



# KBox A-330-RPI

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 KBOX A-330-RPI - USER GUIDE

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## Revision History

Revision	Brief Description of Changes	Date of Issue	Author/ Editor
0.1	Initial draft version	2019-05-20	NN

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## Symbols

The following symbols may be used in this user guide

### **⚠ DANGER**

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

### **⚠ WARNING**

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

### **NOTICE**

NOTICE indicates a property damage message.

### **⚠ CAUTION**

CAUTION indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.



Electric Shock!

This symbol and title warn of hazards due to electrical shocks (> 60 V) when touching products or parts of products. Failure to observe the precautions indicated and/or prescribed by the law may endanger your life/health and/or result in damage to your material.



ESD Sensitive Device!

This symbol and title inform that the electronic boards and their components are sensitive to static electricity. Care must therefore be taken during all handling operations and inspections of this product in order to ensure product integrity at all times.



HOT Surface!

Do NOT touch! Allow to cool before servicing.



Laser!

This symbol inform of the risk of exposure to laser beam and light emitting devices (LEDs) from an electrical device. Eye protection per manufacturer notice shall review before servicing.



This symbol indicates general information about the product and the user guide.

This symbol also indicates detail information about the specific product configuration.



This symbol precedes helpful hints and tips for daily use.

## 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.**



# Table of Contents

<b>Symbols</b> .....	<b>6</b>
<b>For Your Safety</b> .....	<b>7</b>
High Voltage Safety Instructions .....	7
Special Handling and Unpacking Instruction .....	7
Lithium Battery Precautions.....	8
<b>General Instructions on Usage</b> .....	<b>8</b>
<b>Quality and Environmental Management</b> .....	<b>8</b>
Disposal and Recycling.....	8
WEEE Compliance.....	8
<b>Table of Contents</b> .....	<b>9</b>
<b>List of Tables</b> .....	<b>10</b>
<b>List of Figures</b> .....	<b>11</b>
<b>1/ General Safety Instructions for IT Equipment</b> .....	<b>12</b>
<b>2/ Introduction</b> .....	<b>14</b>
<b>3/ Standards, Certifications and Directives</b> .....	<b>15</b>
<b>4/ Shipment and Unpacking</b> .....	<b>17</b>
4.1. Packaging.....	17
4.2. Unpacking .....	17
4.3. Scope of Delivery.....	17
4.4. Accessories .....	17
4.5. Type Label and Product Identification.....	17
<b>5/ Product Overview</b> .....	<b>19</b>
5.1. Front Panel Views .....	20
5.1.1. Power Connector .....	21
5.1.2. Protective Earth.....	21
5.1.3. Micro HDMI.....	21
5.1.4. Ethernet (LAN1, LAN2).....	21
5.1.5. USB 2.0.....	21
5.1.6. USB 2.0 OTG .....	21
5.1.7. Serial Ports & CAN .....	21
5.1.8. GPIO Ports .....	21
5.2. Front View .....	22
5.3. Rear View.....	23
5.4. Side Views.....	24
5.5. Top View .....	25
<b>6/ System Extension</b> .....	<b>26</b>
6.1. Storage .....	26
6.1.1. Micro SD Card Drive Bay.....	26
6.2. Expansion.....	26
<b>7/ Accessing Components</b> .....	<b>27</b>
7.1. Accessing External Components.....	27
7.1.1. Micro SD Card Drive Bay .....	27
7.2. Accessing Internal Components.....	27
7.2.1. Opening the Chassis.....	27
<b>8/ Thermal Considerations</b> .....	<b>28</b>
8.1. Heatsink Plate .....	28

<b>9/</b>	<b>Installation Instructions</b> .....	<b>29</b>
9.1.	DIN Rail Mounting .....	29
9.2.	Power Connector .....	30
9.2.1.	Wiring the DC Mating Power Connector .....	30
<b>10/</b>	<b>Starting Up</b> .....	<b>31</b>
10.1.	Connecting to Power Supply .....	31
10.2.	Operating System (OS) and Drivers.....	31
<b>11/</b>	<b>Technical Data</b> .....	<b>32</b>
11.1.	Block Diagram .....	32
11.2.	Technical Specification .....	33
11.3.	Mechanical Specification .....	33
11.4.	Power Specification .....	35
11.4.1.	Power Consumption .....	35
11.4.2.	Protective Earth.....	35
11.4.3.	Environmental Specification .....	35
<b>12/</b>	<b>Connector, Socket and Jumper Pin Assignments</b> .....	<b>36</b>
12.1.	Front Panel Connectors.....	36
12.2.	Front Panel Connector Pin Assignments .....	37
12.2.1.	Input Power Connector (X3) .....	37
12.2.2.	Micro HDMI Connector (X500) .....	37
12.2.3.	ETH RJ45 Connectors (X600, X700).....	38
12.2.4.	USB Port (X601).....	38
12.2.5.	Serial Port Connector (X15) .....	38
12.2.6.	Front Panel RS485/CAN Connector (X18) .....	39
12.2.7.	Front Panel GPIO Connector (X19).....	39
12.2.8.	USB OTG Port (X4).....	39
<b>13/</b>	<b>Technical Support</b> .....	<b>40</b>
13.1.	Returning Defective Merchandise .....	40
<b>14/</b>	<b>Storage, Transportation and Maintenance</b> .....	<b>42</b>
14.1.	Storage.....	42
14.2.	Transportation .....	42
14.3.	Maintenance.....	42
14.3.1.	Replacing the Lithium Battery .....	42
<b>15/</b>	<b>Warranty</b> .....	<b>43</b>
15.1.	Limitation/Exemption from Warranty Obligation .....	43
<b>16/</b>	<b>Disposal</b> .....	<b>44</b>
	<b>Appendix A: List of Acronyms</b> .....	<b>45</b>
	About Kontron .....	46

## List of Tables

Table 1:	Standards, Certifications and Directives Compliance .....	15
Table 2:	Scope of Delivery .....	17
Table 3:	Accessories .....	17
Table 4:	Technical Specification .....	33
Table 5:	Software Specification .....	33
Table 6:	Mechanical Specification .....	33
Table 7:	Power Specification.....	35
Table 8:	Power Consumption .....	35
Table 9:	Environmental Specification .....	35

Table 10: Front Panel Connectors .....	36
Table 11: List of Acronyms (Example) .....	45

## List of Figures

Figure 1: KBox A-330-RPI .....	14
Figure 2: KBox A-330-RPI Type Label (Example).....	17
Figure 3: KBox A-330-RPI Chassis Variants.....	19
Figure 4: Front Panel View .....	20
Figure 5: Front View .....	22
Figure 6: Rear View .....	23
Figure 7: Side Views .....	24
Figure 8: Top and Bottom Views .....	25
Figure 10: Phoenix Power Mating Connector .....	30
Figure 11: Block Diagram.....	32
Figure 12: Dimensions (Measurements in mm).....	34
Figure 16: Front Panel Connectors.....	36

# 1/ General Safety Instructions for IT Equipment

## **▲WARNING**



Please read this chapter carefully and take careful note of the instructions, that 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 non-observance of the instructions Kontron is exempt from accident liability, this also applies during the warranty period.

