BITMAIN

ANTSPACE

ANTSPACE HK3

V2/V3/V5

Liquid Cooling System

On-Site Installation Manual

Catalogue

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一、ANTSPACE HK3 Product components

ANTSPACE liquid cooling system is mainly composed of a container, a cooling tower, intermediate connecting pipelines and other related accessories, its functions as shown in Table 1-1.

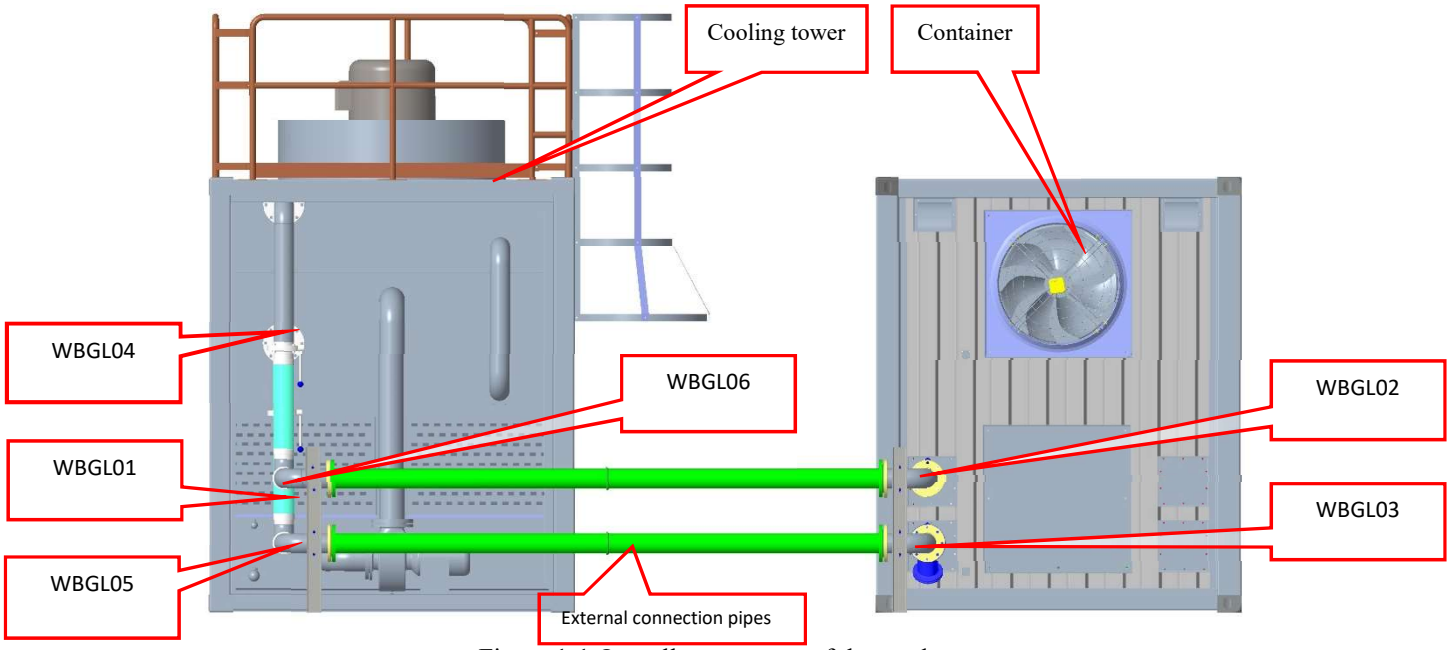

Figure 1-1 Overall appearance of the product

Table 1-1 Summary of device functions

NO.	Type	Function description	Note
1.	Cooling tower	The heat exchange unit exchanges heat between the heated coolant and the atmosphere, and transmits it to the container after cooling.	
2.	Container	Including pump set, power distribution cabinet, water separator, shelf, etc., to distribute water, electricity and power network for mining machines	
3.	WBGL01	Cooling tower outlet pipe	
4.	WBGL02	Container outlet pipe	
5.	WBGL03	Container inlet pipe	
6.	WBGL04	Cooling tower inlet pipe	
7.	WBGL05	Connect the cooling tower outlet pipe and the container inlet pipe	
8.	WBGL06	Connect the cooling tower inlet pipe and the container outlet pipe	

二、ANTSPACE HK3 Installation between the container and the cooling tower

Place the container on the ground. The ground is required to have a certain strength - the ground can withstand 25 tonnes of weight, and is not deformed, and horizontal degree (±1 degree). The cooling tower is hoisted on the side of the container. The distance between the container and the cooling tower must be greater than or equal to 2 m. The intermediate connecting pipelines must be installed on the spot based on the distance between the container and the cooling tower.

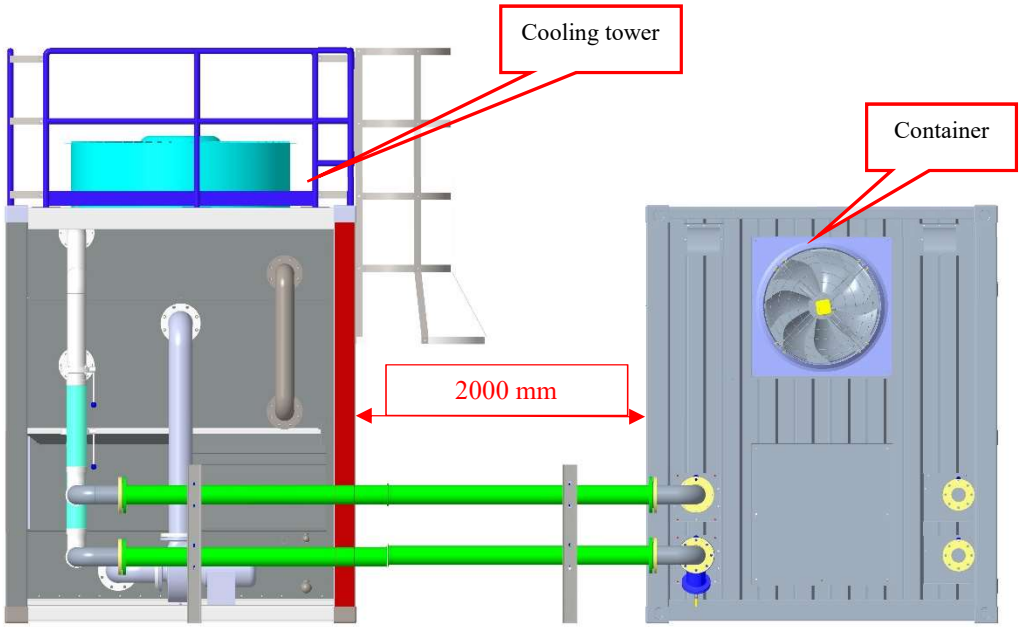

Figure 2-1 The relative position of the container and the cooling tower

三、ANTSPACE HK3 Installation of the exhaust fan of the container

After the relative position of the container and the cooling tower is determined, find the exhaust fan in the water tank of the container, unpack it and install it.

1) The exhaust fan is installed at the rear door of the container, as shown in Figure 3-1.

2) The exhaust fan and the shutter share the installation bolts (M12 outer hexagon bolt).

3) See Figure 3-1 for the schematic diagram after installation.

Figure 3-1 Installation of the exhaust fan

四、ANTSPACE HK3 The layout and installation of the intermediate connecting pipelines

