Automation PC 511

User's Manual

Version: **1.15 (February 2014)**
Model no.: **MAAPC511-ENG**

Chapter 1 • General information

1 Manual history

Version	Date	Change
0.10 Preliminary	26-Aug-11	• First version
1.00	12-Apr-12	• Updated 4 "Software". • Updated 7 "Maintenance and service". • Updated terminal block 0TB1208.3100 (interface board plug) in 6 "Accessories". • Added new CompactFlash cards 5CFCRD.xxxx-06 in 6 "Accessories". Discontinued CompactFlash cards 5CFCRD.xxxx-04. • Corrected drilling template for the system unit. • Updated interface board 5PP5IF.FETH-00. • Updated section "Power management" on page 21 in chapter "Technical data". • Updated sections "Mounting orientations" on page 62 and "Spacing for air circulation" on page 64 in chapter "Installation". • Updated section "Maintenance Controller Extended (MTCX)" on page 223 in A "Appendix A".
1.05	10-Apr-13	• Updated section "Cable lengths and resolutions for SDL transmission" on page 56. • Modified "Organization of safety notices" on page 13. Updated descriptions for cautions and warnings. • Updated section "General instructions for performing temperature testing" on page 67. • Updated Windows 7 Service Pack 1 (see "Windows 7" on page 149). • Updated Windows Embedded Standard 7 Service Pack 1 (see "Windows Embedded Standard 7" on page 151). • Updated "B&R Automation Device Interface (ADI) - Control Center" on page 162. • Updated "B&R Automation Device Interface (ADI) Development Kit" on page 164 to version 3.40. • Updated "B&R Automation Device Interface (ADI) .NET SDK" on page 166 to version 1.80. • Updated "B&R Key Editor" on page 168 to version 3.30. • Updated technical data for CPU boards, see "US15W CPU boards" on page 36. • CompactFlash card 5CFCRD.032G-06 updated, see "5CFCRD.xxxx-06" on page 178. • Revised technical data for I/O board "5PP5IO.GNAC-00" on page 55. • Added "USB media drive" on page 190. • Added section "HMI Drivers & Utilities DVD" on page 217. • Updated all technical data.
1.10	14-Aug-13	• Updated B&R USB flash drive 5MMUSB.4096-01, see "USB flash drives" on page 196. • Updated tightening torque of locating screws in section "Cables" on page 198. • Updated sections "B&R Automation Device Interface (ADI) Development Kit" on page 164 and "B&R Automation Device Interface (ADI) .NET SDK" on page 166.
1.15	17-Feb-14	• Updated GOST-R certification information in the technical data. • Updated section "GOST-R" on page 171. • Added information about the discontinuation of support for the "Windows XP Professional" on page 153 operating system. • Updated "B&R Automation Device Interface (ADI) - Control Center" on page 162. • Updated "B&R Automation Device Interface (ADI) Development Kit" on page 164. • Updated "B&R Automation Device Interface (ADI) .NET SDK" on page 166. • Updated "B&R Key Editor" on page 168 to version 3.40. • Added "Debian (GNU/Linux)" on page 160 operating system. • Added section "Known problems/issues" on page 84.

Table 1: Manual history

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

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

Individual components

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

2.3 Policies and procedures

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

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

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

2.4 Transport and storage

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

2.5 Installation

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

2.6 Operation

2.6.1 Protection against touching electrical parts

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

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

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

2.6.2 Environmental conditions - Dust, humidity, aggressive gases

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

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

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

2.6.3 Viruses and dangerous programs

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

2.7 Environmentally friendly disposal

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

2.7.1 Separation of materials

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

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

Table 2: Environmentally friendly separation of materials

Disposal must comply with applicable legal regulations.

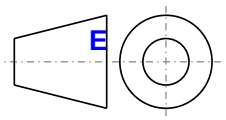
3 Organization of safety notices

Safety notices in this manual are organized as follows:

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

Table 3: Description of the safety notices used in this documentation

4 Guidelines



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

All dimensions are specified in mm.

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

Table 4: Range of nominal sizes

5 Overview

Product ID	Short description	on page
	Automation Runtime	
1A4600.10-5	B&R Automation Runtime ARwin, including license sticker	159
1A4601.06-5	B&R Automation Runtime ARemb, including license sticker	159
1A4601.06-T	B&R Automation Runtime ARemb Terminal, including license sticker	159
	Batteries	
0AC201.91	Lithium batteries 4 pcs., 3 V / 950 mAh button cell We hereby state that the lithium cells contained in this shipment qualify as "partly regulated". Handle with care. If the package is damaged, inspect the cells, repack intact cells and protect the cells against short circuit. For emergency information, call RENATA SA at +41 61 319 28 27.	172
4A0006.00-000	Lithium battery, 3 V / 950 mAh, button cell	172
	CPU boards	
5PP5CP.US15-00	CPU board Intel Atom Z510 1.1 GHz - Single core - US15W chipset	36
5PP5CP.US15-01	CPU board Intel Atom Z520 1.33 GHz - Single core - US15W chipset	36
5PP5CP.US15-02	CPU board Intel Atom Z530 1.6 GHz - Single core - US15W chipset	36
	CompactFlash	
5CFCRD.0064-03	CompactFlash 64 MB Western Digital (SLC)	186
5CFCRD.0128-03	CompactFlash 128 MB Western Digital (SLC)	186
5CFCRD.016G-04	CompactFlash 16 GB B&R (SLC)	182
5CFCRD.016G-06	CompactFlash 16 GB B&R (SLC)	178
5CFCRD.0256-03	CompactFlash 256 MB Western Digital (SLC)	186
5CFCRD.032G-06	CompactFlash 32 GB B&R (SLC)	178
5CFCRD.0512-03	CompactFlash 512 MB Western Digital (SLC)	186
5CFCRD.0512-04	CompactFlash 512 MB B&R (SLC)	182
5CFCRD.0512-06	CompactFlash 512 MB B&R (SLC)	178
5CFCRD.1024-03	CompactFlash 1 GB Western Digital (SLC)	186
5CFCRD.1024-04	CompactFlash 1 GB B&R (SLC)	182
5CFCRD.1024-06	CompactFlash 1 GB B&R (SLC)	178
5CFCRD.2048-03	CompactFlash 2 GB Western Digital (SLC)	186
5CFCRD.2048-04	CompactFlash 2 GB B&R (SLC)	182
5CFCRD.2048-06	CompactFlash 2 GB B&R (SLC)	178
5CFCRD.4096-03	CompactFlash 4 GB Western Digital (SLC)	186
5CFCRD.4096-04	CompactFlash 4 GB B&R (SLC)	182
5CFCRD.4096-06	CompactFlash 4 GB B&R (SLC)	178
5CFCRD.8192-03	CompactFlash 8 GB Western Digital (SLC)	186
5CFCRD.8192-04	CompactFlash 8 GB B&R (SLC)	182
5CFCRD.8192-06	CompactFlash 8 GB B&R (SLC)	178
	DVI cable	
5CADVI.0018-00	DVI-D cable, 1.8 m	198
5CADVI.0050-00	DVI-D cable, 5 m	198
5CADVI.0100-00	DVI-D cable, 10 m	198
	Debian 6.0	
5SWLIN.0138-MUL	Debian 6.0 32-bit, multilingual, for APC511; order CompactFlash card separately (min. 4 GB).	160
	I/O board	
5PP5IO.GNAC-00	Interface board - 1 USB 2.0 - 1 RS232/422/485 - 1 HDA sound - 1 SDL/DVI-D	55
	Interface boards	
5PP5IF.CETH-00	Ethernet interface card - 1 Ethernet 10/100/1000	39
5PP5IF.CHDA-00	Audio interface card - 1 HDA	41
5PP5IF.FCAN-00	CAN interface card - 1 CAN master	49
5PP5IF.FETH-00	Ethernet interface card - 1 Ethernet 10/100/1000 - 512 kB SRAM	43
5PP5IF.FPLM-00	POWERLINK interface card - 2 POWERLINK managing nodes - 512 kB SRAM	45
5PP5IF.FX2X-00	X2X Link interface card - 1 X2X Link master - 512 kB SRAM	51
5PP5IF.FXCM-00	CAN interface card - 1 CAN master - 1 X2X master - 512 kB SRAM - Can be installed in PP500, APC510, APC511 systems	53
	Main memory	
5MMDDR.0512-01	SO-DIMM DDR2 RAM 512 MB PC2-5300	38
5MMDDR.1024-01	SO-DIMM DDR2 RAM 1024 MB PC2-5300	38
5MMDDR.2048-01	SO-DIMM DDR2 RAM 2048 MB PC2-5300	38
	Other	
5SWHMI.0000-00	HMI Drivers & Utilities DVD	217
	RS232 cable	
9A0014.02	RS232 extension cable for remote operation of a display unit with touch screen, 1.8 m	215
9A0014.05	RS232 extension cable for remote operation of a display unit with touch screen, 5 m	215
9A0014.10	RS232 extension cable for remote operation of a display unit with touch screen, 10 m	215
	SDL cable - 45° connector	
5CASDL.0018-01	SDL cable with 45° male connector, 1.8 m	204
5CASDL.0050-01	SDL cable with 45° male connector, 5 m	204
5CASDL.0100-01	SDL cable with 45° male connector, 10 m	204
5CASDL.0150-01	SDL cable with 45° male connector, 15 m	204
	SDL cables	
5CASDL.0018-00	SDL cable, 1.8 m	201
5CASDL.0050-00	SDL cable, 5 m	201
5CASDL.0100-00	SDL cable, 10 m	201
5CASDL.0150-00	SDL cable, 15 m	201

Product ID	Short description	on page
5CASDL.0200-00	SDL cable, 20 m	201
5CASDL.0250-00	SDL cable, 25 m	201
5CASDL.0300-00	SDL cable, 30 m	201
	SDL flex cable	
5CASDL.0018-03	SDL flex cable, 1.8 m	207
5CASDL.0050-03	SDL flex cable, 5 m	207
5CASDL.0100-03	SDL flex cable, 10 m	207
5CASDL.0150-03	SDL flex cable, 15 m	207
5CASDL.0200-03	SDL flex cable, 20 m	207
5CASDL.0250-03	SDL flex cable, 25 m	207
5CASDL.0300-03	SDL flex cable, 30 m	207
5CASDL.0300-13	SDL flex cable with extender, 30 m	210
5CASDL.0400-13	SDL flex cable with extender, 40 m	210
5CASDL.0430-13	SDL flex cable with extender, 43 m	210
	System units	
5PC511.SX01-00	APC511 system unit, connections for 1x RS232, 2x USB 2.0, 1x Ethernet 10/100/1000; can be expanded with interface board; order I/O board (5PP5IO.GNAC-00) and 24 VDC connector for supply voltage separately (screw clamp: 0TB103.9; cage clamp: 0TB103.91)	31
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, 3.31 mm² screw clamp, protected against vibration by the screw flange	174
0TB103.91	Connector, 24 VDC, 3-pin female, 3.31 mm² cage clamp, protected against vibration by the screw flange	174
0TB1208.3100	Connector, 8-pin cage clamp, 1 mm², protected against vibration by the screw flange	175
	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	194
5MD900.USB2-02	USB 2.0 drive combination, consists of DVD-R/RW DVD+R/RW, CompactFlash slot (Type II), USB connection (Type A on the front, Type B on the back); 24V DC (order screw clamp terminal 0TB103.9 or cage clamp terminal 0TB103.91 separately)	190
5MMUSB.2048-01	USB 2.0 flash drive, 2048 MB, B&R	196
5MMUSB.4096-01	USB 2.0 flash drive, 4096 MB, B&R	196
	USB cable	
5CAUSB.0018-00	USB 2.0 connection cable type A - type B, 1.8 m	214
5CAUSB.0050-00	USB 2.0 connection cable type A - type B, 5 m	214
	Windows 7 Professional/Ultimate	
5SWWI7.0100-ENG	Microsoft OEM Windows 7 Professional 32-bit, DVD, English. Only available with a new device.	149
5SWWI7.0100-GER	Microsoft OEM Windows 7 Professional 32-bit, DVD, German. Only available with a new device.	149
5SWWI7.0300-MUL	Microsoft OEM Windows 7 Ultimate 32-bit, DVD, multilingual. Only available with a new device.	149
5SWWI7.1100-ENG	Microsoft OEM Windows 7 Professional 32-bit, Service Pack 1, DVD, English. Only available with a new device.	149
5SWWI7.1100-GER	Microsoft OEM Windows 7 Professional 32-bit, Service Pack 1, DVD, German. Only available with a new device.	149
5SWWI7.1300-MUL	Microsoft OEM Windows 7 Ultimate 32-bit, Service Pack 1, DVD, multilingual. Only available with a new device.	149
	Windows CE 6.0	
5SWWCE.0838-ENG	Microsoft OEM Windows CE 6.0 Professional, English; for APC511; order CompactFlash separately (at least 128 MB)	157
	Windows Embedded Standard 2009	
5SWWXP.0738-ENG	Microsoft OEM Windows Embedded Standard 2009, English; for APC511; order CompactFlash separately (at least 1 GB)	155
	Windows Embedded Standard 7	
5SWWI7.0538-ENG	Microsoft OEM Windows Embedded Standard 7 32-bit, English; for APC511; order CompactFlash separately (at least 8 GB)	151
5SWWI7.0738-MUL	Microsoft OEM Windows Embedded Standard 7 Premium 32-bit, multilingual; for APC511; order CompactFlash separately (at least 8 GB)	151
5SWWI7.1538-ENG	Microsoft OEM Windows Embedded Standard 7 32-bit, Service Pack 1, English; for APC511; order Compact-Flash separately (at least 16 GB)	151
5SWWI7.1738-MUL	Microsoft OEM Windows Embedded Standard 7 Premium 32-bit, Service Pack 1, multilingual; for APC511; order CompactFlash separately (at least 16 GB)	151
	Windows XP Professional	
5SWWXP.0600-ENG	Microsoft OEM Windows XP Professional Service Pack 3, CD, English. Only available with a new device.	153
5SWWXP.0600-GER	Microsoft OEM Windows XP Professional Service Pack 3, CD, German. Only available with a new device.	153
5SWWXP.0600-MUL	Microsoft OEM Windows XP Professional Service Pack 3, CD, multilingual. Only available with a new device.	153

Chapter 2 • Technical data

1 Introduction

The APC510 and APC511 are the first choices when it comes to running applications where good performance needs to be combined with particularly compact dimensions. These devices are based on Intel Atom processors, which are optimized for minimum power dissipation. In the consumer area, this means extended battery life for laptops; for usage in industrial environments, however, the strength of Atom processors lies in their ability to reach the upper end of the temperature scale without requiring the use of fans. B&R is able to draw on many years of experience in the area of heat balancing, which makes it possible to operate even selected Core2 Duo processors without fans. The most important factor considered when designing the APC510 and APC511 was keeping their dimensions to an absolute minimum, and this meant doing away with the space normally taken up by fans. Another factor that contributes to their compact design is the absence of slots for PCI and PCI Express cards, as well as for standard drives such as CD/DVD-ROM. Despite this, however, these Automation PCs are not limited at all in terms of modularity and flexibility. Gigabit Ethernet, USB 2.0 and serial interfaces are all part of the standard package, along with sound output (HD audio) and a removable CompactFlash card.

The APC511 is the optimal solution whenever flush mounting is required. With a minimum installation depth of only 63.25 mm, this system provides the advantages of a complete PC system in extremely tight spaces.

1.1 Features

- Intel® Atom™ Z510, Z520 or Z530 processor
- Up to 2 GB SDRAM
- 2x USB 2.0
- 1x RS232
- 1x Ethernet 10/100/1000 Mbit/s
- Optional interface and I/O boards
- CompactFlash slot (type I)
- 24 VDC supply voltage
- Operation without a fan or heat sink
- BIOS (Insyde)
- Real-time clock (RTC, battery-backed)

1.2 System components / Configuration

The APC511 system can be assembled to meet individual requirements and operating conditions.

The following components are absolutely essential for operation:

- System unit
- CPU board
- Main memory
- Drive (mass storage device such as CompactFlash card) for the operating system
- Power connector (terminal block)

1.2.1 Configuration - Base system

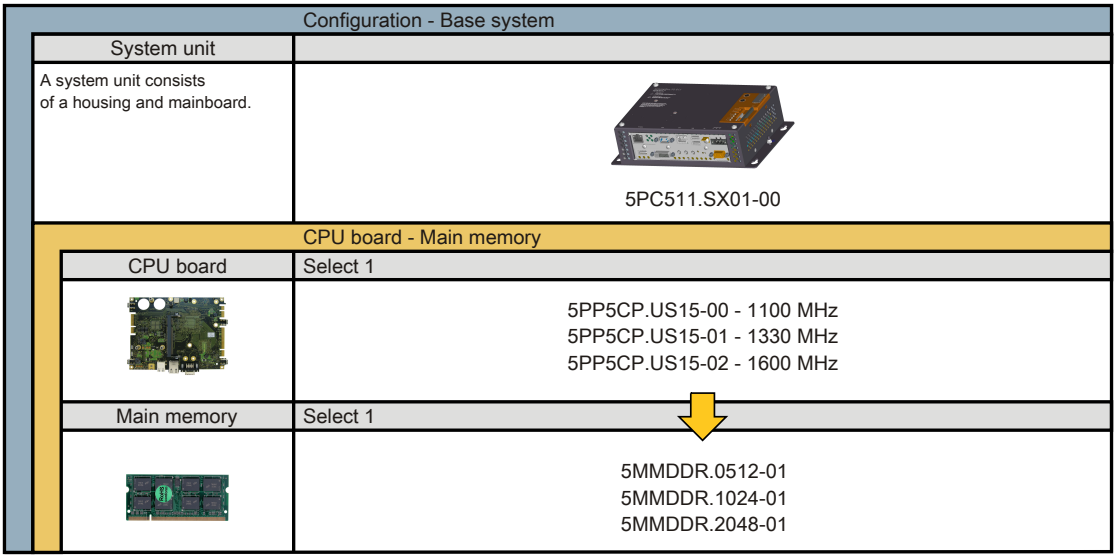


Figure 1: Configuration - Base system

1.2.2 Configuration - Software and accessories

Configuration - Software and accessories	
System unit	
A system unit consists of a housing and mainboard.	 5PC511.SX01-00
Interface board	Select 1
	5PP5IF.CETH-00 - 1x ETH 10/100/100 5PP5IF.CHDA-00 - 1x HDA sound 5PP5IF.FETH-00 - 1x ETH 10/100/100, SRAM 5PP5IF.FPLM-00 - 2x POWERLINK, SRAM 5PP5IF.FCAN-00 - 1x CAN, SRAM 5PP5IF.FX2X-00 - 1x X2X, SRAM 5PP5IF.FXCM-00 - 1x CAN, 1x X2X, SRAM
I/O board	Select 1
	5PP5IO.GNAC-00
CompactFlash	Select 1
	5CFCRD.0512-06 5CFCRD.4096-06 5CFCRD.1024-06 5CFCRD.8192-06 5CFCRD.2048-06 5CFCRD.016G-06 5CFCRD.032G-06
USB accessories	Select 1
	5MMUSB.2048-01 5MMUSB.4096-01
Software	Select 1
Windows xp, Windows 7, Automation Runtime, Windows Embedded Standard 2009, Windows Embedded Standard 7, Windows CE, debian	**Windows XP** 5SWWXP.0600-ENG 5SWWXP.0600-GER 5SWWXP.0600-MUL **Windows 7** 5SWWI7.1100-ENG 5SWWI7.1100-GER 5SWWI7.1300-MUL **Automation Runtime** 1A4600.10-5 1A4601.06-5 1A4601.06-T **Windows Embedded Standard 2009** 5SWWXP.0738-ENG **Windows Embedded Standard 7** 5SWWI7.1538-ENG 5SWWI7.1738-MUL **Windows CE 6.0** 5SWWCE.0838-ENG **Debian 6.0 (GNU/Linux)** 5SWLIN.0138-MUL
Terminal blocks	Select 1 each
	**Power connectors** 0TB103.9 0TB103.91 **Interface board connector** 0TB1208.3100

Figure 2: Configuration - Software and accessories

2 Complete system

2.1 Temperature specifications

Temperature specifications must take both the permissible temperature range of the system unit as well as that of the installed components into consideration. The latter can be found in the technical data for the individual components.

The permissible temperature ranges based on the type of installation must also be taken into consideration. For more information about this, refer to section "Mounting orientations" on page 62.

Information regarding worst-case conditions

- Thermal Analysis Tool (TAT V2.02) 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, USB ports)
- Maximum system expansion and power consumption

2.1.1 Temperature monitoring

Sensors monitor temperature values at various places inside the APC511 (CPU, interfaces, interface board, I/O board). The location of these temperature sensors is illustrated in "Temperature sensor locations" on page 19. The values listed in the table represent the defined maximum temperature[1)] 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 together with Automation Runtime and the B&R Control Center.

2.1.2 Temperature sensor positions

Sensors monitor temperature values at various locations (USB ports, main memory) inside the APC511. These temperatures[2)] can be read in BIOS or Microsoft Windows operating systems using the B&R Control Center[3)] or in Automation Runtime using data points in Automation Studio.

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 programs available in MS-DOS.

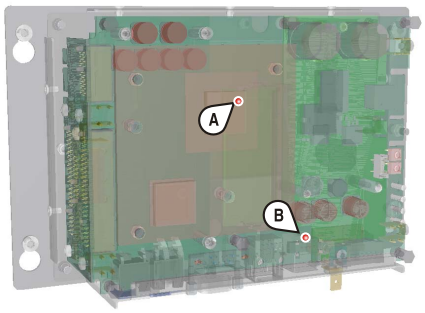


Figure 3: Temperature sensor locations

Position	Measurement point for	Measurement	Max. specified
A	CPU	Ambient temperature of the processor (sensor integrated in the processor)	100°C: 5PP5CP.US15-00, 5PP5CP.US15-01 90°C: 5PP5CP.US15-02
A	Main memory	Ambient temperature of the main memory (sensor integrated in the processor)	80°C
B	Interfaces	Temperature of the interfaces (sensor integrated next to the USB ports)	80°C
	Interface board	Temperature of an interface board (sensor integrated on the interface board)	Board-dependent
	I/O board	Temperature of an I/O board (sensor integrated on the I/O board)	Board-dependent

Table 5: Temperature sensor locations

1) The temperature measured approximates the immediate ambient temperature but may also be influenced by neighboring components.
2) The temperature measured approximates the immediate ambient temperature but may also be influenced by neighboring components.
3) The B&R Control Center is included in the ADI driver, which is available in the Downloads section of the B&R website (www.br-automation.com).

2.2 Humidity specifications

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

Component		Operation[1)]	Storage / Transport[1)]
System units		5 to 90%	5 to 95%
US15W CPU boards		5 to 90%	5 to 95%
Main memory for CPU boards		10 to 90%	5 to 95%
Interface boards	5PP5IF.CETH-00	5 to 90%	5 to 95%
	5PP5IF.CHDA-00	5 to 90%	5 to 95%
	5PP5IF.FETH-00	5 to 90%	5 to 95%
	5PP5IF.FPLM-00	5 to 90%	5 to 95%
	5PP5IF.FCAN-00	5 to 90%	5 to 95%
	5PP5IF.FX2X-00	5 to 90%	5 to 95%
	5PP5IF.FXCM-00	5 to 90%	5 to 95%
I/O board	5PP5IO.GNAC-00	5 to 90%	5 to 95%
Accessories	5CFCRD.xxxx-06 CompactFlash cards	85%	85%
	5CFCRD.xxxx-04 CompactFlash cards	85%	85%
	5CFCRD.xxxx-03 CompactFlash cards	8 to 95%	8 to 95%
	5MMUSB.2048-01 flash drive	10 to 90%	5 to 90%
	5MMUSB.4096-01 flash drive	85%	85%

Table 6: Overview of humidity specifications for individual components

1) Specifications correspond to non-condensing relative humidity.

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

2.3 Power management

2.3.1 Supply voltage block diagram

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

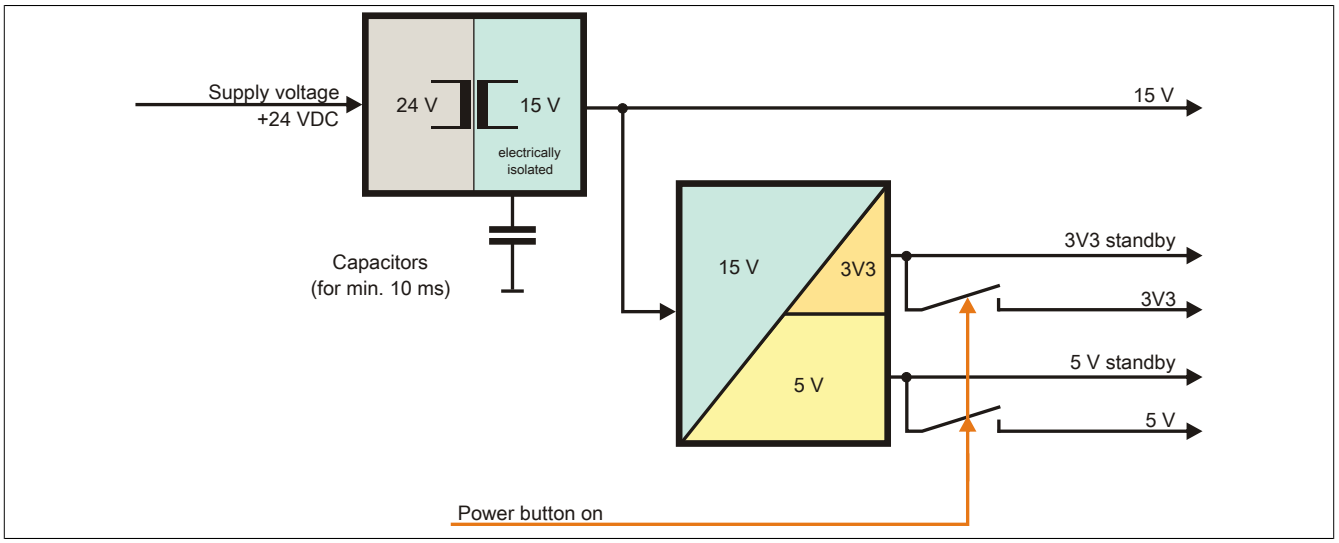


Figure 4: Supply voltage for system units

Description

15 V is generated from the supply voltage using a DC-to-DC converter. This electrically isolated 15 V supplies additional DC-to-DC converters that generate the remaining voltage.

After the system is turned on (e.g. using the power button), the 3V3 and 5 V voltages are active on the system.

2.4 Device interfaces and slots

2.4.1 Overview of device interfaces

Interfaces for system units with an interface and I/O board

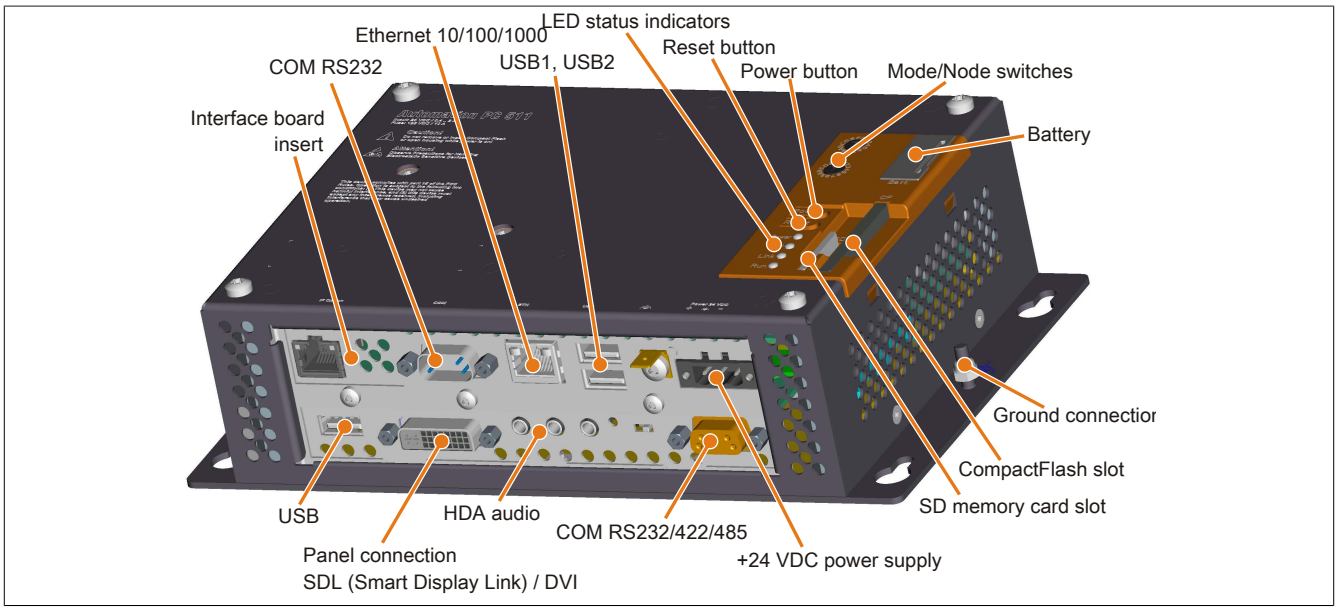


Figure 5: Overview of interfaces for system units with an interface and I/O board

Back cover of the system unit

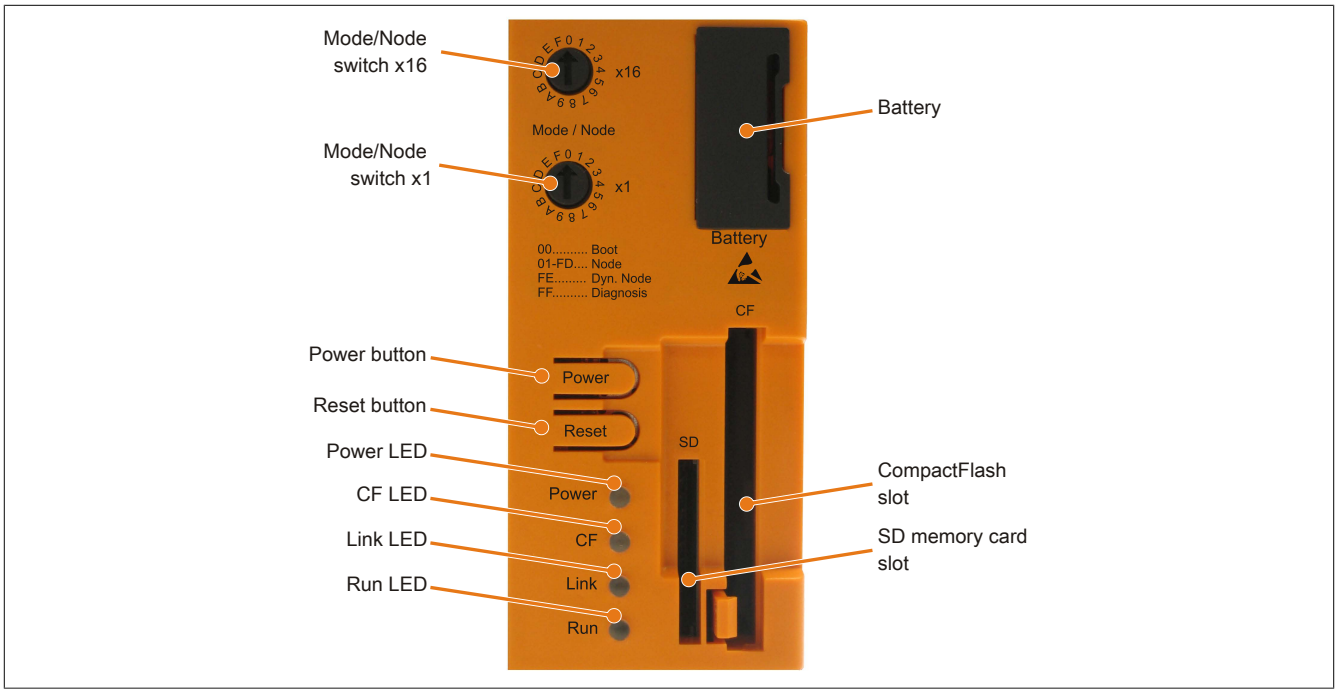


Figure 6: Back cover

2.4.2 +24 VDC power supply

The 3-pin male connector required for the power supply interface is not included in delivery. It can be ordered from B&R using model number 0TB103.9 (screw clamp) or 0TB103.91 (cage clamp).

The pinout is listed in the following table and printed on the housing. The supply voltage is protected internally by a soldered fuse (10 A, fast-acting) to prevent damage to the device in the event of an overload (fuse replacement necessary) or if the voltage supply is connected incorrectly (reverse polarity protection - fuse replacement not necessary). The device must be returned to B&R for repairs if the fuse is blown in the event of an error.

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

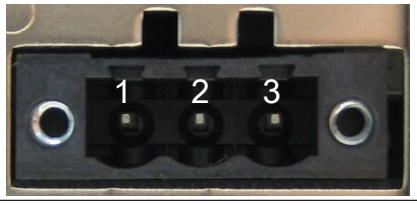


Table 7: 24 VDC power supply interface

2.4.2.1 Grounding

Caution!

The functional ground (pin 2) must be connected to ground (e.g. control cabinet) using the shortest possible path. Using the largest possible conductor cross section on the supply connector is recommended.

The ground connection is located on the mounting plate of the system unit.

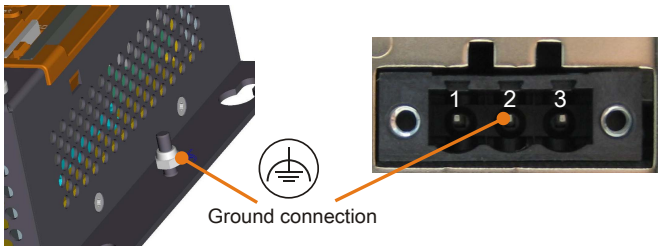


Figure 7: Ground connection

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

2.4.3 COM serial interface

COM serial interface		
	RS232	9-pin male DSUB connector
Type	RS232, modem-capable, not electrically isolated	
UART	16550-compatible, 16-byte FIFO	
Transfer rate	Max. 115 kbaud	
Cable length	Max. 15 meters	
Pin	**Assignment**	
1	DCD	
2	RXD	
3	TXD	
4	DTR	
5	GND	
6	DSR	
7	RTS	
8	CTS	
9	RI	

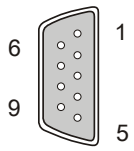


Table 8: COM serial interface - Pinout

2.4.4 Ethernet (ETH)

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

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

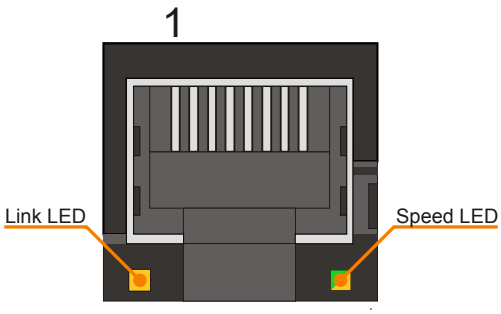


Table 9: Ethernet interface (ETH)

1) Switching takes place automatically.
2) The 10 Mbit/s transfer speed / connection only exists if the Link LED is also lit at the same time.

Driver support

A special driver is required in order to operate the Intel 82574 Ethernet controller. Drivers for approved operating systems are available in the Downloads section of the B&R website (www.br-automation.com).

Information:

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

2.4.5 USB interfaces

The APC511 features a USB 2.0 (Universal Serial Bus) host controller with multiple USB ports, 2 of which are accessible externally for the user.

Warning!

Peripheral USB devices can be connected to the USB interfaces on this device. Due to the vast number of USB devices available on the market, B&R cannot guarantee their performance. USB devices from B&R are guaranteed to function properly, however.

Caution!

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

USB1, 2

Universal Serial Bus (USB1, USB2)[1]		
Type	USB 2.0	2x 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] USB1, USB2	Max. 1 A	
Cable length	Max. 5 m (without hub)	

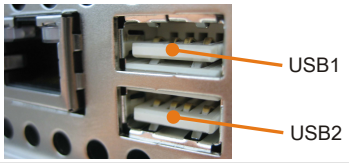


Table 10: USB1, USB2 interfaces

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

2.4.6 Battery

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

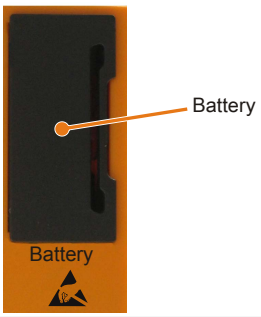
Battery		
Battery Type Removable Service life	 Renata 950 mAh Yes, accessible from the outside 4 years[1)]	
Model number	**Short description**	
	Batteries	
0AC201.91	Lithium batteries, 4 pcs., 3 V / 950 mAh, button cell	
4A0006.00-000	Lithium battery, 1 pc., 3 V / 950 mAh, button cell	

Table 11: Battery

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

Evaluating the battery status

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

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

Table 12: Battery status

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

2.4.7 CompactFlash slot

This CompactFlash slot is connected to the chipset internally via IDE PATA. Type I CompactFlash cards are supported.

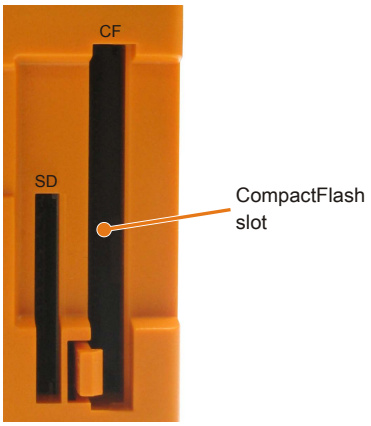
CompactFlash slot		
Connection	PATA master	
CompactFlash Type	Type I	
Model number	**Short description**	
	CompactFlash	
5CFCRD.0512-06	CompactFlash 512 MB B&R	
5CFCRD.1024-06	CompactFlash 1024 MB B&R	
5CFCRD.2048-06	CompactFlash 2048 MB B&R	
5CFCRD.4096-06	CompactFlash 4096 MB B&R	
5CFCRD.8192-06	CompactFlash 8192 MB B&R	
5CFCRD.016G-06	CompactFlash 16 GB B&R	
5CFCRD.032G-06	CompactFlash 32 GB B&R	

Table 13: CompactFlash slot

Warning!

Power must be turned off before inserting or removing CompactFlash cards.

2.4.8 SD memory card slot

The SD memory card slot only supports SD memory cards, not SDHC cards. In addition, SD memory cards can only be used as mass storage devices; booting from SD memory cards is not possible.

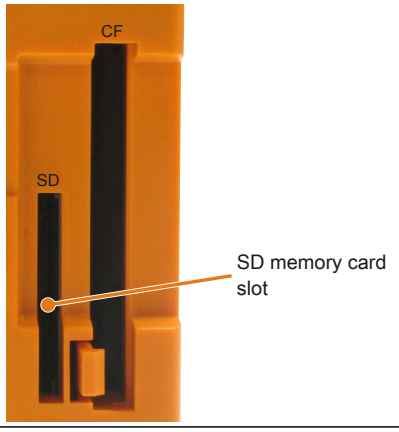
SD memory card slot		
		

Table 14: SD memory card slot

2.4.9 Power button

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

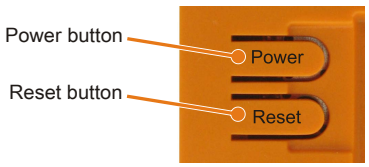
Power button	
The power switch acts like the on/off switch on a normal desktop PC with an ATX power supply: **Press and release** ... Switches on the device or shuts down the operating system and switches off the device **Press and hold** ... Switches off the ATX power supply without shutting down the device (data could be lost!) Pressing the power button does not reset the MTCX processor.	

Table 15: Power button

2.4.10 Reset button

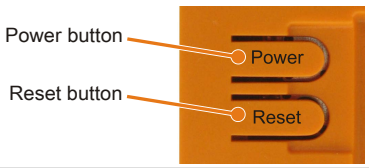
Reset button	
Pushing the reset button triggers a hardware and PCI reset. The device is restarted (cold restart). Pressing the reset button does not reset the MTCX processor.	

Table 16: Reset button

Warning!

A system reset can result in lost data!

2.4.11 Mode/Node switches

There are two 16-digit hex switches located on the back of the system unit that can be used as operating mode switches. The user can use switch positions 01 to FD as needed and evaluate them in the application program.

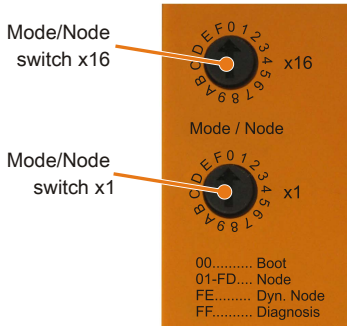
Mode/Node switches			
Switch position			
x16	x1	Description	
0	0	**Boot** Default switch position. Not a terminal node switch position.	
0...1	F...D	**Node** Automation Runtime run mode with node 01-FD (CompactFlash Automation Runtime or terminal operation). Can be used as needed, e.g. to set the INA2000 node number of the Ethernet interface.	
F	E	**Dyn. node** Automation Runtime run mode with dynamic node assignment (CompactFlash Automation Runtime or terminal operation). Device addresses can be assigned using software.	
F	F	**Diagnosis** Boots the device in Diagnostic mode. Does not initialize program sections in User RAM and User FlashPROM. After Diagnostic mode, the CPU always boots with a cold restart.	

Table 17: Mode/Node switches

2.4.12 LED status indicators

LED status indicators are located on the back of the system unit.

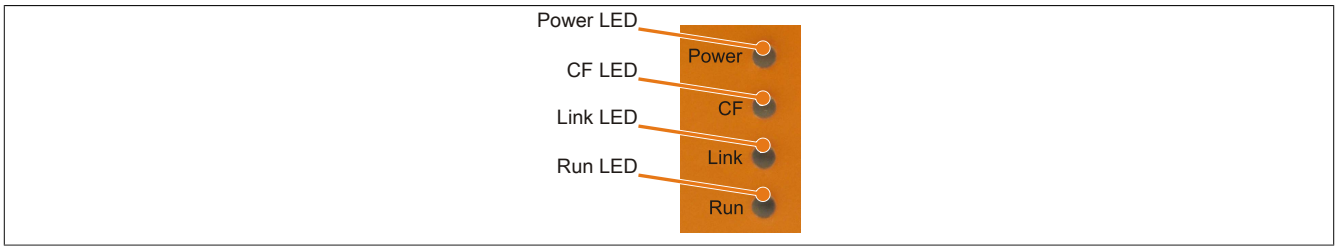


Figure 8: LED status indicators

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

LED	Color	Status	Description	LED status indicator
Power	Green	On	Supply voltage OK	
		Blinking	Device booted, battery status "BAD"	
			Information: **For more information, see "Battery" on page 26.**	
	Red	On	System in standby mode (S5: Soft-off mode or S4: Hibernation mode suspend-to-disk)	
		Blinking	MTCX running, battery status "BAD". System in standby mode (S5: Soft-off mode or S4: Hibernation mode suspend-to-disk)	
	Red / green	Blinking	Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery status OK, supply voltage OK	
			Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery status OK, standby mode (S5: Soft-off mode or S4: Hibernation mode suspend-to-disk)	
			Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery status BAD, supply voltage OK	
			Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery status BAD, standby mode (S5: Soft-off mode or S4: Hibernation mode suspend-to-disk)	
			Information: **An update must be performed again.**	
CF	Yellow	On	Indicates IDE drive access (CF)	
Link	Yellow	On	Indicates an active SDL connection on the male panel connector	
		Blinking	Indicates that an active SDL connection has been interrupted by a loss of power to the display unit	
			Information: **Check the supply voltage / power connector of the connected display unit.**	
Run	Green	Blinking	Automation Runtime booting Controlled by Automation Runtime (ARemb and ARwin)	
	Green	On	Application running Controlled by Automation Runtime (ARemb and ARwin)	
	Red	On	Application in service mode Controlled by Automation Runtime (ARemb and ARwin)	

Table 18: LED status indicators - Data

2.4.13 Interface board slot

Interface board slot	
Model number	**Short description**
	Interface boards
5PP5IF.CETH-00	PP500 interface board; connection for 1x Ethernet 10/100/1000
5PP5IF.CHDA-00	PP500 interface board; connection for 1x MIC, 1x Line IN, 1x Line OUT
5PP5IF.FETH-00	PP500 interface board; connection for 1x Ethernet 10/100/1000, 512 kB SRAM
5PP5IF.FPLM-00	PP500 interface board; connections for 2x POWERLINK
5PP5IF.FCAN-00	PP500 interface board; connection for 1x CAN master, 512 kB SRAM
5PP5IF.FX2X-00	PP500 interface board; connection for 1x X2X master, 512 kB SRAM
5PP5IF.FXCM-00	PP500 interface board; connection for 1x CAN master, 1x X2X master, 512 kB SRAM

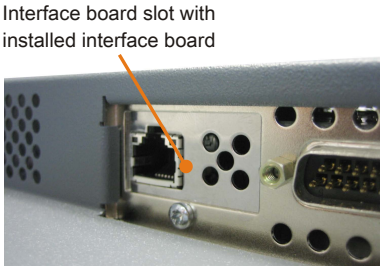


Table 19: Interface board slot

Information:

Interface boards can ONLY be installed and replaced by B&R.

2.4.14 I/O board slot

I/O board slot	
Model number	**Short description**
	I/O board
5PP5IO.GNAC-00	PP500/APC511 I/O board; connections for 1x USB 2.0, 1x RS232/422/485, HDA Sound, Smart Display Link/DVI-D.

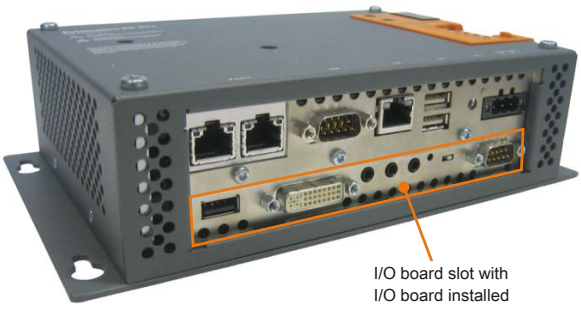


Table 20: I/O board slot

Information:

I/O boards can ONLY be installed and replaced by B&R.

3 Individual components

3.1 System units

3.1.1 5PC511.SX01-00

3.1.1.1 General information

- Intel® Atom™ technology
- Fanless operation
- Can be expanded with an interface or I/O board
- Shallow installation depth for flush-mounted installation

3.1.1.2 Order data

Model number	Short description	Figure
	System units	
5PC511.SX01-00	APC511 system unit, connections for 1x RS232, 2x USB 2.0, 1x Ethernet 10/100/1000; can be expanded with interface board; order I/O board (5PP5IO.GNAC-00) and 24 VDC connector for supply voltage separately (screw clamp: 0TB103.9; cage clamp: 0TB103.91)	
	Required accessories	
	CPU boards	
5PP5CP.US15-00	CPU board Intel Atom Z510 1.1 GHz - Single core - US15W chipset	
5PP5CP.US15-01	CPU board Intel Atom Z520 1.33 GHz - Single core - US15W chipset	
5PP5CP.US15-02	CPU board Intel Atom Z530 1.6 GHz - Single core - US15W chipset	
	Main memory	
5MMDDR.0512-01	SO-DIMM DDR2 RAM 512 MB PC2-5300	
5MMDDR.1024-01	SO-DIMM DDR2 RAM 1024 MB PC2-5300	
5MMDDR.2048-01	SO-DIMM DDR2 RAM 2048 MB PC2-5300	
	Terminal blocks	
0TB103.9	Connector, 24 VDC, 3-pin female, 3.31 mm² screw clamp, protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, 3.31 mm² cage clamp, protected against vibration by the screw flange	
	Optional accessories	
	Batteries	
0AC201.91	Lithium batteries 4 pcs., 3 V / 950 mAh button cell We hereby state that the lithium cells contained in this shipment qualify as "partly regulated". Handle with care. If the package is damaged, inspect the cells, repack intact cells and protect the cells against short circuit. For emergency information, call RENATA SA at +41 61 319 28 27.	
4A0006.00-000	Lithium battery, 3 V / 950 mAh, button cell	
	CompactFlash	
5CFCRD.016G-06	CompactFlash 16 GB B&R (SLC)	
5CFCRD.1024-06	CompactFlash 1 GB B&R (SLC)	
5CFCRD.2048-06	CompactFlash 2 GB B&R (SLC)	
5CFCRD.4096-06	CompactFlash 4 GB B&R (SLC)	
5CFCRD.8192-06	CompactFlash 8 GB B&R (SLC)	
	I/O board	
5PP5IO.GNAC-00	Interface board - 1 USB 2.0 - 1 RS232/422/485 - 1 HDA sound - 1 SDL/DVI-D	
	Interface boards	
5PP5IF.CETH-00	Ethernet interface card - 1 Ethernet 10/100/1000	
5PP5IF.CHDA-00	Audio interface card - 1 HDA	
5PP5IF.FCAN-00	CAN interface card - 1 CAN master	
5PP5IF.FETH-00	Ethernet interface card - 1 Ethernet 10/100/1000 - 512 kB SRAM	
5PP5IF.FPLM-00	POWERLINK interface card - 2 POWERLINK managing nodes - 512 kB SRAM	
5PP5IF.FX2X-00	X2X Link interface card - 1 X2X Link master - 512 kB SRAM	
5PP5IF.FXCM-00	CAN interface card - 1 CAN master - 1 X2X master - 512 kB SRAM - Can be installed in PP500, APC510, APC511 systems	
	USB accessories	
5MMUSB.2048-01	USB 2.0 flash drive, 2048 MB, B&R	
5MMUSB.4096-01	USB 2.0 flash drive, 4096 MB, B&R	

Table 21: 5PC511.SX01-00 - Order data

3.1.1.3 Technical data

Product ID	5PC511.SX01-00
General information	
Cooling	Fanless
LEDs	Power, CF, Link, Run
B&R ID code	$C646
Battery	
Type	Renata 950 mAh
Service life	4 years [1]
Removable	Yes, accessible from the outside
Design	Lithium ion
Power button	Yes
Reset button	Yes
Buzzer	Yes
Certification	
CE	Yes
cULus	Yes
GOST-R	Yes
Controller	
Boot loader	BIOS
Mode/Node switches	2, 16 positions each (back)
Watchdog	MTCX
Power failure logic	
Controller	MTCX [2]
Buffer time	10 ms
Graphics	
Controller	Intel® Graphics Media Accelerator 500
Memory	
Type	DDR2 SDRAM
Size	Max. 2 GB
Interfaces	
COM1 [3]	
Type	RS232, modem-capable, not electrically isolated
Design	9-pin male DSUB connector
UART	16550-compatible, 16-byte FIFO
Max. baud rate	115 kbit/s
CompactFlash slot 1	
Quantity	1
Type	Type I
SD memory card slot	
Type	SD card
USB	
Quantity	2
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 per connection
Ethernet	
Quantity	1
Controller	Intel 82574
Design	Shielded RJ45 port
Transfer rate	10/100/1000 Mbit/s
Max. baud rate	1 Gbit/s
Inserts	
Interface board	Yes
I/O board	Yes
Electrical characteristics	
Nominal voltage	24 VDC ±25%
Nominal current	1.3 A [4]
Starting current	Typ. 3 A, max. 50 A for <300 µs
Power consumption	31 W [5]
Electrical isolation	Yes
Operating conditions	
EN 60529 protection	IP20 (only with installed CompactFlash card, inserted IF board or optional IF cover)
Environmental conditions	
Temperature	
Operation	0 to 50°C
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing

Table 22: 5PC511.SX01-00 - Technical data

Product ID	5PC511.SX01-00
Vibration	
Operation (continuous)	2 to 9 Hz: 1.75 mm amplitude / 9 to 200 Hz: 0.5 g
Operation (occasional)	2 to 9 Hz: 3.5 mm amplitude / 9 to 200 Hz: 1 g
Storage	2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g
Transport	2 to 8 Hz: 7.5 mm amplitude / 8 to 200 Hz: 2 g / 200 to 500 Hz: 4 g
Shock	
Operation	15 g, 11 ms
Storage	30 g, 15 ms
Transport	30 g, 15 ms
Altitude	
Operation	Max. 3000 m (depends on the component) [6]
Mechanical characteristics	
Housing	
Materials	Galvanized plate, plastic
Paint	Dark gray (similar to Pantone 432CV)
Dimensions	
Width	230 mm
Height	140 mm
Depth	63.25 mm
Weight	Approx. 1500 g

Table 22: 5PC511.SX01-00 - Technical data

1) At 50°C, 8.5 µA of the supplied components and a self-discharge of 40%. If an interface board with SRAM has been installed, the service life is 2½ years.
2) Maintenance Controller Extended.
3) The COM1 interface is identified in BIOS as the COM A interface.
4) The specified value applies to a nominal voltage of 24 VDC.
5) The specified value applies to a system unit with a CPU board and I/O board, but without an interface board.
6) The maximum ambient temperature is typically derated by 1°C per 1000 meters (starting at 500 meters above sea level).

3.1.1.4 Dimensions

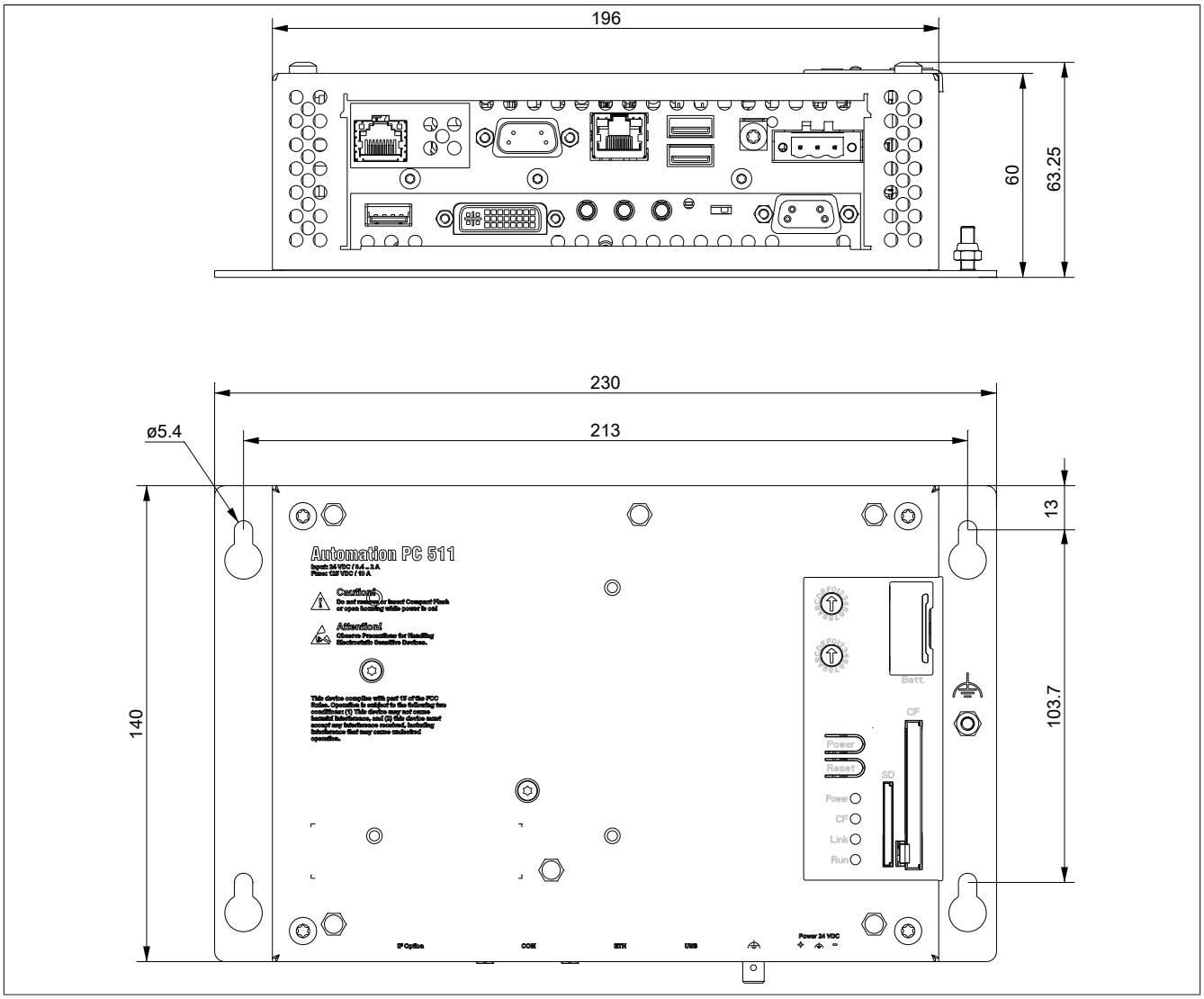


Figure 9: 5PC511.SX01-00 - Dimensions

3.1.1.5 Drilling template

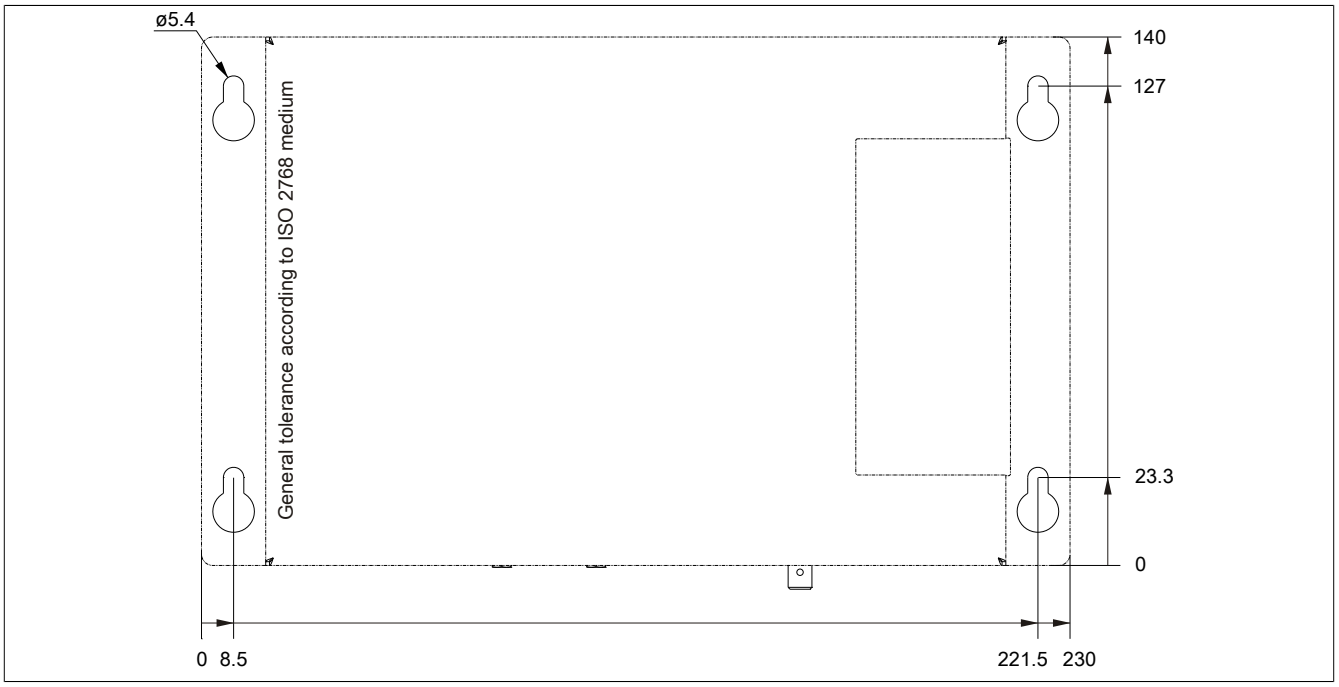


Figure 10: 5PC511.SX01-00 - Drilling template

3.2 US15W CPU boards

3.2.1 General information

These CPU boards are based on the Intel® US15W chipset and contain one DDR2 memory slot for a maximum of 2 GB. In addition, the Intel® GMA 500 with 128 MB memory is also integrated.

- Intel® Atom™ technology
- Intel® US15W chipset
- 1x DDR2 memory slot
- Intel® GMA 500
- Insyde BIOS

3.2.2 Order data

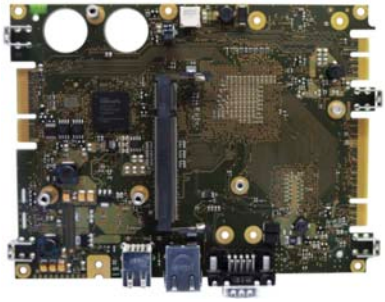
Model number	Short description	Figure
	CPU boards	
5PP5CP.US15-00	CPU board Intel Atom Z510 1.1 GHz - Single core - US15W chipset	
5PP5CP.US15-01	CPU board Intel Atom Z520 1.33 GHz - Single core - US15W chipset	
5PP5CP.US15-02	CPU board Intel Atom Z530 1.6 GHz - Single core - US15W chipset	
	Required accessories	
	Main memory	
5MMDDR.0512-01	SO-DIMM DDR2 RAM 512 MB PC2-5300	
5MMDDR.1024-01	SO-DIMM DDR2 RAM 1024 MB PC2-5300	
5MMDDR.2048-01	SO-DIMM DDR2 RAM 2048 MB PC2-5300	

Table 23: 5PP5CP.US15-00, 5PP5CP.US15-01, 5PP5CP.US15-02 - Order data

3.2.3 Technical data

Product ID	5PP5CP.US15-00	5PP5CP.US15-01	5PP5CP.US15-02
General information			
Certification			
CE		Yes	
cULus		Yes	
GOST-R		Yes	
GL		Yes	
Controller			
Boot loader		BIOS Insyde	
Processor			
Type	Intel® Atom™ Z510PT	Intel® Atom™ Z520PT	Intel® Atom™ Z530P
Clock frequency	1100 MHz	1330 MHz	1600 MHz
Number of cores		1	
Architectures		45 nm	
L1 cache		32 kB	
L2 cache		512 kB	
External bus	400 MHz	533 MHz	
Intel® 64 Architecture		No	
Intel® Hyper-Threading Technology		Yes	
Intel® Virtualization Technology (VT-x)	No	Yes	
Enhanced Intel SpeedStep® Technology		Yes	
Expanded command set		SSE2, SSE3, SSSE3	
Chipset	Intel® US15WPT		Intel® US15WP
Real-time clock			
Accuracy	At 25°C: typ. 12 ppm (1 seconds) per day [1]		
Battery-buffered		Yes	
Memory socket			
Number of memory channels		1	
Type		DDR2	
Size		Max. 2 GB	

Table 24: 5PP5CP.US15-00, 5PP5CP.US15-01, 5PP5CP.US15-02 - Technical data

Product ID	5PP5CP.US15-00	5PP5CP.US15-01	5PP5CP.US15-02
Graphics			
Controller	Intel® Graphics Media Accelerator 500		
Memory	Up to 256 MB [2]		
Color depth	Max. 32-bit		
Resolution	Depends on the system unit [3]		
Power management	ACPI 3.0		

Table 24: 5PP5CP.US15-00, 5PP5CP.US15-01, 5PP5CP.US15-02 - Technical data

1) At 50°C, 8.5 µA of the supplied components and a self discharge of 40%.
2) Allocated in main memory.
3) For PP500: The maximum resolution is determined automatically by the selection of the PP500 system unit.

3.3 Main memory

3.3.1 Order data

Model number	Short description	Figure
	Main memory	
5MMDDR.0512-01	SO-DIMM DDR2 RAM 512 MB PC2-5300	
5MMDDR.1024-01	SO-DIMM DDR2 RAM 1024 MB PC2-5300	
5MMDDR.2048-01	SO-DIMM DDR2 RAM 2048 MB PC2-5300	

Table 25: 5MMDDR.0512-01, 5MMDDR.1024-01, 5MMDDR.2048-01 - Order data

3.3.2 Technical data

Product ID	5MMDDR.0512-01	5MMDDR.1024-01	5MMDDR.2048-01
General information			
Type	SO-DIMM DDR2 SDRAM		
Memory size	512 MB	1 GB	2 GB
Construction	200-pin		
Organization	64M x 64-bit	128M x 64-bit	256M x 64-bit
Velocity	DDR2-667 (PC2-5300)		
Certification			
CE	Yes		
cULus	Yes		
GOST-R	Yes		
GL	Yes [1)]		

Table 26: 5MMDDR.0512-01, 5MMDDR.1024-01, 5MMDDR.2048-01 - Technical data

1) Yes, although applies only if all components installed within the complete system have this certification

Information:

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

3.4 Interface boards

Information:

Interface boards can ONLY be installed and replaced by B&R.

3.4.1 5PP5IF.CETH-00

3.4.1.1 General information

The interface board 5PP5IF.CETH-00 has a 10/100/1000 Mbit/sec network connection, 512 kB SRAM and can be used as an additional network interface in a Power Panel 500, Automation PC 510 or Automation PC 511.

- 1 network connection (10/100/1000 Mbit/s)
- Compatible with the PP500, APC511 and APC511

This interface board can be operated with Automation Runtime beginning with Automation Studio 3.0.90.18 and Automation Runtime D4.01.

3.4.1.2 Order data

Model number	Short description	Figure
	Interface boards	
5PP5IF.CETH-00	Ethernet interface card - 1 Ethernet 10/100/1000	

Table 27: 5PP5IF.CETH-00 - Order data

3.4.1.3 Technical data

Product ID	5PP5IF.CETH-00
General information	
B&R ID code	$B4D5
Diagnostics	
Data transfer	Yes, using status LED
Certification	
CE	Yes
cULus	Yes
GOST-R	Yes
GL	Yes
Interfaces	
Ethernet	
Quantity	1
Controller	Intel 82574
Design	Shielded RJ45 port
Transfer rate	10/100/1000 Mbit/s
Cable length	Max. 100 m between two stations (segment length)
Electrical characteristics	
Power consumption	2 W
Environmental conditions	
Temperature	
Operation	0 to 55°C
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing

Table 28: 5PP5IF.CETH-00 - Technical data

3.4.1.3.1 Ethernet interface (ETH)

Ethernet interface		
Controller	Intel 82574	
Cabling	S/STP (Cat 5e)	
Transfer rate	10/100/1000 Mbit/s[1)]	
Cable length	Max. 100 m (min. Cat 5e)	
Speed LED	**On**	**Off**
Green	100 Mbit/s	10 Mbit/s[2)]
Orange	1000 Mbit/s	-
Link LED	**On**	**Off**
Orange	Link (Ethernet network connection available)	Activity (blinking - data transfer in progress)

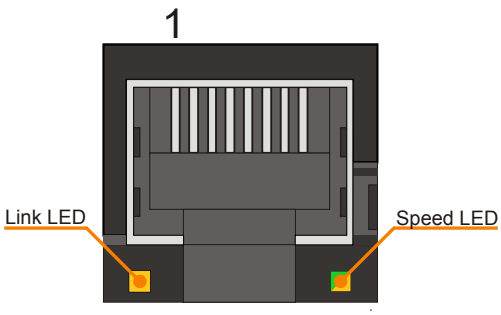


Table 29: 5PP5IF.CETH-00 - Ethernet interface

1) Switching takes place automatically.
2) The 10 Mbit/s transfer speed / connection is only present if the IF slot Link LED is also lit at the same time.

A special driver is required in order to operate the Intel 82574 Ethernet controller. Drivers for approved operating systems are available in the Downloads section of the B&R website (www.br-automation.com).

Information:

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

3.4.2 5PP5IF.CHDA-00

3.4.2.1 General information

The 5PP5IF.CHDA-00 interface board 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 PP500, APC511 and APC511

This interface board can be operated with Automation Runtime beginning with Automation Studio 3.0.90.18 and Automation Runtime A4.01.

3.4.2.2 Order data

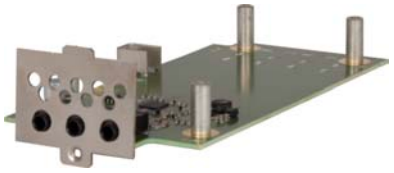
Model number	Short description	Figure
	Interface boards	
5PP5IF.CHDA-00	Audio interface card - 1 HDA	

Table 30: 5PP5IF.CHDA-00 - Order data

3.4.2.3 Technical data

Product ID	5PP5IF.CHDA-00
General information	
B&R ID code	$B4D6
Certification	
CE	Yes
cULus	Yes
GOST-R	Yes
Interfaces	
Audio	
Type	HDA sound
Controller	Realtek ALC 662
Inputs	Microphone, Line IN
Outputs	Line OUT
Electrical characteristics	
Power consumption	2 W
Environmental conditions	
Temperature	
Operation	0 to 55°C
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing

Table 31: 5PP5IF.CHDA-00 - Technical data

3.4.2.3.1 MIC, Line IN, Line OUT

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

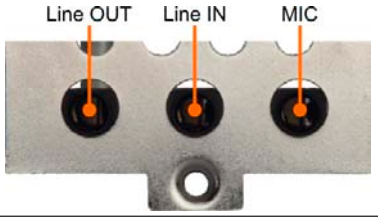


Table 32: MIC, Line IN, Line OUT

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

Information:

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

3.4.3 5PP5IF.FETH-00

3.4.3.1 General information

The interface board 5PP5IF.FETH-00 has a 10/100/1000 Mbit/sec network connection, 512 kB SRAM and can be used as an additional network interface in a Power Panel 500, Automation PC 510 or Automation PC 511.

- 1 network connection (10/100/1000 Mbit/s)
- 512 kB SRAM
- Compatible with the PP500, APC511 and APC511

This interface board can only be operated with Automation Runtime (beginning with Automation Studio 3.0.90.18 and Automation Runtime D4.01).

3.4.3.2 Order data

Model number	Short description	Figure
	Interface boards	
5PP5IF.FETH-00	Ethernet interface card - 1 Ethernet 10/100/1000 - 512 kB SRAM	

Table 33: 5PP5IF.FETH-00 - Order data

3.4.3.3 Technical data

Product ID	5PP5IF.FETH-00
General information	
B&R ID code	$B7C4
Diagnostics	
Data transfer	Yes, using status LED
Certification	
CE	Yes
cULus	Yes
GOST-R	Yes
GL	Yes
Controller	
SRAM	
Size	512 kB
Battery-buffered	Yes
Remanent variables in power failure mode	256 kB (e.g. for Automation Runtime, see AS help documentation) 1)
Interfaces	
Ethernet	
Quantity	1
Controller	Intel 82574
Design	Shielded RJ45 port
Transfer rate	10/100/1000 Mbit/s
Cable length	Max. 100 m between two stations (segment length)
Electrical characteristics	
Power consumption	4 W
Environmental conditions	
Temperature	
Operation	0 to 50°C
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing

Table 34: 5PP5IF.FETH-00 - Technical data

1) With optimized access via write combining.

3.4.3.3.1 Ethernet interface (ETH)

Ethernet interface		
Controller	Intel 82574	
Cabling	S/STP (Cat 5e)	
Transfer rate	10/100/1000 Mbit/s[1)]	
Cable length	Max. 100 m (min. Cat 5e)	
Speed LED	**On**	**Off**
Green	100 Mbit/s	10 Mbit/s[2)]
Orange	1000 Mbit/s	-
Link LED	**On**	**Off**
Orange	Link (Ethernet network connection available)	Activity (blinking - data transfer in progress)

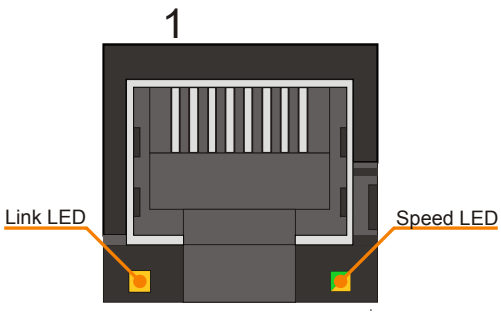


Table 35: 5PP5IF.FETH-00 - Ethernet interface

1) Switching takes place automatically.
2) The 10 Mbit/s transfer speed / connection is only present if the IF slot Link LED is also lit at the same time.

A special driver is required in order to operate the Intel 82574 Ethernet controller. Drivers for approved operating systems are available in the Downloads section of the B&R website (www.br-automation.com).

Information:

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

3.4.4 5PP5IF.FPLM-00

3.4.4.1 General information

The 5PP5IF.FPLM-00 interface board has two POWERLINK connections and 512 kB SRAM.

This integrated hub allows for the easiest possible implementation of a simple tree structure or optional ring redundancy without extra effort.

With pollresponse chaining, the module offers a solution for the highest demands on response time and the shortest cycle times. When combined with the B&R control system, poll-response chaining provides ideal performance, particularly for central control tasks.

- 2x POWERLINK V1/V2 connections
- 512 kB SRAM
- Integrated hub for efficient cabling
- Configurable ring redundancy
- Poll response chaining
- Compatible with the PP500, APC511 and APC511

This interface board can only be operated with Automation Runtime.

3.4.4.2 Order data

Model number	Short description	Figure
	Interface boards	
5PP5IF.FPLM-00	POWERLINK interface card - 2 POWERLINK managing nodes - 512 kB SRAM	

Table 36: 5PP5IF.FPLM-00 - Order data

3.4.4.3 Technical data

Product ID	5PP5IF.FPLM-00
General information	
B&R ID code	$B4D8
Diagnostics	
Data transfer	Yes, using status LED
Certification	
CE	Yes
cULus	Yes
GOST-R	Yes
GL	Yes
Controller	
SRAM	
Size	512 kB
Battery-buffered	Yes
Remanent variables in power failure mode	256 kB (e.g. for Automation Runtime, see AS help documentation) [1)]
Interfaces	
POWERLINK	
Quantity	2
Transmission	100 Base-T (ANSI/IEEE 802.3)
Type	Type 4
Design	Internal 2x hub, 2x shielded RJ45 port
Transfer rate	100 Mbit/s
Cable length	Max. 100 m between two stations (segment length)
Electrical characteristics	
Power consumption	3 W
Environmental conditions	
Temperature	
Operation	0 to 55°C
Storage	-20 to 60°C
Transport	-20 to 60°C

Table 37: 5PP5IF.FPLM-00 - Technical data

Product ID	5PP5IF.FPLM-00
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing

Table 37: 5PP5IF.FPLM-00 - Technical data

1) With optimized access via write combining.

3.4.4.3.1 POWERLINK interface

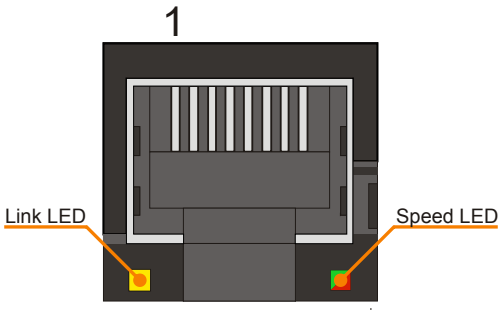
POWERLINK interface board, 2 connections			
Cabling	S/STP (Cat 5e)		
Cable length	Max. 100 m (min. Cat 5e)		
Speed LED	**On**	**Off**	
Green/Red	see Status / Error LED		
Link LED	**On**	**Off**	
Yellow	Link (POWERLINK network connection available)	Activity (blinking - data transfer in progress)	

Table 38: POWERLINK interface board, 2-port connection

3.4.4.3.2 LED status indicators

The Status/Error LED is a green and red dual LED. The LED status can have different meanings depending on the operating mode.

Ethernet TCP/IP mode

The interface can be operated purely as an Ethernet TCP/IP interface.

