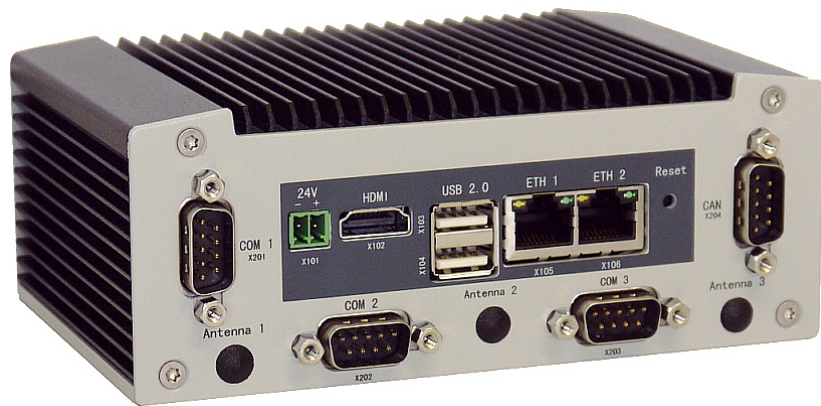# » User's Guide «

KBox A-201/A-202

User's Guide (Version 1.2)
1059-4235

This page has been intentionally left blank.

Table of Contents

Table of Figures

1. Disclaimer

Kontron would like to point out that the information contained in this user guide may be subject to alteration, particularly as a result of the constant upgrading of Kontron products. This document does not entail any guarantee on the part of Kontron with respect to technical processes described in the user guide or any product characteristics set out in the user guide. Kontron assumes no responsibility or liability for the use of the described product(s), conveys no license or title under any patent, copyright or mask work rights to these products and makes no representations or warranties that these products are free from patent, copyright or mask work right infringement unless otherwise specified. Applications that are described in this user guide are for illustration purposes only. Kontron makes no representation or warranty that such application will be suitable for the specified use without further testing or modification. Kontron expressly informs the user that this user guide only contains a general description of processes and instructions which may not be applicable in every individual case. In cases of doubt, please contact Kontron.

This user guide is protected by copyright. All rights are reserved by Kontron. No part of this document may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form or by any means (electronic, mechanical, photocopying, recording, or otherwise), without the express written permission of Kontron. Kontron points out that the information contained in this user guide is constantly being updated in line with the technical alterations and improvements made by Kontron to the products and thus this user guide only reflects the technical status of the products by Kontron at the time of publishing.

Brand and product names are trademarks or registered trademarks of their respective owners.

©2018 by Kontron S&T AG

Kontron S&T AG

Lise-Meitner-Str. 3-5
86156 Augsburg
Germany
www.kontron.com

High Risk Applications Hazard Notice

THIS DEVICE AND ASSOCIATED SOFTWARE ARE NOT DESIGNED, MANUFACTURED OR INTENDED FOR USE OR RESALE FOR THE OPERATION OF NUCLEAR FACILITIES, THE NAVIGATION, CONTROL OR COMMUNICATION SYSTEMS FOR AIRCRAFT OR OTHER TRANSPORTATION, AIR TRAFFIC CONTROL, LIFE SUPPORT OR LIFE SUSTAINING APPLICATIONS, WEAPONS SYSTEMS, OR ANY OTHER APPLICATION IN A HAZARDOUS ENVIRONMENT, OR REQUIRING FAIL-SAFE PERFORMANCE, OR IN WHICH THE FAILURE OF PRODUCTS COULD LEAD DIRECTLY TO DEATH, PERSONAL INJURY, OR SEVERE PHYSICAL OR ENVIRONMENTAL DAMAGE (COLLECTIVELY, "HIGH RISK APPLICATIONS").

You understand and agree that your use of Kontron devices as a component in High Risk Applications is entirely at your risk. To minimize the risks associated with your products and applications, you should provide adequate design and operating safeguards. You are solely responsible for compliance with all legal, regulatory, safety, and security related requirements concerning your products. You are responsible to ensure that your systems (and any Kontron hardware or software components incorporated in your systems) meet all applicable requirements. Unless otherwise stated in the product documentation, the Kontron device is not provided with error-tolerance capabilities and cannot therefore be deemed as being engineered, manufactured or setup to be compliant for implementation or for resale as device in High Risk Applications. All application and safety related information in this document (including application descriptions, suggested safety measures, suggested Kontron products, and other materials) is provided for reference only.

Terms and Conditions

Kontron warrants products in accordance with defined regional warranty periods. For more information about warranty compliance and conformity, and the warranty period in your region, visit http://www.kontron.com/terms-and-conditions.

Kontron sells products worldwide and declares regional General Terms & Conditions of Sale, and Purchase Order Terms & Conditions.   Visit http://www.kontron.com/terms-and-conditions.

For contact information, refer to the corporate offices contact information on the last page of this user guide or visit our website CONTACT US.

Customer Support

Find Kontron contacts by visiting: http://www.kontron.com/support.

Customer Service
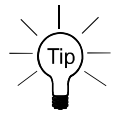
As a trusted technology innovator and global solutions provider, Kontron extends its embedded market strengths into a services portfolio allowing companies to break the barriers of traditional product lifecycles. Proven product expertise coupled with collaborative and highly-experienced support enables Kontron to provide exceptional peace of mind to build and maintain successful products.

For more details on Kontron's service offerings such as: enhanced repair services, extended warranty, Kontron training academy, and more visit http://www.kontron.com/support-and-services/services.

Customer Comments

If you have any difficulties using this user guide, discover an error, or just want to provide some feedback, contact Kontron support. Detail any errors you find. We will correct the errors or problems as soon as possible and post the revised user guide on our website.

Symbols used in this Manual

Symbol	Meaning
⚠	This symbol indicates the danger of injury to the user or the risk of damage to the product if the corresponding warning notices are not observed.
☞	This symbol indicates that the product or parts thereof may be damaged if the corresponding warning notices are not observed.
i	This symbol indicates general information about the product and the user manual.
i	This symbol indicates detail information about the specific product configuration.
Tip	This symbol precedes helpful hints and tips for daily use.

Information about the System Designation and Description in this Manual

This manual includes description and specifications for the KBox A-20x Family product line.

Product Variants of the KBox A-200 Family

Used Designation	
KBox A-201	Equipped with SMARC-sXQU processor module
KBox A-202	Equipped with SMARC sXBTi processor module

i	For the different KBox A-201/A-202 configurations refer also to chapter 10 "Technical Specification".

For Your Safety

Your new Kontron product was developed and tested carefully to provide all features necessary to ensure its compliance with electrical safety requirements. It was also designed for a long fault-free life. However, the life expectancy of your product can be drastically reduced by improper treatment during unpacking and installation. Therefore, in the interest of your own safety and of the correct operation of your new Kontron product, you are requested to conform with the following guidelines.

High Voltage Safety Instructions

As a precaution and in case of danger, the power connector must be easily accessible. The power connector is the product's main disconnect device.

⚠ CAUTION	**Warning** All operations on this product must be carried out by sufficiently skilled personnel only.

⚠ CAUTION	**Electric Shock!** Before installing a non hot-swappable Kontron product into a system always ensure that your mains power is switched off. This also applies to the installation of piggybacks. Serious electrical shock hazards can exist during all installation, repair, and maintenance operations on this product. Therefore, always unplug the power cable and any other cables which provide external voltages before performing any work on this product. Earth ground connection to vehicle's chassis or a central grounding point shall remain connected. The earth ground cable shall be the last cable to be disconnected or the first cable to be connected when performing installation or removal procedures on this product.

Special Handling and Unpacking Instruction

NOTICE	**ESD Sensitive Device!** Electronic boards and their components are sensitive to static electricity. Therefore, care must be taken during all handling operations and inspections of this product, in order to ensure product integrity at all times.

Do not handle this product out of its protective enclosure while it is not used for operational purposes unless it is otherwise protected.

Whenever possible, unpack or pack this product only at EOS/ESD safe work stations. Where a safe work station is not guaranteed, it is important for the user to be electrically discharged before touching the product with his/her hands or tools. This is most easily done by touching a metal part of your system housing.

It is particularly important to observe standard anti-static precautions when changing piggybacks, ROM devices, jumper settings etc. If the product contains batteries for RTC or memory backup, ensure that the product is not placed on conductive surfaces, including anti-static plastics or sponges. They can cause short circuits and damage the batteries or conductive circuits on the product.

Lithium Battery Precautions

If your product is equipped with a lithium battery, take the following precautions when replacing the battery.

⚠CAUTION	Danger of explosion if the battery is replaced incorrectly. Replace only with same or equivalent battery type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

General Instructions on Usage

In order to maintain Kontron's product warranty, this product must not be altered or modified in any way. Changes or modifications to the product, that are not explicitly approved by Kontron and described in this user guide or received from Kontron Support as a special handling instruction, will void your warranty.

This product should only be installed in or connected to systems that fulfill all necessary technical and specific environmental requirements. This also applies to the operational temperature range of the specific board version that must not be exceeded. If batteries are present, their temperature restrictions must be taken into account.

In performing all necessary installation and application operations, only follow the instructions supplied by the present user guide.

Keep all the original packaging material for future storage or warranty shipments. If it is necessary to store or ship the product then re-pack it in the same manner as it was delivered.

Special care is necessary when handling or unpacking the product. See Special Handling and Unpacking Instruction.

Quality and Environmental Management

Kontron aims to deliver reliable high-end products designed and built for quality, and aims to complying with environmental laws, regulations, and other environmentally oriented requirements. For more information regarding Kontron's quality and environmental responsibilities, visit http://www.kontron.com/about-kontron/corporate-responsibility/quality-management.

Disposal and Recycling

Kontron's products are manufactured to satisfy environmental protection requirements where possible. Many of the components used are capable of being recycled. Final disposal of this product after its service life must be accomplished in accordance with applicable country, state, or local laws or regulations.

WEEE Compliance

- ❑ The Waste Electrical and Electronic Equipment (WEEE) Directive aims to:
- ❑ Reduce waste arising from electrical and electronic equipment (EEE)
- ❑ Make producers of EEE responsible for the environmental impact of their products, especially when the product become waste
- ❑ Encourage separate collection and subsequent treatment, reuse, recovery, recycling and sound environmental disposal of EEE
- ❑ Improve the environmental performance of all those involved during the lifecycle of EEE

	Environmental protection is a high priority with Kontron. Kontron follows the WEEE directive You are encouraged to return our products for proper disposal.