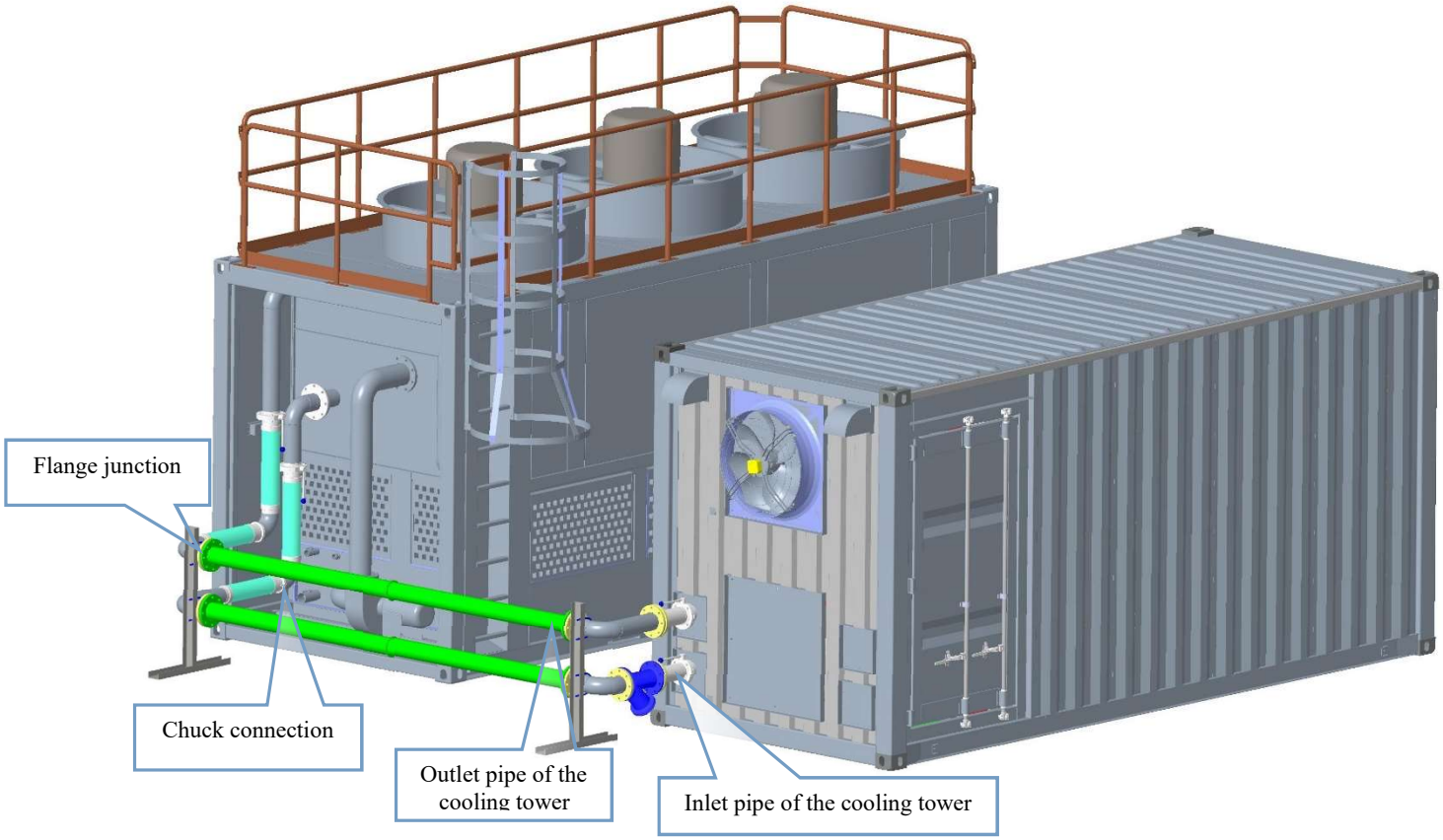

Figure 4-1 Installation of the intermediate connecting pipelines

Pipeline connection:

1) First of all, find two supply and return pipes (short, universal, with valves on the pipe) in the container wooden box, labeled GL14 and GL15; use stainless steel sanitary clamps (double hinges) (ISO 133/304/PN16) with gaskets to connect to the two supply and return connections, it should be noted that the gaskets should not be damaged, worn, deformed; when connecting, you need to pay attention to the direction of the butterfly valve handle, to maintain consistency with Figure 4-3

Figure 4-2 water pipe GL14/15

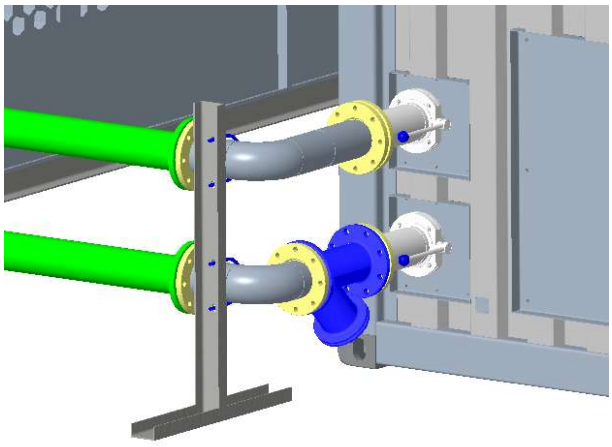

Figure 4-3 The direction of the handle of the butterfly valve

2) Next, find out the wooden boxes with the numbers "WBGL01", "WBGL02", " 008.WBGL03", "WBGL04", "WBGL05", "WBGL06" and "WBGL07"; then find the flanges, chuck washers and connecting bolts and clamps from the wooden box.

3) Connect the above pipelines according to the requirements of Figure 1-1 and Figure 3-1, with a total of 11 connections: 9 flange connections, with 8 single connection points, each with DN125 gasket 1; 2 chuck connections, with 1 single connection point, each with DN125 gasket 2; it should be noted that the gasket should not be damaged, worn or deformed.

After connecting the intermediate pipelines, secure the pipelines and the supports of the external pipelines:

1) Firstly, secure the supports of the external pipelines. The pipelines should be tightly attached to the supports to secure them. The supports of the external pipelines are secured to the ground using expansion screws (M12 x 80). Drill holes on the ground with a pistol grip drill in advance.

2) Secondly, the pipelines are fixed to the supports of the external pipelines using beam clamps (φ133/M12/304).

3) Finally, check whether the connection points are loose.

五、ANTSPACE HK3 Power distribution management

There are two 500 kW PDC inside the equipment. In order to ensure the safe and stable operation of the equipment, two three-phase five-wire cables carrying 500 kW should be prepared on site in advance (no specification is specified).

The two cables are respectively connected via the upper two holes on one side of the exhaust fan of the container, see Figure 5-1.（Note: the rainproof cloth and rainproof cover in the accessories shall be used for protection）Three-phase cables are connected to the top of two PDC. The zero line enters to the top of PDC, extends to the zero line row where it is installed and fixed with screws.

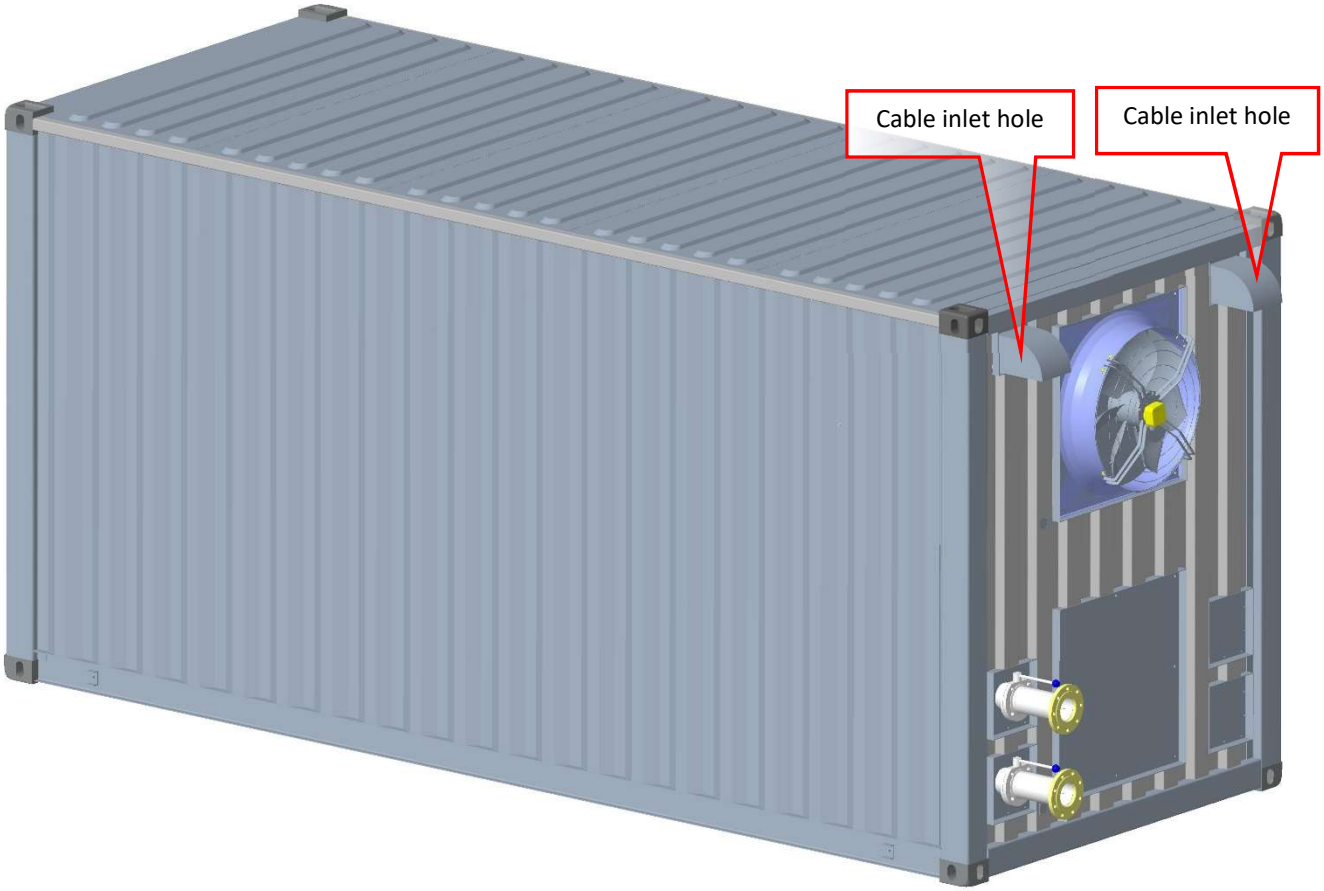

Figure 5-1 Cable inlet hole

Both sides of the container have grounding studs, and PDC must also be grounded securely. Therefore, ensure that both the container shell and PDC shell are grounded securely.

