» R2U4S «

Installation and User's Manual

SD.DT.E84-3e - December 2009

Revision History

Publication Title:	R2U4S User's Manual	
Doc. ID:	SD.DT.E84-3e	
Rev.	Brief Description of Changes	Date of Issue
3e	Chapter 2. Add information related to the ventilation direction	12-2009

Proprietary Note

This document contains information proprietary to Kontron. It may not be copied or transmitted by any means, disclosed to others, or stored in any retrieval system or media without the prior written consent of Kontron or one of its authorized agents.

The information contained in this document is, to the best of our knowledge, entirely correct. However, Kontron cannot accept liability for any inaccuracies or the consequences thereof, or for any liability arising from the use or application of any circuit, product, or example shown in this document.

Kontron reserves the right to change, modify, or improve this document or the product described herein, as seen fit by Kontron without further notice.

Trademarks

This document may include names, company logos and trademarks, which are registered trademarks and, therefore, proprietary to their respective owners.

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.

Environmental protection is a high priority with Kontron.

Kontron follows the DEEE/WEEE directive.

You are encouraged to return our products for proper disposal.

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 they 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

Conventions

This guide uses several types of notice: Note, Caution, ESD.

Note: this notice calls attention to important features or instructions.


Caution: this notice alert you to system damage, loss of data, or risk of personal injury.


ESD: This banner indicates an Electrostatic Sensitive Device.

All numbers are expressed in decimal, except addresses and memory or register data, which are expressed in hexadecimal. The prefix `0x' shows a hexadecimal number, following the `C' programming language convention.

The multipliers `k', `M' and `G' have their conventional scientific and engineering meanings of $*10^3$, $*10^6$ and $*10^9$ respectively. The only exception to this is in the description of the size of memory areas, when `K', `M' and `G' mean $*2^{10}$, $*2^{20}$ and $*2^{30}$ respectively.

When describing transfer rates, `k' `M' and `G' mean $*10^3$, $*10^6$ and $*10^9$ *not $*2^{10}$ $*2^{20}$ and $*2^{30}$.*

In PowerPC terminology, multiple bit fields are numbered from 0 to n, where 0 is the MSB and n is the LSB. PCI and CompactPCI terminology follows the more familiar convention that bit 0 is the LSB and n is the MSB.

Signal names ending with an asterisk (*) or a hash (#) denote active low signals; all other signals are active high.

Signal names follow the PICMG 2.0 R3.0 CompactPCI Specification and the PCI Local Bus 2.3 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


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.

Personal Injury

Be careful while handling the board, because of the cutting edges of the CPU heatsink.

Do not touch the CPU heatsink or the ruggedizer while removing the board from a rack because it can get very hot.

Do not place the board on any surface or in any form of storage container until the board and its heatsink have cooled down to room temperature.

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.

Table Of Contents

Chapter 1 - Introduction 1

Chapter 2 - Technical Characteristics 3
2.1 Technical Recommendations 6

Chapter 3 - Preparing Before Using 7
3.1 Receipt of the Equipment 7
3.1.1 Checking the Packages 7
3.1.2 Unpacking 7
3.2 Description of the Equipment 8
3.3 Identification 9

Chapter 4 - Hardware Description 10
4.1 External Description 10
4.2 Internal Description 11
4.3 Control Panel 14
4.3.1 Front Control Panel 14
4.3.1.1 ON/OFF Button 14
4.3.1.2 Control LEDs 15
4.3.2 Rear Control Panel 16
4.3.2.1 Power Supply Connector 16
4.4 Monitoring Card 17
4.5 Input/Ouput Distribution Panel 18
4.6 Access to the Internal Peripherals 19

Chapter 5 - Hardware Installation and Rack Maintenance 21
5.1 Hardware Installation Procedure 21
5.2 Rack Maintenance Procedure 21

List Of Figures

Figure 1: R2U4S Overview 1
Figure 2: Ventilation Direction 5
Figure 3: Identification 9
Figure 4: Front and Rear Viewes 10
Figure 5: Overall Dimensions (1/2) 11
Figure 6: Overall Dimensions (2/2) 12
Figure 7: Internal Viewes 13
Figure 8: Front Control Panel 14
Figure 9: Control LEDs 15
Figure 10: Rear Control Panel 16
Figure 11: Access to the Internal Peripherals (1/2) 19
Figure 12: Access to the Internal Peripherals (2/2) 20

List Of Tables

Table 1: Order Code 2
Table 2: Main Characteristics 4

Chapter 1 - Introduction

The R2U4S rack, described in this document, is the 4-slot member of Kontron activities of 19-inch Rack Mount Industrial Chassis for 6U (VME64x double Eurocard bus) air-cooled boards.

The R2U4S modular design enables to fulfil the requirements of application areas ranging from the environmentally benign right through to deployed industrial, airborne and naval applications. The R2U4S racks accept all Kontron VME64x boards and any air-cooled VME64x bus boards complying with ANSI/VITA 1.1-1997 standard. These boards, placed horizontally, are directly accessible via the front/rear panel of the rack depending on the *6U VME Boards Bay* manufacturing option.

This rack may be placed in a standard 19-inch rack cabinet enclosure.

The R2U4S is backed up by the full range of Kontron integration and qualification services. This ranges from the delivery of the rack equipped with boards and integration test report, to the qualification of a full managed system in compliance to the requirements of airborne or naval applications.

Figure 1: R2U4S Overview

The objective of this document is to describe the hardware environment of the R2U4S racks.

Functional changes that differ from previous version of the document are identified by a vertical bar in the margin.

The chapters in this document are:

- Chapter 1 - This chapter - Brief description of the rack.
- Chapter 2 - Technical Characteristics: dimensions, card cage, power supply unit, environmental specifications, MTBF.
- Chapter 3 - Preparing Before Using: ESD recommendations, environmental protection, receipt, description and identification of the equipment.
- Chapter 4 - Hardware Description: external and internal description, control panel, access to the internal peripherals.
- Chapter 5 - Hardware Installation and Rack Maintenance.

