User Manual

NovaCool Rear Door Heat Exchanger

Content

Part I. Introduction

Scope of Application

This manual provides comprehensive guidance on the installation, operation, maintenance, and troubleshooting of the **NovaCool RDHx**. It is intended for use by qualified technicians, data center operators, and maintenance personnel. Following this manual ensures optimal performance, reliability, and safety of the equipment.

This product is designed for **indoor** use in data centers and IT environments. It provides **efficient cooling** for rack-mounted IT equipment, helping to maintain optimal operating conditions.

Copyright & Disclaimer

This document is proprietary information of INOVA DC LLC. and is intended for authorized use only.

Specifications and information in this manual are subject to change without prior notice.

INOVA DC LLC. is not responsible for damages resulting from improper use, modification, or non-compliance with this manual.

Quality Management & Certifications

The **NovaCool RDHx** is designed and manufactured in compliance with international quality and safety standards:

- **Quality Certification**: ISO 9001
- **Safety Compliance**: UL62368-1
- **Environmental Compliance**: RoHS, REACH
- **Electrical Safety**: CE, FCC Part 15

Contact Information

For technical support, warranty claims, or general inquiries, please contact:

INOVA DC LLC.

- **Website**: www.inovadc.com
- **Email**: sales@inovadc.com
- **Address**: 8 The Green, Suite R in the City of Dover. Delware. Zip code 19901.

Part II. Safety Information

General Safety Warnings

Read this manual thoroughly before installation, operation, or maintenance.

This equipment must be installed and serviced only by trained and qualified personnel.

Failure to follow safety precautions may result in serious **injury, electric shock, or equipment damage**.

Keep this manual **accessible** for future reference.

This equipment is intended for industrial environments only and must not be used in areas **accessible** to children.

The addition of this symbol to a Danger or Warning safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This symbol alerts users to potential personal injury hazards.

Obey all safety messages that follow this symbol to avoid possible injury or death.

The following blocks will appear again in the following chapters. Please pay special attention to those safety notices.

DANGER

Danger indicates an imminently hazardous situation which, if not avoided, **will result in** death or serious injury, or equipment damage.

WARNING

Warning indicates a potentially hazardous situation which, if not avoided, **can result in** death or serious injury, or equipment damage.

CAUTION

Caution indicates a potentially hazardous situation which, if not avoided, **can result in** minor or moderate injury, or equipment damage.

NOTICE

Notice addresses practices not related to physical injury including certain environmental hazards, potential damage, or loss of data.

Electrical Safety Precautions

- This product **must be properly grounded** before operation.
- The unit uses a plug-type disconnect device. Ensure the output sockets remain easily accessible at all times.
- **Disconnect all power sources** before performing power control box maintenance.
- Do not operate the unit with damaged power cords, loose connections, or exposed wiring.
- Power cables should be routed safely to avoid **tripping hazards or mechanical damage**.
- Fuses must only be replaced by qualified personnel using the specified ratings for detailed instructions, please refer to the maintenance guide.
- If dual power inputs are provided, ensure that both inputs are **properly isolated** before servicing.
- This unit should be installed according to local electrical regulations.

Handling & Installation Safety

- **Heavy Equipment**: This unit may weigh over **200 kg/440 lbs**. Use proper lifting equipment or a team of at least **four trained people** for handling.
- **Positioning**: The unit must be installed **vertically** on a stable, level floor.
- **Tipping hazards**: In handling or removal, ensure the equipment is lifted from the bottom to avoid toppling. When the NovaCool RDHx is installed in an empty rack, the counterweight should be appropriately adjusted to prevent tipping due to an unstable center of gravity.
- Avoid water exposure: The unit must not be exposed to excessive humidity, condensation, or liquid spills.
- **Shock & Vibration**: Avoid installation in high-vibration areas to **prevent structural damage**.

Operational & Maintenance Safety

- This product is intended for use in data centers. The door cover is not designed to be opened by non-professional personnel and should only be accessed by qualified staff using a dedicated key for maintenance work
- **Moving Parts**: The unit contains **fans and other moving components**—keep hands, clothing, and tools clear during operation.
- **Temperature Hazards**: Some parts may become hot during operation—avoid direct contact.
- Cooling System Precautions:
- Always check for leaks or abnormal pressure fluctuations in the water-cooling system.
  - Use only **manufacturer-approved hoses and fittings**.
  - Do not exceed the **maximum water pressure** of 64.3 psi/ 4.5 bar.
- Emergency Shutdown:

- In case of system failure, immediately power off and disconnect the unit.
- Do not attempt repairs without proper authorization and tools.

✧ Personal Protective Equipment (PPE): Always wear appropriate gloves, eye protection, and safety shoes when handling components.

Part III. Product Overview

Product Specifications

The **NovaCool RDHx** is a high-efficiency RDHx designed to provide superior cooling for data centers and high-density IT environments. The following are the key specifications:

- **Maximum Cooling Capacity**: Up to 85kW @ 20°C inlet water temperature, 24°C air supply**.**
- **Available Sizes**: 42U, 48U, 52U, with widths of 600mm and 800mm.
- **Power Supply**: Dual power feed with built-in Automatic Transfer Switch (ATS).
- **Fan Type**: Hot-swappable EC fans, N+1 redundant.
- **Monitoring**: Real-time power supply health, cooling capacity, water temperature, pressure, and flow rate monitoring.
- **Connectivity**: Ethernet, Web Interface, Modbus TCP/IP, BACnet**.**
- **Leak Detection**: Standard leakage sensor with automatic shutoff to prevent water damage.

Features and Capabilities

The **NovaCool RDHx** incorporates state-of-the-art cooling technology, offering superior thermal management and operational efficiency. The key features include:

- **High-Efficiency Heat Exchange**r: Designed with a proprietary heat exchanger for optimal thermal transfer and maximum cooling efficiency.
- **Optimized Energy Efficiency**: Capable of utilizing high-temperature inlet water to enhance free cooling capabilities, significantly reducing energy consumption and operational costs.
- **Intelligent Fan and Valve Control**: Automatic dynamic adjustment based on real-time load conditions to ensure precise cooling regulation**.**
- **Seamless Maintenance and Serviceability**: Tool-free, hot-swappable fans and controllers allow for effortless servicing without disrupting operations.
- **Enhanced Safety Mechanisms**: Integrated leakage detection and dual power supply redundancy improve system reliability and prevent unexpected failures.
- **Flexible and Modular Design**: Compatible with multiple rack sizes, enabling seamless integration into diverse data center environments.

Product Part Number Matrix

The complete series of products consists of the door and frame, piping kit, valve kit, commissioning tools, and sensors. Table 1 is a list of standard products that can meet the requirements of most application scenarios. Customers should first select the appropriate model of the door. Then, based on the water and electrical connection points, choose the corresponding water pipes and electrical cables. Depending on performance requirements and regional considerations, different valves and actuators can be selected. Additionally, commissioning tools and other accessories can be configured as needed.

Table 1. Standard Product List

Part Number	Short Description
NC1-642WL	42UX600 Standard Rear Door, Left-hand open. Including Package
NC1-648WL	48UX600 Standard Rear Door, Left-hand open. Including Package
NC1-842WL	42UX800 Standard Rear Door, Left-hand open. Including Package
NC1-848WL	48UX800 Standard Rear Door, Left-hand open. Including Package
NC1-642WR	42UX600 Standard Rear Door, Right-hand open
NC1-648WR	48UX600 Standard Rear Door, Right-hand open
NC1-842WR	42UX800 Standard Rear Door, Right-hand open
NC1-848WR	48UX800 Standard Rear Door, Right-hand open
NC1-P38BSPT	Pair of Bottom entry pipes with BSP connector
NC1-P38NPT	Pair of Bottom entry pipes with NPT connector
NC1-P20BSPT	Pair of Top entry pipes with BSP connector
NC1-P20NPT	Pair of Top entry pipes with NPT connector
NC1-C19C20UL35	Feed A and B power cord, top feed. US Region
NC1-C19C20UL60	Feed A and B power cord, bottom feed. US Region
NC1-C19C20VDE35	Feed A and B power cord, top feed. EU Region
NC1-C19C20VDE60	Feed A and B power cord, bottom feed. EU Region
NC1-ACTZTU	Actuator Commissioning Tool
NC1-ACT	Actuator
NC1-VLV63NPT	Valve 6.3m³/h, with 1" NPT
NC1-VLV100NPT	Valve 10m³/h, with 1" NPT
NC1-VLV63BSPT	Valve 6.3m³/h, with 1" BSP
NC1-VLV100BSPT	Valve 10m³/h, with 1" BSP
NC1-3VLV63NPT	Valve 6.3m³/h, with 1" NPT
NC1-3VLV63BSPT	Valve 6.3m³/h, with 1" BSP
NC1-652HW	600mmX52U Adaptor
NC1-852HW	800mmX52U Adaptor
NC1-OPHMI	HMI, commissioning tool.
NC1-SEALANT	Sealant
NC1-VFSN	VFS kits
NC1-VFSB	VFS kits
NC1-RPSN	RPS kits with NPT connector
NC1-RPSB	RPS kits with BSP connector

If none of the products in the above table are suitable, please contact sales to confirm compatibility and feasibility. And below is the part number matrix for customized parts.

Table 2. Customized Door Part Matrix

NC1	-	W	HH	C	A	BB*	CC*
NovaCool RDHx	-	Width	Height	Color	Open Direction	Preserved Configuration	
		6-600mm	42-42U	B-Black	L-Left Hinge	For software customization	
		...	45-45U	W-White	R-Right Hinge	Two digits could be number or characters	
		8-800mm	48-48U	G-Gray			
				S-Steel			
				M-Mix			
				…			

Note:

For most of cases, BB, and CC are not included in the PN.

BB is preserved for various software versions. Like changing some factory setting of customize the firmware for some particular customer.

CC is preserved for hardware various versions. Like changing the lock style. etc.

BB will be 00 if CC with particular character.

Table 3. Customized Component Number Matrix

NCC	-	X	#####*
Product Line-Customized Components	-	M-Metal	00001~99999
		P-Pipes	00001~99999
		D-Special Doors	00001~99999
		T-Others	00001~99999

Note:

*Since the product needs to be compatible with the customer's on-site environment and equipment, there are often requirements for additional custom-made parts such as sheet metal covers, piping, and other special structural components. These custom parts will be numbered sequentially, starting from 00001 and continuing up to 99999.

Label Information

Below is the product label information, which includes the common information of product description in short, rated voltage and current, and cooling capacity. And on top of it is the product part number and product serial number, which is different for each unit.

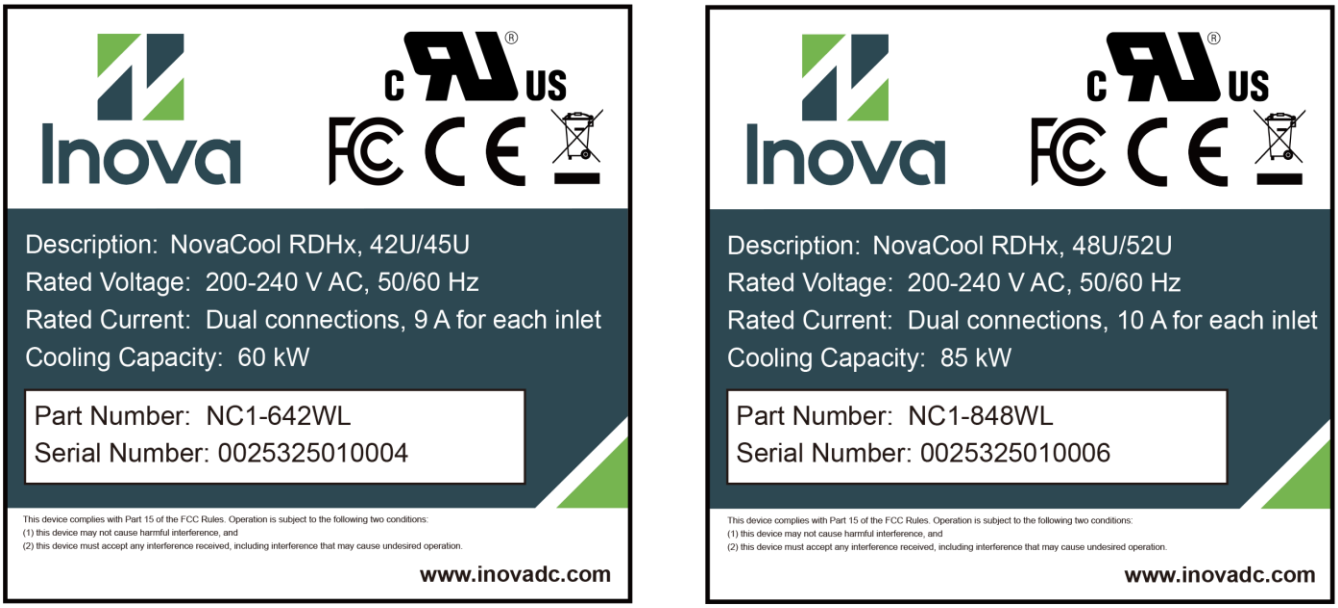


Figure 1. Typical Product Label

Product Dimensions

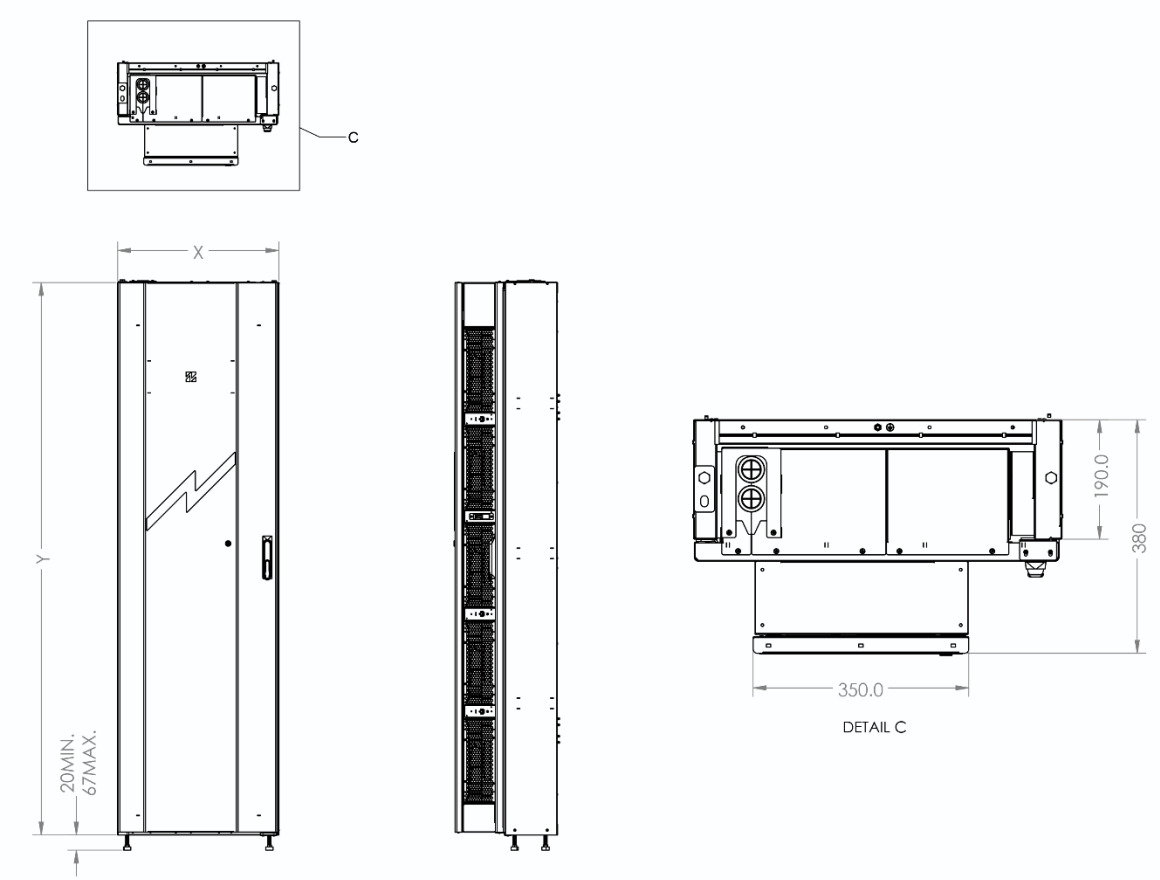


Figure 2. Schematic Diagram

Table 4. Product Dimensions Table

Model		Height (Y) mm(")	Width (X) mm(")	Depth mm(")	Number of Fans	Dry Weight kg(lbs)	Wet Weight kg(lbs)
42U/45U	600W	2050(80.7)	598(23.5)	380(14.96)	5	152(334)	165(363)
	700W		698(27.5)	380(14.96)	5	154(339)	167(368)
	800W		798(31.4)	380(14.96)	5	156(343)	169(372)
48U/52U	600W	2330(91.7)	598(23.5)	380(14.96)	6	170(374)	185(407)
	700W		698(27.5)	380(14.96)	6	178(392)	193(425)
	800W		798(31.4)	380(14.96)	6	186(410)	204(449)

(All models are available in both left- and right-hinged configurations.)

Components Layout

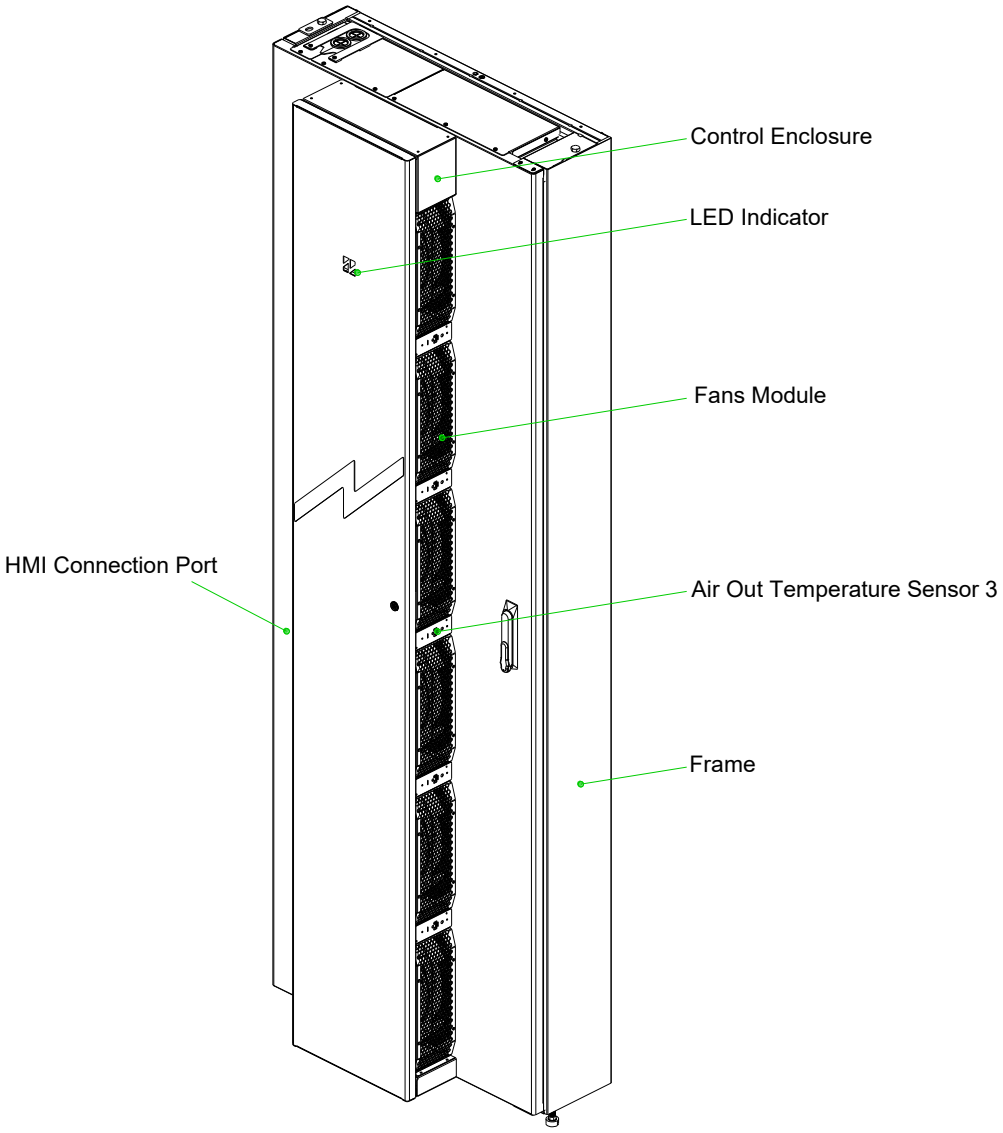


Figure 3. Components Layout (Front)

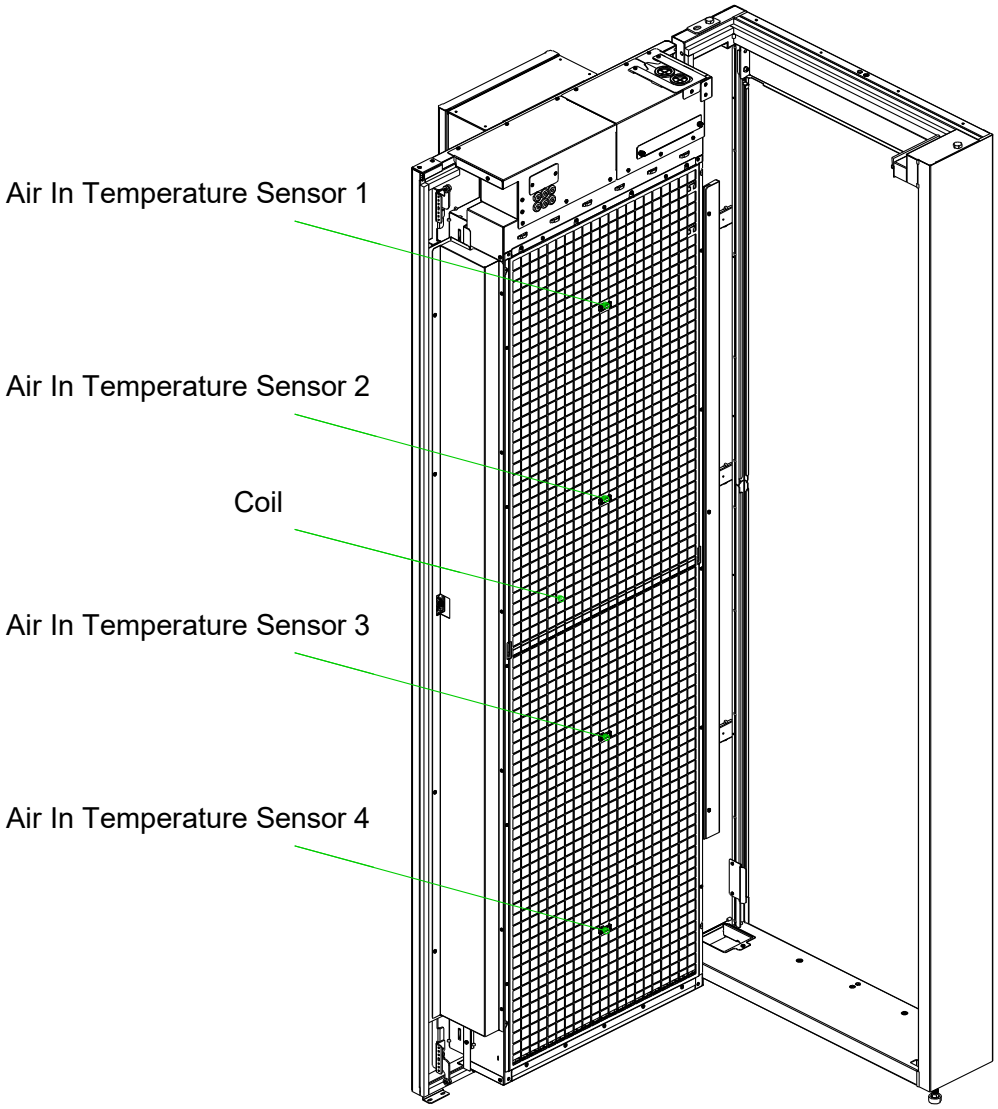


Figure 4. Component Layout (Rear)

Typical Capacity

The cooling capacity of **NovaCool RDHx** varies depending on environmental parameters, inlet water temperature, and IT load conditions. The following table presents typical performance benchmarks:

Table 5. Capacity Under Typical Working Conditions

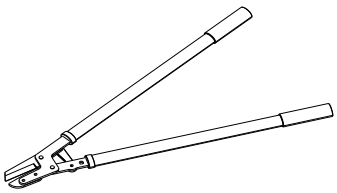
Inlet water temp	Air temp in cabinet	Cooling capacity		
		48U 800W	48U 600W	42U 600W/800W
℃	℃	kW		
20/14	55	86/100	84/98	82/97
	50	73/90	71/87	69/85
	45	60/77	58/74	56/72
	40	45/63	44/61	42/59

(Performance values are based on laboratory testing and may vary under real-world conditions.)

Part IV. Tools, Unpacking and Installation

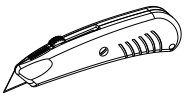
Tool list

*Tools are not provided.

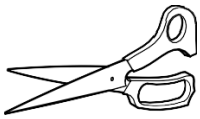


Steel strip scissors

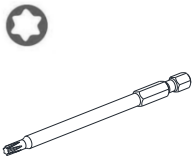
Electric screwdriver



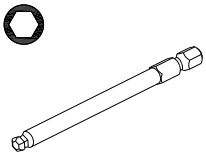
Utility knife



Scissors

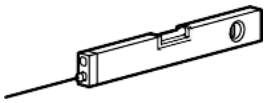


T30 Torx screwdriver bit

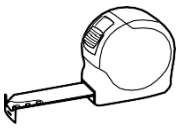


5mm Ball-End hex bit

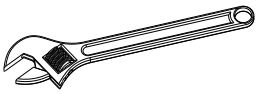
PH2 Phillips screwdriver bit



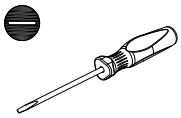
Level



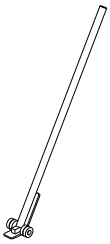
Tape measure



Adjustable open-end wrench 15” x2

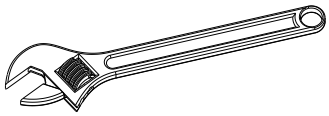


1/8" Slotted Screwdriver



Lifting crowbar

Ladder



Adjustable open-end wrench 18” x1

Figure 5. Tool List

Unpacking

⚠ WARNING

This product is heavy. Follow all local safety regulations to ensure personnel safety during disassembly, installation, and transportation. If lifting equipment is not available, a minimum of six people is required for manual handling.

Failure to follow these instructions can result in serious injury, death or equipment damage.

- Remove the steel strapping and all metal fixing brackets.

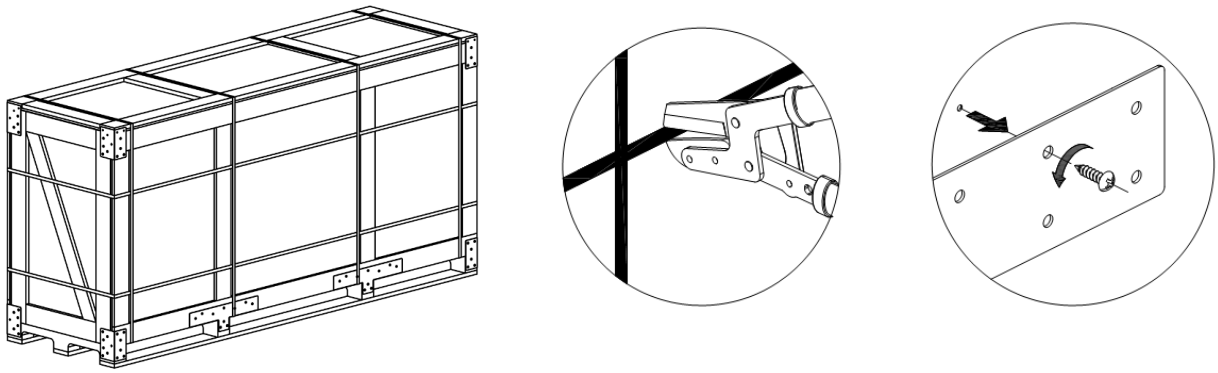


Figure 6. Unpacking

- Dismantle wooden box.

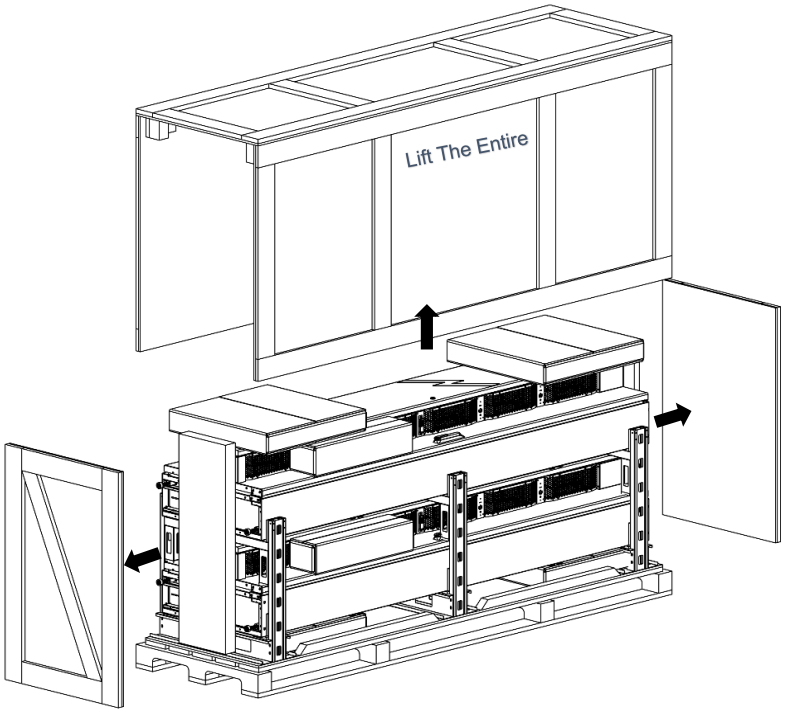


Figure 7. Unpacking

- Remove the top RDHx, the cartons, and the front and rear EPEs.

  (Note: If there is only one set in the packaging, please skip this step.)

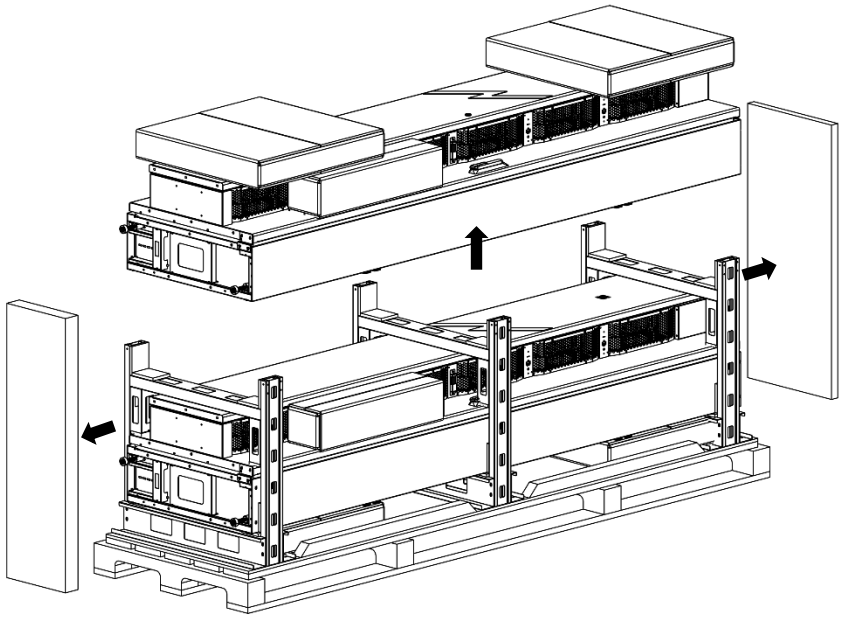


Figure 8. Remove Top RDHx

- Remove the M6×12 Phillips head screws at the bottom, a total of 6 places. And remove the brackets.

  (Note: If there is only one set in the packaging, please skip this step.)

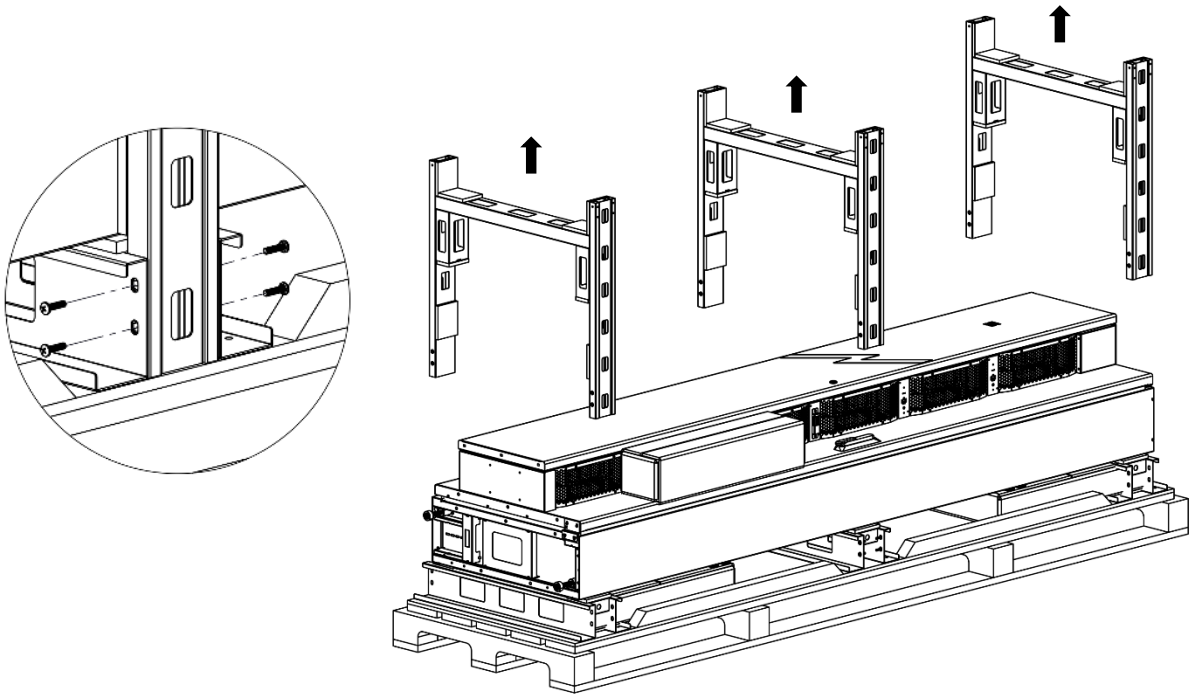


Figure 9. Remove the Brackets

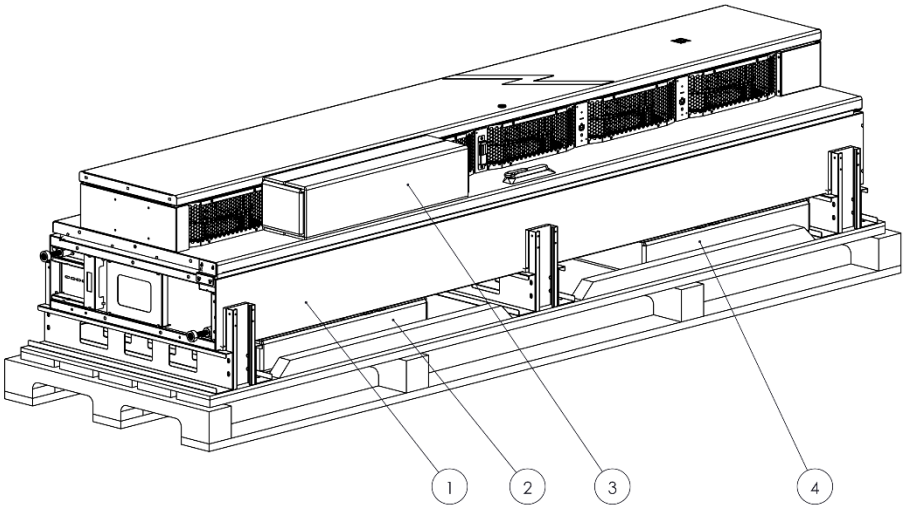


Table 7. Material List

Item	Name	Comments	QTY
1	RDHx	/	1
2	Blue Pipe Kit	/	1
3	Mounting Accessories Kit	Includes: 1. Mounting accessories 2. Power Cords 3. Belimo Ball Valve 4. VFS Sensor (Optional) 5. RPS Sensor (Optional) 6. Fernox LS-X Sealant (Optional)	1
4	Red Pipe Kit	/	1
5	Commissioning Tool	Optional	1

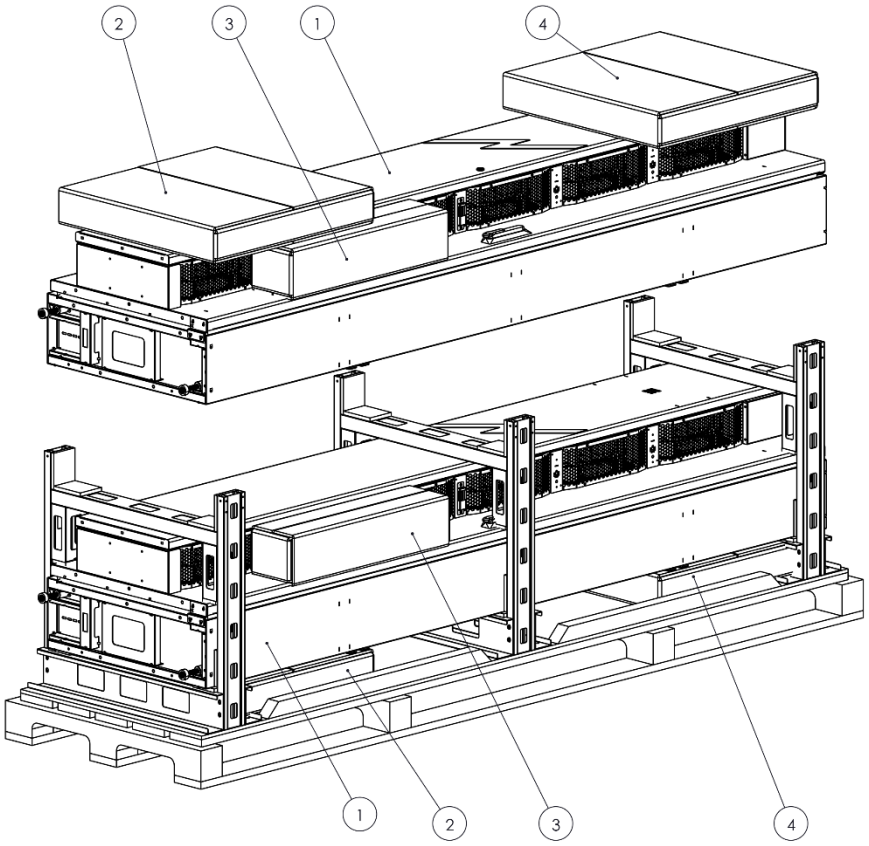


Table 8. Material List

Item	Name	Comments	QTY
1	RDHx	/	2
2	Blue Pipe Kit	/	2
3	Mounting Accessories Kit	Includes: 1. Mounting accessories 2. Power Cords 3. Belimo Ball Valve 4. VFS Sensor (Optional) 5. RPS Sensor (Optional) 6. Fernox LS-X Sealant (Optional)	2
4	Red Pipe Kit	/	2
5	Commissioning Tool	Optional	1

Pre-Installation Checks

- Ensure that the floor can take the weight of the unit.
- Ensure any MAP tiles or grommets are installed, or that any floor tiles are cut as appropriate.
- Check that the working area is free of hazards.
- The rack front door should be correctly closed to avoid damage when tipping.

Floor Cut-Outs

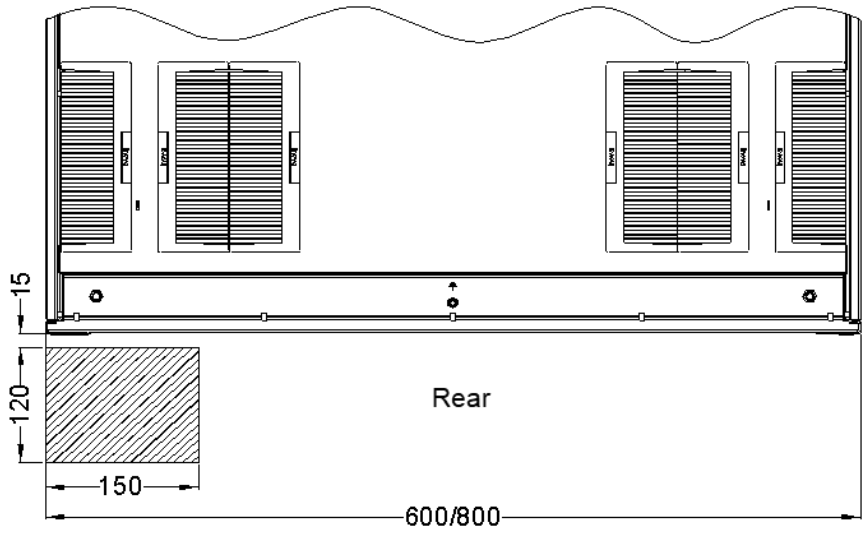


Figure 10. Floor Cut-Outs

- When using bottom-fed RDHx hoses, they must pass through designated openings on the floor.
- A **150mm × 120mm** slot should be cut on the floor accommodate the hoses.
- The hoses may move vertically within the slot as the RDHx unit is opened and closed. Ensure that all cut edges are smooth and free of sharp surfaces to prevent potential damage to the hoses.
- Additional holes may also be cut within the rack footprint to allow network cables etc. to pass through. Reference should be made to the positions of cable trays within the rack when cutting access holes.