When leaving the factory, the phase sequence of the equipment has been determined. After the equipment arrives at the site, it only needs adapt to the phase sequence of the on-site substation. The operation is as follows: connect the three-phase power of the substation to the distribution cabinet, power on the electric control cabinet, and observe whether there is power failure; In case of power failure, please adjust the phase sequence connected to the electric cabinet; If there is no fault, it can operate normally.

The cooling tower is separated from the container, and above the cooling tower are three cooling fans and a spray pump, as well as a liquid level sensor. After the cold tower is fully secured on top of the container, connect cables to four motors and one sensor. After the cold tower is fully secured on top of the container, connect cables to four motors and one sensor as shown in Figure 5-2.Five wires have been reserved. The sequence of the three cooling fans is not specified, but their wiring sequence is U, V and W (from left to right), the location of cooling fan as shown in Figure 5-3. Among them, cable trough is reserved at the top and side of the cooling tower, and the cables need to be arranged along the trough . The wiring sequence of the spray pump is also U, V and W (from left to right). The position for the liquid level sensor has been reserved. Find the npt1

/ 2 nut and gasket from the cooling tower spare parts box, remove the cooling tower air inlet grid, install the liquid level sensor from inside to outside, and install the liquid level sensor as shown in figure 5-4 below.

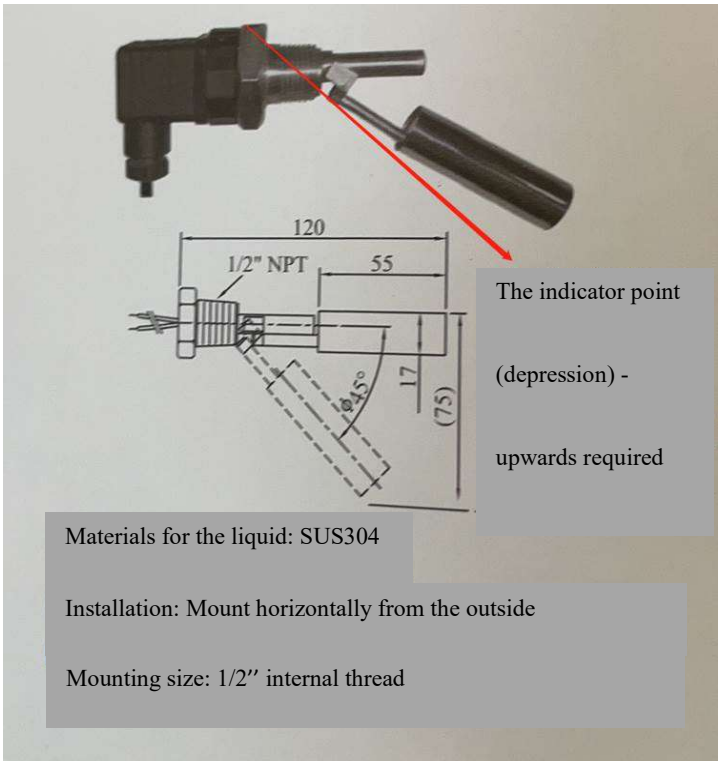

Figure5-2 Liquid level sensor

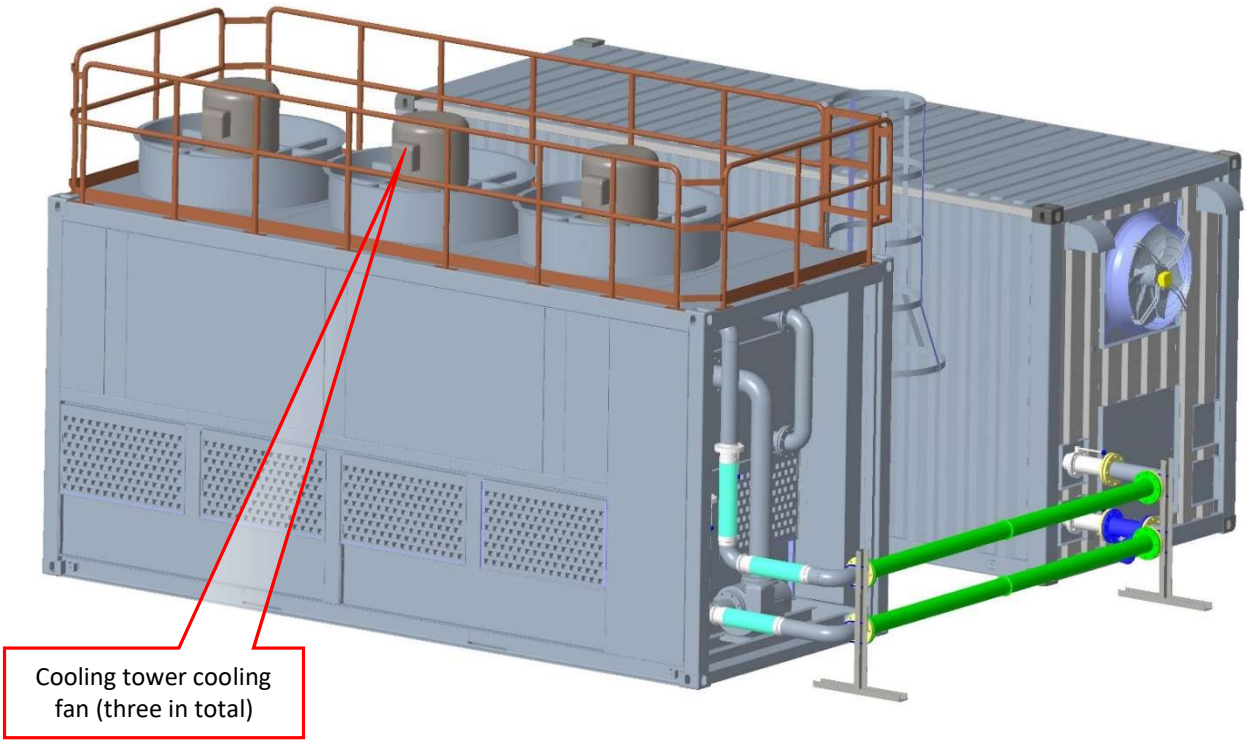

Figure 5-3 Location of cooling tower cooling fan

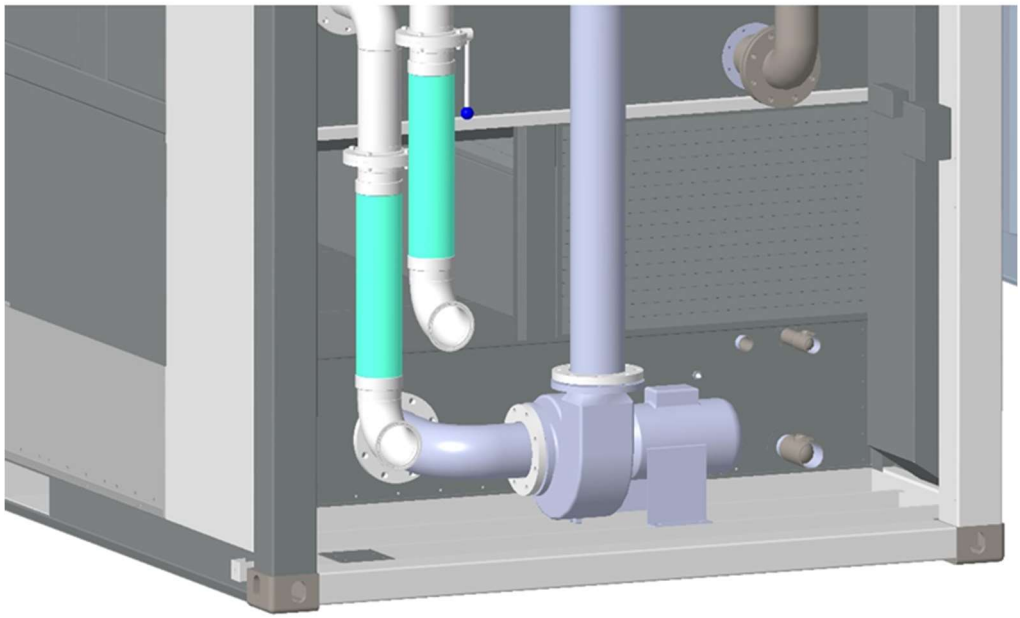

Figure 5-4 Installation diagram of liquid level sensor

六、ANTSPACE HK3 Pressure operation

Preparation for the pressure test:

1） Get hoses and air pumps ready; (Recommended brand: Outstanding, model 2200W-40L; Selection basis: The internal volume of the system is about 1.5m^3/h, and the corresponding exhaust volume air pump is selected according to the time requirements; the maximum output air pressure is more than 8bar, and 10bar is the best)

2） Connect the external pipeline according to the ANTSPACE field installation manual.

