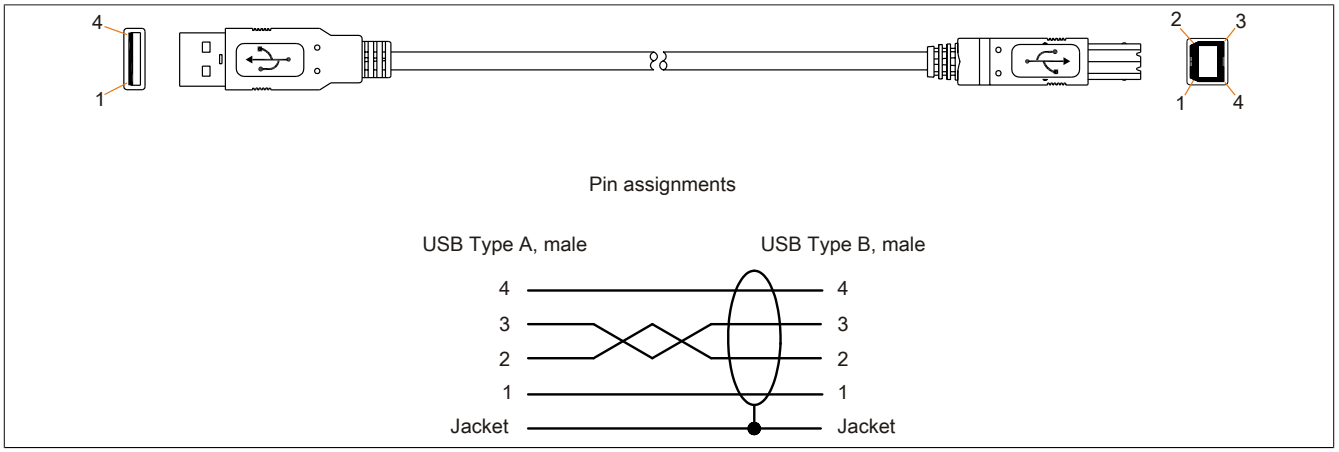


Image 180: 5CAUSB.00xx-00 - USB cable pin assignments

11.7 RS232 cable

11.7.1 9A0014.xx

Order data

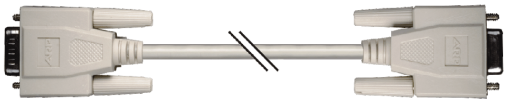
Model number	Short description	Figure
	RS232 cables	
9A0014.02	RS232 extension cable for remote operating of a display unit with touch screen, 1.8 m.	
9A0014.05	RS232 extension cable for remote operating of a display unit with touch screen, 5 m.	
9A0014.10	RS232 extension cable for remote operating of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

Table 298: 9A0014.02, 9A0014.05, 9A0014.10 - Order data

Technical data

Product ID	9A0014.02	9A0014.05	9A0014.10
General information			
Certification types			
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 299: 9A0014.02, 9A0014.05, 9A0014.10 - Technical data

Cable specifications

Warning!

If you want to build a suitable cable yourself, it should be wired according to these specifications.

If a self-built cable is used, B&R cannot guarantee that it will function properly. B&R guarantees the performance of all cables that they provide.

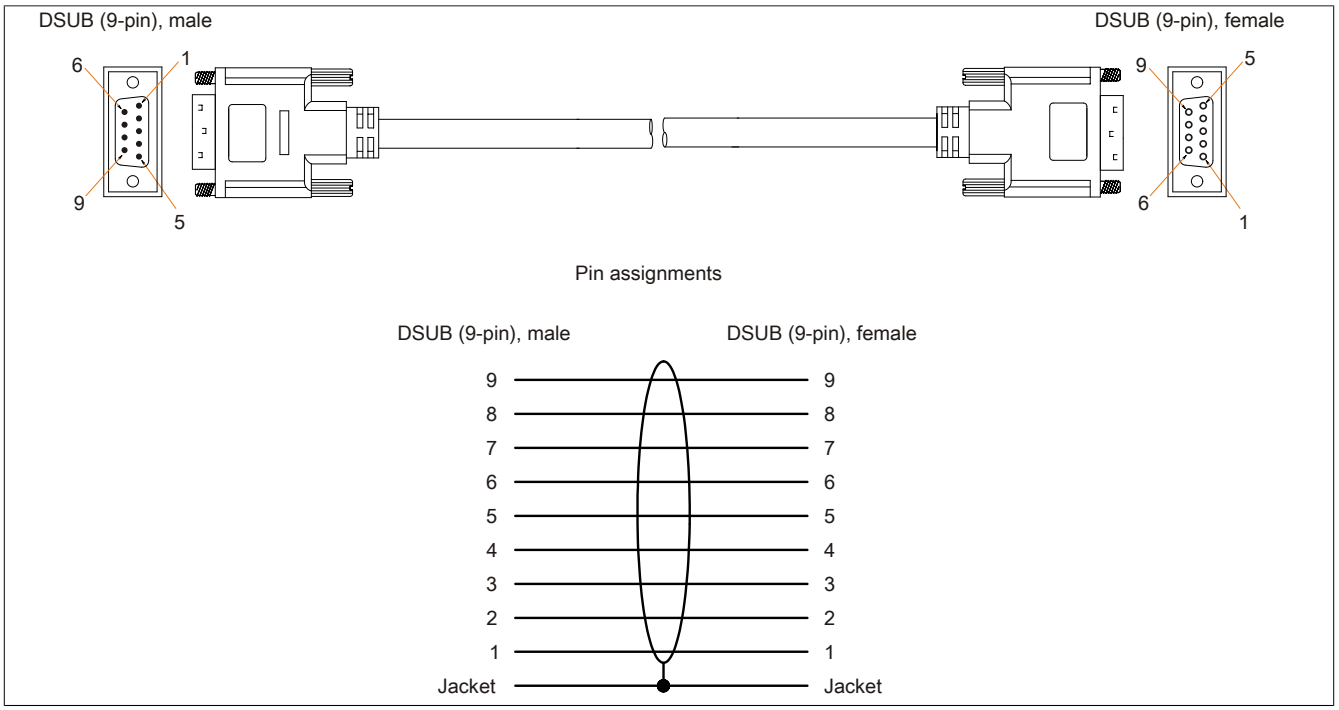


Image 181: 9A0014.xx - RS232 cable pin assignments

11.8 Internal supply cable 5CAMSC.0001-00

11.8.1 General information

This supply cable is used internally e.g. to supply special PCI cards. It is connected to the main board.

For requirements and procedures, see "Connection of an external device to the main board" on page 378.

> **Caution!**
>
> **Cable can only be plugged in and unplugged when the device is turned off.**

11.8.2 Order data

Model number	Short description	Figure
		Image not found for 5CAMSC.0001-00!
5CAMSC.0001-00	APC620 internal power supply cable - Customized -	

Table 300: 5CAMSC.0001-00 - Order data

11.8.3 Technical data

Product ID	5CAMSC.0001-00
General information	
Certification types 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 301: 5CAMSC.0001-00 - Technical data

12 HDD replacement disk tray

12.1 5AC801.FRAM-00

12.1.1 General information

To ensure that a hard disk can be replaced as quickly as possible, we offer the possibility to mount a compartment to the APC810 in which a replacement HDD can be stored.

For more information about installing the HDD replacement disk tray, see chapter Maintenance / Servicing.

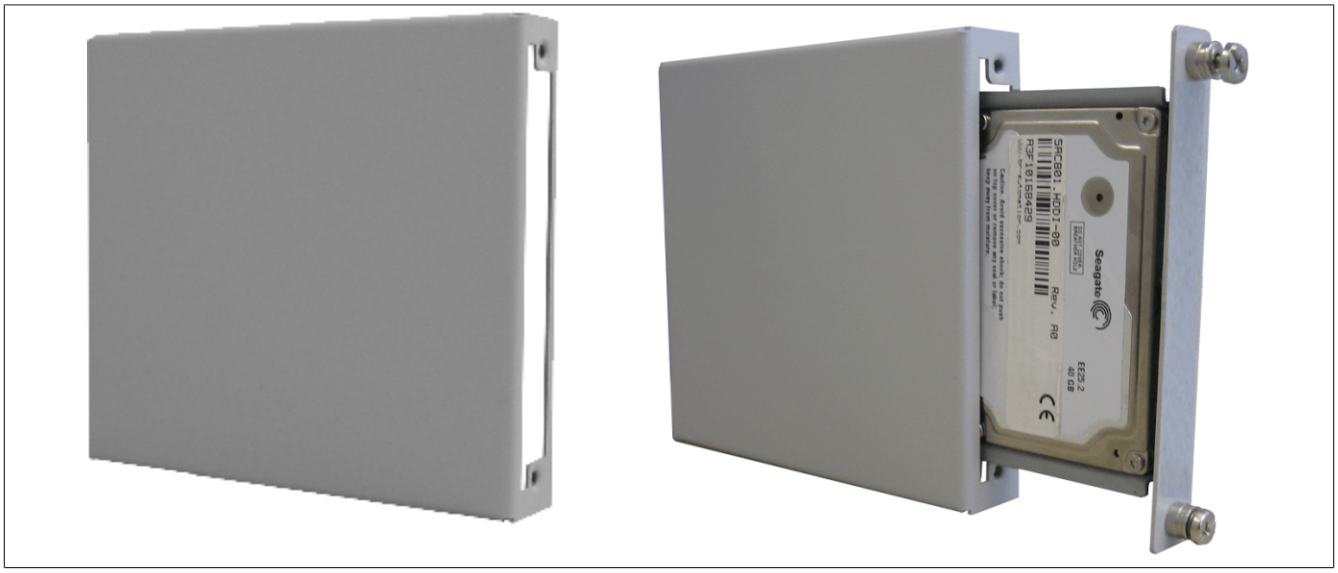


Image 182: HDD replacement disk tray - 5AC801.FRAM-00

12.1.2 Order data

Model number	Short description	Figure
	Accessories	
5AC801.FRAM-00	APC810 SATA hard disk replacement tray	

Table 302: 5AC801.FRAM-00 - Order data

12.1.3 Technical data

Product ID	5AC801.FRAM-00
Mechanical characteristics	
Dimensions	
Width	106 mm
Height	101 mm
Depth	18 mm

Table 303: 5AC801.FRAM-00 - Technical data

12.1.4 Dimensions

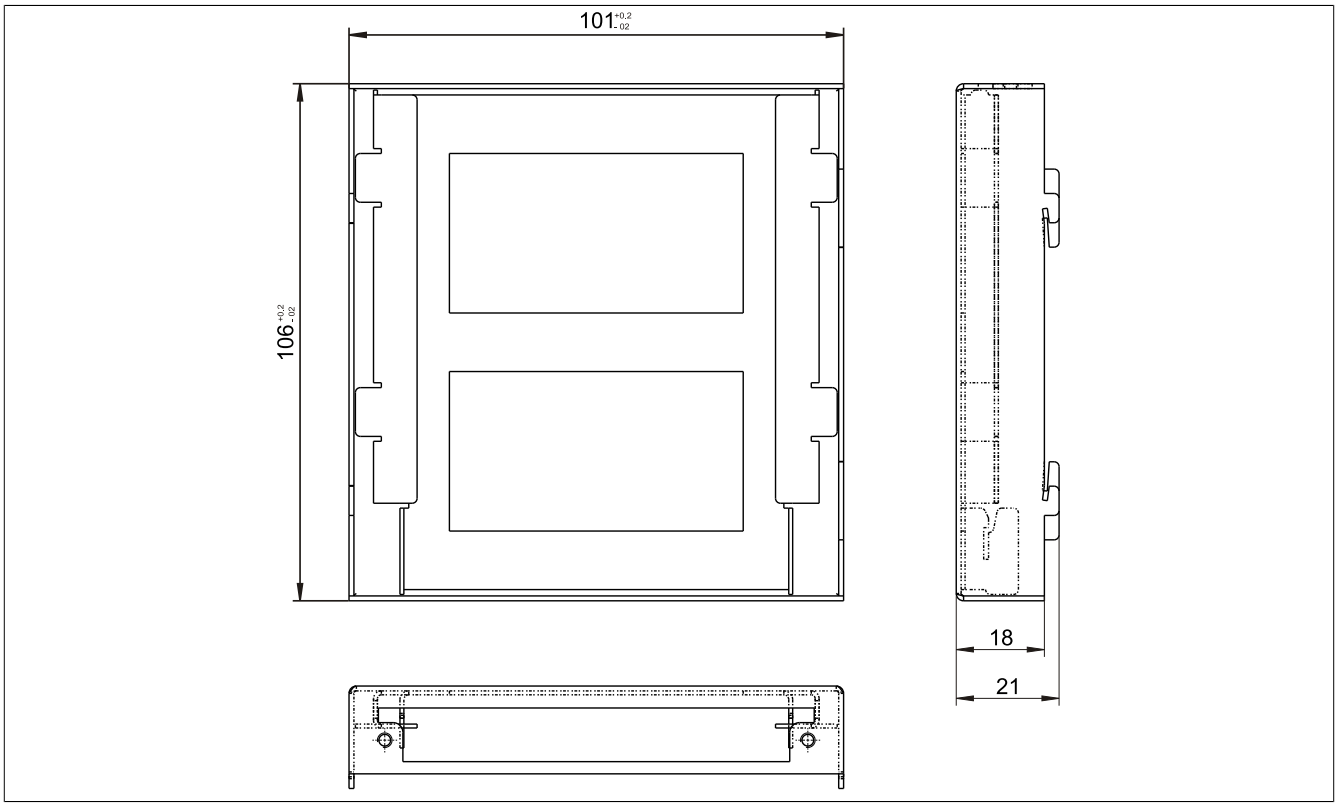


Image 183: 5AC801.FRAM-00 - Dimensions

13 Ready relay

13.1 5AC801.RDYR-01

13.2 General information

The ready relay 5AC801.RDYR-01 can be connected to the APC810 add-on UPS slot (this slot must be available).

