Automation PC 3100 mobile

User's manual

Version: **1.16 (April 2023)**
Order no.: **MAAPC3100m**

Translation of the original documentation

Publishing information

B&R Industrial Automation GmbH

B&R Strasse 1

5142 Eggelsberg

Austria

Telephone: +43 7748 6586-0

Fax: +43 7748 6586-26

office@br-automation.com

1551040897358-1.16.a

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)]
1.16	April 2023	Updated document. • Updated "Battery" on page 30 and "Changing the battery" on page 115. • Updated "International and national certifications" on page 127. • Updated "Technical data" on page 37 and "Temperature specifications" on page 18 for 5MPC3100.K35F-000. • Updated "Operating systems" on page 98. • Updated "5ACCIFM0.FPC3-000" on page 42.
1.15	September 2022	Updated document. • Added expansion options "5ACCIFM0.FPC3-000" on page 42 and "5ACCIFM0.FCAN-000" on page 45. • Added section "Automation software" on page 104. • Added section "Firmware upgrade with Automation Runtime" on page 95. • Added sections "Connection options and communication" on page 14 and "Order number key" on page 14. • Updated section "Accessories" on page 122. • Various minor corrections in section "Technical data" on page 16. • Updated the CAN interface description, see sections "CAN interface" on page 35 and "Expansion options" on page 40. • Name change from "B&R Linux" to "Linux for B&R".
1.10	July 2021	Updated document. • Added system unit **5MPC3100.K35F-000** and *storage health data support*, see "Technical data" on page 37.
1.05	April 2021	Updated document. • Updated "Audio interface" on page 33. • Updated "Ignition (ignition handling)" on page 87. • Updated "Technical data" on page 37. • Added "Screenless update" on page 96 and updated "LED status indicators" on page 29.
1.01	October 2020	Updated document. • Updated "RS422/RS485 interface" on page 35. • Updated "5ACCIFM0.CETH-000" on page 40.
1.00	October 2020	• First version.

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.

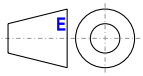
Signal word	Description
Danger!	Failure to observe these safety guidelines and notices will result in death, severe injury or substantial damage to property.
Warning!	Failure to observe these safety guidelines and notices can result in death, severe injury or substantial damage to property.
Caution!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

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 as well as the automation of mobile machinery and commercial vehicles. The intended use includes control, operation, monitoring, drive and HMI tasks as part of automation processes.

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

[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.

- 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.

3 System overview

3.1 Automation PC 3100 mobile

The Automation PC 3100 mobile provides the mobile automation sector with a robust and powerful solution for requirements such as edge computing, M2M communication and autonomous operation.

Intel processors with up to 16 GB RAM form the core of the APC mobile. Standard features of the APC mobile system include connections for CAN, USB and Ethernet. The extremely robust die-cast aluminum housing provides space for 2 expansion options. It also allows operation at temperatures from -40 to 70°C and 100% relative humidity and can withstand mechanical stresses such as vibration and shock.

3.1.1 Features

- Up to 16 GB RAM
- 2x USB interfaces (USB 2.0)
- 2x 100 Mbit Ethernet interfaces
- Up to 480 GB SSD NVMe
- CMC multi-header with audio, CAN, RS232, RS422/RS485
- IP69K
- 2x slot for expansion option

3.1.2 Install, connect, ready

The four mounting tabs allow the APC mobile system to be installed quickly and easily using four screws. Customers can install the device onto any flat mounting surface in any position. Vibrations in the environment also have no influence on the functionality of the system due to its stable design.

Since it is possible to combine modules, the APC mobile system is manufactured individually at B&R and only needs to be installed. This reduces cabling effort to a minimum.

	**Quick installation** Installation is quick and easy: The APC mobile system is installed on a flat mounting surface with four M6 screws. The mounting orientations are freely selectable and possible in all directions.		**PCIe expansion boards** An extensive range of components enables all requirements to be covered simply, cost-effectively and without risk. Additional inputs, outputs or interfaces can be added using option boards.
	**Multi-header** The multi-header forms the interface to the modules and thus supplies the complete system. Attaching the connector is very simple: Push the connector into the female connector and secure the connection by pressing down the latch.		**M12 circular connector** The number and type of connectors that are suitable for on-site assembly may vary depending on the use of modules. The connectors are simply connected to the coupling and screwed tight.

3.2 Configuration

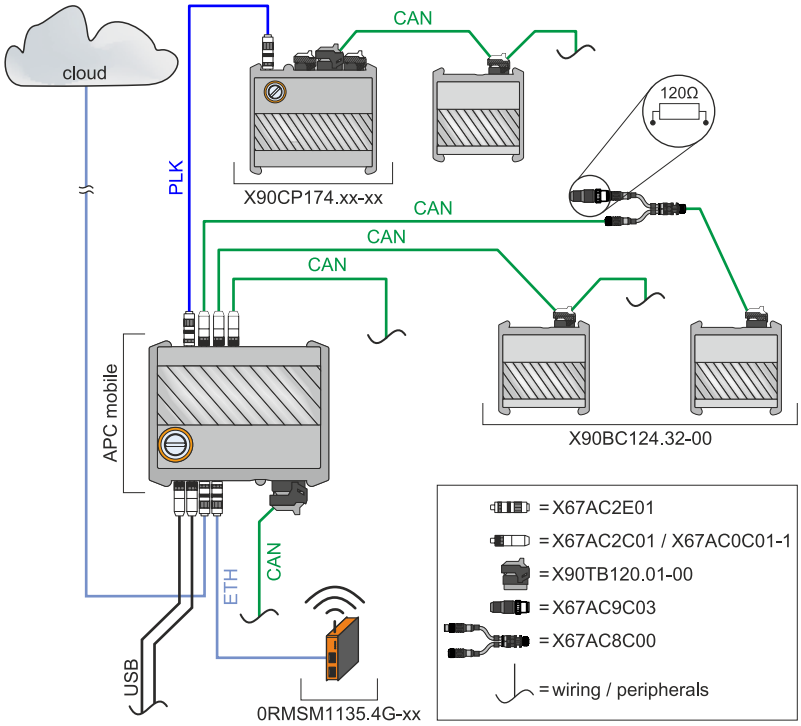
The following individual components are required for a functional device:

- System unit
- Operating system

Automation PC 3100 mobile - Configuration				
System units				Select 1
	System unit	Processor	Processor - Clock frequency	Cores
	5MPC3100.K0xx	Intel C-3965U	2200 MHz	2
	5MPC3100.K3xx	Intel i7-7600U	2800 MHz	2
Interfaces				
	**Expansion options**			Optional, select max. 2
	5ACCIFM0.CETH-000	5ACCIFM0.FPC3-000	5ACCIFM0.FCAN-000	
Accessories				Optional selection
	5MMUSB.2048-01	5MMUSB.4096-01	5MMUSB.4096-02	5MMUSB.032G-02
Operating systems				Select 1
	**Windows 10** 5SWW10.1062-MUL 5SWW10.1162-MUL		**Linux for B&R 10** 5SWLIN.0862-MUL	**Automation Runtime** 0TG1000.01 0TG1000.02 0TGF016.01 1TC4601.06-5 1TC4700.00

3.2.1 Connection options and communication

The following figure shows a connection and wiring diagram of an APC mobile system unit.



3.2.2 Order number key

Information:

A current order number key is available on the B&R website for easy identification of the device configuration:

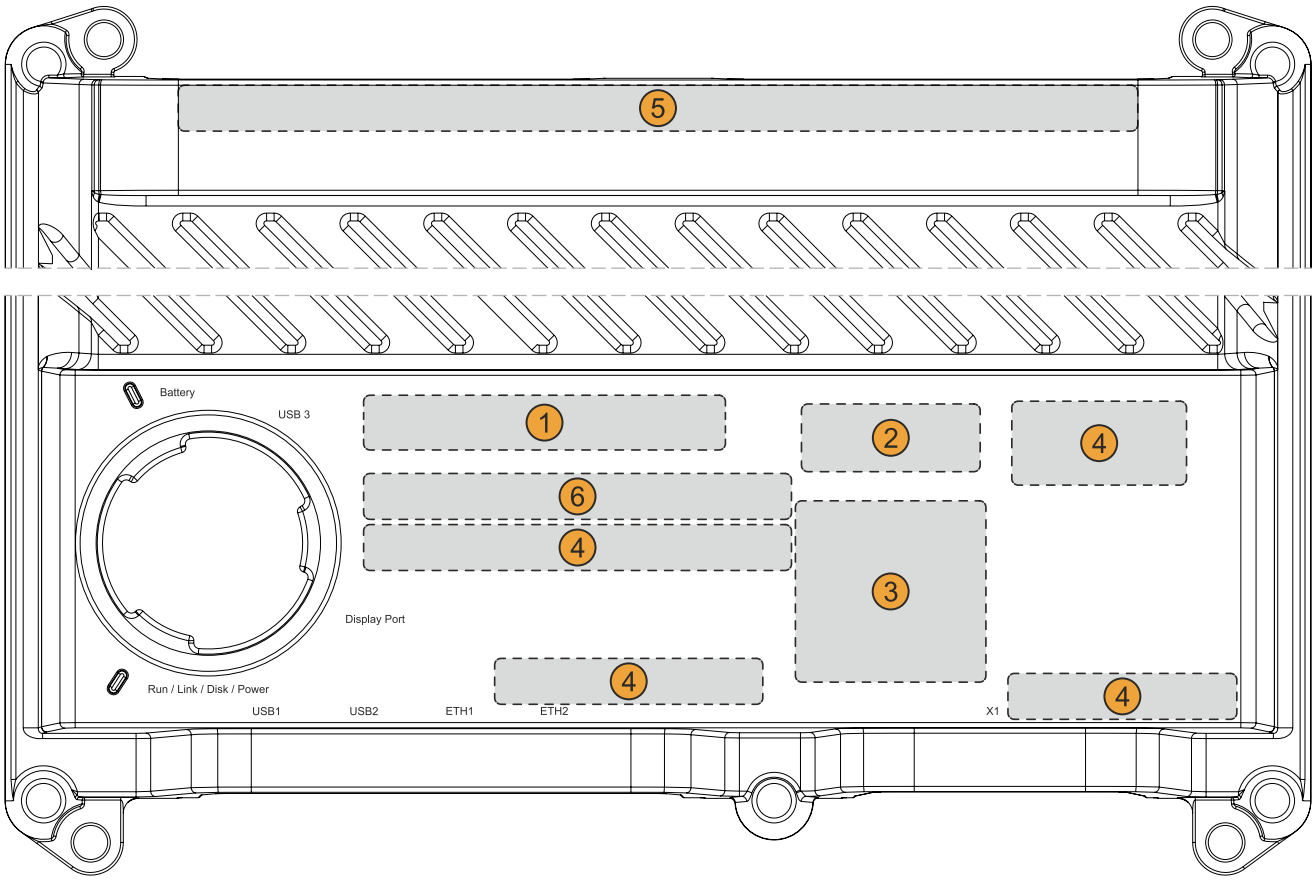
Home > Downloads > Industrial PCs and panels > Automation PC 3100 mobile

3.3 Overview

Order number	Short description	Page
	Accessories	
5CACMC.0030-000	APC mobile, 3 m wiring harness, development accessory for commissioning and testing	123
5CAUSB.0030-000	USB cable M12 to USB 2.0 type A, 3 m, development accessory for commissioning and testing	125
5SWUTI.0001-000	HMI Service Center USB flash drive - Hardware diagnostic software - For APC910/PPC900 - For PPC1200 - For APC2100/PPC2100 - For APC2200/PPC2200 - For APC3100/PPC3100 - For APC mobile - For AP800/AP900 - For AP9x3/AP9xD - For AP1000/AP5000	113
	Expansion options	
5ACCIFM0.CETH-000	Expansion option - 4x Ethernet 10/100 Mbit/s to M12 - With Intel I210 Ethernet controller - For APC mobile - Only available with a new device	40
5ACCIFM0.FCAN-000	Expansion option - 3x CAN interface - For APC mobile - Only available with a new device	45
5ACCIFM0.FPC3-000	Expansion option - 1x POWERLINK interface - 3x CAN interface - 64 kB FRAM - For APC mobile - Only available with a new device	42
	Hypervisor	
1TC4700.00	License for B&R Hypervisor (TC). One license per target system is required.	104
	Linux for B&R 10	
5SWLIN.0862-MUL	Linux for B&R 10 - 64-bit - Multilingual - MPC3100 Kaby Lake (UEFI boot) - Installation - Only available with a new device	101
	Runtime	
1TC4601.06-5	License for Automation Runtime Embedded (TC). One license per target system is required.	104
	System units	
5MPC3100.K038-000	APC mobile 3100, Intel Celeron 3965U 2.2 GHz, 8 GB RAM, 120 GB flash memory, 2x PCIe slots for expansion options, Interfaces: 2x Ethernet 10/100 Mbit/s to M12, 2x USB 2.0 to M12, 1x CAN to multi-header, 1x RS422/485 to multi-header, 1x RS232 to multi-header	37
5MPC3100.K35F-000	APC mobile 3100, Intel i7-7600U 2.8 GHz, 16 GB RAM, 480 GB flash memory, 2x PCIe slots for expansion options, Interfaces: 2x Ethernet 10/100 Mbit/s to M12, 2x USB 2.0 to M12, 1x CAN to multi-header, 1x RS422/485 to multi-header, 1x RS232 to multi-header	37
	Technology Guard	
0TG1000.01	Technology Guard (MSD)	104
0TG1000.02	Technology Guard (HID)	104
0TGF016.01	Technology Guard (MSD) with integrated flash drive, 16 GB (MLC)	104
	Windows 10 IoT Enterprise 2019 LTSC	
5SWW10.1062-MUL	Windows 10 IoT Enterprise 2019 LTSC - 64-bit - Value - Multilingual - MPC3100 Kaby Lake (UEFI boot) - CPU Celeron - License - Only available with a new device	98
5SWW10.1162-MUL	Windows 10 IoT Enterprise 2019 LTSC - 64-bit - High End - Multilingual - MPC3100 Kaby Lake (UEFI boot) - CPU Core i7 - License - Only available with a new device	98

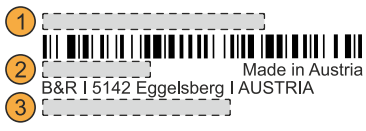
4 Technical data

4.1 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	Interfaces for expansion options (depending on configuration)
6	Space for individual customer information (configuration-dependent)

4.1.1 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.

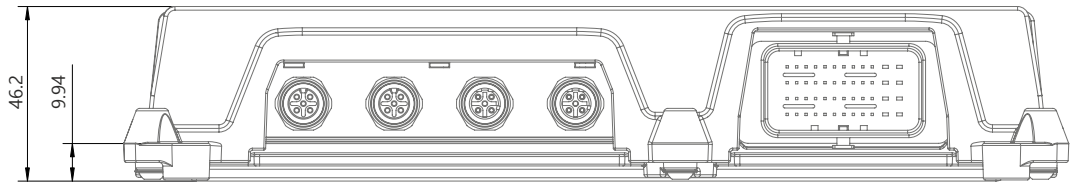
4.2 Mechanical properties

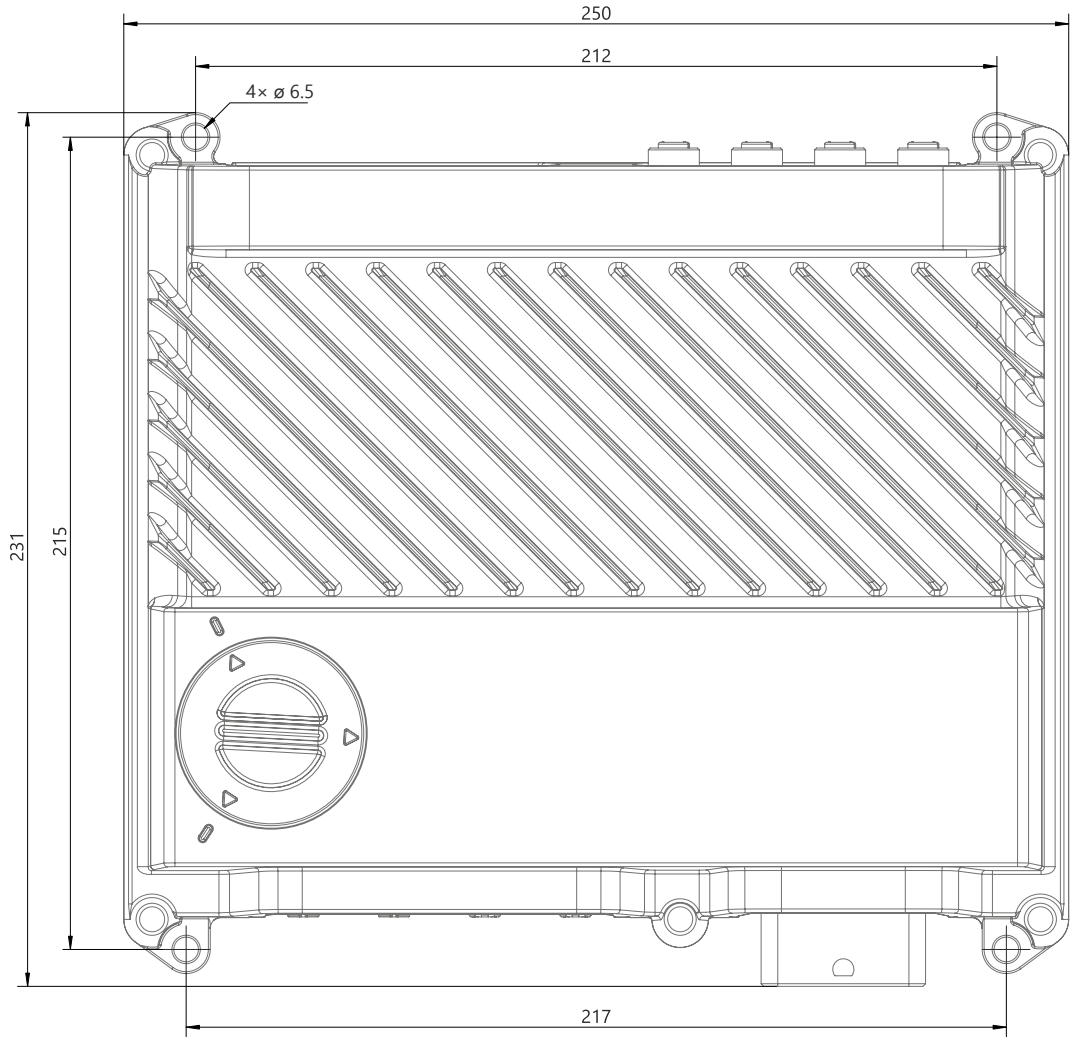
4.2.1 Dimensions

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.





4.2.2 Weight specifications

System units and components

Type	Order number	Weight [g]
System units	5MPC3100.Kxxx-000	1950
Expansion options	5ACCIFM0.CETH-000	100
	5ACCIFM0.FPC3-000	100
	5ACCIFM0.FCAN-000	100

4.3 Environmental properties

4.3.1 Temperature specifications

4.3.1.1 Temperature ranges - Overview

> **Information:**
>
> **The following values are regarded as guide values; detailed consideration depends on the application, see section "Temperature monitoring" on page 21.**

4.3.1.1.1 Worst case

Information about worst-case conditions

- Thermal Analysis Tool (TAT V5) from Intel for simulating processor utilization (100% CPU, 100% graphics , 100% memory)
- BurnInTest V8.1 Professional from PassMark Software for simulating 100% interface utilization using loop-back adapters (100% disk, 100% network)
- 2x 100 Mbit Ethernet
- 3x 2.5 W USB load
- Maximum expansion and power consumption of the system

4.3.1.1.1.1 Maximum ambient temperature

All temperature specifications in degrees Celsius [°C] at 500 m above sea level, **non-condensing**.		**Maximum ambient temperature (system unit 5MPC3100.Kxxx-xxx)**	
		5MPC3100.K038-000 (C-3965U 2.2 GHz)	**5MPC3100.K35F-000** (i7-7600U 2.8 GHz)
		55	**50**
Maximum ambient temperature (accessories)			
Expansion options	5ACCIFM0.CETH-000	✓	✓
	5ACCIFM0.FPC3-000	✓	✓
	5ACCIFM0.FCAN-000	✓	✓

4.3.1.1.1.2 Minimum ambient temperature

The minimum ambient temperature during operation is 0°C. The conditions and limitations in section "Preheat" on page 86 must be strictly observed.

All temperature specifications in degrees Celsius [°C] at 500 m above sea level, **non-condensing**.		**Minimum ambient temperature (system unit 5MPC3100.xxxx-xxx)**		
		5MPC3100.K038-000 (C-3965U 2.2 GHz)	**5MPC3100.K35F-000** (i7-7600U 2.8 GHz) **Rev. D0 and later**	**5MPC3100.K35F-000** (i7-7600U 2.8 GHz) **Up to Rev. C5**
		0 (-40[1])	**0 (-40[1])**	**0**
Minimum ambient temperature (accessories)				
Expansion options	5ACCIFM0.CETH-000	✓	✓	
	5ACCIFM0.FPC3-000	✓	✓	
	5ACCIFM0.FCAN-000	✓	✓	

1) Only with heating enabled.

4.3.1.1.2 Use case

- BurnInTest 8.1 Professional from PassMark Software for simulating moderate system and interface utilization (minimum graphic load) using loopback adapters
- No permanent 100% processor utilization
- 2x 100 Mbit Ethernet
- 2x USB input device (max. 1 W)
- *Intel Turbo Boost Technology* disabled (BIOS setting), if supported
- The power consumption of the complete system is limited as follows (for the power consumption of individual components, see "Power calculation" on page 25):
  - 5MPC3100.K038-000: Max. 12 W
  - 5MPC3100.K35F-000: Max. 21 W

4.3.1.1.2.1 Typical ambient temperature

All temperature specifications in degrees Celsius [°C] at 500 m above sea level, **non-condensing**.		**Typical ambient temperature (system unit 5MPC3100.Kxxx-xxx)**	
		5MPC3100.K038-000 (C-3965U 2.2 GHz)	**5MPC3100.K35F-000** (i7-7600U 2.8 GHz)
		70	**60**
Maximum ambient temperature (accessories)			
Expansion options	5ACCIFM0.CETH-000	✓	✓
	5ACCIFM0.FPC3-000	✓	✓
	5ACCIFM0.FCAN-000	✓	✓

4.3.1.1.3 Derating - General information

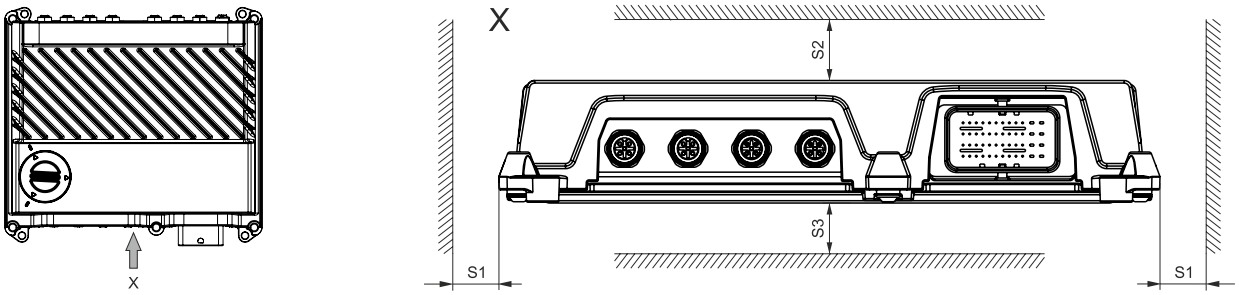
Information:

The following figure and table exclusively show the thermal view of the complete system. If additional space is required for operating or servicing the device , this must be taken into account during installation.

For operation with exclusively passive cooling, the APC mobile must be installed on a flat surface in the standard mounting orientation and the spacing for air circulation specified below must be observed.

Standard mounting orientation

The APC mobile is installed with the connection side (CMC multi-header, Ethernet and USB) facing down. View X is used for a simpler representation of the air circulation data.



Name	Dimension	Name	Dimension	Note
S1	≥ 50	S2	≥ 100	System unit
S3	0	-		System unit

If the APC mobile is used in the application in accordance with these specifications, derating does not have to be taken into account.

4.3.1.1.4 Derating - Use case

Due to the wide range of applications and operating possibilities of the Automation PC 3100 mobile, B&R cannot provide general information about derating. Possible derating must be determined by the customer based on the respective application. It is important to observe the general information in section "Temperature monitoring" on page 21.

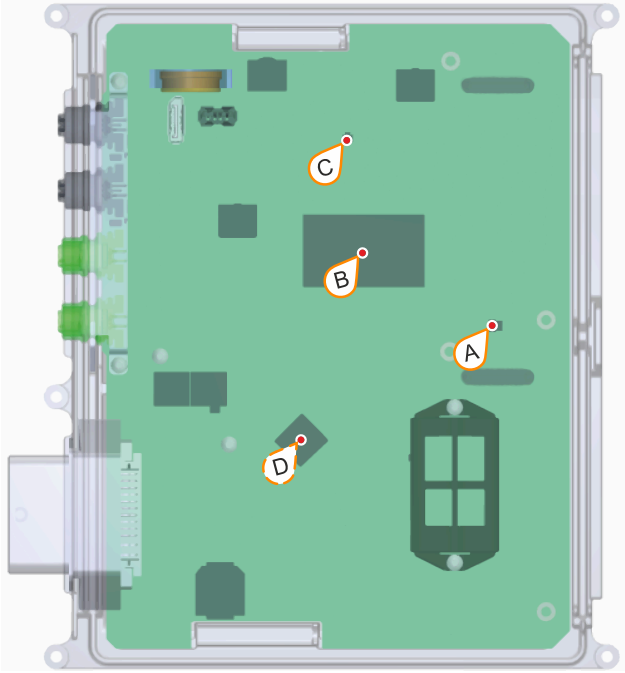
4.3.1.2 Temperature monitoring

General

Sensors monitor temperature values at various areas in the APC mobile. For the position of temperature sensors, see the graphic on the right. The values specified there represent the defined maximum temperature at this measuring point. If the temperature is exceeded, no alarm is triggered.

