

# RackCDU (4U Rackmount/80kw)

## Installation Guide

## Revision History

Rev	Revision Date	Changed
1	Jun./8 <sup>th</sup> /2023	First edition

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# 1. Safety Instructions

This manual contains Warnings, Cautions and Notices concerning the safe use of this product. See documentation below.

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## **WARNING!**

Warning indicates a potential hazardous situation which, if not avoided, could result in death, serious injury or serious equipment damage. It is important not to proceed until all stated conditions are met and clearly understood.

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## **CAUTION!**

Caution indicates a potential hazardous situation which, if not avoided, could result in minor to moderate injury or equipment damage. It is important not to proceed until all stated conditions are met and clearly understood.

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## **NOTICE!**

Notice indicates instructions that must be followed to avoid damage to the CDU-80R4LL or other equipment

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## 2. Introduction

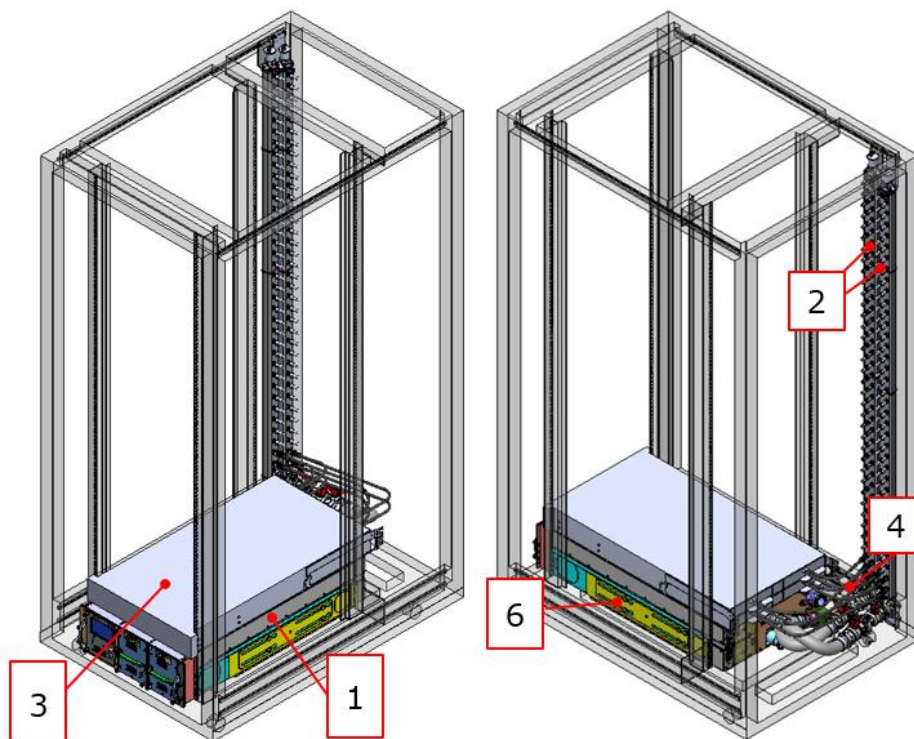
This Liquid cooling system provides 2 kinds of manuals

- Installation Guide (this manual) : to setup
- User Manual: to use for users and servicemen

### Components of liquid cooling module

Nidec's liquid cooling module comprises the following components and can be installed onto a 19-inch server rack.

1. CDU (Coolant Distribution Unit), model: CDU-80R4LL:  
This unit has a heat exchanger, a coolant reservoir tank, and pump units.
2. CDM (Coolant Distribution Manifold)
3. LCM (Liquid Cooling Module)
4. Tube ass'y: Tube to connect a cooling module with a CDM
5. Spacer to install a CDU (not shown in the figure below)
6. Rail to install a CDU

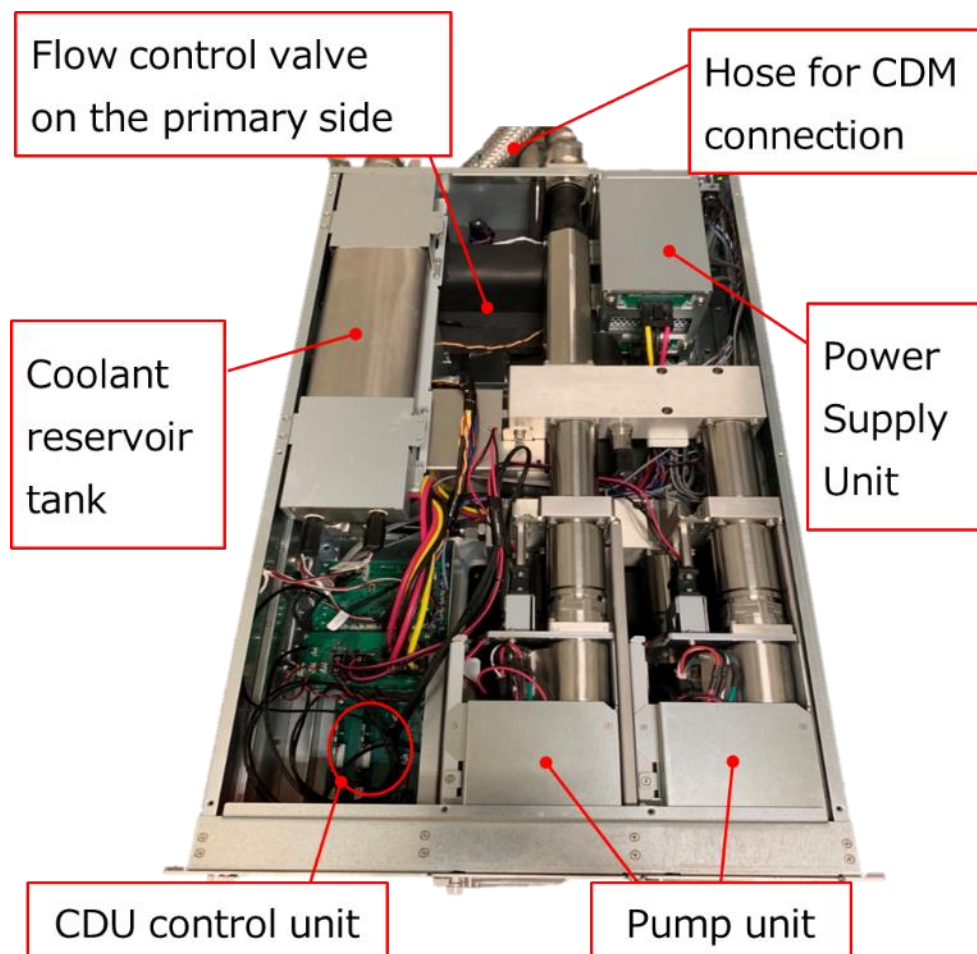


Liquid cooling modules 1, 2, and 4 are pre-filled with coolant in the factory. The coolant is able to fill by the coolant injection fixture although the coolant gradually reduces due to permeation/evaporation during the long-term operation. CDM and LCM are interconnected via the tube ass'y whose ends have the leak-free quick couplings. There is no leakage when the couplings installed to tube ass'y on CDM, and LCM are detached because the coupling end is immediately closed.

## 2.1 CDU

CDU is installed on the bottom of 19" server rack using 4U height. The CDU has a heat exchanger, which dissipate the secondary coolant heat transferred from the server components to the primary cooling water. The primary and secondary flow routes are completely separated from each other.

In addition, the CDU also has the pump unit which circulates coolant, PSU (Power Supply Unit) for driving the pump unit and the PCB for controlling CDU (Control Unit). These unit have redundancy function and are able to hot-swap. The detail of CDU components are the figure below.



The CDU has a monitoring system to watch the following:

- Water temperature of primary side (From/To Facility)
- Coolant temperature of secondary side (From/To Server)
- Pressure of primary water
- Pressure of server-side coolant
- Flow rate of primary water
- Flow rate of server-side coolant
- Coolant level of reservoir tank of server side (Full / OK / Low)
- Heat exchange amount
- Ambient temperature
- Ambient relative humidity
- Leakage detection in the internal CDU

- Leakage detection in the external CDU
- Dewpoint

The threshold values for alert/warning notifications can change from the user interface. In addition, CDU can send SNMP traps to the remote server which is called SNMP manager. SNMP trap is sent to SNMP manager when the monitoring values exceed the alert/warning threshold, if SNMP trap function is enabled. The detail is shown in another document "Section 6.2 of User Manual".

