Automation PC 4100

User's manual

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Translation of the original documentation

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Disclaimer

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1 Introduction

Information:

B&R makes every effort to keep documents as current as possible. The most current versions are available for download on the B&R website (www.br-automation.com).

1.1 Manual history

Version	Date	Comment[1)]
1.00	June 2023	First edition

1) Editorial corrections are not listed.

1.2 Information about this document

This document is not intended for end customers! The safety guidelines required for end customers must be incorporated into the operating instructions for end customers in the respective national language by the machine manufacturer or system provider.

1.2.1 Organization of notices

Safety notices

Contain **only** information that warns of dangerous functions or situations.

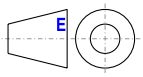
Signal word	Description
Danger!	Failure to observe these safety guidelines and notices will result in death, severe injury or substantial damage to property.
Warning!	Failure to observe these safety guidelines and notices can result in death, severe injury or substantial damage to property.
Caution!	Failure to observe these safety guidelines and notices can result in minor injury or damage to property.
Notice!	Failure to observe these safety guidelines and notices can result in damage to property.

General notices

Contain **useful** information for users and instructions for avoiding malfunctions.

Signal word	Description
Information:	Useful information, application tips and instructions for avoiding malfunctions.

1.2.2 Guidelines



European dimension standards apply to all dimension diagrams.

All dimensions, specifications in dimension diagrams and associated tables are in millimeters [mm].

Unless otherwise specified, the following general tolerances apply:

Nominal dimension range	General tolerance per DIN ISO 2768 medium
Up to 6 mm	±0.1 mm
Over 6 to 30 mm	±0.2 mm
Over 30 to 120 mm	±0.3 mm
Over 120 to 400 mm	±0.5 mm
Over 400 to 1000 mm	±0.8 mm

2 General safety guidelines

2.1 Intended use

In all cases, applicable national and international standards, regulations and safety measures must be taken into account and observed!

The B&R products described in this manual are intended for use in industry and industrial applications.
The intended use includes control, operation, monitoring, drive and HMI tasks as part of automation processes in machines and systems.

B&R products are only permitted to be used in their original condition. Modifications and extensions are only permitted if they are described in this manual.

B&R excludes liability for damage of any kind resulting from the use of B&R products in any intended way.

B&R products have not been designed, developed and manufactured for use that involves fatal risks or hazards that could result in death, injury, serious physical harm or other loss without the assurance of exceptionally stringent safety precautions.

B&R products are explicitly not intended for use in the following applications:

- Monitoring and control of thermonuclear processes
- Weapon systems control
- Flight and traffic control systems for passenger and freight transport
- Health monitoring and life support systems

2.2 Protection against electrostatic discharge

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

2.2.1 Packaging

- **Electrical assemblies with housing:**
  Do not require special ESD packaging but must be handled properly (see "Electrical assemblies with housing").
- **Electrical assemblies without housing:**
  Are protected by ESD-suitable packaging.

2.2.2 Regulations for proper ESD handling

Electrical assemblies with housing

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

Electrical assemblies without housing

The following applies in addition to "Electrical assemblies with housing":

- All persons handling electrical assemblies and devices in which electrical assemblies are installed must be grounded.
- Assemblies are only permitted to be touched on the narrow sides or front plate.
- Always place assemblies on suitable surfaces (ESD packaging, conductive foam, etc.). Metallic surfaces are not suitable surfaces!
- Assemblies must not be subjected to electrostatic discharges (e.g. due to charged plastics).
- A minimum distance of 10 cm from monitors or television sets must be maintained.
- Measuring instruments and devices must be grounded.
- Test probes of floating potential measuring instruments must be discharged briefly on suitable grounded surfaces before measurement.

Individual components

- ESD protective measures for individual components are implemented throughout B&R (conductive floors, shoes, wrist straps, etc.).
- The increased ESD protective measures for individual components are not required for handling B&R products at customer locations.

2.3 Regulations and measures

Electronic devices are generally not failsafe. If the programmable logic controller, operating or control device or uninterruptible power supply fails, the user is responsible for ensuring that connected devices (such as motors) are brought to a safe state.

When using programmable logic controllers as well as when using operating and monitoring devices as control systems in conjunction with a Soft PLC (e.g. B&R Automation Runtime or similar product) or Slot PLC (e.g. B&R LS251 or similar product), the safety measures that apply to industrial controllers (protection by protective equipment such as emergency stops) must be observed in accordance with applicable national and international regulations. This also applies to all other connected devices, such as drives.

All work such as installation, commissioning and servicing are only permitted to be carried out by qualified personnel. Qualified personnel are persons who are familiar with the transport, installation, assembly, commissioning and operation of the product and have the appropriate qualifications for their job (e.g. IEC 60364). National accident prevention regulations must be observed.
The safety guidelines, information about connection conditions (nameplate and documentation) and limit values specified in the technical data must be read carefully before installation and commissioning and must be strictly observed.

2.4 Transport and storage

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

2.5 Installation

- The devices are not ready for use and must be installed and wired according to the requirements of this documentation in order to comply with EMC limit values.
- Installation must be carried out according to the documentation using suitable equipment and tools.
- Devices are only permitted to be installed in a voltage-free state and by qualified personnel. The control cabinet must first be disconnected from the power supply and secured against being switched on again.
- General safety regulations and national accident prevention regulations must be observed.
- The electrical installation must be carried out in accordance with relevant regulations (e.g. line cross section, fuse protection, protective ground connection).

2.6 Operation

2.6.1 Protection against contact with electrical parts

In order to operate programmable logic controllers, operating and monitoring devices and uninterruptible power supplies, it is necessary for certain components to carry dangerous voltages over 42 VDC. Touching one of these components can result in a life-threatening electric shock. There is a risk of death, serious injury or damage to property.

Before switching on programmable logic controllers, operating and monitoring devices and uninterruptible power supplies, it must be ensured that the housing is properly connected to ground potential (PE rail). Ground connections must also be made if the operating and monitoring device and uninterruptible power supply are only connected for testing purposes or only operated for a short time!

Before switching on, live parts must be securely covered. All covers must be kept closed during operation.

2.6.2 Ambient conditions - Dust, moisture, aggressive gases

The use of operating and monitoring devices (e.g. industrial PCs, Power Panels, Mobile Panels) and uninterruptible power supplies in dusty environments must be avoided. This can otherwise result in dust deposits that affect the functionality of the device, especially in systems with active cooling (fans), which may no longer ensure sufficient cooling.

The presence of aggressive gases in the environment can also result in malfunctions. In combination with high temperature and relative humidity, aggressive gases – for example with sulfur, nitrogen and chlorine components – trigger chemical processes that can very quickly impair or damage electronic components. Blackened copper surfaces and cable ends in existing installations are indicators of aggressive gases.

When operated in rooms with dust and condensation that can endanger functionality, operating and monitoring devices such as Automation Panels or Power Panels are protected on the front against the ingress of dust and moisture when installed correctly (e.g. cutout installation). The back of all devices must be protected against the ingress of dust and moisture, however, or the dust deposits must be removed at suitable intervals.

2.6.3 Programs, viruses and malicious programs

Any data exchange or installation of software using data storage media (e.g. floppy disk, CD-ROM, USB flash drive) or via networks or the Internet poses a potential threat to the system. It is the direct responsibility of the user to avert these dangers and to take appropriate measures such as virus protection programs and firewalls to protect against them and to use only software from trustworthy sources.

2.7 Cybersecurity disclaimer for products

B&R products communicate via a network interface and were developed for secure connection with internal and, if necessary, other networks such as the Internet.

Information:

In the following, B&R products are referred to as "product" and all types of networks (e.g. internal networks and the Internet) are referred to as "network".

It is the sole responsibility of the customer to establish and continuously ensure a secure connection between the product and the network. In addition, appropriate security measures must be implemented and maintained to protect the product and entire network from any security breaches, unauthorized access, interference, digital intrusion, data leakage and/or theft of data or information.

B&R Industrial Automation GmbH and its subsidiaries are not liable for damages and/or losses in connection with security breaches, unauthorized access, interference, digital intrusion, data leakage and/or theft of data or information.

The aforementioned appropriate security measures include, for example:

- Segmentation of the network (e.g. separation of the IT network from the control network[1)])
- Use of firewalls
- Use of authentication mechanisms
- Encryption of data
- Use of anti-malware software

Before B&R releases products or updates, they are subjected to appropriate functional testing. Independently of this, we recommend that our customers develop their own test processes in order to be able to check the effects of changes in advance. Such changes include, for example:

- Installation of product updates
- Significant system modifications such as configuration changes
- Deployment of updates or patches for third-party software (non-B&R software)
- Hardware replacement

These tests should ensure that implemented security measures remain effective and that systems in the customer's environment behave as expected.

1) The term "control network" refers to computer networks used to connect control systems. The control network can be divided into zones, and there can be several separate control networks within a company or site. The term "control systems" refers to all types of B&R products such as controllers (e.g. X20), HMI systems (e.g. Power Panel T30), process control systems (e.g. APROL) and supporting systems such as engineering workstations with Automation Studio.

3 System overview

3.1 Design/Configuration

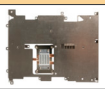
The APC4100 system can be assembled to meet individual requirements and operating conditions. The following individual components are mandatory for operation:

- System unit
- Bus unit (1-slot variant or more)
- CPU board
- Heat sink
- Fan kit (during active operation)
- Main memory
- Mass storage device for the operating system (CFexpress, M.2 memory, SSD/HDD memory)
- Operating system

3.1.1 Configuring the system

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

When operating with a fan kit, higher ambient temperatures are possible than when operating without a fan kit. For additional information, see section "Maximum ambient temperature for worst-case operation" on page 24.

APC4100 configuration				
System units[1]				Select 1.
	5APC4100.SX00-000	5APC4100.SX01-000	5APC4100.SX02-000	5APC4100.SX03-000
Bus units				Select 1.
	-	5APC4100.BX01-000 5APC4100.BX01-001	5APC4100.BX02-000 5APC4100.BX02-001	5APC4100.BX03-000 5APC4100.BX03-001 5APC4100.BX03-002
CPU board				Select 1.
	**HM570E**			
	5APC4100.TGL0-000	Intel C 6600HLE	2.1 GHz	2 cores
	RM590E			
	5APC4100.TGL1-000	Intel i3-11100HE	2.4 GHz	4 cores
	5APC4100.TGL2-000	Intel i5-11500HE	2.6 GHz	6 cores
	5APC4100.TGL3-000	Intel W-11155MRE	2.4 GHz	4 cores
	5APC4100.TGL4-000	Intel W-11865MRE	2.6 GHz	8 cores
Heat sink				Select 1.
	5APC4100.HS00-000 5APC4100.HS01-000			
Fan kit				Select max. 1 (optional).
	**Including air filter**			
	5APC4100.FA00-000	5APC4100.FA01-000	5APC4100.FA02-000	5APC4100.FA03-000
	Excluding air filter[1]			
	5APC4100.FA00-001	5APC4100.FA01-001	5APC4100.FA02-001	5APC4100.FA03-001
Main memory				Select max. 2.
	**Without ECC support** 5MMDDR.4096-05 5MMDDR.8192-05 5MMDDR.016G-05 5MMDDR.032G-05		**With ECC support** 5MMDDR.8192-06	
Front covers				Select 1.[2]
	5ACCFF04.0000-000 5ACCFF04.0000-001	5ACCFF04.0100-000 5ACCFF04.0100-001	5ACCFF04.0200-000 5ACCFF04.0200-001	5ACCFF04.0300-000 5ACCFF04.0300-001
CFexpress cards				Select max. 2.
	5CFXPR.120G-20		5CFXPR.240G-20 5CFXPR.480G-20	
Main memory[6]				Select max. 2.
	5ACCISSD.128G-000 5ACCISSD.256G-000	5ACCISSD.512G-000 5ACCISSD.001T-000	5ACCIHDD.1024-000	
Interfaces				
	IF options			Optional, select max. 2[3]
	5AC901.I232-00 5AC901.I485-00 5ACCIF04.FPLK-000	5AC901.ICAN-01 5AC901.IETH-00 5AC901.IPLK-00		5AC901.ISRM-00 5AC901.ISIO-00 5AC901.IRDY-00
	Graphics options			Optional, select max. 1
	5ACCLI02.DPO0-000 5ACCLI05.SDL4-000[3]			
	Mass storage options[3]			Select 1.
	Adapter card 5ACCMS01.MDT2-000			**M.2 mass storage devices** 5ACCMSM2.0512-000 5ACCMSM2.1024-000
	UPS			Select 1 each.[4]
	UPS module[4]	+ **Battery unit**	+	**UPS cable**
	5AC901.IUPS-00	+ 5AC901.BUPS-00		5CAUPS.0005-01
	5AC901.IUPS-01	+ 5AC901.BUPS-01		5CAUPS.0010-01 5CAUPS.0013-01 5CAUPS.0030-01
Battery				
	5ACCBT02.0000-000			
Installation options				Select 1.[5]

	5APC4100.MB00-000	5APC4100.MB01-000	5APC4100.MB02-000	5APC4100.MB03-000
USB accessories				Optional selection
		5MMUSB.4096-02 5MMUSB.032G-02		
Terminal blocks				Select 1.
		**Power supply connectors**		Select 1.
		0TB103.9 0TB103.91		
		Terminal block for IF option		Optional selection
		0TB2104.8000		
Operating systems				Select 1.
	Windows 10	**Linux for B&R 12**	**Hypervisor**	**Automation Runtime**
	5SWW10.1666-MUL 5SWW10.1766-MUL 5SWW10.1866-MUL	5SWLIN.0966-MUL	1TG4700.00 1TC4700.00	0TG1000.01 0TG1000.02 1TG4601.06-5 1TC4601.06-5

1) Requires customized configuration.
2) The front cover is not included with the system unit and must be ordered separately. If no front cover is selected during device configuration, then front cover 5APC4100.FF0x-000 (orange) is delivered by default.
3) Mounting bracket for IF3 option: 5ACCMBMS.0000-000
4) Certain limitations must be taken into account when using IF options. For additional information, see section "Device interfaces and slots" on page 33.
5) The UPS module can only be operated in the IF option 1 slot, and the battery unit compatible with the UPS module must be used.
6) Installation frame for SSD/HDD: 5APC4100.ISSD-000

3.2 Overview

Order number	Short description	Page
	Accessories	
0TB103.9	Connector 24 VDC - 3-pin, female - Screw clamp terminal block 3.31 mm²	211
0TB103.91	Connector 24 VDC - 3-pin, female - Cage clamp terminal block 3.31 mm²	211
	Battery tray	
5ACCBT02.0000-000	Battery compartment - Including battery - For APC4100	119
	Bus units	
5APC4100.BX01-000	APC4100 with 1-slot bus - 1 PCI	67
5APC4100.BX01-001	APC4100 with 1-slot bus - 1 PCIe x16	67
5APC4100.BX02-000	APC4100 with 2-slot bus - 1 PCI - 1 PCIe x16	67
5APC4100.BX02-001	APC4100 with 2-slot bus - 1 PCIe x16 - 1 PCIe x4	67
5APC4100.BX03-000	APC4100 with 3-slot bus - 2 PCI - 1 PCIe x16	67
5APC4100.BX03-001	APC4100 with 3-slot bus - 1 PCI - 1 PCIe x16 - 1 PCIe x4	67
5APC4100.BX03-002	APC4100 with 3-slot bus - 1 PCIe x16 - 1 PCIe x4 - 1 PCIe x1	67
	CFexpress cards	
5CFXPR.060G-20	CFexpress 60 GB TLC	79
5CFXPR.120G-20	CFexpress 120 GB TLC	79
5CFXPR.240G-20	CFexpress 240 GB TLC	79
5CFXPR.480G-20	CFexpress 480 GB TLC	79
	CPU boards	
5APC4100.TGL0-000	CPU board Intel Celeron 6600HLE - Dual core - HM570E chipset - 2.1 GHz active, 2.1 GHz passive - For APC4100	63
5APC4100.TGL1-000	CPU board Intel Core i3 11100HE - Quad core - RM590E chipset - 2.4 GHz active, x.x GHz passive - For APC4100	63
5APC4100.TGL2-000	CPU board Intel Core i5 11500HE - Hexa core - RM590E chipset - 2.6 GHz active - For APC4100	63
5APC4100.TGL3-000	CPU board Intel Xeon 11155MRE - Quad core - RM590E chipset - 2.4 GHz active, x.x GHz passive - For APC4100	63
5APC4100.TGL4-000	CPU board Intel Xeon 11865MRE - Octa core - RM590E chipset - 2.6 GHz active - For APC4100	63
	Fan kits	
5APC4100.FA00-000	APC4100 fan kit - For 5APC4100.SX00-00 - Includes air filter	75
5APC4100.FA00-001	APC4100 fan kit - For 5APC4100.SX00-00 - Excludes air filter	75
5APC4100.FA01-000	APC4100 fan kit - For 5APC4100.SX01-00 - Includes air filter	76
5APC4100.FA01-001	APC4100 fan kit - For 5APC4100.SX01-00 - Excludes air filter	76
5APC4100.FA02-000	APC4100 fan kit - For 5APC4100.SX02-00 - Includes air filter	77
5APC4100.FA02-001	APC4100 fan kit - For 5APC4100.SX02-00 - Excludes air filter	77
5APC4100.FA03-000	APC4100 fan kit - For 5APC4100.SX03-00 - Includes air filter	78
5APC4100.FA03-001	APC4100 fan kit - For 5APC4100.SX03-00 - Excludes air filter	78
	Front cover	
5ACCFF04.0000-000	Front cover 0-slot APC4100 - Orange	103
5ACCFF04.0000-001	Front cover for 0-slot APC4100 - Dark gray	103
5ACCFF04.0100-000	Front cover 1-slot APC4100 - Orange	103
5ACCFF04.0100-001	Front cover for 1-slot APC4100 - Dark gray	103
5ACCFF04.0200-000	Front cover 2-slot APC4100 - Orange	103
5ACCFF04.0200-001	Front cover for 2-slot APC4100 - Dark gray	103
5ACCFF04.0300-000	Front cover 3-slot APC4100 - Orange	103
5ACCFF04.0300-001	Front cover for 3-slot APC4100 - Dark gray	103
	Graphics options	
5ACCLI02.DPO0-000	Graphics option - 1x DisplayPort transmitter (version 1.2) - For APC3100/PPC3100/APC4100	101
5ACCLI05.SDL4-000	Graphics option - 1x SDL4 transmitter - For APC4100	99
	Heat sink	
5APC4100.HS00-000	APC4100 heat sink, active	66
5APC4100.HS01-000	APC4100 heat sink, passive	66
	Hypervisor	
1TC4700.00	License for B&R Hypervisor (TC). One license per target system is required.	183
	Interface options	
5AC901.I232-00	Interface card - 1x RS232 interface - For APC910/PPC900/APC3100/PPC3100/APC4100	81
5AC901.I485-00	Interface card - 1x RS232/RS422/RS485 interface - For APC910/PPC900/APC3100/PPC3100/APC4100	83
5AC901.ICAN-01	Interface card - 1x CAN interface (SJA1000) - For APC910/PPC900/APC3100/PPC3100/APC4100	86
5AC901.IETH-00	Interface card - 1x ETH 10/100/1000 - For APC910/PPC900/APC3100/PPC3100/APC4100	88
5AC901.IPLK-00	Interface card - 1x POWERLINK interface - 2 MB SRAM - For APC910/PPC900/APC3100/PPC3100/APC4100	90
5AC901.IRDY-00	Interface card - Ready relay - For APC910/PPC900/APC3100/PPC3100/APC4100	92
5AC901.ISIO-00	Interface card - System I/O - For APC910/PPC900/APC3100/PPC3100/APC4100	94
5AC901.ISRM-00	Interface card - 2 MB SRAM - For APC910/PPC900/APC3100/PPC3100/APC4100	96
5ACCIF04.FPLK-000	Interface card - 1x POWERLINK interface - For APC3100/PPC3100/APC4100	97
	Linux for B&R 12	
5SWLIN.0966-MUL	Linux for B&R 12 - 64-bit - Multilingual - APC4100 (UEFI boot) - CPU Celeron C-6600HLE - CPU Core i3-11100HE / i5-11500HE - CPU Xeon w-1115MRE / w-11865MRE - Installation - Only available with a new device	181
	Main memory	
5MMDDR.016G-05	SO-DIMM DDR4, 16384 MB	65
5MMDDR.032G-05	SO-DIMM DDR4, 32768 MB	65
5MMDDR.4096-05	SO-DIMM DDR4, 4096 MB	65
5MMDDR.8192-05	SO-DIMM DDR4, 8192 MB	65

Order number	Short description	Page
5MMDDR.8192-06	SO-DIMM DDR4 ECC, 8192 MB	65
	Mass storage	
5ACCIHDD.1024-000	1 TB hard disk - Slide-in compact - SATA	70
5ACCISSD.001T-000	1 TB SSD MLC - Slide-in compact - SATA	68
5ACCISSD.128G-000	128 GB SSD MLC - Slide-in compact - SATA	68
5ACCISSD.256G-000	256 GB SSD MLC - Slide-in compact - SATA	68
5ACCISSD.512G-000	512 GB SSD MLC - Slide-in compact - SATA	68
	Mass storage options	
5ACCMS01.MDT2-000	Adapter card for M.2 mass storage device - For APC3100/PPC3100/APC4100	73
5ACCMSM2.0512-000	512 GB M.2 SSD MLC - Innodisk - SATA	72
5ACCMSM2.1024-000	1 TB M.2 SSD MLC - Innodisk - SATA	72
	Operating systems	
5SWW10.1666-MUL	W10IoT E 2021 64b APC4100 TGL UEFI	178
5SWW10.1766-MUL	W10IoT V 2021 64b APC4100 TGL UEFI	178
5SWW10.1866-MUL	W10IoT H 2021 64b APC4100 TGL UEFI	178
	Other	
5ACCRHMI.0007-000	HMI installation tool for swing arm: - 1x torque wrench 0.4 - 2.0 Nm - 1x torque wrench 2.0 - 10.0 Nm - 1x hex head bit 3.0, length 89 mm - 1x hex head bit 5.0, length 89 mm - 1x Torx 10 bit, length 90 mm - 1x Torx 20 bit, length 89 mm - 1x Torx 25 bit, length 89 mm - 1x Torx 30 bit, length 89 mm	211
	Runtime	
1TC4601.06-5	License for Automation Runtime Embedded (TC). One license per target system is required.	183
	System units	
5APC4100.SX00-000	0-slot APC4100 system unit	45
5APC4100.SX01-000	1-slot APC4100 system unit	49
5APC4100.SX02-000	2-slot APC4100 system unit	54
5APC4100.SX03-000	3-slot APC4100 system unit	59
	Technology Guard	
0TG1000.01	Technology Guard (MSD)	183
0TG1000.02	Technology Guard (HID)	183
0TGF016.01	Technology Guard (MSD) with integrated flash drive, 16 GB (MLC)	183
1TG4601.06-5	Automation Runtime Embedded TG license	183
1TG4700.00	B&R Hypervisor	183
	Terminal blocks	
0TB2104.8000	Connector 24 VDC - 4-pin female - Screw clamp terminal block 2.5 mm²	213
	Uninterruptible power supply	
5AC901.BUPS-00	Battery unit 4.5 Ah - For UPS 5AC901.IUPS-00	109
5AC901.BUPS-01	Battery unit 2.2 Ah - For UPS 5AC901.IUPS-01	113
5AC901.IUPS-00	UPS - For 4.5 Ah battery	105
5AC901.IUPS-01	UPS - For 2.2 Ah battery	107
5CAUPS.0005-01	UPS cable - 0.5 m - For 5AC901.IUPS-xx	117
5CAUPS.0010-01	UPS cable - 1 m - For 5AC901.IUPS-xx	117
5CAUPS.0013-01	UPS cable - 1.3 m - For 5AC901.IUPS-xx	117
5CAUPS.0030-01	UPS cable - 3 m - For 5AC901.IUPS-xx	117

4 Technical data

4.1 Complete system

4.1.1 Connection options

An Automation Panel can be connected to the Automation PC via the DisplayPort interface and via optional graphics options:

- The following chapter describes SDL4 operation. It shows an overview of functions and possible limitations ("SDL4 operation" on page 17).
- For additional information about DisplayPort, see the corresponding chapter in "Device interfaces and slots" ("DisplayPort interfaces" on page 35).

4.1.1.1 SDL4 operation

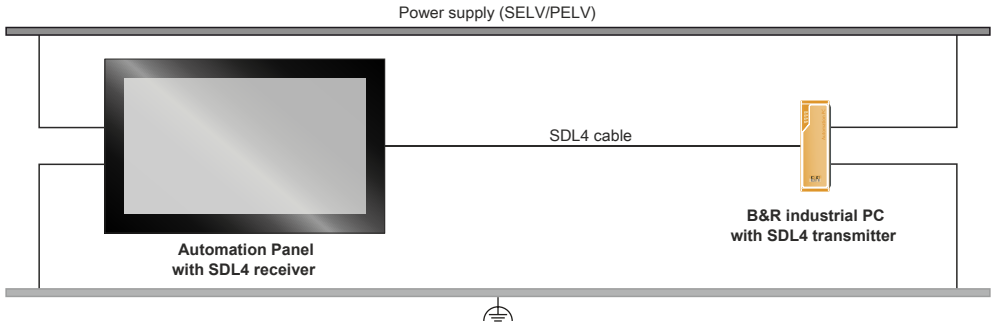
Smart Display Link 4 (SDL4) technology transfers all communication channels between a B&R industrial PC and panel up to 100 m over a standard Ethernet cable (min. Cat 6a). An RJ45 connector is used for the device connection, which is ideal for confined spaces in feed-throughs and swing arm systems.

4.1.1.1.1 SDL4 operation with SDL4 transmitter

In SDL4 operation with an SDL4 transmitter in the B&R industrial PC, all communication between the Automation Panel and B&R industrial PC takes place via a single SDL4 cable.

In addition to the display data, information from the touch screen, matrix keys, LEDs and service/diagnostic data is transferred. The Automation Panel can be installed up to 100 m away from the B&R industrial PC. USB 2.0 is also transferred over this distance and fully integrated into SDL4. External adapter modules are not required.

The brightness of the display can be set via the ADI, for example.



Availability of the interfaces on the Automation Panel with SDL4 receiver:

SDL4 interface	✓	USB1, USB2	✓ USB 2.0	Power supply	✓	Grounding	✓

Maximum cable length for SDL4: 100 m

Requirements

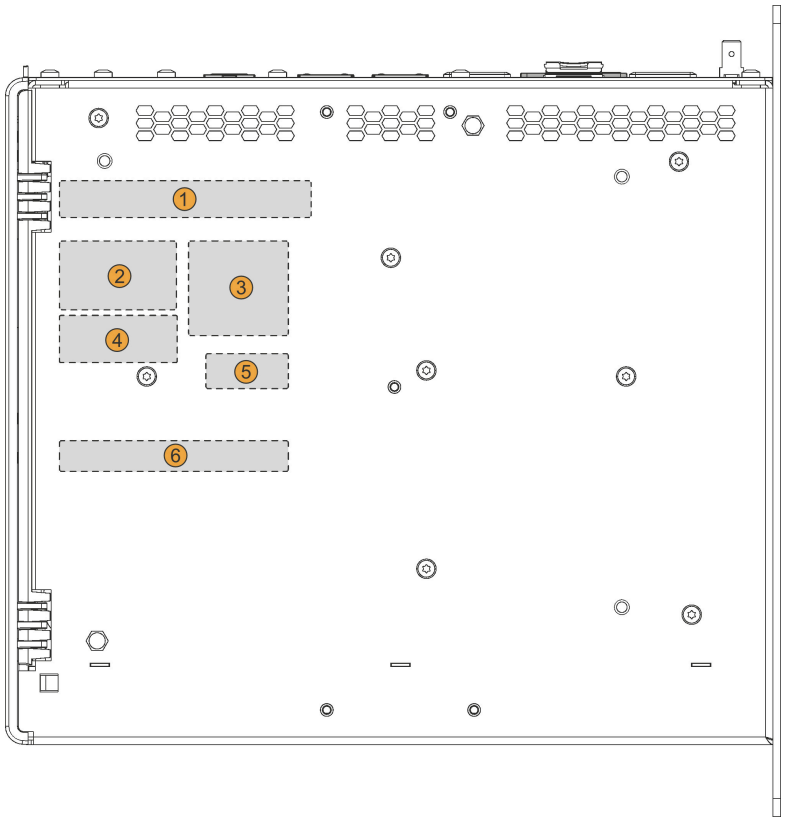
- Automation Panel with SDL4 receiver
- B&R industrial PC with SDL4 interface
- SDL3/SDL4 cable

4.1.1.1.2 General limitations

- USB 2.0 transfer is limited to 150 Mbit/s with SDL4.
- A display is always emulated by the SDL4 transmitter using EDID data and hot plug detection, so DVI-compatible operation is possible. For this reason, the following behavior may occur during operation with multiple displays.
  In the operating system, a connected panel is reported by the video driver even in the following situations:
  - No SDL3/SDL4 cable is connected.
  - There is no connection established yet between the SDL4 link module and SDL4 transmitter.

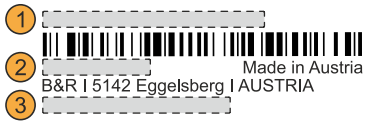
  This behavior can be avoided by appropriate configuration in BIOS or via the graphics driver.

4.1.2 Product information



Position	Description
1	Specifications for the device family and electrical properties
2	Device-specific specifications, serial numbers and MAC addresses, see Identification.
3	Valid test and conformity ID for the product, see section "Technical data" on page 16
4	Safety notices, warnings and information about the product
5	License adhesive label for operating systems (configuration-dependent)
6	Space for individual customer information (configuration-dependent)

4.1.2.1 Identification

Figure (symbolic)	Identification	
	1	Device number
	2	Serial number
	3	MAC addresses
	-	

The device number can be retrieved on the B&R website (www.br-automation.com) using the serial number of the device (login required). Information (serial number, material number, revision, delivery date and end of warranty) about all components installed in the system can be retrieved using the device number.

4.1.3 Mechanical properties

4.1.3.1 Dimensions

Information:

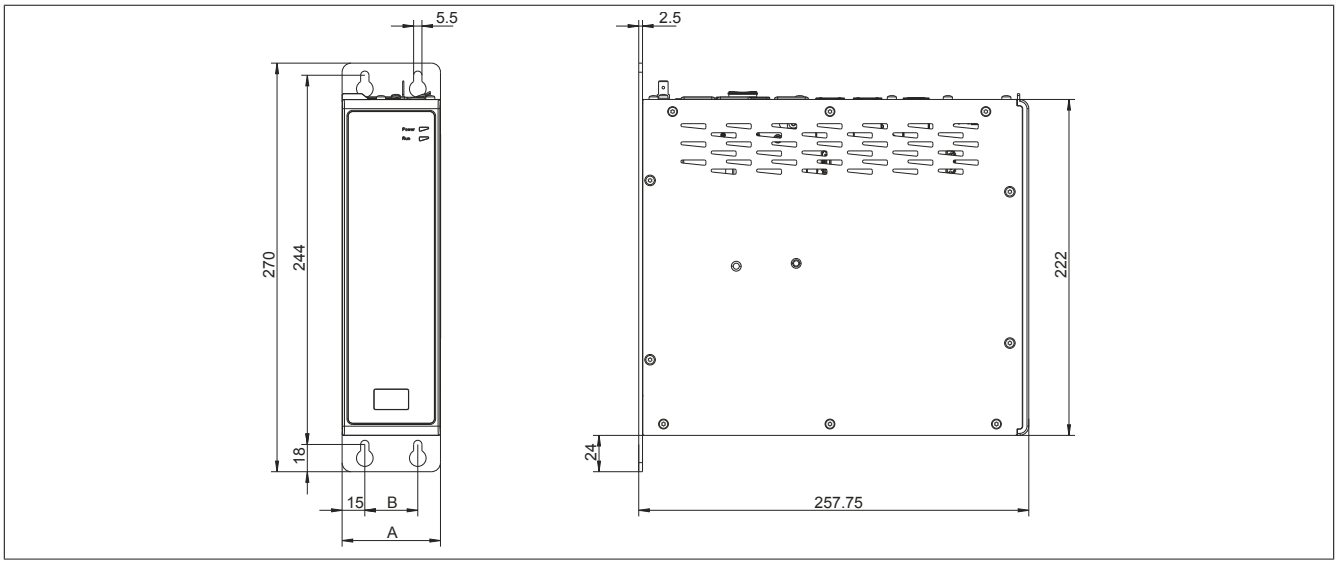
All dimensions, specifications in dimension diagrams and associated tables are in millimeters [mm].

2D and 3D data (DXF and STEP formats) can be downloaded from the B&R website (www.br-automation.com). To do this, search for the order number of the device using the search bar.

Dimension table

Variant	Dimension A	Dimension B
0 slots	65 ±0.5	35
1 slot	91 ±0.5	61
2 slots	111.3 ±0.5	81.3
3 slots	131.6 ±0.5	101.6

Book-style installation (standard)

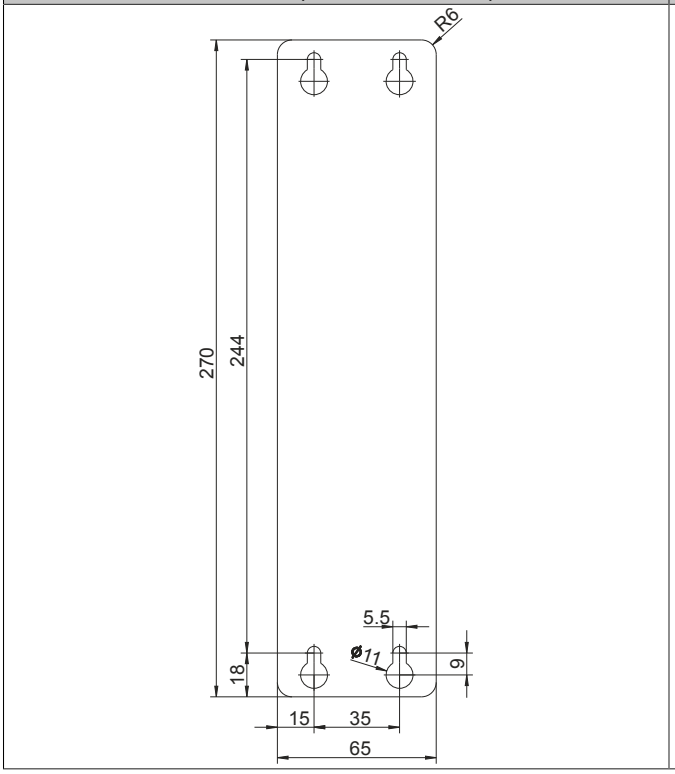


4.1.3.2 Drilling template

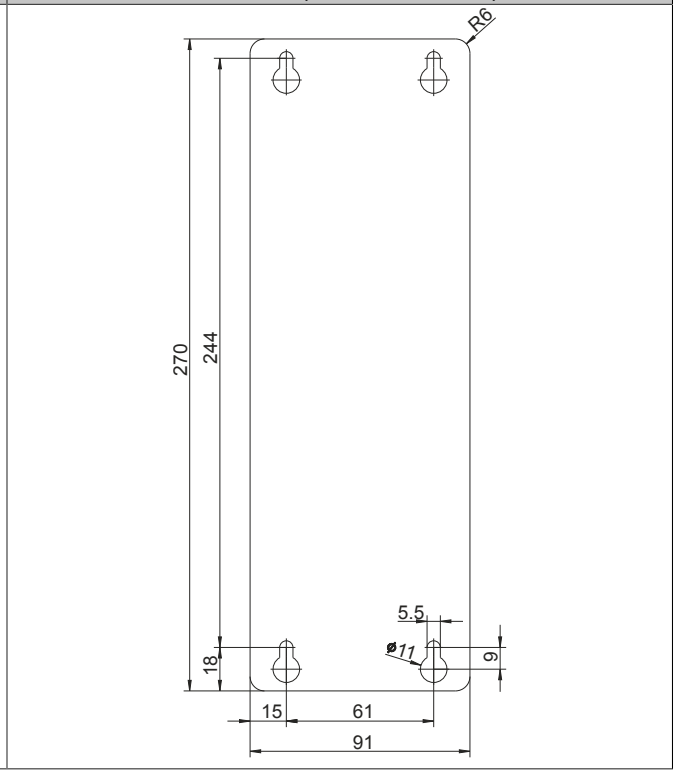
Information:

When installing the Automation PC 4100, spacing for air circulation and additional free space for operating and servicing the device must be taken into account.

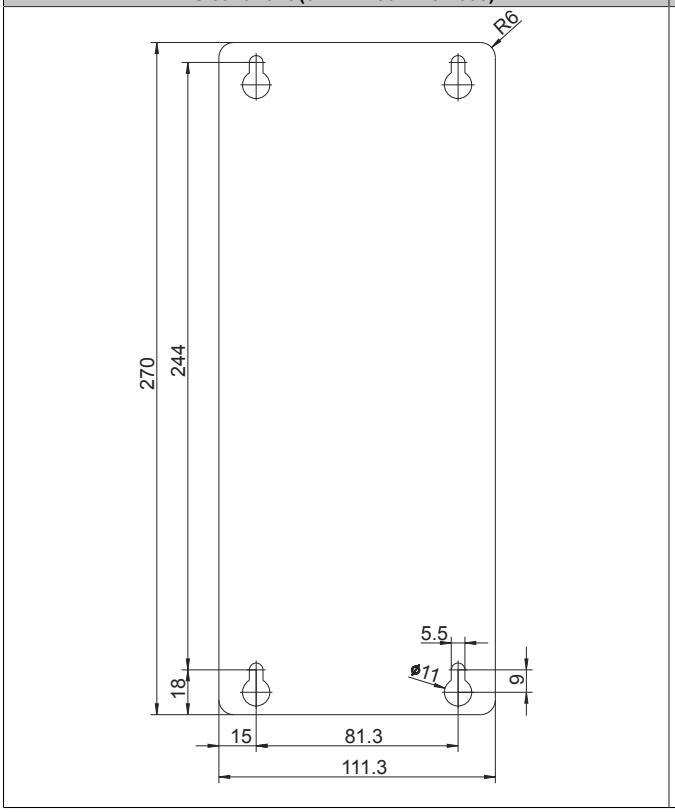
0-slot variant (5APC4100.MB00-000)



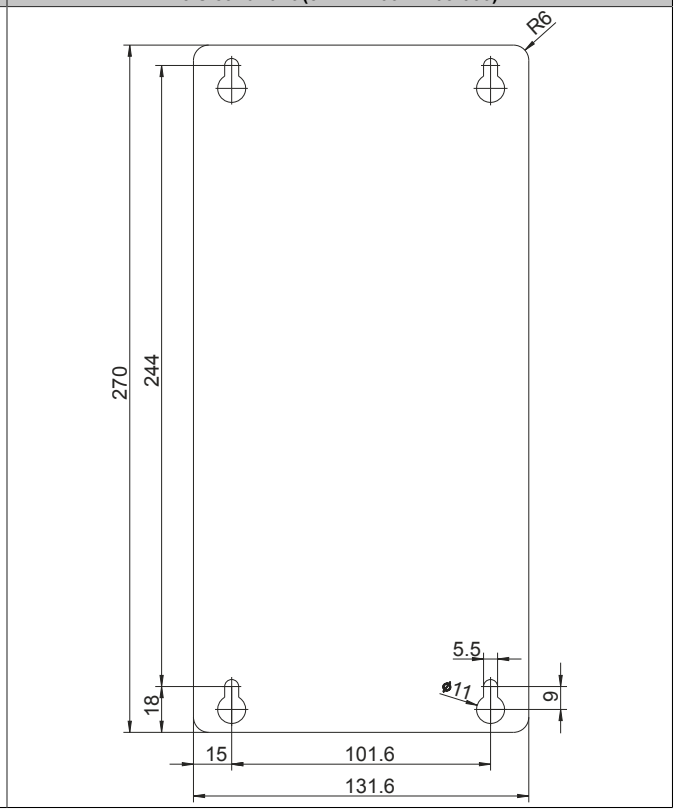
1-slot variant (5APC4100.MB01-000)



2-slot variant (5APC4100.MB02-000)



3-slot variant (5APC4100.MB03-000)



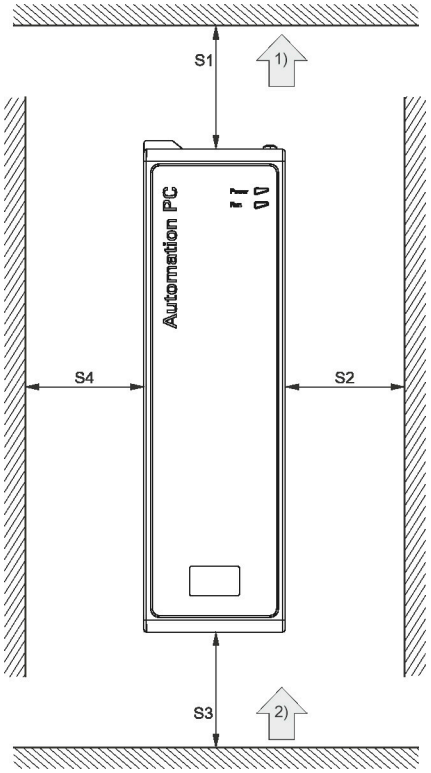
4.1.3.3 Spacing for air circulation

To ensure sufficient air circulation, a specified clearance must be provided above, below, to the side and behind the device. For the minimum specified clearance, see the following diagrams. This is valid for all variants.

It is important to note the following:

- The following distances show only the thermal consideration of the complete system. If additional space is required for operating or servicing the device, this must be taken into account during installation.
- The specified spacing for air circulation is based on worst-case operation at the maximum specified ambient temperature (see "Temperature specifications" in chapter "Technical data").
- If the specified spacing for air circulation cannot be maintained, the maximum specified temperatures of the temperature sensors (see chapter "Technical data") must be monitored by the user and appropriate measures taken if these values are exceeded.
- Spacing at the front must be selected so that the front cover can still be opened.

Book-style installation

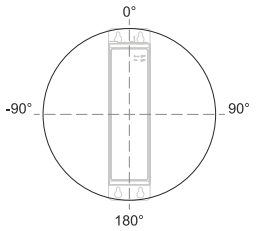
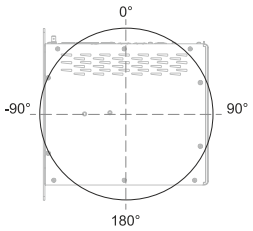


Legend			
1)	Air outlet	2)	Air inlet
Minimum spacing			
Name	Dimension [mm]	Name	Dimension [mm]
S1	≥100	S2	≥50
S3	≥100	S4	≥50

4.1.3.4 Mounting orientations

During installation, it is important to make sure that the spacing as described in section "Spacing for air circulation" on page 21 is observed in order to achieve natural air circulation.

Book-style (standard) - Active cooling (with fan kit)

	Inclination [°]	Derating [°C]	Book style	Inclination [°]	Derating [°C]
	0 to ±5	No limitation		0 to ±5	No limitation
	±5 to ±175	No limitation		5 to 175	No limitation
	-5 to -175	No limitation		-5 to -175	No limitation[1)]
	±175 to 180	No limitation		±175 to 180	No limitation

1) The floor-mounted position is only permissible in conjunction with a fan kit!

4.1.3.5 Weight specifications

Type	Order number	Weight [g]
System units	5APC4100.SX00-000	650
	5APC4100.SX01-000	In preparation
	5APC4100.SX02-000	In preparation
	5APC4100.SX03-000	940
CPU boards	5APC4100.TGL0-000	490
	5APC4100.TGL[1-3]-000	510
Bus units	5APC4100.BX01-00x	In preparation
	5APC4100.BX02-00x	In preparation
	5APC4100.BX03-00x	130
Battery	5ACCBT02.0000-000	12
Heat sink	5APC4100.HS00-000	490
	5APC4100.HS01-000	470
Front cover	5ACCFF04.0000-000x	46
	5ACCFF04.0100-000x	In preparation
	5ACCFF04.0200-000x	In preparation
	5ACCFF04.0300-000x	92
Fan kit	5APC4100.FA00-00x	110
	5APC4100.FA01-00x	In preparation
	5APC4100.FA02-00x	In preparation
	5APC4100.FA03-00x	188
Main memory	5MMDDR.xxxx-0x	10
CFexpress	5CFXPR.xxxG-20	10
Graphics options	5ACCLI02.DPO0-000	30
	5ACCLI05.SDL4-000	In preparation
Interface options	5AC901.I232-00	30
	5AC901.I485-00	34
	5AC901.ICAN-01	33
	5AC901.IRDY-00	30
	5AC901.IPLK-00	35
	5AC901.ISIO-00	30
	5AC901.ISRM-00	20
	5AC901.IETH-00	35
	5ACCIF04.FPLK-000	100
Uninterruptible power supply	5AC901.IUPS-0x	30
Mass storage device - Installation frame [1)]	5APC4100.ISSD-000	In preparation
SSD	5ACCISSD.xxxx-000	60
HDD	5ACCIHDD.xxxx-000	90
SSD/HDD cable set	5APC4100.MMCA-00x	20
M.2 mass storage devices	5ACCMSM2.xxxx-000	40
M.2 mass storage adapter card[1)]	5ACCMS01.MDT2-000	35[1)]
Assembly tools	5APC4100.MB00-000	340
	5APC4100.MB01-000	In preparation
	5APC4100.MB02-000	In preparation
	5APC4100.MB03-000	690

1) Without mass storage device.

4.1.4 Environmental properties

4.1.4.1 Temperature specifications

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

Information:

The maximum specified ambient temperatures for operation with and without a fan kit have been determined under worst-case conditions. Experience has shown that higher ambient temperatures can be achieved with typical applications in Microsoft Windows, for example. The relevant test and assessment must be carried out individually by the user on site (reading out the temperatures in BIOS or using ADI).

Information regarding worst-case conditions of RM590E/HM570E CPU boards

- Thermal Analysis Tool (TAT V02.01.1004) from Intel for simulating 100% processor utilization
- BurnInTest testing tool (BurnIn V10.2 Pro from PassMark Software) for simulating 100% interface load (Ethernet interfaces, memory).
- Maximum expansion and power consumption of the system

4.1.4.1.1 Minimum ambient temperature for worst-case operation

For the minimum ambient temperature in non-condensing operation, taking into account the CPU used, see the following table:

CPU	Min. ambient temperature [°C]
5APC4100.TGL0-000	0
5APC4100.TGL1-000	0
5APC4100.TGL2-000	0
5APC4100.TGL3-000	-25
5APC4100.TGL4-000	-25

4.1.4.1.2 Maximum ambient temperature for worst-case operation

The following temperature tables show the worst case values in active and passive operation under various operating conditions.

The following limitations and information must be taken into account:

- All temperature specifications in degrees Celsius [°C] at 500 m above sea level, **non-condensing**.
- The respective ambient temperature is typically derated 1°C per 1000 meters starting at 500 m above sea level.
- It may be necessary to limit the max. ambient temperature in certain applications (e.g. UL HazLoc) (for additional information, see "International and national certifications" on page 217).
- More information about "power and performance profiles" on page 173.

Active operation with fan kit / Industrial use condition

		CPU boards (5APC4100.TGLx-000)		
		0 (6600HLE 2.1 GHz)	**1** (i3-11100HE 2.4 GHz)	**4** (W-11865MRE 2.6 GHz)
Maximum ambient temperature		**70**	**65**	**60**
System units	5APC4100.SX00-000	✓	✓	✓
	5APC4100.SX01-000		In preparation	
	5APC4100.SX02-000		In preparation	
	5APC4100.SX03-000		In preparation	
Graphics options	5ACCLI02.DPO0-000	✓	✓	✓
	5ACCLI05.SDL4-000	✓	✓	✓
CFexpress cards	5CFXPR.xxxx-20	✓	✓	✓
Mass storage devices	5ACCISSD.xxxx-000	✓	✓	✓
	5ACCIHDD.1024-000	45[1)]	45[1)]	45[1)]
Main memory	5MMDDR.xxxx-0x	✓	✓	✓
Interface options	5AC901.I232-00	✓	✓	✓
	5AC901.I485-00	✓	✓	✓
	5AC901.ICAN-01	✓	✓	✓
	5AC901.IETH-00	✓	✓	✓
	5AC901.IPLK-00		In preparation	
	5AC901.IRDY-00		In preparation	
	5AC901.ISIO-00		In preparation	
	5AC901.ISRM-00		In preparation	
	5AC901.IUPS-0x		In preparation	
	5ACCIF04.FPLK-000		In preparation	
Mass storage options	5ACCMSM2.xxxx-000	60	60	✓

1) Only applicable if 5ACCIHDD.1024-000 is in slot 1 and slot 2 is empty. If slot 2 is occupied, a derating of 10°C must be taken into account.

Active operation with fan kit / Embedded use conditions[2)]

		CPU boards (5APC4100.TGLx-000)		
		0 (6600HLE 2.1 GHz)	**1** (i3-11100HE 2.4 GHz)	**4** (W-11865MRE 2.6 GHz)
Maximum ambient temperature		**65**	**60**	**55**
System units	5APC4100.SX00-000	✓	✓	✓
	5APC4100.SX03-000			
Graphics options	5ACCLI02.DPO0-000	✓	✓	✓
	5ACCLI05.SDL4-000	✓	✓	✓
CFexpress cards	5CFXPR.xxxx-20	✓	✓	✓
Mass storage devices	5ACCISSD.xxxx-000	✓	✓	✓
	5ACCIHDD.1024-000	40[1)]	40[1)]	40[1)]
Main memory	5MMDDR.xxxx-0x	✓	✓	✓
Interface options	5AC901.I232-00	✓	✓	✓
	5AC901.I485-00	✓	✓	✓
	5AC901.ICAN-01	✓	✓	✓
	5AC901.IETH-00	✓	✓	✓
	5AC901.IPLK-00		In preparation	
	5AC901.IRDY-00		In preparation	
	5AC901.ISIO-00		In preparation	
	5AC901.ISRM-00		In preparation	
	5AC901.IUPS-0x		In preparation	
	5ACCIF04.FPLK-000		In preparation	
Mass storage options	5ACCMSM2.xxxx-000	✓	✓	✓

1) Only applicable if 5ACCIHDD.1024-000 is in slot 1 and slot 2 is empty. If slot 2 is occupied, a derating of 10°C must be taken into account.

2) Three embedded use conditions are available: max. system performance (default), max. CPU performance and balanced.

4.1.4.1.3 Determining the ambient temperature

1. Select the system unit.
2. The columns show the maximum and minimum temperature in worst case operation depending on the respective system unit.

   > **Information:**
   >
   > **The maximum and typical temperature specifications correspond to a specification at 500 meters above sea level. The respective ambient temperature is derated approx. 1°C per 1000 meters starting at 500 m above sea level.**

   - If a "✓" (check mark) is entered for the installed component, it can be operated without any problems.
   - If the installed component has a temperature specification (e.g. "45[°C]"), the ambient temperature of the complete system is not permitted to exceed this value.
3. Possible limitations may arise due to the mounting orientation . For additional information, see section Mounting orientations.
4. The relevant test and assessment must be carried out individually by the user on site (reading out the temperatures in BIOS or using ADI).

4.1.4.1.4 Temperature monitoring

Sensors monitor temperature values at various areas in the APC4100. For the position of temperature sensors, see section "Temperature sensor positions" on page 28. The values specified there represent the defined maximum temperature at this measuring point. If the temperature is exceeded, no alarm is triggered.

Temperatures can be read out in different ways in approved operating systems:

- BIOS (see "Mainboard" on page 144)
- ADI
- HMI Service Center
- Automation Runtime library

The CFexpress cards and SSD drives available from B&R are equipped with S.M.A.R.T support[3]. Various parameters (e.g. temperature) can be read out in approved Microsoft Windows or Linux for B&R operating systems.

[3] Self Monitoring, Analysis and Reporting Technology

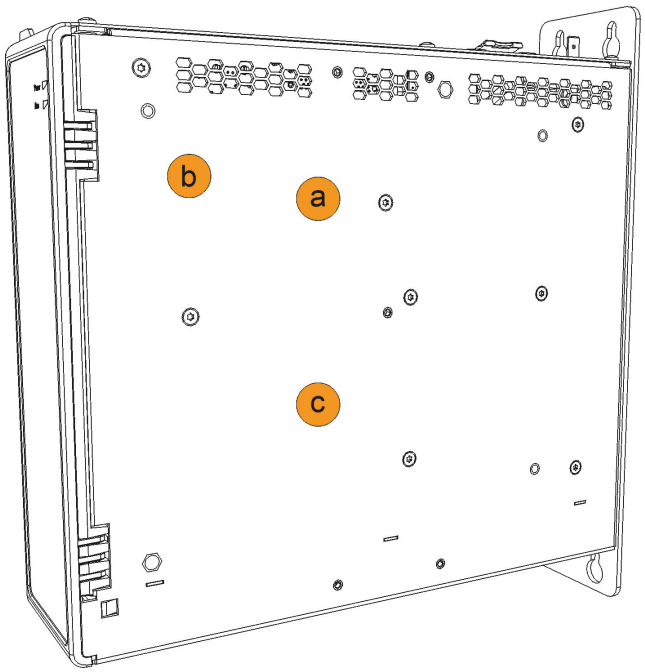
4.1.4.1.5 Ambient temperature for storage and transport

The following table provides an overview of the minimum and maximum ambient temperatures for storing and transporting the complete system. Limitations are possible due to individual components.

System units and components

Type	Order number	Storage [°C]	Transport [°C]
System unit	5APC4100.SX00-000	-20 to 60	-20 to 60
	5APC4100.SX01-000	In preparation	
	5APC4100.SX02-000	In preparation	
	5APC4100.SX03-000	-20 to 60	-20 to 60
CPU boards	5APC4100.TGLx-000	-20 to 60	-20 to 60
Bus units	5APC4100.BX0x-00x	-20 to 60	-20 to 60
Main memory	5MMDDR.8192-05	-20 to 60	-20 to 60
Fan kits	5APC4100.FA0x-00x	-20 to 60	-20 to 60
Mass storage devices	5ACCISSD.xxxx-000	-55 to 95	-55 to 95
	5ACCIHDD.1024-000	-40 to 65	-40 to 65
CFexpress card	5CFXPR.xxxx-20	-40 to 85	-40 to 85
Graphics option	5ACCLI02.DPO0-000	-20 to 60	-20 to 60
	5ACCLI05.SDL4-000	-20 to 60	-20 to 60
Interface option	5AC901.I232-00	-20 to 60	-20 to 60
	5AC901.I485-00	-20 to 60	-20 to 60
	5AC901.ICAN-01	-20 to 60	-20 to 60
	5AC901.IETH-00	-20 to 60	-20 to 60
	5AC901.IPLK-00	-20 to 60	-20 to 60
	5AC901.IRDY-00	-20 to 60	-20 to 60
	5AC901.ISIO-00	-20 to 60	-20 to 60
	5AC901.ISRM-00	-20 to 60	-20 to 60
	5AC901.IUPS-0x	-20 to 60	-20 to 60
	5ACCIF04.FPLK-000	-20 to 60	-20 to 60
Mass storage option	5ACCMSM2.xxxx-000	5 to 95	5 to 95
	5ACCMS01.MDT2-000	5 to 95	5 to 95

4.1.4.1.6 Temperature sensor positions



ADI sensors	Position	Measuring point for	Measurement	Max. specified
System unit sensor 1	a	ETH controller	Temperature of the ETH controller.	90°C
System unit sensor 2	b	CFexpress	Temperature on the CFexpress cards	90°C
System unit sensor 3	c	CPU	Temperature of the CPU processor	95°C

4.1.4.1.7 Fan control

The MTCX constantly monitors the temperature using temperature sensors, which directly determines how the fans are controlled. Their speed depends on the measured temperature. Limit values may depend on the MTCX firmware version being used.

Measuring point for	Switch-on temperature [°C]
ETH controller	70
CFexpress	70
CPU	70
Interface option[1)]	70

1) A temperature sensor is not currently integrated in the interface options.

After the startup temperature is reached, the device is started at the minimum fan speed. The maximum fan speed is reached at a startup temperature of +16°C. The fan speed in this area is controlled depending on the temperature.

The fans will only be shut off again if the evaluation temperature is more than 6°C below the switch-on temperature for a period of 4 hours (overshoot time).

4.1.4.2 Relative humidity

Component	Order number	Operation [%]	Storage [%]	Transport [%]
System units	5APC4100.SX0x-000	5 to 90	5 to 95	5 to 95
CPU boards	5APC4100.TGLx-000	5 to 90	5 to 95	5 to 95
Bus units	5APC4100.BXxx-000	5 to 90	5 to 95	5 to 95
CFexpress cards	5CFXPR.xxxG-20	Max. 85% at 85°C	Max. 85% at 85°C	Max. 85% at 85°C
Main memory	5MMDDR.xxxx-0x	10 to 90	5 to 95	5 to 95
Mass storage devices	5ACCISSD.xxxx-000	5 to 90	5 to 95	5 to 95
	5ACCIHDD.xxxx-000	5 to 90	5 to 95	5 to 95
Graphics options	5ACCLI02.DPO0-000	5 to 90	5 to 95	5 to 95
	5ACCLI05.SDL4-000	5 to 90	5 to 95	5 to 95
Interface options	5AC901.I232-00	5 to 90	5 to 95	5 to 95
	5AC901.I485-00	5 to 90	5 to 95	5 to 95
	5AC901.ICAN-01	5 to 90	5 to 95	5 to 95
	5AC901.IRDY-00	5 to 90	5 to 95	5 to 95
	5AC901.IPLK-00	5 to 90	5 to 95	5 to 95
	5AC901.ISIO-00	5 to 90	5 to 95	5 to 95
	5AC901.ISRM-00	5 to 90	5 to 95	5 to 95
	5AC901.IETH-00	5 to 90	5 to 95	5 to 95
	5ACCIF04.FPLK-000	5 to 90	5 to 95	5 to 95
Mass storage options	5ACCMSM2.xxxx-000	5 to 90	5 to 95	5 to 95
	5ACCMS01.MDT2-000	5 to 90	5 to 95	5 to 95

4.1.4.3 Vibration and shock

The following table provides an overview of the maximum vibrations and shock values of the complete system. Limitations are possible due to individual components.

Vibration				
Automation PC	Operation[1)]		Storage[1)3)]	Transport[1)3)]
	Continuous	Periodic		
With CFexpress card	2 to 9 Hz: 1.75 mm amplitude 9 to 200 Hz: 0.5 g	2 to 9 Hz: 3.5 mm amplitude 9 to 200 Hz: 1 g	2 to 8 Hz: 7.5 mm amplitude 8 to 200 Hz: 2 g 200 to 500 Hz: 4 g	2 to 8 Hz: 7.5 mm amplitude 8 to 200 Hz: 2 g 200 to 500 Hz: 4 g
With SSD drive	In preparation			
With HDD drive[4)]	No vibration or shock permitted			
Shock				
Automation PC	Operation[2)]		Storage[2)3)]	Transport[2)3)]
With CFexpress card	15 g, 11 ms		30 g, 6 ms	30 g, 6 ms
With SSD drive	In preparation			
With HDD drive[4)]	No vibration or shock permitted			

1) Testing is performed per EN 60068-2-6.
2) Testing is performed per EN 60068-2-27.
3) The specification refers to a device in its original packaging.
4) 5ACCIHDD.1024-000 or 5MMHDD.1024-00.