The front and the rear panels of the R2U4S rack depend on the manufacturing options: *Enclosure Panel Door* and *6U VME Boards Bay;* consequently they may be different from those shown in this document. The photographies and diagrams in this manual apply to specific order codes; refer to following table to decode the manufacturing options.

Order Code

ORDER CODE		R2U	4S	V-	SA	4			00
4 slots 6U - 160 mm boards			4S						
VME64x backplane with P0 connector				V-					
Environmental Build for SA and WA boards					SA				
400W Power Supply						4			
Enclosure Panel Door	Front Only Rear Only						F R		
6U VME Boards Bay	Front Rear							1 2	
Reserved									00

Table 1: Order Code

Chapter 2 - Technical Characteristics

The main characteristics of the R2U4S racks are:

Dimensions	
Height	2U 3.5" / 88.9 mm
Width	19" / 482.6 mm 17.63" / 448 mm without mounting ears
Depth	17.32" / 440 mm
Weight (approximately)	6 Kg
Card Cage	
6U VME64x	VITA 1.1 / VITA 1.7 & VITA 38 VME64x backplane with P0 connector
6U CPCI	Please contact Kontron
Slots	4 - Horizontal
Bay Position	Front or Rear
Air Cooling	1.5 m/s average airflow (0) (1)
Acoustic Noise	< 45 dB
RTM Bay	6U - 80 mm - VITA 36 compliant
Door	Yes - Front or Rear
Peripherals (2)	Up to 2 x 2.5" HDD
Power Supply Unit (PSU)	
Input Voltage	100-240 VAC (50-60 Hz)
Max. Power	400 W
Output Voltages and Strength	+5V 40A +3.3V 40A +12V 20A -12V 5A
Redundancy	Option
Modular PSU	Yes

Environmental Specifications		
Temperature		DO-160E §4
	Operating:	-20°C to +65 °C (3)
	Storage:	-40°C to +85 °C
Relative Humidity		DO-160E §6 5 to 95% non condensing
Flammability		UL94-V0
Safety		EN60950
EMC - Emissions (4)		
	Conducted/Radiated	EN55022 Class A (5)
	Harmonic Distorsion	EN61000 §3.2
	Flicker and Fluctuation	EN61000 §3.3
EMC - Immunity (4)		
Conducted/Radiated Susceptibility		EN55024
	Electrostatic Discharge	EN61000 §4.2
	Radiated RFI	EN61000 §4.3
	Fast Transients - burst	EN61000 §4.4
	Input Line Surges	EN61000 §4.5
	Conducted RFI	EN61000 §4.6
	Voltage Dips	EN61000 §4.11
Altitude		
	Operating:	10,000 ft (3,048 m)
	Storage:	30,000 ft (9,144 m)
Shock		DO-160E
	Operating:	15 g peak half sinus 11 ms duration
	Storage:	15 g peak half sinus 20 ms duration
Vibration		
	Operating:	DO-160E §8.5.2 Curve B (1.48 G_{ms}) from 10 to 2000 Hz
	Operating:	EN60068 2 g sinusoidal from 5 to 500 Hz
MTBF		
Ground Benign (GB)		MIL-HDBK-217F 25°C 102,000 hours

Table 2: Main Characteristics

(0) The ventilation direction of the rack is defined as folows:
- Air input is on the fans side and air output on the opposite side.

The ventilation direction of the rack depends on the *6U VME Boards Bay* Manufacturing option.
- *6U VME Boards Bay:* **Rear**
  Air input on the **right** (fans) side and air output on the **left** side of the rack.
- *6U VME Boards Bay:* **Front**
  Air input on the **left** (fans) side and air output on the **right** side of the rack (see Figure 2 below).

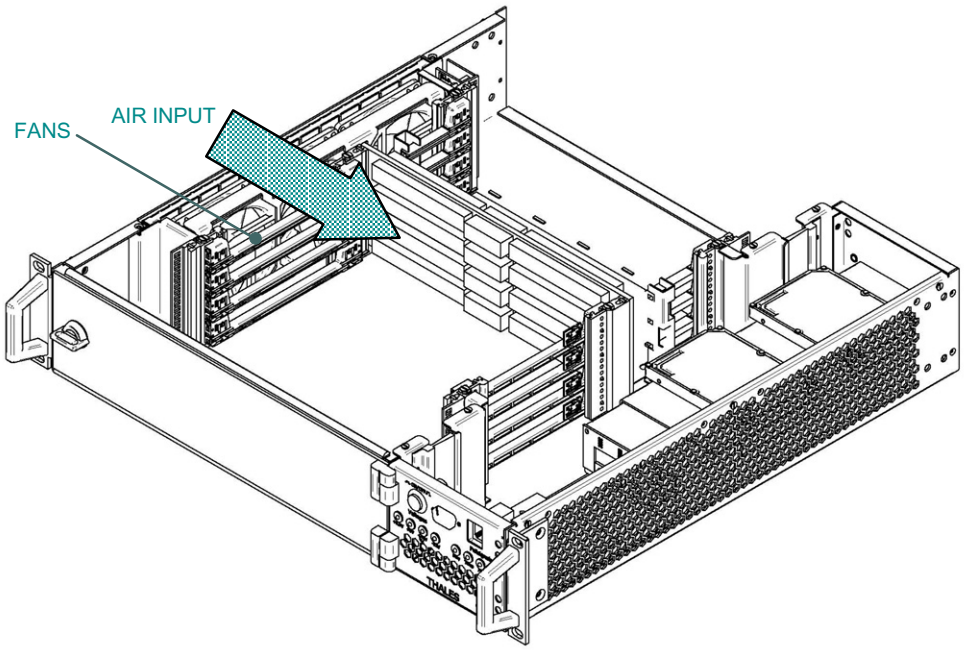


Figure 2: Ventilation Direction

(1) When located in a cabinet, make sure to leave a free space, around 4 cm, on the left and right sides of the rack.