3） Check if the automatic exhaust valves or the ball valves on the internal and external pipes of the container are closed. Screw the top nut of the automatic exhaust valve to open/close the automatic exhaust valve. (See Figures 6-1 through 6-4).

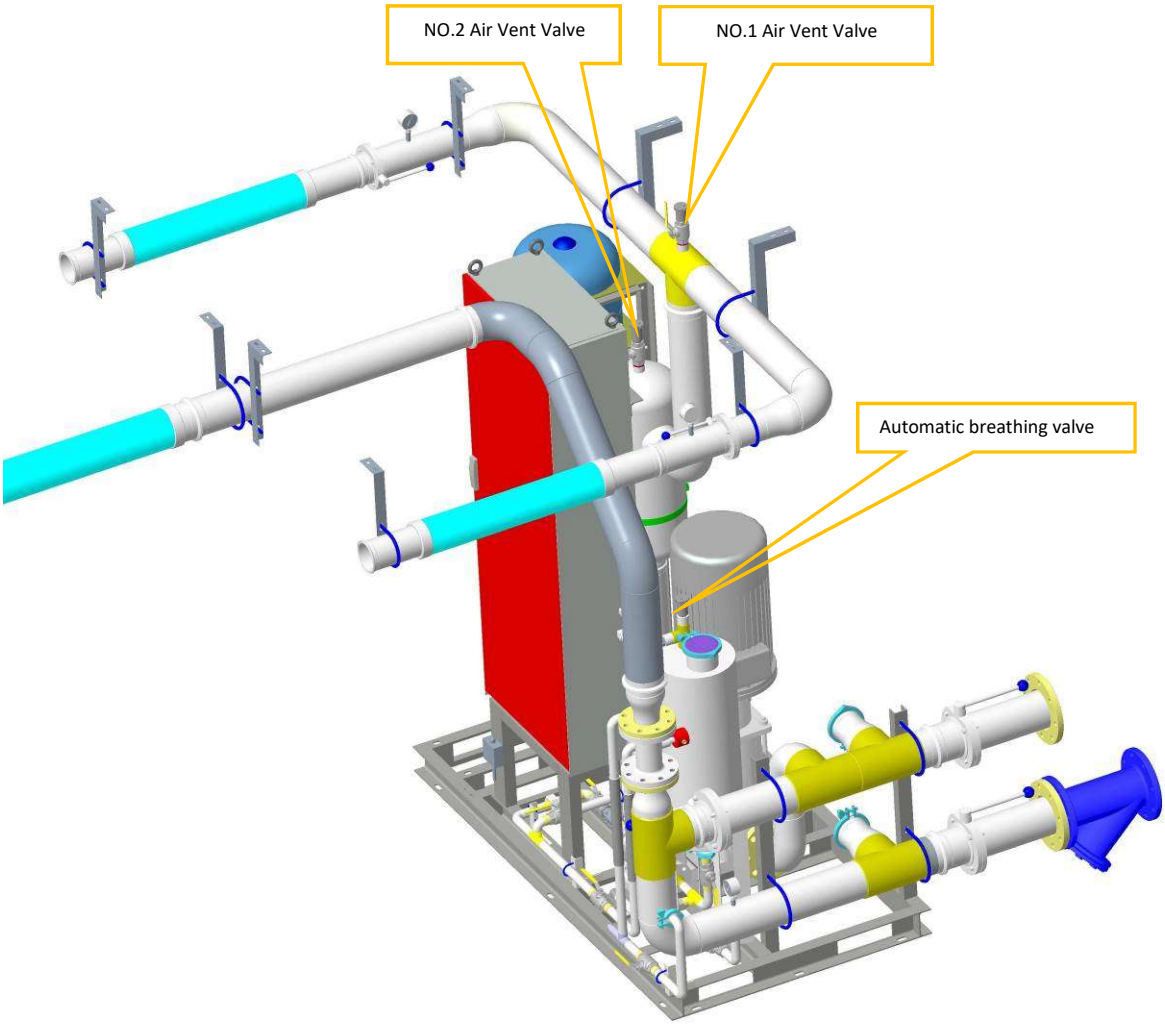

Figure 5-1 Pump station - automatic exhaust valve

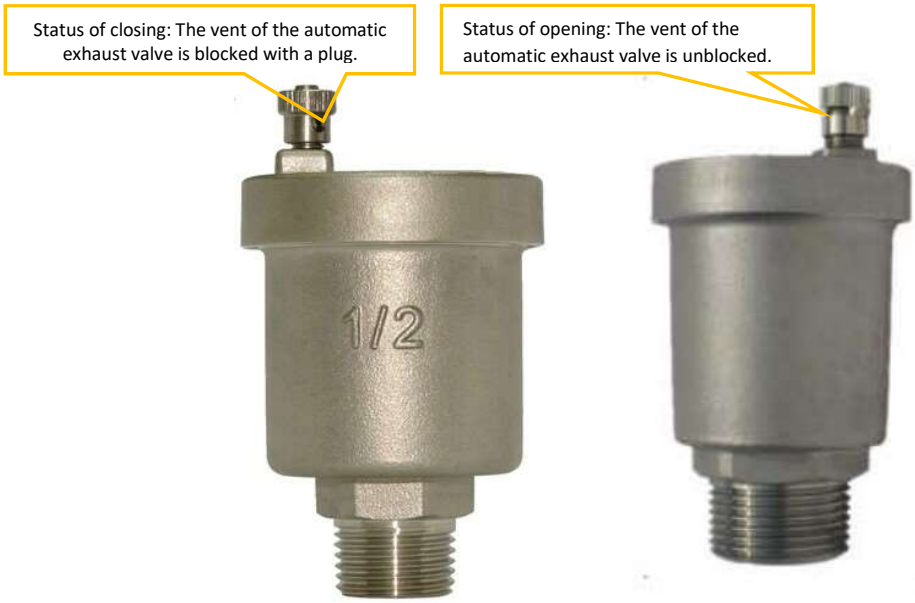

Figure 5-2 Schematic diagram of opening and closing of automatic exhaust valve

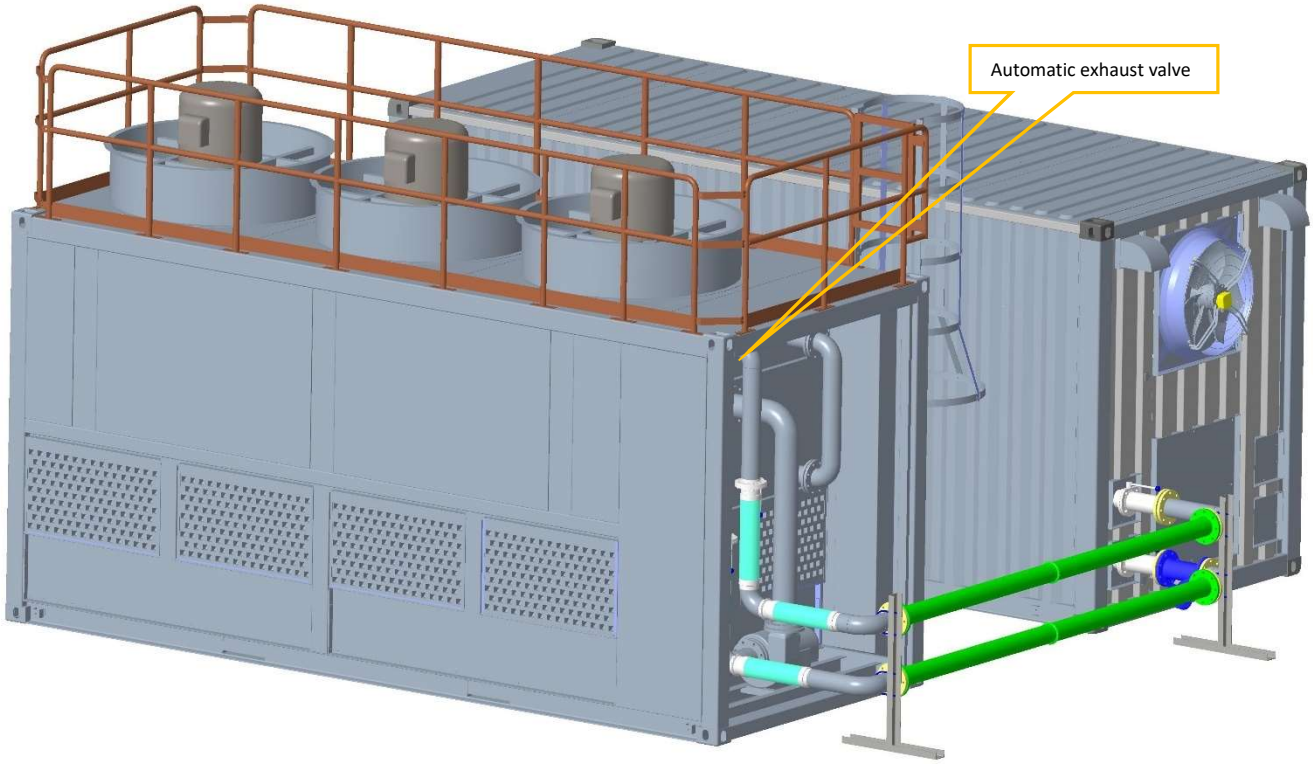

Figure 5-3 External connecting pipelines - automatic exhaust valve

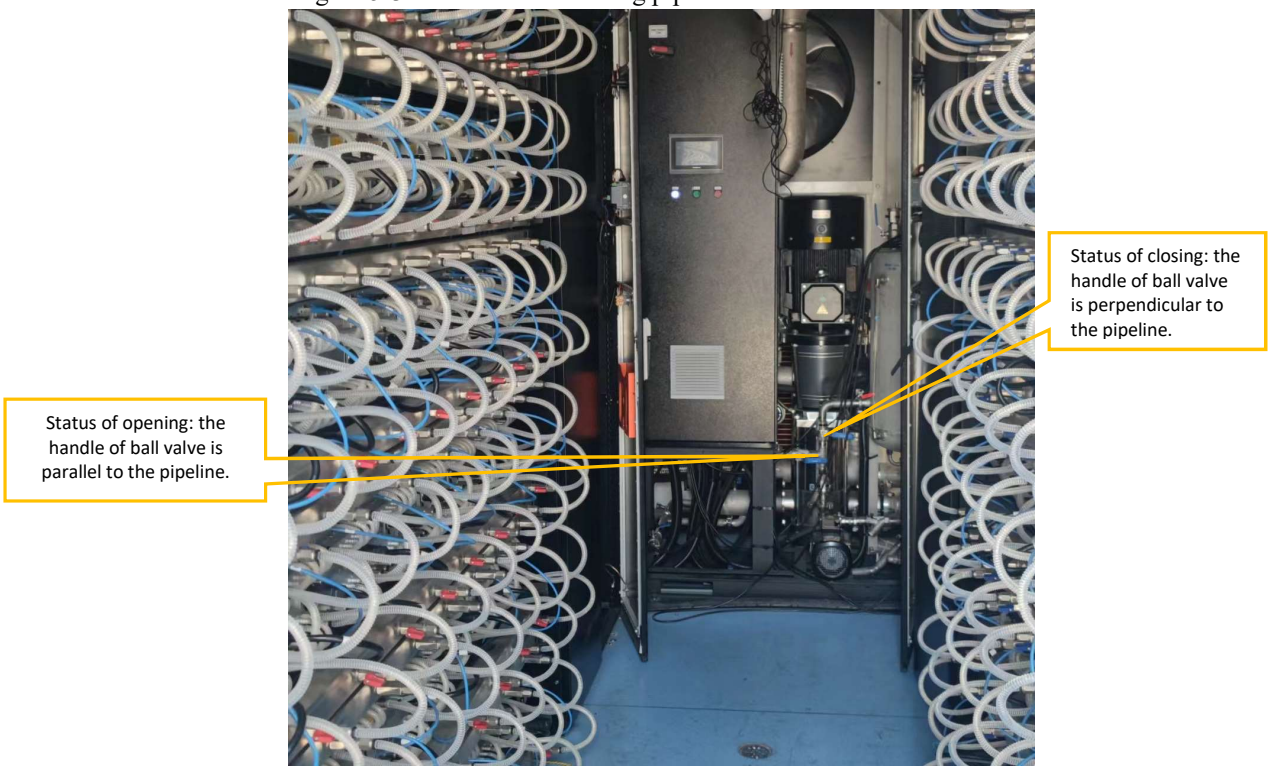

Figure 5-4 Schematic diagram of opening and closing of ball valve

Procedures for the pressure test:

1） Check again whether the exhaust valve and the ball valve are closed;

