# Automation PC 910

## User's Manual

Version: **1.00 (November 2012)**
Model no.: **MAAPC900-ENG**

# Chapter 1 • General information

## 1 Manual history

| Version | Date | Change |
|---|---|---|
| 0.10 Preliminary | 12-Jun-12 | • First version |
| 1.00 | 26-Nov-12 | • Chapter "Software" on page 93 added.<br>• Chapter "Maintenance / Service" on page 138 added.<br>• "Appendix A" on page 154 was added.<br>• Section "Organization of safety notices" on page 11 revised - description text for "Caution" and "Warning" rewritten.<br>• Terminology changes in German edition.<br>• The following sections were added to the chapter "Technical data": "Temperature specifications" on page 19, "Block diagram" on page 27, "Humidity specifications" on page 23.<br>• The following sections were added to the chapter "Commissioning": "Mounting orientation" on page 89, "Spacing for air circulation" on page 90, "Grounding concept" on page 92.<br>• The CPU boards 5PC900.TS77-00, 5PC900.TS77-01, 5PC900.TS77-05, 5PC900.TS77-06, 5PC900.TS77-07 and 5PC900.TS77-08 were added to the chapter "QM77 CPU boards" on page 56 and "HM76 CPU boards" on page 58.<br>• The following drives were added: "5AC901.CSSD-00" on page 67, "5AC901.CSSD-01" on page 69, "5AC901.CSSD-02" on page 71, "5AC901.CCFA-00" on page 73.<br>• The following interface options were added: "5AC901.ICAN-00" on page 78, "5AC901.IHDA-00" on page 80, "5AC901.ISRM-00" on page 82.<br>• Section "Monitor / panel options" on page 83 added.<br>• The heat sink 5AC901.HS01-00 was added, "5AC901.HS0x-00" on page 62.<br>• The section "System components / configuration" on page 16 was changed.<br>• The bus units 5AC901.BX01-01 and 5AC901.BX02-01 were updated, see " Bus units" on page 61.<br>• "CFast cards" on page 108 added.<br>• USB Media Drive "5MD900.USB2-02" on page 113 added. |

# 2 Safety guidelines

## 2.1 Intended use

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

## 2.2 Protection against electrostatic discharge

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

### 2.2.1 Packaging

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

### 2.2.2 Guidelines for proper ESD handling

**Electrical components with a housing**

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

**Electrical components without a housing**

The following apply in addition to "Electrical components with housing":

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

**Individual components**

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

## 2.3 Policies and procedures

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

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

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

## 2.4 Transport and storage

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

## 2.5 Mounting

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

## 2.6 Operation

### 2.6.1 Protection against touching electrical parts

To operate programmable logic controllers, operating/monitoring devices or uninterruptible power supplies, 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, operating/monitoring devices and the uninterruptible power supply, the housing must be properly grounded (PE rail). Ground connections must be established when testing operating/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

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

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

For operation in dusty or humid conditions, correctly installed (cutout installation) operating/monitoring devices like the 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 cleaned at suitable intervals.

### 2.6.3 Programs, viruses and dangerous programs

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

## 2.7 Environmentally friendly

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

### 2.7.1 Separation of materials

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

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

Table 1: Environmentally friendly separation of materials

Disposal must comply with applicable legal regulations.

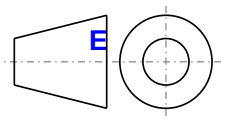
# 3 Organization of safety notices

The safety notices in this manual are organized as follows:

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

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

# 4 Guidelines




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

All dimensions are specified in mm.

| 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 3: Nominal measurement areas

# 5 Overview

| Product ID | Short description | on page |
|---|---|---|
| | **Batteries** | |
| 0AC201.91 | Lithium batteries 4 pieces, 3 V / 950 mAh button cell Hereby we declare that the Lithium cells contained in this shipment qualify as „partly regulated“. Handle with care. If the package is damaged, inspect cells, repack intact cells and protect cells against short circuits. For emergency information, call RENATA SA at + 41 61 319 28 27 | 107 |
| 4A0006.00-000 | Lithium battery, 3 V / 950 mAh, button cell | 107 |
| | **Bus units** | |
| 5AC901.BX01-00 | APC910 bus, 1 PCI | 61 |
| 5AC901.BX01-01 | APC910 bus, 1 PCI Express (x4) | 61 |
| 5AC901.BX02-00 | APC910 bus, 2 PCI | 61 |
| 5AC901.BX02-01 | APC910 bus, 1 PCI, 1 PCI Express (x8) | 61 |
| | **CFast cards** | |
| 5CFAST.016G-00 | CFast 16 GB | 108 |
| 5CFAST.032G-00 | CFast 32 GB | 108 |
| 5CFAST.2048-00 | CFast 2 GB | 108 |
| 5CFAST.4096-00 | CFast 4 GB | 108 |
| 5CFAST.8192-00 | CFast 8 GB | 108 |
| | **CPU boards** | |
| 5PC900.TS77-00 | Intel Core i7 3615QE CPU board, 2.3 GHz, quad-core, 6 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (total memory max. 16 GB) | 56 |
| 5PC900.TS77-01 | Intel Core i7 3612QE CPU board, 2.1 GHz, quad-core, 6 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (total memory max. 16 GB) | 56 |
| 5PC900.TS77-02 | Intel Core i7 3555LE CPU board, 2.5 GHz, dual-core, 4 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (max. total memory 16 GB) | 56 |
| 5PC900.TS77-03 | Intel Core i7 3517UE CPU board, 1.7 GHz, dual-core, 4 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (max. total memory 16 GB) | 56 |
| 5PC900.TS77-04 | Intel Core i5 3610ME CPU board, 2.7 GHz, dual-core, 3 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (max. total memory 16 GB) | 56 |
| 5PC900.TS77-05 | Intel Core i3 3120ME CPU board, 2.4 GHz, dual-core, 3 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (total memory max. 16 GB) | 56 |
| 5PC900.TS77-06 | Intel Core i3 3217UE CPU board, 1.6 GHz, dual-core, 3 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (total memory max. 16 GB) | 56 |
| 5PC900.TS77-07 | Intel Celeron M 847E CPU board, 1.1 GHz, dual-core, 1 MB L2 cache; HM76 chipset; 2 sockets for SO-DIMM DDR3 modules (total memory max. 16 GB) | 58 |
| 5PC900.TS77-08 | Intel Celeron M 827E CPU board, 1.4 GHz, single-core, 1.5 MB L2 cache; HM76 chipset; 2 sockets for SO-DIMM DDR3 modules (total memory max. 16 GB) | 58 |
| | **DVI cable** | |
| 5CADVI.0018-00 | DVI-D cable, 1.8 m. | 119 |
| 5CADVI.0050-00 | DVI-D cable, 5 m. | 119 |
| 5CADVI.0100-00 | DVI-D cable, 10 m. | 119 |
| | **Drives** | |
| 5AC901.CCFA-00 | CFast adapter to operate a CFast card in a slide-in compact slot | 73 |
| 5AC901.CHDD-00 | 250 GB SATA hard disk, Slide-in compact, 24/7 hard disk | 65 |
| 5AC901.CSSD-00 | 32 GB SATA SSD (SLC), Slide-in compact | 67 |
| 5AC901.CSSD-01 | 60 GB SATA SSD (MLC), Slide-in compact | 69 |
| 5AC901.CSSD-02 | 180 GB SATA SSD (MLC), Slide-in compact | 71 |
| | **Fan kits** | |
| 5AC901.FA01-00 | APC910 fan kit for system unit 5PC910.SX01-00 | 63 |
| 5AC901.FA02-00 | APC910 fan kit for system unit 5PC910.SX02-00 | 64 |
| | **Front cover** | |
| 5AC901.FF01-00 | APC910 front cover, 1 slot, orange | 87 |
| 5AC901.FF02-00 | APC910 front cover 2 slot, orange | 87 |
| | **Heat sink** | |
| 5AC901.HS00-00 | APC910 heat sink active | 62 |
| 5AC901.HS01-00 | APC910 heat sink passive | 62 |
| | **Interface options** | |
| 5AC901.I485-00 | RS232/422/485 interface option; for APC910 | 74 |
| 5AC901.ICAN-00 | CAN interface option; for APC910 | 78 |
| 5AC901.IHDA-00 | Audio interface option, connection for 1x MIC, 1x Line IN, 1x Line OUT; for APC910 | 80 |
| 5AC901.ISRM-00 | SRAM interface option, 2 MB; for APC910 | 82 |
| | **Main memory** | |
| 5MMDDR.1024-03 | SO-DIMM DDR3, 1024 MB | 60 |
| 5MMDDR.2048-03 | SO-DIMM DDR3, 2048 MB | 60 |
| 5MMDDR.4096-03 | SO-DIMM DDR3, 4096 MB | 60 |
| 5MMDDR.8192-03 | SO-DIMM DDR3, 8192 MB | 60 |
| | **Monitor / Panel options** | |
| 5AC901.LDPO-00 | DisplayPort transmitter | 83 |
| 5AC901.LSDL-00 | Smart Display Link/DVI transmitter | 85 |
| | **RS232 cable** | |
| 9A0014.02 | RS232 extension cable for remote operating of a display unit with touch screen, 1.8 m. | 136 |
| 9A0014.05 | RS232 extension cable for remote operating of a display unit with touch screen, 5 m. | 136 |
| 9A0014.10 | RS232 extension cable for remote operating of a display unit with touch screen, 10 m. | 136 |
| | **SDL cable - 45° connector** | |
| 5CASDL.0018-01 | SDL cable; 45° connector, 1.8 m. | 125 |

| Product ID | Short description | on page |
|---|---|---|
| 5CASDL.0050-01 | SDL cable; 45° connector, 5 m. | 125 |
| 5CASDL.0100-01 | SDL cable; 45° connector, 10 m. | 125 |
| 5CASDL.0150-01 | SDL cable; 45° connector, 15 m. | 125 |
| | **SDL cables** | |
| 5CASDL.0018-00 | SDL cable, 1.8 m. | 122 |
| 5CASDL.0050-00 | SDL cable, 5 m. | 122 |
| 5CASDL.0100-00 | SDL cable, 10 m. | 122 |
| 5CASDL.0150-00 | SDL cable, 15 m. | 122 |
| 5CASDL.0200-00 | SDL cable, 20 m. | 122 |
| 5CASDL.0250-00 | SDL cable, 25 m. | 122 |
| 5CASDL.0300-00 | SDL cable, 30 m. | 122 |
| | **SDL flex cable** | |
| 5CASDL.0018-03 | SDL Cable flex, 1.8 m. | 128 |
| 5CASDL.0050-03 | SDL cable flex, 5 m. | 128 |
| 5CASDL.0100-03 | SDL cable flex, 10 m. | 128 |
| 5CASDL.0150-03 | SDL cable flex, 15 m. | 128 |
| 5CASDL.0200-03 | SDL cable flex, 20 m. | 128 |
| 5CASDL.0250-03 | SDL cable flex, 25 m. | 128 |
| 5CASDL.0300-03 | SDL cable flex, 30 m. | 128 |
| 5CASDL.0300-13 | SDL cable flex with extender, 30 m. | 131 |
| 5CASDL.0400-13 | SDL cable flex with extender, 40 m. | 131 |
| 5CASDL.0430-13 | SDL Cable flex with extender, 43 m. | 131 |
| | **System units** | |
| 5PC910.SX01-00 | APC910 system unit, 1 slot (PCI Express / PCI, depending on bus), 1 slide-in compact slot; Smart Display Link/DVI/monitor, DisplayPort, 1x RS232, 5x USB, 2x ETH 10/100/1000, 1 CFast slot, 24 VDC | 46 |
| 5PC910.SX02-00 | APC910 system unit, 2 slots (PCI Express / PCI, depending on bus), 1 slot for monitor/panel option, 1 slide-in compact and 1 slide-in slot; Smart Display Link/DVI/Monitor, DisplayPort, 1x RS232, 5x USB, 2x ETH 10/100/1000, 1 CFast slot, 24 VDC | 51 |
| | **Terminal blocks** | |
| 0TB103.9 | Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm², protected against vibration by the screw flange | 106 |
| 0TB103.91 | Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm², protected against vibration by the screw flange | 106 |
| | **USB accessories** | |
| 5A5003.03 | Front cover, For Remote CD-ROM Drive 5A5003.02 and USB 2.0 drive combination 5MD900.USB2-00, 5MD900.USB2-01 and 5MD900.USB2-02. | 117 |
| 5MD900.USB2-02 | USB 2.0 Drives DVD-R/RW DVD+R/RW, CompactFlash slot (type II), USB connector (type A on front side, type B on back side); 24 VDC; (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately). | 113 |
| 5MMUSB.2048-01 | USB 2.0 flash drive 2048 MB B&R | 111 |
| | **USB cable** | |
| 5CAUSB.0018-00 | USB 2.0 connecting cable type A - type B, 1.8 m. | 135 |
| 5CAUSB.0050-00 | USB 2.0 connecting cable type A - type B, 5 m. | 135 |
| | **Windows 7** | |
| 5SWWI7.1100-ENG | Microsoft OEM Windows 7 Professional 32-bit, Service Pack 1, DVD, English. Only available with a new device. | 93 |
| 5SWWI7.1100-GER | Microsoft OEM Windows 7 Professional 32-bit, Service Pack 1, DVD, German. Only available with a new device. | 93 |
| 5SWWI7.1200-ENG | Microsoft OEM Windows 7 Professional 64-bit, Service Pack 1, DVD, English. Only available with a new device. | 93 |
| 5SWWI7.1200-GER | Microsoft OEM Windows 7 Professional 64-bit, Service Pack 1, DVD, German. Only available with a new device. | 93 |
| 5SWWI7.1300-MUL | Microsoft OEM Windows 7 Ultimate 32-bit, Service Pack 1, DVD, multilanguage. Only available with a new device. | 93 |
| 5SWWI7.1400-MUL | Microsoft OEM Windows 7 Ultimate 64-bit, Service Pack 1, DVD, multilanguage. Only available with a new device. | 93 |
| | **Windows Embedded Standard 2009** | |
| 5SWWXP.0740-ENG | Microsoft OEM Windows Embedded Standard 2009, English; for APC910 with QM77/HM76 chipset; please order CFast separately (minimum 2 GB). | 98 |
| | **Windows Embedded Standard 7** | |
| 5SWWI7.1540-ENG | Microsoft OEM Windows Embedded Standard 7 32-bit, Service Pack 1, English; for APC910 with QM77/HM76 chipset; please order CFast separately (minimum 16 GB). | 95 |
| 5SWWI7.1640-ENG | Microsoft OEM Windows Embedded Standard 7 64-bit, Service Pack 1, English; for APC910 with QM77/HM76 chipset; please order CFast separately (minimum 16 GB). | 95 |
| 5SWWI7.1740-MUL | Microsoft OEM Windows Embedded Standard 7 Premium 32-bit, Service Pack 1, multilanguage; for APC910 with QM77/HM76 chipset; please order CFast separately (minimum 16 GB without language packages). | 95 |
| 5SWWI7.1840-MUL | Microsoft OEM Windows Embedded Standard 7 Premium 64-bit, Service Pack 1, multilanguage; for APC910 with QM77/HM76 chipset; please order CFast separately (minimum 16 GB). | 95 |
| | **Windows XP Professional** | |
| 5SWWXP.0600-ENG | Microsoft OEM Windows XP Professional Service Pack 3, CD, English. Only available with a B&R device. | 97 |
| 5SWWXP.0600-GER | Microsoft OEM Windows XP Professional Service Pack 3, CD, German. Only available with a device. | 97 |
| 5SWWXP.0600-MUL | Microsoft OEM Windows XP Professional Service Pack 3, CD, multilanguage. Only available with a B&R device. | 97 |

# Chapter 2 • Technical data

## 1 Introduction

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

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

### 1.2 Maximum performance

The APC910 has the latest Intel® Core™ i-series technology at its heart. By further reducing the structural size of the chip and implementing a new microprocessor architecture that now integrates graphics directly into the CPU, Intel® has been able to improve performance by leaps and bounds over their first Core™ i-series generation and Core™2 Duo systems. The rest of the PC infrastructure has also been streamlined for maximum computing performance and optimal data throughput. The APC910 now has a serial ATA-based CFast card to replace the previously used CompactFlash. And just like the APC810, hard disks and solid state drives are connected to the PC system via the high-speed SATA interface. These devices are also well-equipped when it comes to interface options. Two gigabit Ethernet ports, USB ports and onboard as well as modular serial ports round off the extensive capabilities of the ACP910.

### 1.3 Availability and reliability for many productive years

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

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

## 1.4 Features

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



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

## 1.5 System components / configuration

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

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

### 1.5.1 Configuration - Base system

The system units can be operated with and without a fan kit. This depends on the various types of heat sink and main memory being used.

Using a fan kit allows for operation at higher ambient temperatures. More information can be found under "Maximum ambient temperature" on page 20.

#### Configuration with a fan kit

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

Figure 1: Configuration - Base system with fan kit

3) A fan kit is only mandatory when using the heat sink 5AC901.HS00-00.

## Configuration without a fan kit

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

Figure 2: Configuration - Base system without fan kit

### 1.5.2 Configuration - Accessories and software

| Configuration - Accessories and software | | | |
|---|---|---|---|
| System unit | Select one | | |
| A system unit consists of a housing and main board. |  5PC910.SX01-00 |  5PC910.SX02-00 | |
| Front cover | Select one | | |
|  | 5AC901.FF01-00 | 5AC901.FF02-00 | |
| Compact slide-in drive | Select one | | |
|  | 5AC901.CHDD-00<br>5AC901.CSSD-00<br>5AC901.CSSD-01 | 5AC901.CSSD-02<br>5AC901.CCFA-00 | |
| IF options | Select max. 2 [1] | | |
|  | 5AC901.I485-00<br>5AC901.ICAN-00 | 5AC901.IHDA-00<br>5AC901.ISRM-00 | |
| Monitor/Panel options | | Select one | |
|  | | 5AC901.LDPO-00<br>5AC901.LSDL-00 | |
| CFast cards | Select one | | |
| | 5CFAST.2048-00<br>5CFAST.4096-00<br>5CFAST.8192-00 | 5CFAST.016G-00<br>5CFAST.032G-00 | |
| USB accessories | Select one | | |
|  | 5MMUSB.2048-01 | | |
| Terminal blocks | Select one | | |
|  | **Power connectors**<br>0TB103.9<br>0TB103.91 | | |
| Operating systems | Select one | | |
| Windows xp, Windows 7, Windows Embedded Standard 2009, Windows Embedded Standard 7, Automation Runtime | **Windows 7**<br>5SWWI7.1100-ENG<br>5SWWI7.1100-GER<br>5SWWI7.1300-MUL<br>5SWWI7.1200-ENG<br>5SWWI7.1200-GER<br>5SWWI7.1400-MUL<br>**Windows XP**<br>5SWWXP.0600-ENG<br>5SWWXP.0600-GER<br>5SWWXP.0600-MUL | **Windows Embedded Standard 7**<br>5SWWI7.1540-ENG<br>5SWWI7.1640-ENG<br>5SWWI7.1740-MUL<br>5SWWI7.1840-MUL<br>**Windows Embedded Standard 2009**<br>5SWWXP.0740-ENG | **Automation Runtime**<br>1A4600.10-5<br>1A4601.06-5 |

1) Certain limitations must be taken into account when using IF options. For more information, please refer to "Chapter 2 Technical data", section "Device interfaces".

Figure 3: Configuration - Accessories and software

# 2 Complete device

## 2.1 Temperature specifications

CPU boards can be combined with various other components, such as drives, main memory, additional insert cards, etc. depending on the system unit and fan kit. The 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 regarding worst-case conditions**

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

### 2.1.1 Maximum ambient temperature

#### Operation with a fan kit

## Information:

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

| | All temperature values in degrees Celsius (°C) at 500 meters above sea level.<br><br>The maximum ambient temperature must typically be derated by 1°C per 1000 meters (starting at 500 meters above sea level). | Operation with a fan kit | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 5PC900.TS77-00 | 5PC900.TS77-01 | 5PC900.TS77-02 | 5PC900.TS77-03 | 5PC900.TS77-04 | 5PC900.TS77-05 | 5PC900.TS77-06 | 5PC900.TS77-07 | 5PC900.TS77-08 | Temperature limits | Location of sensor(s) |
| | **Maximum ambient temperature** | **55** | **55** | **55** | **55** | **55** | **55** | **55** | **55** | **55** | | |
| | What can also be operated at the max. ambient temperature, or are there limits? | | | | | | | | | | | |
| **System units** | 5PC910.SX01-00 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | Power supply |
| | 5PC910.SX02-00 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | |
| **Main memory** | 5MMDDR.1024-03 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | - |
| | 5MMDDR.2048-03 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | |
| | 5MMDDR.4096-03 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | |
| | 5MMDDR.8192-03 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | |
| **Compact slide-in drive** | 5AC901.CHDD-00 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | Slide-in compact drive |
| | 5AC901.CSSD-00 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | |
| | 5AC901.CSSD-01 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | |
| | 5AC901.CSSD-02 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | |
| | 5AC901.CCFA-00 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | |
| **Interface options** | 5AC901.I485-00 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | Interface option |
| | 5AC901.ICAN-00 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | |
| | 5AC901.IHDA-00 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | |
| | 5AC901.ISRM-00 | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | - | |
| **Monitor/Panel options** | 5AC901.LDPO-00 | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | - | Monitor/Panel option |
| | 5AC901.LSDL-00 | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | - | |
| **CFast cards** | 5CFAST.2048-00 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | - |
| | 5CFAST.4096-00 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | |
| | 5CFAST.8192-00 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | |
| | 5CFAST.016G-00 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | |
| | 5CFAST.032G-00 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | |

Table 4: Ambient temperature with a fan kit

**Operation without a fan kit**

## Information:

**The 5PC900.TS77-00 CPU board cannot be used when operating without a fan kit.**

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

| | All temperature values in degrees Celsius (°C) at 500 meters above sea level.<br>The maximum ambient temperature must typically be derated by 1°C per 1000 meters (starting at 500 meters above sea level). | Operation without a fan kit | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 5PC900.TS77-00 | 5PC900.TS77-01 | 5PC900.TS77-02 | 5PC900.TS77-03 | 5PC900.TS77-04 | 5PC900.TS77-05 | 5PC900.TS77-06 | 5PC900.TS77-07 | 5PC900.TS77-08 | Temperature limits | Location of sensor(s) |
| | **Maximum ambient temperature** | **-** | **35** | **40** | **50** | **35** | **35** | **50** | **50** | **50** | | |
| | What can also be operated at the max. ambient temperature, or are there limits? | | | | | | | | | | | |
| **System units** | 5PC910.SX01-00 | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | Power supply |
| | 5PC910.SX02-00 | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | |
| **Main memory** | 5MMDDR.1024-03 | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | - |
| | 5MMDDR.2048-03 | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | |
| | 5MMDDR.4096-03 | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | |
| | 5MMDDR.8192-03 | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | |
| **Compact slide-in drive** | 5AC901.CHDD-00 | - | ✓ | ✓ | 45 | ✓ | ✓ | 45 | 45 | 45 | - | Slide-in compact drive |
| | 5AC901.CSSD-00 | - | ✓ | ✓ | 45 | ✓ | ✓ | 45 | 45 | 45 | - | |
| | 5AC901.CSSD-01 | - | ✓ | ✓ | 45 | ✓ | ✓ | 45 | 45 | 45 | - | |
| | 5AC901.CSSD-02 | - | ✓ | ✓ | 45 | ✓ | ✓ | 45 | 45 | 45 | - | |
| | 5AC901.CCFA-00 | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | |
| **Interface options** | 5AC901.I485-00 | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | Interface option |
| | 5AC901.ICAN-00 | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | |
| | 5AC901.IHDA-00 | - | ✓ | ✓ | 40 | ✓ | ✓ | 40 | 40 | 40 | - | |
| | 5AC901.ISRM-00 | - | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | - | |
| **Monitor/Panel options** | 5AC901.LDPO-00 | - | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | - | Monitor/Panel option |
| | 5AC901.LSDL-00 | - | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD | - | |
| **CFast cards** | 5CFAST.2048-00 | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | - |
| | 5CFAST.4096-00 | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | |
| | 5CFAST.8192-00 | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | |
| | 5CFAST.016G-00 | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | |
| | 5CFAST.032G-00 | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | - | |

Table 5: Ambient temperature without a fan kit

**How is the 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, main memory, interface options, etc. can change the temperature limits of an APC910 system.

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

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

### 2.1.2 Minimum ambient temperature

The minimum ambient temperature is 0°C.

### 2.1.3 Temperature monitoring

Sensors monitor temperature values in many different areas in the APC910. The locations of the temperature sensors can be seen in "Figure 4: Temperature sensor locations" on page 22. The values listed in "Table 6: Temperature sensor locations" on page 22 represent the defined maximum temperature[4)] for the respective measurement point. An alarm is not triggered if this temperature is exceeded. These temperatures can be read in BIOS or in approved Microsoft Windows operating systems via the B&R Control Center.

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

### 2.1.4 Temperature sensor locations

Sensors indicate temperature values in many different areas in the APC910. The temperatures[5)] can be read in BIOS (menu item Advanced - OEM Features - System Board Features / CPU Board Features - Temperature Values) or in Microsoft Windows operating systems via the B&R Control Center[6)].

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

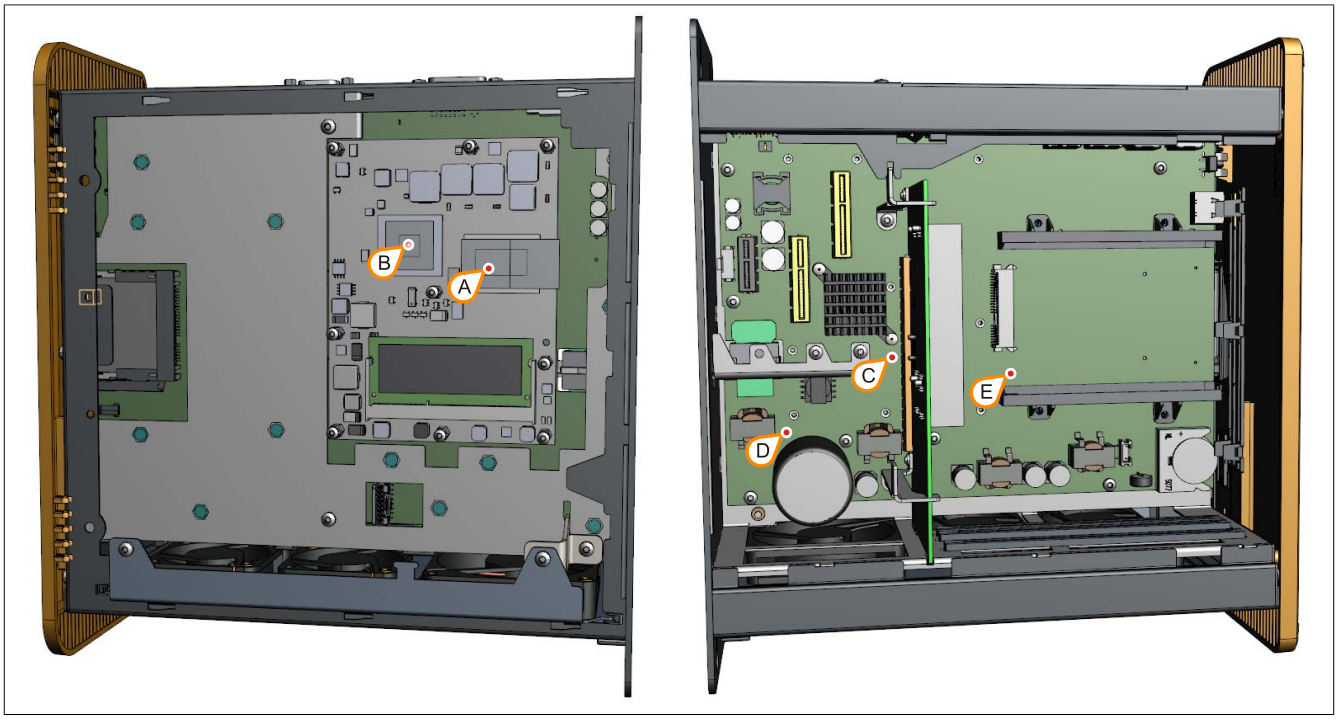



Figure 4: Temperature sensor locations

| Position | Measurement point for | Measurement | Max. specified |
|---|---|---|---|
| A | CPU | Ambient temperature of the processor (sensor integrated in the processor) | 95°C |
| B | Board Controller | Board Controller temperature (sensor integrated on the CPU board). | 95°C |
| C | Main memory | Temperature around main memory (sensor integrated on the baseboard). | 75°C |
| D | Board power supply | Board power supply temperature (sensor on the baseboard). | 90°C |
| E | Slide-in compact | Temperature around slide-in compact drive (sensor on baseboard). | Drive-dependent |
| F | Slide-in drive 1 | Temperature of a slide-in drive 1 (the sensor is integrated on the slide-in drive). | Drive-dependent |
| H | Interface option | Temperature of an interface option (sensor integrated on the interface option) | Depends on interface option |
| I | Monitor / Panel option | Temperature of a monitor / panel option (sensor integrated on the monitor / panel option) | Depends on monitor / panel option |

Table 6: Temperature sensor locations

4) The temperature measured approximates the immediate ambient temperature but may also be influenced by neighboring components.
5) The measured temperature approximates the immediate ambient temperature, but can be influenced by neighboring components.
6) 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 |
|---|---|---|---|
| System units (all models) | | 5 to 90% | 5 to 95% |
| QM77 / HM76 CPU boards | | 10 to 90% | 5 to 95% |
| Main memory for CPU boards | | 10 to 90% | 5 to 95% |
| Compact slide-in drive | 5AC901.CHDD-00 | 5 to 95% | 5 to 95% |
| | 5AC901.CSSD-00 | 5 to 95% | 5 to 95% |
| | 5AC901.CSSD-01 | 5 to 95% | 5 to 95% |
| | 5AC901.CSSD-02 | 5 to 95% | 5 to 95% |
| | 5AC901.CCFA-00 | 5 to 90% | 5 to 95% |
| Interface options | 5AC901.I485-00 | 5 to 90% | 5 to 95% |
| | 5AC901.ICAN-00 | 5 to 90% | 5 to 95% |
| | 5AC901.IHDA-00 | 5 to 90% | 5 to 95% |
| | 5AC901.ISRM-00 | 5 to 90% | 5 to 95% |
| Monitor / panel options | 5AC901.LDPO-00 | 5 to 90% | 5 to 95% |
| | 5AC901.LSDL-00 | 5 to 90% | 5 to 95% |
| Accessories | 5MMUSB.2048-01 flash drive | 10 to 90% | 5 to 90% |
| | 5CFAST.xxxx-00 CFast cards | Max. 85% | Max. 85% |
| | 5MD900.USB2-02 USB Media Drive | 20 to 80% | 5 to 90% / 5 to 95% |

Table 7: Overview of humidity specifications for individual components

The 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 Block diagram - Supply voltage