For more information about installing the ready relay, see chapter Chapter 7 "Maintenance / Servicing", section 12 " Installing the ready relay /2 in the add-on UPS slot" on page 374.

The information sheet included in delivery explains how to attach the label strips to the Automation PC 810.

13.3 Order data

Model number	Short description	Figure
	Accessories	
5AC801.RDYR-01	APC810 Ready Relay /2	

Table 304: 5AC801.RDYR-01 - Order data

13.4 Pin assignments

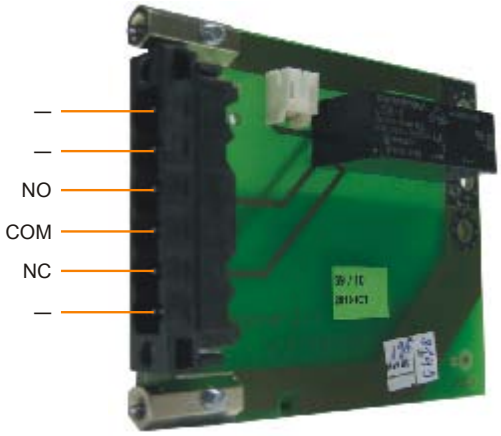
Pin	Assignment	Description	Image
1	-	Not connected	
2	-	Not connected	
3	NO	Normally open	
4	COM	Change-over contact	
5	NC	Normally closed	
6	-	Not connected	

Table 305: 5AC801.RDYR-01 - Pin assignments

13.5 Contents of delivery

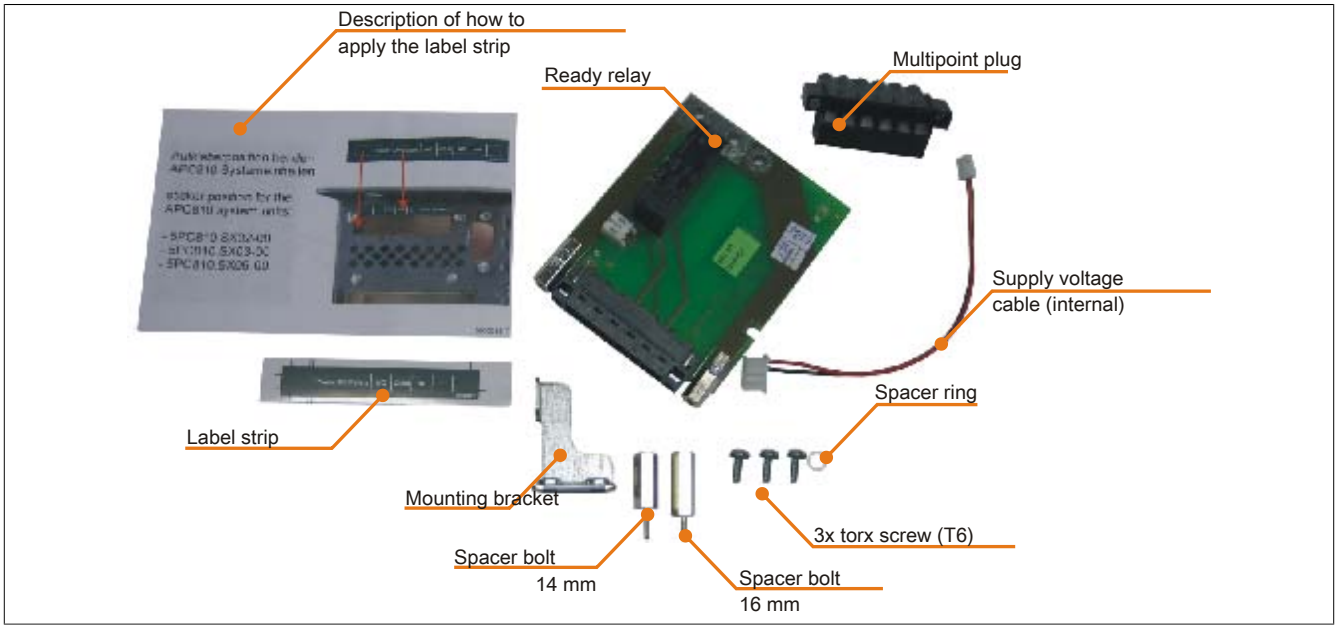


Image 184: 5AC801.RDYR-01 - Contents of delivery

Chapter 7 • Maintenance / Servicing

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

1 Changing the battery

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

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!

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

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

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

1.1 Battery status evaluation

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

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

Table 306: Meaning of battery status

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

1.2 Procedure

- Disconnect the B&R industrial PC.
- Touch the housing or ground connection (not the power supply!) 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.

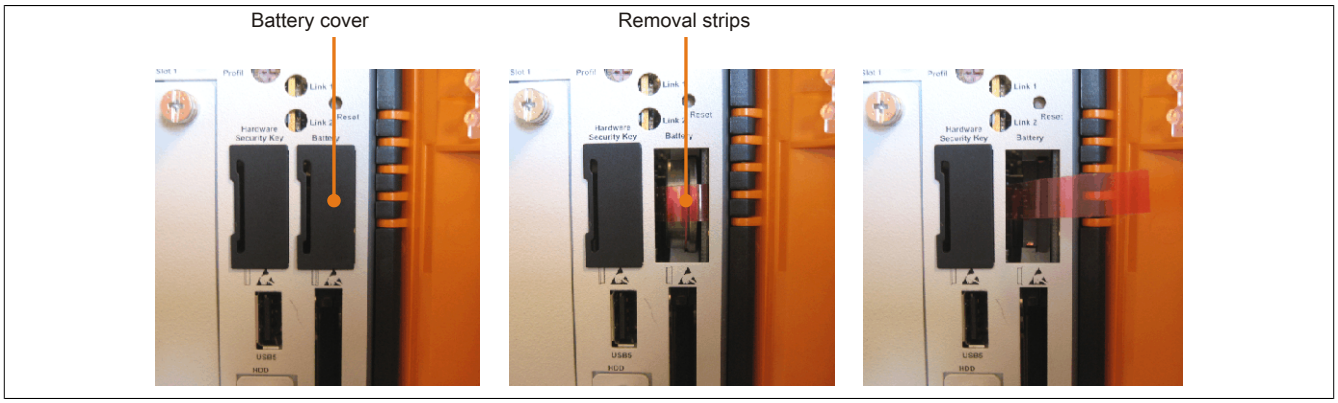


Image 185: Remove battery

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

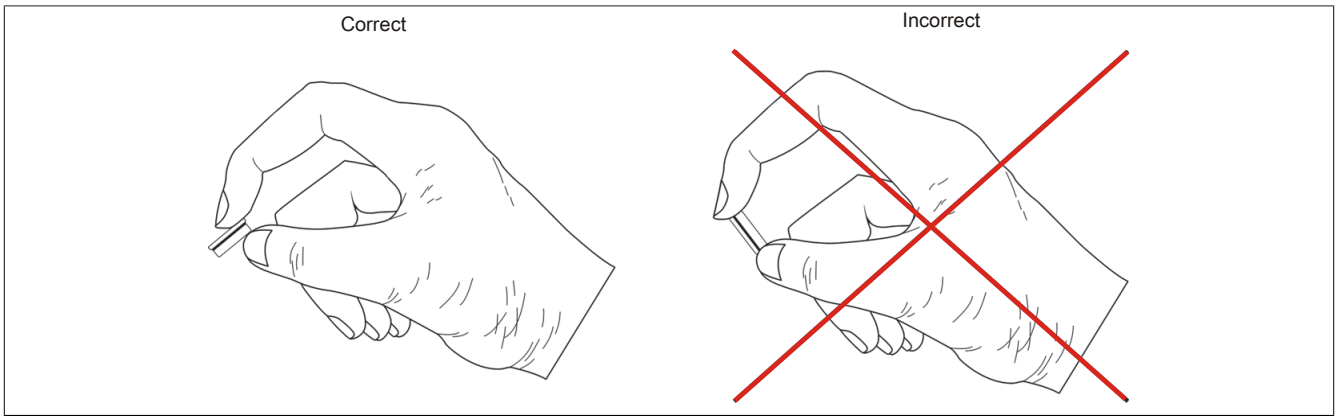


Image 186: Battery handling

- Insert the new battery with correct polarity.

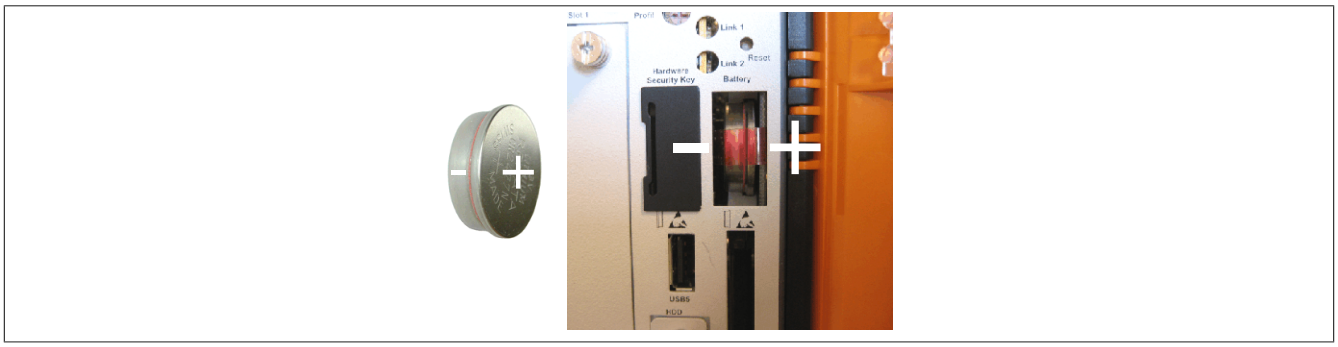


Image 187: Battery polarity

- To make the next battery change easier, be sure the removal strip is in place when inserting battery.
- Reconnect power supply to the B&R industrial PC (plug in power cable and press power button).
- Date and time might need to be reset in BIOS.

Warning!

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

2 Exchanging the CompactFlash

The CompactFlash card can be exchanged quickly and easily by pressing the ejector (see image) with a pointed object such as a pen.

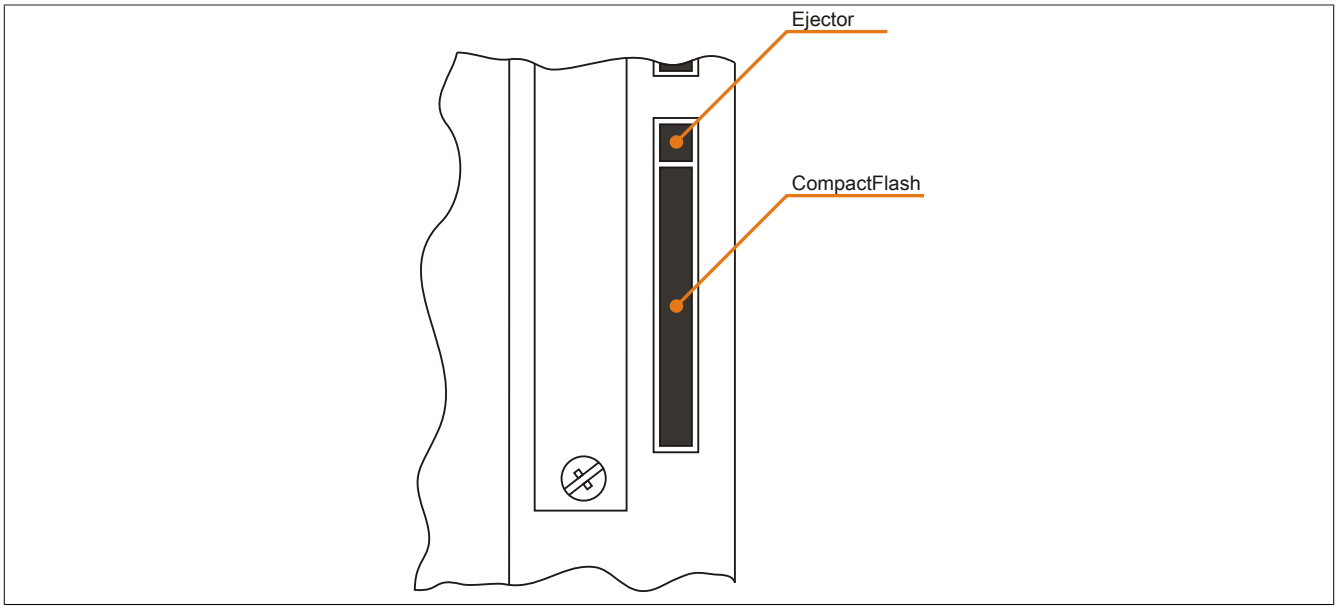


Image 188: CompactFlash + ejector (sample photo)

Caution!

