



ANTSPACE

ANTRACK V1

User Guide

2025.05

BITMAIN

BITMAIN TECHNOLOGIES INC.

www.bitmain.com

Declarations

The purpose of the User Guide (hereinafter referred to as the "Product Manual") is only to provide guidance information to help you properly use the ANTRACK V1 Cabinet Liquid Cooling System (hereinafter referred to as the "Product"). When installing and using this product for the first time, please read all the accessory materials carefully beforehand, especially the precautions mentioned here, which will help you use this product better and safer. Please keep the product manual for future reference.

Please check whether the product components are complete before use. If there is a missing part, please contact BITMAIN in time and carefully inspect the product before installation and use. In the following cases, BITMAIN shall not be liable for any property damage to you or third-party personnel, and the resulting damage to the product is not covered by the warranty. If the user requests a repair service, the repair service can be provided for a fee after approval by BITMAIN's service organization.

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- 2) Installation, use, and storage of this product incorrectly or not in accordance with the instructions and requirements of the manual.
- 3) Operate under working conditions not specified in this manual.
- 4) Use in the installation and operation environment that is not specified by relevant international norms or local laws, regulations, and industry norms.
- 5) Repairs or product changes not carried out by BITMAIN's authorized technicians.
- 6) Use random software on other products, or use other software other than non-random software or special software on this product.
- 7) Other circumstances that do not require liability within the legal scope of the country (region) where the operation is located.

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The photographs, graphics, charts, and illustrations provided in the ANTRACK V1 product manual are for illustrative and illustrative purposes only and may differ from the actual product. The actual specifications and configurations of the product are subject to change as needed and therefore may differ from those in the product manual. In this case, the actual product purchased shall prevail.

Due to the continuous iteration of products and the application of new designs, new materials and new technologies, BITMAIN will make improvements or modifications to the software and hardware and the content of the product manual at any time without prior notice according to factors including but not limited to product characteristics, product performance, and use environment. If you find that the actual product is inconsistent with the product manual during use, or if you want to know the latest information or have any questions or ideas, please call us or log on to the service website to inquire.

Changelog

Version number	Change the project	Contents before the change	Revised content	Change time	Change of person
v1.0	first edition	/	/	2024.04	/
v1.0	Details updated	/	/	2024.10	/

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CHAPTER 1. About this manual

ARTICAL 1 Scope of application

This manual is for ANTRACK V1.

ARTICAL 2 Target audience

This manual is intended for use by professional technicians in installation, operation, and maintenance. Professional and technical personnel must have the following conditions: have certain professional knowledge of electronics, electrical circuits, machinery, etc., and be familiar with electrical and mechanical schematics. Familiar with the composition and working principle of liquid cooling system and related products. Received professional training in the installation and commissioning of electrical products. Ability to respond to hazards or emergencies during installation or commissioning. Familiarity with the relevant standards and norms of the country in which the project is located.

ARTICAL 3 Manual use

Please read this manual carefully before using this product. While the contents of the manual are constantly updated and modified, there may still be errors or slight differences from the actual product. In this case, the actual product purchased shall prevail. Users can download or obtain the latest version of the manual through www.bitmain.com or sales channels.

ARTICAL 4 Symbolic conventions

In order to ensure the safety of the user's person and property when using this product, and to use this product more efficiently and optimally, this manual provides relevant information and is highlighted by the following symbols. The following table defines the symbols that may appear in this document. Please read it carefully for better use of this manual.



Danger

Indicates a high potential danger that, if not avoided, could result in serious accidents such as personal injury, equipment damage, etc.



Warning

Indicates a moderate potential hazard that, if not avoided, could result in serious accidents such as equipment damage.



Caution

Indicates a potential danger that, if not avoided, may result in abnormal operation of the equipment.

CHAPTER 2. Safety Precautions

ARTICAL 5 General Safety Instructions

Disclaimer: The equipment company is not responsible for any of the following. Operations beyond the conditions specified in this document. Use in installation and operating environments not specified in the relevant international specifications. Failure to follow operating instructions and safety precautions in the product and documentation. Damage caused by an anomalous natural environment.

ARTICAL 6 All safety precautions

To ensure the safety of personnel and equipment, pay attention to the safety signs on the equipment and all safety instructions in this document. The "Caution", "Warning" and "Hazard" markings in this document do not represent all safety instructions. They are only in addition to the safety instructions.

1) Local safety regulations must comply with local laws and regulations when operating equipment. The safety instructions in this document are only in addition to local laws and regulations.

2) Personnel requirements: Only trained and qualified personnel are required to install, operate, and maintain BITMAIN equipment, and basic safety precautions must be understood to avoid hazards. Only trained and qualified personnel are allowed to install, operate, and maintain BITMAIN equipment. Only personnel certified or authorized by the equipment supplier may replace or alter equipment or parts (including software). Any malfunction or error that could lead to a security issue must be reported to the supervisor immediately.

3) Grounding requirements: The equipment that needs to be grounded must meet the following requirements: when installing the device, always ground first and disconnect last. Do not damage the grounding wire. Do not operate the appliance without properly installing the grounding wire. Make sure the device is permanently connected to protective ground.

ARTICAL 7 Electrical safety

High voltage

 **Danger**

The high voltage power supply provides power for the device operation. Direct or indirect contact through damp objects (or conductors) with high voltage and alternating current (AC) mains supply may result in fatal danger.

Non-standard and improper high voltage operations may result in fire and electric shocks. Signal cables must be bound separately from strong electricity cables and high-voltage cables.

Large leakage current

 **Danger**

1. Ground the device before powering it on. Otherwise, personal injury or device damage may be caused by high leakage current.