Temperatures[1)] can be read out in different ways in approved operating systems:

- BIOS (see "Baseboard" on page 66)
- ADI Control Center
- ADI Development Kit
- ADI .NET SDK
- B&R HMI Service Center
- B&R HMI Report
- Automation Runtime library



ADI sensors	Position	Measuring point for	Measurement	Max. specified [°C]
System unit sensor 1	C	DDR4	Temperature of the DDR4 memory	90
System unit sensor 2	A	Memory	Temperature of the main memory	90
System unit sensor 3	D	MTCX	Temperature of the MTCX processor	5MPC3100.K038-000: 95 5MPC3100.K35F-000: 97
System unit sensor 4	B	CPU	Temperature of the processor	5MPC3100.K038-000: 95 5MPC3100.K35F-000: 98
Expansion option	-	Expansion option	Temperature of the expansion option	Configuration-dependent[a)]

a) Depends on the installed expansion options, see section "Expansion options" on page 40.

4.3.1.2.1 Application - Design

Depending on the application and operation possibilities, the following environmental conditions must be taken into account by the customer when designing the application.

- The maximum values specified for the temperature sensors must be used as limit values for the system and monitored in the application. If one or more limit values are reached, the appropriate corrective measures must be taken in the application. Operation above the limit values is not permitted.
- Devices that are operated exclusively with passive cooling must be installed on a flat surface made of material with good thermal conductivity (e.g. steel or aluminum sheet). Mounting orientation that deviate from the standard mounting orientation can result in derating depending on the application. This must be checked by the user under real conditions and taken into account in the application.
- Devices that are operated exclusively with passive cooling must be installed in such a way that sufficient air circulation is possible. Insufficient air circulation causes heat accumulation, which can result in derating depending on the application. This must be checked by the user under real conditions and taken into account in the application.
- Hot exhaust air or heat radiation from other machine components can significantly influence the temperature of the APC mobile. This must be checked by the user under real conditions and taken into account in the application.
- Heavy pollution (e.g. due to mud or viscous substances) of the housing surface of the APC mobile can result in heat accumulation. This must be taken into account when designing the machine or prevented through regular cleaning.

There might be other influences depending on the application. B&R thus recommends performing at least one comprehensive test under real conditions to determine the respective derating. The test duration should be at least 8 hours.

1) The measured temperature is a guide value for the immediate ambient temperature, but it may have been influenced by neighboring components.

4.3.1.2.2 Application - Operation

The values of the temperature sensors must be continuously evaluated during operation so that appropriate measures can be implemented if one or more limit values are reached, see "Temperature monitoring during operation" on page 53.

4.3.1.2.3 Application - Optimization possibilities

Cooling can be optimized in the following ways:

- Install the APC mobile on a flat surface with sufficient thermal conductivity (e.g. aluminum or steel sheet) and cooling
- Avoid direct sunlight

4.3.2 Relative humidity

There are no limitations if all conditions for IP69K protection are met.
The use in environments with condensing relative humidity is possible.

4.3.3 Vibration and shock

Notice!

Shock and vibration resistance applies under the condition that cables are securely installed.

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				
APC mobile	Operation[1)]		Storage[1)3)]	Transport[1)3)]
	Continuous	Periodic		
-	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
Shock				
APC mobile	Operation[2)]		Storage[2)3)]	Transport[2)3)]
-	15 g, 11 ms		30 g, 6 ms	30 g, 6 ms

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.

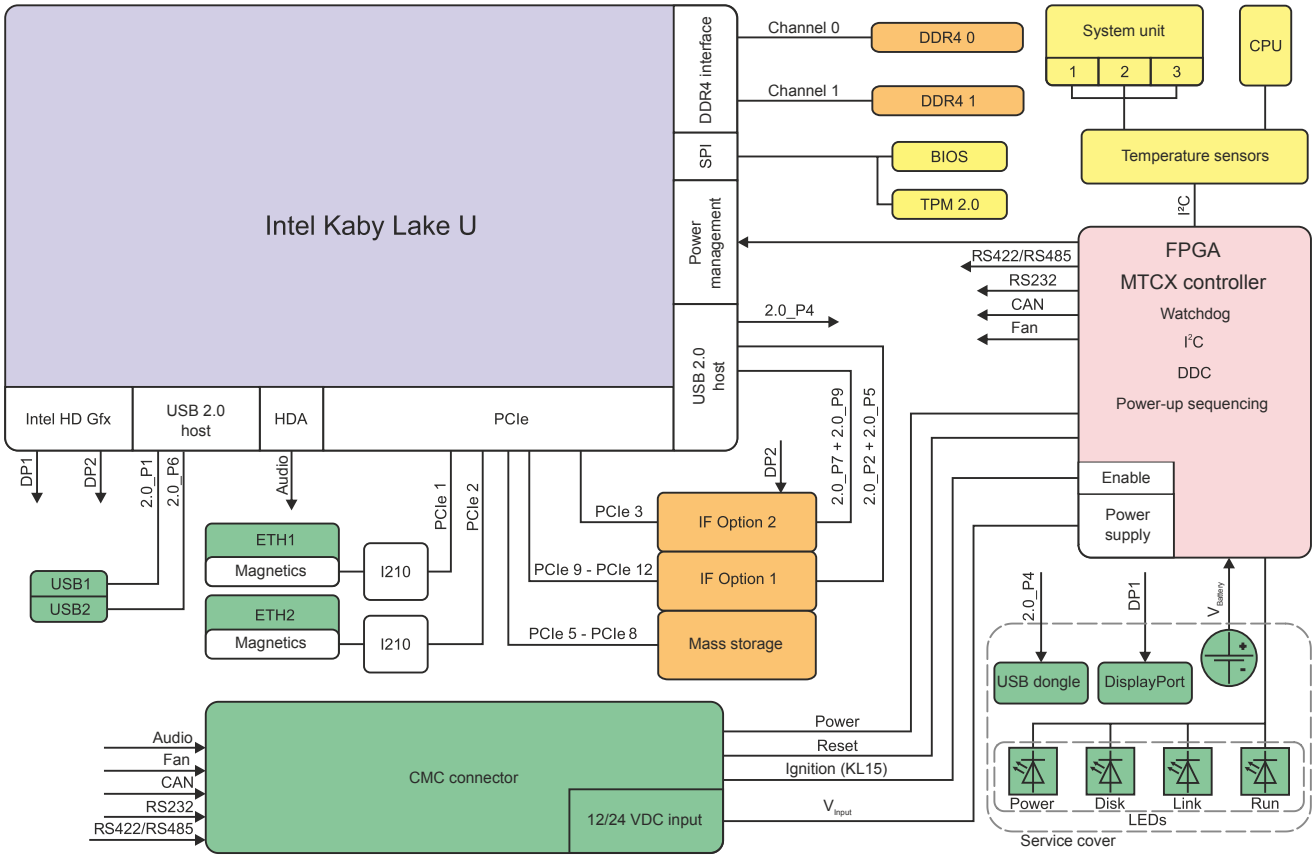
4.3.4 Degree of protection

The following conditions must be met to ensure IP69K protection for the APC mobile:

- Correct installation of the APC mobile (see "Installation and wiring" on page 47)
- Correct installation of all cables, covers (service cover) and components
- Appropriate blank slot covers for interfaces that are not being used
- Compliance with all ambient conditions

4.4 Electrical properties

4.4.1 Block diagram



Legend			
	Internal interface	2.0_Px	USB 2.0 port x
	External interface	3.0_Px	USB 3.0 port x
	Configurable internal interface	-	

4.4.2 Power calculation

To calculate the total power of the APC mobile, the power rating of the system unit, graphics and interface option being used must be added together.

Information:

Unless otherwise specified, the following values are maximum values and additional consumers (e.g. USB devices) are not taken into account.

System units - Power calculation

System unit	Order number	Total power consumption of the system unit
MPC3100 C-3965U 2C 2.2 GHz	5MPC3100.K038-000	Max. 25 W (without USB consumer)[1)] Max. 32.5 W (with USB consumer)[1)]
MPC3100 i7-7600U 2C 2.8 GHz	5MPC3100.K35F-000	Max. 30 W (without USB consumer)[1)] Max. 37.5 W (with USB consumer)[1)]

1) With heating enabled, the maximum power requirements may be temporarily higher (max. 35 W, regardless of the system unit).

IF option boards - Power calculation

Option board	Order number	+3.3 V	+5 V	+12 V	Total power consumption
4x ETH	5ACCM0.CETH-000	1 W	-	-	1 W
3x CAN + POWERLINK	5ACCM0.FPC3-000	0.6 W	1.1 W	-	1.7 W
3x CAN	5ACCM0.FCAN-000	0.6 W	1.1 W		1.7 W

4.4.2.1 Calculation example:

System unit 5MPC3100.K038-000	25	25
1x option board 5ACCM0.FPC3-000	1.7 W	1.7 W
1x option board 5ACCM0.CETH-000	1	1
	Total max.:	27.7 W

Table 1: Power calculation with example configuration 1

System unit 5MPC3100.K038-000	35	35
1x option board 5ACCM0.FPC3-000	0 (not active)	0
1x option board 5ACCM0.CETH-000	0 (not active)	0
	Total max.:	35 W

Table 2: Power calculation with example configuration 1 in preheating mode

Power requirements with vehicle ignition switched off

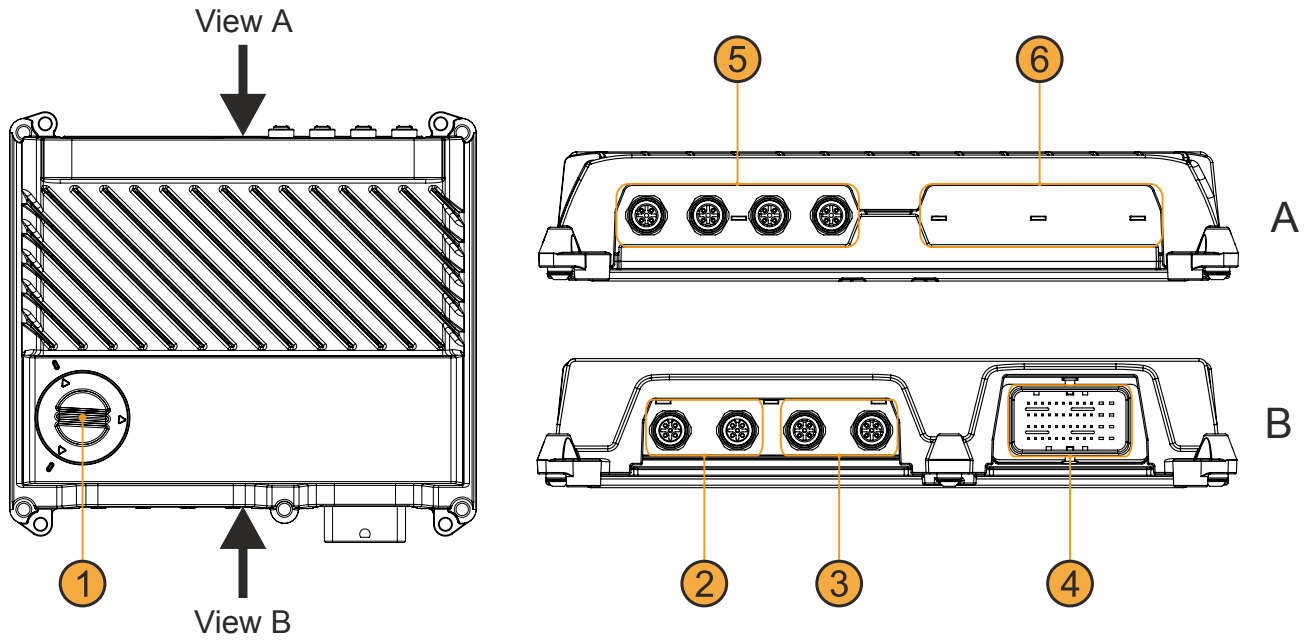
When the vehicle ignition is switched off (ignition OFF), the power consumption of the APC mobile is approx. 1.0 mA (after the *T2 Power OFF Delay Time*, see "Ignition (ignition handling)" on page 87).

4.5 Device interfaces and slots

4.5.1 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.



Legend			
1	Service cover (see detailed view in section "Service interfaces")	2	"USB interfaces" on page 27
3	"Ethernet interfaces" on page 28	4	"CMC multi-header" on page 32
5	"Expansion option IF2" on page 30	6	"Expansion option IF1" on page 30

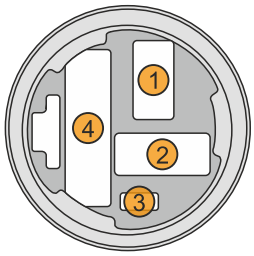
4.5.1.1 Service interfaces

Notice!

The service interfaces are designed with IP20 protection. The service cover is therefore only permitted to be opened in an IP20-compliant environment.

Legend			
1	"USB3" on page 27	2	"DisplayPort interface" on page 28
3	"LED status indicators" on page 29	4	"Battery" on page 30

-

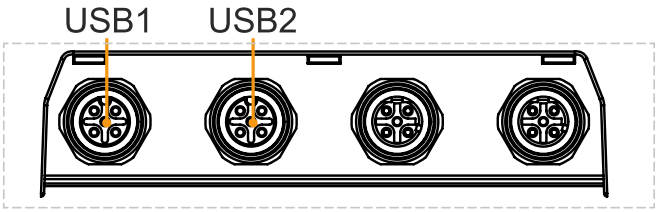


4.5.1.2 USB interfaces

Warning!

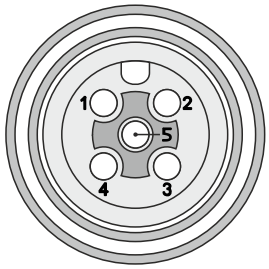
USB peripheral devices can be connected to the USB interfaces. Due to the variety of USB devices available on the market, B&R cannot guarantee their functionality.

USB1, USB2



USB1-2	
Standard	USB 2.0
Variant	M12, A-coded, female[1]
Quantity	2
Transfer rate	Low speed (1.5 Mbit/s)
	Full speed (12 Mbit/s)
	High speed (480 Mbit/s)
Current-carrying capacity[2]	
USB1-USB2	Max. 0.5 A per USB
Cable length	Max. 5 m

Pin	Pinout
1	Data
2	+5 V (USB host)
3	Not connected
4	Data
5	GND

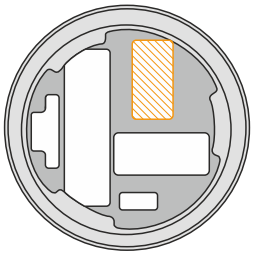


1) Due to their design as M12 circular connectors without leading contacts, these interfaces do not support hot plugging.
2) Each USB interface is protected by a maintenance-free "USB current-limiting switch" (max. 0.5 A).

USB3

A USB 2.0 interface is available under the service cover for service purposes.

USB3	
Standard	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[1]	
USB3	Max. 0.5 A
Cable length	Internal
-	



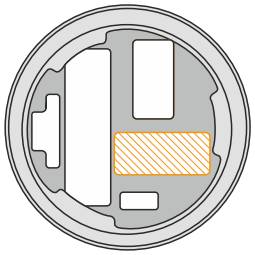
1) The USB interface is protected by a maintenance-free "USB current-limiting switch" (max. 0.5 A).

4.5.1.3 DisplayPort interface

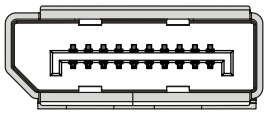
A DisplayPort V1.2 interface is provided under the service cover for commissioning and diagnostics.

Suitable third-party adapters allow display devices to also be used with other transmission technologies (DVI, HDMI) for this purpose.

Position



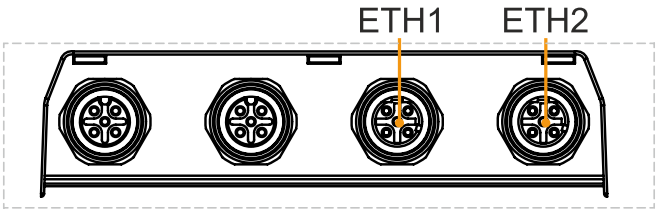
Interface

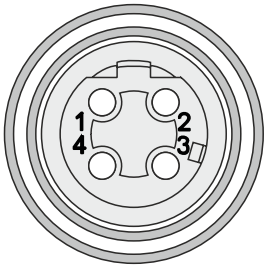


Information:

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

4.5.1.4 Ethernet interfaces



ETH1, ETH2		
Variant	M12, D-coded, female	
Quantity	2	
Controller	Intel I210	
Wiring	S/STP (Cat 5e)	
Transfer rate[1)]	10/100 Mbit/s	
Cable length	Max. 100 m (min. Cat 5e)	
Pin	**Pinout**	
1	Tx	
2	Rx	
3	$\overline{\text{Tx}}$	
4	$\overline{\text{Rx}}$	

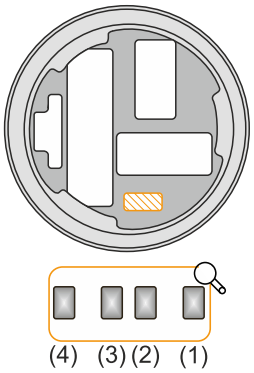
1) Switching takes place automatically.

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.

4.5.1.5 LED status indicators

Assignment	LED	Color	Status	Explanation	LED status indicator[1]
	(1): **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 30.**	
		Red	On	The system is in power saving mode (standby).[1]	
			Blinking	The MTCX is running; the battery state is "BAD". The system is in power saving mode (standby).[1]	
		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 mode (standby)[1]	
				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 mode (standby)[1]	
				Information: **An update must be performed again.**	
	(2): **Disk**	Yellow	On	Indicates drive access (HDD, SSD)	
	(3): **Link**	Yellow	Reserved		
	(4): **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 SERVICE mode Controlled by Automation Runtime (ARemb).	
		Orange	Blinking	A license violation has occurred.	

1) Two columns form 1 interval of 500 ms each.
2) S5: Soft-off
S4: Hibernate (suspend-to-disk)

4.5.1.5.1 LED status indicators - Screenless update

The APC mobile can perform updates without a display unit connected, see "Screenless update" on page 96. The status of the update can be read from the previously described LED status indicators as follows.

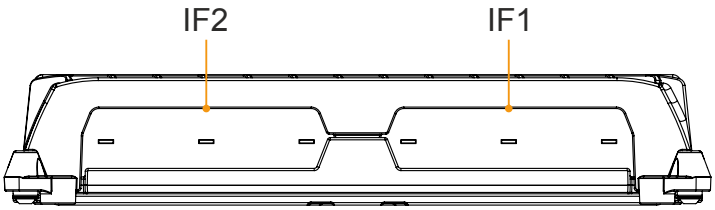
Update active			
LED	**Status**	**Color**	**LED status indicator**
Power	On	Green	
HDD	Blinking	Yellow	
Link	Blinking	Yellow	
Run	On	Green	

Update failed			
LED	**Status**	**Color**	**LED status indicator**
Power	On	Red	
HDD	Blinking	Yellow	
Link	Blinking	Yellow	
Run	On	Red	

4.5.1.6 Expansion option slots

The system units of the Automation PC 3100 mobile are equipped with 2 slots for expansion options that can be configured when ordering. It is not possible to replace the expansion options at a later date.

The expansion options available for each slot are listed below.

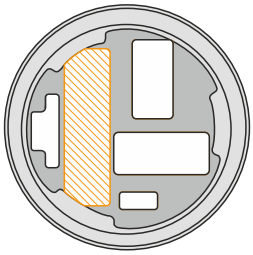


IF1		IF2	
Order number	**Description**	**Order number**	**Description**
5ACCIFM0.CETH-000	4x Ethernet 10/100 Mbit/s	5ACCIFM0.CETH-000	4x Ethernet 10/100 Mbit/s
5ACCIFM0.FCAN-000	3x CAN	5ACCIFM0.FCAN-000	3x CAN
5ACCIFM0.FPC3-000	3x CAN, 1x POWERLINK		-

4.5.1.7 Battery

The lithium battery (3 V, 950 mAh) ensures retention of the internal real-time clock (RTC), CMOS data and remanent data of IF options with SRAM. It is located under the service cover. The service life of the battery is at least 4 years[1)]. The battery is subject to wear and should be replaced regularly (after the specified service life at the latest) by changing the battery (see "Changing the battery" on page 115).

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



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

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 - "Baseboard" on page 66) and in the ADI Control Center but can also be read out in a customer application via the ADI library.

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 by a capacitor for approx. 10 hours after disconnecting the supply voltage.

4.5.1.8 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.

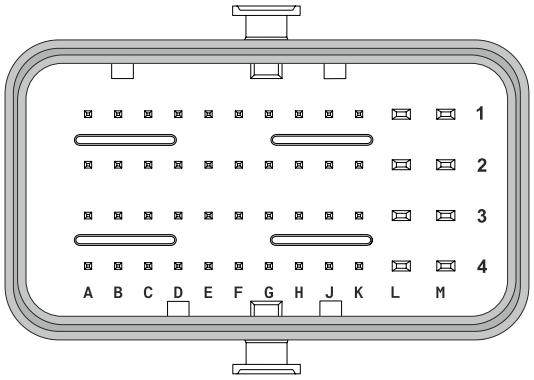
Using the Trusted Platform Module

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.

4.5.1.9 CMC multi-header - Pinout



Pin	Function	Pin	Function
A1	Line_OUT_L	G1	RS422_RXD
A2	AGND[1)]	G2	RS422_$\overline{\text{RXD}}$
A3	Line_IN_L	G3	NC.
A4	MIC_L	G4	NC.
B1	Line_OUT_R	H1	RS422_TXD
B2	AGND[1)]	H2	RS422_$\overline{\text{TXD}}$
B3	Line_IN_R	H3	NC.
B4	MIC_R	H4	NC.
C1	DI_Power	J1	Shield/GND_RS422[1)]
C2	DI_Reset	J2	FAN_DET (reserved)
C3	GND_DI[1)]	J3	GND_FAN_DET[1)] (reserved)
C4	AGND[1)]	J4	NC.
D1	CAN_H	K1	GND_FAN1[1)] (reserved)
D2	CAN_L	K2	FAN1_PWM (reserved)
D3	Shield/GND_CAN[1)]	K3	FAN2_PWM (reserved)
D4	NC.	K4	DO_preheat
E1	RS232_TXD	L1	GND power
E2	RS232_RTS	L2	GND power
E3	Shield/GND_RS232[1)]	L3	GND_FAN2[1)] (reserved)
E4	NC.	L4	FAN_PWR (reserved)
F1	RS232_RXD	M1	VCC
F2	RS232_CTS	M2	VCC
F3	NC.	M3	Ignition
F4	NC.	M4	GND_Power_Ignition[1)]

1) Can be floating if the interface is not used.

4.5.1.9.1 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.

Caution!

The power supply and ignition pin must be supplied from the same power source.

Power supply takes place via the CMC multi-header and is protected against reverse polarity. No fuse is integrated in the device; this must be implemented according to the application (fast-acting, 15 A). For wiring examples for the fuse based on the implementation of the vehicle ignition (KL15), see section "Ignition (KL15)" on page 33.

Power supply		
Pinout	M1, M2	9 to 32 VDC
	L1, L2, M4	GND
Electrical properties		
Nominal voltage		9 to 32 VDC, SELV/PELV circuit[1)]
Nominal current		Max. 3.2 A at 24 VDC
Overvoltage category per EN 61131-2		II
Inrush current		Max. 60 A for < 300 µs
Galvanic isolation		No

1) IEC 61010-2-201 requirements must be observed.

4.5.1.9.2 Ignition (KL15)

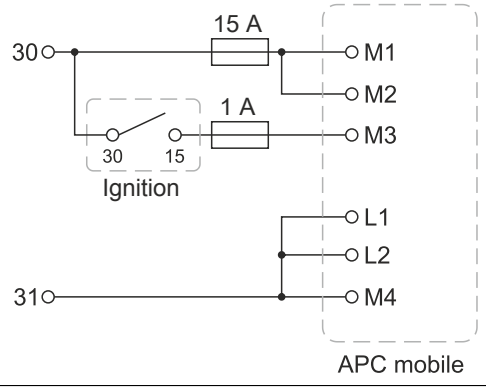
The vehicle ignition (KL15) functions like an enable input for the APC mobile via the "ignition pin (M3)". It is not possible to start the PC without a separate power supply for the main power supply unit. The ignition pin must be protected with a fuse (fast-acting, 1 A), see wiring example 1.

If the vehicle ignition is switched off, the PC can be switched off with a configurable delay or set to any power-safe state. It is important to note that the vehicle battery continues to be loaded during the delay time.
The configurable behavior of the APC mobile in relation to the ignition pin or processes associated with it is referred to as *ignition handling*. Configuration takes place in the BIOS settings, see "Ignition (ignition handling)" on page 87.

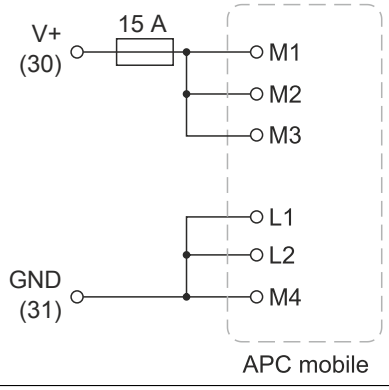
Usage as an industrial PC

For applications outside mobile automation, the ignition pin can be connected directly to the power supply in order to disable the ignition function. The system then behaves like an industrial PC with ATX power supply unit. In this use case, the ignition pin can be protected via the power supply fuse (wiring example 2).

Wiring example 1 (APC mobile)



Wiring example 2 (industrial PC)



4.5.1.9.3 Audio

Pins for an audio interface that allows the use of headsets, for example, are implemented via the CMC multi-header. Actively powered devices must be used for applications with loudspeaker systems via "LINE_OUT".

CMC pin	Pinout	CMC pin	Pinout
B1	Line_OUT_R	A2, B2, C4	AGND
A1	Line_OUT_L	B4	MIC_R
B3	Line_IN_R	A4	MIC_L
A3	Line_IN_L		-

4.5.1.9.4 Power and reset

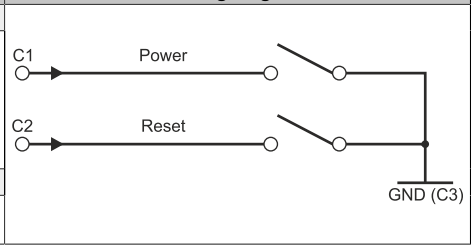
Both functions are available as digital, low-active inputs on the CMC multi-header and can be controlled with suitable switching devices (e.g. relays or pushbuttons) without additional components.