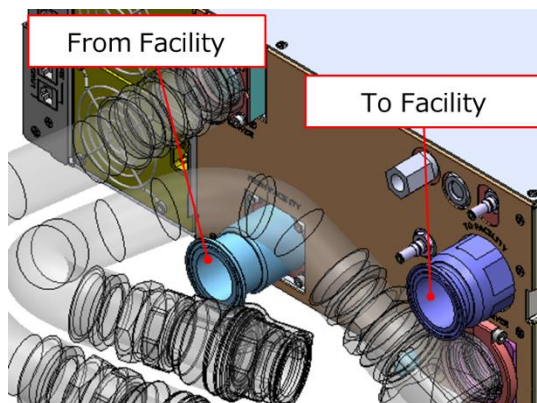
## 2.2 CDM

CDM is located on rear side of rack and comprise two units, supply and return. The cooled coolant by CDU are distributed to each LCM. The coolant remove heats from server components via each LCM and return to CDU.

## 2.3 Primary side piping

The interface of the primary side connection between CDU and the facility is sanitary ferrule. 1.5S (outer diameter:  $\phi 50.5\text{mm}$ ) ferrule, an EPDM gasket and the sanitary clamp should be used for connection.

The primary side piping should be prepared the customer.



Clamp



Gasket

## 2.4 Tube ass'y between LCM and CDM

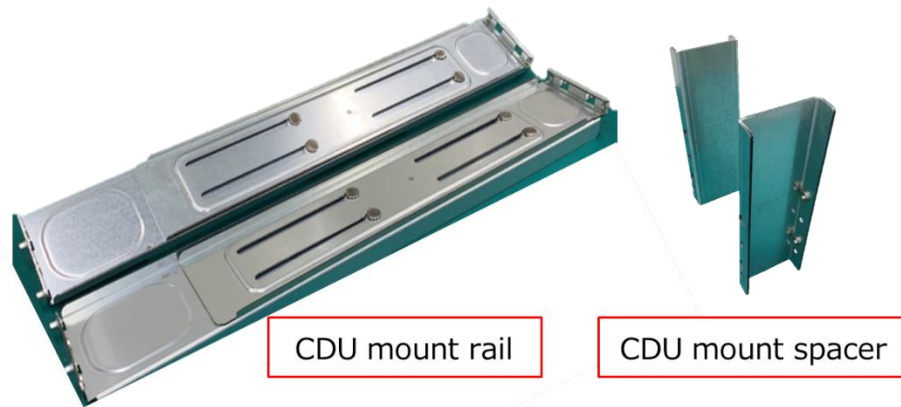
The pair of tube ass'y are used for connection between LCM and CDM. One tube ass'y supplies coolant cooled by CDU to LCM. Another one returns coolant heated by the server components via LCM. Both ends of tube ass'y have quick couplings, which provide easy connection and dis-connection.

## 2.5 Coolant

The coolant used for server cooling in CDU is formulated with propylene glycol and water and has less safety impact. This coolant also has the excellent corrosion resistance to various metals and does not adversely affect rubber and resin. Since there is no flammability, this is not defined as a hazardous substance in Fire Service Act. The concentration of coolant is already adjusted with adequate ratio for cooling, no diluting is required.

## 2.6 CDU installation spacer and rail

The pair of the spacer and the rail for CDU installation are included with shipment. CDU should be installed after these parts are fixed to the server rack. The length of the installation rails are adjustable (Range: 720 – 840mm).



## 2.7 Injection fixture

The diaphragm-type pump is used in the fixture. This pump supplies coolant to CDU by stepping on the diaphragm area. Even if stepping on the diaphragm stops during injection, reverse flow doesn't occur because the fixture has the check valve (non-return valve).



Injection Fixture

### 3. Cautions

- If any cautions in this manual is violated, or if any component is repaired the wrong way, the customer may get into danger (electric shock or a fire), or equipment may break or be damaged.
- Condensation may occur on CDU inside when CDU is quickly transferred from a low-temperature environment into a high-temperature environment. In such a case, CDU should be dried completely before turning on power in a room-temperature environment. If this procedure is neglected, CDU may be damaged.
- CDU and CDM should be transferred with the specified package and way.
- CDU power requires AC100-127, 200-240V (single phase) 50-60Hz.
- A power cable with a ground wire should be used for CDU power.
- Do not connect or disconnect any power cable where lightning may strike.
- Do not place any object or liquid inside the CDU (It may cause electric shock or short circuit).
- In case of an emergency (e.g. CDU damage and a foreign substance in any mechanical unit), turn off all servers' switches immediately, and unplug all units.
- If any liquid leak is detected, check first if the coolant has contacted the power supply part or not. It may cause the electric shock because coolant is electrically conductive if someone touches the power supply part while it is still wet. Therefore, don't touch the coolant before power is shut off.
- Static electricity may damage PCB or the soldered parts inside CDU. Touch the CDU's metal to remove static electricity from your body prior to using it.
- Don't touch any PCB or soldered parts inside CDU. In addition, don't put your hand in CDU at replacing the pump unit.
- A lifter should be used to transfer CDU to the server rack.
- This manual describes how to install a CDU and cautions required during the installation. If any cautions in this manual is violated, it may result in serious damage to the equipment. Pay enough attention to safety.

- This manual includes instruction for Manufacturer, Support, and Customer. Responsibility of each instruction is as below.

Operations		Responsibility
5. Unpacking CDU/CDM		Manufacturer
6. Installation	6.1 Bracket installation to CDM	Manufacturer
	6.2. CDM installation to the rack CDU	Manufacturer
	6.3. Installation of CDU mount rails and spacers	Manufacturer
	6.4. Installation to the rack	Manufacturer
	6.5. Drain tube installation to relief valve and drain hole	Customer
	6.6. Hose Connection between CDU and CDM	Manufacturer
	6.7. External leak sensor connection	Customer
	6.8. Tube ass'y connection to CDM	Customer
	6.9 Power cable and LAN cable connection	Customer
	6.10. Operation check with liquid cooling modules	Customer
	6.1 Monitoring system setting	
	Network setting	Customer
	Sensor threshold setting	Customer
	Status LED check	Customer
	6.12 Primary piping connection to CDU	Customer
7. Maintenance		Support
8. Other malfunctions and abnormal cases ※		Customer

※In the event of other abnormalities or failures, it is necessary to replace the CDU/CDM. Please contact to FUJITSTU sales team.

## 4. Required tools and parts

The following tools and parts are required for CDU/CDM installation.

Tool & Part	Purpose	Preparation
Screwdriver: Phillips#2	Installing CDU/CDM on a rack Opening/closing the panel fastener in front of the CDU.	Manufacturer
Hex wrench (Width across flat: 2mm)	Fastening the low-head screws on the rail. (for adjusting the rail length)	Manufacturer
Scissors	Unpacking the CDU/CDM's packages.	Manufacturer
Box-cutter	Unpacking the CDU/CDM's packages.	Manufacturer
Bucket	Venting air from the facility's cooling water.	Customer
LAN cable	Setting up a monitoring system.	Customer
PC	Setting up a monitoring system.	Customer
Lifter	Transferring CDU to a server rack.	Manufacturer
Wet/dry vacuum cleaner	Cleaning spilled water during installation.	Customer