(2) Please contact your Kontron representative for detailed information on specific peripherals support (e.g. DVD-ROM drive) .

(3) The maximum room temperature is 45°C. Continued operation at this temperature may degrade hardware performance. It is advisable, therefore, to install a supplementary air conditioning system in the room if temperature of the site is greater than that recommended.

(4) The front panels of the Kontron boards are equipped with an EMC gasket. To preserve the gaskets and to prevent that the components of the boards could be damaged by contact with gaskets, it is mandatory to insert the boards downward. To unplug the boards proceed in the inverse sense of the insertion.

(5) This material is a class A material. In a residential environment, this material can cause radio electric scramblings. In that case, the user may be asked to take suitable measures.

2.1 Technical Recommendations

Recommendation
Avoid connecting your rack on the same circuit as any electrical equipment that does not have a noise suppressor, and can produce transient phenomena.
It is preferable to install a separate power line directly from the main electrical network.
All the system components (peripheral rack, printer, etc.) must be connected directly to the main electrical network.

Power Supply
Check the correct input voltage prior applying power to the unit. Refer to Table 2 “Main Characteristics", section “Power Supply Unit PSU".

Electrical safety
To prevent electrical accidents that could damage your equipment and threaten user safety, adhere to the regulations and standards recommended in the IEC publication 364 (International Electronic Commission) and the French standard NFC 15-100.

Electrical Damage
Avoid connecting cables to the front panel application connectors while functioning. Voltage discharge may damage the inserted boards I/O devices or the power supply.

Fire safety
Fire estinguishers, type CO2, should be installed in the work area, close to the rack.

User Safety
All fans are externally protected with proper finger guard grids. User should avoid touching any fan part with his fingers.

DO NOT turn the power on while the power is cycling off. Wait a few seconds until the power has completely cycled off. Follow the same precaution for turning the power off.
Turning the power on or off before this cycle is complete can cause the voltage and temperature values programmed into the board monitoring system to be lost.
MAKE SURE YOU FOLLOW THESE SAFETY PRECAUTIONS.

Make sure the rack has been powered off using the ON/OFF button (on the front control panel of the rack) before unplugging the power supply cable.

It is strongly recommended to use an antistatic wrist strap and a conductive foam pad when you install or upgrade your system to prevent the accumulation of electrostatic charges.

Avoid touching areas of integrated circuitry; static discharge can damage circuits.

Chapter 3 - Preparing Before Using

3.1 Receipt of the Equipment

3.1.1 Checking the Packages

Inspecting the packages and verifying their condition is the responsability of the customer and should be carried out upon delivery.

> Inspect the cartons and check their condition:
  - no broken corners,
  - general state of the case (no rips or holes),
  - condition of the bands and the clips.
> If you wish to report any damage in transit, you should make out a full report, and also note the damage on the packing list that accompanies the equipment. Ensure that the report and the packing list are signed by yourself and also by the transport agent, and send a copy of these documents to:
  - the transport company,
  - Kontron.

3.1.2 Unpacking

Unpacking the equipment must be carried out under the supervision of a technician approved by Kontron.

> Open each of the packages and take out the items one by one.

Two people should assist in the unpacking of the system unit and the monitor, as these items may be heavy.

> Inspect each item and make a note of any possible defects (scratches, marks or blemishes on the monitor screen, damaged cables, etc.). If necessary, make a report of any damage or defects.
> Check the equipment against the packing list and report any missing items.

It is recommended that you keep the cartons and the anti-shock protection. This will be required if you decide to move your system or rack to a different site.

The rack is delivered inside a protective film. Make sure to remove this protective film before starting the system; otherwise that could damage the system.

3.2 Description of the Equipment

> The standard equipment delivered is:

- the rack,
- the Kontron documentation CD-ROM,
- the power supply connection kit.

> The equipment may also include optional units, if they are ordered, such as:

- Kontron SBC or Computing Node (i.e PowerEngine7, PENTXM2, PowerNode3, ...),
- The cables required for the I/O of the Kontron boards,
- Graphics monitor or VT100 console,
- Keyboard, mouse or track ball,
- Kontron PMCs (see CD-ROM documentation),
- Other PMCs (see associated documentation),
- RTM (Rear Transition Modules) for expanding I/O on P0 and P2 and associated cables,
- Internal HDD (Hardware Device Disk),
- External disk, 4 mm tape or CD-ROM drive,
- ...

3.3 Identification

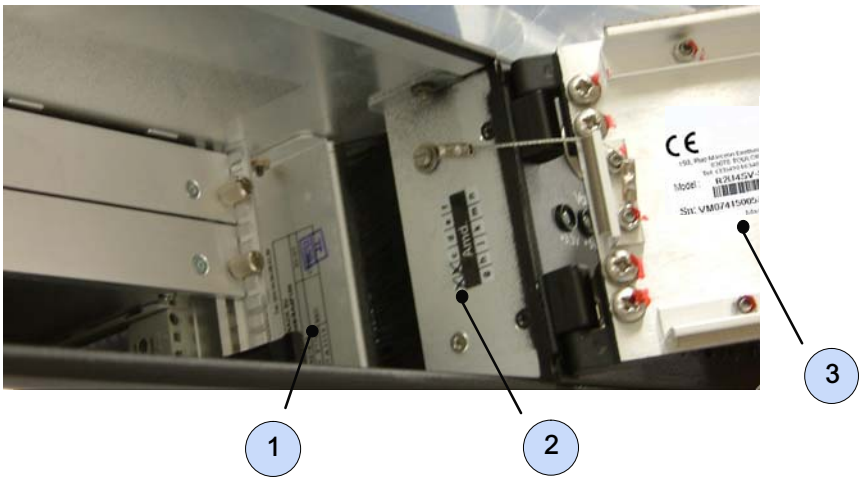


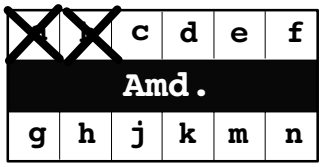
Figure 3: Identification

The rack is identified by three labels:

- Two of them are located inside the rack, near the EMC door (refer to Figure 3 above).

