# » User Guide «

# CP-RIO6-M

**Dual 2.5" SATA Storage**
**6U CompactPCI Rear Transition Module**

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# Imprint

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# Disclaimer

# Table of Contents

# List of Tables



# List of Figures

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## Environmental Protection Statement

This product has been manufactured to satisfy environmental protection requirements where possible. Many of the components used (structural parts, printed circuit boards, connectors, batteries, etc.) are capable of being recycled.

Final disposition of this product after its service life must be accomplished in accordance with applicable country, state, or local laws or regulations.

## Explanation of Symbols

***Caution, Electric Shock!***

This symbol and title warn of hazards due to electrical shocks (> 60V) when touching products or parts of them. 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.

Please refer also to the section “High Voltage Safety Instructions” on the following page.

***Warning, ESD Sensitive Device!***

This symbol and title inform that 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.

Please read also the section “Special Handling and Unpacking Instructions” on the following page.

***Warning!***

This symbol and title emphasize points which, if not fully understood and taken into consideration by the reader, may endanger your health and/or result in damage to your material.

***Note ...***

This symbol and title emphasize aspects the reader should read through carefully for his or her own advantage.

## 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

***Warning!***

All operations on this device must be carried out by sufficiently skilled personnel only.

***Caution, Electric Shock!***

Before installing a not hot-swappable Kontron product into a system always ensure that your mains power is switched off. This applies also to the installation of piggybacks.

Serious electrical shock hazards can exist during all installation, repair and maintenance operations with this product. Therefore, always unplug the power cable and any other cables which provide external voltages before performing work.

### Special Handling and Unpacking Instructions

***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 board 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 board.

# 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 device, which are not explicitly approved by Kontron and described in this manual or received from Kontron's Technical Support as a special handling instruction, will void your warranty.

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

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

Keep all the original packaging material for future storage or warranty shipments. If it is necessary to store or ship the board, please re-pack it as nearly as possible in the manner in which it was delivered.

Special care is necessary when handling or unpacking the product. Please consult the special handling and unpacking instruction on the previous page of this manual.

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Kontron grants the original purchaser of Kontron's products a ***TWO YEAR LIMITED HARDWARE WARRANTY*** as described in the following. However, no other warranties that may be granted or implied by anyone on behalf of Kontron are valid unless the consumer has the express written consent of Kontron.

Kontron warrants their own products, excluding software, to be free from manufacturing and material defects for a period of 24 consecutive months from the date of purchase. This warranty is not transferable nor extendible to cover any other users or long-term storage of the product. It does not cover products which have been modified, altered or repaired by any other party than Kontron or their authorized agents. Furthermore, any product which has been, or is suspected of being damaged as a result of negligence, improper use, incorrect handling, servicing or maintenance, or which has been damaged as a result of excessive current/voltage or temperature, or which has had its serial number(s), any other markings or parts thereof altered, defaced or removed will also be excluded from this warranty.

If the customer's eligibility for warranty has not been voided, in the event of any claim, he may return the product at the earliest possible convenience to the original place of purchase, together with a copy of the original document of purchase, a full description of the application the product is used on and a description of the defect. Pack the product in such a way as to ensure safe transportation (see our safety instructions).

Kontron provides for repair or replacement of any part, assembly or sub-assembly at their own discretion, or to refund the original cost of purchase, if appropriate. In the event of repair, refunding or replacement of any part, the ownership of the removed or replaced parts reverts to Kontron, and the remaining part of the original guarantee, or any new guarantee to cover the repaired or replaced items, will be transferred to cover the new or repaired items. Any extensions to the original guarantee are considered gestures of goodwill, and will be defined in the "Repair Report" issued by Kontron with the repaired or replaced item.