External relays, pushbuttons or other switching devices must be designed for a switching voltage of min. 5.5 V and switching current of min. 2 mA.

The circuit is not permitted to introduce any voltage into the system.

Information:

If the vehicle ignition is switched off or ignition pin KL15 is not supplied with power, the power and reset inputs have no function.

Description		Wiring diagram
Power	Pin C1 and GND C3	
The power input offers full ATX power supply unit support and has various configurable functions. • **Short signal (< 4 s)**: Switches the PC on or off or performs the action configured in the operating system when pressing a power button (shutdown, sleep, etc.). • **Long signal (> 4 s)**: The ATX power supply unit switches off the PC without shutting down. A power signal does not reset the MTCX processor.		
Reset	Pin C2 and GND C3	
A hardware/PCI reset is triggered by a signal at the reset input. The PC is restarted. A reset signal does not reset the MTCX processor.		

Warning!

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

4.5.1.9.5 CAN interface

A legacy CAN interface is implemented via the CMC multi-header.

CMC pin	Pinout	Description	
D1	CAN_H	Controller	SJA1000
D2	CAN_L	Galvanic isolation	No
D3	Shield/GND	Terminating resistor	No

If a terminating resistor (120 Ω) is required, it must be implemented externally by the user.

Bus length[1)]	Transfer rate
≤1000 m	Typ. 50 kbit/s
≤200 m	Typ. 250 kbit/s
≤100 m	Typ. 500 kbit/s
≤15 m	Typ. 1 Mbit/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.

4.5.1.9.5.1 CAN driver settings, I/O addresses 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

The baud rate can be set via the bit timing register.

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

4.5.1.9.5.2 Cable requirements

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see "Cable data" on page 43.

4.5.1.9.6 RS232 interface

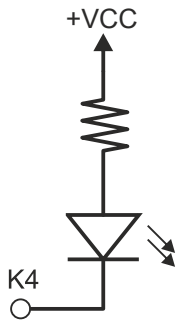
Interface description	
Type	RS232, modem supported, not galvanically isolated
UART	16550-compatible, 16-byte FIFO buffer
Transfer rate	Max. 115 kbit/s
Bus length	Max. 15 m
CMC pin	**Pinout**
F1	RXD
E1	TXD
F2	CTS
E2	RTS
E3	Shield/GND

4.5.1.9.7 RS422/RS485 interface

Interface description	
Type	RS422, modem supported, not galvanically isolated
UART	16550-compatible, 16-byte FIFO buffer
Transfer rate	Max. 115 kbit/s
Bus length	Max. 15 m
CMC pin	**Pinout**
G1	RXD
G2	$\overline{\text{RXD}}$
H1	TXD
H2	$\overline{\text{TXD}}$
J1	Shield/GND

If a terminating resistor (120 Ω) is required, it must be implemented externally by the user.

4.5.1.9.8 Digital output - Heating status (K4)

DO - Heating status		
Output circuit	Sink	Wiring example:
Nominal current	Max. 100 mA	
Voltage range	9 to 32 VDC	
Max. cable length	5 m	
-		

4.6 Individual components

4.6.1 System units

4.6.1.1 5MPC3100.Kxxx-000

4.6.1.1.1 Order data

Order number	Short description	Figure
	System units	
5MPC3100.K038-000	APC mobile 3100, Intel Celeron 3965U 2.2 GHz, 8 GB RAM, 120 GB flash memory, 2x PCIe slots for expansion options, Interfaces: 2x Ethernet 10/100 Mbit/s to M12, 2x USB 2.0 to M12, 1x CAN to multi-header, 1x RS422/485 to multi-header, 1x RS232 to multi-header	
5MPC3100.K35F-000	APC mobile 3100, Intel i7-7600U 2.8 GHz, 16 GB RAM, 480 GB flash memory, 2x PCIe slots for expansion options, Interfaces: 2x Ethernet 10/100 Mbit/s to M12, 2x USB 2.0 to M12, 1x CAN to multi-header, 1x RS422/485 to multi-header, 1x RS232 to multi-header	
	Optional accessories	
	Expansion options	
5ACCIFM0.CETH-000	Expansion option - 4x Ethernet 10/100 Mbit/s to M12 - With Intel I210 Ethernet controller - For APC mobile - Only available with a new device	
5ACCIFM0.FCAN-000	Expansion option - 3x CAN interface - For APC mobile - Only available with a new device	
5ACCIFM0.FPC3-000	Expansion option - 1x POWERLINK interface - 3x CAN interface - 64 kB FRAM - For APC mobile - Only available with a new device	
	Linux for B&R 10	
5SWLIN.0862-MUL	Linux for B&R 10 - 64-bit - Multilingual - MPC3100 Kaby Lake (UEFI boot) - Installation - Only available with a new device	
	Windows 10 IoT Enterprise 2019 LTSC	
5SWW10.1062-MUL	Windows 10 IoT Enterprise 2019 LTSC - 64-bit - Value - Multilingual - MPC3100 Kaby Lake (UEFI boot) - CPU Celeron - License - Only available with a new device	
5SWW10.1162-MUL	Windows 10 IoT Enterprise 2019 LTSC - 64-bit - High End - Multilingual - MPC3100 Kaby Lake (UEFI boot) - CPU Core i7 - License - Only available with a new device	

4.6.1.1.2 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	5MPC3100.K038-000	5MPC3100.K35F-000
General information		
LEDs	Power, Disk, Link, Run	
B&R ID code	0xF995	0x28A2
Cooling	Passive (fanless)	
Battery		
Type	Renata 950 mAh	
Service life	4 years [1)]	
Removable	Yes	
Variant	Lithium ion	
Power button	No, externally controllable via CMC interface	
Reset button	No, externally controllable via CMC interface	
Buzzer	No	
Certifications		
CE	Yes	
UKCA	Yes	
Controller		
Bootloader	UEFI BIOS	

Order number	5MPC3100.K038-000	5MPC3100.K35F-000
Processor		
Type	Intel C-3965U	Intel i7-7600U
Clock frequency	2200 MHz	2800 MHz
Number of cores	2	
Architecture	14 nm	
Thermal design power (TDP)	15 W	
L2 cache	2 MB	4 MB
Intel 64 architecture	Yes	
Intel Turbo Boost Technology	No	Yes
Intel Hyper-Threading Technology	No	Yes
Intel vPro Technology	No	Yes
Intel Virtualization Technology (VT-x)	Yes	
Intel Virtualization Technology for Directed I/O (VT-d)	Yes	
Enhanced Intel SpeedStep Technology	Yes	
Chipset	Intel Kaby Lake U	
Trusted Platform Module	TPM 2.0	
Real-time clock		
Accuracy	At 25°C: Typ. 12 ppm (1 second) per day [2]	
Battery-backed	Yes	
Power failure logic		
Controller	MTCX [3]	
Buffer time	10 ms	
Memory		
Type	DDR4 SDRAM, dual channel	
Memory size	8 GB	16 GB
Removable	No	
Graphics		
Controller	Intel HD Graphics 610	Intel HD Graphics 620
Color depth	Max. 32-bit	
DirectX support	12	
OpenGL support	4.4	
Power management	ACPI 5.0	
Interfaces		
USB		
Quantity	3 [4]	
Type	USB 2.0	
Variant	USB1-2: M12, A-coded, female USB3: 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 per connection	
Ethernet		
Quantity	2	
Variant	M12, D-coded, female	
Transfer rate	10/100 Mbit/s	
Max. baud rate	Max. 100 Mbit/s	
DisplayPort [5]		
Quantity	1	
Version	1.2	
Slots		
Interface option [6]	1	
Monitor/Panel option [6]	1	
Solid-state drive		
Capacity	120 GB	480 GB
Data reliability	<1 unrecoverable error per 10^{16} bits read	
MTBF	3,000,000 h	
S.M.A.R.T. support	Yes	
Interface	PCIe Gen3 (NVMe 1.3c)	
Continuous reading	Max. 1100 MB/s	Max. 2000 MB/s
Continuous writing	Max. 500 MB/s	Max. 1700 MB/s
IOPS		
4k read	Max. 50,000 (random)	Max. 170,000 (random)
4k write	Max. 85,000 (random)	Max. 120,000 (random)
Endurance		
3D TLC flash memory	Yes	
Data volume [7]		
Theoretical	256 TBW	1024 TBW
Client workload	60 TBW	240 TBW
Storage health data support [8]	Yes, AR 4.91 and later	
Electrical properties		
Nominal voltage	+9 to 32 VDC, SELV/PELV circuit [9]	
Nominal current	Max. 3.2 A at +24 V	
Inrush current	Max. 60 A for < 300 µs	
Overvoltage category per EN 61131-2	II	
Galvanic isolation	No	

Order number	5MPC3100.K038-000	5MPC3100.K35F-000
Operating conditions		
Pollution degree per EN 61131-2	Pollution degree 2	
Degree of protection per EN 60529	IP69K [10]	
Ambient conditions		
Temperature [11]		
Operation	-40 to +70°C	Rev. D0 and later: -40 to +60°C Up to Rev. C5: 0 to +60°C
Storage	-40 to +85°C, condensing	
Transport	-40 to +85°C, condensing	
Elevation		
Operation	3000 m [12]	
Mechanical properties		
Dimensions		
Width	250 mm	
Height	48 mm (without heat sink)	
Depth	228 mm	
Weight	Approx. 1950 g	

1) At 50°C, 8.5 µA for the components being supplied and self-discharge of 40%. If an interface option with SRAM or POWERLINK is installed, the service life is 2.5 years.
2) At max. specified ambient temperature: Typ. 58 ppm (5 seconds) - worst case 220 ppm (19 seconds).
3) Maintenance Controller Extended.
4) 2x unrestricted use.
   1x for service purposes.
5) For service purposes only. The max. cable length depends on the resolution used, see the DisplayPort 1.2 specification.
6) Cannot be replaced.
7) TBW: Terabytes written
   Client workload per standard JEDEC JESD219
8) For details about *storage health data*, see Automation Help.
9) IEC 61010-2-201 requirements must be observed.
10) Applies only if mating connector (M12/CMC) is connected or with M12 threaded caps (0.6 Nm torque).
11) The specifications in section "Temperature specifications" must be observed.
12) The maximum ambient temperature is typically derated 1°C per 1000 meters starting at 500 m above sea level.

4.6.2 Expansion options

4.6.2.1 5ACCIFM0.CETH-000

4.6.2.1.1 General information

Expansion option 5ACCIFM0.CETH-000 has a 5-port Ethernet switch with an integrated controller. 4 of these ports are designed as 10/100BASE-T Ethernet interfaces with M12 circular connectors that are externally routed and freely available to the user.

- 4x 10/100 Base-T Ethernet interfaces (routed externally)
- 1x Intel I210 Ethernet controller (internal)
- Compatible with Automation PC 3100 mobile

This expansion option can be operated in slot IF1 or IF2.

This expansion option is only supported by approved GPOSs (Windows and Linux for B&R).

4.6.2.1.2 Order data

Order number	Short description	Figure
	Expansion options	
5ACCIFM0.CETH-000	Expansion option - 4x Ethernet 10/100 Mbit/s to M12 - With Intel I210 Ethernet controller - For APC mobile - Only available with a new device	

4.6.2.1.3 Technical data

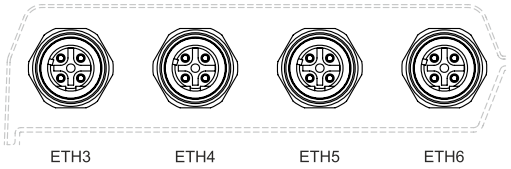
Information:

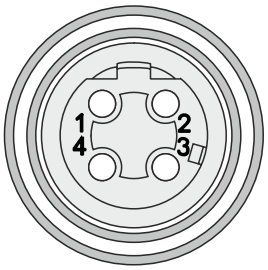
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5ACCIFM0.CETH-000
General information	
B&R ID code	0xF996
Temperature sensor	Max. specified 90°C
Certifications	
CE	Yes
UKCA	Yes
Interfaces	
Ethernet	
Quantity	4 available ports
Controller	Intel I210 (Ethernet controller) Marvell 88E6341 (Ethernet switch)
Variant	M12, D-coded, female
Transfer rate	10/100 Mbit/s [1]
Electrical properties	
Power consumption	Max. 1 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	IP69K [2]
Ambient conditions	
Temperature	
Operation	-40 to 70°C, condensing
Storage	-40 to 85°C, condensing
Transport	-40 to 85°C, condensing
Mechanical properties	
Weight	Approx. 100 g

1) Switching takes place automatically.
2) Only in installed state. All interfaces must be occupied or protected with a suitable cover.

4.6.2.1.3.1 Pinout



ETH1-4		
Variant	M12, D-coded, female	
Quantity	4	
Controller	Intel I210	
Wiring	S/STP (Cat 5e)	
Transfer rate	10/100 Mbit/s	
Cable length	Max. 100 m (min. Cat 5e)	
Pin	**Pinout**	
1	Tx	
2	Rx	
3	$\overline{Tx}$	
4	$\overline{Rx}$	

1) Switching takes place automatically.

4.6.2.1.4 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:

- Linux for B&R
- Windows 10

4.6.2.2 5ACCIFM0.FPC3-000

4.6.2.2.1 General information

Interface option 5ACCIFM0.FPC3-000 is equipped with 1 POWERLINK interface and 3 CAN bus master interfaces. These are designed with M12 circular connectors that are externally routed and freely available to the user. In addition, 64 kB FRAM is installed.

- 1x POWERLINK interface managing or controlled node
- 3x CAN bus master interface
- 64 kB FRAM
- Compatible with Automation PC 3100 mobile

This expansion option can only be operated in slot IF1.

This extension option is only supported by Automation Runtime.

4.6.2.2.2 Order data

Order number	Short description	Figure
	Expansion options	
5ACCIFM0.FPC3-000	Expansion option - 1x POWERLINK interface - 3x CAN interface - 64 kB FRAM - For APC mobile - Only available with a new device	

4.6.2.2.3 Technical data

Information:

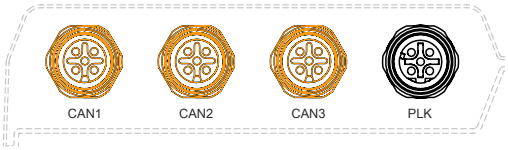
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5ACCIFM0.FPC3-000
General information	
B&R ID code	0x28A3
Temperature sensor	Max. specified 90°C
Certifications	
CE	Yes
UKCA	Yes
Controller	
FRAM	
Size	64 kB
Data retention	10 years
Read/Write endurance	Min. 10^{13} times/byte
Remanent variables in power failure mode	32 kB (for e.g. Automation Runtime, see Automation Help) [1)]
Interfaces	
POWERLINK	
Quantity	1
Type	Type 4 [2)]
Variant	M12, 4-pin, D-coded
Transfer rate	100 Mbit/s
Transfer	100BASE-TX
Line length	Max. 100 m between two stations (segment length)
CAN	
Quantity	3
Variant	M12, 5-pin, A-coded, galvanically isolated
Transfer rate	Max. 1 Mbit/s
Terminating resistor	
Type	Can be switched on and off with software
Default setting	Off
Electrical properties	
Power consumption	Max. 1.7 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	IP69K [3)]

Order number	5ACCIFM0.FPC3-000
Ambient conditions	
Temperature	
Operation	-40 to 70°C, condensing
Storage	-40 to 85°C, condensing
Transport	-40 to 85°C, condensing
Mechanical properties	
Weight	Approx. 100 g

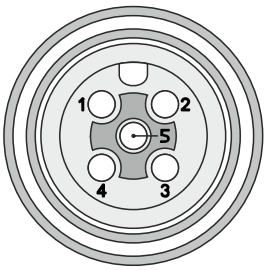
1) A total of 32 kB are available for UserRAM and RemMEM.
2) For additional information, see Automation Help (Communication - POWERLINK - General information - Hardware - IF / LS).
3) Only in installed state. All interfaces must be occupied or protected with an appropriate cover.

4.6.2.2.3.1 CAN interfaces



CAN1 - CAN3	
Variant	M12, A-coded, female
Quantity	3
Galvanic isolation	Yes
Transfer rate	Max. 1 Mbit/s
Bus length	Max. 1000 m
Terminating resistor	Configurable for each interface in Automation Studio

Pin	Pinout
1	Shield[1)]
2	NC.[2)]
3	GND
4	CAN HIGH
5	CAN LOW



1) Shielding also provided by threaded insert in the module.
2) Not connected.

Cable data

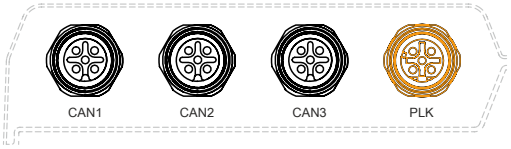
Signal		Signal	
RS232	"RS232 - Bus length and cable type" on page 120	RS422	"RS422 - Bus length and cable type" on page 120
RS485	"RS485 - Bus length and cable type" on page 121	CAN	"CAN - Bus length and cable type" on page 121

CAN driver settings

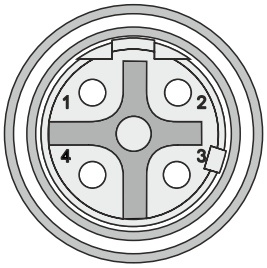
The baud rate can be set either with "predefined values" or via the "bit timing register".
For additional information, see Automation Help.

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

4.6.2.2.3.2 POWERLINK interface



POWERLINK	
Variant	M12, D-coded, female
Wiring	S/STP (Cat 5e)
Cable length	Max. 100 m (min. Cat 5e)
Pin	**Pinout**
1	Tx
2	Rx
3	$\overline{Tx}$
4	$\overline{Rx}$
-	



The POWERLINK interface of the 5ACCIFM0.FPC3-000 has no S/E LEDs. Status information can only be read out via AS/AR.

4.6.2.2.4 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).

4.6.2.3 5ACCIFM0.FCAN-000

4.6.2.3.1 General information

Interface option 5ACCIFM0.FCAN-000 is equipped with 3 CAN bus master interfaces. These are designed with M12 circular connectors that are externally routed and available to the user.

- 3x CAN bus master interfaces
- Compatible with Automation PC 3100 mobile

This expansion option can be operated in slot IF1 or IF2.

This expansion option is only supported by approved GPOSs (Linux for B&R).

4.6.2.3.2 Order data

Order number	Short description	Figure
	Expansion options	
5ACCIFM0.FCAN-000	Expansion option - 3x CAN interface - For APC mobile - Only available with a new device	

4.6.2.3.3 Technical data

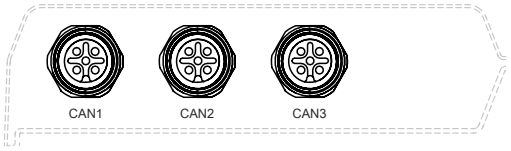
Information:

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	5ACCIFM0.FCAN-000
General information	
B&R ID code	0x28A4
Temperature sensor	Max. specified 90°C
Certifications	
CE	Yes
UKCA	Yes
Interfaces	
CAN	
Quantity	3
Variant	M12, 5-pin, A-coded, galvanically isolated
Transfer rate	Max. 1 Mbit/s
Terminating resistor	
Type	Can be switched on and off with software
Default setting	Off
Electrical properties	
Power consumption	Max. 1.7 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	IP69K [1)]
Ambient conditions	
Temperature	
Operation	-40 to 70°C, condensing
Storage	-40 to 85°C, condensing
Transport	-40 to 85°C, condensing
Mechanical properties	
Weight	Approx. 100 g

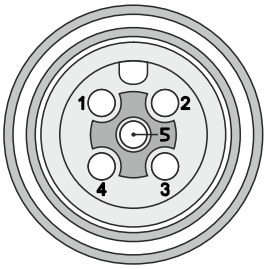
1) Only in installed state. All interfaces must be occupied or protected with an appropriate cover.

4.6.2.3.3.1 CAN interfaces



CAN1 - CAN3	
Variant	M12, A-coded, female
Quantity	3
Galvanic isolation	Yes
Transfer rate	Max. 1 Mbit/s
Bus length	Max. 1000 m
Terminating resistor	Configurable for each interface

Pin	Pinout
1	Shield[1)]
2	NC.[2)]
3	GND
4	CAN HIGH
5	CAN LOW



1) Shielding also provided by threaded insert in the module.
2) Not connected.

Cable data

Signal		Signal	
RS232	"RS232 - Bus length and cable type" on page 120	RS422	"RS422 - Bus length and cable type" on page 120
RS485	"RS485 - Bus length and cable type" on page 121	CAN	"CAN - Bus length and cable type" on page 121

CAN driver settings

For additional information, see the corresponding Linux for B&R user's manual at www.br-automation.com.

4.6.2.3.4 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).

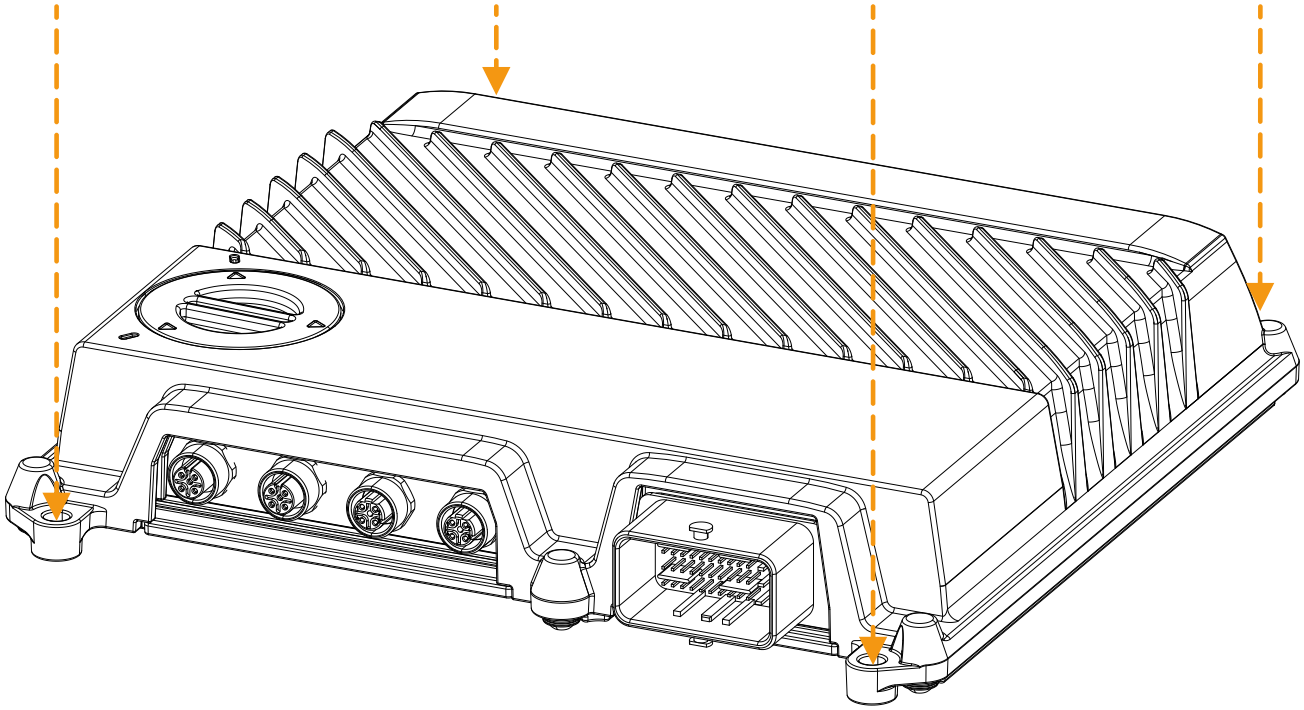
Approved operating systems:

- Linux for B&R

5 Installation and wiring

5.1 Installing/Removing the 5MPC3100.xxxx-000

The APC mobile is installed on a smooth, flat surface using 4 M6 screws.
These screws are not included in delivery, but must be selected according to the application. Manufacturer specifications, such as the max. tightening torque, must be observed.



These 4 screws must be loosened for removal.

5.2 Installing the APC mobile mating connector

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.**

Information:

The following instructions contain the most important steps from the manufacturer's documentation. It is important to note that these accessories are available as different variants. For suitable original accessories and detailed information, see the manufacturer's website (www.molex.com).

Warning!

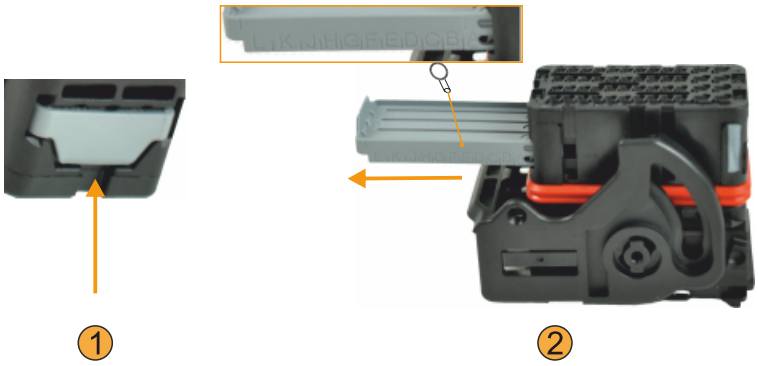
The information from the manufacturer's documentation must be observed in addition to the information in this document.

1. Seal all pins that are not used. The blind plugs must be fully inserted.
   - Orange blind plugs: Connection pins with a cross section of 1.5 mm²
   - White blind plugs: Connection pins with a cross section of 0.6 mm²

Caution!

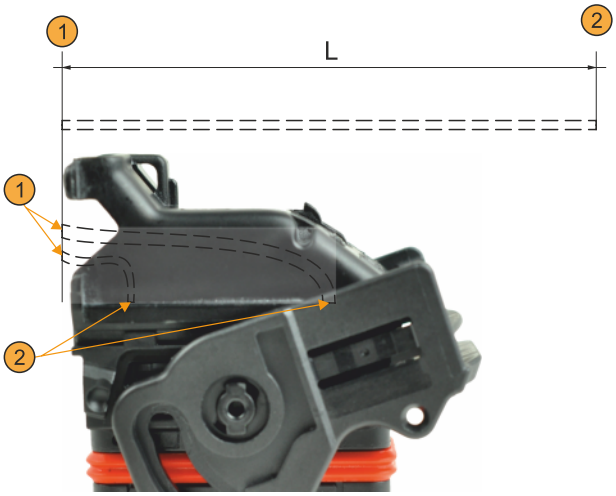
Pins that are not used must be covered with an appropriate blind plug to ensure IP69K protection.

