



RackCDU (InRackCDU)

Operating Manual

History:

Date:	Notes:	Revision:
21-Dec.-2016	First Release	1.0

This document contains a guide on how to setup and use the different functionalities of the InRackCDU.

1. INTRODUCTION	3
1.1. CONCEPT AND TARGET GROUPS FOR THIS MANUAL	3
1.2. DOCUMENTATION OVERVIEW	3
2. FUNCTIONAL OVERVIEW	4
2.1. FEATURES	4
2.2. SPECIFICATIONS	6
2.3. RACKCDU MONITORING SYSTEM	8
3. IMPORTANT INFORMATION	9
4. TOOLS AT FACILITY SITE	10
5. HARDWARE INSTALLATION	12
5.1. PREPARATION OF FLOOR FOR FACILITY TUBES	12
5.1.1. PREPARATION OF FLOOR FOR RACK'S WITH CDM'S IN REAR ONLY	12
5.1.2. PREPARATION OF FLOOR FOR RACK'S WITH CDM'S IN FRONT AND REAR.	13
5.2. MOUNT VENTILATION TUBE FOR RESERVOIR	13
5.3. MOUNT NETWORK AND POWER CABLES	15
5.4. CONNECT EXTERNAL LEAK SENSORS	16
5.5. CONNECT RACKCDU TO FACILITY WATER LINE	17

1. Introduction

Liquid Cooling Technology enables a very effective and efficient cooling of PRIMERGY multi-node servers. With heat exchangers directly installed on CPU, RAM and co-processor cards the warm-water liquid cooling solution can remove the heat generated in a server. Combining liquid cooling with traditional air cooling guarantees full compatibility with existing data center infrastructures.

The RackCDU V3 consist of a separate liquid-to-liquid (L2L) heat exchanger (HEX) cabinet and individual Coolant Distribution Manifolds (CDMs). In addition to these components data centers installing RackCDU, must supply facilities cooling liquid to each rack where the RackCDU is installed.

1.1. Concept and target groups for this manual

This operating manual is intended for those responsible for installing the hardware and ensuring that the system runs smoothly. It contains the information you need to put your RackCDU enclosure into operation.

1.2. Documentation overview

More information on your RackCDU can be found in the following documents:

- RackCDU Monitoring Manual
- RackCDU Maintenance Manual

2. Functional overview

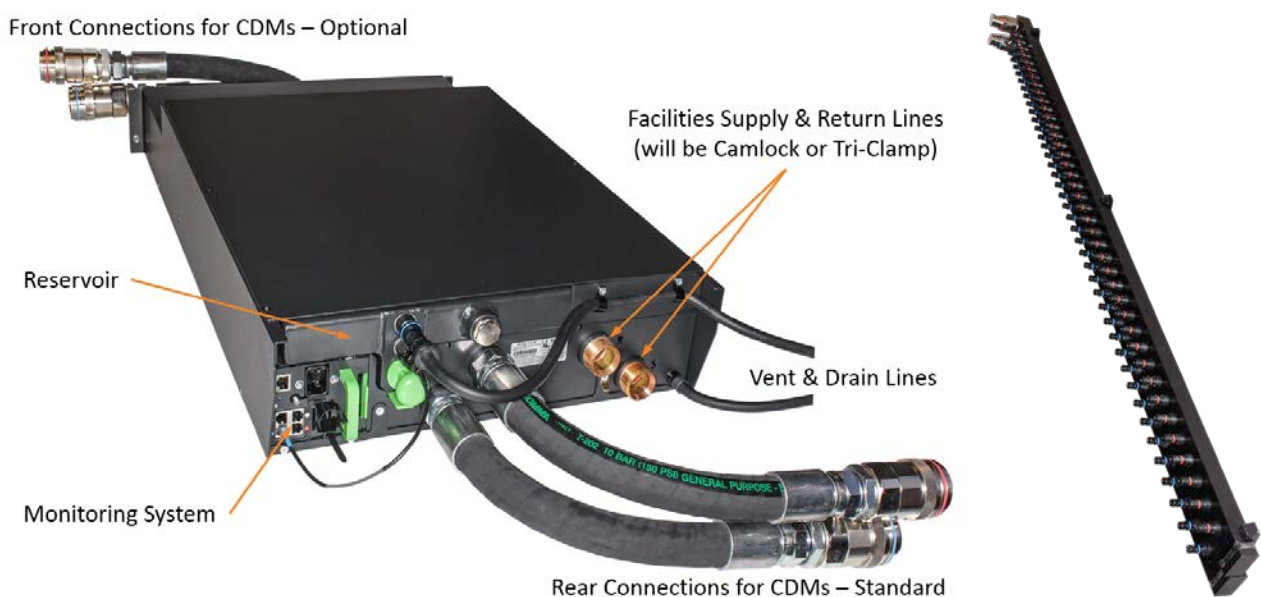
2.1. Features

The horizontal RackCDU V3 consists of two separate units, the HEX cabinet and the coolant distribution manifolds (CDM) which are connected by flexible tubes named CDM tubes. The HEX cabinet is designed to mount horizontally in the top 3U spaces of a rack. Distribution manifolds have the outlook of PDUs or blind mate manifolds. The CDMs with a PDU outlook hang like zero-U PDUs in the rack. The RackCDU has two functions, to distribute liquid to the servers in the rack to which it is attached and to reject heat generated by the connected servers into facilities liquid. The rejection of heat is accomplished by liquid-to-liquid heat exchangers. These heat exchangers keep facilities liquid and server cooling liquid completely separate. There is no mixing of facilities and server liquid. Only heat passes between the two liquids in the heat exchanger.

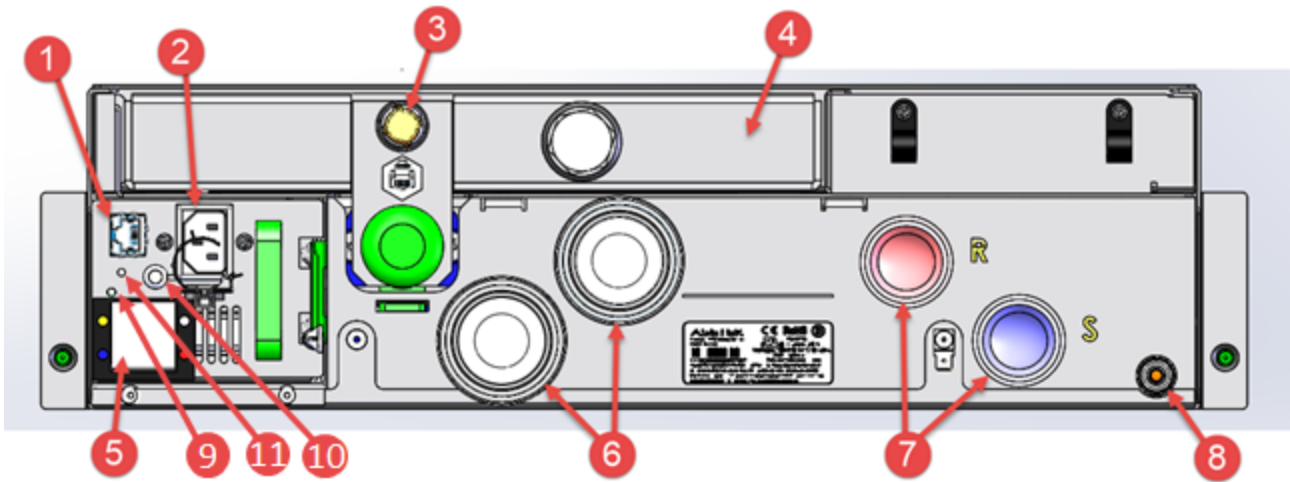
The RackCDU is connected to server liquid coolers via pairs of connecting tubes. One tube is used to deliver cooled (supply) liquid to the server. The other returns heated (return) liquid from the servers to the heat exchangers for heat rejection into facilities liquid.

All components of the RackCDU system are delivered pre-filled with server cooling liquid. There is no need for data center staff to handle server cooling liquid when installing RackCDU or when removing and replacing servers during maintenance. The connecting tubes connect to both the RackCDU and server coolers with locking dripless quick connectors. These connectors seal immediately when disconnected, keeping the server coolant in the tube and RackCDU or server cooler.