Turn off the power before exchanging the CompactFlash card!

3 Installing / exchanging a slide-in compact drive

Information:

The SATA I interface allows data carriers to be exchanged during operation (hot-plug). To utilize this capability, it must be supported by the operating system.

3.1 Procedure

1. Loosen and remove the two ¼ turn screws on the protective cover / slide-in compact drive.

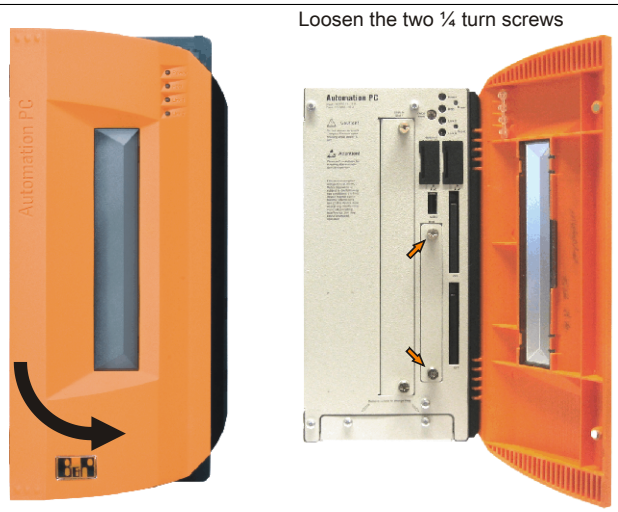


Image 189: Loosening the ¼ turn screws

2. Insert the compact SATA drive and tighten the ¼ turn screws.

Image 190: Inserting the compact SATA drive

4 Installing / exchanging a slide-in slot drive

Slide-in drives can be installed and exchanged in system units with 2, 3 or 5 card slots.

4.1 Procedure

1. Disconnect the power supply to the B&R Industrial PC.
2. Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
3. Remove the dummy slide-in module or slide-in drive by unscrewing the two ¼ turn screws.

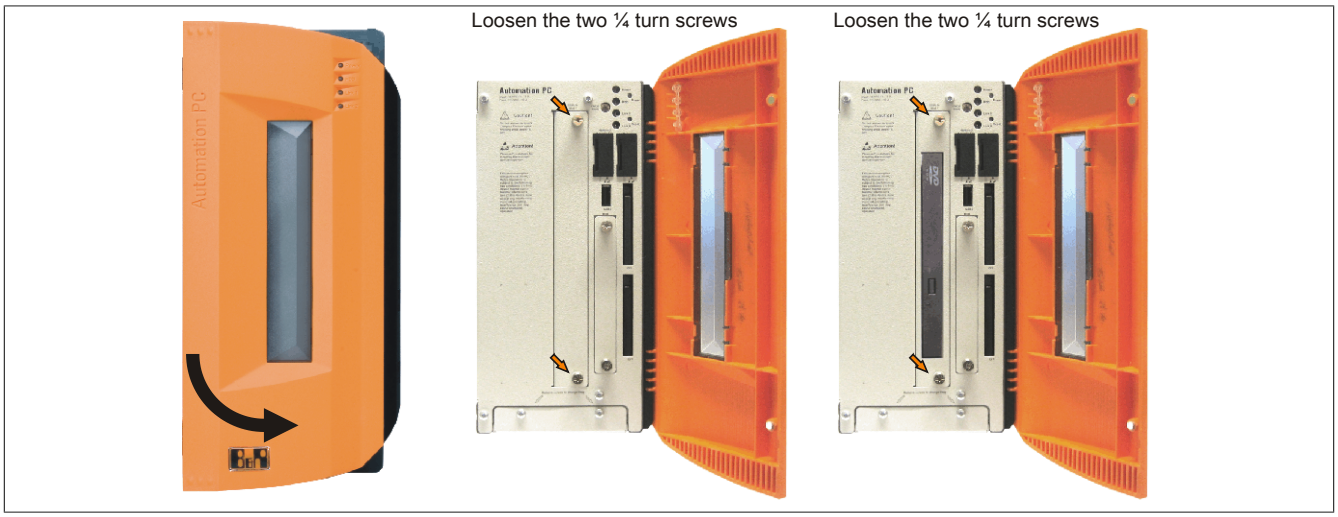


Image 191: Loosening the ¼ turn screws

4. Insert the slide-in drive and tighten with the two ¼ turn screws.

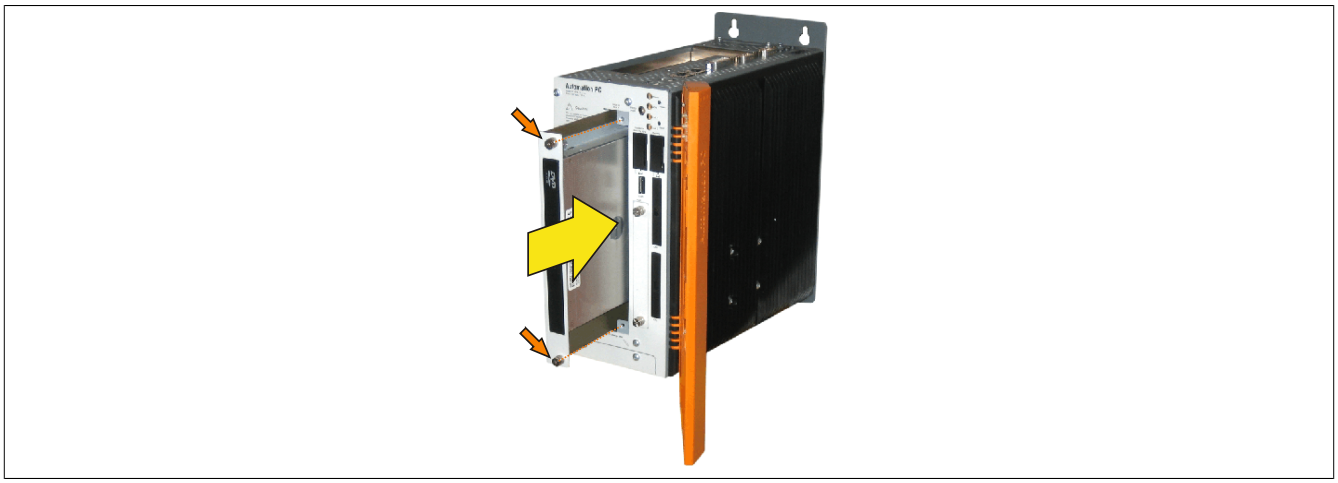


Image 192: Installing the slide-in drive

5 Installing the slide-in compact adapter

Slide-in compact adapters can be installed and exchanged in system units with 2, 3 or 5 card slots. A slide-in compact drive (e.g. slide-in compact HDD) can be installed in a slide-in slot using the slide-in compact adapter.

5.1 Procedure

1. Disconnect the power supply to the B&R Industrial PC.
2. Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
3. Remove the dummy slide-in module or slide-in drive by unscrewing the two ¼ turn screws.