4.1.4.4 Degree of protection

Under the following conditions, the Automation PC 4100 offers IP20 protection per EN 60529:

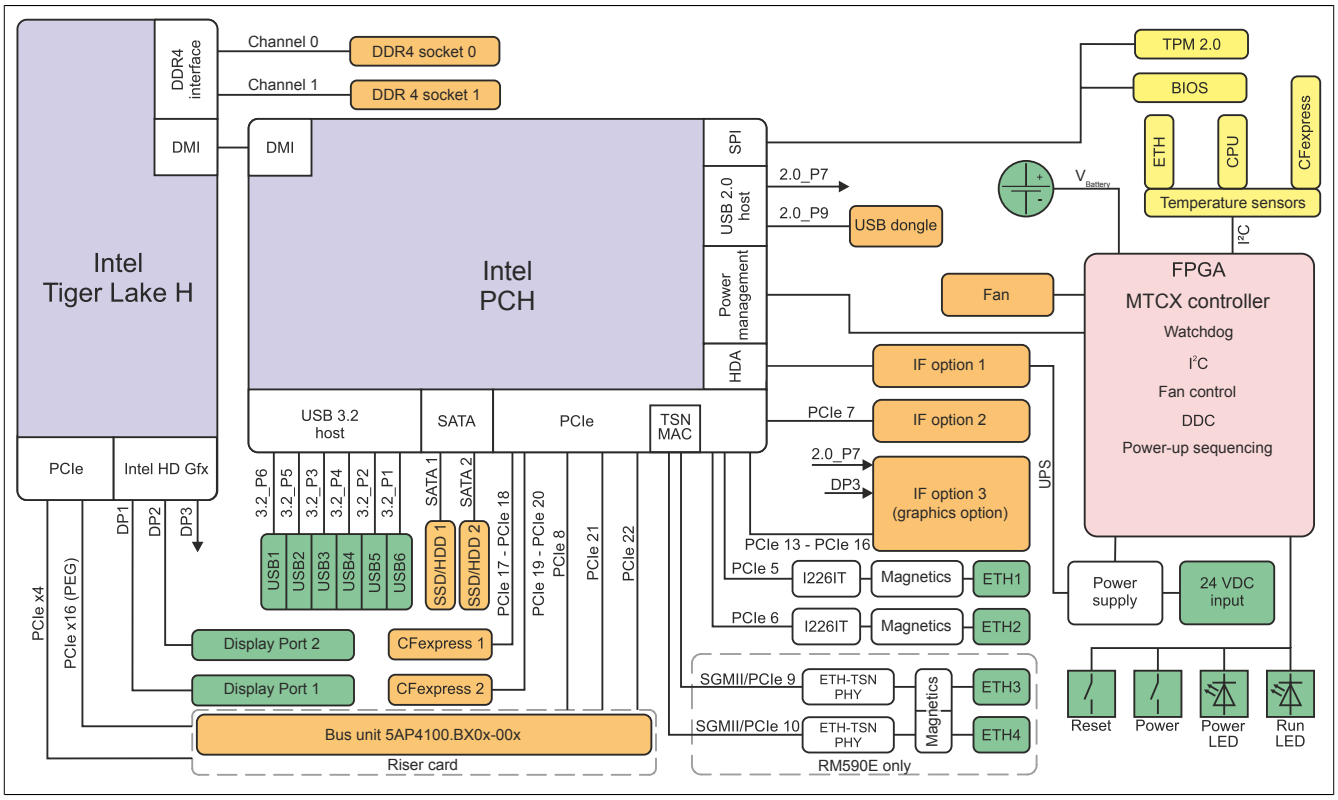
- Correct installation of the Automation PC 4100 (see "Installation and wiring" on page 120)
- Installation of all covers or components on interfaces and slots
- Compliance with all ambient conditions

4.1.5 Electrical properties

4.1.5.1 Block diagrams

The following block diagrams illustrate the simplified structure of system units with a CPU board in relation to the various bus units.

4.1.5.1.1 System unit 5APC4100.SX00-000



Legend			
	Internal interface	2.0_Px	USB 2.0 port x
	External interface	3.2_Px	USB 3.2 port x
	Internal interface, removable/configurable	-	

4.1.5.2 Power management

4.1.5.2.1 Power calculation (5APC4100.SX00-000)

In order to calculate the total power of the Automation PC 4100, the power ratings of the system unit used all other installed components must be added together.

Information:

All values in watts!

The values for the suppliers are maximum values. The values for the consumers are averaged maximum values.

The maximum total power of the power supply unit of 180 watts is not permitted to be exceeded.

The following is important to note:

- For the power ratings of the interface options, see chapter "IF options - Power ratings" on page 32.

Description	CPU board HM570E/RM590E			Current system
	5APC4100.TGL0-000	5APC4100.TGL1-000	5APC4100.TGL4-000	
Total power supply unit +12 V				
Total power supply unit power (maximum)				**180**
Maximum possible				**180**
CPU board, permanent consumers	25	60	62	
Additional power requirements in turbo mode[1)]	0	37	54	
4 GB RAM, each 2.5 W, max. 2 pcs.				
8 GB RAM, each 3 W, max. 2 pcs.				
8 GB RAM ECC, each 3.5 W, max. 2 pcs.				
16 GB RAM, each 3.5 W, max. 2 pcs.				
32 GB RAM, each 4 W, max. 2 pcs.				
Fan kit, optional	5	5	5	
UPS IF option 5AC901.IUPS-00 during operation, optional	30	30	30	
UPS IF option 5AC901.IUPS-01 during operation, optional	25	25	25	
Consumer Σ				
Maximum possible at +5 V				**65**
Drives (SSD/HDD)	4	4	4	
6x USB peripherals, each max. 5 W				
Interface option, optional[2)3)]				
Consumers +5 V Σ				
Maximum possible at 3.3 V				**60**
System unit, permanent consumers	4	6	6	
CFexpress card 60 GB, 2 W				
CFexpress card 120 GB, 2.5 W				
CFexpress card 240 GB, 2.5 W				
CFexpress card 480 GB, 3 W				
Interface option, optional[3)]				
Consumers 3.3 V Σ				
Total power supply unit, consumers Σ				

1) "CPU turbo power limit (PL2)", which can be present for a short time (approx. 10 s) when turbo is enabled, must also be taken into account (to be configured in the BIOS, see "CPU - Power Management Control" on page 151). The specified values refer to BIOS settings with approx. 45 W continuous power (PL1).
2) Max. 2 connectable.
3) Power ratings for the interface options are listed in the table below.

4.1.5.2.2 IF options - Power ratings

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

Component	Order number	+5 V	3V3	12 V	Total power consumption
Interface option					
RS232	5AC901.I232-00	1 W	-	-	1 W
RS485	5AC901.I485-00	1 W	-	-	1 W
CAN	5AC901.ICAN-01	0.5 W	-	-	0.5 W
POWERLINK	5AC901.IPLK-00	-	1.5 W	-	1.5 W
SRAM	5AC901.ISRM-00	-	2 W	-	2 W
Ready relay	5AC901.IRDY-00	0.2 W	-	-	0.2 W
System I/O	5AC901.ISIO-00	-	0.5 W	-	0.5 W
UPS	5AC901.IUPS-00 in standby	-	-	0.1 W	0.1 W
UPS	5AC901.IUPS-01 in standby	-	-	0.1 W	0.1 W
Ethernet	5AC901.IETH-00	-	1 W	-	1 W
POWERLINK	5ACCIF04.FPLK-000	-	1.5 W	-	1.5 W
Graphics options					
DisplayPort transmitter	5ACCLI02.DPO0-000	2.7 W	0.3 W	-	3.0 W
SDL4	5ACCLI05.SDL4-000	2.5 W	2 W	-	4.5 W

4.1.6 Device interfaces and slots

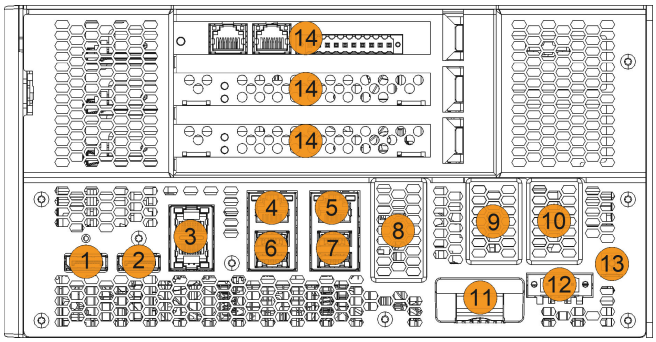
4.1.6.1 Device interfaces - Overview

Information:

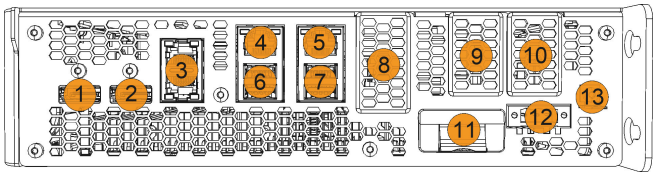
The interfaces available on the device or module are numbered for the purpose of clear differentiation. The numbering used by the operating system may deviate, however.

For all connections, only connections within a building are permitted, taking into account maximum lengths.

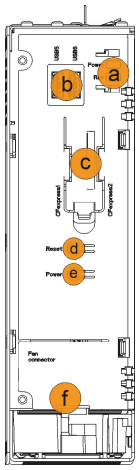
Top interfaces (3-slot)



Top interfaces (0-slot)



Front interfaces



Legend			
1	"DisplayPort interfaces" on page 35	a	"LED status indicators" on page 41
2		b	"USB interfaces" on page 37
3[1)]	"Ethernet interfaces" on page 36	c	"CFexpress slots" on page 38
4		d	"Reset button" on page
5		e	"Power button" on page 42
6	"USB interfaces" on page 37	f	Connection/Slot fan
7		-	
8	"IF option 3 slot" on page 39		
9	"IF option 1 slot" on page 39		
10	"IF option 2 slot" on page 39		
11	"Battery" on page 42		
12	"+24 VDC power supply" on page 34		
13	"Grounding" on page 34		
14	Card slot (PCI/PCIe)		

1) These interfaces are not available for a configuration with CPU board 5APC4100.TGL0-000.

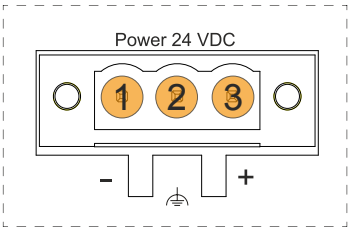
4.1.6.2 +24 VDC power supply

Danger!

This device is only permitted to be supplied with a SELV/PELV power supply unit or with safety extra-low voltage (SELV) per IEC 61010-2-201.

The necessary 3-pin connector is not included in delivery; for suitable accessories, see "0TB103.9x" on page 211.

The device is protected against overload and reverse polarity by a soldered fuse (20 A, fast-acting). If the fuse is defective (e.g. due to overload), the device must be sent to B&R for repairs. If the polarity is reversed, it is not necessary to replace the fuse.

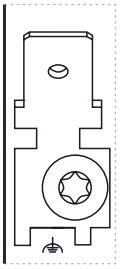
Pin	Description	Figure
1	-	
2	Functional ground	
3	+	
• Reverse polarity protection • 3-pin • Male		
Electrical properties		
Nominal voltage		24 VDC ±25%, SELV/PELV[1)]
Nominal current		Max. 8 A[2)]
Overvoltage category per EN 61131-2		II
Inrush current[2)]		Max. 60 A for < 300 µs[3)]
Galvanic isolation		Yes
Uninterruptible power supply		No

1) IEC 61010-2-201 requirements must be observed.
2) Maximum possible current consumption at 24 V with 180 W. This may vary depending on the configuration (see Power management). The inrush current must also be taken into account when selecting the power supply unit.
3) U_{in} = 24 VDC

4.1.6.3 Grounding

Caution!

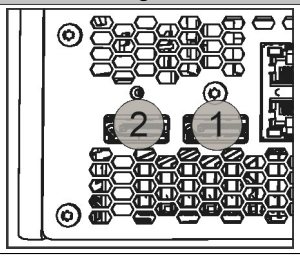
The functional ground (power supply pin 2 and ground connection) must be connected to the central grounding point (e.g. control cabinet or system) via the shortest possible path with the lowest possible resistance and with the largest possible wire cross section. This type of grounding is mandatory for proper functionality.



For example, a copper strip must be attached to the ground connection at a central grounding point of the control cabinet or system in which the device is installed. The line cross section should be as large as possible (at least 2.5 mm²).

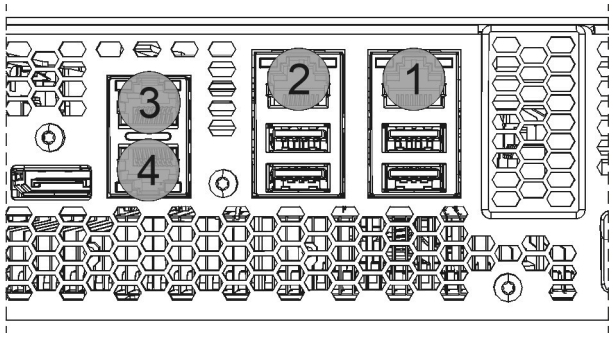
4.1.6.4 DisplayPort interfaces

The APC4100 has 2 DisplayPort 1.2 interfaces.

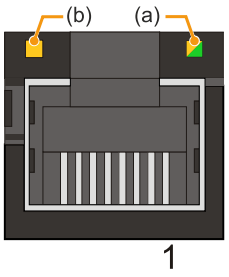
Description		Figure
Variant	DP 1.2, female	
Transmission technology	DisplayPort, DVI, HDMI	
Resolution	Max. 4K, 60 Hz, HDR	
Cable length	Depends on the resolution and refresh rate	
Available video signals	DisplayPort, DVI, HDMI	
-		

4.1.6.5 Ethernet interfaces

The APC4100 has four TSN-capable Ethernet interfaces.

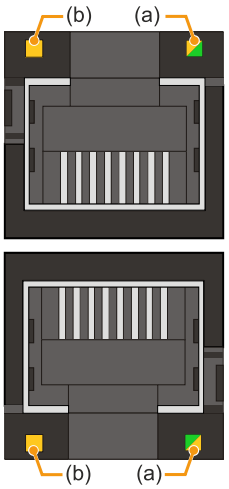


ETH1, 2

Description			Image
Variant	RJ45, female		
Controller			
ETH1	Intel i226-IT		
ETH2	Intel i226-IT		
Wiring	S/STP (Cat 5e)		
Transfer rate	10/100/1000/2500 Mbit/s[1)]		
Cable length	Max. 100 m (min. Cat 5e)		
LED "Speed" (a)	**On**	**Off**	
Green	2500 Mbit/s	100/10 Mbit/s[2)]	
Orange (dark)	1000 Mbit/s	-	
LED "Link" (b)	**On**	**Off**	
Orange (light)	Link (a connection to an Ethernet network exists)	Blinking (data being transferred)	

1) Switching takes place automatically.
2) The 10/100 Mbit/s transfer rate / connection is only available if LED "Link" is active at the same time.

ETH3, 4[4)5)]

Description			Image
Variant	RJ45, female		
Controller			
ETH3	Intel PCH integrated TSN controller		
ETH4	Intel PCH integrated TSN controller		
Wiring	S/STP (Cat 5e)		
Transfer rate	10/100/1000 Mbit/s[1)]		
Cable length	Max. 100 m (min. Cat 5e)		
LED "Speed" (a)	**On**	**Off**	
Green	100 Mbit/s	10 Mbit/s[2)]	
Orange (dark)	1000 Mbit/s	-	
LED "Link" (b)	**On**	**Off**	
Orange (light)	Link (a connection to an Ethernet network exists)	Blinking (data being transferred)	

1) Switching takes place automatically.
2) The 10/100 Mbit/s transfer rate / connection is only available if LED "Link" is active at the same time.

Driver support

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

> **Information:**
>
> **Necessary drivers must be downloaded from the B&R website, not from manufacturer websites.**

4) These interfaces are not available for a configuration with CPU board 5APC4100.TGL0-000.

5) The data lines of ETH3 and EH4 are isolated against shield, but not against each other.

4.1.6.6 USB interfaces

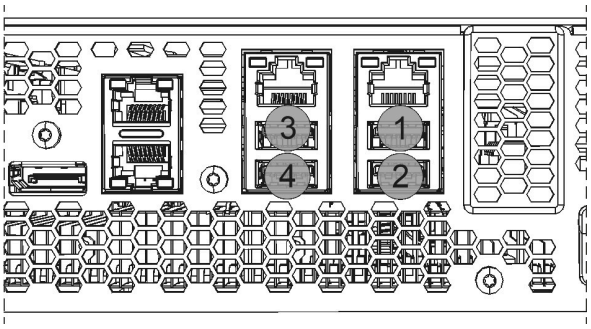
APC4100 devices are equipped with a Universal Serial Bus (USB) 3.2 host controller with several USB ports, of which 6 USB interfaces are routed externally and freely available to the user. An additional USB 2.0 interface located inside the device (internal USB interface).

Warning!

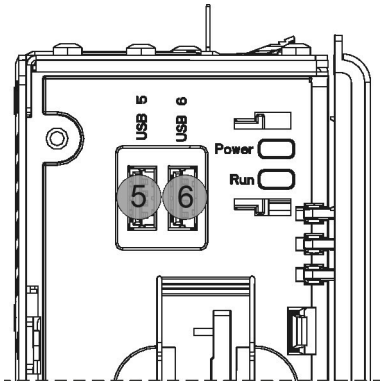
USB peripheral devices can be connected to the USB interfaces. Due to the variety of USB devices available on the market, B&R cannot guarantee their functionality. The functionality of USB devices available from B&R is ensured.

Caution!

Due to the general PC specification, this interface must be handled with the utmost care with regard to EMC, cable routing, etc.

USB1-4		
Description		**Figure**
Type	USB 3.2 Gen2	
Variant	Type A, female	
Transfer rate	Low speed (1.5 Mbit/s) Full speed (12 Mbit/s) High speed (480 Mbit/s) SuperSpeed+ (5 Gbit/s and 10 Gbit/s)	
Current-carrying capacity[1)]	Max. 1 A per USB	
Cable length		
USB 2.0	Max. 5 m (without hub)	
USB 3.0	Max. 3 m (without hub)	
-		

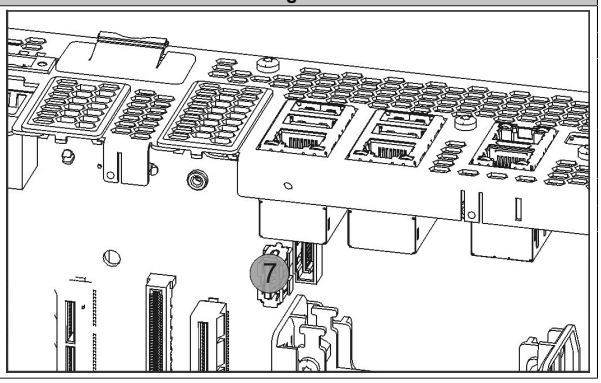
1) Each USB interface is protected by a maintenance-free "USB current-limiting switch" (max. 1 A).

Front USB 5 - 6		
Description		**Figure**
Type	USB 3.2 Gen2	
Variant	Type A, female	
Transfer rate	Low speed (1.5 Mbit/s) Full speed (12 Mbit/s) High speed (480 Mbit/s) SuperSpeed+ (5 Gbit/s and 10 Gbit/s)	
Current-carrying capacity[1)]	Max. 1 A	
Cable length		
USB 2.0	Max. 5 m (without hub)	
USB 3.0	Max. 3 m (without hub)	
-		

1) It is important to note that the front USB interfaces have a common current load of max. 1 A. This can either be used entirely by one connection or split between both connections.

Internal USB interface (USB 7)	
Description	
Type	USB 2.0
Variant	Type A, female
Transfer rate	Low speed (1.5 Mbit/s) Full speed (12 Mbit/s) High speed (480 Mbit/s)
Current-carrying capacity	Max. 0.5 A
Cable length	
USB 2.0	Only for Technology Guard
-	

Figure

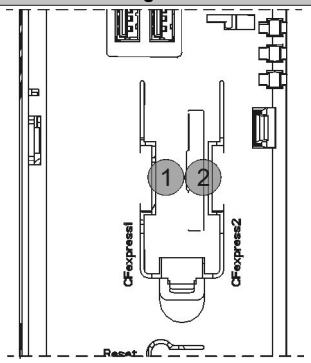


4.1.6.7 CFexpress slots

The Automation PC offers easily accessible CFexpress slots (internally connected to the chipset via PCIe) so that the CFexpress card can also be used as a removable storage medium for data transfer or upgrades.

Description	
Variant	Type B
Standard	PCIe Gen3 x2
Form factor [mm]	38.5 x 29.8 x 3.8
RAID functionality	No
Connection	
CFexpress slot 1	PCIe Gen3 x 2 lanes
CFexpress slot 2	PCIe Gen3 x 2 lanes
CFexpress cards	
"Order data" on page 79	
-	

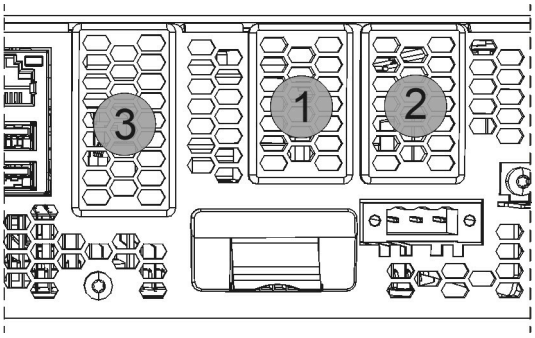
Figure



4.1.6.8 IF options

APC4100 system units have 3 slots for interface options:

- IF option 1 slot
- IF option 2 slot
- IF option 3 slot



Information:

For information about replacing or installing an interface option, see section "Installing the interface option" on page 200.

4.1.6.8.1 IF option 1 slot

Order number	Interface option - Short description
5AC901.I232-00	Interface card - 1x RS232 interface - For APC910/PPC900/APC3100/PPC3100/APC4100
5AC901.I485-00	Interface card - 1x RS232/422/458 interface - For APC910/PPC900/APC3100/PPC3100/APC4100
5AC901.ICAN-01[1)]	Interface card - 1x CAN interface (SJA1000) - For APC910/PPC900/APC3100/PPC3100/APC4100
5AC901.IRDY-00	Interface card - Ready relay - For APC910/PPC900/APC3100/PPC3100/APC4100
5AC901.ISIO-00	Interface card - System I/O - For APC910/PPC900/APC3100/PPC3100/APC4100
5AC901.IUPS-00[3)]	UPS - For 4.5 Ah battery
5AC901.IUPS-01	UPS - For 2.2 Ah battery

1) Simultaneous operation of 2 5AC901.ICAN-xx CAN options in the IF option 1 and IF option 2 slots is not possible.
2) UPS IF option 5AC901.IUPS-00 is only permitted to be operated with battery unit 5AC901.BUPS-00!
3) UPS IF option 5AC901.IUPS-01 is only permitted to be operated with battery unit 5AC901.BUPS-01!

4.1.6.8.2 IF option 2 slot

Order number	Interface option - Short description
5AC901.I232-00	Interface card - 1x RS232 interface - For APC910/PPC900/APC3100/PPC3100/APC4100
5AC901.I485-00	Interface card - 1x RS232/422/458 interface - For APC910/PPC900/APC3100/PPC3100/APC4100
5AC901.ICAN-01[1)]	Interface card - 1x CAN interface (SJA1000) - For APC910/PPC900/APC3100/PPC3100/APC4100
5AC901.IETH-00	Interface card - 1x ETH 10/100/1000 - For APC910/PPC900/APC3100/PPC3100/APC4100
5AC901.IPLK-00	Interface card - 1x POWERLINK interface - 2 MB SRAM - For APC910/PPC900/APC3100/PPC3100/APC4100
5AC901.ISRM-00	Interface card - 2 MB SRAM - For APC910/PPC900/APC3100/PPC3100/APC4100
5AC901.IRDY-00	Interface card - Ready relay - For APC910/PPC900/APC3100/PPC3100/APC4100
5AC901.ISIO-00	Interface card - System I/O - For APC910/PPC900/APC3100/PPC3100/APC4100

1) Simultaneous operation of 2 5AC901.ICAN-xx CAN options in the IF option 1 and IF option 2 slots is not possible.

4.1.6.8.3 IF option 3 slot

Order number	Interface option - Short description
5ACCLI02.DPO0-000	Graphics option - 1x DisplayPort transmitter (version 1.2)
5ACCLI05.SDL4-000[1)]	Smart Display Link 4
5ACCIF04.FPLK-000	Interface card - 1x POWERLINK interface
5ACCMS01.MDT2-000[1)]	Adapter card for M.2 mass storage

1) Mounting bracket 5ACCMBMS.0000-000 is required for the 1- to 3-slot variants.

4.1.6.9 Card slot (PCI/PCIe)

Standard PCI 2.2 half-size cards or PCI Express (PCIe) half-size cards can be installed depending on the bus unit variant. They are not permitted to exceed the following dimensions.

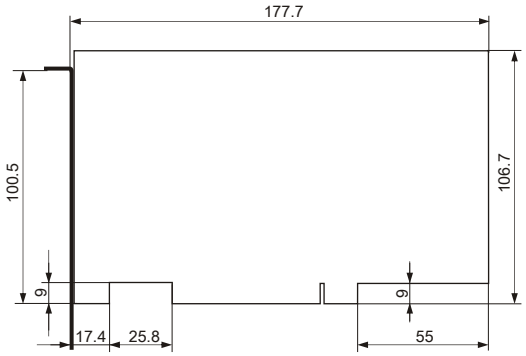


Figure 1: Standard half-size 32-bit PCI card - Dimensions

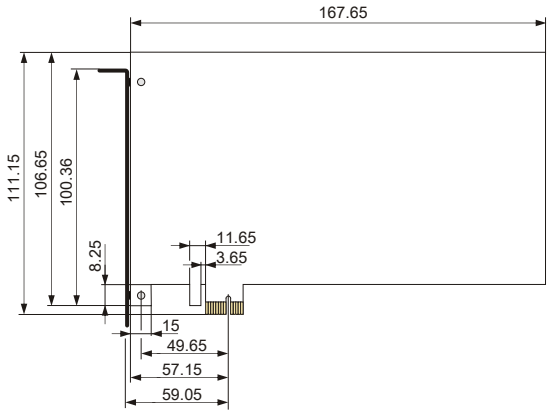


Figure 2: Standard half-size PCIe card - Dimensions

Information:

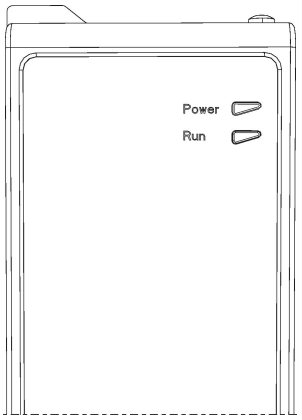
For information about replacing or installing a PCI/PCIe card, see section "Installing PCI/PCIe cards" on page 204.

4.1.6.10 LED status indicators

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

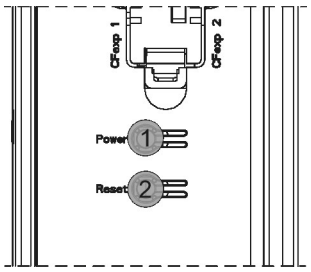
The following intervals are used for the LED status indicators:

- Width of box: 250 ms
- Repeat interval: 500 ms. 2 boxes thus correspond to one interval.

Assignment	LED	Color	Status	Explanation	LED status indicators
	**Power**	Green	On	Power supply OK	
			Blinking	The device is started up; the battery state is "BAD".	
				Information: **For additional information, see "Battery" on page 42.**	
		Red	On	The system is in power saving (standby) mode (S5: soft-off mode or S4: hibernate/suspend-to-disk mode).	
			Blinking	The MTCX is running; the battery state is "BAD". The system is in power saving (standby) mode (S5: soft-off mode or S4: hibernate/suspend-to-disk mode).	
		Red-Green	Blinking	Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery state OK, power supply OK	
				Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery state OK, power saving (standby) mode (S5: soft-off mode or S4: hibernate/suspend-to-disk mode)	
				Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery state BAD, power supply OK	
				Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery state BAD, power saving (standby) mode (S5: soft-off mode or S4: hibernate/suspend-to-disk mode)	
				Information: **An update must be performed again.**	
		Yellow	On	Power supply not OK. The system is running in UPS mode.	
	Run	Green	Blinking	Automation Runtime is starting up. Controlled by Automation Runtime (ARemb).	
		Green	On	Application running Controlled by Automation Runtime (ARemb).	
		Red	On	Application in mode Service or Diagnostics Controlled by Automation Runtime (ARemb).	
		Orange	Blinking	A license violation has occurred.	

4.1.6.11 Power button / Reset button

Due to full ATX power supply unit support, the power button has various functions.

Description	
Reset button (1)	
Pressing the reset button triggers a hardware/PCI reset. The PC is restarted. During a reset, the MTCX processor is not reset.	
Power button (2)	
The power button offers full ATX power supply unit support and has various configurable functions. • **Short press:** Switches the PC on or off or performs the action configured in the operating system when pressing the power button (shutdown, sleep, etc.). • **Long press (approx. 4 s)**: The ATX power supply unit switches off the PC without shutting it down. Pressing the power button does not reset the MTCX processor.	

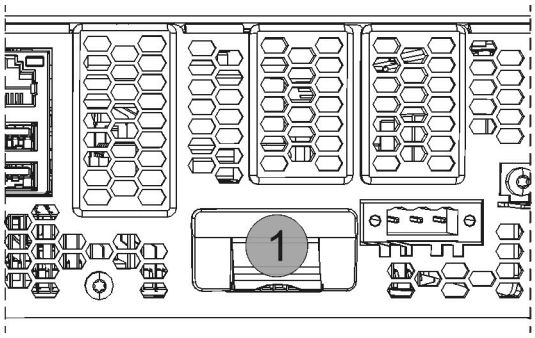
Warning!

Switching off the power without shutting down or resetting the system can result in data loss!

4.1.6.12 Battery

The lithium battery (3 V, 1000 mAh) ensures retention of the internal real-time clock (RTC), CMOS data and remanent data of IF options with SRAM. The service life of the battery is at least 8 years[1)]. The battery is subject to wear and should be replaced regularly (after the specified service life at the latest) (see "Changing the battery" on page 194).

Battery	
Type	Panasonic 3 V, 1000 mAh
Removable	Yes, accessible from the outside
Service life	8 years[1)]
Order number	**Short description**
	Batteries
5ACCBT02.0000-000	APC4100 battery compartment including battery
"Replacement parts and sets" on page 210	



1) At 40°C, 6 µA for the components being supplied. If an interface option with SRAM or POWERLINK is installed, the service life is reduced.

The battery state is determined by the system immediately after the device is switched on and subsequently every 24 hours. During the measurement, the battery is subjected to a brief load (approx. 1 second) and then assessed. The determined battery state is displayed on the BIOS Setup screens (Advanced - OEM features - "Mainboard" on page 144) and via ADI.

Battery state	Explanation
N/A	The hardware or firmware used is too old and does not support readout.
GOOD	Data retention is ensured.
BAD	As soon as the battery capacity is recognized as BAD (insufficient), retention of data is ensured for approximately another 500 hours. The battery must be replaced.

When changing the battery, data is retained for approximately 5 minutes by a gold foil capacitor.

4.1.6.13 Trusted Platform Module (TPM)

A Trusted Platform Module (TPM 2.0) is located on the system unit. A TPM is an additional chip integrated directly into the system hardware that adds important safety functions to the device. In particular, the TPM enables improved protection of the PC against unauthorized tampering by third parties. These safety functions are supported by current operating systems, such as Windows 10.

Enabling the Trusted Platform Module

The TPM is disabled by default and can be enabled in BIOS menu "Setup utility" under "Security". In addition, parameter "Platform Trust Technology" must be disabled under "Advanced - Chipset configuration". Follow the instructions in BIOS Setup.

Information:

Before enabling the TPM, possible country-specific usage restrictions or regulations must be checked.

Using the Trusted Platform Module

The TPM can be used together with the drive encryption *BitLocker* in Windows 10, for example. To do this, follow the instructions in the operating system.

Information:

If the password for data encryption is lost, it is not possible to decrypt the data, e.g. after a BIOS update or TPM firmware update. Access to the encrypted drive is lost. Passwords must be carefully stored and protected from unauthorized access.

4.2 Individual components

4.2.1 System units

The APC4100 slot variants form the basis for all individual components and equipment variants. The interfaces are always easily accessible on the front behind the front cover or on the top. 0 to 3 slots are available depending on the selected configuration.

4.2.1.1 5APC4100.SX00-000

4.2.1.1.1 General information

The 0-slot variant of the Automation PC 4100 is configurable with CPU board, heat sink, etc. Several interfaces are included, and 3 interface options can be additionally installed. For additional information about the configuration, see "Design/Configuration" on page 11.

- Intel Core i-series processors
- DDR4 memory
- 2 DisplayPort interfaces
- 2 CFexpress slots
- Slots for 3 interface options

4.2.1.1.2 Order data

Order number	Short description	Figure
	System units	
5APC4100.SX00-000	0-slot APC4100 system unit	
	Required accessories	
	Accessories	
0TB103.9	Connector 24 VDC - 3-pin, female - Screw clamp terminal block 3.31 mm²	
0TB103.91	Connector 24 VDC - 3-pin, female - Cage clamp terminal block 3.31 mm²	
	Battery tray	
5ACCBT02.0000-000	Battery compartment - Including battery - For APC4100	
	CPU boards	
5APC4100.TGL0-000	CPU board Intel Celeron 6600HLE - Dual core - HM570E chipset - 2.1 GHz active, 2.1 GHz passive - For APC4100	
5APC4100.TGL1-000	CPU board Intel Core i3 11100HE - Quad core - RM590E chipset - 2.4 GHz active, x.x GHz passive - For APC4100	
5APC4100.TGL2-000	CPU board Intel Core i5 11500HE - Hexa core - RM590E chipset - 2.6 GHz active - For APC4100	
5APC4100.TGL3-000	CPU board Intel Xeon 11155MRE - Quad core - RM590E chipset - 2.4 GHz active, x.x GHz passive - For APC4100	
5APC4100.TGL4-000	CPU board Intel Xeon 11865MRE - Octa core - RM590E chipset - 2.6 GHz active - For APC4100	
	Front cover	
5ACCFF04.0000-000	Front cover 0-slot APC4100 - Orange	
5ACCFF04.0000-001	Front cover for 0-slot APC4100 - Dark gray	
	Heat sink	
5APC4100.HS00-000	APC4100 heat sink, active	
5APC4100.HS01-000	APC4100 heat sink, passive	
	Installation options	
5APC4100.MB00-000	APC4100 Montagehilfe - Book Style 0-Slot	
	Main memory	
5MMDDR.016G-05	SO-DIMM DDR4, 16384 MB	
5MMDDR.032G-05	SO-DIMM DDR4, 32768 MB	
5MMDDR.4096-05	SO-DIMM DDR4, 4096 MB	
5MMDDR.8192-05	SO-DIMM DDR4, 8192 MB	
5MMDDR.8192-06	SO-DIMM DDR4 ECC, 8192 MB	
	Optional accessories	
	CFexpress cards	
5CFXPR.060G-20	CFexpress 60 GB TLC	
5CFXPR.120G-20	CFexpress 120 GB TLC	
5CFXPR.240G-20	CFexpress 240 GB TLC	
5CFXPR.480G-20	CFexpress 480 GB TLC	
	Fan kits	
5APC4100.FA00-000	APC4100 fan kit - For 5APC4100.SX00-00 - Includes air filter	
5APC4100.FA00-001	APC4100 fan kit - For 5APC4100.SX00-00 - Excludes air filter	
	Graphics options	
5ACCLI02.DPO0-000	Graphics option - 1x DisplayPort transmitter (version 1.2) - For APC3100/PPC3100/APC4100	
5ACCLI05.SDL4-000	Graphics option - 1x SDL4 transmitter - For APC4100	
	Interface options	
5AC901.I232-00	Interface card - 1x RS232 interface - For APC910/PPC900/APC3100/PPC3100/APC4100	
5AC901.I485-00	Interface card - 1x RS232/RS422/RS485 interface - For APC910/PPC900/APC3100/PPC3100/APC4100	
5AC901.ICAN-01	Interface card - 1x CAN interface (SJA1000) - For APC910/PPC900/APC3100/PPC3100/APC4100	
5AC901.IETH-00	Interface card - 1x ETH 10/100/1000 - For APC910/PPC900/APC3100/PPC3100/APC4100	
5AC901.IPLK-00	Interface card - 1x POWERLINK interface - 2 MB SRAM - For APC910/PPC900/APC3100/PPC3100/APC4100	
5AC901.IRDY-00	Interface card - Ready relay - For APC910/PPC900/APC3100/PPC3100/APC4100	
5AC901.ISIO-00	Interface card - System I/O - For APC910/PPC900/APC3100/PPC3100/APC4100	
5AC901.ISRM-00	Interface card - 2 MB SRAM - For APC910/PPC900/APC3100/PPC3100/APC4100	
5ACCIF04.FPLK-000	Interface card - 1x POWERLINK interface - For APC3100/PPC3100/APC4100	
	Mass storage	
5ACCIHDD.1024-000	1 TB hard disk - Slide-in compact - SATA	
5ACCISSD.001T-000	1 TB SSD MLC - Slide-in compact - SATA	
5ACCISSD.128G-000	128 GB SSD MLC - Slide-in compact - SATA	
5ACCISSD.256G-000	256 GB SSD MLC - Slide-in compact - SATA	
5ACCISSD.512G-000	512 GB SSD MLC - Slide-in compact - SATA	
	Mass storage options	

Order number	Short description	Figure
5ACCMS01.MDT2-000	Adapter card for M.2 mass storage device - For APC3100/ PPC3100/APC4100	
5ACCMSM2.0512-000	512 GB M.2 SSD MLC - Innodisk - SATA	
5ACCMSM2.1024-000	1 TB M.2 SSD MLC - Innodisk - SATA	
	Uninterruptible power supply	
5AC901.IUPS-00	UPS - For 4.5 Ah battery	
5AC901.IUPS-01	UPS - For 2.2 Ah battery	

4.2.1.1.3 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5APC4100.SX00-000
General information	
LEDs	Power, Run
B&R ID code	0x2D1D
Cooling	Passive via heat sink and optionally supported with an active fan kit
Power button	Yes
Reset button	Yes
Certifications	
CE	Yes
UL	In preparation
Controller [1]	
Bootloader	UEFI BIOS
Slots	
Interface option	3
Add-on UPS slot	Yes [2]
Slot for fan kit	Yes
Electrical properties	
Nominal voltage	24 VDC ±25%, SELV [3]
Nominal current	Max. 8 A [4]
Inrush current	Max. 60 A for < 300 µs [5]
Overvoltage category per EN 61131-2	II
Galvanic isolation	Yes
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	IP20 [6]
Ambient conditions	
Temperature	
Operation	Component-dependent [7]
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	Component-dependent
Storage	Component-dependent
Transport	Component-dependent
Vibration [8]	
Operation (continuous)	2 to 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 [8]	
Operation	15 g, 11 ms
Storage	30 g, 6 ms
Transport	30 g, 6 ms
Elevation	
Operation	-300 to 3000 m above sea level [9]
Mechanical properties	
Housing [10]	
Material	EN AW-5754
Coating	Anthracite gray
Dimensions	
Width	65 mm
Height	222 mm
Depth	258 mm
Weight	647 g

1) For detailed information about the controller and interfaces, see *Technical data / Individual components / CPU boards*.
2) The UPS module can only be operated in the IF option 1 slot.
3) IEC 61010-2-201 requirements must be observed (see section "Power supply" in the user's manual).
4) Maximum possible current consumption at 24 V with 180 W. This may vary depending on the configuration (see section "Power management"). The inrush current must also be taken into account when selecting the power supply unit.
5) U_{in} = 24 VDC
6) Only when all interface covers and the front cover are installed.
7) For detailed information, see the temperature tables in the user's manual.
8) Maximum values unless specified otherwise by another individual component.
9) The maximum ambient temperature is typically derated 1°C per 1000 meters starting at 500 m above sea level.
10) Visual deviations in color and surface quality are possible due to process or batch conditions.

4.2.1.2 5APC4100.SX01-000

4.2.1.2.1 General information

The 1-slot variant of the Automation PC 4100 is configurable with CPU board, heat sink, etc. Several interfaces are included, and 3 interface options can be additionally installed. For additional information about the configuration, see "Design/Configuration" on page 11.

- Intel Core i-series processors
- DDR4 memory
- 2 DisplayPort interfaces
- 2 CFexpress slots
- Slots for 3 interface options

4.2.1.2.2 Order data

Order number	Short description	Figure
	System units	
5APC4100.SX01-000	1-slot APC4100 system unit	
	Required accessories	
	Accessories	
0TB103.9	Connector 24 VDC - 3-pin, female - Screw clamp terminal block 3.31 mm²	
0TB103.91	Connector 24 VDC - 3-pin, female - Cage clamp terminal block 3.31 mm²	
	Battery tray	
5ACCBT02.0000-000	Battery compartment - Including battery - For APC4100	
	Bus units	
5APC4100.BX01-000	APC4100 with 1-slot bus - 1 PCI	
5APC4100.BX01-001	APC4100 with 1-slot bus - 1 PCIe x16	
	CPU boards	
5APC4100.TGL0-000	CPU board Intel Celeron 6600HLE - Dual core - HM570E chipset - 2.1 GHz active, 2.1 GHz passive - For APC4100	
5APC4100.TGL1-000	CPU board Intel Core i3 11100HE - Quad core - RM590E chipset - 2.4 GHz active, x.x GHz passive - For APC4100	
5APC4100.TGL2-000	CPU board Intel Core i5 11500HE - Hexa core - RM590E chipset - 2.6 GHz active - For APC4100	
5APC4100.TGL3-000	CPU board Intel Xeon 11155MRE - Quad core - RM590E chipset - 2.4 GHz active, x.x GHz passive - For APC4100	
5APC4100.TGL4-000	CPU board Intel Xeon 11865MRE - Octa core - RM590E chipset - 2.6 GHz active - For APC4100	
	Front cover	
5ACCFF04.0100-000	Front cover 1-slot APC4100 - Orange	
5ACCFF04.0100-001	Front cover for 1-slot APC4100 - Dark gray	
	Heat sink	
5APC4100.HS00-000	APC4100 heat sink, active	
5APC4100.HS01-000	APC4100 heat sink, passive	
	Installation options	
5APC4100.MB01-000	APC4100 Montagehilfe - Book Style 1-Slot	
	Main memory	
5MMDDR.016G-05	SO-DIMM DDR4, 16384 MB	
5MMDDR.032G-05	SO-DIMM DDR4, 32768 MB	
5MMDDR.4096-05	SO-DIMM DDR4, 4096 MB	
5MMDDR.8192-05	SO-DIMM DDR4, 8192 MB	
5MMDDR.8192-06	SO-DIMM DDR4 ECC, 8192 MB	
	Optional accessories	
	CFexpress cards	
5CFXPR.060G-20	CFexpress 60 GB TLC	
5CFXPR.120G-20	CFexpress 120 GB TLC	
5CFXPR.240G-20	CFexpress 240 GB TLC	
5CFXPR.480G-20	CFexpress 480 GB TLC	
	Fan kits	
5APC4100.FA01-000	APC4100 fan kit - For 5APC4100.SX01-00 - Includes air filter	
5APC4100.FA01-001	APC4100 fan kit - For 5APC4100.SX01-00 - Excludes air filter	
	Graphics options	
5ACCLI02.DPO0-000	Graphics option - 1x DisplayPort transmitter (version 1.2) - For APC3100/PPC3100/APC4100	
5ACCLI05.SDL4-000	Graphics option - 1x SDL4 transmitter - For APC4100	
	Interface options	
5AC901.I232-00	Interface card - 1x RS232 interface - For APC910/PPC900/APC3100/PPC3100/APC4100	
5AC901.I485-00	Interface card - 1x RS232/RS422/RS485 interface - For APC910/PPC900/APC3100/PPC3100/APC4100	
5AC901.ICAN-01	Interface card - 1x CAN interface (SJA1000) - For APC910/PPC900/APC3100/PPC3100/APC4100	
5AC901.IETH-00	Interface card - 1x ETH 10/100/1000 - For APC910/PPC900/APC3100/PPC3100/APC4100	
5AC901.IPLK-00	Interface card - 1x POWERLINK interface - 2 MB SRAM - For APC910/PPC900/APC3100/PPC3100/APC4100	
5AC901.IRDY-00	Interface card - Ready relay - For APC910/PPC900/APC3100/PPC3100/APC4100	
5AC901.ISIO-00	Interface card - System I/O - For APC910/PPC900/APC3100/PPC3100/APC4100	
5AC901.ISRM-00	Interface card - 2 MB SRAM - For APC910/PPC900/APC3100/PPC3100/APC4100	
5ACCIF04.FPLK-000	Interface card - 1x POWERLINK interface - For APC3100/PPC3100/APC4100	
	Mass storage	
5ACCIHDD.1024-000	1 TB hard disk - Slide-in compact - SATA	
5ACCISSD.001T-000	1 TB SSD MLC - Slide-in compact - SATA	
5ACCISSD.128G-000	128 GB SSD MLC - Slide-in compact - SATA	
5ACCISSD.256G-000	256 GB SSD MLC - Slide-in compact - SATA	

Order number	Short description	Figure
5ACCISSD.512G-000	512 GB SSD MLC - Slide-in compact - SATA	
	Mass storage options	
5ACCMS01.MDT2-000	Adapter card for M.2 mass storage device - For APC3100/ PPC3100/APC4100	
5ACCMSM2.0512-000	512 GB M.2 SSD MLC - Innodisk - SATA	
5ACCMSM2.1024-000	1 TB M.2 SSD MLC - Innodisk - SATA	
	Uninterruptible power supply	
5AC901.IUPS-00	UPS - For 4.5 Ah battery	
5AC901.IUPS-01	UPS - For 2.2 Ah battery	

4.2.1.2.3 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5APC4100.SX01-000
General information	
LEDs	Power, Run
B&R ID code	0x2D1E
Cooling	Passive via heat sink and optionally supported with an active fan kit
Power button	Yes
Reset button	Yes
Certifications	
CE	In preparation
UL	In preparation
Controller [1]	
Bootloader	UEFI BIOS
Slots	
PCI/PCIe slots	
Quantity	Component-dependent [2]
Interface option	3
Add-on UPS slot	Yes [3]
Slot for fan kit	Yes
Electrical properties	
Nominal voltage	24 VDC ±25%, SELV [4]
Nominal current	Max. 8 A [5]
Inrush current	Max. 60 A for < 300 µs [6]
Overvoltage category per EN 61131-2	II
Galvanic isolation	Yes
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	IP20 [7]
Ambient conditions	
Temperature	
Operation	Component-dependent [8]
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	Component-dependent
Storage	Component-dependent
Transport	Component-dependent
Vibration [9]	
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 [9]	
Operation	15 g, 11 ms
Storage	30 g, 6 ms
Transport	30 g, 6 ms
Elevation	
Operation	-300 to 3000 m above sea level [10]
Mechanical properties	
Housing [11]	
Material	EN AW-5754
Coating	Anthracite gray
Dimensions	
Width	91 mm
Height	222 mm
Depth	258 mm
Weight	In preparation

1) For detailed information about the controller and interfaces, see *Technical data / Individual components / CPU boards*.
2) The PCI and PCIe slots depend on the bus unit used.
3) The UPS module can only be operated in the IF option 1 slot.
4) IEC 61010-2-201 requirements must be observed (see section "Power supply" in the user's manual).
5) Maximum possible current consumption at 24 V with 180 W. This may vary depending on the configuration (see section "Power management"). The inrush current must also be taken into account when selecting the power supply unit.
6) U_{in} = 24 VDC
7) Only when all interface covers and the front cover are installed.
8) For detailed information, see the temperature tables in the user's manual.

9) Maximum values unless specified otherwise by another individual component.
10) The maximum ambient temperature is typically derated 1°C per 1000 meters starting at 500 m above sea level.
11) Visual deviations in color and surface quality are possible due to process or batch conditions.

4.2.1.3 5APC4100.SX02-000

4.2.1.3.1 General information

The 2-slot variant of the Automation PC 4100 is configurable with CPU board, heat sink, etc. Several interfaces are included, and 3 interface options can be additionally installed. For additional information about the configuration, see "Design/Configuration" on page 11.

- Intel Core i-series processors
- DDR4 memory
- 2 DisplayPort interfaces
- 2 CFexpress slots
- Slots for 3 interface options

4.2.1.3.2 Order data

Order number	Short description	Figure
	System units	
5APC4100.SX02-000	2-slot APC4100 system unit	
	Required accessories	
	Accessories	
0TB103.9	Connector 24 VDC - 3-pin, female - Screw clamp terminal block 3.31 mm²	
0TB103.91	Connector 24 VDC - 3-pin, female - Cage clamp terminal block 3.31 mm²	
	Battery tray	
5ACCBT02.0000-000	Battery compartment - Including battery - For APC4100	
	Bus units	
5APC4100.BX02-000	APC4100 with 2-slot bus - 1 PCI - 1 PCIe x16	
5APC4100.BX02-001	APC4100 with 2-slot bus - 1 PCIe x16 - 1 PCIe x4	
	CPU boards	
5APC4100.TGL0-000	CPU board Intel Celeron 6600HLE - Dual core - HM570E chipset - 2.1 GHz active, 2.1 GHz passive - For APC4100	
5APC4100.TGL1-000	CPU board Intel Core i3 11100HE - Quad core - RM590E chipset - 2.4 GHz active, x.x GHz passive - For APC4100	
5APC4100.TGL2-000	CPU board Intel Core i5 11500HE - Hexa core - RM590E chipset - 2.6 GHz active - For APC4100	
5APC4100.TGL3-000	CPU board Intel Xeon 11155MRE - Quad core - RM590E chipset - 2.4 GHz active, x.x GHz passive - For APC4100	
5APC4100.TGL4-000	CPU board Intel Xeon 11865MRE - Octa core - RM590E chipset - 2.6 GHz active - For APC4100	
	Front cover	
5ACCFF04.0200-000	Front cover 2-slot APC4100 - Orange	
5ACCFF04.0200-001	Front cover for 2-slot APC4100 - Dark gray	
	Heat sink	
5APC4100.HS00-000	APC4100 heat sink, active	
5APC4100.HS01-000	APC4100 heat sink, passive	
	Installation options	
5APC4100.MB02-000	APC4100 Montagehilfe - Book Style 2-Slot	
	Main memory	
5MMDDR.016G-05	SO-DIMM DDR4, 16384 MB	
5MMDDR.032G-05	SO-DIMM DDR4, 32768 MB	
5MMDDR.4096-05	SO-DIMM DDR4, 4096 MB	
5MMDDR.8192-05	SO-DIMM DDR4, 8192 MB	
5MMDDR.8192-06	SO-DIMM DDR4 ECC, 8192 MB	
	Optional accessories	
	CFexpress cards	
5CFXPR.060G-20	CFexpress 60 GB TLC	
5CFXPR.120G-20	CFexpress 120 GB TLC	
5CFXPR.240G-20	CFexpress 240 GB TLC	
5CFXPR.480G-20	CFexpress 480 GB TLC	
	Fan kits	
5APC4100.FA02-000	APC4100 fan kit - For 5APC4100.SX02-00 - Includes air filter	
5APC4100.FA02-001	APC4100 fan kit - For 5APC4100.SX02-00 - Excludes air filter	
	Graphics options	
5ACCLI02.DPO0-000	Graphics option - 1x DisplayPort transmitter (version 1.2) - For APC3100/PPC3100/APC4100	
5ACCLI05.SDL4-000	Graphics option - 1x SDL4 transmitter - For APC4100	
	Interface options	
5AC901.I232-00	Interface card - 1x RS232 interface - For APC910/PPC900/APC3100/PPC3100/APC4100	
5AC901.I485-00	Interface card - 1x RS232/RS422/RS485 interface - For APC910/PPC900/APC3100/PPC3100/APC4100	
5AC901.ICAN-01	Interface card - 1x CAN interface (SJA1000) - For APC910/PPC900/APC3100/PPC3100/APC4100	
5AC901.IETH-00	Interface card - 1x ETH 10/100/1000 - For APC910/PPC900/APC3100/PPC3100/APC4100	
5AC901.IPLK-00	Interface card - 1x POWERLINK interface - 2 MB SRAM - For APC910/PPC900/APC3100/PPC3100/APC4100	
5AC901.IRDY-00	Interface card - Ready relay - For APC910/PPC900/APC3100/PPC3100/APC4100	
5AC901.ISIO-00	Interface card - System I/O - For APC910/PPC900/APC3100/PPC3100/APC4100	
5AC901.ISRM-00	Interface card - 2 MB SRAM - For APC910/PPC900/APC3100/PPC3100/APC4100	
5ACCIF04.FPLK-000	Interface card - 1x POWERLINK interface - For APC3100/PPC3100/APC4100	
	Mass storage	
5ACCIHDD.1024-000	1 TB hard disk - Slide-in compact - SATA	
5ACCISSD.001T-000	1 TB SSD MLC - Slide-in compact - SATA	
5ACCISSD.128G-000	128 GB SSD MLC - Slide-in compact - SATA	
5ACCISSD.256G-000	256 GB SSD MLC - Slide-in compact - SATA	

Order number	Short description	Figure
5ACCISSD.512G-000	512 GB SSD MLC - Slide-in compact - SATA	
	Mass storage options	
5ACCMS01.MDT2-000	Adapter card for M.2 mass storage device - For APC3100/ PPC3100/APC4100	
5ACCMSM2.0512-000	512 GB M.2 SSD MLC - Innodisk - SATA	
5ACCMSM2.1024-000	1 TB M.2 SSD MLC - Innodisk - SATA	
	Uninterruptible power supply	
5AC901.IUPS-00	UPS - For 4.5 Ah battery	
5AC901.IUPS-01	UPS - For 2.2 Ah battery	

4.2.1.3.3 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5APC4100.SX02-000
General information	
LEDs	Power, Run
B&R ID code	0x2D1F
Cooling	Passive via heat sink and optionally supported with an active fan kit
Power button	Yes
Reset button	Yes
Certifications	
CE	In preparation
UL	In preparation
Controller [1]	
Bootloader	UEFI BIOS
Slots	
PCI/PCIe slots	
Quantity	Component-dependent [2]
Interface option	3
Add-on UPS slot	Yes [3]
Slot for fan kit	Yes
Electrical properties	
Nominal voltage	24 VDC ±25%, SELV [4]
Nominal current	Max. 8 A [5]
Inrush current	Max. 60 A for < 300 µs [6]
Overvoltage category per EN 61131-2	II
Galvanic isolation	Yes
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	IP20 [7]
Ambient conditions	
Temperature	
Operation	Component-dependent [8]
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	Component-dependent
Storage	Component-dependent
Transport	Component-dependent
Vibration [9]	
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 [9]	
Operation	15 g, 11 ms
Storage	30 g, 6 ms
Transport	30 g, 6 ms
Elevation	
Operation	-300 to 3000 m above sea level [10]
Mechanical properties	
Housing [11]	
Material	EN AW-5754
Coating	Anthracite gray
Dimensions	
Width	111 mm
Height	222 mm
Depth	258 mm
Weight	In preparation

1) For detailed information about the controller and interfaces, see *Technical data / Individual components / CPU boards*.
2) The PCI and PCIe slots depend on the bus unit used.
3) The UPS module can only be operated in the IF option 1 slot.
4) EN 60950 requirements must be observed; see section "Power supply" in the user's manual.
5) Maximum possible current consumption at 24 V with 180 W. This may vary depending on the configuration (see section "Power management"). The inrush current must also be taken into account when selecting the power supply unit.
6) U_{in} = 24 VDC
7) Only when all interface covers and the front cover are installed.
8) For detailed information, see the temperature tables in the user's manual.

9) Maximum values unless specified otherwise by another individual component.
10) The maximum ambient temperature is typically derated 1°C per 1000 meters starting at 500 m above sea level.
11) Visual deviations in color and surface quality are possible due to process or batch conditions.

4.2.1.4 5APC4100.SX03-000

4.2.1.4.1 General information

The 3-slot variant of the Automation PC 4100 is configurable with bus unit, CPU board, heat sink, etc. Several interfaces are included, and 3 interface options can be additionally installed. For additional information about the configuration, see "Design/Configuration" on page 11.