Installation

NOTICE
• Never place the front cover (fan side) on the ground. • Ensure the door lock is engaged during transport. • If fan removal is necessary to reduce door weight during transportation, retain the fan module that includes the door lock. • When the RDHx is ready to stand up, the door frame must touch the ground first (if the fan touches the ground first, it will cause deformation).

➢ Install the fixing brackets with the Torx Screws. Torque is 10 N·m.

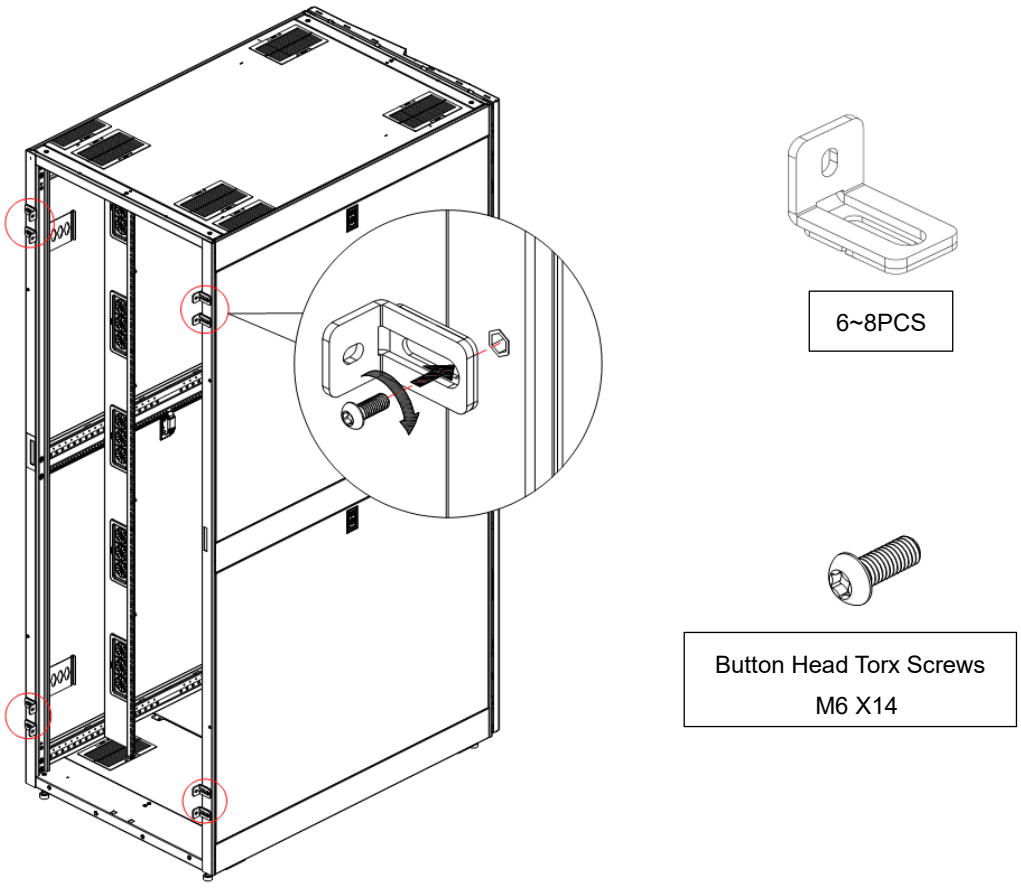


Figure 11. Fix Bracket Installation

- Use a tape measure to ensure dimensions are correct.

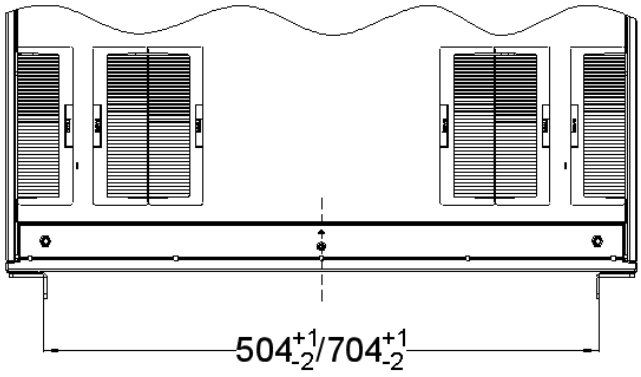


Figure 12. Fix Bracket Position

- Apply the sealing strip.

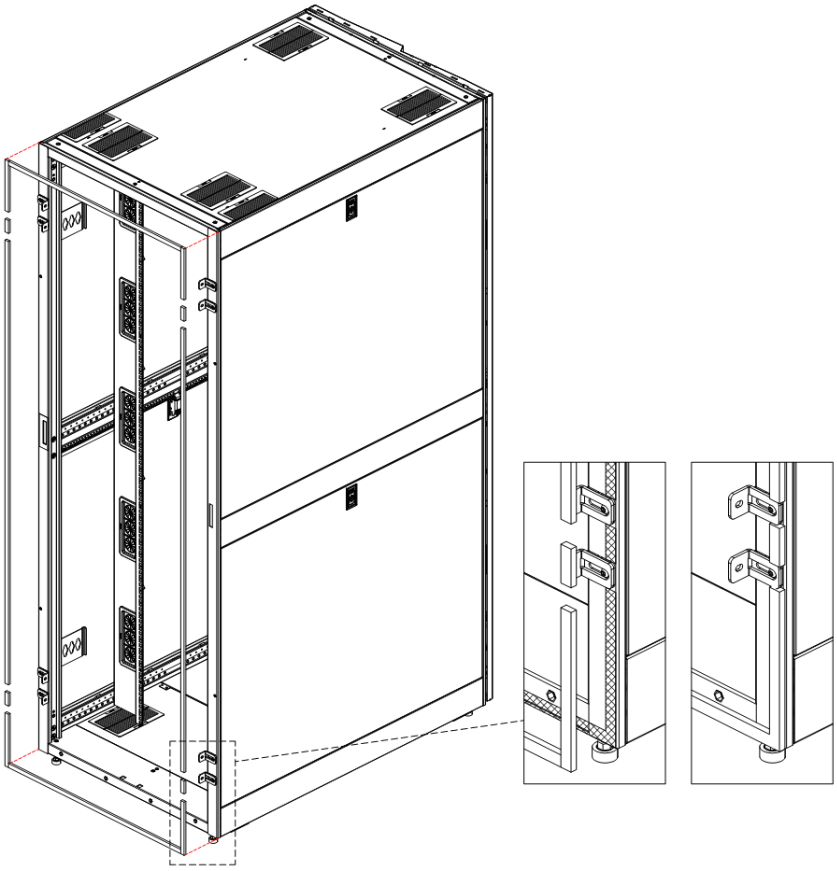


Figure 13. Sealing Strip Paste

- Remove the top and bottom RDHx brackets.

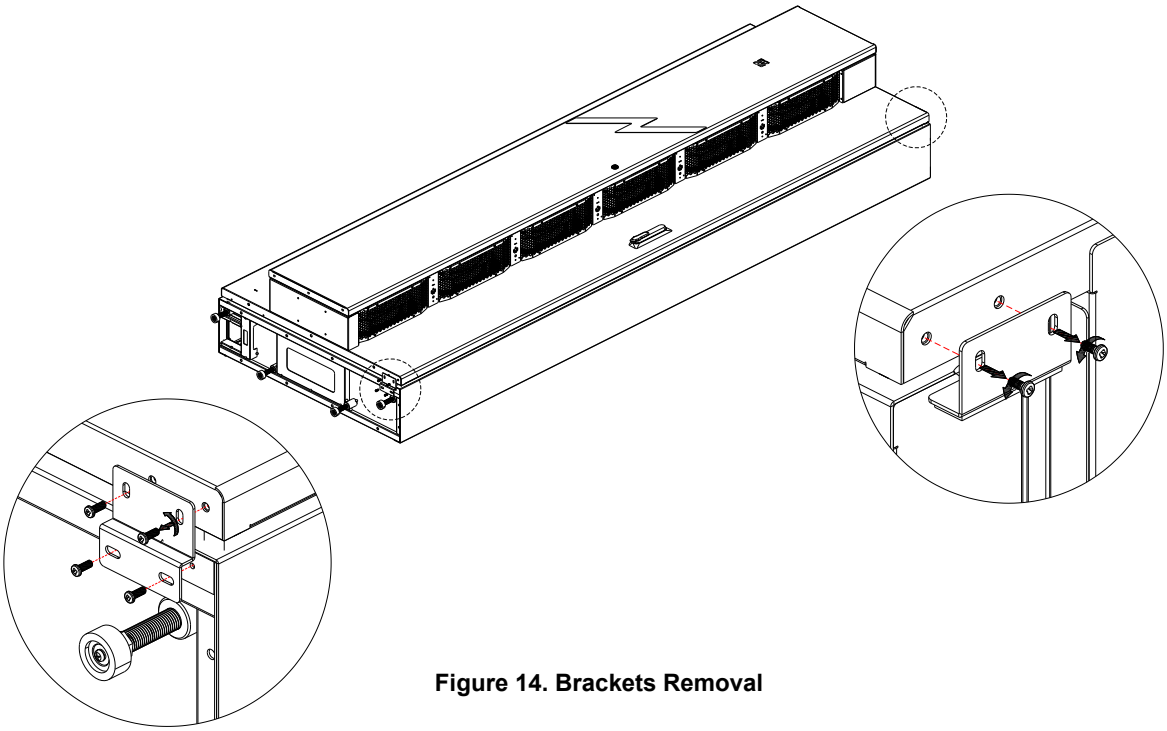


Figure 14. Brackets Removal

- A team of four people is required for transportation and lifting from this side.

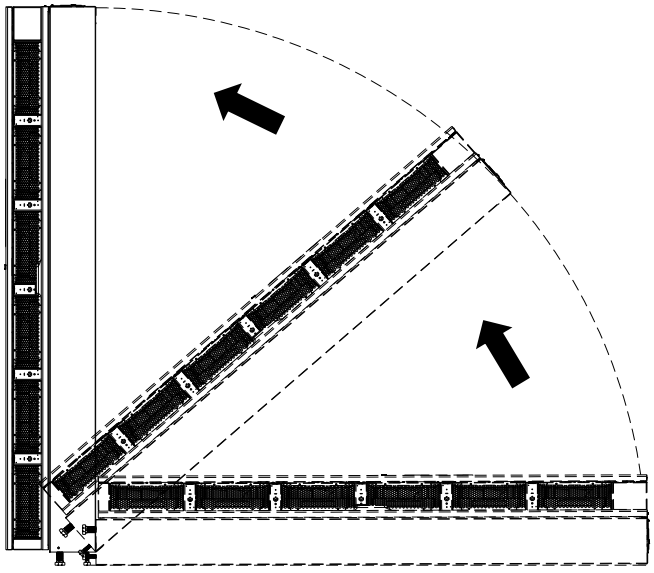
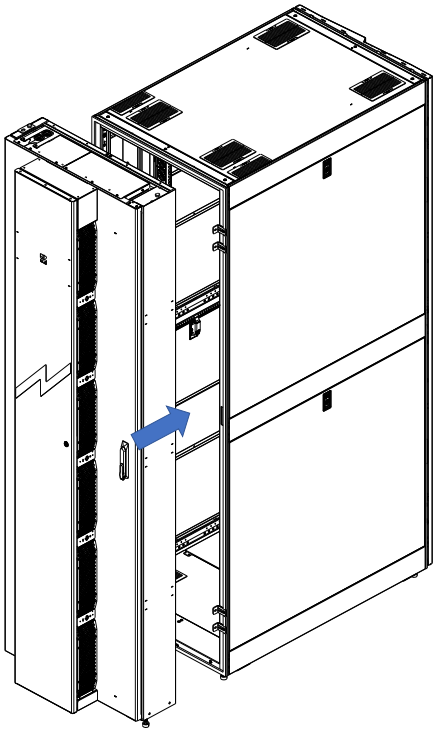


Figure 15. Door Lift-up

- Position the door close to the cabinet and ensure proper alignment. Use a lifting crowbar if necessary.



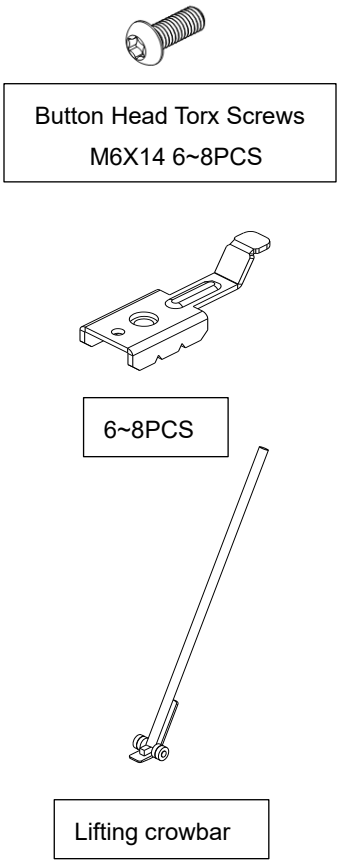


Figure 16. Door Against to Cabinet

- **For Empty Cabinet.** Stand inside the cabinet, insert the Scorpio Bracket into the slot of RDHx and slide to align with the L bracket, then pre-tighten all screws.

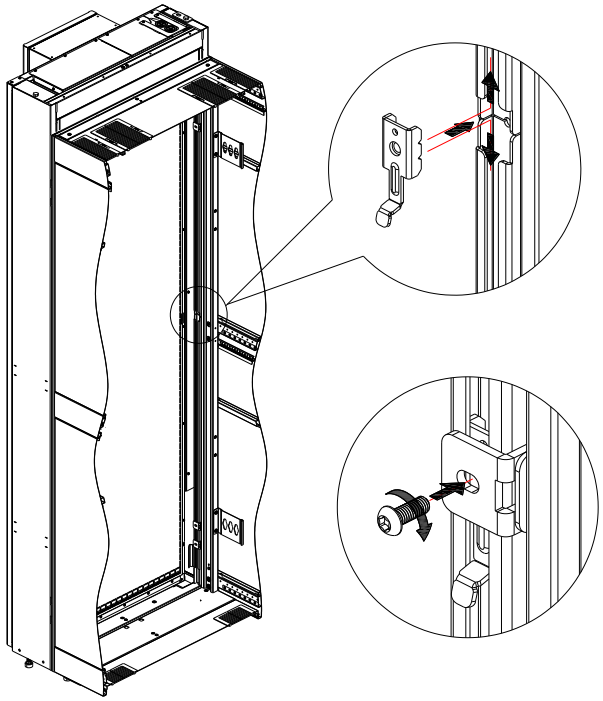


Figure 17. Door Pre-Tighten from Inside

- **For Occupied Cabinet.** Place the RDHx against the cabinet and slowly open the cabinet door (four people are required to assist: two people to hold the door frame, one person to open the cabinet door, and one person to fix the RDHx to the cabinet).

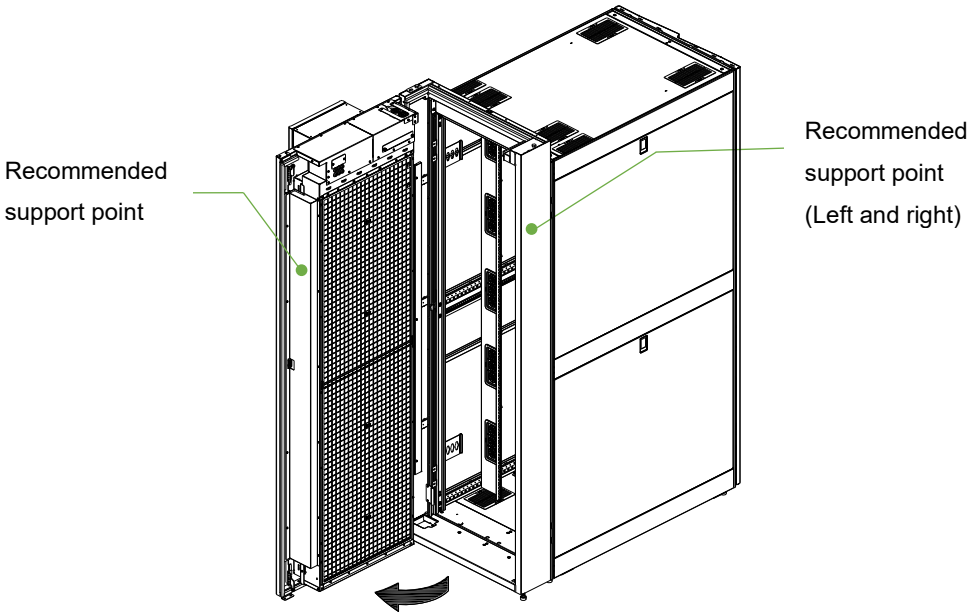


Figure 18. Door open

- **For Occupied Cabinet.** Stand outside of the cabinet. insert the Scorpio Bracket into the slot of RDHx and slide to align with the L bracket, then pre-tighten all screws.

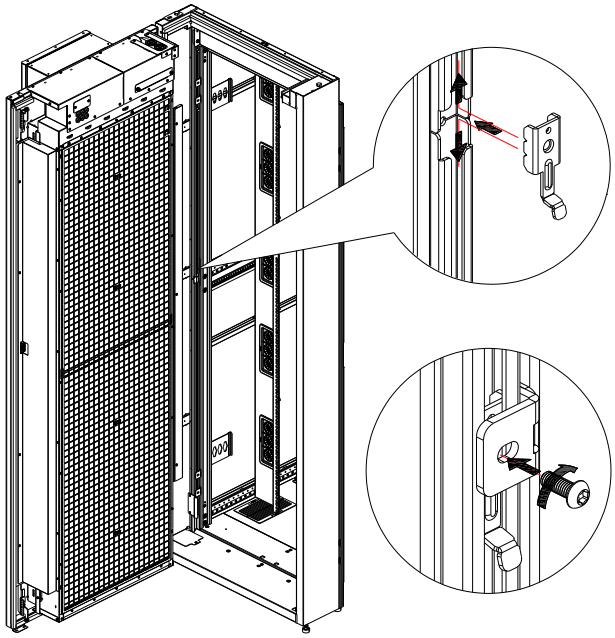


Figure 19. Door Pre-Tighten from Outside

- Use a spirit level to check and adjust the RDHx leveling feet.

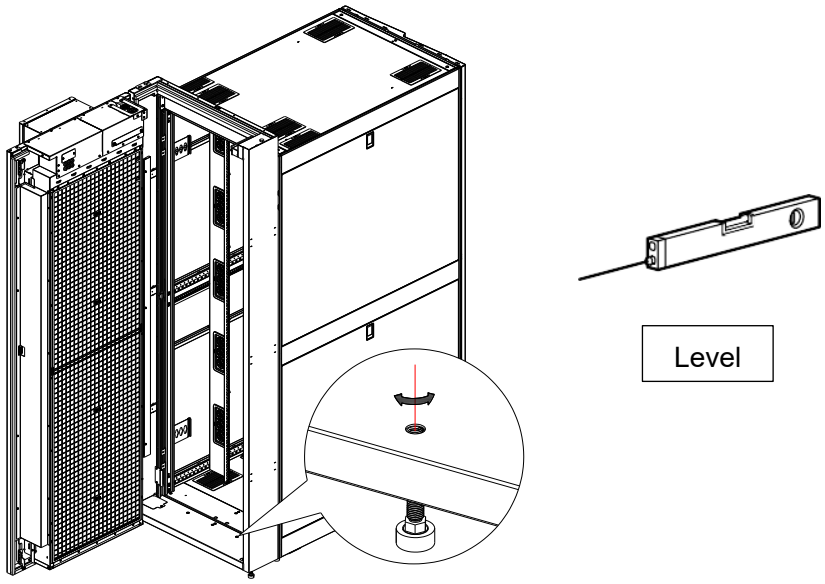


Figure 20. RDHx Leveling

- Tighten all the fixing screws (Torque: 10 N·m).

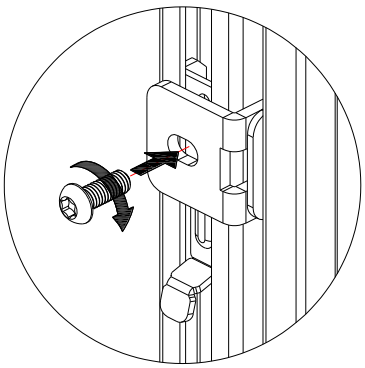


Figure 21. Tighten

- Bay together the RDHx from top.

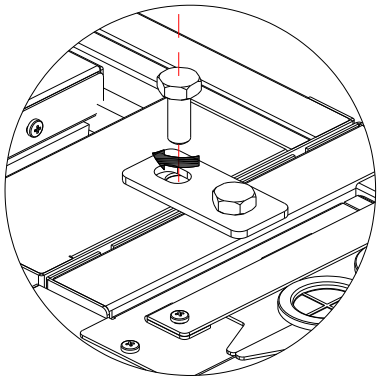


Figure 22. Baying

- Place the bracket and secure it with M4×8 (Torque: 2.0 N·m).

  NOTE: To ensure proper sealing, an extra bracket must be used when installing a 48U RDHx on a 52U AI Ready Rack or other brand higher cabinet.

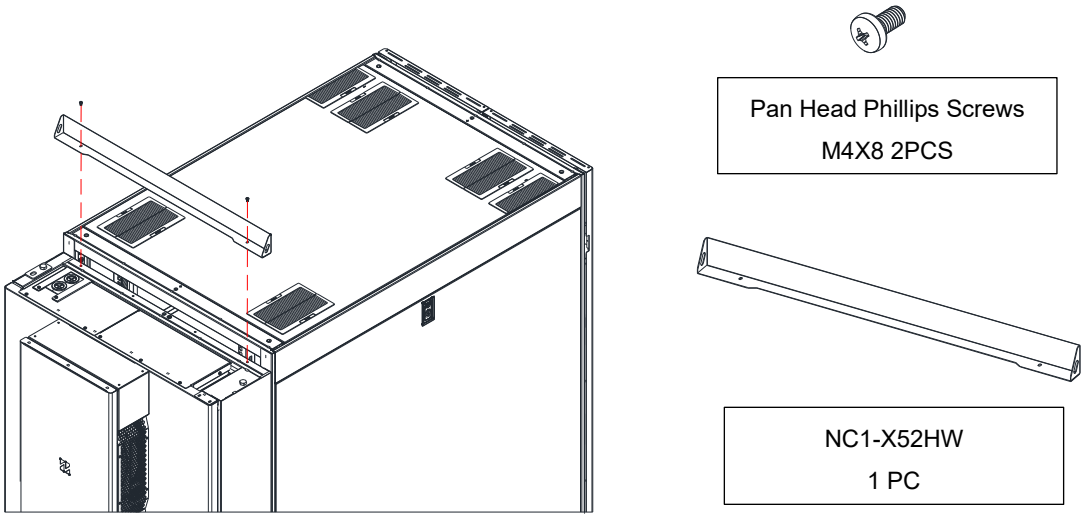


Figure 23. Extra Bracket Installation

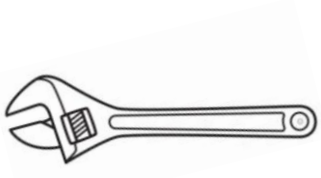
Liquid Circuit Connections

Bottom Feed Instruction

Tool & Material List

1x Electric screwdriver

1x PH2 Phillips screwdriver bit



2x Adjustable Spanner (Opening size ≥38mm)

2xSilicone hose, 2xAdapter

Fernox Sealant

3M Sealing Strip

Figure 24. Tool List

> **⚠ WARNING**
>
> ***TIP HAZARD***
>
> • For safety, make sure RDHx and the cabinet are securely fastened and the cabinet bolted to floor or baying together to prevent tipping over.
>
> ***Failure to follow these instructions can result in serious injury, death, or equipment damage.***

➢ Open the RDHx.

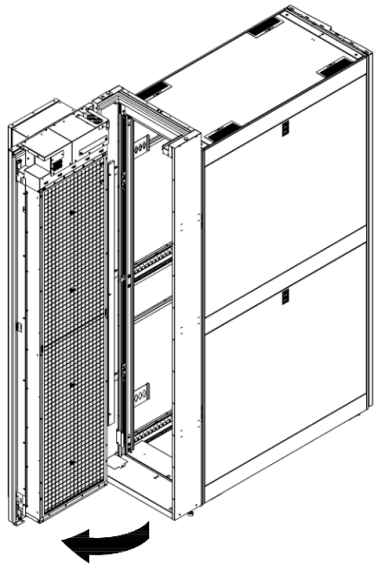


Figure 25. Door Open

- The door should not be opened too wide (90 degrees is recommended). Please note that when the door is at its maximum opening angle, do not force or pull it.

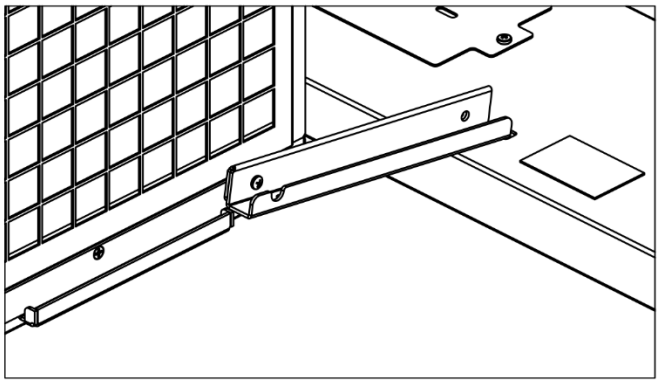


Figure 26. Door Opening Angle

- Remove the screws and take the hose cover away.

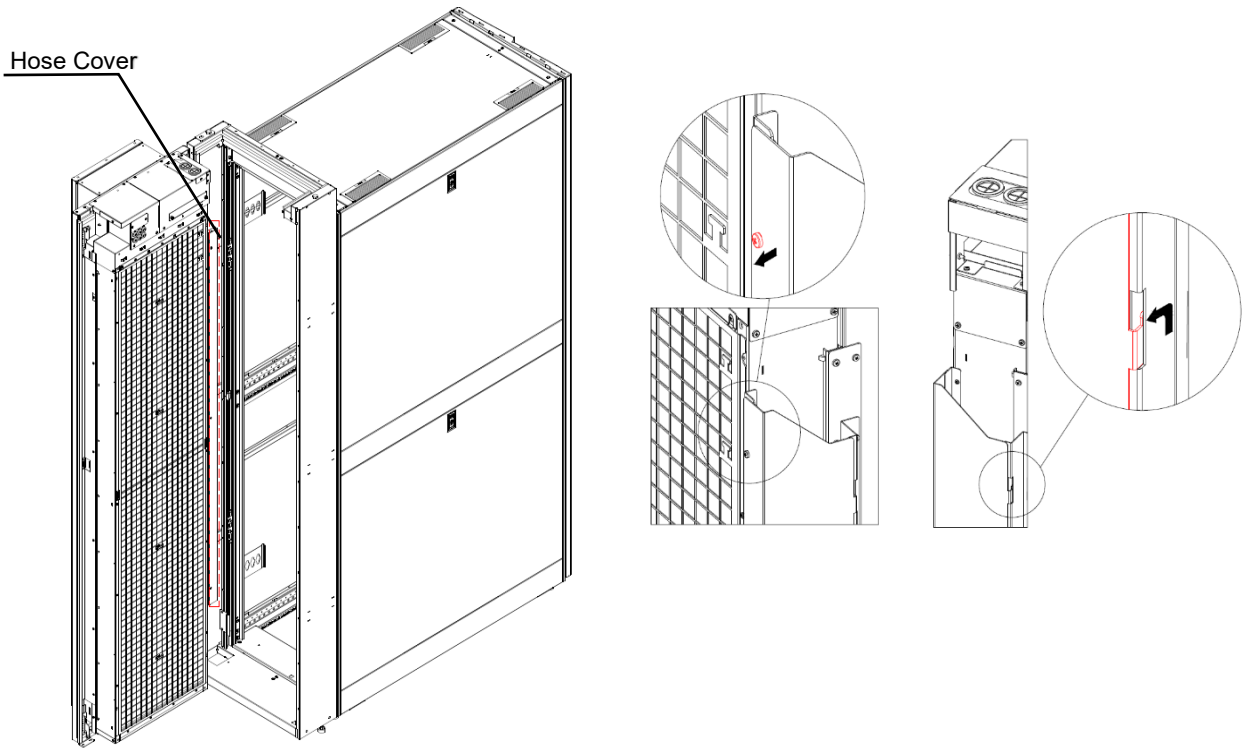


Figure 27. Hose Cover Removal

- Remove the screws and take the Liquid Circuit Protection Module away.

  Note: Pull it out first, otherwise the water tray will get stuck.

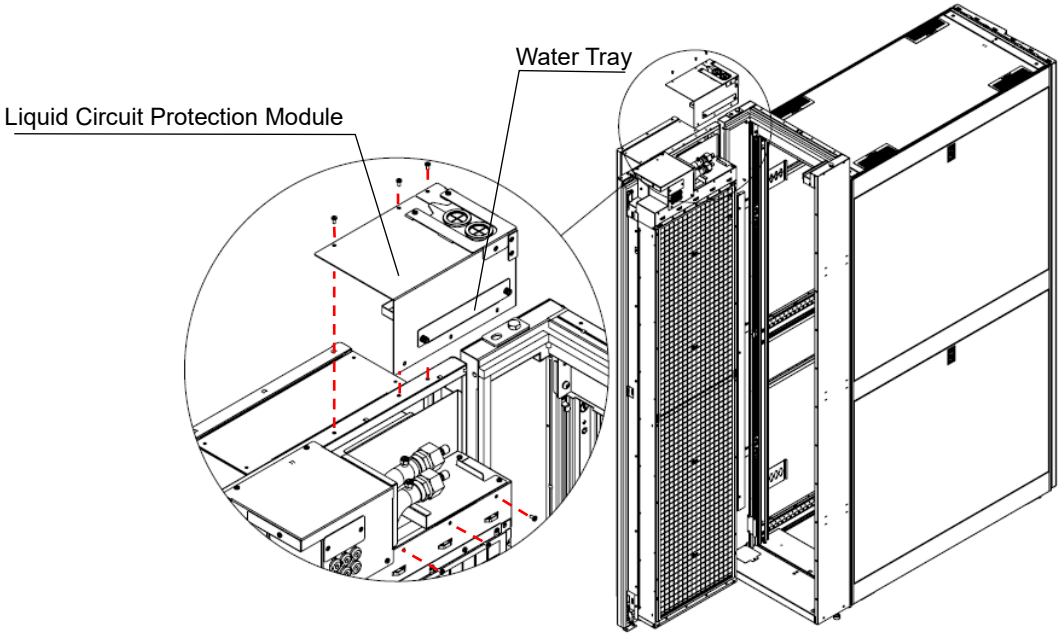


Figure 28. Liquid Circuit Protection Module Operation

- Remove the coil end cap with 2 adjustable spanners to avoid twisting coil cropper elbow.

⚠ WARNING

• For safety, do not remove the end cap directly. Loosen it a little and wait for the air pressure to be released before removing it completely.

Failure to follow these instructions can result in serious injury, death, or equipment damage.

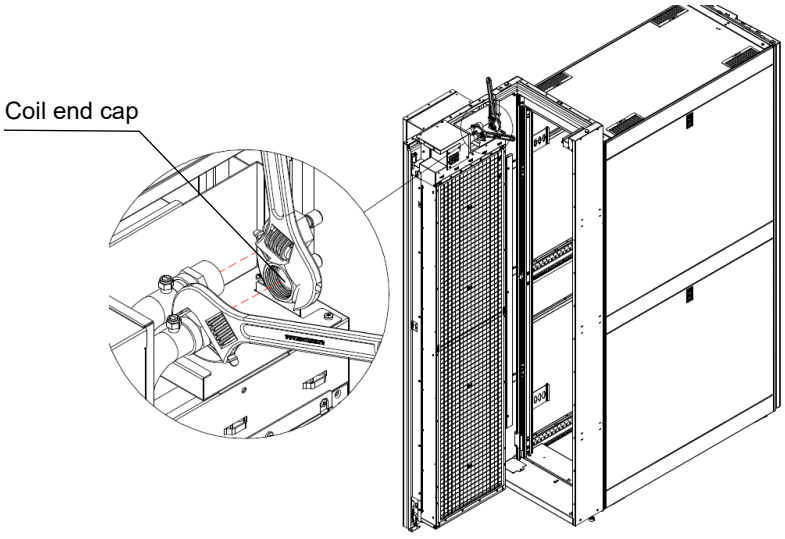


Figure 29. Coil End Cap Removal

- Remove the cover plate in the interface frame.

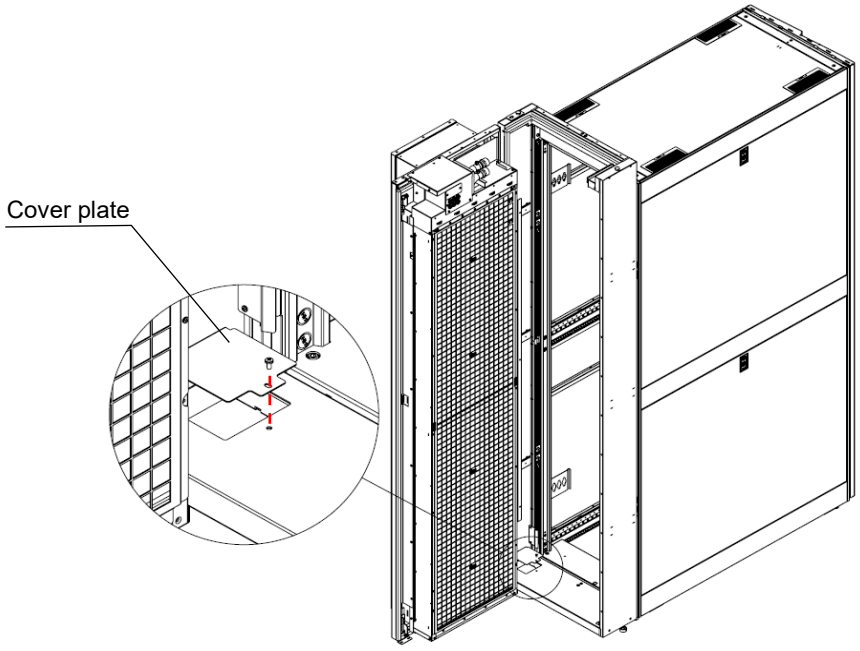


Figure 30. Cover Plate Removal

- Connect the silicone hose end with elbow to coil, pass another end through interface frame cutting and the floor cutting. If there are any gaps between interface frame cutting edge and hose, warp the hose with the 3M sealing strips and seal the gap.

  Note:

  - First install the blue silicone hose, with reference to the blue label on the coil elbow.
  - Ensure the hose elbow is as vertical as possible.
  - The installation torque requirement is between 65-75 N·m.

NOTICE
• Smear a pea sized amount of sealant on the coned face of the coil tail. ***Failure to follow these instructions can result in water leakage, or equipment damage.***

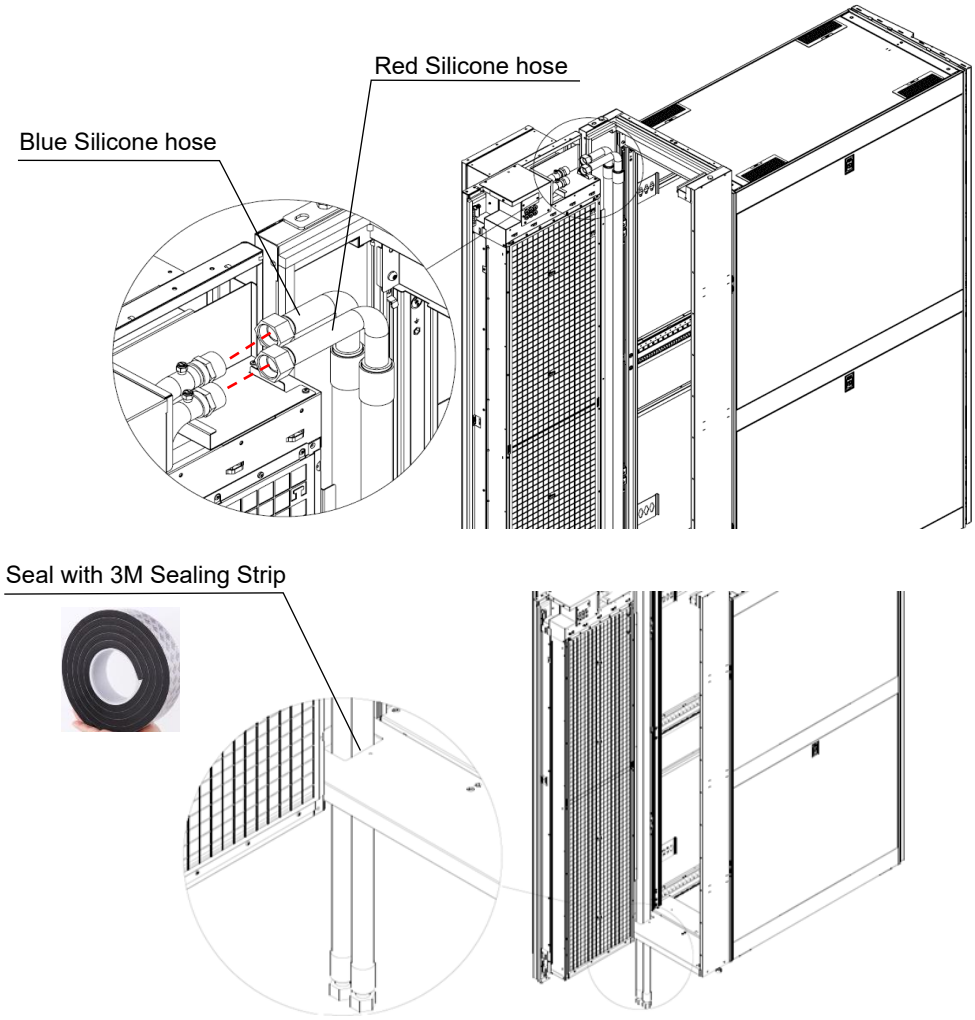


Figure 31. Hose Connection

- Connect the other end of the silicone hose to the primary side water circuit with sealant.

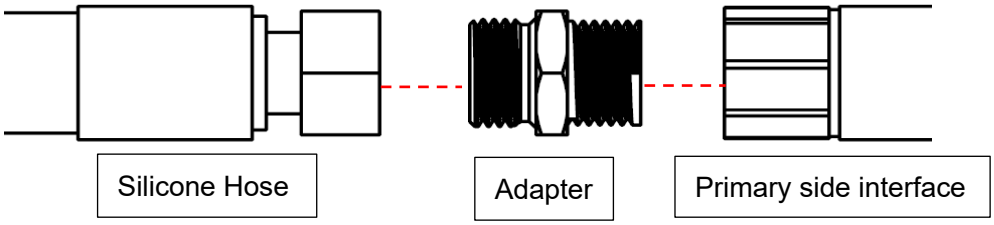


Figure 32. Hose Connection (Facility Side)

- According to the disassembly steps, install Liquid Circuit Protection Module and hose cover to the RDHx. Tighten the screws and then close the Rear Door Heat Exchanger.

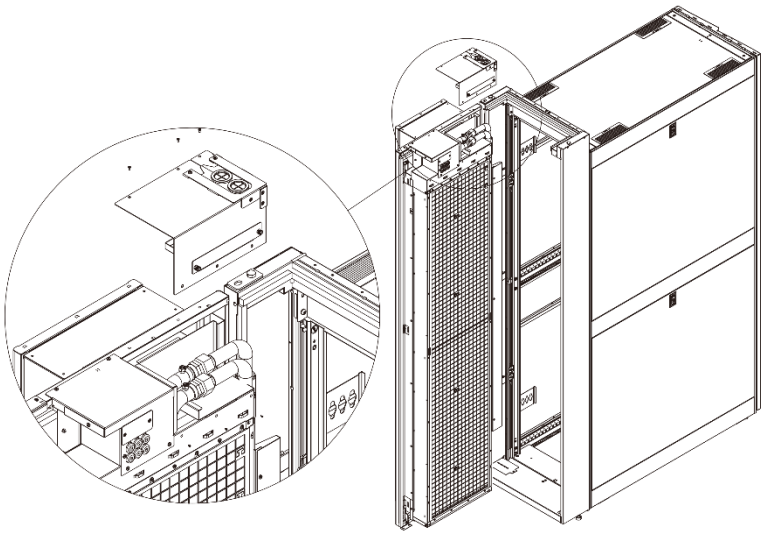


Figure 33. Liquid Circuit Protection Module Installation

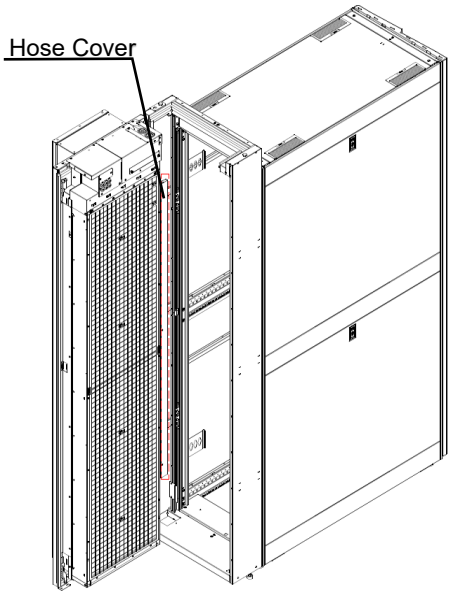


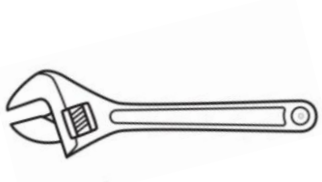
Figure 34. Hose Cover Installation

Top Feed Instruction

Tool & Material List

1x Electric screwdriver

1x PH2 Phillips screwdriver bit



2x Adjustable Spanner (Opening size ≥38mm)

2xSilicone hose, 2xAdapter

Fernox Sealant

3M Sealing Strip

Figure 35. Tool List

> **⚠ WARNING**
>
> ***TIP HAZARD***
>
> • For safety, make sure RDHx and the cabinet are securely fastened and the cabinet bolted to floor or baying together to prevent tipping over.
>
> ***Failure to follow these instructions can result in serious injury, death, or equipment damage.***

➢ Open the RDHx.