2. Unlatch the pins of the mating connector before connecting. To do this, open the gray locking latch (**1**, use a pen or screwdriver if necessary) and pull it out (**2**) until the letter "A" is completely visible.

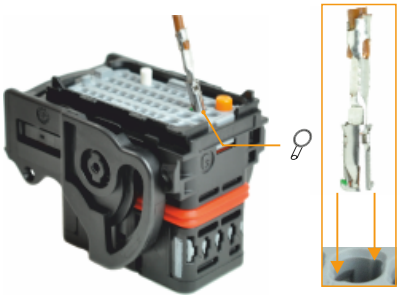


3. Provide the cables with end sleeves according to the manufacturer's instructions.

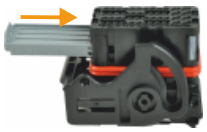
   The appropriate end sleeve can be crimped to the cable using a compatible crimping tool or applicator. The cable lengths recommended by the manufacturer must be used depending on the variant used (edge of wire cap (**1**) - pin (**2**)).



4. Connect the cables fitted with end sleeves via the push-click-pull method. The coding of the end sleeves must be observed.



5. Lock by pushing the locking latch back completely.



> ## Information:
>
> **If the locking latch jams when pushed back, this means that a cable has been connected incorrectly. The row in which this cable is connected can be identified from the gray latch.**

6. Attach the wire cap as shown and push it until it snaps into place.

7. Secure the connected cables with a suitable cable tie to the clip provided for this purpose. All connected cables must be covered. Regardless of the number of cables connected, the cable tie must always be fitted over the entire width of the connector.

8. For installation on the APC mobile, connect the mating connector with the socket of the CMC multi-header and lock it with the black latch as shown.

✓ The APC mobile is connected and meets the requirements for IP69K protection.

5.3 Grounding (ground connection)

The APC mobile housing is not galvanically isolated from ground.

For mobile applications, B&R recommends grounding the housing to a chassis connected to ground (negative pole of the battery) through the screw connection.

If the APC mobile is not installed on mobile machinery, functional ground must be established via the installation surface.

The ground connection and the functional ground connection must be carried out with the shortest possible path with the least resistance possible.

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.

5.4 Removing the APC mobile mating connector

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.**

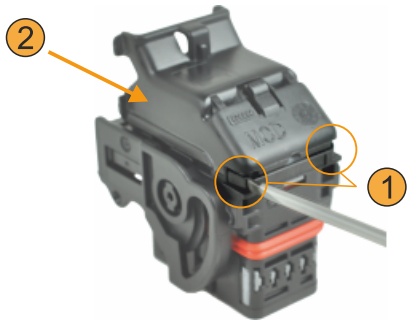
Information:

The following instructions contain the most important steps from the manufacturer's documentation. It is important to note that these accessories are available as different variants. For suitable original accessories and detailed information, see the manufacturer's website (www.molex.com).

Warning!

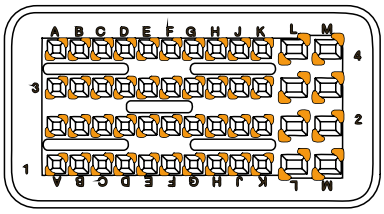
The information from the manufacturer's documentation must be observed in addition to the information in this document.

1. Perform the steps described in section "Disconnecting the power supply" on page 114.
2. Remove the cable tie that is used to secure the cables to the mating connector.
3. Remove the wire cap. For this, loosen the latch at the positions shown in the image using an appropriate tool (e.g. screwdriver) (1) and push the wire cap forward (2).



4. Push the cable(s) to be disconnected into the mating connector, release the interlocking mechanism of the cable in the pin using a suitable removal tool and pull out the cable.

   To release the interlocking device of the cable in the pin, press the removal tool into the marked recesses in the housing.
   Tools of different sizes are required for the different connection cross sections (0.6 mm² or 1.5 mm²).



6 Commissioning

6.1 Switching on the device for the first time

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 47?
- 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 device connected to a suitable ground connector based on its use as a mobile PC or rugged PC?
- 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 device is installed on a grounded surface.
- All connection cables are connected correctly.
- A USB keyboard and USB mouse are connected (optional).

6.1.1 Switching on the device

Procedure

Usage as an industrial PC:

1. Connect the power supply and switch on.
2. The device is operating and boots; LED "Power" lights up.

Usage as a mobile PC:

1. Connect the power supply.
2. Apply a voltage level to the ignition pin.
3. The device is operating and boots; LED "Power" lights up.

6.2 Temperature monitoring during operation

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.

6.2.1 Evaluating temperatures in Windows operating systems

6.2.1.1 Evaluating with the ADI Control Center

The *ADI Control Center* can be used to evaluate temperatures. The temperatures can be viewed in tab **Temperatures**. The ADI Control Center can be downloaded from the B&R website (www.br-automation.com) at no cost and uses the ADI (Automation Device Interface).

6.2.2 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.

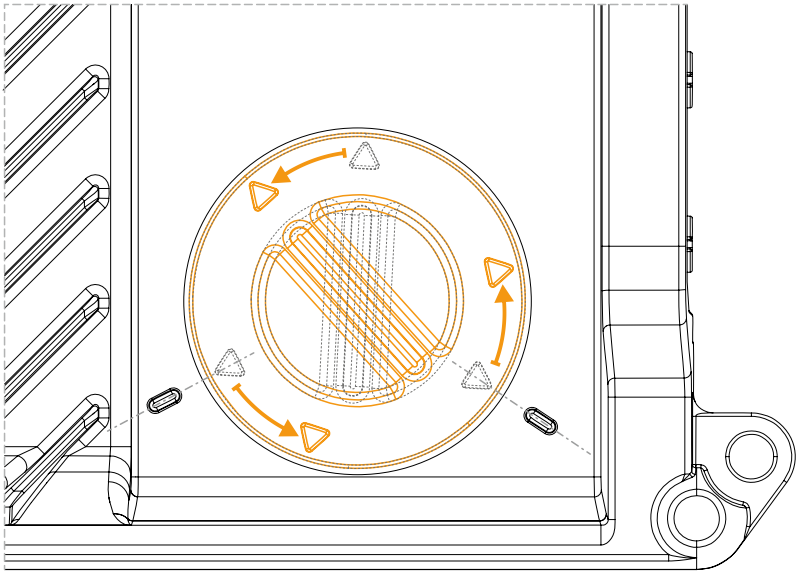
Based on experience gained at B&R, the measured temperature values can be extrapolated linearly to the ambient temperature for passive systems (systems without a fan kit).

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.

6.3 Opening/Closing the service cover

When opening the service cover, the limitations and notes in section "Degree of protection" on page 23 must be observed.

1. Turn the service cover counterclockwise (approx. 35°) using a suitable tool (e.g. coin). This unlocks the service cover.



2. The service cover can be removed.

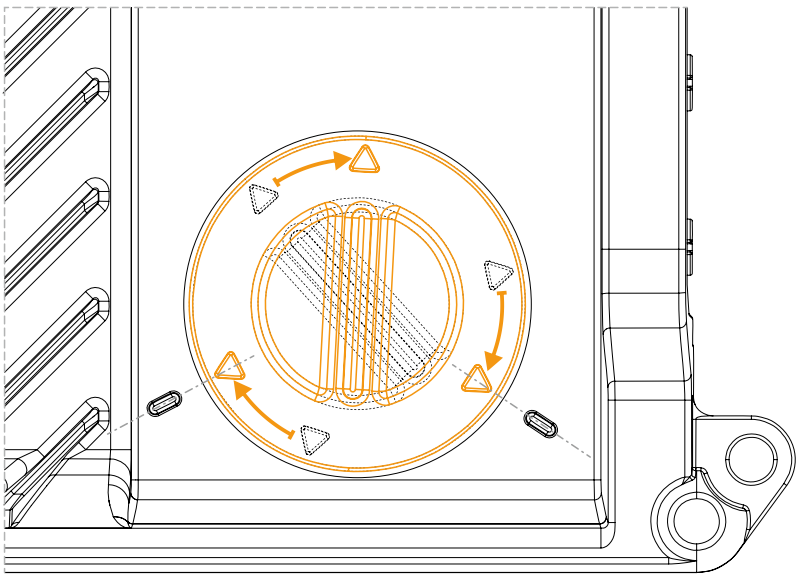
✓ The service cover is removed and the service interfaces are accessible.

Notice!

The device no longer meets IP69K requirements in this state.

Closing the service cover

1. Check the service cover or gasket for dirt or damage. The service cover must be replaced if damaged and cleaned if dirty, see "Cleaning" on page 117. The service cover is only permitted to be installed in a dry and clean state.
2. Use the service cover – ensure that the service access cap and gasket are seated correctly!
3. Turn the service cover clockwise using a suitable tool (e.g. coin) until it snaps into place. The marking arrows are then aligned with the embossing on the housing.



✓ The service cover is closed, and the device again meets IP69K requirements.

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 APC mobile 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 APC mobile 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: 1.21.

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 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 11: 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 (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	Changes a value (step back)
F6	Changes a value (step forward)

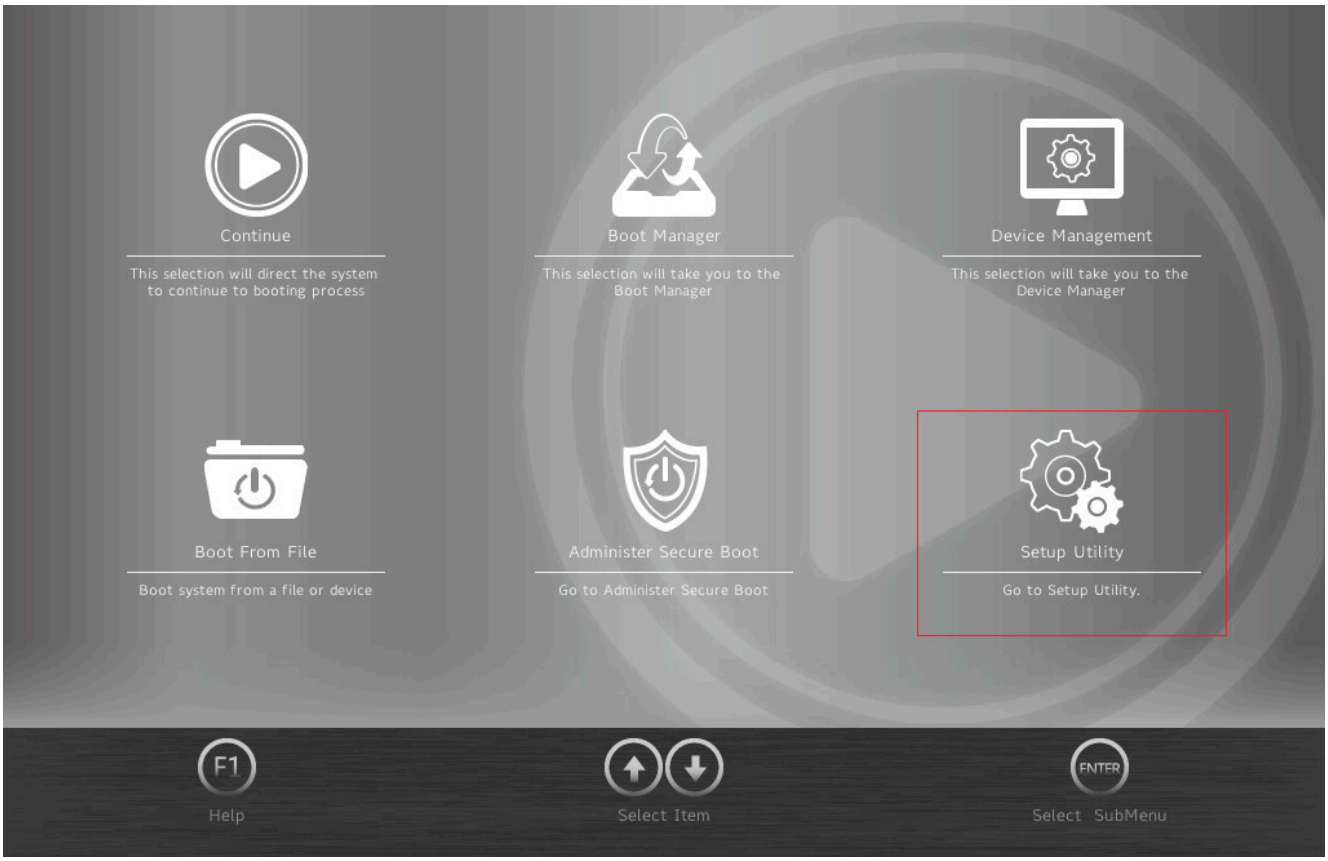
Key	Function
F9	Loads the default settings[1)]
F10	Saves and closes
Enter	Opens the selected submenu/parameter
Alphanumeric keys	Defines manual values for parameters that permit this

1) Save and close to restore the default values.

Information:

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

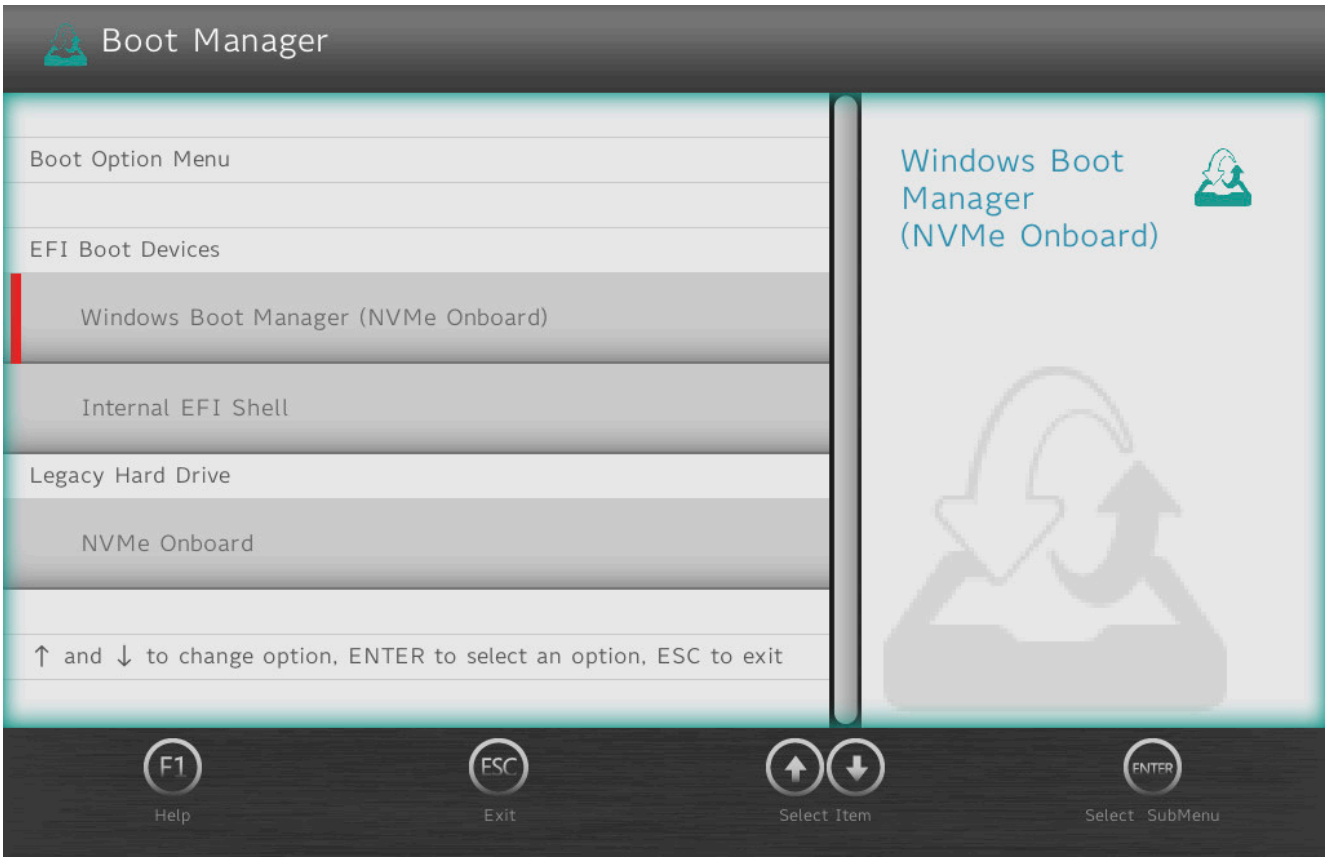
7.1.3 Boot menu



Boot menu option	Description
Continue	Resumes the boot process.
Boot manager	Lists all detected and bootable media. See "Boot manager" on page 60.
Device management	Lists all supported and enabled devices (e.g. Ethernet). See "Device manager" on page 61.
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 62.

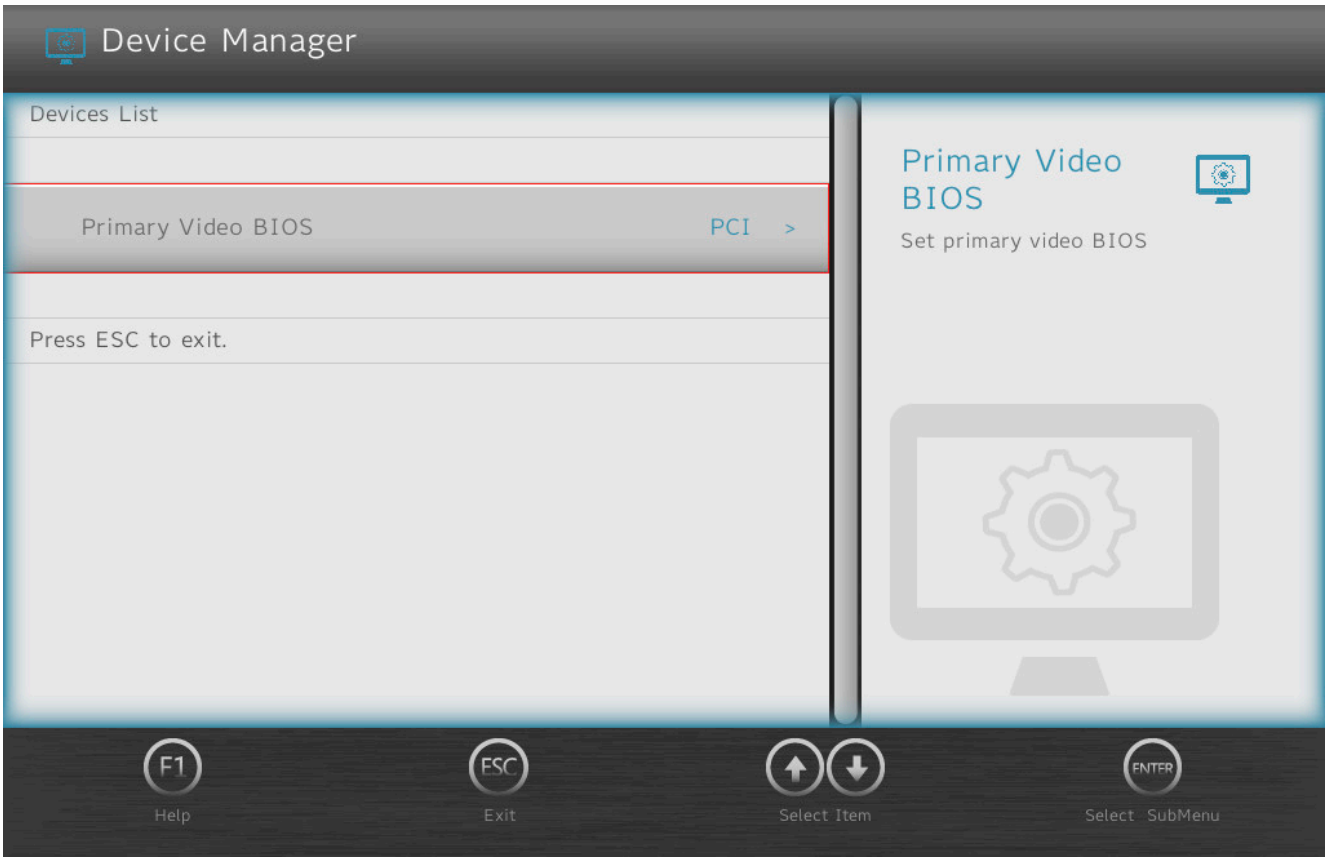
Table 12: Boot menu

7.1.4 Boot manager



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

7.1.5 Device manager



The device manager lists all compatible and enabled devices.

BIOS parameter	Setting options	Description
Primary video BIOS	***PCI***	Selects the primary video BIOS
	AGP	

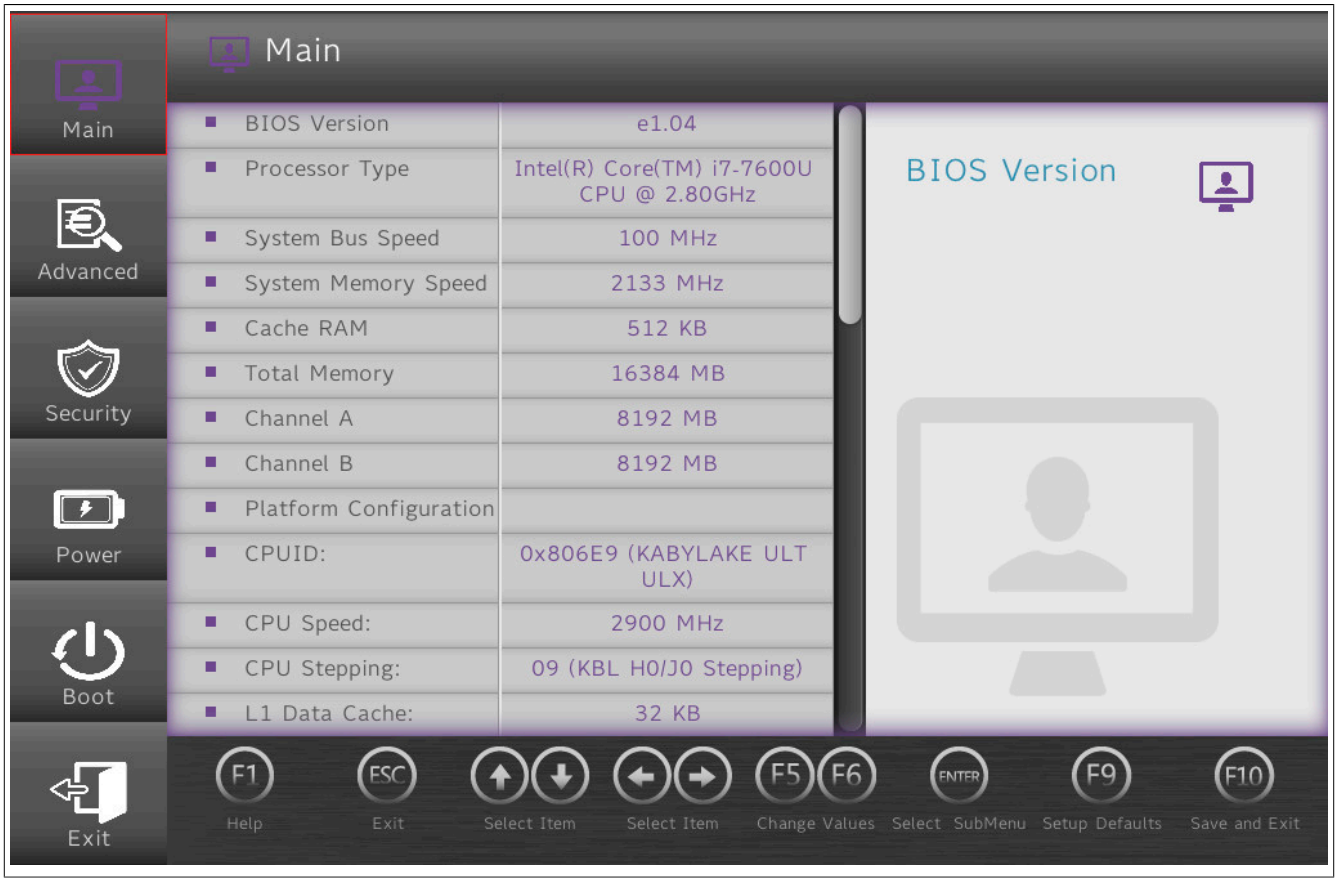
7.1.6 Setup utility

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

Submenu	Setting options	Description
Main	Enter	Opens submenu "Main" on page 62 Basic system information is displayed and the system time can be set here.
Advanced	Enter	Opens submenu "Advanced" on page 64 Changes to system settings can be made here.
Security	Enter	Opens submenu "Security" on page 84 Changes to the Trusted Platform Module can be made here. Passwords for storage media can be created and managed here.
Power	Enter	Opens submenu "Power" on page 85 Changes that affect the power consumption of the system can be made here.
Boot	Enter	Opens submenu "Boot" on page 89 Changes to the boot modes and boot sequence can be made here.
Exit	Enter	Opens submenu "Exit" on page 92 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 13: 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
Channel A	-	Displays the amount of memory for channel A
Channel B	-	Displays the amount of memory for channel B
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]

Table 14: Main

BIOS setting	Setting options	Description
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
PCH rev / SKU	-	Displays the PCH revision / SKU
VBIOS ver	-	Displays the VBIOS version
CSME version / SKU		Displays the Intel CSME version / SKU
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 14: Main

7.1.6.2 Advanced

BIOS parameter	Setting options	Description
OEM features	Enter	Opens submenu "OEM features" on page 65
USB configuration	Enter	Opens submenu "USB configuration" on page 69
Chipset configuration	Enter	Opens submenu "Chipset configuration" on page 70
ACPI settings	Enter	Opens submenu "ACPI table/features control" on page 71
CPU configuration	Enter	Opens submenu "CPU configuration" on page 72
Power & Performance	Enter	Opens submenu "CPU - Power management control" on page 74
Memory configuration	Enter	Opens submenu "Memory configuration" on page 78
System agent (SA) configuration	Enter	Opens submenu "System agent (SA) configuration" on page 79
PCH-IO configuration	Enter	Opens submenu "PCH-IO configuration" on page 81
PCH-FW configuration	Enter	Opens submenu "PCH-FW configuration" on page 83

Table 15: 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 operation. Parameters "VT-d" and "Intel (VMX) Virtualization Technology" are enabled and cannot be changed during hypervisor operation.
	Enabled	
Automatic firmware update	***Disabled***	Disables/Enables automatic firmware updates for the mainboard, SDL and SDL4 cards
	Enabled	
Super IO	Enter	Opens submenu Super IO
H2OUVE	Enter	Opens submenu "H2OUVE" on page 66
Baseboard	Enter	Opens submenu "Baseboard" on page 66
Interface slot *n* [1) 2)]	Enter	Opens submenu "Interface slot n " on page 67
SSD monitoring service	Enter	Opens submenu "SSD monitoring service" on page 67
Custom boot logo	Enter	Opens submenu "Custom boot logo" on page 67
Backup settings	Enter	Opens submenu "Backup settings" on page 68

Table 16: Advanced - OEM features

1) A total of 2 slots are available for expansion options.
2) Slots that are not used are not displayed.
If no slot is used, this submenu is not available.