## 5. Unpacking CDU and CDM



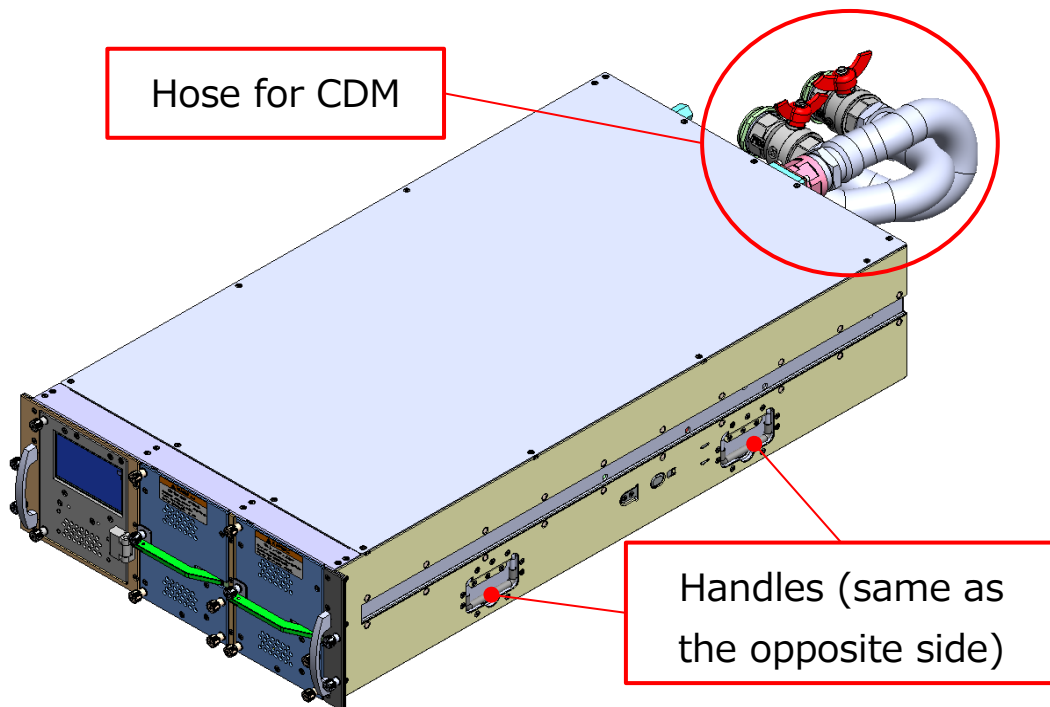
### CAUTION!

Work with 4 people (CDU), 2 people (CDM) at least for CDU/CDM installation. At first install the rails and spacer to a server rack, lift the CDU by holding the side handles and load CDU on a server rack. Pay enough attention to transfer CDU because CDU weight is approx. 100kg. The lifter should be used to transfer CDU to a server rack.

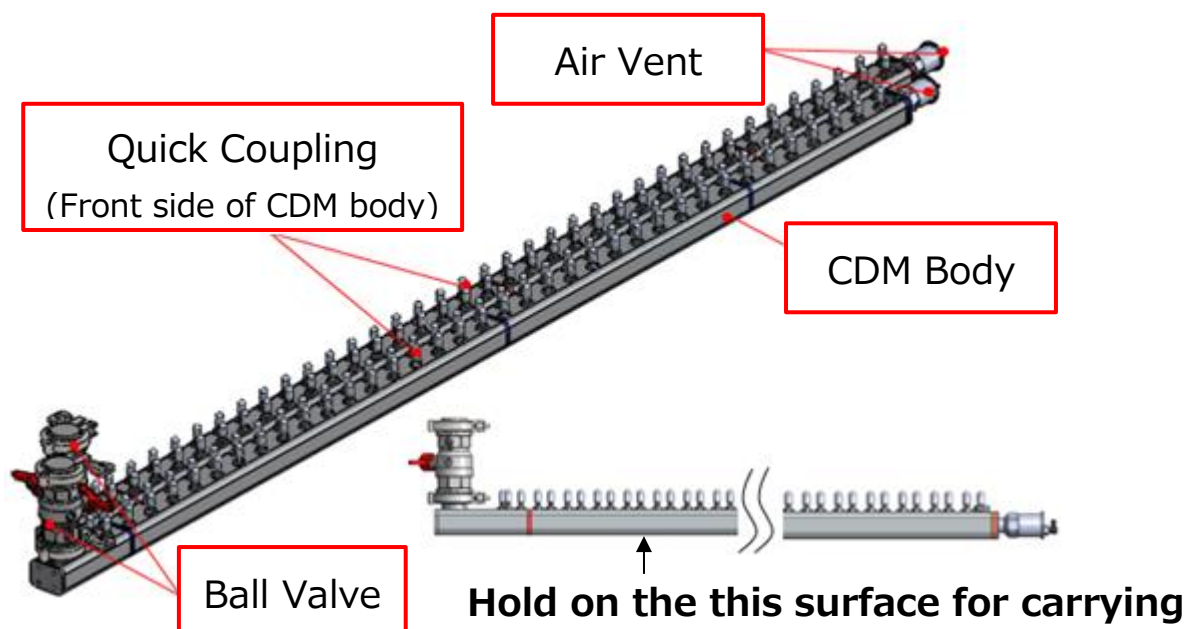
- 1) CDU and CDM are delivered on a wooden palette packaged in a cardboard box. The weights and dimensions with the package (including the palette) are as follows (L x W x H). Remove shrink-wrap by box-cutter for each package.
  - a. CDU : approx.135kg, 1454mm x 772mm x 554mm, 1carton/palette
  - b. CDM : approx.40kg, 2200mm x 1300mm x 1425mm, 20carton/palette
- 2) Cut the strap that ties up the cardboard box and the wooden palette by a scissor.
- 3) Remove the lid of CDU and CDM cardboard box, and remove the buffer material.
- 4) The following accessories are packaged with CDU and CDM. Pay attention not for losing them because they are used to install a rack.

Unit	Parts	Specifications
CDU	CDU mount rail	Left: 1pcs, Right: 1pcs
	CDU mount spacer	Left: 1pcs, Right: 1pcs
	Screw for rail	Cross recessed upset head screw with washer(M5) 4pcs
	Screw for spacer	Cross recessed head screw with washer (M5) 4pcs
	Ferrite core	2pcs, for noise protection
	Clamp for AC power cable	2pcs
CDM	CDM mount bracket	4 types x1pcs/each
	Screw for bracket	Screws with built-in spring washer x16
	Ferrule clamp	1.5S, 2pcs.
	Ferrule gasket	1.5S EPDM, 2pcs.

- 5) Pay enough attention to take CDU up because CDU weight is approx. 100kg. Work with 4 people at least for taking CDU out from the carton box. In case of carrying CDU, hold the side handles and support the hose for CDM connection. The damage to the ball valve and loosening the ball valve handle might cause the leakage of CDU coolant.



- 6) Pay enough attention to take CDM up because CDM weight is approx. 20kg. Work with 2 people at least for taking CDM out from the carton box.
- 7) In case of carrying CDM, hold the opposite of the face installed couplings. Do NOT hold the quick couplings, the air vent and the ball valve because it might cause the damage and coolant leakage. In addition, pay attention NOT to hit CDM on any object.