2. General Safety Instructions for IT Equipment

Please read this chapter carefully and take careful note of the instructions, which have been compiled for your safety and to ensure to apply in accordance with intended regulations. If the following general safety instructions are not observed, it could lead to injuries to the operator and/or damage of the product; in cases of nonobservance of the instructions Kontron is exempt from accident liability, this also applies during the warranty period.

❑ The product must be used as specified in the product documentation, in which the instructions for safety for the product and for the operator are described. These contain guidelines for setting up, installation and assembly, maintenance, transport or storage.

❑ The on-site electrical installation must meet the requirements of the country's specific local regulations.

❑ If a power cable comes with the product, only this cable should be used. Do not use an extension cable to connect the product.

❑ To guarantee that sufficient air circulation is available to cool the product, please ensure that the ventilation openings are not covered or blocked. If an air filter is provided, this should be cleaned regularly. Do not place the system close to heat sources or damp places. Make sure the system is well ventilated.

❑ Only devices or parts which fulfill the requirements of SELV circuits (Safety Extra Low Voltage) as stipulated by IEC 60950-1 may be connected to the available interfaces.

❑ Before opening the device, make sure that the device is disconnected from the mains.

❑ Switching off the device by its power button does not disconnect it from the mains. Complete disconnection is only possible if the power cable is removed from the wall plug or from the device. Ensure that there is free and easy access to enable disconnection.

❑ The device may only be opened for the insertion or removal of add-on cards (depending on the configuration of the system). This may only be carried out by qualified operators.

❑ If extensions are being carried out, the following must be observed:

• all effective legal regulations and all technical data are adhered to

• the power consumption of any add-on card does not exceed the specified limitations

• the current consumption of the system does not exceed the value stated on the product label.

❑ Only original accessories that have been approved by Kontron can be used.

❑ Please note: safe operation is no longer possible when any of the following applies:

• the device has visible damages or

• the device is no longer functioning
In this case the device must be switched off and it must be ensured that the device can no longer be operated.

Additional general safety instructions for DC power supply circuits

❑ A sufficient dimensioning of the power cable wires must be selected – according to the maximum electrical specifications on the product label – as stipulated by EN60950-1 or VDE0100 or EN60204 or UL508 regulations.

❑ The devices do not generally fulfill the requirements for "centralized DC power systems" (UL 60950-1, Annex NAB; D2) and therefore may not be connected to such devices!

❑ *(The following section is not applicable for the KBox A-201/A-202)*
To guarantee safe operation of devices with DC power supply voltages **larger than 60 volts DC** or a power consumption **larger than 240 VA)**, please observe that:

- the device is set up, installed and operated in a room or enclosure marked with "RESTRICTED ACCESS", if there are no safety messages on product as safety signs and labels on the device itself.
- no cables or parts without insulation in electrical circuits with dangerous voltage or power should be touched directly or indirectly
- a reliable protective earthing connection is provided
- a suitable, easily accessible disconnecting device is used in the application (e.g. overcurrent protective device,), if the device itself is not disconnectable
- a disconnect device, if provided in or as part of the equipment, shall disconnect both poles simultaneously
- interconnecting power circuits of different devices cause no electrical hazards

2.1. Electrostatic Discharge (ESD)

A sudden discharge of electrostatic electricity can destroy static-sensitive devices or micro-circuitry. Proper packaging and grounding techniques are necessary precautions to prevent damage. Always take the following precautions:

1. Transport boards in static-safe containers such as boxes or bags.

2. Keep electrostatic sensitive parts in their containers until they arrive at the ESD-safe workplace.

3. Always be properly grounded when touching a sensitive board, component, or assembly.

4. Store electrostatic-sensitive boards in protective packaging or on antistatic mats.

2.1.1. Grounding Methods

The following measures help to avoid electrostatic damages to the device:

1. Cover workstations with approved antistatic material. Always wear a wrist strap connected to workplace as well as properly grounded tools and equipment.

2. Use anti-static mats, heel straps, or air ionizes to give added protection.

3. Always handle electrostatic sensitive components by their edge or by their casing.

4. Avoid contact with pins, leads, or circuitry.

5. Turn off power and input signals before inserting and removing connectors or connecting test equipment.

6. Keep work area free of non-conductive materials such as ordinary plastic assembly aids and styrofoam.

7. Use field service tools such as cutters, screwdrivers, and vacuum cleaners which are conductive.

8. Always place drives and boards PCB-assembly-side down on the foam.

3. Electromagnetic Compatibility (Class A Device)

3.1. Electromagnetic Compatibility (EU)

This product is intended only for use in industrial areas. The most recent version of the EMC guidelines (EMC Directive 2014/30/EU) and/or the German EMC laws apply. If the user modifies and/or adds to the equipment (e.g. installation of add-on cards) the prerequisites for the CE conformity declaration (safety requirements) may no longer apply.

Warning!
This is a class A product. In domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

3.2. FCC Statement (USA)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

3.3. EMC Compliance (Canada)

The method of compliance is self-declaration to Canadian standard ICES-003:

(English): This Class A digital apparatus complies with the Canadian ICES-003.

(French): Cet appareil numérique de la class A est conforme à la norme NMB-003 du Canada.

4. Shipment and Unpacking

4.1. Unpacking

Proceed as follows to unpack the unit:

5. Remove packaging.

6. Do not discard the original packaging. Keep it for future relocation.

7. Check the delivery for completeness by comparing it with your order.

8. Please keep the associated paperwork. It contains important information for handling the unit.

9. Check the contents for visible shipping damage.

10. If you notice any shipping damage or inconsistencies between the contents and your order, please contact Kontron for help and information.

4.2. Scope of Delivery

4.2.1. Standard

❑ KBox A-201/A-202 (corresponding to the ordered system configuration)
❑ Power connector Phoenix FMC 1,5/2-ST-3,5 2-pin plug
❑ General Safety Instructions for IT Equipment

4.2.2. Optional Parts

❑ DIN rail mounting clip
❑ Mini PCIe WiFI card (always factory-installed if orderd) with two antennas (enclosed)
❑ KBox A-202 can optionally be ordered with a factory-installed SSD Kit

4.3. Type Label and Product Identification

The type label (product name, serial number) of your KBox A-201/A-202 system is located on the bottom side of the device (refer to Fig. 1 and Fig. 8, pos. 1).
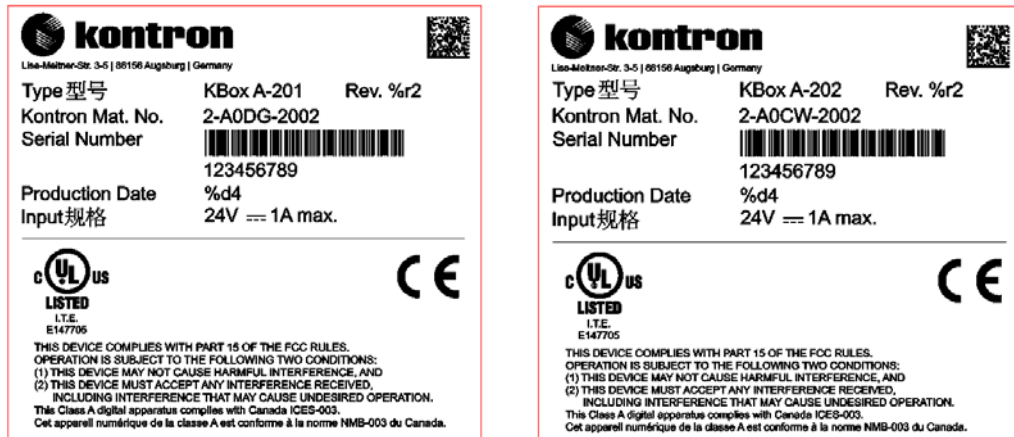

Fig. 1: Type label

5. System Overview

The KBox A-201/A-202 expands the Kontron line of computers - KBox Series. It is a highly scalable and flexible industrial computer. The scalability performance is achieved through the use of the Computer-on-Module SMARC-sXBT (KBox A-202) and SMARC-sXQU (KBox A-201). This is based on Intel's Quark or Bay Trail platforms and is available in different variants.

☞   Refer to the information and technical data in the user manual of the installed SMARC-sXQU/sXBT Module.

Refer to the information and technical data in the user manual of the installed SMARC-sXQU/sXBT Module.

The user's manual of the installed SMARC- sXQU/sXBTi Module can be downloaded from our web page www.kontron.com . Search for the name of the installed module.

The "wartungsfrei" design of the KBox A-201/A-202 includes a fanless, battery free and soldered memory (memory down) conception, which makes the KBox to the ideal all-lockable Box PC for the industrial environment.

Based on this technology, Kontron´s IoT ready KBox A-201/A-202 increases the flexibility, serviceability and cost efficiency for various applications, such as industrial automation, communication or transportation.

The KBox A-201/A-202 hardware system configuration and the robust construction with excellent mechanical stability offer the superior qualities of a computer designed for operation in harsh industrial environment. It is a fanless system based on a compact U-shaped aluminum chassis with cooling fins.

The rated voltage of the mains (+24 V DC) can be found on the type label. The type label is located at the bottom side of the device. The KBox A-201/A-202 may be optionally factory-equipped with an mPCIe WLAN card for two antennas. For the configuration of your KBox A-201/A-202 please follow the ordering options specified in "Configuration Guides – KBox Series" on our web site www.kontron.com.

The following interfaces are available with the KBox A-201/A-202:

Standard front panel:

- ❑ 24 V DC input power (X101)
- ❑ HDMI Port (X102), KBox A-202 only
- ❑ 2x USB 2.0 (X103, X104)
- ❑ 2x Ethernet (X105, X106)
  KBox A-201: 1x Gigabit Ethernet (10/100/1000) and 1x Fast Ethernet (10/100)
  KBox-A-202: 2x Gigabit Ethernet (10/100/1000)
- ❑ COM 1 (X201), RS232
- ❑ COM 2 (X202), RS232, KBox A-201 only
- ❑ COM 3 (X203), RS485, KBox A-202 only
- ❑ CANbus (X204), currently not supported
- ❑ Reset button

The device is designed to be operated in:

❑ vertical position: (KBox A-201/A-202 configuration with vertical mounting plate attached to the rear side of the chassis or with DIN rail clip attached to the right side/cover of the chassis) mounted inside a control cabinet or

❑ horizontal position: (KBox A-201/A-202 configuration without mounting) on a table or another flat surface

☞   When powering on the KBox A-201/A-202, make sure that the cooling fins of the chassis (Fig. 9, Fig. 10 and Fig. 11, pos. 6) are not obstructed (covered) by any objects.