Green - Status	Description
On	POWERLINK interface operating purely as an Ethernet TCP/IP interface

Table 39: Status/Error LED - Ethernet TCP/IP operating mode

POWERLINK V1

LED status		
Green	**Red**	**Status of the POWERLINK station**
On	Off	The POWERLINK station is running with no errors.
Off	On	A fatal system error has occurred. The error type can be read using the PLC logbook. An irreparable problem has occurred. The system cannot properly carry out its tasks. This status can only be changed by resetting the module.
Blinking alternately		The POWERLINK managing node has failed. This error code can only occur when operated as a controlled node.
Off	Blinking	System failure. The red blinking LED signals a certain type of error using a blink code (see section "System failure error codes" on page 47).

Table 40: Status/Error LED - POWERLINK V1 operating mode

POWERLINK V2

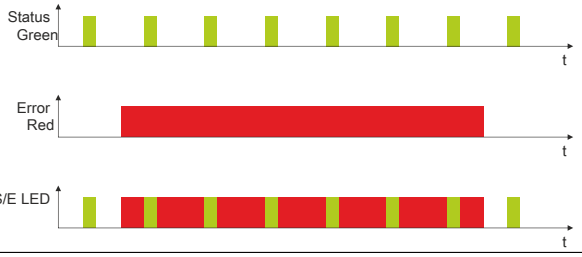
Red - Error	Description
On	The POWERLINK interface has encountered an error (failed Ethernet frames, increased number of collisions on the network, etc.). If an error occurs in the following states, then the green LED blinks over the red LED: • BASIC_ETHERNET • PRE_OPERATIONAL_1 • PRE_OPERATIONAL_2 • READY_TO_OPERATE 

Table 41: Status/Error LED as Error LED - POWERLINK V2 operating mode

Green - Status	Description
Off NOT_ACTIVE	**Managing node (MN)** The bus is monitored for POWERLINK frames. If a frame is not received within the configured time window (timeout), the interface goes directly into the PRE_OPERATIONAL_1 status (single flash). If POWERLINK communication is detected before this time passes, however, the interface goes directly into the BASIC_ETHERNET status (flickering). **Controlled node (CN)** The bus is monitored for POWERLINK frames. If a frame is not received within the configured time window (timeout), the interface goes directly into the BASIC_ETHERNET status (flickering). If POWERLINK communication is detected before this time passes, however, the interface goes directly into the PRE_OPERATIONAL_1 status (single flash).
Green flickering (approx. 10 Hz) BASIC_ETHERNET	The interface is in the BASIC_ETHERNET state and being operated purely as an Ethernet TCP/IP interface. **Managing node (MN)** This status can only be changed by resetting the interface. **Controlled node (CN)** If POWERLINK communication is detected while in this status, the interface goes into the PRE_OPERATIONAL_1 status (single flash).
Single flash (approx. 1 Hz) PRE_OPERATIONAL_1	The interface is in the PRE_OPERATIONAL_1 state. **Managing node (MN)** The MN starts "reduced cycle" operation. Collisions are allowed on the bus. Cyclic communication is not yet taking place. **Controlled node (CN)** The CN waits until it receives an SoC frame and then goes into the PRE_OPERATIONAL_2 status (double flash).
Double flash (approx. 1 Hz) PRE_OPERATIONAL_2	The interface is in the PRE_OPERATIONAL_2 state. **Managing node (MN)** The MN begins cyclic communication (cyclic input data is not yet evaluated). The CNs are configured in this status. **Controlled node (CN)** In this status, the interface is normally being configured by the manager. Once complete, a command changes the state to PRE_OPERATIONAL_3 (triple flash).
Triple flash (approx. 1 Hz) READY_TO_OPERATE	The interface is in the READY_TO_OPERATE state. **Managing node (MN)** Normal cyclic and asynchronous communication. Received PDO data is ignored. **Controlled node (CN)** The configuration of the interface is complete. Normal cyclic and asynchronous communication. The PDO data sent corresponds to the PDO mapping. Cyclic data is not yet evaluated, however.
On OPERATIONAL	The interface is in the OPERATIONAL state.
Blinking (approx. 2.5 Hz) STOPPED	The interface is in the STOPPED state. **Managing node (MN)** This status is not possible for the MN. **Controlled node (CN)** No output data is produced, and no input data is received. It is only possible to enter or leave this state after the manager has given the appropriate command.

Table 42: Status/Error LED as Status LED - POWERLINK operating mode

System failure error codes

Incorrect configuration or defective hardware can cause a system failure error.

The error code is indicated by the red error LED using four switch-on phases. The switch-on phases have a duration of either 150 ms or 600 ms. Error code output is repeated cyclically after 2 seconds.

Key:	• ...	150 ms
	− ...	600 ms
	Delay ...	2 sec. delay

Error description	Error code indicated by red status LED									
RAM error	•	•	•	-	Pause	•	•	•	-	Pause
Hardware error	-	•	•	-	Pause	-	•	•	-	Pause

Table 43: Status/Error LED as Error LED - System failure error codes

3.4.4.4 Updating firmware

The firmware is a component of Automation Studio. The module is automatically updated to this version.

To update the firmware included in Automation Studio, the hardware must be upgraded (see "Project management" / "Automation Studio upgrade" in the online help documentation).

3.4.5 5PP5IF.FCAN-00

3.4.5.1 General information

The 5PP5IF.FCAN-00 interface board has one CAN master interface and 512 kB SRAM.

- 1x CAN master interface
- 512 kB SRAM
- Compatible with the PP500, APC511 and APC511

This interface board can only be operated with Automation Runtime.

3.4.5.2 Order data

Model number	Short description	Figure
	Interface boards	
5PP5IF.FCAN-00	CAN interface card - 1 CAN master	
	Required accessories	
	Terminal blocks	
0TB1208.3100	Connector, 8-pin cage clamp, 1 mm², protected against vibration by the screw flange	

Table 44: 5PP5IF.FCAN-00 - Order data

3.4.5.3 Technical data

Product ID	5PP5IF.FCAN-00
General information	
B&R ID code	$B4DA
Diagnostics	
Module status	Yes, using status LED
Data transfer	Yes, using status LED
Terminating resistor	Yes, using status LED
Certification	
CE	Yes
cULus	Yes
GOST-R	Yes
GL	Yes
Controller	
SRAM	
Size	512 kB
Battery-buffered	Yes
Remanent variables in power failure mode	256 kB (e.g. for Automation Runtime, see AS help documentation) [1]
Interfaces	
CAN	
Quantity	1
Design	8-pin male multipoint connector
Transfer rate	Max. 500 kbit/s
Terminating resistor	
Type	Can be enabled or disabled using a sliding switch
Default setting	Disabled
Electrical characteristics	
Power consumption	3 W
Environmental conditions	
Temperature	
Operation	0 to 55°C
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing

Table 45: 5PP5IF.FCAN-00 - Technical data

1) With optimized access via write combining.

3.4.5.3.1 CAN interface

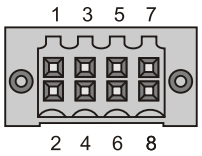
CAN bus		
The electrically isolated CAN bus interface is a 8-pin multipoint plug.		8-pin male multipoint connector 
Transfer rate	Max. 500 kbit/s	
Cable length	Max. 1000 meters	
Pin	**CAN bus**	
1	-	
2	-	
3	-	
4	CAN⊥ (CAN ground)	
5	SHLD (shield)	
6	SHLD (shield)	
7	CAN_L (CAN Low)	
8	CAN_H (CAN High)	

Table 46: 5PP5IF.FCAN-00 - CAN interface

3.4.5.3.2 LED status indicators

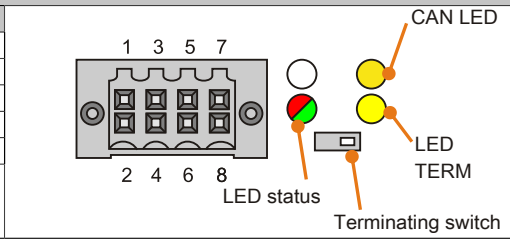
LED status indicators				
LED	**Color**	**Status**	**Description**	
CAN	Yellow	On	Sending data	
		Off	Receiving data	
LED status	Green	On	Interface module active	
	Red	On	CPU starting up	
TERM LED	Yellow	On	Terminating resistor switched on	
		Off	Terminating resistor switched off	

Table 47: 5PP5IF.FCAN-00 - LED status indicators

3.4.5.3.3 CAN terminating switch

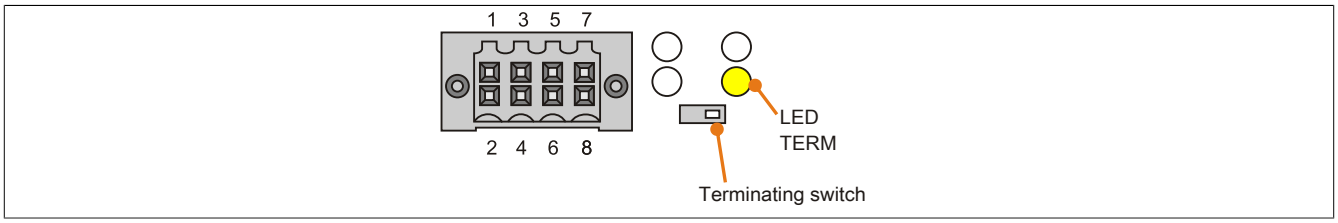


Figure 11: CAN terminating switch

A CAN terminating resistor is integrated on the interface board. It can be turned on and off with a switch on the front. An active terminating resistor is indicated by the TERM LED.

3.4.5.4 Updating firmware

The firmware is a component of Automation Studio. The module is automatically updated to this version.

To update the firmware included in Automation Studio, the hardware must be upgraded (see "Project management" / "Automation Studio upgrade" in the online help documentation).

3.4.6 5PP5IF.FX2X-00

3.4.6.1 General information

The 5PP5IF.FX2X-00 interface board has one X2X Link master interface and 512 kB SRAM.

- 1x X2X Link master interface
- 512 kB SRAM
- Compatible with the PP500, APC511 and APC511

This interface board can only be operated with Automation Runtime.

3.4.6.2 Order data

Model number	Short description	Figure
	Interface boards	
5PP5IF.FX2X-00	X2X Link interface card - 1 X2X Link master - 512 kB SRAM	
	Required accessories	
	Terminal blocks	
0TB1208.3100	Connector, 8-pin cage clamp, 1 mm², protected against vibration by the screw flange	

Table 48: 5PP5IF.FX2X-00 - Order data

3.4.6.3 Technical data

Product ID	5PP5IF.FX2X-00
General information	
B&R ID code	$B4D9
Diagnostics	
Module status	Yes, using status LED
Data transfer	Yes, using status LED
Certification	
CE	Yes
cULus	Yes
GOST-R	Yes
GL	Yes
Controller	
SRAM	
Size	512 kB
Battery-buffered	Yes
Remanent variables in power failure mode	256 kB (e.g. for Automation Runtime, see AS help documentation) [1]
Interfaces	
X2X	
Type	X2X Link master
Quantity	1
Design	8-pin male multipoint connector
Electrical characteristics	
Power consumption	3 W
Environmental conditions	
Temperature	
Operation	0 to 55°C
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing

Table 49: 5PP5IF.FX2X-00 - Technical data

1) With optimized access via write combining.

3.4.6.3.1 X2X interface

X2X Link Master connection	
The electrically isolated X2X Link is an 8-pin male multipoint connector.	
Pin	**X2X Link**
1	X2X\
2	X2X
3	X2X⊥
4	-
5	SHLD (shield)
6	SHLD (shield)
7	-
8	-

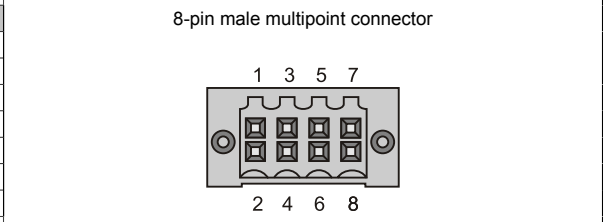


Table 50: 5PP5IF.FX2X-00 - X2X interface

3.4.6.3.2 LED status indicators

LED status indicators			
LED	**Color**	**Status**	**Description**
X2X	Yellow	On	Sending data
		Off	Receiving data
LED status	Green	On	Interface module active
	Red	On	CPU starting up

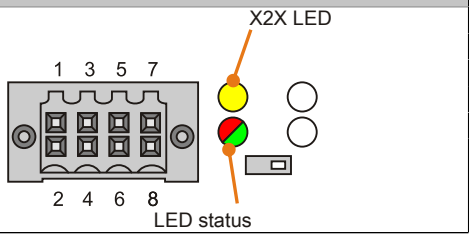


Table 51: 5PP5IF.FX2X-00 - LED status indicators

3.4.6.4 Updating firmware

The firmware is a component of Automation Studio. The module is automatically updated to this version.

To update the firmware included in Automation Studio, the hardware must be upgraded (see "Project management" / "Automation Studio upgrade" in the online help documentation).

3.4.7 5PP5IF.FXCM-00

3.4.7.1 General information

The 5PP5IF.FXCM-00 interface board has one combined CAN master, one X2X Link master interface and 512 kB SRAM.

- 1x CAN master interface
- 1x X2X master interface
- 512 kB SRAM
- Compatible with the PP500, APC511 and APC511

This interface board can only be operated with Automation Runtime.

3.4.7.2 Order data

Model number	Short description	Figure
	Interface boards	
5PP5IF.FXCM-00	CAN interface card - 1 CAN master - 1 X2X master - 512 kB SRAM - Can be installed in PP500, APC510, APC511 systems	
	Required accessories	
	Terminal blocks	
0TB1208.3100	Connector, 8-pin cage clamp, 1 mm², protected against vibration by the screw flange	

Table 52: 5PP5IF.FXCM-00 - Order data

3.4.7.3 Technical data

Product ID	5PP5IF.FXCM-00
General information	
B&R ID code	$BB9D
Diagnostics	
Module status	Yes, using status LED
Data transfer	Yes, using status LED
Terminating resistor	Yes, using status LED
Certification	
CE	Yes
cULus	Yes
GOST-R	Yes
GL	Yes
Controller	
SRAM	
Size	512 kB
Battery-buffered	Yes
Remanent variables in power failure mode	256 kB (e.g. for Automation Runtime, see AS help documentation) 1)
Interfaces	
CAN	
Quantity	1
Design	8-pin male multipoint connector
Transfer rate	Max. 500 kbit/s
Terminating resistor	
Type	Can be enabled or disabled using a sliding switch
Default setting	Disabled
X2X	
Type	X2X Link master
Quantity	1
Design	8-pin male multipoint connector
Electrical characteristics	
Power consumption	3 W
Environmental conditions	
Temperature	
Operation	0 to 55°C
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing

Table 53: 5PP5IF.FXCM-00 - Technical data

1) With optimized access via write combining.

3.4.7.3.1 CAN interface

CAN bus	
The electrically isolated CAN bus interface is a 8-pin multipoint plug.	
Transfer rate	Max. 500 kbit/s
Cable length	Max. 1000 meters
Pin	**CAN bus**
1	-
2	-
3	-
4	CAN⊥ (CAN ground)
5	SHLD (shield)
6	SHLD (shield)
7	CAN_L (CAN Low)
8	CAN_H (CAN High)

8-pin male multipoint connector

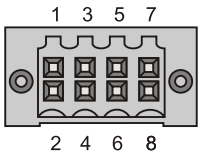


Table 54: 5PP5IF.FCAN-00 - CAN interface

3.4.7.3.2 X2X interface

X2X Link Master connection	
The electrically isolated X2X Link is an 8-pin male multipoint connector.	
Pin	**X2X Link**
1	X2X\
2	X2X
3	X2X⊥
4	-
5	SHLD (shield)
6	SHLD (shield)
7	-
8	-

8-pin male multipoint connector

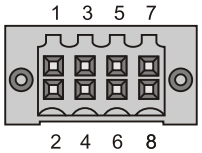


Table 55: 5PP5IF.FX2X-00 - X2X interface

3.4.7.3.3 LED status indicators

LED status indicators			
LED	**Color**	**Status**	**Description**
X2X	Yellow	On	Sending data
		Off	Receiving data
CAN	Yellow	On	Sending data
		Off	Receiving data
LED status	Green	On	Interface module active
	Red	On	CPU starting up
TERM LED	Yellow	On	Terminating resistor switched on
		Off	Terminating resistor switched off

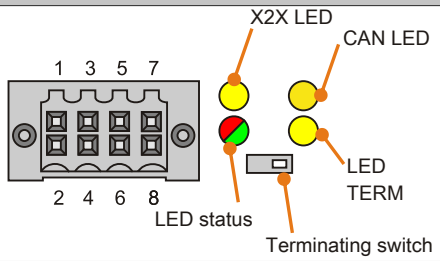


Table 56: 5PP5IF.FXCM-00 - LED status indicators

3.4.7.3.4 CAN terminating switch

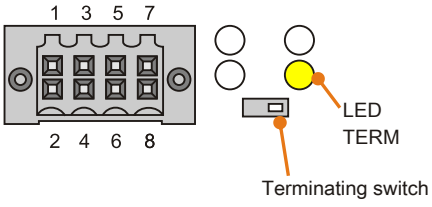


Figure 12: CAN terminating switch

A CAN terminating resistor is integrated on the interface board. It can be turned on and off with a switch on the front. An active terminating resistor is indicated by the TERM LED.

3.4.7.4 Updating firmware

The firmware is a component of Automation Studio. The module is automatically updated to this version.

To update the firmware included in Automation Studio, the hardware must be upgraded (see "Project management" / "Automation Studio upgrade" in the online help documentation).

3.5 I/O boards

Information:

I/O boards can ONLY be installed and replaced by B&R.

3.5.1 5PP5IO.GNAC-00

3.5.1.1 General information

The 5PP5IO.GNAC-00 I/O board has 1x RS232/422/485 interface, 1x USB 2.0 connection, 1x HDA sound connection and 1x female Smart Display Link/DVI connector. This I/O board can be connected to and operated on Power Panel 500 and Automation PC 511 systems with an I/O board slot.

- 1x USB 2.0
- 1x RS232/422/485
- 1x HDA sound
- 1x Smart Display Link / DVI
- Compatible with the PP500 and APC511

3.5.1.2 Order data

Model number	Short description	Figure
	I/O board	
5PP5IO.GNAC-00	Interface board - 1 USB 2.0 - 1 RS232/422/485 - 1 HDA sound - 1 SDL/DVI-D	

Table 57: 5PP5IO.GNAC-00 - Order data

3.5.1.3 Technical data

Product ID	5PP5IO.GNAC-00
General information	
B&R ID code	$B4DD
Certification	
CE	Yes
cULus	Yes
GOST-R	Yes
Interfaces	
COM2 [1)]	
Type	RS232/422/485, electrically isolated
Design	9-pin male DSUB connector
UART	16550-compatible, 16-byte FIFO
Max. baud rate	115 kbit/s
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
Monitor/Panel interface	
Design	Female DVI-I connector
Type	SDL/DVI
Audio	
Type	HDA sound
Inputs	Microphone, Line IN
Outputs	Line OUT
Electrical characteristics	
Power consumption	7 W

Table 58: 5PP5IO.GNAC-00 - Technical data

Product ID	5PP5IO.GNAC-00
Environmental conditions	
Temperature	
Operation	0 to 50°C
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing

Table 58: 5PP5IO.GNAC-00 - Technical data

1) The COM2 interface is identified in BIOS as the COM D interface.

3.5.1.3.1 Panel interface - SDL (Smart Display Link) / DVI

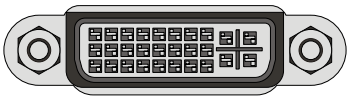
Panel interface - SDL (Smart Display Link) / DVI	
The following overview lists the video signals available on the panel output. For details, see the technical data for the CPU board being used.	
CPU board	**Video signals with all system unit variants**
5PP5CP.US15-00	DVI, SDL
5PP5CP.US15-01	DVI, SDL
5PP5CP.US15-02	DVI, SDL

Table 59: Panel interface - DVI, SDL

Information:

Only digital panels can be connected to the panel interface (analog monitors not permitted).

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	N.C.	Not connected
11	TMDS DATA 1/ XUSB0 SHIELD	Shield for data pair 1 and USB0	C2	N.C.	Not connected
12	XUSB0-	USB lane 0 (negative)	C3	N.C.	Not connected
13	XUSB0+	USB lane 0 (positive)	C4	N.C.	Not connected
14	+5 V power[1)]	+5 V power supply	C5	N.C.	Not connected
15	Ground (return for +5 V, HSync and VSync)	Ground			

DVI 24-pin, female

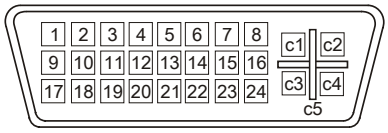


Table 60: DVI interface - Pinout

1) Protected internally by a multifuse.

Cable lengths and resolutions for SDL transmission

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

SDL cables	Resolution					
Segment length [m]	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200	FHD 1920 x 1080
1.8	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03	5CASDL.0018-00 5CASDL.0018-01 5CASDL.0018-03
5	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03	5CASDL.0050-00 5CASDL.0050-01 5CASDL.0050-03

Table 61: Cable lengths and resolutions for SDL transmission

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

Table 61: Cable lengths and resolutions for SDL transmission

Cable lengths and resolutions for DVI transmission

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

DVI cables Segment length [m]	Resolution					
	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 62: Cable lengths and resolutions for DVI transmission

The maximum cable length for DVI transfer is limited to 5 m due to the USB specification.

3.5.1.3.2 Pinout

COM serial interface		
	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 male DSUB connector

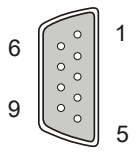


Table 63: COM - Pinout

3.5.1.3.3 I/O address and IRQ

Resource	Default setting	Additional setting options
I/O address	2E8h	238h, 2F8h, 328h, 338h, 3E8h, 3F8h[1)]
IRQ	10	3, 4, 5, 6, 11, 12[1)]

Table 64: RS232/422/485 - I/O address and IRQ

1) If these settings are not already used in the system.

3.5.1.3.4 RS232 - Bus length and cable type

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

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

Table 65: RS232 - Bus length and transfer rate

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

RS232 cables	Property
Signal lines	
Cable cross section	4x 0.16 mm² (26AWG), tinned Cu stranded 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 stranded wire
Wire insulation	PE
Conductor resistance	≤59 Ω/km
Outer sheathing	
Materials	PUR mixture
Features	Halogen-free
Cable shielding	From tinned copper wires

Table 66: RS232 - Cable requirements

3.5.1.3.5 RS422 - Bus length and cable type

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

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

Extension	Transfer rate
1200 m	Typ. 115 kbit/s

Table 67: RS422 - Bus length and transfer rate

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

RS422 cables	Property
Signal lines	
Cable cross section	4x 0.25 mm² (24AWG/19), tinned Cu stranded 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 stranded wire
Wire insulation	PE
Conductor resistance	≤59 Ω/km
Outer sheathing	
Materials	PUR mixture
Features	Halogen-free
Cable shielding	From tinned copper wires

Table 68: RS422 - Cable requirements

3.5.1.3.6 When operated as an RS485 interface

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

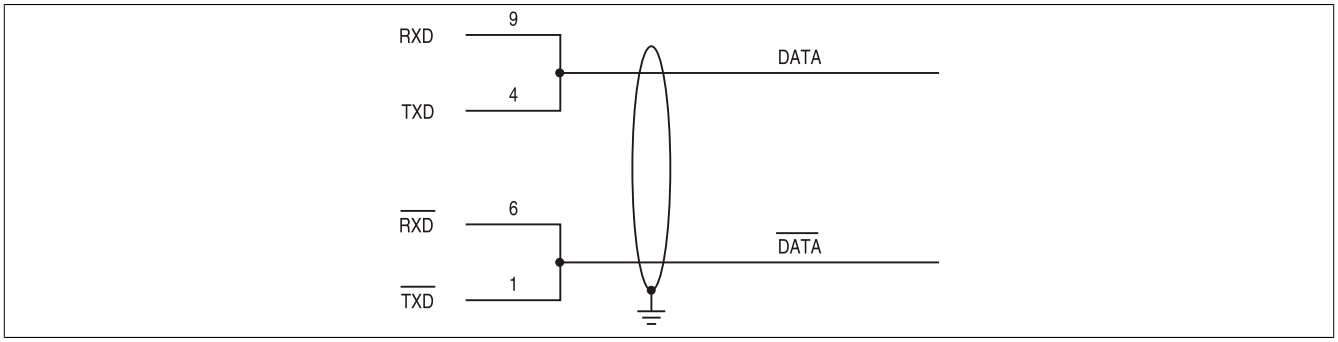


Figure 13: RS232/422/485 interface - Operation in RS485 mode

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

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

3.5.1.3.7 RS485 - Bus length and cable type

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

Extension	Transfer rate
1200 m	Typ. 115 kbit/s

Table 69: RS485 - Bus length and transfer rate

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

RS485 cables	Property
Signal lines	
Cable cross section	4x 0.25 mm² (24AWG/19), tinned Cu stranded 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 stranded wire
Wire insulation	PE
Conductor cross section	≤59 Ω/km
Outer sheathing	
Materials	PUR mixture
Features	Halogen-free
Cable shielding	From tinned copper wires

Table 70: RS485 - Cable requirements

3.5.1.3.8 Terminating resistor

A terminating resistor for the serial interface is already integrated on the I/O board. It can be enabled or disabled with a switch between the serial interface and the audio interface. An active terminating resistor is indicated by a yellow LED.

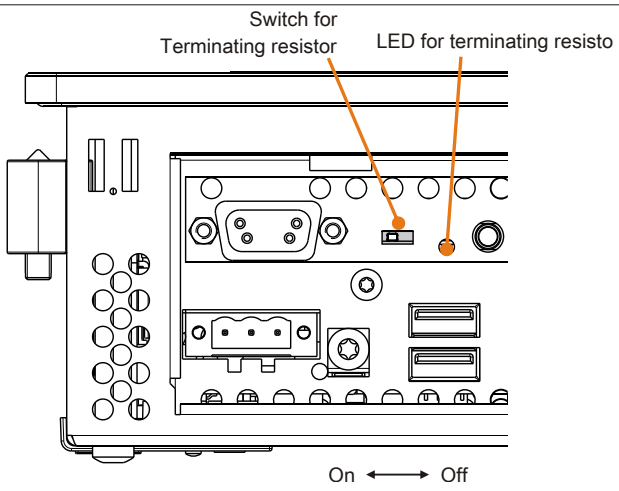


Figure 14: COM serial interface - Terminating resistor

3.5.1.3.9 USB interface (USB4)

The I/O board features a USB 2.0 (Universal Serial Bus) host controller with multiple USB ports, 1 of which is accessible externally for the user.

Warning!

Peripheral USB devices can be connected to the USB interfaces on this device. Due to the vast number of USB devices available on the market, B&R cannot guarantee their performance. USB devices from B&R are guaranteed to function properly, however.

Caution!

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

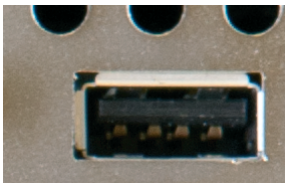
Universal Serial Bus (USB4)[1]		
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)	1x USB type A, female 
Power supply[2] USB4	Max. 1 A	
Cable length	Max. 5 m (without hub)	

Table 71: USB4 interface

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

3.5.1.3.10 MIC, Line IN, Line OUT

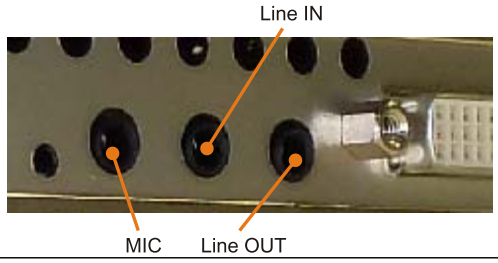
MIC, Line IN, Line OUT		
Controller	Realtek ALC 662	3.5 mm jack, female 
MIC	Connection of a mono microphone with a 3.5 mm jack	
Line IN	Stereo Line IN signal supplied via a 3.5 mm jack	
Line OUT	Connection of a stereo playback device (e.g. amplifier) via a 3.5 mm jack	

Table 72: MIC, Line IN, Line OUT

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

Information:

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

Chapter 3 • Installation

1 Installation

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

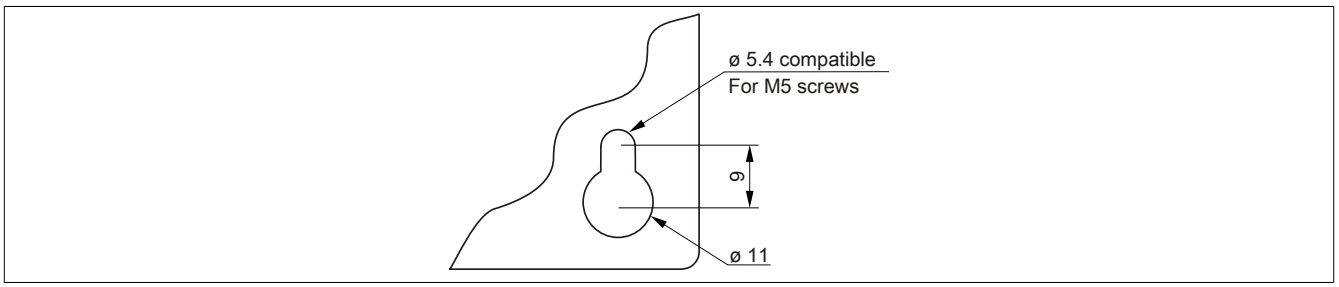


Figure 15: Mounting plates

The exact position of the mounting holes is illustrated in the drilling templates in 2 "Technical data", section "Individual components" on page 31.

1.1 Procedure

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

1.2 Important installation information

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

1.3 Mounting orientations

The following diagrams show the approved mounting orientations for the Automation PC 511.

1.3.1 Mounting orientation 0°

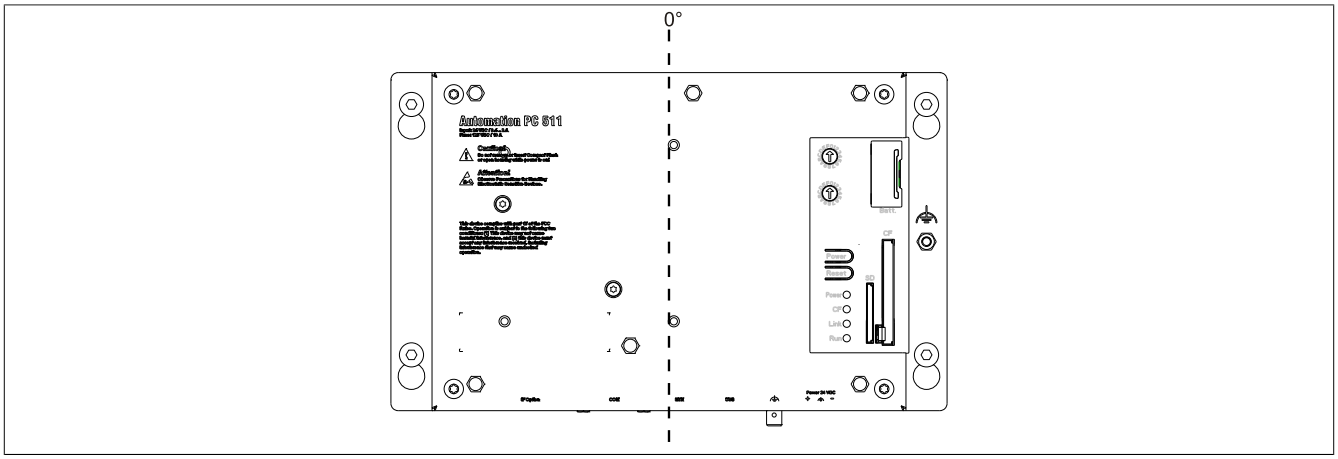


Figure 16: Mounting orientation 0°

In order to facilitate natural air circulation, devices must be mounted according to the spacing indicated in the section "Spacing for air circulation" on page 64.

1.3.2 Mounting orientation 90°

The maximum ambient temperature specification is 45°C when using a 90° mounting orientation (horizontal).

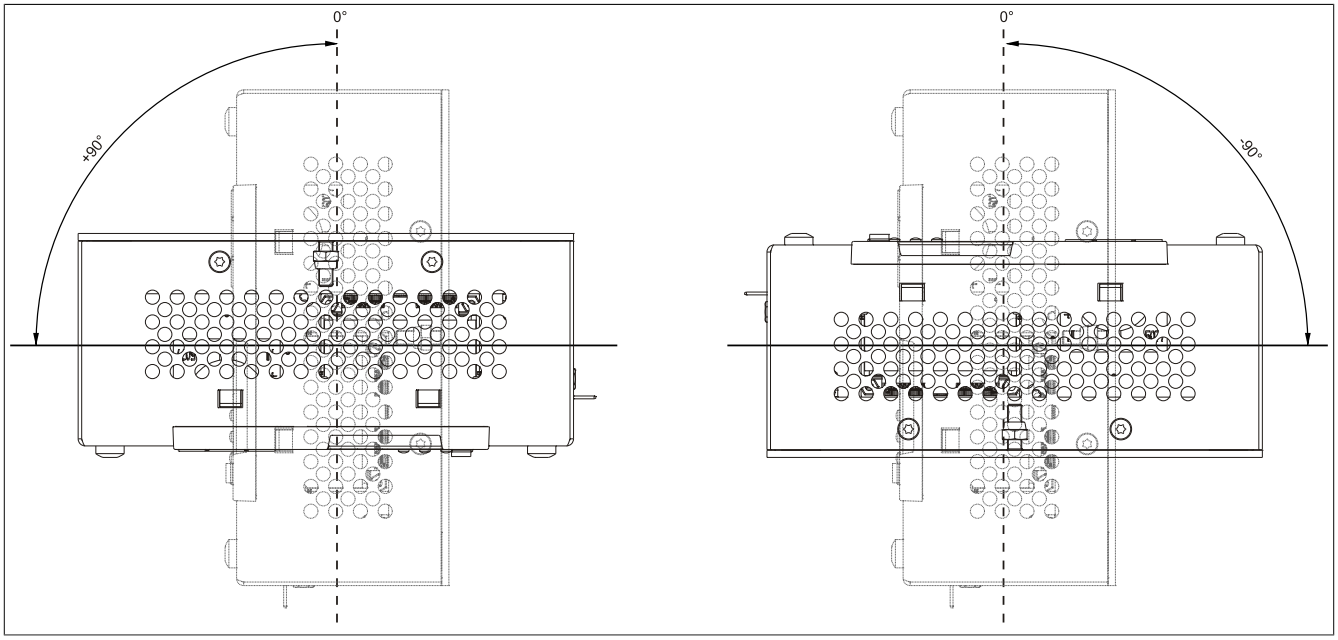


Figure 17: Mounting orientation -90° or +90°.

In order to facilitate natural air circulation, devices must be mounted according to the spacing indicated in the section "Spacing for air circulation" on page 64.

1.3.3 Mounting orientation 90° vertical

There are no limitations regarding ambient temperature when mounted at 90° vertical.

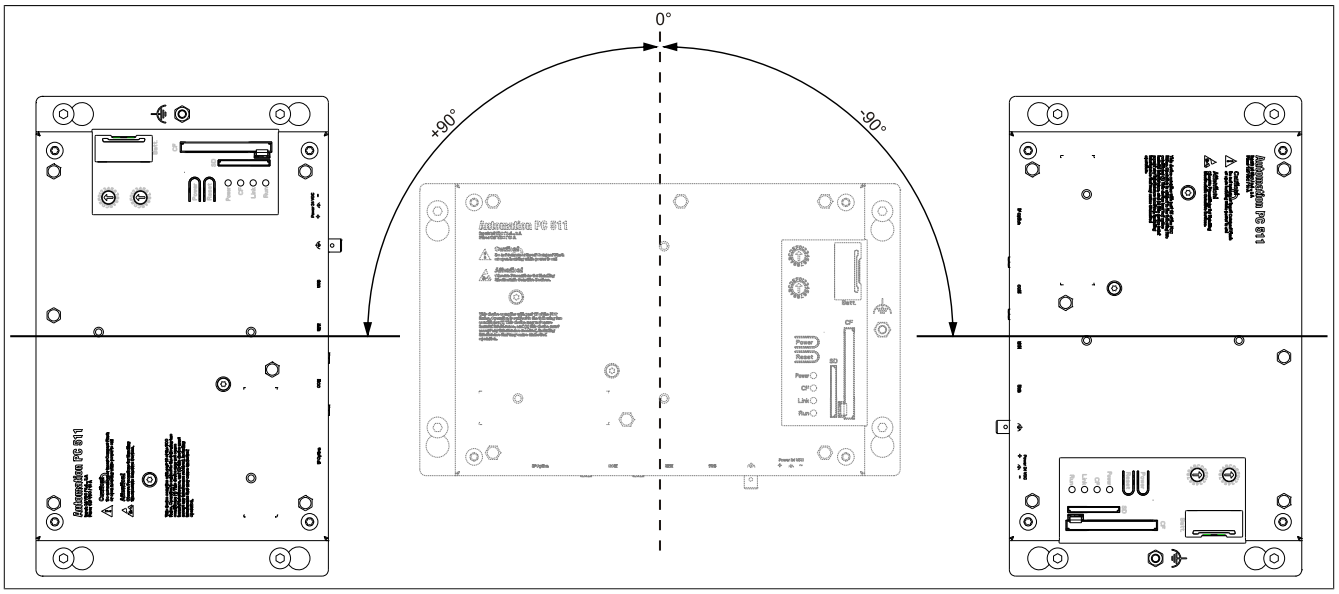


Figure 18: Mounting orientation -90° or +90° vertical

In order to facilitate natural air circulation, devices must be mounted according to the spacing indicated in the section "Spacing for air circulation" on page 64.

1.3.4 Mounting orientation 180°

There are no limitations with respect to ambient temperature when mounted at 180°.

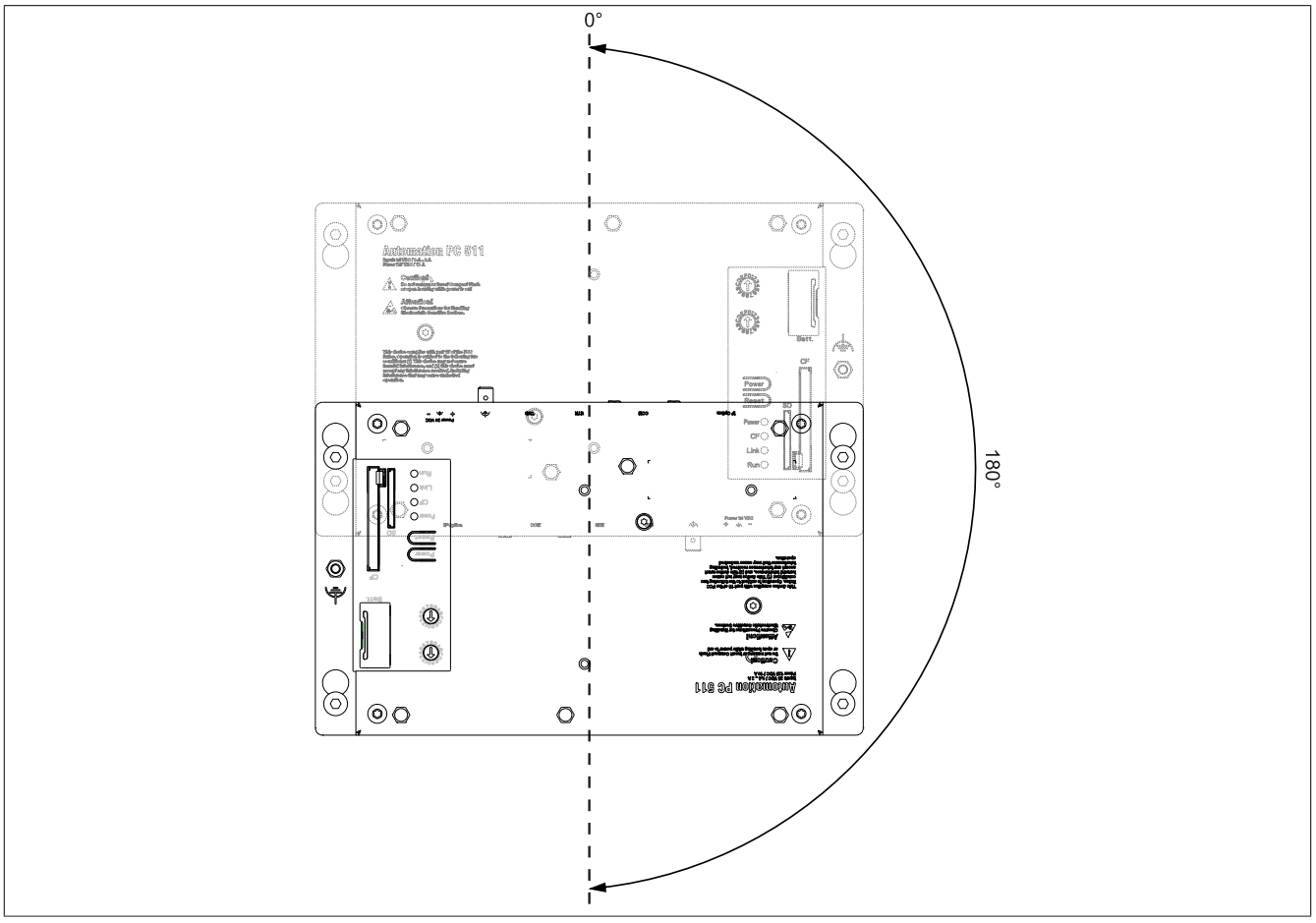


Figure 19: Mounting orientation 180°

In order to facilitate natural air circulation, devices must be mounted according to the spacing indicated in the section "Spacing for air circulation" on page 64.

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 511 devices. The minimum specified spacing is indicated in the following diagram. This applies to all Automation PC 511 variants.

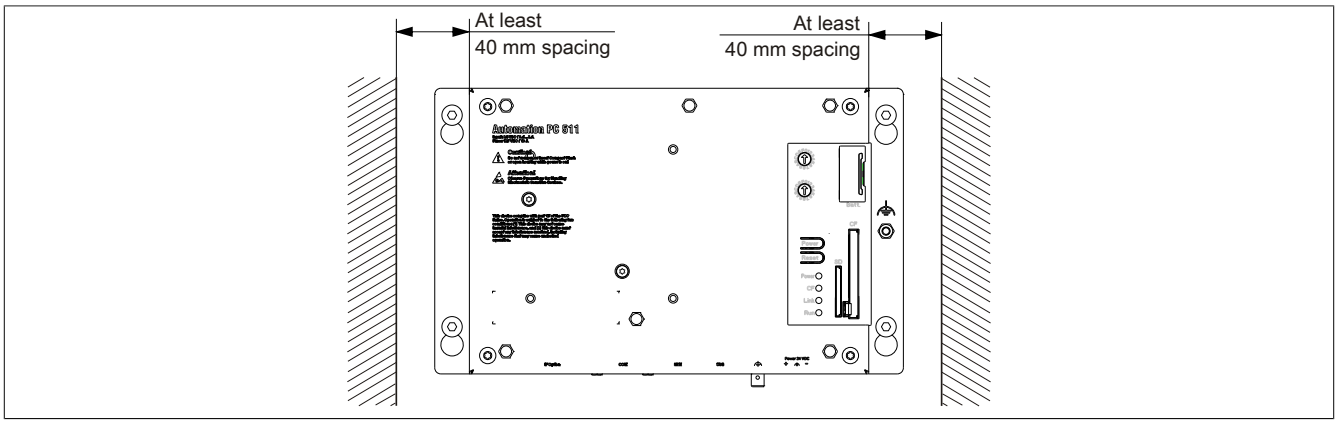


Figure 20: Air circulation spacing - Rear view

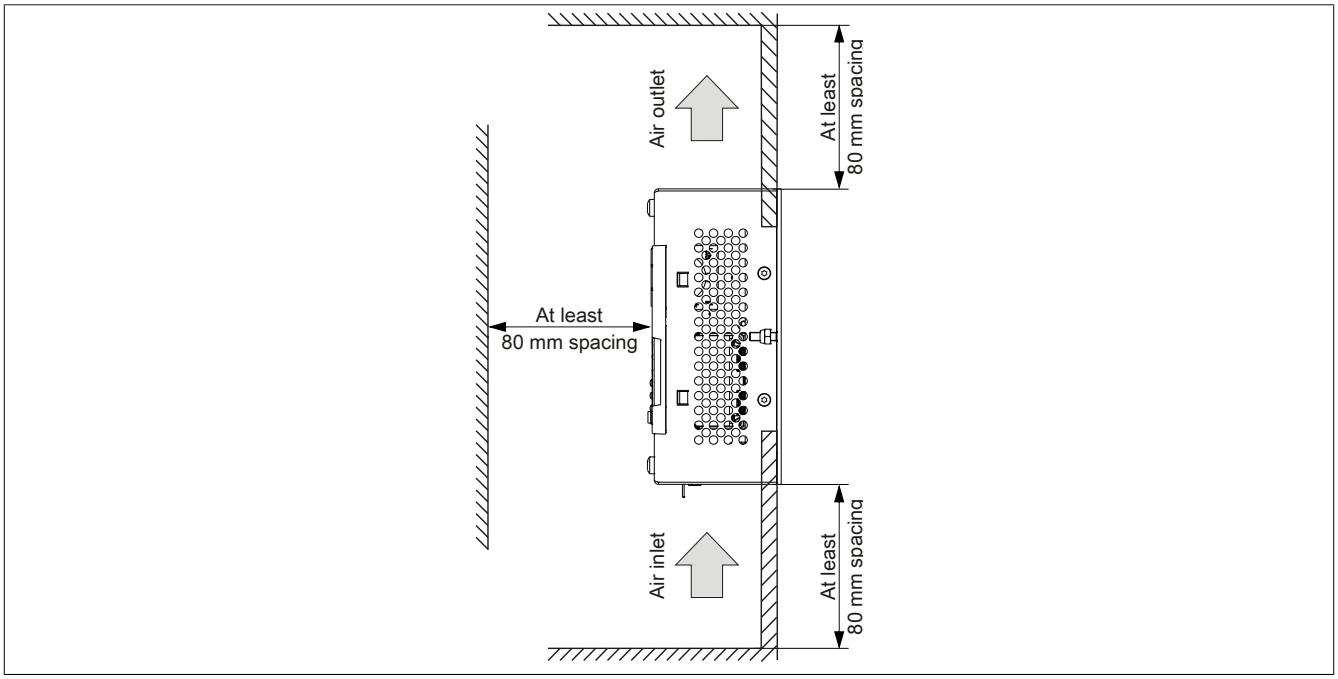


Figure 21: Spacing for air circulation - Side view

Information:

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

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

2 Cable connections

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

Information:

The maximum torque for the locating screws is 0.5 Nm.

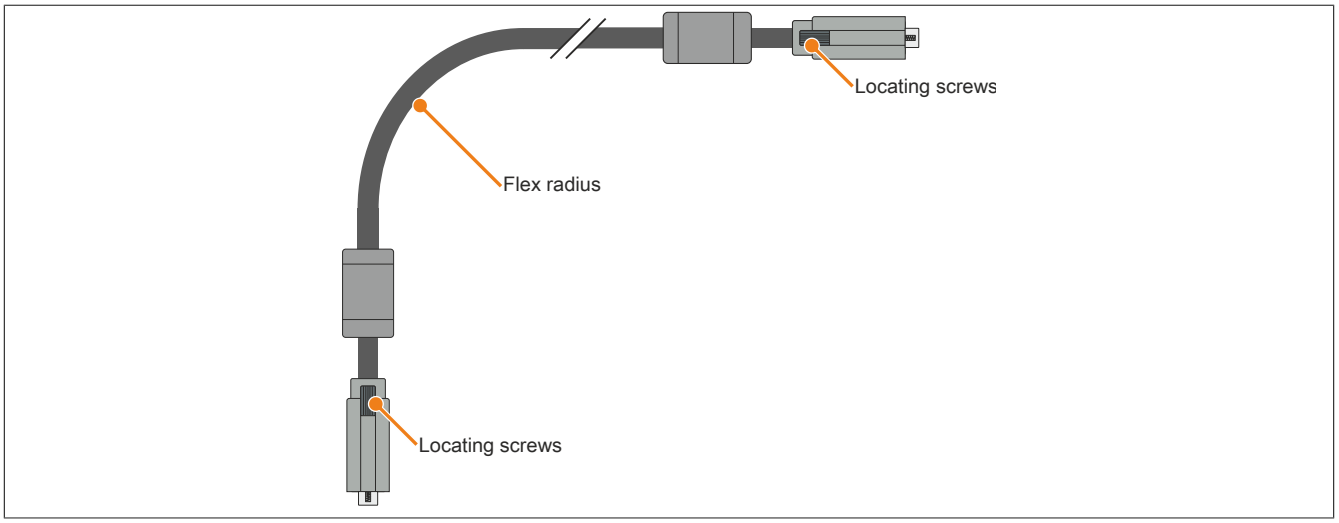


Figure 22: Flex radius - Cable connection

Information:

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

3 Grounding concept

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

The functional ground on the device has 2 connections:

- Supply voltage
- Ground connection

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

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

Functional ground is indicated on the B&R device with the following symbol: ⏚

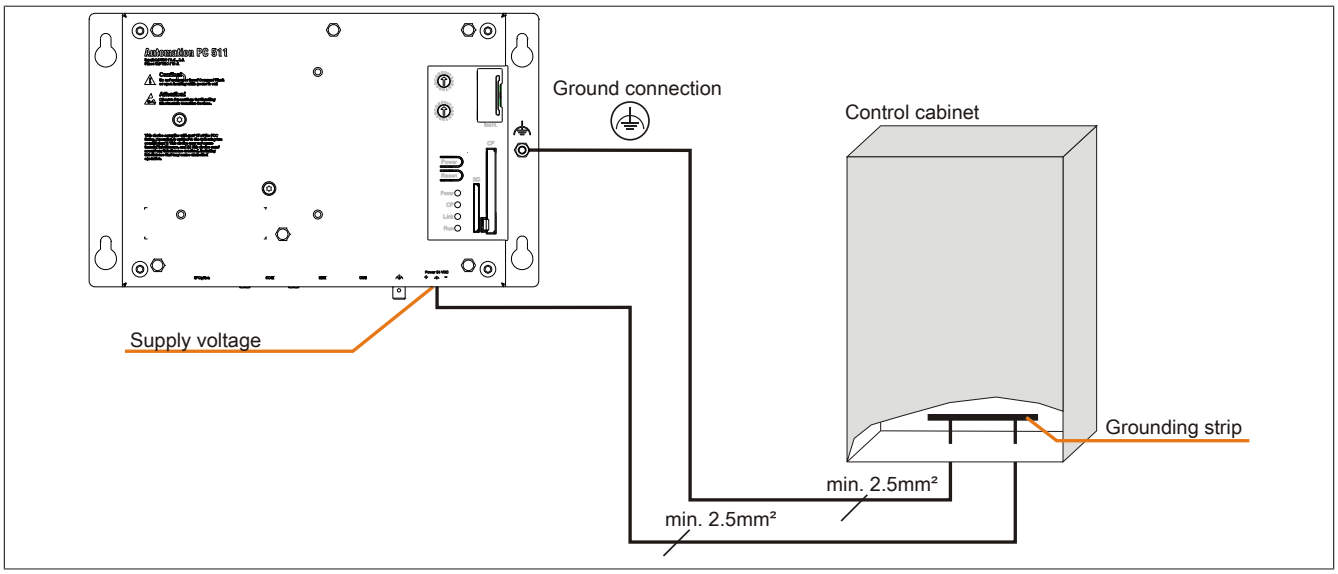


Figure 23: Grounding concept

4 General instructions for performing temperature testing

The purpose of these instructions is to explain general procedures for performing application-specific temperature testing on B&R Industrial PCs and Power Panels. Nevertheless, these instructions are meant to serve only as a guideline.

4.1 Procedure

In order to obtain accurate results, the testing conditions should match the conditions in the field. This means that for the duration of the temperature tests, the target application should be running, the PC should be installed in the control cabinet that will be used, etc.

In addition, a temperature sensor should be installed for the device being tested to provide live monitoring of the ambient temperature. In order to obtain accurate measurements, this sensor should be installed at a distance of 5 to 10 cm from the B&R Industrial PC near the air intake (not near the exhaust).

All B&R Industrial PCs and Power Panels are equipped with internal temperature sensors. These are installed in different locations for each series. The number of sensors and the temperature limits also vary from series to series.

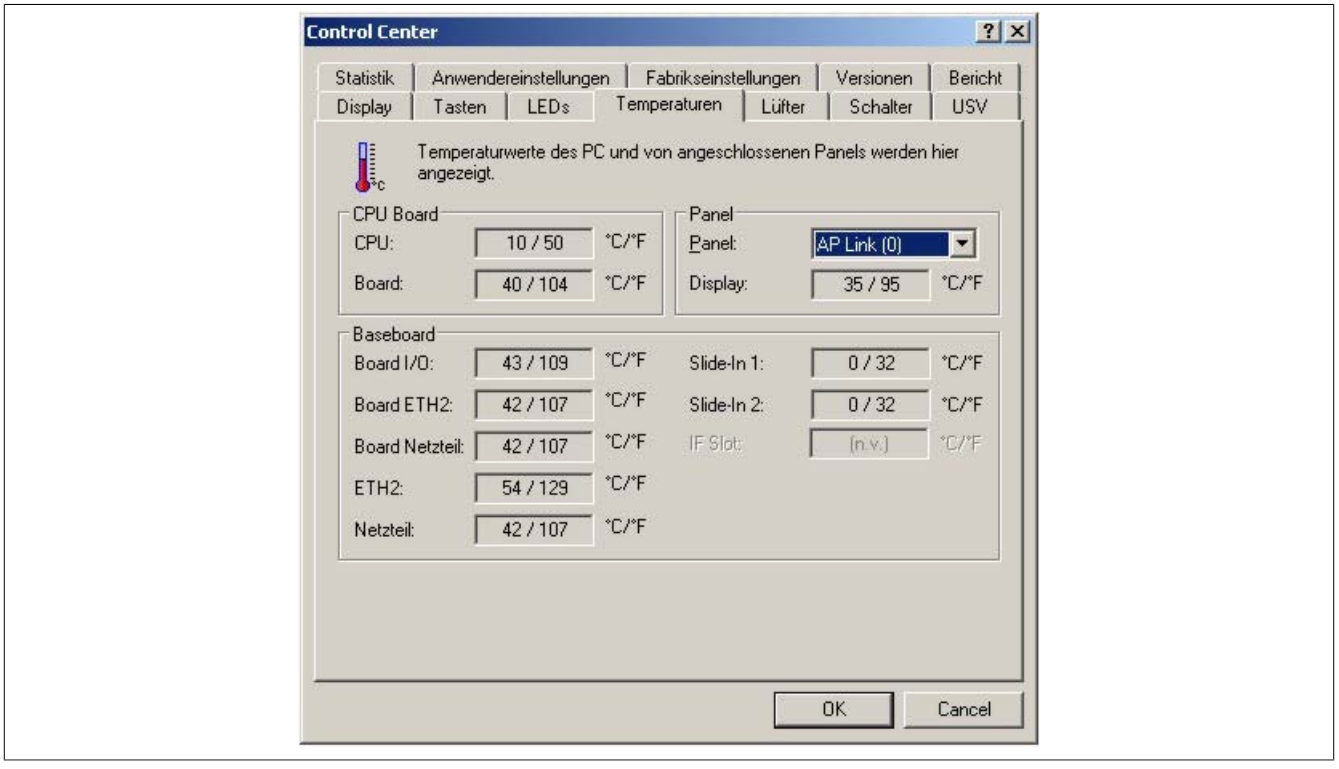
For information about the locations of temperature sensors and the maximum specified values, please see section "Temperature sensor positions" in chapter 2 "Technical data".

To ensure that the thermal situation is evaluated reliably, a minimum of 8 hours is recommended for testing.

4.2 Evaluating temperatures in Windows operating systems

4.2.1 Evaluating with the B&R Control Center

The B&R Control Center can be used to evaluate the temperatures. Temperatures can be viewed on the "Temperatures" property page. The B&R Control Center is available at no cost in the Downloads section of the B&R website (www.br-automation.com). The B&R Control Center uses the B&R Automation Device Interface (ADI).



A separate application can be developed if it is necessary to collect historical data.

Information:

Software development kits such as the ADI .NET SDK are available on the B&R website (www.br-automation.com).

4.2.2 Evaluating with the BurnInTest tool from Passmark

If a separate application is not created or used to evaluate the temperature, then B&R recommends using the BurnInTest software tool from Passmark.

Standard and Professional versions of BurnInTest are available. In addition to the software package, there are also various loopback plugs (serial, parallel, USB, etc.) and test CDs/DVDs available. The exact software and loopback plugs used will determine the corresponding load that can be generated on the system and peripheral devices.

Information:

Loopback plugs are also available from Passmark. More information is available at www.passmark.com.

The following screenshots are based on Passmark BurnInTest Pro V4 and a 2-slot APC810 with DVD.

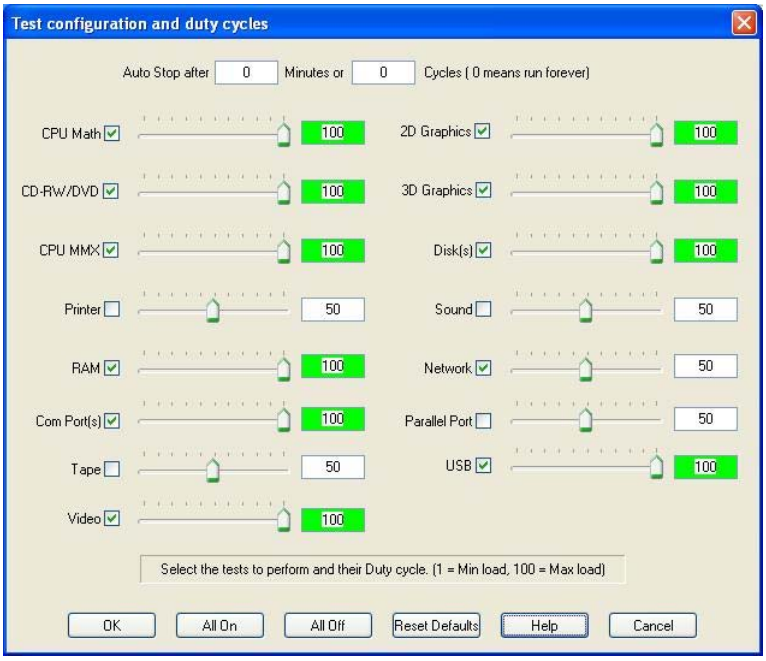


Figure 24: Settings for Passmark BurnInTest Pro V4 and a 2-slot APC810 with DVD

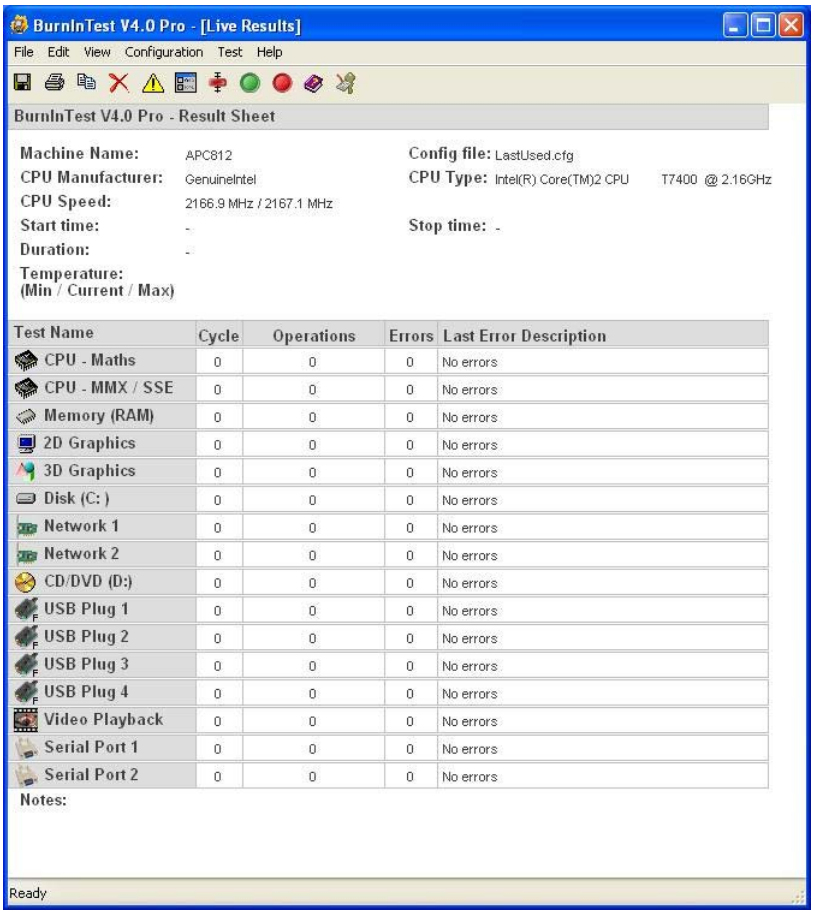


Figure 25: Test overview of a 2-slot APC810 with DVD

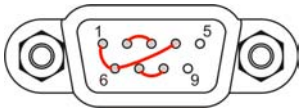
The respective test properties may need to be fine-tuned depending on the availability of a loopback plug and DVDs.

Information:

USB flash drives can also be used if a USB loopback plug is not available. The USB flash drives must be detected as formatted drives in Windows. The test USB must then be deselected, and the USB flash drives must be configured as the testing device in the disk properties.

Information:

Serial loopback plugs are relatively easy to create. Simply connect several pins on the serial interface with wires.



4.3 Evaluating temperatures in operating systems other than Windows

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

The implementation guide only describes device-specific functions and not the main functions of the example programs.

If code from the example programs is used, it is important to observe the notes in the implementation guide regarding TODO statements, I/O access functions, etc.

Information:

Example programs and implementation guides for all B&R Industrial PCs and Power Panels are available at no cost from the B&R website (www.br-automation.com).

4.4 Evaluating the measurement results

The maximum temperature value recorded by each sensor must not exceed the temperature limits specified in the user's manuals.

If the temperature tests cannot be performed in a climate-controlled chamber, they can still be performed in an office environment. In this case, however, it is necessary to measure the ambient temperature. Experience at B&R has shown that values measured on passive systems (systems without a fan kit) can be projected linearly based on the ambient temperature. In order to be able to project the temperature values for systems with a fan kit, the fans must be running. It is also important to take values such as speed into consideration.

If the temperature tests are performed in a climate-controlled chamber with fans, the fans will cool the devices and skew the results. Measurement results for passive devices would therefore be unusable in this case. In order to obtain accurate results in climate-controlled chambers with fans, the fans must be turned off and the device must be allowed to run for a sufficient amount of time (several hours) before beginning the test.

Example using a 2-slot APC810

The following example is only valid if the instructions for installation and mounting orientation provided in the user's manual are observed.

Temperature sensor	Measured temperature	Projected temperature	
Ambient temperature	20°C	35°C	45°C
CPU	48°C	63°C	73°C
CPU board	51°C	66°C	76°C
Board I/O	51°C	66°C	76°C
Board ETH2	52°C	67°C	77°C
Board power supply	51°C	66°C	76°C
ETH2	65°C	80°C	90°C
Power supply	51°C	66°C	76°C

Table 73: Evaluation example using a 2-slot APC810

5 Connection examples

The following examples provide an overview of the configuration options for connecting Automation Panel 800 and Automation Panel 900 and/or Automation Panel 800 devices with the APC511. The following questions will be answered:

- How are Automation Panel 900 devices connected to the monitor/panel output of the APC511? What needs to be considered?
- How are Automation Panel 800 devices connected to the monitor/panel output of the APC511? What needs to be considered?
- What is "display clone" operation?
- How many Automation Panel 900 devices can be connected per line?
- How many Automation Panel 900 devices can be connected to an Automation Panel 800 device per line?
- How are the connected devices numbered internally?
- Are there limitations to the segment length? If so, what are they?
- What cables and link modules are needed?
- Do BIOS settings have to be changed for a specific configuration?

5.1 Selecting display units

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

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

Table 74: Selecting display units

5.2 One Automation Panel 900 system via onboard DVI

An Automation Panel 900 with max. SXGA resolution is connected to the integrated DVI interface (onboard). As an alternative, an office TFT with a DVI interface can also be used. A separate cable is used for both the touch screen and USB data. If USB devices are to be operated on the Automation Panel 900, the maximum distance is 5 meters. USB devices can only be connected directly to the Automation Panel (i.e. without a hub).

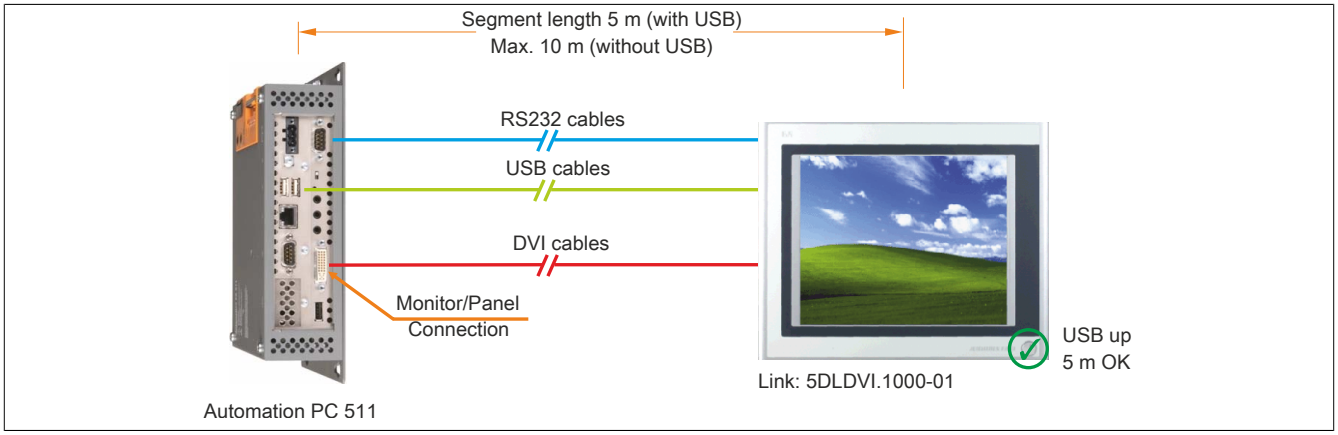


Figure 26: One Automation Panel 900 system via onboard DVI

5.2.1 Link modules

Information:

A corresponding Link module must be selected for each device used.

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

Table 75: Link modules

5.2.2 Cables

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

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

Table 76: Cables for DVI configurations

Information:

Detailed technical data about cables can be found in the Automation Panel 900 user's manual. This can be downloaded as a PDF file from the B&R website at www.br-automation.com.

5.2.3 Possible Automation Panel devices, resolutions and segment lengths

The following Automation Panel 900 devices can be used. In rare cases, segment length is limited by the resolution.

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

Table 77: Possible Automation Panel devices, resolutions and segment lengths

1) USB support is not possible on the Automation Panel 900 in these cases since USB is limited to 5 m.

Information:

When transferring data via DVI, it is not possible to read statistical values from Automation Panel 900 devices.

5.2.4 BIOS settings

No special BIOS settings are necessary for operation.

5.3 One Automation Panel 900 system via onboard SDL

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

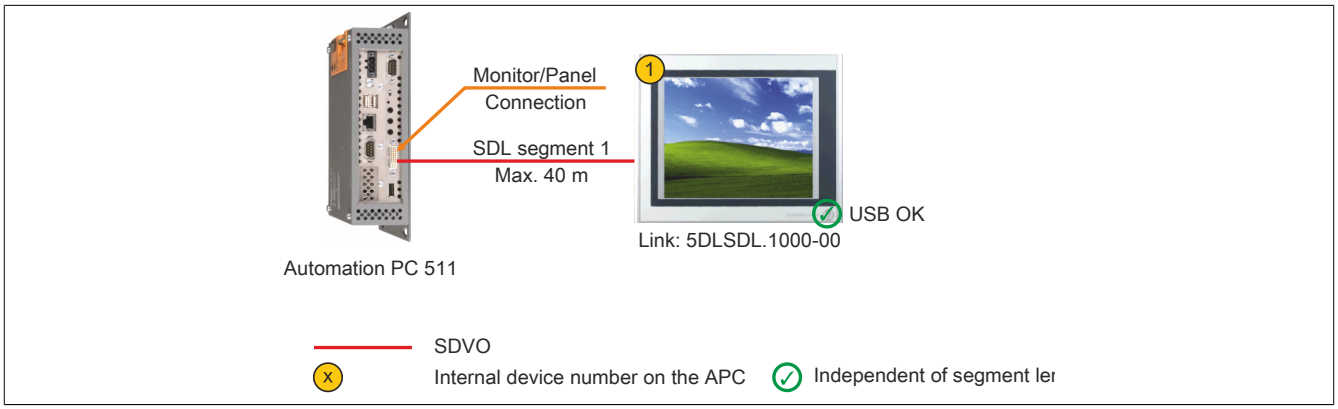


Figure 27: One Automation Panel 900 system via onboard SDL

5.3.1 Link modules

Information:

A corresponding Link module must be selected for each device used.

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

Table 78: Link modules

5.3.2 Cables

Select an Automation Panel 900 cable from the following table.

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

Table 79: Cables for SDL configurations

Information:

Detailed technical data about cables can be found in the Automation Panel 900 user's manual. This can be downloaded as a PDF file from the B&R website at www.br-automation.com.

5.3.2.1 Cable lengths and resolutions for SDL transmission

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

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

Table 80: Cable lengths and resolutions for SDL transmission

5.3.3 BIOS settings

No special BIOS settings are necessary for operation.

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

Touch screen functionality

COM C must be enabled in BIOS in order to operate the panel touch screen connected to the monitor/panel interface ("OEM features - I/O board features - LPC devices").

5.4 One Automation Panel 800 system via onboard SDL

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

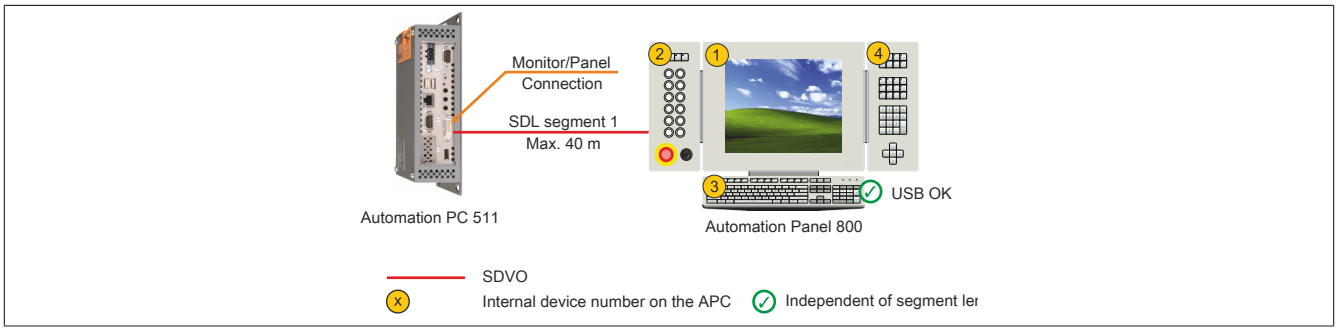


Figure 28: One Automation Panel 800 system via onboard SDL

5.4.1 Cables

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

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

Table 81: Cables for SDL configurations

Information:

Detailed technical data about cables can be found in the Automation Panel 800 user's manual. This can be downloaded as a PDF file from the B&R website at www.br-automation.com.

5.4.1.1 Cable lengths and resolutions for SDL transmission

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

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

Table 82: Cable lengths and resolutions for SDL transmission

5.4.2 BIOS settings

No special BIOS settings are necessary for operation.

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

Touch screen functionality

COM C must be enabled in BIOS in order to operate the panel touch screen connected to the monitor/panel interface ("OEM features - I/O board features - LPC devices").

5.5 One AP900 and one AP800 via onboard SDL

An Automation Panel 900 and an Automation Panel 800 are connected to the integrated SDL interface (onboard) via SDL. Both of the panels show the same content (display clone).

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

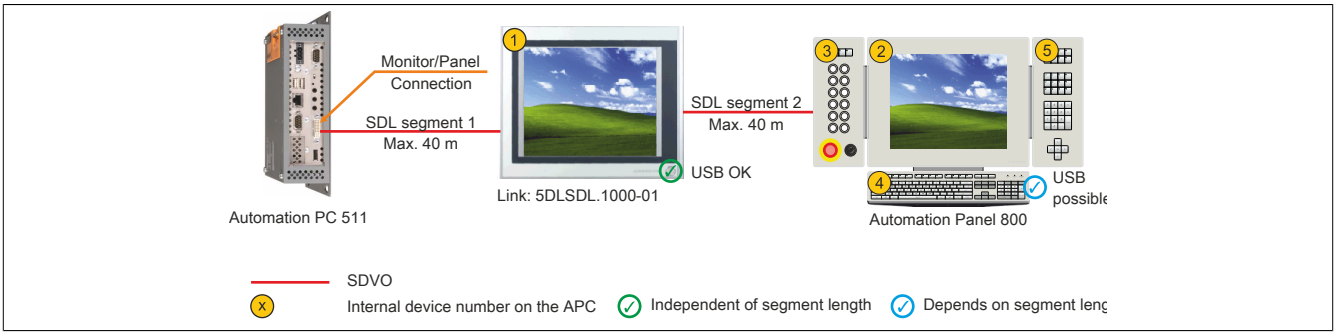


Figure 29: One AP900 system and one AP800 system via onboard SDL

5.5.1 Link modules

Information:

A corresponding Link module must be selected for each device used.

Model number	Description	Note
5DLSDL.1000-01	**Automation Panel Link SDL transceiver** Connections for SDL In and SDL Out; transmission of display, touch screen, USB 1.1, matrix key and service data; 24 VDC (order screw clamp 0TB103.9 or cage clamp 0TB103.91 separately)	For Automation Panel 900

Table 83: Link modules

5.5.2 Cables

Information:

Detailed technical data about cables can be found in the Automation Panel 900 user's manual. This can be downloaded as a PDF file from the B&R website at www.br-automation.com.

Information:

Detailed technical data about cables can be found in the Automation Panel 800 user's manual. This can be downloaded as a PDF file from the B&R website at www.br-automation.com.

5.5.3 BIOS settings

No special BIOS settings are necessary for operation.

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

Touch screen functionality

COM C must be enabled in BIOS in order to operate the panel touch screen connected to the monitor/panel interface ("OEM features - I/O board features - LPC devices").