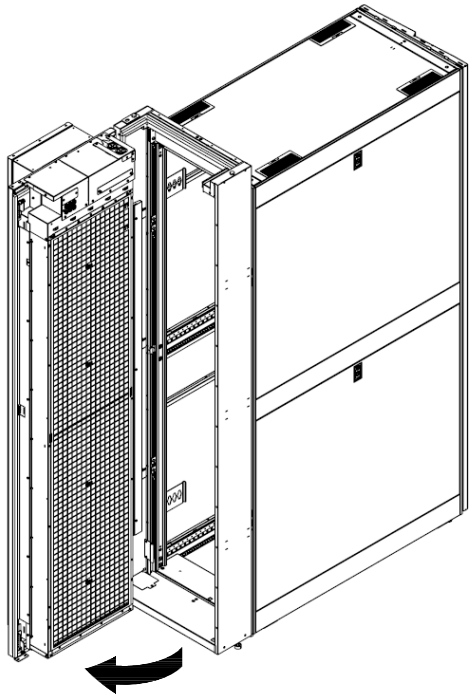


Figure 36. Door Open

- The door should not be opened too wide (90 degrees is recommended). Please note that when the door is at its maximum opening angle, do not force or pull it.

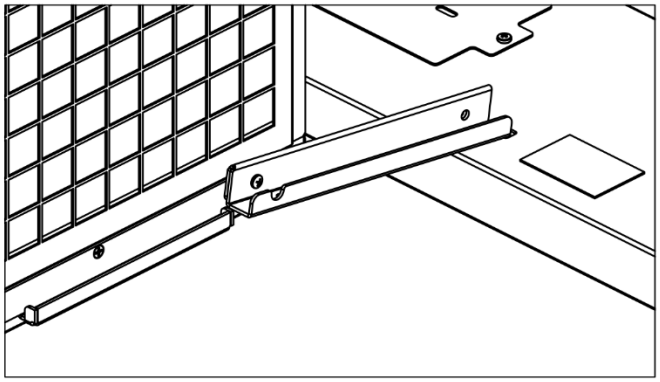


Figure 37. Door Opening Angle

- Remove those screws and detach Liquid Circuit Protection Module away.

  Note: Pull it out first, otherwise the water tray will get stuck.

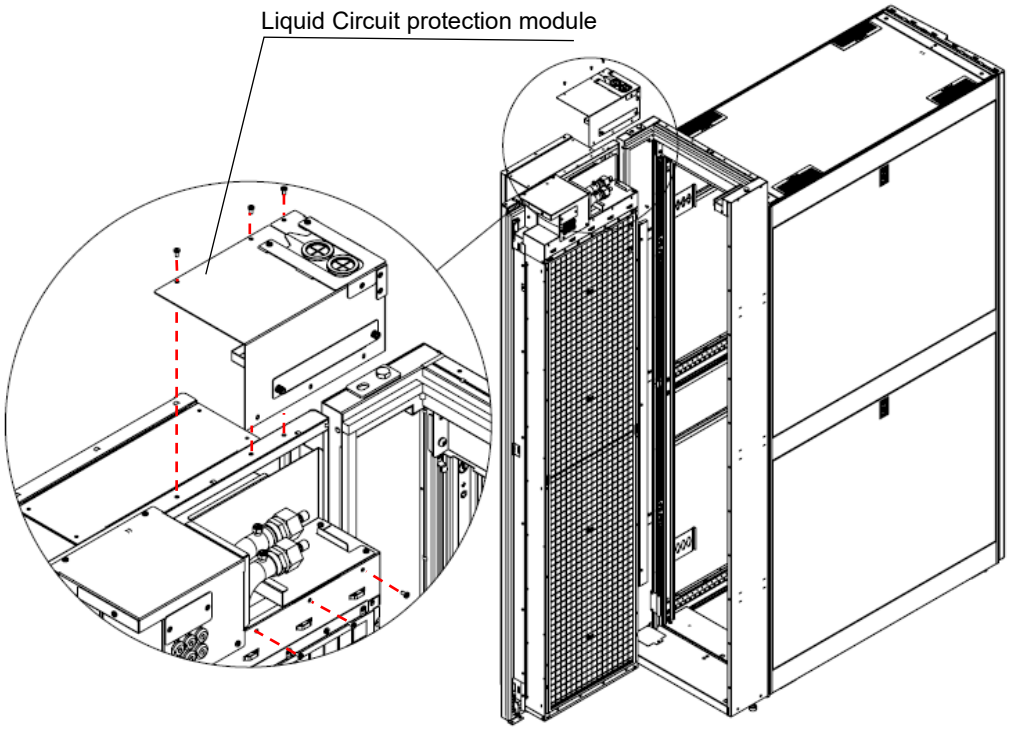


Figure 38. Liquid Circuit Protection Module Removal

- Disassemble the Liquid Circuit Protection Module.

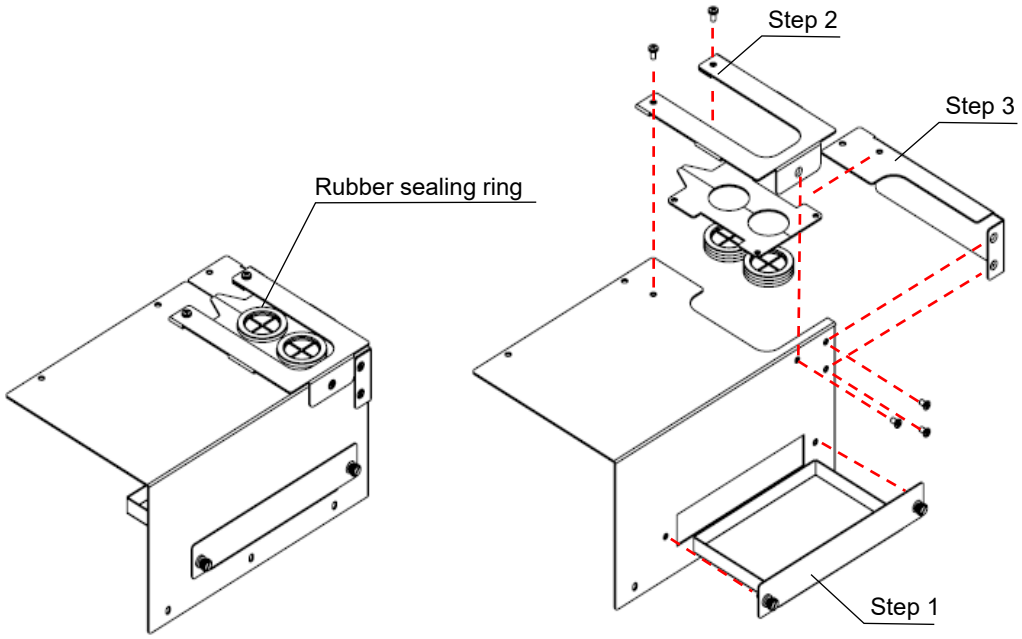


Figure 39. Liquid Circuit Protection Module Exploded

- Remove the coil end cap with 2 adjustable spanners to avoid twisting coil cropper elbow.

⚠ WARNING

• For safety, do not directly unscrew the end cap. Unscrew it slightly to release the pressure in the coil before removing it completely.

Failure to follow these instructions can result in serious injury, death, or equipment damage.

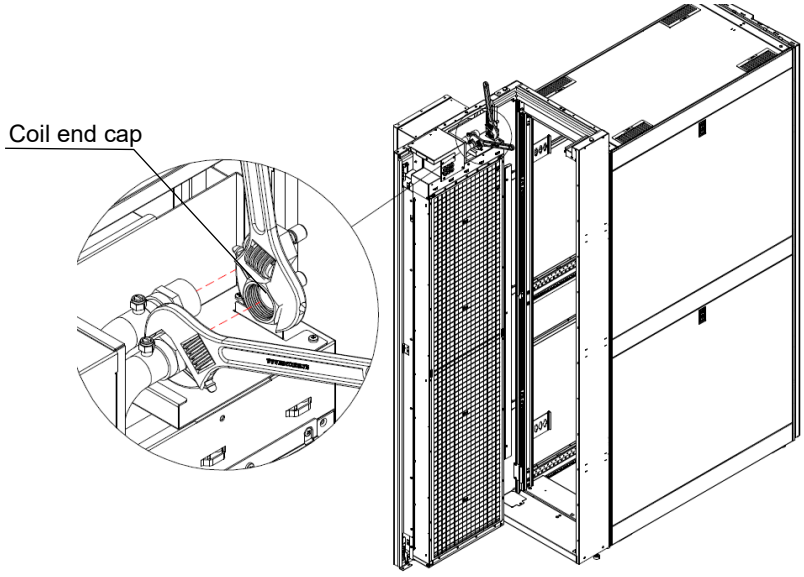


Figure 40. Coil End Cap Removal

- Connect the silicone hose end with elbow to coil tail.

  Note:

  - First install the blue silicone tube, with reference to the blue label on the coil elbow.
  - Ensure the hose elbow is as vertical as possible.
  - The installation torque requirement is between 65-75 N·m.

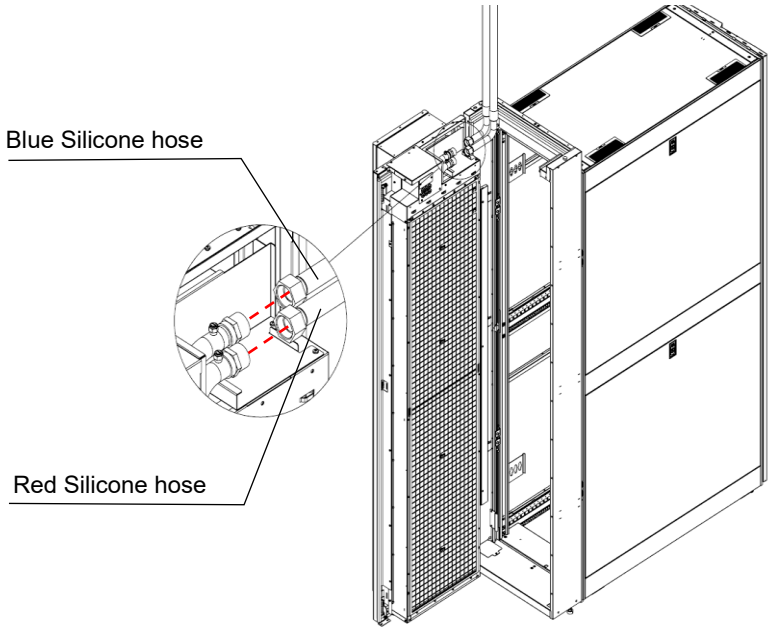


Figure 41. Hose Connection

- Assemble the Liquid Circuit protection module as shown below. If there are any gaps, seal them with 3M sealing strips.

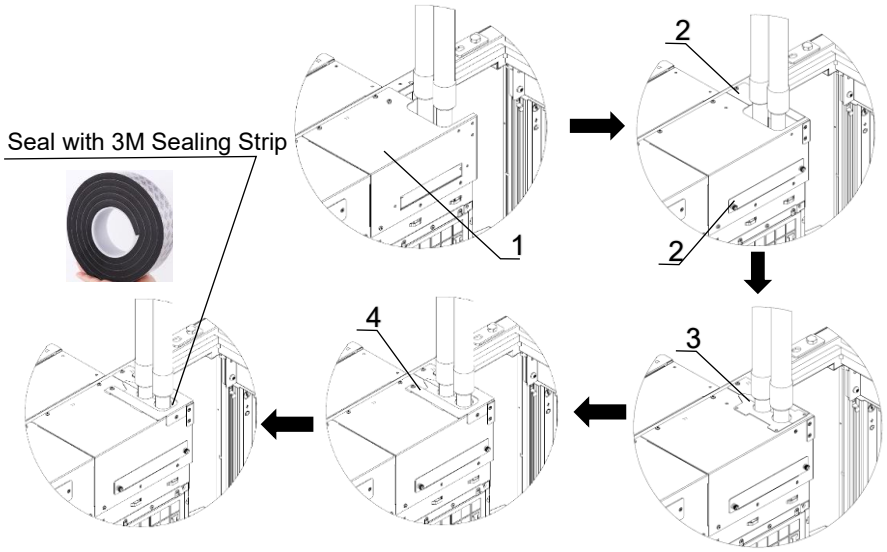


Figure 42. Hose Sealing

- Connect the other end of the silicone hose to the primary side water circuit with sealant.

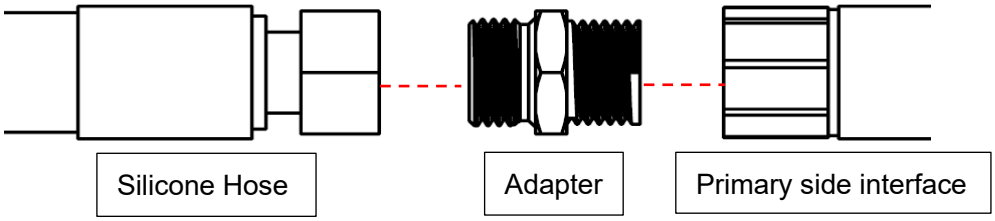
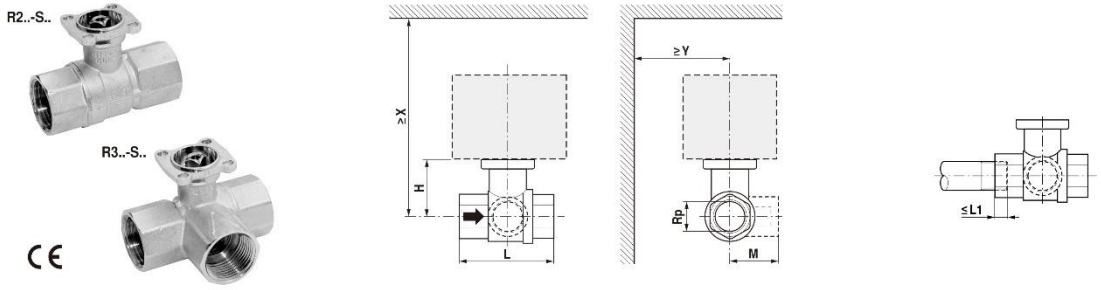


Figure 43. Hose Connection (Facility Side)

- Close the RDHx.

▪

Valve Installation



t –10...120°C p_s 1600 kPa		DN	Rp	mm				80°C		100°C		120°C						100°C		120°C					
								KR..		TR..		LR..A		NR..A		SR..A		TRF..		LRF..		NRF..A		SRF..A	
		mm	"	L	H	M	L1	X	Y	X	Y	X	Y	X	Y	X	Y	X	Y	X	Y	X	Y	X	Y
R2015-P..-S1 R2015-1..-S1	R3015-P..-S1 R3015-1..-S1	15	½"	67	35	36	13	141	75	176	75	186	75	221	80	221	80	181	80	191	90	211	90	211	90
R2015-2P5-S1 R2015-4-S1 R2015-6P3-S1	R3015-2P5-S1 R2015-4-S1	15	½"	67	44	36	13	150	75	185	75	195	75	230	80	230	80	190	80	200	90	220	90	220	90
R2020..-S2	R3020..-S2	20	¾"	78	46	41.5	14					200	75	235	80	235	80			205	90	225	90	225	90
R2025..-S2	R3025..-S2	25	1"	87	46	45	16					200	75	235	80	235	80			205	90	225	90	225	90
R2032..-S3	R3032..-S3	32	1¼"	105	50.5	55.5	19							240	80	240	80					230	90	230	90
R2040..-S3	R3040..-S3	40	1½"	111	50.5	56	19							240	80	240	80					230	90	230	90
	R3040-25-S4	40	1½"	122	62	66.5	19									250	80							240	90
R2050..-S4	R3050..-S4	50	2"	125	56	68	22									245	80							235	90
	R3050-40-S4 R3050-58-S4	50	2"	142	68	79	22									262	80							252	90

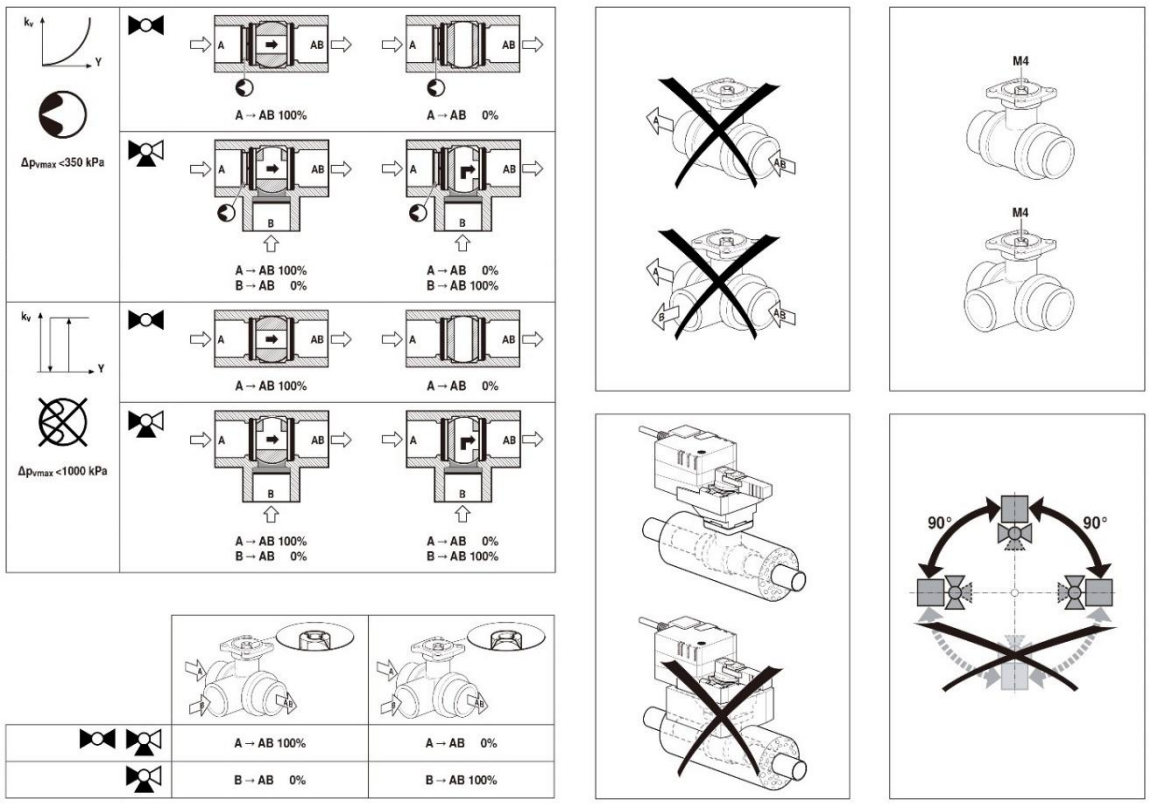


Figure 44. Valve Installation

Actuator Installation

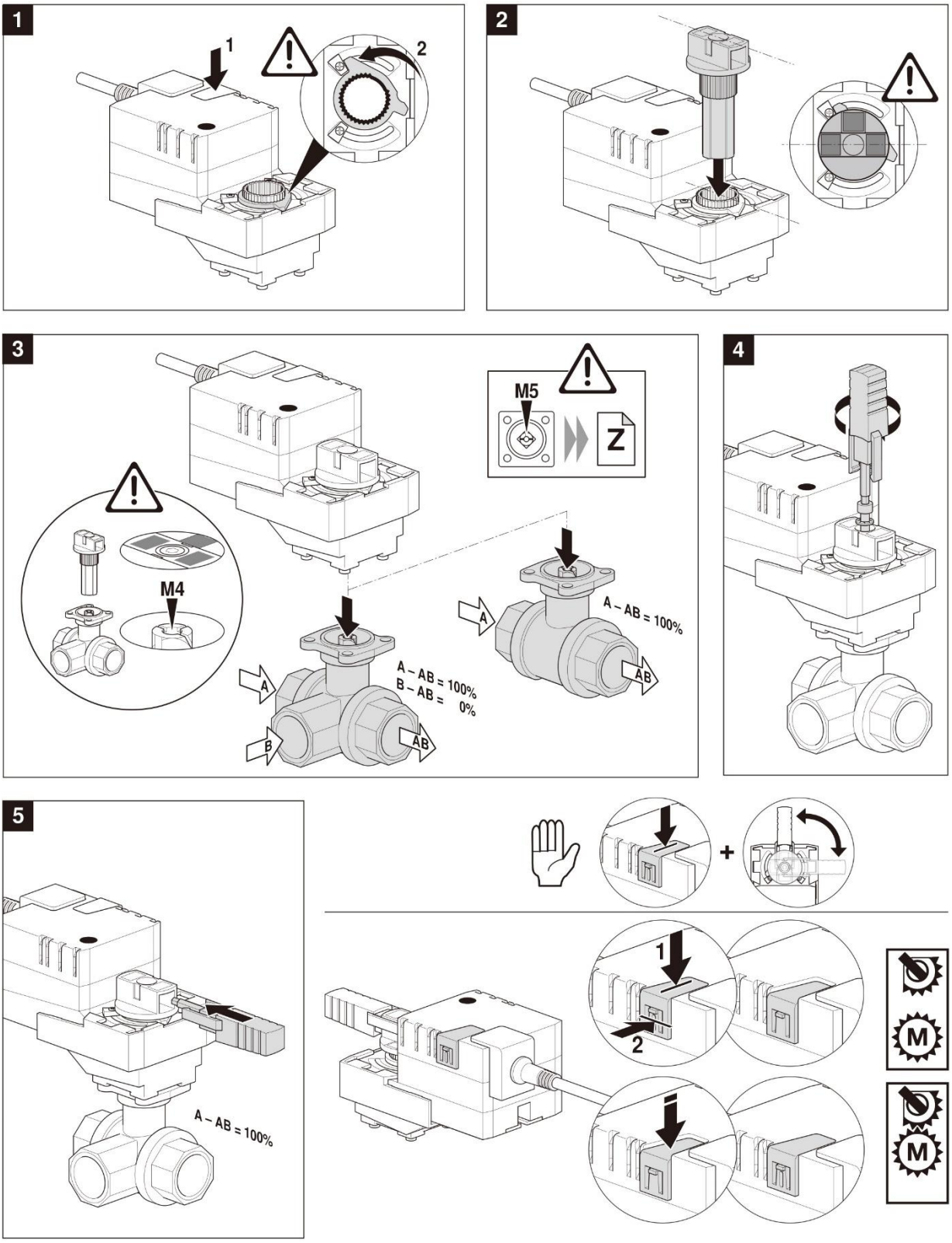


Figure 45. Actuator Installation

Electrical Connections

⚠ ⚠ WARNING

SHOCK HAZARD

• CAUTION: Double pole, neutral fusing. Disconnect mains before servicing.

(ATTENTION. Double pôle/fusible sur le neutre. Débrancher l'alimentation avant l'entretien.）

• Arc flash and electric shock hazard. Can cause serious injury or death. Disconnect all local and remote electric power supplies before connecting.

• Installation, service, and maintenance work must be performed only by qualified personnel.

• Disconnect the device of the RDHx is the plug, and the output socket is easily accessible.

Failure to follow these instructions can result in serious injury, death, or equipment damage.

Power Panel Overview

➢ Open the front fan cover to find the RDHx Power Panel above the fans.

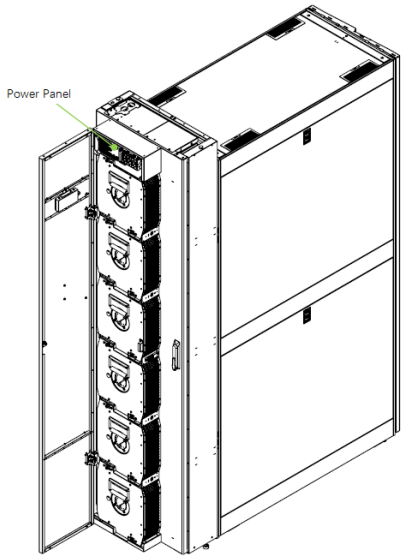


Figure 46. Fan Cover Open Overview

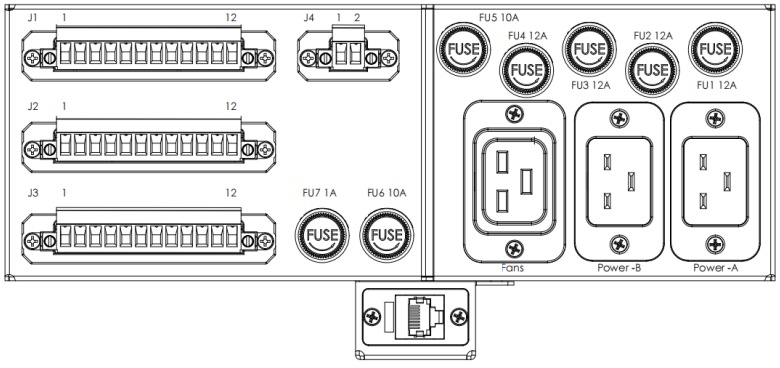


Figure 47. Power Panel Overview

Port Definition

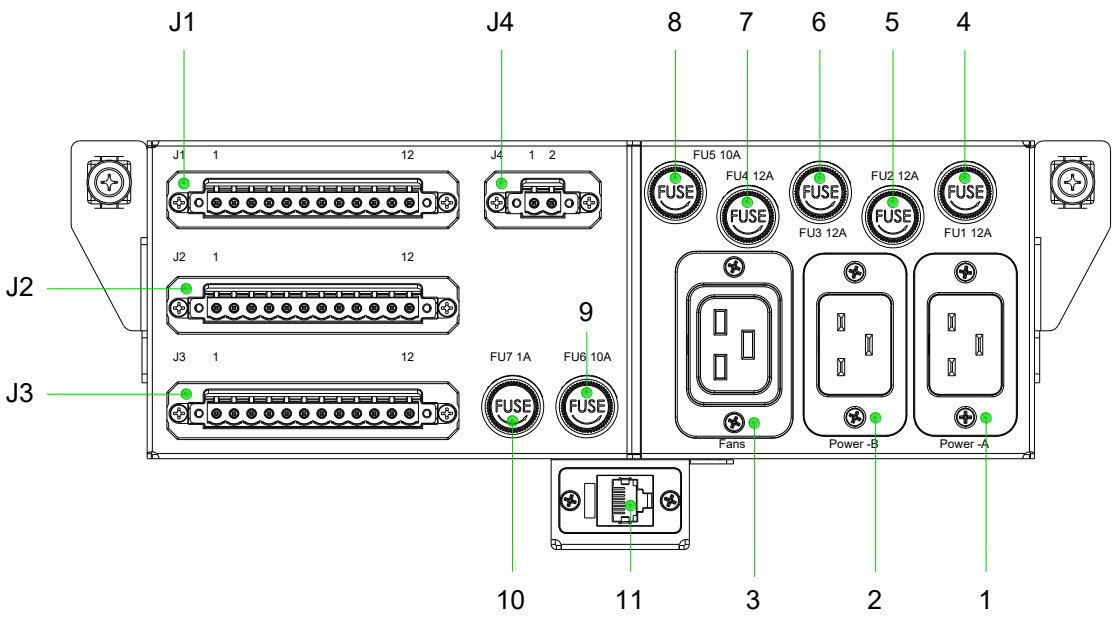


Figure 48. Port Definition

Table 9. Port Definition Table

NO.	Port	Function Description
1	Power-A	Power supply input A
2	Power-B	Power supply input B
3	Fans	Power supply for fans
4	FU 1	Fuse for power A
5	FU 2	
6	FU 3	Fuse for power B
7	FU 4	
8	FU 5	Fuse for fans
9	FU 6	
10	FU 7	Fuse for actuator (DC24V)
11	Network port	Network communication
12	USB Type A	Firmware upgrade via USB memory drive
J1	Pin 1_V-	DC24V output for HMI and water leakage device
	Pin 2_V+	
	Pin 3_DI	Water leakage signal digital input
	Pin 4_GR	Multi-color LED indicator
	Pin 5_RD	
	Pin 6_COM	
	Pin 7_D1+	RS485_1 communication for HMI
	Pin 8_D1-	
	Pin 9_G1	
	Pin 10_D2+	RS485_2 communication for fans and actuator
	Pin 11_D2-	
	Pin 12_G2	

J2	Pin 1	N/A
	Pin 2	N/A
	Pin 3	N/A
	Pin 4	N/A
	Pin 5_AI6	Room temp sensor 6
	Pin 6_COM	
	Pin 7_AI1	Air input temp sensor 1
	Pin 8_AI2	Air input temp sensor 2
	Pin 9_AI3	Air input temp sensor 3
	Pin 10_AI4	Air input temp sensor 4
	Pin 11_AI5	Air out temp sensor 5
	Pin12_COM	Temp sensors COM ports 1 to 5
J3	Pin 1_Temp.	Water flow sensor
	Pin 2_Flow	
	Pin 3_GND	
	Pin 4_5V	
	Pin 5_Temp.	Water pressure sensor
	Pin6_Press	
	Pin 7_GND	
	Pin 8_5V	
	Pin 9	N/A
	Pin 10	Alarm out dry contact: common
	Pin 11	Alarm out dry contact: Normally closed
	Pin 12	Alarm out dry contact: Normally open
J4	Pin 1_V-	DC24V output for actuator
	Pin 2_V+	

Fuse Rating

⚠ ⚠ WARNING

SHOCK HAZARD

- CAUTION: Double pole, neutral fusing. Disconnect mains before servicing.

(ATTENTION. Double pôle/fusible sur le neutre. Débrancher l'alimentation avant l'entretien.）

- Any parts replaced during maintenance must be the same specification as those being replaced.
- Replaced any parts should only be replaced by qualified personnel or contact INOVA.

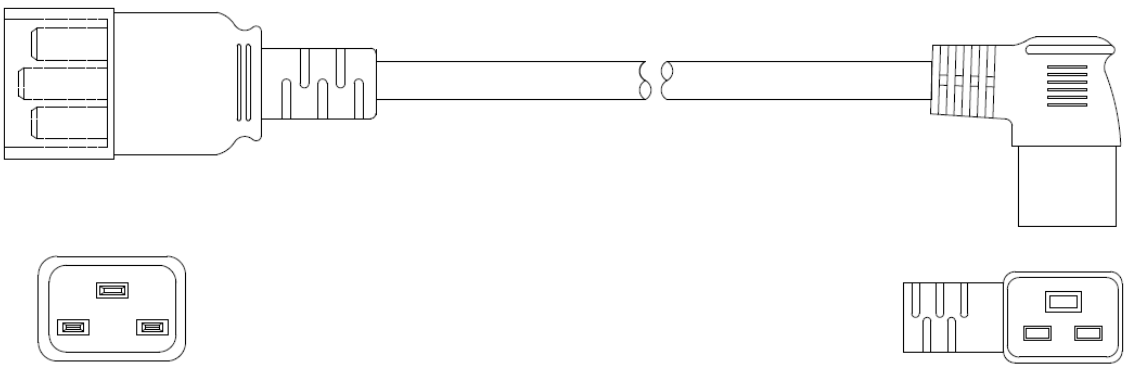
Failure to follow these instructions can result in serious injury, death, or equipment damage.

Table 10. Fuse Rating Table

Fuse Number	Fuse type	Fuse Rating	Function Description
FU 1	Fast fuse, Ø6.3×32mm`	12A/250V	Fuse for power A
FU 2	Fast fuse, Ø6.3×32mm	12A/250V	
FU 3	Fast fuse, Ø6.3×32mm	12A/250V	Fuse for power B
FU 4	Fast fuse, Ø6.3×32mm	12A/250V	
FU 5	Fast fuse, Ø6.3×32mm	10A/250V	Fuse for fans
FU 6	Fast fuse, Ø6.3×32mm	10A/250V	
FU 7	Fast fuse, Ø6.3×32mm	1A/250V	Fuse for actuator (DC 24V)

Input Power Cord Connection

The IEC 320 C19/C20 power cord is provided with the unit.



IEC 320 C20
Male Plug

IEC 320 C19
Female Socket

Figure 49. Power Cord Overview

The Nova Cool RDHx has dual power input ports, allowing for the use of two independent power sources: Power-A and Power-B. If one of the power sources fails, the device will automatically switch to the other power source. Power-A is the preferred source, and the system will only switch to Power-B if Power-A is unavailable. If Power-A is restored, the system will automatically revert to Power-A.

- Loosen the screws on the cover plate and remove it.

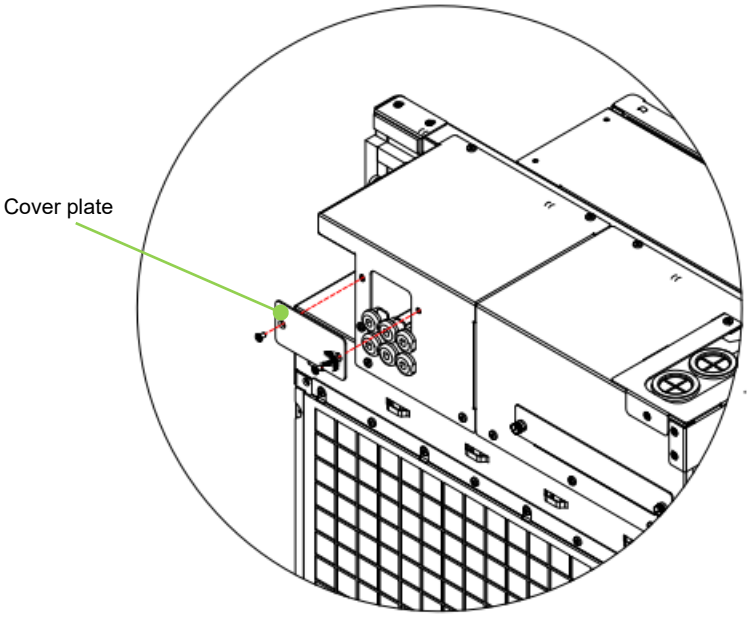


Figure 50. Cover Plate Removal

- Insert the power cord through the hole.
- Connect the C19 end of the power cord to the Power-A and Power-B ports on the Power Panel according to the labels, ensuring they are securely installed with no looseness.

Figure 51. Power Cord Connection

- Route the power cord as below reference. Along the route, there are bridges that can assist to fix the cable by ties.

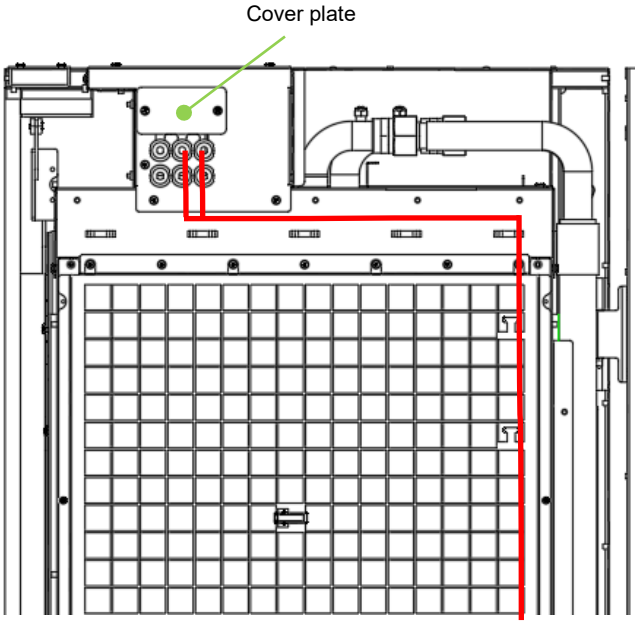


Figure 52. Cover Plate Reinstall and Cable Routing

- Connect the C20 end of the Power-A and Power-B power cords to the power supply.
- Fix the cover plate with screws.

Network cable Connection

It's suggested to use network cables with wire diameter of 22 AWG or larger.

Connect the control box's network interface to a switch for communication with the master system. Use the network cable provided to establish the connection.

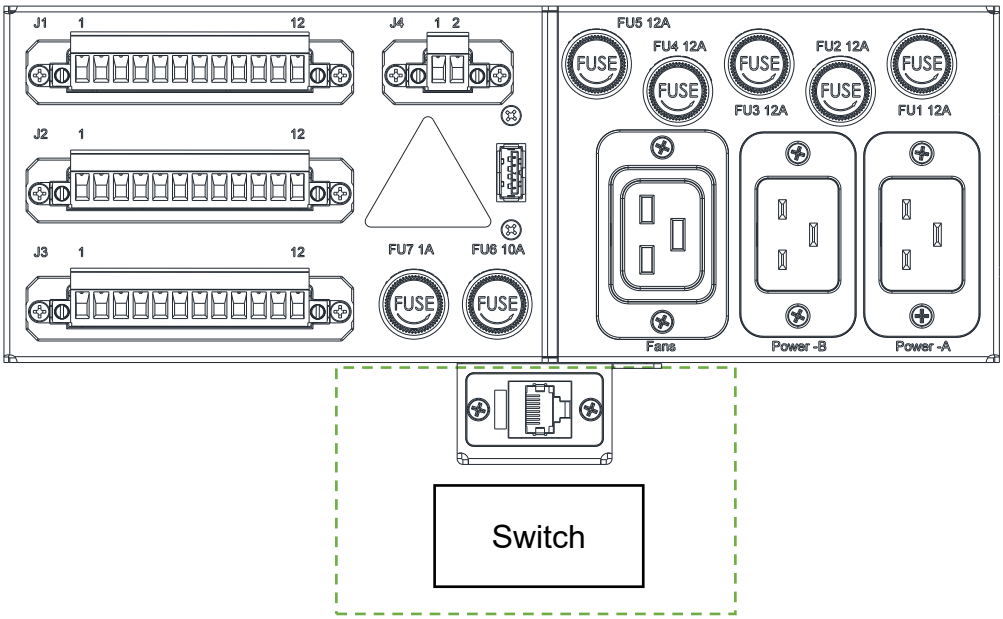


Figure 53. Network Cable Connection

Commissioning Tool Connection

When configuring the parameters, use the provided wire harness to connect the RDHx communication port to the commissioning tool.

Before use, insert the disk into the HMI USB port.

Figure 54. Commissioning Tool Connection

Actuator Cable Connection

Plug the female connector of the A17 harness into the actuator's male connector and secure the nut.

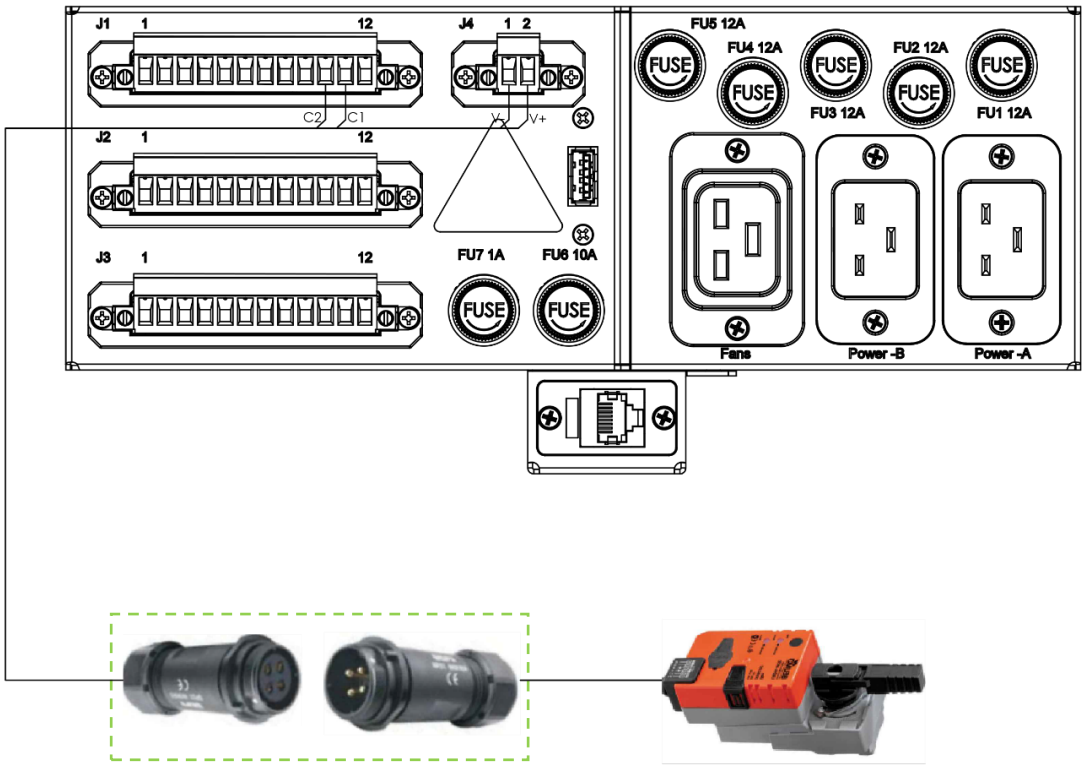


Figure 55. Actuator Cable Connection

Leak Detection Cable Wiring

- Connect the lead to the leak detection cable connector.