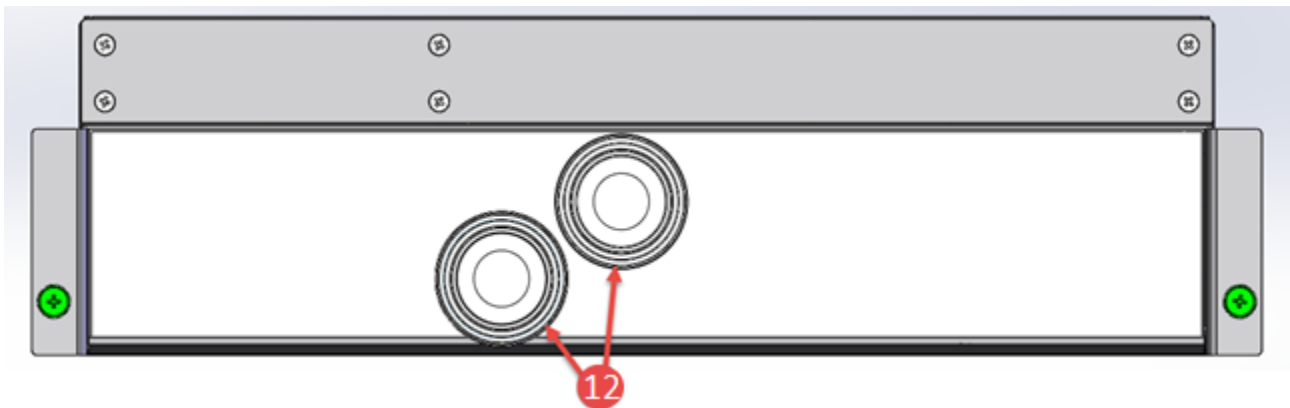
The RackCDU is a passive device. Server cooler and facilities pumps provide circulation. Monitoring systems provide real-time information on operating conditions.



Rear view



Front view



Number	Specification
1	RJ45 Standard network connector Link LED(Green) : "On" when connected to network and ready to use Active LED(Orange) : "Brink" as data are accepted
2	C14 Power connector for monitoring system
3	Quick connector for ventilation tube
4	Reservoir
5	Connector for monitoring system
6	Standard rear connections for CDMs
7	Facilities Supply & Return line connectors
8	Connector for drain lines
9	Status LED : Red="Alarm", Orange="Waring", Green="OK"
10	ID Indicator/Button
11	Reset Switch (refer Monitoring System User Guide to reset)
12	Optional front connectors for CDMs

2.2. Specifications

Facility water requirement

Specification	Value
Water Temperatures	Facilities Supply Max: 45°C Min: Higher of 2°C or above dew point Facilities Return Max: 60°C Min: Higher of 2°C or above dew point
Facilities Temperature Rate of Change	3°C per 5-minute cycle
Water Quality	ASHRAE D-90564 Table 5.3

RackCDU does not have functionality against dew. It should be prepared at facility, if need.

Specification	Value
Corrosion inhibition	Compatible with wetted materials in facilities side of RackCDU: <ul style="list-style-type: none"> • Copper • Brass • Stainless Steel
Storage temperature	Minimum -40 °C Maximum 70 °C
Operation temperature	Maximum 40 °C
Pressure	Maximum: 6.86 bar (100 PSI) Minimum: 0.686 bar (10 PSI)
Flow	Minimum: 1000 l/h (4,4 GPM us) Maximum: 3800 l/h (17 GPM us) RackCDU impedance at above flow: 187kPa Cooling capacity is influenced by facility flow rate, max cooling capacity is obtained with max facility flow

Required Facility Water quality

Parameter	Recommended limits
pH	7 to 9
Corrosion Inhibitor(s)	Required
Sulfides	<10 ppm
Sulfate	<100 ppm
Chloride	<50 ppm
Bacteria	<1,000 CFUs/ml
Total Hardness (as CaCO ₃)	<200 ppm
Residue After Evaporation	<500 ppm
Turbidity	<20 NTU (Nephelometric)

Electrical and Network for Monitoring system

Specification	Value
Electrical	Power Supply Voltage: 100VAC to 240VAC, 50/60Hz auto-detecting Connector: IEC 320 C14 Power Supply Output: 70W Max, 15W Normal Operation
Network	Physical Layer: Copper wire, RJ-45 Connector Application Layer: Web browser interface, SWMP, e-mail alerts & alarms

The coolant in the server loop

The coolant in the server liquid coolant is a mixture of 65% deionized water and 35% Dowcal 200. Dowcal 200 are primarily propylene glycol enhanced with corrosion inhibitors. The coolant is not a “Hazardous Chemical” as defined by the OSHA Hazard Communication Standard, 29 CFR 1910. 1200.

2.3. RackCDU Monitoring System

The RackCDU includes a monitoring system that provides information on liquid temperatures, pressures and flow rates as well as alerts for problems including leak detection and low coolant via Web UI. Please refer “RackCDU Monitoring Software User Guide”

Default static IP address & subnet mask

IP address:	192.168.0.199
Gateway:	192.168.0.1
Subnet mask:	255.255.255.0

Configure the laptop to use the same subnet mask and gateway and an address in the subnet besides 199, and point a web browser at the IP address above. You will be asked for a user name and password. Two levels of user name and password are provided: Standard Users and Administrators. Only Administrators may change the network settings on the monitoring system. To log onto the monitoring system as an administrator:

User name: admin
Password: admin

Under the “Settings” heading on the left you will see a “Network” button. Select the Network button and then de-select the DHCP: check box and enter the desired RackCDU IP address, default gateway and subnet masks. Additional information on the monitoring system is provided in the monitoring manual.