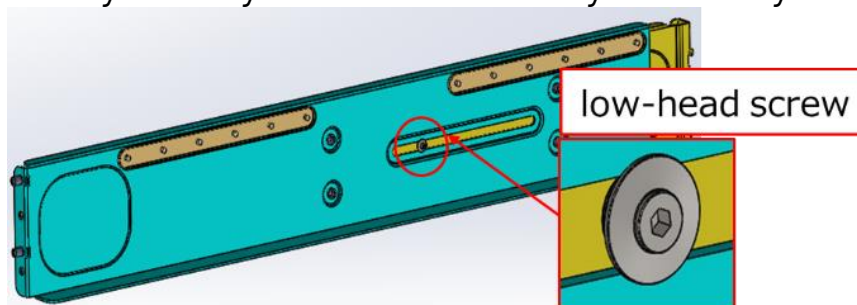
## 6. Installation



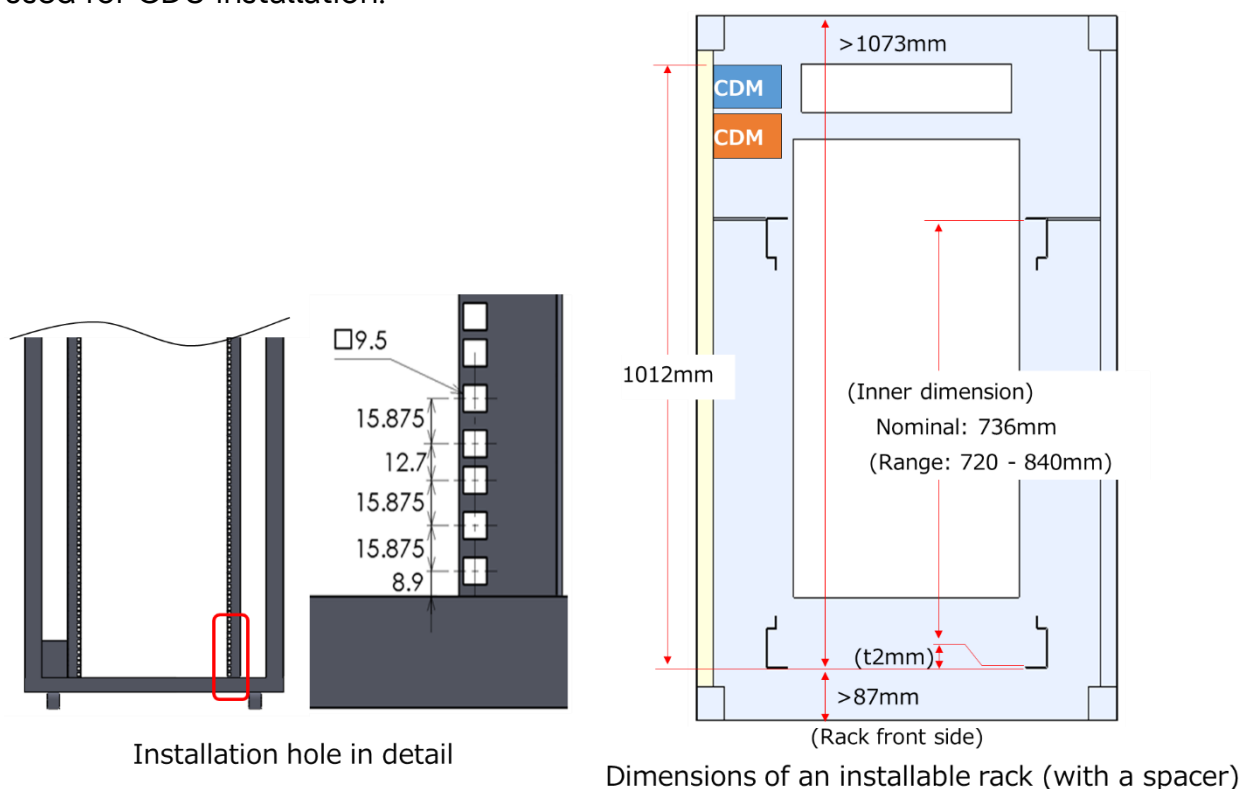
### WARNING!

Do NOT turn on the servers before finishing CDU/CDM installation.

These rails and spacers is mountable to EIA-310-D 19 sever rack with the universal hole pitch. The rail is mainly made by two brackets and they are fixed by the low head screw.



The recommended rack dimension for CDU installation is shown in the figure below. If these dimension are not met, CDU might interfere in the door of the server rack and CDU and CDM might not properly connect. The attached rails and spacers must be used for CDU installation.



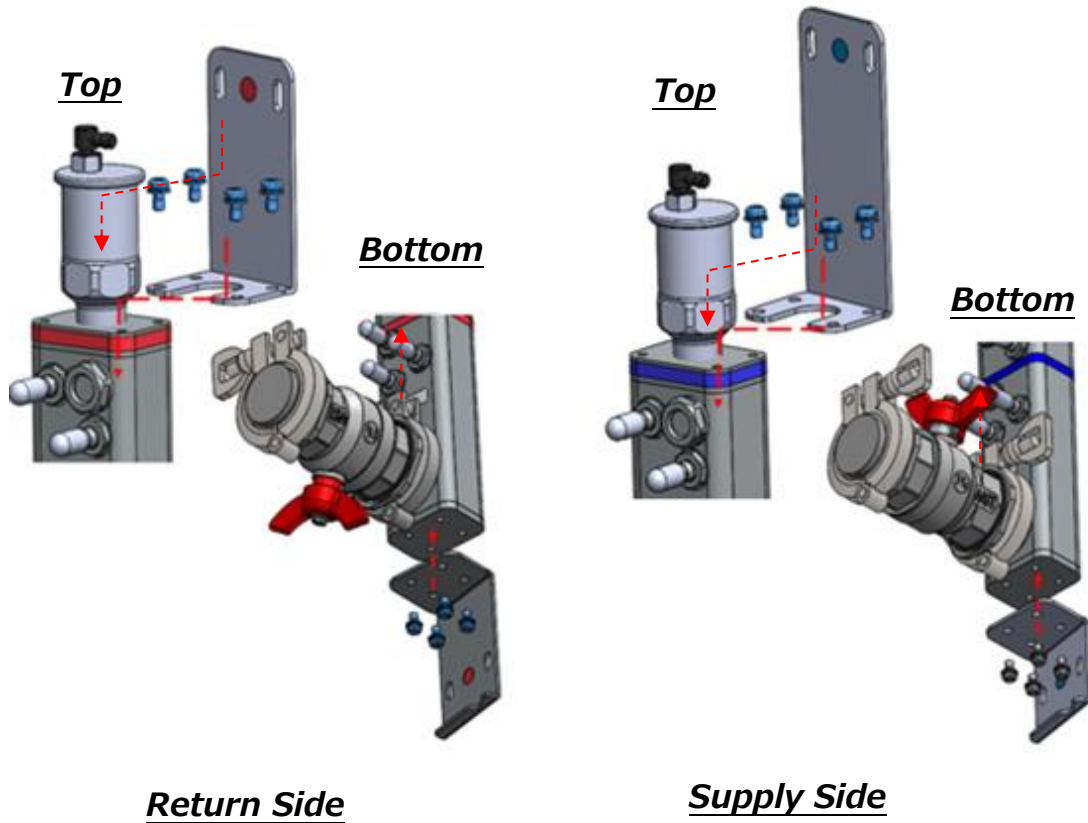
### 6.1 Bracket installation to CDM

Install the brackets to CDM top/bottom with the following screw and torque. Pay attention to the combination of the bracket.

CDM for supply (with blue labels): Use the brackets(top/bottom) with the blue label.  
 CDM for return (with red labels): Use the brackets(top/bottom) with the red label.

The installation is capable with both CDM direction; horizontal, vertical. The screws are included with the package. (There are no specified tightening order).

Screw: Cross recessed pan head screw with  $\phi 10$  washer M5 $\times$ 0.8(U-0512-S1).



## 6.2 CDM installation to the rack



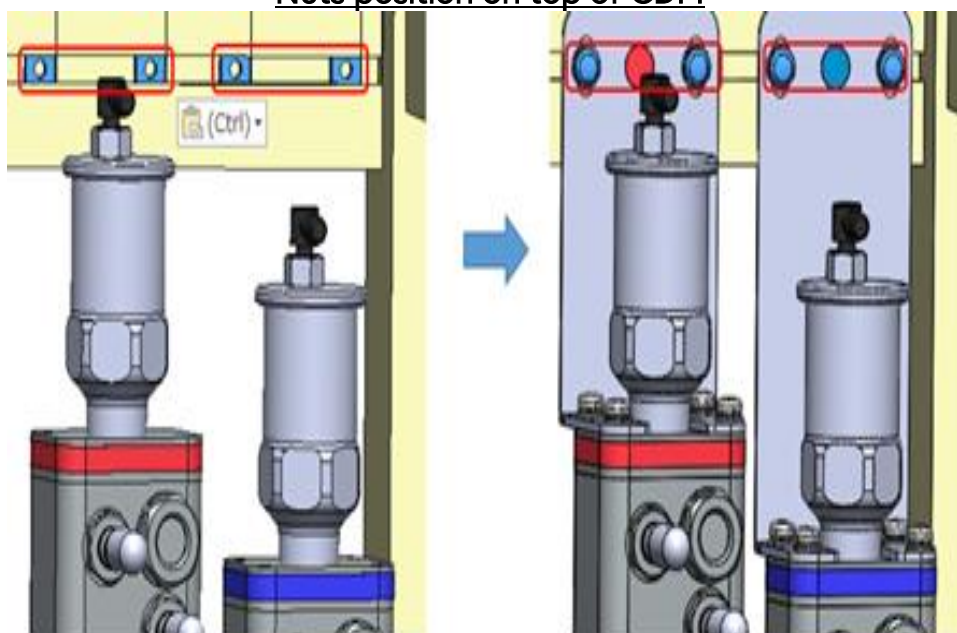
### **WARNING!**

Do NOT connect the tube ass'y before finishing CDM installation to the rack. The abnormal load damages the quick coupling and tube by the unexpected work and it causes the coolant spillage.