2） Close the NO.7 Ball Valve;

3） Open all mini ball valves on the water distributor;

4） Connect the air pipe to any fast plug-in interface, and close the corresponding ball valve.

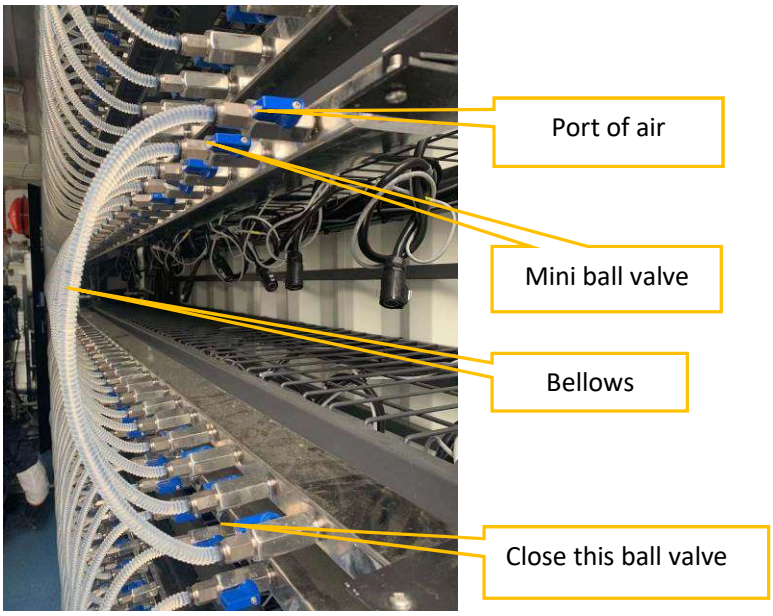

Figure 5-5 System - ball valve for connecting pipelines

5） Use an air compressor to press to 7 bar, keep the pressure for more than 30 minutes, and check for leakage;

6） Key sites for inspection are as follows:

a） Connection between the fast connection-peg and the mini ball valve;

b） Joint between the quick plug ball valve and the bellows;

c） Connection between the mini ball valve and the water separator;

d） Connection between the fast-plug connector and the computing equipment;

e） Flange/chuck/thread/welded joints.