1 "**Manufacturer Label**": manufacturer information and rack identification.

2 "**Amendment Label**": the last notched letter indicates the revision level of the rack.



- Revision **b** in the opposite exemple.
- If the “Amendment Label" is not available; the rack is delivered in its initial revision.

- The third one, is located on the EMC door (refer to Figure 3 above).

3 "**System Label**": Model and Serial Number of the rack

Chapter 4 - Hardware Description

4.1 External Description

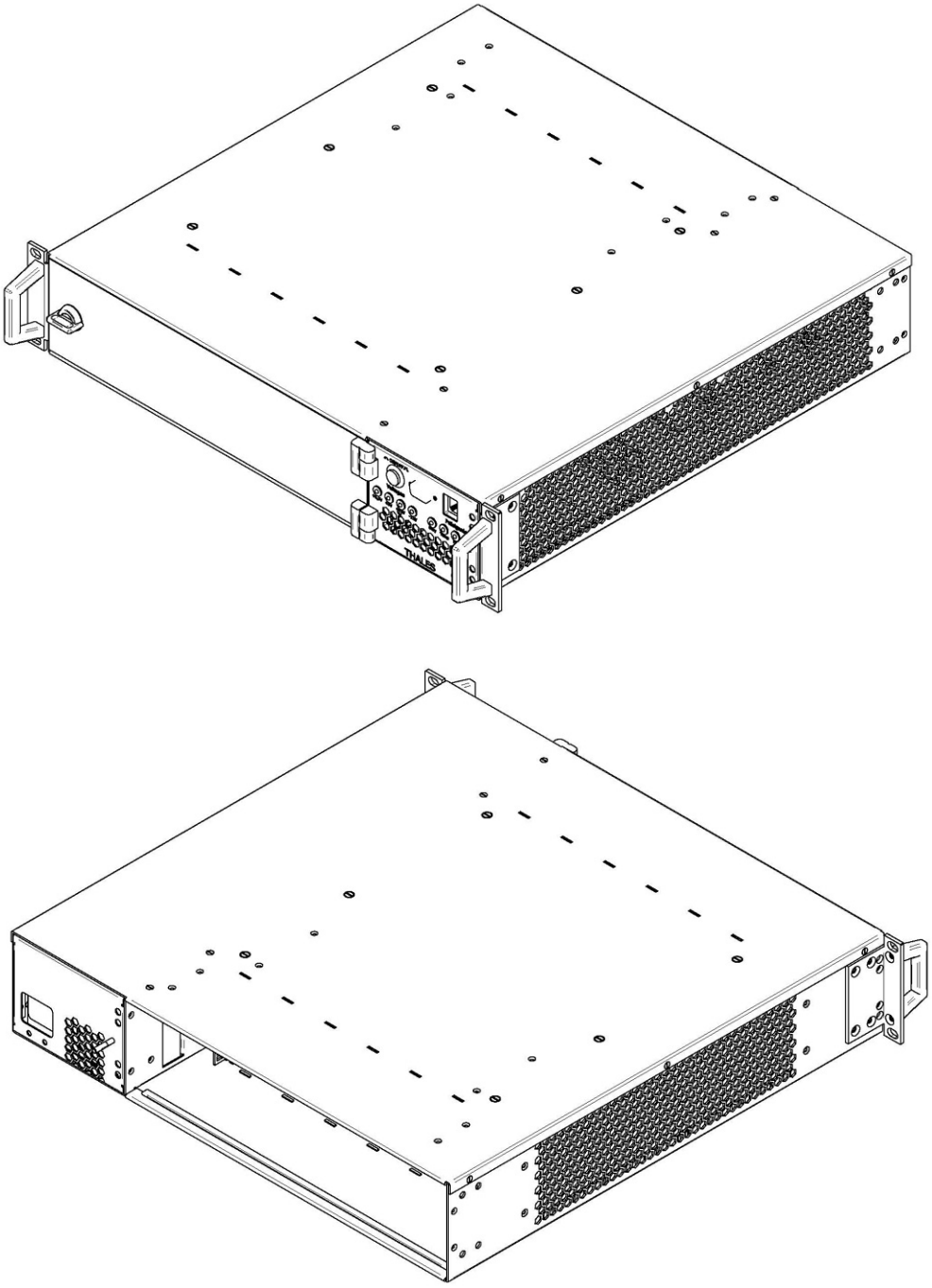


Figure 4: Front and Rear Viewes

4.2 Internal Description

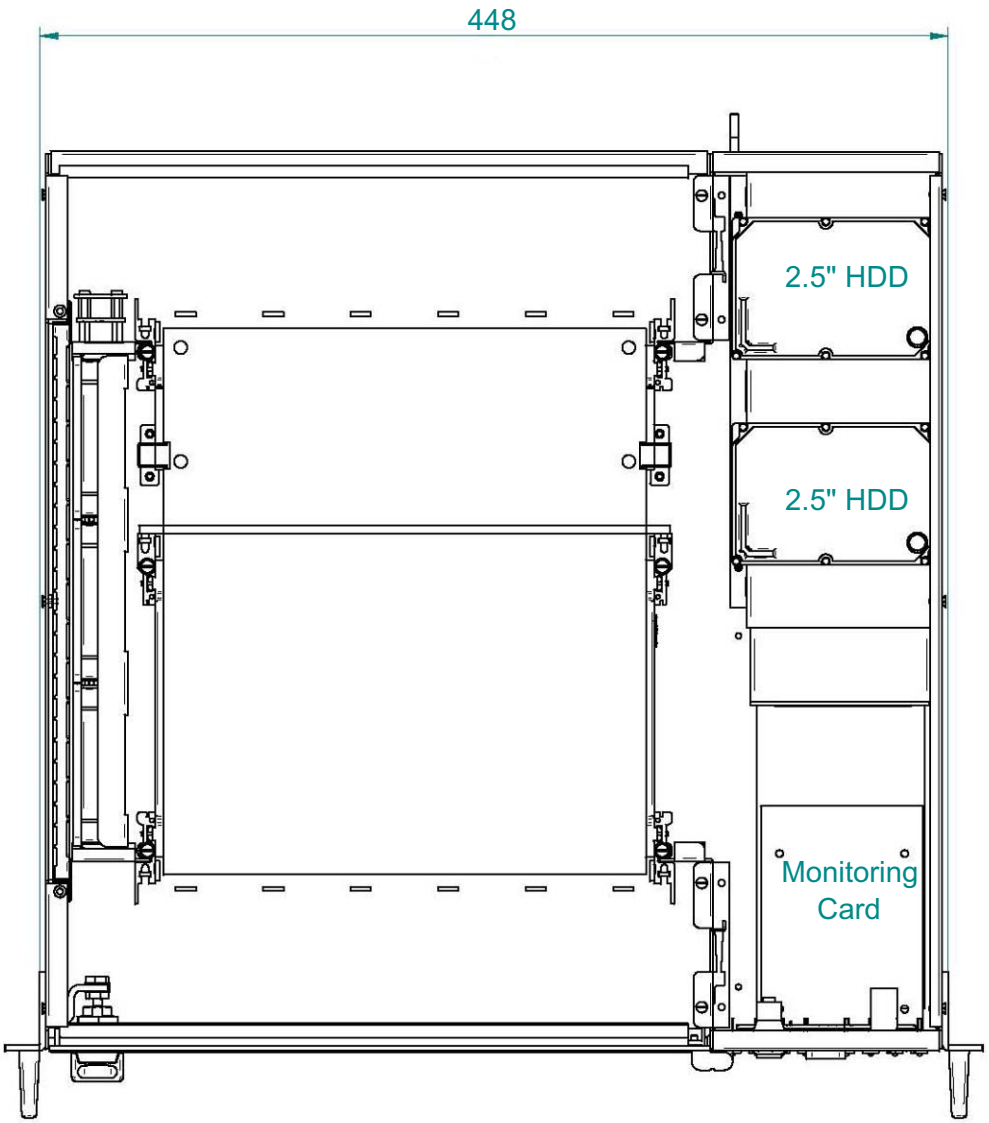


Figure 5: Overall Dimensions (1/2)

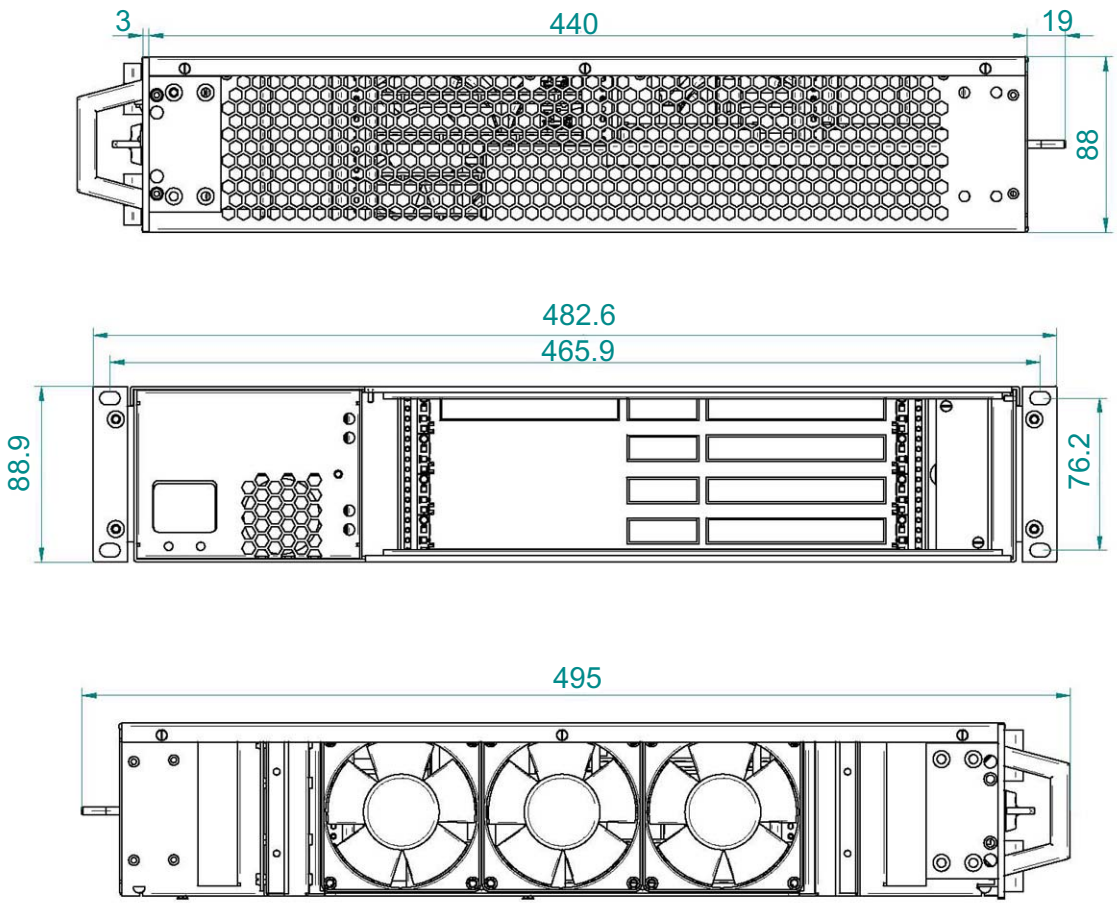


Figure 6: Overall Dimensions (2/2)