- Intel Core i-series processors
- DDR4 memory
- 2 DisplayPort interfaces
- 2 CFexpress slots
- Slots for 3 interface options

4.2.1.4.2 Order data

Order number	Short description	Figure
	System units	
5APC4100.SX03-000	3-slot APC4100 system unit	
	Required accessories	
	Accessories	
0TB103.9	Connector 24 VDC - 3-pin, female - Screw clamp terminal block 3.31 mm²	
0TB103.91	Connector 24 VDC - 3-pin, female - Cage clamp terminal block 3.31 mm²	
	Battery tray	
5ACCBT02.0000-000	Battery compartment - Including battery - For APC4100	
	Bus units	
5APC4100.BX03-000	APC4100 with 3-slot bus - 2 PCI - 1 PCIe x16	
5APC4100.BX03-001	APC4100 with 3-slot bus - 1 PCI - 1 PCIe x16 - 1 PCIe x4	
5APC4100.BX03-002	APC4100 with 3-slot bus - 1 PCIe x16 - 1 PCIe x4 - 1 PCIe x1	
	CPU boards	
5APC4100.TGL0-000	CPU board Intel Celeron 6600HLE - Dual core - HM570E chipset - 2.1 GHz active, 2.1 GHz passive - For APC4100	
5APC4100.TGL1-000	CPU board Intel Core i3 11100HE - Quad core - RM590E chipset - 2.4 GHz active, x.x GHz passive - For APC4100	
5APC4100.TGL2-000	CPU board Intel Core i5 11500HE - Hexa core - RM590E chipset - 2.6 GHz active - For APC4100	
5APC4100.TGL3-000	CPU board Intel Xeon 11155MRE - Quad core - RM590E chipset - 2.4 GHz active, x.x GHz passive - For APC4100	
5APC4100.TGL4-000	CPU board Intel Xeon 11865MRE - Octa core - RM590E chipset - 2.6 GHz active - For APC4100	
	Front cover	
5ACCFF04.0300-000	Front cover 3-slot APC4100 - Orange	
5ACCFF04.0300-001	Front cover for 3-slot APC4100 - Dark gray	
	Heat sink	
5APC4100.HS00-000	APC4100 heat sink, active	
5APC4100.HS01-000	APC4100 heat sink, passive	
	Installation options	
5APC4100.MB03-000	APC4100 Montagehilfe - Book Style 3-Slot	
	Main memory	
5MMDDR.016G-05	SO-DIMM DDR4, 16384 MB	
5MMDDR.032G-05	SO-DIMM DDR4, 32768 MB	
5MMDDR.4096-05	SO-DIMM DDR4, 4096 MB	
5MMDDR.8192-05	SO-DIMM DDR4, 8192 MB	
5MMDDR.8192-06	SO-DIMM DDR4 ECC, 8192 MB	
	Optional accessories	
	CFexpress cards	
5CFXPR.060G-20	CFexpress 60 GB TLC	
5CFXPR.120G-20	CFexpress 120 GB TLC	
5CFXPR.240G-20	CFexpress 240 GB TLC	
5CFXPR.480G-20	CFexpress 480 GB TLC	
	Fan kits	
5APC4100.FA03-000	APC4100 fan kit - For 5APC4100.SX03-00 - Includes air filter	
5APC4100.FA03-001	APC4100 fan kit - For 5APC4100.SX03-00 - Excludes air filter	
	Graphics options	
5ACCLI02.DPO0-000	Graphics option - 1x DisplayPort transmitter (version 1.2) - For APC3100/PPC3100/APC4100	
5ACCLI05.SDL4-000	Graphics option - 1x SDL4 transmitter - For APC4100	
	Interface options	
5AC901.I232-00	Interface card - 1x RS232 interface - For APC910/PPC900/APC3100/PPC3100/APC4100	
5AC901.I485-00	Interface card - 1x RS232/RS422/RS485 interface - For APC910/PPC900/APC3100/PPC3100/APC4100	
5AC901.ICAN-01	Interface card - 1x CAN interface (SJA1000) - For APC910/PPC900/APC3100/PPC3100/APC4100	
5AC901.IETH-00	Interface card - 1x ETH 10/100/1000 - For APC910/PPC900/APC3100/PPC3100/APC4100	
5AC901.IPLK-00	Interface card - 1x POWERLINK interface - 2 MB SRAM - For APC910/PPC900/APC3100/PPC3100/APC4100	
5AC901.IRDY-00	Interface card - Ready relay - For APC910/PPC900/APC3100/PPC3100/APC4100	
5AC901.ISIO-00	Interface card - System I/O - For APC910/PPC900/APC3100/PPC3100/APC4100	
5AC901.ISRM-00	Interface card - 2 MB SRAM - For APC910/PPC900/APC3100/PPC3100/APC4100	
5ACCIF04.FPLK-000	Interface card - 1x POWERLINK interface - For APC3100/PPC3100/APC4100	
	Mass storage	
5ACCIHDD.1024-000	1 TB hard disk - Slide-in compact - SATA	
5ACCISSD.001T-000	1 TB SSD MLC - Slide-in compact - SATA	
5ACCISSD.128G-000	128 GB SSD MLC - Slide-in compact - SATA	

Order number	Short description	Figure
5ACCISSD.256G-000	256 GB SSD MLC - Slide-in compact - SATA	
5ACCISSD.512G-000	512 GB SSD MLC - Slide-in compact - SATA	
	Mass storage options	
5ACCMS01.MDT2-000	Adapter card for M.2 mass storage device - For APC3100/ PPC3100/APC4100	
5ACCMSM2.0512-000	512 GB M.2 SSD MLC - Innodisk - SATA	
5ACCMSM2.1024-000	1 TB M.2 SSD MLC - Innodisk - SATA	
	Uninterruptible power supply	
5AC901.IUPS-00	UPS - For 4.5 Ah battery	
5AC901.IUPS-01	UPS - For 2.2 Ah battery	

4.2.1.4.3 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5APC4100.SX03-000
General information	
LEDs	Power, Run
B&R ID code	0x2D20
Cooling	Passive via heat sink and optionally supported with an active fan kit
Power button	Yes
Reset button	Yes
Certifications	
CE	In preparation
UL	In preparation
Controller [1]	
Bootloader	UEFI BIOS
Slots	
PCI/PCIe slots	
Quantity	Component-dependent [2]
Interface option	3
Add-on UPS slot	Yes [3]
Slot for fan kit	Yes
Electrical properties	
Nominal voltage	24 VDC ±25%, SELV [4]
Nominal current	Max. 8 A [5]
Inrush current	Max. 60 A for < 300 µs [6]
Overvoltage category per EN 61131-2	II
Galvanic isolation	Yes
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	IP20 [7]
Ambient conditions	
Temperature	
Operation	Component-dependent [8]
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	Component-dependent
Storage	Component-dependent
Transport	Component-dependent
Vibration [9]	
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 [9]	
Operation	15 g, 11 ms
Storage	30 g, 6 ms
Transport	30 g, 6 ms
Elevation	
Operation	-300 to 3000 m above sea level [10]
Mechanical properties	
Housing [11]	
Material	EN AW-5754
Coating	Anthracite gray
Dimensions	
Width	132 mm
Height	222 mm
Depth	258 mm
Weight	942 g

1) For detailed information about the controller and interfaces, see *Technical data / Individual components / CPU boards*.
2) The PCI and PCIe slots depend on the bus unit used.
3) The UPS module can only be operated in the IF option 1 slot.
4) IEC 61010-2-201 requirements must be observed (see section "Power supply" in the user's manual).
5) Maximum possible current consumption at 24 V with 180 W. This may vary depending on the configuration (see section "Power management"). The inrush current must also be taken into account when selecting the power supply unit.
6) U_{in} = 24 VDC
7) Only when all interface covers and the front cover are installed.
8) For detailed information, see the temperature tables in the user's manual.

9) Maximum values unless specified otherwise by another individual component.
10) The maximum ambient temperature is typically derated 1°C per 1000 meters starting at 500 m above sea level.
11) Visual deviations in color and surface quality are possible due to process or batch conditions.

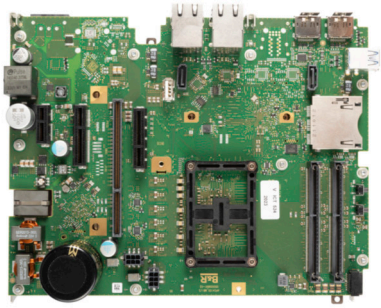
4.2.2 CPU boards

4.2.2.1 5APC4100.TGLx-000

4.2.2.1.1 General information

- 11th processor generation from Intel
- Intel RM590/HM570 chipset
- 2x DDR4 memory slots

4.2.2.1.2 Order data

Order number	Short description	Figure
	CPU boards	
5APC4100.TGL0-000	CPU board Intel Celeron 6600HLE - Dual core - HM570E chipset - 2.1 GHz active, 2.1 GHz passive - For APC4100	
5APC4100.TGL1-000	CPU board Intel Core i3 11100HE - Quad core - RM590E chipset - 2.4 GHz active, x.x GHz passive - For APC4100	
5APC4100.TGL2-000	CPU board Intel Core i5 11500HE - Hexa core - RM590E chipset - 2.6 GHz active - For APC4100	
5APC4100.TGL3-000	CPU board Intel Xeon 11155MRE - Quad core - RM590E chipset - 2.4 GHz active, x.x GHz passive - For APC4100	
5APC4100.TGL4-000	CPU board Intel Xeon 11865MRE - Octa core - RM590E chipset - 2.6 GHz active - For APC4100	
	Required accessories	
	Heat sink	
5APC4100.HS00-000	APC4100 heat sink, active	
5APC4100.HS01-000	APC4100 heat sink, passive	
	Main memory	
5MMDDR.016G-05	SO-DIMM DDR4, 16384 MB	
5MMDDR.032G-05	SO-DIMM DDR4, 32768 MB	
5MMDDR.4096-05	SO-DIMM DDR4, 4096 MB	
5MMDDR.8192-05	SO-DIMM DDR4, 8192 MB	
5MMDDR.8192-06	SO-DIMM DDR4 ECC, 8192 MB	

4.2.2.1.3 Technical data

Order number	5APC4100.TGL0-000	5APC4100.TGL1-000	5APC4100.TGL2-000	5APC4100.TGL3-000	5APC4100.TGL4-000
General information					
Certifications					
CE	Yes		In preparation		Yes
UL	In preparation				
Controller					
Bootloader	UEFI BIOS				
Processor					
Type	Intel Celeron 6600HLE	Intel Core i3-11100HE	Intel Core i5-11500HE	Intel Core W-11155MRE	Intel Core W-11865MRE
Clock frequency	2100 MHz	2400 MHz	2600 MHz	2400 MHz	2600 MHz
Number of cores	2	4	6	4	8
Architecture	10 nmSF				
Thermal design power (TDP)	25 W	45 W			
Intel Smart Cache	8 MB		12 MB	8 MB	24 MB
External bus	-	DMI3, 8 GT/s			
Intel 64 architecture	Yes				
Intel Turbo Boost Technology	No	2.0			
Intel Hyper-Threading Technology	No	Yes			
Intel vPro Technology	No		Yes	No	Yes
Intel Virtualization Technology (VT-x)	Yes				
Intel Virtualization Technology for Directed I/O (VT-d)	Yes				
Intel Speed Shift Technology	-	Yes			
Enhanced Intel SpeedStep Technology	Yes				
Chipset	Intel HM570E	Intel RM590E			
Trusted Platform Module	Yes				
Real-time clock					
Accuracy	At 25°C: Typ. 24 ppm (2 second) per day [1]				
Battery-backed	Yes				
Memory slot					
Number of memory channels	2				
Type	DDR4				
Memory size	Max. 64 GB				
Max. transfer rate	3200 MT/s				

Order number	5APC4100.TGL0-000	5APC4100.TGL1-000	5APC4100.TGL2-000	5APC4100.TGL3-000	5APC4100.TGL4-000
Graphics					
Controller	Intel UHD Gfx 16		Intel UHD Gfx 32	Intel UHD Gfx 16	Intel UHD Gfx 32
Max. dynamic graphics frequency	1100 MHz	1250 MHz	1350 MHz	1250 MHz	1350 MHz
Color depth	Max. 32-bit				
DirectX support	12.1				
OpenGL support	4.6				
Resolution					
HDMI	Resolution up to 4096 x 2304				
DisplayPort	Resolution up to 7680 x 4320				
Application memory					
Error-correcting code (ECC)	-			Yes	
Mass memory management	4x SATA	8x SATA			
Power management	ACPI 5.0 with battery support				
Interfaces					
CFexpress slot					
Quantity	2				
Type	Type B, PCIe Gen3 x2				
USB					
Quantity	7				
Type	4x USB 3.2 (top) 2x USB 3.2 (front) 1x USB 2.0 (internal)				
Variant	Type A				
Connection	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s) to SuperSpeed+ (5/10 Gbit/s) 2)				
Current-carrying capacity	Max. 1 A per connection				
Ethernet					
Quantity	2	4			
Variant	RJ45, shielded				
Transfer rate	10/100/1000/2500 Mbit/s				
Max. baud rate	2x 2.5 Gbit/s	2x 2.5 Gbit/s (ETH1 and ETH2) 2x 1 Gbit/s (ETH3 and ETH4)			
DisplayPort					
Quantity	2				
Version	1.2				

1) At max. specified ambient temperature: Typ. 58 ppm (5 seconds) - worst case 220 ppm (19 seconds).
2) The SuperSpeed transfer rate (5 Gbit/s) is only possible with USB 3.0.

4.2.3 Main memory

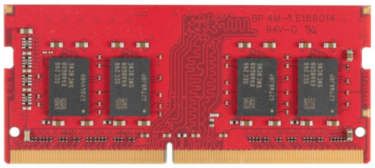
4.2.3.1 5MMDDR.xxxx-0x

4.2.3.1.1 General information

These 260-pin DDR4 main memory modules operate with a data rate of max. 3200 MHz and are available in memory sizes ranging from 4 GB to 32 GB.

If two main memory modules of identical size (e.g. 16 GB) are connected to the CPU board, then dual-channel memory technology is supported.

4.2.3.1.2 Order data

Order number	Short description	Figure
	Main memory	
5MMDDR.4096-05	SO-DIMM DDR4, 4096 MB	
5MMDDR.8192-05	SO-DIMM DDR4, 8192 MB	
5MMDDR.8192-06	SO-DIMM DDR4 ECC, 8192 MB	
5MMDDR.016G-05	SO-DIMM DDR4, 16384 MB	
5MMDDR.032G-05	SO-DIMM DDR4, 32768 MB	

4.2.3.1.3 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5MMDDR.4096-05	5MMDDR.8192-05	5MMDDR.8192-06	5MMDDR.016G-05	5MMDDR.032G-05
General information					
Certifications					
CE	Yes				
UL	In preparation				
Controller					
Memory					
Type	SO-DIMM DDR4 SDRAM				
Memory size	4 GB	8 GB		16 GB	32 GB
Construction	260-pin				
Organization	512M x 64-bit	1024M x 64-bit	1024M x 72-bit	2048M x 64-bit	
Velocity	DDR4-3200 (PC4-3200)				
Endurance					
Error-correcting code (ECC)	No		Yes	No	

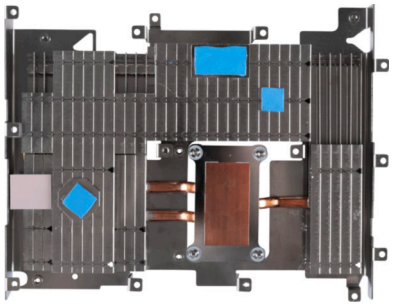
4.2.4 Heat sink

4.2.4.1 5APC4100.HS00-000

4.2.4.1.1 General information

Heat sink 5APC4100.HS00-000 has cooling fins and heat pipes for improved heat dissipation. It is only used together with system units that have fan kits for active cooling.

4.2.4.1.2 Order data

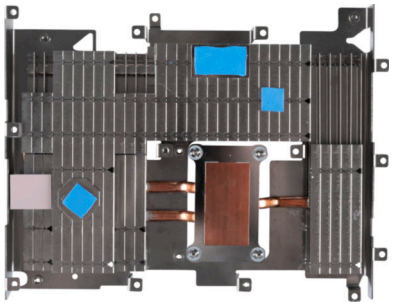
Order number	Short description	Figure
	Heat sink	
5APC4100.HS00-000	APC4100 heat sink, active	
	Required accessories	
	CPU boards	
5APC4100.TGL0-000	CPU board Intel Celeron 6600HLE - Dual core - HM570E chipset - 2.1 GHz active, 2.1 GHz passive - For APC4100	
5APC4100.TGL1-000	CPU board Intel Core i3 11100HE - Quad core - RM590E chipset - 2.4 GHz active, x.x GHz passive - For APC4100	
5APC4100.TGL2-000	CPU board Intel Core i5 11500HE - Hexa core - RM590E chipset - 2.6 GHz active - For APC4100	
5APC4100.TGL3-000	CPU board Intel Xeon 11155MRE - Quad core - RM590E chipset - 2.4 GHz active, x.x GHz passive - For APC4100	
5APC4100.TGL4-000	CPU board Intel Xeon 11865MRE - Octa core - RM590E chipset - 2.6 GHz active - For APC4100	

4.2.4.2 5APC4100.HS01-000

4.2.4.2.1 General information

Heat sink 5APC4100.HS01-000 has cooling fins and heat pipes for improved heat dissipation. Unlike with 5APC4100.HS00-000, no fan kit is required (passive cooling).

4.2.4.2.2 Order data

Order number	Short description	Figure
	Heat sink	
5APC4100.HS01-000	APC4100 heat sink, passive	
	Required accessories	
	CPU boards	
5APC4100.TGL0-000	CPU board Intel Celeron 6600HLE - Dual core - HM570E chipset - 2.1 GHz active, 2.1 GHz passive - For APC4100	
5APC4100.TGL1-000	CPU board Intel Core i3 11100HE - Quad core - RM590E chipset - 2.4 GHz active, x.x GHz passive - For APC4100	
5APC4100.TGL3-000	CPU board Intel Xeon 11155MRE - Quad core - RM590E chipset - 2.4 GHz active, x.x GHz passive - For APC4100	

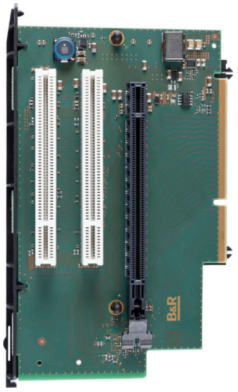
4.2.5 Bus units

4.2.5.1 5APC4100.BX0x-00x

4.2.5.1.1 General information

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

4.2.5.1.2 Order data

Order number	Short description	Figure
	Bus units	
5APC4100.BX01-000	APC4100 with 1-slot bus - 1 PCI	
5APC4100.BX01-001	APC4100 with 1-slot bus - 1 PCIe x16	
5APC4100.BX02-000	APC4100 with 2-slot bus - 1 PCI - 1 PCIe x16	
5APC4100.BX02-001	APC4100 with 2-slot bus - 1 PCIe x16 - 1 PCIe x4	
5APC4100.BX03-000	APC4100 with 3-slot bus - 2 PCI - 1 PCIe x16	
5APC4100.BX03-001	APC4100 with 3-slot bus - 1 PCI - 1 PCIe x16 - 1 PCIe x4	
5APC4100.BX03-002	APC4100 with 3-slot bus - 1 PCIe x16 - 1 PCIe x4 - 1 PCIe x1	

4.2.5.1.3 Technical data

Order number	5APC4100. BX01-000	5APC4100. BX01-001	5APC4100. BX02-000	5APC4100. BX02-001	5APC4100. BX03-000	5APC4100. BX03-001	5APC4100. BX03-002
General information							
Certifications							
CE	In preparation						
UL	In preparation						
Slots							
PCI slots							
Quantity	1	-	1	-	2	1	-
Type	32-bit	-	32-bit	-	32-bit		-
Variant	PCI half-size	-	PCI half-size	-	PCI half-size		-
Standard	2.2	-	2.2	-	2.2		-
Bus speed	33 MHz	-	33 MHz	-	33 MHz		-
PCIe to PCI bridge	Yes	-	Yes	-	Yes		-
PCIe slots							
Quantity	-	1		2	1	2	3
Variant	-	PCIe half-size					
Standard	-	2.0					
Bus speed	-	x16 (8 GB/s)		x4 (2 GB/s) x16 (8 GB/s)	x16 (8 GB/s)	x4 (2 GB/s) x16 (8 GB/s)	x1 (250 MB/s) x4 (2 GB/s) x16 (8 GB/s)

4.2.6 Mass storage devices

4.2.6.1 5ACCISSD.xxxx-000

4.2.6.1.1 General information

5ACCISSD.xxxx-000 slide-in compact solid-state drives (SSD) are based on multi-level cell (MLC) technology and compatible with SATA 3.2. They can be used in APC4100 system units.

- 128, 256, 512 or 1024 GB solid-state drive
- MLC flash memory
- S.M.A.R.T. support
- Slide-in compact
- Compatible with SATA 3.2

4.2.6.1.2 Order data

Order number	Short description	Figure
	Mass storage	
5ACCISSD.128G-000	128 GB SSD MLC - Slide-in compact - SATA	
5ACCISSD.256G-000	256 GB SSD MLC - Slide-in compact - SATA	
5ACCISSD.512G-000	512 GB SSD MLC - Slide-in compact - SATA	
5ACCISSD.001T-000	1 TB SSD MLC - Slide-in compact - SATA	
	Required accessories	
	Mass storage	
5APC4100.ISSD-000	APC4100 Massenspeicher Montagerahmen	
5APC4100.MMCA-000	APC4100 SSD/HDD Kabelset - für 1 Slot - Farbe blau	
5APC4100.MMCA-001	APC4100 SSD/HDD Kabelset - für 2 Slot - Farbe rot	

4.2.6.1.3 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5ACCISSD.128G-000	5ACCISSD.256G-000	5ACCISSD.512G-000	5ACCISSD.001T-000
General information				
Certifications				
CE	Yes			
UL	In preparation			
Solid-state drive				
Capacity	128 GB	256 GB	512 GB	1024 GB
Data reliability	Max. 1 unrecoverable error per 10^{15} bits read			
MTBF	Min. 3,000,000 h			
S.M.A.R.T. support	Yes			
Interface	SATA			
Servicing	None			
Continuous reading	Max. 520 MB/s			
Continuous writing	Max. 350 MB/s		Max. 450 MB/s	
IOPS [1]				
4k read	Max. 75,000 (random)			
4k write	Max. 80,000 (random)	Max. 83,000 (random)	Max. 76,000 (random)	Max. 78,000 (random)
Endurance				
MLC flash memory	Yes			
Data volume				
Theoretical	384 TBW [2]	768 TBW [2]	1536 TBW [2]	3072 TBW [2]
Client workload	150 TBW [3]	300 TBW [3]	600 TBW [3]	1172 TBW [3]
Compatibility	SATA 3.1 compliant ACS-2 SSD Enhanced SMART ATA feature set Native Command Queuing (NCQ)			
Storage health data support [4]	Yes, AR 4.90 and later			

Order number	5ACCISSD.128G-000	5ACCISSD.256G-000	5ACCISSD.512G-000	5ACCISSD.001T-000
Ambient conditions				
Temperature				
Operation	-40 to 85°C			
Storage	-55 to 95°C			
Transport	-55 to 95°C			
Relative humidity				
Operation	10 to 95%, non-condensing			
Storage	10 to 95%, non-condensing			
Transport	10 to 95%, non-condensing			
Vibration				
Operation	7 to 2000 Hz: 20 g			
Storage	7 to 2000 Hz: 20 g			
Transport	7 to 2000 Hz: 20 g			
Shock				
Operation	1500 g, 0.5 ms			
Storage	1500 g, 0.5 ms			
Transport	1500 g, 0.5 ms			
Mechanical properties				
Dimensions				
Width	7 mm			
Height	69 mm			
Depth	100 mm			
Weight	Approx. 90 g			
Vendor information				
Manufacturer	Innodisk			
Manufacturer's product ID	2.5" SATA SSD 3MV2-P 128 GB	2.5" SATA SSD 3MV2-P 256 GB	2.5" SATA SSD 3MV2-P 512 GB	2.5" SATA SSD 3MV2-P 1 TB

1) IOPS: Random read and write input/output operations per second
2) TBW = Terabytes written
3) Client workload per JEDEC JESD219 standard.
4) For details about *storage health data*, see Automation Help.

4.2.6.1.3.1 Temperature and humidity diagram

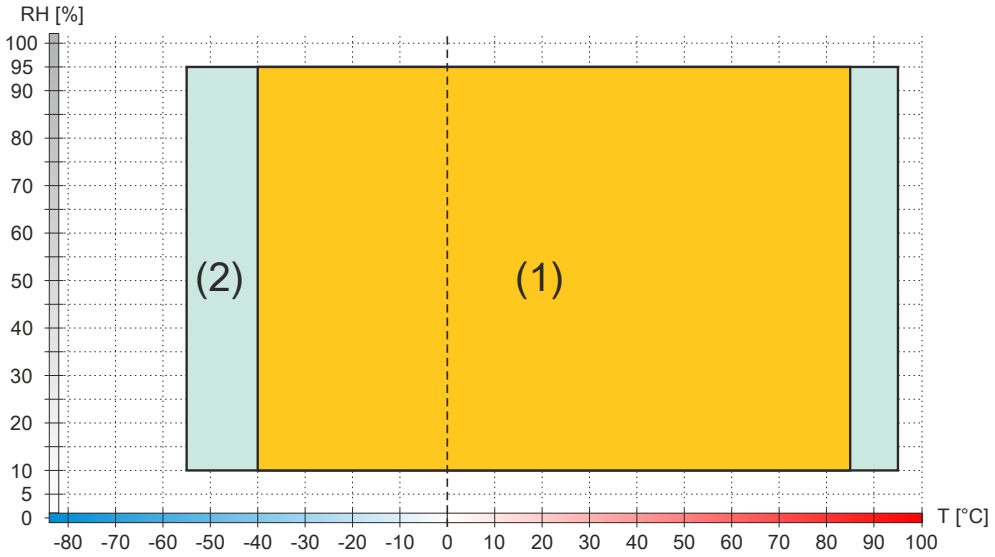


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.6.2 5ACCIHDD.1024-000

4.2.6.2.1 Order data

Order number	Short description	Figure
	Mass storage	
5ACCIHDD.1024-000	1 TB hard disk - Slide-in compact - SATA	
	Required accessories	
	Mass storage	
5APC4100.ISSD-000	APC4100 Massenspeicher Montagerahmen	
5APC4100.MMCA-000	APC4100 SSD/HDD Kabelset - für 1 Slot - Farbe blau	
5APC4100.MMCA-001	APC4100 SSD/HDD Kabelset - für 2 Slot - Farbe rot	

4.2.6.2.2 Technical data

Order number	5ACCIHDD.1024-000
General information	
Certifications	
CE	In preparation
UL	In preparation
Hard disk	
Capacity	1 TB
Number of heads	2
Number of sectors	1,953,525,168
Bytes per sector	512 (logical) / 4096 (physical)
Cache	128 MB
Speed	5400 rpm ±0.2%
Startup time	Typ. 2.8 s (from 0 rpm to read access)
Service life	2 years
MTBF	800,000 h [1]
Interface	SATA III
Access time	Typ. 5.5 ms
Supported transfer modes	Up to SATA III
Data transfer rate	
Internal	Max. 149 MB/s
To/From host	Max. 600 MB/s (SATA III)
Positioning time	
Nominal (read access)	11 ms
Nominal (write access)	13 ms
Endurance	
S.M.A.R.T. support	Yes
Storage health data support [2]	No
Electrical properties	
Power consumption	Max. 2 W (max. 5 W during spin-up)
Ambient conditions	
Temperature [3]	
Operation	0 to 60°C
24-hour operation	0 to 60°C
Storage	-40 to 65°C
Transport	-40 to 65°C
Relative humidity [4]	
Operation	8 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Vibration	
Operation	Not permitted (0 Hz, 0 g)
Shock	
Operation	Not permitted (0 g, 0 ms)
Elevation	
Operation	-305 to 3,048 m
Storage	-305 to 12,192 m

Order number	5ACCIHDD.1024-000
Mechanical properties [5]	
Dimensions	
Width	Approx. 7 mm
Height	Approx. 70 mm
Depth	Approx. 100 mm
Weight	Approx. 90 g

1) At 8760 power-on hours (POH) and max. 55 TB per year.
2) For details about *storage health data*, see Automation Help.
3) Temperature gradient: Max. 20°C per hour.
4) Humidity gradient: Max. 20% per hour.
5) All values without installation accessories.

4.2.6.3 5ACCMSM2.xxxx-000

4.2.6.3.1 General information

5ACCMSM2.xxxx-000 are M.2 mass storage devices (SSD) and can be used with adapter card 5ACCMS01.MDT2-000 as an interface option.

- Compatible with APC3100/PPC3100 and APC4100 (using adapter card 5ACCMS01.MDT2-000)
- Solid-state drives
- MLC technology
- SATA support
- 512 GB or 1 TB

Caution!

M.2 mass storage devices are not designed for hot-plugging or hot-swapping per the Next Generation Form Factor (NGFF) specification. It is therefore not permitted to connect or replace M.2 mass storage devices during operation.

4.2.6.3.2 Order data

Order number	Short description	Figure
	Mass storage options	
5ACCMSM2.0512-000	512 GB M.2 SSD MLC - Innodisk - SATA	
5ACCMSM2.1024-000	1 TB M.2 SSD MLC - Innodisk - SATA	
	Optional accessories	
	Mass storage options	
5ACCMS01.MDT2-000	Adapter card for M.2 mass storage device - For APC3100/PPC3100/APC4100	

4.2.6.3.3 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5ACCMSM2.0512-000	5ACCMSM2.1024-000
General information		
Data retention [1]	10 years [2]	
B&R ID code	0xFCCD	0xFCCE
Certifications		
CE	Yes	
UKCA	Yes	
UL	cULus E115267 Industrial control equipment	
Solid-state drive		
Capacity	512 GB	1024 GB
Data reliability	<1 unrecoverable error per 10^{15} bits read	
MTBF	3,000,000 h	
S.M.A.R.T. support	Yes	
Interface	SATA	
Continuous reading	Max. 560 MB/s	
Continuous writing	Max. 450 MB/s	
IOPS [3]		
4k read	Max. 76,000 (random)	
4k write	Max. 76,000 (random)	
Endurance		
MLC flash memory	Yes	
Guaranteed data volume		
Client workload	600 TBW [4]	1172 TBW [4]
Compatibility	SATA 3.1 compliant ACS-2 SSD Enhanced SMART ATA feature set Native Command Queuing (NCQ)	
Storage health data support [5]	Yes, AR 4.90 and later	
Electrical properties		
Power consumption	Max. 3.5 W	

Order number	5ACCMSM2.0512-000	5ACCMSM2.1024-000
Ambient conditions [6]		
Temperature		
Operation	-40 to 85°C	
Storage	-55 to 95°C	
Transport	-55 to 95°C	
Relative humidity		
Operation	10 to 90%, non-condensing	
Storage	10 to 95%, non-condensing	
Transport	10 to 95%, non-condensing	
Vibration		
Operation	7 to 2000 Hz: 20 g	
Storage	7 to 2000 Hz: 20 g	
Transport	7 to 2000 Hz: 20 g	
Shock		
Operation	1500 g, 0.5 ms	
Storage	1500 g, 0.5 ms	
Transport	1500 g, 0.5 ms	
Mechanical properties		
Dimensions		
Width	22 mm	
Height	80 mm	
Weight	Approx. 15 g	
Vendor information		
Manufacturer	Innodisk	
Manufacturer's product ID	M.2 (S80) 3MV2-P 512 GB	M.2 (S80) 3MV2-P 1 TB

1) Per JEDEC (JESD47), EOL conditions are not permitted to be reached before 18 months. A higher average daily write workload reduces the expected service life and data retention of the data storage medium.
2) At 25°C ambient temperature at the start of service life.
3) IOPS: Random read and write input/output operations per second
4) TBW: Terabytes written
Client workload per standard JEDEC JESD219
5) For details about *storage health data*, see Automation Help.
6) These values can be limited by the adapter card used.

4.2.6.3.4 Installing M.2 mass storage devices

The installation of M.2 mass storage devices in adapter card 5ACCMS01.MDT2-000 is described in section "Installing M.2 mass storage devices" on page 201.

4.2.6.4 5ACCMS01.MDT2-000

4.2.6.4.1 General

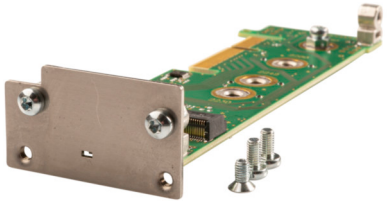
5ACCMS01.MDT2-000 is an adapter card for M.2 mass storage devices. B&R offers two corresponding configurable M.2 solid-state drives (5ACCMSM2.xxxx-000).

- Compatible with APC3100/PPC3100, APC4100 (only with 5ACCMBMS.0000-000)
- Easy installation in slot *IF option 3*.
- 5ACCMSM2.xxxx-000 memory sizes: 512 GB or 1 TB

Notice!

B&R cannot guarantee the function of third-party M.2 mass storage devices. The functionality of mass storage devices available from B&R is ensured.

4.2.6.4.2 Order data

Order number	Short description	Figure
	Mass storage options	
5ACCMS01.MDT2-000	Adapter card for M.2 mass storage device - For APC3100/PPC3100/APC4100	
	Optional accessories	
	Accessories	
5ACCMBMS.0000-000	APC4100 Montagebügel - IF3 Option	
	Mass storage options	
5ACCMSM2.0512-000	512 GB M.2 SSD MLC - Innodisk - SATA	
5ACCMSM2.1024-000	1 TB M.2 SSD MLC - Innodisk - SATA	

4.2.6.4.3 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

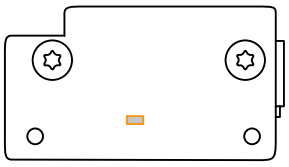
Order number	5ACCMS01.MDT2-000
General information	
LEDs	Yes, 1x activity indicator
B&R ID code	0xFCCC
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
Interfaces	
Add-on interface slot	
Quantity	1x M.2 SSD; M-Key
Electrical properties	
Power consumption	Depends on the mass storage device used
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions [1]	
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
Mechanical properties	
Weight	Approx. 35 g [2]

1) These values can be limited by the mass storage device used.
2) Without mass storage device.

4.2.6.4.3.1 Status LED

Adapter card 5ACCMS01.MDT2-000 has a yellow LED status indicator on the front panel that serves as an activity indicator.

- On: Mass storage device being accessed (write or read procedure)
- Off: Mass storage device not being accessed



4.2.7 Fan kits

Information:

Fan kits are subject to wear and must be checked at appropriate intervals and cleaned or replaced when not functioning properly (e.g. due to dirt and grime).

For information about replacing fan filters, see section "Replacing the fan filter and fan kit" on page 205.

4.2.7.1 5APC4100.FA00-00x

4.2.7.1.1 General information

The fan kit contains 2 fans for better heat dissipation of the 0-slot variant of the APC4100.

4.2.7.1.2 Order data

Order number	Short description	Figure
	Fan kits	
5APC4100.FA00-000	APC4100 fan kit - For 5APC4100.SX00-00 - Includes air filter	
5APC4100.FA00-001	APC4100 fan kit - For 5APC4100.SX00-00 - Excludes air filter	

Table 26: 5APC4100.FA00-000, 5APC4100.FA00-001 - Order data

4.2.7.1.3 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	5APC4100.FA00-000	5APC4100.FA00-001
General information		
Note	Includes 2 air filters	Excludes air filter
Number of fans	2 (2x 50 x 50 x 15 mm)	
Speed	Max. 6000 ±10% rpm	
Noise level	<34 dB(A)	
Service life	100000 hours at 40°C	
Certifications		
CE	Yes	
UL	In preparation	
Ambient conditions		
Temperature		
Operation	-25°C to 70°C	
Mechanical properties		
Dimensions		
Fans		
Width	60 mm	
Height	26 mm	
Depth	246 mm	
Weight	109 g	

Table 27: 5APC4100.FA00-000, 5APC4100.FA00-001 - Technical data

4.2.7.2 5APC4100.FA01-00x

4.2.7.2.1 General information

The fan kit contains 3 fans for better heat dissipation of the 1-slot variant of the APC4100.

4.2.7.2.2 Order data

Order number	Short description	Figure
	Fan kits	
5APC4100.FA01-000	APC4100 fan kit - For 5APC4100.SX01-00 - Includes air filter	
5APC4100.FA01-001	APC4100 fan kit - For 5APC4100.SX01-00 - Excludes air filter	

Table 28: 5APC4100.FA01-000, 5APC4100.FA01-001 - Order data

4.2.7.2.3 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	5APC4100.FA01-000	5APC4100.FA01-001
General information		
Note	Includes 3 air filters	Excludes air filter
Number of fans	3 (2x 50 x 50 x 15 mm, 1x 40 x 40 x 15 mm)	
Speed	50 x 50 x 15 mm fan: Max. 6000 ±10% rpm 40 x 40 x 15 mm fan: Max. 8000 ±10% rpm	
Noise level	<34 dB(A)	
Service life	100000 hours at 40°C	
Certifications		
CE	In preparation	
UL	In preparation	
Ambient conditions		
Temperature		
Operation	-25°C to 70°C	
Mechanical properties		
Dimensions		
Fans		
Width	86 mm	
Height	26 mm	
Depth	246 mm	

Table 29: 5APC4100.FA01-000, 5APC4100.FA01-001 - Technical data

4.2.7.3 5APC4100.FA02-00x

4.2.7.3.1 General information

The fan kit contains 3 fans for better heat dissipation of the 2-slot variant of the APC4100.

4.2.7.3.2 Order data

Order number	Short description	Figure
	Fan kits	
5APC4100.FA02-000	APC4100 fan kit - For 5APC4100.SX02-00 - Includes air filter	
5APC4100.FA02-001	APC4100 fan kit - For 5APC4100.SX02-00 - Excludes air filter	

Table 30: 5APC4100.FA02-000, 5APC4100.FA02-001 - Order data

4.2.7.3.3 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	5APC4100.FA02-000	5APC4100.FA02-001
General information		
Note	Includes 3 air filters	Excludes air filter
Number of fans	3 (2x 50 x 50 x 15 mm, 1x 40 x 40 x 15 mm)	
Speed	50 x 50 x 15 mm fan: Max. 6000 ±10% rpm 40 x 40 x 15 mm fan: Max. 8000 ±10% rpm	
Noise level	<34 dB(A)	
Service life	100000 hours at 40°C	
Certifications		
CE	In preparation	
UL	In preparation	
Ambient conditions		
Temperature		
Operation	-25°C to 70°C	
Mechanical properties		
Dimensions		
Fans		
Width	106 mm	
Height	26 mm	
Depth	246 mm	

Table 31: 5APC4100.FA02-000, 5APC4100.FA02-001 - Technical data

4.2.7.4 5APC4100.FA03-00x

4.2.7.4.1 General information

The fan kit contains 3 fans for better heat dissipation of the 3-slot variant of the APC4100.

4.2.7.4.2 Order data

Order number	Short description	Figure
	Fan kits	
5APC4100.FA03-000	APC4100 fan kit - For 5APC4100.SX03-00 - Includes air filter	
5APC4100.FA03-001	APC4100 fan kit - For 5APC4100.SX03-00 - Excludes air filter	

Table 32: 5APC4100.FA03-000, 5APC4100.FA03-001 - Order data

4.2.7.4.3 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

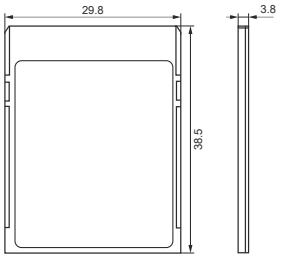
Order number	5APC4100.FA03-000	5APC4100.FA03-001
General information		
Note	Includes 3 air filters	Excludes 3 air filters
Number of fans	3 (3x 50 x 50 x 15 mm)	
Speed	Max. 6000 ±10% rpm	
Noise level	<34 dB(A)	
Service life	100000 hours at 40°C	
Certifications		
CE	In preparation	
UL	In preparation	
Ambient conditions		
Temperature		
Operation	-25°C to 70°C	
Mechanical properties		
Dimensions		
Fans		
Width	127 mm	
Height	26 mm	
Depth	246 mm	
Weight	188 g	

Table 33: 5APC4100.FA03-000, 5APC4100.FA03-001 - Technical data

4.2.8 CFexpress cards

For additional information about compatible CFexpress cards, see Aggregate data sheet - CFexpress cards on the B&R website.

4.2.8.1 Dimensions



These specifications apply to 5CFXPR.xxxx-20 and 5ACCRCFX.xxxx-20.

4.2.8.2 Order data

Order number	Short description	Figure
	CFexpress cards	
5CFXPR.060G-20	CFexpress 60 GB TLC	
5CFXPR.120G-20	CFexpress 120 GB TLC	
5CFXPR.240G-20	CFexpress 240 GB TLC	
5CFXPR.480G-20	CFexpress 480 GB TLC	

4.2.8.3 Technical data

Order number	5CFXPR.060G-20	5CFXPR.120G-20	5CFXPR.240G-20	5CFXPR.480G-20
General information				
Capacity	60 GB	120 GB	240 GB	480 GB
Data retention [1]	10 years [2]			
Data reliability	Max. 1 unrecoverable error per 10^{16} bits read			
Lifetime monitoring	Yes			
MTBF	Min. 2,000,000 h			
Type	Type B			
Supported operating modes	NVMe 1.3 (PCIe Gen3 x2)			
Continuous reading				
Maximum	Up to 594 MB/s	Up to 1,188 MB/s	Up to 1,615 MB/s	Up to 1,613 MB/s
Continuous writing				
Maximum	Up to 209 MB/s	Up to 383 MB/s	Up to 702 MB/s	Up to 827 MB/s
Certifications				
CE	Yes			
UL	In preparation			
Endurance [1]				
3D TLC flash memory	Yes			
Data volume				
Client workload	62 TBW [3]	95 TBW [3]	188 TBW [3]	946 TBW [3]
Wear leveling	Dynamic and static			
Error-correcting code (ECC)	Yes			
S.M.A.R.T. support	Yes			
Storage health data support [4]	Yes, starting with AR 6.00			
Mating cycles	Up to 12,000			
Support				
Hardware	APC4100			
Operating systems				
Windows 10 IoT Enterprise LTSC 64-bit	Yes			
Linux for B&R 12	Yes			

Order number	5CFXPR.060G-20	5CFXPR.120G-20	5CFXPR.240G-20	5CFXPR.480G-20
Software				
PVI	6.0			
Electrical properties				
Power consumption	Max. 1.60 W	Max. 2.12 W	Max. 2.40 W	Max. 2.64 W
Ambient conditions				
Temperature				
Operation	-40 to 85°C			
Storage	-40 to 85°C			
Transport	-40 to 85°C			
Relative humidity				
Operation	Up to 90% at 85°C for 96 h, non-condensing			
Storage	Up to 90% at 85°C for 96 h, non-condensing			
Transport	Up to 90% at 85°C for 96 h, non-condensing			
Vibration				
Storage	10 to 2,000 Hz: 20 g peak			
Transport	10 to 2,000 Hz: 20 g peak			
Shock				
Operation	500 g peak, 1 ms			
Storage	500 g peak, 1 ms			
Transport	500 g peak, 1 ms			
Mechanical properties				
Dimensions				
Width	29.8 mm			
Length	38.5 mm			
Depth	3.8 mm			
Weight	Approx. 10 g			

1) Per JEDEC (JESD47), EOL conditions are not permitted to be reached before 18 months. A higher average daily write workload reduces the expected service life and data retention of the data storage medium.
2) At up to 40°C ambient temperature at the start of service life.
3) TBW = Terabytes written
Client workload per JEDEC JESD219 standard.
4) For details about *storage health data*, see Automation Help.

4.2.8.4 Temperature/Humidity diagram

5CCFXPR.xxxG-20

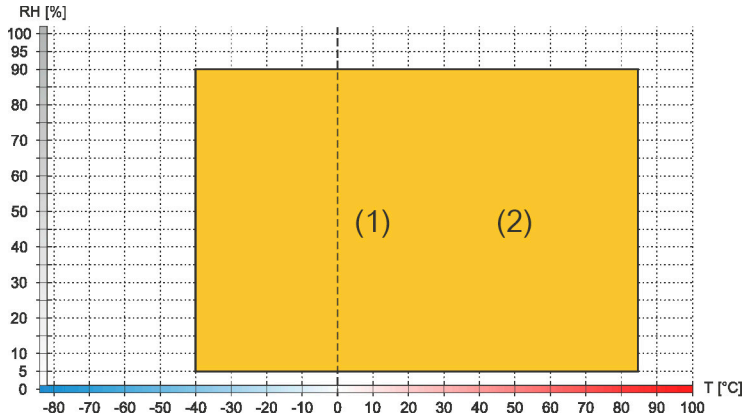


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.9 Interface options

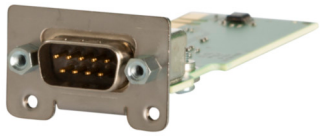
4.2.9.1 5AC901.I232-00

4.2.9.1.1 General information

Interface option 5AC901.I232-00 is equipped with an RS232 interface.

- 1x RS232 interface
- Compatible with APC910/PPC900, APC3100/PPC3100 and APC4100

4.2.9.1.2 Order data

Order number	Short description	Figure
	Interface options	
5AC901.I232-00	Interface card - 1x RS232 interface - For APC910/PPC900/ APC3100/PPC3100/APC4100	

4.2.9.1.3 Technical data

Information:

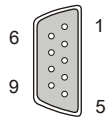
The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	5AC901.I232-00
General information	
B&R ID code	0xF400
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
EAC	Product family certification
Interfaces	
COM	
Type	RS232, modem supported, not galvanically isolated
Variant	DSUB, 9-pin, male
UART	16550-compatible, 16-byte FIFO buffer
Max. baud rate	115 kbit/s
Electrical properties	
Power consumption	1 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 60°C [1)]
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
Mechanical properties	
Weight	Approx. 30 g

1) For detailed information, see the temperature tables in the user's manual.

4.2.9.1.3.1 Pinout

Serial interface COM[1)]		
	RS232	
Variant	DSUB, 9-pin, male	
Type	RS232, modem supported	
UART	16550-compatible, 16-byte FIFO buffer	
Galvanic isolation	No	
Transfer rate	Max. 115 kbit/s	
Bus length	Max. 15 m	
Pin	**Pinout**	
1	DCD	
2	RXD	
3	TXD	
4	DTR	
5	GND	
6	DSR	
7	RTS	
8	CTS	
9	RI	



1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.

4.2.9.1.3.2 I/O address and IRQ

When operated in the APC4100:

Slot	I/O address [1)]	IRQ [1)]
IF option 1 (COM A)	3F8h - 3FFh	4
IF option 2 (COM B)	2F8h - 2FFh	3

1) The default I/O address and IRQ can be modified in BIOS.

4.2.9.1.3.3 Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see "Cable data" on page 224.

4.2.9.1.4 Driver support

Drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com) (if required and not already included in the operating system).

Approved operating systems:

- Automation Runtime
- Linux for B&R
- Windows 10

4.2.9.2 5AC901.I485-00

4.2.9.2.1 General information

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

- 1x RS232/RS422/RS485 interface
- Compatible with APC910/PPC900, APC3100/PPC3100 and APC4100

4.2.9.2.2 Order data

Order number	Short description	Figure
	Interface options	
5AC901.I485-00	Interface card - 1x RS232/RS422/RS485 interface - For APC910/PPC900/APC3100/PPC3100/APC4100	

4.2.9.2.3 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

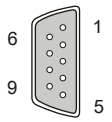
Order number	5AC901.I485-00
General information	
B&R ID code	0xD84A
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1)]
DNV	Temperature: **B** (0 - 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck) [2)]
LR	ENV3
KR	Yes
ABS	Yes
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
EAC	Product family certification
Interfaces	
COM	
Type	RS232/RS422/RS485, galvanically isolated
Variant	DSUB, 9-pin, male
UART	16550-compatible, 16-byte FIFO buffer
Max. baud rate	115 kbit/s
Terminating resistor	
Type	Can be switched on and off with slide switch
Default setting	Off
Electrical properties	
Power consumption	1 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 55°C [3)]
Storage	-20 to 60°C
Transport	-20 to 60°C

Order number	5AC901.I485-00
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	Approx. 34 g

1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
2) Yes, but applies only if all components installed in the complete system have this certification and are listed on the associated DNV certificate for the product family.
3) For detailed information, see the temperature tables in the user's manual.

4.2.9.2.3.1 Pinout

Serial interface COM		
	RS232	**RS422/485**
Variant	DSUB, 9-pin, male	
Type	RS232, not modem supported	
UART	16550-compatible, 16-byte FIFO buffer	
Galvanic isolation	Yes	
Transfer rate	Max. 115 kbit/s	
Bus length	Max. 15 m	Max. 1200 m
Pin	**RS232 - Pinout**[1]	**RS422 - Pinout**[1]
1	NC[2]	TXD\
2	RXD	NC
3	TXD	NC
4	NC	TXD
5	GND	GND
6	NC	RXD\
7	RTS	NC
8	CTS	NC
9	NC	RXD



1) Pins marked "NC" are not permitted to be used or connected in the respective operating mode.
2) Not connected.

4.2.9.2.3.2 I/O address and IRQ

When operated in the APC4100:

Slot	I/O address [1]	IRQ [1]
IF option 1 (COM A)	3F8h - 3FFh	4
IF option 2 (COM B)	2F8h - 2FFh	3

1) The default I/O address and IRQ can be modified in BIOS.

4.2.9.2.3.3 Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see "Cable data" on page 224.

4.2.9.2.3.4 Operation as RS485 interface

The pins of the RS422 default interface (1, 4, 6 and 9) must be used for operation. To do this, connect the pins as shown.

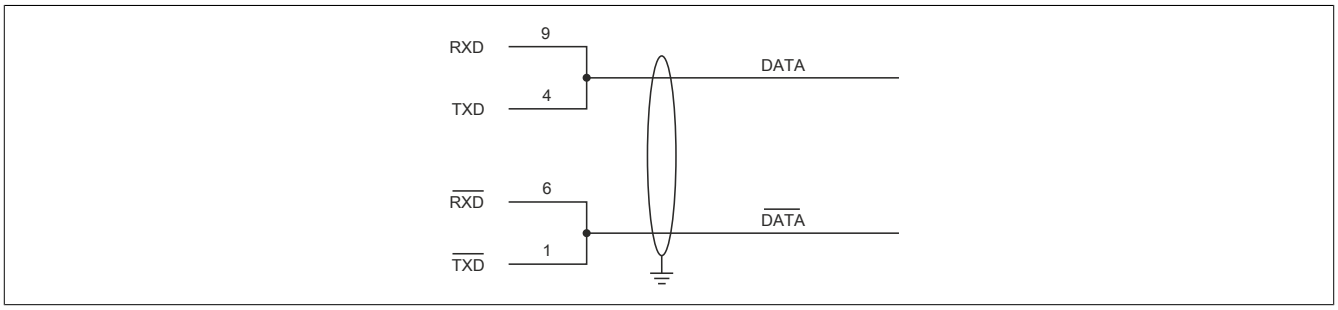


Figure 3: RS232/RS422/RS485 interface - Operation in RS485 mode

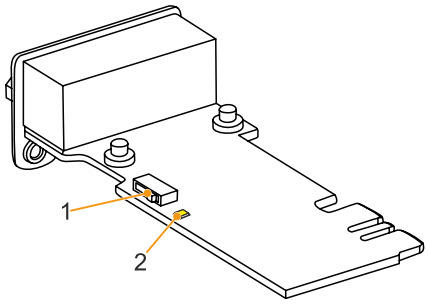
The RTS line must be switched by the driver for each transmission or reception; switching back does not take place automatically. This cannot be configured in Windows.

With long cable lengths, the voltage drop can result in greater potential differences between the bus devices, which can hinder communication. This can be improved by running the ground wire with the others.

The cable ends of an RS485 bus should be terminated (at least for longer cable lengths or higher transfer rates). Passive termination can normally be used by connecting the signal lines via a 120 Ω resistor at each of the two bus ends; see "Terminating resistor" for the IF card.

4.2.9.2.3.5 Terminating resistor

A terminating resistor for the serial interface is already integrated in the IF option. This can be switched on or off with a switch (1); it is necessary to open the system unit for this. A switched-on terminating resistor is indicated by a yellow LED (2).



4.2.9.2.4 Driver support

Drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com) (if required and not already included in the operating system).

Approved operating systems:

- Automation Runtime
- Linux for B&R
- Windows 10

4.2.9.3 5AC901.ICAN-01

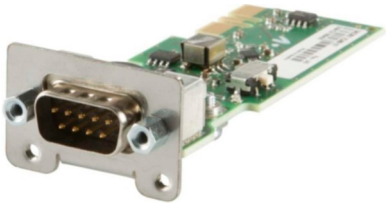
4.2.9.3.1 General information

Interface option 5AC901.ICAN-01 is equipped with a CAN bus master interface.

- 1x CAN bus master interface (SJA1000)
- Compatible with APC910/PPC900, APC3100/PPC3100 and APC4100

Simultaneous operation of 2 interface options with a legacy CAN interface in slots IF option 1 and IF option 2 is not possible.

4.2.9.3.2 Order data

Order number	Short description	Figure
	Interface options	
5AC901.ICAN-01	Interface card - 1x CAN interface (SJA1000) - For APC910/PPC900/APC3100/PPC3100/APC4100	

4.2.9.3.3 Technical data

Information:

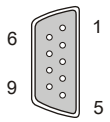
The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	5AC901.ICAN-01
General information	
B&R ID code	0xD84C
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]
EAC	Product family certification
Interfaces	
CAN	
Quantity	1
Controller	SJA1000
Variant	DSUB, 9-pin, male, galvanically isolated
Transfer rate	Max. 1 Mbit/s
Terminating resistor	
Type	Can be switched on and off with slide switch
Default setting	Off
Electrical properties	
Power consumption	0.5 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 60°C [2]
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
Mechanical properties	
Weight	Approx. 33 g

1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
2) For detailed information, see the temperature tables in the user's manual.

4.2.9.3.3.1 Pinout

CAN bus	
Variant	DSUB, 9-pin, male
Galvanic isolation	Yes
Transfer rate	Max. 1 Mbit/s
Bus length	Max. 1000 meters
Pin	**Pinout**
1	NC[1)]
2	CAN LOW
3	GND
4	NC
5	NC
6	Reserved
7	CAN HIGH
8	NC
9	NC



1) Not connected

4.2.9.3.3.2 I/O address and IRQ

Resource	Default setting	Function
I/O address	384h (address register)	Defines the register number to be accessed.
	385h (data register)	Access to the register defined in the address register.
IRQ	IRQ10	Interrupt

1) Resource allocation is identical for the interface option 1 and 2 slots.

4.2.9.3.3.3 Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see "Cable data" on page 224.

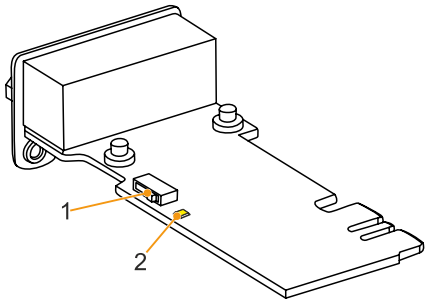
4.2.9.3.3.4 CAN driver settings

The baud rate can be set either with "predefined values" or via the "bit timing register".
For additional information, see www.br-automation.com in the B&R CAN driver user's manual.

Bit timing register 0	Bit timing register 1	Baud rate
00h	14h	1000 kbit/s
80h or 00h	1Ch	500 kbit/s
81h or 01h	1Ch	250 kbit/s
83h or 03h	1Ch	125 kbit/s
84h or 04h	1Ch	100 kbit/s
89h or 09h	1Ch	50 kbit/s

4.2.9.3.3.5 Terminating resistor

A terminating resistor for the CAN interface is already integrated in the IF option. This can be switched on or off with a switch (1); it is necessary to open the system unit for this. A switched-on terminating resistor is indicated by a yellow LED (2).



4.2.9.3.4 Driver support

Drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com) (if required and not already included in the operating system).

Approved operating systems:

- Linux for B&R
- Windows 10

4.2.9.4 5AC901.IETH-00

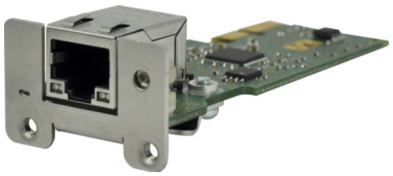
4.2.9.4.1 General information

Interface option 5AC901.IETH-00 is equipped with a 10/100/1000BASE-T Ethernet interface.

- 1x Ethernet interface 10/100/1000BASE-T
- Compatible with APC910/PPC900, APC3100/PPC3100 and APC4100

This interface option can only be operated in slot IF option 2.

4.2.9.4.2 Order data

Order number	Short description	Figure
	Interface options	
5AC901.IETH-00	Interface card - 1x ETH 10/100/1000 - For APC910/PPC900/ APC3100/PPC3100/APC4100	

4.2.9.4.3 Technical data

Information:

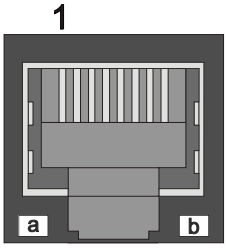
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AC901.IETH-00
General information	
B&R ID code	EC3C
Diagnostics	
Data transfer	Yes, using LED status indicator
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
DNV	Temperature: **B** (0 - 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck) [1]
LR	ENV3
KR	Yes
ABS	Yes
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
EAC	Product family certification
Interfaces	
Ethernet	
Quantity	1
Controller	Intel I210
Variant	RJ45, shielded
Transfer rate	10/100/1000 Mbit/s [2]
Line length	Max. 100 m between two stations (segment length)
Electrical properties	
Power consumption	1 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 55°C [3]
Storage	-20 to 60°C
Transport	-20 to 60°C

Order number	5AC901.IETH-00
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	Approx. 35 g

1) Yes, but applies only if all components installed in the complete system have this certification and are listed on the associated DNV certificate for the product family.
2) Switching takes place automatically.
3) For detailed information, see the temperature tables in the user's manual.

4.2.9.4.3.1 Pinout

Ethernet interface (ETH[1])		
Variant	RJ45, female	
Controller	Intel I210	
Wiring	S/STP (Cat 5e)	
Transfer rate	10/100/1000 Mbit/s[2]	
Cable length	Max. 100 m (min. Cat 5e)	
LED "Speed" (a)	**On**	**Off**
Green	100 Mbit/s	10 Mbit/s[3]
Orange (light)	1000 Mbit/s	-
LED "Link" (b)	**On**	**Active**
Orange (light)	Link (a connection to an Ethernet network exists)	Blinking (data being transferred)

1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
2) Switching takes place automatically.
3) The 10 Mbit/s transfer rate / connection is only available if LED "Link" is active at the same time.

4.2.9.4.4 Driver support

Drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com) (if required and not already included in the operating system).

Approved operating systems:

- Linux for B&R
- Windows 10

Information:

Necessary drivers must be downloaded from the B&R website, not from manufacturer websites.

Wake-on-LAN (WoL) and PXE boot are not supported.

4.2.9.5 5AC901.IPLK-00

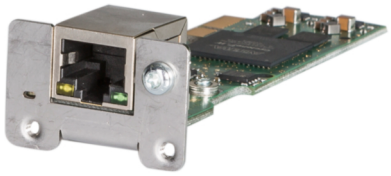
4.2.9.5.1 General information

Interface option 5AC901.IPLK-00 is equipped with 1 POWERLINK interface and 2 MB SRAM.

- 1x POWERLINK interface managing or controlled node
- 2 MB SRAM
- Compatible with APC910/PPC900, APC3100/PPC3100 and APC4100

This interface option can only be operated in the IF option 2 slot and is only supported by Automation Runtime.

4.2.9.5.2 Order data

Order number	Short description	Figure
	Interface options	
5AC901.IPLK-00	Interface card - 1x POWERLINK interface - 2 MB SRAM - For APC910/PPC900/APC3100/PPC3100/APC4100	

4.2.9.5.3 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

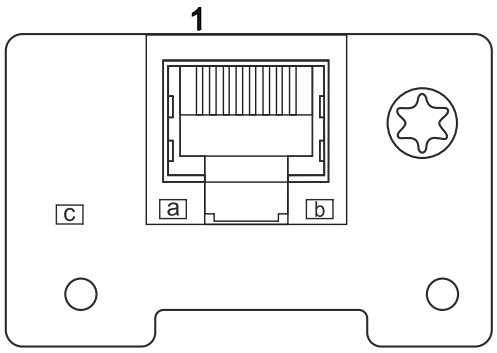
Order number	5AC901.IPLK-00
General information	
B&R ID code	0xE025
Diagnostics	
Data transfer	Yes, using LED status indicator
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]
DNV	Temperature: **B** (0 - 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck) [2]
LR	ENV3
KR	Yes
ABS	Yes
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
EAC	Product family certification
Controller	
SRAM	
Size	2 MB
Battery-backed	Yes (backup battery of the system unit)
Remanent variables in power failure mode	256 kB (for e.g. Automation Runtime, see Automation Help)
Interfaces	
POWERLINK	
Quantity	1
Type	Type 4 [3]
Variant	RJ45, shielded
Transfer rate	100 Mbit/s
Transfer	100BASE-TX
Line length	Max. 100 m between two stations (segment length)
Electrical properties	
Power consumption	1.5 W

Order number	5AC901.IPLK-00
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 55°C [4]
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
Mechanical properties	
Weight	Approx. 35 g

1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
2) Yes, but applies only if all components installed in the complete system have this certification and are listed on the associated DNV certificate for the product family.
3) For additional information, see Automation Help (Communication - POWERLINK - General information - Hardware - IF / LS).
4) For detailed information, see the temperature tables in the user's manual.

4.2.9.5.3.1 Pinout

POWERLINK		
Variant	RJ45, female	
Wiring	S/STP (Cat 5e)	
Cable length	Max. 100 m (min. Cat 5e)	
LED "Link" (a)	**On**	**Active**
Orange (light)	Link (a connection to a POWERLINK network exists)	Blinking (data being transferred)
(b)	-	
-		
LED "Status/Error" (c)	**On**	**Off**
Green/Red	POWERLINK status see "LED "S/E" (status/error LED)" on page 221	
-		



POWERLINK commissioning and operation

For a description of the operating modes, status and node numbers of the POWERLINK interface(s), see "LED "S/E" (status/error LED)" on page 221.