2. If a "high electrical leakage" tag is attached on the equipment, ground the protective ground terminal on the equipment enclosure before connecting the AC power supply; otherwise, electric shock as a result of electricity leakage may occur.

3. Bind the bare parts of power cables with insulation tapes and properly place them.

Power cord


 **Danger**

Do not install or remove a cable with power on. Transient contact between the core of the cable and the conductor will generate electric arcs or sparks, which may cause a fire or hurt human eyes.

Do not install or remove cables with power on. Momentary contact between the core of the cable and the conductor can cause arcing or sparks, which may cause a fire or injure the human eye. Before installing or removing the power cord, turn off the power switch. Before connecting the power cord, check that the label on the power cord is correct. If the power cable is damaged, it must be replaced by the manufacturer, its service agent, or a similarly qualified person to avoid danger. Appliances should be equipped with devices that are disconnected from the mains supply, have contact separation in all poles, provide complete disconnection under Class III overvoltage conditions, and these devices must be incorporated into the fixed wiring according to the wiring rules.

ARTICAL 8 Machinery safety


Drill


Warning

Do not drill the cabinet at will. Drilling holes without complying with the requirements damages the internal components or pipelines and the cables inside the cabinet. In addition, if the metal shavings caused by drilling enter the cabinet, the pipelines may be blocked, foreign matters may occur, and the printed circuit boards (PCBs) may be short circuited.

Sharp objects

ANTRACK's cabinets and heat exchangers are made of metal, so please wear protective gloves when operating close to the cabinet.



Warning

Before you hold or carry a device, wear protective gloves to avoid getting injured by sharp edges of the device.

Fan

When replacing parts, place parts, screws, and tools in a safe place. Otherwise, if any of them fall into a running fan, it could damage the fan. When replacing components near the fan, do not insert your finger or board into the running fan until the fan is turned off and stops running.

Heavy objects move


Warning

1. Wear protective gloves when moving heavy objects to prevent scratches.
2. Be cautious to prevent injury when moving heavy objects.
3. When removing a heavy or unstable component from a cabinet, be aware of unstable or heavy objects on the cabinet.
4. At least two persons are required to move the equipment. When moving the equipment, ensure that it does not tilt at an angle that exceeds 15 degrees from the vertical direction.
5. When moving or lifting the equipment, well protect the equipment to avoid scratches or crashes.
6. When moving the equipment, do not use a part to support the body. Otherwise, the part may be damaged.

ARTICAL 9 Safe to operate

High temperature and high pressure

Mishandling may cause the pressure to be too high, causing coolant to eject.

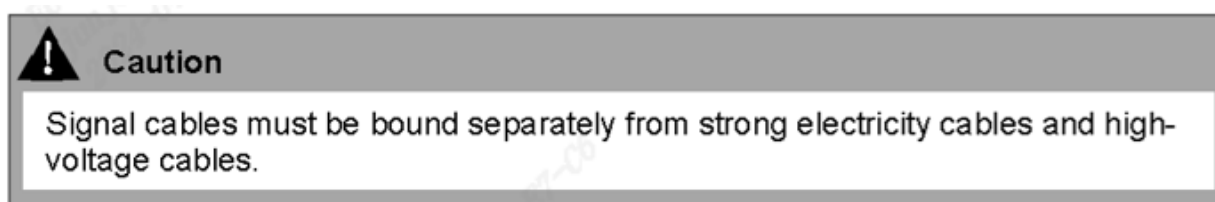
Pay attention to the high-pressure parts: exhaust valves and drain valves.

High-speed operation

Pay attention to the high-speed running part: the fan.

ARTICAL 10 Other

Tie the signal cable



Laying power cables

When laying power cables at very low temperatures, severe shocks or vibrations may damage the power cable sheath. To ensure safety, the following requirements should be observed: power cables should only be laid or installed at temperatures above 0°C. Power cables stored at temperatures below 0°C should be moved to ambient temperature and stored at ambient temperature for at least 24 hours before laying. Handle the power cord with care, especially at low temperatures. Never drop the power cord directly from the vehicle.

Stockpile

Do not store the device near a heat source or in direct sunlight. Keep away from ignition or hot objects, especially equipment that is injected with pressurized nitrogen or refrigerant, otherwise an explosion or refrigerant leakage may occur, causing personal injury.

Recycling and disposal

The mark, Figure 2-1, indicates that in the European Union (EU) region, the product cannot be disposed of with other waste that has an enclosure. Prevent possible harm to the environment or human health from uncontrolled waste disposal and recycle waste responsibly to promote the sustainable reuse of material resources.



Figure 2-1 Identification

CHAPTER 3. Overview

ARTICAL 11 Working Principle

ANTRACK is mainly used for the water-cooled high performance computing servers released by BITMAIN, providing integrated deployment, power supply and network exchange functions for the water-cooled high performance computing servers, and air-cooled-heat-exchanger for liquid cooling is also integrated in the rack, providing integrated operation position for the water-cooled high performance computing servers. It also has liquid-liquid heat exchange function, which can realize the on-site connection of external water source to produce hot water to utilize waste heat, or the on-site configuration of external cold source such as cooling tower centralized heat dissipation.

ARTICAL 12 System composition

ANTRACK is composed of rack body, electric control box, water cooled heat exchanger, air cooled heat exchanger, liquid pump, liquid cooled circulation pipe, coolant tank, fan, etc.

1) Rack body

Install electric control box, water cooled heat exchanger and other components in it before leaving the factory, and provide placement for high performance computing servers. To achieve product integration and meet the requirements of product in transportation, loading and unloading, secondary handling and operation strength.

2) Electric control box

The electric control box provides the main input power switch, the liquid pump and the fan electricity distribution switch, and adjusts the fan operation mode with the liquid temperature sensor; At the same time, the distribution switches and network switch are configured to provide power supply and network exchange for the high performance computing servers.