5.6 Four Automation Panel 900 systems via onboard SDL

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

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

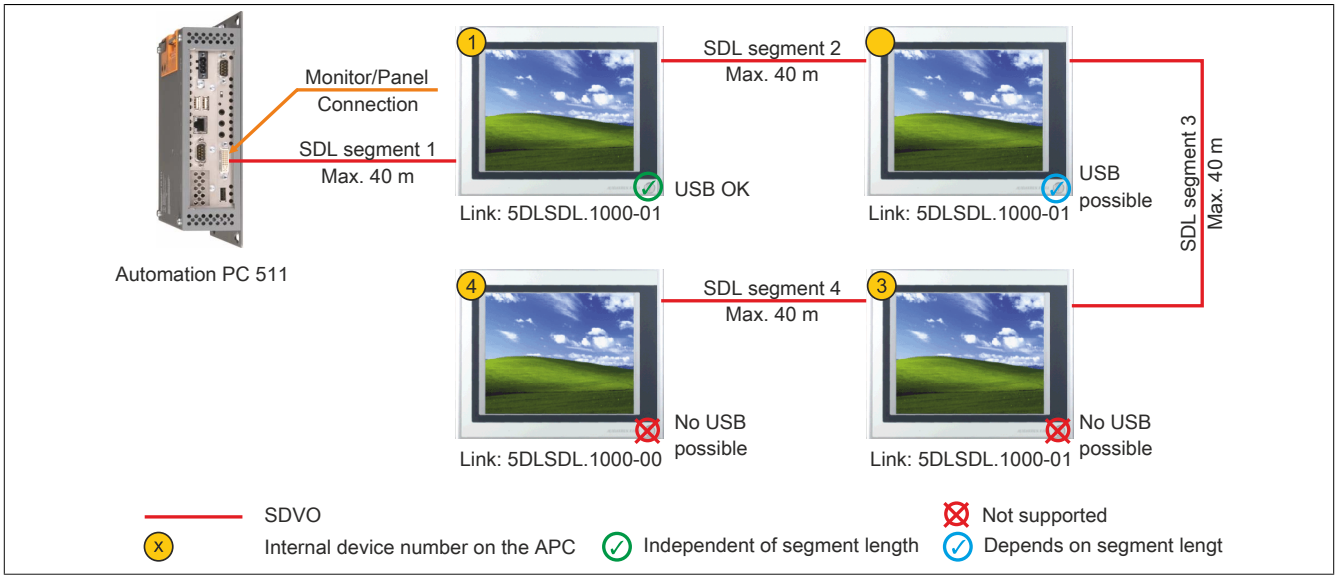


Figure 30: Four Automation Panel 900 systems via onboard SDL

5.6.1 Link modules

Information:

A corresponding Link module must be selected for each device used.

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

Table 84: Link modules

5.6.2 Cables

Select an Automation Panel 900 cable from the following table.

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

Table 85: Cables for SDL configurations

Model number	Description	Length
5CASDL.0018-01	SDL cable with 45° male connector, 1.8 m	1.8 m ±30 mm
5CASDL.0050-01	SDL cable with 45° male connector, 5 m	5 m ±50 mm
5CASDL.0100-01	SDL cable with 45° male connector, 10 m	10 m ±100 mm
5CASDL.0150-01	SDL cable with 45° male connector, 15 m	15 m ±100 mm

Table 85: Cables for SDL configurations

Information:

Detailed technical data about cables can be found in the Automation Panel 900 user's manual. This can be downloaded as a PDF file from the B&R website at www.br-automation.com.

5.6.2.1 Cable lengths and resolutions for SDL transmission

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

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

Table 86: Cable lengths and resolutions for SDL transmission

5.6.3 BIOS settings

No special BIOS settings are necessary for operation.

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

Touch screen functionality

COM C must be enabled in BIOS in order to operate the panel touch screen connected to the monitor/panel interface ("OEM features - I/O board features - LPC devices").

6 Connecting peripheral USB devices

Warning!

Peripheral USB devices can be connected to the USB interfaces on this device. 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.

6.1 Locally on the APC511

Many different peripheral USB devices can be connected to the 3 USB interfaces on this device. These USB interfaces can each handle a load of 1 A. The maximum transfer rate is USB 2.0.

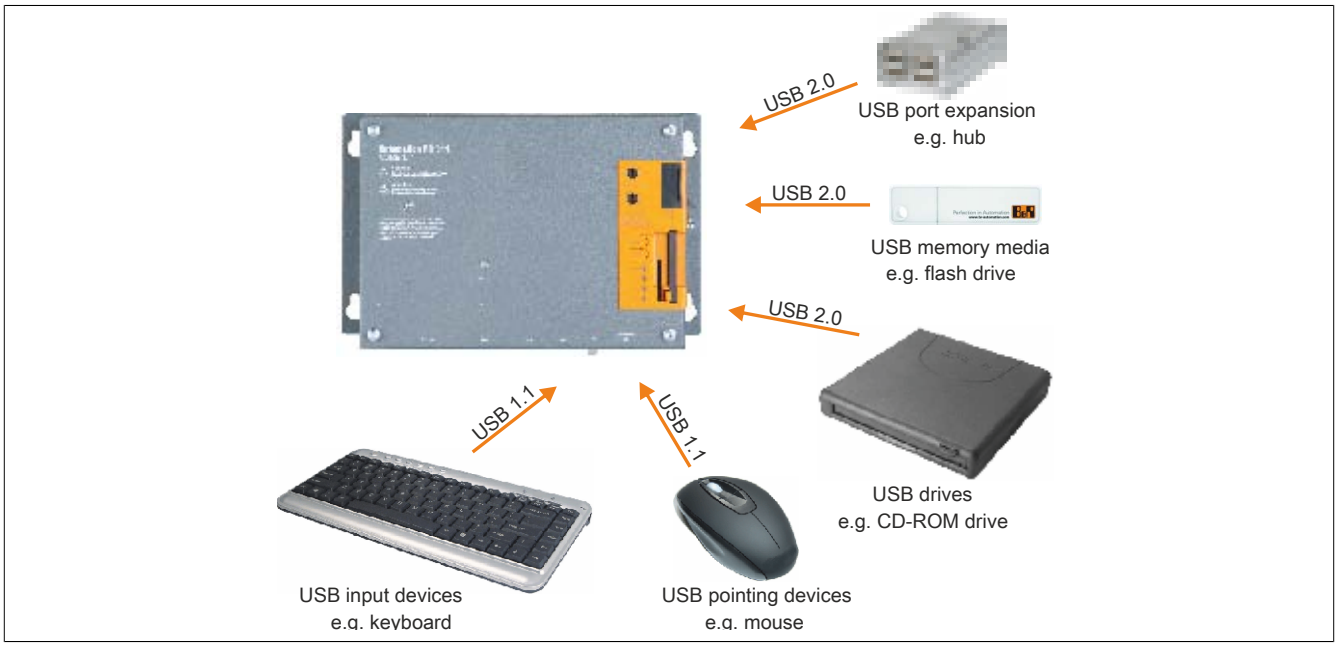


Figure 31: Local connection of USB peripheral devices on the APC511

6.2 Remote connection to Automation Panel 900 via DVI

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

Information:

Only end devices (not hubs) can be connected to the Automation Panel 900.

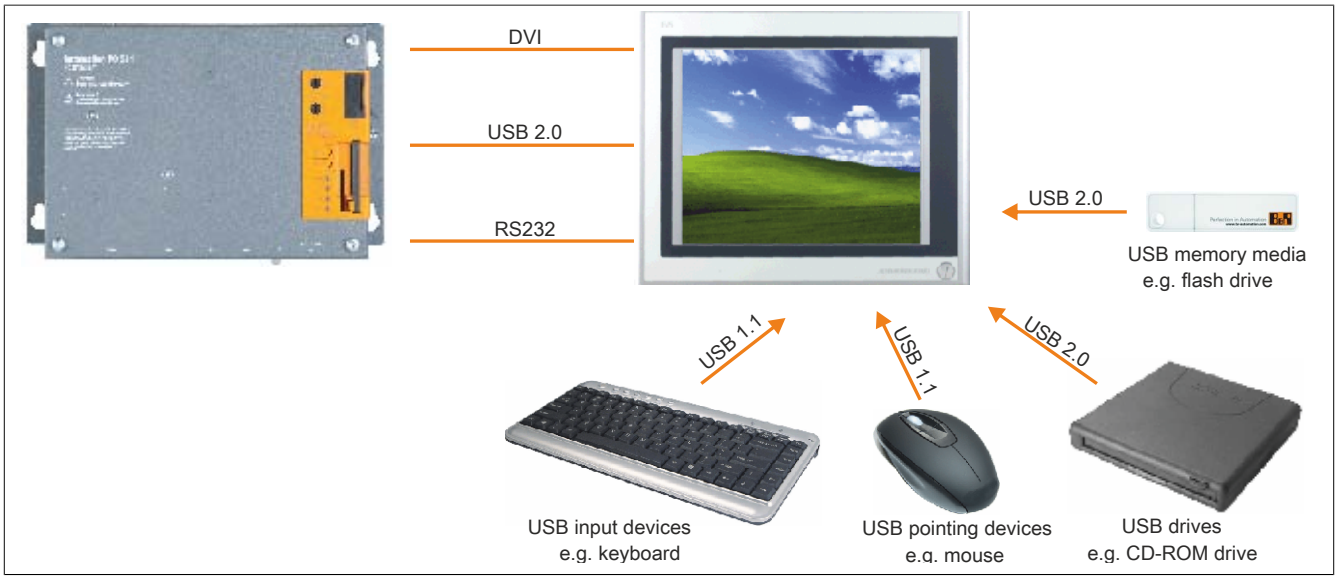


Figure 32: Remote connection of USB peripheral devices on the APC900 via DVI

6.3 Remote connection to Automation Panel 800 / 900 via SDL

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

Information:

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

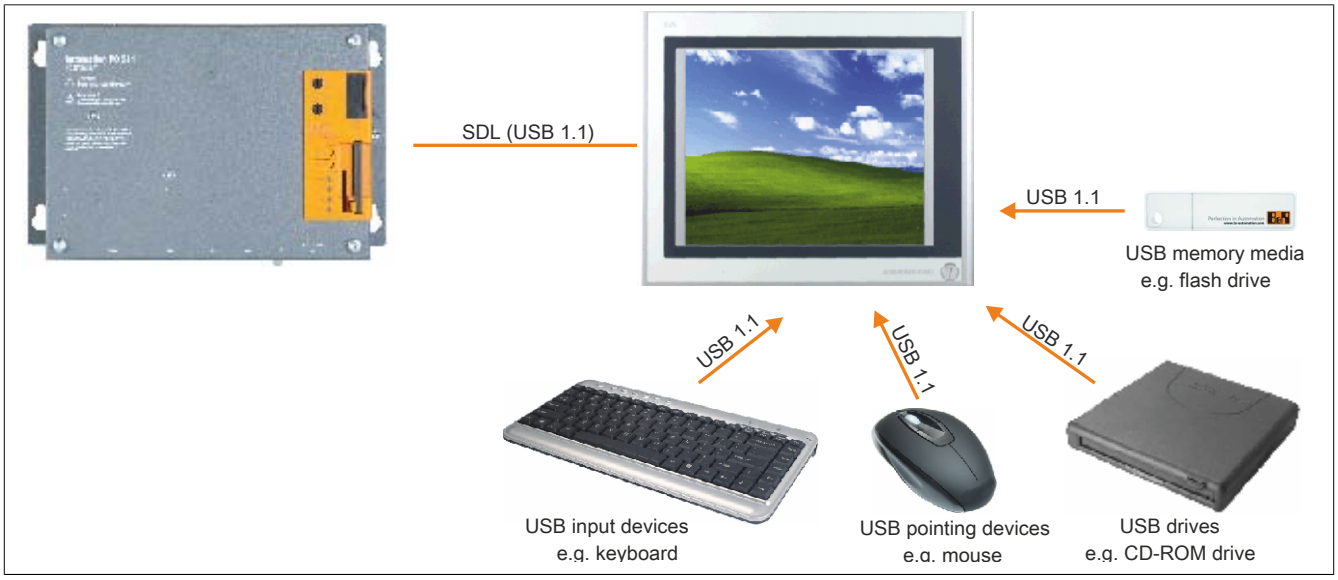


Figure 33: Remote connection of USB peripheral devices on the APC800/900 via SDL

7 Operation with and without an I/O board

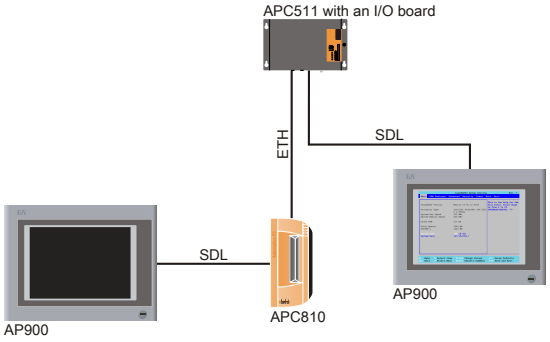
7.1 APC511 operation with an I/O board

Operating the Automation PC 511 **with** an I/O board enables a panel to be connected to the SDL/panel interface to output graphics. When ordering the system unit, the I/O board must be ordered separately and can only be installed at B&R.

The APC511 can also be connected to a PC via Ethernet for remote operation.

BIOS

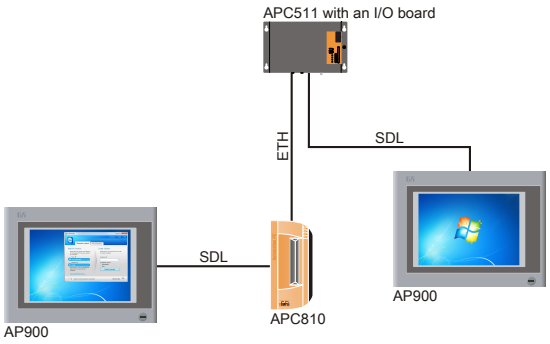
Graphics are output on the panel connected to the APC511. In BIOS under Advanced - Video configuration, the option "Remote panel" is "Disabled" by default.



Windows

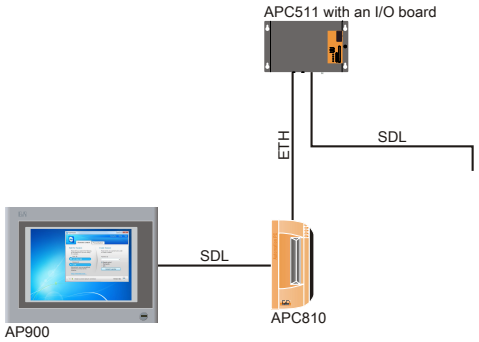
Situation: Automation PC 511 with connected SDL (DVI) panel; second PC with connected panel or integrated display

If an APC511 **with** a connected SDL (DVI) panel is operated remotely from another PC (e.g. remote desktop connection, UltraVNC, TeamViewer, etc.), the graphic properties of the panel that is connected to the Automation PC 511 will be detected automatically.



Situation: Automation PC 511; second PC with connected panel or integrated display

If an APC511 **without** a connected SDL (DVI) panel is operated remotely from another PC (e.g. remote desktop connection, UltraVNC, TeamViewer, etc.), graphics are output on the PC display in only 16 colors because information is not relayed from the Automation PC 511 graphics driver.



If an APC511 without a connected SDL (DVI) panel is operated remotely by another PC (e.g. remote desktop connection, UltraVNC, TeamViewer, etc), but a panel was connected to the Automation PC 511 the first time it was booted, then the BIOS setting Advanced - Video configuration "Remote panel" must be set to "Enabled" manually.

Information:

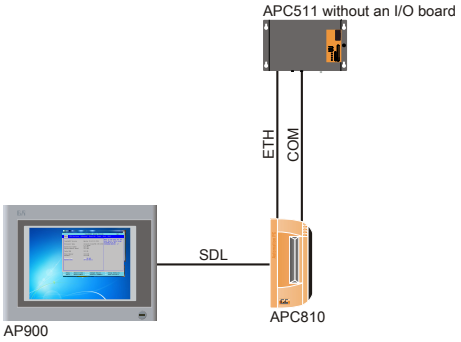
If the Automation PC 511 is no longer being operated remotely, then the "Remote Panel" setting in BIOS (Advanced - Video configuration) must be set back to "Disabled" manually. If this setting is not made, then the connected panel will remain blank.

7.2 APC511 operation without an I/O board (headless option)

Operating the Automation PC 511 **without** an I/O board means that a panel cannot be connected to output graphics since the standard Automation PC 511 does not have its own SDL/panel interface. When ordering the system unit, the I/O board must be ordered separately and can only be installed at B&R.

BIOS

To view and configure BIOS on the Automation PC 511, a second PC must be connected via the serial interface on the APC511. The connected PC must be operated using a panel (e.g. Automation PC 810 with Automation Panel 900) or have its own display (e.g. Panel PC 800). The remote console is enabled when the mode/node switch on the Automation PC 511 is set to "00" (default setting). A terminal emulator[4)] can then be used to access Automation PC 511 BIOS via the serial interface. The "Remote panel" setting in BIOS (Advanced - Video configuration) is set to "Enabled" by default. No other settings are required.

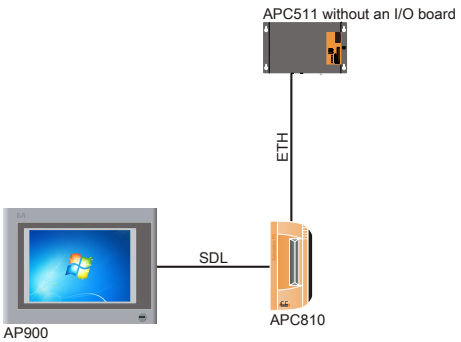


Information:

The default setting must be used the first time the terminal emulator is configured. Information about BIOS settings can be found in "Console redirection" on page 121.

Windows

To use and output content on Windows operating systems, the APC511 must be connected to a PC (with connected or integrated display) via the Ethernet interface. The Automation PC 511 can then be operated remotely (e.g. remote desktop connection, TeamViewer, UltraVNC).



4) For example, PuTTY (freeware) or HyperTerminal (not included in Windows since Windows Vista).

8 Known problems/issues

The following issues for the APC511 devices are known:

- HD resolution (1366x768) is not completely supported by VBIOS, which causes display errors after POST. The image flickers and is shifted down a line. BIOS POST and BIOS Setup are still displayed correctly, however. This effect occurs when using operating systems for which no driver is available (e.g. MS-DOS) or before the operating system's graphics driver is started (e.g. Windows XP boot logo). HD resolution is displayed corrected again when Windows XP or Windows 7 is booted properly with an installed graphics driver.
- The monitor/panel interface does not support RGB signals.

Chapter 4 • Software

1 BIOS options

Information:

The following diagrams, BIOS menu items and their descriptions refer to BIOS version 1.00. It is therefore possible that these diagrams and BIOS descriptions will not correspond with the BIOS version actually installed.

1.1 General information

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

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

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

1.2 BIOS Setup and boot procedure

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

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

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

To enter BIOS Setup, the <F2> key must be pressed after the USB controller has been initialized as soon as the following message appears on the monitor (during POST): "Press F2 to go to Setup Utility"

Information:

The POST screen is only displayed for a fraction of a second due to optimized boot procedures. It is still possible to enter BIOS, however.

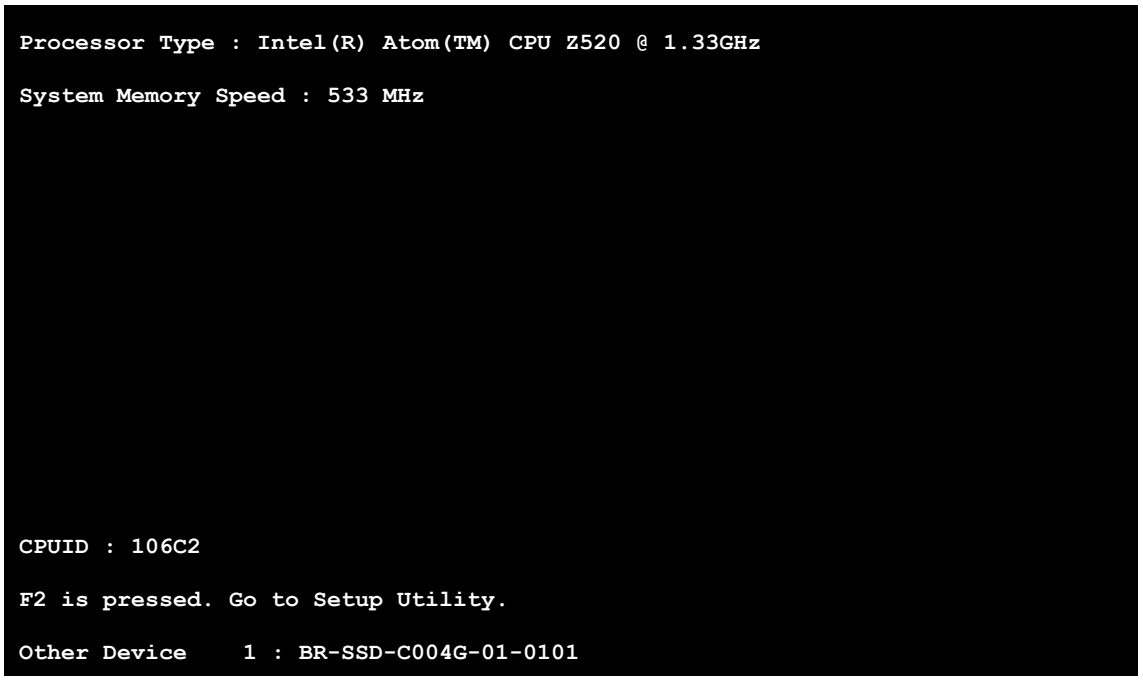


Figure 34: Boot screen

1.2.1 BIOS Setup keys

The following keys are enabled during POST:

Information:

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

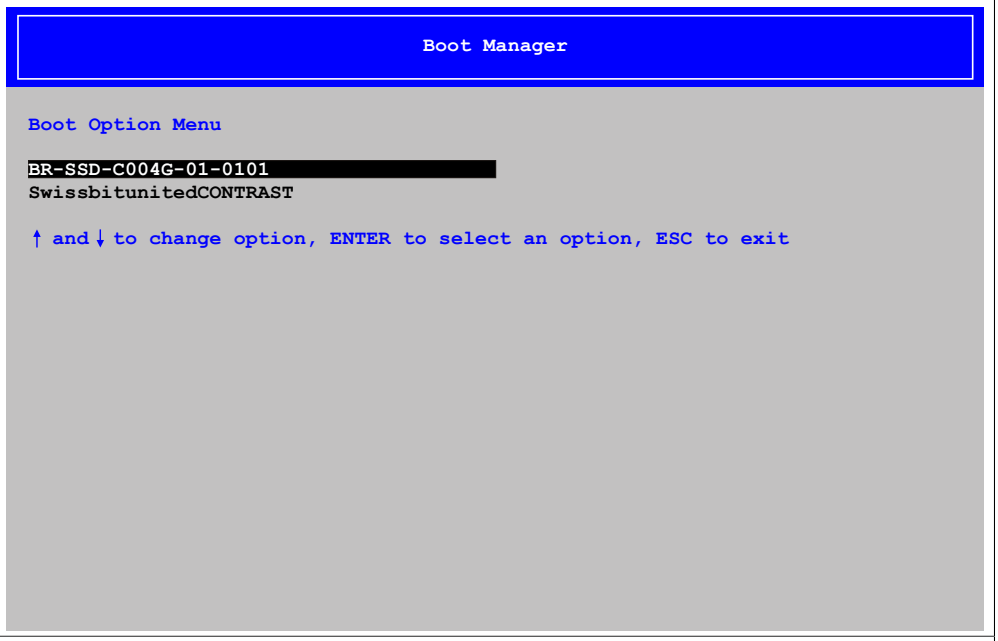
Keys	Function
F2	Opens the main BIOS Setup screen
F12	Opens the boot menu. This lists all bootable devices that are connected to the system. Select the device to boot from with cursor ↑, cursor ↓ and <ENTER>. Use the ESC key to exit the boot menu. 
<Pause>	Pauses POST. Pressing any other key resumes POST.

Table 87: BIOS-relevant keys for POST

The following keys can be used once inside BIOS Setup:

Key	Function
F1	Opens general help information
Cursor ↑	Moves to the previous item
Cursor ↓	Moves to the next item
Cursor ←	Moves to the previous menu
Cursor →	Go to the next menu
F5/F6	Change BIOS settings
Enter	Changes to the selected screen
F9	Loads and configures CMOS default values for all BIOS settings
F10	Saves and exits
ESC	Exits a submenu

Table 88: BIOS-relevant keys

1.3 Main

The main BIOS Setup screen appears immediately after the <F2> button is pressed during startup.

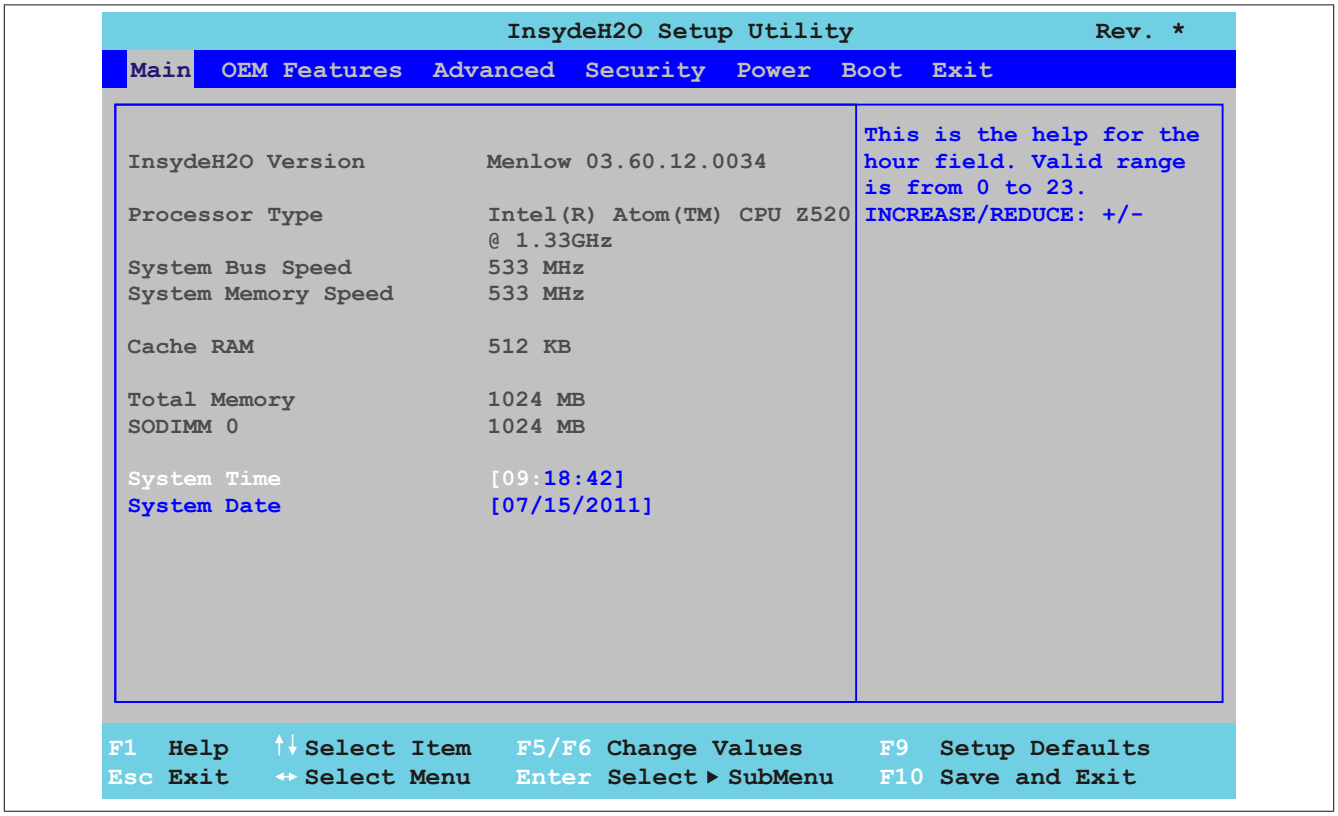


Figure 35: US15W Main menu

BIOS setting	Function	Configuration options	Effect
InsydeH2O version	Displays the BIOS InsydeH2O version	None	-
Processor type	Displays the processor type	None	-
System bus speed	Displays the system bus speed		
System memory speed	Displays the system memory speed	None	-
Cache RAM	Displays the cache RAM in the system	None	-
Total memory	Displays the entire system memory size	None	-
SODIMM 0	Displays the amount of RAM in the SODIMM 0 slot	None	-
System time	The currently configured system time setting. This is buffered by the CMOS battery when the system is switched off.	Changes the system time	Sets the system time in the format Hour:Minute:Second (hh:mm:ss)
System date	The currently configured system date. This is buffered by the CMOS battery when the system is switched off.	Changes the system date	Sets the system date in the format Month:Day:Year (mm:dd:yyyy)

Table 89: US15W Main menu - Configuration options

1.4 OEM features

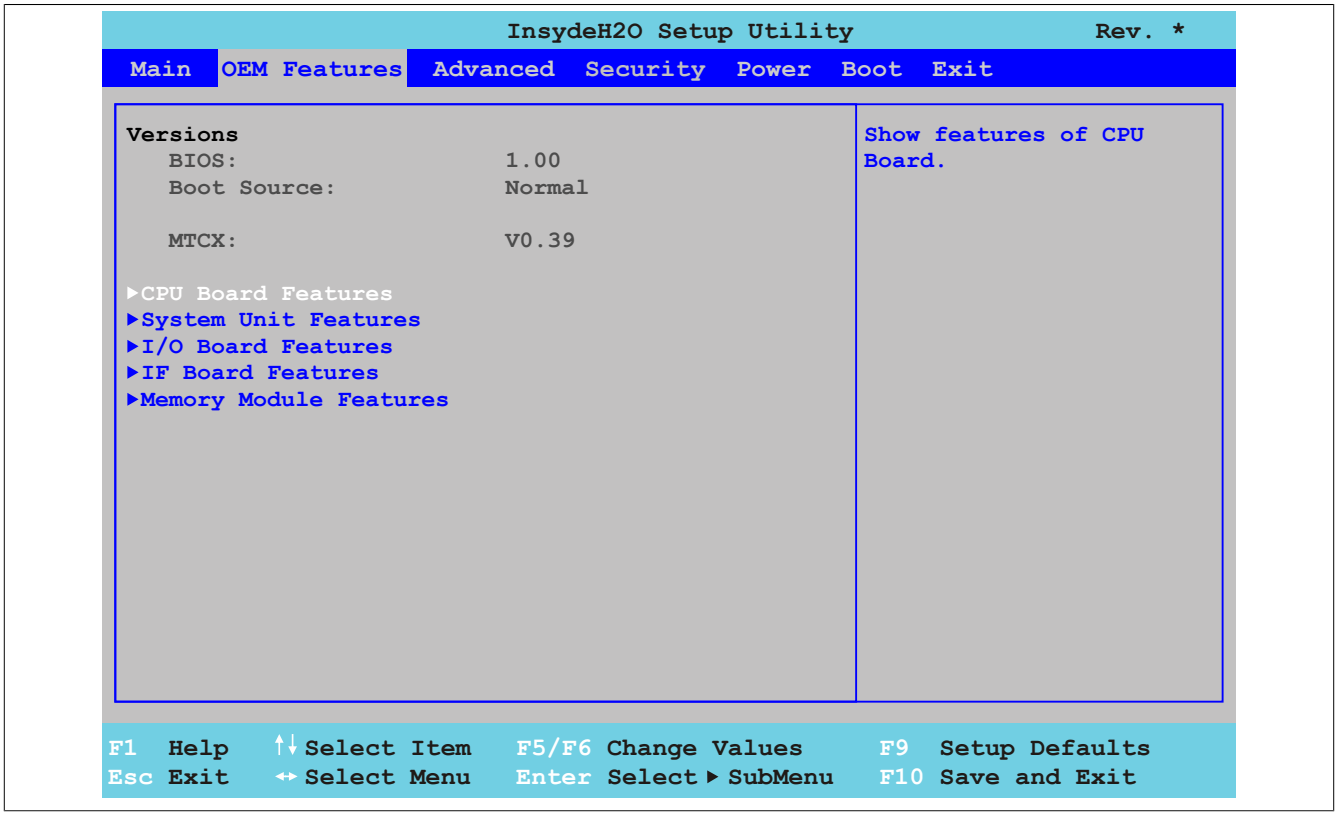


Figure 36: US15W OEM features - Menu

BIOS setting	Function	Configuration options	Effect
BIOS	Displays the installed B&R BIOS version	None	-
Boot source	Displays whether the normal BIOS version or the backup BIOS version (backup) is booted		**Information:** **If a BIOS update failed, then the back-up BIOS will be loaded automatically. The BIOS update can then be attempt-ed again.**
MTCX	Displays the installed MTCX version	None	-
CPU board features	Displays and configures device-specific settings for the CPU board	Enter	Opens the submenu See "CPU board features" on page 90
System unit features	Displays and configures device-specific settings for the system unit	Enter	Opens the submenu See "System unit features" on page 95
I/O board features[1)]	Displays device-specific information for the I/O board	Enter	Opens the submenu See "I/O board features" on page 99
IF board features[2)]	Displays device-specific information for the IF board	Enter	Opens the submenu See "IF board features" on page 104
Memory module features	Displays device-specific information for the main memory	Enter	Opens the submenu See "Memory module features" on page 106

Table 90: US15W OEM features menu - Configuration options

1) This submenu is only displayed if there is an I/O board connected to the system unit.
2) This submenu is only displayed if there is an interface board connected to the system unit.

1.4.1 CPU board features

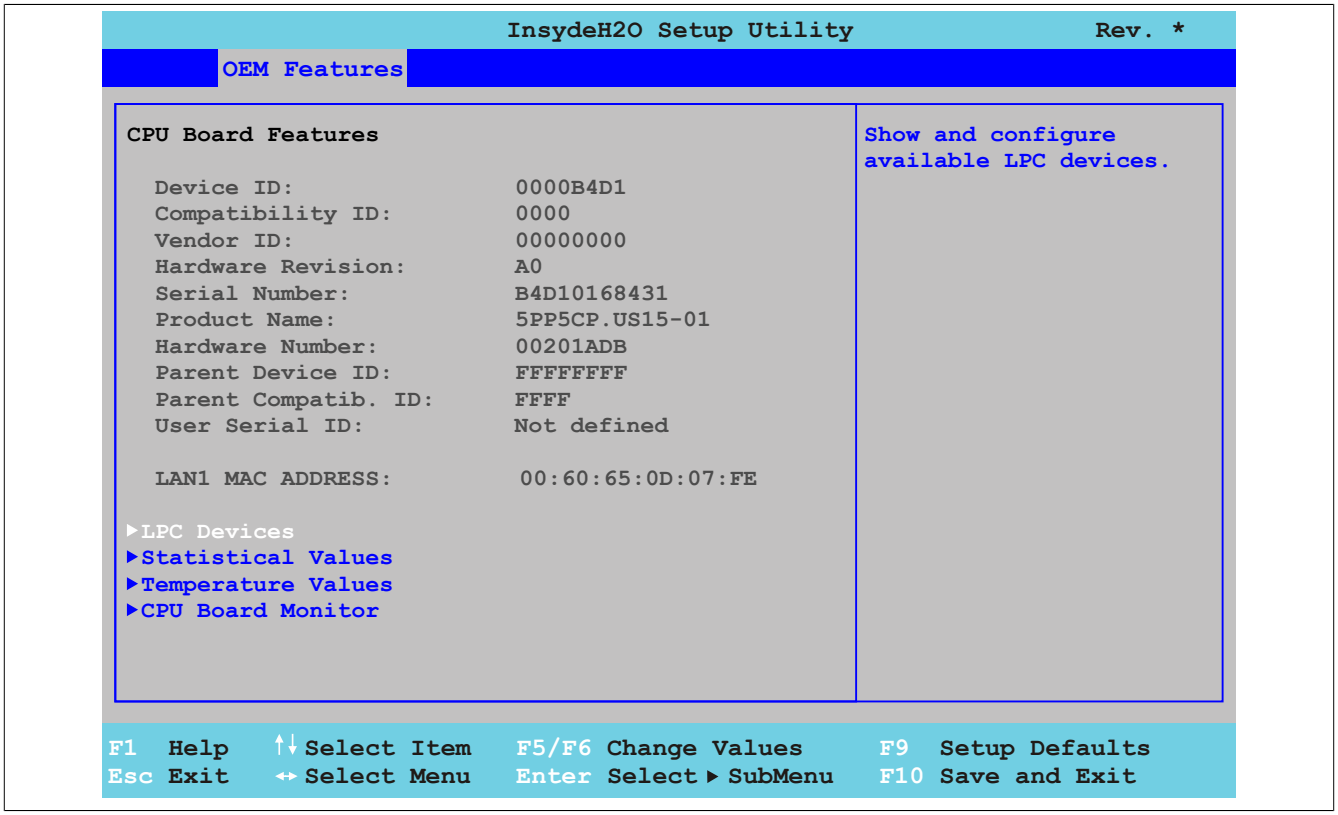


Figure 37: US15W OEM features - CPU board features

BIOS setting	Function	Configuration options	Effect
Device ID	Displays the device ID of the CPU board	None	-
Compatibility ID	Displays the version of the device within the same B&R device ID. This ID is needed for Automation Runtime.	None	-
Vendor ID	Displays the vendor ID	None	-
Hardware revision	Displays the hardware revision of the CPU board	None	-
Serial number	Displays the B&R serial number	None	-
Product name	Displays the B&R model number	None	-
Hardware number	Displays the hardware number of the CPU board	None	-
Parent device ID	Displays the manufacturer number	None	-
Parent compatib. ID	Displays the manufacturer ID	None	-
User serial ID	Displays the user serial ID. This 8-digit hexadecimal value can be freely specified by the user (e.g. to give the device a unique ID) and can only be changed using the "B&R Control Center" included with the ADI driver.	None	-
LAN1 MAC ADDRESS	Displays the assigned MAC address for the ETH interface	None	-
LPC devices	Configures LPC devices	Enter	Opens the submenu See "LPC devices" on page 91
Statistical values	Displays statistical values	Enter	Opens the submenu See "Statistical values" on page 92
Temperature values	Displays current temperature values	Enter	Opens the submenu See "Temperature values" on page 93
CPU board monitor	Displays current voltage values on the CPU board being used	Enter	Opens the submenu See "CPU board monitor" on page 94

Table 91: US15W OEM features - CPU board features - Configuration options

1.4.1.1 LPC devices

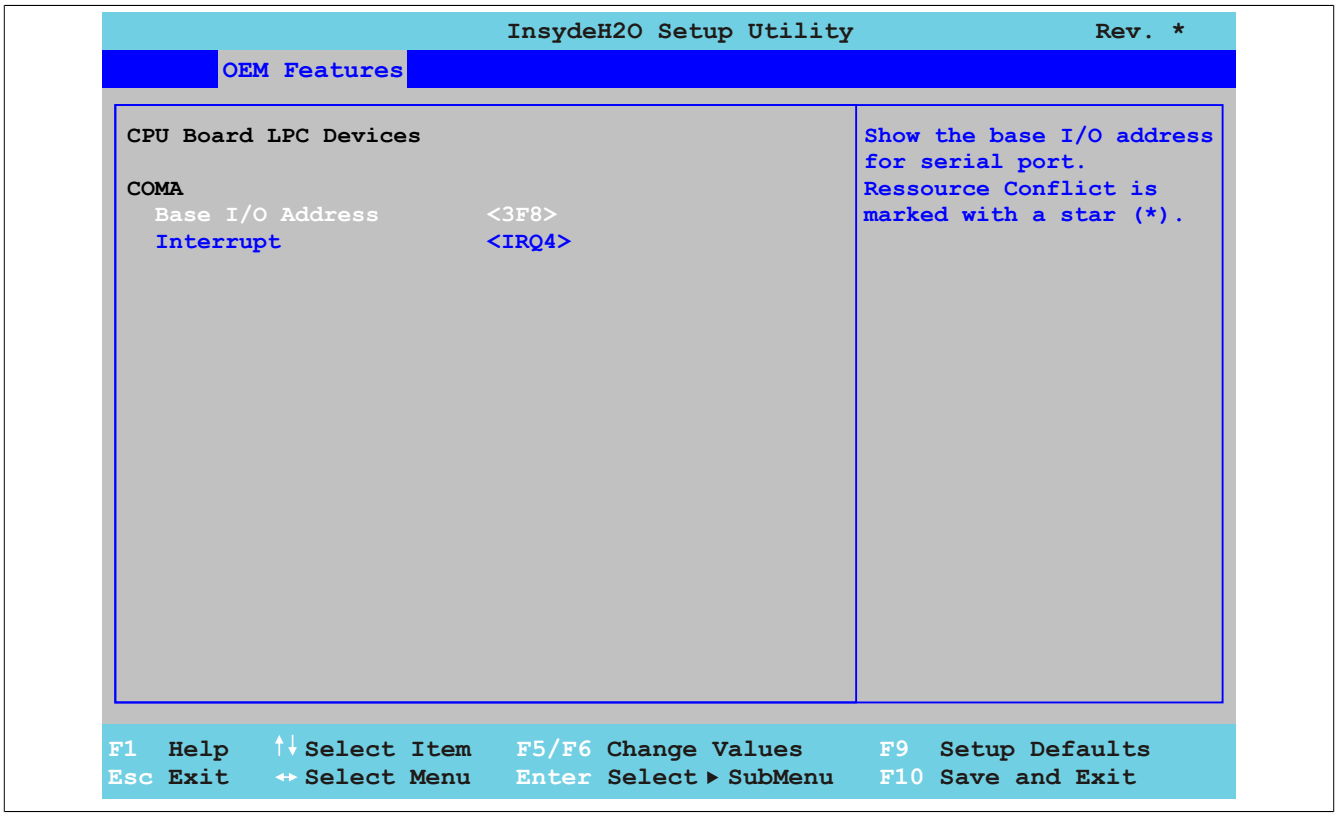


Figure 38: US15W OEM features - CPU board features - LPC devices

BIOS setting	Function	Configuration options	Effect
COMA	Settings for the COM serial interface	None	-
Base I/O address	Selects the base I/O address of the COM port	Disabled, 238, 2E8, 2F8, 328, 338, 3E8, 3F8	Disables or assigns the selected base I/O address
Interrupt	Selects the interrupt for the COM port	IRQ3, IRQ4, IRQ5, IRQ6, IRQ10, IRQ11, IRQ12	Assigns the selected interrupt

Table 92: US15W OEM features - CPU board features - LPC devices - Configuration options

Information:

A resource conflict can occur with respect to the base I/O address or the interrupt settings (indicated by a warning). In order to still be able to make these settings, the setting for the base I/O address or interrupt currently being used must be changed first.

1.4.1.2 Statistical values

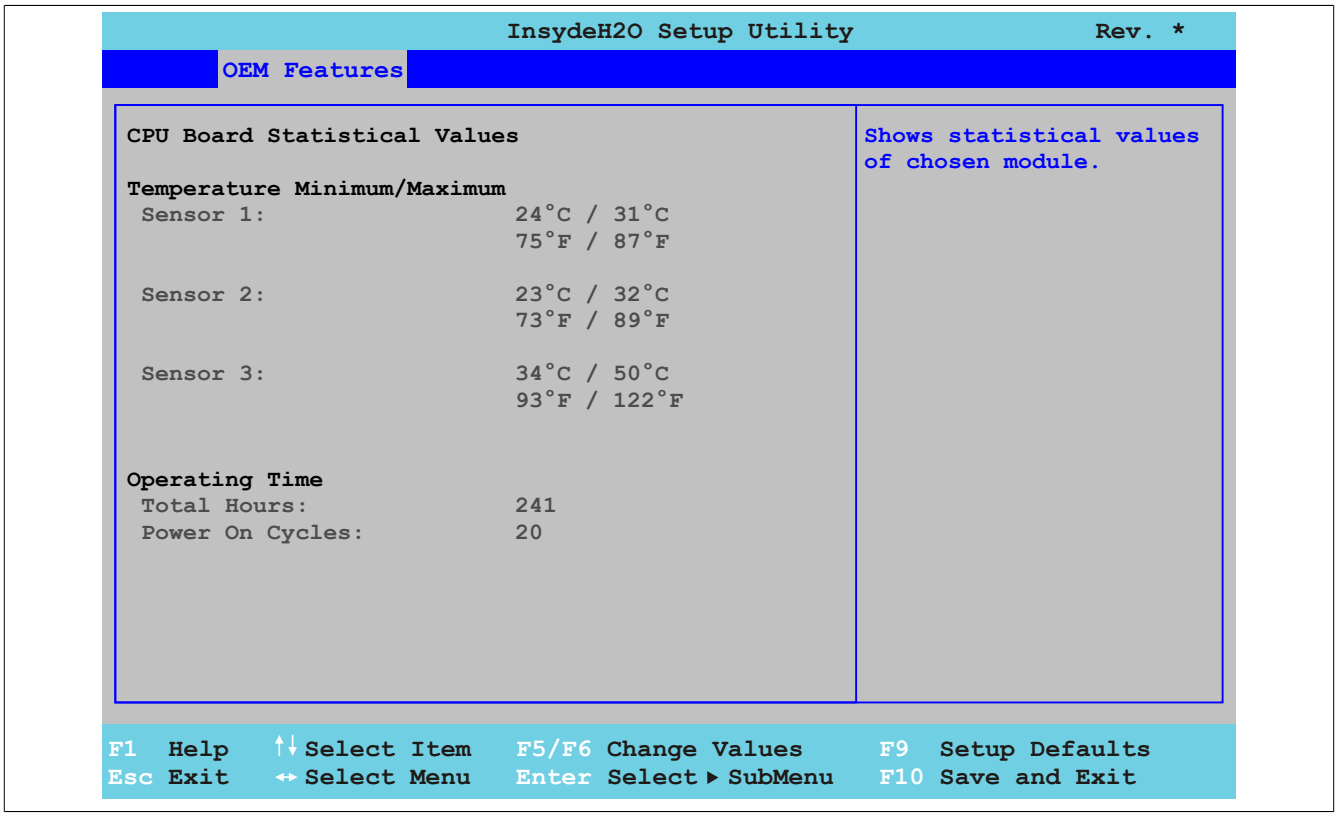


Figure 39: US15W OEM features - CPU board features - Statistical values

BIOS setting	Function	Configuration options	Effect
Sensor 1	Displays the minimum and maximum temperature of sensor 1 (interfaces) in °C and °F	None	-
Sensor 2	Displays the minimum and maximum temperature of sensor 2 (CPU) in °C and °F	None	-
Sensor 3	Displays the minimum and maximum temperature of sensor 3 (main memory) in °C and °F	None	-
Total hours	Displays the runtime in hours	None	-
Power on cycles	Displays the number of power-on cycles. Each restart increases the counter by one.	None	-

Table 93: US15W OEM features - CPU board features - Statistical values - Configuration options

1.4.1.3 Temperature values

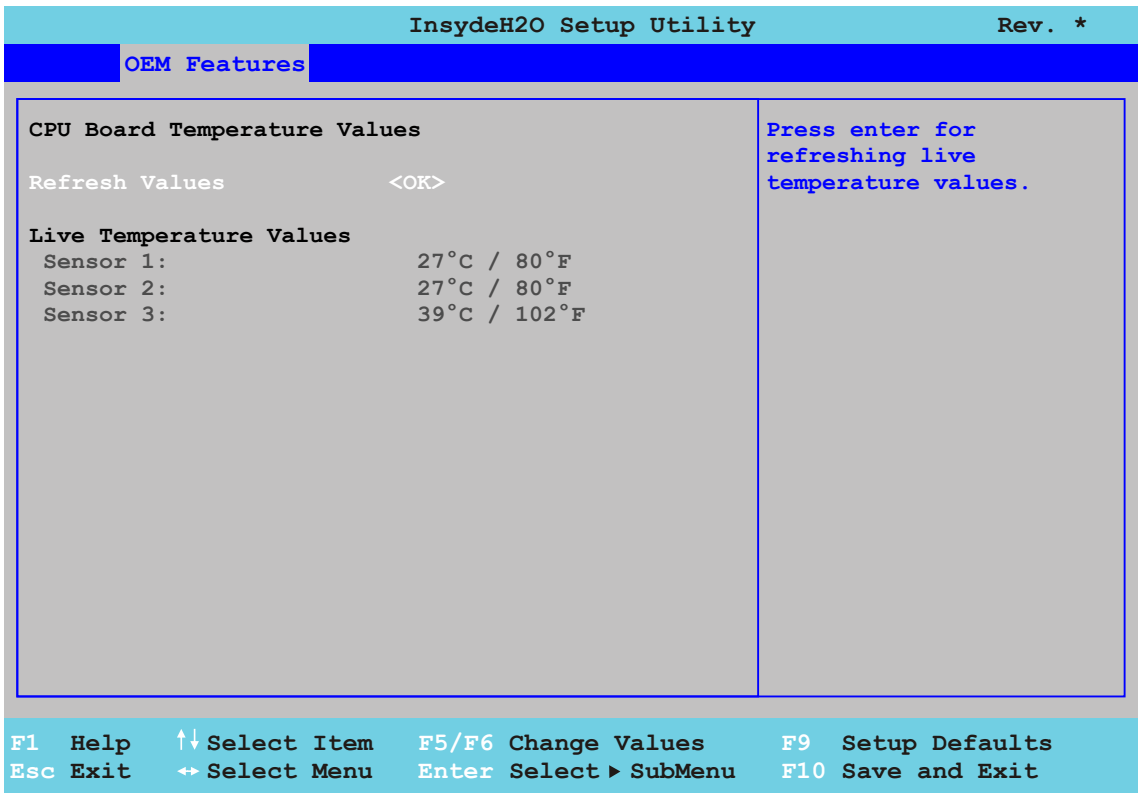


Figure 40: US15W OEM features - CPU board features - Temperature values

BIOS setting	Function	Configuration options	Effect
Refresh values	Option for refreshing the temperature values	OK	Refreshes the temperature values shown below
Sensor 1	Displays the current temperature of sensor 1 (interfaces) in °C and °F	None	-
Sensor 2	Displays the current temperature of sensor 2 (CPU) in °C and °F	None	-
Sensor 3	Displays the current temperature of sensor 3 (main memory) in °C and °F	None	-

Table 94: US15W OEM features - CPU board features - Temperature values - Configuration options

1.4.1.4 CPU board monitor

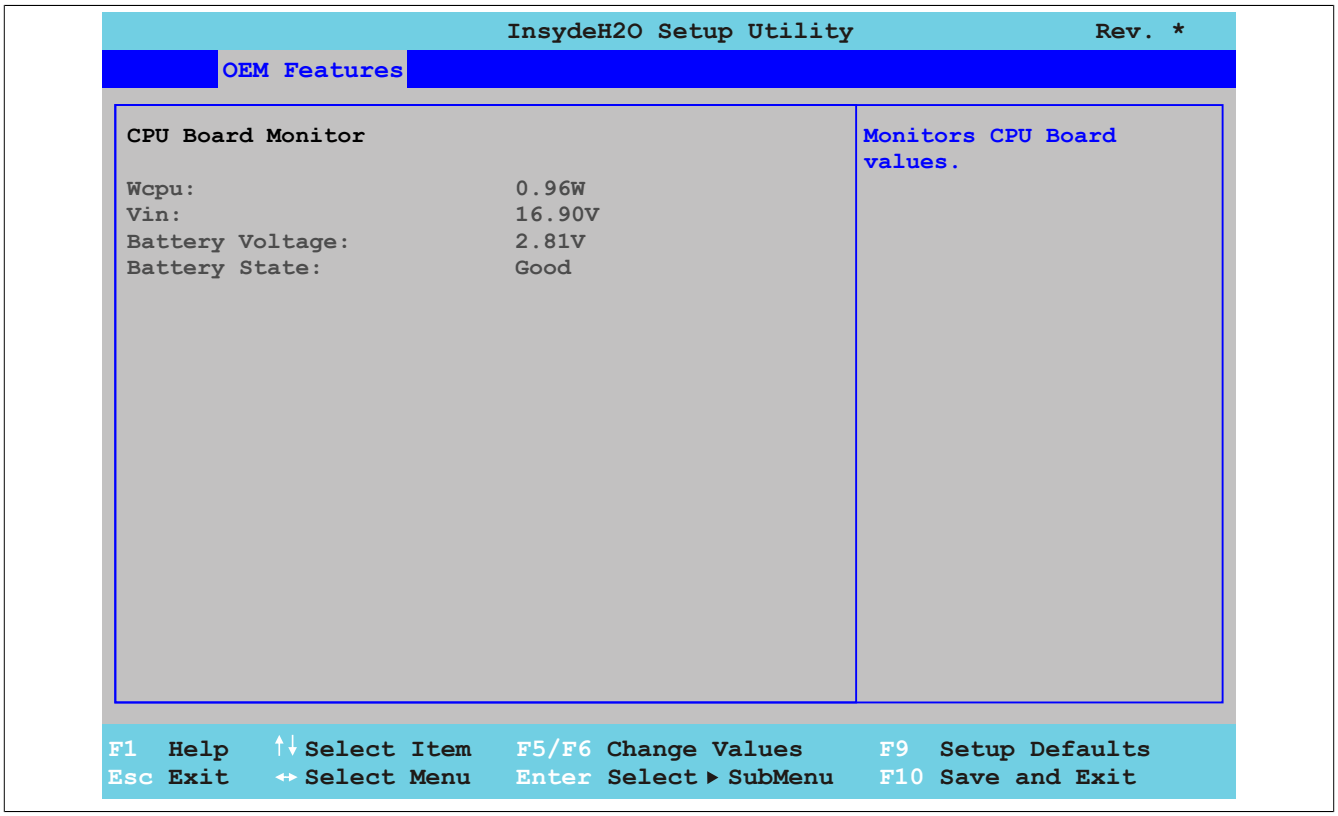


Figure 41: US15W OEM features - CPU board features - CPU board monitor

BIOS setting	Function	Configuration options	Effect
Wcpu:	Displays the CPU power consumption in watts	None	-
Vin:	Displays the current voltage of the power supply in volts	None	-
Battery voltage:	Displays the battery voltage in volts	None	-
Battery state:	Displays the status of the battery	None	-

Table 95: US15W OEM features - CPU board features - CPU board monitor - Configuration options

1.4.2 System unit features

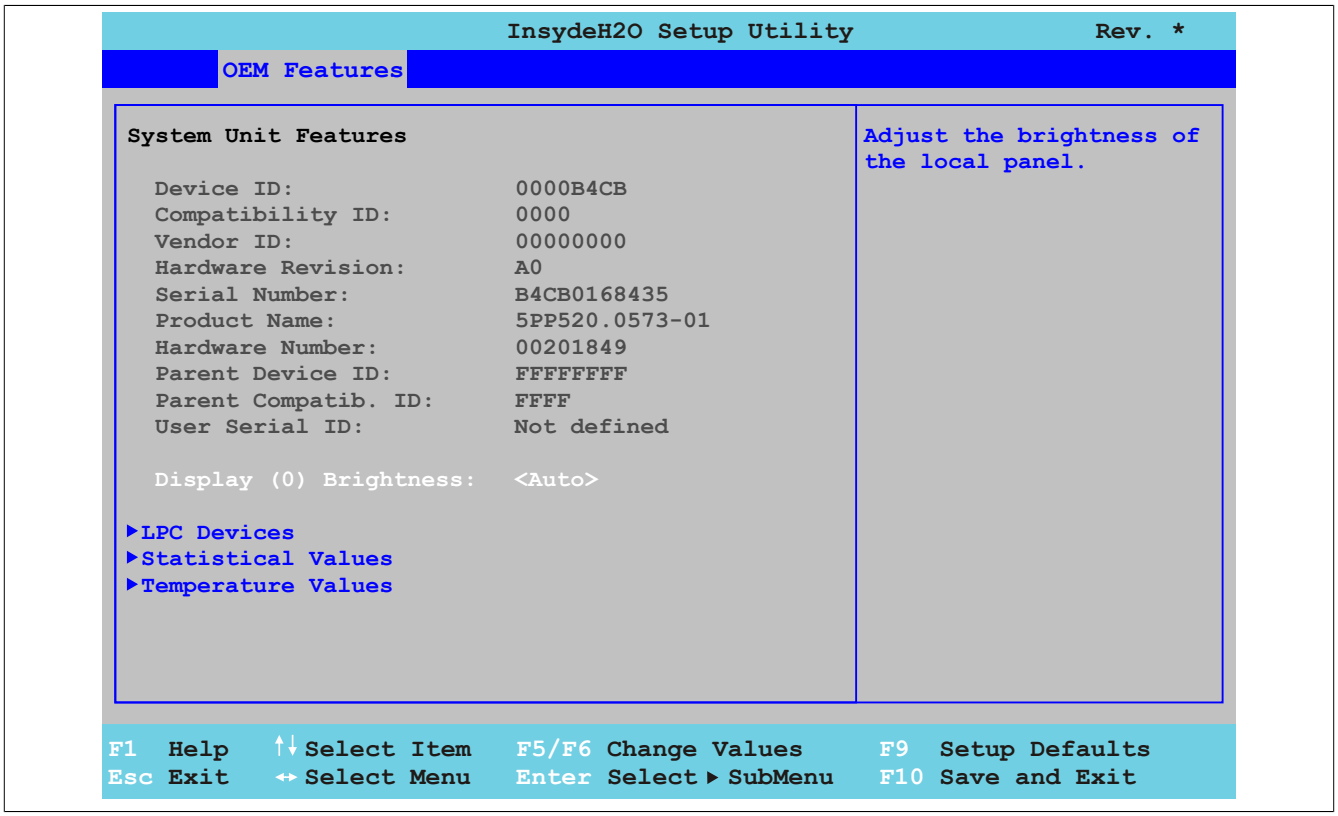


Figure 42: US15W OEM features - System unit features

BIOS setting	Function	Configuration options	Effect
Device ID	Displays the device code of the Power Panel device	None	-
Compatibility ID	Displays the version of the device within the same B&R device ID. This ID is needed for Automation Runtime.	None	-
Vendor ID	Displays the vendor ID	None	-
Hardware revision	Displays the system unit hardware revision	None	-
Serial number	Displays the B&R serial number	None	-
Product name	Displays the B&R model number	None	-
Hardware number	Displays the system unit hardware number	None	-
Parent device ID	Displays the manufacturer number	None	-
Parent compatib. ID	Displays the manufacturer ID	None	-
User serial ID	Displays the user serial ID. This 8-digit hexadecimal value can be freely specified by the user (e.g. to give the device a unique ID) and can only be changed using the "B&R Control Center" included with the ADI driver.	None	-
Display (0) brightness[1)]	Option for setting the intensity of the display backlight	Auto	Automatically configures the optimal brightness configured using the factory settings. A brightness value between 100% and 0% is set.
		0%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 100%	Sets the desired brightness within the factory setting limits
LPC devices	Configures LPC devices	Enter	Opens the submenu See "LPC devices" on page 96
Statistical values	Displays statistical values	Enter	Opens the submenu See "Statistical values" on page 97
Temperature values	Displays current temperature values	Enter	Opens the submenu See "Temperature values" on page 98

Table 96: US15W OEM features - System unit features - Configuration options

1) This setting is only available for PP500 system units.

1.4.2.1 LPC devices

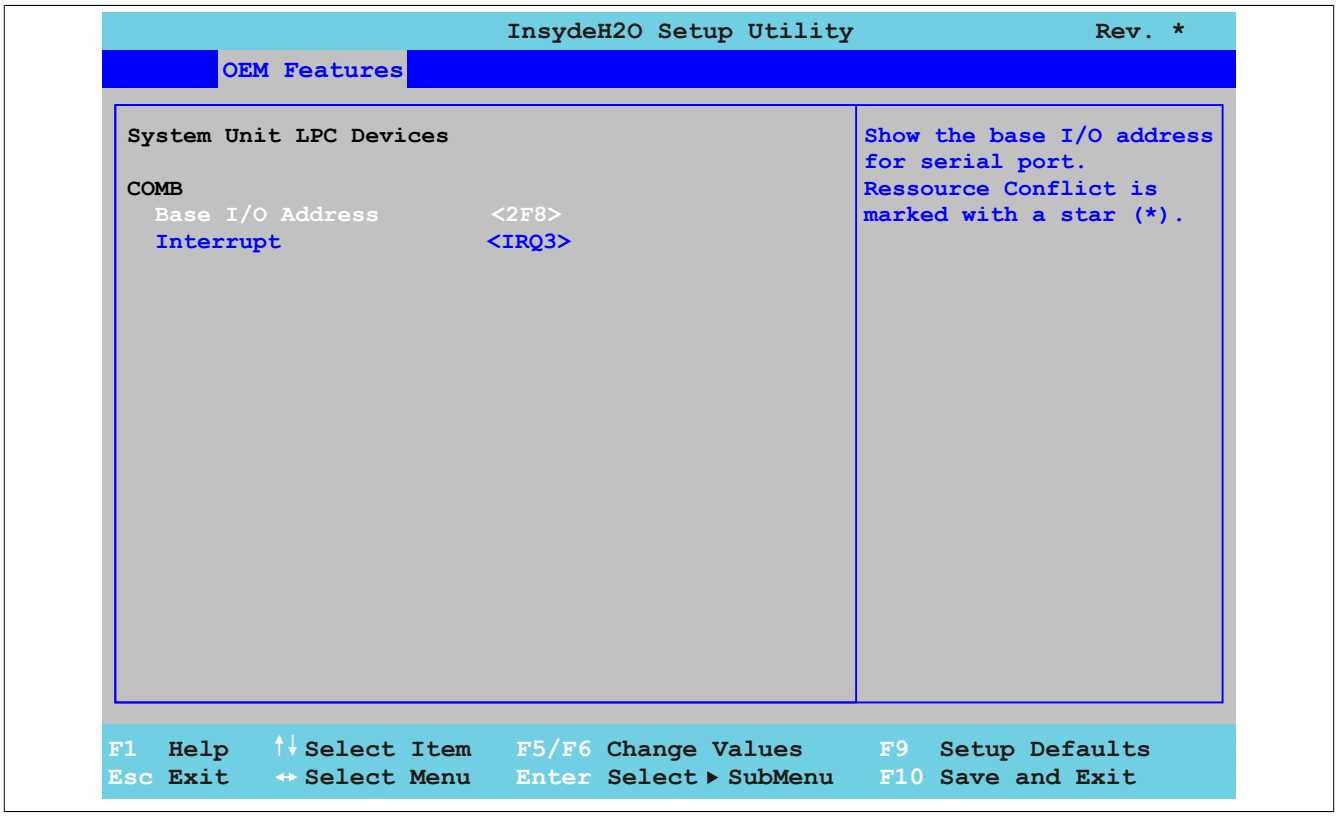


Figure 43: US15W OEM features - System unit features - LPC devices

BIOS setting	Function	Configuration options	Effect
COMB	Settings for the COM serial interface	None	-
Base I/O address	Selects the base I/O address of the COM port	Disabled, 238, 2E8, 2F8, 328, 338, 3E8, 3F8	Disables or assigns the selected base I/O address
Interrupt	Selects the interrupt for the COM port	IRQ3, IRQ4, IRQ5, IRQ6, IRQ10, IRQ11, IRQ12	Assigns the selected interrupt

Table 97: US15W OEM features - System unit features - LPC devices - Configuration options

Information:

A resource conflict can occur with respect to the base I/O address or the interrupt settings (indicated by a warning). In order to still be able to make these settings, the setting for the base I/O address or interrupt currently being used must be changed first.

1.4.2.2 Statistical values

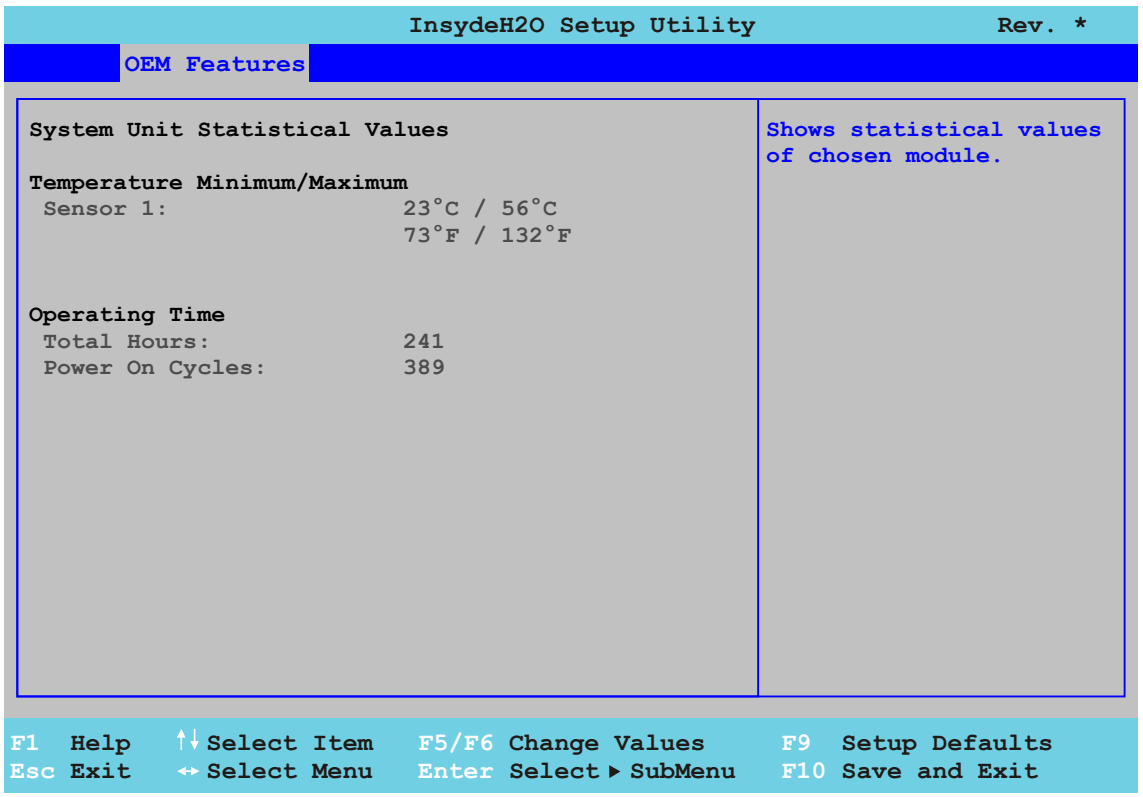


Figure 44: US15W OEM features - System unit features - Statistical values

BIOS setting	Function	Configuration options	Effect
Sensor 1	Displays the minimum and maximum temperature of sensor 1 in °C and °F	None	-
Total hours	Displays the runtime in hours	None	-
Power on cycles	Displays the number of power-on cycles. Each restart increases the counter by one.	None	-

Table 98: US15W OEM features - System unit features - Statistical values - Configuration options

1.4.2.3 Temperature values

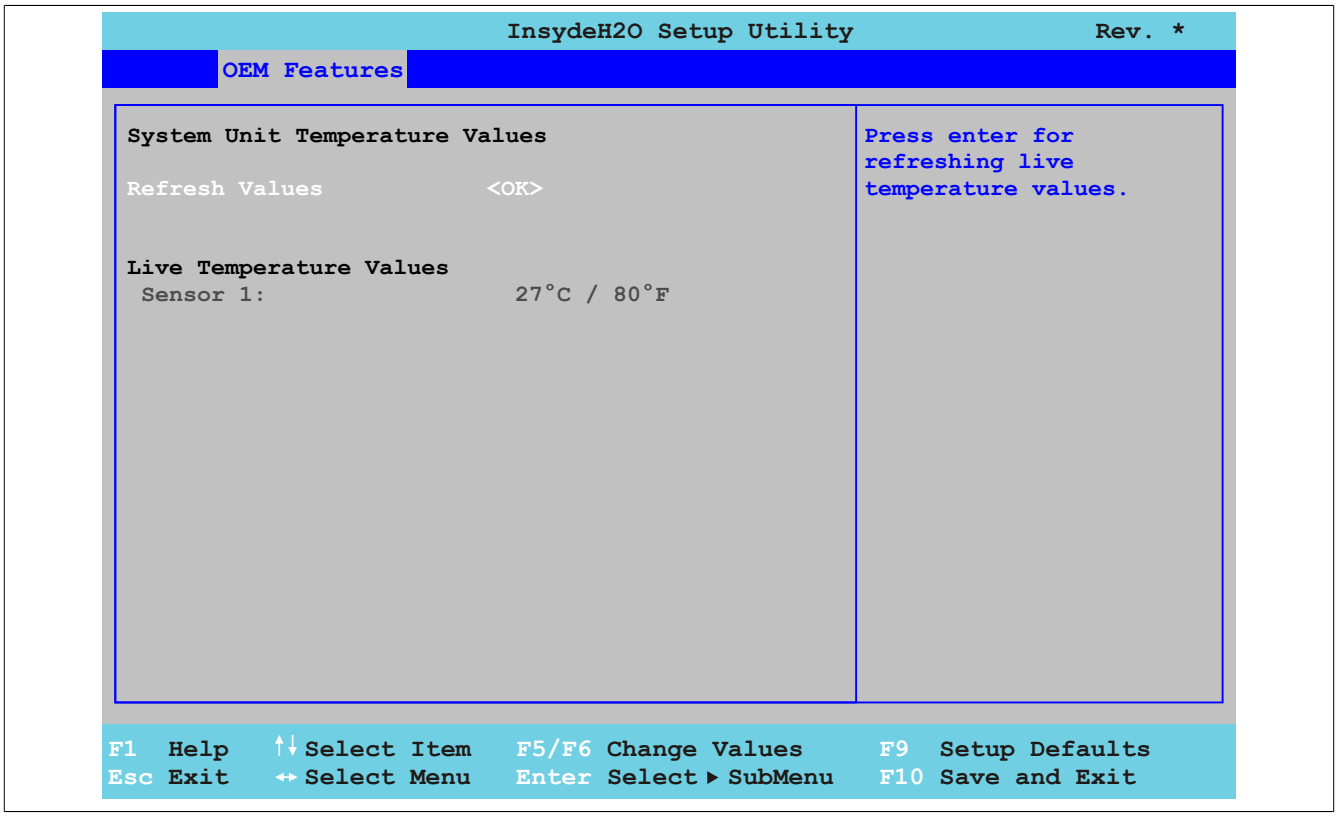


Figure 45: US15W OEM features - System unit features - Temperature values

BIOS setting	Function	Configuration options	Effect
Refresh values	Option for refreshing the temperature values	OK	Refreshes the temperature values shown below
Sensor 1	Displays the current temperature of sensor 1 in °C and °F	None	-

Table 99: US15W OEM features - System unit features - Temperature values - Configuration options

1.4.3 I/O board features

Information:

The values and menus shown may vary depending on which I/O board is connected.

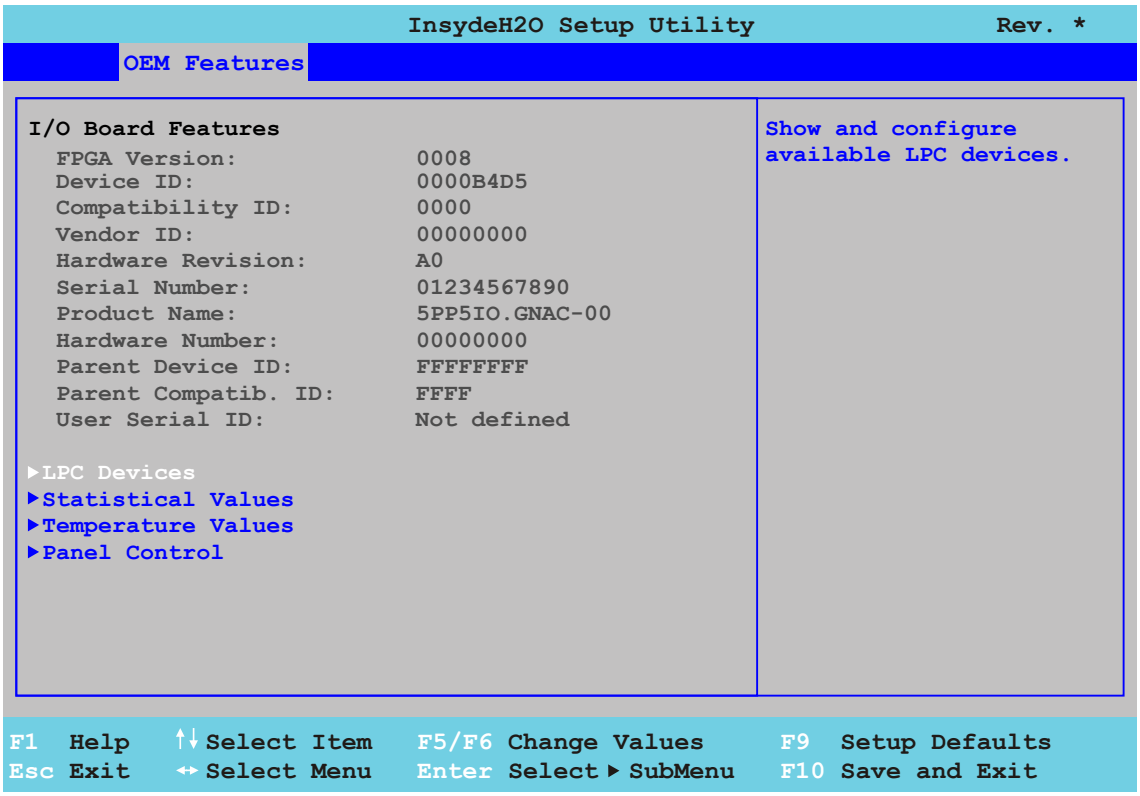


Figure 46: US15W OEM features - I/O board features

BIOS setting	Function	Configuration options	Effect
FPGA version	Displays the FPGA version of the I/O board	None	-
Device ID	Displays the device ID of the I/O board	None	-
Compatibility ID	Displays the version of the device within the same B&R device ID. This ID is needed for Automation Runtime.	None	-
Vendor ID	Displays the vendor ID	None	-
Hardware revision	Displays the hardware revision of the I/O board	None	-
Serial number	Displays the B&R serial number	None	-
Product name	Displays the B&R model number	None	-
Hardware number	Displays the hardware number of the I/O board	None	-
Parent device ID	Displays the manufacturer number	None	-
Parent compatib. ID	Displays the manufacturer ID	None	-
User serial ID	Displays the user serial ID. This 8-digit hexadecimal value can be freely specified by the user (e.g. to give the device a unique ID) and can only be changed using the "B&R Control Center" included with the ADI driver.	None	-
LPC devices	Configures LPC devices	Enter	Opens the submenu See "LPC devices" on page 100
Statistical values	Displays statistical values	Enter	Opens the submenu See "Statistical values" on page 101
Temperature values	Displays current temperature values	Enter	Opens the submenu See "Temperature values" on page 102
Panel control	Configures special settings for connected panels (display units)	Enter	Opens the submenu See "Panel control" on page 103

Table 100: US15W OEM features - I/O board features - Configuration options

1.4.3.1 LPC devices

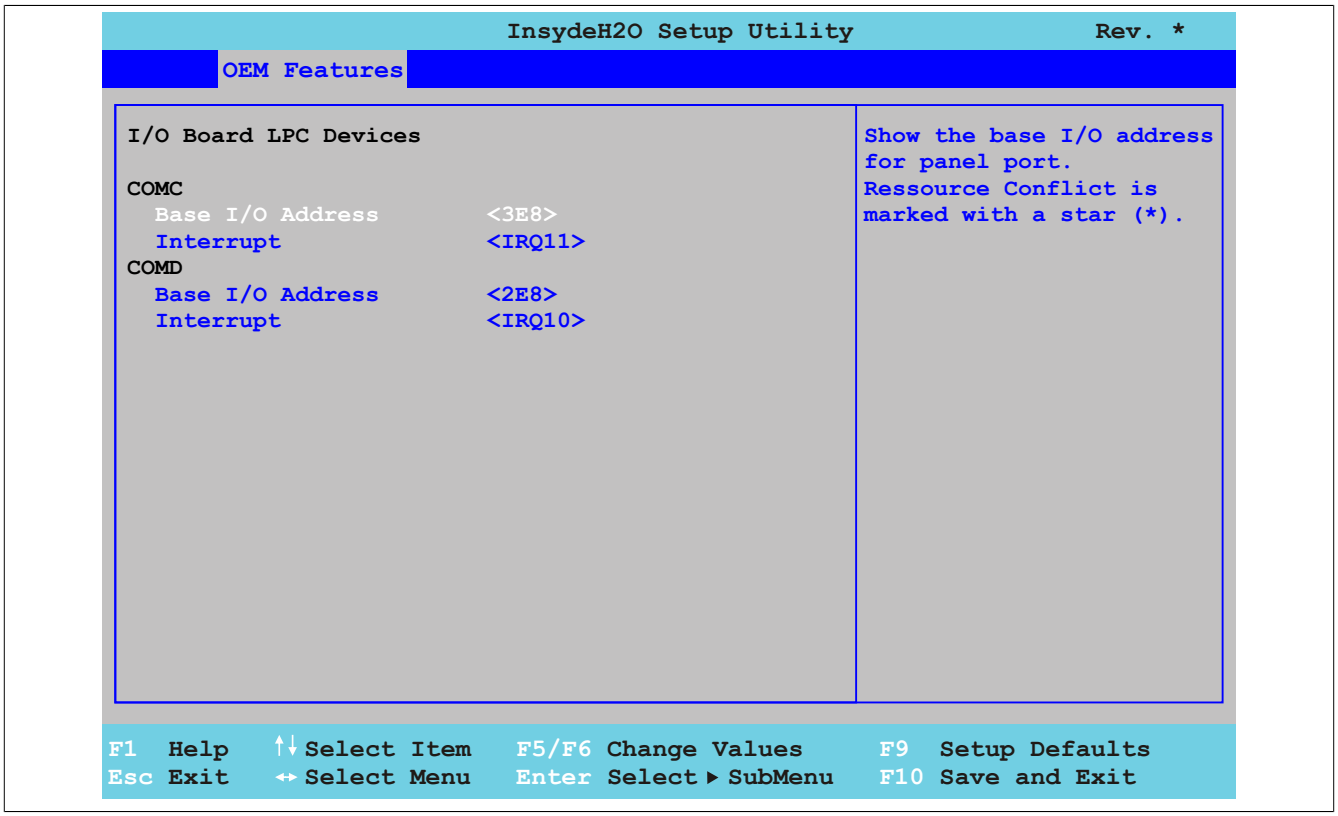


Figure 47: US15W OEM features - I/O board features - LPC devices

BIOS setting	Function	Configuration options	Effect
COMC	Setting for the panel interface on the I/O board	None	-
Base I/O address	Selects the base I/O address of the COM port	Disabled, 238, 2E8, 2F8, 328, 338, 3E8, 3F8	Disables or assigns the selected base I/O address
Interrupt	Selects the interrupt for the COM port	IRQ3, IRQ4, IRQ5, IRQ6, IRQ10, IRQ11, IRQ12	Assigns the selected interrupt
COMD	Setting for the serial interface (COM) on the I/O board	None	-
Base I/O address	Selects the base I/O address of the COM port	Disabled, 238, 2E8, 2F8, 328, 338, 3E8, 3F8	Disables or assigns the selected base I/O address
Interrupt	Selects the interrupt for the COM port	IRQ3, IRQ4, IRQ5, IRQ6, IRQ10, IRQ11, IRQ12	Assigns the selected interrupt

Table 101: US15W OEM features - I/O board features - LPC devices - Configuration options

Information:

A resource conflict can occur with respect to the base I/O address or the interrupt settings (indicated by a warning). In order to still be able to make these settings, the setting for the base I/O address or interrupt currently being used must be changed first.