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Chapter 1

# Introduction

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# 1. Introduction

## 1.1 Board Overview

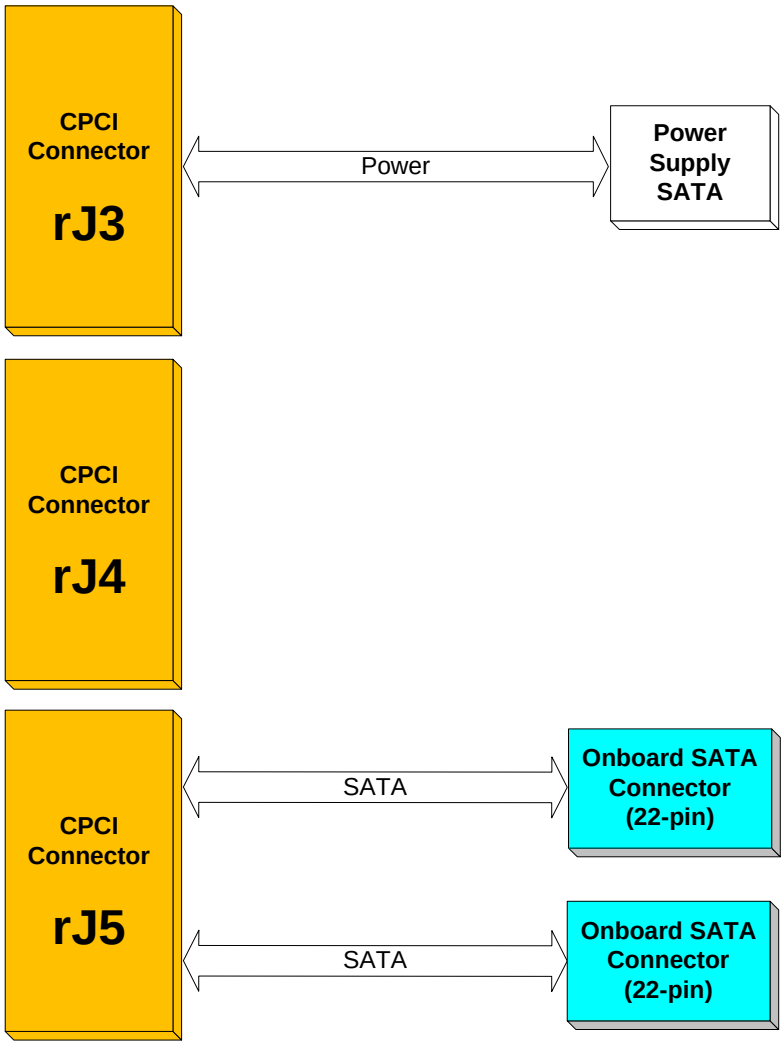
The CP-RIO6-M 6U CompactPCI rear transition module has been designed for use with Kontron 6U CompactPCI CPU boards and provides the capability to install two onboard 2.5" SATA HDDs/ SSDs. In order to use the CP-RIO6-M, a special 6U CompactPCI backplane with rear I/O support as well as a compatible and correctly configured CPU board are required. The CP-RIO6-M connects to the backplane via three CompactPCI connectors.

## 1.2 Board Diagrams

The following diagrams provide additional information concerning the boards' functionality and component layout.