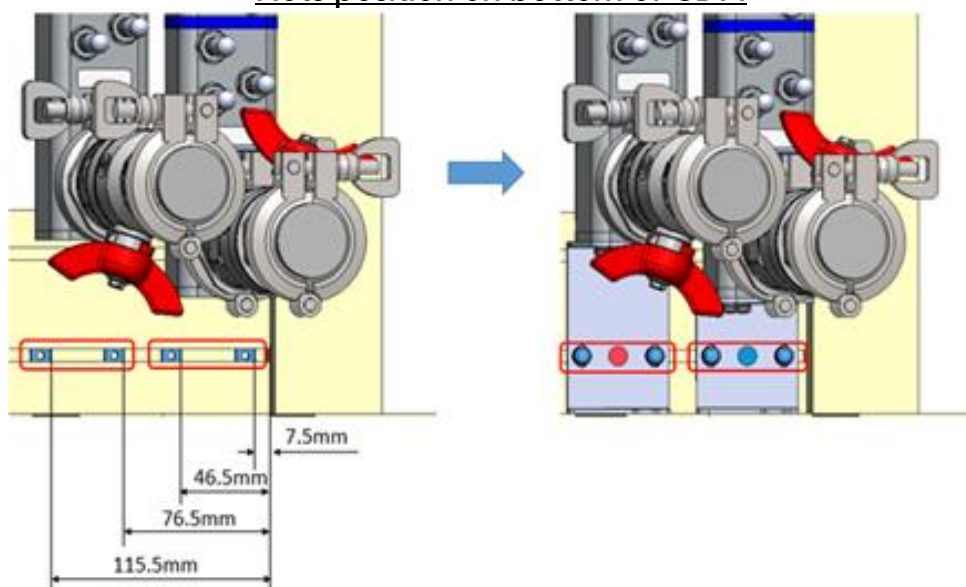
Install the CDM with blue labels at first. After that, install the CDM with red labels.

The screws for this are NOT included with the package. The install dimension should follow the below figure.

Nuts position on top of CDM

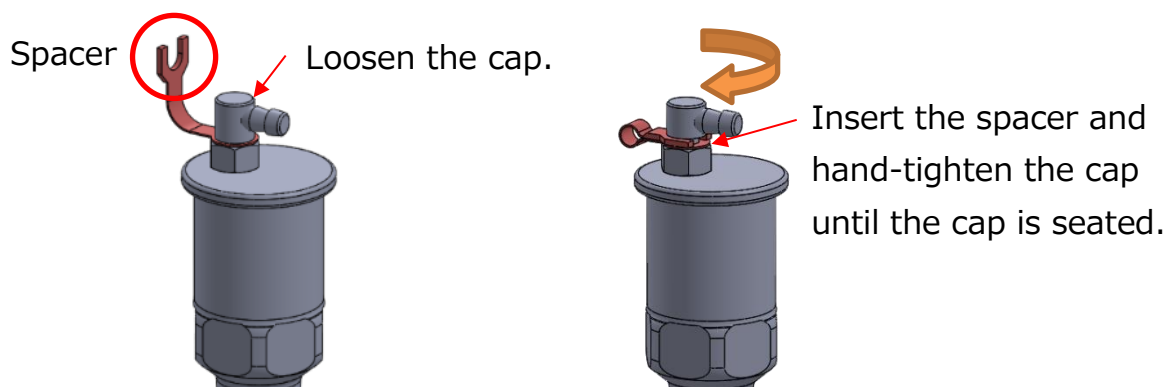


Nuts position on bottom of CDM



## Open air vent drain port

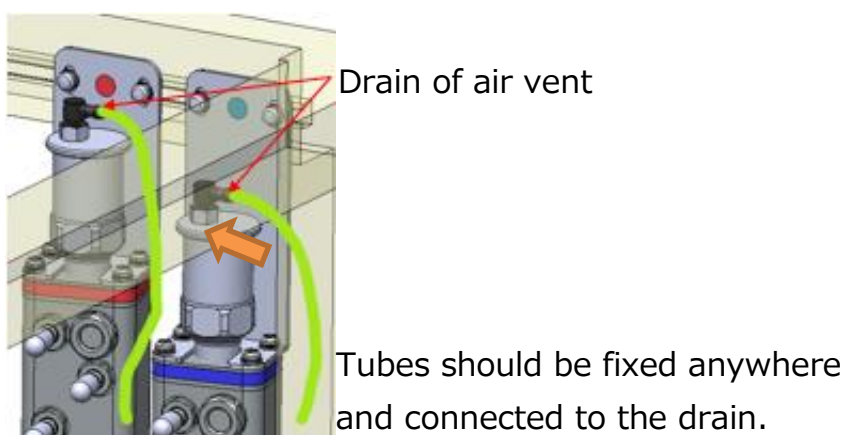
Loosen the caps on the air vents once. Insert the spacer between the cap and the air vent body and hand-tighten the cap until the cap is seated in order to keep the adequate space which the air vent works well. The excessive torque causes the cap damage because the cap is made by the resin.



## Drain tube installation

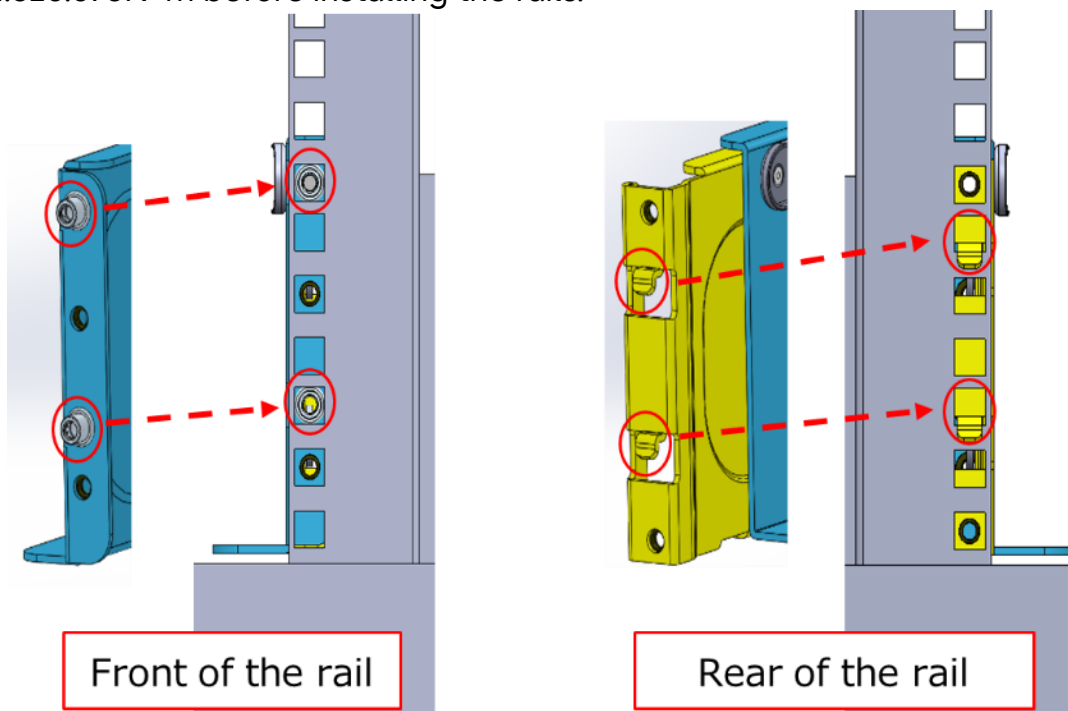
This task is not supported by Fujitsu.