1.4.3.2 Statistical values

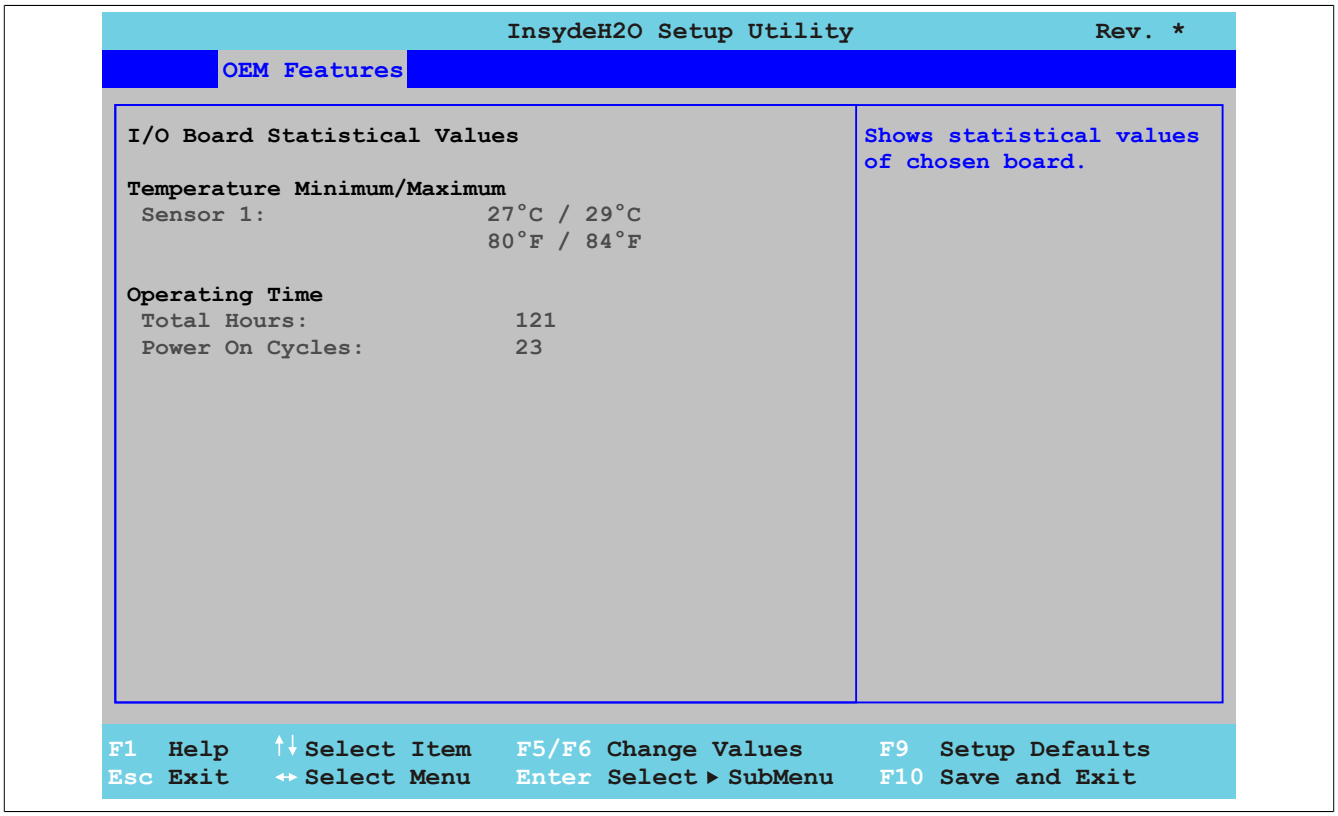


Figure 48: US15W OEM features - I/O board features - Statistical values

BIOS setting	Function	Configuration options	Effect
Sensor 1	Displays the minimum and maximum temperature of sensor 1 in °C and °F		
Total hours	Displays the runtime in hours	None	-
Power on cycles	Displays the number of power-on cycles. Each restart increases the counter by one.	None	-

Table 102: US15W OEM features - I/O board features - Statistical values - Configuration options

1.4.3.3 Temperature values

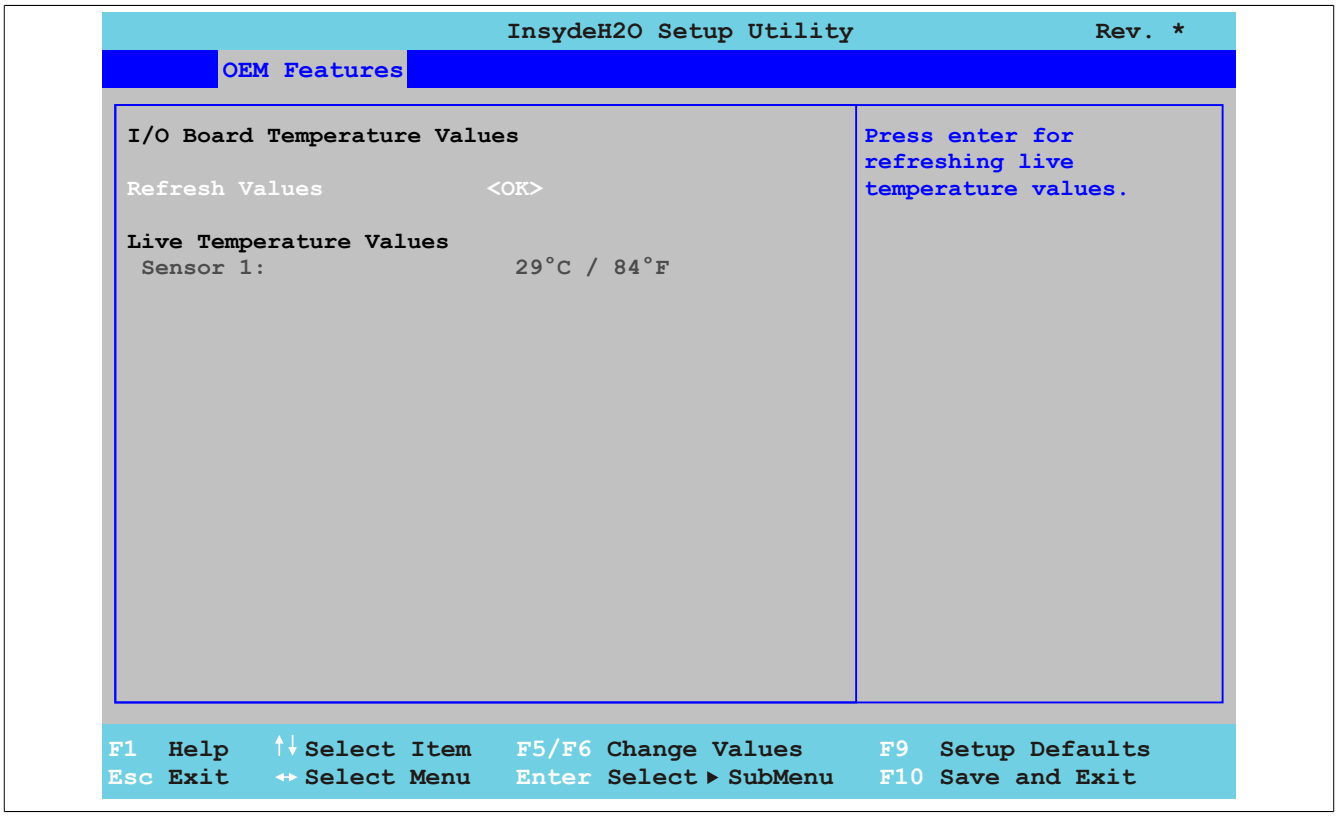


Figure 49: US15W OEM features - I/O board features - Temperature values

BIOS setting	Function	Configuration options	Effect
Refresh values	Option for refreshing the temperature values	OK	Refreshes the temperature values shown below
Sensor 1	Displays the current temperature of sensor 1 (interfaces) in °C and °F	None	-

Table 103: US15W OEM features - I/O board features - Temperature values - Configuration options

1.4.3.4 Panel control

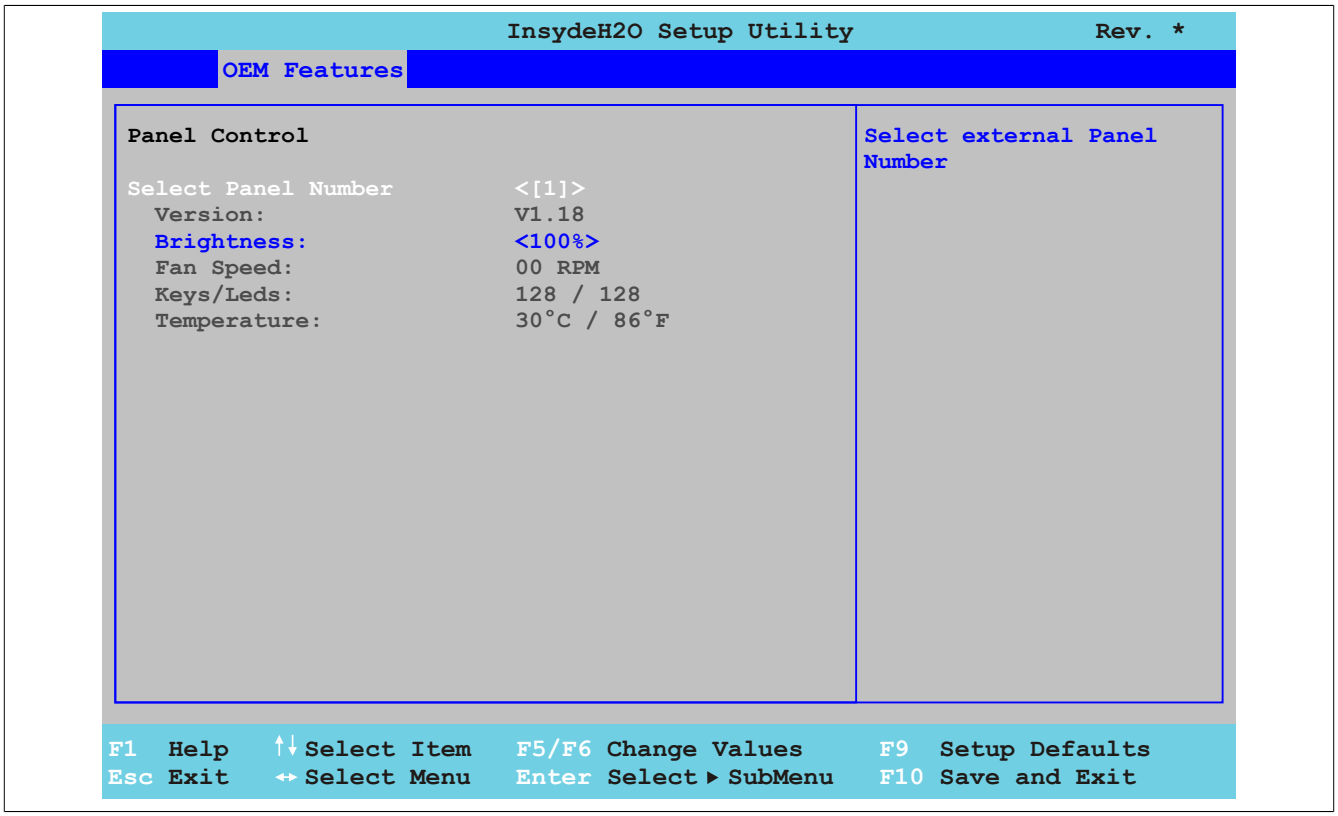


Figure 50: US15W OEM features - I/O board features - Panel control

BIOS setting	Function	Configuration options	Effect
Select panel number	Selects the panel number for which the values should be displayed and/or changed	0...15	Selects panel 0-15
Version	Displays the firmware version of the SDLR controller	None	-
Brightness	Sets the brightness of the selected panel	0%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 100%	Sets the brightness (in %) of the selected panel Changes take effect after saving and restarting the system (e.g. by pressing <F10>).
Fan speed	Displays the fan speed of the selected panel	None	-
Keys/LEDs	Displays the available keys and LEDs on the selected panel	None	-
Temperature	Displays the temperature of the selected panel in °C and °F	None	-

Table 104: US15W OEM features - I/O board features - Panel control - Configuration options

1.4.4 IF board features

Information:

The values and menus shown may vary depending on which interface board is connected.

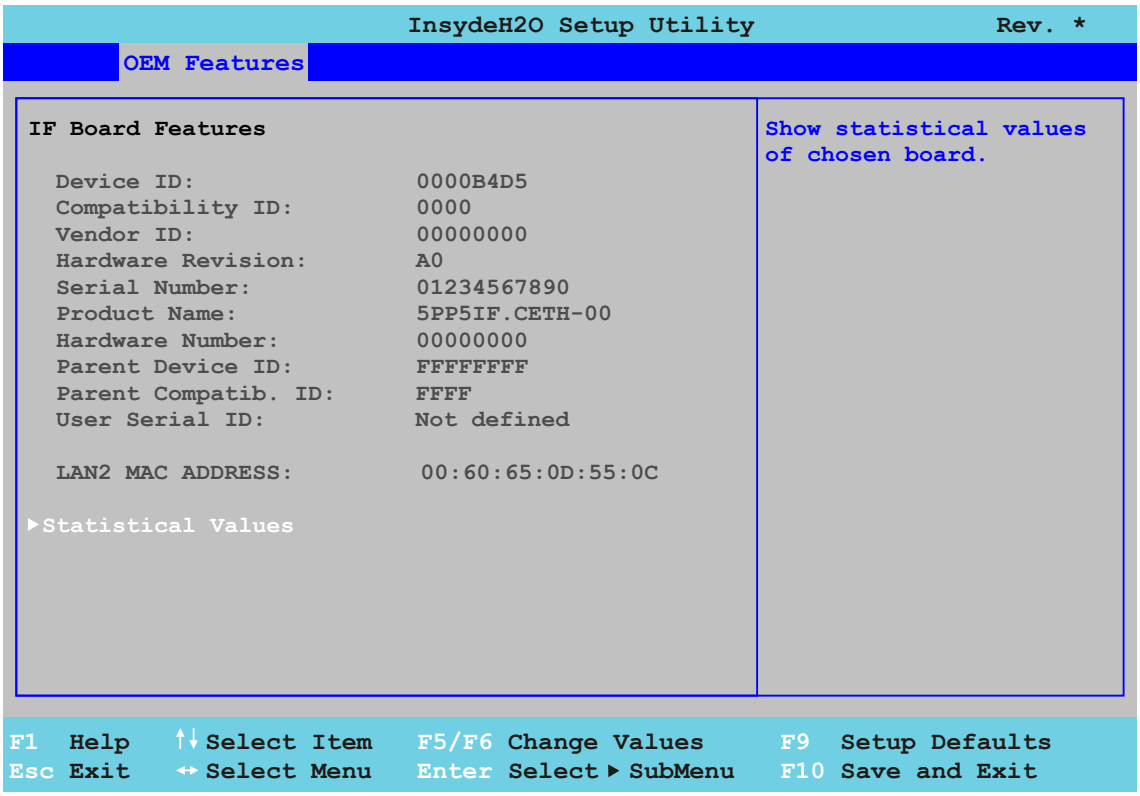


Figure 51: US15W OEM features - IF board features

BIOS setting	Function	Configuration options	Effect
Device ID	Displays the device ID of the IF board	None	-
Compatibility ID	Displays the version of the device within the same B&R device ID. This ID is needed for Automation Runtime.	None	-
Vendor ID	Displays the vendor ID	None	-
Hardware revision	Displays the IF board hardware revision	None	-
Serial number	Displays the B&R serial number	None	-
Product name	Displays the B&R model number	None	-
Hardware number	Displays the IF board hardware number.	None	-
Parent device ID	Displays the manufacturer number	None	-
Parent compatib. ID	Displays the manufacturer ID	None	-
User serial ID	Displays the user serial ID. This 8-digit hexadecimal value can be freely specified by the user (e.g. to give the device a unique ID) and can only be changed using the "B&R Control Center" included with the ADI driver.	None	-
LAN2 MAC ADDRESS[1)]	Displays the assigned MAC address for the ETH interface	None	-
Statistical values	Displays statistical values	Enter	Opens the submenu See "Statistical values" on page 105

Table 105: US15W OEM features - IF board features - Configuration options

1) *LAN2 MAC ADDRESS* is only displayed for interface board 5PP5IF.CETH-00.

1.4.4.1 Statistical values

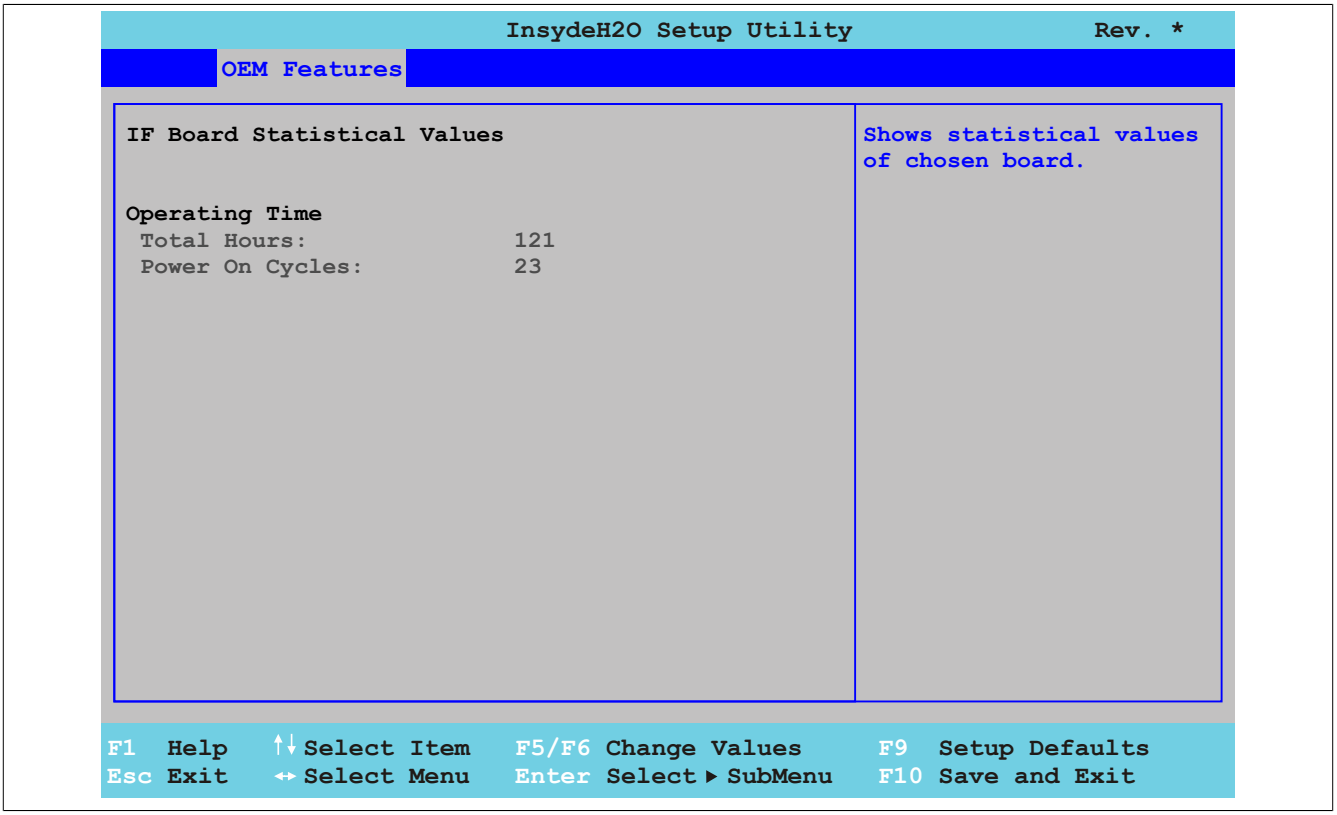


Figure 52: US15W OEM features - IF board features - Statistical values

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

Table 106: US15W OEM features - IF board features - Statistical values - Configuration options

1.4.5 Memory module features

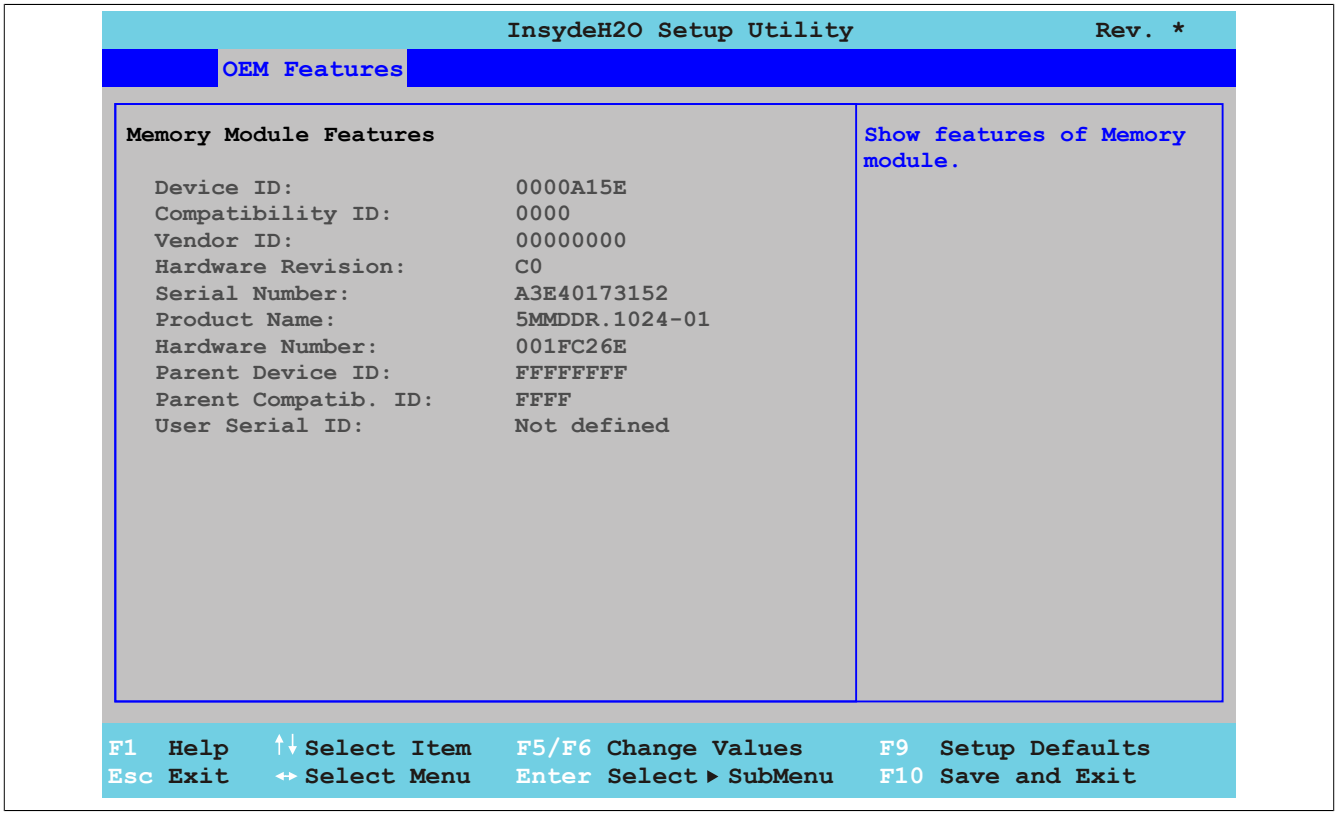


Figure 53: US15W OEM features - Memory module features

BIOS setting	Function	Configuration options	Effect
Device ID	Displays the device ID of the RAM	None	-
Compatibility ID	Displays the version of the device within the same B&R device ID. This ID is needed for Automation Runtime.	None	-
Vendor ID	Displays the vendor ID	None	-
Hardware revision	Displays the hardware revision of the main memory	None	-
Serial number	Displays the B&R serial number	None	-
Product name	Displays the B&R model number	None	-
Hardware number	Displays the hardware number of the main memory	None	-
Parent device ID	Displays the manufacturer number	None	-
Parent compatib. ID	Displays the manufacturer ID	None	-
User serial ID	Displays the user serial ID. This 8-digit hexadecimal value can be freely specified by the user (e.g. to give the device a unique ID) and can only be changed using the "B&R Control Center" included with the ADI driver.	None	-

Table 107: US15W OEM features - Memory module features - Configuration options

1.5 Advanced

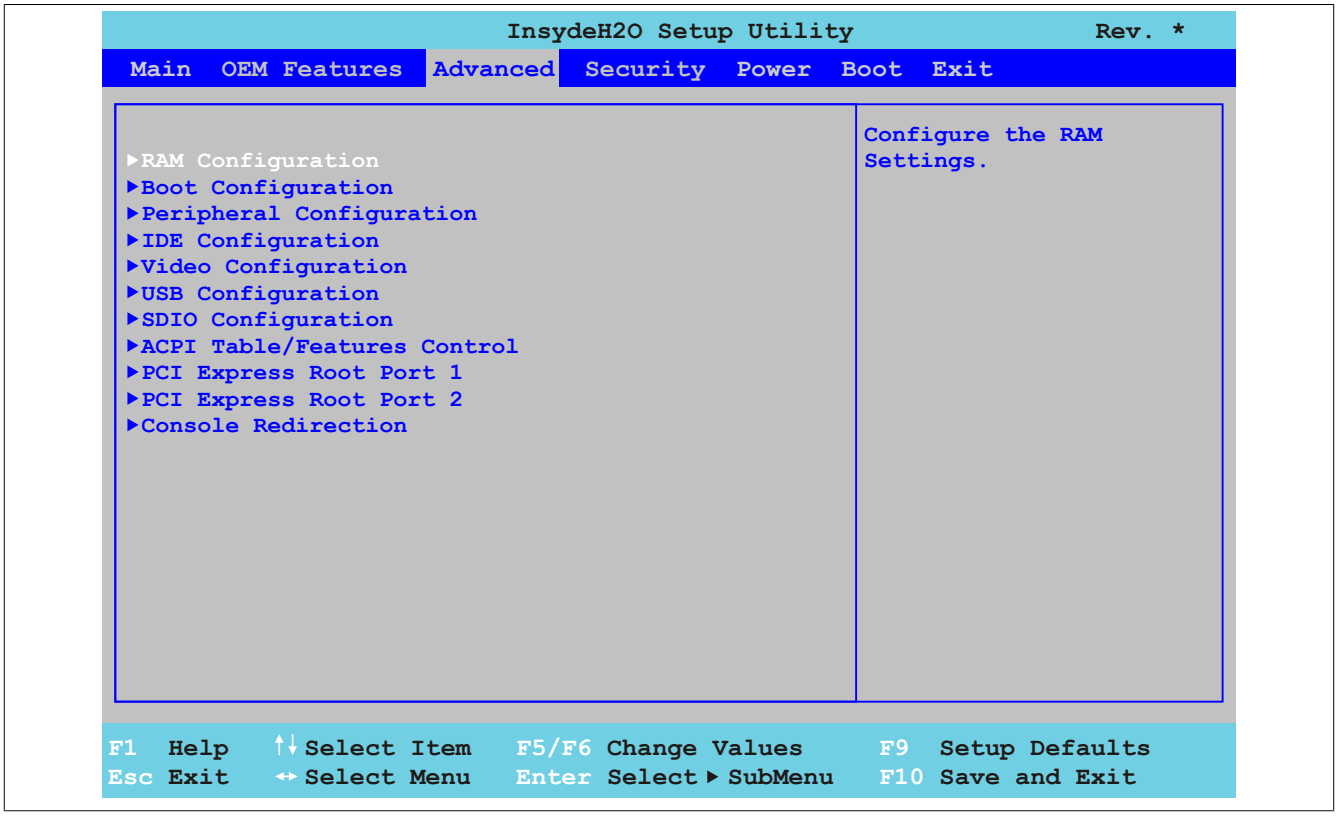


Figure 54: US15W Advanced menu

BIOS setting	Function	Configuration options	Effect
RAM configuration	Configures RAM settings	Enter	Opens the submenu See "RAM configuration" on page 108
Boot configuration	Configures boot settings	Enter	Opens the submenu See "Boot configuration" on page 109
Peripheral configuration[1)]	Configures peripheral settings	Enter	Opens the submenu See "Peripheral configuration" on page 110
IDE configuration	Configures IDE functions	Enter	Opens the submenu See "IDE configuration" on page 111
Video configuration	Configures graphics settings	Enter	Opens the submenu See "Video configuration" on page 114
USB configuration	Configures USB settings	Enter	Opens the submenu See "USB configuration" on page 115
SDIO configuration[2)]	Configures SDIO settings	Enter	Opens the submenu See "SDIO configuration" on page 116
ACPI table/features control configuration	Configures ACPI table/features	Enter	Opens the submenu See "ACPI table/features control" on page 117
PCI Express root port 1	Configures PCI Express settings on port 1 **Warning!** **Improper settings can cause instability or device problems. It is therefore strongly recommended that these settings only be changed by experienced users.**	Enter	Opens the submenu See "PCI Express root port 1" on page 117

Table 108: US15W Advanced menu - Configuration options

BIOS setting	Function	Configuration options	Effect
PCI Express root port 2	Configures PCI Express settings on port 2 **Warning!** **Improper settings can cause instability or device problems. It is therefore strongly recommended that these settings only be changed by experienced users.**	Enter	Opens the submenu See "PCI Express root port 2" on page 120
Console redirection[3]	Configures the remote console	Enter	Opens the submenu See "Console redirection" on page 121

Table 108: US15W Advanced menu - Configuration options

1) This menu option is only available if there is an audio connection.
2) SDIO - Secure digital input output.
3) These settings are only visible to Automation PC 511 system units without an I/O board. The mode/node switches must be set to "00" (default).

1.5.1 RAM configuration

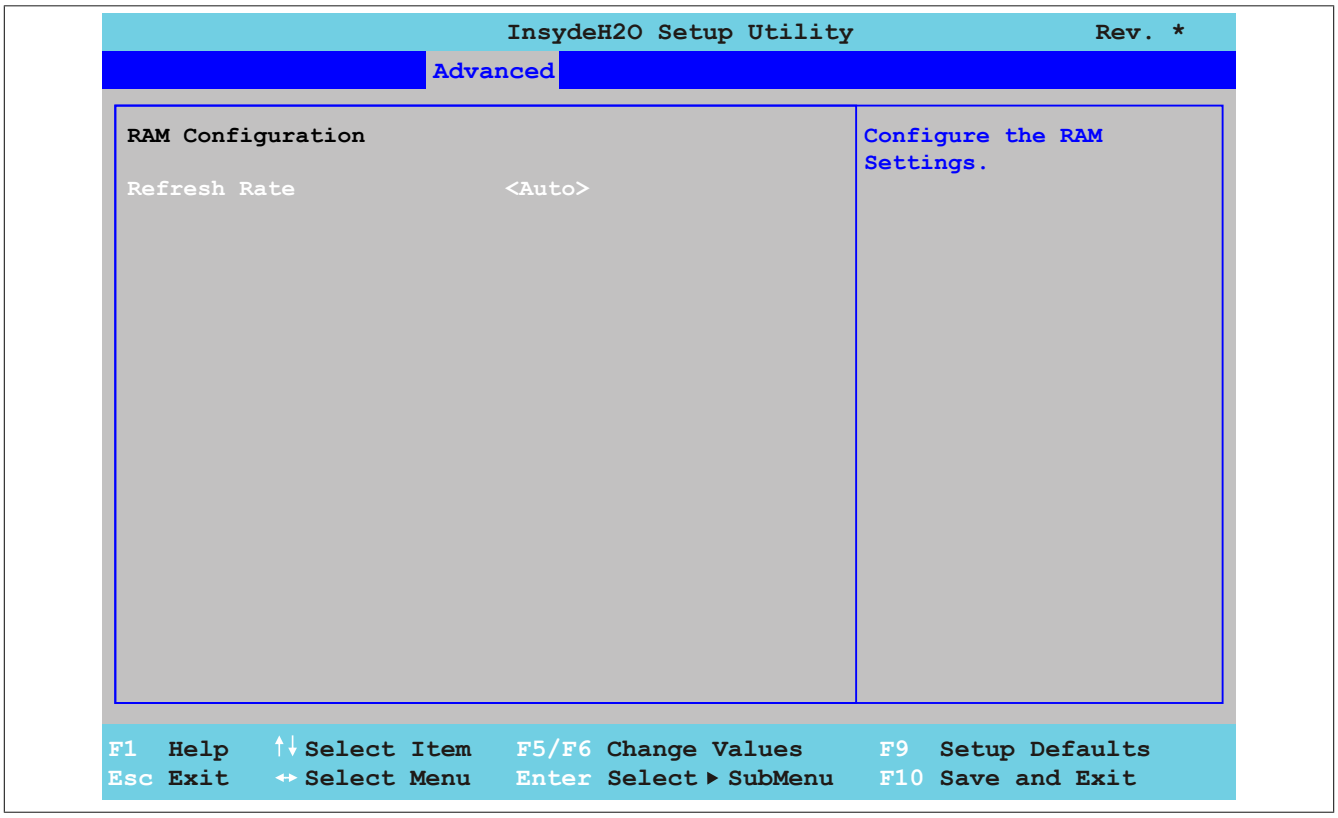


Figure 55: US15W Advanced - RAM configuration

BIOS setting	Function	Configuration options	Effect
Refresh rate	Option for configuring the DRAM refresh rate	Auto	Reads the DRAM refresh rate from the SPD data of the DRAM module
		7.8 µs	The DRAM refresh rate is set manually.
		3.9 µs	The DRAM refresh rate is set manually.

Table 109: US15W Advanced - RAM configuration - Configuration options

1.5.2 Boot configuration

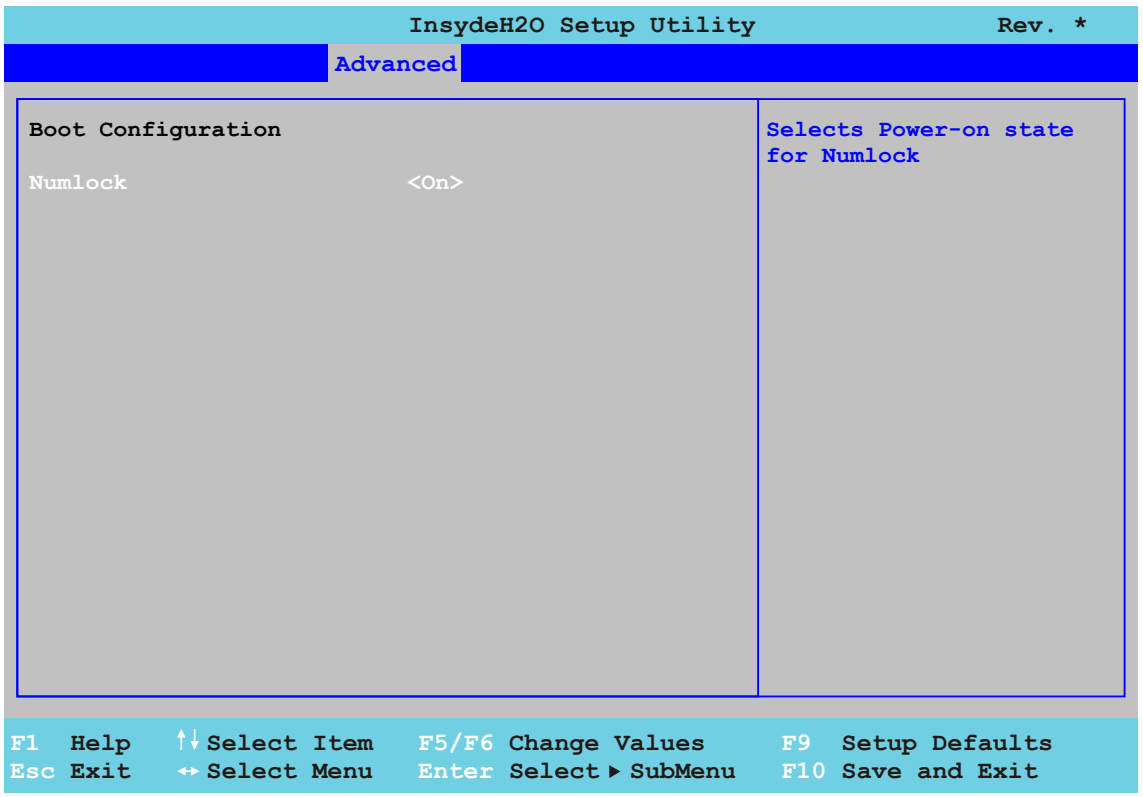


Figure 56: US15W Advanced - Boot configuration

BIOS setting	Function	Configuration options	Effect
NumLock	Defines the state of the NumLock key on the numeric keypad when booting	On	Enables the numeric keypad
		Off	Only enables the cursor (movement) functions of the numeric keypad

Table 110: US15W Advanced - Boot configuration - Configuration options

1.5.3 Peripheral configuration

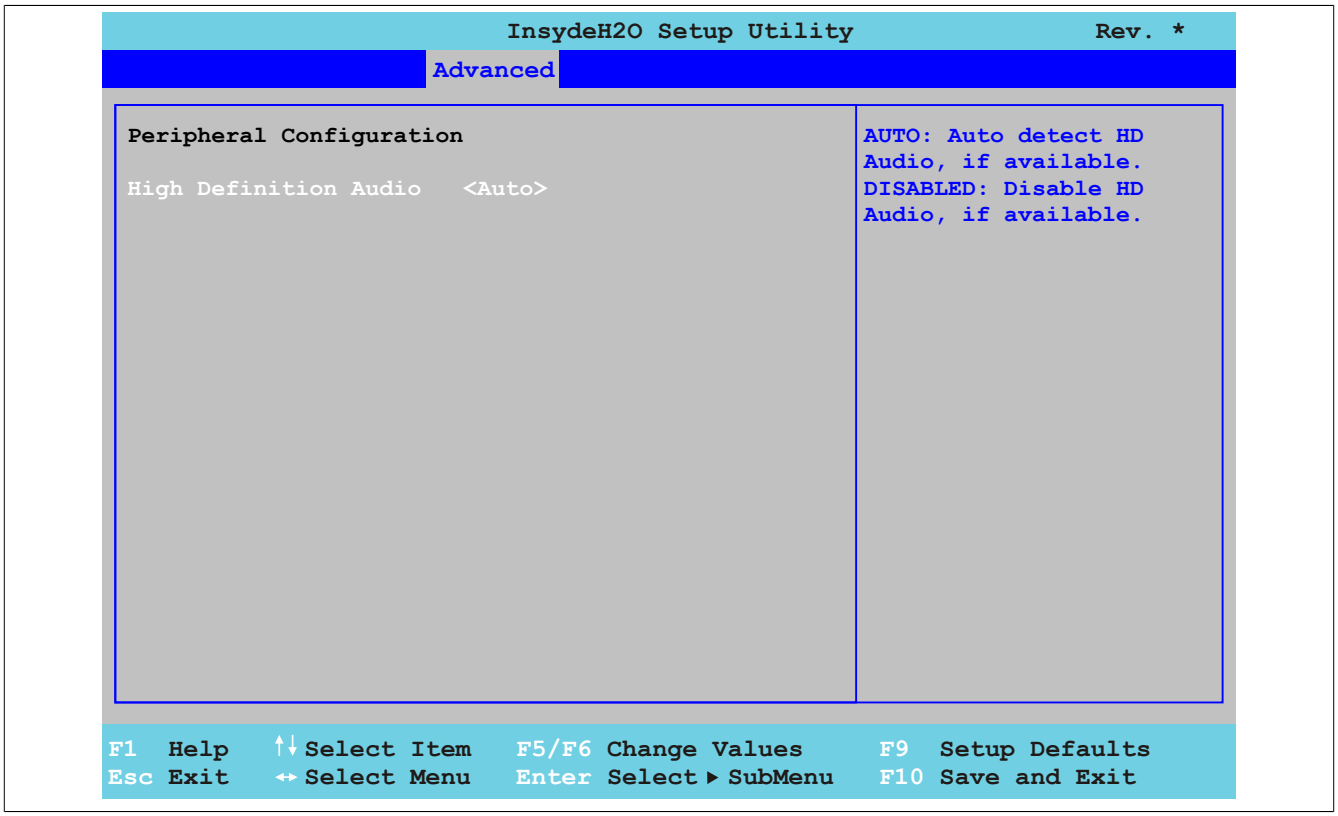


Figure 57: US15W Advanced - Peripheral configuration

BIOS setting	Function	Configuration options	Effect
High definition audio	Option for enabling/disabling audio support	Disabled	Disables the audio controller
		Auto	Enables HDA (high definition audio). The HDA controller automatically detects installed audio devices.

Table 111: US15W Advanced - Peripheral configuration - Configuration options

Information:

The menu option "Peripheral configuration" is only displayed if there is an audio connection.

1.5.4 IDE configuration

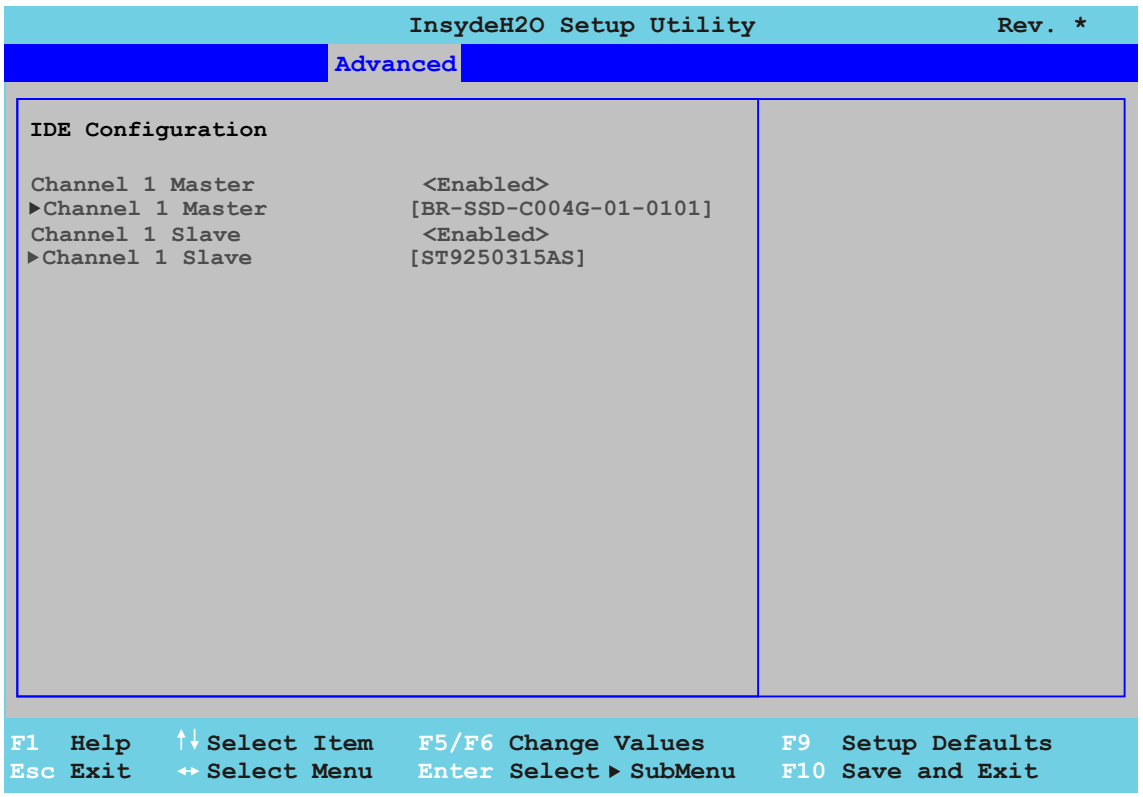


Figure 58: US15W Advanced - IDE configuration

BIOS setting	Function	Configuration options	Effect
Channel 1 master	Option for enabling/disabling the drive connected to the channel 1 master	Disabled	Disables mass memory
		Enabled	Enables mass memory
Channel 1 master	Displays the drive that is connected to the channel 1 master	Enter	Opens the submenu See "Channel 1 master" on page 112
Channel 1 slave	Option for enabling/disabling the drive connected to the channel 1 slave	Disabled	Disables mass memory
		Enabled	Enables mass memory
Channel 1 slave	Displays the drive that is connected to the channel 1 slave	Enter	Opens the submenu See "Channel 1 slave" on page 113

Table 112: US15W Advanced - IDE configuration - Configuration options

1.5.4.1 Channel 1 master

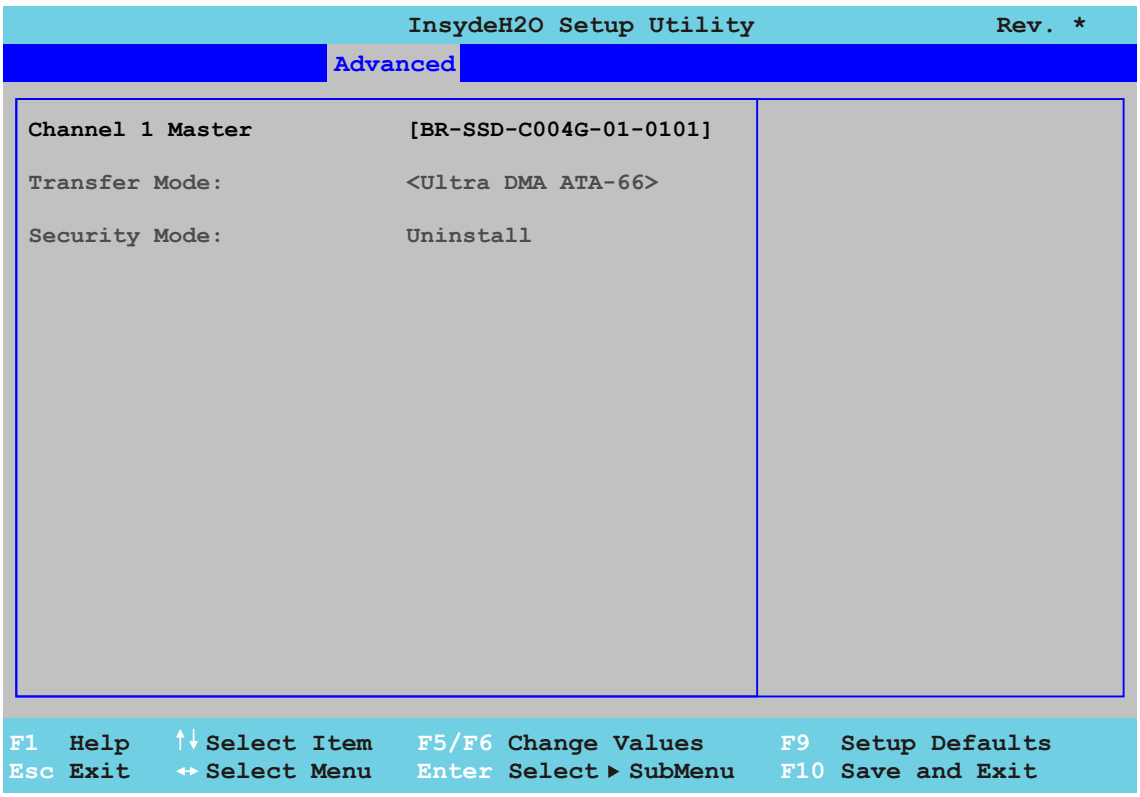


Figure 59: US15W Advanced - IDE configuration - Channel 1 master

BIOS setting	Function	Configuration options	Effect
Transfer mode	Displays the transfer mode used between the channel 1 master drive and the system memory	None	-
Security mode		None	-

Table 113: US15W Advanced - IDE configuration - Channel 1 master - Configuration options

1.5.4.2 Channel 1 slave

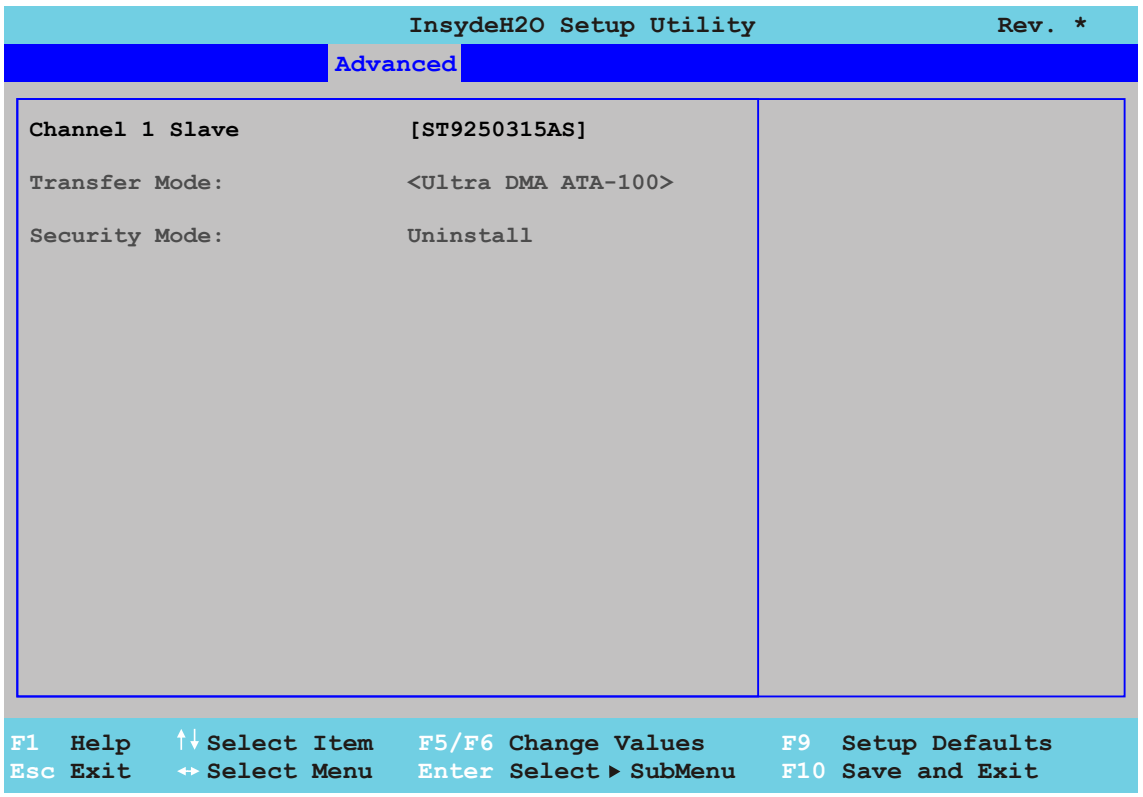


Figure 60: US15W Advanced - IDE configuration - Channel 1 slave

BIOS setting	Function	Configuration options	Effect
Transfer mode	Displays the transfer mode used between the channel 1 slave drive and the system memory	None	-
Security mode		None	-

Table 114: US15W Advanced - IDE configuration - Channel 1 slave - Configuration options

1.5.5 Video configuration

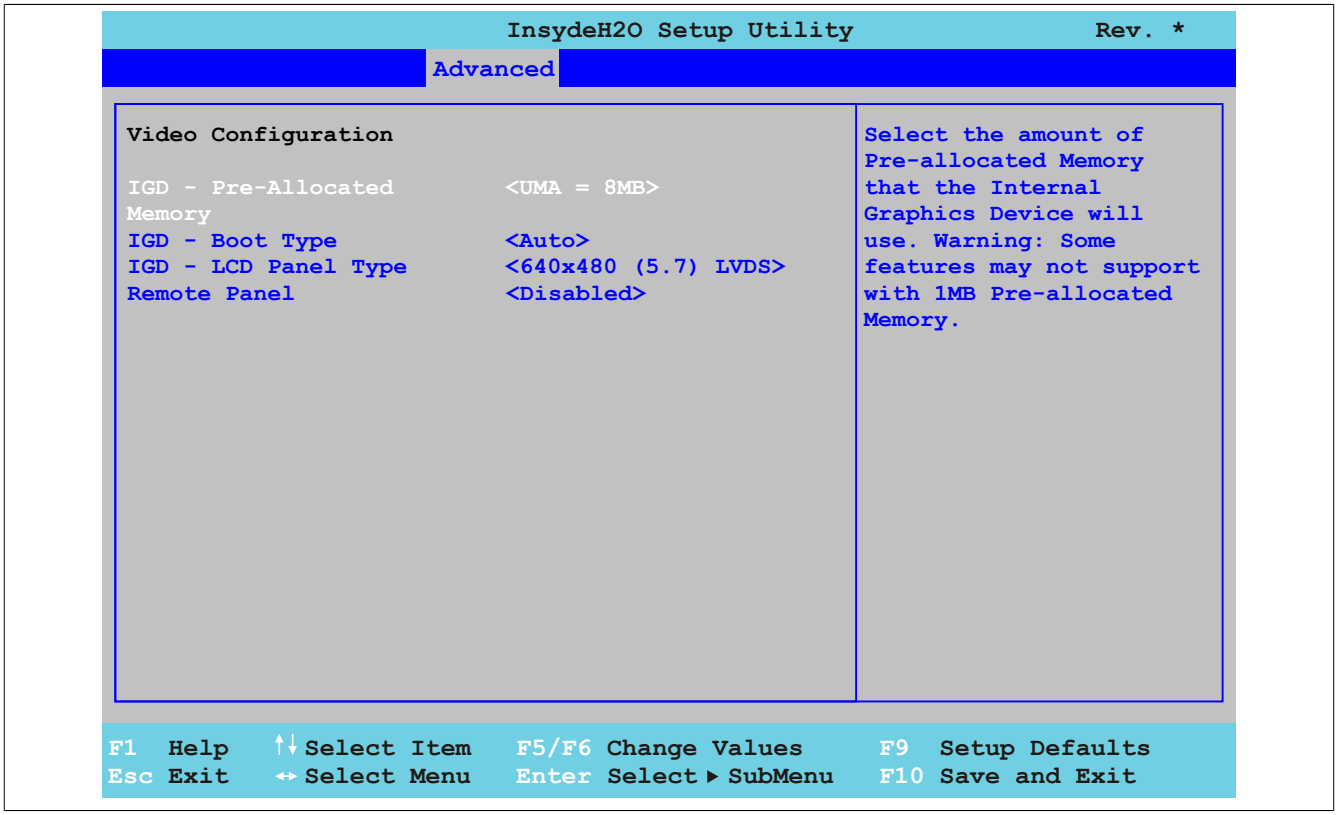


Figure 61: US15W Advanced - Video configuration

BIOS setting	Function	Configuration options	Effect
IGD - Pre-allocated memory	Option for setting the amount of memory used for the internal graphics controller **Information:** **Some functions are not supported with the setting "UMA = 1 MB".**	UMA = 1 MB	Allocates 1 MB main memory
		UMA = 4 MB	Allocates 4 MB main memory
		UMA = 8 MB	Allocates 8 MB main memory
IGD - Boot type	Option for defining the enabled panel during POST	Auto	Automatically selects one of the panels listed under "IGD - LCD panel type"
		LFP(LVDS)	Shows POST on the Power Panel 500 display (LFP = local flat panel)
		EFP(SDL or DVI)	Shows POST on an external panel (EFP = external flat panel)
IGD - LCD panel type[1)]	Option for configuring the display resolution **Information:** **If the display setting is present in the EPROM data, then this setting has no effect on the display resolution. This is because the EPROM data is loaded each time the system is restarted and the BIOS setting is overwritten.**	640x480 (5.7) LVDS	640 x 480 resolution (for 5.7" displays)
		800x480 (7.0) LVDS	800 x 480 resolution (for 7" displays)
		800x600 (8.4) LVDS	800 x 600 resolution (for 8.4" displays)
		640x480 (10.4) LVDS	640 x 480 resolution (for 10.4" displays)
		800x600 (12.0) LVDS	800 x 600 resolution (for 12.0" displays)
		1024x768 (15.0) LVDS	1024 x 768 resolution (for 15" displays)
Remote Panel[2)]	Option for controlling the device remotely (with no display connected) from another PC via the Ethernet interface. This makes it possible to make BIOS settings.	Enabled	Enables this function
		Disabled	Disables this function

Table 115: US15W Advanced - Video configuration - Configuration options

1) This setting is only available for PP500 system units.
2) This setting is only shown if an I/O board is installed. This option does not appear if a display is connected or integrated. It is also shown on APC511 system units if no I/O board is installed.

1.5.6 USB configuration

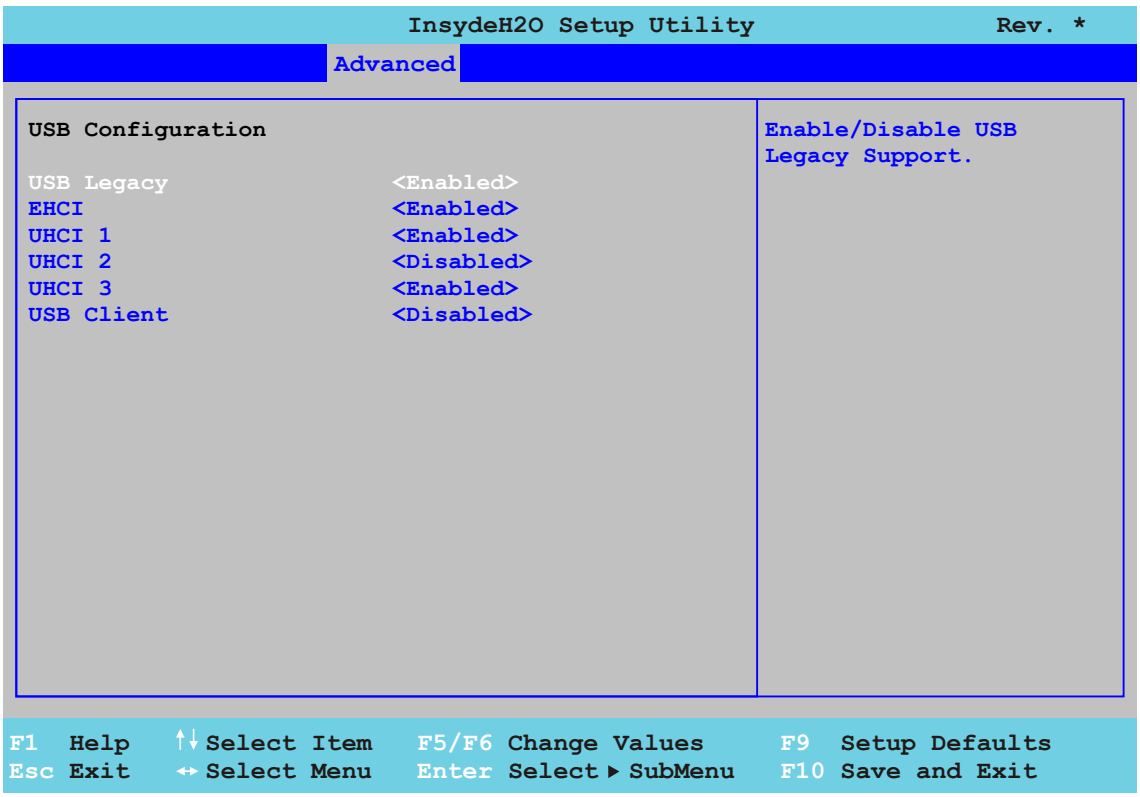


Figure 62: US15W Advanced - USB configuration

BIOS setting	Function	Configuration options	Effect
USB Legacy	Enables/Disables Legacy USB support. USB ports do not function during startup. USB support is available again after the operating system has started. A USB keyboard is still recognized during POST.	Enabled	Enables this function
		Disabled	Disables this function
EHCI	Allows support for operating systems to be set up without the fully automatic EHCI function	Enabled	Enables USB support USB 2.0 support is enabled as soon as a USB 2.0 device is connected to the interface.
		Disabled	Disables USB 2.0 support
UHCI 1	Configures USB UHCI controller 1 for USB ports 1, 2 and 3	Enabled	Enables USB support
		Disabled	Disables USB support **Warning!** **If this setting is *Disabled*, then the settings *UHCI 2* and *UHCI 3* will also be set to *Disabled* and all USB ports will be disabled. As a result, it will no longer be possible to enter BIOS.** **However, if UHCI 1 has been disabled, then you can use the Backup BIOS to once again enter BIOS. For more information, see "OEM features" on page 89**
UHCI 2[1)]	Configures USB UHCI controller 2 for USB ports on the I/O board	Enabled	Enables USB support
		Disabled	Disables USB support
UHCI 3[1)]	Configures USB UHCI controller 3 for USB port 3	Enabled	Enables USB support
		Disabled	Disables USB support
USB client	Setting for USB client support	Enabled	Enables USB Client support
		Disabled	Disables USB Client support

Table 116: US15W Advanced - USB configuration - Configuration options

1) These settings are only possible if *UHCI 1* is set to *Enabled*.

1.5.7 SDIO configuration

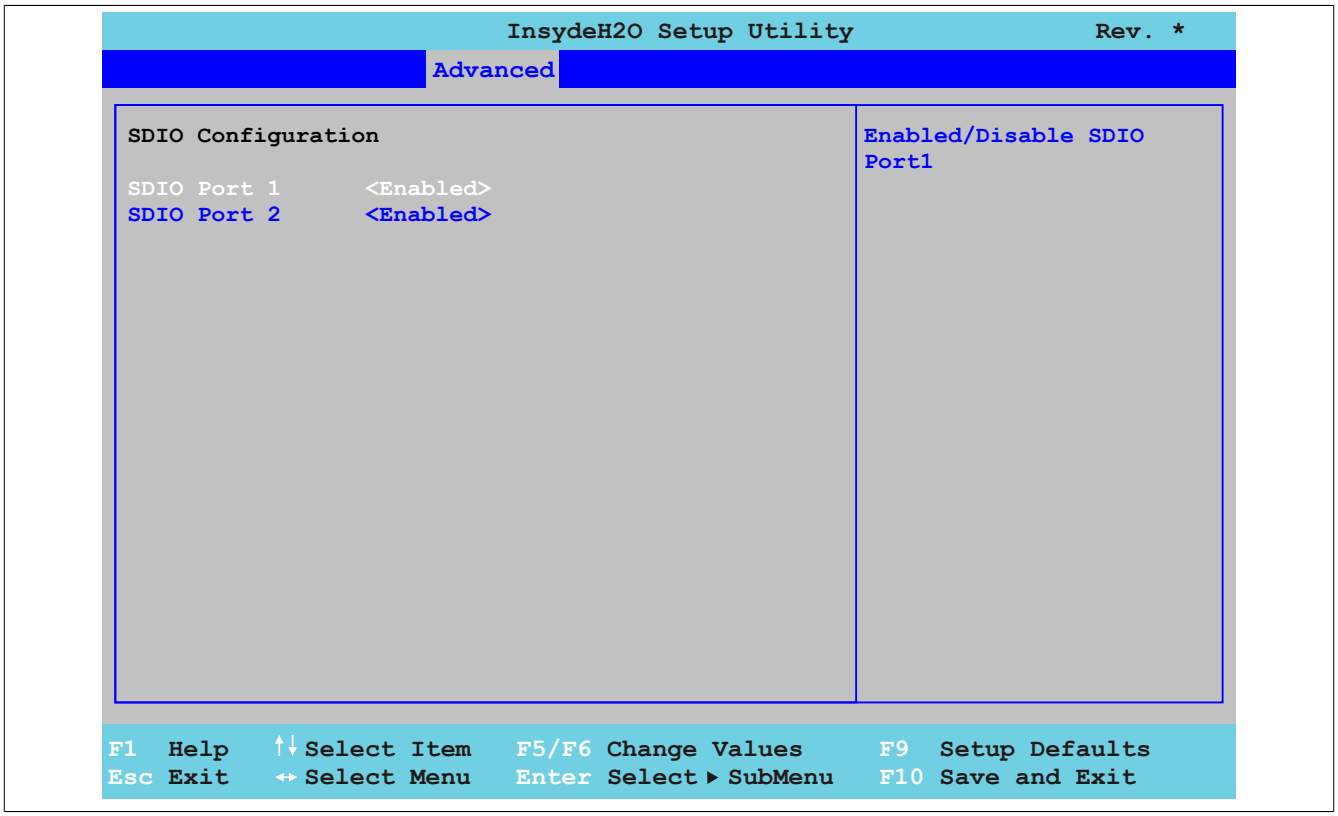


Figure 63: US15W Advanced - SDIO configuration

BIOS setting	Function	Configuration options	Effect
SDIO port 1	Option for enabling/disabling SDIO port 1 (secure digital input output - SD memory card slot)	Enabled	Enables this function
		Disabled	Disables this function
SDIO port 2	Option for enabling/disabling SDIO port 2 (secure digital input output - SD memory card slot)	Enabled	Enables this function
		Disabled	Disables this function

Table 117: US15W Advanced - SDIO configuration - Configuration options

1.5.8 ACPI table/features control

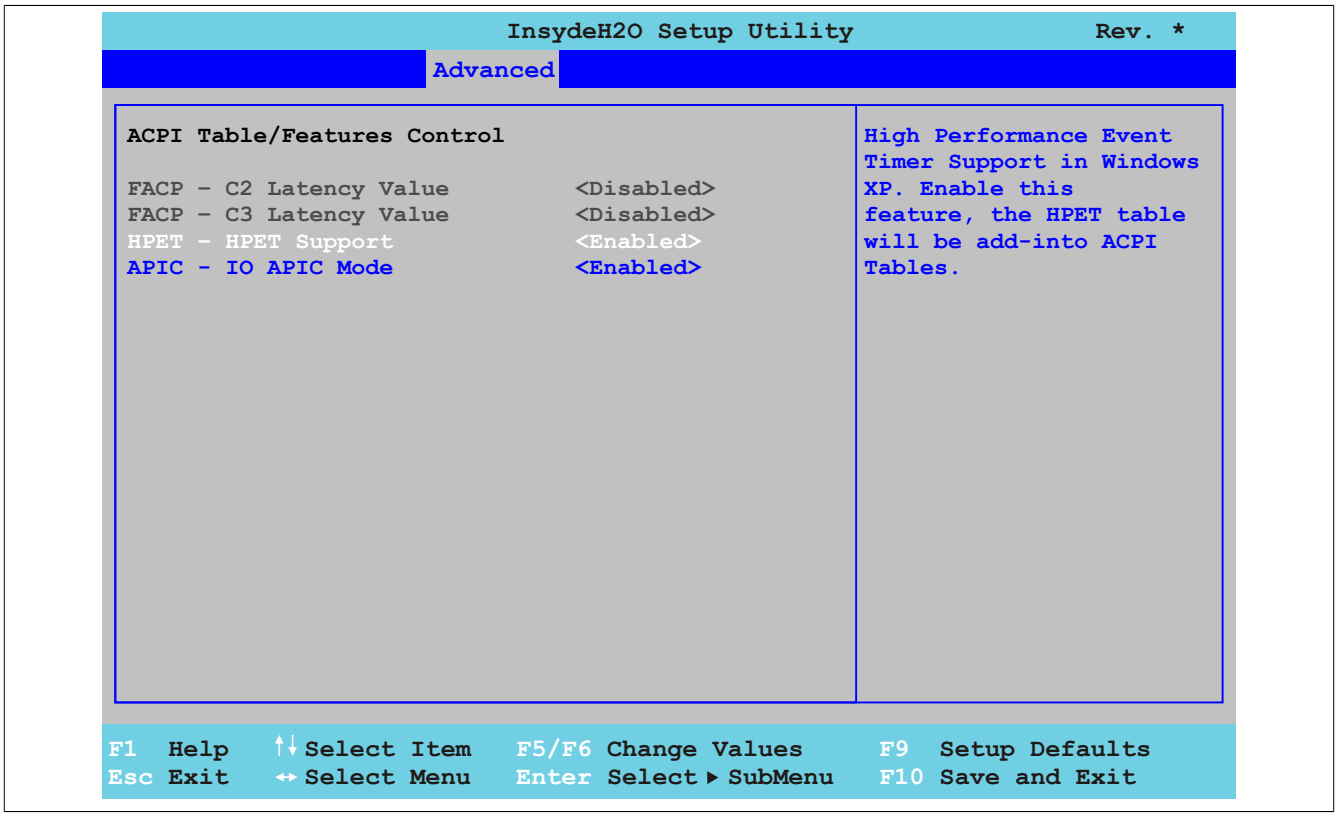


Figure 64: US15W Advanced - ACPI table/features control

BIOS setting	Function	Configuration options	Effect
FACP – C2 latency value[1)]	Option for setting a latency period in the C2 state	Enabled	Enables this function Sets a latency of 1 µs (i.e. the C2 state will be entered within 1 µs and exited again within 1 µs)
		Disabled	Disables this function
FACP – C3 latency value[1)]	Option for setting a latency period in the C3 state	Enabled	Enables this function Sets a latency of 85 µs (i.e. the C3 state will be entered within 85 µs and exited again within 85 µs)
		Disabled	Disables this function
HPET – HPET support	The HPET is a timer inside the PC. It is able to trigger an interrupt with a high degree of accuracy, which allows other programs to better synchronize a variety of applications.	Enabled	Enables this function This function is recommended for multimedia applications.
		Disabled	Disables this function
APIC - I/O APIC mode	This option controls the support of the advanced programmable interrupt controller in the processor.	Enabled	Enables this function
		Disabled	Disables this function **Warning!** **Windows XP will not be started if this setting is disabled.**

Table 118: US15W Advanced - ACPI table/features control - Configuration options

1) These settings are only possible if *C-States* under the *Advanced CPU control* menu item is set to *Enabled*.

1.5.9 PCI Express root port 1

Warning!