To provide sufficient heat dissipation by the cooling of the device, do not cover the cooling fins of the KBox A-201/A-202. Do not place any objects on the device. When installing the system, please note the clearance recommendation in the section 7.1 "System Mounting".

5.1. RTC

The KBox A-201/A-202 comprises a chipset internal RTC. To provide a valid date and time when no power is connected to the KBox A-201/A-202, the RTC is equipped with a goldcap buffer.

5.1.1. RTC Buffer Time

The RTC buffer time is depending of the ambient temperature.
If the time is not valid this is indicated by a status bit in the RTC registers.

𝑖   To get the maximum buffer time it is necessary to have the system a certain time powered on. This ensures that the buffer capacitors are fully loaded.

The buffer time depends on the ambient temperature and on how long the box is connected to its power supply.

5.2. System Expansion Capabilities

The KBox A-201/A-202 is available in the configurations described in this manual (chapter 10 "Technical Specification"). If you are interested in a different, customer-specific configuration, feel free to contact Kontron and ask for your requirements. Contact information can be found on our web site www.kontron.com.

5.3. Block Diagrams
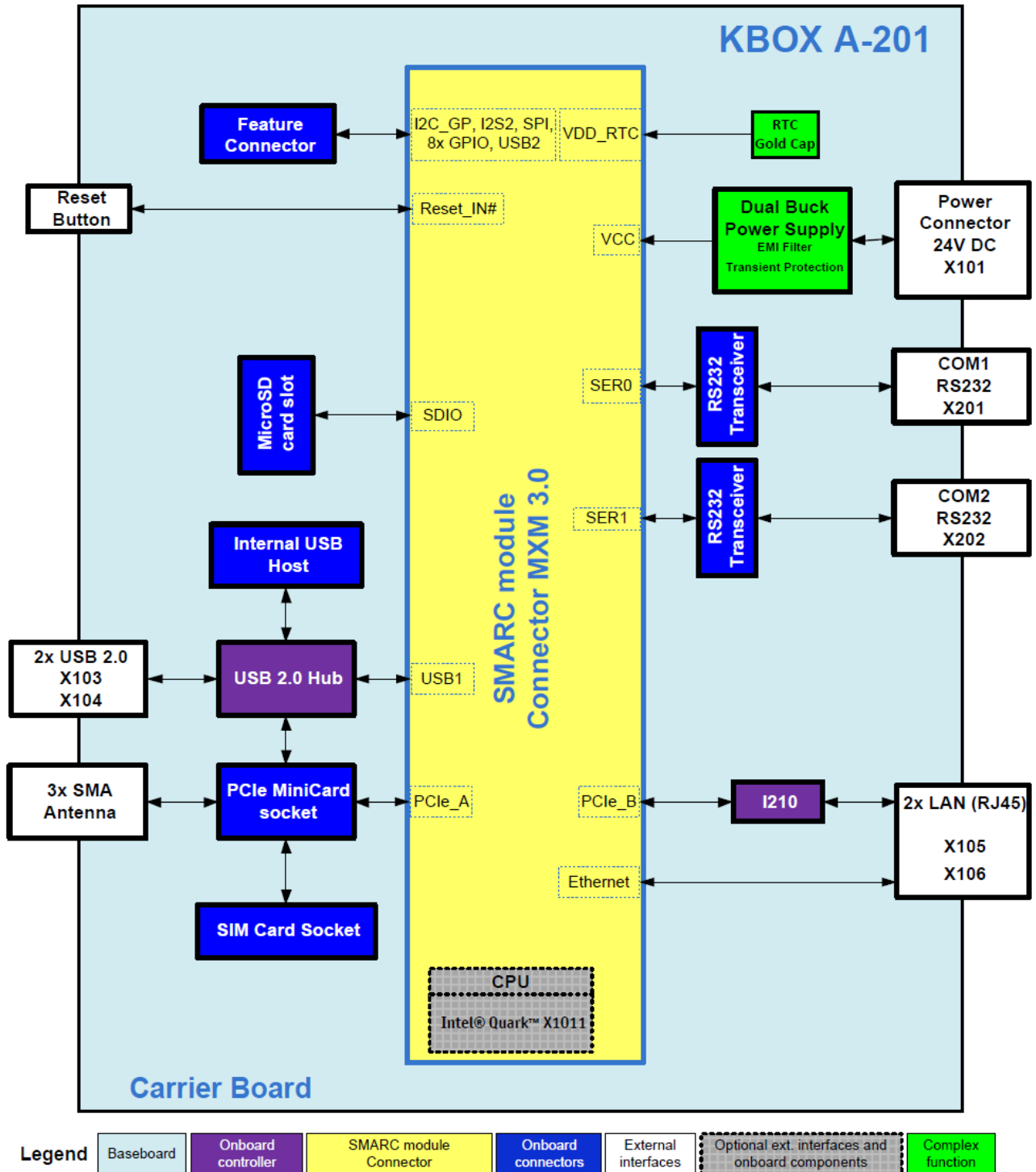
5.3.1. Block diagram of KBox A-201

Fig. 2: Block diagram of KBox A-201

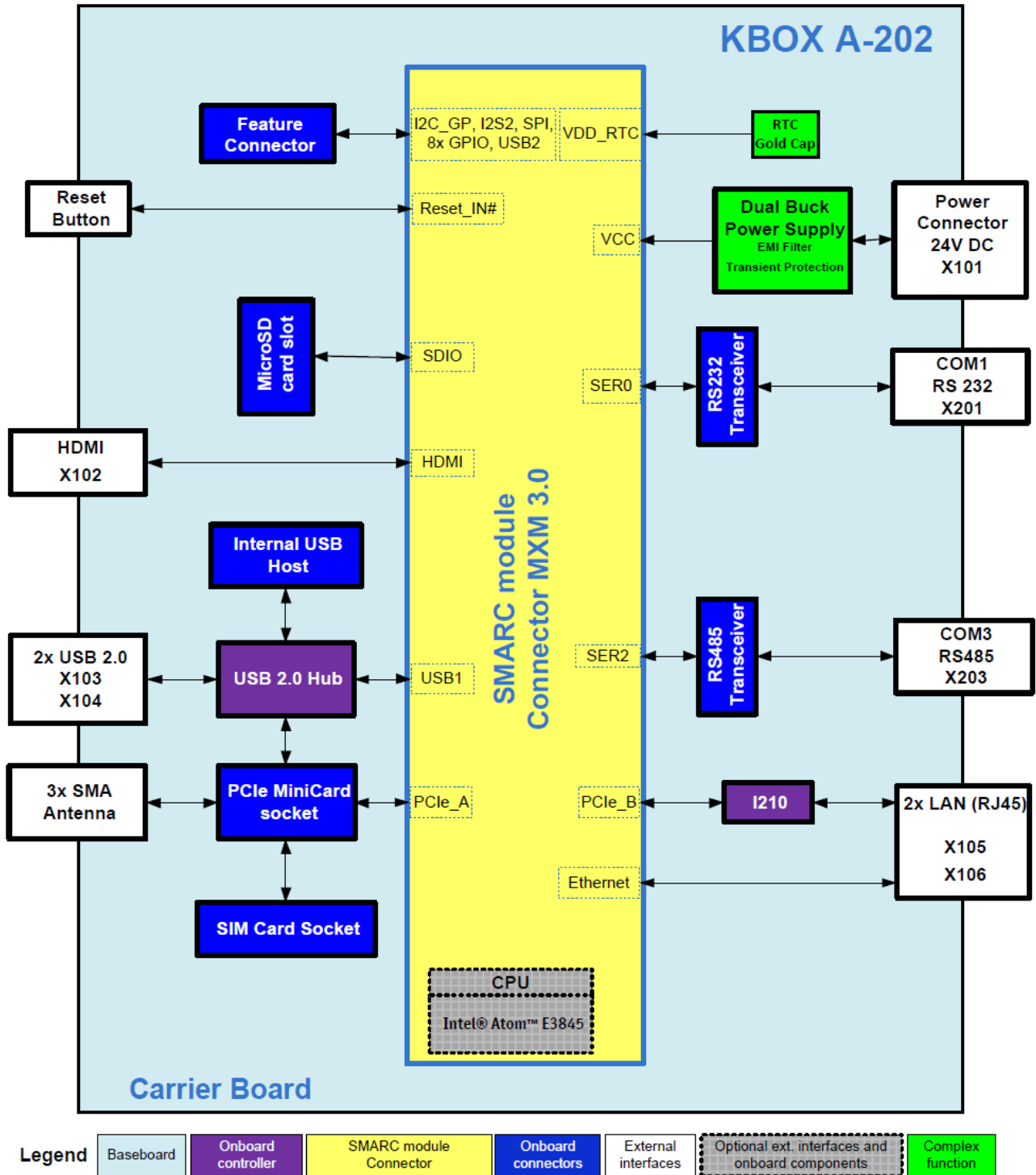### 5.3.2. Block diagram of KBox A-202

Fig. 3: Block diagram of KBox A-202
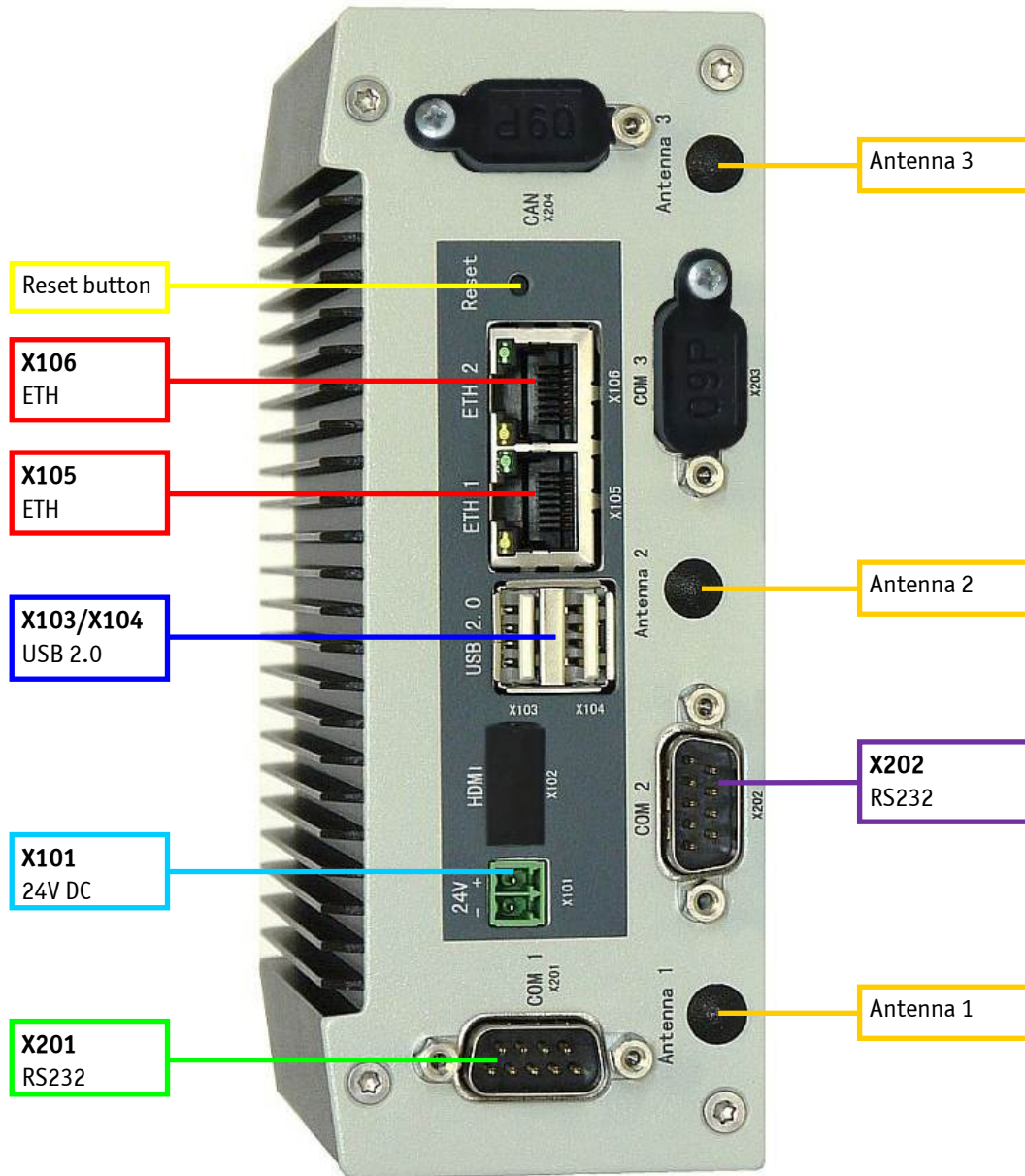
5.4. Front Side of KBox A-201

Fig. 4: Front view of KBox A-201

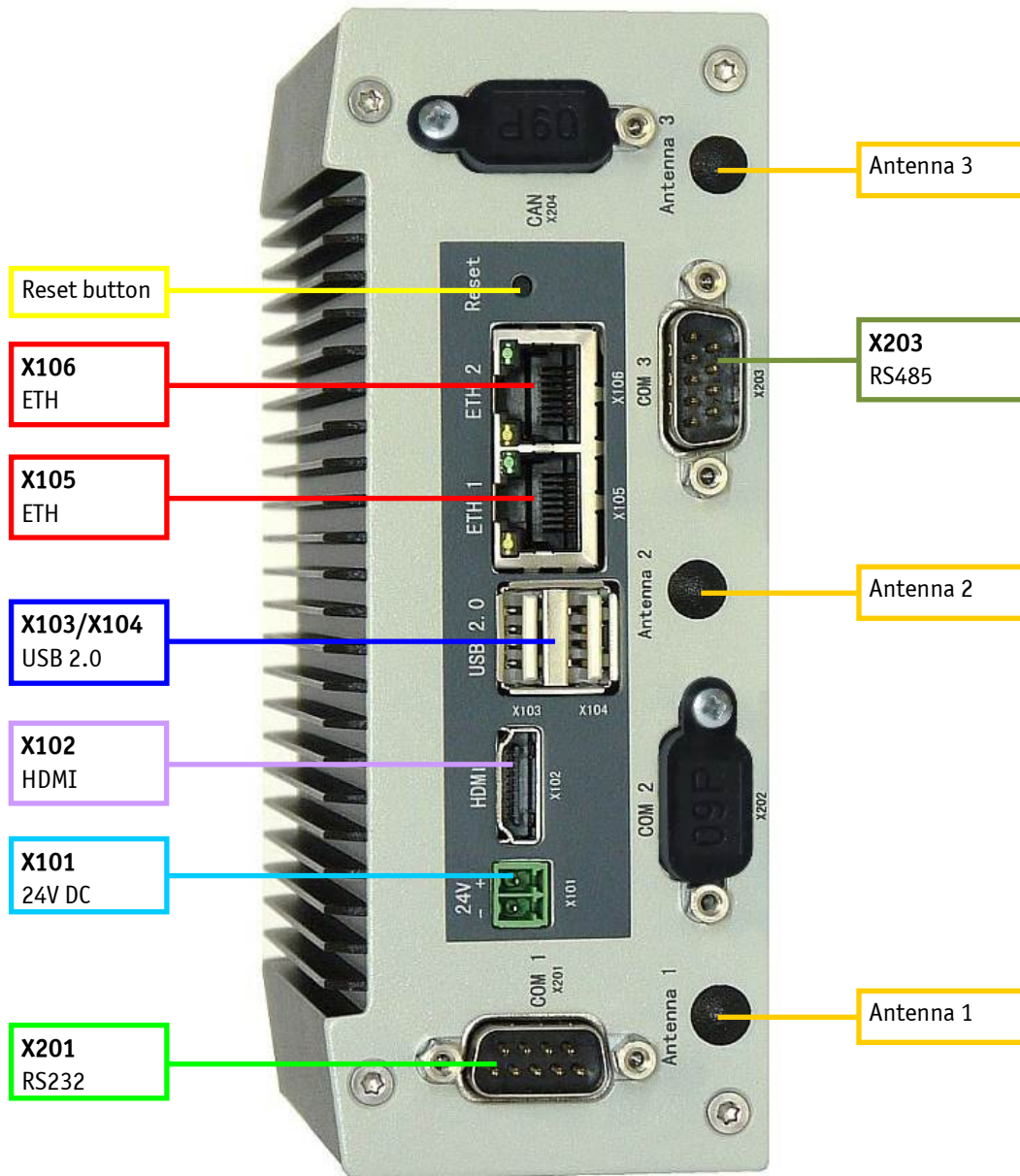## 5.5. Front Side of KBox A-202

Fig. 5: Front view of KBox A-202

5.6. Front Interfaces of the KBox A-20x

5.6.1. X101 - Power Input Connector

The 2-pin connector (X101, Fig. 4, Fig. 6) provides the power connection of the KBox A-201/A-202 to the appropriate DC main power supply. For pin assignments refer to the subsection 11.1.1.
The external cable connector is a Phoenix FMC 1,5/ 2-ST-3,5 2-pin plug . This power plug is delivered along with the KBox A-201/A-202. Please observe the section 8.1 "Connecting to DC Main Power Supply". The mating connector is a Phoenix MC 1,5/ 2-G-3,5 connector.

Pin	Signal Name
1	0 V (Ground)
2	+24 V DC
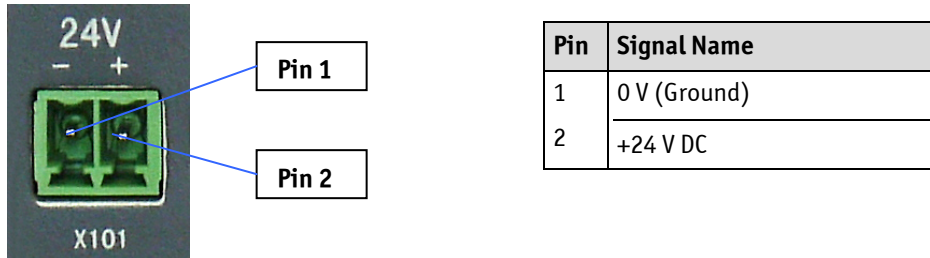
Fig. 6: X101 – 24 V DC power input connector