3) Water cooled heat exchanger

Water cooled heat exchanger is a kind of efficient heat exchanger for liquid-liquid heat exchange. Through the heat exchanger, the external cooling water can be connected to the site, and the heat of the liquid cooling servers can be taken away, the hot water can be produced for waste heat recovery. Or use an external cooling tower as a cooling heat source.

4) Air cooled heat exchanger

The air-cooled heat exchanger realizes the heat dissipation of the liquid cooling cycle of the liquid cooling server by means of air cooling. The air-cooled heat exchanger works together with

the fan.

5) Liquid pump

The liquid pump provides circulating power and flow to the coolant for the liquid cooling cycle of the liquid cooling servers.

6) Liquid cooling circulation piping

The liquid cooled circulation pipe connects the liquid cooled servers, liquid pump, water cooled heat exchanger, air cooled heat exchanger, and coolant tank to form a liquid cooled circulation system.

7) Coolant tank

The coolant tank is used to add coolant to the liquid cooled servers during field installation, as well as for coolant replenishment during operation.

8) Fans

The fans draws air flow from the front door and sides to provide the amount of air needed for air-cooled heat exchanger and sends hot air out the back door.

ARTICAL 13 Operation mode

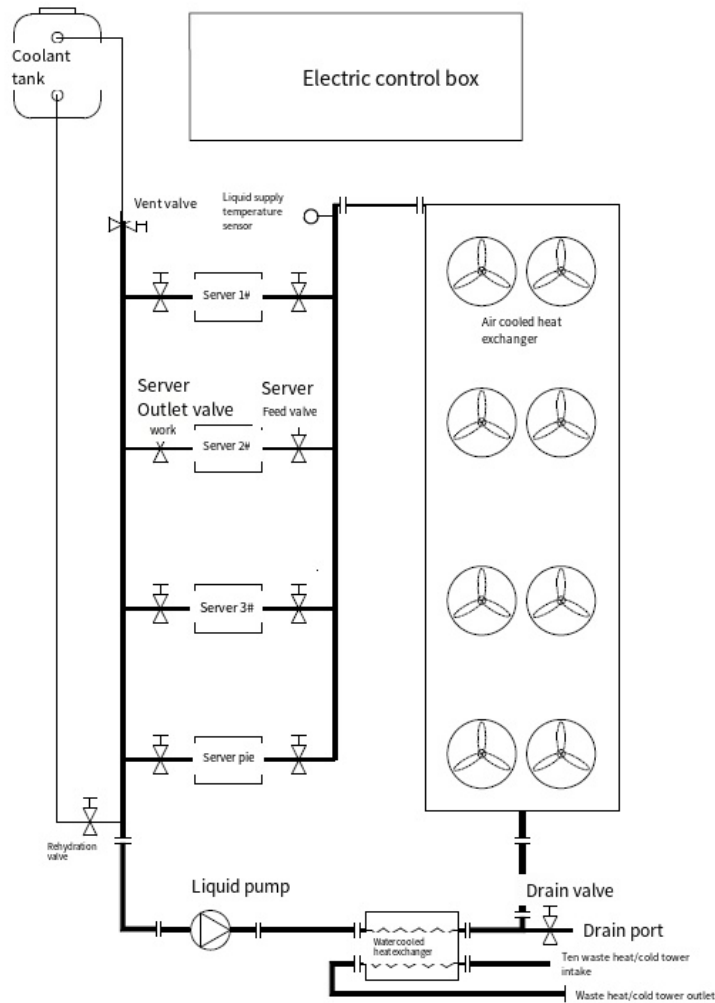
ANTRACK has two operating modes: air-cooled mode and water-cooled mode.

In the air-cooled mode, ANTRACK uses the integrated air-cooled heat exchanger in the rack to dissipate heat, and air paths on site for air inlet and exhaust is NEEDED. In the air-cooled mode, the front door and left and right sides of the rack draw air into the air-cooled heat exchanger to cool the coolant in the liquid cooling cycle of the water-cooled servers, and then the heat is dissipated to the air from the back door. The coolant circulates between the water cooled high performance computing servers, liquid pump, water cooled heat exchanger and air cooled heat exchanger, taking away the heat during the running of the high performance computing servers to ensure the stable operation situation for the high performance computing servers.

In the water-cooled mode, the external cooling water source is connected to the water-cooled heat exchanger of ANTRACK on site, to carry away the heat in the cabinet through liquid-liquid heat exchanged. The external cooling water is suitable for heating or hot water supply to utilize the waste heat.

ARTICAL 14 Working principle

The principle diagram of the ANTRACK liquid cooling system is as follows:



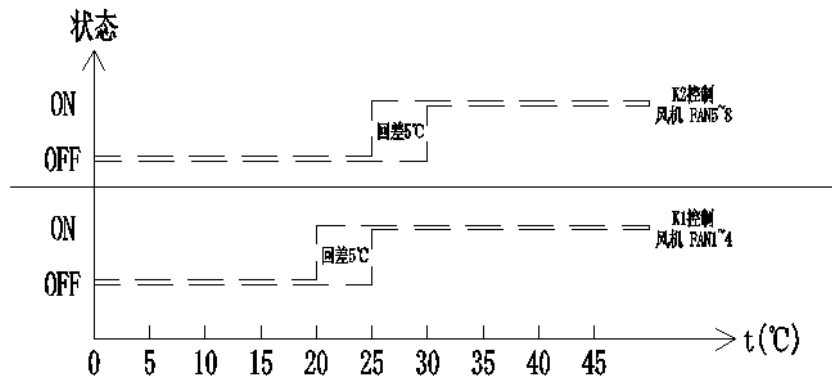
Exhaust and liquid cooling cycles: After ANTRACK is in place, close the drain valve, add enough coolant into the coolant tank (about 20L) and put the servers on the shelf, connect the server inlet and outlet pipe, open the server liquid supply/feed valve, server liquid outlet valve, liquid replenish valve, and exhaust valve, and after ANTRACK is finished the initial automatic exhaust (about 5min), You can do exhaust operation by turn ON/turn OFF liquid pump electricity switch on the electric control box panel (ON 30S, OFF for 1min, ON/OFF for 3 cycles). After the exhaust is completed, the liquid cooling pump can continue running, and the coolant is circulated between the liquid cooling servers -- the liquid pump -- the water-cooled heat exchanger -- the air-cooled heat exchanger through the liquid pipe under the drive of the liquid pump.