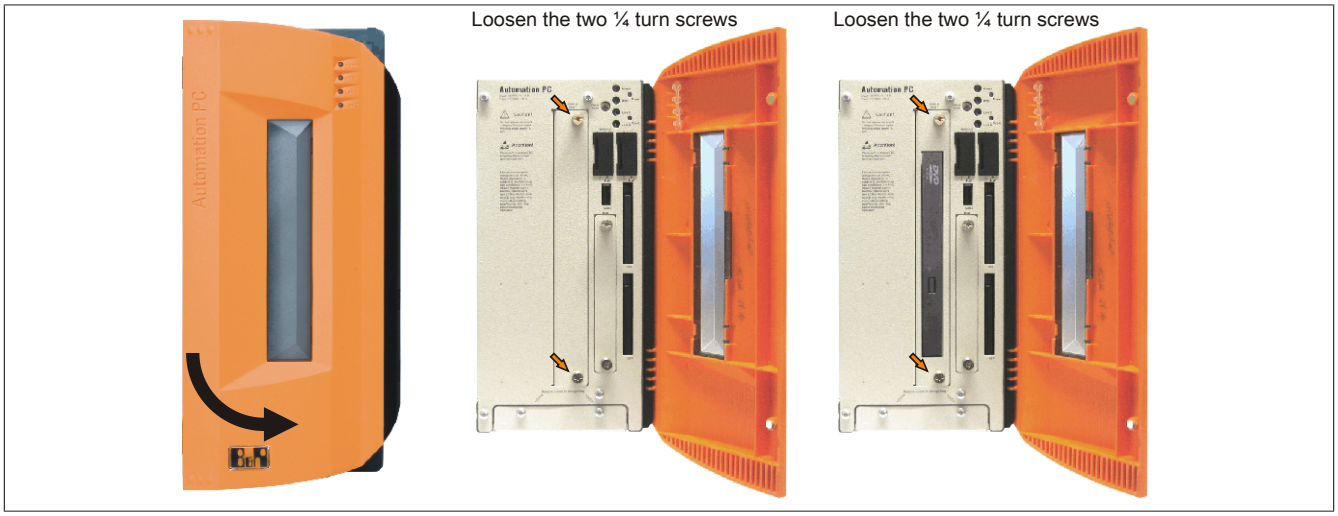


Image 193: Loosening the ¼ turn screws

4. Insert the slide-in compact adapter and tighten the two ¼ turn screws.

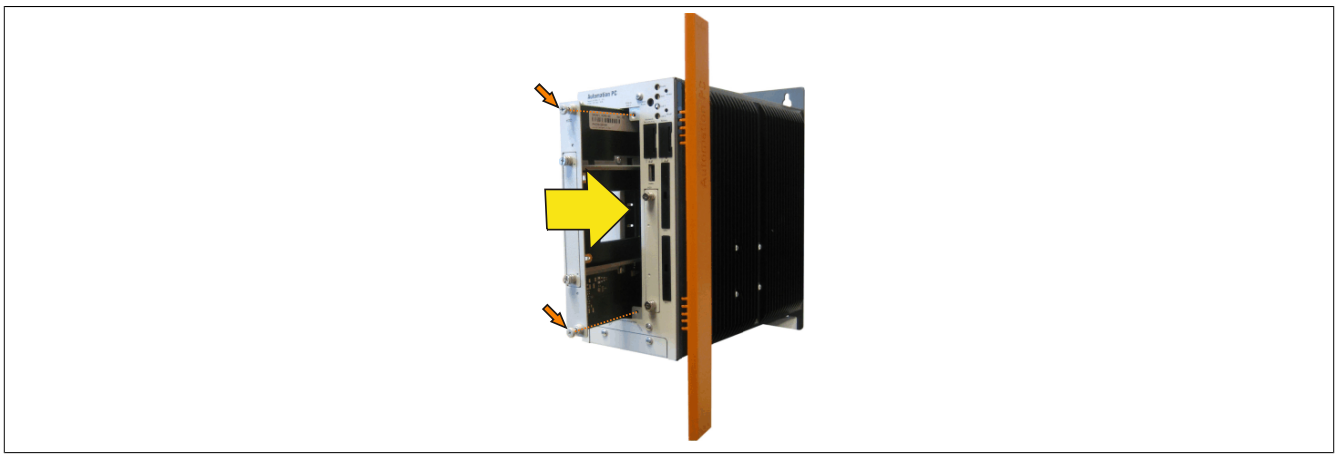


Image 194: Installing the slide-in compact adapter

5. Once the adapter has been installed, the slide-in compact drive can be inserted.

Image 195: Inserting the slide-in compact drive

6 Installing / exchanging the fan kit

6.1 Procedure

1. Remove fan kit cover. Loosen Torx (T10) screws and slide cover forward.

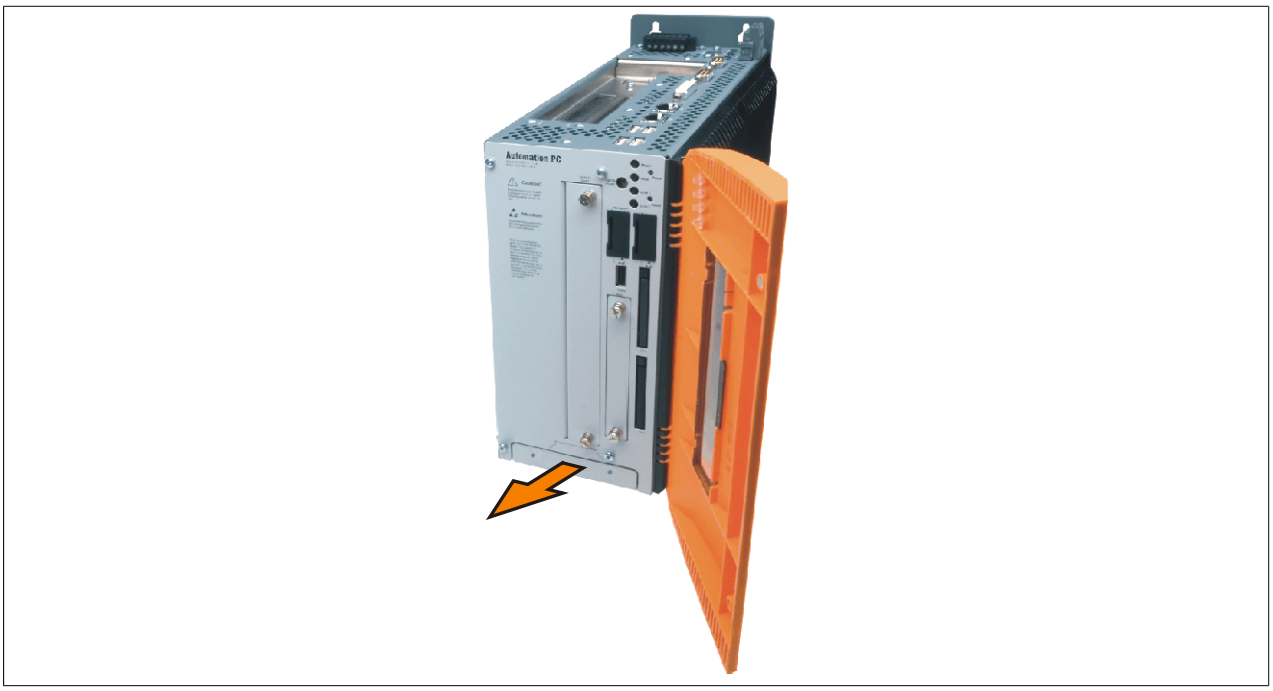


Image 196: Remove fan kit insert

2. Insert the frame - Mount the contact board side to the sliding contacts on the system unit and fasten using the ¼ turn screws.

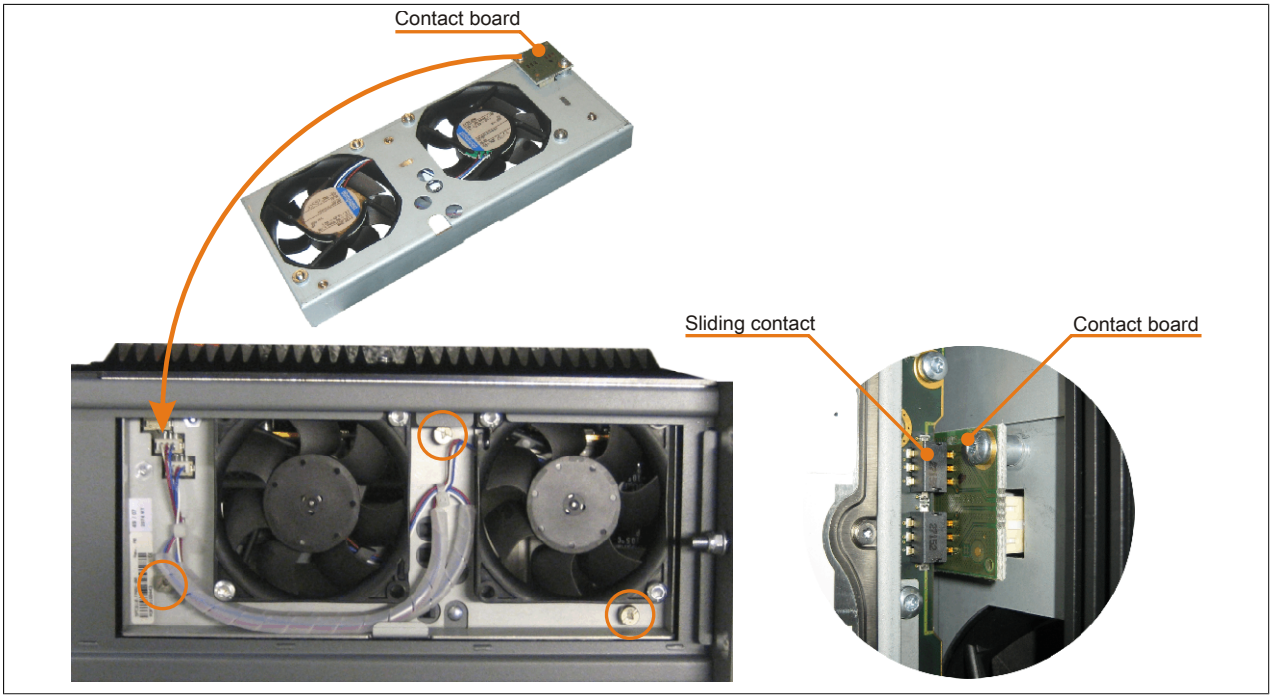


Image 197: Inserting and fastening the fan kit

3. Place the dust filter in the fan kit cover and secure with the filter clasp.

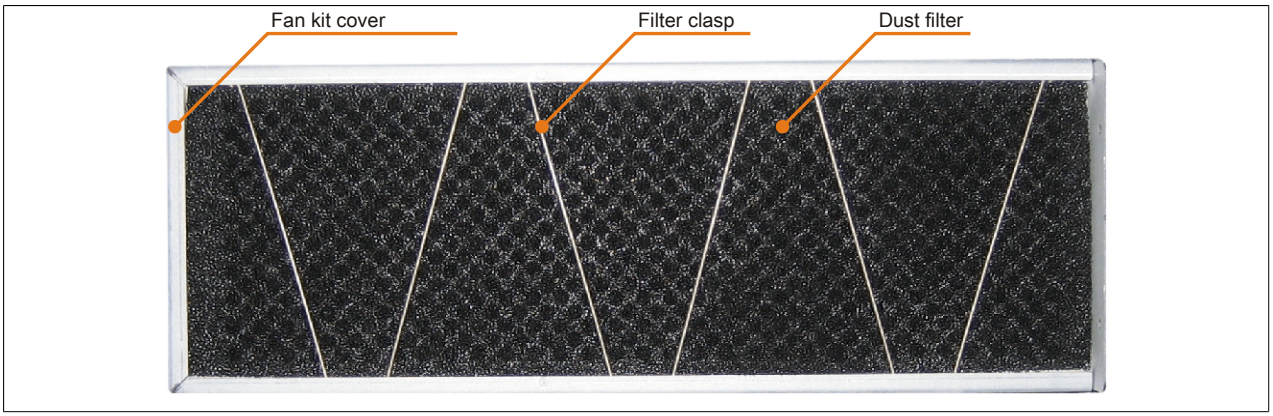


Image 198: Securing the dust filter with the filter clasp

4. Place the fan kit cover in the housing and fasten using the Torx screws removed earlier.

Information:

Regular control of the dust filter depending on area of use and degree of dirtiness.

Installation is the same as for all APC810 devices.

7 Installing the UPS module

The module is installed using the materials included in the delivery.

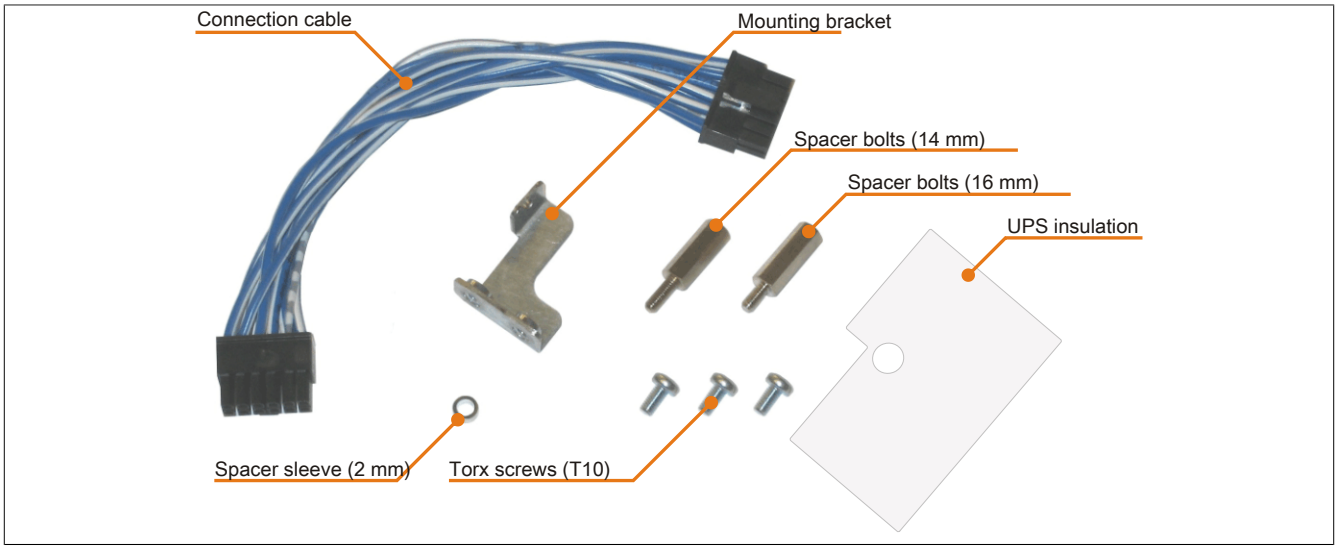


Image 199: 5AC600.UPSI-00 Add-on UPS module - Installation materials

Installation may vary depending the system unit type (1, 2 or 5 card slots) or whether an add-on interface module (IF option) is installed in the APC810.

7.1 Installation without installed add-on interface module

Different parts are used depending on the system unit and whether the add-on interface module is installed or not installed.

7.1.1 APC810 1 card slot

1. Remove the side cover (see "Mounting the side cover" on page 368).
2. Remove UPS module cover by removing the 2 marked Torx screws (T10).

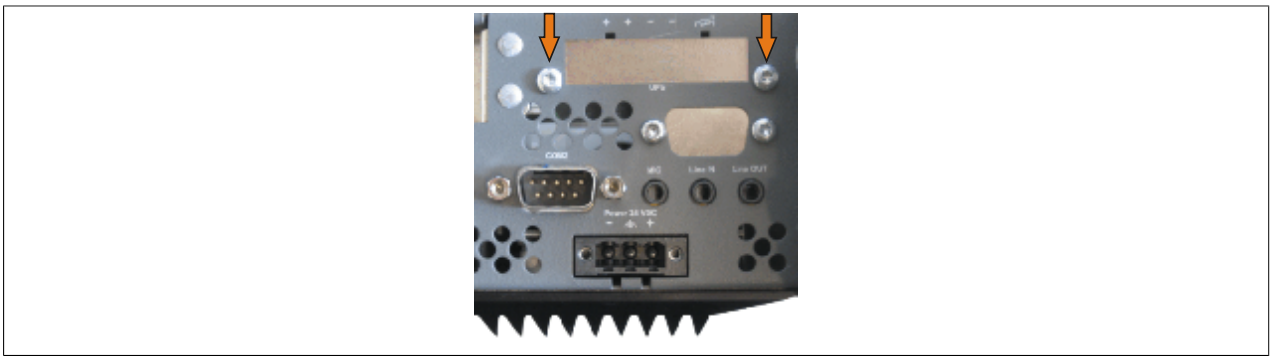


Image 200: Remove UPS module cover

3. Screw in spacing bolt and spacing ring on the main board (using M5 hex socket screwdriver).

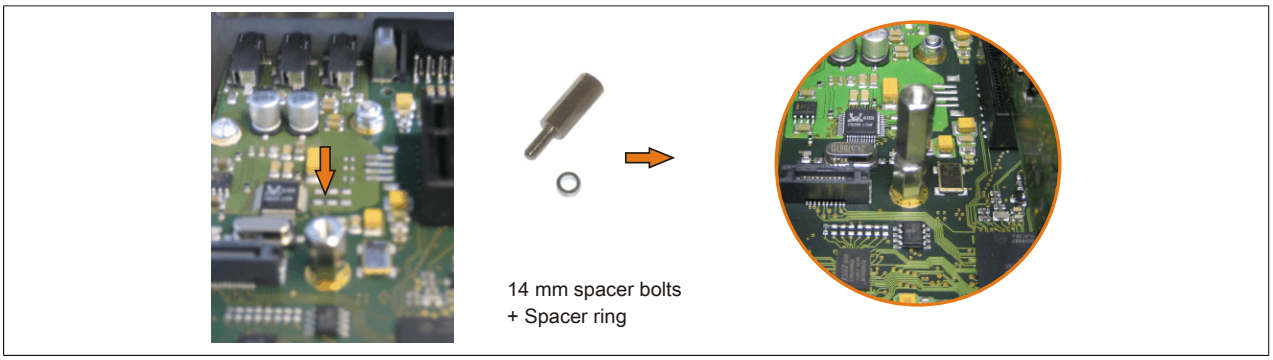


Image 201: Screw in spacing bolt and spacing ring

4. Install UPS module with 2 Torx screws (T10) on the housing and 1 Torx screw (T10) on the main board (spacing bolt). Use the previously removed Torx screws from the mounting materials.