The unit is only completely disconnected from the DC mains, when the power is removed.

 For preparing the power cable for the KBox A-201/A-202 by connecting appropriate wires to the Phoenix power terminal, refer to subsection 7.2.1 "Cabling".

5.6.2. X102 – HDMI (KBox A-202 only)

This is a HDMI compliant interface realized using a HDMI 1.1 connector. An external (digital) display can be connected to the HDMI connector (X102, Fig. 4). For pin assignment refer to subsection 11.1.7 "(X102) HDMI Port".

5.6.3. X103/X104 - USB 2.0

The KBox A-201/A-202 provides two USB 2.0/1.1 interfaces. These connectors (X103/X104, Fig. 4) allow connection of USB-compatible devices to the system. For pin assignment refer to subsection 11.1.5.

5.6.4. X105/X106 - Ethernet Connectors (ETH)

LAN Port	KBox A-201	KBox A-202
ETH1 (X105)	Gigabit Ethernet (10/100/1000 MBit/s)	Gigabit Ethernet (10/100/1000 MBit/s)
ETH2 (X106)	Fast Ethernet (10/100 MBit/s)	Gigabit Ethernet (10/100/1000 MBit/s)

The connectors are standard 8-pin RJ45 type connectors (Fig. 4) with status LEDs:
- ❑ Activity/link: green = link up; green blinking = activity.
- ❑ Speed: off, green, yellow (10/100/1000 MBit/s).

For pin assignment refer to subsection 11.1.6.

5.6.5. Reset Button

If your system no longer reacts, you need to restart the KBox A-201/A-202 platform. Press the reset button to restart your system. Use a pointed object (e.g. a pencil) to press the recessed reset button.

1   Front bezel

2   Reset button (recessed)

Fig. 7: Detail - Reset button

i   When a reset is performed, all data is erased from the internal memory. The system restarts, without the need to switch the computer off and on again.

☞   Data might be lost when a restart is executed by pressing the reset button.

5.6.6. X201 – Serial Port COM 1

This interface (X201, Fig. 4) is provided as a 9-pin D-SUB connector; it is RS232 configured and allows the connection of a serial peripheral. For pin assignment refer to subsection 11.1.2.

5.6.7. X202 - Serial Port COM 2 (Option; KBox A-201 SMARC-sXQU only)

This interface (X204, Fig. 4) is provided as a 9-pin D-SUB and allows the connection of a serial peripheral. It is designed to support RS232 serial communication. For pin assignment refer to subsection 11.1.3.

i   This port is internally terminated with a termination resistor (120Ω).