Coolant specifications: Coolant recommended to use antifreeze that freezing point is -25°C , PH value range 7.8~8.5. Do not directly use tap water or outdoor lake combined water, do not use liquid that PH value below 7.5, do not use unclean liquid containing impurities.

The coolant box is equipped with a level switch. When the level is too low, the main input power switch of the ANTRACK will disconnect automatically in order to protect the system.

After replenishing the coolant, turn on the input power switch to run.

Air cooling mode: ANTRACK adopts air cooling mode when it is not connected to the external cooling water source to produce hot water or to the external cooling tower. In this mode, after the fan power distribution switch on the panel of the electric control box is turned on, the fans keep running and draws air from the front door and both sides of the rack. The air take away heat through the air-cooled heat exchanger in the rack and discharged from the rear door of the rack. In the air-cooled mode, the fan starts and stops according to the temperature of the coolant detected by the temperature sensor on the liquid cooling pipe. The control diagram is as follows:



Water-cooled mode: After connecting to the external cooling water source, ANTRACK can adopt the water-cooled mode. In this mode, the external water supplied will take away the heat of the coolant in the liquid circuit through the water-cooled heat exchanger. In this mode, the external water source entering ANTRACK needs to meet the following water quality requirements:

PH value: 6~8;

Cl⁻ concentration: ≤ 50 ppm

Sulfate ion (SO_4^{2-}) concentration: $\leq 30\text{mg/L}$

Ammonia ion (NH_4^+) concentration: $\leq 0.1\text{mg/L}$

And configure water filter before entering ANTRACK, filter mesh number: 30-60 mesh.

Shutdown state: When ANTRACK is not needed to run, turn off all electrical switches on the electric control box, discharge and recover the coolant from the drain valve.

CHAPTER 4. Installation

ARTICAL 15 Open the package and check

After receiving the ANTRACK, remove the outer packaging and then check the outer surface of the products and inspect the internal opening the door, especially to check whether the coolant tank cover and connectors of the rack are intact.

If any damage is found, report it to the shipping company immediately.

If any hidden damage is found, report it to the shipping company.

ARTICAL 16 Installation Precautions


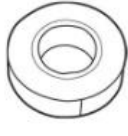








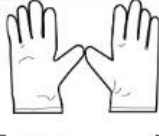

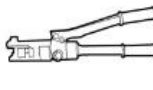
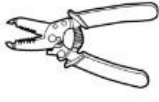




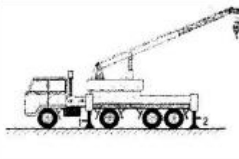


To ensure the best working conditions and the longest service life, install the equipment correctly as required. Before installation, check whether the installation environment meets the requirements. The cabinet should be installed in a building free of floating water, dripping water, and dust. After the cabinet is installed, at least 1m air and maintenance space should be needed in front and behind the rack. Provide each rack with a 400V63A3P power supply switch and a three-phase and five-wire (L1+L2+L3+N+PE) power supply cable from the inlet hole on the top of the cabinet to the electric control box in the cabinet. Suitable power distribution cabinets and cable routing facilities for Rack is needed. The network cable connecting to the network switch is also introduced from the inlet hole on the top of the rack to the electric control box. If ANTRACK is planned to produce hot water or an external cooling tower is used as the cold source, pipeline construction design is required. In the air-cooling mode, the room in place should be properly ventilated to prevent the hot air discharged from the cabinet from circulating again into the air intake surface of the cabinet.

Please note that on-site cable materials and construction must comply with the current selection and regulatory requirements of local safety regulations, and meet the safety requirements regarding the construction process.

ARTICAL 17 Tools

The tools required are as follows:

Table 4-1 Tools

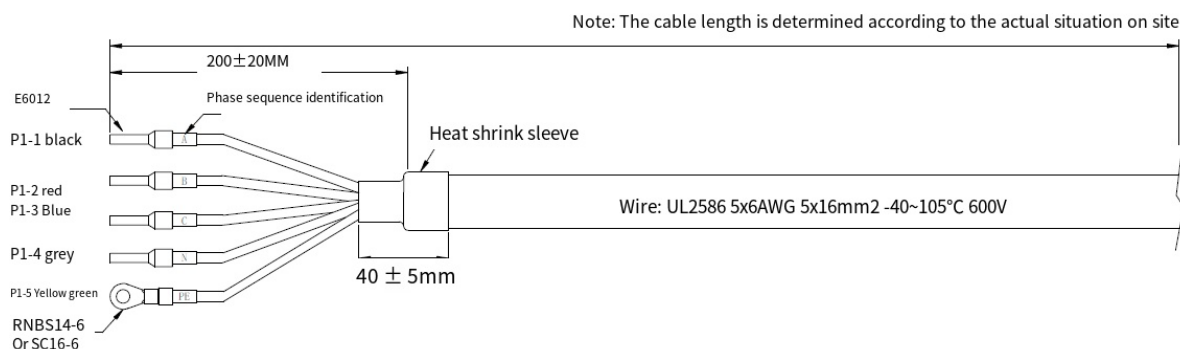
Appearance, Specifications & Name of General Tools			
Torque wrench (10 # 13 # // 18 #)	Insulation tape	Antifreeze gloves	Needle-nose pliers
			
Claw hammer	Diagonal pliers		
			
Appearance, Specifications & Name of General Tools			
Combination pliers	Tape measure	Flashlight	Step ladder
			
Appearance, Specifications & Name of Electric Tools			
ESD gloves	Insulated gloves	Power cable crimping tool	Wire strippers
			
Heat gun	Insulation tape	Multimeter	
			
Appearance, Specifications & Name of Transportation Tools			
Electric forklift	Crane	Crowbar	Hanging rope
			
Note: The lifting weight of the crane should be 2 20 T.			