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

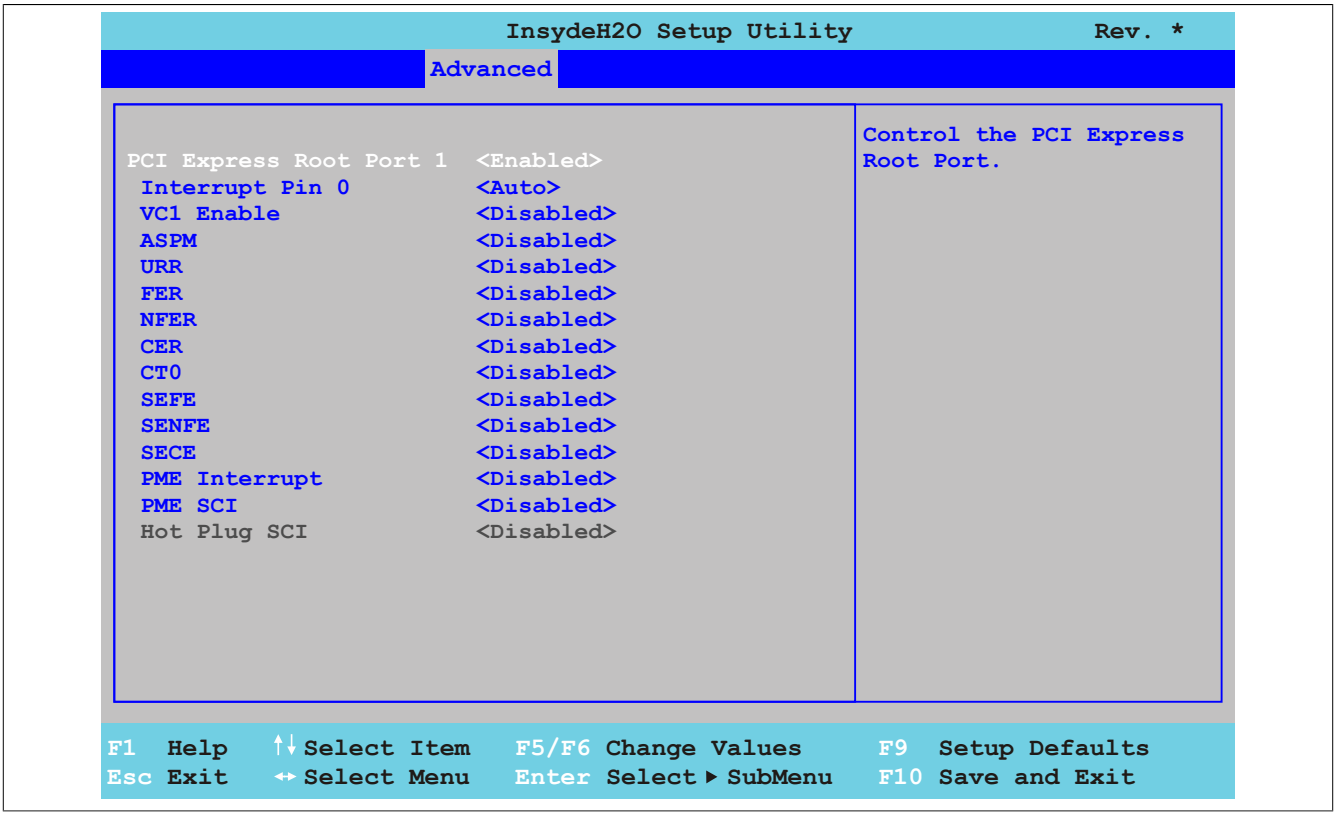


Figure 65: US15W Advanced - PCI Express root port 1

BIOS setting	Function	Configuration options	Effect
PCI Express root port 1	Option for enabling/disabling PCI Express root port 1	Enabled	Enables PCI Express root port 1
		Disabled	Disables PCI Express root port 1 and 2
Interrupt pin 0		Auto	Enables IRQ for root port 1
		Disabled	Disables IRQ for root port 1
VC1 enable	Virtual channel 1	Auto	Configures the mapping under the "VC1/TC mapping" setting in BIOS
		Disabled	Disables this function Automatically uses the TC0 traffic class and maps it to the VC0 virtual channel
VC1/TC mapping[1)]	Option for defining which traffic will be mapped to which virtual channel	TC0	TBD
		TC1	Maps the TC1 traffic class manually to the VC1 virtual channel
		TC2	Maps the TC2 traffic class manually to the VC1 virtual channel
		TC3	Maps the TC3 traffic class manually to the VC1 virtual channel
		TC4	Maps the TC4 traffic class manually to the VC1 virtual channel
		TC5	Maps the TC5 traffic class manually to the VC1 virtual channel
		TC6	Maps the TC6 traffic class manually to the VC1 virtual channel
		TC7	Maps the TC7 traffic class manually to the VC1 virtual channel
ASPM	*Active state power management* Option for configuring a power saving function (L0s/L1) for PCIe link cards if they do not require full power	Enabled	Enables this function
		Disabled	Disables this function
Automatic ASPM[2)]	Option for manually or automatically configuring ASPM.	Auto	Automatic assignment by BIOS and the operating system
		Manual	Assignment under the BIOS setting "ASPM L0s" and "ASPM L1"
ASPM L0s[3)]	Option for configuring the L0 power saving function	Disabled	Disables this function
		Root port only	Enables the power saving function for the root port
		Endpoint port only	Enables the power saving function for the endpoint port
		Root & endpoint ports	Enables the power saving function for the root and endpoint ports
ASPM L1[3)]	Option for configuring the L1 power saving function Power consumption is lower than with L0, but the exit latency is higher.	Enabled	Enables this function
		Disabled	Disables this function
URR	*Unsupported Request (UR) reporting*	Enabled	Enables this function

Table 119: US15W Advanced - PCI Express root port 1 - Configuration options

BIOS setting	Function	Configuration options	Effect
	Option for reporting unsupported requests. Logging of error messages received by the root port is controlled exclusively by the root control register.	Disabled	Disables this function
FER	*Fatal error reporting* Option for reporting fatal errors. All of the functions of a multifunction device will be monitored. The report for the root port takes place internally inside the root complex.	Enabled	Enables this function
		Disabled	Disables this function
NFER	*Non-fatal error reporting* Option for reporting non-fatal errors. All of the functions of a multifunction device will be monitored. The report for the root port takes place internally inside the root complex.	Enabled	Enables this function
		Disabled	Disables this function
CER	*Correctable error reporting* Option for reporting non-fatal errors. All of the functions of a multifunction device will be monitored. The report for the root port takes place internally inside the root complex.	Enabled	Enables this function
		Disabled	Disables this function
CT0	*PCI Express completion timer T0* Option for enabling/disabling the PCI Express completion timer **Information:** **This setting should be set to "Enabled" if the system detected an ROB (processor reorder buffer) timeout.**	Enabled	Enables this function
		Disabled	Disables this function
SEFE	*System error on fatal error* Option for generating a system error if a fatal error is registered by a device on the root port or by the root port itself	Enabled	Enables this function
		Disabled	Disables this function
SENFE	*System error on non-fatal error* Option for generating a system error if a non-fatal error is registered by a device on the root port or by the root port itself	Enabled	Enables this function
		Disabled	Disables this function
SECE	*System error on correctable error* Option for generating a system error if a correctable error is registered by a device on the root port or by the root port itself	Enabled	Enables this function
		Disabled	Disables this function
PME interrupt	*Power management event interrupt* Option for generating a PME interrupt An interrupt is generated when a PME message is received from a PCIe device.	Enabled	Enables this function Generates a PME interrupt when a PME message is received
		Disabled	Disables this function
PME SCI	Option for generating an SCI if power management is detected	Enabled	Enables this function Enables the root port to generate an SCI if power management is detected
		Disabled	Disables this function
Hot plug SCI	Option for generating an SCI if hot plugging is detected	Enabled	Enables this function Enables the root port to generate an SCI if hot plugging is detected
		Disabled	Disables this function

Table 119: US15W Advanced - PCI Express root port 1 - Configuration options

1) These settings are only possible if *VC1 Enable* is set to *Auto*.
2) These settings are only possible if *ASPM* is set to *Enabled*.
3) These settings are only possible if *Automatic ASPM* is set to *Manual*.

1.5.10 PCI Express root port 2

Warning!

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

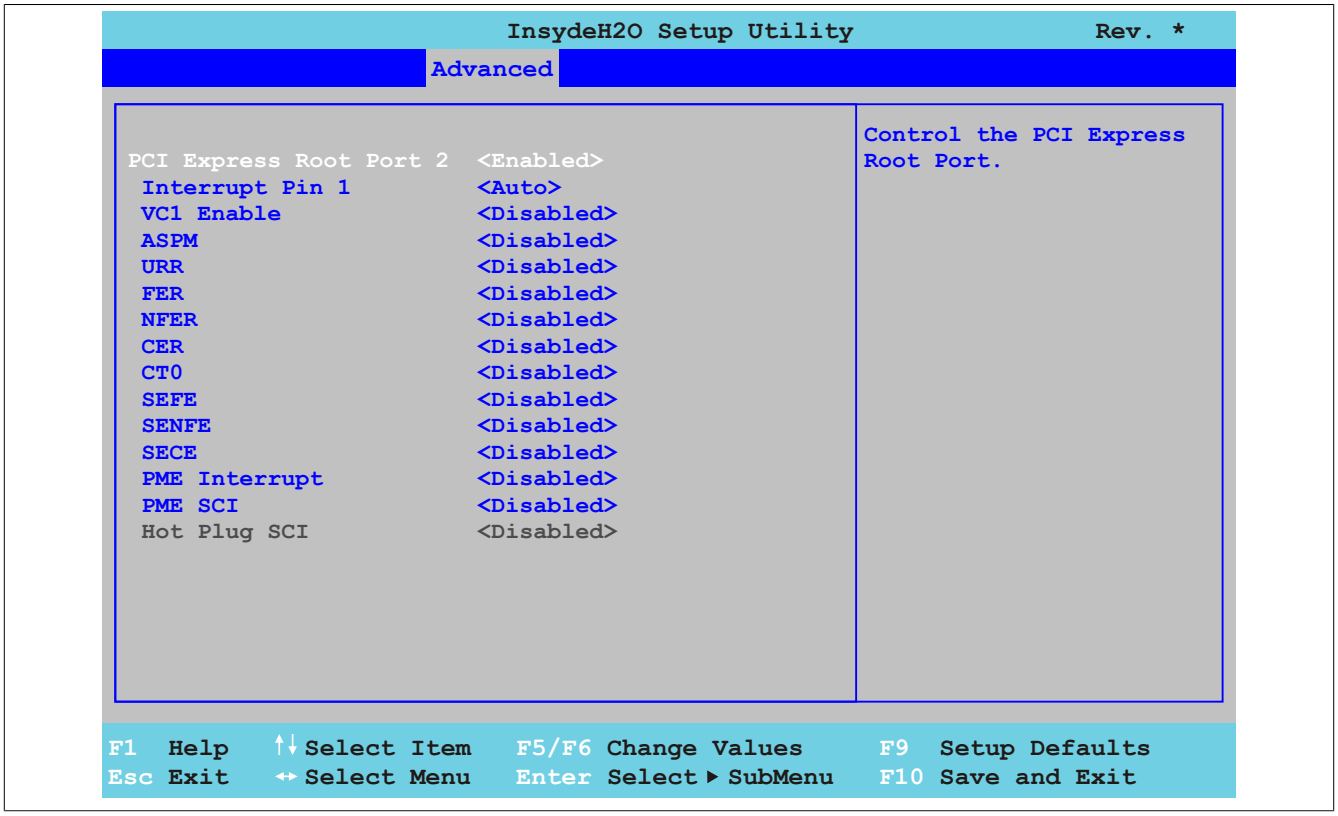


Figure 66: US15W Advanced - PCI Express root port 2

BIOS setting	Function	Configuration options	Effect
PCI Express root port 2	Option for enabling/disabling PCI Express root port 2	Enabled	Enables PCI Express root port 2
		Disabled	Disables PCI Express root port 2
Interrupt pin 1	**Information:** **This function is disabled by default when using ARwin and/or a fieldbus card. This function must be disabled in order to use a fieldbus card.**	Auto	Enables IRQ for root port 2
		Disabled	Disables IRQ for root port 2
VC1 enable	Virtual channel 1	Auto	Configures the mapping under the "VC1/TC mapping" setting in BIOS
		Disabled	Disables this function Automatically uses the TC0 traffic class and maps it to the VC0 virtual channel
VC1/TC mapping[1)]	Option for defining which traffic will be mapped to which virtual channel	TC0	TBD
		TC1	Maps the TC1 traffic class manually to the VC1 virtual channel
		TC2	Maps the TC2 traffic class manually to the VC1 virtual channel
		TC3	Maps the TC3 traffic class manually to the VC1 virtual channel
		TC4	Maps the TC4 traffic class manually to the VC1 virtual channel
		TC5	Maps the TC5 traffic class manually to the VC1 virtual channel
		TC6	Maps the TC6 traffic class manually to the VC1 virtual channel
		TC7	Maps the TC7 traffic class manually to the VC1 virtual channel
ASPM	*Active state power management* Option for configuring a power saving function (L0s/L1) for PCIe link cards if they do not require full power	Enabled	Enables this function
		Disabled	Disables this function

Table 120: US15W Advanced - PCI Express root port 2 - Configuration options

BIOS setting	Function	Configuration options	Effect
Automatic ASPM[2)]	Option for manually or automatically configuring ASPM.	Auto	Automatic assignment by BIOS and the operating system
		Manual	Assignment under the BIOS setting "ASPM L0s" and "ASPM L1"
ASPM L0s[3)]	Option for configuring the L0 power saving function	Disabled	Disables this function
		Root port only	Enables the power saving function for the root port
		Endpoint port only	Enables the power saving function for the endpoint port
		Root & endpoint ports	Enables the power saving function for the root and endpoint ports
ASPM L1[3)]	Option for configuring the L1 power saving function Power consumption is lower than with L0, but the exit latency is higher.	Enabled	Enables this function
		Disabled	Disables this function
URR	*Unsupported Request (UR) reporting* Option for reporting unsupported requests. Logging of error messages received by the root port is controlled exclusively by the root control register.	Enabled	Enables this function
		Disabled	Disables this function
FER	*Fatal error reporting* Option for reporting fatal errors. All of the functions of a multifunction device will be monitored. The report for the root port takes place internally inside the root complex.	Enabled	Enables this function
		Disabled	Disables this function
NFER	*Non-fatal error reporting* Option for reporting non-fatal errors. All of the functions of a multifunction device will be monitored. The report for the root port takes place internally inside the root complex.	Enabled	Enables this function
		Disabled	Disables this function
CER	*Correctable error reporting* Option for reporting non-fatal errors. All of the functions of a multifunction device will be monitored. The report for the root port takes place internally inside the root complex.	Enabled	Enables this function
		Disabled	Disables this function
CT0	*PCI Express completion timer T0* Option for enabling/disabling the PCI Express completion timer **Information:** **This setting should be set to "Enabled" if the system detected an ROB (processor reorder buffer) timeout.**	Enabled	Enables this function
		Disabled	Disables this function
SEFE	*System error on fatal error* Option for generating a system error if a fatal error is registered by a device on the root port or by the root port itself	Enabled	Enables this function
		Disabled	Disables this function
SENFE	*System error on non-fatal error* Option for generating a system error if a non-fatal error is registered by a device on the root port or by the root port itself	Enabled	Enables this function
		Disabled	Disables this function
SECE	*System error on correctable error* Option for generating a system error if a correctable error is registered by a device on the root port or by the root port itself	Enabled	Enables this function
		Disabled	Disables this function
PME interrupt	*Power management event interrupt* Option for generating a PME interrupt An interrupt is generated when a PME message is received from a PCIe device.	Enabled	Enables this function Generates a PME interrupt when a PME message is received
		Disabled	Disables this function
PME SCI	Option for generating an SCI if power management is detected	Enabled	Enables this function Enables the root port to generate an SCI if power management is detected
		Disabled	Disables this function
Hot plug SCI	Option for generating an SCI if hot plugging is detected	Enabled	Enables this function Enables the root port to generate an SCI if hot plugging is detected
		Disabled	Disables this function

Table 120: US15W Advanced - PCI Express root port 2 - Configuration options

1) These settings are only possible if *VC1 Enable* is set to *Auto*.
2) These settings are only possible if *ASPM* is set to *Enabled*.
3) These settings are only possible if *Automatic ASPM* is set to *Manual*.

1.5.11 Console redirection

Information:

These settings are only visible to Automation PC 511 system units without an I/O board. The mode/node switches must be set to "00" (default).

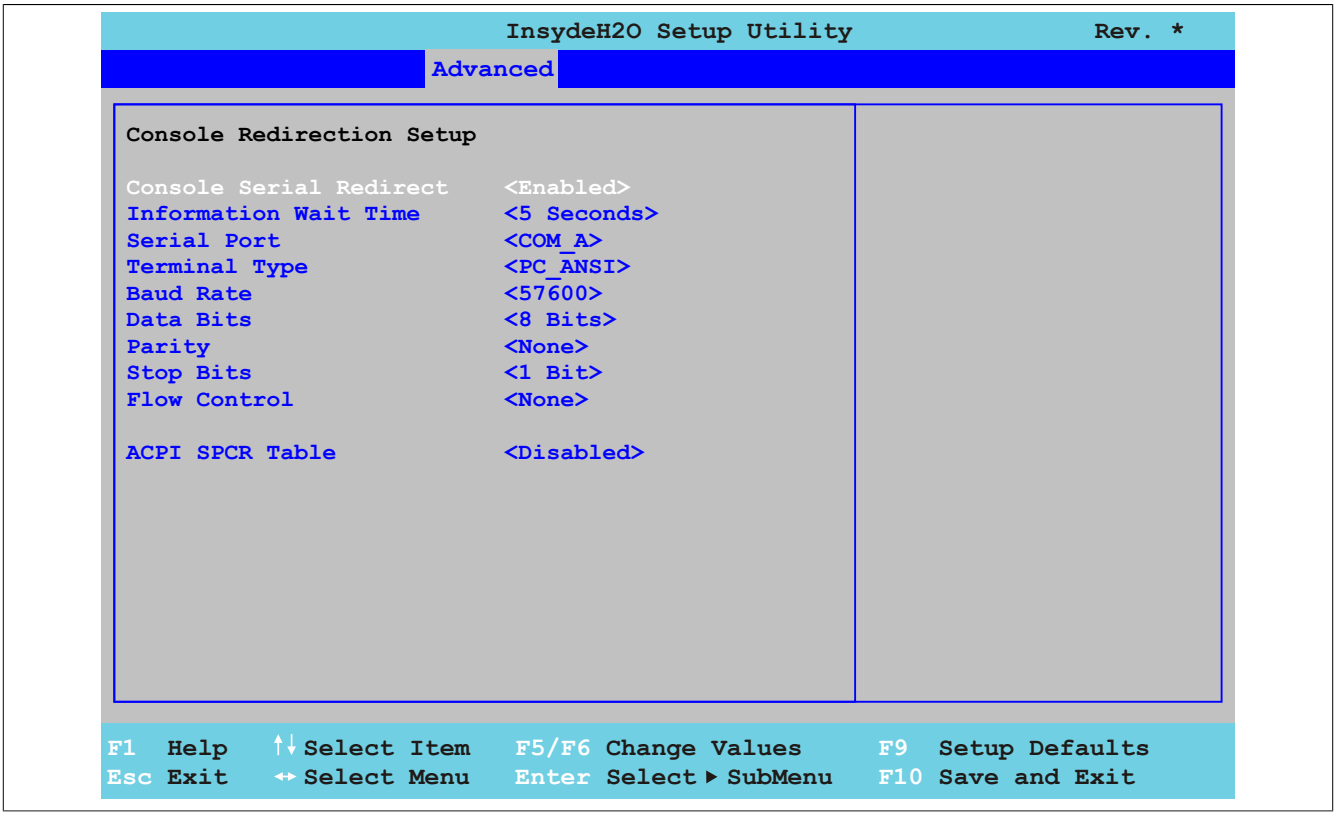


Figure 67: US15W Advanced - Console redirection

BIOS setting	Function	Configuration options	Effect
Console serial redirect	Option for configuring the remote console. The remote console can be used to access BIOS Setup via the serial interface using a terminal emulator (PuTTY or HyperTerminal). **Information:** **This setting is automatically enabled when using an APC511 without an I/O board and mode/node switch position "00" (default).**	Enabled	Enables this function
		Disabled	Disables this function
Information wait time	Option for configuring the amount of time for the remote console to wait before accessing BIOS for the first time	0 seconds, 2 seconds, 5 seconds, 10 seconds, 30 seconds	The remote console waits x seconds before accessing BIOS for the first time.
Serial port	Option for configuring the serial interface	COM_A	Uses the COMA serial interface for access
		COM_B	Uses the COMB serial interface for access
		COM_C	Uses the COMC serial interface for access
		COM_D	Uses the COMD serial interface for access
		All ports	TBD
Terminal type	Option for configuring keyboard input	VT_100	Enables the VT100 convention (ASCII character set)
		VT_100+	Enables the VT100+ convention (ASCII character set and support for color, function keys, etc)
		VT_UTF8	Enables the VT-UTF8 convention (uses UTF8 encoding to assign Unicode characters to one or more bytes)
		PC_ANSI	Enables the PC ANSI convention (extended ASCII character set).
Baud rate	Option for setting the transfer rate of the serial interface (bits per second)	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200	Enables a transfer rate of x bits
Data bits	Option for configuring the character length (data bits) to use for serial communication	7 bits	Character length with 7 bits
		8 bits	Character length with 8 bits
Parity	Option for configuring the parity bit to use for serial communication	None	Parity bit not used
		Even	Uses an even number of parity bits
		Odd	Uses an odd number of parity bits
Stop bits	Option for configuring the stop bits to use for serial communication	1-bit	Uses 1 bit as the stop bit
		2-bit	Uses 2 bits as the stop bit
Flow control	Option for configuring the data flow control	None	Disables data flow control

Table 121: US15W Advanced - Console redirection - Configuration options

BIOS setting	Function	Configuration options	Effect
		RTS/CTS	Enables hardware handshake
		XON/XOFF	Enables software handshake
ACPI SPCR table	Option for configuring ACPI serial port console redirection (SPCR)	Enabled	Enables this function
		Disabled	Disables this function

Table 121: US15W Advanced - Console redirection - Configuration options

1.6 Security

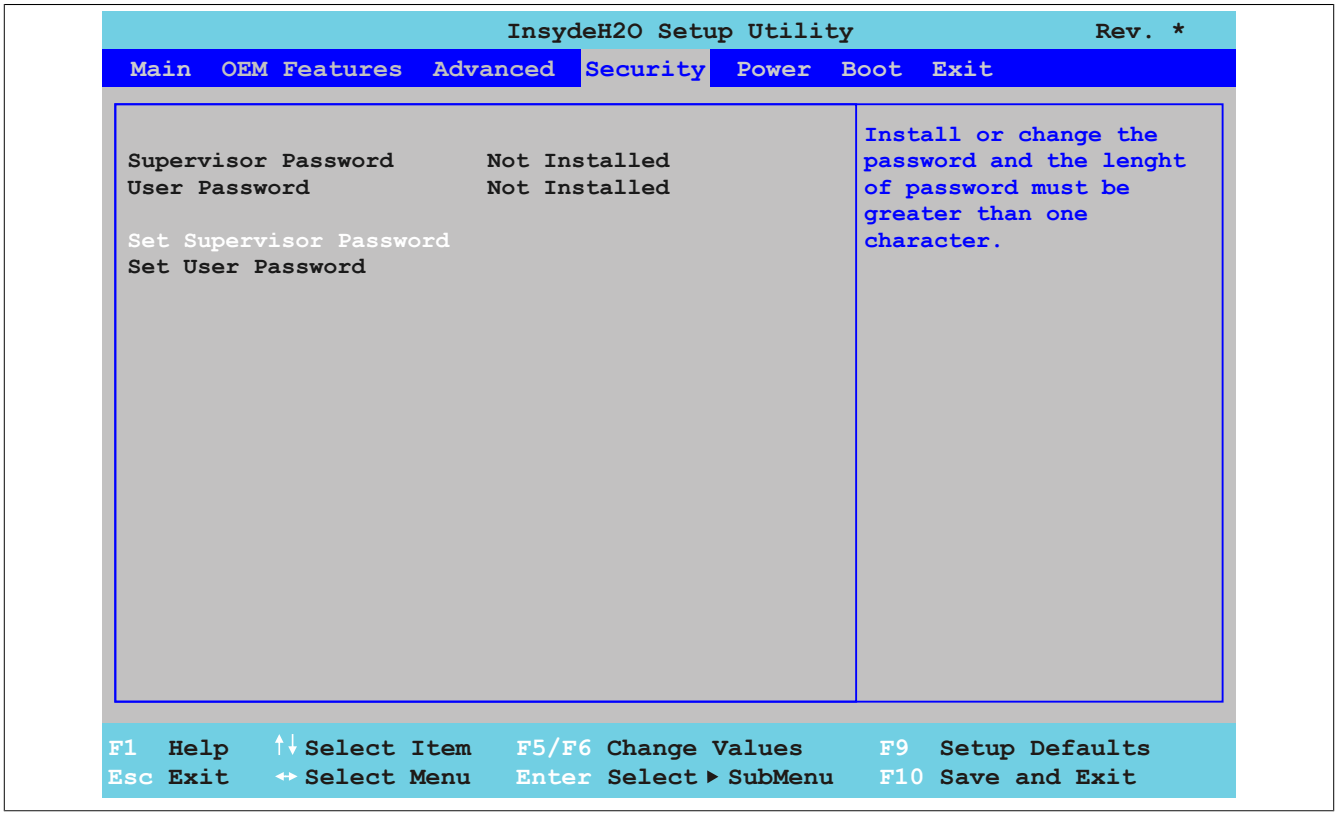


Figure 68: US15W Security menu

BIOS setting	Function	Configuration options	Effect
Supervisor password	Displays whether a supervisor password has been set	None	-
User password	Displays whether a user password has been set	None	-
Set supervisor password	Option for entering/changing a supervisor password. A supervisor password is necessary to edit all BIOS settings.	Enter	Password entry
Set user password	Option for entering/changing a user password. The user password allows the user to edit only certain BIOS settings.	Enter	Password entry

Table 122: US15W Security menu - Configuration options

1.6.1 Set supervisor password

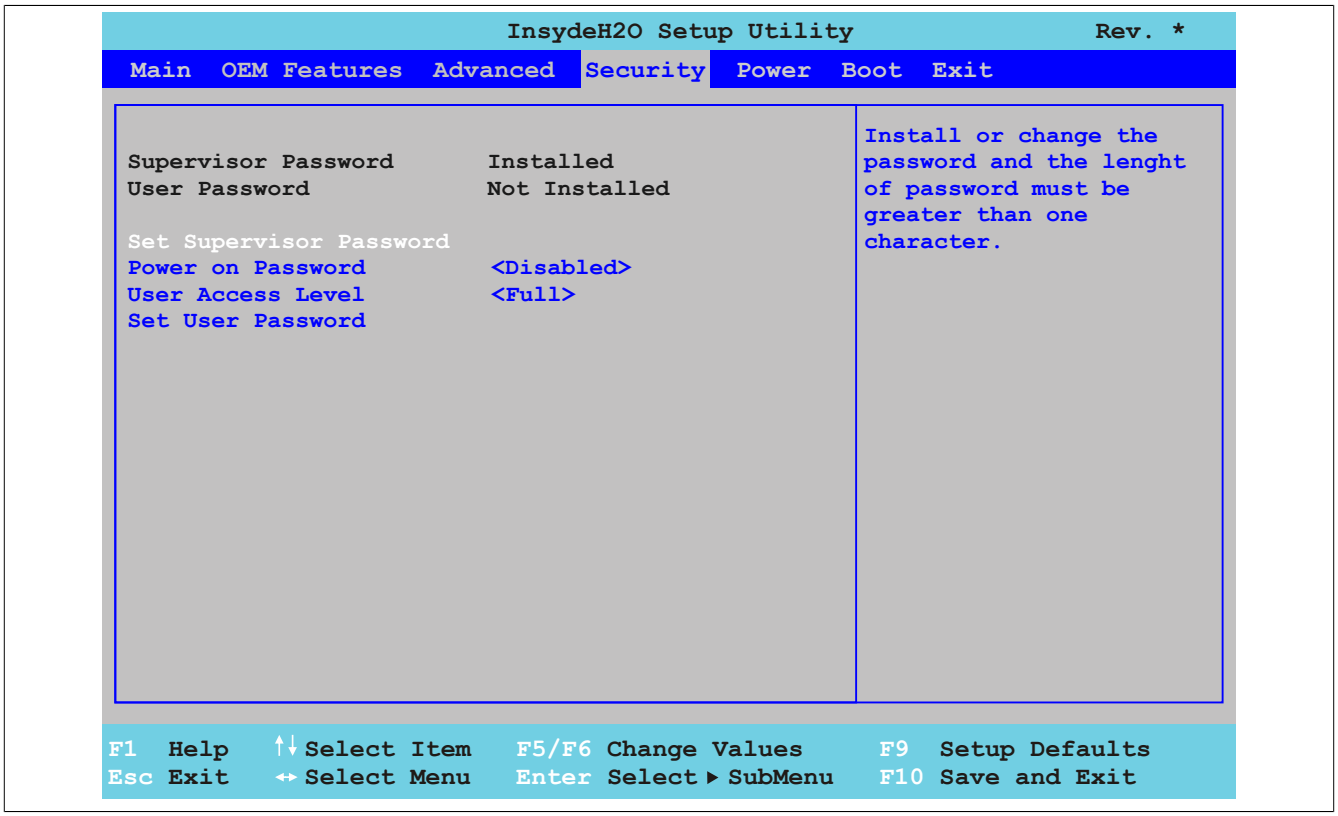


Figure 69: US15W Security - Set supervisor password

BIOS setting	Function	Configuration options	Effect
Supervisor password	Displays whether a supervisor password has been set	None	-
User password	Displays whether a user password has been set	None	-
Set supervisor password	Option for entering/changing a supervisor password. A supervisor password is necessary to edit all BIOS settings.	Enter	Password entry
Power on password	The supervisor password must be entered to access BIOS or start the operating system.	Enabled	Supervisor password necessary for POST
		Disabled	Supervisor password necessary for POST, but not to start the operating system
User access level	Assigns operational permissions in BIOS. These settings are only relevant if a user password has been created.	View only	The user can only view BIOS settings (unable to make changes).
		Limited	The user can view all BIOS settings, but only some changes are possible. Settings that the user can change: Main - System time, Main - System date, Advanced - Boot configuration - Numlock
		Full	The user has full access to BIOS and can make any necessary changes.

Table 123: US15W Security - Set supervisor password - Configuration options

1.6.2 Set user password

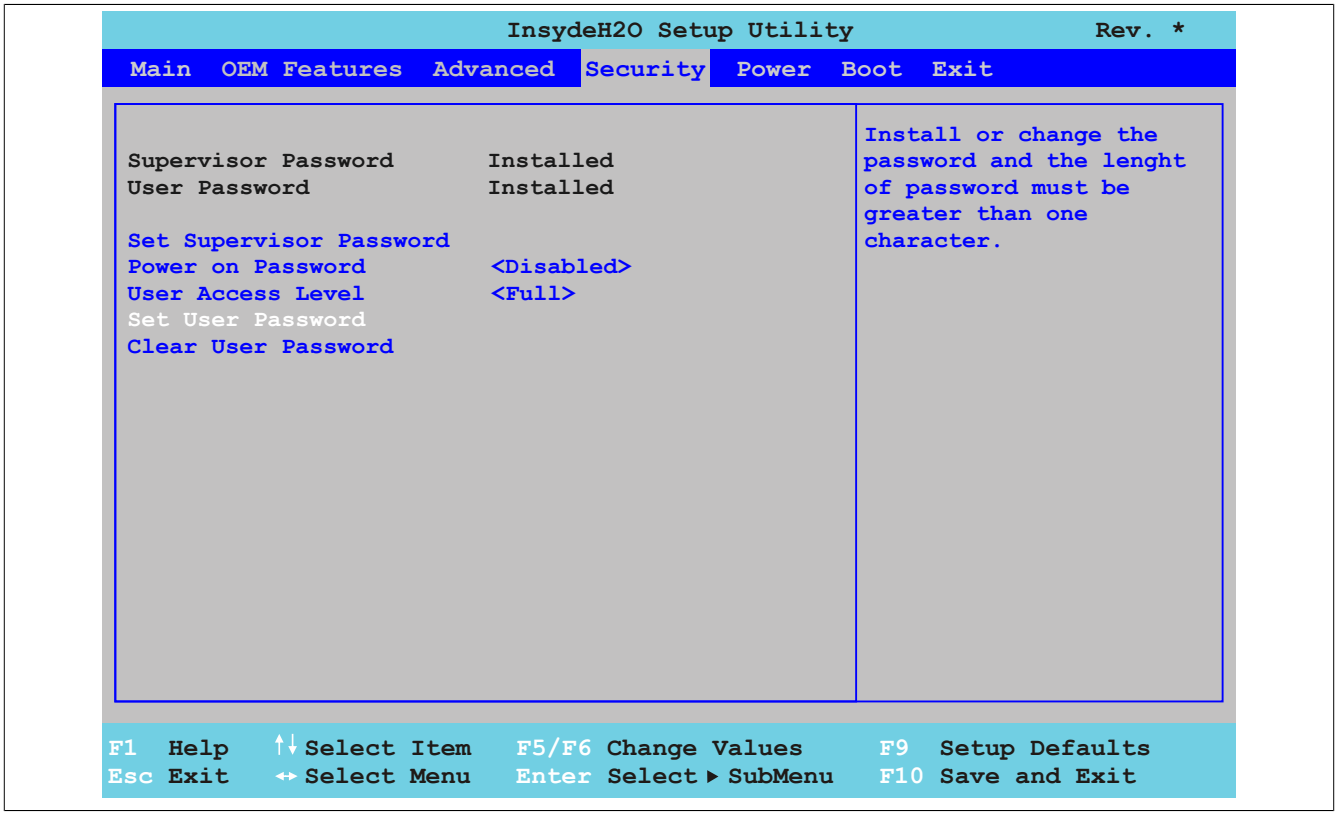


Figure 70: US15W Security - Set user password

BIOS setting	Function	Configuration options	Effect
Supervisor password	Displays whether a supervisor password has been set	None	-
User password	Displays whether a user password has been set	None	-
Set user password	Option for entering/changing a user password. The user password allows the user to edit only certain BIOS settings.	Enter	Password entry
Clear user password[1)]	Option for clearing the user password		Clears the user password

Table 124: US15W Security - Set user password - Configuration options

1) This setting is only visible if a user password was created with *Set user password*.

1.7 Power

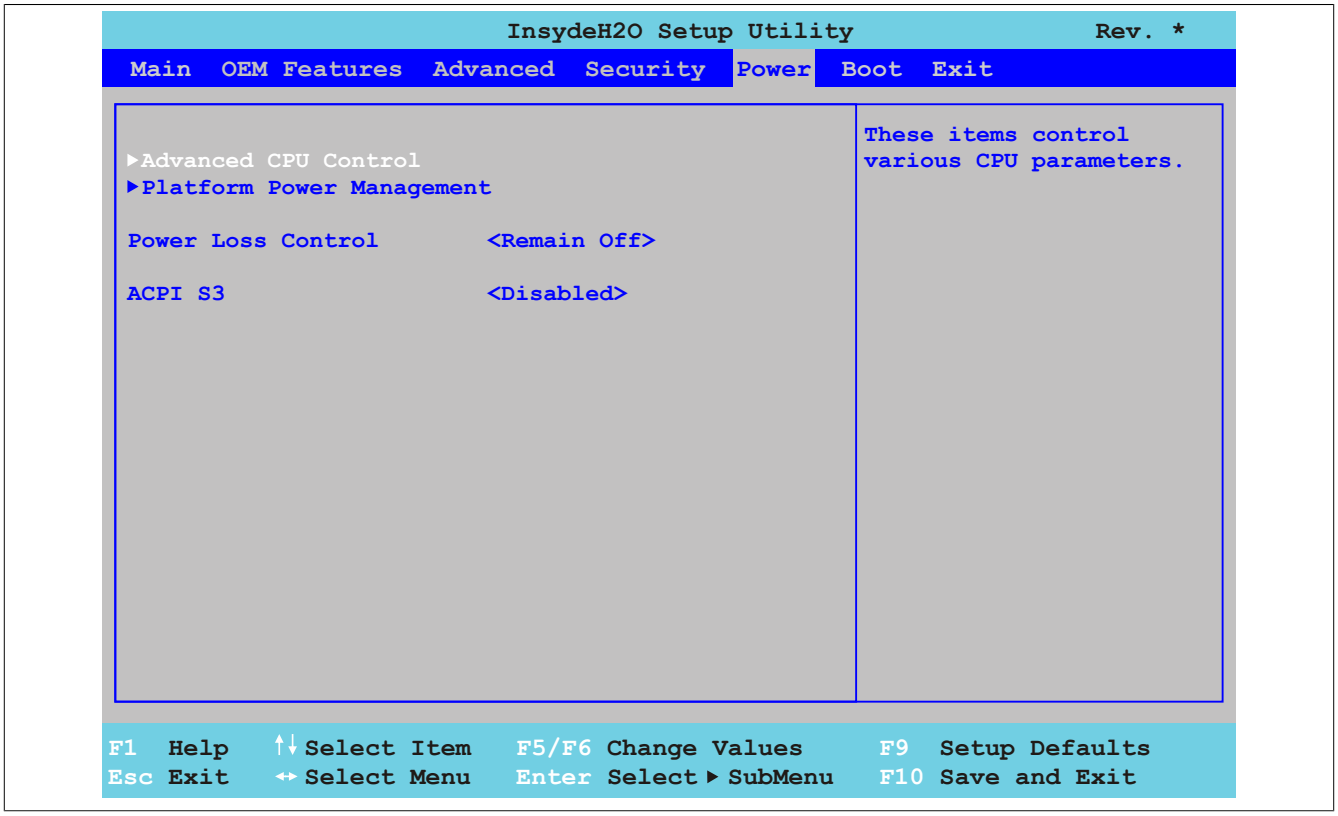


Figure 71: US15W Power menu

BIOS setting	Function	Configuration options	Effect
Advanced CPU control	Configures advanced CPU control settings	None	Opens the submenu See "Advanced CPU control" on page 128
Platform power management	Configures platform power management settings	None	Opens the submenu See "Platform power management" on page 131
Power loss control	Option for determining what should happen after a power failure	Remain off	The device remains off.
		Turn on	The device turns back on.
ACPI S3	Option for determining whether or not the operating system should be written to the RAM and whether only RAM should be supplied with power	Enabled	Enables this function
		Disabled	Disables the function

Table 125: US15W Power menu - Configuration options

1.7.1 Advanced CPU control

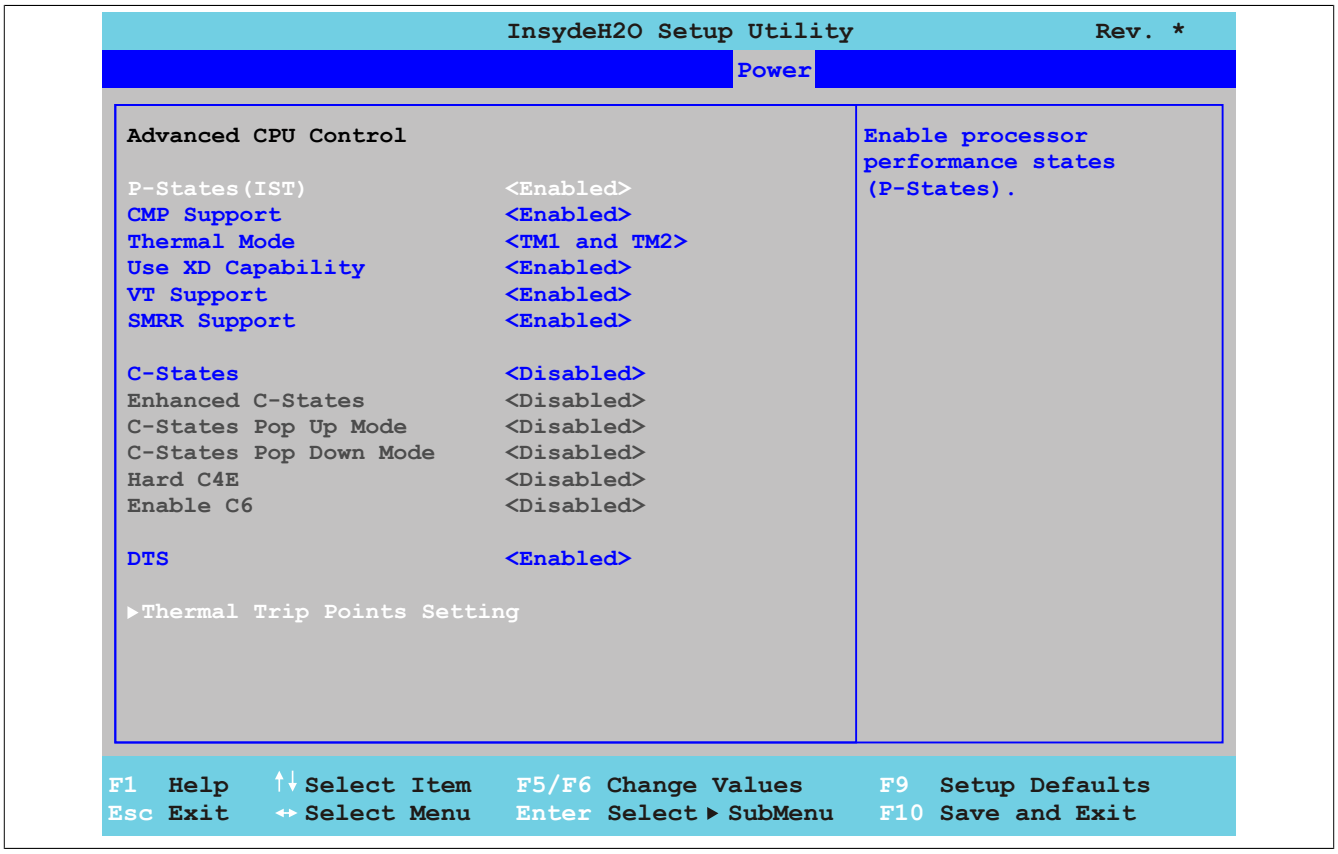


Figure 72: US15W Power - Advanced CPU control

BIOS setting	Function	Configuration options	Effect
P-States(IST)	Option for controlling the Intel(R) SpeedStep(TM) technology. The processor clock speed is increased or decreased according to the number of calculations that must be made. As a result, the power consumption depends largely on the processor load.	Enabled	The processor speed is regulated by the operating system.
		Disabled	Disables SpeedStep technology
CMP support	This option supports the use of multiple CPUs (CMP = core multi-processing). **Information:** **In order to use ARwin, CMP support must be switched off to avoid runtime violations.**	Enabled	Enables this function
		Disabled	Disables this function
Thermal mode[1)]	Option for configuring temperature monitoring **Information:** **To operate the processor within the specified values, changing the default setting (TM1 and TM2) is not recommended.**	Disabled	Disables temperature monitoring
		TM1	Enables Intel Thermal Mode 1 If the CPU reaches excessive temperatures, the processor speed will be reduced by 50%.
		TM2	Enables Intel Thermal Mode 2 If the CPU reaches excessive temperatures, the SpeedStep technology will be enabled.
		TM1 and TM2	Enables Intel Thermal Mode 1 and 2. If the CPU reaches excessive temperatures, TM1 reduces the processor speed by 50% and TM2 enables Intel SpeedStep technology.
Use XD capability	This option is a safety feature that protects specific data regions of system memory from potentially damaging code.	Enabled	Enables this function
		Disabled	Disables this function
VT support	Option for enabling/disabling a virtual machine **Information:** **A restart is required in order to apply changes made to this setting.**	Enabled	Allows a virtual machine to use the additional hardware capacity
		Disabled	Disables this function

Table 126: US15W Power - Advanced CPU control - Configuration options

BIOS setting	Function	Configuration options	Effect
SMRR support	The SMRR (system management range register) limits cacheable references of addresses in SM-RAM so that code can be run in SMM (system management mode). In some circumstances, an intruder who is logged on as administrator could configure the Intel processor to gain access to the SMM. Enabling SMRR reduces this risk of unauthorized access.	Enabled	Enables this function
		Disabled	Disables this function
C-States	This setting allows the operating system to set the processor clock speed on its own, thereby saving energy.	Enabled	Enables this function The processors are operated at different frequencies to save energy.
		Disabled	Disables this function Both processors are operated at the same frequency.
Enhanced C-States[2)]	This setting allows the operating system to set the processor clock speed on its own, thereby saving energy.	Enabled	Enables this function
		Disabled	Disables this function
C-State pop up mode	This setting makes it possible to detect bus master requests and assign processor clock frequencies, thereby saving energy.	Enabled	If the ICH receives a bus master request, then the system changes from the C3/C4 state to the C2 state and the bus master is enabled automatically.
		Disabled	Bus master data transfer is a break event, and the ICH will attempt to return to the C0 state.
C-State pop down mode[3)]	This setting makes it possible to detect bus master requests and assign processor clock frequencies, thereby saving energy.	Enabled	If the ICH does not receive a bus master request, then the system will be reset back to the C3/C4 state.
		Disabled	The ICH will not attempt to automatically return to C3/C4 state.
Hard C4E[4)]	Power management for the Intel Atom processor - Enhanced C4 support	Enabled	Enables this function Reduces CPU voltage and turns off the memory cache
		Disabled	Disables this function
Enable C6	Power management for the Intel Atom processor - C6 support	Enabled	Enables this function Reduces the internal CPU voltage (can also be 0 V)
		Disabled	Disables this function
DTS	Option for enabling or disabling the CPU digital thermal sensor function	Enabled	Enables this function
		Disabled	Disables this function
Thermal trip points setting[5)]	Configures thermal trip points settings	Enter	Opens the submenu See "Thermal trip points settings" on page 130

Table 126: US15W Power - Advanced CPU control - Configuration options

1) These settings are only possible if *P-States(IST)* is set to *Enabled*.
2) These settings are only possible if *C-States* is set to *Enabled*.
3) These settings are only possible if *C-States pop up mode* is set to *Enabled*.
4) These settings are only possible if *Enhanced C-States* is set to *Enabled*.
5) These settings are only possible if *DTS* is set to *Enabled*.

1.7.1.1 Thermal trip points settings

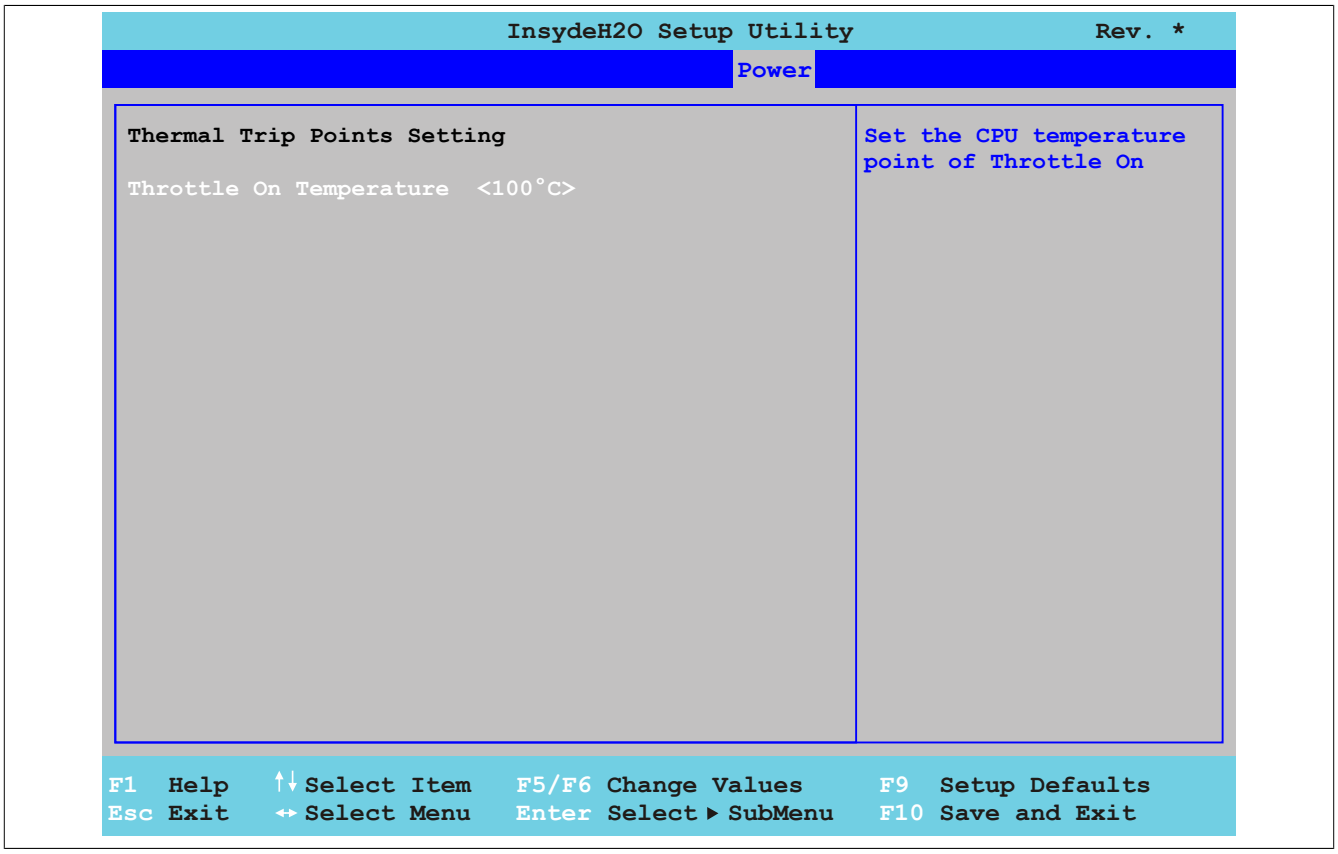


Figure 73: US15W Power - CPU control - Thermal trip points settings

BIOS setting	Function	Configuration options	Effect
Throttle on temperature	Option for configuring a CPU temperature at which the operating system throttles the system	40°C, 45°C, 50°C, 55°C, 60°C, 65°C, 70°C, 75°C, 80°C, 85°C, 90°C, 95°C, 100°C	Temperature setting for the thermal trip point. Configurable in increments of 5 degrees.

Table 127: US15W Power - CPU control - Thermal trip points settings - Configuration options

1.7.2 Platform power management

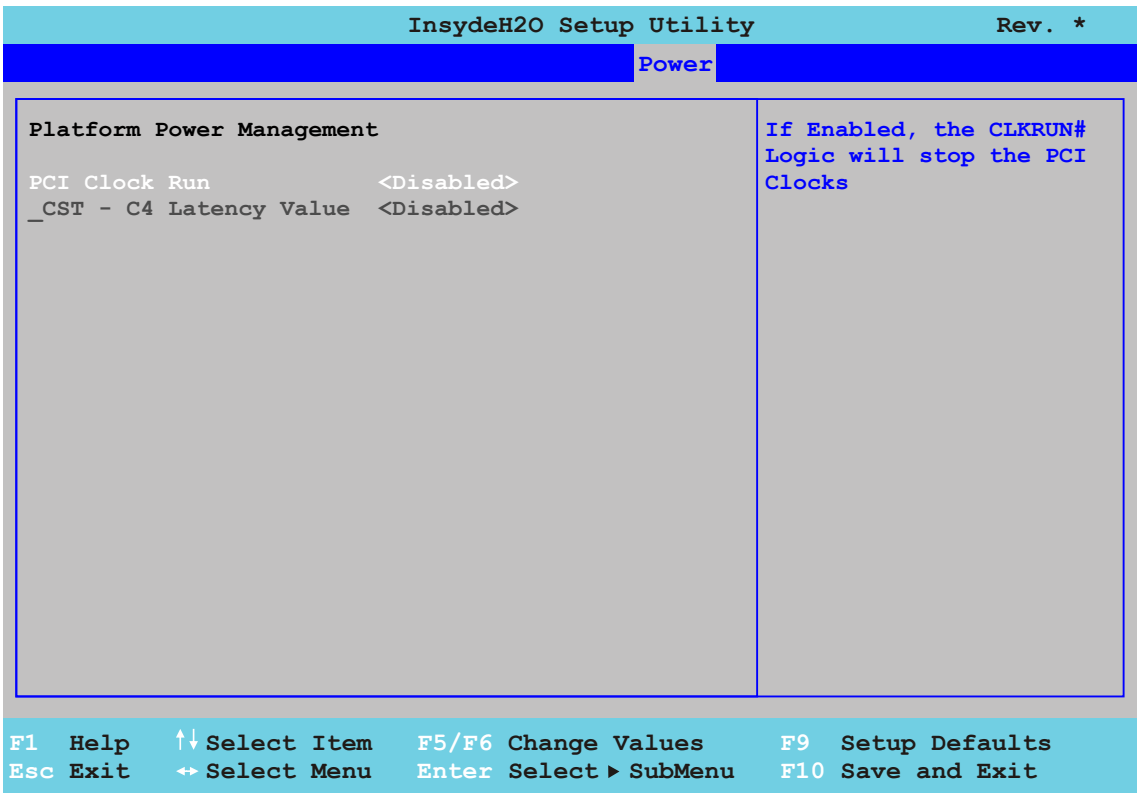


Figure 74: US15W Power - Platform power management

BIOS setting	Function	Configuration options	Effect
PCI clock run	Option for enabling/disabling the PCI clocks to save energy	Enabled	Enables this function
		Disabled	Disables this function
_CST - C4 latency value[1)]	Option for enabling/disabling the latency period for C4 C-States in the ACPI _CST object **Information:** **For more detailed information about this setting, see the ACPI specification (www.acpi.info).**	Enabled	Enables this function
		Disabled	Disables this function
C4 on C3 - Deeper sleep[2)]	Fine-tunes the power saving function on an ACPI operating system	Enabled	Brings the processor to C4 if the operating system is initiated in a C3 state
		Disabled	Disables this function

Table 128: US15W Power - Platform power management - Configuration options

1) These settings are only possible if *C-States* under the *Advanced CPU control* menu item is set to *Enabled*.
2) These settings are only possible if *_CST - C4 Latency Value* is set to *Enabled*.

1.8 Boot

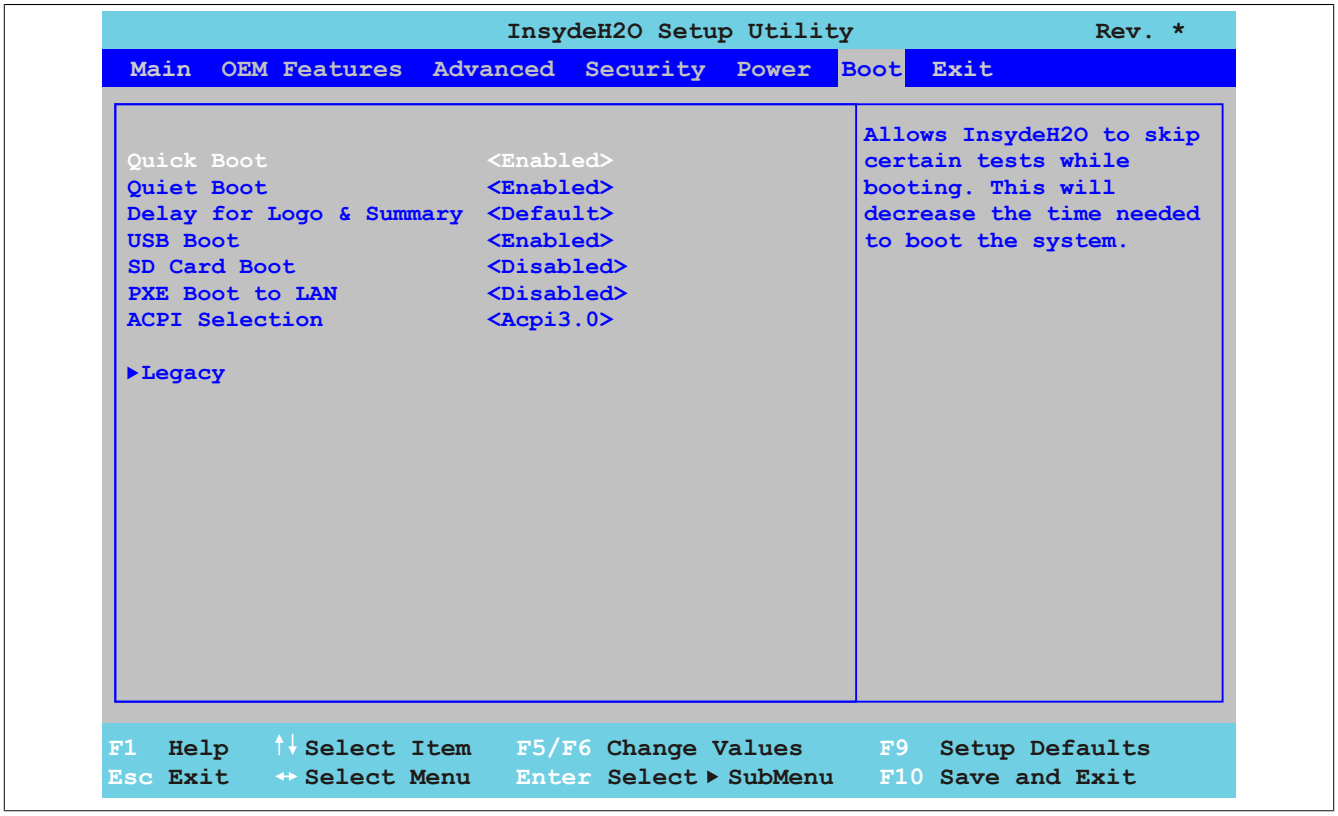


Figure 75: US15W Boot menu

BIOS setting	Function	Configuration options	Effect
Quick boot	This function reduces the boot time by skipping some POST tests.	Enabled	Enables this function
		Disabled	Disables this function
Quiet boot	Determines whether the POST message or the OEM logo (default = black background) is displayed	Enabled	Displays the OEM logo instead of the POST message
		Disabled	Displays the POST message
Delay for logo & summary	Option for setting the display duration of the logo and summary screen	Default	Minimizes the display duration for a quick boot procedure
		1 sec., 1.5 sec., 2 sec., 2.5 sec., 3 sec., 4 sec., 5 sec., 10 sec., 20 sec.	Allows a display duration of x seconds to be defined
USB boot	Function for enabling/disabling the option of booting from USB devices	Enabled	Enables this function
		Disabled	Disables this function
SD card boot	Function for enabling/disabling the option of booting from SD cards **Warning!** **SD memory cards can only be used a mass storage devices. It is not possible to boot from an SD card.**	Enabled	Enables this function
		Disabled	Disables this function
PXE boot to LAN	Function for enabling/disabling the option of booting from LAN (ETH)	Enabled	Enables this function
		Disabled	Disables this function
ACPI selection	Option for setting the power option specifications to be supported. The ACPI functions must be supported by the drivers and operating systems being used.	Acpi 1.0B	Uses ACPI functions in accordance with v1.0B
		Acpi 3.0	Uses ACPI functions in accordance with v3.0
		Acpi 4.0	Uses ACPI functions in accordance with v4.0
Legacy	Configures and displays the boot order	Enter	Opens the submenu See "Legacy" on page 133

Table 129: US15W Boot menu - Configuration options

1.8.1 Legacy

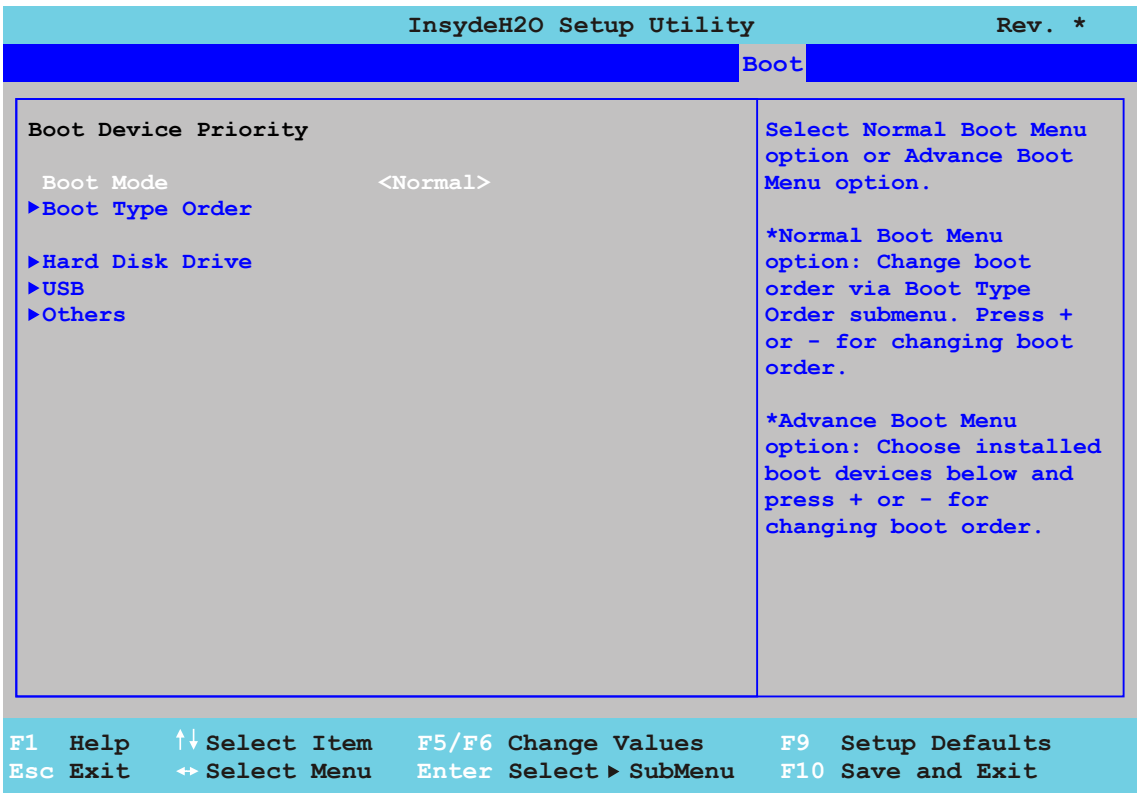


Figure 76: US15W Boot - Legacy

BIOS setting	Function	Configuration options	Effect
Boot mode	Boot mode configuration	Normal	Displays the submenus for changing the boot sequence settings
		Advanced	Displays only the product names of connected bootable devices. The boot sequence can be defined here.
Boot type order[1)]	Configures boot type order settings	Enter	Opens the submenu See "Boot type order" on page 134
Hard disk drive[1)2)]	Displays inserted CompactFlash cards	Enter	Opens the submenu See "Hard disk drive" on page 135
USB[1)3)]	Displays connected USB flash drives	Enter	Opens the submenu See "USB" on page 135
Others[1)4)]	Displays CPU boards / baseboards for PXE booting with onboard Ethernet interfaces	Enter	Opens the submenu See "Other" on page 136

Table 130: US15W Boot - Legacy - Configuration options

1) These submenus are only shown if *Normal boot mode* is set to *Normal*.
2) Only shown if a CompactFlash card is connected.
3) Only shown if a USB flash drive is connected.
4) Only shown if *PXE boot to LAN* is set to *Enabled* in the boot menu.

1.8.1.1 Boot type order

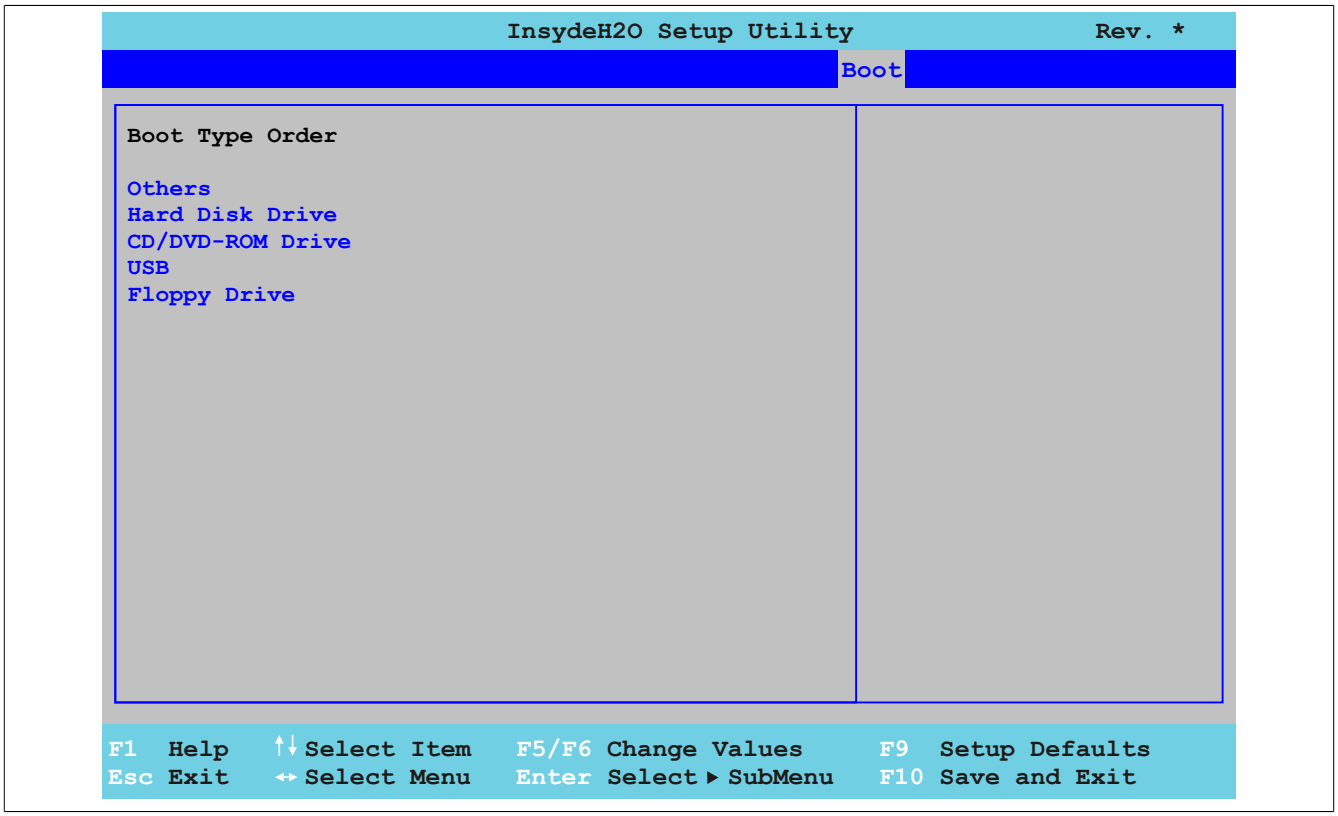


Figure 77: US15W Boot - Legacy - Boot type order

BIOS setting	Function	Configuration options	Effect
Others	Option for selecting drives to be used for booting	Others	Specifies the desired boot sequence
Hard disk drive		Hard disk drive	
CD/DVD ROM drive		CD/DVD ROM drive	
USB		USB	
Floppy drive		Floppy drive	

Table 131: US15W Boot - Legacy - Boot type order - Configuration options

1.8.1.2 Hard disk drive

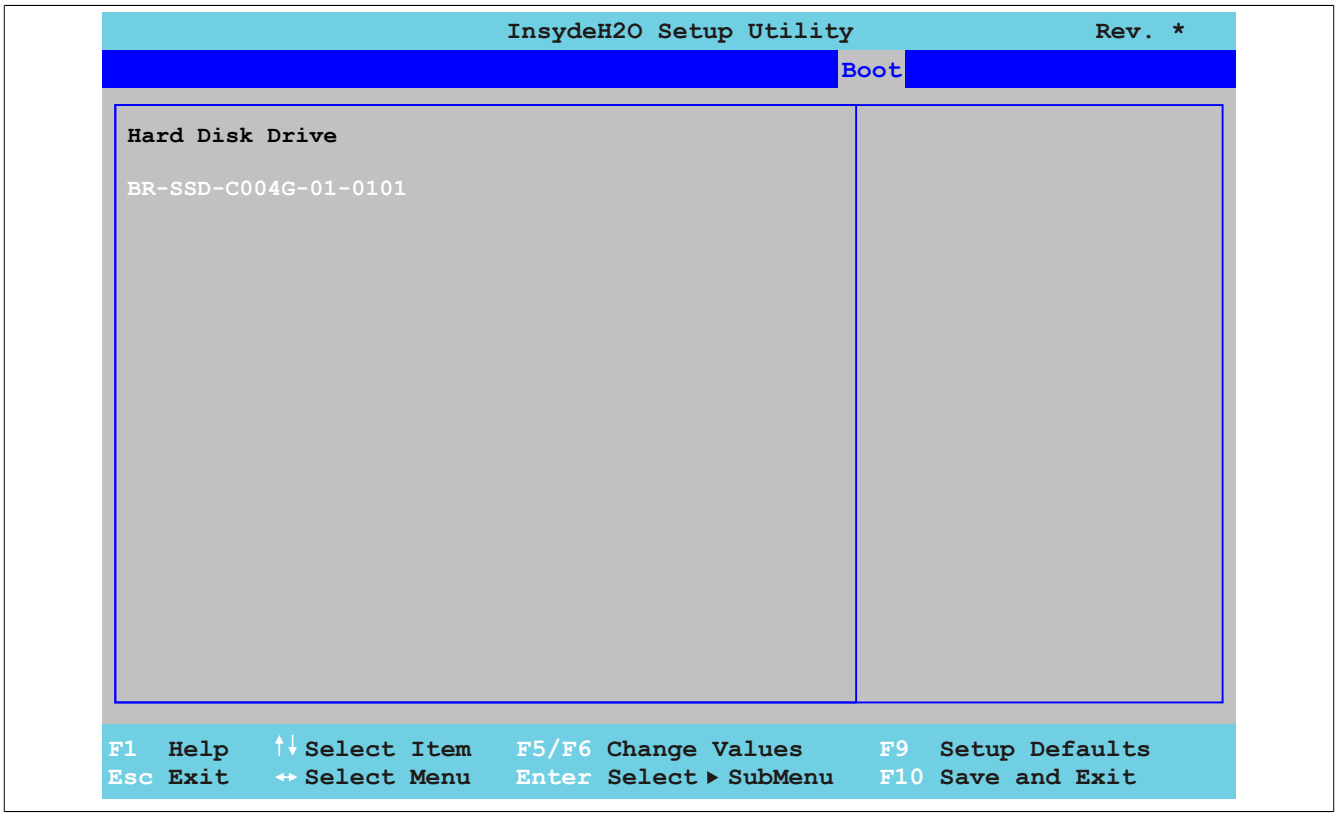


Figure 78: US15W Boot - Legacy - Hard disk drive

BIOS setting	Function	Configuration options	Effect
	Displays inserted CompactFlash cards	None	-

Table 132: US15W Boot - Legacy - Hard disk drive - Configuration options

1.8.1.3 USB

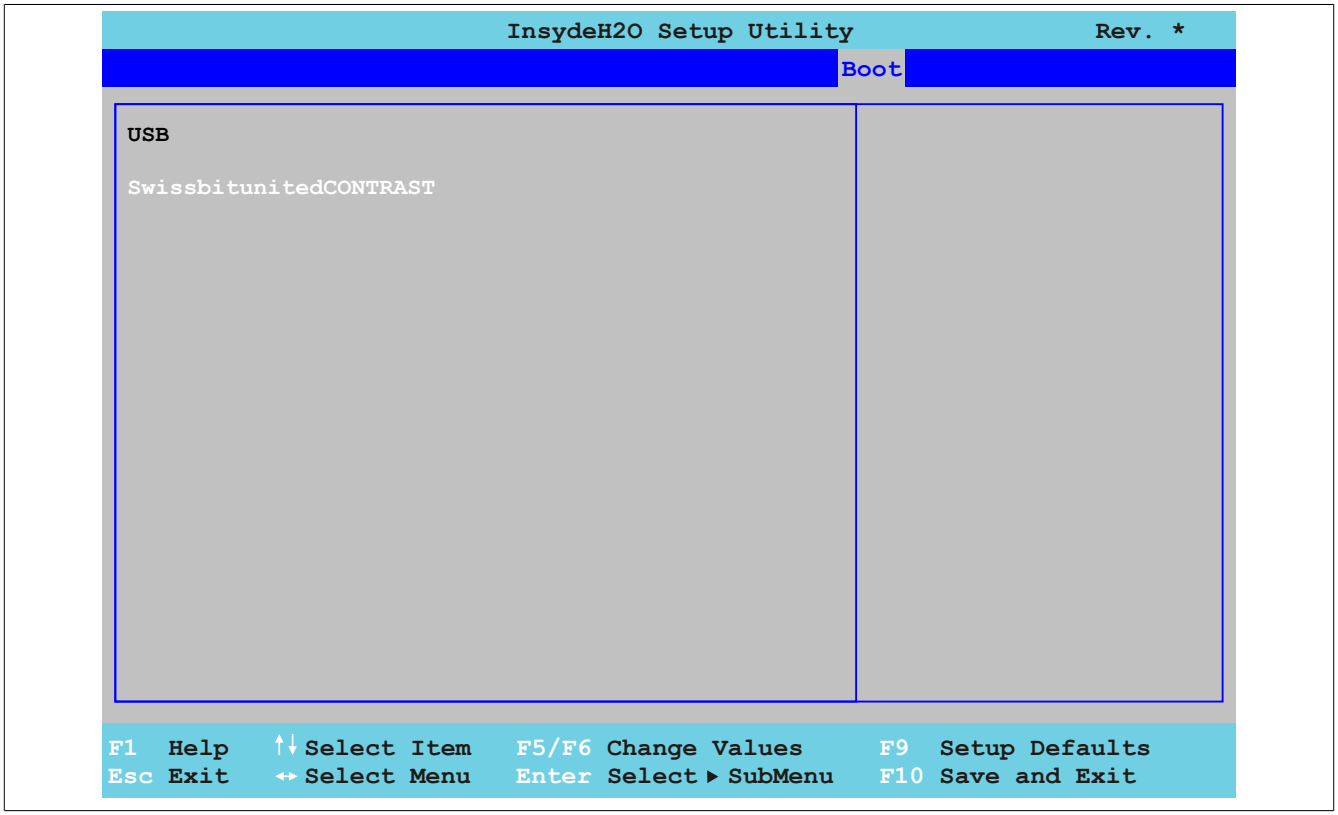


Figure 79: US15W Boot - Legacy - USB

BIOS setting	Function	Configuration options	Effect
	Displays connected USB flash drives	None	-

Table 133: US15W Boot - Legacy - USB - Configuration options

1.8.1.4 Other

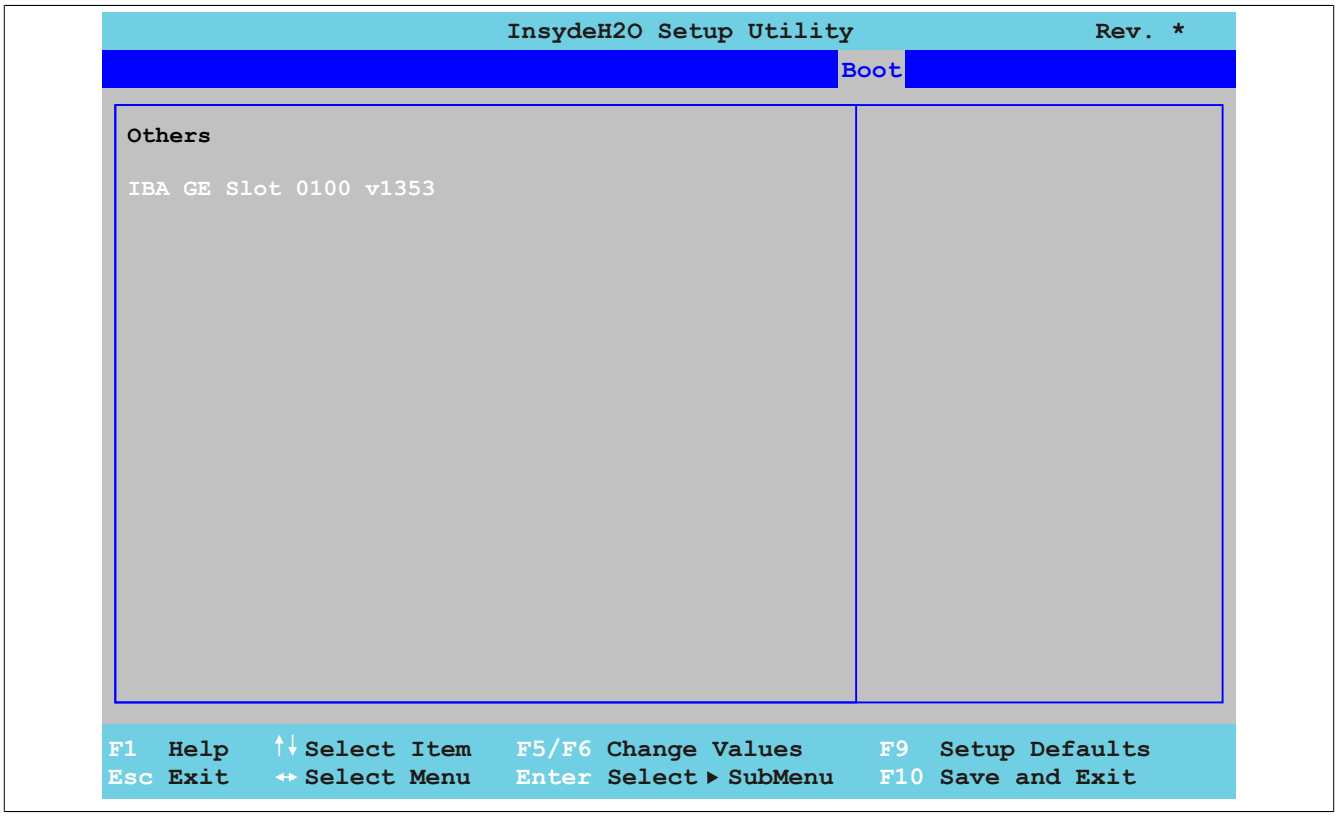


Figure 80: US15W Boot - Legacy - Others

BIOS setting	Function	Configuration options	Effect
-	Displays CPU boards / baseboards for PXE booting with onboard Ethernet interfaces	None	-

Table 134: US15W Boot - Legacy - Others - Configuration options

1.9 Exit

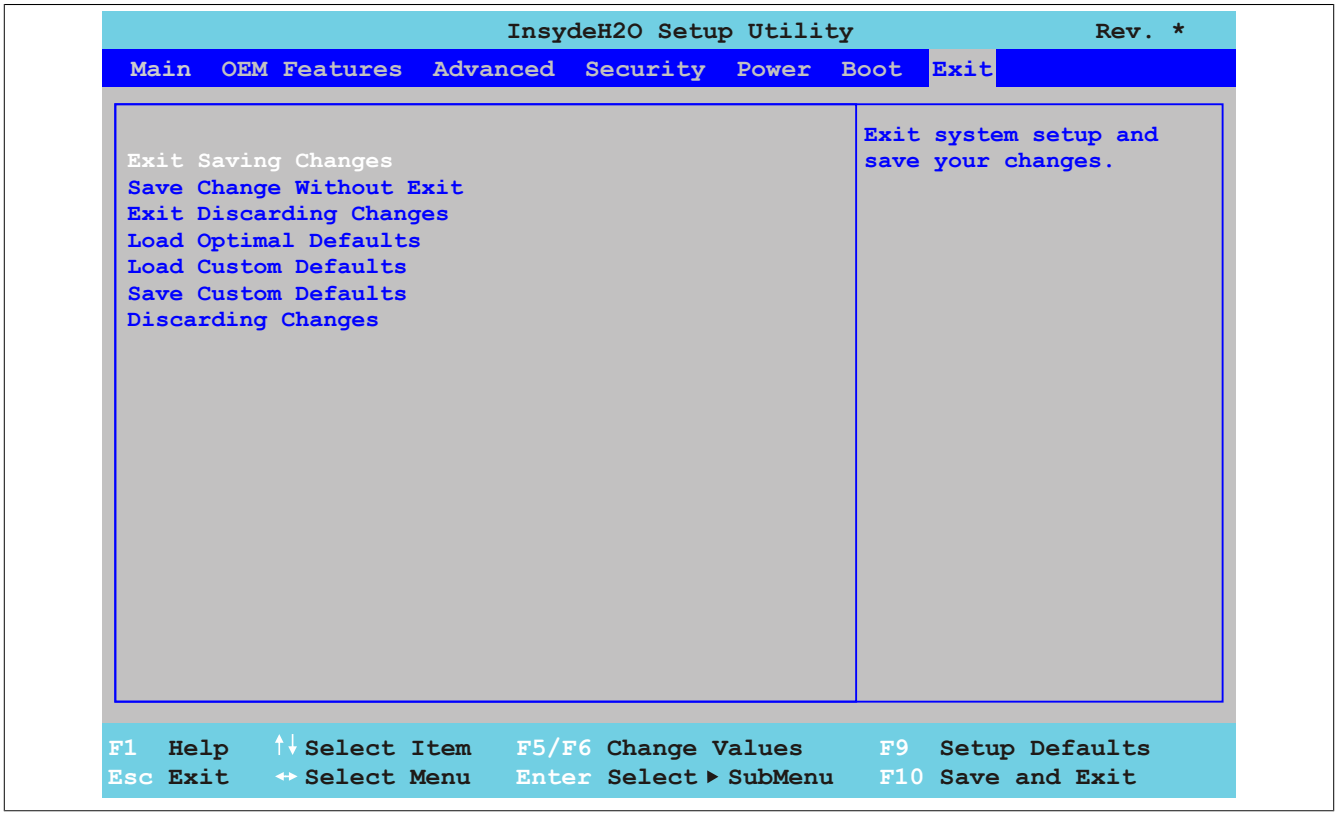


Figure 81: US15W Exit menu

BIOS setting	Function	Configuration options	Effect
Exit saving changes	Selecting this option closes BIOS Setup. Any changes made are saved to CMOS after confirmation, and the system is rebooted.	OK / Cancel	
Save change without exit	Selecting and confirming this option saves any changes made to CMOS.	OK / Cancel	
Exit discarding changes	Selecting this option closes BIOS Setup without saving any changes made. The system is then rebooted.	OK / Cancel	
Load optimal defaults	This option loads the CMOS default values defined by the mode/node switches. These values are loaded for all BIOS settings.	OK / Cancel	
Load custom defaults	This option loads the CMOS values defined by the mode/node switches. These values are loaded for all BIOS settings.	OK / Cancel	
Save custom defaults	This saves defined CMOS vales. These settings are saved for all BIOS configurations.	OK / Cancel	
Discarding changes	In the event that settings were made that the user can no longer remember, they can be reset as long as they have not yet been saved.	OK / Cancel	

Table 135: US15W Exit menu - Configuration options

1.10 BIOS default settings

If the "Load optimal defaults" function is selected in the main BIOS Setup screen, or if "Exit" is selected (or <F9> is pressed) in the individual setup screens, the following BIOS settings are the optimized values that will be used.

