WEIHENG

TIANWU Energy Storage System Maintenance Manual

Purpose

This document describes routine maintenance and spare parts of TIANWU AIO Energy Storage Systems (also referred to as ESSs). Before maintaining the ESS, read this document carefully to understand the safety information as well as functions and
features of the ESS.

Intended Audience

This document is intended for:
Technical support engineers
Maintenance engineers

Change History

Changes between document issues are cumulative. The latest document issue contains all the changes made in earlier issues.
Issue 02 (2024-04-10)
Updated 2. Fire Control System Maintenance Information.
Issue 01 (2024-01-05)
This issue is used for first office application (FOA).

⚠ CAUTION

Safety requirements in maintenance and repair:
Before connecting or removing cables, turn off the protection switch of the corresponding loop.
Place a warning sign indicating that the switch must not be turned on at the position where the switch resides.
Use an electroscope of a proper voltage level to check whether the equipment is energized and ensure that the equipment is completely powered off.
If charged bodies are found nearby, block or wrap them with insulation plates or insulation tapes.
Before performing maintenance or repair, securely connect the loop to be repaired to the main ground loop using a ground cable.
After the maintenance or repair is complete, remove the ground cable between the loop that has been maintained and the main ground loop.

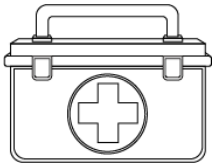
Content

1. Product Maintenance

1.1 Preparations Before Maintenance

NOTE:

This section lists only personal protective equipment (PPE). For details about the tools required for replacement, see the specific parts replacement section.

 Insulated gloves	 Protective gloves	 Goggles	 Dust mask
 Insulated shoes	 Reflective vest	 Safety helmet	 Safety harness
 Medical kit	-	-	-

1.2 Powering Off a Single ESS

1.3 Routine Maintenance

The following maintenance contents must be completed by the users. If you need professional on-site services by Weiheng, please contact Weiheng.

Routine Remote Maintenance

Log in to the monitor platform and check whether there are major or minor alarms.

Note: for details, see the software user manuals.

1.3.1 Quarterly Maintenance

Table 1-2 Quarterly maintenance checklist

Maintenance Category	Maintenance Action	Expected Result	System Powered Off

			or Not
Cabinet	Perform the visual inspection: • Appearance • Rust • condition • Door lock • Vent	• The coating is not peeling or scratched. • There is no obvious paint peeling or rust. • The door locks are not damaged. • There is no dust at the vents. • There are no insects, rodents, snakes or other animals.	No
Air-cooled Chiller	• Check the appearance • Clean the filter	• There is no obvious damage to the appearance. • There is no obvious paint peeling or rust. • The screws are secured. • The fans rotate properly without abnormal sound. • The filter is clean and free from blockage.	No
Adapter	Check the indicator status	The indicator is steady green.	No
Power distribution area	Check whether there are foreign objects in the power distribution area.	The area is clean and free from foreign objects.	No
Window filters	Perform the visual inspection: • Appearance • Rust condition • Foreign objects/Ice and snow	• There is no obvious paint peeling or rust. • Pressure relief windows are not damaged. • There is no foreign object, ice, or snow on the top.	No
Note [1]: Monthly maintenance is recommended in a high-temperature (≥ 35°C) or low-temperature (≤ 0°C) environment. Note [2]: You are advised to clean the filter after each occurrence of a sandstorm and before summer in sandstorm-stricken areas. In other areas, clean the filter according to the actual situation and ensure that the filter or condenser is not blocked. Note [3]: In areas with severe sandstorms or heavy ice or snow, perform maintenance based on the actual situation. Ensure that there is no foreign object, ice, or snow on the pressure relief windows. Clean the foreign objects, ice, or snow in the specified area to avoid damaging the pressure relief devices due to improper operations.			