The product has been built and tested according to the basic safety requirements for low voltage (LVD) applications and has left the manufacturer in safety-related, flawless condition. To maintain this condition and also to ensure safe operation, the operator must not only observe the correct operating conditions for the product but also the following general safety instructions:

- ▶ 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, and 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, ensure that if the product has ventilation openings the openings are not covered or blocked. If an air filter is provided, this should be cleaned regularly. Additionally, make sure the system is well ventilated by observing if heat-dissipating elements are covered/obstructed by objects as this can cause a build-up of heat and stop heat from being dispersed into the ambient environment.
- ▶ Do not place the system close to heat sources or damp places.
- ▶ Only products 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 product, make sure that the product is disconnected from the mains. Complete disconnection is only possible if the power cable is disconnected and removed. Ensure that there is free and easy access to enable disconnection.
- ▶ If the product is opened for the insertion or removal of expansion devices (depending on the configuration of the system), this may only be carried out by qualified persons.
- ▶ If extensions are made to the product, the following must be observed:
  - ▶ All effective legal regulations and all technical data for the expansion devices are adhered to.
  - ▶ The power consumption of any expansion devices 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:
  - ▶ Damage is visible.
  - ▶ The device no longer functions.

In these cases, the device must be switched off and it must be ensured that the device can no longer be operated.

### Additional Safety Instructions for DC Power Supply Circuits

- ▶ To guarantee safe operation of products with DC power supply voltages larger than 60 volts DC or a power consumption larger than 240 VA, please observe that:
  - ▶ The product 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 product 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 product is used in the application (e.g. overcurrent protective product), if the product itself is not disconnectable
  - ▶ A disconnect product, if provided in or as part of the equipment, shall disconnect both poles simultaneously
  - ▶ Interconnecting power circuits of different products cause no electrical hazards
- ▶ 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 product does not generally fulfill the requirements for "centralized DC power systems" (UL 60950-1, Annex NAB; D2) and therefore may not be connected to such products!

## 2/ Introduction

This user guide describes the KBox A-330-RPI. New users are recommended to study the installation instructions within this user guide before switching on the power.

Kontron's KBox A-330-RPI is developed specifically for control cabinet applications with flexible DIN rail mounting positions for use when space is limited. The fanless design ensures a significantly prolonged lifespan and high system availability.

The KBox A-330-RPI is an industrial grade box PC based on the Raspberry Pi Computer Module CM3+ with Quad Core processor designed for use in demanding applications. Due to the varied amount of onboard interfaces such as dual fast Ethernet, USB 2.0, micro HDMI, digital IO and serial ports, the KBox A-330-RPI enables connectivity for nearly all applications and supports besides the on board eMMC memory , expandability via SD cards.

General features are:

- ▶ Broadcom® BCM2837B0 Arm®-A53 quad core processor
- ▶ 1 GB GB RAM with DDR2L soldered memory
- ▶ 4GB memory storage via soldered eMMC
- ▶ External SD drive slot
- ▶ External Interfaces 1x micro HDMI, 2x Fast Ethernet, 2x USB 2.0, 1x RS232, 1x RS485 and 1x CAN
- ▶ Fanless passive cooling

The KBox A-330-RPI is intended for 24/7 continuous operation and longtime industrial applications. All components are selected to ensure a long lifetime.

Figure 1: KBox A-330-RPI



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The KBox A-330-RPI is factory configured to meet customer requirements. Kontron does not recommend opening the system as this may cause damage to internal components.

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### 3/ Standards, Certifications and Directives

The KBox A-330-RPI is currently in test and aims to comply with the requirements of the following standards.



If the user modifies the product, prerequisites for specific approvals such as CE conformity declaration (safety requirements) may no longer apply.

Table 1: Standards, Certifications and Directives Compliance

CE-Mark Compliant with EU Directives	Electromagnetic Compatibility	Directive 2014/30/EU
	Low Voltage	Directive 2014/35/EU
	Radio Equipment Directive (RED)	Directive 2014/53/EU
	RoHS II	Directive 2011/65/EU
EMC 2014/30/EU Emission	CISPR 11 EN 55011	Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement
EMC 2014/30/EU Immunity	EN 61000-6-2	Electromagnetic compatibility (EMC), part 6-2: Generic standards- Immunity for industrial environment
EMC 2014/53/EU	EN 301 489-1 V2.2.0	Electro-Magnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonized Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU
EMC 2014/53/EU	<i>EN 301 489-17 V3.1.1</i>	Electro-Magnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonized Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU
RF Spectrum Efficiency & Spurious Emission 2014/53/EU	EN 300 328 V2.1.1	Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonized Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU
EMC CFR 47 Part 15, Subpart B	ANSI C63.4 CISPR 16 ICES-003	The American National Standards Institute standard ANSI C63.4 is the key standard for measuring electrical and electronic equipment for showing compliance to FCC and Industry Canada regulations.
Safety 2014/35/EU	IEC 61010-1 EN 61010-1 UL 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements
	IEC 61010-2-201 EN 61010-2-201 UL 61010-2-201	Safety requirements for electrical equipment for measurement, control and laboratory use - Part 2-201: Particular requirements for control equipment
Safety and Health 2014/35/EU	EN 62311	Assessment of the compliance of low power electronic and electrical equipment with the basic restrictions related to human exposure to electromagnetic fields (10 MHz to 300 GHz)

<b>WEEE 2002/96/EC</b>	<b>Waste Electrical and Electronic Equipment Directive (WEEE Directive)</b>	Compliant with the Waste Electrical and Electronic Equipment (WEEE) directive to reduce waste of electrical and electronic equipment, encourage recycling and environmental disposal and increase the environmental awareness of producers
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## 4/ Shipment and Unpacking

### 4.1. Packaging

All parts are delivered together in a product specific cardboard package designed to provide adequate protection and absorb shock. Kontron recommends keeping the packaging to store or transport the product.

### 4.2. Unpacking

Proceed as follows to unpack the unit:

1. Remove packaging.
2. Do not discard the original packaging. Keep packaging for future relocation or storage.
3. Check the delivery for completeness by comparing it with the original order.
4. Keep the associated paperwork. It contains important information for handling the unit.
5. Check the contents for visible shipping damage.
6. If you notice any shipping damage or inconsistencies between the contents and the original order, contact Kontron for help and information.

### 4.3. Scope of Delivery

Check that your delivery is complete, and contains the items listed below. If you discover damaged or missing items, contact your dealer.

Table 2: Scope of Delivery

Delivered Item	Description
KBox A-330-RPI	Corresponding to the ordered product configuration

### 4.4. Accessories

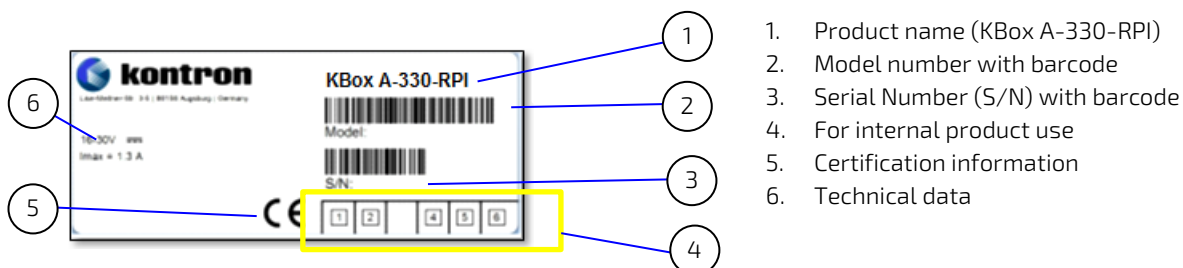
Table 3: Accessories

Part	Part Description
Power Supply	External power supply 230AC to 24VDC
Power Cord	230 V power Cord
Power mating connector	Phoenix Contact FMC 1,5/ 2-ST-3,5 BK
RS232/RS485/ CAN / GPIO mating connector	Phoenix Contact DFMC 0,5/ 4-ST-2,54

### 4.5. Type Label and Product Identification

The type label is position on contains the following information.