5.6.8. X203 - Serial Port COM 3 (Option; KBox A-202 SMARC-sXBT only)

This interface (X204, Fig. 4) is provided as a 9-pin D-SUB and allows the connection of a serial peripheral. It is designed to support RS485 serial communication. For pin assignment refer to subsection 11.1.4.

5.7. Left and Right Side View
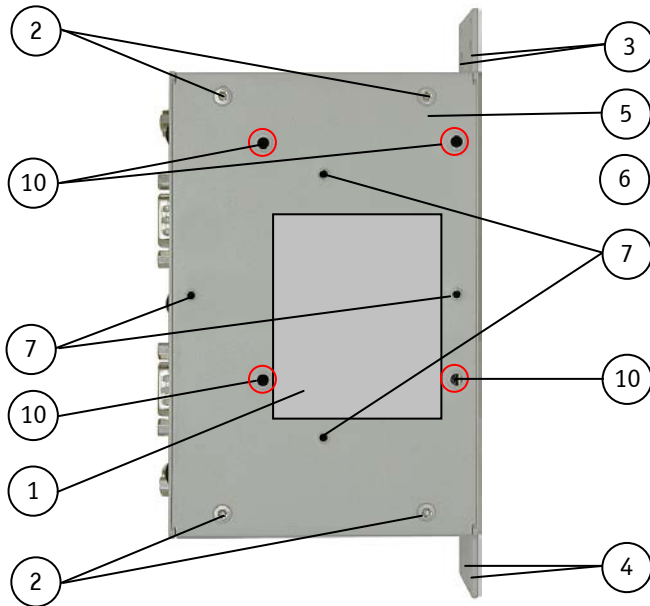
Fig. 8: Right side of the KBox A-201/A-202 system
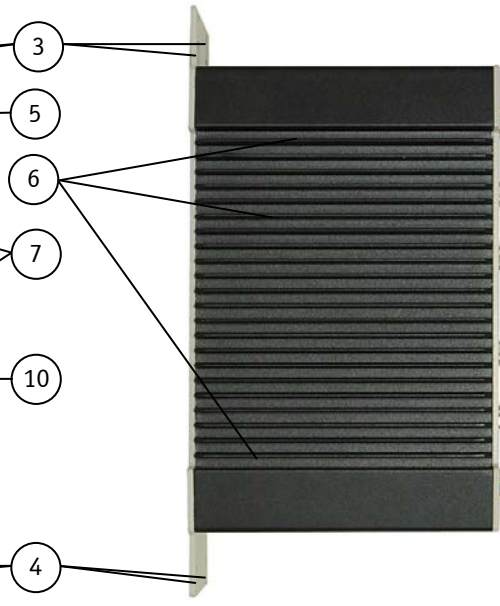
Fig. 9: Left side of the KBox A-201/A-202 system

Legend for Fig. 8, Fig. 9, Fig. 10 **and** Fig. 11:

1   Type label
2   4x torx screws (3x8) that secure the access cover
3   Upper side of the mounting plate with key holes
4   Lower side of the mounting plate with key holes
5   Access cover

6   Cooling fins on the left side of the U-shaped chassis
7   Threaded holes for mounting the DIN rail mounting clip
8   Cooling fins on the top side of the U-shaped chassis
9   Cooling fins on the bottom side of the U-shaped chassis
10 Mounting holes for optional SSD kit (KBox A-202 only)

5.8. Top and Bottom Side View
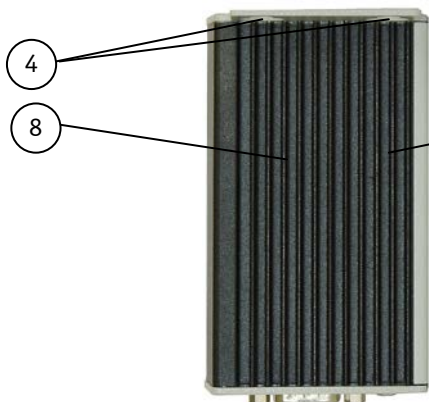
Fig. 10:Top side of the KBox A-201/A-202 system
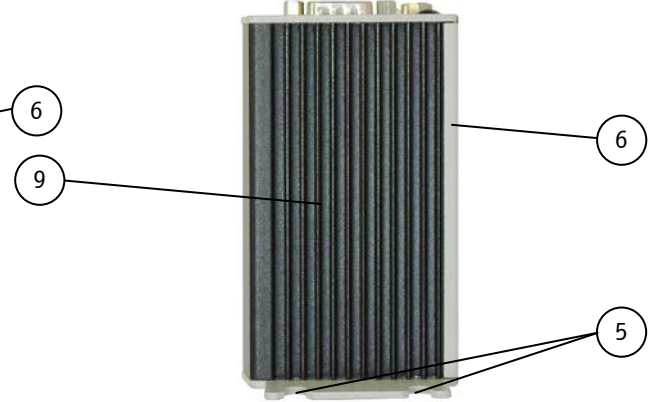
Fig. 11: Bottom side of the KBox A-201/A-202 system

☞   To provide sufficient heat dissipation for the cooling of the KBox A-201/A-202 platform, never cover the cooling fins of the chassis. Do not place any objects onto the device.

5.9. Rear Side View

5.9.1. Rear Side View of the KBox A-201/A-202 with Vertical Mounting Bracket

The KBox A-201/A-202 is designed for wall mounting, in vertical position inside of a control cabinet.

Please observe the mounting instructions included in the section 7 "Installation Instructions", and the outline dimensions in the subsection 10.1.2 "Mechanical Specifications of the KBox A-201/A-202 with Vertical Mounting Plate".

1   Vertical mounting plate

2   Key holes on the mounting plate

3   Screws that secure the mounting plate to the chassis of the KBox A-201/A-202
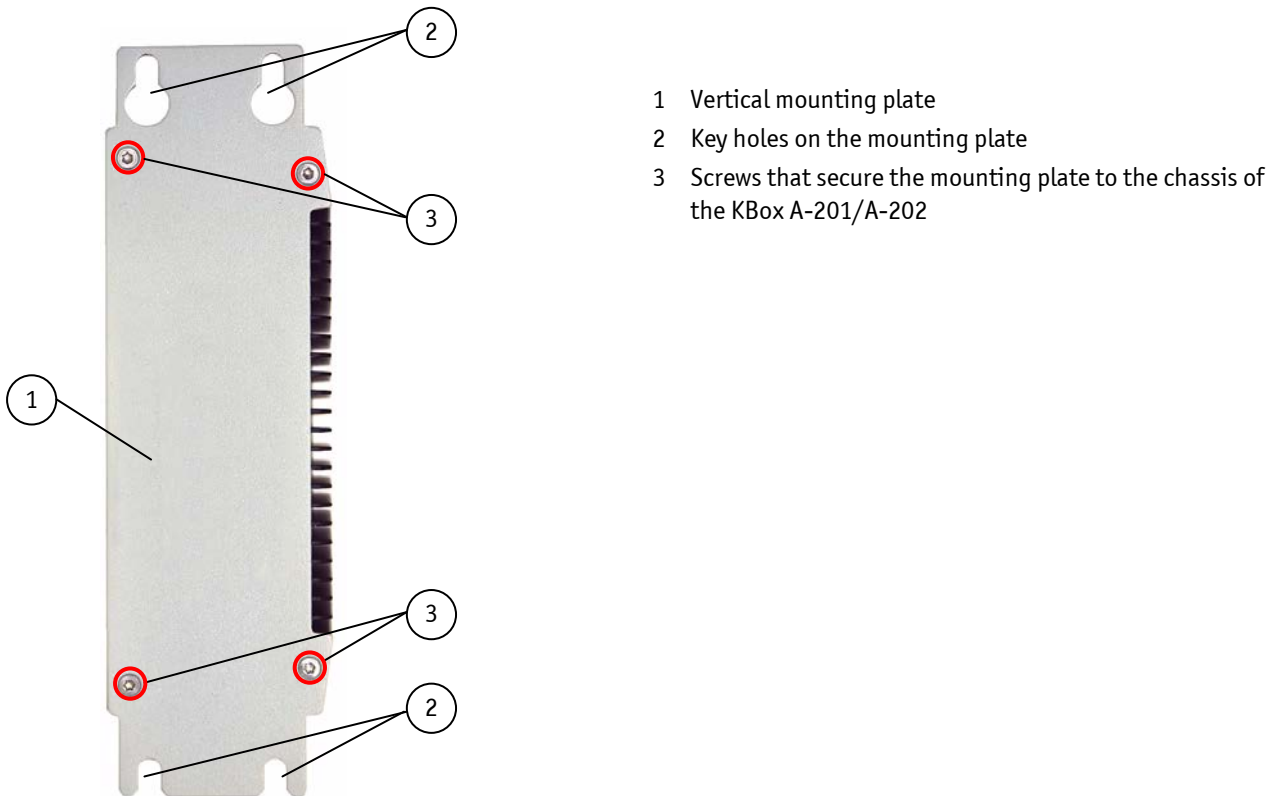
Fig. 12: Rear side of the KBox A-201/A-202 system with vertical mounting plate

☞   The vertical mounting plate is factory-installed (when KBox A-201/A-202 was ordered with vertical mounting plate).

If the vertical mounting plate was ordered later and is to be mounted subsequently, first remove the rear panel of the KBox A-201/A-202.

Do not mount the vertical mounting plate on top of the rear panel!

5.10. Optional Parts

5.10.1. DIN Rail Clip (Option)

For DIN Rail mounting of the KBox A-201/A-202 a DIN Rail clip can be ordered (refer to subsection 4.2.2 "Optional Parts"). If ordered, you can adopt your system for mounting to a DIN Rail. Tapped holes are provided on the access cover (Fig. 8, pos. 7) for mounting the optional DIN Rail clip in vertical or horizontal orientation (Fig. 13).
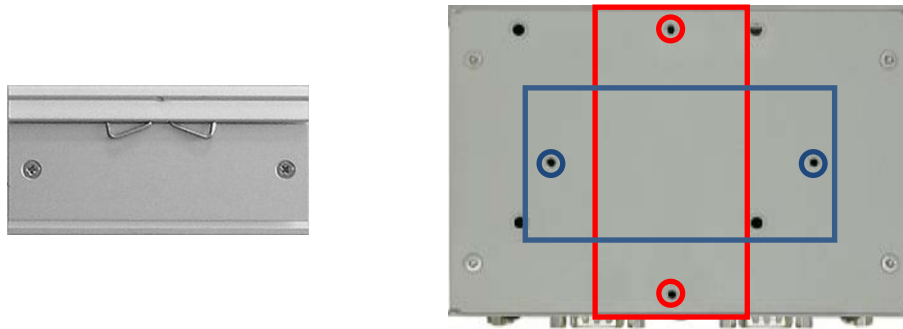
Fig. 13: DIN rail clip: Possible mounting positions

5.10.2. WiFi/WLAN (Option)

Depending on the ordered system configuration, the KBox A-201/A-202 system can be equipped with WiFi hardware. If you have ordered a system configuration including WLAN, two Reverse (RP) SMA-connectors for screwing on the provided WLAN antennas are installed at the front side (Fig. 4; "Antenna 1" and "Antenna 3"). The "Antenna 2" connector is intended for future use only.