1.3.2 Semi-annual Maintenance

Table 1-3 Semi-annual maintenance checklist

Maintenance Category	Maintenance Action	Expected Result	System Powered Off or Not
Air-cooled Chiller	Perform the visual inspection: • Appearance • Rust condition • Screw • Fan • Filter	• There is no obvious damage to the appearance. • There is no obvious paintpeeling or rust. • The screws are secured. • The fans rotate properly without abnormal sound. • The filter is clean and freefrom blockage.	No
Filter	Clean the air filter.	The filter is clean and free fromblockage.	No
Smoke detector and temperature and humidity (T/H) sensor	Spot check the smoke detectorand T/H sensor with smoke or heat generated by using dedicated devices.	The smoke detector indicator issteady red, and the T/H sensor reports the temperature changeon the CMU.	Yes
Fire suppression module	• Check whether the pressure gauge pointer of the module is in the green area. • Clean the module. • Check that cables are not damaged, loose, or disconnected.	• The display is normal. • The module is clean and free from dust. • Cables are intact and securely connected.	Yes
UPS	• Screen • Buttons • Fan • Inside battery status	• The display is normal. • Can be power on and power off. • The module is clean and free from dust. • Battery capacity is normal.	No
Note [1]: You are advised to clean the filter after each occurrence of a sandstorm and before summer in sandstorm-stricken areas. In other areas, clean the filter according to the actual situation and ensure that the filter or condenser is not blocked. The recommended tool is high pressure water gun. Note [2]: Remove cables from the solenoid valve in advance of the test to prevent extinguishant release. ***Note [3]: For Semi-annual maintenance, the user must complete the above contents and***			

quarterly maintenance contents.

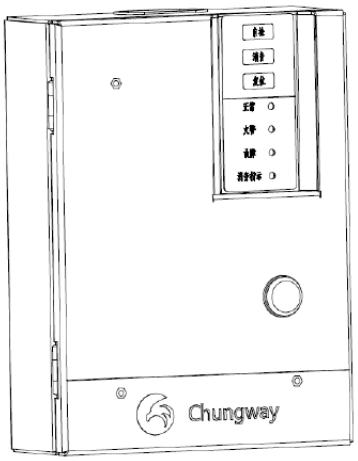
1.3.3 Annual Maintenance

Table 1-4 Annual maintenance checklist

Maintenance Category	Maintenance Action	Expected Result	System Powered off or Not
Battery pack	Perform the visual inspection: • Appearance • Rust condition • Screw • Front panel vent	• There is no obvious damage to the appearance. • There is no obvious paint peeling or rust. • The screws are secured.	Yes
Adapter	Check the indicator status.	The indicator is steady green.	No
Note [1]: For Annual maintenance, the user must complete the above contents, quarterly maintenance contents and Semi-annual maintenance contents.			

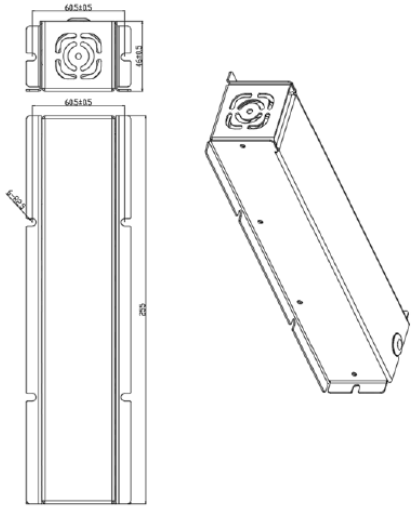
2. Fire Control System

2.1 Fire alarm control panel routing inspection



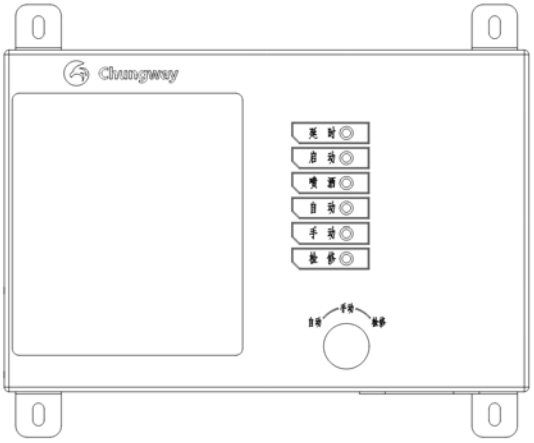
- Inspection:
  - The controller is securely installed
  - The controller is not faulty (yellow indicator)
- Polling period:
  - Every three months, checking one by one