3. Important information

In this chapter you will find essential information regarding safety.

- Any failure to observe the guidelines in this manual, and any improper repairs could expose the user to risks (electric shock, energy hazards and fire hazards) or damage the equipment.
- If the server enclosure has been moved from a cold environment, condensation may form both inside and on the outside of the machine.
- Wait until the RackCDU has acclimatized to room temperature and is absolutely dry before starting it up. Material damage may be caused to the server enclosure if this requirement is not met.
- Only transport the server enclosure in the original packaging or in packaging that protects it from impacts and jolts.
- The unit automatically adjusts itself to a mains voltage in a range of 100 -240 V. Ensure that the local mains voltage lies within these limits.
- This device must only be connected to properly grounded power outlets or insulated sockets of the rack's internal power supply with tested and approved power cords.
- Never connect or disconnect data transmission lines during a storm (risk of lightning hazard).
- Make sure that no objects (e.g. jewelry, paperclips etc.) or liquids can get inside the server enclosure (risk of electric shock, short circuit).
- In emergencies (e.g. damaged casing, controls or cables, penetration of liquids or foreign bodies), switch off the server enclosure immediately, remove all power plugs and contact your sales outlet or customer service team.
- The circuit boards and soldered parts of internal options are exposed and can be damaged by static electricity. Before handling them, first touch a metal part of the server enclosure to discharge static electricity from your body.
- Do not touch the circuitry on boards or soldered parts. Hold the metallic areas or the edges of the circuit boards.
- Disconnect all external cables from monitoring system before pulling it out.
- RackCDU installation and maintenance etc. use stepladder. Do be careful not to fall from stepladder.
- Only Monitoring Box and Reservoir Tank are defined as spare part, so in case of any trouble about RackCDU (for ex, Leakage in Cabinet or some Sensor Error), RackCDU itself must be replaced.
- When leakage is detected by Leak Sensor, leaked Coolant or Facility water is pooled in the cabinet. Before the cabinet is full with the leakage, leakage goes out through the drain tube on the floor, so Servers does not get any leakage from the cabinet and prepared floor pan should be considered against drained leakage.

4. Tools at facility site

The following tools are needed for setup and maintenance. It should therefore be provided by the facility site, if the service engineer asks for it.

Equipment	Spec	Representation/Note
Wet/dry vacuum cleaner	More than 8 liter capacity used for collecting eventual liquid spillage.	
Funnel	A small end opening of 18 mm or less	
Wrench	41 mm for mounting facility tubes. 8mm for CDM locking mechanism(no need for JP/APAC market)	
Bucket	More than 4 liter capacity To exchange Reservoir Tank	
Step ladder	Over 1m Height	
PC	Can be connect to network which RackCDU is connecting	To check the status of RackCDU