5.10.2.1. WLAN/WiFi Antenna

During the installation of the KBox A-201/A-202 the provided system antennas (Fig. 14) will be screwed onto the RP SMA connectors (Fig. 4; "Antenna 1" and "Antenna 3") of the system. The antennas may be tilted and rotated in the appropriate positions to get the optimal transmission and reception quality.

Fig. 14: WLAN (WiFi) antenna

1	Reverse (RP) SMA antenna connector
2	Hinge for positioning the antenna

☞   If the antennas are mounted outdoors it must be ensured that the screen of the coaxial cable is connected to earth in the building installation!

6. Thermal Considerations

6.1. Available Processors

Please refer to the chapter 10 "Technical Specification".

The list of processors is not complete and may be extended over the product lifetime.

6.2. Convection Cooling

The applied cooling method provides adequate cooling of the device during operation and performs a one-way thermal transfer to the chassis. Three sides of the KBox A-201/A-202 consist of a compact aluminum chassis with cooling fins. The cooling fins provide heat dissipation during operation.

To provide sufficient heat dissipation for the cooling of the KBox A-201/A-202, never cover the cooling fins of the chassis. Do not place any objects on the device.

6.3. Minimum System Clearance

To provide a maximum of airflow around the box, minimum distances to surrounding parts must be observed (please refer to the chapter 7.1 "System Mounting" and Fig. 15).

6.4. Maximum Temperatures

The maximum system ambient temperature depends mostly on the power consumption of the processor and the chipset.

For the temperature evaluation a specialized tool from Intel® was used to set the processor to a defined workload. Depending on the power consumption one or more cores were set to 75% workload. This includes the graphics core, if applicable (KBox A-202). The tool also handles the usage of the "Turbo Mode" of certain processor types.

The processor utilization depends highly on the software used. Software using multicore feature will run on several cores whereas standard software will only utilize one core.

7. Installation Instructions

The KBox A-201/A-202 system is designed for operating:

❑ installed onto a wall or within a control cabinet by use of the vertical mounting plate

❑ installed within a control cabinet by use of the DIN Rail mounting clip

Whenever possible, unpack or pack this product only at EOS/ESD safe work stations. Where a safe work station is not guaranteed, it is important for the user to be electrically discharged before touching the product with his/her hands or tools. This is most easily done by touching a metal part of the system chassis.

Do not handle this product out of its protective enclosure while it is not used for operational purposes unless it is otherwise protected.

Prior any installation work, ensure that there are no live wires on the installation site.

Do not handle the device if there is any damage visible.

Do not operate the KBox A-201/A-202 with foreign objects inside the chassis.

Further do not insert any retrieval device into the device while it is connected to power.

Kontron rejects all liability for any and all damages resulting from operation of the unit with foreign objects inside the chassis.

The KBox A-201/A-202 has to be installed and operated only by trained and qualified personnel.

Only personnel with appropriate qualifications, trainings and authorization are permitted to install and work with the Kontron KBox A-201/A-202.

This device shall only be installed in or connected to systems that fulfill all necessary technical and specific environmental requirements.

The unit must be placed such that there is sufficient space in front of it for connecting the cables to the I/O interface connectors and for operating the power button.

Leave sufficient free space around the unit to prevent the device from possibly overheating!

To ensure proper operation, we recommended free space as specified in Fig. 15 and Fig. 16.

Refer also to section 10.1.2 "Mechanical Specifications".

The KBox A-201/A-202 must be firmly attached to a clean flat and solid mounting surface. Use proper fastening materials suitable for the mounting surface. Ensure that the mounting surface type and the used mounting solution safely support the load of the KBox A-201/A-202 and the attached components.

Please follow the local/national regulations for grounding.

The voltage feeds must not be overloaded. Adjust the cabling and the overcurrent protection to correspond with the electrical figures indicated on the type label.

The type label is located on the access cover of the system.

It is recommended that the last cable attached to the system should be the power cable! Refer to the section 7.2 "DC Power Connection" and chapter 8 "Starting Up".

7.1. System Mounting

In order to adapt the KBox A-201/A-202 for mounting Kontron offers different mounting solution such as:
- ❑ KBox A-201/A-202 configuration with vertical mounting plate for installation into a control cabinet or to a wall
- ❑ KBox A-201/A-202 for DIN Rail mounting into a control cabinet
- ❑ KBox A-201/A-202 for desktop operation without mounting

Depending on the ordered KBox A-201/A-202 configuration, your system is supplied with the corresponding mounting plate or DIN Rail clip.

The key holes of the vertical mounting plate (Fig. 12, pos. 2) allow you to mount the KBox A-201/A-202 in vertical position.

Prepare the mounting surface with four screws and if necessary anchors corresponding to the mounting surface type (fire-resistant material). Please refer to the information for mounting in the section 10.1.2, "Mechanical Specifications of the KBox A-201/A-202 with Vertical Mounting Plate" or refer to the drawings for KBox A-201/A-202 on our web site. The drawings can be downloaded from our web site www.kontron.com by selecting the product name.

☞   For a sufficient air circulation around the device, we recommend not to mount or operate any other devices within the "Keep Out Area" around the KBox A-201/A-202; refer to the red marked area in Fig. 15 and Fig. 16.
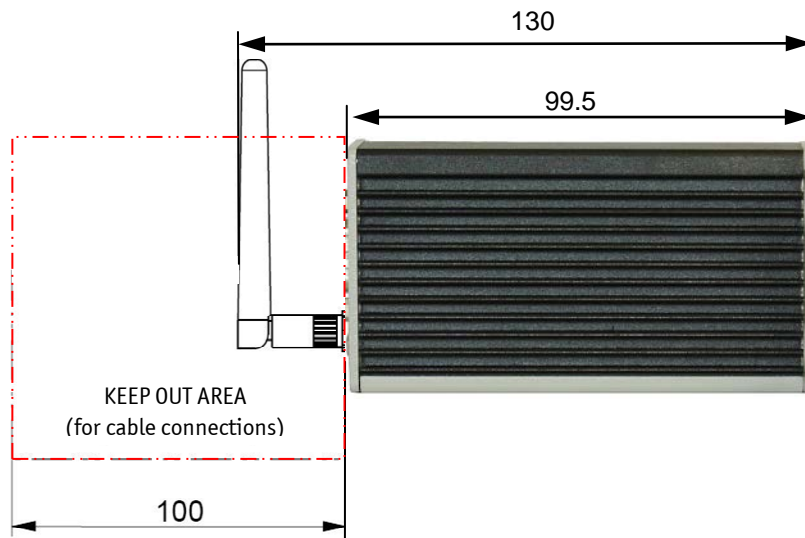

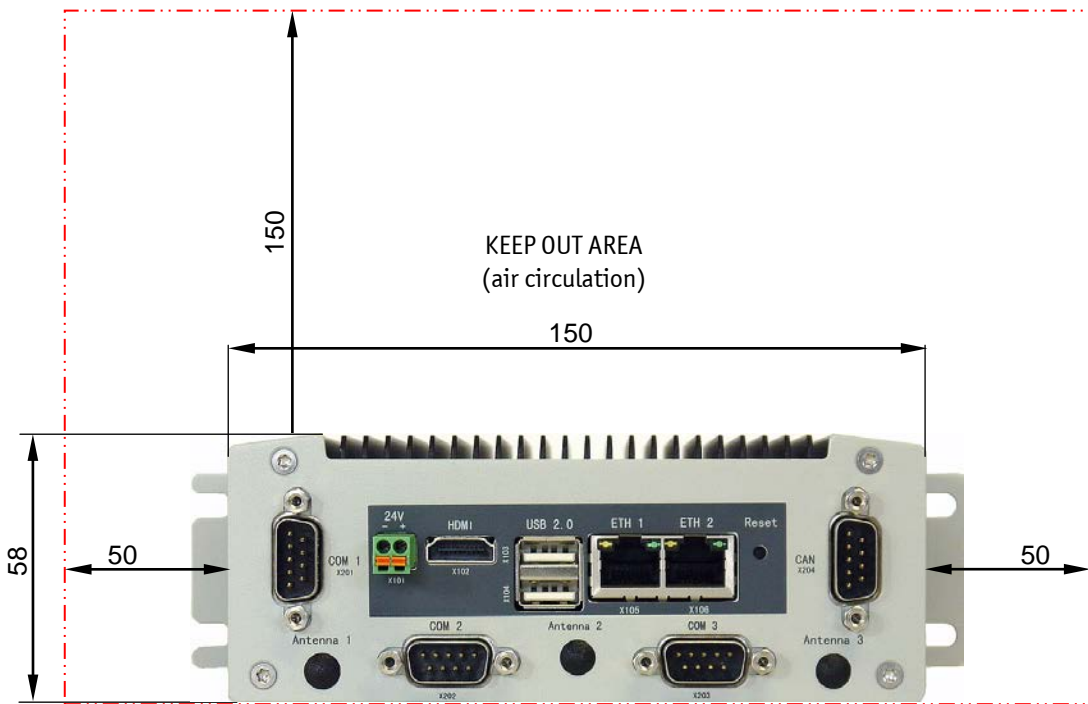*Fig. 15: Keep out area for mounting around KBox A-201/A-202 (side view with optional antenna)*

Fig. 16: Keep out area for mounting around KBox A-201/A-202
(front view with vertical mounting bracket)

7.2. DC Power Connection

The KBox A-201/A-202 is connected by a Phoenix connector to a DC power source via a DC power supply wiring (only the Phoenix power plug terminal is included).