2.2 Aerosol routing inspection



- Inspection:
  - Aerosol installation is not loose.
  - The controller is not faulty (yellow indicator)
  - When the fire extinguishing device is in normal working state, it is necessary to check the control device with it to confirm that the cable wiring is normal.
- Polling period:
  - Every three months, checking one by one

2.3 Emergency start/stop button



- Inspection:
  - The emergency start button is securely installed
  - No fault (yellow indicator)
  - Manual/automatic switch with no problem
  - Normal indicator light
- Polling period:
  - Every three months, checking one by one

3. Liquid Cooling System

3.1 Routine Maintenance

The accumulation of dust in the condenser of the water cooler can make it prone to high pressure alarm faults, forcing the water cooler to shut down. To ensure the normal operation of the chiller, please refer to the table below for regular maintenance of the chiller.

Maintenance Category	Maintenance Action	Maintenance cycle	Best maintenance time
Condenser	Check the cleanliness of the condenser and clean it with an air compressor and vacuum cleaner.	6 Months	Fist time: before the arrival of summer high temperatures
Cable wiring	Visually inspect for looseness.	1 Year	before the arrival of summer high temperatures
Fan abnormality	Flip the fan to check whether it rotates smoothly and whether there is any abnormal sound.	1Year	before the arrival of summer high temperatures
Cooling system	Visually check whether the air conditioner has traces of refrigerant leakage, and lastly let the air conditioner self-test to check whether the compressor is running well.	1Year	before the arrival of summer high temperatures

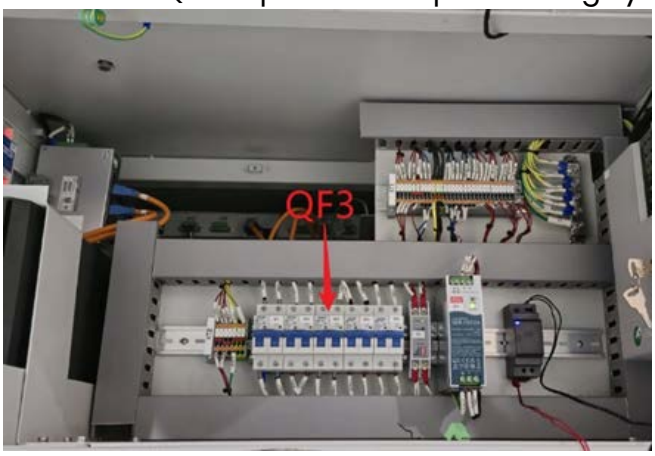
3.2 Tools and materials

 Cable ties	 Hex key	 Cross screwdriver	 Multi-meter
 Diagonal pliers	 Soft hairbrush	 Portable air compressor	 Air rifle head
 Vacuum	-	-	-