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

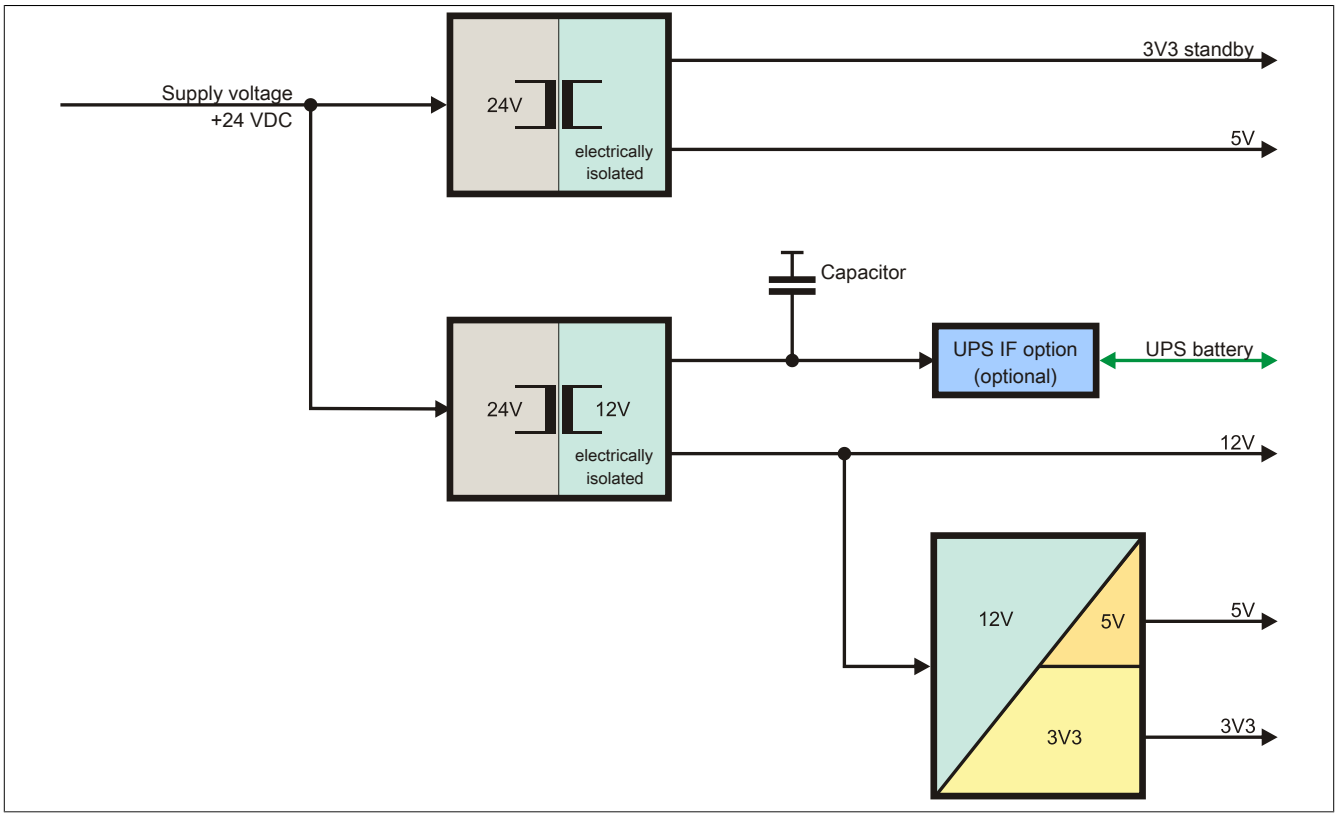



Figure 5: Supply voltage for system units

### 2.3.2 Power calculation with 5PC910.SX01-00

## Information:

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

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

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

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

Table 8: Power calculation APC 1 slot

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

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

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

### 2.3.3 Power calculation with 5PC910.SX02-00

## Information:

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

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

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

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

Table 10: Power calculation APC 2 slot

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

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

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

## 2.4 Block diagram

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

### 2.4.1 System unit 5PC910.SX01-00 + bus unit 5AC901.BX01-00

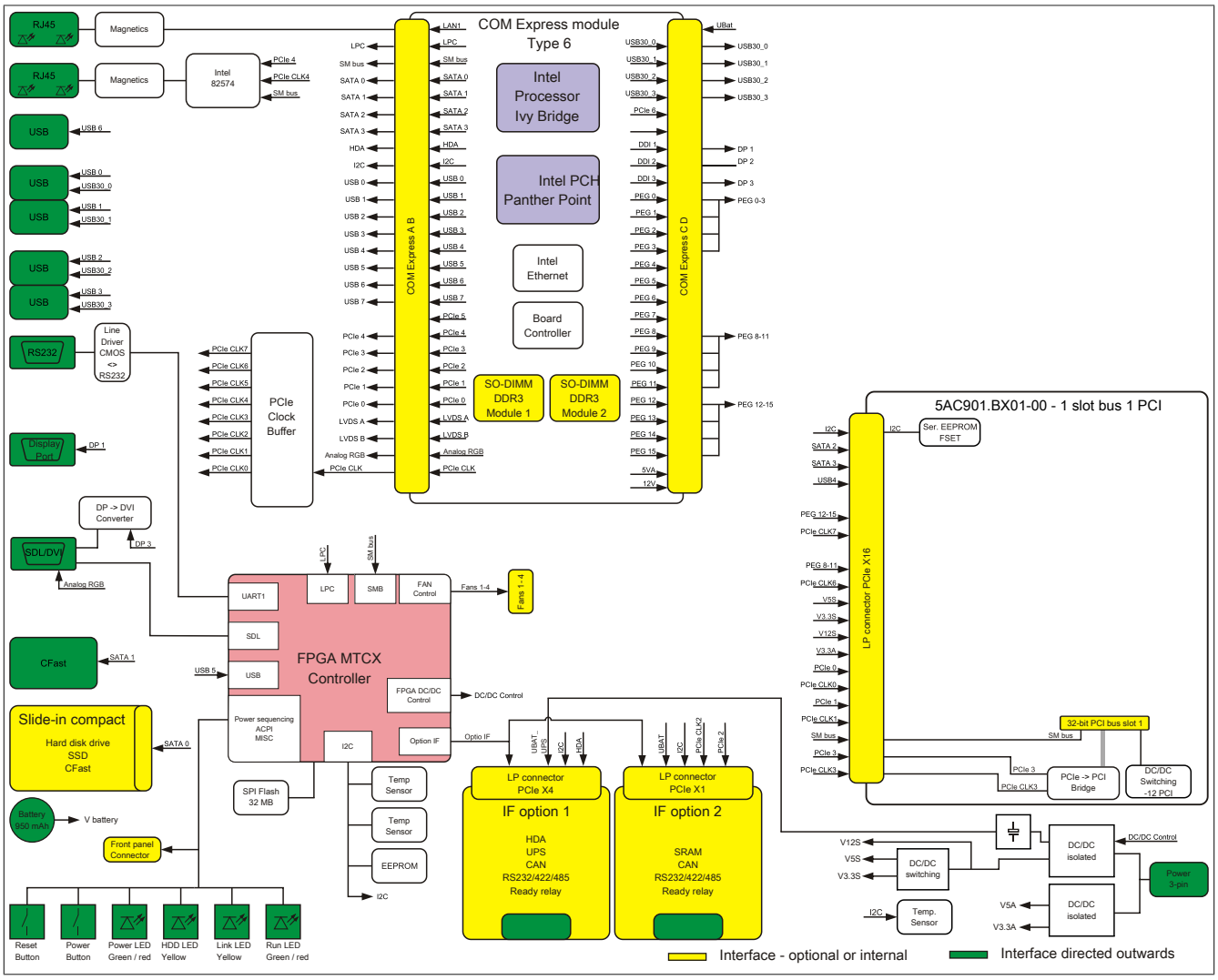



Figure 6: System unit 5PC910.SX01-00 + bus unit 5AC901.BX01-00 block diagram

## 2.4.2 System unit 5PC910.SX01-00 + bus unit 5AC901.BX01-01

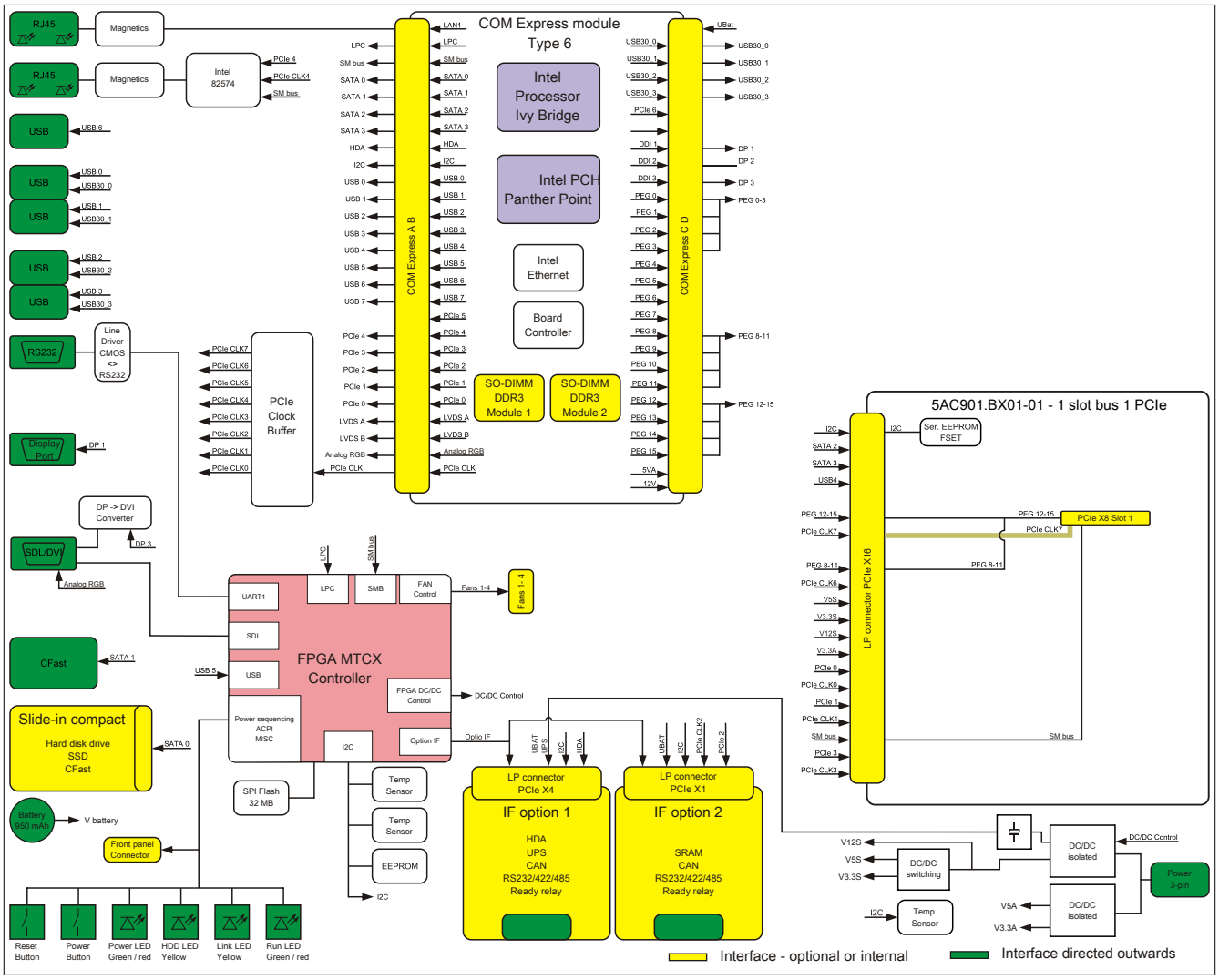



Figure 7: System unit 5PC910.SX01-00 + bus unit 5AC901.BX01-01 block diagram

## 2.4.3 System unit 5PC910.SX02-00 + bus unit 5AC901.BX02-00

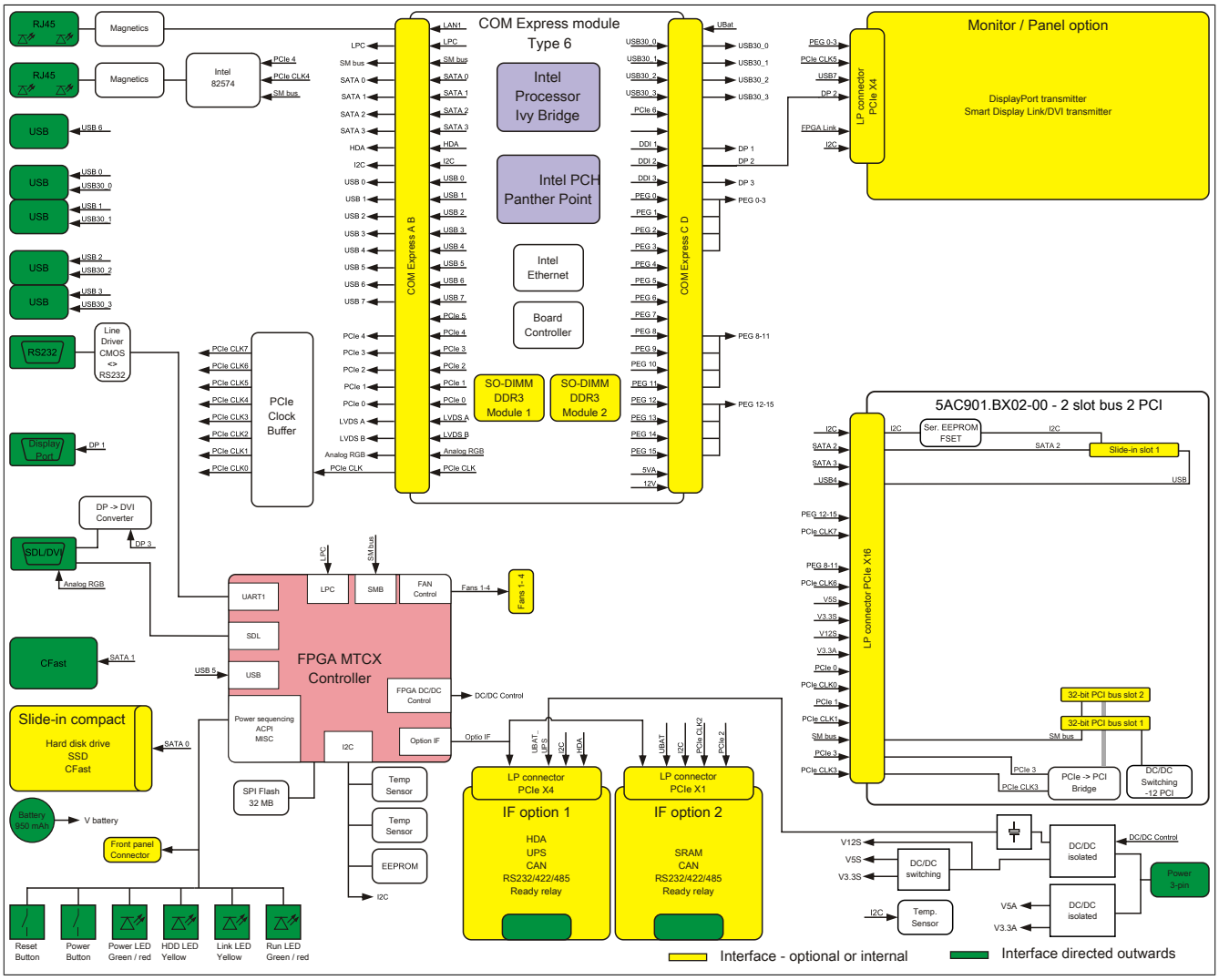



Figure 8: System unit 5PC910.SX02-00 + bus unit 5AC901.BX02-00 block diagram

## 2.4.4 System unit 5PC910.SX02-00 + bus unit 5AC901.BX02-01

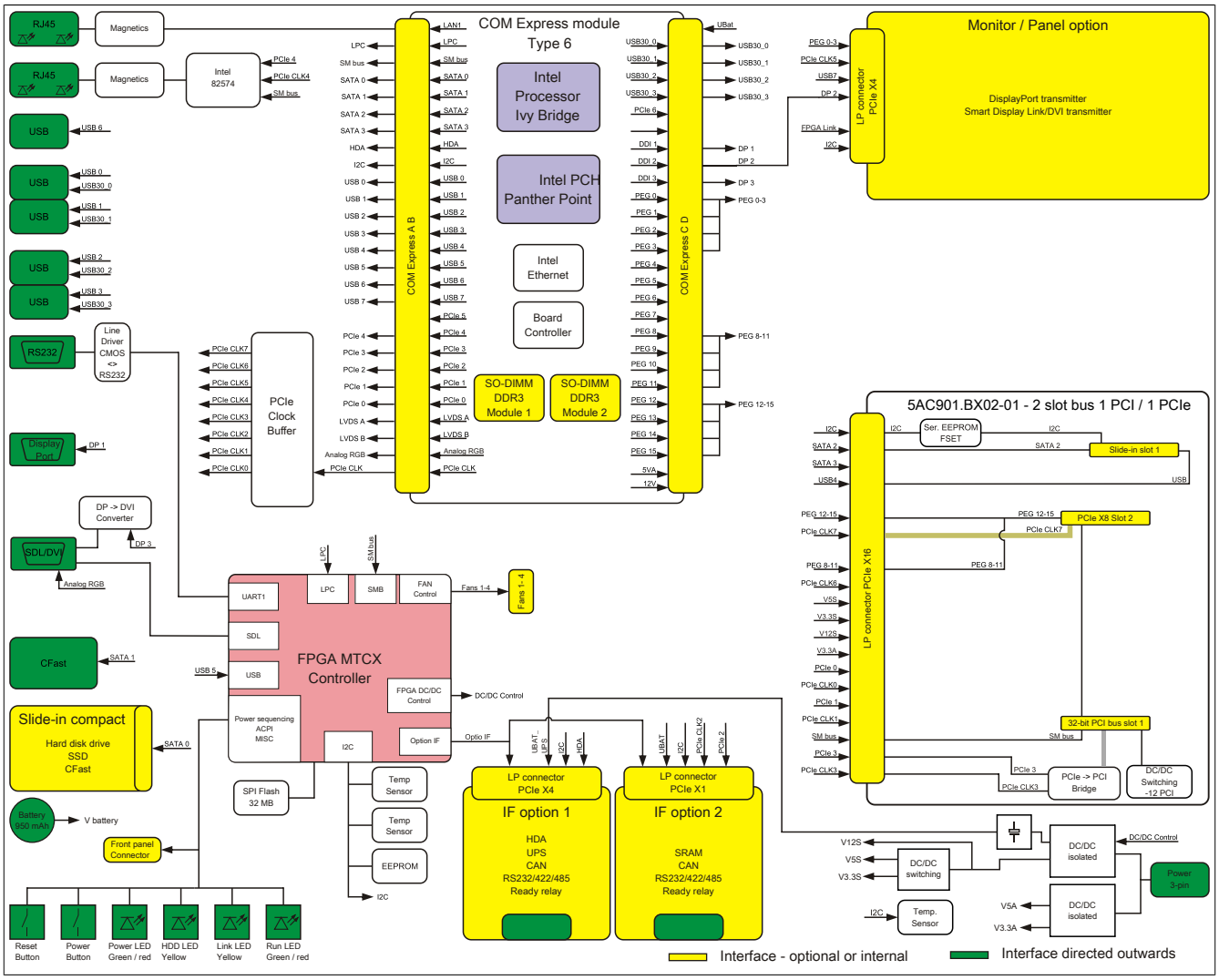



Figure 9: System unit 5PC910.SX02-00 + bus unit 5AC901.BX02-01 block diagram

### 2.4.5 Monitor / panel options

#### DisplayPort transmitter

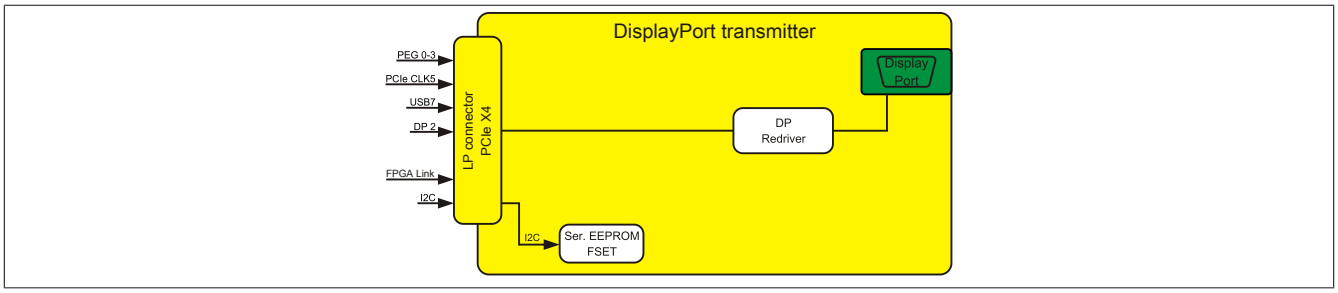



Figure 10: DisplayPort transmitter 5AC901.LDPO-00 block diagram

#### SDL / DVI transmitter

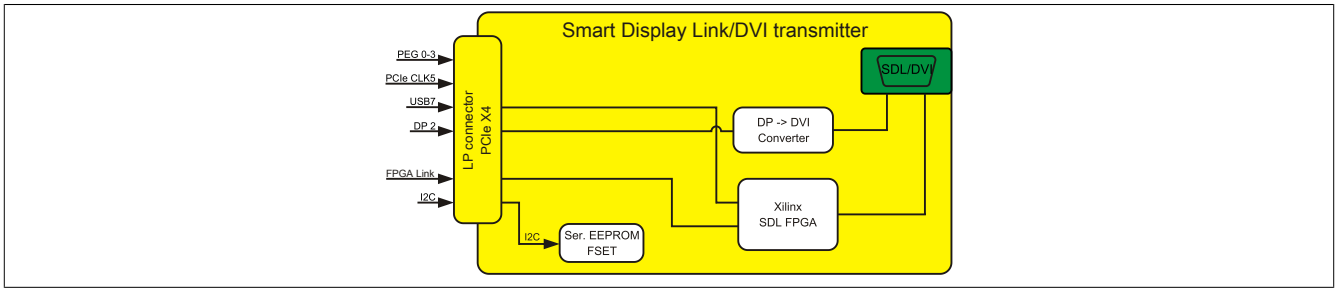



Figure 11: Smart Display Link/DVI transmitter 5AC901.LSDL-00 block diagram

## 2.5 Device interfaces

### 2.5.1 Overview of device interfaces

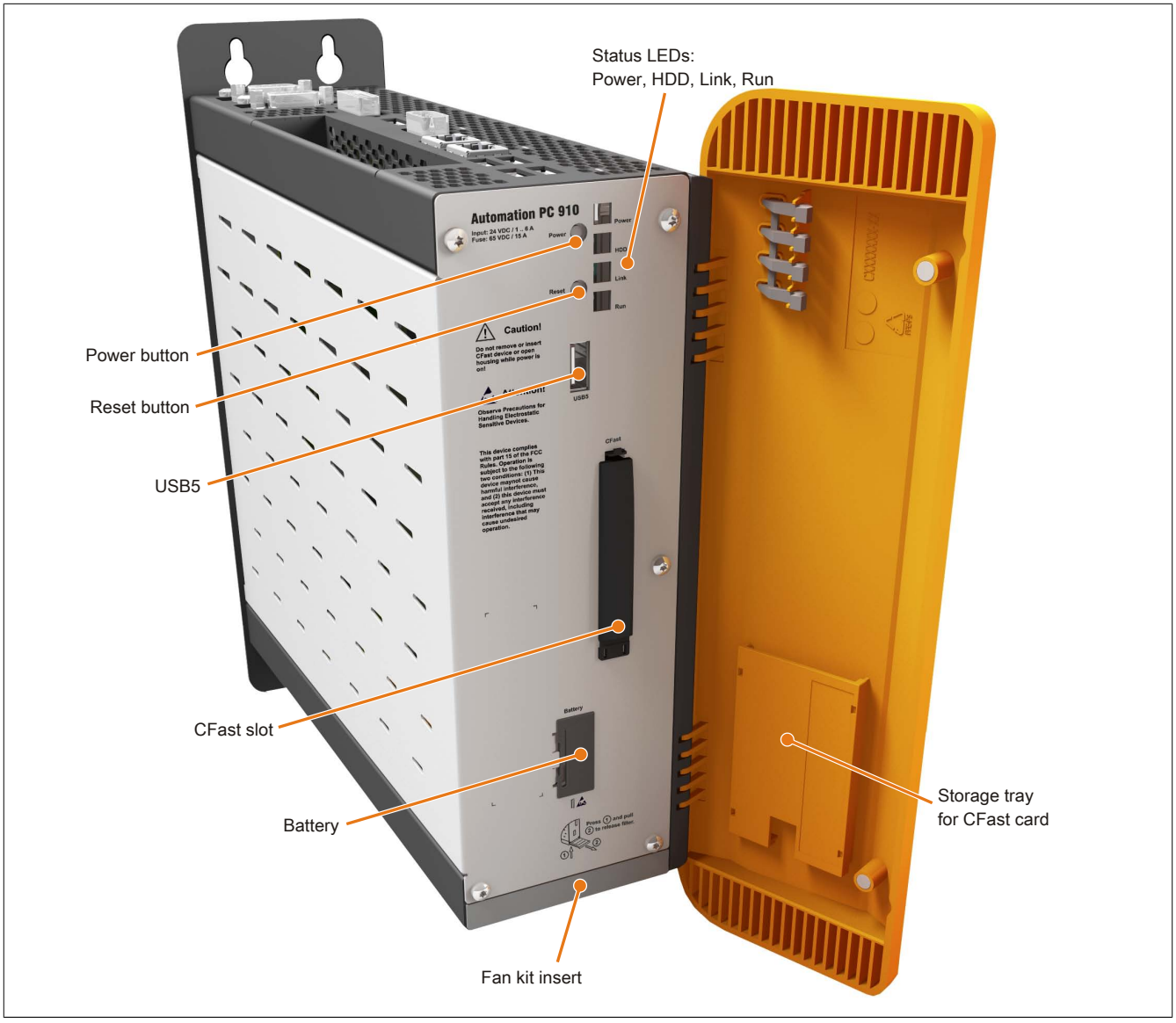



Figure 12: Device interfaces - Overview (front)

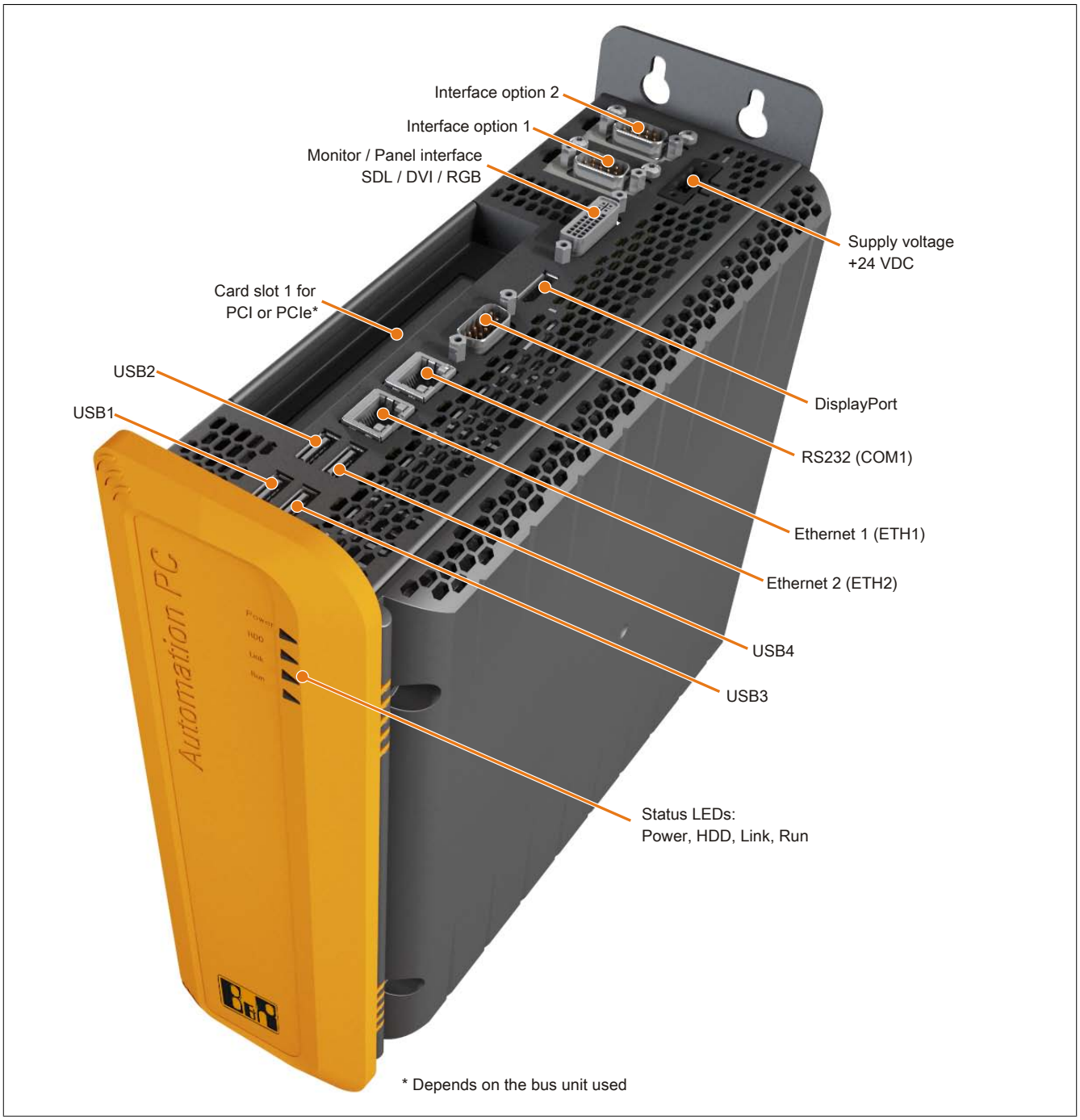



Figure 13: Device interfaces - Overview (top)

### 2.5.2 Supply voltage +24 VDC

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

The pinout can be found either in the following table or printed on the housing. The supply voltage is protected internally by a soldered fuse (15 A, fast-acting) so that the device cannot be damaged if an overload occurs (fuse replacement necessary) or 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 due to 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 | Connector 24 V 5.08 3-pin screw clamp | |
| 0TB103.91 | Connector 24 V 5.08 3-pin cage clamp | |
| | | |

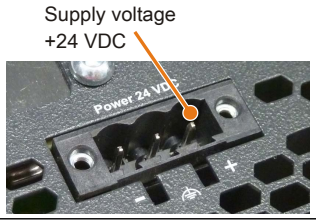



Table 12: 24 VDC supply voltage connection

#### Ground

## Caution!

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

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

Figure 14: Ground connection

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

### 2.5.3 Serial interface COM1

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

9-pin DSUB plug

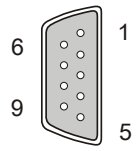



Table 13: Pin assignments - COM1

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

### 2.5.4 Monitor / panel connection

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

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

### Pinout

| Pin | assignment | Description | Pin | assignment | Description |
|---|---|---|---|---|---|
| 1 | TMDS Data 2- | DVI lane 2 (negative) | 16 | HPD | Hot plug detect |
| 2 | TMDS Data 2+ | DVI lane 2 (positive) | 17 | TMDS Data 0- | DVI lane 0 (negative) |
| 3 | TMDS Data 2/4 SHIELD | Shield for data pair 2 and 4 | 18 | TMDS Data 0+ | DVI lane 0 (positive) |
| 4 | SDL- | SDL lane (negative) | 19 | TMDS Data 0/ XUSB1 SHIELD | Shield for data pair 0 and USB1 |
| 5 | SDL+ | SDL lane (positive) | 20 | XUSB1- | USB lane 1 (negative) |
| 6 | DDC Clock | DDC-based control signal (clock) | 21 | XUSB1+ | USB lane 1 (positive) |
| 7 | DDC Data | DDC-based control signal (data) | 22 | TMDS Clock Shield | Shield for clock pair |
| 8 | n.c. | Not connected | 23 | TMDS Clock+ | DVI clock (positive) |
| 9 | TMDS Data 1- | DVI lane 1 (negative) | 24 | TMDS Clock - | DVI clock (negative) |
| 10 | TMDS DATA 1+ | DVI lane 1 (negative) HDMI clock (positive) | C1 | ANALOG RED | Analog red |
| 11 | TMDS DATA 1/ XUSB0 SHIELD | Shield for data pair 1 and USB0 | "c2" | ANALOG GREEN | Analog green |
| 12 | XUSB0- | USB lane 0 (negative) | C3 | ANALOG BLUE | Analog blue |
| 13 | XUSB0+ | USB lane 0 (positive) | C4 | ANALOG HORZ SYNC | Analog horizontal synchro-nization |
| 14 | +5 V Power[1)] | +5 V power supply | C5 | ANALOG GND | Analog ground (return for R, G and B signals) |
| 15 | Ground (return for +5 V, HSync and VSync) | Ground | | | |

DVI 24-pin, female

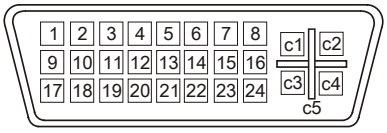



Table 15: Pinout - DVI connection

1) Protected internally by a multifuse

### Cable lengths and resolutions for SDL transfer

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

| SDL cables | Resolution | | | | | |
|---|---|---|---|---|---|---|
| Segment length [m] | VGA 640 x 480 | SVGA 800 x 600 | XGA 1024 x 768 | SXGA 1280 x 1024 | UXGA 1600 x 1200 | FHD 1920 x 1080 |
| **1.8** | 5CASDL.0018-00<br>5CASDL.0018-01<br>5CASDL.0018-03 | 5CASDL.0018-00<br>5CASDL.0018-01<br>5CASDL.0018-03 | 5CASDL.0018-00<br>5CASDL.0018-01<br>5CASDL.0018-03 | 5CASDL.0018-00<br>5CASDL.0018-01<br>5CASDL.0018-03 | 5CASDL.0018-00<br>5CASDL.0018-01<br>5CASDL.0018-03 | 5CASDL.0018-00<br>5CASDL.0018-01<br>5CASDL.0018-03 |
| **5** | 5CASDL.0050-00<br>5CASDL.0050-01<br>5CASDL.0050-03 | 5CASDL.0050-00<br>5CASDL.0050-01<br>5CASDL.0050-03 | 5CASDL.0050-00<br>5CASDL.0050-01<br>5CASDL.0050-03 | 5CASDL.0050-00<br>5CASDL.0050-01<br>5CASDL.0050-03 | 5CASDL.0050-00<br>5CASDL.0050-01<br>5CASDL.0050-03 | 5CASDL.0050-00<br>5CASDL.0050-01<br>5CASDL.0050-03 |
| **10** | 5CASDL.0100-00<br>5CASDL.0100-01<br>5CASDL.0100-03 | 5CASDL.0100-00<br>5CASDL.0100-01<br>5CASDL.0100-03 | 5CASDL.0100-00<br>5CASDL.0100-01<br>5CASDL.0100-03 | 5CASDL.0100-00<br>5CASDL.0100-01<br>5CASDL.0100-03 | 5CASDL.0100-00<br>5CASDL.0100-01<br>5CASDL.0100-03 | 5CASDL.0100-00<br>5CASDL.0100-01<br>5CASDL.0100-03 |
| **15** | 5CASDL.0150-00<br>5CASDL.0150-01<br>5CASDL.0150-03 | 5CASDL.0150-00<br>5CASDL.0150-01<br>5CASDL.0150-03 | 5CASDL.0150-00<br>5CASDL.0150-01<br>5CASDL.0150-03 | 5CASDL.0150-00<br>5CASDL.0150-01<br>5CASDL.0150-03 | -<br>-<br>- | -<br>-<br>5CASDL.0150-03 |
| **20** | 5CASDL.0200-00<br>5CASDL.0200-03 | 5CASDL.0200-00<br>5CASDL.0200-03 | 5CASDL.0200-00<br>5CASDL.0200-03 | 5CASDL.0200-00<br>5CASDL.0200-03 | -<br>- | -<br>5CASDL.0200-03 |

Table 16: Cable lengths and resolutions for SDL transfer

| SDL cables | Resolution | | | | | |
|---|---|---|---|---|---|---|
| Segment length [m] | VGA 640 x 480 | SVGA 800 x 600 | XGA 1024 x 768 | SXGA 1280 x 1024 | UXGA 1600 x 1200 | FHD 1920 x 1080 |
| 25 | 5CASDL.0250-00<br>5CASDL.0250-03 | 5CASDL.0250-00<br>5CASDL.0250-03 | 5CASDL.0250-00<br>5CASDL.0250-03 | -<br>- | -<br>- | -<br>- |
| 30 | 5CASDL.0300-00<br>5CASDL.0300-03 | 5CASDL.0300-00<br>5CASDL.0300-03 | -<br>5CASDL.0300-13 | -<br>5CASDL.0300-13 | -<br>- | -<br>5CASDL.0300-13 |
| 40 | 5CASDL.0400-13 | 5CASDL.0400-13 | 5CASDL.0400-13 | 5CASDL.0400-13 | - | 5CASDL.0400-13 |

Table 16: Cable lengths and resolutions for SDL transfer



### Cable lengths and resolutions for DVI transfer

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

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

Table 17: Cable lengths and resolutions for DVI transfer

## 2.5.5 DisplayPort

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

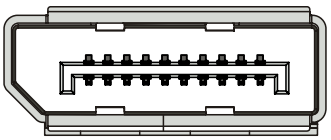


Table 18: DisplayPort 1.1

### Pin assignments - DisplayPort

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

DisplayPort (20-pin, female)

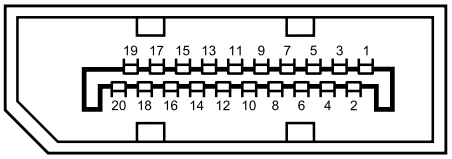



Table 19: Pin assignments - DisplayPort

### 2.5.6 Ethernet 1 (ETH1)

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

| Ethernet 1 connection (ETH1[1]) | | | |
|---|---|---|---|
| Controller | Intel® 82579 | | RJ45 twisted pair (10BaseT/100BaseT), female |
| Cabling | S/STP (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) | |

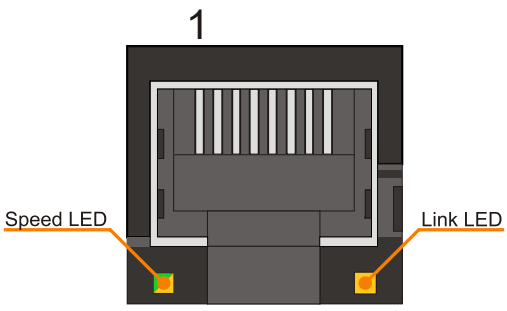



Table 20: Ethernet connection (ETH1)

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

#### Driver support

A special driver is required in order to operate the Ethernet controller. Drivers for approved operating systems are available in the Downloads 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.**

### 2.5.7 Ethernet 2 (ETH2)

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

| Ethernet 2 connection (ETH2[1]) | | | |
|---|---|---|---|
| Controller | Intel® 82574L | | RJ45 twisted pair (10BaseT/100BaseT), female |
| Cabling | S/STP (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) | |

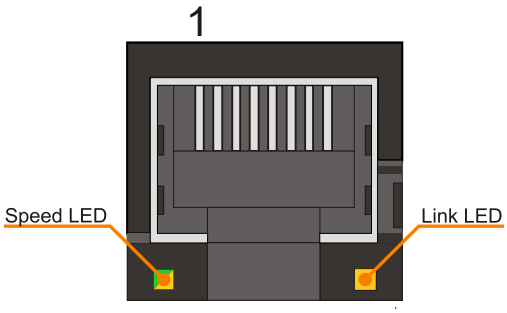



Table 21: Ethernet connection (ETH2)

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

#### Driver support

A special driver is required in order to operate the Ethernet controller. Drivers for approved operating systems are available in the Downloads 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.**

### 2.5.8 USB ports

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

## Warning!

**Peripheral USB devices can be connected to 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.**

## Caution!

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

#### USB1, USB2, USB3, USB4

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

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

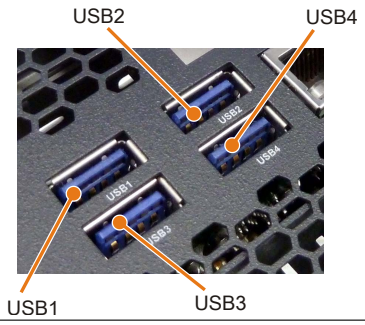



Table 22: USB1, USB2, USB3, USB4 connection

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

#### USB5

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

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

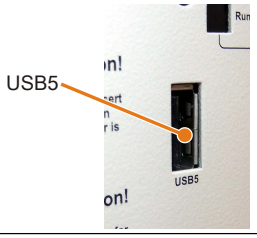



Table 23: USB5 connection

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

### 2.5.9 IF option 1 slot

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

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

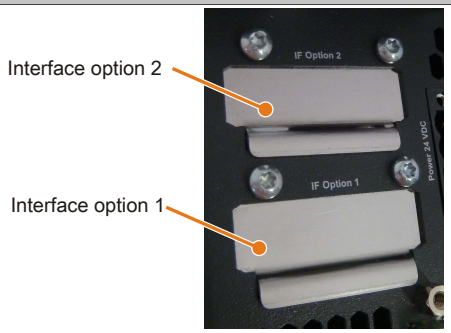



Table 24: IF option 1 slot

1) It is not possible to run two 5AC901.ICAN interface options (connected to both the IF Option 1 and IF Option 2 slots).

## Information:

**For information about replacing or exchanging an interface option, please refer to the section "Installation - Interface option" on page 139.**

### 2.5.10 IF option 2 slot

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

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

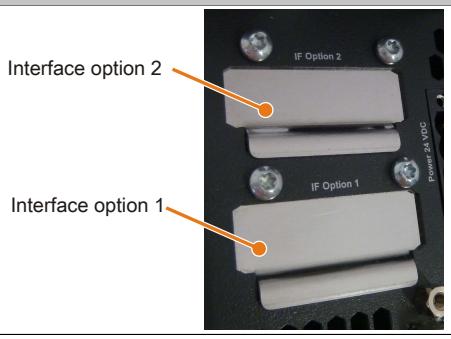



Table 25: IF option 2 slot

1) It is not possible to run two 5AC901.ICAN interface options (connected to both the IF Option 1 and IF Option 2 slots).

## Information:

**For information about replacing or exchanging an interface option, please refer to the section "Installation - Interface option" on page 139.**

### 2.5.11 Card slot (PCI / PCIe)

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

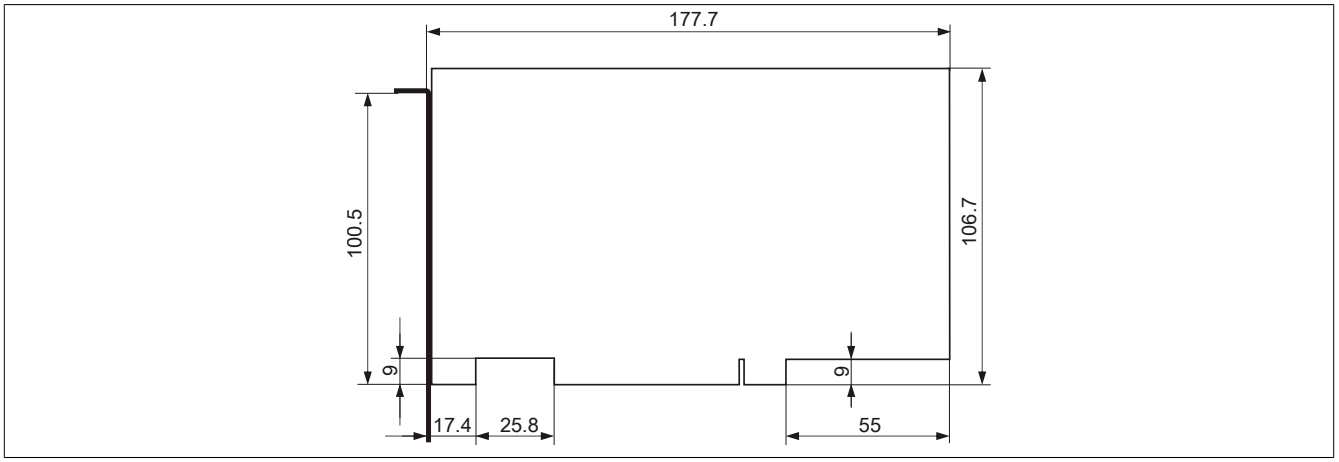



Figure 15: Dimensions - Standard half-size 32-bit PCI card

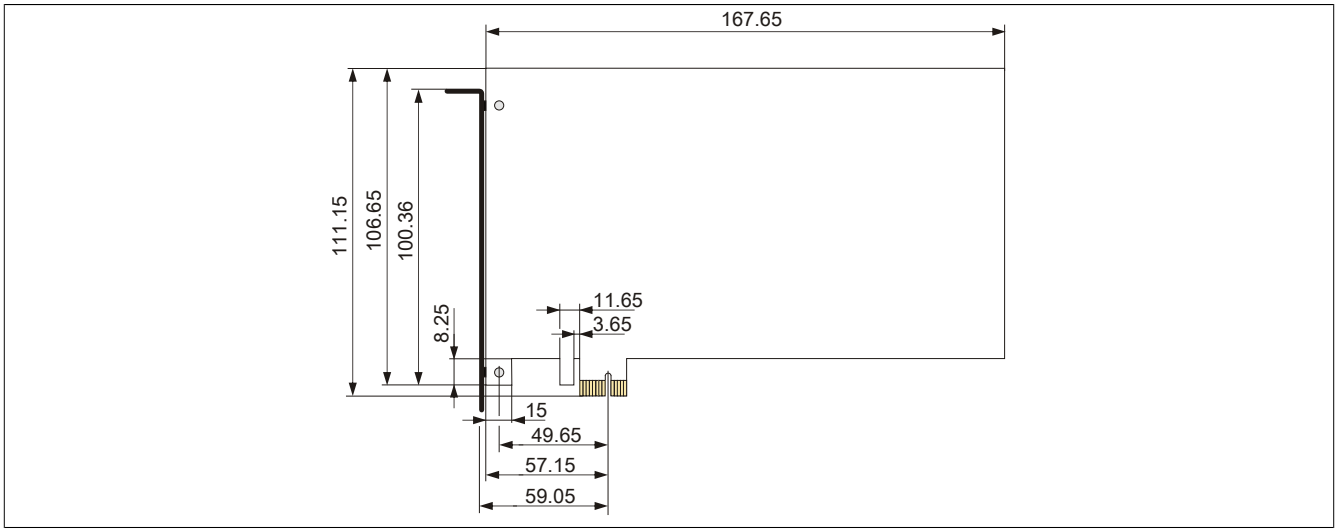
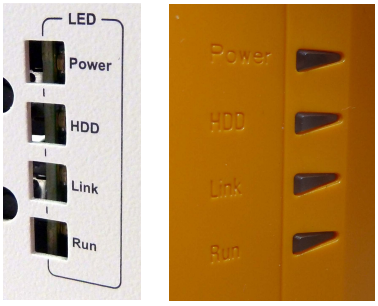



Figure 16: Dimensions - Standard half-size PCIe card

### 2.5.12 Status LEDs

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




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

| LED | Color | Status | Meaning | LED indicator |
|---|---|---|---|---|
| Power | Green | On | Supply voltage OK | |
| | | Blinking | The device has booted, the battery status is "BAD". | |
| | | | **Information:**<br>**For more information, see "Battery" on page 44.** | |
| | Red | On | The system is in standby mode (S5: soft-off mode or S4: hibernate mode - suspend-to-disk) | |
| | | Blinking | The MTCX is running, the battery status is "BAD". The system is in standby mode (S5: soft-off mode or S4: hibernate mode - suspend-to-disk). | |
| | Red / green | Blinking | Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery status OK, power supply OK | |
| | | | Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery status OK, standby mode (S5: soft-off mode or S4: hibernate mode - suspend-to-disk) | |
| | | | Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery status BAD, power supply OK | |
| | | | Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery status BAD, standby mode (S5: soft-off mode or S4: hibernate mode - suspend-to-disk) | |
| | | | **Information:**<br>**An update must be performed again.** | |
| HDD | Yellow | On | Indicates drive access (HDD, CFast) | |
| Link | Yellow | On | Indicates an active SDL connection on the panel plug | |
| | | Blinking | An active SDL connection has been interrupted by a loss of power to the display unit. | |
| | | | **Information:**<br>**Check the power supply / power connector for the connected display unit.** | |
| Run | Green | Blinking | Automation Runtime booting<br>Handled by Automation Runtime (ARemb and ARwin) | |
| | Green | On | Application running<br>Handled by Automation Runtime (ARemb and ARwin) | |
| | Red | On | Application in service mode<br>Handled by Automation Runtime (ARemb and ARwin) | |

Table 26: Data - Status LEDs

### 2.5.13 Power button

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

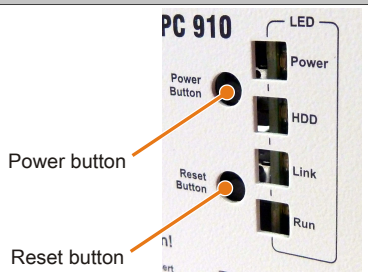
| Power button | |
|---|---|
| The power button can be pressed with a pointed object (e.g. paper clip or tip of a pen).<br><br>The power button acts like the on/off switch on a normal desktop PC with an ATX power supply:<br>**Press and release** ... Switches on the APC910 or shuts down the operating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

Table 27: Power button

### 2.5.14 Reset button

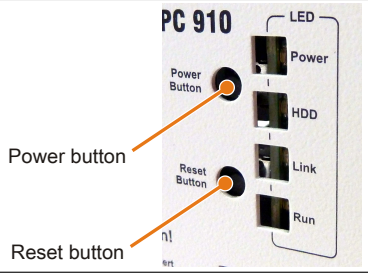
| Reset button | |
|---|---|
| The reset button can be pressed with a pointed object (e.g. paper clip or tip of a pen).<br><br>Pushing the reset button triggers a hardware and PCI reset. The APC910 is restarted (cold restart).<br><br>Pressing the reset button does not reset the MTCX processor. |  |

Table 28: Reset button

## Warning!

**A system reset can result in lost data!**

### 2.5.15 Battery

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

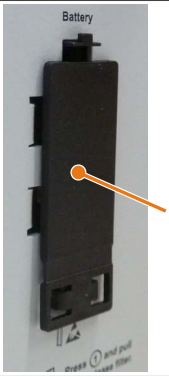
| Battery | | |
|---|---|---|
| Battery<br>Type<br>Removable<br>Lifespan | <br>Renata 950 mAh<br>Yes, accessible from the outside<br>TBD Years[1)] |  |
| **Model number** | **Short description** | |
| | **Batteries** | |
| 0AC201.91 | Lithium batteries, 4 pcs., 3 V / 950 mAh, button cell | |
| 4A0006.00-000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

Table 29: Battery

1) At 50°C, TBD µA for the components being supplied and a self-discharge of 40%

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

| Battery status | Meaning |
|---|---|
| N/A | The hardware or firmware being used is too old and does not support reading the battery status. |
| GOOD | Data buffering is provided. |
| BAD | Data buffering is provided for approximately another 500 hours from the point when battery capacity is recognized as insufficient (BAD). |

Table 30: Meaning of the battery status

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

### 2.5.16 CFast slot

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

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

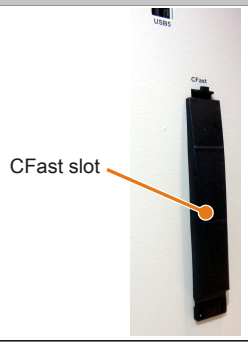
| CFast slot | | |
|---|---|---|
| Connection | SATA I |  |
| **Model number** | **Short description** | |
| | **CFast cards** | |
| 5CFAST.2048-00 | CFast card, 2 GB | |
| 5CFAST.4096-00 | CFast card, 4 GB | |
| 5CFAST.8192-00 | CFast card, 8 GB | |
| 5CFAST.016G-00 | CFast card, 16 GB | |
| 5CFAST.032G-00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

Table 31: CFast slot

## Warning!

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

### 2.5.17 Slide-in compact slot

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

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

Table 32: Slide-in compact slot

## Information:

**The slide-in compact slot cannot be accessed from the outside. The side panel must be removed in order to exchange a drive. For information about replacing or exchanging an slide-in compact drive, please refer to the section "Slide-in compact drive installation / replacement" on page 147.**

# 3 Individual components

## 3.1 System units

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

### 3.1.1 5PC910.SX01-00

#### General information

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

#### Order data

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

Table 33: 5PC910.SX01-00 - Order data

| Model number | Short description | Figure |
|---|---|---|
| | **Drives** | |
| 5AC901.CCFA-00 | CFast adapter to operate a CFast card in a slide-in compact slot | |
| 5AC901.CHDD-00 | 250 GB SATA hard disk, Slide-in compact, 24/7 hard disk | |
| 5AC901.CSSD-00 | 32 GB SATA SSD (SLC), Slide-in compact | |
| 5AC901.CSSD-01 | 60 GB SATA SSD (MLC), Slide-in compact | |
| 5AC901.CSSD-02 | 180 GB SATA SSD (MLC), Slide-in compact | |
| | **Fan kits** | |
| 5AC901.FA01-00 | APC910 fan kit for system unit 5PC910.SX01-00 | |
| | **Interface options** | |
| 5AC901.I485-00 | RS232/422/485 interface option; for APC910 | |
| 5AC901.ICAN-00 | CAN interface option; for APC910 | |
| 5AC901.IHDA-00 | Audio interface option, connection for 1x MIC, 1x Line IN, 1x Line OUT; for APC910 | |
| 5AC901.ISRM-00 | SRAM interface option, 2 MB; for APC910 | |

Table 33: 5PC910.SX01-00 - Order data



## Technical data

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

Table 34: 5PC910.SX01-00 - Technical data

| Product ID | 5PC910.SX01-00 |
|---|---|
| Quantity | 1 PCI slot or 1 PCIe slot [4] |
| Slide-in drives | No |
| Compact slide-in drive | 1 |
| Interface option | 2 |
| Monitor/Panel option | No |
| Add-on UPS slot | Yes [5] |
| Insert for fan kit | Yes |
| **Electrical characteristics** | |
| Nominal voltage | 24 VDC ±25% |
| Nominal current | 5.5 A |
| Starting current | Max. 60 A for < 300 µs |
| Electrical isolation | Yes |
| **Operating conditions** | |
| EN 60529 protection | IP20 [6] |
| **Environmental conditions** | |
| Temperature | |
| Operation | Component-dependent [7] |
| Storage | -20 to 60°C |
| Transport | -20 to 60°C |
| Relative humidity | |
| Operation | Component-dependent |
| Storage | Component-dependent |
| Transport | Component-dependent |
| Vibration [8] | |
| Operation (continuous) | TBD |
| Operation (occasional) | TBD |
| Storage | TBD |
| Transport | TBD |
| Shock [8] | |
| Operation | TBD |
| Storage | TBD |
| Transport | TBD |
| Altitude | |
| Operation | TBD [9] |
| **Mechanical characteristics** | |
| Housing [10] | |
| Material | Galvanized plate, plastic |
| Front cover | Colored orange plastic (similar to Pantone 144CV) |
| Paint | Anthracite gray |
| Dimensions | |
| Width | 91 mm |
| Height | 270 mm |
| Depth | 254.75 mm |
| Weight | 2050 g |

Table 34: 5PC910.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) Super-speed transfer rate (5 GBit/s) is only possible with USB 3.0.
4) The PCI and PCIe slots available depend on the bus unit being used (5AC901.BX01-00 or 5AC901.BX01-01).
5) This UPS module can only be operated in the IF option 1 slot.
6) Only if all interface covers and front cover are in place.
7) Detailed information can be found in the temperature tables in the user's manual.
8) Maximum values, as long as no other individual component specifies any other.
9) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).
10) Depending on the process or batch, there may be visible deviations in the color and surface structure.