ARTICAL 18 Connect power cables and networks

The following preparation is needed for installation:

A 400V63A3P power switch is required for each cabinet.

The power cables for electricity supply must meet the requirements of the power supply system and current capacity, and wiring terminals for connecting to the ANTRACK electric control box must be prepared in advance. Terminal requirements and recommended cable specifications are shown in the following figure.



The specifications of the ANTRACK network cable to be connected are recommended for Cat.5e-FTP, and the RJ45 plug must be prepared before connecting.

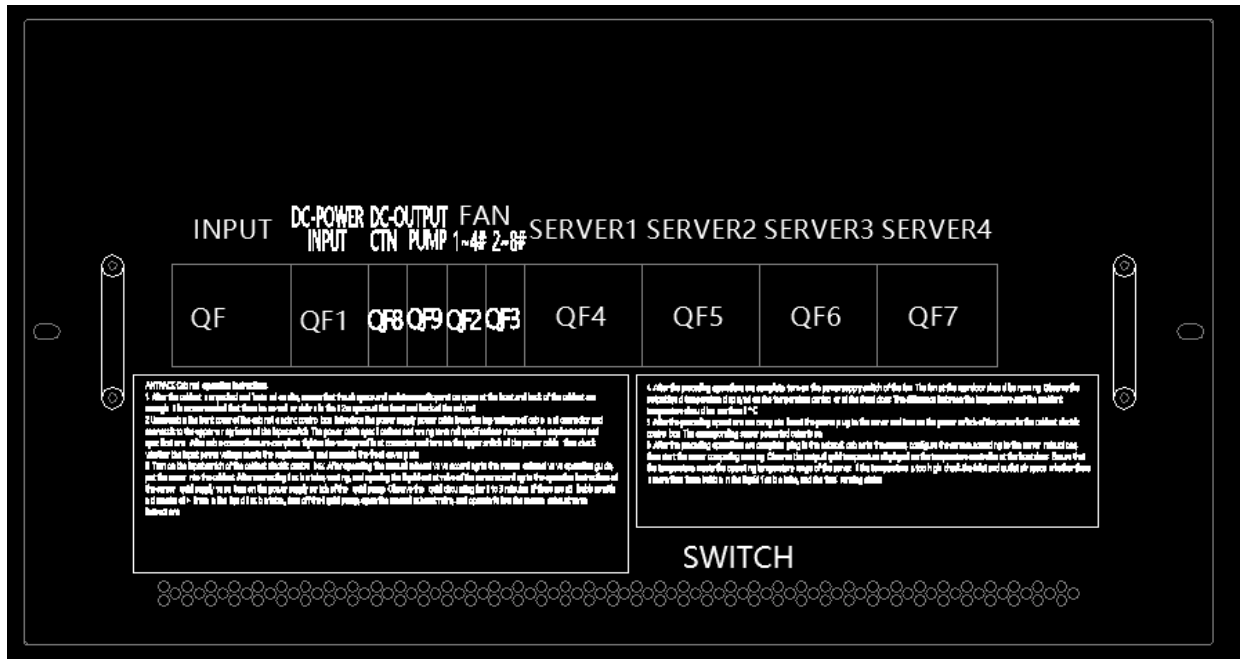


Please note that the onsite cable materials, construction personnel and construction process should meet the current selection and legal requirements of local safety regulations, and meet the safety requirements on the construction process.