3.3 Maintenance steps

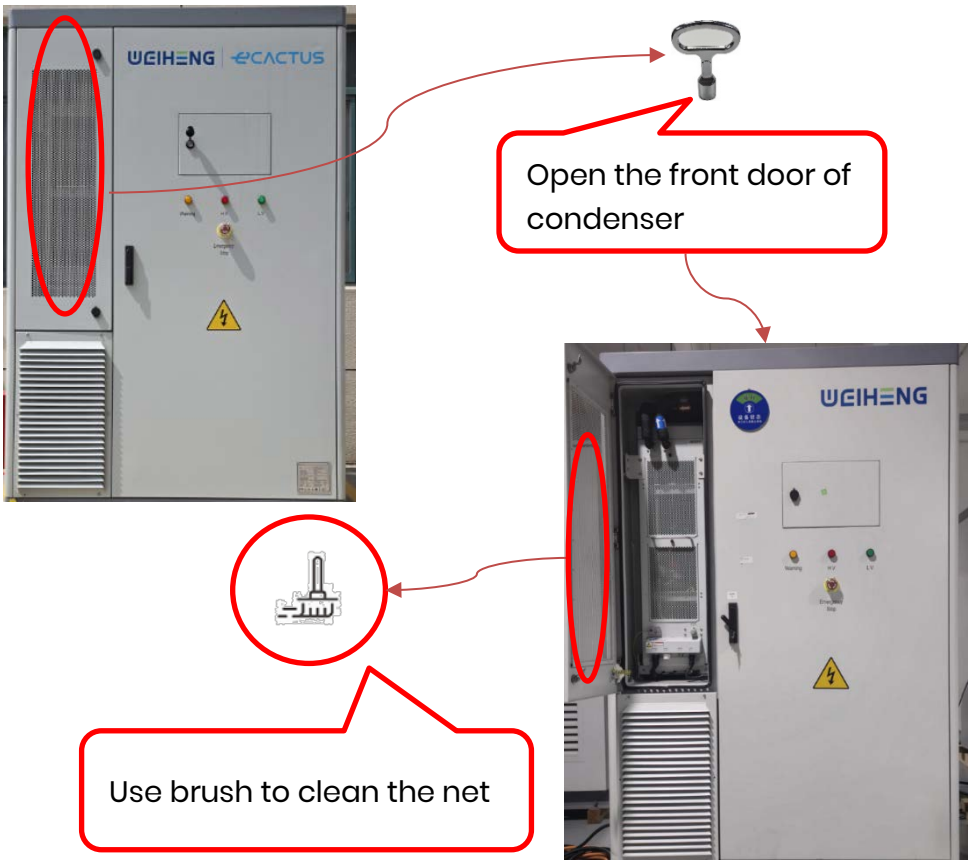
Step 1: Shutdown BESS and inform maintenance.

Step 2: Switch off QF3 to power off liquid cooling system on the back of BESS.