4.2.9.5.3.2 Driver support and firmware update

The driver is part of the Automation Runtime and the firmware is part of Automation Studio. The module is automatically brought up to this level.

To update the firmware contained in Automation Studio, a hardware upgrade must be performed (see **Project management / Workspace / Upgrades** in Automation Help).

4.2.9.6 5AC901.IRDY-00

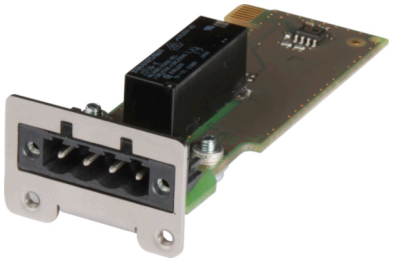
4.2.9.6.1 General information

Ready relay 5AC901.IRDY-00 is switched as soon as the B&R industrial PC has started up and all internal supply voltages are applied. It is possible to connect additional devices to the ready relay; they will also be switched on when the B&R industrial PC starts up.

- 1 normally closed contact, 1 normally open contact
- Compatible with APC910/PPC900, APC3100/PPC3100 and APC4100

Terminal block 0TB2104.8000 is not included in delivery and must be ordered separately.

4.2.9.6.2 Order data

Order number	Short description	Figure
	Interface options	
5AC901.IRDY-00	Interface card - Ready relay - For APC910/PPC900/APC3100/PPC3100/APC4100	
	Required accessories	
	Terminal blocks	
0TB2104.8000	Connector 24 VDC - 4-pin female - Screw clamp terminal block 2.5 mm²	

4.2.9.6.3 Technical data

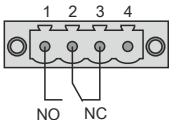
Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	5AC901.IRDY-00
General information	
B&R ID code	0xD84F
Ready relay	Normally open contact and normally closed contact, max. 30 VDC, max. 2 A
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
EAC	Product family certification
Electrical properties	
Power consumption	0.2 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 60°C [1]
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
Mechanical properties	
Weight	Approx. 30 g

1) For detailed information, see the temperature tables in the user's manual.

4.2.9.6.3.1 Pinout

Ready relay			
Variant	4-pin, male		
Pin	**Pinout**	**Description**	
1	NO	Normally open contact	
2	COM	Changeover contact	
3	NC	Normally closed contact	
4	NC[1)]		

1) Not connected.

4.2.9.7 5AC901.ISIO-00

4.2.9.7.1 General information

The ready relay function of IF option 5AC901.ISIO-00 can be controlled using the MTCX. Corresponding commands must be issued by the MTCX in order to switch the ready relay.

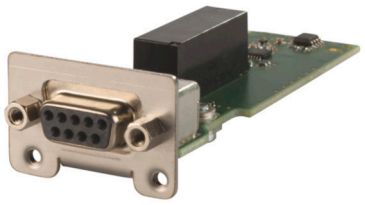
In addition to the ready relay function, the reset and power button as well as the power LED of the APC910/PPC900, APC3100/PPC3100 and APC4100 can be routed externally.

- Connections for the reset button and power buttons on the PC
- Connection for LED "Power" on the PC
- 1 normally closed contact, 1 normally open contact of the ready relay
- Control of the ready relay functions using MTCX commands
- Compatible with APC910/PPC900, APC3100/PPC3100 and APC4100

Unlike IF option 5AC901.IRDY-00, ready relay 5AC901.ISIO-00 is not automatically switched on or off if the power supply to the PC is switched on or off.

The maximum cable length for connecting the reset button, power button and LED "Power" is 2 m.

4.2.9.7.2 Order data

Order number	Short description	Figure
	Interface options	
5AC901.ISIO-00	Interface card - System I/O - For APC910/PPC900/APC3100/PPC3100/APC4100	

4.2.9.7.3 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	5AC901.ISIO-00
General information	
B&R ID code	0xE674
Ready relay	Normally open contact and normally closed contact, max. 30 VDC, max. 1 A
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
DNV	Temperature: **B** (0 - 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck) [1]
LR	ENV3
ABS	Yes
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
EAC	Product family certification
Electrical properties	
Power consumption	0.5 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 60°C [2]
Storage	-20 to 60°C
Transport	-20 to 60°C

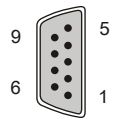
Order number	5AC901.ISIO-00
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	Approx. 30 g

1) Yes, but applies only if all components installed in the complete system have this certification and are listed on the associated DNV certificate for the product family.
2) For detailed information, see the temperature tables in the user's manual.

4.2.9.7.3.1 Pinout

Ready relay	
Cable length	Max. 2 meters
Pin	**Pinout**
1	Output LED ("Power") - Green
2	Output LED ("Power") - Red
3	GND
4	Input - Power button
5	Input - Reset button
6	Relay, normally open contact
7	Relay, normally closed contact
8	GND
9	COM relay, changeover contact

DSUB, 9-pin, female

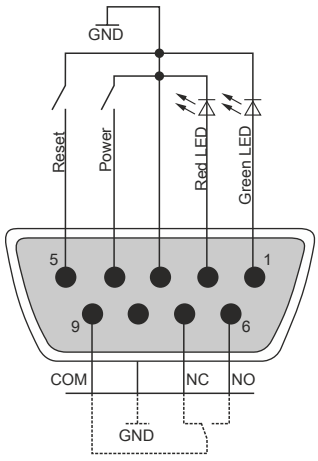


4.2.9.7.3.2 Connection example

Information:

Series resistors for the LEDs are already installed on the interface option.

The LED outputs are dimensioned for a typical LED current of 3.5 mA.



4.2.9.8 5AC901.ISRM-00

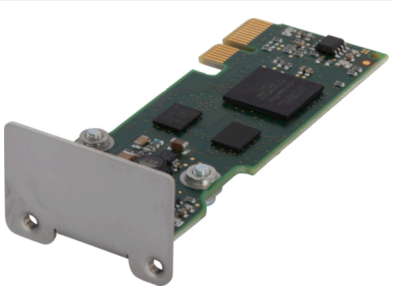
4.2.9.8.1 General information

Interface option 5AC901.ISRM-00 is equipped with 2 MB SRAM.

- 2 MB SRAM
- Compatible with APC910/PPC900, APC3100/PPC3100 and APC4100

This interface option can only be operated in slot IF option 2.

4.2.9.8.2 Order data

Order number	Short description	Figure
	Interface options	
5AC901.ISRM-00	Interface card - 2 MB SRAM - For APC910/PPC900/APC3100/PPC3100/APC4100	

4.2.9.8.3 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	5AC901.ISRM-00
General information	
B&R ID code	0xD850
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]
EAC	Product family certification
Controller	
SRAM	
Size	2 MB
Battery-backed	Yes (backup battery of the system unit)
Remanent variables in power failure mode	256 kB (for e.g. Automation Runtime, see Automation Help)
Electrical properties	
Power consumption	2 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 55°C [2]
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
Mechanical properties	
Weight	Approx. 20 g

1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
2) For detailed information, see the temperature tables in the user's manual.

4.2.9.9 5ACCIF04.FPLK-000

4.2.9.9.1 General information

Interface option 5ACCIF04.FPLK-000 is equipped with a POWERLINK interface.

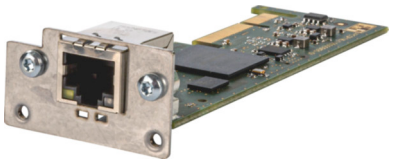
- 1x POWERLINK interface (managing or controlled node) for real-time communication
- Poll-response chaining
- Compatible with APC3100/PPC3100 and APC4100
- Easy installation in slot *IF option 3*.
- Support in Automation Runtime and Automation Studio: Both starting with V4.9

Simultaneous operation with another POWERLINK interface card (see IF option 2 slot)in slot *IF option 2* with different addressing is possible. This allows parallel data acquisition from two separate networks.

With poll-response chaining (PRC), the IF option 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.

This interface option can only be operated in the IF option 3 slot and is only supported by Automation Runtime.

4.2.9.9.2 Order data

Order number	Short description	Figure
	Interface options	
5ACCIF04.FPLK-000	Interface card - 1x POWERLINK interface - For APC3100/ PPC3100/APC4100	

4.2.9.9.3 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

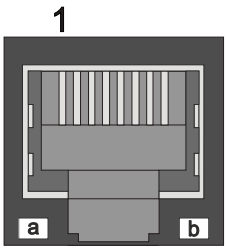
Order number	5ACCIF04.FPLK-000
General information	
B&R ID code	0xFC5E
Diagnostics	
Data transfer	Yes, using LED status indicator
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
Interfaces	
POWERLINK	
Quantity	1
Type	Type 4 [1)]
Variant	RJ45, shielded
Transfer rate	100 Mbit/s
Transfer	100BASE-TX
Line length	Max. 100 m between two stations (segment length)
Electrical properties	
Power consumption	1.5 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 55 °C
Storage	-20 to 60°C
Transport	-20 to 60°C

Order number	5ACCIF04.FPLK-000
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	Approx. 25 g

1) For additional information, see Automation Help (Communication - POWERLINK - General information - Hardware - IF / LS).

4.2.9.9.3.1 Pinout

The POWERLINK interface is available in the IF option 3 slot.

POWERLINK interface			
Variant	RJ45, female		
Wiring	S/STP (Cat 5e)		
Cable length	Max. 100 m (min. Cat 5e)		
LED "Link" (a)	**On**	**Active**	
Orange (light)	Link (a connection to a POWERLINK network exists)	Blinking (data being transferred)	
LED "Status" (b)	**On**	**Off**	
Green/Red	POWERLINK status see "LED "S/E" (status/error LED)" on page 221		

POWERLINK commissioning and operation

For a description of the operating modes, status and node numbers of the POWERLINK interface(s), see "LED "S/E" (status/error LED)" on page 221.

4.2.9.9.3.2 Driver support and firmware update

To ensure the functionality of the interface option, the following minimum versions must be used:

- Automation Studio: V4.9

The driver is part of the Automation Runtime and the firmware is part of Automation Studio. The module is automatically brought up to this level.

To update the firmware contained in Automation Studio, a hardware upgrade must be performed (see **Project management / Workspace / Upgrades** in Automation Help).

4.2.10 Graphics options

Information:

Graphics options can only be operated in the IF option 3 slot.

4.2.10.1 5ACCLI05.SDL4-000

4.2.10.1.1 General information

The graphics option is equipped with an SDL4 interface.

- SDL4 interface
- Compatible with APC4100

4.2.10.1.2 Order data

Order number	Short description	Figure
	Graphics options	
5ACCLI05.SDL4-000	Graphics option - 1x SDL4 transmitter - For APC4100	
	Required accessories	
	Accessories	
5ACCMBMS.0000-000	APC4100 Montagebügel - IF3 Option	

Table 54: 5ACCLI05.SDL4-000 - Order data

4.2.10.1.3 Technical data

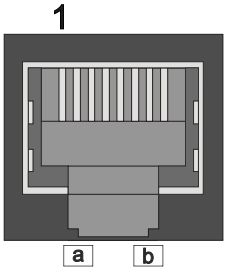
Order number	5ACCLI05.SDL4-000
General information	
LEDs	Status, Link
B&R ID code	0x2E9D
Certifications	
CE	In preparation
UL	In preparation
Interfaces	
SDL4 Out	
Variant	RJ45, shielded
Type	SDL4
Electrical properties	
Power consumption	4.5 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 60°C [1)]
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing

Table 55: 5ACCLI05.SDL4-000 - Technical data

1) For detailed information, see the temperature tables in the user's manual.

4.2.10.1.3.1 SDL4 interface

The SDL4 interface is a female RJ45 connector and operated with SDL4 transmission technology.

SDL4 LEDs				
Description				Figure
Variant	RJ45, female			
Resolution	Max. 1920 x 1080			
Wiring	Cat 6a min.			
Cable length	Max. 100 m			
LEDs				
LED	**Color**	**Status**	**Explanation**	
Link (a)	Yellow	On	Indicates an active SDL4 connection.	
		Off	No active SDL4 connection.	
Status (b)	Yellow	On	The SDL4 connection is established and OK.	
		Blinking	No active SDL4 connection.	
-				

Information:

Hot plugging output devices on the interface for service purposes is supported by the hardware and graphic drivers of approved operating systems. Recalibration may be required for touch screen devices.

A maximum of 500 mating cycles are specified for this interface.

4.2.10.2 5ACCLI02.DPO0-000

4.2.10.2.1 General information

Graphics option 5ACCLI02.DPO0-000 is equipped with a DisplayPort and USB 2.0 interface.

- DisplayPort interface
- USB 2.0 interface
- Compatible with APC3100/PPC3100/APC4100

4.2.10.2.2 Order data

Order number	Short description	Figure
	Graphics options	
5ACCLI02.DPO0-000	Graphics option - 1x DisplayPort transmitter (version 1.2) - For APC3100/PPC3100/APC4100	

4.2.10.2.3 Technical data

Information:

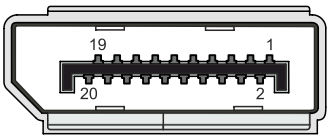
The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	5ACCLI02.DPO0-000
General information	
B&R ID code	0xEEE6
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]
EAC	Product family certification
Interfaces	
USB	
Quantity	1
Type	USB 2.0
Variant	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s)
Current-carrying capacity	Max. 0.5 A
DisplayPort	
Quantity	1
Version	1.2
Electrical properties	
Power consumption	3 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 60°C [2]
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
Mechanical properties	
Weight	Approx. 27 g

1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
2) For detailed information, see the temperature tables in the user's manual.

4.2.10.2.3.1 DisplayPort interface

The DisplayPort interface is 20-pin (female) and can be operated with DisplayPort, DVI or HDMI transmission technologies.



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

Information:

Hot plugging output devices on the interface for service purposes is supported by the hardware and graphic drivers of approved operating systems.

A maximum of 10,000 mating cycles are specified for this interface.

4.2.11 Front covers

4.2.11.1 5AC901.FF0x-00

4.2.11.1.1 General information

The front cover serves as protection against contamination for the interfaces on the front of the Automation PC 4100. There are 2 options available per slot variant.

> **Information:**
>
> **The front cover is not included with the system unit and must be ordered separately.**

4.2.11.1.2 Order data

Order number	Short description	Figure
	Front cover	
5ACCFF04.0000-000	Front cover 0-slot APC4100 - Orange	
5ACCFF04.0000-001	Front cover for 0-slot APC4100 - Dark gray	
5ACCFF04.0100-000	Front cover 1-slot APC4100 - Orange	
5ACCFF04.0100-001	Front cover for 1-slot APC4100 - Dark gray	
5ACCFF04.0200-000	Front cover 2-slot APC4100 - Orange	
5ACCFF04.0200-001	Front cover for 2-slot APC4100 - Dark gray	
5ACCFF04.0300-000	Front cover 3-slot APC4100 - Orange	
5ACCFF04.0300-001	Front cover for 3-slot APC4100 - Dark gray	

4.2.11.1.3 Technical data

> **Information:**
>
> **The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.**

Order number	5ACCFF04.0000-000	5ACCFF04.0000-001	5ACCFF04.0100-000	5ACCFF04.0100-001
General information				
Certifications				
CE	Yes		In preparation	
UL	In preparation			
Mechanical properties				
Housing				
Front cover	Dyed orange plastic (similar to Pantone 144C)	Dyed dark gray plastic (similar to Pantone 432C)	Dyed orange plastic (similar to Pantone 144C)	Dyed dark gray plastic (similar to Pantone 432C)
Material	Plastic			
Dimensions				
Width	65 mm		91 mm	
Height	226 mm			
Depth	7.5 mm			
Weight	46 g		In preparation	

Order number	5ACCFF04.0200-000	5ACCFF04.0200-001	5ACCFF04.0300-000	5ACCFF04.0300-001
General information				
Certifications				
CE	In preparation			
UL	In preparation			
Mechanical properties				
Housing				
Front cover	Dyed orange plastic (similar to Pantone 144C)	Dyed dark gray plastic (similar to Pantone 432C)	Dyed orange plastic (similar to Pantone 144C)	Dyed dark gray plastic (similar to Pantone 432C)
Material	Plastic			
Dimensions				
Width	111 mm		132 mm	
Height	226 mm			
Depth	7.5 mm			
Weight	In preparation		92 g	

4.2.12 Uninterruptible power supply (UPS)

With the optionally integrated UPS, the B&R industrial PC ensures that the PC system can complete write operations even after a power failure occurs. If the UPS detects a power failure, it switches to battery operation immediately without interruption. All running programs are properly exited by the UPS software. The possibility of inconsistent data is eliminated (only works if the UPS has already been configured and the driver is enabled).

Information:

- **An external panel or monitor is not buffered by the UPS and will fail if a power failure occurs.**

Because the charging circuit is integrated in the housing of the B&R industrial PC, installation has been reduced to simply attaching the connection cable to the battery unit installed next to the PC.

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

4.2.12.1 Requirements

- A suitable system unit
- UPS IF option 5AC901.IUPS-00 or 5AC901.IUPS-01
- Battery unit 5AC901.BUPS-00 or 5AC901.BUPS-01
- UPS connection cable 5CAUPS.00xx-01
- Configuration of the B&R UPS using ADI

Warning!

Battery unit 5AC901.BUPS-00 is only permitted to be operated with UPS IF option 5AC901.IUPS-00!

Battery unit 5AC901.BUPS-01 is only permitted to be operated with UPS IF option 5AC901.IUPS-01!

4.2.12.2 5AC901.IUPS-00

4.2.12.2.1 General information

UPS IF option 5AC901.IUPS-00 used together with battery unit 5AC901.BUPS-00 allows the B&R industrial PC to be switched off properly without data loss during a power failure.

This interface option can only be operated in slot IF option 1.

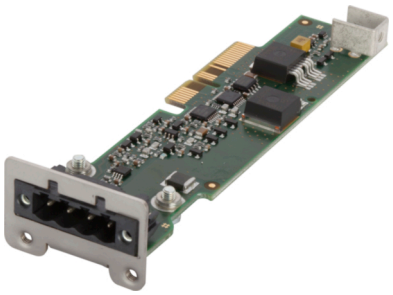
Warning!

UPS IF option 5AC901.IUPS-00 is only permitted to be operated with battery unit 5AC901.BUPS-00!

Information:

If the system is in power saving mode (S5: soft-off or S4: hibernate/suspend-to-disk), then the internal UPS interface option charges the connected battery unit. The system's internal power supplies are active during this procedure. This allows various actions to be performed (e.g. opening the tray of the built-in slide-in DVD drive).

4.2.12.2.2 Order data

Order number	Short description	Figure
	Uninterruptible power supply	
5AC901.IUPS-00	UPS - For 4.5 Ah battery	
	Required accessories	
	Uninterruptible power supply	
5AC901.BUPS-00	Battery unit 4.5 Ah - For UPS 5AC901.IUPS-00	
5CAUPS.0005-01	UPS cable - 0.5 m - For 5AC901.IUPS-xx	
5CAUPS.0010-01	UPS cable - 1 m - For 5AC901.IUPS-xx	
5CAUPS.0013-01	UPS cable - 1.3 m - For 5AC901.IUPS-xx	
5CAUPS.0030-01	UPS cable - 3 m - For 5AC901.IUPS-xx	

4.2.12.2.3 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

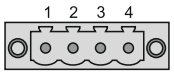
Order number	5AC901.IUPS-00
General information	
B&R ID code	0xD851
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1)]
EAC	Product family certification
Electrical properties	
Power consumption	Max. 30 W at 1 A
Deep discharge protection	Yes
Short-circuit proof	Yes [2)]
Battery charging data	
Charging current	Typ. 1 A
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 55°C [3)]
Storage	-20 to 60°C
Transport	-20 to 60°C

Order number	5AC901.IUPS-00
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	Approx. 28 g

1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
2) The interface option is short-circuit proof. This value does not apply to the connected battery unit.
3) For detailed information, see the temperature tables in the user's manual.

4.2.12.2.3.1 Pinout

UPS interface		
Variant	4-pin, male	
Pin	**Pinout**	
1	Temperature sensor	
2	Temperature sensor	
3	-	
4	+	



4.2.12.2.4 Installation

This module is installed using the materials included in delivery. For additional information about installation, see section "Installing the interface option" on page 200.

4.2.12.3 5AC901.IUPS-01

4.2.12.3.1 General information

UPS IF option 5AC901.IUPS-01 used together with battery unit 5AC901.BUPS-01 allows the B&R industrial PC to be switched off properly without data loss during a power failure.

This interface option can only be operated in slot IF option 1.

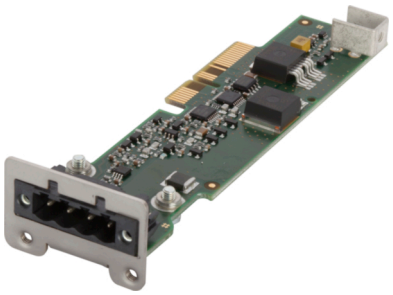
Warning!

UPS IF option 5AC901.IUPS-01 is only permitted to be operated with battery unit 5AC901.BUPS-01!

Information:

If the system is in power saving mode (S5: soft-off or S4: hibernate/suspend-to-disk), then the internal UPS interface option charges the connected battery unit. The system's internal power supplies are active during this procedure. This allows various actions to be performed (e.g. opening the tray of the built-in slide-in DVD drive).

4.2.12.3.2 Order data

Order number	Short description	Figure
	Uninterruptible power supply	
5AC901.IUPS-01	UPS - For 2.2 Ah battery	
	Required accessories	
	Uninterruptible power supply	
5AC901.BUPS-01	Battery unit 2.2 Ah - For UPS 5AC901.IUPS-01	
5CAUPS.0005-01	UPS cable - 0.5 m - For 5AC901.IUPS-xx	
5CAUPS.0010-01	UPS cable - 1 m - For 5AC901.IUPS-xx	
5CAUPS.0013-01	UPS cable - 1.3 m - For 5AC901.IUPS-xx	
5CAUPS.0030-01	UPS cable - 3 m - For 5AC901.IUPS-xx	

4.2.12.3.3 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

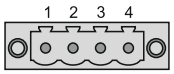
Order number	5AC901.IUPS-01
General information	
B&R ID code	0xDF84
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1)]
EAC	Product family certification
Electrical properties	
Power consumption	Max. 25 W at 0.9 A
Deep discharge protection	Yes
Short-circuit proof	Yes [2)]
Battery charging data	
Charging current	Typ. 0.88 A
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 55°C [3)]
Storage	-20 to 60°C
Transport	-20 to 60°C

Order number	5AC901.IUPS-01
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	Approx. 28 g

1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
2) The interface option is short-circuit proof. This value does not apply to the connected battery unit.
3) For detailed information, see the temperature tables in the user's manual.

4.2.12.3.3.1 Pinout

UPS interface		
Variant	4-pin, male	
Pin	**Pinout**	
1	Temperature sensor	
2	Temperature sensor	
3	-	
4	+	



4.2.12.3.4 Installation

This module is installed using the materials included in delivery. For additional information about installation, see section "Installing the interface option" on page 200.

4.2.12.4 5AC901.BUPS-00

4.2.12.4.1 General information

- Battery unit for UPS IF option 5AC901.IUPS-00
- Single-cell rechargeable battery
- 2 Hawker Cyclon 12 V, 4.5 Ah rechargeable batteries connected in series
- Rated voltage 24 V
- Capacity 4.5 Ah

The battery unit is subject to wear and should be replaced regularly (after the specified service life at the latest).

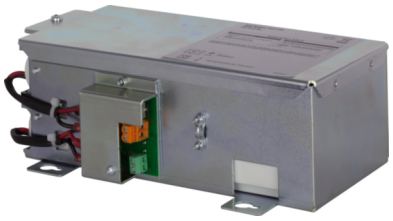
Warning!

Battery unit 5AC901.BUPS-00 is only permitted to be operated with UPS IF option 5AC901.IUPS-00!

Information:

If the max. specified temperature limits of the battery unit are overshot or undershot, the temperature alarm of the battery unit is set. Battery backing is no longer provided if the temperature alarm for the battery unit is active. The battery is also no longer charged since this can result in damage to the battery. This temperature alarm is defined with a hysteresis of 5°C, i.e. the temperature alarm is only cleared again if the minimum temperature limit is again overshot by this hysteresis or the maximum temperature limit is again undershot by this hysteresis. The temperature or temperature alarm of the battery unit is not only monitored and checked at runtime, but also when the system is powered on; it can be evaluated using the B&R ADI library.

4.2.12.4.2 Order data

Order number	Short description	Figure
	Uninterruptible power supply	
5AC901.BUPS-00	Battery unit 4.5 Ah - For UPS 5AC901.IUPS-00	
	Required accessories	
	Uninterruptible power supply	
5CAUPS.0005-01	UPS cable - 0.5 m - For 5AC901.IUPS-xx	
5CAUPS.0010-01	UPS cable - 1 m - For 5AC901.IUPS-xx	
5CAUPS.0013-01	UPS cable - 1.3 m - For 5AC901.IUPS-xx	
5CAUPS.0030-01	UPS cable - 3 m - For 5AC901.IUPS-xx	

4.2.12.4.3 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

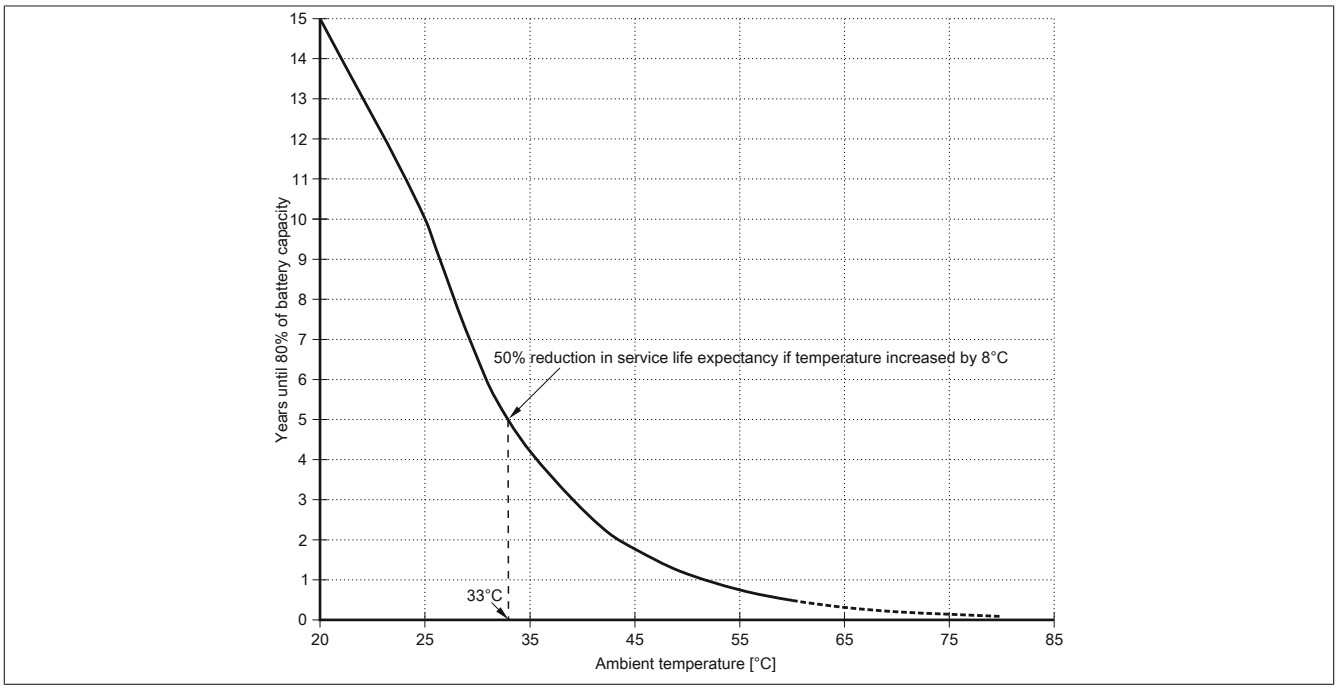
Order number	5AC901.BUPS-00
General information	
B&R ID code	0xD82E
Battery	
Type	Hawker Cyclon 12 V, 4.5 Ah, two rechargeable batteries connected in series
Service life	Up to 15 years at 20°C / 10 years at 25°C [1]
Variant	Single cell (VRLA)
Temperature sensor	NTC resistance
Service interval during storage	Charge 1 time every 6 months
Charge duration when battery low	Typ. 7 hours
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [2]
EAC	Product family certification
Electrical properties	
Nominal voltage	24 V

Order number	5AC901.BUPS-00
Capacity	4.5 Ah
Fuse	Yes
Battery charging data	
Charging current 3)	Typ. 1 A
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	-30 to 60°C 4)
Storage	-65 to 80°C
Transport	-65 to 80°C
Relative humidity	
Operation	5 to 95%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Elevation	
Operation	Max. 3000 m
Mechanical properties	
Dimensions	
Width	223.2 mm
Height	78.2 mm
Depth	145 mm
Weight	Approx. 4600 g

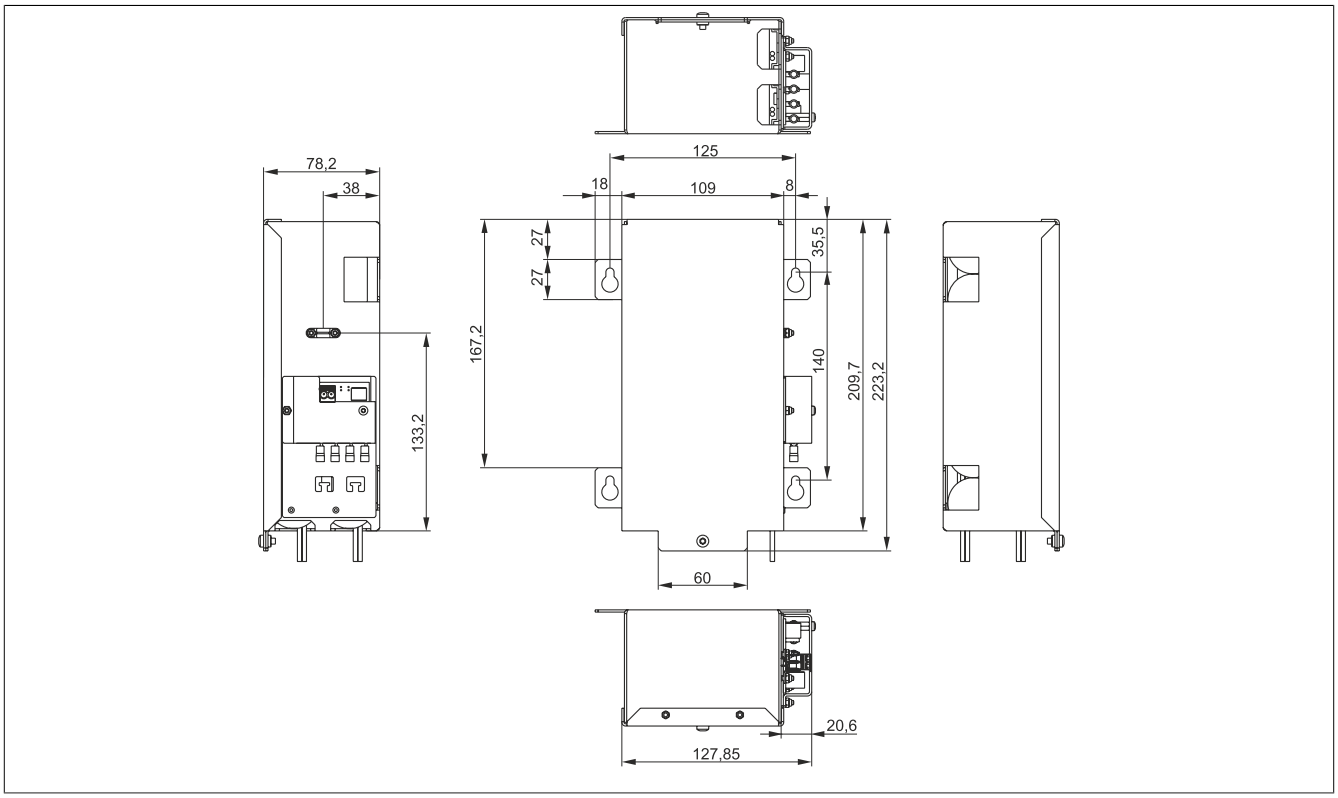
1) Depends on the charging and discharging cycles (up to 80% battery capacity).
2) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
3) Maximum charging current.
4) Battery backing is no longer provided if the temperature undershoots the minimum temperature or overshoots the maximum temperature. The battery is also no longer charged since this can result in damage to the battery.

4.2.12.4.4 Service life

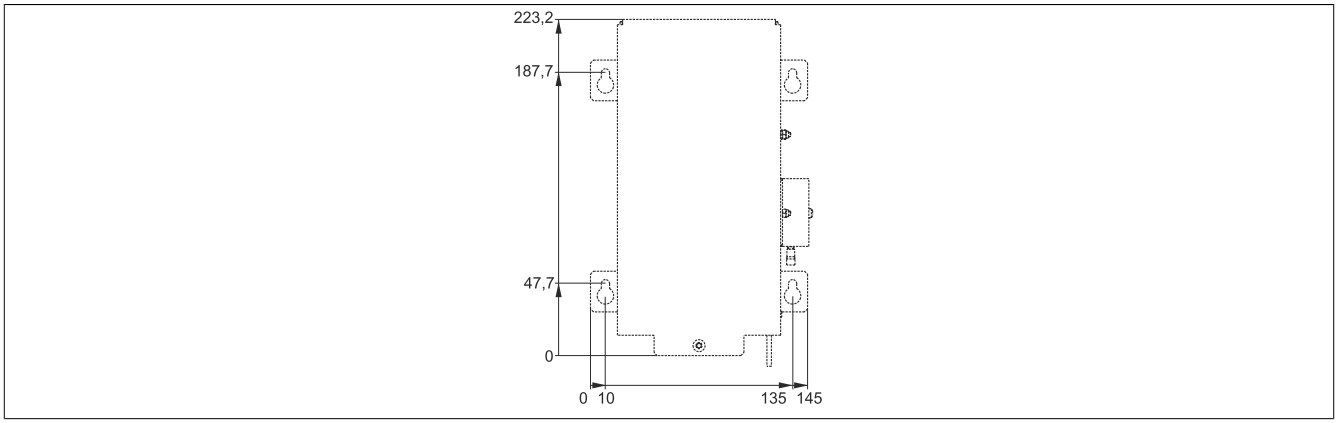
The following diagram shows the relationship between ambient temperature and service life.



4.2.12.4.5 5AC901.BUPS-00 - Dimensions



4.2.12.4.6 5AC901.BUPS-00 - Drilling template



4.2.12.4.7 Installation

For information about installation and connecting to the UPS IF option, see section "Installing and connecting the UPS battery unit" on page 207.

4.2.12.4.8 Precautions for handling and use

Spills and leaks:

Further leakage must be prevented. Smaller spills must be bonded with dry sand, dirt and vermiculite. The use of flammable materials is not permitted. If possible, neutralize acids with sodium bicarbonate, chalk, etc. Acid-resistant clothing, shoes, gloves as well as acid-resistant face protection must be worn. The disposal of unneutralized acid in the sewage system is prohibited!

Waste disposal:

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

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

Handling and storage:

- Store in cool, dry and well-ventilated rooms with impermeable surfaces and appropriate containment conditions in case of leakage.
- Protect from adverse weather conditions and separate from incompatible materials during storage and transport.
- A sufficient supply of water must be located nearby.
- Prevent damage to containers in which batteries and rechargeable batteries are stored and transported.
- Keep away from fire, sparks and heat.

4.2.12.5 5AC901.BUPS-01

4.2.12.5.1 General information

- Battery unit for UPS IF option 5AC901.IUPS-01
- Maintenance-free lead acid rechargeable battery
- 2x 12 V, 2.2 Ah rechargeable batteries connected in series
- Rated voltage 24 V
- Capacity 2.2 Ah

The battery unit is subject to wear and should be replaced regularly (after the specified service life at the latest).

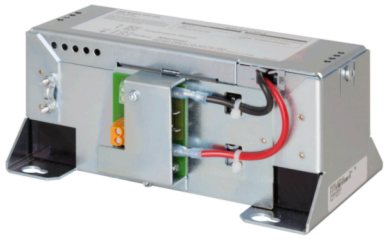
Warning!

Battery unit 5AC901.BUPS-01 is only permitted to be operated with UPS IF option 5AC901.IUPS-01!

Information:

If the max. specified temperature limits of the battery unit are overshot or undershot, the temperature alarm of the battery unit is set. Battery backing is no longer provided if the temperature alarm for the battery unit is active. The battery is also no longer charged since this can result in damage to the battery. This temperature alarm is defined with a hysteresis of 5°C, i.e. the temperature alarm is only cleared again if the minimum temperature limit is again overshot by this hysteresis or the maximum temperature limit is again undershot by this hysteresis. The temperature or temperature alarm of the battery unit is not only monitored and checked at runtime, but also when the system is powered on; it can be evaluated using the B&R ADI library.

4.2.12.5.2 Order data

Order number	Short description	Figure
	Uninterruptible power supply	
5AC901.BUPS-01	Battery unit 2.2 Ah - For UPS 5AC901.IUPS-01	
	Required accessories	
	Uninterruptible power supply	
5CAUPS.0005-01	UPS cable - 0.5 m - For 5AC901.IUPS-xx	
5CAUPS.0010-01	UPS cable - 1 m - For 5AC901.IUPS-xx	
5CAUPS.0013-01	UPS cable - 1.3 m - For 5AC901.IUPS-xx	
5CAUPS.0030-01	UPS cable - 3 m - For 5AC901.IUPS-xx	

4.2.12.5.3 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

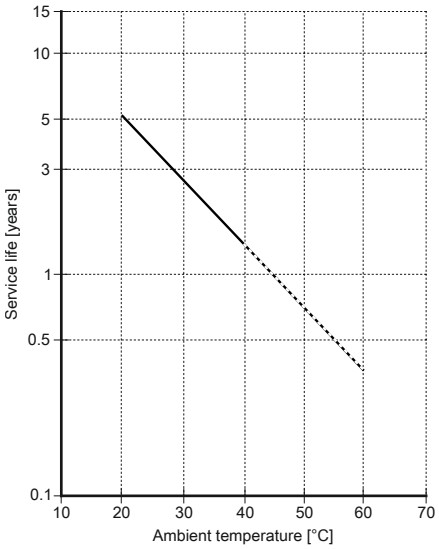
Order number	5AC901.BUPS-01
General information	
B&R ID code	0xDF83
Battery	
Type	12 V, 2.2 Ah, two rechargeable batteries connected in series
Service life	Up to 5 years at 20°C [1]
Variant	Maintenance-free lead acid battery (VRLA)
Temperature sensor	NTC resistance
Service interval during storage	Charge 1 time every 6 months
Charge duration when battery low	Typ. 5 hours
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [2]
EAC	Product family certification

Order number	5AC901.BUPS-01
Electrical properties	
Nominal voltage	24 V
Capacity	2.2 Ah
Fuse	Yes
Battery charging data	
Charging current [3]	Typ. 0.88 A
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 40°C [4]
Storage	-15 to 40°C
Transport	-15 to 40°C
Relative humidity	
Operation	25 to 85%, non-condensing
Storage	25 to 85%, non-condensing
Transport	25 to 85%, non-condensing
Elevation	
Operation	Max. 3000 m
Mechanical properties	
Dimensions	
Width	188 mm
Height	78 mm
Depth	115 mm
Weight	Approx. 2550 g

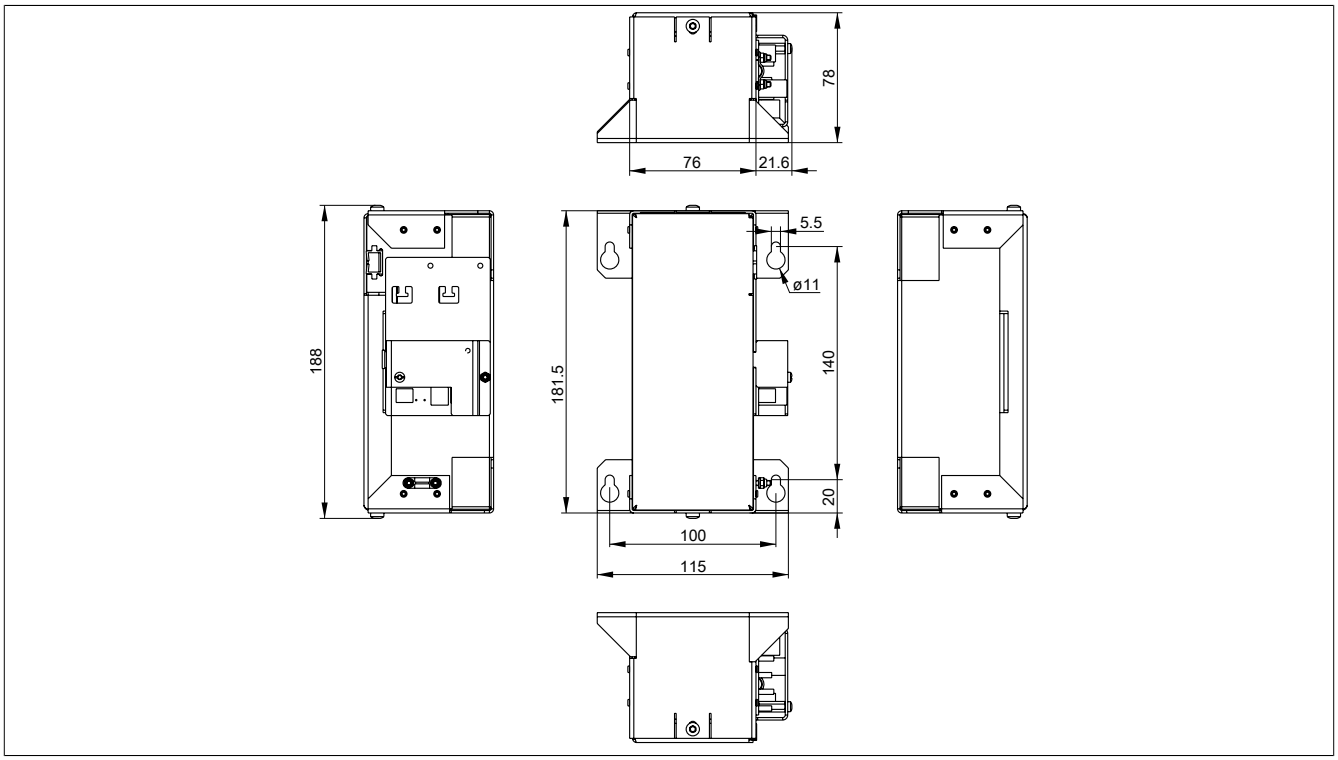
1) Depends on the charging and discharging cycles.
2) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
3) Maximum charging current.
4) Battery backing is no longer provided if the temperature undershoots the minimum temperature or overshoots the maximum temperature. The battery is also no longer charged since this can result in damage to the battery.

4.2.12.5.4 Service life

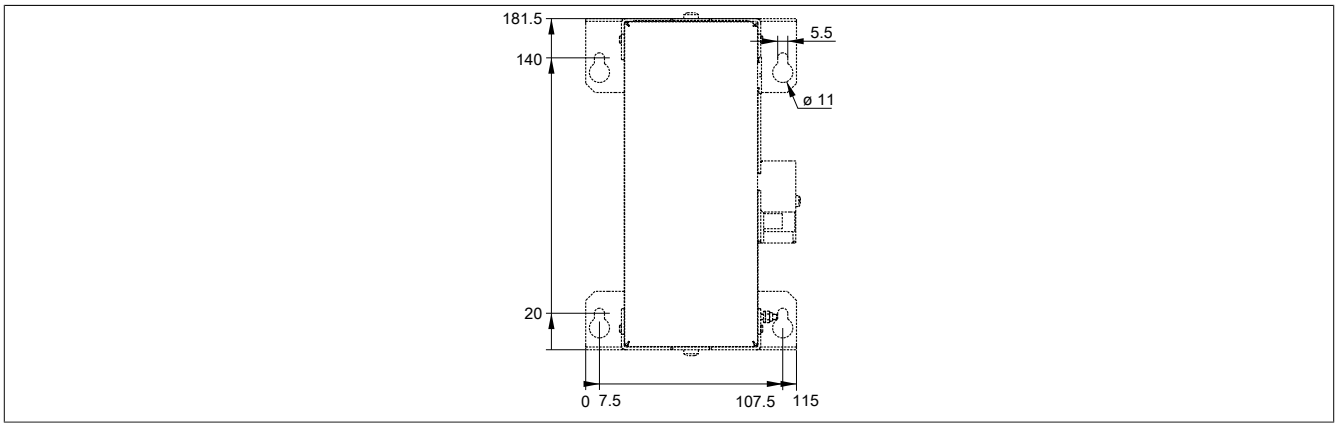
The following diagram shows the relationship between ambient temperature and service life.



4.2.12.5.5 5AC901.BUPS-01 - Dimensions



4.2.12.5.6 5AC901.BUPS-01 - Drilling template



4.2.12.5.7 Installation

For information about installation and connecting to the UPS IF option, see section "Installing and connecting the UPS battery unit" on page 207.

4.2.12.5.8 Precautions for handling and use

Spills and leaks:

Further leakage must be prevented. Smaller spills must be bonded with dry sand, dirt and vermiculite. The use of flammable materials is not permitted. If possible, neutralize acids with sodium bicarbonate, chalk, etc. Acid-resistant clothing, shoes, gloves as well as acid-resistant face protection must be worn. The disposal of unneutralized acid in the sewage system is prohibited!

Waste disposal:

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

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

Handling and storage:

- Store in cool, dry and well-ventilated rooms with impermeable surfaces and appropriate containment conditions in case of leakage.
- Protect from adverse weather conditions and separate from incompatible materials during storage and transport.
- A sufficient supply of water must be located nearby.
- Prevent damage to containers in which batteries and rechargeable batteries are stored and transported.
- Keep away from fire, sparks and heat.

4.2.12.6 5CAUPS.xxxx-01

4.2.12.6.1 General information

The UPS connection cable establishes the connection between the UPS interface option and battery unit.

4.2.12.6.2 Order data

Order number	Short description	Figure
	Uninterruptible power supply	
5CAUPS.0005-01	UPS cable - 0.5 m - For 5AC901.IUPS-xx	
5CAUPS.0010-01	UPS cable - 1 m - For 5AC901.IUPS-xx	
5CAUPS.0013-01	UPS cable - 1.3 m - For 5AC901.IUPS-xx	
5CAUPS.0030-01	UPS cable - 3 m - For 5AC901.IUPS-xx	

4.2.12.6.3 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	5CAUPS.0005-01	5CAUPS.0010-01	5CAUPS.0013-01	5CAUPS.0030-01
General information				
Certifications				
CE	Yes			
UKCA	Yes			
UL	cULus E115267 Industrial control equipment			
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]			
Cable construction				
Wire cross section	2x 0.5 mm² (20 AWG) 2x 2.5 mm² (13 AWG)			
Conductor resistance	At 0.5 mm² max. 39 Ω/km At 2.5 mm² max. 7.98 Ω/km [2]			
Outer jacket				
Material	Thermoplastic PVC-based material			
Color	Window gray (similar to RAL 7040)			
Connector				
Type	4-pin screw clamp terminal block [3]			
Electrical properties				
Operating voltage	Max. 30 VDC			
Peak operating voltage	Typ. 30 VDC			
Test voltage				
Wire - Wire	1500 V			
Current-carrying capacity	10 A at 20°C			
Operating conditions				
Pollution degree per EN 61131-2	Pollution degree 2			
Ambient conditions				
Temperature				
Moving	-5 to 70°C			
Static	-30 to 70°C			
Mechanical properties				
Dimensions				
Length	0.5 m	1 m	1.3 m	3 m
Diameter	7 mm			
Bend radius				
Moving	10x wire diameter		10x line diameter	10x wire diameter
Fixed installation	5x wire diameter		5x line diameter	5x wire diameter
Weight	Approx. 55 g	Approx. 100 g	Approx. 130 g	Approx. 250 g

1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
2) At an ambient temperature of 20°C.
3) Tightening torque: Min. 0.4 Nm, max. 0.5 Nm

Information:

The maximum length of the UPS connection cable depends on the following:

- **Power output**
- **Voltage drop**
- **Wire cross section**
- **Sensor line**

4.2.12.6.4 Installation

For information about connecting the cable to the battery unit, see section "Installing and connecting the UPS battery unit" on page 207.

4.2.13 Battery compartment

4.2.13.1 5ACCBT02.0000-000

4.2.13.1.1 General information

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

The battery is subject to wear and must be replaced if the battery capacity is insufficient.

4.2.13.1.2 Order data

Order number	Short description	Figure
	Battery tray	
5ACCBT02.0000-000	Battery compartment - Including battery - For APC4100	

Table 71: 5ACCBT02.0000-000 - Order data

4.2.13.1.3 Technical data

Order number	5ACCBT02.0000-000
General information	
Note	Battery compartment including battery
Certifications	
CE	Yes
UL	In preparation
Electrical properties	
Operating voltage	3 V
Capacity	1000 mAh
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	-40 to 125°C
Relative humidity	
Operation	0 to 95%
Storage	0 to 95%
Transport	0 to 95%
Vendor information	
Manufacturer	Panasonic

Table 72: 5ACCBT02.0000-000 - Technical data

5 Installation and wiring

5.1 Basic information

A damaged device has unpredictable properties and states. The unintentional installation or startup of a damaged device must be prevented. The damaged device must be marked as such and made inaccessible, or it must be returned for repairs immediately.

Unpacking

The following activities must be performed before unpacking the device:

- Check the packaging for visible transport damage.
- If transport damage is noticeable, document this immediately and submit a complaint. If possible, have the damage confirmed by the carrier/delivery service.
- Check the contents of the shipment for completeness and damage.
- If the contents of the packaging are incomplete, damaged or do not correspond to the order, the responsible sales office or B&R Headquarters must be informed immediately.
- The information in section "Protection against electrostatic discharge" on page 7 must be observed for unpacked devices and components.
- Keep the original packaging for further transport.

Power supply

The following information is generally applicable and should be observed before performing any work on the device:

- The entire power supply must be disconnected before removing any covers or components from the device and installing or removing any accessories, hardware or cables.
- Remove the power cable from the device and from the power supply.
- All covers and components, accessories, hardware and cables must be installed or secured before the device is connected to the power supply and switched on.

Caution!

Energy regeneration is not permitted and can cause damage or the device to become defective. Built-in or connected peripheral devices (e.g. USB hubs) are not permitted to introduce any voltage into the device.

Installation

Information:

Optional sets are available that contain all necessary tools for installation. For additional information about tool sets, see section "Installation accessories" on page 210.

Before installation

The following activities and limitations must be observed before installing the device.

- Allow sufficient space for installation, operation and maintenance of the device.
- The device must be installed on a flat, clean and burr-free surface.
- The wall or control cabinet panel must be able to support four times the total weight of the device. If necessary, bracing must be attached to reinforce the mounting surface.

  #### Caution!

  If the load-bearing capacity of the mounting surface is insufficient, or if the fastening material is inadequate or incorrect, the device may fall and become damaged.

- To avoid overheating, the device is not permitted to be placed near other heat sources.

Information about the device's environment

- Observe the notes and regulations regarding the power supply and functional ground.
- Observer the specified bend radius when connecting cables.
- Ventilation openings are not permitted to be covered or blocked.
- The device is only permitted to be operated in closed rooms and not permitted to be exposed to direct sunlight.
- The climatic ambient conditions and environmental conditions must be taken into account – see "Environmental properties" on page 23.

General installation instructions

- Inclined installation reduces the air convection through the device and thus the maximum permissible ambient temperature for operation. If there is sufficient external ventilation in an inclined mounting orientation, the maximum permissible ambient temperature must be checked in each individual case. Failure to do so may result in damage to the equipment and void the certifications and warranty for the device.
- When installing the device, the permissible mounting orientations must be observed - Mounting orientations.
- When connecting installed or connected peripherals, follow the instructions in the peripheral device's documentation.

Transport and storage

Condensation may form under certain environmental conditions or rapid climatic changes. For improved acclimatization and to avoid damage, the device must be slowly adapted to the room temperature.

When transporting at low temperatures or in the event of large temperature fluctuations, the collection of moisture in or on the device is not permitted. Moisture can cause short circuits in electrical circuits and damage the device.

If a device is transported or stored without packaging, all environmental influences such as shocks, vibrations, pressure and moisture have an unprotected effect on the device. Damaged packaging indicates that the device has been severely affected by environmental influences and may have been damaged.

This can result in malfunctions of the device, machine or system.

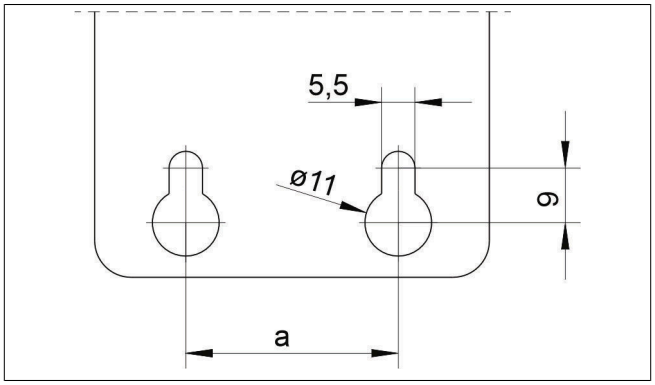
Use of third-party products

If third-party devices or components are used, the relevant manufacturer's documentation must be observed. If limitations or interactions by or with third-party products are possible, this must be taken into account in the application.

5.1.1 Installing the Automation PC

The Automation PC 4100 is installed using the mounting holes on the mounting plate. The holes are designed for M5 screws. The two M5 screws needed for this are not included in delivery.

For the exact position of the mounting holes (including spacing a), see section "Drilling template" on page 20.



5.1.1.1 Procedure

1. Provide the mounting surface with the necessary holes. For the exact position of the mounting holes, see the drilling templates.
2. Install the B&R industrial PC with M5 screws.

5.1.2 Installation information for individual deliveries / individual components

Information:

If the APC4100 is not delivered as a complete system but as individual deliveries (or individual components are installed afterward), it may be necessary to enable these components in BIOS. To do this, open BIOS during system startup, load the BIOS default values and restore and save any customized BIOS settings. For additional information, see section "UEFI BIOS options" on page 133. This may be required for the following individual components:

- **Interface option**
- **Graphics option**
- **Mass storage option**
- **Main memory (DDR4 SDRAM)**

5.2 Connecting to the power grid

Danger!

- **The entire power supply must be disconnected and electrostatic discharge must take place on the housing or ground connection before removing any covers or components from the device and installing or removing any accessories, hardware or cables.**
- **Remove the power cable from the device and from the power supply.**
- **All covers and components, accessories, hardware and cables must be installed or secured before the device is connected to the power supply and switched on.**

5.2.1 Installing the DC power cable

Danger!

The entire power supply to the B&R industrial PC or B&R Automation Panel must be interrupted. Before connecting the DC power cable, it must be checked whether it has been disconnected from the voltage source (e.g. power supply unit).

5.2.1.1 Wiring

Caution!

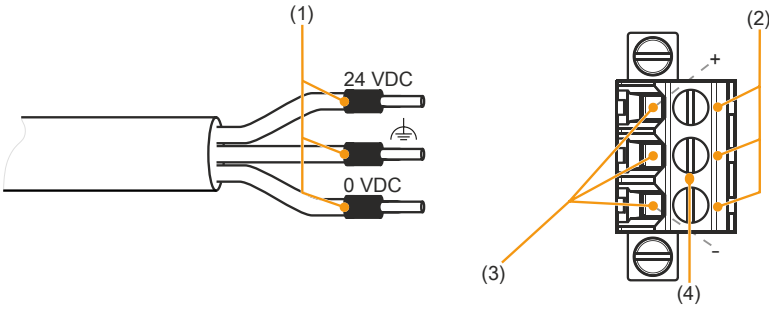
The pinout of the power supply interface must be observed!

The DC power cable must be implemented with a wire cross section of 0.75 mm² to 1.5 mm² and wire end sleeves.

Conductors of the power cable	Terminal connection symbol
+24 VDC	+
GND	⏚
0 VDC	-

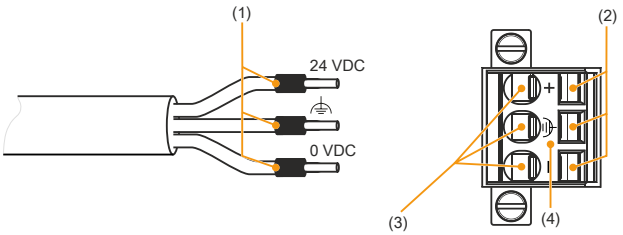
Installing screw clamp terminal block 0TB103.9

Secure the conductors with wire end sleeves ① in the terminal contacts ③ as shown in the figure below and tighten the screw clamp terminals ④ with a screwdriver (max. tightening torque 0.4 Nm). It is important to pay attention to the label on the screw clamp terminal ②.



Installing cage clamp terminal block 0TB103.91

Insert a screwdriver into the cage clamp terminals ② and secure the conductors with wire end sleeves ① in the terminal contacts ③ as shown in the figure below. Close the terminal contact by removing the screwdriver. It is important to pay attention to the label on the cage clamp terminal ④.

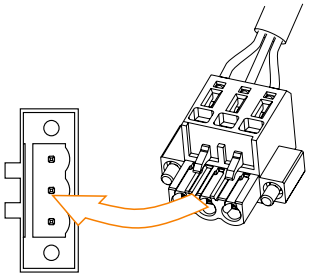


5.2.2 Connecting the power supply to a B&R device

Danger!

The entire power supply to the B&R device must be interrupted. Before connecting the power cable, it must be checked whether it has been disconnected from the voltage source (e.g. power supply unit).

1. Carry out electrostatic discharge on the housing or at the ground connection.
2. Connect the power supply connector to the B&R device and tighten the mounting screws (max. tightening torque 0.5 Nm).



5.2.3 Grounding concept - Functional ground

Functional ground is a low impedance current path between circuits and ground. It is used for equipotential bonding and thus for improving immunity to interference.

Notice!

Functional grounding does not meet the requirements of protective ground!
Suitable measures for electrical safety in the event of operation and faults must be provided separately.