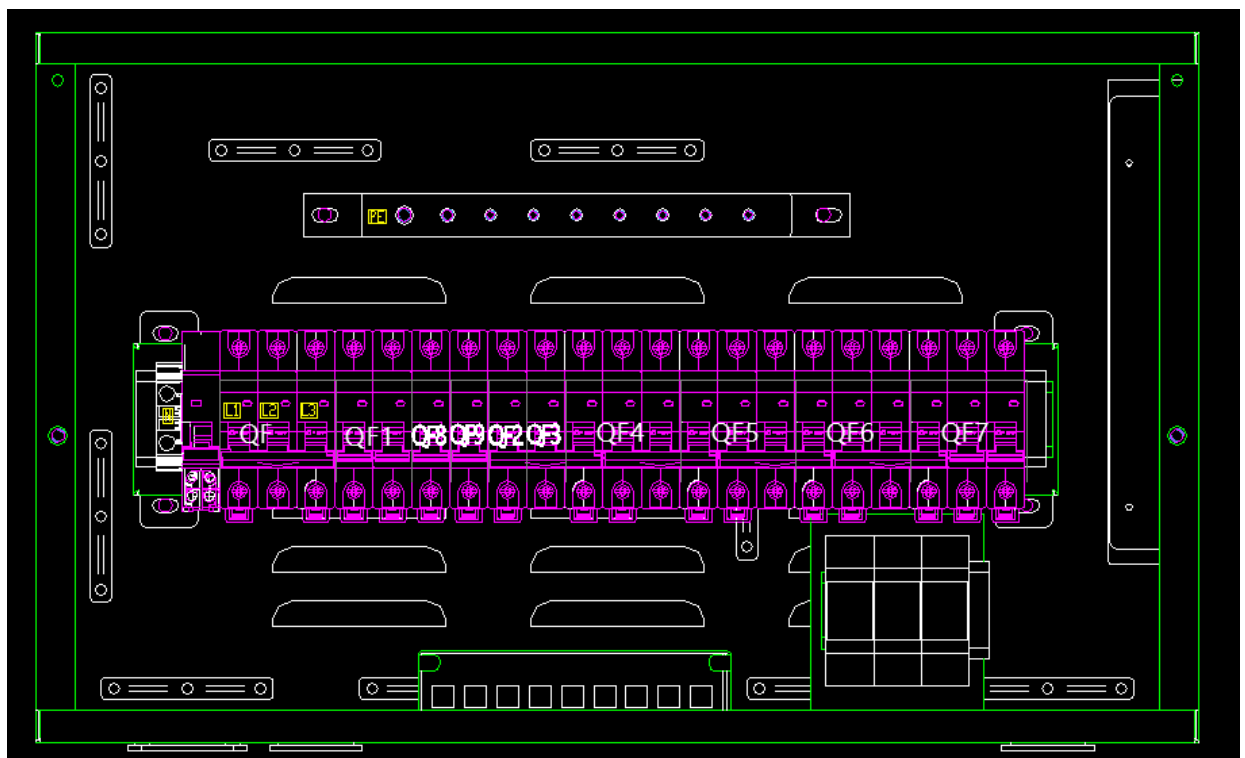
After the preparation work is completed, start connecting the power cord and network cable to the ANTRACK electric control box.

First, laid the power supply power cables and network cables near the inlet connector on the top of the ANTRACK cabinet through the cable bridge and other facilities.

Then, open the front door of the cabinet and loosen the panel screws of the ANTRACK electric control box and remove the panel.



The following is the schematic diagram of ANTRACK electric control box. Insert the supply power cable and network cable into the electric control box through the inlet hole at the top. Connect the PE/N and three-phase wires of the power cable to the PE bar/the N terminal and the inlet end of the QF switch correspondingly. Connect the RJ45 plug of the network cable to the P1 port of the switch.



Ensure that the cable terminal is properly inserted and the cable screw is secure. After the

wiring is complete and the power supply is checked to meet the electrical specifications, tighten the the cable properly. Finally, reinstall the electric control box panel.

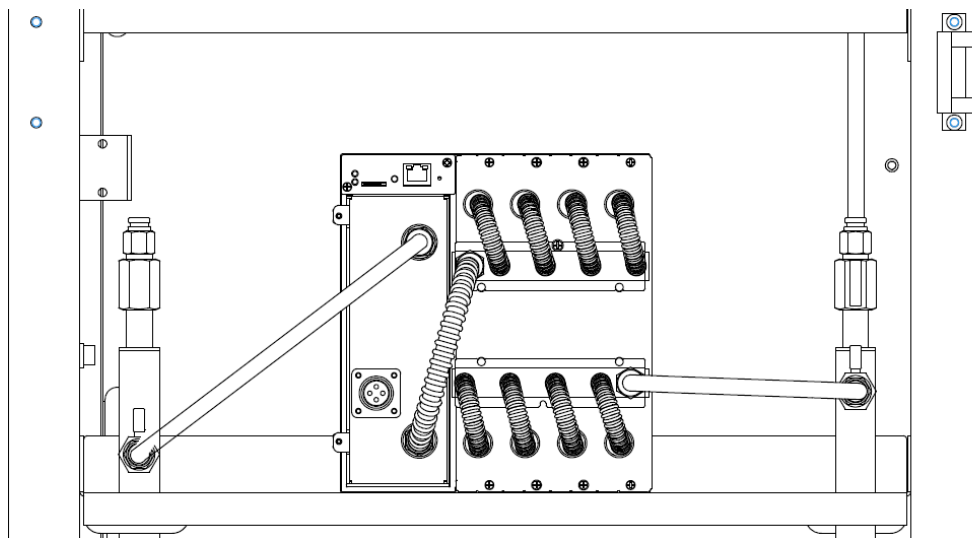
ARTICAL 19 Install high performance servers

Open the front door of the cabinet, and the cabinet is equipped with the server shelf layers, the corresponding server liquid supply/feed valve, liquid outlet valve, and liquid inlet and outlet hose. The power supply plug and network plug of each server are also configured.

Place the high performance computer server on the cabinet shelf layer, center left and right, and the rear of the server is against the rear hem of the layer. Then insert the inlet and outlet hose to the inlet and outlet quick connector of the server accordingly.

Note: Do not connect the power supply plug and network plug of the server at this time. It is necessary to connect the power supply plug and network plug of the server and start the computing power calculation of the server after the cabinet has completed the liquid filling, initial exhaust, liquid pump ONOFF cycles for exhaust operation, and fans running.

After the server is installed, it is as follows:



ARTICAL 20 Add coolant to system

Coolant specifications: Coolant recommended using antifreeze that freezing point is -25°C , PH value range 7.8~8.5. Do not directly use tap water or outdoor lake combined water, do not use antifreeze that PH value below 7.5, do not use unclean liquid containing impurities.

When filling liquid, close the cabinet drain valve first, and make sure that the cabinet fill valve, exhaust valve, server supply valve and server outlet valve are open. Then unscrew the red cover of the coolant tank (20L) on the top of the cabinet, and slowly pour the coolant that meets the requirements into the tank, and the initial liquid filling capacity is about 20L. After filling the liquid, tighten the coolant tank cover in time.

During the filling process, avoid the coolant spilling out and avoid impurities and foreign bodies entering the coolant tank.