The KBox A-201/A-202 is delivered with a DC power plug terminal (2-pin Phoenix FMC 1,5/ 2-ST-3,5 2-pin plug). For DC connection prepare the connecting wires using the supplied Phoenix plug terminal.
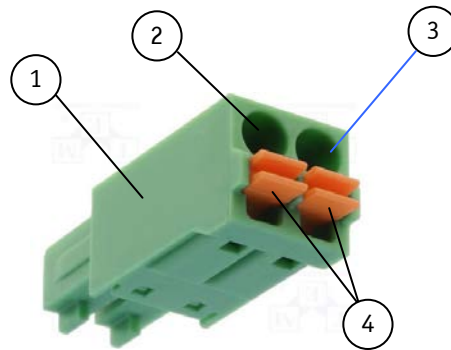
Fig. 17: Phoenix power plug terminal

1	2-pin Phoenix plug terminal	3	Location for inserting the "+24V" wire
2	Location for inserting the "-" (ground) wire	4	Cable release button

7.2.1. Cabling

For the pin assignment Phoenix power plug terminal refer to the subsection 5.6 "Front Interfaces of the KBox A-20x

X101 - Power Input Connector".

1. Cut the required length two isolated wires (1 mm^2) AWG18 and strip each end 5 –7 mm.
2. Twist the striped wire-ends. Optionally, you can provide them with ferrules.
3. The power connector is equipped with "push-in" spring clamps. Insert the wires into the corresponding clamp of the Phoenix plug termi nal. Make sure that you have the right polarity of the connection (refer to Fig. 6, Fig. 17, Fig. 18).
4. For releasing/removing the cable from the connector, press in the orange release button using a screw driver and pull out the cable (Fig. 17, pos. 4)

Fig. 18: Cabling the Phoenix power plug (shown with optional ferrules)

☞ The DC power supply cable must be shielded over the total length of the supply line (e. g. outer shield specification: tinned copper braid >85% shield coverage)!

8. Starting Up

☞   The KBox A-201/A-202 must be only operated with the nominal voltage of 24V DC of type SELV. For details refer to the chapter 10 "Technical Specification".

8.1. Connecting to DC Main Power Supply

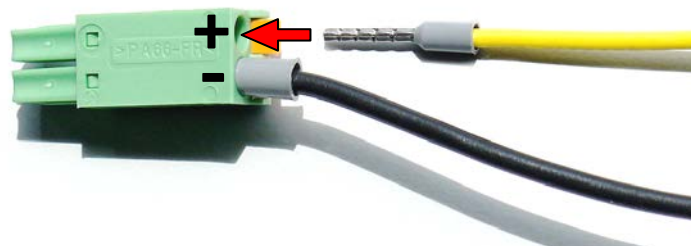The DC input connector (Fig. 4 and Fig. 6, marked X101) is located on the front side of the KBox A-201/A-202. The KBox A-201/A-202 will be connected to a DC main power supply via the supplied Phoenix power plug terminal (see Fig. 17) and corresponding power wires (not included).

☞	Before using your system, become familiar with the system components and check that everything is connected properly. Following a proper cabling procedure will prevent a false power-on condition, which could result in unit operational failure.
	Also, it is recommended that the last connections attached to the system should be the power wires!
⚠	The KBox A-201/A-202 must be connected only to a LPS (Limited Power Supply) DC mains power supply complying with the requirements of EN 60950-1.
	It must be observed that wiring and short-circuit/overcurrent protection is performed according to the applicable standards, regulations and respect to the electrical specification of the KBox A-201/A-202.
	The disconnecting device (fuse/circuit backer) rating must be in accordance with the wire cross-section and the rated current of the KBox A-201/A-202.

☞   The wires used for power connections must be clearly marked (+/-) to ensure that they will be proper connected to the DC IN connector of the KBox A-201/A-202 and to the main power source, corresponding to signals marked. Refer to Fig. 6 and Fig. 17.
In addition, the cables must have some form of support so as to minimize the strain on the unit's connectors.

To connect the KBox A-201/A-202 to a corresponding DC main power supply, please perform the following steps:

1. Ensure that the DC power source is switched off via a disconnecting device (circuit breaker), in order to ensure that no power is flowing from the external DC power source during the connection procedure.

2. Connect the Phoenix power terminal prepared as described in the subsection 7.2.1 "Cabling" to the DC input connector (Fig. 4 and Fig. 6, marked X101) of the KBox A-201/A-202. The DC input connector is located on the front side and is marked "24V".

3. Connect the other ends of the DC power wires to the connections of the DC main power supply. Pay attention to the polarity of the connections.

4. Switch on the disconnecting device (circuit breaker) in order to apply voltage to the terminals of the power wires.

𝒊   When powered on, the KBox A-201/202 starts up automatically.

8.2. Connecting to the KBox A-201's Serial Console

By default, a serial console is running on COM2 of the KBOX A-201. It enables you to influence the Bootloader behavior and in Yocto Linux you will be able to login via this serial connection.

In order to establish a serial connection, connect a serial null modem cable to the COM2 port of the KBox A-201 and to the corresponding RS-232 serial port of the host system. On the host system, an appropriate terminal application is required (i.e. "PuTTY" for Windows, "Minicom" or "Picocom" for Linux).

24 V DC power

RS232 serial null modem cable (DB-9F to DB-9F)
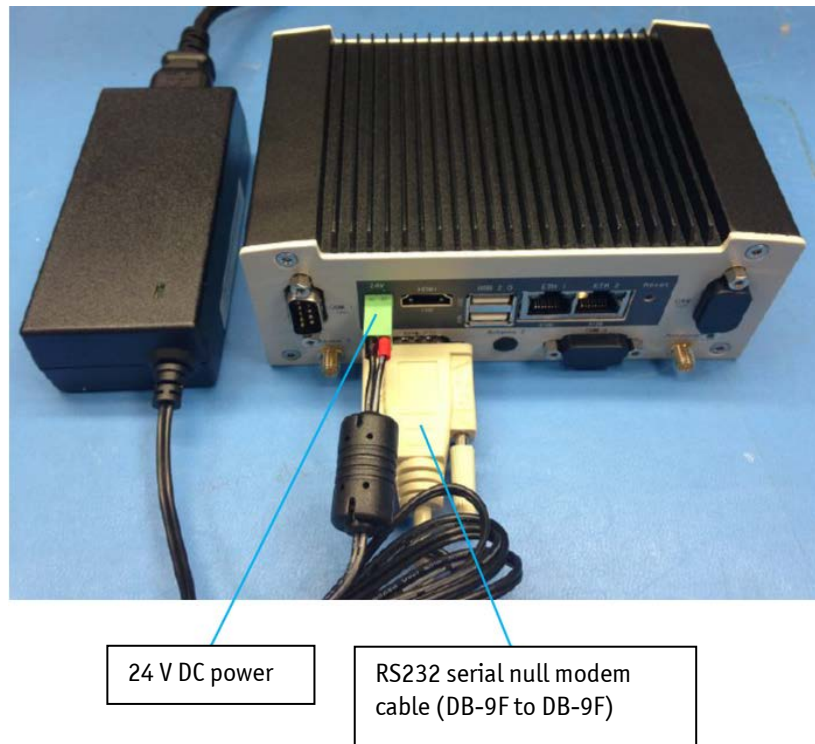
Fig. 19: Connecting a null modem cable to COM2 of the KBox A-201

☞   Connect the serial null modem cable to the **COM2 (X202)** port of the KBox A-201.

COM2 Port (RS232)	Serial Port Settings
Baud Rate	115200
Parity	none
Data Bits	8
Stop Bits	1
HW Flow Control	none

9. Maintenance and Cleaning

Equipment from Kontron requires only minimum servicing and maintenance for proper operation.

❑ For light soiling, clean the KBox A-201/A-202 with a dry cloth.
  Carefully remove dust from the surface of the cooling fins of the chassis using a clean, soft brush.

❑ Stubborn dirt should be removed using a mild detergent and a soft cloth.

☞   Do not use steel wool, metallic threads or solvents like abrasives, alcohol, acetone or benzene for cleaning
           the KBox A-201/A-202.

10. Technical Specification

	KBox A-201	KBox A-202
Installed CPU Module and Baseboard	Baseboard with SMARC-sXQUi module	Baseboard with SMARC-sXBTi module
Processor	Intel® Quark^{TM} X1011	Intel® Atom^{TM} E3845
RAM	1GB (soldered)	4GB (soldered)
Storage	8GB via Micro SD card	16GB eMMC onboard, Micro SD card optional
BIOS		Phoenix SecureCore^{TM}
Interfaces	1x Ethernet (10/100/1000 Mbit/s) 1x Ethernet (10/100 Mbit/s) with IEEE1588 support 2x USB 2.0 1x COM 1 (RS232) 1x COM 2 (RS232)	2x Ethernet (10/100/1000 Mbit/s) with IEEE1588 support 2x USB 2.0 1x HDMI Port 1x COM 1 (RS232) 1x COM 3 (RS485)
Controls (at the front side)	Reset button (PWR)	Reset button (PWR)
DC IN Connector (at the front side)	2-pin DC input connector	2-pin DC input connector
Protection Class	IP20	IP20
Rated Voltage	24 V DC	24 V DC

10.1. Mechanical Specifications

Dimensions	KBox A-201/A-202 with vertical mounting plate (dimensions in vertical position)	KBox A-201/A-202 with DIN rail clip (dimensions in lying/desktop position)
Height	192 mm (10.47")	58 mm (2.58")
Width	58 mm (2.28")	150 mm (8.27")
Depth	99.5 mm (5.43")	99.5 mm (5.51")
Weight (without packaging, expansions)	Approx. 1.0 kg (10.47 lbs.)	Approx. 1.0 kg (10.47 lbs.)
Chassis	Cooling fins, black Chassis: steel sheet, light grey (RAL 7035) Side with External Interfaces : trim strips, traffic grey (RAL 7043)	