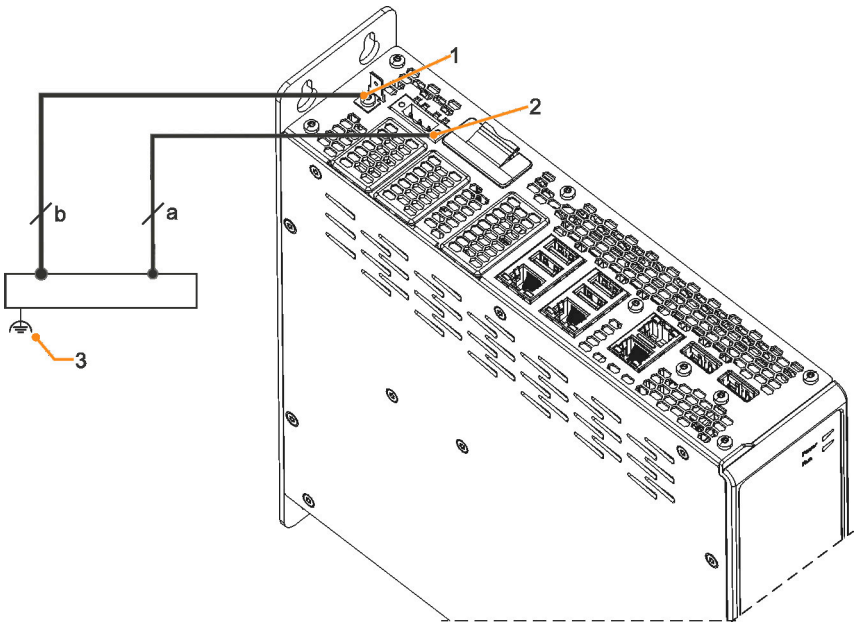
The device is equipped with the following functional ground connections:

- Functional ground connection of the power supply
- Ground connection

The functional ground on the B&R device is marked with the following symbol: ⏚

The following points must be observed to ensure that electrical interference is safely diverted:

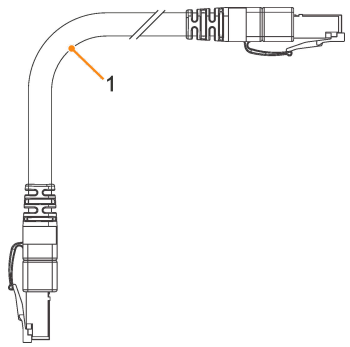
- Connect the device to the central grounding point (e.g. the control cabinet or the system) using the shortest possible low-resistance path.
- Cable design with at least 2.5 mm² per connection. If a cable with wire end sleeve is used with terminal block 0TB103.9 or 0TB103.91, a cable with a maximum of 1.5 mm² per connection is possible.
- Observe the shielding concept of the conductors. All data cables connected to the device must be implemented using shielded lines.



Legend					
1	Ground connection ⏚	2	Power supply connection +24 VDC pin 2	3	Central grounding point
a	At least 1.5 mm²	b	At least 2.5 mm²		-

5.2.4 Connecting cables

When connecting or installing cables, the bend radius specification must be observed. For this specification, see the technical data of the respective cable.
The maximum tightening torque of the locating screws is 0.5 Nm.



1) Bend radius

5.3 Procedure

Preparation

Corresponding M5 screws are not included in delivery and must be selected according to the application; manufacturer's specifications for the max. tightening torque must be observed.

Installation

1. Provide the mounting surface with the necessary holes. For the exact position of the mounting holes, see the drilling templates.
2. Install the B&R industrial PC with M5 screws.

6 Commissioning

6.1 Basic information

Condensation may form under certain environmental conditions or rapid climatic changes. For improved acclimatization and to avoid damage, the device must be slowly adapted to the room temperature.

6.2 Switching on the device for the first time

6.2.1 General information before switching on the device

Checklist

Before the device is started up for the first time, the following points must be checked:

- Have the installation instructions been observed as described in "Installation and wiring" on page 120?
- Have the permissible ambient conditions and environmental conditions for the device been taken into account?
- Is the power supply connected correctly and have the values been checked?
- Is the ground cable correctly connected to the ground connection?
- Before installing additional hardware, the device must have been started up.

Caution!

Before the device is started up, it must be gradually adapted to room temperature! Exposure to direct heat radiation is not permitted.

When transporting at low temperatures or in the event of large temperature fluctuations, the collection of moisture in or on the device is not permitted.

Moisture can cause short circuits in electrical circuits and damage the device.

Requirements

The following criteria must be met before switching on the device for the first time:

- The functional ground connections are as short as possible and connected to the central grounding point using the largest possible wire cross section.
- All connection cables are connected correctly.
- A USB keyboard and USB mouse are connected (optional).

6.2.2 Switching on the device

Procedure

1. Connect the power supply and switch it on (e.g. power supply unit).
2. The device is operating and boots; LED *Power* lights up.

6.3 General instructions about the procedure for temperature testing

The purpose of these instructions is to explain the general procedure for application-specific temperature tests with B&R industrial PCs or Power Panels. These instructions are only guidelines, however.

6.3.1 Procedure

In order to obtain meaningful results, the test conditions should correspond to conditions in the field. This means that during the temperature tests, for example, the target application should be running and the PC should be installed in the control cabinet housing that will be used later.

In addition, a temperature sensor should be installed for the device being tested in order to continuously monitor the ambient temperature. To obtain correct values, it must be installed at a distance of approx. 5 to 10 cm from the B&R industrial PC near the air inlet (not near the air outlet).

Every B&R industrial PC or Power Panel is equipped with internal temperature sensors. Depending on the device family, these are installed in different positions. The number and temperature limits vary depending on the device family.

For position specifications of the temperature sensors and their maximum specified temperatures, see section "Temperature sensor positions" on page 28.

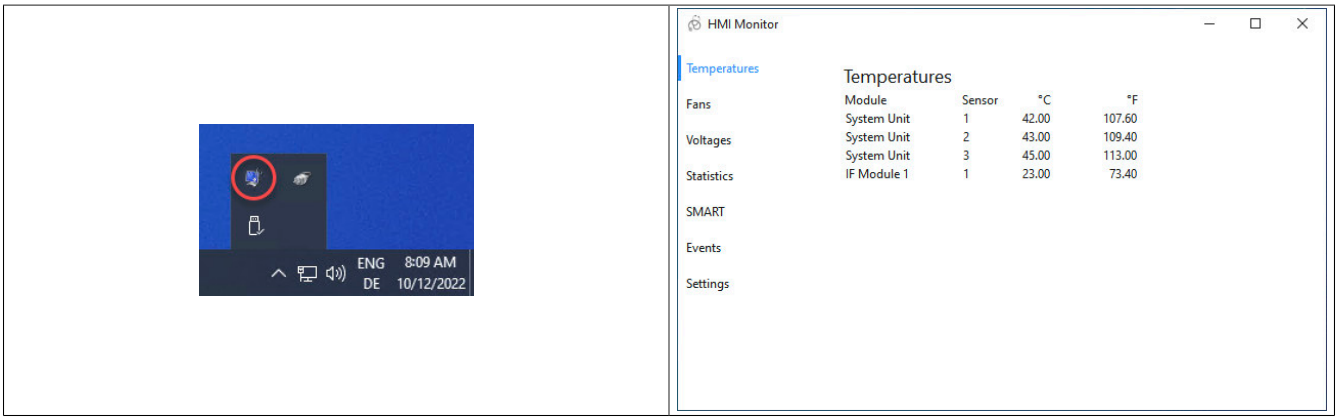
A minimum test time of 8 hours is recommended for to optimally determine and assess the temperature situation.

6.3.2 Evaluating temperatures in Windows operating systems

6.3.2.1 Evaluating with HMI Monitor

HMI Monitor can be used to evaluate temperatures. The temperatures can be viewed in tab Temperatures. This is available as a free download on the B&R website (www.br-automation.com) and uses the Automation Device Interface (ADI).

For additional information, see the ADI driver user's manual.



6.3.2.2 Evaluation with BurnInTest from PassMark

If a separate application is not created or used for temperature evaluation, B&R recommends using the BurnInTest software tool from PassMark.

The BurnInTest software tool is available in standard and professional versions. In addition to the software package, various loopback adapters (serial, parallel, USB, etc.) and test CDs or DVDs are also available. Depending on the expansion level of the software and available loopback adapters, a correspondingly high system and peripheral load can be generated.

> **Information:**
>
> **Loopback adapters are also available from PassMark. For additional information, see www.passmark.com.**

The following screenshots refer to PassMark BurnInTest Pro V10.2 using a APC4100 with IF options.

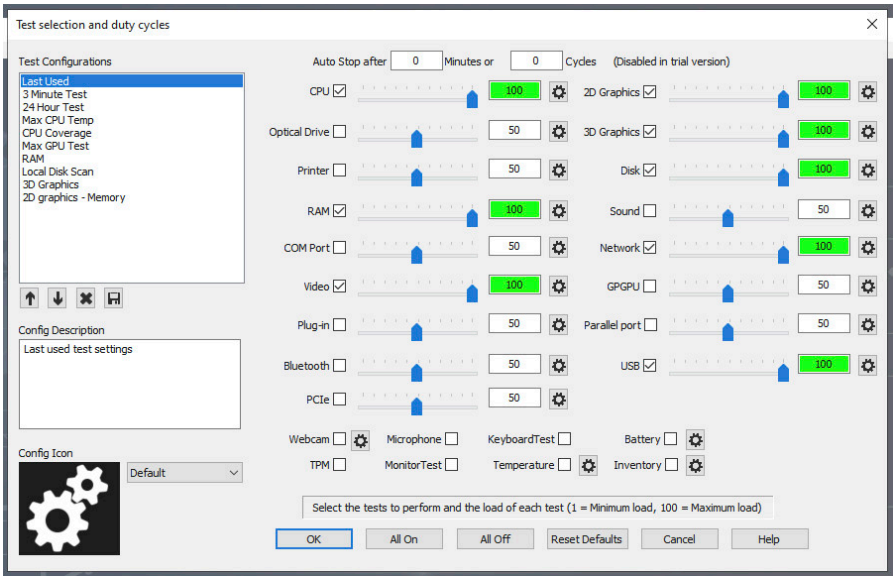


Figure 4: Settings for PassMark BurnInTest Pro V10.2

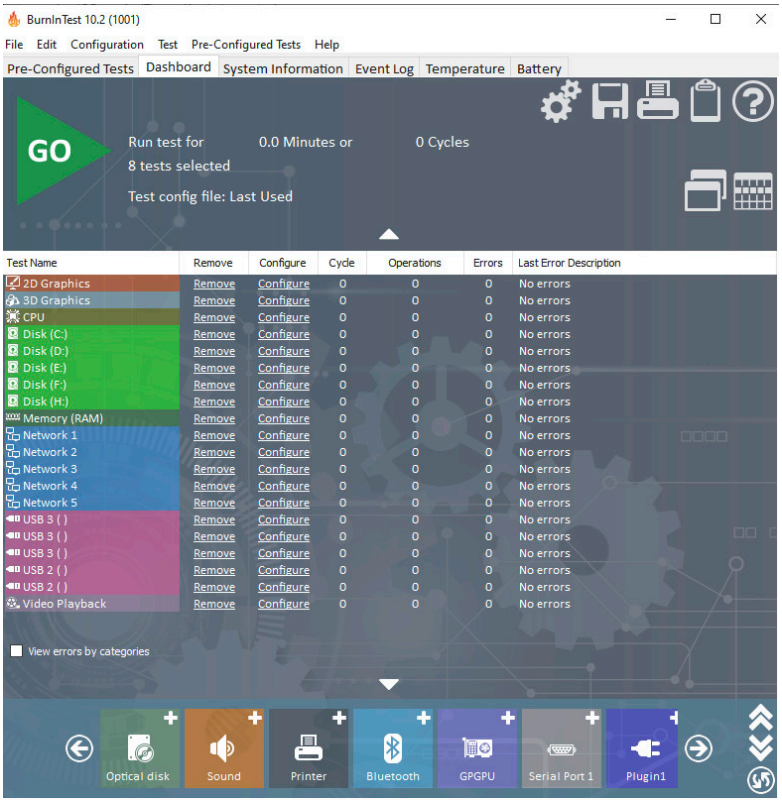
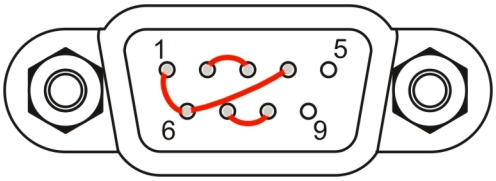


Figure 5: Test overview

Depending on the availability of the loopback adapters and DVDs, appropriate fine tuning must be carried out in the respective test properties.

If no USB loopback adapters are available, USB flash drives can also be used. These must be available in Windows as formatted drives. Option **USB** must be deselected under **Test selection and duty cycles**, and **Test this device** must then be selected in the **Disk** settings (**Configuration / Test Preferences / Disk**).

Serial loopback adapters can be easily created by connecting some pins as shown.



6.3.3 Evaluating the measurement results

The recorded maximum temperature value of each individual sensor is not permitted to exceed the temperature limit specified in the user's manuals.

If the temperature tests cannot be carried out in a climate chamber, they can be carried out in an office environment, for example. It is necessary to record the ambient temperature, however. Based on experience gained at B&R, the measured temperature values can be extrapolated linearly to the ambient temperature for passive systems (systems without a fan kit). In order to also be able to extrapolate the temperature values for systems with a fan kit, the fans must be running. The speed, etc. must also be taken into account.

If the temperature tests are carried out in a controlled climate chamber with a fan, the devices to be tested are cooled by this fan and thus the measurement results are distorted. With passive devices, the measurement results are therefore unusable. In order to be able to carry out temperature tests in climate chambers with fans without distorting the measurement results, however, the fan of the climate chamber must be switched off and a correspondingly long lead time (several hours) must be observed.

6.4 Known problems / Characteristics

- USB 2.0 transfer is limited to 150 Mbit/s with SDL4.
- A display is always emulated by the SDL4 transmitter using EDID data and hot plug detection, so DVI-compatible operation is possible. For this reason, the following behavior may occur during operation with multiple displays.
  In the operating system, a connected panel is reported by the video driver even in the following situations:
  - No SDL4 cable is connected.
  - No connection has been established yet.

  This behavior can be avoided by appropriate configuration in BIOS or via the graphics driver.

7 Software

7.1 UEFI BIOS options

7.1.1 General information

The Unified Extensible Firmware Interface (UEFI) and its predecessor Extensible Firmware Interface (EFI) establish the basic standardized connection between the user and the system (hardware and firmware), the individual components of a computer and the operating system. This B&R industrial PC uses UEFI BIOS from Insyde Software.

The UEFI BIOS Setup Utility makes it possible to modify basic system configuration settings. These settings are stored in a flash block.

Information:

The following BIOS settings are system-optimized. Changes should only be made by experts who have knowledge of their effects.

7.1.1.1 Adaptation for touch operation

The BIOS used for the APC4100 was developed with touch screen systems in mind. Compared to other or older B&R systems, the user interface, especially buttons and selection fields, is therefore larger. In addition, the setting and configuration options are divided into separate submenu structures.
The APC4100 can still be used with ordinary displays and operator panels without any limitation on usability, however.

7.1.1.1.1 Operation

During touch operation, the system does not display a mouse pointer. If operation is carried out using an external operating device, the mouse pointer is displayed. Both input methods can be used simultaneously; the system automatically displays or hides the mouse pointer.

If keyboard entry is required, a keyboard appears on the display that can be operated via touch screen or mouse. All keyboard entries can also be made with an external keyboard.

7.1.1.2 Overview of BIOS description

Information:

This description is for the full extent of version 0.16.

Selection and setting options as well as the menu structure and display may differ slightly depending on the device series, system configuration, BIOS version and BIOS settings that have already been made. The figures in the following section are symbolic.

For simplification purposes, only setting option **[Enter]** is explicitly listed below. All settings can also be made via mouse click or touch screen.

These figures are only excerpts from the respective menus. A complete list of all parameters and menus is available in a table in each section.
Depending on the display system used, it is possible to navigate to all menus on the device using the slide bar or mouse and keyboard input.

Variables written in italics (*n*) are used to maintain clarity and to summarize different menus that have the same setting options. When first time mentioned, their range of values is defined and, if necessary, further notes are listed. *n* within a certain range of values of a certain BIOS setting is only valid for this parameter. Each combination of "[BIOS parameter]" and "*n*" is defined independently.

Entries outside a specified range of values are not applied.

Default values are marked bold and italic in column "Input options" in tables.
Submenus are bold in column "BIOS parameter" in tables.

BIOS parameter			Input options	Description
BIOS Parameter 1			***Enable(d)***	Disables/Enables BIOS parameter 1
			Disable(d)	
BIOS Parameter 1 Value			UINT Default: ***42***	Defines the value of BIOS parameter 1 Range: 0 to 65535 Resolution: 3
BIOS Parameter 2			-	Displays BIOS parameter 2
	BIOS Parameter 2.1		a1	Selects mode of BIOS parameter 2.1
			a2	
			b	
		BIOS subparameter 2.1 value	***Disable(d)***	Disables/Enables BIOS subparameter 2.1
			Enable(d)	
BIOS Parameter *n* [1]			***Disable(d)***	Disables BIOS parameter *n* or selects option
			(Various)[2]	
Hardware Components			Enter	Opens submenu "Hardware components" on page xyz

Table 73: Main menu - Menu - Submenu(s)

1) The 16 possible parameters are indexed from 0 to 15.
2) Setting option "(Various)" combines different values/modes with different dependencies.

7.1.2 BIOS Setup and startup procedure

UEFI BIOS is enabled immediately after switching on the B&R industrial PC. A check takes place as to whether the setup data from the FLASH block is OK. If it is OK, the boot procedure is started. If it is not OK, the setup default settings are loaded and the boot procedure is continued.

UEFI BIOS reads the system configuration information, checks the system and configures it through the power-on self-test (POST).

UEFI BIOS then searches the data storage media in the system (CFexpress cards, CFast cards, USB mass storage devices, SSD, HDD, etc.) for an operating system. UEFI BIOS starts the operating system and transfers to it control over system operations.

To enter UEFI BIOS Setup, **[Esc]**, **[Del]** or **[F2]** must be pressed after initializing the USB controller when the following message appears on the screen (during POST): *Press ESC / DEL / F2 to enter Setup*.

If a B&R panel with touch sensor is used during device configuration, Setup can be opened by quickly tapping the upper edge of the touch area.

It is important to note that the upper edge of the touch screen area is always on the front side, opposite the connection side. This is independent of the rotation direction of the software.

7.1.2.1 Input options

Power-on self-test (POST)

The following keys are enabled during POST:

Keys	Function
Esc, Del, F2	Accesses the BIOS Setup menu or boot manager.
<Pause>	The POST can be stopped with the <Pause> button. POST resumes after pressing any other key.

Information:

The key signals of the USB keyboard are only processed after the USB controller in initialized.

Boot menu

The following keys are enabled during POST:

Key	Function
F1	Help
ESC	Exits the help documentation
Cursor keys (←, ↑, ↓, →)	Navigation in the boot menu
Enter	Opens the selected submenu

BIOS Setup

The following keys can be used after entering BIOS Setup:

Key	Function
F1	Help
ESC	Exits
Cursor keys (←, ↑, ↓, →)	Navigation in the menu
Page ↑, Page ↓	Press once: Cursor jumps to first/last line in the display area Press twice: Cursor jumps to first/last item in the menu
F5, - (numeric keypad)	Changes a value (step back)
F6, + (numeric keypad)	Changes a value (step forward)

Key	Function
F9	Loads the default settings[1)]
F10	Saves and closes
Enter	Opens the selected submenu/parameter
Alphanumeric keys	Defines manual values for parameters that permit this

1) Save and close to restore the default values.

Information:

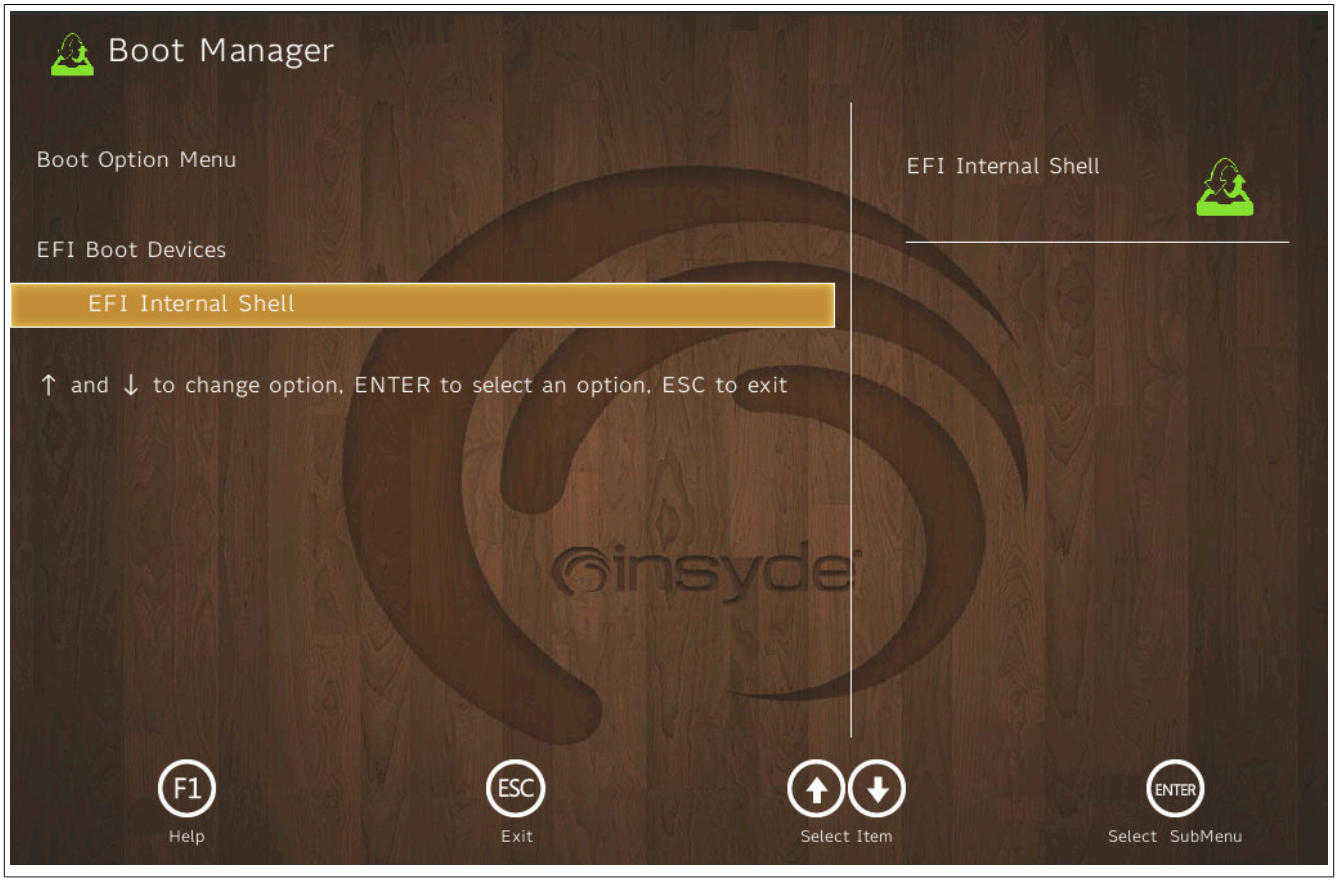
All manual changes are overwritten if the default values are loaded and saved.

7.1.3 Boot menu

Boot menu option	Description
Continue	Resumes the boot process.
Boot Manager	Lists all detected and bootable media. See "Boot Manager" on page 138.
Device Management	Lists all supported and enabled devices (e.g. RAID and Ethernet). See "Device Manager" on page 139.
Boot From File	Selects a bootable file to boot from. Depending on the boot configuration, the files can also be stored on external storage media.
Administer Secure Boot	For a detailed description of this option, see the user documentation from the operating system manufacturer.
Setup Utility	Performs advanced configurations. See "Setup Utility" on page 141.

Table 74: Boot menu

7.1.4 Boot Manager



The boot manager lists all detected and bootable UEFI media. It is possible to select the media from which the boot procedure should be performed.

7.1.5 Device Manager

Information:

For detailed instructions on how to create a RAID volume, see section "RAID configuration" on page 169.

BIOS parameter	Setting options	Description
Intel(R) Rapid Storage Technology	Enter	Opens submenu "Intel(R) Rapid Storage Technology" on page 139

Table 75: Device Manager

7.1.5.1 Intel(R) Rapid Storage Technology

BIOS parameter	Setting options	Description
Intel(R) RST (...) RAID Driver	-	Displays the version of the Intel RST RAID driver
Create RAID Volume	Enter	Opens submenu "Create RAID Volume" on page 139
Non-RAID Physical Disks:		
Disk *n* [1]	Enter	Opens submenu "Disk n" on page 140
RAID Volumes: [2]		
Volume1	Enter	Opens submenu "RAID Volume Info" on page 140

Table 76: Device Manager - Intel(R) Rapid Storage Technology

1) "Disk *n*" is a placeholder. This BIOS parameter displays a subset of the values that are listed in more detail in the corresponding submenu.
2) Requires an existing RAID volume.

   Its name can be defined during creation (see "Create RAID Volume" on page 139). ***Volume1*** is used as the default value.

7.1.5.1.1 Create RAID Volume

BIOS parameter	Setting options	Description
Name:	String Default: ***Volume1***	Name for the RAID volume No special characters are permitted. Range: Max. 16 characters
RAID Level:	***RAID0 (Stripe)***	Selects the RAID level
	RAID1 (Mirror)	
Select Disks:		
Disk n:	(Blank)	Select the storage medium for the RAID volume (X).
	X	

Table 77: Device Manager - Create RAID Volume

BIOS parameter	Setting options	Description
Stripe Size:	4 kB	Selects the data block size [kB]
	8 kB	
	16 kB	
	32 kB	
	64 kB	
	128 kB	
Capacity:	INT	Defines the RAID memory size [MB] Range: 0 to max. available application memory (hardware-dependent) If storage media of different sizes are used, this is limited to the smaller medium.

Table 77: Device Manager - Create RAID Volume

7.1.5.1.2 Disk *n*

BIOS parameter	Setting options	Description
Volume Actions[1)]		
Reset to Non-RAID[1)]	Enter	Resets the disk to non-RAID
Port:	-	Displays the port number of device *n*
Model Number:	-	Displays the product ID of device *n*
Serial Number:	-	Displays the serial number of device *n*
Size:	-	Displays the memory size of device *n*
Status:	-	Displays the RAID status of device *n*
Controller Type:	-	Displays the controller of device *n*
Controller Interface:	-	Displays the controller interface of device *n*

Table 78: Device Manager - Intel(R) Rapid Storage Technology

1) Available only if the storage medium is part of a RAID volume.

7.1.5.1.3 RAID Volume Info

BIOS parameter	Setting options	Description
Volume Actions		
Delete	Enter	Deletes the RAID volume
Name:	-	Displays the name of the RAID volume
RAID Level:	-	Displays the RAID level of the volume
Strip Size:	-	Displays the data block size [kB] of the volume
Size:	-	Displays the memory size [GB or TB] of the volume
Status:	-	Displays the status of the volume
Bootable:	-	Displays the bootability of the volume
Disk *n*[1)]	Enter	Opens submenu "Disk n" on page 140

Table 79: Device Manager - Intel(R) Rapid Storage Technology - RAID Volume Info

1) "Disk *n*" is a placeholder. This BIOS parameter displays a subset of the values that are listed in more detail in the corresponding submenu.

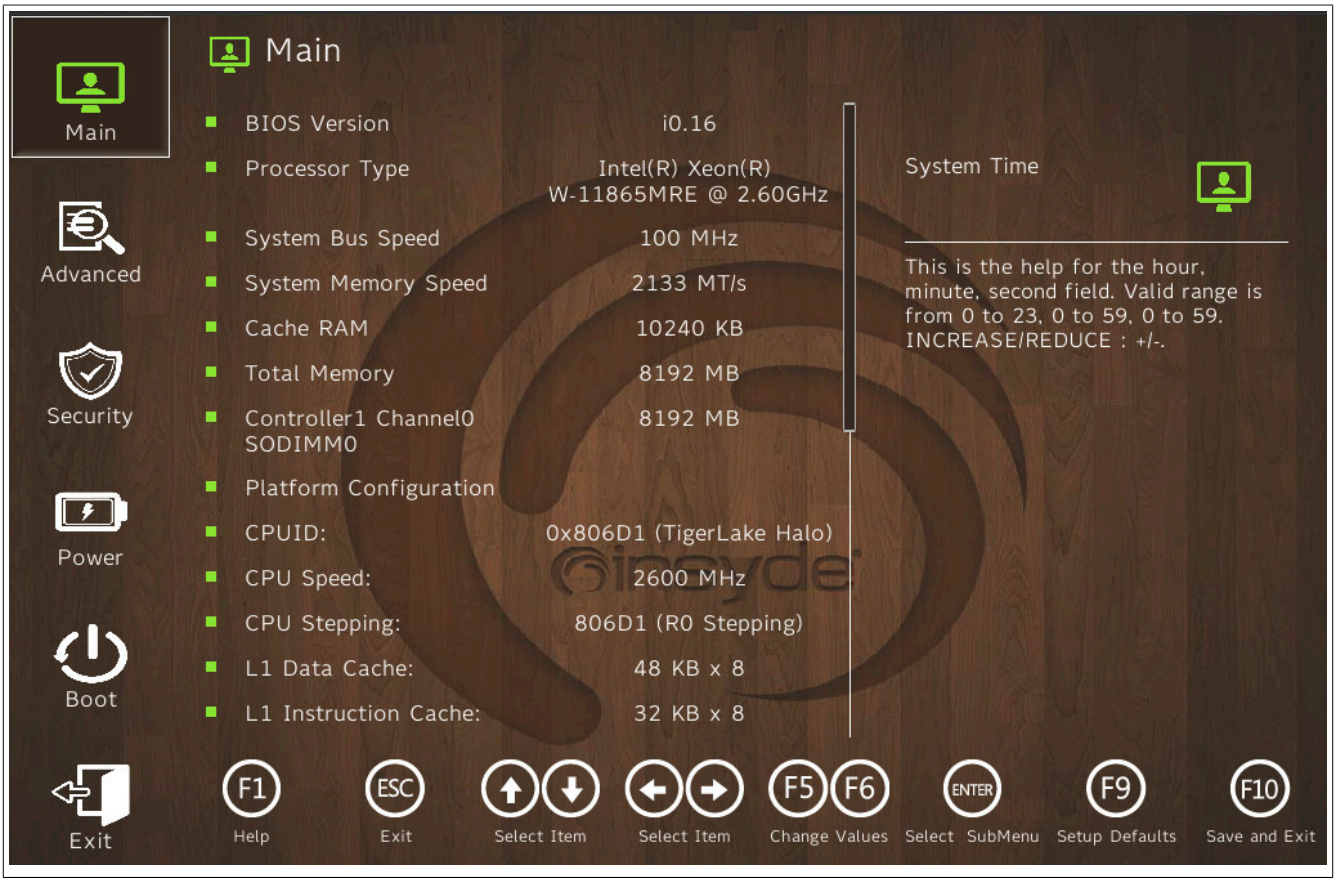
7.1.6 Setup Utility

Settings can be made in the boot menu under **Setup utility**.

Submenu	Setting options	Description
Main	Enter	Basic system information is displayed and the system time can be set here.
Advanced	Enter	Changes to system settings can be made here.
Security	Enter	Changes to the Trusted Platform Module can be made here. Passwords for storage media can be created and managed here.
Power	Enter	Changes that affect the power consumption of the system can be made here.
Boot	Enter	Opens submenu "Boot" on page 167 Changes to the boot modes and boot sequence can be made here.
Exit	Enter	Opens submenu "Exit" on page 169 Changes can be discarded or saved here. User-specific default values can be saved and loaded here or system-optimized default values from B&R can be restored.

Table 80: Boot menu - Setup Utility

7.1.6.1 Main



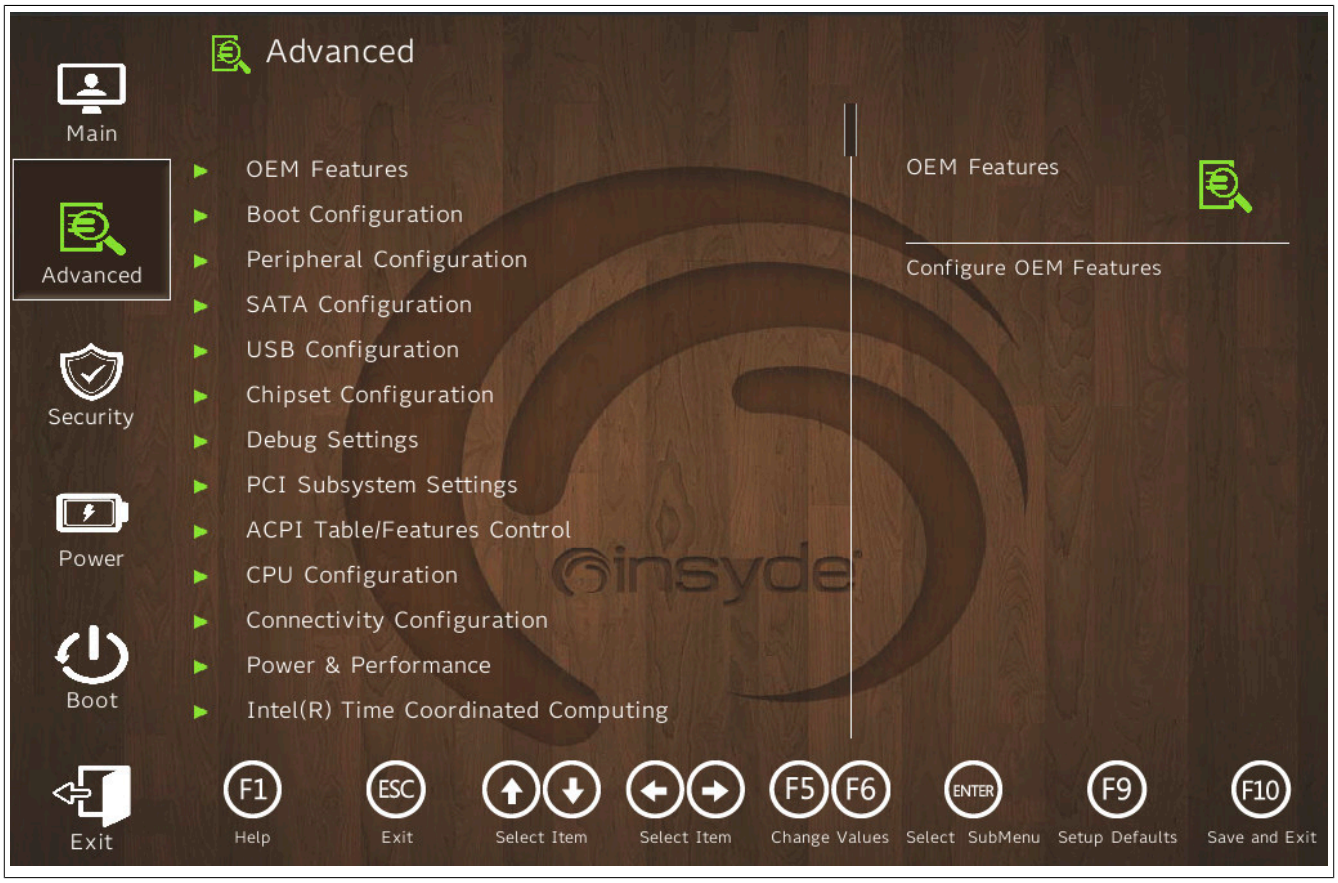
BIOS setting	Setting options	Description
BIOS Version	-	Displays the BIOS version
Processor Type	-	Displays the processor type
System Bus Speed	-	Displays the bus speed
System Memory Speed	-	Displays the data rate
Cache RAM	-	Displays the processor cache
Total Memory	-	Displays the total RAM
Platform Configuration		
CPUID	-	Displays the processor ID
CPU Speed	-	Displays the processor speed [MHz]
CPU Stepping	-	Displays the stepping version of the processor
L1 Data Cache	-	Displays the L1 data cache [kB]
L1 Instruction Cache	-	Displays the L1 instruction cache [kB]
L2 Cache	-	Displays the L2 cache [kB]
L3 Cache	-	Displays the L3 cache [kB]
Number of Processors	-	Displays the number of cores / number of threads
Microcode Rev	-	Displays the microcode revision
GT Info	-	Displays the name of the graphics processor (ID)
SMX / TXT	-	Displays SMX / TXT support

Table 81: Main

BIOS setting	Setting options	Description
PCH Rev / SKU	-	Displays the PCH revision / SKU
GOP Ver	-	Displays the GOP version
CSME Version / SKU	-	Displays the Intel ME version
System Time	INT	Adjusts the system time in the format hh:mm:ss
System Date	INT	Adjusts the system date in the format yyyy:mm:dd
About this Software	Enter	Displays the copyright disclaimer

Table 81: Main

7.1.6.2 Advanced



BIOS parameter	Setting options	Description
OEM Features	Enter	Opens submenu "OEM Features" on page 143
USB Configuration	Enter	Opens submenu "USB Configuration" on page 147
Chipset Configuration	Enter	Opens submenu "Chipset Configuration" on page 148
ACPI Settings	Enter	Opens submenu "ACPI Table/Features Control" on page 149
CPU Configuration	Enter	Opens submenu "CPU Configuration" on page 150
Power & Performance	Enter	Opens submenu "CPU - Power Management Control" on page 151
Memory Configuration	Enter	Opens submenu "Memory Configuration" on page 154
System Agent (SA) Configuration	Enter	Opens submenu "System Agent (SA) Configuration" on page 155
PCH-IO Configuration	Enter	Opens submenu "PCH-IO Configuration" on page 159
PCH-FW Configuration	Enter	Opens submenu "PCH-FW Configuration" on page 163

Table 82: Advanced

7.1.6.2.1 OEM Features

BIOS parameter	Setting options	Description
BIOS Version	-	Displays the BIOS version
MTCX Version	-	Displays the MTCX version
Realtime Environment	***Disabled***	Disables/Enables the real-time environment This must be enabled for real-time operating systems such as Automation Runtime.
	Enabled	
Hypervisor Environment	***Disabled***	Disables/Enables the hypervisor environment Enabling is necessary for hypervisor mode. Parameters "VT-d" and "Intel (VMX) Virtualization Technology" are enabled and cannot be changed during hypervisor mode.
	Enabled	
Power and performance profiles	***Maximum System Performance Mode***	Selects preconfigured power and energy settings
	Maximum CPU Performance Mode	
	Industrial Use-condition Mode	
	Balanced Mode	
Automatic Firmware Update	***Disabled***	Disables/Enables automatic firmware updates for the mainboard and SDL4 cards
	Enabled	
Mainboard	Enter	Opens submenu "Mainboard" on page 144
Interface Slot *n* [1) 2)]	Enter	Opens submenu "Interface Slot n " on page 144

Table 83: Advanced - OEM Features

BIOS parameter	Setting options	Description
Panel Settings	Enter	Opens submenu "Panel Settings" on page 145
SSD Monitoring Service	Enter	Opens submenu "SSD Monitoring Service" on page 145
Custom Boot Logo	Enter	Opens submenu "Custom Boot Logo" on page 146
Backup settings	Enter	Opens submenu "Settings Backup" on page 146

Table 83: Advanced - OEM Features

1) A total of 3 interface option slots are available. Slot IF option 3 is reserved for graphic interfaces.
2) Slots that are not used are not displayed.
If no slot is used, this submenu is not available.

The configuration of hypervisor mode is possible with or without hyper-threading for the GPOS (if the CPU used supports this).

Option	Realtime Environment (RTE)	Hypervisor Environment (HV)	Description
a)	Disabled	Disabled	The default settings are used.
b)	Enabled	Disabled	The system has full RTE support. Hyperthreading is disabled.
c)	Enabled	Enabled	The system has full RTE and AS support. Hyperthreading is disabled.
d)	Disabled	Enabled	The system has RTE and AS support. Hyperthreading is enabled.

If the complete system has been preconfigured for real-time and/or hypervisor operation, these parameters are system specifications and grayed out. Changes in BIOS Setup are then ineffective since they are overwritten by the system specifications during booting. In this case, configuration changes must be made in the EFI shell with tool *mtcxsvc.efi*, which is part of the firmware upgrades for APC4100 systems (see "PC firmware upgrade" on page 175).

7.1.6.2.1.2 Mainboard

BIOS parameter	Setting options	Description
Product Name	-	Displays the B&R order number of the mainboard
Serial Number	-	Displays the B&R serial number of the mainboard
Device ID	-	Displays the device ID of the mainboard
Vendor ID	-	Displays the vendor ID of the mainboard
Compatibility ID	-	Displays the compatibility ID of the mainboard
HW Revision	-	Displays the hardware revision of the mainboard
Parent Device ID	-	Displays the parent device ID of the mainboard
Parent Comp. ID	-	Displays the parent compatibility of the mainboard
ETH1 MAC Address	-	Displays the ETH1 MAC address
ETH2 MAC Address	-	Displays the ETH2 MAC address
ETH3 MAC Address	-	Displays the ETH3 MAC address
ETH4 MAC Address	-	Displays the ETH4 MAC address
Power on Cycles[1)]	-	Displays the power-on cycles of the mainboard
Power on Hours	-	Displays the operating time [h] of the mainboard
Battery Voltage	-	Displays the battery voltage [V]
Battery State	-	Displays the battery state
Temperature 1	-	Displays the current temperature at sensor 1 [°C and °F]
Temperature 2	-	Displays the current temperature at sensor 2 [°C and °F]
Temperature 3	-	Displays the current temperature at sensor 3 [°C and °F]

Table 84: Advanced - OEM Features - Mainboard

1) Each start/restart increases the value by 1.

7.1.6.2.1.3 Interface Slot *n*

BIOS parameter	Setting options	Description
Product Name	-	Displays the B&R order number of IF option *n*
Serial Number	-	Displays the B&R serial number of IF option *n*
Device ID	-	Displays the device ID of IF option *n*
Vendor ID	-	Displays the vendor ID of IF option *n*
Compatibility ID	-	Displays the compatibility ID of IF option *n*
HW Revision	-	Displays the hardware revision of IF option *n*
FW Version	-	Displays the firmware version of IF option *n*
Parent Device ID	-	Displays the parent device ID of IF option *n*
Parent Comp. ID	-	Displays the parent compatibility ID of IF option *n*
Power on Cycles	-	Displays the power-on cycles of IF option *n*
Power on Hours	-	Displays the operating time [h] of IF option *n*
Temperature *q*	-	Displays the temperature at sensor *q* [°C and °F]

Table 85: Advanced - OEM Features - Interface Slot *n*

1) For graphics options only.
2) Each start/restart increases the value by 1.
3) The number of temperature sensors varies depending on the interface option. If no temperature sensor is available, the parameter is not displayed.

7.1.6.2.1.4 Panel Settings

BIOS parameter	Setting options	Description
Panel *n*[1)]	Enter	Opens menu "Panel n" on page 145

Table 86: Advanced - OEM Features - Panel Settings

1) The number of panels varies by system and system configuration (see submenu "Panel *n*" for reserved indices).

Panel *n*

If the APC4100 has a graphics option in the monitor/panel option slot, the associated panel is assigned index Panel 0.

BIOS parameter	Setting options	Description
Product Name	-	Displays the B&R order number of the panel
Serial Number	-	Displays the B&R serial number of the panel
Device ID	-	Displays the device ID of the panel
Vendor ID	-	Displays the vendor ID of the panel
Compatibility ID	-	Displays the panel's compatibility ID
HW Revision	-	Displays the hardware revision of the panel
Parent Device ID	-	Displays the parent device ID of the panel
Parent Compat. ID	-	Displays the parent compatibility ID of the panel
Backlight on Cycles[1)]	-	Displays the backlight-on cycles of the panel
Backlight on Hours	-	Displays the operating time of the backlight [h] for the panel
Power on Cycles[2)]	-	Displays the power-on cycles of the panel
Power on Hours	-	Displays the operating time [h] of the panel
Brightness	INT Default: ***100***	Screen brightness of the panel [%] Range: 0 to 100 Resolution: 1%

Table 87: Advanced - OEM Features - Panel Settings - Panel *n*

1) Each time the backlight is switched on increases the value by 1.
2) Each start/restart increases the value by 1.

7.1.6.2.1.5 SSD Monitoring Service

The following data is only displayed for B&R products. B&R cannot ensure this support for third-party products.

BIOS parameter	Setting options	Description
CFexpress 1		
Product Name	-	Displays the product ID of CFexpress card 1
Serial Number	-	Displays the manufacturer serial number of CFexpress card 1
Firmware version	-	Displays the firmware version of CFexpress card 1
Percentage Used	-	Displays the used (expected) lifetime of CFexpress card 1 [%]
Power On Hours	-	Displays the previous operating hours [h] of CFexpress card 1
Critical Warning	-	Displays an error code (S.M.A.R.T.[1)] status), see the S.M.A.R.T. specifications or manufacturer's documentation. 0x00 signalizes operation without critical error.
CFexpress 2		
Product Name	-	Displays the product ID of CFexpress card 2
Serial Number	-	Displays the manufacturer serial number of CFexpress card 2
Firmware version	-	Displays the firmware version of CFexpress card 2
Percentage Used	-	Displays the used (expected) lifetime of CFexpress card 2 [%]
Power On Hours	-	Displays the previous operating hours [h] of CFexpress card 2
Critical Warning	-	Displays an error code (S.M.A.R.T.[1)] status), see the S.M.A.R.T. specifications or manufacturer's documentation. 0x00 signalizes operation without critical error.
M.2		
Product Name	-	Displays the product ID of the M.2 mass storage device
Serial Number	-	Displays the manufacturer's serial number of the M.2 mass storage device
Firmware version	-	Displays the firmware version of the M.2 mass storage device
Percentage Used	-	Displays the used (expected) lifetime of CFexpress card 1 [%]
Power On Hours	-	Displays the previous operating hours [h] of CFexpress card 1
Critical Warning	-	Displays an error code (S.M.A.R.T.[1)] status), see the S.M.A.R.T. specifications or manufacturer's documentation. 0x00 signalizes operation without critical error.

Table 88: Advanced - OEM Features - SSD Monitoring Service

1) Self-Monitoring, Analysis and Reporting Technology

7.1.6.2.1.6 Custom Boot Logo

BIOS parameter	Setting options	Description
Custom Boot Logo	-	Displays whether a user-specific logo is being used
Add Custom Boot Logo	Enter	Selects a customized boot logo A JPG graphic with a maximum size of 40 kB and filename "XPCLGO" must be used. The target file for the boot logo must be stored in folder "XPCLGO" in the root directory of the target media (*./XPCLGO/XPCLGO.jpg*).
Delete Custom Boot Logo	Enter	Deletes customized boot logos[1)]

Table 89: Advanced - OEM Features - Custom Boot Logo

1) If no customized boot logo is available, the B&R boot logo is used by default.

7.1.6.2.1.7 Settings Backup

BIOS parameter	Setting options	Description
Backup Settings	***Disabled***	Disables/Enables backup of BIOS settings during the next reboot Folder "XPCSET" (*./XPCSET/*) must exist in the root directory of the target medium as the target for the backup.
	Enabled	
Recover Settings	***Disabled***	Disables/Enables restoring BIOS settings from a backup during the next reboot The backup file must be stored in folder "XPCSET" (*./XPCSET/*) in the root directory of the target medium.
	Enabled	

Table 90: Advanced - OEM Features - Settings Backup

7.1.6.2.2 USB Configuration

BIOS parameter		Setting options	Description
USB BIOS Support		Disabled	Disables/Enables USB support in BIOS
		Enabled	
USB Legacy SMI bit Clean		***Disabled***	Disables/Enables USB legacy SMI bit clean
		Enabled	
USB Port Disable Override[1]		***Disabled***	Manually disables/enables USB ports (per port) or enables all ports
		Select Per-Port	
	USB*n*[2] 3.0 Connector	Disabled	Disables/Enables USB*n* 3.0 connector interface
		Enabled	
	USB*n* 2.0 Connector	Disabled	Disables/Enables USB*n* 2.0 connector interface
		Enabled	
	USB 2.0 IF 3	Disabled	Disables/Enables the USB 2.0 interface on IF option 3
		Enabled	
	USB 2.0 Internal	Disabled	Disables/Enables the internal USB 2.0 interface
		Enabled	

Table 91: Advanced - OEM Features - USB Configuration

1) The names and scope of these parameters may vary depending on the main device and configuration.
2) *n* corresponds to one of the 6 available USB 3.0 interfaces.

7.1.6.2.3 Chipset Configuration

Warning!

Settings made in this menu can cause malfunctions if changes are made to configured TPM systems (e.g. Secure Boot).

BIOS parameter	Setting options	Description
Platform Trust Technology	Disabled	Disables/Enables Platform Trust Technology (PTT) By default, firmware TPM (FTPM of the combination of CPU and PCH) is used. If PTT is disabled, the discrete TPM (hardware DTPM) is used.
	Enabled	

Table 92: Advanced - Chipset Configuration

7.1.6.2.4 ACPI Table/Features Control

BIOS parameter	Setting options	Description
ACPI Settings	Enter	Opens submenu "ACPI Settings" on page 149
FACP - RTC S4 Wakeup	Disabled	Disables/Enables S4 wakeup via RTC
	Enabled	
APIC[1)] - IO APIC Mode	Disabled	Disables/Enables IO APIC mode
	Enabled	

Table 93: Advanced - OEM Features - ACPI Table/Features Control

1) Advanced Programmable Interrupt Controller

7.1.6.2.4.1 ACPI Settings

BIOS parameter	Setting options	Description
ACPI Version	-	Displays the ACPI version
Enable ACPI Auto Configuration	***Disabled***	Disables/Enables ACPI BIOS auto-configuration
	Enabled	
Enable Hibernation	Disabled	Disables/Enables hibernation The effectiveness of this option may vary depending on the operating system.
	Enabled	
PTID Support	Disabled	Disables/Enable PTID support
	Enabled	
PECI[1)] Access Method	***Direct I/O***	Selects the PECI access mode
	ACPI	
ACPI S3 Support	Disabled	Disables/Enable ACPI S3 support
	Enabled	
Native PCIE Enable	Disabled	Native operating system PCI Express support
	Enabled	
Native ASPM	***Auto***	Disables native ASPM (BIOS controls ASPM), enables it (operating system controls ASPM) or sets it automatically (mode selected automatically)
	Disabled	
	Enabled	

Table 94: Advanced - OEM Features - ACPI Table/Features Control - ACPI Settings

1) Platform Environment Control Interface

7.1.6.2.5 CPU Configuration

BIOS parameter	Setting options	Description
Type	-	Displays the CPU type
ID	-	Displays the CPU ID
Speed	-	Displays the CPU speed [MHz]
L1 Data Cache	-	Displays the L1 data cache [kB]
L1 Instruction Cache	-	Displays the L1 instruction cache [kB]
L2 Cache	-	Displays the L2 cache [kB]
L3 Cache	-	Displays the L3 cache [kB]
L4 Cache	-	Displays the L4 cache [kB]
VMX	-	Displays VMX support
SMX/TXT	-	Displays SMX/TXT support
C6DRAM	Disabled	Disables/Enables C6DRAM DRAM data can be moved to PRM memory when the processor is in C6.
	Enabled	
CPU Flex Ratio Override	***Disabled***	Disables/Enables the CPU flex ratio override
	Enabled	
CPU Flex Ratio Settings[1)]	INT Default: (diverse)	Defines the CPU flex ratio override multiplier Range: Hardware-dependent
Hardware Prefetcher	Disabled	Disables/Enables the hardware prefetcher
	Enabled	
Adjacent Cache Line Prefetch	Disabled	Disables/Enables adjacent cache line prefetch
	Enabled	
Intel (VMX) Virtualization Technology	Disabled	Disables/Enables Intel (VMX) Virtualization Technology
	Enabled	
PECI	Disabled	Disables/Enables PECI
	Enabled	
AVX[2)]	Disabled	Disables/Enables AVX 2/3
	Enabled	
AVX3	Disabled	Disables/Enables AVX 3
	Enabled	
Active Processor Cores	***All***	Disables/Enables a certain number of available processor cores
	(Various)	
Hyper Threading	Disabled	Disables/Enables hyper-threading
	Enabled	
BIST	***Disabled***	Disables/Enables the built-in self-test on reset
	Enabled	
AP threads Idle Manner	HALT Loop	Selects the setting for thread idle behavior
	MWAIT Loop	
	RUN Loop	
AES	Disabled	Disables/Enables the Advanced Encryption Standard
	Enabled	
Machine Check	Disabled	Disables/Enables the machine check
	Enabled	
MonitorMWait	Disabled	Disables/Enables MonitorMWait
	Enabled	
RaceConditionResponse Policy	***Disabled***	Disables/Enables RaceConditionResponse policy
	Enabled	

Table 95: Advanced - CPU Configuration

1) This variable determines the multiplier for the CPU speed (variable * 100 MHz = CPU frequency).

   The range of values is specified by the system and hardware.

2) Advanced Vector Extensions.

7.1.6.2.6 Power & Performance

BIOS parameter	Setting options	Description
CPU - Power Management Control	Enter	Opens submenu "CPU - Power Management Control" on page 151
GT - Power Management Control	Enter	Opens submenu "GT - Power Management Control" on page 154
Intel(R) Speed Shift Technology Interrupt Control	Disabled	Disables/Enables Intel Speed Shift Technology interrupt control
	Enabled	

Table 96: Advanced - Power & Performance

7.1.6.2.6.1 CPU - Power Management Control

BIOS parameter	Setting options	Description
Boot Performance mode	Max Battery	Selects the performance mode in which BIOS starts
	Max Non-Turbo Performance	
	Turbo Performance	
Intel(R) SpeedStep(tm)	Disabled	Disables/Enables Intel SpeedStep for more than 2 supported frequency ranges
	Enabled	
Race-to-Halt (RTH)	Disabled	Disables/Enables race-to-halt
	Enabled	
Intel(R) Speed Shift Technology	Disabled	Disables/Enables Intel Speed Shift Technology[1)]
	Enabled	
Intel(R) Turbo Boost Max Technology 3.0	Disabled	Disables/Enables Intel Turbo Boost Max Technology 3.0 support
	Enabled	
Per Core P State OS control mode	Disabled	Disables/Enables Per Core P State OS control mode
	Enabled	
HwP Autonomous Per Core P State	Disabled	Enables/Disables HwP (Hardware-Controlled Performance States) Autonomous Per Core P State
	Enabled	
HwP Autonomous EPP Grouping	Disabled	Enables/Disables HwP Autonomous EPP Grouping
	Enabled	
EPB override over PECI	***Disabled***	Enables/Disables EPB (Performance and Energy Bias Hint) override over PECI
	Enabled	
HwP Fast MSR Support	Disabled	Disables/Enables HwP Fast MSR Support
	Enabled	
HDC[3)] Control	Disabled	Disables/Enables HDC control The processor can force system components into idle mode.
	Enabled	
Turbo Mode	Disabled	Disables/Enables Intel Turbo Boost Technology Available only for processors with turbo mode support.
	Enabled	
View/Configure Turbo Options[4)]	Enter	Opens submenu "View/Configure Turbo Options" on page 152
Config TDP Configurations	Enter	Opens submenu "Config TDP Configurations" on page 153
Platform PL1 Enable	***Disabled***	Disables/Enables platform power limit (PL1) programming Serves the processor as a performance limit in a specific time window.
	Enabled	
Platform PL1 Power	INT Default: ***0***[6)]	Defines the platform PL1 power limit [mW][5)] Range: 0 to 4,095,875 Resolution: 1/8
Platform PL1 Time Window	INT Default: ***0***	Defines the platform PL1 time window [s] Range: 0 to 128
Platform PL2 Enable	***Disabled***	Disables/Enables platform power limit (PL2) programming
	Enabled	
Platform PL2 Power	INT Default: ***0***	Defines the platform PL2 power limit [mW] Range: 0 to 4,095,875 Resolution: 1/8
Power Limit 4 Override	***Disabled***	Disables/Enables the power limit 4 override Enable to set values for power limit 4 manually; otherwise, the system default values are used.
	Enabled	
Power Limit 4	INT Default: ***0***	Defines PL4 power limit 4 [mW] Range: 0 to 4,095,875 Resolution: 1/8
Power Limit 4 Lock	***Disabled***	Disables/Enables the power limit 4 lock function This can be used to lock the PL4 configuration when using an operating system.
	Enabled	
C states[7)]	***Disabled***	Disables/Enables CPU C-states management
	Enabled	
Thermal Monitor	Disabled	Disables/Enables Thermal Monitor
	Enabled	
Interrupt Redirection Mode Selection	***Fixed Priority***	Selects the redirection mode for logical interrupts
	Round robin	
	Hash Vector	
	No Change	
Timed MWAIT	***Disabled***	Disables/Enables Timed MWAIT
	Enabled	
Power Limit 3 Settings	Enter	Opens submenu "Power Limit 3 Settings" on page 154

Table 97: Advanced - Power & Performance - CPU-Power Management Control

1) Intel Speed Shift Technology enables hardware-controlled P-states via the CPPC (Collaborative Processor Performance Control) v2 interface.
3) Hardware Duty Cycling
4) This submenu appears only if option Intel(R) Speed Shift Technology is enabled.

5) For all power limits (PL1 to PL4), the additional description on the display unit must be observed. All values must be entered in mW.
6) The default value 0 for this table means that pre-programmed default values are used. The system does not use the numeric value 0.
7) The C-states options are described separately in the following table to maintain clarity.

BIOS setting	Setting options	Description
Enhanced C-states	Disabled	Disables/Enables enhanced C-states (C1E) The CPU switches to the lowest speed level if all cores are in a C-state.
	Enabled	
Package C-State Demotion	***Auto***	Disables/Enables package C-state demotion or sets it automatically
	Disabled	
	Enabled	
Package C-State Un-demotion	***Auto***	Disables/Enables package C-state un-demotion or sets it automatically
	Disabled	
	Enabled	
CState Pre-Wake	Disabled	Disables/Enables CState pre-wake
	Enabled	
IO MWAIT Redirection	***Disabled***	Disables/Enables I/O MWAIT redirection
	Enabled	
Package C-State Limit	***Auto***	Selects package C-state limits, sets it automatically (lowest available state selected) or the CPU default (default C-state of the CPU)
	CPU Default	
	C10	C9 optimized VR[1] off
	C9	C8 + VR off
	C8	C7 + PCH off
	C7S	Optimized Deeper Power Down
	C7	Deeper Power Down
	C6	Deep Power Down
	C3	Deep Sleep
	C2	Stop Clock
	C0/C1	Operating Mode/Halt
C6/C7 Short Latency Control (MSR 0x60B)		
Time Unit	1 ns	Selects the IRTL time unit [ns]
	32 ns	
	1024 ns	
	32768 ns	
	1048576 ns	
	33554432 ns	
Latency	INT Default: ***0***	Defines the IRTL value Range: 0 to 1023
C6/C7 Long Latency Control (MSR 0x60C)		
Time Unit	1 ns	Selects the IRTL time unit [ns]
	32 ns	
	1024 ns	
	32768 ns	
	1048576 ns	
	33554432 ns	
Latency	INT Default: ***0***	Defines the IRTL value Range: 0 to 1023
Custom P-state Table	Enter	Opens submenu "Custom P-state Table" on page 153

Table 98: Advanced - Power & Performance - CPU-Power Management Control - C-States

1) Voltage Regulator (Module)
2) Interrupt Response Time Limit

View/Configure Turbo Options

BIOS parameter	Setting options	Description
Max Turbo Power Limit	-	Displays the max. turbo power limit
Min Turbo Power Limit	-	Displays the min. turbo power limit
Package TDP[1] Limit	-	Displays the package TDP limit
Power Limit 1	-	Displays power limit 1
Power Limit 2	-	Displays power limit 2
n-core[2] Turbo Ratio Limit Ratio (TRLR)	-	Displays the *n-core*Turbo Ratio Limit Ratio
Energy Efficient P-state	Disabled	Disables/Enables energy-efficient P-states
	Enabled	
Package Power Limit MSR Lock	***Disabled***	Disables/Enables the package power limit MSR lock function A reset is necessary to unlock the register.
	Enabled	
n-Core Turbo Ratio Limit Ratio (TRLR) Override	INT Default: (diverse)	Defines the frequency of CPU turbo on an active core Range: Hardware-dependent
Energy Efficient Turbo	Disabled	Disables/Enables energy-efficient turbo Reduces the turbo frequency to increase energy efficiency.
	Enabled	

Table 99: Advanced - Power & Performance - CPU-Power Management Control - View/Configure Turbo Options

1) Thermal Design Power
2) *n* depends on the number of available processor cores.