## Dimensions

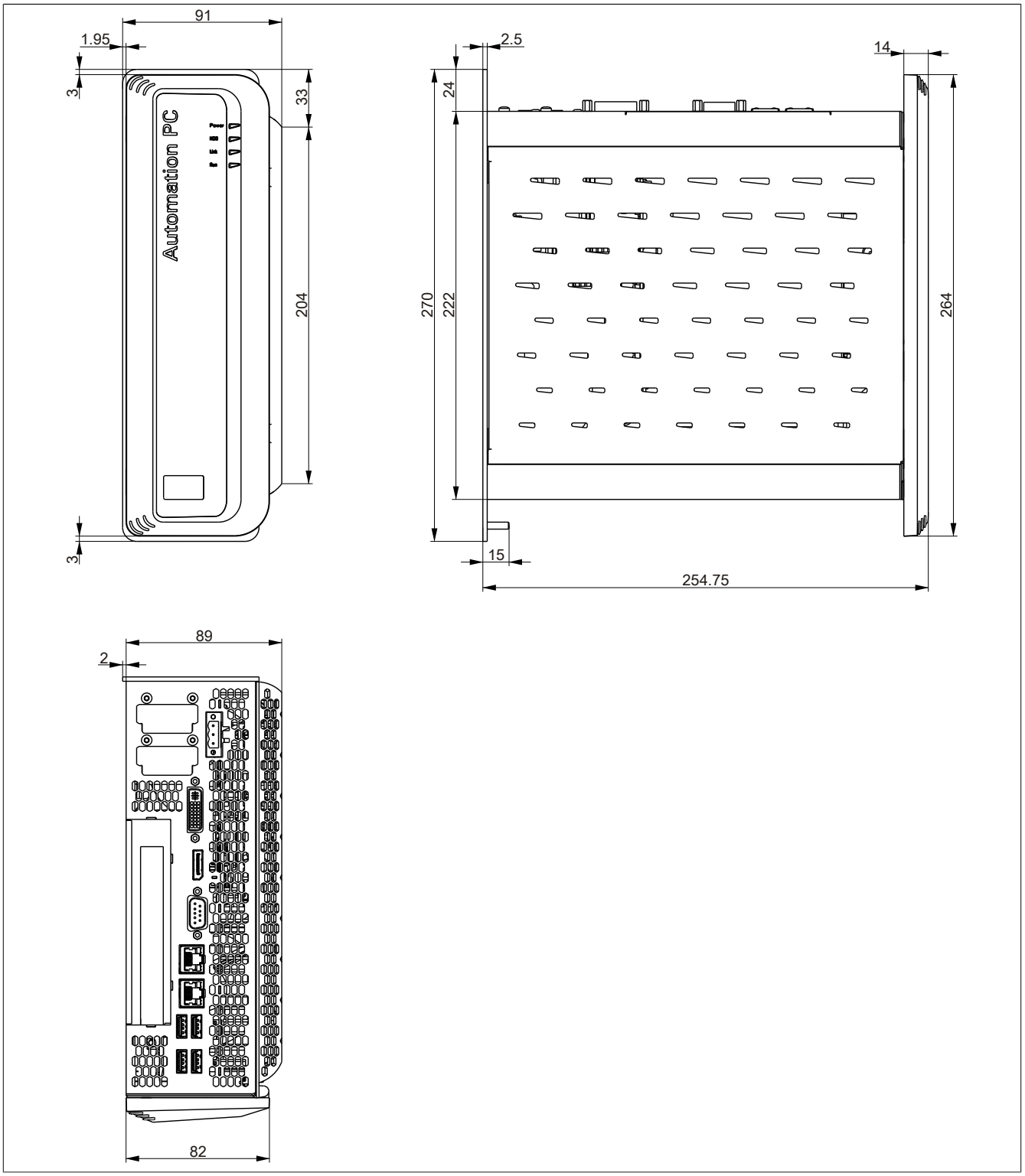



Figure 17: 5PC910.SX01-00 - Dimensions

**Drilling template**

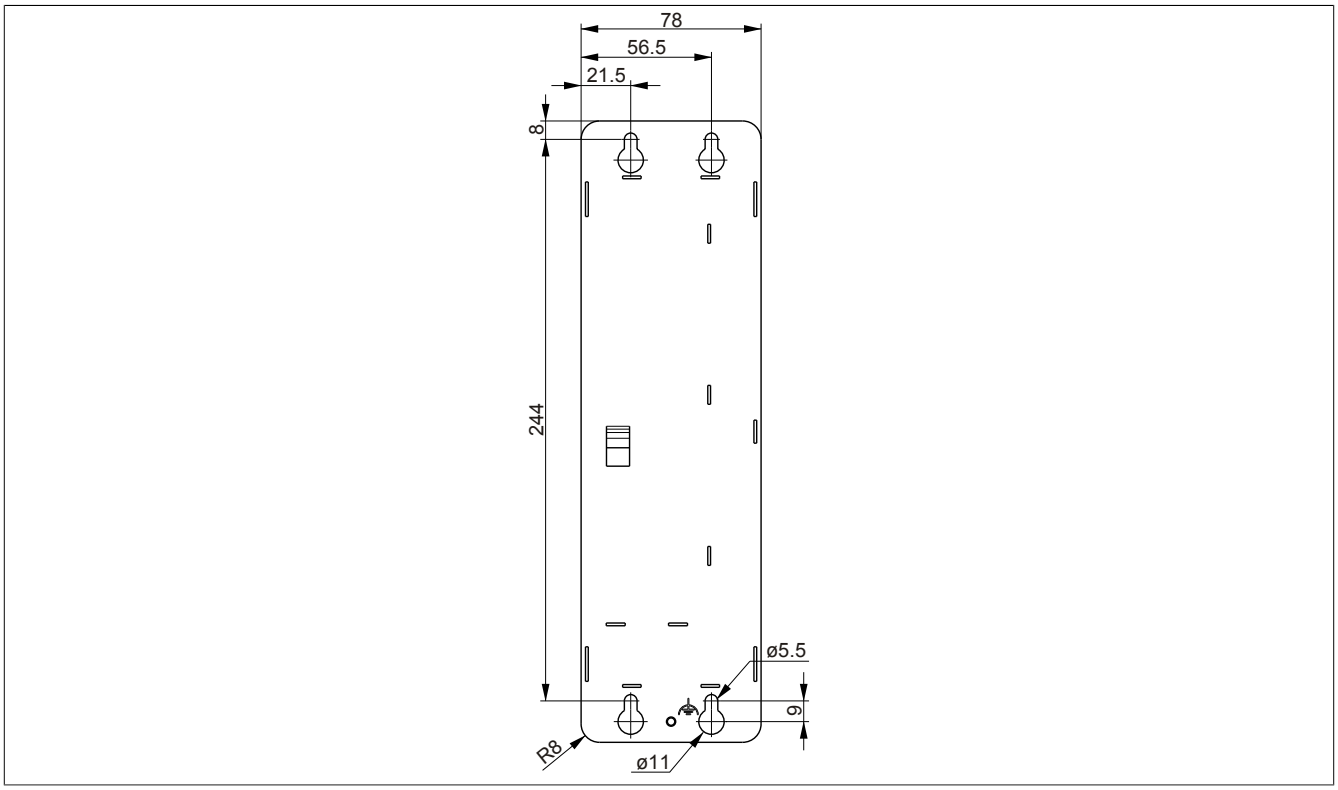



Figure 18: 5PC910.SX01-00 - Drilling template

### 3.1.2 5PC910.SX02-00

#### General information

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

#### Order data

| Model number | Short description | Figure |
|---|---|---|
| | **System units** |  |
| 5PC910.SX02-00 | APC910 system unit, 2 slots (PCI Express / PCI, depending on bus), 1 slot for monitor/panel option, 1 slide-in compact and 1 slide-in slot; Smart Display Link/DVI/Monitor, DisplayPort, 1x RS232, 5x USB, 2x ETH 10/100/1000, 1 CFast slot, 24 VDC | |
| | **Required accessories** | |
| | **Bus units** | |
| 5AC901.BX02-00 | APC910 bus, 2 PCI | |
| 5AC901.BX02-01 | APC910 bus, 1 PCI, 1 PCI Express (x8) | |
| | **CPU boards** | |
| 5PC900.TS77-00 | Intel Core i7 3615QE CPU board, 2.3 GHz, quad-core, 6 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (total memory max. 16 GB) | |
| 5PC900.TS77-01 | Intel Core i7 3612QE CPU board, 2.1 GHz, quad-core, 6 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (total memory max. 16 GB) | |
| 5PC900.TS77-02 | Intel Core i7 3555LE CPU board, 2.5 GHz, dual-core, 4 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (max. total memory 16 GB) | |
| 5PC900.TS77-03 | Intel Core i7 3517UE CPU board, 1.7 GHz, dual-core, 4 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (max. total memory 16 GB) | |
| 5PC900.TS77-04 | Intel Core i5 3610ME CPU board, 2.7 GHz, dual-core, 3 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (max. total memory 16 GB) | |
| 5PC900.TS77-05 | Intel Core i3 3120ME CPU board, 2.4 GHz, dual-core, 3 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (total memory max. 16 GB) | |
| 5PC900.TS77-06 | Intel Core i3 3217UE CPU board, 1.6 GHz, dual-core, 3 MB L2 cache; QM77 chipset; 2 sockets for SO-DIMM DDR3 modules (total memory max. 16 GB) | |
| 5PC900.TS77-07 | Intel Celeron M 847E CPU board, 1.1 GHz, dual-core, 1 MB L2 cache; HM76 chipset; 2 sockets for SO-DIMM DDR3 modules (total memory max. 16 GB) | |
| 5PC900.TS77-08 | Intel Celeron M 827E CPU board, 1.4 GHz, single-core, 1.5 MB L2 cache; HM76 chipset; 2 sockets for SO-DIMM DDR3 modules (total memory max. 16 GB) | |
| | **Heat sink** | |
| 5AC901.HS00-00 | APC910 heat sink active | |
| 5AC901.HS01-00 | APC910 heat sink passive | |
| | **Main memory** | |
| 5MMDDR.1024-03 | SO-DIMM DDR3, 1024 MB | |
| 5MMDDR.2048-03 | SO-DIMM DDR3, 2048 MB | |
| 5MMDDR.4096-03 | SO-DIMM DDR3, 4096 MB | |
| 5MMDDR.8192-03 | SO-DIMM DDR3, 8192 MB | |
| | **Terminal blocks** | |
| 0TB103.9 | Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm², protected against vibration by the screw flange | |
| 0TB103.91 | Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm², protected against vibration by the screw flange | |
| | **Optional accessories** | |
| | **Drives** | |
| 5AC901.CCFA-00 | CFast adapter to operate a CFast card in a slide-in compact slot | |
| 5AC901.CHDD-00 | 250 GB SATA hard disk, Slide-in compact, 24/7 hard disk | |
| 5AC901.CSSD-00 | 32 GB SATA SSD (SLC), Slide-in compact | |
| 5AC901.CSSD-01 | 60 GB SATA SSD (MLC), Slide-in compact | |
| 5AC901.CSSD-02 | 180 GB SATA SSD (MLC), Slide-in compact | |
| 5AC901.SDVW-00 | DVD-R/RW DVD+R/RW SATA drive, Slide-in | |
| | **Fan kits** | |

Table 35: 5PC910.SX02-00 - Order data

| Model number | Short description | Figure |
|---|---|---|
| 5AC901.FA02-00 | APC910 fan kit for system unit 5PC910.SX02-00 | |
| | **Interface options** | |
| 5AC901.I485-00 | RS232/422/485 interface option; for APC910 | |
| 5AC901.ICAN-00 | CAN interface option; for APC910 | |
| 5AC901.IHDA-00 | Audio interface option, connection for 1x MIC, 1x Line IN, 1x Line OUT; for APC910 | |
| 5AC901.ISRM-00 | SRAM interface option, 2 MB; for APC910 | |
| | **Monitor / Panel options** | |
| 5AC901.LDPO-00 | DisplayPort transmitter | |
| 5AC901.LSDL-00 | Smart Display Link/DVI transmitter | |

Table 35: 5PC910.SX02-00 - Order data

## Technical data

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

Table 36: 5PC910.SX02-00 - Technical data

| Product ID | 5PC910.SX02-00 |
|---|---|
| Monitor/Panel option | 1 |
| Add-on UPS slot | Yes [5] |
| Insert for fan kit | Yes |
| **Electrical characteristics** | |
| Nominal voltage | 24 VDC ±25% |
| Nominal current | 5.5 A |
| Starting current | Max. 60 A for < 300 µs |
| Electrical isolation | Yes |
| **Operating conditions** | |
| EN 60529 protection | IP20 [6] |
| **Environmental conditions** | |
| Temperature | |
| Operation | Component-dependent [7] |
| Storage | -20 to 60°C |
| Transport | -20 to 60°C |
| Relative humidity | |
| Operation | Component-dependent |
| Storage | Component-dependent |
| Transport | Component-dependent |
| Vibration [8] | |
| Operation (continuous) | TBD |
| Operation (occasional) | TBD |
| Storage | TBD |
| Transport | TBD |
| Shock [8] | |
| Operation | TBD |
| Storage | TBD |
| Transport | TBD |
| Altitude | |
| Operation | TBD [9] |
| **Mechanical characteristics** | |
| Housing [10] | |
| Material | Galvanized plate, plastic |
| Front cover | Colored orange plastic (similar to Pantone 144CV) |
| Paint | Anthracite gray |
| Dimensions | |
| Width | 130 mm |
| Height | 270 mm |
| Depth | 254.75 mm |
| Weight | 2550 g |

Table 36: 5PC910.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) Super-speed transfer rate (5 GBit/s) is only possible with USB 3.0.
4) The PCI and PCIe slots available depend on the 5AC901.BX01-00 or 5AC901.BX01-01 bus unit being used.
5) This UPS module can only be operated in the IF option 1 slot.
6) Only if all interface covers and front cover are in place.
7) Detailed information can be found in the temperature tables in the user's manual.
8) Maximum values, as long as no other individual component specifies any other.
9) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).
10) Depending on the process or batch, there may be visible deviations in the color and surface structure.

## Dimensions

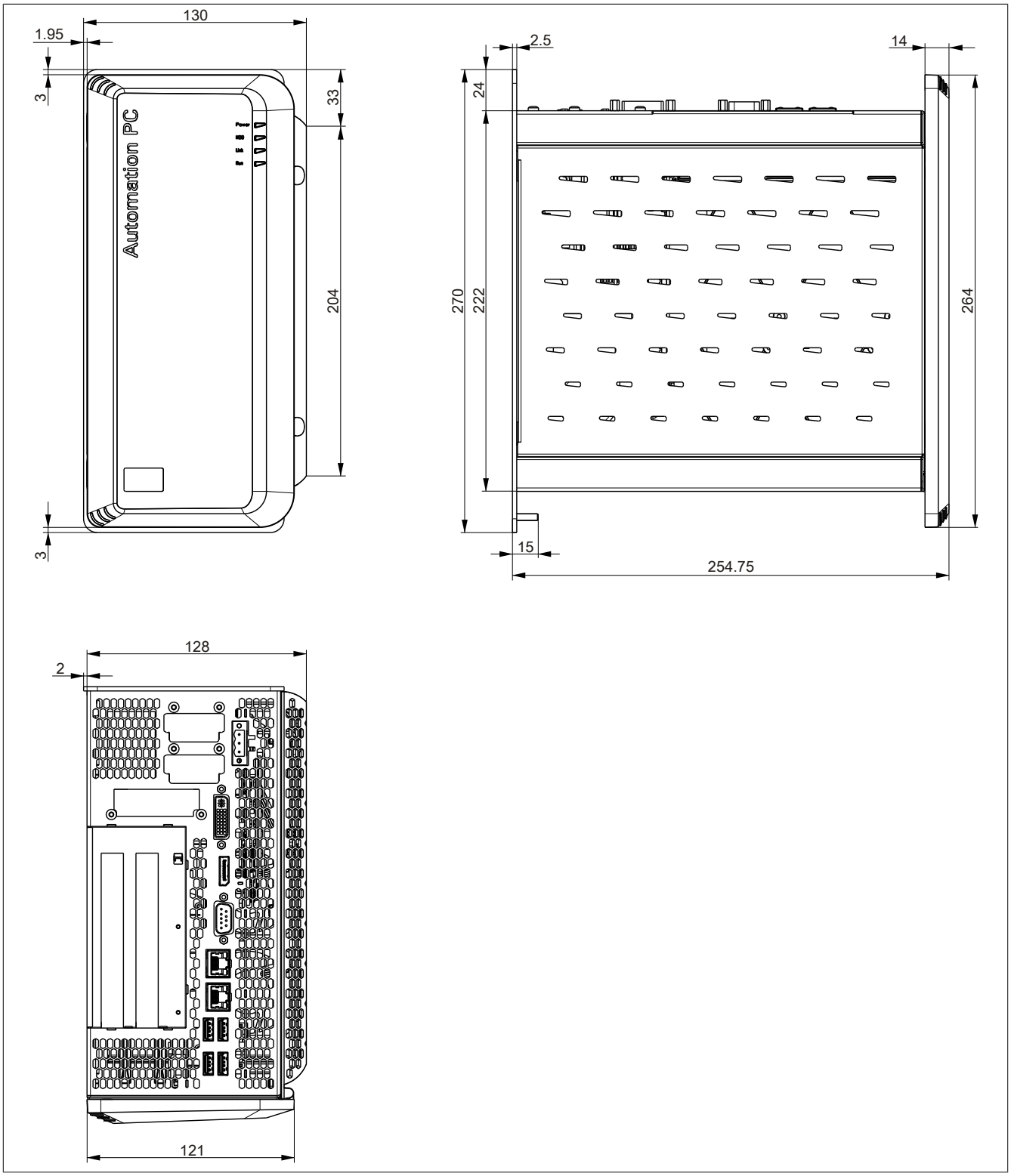



Figure 19: 5PC910.SX02-00 - Dimensions

**Drilling template**

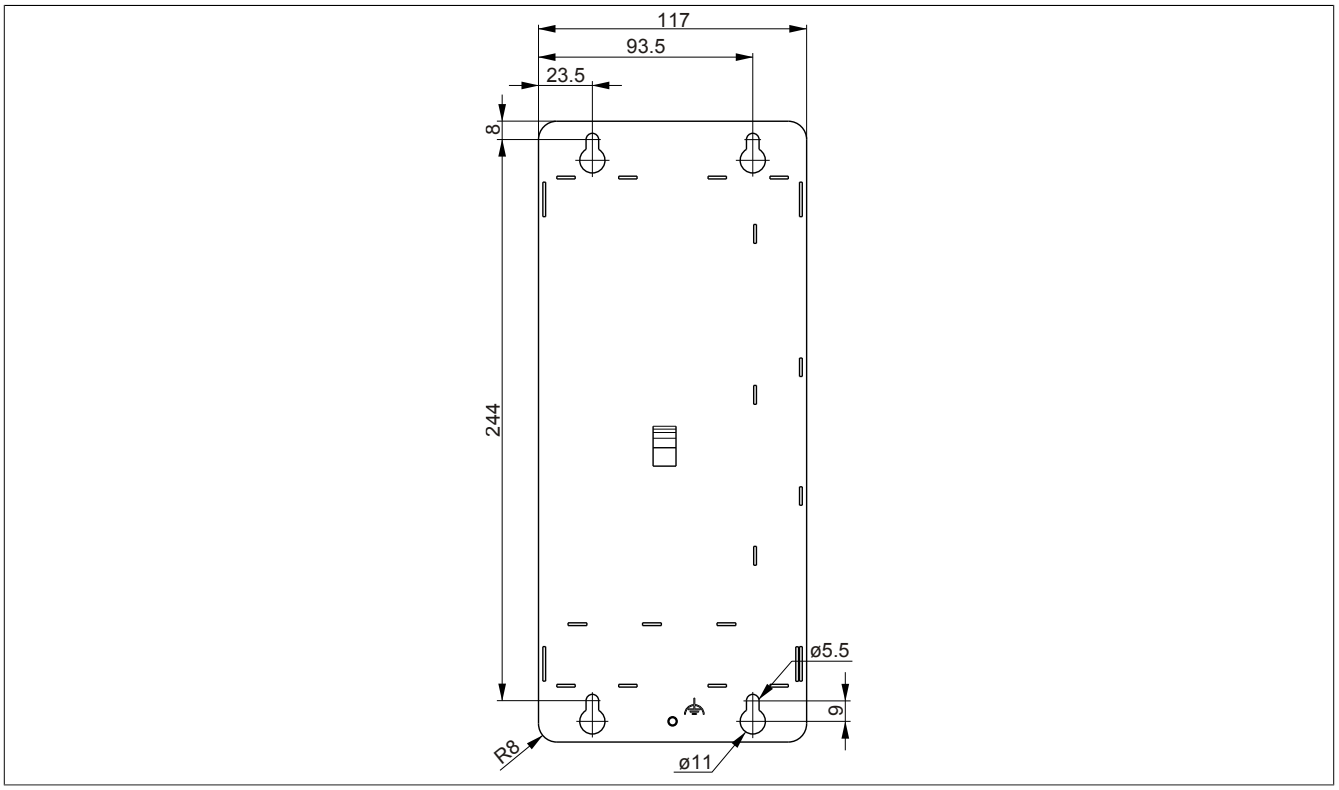



Figure 20: 5PC910.SX02-00 - Drilling template

## 3.2 QM77 CPU boards

### 3.2.1 5PC900.TS77-0x

#### General information

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

## Information:

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

#### Order data

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

Table 37: 5PC900.TS77-00, 5PC900.TS77-01, 5PC900.TS77-02, 5PC900.TS77-03, 5PC900.TS77-04, 5PC900.TS77-05, 5PC900.TS77-06 - Order data

#### Technical data

| Product ID | 5PC900.TS77-00 | 5PC900.TS77-01 | 5PC900.TS77-02 | 5PC900.TS77-03 | 5PC900.TS77-04 | 5PC900.TS77-05 | 5PC900.TS77-06 |
|---|---|---|---|---|---|---|---|
| **General information** | | | | | | | |
| Certification | | | | | | | |
| CE | Yes | | | | | | |
| **Controller** | | | | | | | |
| Boot loader | embedded AMI BIOS | | | | | | |
| Processor | | | | | | | |
| Type | Intel® Core™ i7 3615QE | Intel® Core™ i7 3612QE | Intel® Core™ i7 3555LE | Intel® Core™ i7 3517UE | Intel® Core™ i5 3610ME | Intel® Core™ i3-3120ME | Intel® Core™ i3-3217UE |
| Clock frequency | 2300 MHz | 2100 MHz | 2500 MHz | 1700 MHz | 2700 MHz | 2400 MHz | 1600 MHz |
| Number of cores | 4 | 4 | 2 | 2 | 2 | 2 | 2 |
| Architectures | 22 nm | | | | | | |
| Intel® Smart Cache | 6 MB | 6 MB | 4 MB | 4 MB | 3 MB | 3 MB | 3 MB |

Table 38: 5PC900.TS77-00, 5PC900.TS77-01, 5PC900.TS77-02, 5PC900.TS77-03, 5PC900.TS77-04, 5PC900.TS77-05, 5PC900.TS77-06 - Technical data

| Product ID | 5PC900.TS77-00 | 5PC900.TS77-01 | 5PC900.TS77-02 | 5PC900.TS77-03 | 5PC900.TS77-04 | 5PC900.TS77-05 | 5PC900.TS77-06 |
|---|---|---|---|---|---|---|---|
| External bus | DMI, 5 GT/s | | | | | | |
| Intel® 64 Architecture | Yes | | | | | | |
| Intel® Turbo Boost Technology | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | No | No |
| Intel® Hyper-Threading Technology | Yes | | | | | | |
| Intel® Virtualization Technology (VT-x) | Yes | | | | | | |
| Enhanced Intel SpeedStep® Technology | Yes | | | | | | |
| Chipset | Intel® QM77 | | | | | | |
| Real-time clock | | | | | | | |
| Precision | At 25°C: typ. 12 ppm (1 seconds) per day [1] | | | | | | |
| Battery-buffered | Yes | | | | | | |
| Memory socket | | | | | | | |
| Number of memory channels | 2 | | | | | | |
| Type | DDR3 | | | | | | |
| Size | Max. 16 GB | | | | | | |
| Max. memory bandwidth | 25.6 GB/s | | | | | | |
| Graphics | | | | | | | |
| Controller | Intel® HD Graphics 4000 | | | | | | |
| Max. dynamic graphics frequency | 1 GHz | 1 GHz | 1 GHz | 1 GHz | 950 MHz | 900 MHz | 900 MHz |
| Color depth | Max. 32-bit | | | | | | |
| Resolution | | | | | | | |
| DVI | Resolution up to 1920 x 1200 (WUXGA) | | | | | | |
| RGB | 350 MHz RAMDAC, resolution up to 2048 x 1536 @ 75 Hz (QXGA) | | | | | | |
| DisplayPort | Version 1.1 | | | | | | |
| Mass memory management | 4x SATA | | | | | | |
| Power management | ACPI 4.0 with battery support | | | | | | |

Table 38: 5PC900.TS77-00, 5PC900.TS77-01, 5PC900.TS77-02, 5PC900.TS77-03, 5PC900.TS77-04, 5PC900.TS77-05, 5PC900.TS77-06 - Technical data

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

## 3.3 HM76 CPU boards

### 3.3.1 5PC900.TS77-0x

### General information

- Intel® Celeron® processors
- Intel® HM76 chipset
- 2x DDR3 memory socket
- Intel® HD Graphics 4000
- AMI BIOS (UEFI)

### Order data

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

Table 39: 5PC900.TS77-07, 5PC900.TS77-08 - Order data

### Technical data

| Product ID | 5PC900.TS77-07 | 5PC900.TS77-08 |
|---|---|---|
| **General information** | | |
| Certification | | |
| CE | Yes | |
| **Controller** | | |
| Boot loader | embedded AMI BIOS | |
| Processor | | |
| Type | Intel® Celeron® M 847E | Intel® Celeron® M 827E |
| Clock frequency | 1100 MHz | 1400 MHz |
| Number of cores | 2 | 1 |
| Architectures | 32 nm | |
| Intel® Smart Cache | 2 MB | 1.5 MB |
| External bus | TBD | |
| Intel® 64 Architecture | Yes | |
| Intel® Turbo Boost Technology | No | |
| Intel® Hyper-Threading Technology | No | |
| Intel® Virtualization Technology (VT-x) | Yes | |
| Enhanced Intel SpeedStep® Technology | Yes | |
| Chipset | Intel® HM76 | |
| Real-time clock | | |
| Precision | At 25°C: typ. 12 ppm (1 seconds) per day [1)] | |
| Battery-buffered | Yes | |
| Memory socket | | |
| Number of memory channels | 2 | |
| Type | DDR3 | |
| Size | Max. 16 GB | |
| Max. memory bandwidth | 21.3 GB/s | |
| Graphics | | |
| Controller | Intel® HD Graphics 3000 | |
| Max. dynamic graphics frequency | 800 MHz | |
| Color depth | Max. 32-bit | |
| Resolution | | |
| DVI | Resolution up to 1920 x 1200 (WUXGA) | |

Table 40: 5PC900.TS77-07, 5PC900.TS77-08 - Technical data

| Product ID | 5PC900.TS77-07 | 5PC900.TS77-08 |
|---|---|---|
| RGB | 350 MHz RAMDAC, resolution up to 2048 x 1536 @ 75 Hz (QXGA) | |
| DisplayPort | Version 1.1 | |
| Mass memory management | 4x SATA | |
| Power management | ACPI 4.0 with battery support | |

Table 40: 5PC900.TS77-07, 5PC900.TS77-08 - Technical data

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

## 3.4 Main memory

### 3.4.1 5MMDDR.xxxx-03

#### General information

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

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

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

#### Order data

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

Table 41: 5MMDDR.1024-03, 5MMDDR.2048-03, 5MMDDR.4096-03, 5MMDDR.8192-03 - Order data

#### Technical data

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

Table 42: 5MMDDR.1024-03, 5MMDDR.2048-03, 5MMDDR.4096-03, 5MMDDR.8192-03 - Technical data

## Information:

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

## 3.5 Bus units

### 3.5.1 5AC901.BX0x-0x

#### General information

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

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

#### Order data

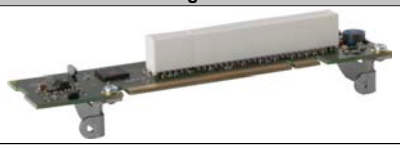
| Model number | Short description | Figure |
|---|---|---|
| | **Bus units** |  |
| 5AC901.BX01-00 | APC910 bus, 1 PCI | |
| 5AC901.BX01-01 | APC910 bus, 1 PCI Express (x4) | |
| 5AC901.BX02-00 | APC910 bus, 2 PCI | |
| 5AC901.BX02-01 | APC910 bus, 1 PCI, 1 PCI Express (x8) | |

Table 43: 5AC901.BX01-00, 5AC901.BX01-01, 5AC901.BX02-00, 5AC901.BX02-01 - Order data

#### Technical data

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

Table 44: 5AC901.BX01-00, 5AC901.BX01-01, 5AC901.BX02-00, 5AC901.BX02-01 - Technical data

## 3.6 Heat sink

### 3.6.1 5AC901.HS0x-00

#### General information

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

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

#### Order data

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

Table 45: 5AC901.HS00-00, 5AC901.HS01-00 - Order data

## 3.7 Fan kit

**Information:**

**The fan kits are subject to wear and must be checked with appropriate frequency and cleaned or replaced when not functioning properly (e.g. due to dirt and grime). For information about replacing fan filters, please refer to the section "Fan filter replacement" on page 151.**

**Information:**

**For information about replacing or exchanging the fan kit, please refer to the section "Fan kit replacement" on page 152.**

### 3.7.1 5AC901.FA01-00

#### General information

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

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

#### Order data

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

Table 46: 5AC901.FA01-00 - Order data

#### Technical data

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

Table 47: 5AC901.FA01-00 - Technical data

### 3.7.2 5AC901.FA02-00

#### General information

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

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

#### Order data

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

Table 48: 5AC901.FA02-00 - Order data

#### Technical data

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

Table 49: 5AC901.FA02-00 - Technical data

## 3.8 Drives

### 3.8.1 5AC901.CHDD-00

#### General information

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

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

#### Order data

| Model number | Short description | Figure |
|---|---|---|
| | **Drives** | |
| 5AC901.CHDD-00 | 250 GB SATA hard disk, Slide-in compact, 24/7 hard disk |  |

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

#### Technical data

## Information:

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

| Product ID | 5AC901.CHDD-00 |
|---|---|
| **General information** | |
| Certification | |
| CE | Yes |
| **Hard disk drive** | |
| Capacity | 250 GB |
| Number of heads | 2 |
| Number of sectors | 488,397,168 |
| Bytes per sector | 512 |
| Cache | 8 MB |
| Speed | 5400 rpm ±0.2% |
| Startup time | Typ. 3.6 s (from 0 rpm to read access) |
| MTBF | 550,000 POH [1] |
| S.M.A.R.T. Support | Yes |
| Interface | SATA |
| Access time | 5.6 ms |
| Supported transfer modes | SATA 1.0, Serial ATA Revision 2.6<br>PIO mode 0-4, multiword DMA mode 0-2, UDMA mode 0-6 |
| Data transfer rate | |
| Internal | Max. 1175 Mbit/s |
| To/from host | Max. 150 MB/s (SATA I), max. 300 MB/s (SATA II) |
| Positioning time | |
| Minimum (track to track) | 1 ms |
| Nominal (read only) | 14 ms |
| Maximum (read only) | 30 ms |
| **Environmental conditions** | |
| Temperature [2] | |
| Operation [3] | 0 to 60°C |
| Operation - 24-hour [4] | 0 to 60°C |
| Storage | -40 to 70°C |
| Transport | -40 to 70°C |
| Relative humidity [5] | |
| Operation | 5 to 95%, non-condensing |
| Storage | 5 to 95%, non-condensing |
| Transport | 5 to 95%, non-condensing |
| Vibration | |
| Operation (continuous) | 5 to 500 Hz: 0.25 g; no unrecoverable errors |
| Operation (occasional) | 5 to 500 Hz: 0.5 g; no unrecoverable errors |
| Storage | 10 to 500 Hz: 5 g; no unrecoverable errors |

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

| Product ID | 5AC901.CHDD-00 |
|---|---|
| Transport | 10 to 500 Hz: 5 g; no unrecoverable errors |
| Shock | |
| Operation | 350 g and 2 ms duration; no unrecoverable errors |
| Storage | 800 g and 2 ms duration; no unrecoverable errors<br>800 g and 1 ms duration; no unrecoverable errors<br>600 g and 0.5 ms duration; no unrecoverable errors |
| Transport | 800 g and 2 ms duration; no unrecoverable errors<br>800 g and 1 ms duration; no unrecoverable errors<br>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 | ST9250311CS |

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

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

## Temperature humidity diagram

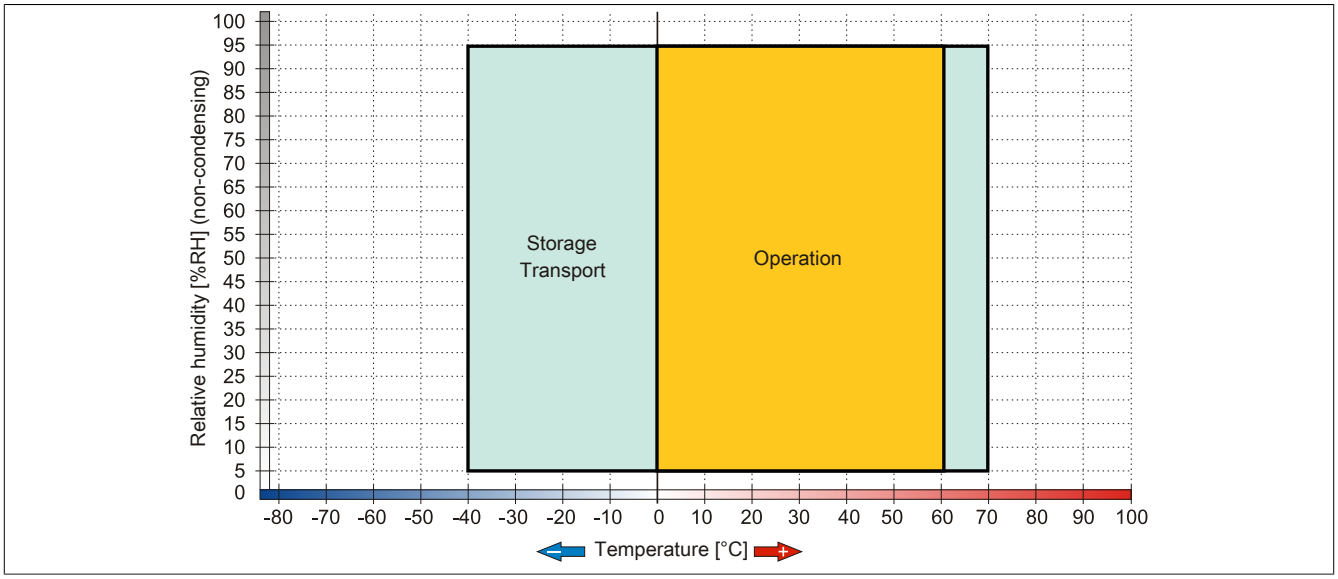



Figure 21: 5AC901.CHDD-00 - Temperature humidity diagram

### 3.8.2 5AC901.CSSD-00

#### General information

This 32 GB slide-in compact SSD (Solid State Drive) is based on Single Level Cell (SLC) technology and is SATA 2.6 compatible. The slide-in compact drive can be used in APC910 system units.

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

#### Order data

| Model number | Short description | Figure |
|---|---|---|
| | **Drives** | Image not found for 5AC901.CSSD-00! |
| 5AC901.CSSD-00 | 32 GB SATA SSD (SLC), Slide-in compact | |

Table 52: 5AC901.CSSD-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 accesory and can deviate from those specified for the entire device.**

| Product ID | 5AC901.CSSD-00 |
|---|---|
| **General information** | |
| Certification | |
| CE | Yes |
| **Solid state drive** | |
| Capacity | 32 GB |
| Data reliability | < 1 unrecoverable errors in $10^{16}$ bit read accesses |
| MTBF | 2,000,000 hours |
| Power on/off cycles | 50000 |
| S.M.A.R.T. Support | Yes |
| Interface | SATA |
| Maintenance | None |
| Continuous reading | Max. 250 MB/s |
| Continuous writing | Max. 195 MB/s |
| IOPS [1)] | |
| 4k read | 45,000 |
| 4k write | 5,500 |
| **Endurance** | |
| Guaranteed data volume | |
| Guaranteed | 700 TB |
| Results for 5 years | 350 GB/day |
| SLC Flash | Yes |
| Wear leveling | Static |
| Error Correction Coding (ECC) | Yes |
| Compatibility | SATA revision 2.6 compliant, compatible with SATA 1.5 Gbit/s and 3 Gbit/s interface rates<br>ATA/ATAPI-7<br>SSD Enhanced SMART ATA feature set<br>Native Command Queuing (NCQ) command |
| **Environmental conditions** | |
| Temperature | |
| Operation | 0 to 70°C |
| Storage | -55 to 95°C |
| Transport | -55 to 95°C |
| Relative humidity | |

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

| Product ID | 5AC901.CSSD-00 |
|---|---|
| Operation | 5 to 95% |
| Storage | 5 to 95% |
| Transport | 5 to 95% |
| Vibration | |
| Operation | 5 to 700 Hz: 2.17 g |
| Storage | 5 to 800 Hz: 3.13 g |
| Transport | 5 to 800 Hz: 3.13 g |
| Shock | |
| Operation | 1500 g, 0.5 ms |
| Storage | 1500 g, 0.5 ms |
| Transport | 1500 g, 0.5 ms |
| Altitude | |
| Operation | -300 to 12,192 m |
| Storage | -300 to 12,192 m |
| Transport | -300 to 12,192 m |
| **Mechanical characteristics** | |
| Installation | Fixed [2] |
| Dimensions | |
| Width | 13 mm |
| Height | 98 mm |
| Depth | 105 mm |
| Weight | 118 g |
| **Manufacturer information** | |
| Manufacturer | Intel |
| Manufacturer's product ID | SSDSA2SH032G201 |

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

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

## Temperature humidity diagram

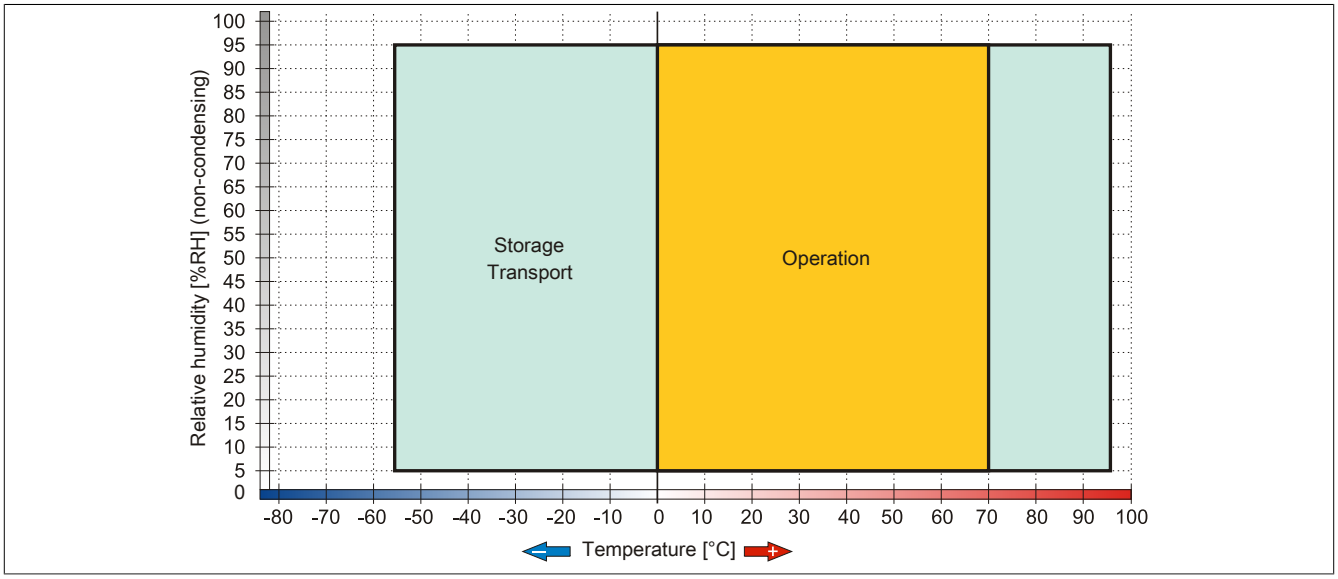



Figure 22: 5AC901.CSSD-00 - Temperature humidity diagram

### 3.8.3 5AC901.CSSD-01

#### General information

This 60 GB slide-in compact SSD (Solid State Drive) is based on Multi Level Cell (MLC) technology and is SATA 3.0 compatible. The slide-in compact drive can be used in APC910 system units.

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

#### Order data

| Model number | Short description | Figure |
|---|---|---|
| | **Drives** | Image not found for 5AC901.CSSD-01! |
| 5AC901.CSSD-01 | 60 GB SATA SSD (MLC), Slide-in compact | |

Table 54: 5AC901.CSSD-01 - 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 accesory and can deviate from those specified for the entire device.**

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

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

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

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

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

## Temperature humidity diagram

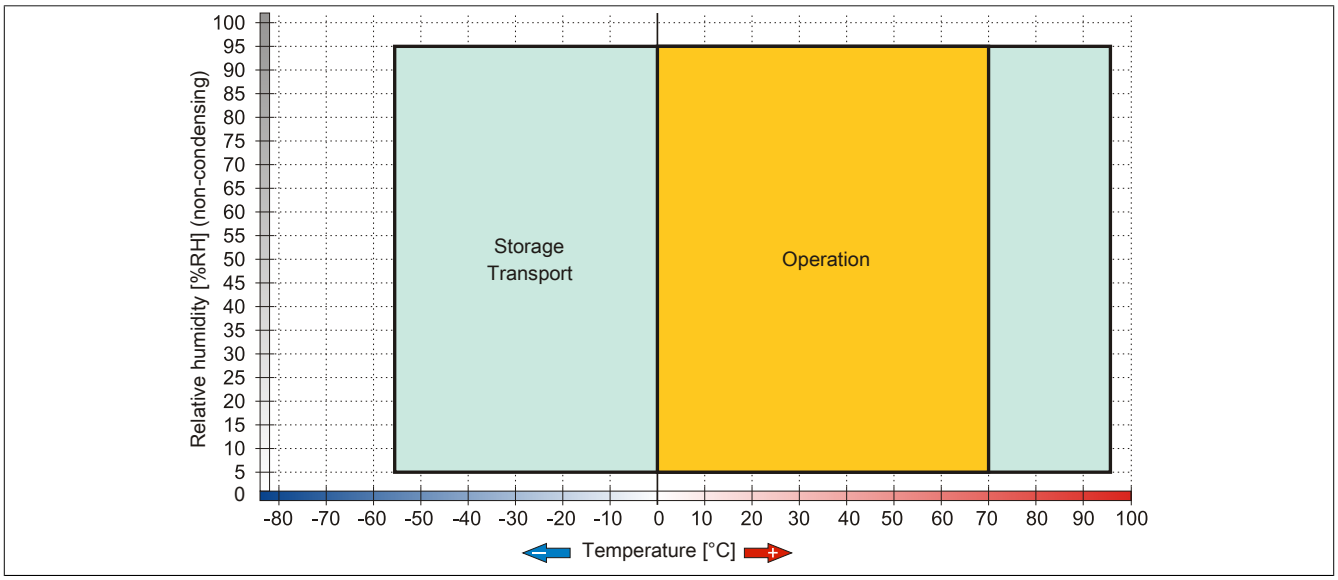



Figure 23: 5AC901.CSSD-01 - Temperature humidity diagram

### 3.8.4 5AC901.CSSD-02

#### General information

This 180 GB slide-in compact SSD (Solid State Drive) is based on Multi Level Cell (MLC) technology and is SATA 3.0 compatible. The slide-in compact drive can be used in APC910 system units.

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

#### Order data

| Model number | Short description | Figure |
|---|---|---|
| | **Drives** | Image not found for 5AC901.CSSD-02! |
| 5AC901.CSSD-02 | 180 GB SATA SSD (MLC), Slide-in compact | |

Table 56: 5AC901.CSSD-02 - 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 accesory and can deviate from those specified for the entire device.**

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

Table 57: 5AC901.CSSD-02 - Technical data

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

Table 57: 5AC901.CSSD-02 - Technical data

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

## Temperature humidity diagram

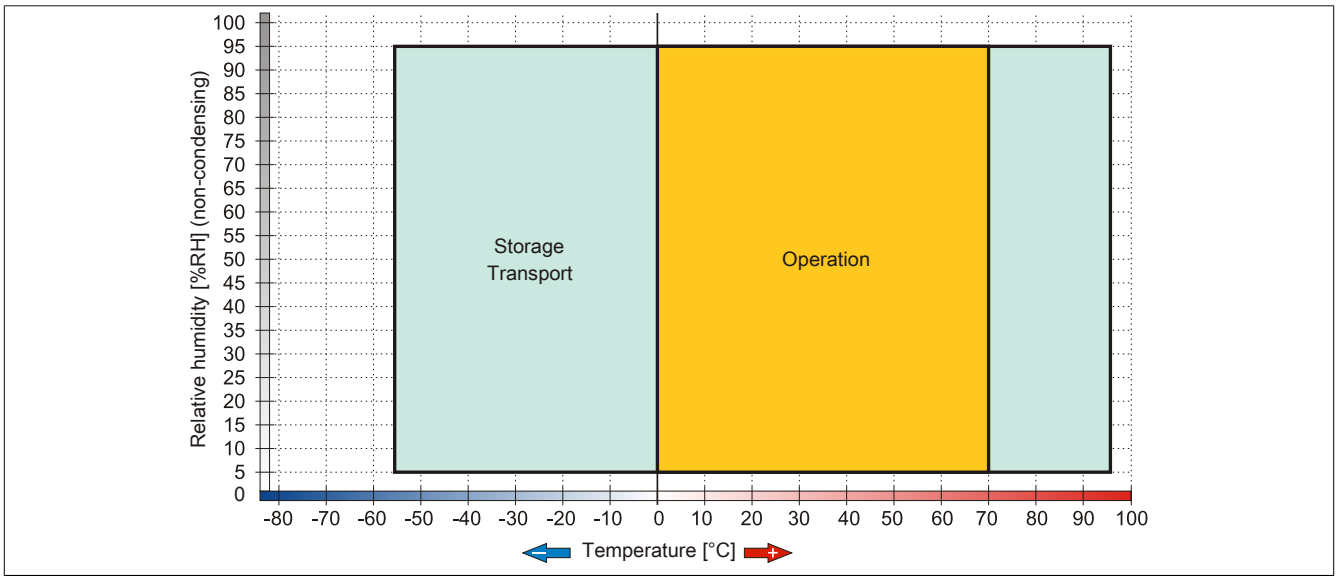



Figure 24: 5AC901.CSSD-02 - Temperature humidity diagram

### 3.8.5 5AC901.CCFA-00

#### General information

The CFast adapter is a slide-in compact adapter where a CFast card can be installed and then operated on the B&R industrial PC. The CFast adapter can be used in APC910 system units.