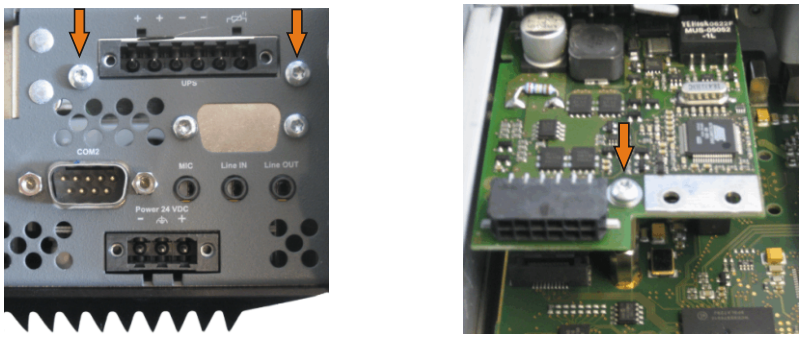


Image 202: Install UPS module

5. Plug in connection cable (see marked socket).

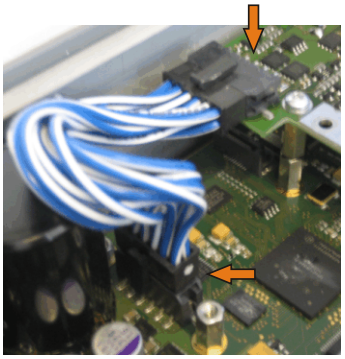


Image 203: Plug in connection cable

Information:

When connecting the cable, make sure that the connector locking mechanism is engaged.

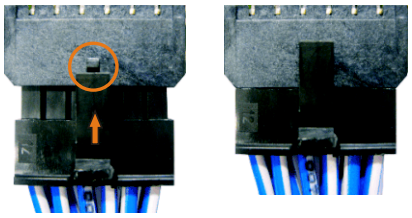


Image 204: Connector locking mechanism

6. Attach the side cover.

7.1.2 APC810 2 and 3 card slot

1. Remove the side cover (see "Mounting the side cover" on page 368).
2. Remove UPS module cover by removing the 2 marked Torx screws (T10).

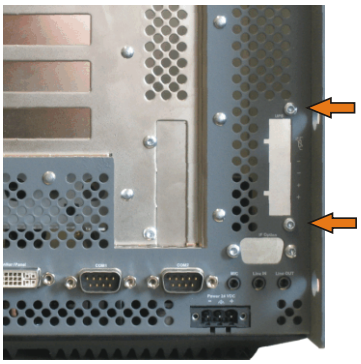


Image 205: Remove UPS module cover

3. Screw in spacing bolt and spacing ring on the main board (using M5 hex socket screwdriver).

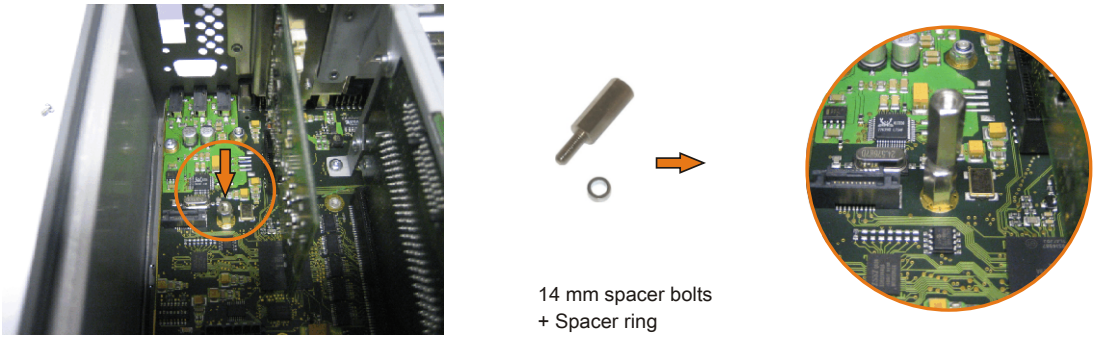


Image 206: Screw in spacing bolt and spacing ring

4. Install mounting bracket on UPS module using 2 Torx screws (T10).

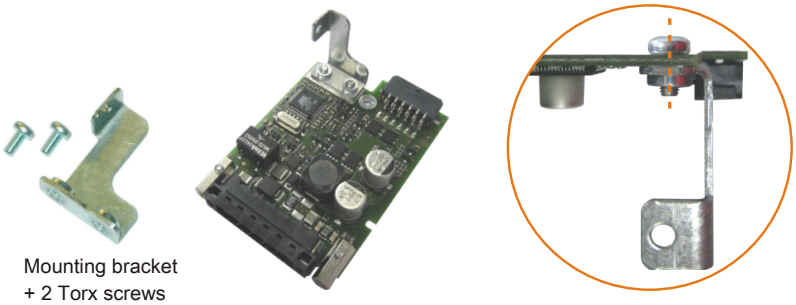


Image 207: Install mounting bracket

5. Install UPS module with 2 Torx screws (T10) on the housing and 1 Torx screw (T10) on the main board (spacing bolt). Use the previously removed Torx screws from the mounting materials.

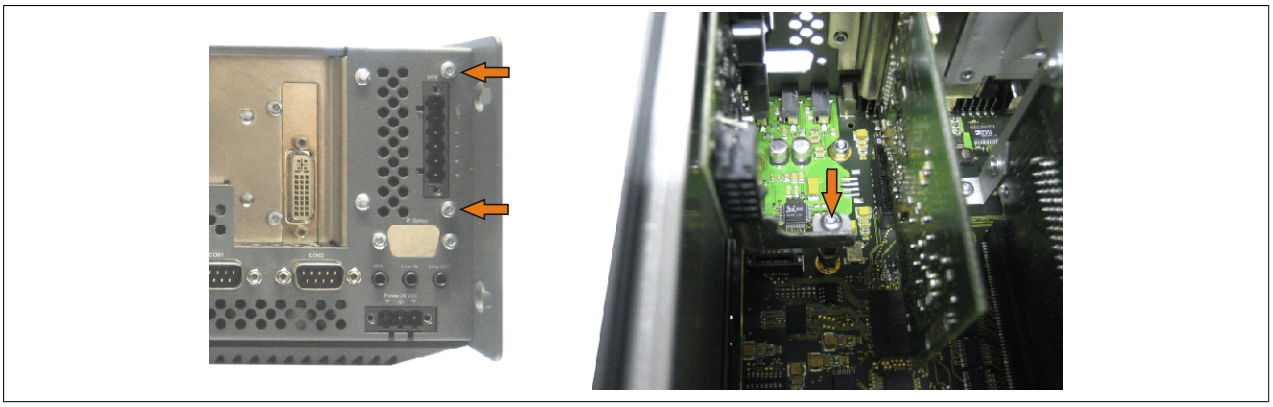


Image 208: Install UPS module

6. Plug in connection cable (see marked socket).

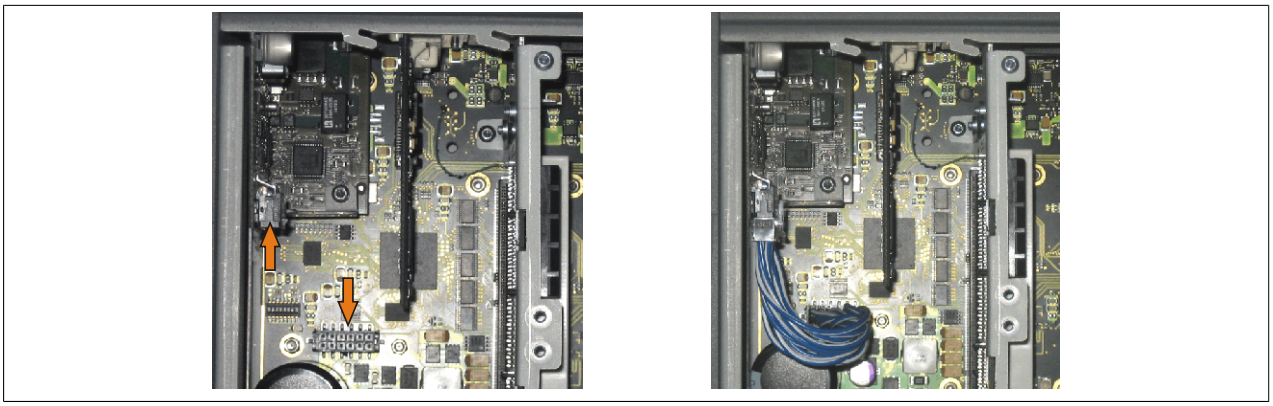


Image 209: Plug in connection cable

Information:

When connecting the cable, make sure that the connector locking mechanism is engaged.

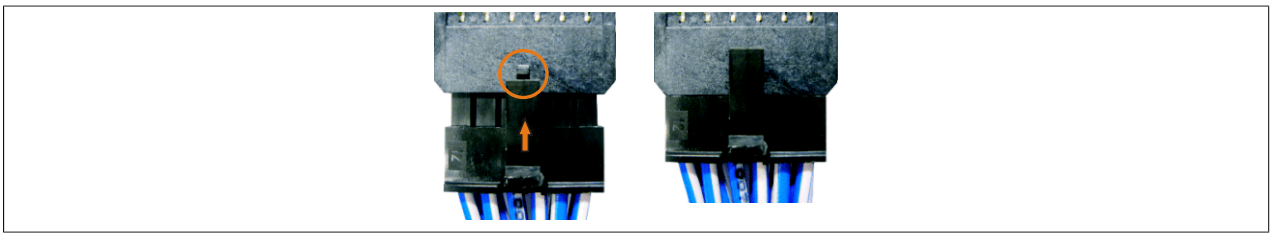


Image 210: Connector locking mechanism

7. Attach the side cover.

7.1.3 APC810 5 card slot

1. Remove the side cover (see "Mounting the side cover" on page 368).
2. Remove UPS module cover by removing the 2 marked Torx screws (T10).

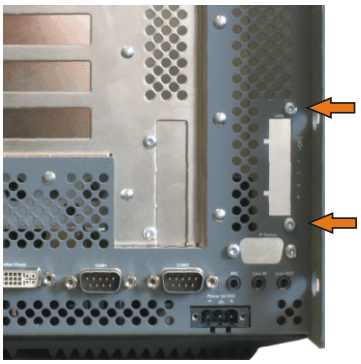


Image 211: Remove UPS module cover

3. Screw in spacing bolt and spacing ring (using M5 hex socket screwdriver).

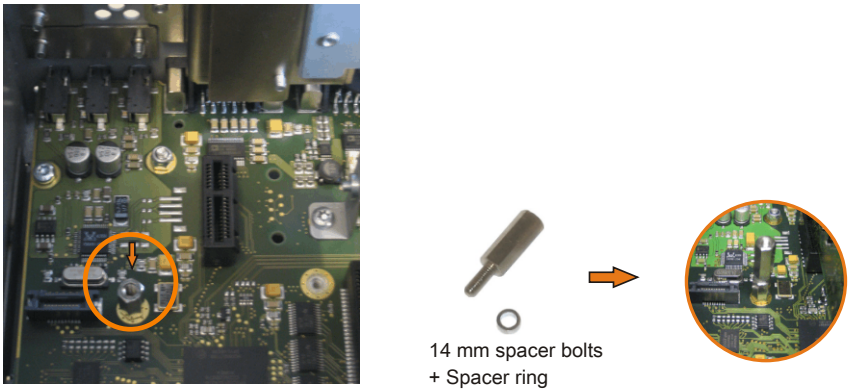


Image 212: Screw in spacing bolt and spacing ring

4. Install mounting bracket on UPS module using 2 Torx screws (T10).

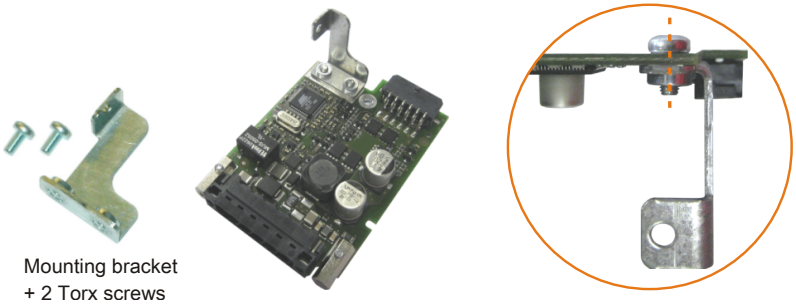


Image 213: Install mounting bracket

5. Install UPS module with 2 Torx screws (T10) on the housing and 1 Torx screw (T10) on the main board (spacing bolt). Use the previously removed Torx screws from the mounting materials.