1.10.1 Main

Setting/Option	Profile 0	My setting
InsydeH2O version	-	
Processor type	-	
System bus speed	-	
System memory speed	-	
Cache RAM	-	
Total memory	-	
SODIMM 0	-	
System time	-	
System date	-	

Table 136: US15W - Main - Overview of profile settings

1.10.2 OEM features

Setting/Option	Profile 0	My setting
BIOS	-	
Boot source	-	
MTCX	-	

Table 137: US15W - OEM features - Overview of profile settings

1.10.2.1 CPU board features

Setting/Option	Profile 0	My setting
Device ID	-	
Compatibility ID	-	
Vendor ID	-	
Hardware revision	-	
Serial number	-	
Product name	-	
Hardware number	-	
Parent device ID	-	
Parent compatib. ID	-	
User serial ID	-	
LAN1 MAC ADDRESS	-	
LPC devices		
COMA	-	
Base I/O address	3F8	
Interrupt	IRQ4	
Statistical values		
Sensor 1	-	
Sensor 2	-	
Sensor 3	-	
Total hours	-	
Power on cycles	-	
Temperature values		
Refresh values	-	
Sensor 1	-	
Sensor 2	-	
Sensor 3	-	
Temperature values		
Wcpu	-	
Vin	-	
Battery voltage	-	
Battery state	-	

Table 138: US15W - CPU board features - Overview of profile settings

1.10.2.2 System unit features

Setting/Option	Profile 0	My setting
Device ID	-	
Compatibility ID	-	
Vendor ID	-	
Hardware revision	-	
Serial number	-	
Product name	-	
Hardware number	-	
Parent device ID	-	
Parent compatib. ID	-	
User serial ID	-	
Display (0) brightness	Auto	
LPC devices		
COMB	-	
Base I/O address	2F8	
Interrupt	IRQ3	
Statistical values		
Sensor 1	-	
Total hours	-	
Power on cycles	-	
Temperature values		
Refresh values	-	
Sensor 1	-	

Table 139: US15W - System unit features - Overview of profile settings

1.10.2.3 I/O board features

Setting/Option	Profile 0	My setting
FPGA version	-	
Device ID	-	
Compatibility ID	-	
Vendor ID	-	
Hardware revision	-	
Serial number	-	
Product name	-	
Hardware number	-	
Parent device ID	-	
Parent compatib. ID	-	
User serial ID	-	
I/O board LPC devices		
COMC		
Base I/O address	3E8	
Interrupt	IRQ11	
COMD		
Base I/O address	2E8	
Interrupt	IRQ10	
Statistical values		
Sensor 1	-	
Total hours	-	
Power on cycles	-	
Refresh values		
Sensor 1	-	
Panel control		
Select panel number	1	
Version	-	
Brightness	100%	
Fan speed	-	
Keys/LEDs	-	
Temperature	-	

Table 140: US15W - I/O board features - Overview of profile settings

1.10.2.4 IF board features

Setting/Option	Profile 0	My setting
Device ID	-	
Compatibility ID	-	
Vendor ID	-	
Hardware revision	-	

Table 141: US15W - IF board features - Overview of profile settings

Setting/Option	Profile 0	My setting
Serial number	-	
Product name	-	
Hardware number	-	
Parent device ID	-	
Parent compatib. ID	-	
User serial ID	-	
LAN2 MAC ADDRESS	-	
Statistical values		
Total hours	-	
Power on cycles	-	

Table 141: US15W - IF board features - Overview of profile settings

1.10.2.5 Memory module features

Setting/Option	Profile 0	My setting
Device ID	-	
Compatibility ID	-	
Vendor ID	-	
Hardware revision	-	
Serial number	-	
Product name	-	
Hardware number	-	
Parent device ID	-	
Parent compatib. ID	-	
User serial ID	-	

Table 142: US15W - Memory module features - Overview of profile settings

1.10.3 Advanced

1.10.3.1 RAM configuration

Setting/Option	Profile 0	My setting
Refresh rate	Auto	

Table 143: US15W - RAM configuration - Overview of profile settings

1.10.3.2 Boot configuration

Setting/Option	Profile 0	My setting
NumLock	On	

Table 144: US15W - Boot configuration - Overview of profile settings

1.10.3.3 Peripheral configuration

Setting/Option	Profile 0	My setting
High definition audio[1)]	Auto	

Table 145: US15W - Peripheral configuration - Overview of profile settings

1) This menu option is only available if there is an audio connection.

1.10.3.4 IDE configuration

Setting/Option	Profile 0	My setting
Channel 1 master	Enabled[1)]	
Channel 1 master		
Transfer mode	-	
Security mode	-	
Channel 1 slave	Enabled[1)]	
Channel 1 slave		
Transfer mode	-	
Security mode	-	

Table 146: US15W - IDE configuration - Overview of profile settings

1) Only with drive installed.

1.10.3.5 Video configuration

Setting/Option	Profile 0	My setting
IGD - Pre-allocated memory	UMA = 8 MB	
IGD - Boot type	Auto	
IGD - LCD panel type[1)]	640x480 (5.7) LVDS	
Remote Panel	Disabled[2)]	

Table 147: US15W - Video configuration - Overview of profile settings

1) This setting is only available for PP500 system units.
2) This option is enabled by default on APC511 system units without an I/O board.

1.10.3.6 USB configuration

Setting/Option	Profile 0	My setting
USB Legacy	Enabled	
EHCI	Enabled	
UHCI 1	Enabled	
UHCI 2	If an I/O board is not connected: Disabled If an I/O board is connected: Enabled	
UHCI 3	Enabled	
USB client	Disabled	

Table 148: US15W - USB configuration - Overview of profile settings

1.10.3.7 SDIO configuration

Setting/Option	Profile 0	My setting
SDIO port 1	Enabled	
SDIO port 2	Enabled	

Table 149: US15W - SDIO configuration - Overview of profile settings

1.10.3.8 ACPI table/features control

Setting/Option	Profile 0	My setting
FACP - C2 latency value	Disabled	
FACP - C3 latency value	Disabled	
HPET - HPET support	Enabled	
APIC - I/O APIC mode	Enabled	

Table 150: US15W - ACPI table/features control - Overview of profile settings

1.10.3.9 PCI Express root port 1

Setting/Option	Profile 0	My setting
PCI Express root port 1	Enabled	
Interrupt pin 0	Auto	
VC1 enable	Disabled	
VC1/TC mapping	Disabled	
ASPM	Disabled	
Automatic ASPM	Disabled	
ASPM L0s	Disabled	
ASPM L1s	Disabled	
URR	Disabled	
FER	Disabled	
NFER	Disabled	
CER	Disabled	
CT0	Disabled	
SEFE	Disabled	
SENFE	Disabled	
SECE	Disabled	
PME interrupt	Disabled	
PME SCI	Disabled	
Hot plug SCI	Disabled	

Table 151: US15W - PCI Express root port 1 - Overview of profile settings

1.10.3.10 PCI Express root port 2

Setting/Option	Profile 0	My setting
PCI Express root port 2	Enabled	
Interrupt pin 1	If a fieldbus card is not connected: Auto If a fieldbus card is connected: Disabled	
VC1 enable	Disabled	
VC1/TC mapping	Disabled	
ASPM	Disabled	
Automatic ASPM	Disabled	
ASPM L0s	Disabled	
ASPM L1s	Disabled	
URR	Disabled	
FER	Disabled	
NFER	Disabled	
CER	Disabled	
CT0	Disabled	
SEFE	Disabled	
SENFE	Disabled	
SECE	Disabled	
PME interrupt	Disabled	
PME SCI	Disabled	
Hot plug SCI	Disabled	

Table 152: US15W - PCI Express root port 2 - Overview of profile settings

1.10.3.11 Console redirection

Setting/Option	Profile 0	My setting
Console serial redirect	Enabled	
Information wait time	5 seconds	
Serial port	COM_A	
Terminal type	PC_ANSI	
Baud rate	57600	
Data bits	8 bits	
Parity	None	
Stop bits	1-bit	
Flow control	None	
ACPI SPCR table	Disabled	

Table 153: US15W - Console redirection - Overview of profile settings

1.10.4 Power

Setting/Option	Profile 0	My setting
Power loss control	Read from EEPROM data	
ACPI S3	Disabled	

Table 154: US15W Power - Overview of profile settings

1.10.4.1 Advanced CPU control

Setting/Option	Profile 0	My setting
P-States(IST)	Enabled	
CMP support	Enabled	
Thermal mode	TM1 and TM2	
Use XD capability	Enabled	
VT support	Enabled	
SMRR support	Enabled	
C-States	Disabled	
Enhanced C-States	Disabled	
C-States pop up mode	Disabled	
C-States pop down mode	Disabled	
Hard C4E	Disabled	
Enable C6	Disabled	
DTS	Enabled	
Thermal trip points setting		
Throttle on temperature	100°C	

Table 155: US15W - Advanced CPU control - Overview of profile settings

1.10.4.2 Platform power management

Setting/Option	Profile 0	My setting
PCI clock run	Disabled	
_CST - C4 latency value	Disabled	
C4 on C3 - Deeper sleep	Disabled	

Table 156: US15W - Platform power management - Overview of profile settings

1.10.5 Boot

Setting/Option	Profile 0	My setting
Quick boot	Enabled	
Quiet boot	Enabled	
Delay for logo & summary	Default	
USB boot	Enabled	
SD card boot	Disabled	
PXE boot to LAN	Disabled	
ACPI selection	Acpi3.0	

Table 157: US15W Boot - Overview of profile settings

1.11 Allocation of resources

1.11.1 RAM address assignment

RAM address	Address in hexadecimal	Resource
(TOM - FB[1]) – TOM[2]	N.A.	ACPI reclaim, MPS and NVS area[3]
(TOM - FB - TSEG[4]) – (TOM - FB)	N.A.	VGA frame buffer[5]
1024 kB – (TOM - 8 MB - 192 kB)	100000h - N.A.	Extended memory
896 kB – 1024 kB	0E0000h - 0FFFFFh	Runtime BIOS
832 kB – 896 kB	0D0000h - 0DFFFFh	Upper memory
640 kB – 832 kB	0A0000h - 0CFFFFh	Video memory and BIOS
639 kB – 640 kB	09FC00h - 09FFFFh	Extended BIOS data
0 – 639 kB	000000h - 09FC00h	Conventional memory

Table 158: RAM address assignment

1) FB - VGA frame buffer.
2) TOM = Top of memory: max. installed DRAM.
3) Only if ACPI Aware OS is set to "YES" in the setup.
4) TSEG - Intended internally by BIOS for SMI handling.
5) The VGA frame buffer can be reduced to 1 MB in the setup.

1.11.2 I/O address assignment

I/O address	Resource
0000h - 00FFh	Motherboard resources
01F0h - 01F7h	Primary IDE channel
03B0h - 03DFh	Video system
03F6h - 03F6h	Primary IDE channel command port
03F7h - 03F7h	Primary IDE channel status port
03F8h - 03FFh	COM1
0480h - 04BFh	Motherboard resources
04D0h - 04D1h	Motherboard resources
0800h - 087Fh	Motherboard resources
0CF8h - 0CFBh	PCI config address register
0CFCh - 0CFFh	PCI config data register
0D00h - FFFFh	PCI / PCI Express bus[1]
4100h - 417Fh	MTCX
FF00h - FF07h	IDE bus master register

Table 159: I/O address assignment

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

1.11.3 Interrupt assignments in PIC mode

IRQ	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	NMI	NONE
System timer	●																	
Keyboard		●																
IRQ cascade			●															
COM1 (serial port A)				○	●	○	○				○	○	○					
COM2 (serial port B)				●	○	○	○				○	○	○					
ACPI[1]										●								
Real-time clock									●									
Coprocessor (FPU)														●				
Primary IDE channel															●			
Secondary IDE channel																●		

Table 160: IRQ interrupt assignments in PIC mode

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

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

1.11.4 Interrupt assignments in APIC mode

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

IRQ	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	NMI	NONE
System timer	●																									
Keyboard		●																								
IRQ cascade			●																							
COM1 (serial port A)				○	●	○	○				○	○	○													
COM2 (serial port B)				●	○	○	○				○	○	○													
ACPI[1]										●																
Real-time clock									●																	
Coprocessor (FPU)														●												
Primary IDE channel															●											
Secondary IDE channel																●										
PIRQ A[2]																	●									
PIRQ B[3]																		●								
PIRQ C[4]																			●							
PIRQ D[5]																				●						
PIRQ E[6]																					●					
PIRQ F[7]																						●				
PIRQ G[8]																							●			
PIRQ H[9]																								●		

Table 161: IRQ interrupt assignments in APIC mode

1) **A**dvanced **C**onfiguration and **P**ower **I**nterface.
2) PIRQ A: for IF board; GMA500 graphics controller, LPC, root port 1, Ethernet controller, USB client
3) PIRQ B: for IF board; root port 2
4) PIRQ C: for IF board
5) PIRQ D: for IF board; HD audio
6) PIRQ E: UHCI host controller 0, SDIO 0 controller
7) PIRQ F: UHCI host controller 1, SDIO 1 controller
8) PIRQ G: UHCI host controller 2, SDIO 2 controller
9) PIRQ H: EHCI host controller

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

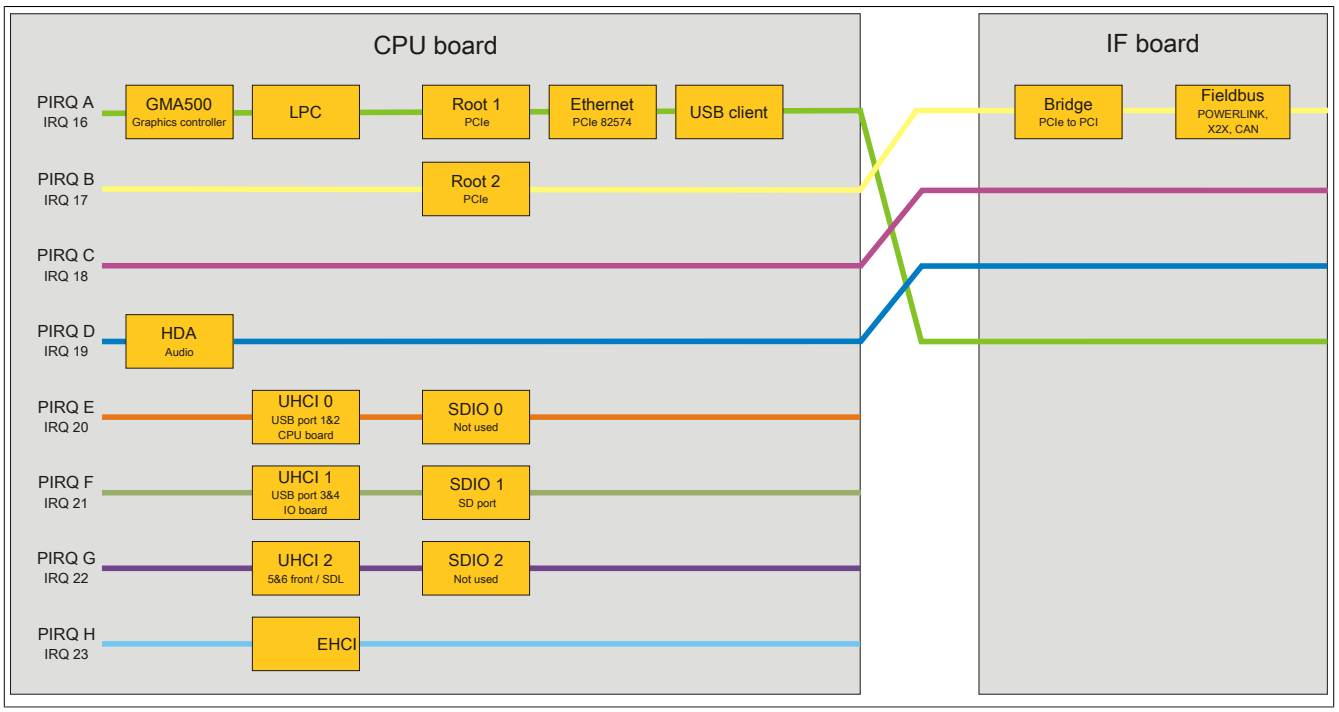


Figure 82: Interrupt routing with enabled APIC - Beginning with BIOS version N0.15

2 Upgrade information

Warning!

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

2.1 BIOS upgrade

An upgrade may be necessary in order to accomplish the following:

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

2.1.1 Important information

Information:

Customized BIOS settings are deleted when upgrading BIOS.

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

2.1.1.1 Which BIOS version and firmware are already installed on the device?

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

- After switching on the device, BIOS Setup can be accessed by pressing <F2>.
- The current BIOS and MTCX version can be viewed in BIOS under "OEM features".

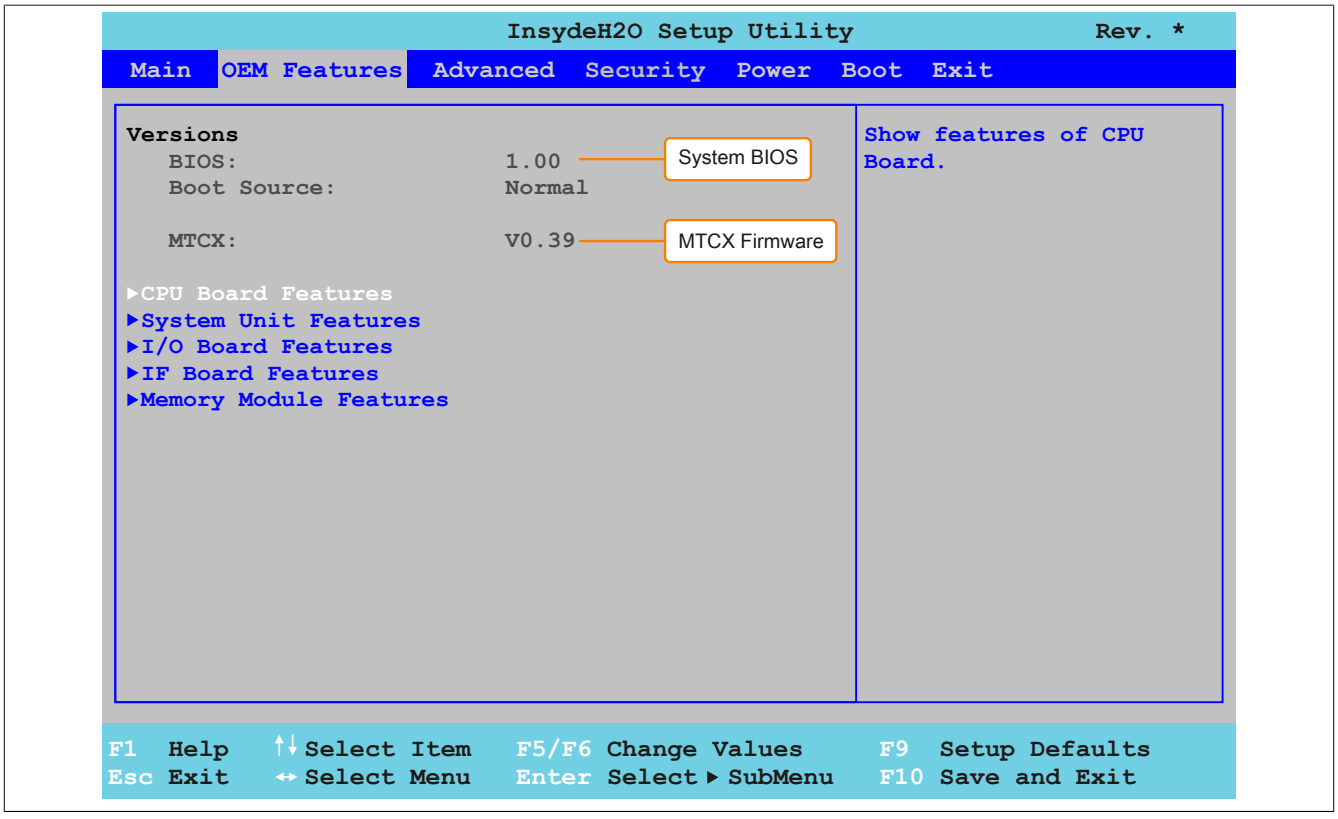


Figure 83: BIOS and MTCX software versions

Information about BIOS and firmware versions can also be found in the Control Center (Start menu / Control Panel / Control Center / Versions).

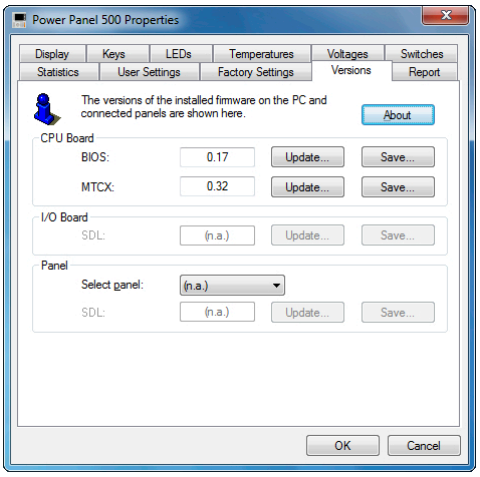


Figure 84: BIOS and MTCX software versions - Control Center

2.1.2 Using the Control Center

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

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

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

Information:

The system must be restarted for the BIOS settings to take effect and for the updated version to be displayed. The user is prompted to restart the system when closing the Control Center.

Information:

For more information about saving and updating BIOS, please refer to the help documentation for the Control Center.

2.2 Firmware upgrade

The latest firmware upgrade is available in the Downloads section of the B&R website (www.br-automation.com).

2.2.1 Procedure

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

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

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

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

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

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

2.3 Upgrade problems

Potential upgrade problems are listed in the Readme.txt files on the upgrade disks.

3 Windows 7

3.1 General information

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

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

3.2 Order data

Model number	Short description	Figure
	Windows 7 Professional/Ultimate	
5SWWI7.0100-ENG	Microsoft OEM Windows 7 Professional 32-bit, DVD, English. 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.	
5SWWI7.0100-GER	Microsoft OEM Windows 7 Professional 32-bit, DVD, German. Only available with a new device.	
5SWWI7.1100-GER	Microsoft OEM Windows 7 Professional 32-bit, Service Pack 1, DVD, German. Only available with a new device.	
5SWWI7.0300-MUL	Microsoft OEM Windows 7 Ultimate 32-bit, DVD, multilingual. Only available with a new device.	
5SWWI7.1300-MUL	Microsoft OEM Windows 7 Ultimate 32-bit, Service Pack 1, DVD, multilingual. Only available with a new device.	

Table 162: 5SWWI7.0100-ENG, 5SWWI7.1100-ENG, 5SWWI7.0100-GER, 5SWWI7.1100-GER, 5SWWI7.0300-MUL, 5SWWI7.1300-MUL - Order data

3.3 Overview

Product ID	5SWWI7.0100-ENG
General information	
Certification	
CE	Yes
CE	Yes
Operating system	
Target systems	
Industrial PC	APC510 APC511 APC810 APC910 PPC800 PP500
Chipset	945GME GM45 QM77/HM76 US15W
Edition	Professional
Architectures	32-bit
Language	English
Preinstallation	Optional
Minimum RAM required	1 GB
Minimum hard disk space required	16 GB

Table 163: 5SWWI7.0100-ENG - Technical data

3.4 Installation

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

3.5 Drivers

Current drivers for all approved operating systems are available in the Downloads section of the B&R website www.br-automation.com.

Information:

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

3.6 Special considerations, limitations

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

4 Windows Embedded Standard 7

4.1 General information

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

With Windows® Embedded Standard 7, Microsoft has made substantial improvements in the area of security. The AppLocker program, available in the premium version, can prevent the execution of unknown or potentially undesired applications that are being installed over a network or from drives that are directly connected. A tiered approach allows the differentiation between scripts (.ps1, .bat, .cmd, .vbs and .js), installation files (.msi, .msp) and libraries (.dll, .ocx). AppLocker can also be configured to record undesired activity and display it in the Event Viewer. Windows® Embedded Standard 7 is available in both a 32-bit and 64-bit version.[5)], which ensures that even the most demanding applications have the level of support they need.

4.2 Order data

Model number	Short description	Figure
	Windows Embedded Standard 7	
5SWWI7.0538-ENG	Microsoft OEM Windows Embedded Standard 7 32-bit, English; for APC511; order CompactFlash separately (at least 8 GB)	
5SWWI7.1538-ENG	Microsoft OEM Windows Embedded Standard 7 32-bit, Service Pack 1, English; for APC511; order CompactFlash separately (at least 16 GB)	
5SWWI7.0738-MUL	Microsoft OEM Windows Embedded Standard 7 Premium 32-bit, multilingual; for APC511; order CompactFlash separately (at least 8 GB)	
5SWWI7.1738-MUL	Microsoft OEM Windows Embedded Standard 7 Premium 32-bit, Service Pack 1, multilingual; for APC511; order CompactFlash separately (at least 16 GB)	
	Required accessories	
	CompactFlash	
5CFCRD.016G-06	CompactFlash 16 GB B&R (SLC)	
5CFCRD.032G-06	CompactFlash 32 GB B&R (SLC)	
5CFCRD.8192-06	CompactFlash 8 GB B&R (SLC)	
	Optional accessories	
	Windows Embedded Standard 7	
5SWWI7.0900-MUL	Microsoft OEM Windows Embedded Standard 7 32-bit, Language Pack DVD	
5SWWI7.1900-MUL	Microsoft OEM Windows Embedded Standard 7 32-bit, Service Pack 1, Language Pack DVD	

Table 164: 5SWWI7.0538-ENG, 5SWWI7.1538-ENG, 5SWWI7.0738-MUL, 5SWWI7.1738-MUL - Order data

4.3 Overview

Model number	Edition	Target system	Chipset	Service Pack	Architectures	Language	Preinstalled	Minimum disk size	Minimum RAM required
5SWWI7.0538-ENG	Embedded	APC511	US15W		32-bit	English	Optional	8 GB	1 GB
5SWWI7.1538-ENG	Embedded	APC511	US15W	SP1	32-bit	English	Optional	16 GB	1 GB
5SWWI7.0738-MUL	Premium	APC511	US15W		32-bit	Multilingual	Optional	8 GB [1)]	1 GB
5SWWI7.1738-MUL	Premium	APC511	US15W	SP1	32-bit	Multilingual	Optional	16 GB [1)]	1 GB

1) The memory used by additional language packs is not taken into account in the minimum size of the disk.

4.4 Features with WES7 (Windows Embedded Standard 7)

The feature list displays the essential device functions and differences in Windows Embedded Standard 7 and Windows Embedded Standard 7 Premium.

Function	Windows Embedded Standard 7	Windows Embedded Standard 7 Premium
Enhanced Write Filter (EWF)	✓	✓
File-Based Write Filter (FBWF)	✓	✓
Administrator accounts	✓	✓
User accounts	Configurable	Configurable

Table 165: Device functions in Windows Embedded Standard 7

5) 64-bit versions are not supported by all systems.

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

Table 165: Device functions in Windows Embedded Standard 7

4.5 Installation

Upon request, Windows Embedded Standard 7 can be preinstalled by B&R on a suitable CompactFlash card (minimum 8 GB). The system is then automatically configured when it is switched on for the first time. This procedure takes approximately 30 minutes, with the device being rebooted a number of times.

Information:

If the EWF should be used, all mass storage devices should be disconnected from the system during installation oder SYSPREP (except for the boot drive). It is also possible to disable additional mass storage devices in BIOS.

4.6 Drivers

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

4.6.1 Touch screen driver

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

Information:

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

5 Windows XP Professional

5.1 General information

Information:

Discontinuation of support for Windows XP by Microsoft:

After *April 8th, 2014* Microsoft will no longer be providing any security updates, hotfixes, support (free or paid) or technical resources for Windows XP.

5.2 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 new device.	
5SWWXP.0600-GER	Microsoft OEM Windows XP Professional Service Pack 3, CD, German. Only available with a new device.	
5SWWXP.0600-MUL	Microsoft OEM Windows XP Professional Service Pack 3, CD, multilingual. Only available with a new device.	

Table 166: 5SWWXP.0600-ENG, 5SWWXP.0600-GER, 5SWWXP.0600-MUL - Order data

5.3 Overview

Model number	Edition	Target system	Chipset	Service Pack	Language	Preinstalled	Minimum hard disk space required	Minimum RAM required
5SWWXP.0600-ENG	Professional	APC510 APC511 APC620 APC810 APC820 APC910 PPC700 PPC725 PPC800 PPC900 PP500	945GME GM45 QM77/HM76 NM10 US15W	SP3	English	Optional	≤2.1 GB	128 MB
5SWWXP.0600-GER	Professional	APC510 APC511 APC620 APC810 APC820 APC910 PPC700 PPC725 PPC800 PPC900 PP500	945GME GM45 QM77/HM76 NM10 US15W	SP3	German	Optional	≤2.1 GB	128 MB
5SWWXP.0600-MUL	Professional	APC510 APC511 APC620 APC810 APC820 APC910 PPC700 PPC725 PPC800 PPC900 PP500	945GME GM45 QM77/HM76 NM10 US15W	SP3	Multilingual	Optional	≤2.1 GB	128 MB

5.4 Installation

Upon request, B&R can preinstall 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 in this process.

5.5 Drivers

Current drivers for all approved operating systems are available in the Downloads section of the B&R website www.br-automation.com.

Information:

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

6 Windows Embedded Standard 2009

6.1 General information

Windows® Embedded Standard 2009 is the modular version of Windows® XP Professional. It is used if XP applications should be executed with a minimal operating system size. Together with CompactFlash memory, Windows® Embedded Standard 2009 makes it possible to use the Microsoft desktop operating system in harsh 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 problems even after an unexpected power failure. B&R offers complete images for industrial PCs, Power Panel and Mobile Panel devices to make the transition to Windows® Embedded Standard 2009 as easy as possible. In addition to Windows® Embedded Standard 2009, the standard Windows® XP Professional operating system is also available in English, German and a multilingual version.

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

6.2 Order data

Model number	Short description	Figure
	Windows Embedded Standard 2009	
5SWWXP.0738-ENG	Microsoft OEM Windows Embedded Standard 2009, English; for APC511; order CompactFlash separately (at least 1 GB)	
	Required accessories	
	CompactFlash	
5CFCRD.016G-06	CompactFlash 16 GB B&R (SLC)	
5CFCRD.032G-06	CompactFlash 32 GB B&R (SLC)	
5CFCRD.1024-06	CompactFlash 1 GB B&R (SLC)	
5CFCRD.2048-06	CompactFlash 2 GB B&R (SLC)	
5CFCRD.4096-06	CompactFlash 4 GB B&R (SLC)	
5CFCRD.8192-06	CompactFlash 8 GB B&R (SLC)	

Table 167: 5SWWXP.0738-ENG - Order data

6.3 Overview

Model number	Target system	Chipset	Language	Preinstalled	Minimum disk size	Minimum RAM required
5SWWXP.0738-ENG	APC511	US15W	English	Yes	1 GB	256 MB

6.4 Features with WES2009 (Windows Embedded Standard 2009)

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

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

Table 168: Device functions in Windows Embedded Standard 2009

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

Table 168: Device functions in Windows Embedded Standard 2009

6.5 Installation

Upon request, Windows Embedded Standard 2009 can be preinstalled by B&R on a suitable CompactFlash card (minimum 1 GB). The system is then automatically configured when it is switched on for the first time. This procedure takes approximately 10 minutes, with the device being rebooted a number of times.

6.6 Drivers

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

6.6.1 Touch screen driver

The touch screen driver is installed automatically during Windows Embedded Standard 2009 setup. If an Automation Panel 800/900 is connected later on, the additional touch screen interface needs to be selected in the touch screen settings in the Windows Control Panel. It is important that both the Enhanced Write Filter (EWF) and the File Based Write Filter (FBWF) are disabled for this.

Information:

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

7 Windows CE

7.1 General information

B&R Windows CE is an operating system that is optimally tailored to B&R's devices, i.e. it includes only the functions and modules that are required by each device. This makes this operating system extremely robust and stable. A further advantage of B&R Windows CE compared to other operating systems are the low licensing costs.

7.2 Order data

Model number	Short description	Figure
	Windows CE 6.0	
5SWWCE.0838-ENG	Microsoft OEM Windows CE 6.0 Professional, English; for APC511; order CompactFlash separately (at least 128 MB)	
	Required accessories	
	CompactFlash	
5CFCRD.0128-03	CompactFlash 128 MB Western Digital (SLC)	
5CFCRD.016G-06	CompactFlash 16 GB B&R (SLC)	
5CFCRD.0256-03	CompactFlash 256 MB Western Digital (SLC)	
5CFCRD.0512-03	CompactFlash 512 MB Western Digital (SLC)	
5CFCRD.1024-03	CompactFlash 1 GB Western Digital (SLC)	
5CFCRD.1024-06	CompactFlash 1 GB B&R (SLC)	
5CFCRD.2048-03	CompactFlash 2 GB Western Digital (SLC)	
5CFCRD.2048-06	CompactFlash 2 GB B&R (SLC)	
5CFCRD.4096-03	CompactFlash 4 GB Western Digital (SLC)	
5CFCRD.4096-06	CompactFlash 4 GB B&R (SLC)	
5CFCRD.8192-03	CompactFlash 8 GB Western Digital (SLC)	
5CFCRD.8192-06	CompactFlash 8 GB B&R (SLC)	

Table 169: 5SWWCE.0838-ENG - Order data

7.3 Overview

Model number	Target system	Chipset	Language	Preinstalled	Minimum disk size	Minimum RAM required
5SWWCE.0838-ENG	APC511	US15W	English	Yes	128 MB	128 MB

7.4 Windows CE 6.0 features

Detailed information about Windows CE for B&R devices is available in the Downloads section of the B&R website (www.br-automation.com).

Features	Windows CE 6.0
Supported screen resolutions	WVGA (TFT), VGA (TFT), SVGA (TFT), XGA (TFT)
Chipset	Intel US15W
Color depth	16-bit or 65,536 colors[1)]
Graphics card driver	Intel(R) embedded graphics driver
Main memory	Automatic detection and use of up to 512 MB RAM
Boot time / Startup time	Approx. 25 seconds
Screen rotation	Not supported
Web browser	Internet Explorer
.NET	Compact Framework 3.5
Image size	Approx. 40 MB[2)], uncompressed
Custom keys	Supported
PVI	Supported
Automation Device Interface	Supported
Remote Desktop Protocol for thin clients	Supported
B&R VNC Viewer	Supported
B&R Task Manager	Supported
B&R Picture Viewer	Supported
Compatible with zenOn	Yes
Compatible with Wonderware	No
Serial interfaces for any use	2
DirectX	No
Audio ports	"Line OUT" and "Line IN" are supported. "MIC" is not supported.

Table 170: Windows CE 6.0 features

1) The color depth depends on the display used.
2) The "Compress Windows CE image" function in the B&R Embedded OS Installer can be used to reduce the image size.

7.5 Requirements

The device must fulfill the following criteria to be able run the Windows CE operating system.

- At least 128 MB main memory
- At least one 128 MB CompactFlash card (size should be specified when ordered)

7.6 Installation

Windows CE is usually preinstalled at B&R.

7.7 B&R Embedded OS Installer

The B&R Embedded OS Installer makes it possible to install existing B&R Windows CE images. The 4 files NK.BIN, BLDR, LOGOXRES.BMP and LOGOQVGA.BMP must be available from an already functioning B&R Windows CE installation.

The B&R Embedded OS Installer is available in the Downloads section of the B&R website (www.br-automation.com). Additional information is available in the online help documentation for the B&R Embedded OS Installer.

8 Automation Runtime

8.1 General information

An integral component of Automation Studio is the real-time operating system, which makes up the software kernel that allows applications to run on a target system.

- Guaranteed highest possible performance for the hardware being used
- Runs on all B&R target systems
- Makes the application hardware-independent
- Easy portability of applications between B&R target systems
- Deterministic behavior guaranteed by cyclic runtime system
- Multitasking according to deterministic runtime rules
- Configuration of priorities, time classes and jitter tolerance
- Up to eight different time classes with any number of subroutines
- Guaranteed response to time and jitter tolerance violations
- Exception handling
- Configurable jitter tolerance in all task classes
- Support for all relevant programming languages, including IEC 61131-3 and ANSI C
- Extensive function library conforming to IEC 61131-3 as well as the expanded Automation library
- Access to all networks and bus systems via function calls or the Automation Studio configuration

B&R Automation Runtime is fully embedded in the corresponding target system (the hardware where Automation Runtime is installed). It allows application programs to access I/O systems (e.g. via fieldbus) and other devices (interfaces, networks, etc.).

8.2 Order data

Model number	Short description	Figure
	Automation Runtime	
1A4600.10-5	B&R Automation Runtime ARwin, including license sticker	
1A4601.06-5	B&R Automation Runtime ARemb, including license sticker	
1A4601.06-T	B&R Automation Runtime ARemb Terminal, including license sticker	

Table 171: 1A4600.10-5, 1A4601.06-5, 1A4601.06-T - Order data

8.3 Automation Runtime Windows (ARwin)

System support is provided by ARwin with an AS 3.0.90 / AR 4.00 upgrade.

Information:

Audio output under ARwin supported with AR 4.01 and higher.

8.4 Automation Runtime Embedded (ARemb)

System support is provided by ARemb with an AS 3.0.90 / AR 4.00 upgrade.

Information:

Audio output under ARemb supported with AR 4.01 and higher.

9 Debian (GNU/Linux)

9.1 General information

A Linux or GNU/Linux system is an open, Unix-like multiuser operating system based on the Linux kernel and GNU software. Widespread use and commercial applications were made possible starting in 1992 with the licensing of the Linux kernel under the GPL.

The Debian 6.0 operating system developed by B&R already contains all of the necessary drivers for the devices and can be used immediately without additional work.

Advantages of Debian:

- High degree of stability
- Wide selection of packages
- Suitable packages with real-time kernels already available

For more information about Debian, please visit http://www.debian.org.

9.2 Order data

Model number	Short description	Figure
	Debian 6.0	
5SWLIN.0138-MUL	Debian 6.0 32-bit, multilingual, for APC511; order CompactFlash card separately (min. 4 GB).	

Table 172: 5SWLIN.0138-MUL - Order data

9.3 Overview

Model number	Target system	Chipset	Architectures	Language	Preinstalled	Minimum disk size	Minimum RAM required
5SWLIN.0138-MUL	APC511	US15W		Multilingual	Optional	4 GB	512 MB

9.4 Features

- Gnome desktop
- Touch drivers (for Power Panel 500 and Automation Panels with a resistive touch screen)
- MTCX driver
- ADI library
- HMI diagnostics tool
- Tool for right-click support via touch screen
- Tool for setting the display brightness
- Virtual keyboard
- Support for the following resolutions:

Display size	Display resolution
5.7"	VGA, 640 x 480
7"	WVGA, 800 x 480
10.4"	VGA, 640 x 480
12.1"	SVGA, 800 x 600
15"	XGA, 1024 x 768

Table 173: Debian-supported resolutions

Detailed information about Debian 6.0 for B&R devices is available in the Downloads section of the B&R website (www.br-automation.com).

9.5 Installation/Drivers

Upon request, B&R can preinstall Debian 6.0 on the desired mass storage device (e.g. CompactFlash card, etc.). All of the drivers required for operation (graphics, network, etc.) are also installed in this process.

Debian can also be downloaded from the Debian website (http://www.debian.org) and installed separately. The Debian website provides more detailed instructions.

Notes regarding installation on B&R devices are included in a separate document that can be downloaded from the B&R website (www.br-automation.com).

Installation packages for the necessary B&R adjustments are also available on the B&R website (www.br-automation.com).

All drivers required for operation are preinstalled along with B&R Debian 6.0.

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

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

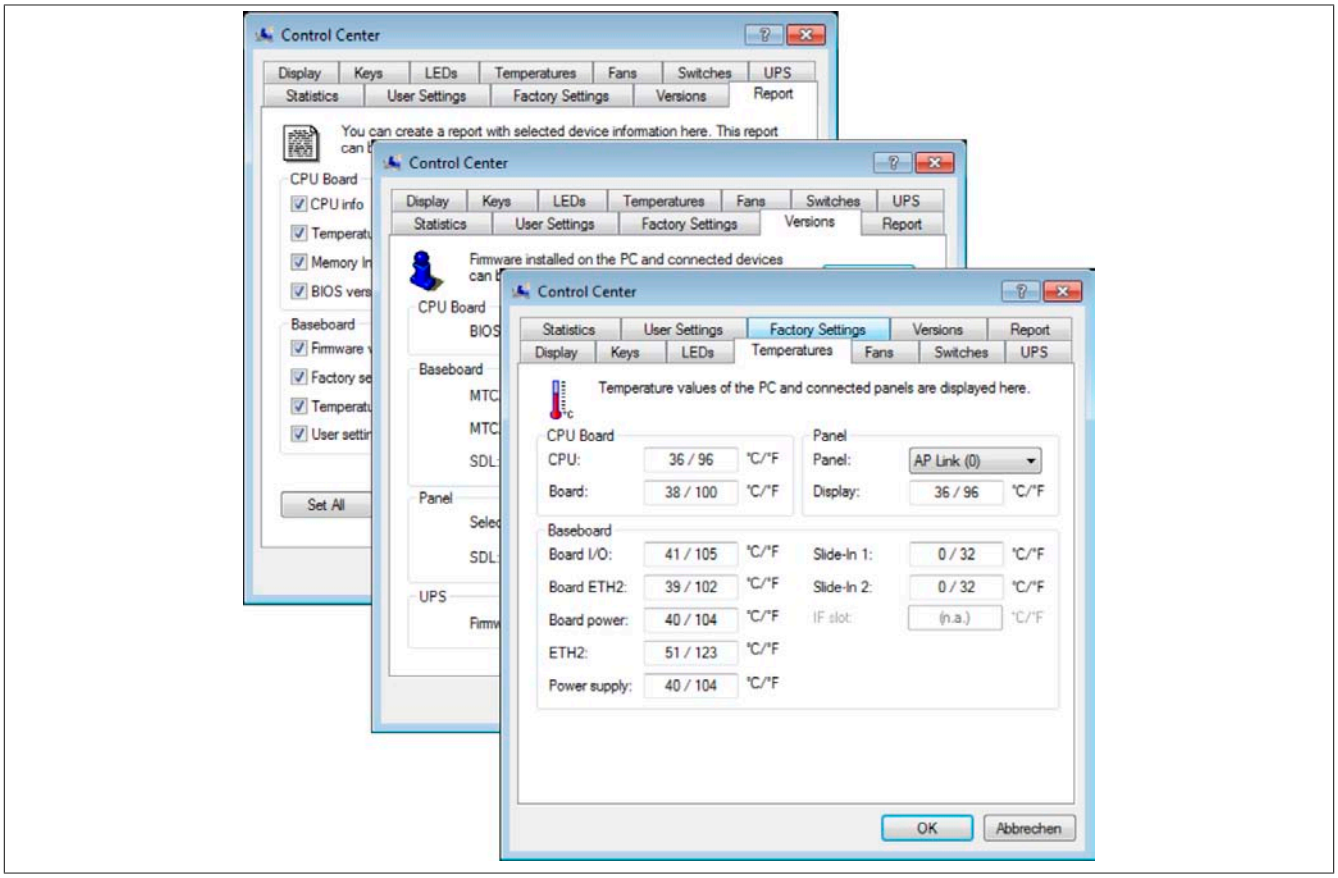


Figure 85: ADI Control Center screenshots - Examples

Information:

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

10.1 Functions

Information:

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

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

Supports the following systems:

- Automation PC 510
- Automation PC 511
- Automation PC 620
- Automation PC 810
- Automation PC 820
- Automation PC 910
- Panel PC 300
- Panel PC 700
- Panel PC 725
- Panel PC 800
- Panel PC 900
- 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

10.2 Installation

A detailed description of the Control Center can be found in the integrated online help documentation. The B&R Automation Device Interface (ADI) driver (also 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 B&R images of embedded operating systems.

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

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

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

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

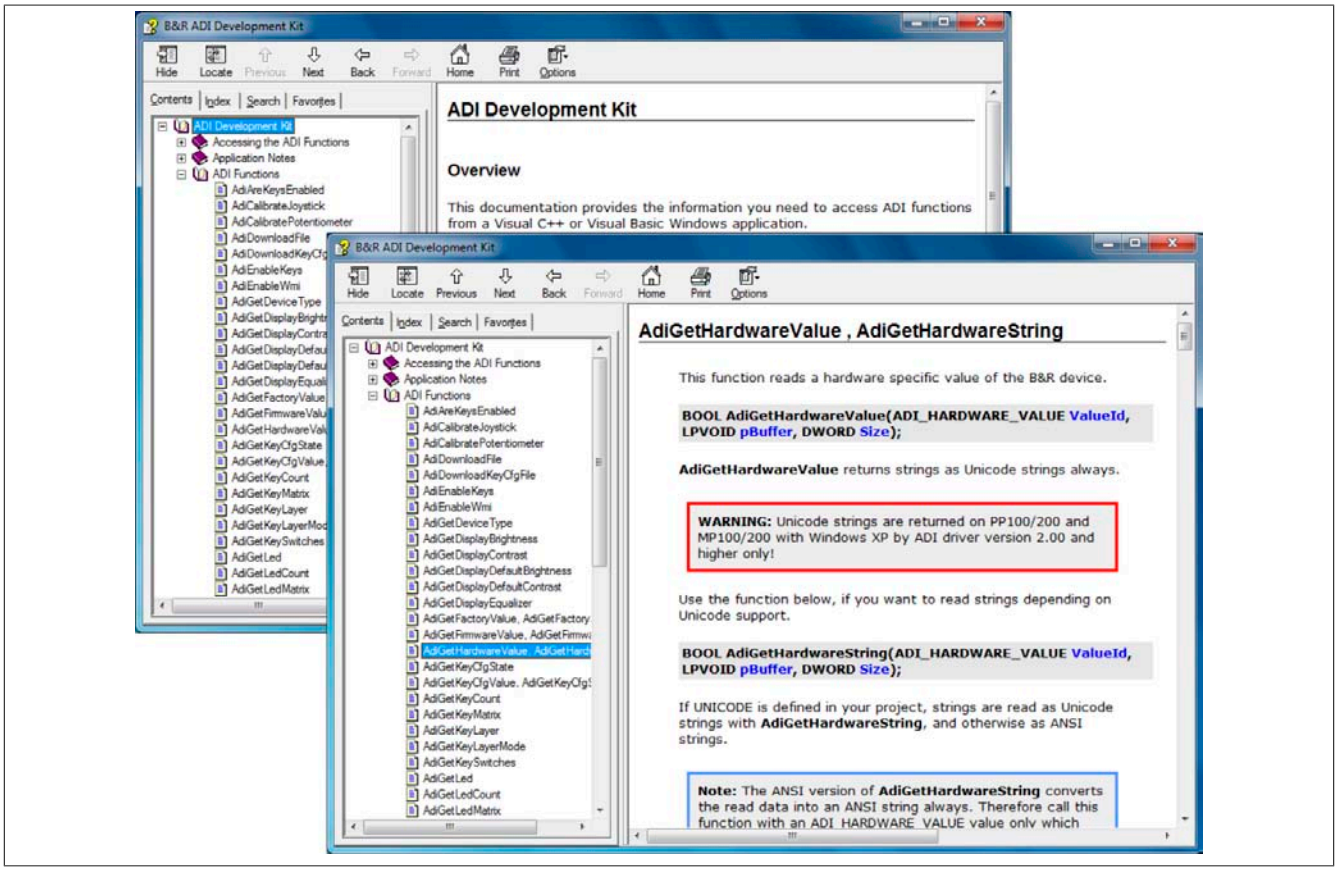


Figure 86: ADI Development Kit screenshots (version 3.60)

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)

The following systems are supported (version 3.60 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
- Panel PC 900
- Power Panel 100/200
- Power Panel 300/400

- Power Panel 500
- Mobile Panel 40/50
- Mobile Panel 100/200

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

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

The B&R Automation Device Interface (ADI) development kit is available at no cost in the Downloads section of the B&R website (www.br-automation.com).

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

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

Supported programming languages:

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

System requirements

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

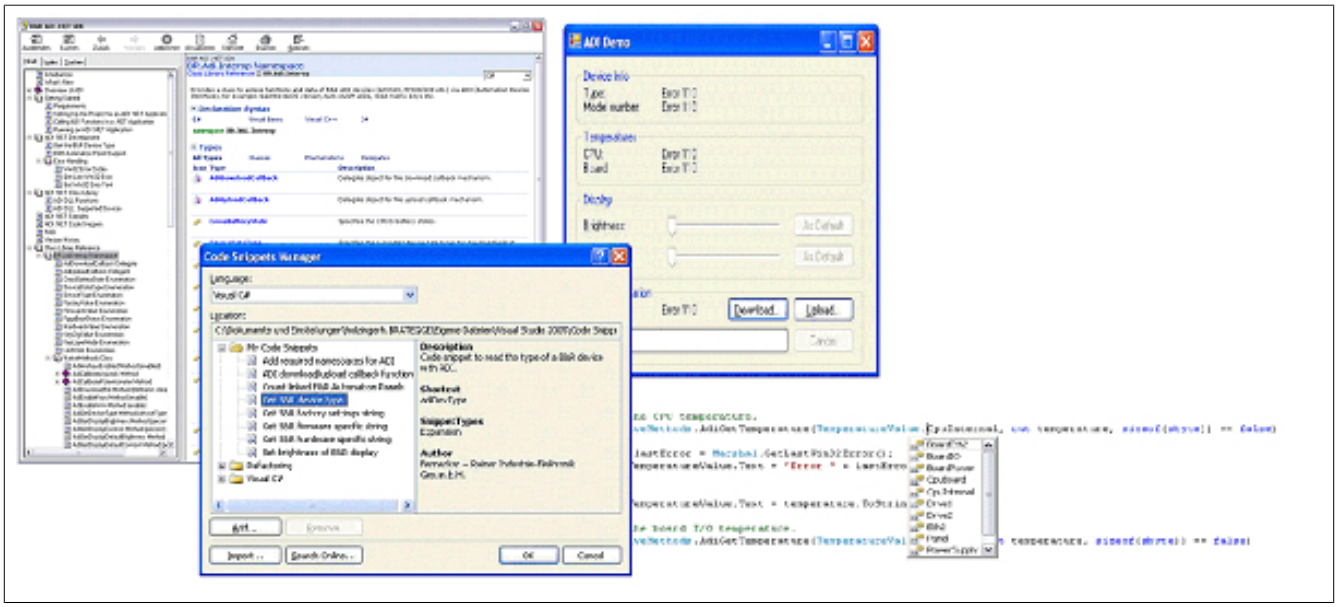


Figure 87: ADI .NET SDK screenshots (version 2.00)

Features (version 2.00 and higher):

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

The following systems are supported (version 2.00 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
- Panel PC 900
- Power Panel 100/200
- Power Panel 300/400
- Power Panel 500
- Mobile Panel 40/50
- Mobile Panel 100/200

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

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

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

13 B&R Key Editor

On display devices, it is often necessary to adapt the function keys and LEDs directly to the application software being used. The B&R Key Editor makes it quick and easy to implement a unique configuration for the application.

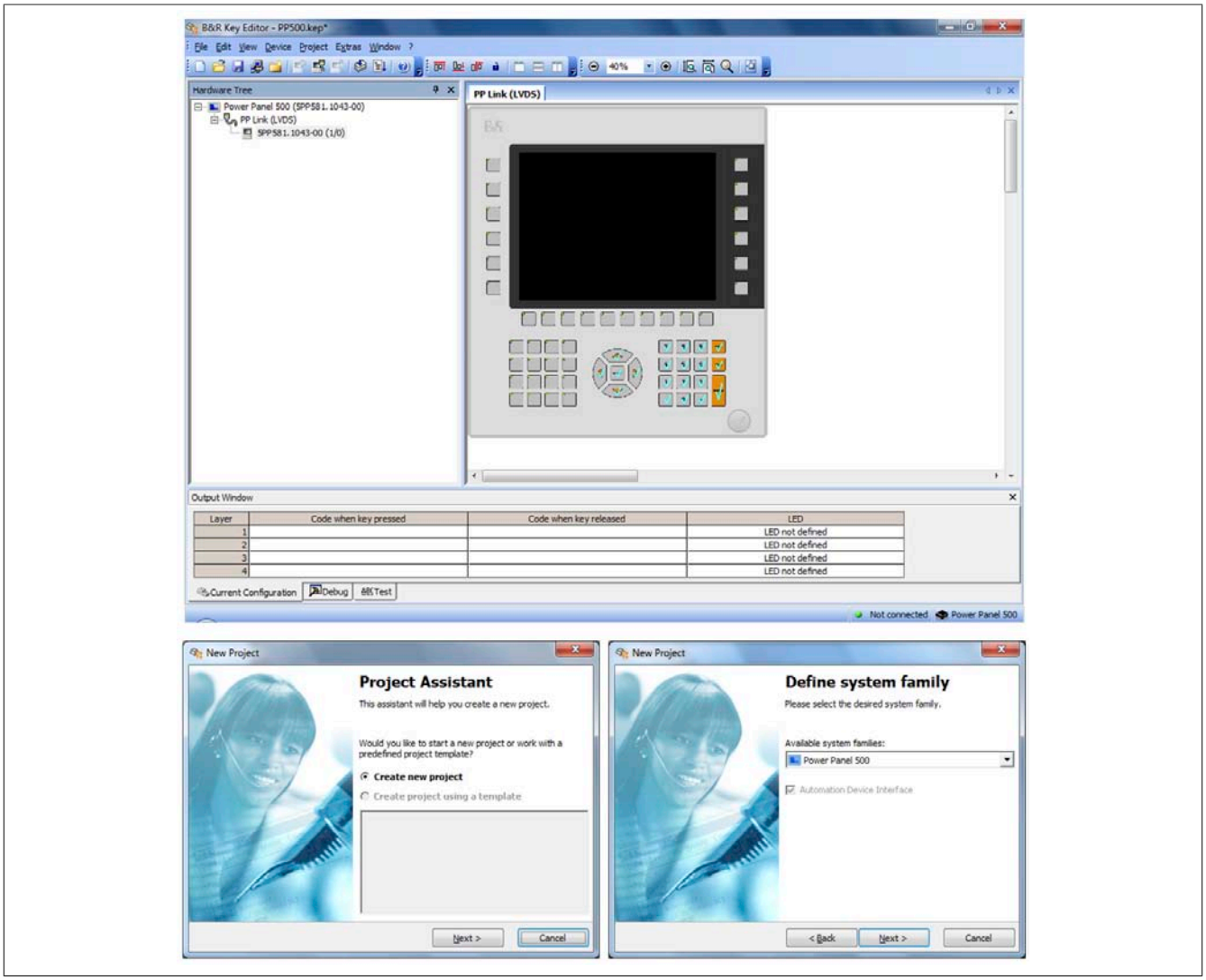


Figure 88: B&R Key Editor screenshots (version 3.40)

Features:

- Configuration of normal keyboard keys (A, B, C, etc.)
- Keyboard shortcuts (CTRL+C, SHIFT+DEL, etc.) using only one key
- Special key functions (change brightness, etc.)
- Assignment of functions to LEDs (HDD access, power, etc.)
- 4 assignments possible per key (using layers)
- Configuration of the panel locking time when multiple Automation Panel 900 devices are connected to Automation PC and Panel PC devices.

The following systems are supported (version 3.40):

- Automation PC 510
- Automation PC 511
- Automation PC 620
- Automation PC 810
- Automation PC 820
- Automation PC 910
- Automation Panel 800
- Automation Panel 830
- Automation Panel 900

- Automation Panel 9x3
- IPC2000, IPC2001, IPC2002
- IPC5000, IPC5600
- IPC5000C, IPC5600C
- Mobile Panel 40/50
- Mobile Panel 100/200
- Panel PC 300
- Panel PC 700
- Panel PC 800
- Panel PC 900
- Power Panel 100/200
- Power Panel 300/400
- Power Panel 500

A detailed guide for configuring keys and LEDs can be found in the B&R Key Editor's online help documentation. The B&R Key Editor is available at no cost in the Downloads section of the B&R website (www.br-automation.com). It can also be found on the B&R HMI Drivers & Utilities DVD (model number 5SWHMI.0000-00).

Chapter 5 • Standards and certifications

1 Standards and guidelines

1.1 CE mark

This mark certifies that all harmonized EN standards for the applicable directives have been met for B&R products.

1.2 EMC directive

These devices meet the requirements of EC directive "2004/108/EC Electromagnetic compatibility" and are designed for the following areas:

EN 61131-2:2007	Programmable logic controllers - Part 2: Equipment requirements and tests
EN 61000-6-2:2005	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
EN 61000-6-4:2007	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

1.3 Low voltage directive

These devices satisfy the requirements of EC directive "2006/95/EC Low voltage directive" and are designed for the following areas:

EN 61131-2:2007	Programmable logic controllers - Part 2: Equipment requirements and tests
EN 60204-1:2006 + A1:2009	Safety of machinery - Electrical equipment of machines - Part 1: General requirements

2 Certifications

Danger!

A complete system can only receive certification if ALL of the individual components it includes have the applicable certifications. If an individual component is being used that DOES NOT have an applicable certification, then the complete system will NOT RECEIVE certification.

B&R products and services comply with applicable standards. This includes international standards from organizations such as ISO, IEC and CENELEC, as well as national standards from organizations such as UL, CSA, FCC, VDE, ÖVE, etc. We are committed to ensuring the reliability of our products in an industrial environment.

Unless otherwise specified, the following certifications apply:

2.1 UL certification

Products with this label have been certified by Underwriters Laboratories and are listed as "Industrial Control Equipment". This mark is valid for the USA and Canada and simplifies the certification of your machines and systems in these areas.

Underwriters Laboratories (UL) in accordance with the UL508 standard - 17th Edition
Canadian (CSA) standard in accordance with C22.2 No. 142-M1987

2.2 GOST-R

Products with this mark have been certified by an accredited certification body and have been approved for import to the Russian Federation.

Chapter 6 • Accessories

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

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

1 Replacement CMOS batteries

1.1 0AC201.91 / 4A0006.00-000

1.1.1 General information

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 is insufficient ("Bad" status).

1.1.2 Order data

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

Table 174: 0AC201.91, 4A0006.00-000 - Order data

1.1.3 Technical data

Warning!

The battery must be replaced by a Type CR2477N Renata battery only. The use of another battery may present a risk of fire or explosion.

The battery may explode if handled improperly. Do not recharge, disassemble or dispose of in fire.

Information:

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

Product ID	0AC201.91	4A0006.00-000
General information		
Storage time	Max. 3 years at 30°C	
Certification		
CE	Yes	
cULus	Yes	
Electrical characteristics		
Capacity	950 mAh	
Self-discharging	<1% per year (at 23°C)	
Voltage range	3 V	

Table 175: 0AC201.91, 4A0006.00-000 - Technical data

Product ID	0AC201.91	4A0006.00-000
Environmental conditions		
Temperature		
Storage	-20 to 60°C	
Relative humidity		
Operation	0 to 95%	
Storage	0 to 95%	
Transport	0 to 95%	

Table 175: 0AC201.91, 4A0006.00-000 - Technical data

2 Power connectors

2.1 0TB103.9x

2.1.1 General information

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

2.1.2 Order data

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

Table 176: 0TB103.9, 0TB103.91 - Order data

2.1.3 Technical data

Information:

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

Product ID	0TB103.9	0TB103.91
General information		
Certification		
CE	Yes	
cULus	Yes	
cULus HazLoc Class 1 Division 2	Yes 1)	
GL	Yes 1)	
Terminal block		
Note	Protected against vibration by the screw flange Nominal values according to UL	
Number of pins	3 (female)	
Type of terminal clamp	Screw clamps	Cage clamps 3)
Cable type	Only copper wires (no aluminum wires!)	
Distance between contacts	5.08 mm	
Connection cross section		
AWG wire	26 to 14 AWG	26 to 12 AWG
Wire end 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 end sleeves	0.20 to 1.50 mm²	
Fastening torque	0.4 Nm	-
Electrical characteristics		
Nominal voltage	300 V	
Nominal current 2)	10 A / contact	
Contact resistance	≤5 mΩ	

Table 177: 0TB103.9, 0TB103.91 - Technical data

1) Yes, although applies only if all components installed within the complete system have this certification
2) The limit data for each I/O module must be taken into consideration.
3) Cage clamp terminal blocks cannot be used side-by-side.

3 Interface board connector

3.1 0TB1208.3100

3.1.1 General information

The 2-row 8-pin terminal block TB1208 is used to connect to various Power Panel 500 interface boards.

3.1.2 Order data

Model number	Short description	Figure
	Terminal blocks	
0TB1208.3100	Connector, 8-pin cage clamp, 1 mm², protected against vibration by the screw flange	

Table 178: 0TB1208.3100 - Order data

3.1.3 Technical data

Product ID	0TB1208.3100
General information	
Certification	
CE	Yes
cULus	Yes
GL	Yes
Terminal block	
Note	Nominal values according to UL
Number of pins	8 (female)
Type of terminal clamp	Tension spring connection
Cable type	Only copper wires (no aluminum wires!)
Distance between contacts	3.5 mm
Connection cross section	
AWG wire	28 to 18 AWG
Wire end sleeves with plastic covering	0.13 to 0.34 mm²
Solid wires	0.20 to 1 mm²
Fine strand wires	0.20 to 1 mm²
With wire end sleeves	0.13 to 0.34 mm²
Electrical characteristics	
Nominal voltage	300 V
Nominal current [1)]	10 A / contact

Table 179: 0TB1208.3100 - Technical data

1) The limit data for each I/O module must be taken into consideration.

4 CompactFlash cards

4.1 General information

CompactFlash cards are storage media that are easy to replace. Due to their robustness against environmental influences (e.g. temperature, shock, vibration, etc.), CompactFlash cards are ideal for use as storage media in industrial environments.

4.2 General information

In order to be suited for use in industrial automation, CompactFlash cards must be highly reliable. The following items are very important to achieving the necessary level of reliability:

- The flash technology used
- An efficient algorithm for maximizing service life
- Good mechanisms for detecting and fixing errors in the flash memory

4.2.1 Flash technology

Currently, CompactFlash cards are available with MLC (multi-level cell) and SLC (single-level cell) flash blocks. SLC flash memory has a service life 10 times longer than MLC, which is why only CompactFlash cards with SLC flash blocks are suited for industrial applications.

4.2.2 Wear leveling

Wear leveling is an algorithm that can be used to maximize the service life of a CompactFlash card. There are three different algorithms:

- No wear leveling
- Dynamic wear leveling
- Static wear leveling

The basic idea behind wear leveling is to distribute data over a broad area of blocks or cells on the disk so that the same areas don't have to be cleared and reprogrammed over and over again.

4.2.2.1 No wear leveling

The earliest CompactFlash cards didn't have an algorithm for maximizing service life. The service life of a CompactFlash card was determined only by the guaranteed lifespan of the flash blocks.

4.2.2.2 Dynamic wear leveling

Dynamic wear leveling makes it possible to utilize unused flash blocks when writing to a file.
If the disk is 80% full with files, then only 20% can be used for wear leveling.
The service life of the CompactFlash card is therefore dependent on the amount of unused flash blocks.

4.2.2.3 Static wear leveling

Static wear leveling monitors which data is rarely modified. From time to time, the controller then moves this data to blocks that have already been used frequently in order to prevent further wear on those cells.

4.2.3 ECC error correction

Bit errors can be caused by inactivity or when a certain cell is being operated. Error correction coding (ECC) implemented via hardware or software can detect and correct many errors of this type.

4.2.4 S.M.A.R.T. support

Self-Monitoring, Analysis and Reporting Technology (S.M.A.R.T.) is an industry standard for mass storage devices that has been introduced to monitor important parameters and quickly detect imminent failures. Critical performance and calibration data is monitored and stored in order to help predict the probability of errors.

4.2.5 Maximum reliability

CompactFlash cards supplied by B&R use SLC flash blocks and static wear leveling together with a powerful ECC algorithm to provide maximum reliability.

4.3 5CFCRD.xxxx-06

4.3.1 General information

Information:

B&R CompactFlash cards 5CFCRD.xxxx-06 and CompactFlash cards from a different manufacturer cannot be used in the same system at the same time. Due to differences in technology (older vs. newer technologies), problems can occur during system startup that are caused by different boot times.

see "Known problems/issues" on page 189

Information:

5CFCRD.xxxx-06 CompactFlash cards are supported on B&R devices with WinCE version ≥ 6.0.

4.3.2 Order data

Model number	Short description	Figure
	CompactFlash	
5CFCRD.0512-06	CompactFlash 512 MB B&R (SLC)	
5CFCRD.1024-06	CompactFlash 1 GB B&R (SLC)	
5CFCRD.2048-06	CompactFlash 2 GB B&R (SLC)	
5CFCRD.4096-06	CompactFlash 4 GB B&R (SLC)	
5CFCRD.8192-06	CompactFlash 8 GB B&R (SLC)	
5CFCRD.016G-06	CompactFlash 16 GB B&R (SLC)	
5CFCRD.032G-06	CompactFlash 32 GB B&R (SLC)	

Table 180: 5CFCRD.0512-06, 5CFCRD.1024-06, 5CFCRD.2048-06, 5CFCRD.4096-06, 5CFCRD.8192-06, 5CFCRD.016G-06, 5CFCRD.032G-06 - Order data

4.3.3 Technical data

Caution!

A sudden loss of power may result in data loss! In very rare cases, the mass storage device may also become damaged.

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

Information:

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

Product ID	5CFCRD. 0512-06	5CFCRD. 1024-06	5CFCRD. 2048-06	5CFCRD. 4096-06	5CFCRD. 8192-06	5CFCRD. 016G-06	5CFCRD. 032G-06
General information							
Capacity	512 MB	1 GB	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	>3,000,000 hours (at 25°C)						
Maintenance	None						
Supported operating modes	PIO Mode 0-6, Multiword DMA Mode 0-4, Ultra DMA Mode 0-4						
Continuous reading							
Typical	33 MB/s	33 MB/s	33 MB/s	33 MB/s	33 MB/s	36 MB/s	36 MB/s
Maximum	35 MB/s	35 MB/s	35 MB/s	34 MB/s	34 MB/s	37 MB/s	37 MB/s

Table 181: 5CFCRD.0512-06, 5CFCRD.1024-06, 5CFCRD.2048-06, 5CFCRD.4096-06, 5CFCRD.8192-06, 5CFCRD.016G-06, 5CFCRD.032G-06 - Technical data

Product ID	5CFCRD.0512-06	5CFCRD.1024-06	5CFCRD.2048-06	5CFCRD.4096-06	5CFCRD.8192-06	5CFCRD.016G-06	5CFCRD.032G-06
Continuous writing							
Typical	15 MB/s	15 MB/s	15 MB/s	14 MB/s	14 MB/s	28 MB/s	28 MB/s
Maximum	18 MB/s	18 MB/s	18 MB/s	17 MB/s	17 MB/s	30 MB/s	30 MB/s
Certification							
CE	Yes						
cULus	Yes						
cULus HazLoc Class 1 Division 2	-	-	-	-	-	Yes [1]	-
ATEX Zone 22	-	-	-	-	-	Yes [1]	-
GOST-R	Yes						
GL	Yes [1]						
Endurance							
SLC flash	Yes						
Guaranteed data volume							
Guaranteed [2]	50 TB	100 TB	200 TB	400 TB	800 TB	1600 TB	3200 TB
Results for 5 years [2]	27.40 GB/day	54.79 GB/day	109.9 GB/day	219.8 GB/day	438.6 GB/day	876.72 GB/day	1753.44 GB/day
Clear/Write cycles							
Guaranteed	100,000						
Wear leveling	Static						
Error correction coding (ECC)	Yes						
S.M.A.R.T. support	Yes						
Support							
Hardware	PP300/400, PP500, PPC300, PPC700, PPC725, PPC800, APC620, APC810, APC820						
Operating systems							
Windows 7, 32-bit	No	No	No	No	No	Yes	Yes
Windows 7, 64-bit	No	No	No	No	No	No	Yes
Windows Embedded Standard 7, 32-bit	No	No	No	No	Yes	Yes	Yes
Windows Embedded Standard 7, 64-bit	No	No	No	No	No	Yes	Yes
Windows XP Professional	No	No	No	Yes	Yes	Yes	Yes
Windows XP Embedded	Yes						
Windows Embedded Standard 2009	No	Yes	Yes	Yes	Yes	Yes	Yes
Windows CE 6.0	Yes	Yes	Yes	Yes	Yes	Yes [3]	Yes [3]
Windows CE 5.0	No						
Software							
PVI Transfer	≥V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011)	≥V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011)	≥V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011)	≥V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011)	≥V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011)	≥V3.6.8.40 (part of PVI Development Setup ≥ V3.0.0.3020)	≥V4.0.0.8 (part of PVI Development Setup ≥ V3.0.2.3014)
B&R Embedded OS Installer	≥V3.10	≥V3.10	≥V3.10	≥V3.10	≥V3.10	≥V3.20	≥V3.21
Environmental conditions							
Temperature							
Operation	0 to 70°C						
Storage	-65 to 150°C						
Transport	-65 to 150°C						
Relative humidity							
Operation	Max. 85% at 85°C						
Storage	Max. 85% at 85°C						
Transport	Max. 85% at 85°C						
Vibration							
Operation	20 g peak, 20 to 2000 Hz, 4 in each direction (JEDEC JESD22, method B103) 5.35 g RMS, 15 min per level (IEC 68-2-6)						
Storage	20 g peak, 20 to 2000 Hz, 4 in each direction (JEDEC JESD22, method B103) 5.35 g RMS, 15 min per level (IEC 68-2-6)						
Transport	20 g peak, 20 to 2000 Hz, 4 in each direction (JEDEC JESD22, method B103) 5.35 g RMS, 15 min per level (IEC 68-2-6)						
Shock							
Operation	1.5 kg peak, 0.5 ms 5 times (JEDEC JESD22, method B110) 30 g, 11 ms 1 times (IEC 68-2-27)						
Storage	1.5 kg peak, 0.5 ms 5 times (JEDEC JESD22, method B110) 30 g, 11 ms 1 times (IEC 68-2-27)						
Transport	1.5 kg peak, 0.5 ms 5 times (JEDEC JESD22, method B110) 30 g, 11 ms 1 times (IEC 68-2-27)						
Altitude							
Operation	Max. 4572 m						

Table 181: 5CFCRD.0512-06, 5CFCRD.1024-06, 5CFCRD.2048-06, 5CFCRD.4096-06, 5CFCRD.8192-06, 5CFCRD.016G-06, 5CFCRD.032G-06 - Technical data

Product ID	5CFCRD.0512-06	5CFCRD.1024-06	5CFCRD.2048-06	5CFCRD.4096-06	5CFCRD.8192-06	5CFCRD.016G-06	5CFCRD.032G-06
Mechanical characteristics							
Dimensions							
Width	42.8 ±0.10 mm						
Length	36.4 ±0.15 mm						
Height	3.3 ±0.10 mm						
Weight	10 g						

Table 181: 5CFCRD.0512-06, 5CFCRD.1024-06, 5CFCRD.2048-06, 5CFCRD.4096-06, 5CFCRD.8192-06, 5CFCRD.016G-06, 5CFCRD.032G-06 - Technical data

1) Yes, although applies only if all components installed within the complete system have this certification
2) Endurance of B&R CFs (with linear written block size ≥128 kB).
3) Not supported by the B&R Embedded OS Installer.