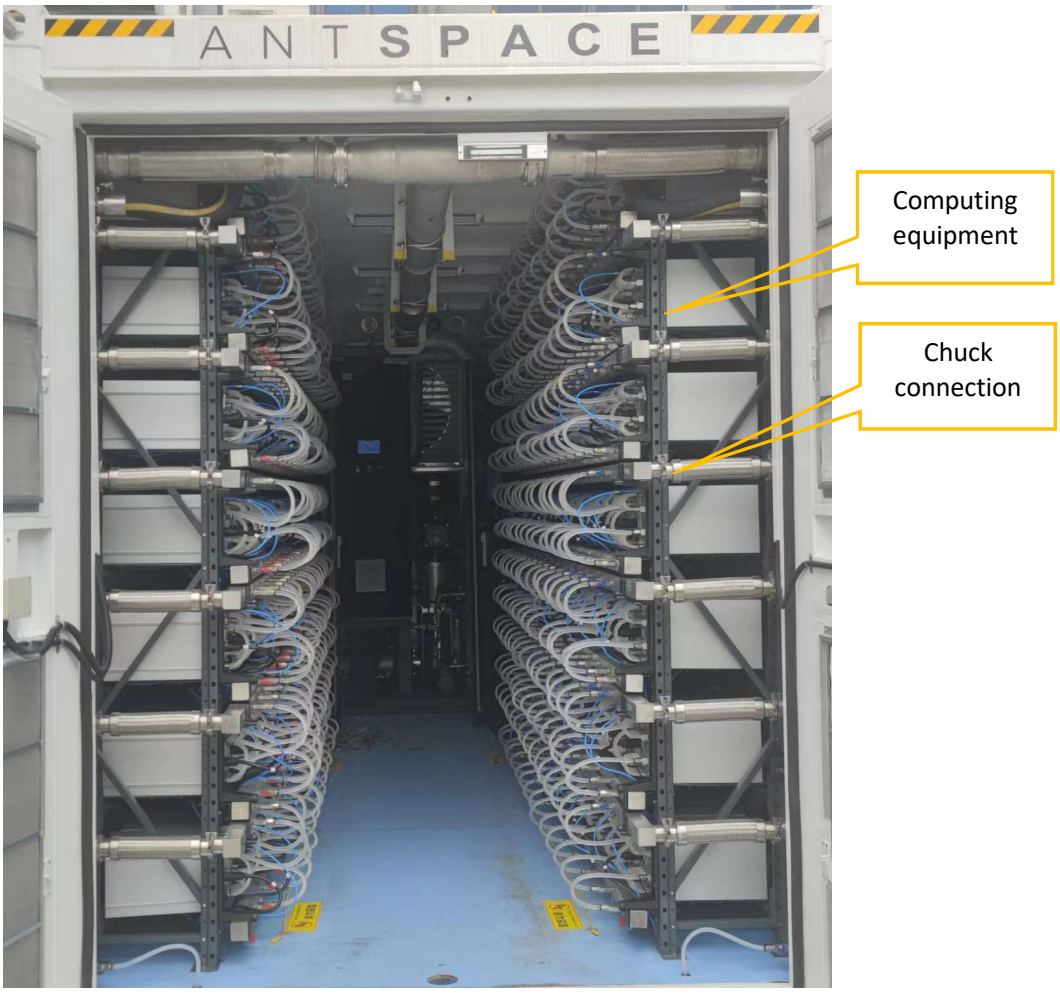

Figure 5-6 System - chuck connection

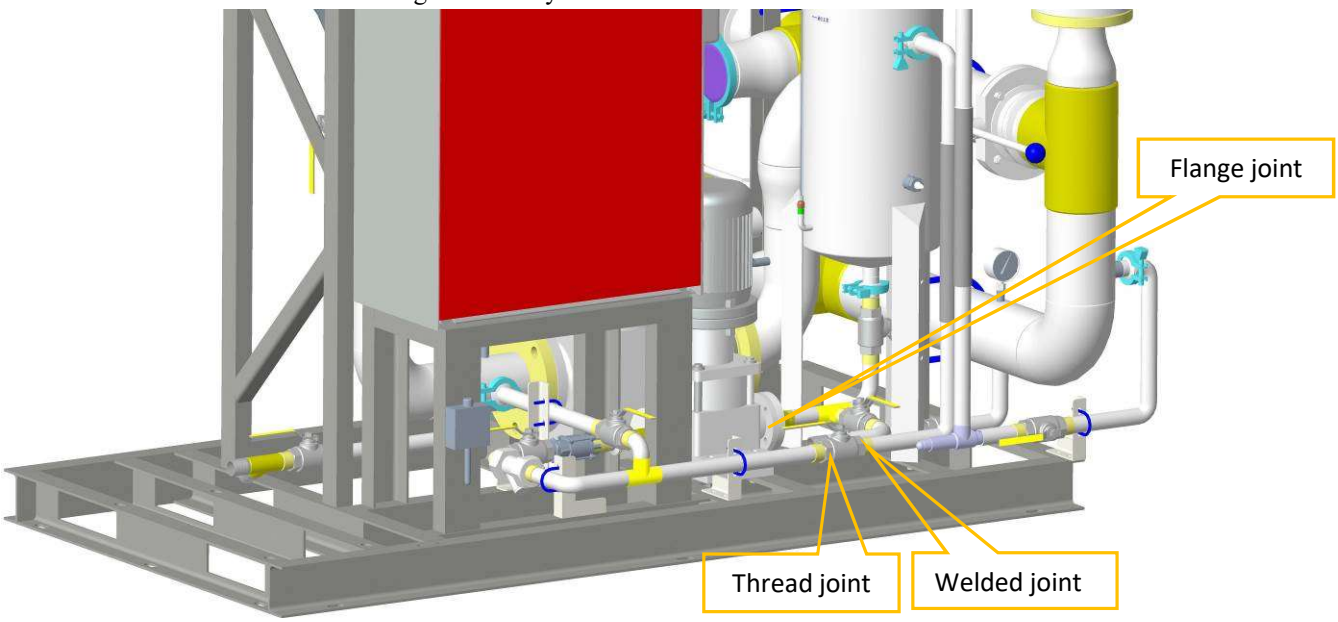

Figure 5-7 System - Flange/thread/welded joints

7） The check methods are as follows:

a） Seeing, hearing and touching are applicable to leakage inspection.

b） Choose one of soap, washing powder and detergent, add water to one of them to make soapy liquid and apply it to the

suspected leakage points, especially at the connections. The part with bubbles is the leak point.

七、ANTSPACE HK3 Liquid filling operation

System rehydration consists of four steps:

1） Preparation: prepare materials and tools and open all exhaust valves of the system;

2） System fluid replenishment: use self-priming pump and fluid replenishment pump to replenish the system, and manual exhaust of circulating pump is required;

3） Replenishment of water tank: replenish the water tank with the cooperation of self-priming pump and replenishment pump;

4） Regular replenishment: self priming pump and replenishment pump can be used together, or the manual replenishment port on the top of the water tank can be used to replenish the water tank;

Step 1: preparation

1） Get the coolant ready.

2） Connect the external pipeline according to the ANTSPACE field installation manual;

3） Check if the automatic exhaust valves or the ball valves on the internal and external pipes of the container are opened. (See Figures 7-1 through 7-3);

4） Open the top exhaust valve of the water tank and install the chuck, ensuring that the tank is connected to atmospheric pressure. (See Figure 7-1).