- CFast slot
- Slide-in compact

#### Order data

| Model number | Short description | Figure |
|---|---|---|
| | **Drives** | Image not found for 5AC901.CCFA-00! |
| 5AC901.CCFA-00 | CFast adapter to operate a CFast card in a slide-in compact slot | |

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

#### Technical data

## Information:

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

| Product ID | 5AC901.CCFA-00 |
|---|---|
| **General information** | |
| Certification | |
| CE | Yes |
| **Interfaces** | |
| CFast slot | |
| Quantity | 1 |
| **Environmental conditions** | |
| Temperature | |
| Operation | TBD |
| Storage | TBD |
| Transport | TBD |
| Relative humidity | |
| Operation | 5 to 90% |
| Storage | 5 to 95% |
| Transport | 5 to 95% |

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

## 3.9 Interface options

# Information:

**For information about replacing or exchanging an interface option, please refer to the section "Installation - Interface option" on page 139.**

### 3.9.1 5AC901.I485-00

#### General information

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

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

#### Order data

| Model number | Short description | Figure |
|---|---|---|
| | **Interface options** | Image not found for 5AC901.I485-00! |
| 5AC901.I485-00 | RS232/422/485 interface option; for APC910 | |

Table 60: 5AC901.I485-00 - Order data

#### Technical data

# Information:

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

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

Table 61: 5AC901.I485-00 - Technical data

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

### *Serial interface COM*

| Serial interface (COM) | | | |
|---|---|---|---|
| | **RS232** | **RS422/485** | |
| Type | RS232; not modem capable; electrically isolated | | |
| UART | 16550-compatible, 16-byte FIFO | | |
| Transfer rate | Max. 115 kbit/s | | |
| Bus length | Max. 15 m | Max. 1200 m | |
| **Pin** | **RS232 pinout** | **RS422 pinout** | |
| 1 | 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 plug

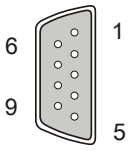



Table 62: Pinout - COM

### *Bus length and cable type RS232*

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

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

Table 63: RS232 - Bus length and transfer rate

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

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

Table 64: RS232 - Cable requirements

### *RS422 - Bus length and cable type*

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.

| Extension | Transfer rate |
|---|---|
| 1200 m | Typ. 115 kbit/s |

Table 65: 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 |
| Stranding | Wires stranded in pairs |
| Shield | Paired shield with aluminum foil |

Table 66: RS422 - Cable requirements

| RS422 cable | Property |
|---|---|
| Grounding line | |
| Cable cross section | 1x 0.34 mm² (22AWG/19), tinned Cu wire |
| Wire insulation | PE |
| Conductor resistance | ≤59 Ω/km |
| Outer sheathing | |
| Material | PUR mixture |
| Features | Halogen free |
| Cable shielding | From tinned cu wires |

Table 66: RS422 - Cable requirements

### *When used as an RS485 interface*

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

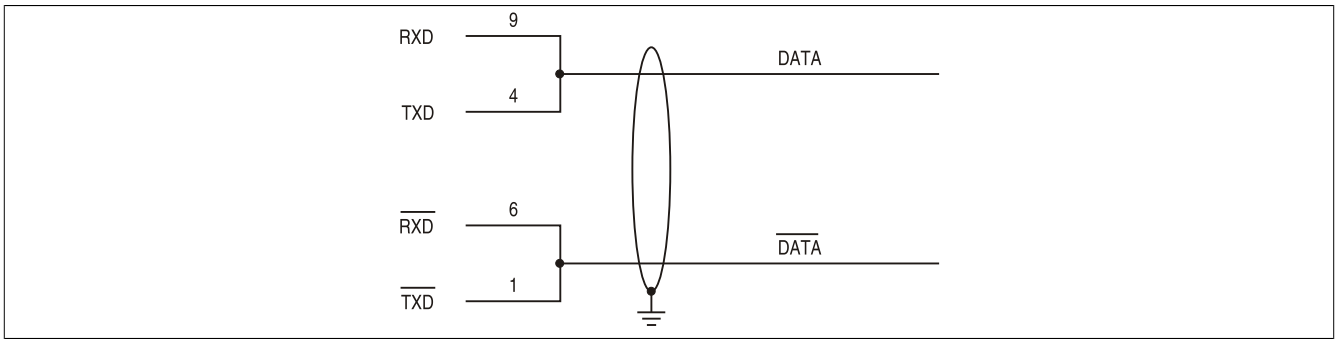



Figure 25: RS232/422/485 interface - operated in RS485 mode

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.

### *RS485 - Bus length and cable type*

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

| Extension | Transfer rate |
|---|---|
| 1200 m | Typ. 115 kbit/s |

Table 67: 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 cross section | ≤59 Ω/km |
| Outer sheathing | |
| Material | PUR mixture |
| Features | Halogen free |
| Cable shielding | From tinned cu wires |

Table 68: RS485 - Cable requirements

### *Terminating resistor*

A terminating resistor for the serial interface is already integrated on the IF option. A switch is provided to enable or disable the terminating resistor. However, the side cover must be removed from the system unit in order to do this (see Installation - Interface option, steps 1 to 4). An active terminating resistor is indicated by a yellow LED.

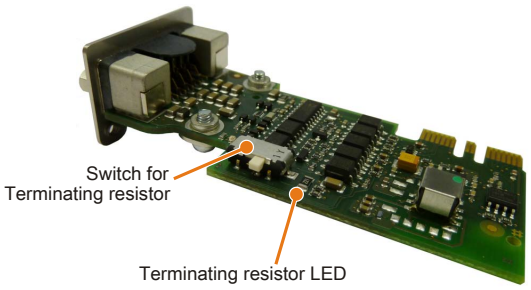



Figure 26: 5AC901.I485-00 - Terminating resistor

### 3.9.2 5AC901.ICAN-00

#### General information

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

- 1x CAN master interface
- Compatible with the APC910

It is not possible to run two 5AC901.ICAN interface options (connected to both the IF Option 1 and IF Option 2 slots).

#### Order data

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

Table 69: 5AC901.ICAN-00 - Order data

#### Technical data

## Information:

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

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

Table 70: 5AC901.ICAN-00 - Technical data

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

### *CAN interface*

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

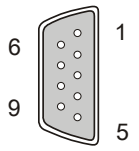



Table 71: 5AC901.ICAN-00 - CAN pinout

### *Terminating resistor*

A terminating resistor for the CAN interface is already integrated on the IF option. A switch is provided to enable or disable the terminating resistor. However, the side cover must be removed from the system unit in order to do this (see Installation - Interface option, steps 1 to 4). An active terminating resistor is indicated by a yellow LED.

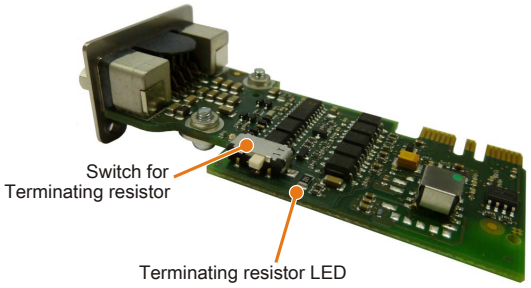



Figure 27: 5AC901.ICAN-00 - Terminating resistor

### 3.9.3 5AC901.IHDA-00

#### General information

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

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

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

#### Order data

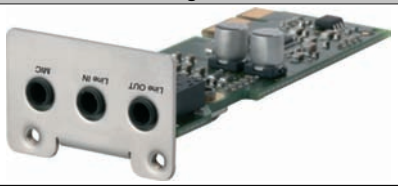
| Model number | Short description | Figure |
|---|---|---|
| | **Interface options** | |
| 5AC901.IHDA-00 | Audio interface option, connection for 1x MIC, 1x Line IN, 1x Line OUT; for APC910 |  |

Table 72: 5AC901.IHDA-00 - Order data

#### Technical data

## Information:

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

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

Table 73: 5AC901.IHDA-00 - Technical data

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

### *MIC, Line IN, Line OUT*

| MIC, Line IN, Line OUT | | |
|---|---|---|
| Controller | Realtek ALC 662 | 3.5mm socket, female |
| MIC | Connection of a mono microphone with a 3,5mm jack. | |
| Line IN | Stereo Line IN signal supplied via a 3.5mm jack. | |
| Line OUT | Connection of a stereo sound device (e.g. amplifier) via a 3.5 mm jack. | |
| | | |


Table 74: MIC, Line IN, Line OUT

A special driver is required in order to operate the audio controller. Drivers for approved operating systems are available in the Downloads 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.**

### 3.9.4 5AC901.ISRM-00

#### General information

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

- 2 MB SRAM
- Compatible with the APC910

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

## Information:

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

#### Order data

| Model number | Short description | Figure |
|---|---|---|
| | **Interface options** | Image not found for 5AC901.ISRM-00! |
| 5AC901.ISRM-00 | SRAM interface option, 2 MB; for APC910 | |

Table 75: 5AC901.ISRM-00 - Order data

#### Technical data

## Information:

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

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

Table 76: 5AC901.ISRM-00 - Technical data

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

## 3.10 Monitor / panel options

### Information:

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

### Information:

**For information about replacing or exchanging an monitor / panel option, please refer to the section "Installation - Monitor / panel option" on page 143.**

### 3.10.1 5AC901.LDPO-00

#### General information

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

- DisplayPort interface
- USB 2.0 port

#### Order data

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

Table 77: 5AC901.LDPO-00 - Order data

#### Technical data

### Information:

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

| Product ID | 5AC901.LDPO-00 |
|---|---|
| **General information** | |
| B&R ID code | $D852 |
| Certification | |
| CE | Yes |
| **Interfaces** | |
| USB | |
| Quantity | 1 |
| Type | USB 2.0 |
| Design | Type A |
| Transfer rate | Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s) |
| Current load | Max. 1 A |
| DisplayPort | |
| Quantity | 1 |
| Version | 1.1 |
| **Electrical characteristics** | |
| Power consumption | 3 W |
| **Environmental conditions** | |
| Temperature | |
| Operation | TBD 1) |
| Storage | TBD |
| Transport | TBD |
| Relative humidity | |
| Operation | TBD |
| Storage | TBD |
| Transport | TBD |

Table 78: 5AC901.LDPO-00 - Technical data

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

### *Pin assignments - DisplayPort*

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

DisplayPort (20-pin, female)

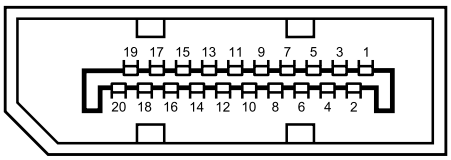



Table 79: Pin assignments - DisplayPort

### 3.10.2 5AC901.LSDL-00

#### General information

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

- DVI/SDL interface

#### Order data

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

Table 80: 5AC901.LSDL-00 - Order data

#### Technical data

## Information:

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

| Product ID | 5AC901.LSDL-00 |
|---|---|
| **General information** | |
| B&R ID code | $D853 |
| Certification | |
| CE | Yes |
| **Interfaces** | |
| Panel/Monitor interface | |
| Design | DVI-D socket |
| Type | SDL/DVI |
| **Electrical characteristics** | |
| Power consumption | TBD |
| **Environmental conditions** | |
| Temperature | |
| Operation | TBD [1] |
| Storage | TBD |
| Transport | TBD |
| Relative humidity | |
| Operation | TBD |
| Storage | TBD |
| Transport | TBD |

Table 81: 5AC901.LSDL-00 - Technical data

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

#### *Pinout*

| Pin | assignment | Description | Pin | assignment | Description |
|---|---|---|---|---|---|
| 1 | TMDS Data 2- | DVI lane 2 (negative) | 16 | HPD | Hot plug detect |
| 2 | TMDS Data 2+ | DVI lane 2 (positive) | 17 | TMDS Data 0- | DVI lane 0 (negative) |
| 3 | TMDS Data 2/4 SHIELD | Shield for data pair 2 and 4 | 18 | TMDS Data 0+ | DVI lane 0 (positive) |
| 4 | SDL- | SDL lane (negative) | 19 | TMDS Data 0/ XUSB1 SHIELD | Shield for data pair 0 and USB1 |
| 5 | SDL+ | SDL lane (positive) | 20 | XUSB1- | USB lane 1 (negative) |
| 6 | DDC Clock | DDC-based control signal (clock) | 21 | XUSB1+ | USB lane 1 (positive) |
| 7 | DDC Data | DDC-based control signal (data) | 22 | TMDS Clock Shield | Shield for clock pair |
| 8 | n.c. | Not connected | 23 | TMDS Clock+ | DVI clock (positive) |
| 9 | TMDS Data 1- | DVI lane 1 (negative) | 24 | TMDS Clock - | DVI clock (negative) |
| 10 | TMDS DATA 1+ | DVI lane 1 (negative) HDMI clock (positive) | C1 | ANALOG RED | Analog red |
| 11 | TMDS DATA 1/ XUSB0 SHIELD | Shield for data pair 1 and USB0 | "c2" | ANALOG GREEN | Analog green |
| 12 | XUSB0- | USB lane 0 (negative) | C3 | ANALOG BLUE | Analog blue |
| 13 | XUSB0+ | USB lane 0 (positive) | C4 | ANALOG HORZ SYNC | Analog horizontal synchro-nization |

DVI 24-pin, female

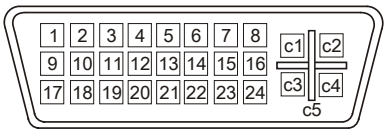



Table 82: Pinout - DVI connection

| Pin | assignment | Description | Pin | assignment | Description | |
|---|---|---|---|---|---|---|
| 14 | +5 V Power[1)] | +5 V power supply | C5 | ANALOG GND | Analog ground (return for R, G and B signals) | |
| 15 | Ground (return for +5 V, HSync and VSync) | Ground | | | | |

Table 82: Pinout - DVI connection

1) Protected internally by a multifuse

## 3.11 Front covers

### 3.11.1 5AC901.FF0x-00

#### General information

The front cover on the APC910 keeps the front-side ports free of dust, dirt and other contaminants.

A front cover is available for each APC910 system unit model.

#### Order data

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

Table 83: 5AC901.FF01-00, 5AC901.FF02-00 - Order data

# Chapter 3 • Commissioning

## 1 Mounting

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

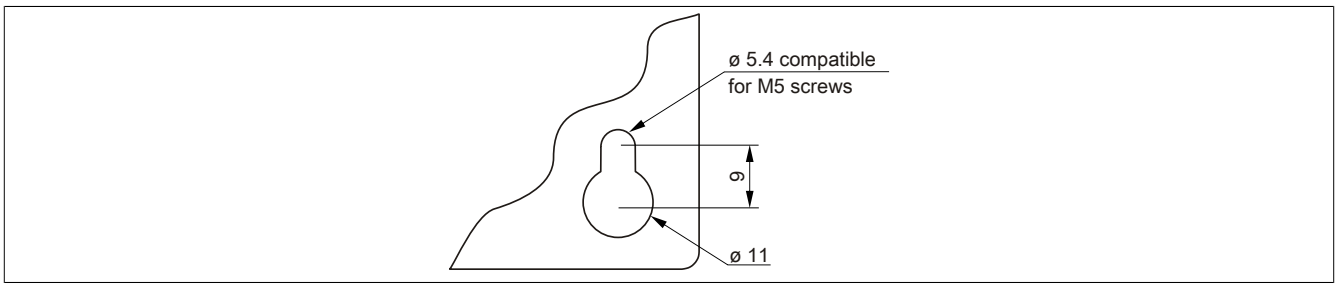



Figure 28: Mounting plates

The exact positioning of the mounting holes can be seen in the drilling templates in Chapter 2 "Technical data", section "Individual components" on page 46.

### 1.1 Important mounting information

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

### 1.2 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.

## 1.3 Mounting orientation

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

### 1.3.1 Mounting orientation - Vertical

APC910 systems with and without fan kit can be mounted this way.

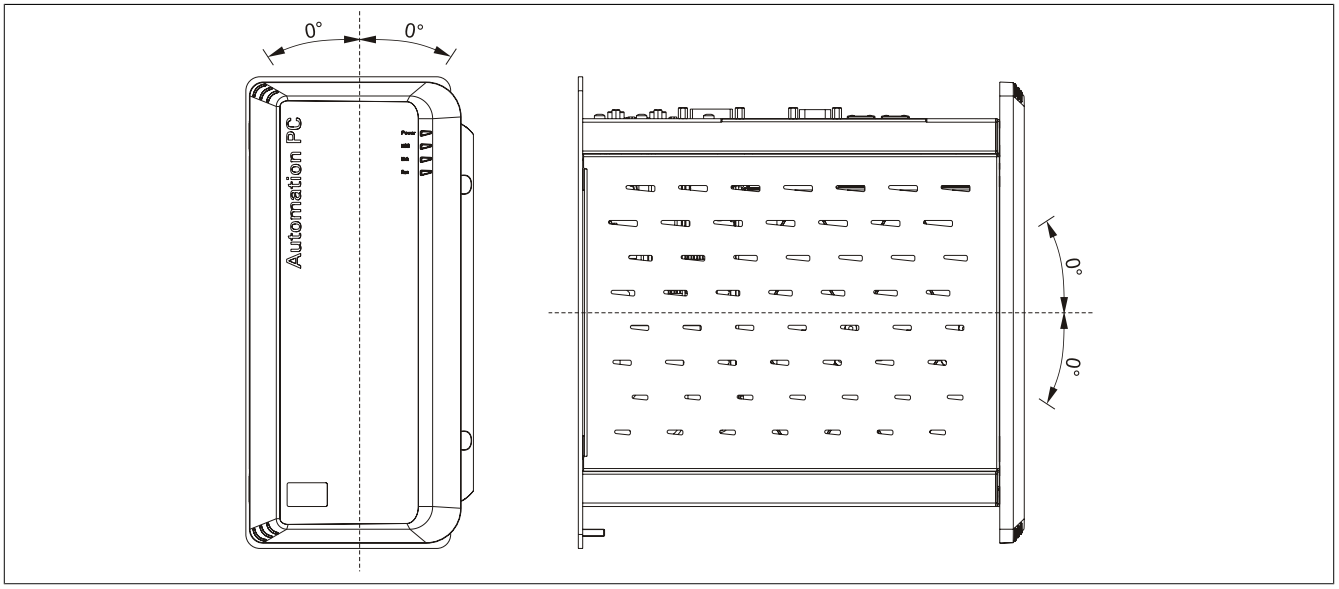



Figure 29: Mounting orientation - Vertical

Mount the device so that the spacing is as indicated in section "Spacing for air circulation" on page 90 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.

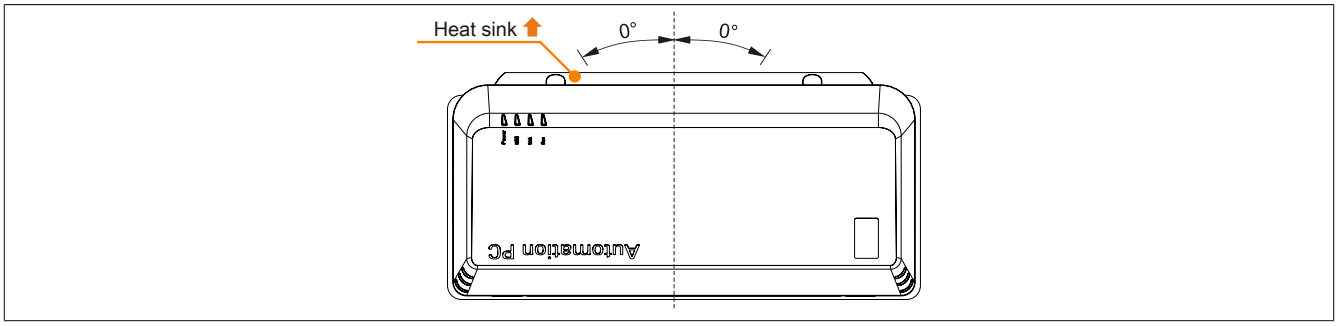



Figure 30: Mounting orientation - Horizontal

Mount the device so that the spacing is as indicated in section "Spacing for air circulation" on page 90 in order to facilitate natural air circulation.

### 1.4 Spacing for air circulation

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

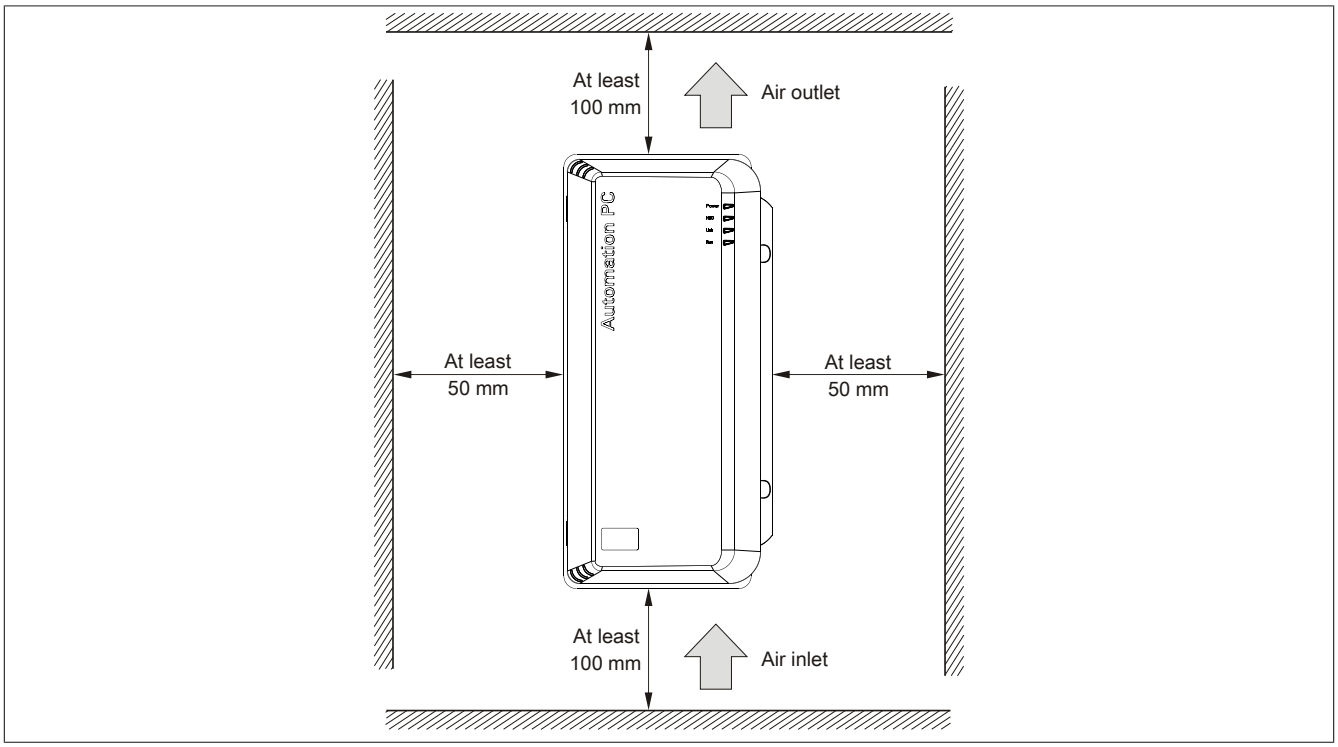



Figure 31: Standard mounting - Mounting distances

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

## Information:

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

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

## 2 Cable connections

The flex radius specification must be taken into account when connecting or laying cables.

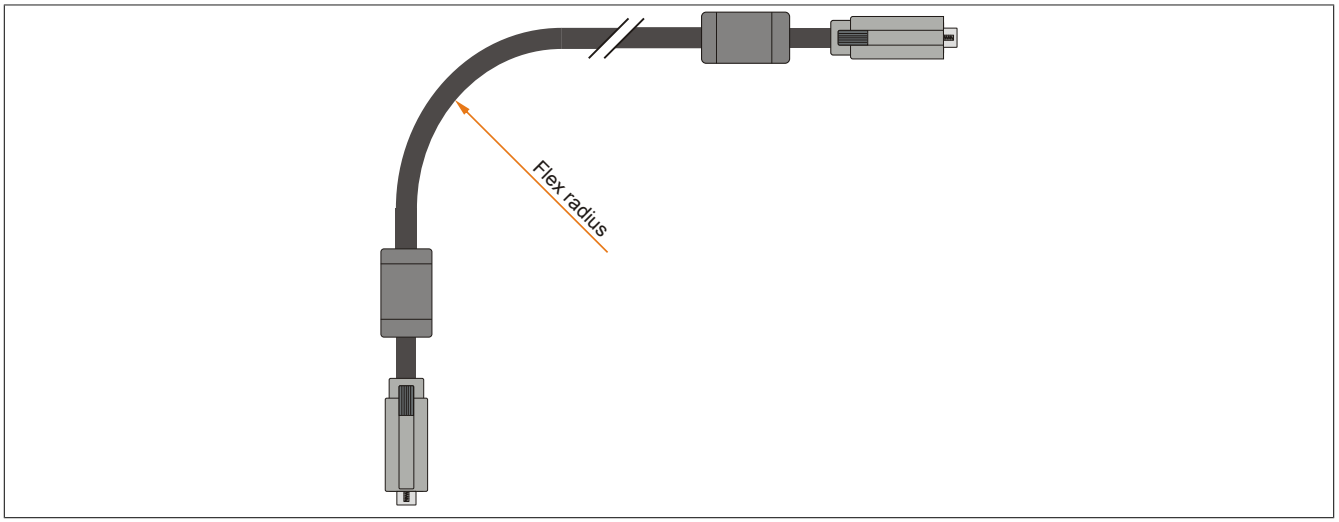



Figure 32: Flex radius - Cable connection

### Information:

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

# 3 Grounding concept

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

The functional ground on the device has 2 connections:

- Supply voltage
- Ground connection

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

- The device should be connected to the central grounding point in the control cabinet using the shortest route possible.
- Use a 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.

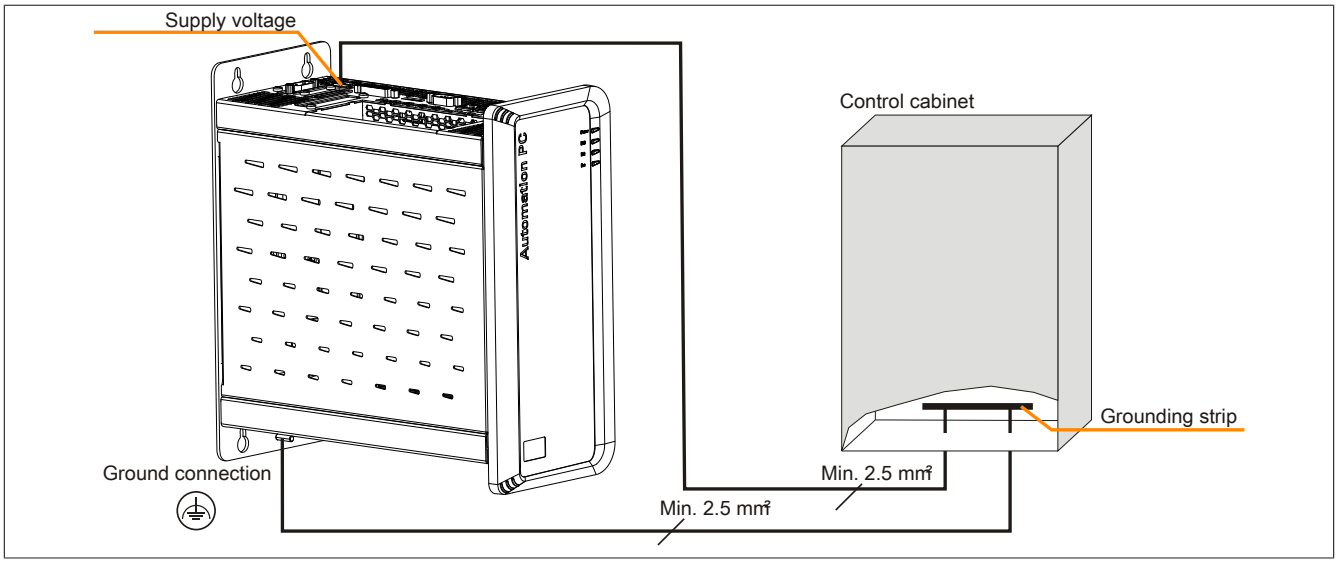



Figure 33: Grounding concept

# Chapter 4 • Software

## 1 Windows 7

### 1.1 General information

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

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

### 1.2 Order data

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

Table 84: 5SWWI7.1100-GER, 5SWWI7.1100-ENG, 5SWWI7.1200-GER, 5SWWI7.1200-ENG, 5SWWI7.1300-MUL, 5SWWI7.1400-MUL - Order data

### 1.3 Overview

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

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

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

## 1.4 Installation

Upon request, B&R can pre-install the required Windows 7 version on the desired mass storage device (e.g. CompactFlash card, etc.). All of the drivers required for operation (graphics, network, etc.) are also installed when doing so.

## 1.5 Drivers

The latest drivers for all approved operating systems can be found in the Download area (Service / Material-related downloads - BIOS / Drivers / Updates) 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.**

## 1.6 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, APC511, APC910 or PPC800 with NM10 chipset).

# 2 Windows Embedded Standard 7

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

With Windows® Embedded Standard 7, Microsoft has made substantial improvements in the area of security. The AppLocker program, available in the premium version, can prevent the execution of unknown or potentially 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[7)]. This ensures that even the most demanding applications have the level of support they need.

## 2.2 Order data

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

Table 85: 5SWWI7.1540-ENG, 5SWWI7.1640-ENG, 5SWWI7.1740-MUL, 5SWWI7.1840-MUL - Order data

## 2.3 Overview

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

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

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

## 2.4 Features with WES7 (Windows Embedded Standard 7)

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

| Functionality | 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 86: Device functions in Windows Embedded Standard 7

## 2.5 Installation

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

## 2.6 Drivers

All drivers required for operation are preinstalled on the operating system. If an older version of the driver is still being used, 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 disabled.

### 2.6.1 Touch screen driver

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

# 3 Windows XP Professional

## 3.1 Order data

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



Table 87: 5SWWXP.0600-ENG, 5SWWXP.0600-GER, 5SWWXP.0600-MUL - Order data

## 3.2 Overview

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

## 3.3 Installation

Upon request, B&R can pre-install the required Windows XP Professional version on the desired mass storage device (e.g. CompactFlash card, etc.). All of the drivers required for operation (graphics, network, etc.) are also installed when doing so.

## 3.4 Drivers

The latest drivers for all approved operating systems can be found in the Download area (Service / Material-related downloads - BIOS / Drivers / Updates) 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.**

# 4 Windows Embedded Standard 2009

## 4.1 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.

## 4.2 Order data

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



Table 88: 5SWWXP.0740-ENG - Order data

## 4.3 Overview

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

## 4.4 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 8.0 | ✓ |
| Internet information service (IIS) | - |
| Terminal service | ✓ |
| Windows Firewall | ✓ |
| MSN Explorer | - |
| Outlook Express | - |
| Administrative Tools | ✓ |
| Remote Desktop | ✓ |
| Remote Assistance | - |
| .NET Framework | - |
| ASP.NET | - |
| OpenGL support | ✓ |
| Local Network Bridge | ✓ |

Table 89: Device functions in Windows Embedded Standard 2009

| Function | Present |
|---|---|
| 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 89: Device functions in Windows Embedded Standard 2009

## 4.5 Installation

Upon request, Windows Embedded Standard 2009 can be pre-installed at B&R Austria on a suitable CFast card (min. 2 GB). 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.

## 4.6 Drivers

All drivers required for operation are preinstalled on the operating system. If an older version of the driver is still being used, 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 disabled.

# 5 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.

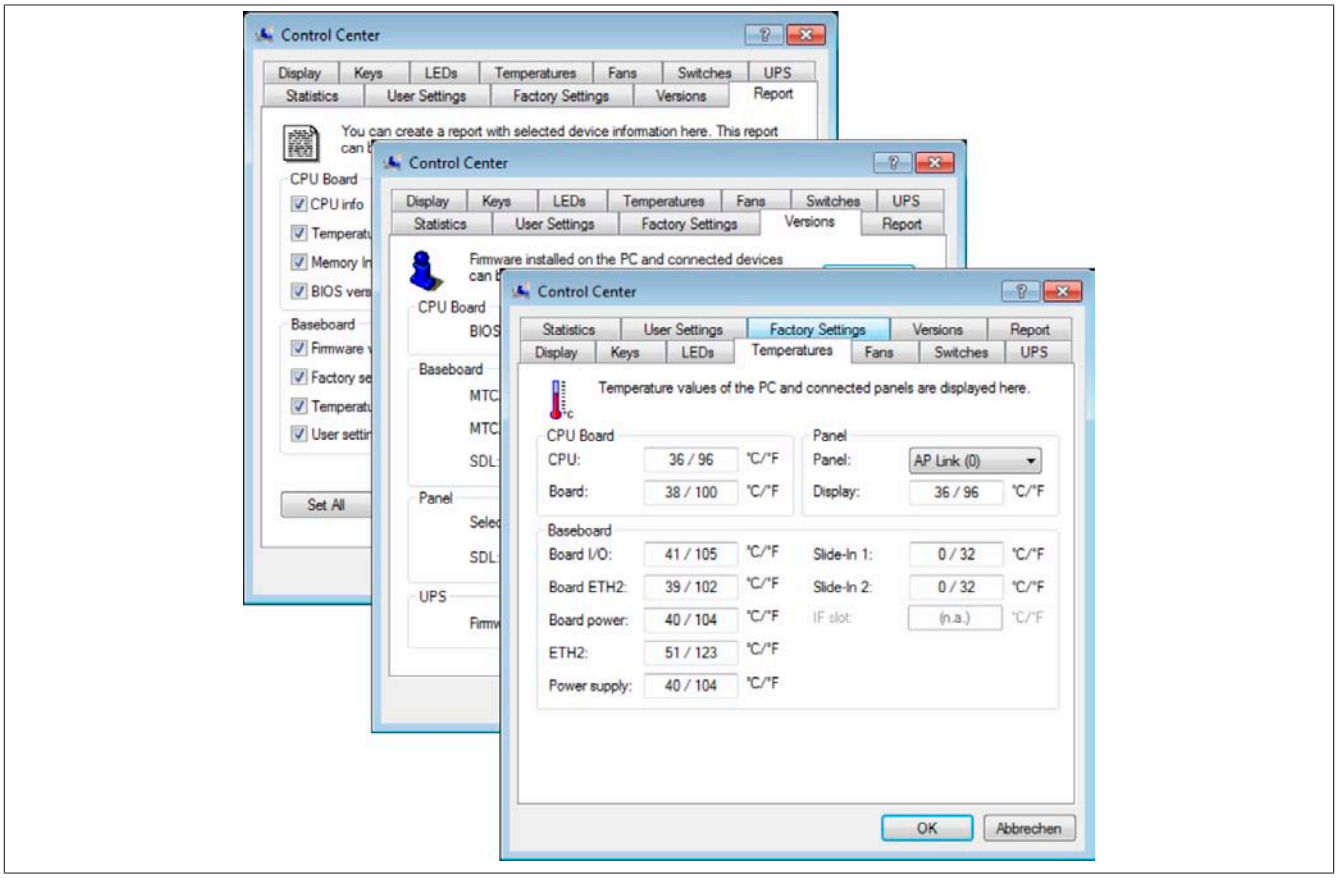



Figure 34: ADI Control Center screenshots - Examples (symbol photo)

## 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.**

### 5.1 Functions

## Information:

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

- Changing display-specific parameters
- Reading device-specific keys
- Updating the key configuration
- Activating device-specific LEDs on a membrane 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 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 the following systems:

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

### 5.2 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) is available in the Downloads section of the B&R website (www.br-automation.com).

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

## Information:

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

**If a more current ADI driver version exists (see the Downloads area of the B&R website), it can be installed later. During installation, make sure to check whether or not the Enhanced Write Filter (EWF) is disabled.**

# 6 B&R Automation Device Interface (ADI) Development Kit

This software can be used to access B&R Automation Device Interface (ADI) functions from Windows applications created e.g. using the following development environments:

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

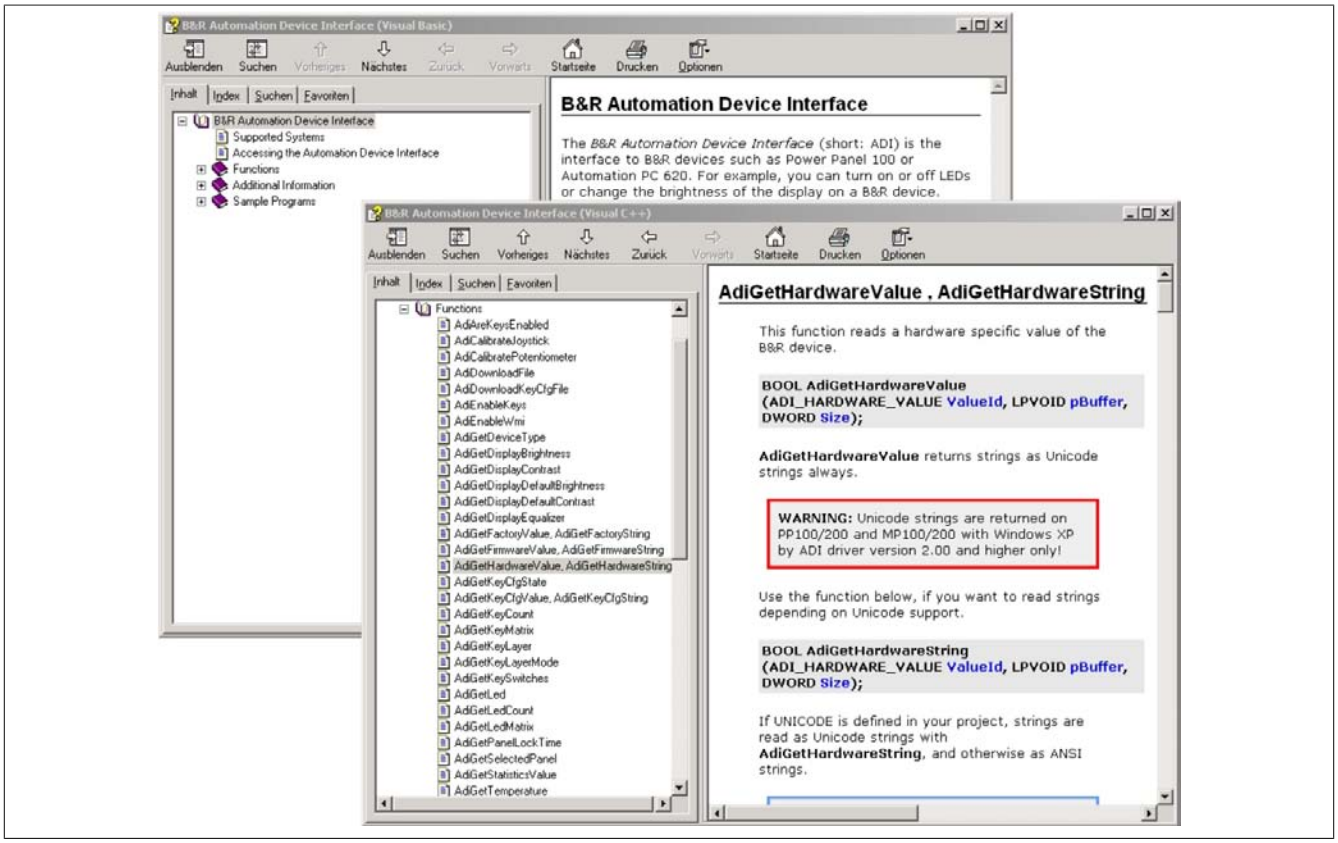



Figure 35: ADI Development Kit screenshots (Version 3.40)

Features:

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

Supports the following systems (Version 3.40 and higher):

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

- Mobile Panel 100/200

The ADI driver 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.

The B&R Automation Device Interface (ADI) Development Kit is available in the Download area of the B&R website (www.br-automation.com).

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

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

Supported programming languages:

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

System requirements

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

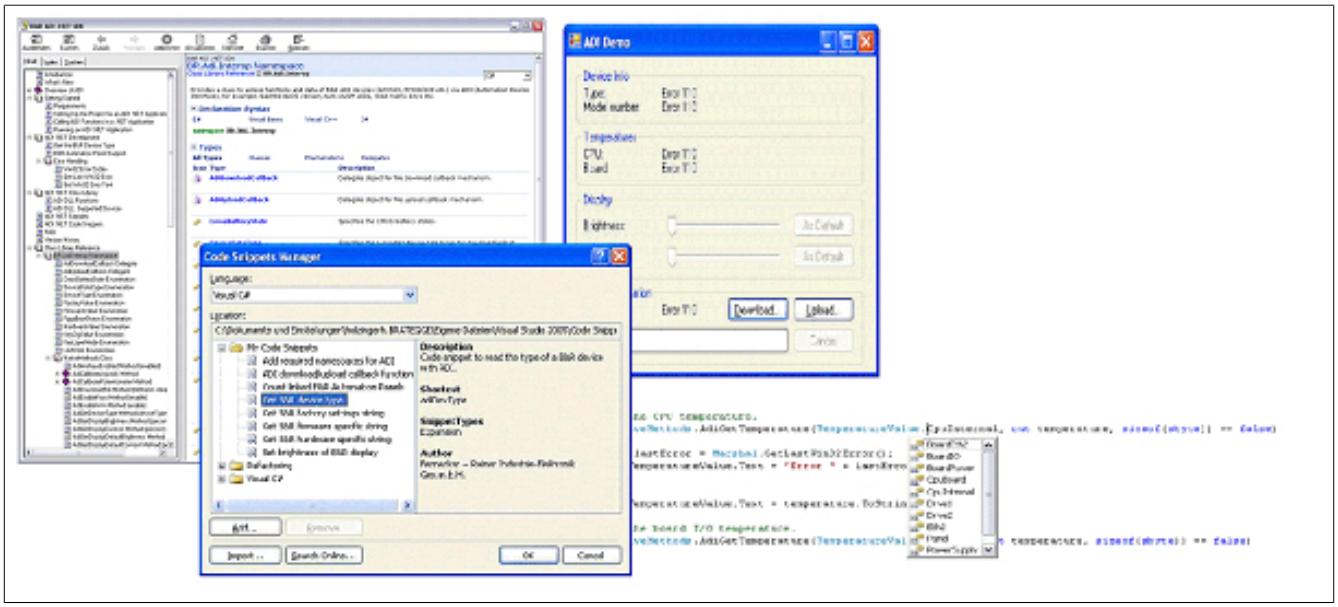



Figure 36: ADI .NET SDK screenshots (Version 1.80)

Features (Version 1.80 and higher)

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

Supports the following systems (Version 1.80 and higher):

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

The ADI driver 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).

# Chapter 5 • Accessories

The following accessories have passed B&R's functional testing and are approved for use with this device. Nevertheless, it is important to observe any limitations that may apply to the complete device when operated with different components. When operating the complete device, it is the specifications for the individual components that must be adhered to.

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

## 1 Power connectors

### 1.1 0TB103.9x

#### 1.1.1 General information

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

#### 1.1.2 Order data

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

Table 90: 0TB103.9, 0TB103.91 - Order data

#### 1.1.3 Technical data

> **Information:**
>
> **The following characteristics, features and limit values only apply to this accesory and can deviate from those specified for the entire device.**

| Product ID | 0TB103.9 | 0TB103.91 |
|---|---|---|
| **Terminal block** | | |
| Note | Protected against vibration by the screw flange<br>Rated values according to UL | |
| Number of pins | 3 (female) | |
| Type of terminal clamp | 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 wires | 0.20 to 2.50 mm² | |
| Fine strand wires | 0.20 to 1.50 mm² | 0.20 to 2.50 mm² |
| With wire tip sleeves | 0.20 to 1.50 mm² | |
| Fastening torque | 0.4 Nm | - |
| **Electrical characteristics** | | |
| Nominal voltage | 300 V | |
| Nominal current [1] | 10 A / contact | |
| Contact resistance | ≤ 5 mΩ | |

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

1) Please take the respective limit data for the I/O modules into consideration!
2) Cage clamp terminal blocks cannot be strung together.

# 2 Replacement CMOS batteries

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

### 2.1.1 General information

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

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

### 2.1.2 Order data

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

Table 92: 0AC201.91, 4A0006.00-000 - Order data

### 2.1.3 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 accesory and can deviate from those specified for the entire device.**

| Product ID | 0AC201.91 | 4A0006.00-000 |
|---|---|---|
| **General information** | | |
| Storage time | Max. 3 years at 30°C | |
| **Electrical characteristics** | | |
| Capacity | 950 mAh | |
| Self discharging | <1% per year (at 23°C) | |
| Voltage range | 3V | |
| **Environmental conditions** | | |
| Temperature | | |
| Storage | -20 to 60°C | |
| Relative humidity | | |
| Operation | 0 to 95% | |
| Storage | 0 to 95% | |
| Transport | 0 to 95% | |

Table 93: 0AC201.91, 4A0006.00-000 - Technical data

# 3 CFast cards

## 3.1 5CFAST.xxxx-00

### 3.1.1 General information

CFast cards are based on Single Level Cell (SLC) technology and are SATA 2.6 compatible. The dimensions are identical to CompactFlash cards.