Insert the drain tube to the air vent because the coolant will blow off from air vent. The drain tube should be fixed anywhere and connected to the drain. The drain tube are NOT included with the package and should be prepared by a user.



## 6.3 Installation of CDU mount rails and spacers

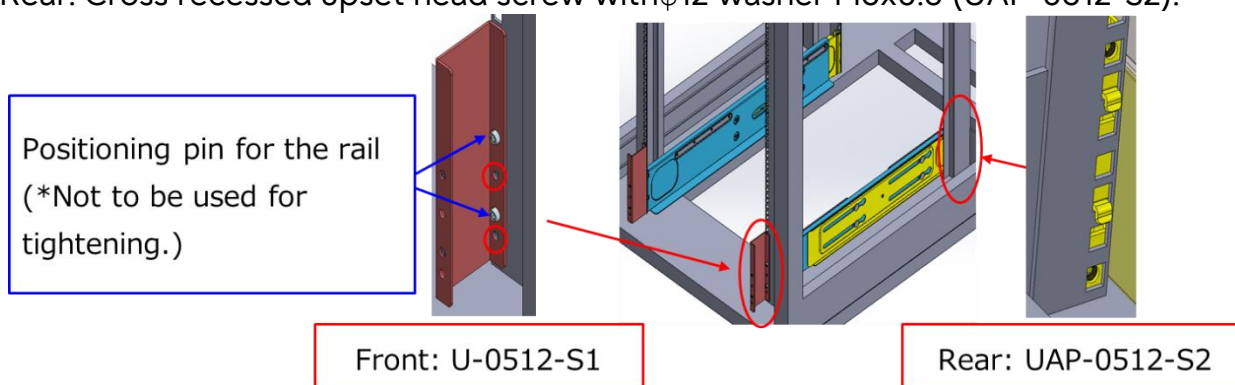
The rails should be installed to the bottom the server rack. The positioning pins on the rail front and the hook on the rail rear are matched with the figure below. The rail length is need to adjust for the server rack and tighten the rail screw with adequate torque  $1.5 \pm 0.075 \text{ N} \cdot \text{m}$  before installing the rails.



Mount the spacers to the server rack and tighten the following screws. The screws are included with the package.

Front: Cross recessed pan head screw with  $\phi 10$  washer M5x0.8 (U-0512-S1).

Rear: Cross recessed upset head screw with  $\phi 12$  washer M5x0.8 (UAP-0512-S2).





## CAUTION!

The screw size of front and rear are different. The incorrect screw interfere to the spacer and cause insufficient tightening torque because the washer contact area against the square hole of the rack is small.



Front: Washer  $\phi 10$ , pan head

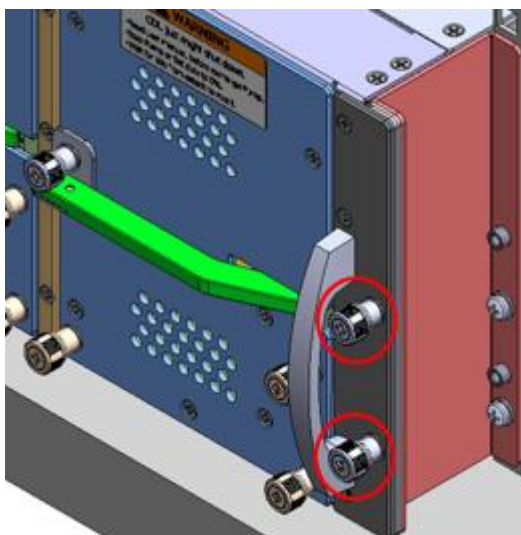


Back: Washer  $\phi 12$ , hex upset

## 6.4 CDU Installation to the rack

Slide CDU along the mounted rails until CDU front panel contacts to the spacer. Then, tighten the captive screws on CDU front.

The other rails should NOT be used because CDU is heavy (approx. 100kg).



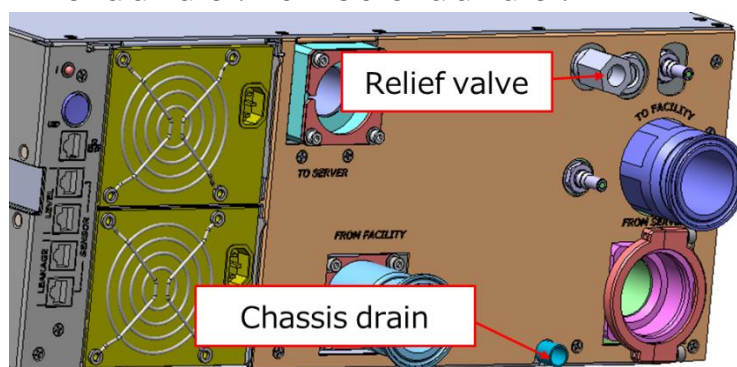
## 6.5 Drain tube installation to relief valve and drain hole

This task is not supported by Fujitsu.

CDU has the relief valve on the reservoir tank in the secondary side. If the abnormal pressure is applied, the valve discharge the coolant to protect CDU. In addition, the coolant drain hose is also mounted, which drains dew or leaked water from the CDU cabinet. The tubes should be connected to protect the server equipment. (The tubes for drain are not included with the package.)

Relief valve : R1/4 fitting and drain tube is required

Drain hole : Inner diameter:  $\phi 10$  x Outer diameter:  $\phi 12$  mm



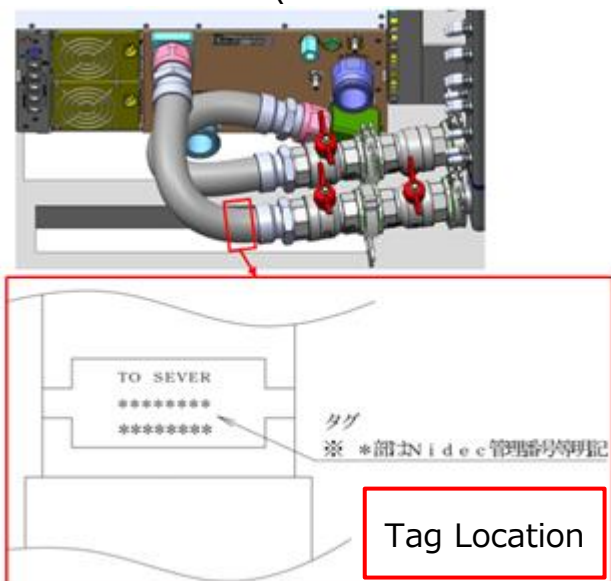
## 6.6 Hose Connection between CDU and CDM

The hoses for CDM connection are installed to CDU. The identification labels are applied on CDM surface in order to confirm the connection destination (supply/return). The hoses should be connected like the following.

Hose for CDU to Server → connect to supply side CDM (Blue label)

Hose for CDU to Facility → connect to return side CDM (Orange label)

The hose for CDM supply side on CDU has the name tag on the hose end. The tag shows "To Sever". (The hose for CDM return side on CDU has no tag.)