Figure 56. Leak Detection Cable Connection

- Wrap the leakage detection cable in a spiral pattern around the return pipe and supply pipes, securing it with tie wraps every 200mm.

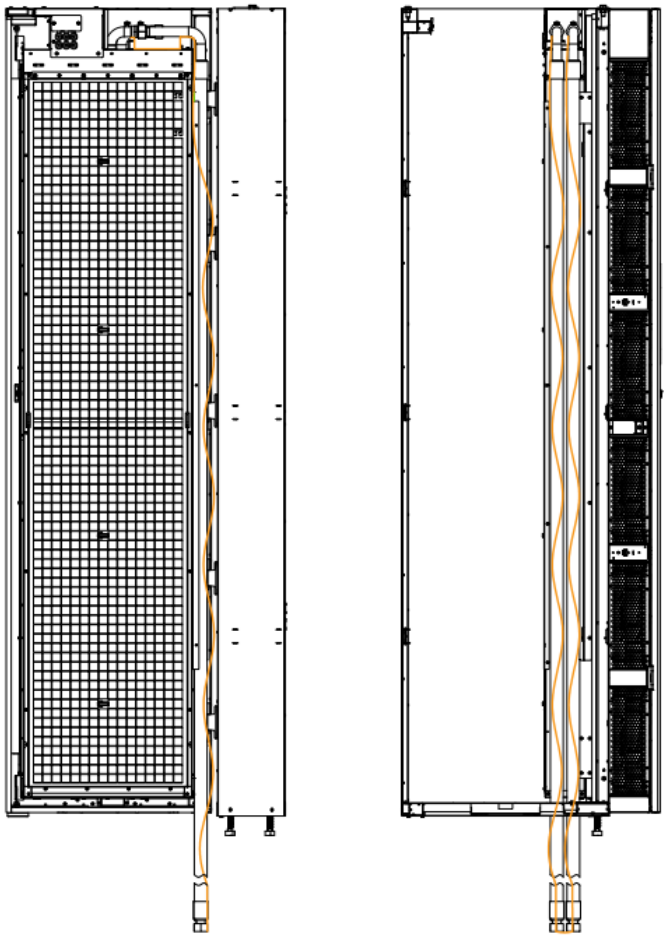


Figure 57. Leakage Rope Routing

Room Temperature Sensor Installation

The room temperature sensor monitors the server's air intake temperature to support accurate thermal management.

- Locate the room temperature sensor on the RDHx. And remove it.
- Route the cable toward the front of the cabinet.

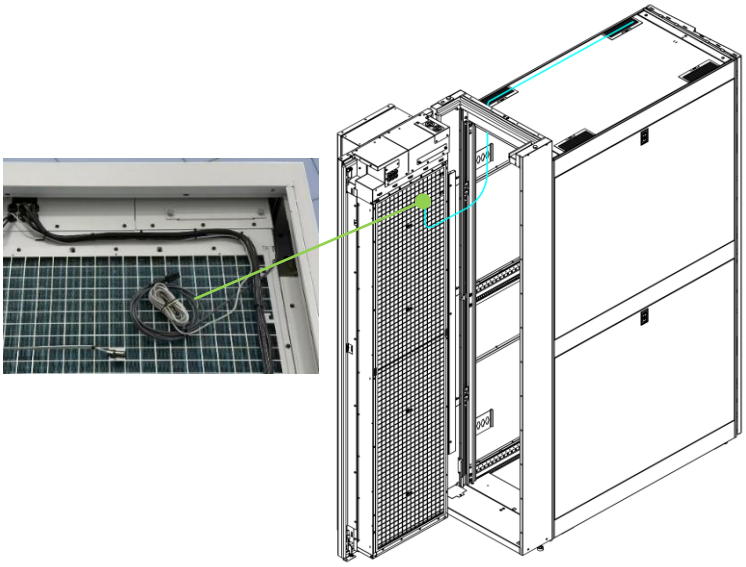


Figure 58. Room Temperature Sensor Cable Routing

- Secure the room temperature sensor to the front door using cable ties.

  CAUTION: Do not let the temperature sensor touch metal directly. Insert it into the provided holder and secure the holder to the front door.

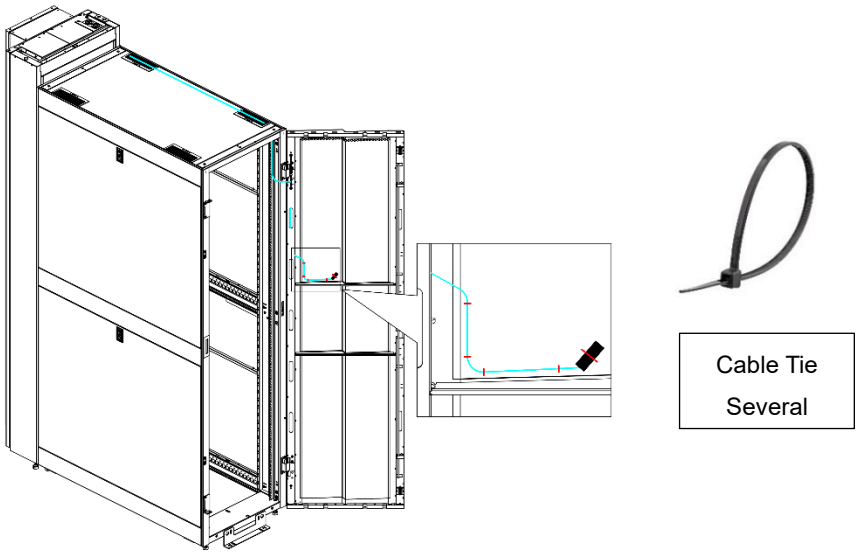


Figure 59. Room Temperature Sensor Mounted

Capacity Sensor Installation

Flow and Temp Sensor VFS Installation

Figure 60. Installation Diagram

*Suggest installing the VFS on the entering water (supply) side.

Power Cable Connection

A20 harness | Sensor Wire Harness | VFS kit

Figure 61. Material List

- Connect the sensor wire harness to the VFS sensor.

Figure 62. Pre-connection

- Connect the A20 harness to the control box J3 terminal ports.
- Connect the female connector of the A20 harness to the male connector of the VFS wire and secure them.

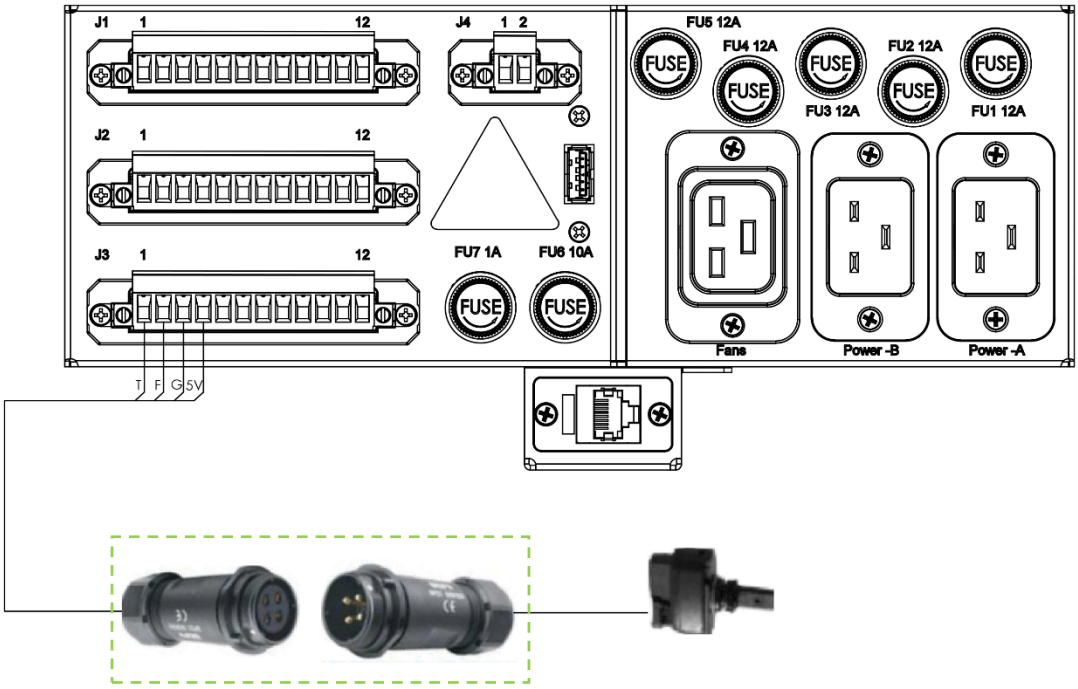


Figure 63. A20 Harness Connection

Table 11. J3 Terminal Ports

Terminal		Wire Number	Description
J3	Pin 1	T	Temperature signal of VFS
	Pin 2	F	Flow signal of VFS
	Pin 3	GND	Power supply GND of VFS
	Pin 4	5V	Power supply 5V of VFS

Pressure and Temp Sensor RPS Installation

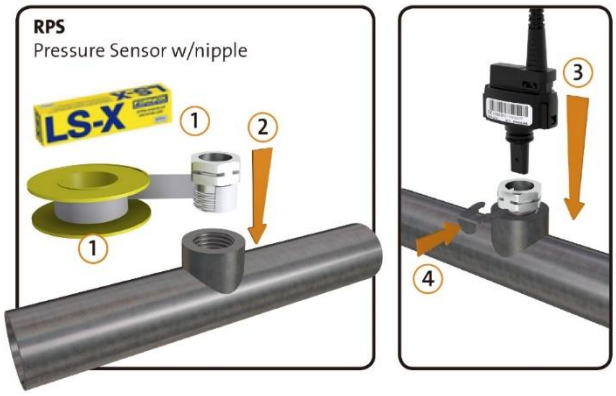


Figure 64. Installation Diagram

*Suggest installing the RPS on the leaving water (return) side.

Power Cable Connection

A21 harness

Sensor Wire Harness

RPS sensor

Figure 65. Material List

- Insert the Sensor Wire Harness to the RPS sensor.

Figure 66. Pre-connection

- Connect the A21 harness to the corresponding ports on the control box J3 terminal.
- Connect the female connector of the A21 harness to the male connector of the RPS harness, then secure them.

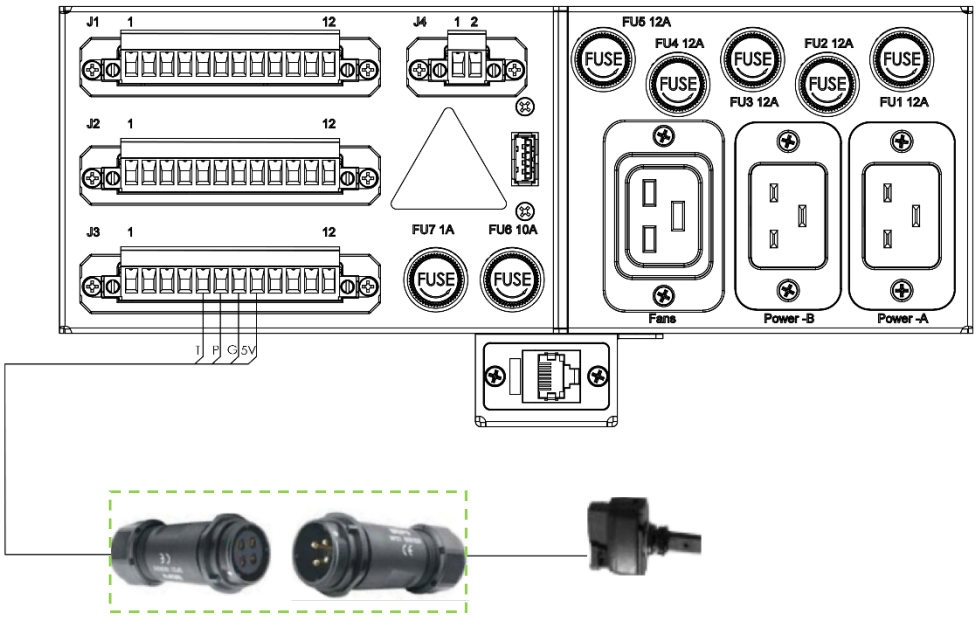


Figure 67. A21 Harness Connection

Table 12. J3 Terminal Ports

Terminal		Wire Number	Description
J3	Pin 5	T	Temperature signal of RPS
	Pin 6	P	Pressure signal of RPS
	Pin 7	GND	Power supply GND of RPS
	Pin 8	5V	Power supply 5V of RPS

Part Ⅴ. System Setup and Start-up

Pre-Activation Checklist

Physical Inspection

- Ensure the unit is securely mounted and aligned with the designated rack.
- Confirm that all mechanical fasteners and support structures are properly tightened.
- Verify that the cooling unit is free of any physical damage or obstructions.

Liquid Circuit Checks

- Inspect all flexible hoses and fittings for secure connections and potential leaks.
- Ensure the water inlet and outlet connections comply with specified pressure and temperature requirements.
- Confirm that the isolation valves and pressure-independent control valves (if applicable) are correctly positioned.
- Verify the presence of a properly functioning leakage detection sensor.

Electrical and Control System Verification

- Ensure both A & B power feeds are correctly connected and securely fastened.
- Confirm that the Automatic Transfer Switch (ATS) is operational (if applicable).
- Verify the integrity of all power and signal cables.
- Check that all network communication lines are correctly wired and terminated.
- Ensure that the control panel and monitoring system are properly mounted and responsive.

Power-On Procedures

Power Supply Activation

- Turn on both A & B power sources to supply power to the NovaCool RDHx.
- Verify that the LED status indicators on the control panel illuminate correctly.

System Initialization

- The unit will conduct a self-diagnostic check to ensure all components are functioning correctly.
- The controller will verify the status of fans and temperature sensors.

Liquid Circuit Activation

- Open the necessary isolation valves to allow coolant flow through the system.
- Gradually pressurize the system to prevent water hammer effects.

- Ensure that the water temperature and flow rate sensors register stable values.

Fan and Valve Operation Check

- Initiate a test run of the EC fans and verify that all units are operational.
- If applicable, check that the motorized control valves respond correctly to system commands.
- Confirm System Readiness
- Closely monitor the system for any error messages or warning codes before proceeding.
- Validate that all real-time monitoring parameters (temperature, pressure, flow rate) are within acceptable limits.

Initial Setup

Control Panel Configuration

- Access the control panel and navigate to the main menu.
- Verify and adjust the following operational parameters as needed:
  - Target supply air temperature
  - Fan speed settings (Auto/Manual mode)
  - Water flow rate thresholds
  - Leak detection sensitivity
- Network and Communication Setup
- Configure the MODBUS settings for remote monitoring.
- Assign a unique IP address if integrated with a Data Center Infrastructure Management (DCIM) system.
- System Performance Validation
- Conduct a final operational test by running the unit under a simulated load condition.
- Confirm that the cooling capacity meets expected performance levels.
- Record baseline operating data for future maintenance and troubleshooting reference.

Part VI. Commission Tool Configuration

Hardware Display

HMI stands for Human-Machine Interface and refers to a dashboard that enables a user to communicate with a machine, computer program or system. Technically, the term HMI can be applied to any screen that someone uses to interact with a device, but it's typically used to describe such screens used in industrial settings. HMIs display real-time data and allow a user to control machinery using a graphical user interface.

The HMI used in this **NovaCool RDHx** is the which features 4.3 wide TFT touchscreen display and packed with an Enclosure.

Parts Identification

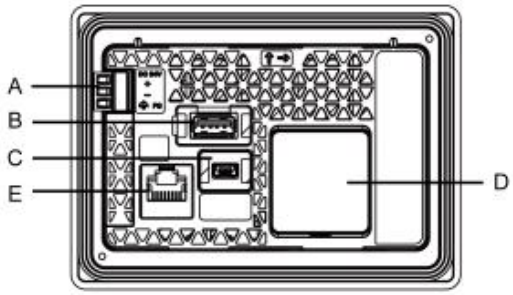


Figure 68. Parts Diagram

Table 13. Parts Identification

A	Power Contactor
B	USB (Type-A) Interface
C	USB (Mini-B) Interface
D	RTC Battery Cover
E	Ethernet Interface
F	Serial Interface

System Status

When the HMI is powered On RDHx System Status is generally displayed.

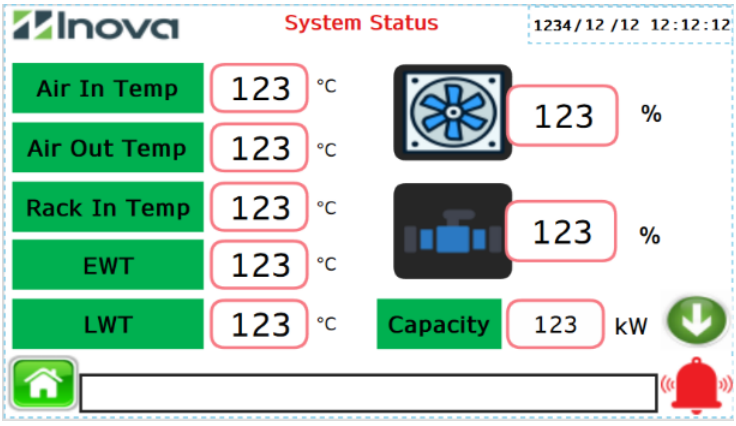


Figure 69. System Status_1

- The “Air In Temp” displays the temperature of air entering the coil. This value controls the fan speed.
- The “Air Out Temp” shows the Air off temperature which is controls the Valve Open/Close
- The “Rack in Temp” displays the rack’s front temperature and is used for monitoring only—it does not control any system functions.
- The “EWT” shows the entering water temperature. This value is available only if the VFS sensor is installed.
- The “LWT” shows the Leaving Water (Return Water) temperature from the unit, this value will be available only the RPS sensor is available.
-  symbol is Fan Running Speed,  symbol is Valve Open position.

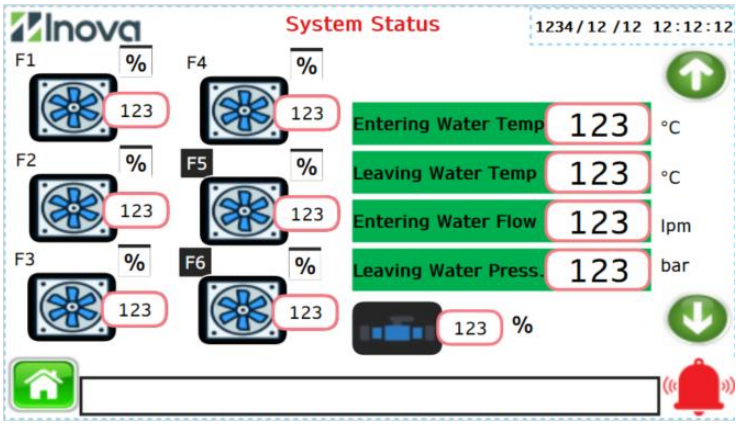


Figure 70. System Status_2

- F1 to F6 shows the individual Fan running speed.  symbol is Valve Open Command .
- The “EWT” shows the Entering Water temperature to the unit, this value will be available only the VFS sensor is available.

- The “LWT” shows the Leaving Water temperature from the unit, this value will be available only the RPS sensor is available.
- The “EWF” shows the Entering Water flow to the unit, this value will be available only the VFS sensor is available.
- The “LWP shows the Leaving Water pressure (Return Water) from the unit, this value will be available only the RPS sensor is available.

Power Status

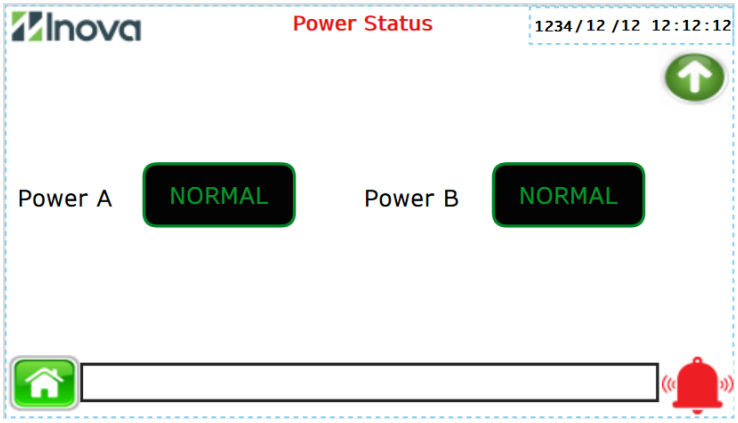


Figure 71. Power Status

There are Two Power sources are available in the system POWER A and POWER B.

- IF the Power is available, display shows as Normal.
- IF the Power is not available, display shows as Failure.

Selection Menu

Figure 72. Selection Menu

: Unit Turned On/Off here. When the unit is turned off, no alarms will be generated, the fans will not run, and the valve will close except for communication alarms.

: This Symbol navigates to perform a Manual testing of Fan & Valve individually

: This Symbol navigates to set up a factory setting of RDHx, these default values can be editable by end user. Password protected. User: Main; Password :9090

: This Symbol navigates to set up an operator setting of RDHx, these default values can be editable by end user. Password protected. User: Oper; Password :8080

: This Symbol navigates setting up a programmer setting of RDHx, these default values can be editable by Manufacturer Only. Password protected.

: This Symbol navigates to system status; it shows various readings of RDHx.

: This Symbol navigates to an Alarm Log, it shows acknowledged alarms of RDHx.

: This Symbol navigates to Date and Time, adjustable if it's wrong here.

: This Symbol navigates to Network setting, for Web UI or Any other Integration.

: This Symbol navigates to Device information like Model No., Contact detail etc...


: This Symbol navigates to Menu; this will be in all the screens for immediate action.


: This Symbol navigates to Active alarms; this will be on all the screens for immediate action.

: This shows the Active alarms or Un-acknowledged alarm in red background color; this will be in all the screens for immediate action.

Temperature Settings

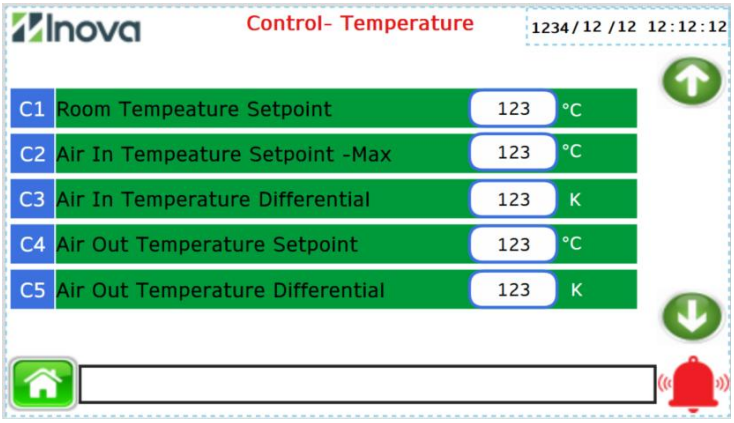


Figure 73. Temperature Settings

: This Icon take into the Operational settings screen, password protected.

- The Room & Air in Temperature parameters are used to control the fan speed.
- The difference between Room temperature and Air in Temperature setpoint range over which fan will go from minimum speed and maximum speed.
- The Air Out Temperature parameters are used to control the Valve open/close.
- The differential values are used to calculate the minimum and maximum temperature values that unit has to be operated.

Control – Fan

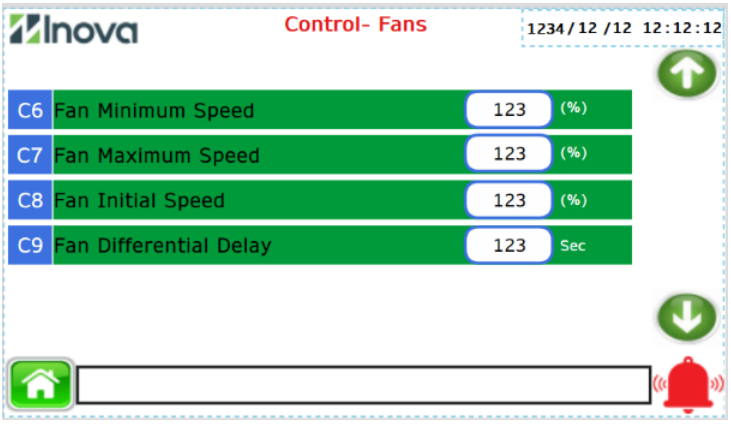


Figure 74. Control Fans (C6~C9)

- The fans are controlled by the temperature on the front of RDHx and back side of IT Equipment.
- The fan parameters can be varied depending on equipment and operation parameters.
- The Fan Minimum speed(C6) is the speed a fan operates at when Air in temperature below the Room temperature setpoint.
- In startup all the fans operate at Initial speed(C8).
- The Fan Maximum speed(C7) will have been set at site based on expected maximum speed that unit transfers the heat from the RDHx.
- Fan Differential Delay(C9) is ensuring the fan speed modulation on periodically to avoid the false results.

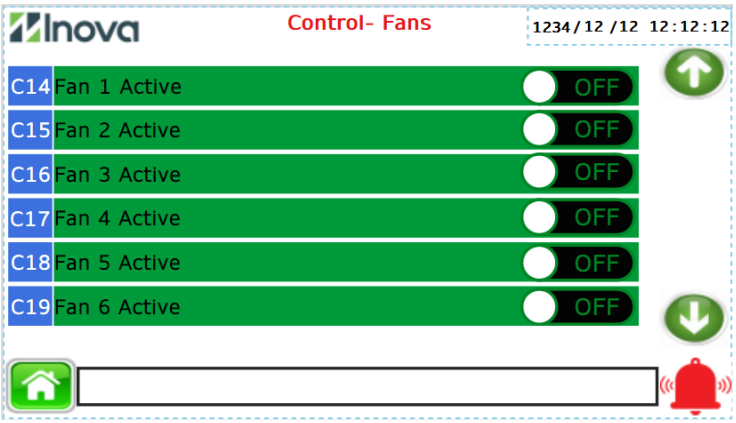


Figure 75. Control – Fans (C14~C19)

- No of Fans (C14…C19) can be enabled based on-Site requirements, by default all the fans are active.
- If Fan is not activated, alarms of the corresponding fan also do not activate.

Control – Valve

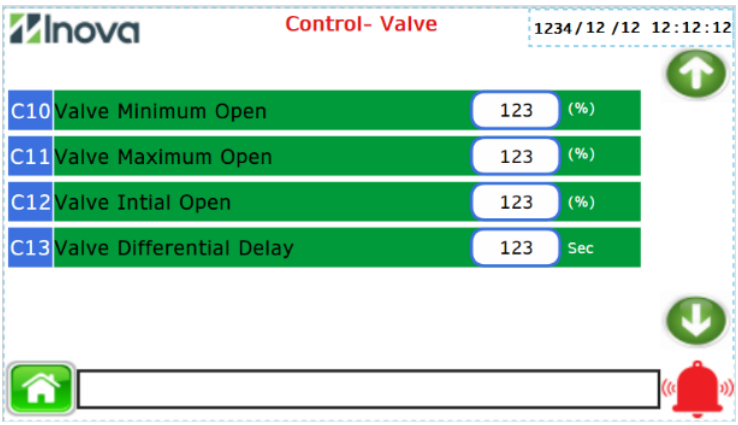


Figure 76. Control – Valve

- The valve is controlled purely by the Air Out temperature
- The Valve Minimum Open(C10) is the position when Air Out temperature is below the setpoint.
- In startup all the valve opens at Initial Open position(C12), this can adjust at site conditions.
- The Valve Maximum open(C11) will have been set at site based on the expected maximum speed that unit to transfer the heat from the RDHx.
- Valve differential delay(C13) is ensuring the valve opening periodically to avoid the false results.

Water Sensor Settings

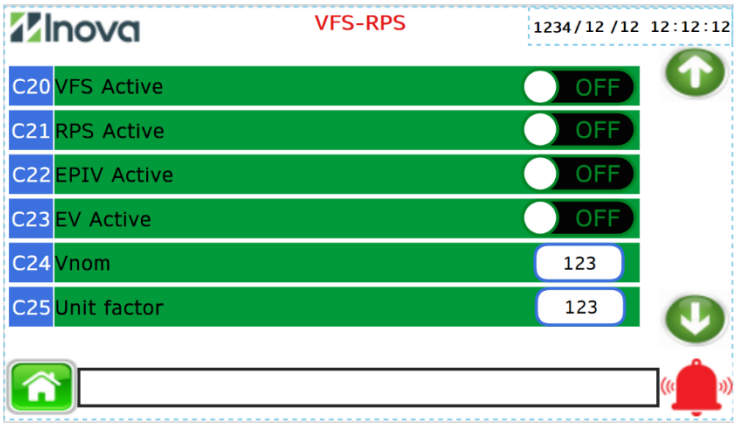


Figure 77. VFS - RPS

- VFS is a sensor used to monitor the Supply Water (Entering Water) Temperature and Flow rate.
- RPS is a sensor used to monitor the Return Water (Leaving Water) Temperature and Pressure.
- If these C20, C21 are not On, the functions of the sensor are not activated.
- C22 is a parameter to enable the EPIV valve, then C21 is need to enable the RPS is used.
- C23 is a parameter to enable the EV valve, if it is enabling remaining selection option will reset to default.
- C24 & C25 parameters are used to calculate the actual flow and temperature according to the valve models used (applicable for EPIV &EV).

Alarm Settings

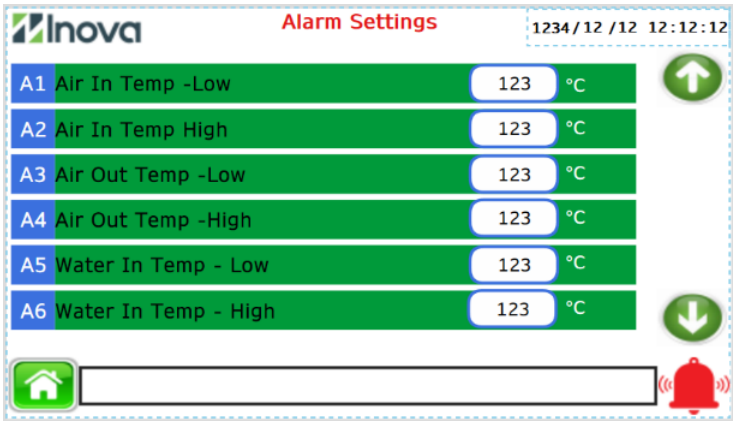


Figure 78. Alarm Settings (A1~A6)

- A1 & A2 Setup an Alarm to indicate the Air In temperature at the front of the unit that reaches preset temperature.
- A3 & A4 Setup an Alarm to indicate the Air Out temperature at the back of the rack reaches preset temperature.
- A5 & A6 Setup an Alarm to indicate the Water In temperature to the unit that reaches preset temperature. (Only applicable for VFS sensor availability).

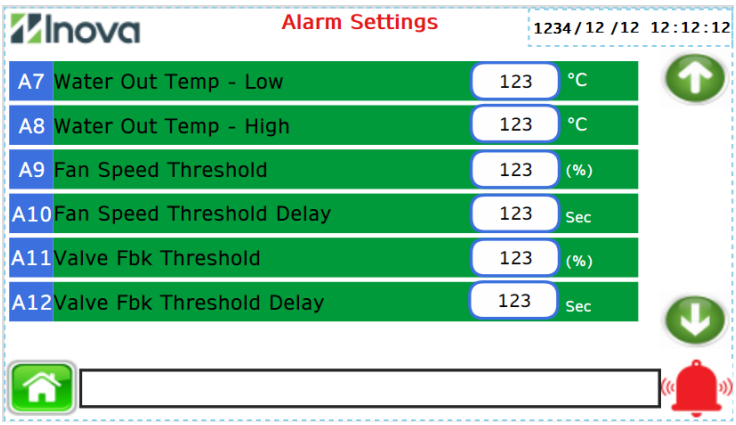


Figure 79. Alarm Settings (A7~A12)

- A7 & A8 Setup an Alarm to indicate the Return Water temperature from the unit that reaches preset temperature. (Only applicable for RPSS sensor availability).
- A9 is a Fan threshold value, when the fan run command and actual running feedback are not in the range of threshold % then the fan threshold not in range alarm will appear. A10 is a delay that waits for a time to monitor Fan modulation.
- A11 is a Valve threshold value, when the valve opening command and actual opened feedback are not in the range of threshold % then the valve threshold not in range alarm will appear. A12 is a delay that waits for a time to monitor valve modulation

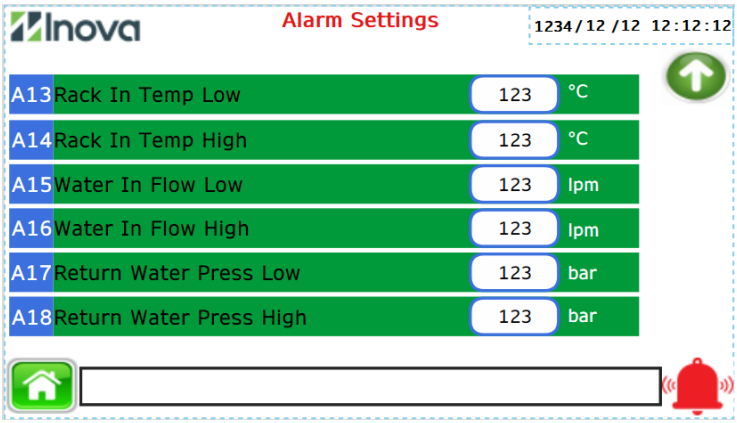


Figure 80. Alarm Settings (A13~A18)

- A13 & A14 Setup an Alarm to indicate the Room temperature at the front of the rack reaches preset temperature.
- A15 & A16 Setup an Alarm to indicate the Water In flow rate to the unit that reaches preset value. (Only applicable for VFS sensor availability).
- A17 & A18 Setup an Alarm to indicate the Return Water pressure from the unit that reaches preset value. (Only applicable for RPS sensor availability).

Factory Settings

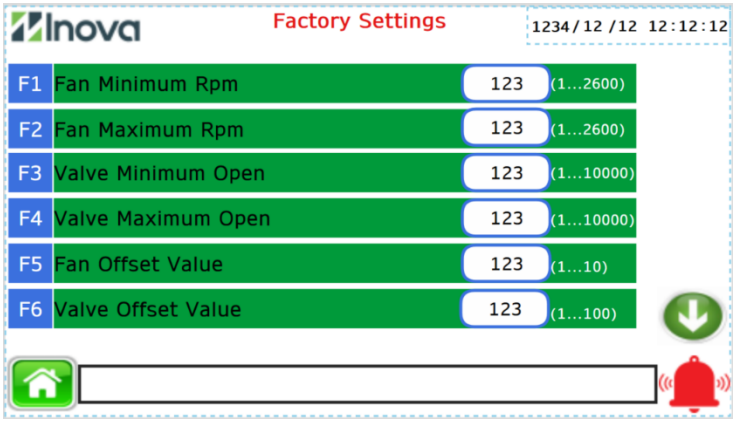


Figure 81. Factory Settings

This Icon takes into the factory settings Screen (Maintenance purpose, Password protected.

- F1 & F2 are the parameters of fan, it can be modified at site operations, so that modulation will happen with in this set values.
- F3 & F4 are the parameters of valve, it can be modified at site operations, so that valve position modulation will happen with in this set values.
- F5 & F6 are the Offset parameters to decide the ratio of fan speed and valve opening modulations.

Leakage Sensor Settings

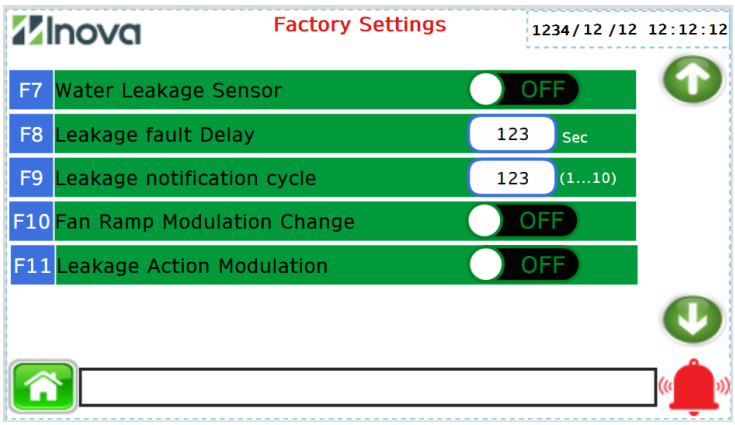


Figure 82. Leakage Sensor Settings

- F7 parameter used to activate the leakage sensor function normally it is an optional sensor.
- F8 is delay and F9 is count that decides if the leakage happens during the operation and creates an alarm as leakage fault.
- F10 is an Option to change fan modulation (Optional)
- F11 is start the action due to the leakage fault, if this is parameter is enabled and the leakage fault happens more than the notify cycle value(F9), then all the fans will be running in maximum speed, and the valve will close completely.

Preventive Maintenance Settings

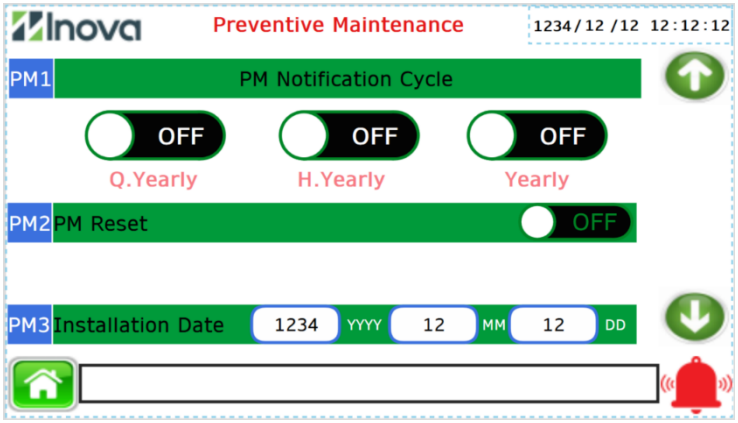


Figure 83. Preventive Maintenance Settings

- PM1 Parameter enables the preventive maintenance warning notification from the date of selection (Q. Yearly or H. Yearly or Yearly). It's mandatory to select period to enable PM warning of unit.
- Q. Yearly: Every 3 Months from the date of selection warning  icon will be displayed.
- H. Yearly: Every 6 Months from the date of selection warning icon  will be displayed.

- Yearly: Every 12 Months from the date of selection warning icon will be displayed.
- PM2 is reset the current period of PM setting, if necessary, only for Maintenance purpose of unit.
- After the PM activity, need to again enable the PM1parameter for next cycle.
- PM3 is an option to enter the Installation date for calculate the number of days from the installation date.

IO - Status Analog

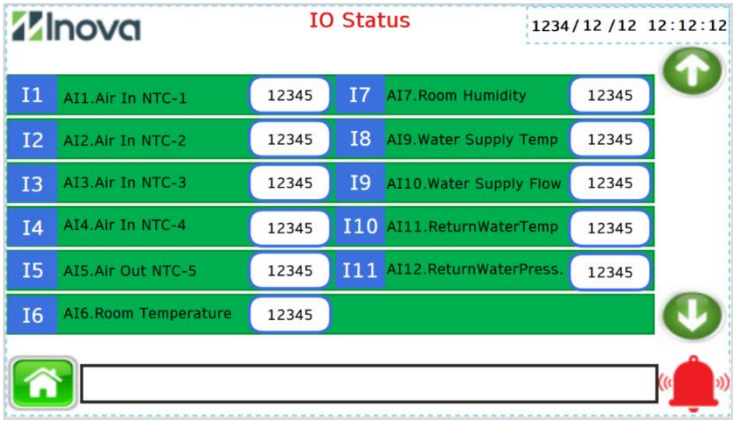


Figure 84. IO Status Analog

IO - Status Digital

- The IO status of Analog & Digital is used to monitor the healthy and working conditions of hardware devices which are used in RDHx.