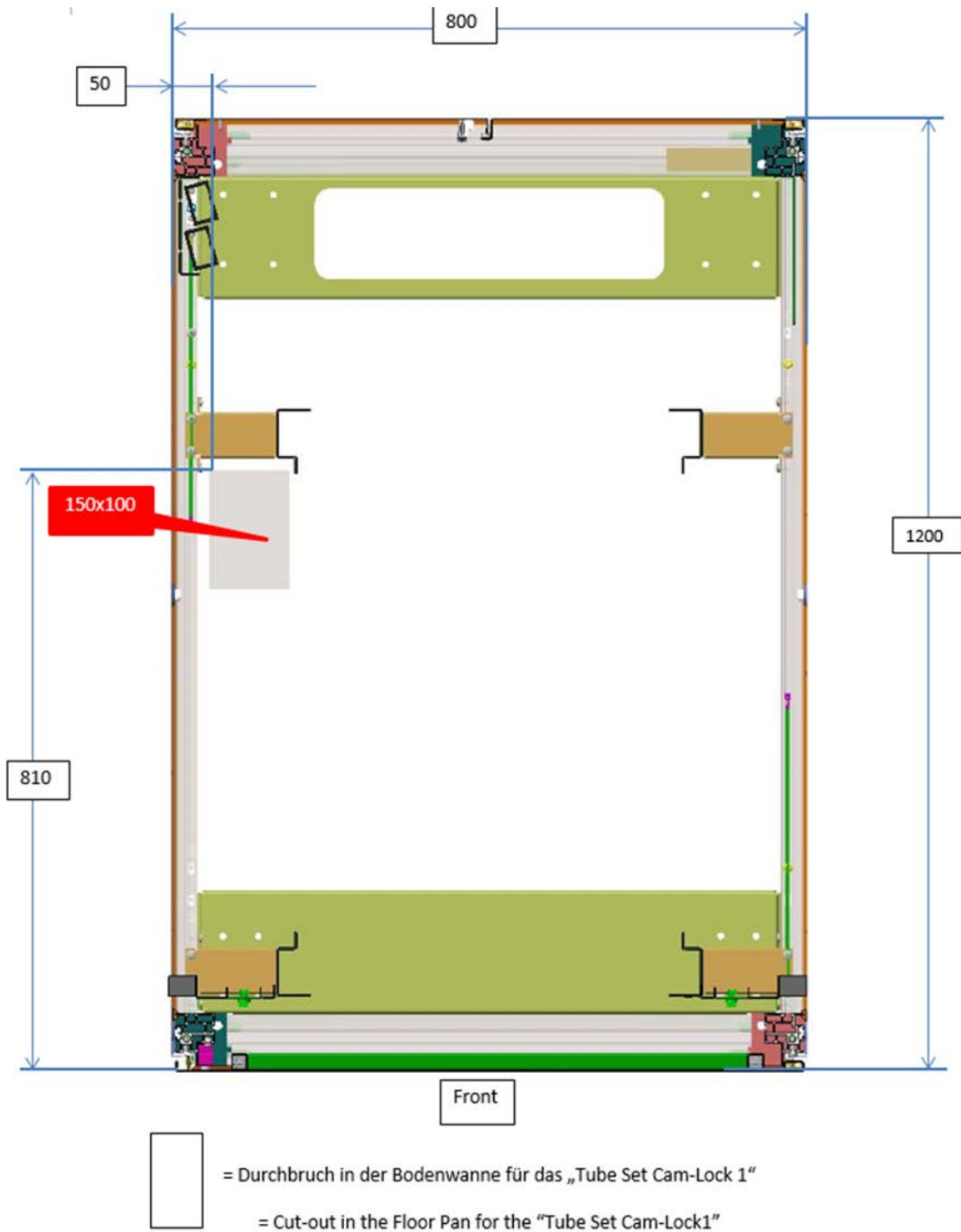
5. Hardware installation

Important: Please do not power on server node until