During the liquid filling process, stable climbing facilities such as ladders should be used to ensure operation safety.

After adding liquid, let ANTRACK stand for about 5min and let it initially exhaust. After the initial venting, the flexible inlet and outlet tube of liquid pump should be full of coolant.

ARTICAL 21 Liquid pump exhaust operation

After filling and standing the initial venting is complete, run the liquid pump for venting.

Supply power to the cabinet, turn on the INPUT switch and PUMP switch of the ANTRACK electric control box, and the liquid pump starts to run. After running PUMP for about 30 seconds, turn off PUMP switch for 1min. after 3 ONOFF cycles, check whether there are bubbles in the inlet and outlet tubes of the liquid pump and the servers, if no obvious bubbles (no bubbles with a diameter greater than 1mm), the liquid pump shall run continuously for 15min to 30min, and check whether coolant leak such as the joints of the liquid cooling pipes, or any abnormal vibration or sound occur in the liquid pump.

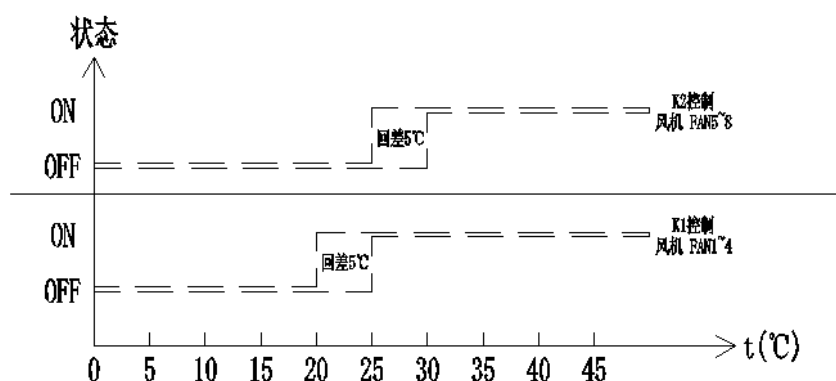
If there is any abnormality, please stop the liquid pump exhaust operation and contact technical support.

ARTICAL 22 Running the fan

After completing the above liquid pump exhaust and continuous operation, turn on the fan switch on the ANTRACK electric control box and observe the coolant temperature display value of the temperature controller at the front door. When the value is above 25°C, the fan at the rear door of the cabinet starts to run.

Observe that the fan runs for 3 minutes check whether any abnormal vibration or abnormal sound occur in.

The following is the fan running curve.



If there is any abnormality, please stop the fans and contact technical support.

ARTICAL 23 Power on and run the server

After completing the above operation, turn on the servers switch on the ANTRACK electric control box in turn and observe the power-on status of the server. Configure the server without any abnormality, run the network Settings, and start the computation operation.

When installing, there must be no obstructions within 1 meter of the ANTRACK. During transportation, each component in the system needs to be fixed firmly, and the fastening torque of the fasteners should meet the national standards and transportation requirements, and meet the structural strength requirements of sea, land and air transportation. All cables meet the current selection and regulatory requirements for safety in the sales area and meet the overall environmental requirements of the product.

CHAPTER 5. Maintenance

ARTICAL 24 Routine maintenance Overview

Routine maintenance is the scheduled maintenance that is performed to ensure that the system is functioning properly, thus avoiding any unplanned failures and downtime. The purpose of routine maintenance is to enable the equipment to operate stably for a long time.

Routine maintenance helps maintenance personnel:

- 1) Timely discover and deal with alarms related to equipment operation.
- 2) Timely detection of potential risks to prevent failures that may cause economic losses and reduce customer satisfaction.
- 3) Analyze the operating trend of the system according to the collected information, and take measures to improve the operating efficiency.

The main points for attention in daily maintenance are as follows:

1) Before maintenance, read the safety precautions and product documents carefully. Comply with local safety regulations and laws to avoid accidents. The words "Precautions," "caution," "warning," and "danger" in this manual do not represent all safety precautions that should be followed. But they should only be used in addition to safety precautions. Therefore, the personnel responsible for the installation, maintenance and other operations of the equipment company's products must have basic knowledge of safe operation, go through strict training, master the correct operation methods, and have the corresponding qualifications.

2) In the various operations of the company's products, must strictly comply with the relevant equipment precautions and special safety instructions provided by the equipment company. The safety warnings listed in the manual represent only the part of the equipment company's understanding. Equipment companies do not accept any liability for violations of general safe operating requirements or for violations of safety standards for the design, production, and use of equipment.

3) Most repair work can only be done after the power supply has been disconnected from the equipment. Do not connect the power supply during maintenance. If you need to perform maintenance tasks while the device is running, such as measuring current, voltage, and temperature, only connect the power supply after you have connected all the devices. Disconnect the power supply after you have completed maintenance.

4) Electrical maintenance must take protective measures, including but not limited to wearing insulation gloves or wearing insulation shoes, and comply with local laws and regulations.

5) The following routine inspections of ANTRACK are recommended daily.

6) Caution should be exercised in professional maintenance. Consult the Bitmain customer

!

Danger

When working at heights, local laws and regulations must be complied with.

service center for details.

After the high-performance server is installed, insert the bellows in turn, and the length of the bellows corresponds to Figure 5-2.