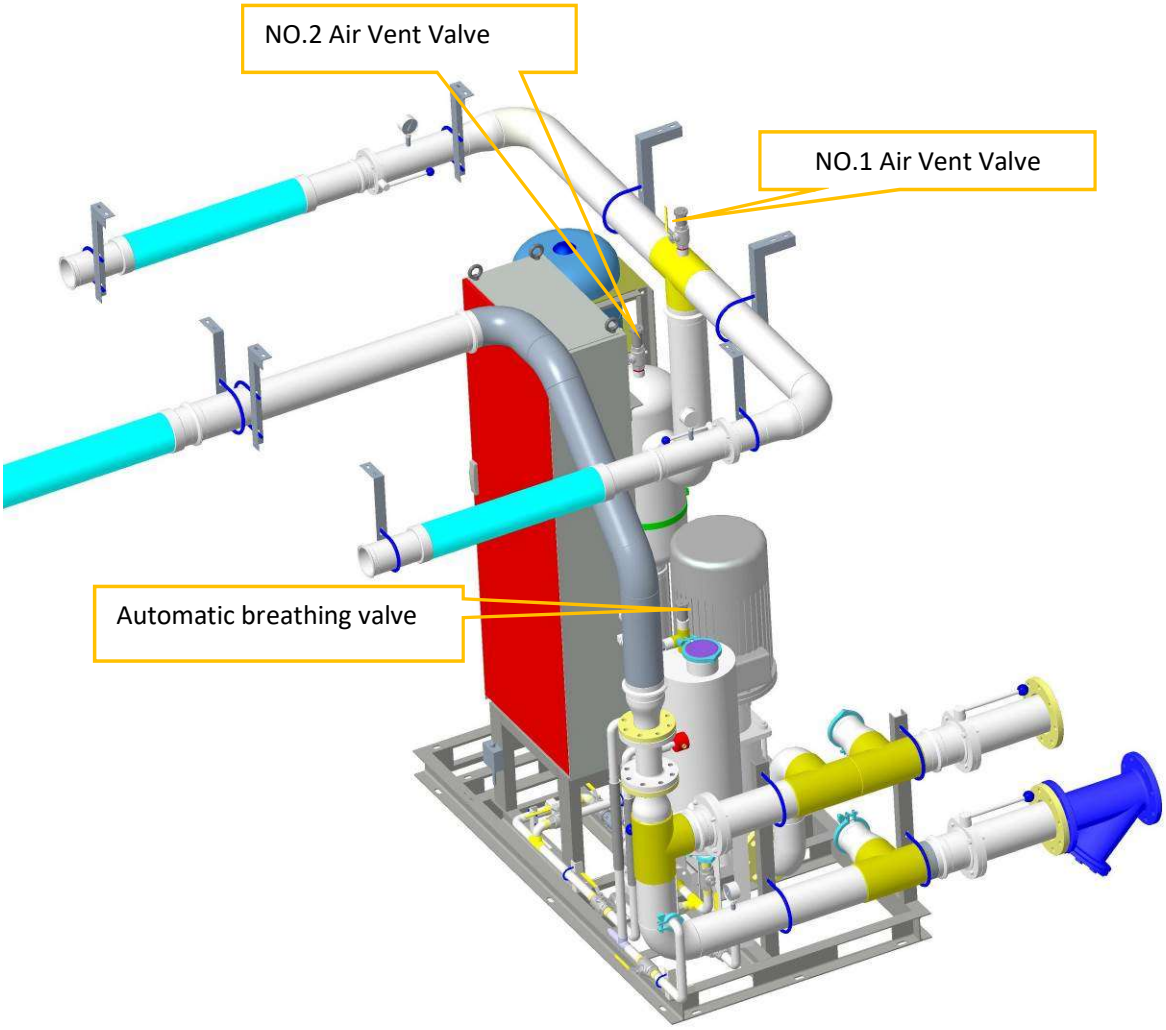

Figure 7-1 Internal container - automatic exhaust valve

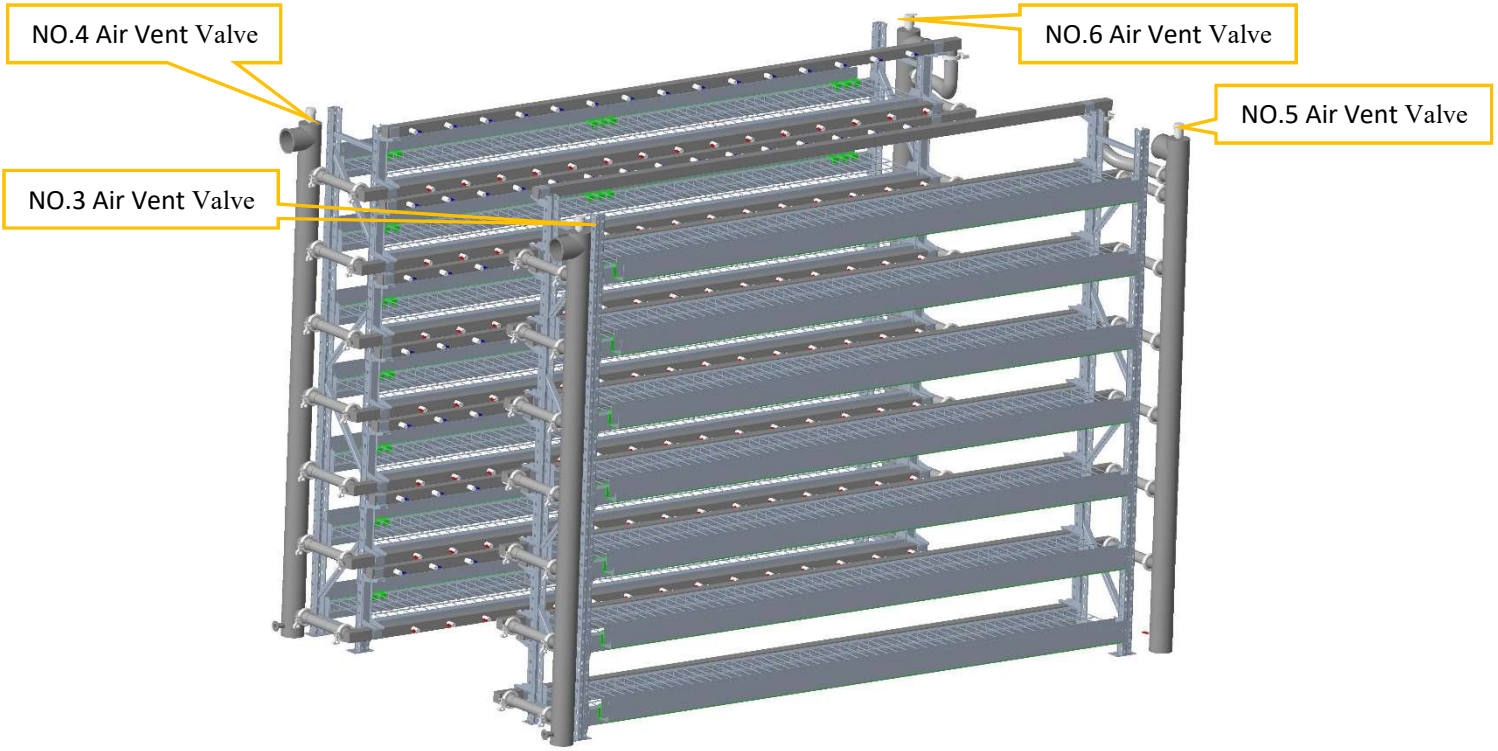

Figure 7-2 Internal container - plug

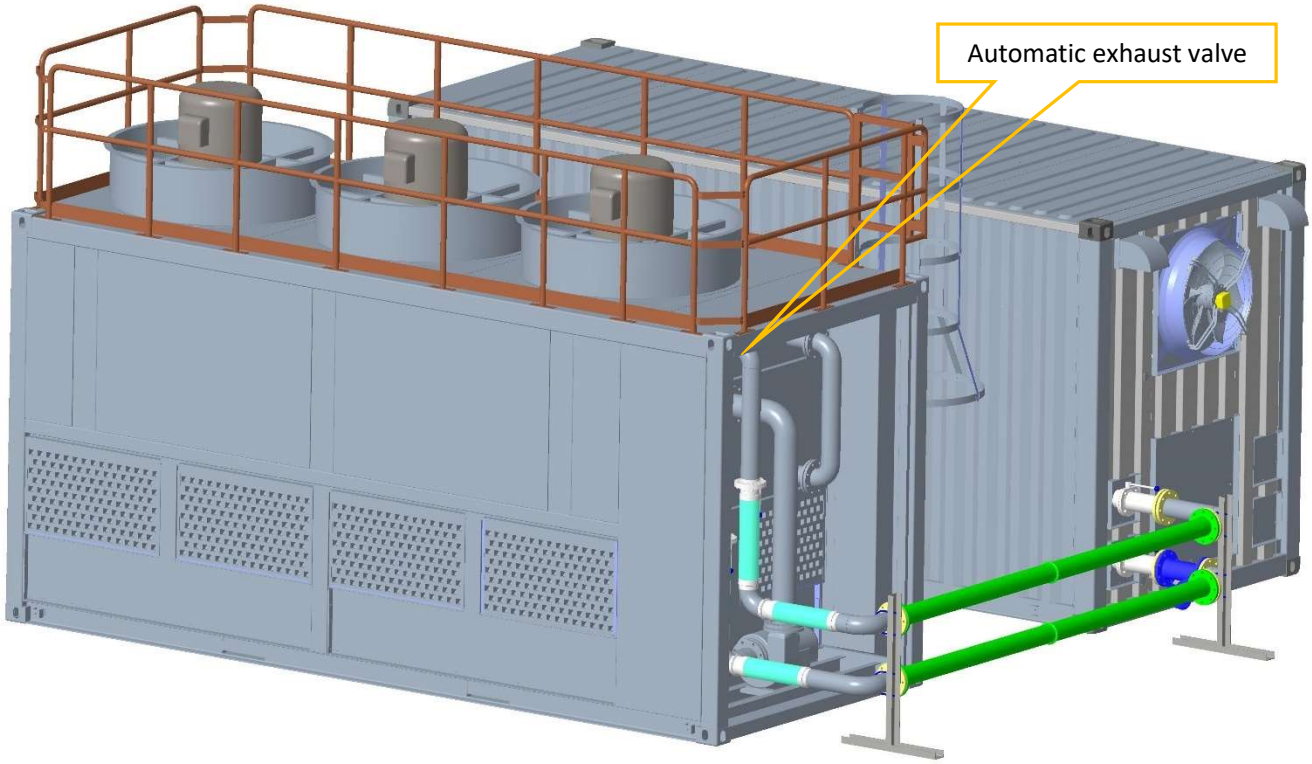

Figure 7-3 External connecting pipelines - automatic exhaust valve

Step 2-3：Procedures for the coolant charge:

1） A self-priming pump must be installed outside the container，The self-priming pump needs to inject liquid into the pump head for the first time. Find the port for coolant charge outside the container (at the side door of the container), plug in the hose, and clean it. External coolant is added into the suction port of the self-priming pump. (see Figure 7-4)

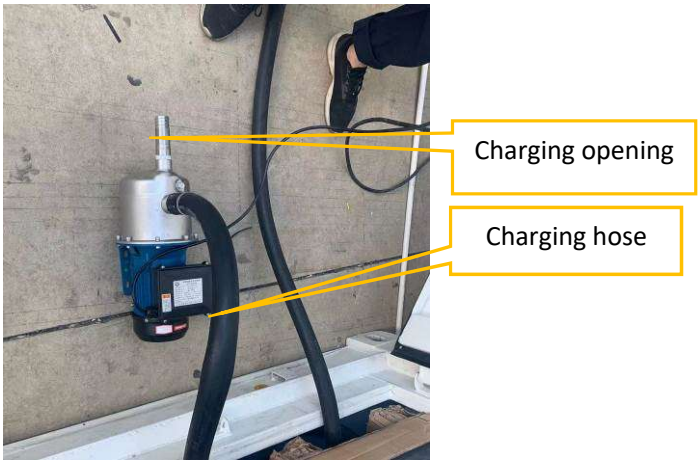

Figure 7-4 Pump station - charging hose

Note: the recommended brands and parameters of self-priming pumps are as follows:

(i) Nanfang pump 25qy-2, rated flow 2m3 / h, rated lift 40m, motor power 1.1kw, electric system 380V / 50Hz;

(ii) Lingxiao pump bjz150, rated flow 3m3 / h, rated lift 30m, Output Power 1KW, electric system 380V / 50Hz;

(iii) Nanfang pump 32zw (f) 5-20, rated flow 5M3 / h, rated head 20m, motor power 1.5kw, electric system 380V / 50Hz;