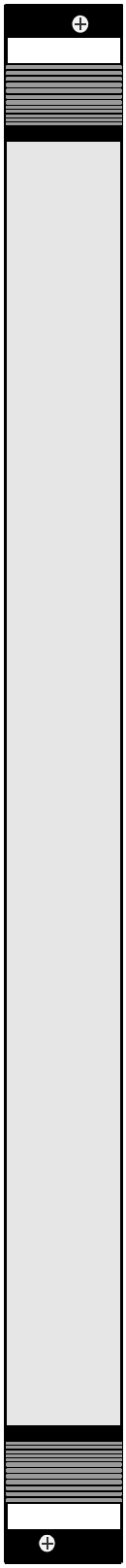
### 1.2.1 Functional Block Diagrams

**Figure 1-1: CP-RIO6-M Functional Block Diagram**



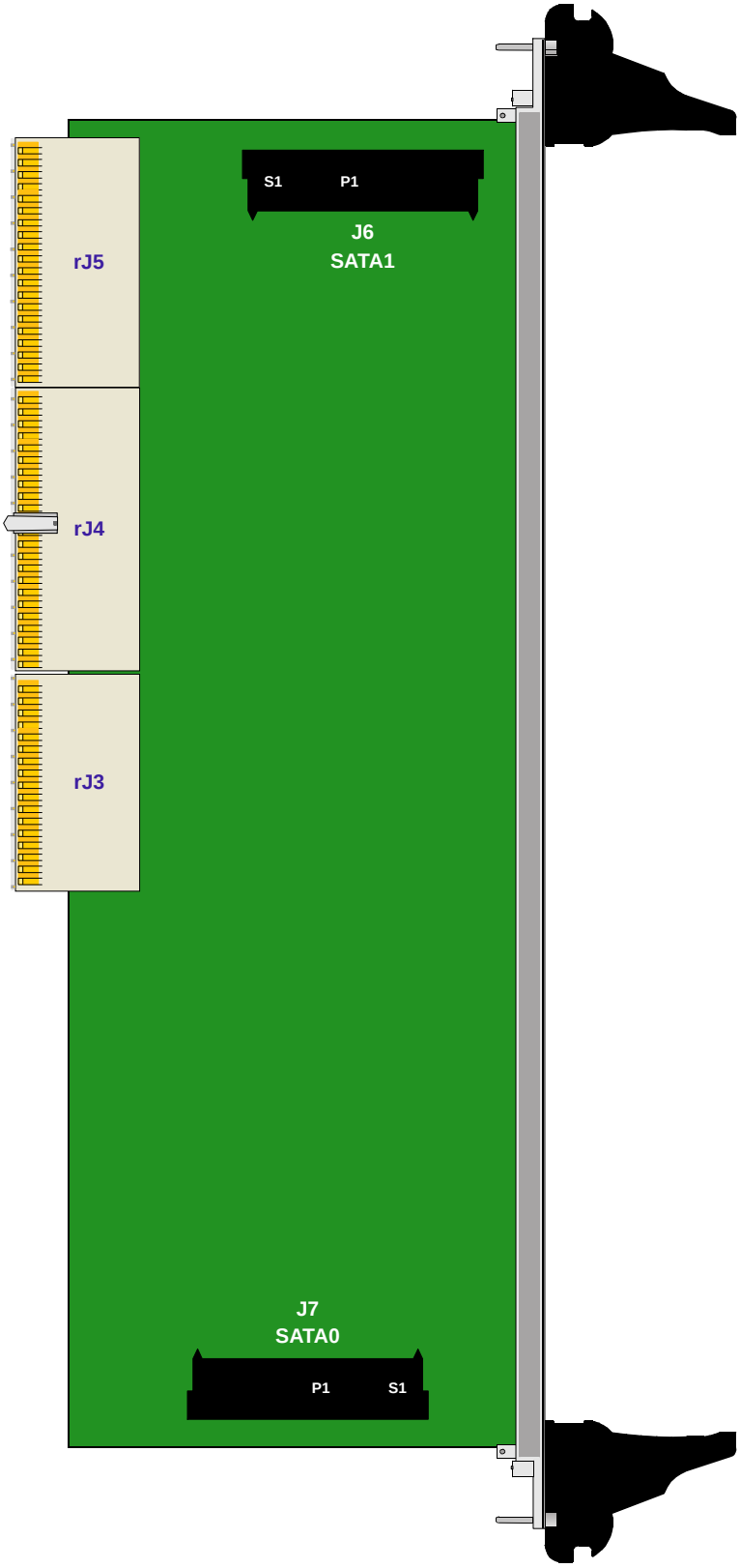
### 1.2.2 Front Panel

**Figure 1-2: CP-RIO6-M Front Panel**



### 1.2.3 Board Layout

**Figure 1-3: CP-RIO6-M Board Layout – Front View**



## 1.3 Technical Specification

**Table 1-1: CP-RIO6-M Main Specifications**

| CP-RIO6-M | | SPECIFICATIONS |
|---|---|---|
| Onboard Interfaces | SATA | Two SATA I interfaces implemented as onboard, 22-pin, SATA connectors, J6 and J7, for connecting two 2.5" SATA HDDs/SSDs |
| | CompactPCI | Three CompactPCI connectors, rJ3, rJ4 and rJ5, for connecting the CP-RIO6-M to the backplane |
| General | Temperature Range | Operational: 0°C to +60°C Standard<br>-40°C to +85°C E2 (without any SATA HDDs/SSDs)<br>Storage: -55°C to +85°C Without any SATA HDDs/SSDs<br>***Note ...***<br>When SATA HDDs/SSDs are installed, refer to their operational specifications as this will influence the modules' operational and storage temperature. |
| | MTBF | 2286782 h (MIL-HDBK-217 FN2, Ground Benign 30°)<br>6343931 h (Bellcore Issue 6, Ground Benign 30°) |
| | Mechanical | 6U, 4HP, CompactPCI-compliant form factor |
| | Dimensions | 233.35 mm x 80 mm |
| | Board Weight | 200 g (without 2.5" SATA HDD/SSD) |

## 1.4 Standards

The CP-RIO6-M complies with the requirements of the following standards:

**Table 1-2: Standards for the CP-RIO6-M**

| TYPE | ASPECT | STANDARD | REMARKS |
|---|---|---|---|
| CE | Emission | EN55022<br>EN61000-6-3 | -- |
| | Immission | EN55024<br>EN61000-6-2 | -- |
| | Electrical Safety | EN60950-1 | -- |
| Mechanical | Mechanical Dimensions | IEEE 1101.10 | -- |
| Environmental | Climatic Humidity | IEC60068-2-78 | 93% RH at 40°C, non-condensing |
| | WEEE | Directive 2002/96/EC | Waste electrical and electronic equipment |
| | RoHS | Directive 2002/95/EC | Restriction of the use of certain hazardous substances in electrical and electronic equipment |
| | Vibration (Sinusoidal) | IEC61131-2<br>IEC60068-2-6 | Test parameters for the CP-RIO6-M without any SATA HDD/SSDs (see note below):<br>• 5-150 (Hz) frequency range<br>• 1 (g) acceleration<br>• 1 (oct/min) sweep rate<br>• 10 cycles/axis<br>• 3 axes |
| | Single Shock | IEC61131-2<br>IEC60068-2-27 | Test parameters for the CP-RIO6-M without any SATA HDD/SSDs (see note below):<br>• 15 (g) acceleration<br>• 11 (ms) pulse duration<br>• 3 shocks per direction<br>• 6 directions<br>• 5 (s) recovery time |

***Note ...***

For information relating to shock and vibration standards for the HDD/SSD devices, refer to the respective manufacturer's specification.

***Note ...***

Kontron performs comprehensive environmental testing of its products in accordance with applicable standards.

Customers desiring to perform further environmental testing of Kontron products must contact Kontron for assistance prior to performing any such testing. This is necessary, as it is possible that environmental testing can be destructive when not performed in accordance with the applicable specifications.

In particular, for example, boards **without conformal coating** must not be exposed to a change of temperature exceeding 1K/minute, averaged over a period of not more than five minutes. Otherwise, condensation may cause irreversible damage, especially when the board is powered up again.

Kontron does not accept any responsibility for damage to products resulting from destructive environmental testing.

## 1.5 Related Publications

The following publications contain information relating to the CP-RIO6-M.

**Table 1-3: Related Publications**

| PRODUCT | PUBLICATION |
|---|---|
| CompactPCI Systems and Boards | CompactPCI Specification 2.0, Rev. 3.0<br>CompactPCI Packet Switching Backplane Specification PICMG 2.16, Rev. 2.0 |
| | *Kontron* CompactPCI Backplane Manual, ID 24229 |
| All Kontron products | Product Safety and Implementation Guide, ID 1021-9142 |

Chapter 2

# Functional Description

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# 2. Functional Description

## 2.1 Board Interfaces

### 2.1.1 Serial ATA Interfaces

The CP-RIO6-M provides two SATA I interfaces implemented on two onboard SATA connectors, J6 and J7, used to connect two 2.5” SATA HDDs/SSDs.