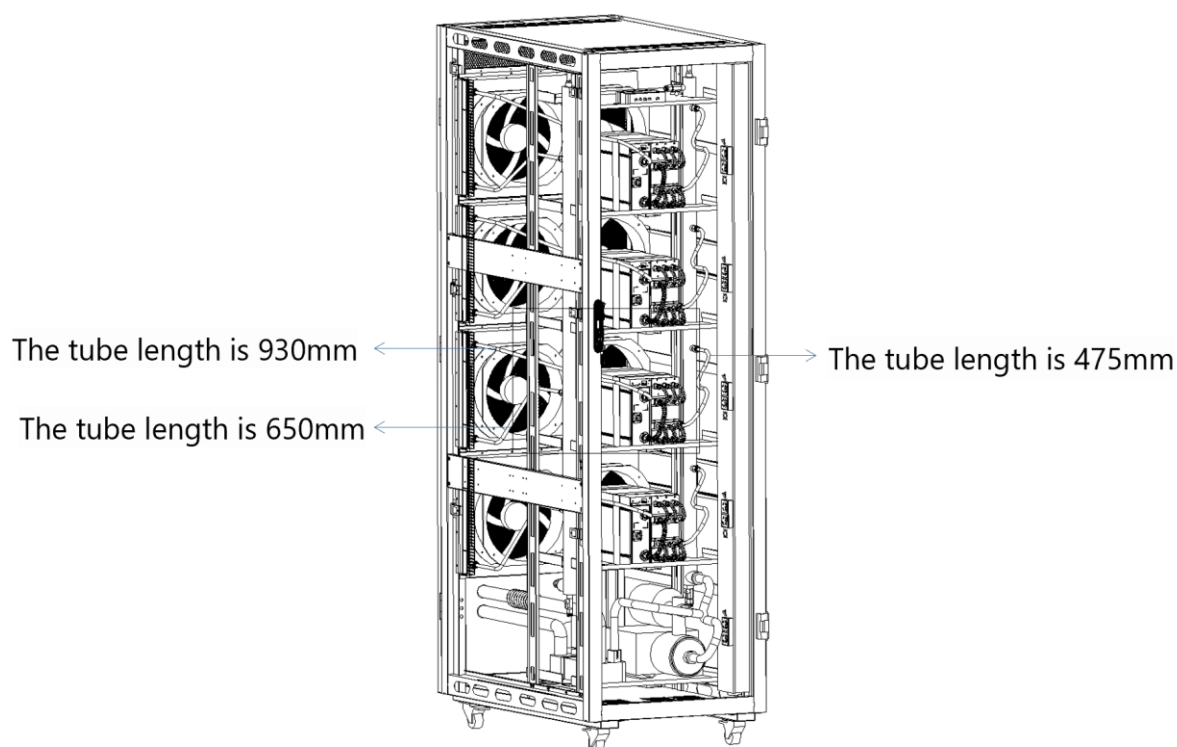


Figure 5-2 Bellows tube length and installation instructions

ARTICAL 25 Coolant Check

It is necessary to observe the liquid level in the coolant tank every day. If the liquid level is too low (less than 1/3 of the height of the coolant tank), it will cause poor heat dissipation of the server, vibration or abnormal noise of the liquid pump, or even damage the liquid pump, which will cause ANTRACK protective automatic trip (INPUT switch).

When the liquid level is low, it is necessary to timely supplement the coolant that meets the requirements.

The coolant should be tested and replaced regularly. During routine maintenance, use PH test strips to monitor the liquid's acidity. If the PH level falls below 7.8, replace the liquid promptly to prevent system corrosion and abnormal wear of the liquid pump caused by acidification. The recommended testing and replacement intervals for different coolants are shown in the following table.

Table 5-1 The recommended testing and replacement intervals for different coolants

Coolant	Recommended testing intervals	Recommended replacement intervals
Pure water	2 weeks	1~2 months
Antifreeze (10%)	1 month	3~6 months
Pure water + Corrosion inhibitor	2~3 months	~12 months

When replacing the liquid, ensure complete drainage of the old liquid and refill with fresh coolant that meets the standards outlined in ARTICAL 20 of this manual. After refilling, exhaust the air from the ANTRACK system as instructions, ensuring proper system operation.

If it is found that there are foreign impurities in the coolant, it is necessary to shut down in time, clean the liquid cooling system, and replace the clean coolant.

ARTICAL 26 Check the liquid cooling pipe

It is necessary to observe the valve status of liquid cooling pipe joints on a daily basis. If the pipes or joints leak, stop the machine to check and tighten them. If the joints are damaged, they need to be replaced.

If the transparent bellows for liquid supply and outlet of the server vibrate greatly, you can replace them with smooth hoses in the delivery accessories.

ARTICAL 27 Check the air cooled heat exchanger

It is necessary to observe whether there are sundries in front and back of the cabinet and around the cabinet, and whether there is dust and impurities in the place that may be inhaled into the cabinet. If so, it is necessary to clean up in time to keep the inlet and outlet air path unhindered and the environment clean.

If there is dust or foreign matter attached to the mesh of the front door or side door of the cabinet, or there is dust or foreign matter attached to the surface of the air-cooled heat exchanger in the cabinet, clean it up immediately, check the source of dust and foreign matter in the place, and take preventive measures.

ARTICAL 28 Fan inspection

It is necessary to observe the noise and vibration of the fan on a daily basis. If any abnormality occurs, contact technical personnel for confirmation. If necessary, replace and maintain the fan.

ARTICAL 29 Liquid pump inspection

It is necessary to observe the running noise and vibration of the liquid pump on a daily basis. If any abnormality occurs, contact technical personnel for confirmation. If necessary, replace the pump.

ARTICAL 30 Water cooled heat exchanger application check

When using water-cooled heat exchanger for heat exchange, it is necessary to monitor whether the external water source meets the following water quality requirements:

PH value: 6~8;

Cl⁻ concentration: ≤50 ppm

Sulfate ion (SO₄⁻²) concentration: ≤30mg/L

Ammonia ion (NH₄⁺) concentration: ≤0.1mg/L

And monitor the flow or water pressure to and from ANTRACK, and check the cleaning water filter if there is an anomaly.