Config TDP Configurations

BIOS parameter	Setting options	Description
Enable Configurable TDP	***Applies to cTDP***	Disables/Enables Configurable TDP (cTDP)
	Applies to non-cTDP	
Configurable TDP Boot Mode	Deactivate	Selects the configurable TDP boot mode Nominal: TDP is not overshot or undershot. Down: TDP is undershot and the processor works with lower power.
	Down	
	Nominal	
Configurable TDP Lock	***Disabled***	Disables/Enables TDP control register
	Enabled	
CTDP BIOS control	***Disabled***	Disables/Enables CTDP BIOS control
	Enabled	
ConfigTDP Levels	-	Displays the ConfigTDP levels supported by the MSR[1)]
ConfigTDP Turbo Activation Ratio	-	Displays the ConfigTDP turbo activation ratio values read by the MSR
Power Limit 1	-	Displays the PL1 values from MMIO[2)]
Power Limit 2	-	Displays the PL2 values from MMIO
Custom Settings Nominal		
ConfigTDP Nominal	-	Displays the ConfigTDP nominal ratio, turbo activation ratio and PL1 read from the MSR
Power Limit 1[3)]	INT Default: ***0***[4)]	Defines the PL1 power limit [mW] Range: 0 to 4,095,875 Resolution: 125 mW
Power Limit 2	INT Default: ***0***	Defines the PL2 power limit [mW] Range: 0 to 4,095,875 Resolution: 125 mW
Power Limit 1 Time Window	INT Default: ***0***	Defines the PL1 time window [s] Range: 0 to 128
ConfigTDP Turbo Activation Ratio	INT Default: ***0***	Defines the ConfigTDP turbo activation ratio Range: 0 to 255
Custom Settings Down		
ConfigTDP Level1	-	Displays the ConfigTDP nominal ratio, turbo activation ratio and PL1 read from the MSR
Power Limit 1	INT Default: ***0***	Defines the PL1 power limit [mW] Range: 0 to 4,095,875 Resolution: 125 mW
Power Limit 2	INT Default: ***0***	Defines the PL2 power limit [mW] Range: 0 to 4,095,875 Resolution: 125 mW
Power Limit 1 Time Window	INT Default: ***0***	Defines the PL1 time window [s] Range: 0 to 128
Config TDP Turbo Activation Ratio	INT Default: ***0***	Defines the ConfigTDP turbo activation ratio Range: 0 to 255

Table 100: Advanced - Power & Performance - CPU-Power Management Control - Config TDP Configurations

1) Model-Specific Register
2) Memory Mapped I/O
3) For all power limits (PL1 to PL2), the additional description on the display unit must be observed. All values must be entered in mW.
4) The default value 0 for this table means that pre-programmed default values are used. The system does not use the numeric value 0.

Custom P-state Table

BIOS parameter	Setting options	Description
Number of P states	INT Default: ***0***	Defines the number Range: 0, 2 to 40, 1 = Invalid input
Max P-State Ratio	INT Default: ***0***	Range: 0 to 127
P-State Ratio (*n*)	INT Default: ***0***	Range: 0 to 127

Information:

Depending on the operating system used, the maximum number of possible P-states may be limited to 16.

Max 16 custom P-state Table		
Max P-State Ratio	INT Default: ***0***	Range: 0 to 127
P-State Ratio (*q*)	INT Default: ***0***	Range: 0 to 127

Table 101: Advanced - Power & Performance - CPU-Power Management Control - Custom P-state Table

1) *n* corresponds to the number defined with "Number of P states". Indexing is not displayed.
2) *q* corresponds to max. 16. Indexing is not displayed.

Power Limit 3 Settings

BIOS parameter	Setting options	Description
Power Limit 3 Override	***Disabled***	Disables/Enables power limit 3 If the power limit 3 override is disabled, default values are used.
	Enabled	
Power Limit 3[1)]	INT Default: ***0***[2)]	Defines power limit 3 [mW] Range: 0 to 4,095,875 Resolution: 125 mW
Power Limit 3 Time Window	INT Default: ***0***	Selects the power limit 3 time window [s]
	(Various)	
Power Limit 3 Duty Cycle	INT Default: ***0***	Defines the power limit 3 duty cycle [%] Range: 0 to 100 Resolution: 1
Power Limit 3 Lock	***Disabled***	Disables/Enables the power limit 3 lock function
	Enabled	

Table 102: Advanced - Power & Performance - CPU-Power Management Control - Power Limit 3 Settings

1) The additional description on the display unit must be observed.
2) The default value 0 for this table means that pre-programmed default values are used. The system does not use the numeric value 0.

7.1.6.2.6.2 GT - Power Management Control

BIOS parameter	Setting options	Description
RC6 (Render Standby)	Disabled	Disable/Enables RC6 (render standby) Permits the GPU to go into standby.
	Enabled	
Maximum GT frequency	***Default Max Frequency***	Maximum graphics frequency (including graphic turbo) [MHz] The max. possible frequency is selected by default. Resolution: 50 MHz
	100 to 1200 Mhz	
Disable Turbo GT frequency	***Disabled***	Disables/Enables Turbo GT frequency
	Enabled	

Table 103: Advanced - Power & Performance - GT-Power Management Control

7.1.6.2.7 Memory Configuration

BIOS parameter		Setting options	Description
Memory RC Version		-	Displays the memory RC version
Memory Speed		-	Displays the transfer rate [megatransfers per second, MT/s]
Memory Timings		-	Displays RAM timing
Controller 0 Channel 0 Slot 0		-	Displays the memory status
	Size	-	Displays the memory size [MB]
	Number of Ranks	-	Displays the number of ranks
	Manufacturer	-	Displays the memory manufacturer
Controller 0 Channel 0 Slot 1		-	Displays the memory status
	Size	-	Displays the memory size [MB]
	Number of Ranks	-	Displays the number of ranks
	Manufacturer	-	Displays the memory manufacturer
Controller 1 Channel 0 Slot 0		-	Displays the memory status
	Size	-	Displays the memory size [MB]
	Number of Ranks	-	Displays the number of ranks
	Manufacturer	-	Displays the memory manufacturer
Controller 1 Channel 0 Slot 1		-	Displays the memory status
	Size	-	Displays the memory size [MB]
	Number of Ranks	-	Displays the number of ranks
	Manufacturer	-	Displays the memory manufacturer
Memory Maximum Frequency		***Auto***	Selects the maximum frequency of RAM [MHz] automatically or manually
		(Various)	
ECC Support[1)]		Disabled	Disables/Enable DDR ECC support
		Enabled	
Max TOLUD[2)]		***Dynamic***	Sets the max. TOLUD [GB] automatically (dynamic) or manually Resolution: 0.25 GB
		(Various)	
Enable RH Prevention		***Disabled***	Disables/Enable Row Hammer Prevention
		Enabled	
Row Hammer Refresh Solution		***2x Refresh***	Selects the refresh rate for Row Hammer Prevention
		4x Refresh	
		NORMAL Refresh	
RH Activation Probability		***1/2^11***	Selects RH Activation Probability
		(Various)	

Table 104: Advanced - Memory Configuration

1) Hardware-dependent
2) Top of low usable DRAM

7.1.6.2.8 System Agent (SA) Configuration

BIOS parameter	Setting options	Description
VT-d[1]	-	Displays VT-d support
Graphics Configuration	Enter	Opens submenu "Graphics Configuration" on page 155
VMD[2] setup menu	Enter	Opens submenu "VMD setup menu" on page 156
Display setup menu	Enter	Opens submenu "Display setup menu" on page 156
PCI Express Configuration	Enter	Opens submenu "PCI Express Configuration" on page 156
VT-d	Disabled	Disables/Enables VT-d
	Enabled	
Above 4 GB MMIO BIOS assignment	Disabled	Disables/Enables above 4 GB MMIO BIOS assignment
	Enabled	

Table 105: Advanced - System Agent (SA) Configuration

1) Intel Virtualization Technology for Directed I/O
2) Intel Volume Management Device

7.1.6.2.8.1 Graphics Configuration

BIOS parameter	Setting options	Description
Graphics Turbo IMON Current	INT Default: ***31***	Defines the graphics turbo IMON current Range: 14 to 31
Primary Display	***Auto***	Selects the primary display automatically or manually or enables hybrid graphics (HG)
	IGFX	
	PEG Slot	
	PCH PCI	
	HG	
Internal Graphics	***Auto***	Disables/Enables IGFX or automatic
	Disabled	
	Enabled	
GTT[1] Size	***8MB***	Selects the GTT size [MB]
	4MB	
	2MB	
Aperture Size	128MB	Selects reserved RAM [MB] If the graphics memory is full, the defined amount of memory is made available.
	256MB	
	512 MB	
	1024 MB	
PSMI Support	***Disabled***	Disables/Enables PSMI support
	Enabled	
DVMT[2] Pre-Allocated	0M to 160M Default: ***60M***	Defines the allocated graphics memory (DVMT) [MB] to be used by the IGD[3].
DVMT Total Gfx Mem	***256M***	Selects the memory size [MB] that can be used by the IDG. MAX uses the entire available main memory. The additional memory is dynamically allocated according to DVMT 5.0.
	128M	
	MAX	
DFD Restore	***Disabled***	Disables/Enables display memory map programming for DFD Restore
	Enabled	
DiSM Size	***0GB***	Selects DiSM Size
	(Various)	
Intel Graphics Pei Display Peim	Disabled	Disables/Enables Intel Graphics Pei Display Peim
	Enabled	
VDD Enable	Disabled	Disables/Enables force VDD
	Enabled	
Configure GT for use	Disabled	Disables/Enables GT configuration in BIOS
	Enabled	
RC1p Support	***Disabled***	Disables/Enables RC1p support
	Enabled	
PAVP Enable	Disabled	Disables/Enables "Force protected audio video path"
	Enabled	
Cdynmax Clamping Enable	Disabled	Disables/Enables Cdynmax clamping
	Enabled	
Cd Clock Frequency	***Max CdClock freq based on Reference Clk***	Selects highest supported Cd Clock Frequency [MHz] or automatic
	(Various)	
Skip Full CD Clock Init	***Disabled***	Disables/Enables Skip Full CD Clock Init
	Enabled	

Table 106: Advanced - System Agent (SA) Configuration - Graphics Configuration

BIOS parameter	Setting options	Description
VBT Select	eDP	Selects VBT of the GOP driver
	MIPI	
	eDP & HDMI	
	eDP & HDMI for TGLH	
IUER Button Enable	***Disabled***	Disables/Enables function IUER Button
	Enabled	

Table 106: Advanced - System Agent (SA) Configuration - Graphics Configuration

1) Graphics translation table (see also graphics aperture/address remapping table (GART))
2) Dynamic Video Memory Technology
3) Internal Graphics Device
4) Pre-EFI initialization (modules)

7.1.6.2.8.2 VMD setup menu

BIOS parameter	Setting options	Description
Enable VMD controller	***Disabled***	Disables/Enables the VMD controller
	Enabled	
Enable VMD Global Mapping	***Disabled***	Disables/Enables VMD Global Mapping
	Enabled	
Map this Root Port under VMD	***Disabled***	Disables/Enables Map this Root Port under VMD
	Enabled	
Root Port BDF[1] details	-	Displays root port BDF details
RAID0	Disabled	Disables/Enables RAID0 support
	Enabled	
RAID1	Disabled	Disables/Enables RAID1 support
	Enabled	
RAID5	Disabled	Disables/Enables RAID5 support
	Enabled	
RAID10	Disabled	Disables/Enables RAID10 support
	Enabled	
Intel Rapid Recovery Technology	Disabled	Disables/Enables Intel Rapid Recovery Technology support
	Enabled	
RRT volumes can span internal and eSATA drives	Disabled	Enable enables eSATA drives for RRT only
	Enabled	
Intel(R) Optane (TM) Memory	Disabled	Disables/Enables Intel Optane Memory support
	Enabled	

Table 107: Advanced - System Agent (SA) Configuration - VMD setup menu

1) Boot:Device.Function

7.1.6.2.8.3 Display setup menu

BIOS parameter	Setting options	Description
DP1	Disabled	Disables/Enables GPIO DP1
	Enabled	
DP2	Disabled	Disables/Enables GPIO DP2
	Enabled	
DP3 (IF3)	Disabled	Disables/Enables GPIO DP3
	Enabled	

Table 108: Advanced - System Agent (SA) Configuration - Display setup menu

7.1.6.2.8.4 PCI Express Configuration

BIOS parameter	Setting options	Description
PCI Express Clock Gating	Disabled	Disables/Enables PCI Express clock gating for root ports
	Enabled	
Fia Programming	Disabled	Disables/Enables loading of the FIA configuration (for each port)
	Enabled	
PCI Express Power Gating	Disabled	Disables/Enables PCI Express Power Gating for root ports
	Enabled	
Compliance Test Mode	***Disabled***	Disables/Enables compliance test mode
	Enabled	
PCIe function swap	Disabled	Disables/Enables PCIe function swap
	Enabled	
PCIE Resizable BAR Support	***Disabled***	Disables/Enables PCIE Resizable BAR support
	Enabled	
PCI Express Root Port *n*[1]	Enter	Opens submenu "PCI Express Root Port n" on page 157

Table 109: Advanced - System Agent (SA) Configuration - PCI Express Configuration

1) Depending on the hardware, all available PCIe root ports are listed.

PCI Express Root Port *n*

BIOS parameter		Setting options	Description
PCI Express Root Port *n*[1]		Disabled	Disables/Enables PCI Express root port *n*
		Enabled	
ASPM		***Disabled***	Selects PCIe Active State Power Management manually or disables it
		L1	
L1 Substates		Disabled	Selects or disables L1 substates
		L1.1	
		L1.1 & L1.2	
Gen3 Eq Phase3 Method		***Hardware***	PCIe Gen3 Equalization Phase3 Method
		Static Coeff.	
Gen4 Eq Phase3 Method		***Hardware***	PCIe Gen4 Equalization Phase3 Method
		Static Coeff.	
ACS		Disabled	Disables/Enables access control services extended capabilities
		Enabled	
PTM		Disabled	Disables/Enables Precision Time Measurement
		Enabled	
DPC		Disabled	Disables/Enables Downstream Port Containment
		Enabled	
FOM Scoreboard Control Policy		***Auto***	Selects FOM Scoreboard Control Policy
		Gen3	
		Gen4	
		Gen3/Gen4	
VC		Disabled	Disables/Enables Virtual Channel
		Enabled	
Multi-VC		***Disabled***	Disables/Enables Multi Virtual Channel
		Enabled	
EDPC		Disabled	Disables/Enables Rootport extensions for Downstream Port Containment
		Enabled	
	URR	***Disabled***	Disables/Enables unsupported request reporting Notification of unsupported requests.
		Enabled	
	FER	***Disabled***	Disables/Enables fatal error reporting Notification of fatal errors[2]
		Enabled	
	NFER	***Disabled***	Disables/Enables non-fatal error reporting Notification of non-fatal errors[2]
		Enabled	
	CER	***Disabled***	Disable/Enable correctable error reporting Notification of correctable errors[2]
		Enabled	
	CTO	***Disabled***	Disables/Enables PCIe completion timer timeout
		Enabled	
	SEFE	***Disabled***	Disables/Enables system error on fatal error[3]
		Enabled	
	SENFE	***Disabled***	Disables/Enables system error on non-fatal error[3]
		Enabled	
	SECE	***Disabled***	Disables/Enables system error on correctable error[3]
		Enabled	
	PME SCI	Disabled	Disables/Enables system control interrupt on a power management event
		Enabled	
	Hot Plug	***Disabled***	Disables/Enables hot plugging
		Enabled	
	Advanced Error Reporting	Disabled	Disables/Enables advanced error reporting
		Enabled	
PCIe Speed		***Auto***	Selects the PCIe transfer rate [gigatransfers per second (GT/s)] automatically or manually Gen1: Max. 2.5 GT/s Gen2: Max. 5.0 GT/s Gen3: Max. 8.0 GT/s Gen4: Max. 16.0 GT/s
		Gen1	
		Gen2	
		Gen3	
		Gen4	
IOTG Mode		***Disabled***	Disables/Enables IOTG Mode
		Enabled	
	Transmitter Half Swing	***Disabled***	Disables/Enables transmitter half-swing Signals are transferred with a half-swing.
		Enabled	
Detect Timeout		INT Default: ***0***	Defines the detect timeout [ms] If no link is received from an enabled port after the detect timeout has expired, it is assumed that no device is present there. The system can disable the port if necessary. Range: 0 to 65535
P2P Support		***Disabled***	Disables/Enables peer-to-peer support
		Enabled	
SA PCIe LTR Configuration			
LTR		Disabled	Disables/Enables SA PCIe Latency Reporting
		Enabled	
	Snoop Latency Override	***Auto***	Disables the snoop latency override or selects manual or automatic mode
		Disabled	
		Manual	

Table 110: Advanced - System Agent (SA) Configuration - PCI Express Configuration - PCI Express Root Port *n*

BIOS parameter		Setting options	Description
	Snoop Latency Value	INT Default: ***60***	Defines the snoop latency value Range: 0 to 1023
	Snoop Latency Multiplier	1 ns	Defines the snoop latency multiplier value [ns]
		32 ns	
		1024 ns	
		32768 ns	
		1048576 ns	
		33554432 ns	
	Non-Snoop Latency Override	***Auto***	Disables the non-snoop latency override or selects manual or automatic mode
		Disabled	
		Manual	
	Non-Snoop Latency Value	INT Default: ***60***	Defines the non-snoop latency value Range: 0 to 1023
	Non-Snoop Latency Multiplier	1 ns	Defines the non-snoop latency multiplier value [ns]
		32 ns	
		1024 ns	
		32768 ns	
		1048576 ns	
		33554432 ns	
	Force LTR Override	***Disabled***	Disables/Enables force LTR override
		Enabled	
LTR Lock		***Disabled***	Disables/Enables the PCIE1 LTR lock function
		Enabled	
CPU PCIe Gen3 HWEQ Config			
UPTP		INT Default: ***7***	Selects Upstream Port Transmitter Preset Range: 0 to 10
DPTP		INT Default: ***7***	Selects Downstream Port Transmitter Preset Range: 0 to 10
CPU PCIe Gen4 HWEQ Config			
UPTP		INT Default: ***8***	Selects Upstream Port Transmitter Preset Range: 0 to 10
DPTP		INT Default: ***9***	Selects Downstream Port Transmitter Preset Range: 0 to 10

Table 110: Advanced - System Agent (SA) Configuration - PCI Express Configuration - PCI Express Root Port *n*

1) PCI Express root port *n* must be enabled in order to make further configurations.
2) With a multifunction device, all functions within the device are monitored.
   For the root port, the error occurs within the root complex.
3) Generates a system error if an error of this category is reported by a root port or device on a root port.

7.1.6.2.9 PCH-IO Configuration

BIOS parameter	Setting options	Description
PCI Express Configuration	Enter	Opens submenu "PCI Express Configuration" on page 159
SATA Configuration	Enter	Opens submenu "SATA Configuration" on page 161
Security Configuration	Enter	Opens submenu "Security Configuration" on page 161
HD Audio Configuration	Enter	Opens submenu "HD Audio Configuration" on page 161
TSN GBE Configuration	Enter	Opens submenu "PCH-IO Configuration - TSN GBE Configuration" on page 161
State after G3	***S0 State***	Working: Selects the state after G3
	S5 State	Soft off: Defines how to proceed after "mechanical off" (G3). S0 or S5 after G3
Legacy IO Low Latency	***Disabled***	Disables/Enables Low Latency for Legacy IO
	Enabled	
Numlock	Disabled	Disables/Enables the numeric keypad during booting Enables BIOS input via the numeric keypad of a keyboard.
	Enabled	
Screenshot Function	***Disabled***	Disables/Enables the screenshot function **[F11]** This function is only available in BIOS and cannot be used in operating systems. Screenshots are stored in BMP format and named using the capture time (yyyymmddhhmmss).
	Enabled	
Shell Startup Script Delay	INT Default: ***3***	Defines the shell startup script delay time [s] Range: 0 to 10
Block boot fail pop-up	***Disabled***	Enables/Disables the boot-fail pop-up (e.g. for UEFI PXE). The device tries to boot automatically from the next boot device after a boot failure.
	Enabled	

Table 111: Advanced - PCH-IO Configuration

7.1.6.2.9.1 PCI Express Configuration

BIOS parameter	Setting options	Description
DMI Link ASPM Control	Disabled	Selects DMI Link ASPM Control mode
	L0s	
	L1	
	L0sL1	
Port8xh Decode	***Disabled***	Disables/Enables Port8xh decoding
	Enabled	
Port8xh Decode Port	INT	Defines the Port8xh Decode root port
Peer Memory Write Enable	***Disabled***	Disables/Enables peer memory write enable
	Enabled	
Compliance Test Mode	***Disabled***	Disables/Enables compliance test mode
	Enabled	
PCIe function swap	Disabled	Disables/Enables PCIe function swap
	Enabled	
PCI Express Root Port *n* (...)[1]	-	Displays the preconfigured setting
PCI Express Root Port *n* (...)[2]	Enter	Opens submenu "PCI Express Root Port n" on page 159

Table 112: Advanced - PCH-IO Configuration - PCI Express Configuration

1) Depending on the hardware, all available preconfigured PCIe root ports are listed.
2) Depending on the hardware, all available configurable PCIe root ports are listed.

PCI Express Root Port *n*

BIOS parameter	Setting options	Description
PCI Express Root Port *n*[1]	Disabled	Disables/Enables PCI Express root port *n*
	Enabled	
Connection Type	Built-in	Defines Connection Type (installed or removable) Default: n/A[2]
	Slot	
ASPM	Auto	Selects PCIe Active State Power Management manually/automatically or disables it
	Disabled	
	L0sL1	
	L0s	
	L1	
L1 Substates	***Disabled***	Selects or disables L1 substates
	L1.1	
	L1.1 & L1.2	
ACS	Disabled	Disables/Enables access control services extended capabilities
	Enabled	
PTM	Disabled	Disables/Enables Precision Time Measurement
	Enabled	
DPC	Disabled	Disables/Enables Downstream Port Containment
	Enabled	
EDPC	Disabled	Disables/Enables Rootport extensions for Downstream Port Containment
	Enabled	

Table 113: Advanced - PCH-IO Configuration - PCI Express Root Port *n*

BIOS parameter		Setting options	Description
	URR	***Disabled***	Disables/Enables unsupported request reporting Notification of unsupported requests.
		Enabled	
	FER	***Disabled***	Disables/Enables fatal error reporting Notification of fatal errors[3]
		Enabled	
	NFER	***Disabled***	Disables/Enables non-fatal error reporting Notification of non-fatal errors[3]
		Enabled	
	CER	***Disabled***	Disable/Enable correctable error reporting Notification of correctable errors[3]
		Enabled	
	SEFE	***Disabled***	Disables/Enables system error on fatal error[4]
		Enabled	
	SENFE	***Disabled***	Disables/Enables system error on non-fatal error[4]
		Enabled	
	SECE	***Disabled***	Disables/Enables system error on correctable error[4]
		Enabled	
	PME SCI	Disabled	Disables/Enables system control interrupt on a power management event
		Enabled	
	Hot Plug	***Disabled***	Disables/Enables hot plugging
		Enabled	
	Advanced Error Reporting	Disabled	Disables/Enables advanced error reporting
		Enabled	
PCIe Speed		***Auto***	Selects the PCIe transfer rate [gigatransfers per second (GT/s)] automatically or manually[2] Gen1: Max. 2.5 GT/s Gen2: Max. 5.0 GT/s Gen3: Max. 8.0 GT/s
		Gen1	
		Gen2	
		Gen3	
	Transmitter Half Swing	***Disabled***	Disables/Enables transmitter half-swing Signals are transferred with a half-swing.
		Enabled	
Detect Timeout		INT Default: ***0***	Defines the detect timeout [ms] If no link is received from an enabled port after the detect timeout has expired, it is assumed that no device is present there. The system can disable the port if necessary. Range: 0 to 65535
Extra Bus Reserved		INT Default: ***0***	Defines the extra bus reserved for bridges after this root bridge Range: 0 to 7
Reserved Memory		INT Default: ***10***	Defines reserved memory [MB] for this bridge Range: 0 to 20
Reserved I/O		INT Default: ***4***	Defines the reserved I/O range for this bridge Range: 4 to 20 kB Resolution: 4 kB
PCH PCIe LTR Configuration			
LTR		Disabled	Disables/Enables PCH PCIe Latency Reporting
		Enabled	
	Snoop Latency Override	***Auto***	Disables the snoop latency override or selects manual or automatic mode
		Disabled	
		Manual	
	Snoop Latency Value	INT Default: ***60***	Defines the snoop latency value Range: 0 to 1023
	Snoop Latency Multiplier	1 ns	Defines the snoop latency multiplier value [ns]
		32 ns	
		1024 ns	
		32768 ns	
		1048576 ns	
		33554432 ns	
	Non-Snoop Latency Override	***Auto***	Disables the non-snoop latency override or selects manual or automatic mode
		Disabled	
		Manual	
	Non-Snoop Latency Value	INT Default: ***60***	Defines the non-snoop latency value Range: 0 to 1023
	Non-Snoop Latency Multiplier	1 ns	Defines the non-snoop latency multiplier value [ns]
		32 ns	
		1024 ns	
		32768 ns	
		1048576 ns	
		33554432 ns	
	Force LTR Override	***Disabled***	Disables/Enables force LTR override
		Enabled	
	LTR Lock	***Disabled***	Disables/Enables the PCIe LTR lock function
		Enabled	

Table 113: Advanced - PCH-IO Configuration - PCI Express Root Port *n*

1) PCI Express root port *n* must be enabled in order to make further configurations.
2) Hardware-dependent.
3) With a multifunction device, all functions within the device are monitored.
   For the root port, the error occurs within the root complex.
4) Generates a system error if an error of this category is reported by a root port or device on a root port.

7.1.6.2.9.2 SATA Configuration

BIOS parameter		Setting options	Description
SATA controller(s)[1]		Disabled	Disables/Enables the SATA controller
		Enabled	
Aggressive LPM Support		***Disabled***	Disables/Enables Aggressive Link Power Management The host controller can change to a low-power state in the idle phase of the SATA device.
		Enabled	
Serial ATA Port *n*[3)2)]		-	Displays the name and capacity of the SATA device
	Software Preserve	-	Displays support for the software preserve
	Port *n*	Disabled	Disables/Enables SATA port *n*
		Enabled	
	Hot Plug	***Disabled***	Disables/Enables hot plugging
		Enabled	
	Spin Up Device	***Disabled***	Disables/Enables spin up for the connected device on the SATA port
		Enabled	
	SATA Device Type	Hard Disk Drive	Defines the SATA device type as HDD or SSD
		Solid-state drive	
	Topology	Unknown	Defines the SATA topology
		ISATA	
		Direct Connect *Default for port 0 and 1*	
		Flex	
		M2 *Default for port 2*	
	SATA Port *n* DevSlp	***Disabled***	Disables/Enables for the device on port *n*
		Enabled	
	DITO Configuration	***Disabled***	Disables/Enables device sleep idle timeout
		Enabled	
	DITO Value	INT Default: ***625***	Defines the DITO value [ms] Range: 0 to 1023
	DM Value	INT Default: ***15***	Defines the DITO multiplier Range: 0 to 15

Table 114: Advanced - PCH-IO Configuration - SATA Configuration

1) SATA controller(s) must be enabled to be able to make additional configurations.
3)2) *n* corresponds to the available SATA ports that are indexed from 0 to *n*-1.

7.1.6.2.9.3 Security Configuration

BIOS parameter	Setting options	Description
RTC Lock	Disabled	Disables/Enables lock bytes 0x38 to 0x3F of RTC RAM
	Enabled	
BIOS Lock	Disabled	Disables/Enables the PCH BIOS lock function The BIOS lock function must be enabled for SMM[1].
	Enabled	
Force unlock on all GPIO pads	***Disabled***	Disables/Enables Force unlock all GPIO pads
	Enabled	

Table 115: Advanced - PCH-IO Configuration - Security Configuration

1) System Management Mode

7.1.6.2.9.4 PCH-IO Configuration - TSN GBE Configuration

BIOS parameter	Setting options	Description
PCH TSN LAN Controller 0	Disabled	Disables/Enables TSN LAN controller 0
	Enabled	
PCH TSN LAN Controller 1	Disabled	Disables/Enables TSN LAN controller 0
	Enabled	
Enable Timed TSN PCS	***Disabled***	Disables/Enables Force unlock all GPIO pads
	Enabled	
PCH TSN Multi-VC	***Disabled***	Disables/Enables Multi Channel Support for PCH TSN
	Enabled	

Table 116: Advanced - PCH-IO Configuration - TSN GBE Configuration

7.1.6.2.9.5 HD Audio Configuration

BIOS parameter	Setting options	Description
HD Audio	Auto	Disables/Enables HD audio device detection or sets it to automatic
	Disabled	Disables/Enables has a permanent effect. Auto must be enabled if audio should be transmitted via DisplayPort.
	Enabled	

Table 117: Advanced - PCH-IO Configuration - HD Audio Configuration

BIOS parameter	Setting options	Description
Audio DSP	Disabled	Disables/Enables audio digital signal processing
	Enabled	
PME Enable	***Disabled***	Disables/Enables PME wake of HD audio controller during POST
	Enabled	

Table 117: Advanced - PCH-IO Configuration - HD Audio Configuration

7.1.6.2.10 PCH-FW Configuration

BIOS parameter	Input options	Description
ME[1] Firmware Version	-	Displays the ME firmware version
ME Firmware Mode	-	Displays the ME firmware mode
ME Firmware SKU	-	Displays the ME firmware SKU
ME Firmware Status 1	-	Displays ME firmware status 1
ME Firmware Status 2	-	Displays ME firmware status 2
ME State	Disabled	Disables/Enables ME state
	Enabled	
Firmware Update Configuration	Enter	Opens submenu "Firmware Update Configuration" on page 163
PTT[2] Configuration	Enter	Opens submenu "PTT Configuration" on page 163

Table 118: Advanced - PCH-FW Configuration

1) Intel Management Engine
2) Platform Trust Technology

7.1.6.2.10.1 Firmware Update Configuration

BIOS parameter	Setting options	Description
Me FW Image Re-Flash	***Disabled***	Disables/Enables ME firmware image re-flash
	Enabled	
FW Update	Disabled	Disables/Enables ME FW Update
	Enabled	

Table 119: Advanced - PCH-FW Configuration - Firmware Update Configuration

7.1.6.2.10.2 PTT Configuration

BIOS parameter	Setting options	Description
PTT Capability / State	-	Displays the PTT capability and status
PTP aware OS	***PTP Aware***	Selects whether the operating system used is PTP-capable or not
	Not PTP Aware	

Table 120: Advanced - PCH-FW Configuration - PTT Configuration

7.1.6.2.11 H2OUVE

BIOS parameter	Setting options	Description
H2OUVE Support	***Disabled***	Disables/Enables H2OUVE support
	Enabled	

Table 121: Advanced - H2OUVE

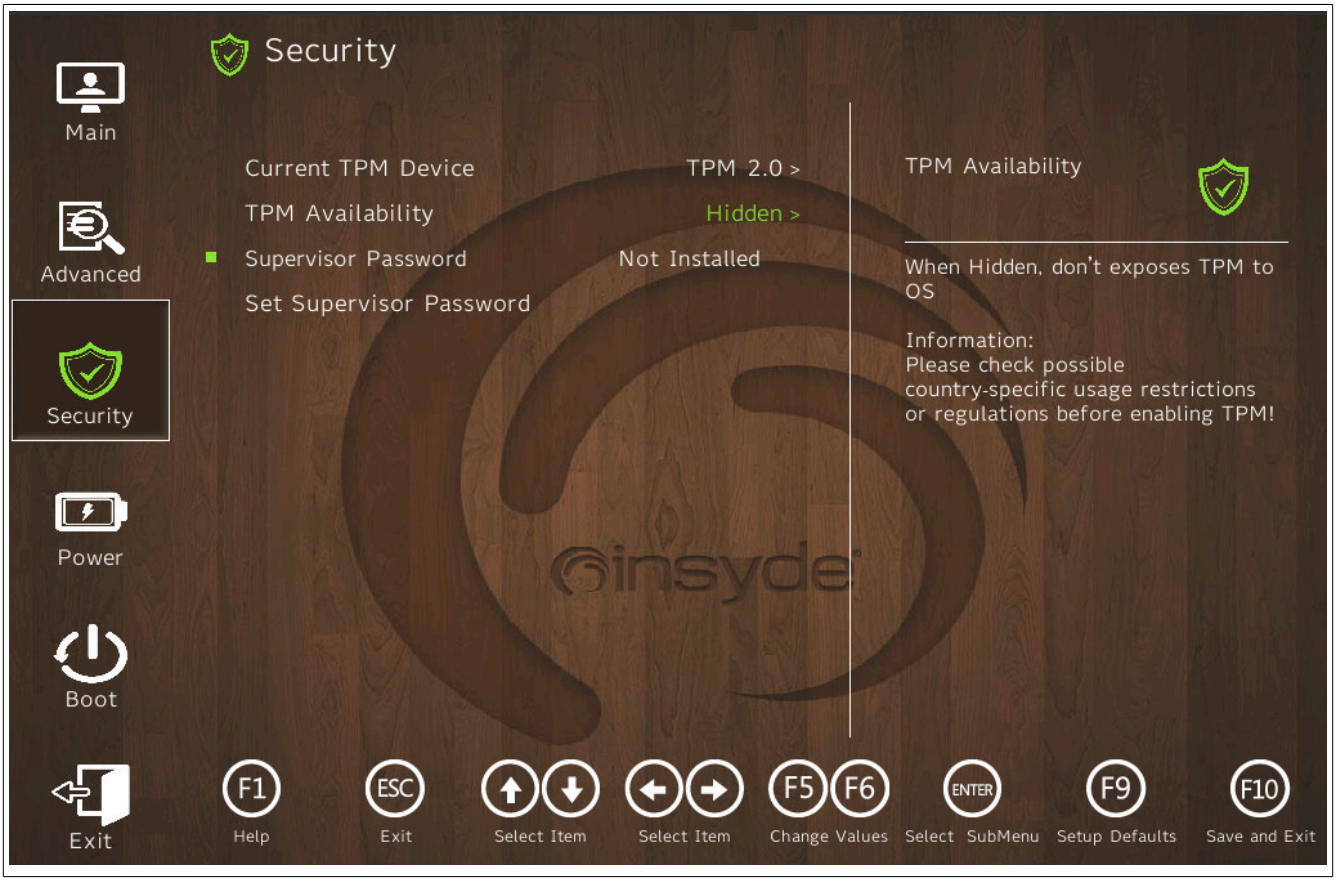
7.1.6.2.12 Super IO

> **Note:**
>
> **COM ports are only displayed if they are occupied.**

BIOS parameter		Setting options	Description
CAN Device		-	Displays whether a CAN interface (IF option) is installed
COM A		Disable	Disables/Enables COM A
		Enable	
	Base I/O Address	***0x2F8***	Selects the I/O address for COM A
		(Various)	
	Interrupt	***IRQ 3***	Selects the interrupt for COM A
		(Various)	

Table 122: Advanced - Super IO

7.1.6.3 Security



BIOS parameter	Setting options	Description
Current TPM[1] Device	-	Displays the current TPM device
TPM State	-	Displays the TPM status
TPM Active PCR Hash Algorithm	-	Displays the current PCR hash algorithm
TPM Hardware Support Hash Algorithm	-	Displays the hash algorithms supported by the hardware
TrEE Protocol Version	***1.1***	Selects TrEE Protocol Version
	1.0	
TPM Availability	***Hidden***	TPM invisible/visible for the operating system
	Available	
TPM Operation	***No operation***	Configuration of supported TPM functions The setting options of this parameter depend on whether FTPM or DTPM is used, see "Chipset Configuration" on page 148.
	(Various)	
Clear TPM	***Disabled***	Starts clearing TPM by enabling it
	Enabled	
Supervisor Password	-	Displays whether a supervisor password has been created
Set Supervisor Password	String	Sets or changes the supervisor password
Set All Hdd Master Password	String	Sets all HDD master passwords
Storage Password Setup Page	Enter	Opens submenu "Storage Password Setup Page" on page 164

Table 123: Security

1) Trusted Platform Module

Information:

TPM commands are executed during the boot procedure.

The next time this menu is called after a boot procedure, parameter *TPM operation* shows "No operation" since the inputs have already been processed.

7.1.6.3.1 Storage Password Setup Page

BIOS parameter	Setting options	Description
CFexpress Name *n*[1]	Enter	Opens submenu "CFexpress Name n" on page 165

Table 124: Security - Storage Password Setup Page

1) Displays the manufacturer ID of the CFexpress card in the corresponding CFexpress slot. 2 CFexpress card slots are available. They are indexed from 1 to 2.

7.1.6.3.1.1 CFexpress Name *n*

A total of 2 CFexpress card slots are available. They are indexed from 1 to 2.

BIOS parameter	Setting options	Description
Device Name	-	Displays the manufacturer ID of the CFexpress card
Security Mode	-	Displays the security mode of the CFexpress card
Set Storage Password	String	Sets the HDD password
Set Master Hdd Password	String	Sets the master HDD password

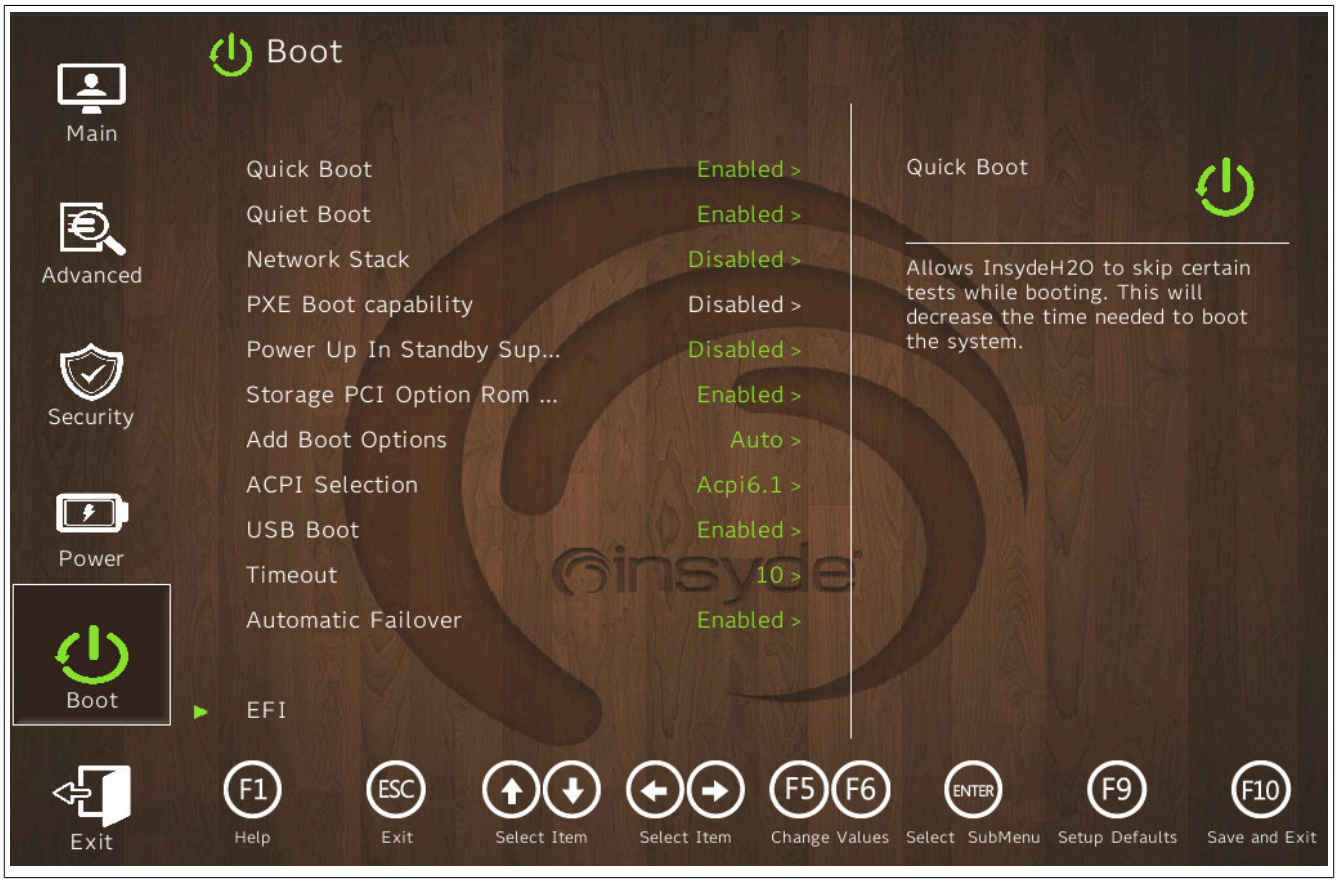
Table 125: Security - Storage Password Setup Page - CFexpress Name *n*

7.1.6.4 Power

BIOS parameter		Setting options	Description
Wake on PME		Disabled	Disables/Enables wake on PME
		Enabled	
Auto Wake on S5		***Disabled***	Disables auto wake on S5 or sets it to daily or a specific day of the month
		By Every Day	
		By Day of Month	
	Wake on S5 Time	INT	Defines the time for Auto Wake on S5 in hh:mm:ss format (daily or monthly)
	Day of Month	INT Default: ***1***	Defines the monthly day for auto wake on S5 Range: 1 to 31
S5 long run test		***Disabled***	Disables/Enables S5 long run test Enabling overrides some settings in the operating system.
		Enabled	
USB Standby Power		-	Displays the USB standby power state
Set USB Standby Power		Disabled	Disables/Enables the USB standby power
		Enabled	
Always-on		-	Displays the always-on state
Set Always-On		Disabled	Disables/Enables always-on
		Enabled	

Table 126: Power

7.1.6.5 Boot



BIOS parameter	Setting options	Description
Quick Boot	Disabled	Disables/Enables quick boot If quick boot is enabled, certain tests are not performed so the boot procedure is faster.
	Enabled	
Quiet Boot	Disabled	Disables/Enables booting in text mode
	Enabled	
Network Stack	***Disabled***	Disables/Enables the network stack Enabling makes ETH booting possible.
	Enabled	
Power Up In Standby Support	***Disabled***	Disables/Enables power up in standby support
	Enabled	
Add Boot Options	***Auto***	Selects or changes the mode of arrangement in the boot sequence for newly added devices
	First	
	Load	
ACPI Selection[1)]	Acpi3.0	Selects the ACPI mode
	Acpi4.0	
	Acpi5.0	
	Acpi6.0	
	Acpi6.1	
	Acpi6.2	
	Acpi6.3	
USB Boot	Disabled	Disables/Enables USB boot
	Enabled	
Timeout	INT Default: ***0***	Delay time until the boot list is processed [s] Range: 0 to 10
Automatic Failover	Disabled	Disables/Enables automatic failover
	Enabled	
EFI	Enter	Opens submenu "EFI" on page 168

Table 127: Boot

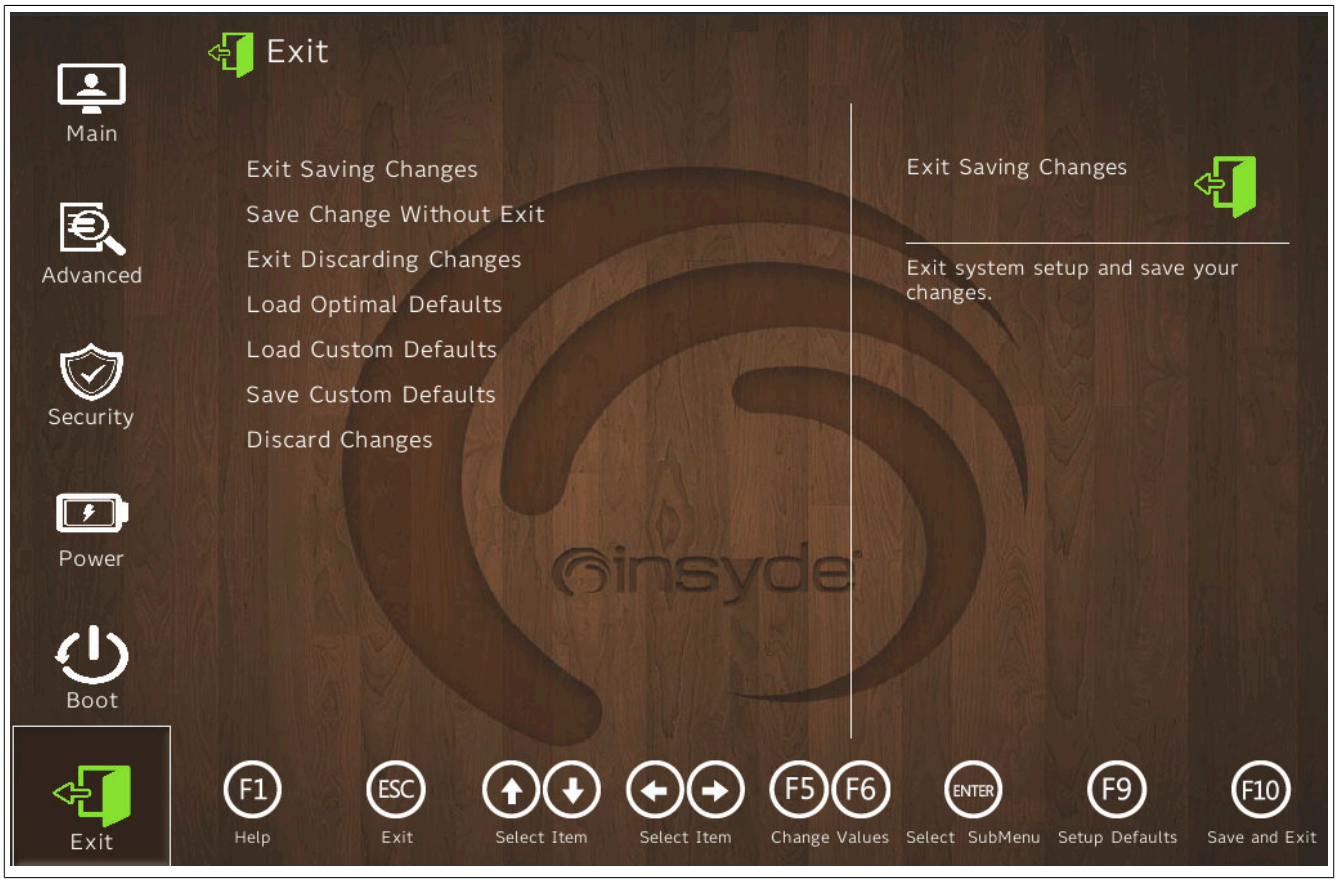
1) When changing the ACPI version, make sure that the operating system used is compatible.

7.1.6.5.1 EFI

BIOS parameter	Setting options	Description
EFI	► Keyboard: F5/F6 ► Touch screen: Move items at the gray arrows Or: Enter (toggle Disabled/Enabled)	Defines the boot order, disables/enables option

Table 128: Boot - EFI

7.1.6.6 Exit



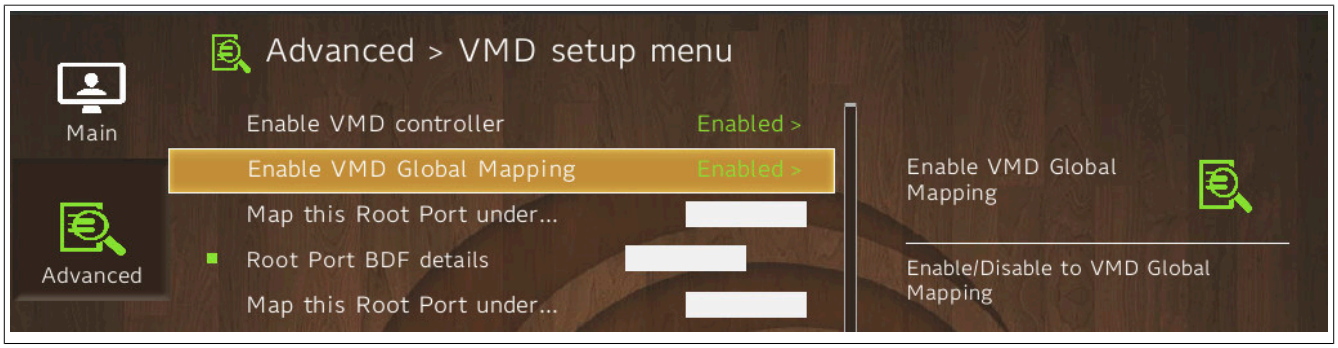
BIOS parameter	Setting options	Description
Exit Saving Changes	Enter	Saves changes and restarts
Save Changes Without Exit	Enter	Saves changes Some settings only take effect after a restart.
Exit Discarding Changes	Enter	Discards changes and exits
Load Optimal Defaults	Enter	Loads system-optimized default values
Load Custom Defaults	Enter	Loads user-specific default values
Save Custom Defaults	Enter	Saves user-specific default values
Discard Changes	Enter	Discards changes

Table 129: Exit

7.2 RAID configuration

> **Note:**
>
> **When creating a RAID volume, existing data on the storage media is deleted.**
>
> **Before creating a RAID volume, make sure that there is no important data on the storage media.**

In order to be able to create a SATA RAID volume and to access the "Configuration Utility", settings *Enable VMD controller* and *Enable VMD Global Mapping* must be enabled in BIOS (see "VMD setup menu" on page 156).



7.2.1 UEFI RAID

7.2.1.1 Configuration with the internal RAID controller

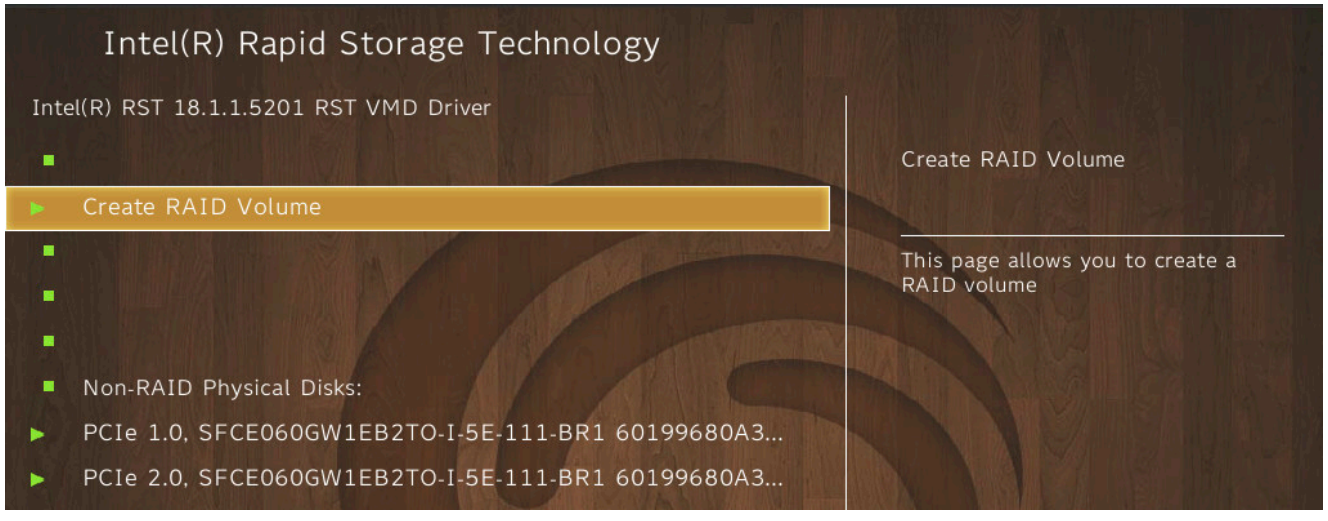
The following software description applies to the internal RAID controller on *Tiger Lake-U* chipset.

Information:

B&R recommends using only the same drive type in the RAID volume.

Caution!

The maximum number of possible write cycles must be taken into account when setting up a RAID volume with storage media with MLC technology.



Use submenu **Intel(R) Rapid Storage Technology** to navigate to the configuration of the RAID volume.

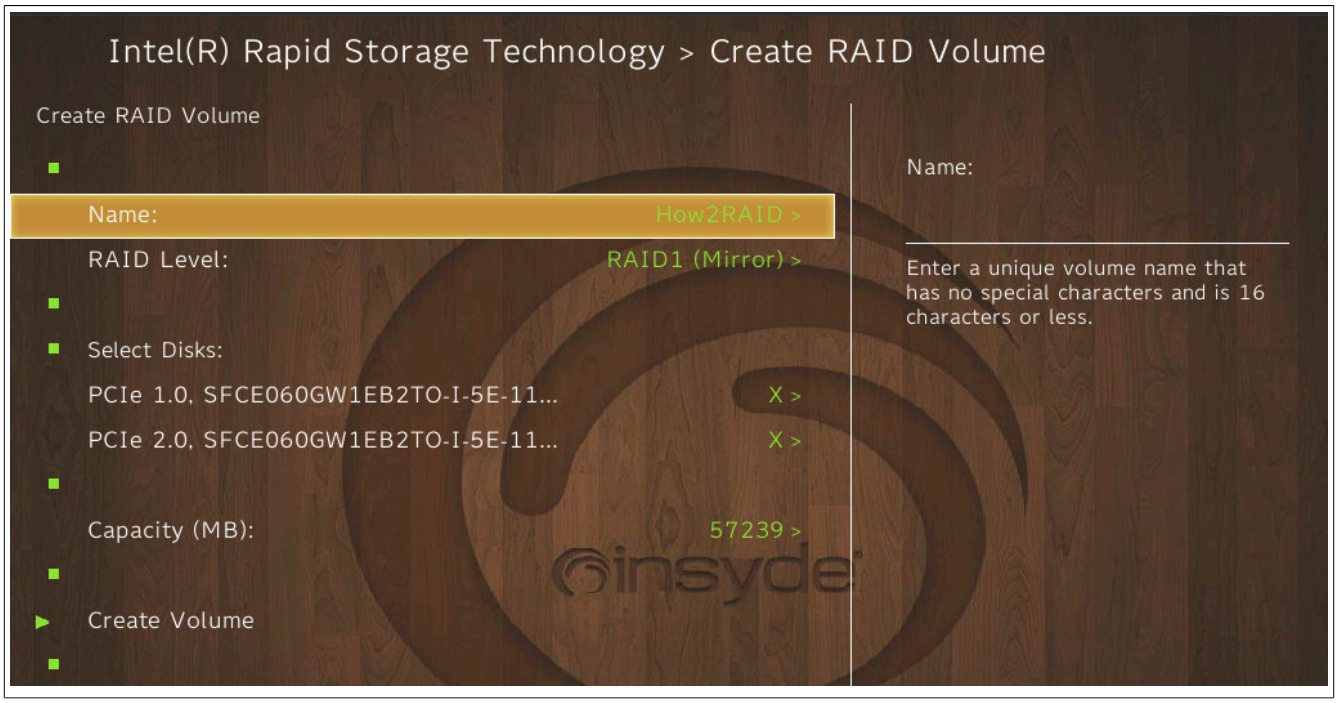
The following keys can be used in the device manager:

Key	Function
Cursor (↑, ↓)	Navigation in the menu and between objects.
Enter	Selects an item or opens a submenu.
ESC	Exits.

Table 130: Keys in the device manager

7.2.1.2 Create RAID Volume

RAID volumes can be created via submenu "Create RAID Volume" on page 139 in section "Intel(R) Rapid Storage Technology" on page 139.



BIOS parameter	Setting options	Description
Name:	String Default: ***Volume1***	Name for the RAID volume No special characters are permitted. Range: Max. 16 characters
RAID Level:	***RAID0 (Stripe)***	Selects the RAID level
	RAID1 (Mirror)	
Select Disks:		
Disk n:	(Blank)	Select the storage medium for the RAID volume (X).
	X	
Stripe Size:	4 kB	Selects the data block size [kB]
	8 kB	
	16 kB	
	32 kB	
	64 kB	
	128 kB	
Capacity:	INT	Defines the RAID memory size [MB] Range: 0 to max. available application memory (hardware-dependent) If storage media of different sizes are used, this is limited to the smaller medium.

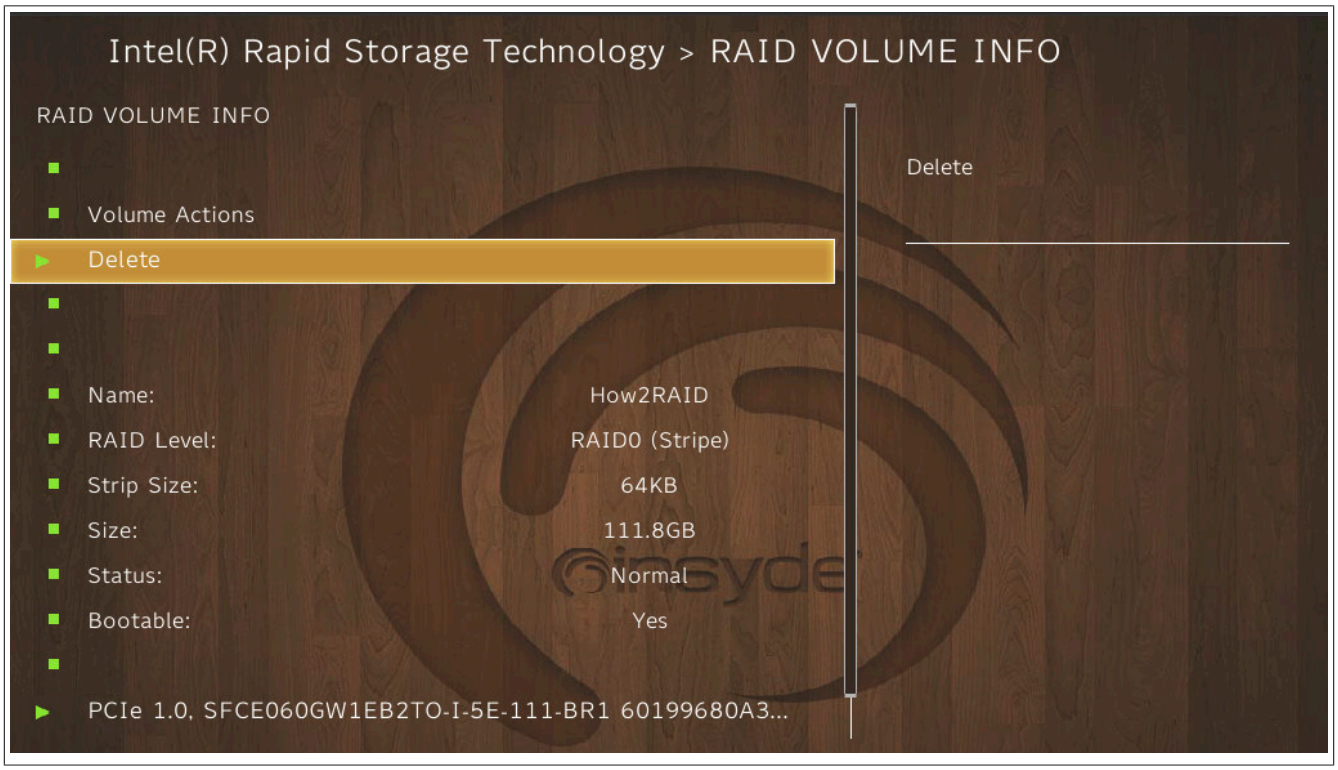
Table 131: Device Manager - Create RAID Volume

7.2.1.3 Delete RAID Volume

Function **Delete** (in section "RAID Volume Info" on page 140) must be used to delete existing RAID volumes and reformat used drives to non-RAID.