**Figure 2-1: SATA Con. J6 and J7**

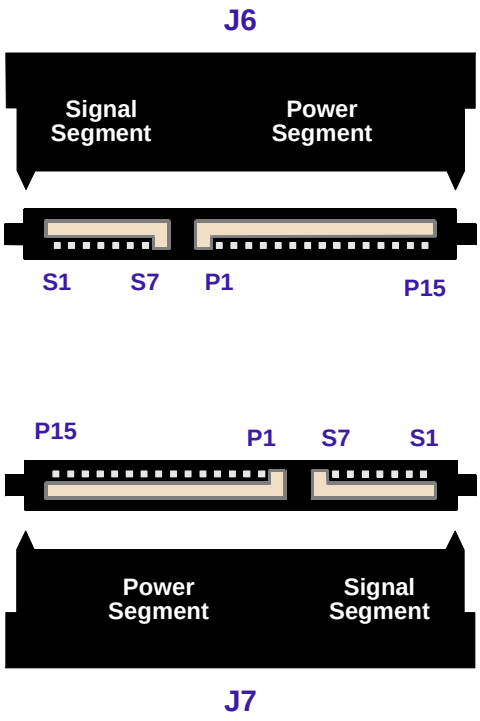


**Table 2-1: SATA Con. J6 and J7 Pinout**

| PIN | SIGNAL | FUNCTION | I/O |
|---|---|---|---|
| Signal Segment Key | | | |
| S1 | GND | Ground signal | -- |
| S2 | SATA_TX+ | Differential Transmit+ | I |
| S3 | SATA_TX- | Differential Transmit- | I |
| S4 | GND | Ground signal | -- |
| S5 | SATA_RX- | Differential Receive- | O |
| S6 | SATA_RX+ | Differential Receive+ | O |
| S7 | GND | Ground signal | -- |
| Signal Segment “L” | | | |
| Central Connector Polarizer | | | |
| Power Segment “L” | | | |
| P1 | NC (3.3 V) | Not connected | -- |
| P2 | NC (3.3 V) | Not connected | -- |
| P3 | NC (3.3 V) | Not connected | -- |
| P4 | GND | Ground signal | -- |
| P5 | GND | Ground signal | -- |
| P6 | GND | Ground signal | -- |
| P7 | 5V | 5V power | -- |
| P8 | 5V | 5V power | -- |
| P9 | 5V | 5V power | -- |
| P10 | GND | Ground signal | -- |
| P11 | RES | Reserved | -- |
| P12 | GND | Ground signal | -- |
| P13 | 12V (NC) | Not connected | -- |
| P14 | 12V (NC) | Not connected | -- |
| P15 | 12V (NC) | Not connected | -- |
| Power Segment Key | | | |

***Note ...***

The CP-RIO6-M supports SATA devices with a maximum start-up current of 1.1 A (5.5 W) and a maximum operating current of 0.7 A (3.5 W) on the 5 V voltage supply.

### 2.1.2 Rear I/O Interface on CompactPCI Connectors rJ3, rJ4 and rJ5

The CP-RIO6-M is equipped with three CompactPCI rear I/O connectors, rJ3, rJ4 and rJ5.

***Warning!***

To support the rear I/O feature, a 6U CompactPCI backplane with rear I/O support as well as a compatible and correctly configured CPU board are required. Do not plug the CP-RIO6-M in a backplane without rear I/O support. Failure to comply with the above will result in damage to the CP-RIO6-M.