Figure 2: KBox A-330-RPI Type Label (Example)





## 5/ Product Overview

Before working with the KBox A-330-RPI, Kontron recommends that users take a few minutes to learn about the various parts of the KBox A-330-RPI.

The KBox A-330-RPI is flexible industrial grade box computer fanless device designed for use in demanding applications requiring a flexible rapid rail attachment solution. Based on the Raspberry Pi Computer Module CM3+ the KBox A-330-RPI features long-term availability and supports a varied amount of onboard interfaces to enable connectivity to nearly all applications. An SD card socket supports memory expansion for flexible data storage.

All variants are available in a robust steel chassis, designed for operation in a DIN rail environment using a vertical orientation.

Figure 3: KBox A-330-RPI Chassis Variants



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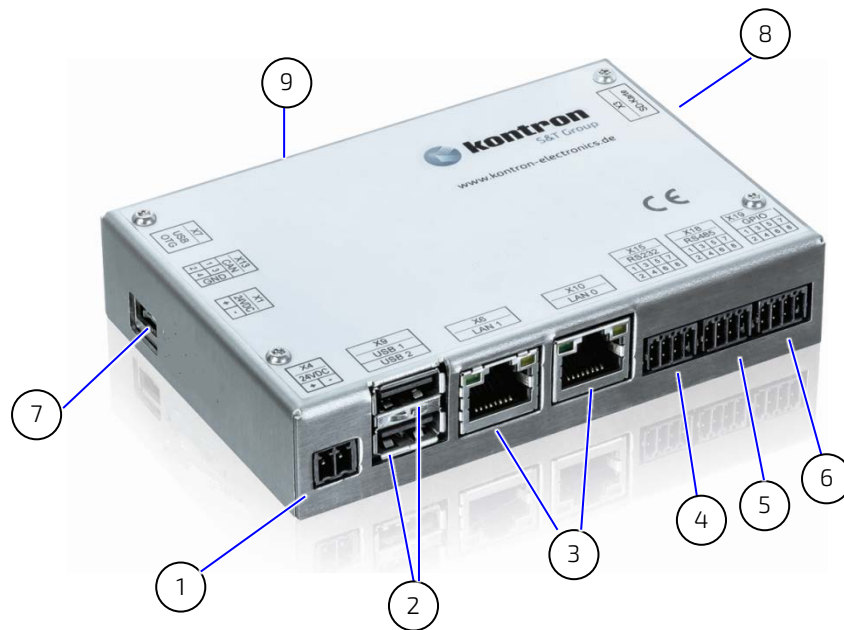
The KBox A-330-RPI is designed for operation in a DIN rail environment using a vertical orientation or horizontally as desktop version.

---

## 5.1. Front Panel Views

The front panel includes most of the I/O connectors.

Figure 4: Front Panel View



- |   |                   |   |            |
|---|-------------------|---|------------|
| 1 | Power connector   | 6 | GPIO       |
| 2 | 2x USB 3.0        | 7 | USB OTG    |
| 3 | 2x LAN Connector  | 8 | SD card    |
| 4 | RS232 Serial Port | 9 | Micro HDMI |
| 5 | RS485 or CAN port |   |            |

### 5.1.1. Power Connector

There is one 2-pin power connector on the front panel supporting an input DC voltage range of 9 VDC to 32 VDC, see Figure 4 (pos.1). The mating connector required to connect the power connector to a DC main power source is not supplied with the KBox A-330-RPI. For information on how to connect the supplied mating connector to the front panel input power connector, refer to Chapter 9.2.1: Wiring the DC Mating Power Connector.

For the pin assignment of the Input power connector, refer to Chapter 12.2.1: Input Power Connector.

### 5.1.2. Protective Earth

The GND pin of the power connector is connected to protective ground of the electronics and also to the metal housing of the KBox A-330-RPI.

### 5.1.3. Micro HDMI

There is one micro HDMI 1.4 interface (1920 x1080 pixel resolution), for video/audio solutions, see Figure 4 (pos.9).

For the pin assignment of the HDMI connector, refer to Chapter 12.2.2: Micro HDMI Connector.

### 5.1.4. Ethernet (LAN1, LAN2)

There are two LAN ports both supporting 10/100 Mbit Ethernet, see Figure 4 (pos.3).

For the pin assignment of the RJ45 Ethernet connectors, refer to Chapter 12.2.3: ETH RJ45 Connectors (X600, X700).

### 5.1.5. USB 2.0

There are two USB 2.0 ports allowing for the connection of a USB 2.0 compatible devices, see Figure 4 (pos.2).

For the pin assignment of the USB 3.0 connector, refer to Chapter 12.2.4: USB Port.

### 5.1.6. USB 2.0 OTG

There is a single USB 2.0 OTG port allowing for the USB client connection to a USB 2.0 compatible master device, see Figure 4 (pos.7).

For the pin assignment of the USB OTG connector, refer to Chapter 12.2.4: USB Port.

### 5.1.7. Serial Ports & CAN

There is a single serial port supporting RS232 RX/TX, see Figure 4 (pos.4).

The RS485 port Figure 4 (pos. 5) contains also the wiring for CAN.

For the pin assignment of the serial port connectors, refer to Chapter 12.2.5: Serial Port Connector

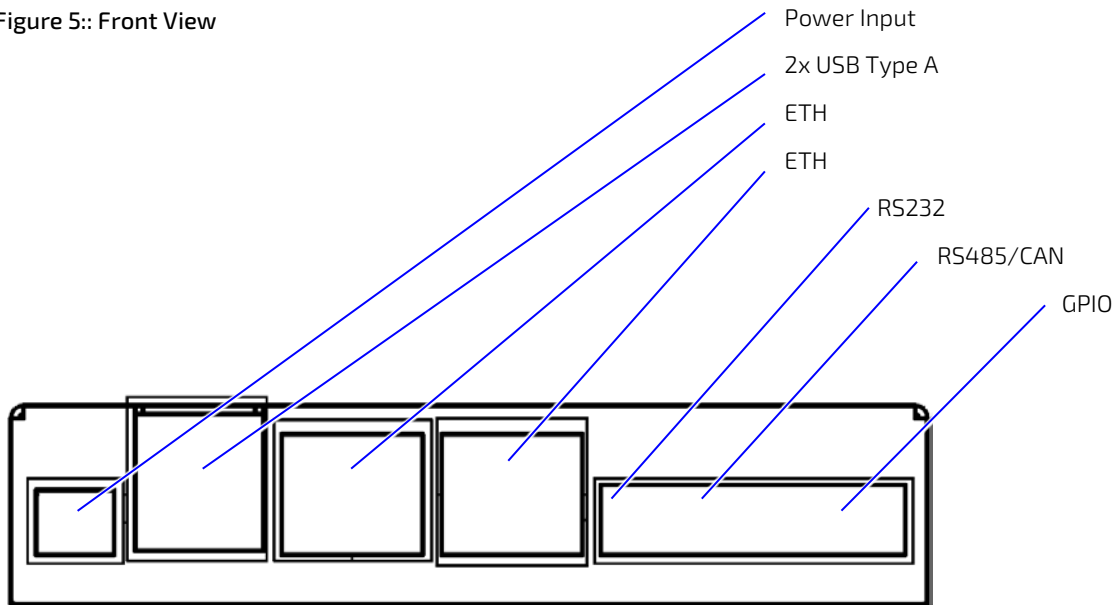
### 5.1.8. GPIO Ports

There is a four port GPIO interface available on the front panel of the KBox A-330-RPI, see Figure 4 (pos.6).