7.1.6.2.1.1 Super IO

BIOS parameter	Setting options	Description
CAN device	-	Displays whether a CAN interface is installed
COM A	Disable	Disables/Enables COM A (RS422/RS485)
	Enable	

Table 17: Advanced - OEM features - Super IO

BIOS parameter		Setting options	Description
	Base I/O address	0x2E8	Selects the I/O address for COM A
		0x2F8	
		0x338	
		0x378	
		0x3E8	
		0x3F8	
	Interrupt	IRQ 3	Selects the interrupt for COM A
		IRQ 4	
		IRQ 5	
		IRQ 7	
		IRQ 11	
COM B		Disable	Disables/Enables COM B (RS232)
		Enable	
	Base I/O address	0x2E8	Selects the I/O address of port COM B
		0x2F8	
		0x338	
		0x378	
		0x3E8	
		0x3F8	
	Interrupt	***IRQ 3***	Selects the interrupt for COM B
		IRQ 4	
		IRQ 5	
		IRQ 7	
		IRQ 11	
MTCX interrupt		***Automatic***	Disables the MTCX interrupt or assigns it automatically if permitted by the system configuration (at least 1 IRQ free).
		Disable	

Table 17: Advanced - OEM features - Super IO

Information:

COM ports are only displayed if they are occupied.

7.1.6.2.1.2 H2OUVE

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

Table 18: Advanced - OEM features - H2OUVE

7.1.6.2.1.3 Baseboard

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
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 19: Advanced - OEM features - Baseboard

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

7.1.6.2.1.4 Interface slot *n*

A total of 2 interface option slots are available. They are indexed from 1 to 2.

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[1)]	-	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[2)]	-	Displays the power-on cycles of IF option *n*
Power on hours	-	Displays the operating time [h] of IF option *n*
Temperature *q*[3)]	-	Displays the temperature at sensor *q* [°C and °F]

Table 20: 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 expansion option. If no temperature sensor is available, the parameter is not displayed.

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
NVMe onboard		
Product name	-	Displays the product ID of the memory module
Serial number	-	Displays the manufacturer's serial number of the memory module
FW version	-	Displays the firmware version of the memory module
Percentage used	-	Displays the used (expected) lifetime of the memory module [%]
Power on hours	-	Displays the operating hours [h] of the memory module up until now
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.
NVMe option 1		
Product name	-	Displays the product ID of the memory module
Serial number	-	Displays the manufacturer's serial number of the memory module
FW version	-	Displays the firmware version of the memory module
Percentage used	-	Displays the used (expected) lifetime of the memory module [%]
Power on hours	-	Displays the operating hours [h] of the memory module up until now
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.
NVMe option 2		
Product name	-	Displays the product ID of the memory module
Serial number	-	Displays the manufacturer's serial number of the memory module
FW version	-	Displays the firmware version of the memory module
Percentage used	-	Displays the used (expected) lifetime of the memory module [%]
Power on hours	-	Displays the operating hours [h] of the memory module up until now
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 21: 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 22: 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 Backup settings

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 23: Advanced - OEM features - Backup settings

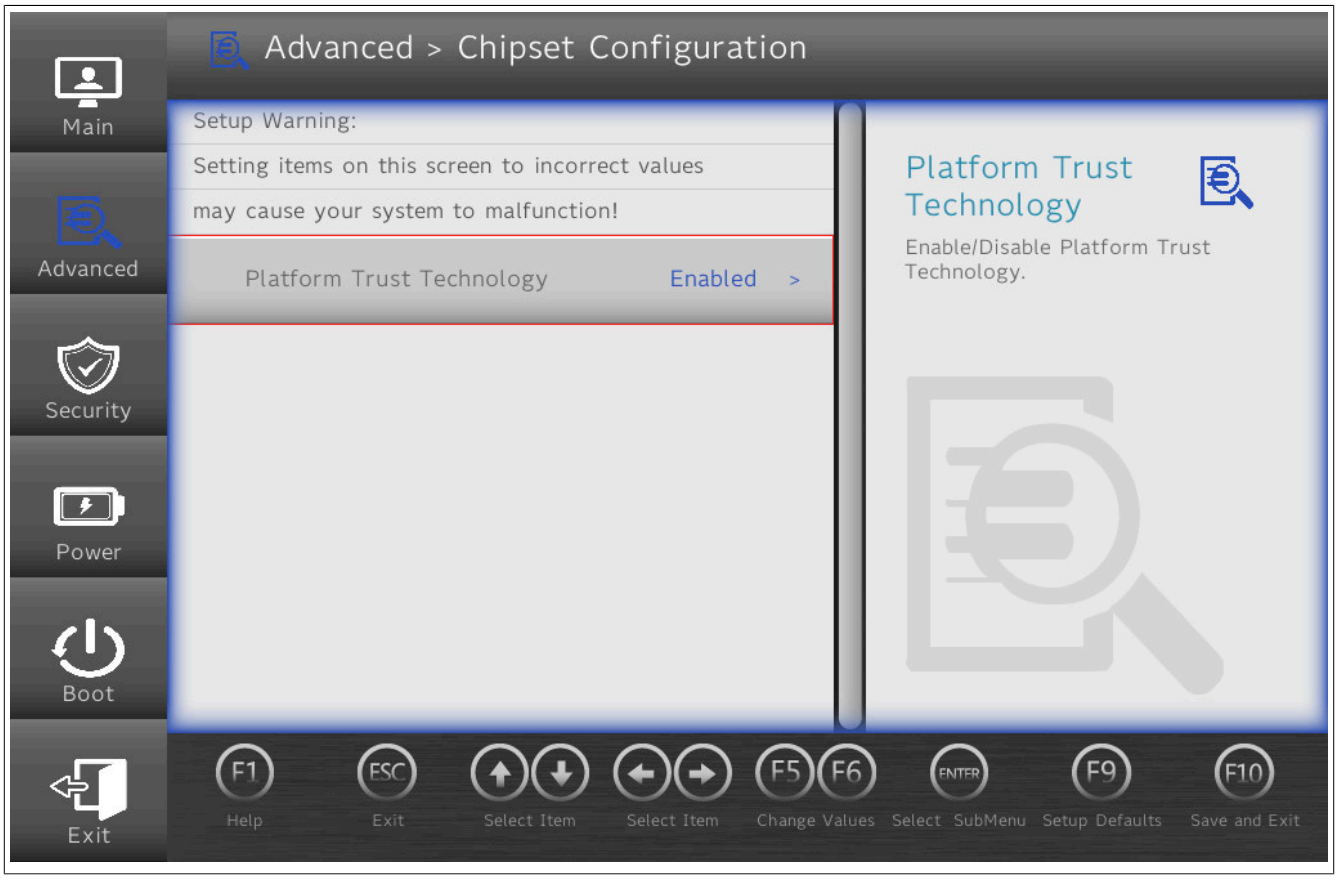
7.1.6.2.2 USB configuration

BIOS parameter		Setting options	Description
USB BIOS support		Disabled	Disables USB support in BIOS or enables USB support (UEFI only) or USB support (UEFI and Legacy Mode)
		Enabled	
		UEFI only	
USB legacy SMI bit clean		***Disabled***	Disables/Enables USB legacy SMI bit clean
		Enabled	
XHCI disable compliance mode		***False***	Selects XHCI disable compliance mode
		True	
USB port disable override[1)]		***Disabled***	Manually disables/enables USB ports (per port) or enables all ports
		Select per-port	
	USB1 connector	Disabled	Disables/Enables the USB1 interface of the system unit
		Enabled	
	USB2 connector	Disabled	Disables/Enables the USB2 interface of the system unit
		Enabled	
	USB1 IF option 1	Disabled	Disables/Enables the USB1 interface of expansion option 1
		Enabled	
	USB2 IF option 1	Disabled	Disables/Enables the USB2 interface of expansion option 1
		Enabled	
	USB1 IF option 2	Disabled	Disables/Enables the USB1 interface of expansion option 2
		Enabled	
	USB2 IF option 2	Disabled	Disables/Enables the USB2 interface of expansion option 2
		Enabled	
	USB internal	Disabled	Disables/Enables the internal USB interface
		Enabled	

Table 24: Advanced - OEM features - USB configuration

1) The names and scope of these parameters may vary depending on the main device and configuration.

7.1.6.2.3 Chipset configuration



Warning!

Settings made in this screen 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 25: 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 71
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 26: Advanced - OEM features - ACPI table/features control

1) Advanced Programmable Interrupt Controller

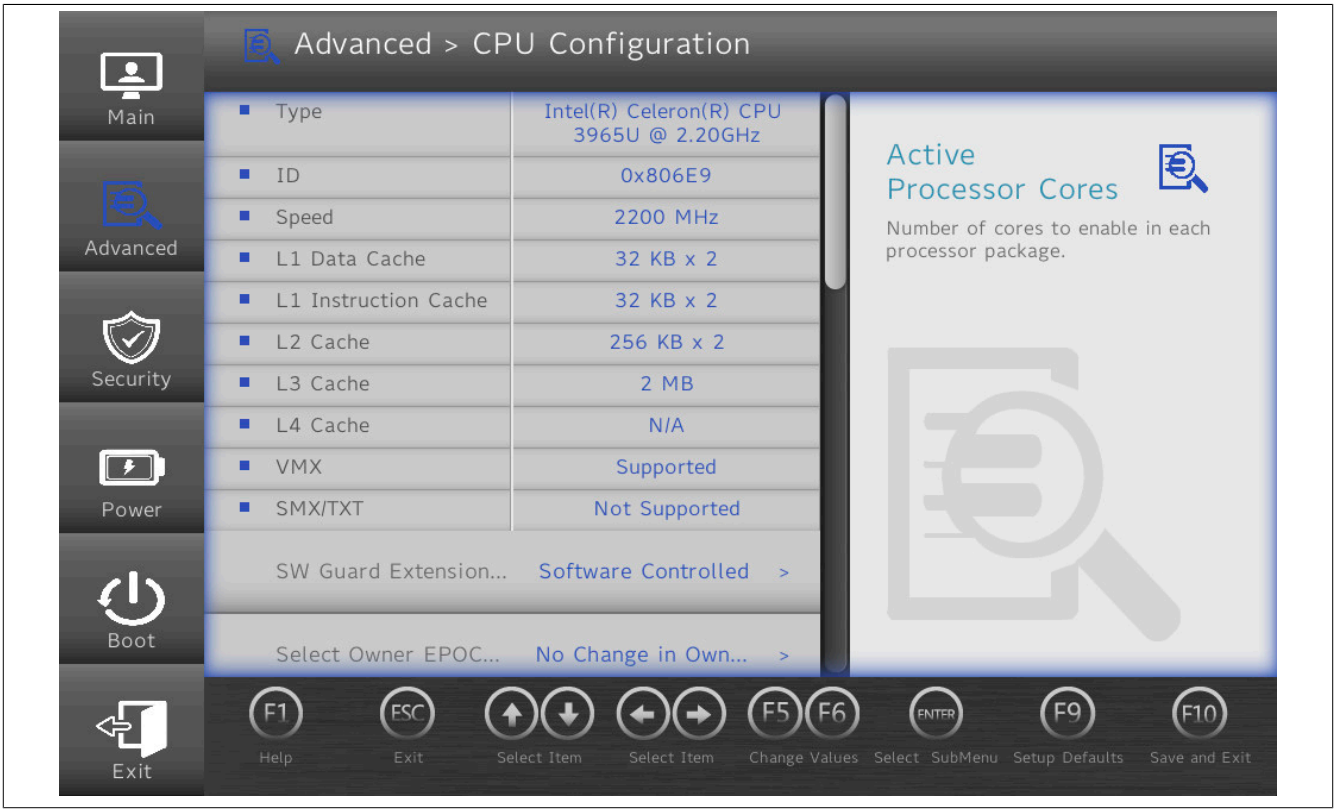
7.1.6.2.4.1 ACPI settings

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	

Table 27: 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
SW guard extension (SGX)	Disabled	Disables/Enables software guard extension or lets it be determined by the system
	Enabled	
	Software controlled	
Select owner EPOCH input type	***No change in owner EPOCH***	Security key initial value[1] unchanged, random or manual
	Change to new random owner EPOCH	
	Manual user defined owner EPOCH	
CPU flex ratio override	***Disabled***	Disables/Enables the CPU flex ratio override
	Enabled	
CPU flex ratio settings[2]	INT Default: ***24***	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	
Active processor cores	***All***	Disables/Enables individual or all processor cores
	1	
Hyper threading	Disabled	Disables/Enables hyper-threading
	Enabled	
BIST	***Disabled***	Disables/Enables the built-in self-test on reset
	Enabled	

Table 28: Advanced - CPU configuration

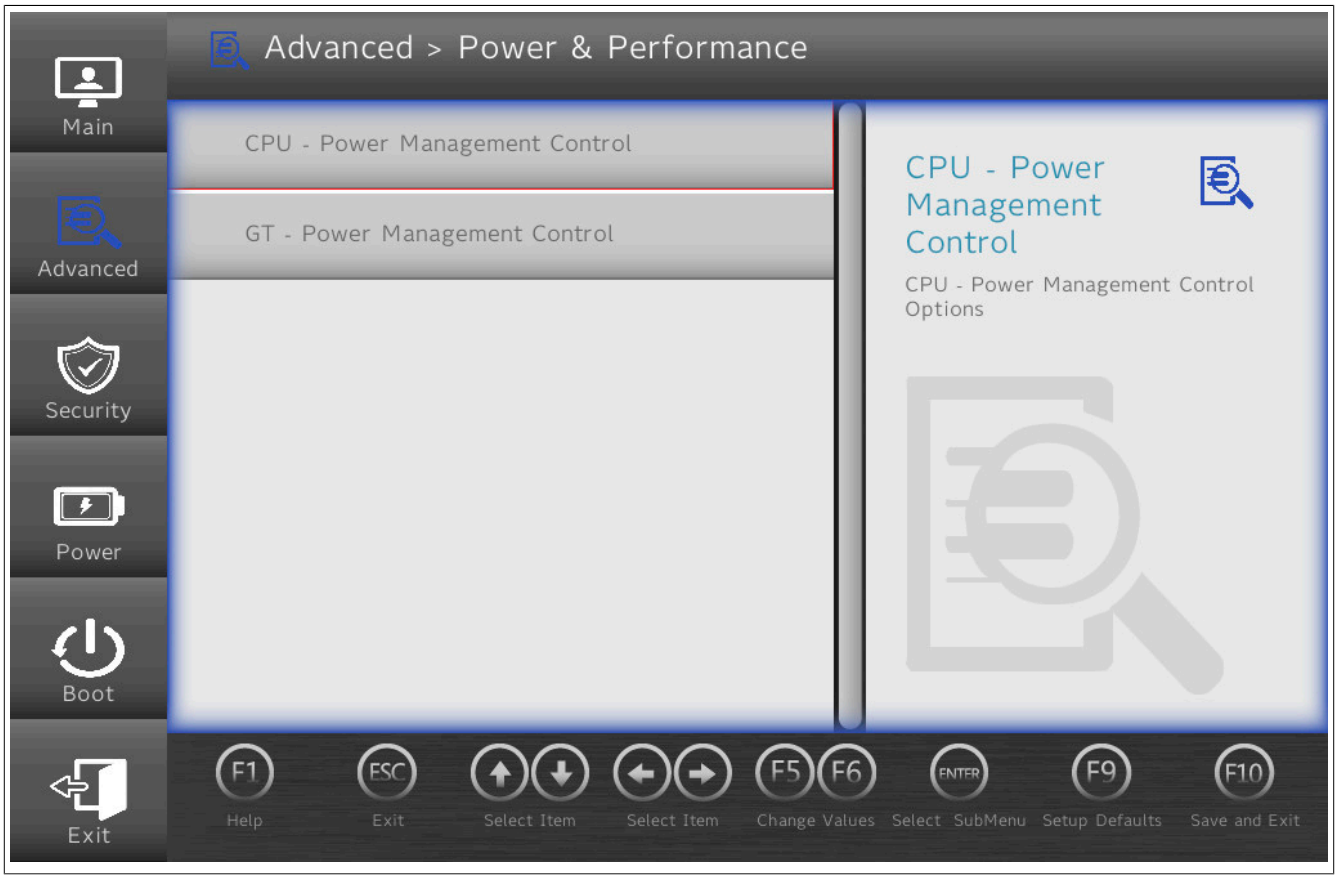
BIOS parameter	Setting options	Description
AES	Disabled	Disables/Enables the Advanced Encryption Standard
	Enabled	
Machine check	Disabled	Disables/Enables the machine check
	Enabled	

Table 28: Advanced - CPU configuration

1) For "initial value", see "seed" (key).
2) 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.

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 74
GT - Power management control	Enter	Opens submenu "GT - Power management control" on page 77

Table 29: Advanced - Power & Performance

7.1.6.2.6.1 CPU - Power management control

BIOS parameter	Setting options	Description
Boot performance mode	***Max non-turbo performance***	Selects the performance mode in which BIOS starts
	Max battery	
	Turbo performance	
Intel® SpeedStep™	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® Speed Shift Technology	***Disabled***	Disables/Enables Intel Speed Shift Technology[1)]
	Enabled	
HDC[2)] 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[3)]	Enter	Opens submenu "View/Configure turbo options" on page 76
Config TDP configurations	Enter	Opens submenu "Config TDP configurations" on page 76
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***[5)]	Defines the platform PL1 power limit [mW][4)] 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

Table 30: Advanced - Power & Performance - CPU power management control

BIOS parameter	Setting options	Description
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[6)]	***Disabled***	Disables/Enables CPU C-states management
	Enabled	
Thermal monitor	Disabled	Disables/Enables temperature monitoring
	Enabled	
Power limit 3 settings	Enter	Opens submenu "Power limit 3 settings" on page 77

Table 30: 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.
2) Hardware duty cycling
3) This submenu appears only if the Intel® Speed Shift Technology option is enabled.
4) For all power limits (PL1 to PL4), the additional description on the display unit must be observed. All values must be entered in mW.
5) The default value 0 for this table means that pre-programmed default values are used. The system does not use the numeric value 0.
6) 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	
C-state auto demotion	C1	Selects or disables C-state auto-demotion Can be used to prevent unnecessary changing of C-states.
	C1 and C3	
	C3	
	Disabled	
C-state un-demotion	C1	Selects or disables C-state un-demotion
	C1 and C3	
	C3	
	Disabled	
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
C3 latency control (MSR 0x60A)		
Time unit	1 ns	Select the IRTL[2)] time unit [ns]
	32 ns	
	1024 ns	
	32768 ns	
	1048576 ns	
	33554432 ns	
Latency	INT Default: ***78***	Defines the IRTL value Range: 0 to 1023
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: ***118***	Defines the IRTL value Range: 0 to 1023
C6/C7 long latency control (MSR 0x60C)		

Table 31: Advanced - Power & Performance - CPU power management control - C-states

BIOS setting	Setting options	Description
Time unit	1 ns	Selects the IRTL time unit [ns]
	32 ns	
	1024 ns	
	32768 ns	
	1048576 ns	
	33554432 ns	
Latency	INT Default: ***148***	Defines the IRTL value Range: 0 to 1023
C8 latency control (MSR 0x633)		
Time unit	1 ns	Selects the IRTL time unit [ns]
	32 ns	
	1024 ns	
	32768 ns	
	1048576 ns	
	33554432 ns	
Latency	INT Default: ***250***	Defines the IRTL value Range: 0 to 1023
C9 latency control (MSR 0x634)		
Time unit	1 ns	Selects the IRTL time unit [ns]
	32 ns	
	1024 ns	
	32768 ns	
	1048576 ns	
	33554432 ns	
Latency	INT Default: ***332***	Defines the IRTL value Range: 0 to 1023
C10 latency control (MSR 0x635)		
Time unit	1 ns	Selects the IRTL time unit [ns]
	32 ns	
	1024 ns	
	32768 ns	
	1048576 ns	
	33554432 ns	
Latency	INT Default: ***1010***	Defines the IRTL value Range: 0 to 1023

Table 31: 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 limit	-	Displays the package TDP limit
Power limit 1	-	Displays power limit 1
Power limit 2	-	Displays power limit 2
1-core turbo ratio	-	Displays the 1-core turbo ratio
2-core turbo ratio	-	Displays the 2-core turbo 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	
1-core ratio limit override	INT Default: ***24***	Defines the frequency of CPU turbo on an active core Range: 1 to 255
2-core ratio limit override	INT Default: ***24***	Defines the frequency of CPU turbo on two active cores Range: 1 to 255
Energy efficient turbo	Disabled	Disables/Enables energy-efficient turbo Reduces the turbo frequency to increase energy efficiency.
	Enabled	

Table 32: Advanced - Power & Performance - CPU power management control - View/Configure turbo options

Config TDP configurations

BIOS parameter	Setting options	Description
Configurable TDP[1)] 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	

Table 33: Advanced - Power & Performance - CPU power management control - Config TDP configurations

BIOS parameter	Setting options	Description
ConfigTDP levels	-	Displays the ConfigTDP levels supported by the MSR[2]
ConfigTDP turbo activation ratio	-	Displays the ConfigTDP turbo activation ratio values read by the MSR
Power limit 1	-	Displays the PL1 values from MMIO[3]
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[4]	INT Default: ***0***[5]	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 33: Advanced - Power & Performance - CPU power management control - Config TDP configurations

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

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] Range: 0 to 64
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 34: Advanced - Power & Performance - CPU power management control - Power limit 3 settings

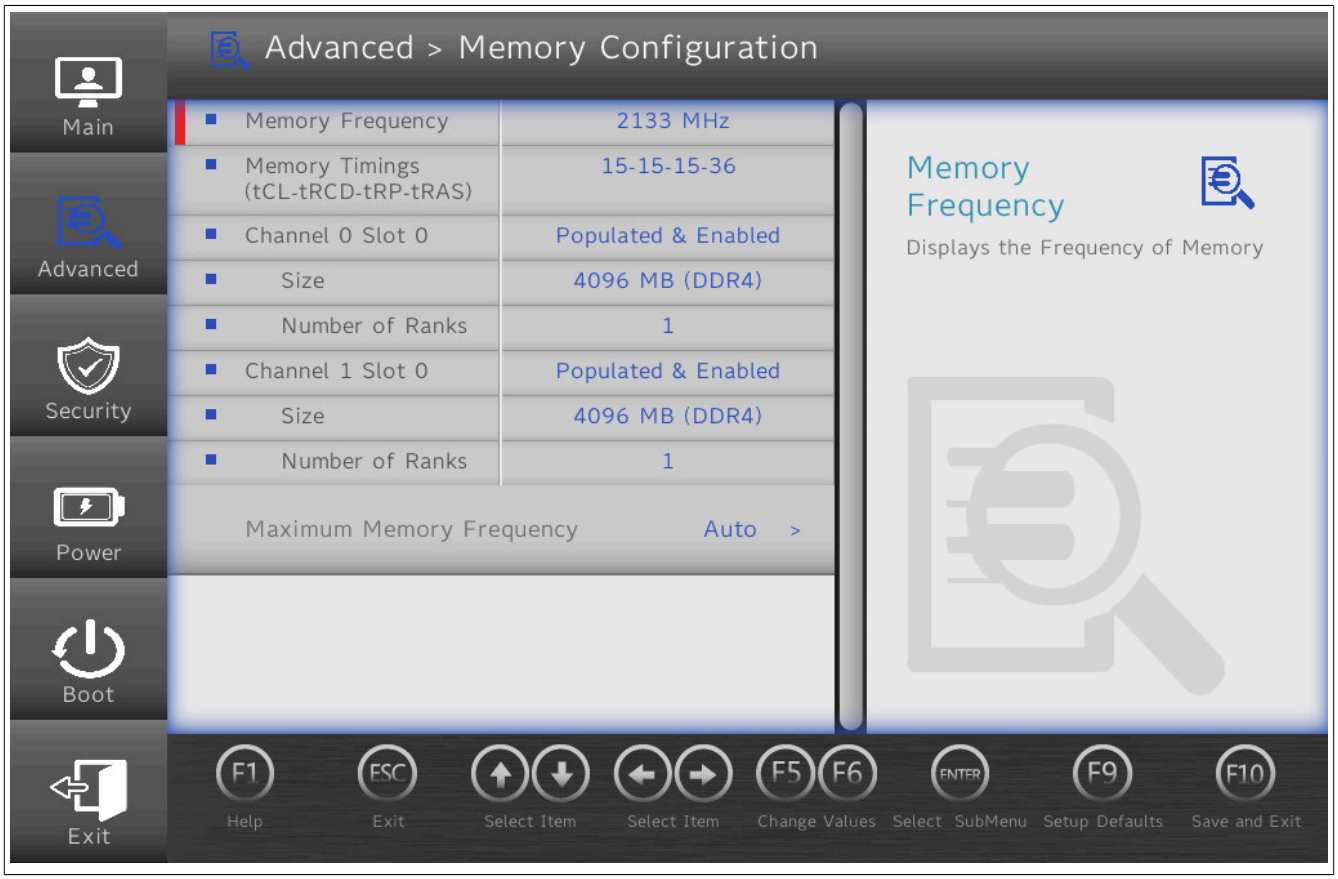
1) The additional description on the display unit must be observed.
2) The default value 0 for this table means that pre-programmed default values are used. The system does not use the numeric value 0.