**Figure 2-2: Rear I/O CompactPCI Connectors rJ3, rJ4 and rJ5**

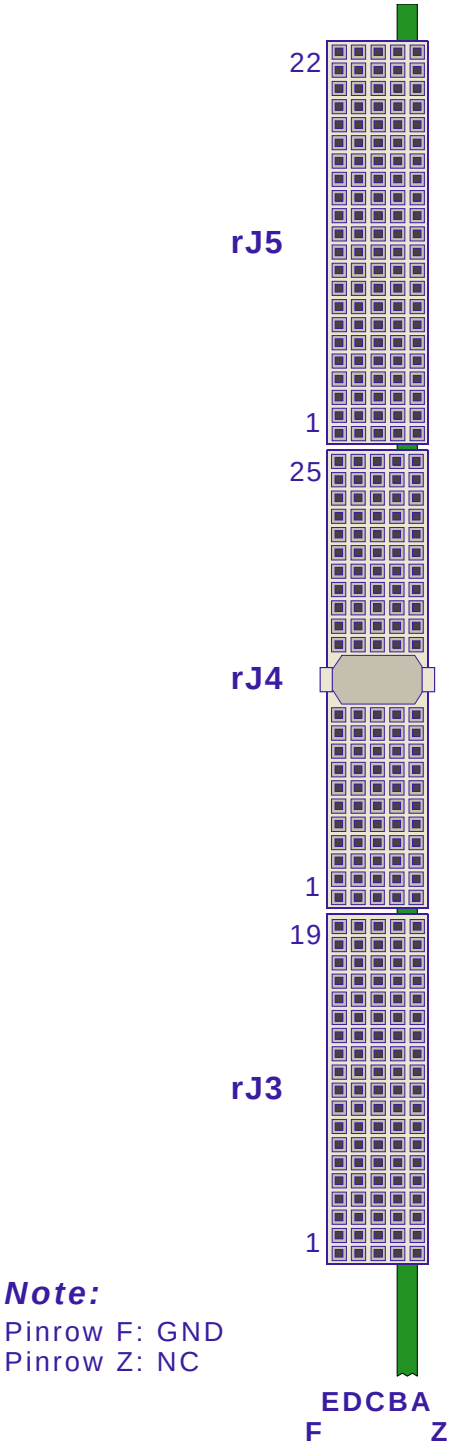

**Table 2-2: Rear I/O CompactPCI Rear I/O Connector rJ3 Pinout**

| PIN | Z | A | B | C | D | E | F |
|---|---|---|---|---|---|---|---|
| 19 | NC | RIO_5V | RIO_5V | RIO_3.3V | NC | NC | GND |
| 18 | NC | NC | NC | GND | NC | NC | GND |
| 17 | NC | NC | NC | GND | NC | NC | GND |
| 16 | NC | NC | NC | GND | NC | NC | GND |
| 15 | NC | NC | NC | GND | NC | NC | GND |
| 14 | NC | NC | NC | NC | NC | NC | GND |
| 13 | NC | NC | NC | NC | NC | NC | GND |
| 12 | NC | NC | NC | GND | NC | NC | GND |
| 11 | NC | NC | NC | GND | NC | NC | GND |
| 10 | NC | NC | NC | GND | NC | NC | GND |
| 9 | NC | NC | NC | GND | NC | NC | GND |
| 8 | NC | NC | NC | GND | NC | NC | GND |
| 7 | NC | NC | NC | NC | NC | NC | GND |
| 6 | NC | NC | NC | NC | NC | NC | GND |
| 5 | NC | NC | NC | NC | NC | NC | GND |
| 4 | NC | NC | NC | NC | NC | NC | GND |
| 3 | NC | NC | NC | NC | NC | NC | GND |
| 2 | NC | NC | NC | NC | NC | NC | GND |
| 1 | NC | NC | NC | NC | NC | GND | GND |

***Warning!***

The RIO_XXX signals are power supply **INPUTS** to supply the CP-RIO6-M with power from the CPU board. These pins **MUST NOT** be connected to any other power source, either within the backplane itself or within the CP-RIO6-M.

Failure to comply with the above will result in damage to the CP-RIO6-M.

**Table 2-3: Rear I/O CompactPCI Rear I/O Connector rJ4 Pinout**

| PIN | Z | A | B | C | D | E | F |
|---|---|---|---|---|---|---|---|
| 25 | NC | NC | NC | GND | NC | NC | GND |
| 24 | NC | NC | NC | GND | NC | NC | GND |
| 23 | NC | NC | RIO_5V | GND | NC | RIO_3.3V | GND |
| 22 | NC | NC | NC | GND | NC | NC | GND |
| 21 | NC | NC | NC | GND | NC | NC | GND |
| 20 | NC | GND | GND | GND | GND | GND | GND |
| 19 | NC | NC | NC | GND | NC | NC | GND |
| 18 | NC | NC | NC | GND | NC | NC | GND |
| 17 | NC | GND | GND | GND | GND | GND | GND |
| 16 | NC | NC | NC | GND | NC | NC | GND |
| 15 | NC | NC | NC | GND | NC | NC | GND |
| 12-14 | Key Area | | | | | | |
| 11 | NC | NC | NC | GND | NC | NC | GND |
| 10 | NC | NC | NC | GND | NC | NC | GND |
| 9 | NC | GND | GND | GND | GND | GND | GND |
| 8 | NC | NC | NC | GND | NC | NC | GND |
| 7 | NC | NC | NC | GND | NC | NC | GND |
| 6 | NC | GND | GND | GND | GND | GND | GND |
| 5 | NC | NC | NC | GND | NC | NC | GND |
| 4 | NC | NC | NC | GND | NC | NC | GND |
| 3 | NC | GND | GND | GND | GND | GND | GND |
| 2 | NC | NC | NC | GND | NC | NC | GND |
| 1 | NC | NC | NC | GND | NC | NC | GND |

***Warning!***

The RIO_XXX signals are power supply **INPUTS** to supply the CP-RIO6-M with power from the CPU board. These pins **MUST NOT** be connected to any other power source, either within the backplane itself or within the CP-RIO6-M.

Failure to comply with the above will result in damage to the CP-RIO6-M.