The voltage level is 24VDC nominally. It can be used as output (24VDC out – high side drivers) or direct input with 24VDC.

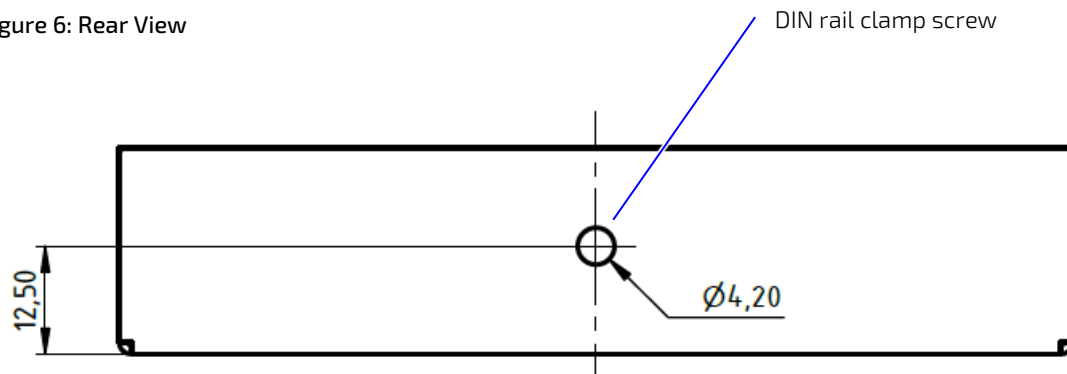
## 5.2. Front View

Figure 5:: Front View



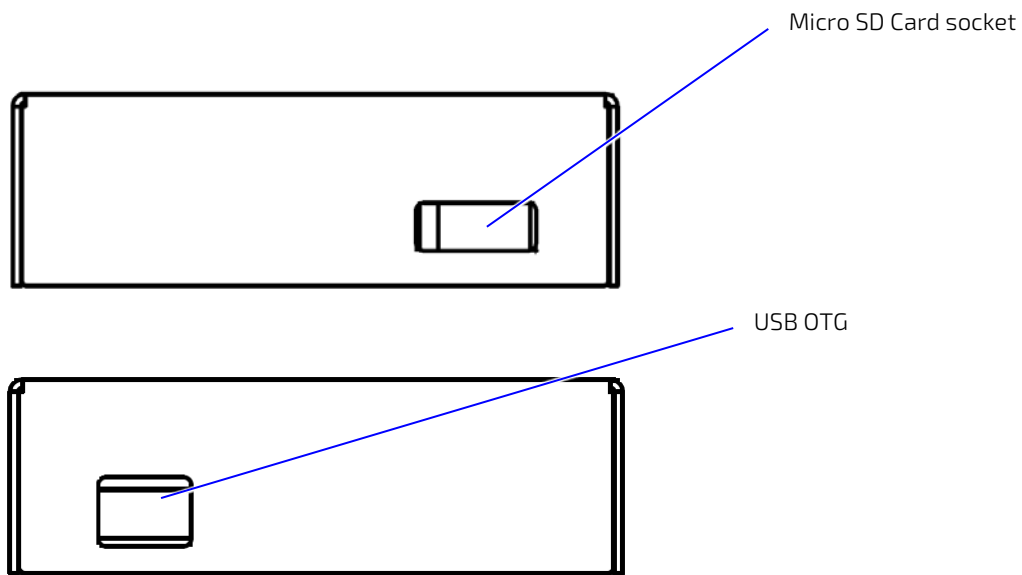
### 5.3. Rear View

Figure 6: Rear View



## 5.4. Side Views

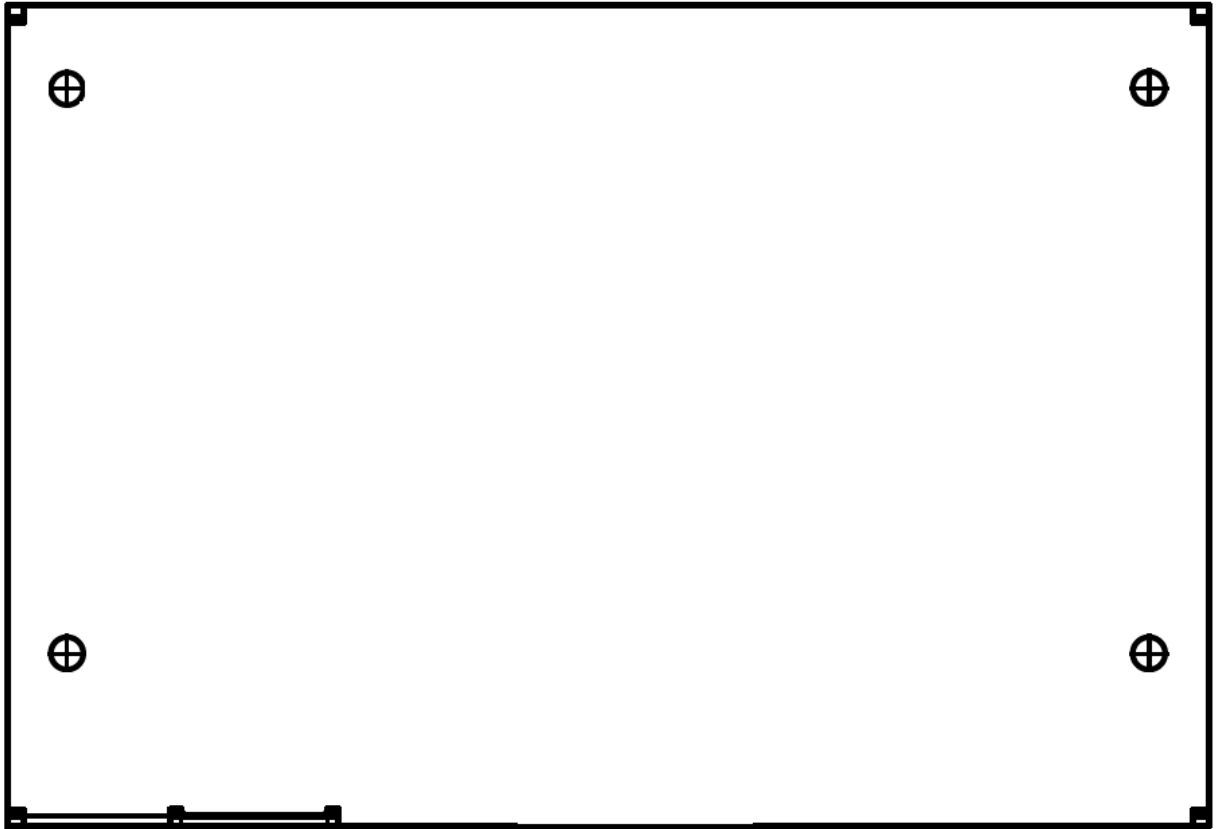
Figure 7: Side Views





## 5.5. Top View

Figure 8: Top and Bottom Views



## 6/ System Extension



The KBox A-330-RPI is factory configured to meet customer requirements. Kontron does not recommend opening the system s as this may cause damage to internal components.