### 3.1.2 Order data

| Model number | Short description | Figure |
|---|---|---|
| | **CFast cards** | Image not found for 5CFAST.2048-00! |
| 5CFAST.2048-00 | CFast 2 GB | |
| 5CFAST.4096-00 | CFast 4 GB | |
| 5CFAST.8192-00 | CFast 8 GB | |
| 5CFAST.016G-00 | CFast 16 GB | |
| 5CFAST.032G-00 | CFast 32 GB | |

Table 94: 5CFAST.2048-00, 5CFAST.4096-00, 5CFAST.8192-00, 5CFAST.016G-00, 5CFAST.032G-00 - Order data

### 3.1.3 Technical data

## Information:

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

| Product ID | 5CFAST.2048-00 | 5CFAST.4096-00 | 5CFAST.8192-00 | 5CFAST.016G-00 | 5CFAST.032G-00 |
|---|---|---|---|---|---|
| **General information** | | | | | |
| Capacity | 2 GB | 4 GB | 8 GB | 16 GB | 32 GB |
| Data retention | 10 years | | | | |
| Data reliability | < 1 unrecoverable error in $10^{14}$ bit read accesses | | | | |
| Lifetime monitoring | Yes | | | | |
| MTBF | > 2,500,000 hours (at 25°C) | | | | |
| Maintenance | None | | | | |
| Supported operating modes | SATA 2.6, max. PIO Mode 4, Multiword DMA Mode 2, Ultra DMA Mode 6 | | | | |
| Continuous reading | | | | | |
| Typical | | | | | |
| With 128 kB block size | 56 MB/s | 107 MB/s | 116 MB/s | 116 MB/s | 116 MB/s |
| With 4 kB block size | 23 MB/s | 26 MB/s | 29 MB/s | 29 MB/s | 29 MB/s |
| Maximum | | | | | |
| With 128 kB block size | 60 MB/s | 110 MB/s | 120 MB/s | 120 MB/s | 120 MB/s |
| With 4 kB block size | 25 MB/s | 30 MB/s | 35 MB/s | 35 MB/s | 35 MB/s |
| Continuous writing | | | | | |
| Typical | | | | | |
| With 128 kB block size | 24 MB/s | 49 MB/s | 93 MB/s | 93 MB/s | 93 MB/s |
| With 4 kB block size | 17 MB/s | 19 MB/s | 21 MB/s | 21 MB/s | 21 MB/s |
| Maximum | | | | | |
| With 128 kB block size | 30 MB/s | 55 MB/s | 100 MB/s | 100 MB/s | 100 MB/s |
| With 4 kB block size | 20 MB/s | 25 MB/s | 25 MB/s | 25 MB/s | 25 MB/s |
| Certification | | | | | |
| CE | Yes | | | | |
| **Endurance** | | | | | |
| SLC Flash | Yes | | | | |
| Wear leveling | Static | | | | |
| S.M.A.R.T. Support | Yes | | | | |
| **Support** | | | | | |
| Hardware | APC910 | | | | |
| Operating systems | | | | | |
| Windows 7 32-bit | No | No | No | Yes | Yes |
| Windows 7 64-bit | No | No | No | No | Yes |
| Windows Embedded Standard 7, 32-bit | No | No | No | Yes | Yes |
| Windows Embedded Standard 7, 64-bit | No | No | No | Yes | Yes |
| Windows XP Professional | No | Yes | Yes | Yes | Yes |
| Windows Embedded Standard 2009 | Yes | | | | |
| Software | | | | | |
| PVI Transfer | ≥ V4.0.0.8 (part of PVI Development Setup ≥ V3.0.2.3014) | | | | |
| B&R Embedded OS Installer | ≥ V3.10 | ≥ V3.10 | ≥ V3.10 | ≥ V3.20 | ≥ V3.21 |
| **Environmental conditions** | | | | | |

Table 95: 5CFAST.2048-00, 5CFAST.4096-00, 5CFAST.8192-00, 5CFAST.016G-00, 5CFAST.032G-00 - Technical data

| Product ID | 5CFAST.2048-00 | 5CFAST.4096-00 | 5CFAST.8192-00 | 5CFAST.016G-00 | 5CFAST.032G-00 |
|---|---|---|---|---|---|
| Temperature | | | | | |
| Operation | 0 to 70°C | | | | |
| Storage | -50 to 100°C | | | | |
| Transport | -50 to 100°C | | | | |
| Relative humidity | | | | | |
| Operation | Max. 85% at 70°C | | | | |
| Storage | Max. 85% at 70°C | | | | |
| Transport | Max. 85% at 70°C | | | | |
| Vibration | | | | | |
| Operation | 20 g peak, 10 to 2000 Hz | | | | |
| Storage | 20 g peak, 10 to 2000 Hz | | | | |
| Transport | 20 g peak, 10 to 2000 Hz | | | | |
| Shock | | | | | |
| Operation | 1.5 kg peak, 0.5 ms | | | | |
| Storage | 1.5 kg peak, 0.5 ms | | | | |
| Transport | 1.5 kg peak, 0.5 ms | | | | |
| Altitude | | | | | |
| Operation | TBD | | | | |
| **Mechanical characteristics** | | | | | |
| Dimensions | | | | | |
| Width | 42.8 ±0.10mm | | | | |
| Length | 36.4 ±0.10mm | | | | |
| Depth | 3.6 ±0.10mm | | | | |
| Weight | 10 g | | | | |

Table 95: 5CFAST.2048-00, 5CFAST.4096-00, 5CFAST.8192-00, 5CFAST.016G-00, 5CFAST.032G-00 - Technical data

### 3.1.4 Dimensions

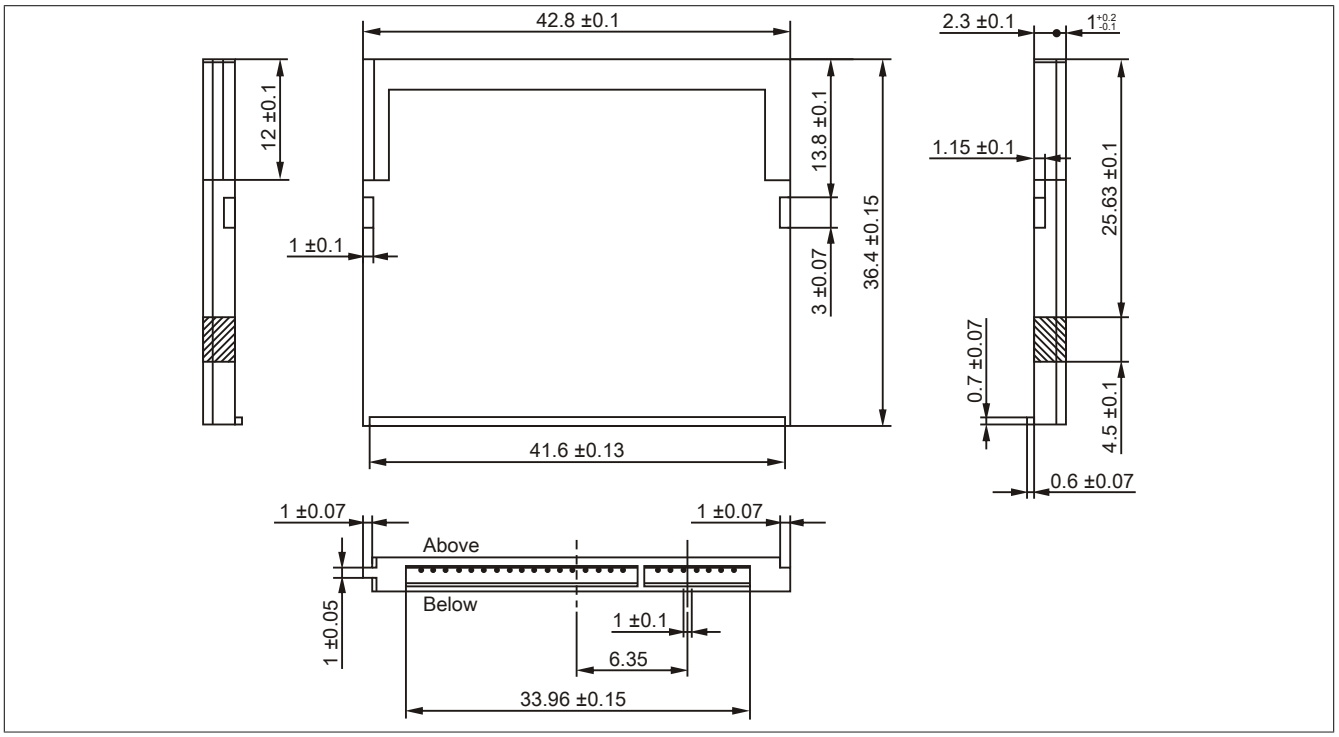



Figure 37: Dimensions – CFast card

### 3.1.5 Temperature humidity diagram

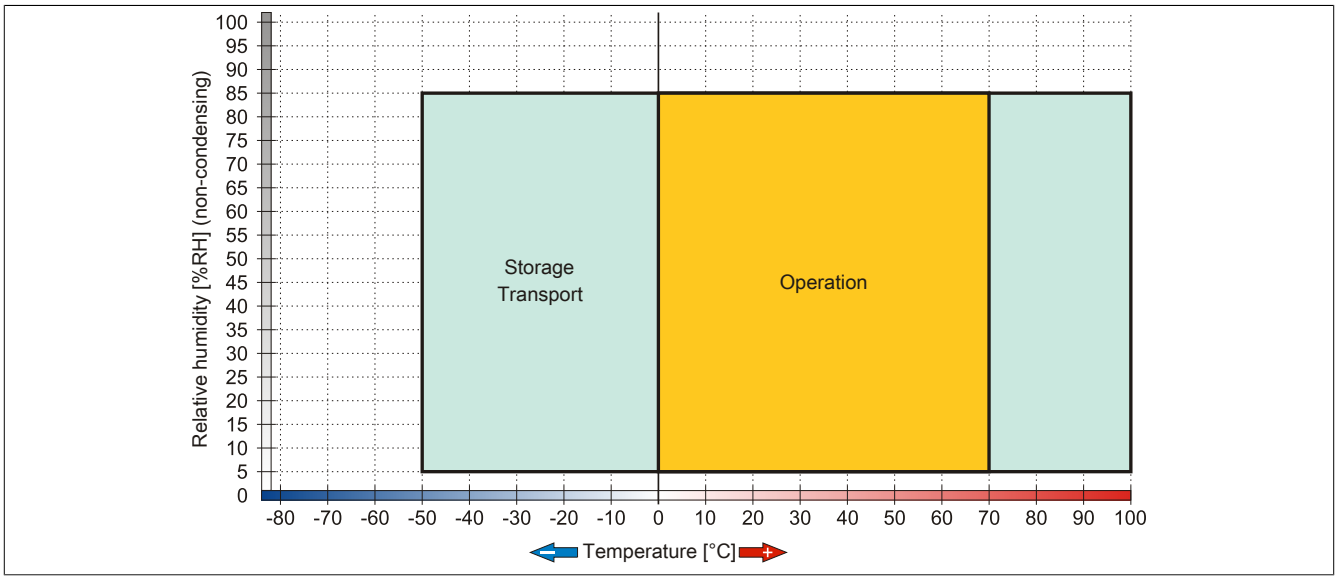



Figure 38: 5CFAST.xxxx-00 - Temperature humidity diagram

# 4 USB flash drive

## 4.1 5MMUSB.2048-01

### 4.1.1 General information

USB flash drives are storage media that are easy to replace. Because of their fast data transfer (USB 2.0), USB flash drives are ideal for use as portable data storage. Without requiring additional drivers ("Hot 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 USB 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

### 4.1.2 Order data

| Model number | Short description | Figure |
|---|---|---|
| | **USB accessories** | |
| 5MMUSB.2048-01 | USB 2.0 flash drive 2048 MB B&R |  |

Table 96: 5MMUSB.2048-01 - Order data

### 4.1.3 Technical data

| Product ID | 5MMUSB.2048-01 |
|---|---|
| **General information** | |
| Data retention | > 10 years |
| LEDs | 1 LED (green), signals data transfer (send and receive) 1) |
| MTBF | > 3,000,000 hours |
| Type | USB 1.1, USB 2.0 |
| Maintenance | None |
| Certification | |
| CE | Yes |
| **Interfaces** | |
| USB | |
| Type | USB 1.1, USB 2.0 |
| Connection | To each USB type A interface |
| Transfer rate | Low speed (1.5 Mbit/s), full speed (12 Mbit/s), 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 characteristics** | |
| Power consumption | Max. 500 µA sleep mode, max. 120 mA read/write |
| **Environmental conditions** | |
| Temperature | |

Table 97: 5MMUSB.2048-01 - Technical data

| Product ID | 5MMUSB.2048-01 |
|---|---|
| Operation | 0 to 70°C |
| Storage | -50 to 100°C |
| Transport | -50 to 100°C |
| Relative humidity | |
| Operation | 85%, non-condensing |
| Storage | 85%, non-condensing |
| Transport | 85%, non-condensing |
| Vibration | |
| Operation | 20 to 2000 Hz: 20 g (peak) |
| Storage | 20 to 2000 Hz: 20 g (peak) |
| Transport | 20 to 2000 Hz: 20 g (peak) |
| Shock | |
| Operation | Max. 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 97: 5MMUSB.2048-01 - Technical data

1) Signals data transfer (send and receive).

### 4.1.4 Temperature humidity diagram

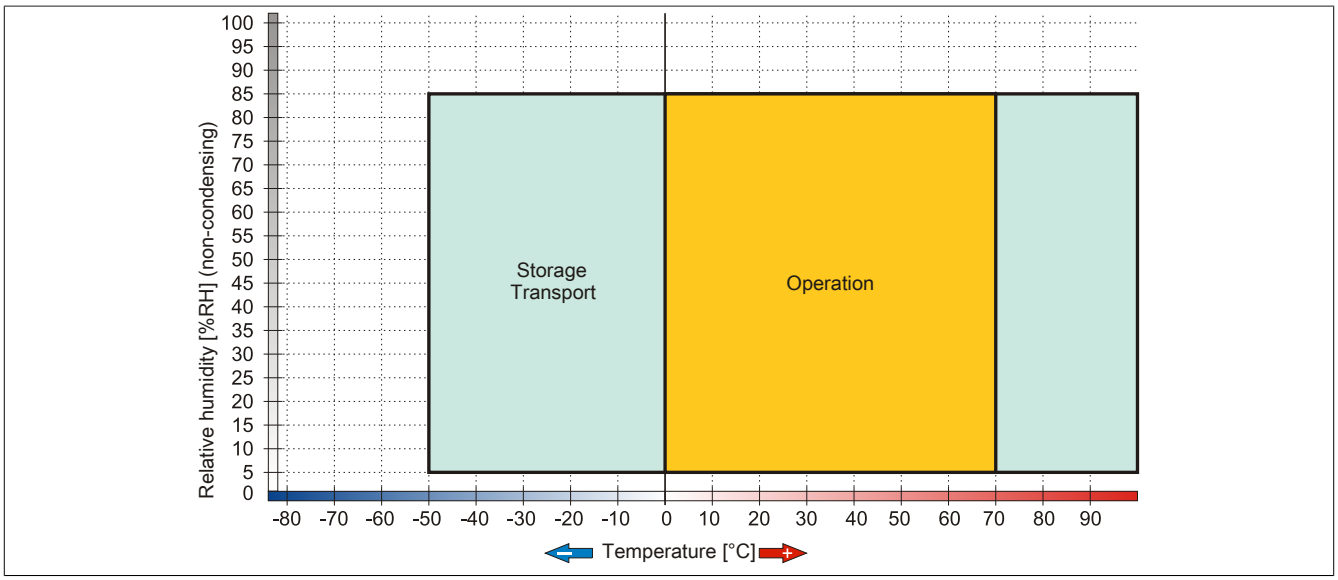



Figure 39: 5MMUSB.2048-01 - Temperature humidity diagram

# 5 USB Media Drive

## 5.1 5MD900.USB2-02

### 5.1.1 General information

The USB Media Drive features a DVD-R/RW DVD+R/RW drive, a CompactFlash slot and a USB port on the front and back sides. It is connected to the USB port on the B&R industrial PC.

- Desk-top or rack-mount operation (mounting rail brackets)
- Integrated DVD-R/RW DVD+R/RW drive
- Integrated CompactFlash slot IDE/ATAPI (Hot Plug capable)
- Integrated USB 2.0 connection
- +24 VDC supply (back side)
- USB 2.0 connection (back side)
- Optional front cover

### 5.1.2 Order data

| Model number | Short description | Figure |
|---|---|---|
| | **USB accessories** |  |
| 5MD900.USB2-02 | USB 2.0 Drives DVD-R/RW DVD+R/RW, CompactFlash slot (type II), USB connector (type A on front side, type B on back side); 24 VDC; (0TB103.9 screw clamp or 0TB103.91 cage clamp must be ordered separately). | |
| | **Required accessories** | |
| | **Other** | |
| 5SWUTI.0000-00 | OEM Nero CD-RW Software, only available with a CD writer. | |
| | **Terminal blocks** | |
| 0TB103.9 | Connector, 24 VDC, 3-pin female, screw clamps 3.31 mm², protected against vibration by the screw flange | |
| 0TB103.91 | Connector, 24 VDC, 3-pin female, cage clamps 3.31 mm², protected against vibration by the screw flange | |
| | **USB cable** | |
| 5CAUSB.0018-00 | USB 2.0 connecting cable type A - type B, 1.8 m. | |
| 5CAUSB.0050-00 | USB 2.0 connecting cable type A - type B, 5 m. | |

Table 98: 5MD900.USB2-02 - Order data

### 5.1.3 Interfaces

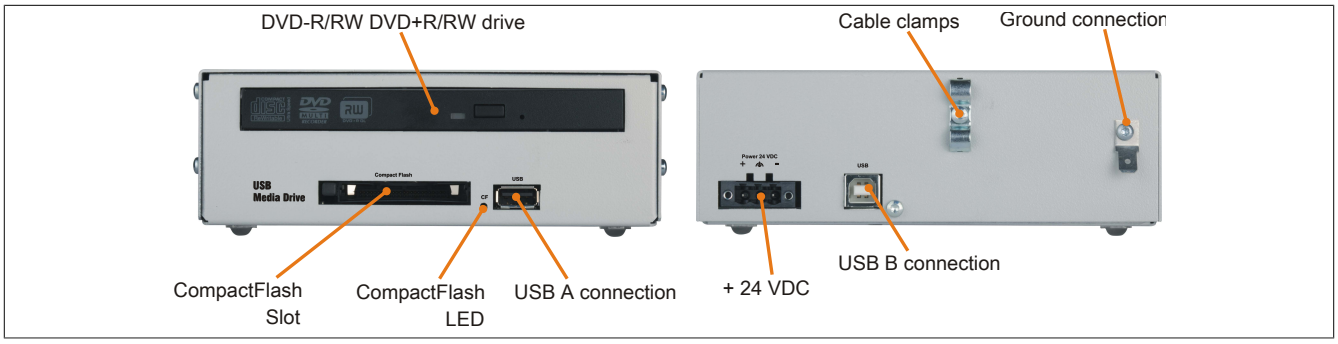



Figure 40: 5MD900.USB2-02 - Interfaces

### 5.1.4 Technical data

| Product ID | 5MD900.USB2-02 |
|---|---|
| **General information** | |
| Max. cable length | 5m (not including hub) |
| Certification | |
| CE | Yes |
| c-UL-us | Yes |
| **Interfaces** | |
| CompactFlash slot 1 | |
| Type | Type I |
| Connection | IDE/ATAPI |
| Activity LED | Signals read or write access to an inserted CompactFlash card |

Table 99: 5MD900.USB2-02 - Technical data

| Product ID | 5MD900.USB2-02 |
|---|---|
| USB | |
| Type | USB 2.0 |
| Design | Type A front<br>Type B back |
| Transfer rate | Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s) |
| Current load | Max. 500 mA |
| **CD / DVD drive** | |
| Data buffer capacity | 2 MB |
| Data transfer rate | Max. 33.3 MB/s |
| Speed | Max. 5090 rpm ±1% |
| Noise level | Approx. 45 dBA in a distance of 50 cm (full read access) |
| Compatible formats | CD-DA, CD-ROM mode 1/mode 2<br>CD-ROM XA mode 2 (form 1, form 2)<br>Photo CD (single/multi-session), Enhanced CD, CD text<br>DVD-ROM, DVD-R, DVD-RW, DVD-Video<br>DVD-RAM (4.7GB, 2.6GB)<br>DVD+R, DVD+R (double layer), DVD+RW |
| Laser class | Class 1 laser |
| Lifespan | 60000 POH (Power-On Hours) |
| Interface | IDE (ATAPI) |
| Startup time | |
| CD | Max. 14 seconds (0 rpm to read access) |
| DVD | Max. 15 seconds (0 rpm to read access) |
| Access time | |
| CD | Typ. 140 ms (24x) |
| DVD | Typ. 150 ms (8x) |
| Readable media | |
| CD | CD/CD-ROM (12 cm, 8 cm), CD-R, CD-RW |
| DVD | DVD-ROM, DVD-R, DVD-RW. DVD-RAM, DVD+R, DVD+R (double layer), DVD+RW |
| Non-write protected media | |
| CD | CD-R, CD-RW |
| DVD | DVD-R/RW, DVD-RAM (4.7 GB), DVD+R/RW, DVD+R (double layer) |
| Reading rate | |
| CD | 24x |
| DVD | 8x |
| Write speed | |
| CD-R | 10 to 24x |
| CD-RW | 10 to 24x |
| DVD+R | 3.3 to 8x |
| DVD+R (Double Layer) | 2.4 to 4x |
| DVD+RW | 3.3 to 8x |
| DVD-R | 2 to 6x |
| DVD-R (Double Layer) | 2 to 4x |
| DVD-RAM | 3 to 5x |
| DVD-RW | 2 to 6x |
| Write-methods | |
| CD | Disk at once, session at once, packet write, track at once |
| DVD | Disk at once, incremental, over-write, sequential |
| **Electrical characteristics** | |
| Nominal voltage | 24 VDC ±25% |
| **Operating conditions** | |
| EN 60529 protection | IP65 front side (only with optional front cover), IP20 back side |
| **Environmental conditions** | |
| Temperature [1)] | |
| Operation | 5 to 45°C |
| Storage | -20 to 60°C |
| Transport | -40 to 60°C |
| Relative humidity | |
| Operation | 20 to 80% |
| Storage | 5 to 90% |
| Transport | 5 to 95% |
| Vibration | |
| Operation | 5 to 500 Hz: 0.3 g (2.9 m/s² 0-peak) |
| Storage | 10 to 100 Hz: 2 g (19.6 m/s² 0-peak) |
| Transport | 10 to 100 Hz: 2 g (19.6 m/s² 0-peak) |
| Shock | |
| Operation | 5 g, 11 ms |
| Storage | 60 g, 11 ms |
| Transport | 60 g, 11 ms |
| Altitude | |
| Operation | Max. 3000 m |
| **Mechanical characteristics** | |
| Dimensions | |

Table 99: 5MD900.USB2-02 - Technical data

| Product ID | 5MD900.USB2-02 |
|---|---|
| Width | 156 mm |
| Height | 52 mm |
| Depth | 140 mm |
| Weight | Approx. 1100 g (without front cover) |

Table 99: 5MD900.USB2-02 - Technical data

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

### 5.1.5 Dimensions

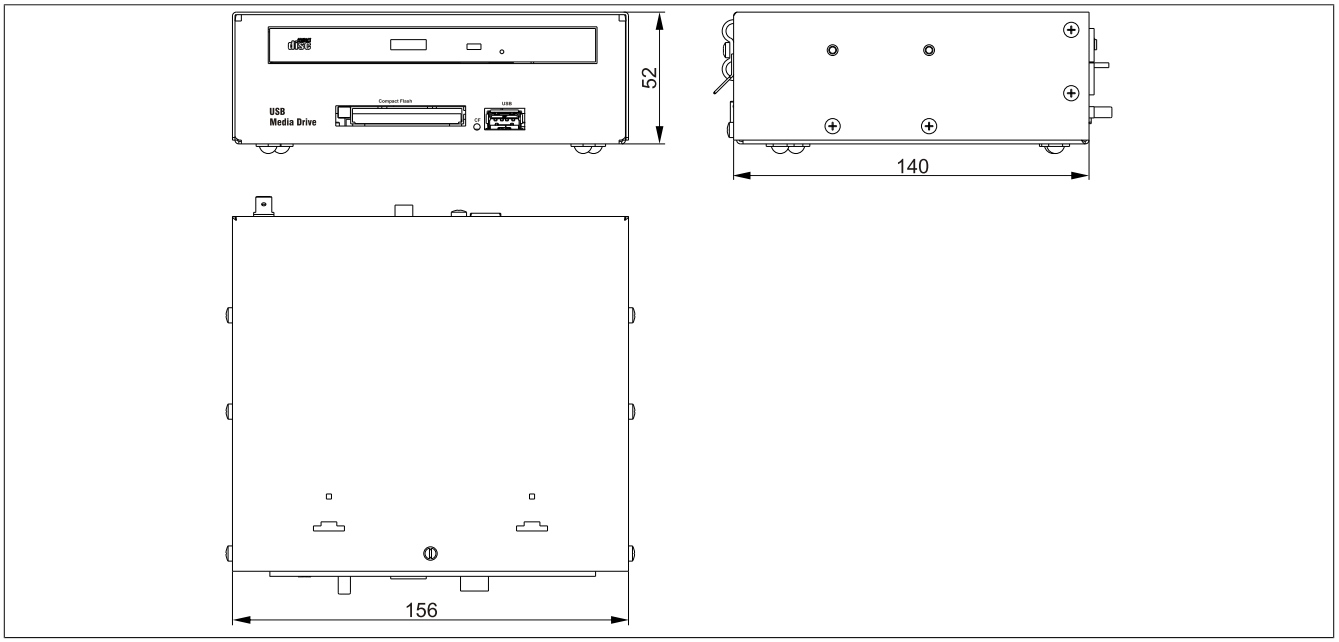



Figure 41: 5MD900.USB2-02 - Dimensions

### 5.1.6 Dimensions with front cover

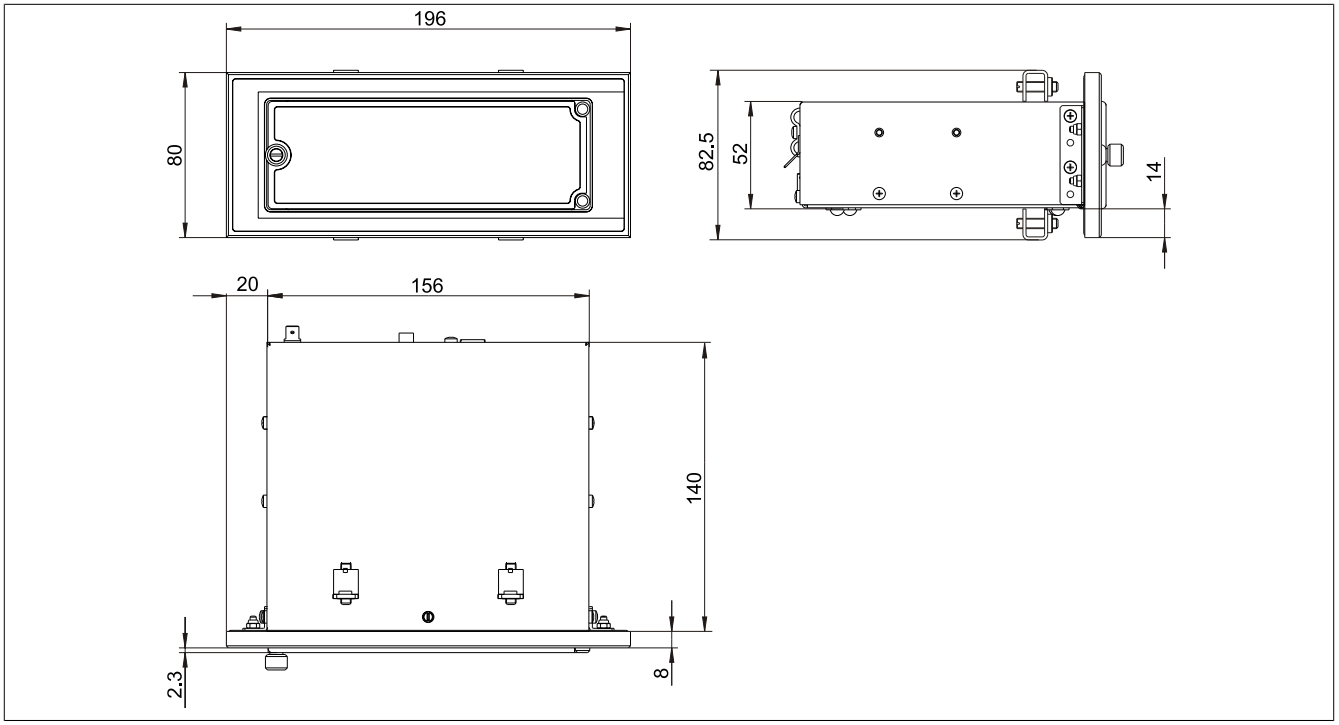



Figure 42: Dimensions - USB Media Drive with front cover

### 5.1.7 Cutout installation

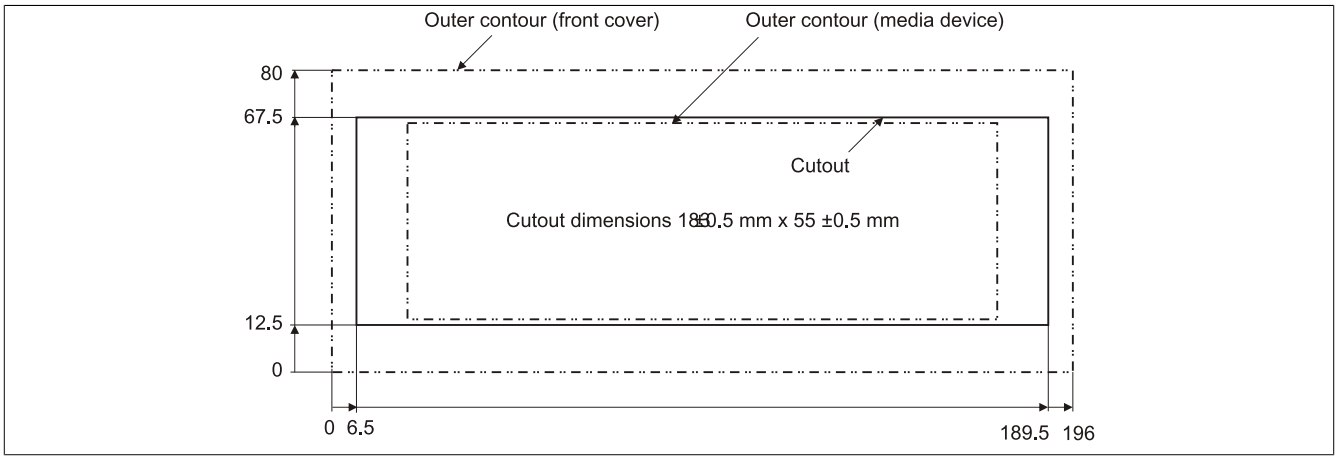



Figure 43: Installation cutout - USB Media Drive with front cover

### 5.1.8 Contents of delivery

| Quantity | Component |
|---|---|
| 1 | USB Media Drive complete unit |
| 2 | Mounting rail brackets |

Table 100: 5MD900.USB2-02 - Contents of delivery

### 5.1.9 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

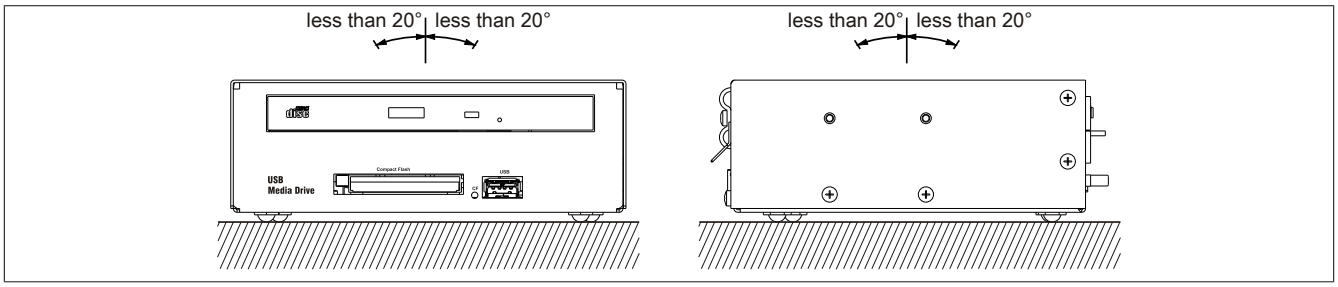



Figure 44: 5MD900.USB2-02 - Mounting orientation

## 5.2 5A5003.03

### 5.2.1 General information

This front cover can also be mounted on the front of the USB media drive (model number 5MD900.USB2-00, 5MD900.USB2-01 or 5MD900.USB2-02) to protect the interface.

### 5.2.2 Order data

| Model number | Short description | Figure |
|---|---|---|
| | **USB accessories** | |
| 5A5003.03 | Front cover, For Remote CD-ROM Drive 5A5003.02 and USB 2.0 drive combination 5MD900.USB2-00, 5MD900.USB2-01 and 5MD900.USB2-02. | |

Table 101: 5A5003.03 - Order data

### 5.2.3 Technical data

| Product ID | 5A5003.03 |
|---|---|
| **Mechanical characteristics** | |
| Front | |
| Décor foil | |
| Light background | Similar to Pantone 427CV |
| Dimensions | |
| Width | 196 mm |
| Height | 80 mm |
| Depth | 8 mm |

Table 102: 5A5003.03 - Technical data

### 5.2.4 Dimensions

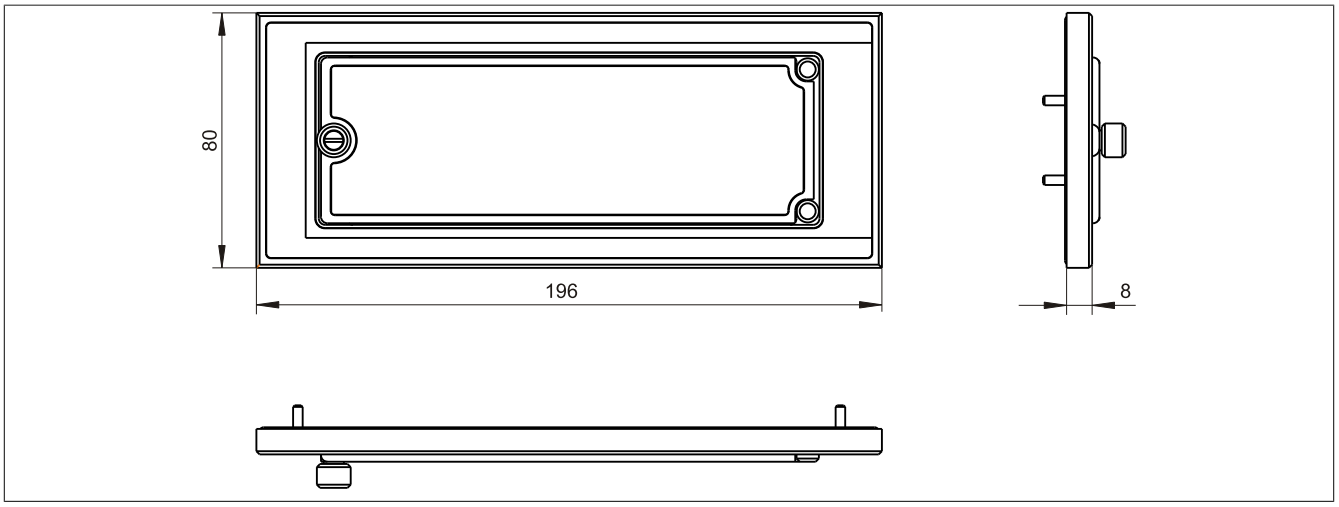



Figure 45: 5A5003.03 - Dimensions

### 5.2.5 Contents of delivery

| Amount | Component |
|---|---|
| 1 | Front cover 5A5003.03 for the USB Media Drive |
| 4 | M3 locknut |
| 4 | Cover retaining clip |

Table 103: 5A5003.03 - Contents of delivery

### 5.2.6 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.

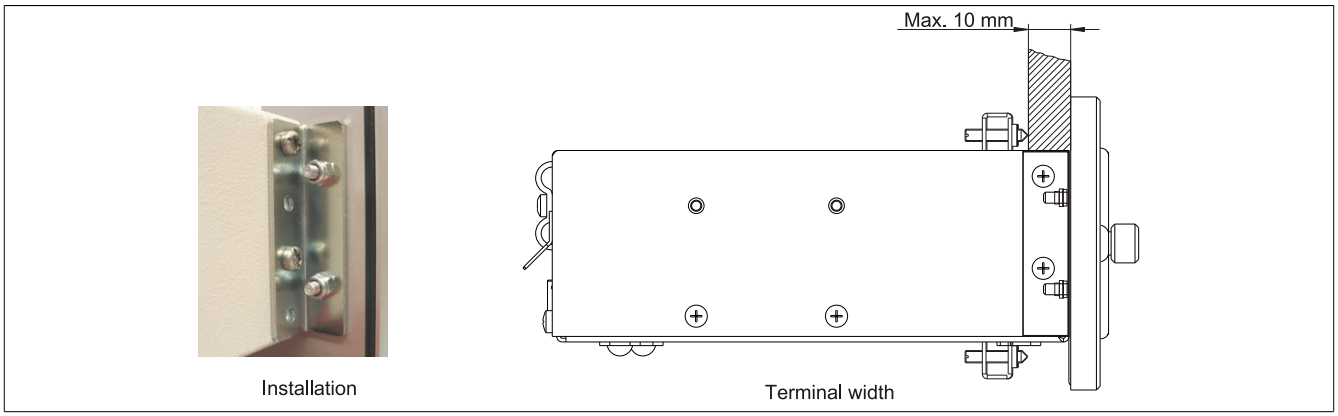



Figure 46: Front cover mounting and installation depth

## Cutout installation

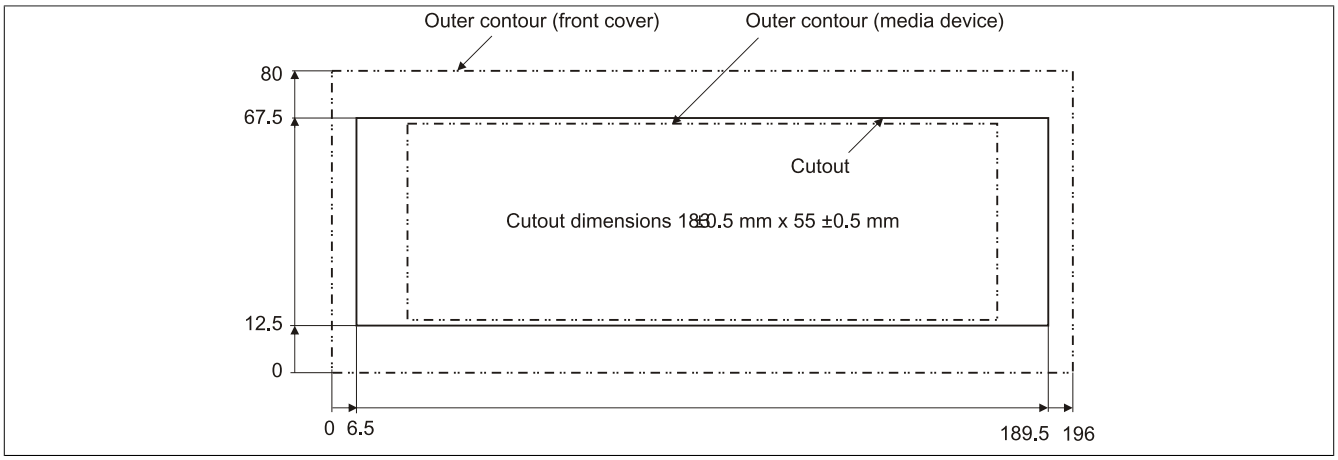



Figure 47: Installation cutout - USB Media Drive with front cover

# 6 Cables

## 6.1 DVI cables

### 6.1.1 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 cable** |  |
| 5CADVI.0018-00 | DVI-D cable, 1.8 m. | |
| 5CADVI.0050-00 | DVI-D cable, 5 m. | |
| 5CADVI.0100-00 | DVI-D cable, 10 m. | |

Table 104: 5CADVI.0018-00, 5CADVI.0050-00, 5CADVI.0100-00 - Order data

#### Technical data

| Product ID | 5CADVI.0018-00 | 5CADVI.0050-00 | 5CADVI.0100-00 |
|---|---|---|---|
| **General information** | | | |
| Certification | | | |
| CE | Yes | | |
| c-UL-us | Yes | | |
| **Cable structure** | | | |
| Wire cross section | AWG 28 | | |
| Shield | Individual cable pairs and entire cable | | |
| Cable shielding | Tinned CU mesh, optical coverage >86% | | Tinned Cu mesh, optical coverage >86% |
| Outer sheathing | | | |
| Material | PVC | | |
| Color | Beige | | |
| Labeling | AWM STYLE 20276 80°C 30V VW1 DVI DIGITAL SINGLE LINK DER AN | | |
| **Connector** | | | |
| Type | 2x DVI-D (18+1), male | | |
| Connection cycles | 100 | | |
| **Electrical characteristics** | | | |
| Conductor resistance | Max. 237 Ω/km | | |
| Insulation resistance | Min. 100 MΩ/km | | |
| **Mechanical characteristics** | | | |
| Dimensions | | | |
| Length | 1.8 m ±50 mm | 5 m ± 80 mm | 10 m ±100 mm |
| Diameter | Max. 8.5 mm | | |
| Flex radius | ≥ 5x cable diameter (plug - ferrite magnet and ferrite magnet - ferrite magnet) | | |
| Weight | Approx. 260 g | Approx. 460 g | Approx. 790 g |