installation is completed.

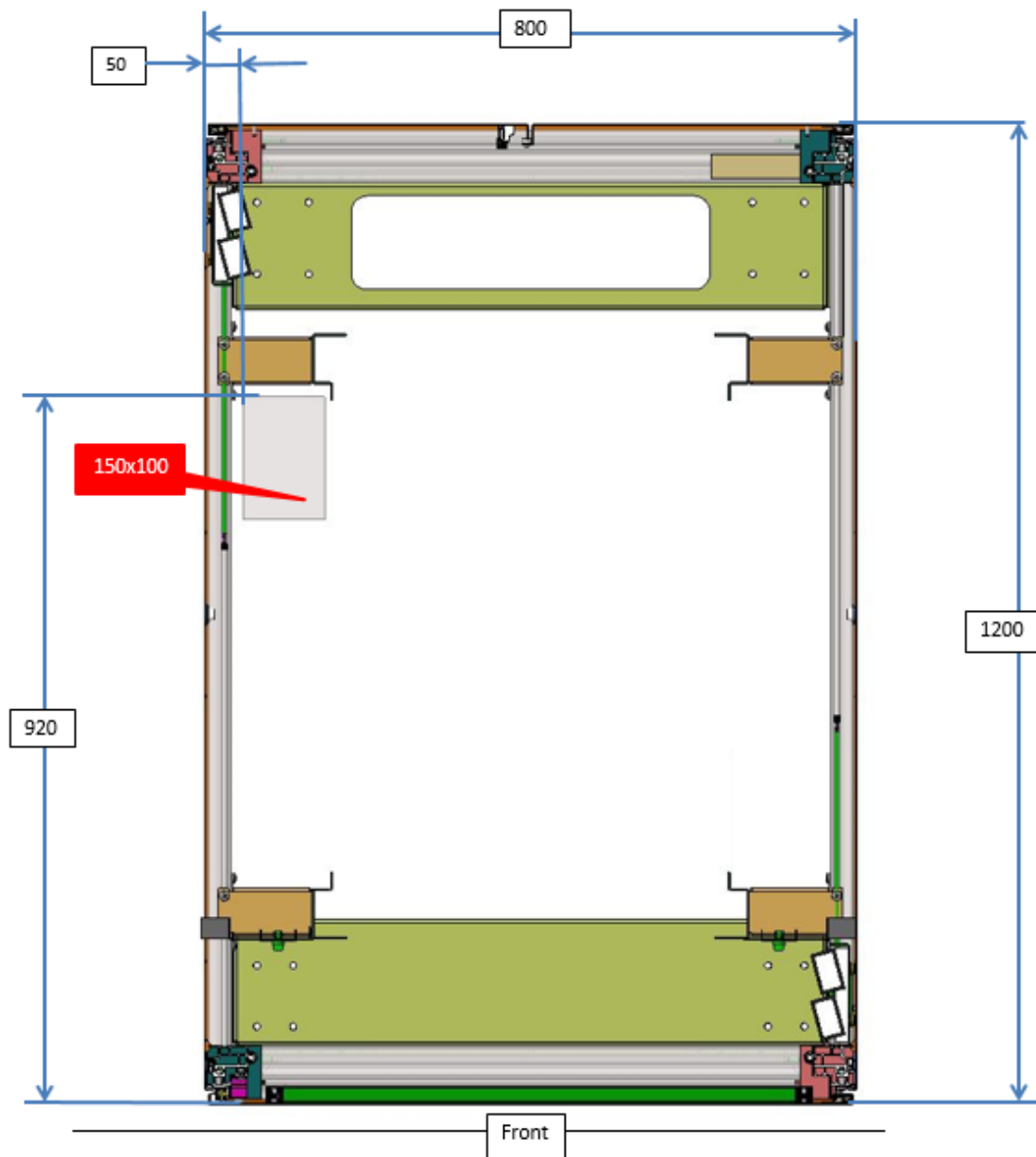
5.1. Preparation of floor for facility tubes