10.1.1. Mechanical Specifications of the KBox A-201/A-202 with DIN rail clip
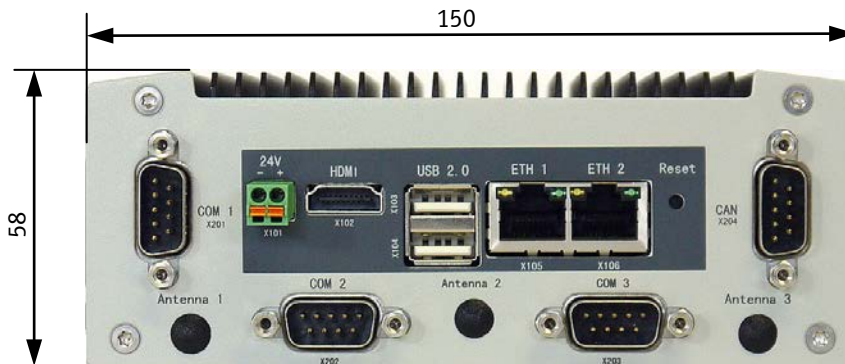

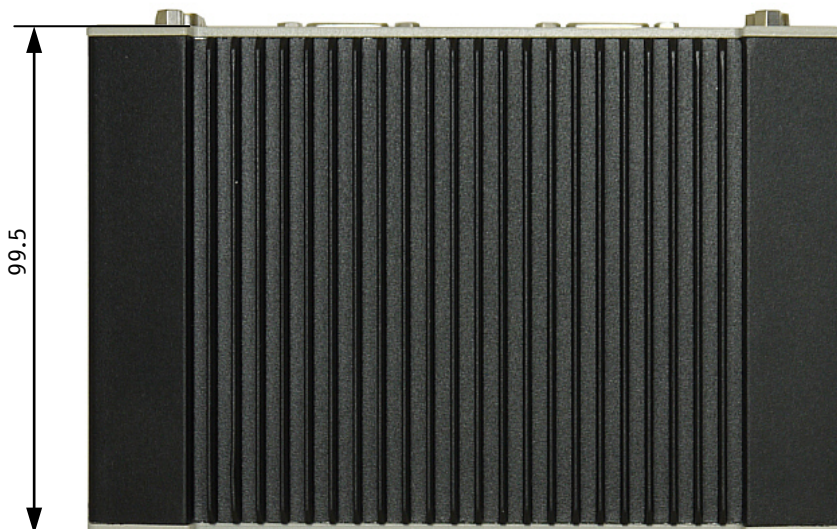*Fig. 20:Dimensions: front without vertical mounting plate*

Fig. 21: Dimensions: top side without vertical mounting brackets

10.1.2. Mechanical Specifications of the KBox A-201/A-202 with Vertical Mounting Plate
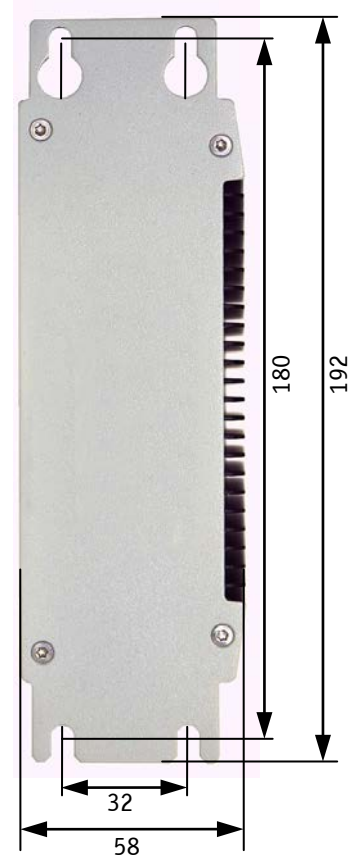

Fig. 22:Dimensions: left side

Fig. 23: Dimensions: rear side with vertical mounting plate
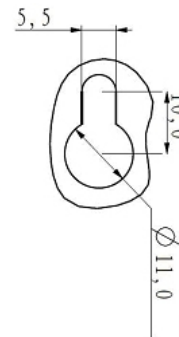
Fig. 24:Dimensions: detail key hole

10.2. Environmental Specifications

	KBox A-201 (Standard Version)	KBox A-202 (Standard Version)
Thermal Management	Convection cooling	Convection cooling
Operating Temperature	-40°C … +55°C (-40 … 131 °F)	-40°C … +55°C (-40 … 131 °F)
Storage / Transit Temperature	-40 °C … +85 °C (-40 °F … +185 °F)	-40 °C … +85 °C (-40 °F … +185 °F)
Relative Humidity (Operating/Transit)	93 % @ 40 °C (non-condensing) acc. to IEC 60068-2-78	93 % @ 40 °C (non-condensing) acc. to IEC 60068-2-78
Max. Operation Altitude	2,000 m (6,560 ft)	2,000 m (6,560 ft)
Max. Storage / Transit Altitude	10,000 m (32,810 ft)	10,000 m (32,810 ft)
Operating Shock	15 G, 11 ms, half sine acc. to IEC 60068-2-27	15 G, 11 ms, half sine acc. to IEC 60068-2-27
Operating Vibration	5 - 500 Hz, 2 G (IEC 60068-2-6)	5 - 500 Hz, 2 G (IEC 60068-2-6)

10.3. CE Directives and Standards

CE Directive	
Elektrical Safety	General Product Safety Directive (GPSD) 2001/95/EC
	Low Voltage Directive (LVD) 2014/35/EU
Electromagnetic Compatibility (EMC)	EMC Directive 2014/30/EU, R&TTE Directive 2014/53/EU
CE Marking	CE Directive 93/68/EEC
RoHS II Directives	2011/65/EU
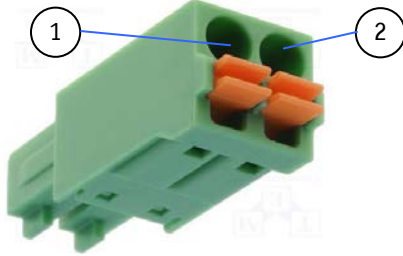
Elektrical Safety	Harmonized Standards
EUROPE	Information technology equipment - Safety - Part 1: General requirements EN 60950-1:2006+A11:2009+A1:2010+A12:2011+A2:2013
U.S.A. / CANADA	Certified to IEC/UL 60950-1 + CAN/CSA C22.2 No. 60950-1
CB Report	IEC 60950-1(ed.2);am1, am2

EMC	Harmonized Standards
EU	Generic standards - Emission standard for industrial environments (Emission): EN 55022, Class A (Radiated and Conducted Emissions) EN 55032:2012/AC:2013 Class A EN 61000-6-4 EN 301 489-17; EN 301 489-1; EN 301 893; EN 300 328 (R&TTE) Generic standards - Immunity for industrial environments (Immunity): EN 61000-6-2
U.S.A. / Canada	FCC (CFR) 47 Part 15
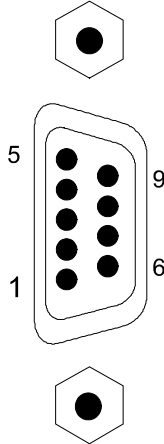
11. Standard Interfaces – Pin Assignments

Low-active signals are indicated by a minus sign.

11.1.1. (X101) Power Input Connector

Pin	Signal Name	2-pin POWER SUBCON (female)
1	0 V (Ground)	
2	+24 V DC (Input)	

11.1.2. (X201) Serial Interface COM 1 (RS232)

Pin	Signal Name		9-pin D-SUB Connector
1	N.C.		
2	COM1_RXD	(Receive Data)	
3	COM1_TXD	(Transmit Data)	
4	N.C.		
5	GND	(Signal Ground)	
6	N.C.		
7	COM1_RTS#		
8	COM1_CTS#		
9	N.C.		

11.1.3. (X202) Serial interface COM 2 (RS232) KBox A-201/ SMARC-sXQU only

Pin	Signal Name		9-pin D-SUB Connector (male)
1	N.C.		
2	COM2_RXD	(Receive Data)	
3	COM2_TXD	(Transmit Data)	
4	N.C.		
5	GND	(Signal Ground)	
6	N.C.		
7	N.C.		
8	N.C.		
9	N.C.		

11.1.4. (X203) Serial interface COM 3 (RS485) KBox A-202/ SMARC-sXBT only

Pin	Signal Name		9-pin D-SUB Connector (male)
1	N.C.		
2	N.C.		
3	RS485_B		
4	N.C.		
5	GND	(Signal Ground)	
6	N.C.		
7	N.C.		
8	RS485_A		
9	N.C.		

11.1.5. (X103, X104) USB 2.0 Port
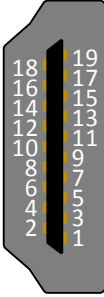
Pin	Signal Name	4-pin USB Connector Typ A Version 2.0
1	VCC	
2	Data-	
3	Data+	
4	GND	

11.1.6. (X 105 as ETH 1 and X 106 as ETH 2) Ethernet Connectors

Pin#	Signal Name	2x ETH (RJ45 female)
1	MDI0+	
2	MDI0-	
3	MDI1+	
4	MDI2+	
5	MDI2-	
6	MDI1-	
7	MDI3+	
8	MDI3-	

Speed (Mbps)		LINK/ACT	
		LINK	ACTIVE
10	off	on	orange on (blinking)
100	green	on	orange on (blinking)
1000	orange	on	orange on (blinking)

11.1.7. (X102) HDMI Port

Pin#	Signal Name	Description	Type A full size HDMI connector
1	TMDS Data 2+	TMDS data differential line 2+	
2	GND	Ground	
3	TMDS Data 2-	TMDS data differential line 2-	
4	TMDS Data 1+	TMDS data differential line 2-	
5	GND	Ground	
6	TMDS Data 1-	TMDS data differential line 1-	
7	TMDS Data 0+	TMDS data differential line 0+	
8	GND	Ground	
9	TMDS Data 0-	TMDS data differential line 0-	
10	TMDS Data Clock+	HDMI differential clock+	
11	GND	Ground	
12	TMDS Data Clock-	HDMI differential clock-	
13	CEC	HDMI Consumer Electronics Control	
14	n.c.	Not connected	
15	SCL	DDC Clock line	
16	SDA	DDC Data line	
17	GND	Ground	
18	+5V	5V power EDID/DDC	
19	Hot Plug Detect	HDMI Hot Plug Detect input	

About Kontron

Kontron is a global leader in embedded computing technology (ECT). As a part of technology group S&T, Kontron offers a combined portfolio of secure hardware, middleware and services for Internet of Things (IoT) and Industry 4.0 applications. With its standard products and tailor-made solutions based on highly reliable state-of-the-art embedded technologies, Kontron provides secure and innovative applications for a variety of industries. As a result, customers benefit from accelerated time-to-market, reduced total cost of ownership, product longevity and the best fully integrated applications overall.

For more information, please visit: **www.kontron.com**

▼

Global Headquarters

Kontron S&T AG

Lise-Meitner-Str. 3-5
86156 Augsburg
Germany
Tel.: + 49 821 4086-0
Fax: + 49 821 4086-111
info@kontron.com