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	

Table 35: Advanced - Power & Performance - GT power management control

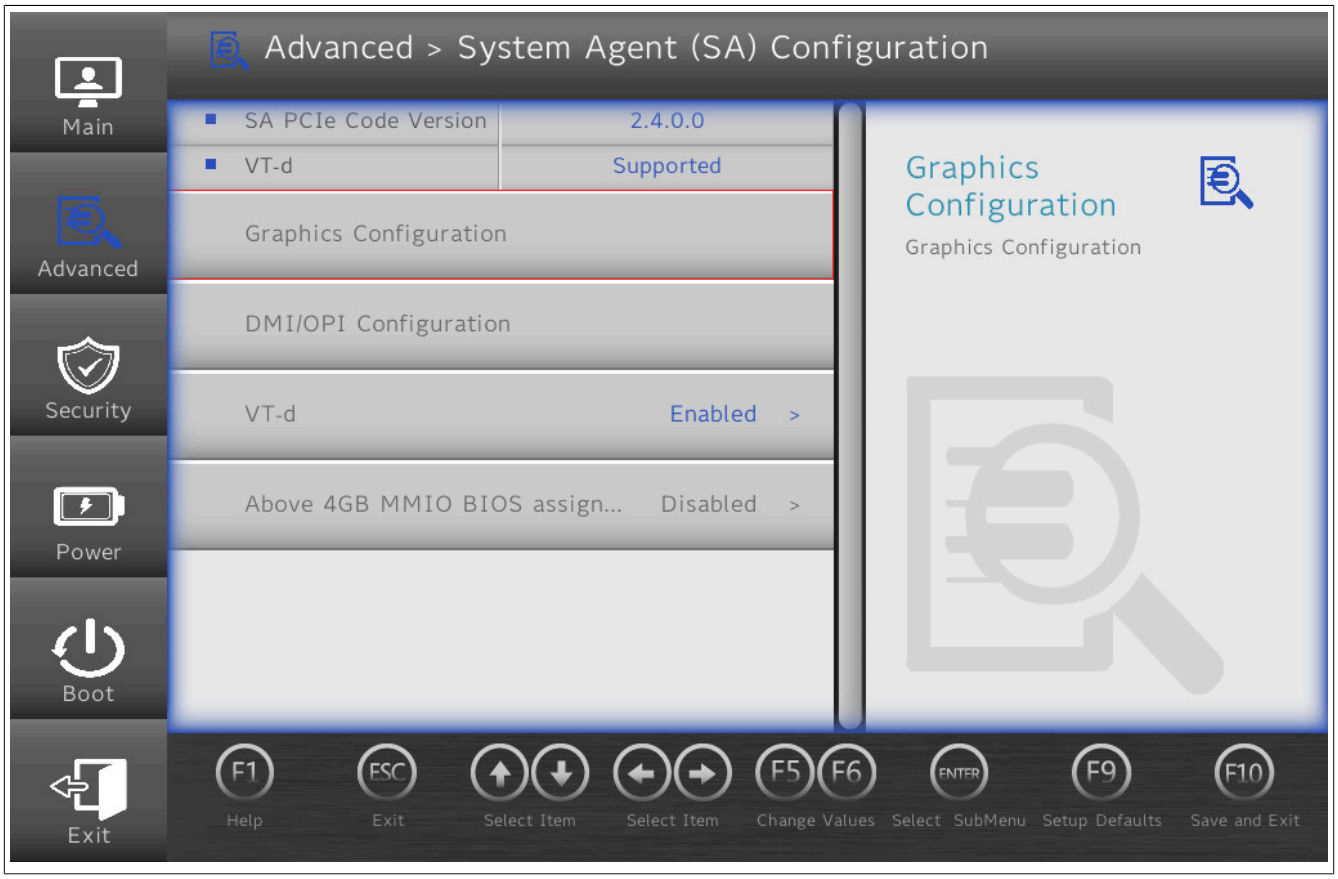
7.1.6.2.7 Memory configuration



BIOS parameter		Setting options	Description
Memory frequency		-	Displays the memory frequency [MHz]
Memory timings		-	Displays RAM timing
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
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
Channel 1 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
Channel 1 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)	

Table 36: Advanced - Memory configuration

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 79
DMI[2]/OPI[3] configuration	Enter	Opens submenu "DMI/OPI configuration" on page 80
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 37: Advanced - System agent (SA) configuration

1) Intel Virtualization Technology for Directed I/O
2) Direct Media Interface
3) On package DMI interconnect Interface

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
GTT[1] size	***8 MB***	Selects the GTT size [MB]
	4 MB	
	2 MB	
Aperture size	128 MB	Selects reserved RAM [MB] If the graphics memory is full, the defined amount of memory is made available.
	256 MB	
	512 MB	
	1024 MB	
DVMT[2] pre-allocated	4M to 64M Default: ***32M***	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	
Gfx low power mode[4]	Disabled	Disables/Enables the graphic controller's sleep mode
	Enabled	
VDD enable	Disabled	Disables/Enables force VDD
	Enabled	
HDCP support	Disabled	Disables/Enable HDCP support
	Enabled	

Table 38: Advanced - System agent (SA) configuration - Graphics configuration

BIOS parameter		Setting options	Description
	Algorithm	***One-time***	Selects HDCP re-encryption flow
		Periodic	
PM support		Disabled	Disables/Enables power management 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		337.5 Mhz	Select highest supported Cd clock frequency [MHz]
		450 Mhz	
		540 Mhz	
		675 Mhz	
LCD control		Enter	Opens submenu "LCD control" on page 80

Table 38: 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) This function is only available for small form factor devices.

LCD control

BIOS parameter	Setting options	Description
Panel scaling	***Auto***	Disables, forces or selects panel scaling automatically
	Force scaling	
	Off	

Table 39: Advanced - System agent (SA) configuration - Graphics configuration - LCD control

7.1.6.2.8.2 DMI/OPI configuration

BIOS parameter	Setting options	Description
DMI Vc1 control	***Disabled***	Disables/Enables DMI Vc1
	Enabled	
DMI Vcm control	Disabled	Disables/Enables DMI Vcm
	Enabled	

Table 40: Advanced - System agent (SA) configuration - DMI/OPI configuration

7.1.6.2.9 PCH-IO configuration

BIOS parameter	Setting options	Description
PCI Express configuration	Enter	Opens submenu "PCI Express configuration" on page 81
RST configuration	Enter	Opens submenu "RST configuration" on page 82
HD audio	***Enabled***	Disables/Enables HD audio device detection
	Disabled	
Numlock	***Off***	Disables/Enables the numeric keypad during booting Enables BIOS input via the numeric keypad of a keyboard.
	On	
Screenshot function	***Disabled***	Disables/Enables the screenshot function 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 from the next boot device automatically.
	Enabled	

Table 41: Advanced - PCH-IO configuration

7.1.6.2.9.1 PCI Express configuration

BIOS parameter	Setting options	Description
PCI Express clock gating	Disabled	Disables/Enables PCI Express clock gating for root ports
	Enabled	
Legacy IO low latency	***Disabled***	Disables/Enables legacy I/O low latency
	Enabled	
DMI link ASPM control	Disabled	Disables/Enables DMI link ASPM control
	Enabled	
Peer memory write enable	***Disabled***	Disables/Enables peer memory write enable
	Enabled	
PCIe USB glitch W/A[1)]	***Disabled***	Disables/Enables PCIe USB glitch W/A For faulty USB devices after the PCIe/PEG[2)] port
	Enabled	
PCIe function swap	Disabled	Disables/Enables PCIe function swap
	Enabled	
PCI Express root port *n*[3)]	Disabled	Disables/Enables PCI Express root port n
	Enabled	

Table 42: Advanced - PCH-IO configuration - PCI Express configuration

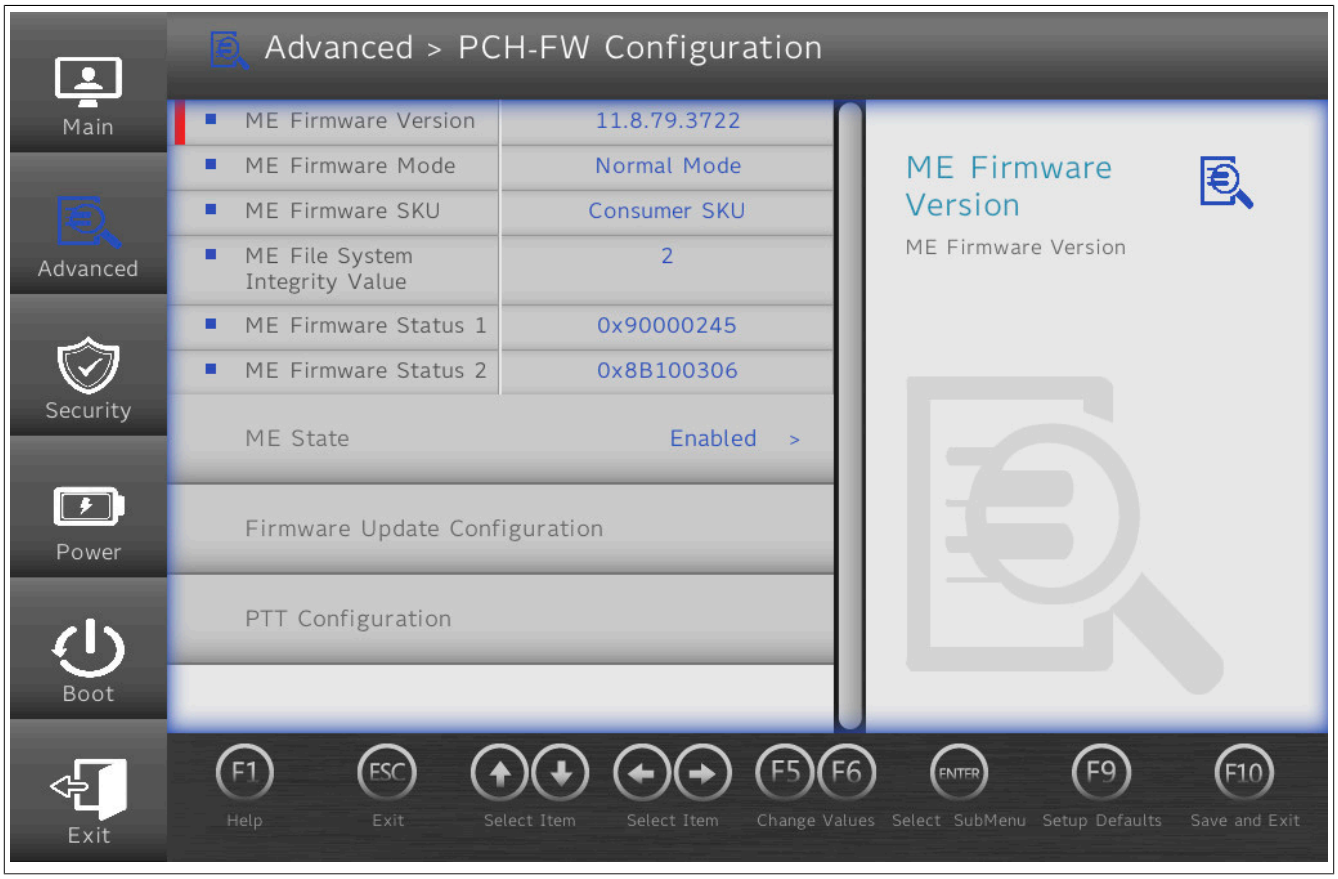
1) PCIe-USB glitch workaround
2) PCIe for graphics
3) Names and number of these parameters may vary depending on the main device and configuration

7.1.6.2.9.2 RST configuration

BIOS parameter	Setting options	Description
Mode selection	***AHCI***	Selects the mode for Intel Rapid Storage Technology
	Intel RST premium with Intel Optane	
NVMe onboard	***RST controlled***	Disables/Enables RST PCIe storage remapping
	Disabled	
NVMe option 1	***RST controlled***	Disables/Enables RST PCIe storage remapping
	Disabled	
NVMe option 2	***RST controlled***	Disables/Enables RST PCIe storage remapping
	Disabled	
RAID device ID	Alternate	Selects the RAID device ID mode
	Client	

Table 43: Advanced - PCH-IO configuration - RST 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 file system integrity value	-	Displays the ME file system integrity value
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 83
PTT[2] configuration	Enter	Opens submenu "PTT configuration" on page 83

Table 44: 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	
Local FW update	Disabled	Disables/Enables local firmware update
	Enabled	

Table 45: 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 46: Advanced - PCH-FW configuration - PTT configuration

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	***1.0***	Selects the TrEE protocol version
	1.1	
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 70.
	(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

Table 47: 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.

7.1.6.4 Power

BIOS parameter		Setting options	Description
ACPI S3		Disabled	Disables/Enables ACPI S1/S3 sleep state
		Enabled	
Wake on PME		Disabled	Disables/Enables wake on PME
		Enabled	
Wake on modem ring		***Disabled***	Disables/Enables wake on modem ring
		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 hour	INT Default: ***0***	Defines the hour for auto wake on S5 daily Range: 0 to 23
	Wake on S5 minute	INT Default: ***0***	Defines the minute for auto wake on S5 daily Range: 0 to 59
	Wake on S5 second	INT Default: ***0***	Defines the second for auto wake on S5 daily Range: 0 to 59
	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	
IF*n*[1] standby power		-	Displays the IF*n* standby power states
Set IF*n* standby power		Disabled	Disables/Enables the IF*n* standby power
		Enabled	
Always-on		-	Displays the always-on state
Set always-on		Disabled	Disables/Enables always-on
		Enabled	
Device preheat state		-	Displays the device preheat state "Device preheat state" displays the general enable state of "Set device preheat" but not whether preheating is active.
Set device preheat		***Disabled***	Disables/Enables preheating, see "Preheat" on page 86
		Enabled	
Ignition		**Enter**	Opens submenu "Ignition (ignition handling)" on page 87

Table 48: Power

1) Depends on the configuration (max. 2 expansion options possible).

7.1.6.4.1 Preheat

BIOS parameter *Preheat* must be enabled if the APC mobile is meant to be used at ambient temperatures below 0°C. The following properties must be observed in preheating mode:

- An increased power requirement of max. 35 W is possible for a short time in preheating mode.
- The CPU is not permitted to be put into a standby state (S3/S4/S5) during preheating mode.
- The boot procedure can be started with a delay due to preheating mode.

Whether or not the system is in preheating mode can be evaluated via pin K4 on the CMC multi-header, see "Digital output - Heating status (K4)" on page 36.

7.1.6.4.2 Ignition (ignition handling)

BIOS parameter	Setting options	Description
PWRBTN after T1	-	Displays state "PWRBTN after T1"
Set PWRBTN after T1	Disabled ***Enabled***	Disables/Enables "PWRBTN after T1" After the T1 timer has expired, a power button event is triggered.
PWRBTN at ignition	-	Displays state "PWRBTN at ignition"
Set PWRBTN at ignition	Disabled ***Enabled***	Disables/Enables "PWRBTN at ignition" If the level on the ignition pin changes to "High" again during the T2 timer, a power button event is triggered.
T0 ignore time	-	Displays the defined T0 ignore time
Set T0 ignore time	INT Default: ***0***	Defines the duration of T0 ignore time [s] During the T0 ignore time, a low level on the ignition pin is not processed or passed on to the operating system. The system runs at full capacity. Range: 0 to 65,535 Resolution: 1 [s]
T1 power button delay time	-	Displays the defined T1 power button delay time
Set T1 power button delay time	INT Default: ***0***	Defines the duration of "T1 power button delay time" [s] The system is powered by the vehicle battery, the ignition is disabled (ONBAT = high). Depending on parameter *PWRBTN after T1*, a power button event can be triggered. Range: 0 to 655,350 Resolution: 10 [s]
T1-T2 time after power button	-	Displays the defined duration of "T1-T2 time after power button"
Set T1-T2 time after power button	INT Default: ***10***	Defines the duration of "T1-T2 time after power button" [s] This is only set if a power button event is triggered after T1 and runs parallel to "T2 power OFF delay time". If no change in the "S" states is detected in this time window, the MTCX will trigger a power button override event. Range: 0 to 65,535 Resolution: 1 [s]
T2 power OFF delay time	-	Displays the defined T2 power OFF delay time
Set T2 power OFF delay time	INT Default: ***20***	Defines the duration of the T2 power OFF delay time [s] ONBAT is set. The system is shut down after "T2 power OFF delay time". Range: 0 to 655,350 Resolution: 10 [s]

Table 49: Power - Ignition

BIOS parameter	Setting options	Description
Low voltage limit	-	Displays the low voltage limit
Set low voltage limit	INT Default: ***0***	Defines the low level limit of the supply voltage [mV] If this value is undershot, all ignition handling timers are set to 0 [s] except *T0 ignore time*. The CPU S states are changed without limitations. Domain[1]: 0; 8,500 to 32,000 Resolution: 1 [mV]
Critical voltage limit	-	Displays the critical voltage limit
Set critical voltage limit	INT Default: ***0***	Defines the limit for the critical level of the supply voltage [mV] If this value falls is undershot, all ignition handling timers are set to 0 [s]. The CPU S states are changed without limitations. Domain[1]: 0; 8,500 to 32,000 Resolution: 1 [mV]

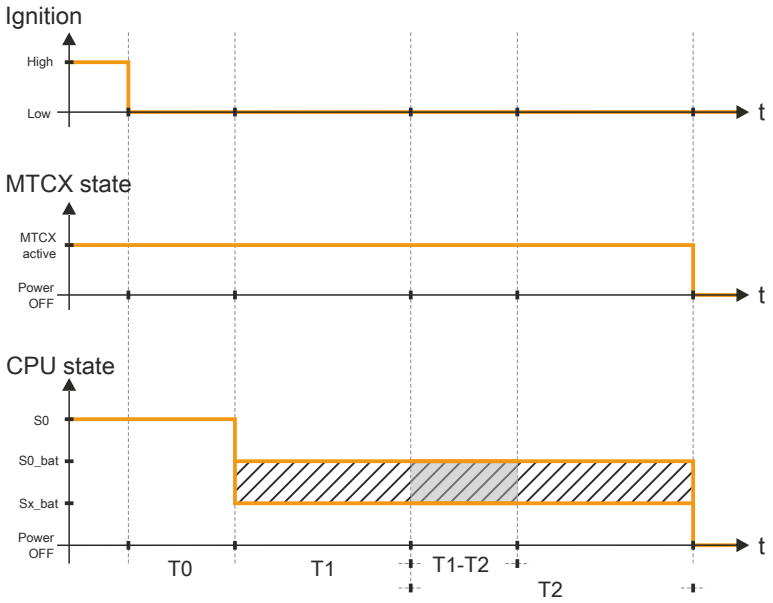
Table 49: Power - Ignition

1) The numerical value 0 disables this parameter. The system does not use the numeric value 0.

7.1.6.4.2.1 Detailed information about ignition handling

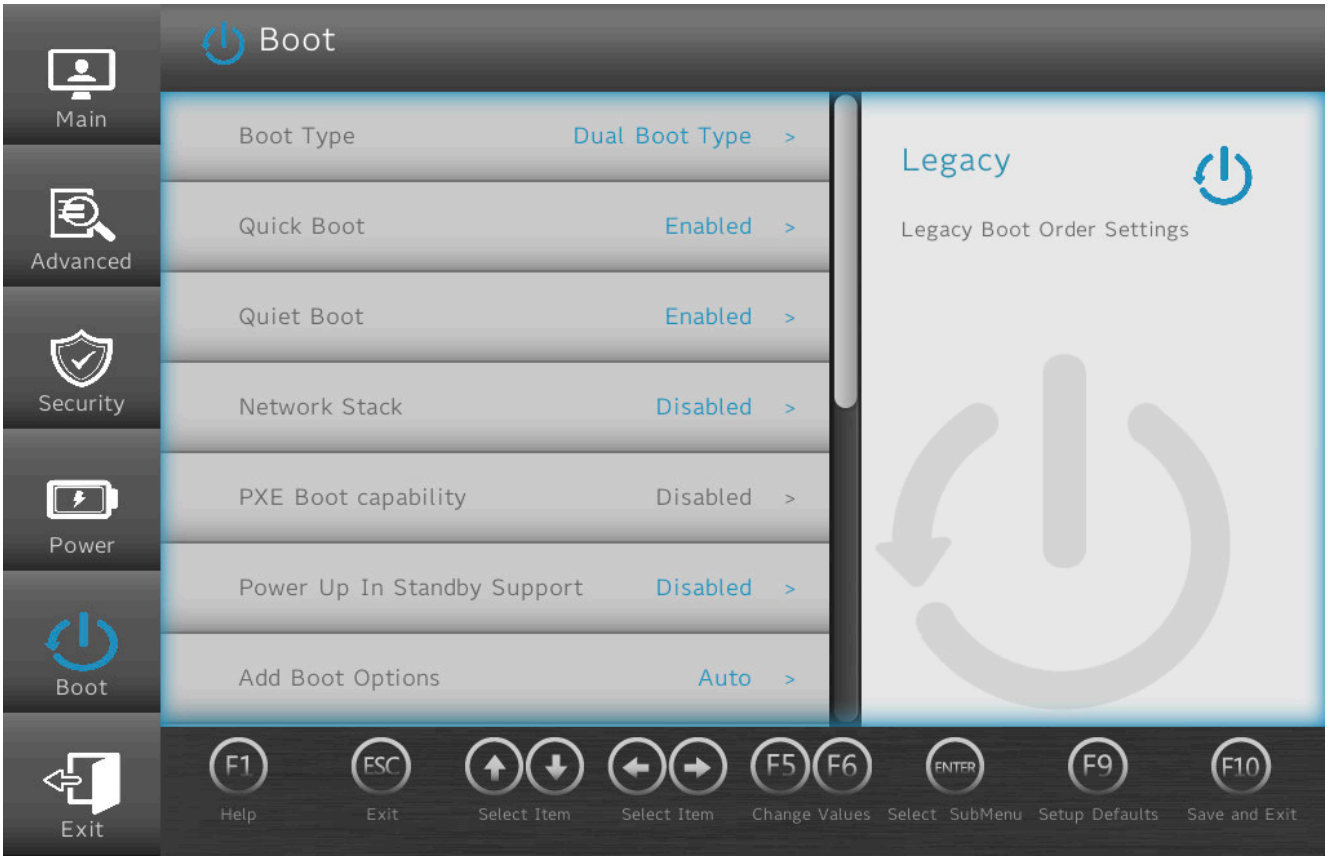
T0 ignore time defines a time range in which a low level on the ignition pin is ignored. *T1 power button delay time* defines a delay after which a *power button event* is set. The action that is performed after a *power button event* can be configured via the operating system. This can be used to put the APC mobile into a sleep state during a pause in operation so that an even shorter boot time can be achieved.
Optionally, this can be monitored with *T1-T2 time after power button* and a power override event can be triggered to protect the vehicle battery from discharging if necessary. After *T2 power OFF delay time*, the internal power supply of the APC mobile is completely switched off, the power consumption is reduced to ≤1 mA.

If the system is in *ignition handling* state T0 or T1 and the level on the ignition pin reaches a value in the range of normal operation (9 to 32 VDC), *ignition handling* is aborted and the system is reset to CPU state S0 with "*ONBAT* = Low". This behavior can be disabled for T2.
The voltage limits are only taken into account during a low level on the ignition pin and can be used to ease the load on the vehicle battery.



Legend			
T0	T0 ignore time in [s]	T1	T1 power button delay time in [s]
T1-T2	T1-T2 time after power button in [s]	T2	T2 power OFF delay time in [s]
ONBAT	Status bit *ONBAT* is "High" if the system is running while level "Low" is present on the ignition pin (KL15).	S0	CPU state S0 and "*ONBAT* = Low"
S0_bat	CPU state S0 and "*ONBAT* = High"	Sx_bat	CPU state S3/S4/S5 and "*ONBAT* = High"

7.1.6.5 Boot



BIOS parameter	Setting options	Description
Boot type	***Dual boot type***	Selects the boot type In dual boot mode, both UEFI and Legacy boot are possible and the CSM is enabled. In Legacy boot mode, the CSM is enabled. In UEFI boot mode, the CSM is disabled.
	Legacy boot type	
	UEFI boot type	
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	
PXE boot capability	***Disabled***	Disables PXE boot or selects the mode
	UEFI:IPV4	
	UEFI:IPV6	
	UEFI:IPV4/IVP6	
	Legacy	
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 Manual mode is not fully UEFI compatible.
	First	
	Manual	
	Last	
ACPI selection[1)]	Acpi3.0	Selects the ACPI mode
	Acpi4.0	
	Acpi5.0	
	Acpi6.0	
	Acpi6.1	
USB boot	Disabled	Disables/Enables USB boot
	Enabled	
EFI device first	Disabled	Disables/Enables EFI device first Enable to boot EFI devices before legacy devices. Disable to boot legacy devices before EFI devices.
	Enabled	
Timeout	INT Default: ***0***	Delay time until the boot list is processed [s] Range: 0 to 99

Table 50: Boot

BIOS parameter	Setting options	Description
Automatic failover	Disabled	Disables/Enables automatic failover
	Enabled	
EFI	Enter	Opens submenu "EFI" on page 90
Legacy	Enter	Opens submenu "Legacy" on page 91

Table 50: 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	Enter	Opens submenu "EFI" on page 90
1st device	***NVMe onboard***	Selects this device as first in the boot sequence
	NVMe option 1	
	NVMe option 2	
	USB storage	
	USB CD-ROM	
	USB other	
	Internal EFI shell	
	ETH1 IPv4	
	ETH1 IPv6	
	ETH2 IPv4	
	ETH2 IPv6	
	Other	
	RAID volume	
	Disabled	
2nd device[1)]	***NVMe option 1***	Selects this device as second in the boot sequence
3rd device	***NVMe option 2***	Selects this device as third in the boot sequence
4th Device	***USB storage***	Selects this device as fourth in the boot sequence
5th device	***USB CD-ROM***	Selects this device as fifth in the boot sequence
6th device	***USB other***	Selects this device as sixth in the boot sequence
7th device	***Internal EFI shell***	Selects this device as seventh in the boot sequence
8th device	***ETH1 IPv4***	Selects this device as eighth in the boot sequence

Table 51: Boot - EFI

1) Starting with the *2nd device*, only the respective default values are specified.