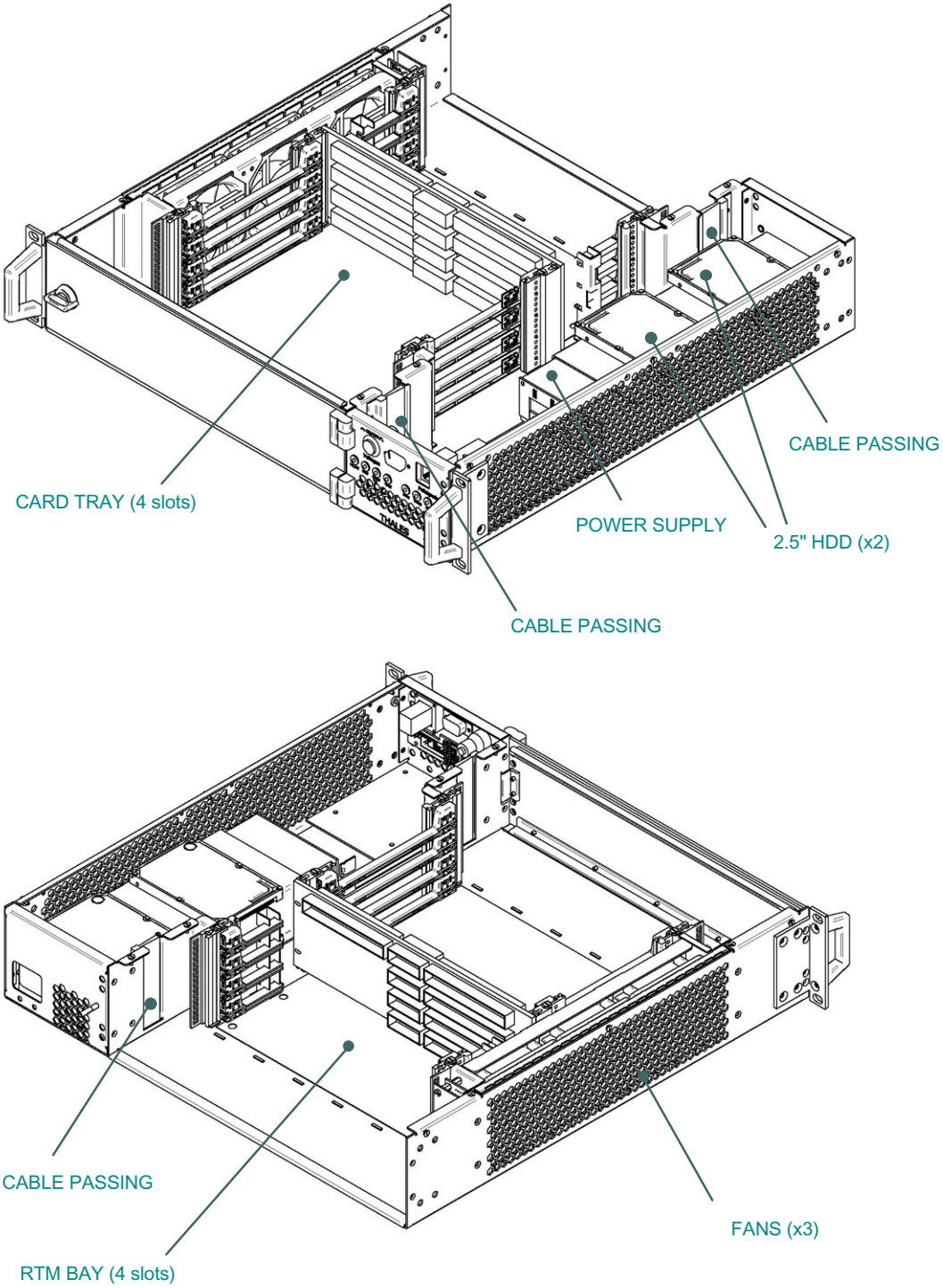


Figure 7: Internal Viewes

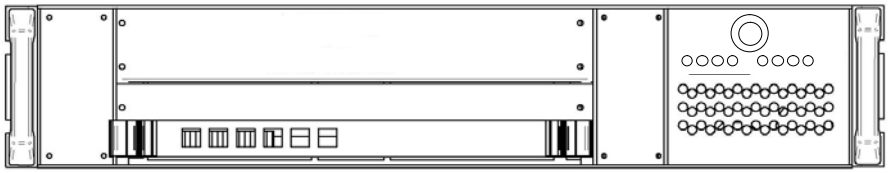
The location of the cable passing: they make easier the cable passing from the front side to the top sie of the rack, or reciprocally.

4.3 Control Panel

4.3.1 Front Control Panel

Figure 8: Front Control Panel

Depending on the *6U VME Boards Bay* Manufacturing option, the front control panel may be located on the left side or on the right side of the front panel:
- *6U VME Boards Bay:* **Rear** the front control panel is located on the **left** side of the front panel (refer to Figure 8).
- *6U VME Boards Bay:* **Front** the front control panel is located on the **right** side of the front panel (see below).



4.3.1.1 ON/OFF Button

The ON/OFF button is located on the front panel of the R2U4S rack.

» Powering the rack Off and On

DO NOT turn the power on while the power is cycling off. Wait a few seconds until the power has completely cycled off. Follow the same precaution for turning the power off.
Turning the power on or off before this cycle is complete can cause the voltage and temperature values programmed into the board monitoring system to be lost.
MAKE SURE YOU FOLLOW THESE SAFETY PRECAUTIONS.

Make sure the rack has been powered off using the ON/OFF button (on the front control panel of the rack) before unplugging the power supply cable.

4.3.1.2 Control LEDs

The control LEDs are located on the front panel of the R2U4S rack.