Table 105: 5CADVI.0018-00, 5CADVI.0050-00, 5CADVI.0100-00 - Technical data

## Flex radius specification

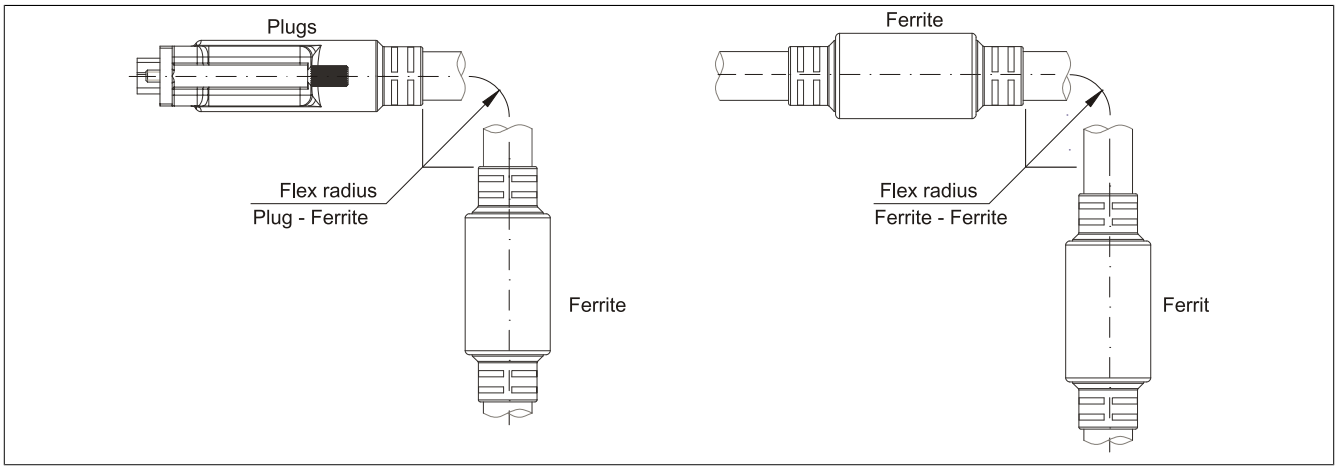



Figure 48: Flex radius specification

## Dimensions

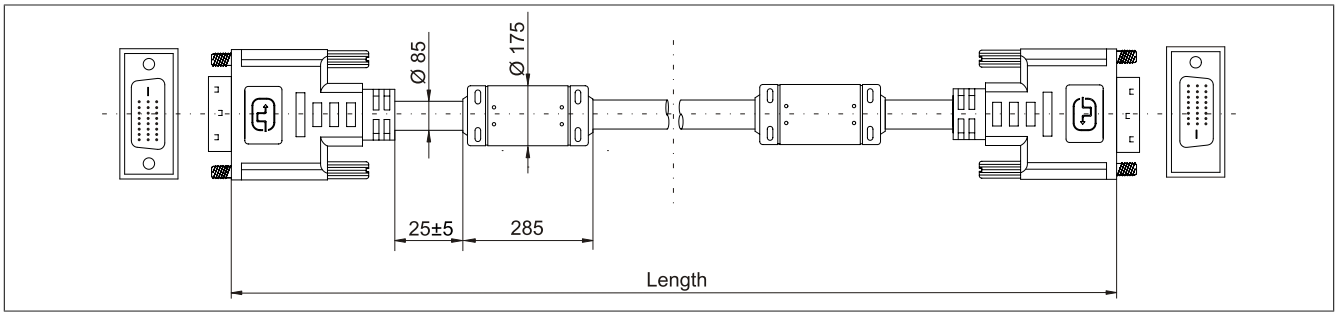



Figure 49: 5CADVI.0xxx-00 - Dimensions

**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.**

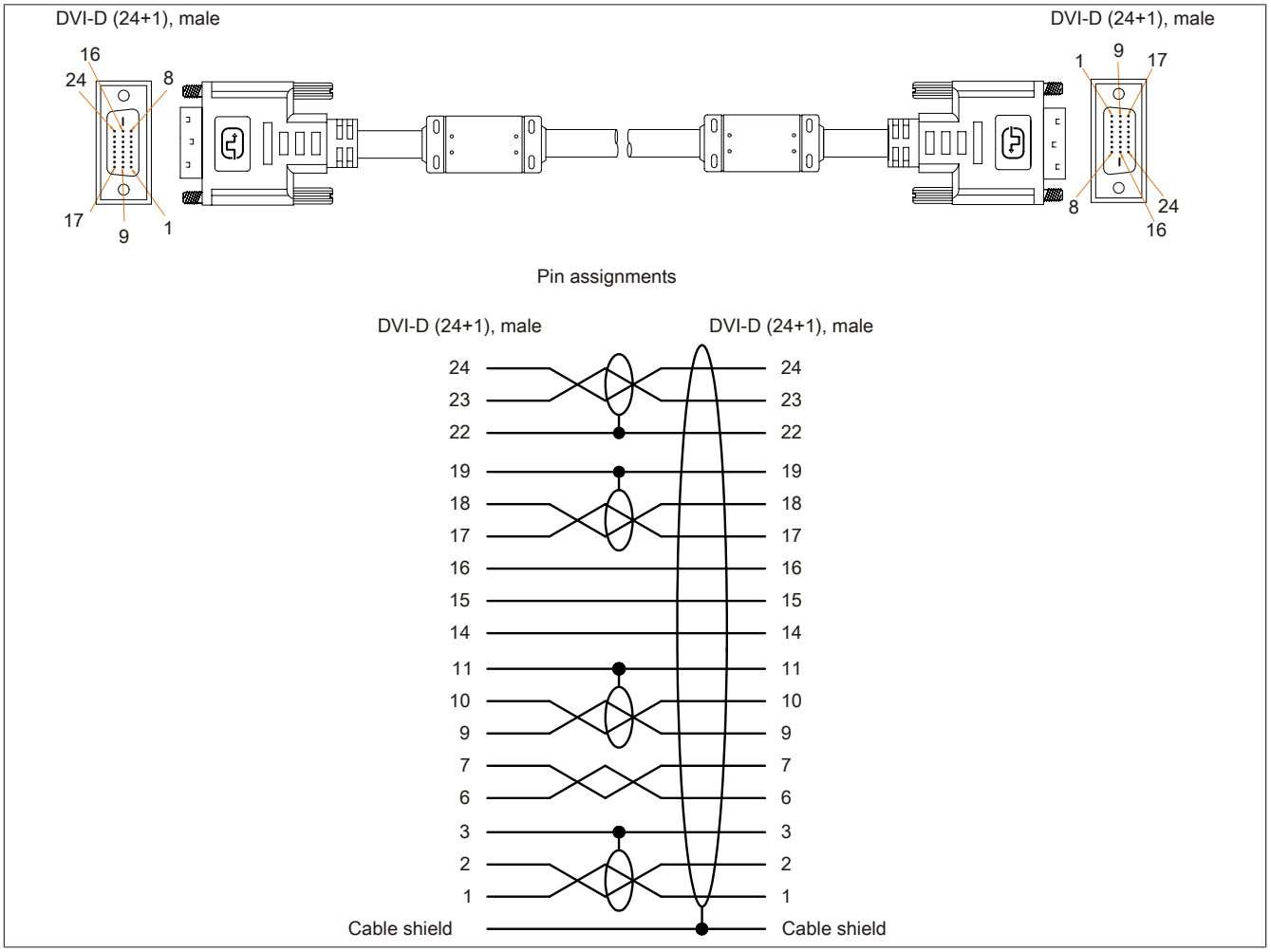



Figure 50: 5CADVI.0xxx-00 - Pinout

## 6.2 SDL cables

### 6.2.1 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 106: 5CASDL.0018-00, 5CASDL.0050-00, 5CASDL.0100-00, 5CASDL.0150-00, 5CASDL.0200-00, 5CASDL.0250-00, 5CASDL.0300-00 - Order data

#### Technical data

| Product ID | 5CASDL. 0018-00 | 5CASDL. 0050-00 | 5CASDL. 0100-00 | 5CASDL. 0150-00 | 5CASDL. 0200-00 | 5CASDL. 0250-00 | 5CASDL. 0300-00 |
|---|---|---|---|---|---|---|---|
| **General information** | | | | | | | |
| Certification | | | | | | | |
| CE | Yes | | | | | | |
| c-UL-us | Yes | | | | | | |
| **Cable structure** | | | | | | | |
| Wire cross section | AWG 28 | | AWG 24 | | | | |
| Shield | Individual cable pairs and entire cable | | | | | | |
| Cable shielding | Tinned Cu mesh, optical coverage >85% | | | | | | |
| Outer sheathing | | | | | | | |
| Material | PVC | | | | | | |
| Color | Black | | | | | | |
| Labeling | E74020-C (UL) AWM STYLE 20176 80°C 30V VW-1 DVI DIGITAL LINK | | | | | | |
| **Connector** | | | | | | | |
| Type | 2x DVI-D (24+1), male | | | | | | |
| Connection cycles | 100 | | | | | | |
| Contacts | Gold plated | | | | | | |
| Mechanical protection | Metal cover with crimped stress relief | | | | | | |
| **Electrical characteristics** | | | | | | | |
| Conductor resistance | | | | | | | |
| AWG 24 | - | | ≤93 Ω/km | | | | |
| AWG 28 | ≤237 Ω/km | | - | | | | |
| Insulation resistance | Min. 10 MΩ/km | | | | | | |
| **Mechanical characteristics** | | | | | | | |
| Dimensions | | | | | | | |
| Length | 1.8 m ±30 mm | 5 m ± 30 mm | 10 m ±50 mm | 15 m ±100 mm | 20 m ±100 mm | 25 m ± 100 mm | 30 m ± 100 mm |
| Diameter | Typ. 8.6 ± 0.2 mm Max. 9 mm | | Typ. 11 ± 0.2 mm Max. 11.5 mm | | | | |
| Flex radius | ≥ 5x cable diameter (plug - ferrite magnet and ferrite magnet - ferrite magnet) | | | | | | |
| Flexibility | Limited flexibility; valid for ferrite magnet - ferrite magnet (tested 100 cycles with 5x cable diameter, 20 cycles / minute) | | | | | | |
| Weight | Approx. 300 g | Approx. 580 g | Approx. 1500 g | Approx. 2250 g | Approx. 2880 g | Approx. 4800 g | Approx. 5520 g |

Table 107: 5CASDL.0018-00, 5CASDL.0050-00, 5CASDL.0100-00, 5CASDL.0150-00, 5CASDL.0200-00, 5CASDL.0250-00, 5CASDL.0300-00 - Technical data

## Flex radius specification

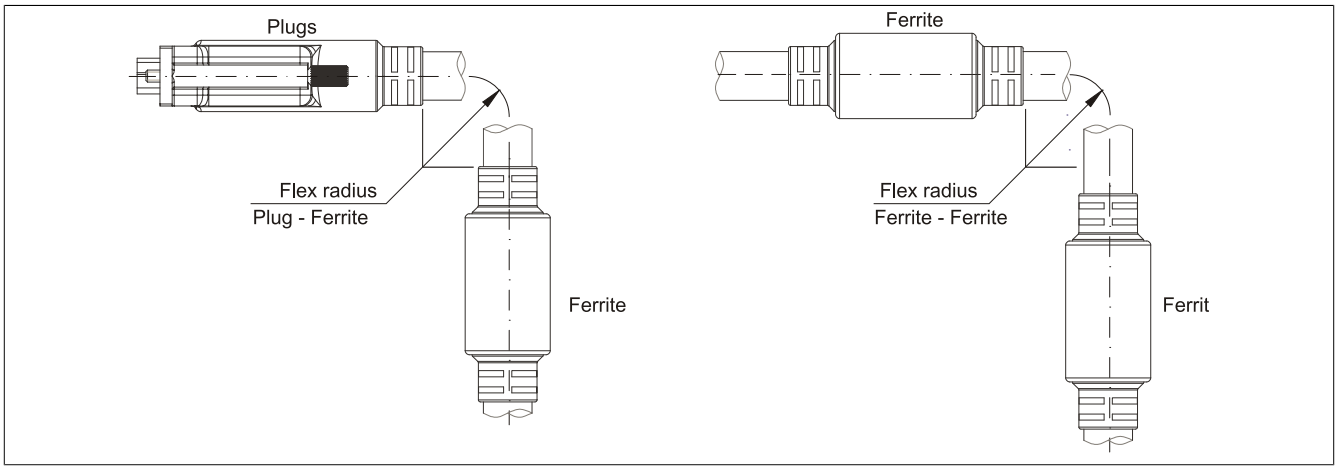



Figure 51: Flex radius specification

## Dimensions

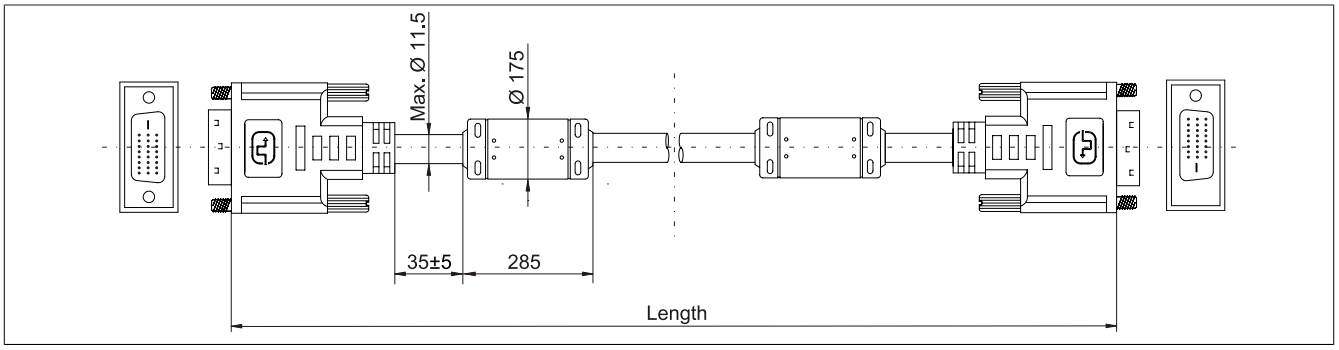



Figure 52: 5CASDL.0xxx-00- Dimensions

**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.**

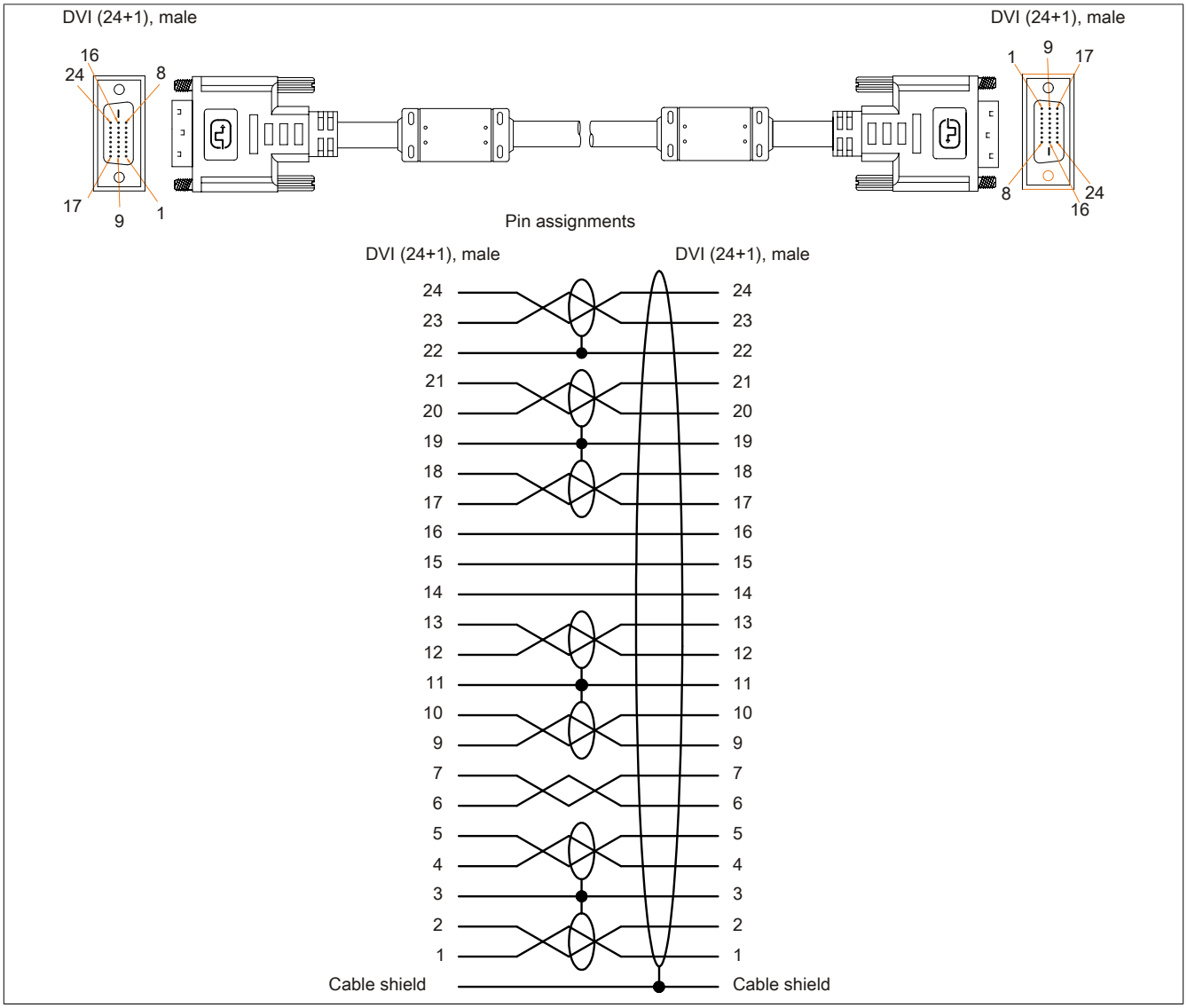



Figure 53: 5CASDL.0xxx-00- Pinout

## 6.3 SDL cables with 45° plugs

### 6.3.1 5CASDL.0xxx-01

#### General information

The 5CASDL.0xxx-01 SDL cables with 45° plug are designed for a 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 cable - 45° connector** |  |
| 5CASDL.0018-01 | SDL cable; 45° connector, 1.8 m. | |
| 5CASDL.0050-01 | SDL cable; 45° connector, 5 m. | |
| 5CASDL.0100-01 | SDL cable; 45° connector, 10 m. | |
| 5CASDL.0150-01 | SDL cable; 45° connector, 15 m. | |

Table 108: 5CASDL.0018-01, 5CASDL.0050-01, 5CASDL.0100-01, 5CASDL.0150-01 - Order data

#### Technical data

| Product ID | 5CASDL.0018-01 | 5CASDL.0050-01 | 5CASDL.0100-01 | 5CASDL.0150-01 |
|---|---|---|---|---|
| **General information** | | | | |
| Certification | | | | |
| CE | Yes | | | |
| c-UL-us | Yes | | | |
| **Cable structure** | | | | |
| Wire cross section | AWG 28 | | AWG 24 | |
| Shield | Individual cable pairs and entire cable | | | |
| Cable shielding | Tinned Cu mesh, optical coverage >85% | | | |
| Outer sheathing | | | | |
| Material | PVC | | | |
| Color | Black | | | |
| **Connector** | | | | |
| Type | 2x DVI-D (24+1), male | | | |
| Connection cycles | 100 | | | |
| Contacts | Gold plated | | | |
| Mechanical protection | Metal cover with crimped stress relief | | | |
| **Electrical characteristics** | | | | |
| Conductor resistance | | | | |
| AWG 24 | - | | ≤93 Ω/km | |
| AWG 28 | ≤237 Ω/km | | - | |
| Insulation resistance | Min. 10 MΩ/km | | | |
| **Mechanical characteristics** | | | | |
| Dimensions | | | | |
| Length | 1.8 m ±30 mm | 5 m ± 50 mm | 10 m ±100 mm | 15 m ±100 mm |
| Diameter | Max. 9 mm | | Max. 11.5 mm | |
| Flex radius | | | | |
| Fixed installation | ≥ 5x cable diameter (plug - ferrite magnet and ferrite magnet - ferrite magnet) | | | |
| Flexibility | Limited flexibility; valid for ferrite magnet - ferrite magnet (tested 100 cycles with 5x cable diameter, 20 cycles / minute) | | | |
| Weight | Approx. 300 g | Approx. 590 g | Approx. 2800 g | Approx. 2860 g |

Table 109: 5CASDL.0018-01, 5CASDL.0050-01, 5CASDL.0100-01, 5CASDL.0150-01 - Technical data

### Flex radius specification

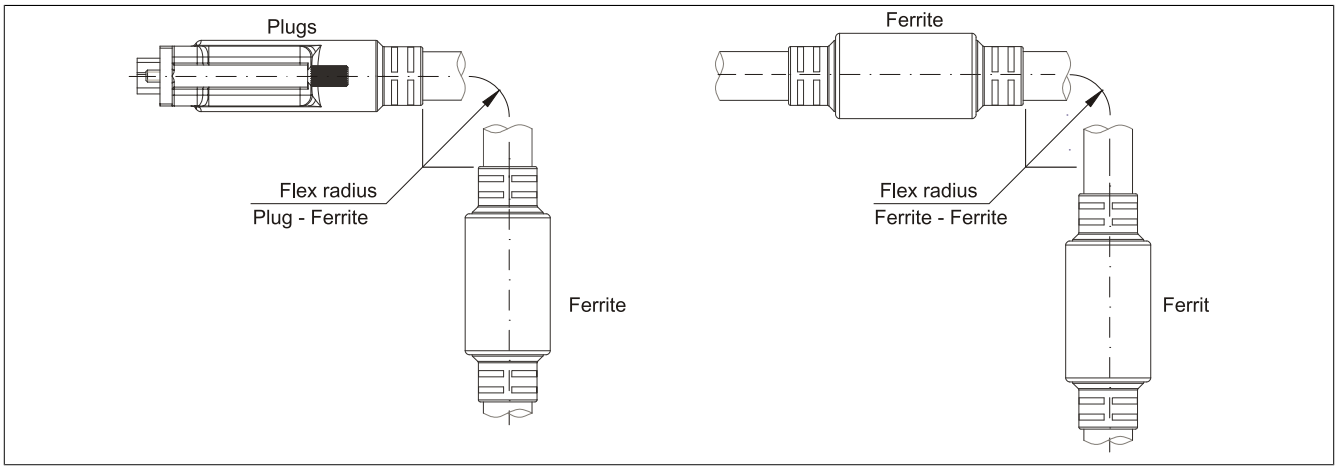



Figure 54: Flex radius specification

### Dimensions

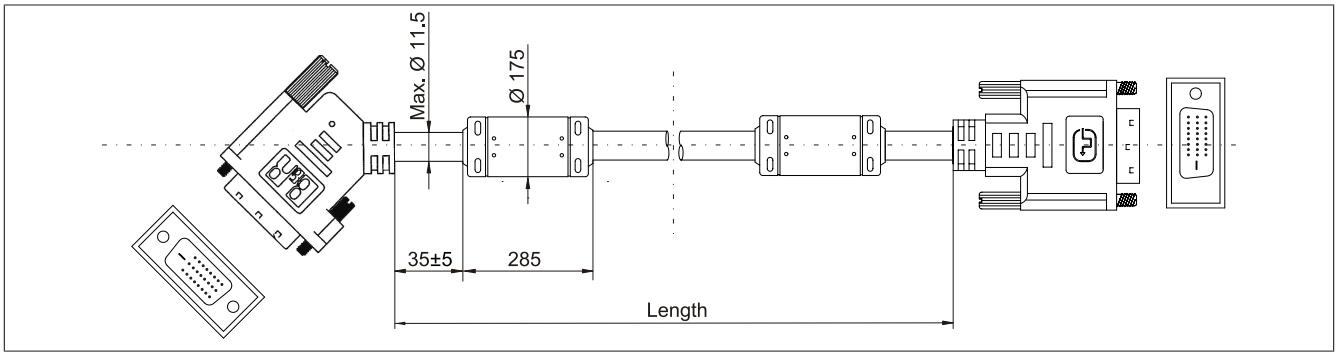



Figure 55: 5CASDL.0xxx-01 - Dimensions

**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.**

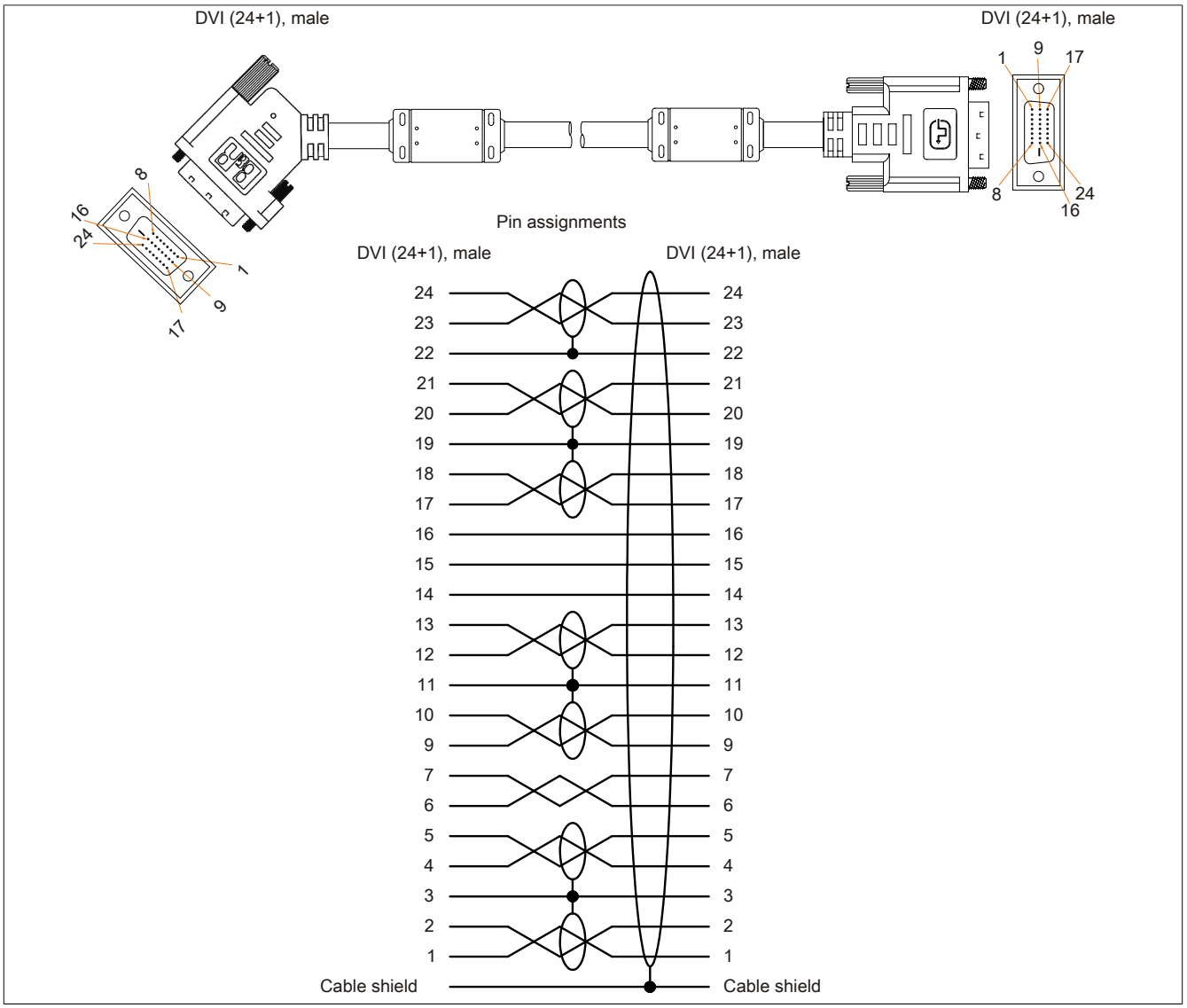



Figure 56: 5CASDL.0xxx-01 - Pinout

## 6.4 SDL flex cables

### 6.4.1 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 cable** |  |
| 5CASDL.0018-03 | SDL Cable flex, 1.8 m. | |
| 5CASDL.0050-03 | SDL cable flex, 5 m. | |
| 5CASDL.0100-03 | SDL cable flex, 10 m. | |
| 5CASDL.0150-03 | SDL cable flex, 15 m. | |
| 5CASDL.0200-03 | SDL cable flex, 20 m. | |
| 5CASDL.0250-03 | SDL cable flex, 25 m. | |
| 5CASDL.0300-03 | SDL cable flex, 30 m. | |

Table 110: 5CASDL.0018-03, 5CASDL.0050-03, 5CASDL.0100-03, 5CASDL.0150-03, 5CASDL.0200-03, 5CASDL.0250-03, 5CASDL.0300-03 - Order data

#### Technical data

| Product ID | 5CASDL. 0018-03 | 5CASDL. 0050-03 | 5CASDL. 0100-03 | 5CASDL. 0150-03 | 5CASDL. 0200-03 | 5CASDL. 0250-03 | 5CASDL. 0300-03 |
|---|---|---|---|---|---|---|---|
| **General information** | | | | | | | |
| Certification | | | | | | | |
| CE | Yes | | | | | | |
| c-UL-us | Yes | | | | | | |
| **Cable structure** | | | | | | | |
| Wire cross section | 26 AWG (control wires)<br>26 AWG (DVI, USB, data) | | | | | | |
| Features | Free of halogen and silicon | | | | | | |
| Shield | Individual cable pairs and entire cable | | | | | | |
| Cable shielding | Aluminum foil clad + tinned copper mesh | | | | | | |
| Outer sheathing | | | | | | | |
| Material | Special TMPU - semi gloss | | | | | | |
| Color | Black | | | | | | |
| Labeling | (B&R) SDL cable (UL) AWM 20236 80°C 30V E 63216 | | | | | | |
| **Connector** | | | | | | | |
| Type | 2x DVI-D (24+1), male | | | | | | |
| Connection cycles | Min. 200 | | | | | | |
| Contacts | Gold plated | | | | | | |
| Mechanical protection | Metal cover with crimped stress relief | | | | | | |
| **Electrical characteristics** | | | | | | | |
| Operating voltage | ≤30 V | | | | | | |
| Test voltage | | | | | | | |
| Wire/wire | 1 kV | | | | | | |
| Wire/shield | 0.5 kV | | | | | | |
| Wave impedance | 100 ±10 Ω | | | | | | |
| Conductor resistance | | | | | | | |
| AWG 24 | ≤95 Ω/km | | | | | | |
| AWG 26 | ≤145 Ω/km | | | | | | |
| Insulation resistance | > 200 MΩ/km | | | | | | |
| **Operating conditions** | | | | | | | |
| Approbation | UL AWM 20236 80°C 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 111: 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)<br>≥ 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 111: 5CASDL.0018-03, 5CASDL.0050-03, 5CASDL.0100-03, 5CASDL.0150-03, 5CASDL.0200-03, 5CASDL.0250-03, 5CASDL.0300-03 - Technical data

## Flex radius specification

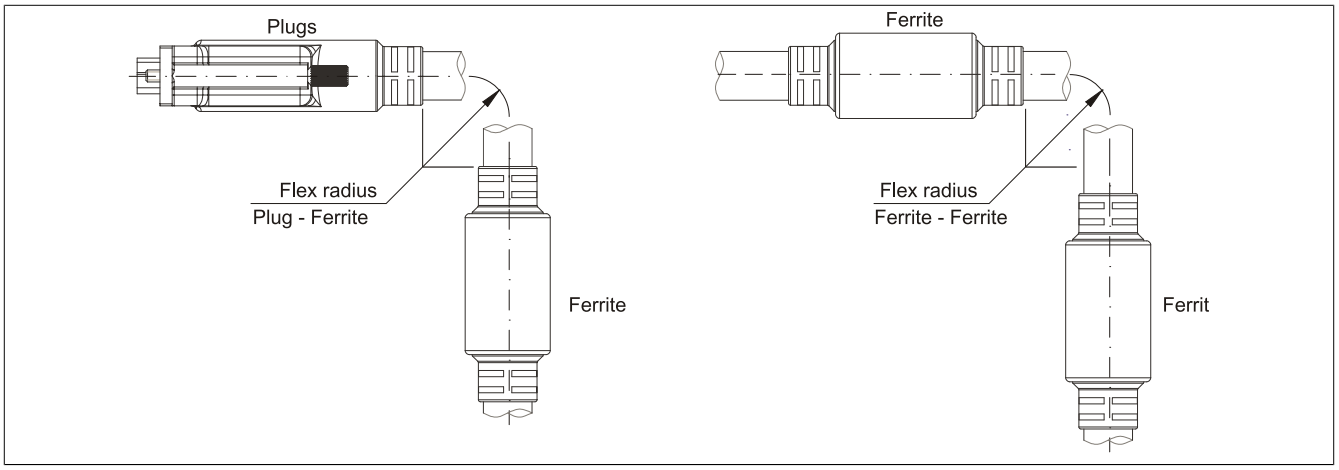



Figure 57: Flex radius specification

## Dimensions

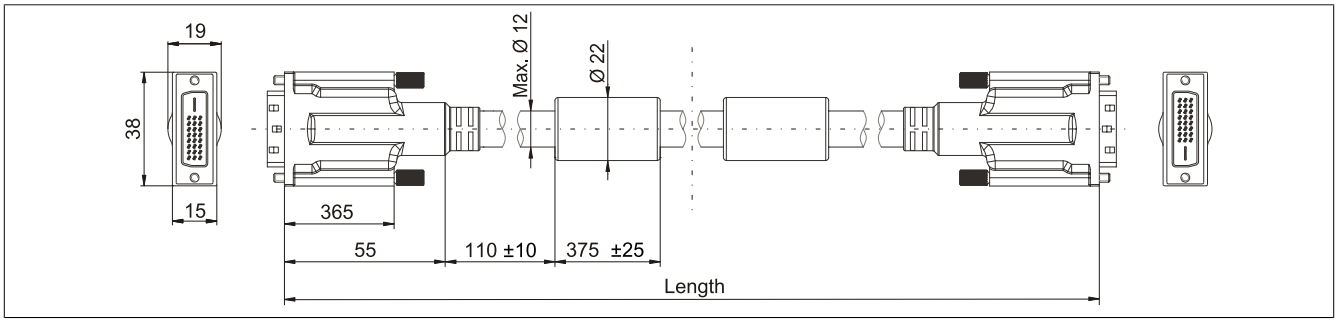



Figure 58: 5CASDL.0xxx-03 - Dimensions

### Layout

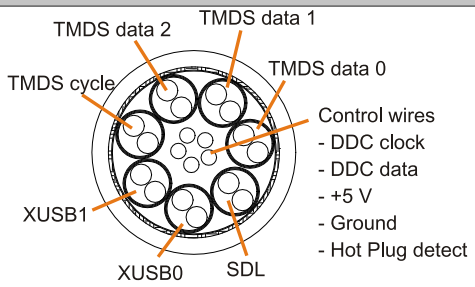
| Element | Assignment | Cross section | |
|---|---|---|---|
| DVI | TMDS data 0 | 26 AWG |  |
| | TMDS data 1 | 26 AWG | |
| | TMDS data 2 | 26 AWG | |
| | TMDS cycle | 26 AWG | |
| USB | XUSB0 | 26 AWG | |
| | XUSB1 | 26 AWG | |
| Data | SDL | 26 AWG | |
| Control wires | DDC cycle | 24 AWG | |
| | DDC data | 24 AWG | |
| | +5 V | 24 AWG | |
| | Mass | 24 AWG | |
| | Hot Plug detect | 24 AWG | |



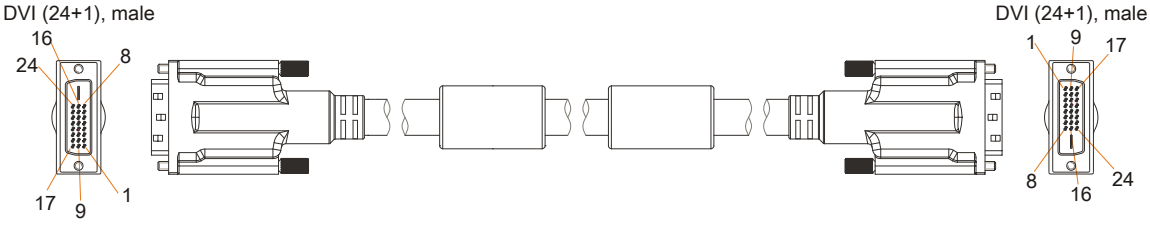
Table 112: Structure - SDL flex cable 5CASDL.0xxx-03

### 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.**




Pin assignments

| DVI (24+1), male | | DVI (24+1), male | |
|---|---|---|---|
| TMDS clock - | 24 | 24 | TMDS clock - |
| TMDS clock + | 23 | 23 | TMDS clock + |
| TMDS clock shielding | 22 | 22 | TMDS clock shielding |
| XUSB1+ | 21 | 21 | XUSB1+ |
| XUSB1- | 20 | 20 | XUSB1- |
| TMDS data 0/XUSB1 shielding | 19 | 19 | TMDS data 0/XUSB1 shielding |
| TMDS data 0+ | 18 | 18 | TMDS data 0+ |
| TMDS data 0- | 17 | 17 | TMDS data 0- |
| Hot Plug detect | 16 | 16 | Hot Plug detect |
| Mass | 15 | 15 | Mass |
| +5 V | 14 | 14 | +5 V |
| XUSB0+ | 13 | 13 | XUSB0+ |
| XUSB0- | 12 | 12 | XUSB0- |
| TMDS data 1/XUSB0 shielding | 11 | 11 | TMDS data 1/XUSB0 shielding |
| TMDS data 1+ | 10 | 10 | TMDS data 1+ |
| TMDS data 1- | 9 | 9 | TMDS data 1- |
| DDC cycle | 7 | 7 | DDC cycle |
| DDC data | 6 | 6 | DDC data |
| SDL+ | 5 | 5 | SDL+ |
| SDL- | 4 | 4 | SDL- |
| TMDS data 2/SDL shielding | 3 | 3 | TMDS data 2/SDL shielding |
| TMDS data 2+ | 2 | 2 | TMDS data 2+ |
| TMDS data 2- | 1 | 1 | TMDS data 2- |
| Cable shield | | | Cable shield |

Figure 59: 5CASDL.0xxx-03- Pinout

## 6.5 SDL flex cables with extender

### 6.5.1 5CASDL.0xx0-13

#### General information

The 5CASDL.0xx0-13 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

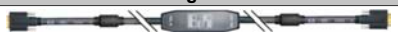
| Model number | Short description | Figure |
|---|---|---|
| | **SDL flex cable** |  |
| 5CASDL.0300-13 | SDL cable flex with extender, 30 m. | |
| 5CASDL.0400-13 | SDL cable flex with extender, 40 m. | |
| 5CASDL.0430-13 | SDL Cable flex with extender, 43 m. | |

Table 113: 5CASDL.0300-13, 5CASDL.0400-13, 5CASDL.0430-13 - Order data

#### Technical data

| Product ID | 5CASDL.0300-13 | 5CASDL.0400-13 | 5CASDL.0430-13 |
|---|---|---|---|
| **General information** | | | |
| Certification | | | |
| CE | | Yes | |
| c-UL-us | | Yes | |
| **Cable structure** | | | |
| Wire cross section | | 26 AWG (control wires)<br>26 AWG (DVI, USB, data) | |
| Features | | Free of halogen and silicon | |
| Shield | | Individual cable pairs and entire cable | |
| Cable shielding | | Aluminum foil clad + tinned copper mesh | |
| Outer sheathing | | | |
| Material | | Special TMPU - semi gloss | |
| Color | | Black | |
| Labeling | | (B&R) SDL cable (UL) AWM 20236 80°C 30V E63216 | |
| **Connector** | | | |
| Type | | 2x DVI-D (24+1), male | |
| Connection cycles | | Min. 200 | |
| Contacts | | Gold plated | |
| Mechanical protection | | Metal cover with crimped stress relief | |
| **Electrical characteristics** | | | |
| Operating voltage | | ≤30 V | |
| Test voltage | | | |
| Wire/wire | | 1 kV | |
| Wire/shield | | 0.5 kV | |
| Wave impedance | | 100 ±10 Ω | |
| Conductor resistance | | | |
| AWG 24 | | ≤95 Ω/km | |
| AWG 26 | | ≤145 Ω/km | |
| Insulation resistance | | > 200 MΩ/km | |
| **Operating conditions** | | | |
| Approbation | | UL AWM 20236 80°C 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 114: 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)<br>≥ 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 114: 5CASDL.0300-13, 5CASDL.0400-13, 5CASDL.0430-13 - Technical data

## Flex radius specification

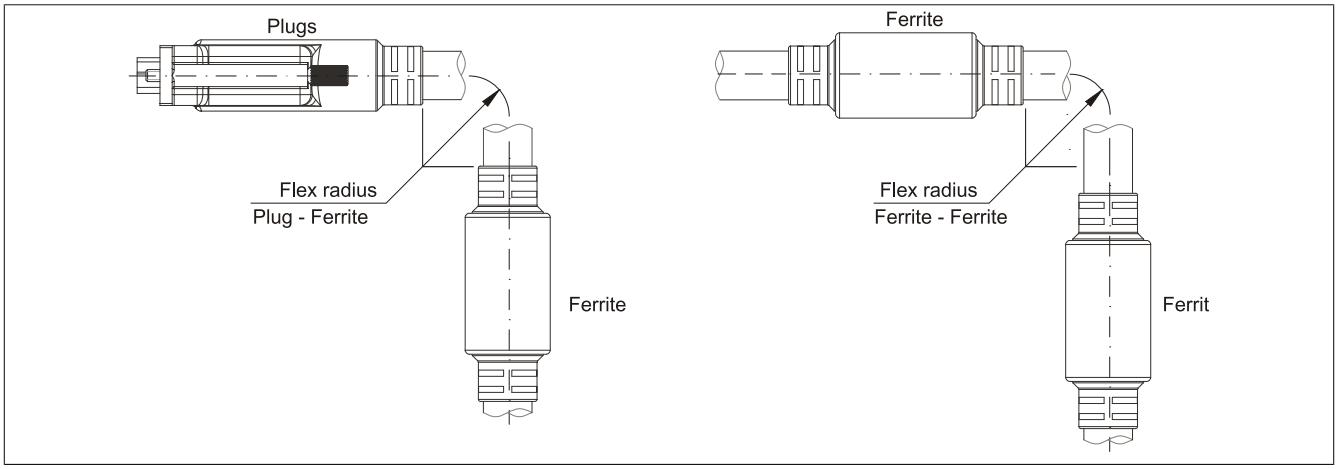



Figure 60: Flex radius specification

## Dimensions

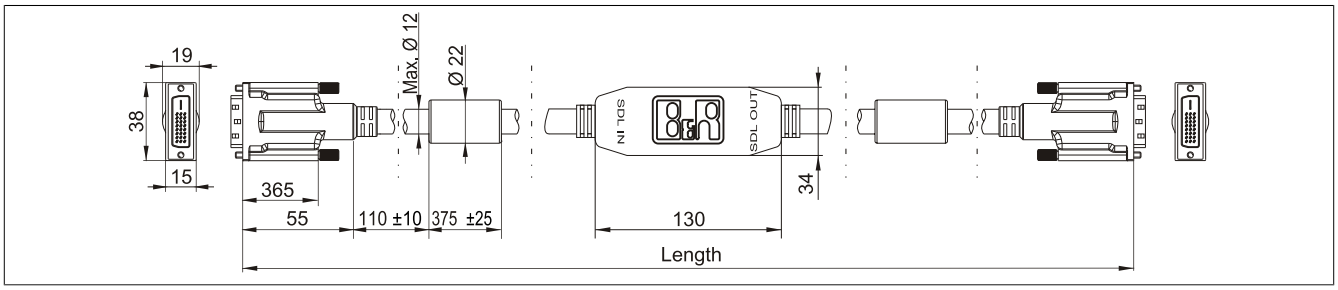



Figure 61: 5CASDL.0xx0-13- Dimensions

**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.**

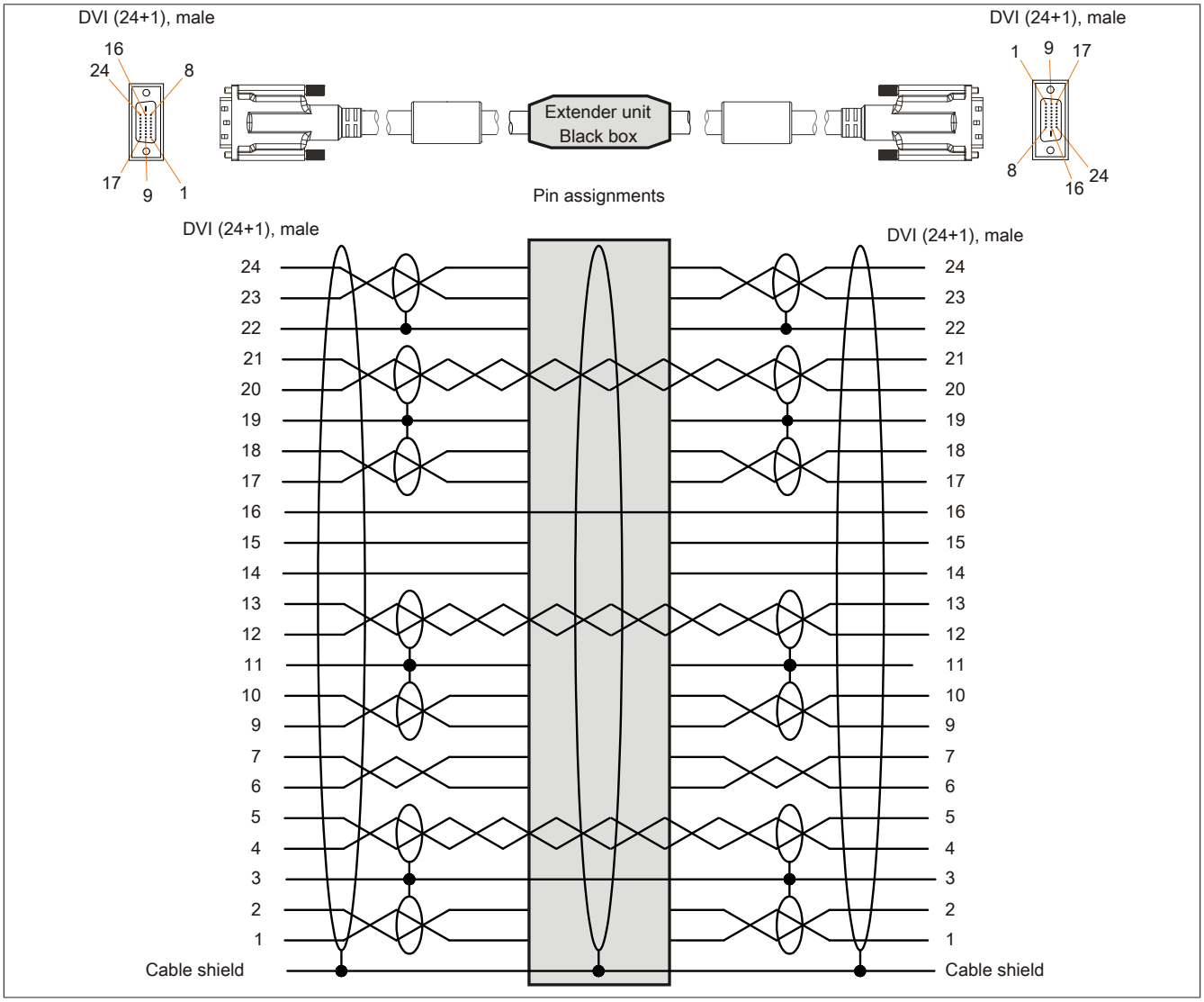



Figure 62: 5CASDL.0xx0-13 - Pinout

### Cable connection

SDL flex cables with extenders must be connected between the B&R industrial PC and Automation Panel 900 display unit in the correct direction. The signal direction is indicated on the extender unit for this purpose.