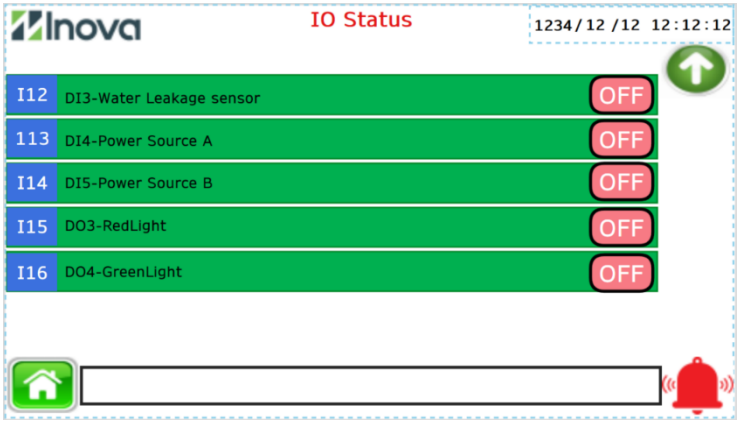


Figure 85. IO Status Digital

Program Settings

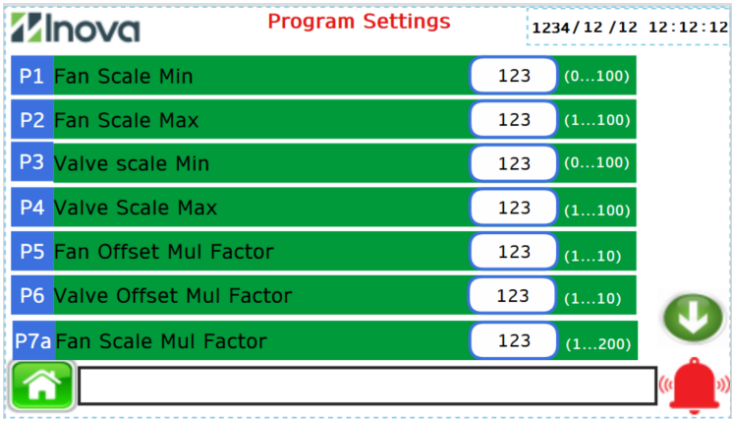


Figure 86. Program Settings

This Icon takes into program settings, password protected.

Alarm Bypass Screen

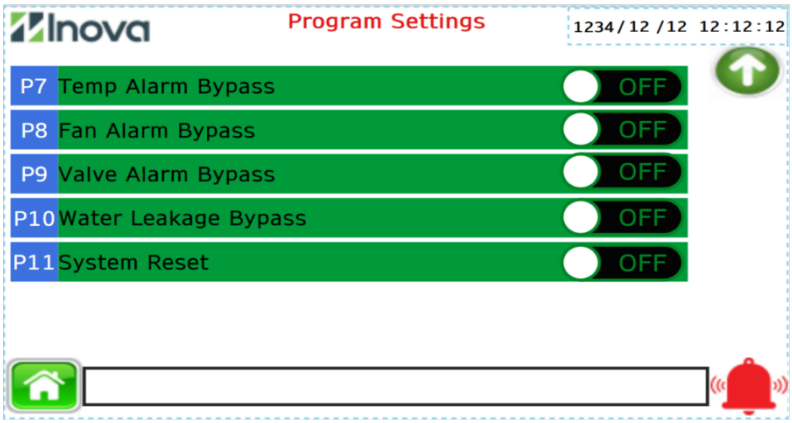


Figure 87. Alarm Bypass Screen

Basically, program settings are applicable for Manufacturers, Password protected.

Network Settings

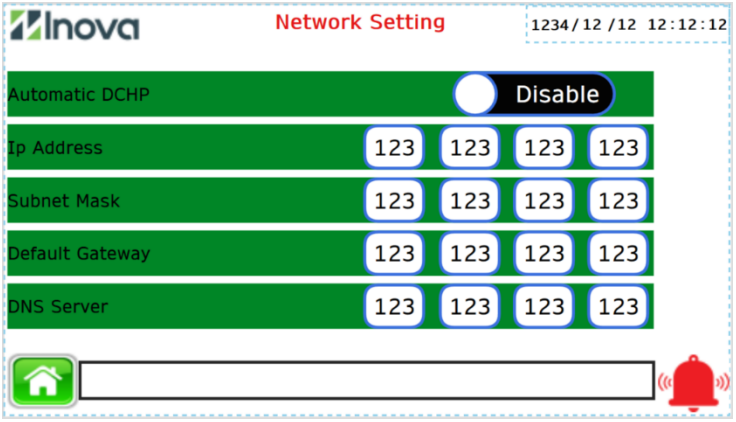


Figure 88. Network Setting

This Icon take into Network Settings screen.

- The RDHx is delivered with default Ip Address of 10.0.0.100 or 192.168.0.100 and sub net is 255.255.255.0.
- Ip address and other network details can be edited as per the site network requirement.
- The other method of assigning Ip details is enable the Automatic DCHP method, once the DCHP option is enabled automatically Ip details will assign as per the network connection so the same can use for other integrations.

Date/Time Settings

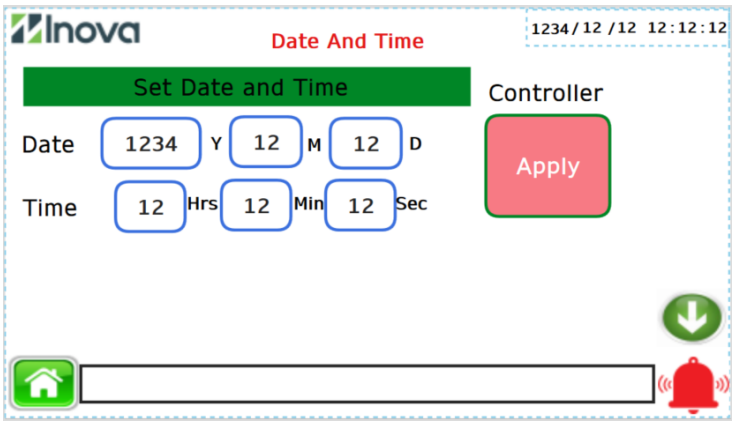


Figure 89. Data And Time

This Icon takes into Date/Time Adjust screen.

- The RDHx controller has internal date/time memorizing capabilities, but sometimes it necessary to adjust Date/ Time based on region/Zone changes.

- Enter the present Date/Time if it necessary and press the Controller Apply button in the above screen so that actual Date/Time will update to controller, the same timing will follow.
- If the HMI display shows the incorrect Date/Time, then press the Display apply button to adjust the actual Date/Time to Display.

Manual Testing

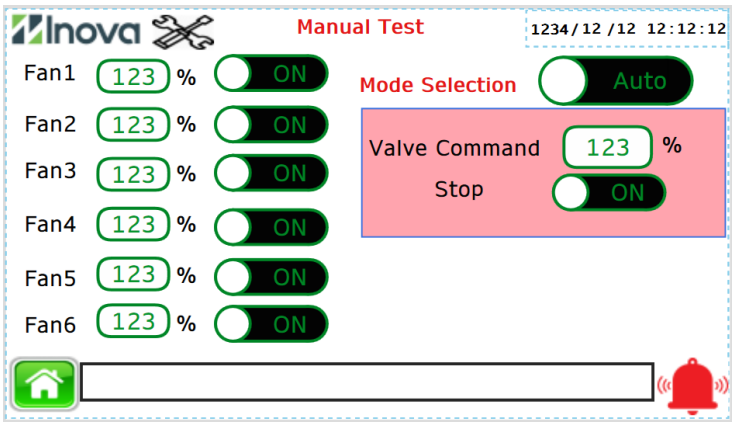


Figure 90. Manual Test

Note:

Manual Mode operates only when the unit is “OFF” condition. After testing completes its mandatory to select “Auto” so that system will function in “Auto Mode”

- Select the Manual Mode to test the RDHx in Manual Mode.
- Manual fan test possible here, Set the required speed (10 % to 100%) the fan will start running in manual mode.
- Select the button to “OFF” to stop the fan in manual mode.
- Select the button to “ON” and enter “0” to stop the fan in manual mode. So that fan will not be running.
- Manual Valve test possible here, Set the required opening command (10 % to 100%) the valve will start opening in manual mode.
- Select the Valve stop to “OFF” to stop the valve in manual mode.
- Select the valve stop to “ON” and enter “0” in valve command. So that valve will be fully closed.

Alarms

Active Alarm - View

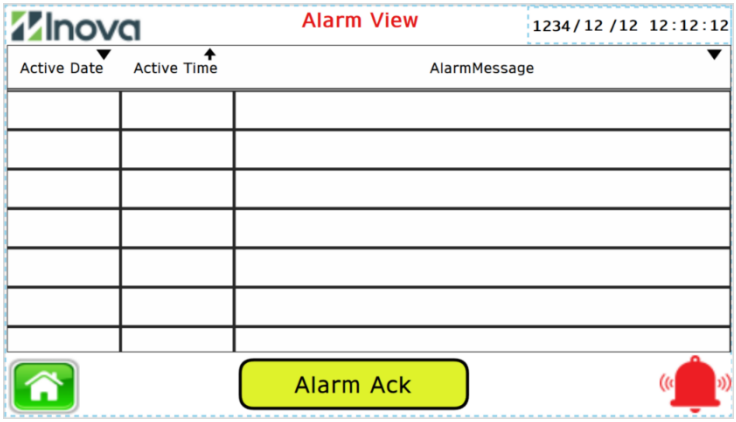


Figure 91. Alarm View


This Icon takes into alarm view screen,

- Here we can see all the recent alarms
- If any severe alarm appears it needs to be acknowledged (Press Alarm Ack Button), then it will reset otherwise the alarm state will be in set condition.
- The active alarms display in red background, and acknowledged alarms displayed in white background.

Active History

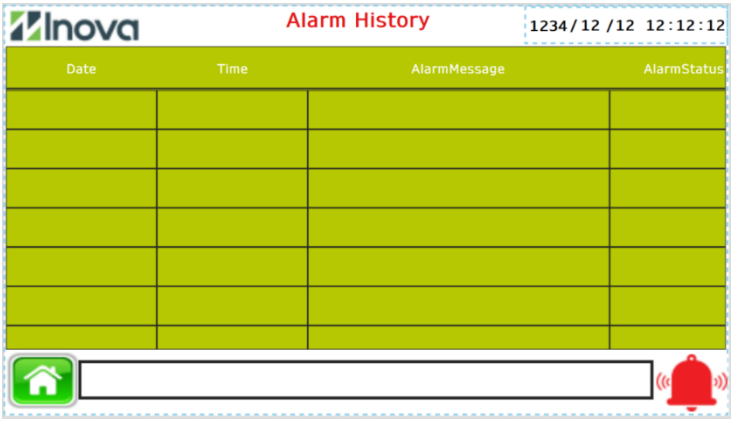


Figure 92. Alarm History

Alarm Log This Icon takes into Alarm History screen

- Here we can find the recent logged alarms.
- This will help for maintenance or service engineers to identify the faults and analyze the root cause.

System Information

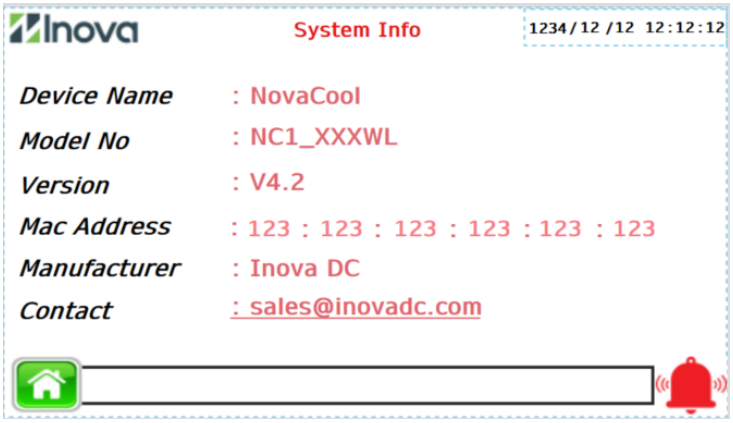
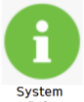


Figure 93. System Information



System Info This Icon takes into system information screen.

- THE RDHx unit details has been attached to the above screen, in case of any support client can contact through the above mail is sales@inovadc.com.

Modbus Register List

Parameter Code	Data Type	Address	Name	Available set values	Factory Set Values	Units
	Bool	16404	Unit On/Off	ON/OFF	OFF	
Manual Test						
	Bool	9049	Fan1_TurnOff	ON/OFF	ON	
	Bool	9050	Fan2_TurnOff	ON/OFF	ON	
	Bool	9051	Fan3_TurnOff	ON/OFF	ON	
	Bool	9052	Fan4_TurnOff	ON/OFF	ON	
	Bool	9053	Fan5_TurnOff	ON/OFF	ON	
	Bool	9054	Fan6_TurnOff	ON/OFF	ON	
	Bool	9075	Mode Selection	Manual/Auto	Auto	
	Int	9076	Fan1Speed	0	0	%
	Int	9077	Fan2Speed	0	0	%
	Int	9078	Fan3Speed	0	0	%
	Int	9079	Fan4Speed	0	0	%
	Int	9080	Fan5Speed	0	0	%
	Int	9081	Fan6Speed	0	0	%
	Int	9082	ValveCommand	40	40	%
	Bool	9086	Stop	ON/OFF	ON	
Factory Settings						
F1	Int	16407	Fan Minimum Rpm	0	0	
F2	Int	16408	Fan_MaxRpm	2600	2600	
F3	Int	16409	Valve Minimum Open	0	0	
F4	Int	16410	Valve Maximum Open	10000	10000	
F5	Int	16411	Fan Offset Value	20	20	
F6	Int	16412	Valve Offset Value	20	20	
F7	Bool	16413	Water Leakage Sensor	ON/OFF	OFF	
F8	Int	16414	Leakage fault Delay	25	25	Sec
F9	Int	16415	Leakage notification cycle	3	3	
F10	Bool	16468	Fan Ramp Modulation Change	ON/OFF	OFF	
F11	Bool	16480	Leakage Action Modulation	ON/OFF	OFF	
F12	Bool	16496	Valve placement Line	Retrun/Supply	Return	
Preventive Maintenance						
PM1			PM Notification Cycle			
	Int	16425	Q.Yearly	ON/OFF	OFF	
	Int	16426	H.Yearly	ON/OFF	OFF	
	Int	16427	Yearly	ON/OFF	OFF	
PM2	Bool	9133	PM Reset	ON/OFF	OFF	
PM3			Installation Date			
	Int	16457	YYYY		0	
	Int	16458	MM		0	
	Int	16459	DD		0	

Fan Replace						
PM4	Int	9083	Fan Node Address	0	0	
PM5	Bool	9085	Fan Address Confirm	NO/Confirm	NO	
PM6	Int	9153	Reset Fan address to default	0	0	
PM7	Bool	9155	Fan Address Reset	NO/Confirm	NO	
IO Status (No settings required these are actual values)						
I1	Int	9097	AI1.Air In NTC-1	0	0	
I2	Int	9098	AI2.Air In NTC-2	0	0	
I3	Int	9099	AI3.Air In NTC-3	0	0	
I4	Int	9100	AI4.Air In NTC-4	0	0	
I5	Int	9101	AI5.Air Out NTC-5	0	0	
I6	Int	9102	AI6.Room Temperature	0	0	
I7	Int	9103	AI7.Humidity (Optional)	0	0	
I8	Int	9105	AI9.Water Supply Temp	0	0	
I9	Int	9106	AI10.Water Supply Flow	0	0	
I10	Int	9107	AI11.ReturnWaterTemp	0	0	
I11	Int	9108	AI12.ReturnWaterPress.	0	0	
I12	Bool	9109	DI3-Water Leakage sensor	ON/OFF	OFF	
I13	Bool	9110	DI4-Power Source A	ON/OFF	ON	
I14	Bool	9111	DI5-Power Source B	ON/OFF	ON	
I15	Bool	9112	DO3-RedLight	ON/OFF	OFF	
I16	Bool	9113	DO4-GreenLight	ON/OFF	OFF	
Air In Sensor Bypass						
I17	Bool	16781	Air In Temp Sensor -1	Enable/Disable	Disable	
I18	Bool	16782	Air In Temp Sensor -2	Enable/Disable	Disable	
I19	Bool	16783	Air In Temp Sensor -3	Enable/Disable	Disable	
I20	Bool	16784	Air In Temp Sensor -4	Enable/Disable	Disable	
I21	DInt	9160	AirIn Sensor Online		Actual	
	Bool	9172	Do Not Bypass Further Sensor		Invisible	
Sensor Calibration						
	Int	9192	Sensor Select	0.None 1.Air In Temp Sensor -1 2.Air In Temp Sensor -2 3.Air In Temp Sensor -3 4.Air In Temp Sensor -4	0	
	Real	9190	Sensor Read Value		Actual	°C
	Real	9194	Required Value		0.0	°C
	Real	9186	Offset Value		0.0	°C
	Real	9184	Corrected Value		0.0	°C
	Real	16511	Gain		1.0	°C
	Bool	9193	Confirm	ON/OFF	OFF	°C

Sensor Status						
	Real	9196	Air In Temp-1		Actual	°C
	Real	9198	Air In Temp-2		Actual	°C
	Real	9200	Air In Temp-3		Actual	°C
	Real	9202	Air In Temp-4		Actual	°C
	Real	9204	Air Out Temp		Actual	°C
	Real	9206	Room Temp		Actual	°C
	Real	8994	Air In Temp-1 - Corrected Value		Actual	°C
	Real	8996	Air In Temp-2 - Corrected Value		Actual	°C
	Real	8998	Air In Temp-3 - Corrected Value		Actual	°C
	Real	9000	Air In Temp-4 - Corrected Value		Actual	°C
	Real	9002	Air Out Temp - Corrected Value		Actual	°C
	Real	9004	Room Temp - Corrected Value		Actual	°C
Metric Selection						
	Bool	16428	Celsius/Fahrenheit	C/F	C	
	Bool	16447	Bar/Psi	Bar/Psi	Bar	
	Bool	16448	Lpm/Gpm	Lpm/Gpm	Lpm	
Control- Temperature						
C1	Real	16384	Room Temperature Setpoint	24	24	°C
C2	Real	16388	Air In Temperature Setpoint -M	45	45	°C
C3	Real	16390	Air In Temperature Differential	1	1	K
C4	Real	16392	Air Out Temperature Setpoint	23	23	°C
C5	Real	16398	Air Out Temperature Differentia	1	1	K
Control- Fans						
C6	Int	16400	Fan Minimum Speed	30	30	%
C7	Int	16445	Fan Maximum Speed	100	100	%
C8	Int	16405	Fan Initial Speed	30	30	%
C9	Int	16402	Fan Differential Delay	30	30	Sec
Control- Valve						
C10	Real	16396	Valve Minimum Open	15	15	%
C11	Real	16394	Valve Maximum Open	70	70	%
C12	Int	16446	Valve Initial Open	30	30	%
C13	Int	16401	Valve Differential Delay	180	180	Sec
Control- Fans						
C14	Bool	16472	Fan 1 Active	ON/OFF	ON	
C15	Bool	16473	Fan 2 Active	ON/OFF	ON	
C16	Bool	16474	Fan 3 Active	ON/OFF	ON	
C17	Bool	16475	Fan 4 Active	ON/OFF	ON	
C18	Bool	16476	Fan 5 Active	ON/OFF	ON	
C19	Bool	16477	Fan 6 Active	ON/OFF	ON	
VFS-RPS						
C20	Bool	16478	VFS Active	ON/OFF	OFF	
C21	Bool	16479	RPS Active	ON/OFF	OFF	
C22	Bool	16488	EPIV Active	ON/OFF	OFF	
C23	Bool	16495	EV Active	ON/OFF	OFF	
C24	Bool	16489	Vnom	0.4..5.0	0.97	
C25	Bool	16491	Unit factor	0.01	0.01	

Alarm Settings						
A1	Real	16449	Air In Temp -Low	20	20	°C
A2	Real	16451	Air In Temp High	60	60	°C
A3	Real	16429	Air Out Temp -Low	17	17	°C
A4	Real	16431	Air Out Temp -High	27.3	`	°C
A5	Real	16433	Water In Temp - Low	15	15	°C
A6	Real	16435	Water In Temp - High	25	25	°C
A7	Real	16437	Water Out Temp - Low	15	15	°C
A8	Real	16439	Water Out Temp - High	40	40	°C
A9	Int	16441	Fan Speed Threshold	2	2	%
A10	Int	16442	Fan Speed Threshold Delay	30	30	Sec
A11	Int	16443	Valve Fbk Threshold	2	2	%
A12	Int	16445	Valve Fbk Threshold Delay	30	30	Sec
A13	Real	16386	Rack In Temp Low	17	17	°C
A14	Real	16453	Rack In Temp High	27	27	°C
A15	Real	16460	Water In Flow Low	10	10	Lpm
A16	Real	16462	Water In Flow High	140	140	Lpm
A17	Real	16464	Return Water Press Low	2	2	Bar
A18	Real	16466	Return Water Press High	6	6	Bar
Status						
	Real	9064	Air In Temp		Actual	°C
	Real	9002	Air Out Temp		Actual	°C
	Real	9004	Rack In Temp		Actual	°C
	Real	9008	EWT(Enter Water Temperature)		Actual	°C
	Real	9012	LWT(Leaving Water Temperature)		Actual	°C
	Int	9096	Fan Speed Command		Actual	%
	Real	8966	Valve Open		Actual	%
	Real	9073	Capacity		Actual	Kw
	Int	8960	F1 Speed		Actual	%
	Int	8961	F2 Speed		Actual	%
	Int	8962	F3 Speed		Actual	%
	Int	8963	F4 Speed		Actual	%
	Int	8964	F5 Speed		Actual	%
	Int	8965	F6 Speed		Actual	%
	Real	9010	Water Flow		Actual	Lpm
	Real	9014	Water Pressure		Actual	Bar
	Int	9063	Valve command		Actual	%
Power Status						
	Bool	9066	Power A	Normal/Failure	ON : Normal OFF: Failure	
	Bool	9067	Power B	Normal/Failure	ON : Normal OFF: Failure	
Alarm History - All Alarm history shows here						

Date/Time						
Date	Int	8750, 8749, 8748	Enter the present date/Time and press to apply to controller	YYYY:MM:DD		
Time	Int	8745, 8744		HH:MM:SS		
Display	Bool	8751	HMI device actual time displays here, Press apply to update actual date/time to display	Apply		
Hardware Configuration :- Shows HMI hardware settings (Not Required to change)						
Network Setting						
Enable DHCP	Bool	5818	Automatic DHCP : If this option enable's Controller will assign it own network IP address and below static IP settings will be disabled	Enable/Disable	Disable	
	Int	5798..5801	IP address	10.0.0.100	10.0.0.100	
	Int	5806..5809	Subnet Mask	255.255.255.0	255.255.255.0	
	Int	5802..5805	Default Gateway	10.0.0.1	10.0.0.1	
	Int	5810..5813	DNS Server	8.8.8.8	8.8.8.8	
Alarms List						
A01	Bool	9048	A01 : Valve Communication Fault			
A02	Bool	8982	A02: Fan1 Communication Fault			
A03	Bool	8983	A03: Fan2 Communication Fault			
A04	Bool	8984	A04 : Fan3 Communication Fault			
A05	Bool	8985	A05: Fan4 Communication Fault			
A06	Bool	8986	A06: Fan5 Communication Fault			
A07	Bool	8987	A07: Fan6 Communication Fault			
A08	Bool	8972	A08 : Power Source A fault			
A09	Bool	8973	A09 : Power Source B fault			
A10	Bool	9095	A10 : Air In Temp Sensor 1 failed			
A11	Bool	8989	A11 : Air In Temp Sensor 2 failed			
A12	Bool	8990	A12 : Air In Temp Sensor 3 failed			
A13	Bool	8991	A13 : Air In Temp Sensor 4 failed			
A14	Bool	9016	A14 : Room Temperature sensor Failed			
A15	Bool	8993	A15 : Room Humidity Sensor Failed			
A16	Bool	8992	A16 : AirOut Temperature Sensor Failed			
A17	Bool	9018	A17: In Water Flow Sensor Failed			
A18	Bool	9017	A18: In Water Temperature Sensor Failed			
A19	Bool	9019	A19 : Return Water Temperature Sensor Failed			
A20	Bool	9020	A20 : Return Water Pressure Sensor Failed			
A21	Bool	8969	A21 : AirIn Temperature is High			
A22	Bool	8970	A22 : AirIn Temperature is Low			
A23	Bool	9122	A23 : AirOut Temperature is High			
A24	Bool	8971	A24: AirOut Temperature is Low			
A25	Bool	9055	A25 : Room Temperature is High			

A26	Bool	9056	A26 : Room Temperature is Low		
A27	Bool	9140	A27 : Air In Process Temperature High		
A28	Bool	9141	A28 : Air In Process Temperature Low		
A29	Bool	9142	A29 : Air Out Process Temperature High		
A30	Bool	9143	A30 : Air Out Process Temperature Low		
A31	Bool	8968	A31: Water Leakage Fault (Need Action)		
A32	Bool	9119	A32: Fan1 Threshold Value Not in Range		
A33	Bool	9123	A33: Fan2 Threshold Value Not in Range		
A34	Bool	9124	A34: Fan3 Threshold Value Not in Range		
A35	Bool	9125	A35: Fan4 Threshold Value Not in Range		
A36	Bool	9126	A36: Fan5 Threshold Value Not in Range		
A37	Bool	9127	A37: Fan6 Threshold Value Not in Range		
A38	Bool	8974	A38 : Valve Threshold Value Not in Range		
A39	Bool	9115	A39: In Water Temperature is High		
A40	Bool	9116	A40: In Water Temperature is Low		
A41	Bool	9118	A41: Out Water Temperature is High		
A42	Bool	9117	A42: Out Water Temperature is Low		
A43	Bool	9137	A43 : Entering Water Flow High		
A44	Bool	9136	A44 : Entering Water Flow Low		
A45	Bool	9139	A45: Leaving Water Pressure High		
A46	Bool	9138	A46: Leaving Water Pressure Low		
A47	Bool	9150	A47 : Water Leakage Fault		
A48	Bool	9151	A48 : Water Leakage Fault (Critical)		
A49	Bool	9152	A49 : Water Leakage Fault (Very Critical)		
A50	Bool	8975	A50 : Fan1 Node Address :2 conflict		
A51	Bool	8976	A51 : Fan2 Node Address :3 conflict		
A52	Bool	8977	A52 : Fan3 Node Address :4 conflict		
A53	Bool	8978	A53 : Fan4 Node Address :5 conflict		
A54	Bool	8979	A54 : Fan5 Node Address :6 conflict		
A55	Bool	8980	A55 : Fan6 Node Address :7 conflict		

RS 485 Communication Settings	
HMI Display	
SIO Type	RS 485
Speed	38400
Data Length	8 Bits
Parity Bit	Even
Stop Bits	1 Bit
Flow Control	None
PLC Configuration (RS 485)	
Mode	Modbus Master
Baud Rate	38400
Serial Parity	No Parity
Serial Databit	8 Data bits
Serial Stopbit	2 Stop Bit

Web User Interface Configuration

Web Configuration

The supported Web browsers are Google Chrome (mobile and desktop), Mozilla Firefox, Microsoft Edge.

Web Access

Default controller Ip address; 10.0.0.100

Default controller Subnet: 255.255.255.0

Laptop Network Ip should be in this series 10.0.0.XXX

Log on Web UI

- Step 1: Connect the Lan cable between Controller and Laptop.
- Step 2: Enter the controller Ip address in network browser (10.0.0.100)

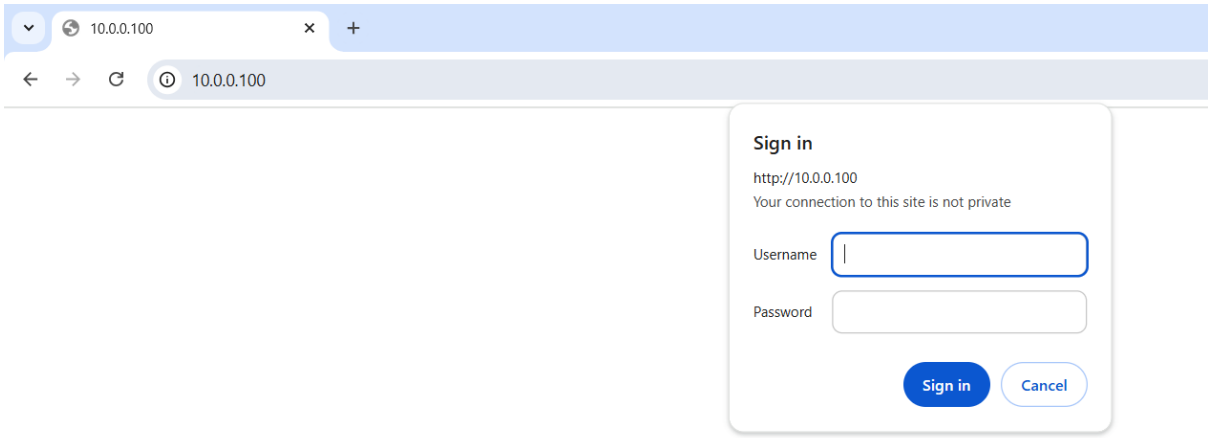


Figure 94. Log on

- Step :3 Enter Username: “administrator”, Default Password: “123456”, then Sign in. The screen below will be displayed.

Change Password

After successful login, you are required to change the default password. Input the current password and new password twice to confirm. Press “Apply” to complete set up new password.

After successful login below tabs will be displayed.

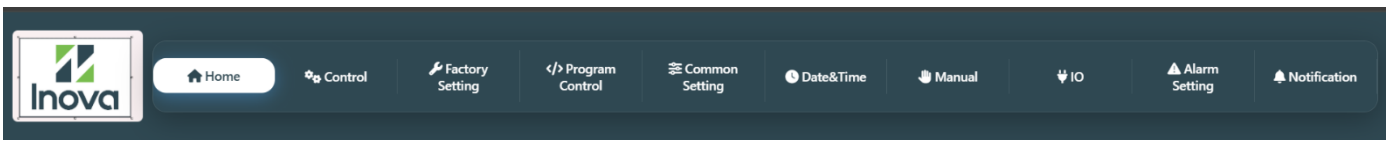


Figure 95. Login Tabs

Home

Unit Turned On/Off here. When the unit is turned off, no alarms will be generated, the fans will not run, and the valve will close except for communication alarms.

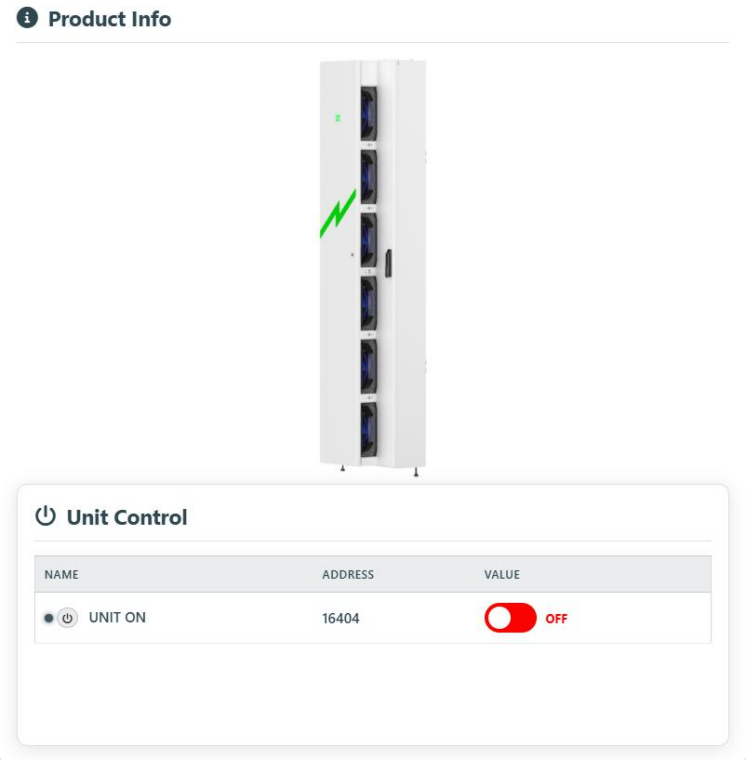


Figure 96. Unit Control

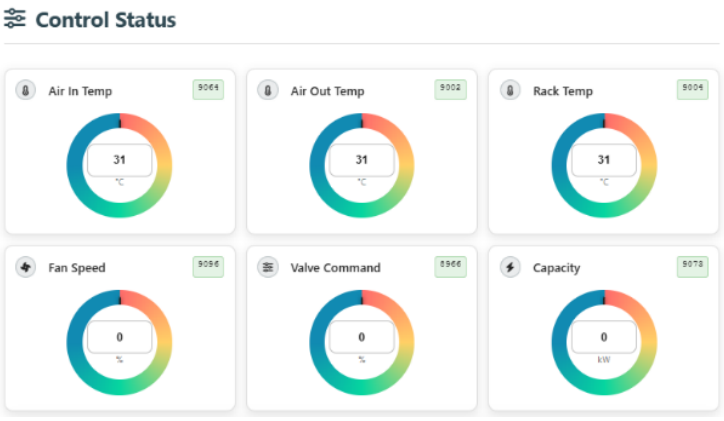


Figure 98. Control Status

- The “Air in Temp” shows the Air on into Coil temperature which is controls the Fan speed
- The “Air Out Temp” shows the Air off temperature which is controls the Valve Open/Close
- The “Rack in Temp” shows the Rack front temperature, this has no control function.
- The “Fan speed” shows the fan running speed.
- The “Valve Open” shows position of valve open condition

- The “Capacity” shows the actual running capacity of unit.

Figure 100. Fan Status

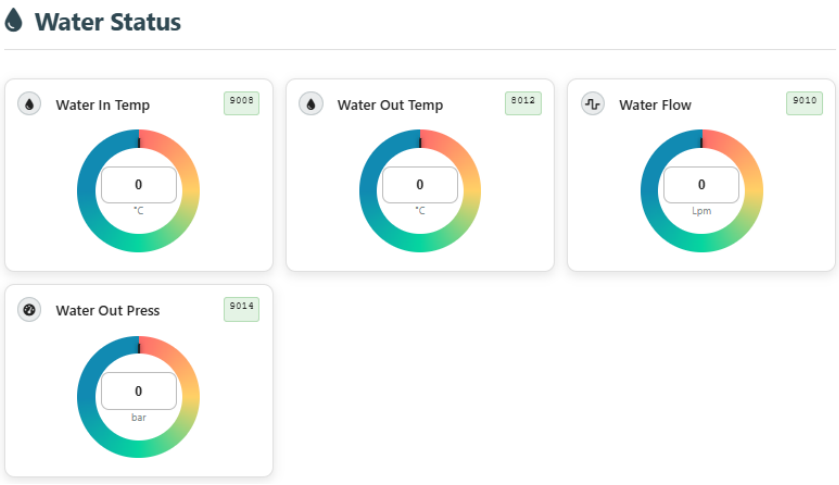


Figure 99. Water Status

- Fan feedback shows the F1 to F6 individual Fan running speed.
- The “EWT” shows the Entering Water temperature to the unit, this value will be available only the VFS sensor is available.
- The “LWT” shows the Leaving Water temperature from the unit, this value will be available only the RPS sensor is available.
- The “EWF” shows the Entering Water flow to the unit, this value will be available only the VFS sensor is available.
- The “LWP shows the Leaving Water pressure (Return Water) from the unit, this value will be available only the RPS sensor is available.

There are Two Power sources are available in the system POWER A and POWER B

- IF the Power is available, display shows as Green.
- IF the Power is not available, display shows as Red.

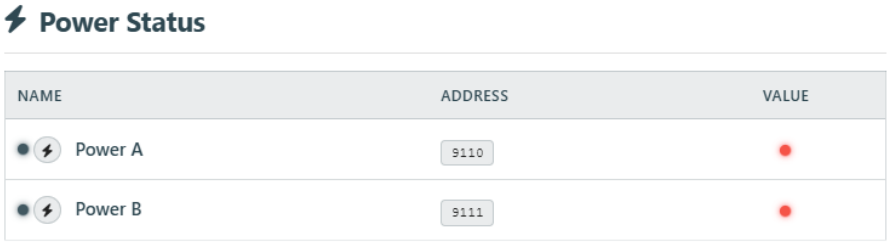


Figure 101. Power Status

Control settings

The control page is protected by password, when pressing the Control tab below pop will be displayed.

The password is 8080.

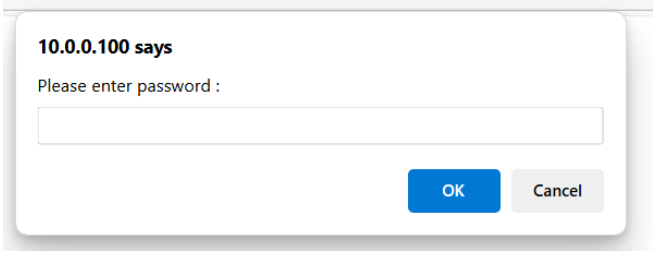


Figure 102. Sign In

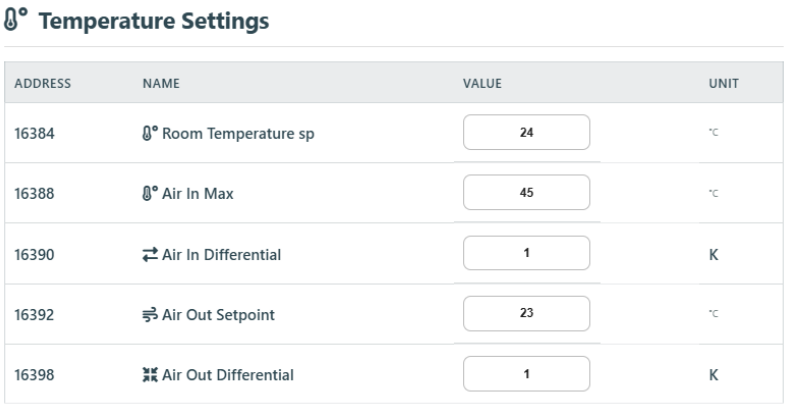


Figure 103. Temperature Settings

- The Room & Air in Temperature parameters are used to control the fan speed.
- The difference between Room temperature and Air in Temperature setpoint range over which fan will go from minimum speed and maximum speed.
- The Air Out Temperature parameters are used to control the Valve open/close.
- The differential values are used to calculate the minimum and maximum temperature values that unit must be operated.

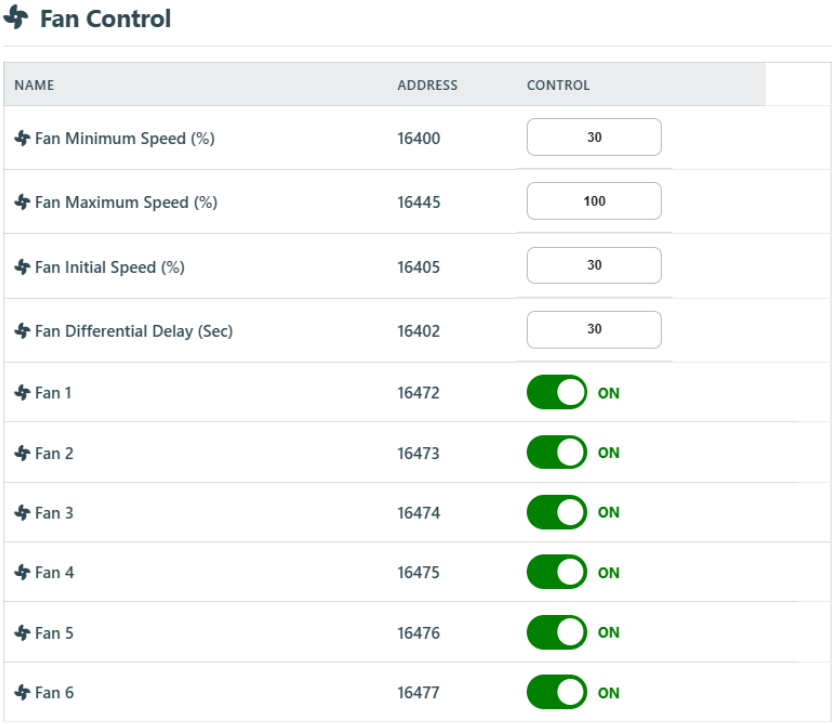


Figure 104. Fan Control

- The fans are controlled by the temperature on the front of RDHx and back side of IT Equipment.
- The fan parameters can be varied depending on equipment and operation parameters.
- The Fan Minimum speed is the speed a fan operates at when Air in temperature below the Room temperature setpoint.
- In startup all the fans operate at Initial speed.
- The Fan Maximum speed will have been set at site based on the expected maximum speed that unit transfers the heat from the RDHx.
- Fan differential delay is ensuring the fan speed modulation periodically to avoid the false results.
- Number of Fans can be enabled based on-Site requirements, by default all the fans are active(true).
- If Fan is not activated, the alarms of the corresponding fan also do not activate.

Figure 105. Valve Control

- The valve is controlled purely by the Air Out temperature

- The Valve Minimum Open is the position when Air Out temperature is below the setpoint.
- In startup all the valve opens at Initial Open position, this can adjust at site conditions.
- The Valve Maximum open will have been set at site based on the expected maximum speed that unit transfers the heat from the RDHx.
- Valve differential delay is ensuring the valve opening periodically to avoid the false results.

Factory setting

The control page is protected by password, when pressing the Factory tab below pop will be displayed.

The password is 9090.