**Table 2-4: Rear I/O CompactPCI Rear I/O Connector rJ5 Pinout**

| PIN | Z | A | B | C | D | E | F |
|---|---|---|---|---|---|---|---|
| 22 | NC | SATA:LED# | NC | GND | NC | NC | GND |
| 21 | NC | NC | NC | GND | NC | NC | GND |
| 20 | NC | NC | NC | GND | NC | NC | GND |
| 19 | NC | NC | NC | GND | NC | NC | GND |
| 18 | NC | NC | NC | GND | NC | NC | GND |
| 17 | NC | NC | NC | GND | NC | NC | GND |
| 16 | NC | NC | NC | GND | NC | NC | GND |
| 15 | NC | NC | NC | GND | NC | NC | GND |
| 14 | NC | NC | NC | GND | NC | NC | GND |
| 13 | NC | NC | NC | GND | NC | NC | GND |
| 12 | NC | NC | NC | GND | NC | NC | GND |
| 11 | NC | NC | NC | GND | NC | NC | GND |
| 10 | NC | NC | NC | GND | NC | NC | GND |
| 9 | NC | GND | GND | GND | GND | GND | GND |
| 8 | NC | NC | NC | GND | NC | NC | GND |
| 7 | NC | GND | GND | GND | GND | GND | GND |
| 6 | NC | NC | NC | GND | NC | NC | GND |
| 5 | NC | GND | GND | GND | GND | GND | GND |
| 4 | NC | HT1:TX+ | HT1:TX- | GND | HT1:RX+ | HT1:RX- | GND |
| 3 | NC | GND | GND | GND | GND | GND | GND |
| 2 | NC | HT0:TX+ | HT0:TX- | GND | HT0:RX+ | HT0:RX- | GND |
| 1 | NC | GND | GND | GND | GND | GND | GND |

The following table describes the signals of the rJ5 connector.

**Table 2-5: Rear I/O CompactPCI Rear I/O Connector rJ5 Signals**

| SIGNAL | DESCRIPTION |
|---|---|
| HT0 | SATA port 0 routed to J7 |
| HT1 | SATA port 1 routed to J6 |
| SATA:LED | SATA activity LED |

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Chapter 3

# Installation

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# 3. Installation

The CP-RIO6-M has been designed for easy installation. However, the following standard precautions, installation procedures, and general information must be observed to ensure proper installation and to preclude damage to the CP-RIO6-M, other system components, or injury to personnel.

## 3.1 Safety Requirements

The following safety precautions must be observed when installing or operating the CP-RIO6-M. Kontron assumes no responsibility for any damage resulting from failure to comply with these requirements.

***Caution!***

Ensure that the system main power is removed prior to installing or removing the CP-RIO6-M. Ensure that there are no other external voltages or signals being applied to the CP-RIO6-M or other boards within the system. Failure to do so could endanger your life or health and may damage the CP-RIO6-M or other system components including process-side signal conditioning equipment.

***ESD Equipment!***

The CP-RIO6-M contains electrostatically sensitive devices. Please observe the necessary precautions to avoid damage to the CP-RIO6-M:

- Discharge your clothing before touching the assembly. Tools must be discharged before use.
- Do not touch components, connector-pins or traces.
- If working at an anti-static workbench with professional discharging equipment, please do not omit to use it.

## 3.2 Initial Installation Procedures

The following procedures are applicable only for the initial installation of the CP-RIO6-M in a system.

To perform an initial installation of both the CP-RIO6-M in a system, proceed as follows:

1. Ensure that the safety requirements indicated Chapter 3.1 are observed.

***Warning!***

Failure to comply with the instruction below may cause damage to the CP-RIO6-M or result in improper system operation.

2. Ensure that the CP-RIO6-M is compatible with the CPU board and the backplane prior to installation.
3. Ensure that the SATA devices are properly installed prior to installation.
4. Ensure that no power is applied to the system before proceeding.

***Warning!***

When performing the next step, **DO NOT** push the CP-RIO6-M into the backplane connectors. Use the ejector handles to seat the CP-RIO6-M into the backplane connectors.

5. Carefully insert the CP-RIO6-M into the slot designated by the application requirements for the CP-RIO6-M until it makes contact with the backplane connectors.
6. Using both ejector handles, engage the CP-RIO6-M with the backplane. When the ejector handles are locked, the CP-RIO6-M is engaged.
7. Fasten the two front panel retaining screws.
8. Ensure that the CP-RIO6-M is properly secured.

The CP-RIO6-M is now ready for initial operation.

## 3.3 Standard Removal Procedures

To remove the CP-RIO6-M proceed as follows:

1. Ensure that the safety requirements indicated in Chapter 3.1 are observed.

***Warning!***

Care must be taken when applying the procedures below to ensure that neither the CP-RIO6-M nor system boards are physically damaged by the application of these procedures.