---

### 6.1. Storage



Pay attention to the manufacturer's lifespan specification. Due to the limited lifespan of SDCards/SSD drives Kontron recommends checking the condition regularly.

---

#### 6.1.1. Micro SD Card Drive Bay

To expand storage memory a micro SD Card can be used. Before installing or removing an existing Micro SD card, refer to Chapter 7.1: Accessing External Components.

### 6.2. Expansion

There is no expansion capability of the KBox A-330-RPI except external USB devices.

## 7/ Accessing Components

This chapter contains important information that users must read before accessing components. Follow these procedures properly when accessing or installing component to extend the system.




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The KBox A-330-RPI is factory configured to meet customer requirements. Kontron does not recommend opening the system as this may cause damage to internal components.

---

### **▲WARNING**

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The installation/removal of system components may only be performed by a qualified persons. Observe the "General Safety Instructions for IT-Equipment" and the "installation instructions" contained within this user guide.

---



#### ESD Sensitive

---

Follow the safety instructions for components that are sensitive to electrostatic discharge (ESD). Failure to observe this warning notice may result in damage to the product or/and internal components.

---




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Because of the limited predetermined lifespan of expansion devices, Kontron recommends checking the condition of installed expansion devices regularly and to pay attention to the manufacturer specifications for lifespan.

---

## 7.1. Accessing External Components

### 7.1.1. Micro SD Card Drive Bay

The KBox A-330-RPI supports a removable micro SD card

To remove/install a removable micro SD cards, perform the following steps:

1. Press the micro SD card on the right hand side of the KBox A-330-RPI, to remove an micro SD card from the drive bay.
2. The micro SD card automatically slides out a bit for removal.
3. Slide in the micro SD card, if needed. Take care of the correct position.

## 7.2. Accessing Internal Components

### 7.2.1. Opening the Chassis




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The KBox A-330-RPI is factory configured to meet customer requirements. Kontron does not recommend opening the system as this may cause damage to internal components.

---

## 8/ Thermal Considerations

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**⚠WARNING**

Hot Surface - heatsink

Danger of burns. Heatsink can get very hot. To avoid burns and personal injury:

- Do not touch the heatsink when the product is in operation
  - Allow the product to cool before handling
  - Wear protective gloves
  - Always turn the product off when not in use
- 

### 8.1. Heatsink Plate

The KBox A-330-RPI is a fanless and passively cooled. When mounting the KBox A-330-RPI in a DIN rail enclosure or housing take care not to obstruct the airflow over the chassis, as this stops sufficient heat dispersing into the ambient environment and causes a build-up of heat.

## 9/ Installation Instructions

### 9.1. DIN Rail Mounting

The KBox A-330-RPI is a rail mount PC box designed for use in a DIN rail enclosure or housing by attaching a DIN rail mounting clamp. The DIN rail mounting clamp can be attached on the rear side of the chassis.

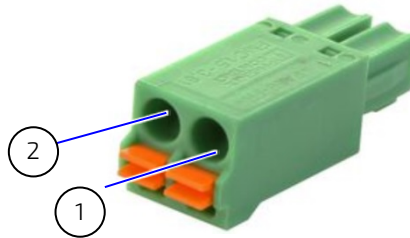
To attach the DIN Rail mounting clamp, follow the steps below:

1. Make sure that the DIN Rail Mounting clamp is in the upright position.
2. Clip the top of the DIN rail clamp in to the DIN rail and push the bottom of the DIN rail firmly until it clamps on to the bottom of the DIN rail.

## 9.2. Power Connector

The KBox A-330-RPI is connected by the input power connector on the front panel to a DC power source via a DC power supply wiring consisting of the power mating connector (Phoenix Contact FMC 1,5/ 2-ST-3,5 BK) delivered with the KBox A-330-RPI and the assembled wires. For information on how to wire the connector, see Chapter 9.2.1:Wiring the DC Mating Power Connector.

Figure 9: Phoenix Power Mating Connector



- 1 Location for inserting the 24 V wire
- 2 Location for inserting the 0 V wire

### 9.2.1. Wiring the DC Mating Power Connector

To wire the supplied Phoenix Contact FMC 1,5/ 2-ST-3,5 BK power mating connector, following the step below.

1. Cut two (1 mm<sup>2</sup>) AWG18 isolated wires to the required length and strip each end 5 mm – 7 mm.
2. Twist the striped wire-ends and provide them with ferrules.
3. Press the contact levers of the power mating connector down - far enough so that you can insert the end of the prepared wires.
4. Insert the wires into the corresponding clamp of the power mating connector. Make sure that you have the right polarity of the connection. For the pin assignment of the input power connector, refer to Chapter 12.2.1: Input Power Connector].




---

The wires used for power connections must be clearly marked (+/-/functional earth) to ensure proper connection to the front panel input power connector and to the main power source. In addition, the cables must have some form of support to minimize the strain on the unit's connectors.

---

## 10/ Starting Up

Before using the system, become familiar with the system components and follow the startup instructions below.

### 10.1. Connecting to Power Supply

The KBox A-330-RPI connects to a DC main power supply via a Phoenix Contact input power connector on the front panel and corresponding power cable.




---

When starting the KBox A-330-RPI, the functional earth connection must always be made first and disconnected last. Kontron recommended that the last connections attached to the system should be the power cable. Following a proper cabling procedure will prevent a false power-on condition, which could result in an operational failure.

---

#### **CAUTION**

---

The KBox KBox A-330-RPI must be connected to a DC mains power supply complying with the SELV (Safety Extra Low Voltage) requirements of EN 60950-1 standard. 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-330-RPI. The disconnecting device (fuse/circuit breaker) rating must be in accordance with the KBox A-330-RPI's wire cross-section.

---

To start the KBox A-330-RPI, follow the steps below:

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 power connector with wiring (refer to Chapter 9.2: Power Connector and Chapter 9.2.1: Wiring the DC Mating Power Connector) to the Input power connector located on the front panel, see Figure 4: Front Panel (pos. 1). Pay attention to the polarity of the connections. For more information on the input power connector's polarity, see Chapter 12.2.1: Input Power Connector.
3. Connect the DC power cable's other end to the DC main power supply.
4. Switch on the disconnecting device (circuit breaker) in order to apply voltage to the KBox A-330-RPI.

#### **NOTICE**

---

Do not disconnect the power from KBox A-330-RPI while KBox A-330-RPI is powered up! Performing a forced shutdown can lead to loss of data or other undesirable effects!