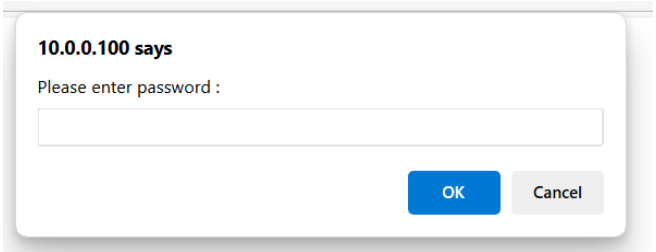


Figure 106. Password Interface

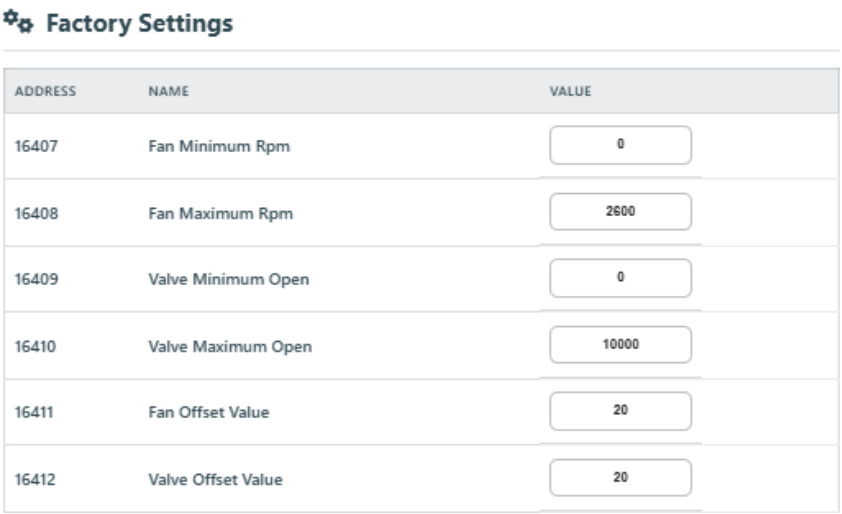


Figure 107. Factory Setting

- Fan minimum Rpm & Fan Maximum Rpm are the parameters of fan, it can be modified at site operations, so that modulation will happen within this set values.
- Valve minimum Open & Valve Maximum Open are the parameters of valve, it can be modified at site operations, so that valve position modulation will happen with in this set values.
- Fan offset & Valve offset are the Offset parameters to decide the ratio of fan speed and valve opening modulations.

Leakage Sensor Settings

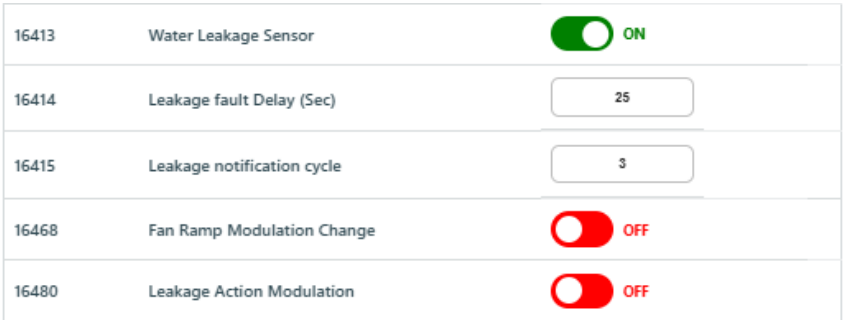


Figure 108. Leakage Sensor Settings

- Water Leakage sensor to activate the leakage sensor function normally is an optional sensor.
- The delay and notification count that decides if the leakage happens during the operation and creates an alarm as leakage fault.
- Fan Ramp Modulation is an Option to change fan modulation (Optional)

Water Sensor Settings

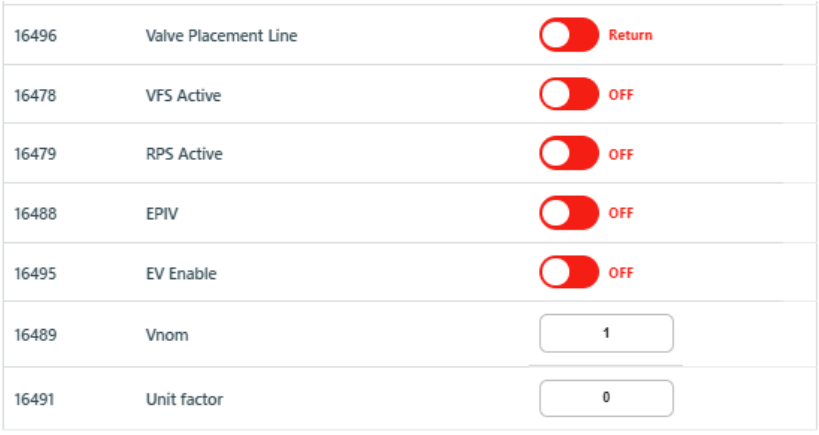


Figure 109. Water Sensor Settings

- VFS is a sensor used to monitor the Water In supply (Entering Water) Temperature and Flow rate.
- RPS is a sensor used to monitor the Return water (Leaving Water) Temperature and Pressure.
- If the above options (VFS and RPS) are not enabled, the functions of sensor will not be functioned.
- EPIV is a parameter to enable the EPIV valve, then RPS is need to enable the RPS is used.
- EV Enable is a parameter to enable the EV valve, if it is enabling remaining selection option will reset to default.
- Vnom & Unit factor parameters are used to calculate the actual flow and temperature according to the valve models used (applicable for EPIV &EV).

Program Control settings

Program Control

Address	Name	Value	Um
16416	Fan Scale Min (%)	0	
16417	Fan Scale Max (%)	100	
16418	Valve scale Min (%)	0	
16419	Valve Scale Max (%)	100	
16456	Fan Offset Mul Factor (%)	4	
16455	Valve Offset Mul Factor (%)	4	
16420	Temp Alarm Bypass	False	
16421	Fan Alarm Bypass	False	
16422	Valve Alarm Bypass	False	
16423	Water Leakage Bypass	False	
16424	System Reset	False	

Figure 110. Program Control

Basically, program settings are applicable for Manufacturers, Password protected.

Common settings

Metric Selection

NAME	ADDRESS	VALUE
Celsius / Fahrenheit	16428	C
Bar/Psi	16447	Bar
Lpm/Gpm	16448	Lpm

Figure 111. Metric Selection

Metric selection provides the options to change the units

By default, temperature units are Celsius °C, this can change to Fahrenheit.

By default, pressure units are Bar, this can change to Psi.

By default, Water flow units are Lpm, this can change to Gpm.

Network Settings

- The RDHx is delivered with default Ip Address of 10.0.0.100 or 192.168.0.100 and sub net is 255.255.255.0.
- Ip address and other network details can be edited as per the site network requirement.
- The other method of assigning Ip details is enabled the Automatic DCHP method, once the DCHP option is enabled automatically Ip details will assign as per the network connection so the same can be used for other integrations.

Figure 112. Network Settings

Date & Time settings

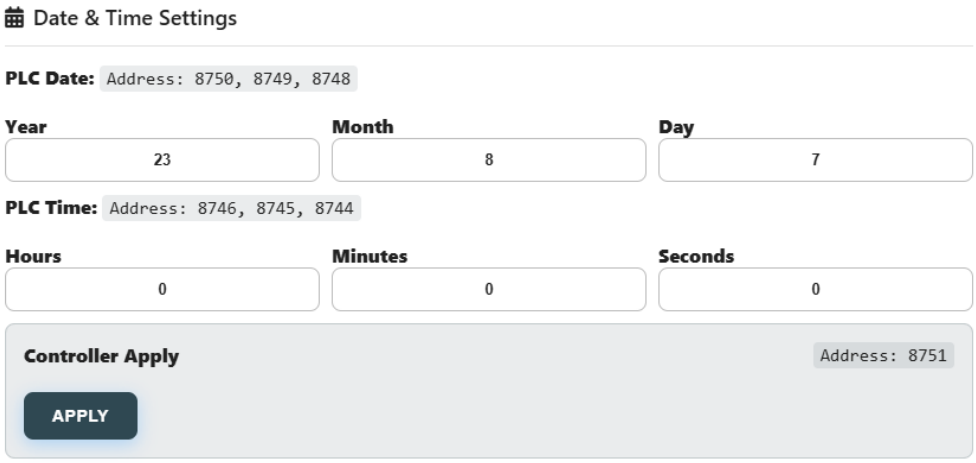


Figure 113. Date & Time

- The RDHx controller has internal date/time memorizing capabilities, but sometimes it necessary to adjust Date/ Time based on region/Zone changes.
- Enter the present Date/Time if it necessary and press the Controller Apply button in the above screen so that actual Date/Time will update to controller, the same timing will follow.
- If the HMI display shows the incorrect Date/Time, then press the Display apply button to adjust the actual Date/Time to Display.
- Parameter enables the preventive maintenance warning notification from the date of selection (Q. Yearly or H. Yearly or Yearly). It's mandatory to select a period to enable PM warning of unit.

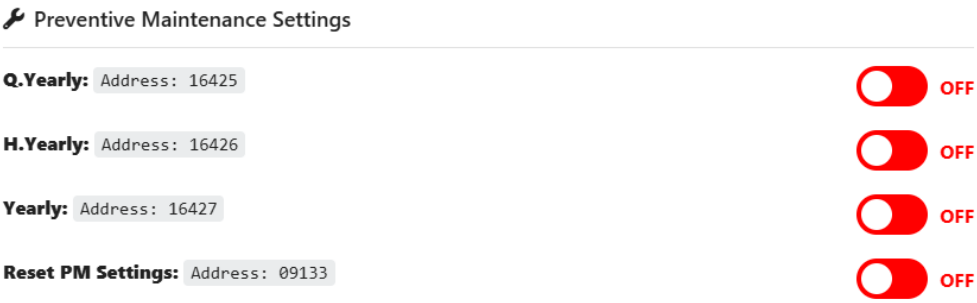


Figure 114. PM Settings

- Q. Yearly: Every 3 Months from the date of selection warning will be displayed.
- H. Yearly: Every 6 Months from the date of selection warning will be displayed.
- Yearly: Every 12 Months from the date of selection warning will be displayed.
- PM Reset is reset the current period of PM setting, if necessary, only for Maintenance purpose of unit.
- After the PM activity, need to again enable the PM1parameter for next cycle.

Figure 115. Installation Details

Installation details are an option to enter the Installation date for calculate the number of days from the installation date.

Manual Testing

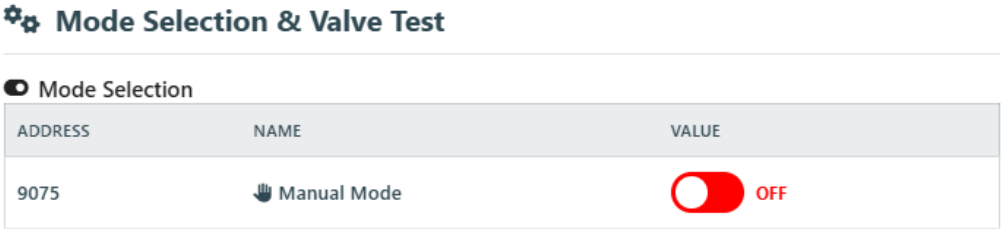


Figure 116. Mode Selection

Note: Manual Mode operates only when the unit is “OFF” condition. After testing completes its mandatory to select “Off” so that system will function in “Auto Mode”

- Press “On” to Enable the Manual Mode.

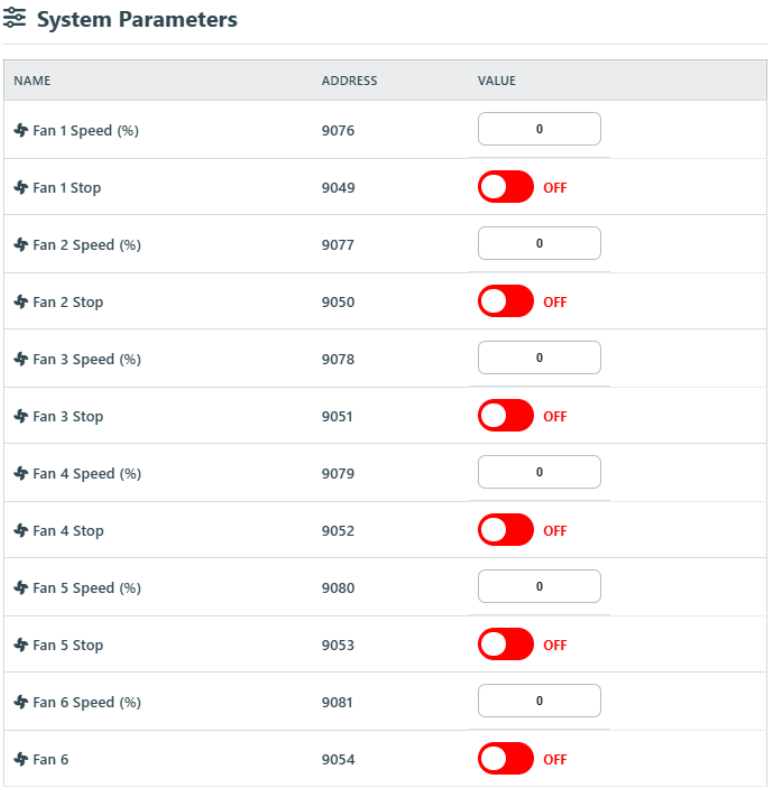


Figure 117. Fan Test

- Manual fan test possible here, Set the required speed (10 % to 100%) the fan will start running in manual mode.
- Select the Fan turn to “Off” to stop the fan in manual mode.
- Select the Fan turn to “On” and enter “0” in fan speed Field. So that fan will not be running.

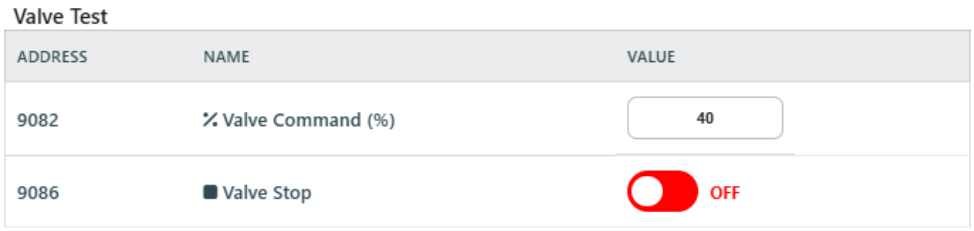


Figure 118. Valve Test

- Manual Valve test possible here, Set the required opening command (10 % to 100%) the valve will start opening in manual mode.
- Select the Valve stop to “Off” to stop the valve in manual mode.
- Select the valve stop to “On” and enter “0” in valve command. So that valve will be fully closed.

IO Status

- The IO status of Analog & Digital is used to monitor the healthy and working conditions of hardware devices which are used in RDHx.

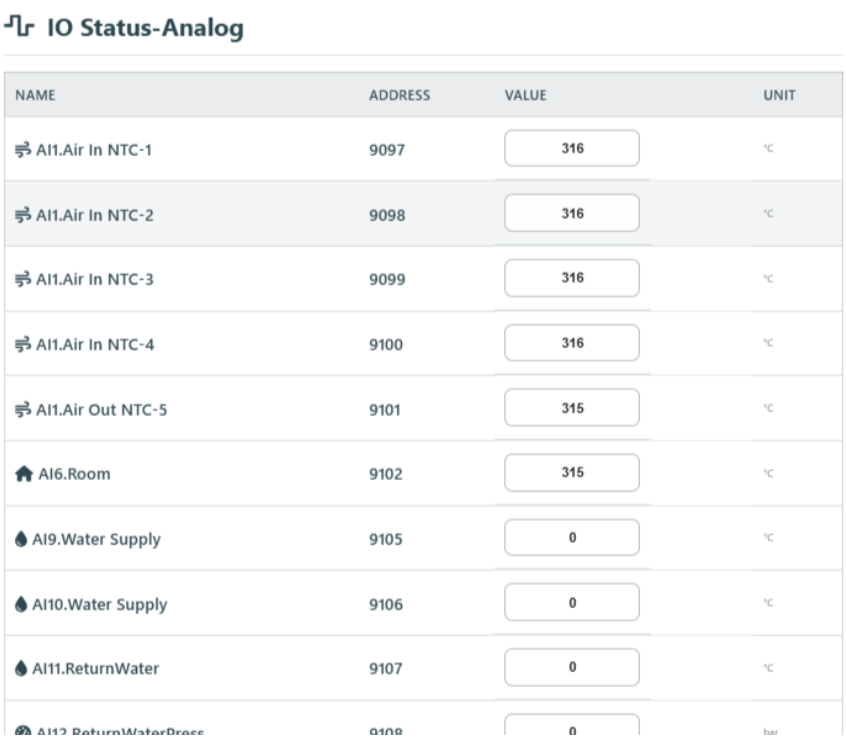


Figure 119. IO Status - Analog

IO Status-Digital

NAME	ADDRESS	VALUE
DI3-Water Leakage sensor	9109	
DI4-Power Source A	9110	
DI5-Power Source B	9111	
DO3-RedLight	9112	
DO4-GreenLight	9113	

Figure 120. IO Status - Digital

Alarm Settings

Alarm Threshold Setting

ADDRESS	NAME	VALUE	UNIT
16449	A1 : Air In Temp Low	20	℃
16451	A2 : Air In Temp High	60	℃
16429	A3 : Air Out Temp Low	17	℃
16431	A4 : Air Out Temp High	27	℃
16433	A5 : Water In Temp Low	15	℃

Figure 121. Alarm Setting (A1~A6)

16437	A7 : Water Out Temp Low	15	℃
16439	A8 : Water Out Temp High	40	℃
16441	A9 : Fan speed Threshold	2	%
16442	A10 : Fan speed Threshold Delay	30	Sec
16443	A11 : Valve Fbk Threshold	2	%
16444	A12 : Valve Fbk Threshold Delay	30	Sec
16386	A13 : Rack In Temp Low	17	℃
16453	A14 : Rack In Temp High	27	℃
16460	A15 : Water In Flow Low	10	L/min
16462	A16 : Water In Flow High	140	L/min
16464	A17 : Return Water Pressure Low	2	bar
16466	A18 : Return Water Pressure High	6	bar

Figure 122. Alarm Setting (A7~A18

- A1 & A2 Setup an Alarm to indicate the Air In temperature at the front of the unit that reaches preset

temperature.

- A3 & A4 Setup an Alarm to indicate the Air Out temperature at the back of the rack reaches preset temperature.
- A5 & A6 Setup an Alarm to indicate the Water In temperature to the unit that reaches preset temperature. (Only applicable for VFS sensor availability).
- A7 & A8 Setup an Alarm to indicate the Return Water temperature from the unit that reaches preset temperature. (Only applicable for RPSS sensor availability)
- A9 is a Fan threshold value, when the fan run command and actual running feedback are not in the range of threshold % then the fan threshold not in range alarm will appear. A10 is a delay that waits for a time to monitor Fan modulation.
- A11 is a Valve threshold value, when the valve opening command and actual opened feedback are not in the range of threshold % then the valve threshold not in range alarm will appear. A12 is a delay that waits for a time to monitor valve modulation.
- A13 & A14 Setup an Alarm to indicate the Room temperature at the front of the rack reaches preset temperature.
- A15 & A16 Setup an Alarm to indicate the Water In flow rate to the unit that reaches preset value. (Only applicable for VFS sensor availability).
- A17 & A18 Setup an Alarm to indicate the Return Water pressure from the unit that reaches preset value. (Only applicable for RPS sensor availability).

ALARM	MESSAGE
A01	A01 : Valve Communication Fault - ACTIVE
A02	A02 : Fan1 Communication Fault - ACTIVE
A03	A03 : Fan2 Communication Fault - ACTIVE
A04	A04 : Fan3 Communication Fault - ACTIVE
A05	A05 : Fan4 Communication Fault - ACTIVE
A06	A06 : Fan5 Communication Fault - ACTIVE
A07	A07 : Fan6 Communication Fault - ACTIVE
A08	A08 : Power Source A fault - ACTIVE
A09	A09 : Power Source B fault - ACTIVE
A10	A10 : Air In Temp Sensor 1 failed - ACTIVE
A11	A11 : Air In Temp Sensor 2 failed - ACTIVE
A12	A12 : Air In Temp Sensor 3 failed - ACTIVE
A13	A13 : Air In Temp Sensor 4 failed - ACTIVE
A14	A14 : Room Temperature sensor Failed - ACTIVE
A16	A16 : AirOut Temperature Sensor Failed - ACTIVE

Figure 123. Alarm Notifications

Part Ⅶ. Maintenance and Troubleshooting

Weekly Checks

- Visual Inspection: Inspect the unit for any visible signs of wear, leaks, or corrosion.
- Leak Detection Sensor: Verify the operation of the leakage detection sensor. Ensure that it is free of obstructions and that the signal response is functioning correctly.
- Cooling System Status: Check the coolant flow rate and water pressure to ensure they are within the recommended operating range.

Monthly Maintenance

- Fan Operation Check: Inspect and test the EC fans to ensure smooth operation. Check for unusual vibrations or noise that may indicate wear or imbalance.
- Control Panel Functionality: Verify the response of the control panel buttons and the accuracy of displayed readings. Ensure all LED indicators and status alarms are functioning correctly.
- Piping and Connections: Inspect all water pipes, hoses, and fittings for signs of wear, corrosion, or leaks. Ensure that connections are tight and that there are no blockages.

Quarterly Checks

- Internal Components Inspection: Open the unit (if safe to do so) and inspect internal components such as the heat exchanger and fans for dust accumulation or damage.
- Electrical Connections: Check all electrical connections for proper tightness and insulation. Ensure that power feeds (A & B) are connected securely and show no signs of wear or deterioration.
- Calibration and Adjustment: Calibrate the temperature sensors, flow rate sensors, and other monitoring devices to ensure accurate performance readings.

Annual Maintenance

- Comprehensive System Check: Perform a comprehensive review of the entire system, ensuring that all components are in good working condition and have no potential points of failure.
- Fan and Valve Maintenance: Conduct a thorough inspection of the fans, motors, and valves, replacing any parts that are worn or damaged.
- System Software Update: Ensure that the unit's firmware and software are up to date with the latest improvements and security patches.

Cleaning and Water Quality Management

Cleaning Guidelines

- Fan Cleaning: Periodically clean the EC fans using a soft brush or compressed air to remove any dust or debris that may obstruct airflow. Ensure that fans are powered off before cleaning.
- Heat Exchanger Cleaning: Use appropriate cleaning solutions (non-corrosive) to clean the heat exchanger surface. Ensure the solution does not damage the fins or interfere with heat transfer efficiency.
- Control Panel Cleaning: Clean the control panel and surrounding areas using a dry cloth. Avoid using abrasive materials that may scratch or damage the display.
- Exterior Surface Cleaning: Wipe down the unit's exterior with a soft cloth dampened with water and mild detergent. Avoid harsh chemicals that may degrade the unit's finish.

Water Quality Management

- Water Quality Monitoring: Regularly test the water quality in the cooling system. Check for pH levels, conductivity, and contaminant concentrations. Ensure that water is free from minerals that can cause scaling or corrosion.
- Water Treatment: If necessary, treat the water with a suitable cooling water additive to prevent corrosion, scaling, and microbiological growth.
- Water Filter Maintenance: If the system is equipped with filters, inspect and clean or replace them at regular intervals as recommended by the manufacturer.
- Water Chemistry Adjustment: Regularly adjust the water chemistry to maintain proper water hardness and alkalinity. This will ensure the longevity of internal components and improve overall system efficiency.

Alarms & Trouble shooting

Table 14. Alarm & Trouble shooting

Code	Description	Causes	Solution
A01	Valve Communication Fault	1.NO communication between Controller & Valve. 2.RS 485 Communication Lost	1.Make sure the Valve power 24V DC cable “A 17” connected correct way in “J1” Connector. 2.Make sure the Communication cable “A17” connected correct way in “J1” Connector.
A02	Fan1 Communication Fault	1.NO communication between controller & Fan 1. 2.RS 485 Communication Lost	1.Make sure the Fan 1 single phase power connection cable “A11” in “J21” Connector. 2.Make sure the Communication cable “A05_1” connected correct way in “J21” Connector.
A03	Fan2 Communication Fault	1.NO communication between controller & Fan 2. 2.RS 485 Communication Lost	1.Make sure the Fan 2 single phase power connection cable “A12” in “J22” Connector. 2.Make sure the Communication cable “A05_2” connected correct way in “J22” Connector.
A04	Fan3 Communication Fault	1.NO communication between controller & Fan 3. 2.RS 485 Communication Lost	1.Make sure the Fan 3 single phase power connection cable “A13” in “J23” Connector. 2.Make sure the Communication cable “A05_3” connected correct way in “J23” Connector.
A05	Fan4 Communication Fault	1.NO communication between controller & Fan 4. 2.RS 485 Communication Lost	1.Make sure the Fan 4 single phase power connection cable “A14” in “J24” Connector. 2.Make sure the Communication cable “A05_4” connected correct way in “J24” Connector.
A06	Fan5 Communication Fault	1.NO communication between controller & Fan 5. 2.RS 485 Communication Lost	1.Make sure the Fan 5 single phase power connection cable “A15” in “J25” Connector. 2.Make sure the Communication cable “A05_5” connected correct way in “J25” Connector.
A07	Fan6 Communication Fault	1.NO communication between controller & Fan 6. 2.RS 485 Communication Lost	1.Make sure the Fan 6 single phase power connection cable “A16” in “J26” Connector. 2.Make sure the Communication cable “A05_6” connected correct way in “J26” Connector.
A08	Power Source A fault	1.NO incoming power source 200V –	1. Make sure the power

		240V AC in C19/20 connector	source is available in power A connector 2. Make sure FU1, FU2 is healthy . 3.Make sure relay KA1 is healthy
A10	In Temp Sensor 1 failed	1.Air In temperature sensor 1 failed to send the values	1.Make sure the temperature sensor “U1-TS1” physically not damaged. 2. Make sure the “U1-TS1” cable connected correct way in “J2” connector. 3. Make sure the “CAN 5” connector connected properly in controller.
A11	In Temp Sensor 2 failed	1.Air In temperature sensor 2 failed to send the values	1.Make sure the temperature sensor “U2-TS2” physically not damaged. 2. Make sure the “U2-TS2” cable connected correct way in “J2” connector. 3. Make sure the “CAN 5” connector connected properly in controller.
A12	In Temp Sensor 3 failed	1.Air In temperature sensor 3 failed to send the values	1.Make sure the temperature sensor “B1-TS3” physically not damaged. 2. Make sure the “B1-TS3” cable connected correct way in “J2” connector. 3. Make sure the “CAN 5” connector connected properly in controller.
A13	In Temp Sensor 4 failed	1.Air In temperature sensor 4 failed to send the values	1.Make sure the temperature sensor “B2-TS4” physically not damaged. 2. Make sure the “B2-TS4” cable connected correct way in “J2” connector. 3. Make sure the “CAN 5” connector connected properly in controller.
A14	Room Temperature sensor Failed	1.Room temperature sensor failed to send the values	1.Make sure the Room temperature sensor “TS6” physically not damaged. 2. Make sure the “TS6” cable connected correct way in “J2” connector. 3. Make sure the “CAN 5” connector connected properly in controller.
A15	Room Humidity Sensor Failed (Spare)	1.Room humidity sensor failed to send the values	1.Make sure the Room humidity sensor “TS7” physically not damaged. 2. Make sure the “TS7” cable connected correct way in “J2” connector. 3. Make sure the “CAN 5” connector connected

			properly in controller.
A16	Air Out Temperature Sensor Failed	1.Air Outlet temperature sensor failed to send the values	1.Make sure the outlet temperature sensor “TS5” physically not damaged. 2. Make sure the “TS5” cable connected correct way in “J2” connector. 3. Make sure the “CAN 5” connector connected properly in controller.
A17	In Water Flow Sensor Failed	1.The VFS sensor failed to send the values.	1. Make sure the VFS sensor is physically not damaged. 2. Make sure the 5V dc cable “A20” connected correct way in “J3” connector. 3. Make sure the signal transmission cable “A20” connected correct way in “J3” connector. 4. Make sure the “CAN 13” connector connected properly in controller.
A18	In Water Temperature Sensor Failed	1.The VFS sensor failed to send the values.	1. Make sure the VFS sensor is physically not damaged. 2. Make sure the 5V dc cable “A20” connected correct way in “J3” connector. 3. Make sure the signal transmission cable “A20” connected correct way in “J3” connector. 4. Make sure the “CAN 13” connector connected properly in controller.
A19	Return Water Temperature Sensor Failed	1.The RPS sensor failed to send the values.	1. Make sure the RPS sensor is not damaged physically. 2. Make sure the 5V dc cable “A21” connected correct way in “J3” connector. 3. Make sure the signal transmission cable “A21” connected correct way in “J3” connector. 4. Make sure the “CAN 13” connector connected properly in controller.
A21	Air In Temperature is High	1.Actual Air in temperature is higher than the set value.	1. Make sure the correct parameter set value in Alarm settings screen in HMI or Web UI. 2. Make sure all the fans are running as per the values which are displayed on the status screen. Not below the displayed values. 3.If above points are ok then press the Alarm Ack button in HMI.

A22	Air In Temperature is Low	1.Actual Air in temperature is lower than the set value.	1. Make sure the correct parameter set value in Alarm settings screen in HMI or Web UI. 2. Make sure all the fans are running as per the values which are displayed on the status screen. Not maximum the displayed values. 3.If above points are ok then press the Alarm Ack button in HMI.
A23	Air Out Temperature is High	1.Actual Air out temperature is higher than the set value.	1. Make sure the correct parameter set value in Alarm settings screen in HMI or Web UI. 2. Make sure the valve is running as per the values which are displayed on the status screen. 3. Make sure proper water flow is available. 4. If above points are ok then press the Alarm Ack button in HMI.
A24	Air Out Temperature is Low	1.Actual Air out temperature is lower than the set value.	1. Make sure the correct parameter set value in Alarm settings screen in HMI or Web UI. 2. Make sure the valve is running as per the values which are displayed on the status screen. 3. Make sure proper water flow is available. 4. If above points are ok then press the Alarm Ack button in HMI.
A25	Room Temperature is High	1.Actual room temperature (Rack In) is higher than the set value.	1. Make sure the correct parameter set value in Alarm settings screen in HMI or Web UI. 2. Make sure room infra temperature like AC or centralizing system. 3.If above points are ok then press the Alarm Ack button in HMI.
A26	Room Temperature is Low	1.Actual room temperature (Rack In) is lower than the set value.	1. Make sure the correct parameter set value in Alarm settings screen in HMI or Web UI. 2. Make sure room infra temperature like AC or centralizing system. 3.If above points are ok then press the Alarm Ack button in HMI.
A27	Air In Process Temperature High	If fan is running at high speed still actual air in temperature is higher than the set value, then this fault occurs.	1.Make sure all the fans are running as per the command 2.Make sure the temperature sensors are functioning properly. 3.If server is running as higher temperature then

			adjust the “Room temperature setpoint “in control-temperature screen. 4. If above points are ok then press the Alarm Ack button in HMI.
A28	Air In Process Temperature Low	If fan is running at minimum speed still actual air in value is lower than the set value, then this fault occurs.	1.Make sure all the fans are running as per the command 2.Make sure the temperature sensors are functioning properly. 3.If server is running as lower temperature then adjust the “Room temperature setpoint” in control-temperature screen. 4. If above points are ok then press the Alarm Ack button in HMI.
A29	Air Out Process Temperature High	If valve is maximum open still actual air outlet temperature is higher than the set value, then this fault occurs.	1.Make sure the valve is open as per the command. 2. Make sure the outlet temperature sensor is functioning properly. 3. Make sure there is enough water supplied to the unit. If it requires adjust the “Air out temperature set point” in Control – Temperature Screen 4. If above points are ok then press the Alarm Ack button in HMI.
A30	Air Out Process Temperature Low	If valve is minimum open and the actual air outlet temperature is lower than the set value, then this fault occurs.	1.Make sure the valve is open as per the command 2. Make sure the outlet temperature sensor is functioning properly. 3. Make sure there is enough water supplied to the unit. If it requires adjust the “Air out temperature set point” in Control – Temperature Screen 4. If above points are ok then press the Alarm Ack button in HMI.
A31	Water Leakage Fault (Need Action)	Leakage sensor detects the water leak	1.Water leakage fault is optional; it detects the fault when leakage sensor enabled 2. Make sure there is not any water leakage. 3.Is there any leakage found fixed it. 4.If it requires adjusting the leakage fault delay or notifications cycle in factory settings screen. 5.If above points are ok then press the Alarm Ack button in HMI.
A32	Fan1 Threshold Value Not in	If the fan1 run command and actual running feedback is not in the threshold set value, then this fault	1. Make sure the fan1 is in running condition. 2.Make sure the fan1

	Range	occurs	running feedback and run command are within threshold setting range. 3.If it requires adjusting the fan speed threshold value in alarm settings screen. 4. If above points are ok then press the Alarm Ack button in HMI.
A33	Fan2 Threshold Value Not in Range	If the fan2 run command and actual running feedback is not in the threshold set value, then this fault occurs	1. Make sure the fan2 is in running condition. 2. Make sure the fan2 running feedback and run command are within threshold setting range. 3.If it requires adjusting the fan speed threshold value in alarm settings screen. 4. If above points are ok then press the Alarm Ack button in HMI.
A34	Fan3 Threshold Value Not in Range	If the fan3 run command and actual running feedback is not in the threshold set value, then this fault occurs	1. Make sure the fan3 is in running condition. 2. Make sure the fan3 running feedback and run command are within threshold setting range. 3.If it requires adjusting the fan speed threshold value in alarm settings screen. 4. If above points are ok then press the Alarm Ack button in HMI.
A35	Fan4 Threshold Value Not in Range	If the fan4 run command and actual running feedback is not in the threshold set value, then this fault occurs	1. Make sure the fan4 is in running condition. 2. Make sure the fan4 running feedback and run command are within threshold setting range. 3.If it requires adjusting the fan speed threshold value in alarm settings screen. 4. If above points are ok then press the Alarm Ack button in HMI.
A36	Fan5 Threshold Value Not in Range	If the fan5 run command and actual running feedback is not in the threshold set value, then this fault occurs	1.Make sure the fan5 is in running condition. 2. Make sure the fan5 running feedback and run command are within threshold setting range. 3.If it requires adjusting the fan speed threshold value in alarm settings screen.4. If above points are ok then press the Alarm Ack button in HMI.
A37	Fan6 Threshold Value Not in Range	If the fan6 run command and actual running feedback is not in the threshold set value, then this fault occurs	1.Make sure the fan6 is in running condition. 2. Make sure the fan6 running feedback and run command are within threshold setting range. 3.If it requires adjusting the fan speed threshold value in

			alarm settings screen. 4. If above points are ok then press the Alarm Ack button in HMI.
A38	Valve Threshold Value Not in Range	If the valve open command and actual opening feedback is not in the threshold set value, then this fault occurs	1.Make sure the valve is in healthy condition. 2. Make sure the valve running feedback and running command are within threshold setting range. 3 .If it requires adjusting the valve fbk threshold value in alarm settings screen. 4. If above points are ok then press the Alarm Ack button in HMI.
A39	In Water Temperature is High	1.Actual In water temperature is higher than the set value.	1. Make sure the correct parameter set value in Alarm settings screen in HMI or Web UI. 2. Make sure proper water flow is available. 3.If above points are ok then press the Alarm Ack button in HMI.
A40	In Water Temperature is Low	1.Actual In water temperature is lower than the set value.	1. Make sure the correct parameter set value in Alarm settings screen in HMI or Web UI. 2. Make sure proper water flow is available. 3.If above points are ok then press the Alarm Ack button in HMI.
A41	Out Water Temperature is Low	1.Actual Out water temperature is lower than the set value.	1. Make sure the correct parameter set value in Alarm settings screen in HMI or Web UI. 2. Make sure proper water flow is available. 3.If above points are ok then press the Alarm Ack button in HMI.
A42	Out Water Temperature is High	1.Actual Outlet water temperature is higher than the set value.	1. Make sure the correct parameter set value in Alarm settings screen in HMI or Web UI. 2. Make sure proper water flow is available. 3.If above points are ok then press the Alarm Ack button in HMI.
A43	Entering Water Flow High	1.Actual inlet water flow is higher than the set value.	1. Make sure the correct parameter set value in Alarm settings screen in HMI or Web UI. 2. Make sure proper water flow is available. 3.If above points are ok then press the Alarm Ack button in HMI.
A44	Entering Water Flow Low	1.Actual inlet water flow is lower than the set value.	1. Make sure the correct parameter set value in Alarm settings screen in HMI or

			Web UI. 2. Make sure proper water flow is available. 3.If above points are ok then press the Alarm Ack button in HMI.
A45	Leaving Water Pressure High	1.Actual outlet water pressure is higher than the set value.	1. Make sure the correct parameter set value in Alarm settings screen in HMI or Web UI. 2. Make sure proper water flow is available. 3.If above points are ok then press the Alarm Ack button in HMI.
A46	Leaving Water Pressure Low	1.Actual outlet water pressure is lower than the set value.	1. Make sure the correct parameter set value in Alarm settings screen in HMI or Web UI. 2. Make sure proper water flow is available. 3.If above points are ok then press the Alarm Ack button in HMI.
A47	Water Leakage Fault	1. Leakage sensor detects the water leak in unit	1.Water leakage fault is optional; it detects the fault when leakage sensor enabled 2. Make sure there is not any water leakage. 3.Is there any leakage found fixed it. 4.If it requires adjusting the leakage fault delay or notifications cycle in factory settings screen.
A48	Water Leakage Fault (Critical)	1. Leakage sensor detects the water leak in unit continuously	1. Make sure there is not any water leakage. 2.Is there any leakage found fixed it. 3.If it requires adjusting the leakage fault delay or notifications cycle in factory settings screen.
A49	Water Leakage Fault (Very Critical)	1. Leakage sensor detects the water leak in unit continuously final Warning.	1. Make sure there is not any water leakage. 2.Is there any leakage found fixed it. 3.If it requires adjusting the leakage fault delay or notifications cycle in factory settings screen.
A50..A55	Fan “X” Node Address:” X” Conflict	1.While replacing the Repaired fan when the running fan address is overlapping with new fan address.	1. Make sure the fan node address should not overlap 2.If it same address disconnect the running fan until the new fan gets new address then re connect it

Faulty Modular Replacement

Fan Modular Replacement

- Rotate the fixing buckle to the left, pull the handle, and remove the fan module from the door.

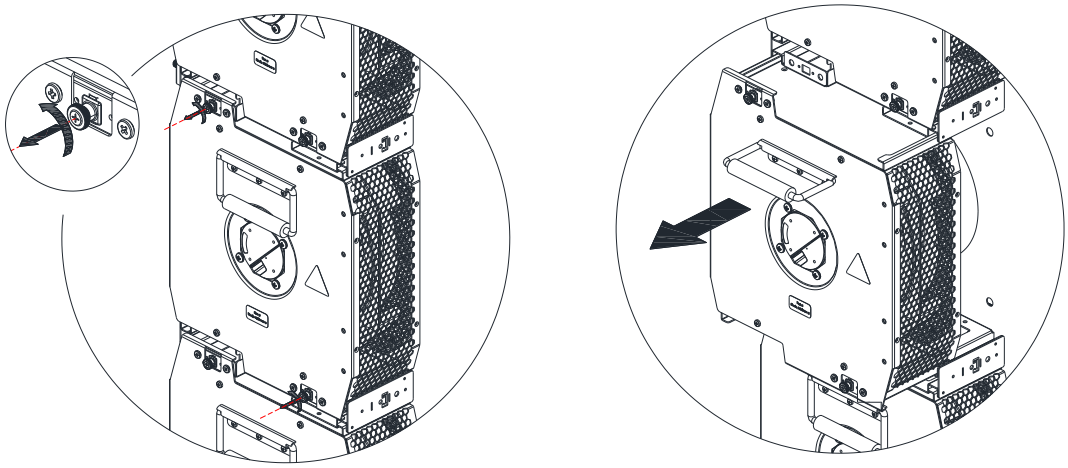


Figure 124. Fan Module Removal

⚠ ⚠ WARNING

SHOCK HAZARD

- CAUTION: Double pole, neutral fusing. Disconnect mains before servicing.

(ATTENTION. Double pôle/fusible sur le neutre. Débrancher l'alimentation avant l'entretien.）

- Arc flash and electric shock hazard. Can cause serious injury or death. Disconnect all local and remote electric power supplies before connecting.
- Installation, service, and maintenance work must be performed only by qualified personnel.
- Disconnect the device of the RDHx is the plug, and the output socket is easily accessible.

Failure to follow these instructions can result in serious injury, death, or equipment damage.

- The module supports hot swapping without power off, but please do not touch the contact interface.

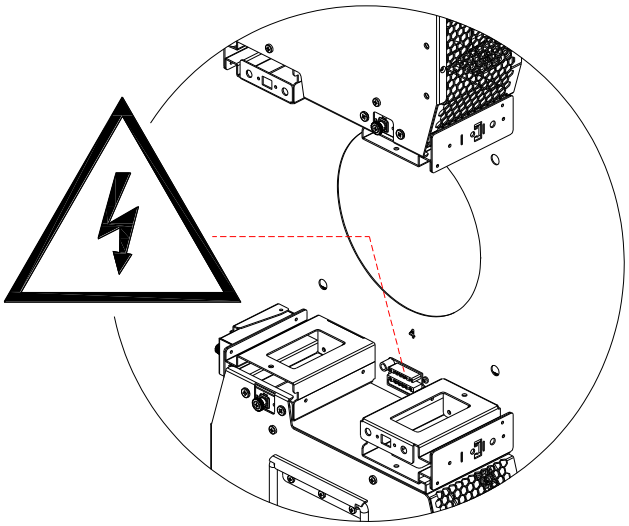


Figure 125. Shock Attention

- Push the new fan module into the slot, observe the positioning circular hole at the buckle, and when they are concentric, press the buckle to fix the fan module.