2. Ensure that no power is applied to the system before proceeding.

***Warning!***

Even though power may be removed from the system, the CP-RIO6-M front panel cables may have power applied which comes from an external source.

In addition, these cables may be connected to devices that can be damaged by electrostatic discharging or short-circuiting of pins.

It is the responsibility of the system designer or integrator to ensure that appropriate measures are taken to preclude damage to the system or injury to personnel which may arise from the handling of these cables (connecting or disconnecting).

Kontron disclaims all liability for damages or injuries resulting from failure to comply with the above.

3. Unscrew the front panel retaining screws.
4. Disengage the CP-RIO6-M from the backplane by first unlocking the ejection handles and then by pressing the handles as required until the CP-RIO6-M is disengaged.
5. After disengaging the CP-RIO6-M from the backplane, pull it out of the slot.
6. Dispose of the CP-RIO6-M as required.

## 3.4 Installation of Peripheral Devices

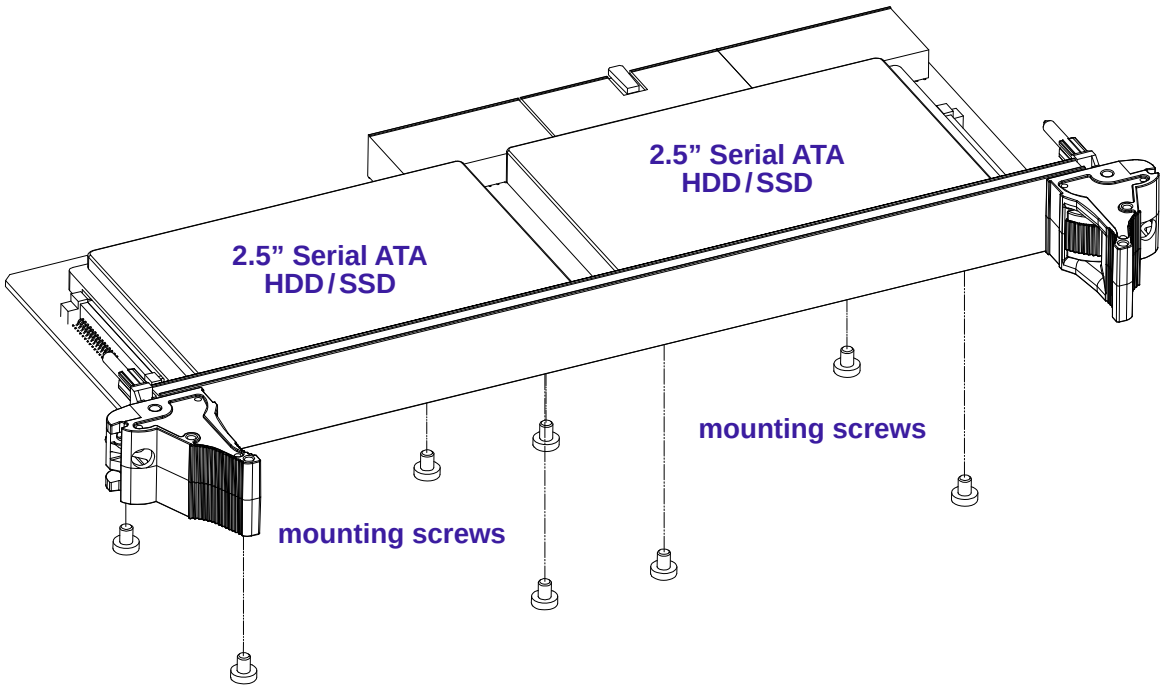
The CP-RIO6-M is designed to accommodate two 2.5” Serial ATA HDDs/SSDs. The following section provides information regarding installation aspects and not detailed procedures.

### 3.4.1 Installation of 2.5” HDD/SSD Devices

Up to two 2.5” HDDs/SSDs may be installed on the CP-RIO6-M via the onboard SATA connectors, J6 and J7. During installation it is necessary to ensure that the SATA devices are correctly seated in the onboard SATA connectors and properly secured via the four mounting screws.

The following figure shows the placement of the 2.5” SATA HDDs/SSDs on the CP-RIO6-M.

**Figure 3-1: Placement of the 2.5” SATA HDDs/SSDs on the CP-RIO6-M**




***Note ...***

The CP-RIO6-M supports SATA devices with a maximum start-up current of 1.1 A (5.5 W) and a maximum operating current of 0.7 A (3.5 W) on the 5 V voltage supply.