7.1.6.5.1.1 EFI

BIOS parameter	Setting options	Description
EFI	Enter, then: ► Keyboard: F5/F6 ► Touch screen: Move items at the gray arrows	Defines the boot sequence

Table 52: Boot - EFI - EFI

7.1.6.5.2 Legacy

BIOS parameter	Setting options	Description
boot menu	***Normal***	Selects the boot sequence type
	Advanced	
Boot type order	Enter	Opens submenu "Boot type order" on page 91
Other	Enter	Opens submenu[1)]
Floppy disk	Enter	
Hard disk drive	Enter	Opens submenu "Hard disk drive" on page 91
CD/DVD-ROM drive	Enter	Opens submenu[1)]
USB	Enter	
Legacy	Enter, then: ► Keyboard: F5/F6 ► Touch screen: Move items at the gray arrows	Defines the boot sequence

Table 53: Boot - Legacy

1) These submenus are only available if at least one corresponding device is available.
Their structure corresponds to that of submenu **Hard disk drive**.

7.1.6.5.2.1 Boot type order

BIOS parameter	Setting options	Description
Boot type order	Enter	Opens submenu "Boot type order" on page 91

Table 54: Boot - Legacy - Boot type order

Boot type order

BIOS parameter	Setting options	Description
Boot type order	Enter, then: ► Keyboard: F5/F6 ► Touch screen: Move items at the gray arrows	Defines the boot sequence

Table 55: Boot - Legacy - Boot type order - Boot type order

7.1.6.5.2.2 Hard disk drive

BIOS parameter	Setting options	Description
Hard disk drive	Enter	Opens submenu "Hard disk drive" on page 91

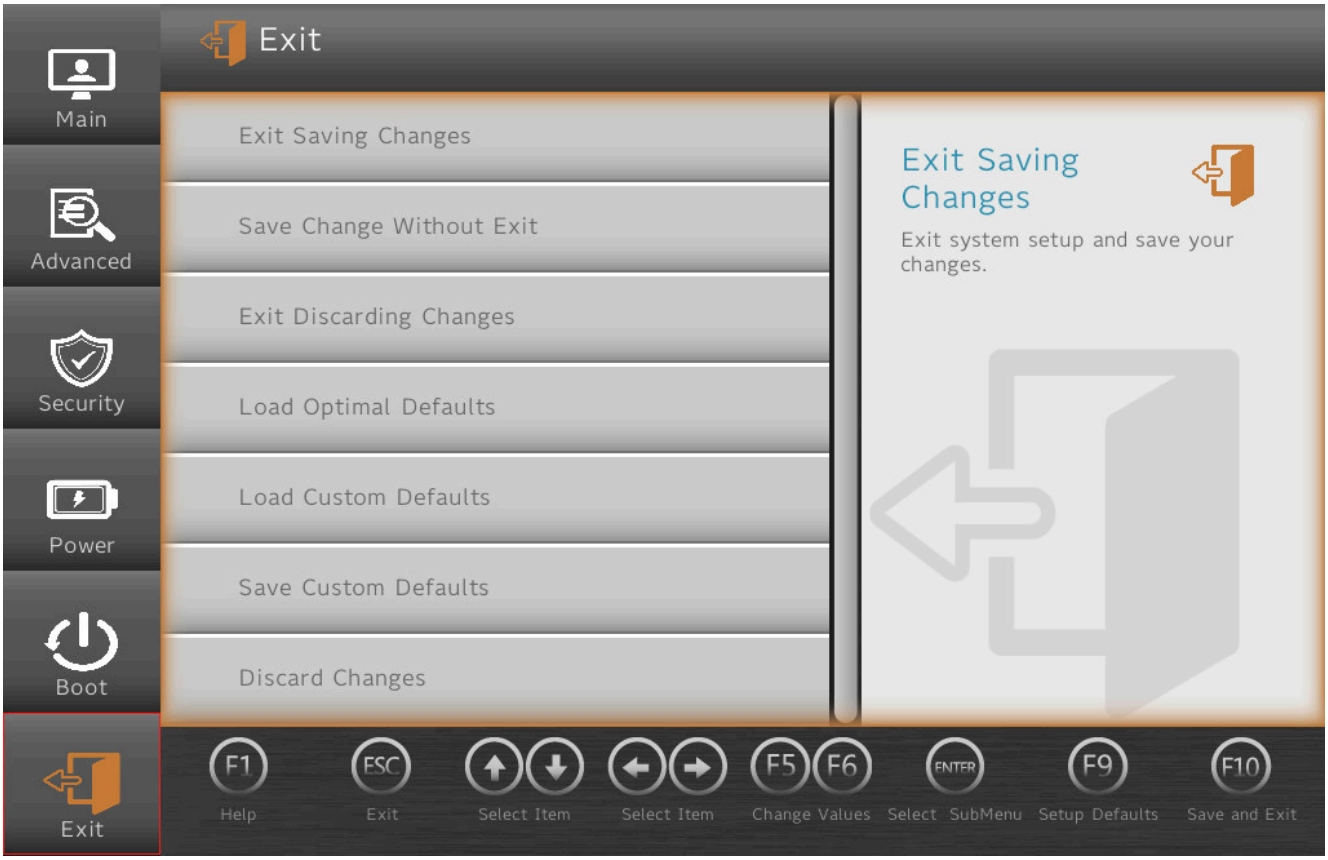
Table 56: Boot - Legacy - Hard disk drive

Hard disk drive

BIOS parameter	Setting options	Description
Hard disk drive	Enter, then: ► Keyboard: F5/F6 ► Touch screen: Move items at the gray arrows	Defines the boot sequence

Table 57: Boot - Legacy - Hard disk drive - Hard disk drive

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 58: Exit

7.2 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).

7.2.1 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.

7.2.1.1 BIOS upgrade

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

7.2.1.1.1 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 APC mobile, open BIOS Setup with **[Esc]**, **[Del]** or **[F2]**.
2. The installed versions are displayed under **Setup utility / Advanced / OEM features**, see figure (symbolic).

7.2.1.1.2 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*.
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.

7.2.2 PC firmware upgrade

With *Firmware upgrade (MTCX)*, it is possible to update the firmware depending on the variant of the Automation PC mobile system.

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!

7.2.2.1 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.

7.2.2.2 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*.
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.

7.2.2.3 Automatic firmware upgrade

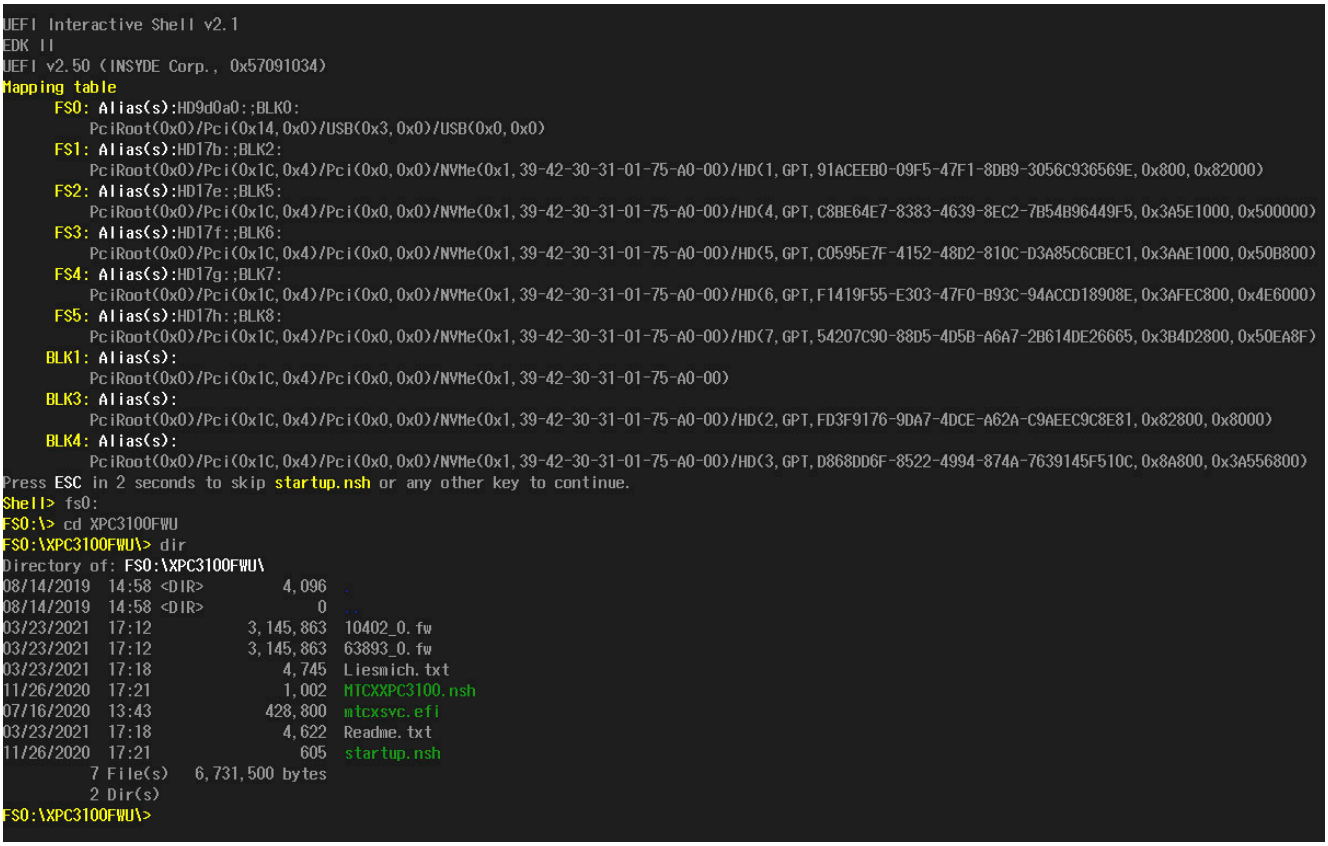
With the APC mobile, it is possible to perform updates automatically.

For this, parameter **Automatic firmware update** must be enabled in BIOS (see "Advanced - OEM features" on page 65).

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 "XPC3100FWU" 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.



Information:

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

7.2.2.4 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).

7.2.2.5 Screenless update

The APC mobile can perform updates without having to connect a display unit and operating devices.

This requires a suitable USB flash drive and a free USB port on the APC mobile.

> **Information:**
>
> **The status of a screenless update can be read via the LED status indicators on the APC mobile, see "LED status indicators - Screenless update" on page 29.**

Preparation - General

- Configure the USB flash drive as a *FAT16* or *FAT32* drive with write and read access and drive name "MPC3100AUPD".

Firmware update

1. Unpack the firmware update archive *(ZIP)*.
2. Create a directory with the "MPC3100FWU" in the root directory of the prepared USB flash drive and store the update files in this folder.
3. Connect the USB flash drive to the APC mobile (notes about the degree of protection must be observed!).
4. Reboot the APC mobile.
5. After the update has been completed, the APC mobile automatically returns to operating mode.

✓ The upgrade is installed and in effect. The USB flash drive can be removed.

Preparation - BIOS update

The following additional preparatory measures may be required depending on the use case:

- If a new BIOS update is performed with the same USB flash drive used for a previous update, file *State.dat* in the root directory must be deleted. If this file is not available, it is possible to continue with step 1, provided that no other preparatory measures are applicable.
- If no customized settings have been made, it is possible to continue with step 1, provided that no further preparatory measures are applicable.
  A back-up of customized settings can be created as described below.

Backing up customized settings

► Customized BIOS settings can be exported and re-enabled automatically by the system. For this purpose, directory "XPCSET" must be created in the root directory of the USB flash drive.

✓ Customized BIOS settings are then applied automatically and stored on the USB flash drive in directory XPCSET/**XPCSET_[*Timestamp*]**.

BIOS update

1. Unpack the BIOS update archive *(ZIP)* and store the files directly in the root directory of the prepared USB flash drive.
2. Connect the USB flash drive to the APC mobile (notes about the degree of protection must be observed!).
3. Reboot the APC mobile.
4. After the update has been completed, the APC mobile automatically returns to operating mode.

✓ The upgrade is installed and in effect. The USB flash drive can be removed.

After a successful update, the system stores a report file *(TXT)* and a backup of the customized BIOS settings on the USB flash drive.

BIOS and firmware update

1. Perform steps 1 and 2 of the instructions for the "firmware update" on page 96 and step 1 of the instructions for the "BIOS update" on page 96 on the USB flash drive.
2. Connect the USB flash drive to the APC mobile (notes about the degree of protection must be observed!).
3. Reboot the APC mobile.

4. After the update has been completed, the APC mobile automatically returns to operating mode.

✓ The upgrades are installed and effective. The USB flash drive can be removed.

7.3 Operating systems

7.3.1 Windows 10 IoT Enterprise 2019 LTSC

7.3.1.1 General information

Windows 10 IoT Enterprise 2019 LTSC is a special version of Windows 10 Enterprise for industrial use (Long-Term Servicing Channel) that provides a high level of protection for applications through additional lockdown functions.

> **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).**

7.3.1.2 Order data

Order number	Short description	Figure
	Windows 10 IoT Enterprise 2019 LTSC	
5SWW10.1062-MUL	Windows 10 IoT Enterprise 2019 LTSC - 64-bit - Value - Multilingual - MPC3100 Kaby Lake (UEFI boot) - CPU Celeron - License - Only available with a new device	
5SWW10.1162-MUL	Windows 10 IoT Enterprise 2019 LTSC - 64-bit - High End - Multilingual - MPC3100 Kaby Lake (UEFI boot) - CPU Core i7 - License - Only available with a new device	

7.3.1.3 Overview

Order number	5SWW10.1062-MUL	5SWW10.1162-MUL
Operating system		
Target systems		
Industrial PC	Automation PC mobile 3100	
Processor	Celeron, Core i3, Core i5	Core i7
Chipset	Kaby Lake-U	
License class	Value	High End
Architecture	64-bit (UEFI boot)	
Language	Multilingual	
Minimum size of RAM	2 GB 1)	
Minimum size of data storage medium	20 GB 2)	

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.
2) The specified minimum size of the data storage medium does not take into account the memory requirements of additional language packages.

7.3.1.4 Features

Windows 10 IoT Enterprise 2019 LTSC supports the following Microsoft features:

Features	Windows 10 IoT Enterprise 2019 LTSC
Range of functions in Windows 10 Enterprise	✓
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)	
Assigned access	Configurable
AppLocker	Configurable
Shell Launcher	Configurable
Unified Write Filter	✓
Keyboard Filter	Configurable

The following are some differences from standard Windows 10 Enterprise:

- Windows 10 IoT Enterprise 2019 LTSC does not include Cortana, the Microsoft Edge browser or the Microsoft Store.
- The LTSC version is based on build 17763 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 2019 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.

7.3.1.5 Installation

B&R installs and activates Windows 10 IoT Enterprise 2019 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 now only installed in UEFI mode.

The data storage medium containing the Windows partition is formatted as a GUID Partition Table (GPT) file system in UEFI mode. 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 when installing in UEFI mode, the GPT file system must be supported by the software being used when backing up and restoring the installation.

7.3.1.6 Drivers

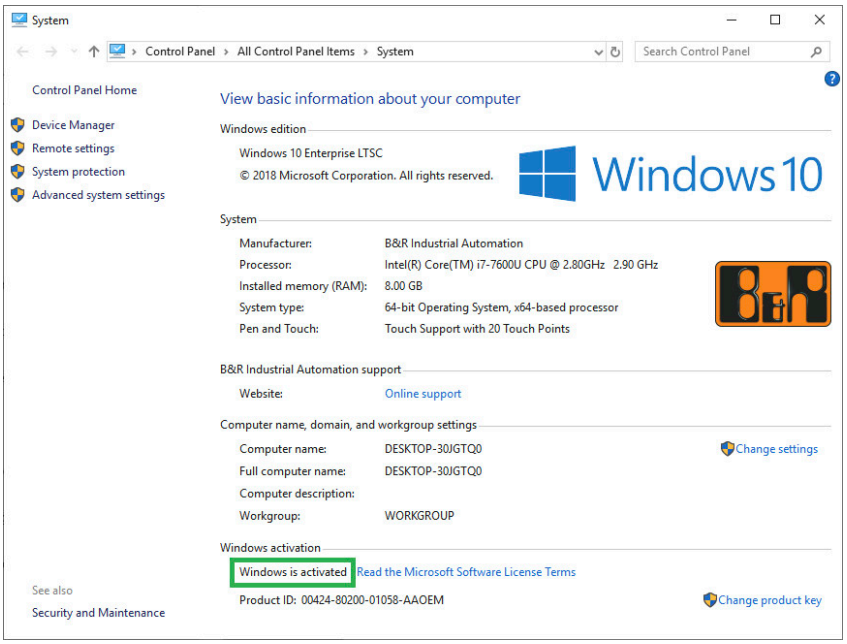
The operating system contains all drivers necessary for operation. If an older driver version is installed, the most current version can be downloaded and installed from the B&R website (www.br-automation.com). It is important to ensure that "Unified Write Filter (UWF)" is disabled.

Information:

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

7.3.1.7 Activation

Windows 10 IoT Enterprise 2019 LTSC must be activated. This takes place at B&R. The activation status can be checked in the Control Panel:



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).

7.3.1.8 Supported display resolutions

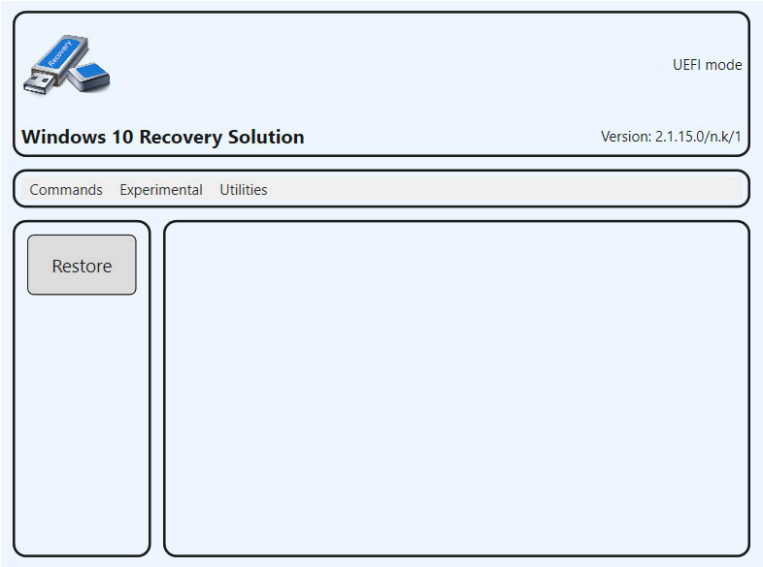
Windows requires SVGA resolution (800 x 600) or higher per Microsoft requirements to activate full operation of the Windows interface (e.g. with system dialog boxes). A lower resolution can be selected for applications.

7.3.2 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).

7.3.3 Linux for B&R 10 (GNU/Linux)

7.3.3.1 General information

B&R supports Linux in the form of modified images based on Debian GNU / Linux 10 (codename "buster").

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/).

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).

7.3.3.2 Order data

Order number	Short description	Figure
	Linux for B&R 10	
5SWLIN.0862-MUL	Linux for B&R 10 - 64-bit - Multilingual - MPC3100 Kaby Lake (UEFI boot) - Installation - Only available with a new device	

7.3.3.3 Overview

Order number	5SWLIN.0862-MUL
Operating system	
Target systems	
Industrial PC	Automation PC mobile 3100
Chipset	Kaby Lake-U
Architecture	64-bit (UEFI boot)
Language	Multilingual
Minimum size of RAM	2 GB
Minimum size of data storage medium	8 GB

7.3.3.4 Features

Linux for B&R 10 contains a selection of predefined software package groups. Additional packages can be installed later with an existing Internet connection.

Appropriate modifications have been made and certain features provided using custom packages in order to use Debian on B&R Automation Panels and Panel PCs. Most of these packages are already included in Linux for B&R and/or available for download on the B&R website (www.br-automation.com).

7.3.3.5 Installation

Linux for B&R 10 is preinstalled on the data storage medium .

7.3.3.6 Drivers

The operating system contains all drivers necessary for operation.

The current version of B&R-specific drivers can be downloaded and installed from the B&R website (www.br-automation.com).

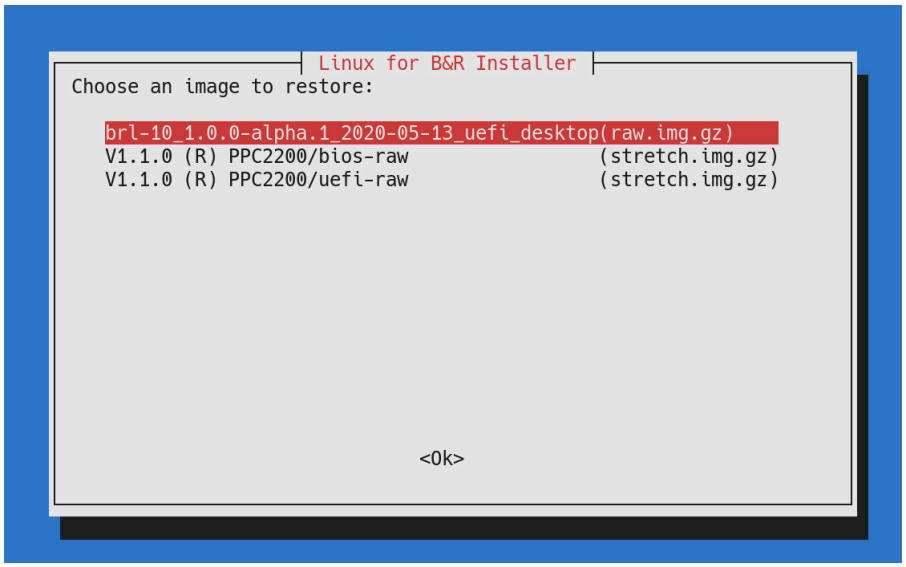
7.3.4 Linux for B&R installer

The installer makes it easy to install Linux recovery 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).

Recovery images can be requested via B&R Support.

A bootable USB flash drive is required to execute the tool.



Information:

For additional information, see the respective Linux for B&R user's manual. This can be downloaded at no cost from the B&R website (www.br-automation.com).

7.4 Automation software

7.4.1 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**).

7.4.2 Order data

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)	

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.	

7.4.3.1 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)
APC mobile	Yes, TC only	Yes, TC only	No

7.4.4 Automation Runtime

7.4.4.1 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.

7.4.4.2 Minimum versions

7.4.4.2.1 Automation Runtime Embedded (ARemb)

System requirements

The following software versions (or higher) are required to operate Automation Runtime Embedded:

- ARemb upgrade AR 4.91
- Automation Studio V4.10
- Visual Components Runtime (VC) V4.72

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).

7.4.4.3 Information about operation with Automation Runtime

Information:

The specified thermal design power (TDP) of the CPU may be exceeded if the graphics load and CPU utilization are high at the same time. In real-time applications, this can result in increased jitter and/or higher cycle times.

If the TDP is exceeded, internal protection mechanisms of the CPU begin limiting the load to the limit of the TDP. This means that either the CPU frequency or the graphic frequency (GPU) will be reduced/controlled. In real-time applications, this can result in increased jitter and/or higher cycle times.

This behavior can be influenced by settings in BIOS. The maximum CPU frequency can be set in BIOS under *Advanced - CPU configuration* using option *CPU flex ratio override*. The number of cores used can be set using option *Active processor cores*.

In addition, the maximum frequency of the GPU (Gfx) can be limited in BIOS under **Advanced - Power & Performance - GT power management control** with option *Maximum GT frequency*.
Limiting the CPU and/or GPU frequency reduces power consumption and prevents the TDP from being exceeded.

The optimal settings for real-time operation depend on several factors:

7.4.4.3.1 CPU variant used:

- If CPU C-3965U is used, no further action (BIOS settings) are necessary. However, B&R still recommends using single-core operation for pure ARemb operation (*Active processor cores* limited to *1*).
- If a CPU i7-7600U is used, see "ARemb or B&R Hypervisor mode".

7.4.4.3.2 ARemb or B&R Hypervisor mode:

- For pure ARemb operation, single-core operation (*Active processor cores* = 1) must be used and the GPU frequency limited to an average value, see "Typical use cases for ARemb".
- For B&R Hypervisor mode, see "Typical use cases for B&R Hypervisor".

7.4.4.3.3 Typical use cases for ARemb:

The following configuration examples are intended to represent typical use cases.	
xPC3100 C-3965U	No limitation of CPU and/or GPU frequency necessary. Operation with max. CPU and Gfx frequency is possible. However, B&R recommends single-core operation (*Active processor cores* = 1).
xPC3100 i7-7600U	Single-core operation with 2800 MHz CPU frequency and 600 MHz Gfx frequency

7.4.4.3.4 Typical use cases for B&R Hypervisor:

The following configuration examples are intended to represent typical use cases.	
xPC3100 C-3965U	No limitation of CPU and/or GPU frequency necessary. Operation with max. CPU and Gfx frequency is possible.
xPC3100 i7-7600U	Single-core operation with 1600 MHz CPU frequency and 800 MHz Gfx frequency
	Single-core operation with 2100 MHz CPU frequency and 450 MHz Gfx frequency

7.4.5 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 APC mobile:

- ARemb upgrade AR 4.91
- Automation Studio V4.10
- APC mobile BIOS V1.00
- APC mobile MTCX V1.00

Information:

The following settings must be made to operate B&R Hypervisor:

- ***Advanced - OEM features - Realtime environment*** **must be enabled.**
- ***Advanced - OEM features - Hypervisor environment*** **must be enabled.**

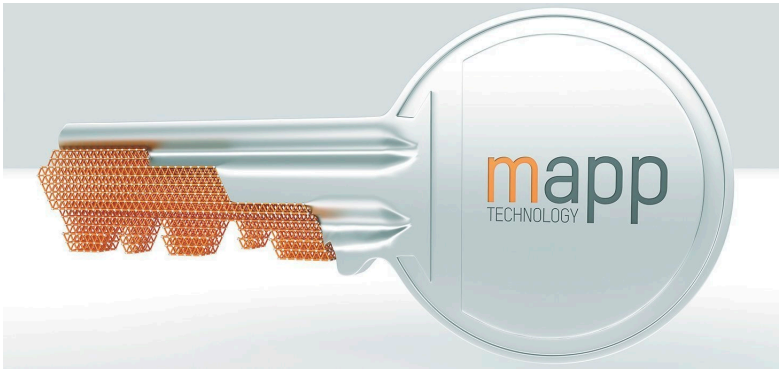
Information:

For additional important information regarding operation of Automation Runtime, see "Information about operation with Automation Runtime" on page 105.

Information:

For detailed information, see Automation Help or the B&R website (www.br-automation.com).