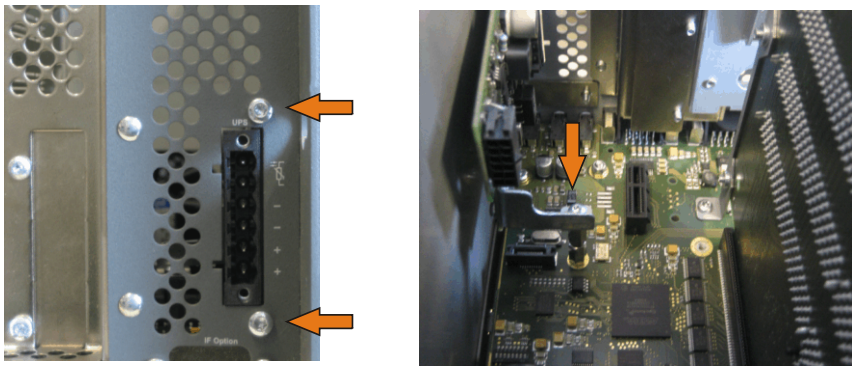


Image 214: Install UPS module

6. Attach connection cable (see marked socket).

Image 215: Plug in connection cable

Information:

When connecting the cable, make sure that the connector locking mechanism is engaged.

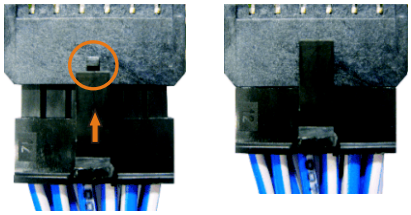


Image 216: Connector locking mechanism

7. Attach the side cover

7.2 Installation with installed add-on interface module

7.2.1 APC810 1 card slot

1. Remove the side cover (see "Mounting the side cover" on page 368).
2. Remove UPS module cover by removing the 2 marked Torx screws (T10).

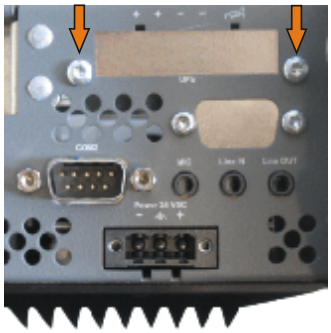


Image 217: Remove UPS module cover

3. Screw in spacing bolt (using M5 hex socket screwdriver).

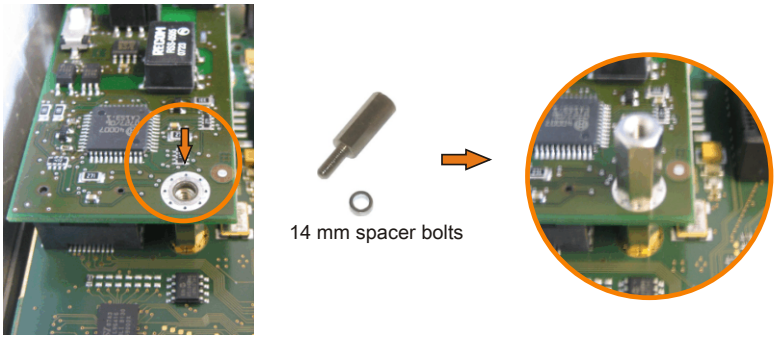


Image 218: Screw in spacing bolt

4. Install the UPS module using 3 Torx screws (T10). Use the previously removed Torx screws and one Torx screw from the mounting materials.

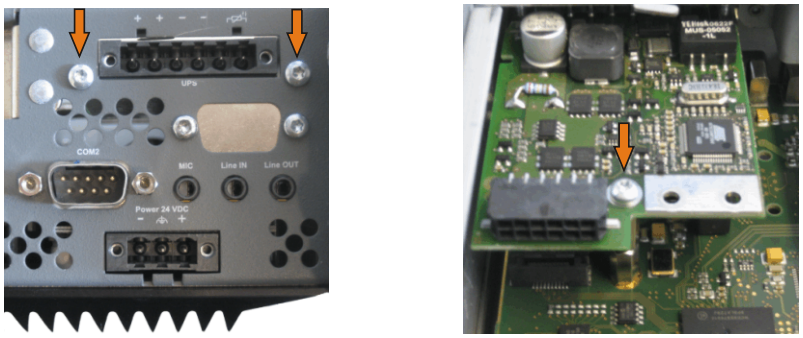


Image 219: Install UPS module

5. Plug in connection cable (see marked socket).

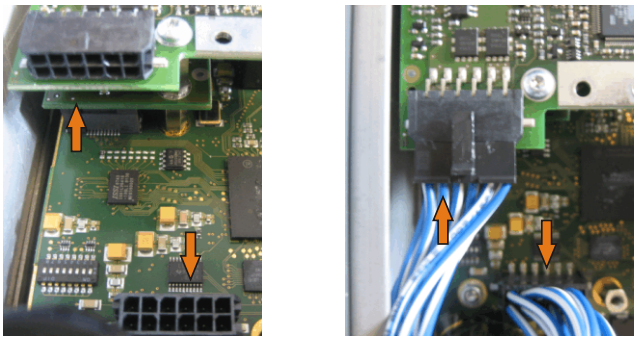


Image 220: Plug in connection cable

Information:

When connecting the cable, make sure that the connector locking mechanism is engaged.

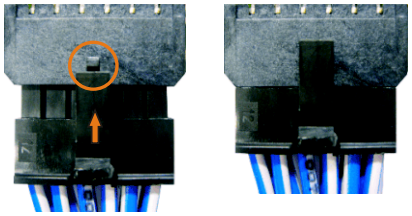


Image 221: Connector locking mechanism

6. Attach cover plate and side cover.

7.2.2 APC810 2 and 3 card slot

1. Remove the side cover (see "Mounting the side cover" on page 368).
2. Remove UPS module cover by removing the 2 marked Torx screws (T10).

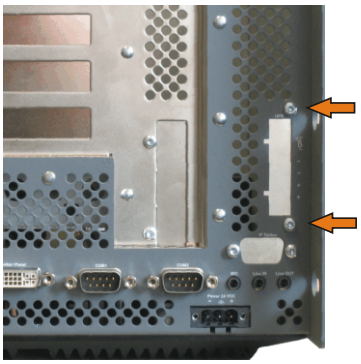


Image 222: Remove UPS module cover

3. Screw in spacing bolt (using M5 hex socket screwdriver).

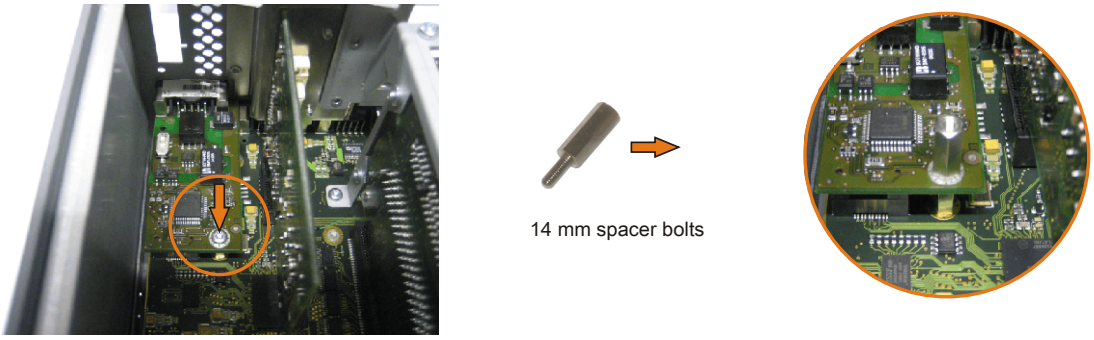


Image 223: Screw in spacing bolt

4. Install mounting bracket on UPS module using 2 Torx screws (T10).

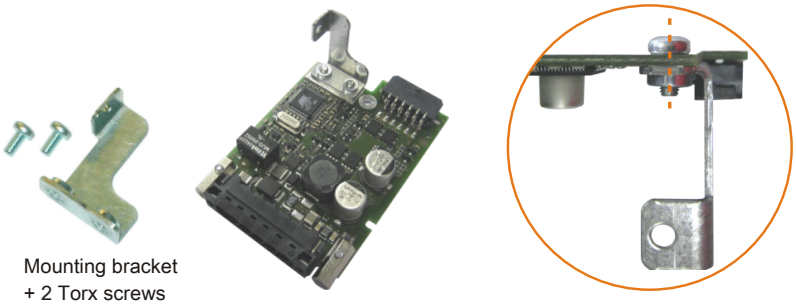


Image 224: Install mounting bracket

5. Install the UPS module using 3 Torx screws (T10). Use the previously removed Torx screws and one Torx screw from the mounting materials.

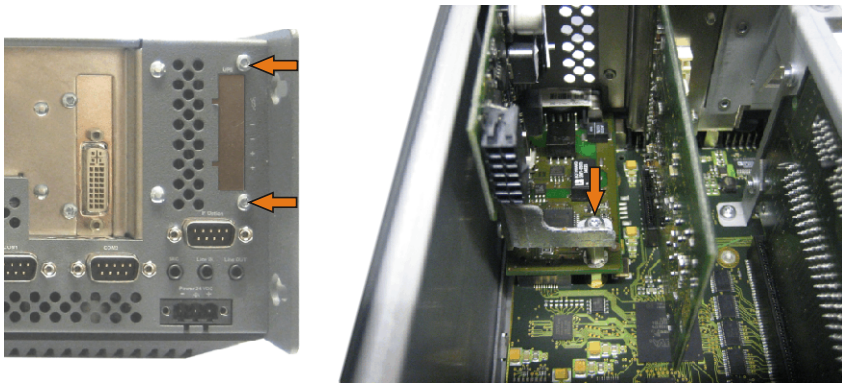


Image 225: Install UPS module

6. Plug in connection cable (see marked socket).

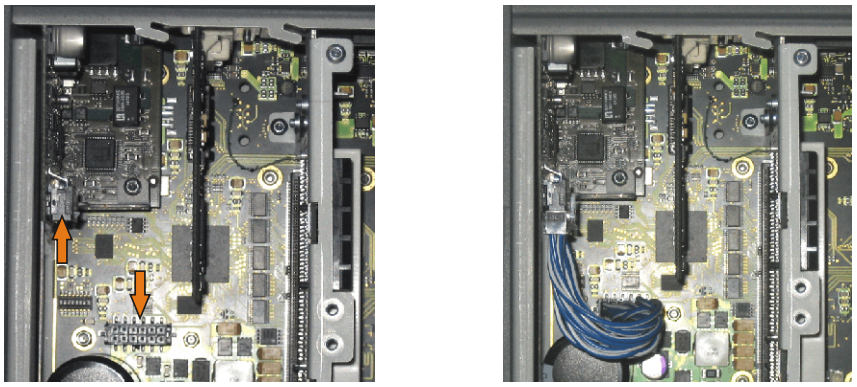


Image 226: Plug in connection cable

Information:

When connecting the cable, make sure that the connector locking mechanism is engaged.

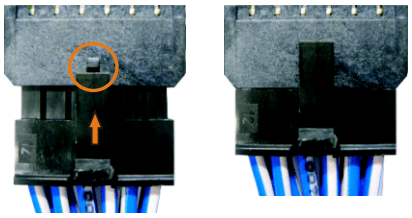


Image 227: Connector locking mechanism

7. Attach cover plate and side cover.

7.2.3 APC810 5 card slot

1. Remove the side cover (see "Mounting the side cover" on page 368).
2. Remove UPS module cover by removing the 2 marked Torx screws (T10).