4.3.4 Temperature humidity diagram

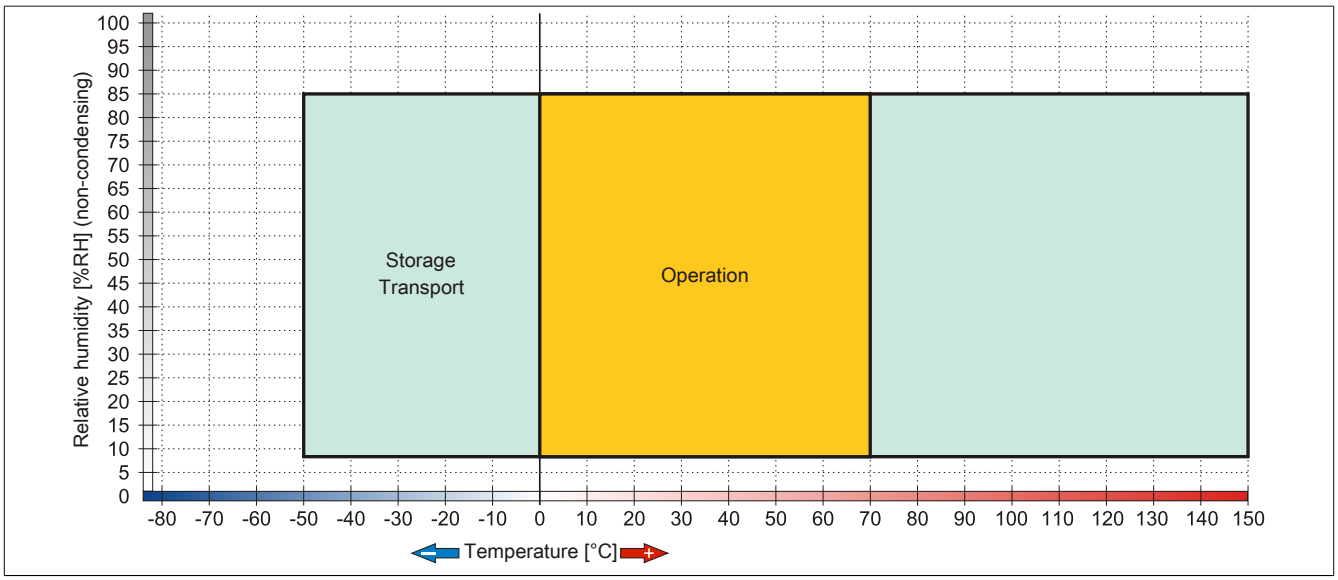


Figure 89: 5CFCRD.xxxx-06 CompactFlash cards - Temperature humidity diagram

4.3.5 Dimensions

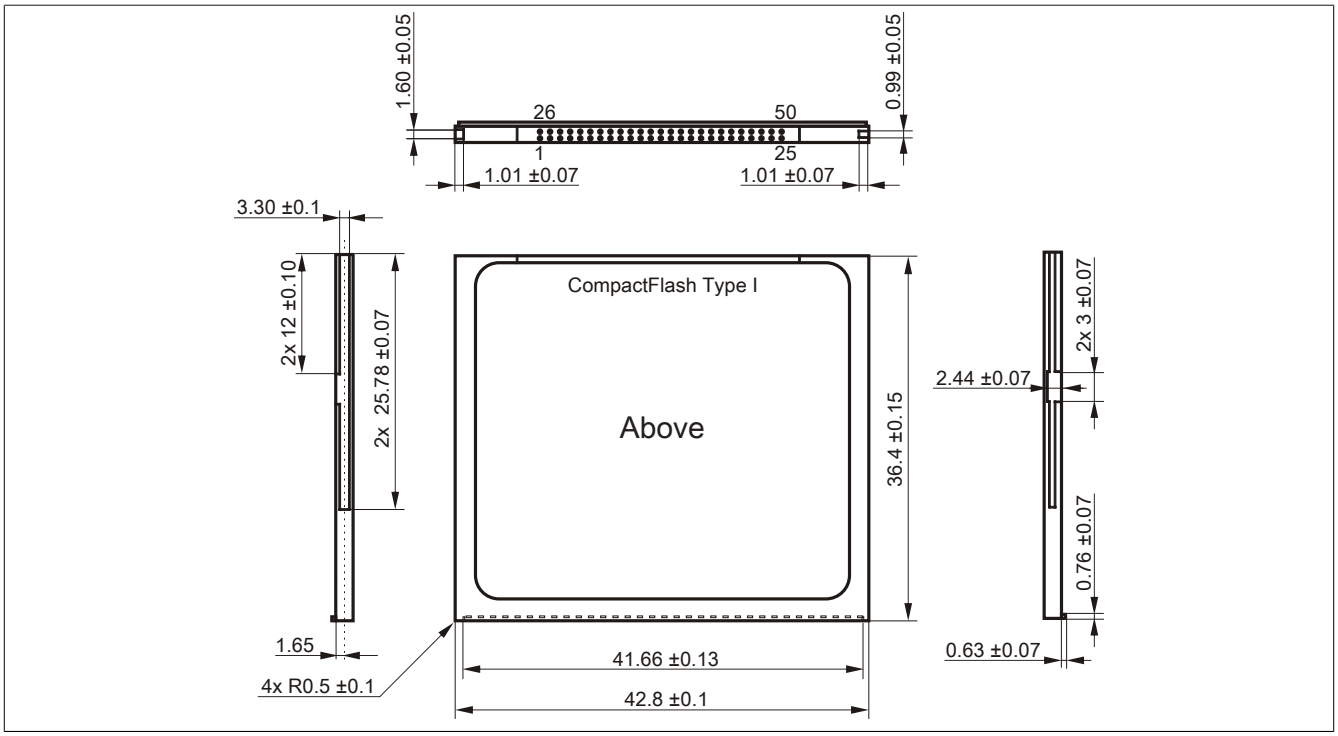


Figure 90: Type I CompactFlash card - Dimensions

4.3.6 Benchmark

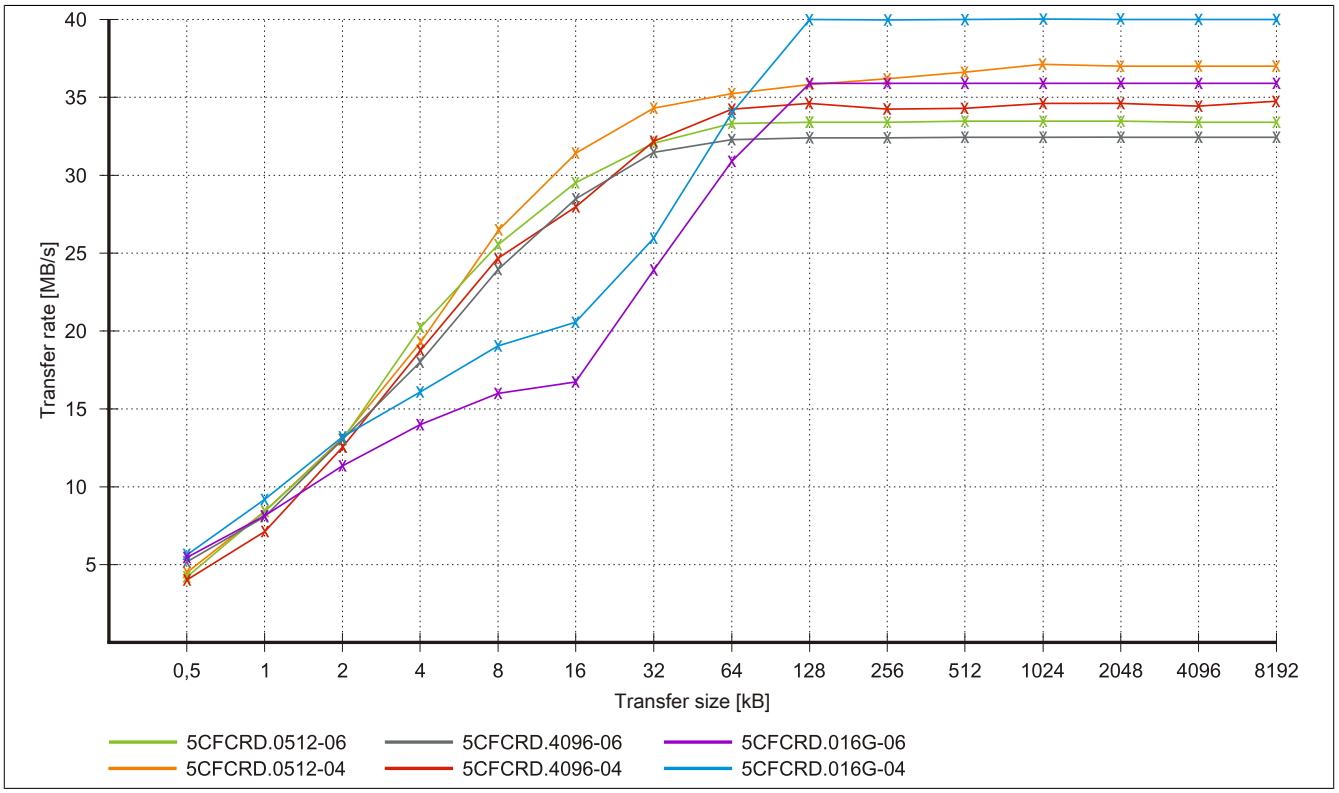


Figure 91: ATTO Disk Benchmark v2.34 read comparison - 5CFCRD.xxxx-04 and 5CFCRD.xxxx-06

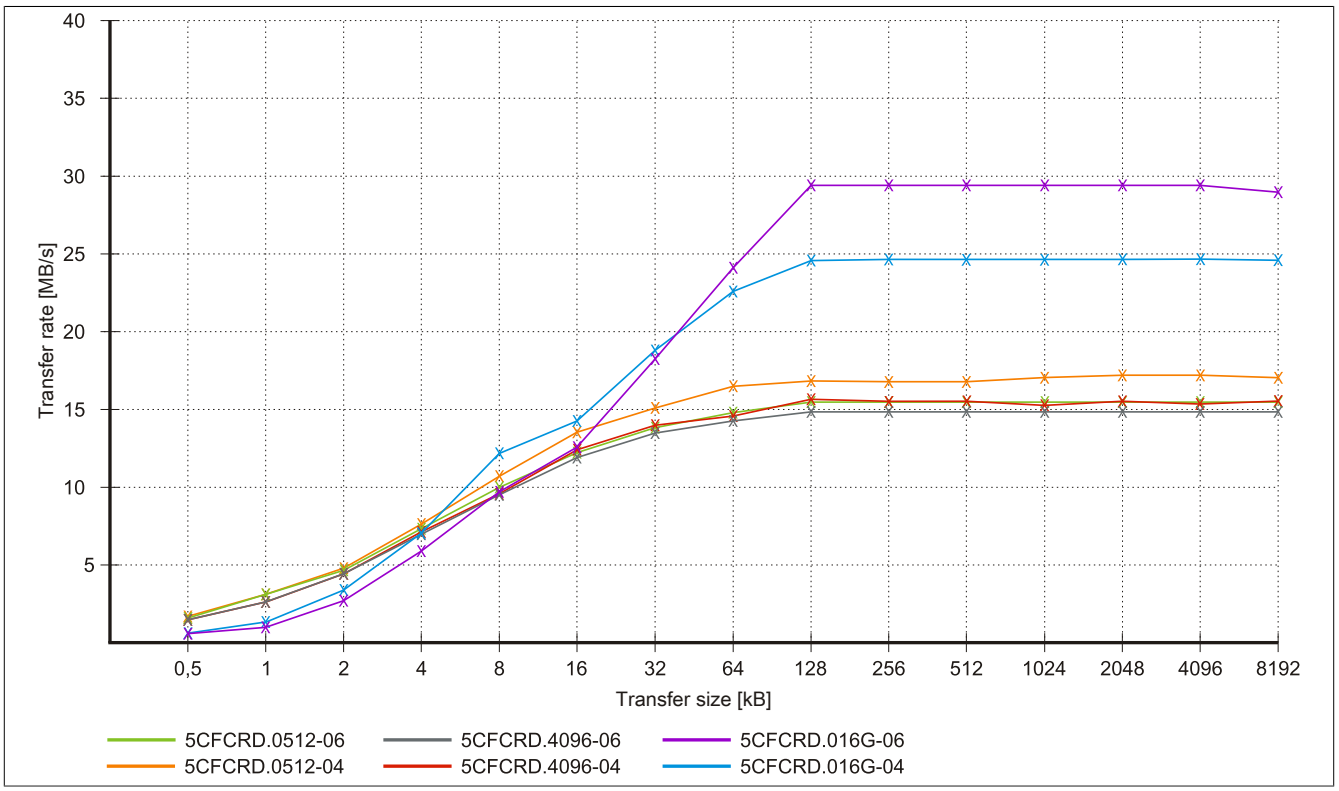


Figure 92: ATTO Disk Benchmark v2.34 write comparison - 5CFCRD.xxxx-04 and 5CFCRD.xxxx-06

4.4 5CFCRD.xxxx-04

4.4.1 General information

Information:

B&R CompactFlash cards 5CFCRD.xxxx-04 and CompactFlash cards from a different manufacturer cannot be used in the same system at the same time. Due to differences in technology (older vs. newer technologies), problems can occur during system startup that are caused by different boot times.

see "Known problems/issues" on page 189

Information:

5CFCRD.xxxx-04 CompactFlash cards are supported on B&R devices with WinCE version ≥ 6.0.

4.4.2 Order data

Model number	Short description	Figure
	CompactFlash	
5CFCRD.0512-04	CompactFlash 512 MB B&R (SLC)	
5CFCRD.1024-04	CompactFlash 1 GB B&R (SLC)	
5CFCRD.2048-04	CompactFlash 2 GB B&R (SLC)	
5CFCRD.4096-04	CompactFlash 4 GB B&R (SLC)	
5CFCRD.8192-04	CompactFlash 8 GB B&R (SLC)	
5CFCRD.016G-04	CompactFlash 16 GB B&R (SLC)	

Table 182: 5CFCRD.0512-04, 5CFCRD.1024-04, 5CFCRD.2048-04, 5CFCRD.4096-04, 5CFCRD.8192-04, 5CFCRD.016G-04 - Order data

4.4.3 Technical data

Caution!

A sudden loss of power may result in data loss! In very rare cases, the mass storage device may also become damaged.

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

Information:

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

Product ID	5CFCRD.0512-04	5CFCRD.1024-04	5CFCRD.2048-04	5CFCRD.4096-04	5CFCRD.8192-04	5CFCRD.016G-04
General information						
Capacity	512 MB	1 GB	2 GB	4 GB	8 GB	16 GB
Data retention	10 years					
Data reliability	<1 unrecoverable error in 10^{14} bit read accesses					
Lifetime monitoring	Yes					
MTBF	>3,000,000 hours (at 25°C)					
Maintenance	None					
Supported operating modes	PIO Mode 0-6, Multiword DMA Mode 0-4, Ultra DMA Mode 0-4					
Continuous reading						
Typical	35 MB/s (240X) [1]	35 MB/s (240X) [1]	35 MB/s (240X) [1]	33 MB/s (220X) [1]	27 MB/s (180X) [1]	36 MB/s (240X) [1]
Maximum	37 MB/s (260X) [1]	37 MB/s (260X) [1]	37 MB/s (260X) [1]	34 MB/s (226X) [1]	28 MB/s (186X) [1]	37 MB/s (247X) [1]

Table 183: 5CFCRD.0512-04, 5CFCRD.1024-04, 5CFCRD.2048-04, 5CFCRD.4096-04, 5CFCRD.8192-04, 5CFCRD.016G-04 - Technical data

Product ID	5CFCRD.0512-04	5CFCRD.1024-04	5CFCRD.2048-04	5CFCRD.4096-04	5CFCRD.8192-04	5CFCRD.016G-04
Continuous writing						
Typical	17 MB/s (110X)	17 MB/s (110X)	17 MB/s (110X)	16 MB/s (106X)	15 MB/s (100X)	18 MB/s (120X)
Maximum	20 MB/s (133X)	20 MB/s (133X)	20 MB/s (133X)	18 MB/s (120X)	17 MB/s (110X)	19 MB/s (126X)
Certification						
CE	Yes					
cULus	Yes					
GOST-R	-	Yes	Yes	Yes	Yes	Yes
GL	Yes [2]					
Endurance						
SLC flash	Yes					
Guaranteed data volume						
Guaranteed [3]	50 TB	100 TB	200 TB	400 TB	800 TB	1600 TB
Results for 5 years [3]	27.40 GB/day	54.79 GB/day	109.9 GB/day	219.8 GB/day	438.6 GB/day	876.72 GB/day
Clear/Write cycles						
Typical [4]	2,000,000					
Guaranteed	100,000					
Wear leveling	Static					
Error correction coding (ECC)	Yes					
S.M.A.R.T. support	No					
Support						
Hardware	PP300/400, PP500, PPC300, PPC700, PPC725, PPC800, APC620, APC810, APC820					
Operating systems						
Windows 7, 32-bit	No	No	No	No	No	Yes
Windows 7, 64-bit	No					
Windows Embedded Standard 7, 32-bit	No	No	No	No	Yes	Yes
Windows Embedded Standard 7, 64-bit	No	No	No	No	No	Yes
Windows XP Professional	No	No	No	Yes	Yes	Yes
Windows XP Embedded	Yes					
Windows Embedded Standard 2009	No	Yes	Yes	Yes	Yes	Yes
Windows CE 6.0	Yes	Yes	Yes	Yes	Yes	Yes [5]
Windows CE 5.0	No					
Software						
PVI Transfer	≥V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011)	≥V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011)	≥V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011)	≥V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011)	≥V3.2.3.8 (part of PVI Development Setup ≥ V2.06.00.3011)	≥V3.6.8.40 (part of PVI Development Setup ≥ V3.0.0.3020)
B&R Embedded OS Installer	≥V3.10	≥V3.10	≥V3.10	≥V3.10	≥V3.10	≥V3.20
Environmental conditions						
Temperature						
Operation	0 to 70°C					
Storage	-65 to 150°C					
Transport	-65 to 150°C					
Relative humidity						
Operation	Max. 85% at 85°C					
Storage	Max. 85% at 85°C					
Transport	Max. 85% at 85°C					
Vibration						
Operation	20 g peak, 20 to 2000 Hz, 4 in each direction (JEDEC JESD22, method B103) 5.35 g RMS, 15 min per level (IEC 68-2-6)					
Storage	20 g peak, 20 to 2000 Hz, 4 in each direction (JEDEC JESD22, method B103) 5.35 g RMS, 15 min per level (IEC 68-2-6)					
Transport	20 g peak, 20 to 2000 Hz, 4 in each direction (JEDEC JESD22, method B103) 5.35 g RMS, 15 min per level (IEC 68-2-6)					
Shock						
Operation	1.5 kg peak, 0.5 ms 5 times (JEDEC JESD22, method B110) 30 g, 11 ms 1 times (IEC 68-2-27)					
Storage	1.5 kg peak, 0.5 ms 5 times (JEDEC JESD22, method B110) 30 g, 11 ms 1 times (IEC 68-2-27)					
Transport	1.5 kg peak, 0.5 ms 5 times (JEDEC JESD22, method B110) 30 g, 11 ms 1 times (IEC 68-2-27)					
Altitude						
Operation	Max. 4572 m					
Mechanical characteristics						
Dimensions						
Width	42.8 ±0.10 mm					
Length	36.4 ±0.15 mm					
Height	3.3 ±0.10 mm					
Weight	10 g					

Table 183: 5CFCRD.0512-04, 5CFCRD.1024-04, 5CFCRD.2048-04, 5CFCRD.4096-04, 5CFCRD.8192-04, 5CFCRD.016G-04 - Technical data

1) Speed specification with 1X = 150 Kb/s. All specifications refer to Samsung flash chips, CompactFlash cards in UDMA mode 4 and 30 ns cycle time in True IDE mode with sequential write/read test.
2) Yes, although applies only if all components installed within the complete system have this certification

3) Endurance of B&R CFs (with linear written block size ≥128 kB).
4) Depends on the average file size.
5) Not supported by the B&R Embedded OS Installer.

4.4.4 Temperature humidity diagram

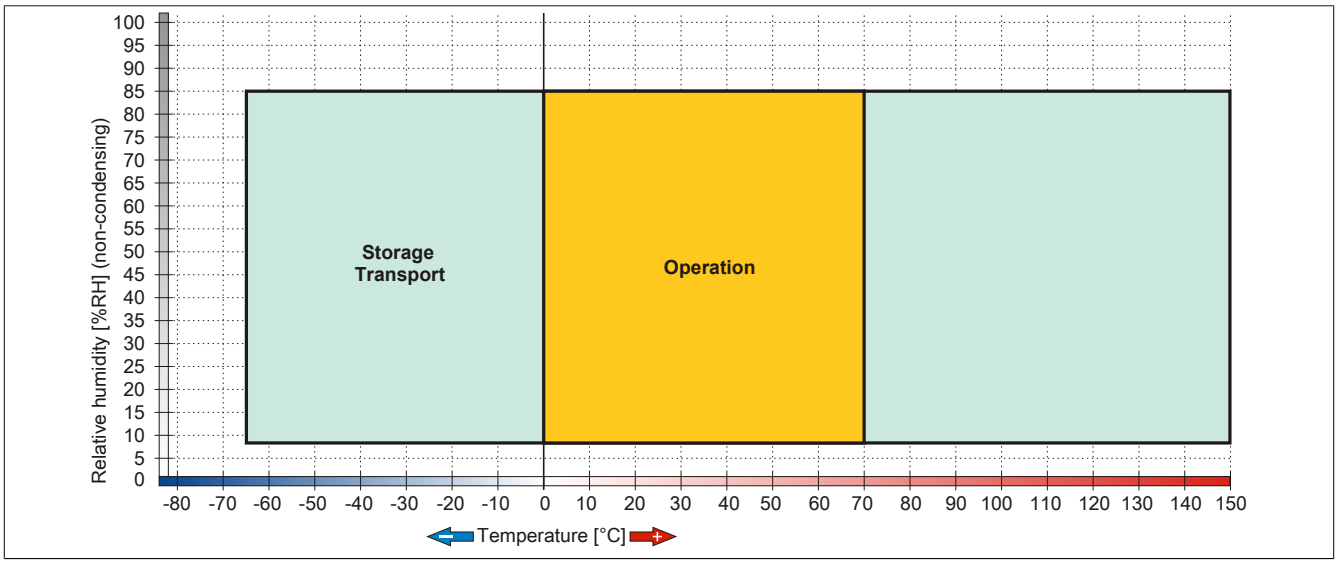


Figure 93: 5CFCRD.xxxx-04 CompactFlash cards - Temperature humidity diagram

4.4.5 Dimensions

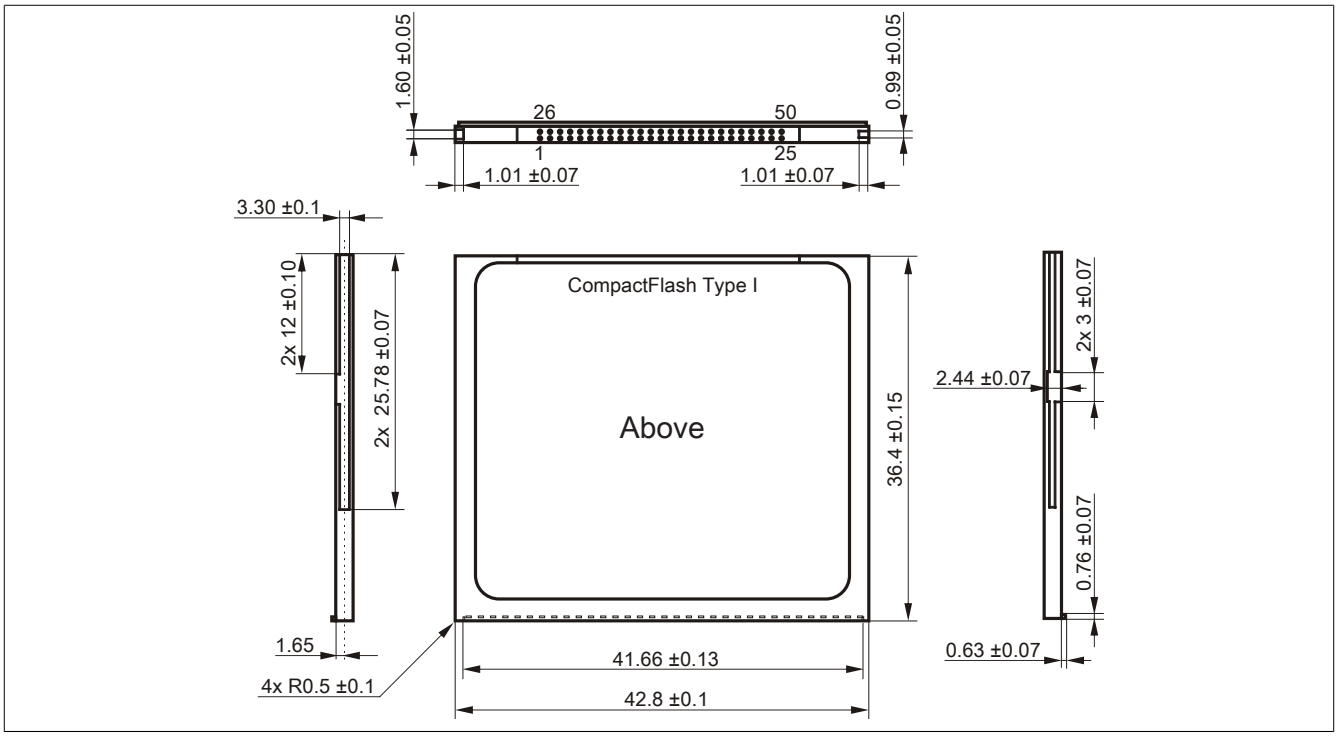


Figure 94: Type I CompactFlash card - Dimensions

4.4.6 Benchmark

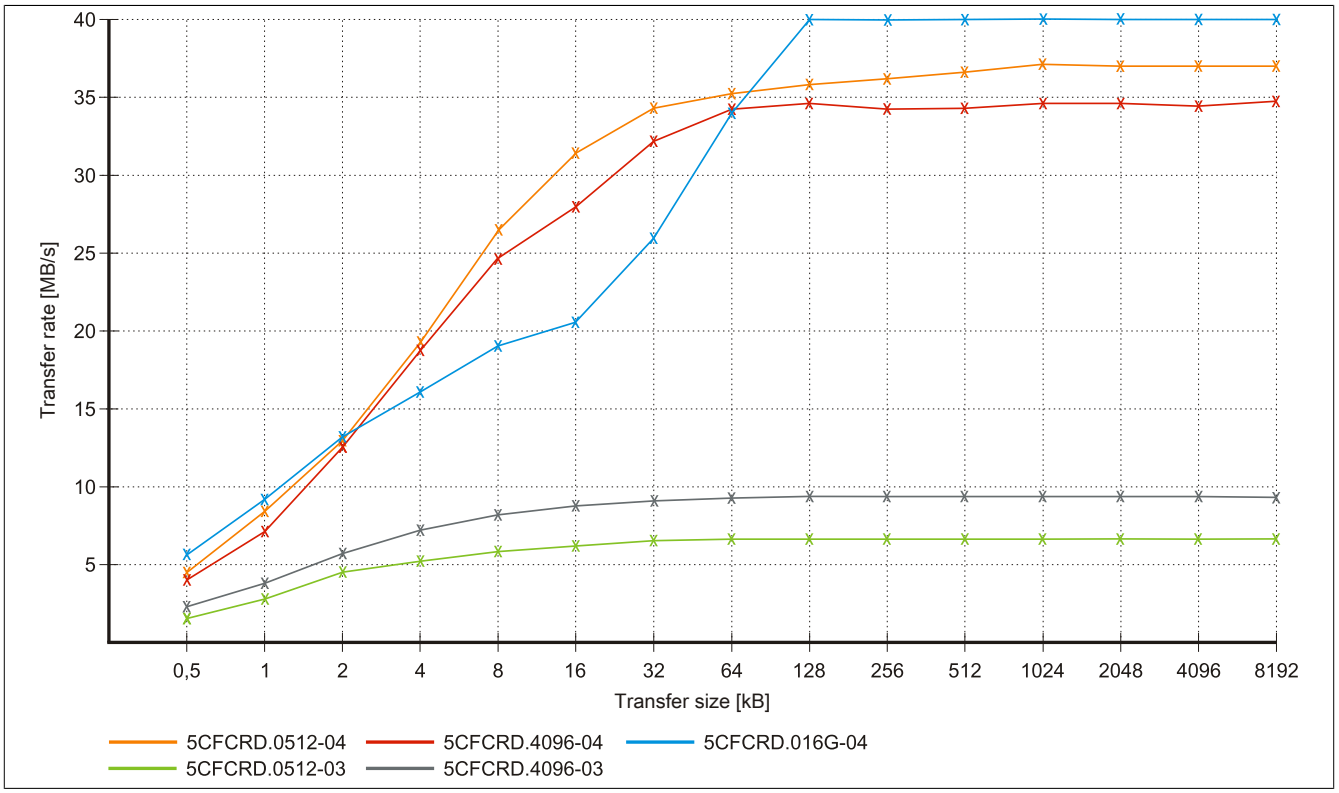


Figure 95: ATTO Disk Benchmark v2.34 read comparison - 5CFCRD.xxxx-03 and 5CFCRD.xxxx-04

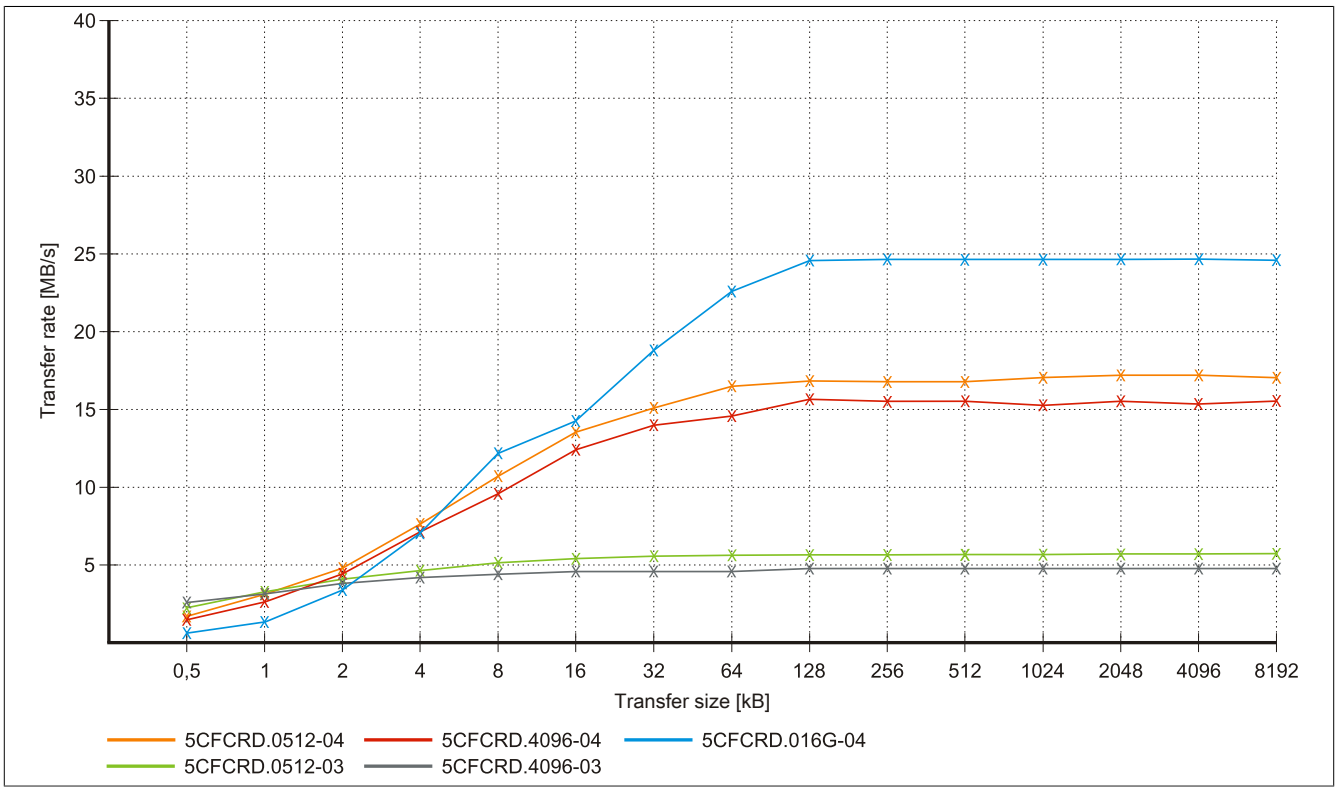


Figure 96: ATTO Disk Benchmark v2.34 write comparison - 5CFCRD.xxxx-03 and 5CFCRD.xxxx-04

4.5 5CFCRD.xxxx-03

4.5.1 General information

Information:

Western Digital CompactFlash cards 5CFCRD.xxxx- 03 and CompactFlash cards from a different manufacturer cannot be used in the same system at the same time. Due to differences in technology (older vs. newer technologies), problems can occur during system startup that are caused by different boot times.

see "Known problems/issues" on page 189

Information:

On Windows CE 5.0 devices, 5CFCRD.xxxx-03 CompactFlash cards up to 1 GB are supported.

Information:

On CompactFlash cards 5CFCRD.xxxx-03, only the sticker and the description have changed. The technical data has not been changed.

4.5.2 Order data

Model number	Short description	Figure
	CompactFlash	
5CFCRD.0064-03	CompactFlash 64 MB Western Digital (SLC)	
5CFCRD.0128-03	CompactFlash 128 MB Western Digital (SLC)	
5CFCRD.0256-03	CompactFlash 256 MB Western Digital (SLC)	
5CFCRD.0512-03	CompactFlash 512 MB Western Digital (SLC)	
5CFCRD.1024-03	CompactFlash 1 GB Western Digital (SLC)	
5CFCRD.2048-03	CompactFlash 2 GB Western Digital (SLC)	
5CFCRD.4096-03	CompactFlash 4 GB Western Digital (SLC)	
5CFCRD.8192-03	CompactFlash 8 GB Western Digital (SLC)	

Table 184: 5CFCRD.0064-03, 5CFCRD.0128-03, 5CFCRD.0256-03, 5CFCRD.0512-03, 5CFCRD.1024-03, 5CFCRD.2048-03, 5CFCRD.4096-03, 5CFCRD.8192-03 - Order data

4.5.3 Technical data

Caution!

A sudden loss of power may result in data loss! In very rare cases, the mass storage device may also become damaged.

To prevent damage and loss of data, B&R recommends that you use a UPS device.

Information:

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

Product ID	5CFCRD. 0064-03	5CFCRD. 0128-03	5CFCRD. 0256-03	5CFCRD. 0512-03	5CFCRD. 1024-03	5CFCRD. 2048-03	5CFCRD. 4096-03	5CFCRD. 8192-03
General information								
Capacity	64 MB	128 MB	256 MB	512 MB	1 GB	2 GB	4 GB	8 GB
Data retention	10 years							
Data reliability	<1 unrecoverable error in 10^{14} bit read accesses							
Lifetime monitoring	Yes							

Table 185: 5CFCRD.0064-03, 5CFCRD.0128-03, 5CFCRD.0256-03, 5CFCRD.0512-03, 5CFCRD.1024-03, 5CFCRD.2048-03, 5CFCRD.4096-03, 5CFCRD.8192-03 - Technical data

Product ID	5CFCRD.0064-03	5CFCRD.0128-03	5CFCRD.0256-03	5CFCRD.0512-03	5CFCRD.1024-03	5CFCRD.2048-03	5CFCRD.4096-03	5CFCRD.8192-03
MTBF	>4,000,000 hours (at 25°C)							
Maintenance	None							
Supported operating modes	PIO Mode 0-4, Multiword DMA Mode 0-2							
Continuous reading								
Typical	8 MB/s							
Continuous writing								
Typical	6 MB/s							
Certification								
CE	Yes							
cULus	Yes							
GOST-R	Yes							
GL	Yes [1]	Yes [1]	Yes	Yes [1]	Yes [1]	Yes [1]	Yes [1]	Yes [1]
Endurance								
SLC flash	Yes							
Clear/Write cycles								
Typical	>2,000,000							
Wear leveling	Static							
Error correction coding (ECC)	Yes							
S.M.A.R.T. support	No							
Support								
Hardware	MP100/200, PP100/200, PP300/400, PP500, PPC300, PPC700, PPC725, PPC800, Provit 2000, Provit 5000, APC620, APC680, APC810, APC820							
Operating systems								
Windows 7, 32-bit	No							
Windows 7, 64-bit	No							
Windows Embedded Standard 7, 32-bit	No	No	No	No	No	No	No	Yes
Windows Embedded Standard 7, 64-bit	No							
Windows XP Professional	No	No	No	No	No	No	Yes	Yes
Windows XP Embedded	No	No	No	Yes	Yes	Yes	Yes	Yes
Windows Embedded Standard 2009	No	No	No	No	Yes	Yes	Yes	Yes
Windows CE 6.0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes [2]
Windows CE 5.0	Yes	Yes	Yes	Yes	Yes	No	No	No
Software								
PVI Transfer	≥V2.57 (part of PVI Development Setup ≥ V2.5.3.3005)							
B&R Embedded OS Installer	≥V2.21							
Environmental conditions								
Temperature								
Operation	0 to 70°C							
Storage	-50 to 100°C							
Transport	-50 to 100°C							
Relative humidity								
Operation	8 to 95%, non-condensing							
Storage	8 to 95%, non-condensing							
Transport	8 to 95%, non-condensing							
Vibration								
Operation	Max. 16.3 g (159 m/s² 0-peak)							
Storage	Max. 30 g (294 m/s² 0-peak)							
Transport	Max. 30 g (294 m/s² 0-peak)							
Shock								
Operation	Max. 1000 g (9810 m/s² 0-peak)							
Storage	Max. 3000 g (29430 m/s² 0-peak)							
Transport	Max. 3000 g (29430 m/s² 0-peak)							
Altitude								
Operation	Max. 24383 m							
Mechanical characteristics								
Dimensions								
Width	42.8 ±0.10 mm							
Length	36.4 ±0.15 mm							
Height	3.3 ±0.10 mm							
Weight	11.4 g							

Table 185: 5CFCRD.0064-03, 5CFCRD.0128-03, 5CFCRD.0256-03, 5CFCRD.0512-03, 5CFCRD.1024-03, 5CFCRD.2048-03, 5CFCRD.4096-03, 5CFCRD.8192-03 - Technical data

1) Yes, although applies only if all components installed within the complete system have this certification
2) Not supported by the B&R Embedded OS Installer.

4.5.4 Temperature humidity diagram

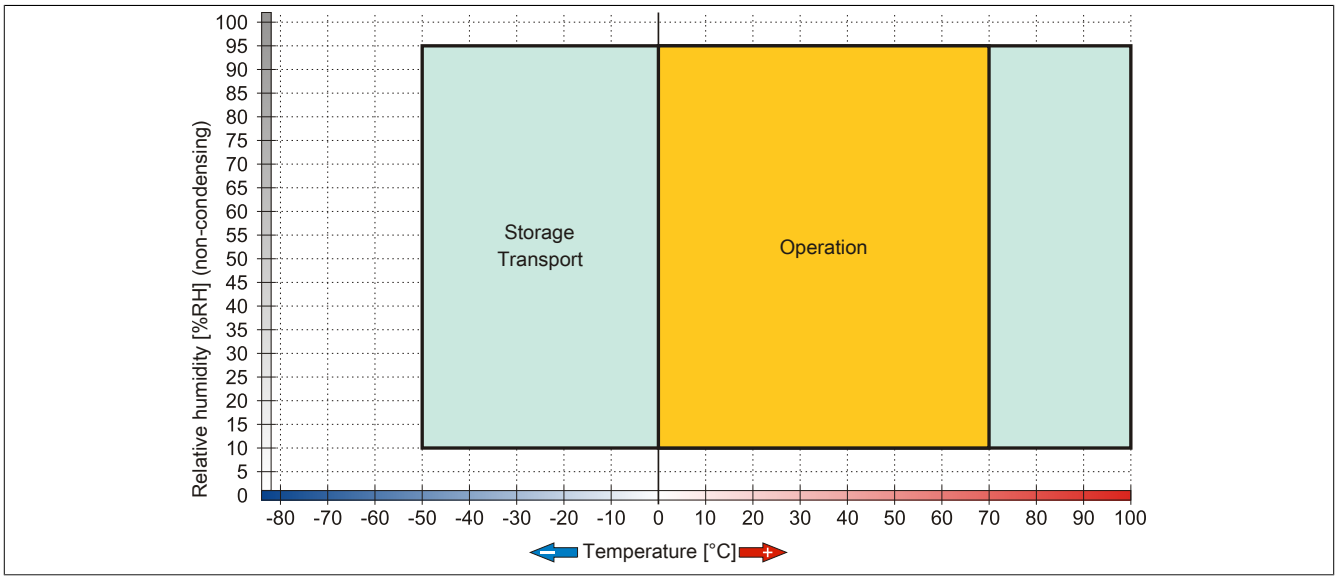


Figure 97: 5CFCRD.xxxx-03 CompactFlash cards - Temperature humidity diagram

4.5.5 Dimensions

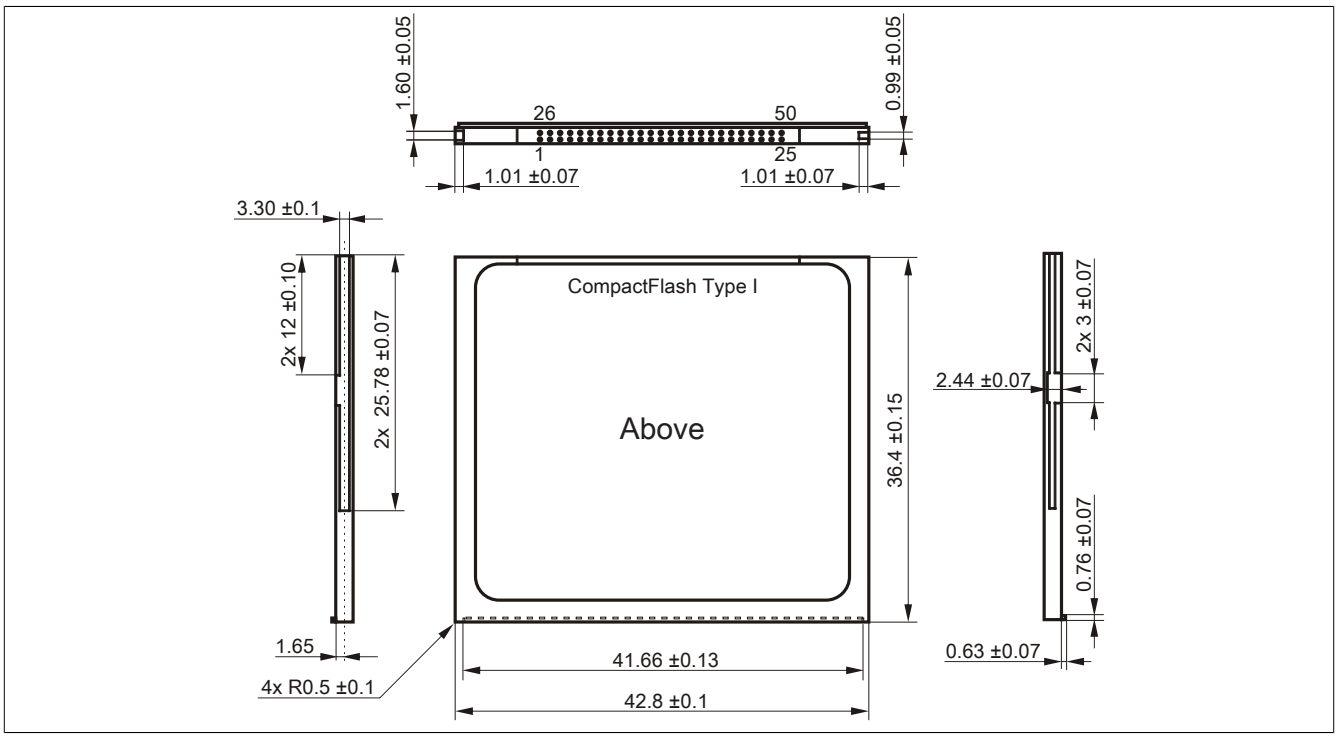


Figure 98: Type I CompactFlash card - Dimensions

4.6 Known problems/issues

The following is a known issue for devices with two CompactFlash slots:

- Using two different types of CompactFlash cards can cause problems with Automation PCs and Panel PCs. For example, it is possible that one of the two cards is not detected during system startup. This is caused by different startup speeds. CompactFlash cards with older technology require significantly more time during system startup than CompactFlash cards with newer technology. This behavior occurs near the end of the time frame provided for startup. The problem described can occur because the startup time for the CompactFlash cards fluctuates due to the different components being used. Depending on the CompactFlash cards being used, this error may occur never, sometimes or always.

5 USB media drive

5.1 5MD900.USB2-02

5.1.1 General information

The USB media drive features a DVD-R/RW DVD+R/RW drive, a CompactFlash slot and one USB port on both the front and back. It is connected to a USB port on the B&R Industrial PC.

- Desktop or rack-mounted operation (mounting rail brackets)
- Integrated DVD-R/RW DVD+R/RW drive
- Integrated IDE/ATAPI CompactFlash slot (hot pluggable)
- Integrated USB 2.0 connection
- +24 VDC supply (back)
- USB 2.0 connection (back)
- Optional front cover

5.1.2 Order data

Model number	Short description	Figure
	USB accessories	
5MD900.USB2-02	USB 2.0 drive combination, consists of DVD-R/RW DVD+R/RW, CompactFlash slot (Type II), USB connection (Type A on the front, Type B on the back); 24V DC (order screw clamp terminal 0TB103.9 or cage clamp terminal 0TB103.91 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, 3.31 mm² screw clamp, protected against vibration by the screw flange	
0TB103.91	Connector, 24 VDC, 3-pin female, 3.31 mm² cage clamp, protected against vibration by the screw flange	
	USB cable	
5CAUSB.0018-00	USB 2.0 connection cable type A - type B, 1.8 m	
5CAUSB.0050-00	USB 2.0 connection cable type A - type B, 5 m	

Table 186: 5MD900.USB2-02 - Order data

5.1.3 Interfaces

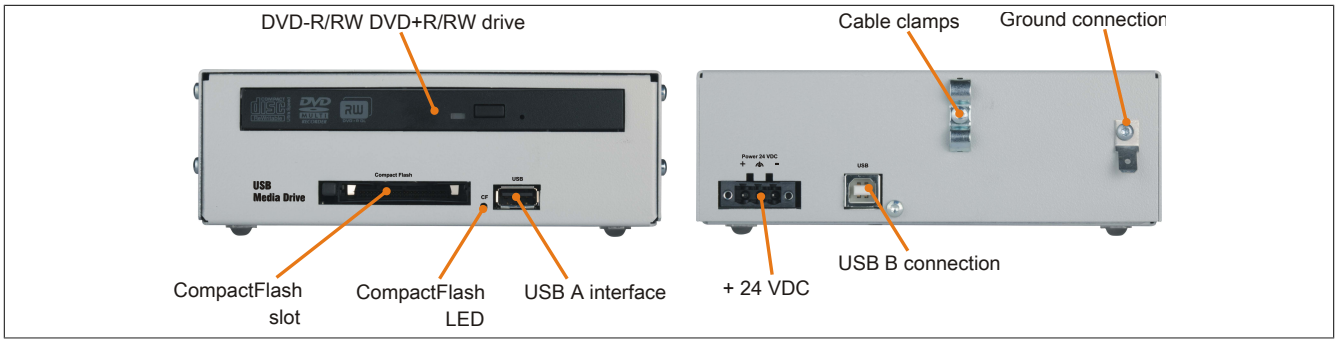


Figure 99: 5MD900.USB2-02 - Interfaces

5.1.4 Technical data

Product ID	5MD900.USB2-02
General information	
Max. cable length	5 m (not including hub)
Certification	
CE	Yes
cULus	Yes
GOST-R	Yes

Table 187: 5MD900.USB2-02 - Technical data

Product ID	5MD900.USB2-02
Interfaces	
CompactFlash slot 1	
Type	Type I
Connection	IDE/ATAPI
Activity LED	Signals read or write access to an inserted CompactFlash card
USB	
Type	USB 2.0
Design	Type A front Type B back
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Current load	Max. 500 mA
CD / DVD drive	
Data buffer capacity	2 MB
Data transfer rate	Max. 33.3 MB/s
Speed	Max. 5090 rpm ±1%
Noise level	Approx. 45 dBA in a distance of 50 cm (full read access)
Compatible formats	CD-DA, CD-ROM mode 1/mode 2 CD-ROM XA mode 2 (form 1, form 2) Photo CD (single-/multi-session), Enhanced CD, CD text DVD-ROM, DVD-R, DVD-RW, DVD-Video DVD-RAM (4.7GB, 2.6GB) DVD+R, DVD+R (dual layer), DVD+RW
Laser class	Class 1 laser
Service life	60000 POH (power-on hours)
Interface	IDE (ATAPI)
Startup time	
CD	Max. 14 seconds (from 0 rpm to read access)
DVD	Max. 15 seconds (from 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 (dual layer), DVD+RW
Writable media	
CD	CD-R, CD-RW
DVD	DVD-R/RW, DVD-RAM (4.7 GB), DVD+R/RW, DVD+R (dual layer)
Read speed	
CD	24x
DVD	8x
Write speed	
CD-R	10 to 24x
CD-RW	10 to 24x
DVD+R	3.3 to 8x
DVD+R (dual layer)	2.4 to 4x
DVD+RW	3.3 to 8x
DVD-R	2 to 6x
DVD-R (dual 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, overwrite, sequential
Electrical characteristics	
Nominal voltage	24 VDC ±25%
Operating conditions	
EN 60529 protection	Front: IP65 (only with optional front cover), back: IP20
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

Table 187: 5MD900.USB2-02 - Technical data

Product ID	5MD900.USB2-02
Altitude	
Operation	Max. 3000 m
Mechanical characteristics	
Dimensions	
Width	156 mm
Height	52 mm
Depth	140 mm
Weight	Approx. 1100 g (without front cover)

Table 187: 5MD900.USB2-02 - Technical data

1) Temperature specifications refer to operation at 500 meters. The maximum ambient temperature is typically derated by 1°C per 1000 meters (starting at 500 meters above sea level).

5.1.5 Dimensions

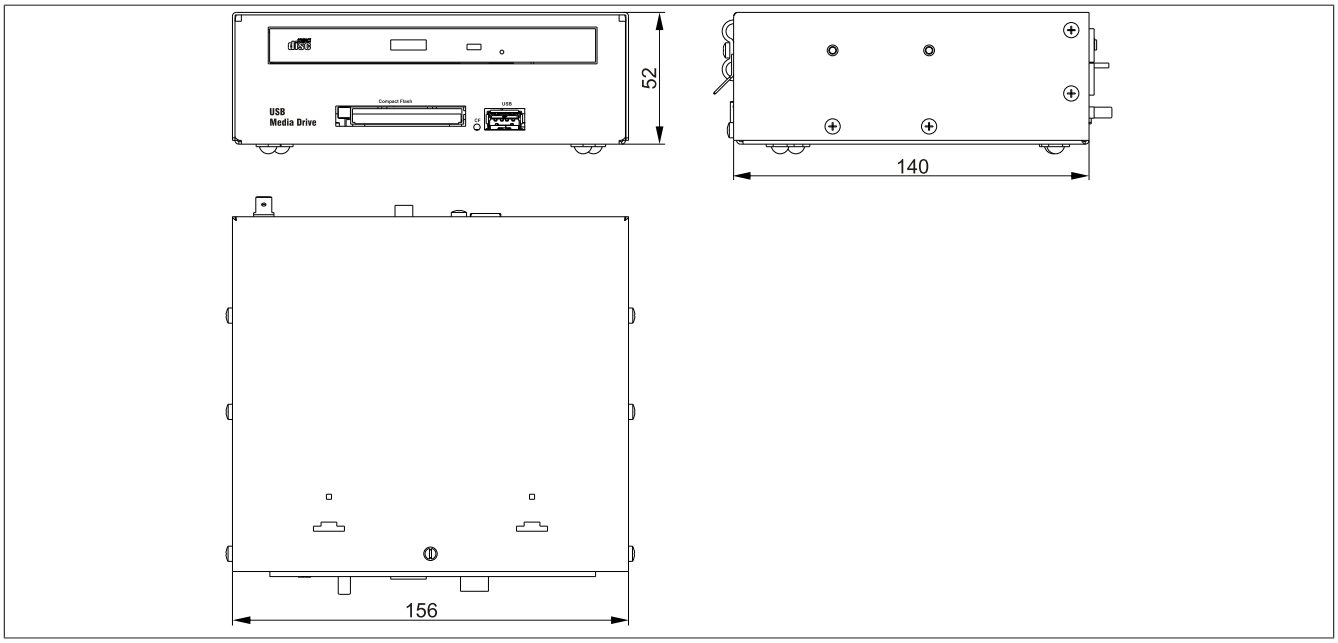


Figure 100: 5MD900.USB2-02 - Dimensions

5.1.6 Dimensions with front cover

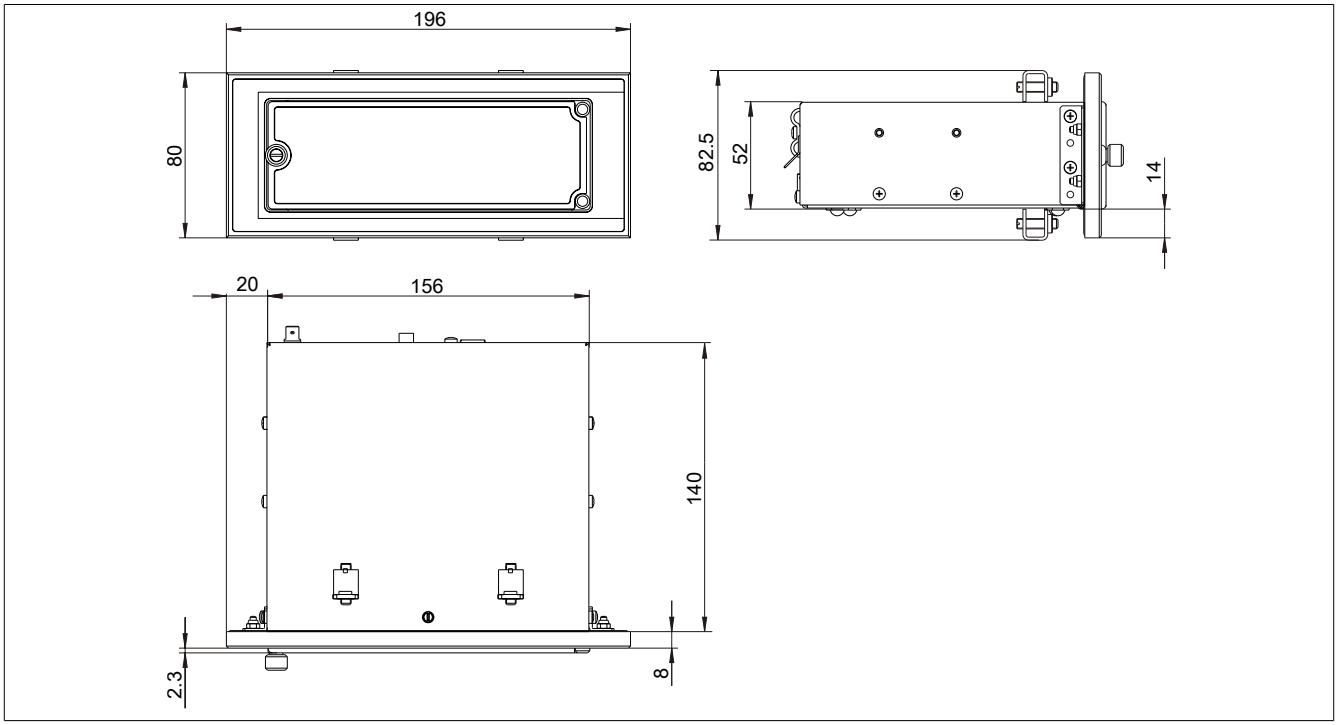


Figure 101: USB media drive with front cover - Dimensions

5.1.7 Cutout installation

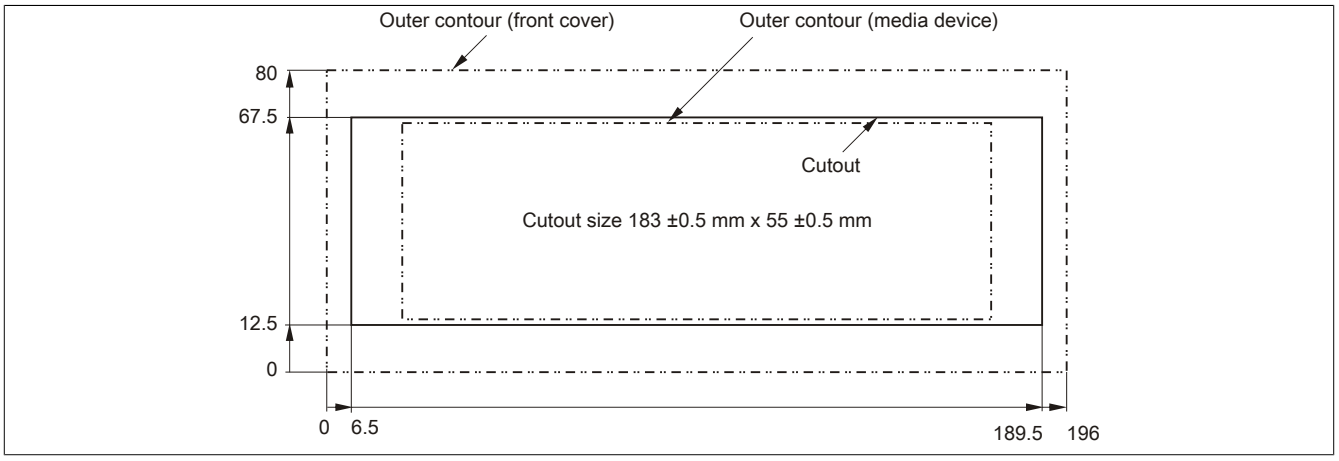


Figure 102: USB media drive with front cover - Installation cutout

5.1.8 Contents of delivery

Quantity	Component
1	USB media drive
2	Mounting rail brackets

Table 188: 5MD900.USB2-02 - Contents of delivery

5.1.9 Installation

The USB media drive can be operated as a desktop device (rubber feet) or as a rack-mounted device (2 mounting rail brackets included).

5.1.9.1 Mounting orientation

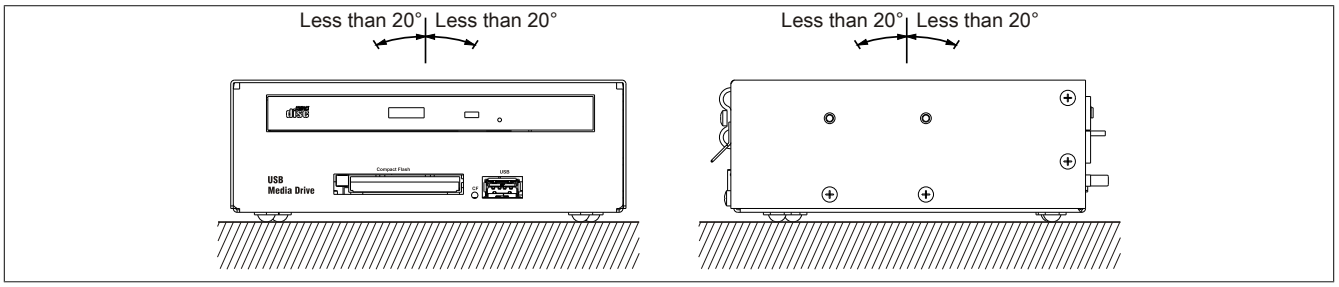


Figure 103: 5MD900.USB2-02 - Mounting orientation

5.2 5A5003.03

5.2.1 General information

This front cover can 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 189: 5A5003.03 - Order data

5.2.3 Technical data

Product ID	5A5003.03
General information	
Certification	
CE	Yes
cULus	Yes
GOST-R	Yes
Mechanical characteristics	
Front	
Panel membrane	
Light background	Similar to Pantone 427CV
Dimensions	
Width	196 mm
Height	80 mm
Depth	8 mm

Table 190: 5A5003.03 - Technical data

5.2.4 Dimensions

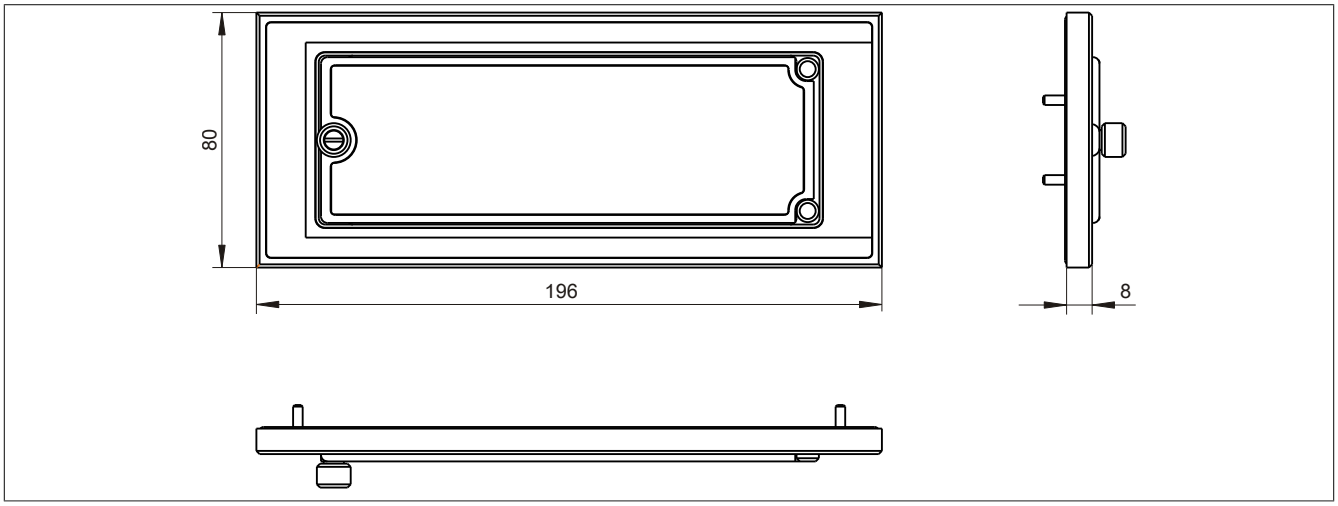


Figure 104: 5A5003.03 - Dimensions

5.2.5 Contents of delivery

Quantity	Component
1	Front cover 5A5003.03 for the USB media drive
4	M3 locknut
4	Cover retaining clip

Table 191: 5A5003.03 - Contents of delivery

5.2.6 Installation

The front cover is attached with 2 mounting rail brackets (included with the USB media drive) and 4 M3 locknuts. The 4 retaining clips provided can be used to mount the USB media drive and front cover as a whole, for example in a control cabinet door.

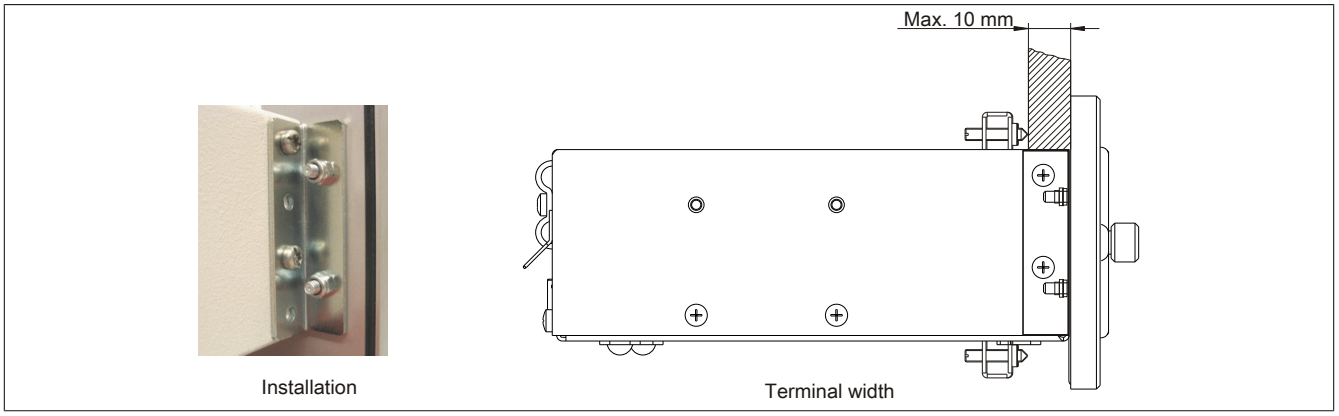


Figure 105: Front cover mounting and installation depth

5.2.6.1 Cutout installation

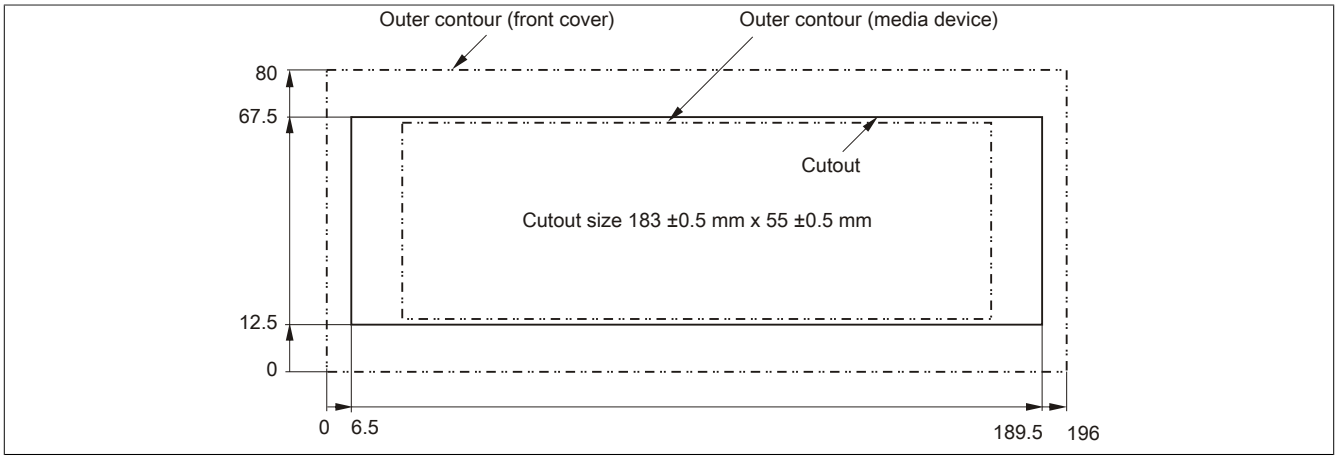


Figure 106: USB media drive with front cover - Installation cutout

6 USB flash drives

6.1 5MMUSB.xxxx-01

6.1.1 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 plugging", except in the case of Windows 98SE), the USB flash drive can immediately act as an additional drive where data can be read or written.

Information:

Due to the vast quantity of USB flash drives available on the market as well as their short product life cycle, we reserve the right to supply alternative products at any time. The following measures may therefore be necessary in order to boot from these flash drives as well:

- **The flash drive must be reformatted or in some cases even repartitioned (set active partition).**
- **The flash drive must be the first bootable device in the BIOS boot order; alternatively, the IDE controllers can be disabled in BIOS. This can be avoided in most cases if the "fdisk /mbr" command is additionally executed on the USB flash drive.**

6.1.2 Order data

Model number	Short description	Figure
	USB accessories	
5MMUSB.2048-01	USB 2.0 flash drive, 2048 MB, B&R	
5MMUSB.4096-01	USB 2.0 flash drive, 4096 MB, B&R	

Table 192: 5MMUSB.2048-01, 5MMUSB.4096-01 - Order data

6.1.3 Technical data

Product ID	5MMUSB.2048-01	5MMUSB.4096-01
General information		
Capacity	2 GB	4 GB
LEDs	1 LED (green) [1)]	
MTBF	>3,000,000 hours	
Type	USB 1.1, USB 2.0	
Maintenance	None	
Default file system	FAT16	FAT32
Certification		
CE	Yes	
GOST-R	Yes	
Interfaces		
USB		
Type	USB 1.1, USB 2.0	
Connection	To any USB type A interface	
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)	
Sequential reading	Full speed max. 1 MB/s, High speed max. 32 MB/s	
Sequential writing	Full speed max. 0.9 MB/s, High speed max. 23 MB/s	
Support		
Operating systems		
Windows 7	Yes	
Windows XP Professional	Yes	
Windows XP Embedded	Yes	
Windows ME	Yes	
Windows 2000	Yes	
Windows CE 5.0	Yes	
Windows CE 4.2	Yes	
Electrical characteristics		
Power consumption	Max. 500 µA sleep mode, max. 120 mA read/write	

Table 193: 5MMUSB.2048-01, 5MMUSB.4096-01 - Technical data

Product ID	5MMUSB.2048-01	5MMUSB.4096-01
Environmental conditions		
Temperature		
Operation	0 to 70°C	
Storage	-50 to 100°C	
Transport	-50 to 100°C	
Relative humidity		
Operation	85%, non-condensing	
Storage	85%, non-condensing	
Transport	85%, non-condensing	
Vibration		
Operation	20 to 2000 Hz: 20 g (peak)	
Storage	20 to 2000 Hz: 20 g (peak)	
Transport	20 to 2000 Hz: 20 g (peak)	
Shock		
Operation	Max. 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 193: 5MMUSB.2048-01, 5MMUSB.4096-01 - Technical data

1) Indicates data being transferred (sending and receiving).

6.1.4 Temperature humidity diagram

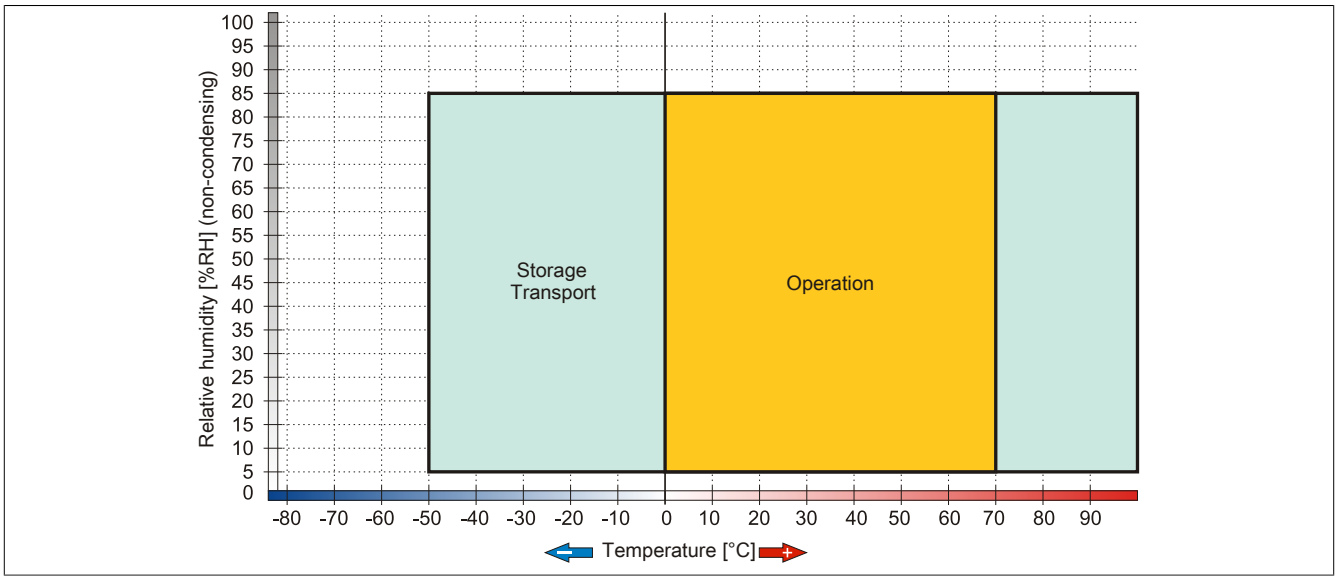


Figure 107: 5MMUSB.xxxx-01 - Temperature humidity diagram

7 Cables

7.1 DVI cables

7.1.1 5CADVI.0xxx-00

7.1.1.1 General information

5CADVI.0xxx-00 DVI cables are designed for use in inflexible applications.

> **Caution!**
>
> **Power must be turned off before plugging in and unplugging cables.**

7.1.1.2 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 194: 5CADVI.0018-00, 5CADVI.0050-00, 5CADVI.0100-00 - Order data

7.1.1.3 Technical data

Product ID	5CADVI.0018-00	5CADVI.0050-00	5CADVI.0100-00
General information			
Certification			
CE	Yes		
cULus	Yes		
GOST-R	Yes		
GL	Yes [1]		
Cable structure			
Wire cross section	AWG 28		
Shield	Individual cable pairs and entire cable		
Cable shielding	Tinned copper braiding, optical coverage >86%		
Outer sheathing			
Materials	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		
Locating screw tightening torque	Max. 0.5 Nm		
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 (male connector - ferrite bead and ferrite bead - ferrite bead)		
Weight	Approx. 260 g	Approx. 460 g	Approx. 790 g

Table 195: 5CADVI.0018-00, 5CADVI.0050-00, 5CADVI.0100-00 - Technical data

1) Yes, although applies only if all components installed within the complete system have this certification

7.1.1.4 Flex radius specifications

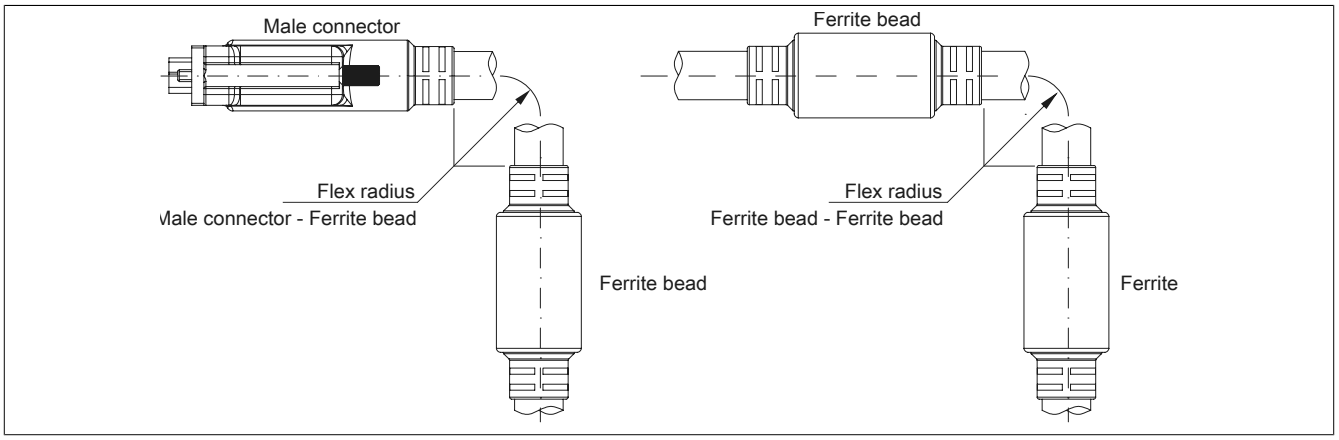


Figure 108: Flex radius specifications

7.1.1.5 Dimensions

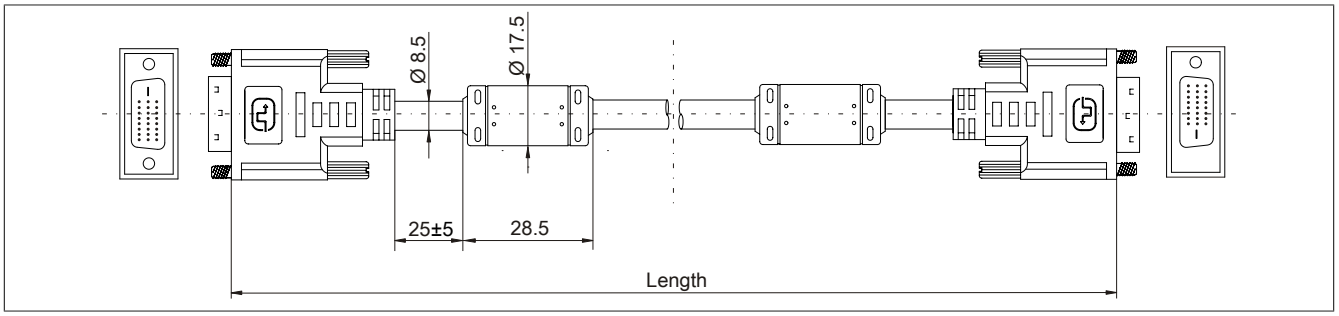


Figure 109: 5CADVI.0xxx-00 - Dimensions

7.1.1.6 Cable pinout

Warning!