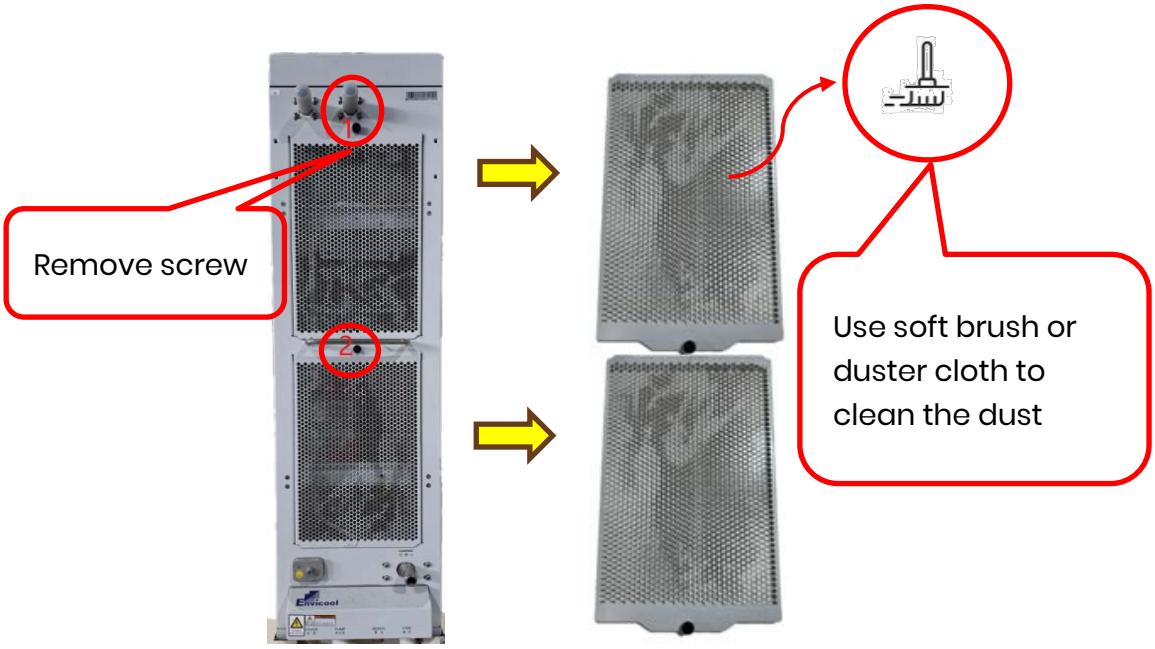


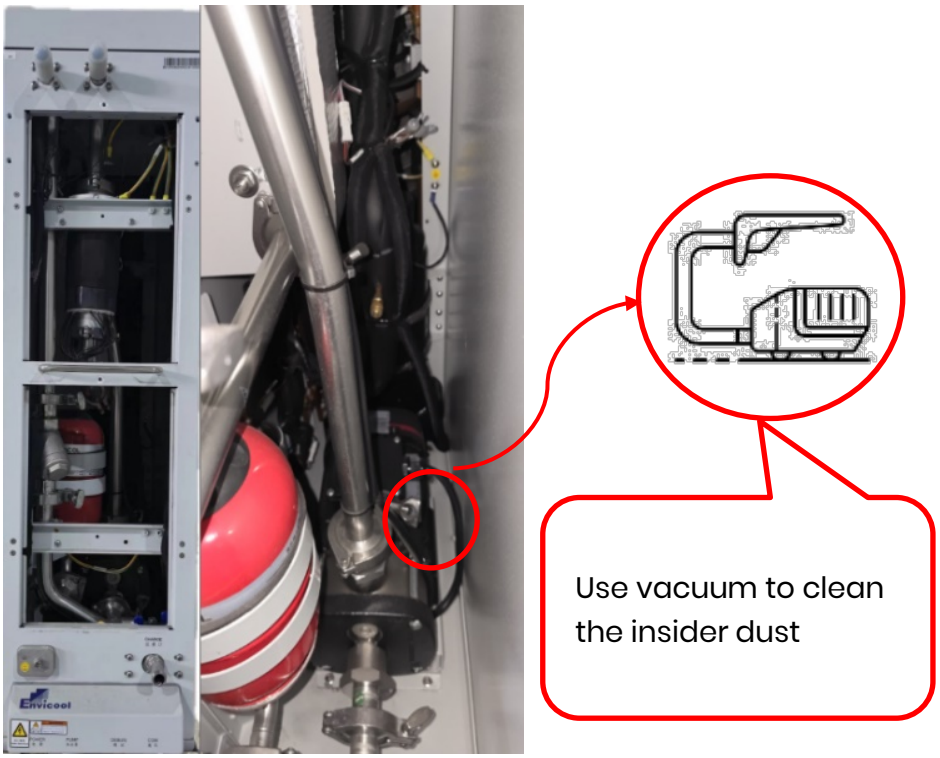
Step 3: Basic clean.