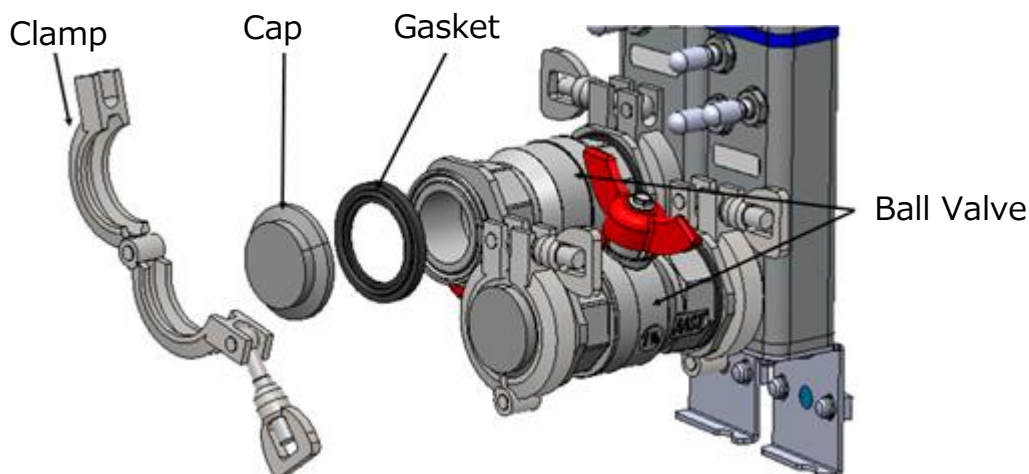


CDM Supply  
Label: Blue

CDM Return  
Label: Red

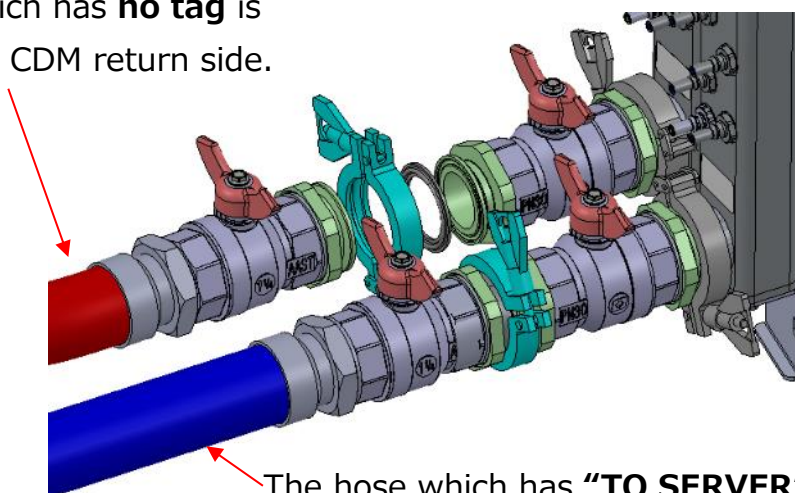
Confirm that the ball valve is closed and detach the sanitary cap and gasket by loosening the screw of sanitary clamp.

Connect CDM and CDU hoses with the gasket and tighten the wing nut on the sanitary clamp. After that, open the 4 ball valves on CDU hoses and CDM.  
(The caps are not used except the protection purpose)



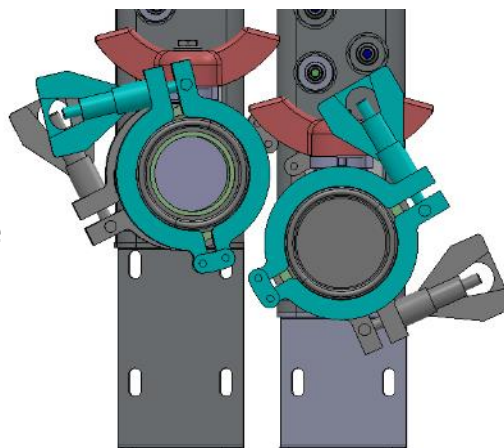
Connect CDM and CDU hoses with the gasket and hand-tighten the wing nut on the sanitary clamp.

The hose which has **no tag** is connected to CDM return side.



The hose which has **"TO SERVER"** tag is connected to CDM supply side.

Recommended orientation of the clamps is like as the right figure.

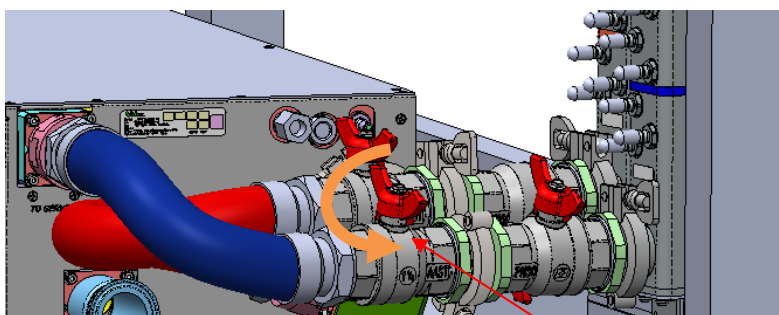
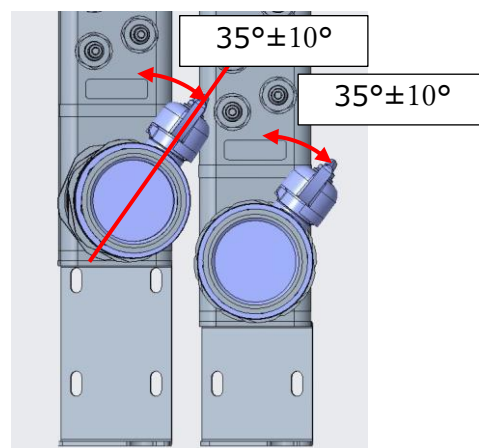


## 6. Installation

Recommended orientation of the CDU hose valve is like as the right figure.

To check no interference of valve with server or rack door.

Open the ball valves on CDU and CDM.

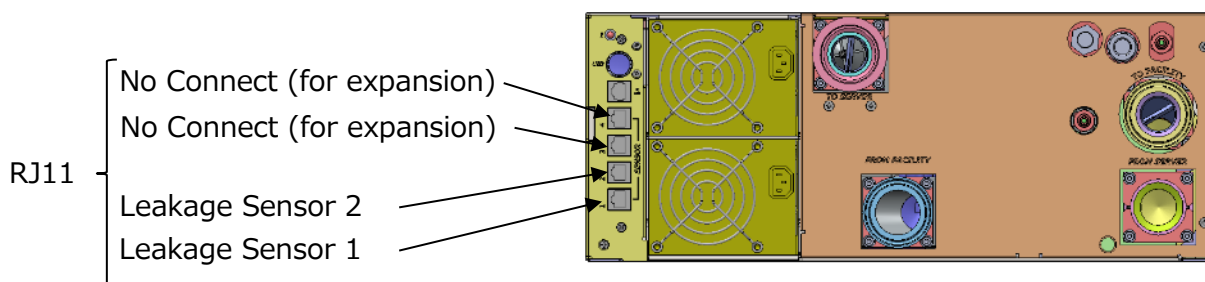


Open 4 ball valves.

## 6.7 External leak sensor connection

This sensor is not supported by Fujitsu.

This CDU support two external leakage sensor with RJ11 connectors. CDU monitors their outputs and saves to the log file.

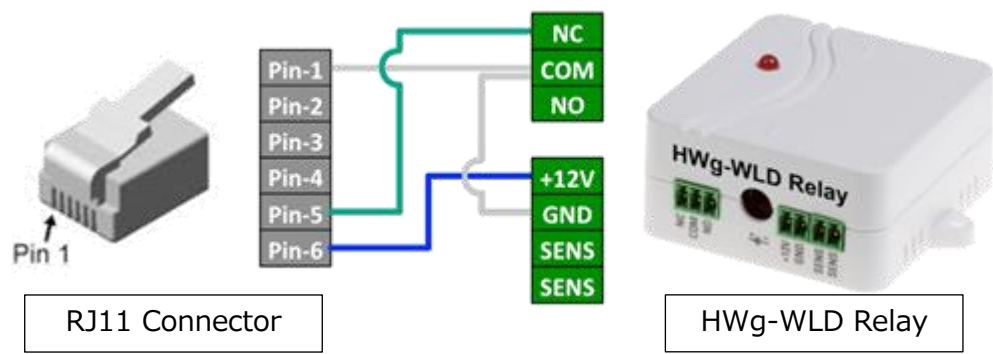


Supported leakage sensor is below.

Supplier: HW group

Model: WLD Relay 1W-UNI

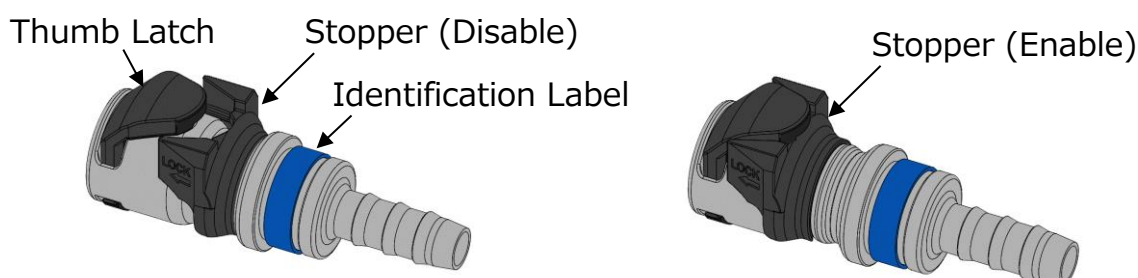
The sensors are connected to the external port 1 or 2 on CDU rear side.