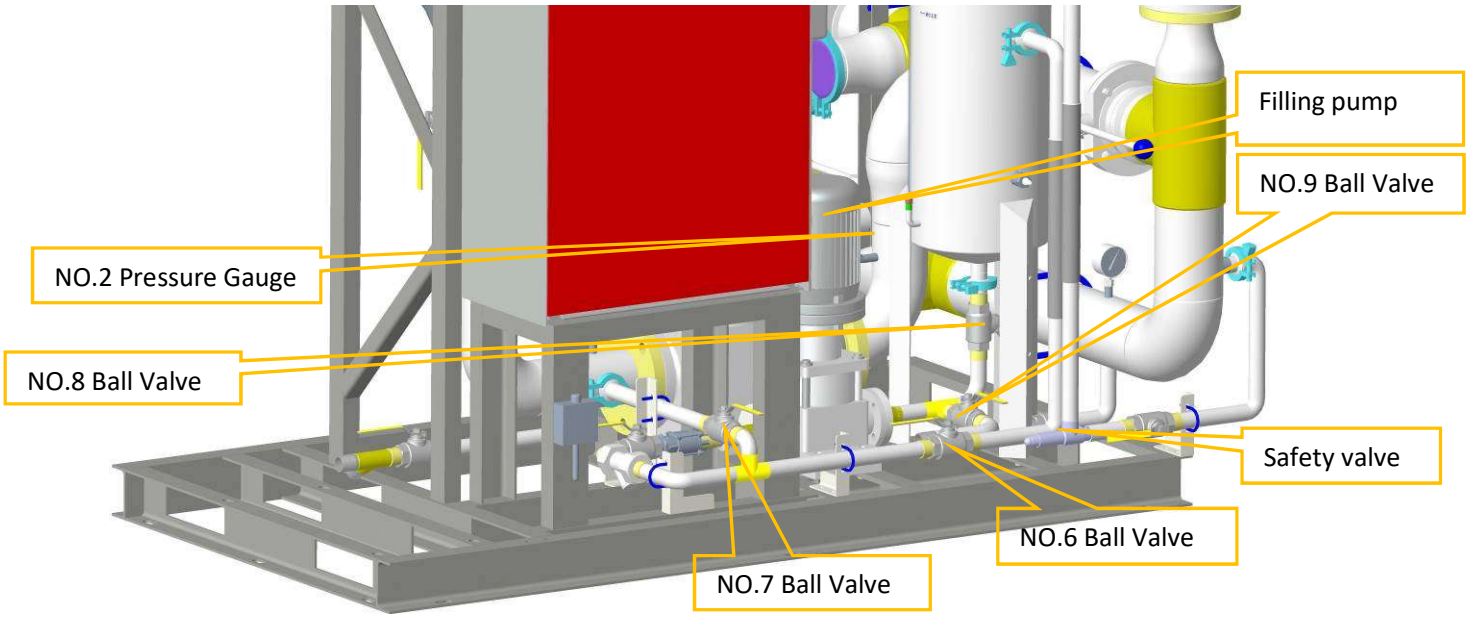

Figure 7-5 Pump station - charging valve

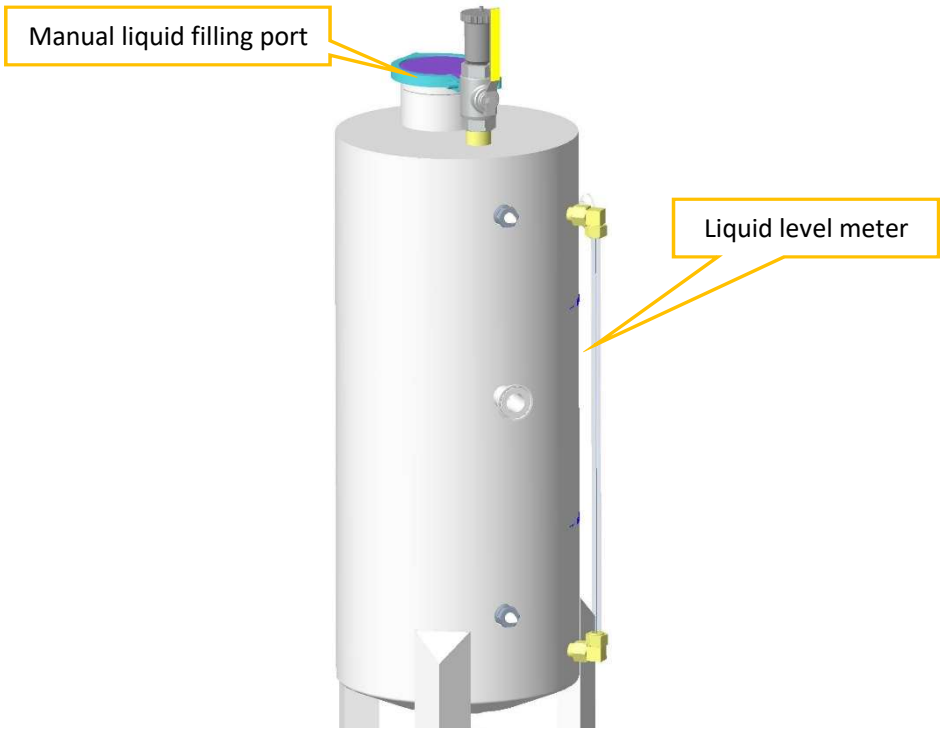

Figure 7-6 Pump station - liquid level meter

2） Close NO.8 Ball Valve and NO.6 Ball Valve as shown in Figure 7-5, open NO.7 Ball Valve, click on the filling pump on the touch screen interface, and turn it on. The refilling pump can be used for refilling both the system and the water tank. If the valve handle is parallel to the pipeline, the valve is in the open state; if the valve handle is perpendicular to the pipeline, the valve is in the closed state.

3） When the system is filled with liquid, if the static pressure reaches more than 0.7 bar (Refer to figure 7-7 for touch screen readings), the circulating pump can operate for 10 seconds, and then it should be stopped.

4） Continue to add liquid. Repeat twice to ensure that 1.3 to 1.5 tonnes of coolant is added.

5） When the static pressure reaches 1.0 bars, stop adding coolant(Just observe the reading of the pressure sensor on the main interface, as shown in figure 7-7 below).

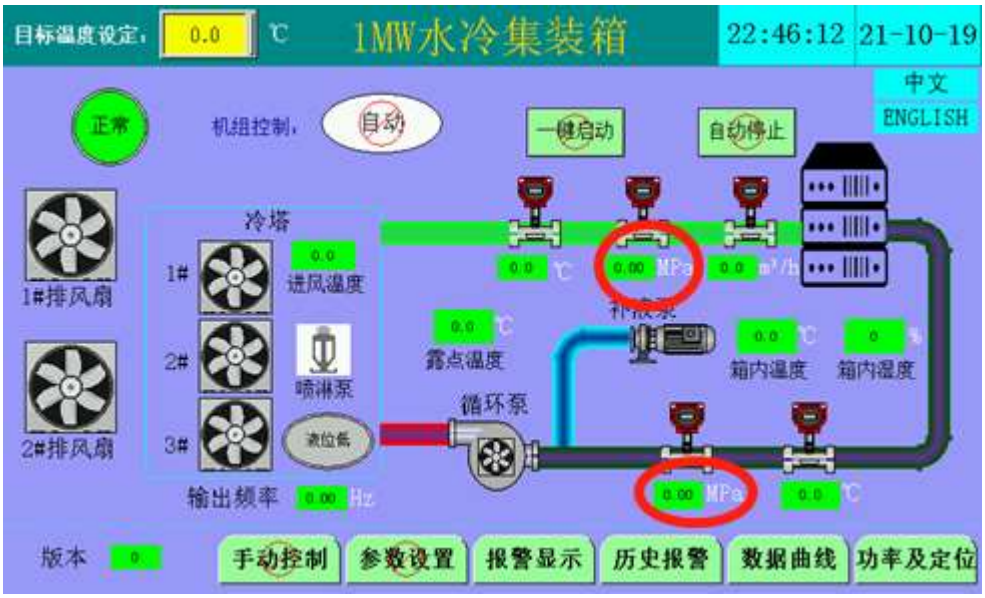

Figure 7-7 pressure sensor reading on main interface

6） Then open the circulation pump again, circulate the medium in the system, ensure that the exhaust valves are all opened.

7） Then open NO.6 Ball Valve, close NO.7 Ball Valve, click on the refilling pump on the touch screen interface, and turn it on. Fill the water tank with coolant, and stop refilling coolant when the level gauge in the water tank reaches more than 2/3 (see Figure 7-6 for the location of the level gauge).

8） Close NO.9 Ball Valve and NO.6 Ball Valve outside the container, and open NO.8 Ball Valve and NO.7 Ball Valve.

9） After the above operation is completed, the system back pressure (1# pressure gauge/return pressure sensor) will be stabilized at 1-1.5 bar for normal operation.

Step 4：Regular replenishment of water tank

When the water tank needs to add a small amount of coolant, you can open the top exhaust valve of the water tank to install the chuck (see Figure 5-3-6), and manually add coolant to the water tank from the manual feeding port.

Note: If the valve handle is parallel to the valve, the valve is in the open state; if the valve handle is perpendicular to the valve, the valve is in the closed state.

八、ANTSPACE HK3 Site installation summary

Table 8-1 Summary of site installation steps

Step No.	Step content	Note
1.	Location and hoisting of containers and cooling towers on site	The cooling tower is hoisted on the side of the container, and the distance between the container and the cooling tower is required to be ≥ 2m
2.	Installation of container exhaust fan	
3.	Installation of intermediate connecting pipeline between container and cooling tower	
4.	Installation of cooling system power distribution	

5.	Operation of cooling system	Gas check 7bar / 12h and liquid check 7bar / 30min
6.	Filling operation of cooling system	Preparatory work - system rehydration - water tank rehydration - periodic rehydration

After the equipment arrives at the site, it needs to be installed according to the sequence in table 8-1. After installation, the control mode can be changed to "automatic", and click "auto start" to make the system run automatically.