If you choose to make a suitable cable yourself, it should be wired according to these specifications.

If a self-made cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly.

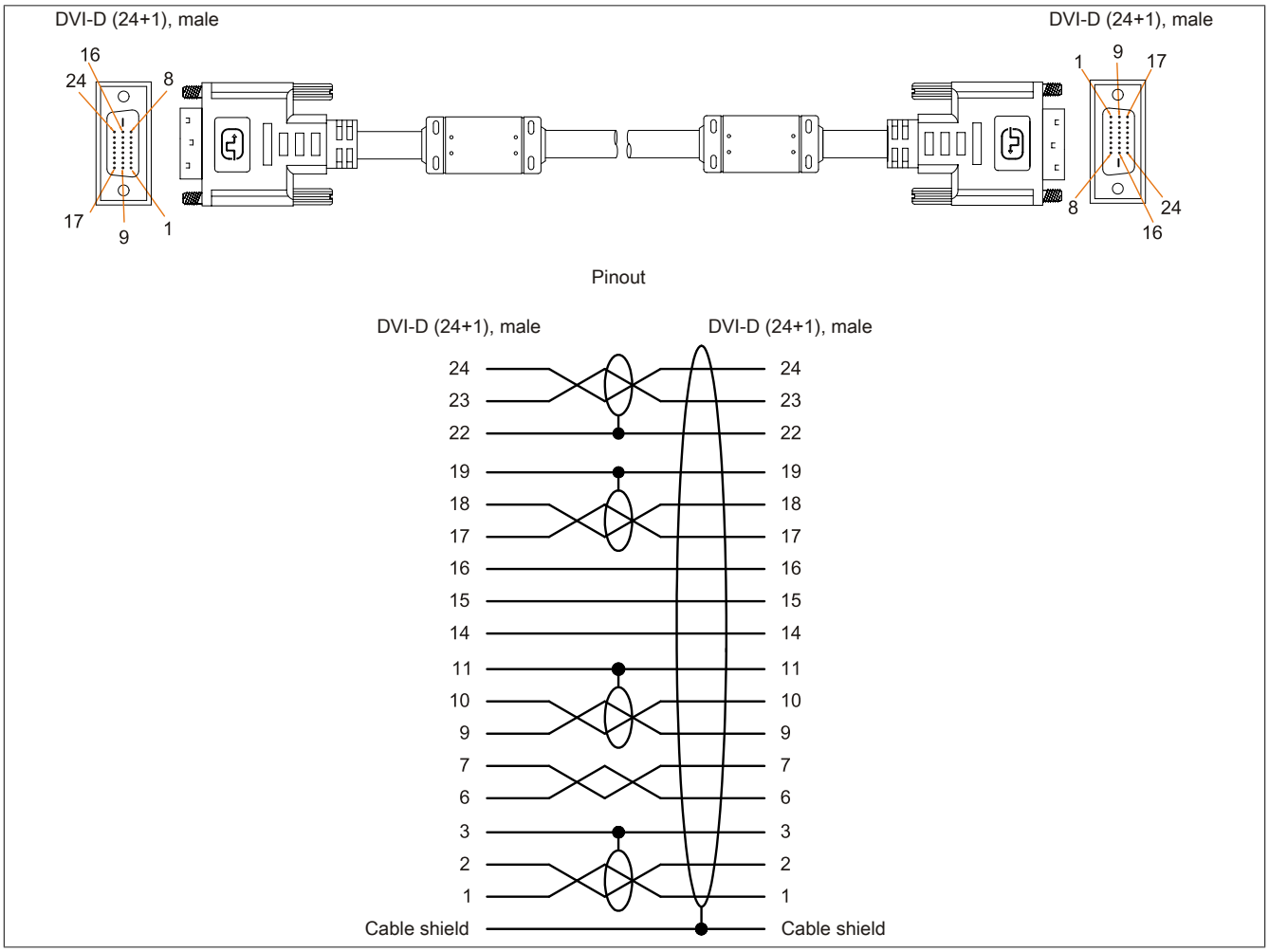


Figure 110: 5CADVI.0xxx-00 - Pinout

7.2 SDL cables

7.2.1 5CASDL.0xxx-00

7.2.1.1 General information

5CASDL.0xxx-00 SDL cables are designed for use in inflexible applications. SDL flex cables 5CASDL.0xxx-03 are required for flexible applications (e.g. swing arm systems).

Caution!

Power must be turned off before plugging in and unplugging cables.

7.2.1.2 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 196: 5CASDL.0018-00, 5CASDL.0050-00, 5CASDL.0100-00, 5CASDL.0150-00, 5CASDL.0200-00, 5CASDL.0250-00, 5CASDL.0300-00 - Order data

7.2.1.3 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						
cULus	Yes						
GOST-R	Yes						
GL	Yes [1]						
Cable structure							
Wire cross section	AWG 28		AWG 24				
Shield	Individual cable pairs and entire cable						
Cable shielding	Tinned copper braiding, optical coverage >85%						
Outer sheathing							
Materials	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						
Locating screw tightening torque	Max. 0.5 Nm						
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 (male connector - ferrite bead and ferrite bead - ferrite bead)						
Flexibility	Limited flexibility; valid for ferrite bead - ferrite bead (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 197: 5CASDL.0018-00, 5CASDL.0050-00, 5CASDL.0100-00, 5CASDL.0150-00, 5CASDL.0200-00, 5CASDL.0250-00, 5CASDL.0300-00 - Technical data

1) Yes, although applies only if all components installed within the complete system have this certification

7.2.1.4 Flex radius specifications

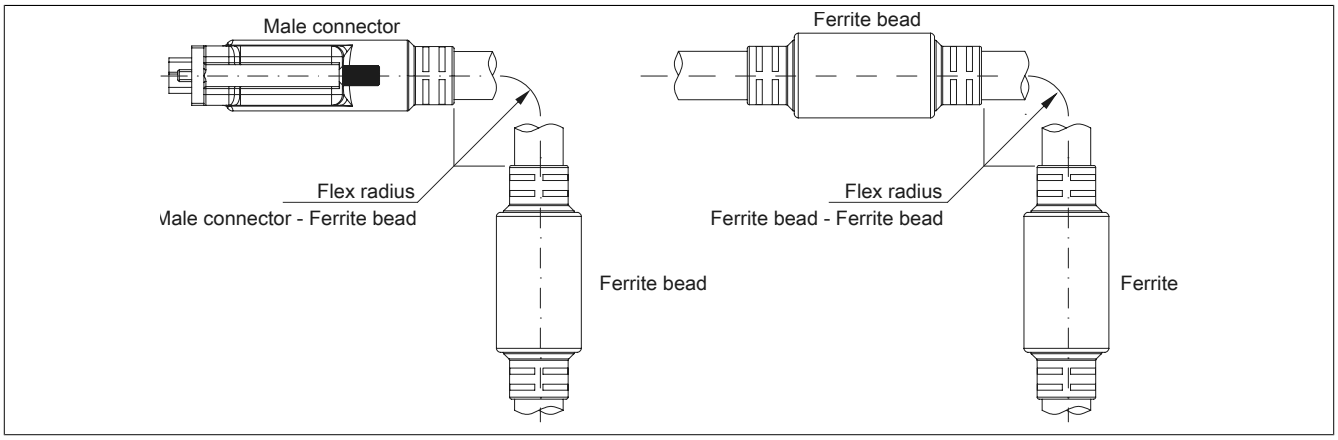


Figure 111: Flex radius specifications

7.2.1.5 Dimensions

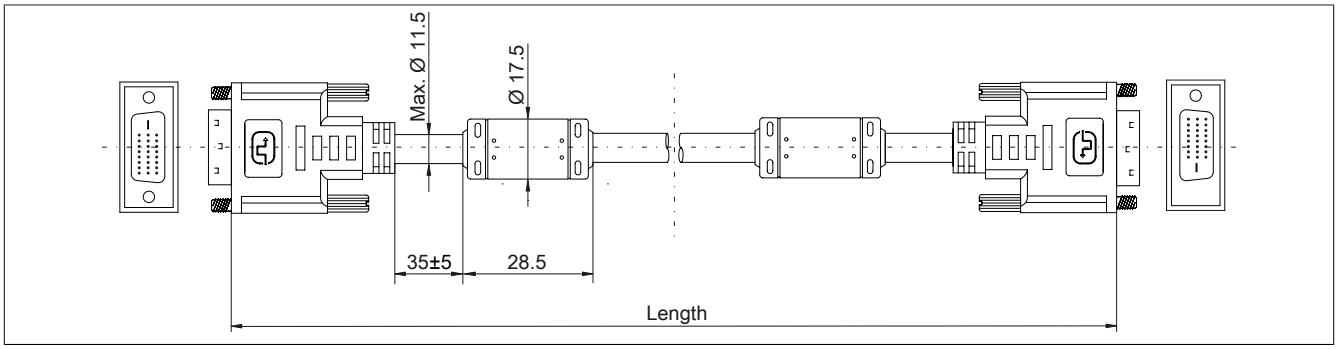


Figure 112: 5CASDL.0xxx-00- Dimensions

7.2.1.6 Cable pinout

Warning!

If you choose to make a suitable cable yourself, it should be wired according to these specifications.

If a self-made cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly.

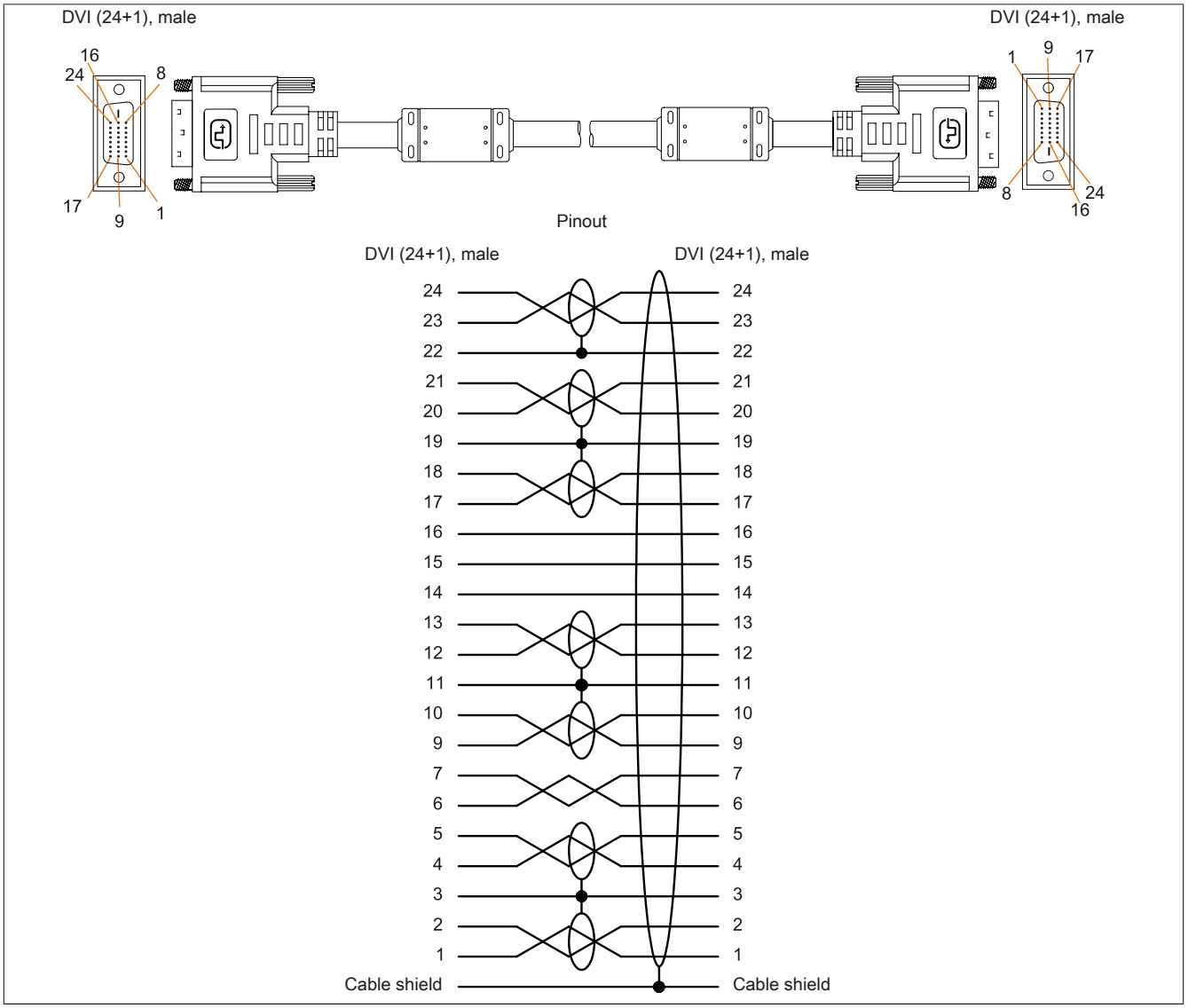


Figure 113: 5CASDL.0xxx-00 - Pinout

7.3 SDL cables with 45° male connector

7.3.1 5CASDL.0xxx-01

7.3.1.1 General information

5CASDL.0xxx-01 SDL cables with a 45° connector are designed for use in inflexible applications.

Caution!

Power must be turned off before plugging in and unplugging cables.

7.3.1.2 Order data

Model number	Short description	Figure
	SDL cable - 45° connector	
5CASDL.0018-01	SDL cable with 45° male connector, 1.8 m	
5CASDL.0050-01	SDL cable with 45° male connector, 5 m	
5CASDL.0100-01	SDL cable with 45° male connector, 10 m	
5CASDL.0150-01	SDL cable with 45° male connector, 15 m	

Table 198: 5CASDL.0018-01, 5CASDL.0050-01, 5CASDL.0100-01, 5CASDL.0150-01 - Order data

7.3.1.3 Technical data

Product ID	5CASDL.0018-01	5CASDL.0050-01	5CASDL.0100-01	5CASDL.0150-01
General information				
Certification				
CE	Yes			
cULus	Yes			
GOST-R	Yes			
GL	Yes [1]			
Cable structure				
Wire cross section	AWG 28		AWG 24	
Shield	Individual cable pairs and entire cable			
Cable shielding	Tinned copper braiding, optical coverage >85%			
Outer sheathing				
Materials	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			
Locating screw tightening torque	Max. 0.5 Nm			
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 (male connector - ferrite bead and ferrite bead - ferrite bead)			
Flexibility	Limited flexibility; valid for ferrite bead - ferrite bead (tested 100 cycles with 5x cable diameter, 20 cycles / minute)			
Weight	Approx. 300 g	Approx. 590 g	Approx. 2800 g	Approx. 2860 g

Table 199: 5CASDL.0018-01, 5CASDL.0050-01, 5CASDL.0100-01, 5CASDL.0150-01 - Technical data

1) Yes, although applies only if all components installed within the complete system have this certification

7.3.1.4 Flex radius specifications

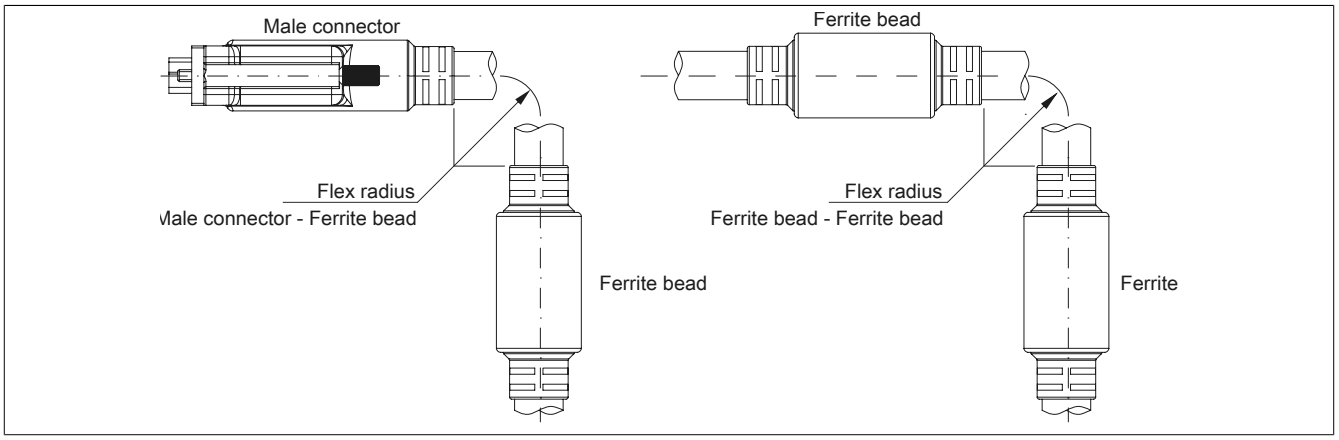


Figure 114: Flex radius specifications

7.3.1.5 Dimensions

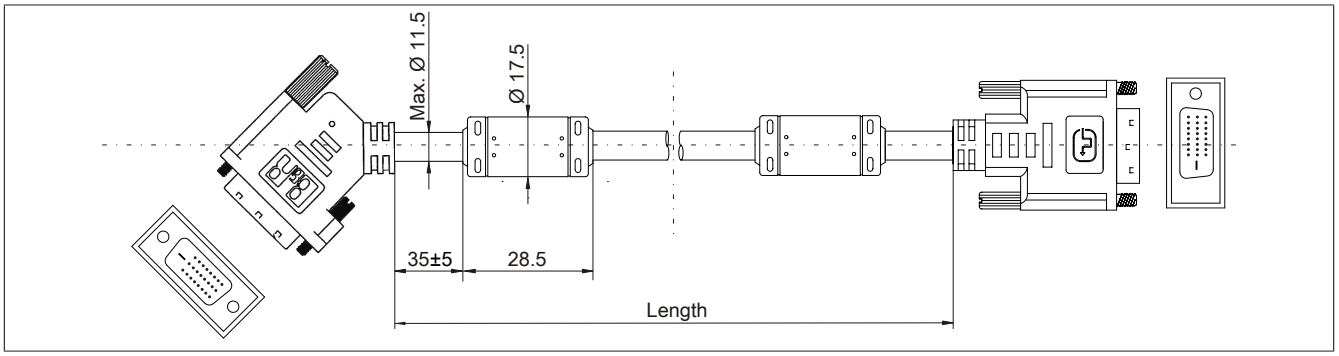


Figure 115: 5CASDL.0xxx-01 - Dimensions

7.3.1.6 Cable pinout

Warning!

If you choose to make a suitable cable yourself, it should be wired according to these specifications.

If a self-made cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly.

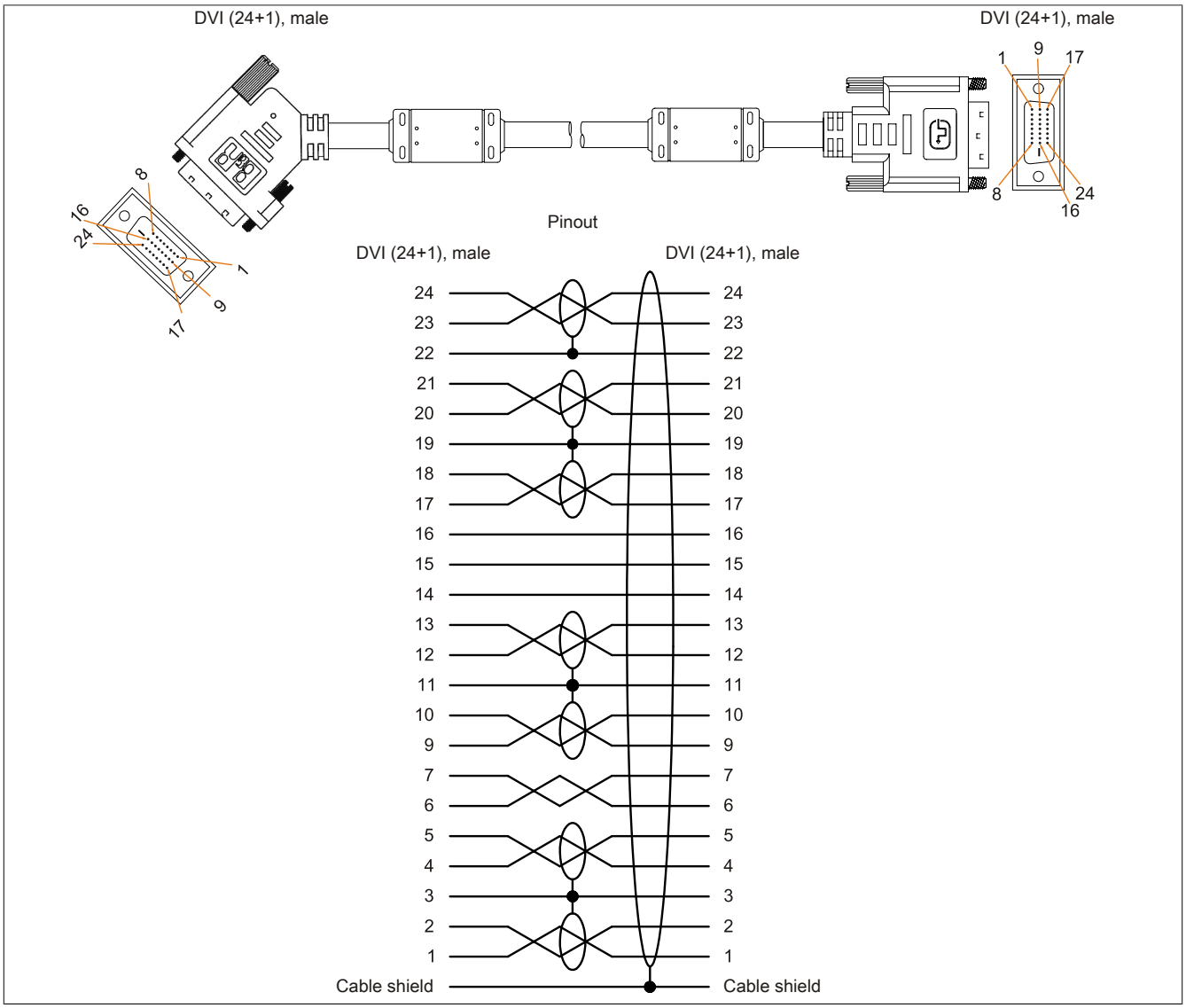


Figure 116: 5CASDL.0xxx-01 - Pinout

7.4 SDL flex cables

7.4.1 5CASDL.0xxx-03

7.4.1.1 General information

5CASDL.0xxx-03 SDL flex cables are designed for use in both inflexible and flexible applications (e.g. support arm systems).

Caution!

Power must be turned off before plugging in and unplugging cables.

7.4.1.2 Order data

Model number	Short description	Figure
	SDL flex cable	
5CASDL.0018-03	SDL flex cable, 1.8 m	
5CASDL.0050-03	SDL flex cable, 5 m	
5CASDL.0100-03	SDL flex cable, 10 m	
5CASDL.0150-03	SDL flex cable, 15 m	
5CASDL.0200-03	SDL flex cable, 20 m	
5CASDL.0250-03	SDL flex cable, 25 m	
5CASDL.0300-03	SDL flex cable, 30 m	

Table 200: 5CASDL.0018-03, 5CASDL.0050-03, 5CASDL.0100-03, 5CASDL.0150-03, 5CASDL.0200-03, 5CASDL.0250-03, 5CASDL.0300-03 - Order data

7.4.1.3 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						
cULus	Yes						
GOST-R	Yes						
GL	Yes [1)]						
Cable structure							
Wire cross section	AWG 24 (control wires) AWG 26 (DVI, USB, data)						
Properties	Silicone- and halogen-free						
Shield	Individual cable pairs and entire cable						
Cable shielding	Aluminum-clad foil + tinned copper braiding						
Outer sheathing							
Materials	Special semi-glossy TMPU						
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						
Locating screw tightening torque	Max. 0.5 Nm						
Electrical characteristics							
Operating voltage	≤30 V						
Test voltage							
Wire/Wire	1 kV						
Wire/Shield	0.5 kV						
Wave impedance	100 ±10 Ω						
Conductor resistance							
AWG 24	≤95 Ω/km						
AWG 26	≤145 Ω/km						
Insulation resistance	>200 MΩ/km						
Operating conditions							
Approbation	UL AWM 20236 80°C 30 V						
Flame-resistant	In accordance with UL758 (cable vertical flame test)						
Oil and hydrolysis resistance	In accordance with VDE 0282-10						

Table 201: 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
Environmental conditions							
Temperature							
Storage	-20 to 80°C						
Fixed installation	-20 to 80°C						
Flexible installation	-5 to 60°C						
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 male connector - ferrite bead) ≥10x cable diameter (from ferrite bead - ferrite bead)						
Flexible installation	≥15x cable diameter (from ferrite bead - ferrite bead)						
Flexibility	Flexible; valid for ferrite bead - ferrite bead (tested 300,000 cycles with 15x cable diameter, 4800 cycles/hour)						
Drag chain data							
Flex cycles	300,000						
Velocity	4800 cycles/hour						
Flex radius	180 mm; 15x cable diameter						
Hub	460 mm						
Weight	Approx. 460 g	Approx. 1020 g	Approx. 1940 g	Approx. 2840 g	Approx. 3740 g	Approx. 4560 g	Approx. 5590 g
Tension							
During operation	≤50 N						
During installation	≤400 N						

Table 201: 5CASDL.0018-03, 5CASDL.0050-03, 5CASDL.0100-03, 5CASDL.0150-03, 5CASDL.0200-03, 5CASDL.0250-03, 5CASDL.0300-03 - Technical data

1) Yes, although applies only if all components installed within the complete system have this certification

7.4.1.4 Flex radius specifications

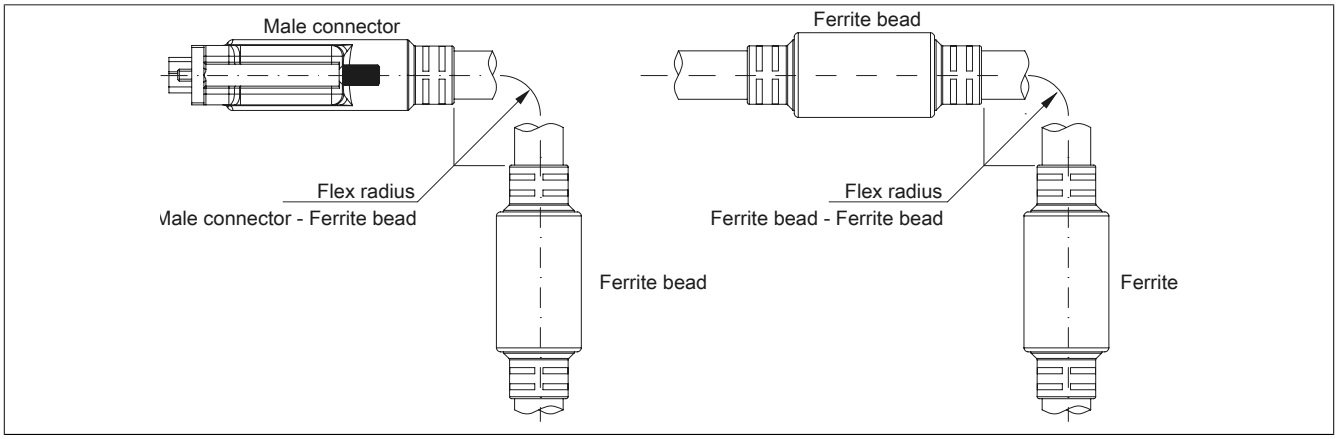


Figure 117: Flex radius specifications

7.4.1.5 Dimensions

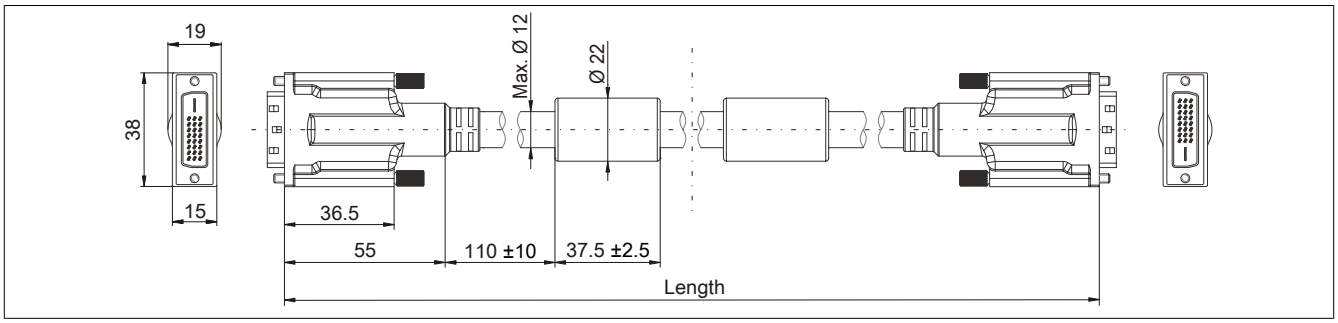


Figure 118: 5CASDL.0xxx-03 - Dimensions

7.4.1.6 Structure

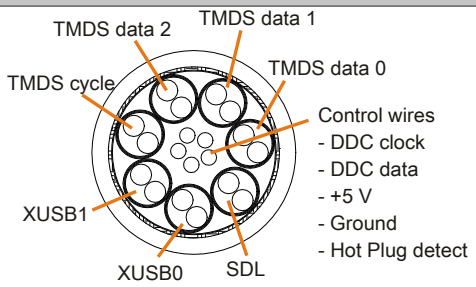
Element	Assignment	Cross section	
DVI	TMDS data 0	26 AWG	
	TMDS data 1	26 AWG	
	TMDS data 2	26 AWG	
	TMDS cycle	26 AWG	
USB	XUSB0	26 AWG	
	XUSB1	26 AWG	
Data	SDL	26 AWG	
Control wires	DDC cycle	24 AWG	
	DDC data	24 AWG	
	+5 V	24 AWG	
	Ground	24 AWG	
	Hot plug detect	24 AWG	

Table 202: 5CASDL.0xxx-03 SDL flex cables - Structure

7.4.1.7 Cable pinout

Warning!

If you choose to make a suitable cable yourself, it should be wired according to these specifications.

If a self-made cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly.

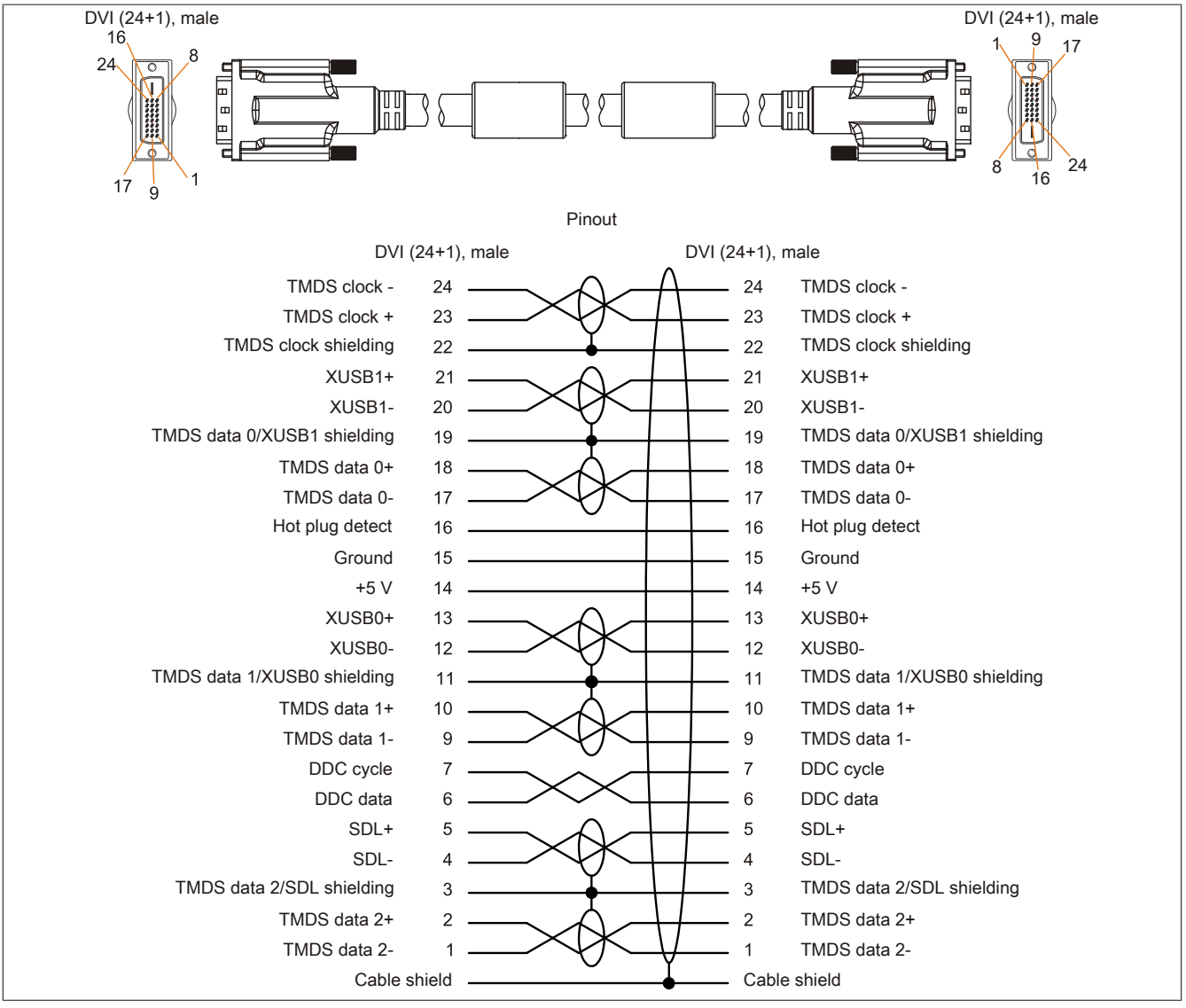


Figure 119: 5CASDL.0xxx-03 - Pinout

7.5 SDL flex cables with extender

7.5.1 5CASDL.0xx0-13

7.5.1.1 General information

5CASDL.0xx0-13 SDL flex cables with an extender are designed for use in both inflexible and flexible applications (e.g. support arm systems).

Caution!

Power must be turned off before plugging in and unplugging cables.

7.5.1.2 Order data

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

Table 203: 5CASDL.0300-13, 5CASDL.0400-13, 5CASDL.0430-13 - Order data

7.5.1.3 Technical data

Product ID	5CASDL.0300-13	5CASDL.0400-13	5CASDL.0430-13
General information			
Certification			
CE	Yes		
cULus	Yes		
GOST-R	Yes		
GL	Yes [1)]		
Cable structure			
Wire cross section	AWG 24 (control wires) AWG 26 (DVI, USB, data)		
Properties	Silicone- and halogen-free		
Shield	Individual cable pairs and entire cable		
Cable shielding	Aluminum-clad foil + tinned copper braiding		
Outer sheathing			
Materials	Special semi-glossy TMPU		
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		
Locating screw tightening torque	Max. 0.5 Nm		
Electrical characteristics			
Operating voltage	≤30 V		
Test voltage			
Wire/Wire	1 kV		
Wire/Shield	0.5 kV		
Wave impedance	100 ±10 Ω		
Conductor resistance			
AWG 24	≤95 Ω/km		
AWG 26	≤145 Ω/km		
Insulation resistance	>200 MΩ/km		
Operating conditions			
Approbation	UL AWM 20236 80°C 30 V		
Flame-resistant	In accordance with UL758 (cable vertical flame test)		
Oil and hydrolysis resistance	In accordance with VDE 0282-10		
Environmental conditions			
Temperature			
Storage	-20 to 60°C		
Fixed installation	-20 to 60°C		
Flexible installation	-5 to 60°C		

Table 204: 5CASDL.0300-13, 5CASDL.0400-13, 5CASDL.0430-13 - Technical data

Product ID	5CASDL.0300-13	5CASDL.0400-13	5CASDL.0430-13
Mechanical characteristics			
Dimensions			
Length	30 m ±280 mm	40 m ±380 mm	43 m ±410 mm
Diameter		Max. 12 mm	
Extender box			
Width		35 mm	
Length		125 mm	
Height		18.5 mm	
Flex radius			
Fixed installation		≥6x cable diameter (from male connector - ferrite bead) ≥10x cable diameter (from ferrite bead - ferrite bead)	
Flexible installation		≥15x cable diameter (from ferrite bead - ferrite bead)	
Flexibility		Flexible; valid for ferrite bead - ferrite bead (tested 300,000 cycles with 15x cable diameter, 4800 cycles/hour)	
Drag chain data			
Flex cycles		300,000	
Velocity		4800 cycles/hour	
Flex radius		180 mm; 15x cable diameter	
Hub		460 mm	
Weight	Approx. 5430 g	Approx. 7200 g	Approx. 7790 g
Tension			
During operation		≤50 N	
During installation		≤400 N	

Table 204: 5CASDL.0300-13, 5CASDL.0400-13, 5CASDL.0430-13 - Technical data

1) Yes, although applies only if all components installed within the complete system have this certification

7.5.1.4 Flex radius specifications

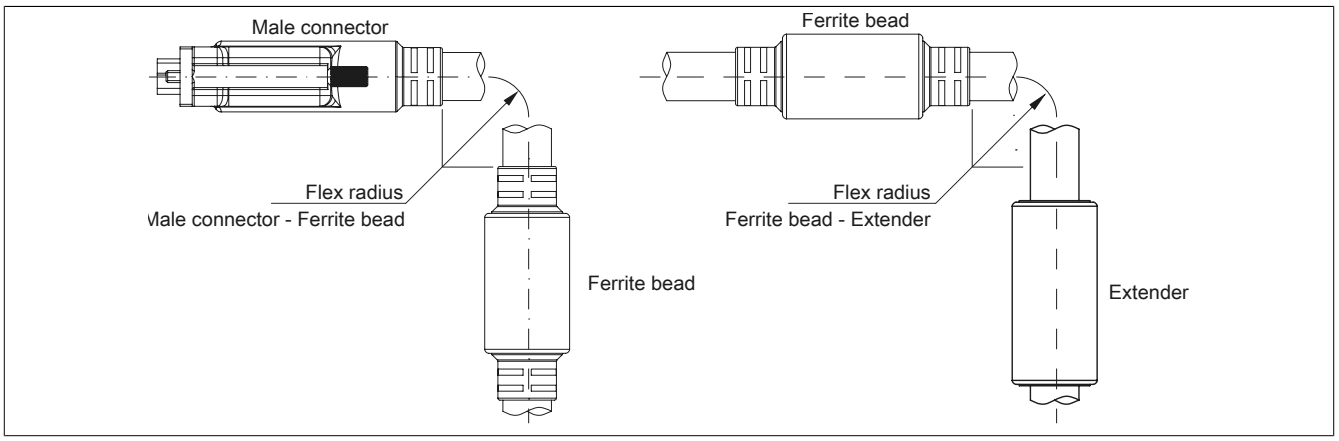


Figure 120: Flex radius specification with extender

7.5.1.5 Dimensions

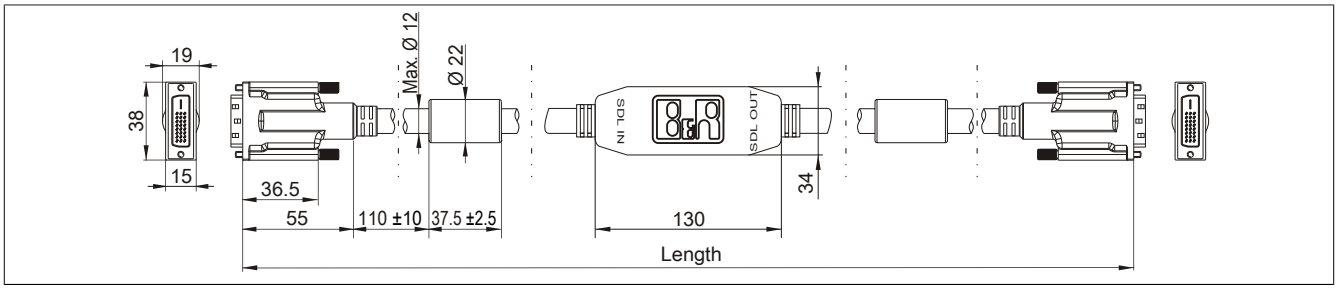


Figure 121: 5CASDL.0xx0-13 - Dimensions

7.5.1.6 Cable pinout

Warning!

If you choose to make a suitable cable yourself, it should be wired according to these specifications.

If a self-made cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly.

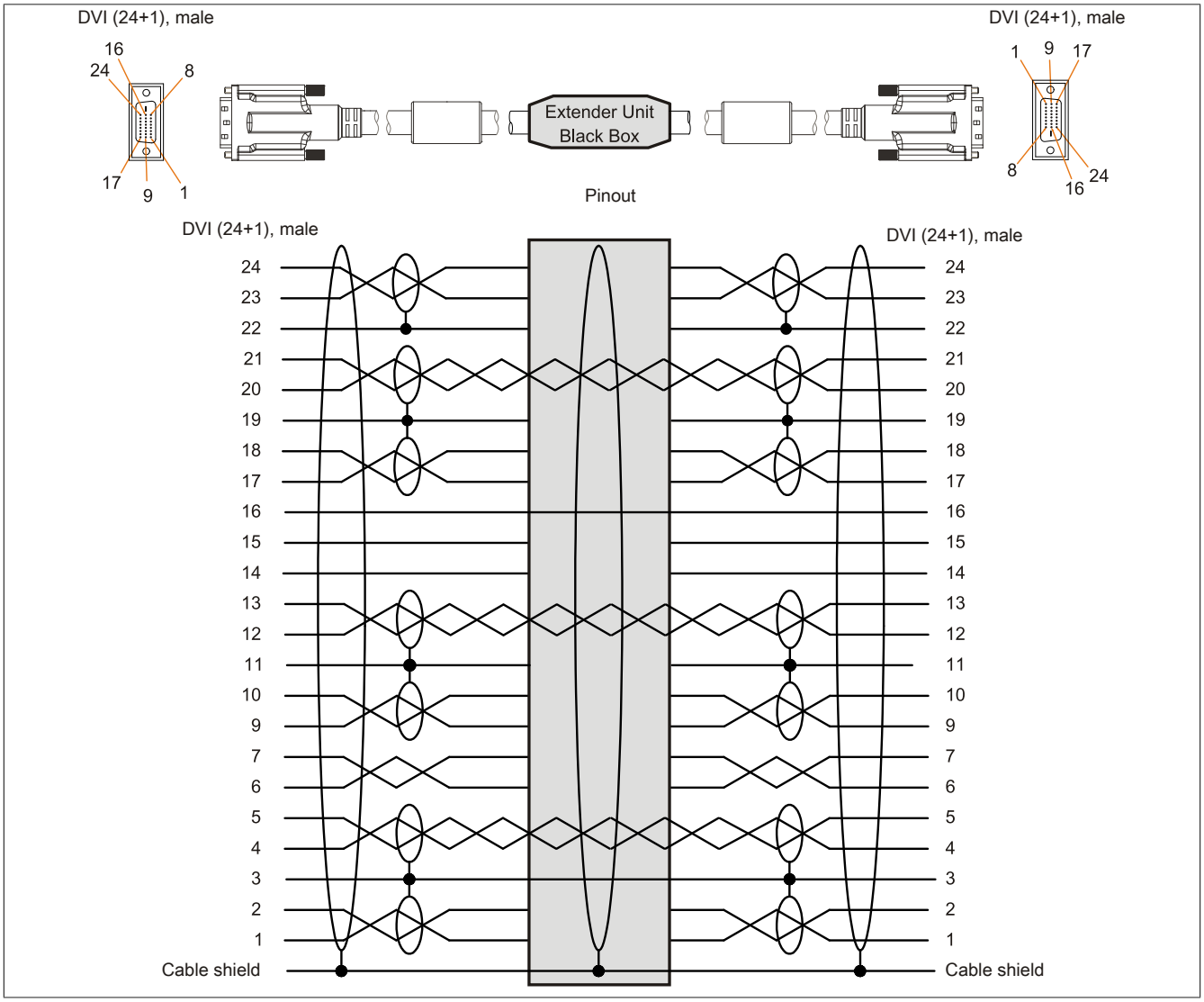


Figure 122: 5CASDL.0xx0-13 - Pinout

7.5.1.7 Cable connection

SDL flex cables with an extender must be connected between the B&R Industrial PC and the Automation Panel display unit in the correct direction. The proper signal direction is indicated on the extender.

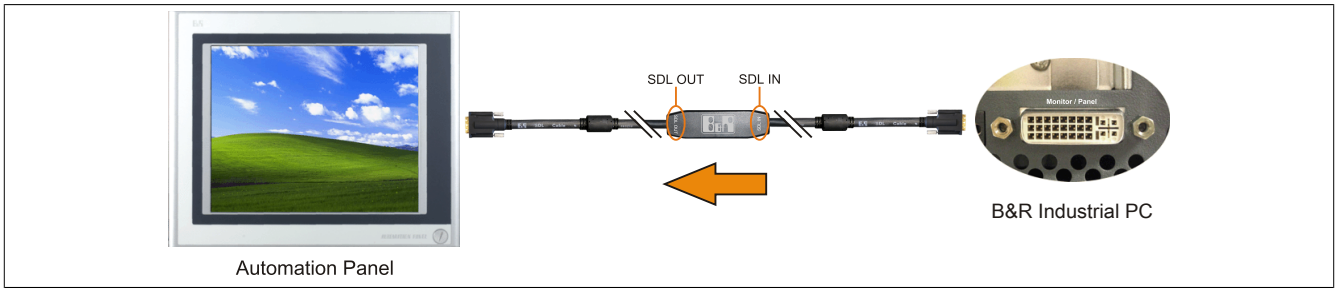


Figure 123: Example of the signal direction for an SDL flex cable with extender

7.6 USB cables

7.6.1 5CAUSB.00xx-00

7.6.1.1 General information

USB cables are designed to achieve USB 2.0 transfer speeds.

7.6.1.2 Order data

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

Table 205: 5CAUSB.0018-00, 5CAUSB.0050-00 - Order data

7.6.1.3 Technical data

Product ID	5CAUSB.0018-00	5CAUSB.0050-00
General information		
Certification		
CE	Yes	
cULus	Yes	
GOST-R	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 206: 5CAUSB.0018-00, 5CAUSB.0050-00 - Technical data

7.6.1.4 Cable pinout

Warning!

If you choose to make a suitable cable yourself, it should be wired according to these specifications.

If a self-made cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly.

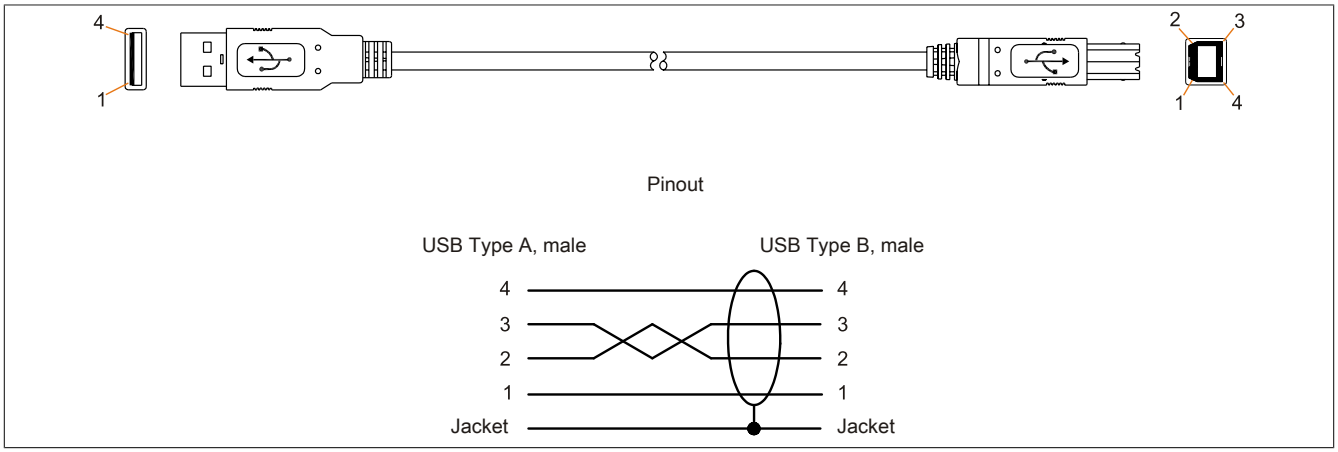


Figure 124: 5CAUSB.00xx-00 USB cables - Pinout

7.7 RS232 cables

7.7.1 9A0014.xx

7.7.1.1 General information

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

7.7.1.2 Order data

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

Table 207: 9A0014.02, 9A0014.05, 9A0014.10 - Order data

7.7.1.3 Technical data

Product ID	9A0014.02	9A0014.05	9A0014.10
General information			
Certification			
CE		Yes	
GOST-R	-	Yes	
Cable structure			
Wire cross section		AWG 26	
Shield		Entire cable	
Outer sheathing			
Color		Beige	
Connector			
Type		9-pin male/female DSUB connector	
Locating screw tightening torque		Max. 0.5 Nm	
Mechanical characteristics			
Dimensions			
Length	1.8 m ±50 mm	5 m ±80 mm	10 m ±100 mm
Diameter		Max. 5 mm	
Flex radius		Min. 70 mm	

Table 208: 9A0014.02, 9A0014.05, 9A0014.10 - Technical data

7.7.1.4 Cable pinout

Warning!

If you choose to make a suitable cable yourself, it should be wired according to these specifications.

If a self-made cable is used, B&R cannot guarantee that it will function properly. All cables provided by B&R are guaranteed to function properly.

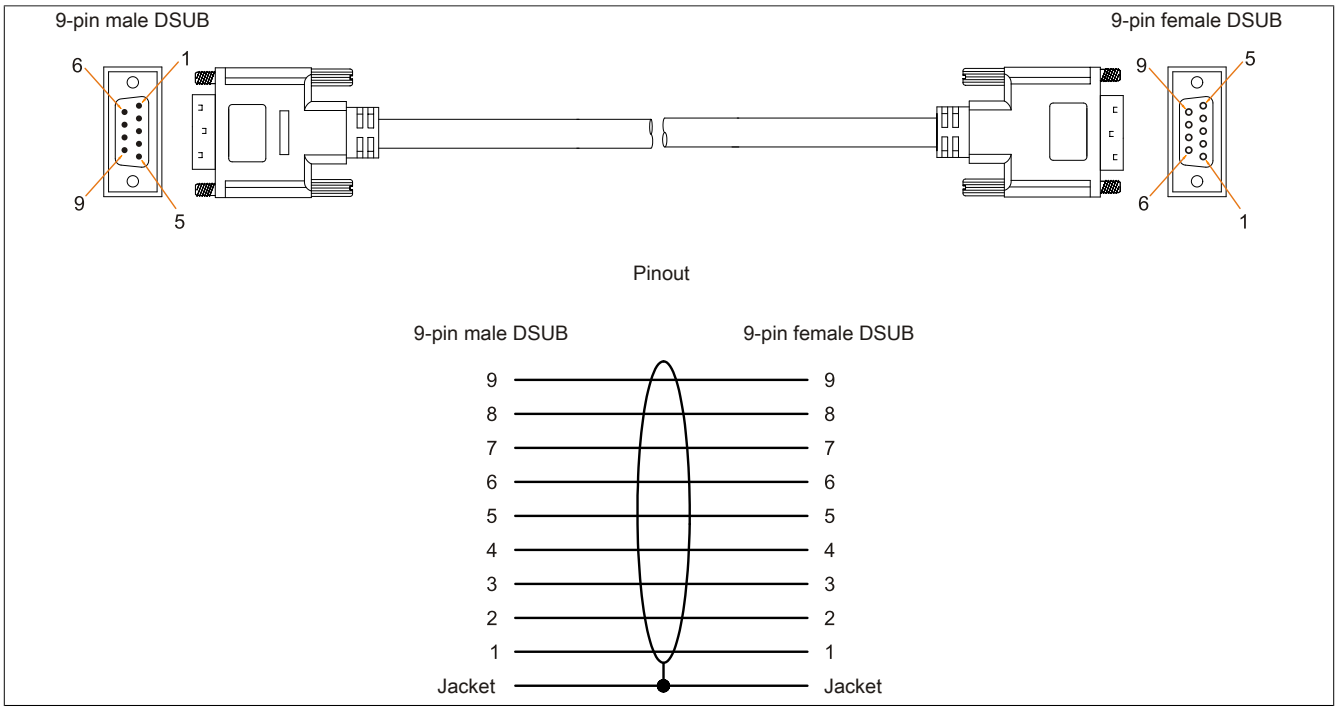


Figure 125: 9A0014.xx RS232 cables - Pinout

8 HMI Drivers & Utilities DVD

8.1 5SWHMI.0000-00

8.1.1 General information

This DVD contains drivers, utilities, software upgrades and user's manuals for B&R panel system products (see the "Industrial PCs" or "Visualization and operation" section of the B&R website at www.br-automation.com).

When the DVD is created, its contents are identical to the files found in the Downloads section of the B&R website (Service / Material-related downloads).

8.1.2 Order data

Model number	Short description	Figure
	Other	
5SWHMI.0000-00	HMI Drivers & Utilities DVD	

Table 209: 5SWHMI.0000-00 - Order data

8.1.3 Contents (V2.20)

BIOS product upgrades

- Automation PC 620 / Panel PC 700 CPU board 815E and 855GME BIOS
- Automation PC 620 / Panel PC 700 CPU board X855GME BIOS
- Automation PC 620 / Panel PC 700 CPU board 945GME BIOS
- Automation PC 620 / Panel PC 700 CPU board 945GME N270 BIOS
- Automation PC 680
- Automation PC 810 / Automation PC 820 / Panel PC 800 B945GME BIOS
- Automation PC 810 / Panel PC 800 945GME N270 CPU board BIOS
- Automation PC 810 / Panel PC 800 GM45 CPU board BIOS
- Provit 2000 product family - IPC2000/2001/2002
- Provit 5000 product family - IPC5000/5600/5000C/5600C
- Power Panel 100 BIOS devices
- Mobile Panel 100 BIOS devices
- Power Panel 100 / Mobile Panel 100 user boot logo
- Power Panel 100 / Mobile Panel 100 REMHOST utility
- Power Panel 300/400 BIOS devices
- Power Panel 300/400 BIOS user boot logo
- Power Panel 500 / Automation PC 510 / Automation PC 511 BIOS
- Panel PC 310

Device drivers

- Automation Device Interface (ADI)
- Audio
- Chipset
- CD-ROM
- LS120

- Graphics
- Network
- PCI / SATA RAID controller
- Touch screen
- Touchpad
- Interface board

Firmware upgrades

- Automation PC 620 / Panel PC 700 (MTCX, SDLR, SDLT)
- Automation PC 810 (MTCX, SDLR, SDLT)
- Automation PC 820 (MTCX, SDLR, SDLT)
- Mobile Panel 100 (SMCX)
- Panel PC 300 (MTCX)
- Power Panel 100 (aPCI)
- Power Panel 300/400 (aPCI)
- Power Panel 300/400 (MTCX)
- Power Panel 500 / Automation PC 510 / Automation PC 511 (MTCX, SDLR, I/O board)
- Panel PC 800 (MTCX, SDLR, SDLT)
- UPS firmware

Utilities/Tools

- B&R Embedded OS Installer
- Windows CE Tools
- User boot logo conversion program
- SATA RAID Installation Utility
- Automation Device Interface (ADI)
- CompactFlash service life calculator (Silicon Systems)
- Miscellaneous
- MTC utilities
- B&R Key Editor
- MTC & Mkey utilities
- Mkey utilities
- UPS configuration software
- ICU ISA configuration
- Intel PCI NIC boot ROM
- Diagnostic programs

Windows

- Windows CE 6.0
- Windows CE 5.0
- Windows CE 4.2
- Windows CE 4.1
- Windows CE Tools
- Windows Embedded Standard 2009
- Windows Embedded Standard 7
- Thin client
- Windows NT Embedded
- Windows XP Embedded
- VNC viewer

MCAD templates for

- Industrial PCs

- Visualization and operating devices
- Slide-in label templates
- Custom designs

ECAD templates for

- Industrial PCs
- Automation PCs
- Automation Panel 900
- Panels (Power Panel)

Documentation for

- Automation PC 511
- Automation PC 620
- Automation PC 680
- Automation PC 810
- Automation PC 820
- Automation Panel 800
- Automation Panel 900
- Panel PC 310
- Panel PC 700
- Panel PC 725
- Panel PC 800
- Power Panel 15/21/35/41
- Power Panel 100/200
- Power Panel 300/400
- Power Panel 500
- Mobile Panel 40/50
- Mobile Panel 100/200
- Mobile Panel connection box
- Provit 2000
- Provit 3030
- Provit 4000
- Provit 5000
- Provit Benchmark
- Provit Mkey
- Windows CE 5.0 help documentation
- Windows CE 6.0 help documentation
- Windows NT Embedded application guide
- Windows XP Embedded application guide
- Uninterruptible power supply
- Implementation guides
- B&R Hilscher fieldbus cards (CANopen, DeviceNet, PROFIBUS, PROFINET)

Service tools

- Acrobat Reader 5.0.5 (freeware in German, English and French)
- Power Archiver 6.0 (freeware in German, English and French)
- Internet Explorer 5.0 (German and English)
- Internet Explorer 6.0 (German and English)

Chapter 7 • Maintenance and service

This chapter describes service/maintenance work that can be carried out by a qualified end user.

1 Changing the battery

The lithium battery buffers the internal real-time clock (RTC) and CMOS data.

Information:

- **The product design allows the battery to be changed with the B&R device switched either on or off. In some countries, safety regulations do not allow batteries to be changed while the module is switched on.**
- **Any BIOS settings that have been made will remain when the battery is changed with the power turned off (stored in non-volatile EEPROM). The date and time must be reset later since this data is lost when the battery is changed.**
- **The battery should only be changed by qualified personnel.**

Warning!

The battery must be replaced by a Type CR2477N Renata battery only. The use of another battery may present a risk of fire or explosion.

The battery may explode if handled improperly. Do not recharge, disassemble or dispose of in fire.

The following replacement lithium batteries are available: 4A0006.00-000 (1 pc.) and 0AC201.91 (4 pcs.).

1.1 Evaluating the battery status

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

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

Table 210: Battery status

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

1.2 Procedure

- Disconnect the power supply to the B&R Industrial PC.
- Touch the housing or ground connection in order to discharge any electrostatic charge from your body.
- Remove the cover from the battery compartment and carefully pull out the battery using the removal strip.

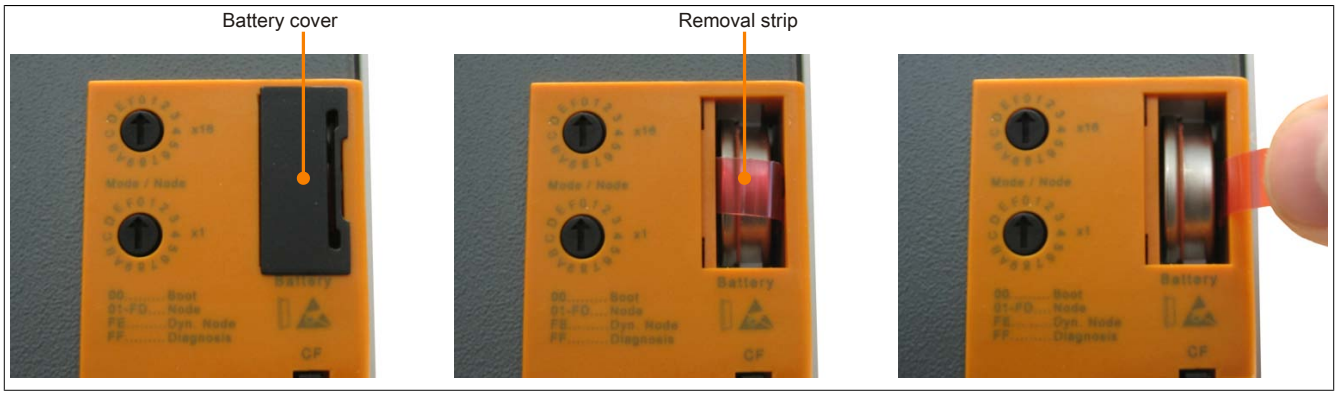


Figure 126: Removing the battery

- The battery should not be held by its edges. Insulated tweezers may also be used to insert the battery.

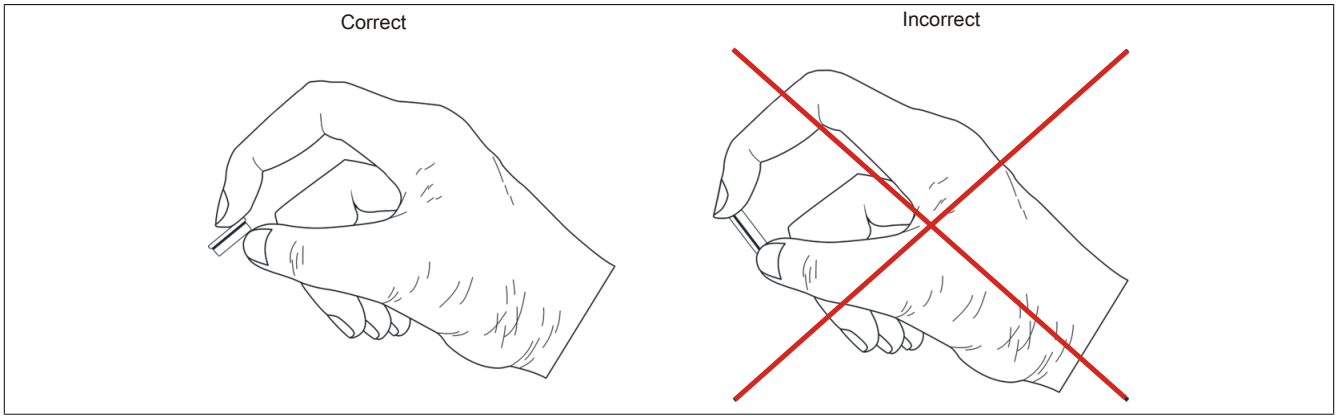


Figure 127: Battery handling

- Insert the new battery with the correct polarity.

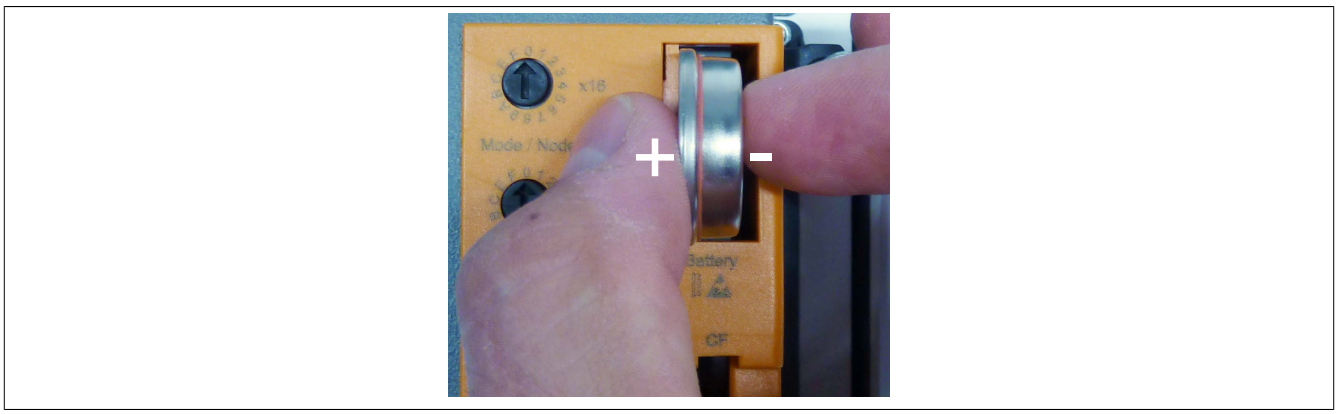


Figure 128: Insert battery

- To make the next battery replacement easier, be sure the removal strip is in place when inserting the battery.
- Reconnect the power supply to the B&R Industrial PC (plug in the power cable).
- Reset the date and time in BIOS.

Warning!

Lithium batteries are considered hazardous waste. Used batteries should be disposed of in accordance with applicable local regulations.

2 Replacing a CompactFlash card

Caution!

Power must be turned off before replacing CompactFlash cards.

The CompactFlash card can be replaced quickly and easily by sliding the ejector to the left (see image).

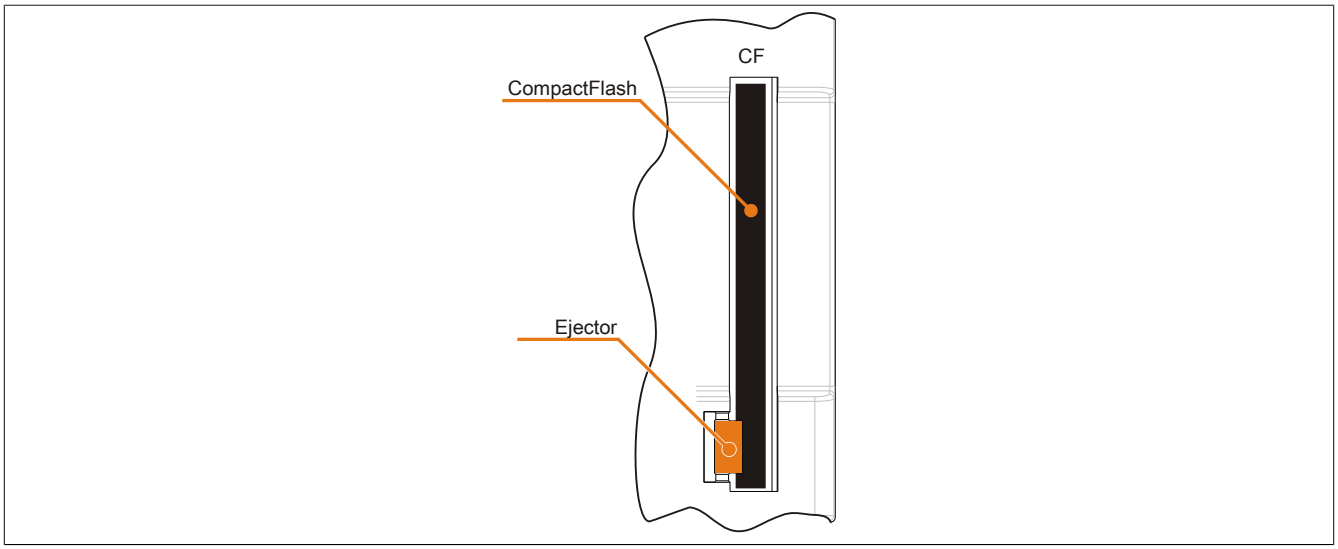


Figure 129: CompactFlash + ejector

Appendix A

1 Maintenance Controller Extended (MTCX)

The MTCX controller (FPGA processor) is located on the CPU board.

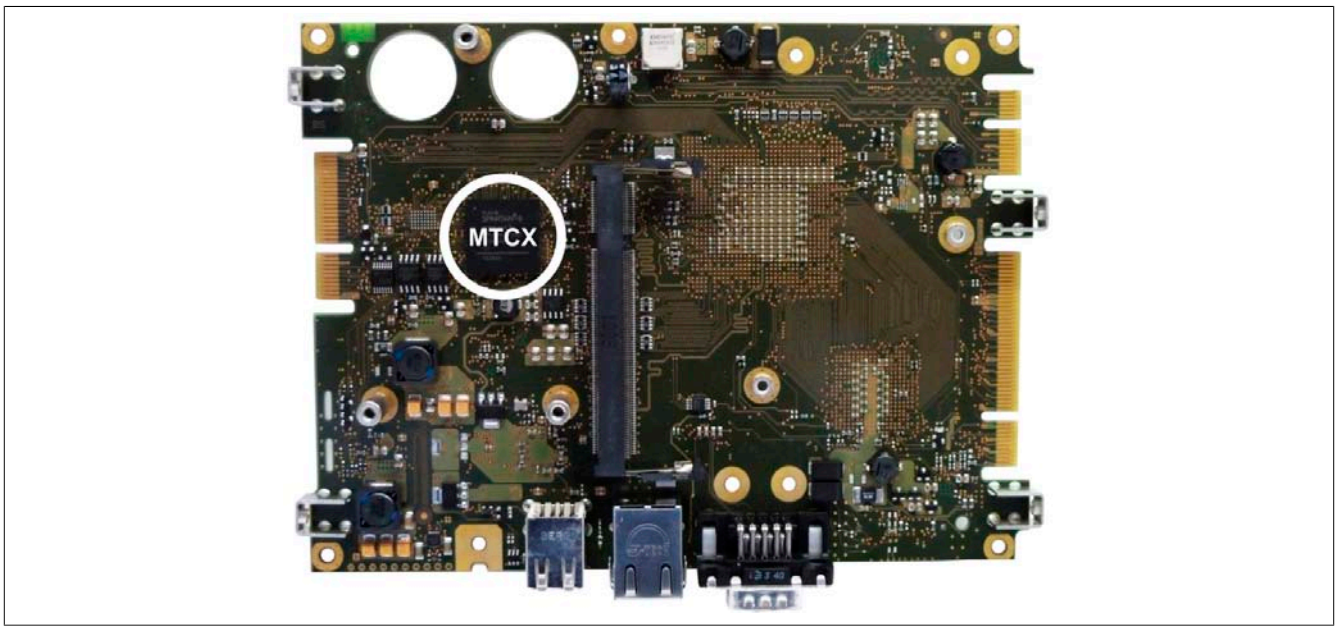


Figure 130: MTCX controller location

The MTCX is responsible for the following monitoring and control functions:

- Power failure logic
- Watchdog handling (NMI and reset handling)
- Temperature monitoring (I/O area, power supply)
- Key and LED handling/coordination
- Advanced desktop operation (keys, USB forwarding)
- Backlight control for the display
- Statistical data recording (power cycles - records every switch-on and power-on; each full hour is counted, i.e. not increased at 50 minutes)
- LED status indicators (Power, CF, Link, Run)

Extended MTCX functions are available by upgrading firmware [6]. The version can be read in BIOS ("OEM features" on page 89) or approved Microsoft Windows operating systems via the B&R Control Center.

[6] Available in the Downloads section of the B&R website (www.br-automation.com).

2 Abbreviations

Abbreviation	Stands for	Description
NC	Normally closed	A normally closed relay contact
	Not connected	Used in pinout descriptions if a terminal or pin is not connected to a module
ND	Not defined	In data tables, this stands for a value that has not been defined. This may be because a cable manufacturer does not provide certain technical data, for example.
NO	Normally open	A normally open relay contact
TBD	To be defined	Used in technical data tables when certain information is not yet available. The value will be provided later.

Table 211: Abbreviations used in this user's manual

3 Glossary

Address	An address is a character string for identifying a memory location or a memory area, where data is stored and can be retrieved. It is also a symbol (e.g. with numerical controllers) for identifying a function unit for which subsequent geometrical or technological data are determined by the symbol.
Algorithms	According to DIN 19226: Algorithms are a finite series of well-defined regulations. The desired output quantities are created from permitted system input quantities. It describes how something is to be done. A procedure must at least satisfy the following requirements to be valid as an algorithm in a mathematical context. *Discreteness:* An algorithm is made up of a finite series of steps. *Determinacy:* Under the same start conditions, it always creates the same end result. *Clearness:* The series of steps is clearly defined. *Finiteness:* It ends after a finite number of steps. From a quantity theory perspective, an algorithm is clearly defined by a set of sizes [input, intermediate and output sizes], a set of elementary operations and also by a regulation, which specifies when and in what sequence certain operations should be carried out. From a functional perspective, it transfers a set of input sizes into a set of output sizes. It can be represented in text form in a natural or artificial formal language or using graphic representations [graph, program flow chart, structured chart, Petri Nets etc.].
ANSI	American National Standards Institute > this organization promotes and manages American industrial standards.
APC	Abbreviation for »Automation PC«
Application software	Software, which is not used for operation by the computer itself, but rather when a computer is used to process a concrete application problem. It sets up the system software and uses this for fulfilling individual tasks. Application software can be accommodated in standard software used by a large number of customers in a wide range of industries. Common examples are Word, Excel, PowerPoint, Paint, Matlab etc. Industrial software tailored to the respective problems of a certain industry and individual software created for solving the particular problems of an individual user.
ASCII	American Standard Code for Information Interchange, used worldwide; numbers, letters, special characters and device controller characters are represented as 7-bit binary combinations. Standard ASCII-characters cover 27 = 128 characters in total. An eighth bit is used as a so-called parity bit for error detection when transferring ASCII files. During even parity checking, this bit is set to 0, when the number of ‘1s’ in the remaining seven bits is an even number. Otherwise, it is set to 1. The expanded ASCII character set does not use parity checking. The highest value bit is used here to switch from the standard character set to the expansion. This allows space for special regional characters e.g. umlauts in the German language. www.asciitable.com
Automation	According to Brockhaus: The application of technical means, using specific programs that (either partially or totally) do not require human intervention to perform operations.
Automation Runtime	A uniform runtime system for all B&R automation components.
Failure	Failure according to IEC 61508: A function unit loses the ability to perform a required function. In regards to safety-oriented systems, a distinction is made between dangerous and safe failures. This depends on whether the status of the system failure is considered dangerous or safe. The cause of the failure may be load related or age-related, and therefore a random failure, or related to a flaw inherent in the system. In this case, it is known as a systematic failure.

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