• Connect the end labeled "SDL IN" with the video output of the APC910 (monitor/panel output) or Panel OUT of an AP900 AP Link card.

• The "SDL OUT" end should be connected to the display unit (e.g. Automation Panel 900) via the Automation Panel Link insert card (Panel IN).

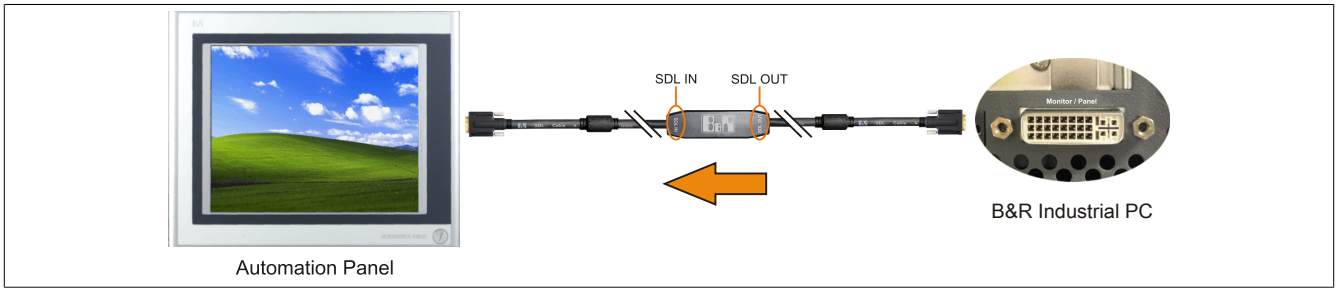



Figure 63: Example of the signal direction for the SDL flex cable with extender

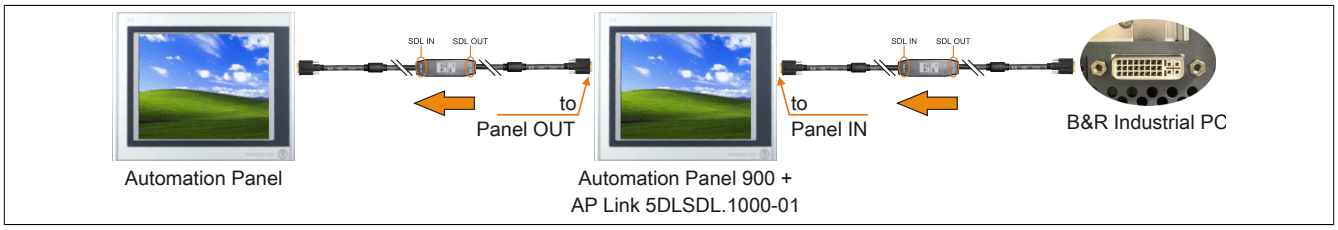



Figure 64: Example of signal direction display - SDL flex cable with extender

## 6.6 USB cables

### 6.6.1 5CAUSB.00xx-00

#### General information

USB cables are designed to achieve USB 2.0 transfer speeds.

#### Order data

| Model number | Short description | Figure |
|---|---|---|
| | **USB cable** |  |
| 5CAUSB.0018-00 | USB 2.0 connecting cable type A - type B, 1.8 m. | |
| 5CAUSB.0050-00 | USB 2.0 connecting cable type A - type B, 5 m. | |

Table 115: 5CAUSB.0018-00, 5CAUSB.0050-00 - Order data

#### Technical data

| Product ID | 5CAUSB.0018-00 | 5CAUSB.0050-00 |
|---|---|---|
| **General information** | | |
| Certification | | |
| CE | Yes | |
| c-UL-us | Yes | |
| **Cable structure** | | |
| Wire cross section | AWG 24, 28 | |
| Shield | Entire cable | |
| Outer sheathing | | |
| Color | Beige | |
| **Connector** | | |
| Type | USB type A male and USB type B male | |
| **Mechanical characteristics** | | |
| Dimensions | | |
| Length | 1.8 m ±30 mm | 5 m ± 50 mm |
| Diameter | Max. 5 mm | |
| Flex radius | Min. 100 mm | |

Table 116: 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.**

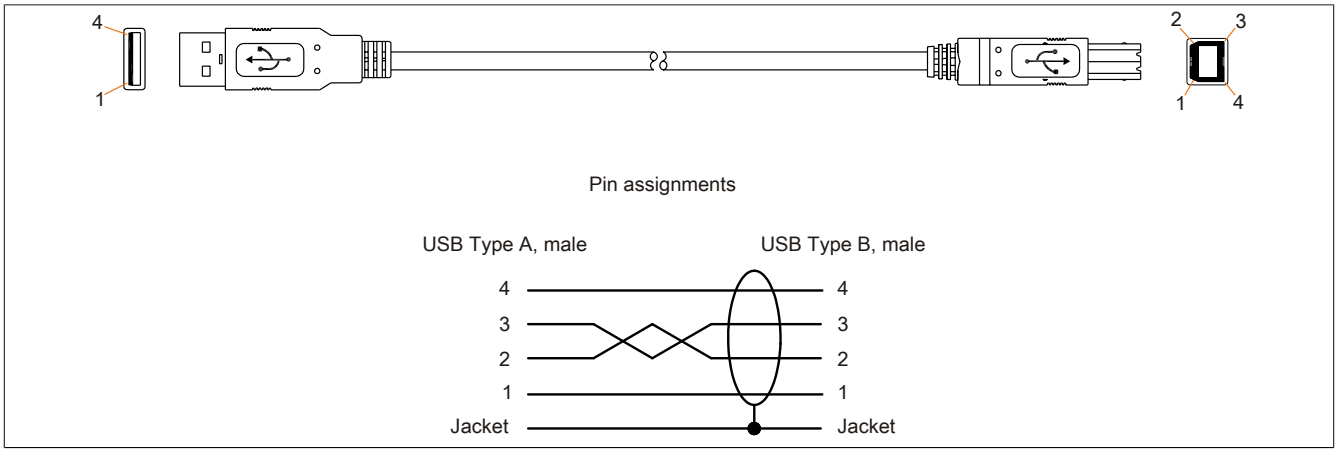



Figure 65: 5CAUSB.00xx-00 - USB cable pinout

## 6.7 RS232 cables

### 6.7.1 9A0014.xx

#### General information

The RS232 cables are used as extension cables between two RS232 interfaces.

#### Order data

| Model number | Short description | Figure |
|---|---|---|
| | **RS232 cable** |  |
| 9A0014.02 | RS232 extension cable for remote operating of a display unit with touch screen, 1.8 m. | |
| 9A0014.05 | RS232 extension cable for remote operating of a display unit with touch screen, 5 m. | |
| 9A0014.10 | RS232 extension cable for remote operating of a display unit with touch screen, 10 m. | |

Table 117: 9A0014.02, 9A0014.05, 9A0014.10 - Order data

#### Technical data

| Product ID | 9A0014.02 | 9A0014.05 | 9A0014.10 |
|---|---|---|---|
| **General information** | | | |
| Certification<br>CE | | Yes | |
| **Cable structure** | | | |
| Wire cross section | | AWG 26 | |
| Shield | | Entire cable | |
| Outer sheathing<br>Color | | Beige | |
| **Connector** | | | |
| Type | | 9-pin DSUB socket, male / female | |
| **Mechanical characteristics** | | | |
| Dimensions<br>Length<br>Diameter | 1.8 m ±50 mm | 5 m ± 80 mm<br>Max. 5 mm | 10 m ±100 mm |
| Flex radius | | Min. 70 mm | |

Table 118: 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.**

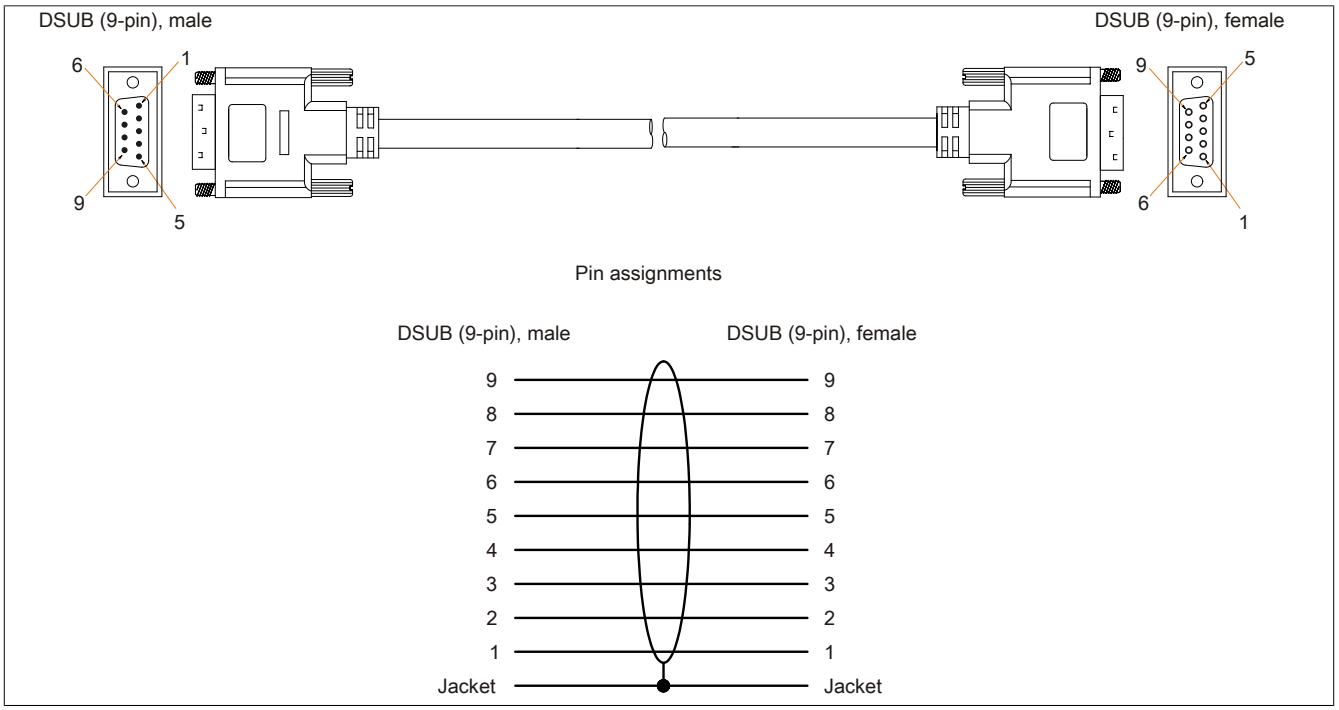



Figure 66: 9A0014.xx - RS232 cable pinout

# Chapter 6 • Maintenance / Service

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

## 1 Replacing a CFast card

### Caution!

**Turn off the power before replacing the CFast card!**

The CFast card can be exchanged quickly and easily by pressing the ejector (see image) with a pointed object such as a pen.

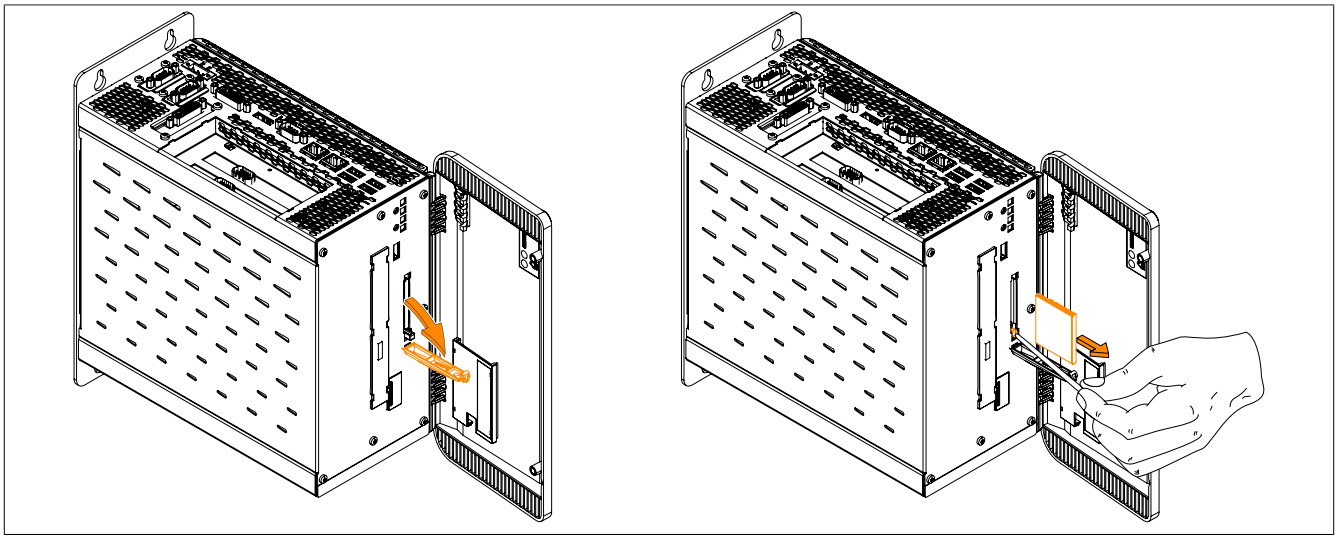


Figure 67: Replacing a CFast card

# 2 Installation - Interface option

1. Disconnect the power supply to the B&R Industrial PC.
2. Touch the housing or ground connection in order to discharge any electrostatic charge from your body.
3. Open the front cover. The torx screws (T10) behind the cover that are marked in the image must be removed. The number of torx screws can vary depending on the system unit.

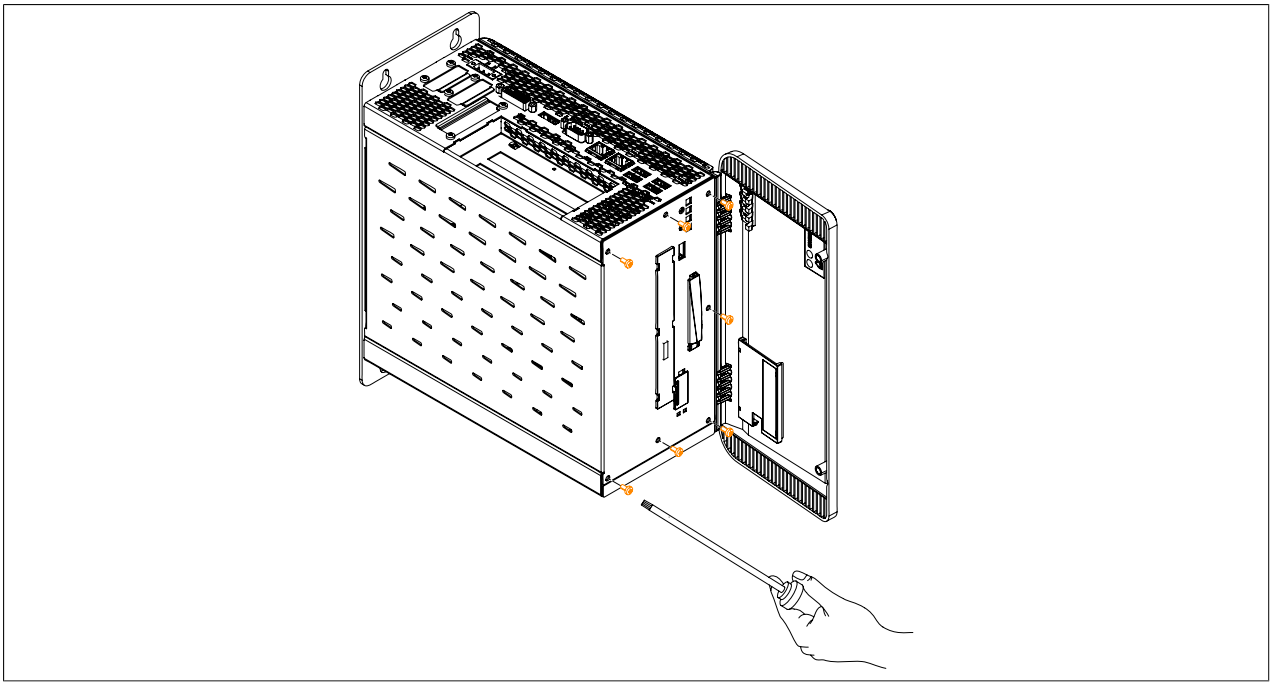


Figure 68: Removing the combi-torx screws for the side cover

4. After the screws have been removed, the side cover can be removed by sliding it toward the front and to the side.

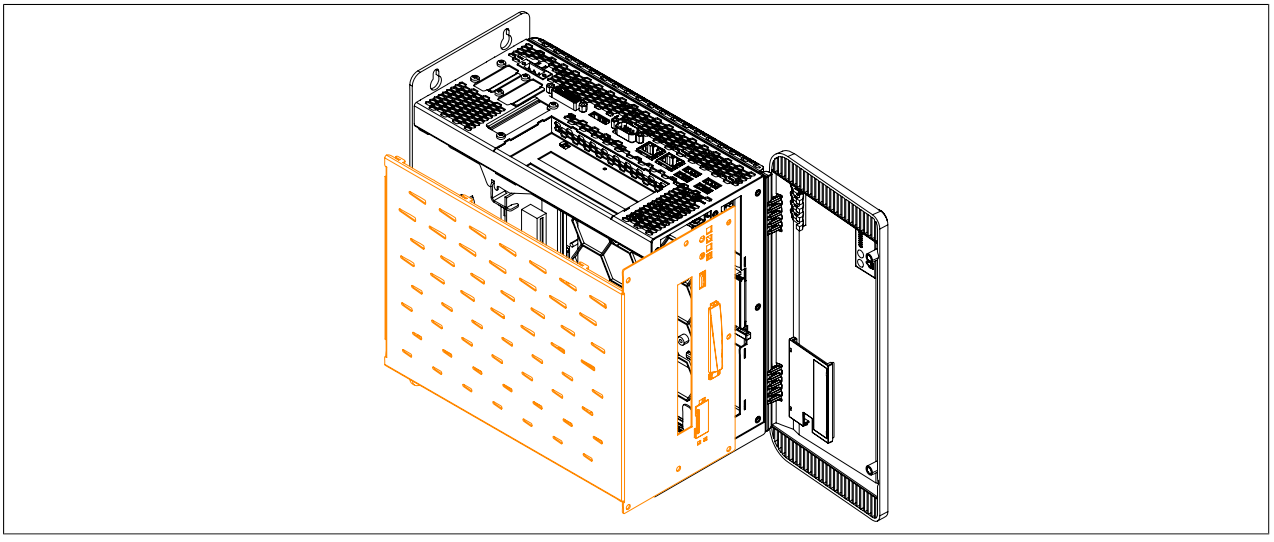


Figure 69: Removing the side cover

5. Remove the marked torx screws (T10) and slot cover.

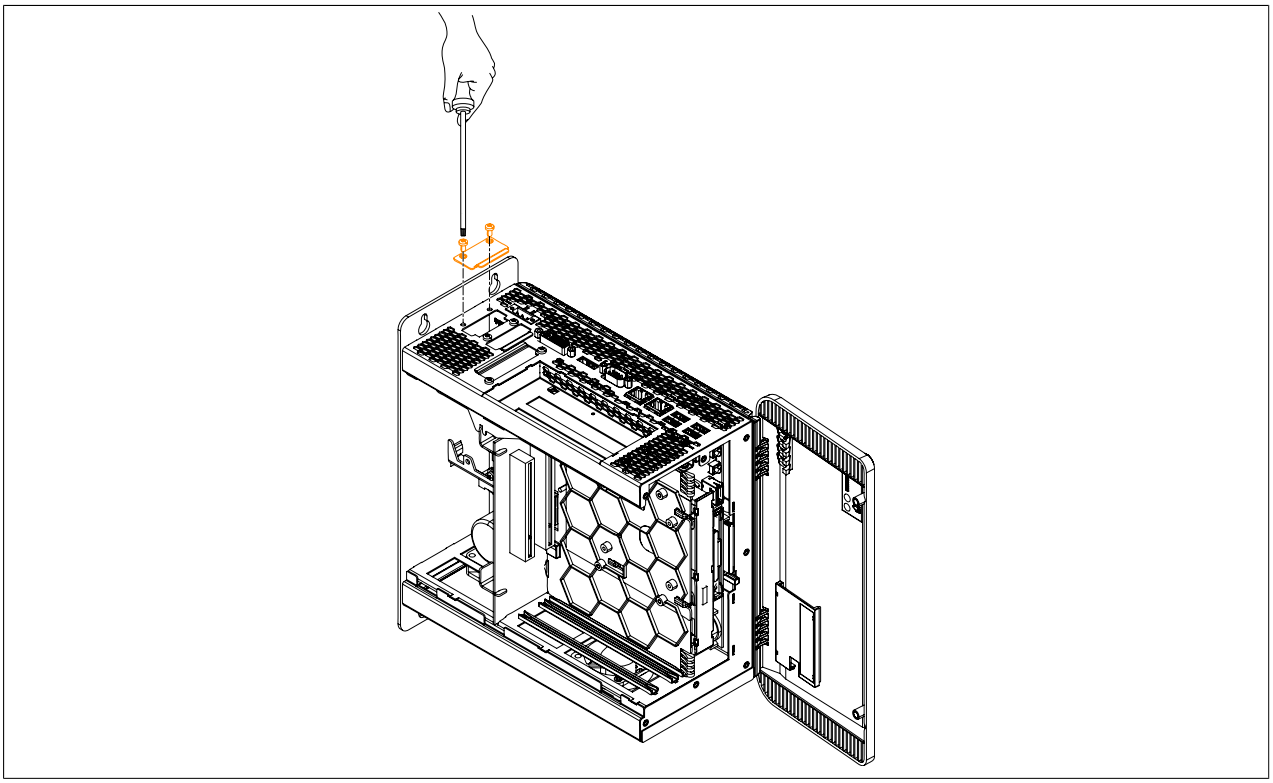


Figure 70: Removing the combi-torx screws and slot cover

6. Place interface option into slot. Please note that not every interface option can be plugged into interface slot 1 and 2. For more information about this, see the section "IF option 1 slot" on page 40 and "IF option 2 slot" on page 40.

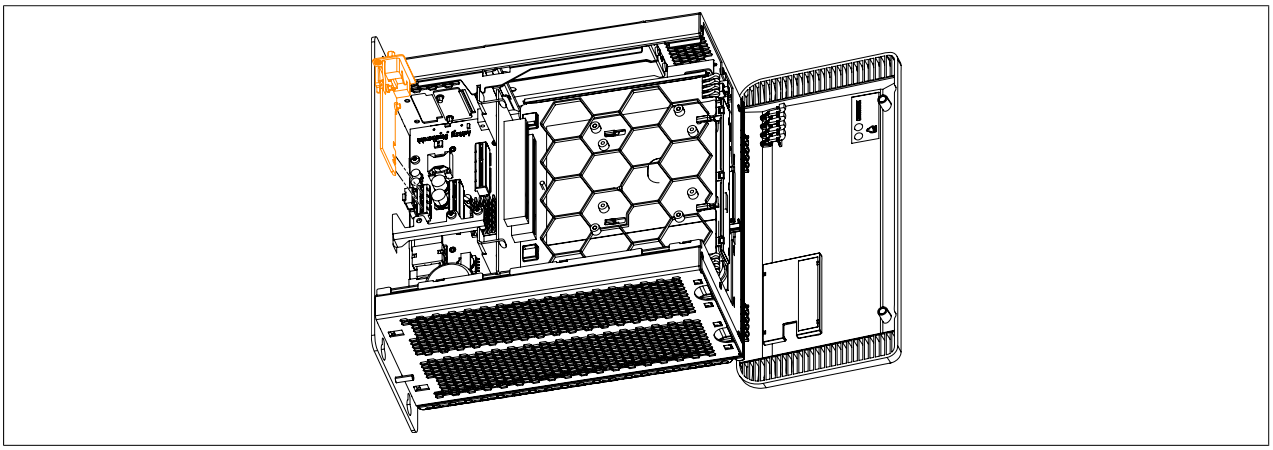


Figure 71: Installing the interface option

7. Secure the interface option to the B&R Industrial PC using torx screws (T10).

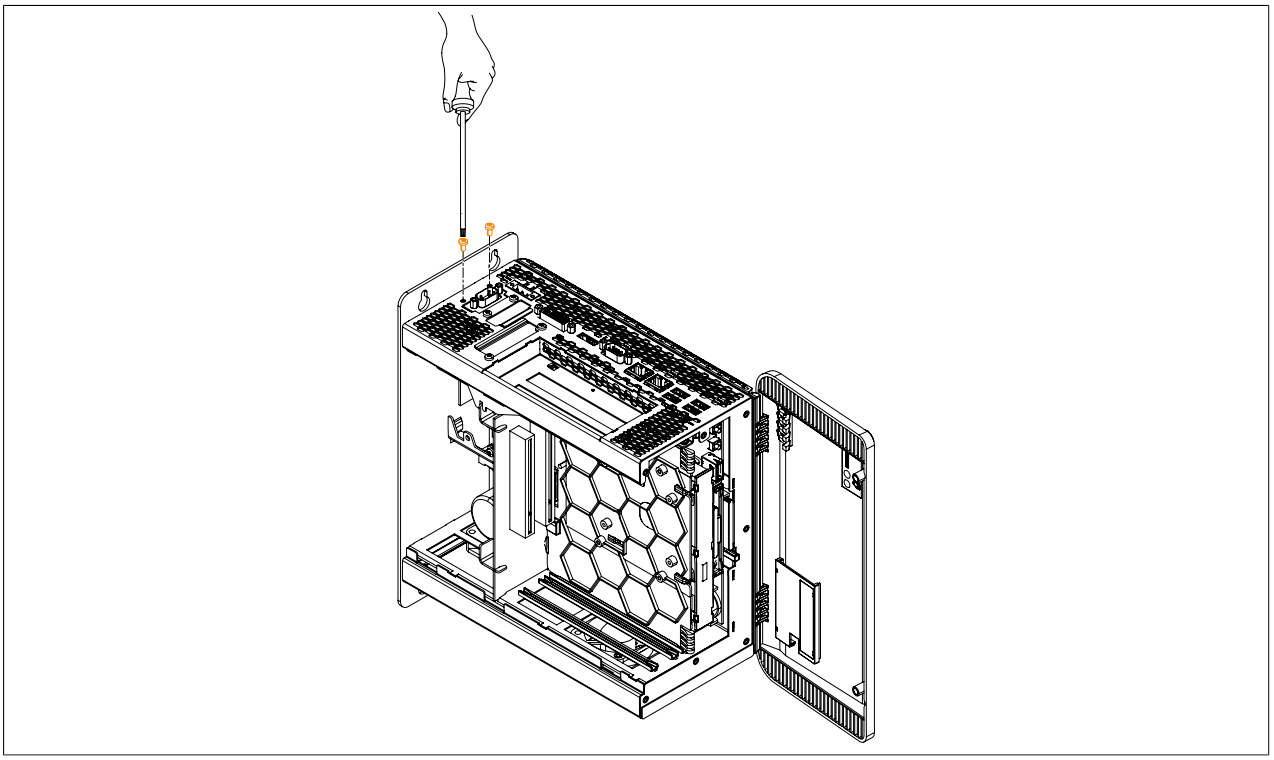


Figure 72: Securing the interface option

8. Attach side cover.

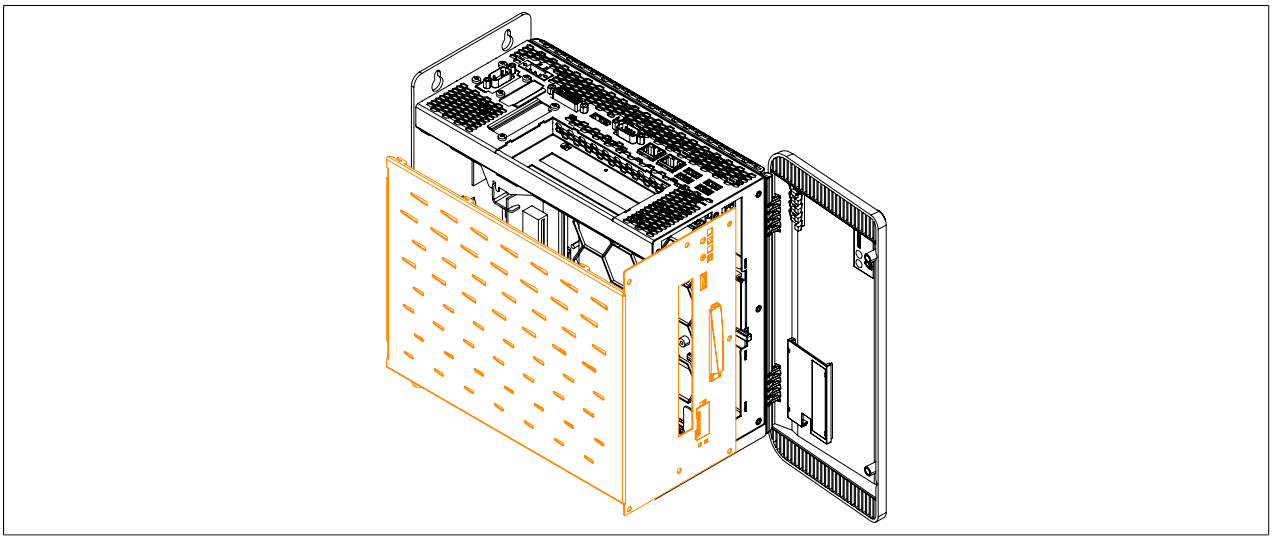


Figure 73: Attaching the side cover

9. Secure the side cover to the B&R Industrial PC using the same torx screws (T10) from before.

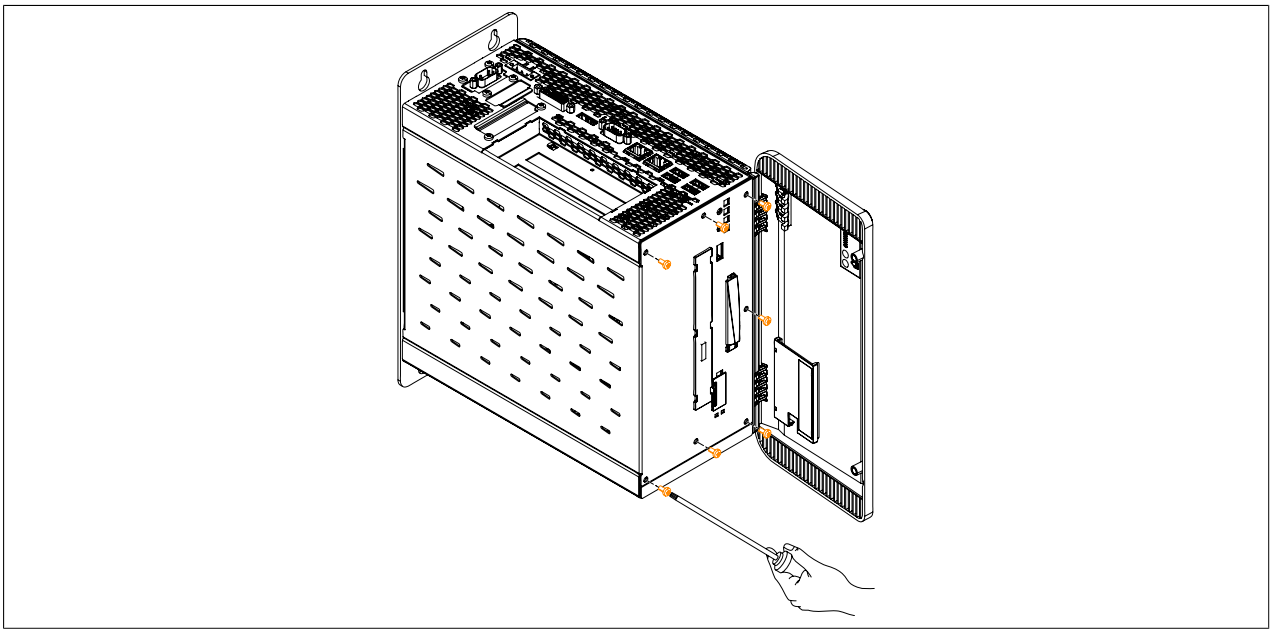


Figure 74: Securing the side cover

# 3 Installation - Monitor / panel option

1. Disconnect the power supply to the B&R Industrial PC.
2. Touch the housing or ground connection in order to discharge any electrostatic charge from your body.
3. Open the front cover. The torx screws (T10) behind the cover that are marked in the image must be removed. The number of torx screws can vary depending on the system unit.