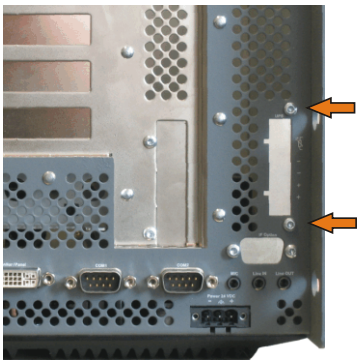


Image 228: Remove UPS module cover

3. Screw in spacing bolt (using M5 hex socket screwdriver).

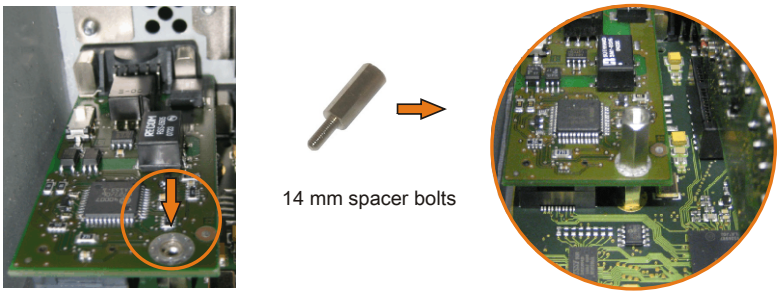


Image 229: Screw in spacing bolt

4. Install mounting bracket on UPS module using 2 Torx screws (T10).

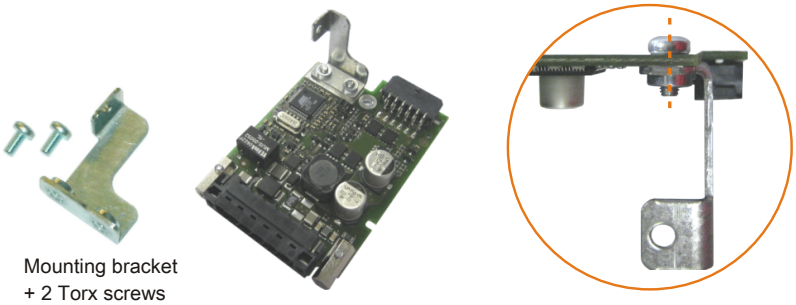


Image 230: Install mounting bracket

5. Install the UPS module using 3 Torx screws (T10). Use the previously removed Torx screws and one Torx screw from the mounting materials.

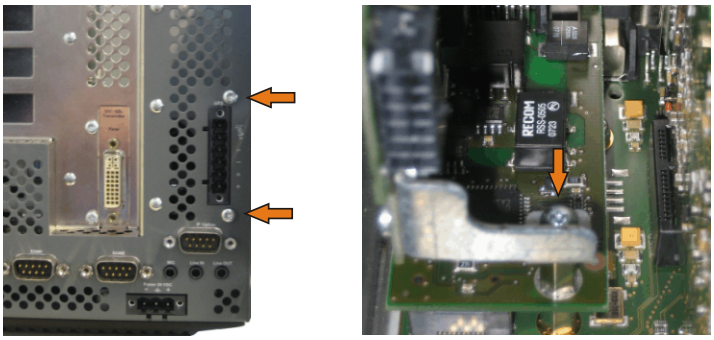


Image 231: Install UPS module

6. Plug in connection cable (see marked socket).

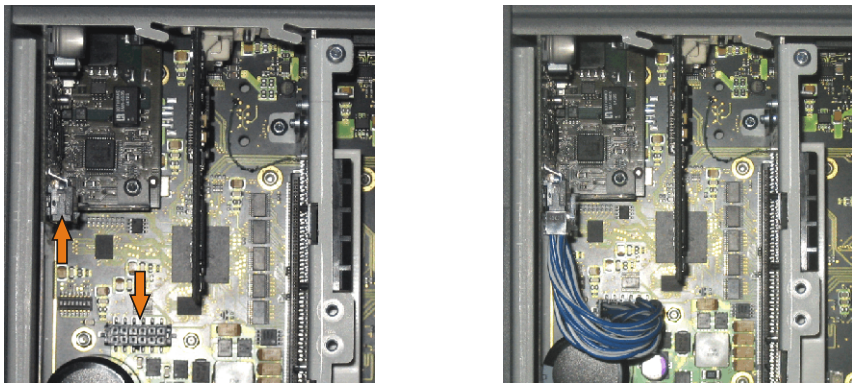


Image 232: Plug in connection cable

Information:

When connecting the cable, make sure that the connector locking mechanism is engaged.

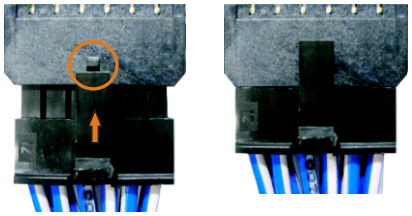


Image 233: Connector locking mechanism

7. Attach cover plate and side cover.

8 Mounting the side cover

The side cover can be easily removed by loosening the Torx (T10) screws. The number of Torx screws can vary depending on the system.

8.1 APC810 with 1 card slot

1. Disconnect the power supply to the Automation PC 810.
2. Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
3. Open the orange front cover. Behind the cover there are 4 combi-torx screws (T10) that must be removed.
4. After the screws have been removed, the side cover can be removed by sliding it toward the front.

Image 234: Mounting the side cover - APC810 with 1 card slot

8.2 APC810 with 2 and 3 card slot

1. Disconnect the power supply to the Automation PC 810.
2. Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
3. Open the orange front cover. Behind the cover there are 4 combi-torx screws (T10) that must be removed.
4. After the screws have been removed, the side cover can be removed by sliding it toward the front.

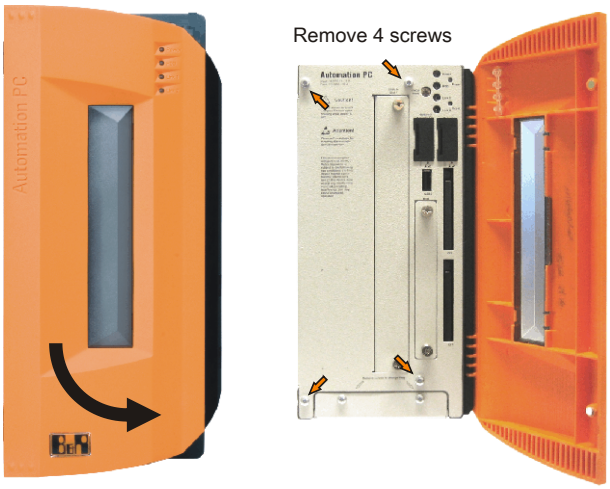


Image 235: Mounting the side cover - APC810 with 2 card slot

8.3 APC810 with 5 card slot

1. Disconnect the power supply to the Automation PC 810.
2. Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
3. Open the orange front cover. Behind the cover there are 4 combi-torx screws (T10) that must be removed.
4. After the screws have been removed, the side cover can be removed by sliding it toward the front.

Image 236: Mounting the side cover - APC810 with 5 card slot

9 AP Link installation

9.1 Procedure

1. Remove the side cover (see "Mounting the side cover" on page 368).
2. Remove AP Link module cover by removing the 2 marked Torx screws (T10).

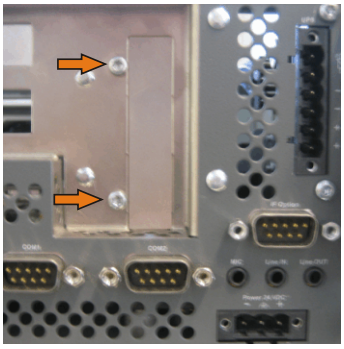


Image 237: Remove AP Link module cover

3. Insert the AP Link card in appropriate slot.

> **Warning!**
>
> **When inserting the AP Link card, be sure to push it all the way into the AP Link slot.**
>
> **Do not force the card into the slot.**

4. Install the AP Link module using 3 Torx screws (T10). Use the previously removed Torx screws and an additional Torx screw from the mounting materials.

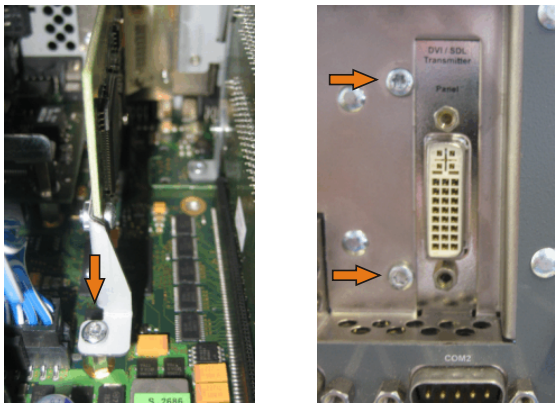


Image 238: Install AP Link module

5. Attach cover plate and side cover.

10 Exchanging a PCI SATA RAID hard disk in a RAID 1 system

In the example, the assumption is made that the secondary hard disk (HDD1) is defective in a RAID 1 configuration. In such a case, the defective hard disk can be replaced by the replacement drive SATA hard disk.

Model number - PCI SATA RAID controller	Model number of required replacement SATA HDD	Note
5ACPCI.RAIC-03	5ACPCI.RAIC-04	160 GB hard disk
5ACPCI.RAIC-05	5MMHDD.0250-00	250 GB hard disk

Table 307: Overview of required replacement SATA HDD for PCI SATA HDD RAID controller

A size 10 Torx screwdriver is needed for exchanging the hard disk.

10.1 Procedure

1. Disconnect the power supply.
2. Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
3. Remove the side cover.
4. Remove the SATA RAID insert.
5. Loosen the 4 appropriate mounting screws (M3x5).

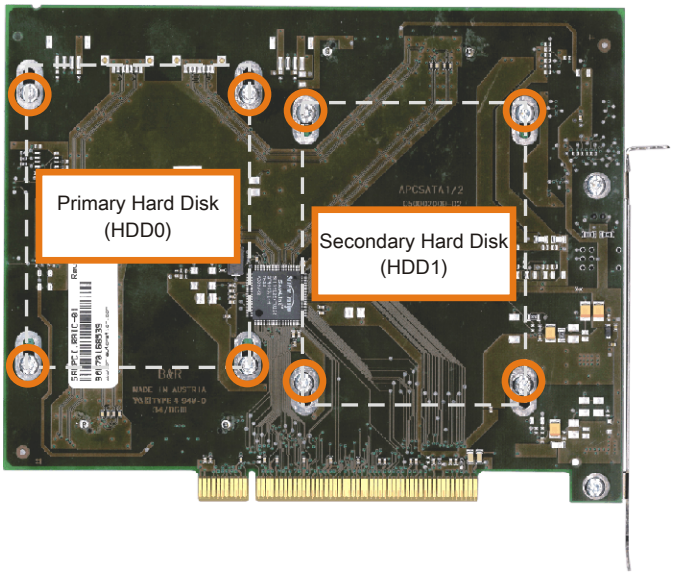


Image 239: Screw layout on the back side of the SATA RAID controller 5ACPCI.RAIC-03

6. On the front side, slide the hard disk down and away (image 1).
7. Insert the new hard disk carefully into the connector (image 2), being careful to only touch it on the front, and not on the top.

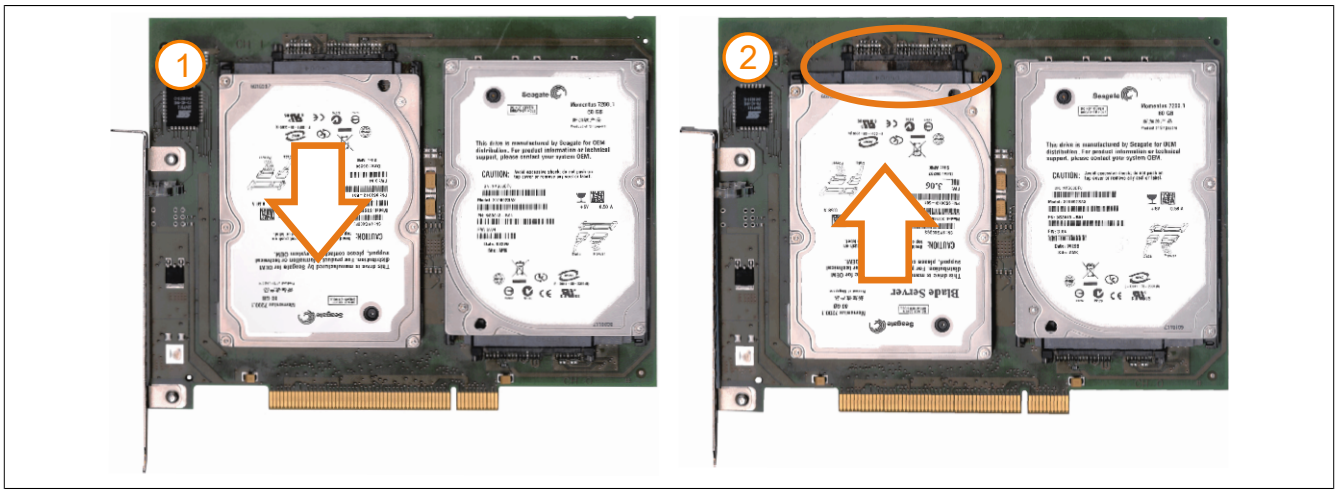


Image 240: Hard disk exchange

8. Re-secure the hard disk using the 4 fastening screws (M3x5) used earlier.
9. Reassemble device in the reverse order.
10. An error message is output by the RAID BIOS after starting the system "RAID1 set is in Critical status - press any key to enter Configuration Utility".
11. A rebuild must be executed in the SATA RAID BIOS - see "Rebuild mirrored set" on page 180.