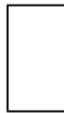

In order to prepare the rack for facility tubes the floor pan must be cut out as instructed below.

5.1.1. Preparation of floor for rack's with CDM's in rear only.

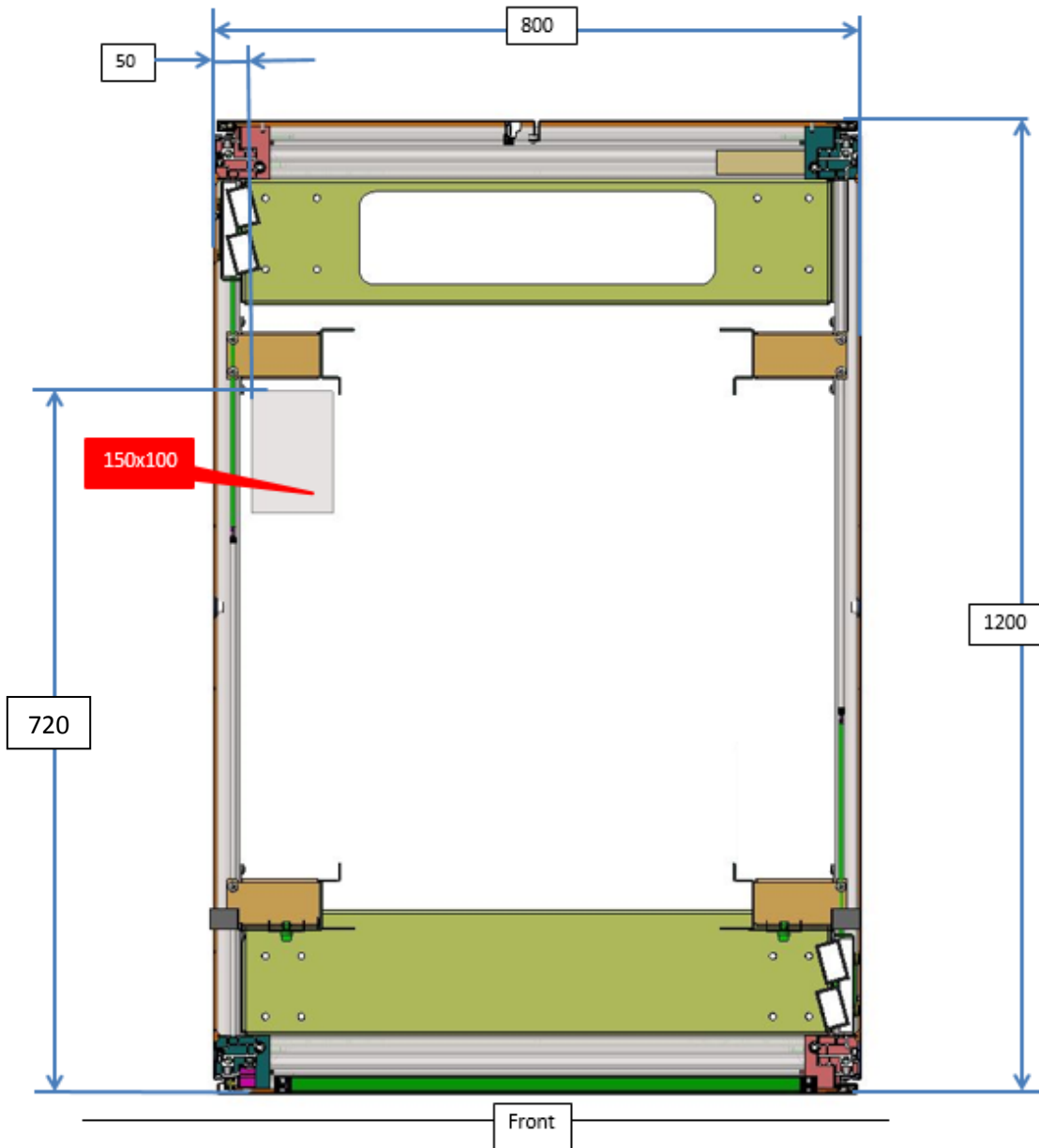



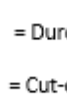
5.1.2. Preparation of floor for rack's with CDM's in front and rear.



-  = Durchbruch in der Bodenwanne für das „Tube Set Cam-Lock 1“
-  = Cut-out in the Floor Pan for the “Tube Set Cam-Lock1”

5.1.3. Preparation of floor for rack's with CDM's. (Only for APAC/JP Market)

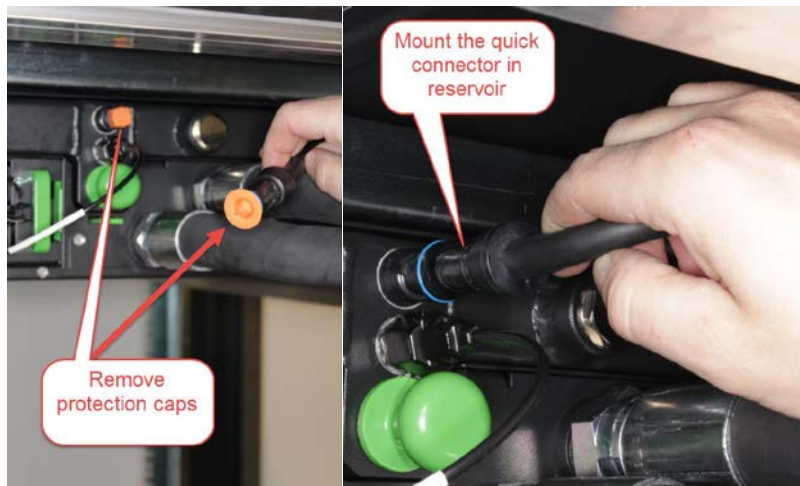


-  = Durchbruch in der Bodenwanne für das „Tube Set Cam-Lock 1“
-  = Cut-out in the Floor Pan for the “Tube Set Cam-Lock1”

5.2. Mount ventilation tube for reservoir

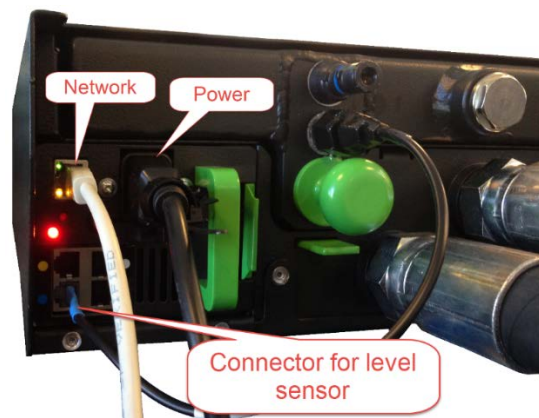
In the top of the HEX cabinet is a reservoir for the cooling liquid which provide server coolant for more than 5 years of operation. In order to secure atmospheric pressure inside the reservoir the ventilation tube is mounted. Remove the protection caps from the reservoir connector and the ventilation tube. Then mount the quick connector on to the reservoir as shown in the picture below. The connection point is located on the left rear side of the HEX cabinet. When connection is complete, route the ventilation tube and the drain tube inside the rack to the floor.