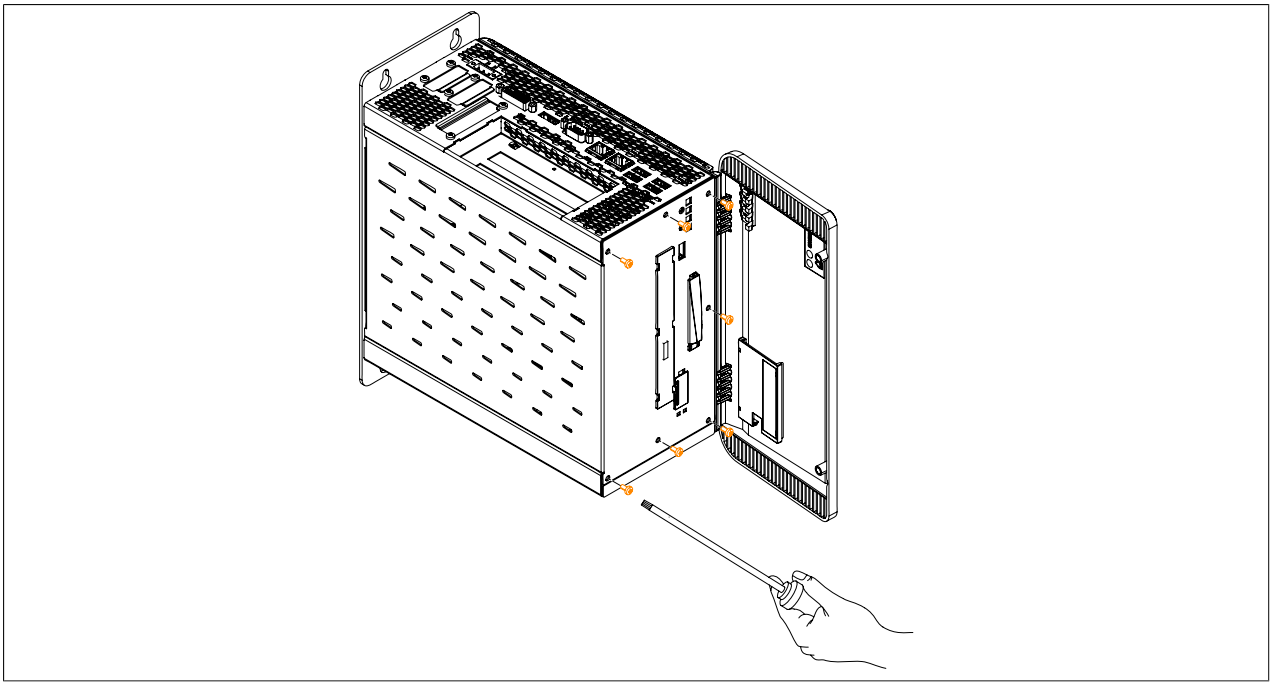


Figure 75: Removing the combi-torx screws for the side cover

4. After the screws have been removed, the side cover can be removed by sliding it toward the front and to the side.

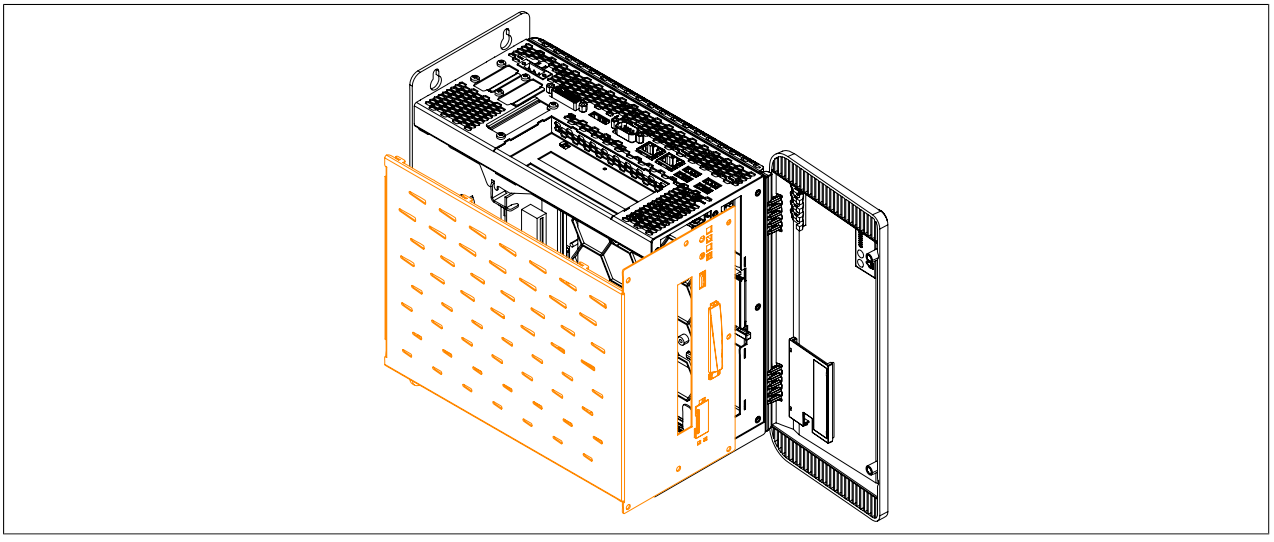


Figure 76: Removing the side cover

5. Remove the marked torx screws (T10) and slot cover.

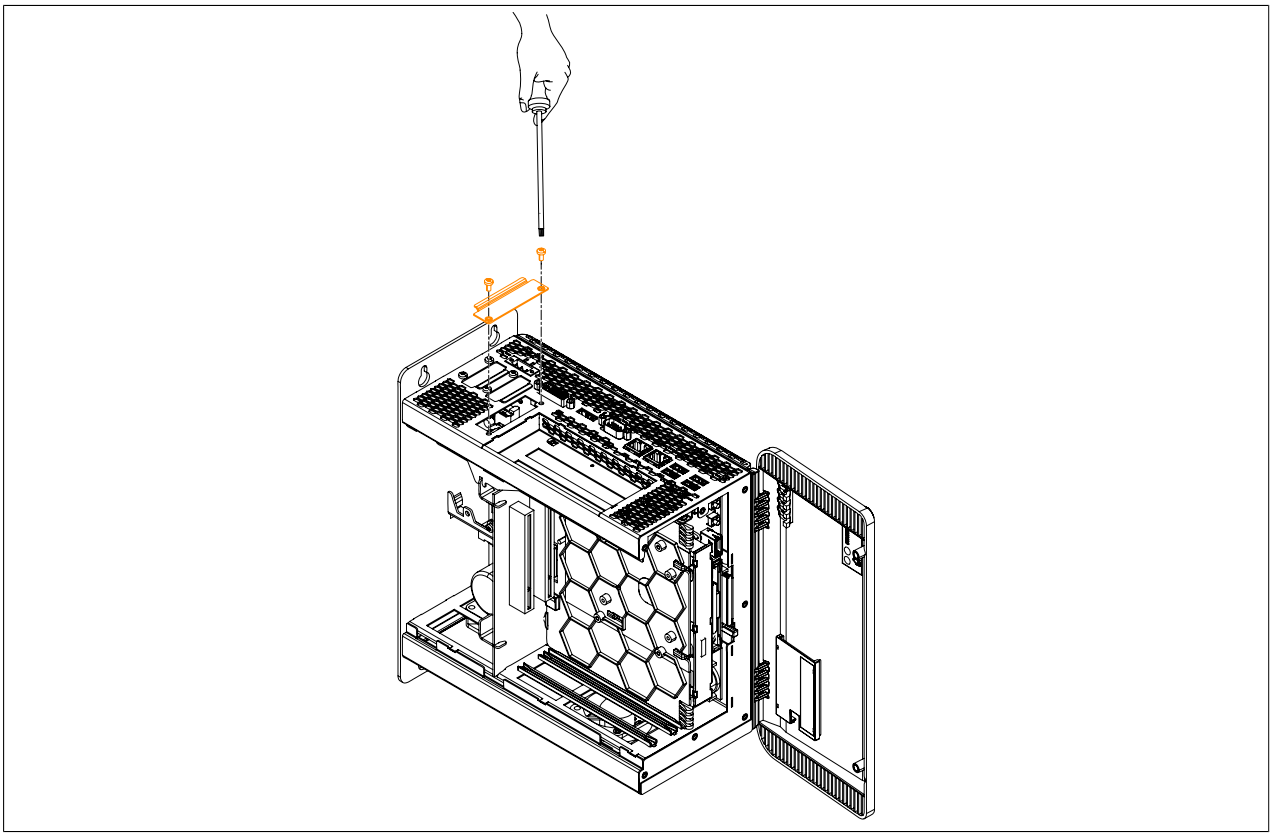


Figure 77: Removing the combi-torx screws and slot cover

6. Place monitor / panel option into slot.

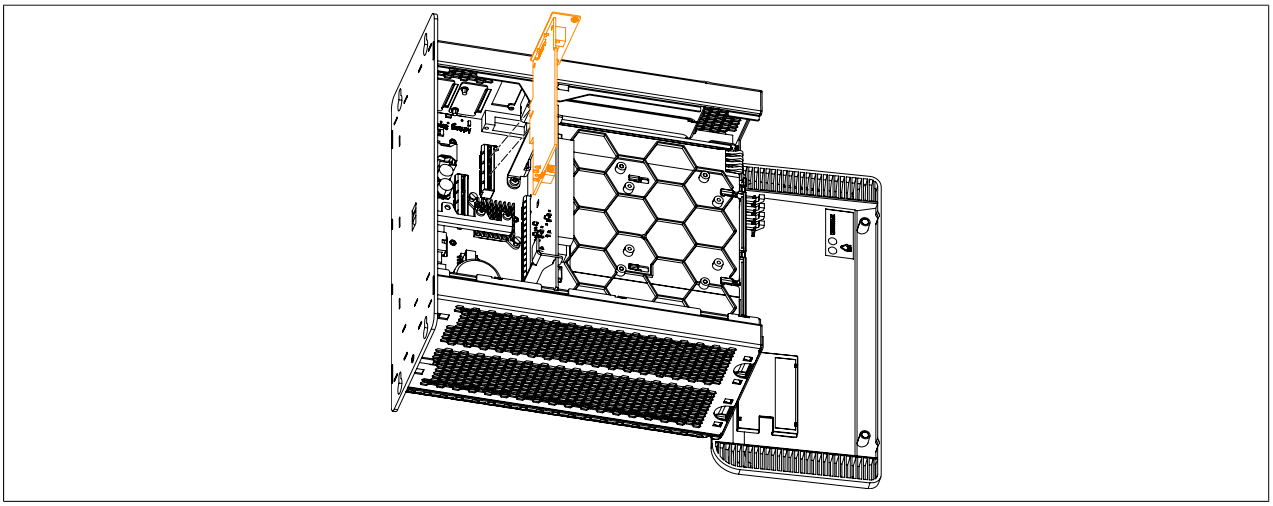


Figure 78: Placing the monitor / panel option into the APC910

7. Secure the monitor / panel option to the B&R Industrial PC using torx screws (T10).

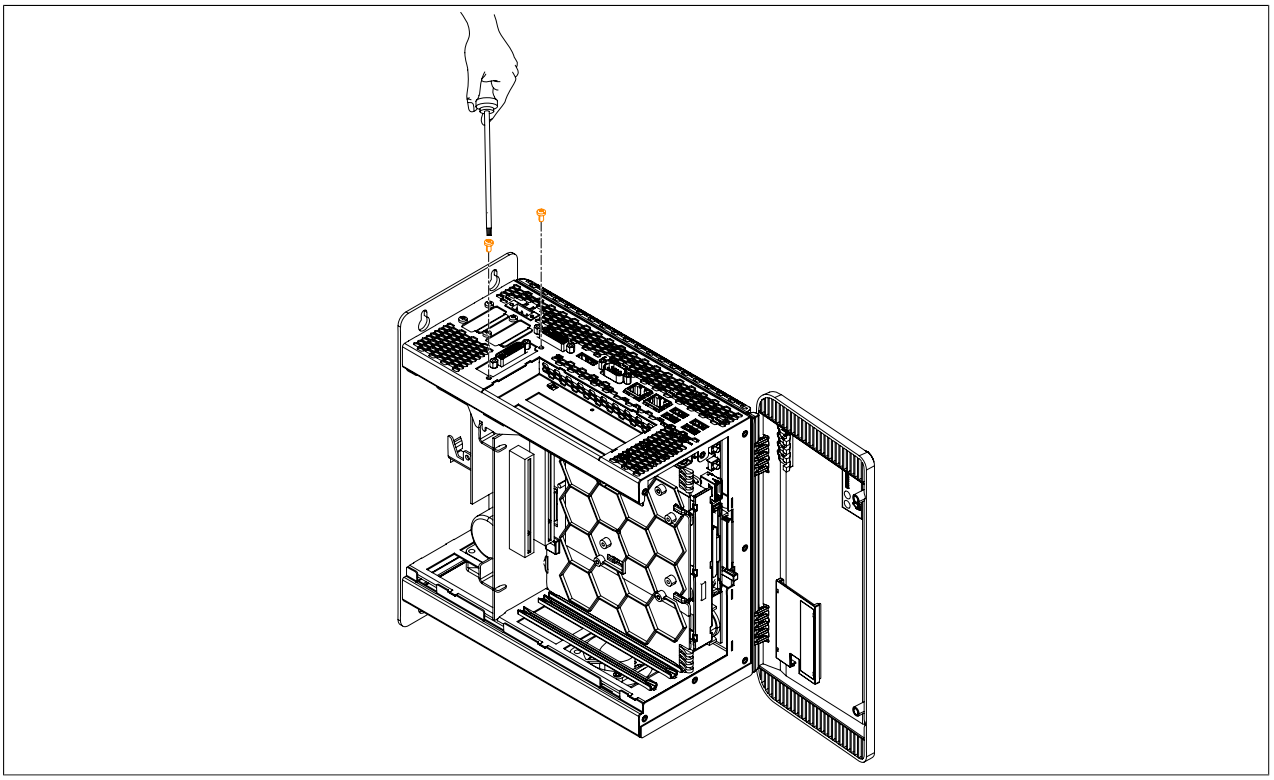


Figure 79: Securing the monitor / panel option using combi-torx screws

8. Attach side cover.

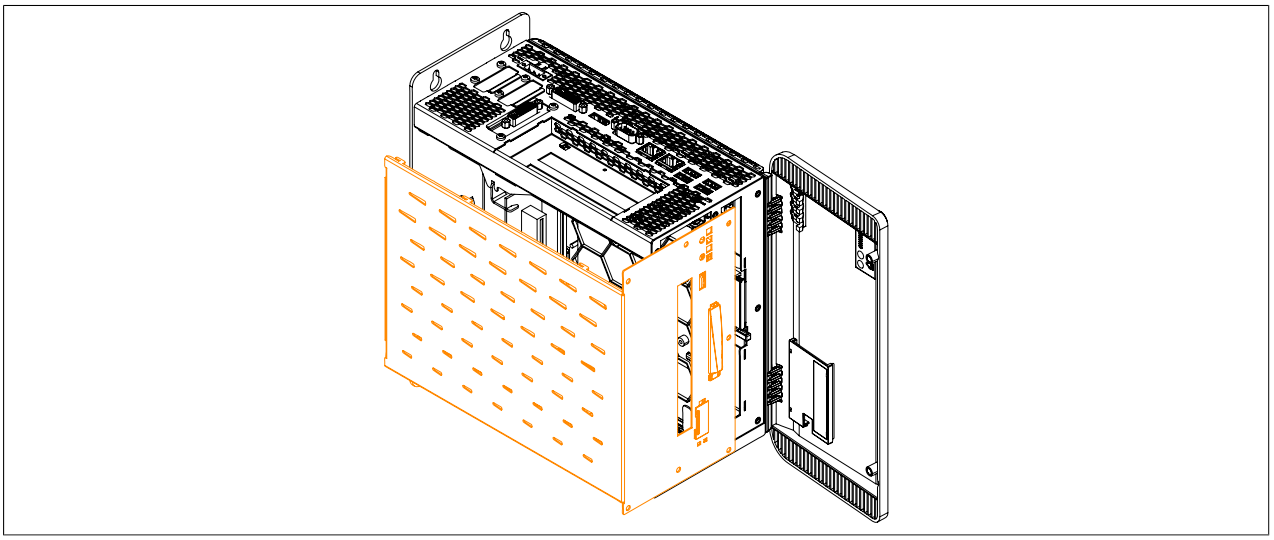


Figure 80: Attaching the side cover

9. Secure the side cover to the B&R Industrial PC using the same torx screws (T10) from before.

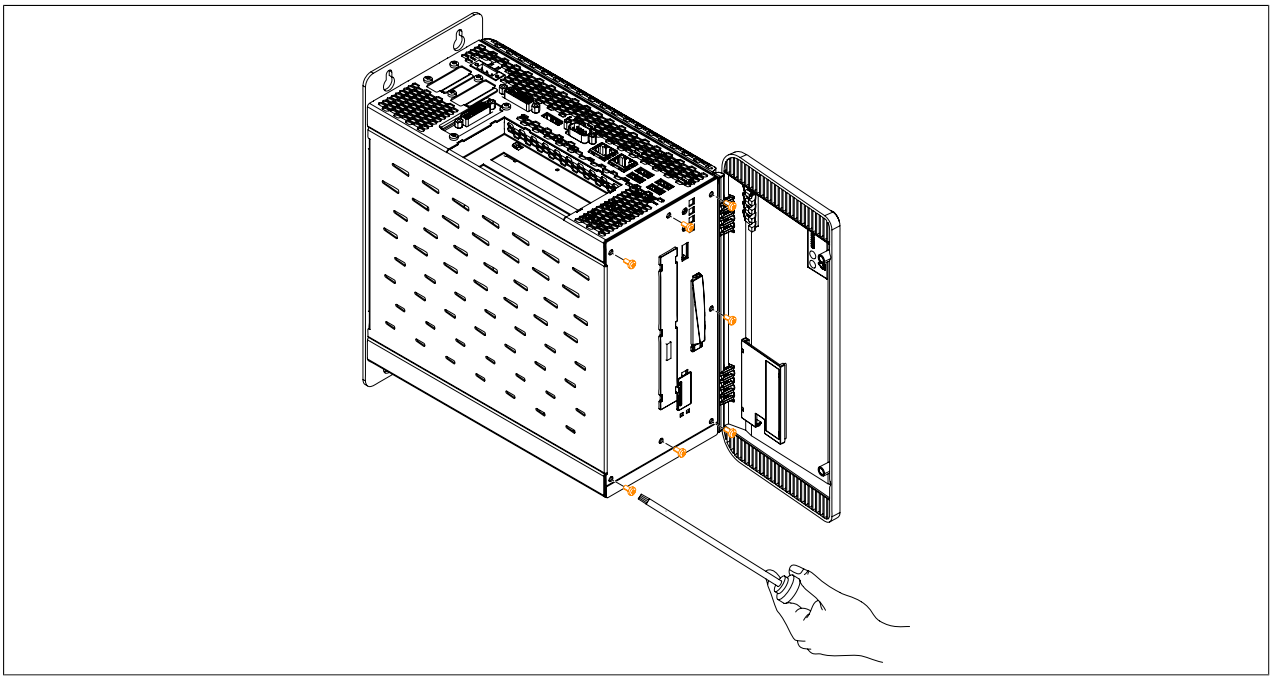


Figure 81: Securing the side cover

# 4 Slide-in compact drive installation / replacement

1. Disconnect the power supply to the B&R Industrial PC.
2. Touch the housing or ground connection in order to discharge any electrostatic charge from your body.
3. Open the front cover. The torx screws (T10) behind the cover that are marked in the image must be removed. The number of torx screws can vary depending on the system unit.

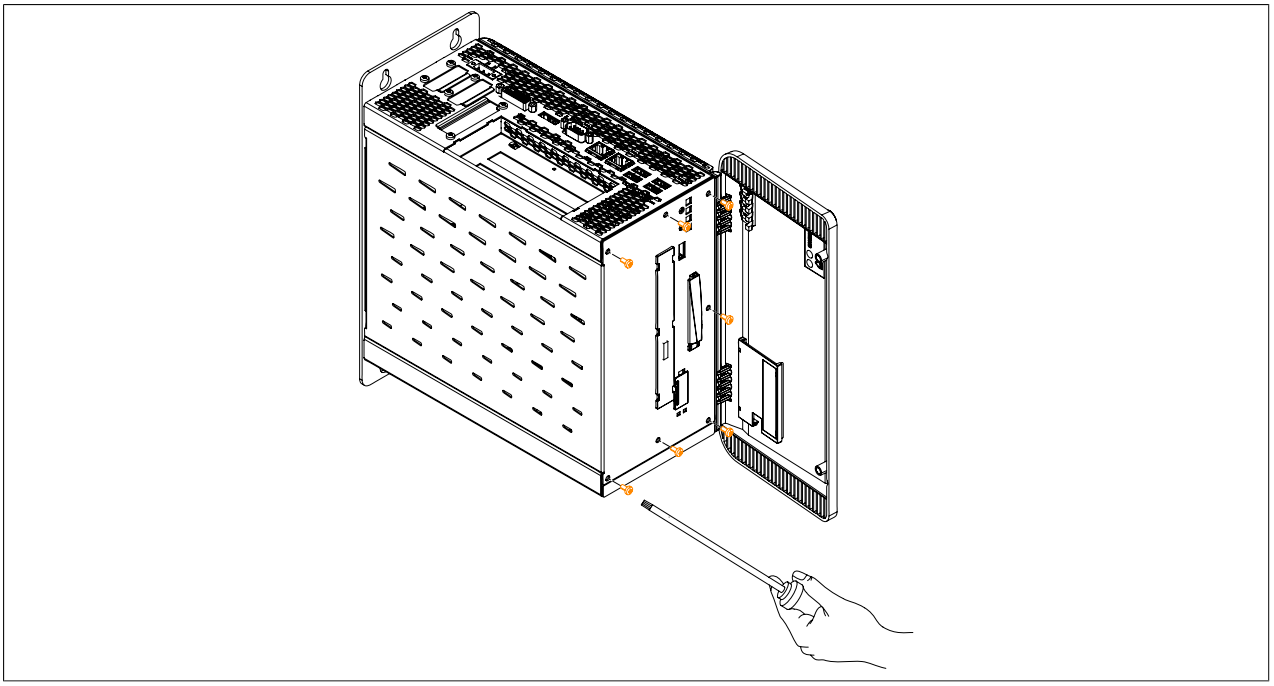


Figure 82: Removing the combi-torx screws for the side cover

4. After the screws have been removed, the side cover can be removed by sliding it toward the front and to the side.

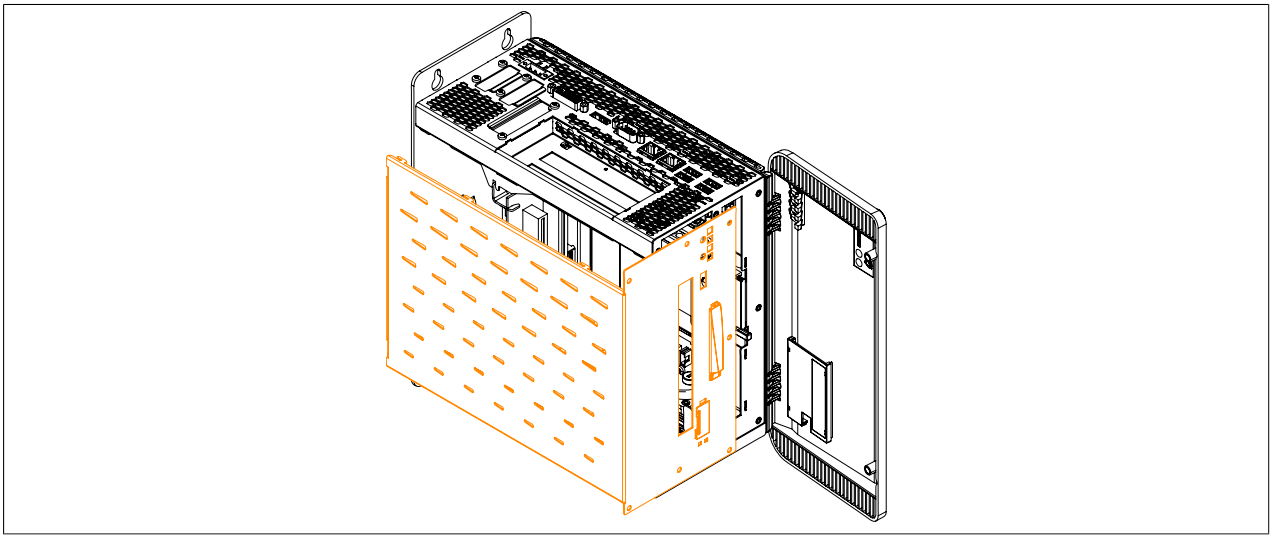


Figure 83: Removing the side cover

5. Remove / replace the slide-in compact drive from the Automation PC 910. The slide-in compact drive must glide into the guide rails and snap into the connector.

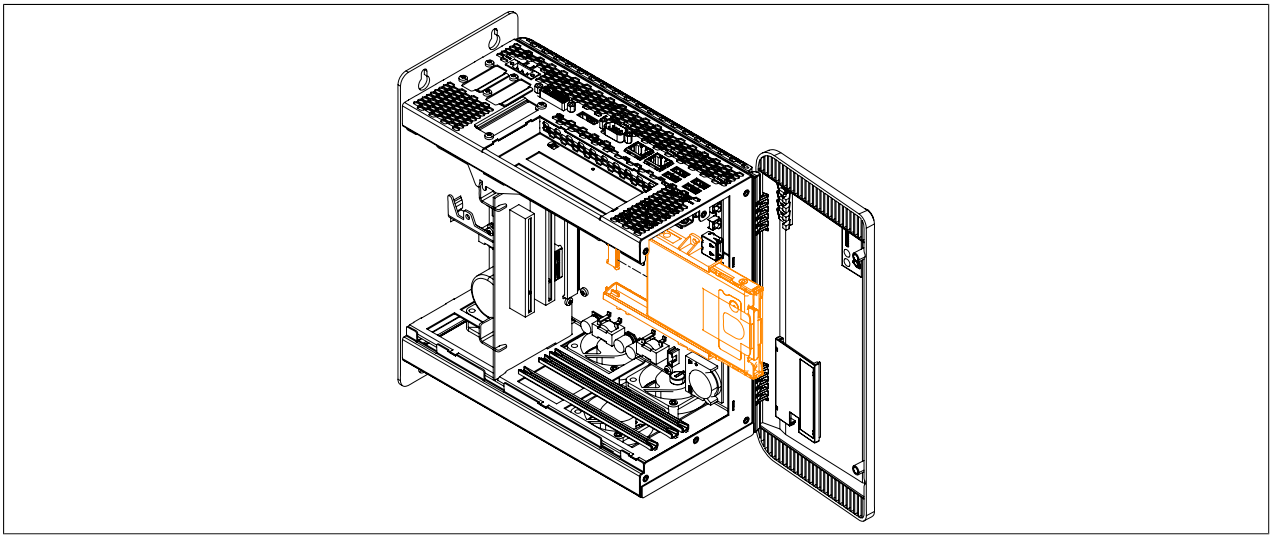


Figure 84: Removing / replacing the slide-in compact drive

6. Attach side cover.

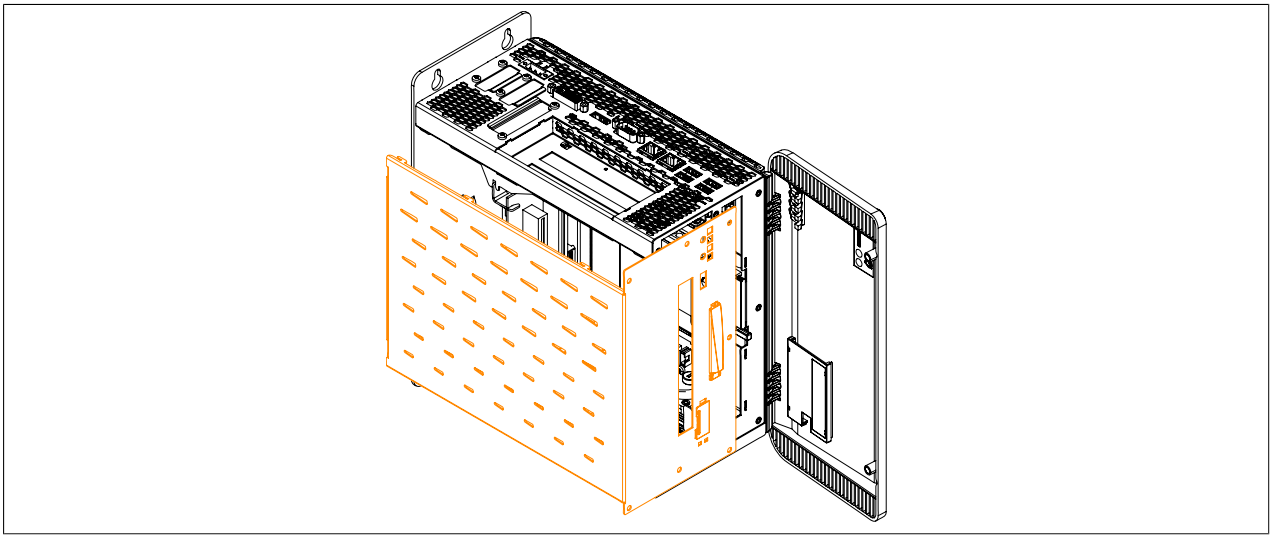


Figure 85: Attaching the side cover

7. Secure the side cover to the B&R Industrial PC using the same torx screws (T10) from before.

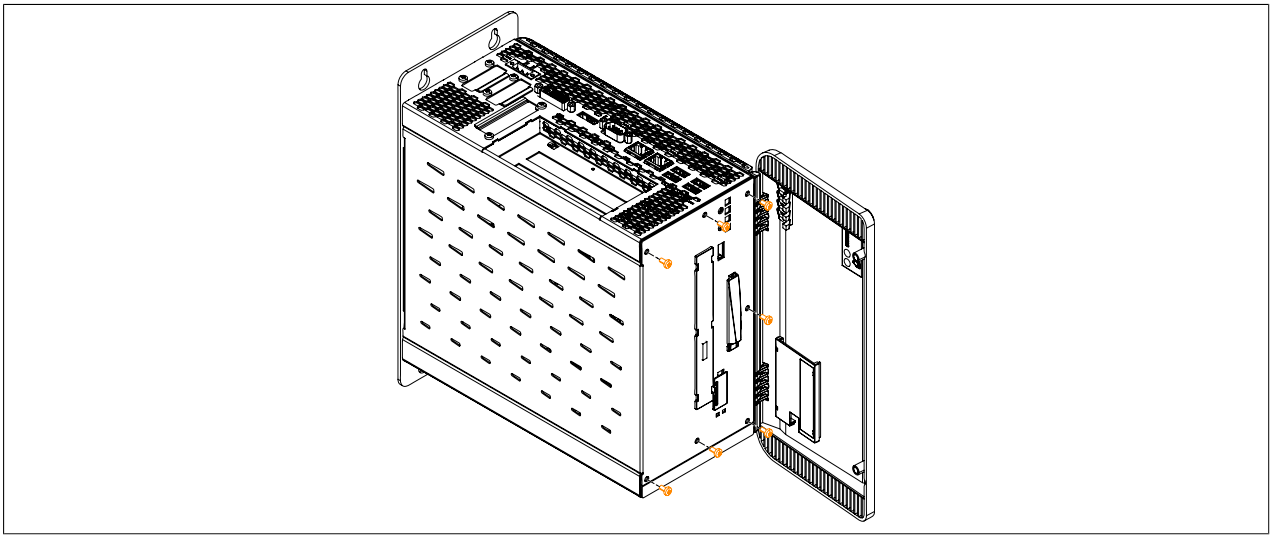


Figure 86: Securing the side cover

# 5 Slide-in drive installation / replacement

1. Disconnect the power supply to the B&R Industrial PC.
2. Touch the housing or ground connection in order to discharge any electrostatic charge from your body.
3. Open the front cover. The torx screws (T10) behind the cover that are marked in the image must be removed. The number of torx screws can vary depending on the system unit.

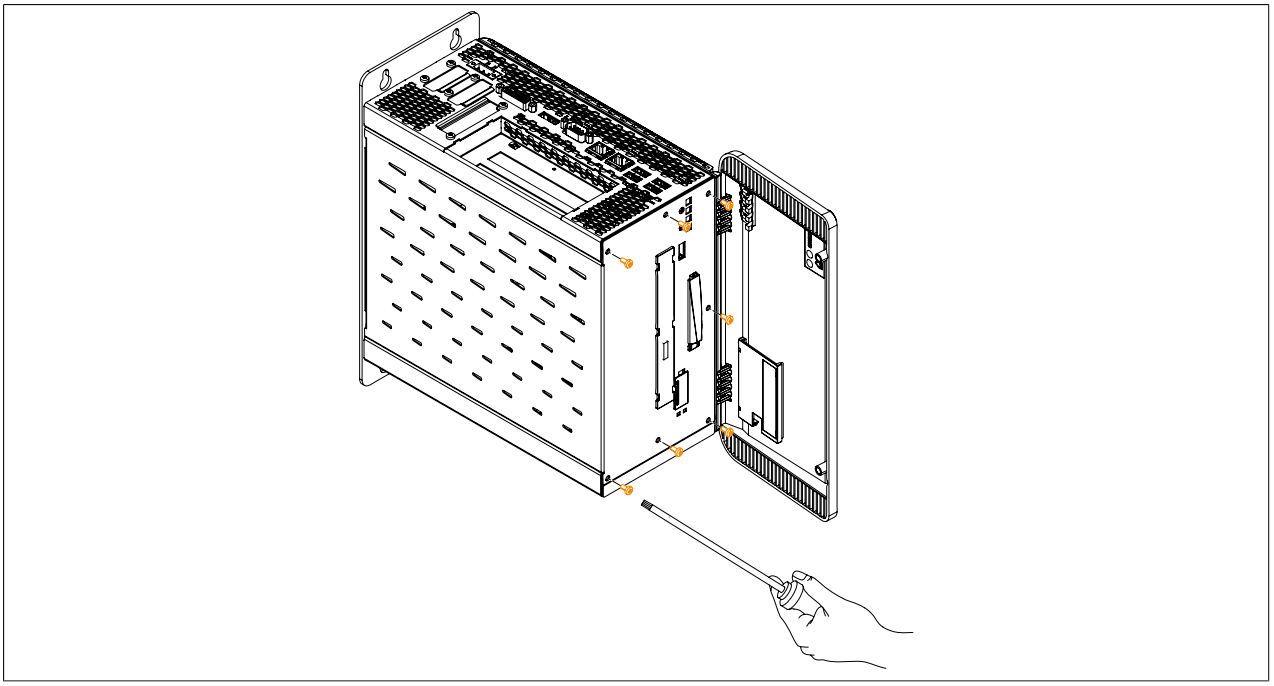


Figure 87: Removing the combi-torx screws for the side cover

4. After the screws have been removed, the side cover can be removed by sliding it toward the front and to the side.

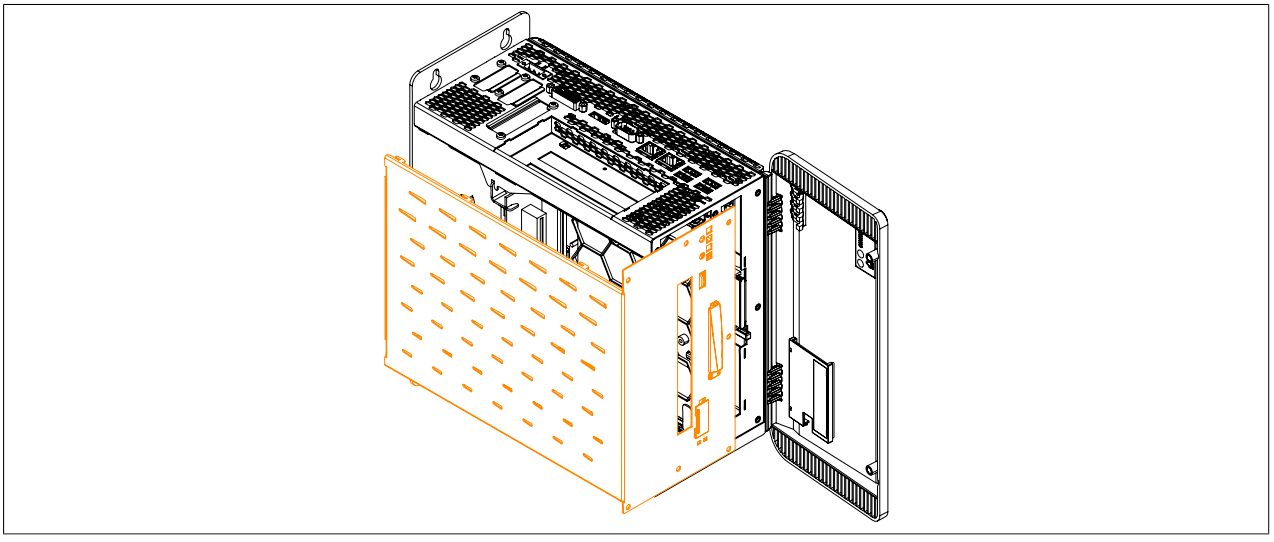


Figure 88: Removing the side cover

5. Remove / replace the slide-in drive from the Automation PC 910. The slide-in drive must glide into the guide rails and snap into the connector.

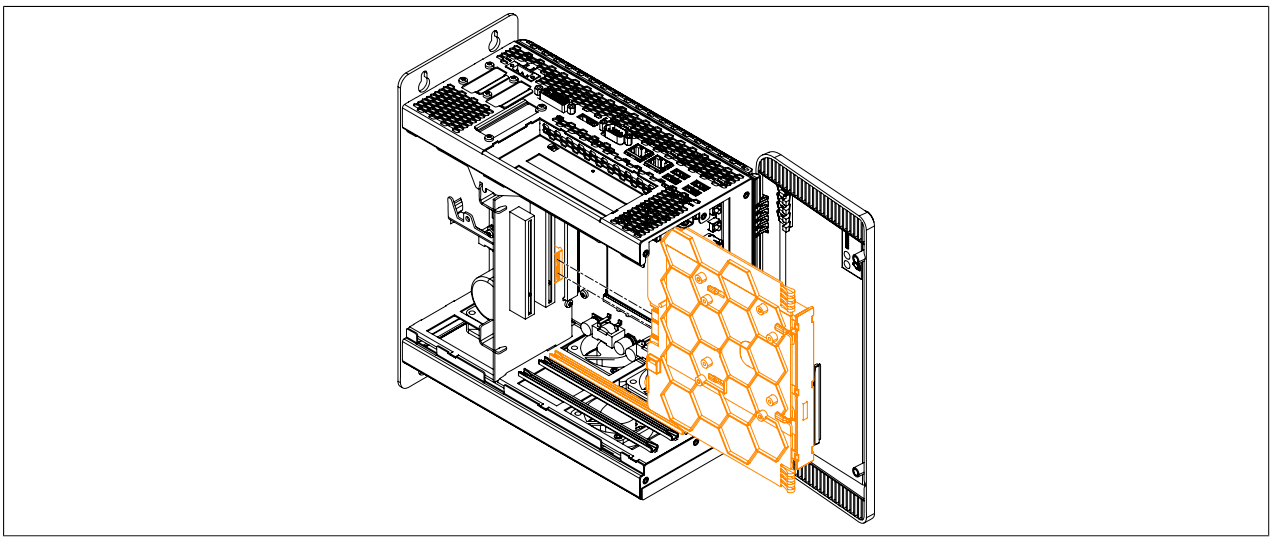


Figure 89: Removing / replacing the slide-in drive

6. Attach side cover.

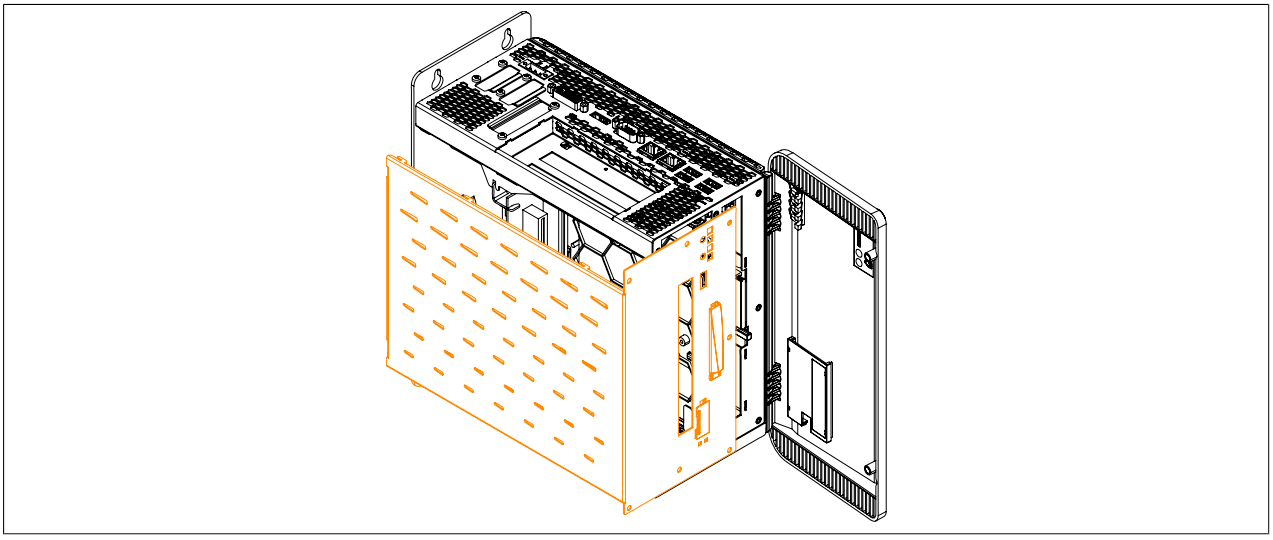


Figure 90: Attaching the side cover

7. Secure the side cover to the B&R Industrial PC using the same torx screws (T10) from before.

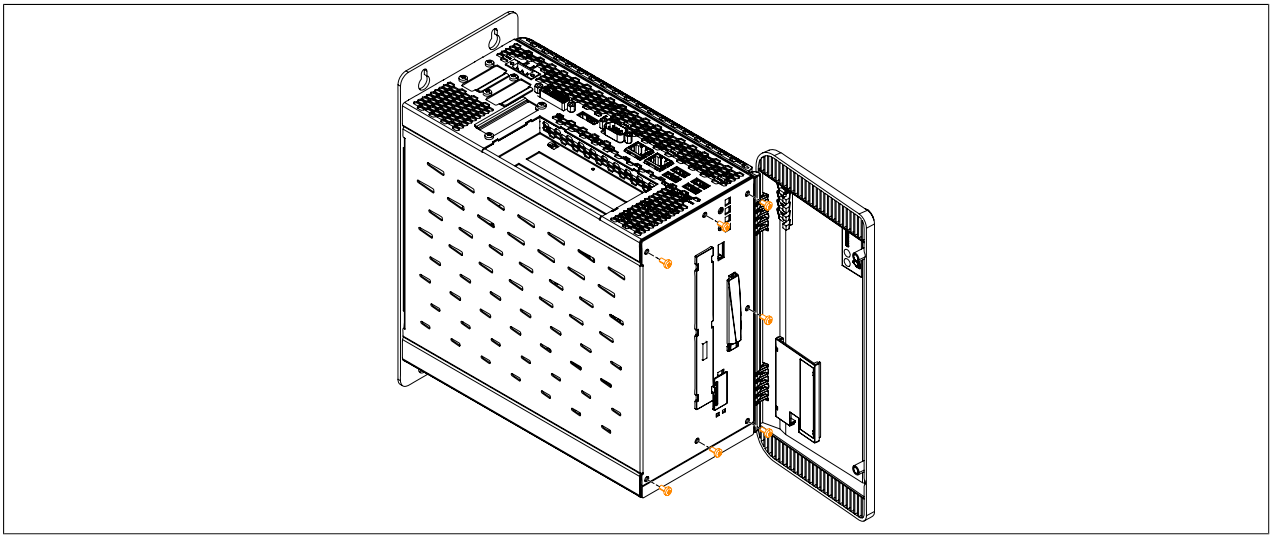


Figure 91: Securing the side cover

# 6 Fan filter replacement

1. Disconnect the power supply to the B&R Industrial PC.
2. Touch the housing or ground connection in order to discharge any electrostatic charge from your body.
3. Open the front cover.
4. To remove the fan filter from the B&R Industrial PC, push up on the locking mechanism while pulling the fan filter outward. The number of locking mechanisms can vary depending on the system unit.

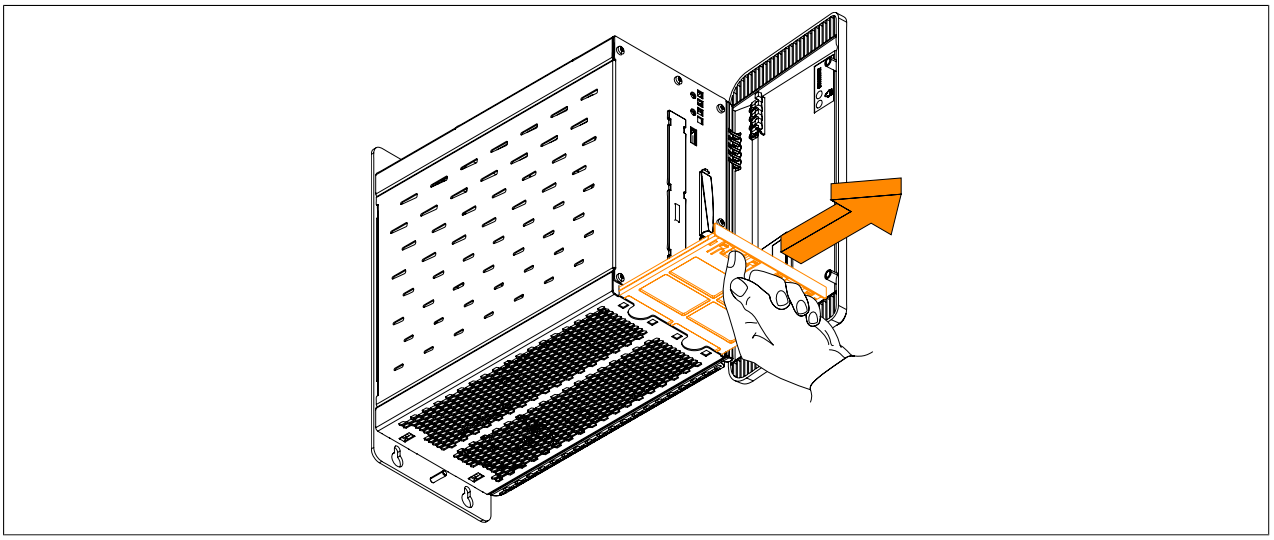


Figure 92: Removing the fan filter from the APC910

## Information:

**The dust filter must be inspected regularly depending on the amount of dust in the operating environment.**

# 7 Fan kit replacement

1. Disconnect the power supply to the B&R Industrial PC.
2. Touch the housing or ground connection in order to discharge any electrostatic charge from your body.
3. Open and remove the front cover.

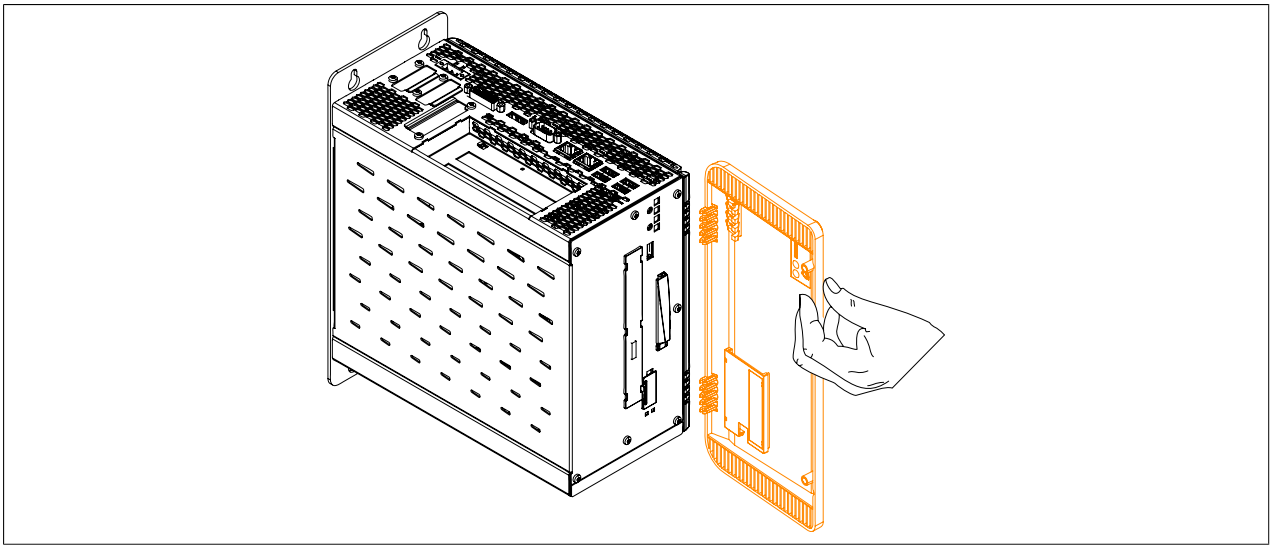


Figure 93: Removing the front cover

4. Remove heat sink cover. The torx screws (T10) that are marked in the image must be removed.

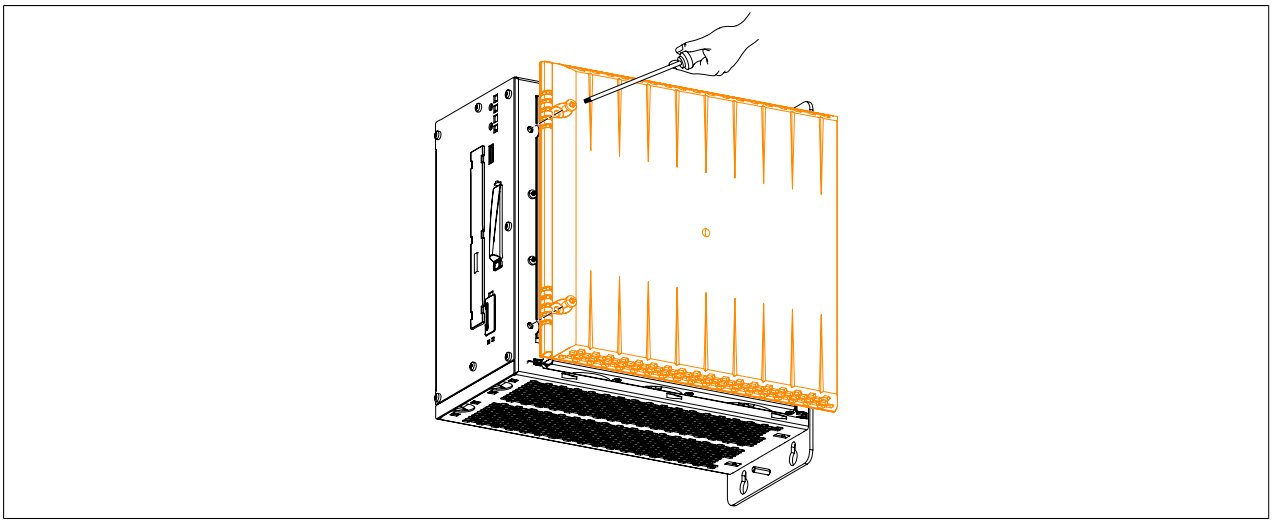


Figure 94: Removing the heat sink cover

5. Remove the torx screws (T10) from the fan kit that are marked in the following image and unplug the fan kit cable from the baseboard.

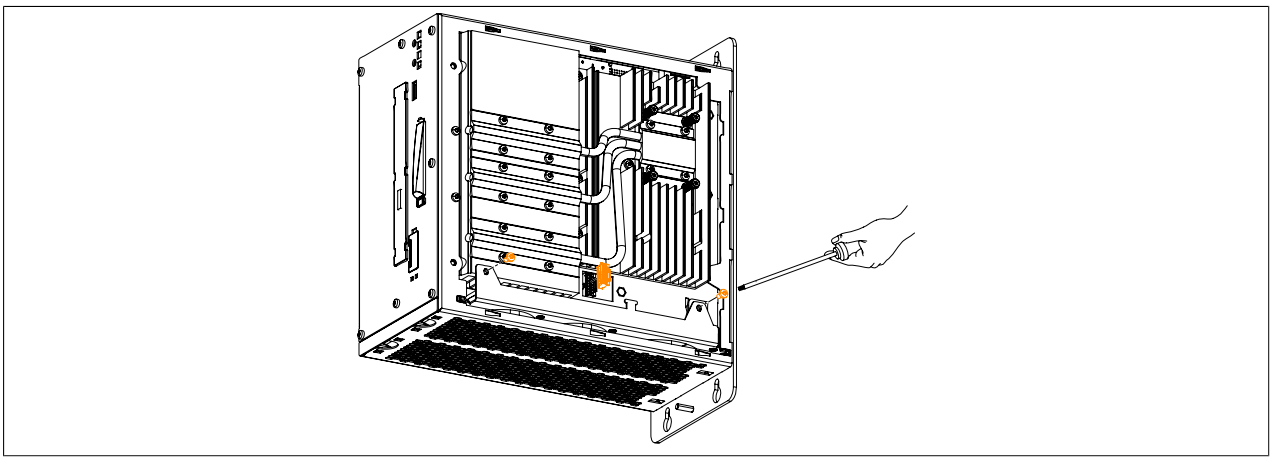


Figure 95: Removing the combi-torx screws and fan cable

6. The fan kit can now be removed from the Automation PC 910.

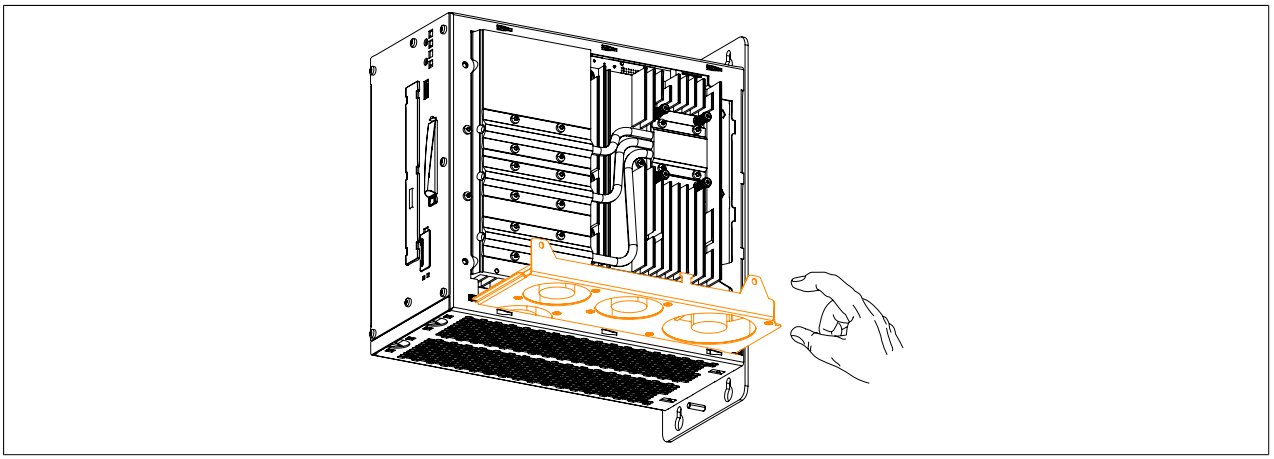


Figure 96: Removing the fan kit from the APC910

7. The Automation PC 910 can now be re-assembled in reverse order of these instructions.

# Appendix A

## 1 Abbreviations

| Abbreviation | Stands for | Description |
|---|---|---|
| NC | Normally closed | A normally closed (N.C.) relay contact. |
| | Not connected | Used in the description of pinout if a terminal or pin is not connected to a module. |
| ND | Not defined | In data tables, this stands for a value that has not been defined. Because a cable manufacturer does not provide certain technical data, for example. |
| NO | Normally open | A normally open (N.O.) relay contact. |
| TBD | To be defined | Used in technical data tables when certain information is not yet available. The value will be provided later. |

Table 119: Abbreviations used in this user's manual

## A



## B



## C



## D



## E

## F



## G



## H



## I



## L

## M



## O



## P



## R



## S

## T



## U



## V



## W