Figure 9: Control LEDs

Voltages: +3.3V, +5V, +12V, -12V

These LEDs monitor and show that the power supplied is within the permitted tolerances.

- Green light: The power is on (ON/OFF Button) and the voltages are within the permitted tolerances. Green lights must remain illuminated (without flickering) when the system is powered on.

Fail Signals: Stdby, Temp, Fan, Sys

Stdby LED: The standby LED indicates that the power supply cable is connected to the rack. The equipment is ready for use, but not necessarily in use.

- Green light: The power supply cable is connected, independently of the ON/OFF button status.

Temp light: This LED indicates that the rack temperature is within the permitted tolerances.

- Red light: Temperature is out of permitted tolerances.

Fan light: This LED indicates that the fans are working correctly

- Red light: Fans are not working correctly.

Sys light: This LED indicates that the ACFAIL signal is present.

- Red light: ACFAIL signal is present.

4.3.2 Rear Control Panel

Figure 10: Rear Control Panel

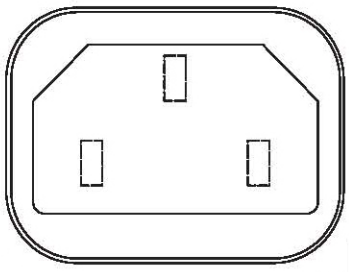
Depending on the *6U VME Boards Bay* Manufacturing option, the rear control panel may be located on the left side or on the right side of the front panel:
- *6U VME Boards Bay:* **Rear** the rear control panel is located on the **right** side of the front panel (refer to Figure 8).
- *6U VME Boards Bay:* **Front** the rear control panel is located on the **left** side of the front panel (see below).

4.3.2.1 Power Supply Connector

J1 Mating Connector

IEC320 type female plug rated 3 ^

Pin	J1
1	Line
2	Neutral
3	Earth



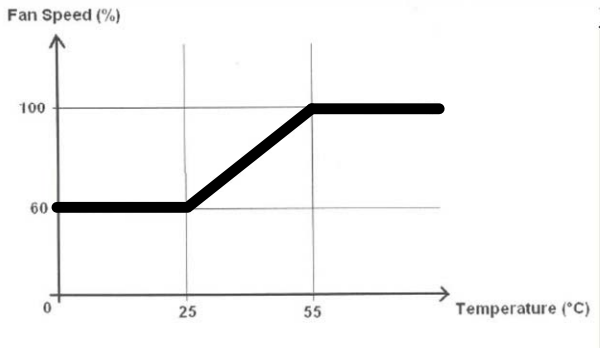
4.4 Monitoring Card

Start Up of the Monitoring Card

At the start up of the monitoring card, a LEDs flickering test is launched with 4 one second cycles which are composed of 0.5 second of green state (`+3.3V, +5V, +12V` and `-12V` are lighted in green) and 0.5 second of red state (except `Stdby`, all LEDs are lighted in red).

Temperature and Fan Control

The temperature acquisition is made by four I2C temperature sensors. If the temperature is higher than +70°C, the `Temp` LED is lighted. The monitoring card controls the speed of three fans and is compliant to the following graph:



If the Monitoring card detects one speed of the three fans lower than 45% of full speed, the `Fan` LED is lighted and the other fans are set in full speed mode

Failure Detection List

Failure Description	Diagnosis
Temp LED flickers	The monitoring card has detected less than 4 temperature sensors
Temp LED is ON (red) but the temperature is lower than +70°C	The monitoring card has not detected any temperature sensors at start up
Temp LED is ON (red)	The temperature is higher than +70°C
Fan LED is ON (red)	The monitoring card has detected a fan failure
One voltage indicator LED is lighted in green	The voltage level of this channel is correct
One voltage indicator LED is lighted in red	The voltage level of this channel is not correct
Voltage indicator LEDs flicker	The monitoring card has detected a failure
Sys LED is ON (red)	A VME board has detected a failure

4.5 Input/Ouput Distribution Panel

The I/O distribution panel consists of the front panel of the boards contained in the rack. These front panels are accessible via the front or the rear panel of the R2U4S rack depending on the manufacturing option: *6U VME Boards Bay*.

6U VME Boards Bay	Description
Front	The VME boards are accessible via the **front panel** of the rack.
Back	The VME boards are accessible via the **rear panel** of the rack.

Depending on the manufacturing option: *Enclosure Panel Door* the accesses to the boards or the RTM may be protected by an enclosure panel door.

	Enclosure Panel Door: Front Only	Enclosure Panel Door: Rear Only
6U VME Boards Bay: **Front**	- The VME boards are accessible via the **front panel** of the rack. - The **front panel** of the rack is closed by an enclosure panel door.	- The VME boards are accessible via the **front panel** of the rack. - The **rear panel** of the rack is closed by an enclosure panel door.
6U VME Boards Bay: **Back**	- The VME boards are accessible via the **rear panel** of the rack. - The **front panel** of the rack is closed by an enclosure panel door.	- The VME boards are accessible via the **rear panel** of the rack. -The **rear panel** of the rack is closed by an enclosure panel door.

4.6 Access to the Internal Peripherals

Inserting or removing modules with power applied may results in system damage.

The internal 2.5 inch hardware disks are accessible by removing the cover of the rack.

1. Power-off the rack (ON/OFF buttton).
2. Remove the cover of the rack. 16 screws lock the cover of the rack, they can be unscrewed using a Phillips screwdriver. Refer to Figure 11 page 19.
3. A specific support, on top of the power supply unit, is used to maintain up to two 2.5" HDD. Refer to Figure 12 page 20.
4. Install the cover of the rack. Fix it to the rack frame with the screws removed at stage 2. Refer to Figure 11 page 19.
5. Power-on the rack.