Information:

This option deletes all data on the drive, including the operating system.



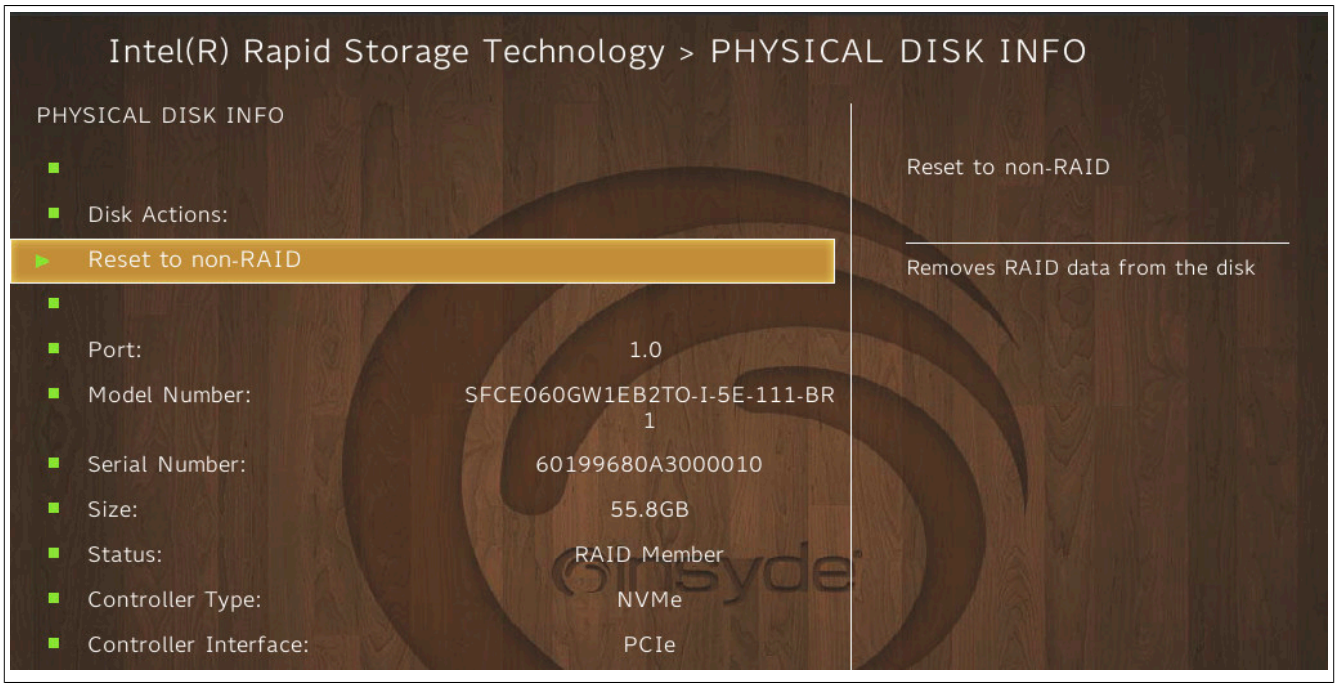
7.2.1.4 Reset Disks to Non-RAID

Individual components of a RAID volume can be reset to non-RAID mode.

This option is available in menu Disk n.

Information:

Deleting a RAID volume also deletes all of the data on the drive.



7.3 Power and performance profiles

The following profiles can be configured via the BIOS settings on the APC4100.

Mode	Description	BIOS settings	
		CPU turbo	GFX turbo
max. system performance (default)	• embedded use-condition • Reliability for 5 years with 80% active use. • Limited ambient temperatures. • Max. system performance.	On	On
max. CPU performance	• embedded use-condition • Reliability for 5 years with 80% active use. • Limited ambient temperatures. • Maximum CPU power • Low graphics performance	On	Off
balanced	• embedded use-condition • Reliability for 5 years with 80% active use.	Off	On
industrial use-condition	• industrial use-condition • Reliability for 10 years with 100% active use.[1)] • For max. ambient temperatures. • Core-i processors are excluded.	Off	Off

1) Excluded processors: 5APC4100.TGL1-000 (i3-11100HE) and 5APC4100.TGL2-000 (i5-11500HE)

7.4 Upgrade information

Warning!

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

7.4.1 UEFI BIOS upgrade

An upgrade may be necessary for making updated or new functions available.
For a detailed description of changes, see file *Readme.txt* or *Liesmich.txt*, which is included in every upgrade archive (ZIP).

Information:

Individually saved setup settings are deleted during a UEFI BIOS upgrade.

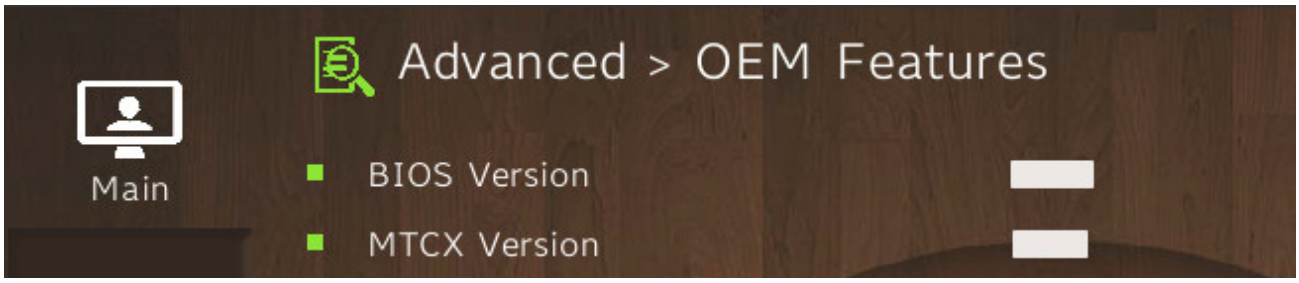
7.4.1.1 BIOS upgrade

The installed software versions should be determined before an upgrade is started.

7.4.1.1.1 Displaying firmware and BIOS version information

Information about the BIOS version and firmware is available in BIOS menu *OEM features*:

1. After switching on the APC4100, open BIOS Setup with **[Esc]**, **[Del]** or **[F2]**.
2. The installed versions are displayed under **Setup utility / Advanced / OEM features**, see figure (symbolic).



7.4.1.2 Procedure in the EFI shell

Caution!

The PC is not permitted to be switched off or reset while performing an upgrade!

1. Download the ZIP file from the B&R website (www.br-automation.com).
2. Unzip the ZIP file and copy the files to a USB flash drive formatted in *FAT16* or *FAT32*. Alternatively, a CFast card can also be used.
3. Reboot the PC, open the boot menu with **[Esc]**, **[Del]** or **[F2]** and select *Internal EFI shell* as the boot device.
4. After booting the EFI shell, *startup.nsh* is executed and the UEFI BIOS upgrade is started.

   ### Information:

   With an "Extended" update (e.g. Intel ME firmware), several reboots are necessary.
   The instructions during the update process must be followed until the upgrade installation is completed with the message "BIOS update done".

5. After a successful upgrade, the system must be switched off and on again for the upgrade to take effect. Call the boot menu with **[Esc]**, **[Del]** or **[F2]** during the following boot procedure and load the setup defaults and accept them with *Save changes and exit*.

✓ The upgrade is installed and in effect.

7.4.2 PC firmware upgrade

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

> **Caution!**
>
> **The PC is not permitted to be switched off or reset while performing an upgrade!**

7.4.2.1 Procedure in Windows (ADI Control Center)

1. Download the ZIP file from the B&R website (www.br-automation.com).
2. Open the *ADI Control Center* in the Control Panel.
3. Open tab **Versions**.
4. Enter the name of the firmware file or select a file under "Filename".
5. Execute file with **Open**.
6. After a successful upgrade, the system must be switched off and on again for the upgrade to take effect.

✓ The upgrade is installed and in effect.

The transfer can be canceled by clicking on **Cancel** in dialog box "Download". This is disabled while writing to flash memory.

Erasing the data in flash memory can take several seconds depending on the memory module used. During this time, the progress indicator is not updated.

> **Information:**
>
> **For more detailed information about saving and updating the firmware, see the ADI driver user's manual. This is available for download at www.br-automation.com.**

7.4.2.2 Procedure in the EFI shell

1. Download the ZIP file from the B&R website (www.br-automation.com).
2. Unzip the ZIP file and copy the files to a USB flash drive formatted in *FAT16* or *FAT32*. Alternatively, a CFast card can also be used.
3. Reboot the PC, open the boot menu with **[Esc]**, **[Del]** or **[F2]** and select *Internal shell* as the boot device.
4. After a successful upgrade, the system must be switched off and on again for the upgrade to take effect.

✓ The upgrade is installed and in effect.

7.4.2.3 Automatic firmware upgrade

With the APC4100, it is possible to perform updates automatically.

For this, parameter **Automatic firmware update** must be enabled in BIOS (see).

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

Upgrades are provided as a *ZIP* file and include a readme file (*TXT* file) that provides additional information.

For automatic upgrades, the upgrade files must be stored in a directory named "XPC4100FWU" that is located in the root directory of a data storage medium formatted in *FAT32* (e.g. CFast card or USB flash drive). The following figure shows the view of a suitable data storage medium with an upgrade.

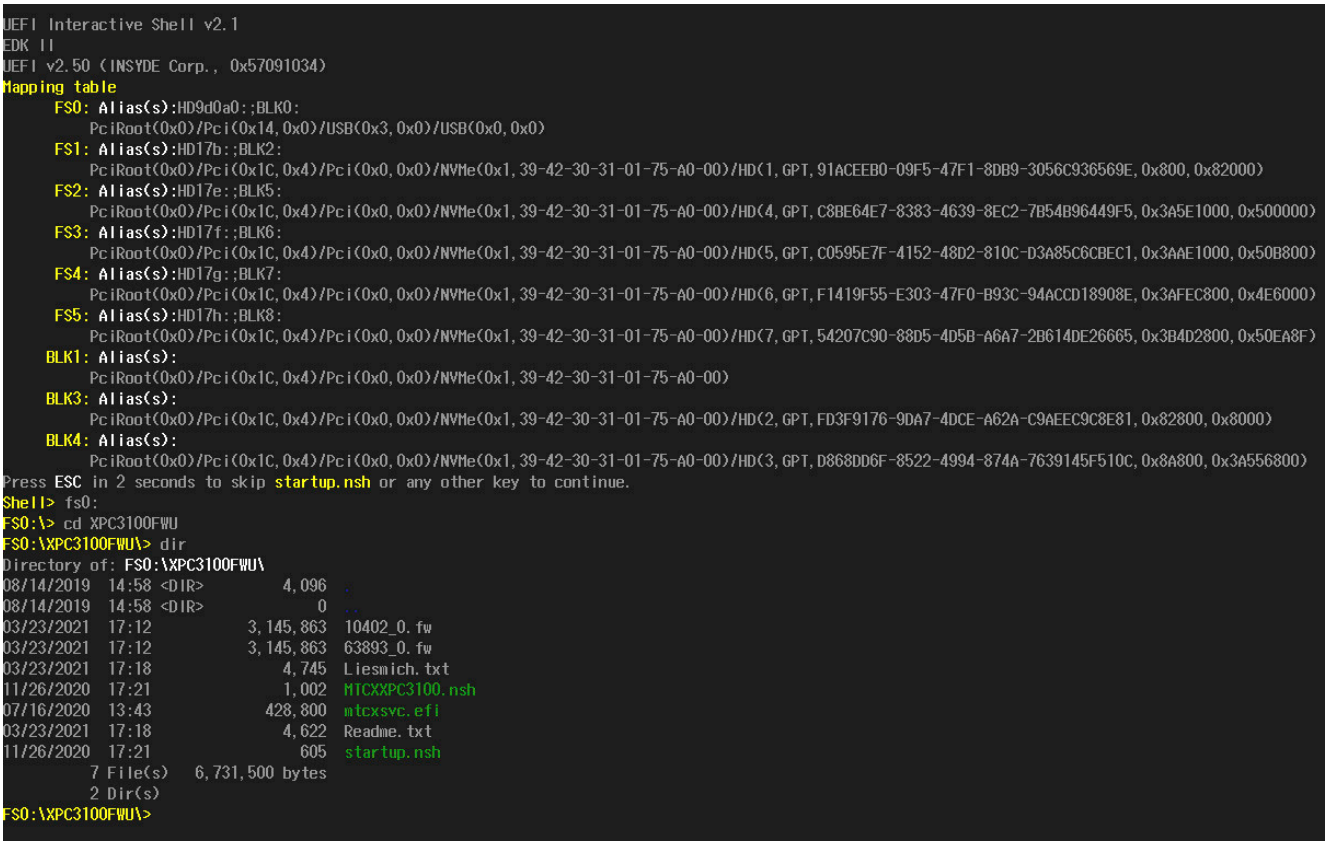


Figure 6: (symbolic image)

Information:

The automatic update only takes place if the installed firmware version differs from the upgrade version.
Automatic downgrades are possible!

7.4.2.4 Firmware upgrade with Automation Runtime

The MTCX firmware is part of Automation Studio. The system is automatically updated to this status by Automation Runtime.

To update the firmware contained in Automation Studio, a hardware upgrade must be performed (see **Project management / Workspace / Upgrades** in Automation Help).

7.4.3 Automation Panel firmware upgrade

With *Firmware upgrade (Automation Panel, SDL3 Converter, SLD4 converter)*, it is possible to update the firmware of several controllers (SDLR, SDL3R, SDL4R, SDL3 Converter, SDL4 Converter) depending on the variant of the system.

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

Caution!

The Automation Panel is not permitted to be switched off or reset while performing an upgrade!

7.4.3.1 Procedure in Windows (ADI Control Center)

1. Download the ZIP file from the B&R website (www.br-automation.com).
2. Open the *ADI Control Center* in the Control Panel.
3. Open tab **Versions**.
4. Enter the name of the firmware file or select a file under "Filename".
5. Execute file with **Open**.
6. After a successful upgrade, the system must be switched off and on again for the upgrade to take effect.

✓ The upgrade is installed and in effect.

The transfer can be canceled by clicking on **Cancel** in dialog box "Download". This is disabled while writing to flash memory.

Erasing the data in flash memory can take several seconds depending on the memory module used. During this time, the progress indicator is not updated.

Information:

For more detailed information about saving and updating the firmware, see the ADI driver user's manual. This is available for download at www.br-automation.com.

7.4.3.2 Procedure in the EFI shell

1. Download the ZIP file from the B&R website (www.br-automation.com).
2. Unzip the ZIP file and copy the files to a USB flash drive formatted in *FAT16* or *FAT32*. Alternatively, a CFast card can also be used.
3. Reboot the PC, open the boot menu with **[Esc]**, **[Del]** or **[F2]** and select *Internal EFI shell* as the boot device.
4. After a successful upgrade, a the system must be switched off and on again.

✓ The upgrade is installed and in effect.

Information:

The power supply to the PC or Automation Panel must be switched off and on again for the new firmware to take effect and the updated version to be displayed.

7.5 Operating systems

7.5.1 Windows 10 IoT Enterprise 2021 LTSC

7.5.1.1 General information

Windows 10 IoT Enterprise 2021 LTSC is a version of Windows 10 Enterprise specifically developed for use in industrial applications (Long-Term Servicing Channel).

> **Information:**
>
> **For detailed information, see the user's manual of the operating system. This is available for download on the B&R website (www.br-automation.com).**

7.5.1.2 Order data

Order number	Short description	Figure
	Operating systems	
5SWW10.1666-MUL	W10IoT E 2021 64b APC4100 TGL UEFI	
5SWW10.1766-MUL	W10IoT V 2021 64b APC4100 TGL UEFI	
5SWW10.1866-MUL	W10IoT H 2021 64b APC4100 TGL UEFI	

7.5.1.3 Overview

Order number	5SWW10.1666-MUL	5SWW10.1766-MUL	5SWW10.1866-MUL
Operating system			
Target systems			
Industrial PC		APC4100	
Processor	Celeron C-6600HLE	Core i3-11100HE / i5-11500HE	Xeon W-11865MRE / Xeon W-11155MRE
Chipset		Tiger Lake	
License class	Entry	Value	High End
Architecture		64-bit (UEFI boot)	
Language		Multilingual (EN / DE / FR / ES)	
Minimum size of RAM		2 GB [1)]	
Minimum size of data storage medium		40 GB	

1) The specified memory size is a minimum requirement according to Microsoft. B&R recommends using 4 GB RAM or more for 64-bit operating systems.

7.5.1.4 Features

Windows 10 IoT Enterprise 2021 LTSC supports the following Microsoft features:

Features	Windows 10 IoT Enterprise 2021 LTSC
Range of functions in Windows 10 Enterprise	✓
Microsoft Edge (default browser)	✓
Internet Explorer 11 (including Enterprise Mode)	✓
Windows Touch	✓
Multilingual support	With language packs (default: English)
Page file	Configurable (default: disabled by UWF)
Hibernate file	Configurable (default: disabled)
System restore	Configurable (default: disabled by UWF)
SuperFetch	
File indexing service	
Fast boot	
Defragmentation service	✓ (disabled when enabling the UWF)
Additional lockdown features (excerpt)	
Custom Logon	Configurable
Keyboard Filter	Configurable
Shell Launcher	Configurable
Unbranded Boot	Configurable
Unified Write Filter	✓

The following are some differences from standard Windows 10 Enterprise:

- Windows 10 IoT Enterprise 2021 LTSC does not include Cortana or the Microsoft Store.
- The LTSC version is based on build 19044 of Windows 10 and does not receive any feature updates.
- The version installed by B&R contains optimized settings for operation in an industrial environment.

These are described in detail in the **Windows 10 IoT Enterprise 2021 LTSC working guide**. This contains information about installing languages, enabling lockdown and other features.

Information:

These settings, as well as all features not included in the LTSC version, result in different behavior compared to a standard Windows 10 Enterprise installation.

7.5.1.5 Installation

B&R installs and activates Windows 10 IoT Enterprise 2021 LTSC on a suitable data storage medium. After the system has been switched on for the first time, it runs through the out-of-box experience (OOBE), which allows the user to make various settings (e.g. language, region, keyboard, computer name, username).

The operating system is installed in UEFI mode.

The data storage medium containing the Windows partition is formatted as a GUID Partition Table (GPT) file system. For other drives, it is possible to use either the GPT or Master Boot Record (MBR) file format. A GPT drive can have up to 128 partitions.

Notice!

It is important to note that the GPT file system must be supported by the recovery software being used when backing up and restoring the installation.

7.5.1.6 Drivers

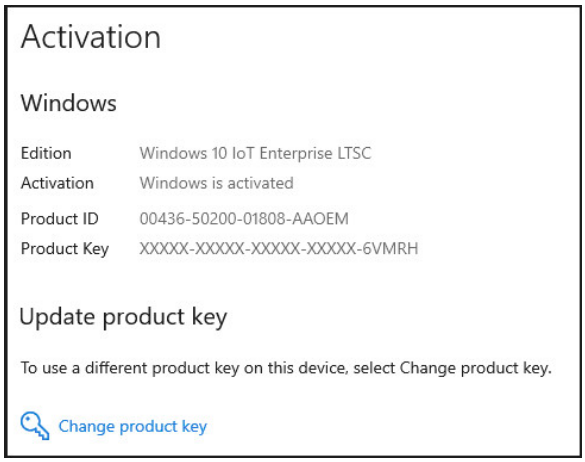
The operating system contains all drivers necessary for operation. If an older driver version is installed, the most current version can be downloaded and installed from the B&R website (www.br-automation.com). It is important to ensure that "Unified Write Filter (UWF)" is disabled.

Information:

Necessary drivers must be downloaded from the B&R website, not from manufacturer websites.

7.5.1.7 Activation

Windows 10 IoT Enterprise 2021 LTSC is already installed and activated at B&R. The activation status can be checked via **Activation settings**:



The activation carried out by B&R is supported by special B&R extensions in the operating system and is not lost when the hardware is changed (e.g. replacement of components in the event of repair) or when the system is reinstalled (Microsoft reserves the right to make technical changes without notice).

7.5.1.8 Supported display resolutions

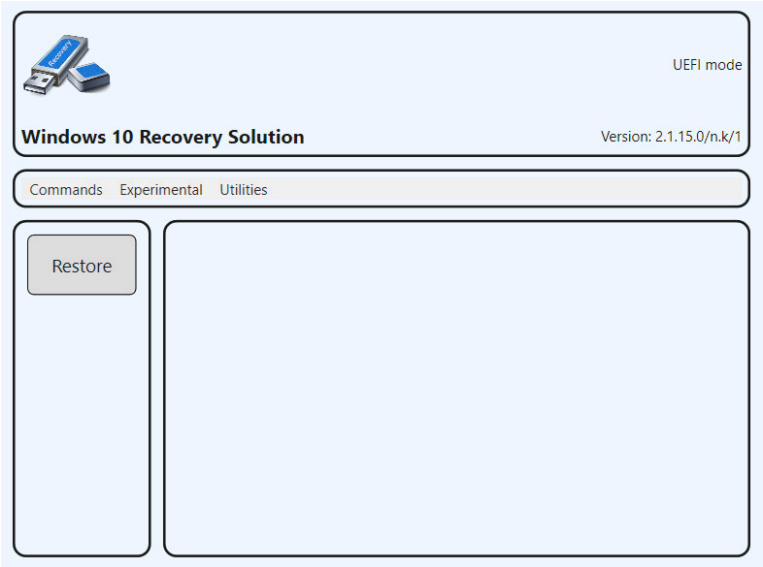
Windows requires SVGA resolution (800 x 600) or higher per Microsoft requirements to activate full operation of the Windows interface (e.g. with system dialog boxes). A lower resolution can be selected for applications.

7.5.2 Windows 10 Recovery Solution

Windows 10 Recovery Solution is used to restore Windows 10 Recovery Solution images on B&R PCs.

This tool is available as a download on the B&R website (www.br-automation.com) (login required for some downloads).
Windows 10 Recovery Solution images are available separately on the B&R website.

A bootable USB flash drive is required to execute the tool.



Information:

For additional information, see the Windows 10 Recovery Solution user's manual. This can be downloaded at no cost from the B&R website (www.br-automation.com).

7.5.3 Linux for B&R 12 (GNU/Linux)

7.5.3.1 General information

B&R provides an optimized variant of Debian for B&R industrial PCs. This includes all B&R-specific adjustments and provides the broadest possible basis for various applications.

Reasons for Debian:

- High stability
- Large package selection
- Wide distribution of Debian and various derivatives (e.g. Ubuntu, Linux Mint)

For additional information, see the Debian website (https://www.debian.org/).

7.5.3.2 Order data

Order number	Short description	Figure
	Linux for B&R 12	
5SWLIN.0966-MUL	Linux for B&R 12 - 64-bit - Multilingual - APC4100 (UEFI boot) - CPU Celeron C-6600HLE - CPU Core i3-11100HE / i5-11500HE - CPU Xeon w-1115MRE / w-11865MRE - Installation - Only available with a new device	

Table 134: 5SWLIN.0966-MUL - Order data

7.5.3.3 Overview

Order number	5SWLIN.0966-MUL
Operating system	
Target systems	
Industrial PC	APC4100
Chipset	Tiger Lake
Architecture	64-bit (UEFI boot)
Language	Multilingual
Minimum size of RAM	2 GB
Minimum size of data storage medium	8 GB

7.5.3.4 Features

A selection of predefined software package groups is already included. Additional packages can be installed later with an existing Internet connection.

```
# apt update
# apt search [KEYWORD]...
# apt install [PACKAGE_NAME]...
```

A list of installed packages can be displayed in a terminal using command `dpkg --list`. (More than 1000 packages are already installed by default).

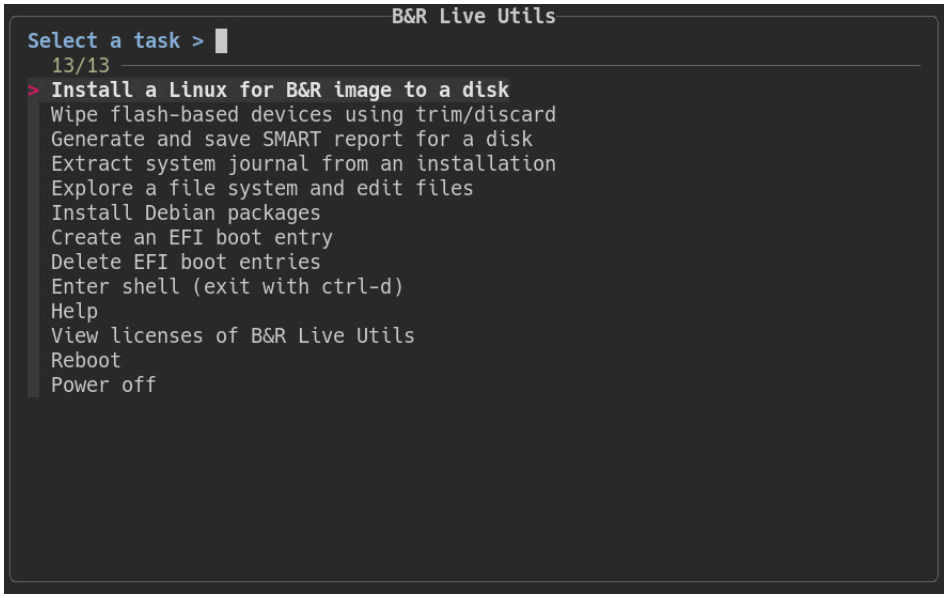
LXDE is used as the default desktop, and **Chromium** is included as the web browser.

B&R has made adjustments and provided certain features using custom packages in order to use Debian on B&R Automation PCs and Panel PCs. Most of these packages are already included and/or available for download on the B&R website (www.br-automation.com).

> **Information:**
>
> **For additional information, such as installation, see the Linux for B&R 12 user's manual.**

7.5.4 B&R Live Utils

B&R Live Utils is a Debian-based live OS that can be used to perform various tasks to diagnose and install Linux for B&R.



This tool is available as a download on the B&R website (www.br-automation.com).[6)]

A bootable USB flash drive is required to execute the tool.

Information:

For additional information, see the Linux for B&R 12 user's manual. This can be downloaded at no cost from the B&R website (www.br-automation.com).

[6)] A login is required for some downloads.

7.6 Automation software

7.6.1 Licensing

B&R Automation Runtime software components (e.g. Automation Runtime, B&R Hypervisor, mapp Technology) require a license.

It is possible to choose between the following licensing types:

Technology Guarding (TG)

Technology Guarding is license protection used for individual software components. The *Technology Guard* (hardware dongle) serves as the license container; this is connected to an available USB interface on the target system.

> **Information:**
>
> **Licensing via TG is required for Automation Studio V4.1 or later and Automation Runtime V4.08 or later. No TG is necessary in earlier versions.**

Terms and conditions (TC)

No *Technology Guard* is necessary; licensing takes place via a license agreement. Licenses are supplied with the sales receipt. The user is responsible for complying with the license conditions. B&R is protected by the terms of the EULA.

> **Information:**
>
> **Licensing via TC is possible for Automation Studio V4.9 or later as well as Automation Runtime V4.90 or later.**

For detailed information about licensing, see Automation Help (**Automation software / Licensing**).

7.6.2 Order data

Hardware-based licensing (Technology Guard)

Order number	Short description	Figure
	Technology Guard	
0TG1000.01	Technology Guard (MSD)	
0TG1000.02	Technology Guard (HID)	
0TGF016.01	Technology Guard (MSD) with integrated flash drive, 16 GB (MLC)	
1TG4601.06-5	Automation Runtime Embedded TG license	
1TG4700.00	B&R Hypervisor	

Contract-based licensing (terms and conditions)

Order number	Short description	Figure
	Runtime	
1TC4601.06-5	License for Automation Runtime Embedded (TC). One license per target system is required.	
	Hypervisor	
1TC4700.00	License for B&R Hypervisor (TC). One license per target system is required.	

7.6.3.1 Support

The following table provides an overview of which Automation Runtime software components are supported by the device.

Target system	B&R Hypervisor	ARemb	ARemb Terminal (TG only)
APC4100	Yes	Yes	No

7.6.4 Automation Runtime

7.6.4.1 General information

The real-time operating system Automation Runtime is an integral part of Automation Studio. This real-time operating system forms the software core for running applications on a target system.

- Guarantees the highest possible performance of 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
- Guaranteed determinism through cyclic system
- Configurable jitter tolerance in all task classes
- Support for all relevant programming languages, such as IEC 61131-3 languages and C
- Rich function library per IEC 61131-3 as well as the extended B&R automation library
- Integrated in Automation NET. Access to all networks and bus systems via function calls or by configuration in Automation Studio

B&R Automation Runtime is fully embedded in the corresponding target system (hardware on which Automation Runtime is installed). It thus enables application programs to access I/O systems (also via the fieldbus) and other devices such as interfaces and networks.

7.6.4.2 Minimum versions

7.6.4.2.1 Automation Runtime Embedded (ARemb)

System requirements

The following software versions (or higher) are required to operate Automation Runtime Embedded on an :

- ARemb upgrade AR 6
- Automation Studio V6
- Automation software license (TG or TC)

Information:

In order to use Automation Runtime Embedded (ARemb), BIOS setting *Advanced - OEM features - Realtime environment* must be set to *Enabled*.

Information:

For detailed information, see Automation Help or the B&R website (www.br-automation.com).

7.6.5 B&R Hypervisor

B&R Hypervisor allows multiple operating systems to operate simultaneously on a single device. The operating systems can communicate with each other via a virtual network.

Intelligent distribution of CPU resources

B&R Hypervisor allows Windows or Linux to run simultaneously with Automation Runtime. This makes it possible to combine a controller and HMI PC in one device. With B&R Hypervisor, an industrial PC can also be used as an edge controller. This serves as a controller and simultaneously transmits pre-processed data to higher-level systems in the cloud via OPC UA.

Virtual network

The hypervisor provides a virtual network connection that allows applications to exchange data between operating systems. Similar to an ordinary Ethernet interface, standard network protocols are used. In place of a cable, there is a reserved memory area that is not allocated to either operating system.

Maximum flexibility

The user configures the hypervisor and allocates hardware resources in the B&R Automation Studio software development environment. The system configurations are determined individually. This makes the assignment of resources to the respective operating system flexible. Whereas previous simultaneous solutions were tailored to a specific Windows version, B&R Hypervisor is completely independent of the version of the operating systems used.

System requirements

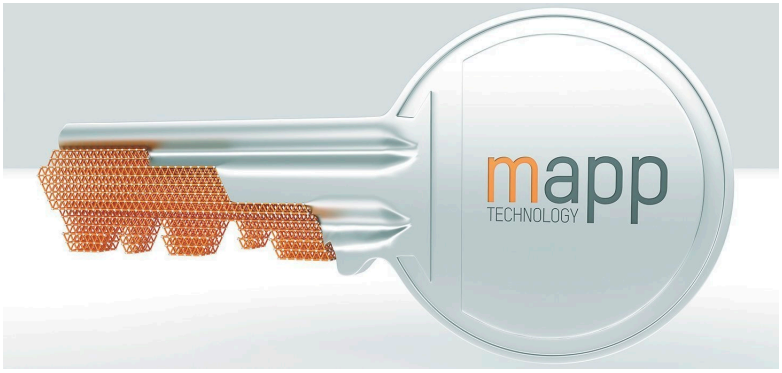
The following minimum software versions are required to operate B&R Hypervisor on the Automation PC 4100:

- ARemb upgrade AR 6
- Automation Studio V6
- Automation software license (TG or TC)

Information:

For detailed information, see Automation Help or the B&R website (www.br-automation.com).

7.6.6 mapp Technology



mapp Technology is revolutionizing the creation of machine and plant software. "mapps" are as easy to use as smartphone apps. Instead of programming user/role systems, alarm systems or the control of axes line by line, the machine software developer simply configures the finished mapps. Complex algorithms are easy to master. The programmer can concentrate fully on the machine process.

Information:

For detailed information, see Automation Help or the B&R website (www.br-automation.com).

7.7 Automation Device Interface (ADI)

The Automation Device Interface (ADI) allows access to specific functions of B&R devices in Windows and Linux.

7.7.1 ADI driver (Windows)

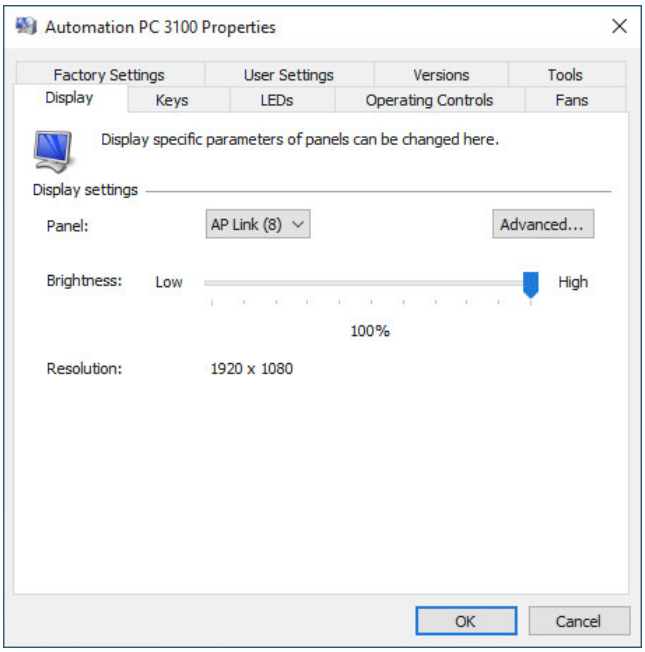
> **Information:**
>
> **Basic functionalities and components of the ADI driver are explained below. For more detailed information, the ADI driver user's manual can be downloaded from the B&R website (https://www.br-automation.com).**

7.7.1.1 Control Center

The Control Center is used to change and display settings for a B&R industrial PC and Automation Panels. It can be opened from the Control Panel or Start menu.

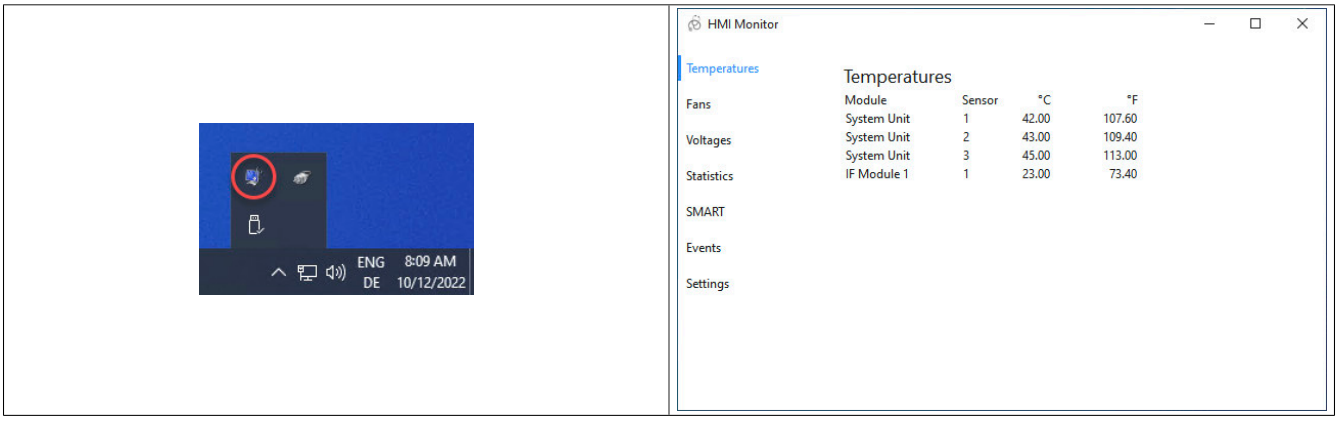
The following chapters describe the setting options in the Control Center tabs. Tabs:

- Display
- Keys
- LEDs
- Operating elements
- Fans
- Factory settings
- User settings
- Versions
- Tools



7.7.1.2 HMI Monitor

Allows display of fan, SMART, voltage, statistical and temperature values. HMI Monitor can be opened via a symbol in the taskbar or from the Start menu.



HMI Monitor displays alarms (e.g. temperature or SMART alarm), errors and warnings from the ADI System Service in the symbol in the notification area. The icon will be hidden after reinstallation, but it can be displayed using drag-and-drop or via the Windows settings.

The icon can be disabled in the Windows *Task Manager* under tab *Autostart*.

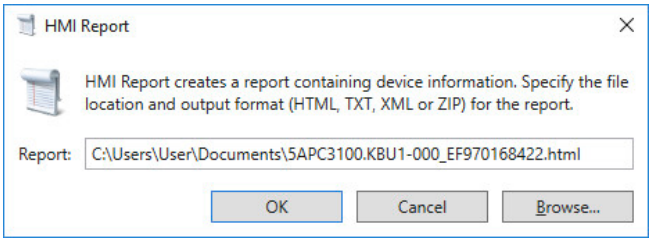
The following menu options are available in HMI Monitor and described in more detail below:

- Temperatures
- Fans
- Voltages

- Statistics
- SMART
- Events
- Settings

7.7.1.3 HMI Report

HMI Report can be used to create a report with device-specific information. This report can then be used for support purposes or system documentation. The program is opened via the Start menu.



The following output formats are available:

- HTML Report (HTML) - Report in HTML format for display in the browser.
- Text Report (TXT) - Report in text format for display in the text editor.
- XML Report (XML) - Report in XML format for display in the browser.
- Diagnostic package (ZIP) - The diagnostic package contains a text report and log files for troubleshooting by B&R.

The following settings can also be made:

- **Report**:
  Specifies the storage location, filename and output format for the report. Alternatively, the file dialog box can be used with **Browse**.

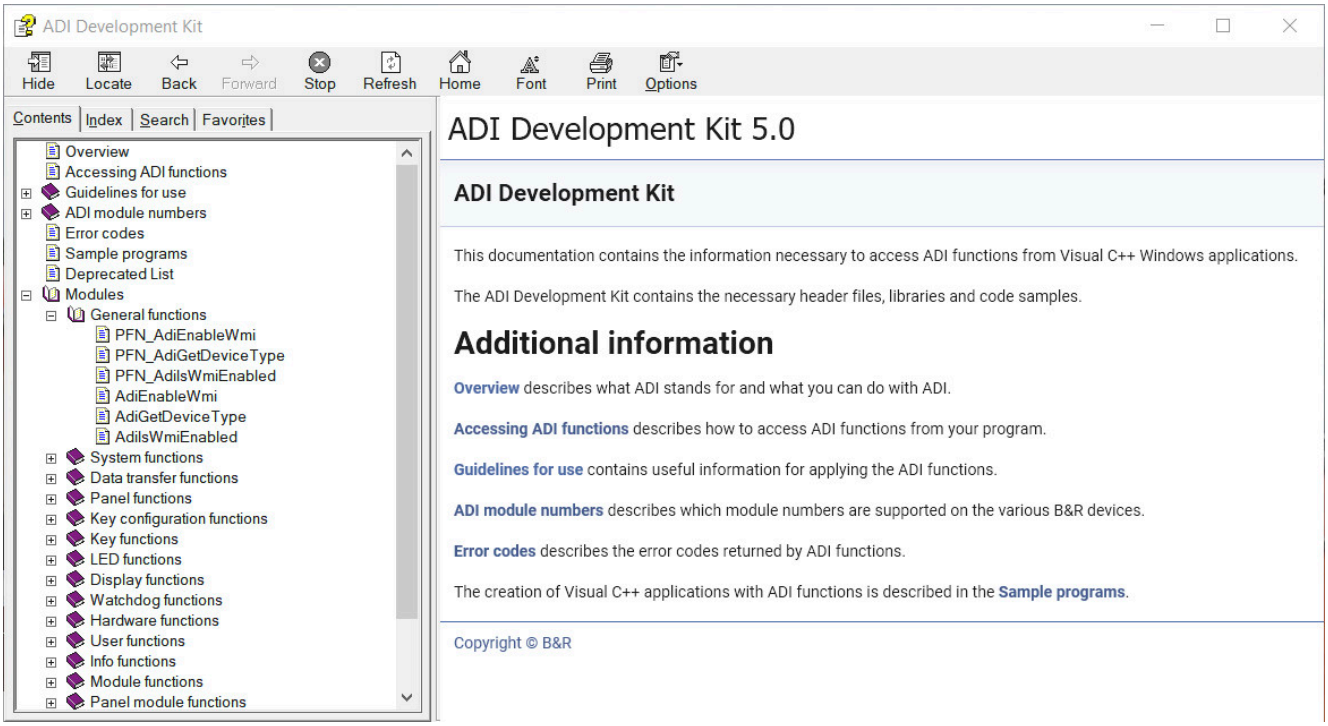
Alternatively, the report can be created from the **command line** with the following command:

```
C:\Programme\BrAutomation\Adi\System\HmiReport\BR.Hmi.Report.Cli.exe <Dateiname>
```

If no filename is specified, a text report is created with filename "<Material number>_<Serial number>.txt".

7.7.2 ADI Development Kit (Windows)

This software allows *ADI* functions to be accessed from Windows applications created with Microsoft Visual Studio, for example:



Features:

- Header files and import libraries
- Help files (in English)
- Example projects
- ADI DLL: For testing applications if no ADI driver is installed.

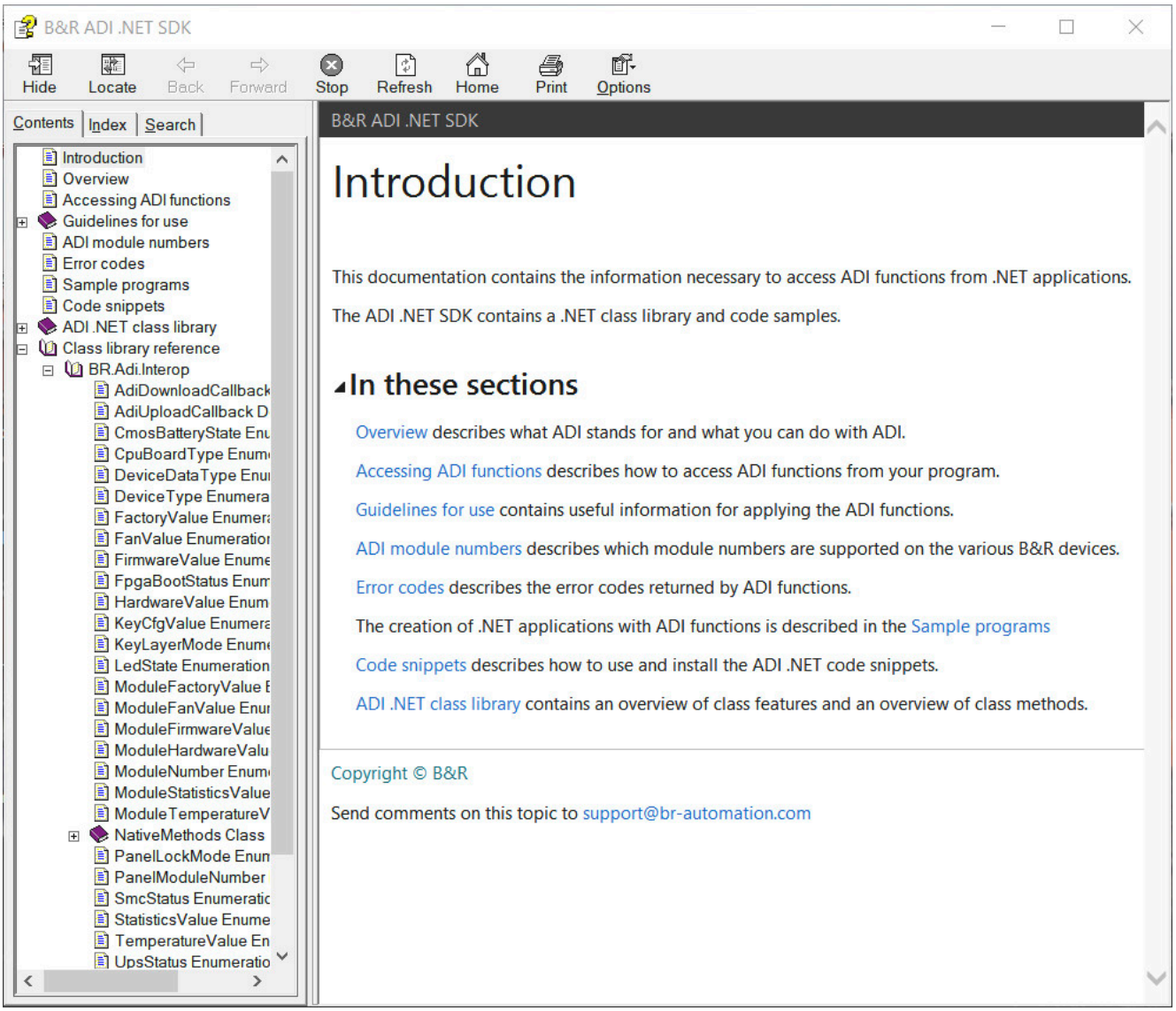
The appropriate ADI driver must be installed for the device. The ADI driver is already included in B&R images of embedded operating systems.

For a detailed description of how to use ADI functions, see Automation Help.

The ADI Development Kit can be downloaded at no cost from the Downloads section of the B&R website (www.br-automation.com).

7.7.3 ADI .NET SDK (Windows)

This software allows *ADI* functions to be accessed from .NET applications created with Microsoft Visual Studio.



Features:

- ADI .NET class library
- Help files (in English)
- Example projects
- ADI DLL: For testing applications if no ADI driver is installed.

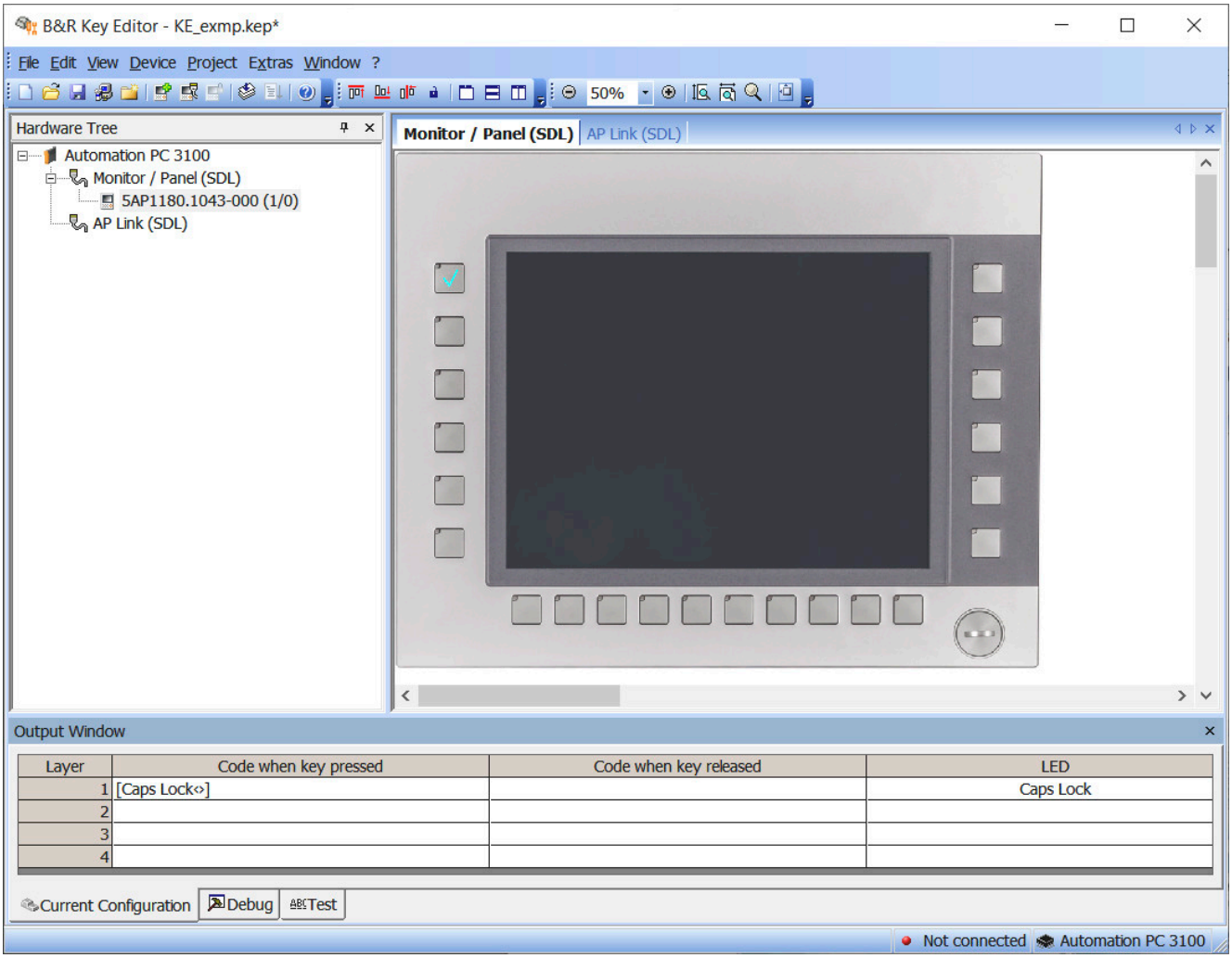
The appropriate ADI driver must be installed for the device. The ADI driver is already included in B&R images of embedded operating systems.

For a detailed description of how to use ADI functions, see Automation Help.

The ADI .NET SDK can be downloaded at no cost from the Downloads section of the B&R website (www.br-automation.com).

7.8 Key Editor

A frequently occurring requirement for panels is adapting function keys and LEDs to the application software. With the Key Editor, individual adaptation to the application is possible quickly and easily.



Features:

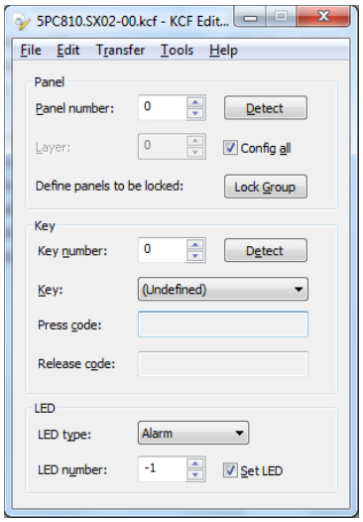
- Configuration of normal keys like on a keyboard (A, B, C, etc.)
- Keyboard shortcuts (CTRL+C, SHIFT+DEL, etc.) on one key
- Special key functions (change brightness, etc.)
- Assignment of LED functions (HDD access, power, etc.)
- 4 assignments possible per key (using layers)
- Configuration of the panel lock time when connecting several Automation Panel devices to Automation PCs and Panel PCs

For detailed instructions about configuring keys and LEDs and installing the key configuration on the target system, see the help documentation for the Key Editor. The Key Editor and help documentation can be downloaded at no cost from the Downloads section of the B&R website (www.br-automation.com).

7.9 KCF Editor

The KCF Editor can be used as a simple alternative to the Key Editor. It can also be used to adapt function keys and LEDs to the application software. In contrast to the Key Editor, operation does not take place using a graphical representation of the device, but via a simple Windows dialog box. The KCF Editor can therefore also be used for devices that are not yet supported in the Key Editor. The KCF Editor is a "portable" application and can be started directly from a USB flash drive without installation on the target device, for example.

An installed ADI driver is required for the full range of functions.



Features:

- Configuration of normal keys like on a keyboard (A, B, C, etc.)
- Special key functions (change brightness, etc.)
- Assignment of LED functions (HDD access, power, etc.)
- 4 assignments possible per key (using layers)
- Configuration of the panel lock time when connecting several Automation Panel devices to B&R PCs.
- Export and import of the configuration (via INI files)
- Save configuration as report (text file)

If the KCF Editor is running on the target device and the ADI driver is installed, the following additional features are available:

- Panel and key detection
- LED test
- Download/Upload the configuration

For detailed instructions about configuring keys and LEDs and installing the key configuration on the target system, see the user documentation for the KCF Editor. The KCF Editor and user documentation can be downloaded at no cost from the Downloads section of the B&R website (www.br-automation.com).

7.10 HMI Service Center

The HMI Service Center is software for testing B&R industrial PCs and Automation Panels. Testing covers different categories such as COM, network and SRAM.

Since version 3.0.0, the HMI Service Center is available as a download at no cost and can be installed on any USB flash drive with the HMI Service Center Maintenance tool.

For more detailed information, the HMI Service Center user's manual can be downloaded from the B&R website (https://www.br-automation.com).

8 Maintenance

The following chapter describes the maintenance work that can be carried out by a qualified and trained end user.

Information:

Only components approved by B&R are permitted to be used for maintenance work.

8.1 Changing the battery

Warning!

The battery is only permitted to be replaced with a BR2477A battery. The use of any other battery may present a risk of fire or explosion.

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

Note the following when changing the battery:

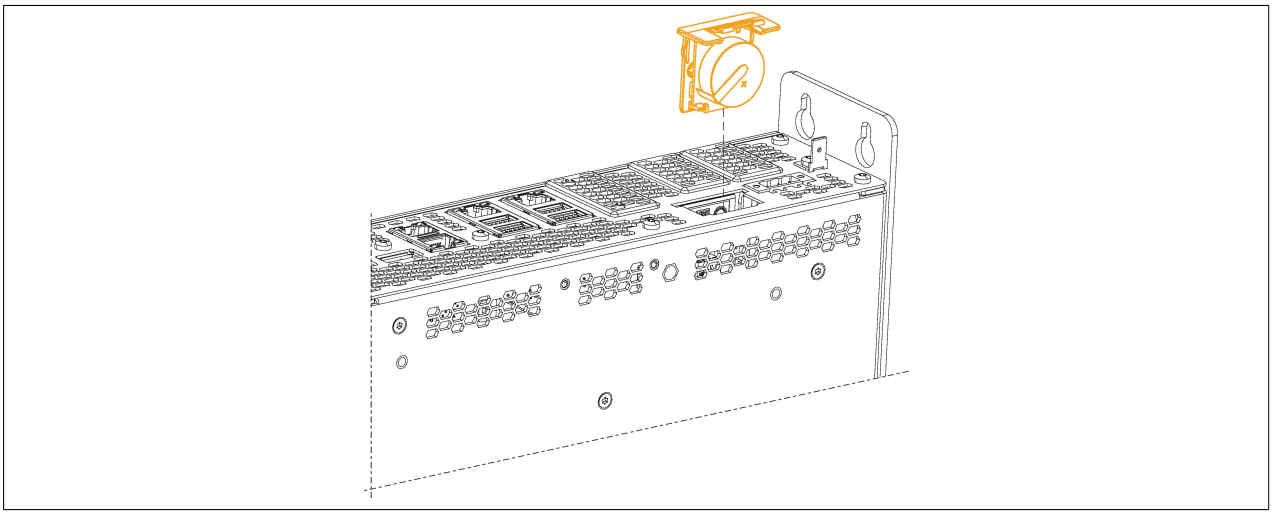
- The product design allows the battery to be changed when the PLC is in a voltage-free state as well as when the B&R device is switched on. In some countries, changing under operating voltage is not permitted, however; local regulations must be observed!
- The battery is only permitted to be changed by qualified personnel.
- When changing the battery in a voltage-free state, any BIOS settings made are retained (stored in voltage-safe EEPROM). The date and time must be set again, and remanent data in the battery-backed SRAM of IF options must be backed up since this data can be lost when the battery is changed. For details about the stored data, see the following section:

"Device interface - Battery" on page 42

System unit	Max. retention time during battery change [min]
APC4100	5[7)]

8.1.1 Procedure for replacing the battery

1. Disconnect the power supply cable to the B&R industrial PC (disconnect the power cable).
2. Carry out electrostatic discharge on the housing or at the ground connection.
3. Remove the battery adapter of the device (protected against reverse polarity).



4. Insert the new battery back into the device.

7) Decreases to 3 minutes when using IF options with SRAM.

5. Reconnect the power supply to the B&R industrial PC (connect the power connector).
6. Set the date and time in BIOS again.

Warning!

Lithium batteries are hazardous waste! Used batteries must be disposed of in accordance with local regulations.

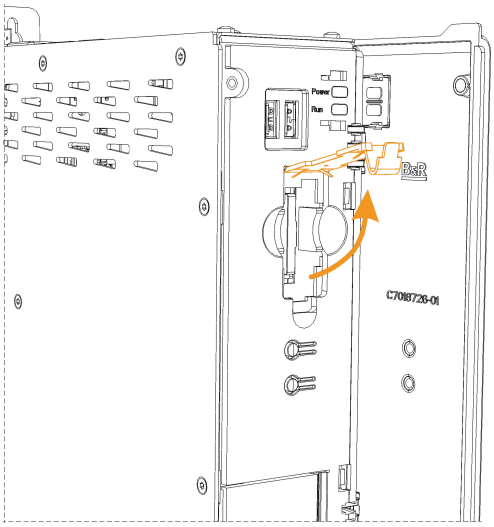
8.2 Replacing a CFexpress card

Caution!

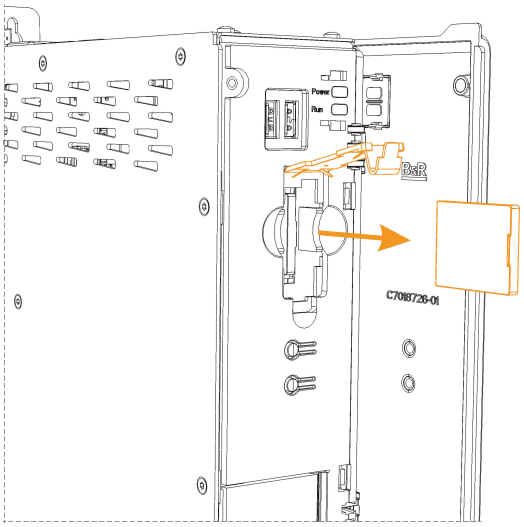
The CFexpress card is only permitted to be replaced in a voltage-free state![8)]

Improper handling can result in a defect in the ejection mechanism.

1. Disconnect the power supply cable to the B&R industrial PC.
2. Carry out electrostatic discharge on the housing or at the ground connection.
3. Open the front cover.
4. Flip up the CFexpress slot cover.



5. If the CFexpress card is already connected, the eject mechanism can be triggered by pressing it lightly and the card can be removed.



6. Insert the new CFexpress card(s).

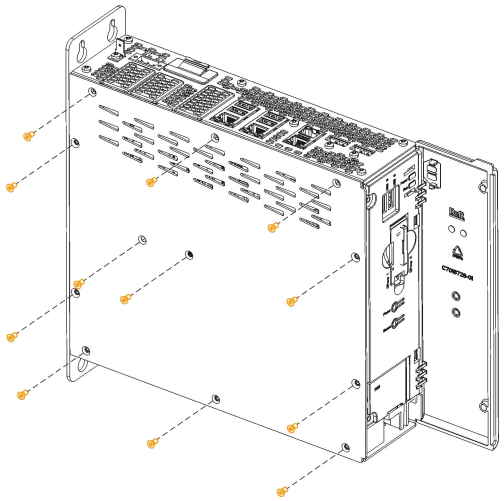
[8)] Depending on the configuration, a CFexpress card can also be used as a removable data storage medium and therefore also be changed during operation if handled correctly.