- Clean the front rack dust filter



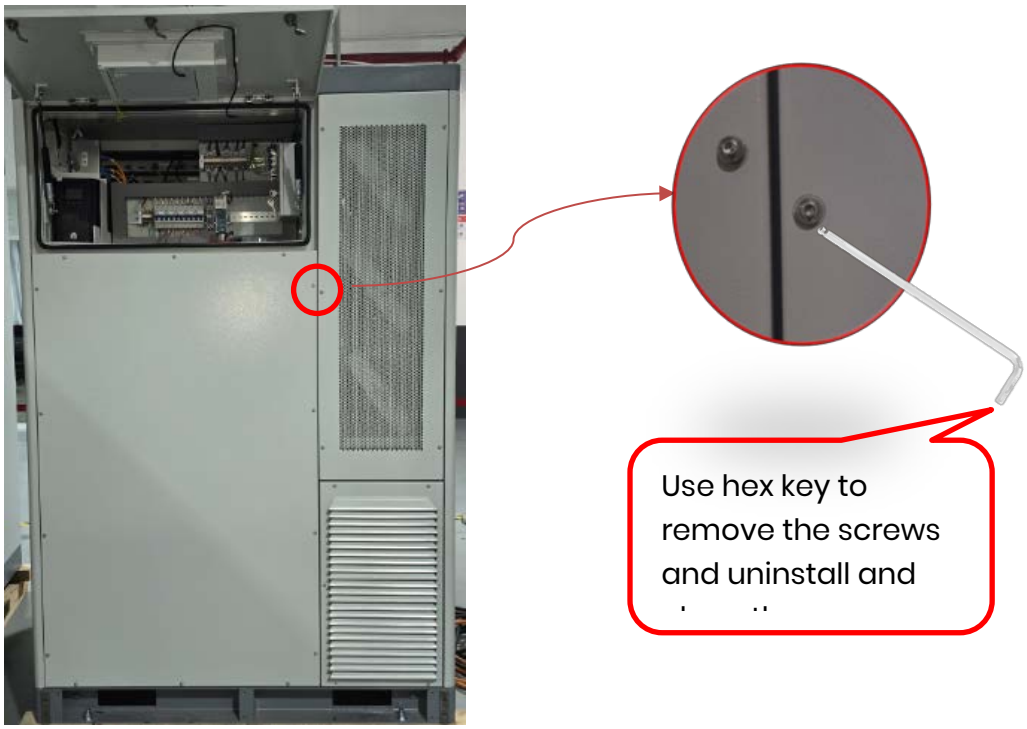
- Clean the dust and dust filter of condenser