---

### 10.2. Operating System (OS) and Drivers

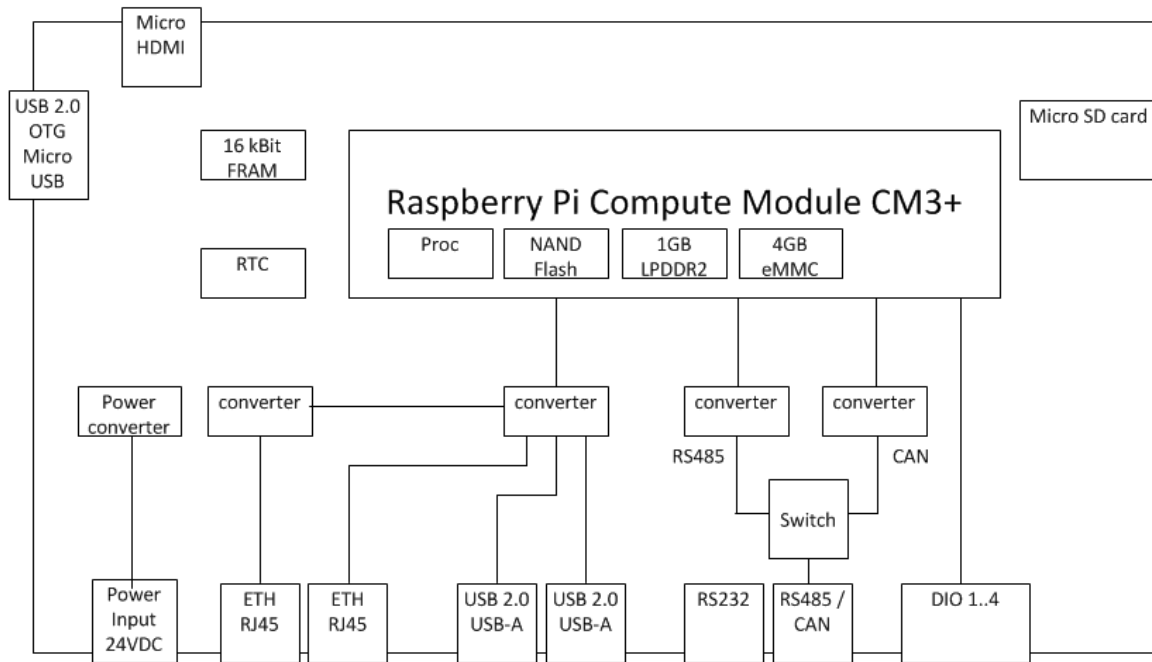
The standard KBox A-330-RPI is fully operational when switched on for the first time with pre-installed OS and drivers. Drivers are available from Kontron's EMD customer section.

If ordered without pre-installed OS, before starting the KBox A-330-RPI the operating system and the appropriate drivers need to be installed for the ordered system configuration.

# 11/Technical Data

## 11.1. Block Diagram

Figure 10: Block Diagram





## 11.2. Technical Specification

The KBox A-330-RPI implements the following mainboard technical specification.

**Table 4: Technical Specification**

<b>Processor</b>	Broadcom BCM 2837 Quad Core, 1.2GHz
<b>System Memory</b>	1GB LPDDR2
<b>Storage</b>	4GB eMMC 16 Kit FRAM 2Micro SD card socket
<b>Interfaces</b>	2x USB 2.0, USB A 1x USB 2.0 OTG, micro USB B 2x LAN (10/100 Mb/s), RJ45 1x micro HDMI 2x COM ( RS 232, RS485 ) 1x CAN 4x Digital IO (24VDC)
<b>Expansion Sockets</b>	1x micro SD card socket
<b>Power</b>	24VDC (9 VDC - 32 VDC) Input

**Table 5: Software Specification**

<b>Operating System (OS)</b>	Raspbian
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## 11.3. Mechanical Specification

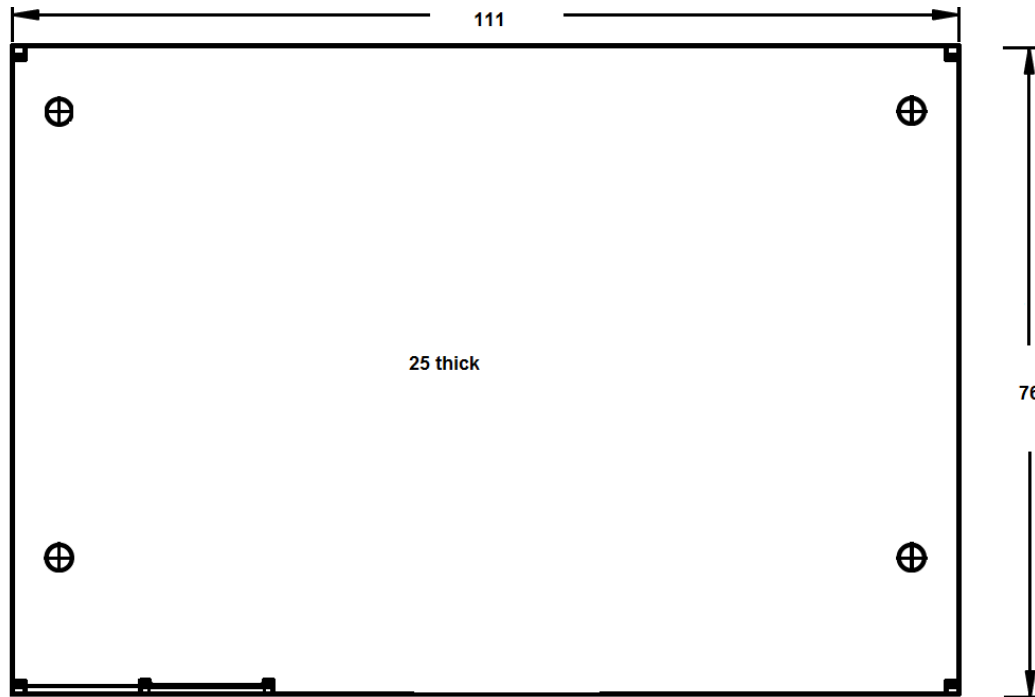
**Table 6: Mechanical Specification**

<b>Dimensions</b>	<b>KBox A-330-RPI</b>
<b>Width</b>	110 mm (4.33")
<b>Depth</b>	76 mm (3")
<b>Height</b>	25 mm (1")
<b>Weight (chassis only)</b>	Approx. ~0,3 kg (~0,66 lbs.)
<b>Construction</b>	Stainless Steel chassis
<b>Mounting</b>	DIN Rail
<b>Color</b>	Stainless Steel

For more detailed mechanical information, refer to the outline dimensions drawings within this chapter. Each dimension drawing shows the main external mechanical features such as the position and size of mounting holes for the DIN rail mounting clamp.

The following outline dimensions drawings shows the main external mechanical features for the KBox A-330-RPI.

Figure 11: Dimensions (Measurements in mm)



## 11.4. Power Specification

The KBox A-330-RPI is powered by a 2-pin Input power connector on the front panel and has no internal power supply. The standard input voltage of 24 V DC is converted internally to supply all other required voltages.

### NOTICE

Hot Plugging the power supply is not supported. Hot plugging might damage the board.

Table 7: Power Specification

Nominal Input Voltage	24 V DC
Input Voltage Range	12 V DC to 36 V DC
Input Power Mating Connector	2-pin Phoenix Contact FMC 1,5/ 2-ST-3,5 BK

### 11.4.1. Power Consumption

The power consumption of the KBox A-330-RPI depends on the implemented mainboard capacity and external interfaces, for more information see Table 8: Power Consumption.

Table 8: Power Consumption

Power Consumption			Type Label Rating	
Mainboard (Burn-In)	External Interfaces	Total		
100% RAM 100% CPU 100% Disk	2x Ethernet 2x USB 3.0 1x HDMI	Mainboard + External Interfaces	Voltage	32 V to 9 V (Max. range)
			Current	tbd
tbd	tbd	tbd	Power	tbd

### 11.4.2. Protective Earth

There is no protective earth stud bolt on the front panel connected to the chassis GND inside the system. Protected Earth is directly attached to the housing and electronic ground.