8.3 Preparatory measures

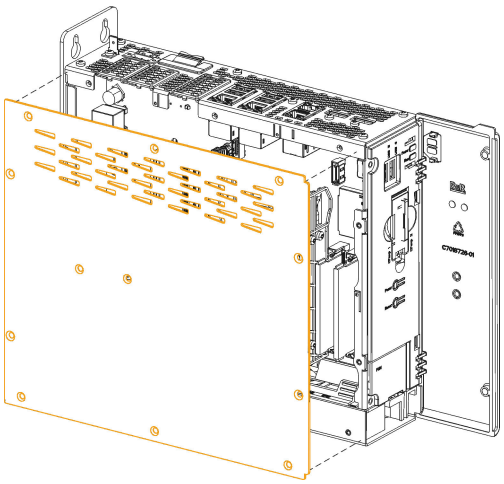
In order to properly replace or install interface options, main memory, SSD/HDD and/or M.2 mass storage, the following preparatory steps must be performed.

8.3.1 0 slots

1. Disconnect the power supply cable to the B&R industrial PC.
2. Carry out electrostatic discharge on the housing or at the ground connection.
3. Open the front cover for easier handling. On the side of the device, loosen the Torx screws (T10) marked in the following figure. The number of Torx screws can vary depending on the system unit.

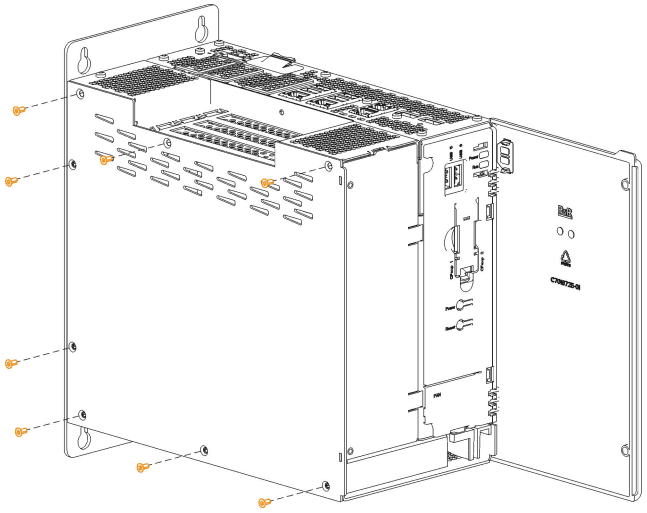


4. After loosening the screws, remove the side cover.

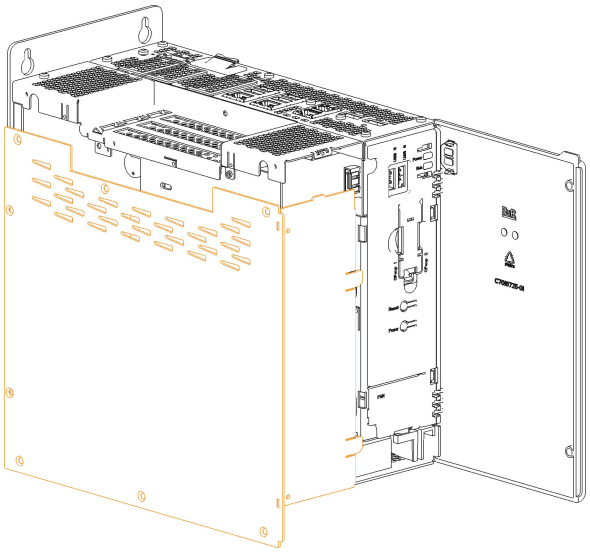


8.3.2 Slot variants

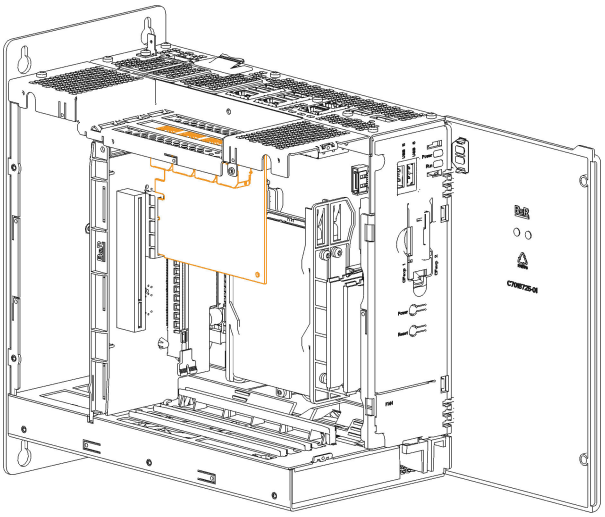
1. Disconnect the power supply cable to the B&R industrial PC.
2. Carry out electrostatic discharge on the housing or at the ground connection.
3. Open the front cover for easier handling. On the side of the device, loosen the Torx screws (T10) marked in the following figure. The number of Torx screws can vary depending on the system unit.



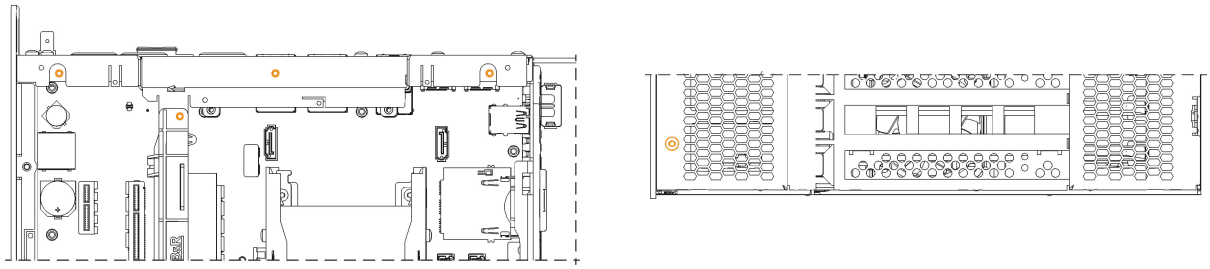
4. After loosening the screws, remove the side cover.



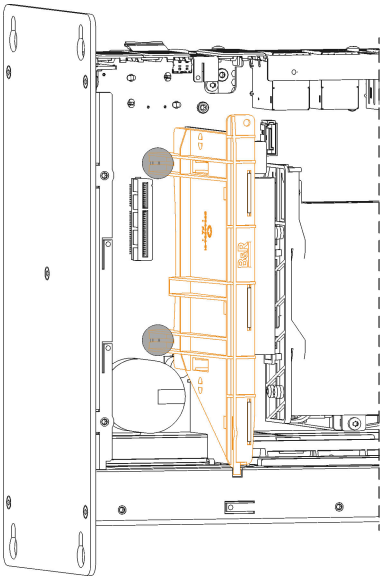
5. Remove the PCI/PCIe card.



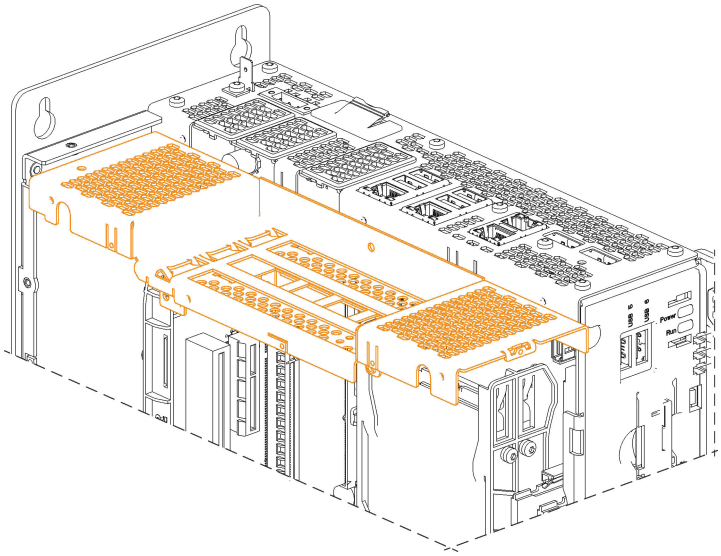
6. Loosen the Torx screws (T10) indicated in the following figure.



7. Remove the bus unit by squeezing the fuses (gray markings).



8. Remove the marked plate.



9. After the required installation/replacement has been made, assemble the B&R Automation PC in reverse order.

8.4 Installing the interface option

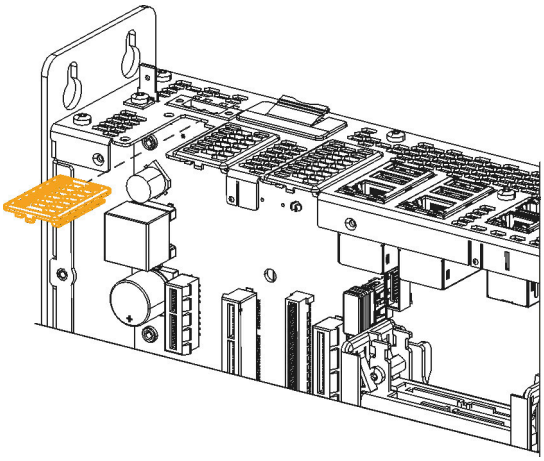
Information:

It is important to note that not every interface option can be connected in any interface slot. For additional information, see section "IF options" on page 39.

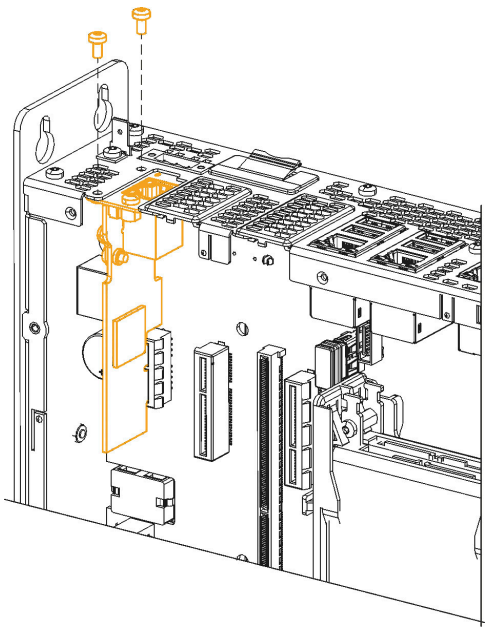
Depending on the IF option used, it may be necessary to load the default settings in BIOS after replacement or installation (see "Exit" on page 169).

For slot variants 1 to 3, mounting bracket 5ACCMBMS.0000-000 is required to install 5ACCMS01.MDT2-000 and 5ACCLI05.SDL4-000 on IF3.

1. "Preparatory measures" on page 197.
2. Remove the blank slot cover.



3. Connect the interface option into the slot and installed it in the B&R industrial PC using Torx screws (T10).

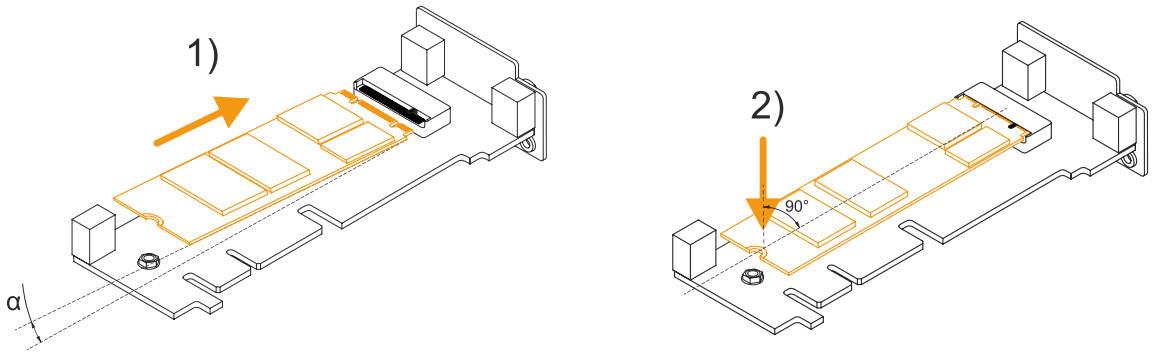


4. Reassemble the Automation PC in reverse order.
5. Once installed successfully, the interface option must be enabled in BIOS. To do this, launch BIOS during system startup, load the BIOS default values and save the settings.

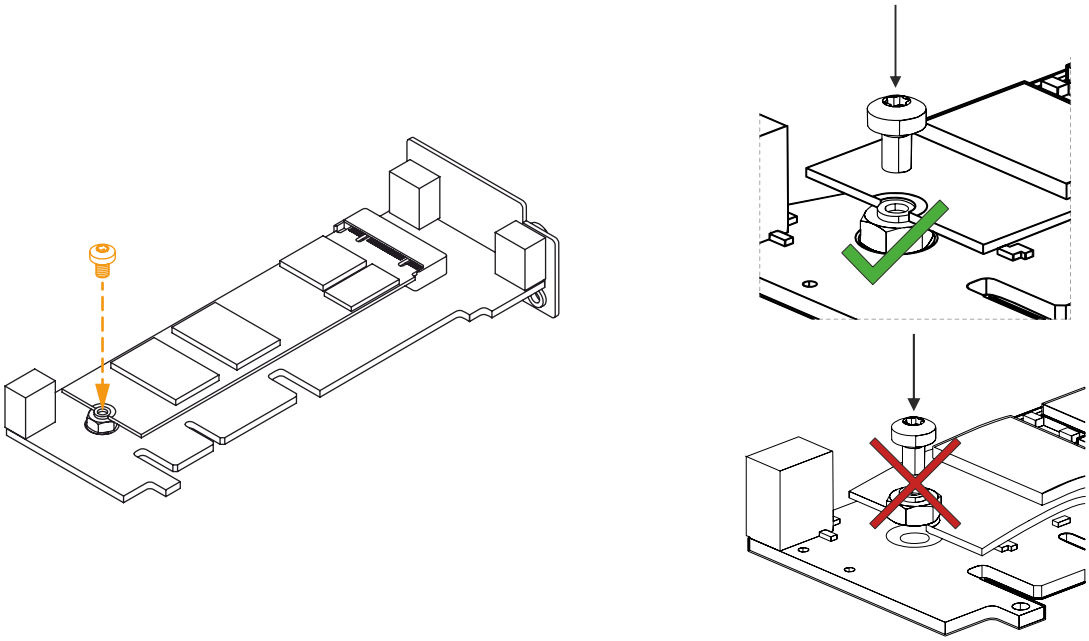
8.4.1 Installing M.2 mass storage devices

M.2 mass storage devices must be installed in adapter card 5ACCMS01.MDT2-000 as follows:

1. Insert the mass storage device into the connection strip block at angle α of 5 to 20° (1) and then carefully press it into a horizontal position (2).



2. Secure the mass storage device with an M2.5 Torx screw size T8 (max. tightening torque 0.45 Nm). The force-fit nut is not permitted to be loosened and installed between the mass storage device and the screw!



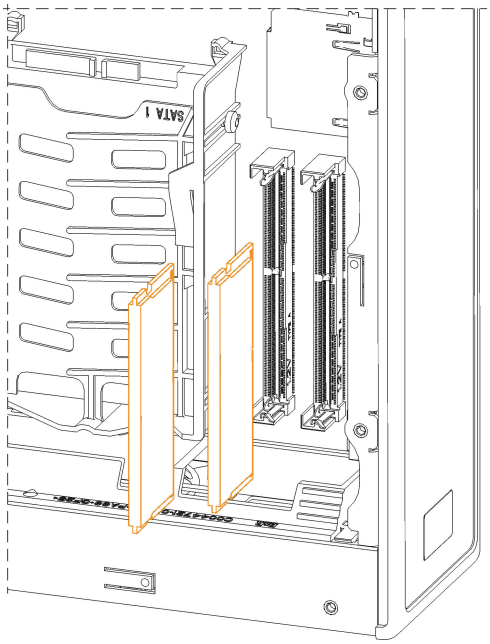
✓ The mass storage device is installed, and the adapter card can be installed in the device.

Installation in an APC4100 must be carried out according to the description in section "Installing the interface option" on page 200. Installation takes place in slot *IF option 3*[9)].

[9)] Mounting bracket 5ACCMBMS.0000-000 is also required for installation in slot variants 1 to 3.

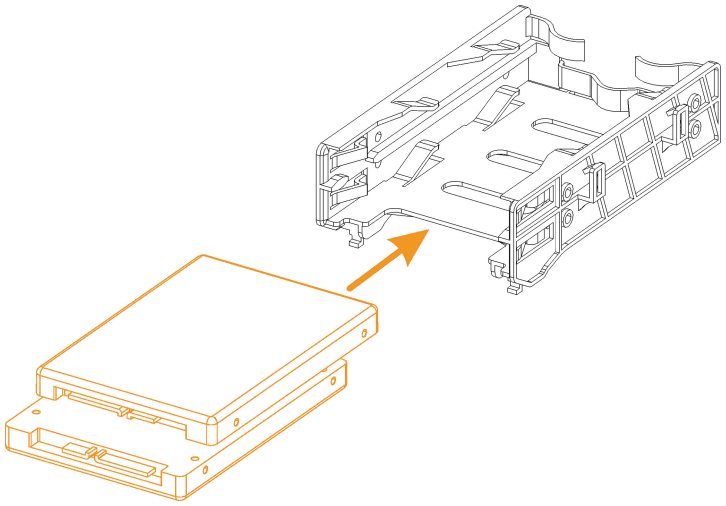
8.5 Replacing main memory

1. "Preparatory measures" on page 197.
2. To replace the main memory, first loosen the locking mechanism.
3. Remove the main memory.
4. Insert the new main memory into the connector strip at a small angle and then carefully bring it into a horizontal position.
5. When the main memory is installed properly, the locking mechanism engages and secures it into place.

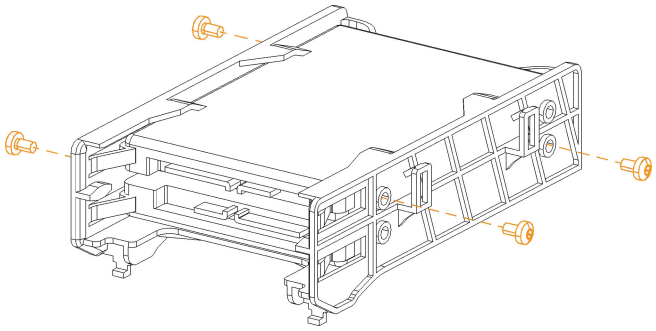


8.6 Installing or replacing the SSD/HDD

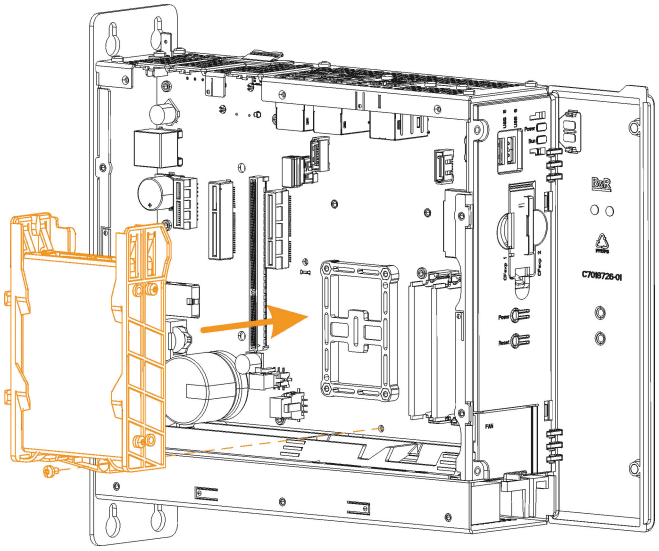
1. "Preparatory measures" on page 197
2. To install the hard disk, slide it into the bracket.



3. Each hard disk must be secured with at least 2 screws (torque: max. 0.55 Nm).



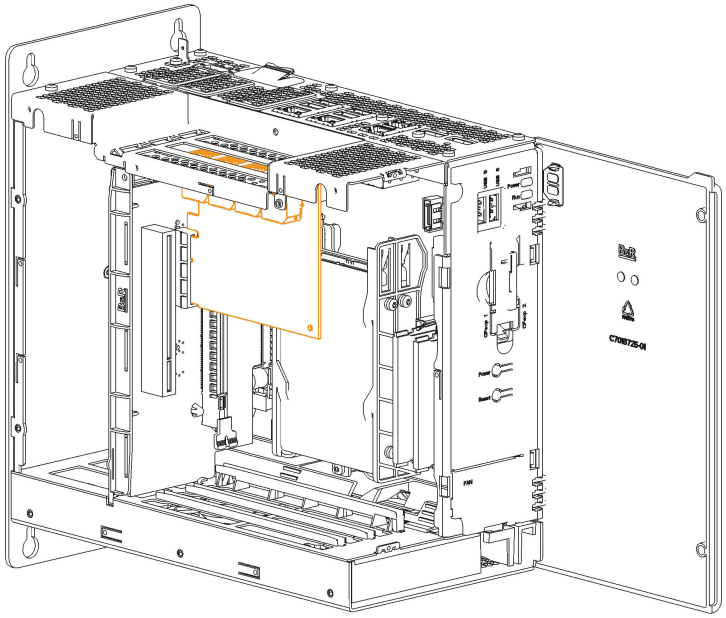
4. Connect the cable to the SSD in the removed state.
5. Hook the bracket and hard disk(s) into the opening provided and secure them with a screw (torque: max. 0.55 Nm).



6. First connect the data cable, then the power supply cable.
7. Reassemble the B&R industrial PC in reverse order.

8.7 Installing PCI/PCIe cards

1. "Preparatory measures" on page 197
2. Remove the PCI blank slot cover. To do this, loosen the Torx screw (T10) and pull out the blank slot cover.
3. Install or replace the PCI/PCIe card. When using large cards, be sure to insert the PCI/PCIe card in the lower black guide rail. Secure the PCI/PCIe card with the previously loosened Torx screw of the slot cover.

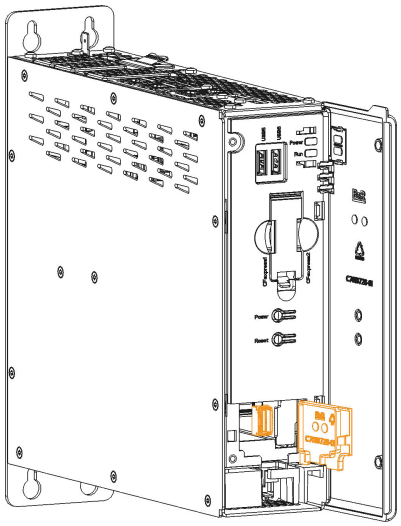


4. Reassemble the B&R industrial PC in reverse order.

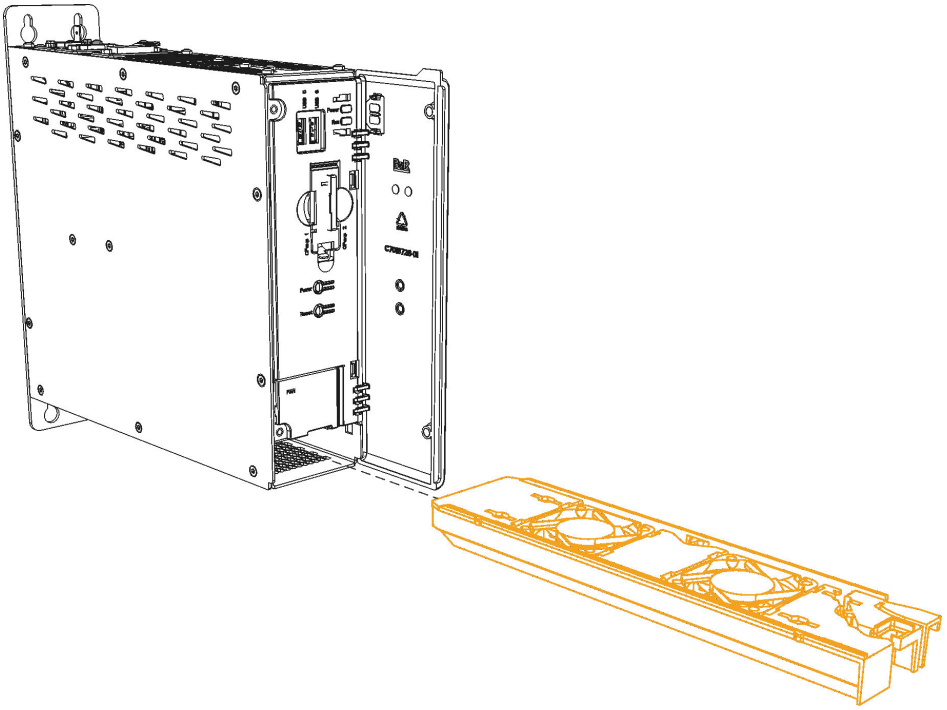
8.8 Replacing the fan filter and fan kit

It is important to note that not all steps in the following instructions must be performed, depending on whether only the filters or the entire kit is being installed or replaced.

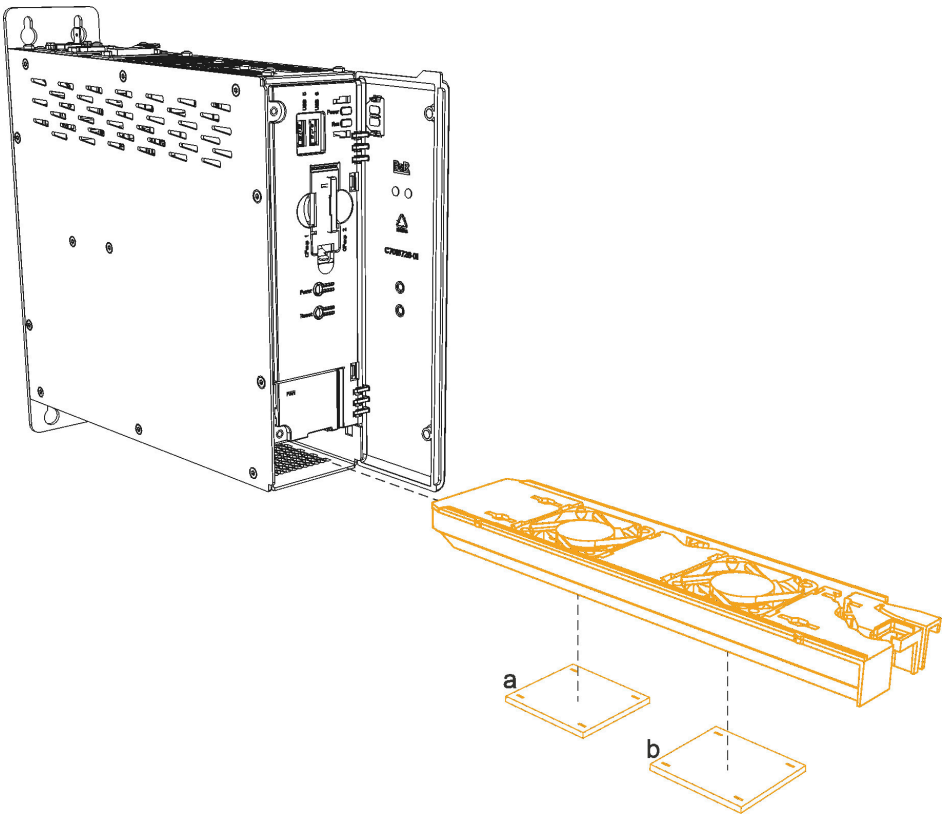
1. Disconnect the power supply cable to the B&R industrial PC.
2. Carry out electrostatic discharge on the housing or at the ground connection.
3. Open the front cover.
4. To remove the fan kit from the B&R industrial PC, the corresponding connector must be disconnected. To do this, open the hinge of the front cover.



5. Disconnect the fan kit connector.
6. Unlock the fan kit by squeezing the handle surfaces together and pull it out to the front.



7. Remove the fan filters (a and b in the figure) and insert the new filters.



8. Insert the (new) fan kit into the industrial PC and connect it.

Information:

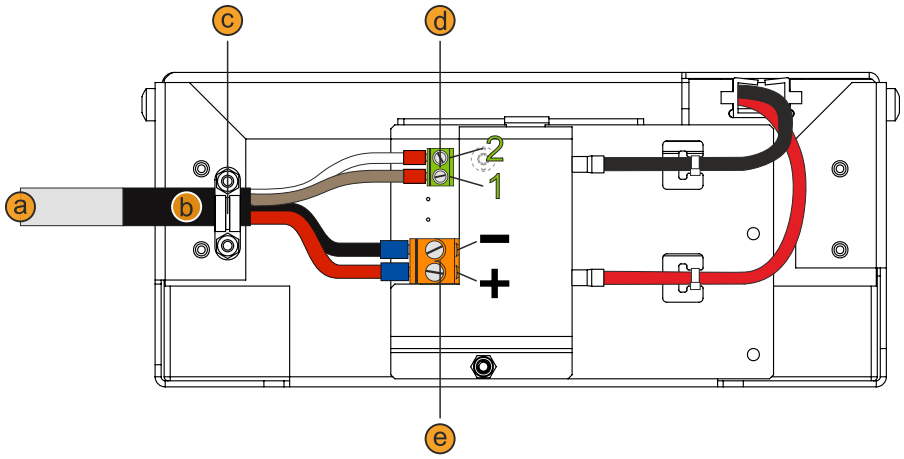
The dust filter must be inspected at regular intervals determined by the pollution degree in the operating environment.

8.9 Installing and connecting the UPS battery unit

Warning!

Opening the UPS battery unit is not permitted!

1. Disconnect the power supply cable to the B&R industrial PC.
2. Install the battery unit. For the drilling template, see the technical data for the respective UPS battery unit. The spacing between the battery unit and B&R industrial PC must be selected so that they can be connected together with the UPS cable; note the cable length.
   4 M5 screws, 4 flat washers and 1 screw locking washer are needed for installation (min. tightening torque 1.3 Nm, screw-in depth per applicable DIN regulations and the application). These are not included in delivery.
3. Connect the UPS cable to the battery. To do so, connect the red and black wires to the power supply (**orange** screw clamp terminal).
   Connect the white and brown wires to the temperature sensor (**green** screw clamp terminal).

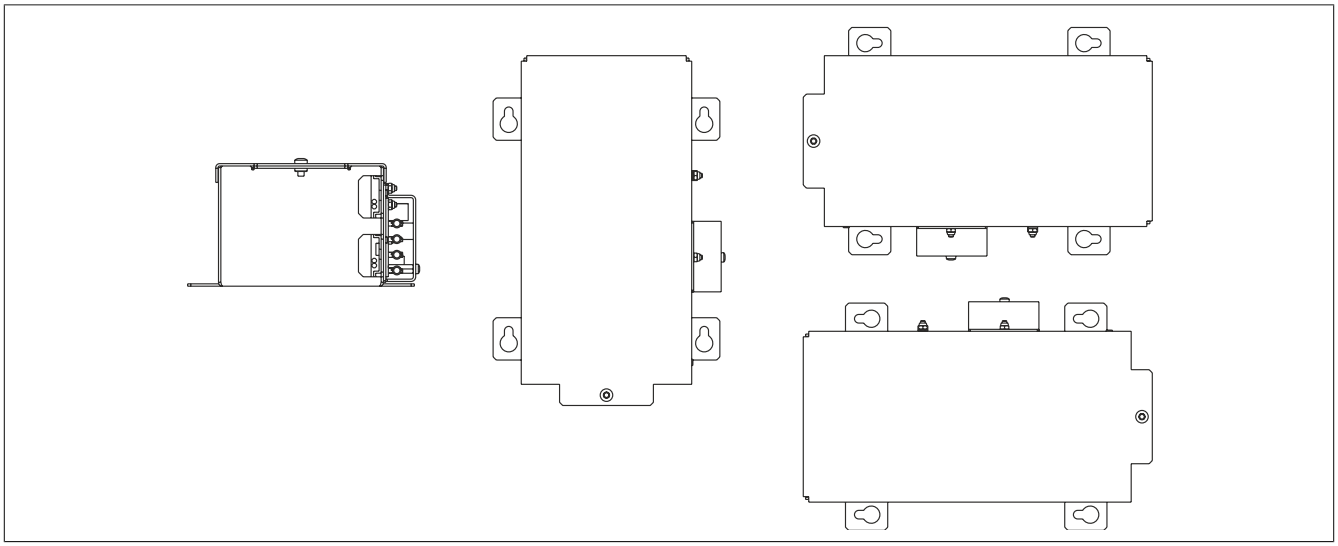


Legend			
a	UPS cable	b	Heat shrink tubing
c	Cable clamp	d	Temperature sensor connection
e	Battery unit connection		
Temperature sensor screw clamp terminal (green)			
1	Brown	2	White
Power supply screw clamp terminal (orange)			
+	Red	-	Black

4. Tighten the connected wires to the screw clamp terminals with a screwdriver (max. tightening torque 0.4 Nm).
5. Loosen both nuts (M3) on the cable clamp and feed the UPS cable through.
6. Fasten the UPS cable using the cable clamp. Alternately tighten the previously removed nuts onto the cable clamp (max. tightening torque 0.35 Nm).
7. Connect the 4-pin screw clamp terminal block to the UPS IF option and tighten the two screws with a screwdriver (max. tightening torque 0.4 Nm).

8.9.1 Permissible mounting orientations

The UPS battery unit is only permitted to be installed as illustrated below.



8.10 Repairs/Complaints and replacement parts

Danger!

Unauthorized opening or repair of a device may result in personal injury and/or serious damage to property. Repairs are therefore only permitted to be carried out by authorized qualified personnel at the manufacturer's premises.

To process a repair/complaint, a repair order or complaint must be created via the B&R Material Return Portal on the B&R website (www.br-automation.com).

9 Accessories

The following accessories have undergone functional testing by B&R in connection with the device used and can be operated with this device. Possible limitations regarding operation with individual components other than the complete system must be taken into account, however. All individual specifications of the components must be observed when operating the complete system.

All components listed in this manual have undergone intensive system and compatibility testing and been approved accordingly. B&R cannot assume any functional warranty for accessories that have not been approved.

9.1 General information

The following products can be used in the event of loss or for conversion or retrofitting.

9.1.1 Replacement parts and sets

For additional technical details, see Individual components.

Order number	Description
5ACCRPC4.BT02-000	HMI APC4100 battery compartment including battery
5ACCRDDR.4096-05	HMI SO-DIMM DDR4-3200 4096 MB
5ACCRDDR.8192-05	HMI SO-DIMM DDR4-3200 8192 MB
5ACCRDDR.8192-06	HMI SO-DIMM DDR4-3200 ECC 8192 MB
5ACCRDDR.016G-05	HMI SO-DIMM DDR4-3200 16384 MB
5ACCRDDR.032G-05	HMI SO-DIMM DDR4-3200 32768 MB
5MMHDD.1024-00	1 TB hard disk - SATA
5MMSSD.0128-01	128 GB SSD MLC - Innodisk - SATA
5MMSSD.0256-00	256 GB SSD MLC - Innodisk - SATA
5MMSSD.0512-00	512 GB SSD MLC - Innodisk - SATA
5MMSSD.1024-00	1 TB SSD MLC - Innodisk - SATA
5ACCRPC4.CBLS-000	HMI APC4100 cable set SSD/HDD
5ACCRPC4.MMFR-000	HMI APC4100 SSD/HDD installation frame
5ACCRCFX.060G-20	HMI CFexpress 60 GB TLC
5ACCRCFX.120G-20	HMI CFexpress 120 GB TLC
5ACCRCFX.240G-20	HMI CFexpress 240 GB TLC
5ACCRCFX.480G-20	HMI CFexpress 480 GB TLC
5ACCRPC4.FA00-001	HMI APC4100 fan kit 0CS w/ air filter
5ACCRPC4.FA01-001	HMI APC4100 fan kit 1CS w/ air filter
5ACCRPC4.FA02-001	HMI APC4100 fan kit 2CS w/ air filter
5ACCRPC4.FA03-001	HMI APC4100 fan kit 3CS w/ air filter
5ACCRPC4.FLT0-000	HMI filter mat set 0CS for 5 devices
5ACCRPC4.FLT1-000	HMI filter mat set 1CS for 5 devices
5ACCRPC4.FLT2-000	HMI filter mat set 2CS for 5 devices
5ACCRPC4.FLT3-000	HMI filter mat set 3CS for 5 devices
5ACCRPC4.FF00-000	HMI APC4100 front cover set 0CS OR w/ logo
5ACCRPC4.FF01-000	HMI APC4100 front cover set 1CS OR w/ logo
5ACCRPC4.FF02-000	HMI APC4100 front cover set 2CS OR w/ logo
5ACCRPC4.FF03-000	HMI APC4100 front cover set 3CS OR w/ logo
5ACCRPC4.COV0-000	HMI IF covers and grounding clip
5ACCRHMI.0019-000	HMI APC/PPC interface covers

9.2 Installation accessories

Suitable tool sets can be ordered to easily install B&R industrial PCs and converters.

- Consisting of:

  5ACCRHMI.0007-000

  - 1x torque screwdriver: 0.4 to 2.0 Nm
  - 1x torque wrench: 2.0 to 10.0 Nm
  - 1x bit set (6 pieces): Hex recess (3.0 mm, 5.0 mm), Torx (T10, T20, T25, T30)

9.2.1 Order data

Order number	Short description	Figure
	Other	
5ACCRHMI.0007-000	HMI installation tool for swing arm: - 1x torque wrench 0.4 - 2.0 Nm - 1x torque wrench 2.0 - 10.0 Nm - 1x hex head bit 3.0, length 89 mm - 1x hex head bit 5.0, length 89 mm - 1x Torx 10 bit, length 90 mm - 1x Torx 20 bit, length 89 mm - 1x Torx 25 bit, length 89 mm - 1x Torx 30 bit, length 89 mm	

9.3 Terminal block power supply

9.3.1 0TB103.9x

9.3.1.1 General information

One-row 3-pin terminal block 0TB103.9x is used for the power supply.

9.3.1.2 Order data

Order number	Short description	Figure
	Accessories	
0TB103.9	Connector 24 VDC - 3-pin, female - Screw clamp terminal block 3.31 mm²	
0TB103.91	Connector 24 VDC - 3-pin, female - Cage clamp terminal block 3.31 mm²	

9.3.1.3 Technical data

> **Information:**
>
> **The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.**

Product ID	0TB103.9	0TB103.91
General information		
Certifications		
CE	Yes	
UKCA	Yes	
UL	cULus E115267 Industrial control equipment	
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4[1)]	
DNV	Temperature: **B** (0 - 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck)[2)]	
LR	ENV3	
KR	Yes	
ABS	Yes	
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck	
EAC	Yes	
Terminal block		
Note	Protected against vibration by the screw flange Nominal data per UL	
Number of pins	3 (female)	
Type of terminal block	Screw clamp terminal block variant	Cage clamp terminal block variant[3)]
Cable type	Only copper wires (no aluminum wires!)	

Product ID	0TB103.9	0TB103.91
Pitch	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	
Single-wire	0.20 to 2.50 mm²	
Fine-stranded wires	0.20 to 1.50 mm²	0.20 to 2.50 mm²
With wire end sleeves	0.20 to 1.50 mm²	
Tightening torque	0.4 Nm	-
Electrical properties		
Nominal voltage	300 V	
Nominal current	13 A / contact	15 A / contact
Contact resistance	≤5 mΩ	
Operating conditions		
Pollution degree per EN 61131-2	Pollution degree 2	

1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
2) Yes, but applies only if all components installed in the complete system have this certification and are listed on the associated DNV certificate for the product family.
3) The cage clamp terminal block cannot be used side by side.

9.4 Terminal block for IF options

9.4.1 0TB2104.8000

9.4.1.1 General information

This 1-row, 4-pin TB2104 terminal block is used for ready relay 5AC901.IRDY-00.

9.4.1.2 Order data

Order number	Short description	Figure
	Terminal blocks	
0TB2104.8000	Connector 24 VDC - 4-pin female - Screw clamp terminal block 2.5 mm²	

9.4.1.3 Technical data

Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	0TB2104.8000
General information	
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
EAC	Yes
Terminal block	
Note	Nominal data per UL
Number of pins	4 (female)
Type of terminal block	Screw clamp terminal block variant
Cable type	Only copper wires (no aluminum wires!)
Pitch	5.08 mm
Connection cross section	
AWG wire	26 to 14 AWG
Wire end sleeves with plastic covering	0.2 to 1.5 mm²
Single-wire	0.2 to 2.5 mm²
Fine-stranded wires	0.2 to 1.5 mm²
With wire end sleeves	0.2 to 1.5 mm²
Electrical properties	
Nominal voltage	300 V
Nominal current [1)]	10 A
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2

1) The respective limit data of the IF option must be taken into account!

9.5 Replacement CMOS batteries

9.5.1 5ACCRPC4.BT02-000

9.5.1.1 General information

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

The battery is subject to wear and must be replaced if the battery capacity is insufficient.

9.5.1.2 Order data

Order number	Short description	Figure
	Accessories	
5ACCRPC4.BT02-000	HMI APC4100 battery compartment including battery	

9.5.1.3 Technical data

Order number	5ACCRPC4.BT02-000
General information	
Note	Battery compartment including battery
Certifications	
CE	Yes
UL	In preparation
Electrical properties	
Operating voltage	3 V
Capacity	1000 mAh
Self-discharge	0.03 mA
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	-40 to 125°C
Relative humidity	
Operation	0 to 95%
Storage	0 to 95%
Transport	0 to 95%

9.6 Air filters and filter mats

9.6.1 General information

> **Information:**
>
> **Fan filters are subject to wear and should be checked with appropriate frequency to determine whether the air flow provides sufficient cooling. Replacing or cleaning the fan filter is appropriate at that time.**

9.6.2 5ACCRPC4.FA0x-001

Order number	Short description
	Fan kits
5ACCRPC4.FA00-001	HMI APC4100 fan kit 0CS w/ air filter
5ACCRPC4.FA01-001	HMI APC4100 fan kit 1CS w/ air filter
5ACCRPC4.FA02-001	HMI APC4100 fan kit 2CS w/ air filter
5ACCRPC4.FA03-001	HMI APC4100 fan kit 3CS w/ air filter

9.6.3 5ACCRPC4.FLT0-000

Order number	Short description
	Filter mats
5ACCRPC4.FLT0-000	HMI filter mat set 0CS for 5 devices
5ACCRPC4.FLT1-000	HMI filter mat set 1CS for 5 devices
5ACCRPC4.FLT2-000	HMI filter mat set 2CS for 5 devices
5ACCRPC4.FLT3-000	HMI filter mat set 3CS for 5 devices

9.7 USB mass storage device

For additional information about compatible USB mass storage devices, see the B&R website (USB mass storage devices).

9.8 CFexpress cards

Detailed information about compatible CFexpress cards is available on the B&R website (CFexpress cards).

9.9 Cables

For additional information about compatible cables, see the B&R website (HMI cable manual).

10 International and national certifications

10.1 Directives and declarations

10.1.1 CE marking

All directives applicable to the respective product and their harmonized EN standards are met.

10.1.2 EMC Directive

The products meet the requirements of EU directive "Electromagnetic compatibility 2014/30/EU" and are designed for industrial applications:

EN 61131-2:2007	Programmable 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

Information:

Declarations of conformity are available on the B&R website under Downloads > Certificates > Declarations of conformity.

10.1.3 UKCA

UK Conformity Assessed (UKCA)
All directives applicable to the respective product and their relevant standards are met. Products with this marking are permitted to be imported into Great Britain (England, Wales, Scotland).

Information:

Declarations of conformity are available on the B&R website under Downloads > Certificates > Declarations of conformity.

10.2 Certifications

Danger!

A complete system can only receive certification if all individual components installed and connected in it have the corresponding certifications. If an individual component is used that does not have the corresponding certification, the complete system will also not be certified.

B&R products and services comply with applicable standards. These are international standards from organizations such as ISO, IEC and CENELEC, as well as national standards from organizations such as UL, CSA, FCC, VDE, ÖVE, etc. We pay special attention to the reliability of our products in the industrial sector.

Information:

The certifications valid for the respective product are available on the website and in the user's manual under the technical data in section "Certifications" or in the associated certificates.

10.2.1 UL certification

Ind. Cont. Eq.
E115267

Products with this mark are tested by Underwriters Laboratories and listed as "industrial control equipment". The mark is valid for the USA and Canada and facilitates the certification of your machines and systems in this economic area.

Underwriters Laboratories (UL) per standards UL 61010-1 and UL 61010-2-201
Canadian (CSA) standard per C22.2 No. 61010-1-12 and CSA C22.2 No. 61010-2-201:14

The UL certificates are available on the B&R website (Downloads > Certificates > UL).

11 Environmentally friendly disposal

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

11.1 Separation of materials

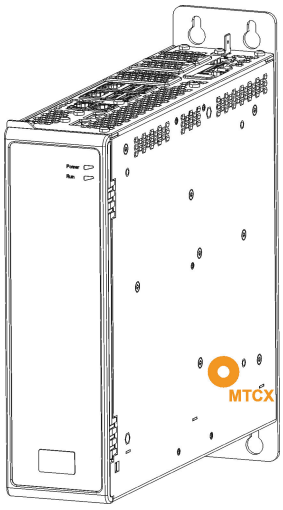
To ensure that devices can be recycled in an environmentally friendly manner, it is necessary to separate out the different materials.

Component	Disposal
Programmable logic controllers Operating and monitoring devices Uninterruptible power supplies Batteries and rechargeable batteries Cables	Electronics recycling
Paper/Cardboard packaging	Paper/Cardboard recycling
Plastic packaging material	Plastic recycling

Disposal must be carried out in accordance with applicable legal regulations.

Appendix A Maintenance Controller Extended (MTCX)

The MTCX controller (FPGA processor) is located on the mainboard (component of every system unit) of the APC4100 device.



The MTCX is responsible for the following monitoring and control functions:

- Power failure logic and power on logic (power OK sequencing)
- Watchdog handling (NMI/reset handling)
- Temperature monitoring and fan control
- SDL4 data transfer (display, matrix keyboard, touch screen, service data, USB)

The functions of the MTCX can be extended by upgrading its firmware[10]. The version can be read in BIOS or in approved operating systems using ADI.

[10] Can be downloaded from the Downloads section of the B&R website (www.br-automation.com).

Appendix B POWERLINK

B.1 LED "S/E" (status/error LED)

This LED is a green/red dual LED and indicates the state of the POWERLINK interface. The LED states have a different meaning depending on the operating mode of the POWERLINK interface.

B.1.1 Ethernet mode

In this mode, the interface is operated as an Ethernet interface.

LED "S/E"		
Green	Red	Description
On	Off	The interface is operated as an Ethernet interface.

Table: LED "S/E": Interface in Ethernet mode

B.1.2 POWERLINK V2 mode

Error message

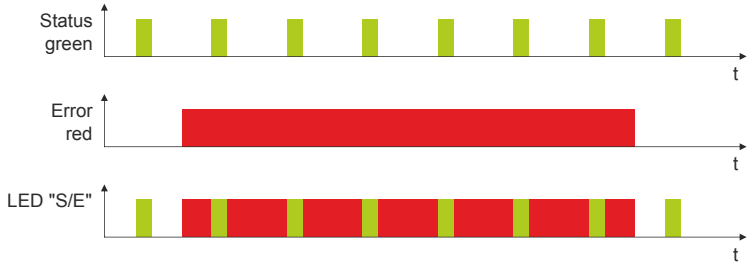
LED "S/E"		
Green	Red	Description
Off	On	The interface is in error mode (failed Ethernet frames, increased number of collisions on the network, etc.). Note: Several red blinking signals are displayed immediately after the device is switched on. These are not errors, however.
Blinking	On	If an error occurs in the following modes, then the green LED blinks over the red LED: • PRE_OPERATIONAL_1 • PRE_OPERATIONAL_2 • READY_TO_OPERATE 

Table: LED "S/E" - Error message (interface in POWERLINK mode)

Interface status

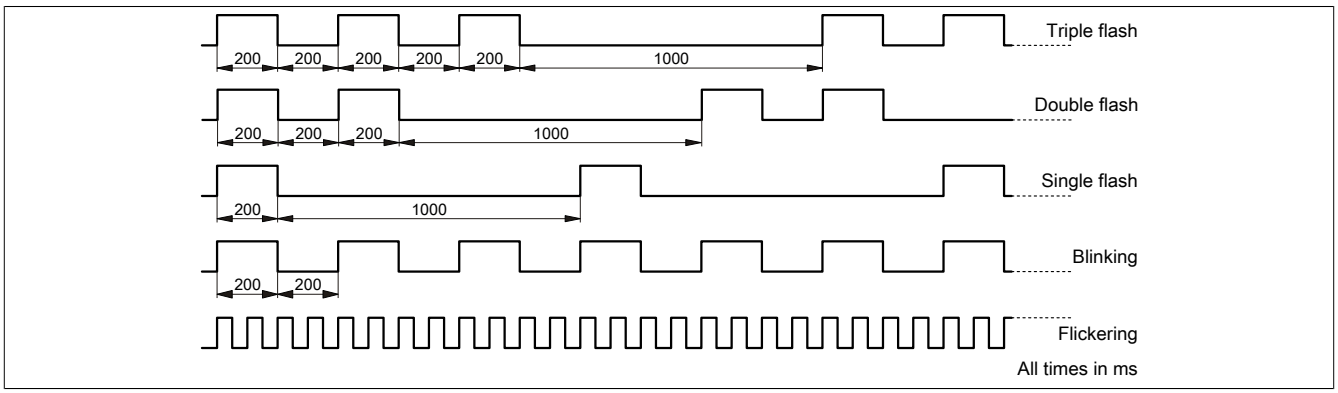
LED "S/E"		
Green	Red	Description
Off	Off	**Mode:** NOT_ACTIVE The interface is either in mode NOT_ACTIVE or one of the following modes or errors is present: • The device is switched off. • The device is in the startup phase. • The interface or device is not configured correctly in Automation Studio. • The interface or device is defective. **Managing node (MN)** The network is monitored for POWERLINK frames. If a frame is not received within the configured time window (timeout), the interface immediately enters mode PRE_OPERATIONAL_1. If POWERLINK communication is detected before the time has elapsed, however, the MN is not started. **Controlled node (CN)** The network is monitored for POWERLINK frames. If a frame is not received within the configured time window (timeout), the interface immediately enters mode BASIC_ETHERNET. If POWERLINK communication is detected before this time expires, however, the interface immediately enters mode PRE_OPERATIONAL_1.

Table: LED "S/E" - Interface state (interface in POWERLINK mode)

LED "S/E"		
Green	**Red**	**Description**
Flickering (approx. 10 Hz)	Off	**Mode:** BASIC_ETHERNET The interface is in mode BASIC_ETHERNET. The interface is operated in Ethernet mode. **Managing node (MN)** This mode can only be exited by resetting the controller. **Controlled node (CN)** If POWERLINK communication is detected during this mode, the interface enters mode PRE_OPERATIONAL_1.
Single flash (approx. 1 Hz)	Off	**Mode:** PRE_OPERATIONAL_1 The interface is in mode PRE_OPERATIONAL_1. **Managing node (MN)** The MN is in "reduced cycle" mode. The CNs are configured in this mode. Cyclic communication is not yet taking place. **Controlled node (CN)** The CN can be configured by the MN in this mode. The CN waits until it receives an SoC frame and then switches to mode PRE_OPERATIONAL_2.
	On	**Controlled node (CN)** If the red LED lights up in this mode, this means that the MN has failed.
Double flash (approx. 1 Hz)	Off	**Mode:** PRE_OPERATIONAL_2 The interface is in mode PRE_OPERATIONAL_2. **Managing node (MN)** The MN starts cyclic communication (cyclic input data is not yet evaluated). The CNs are configured in this mode. **Controlled node (CN)** The CN can be configured by the MN in this mode. A command then switches the mode to READY_TO_OPERATE.
	On	**Controlled node (CN)** If the red LED lights up in this mode, this means that the MN has failed.
Triple flash (approx. 1 Hz)	Off	**Mode:** READY_TO_OPERATE The interface is in mode READY_TO_OPERATE. **Managing node (MN)** Cyclic and asynchronous communication. Received PDO data is ignored. **Controlled node (CN)** The configuration of the CN is completed. Normal cyclic and asynchronous communication. The transmitted PDO data corresponds to the PDO mapping. However, cyclic data is not yet evaluated.
	On	**Controlled node (CN)** If the red LED lights up in this mode, this means that the MN has failed.
On	Off	**Mode:** OPERATIONAL The interface is in mode OPERATIONAL. PDO mapping is active and cyclic data is evaluated.
Blinking (approx. 2.5 Hz)	Off	**Mode:** STOPPED The interface is in mode STOPPED. **Managing node (MN)** This mode does not occur for the MN. **Controlled node (CN)** Output data is not being output, and no input data is being provided. This mode can only be reached and exited by a corresponding command from the MN.

Table: LED "S/E" - Interface state (interface in POWERLINK mode)

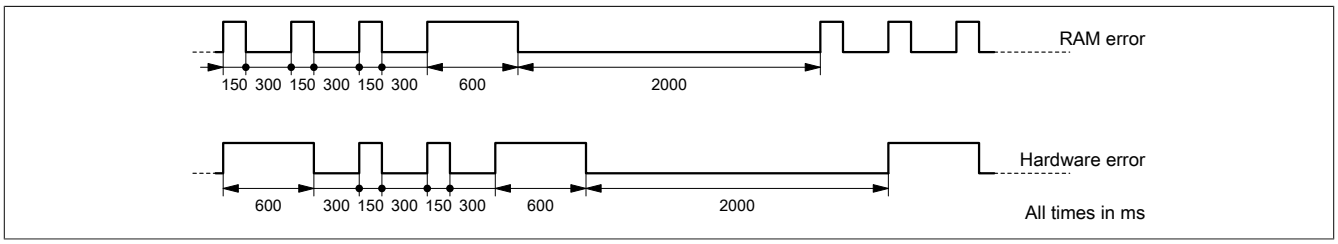
Blink times



B.1.3 System stop error codes

A system stop error can occur due to incorrect configuration or defective hardware.

The error code is indicated by LED "S/E" blinking red. The blinking signal of the error code consists of 4 switch-on phases with short (150 ms) or long (600 ms) duration. The error code is repeated every 2 seconds.



Error	Error description
RAM error	The device is defective and must be replaced.
Hardware error	The device or a system component is defective and must be replaced.

B.1.4 POWERLINK V2

By default, the POWERLINK interface is operated as a managing node (MN). In the managing node, the node number is set to a fixed value of 240.

If the POWERLINK node is operated as a controlled node (CN), a node number from 1 to 239 can be set in the POWERLINK configuration in Automation Studio.

Appendix C Cable data

Signal		Signal	
RS232	"RS232 - Bus length and cable type" on page 224	RS422	"RS422 - Bus length and cable type" on page 224
RS485	"RS485 - Bus length and cable type" on page 225	CAN	"CAN - Bus length and cable type" on page 225

C.1 RS232 - Bus length and cable type

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

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

Preferably, the cable material used should have the following properties or deviate only slightly from them in order to achieve an optimal transfer rate.

RS232 cables		Property
Signal line		
	Cable cross section	4x 0.16 mm² (26 AWG), tinned copper stranded wire
	Wire insulation	PE
	Conductor resistance	≤82 Ω/km
	Stranding	Twisted-pair wires
	Shield	Pair shielding with aluminum foil
GND		
	Cable cross section	1x 0.34 mm² (22AWG/19), tinned copper stranded wire
	Wire insulation	PE
	Conductor resistance	≤59 Ω/km
Outer jacket		
	Material	PUR compound
	Properties	Halogen-free
	Cable shield	Tinned copper wire

C.2 RS422 - Bus length and cable type

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

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

Bus length	Transfer rate
1200 m	Typ. 115 kbit/s

Preferably, the cable material used should have the following properties or deviate only slightly from them in order to achieve an optimal transfer rate.

RS422 cables		Property
Signal line		
	Cable cross section	4x 0.25 mm² (24AWG/19), tinned copper stranded wire
	Wire insulation	PE
	Conductor resistance	≤82 Ω/km
	Stranding	Twisted-pair wires
	Shield	Pair shielding with aluminum foil
GND		
	Cable cross section	1x 0.34 mm² (22AWG/19), tinned copper stranded wire
	Wire insulation	PE
	Conductor resistance	≤59 Ω/km
Outer jacket		
	Material	PUR compound
	Properties	Halogen-free
	Cable shield	Tinned copper wire

C.3 RS485 - Bus length and cable type

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

Bus length	Transfer rate
1200 m	Typ. 115 kbit/s

Preferably, the cable material used should have the following properties or deviate only slightly from them in order to achieve an optimal transfer rate.

RS485 cables		Property
Signal line		
	Cable cross section	4x 0.25 mm² (24AWG/19), tinned copper stranded wire
	Wire insulation	PE
	Conductor resistance	≤82 Ω/km
	Stranding	Twisted-pair wires
	Shield	Pair shielding with aluminum foil
GND		
	Cable cross section	1x 0.34 mm² (22AWG/19), tinned copper stranded wire
	Wire insulation	PE
	Conductor resistance	≤59 Ω/km
Outer jacket		
	Material	PUR compound
	Properties	Halogen-free
	Cable shield	Tinned copper wire

C.4 CAN - Bus length and cable type

The type of cable to be used depends largely on the required bus length and number of nodes. The bus length is determined by the transfer rate. Per CiA (CAN in Automation), the maximum bus length is 1000 meters.

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

Bus length[1)]	Transfer rate
≤1000 m	Typ. 50 kbit/s
≤200 m	Typ. 250 kbit/s
≤100 m	Typ. 500 kbit/s

1) The specified cable length is only valid with the values specified in "CAN driver settings". Cable lengths otherwise depend on the values in the bit timing register, cable quality and number of nodes.

Preferably, the cable material used should have the following properties or deviate only slightly from them in order to achieve an optimal transfer rate.

CAN cable		Property
Signal line		
	Cable cross section	2x 0.25 mm² (24AWG/19), tinned copper stranded wire
	Wire insulation	PE
	Conductor resistance	≤82 Ω/km
	Stranding	Twisted-pair wires
	Shield	Pair shielding with aluminum foil
GND		
	Cable cross section	1x 0.34 mm² (22AWG/19), tinned copper stranded wire
	Wire insulation	PE
	Conductor resistance	≤59 Ω/km
Outer jacket		
	Material	PUR compound
	Properties	Halogen-free
	Cable shield	Tinned copper wire

Appendix D Abbreviations

Abbreviations used in the document are explained here.

Abbreviation	Stands for	Description
NC	Normally closed	Stands for a normally closed relay contact.
	Not connected	Used in pinout descriptions if a terminal or pin is not connected on the module side.
ND	Not defined	Stands for an undefined value in technical data tables. This may be because the cable manufacturer has not provided a value for certain technical data.
NO	Normally open	Stands for a normally open relay contact.
TBD	To be defined	Used in technical data tables if there is currently no value for specific technical data. The value will be supplied later.
B_{10D}	-	Number of cycles until 10% of the components fail dangerously (per channel).
MTBF	Mean time between failures	The expected value of the operating time between two consecutive failures.
$MTTF_D$	Mean time to dangerous failure	Mean time to dangerous failure (per channel).
DC	Diagnostic coverage	Degree of diagnostic coverage
PL	Performance level	Discrete level specifying the ability of safety-related devices to perform a safety function under foreseeable conditions.
PFH	Probability of failure per hour	Probability of a failure per hour.
SIL	Safety integrity level	Safety integrity level