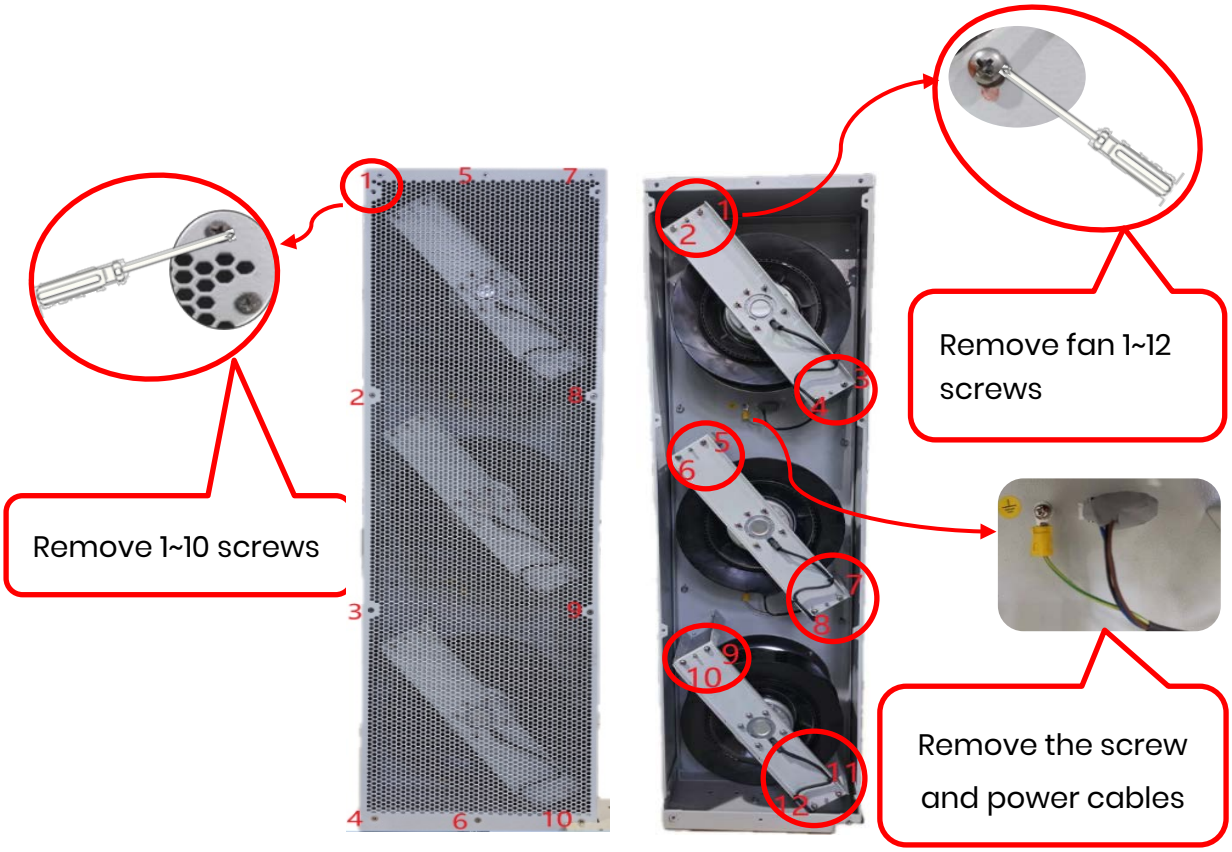




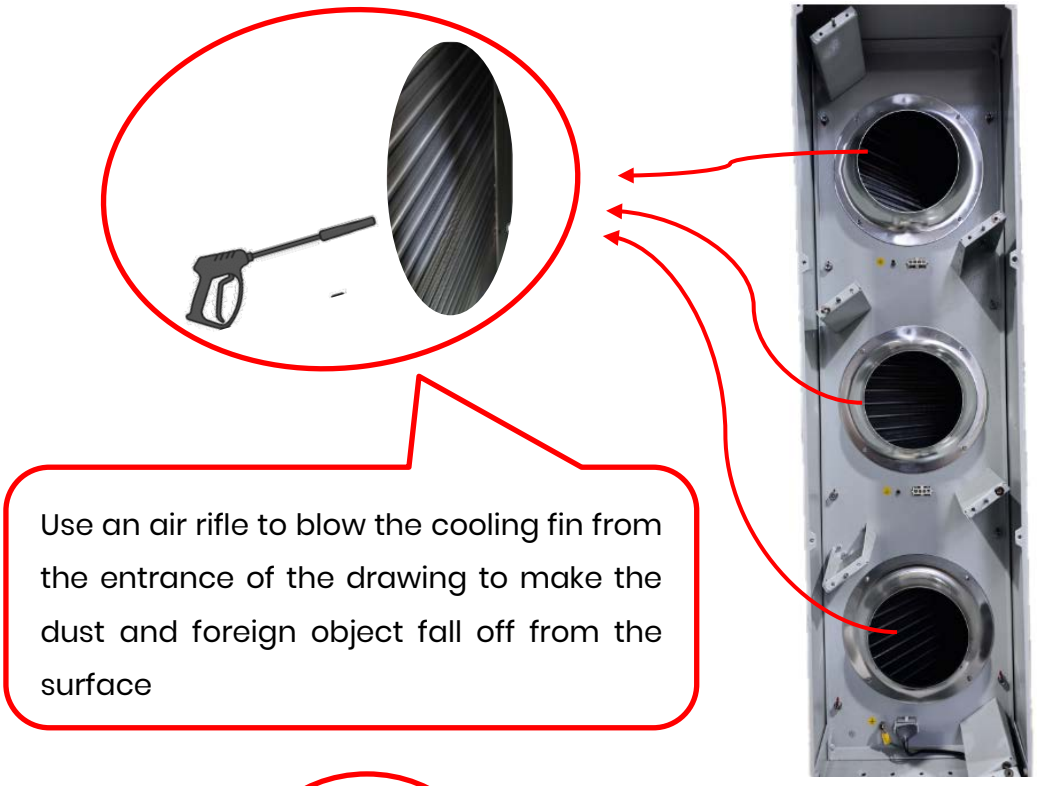
Step 4: Deep clean

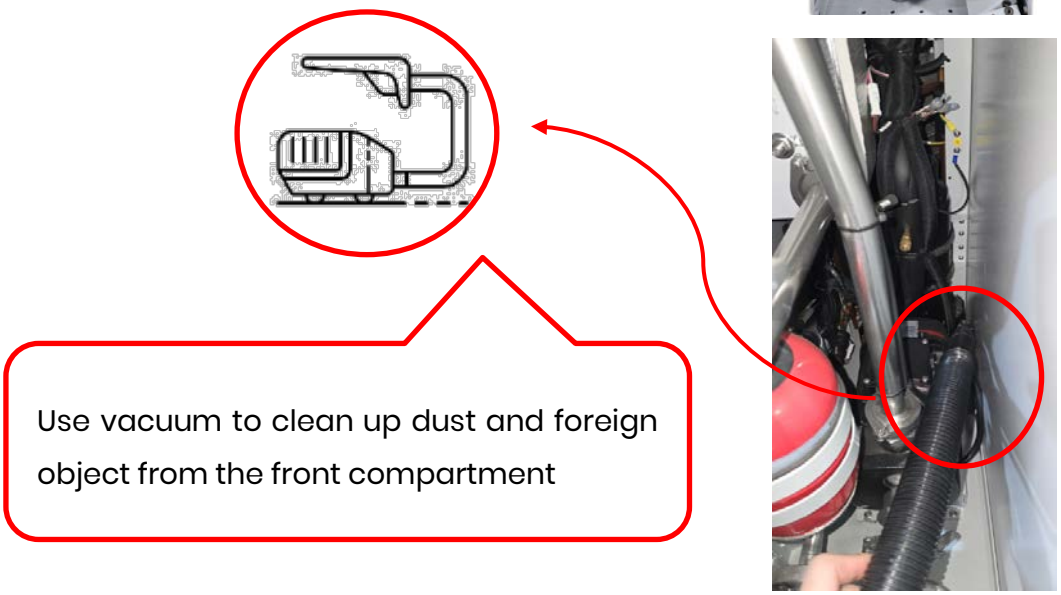
- Clean condenser backside





- Dust cleaning of condenser fin surface





Step 5: System recovery

- Use a cross screwdriver to install and fix the fan module. (After installation, check whether the fan rotates smoothly.)
- Connect the power cable and ground cable and fix the power cable with a cable tie.
- Tighten the front and rear protective nets of the water cooler.
- Tighten screws on the front and rear door panels.

Step 5: Power on condenser

- Switch on **QF3** breaker and check condenser communication status on PANGU platform.
- Observe the operating conditions of the water cooler, such as whether the fan rotates normally and the inlet and outlet water pressure.

Note:

- When cleaning dust, wear electrician's gloves and work clothes to reduce the potential damage caused by electric leakage.
- Avoid using cleaners that contain chemicals to avoid damage to the equipment.
- During the cleaning process, take special care not to touch sensitive parts to avoid damage to the equipment.
- Before reconnecting the power supply and switching on the device, ensure that all connected parts are tight to ensure the safe operation of the device.

4. Spare parts list

Table 2-1 Spare parts list

Spare Part Name	Unit	Quantity
EMS100	Pcs	1
BMS	Pcs	1
HV control box	Pcs	1
LED light Red	Pcs	1
LED light Green	Pcs	1
LED light Yellow	Pcs	1
Emergency Stop Button	Pcs	1
Fire alarm control device	Pcs	1
Photoelectric smoke detector	Pcs	1
Emergency Stop Switch	Pcs	1
Aerosol	Pcs	1
TP-LINK Router	Pcs	1
Air-cooled Chiller	Pcs	1
PCS	Pcs	4
MSD	Pcs	5
UPS	Pcs	1
Screen	Pcs	1
Liquid Pipe assembly	Set	1
Liquid Pipe assembly	Set	1
Refrigerant injection equipment	Pcs	1
Coolant	Liter	10
Note [1]: The above number of spare parts is calculated based on more than 7 TIANWU energy storage systems.		

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