### 11.4.3. Environmental Specification

Table 9: Environmental Specification

Temperature (Operating)	0°C - 55°C ambient
Relative Humidity (Operating)	10%-90% RH @ 39°C, non condensing

## 12/ Connector, Socket and Jumper Pin Assignments

Before changing any hardware settings read this chapter carefully. This chapter provided information regarding relevant connectors, sockets and jumpers.

### 12.1. Front Panel Connectors

Figure 12: Front Panel Connectors

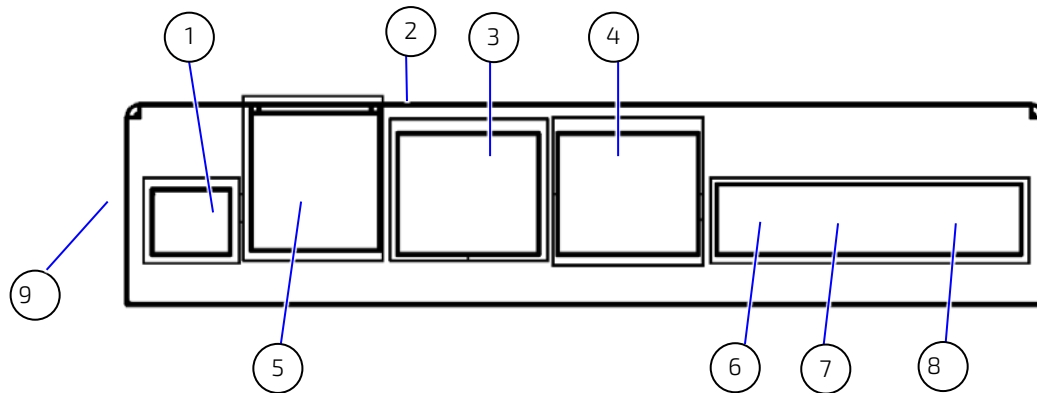
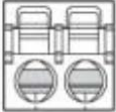


Table 10: Front Panel Connectors

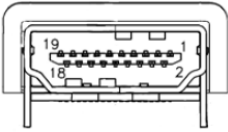
Item	Label	Function	See Chapter
1	X3	DC Power connector (2-pin Phoenix Contact)	12.2.1
2	X500 (rear)	Micro HDMI connector	12.2.2
3	X600	10/100 MBit/s LAN1 RJ-45 connector	12.2.3
4	X700	10/100 MBit/s LAN2 RJ-45 connector	
5	X601	USB2.0 Port 0 / 1 connectors (upper / lower)	12.2.4
6	X15	RS232 connector	12.2.5
7	X18	RS485 / CAN connector	12.2.6
8	X19	GPIO connector	12.2.7
9	X4 (side)	USB OTG	12.2.8

## 12.2. Front Panel Connector Pin Assignments

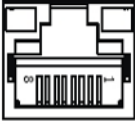
### 12.2.1. Input Power Connector (X3)

2-Pin Power Mating Connector		Pin	Signal Name
 1 (+), 2 (-)	Phoenix Contact Connector FMC 1,5/ 2-ST-3,5 BK	1	VCC
		2	GND

### 12.2.2. Micro HDMI Connector (X500)

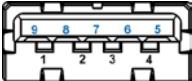
Micro HDMI	Pin	Signal Name
	3	TMDS Data2+
	4	TMDS Data2 GND
	5	TMDS Data2-
	6	TMDS Data1 +
	7	TMDS Data1 GND
	8	TMDS Data1-
	9	TMDS Data0+
	10	TMDS Data0 GND
	11	TMDS Data0-
	12	TMDS Clock+
	13	TMDS Clock GND
	14	TMDS Clock-
	15	CEC
	2	Reserved
	17	DDC_CLK
	18	DDC_DATA
	16	DDC_GND
	19	+5V Power
	1	Hot Plug Detect

### 12.2.3. ETH RJ45 Connectors (X600, X700)

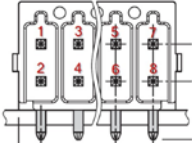

RJ45 (female)	Pin	Signal Name	Pin	Signal Name
	1	TX1+	5	TX3-
	2	TX1-	6	TX2-
	3	TX2+	7	TX4+
	4	TX3+	8	TX4+

Left LED: Activity / Link		Right LED: Activity 10/100	
Off	NO LAN connectivity	Off	10 Mbit
Yellow	Link	Green	100 Mbit
Blinking	Activity		

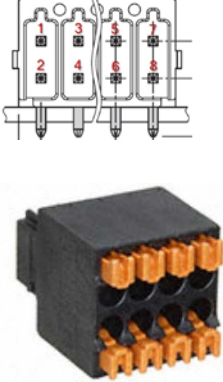
### 12.2.4. USB Port (X601)

USB 2.0 Port	Pin	Signal Name	Pin	Signal Name
	1	+USB_VCC <sup>(1)</sup>	5	USB_RX-
	2	Dat-	6	USB_RX+
	3	Dat+	7	GND
	4	GND	8	USB_TX-
			9	USB_TX+

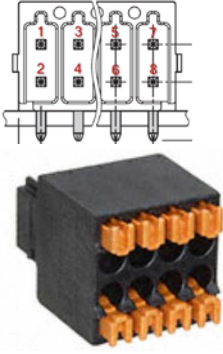
### 12.2.5. Serial Port Connector (X15)

Serial Port	Pin	RS232
  Phoenix Contact DFMC 0,5/ 4-ST-2,54	1	+24VDC
	2	GND
	3	TxD
	4	RxD
	5	NC
	6	NC
	7	+5VDC
	8	GND

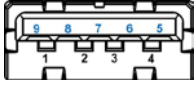
### 12.2.6. Front Panel RS485/CAN Connector (X18)

 <p>Phoenix Contact DFMC 0,5/ 4-ST-2,54</p>	1	+24VDC
	2	GND
	3	RS485 A
	4	CAN H
	5	RS485 B
	6	CAN L
	7	+5VDC
	8	GND

### 12.2.7. Front Panel GPIO Connector (X19)

	Pin	Signal Name	Pin	Signal Name
 <p>Phoenix Contact DFMC 0,5/ 4-ST-2,54</p>	1	Dout1 / Din1 Dout I <sub>max</sub> =800mA	2	GND
	3	Dout2 / Din2 Dout I <sub>max</sub> =800mA	4	GND
	5	Dout3 / Din3 Dout I <sub>max</sub> =800mA	6	GND
	7	Dout4 / Din4 Dout I <sub>max</sub> =800mA	8	GND

### 12.2.8. USB OTG Port (X4)

Micro USB Port	Pin	Signal Name	Pin	Signal Name
	1	+USB_VCC <sup>(1)</sup>	5	USB_RX-
	2	Dat-	6	USB_RX+
	3	Dat+	7	GND
	4	GND	8	USB_TX-
			9	USB_TX+

## 13/ Technical Support

For information on how to receive technical support, visit Kontron Support (<http://www.kontron.com/support>).

To request support via e-mail, report documentation errors, or general customer feedback, use Kontron's Contact Support Request Form by visiting:

<http://www.kontron.com/about-kontron/company-overview/contact-us/forms/contact-support>

In case the request form does not work or you do not get a response within 48 hours, send a follow up email to [support@kontron.com](mailto:support@kontron.com)

Make sure you have the following product identification information on hand when you call:

- ▶ Product name,
- ▶ Product model number
- ▶ Serial number (SN) of the unit

Be ready to explain the nature of your problem to the service technician.