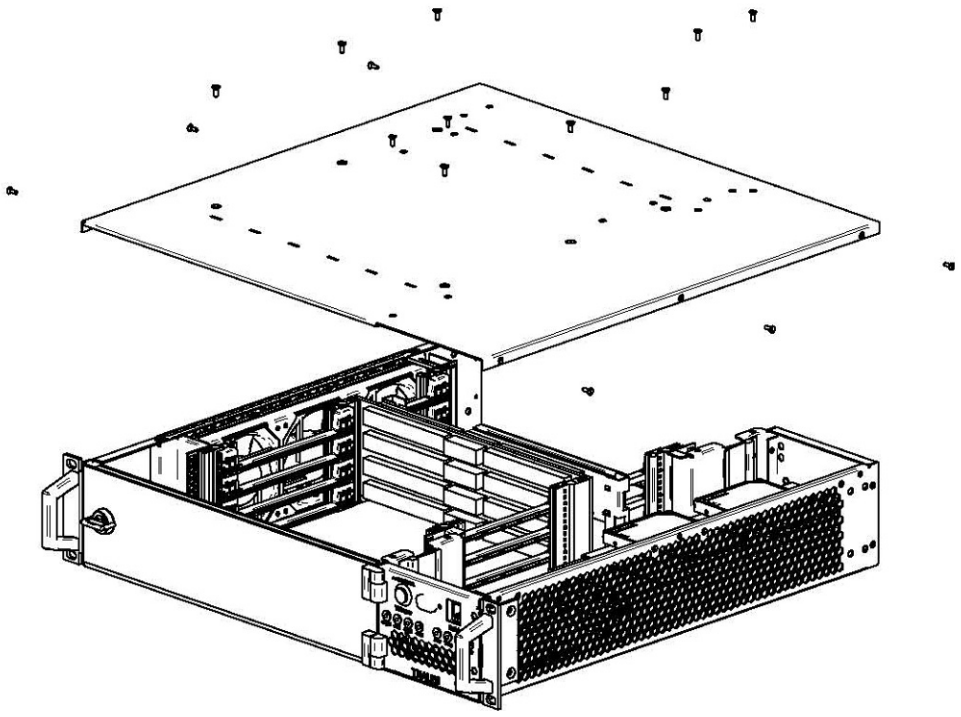


Figure 11: Access to the Internal Peripherals (1/2)

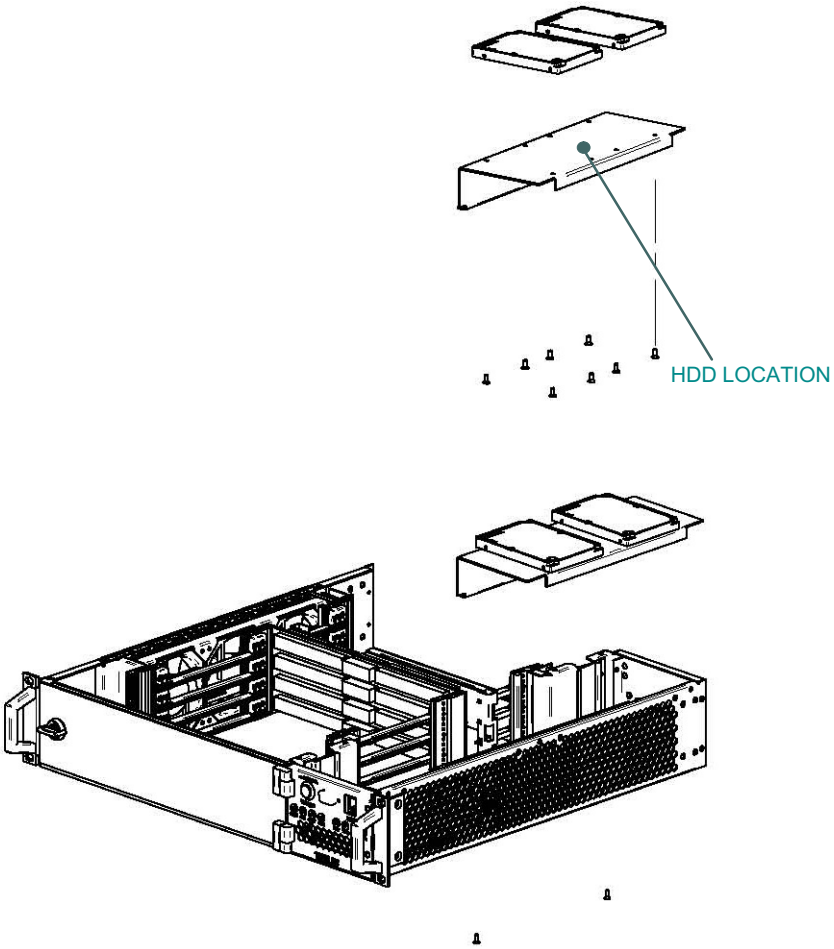


Figure 12: Access to the Internal Peripherals (2/2)

Chapter 5 - Hardware Installation and Rack Maintenance

5.1 Hardware Installation Procedure

All Kontron racks are configured and tested at the factory according to the Quality procedures and instructions developed and implemented at Kontron, in accordance with the ISO 9000 standards.

The installation and the initial start-up of a Kontron rack must be performed by personnel who have appropriate training for Kontron hardware.

5.2 Rack Maintenance Procedure

When the operating conditions for the R2U4S rack, given in Chapter 2, are implemented the rack does not require any particular preventive maintenance.

Maintenance on the fixed parts of the R2U4S rack: the card tray, the VME backplane, the fans, and the power supply must be performed at the Kontron operation center or in a repair shop that specializes in this equipment.

MAILING ADDRESS
Kontron Modular Computers S.A.S.
150 rue Marcelin Berthelot - BP 244
ZI TOULON EST
83078 TOULON CEDEX - France

TELEPHONE AND E-MAIL
+33 (0) 4 98 16 34 00
sales@kontron.com
support-kom-sa@kontron.com

For further information about other Kontron products, please visit our Internet web site: www.kontron.com.