11 Installing the HDD replacement disk tray

11.1 Procedure

1. Insert the replacement HDD in the replacement disk tray and fasten using the ¼ turn screws.

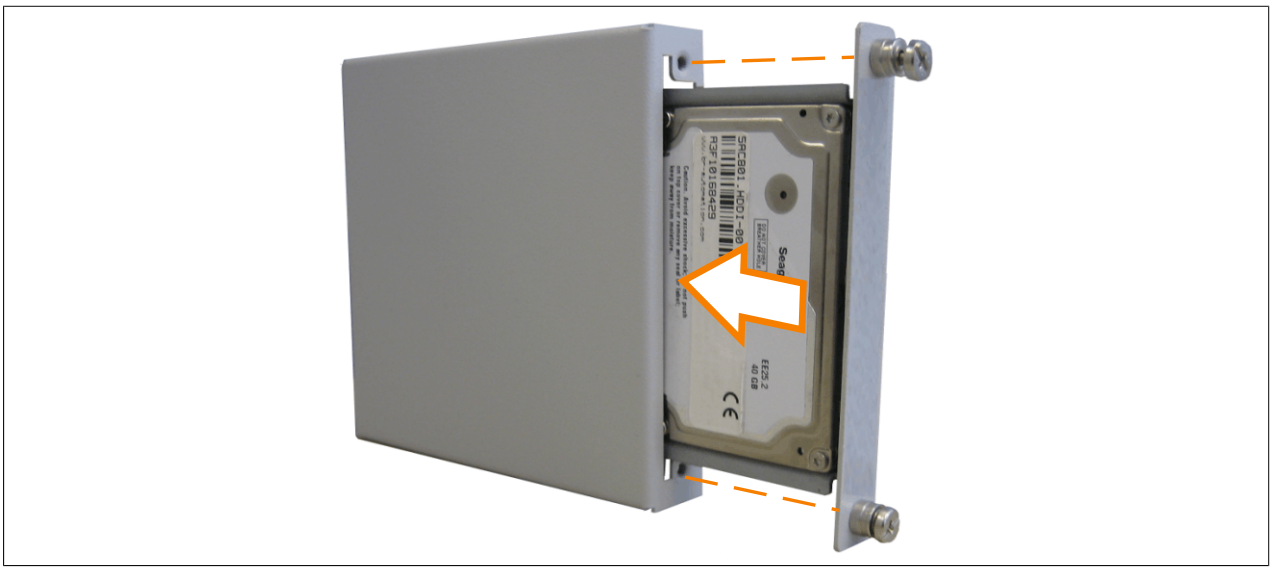


Image 241: Installing the replacement hard disk in the replacement disk tray

2. Attach the HDD replacement disk tray to the ventilation slots on the APC810 housing using the hooks provided.

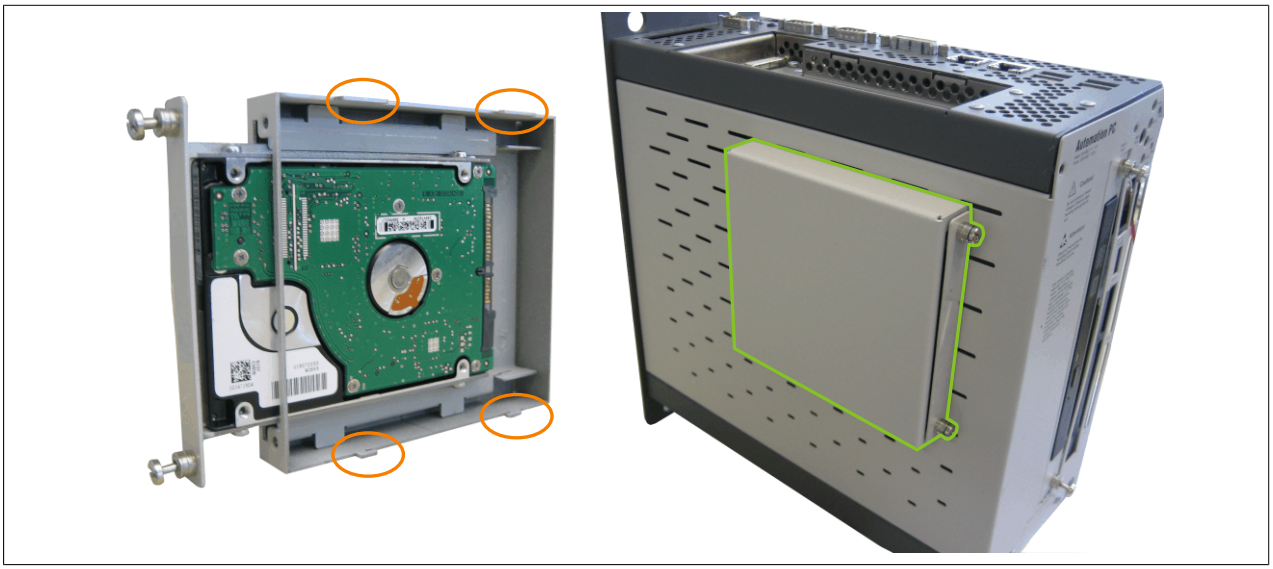


Image 242: Installing the replacement disk tray in the APC810

12 Installing the ready relay /2 in the add-on UPS slot

12.1 Procedure

1. Remove side cover (see section 8 "Mounting the side cover" on page 368).
2. Remove UPS module cover or mounted UPS by loosening the 2 marked Torx screws (T10).

Image 243: Remove UPS module cover

3. Attach spacing bolt and spacing ring (if not already mounted from the UPS) on the main board (using size 5 hex screwdriver). The spacing bolt with a length of 14 mm must be used for APC810 system units 5PC810.SX01-00, 5PC810.SX02-00 and 5PC810.SX03-00. The spacing bolt with a length of 16 must be used for the system unit 5PC810.SX05-00.

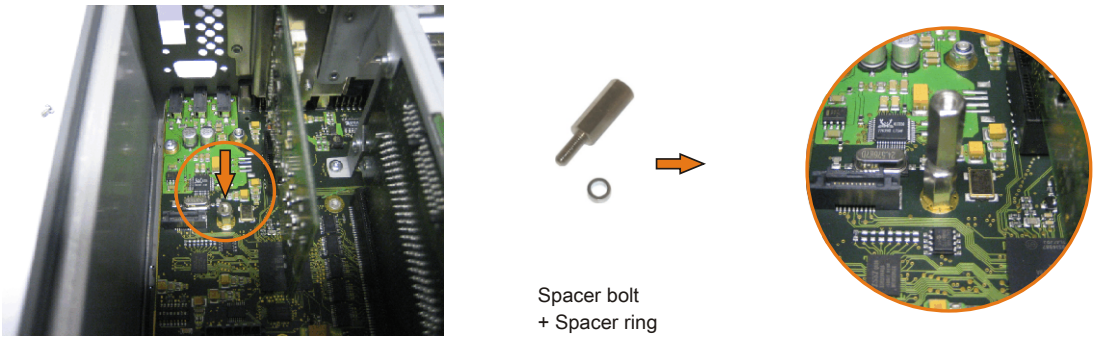


Image 244: Screw in spacing bolt and spacing ring

4. Ready relay with 2 Torx screws (T6) and the mounting bracket on the housing and 1 Torx screw (T6) on the main board (spacing bolt).

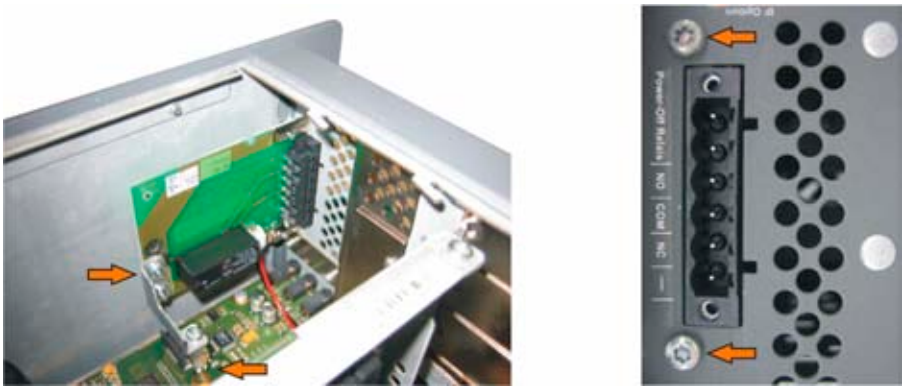


Image 245: Installing the ready relay

5. Plug in connection cable

> **Information:**
>
> **When connecting the internal supply voltage cable, make sure that the connector locking mechanism is engaged.**

Image 246: Plug in connection cable

6. Attach the side cover

Appendix A

1 Maintenance controller extended (MTCX)

The MTCX controller (FPGA processor) is located on the main board (part of every system unit) of the APC810 device.

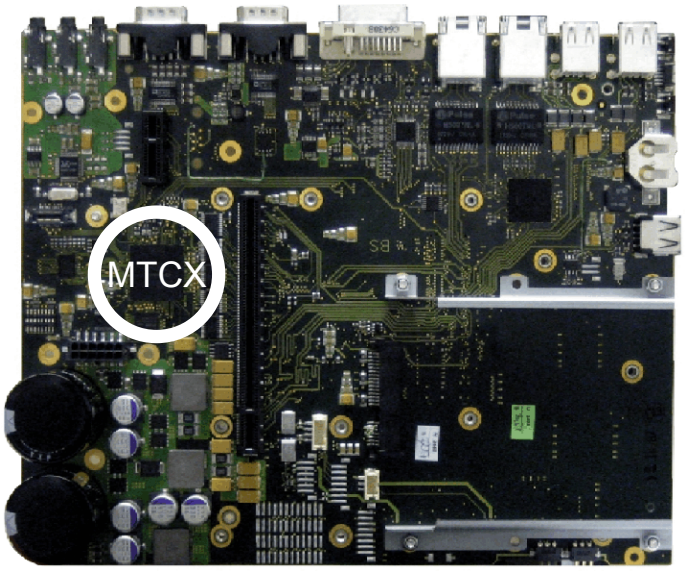


Image 247: MTCX controller location

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

- Power on (power OK sequencing) and power fail logic
- Watchdog handling (NMI and reset handling)
- Temperature monitoring (I/O area, power supply, slide-in drive 1/2)
- Fan control
- Key and LED handling/coordination (matrix keyboard on B&R display units)
- Advanced desktop operation (keys, USB forwarding)
- Daisy chain display operation (touch screen, USB forwarding)
- Panel locking mechanism (configurable using B&R Control Center - ADI driver)
- Backlight control for a connected B&R display
- Statistical data recording (power cycles - each power on, power on and fan hours are recorded - every full hour is counted e.g. 50 minutes no increase)
- SDL data transfer (display, matrix keyboard, touch screen, service data, USB)
- Status LEDs (HDD, panel lock, Link 1, Link 2)

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

1.1 Temperature monitoring - Fan control

The MTCX constantly monitors the temperature using temperature sensors (see "Temperature sensor locations" on page 29), which directly determine how the fan is controlled. The RPM depends on the temperature measured. The limit values depend on the MTCX firmware version being used.

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

Sensor range	Start-up temperature	Max fan speed at:
CPU	65°C	81°C
Board CPU	65°C	81°C
Board I/O	60°C	76°C
Board ETH2	60°C	76°C
Board Power	60°C	76°C
Power supply	60°C	76°C
ETH2 Controller	70°C	86°C
Slide-in 1/2	44°C	60°C

Table 308: Temperature limits of the fan (MTCX PX32 V0.06).

Once the start-up temperature is reached, the device is started at the minimum fan speed. The maximum fan speed is reached at a start-up temperature of 16°C. The fan speed in this area is controlled depending on the temperature.

For example, slide-in 1/2: 44°C + 16°C = 60°C --> maximum fan speed

The fans are first switched off again if the evaluated temperature remains 6°C lower than the start-up temperature for a time span of 4 hours (=lag-time).

2 Connection of an external device to the main board

A plug on the main board enables branching of +5 VDC and +12 VDC for the internal supply of e.g. special PCI cards.

The voltage can be accessed using the "Internal supply cable 5CAMSC.0001-00" on page 342. The plug is located close to the bus unit(s) and can be attached to it with a cable tie (see arrow in image). The APC810 side cover (see "Mounting the side cover" on page 368) and possibly also the slide-in drive and PCI cards must be removed to reach the connector.

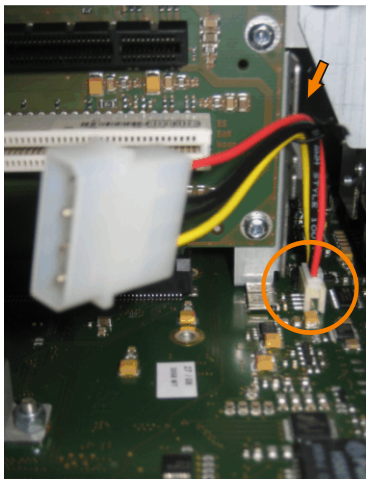


Image 248: Connector location for external devices

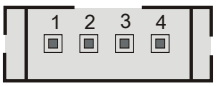
Connector for the external devices			
Pin	Assignment	Power	4-pin connector, male
1	+12 VDC	Max. 10 watts	
2	GND		
3	GND	Max. 5 watts	
4	+5 VDC		

Table 309: Pin assignments - Connector on main board

Connections are protected with a 1A multi-fuse.

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