## 6.8 Tube ass'y connection to CDM

Tube ass'y has the identification seal in order to check easily LCM/CDM connection. The tube of supply side has the blue seal and the one of return side has the red seal.

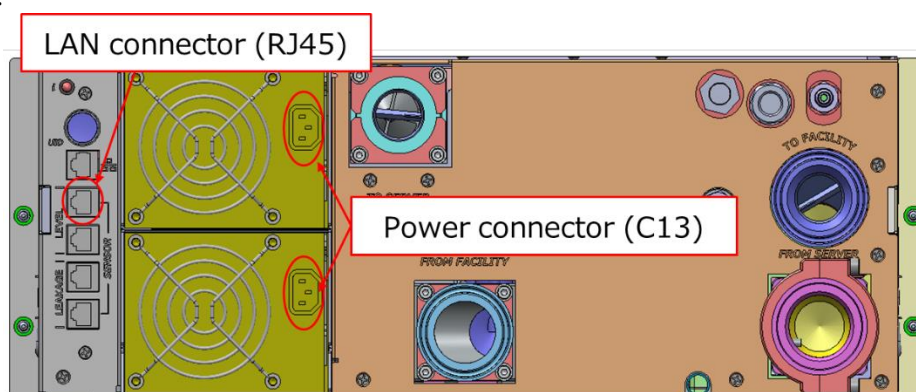
Remove the protection caps on the quick coupling plugs in CDM and insert the tubes until the thumb latch on the quick coupling click. The tubes could be easily detach by pushing the thumb latch on the quick coupling. In addition, it has a stopper to prevent erroneous attachment/detachment, and you can switch between enabling/disabling the stopper by sliding it.



## 6.9 Power cable and LAN cable connection

Time : 10 minutes to take

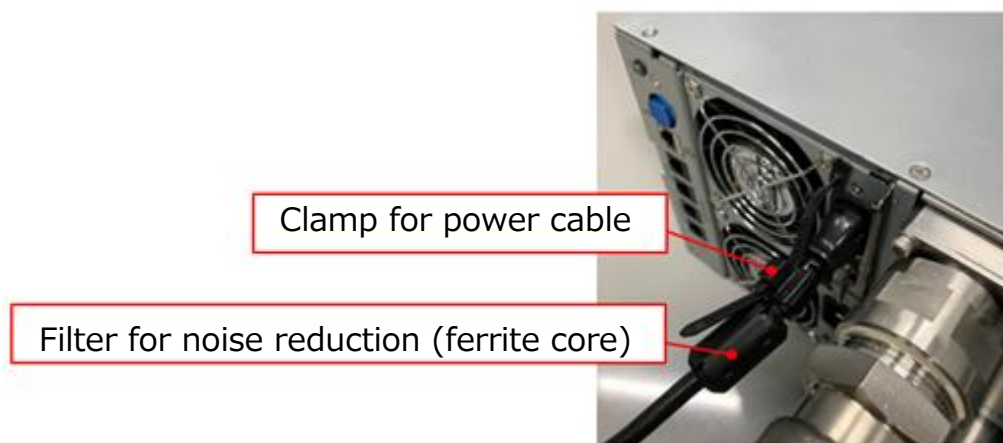
Connect the AC power cable and LAN cable to the specified position shown in the figure below.



CDU power requires AC100-127, 200-240V (single phase) 50-60Hz. AC power cable which has C14 end connection is required because PSU inlet type is C13. AC cables, ferrite cores, and clamps for AC cables are attached to CDU.

Please the attached ferrite core to the power cable for noise reduction.

The cable clamps are included in the package. The cables should be fixed by them. Connect the LAN cable to the specified position to control CDU from IT equipment.



## 6.10 Pump unit operation check

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### **WARNING!**

This process is required before turning on the server for the first time. The purpose of this is to remove the air in the liquid cooling system. If this is skipped, the cooling performance is not gotten and it might damage the servers.

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Time : 15 minutes to take

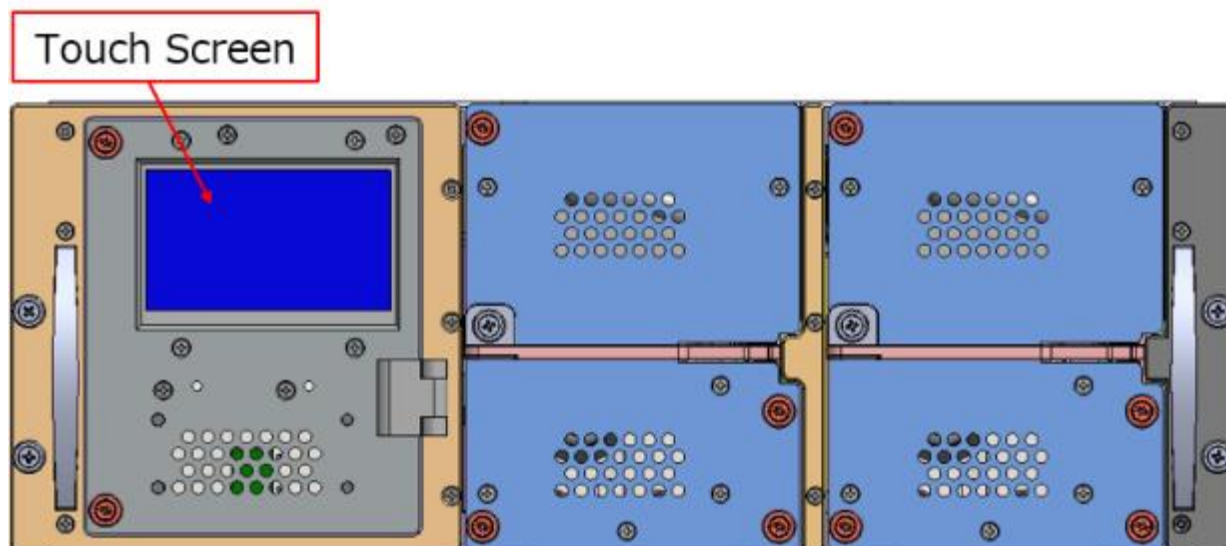
Confirm that all the valve on CDU/CDM fully open and follow the steps below.

1. Set the flow rate to the number of nodes x 1L/min in Auto mode and turn on the pump unit
2. Keep pump rotation 5 minutes to remove the air in the secondary loop.
3. If no error occurs, stop the pump unit, after 5min.

## 6.11 Monitoring system setting

Time : 15 minutes to take

The various setting (network connection, alarm threshold, etc.) is able to configure from the touch screen on CDU. The details are shown in "Section 5. User Interface Overview" on the user manual.



## 6.12 Primary piping connection to CDU



### **WARNING!**

When the primary water is turned on or off, water hammer may occur if the flow rate/pressure changes quickly. Since the impact by water hammer might damage the inside of the CDU and cause water leakage, please take appropriate countermeasures.

The inlet/outlet of the primary side are mounted on CDU rear (refer to section 1.3). The rear panel shows the connection destination, i.e. To Facility, From Facility. The connection type is the sanitary ferrule. The protective caps for contaminants are attached and remove them before connecting the primary piping. Insert the gasket and hand-tighten the wing nut on the sanitary clamp.

In addition, the cap is required at storage and transportation only. Please dispose of or keep the cap as needed.

## 7. Maintenance

CDU has the pump unit which circulates coolant, PSU (Power Supply Unit) for driving the pump unit and the PCB for controlling CDU (Control Unit). These unit have redundancy function and are able to hot-swap. The incorrect operation might damage the liquid cooling systems and the servers. The details are shown in the user manual and refer to the following.

Exchange Pump Unit :                      Section 6.4

Exchange Power Supply Unit :      Section 6.5

Exchange CU(Control Unit) :      Section 6.6

## 8. Unexpected failure

If any parts excluding pump, PSU and CU fail, please contact your seller.