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**The serial number can be found on the type label on the system.**

---

### 13.1. Returning Defective Merchandise

All equipment returned to Kontron must have a Return of Material Authorization (RMA) number assigned exclusively by Kontron. Kontron cannot be held responsible for any loss or damage caused to the equipment received without an RMA number. The buyer accepts responsibility for all freight charges for the return of goods to Kontron's designated facility. Kontron will pay the return freight charges back to the buyer's location in the event that the equipment is repaired or replaced within the stipulated warranty period. Follow these steps before returning any product to Kontron.

1. Visit the RMA Information website:




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**Kontron's RMA Information website can be found at:**  
<http://www.kontron.com/support-and-services/support/rma-information>

---

Download the RMA Request sheet for Kontron Europe GmbH - Augsburg and fill out the form. Take care to include a short detailed description of the observed problem or failure and to include the product identification (product name, material number and serial-number). If more than one product is sent in a delivery. Fill out the above information in the RMA Request form for each product.

2. Send the completed RMA-sheet to the given fax- or email-address at Kontron Europe GmbH. Kontron Europe GmbH will provide an RMA-Number within one business day.
3. The goods for repair shall be packed properly for shipping, considering shock- and ESD-protection.




---

**Goods returned to Kontron Europe GmbH in non-proper packaging are considered as customer caused faults and cannot be accepted as warranty repairs.**

---



4. Add the RMA-sheet to the relevant delivery address and include the RMA-No with the shipping paperwork.  
Sent the product to the following delivery address:

Kontron Europe GmbH

RMA Support

Lise-Meitner-Str. 3-5

86156 Augsburg

Germany

Phone: +49 (0) 821 4086-0

Fax: +49 (0) 821 4086 111

Email: [service@kontron.com](mailto:service@kontron.com)

5. After Kontron Europe GmbH receives the product, a confirmation of the order is sent via email to the address named on the RMA sheet.

## 14/ Storage, Transportation and Maintenance

### 14.1. Storage

If the product is not in use for an extended period time, disconnect the power plug from the AC outlet .If it is necessary to store the product then re-pack the product as originally delivered to avoid damage. The storage facility must meet the products environmental requirements as stated within this user guide. Kontron recommends keeping the original packaging material for future storage or warranty shipments.

### 14.2. Transportation

To ship the product use the original packaging, designed to withstand impact and adequately protect the product. When packing or unpacking products always take shock and ESD protection into consideration and use an EOS/ESD safe working area.

### 14.3. Maintenance

Maintenance or repair on the open product may only be carried out by qualified personnel authorized by Kontron.  
Cleaning

- ▶ For light soiling, clean the product with a dry cloth.
- ▶ Carefully remove dust from the surface of the chassis and cooling fins using a clean, soft brush.
- ▶ Stubborn dirt should be removed using a mild detergent and a soft cloth

#### **NOTICE**

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Do not use steel wool, metallic threads or solvents like abrasives, alcohol, acetone or benzene for cleaning the KBox A-330-RPI

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#### 14.3.1. Replacing the Lithium Battery

The lithium battery must only be replaced with the same type of battery or with a type of battery recommended by Kontron. If the on-board Lithium battery needs to be replaced, follow the steps below:

1. Remove the lithium battery from the holder by pulling it outwards.
2. Place a new lithium battery in the battery holder.
3. Pay attention to the polarity of the battery.

#### **CAUTION**

---

Danger of explosion when replacing with wrong type of battery. Replace only with the same or equivalent type recommended by the manufacturer. The lithium battery type must be UL recognised.

---




---

Do not dispose of lithium batteries in general trash collection. Dispose of the battery according to the local regulations dealing with the disposal of these special materials, (e.g. to the collecting points for dispose of batteries).

---

## 15/ Warranty

Kontron defines product warranty in accordance with regional warranty definitions. Claims are at Kontron's discretion and limited to the defect being of a material nature. To find out more about the warranty conditions and the defined warranty period for your region, following the steps below:

1. Visit Kontron's Term and Conditions webpage.  
<http://www.kontron.com/terms-and-conditions>
2. Click on your region's General Terms and Conditions of Sale.



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**The KBox A-330-RPI is factory configured to meet customer requirements. Kontron does not recommend opening the system as this may cause damage to internal components.**

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### 15.1. Limitation/Exemption from Warranty Obligation

In general, Kontron shall not be required to honor the warranty, even during the warranty period, and shall be exempted from the statutory accident liability obligations in the event of damage caused to the product due to failure to observe the following:

- ▶ General safety instructions for IT equipment within this user guide
- ▶ Warning labels on the product and warning symbols within this user guide
- ▶ Information and hints within this user guide

Additionally, alterations or modifications to the product that are not explicitly approved by Kontron, described in this user guide, or received from Kontron Support as a special handling instruction will void your warranty.

Within the warranty period, the product should only be opened by Kontron. Removing the protection label and opening the product within the warranty period exempts the product from the statutory warranty obligation.

Due to their limited service life, parts which by their nature are subject to a particularly high degree of wear (wearing parts) are excluded from the warranty beyond that provided by law.

## 16/ Disposal

Final disposal of this product after the product's service life must be accomplished in accordance with the applicable country, state, or local laws or regulations.



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**Kontron manufactures products to satisfy environmental protection requirements where possible. Many of the components used are capable of being recycled.**

---

Kontron follows the Waste Electrical and Electronic Equipment (WEEE) Directive that aims to reduce waste arising from Electrical and Electronic waste and encourages customers to return Kontron products for proper disposal. For more information regarding WEEE compliance, see the Disposal and Recycling section at the start of this user guide.

## Appendix A: List of Acronyms

Table 11: List of Acronyms (Example)

AC	Alternating Current
ACPI	Advanced Configuration Control Interface
CPU	Central Processing Unit
DC	Direct Current
DIO	Digital Input/Output
DP	Display Port
ECC	Error Checking and Correction
EHCI	Enhanced Host Controller Interface
ESD	Electrostatic Discharge
GbE	Gigi bit Ethernet
GPU	Graphics Processing Unit
HD/HDD	Hard Disk /Drive
HDMI	High Definition Multimedia Interface
HPM	PICMG Hardware Platform Management specification family
H/W	Hardware
IOL	IPMI-Over-LAN
IOT	Internet of Things
KVM	Keyboard Video Mouse
LAN	Local Area Network
LVD	Low Voltage Device
M.2	Next smaller generation of mSATA
MEI	Management Engine Interface
mPCIe	Mini PCI-Express

mSATA	Mini SATA
OS	Operating System
PCIe	PCI-Express
RAM	Read Access Memory
RoHS	Restriction of the use of certain hazardous substances
RTC	Real Time Clock
SATA	Serial-ATA
SEL	System Event Log
SELV	Safety Extra Low Voltage
SIO	Super Input/output
SMBus	System Management Bus
SMWI	System Monitor Web Interface
SOL	Serial Over LAN
SSD	Solid State Drive
TPM	Trusted Platform Module
UEFI	Unified Extensible Firmware Interface
USB	Universal Serial Bus
VGA	Video Graphics Array
VLP	Very Low Profile
WEEE	Waste Electrical and Electronic Equipment
WLAN	Wireless LAN
XHCI	eXtensible Host Controller Interface



## 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](http://www.kontron.com)



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