The ventilation tube should be disconnected during any transportation and therefore only be mounted at finale location.



5.3. Mount network and power cables

The monitoring system requires a network connection and power. The power supply is a universal type, capable of accepting 100VAC to 240 VAC and either 50 or 60 Hz. The connection points for network and power are located on the left rear side of the HEX cabinet as shown on the picture below. The networks connects via a shielded F/UTP network cable with shielded RJ45 connectors. The power inlet on the monitoring is a C14 male and uses a power cord with a C13 connector. After connecting the power cord ensure the LED is turned on and then secure the power cord with the cable relief. The color of LED is green when RackCDU is good status, if it is orange or red as below picture, please login and check RackCDU monitoring system. The plug end of the power cord is chosen based on the wall or power distribution sockets available.



Besides the network and power cable, ensure the connector for level sensor which is marked by a blue label is connected to the matching blue socket in the monitoring box. Always disconnect all external cables from monitoring system before pulling it out.

5.4. Connect external leak sensors(Option[prepared by customers])

The RackCDU is prepared for additional two external leak sensors not included in Asetek's delivery. These external leak sensors must have one of the following types of output:

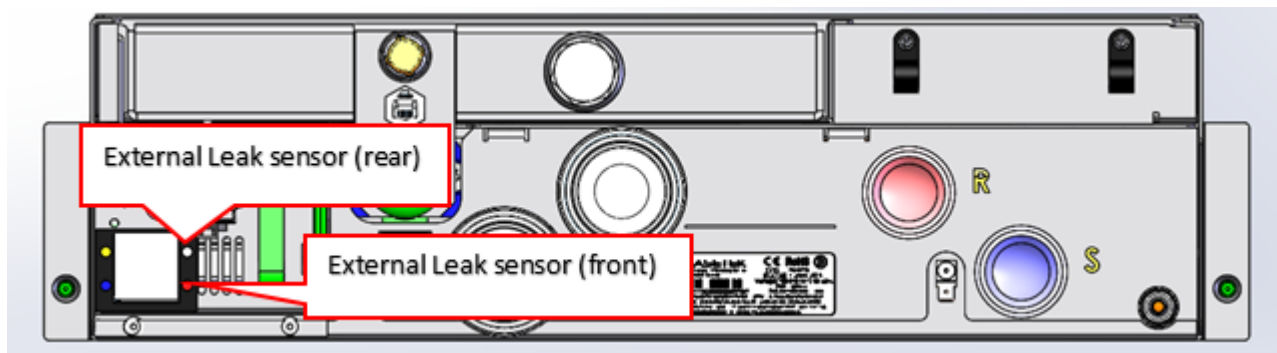
- *An open collector output*
- *A relay output which connects the output to ground.*
- *A digital high/low signal, with a high voltage between 3V and 5V.*

The sensor output must be active low when the sensor is DRY. The output must be high or open when sensor is wet.

Sensors with analog output cannot be used.

There is a 12V DC supply available for the sensor. Each sensor port can deliver max 150mA.

The external sensors are connected to the monitoring box as shown on the picture below.



The rear external leak sensor connects to the red port in the lower right corner and the front external leak sensor connects to the white port in the upper right corner.

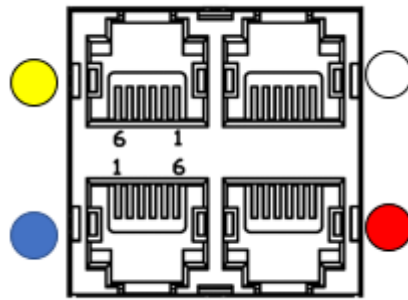
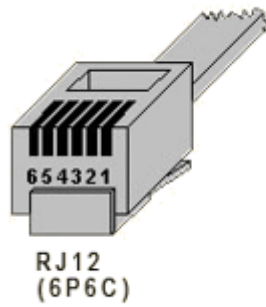
Pin layout for connection cable between external leak sensor and monitoring box is shown on picture below

Red: External Leak sensor (rear)

- P1 – GND
- P5 – sense input
- P6 – 12V out

White: External Leak sensor (front)

- P1 – GND
- P4 – sense input
- P6 – 12V out



5.5. Connect RackCDU to facility water line

The facility water line should be prepared with male and female cam lock connectors as shown on the picture below. Female is on supply side and male on return side as also marked on the tube.



Connect the cam locks by bringing the two ends together and then pull back the handles on the female connector as shown in the second picture. When the facility tube set is connected to the facility water line, let water flow through it for 10 minutes in order to remove eventual air.