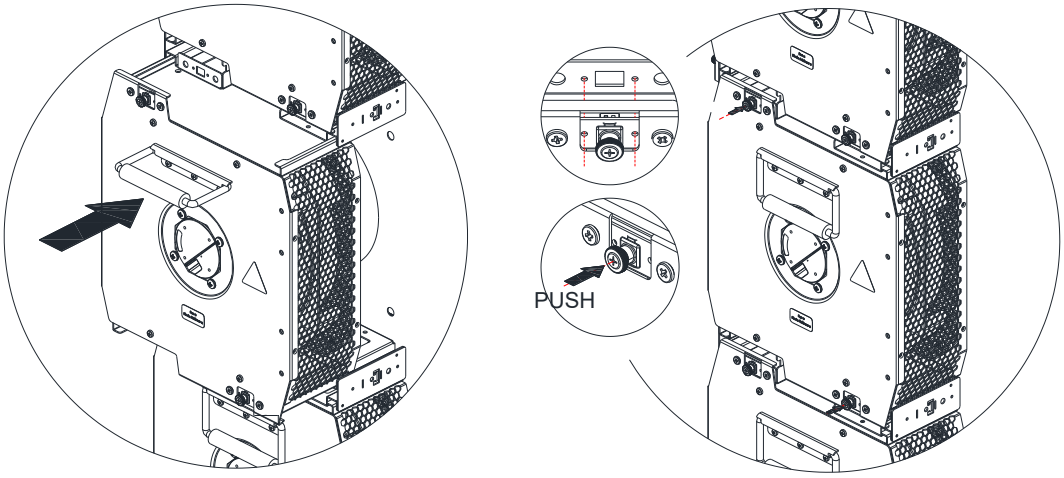


Figure 126. New Fan Module Installation

- Rewrite the address of the fan.

  Each time you insert only one replacement fan, by HMI to modify the fan address.

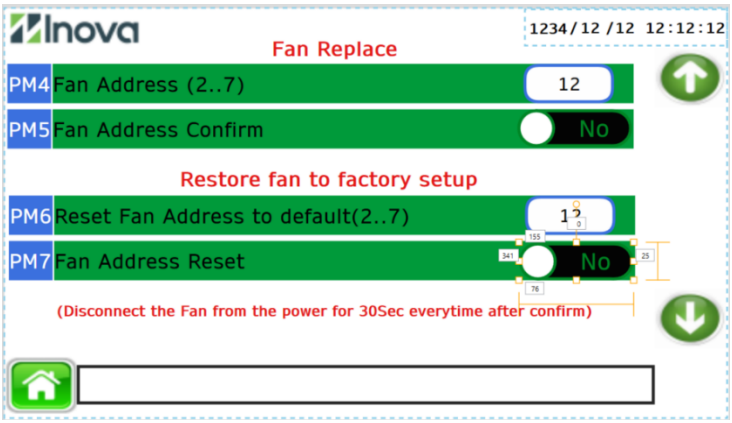


Figure 127. Fan Node Address Rewrite

- In case of any failure or modification on the fan, this screen helps to enable communication between the fan and controller.
- Generally, fan communication node starts from 2 to 7 from top to bottom.

If it is a new fan (Default address is 247) follow the following Steps

- 1.Place the fan into the unit
- 2.Enter the required fan address (PM4)
- 3.Press the Fan address confirm button (PM5) once the fan address updates the confirmation button will become initial position (No)
- 4.Disconnect the fan from the power for 30 seconds, LED on the fan will become off then connect the fan to the power

If the fan is old one and it's having the existing address of (2…7) any, follow below steps

- Place the fan into the unit.
- Enter the fan address (PM6) that needs to be restore default settings.
- Press the Fan address confirms button (PM7) once the fan address updates the confirmation button will become initial position (No)
- Disconnect the fan from the power for 30 seconds, LED on the fan will become off then connect the fan to the power
- Now the fan goes to default settings.
- Follow Method 1.

Control Box Replacement Guide

- Use a small flathead screwdriver to remove the fixing screws on the green sockets and unplug all sockets. Unplug the 3 power cords.

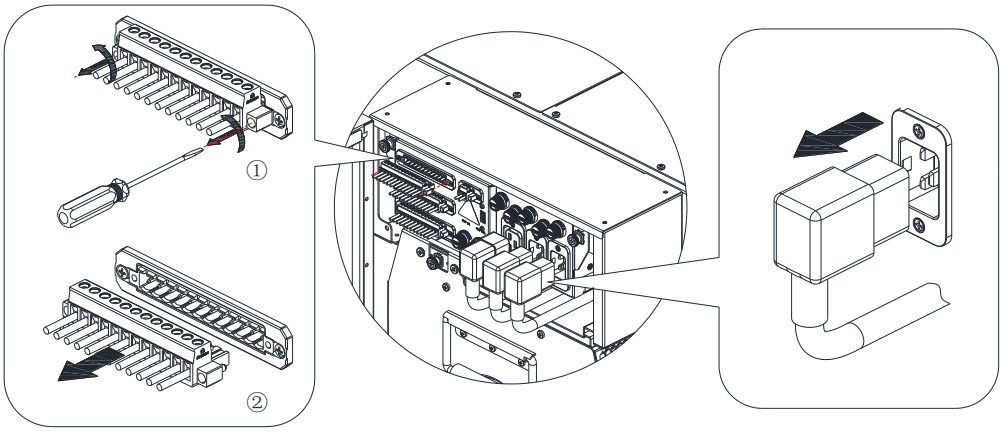


Figure 128. Screws and Plugs Removal

- Loose the Thumb screws and pull out the control box.

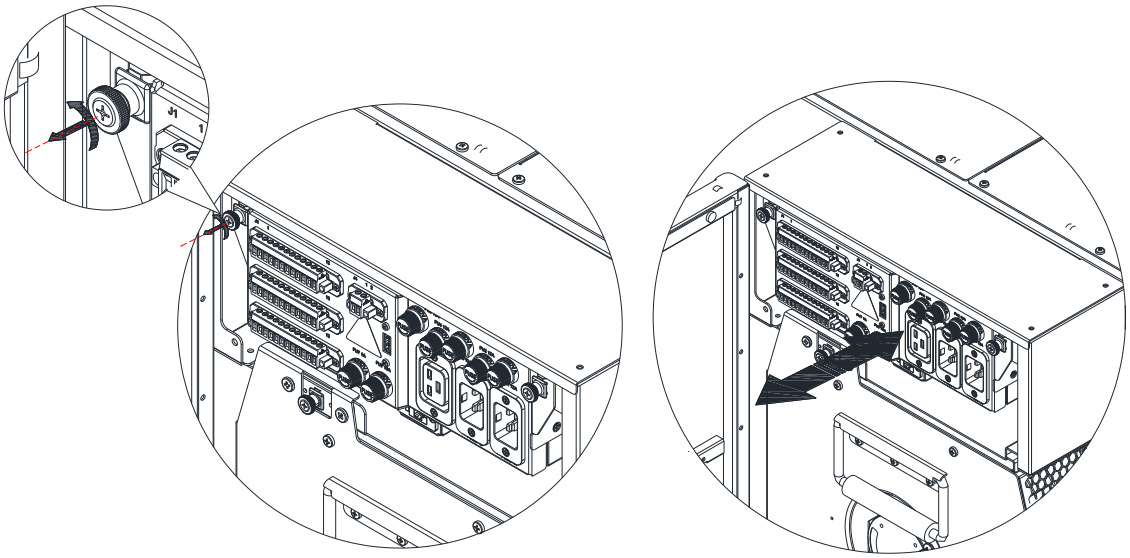


Figure 129. Control Box Removal

- Push the new control box in and tighten the Thumb screw to fix the control box. And reconnect all the sockets.

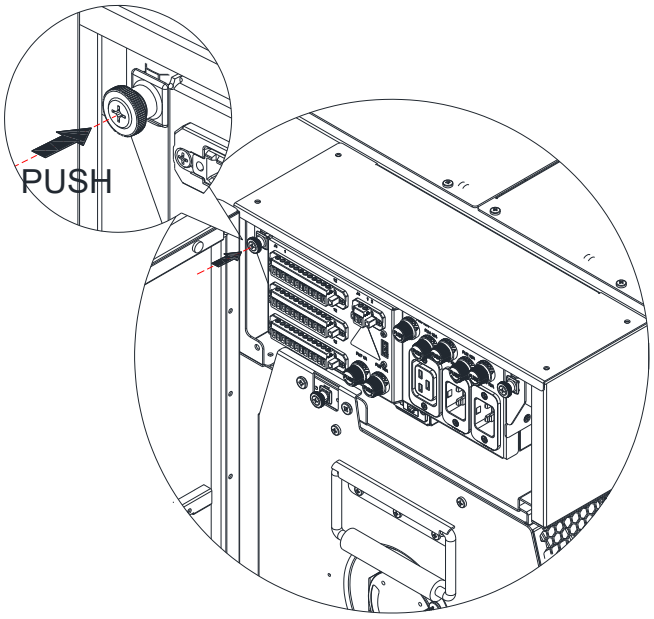


Figure 130. New Control Box Installation

Temperature Sensor Replacement Guide

The **RDHx** must be powered off before replacing a faulty temperature sensor.

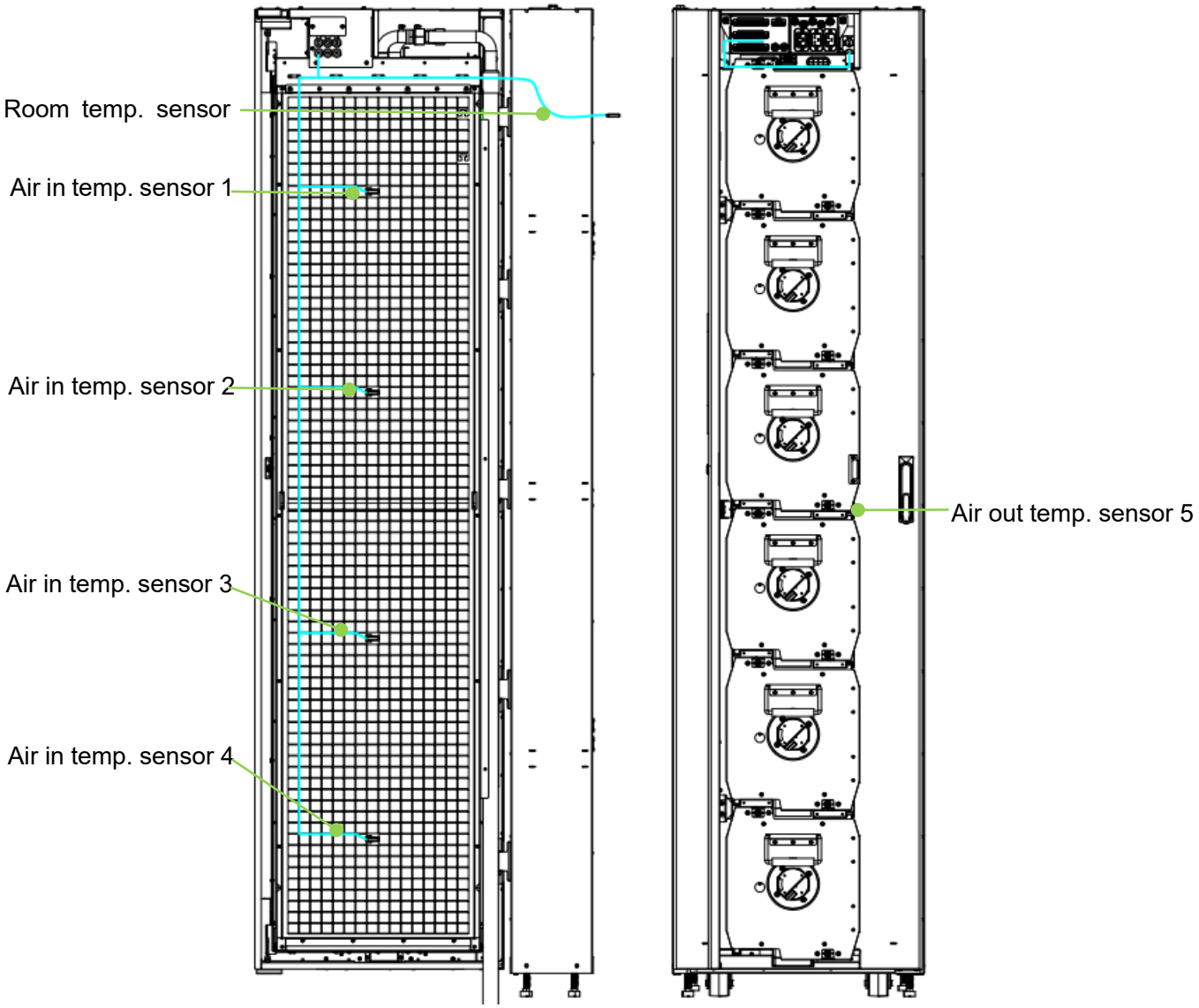


Figure 131. Air in Temperature Sensor Diagram

Table 15. Control Box Temperature Sensor Connection Ports

Terminal		Wire Core Colour	Description
J2	Pin 5	White	Signal out for room temp sensor 6
	Pin 6	Black	Signal COM for room temp sensor 6
	Pin 7	White	Signal out for Air in temp sensor 1
	Pin 8	White	Signal out for Air in temp sensor 2
	Pin 9	White	Signal out for Air in temp sensor 3
	Pin 10	White	Signal out for Air in temp sensor 4
	Pin 11	White	Signal out for Air out temp sensor 5
	Pin 12	Black	Signal COM for temp sensor 1 to 5

1) Replacement air in temperature or room temperature sensors steps.

- Use a small flathead screwdriver to remove the fixing screws on the green sockets of the J2 terminal from the power panel and pull out it.

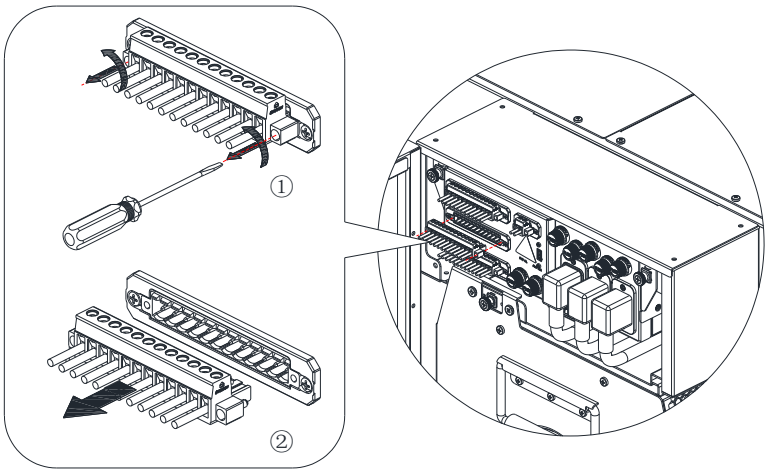


Figure 132. J2 Terminal Removal

- Remove the faulty air in temperature or room temperature sensors cable from the J2 terminal ports.
- Replace the new temperature sensor connection to the J2 terminal ports.
- Secure the sensor cable with ties.

2) Replacement air out temperature sensor seps.

- Use a small flathead screwdriver to remove the fixing screws on the green sockets of the J2 terminal from the power panel and pull out it.
- Replace the new temperature sensor connection to the J2 terminal ports.
- Move the rubber base to the left location and use the tie to fix the temperature probe.
- Use screws to fix the protective cover.
- Use diagonal pliers to cut the tie wrap of the faulty temperature sensor.
- Disconnect the faulty temperature sensor from the control box J2 connector.
- Connect the replacement temperature sensor to the corresponding position on the control box J2 connector and secure it with a tie wrap.

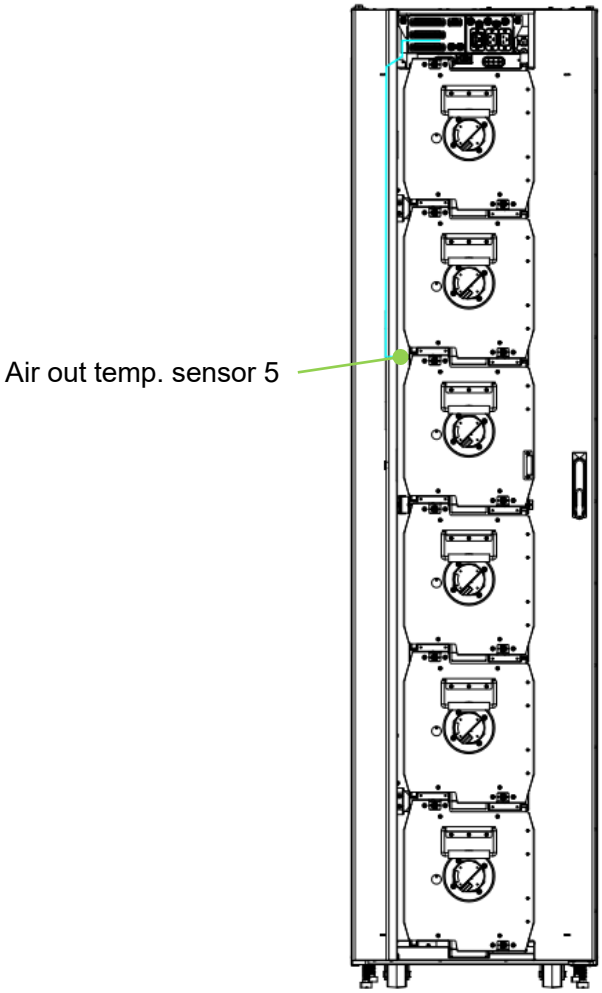


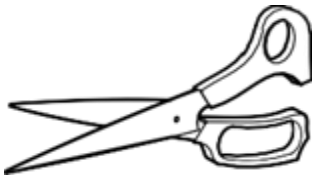
Figure 133. Air Out Temperature Sensor Diagram

LED Light Replacement Guide

Tool & Material List

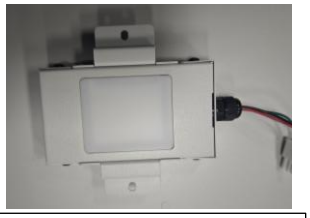
Electric screwdriver

PH2 Phillips screwdriver bit



Scissors

Cable tie



New Led light module

Figure 134. Tool List

- Open the fan cover.

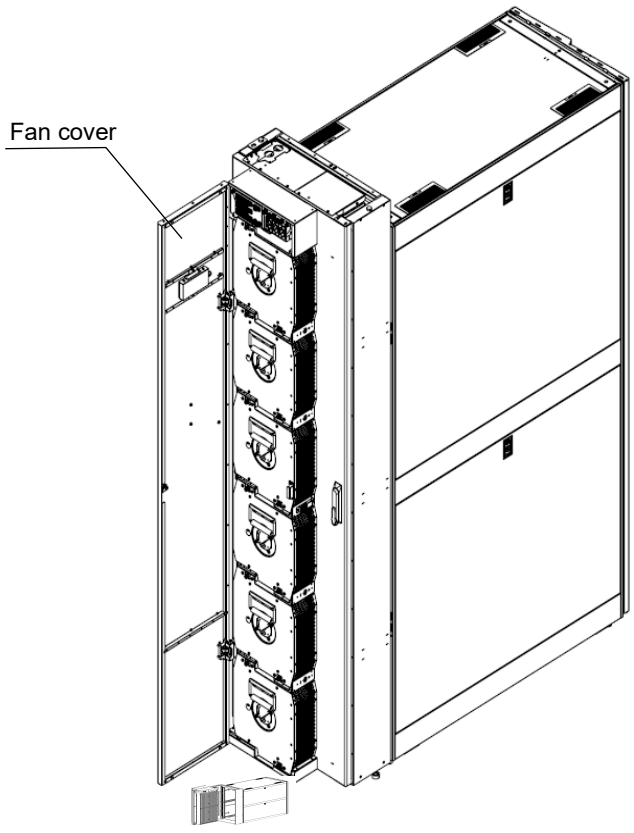


Figure 135. Fan Cover Open

➢

➢ Use the scissor to shear the cable tie, unplug the male and female connectors.

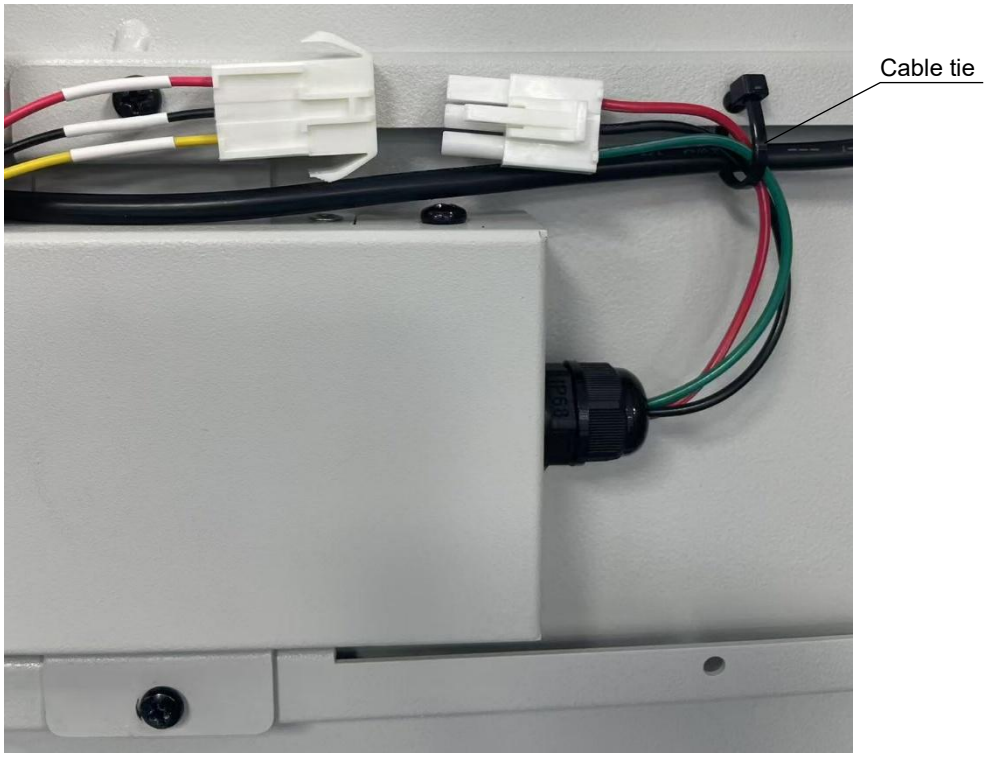


Figure 136. Unplug Connectors

➢ Remove the two screws and take off the Led light module.

Figure 137. LED Light Module Removal

- Plug the new Led light module male connector into the female connector, tighten the two screws to install the new Led light module, use the cable tie to fix the connector. Close the fan cover.

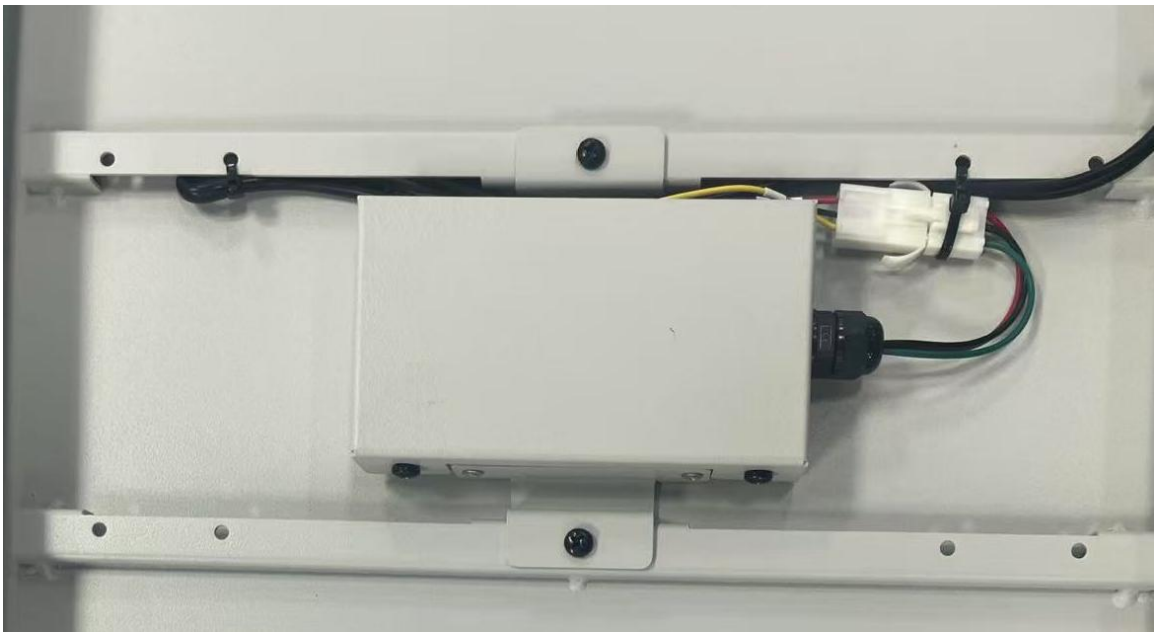
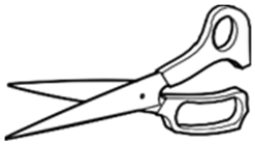


Figure 138. New LED Light Module Installation

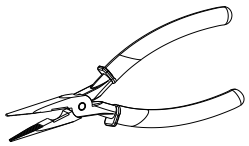
Fan Cover Replacement Guide

Tool & Material List



Scissors

Cable tie



Needle Nose Pliers

New Fan Cover

Figure 139. Tool List

- Open the fan cover.

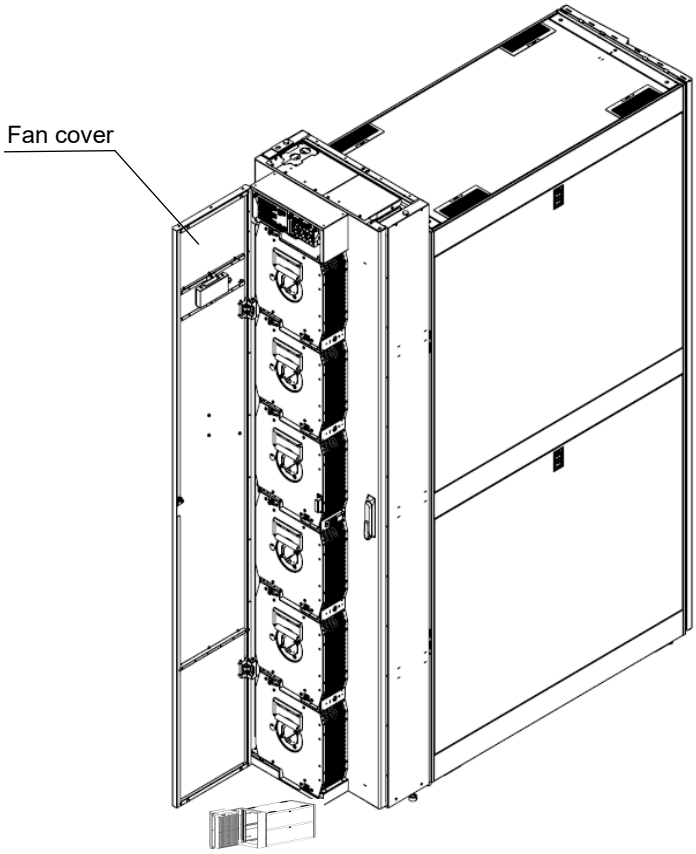


Figure 140. Fan Cover Open

- Use the scissors to shear the cable ties.

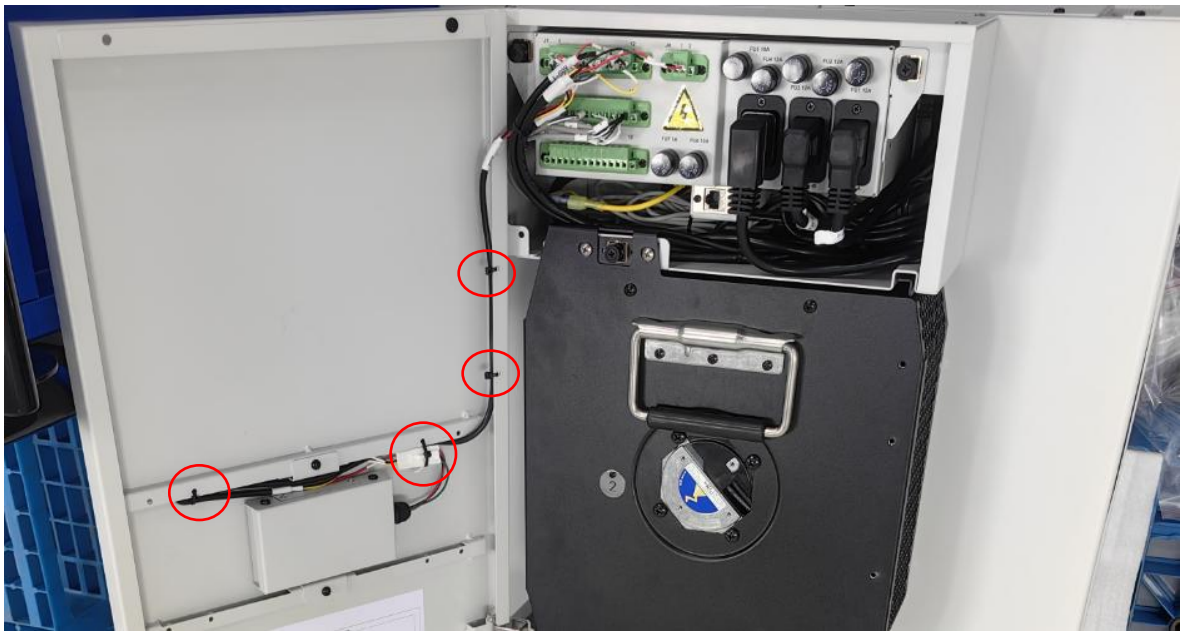


Figure 141. Cable Ties Shearing

- Unplug the male and female connector. Refer to the last chapter to remove the LED modular and keep the LED modular.

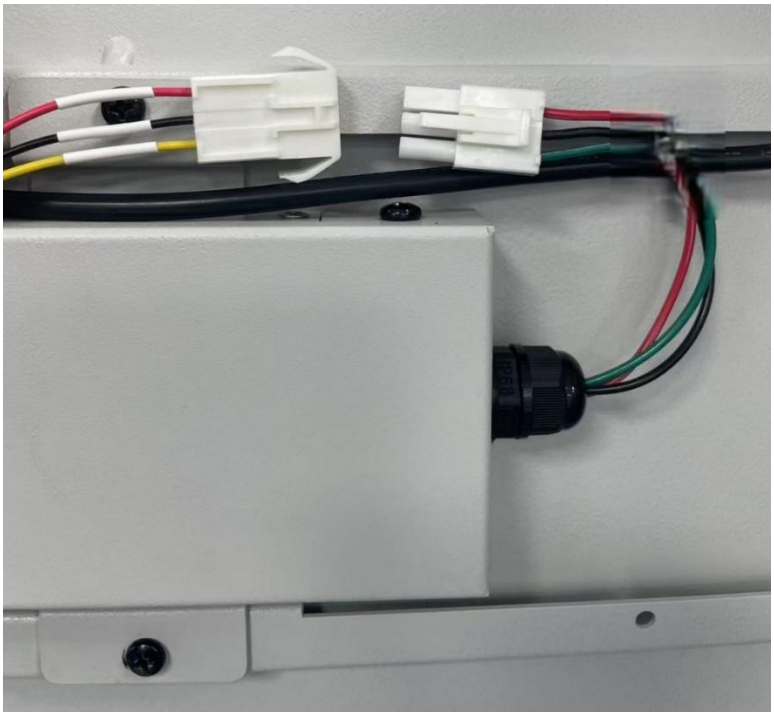


Figure 142. Unplug Connectors

- Use the needle nose pilers to uninstall the circlip, then pull out both top and bottom the hinge pin. Remove the fan cover.

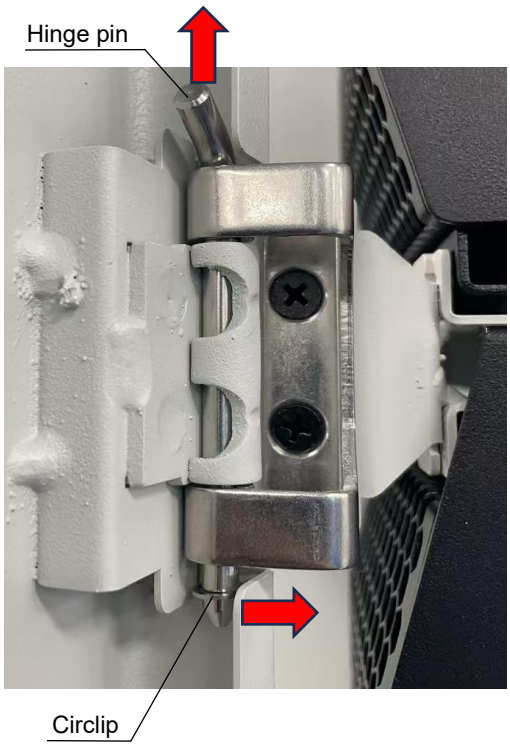


Figure 143. Fan Cover Removal

- According to the disassembly steps, install the LED modular and install the new fan cover. Then close it.

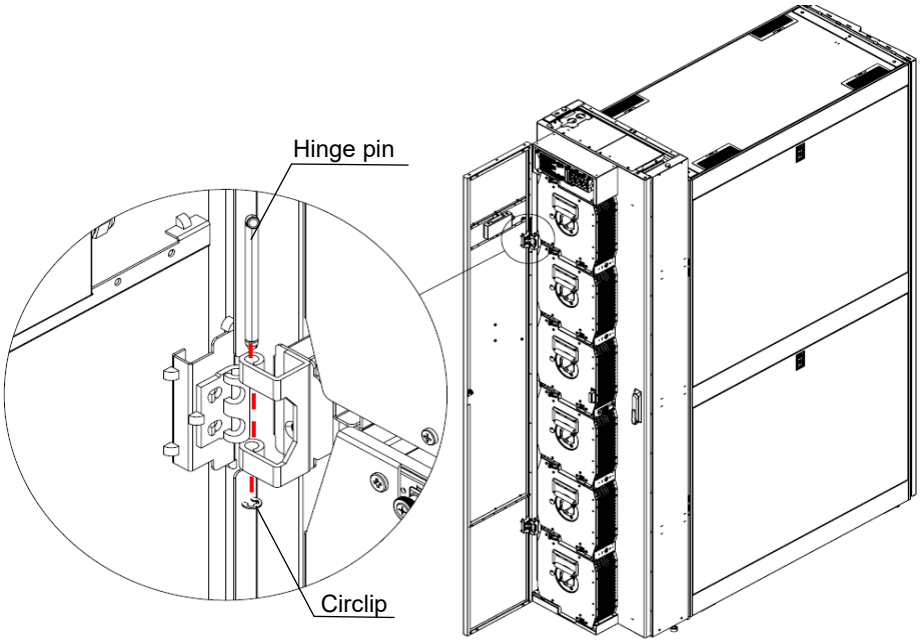
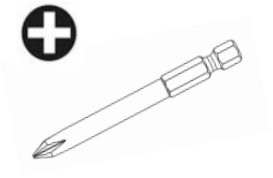


Figure 144. LED Modular and Fan Cover Installation

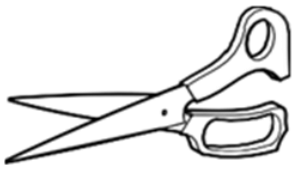
Coil Replacement Guide

Tool & Material List

Electric Screwdriver

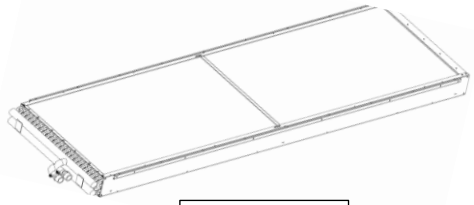


PH2 Phillips Screwdriver Bit



Scissor

Cable Tie



New Coil

Figure 145. Tool List

- Place the RDHx on the ground.

NOTICE
• Make sure EPE or other materials have been used as a cushion to protect the fan cover surface. ***Failure to follow these instructions can result in equipment damage.***

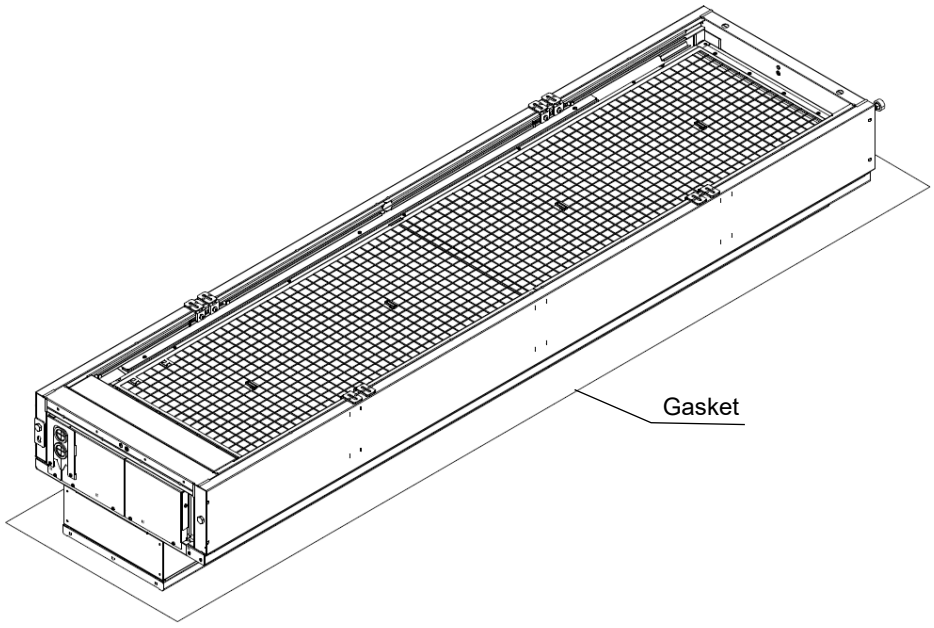


Figure 146. RDHx Placement

- Open the interface frame and disconnect the male hinge pin (on the frame) and female hinge (on the door), then remove the interface frame.

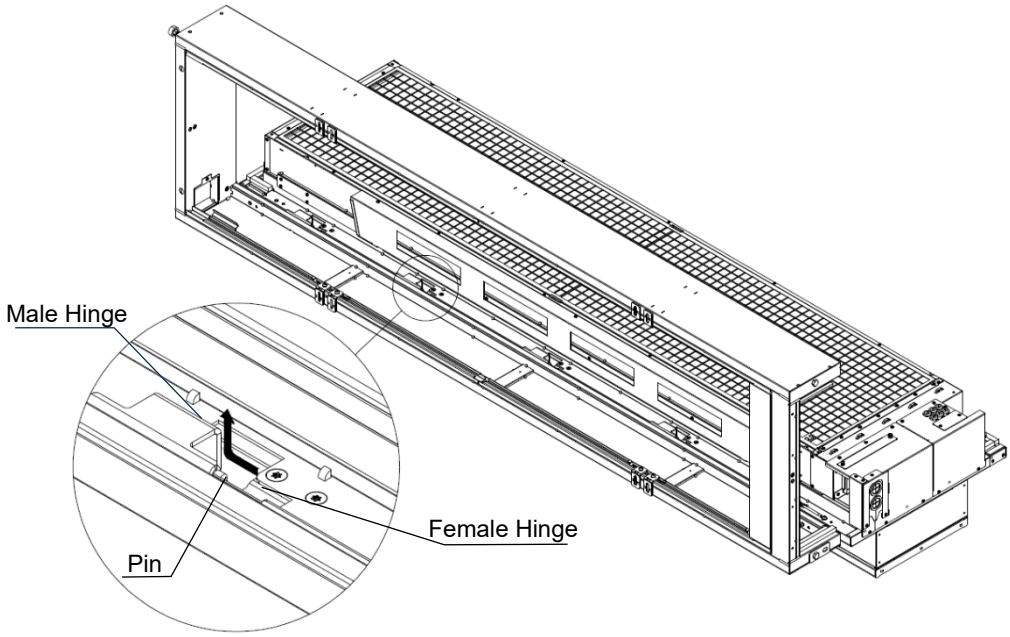


Figure 147. Interface Frame Removal

- Remove the temperature sensor, power cord, water leakage cord and actuator LR24A-MOD connection cable.