7.4.6 mapp Technology



mapp Technology if 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).

7.5 Automation Device Interface (ADI)

The Automation Device Interface (ADI) enables access to specific functions of B&R devices.

7.5.1 ADI driver

7.5.1.1 Installation

The ADI driver is included in most B&R Windows operating systems or can be installed on request.

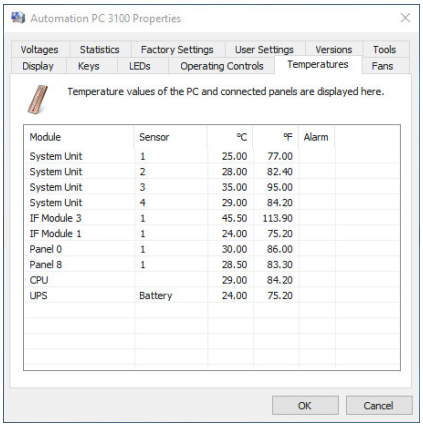
The ADI driver (also includes the ADI Control Center) and user documentation can be downloaded at no cost from the Downloads section of the B&R website (www.br-automation.com). If a more recent version is available, it can be installed later.

Information:

The *Write filter* must be disabled during installation.

7.5.1.2 ADI Control Center

The settings of B&R devices can be read out and changed in Windows using the ADI Control Center in the Control Panel. The figure shown is a symbolic image; the representation may vary depending on the device.



Information:

The displayed temperature and voltage values (e.g. CPU temperature, core voltage, battery voltage) represent uncalibrated information values. No conclusions about possible alarms or hardware malfunctions can be drawn from this. The hardware components used have automatic diagnostic functions in the event of error.

7.5.1.2.1 Functions

The ADI Control Center offers the following functions, for example:

- Changing display-specific parameters
- Reading out device-specific keys
- Updating the key configuration
- Testing keys or device-specific LEDs of a membrane keypad
- Reading out or calibrating control devices (e.g. key switch, handwheel, joystick, potentiometer)
- Reading out temperatures, fan speeds, switch positions and statistical data
- Reading out operating hours (power-on hours)
- Reading user settings and factory settings
- Reading out software versions
- Updating and backing up BIOS and firmware
- Creating reports for the current system (support)
- Setting the SDL equalizer value for the SDL cable adjustment
- Changing the user serial ID

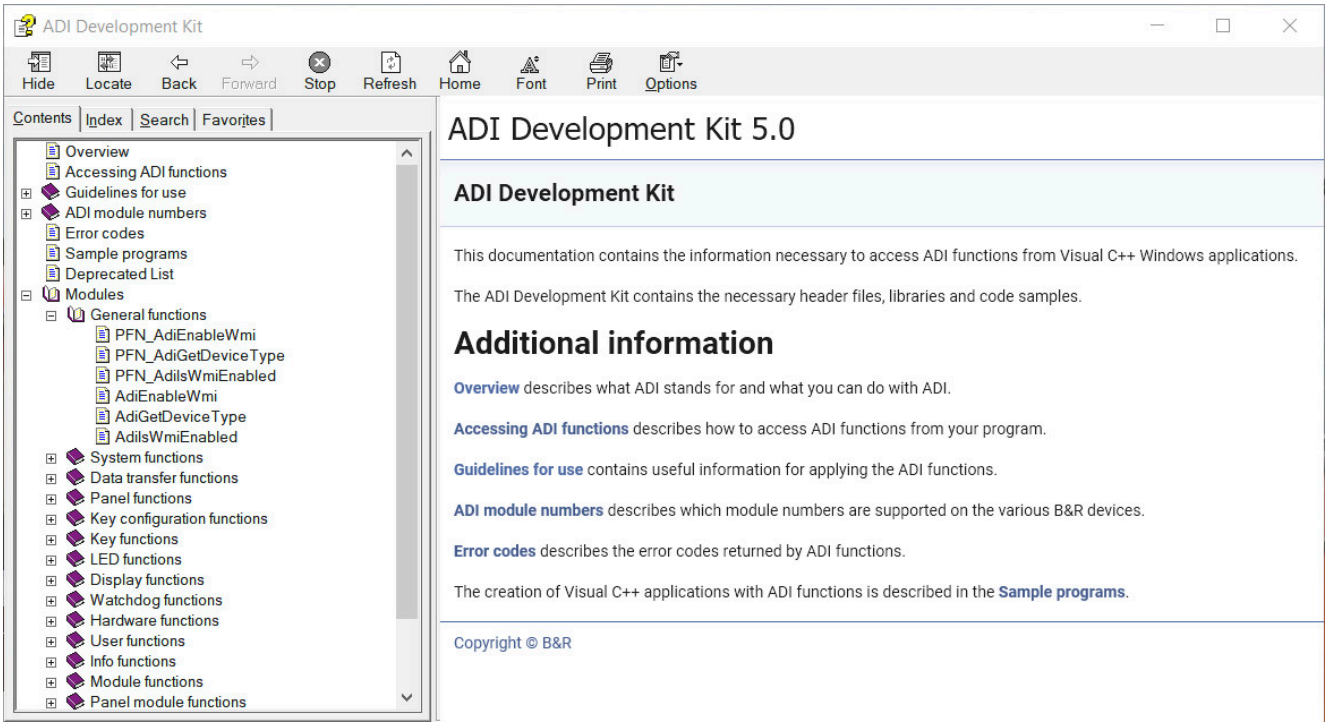
For a detailed description, see the user documentation for the ADI driver.

Information:

The functions available in the ADI Control Center depend on the device family.

7.5.2 ADI Development Kit

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
- Example projects
- ADI DLL: For testing applications if no ADI driver is installed.

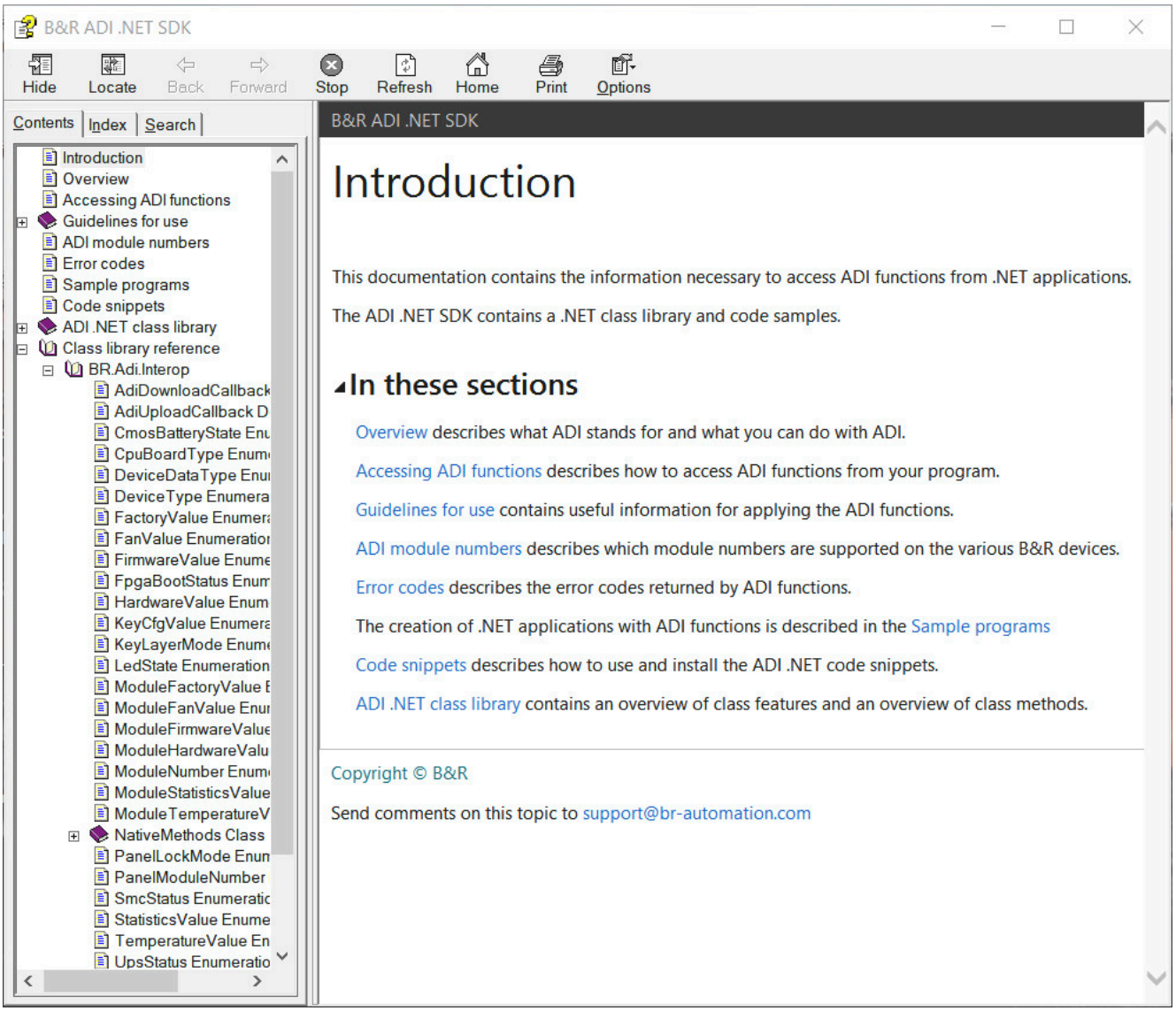
The appropriate ADI driver must be installed for the device. The ADI driver is already included in B&R images of embedded operating systems.

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).

7.5.3 ADI .NET SDK

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)
- Sample projects and code snippets
- ADI DLL: For testing applications if no ADI driver is installed.

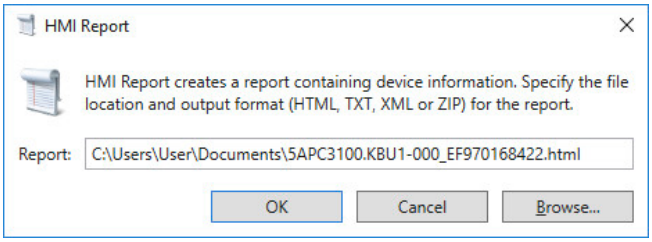
The appropriate ADI driver must be installed for the device. The ADI driver is already included in B&R images of embedded operating systems.

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).

7.5.4 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".

7.6 HMI Service Center

7.6.1 General information

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.

The test system consists of a USB flash drive with installed Windows PE operating system and the HMI Service Center.

For details about the HMI Service Center, see the HMI Service Center user's manual. This can be downloaded at no cost from the B&R website (www.br-automation.com).

7.6.2 Order data

Order number	Short description	Figure
	Accessories	
5SWUTI.0001-000	HMI Service Center USB flash drive - Hardware diagnostic software - For APC910/PPC900 - For PPC1200 - For APC2100/PPC2100 - For APC2200/PPC2200 - For APC3100/PPC3100 - For APC mobile - For AP800/AP900 - For AP9x3/AP9xD - For AP1000/AP5000	

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 Disconnecting the power supply

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.**

1. Switch off the device and disconnect the power supply.
2. Unlatch and disconnect the mating connector from the CMC multi-header of the APC mobile.

✓ The APC mobile is disconnected from the power supply.

8.2 Changing the battery

Warning!

The battery is only permitted to be replaced with a CR2477N 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:

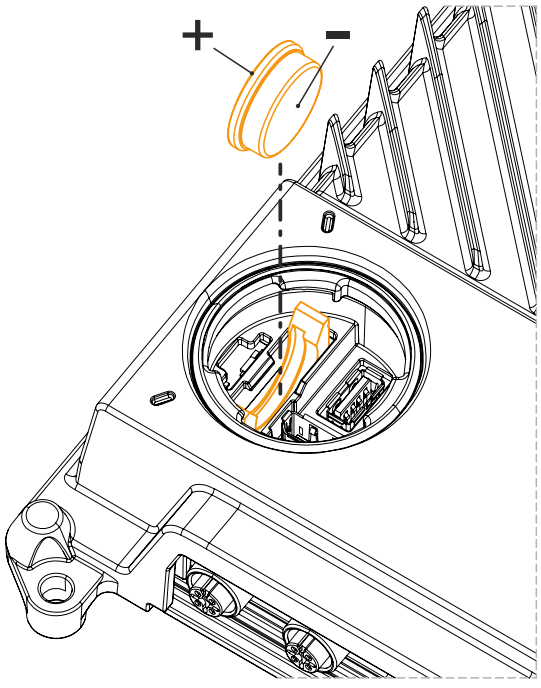
- The product design allows the battery to be changed when the PLC is in a voltage-free state as well as when the B&R device is switched on. In some countries, changing under operating voltage is not permitted, however; local regulations must be observed!
- The battery is only permitted to be changed 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 30

System unit	Max. retention time during battery change [h]
APC mobile	10

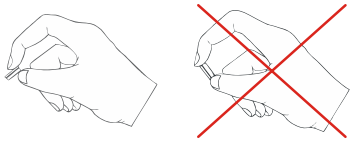
Procedure

1. Disconnect the power supply to the device.
2. Carry out electrostatic discharge on the housing or at the ground connection.
3. Open the service cover, see "Opening/Closing the service cover" on page 54.
4. Remove the old battery from the battery holder.



5. Insert the replacement battery into the battery holder.

> **Caution!**
>
> **The battery is not permitted to be held by its edges. Insulated tweezers may also be used to insert the battery.**
> **When reinserting, pay attention to the polarity.**



6. Close the service cover, see "Opening/Closing the service cover" on page 54.
7. Connect the device to the power supply again.
8. Set the date and time in BIOS again.

✓ The battery has been changed, and the APC mobile again meets IP69K requirements.

> **Warning!**
>
> **Lithium batteries are hazardous waste! Used batteries must be disposed of in accordance with local regulations.**

8.3 Cleaning

When cleaning the device, the limit values for IP69K protection and chemical resistance must be taken into account.

The service cover can be cleaned with a damp, soft cloth. When cleaning the service cover, it is important to ensure that no moisture or liquid enters the device during installation.

When cleaning, areas with adhesive labels and product information should be left out to avoid damage.

8.4 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 Technical information

9.A Maintenance Controller Extended (MTCX)

The MTCX controller (FPGA processor) is located on the mainboard (component of every system unit) of the APC mobile.

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
- Key and LED handling/coordination (matrix keyboard of B&R panels)
- Advanced desktop operation (buttons, USB forwarding)
- Daisy chain display operation (touch screen, USB redirection)
- Panel locking mechanism (configurable via the ADI Control Center)
- Backlight control of a connected B&R display
- Calculating statistical data: Power-on cycles, power-on hours and fan hours (resolution: 15 min)
- SDL data transfer (display, matrix keyboard, touch screen, service data, USB)
- LED status indicators (Power, Disk, Link, Run)
- Optimal (default) BIOS settings are reported to BIOS by the MTCX depending on the existing hardware.

The functions of the MTCX can be extended by upgrading its firmware[2)]. The version can be read in BIOS or in approved Microsoft Windows operating systems using the ADI Control Center.

9.B Cable lengths

Connection	Shielding	Cable length (max.)	Note
Power supply	No	-	9 - 32 VDC, on CMC multi-header KL30
Ignition	No	-	On CMC multi-header KL15
USB x	Yes	5 m	M12 circular connector
ETH x	Yes	100 m	M12 circular connector
DI_Power	No	5 m	On the CMC multi-header
DI_Reset	No	5 m	On the CMC multi-header
Heating status	No	5 m	On the CMC multi-header
RS232	No	15 m	On the CMC multi-header
RS422	No	15 m	On the CMC multi-header
CAN	No	Application-dependent	On the CMC multi-header
Audio	No	2.5 m	On the CMC multi-header
Fan	No	0.5 m	On the CMC multi-header
USB service interface	Yes	2.5 m	Service cover
DisplayPort	Yes	2.5 m	Service cover

2) Can be downloaded from the Downloads section of the B&R website (www.br-automation.com).

9.C Cable data

Signal		Signal	
RS232	"RS232 - Bus length and cable type" on page 120	RS422	"RS422 - Bus length and cable type" on page 120
RS485	"RS485 - Bus length and cable type" on page 121	CAN	"CAN - Bus length and cable type" on page 121

9.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

9.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

9.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

9.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
≤15 m	Typ. 1 Mbit/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

10 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.

10.1 General information

This accessory can be used for APC mobile, e.g. to assemble embedded cables.

10.1.1 Order data

Material number	Description
X67AC0C01-1	X67 male M12 connector, 5-pin, A-coded, shielded, cage clamp connection
X67AC0M12	X67 M12 threaded caps, 50 pcs.
X67AC2C01	X67 male M12 connector, 5-pin, A-keyed, shielded, screw clamp connection
X67AC2E01	X67 male M12 connector, 4-pin, D-keyed, shielded, insulation piercing connection
X67ACTQ12	X67 torque wrench 0.6 Nm for X67 male M12 connectors, for hex-head connectors
X67ACTQMX	X67 torque wrench set, for X67 M8 and M12 connectors, for hex-head connectors
X90TB120.01-00	X90 mobile 120, connector for CMC header, with connector contacts and dummy plugs

10.1.2 Technical data

Order number	X90TB120.01-00
Short description	
Accessories	Set consists of: 1x mating connector X1, 1x wire cap for 48-pin mating connector, 10x female connector for 1.5 mm contacts, 50x female connector for 0.6 mm contacts, 20x blind plug for 0.6 mm contacts, 5x blind plug for 1.5 mm contacts
General information	
Certifications	
CE	Yes
UKCA	Yes
Electrical properties	
Nominal voltage	12 / 24 VDC
Max. voltage	32 VDC
Nominal current [1]	4 A for 0.6 mm connections / 10 A for 1.5 mm connections
Ambient conditions	
Temperature	
Operation	Corresponds to the X90 module used
Mechanical properties	
Weight	100 g
Vendor information	
Manufacturer	Molex
Manufacturer's product ID	Mating connector X1: 64320-1311 Wire cap for 48-pin mating connector: 64320-1301 Female connector for 1.5 mm contacts: 0643221039 Female connector for 0.6 mm contacts: 0643231039 Blind plug for 0.6 mm contacts: 0643251010 Blind plug for 1.5 mm contacts: 0643251023

Table 66: X90TB120.01-00 - Technical data

1) The respective limit data of the individual I/O channels must be taken into account!

10.2 Cables

10.2.1 5CACMC.0030-000

10.2.1.1 General information

5CACMC.0030-000 is a pre-assembled cable with 48-pin CMC multi-header.

Information:

This product is a development accessory and intended for the commissioning and maintenance of APC mobile system units. Not intended for use in series-produced machines.

10.2.1.2 Order data

Order number	Short description	Figure
	Accessories	
5CACMC.0030-000	APC mobile, 3 m wiring harness, development accessory for commissioning and testing	

10.2.1.3 Technical data

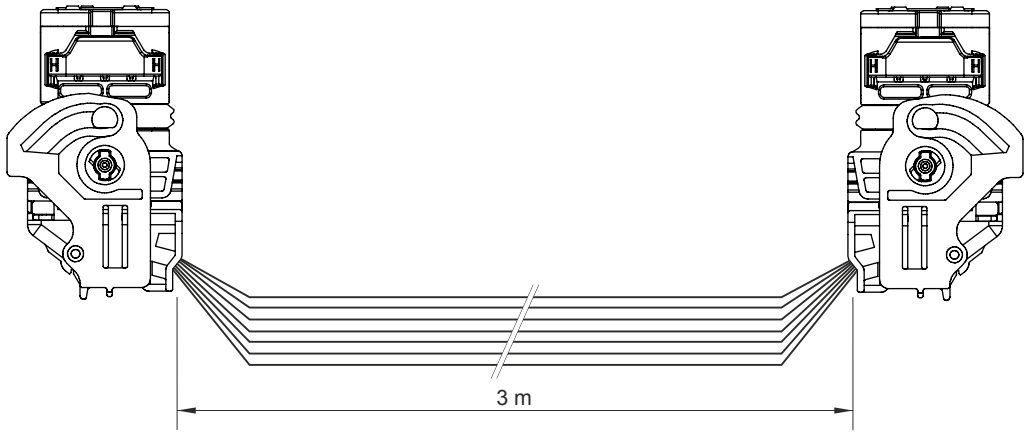
Information:

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	5CACMC.0030-000
General information	
Short description	Wiring harness with 48-pin CMC mating connector
Type	APC mobile connection cable
Cable cross section	
mm²	See section "Cable pinout".
Cable construction	
Outer jacket	
Material	PVC
Color	See section "Cable pinout".
Labeling	At least every 25 cm
Electrical properties	
Nominal voltage	12 / 24 VDC
Max. voltage	32 VDC
Nominal current [1)]	4 A for 0.6 mm connections / 10 A for 1.5 mm connections
Ambient conditions	
Temperature	
Operation	Corresponds to the used configuration of the APC mobile
Mechanical properties	
Dimensions	
Length	3 m
Bend radius	≥15 mm
Can be used in cable drag chains	No
Weight	Approx. 1,100 g

1) The respective limit data of the individual I/O channels must be taken into account!

10.2.1.4 Cable pinout



Pin	Cross section	Assignment (label)	Color
A1	0.5 mm²	Line_OUT_L (LineOUT_L)	White
A2	0.5 mm²	AGND	Black
A3	0.5 mm²	Line_IN_L (LineIN_L)	White
A4	0.5 mm²	MIC_L	White
B1	0.5 mm²	Line_OUT_R (LineOUT_R)	White
B2	0.5 mm²	AGND	Black
B3	0.5 mm²	Line_IN_R (LineIN_R)	White
B4	0.5 mm²	MIC_R	White
C1	0.5 mm²	DI_POWER	Yellow
C2	0.5 mm²	DI_RESET	Yellow
C3	0.5 mm²	GND_DI (GND DI)	Black
C4	0.5 mm²	AGND	Black
D1	0.5 mm²	CAN_H	Pink
D2	0.5 mm²	CAN_L	Pink
D3	0.5 mm²	GND_CAN	Black
D4	(n. c.)[1]		
E1	0.5 mm²	RS232_TXD	Gray
E2	0.5 mm²	RS232_RTS	Gray
E3	0.5 mm²	GND_RS232	Black
E4	(n. c.)		
F1	0.5 mm²	RS232_RXD	Gray
F2	0.5 mm²	RS232_CTS	Gray
F3	(n. c.)		
F4	(n. c.)		
G1	0.5 mm²	RS422_RXD	Orange
G2	0.5 mm²	RS422_$\overline{\text{RXD}}$ (RS422_RXDn)	Orange
G3	(n. c.)		
G4	(n. c.)		
H1	0.5 mm²	RS422_TXD	Orange
H2	0.5 mm²	RS422_$\overline{\text{TXD}}$ (RS422_TXDn)	Orange
H3	(n. c.)		
H4	(n. c.)		
J1	0.5 mm²	GND_RS422	Black
J2	0.5 mm²	FAN_DET	Brown
J3	0.5 mm²	GND_FAN_DET	Black
J4	(n. c.)		
K1	0.5 mm²	GND_FAN1	Black
K2	0.5 mm²	FAN1_PWM	Brown
K3	0.5 mm²	FAN2_PWM	Brown
K4	0.5 mm²	DO_preheat (DO_Heat_State)	Gray
L1	1.5 mm²	GND power	Black
L2	1.5 mm²	GND power	Black
L3	1.5 mm²	GND_FAN2	Black
L4	1.5 mm²	FAN_PWR (FAN_Power)	Brown
M1	1.5 mm²	VCC	Red
M2	1.5 mm²	VCC	Red
M3	1.5 mm²	Ignition	Violet
M4	1.5 mm²	GND_Power_Ignition	Black

1) Not connected.

10.2.2 5CAUSB.0030-000

10.2.2.1 General information

5CAUSB.0030-000 is a pre-assembled M12 to USB type A cable.

Information:

This product is a development accessory and intended for the commissioning and maintenance of APC mobile system units. Not intended for use in series-produced machines.

10.2.2.2 Order data

Order number	Short description	Figure
	Accessories	
5CAUSB.0030-000	USB cable M12 to USB 2.0 type A, 3 m, development accessory for commissioning and testing	

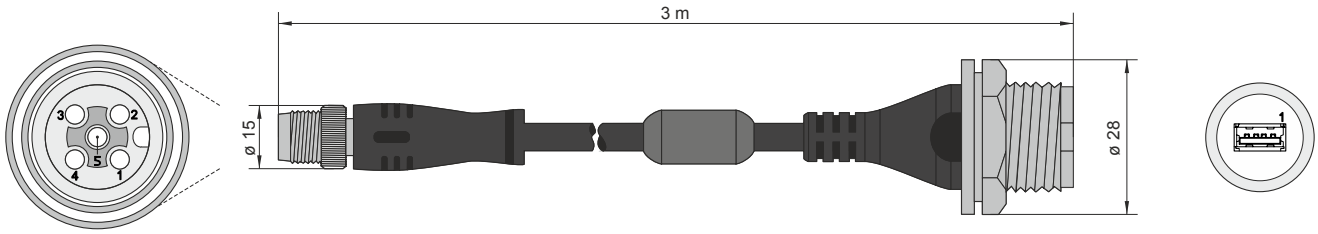
10.2.2.3 Technical data

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	5CAUSB.0030-000
General information	
Note	Halogen-free, lead-free
Connection	M12 to USB 2.0 type A
Cable cross section	4x 24 AWG
Type	M12, 5-pin, A-coded, male to USB 2.0 type A, female
Cable construction	
Cable shield	Aluminum foil and braided wire shield
Outer jacket	
Material	Polyurethane (PUR)
Color	Black
Connector	
Mating cycles	Max. 3000 (USB)
Operating conditions	
Degree of protection per EN 60529	M12 connection side: IP69K, only when properly connected USB connection side: IP65, only when properly connected
Ambient conditions	
Temperature	
Fixed installation	-40 to 90°C
Flexible installation	-25 to 80°C
Mechanical properties	
Dimensions	
Length	Approx. 3 m
Bend radius	
Fixed installation	≥10x cable diameter
Flexible installation	≥15x cable diameter
Can be used in cable drag chains	No
Weight	Approx. 150 g

10.2.2.4 Cable pinout



10.3 USB mass storage device

For additional information about compatible USB mass storage devices, see the B&R website (USB mass storage devices).

11 International and national certifications

11.1 CE marking

All directives applicable to the respective product and their harmonized EN standards are met.

11.2 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.

11.3 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.

12 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.

12.1 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.