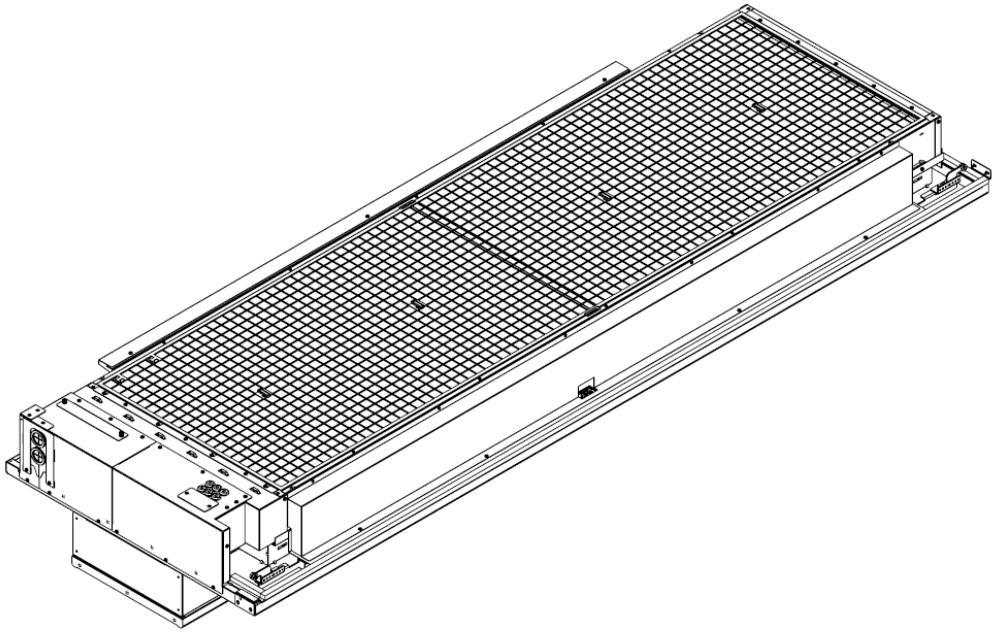


Figure 148. Accessories Removal

- Remove the Liquid Circuit Protection module and electric cable protection module.

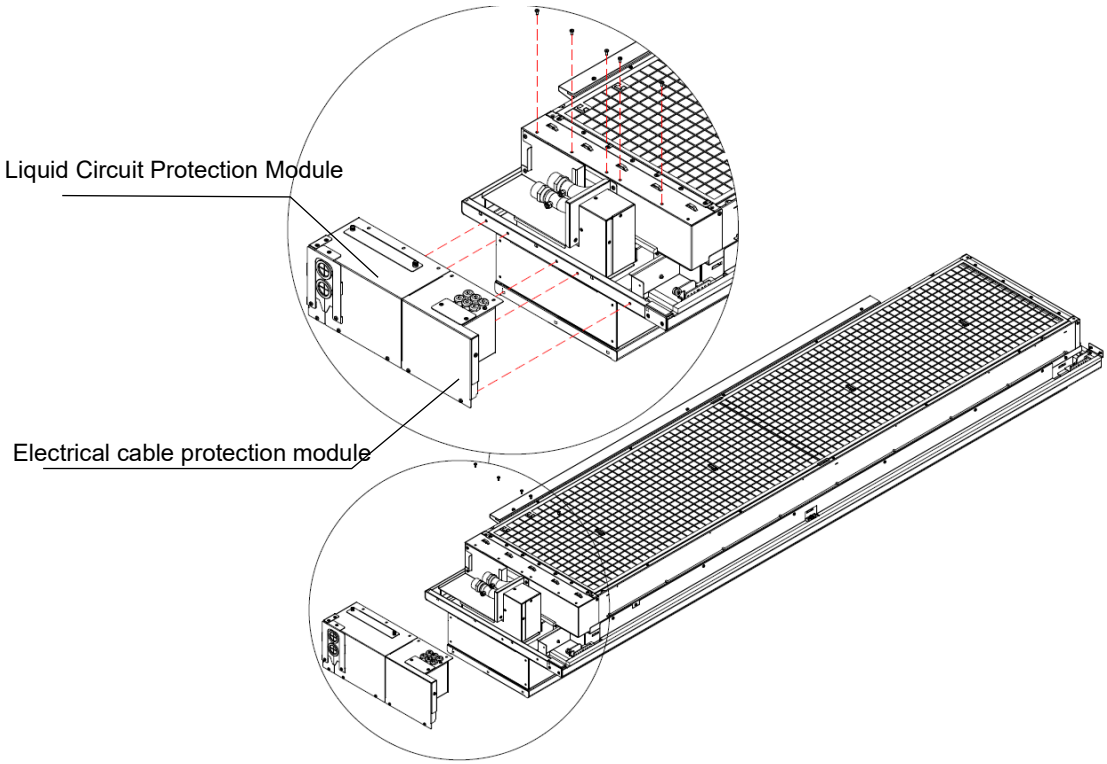


Figure 149. Protection Modules Removal

- Remove the bottom fixing bracket.

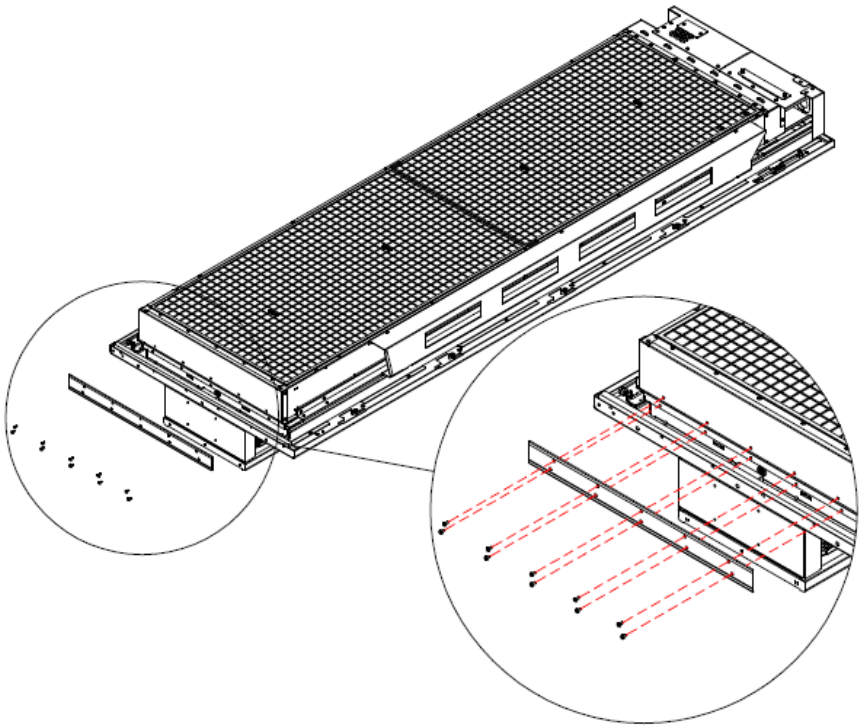


Figure 150. Bottom Fixing Bracket Removal

- Remove the screws, then take coil left windshield off. (skip this step if there is no windshield).

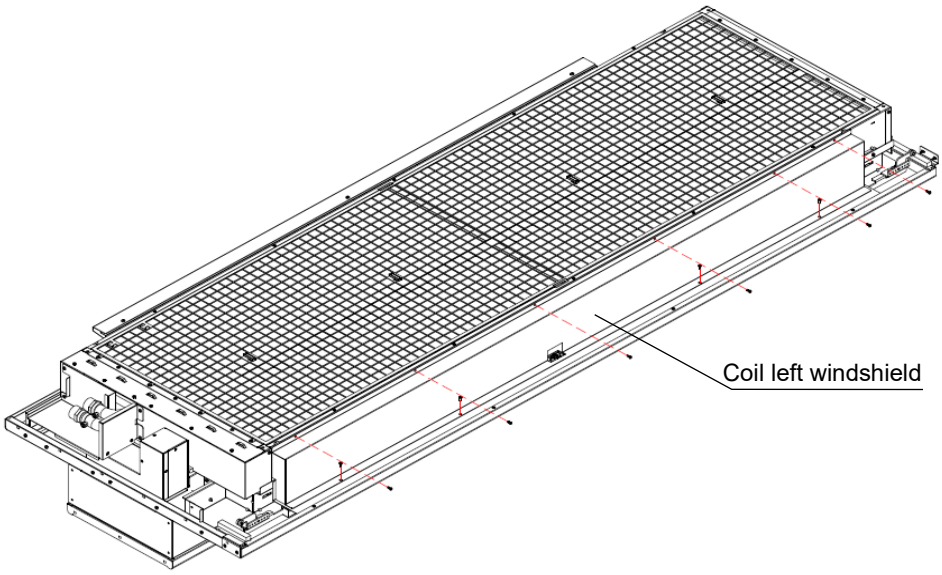


Figure 151. Coil Left Windshield Removal

- Remove the left fixing screws.

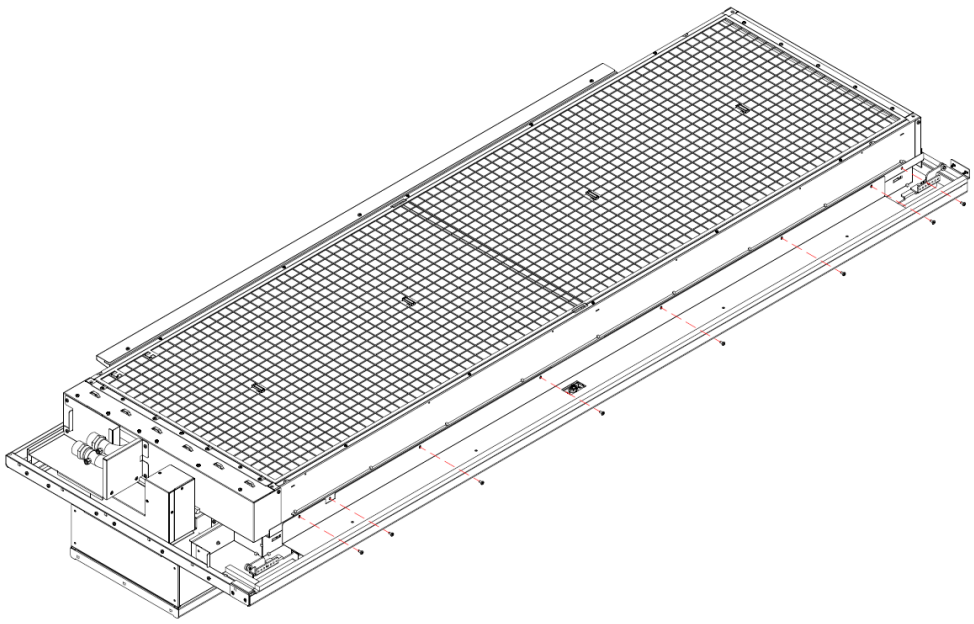


Figure 152. Left Fixing Screws Removal

- Remove the hose cover.

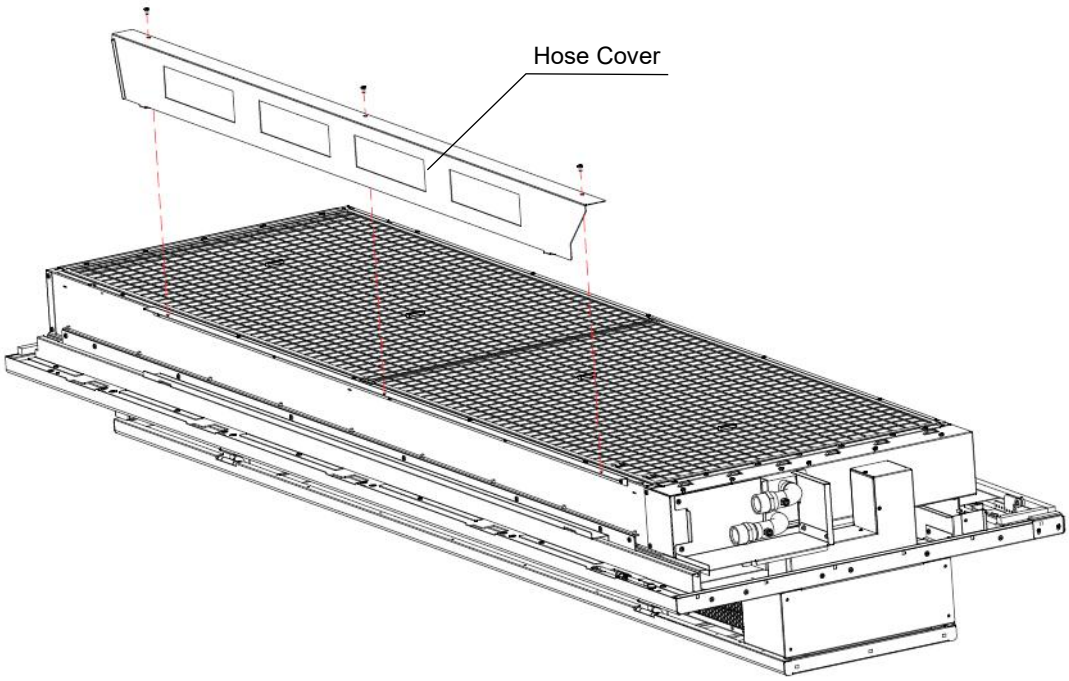


Figure 153. Hose Cover Removal

- Remove the right L bracket.

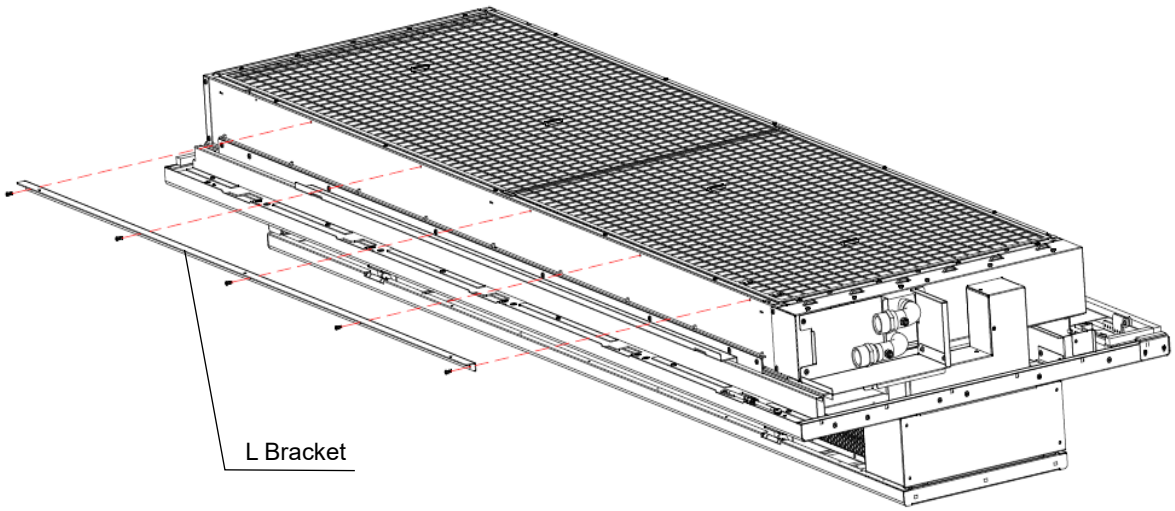


Figure 154. Right L Bracket Removal

- Remove the right cover bracket.

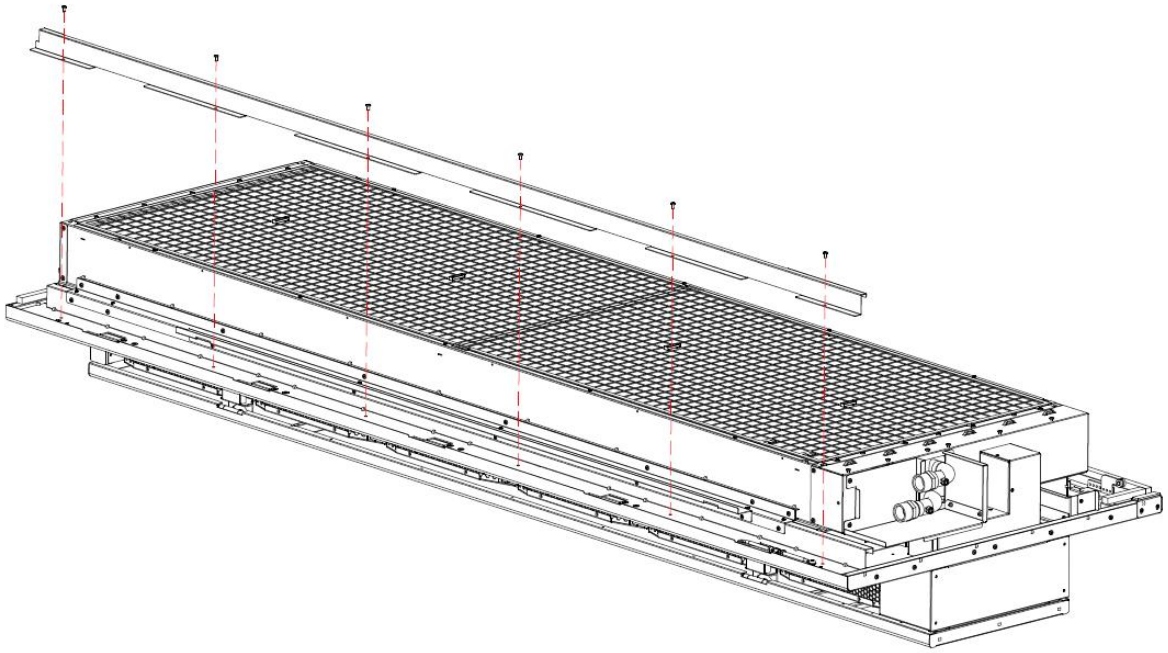


Figure 155. Right Cover Bracket Removal

- Remove the right Z bracket.

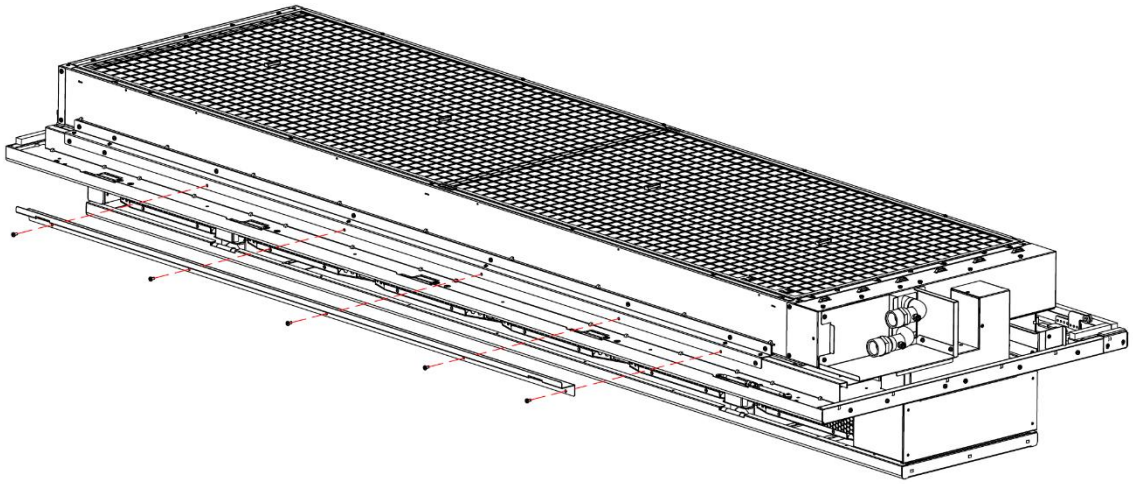


Figure 156. Right Z Bracket Removal

- Remove the right fixing bracket.

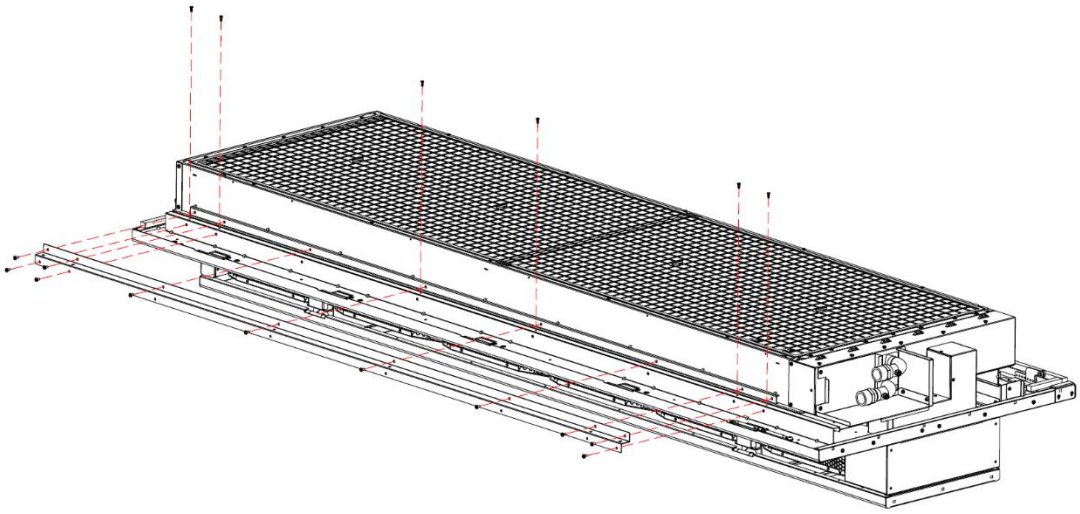


Figure 157. Right Fixing Bracket Removal

- Remove the coil from the door.

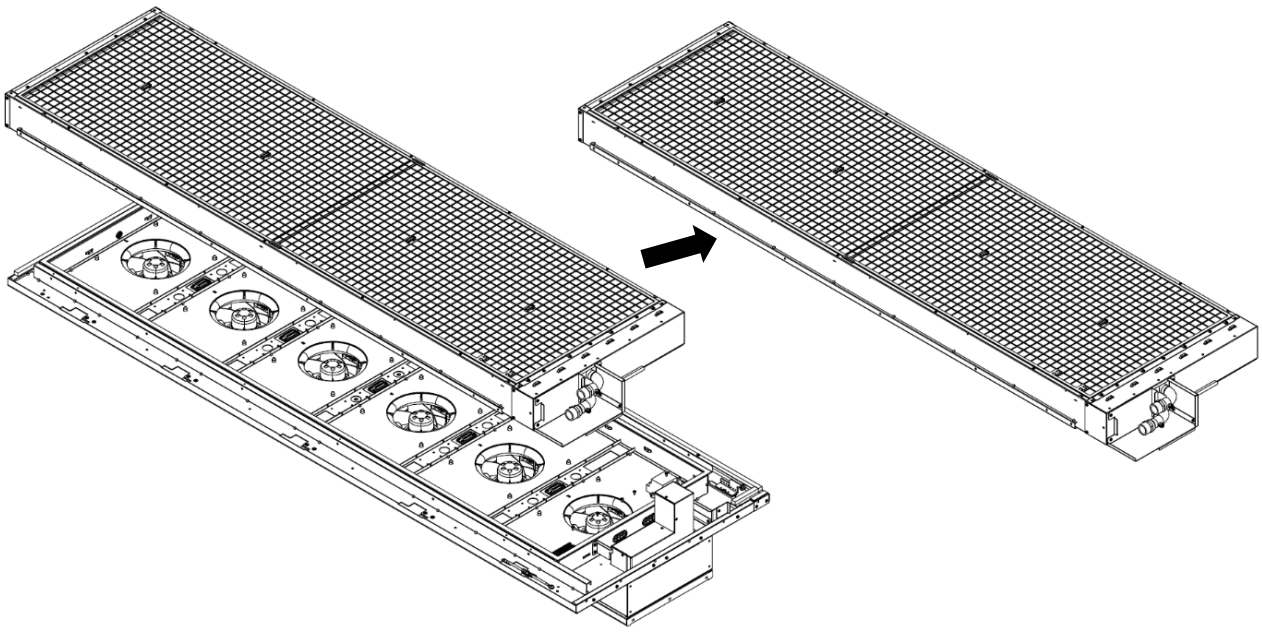


Figure 158. Coil Removal

- Remove the coil protection grating and coil elbow protection plates.

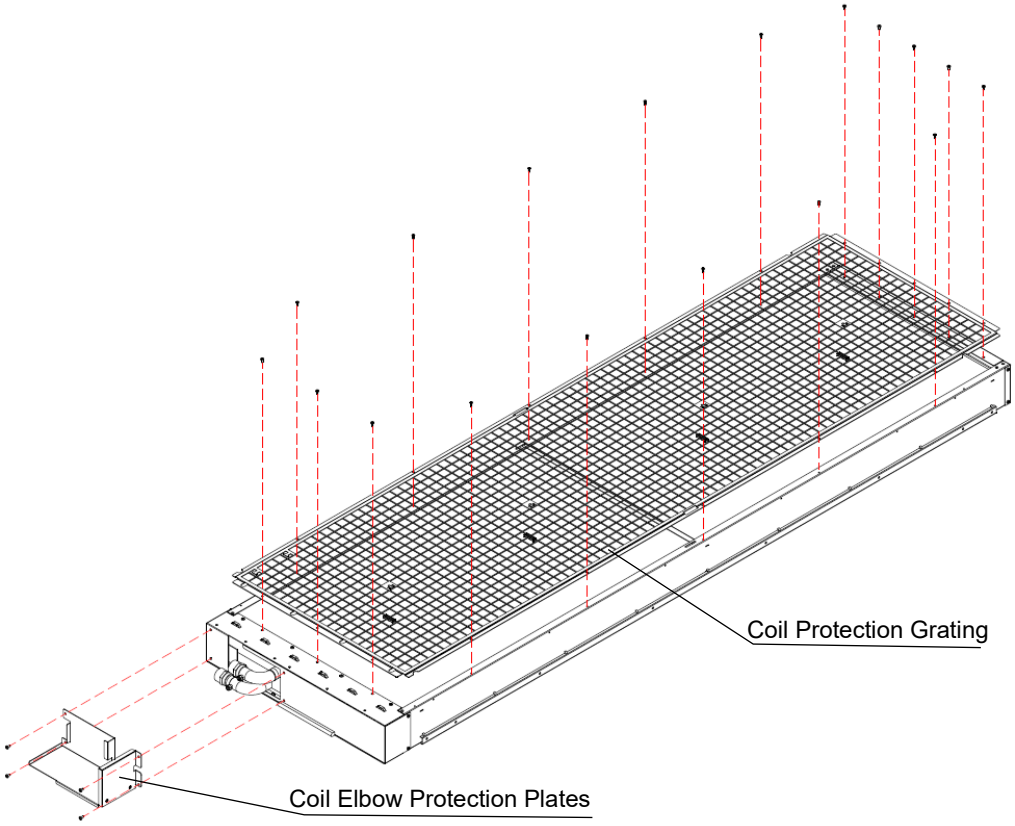


Figure 159. Protection Plates and Protection Grating Removal

- Remove the screws.

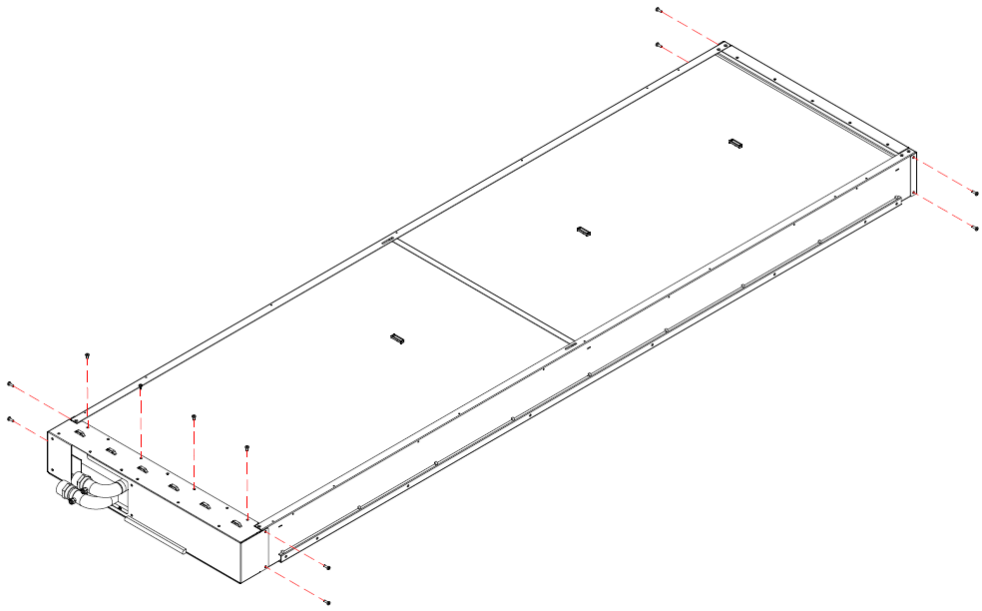


Figure 160. Screw Removal

- Position the heat exchanger vertically on its side and remove its bottom and top cover plates.
-

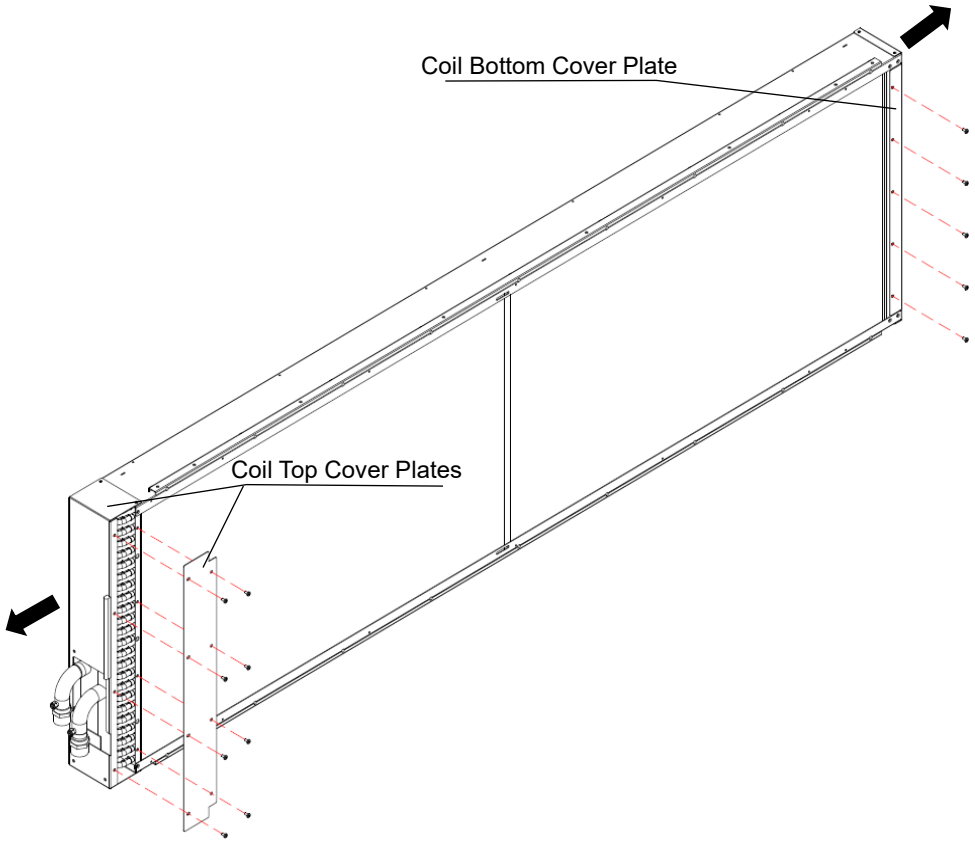
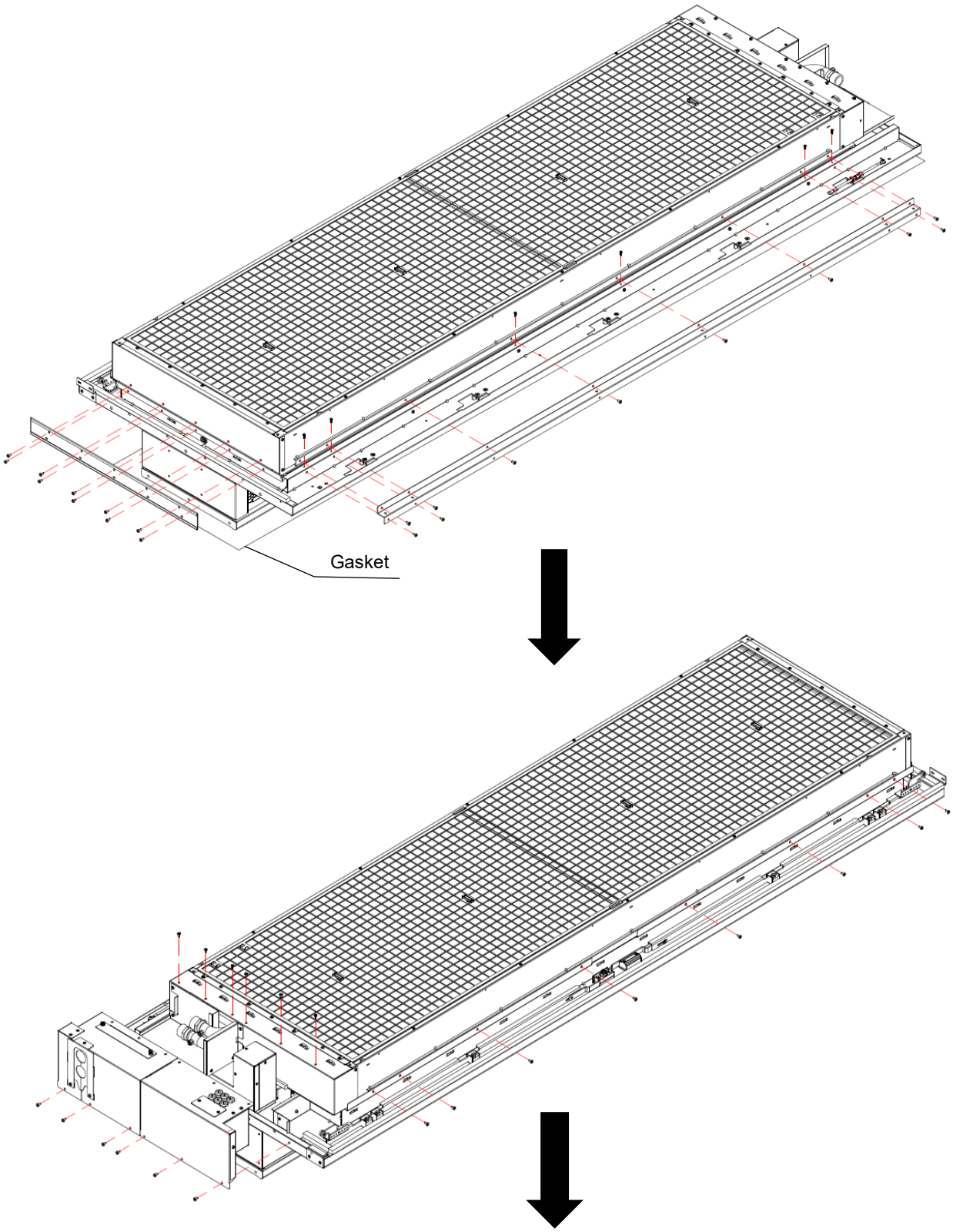
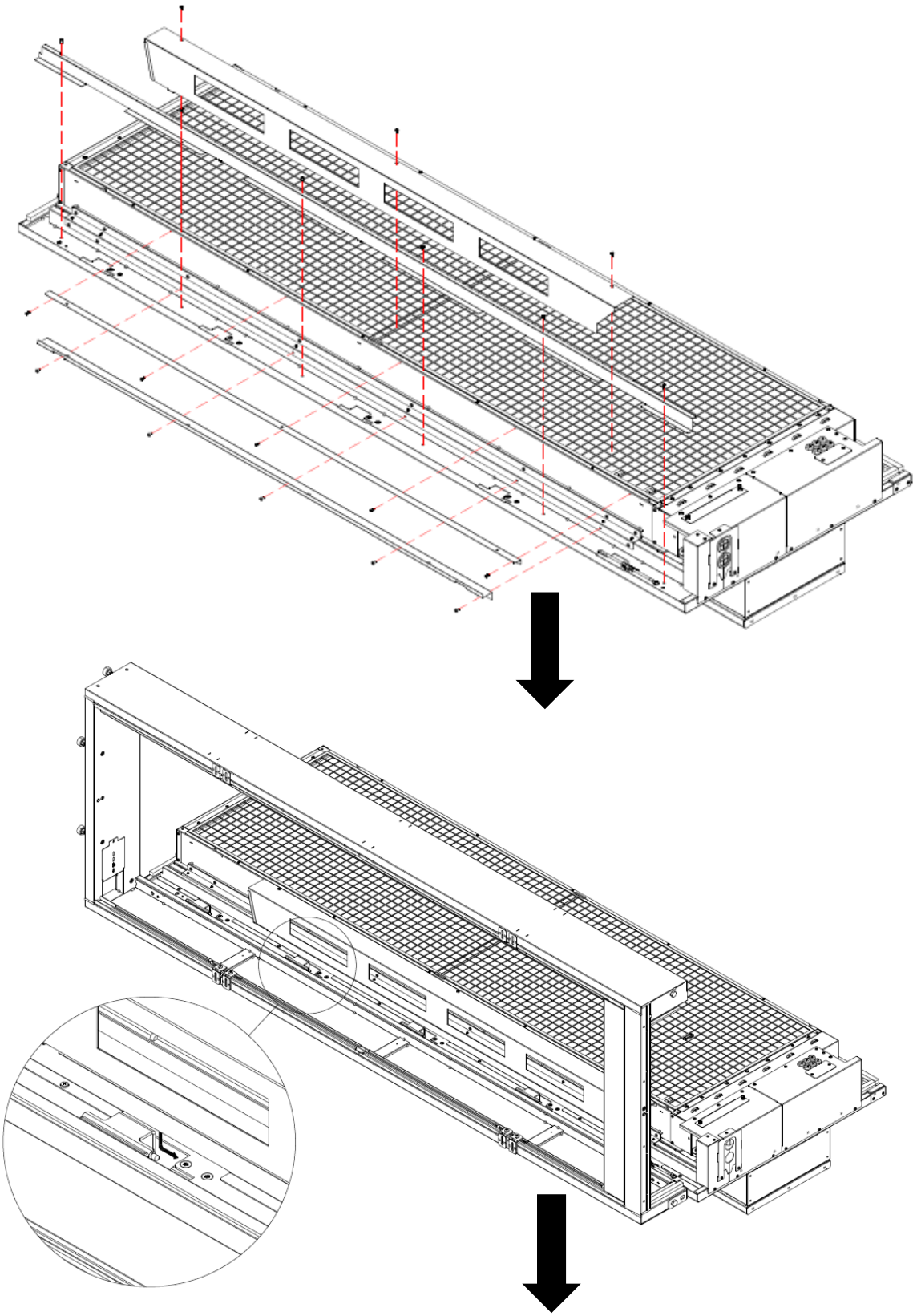


Figure 161. Cover Plates Removal

- According to the disassembly steps, install the coil back to the RDHx.





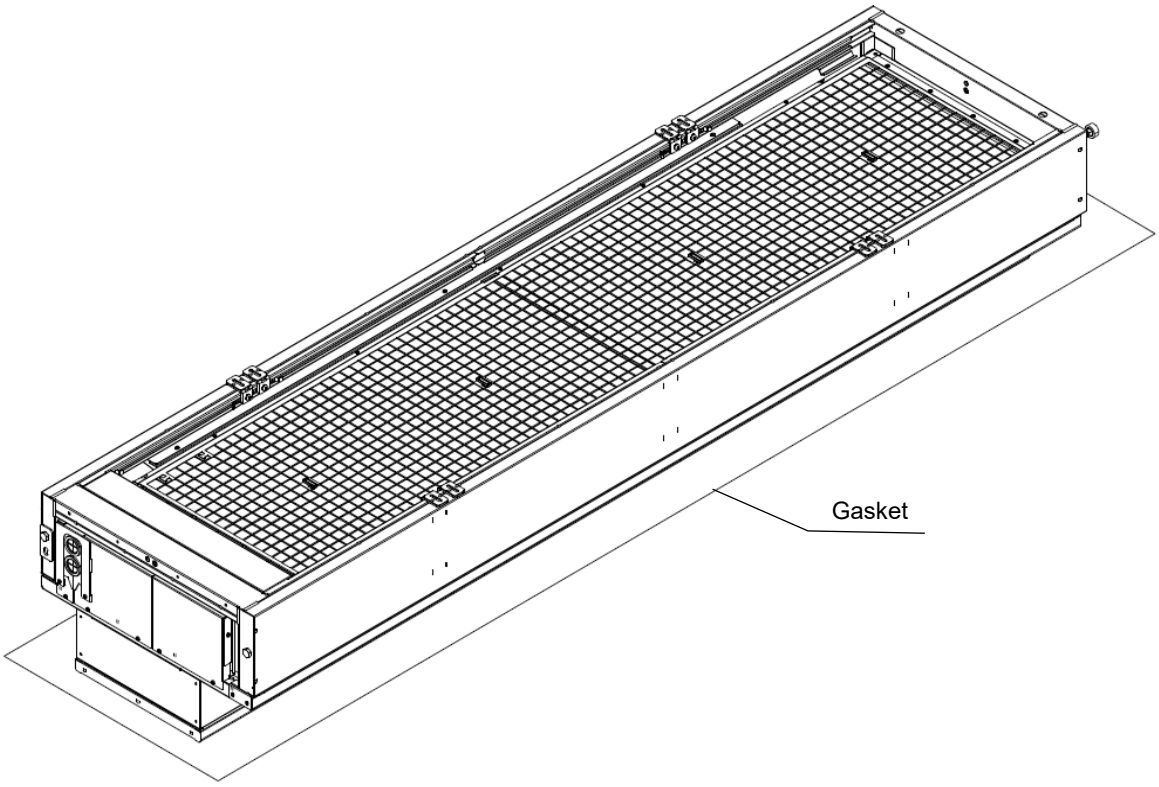


Figure 162. Coil Back Installation Process

Choose Us, Choose More Options

Ready to revolutionize your data center operations? Embrace the high-performance, adaptable cooling offered by NovaCool RDHx for maximum efficiency and peace of mind.

For inquiries and consultation, contact sales@inovadc.com.