



Liebert[®] Adiabatic System

User Manual

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Technical Support Site

If you encounter any installation or operational issues with your product, check the pertinent section of this manual to see if the issue can be resolved by following outlined procedures.

Visit <https://www.vertiv.com/en-us/support/> for additional assistance.

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1 Introduction

1.1 Vertiv™ Liebert® Adiabatic System Operating Principle

Liebert® Adiabatic System units are designed to decrease the dry bulb inlet air temperature of the unit, through the natural evaporation of water in its liquid phase. The airflow passes through a cellular panel, which is watered by an irrigation system. The panel is made up of undulating sheets of organic or inorganic paper containing stiffening agents and water absorbers.

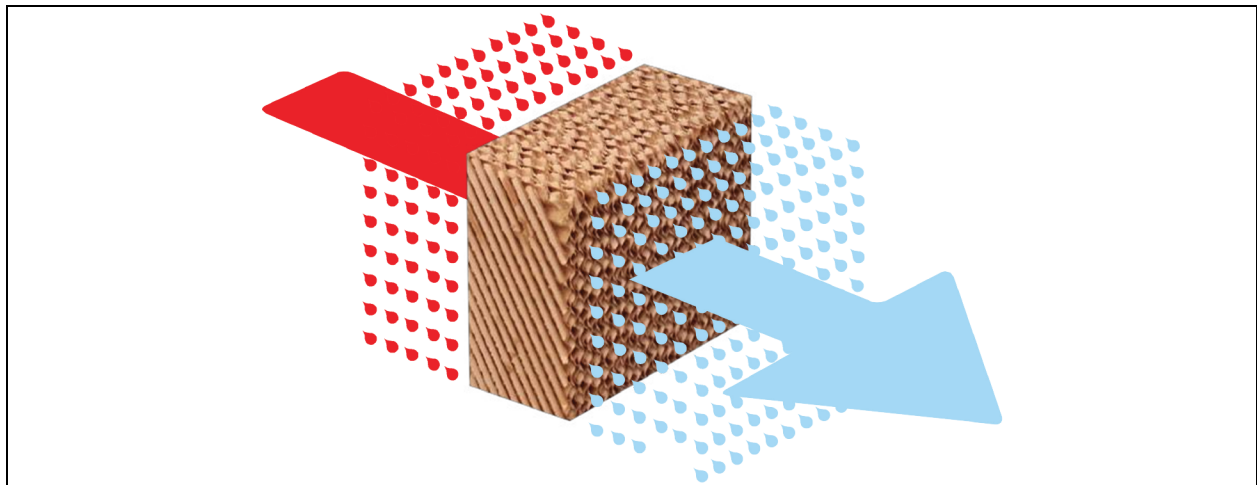
Panels are positioned in crisscross channels to provide a large surface area for air-water contact, which maximizes water evaporation and at the same time minimizes resistance to the passing through airflow (pressure drop).

1.2 Provisional Storage

During storage, keep units dry and protected against the elements that can cause damage or deterioration.

Thermo-hygrometric conditions of the storage area:

- **Temperature:** -10 °C to 50 °C.
- **Relative Humidity:** 5% HR to 95% HR.
- No condensation.



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2 Safety

This chapter gives general safety instructions.

Additional safety warnings, for specific operations, are given in the rest of the manual.

2.1 Conventions



WARNING! Indicates a hazardous situation which, if not avoided, will result in death or serious injury.



WARNING! Indicates a hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION: Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury

Notice

Indicates a property damage message.

NOTE: Indicates an environment damage message.



WARNING! Low Burning velocity gas.

2.2 General Instructions

Intended readers	This user manual is intended for transport, installation and maintenance personnel. The end user can only switch the unit ON and OFF.
Authorized personnel	The operations described in this manual must be made by technical personal, authorized in compliance with the regulations in force at the installation site.
Read this manual	Carefully read the manual before performing any operation on the unit.
Keep this manual	Keep the manual during the complete lifespan of the unit. If you move or sell the unit, transfer the manual and the diagrams together with the unit. This manual may be subject to modification. For complete and up-to-date information always consult the manual supplied with the machine.
Intended use	Exclusively employ the unit for the purpose it has been designed. The improper use of the unit exonerates the manufacturer of any responsibility.
Do not modify the unit	Do not modify the unit in any way, including the control system and the software. Any modification to the unit exonerates the manufacturer of any responsibility.
Warning labels	Pay attention to the warning labels on the unit.

General points

- If something is not working properly, switch off the unit immediately and take steps to ensure that it does not switch on again. All faults must be corrected immediately.
- Only qualified personnel can do the repair and maintenance. This will ensure that the unit operates safely.

- Use only original parts for replacement.
- Refer to local regulations that restrict or regulate the use of this system.

How the unit works

- Do not compromise the safety of the unit.
- Periodically check the device's protection and alert devices.
- The unit's safety fittings must not be removed or disabled.

2.3 Electric System



WARNING! The machine must not be malfunction when it is operating. Switch off the unit's power supply when conducting maintenance work or making repairs to the unit. Never add components to the unit without prior written approval from Vertiv.



WARNING! Any work that affects the electrical components must be carried out by qualified electricians.

Use only original, correctly calibrated fuses.

Carry out periodic checks of the electrical unit.

All defects, such as loose connections or burnt cables, must be repaired immediately.



WARNING! Lethal Voltage. Unit contains potentially lethal voltage in some circuits. Pay attention while working on the electric system.



WARNING! Risk of arc flash and electric shock. Can cause injury or death.

Open all local and remote unit electric power disconnect switches, verify with a voltmeter that power is OFF and wear protective equipment according to the local standard before working within the electric control enclosure.

The panel key supplied with the unit must be kept by the person responsible for maintenance.



WARNING! The electric and control enclosures can retain a stored high-voltage electrical charge for up to 10 minutes. Wait for 10 minutes before working on the electric system.



WARNING! Risk of electric shock. Can cause serious injury or death.



WARNING! Before working within the unit electric and control enclosures proceed as below:

Open all local and remote unit electric power disconnect switches.

Wait 10 minutes.

Verify with a voltmeter that power is OFF.

Only properly trained and qualified personnel should clean, maintain and repair the Vertiv™ Liebert® AFC.

2.4 Personal Protective Equipment

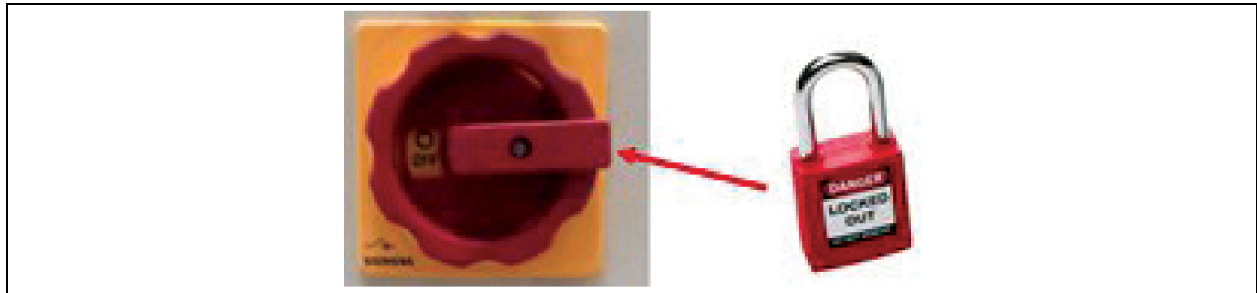
Always wear the below personal protective equipment (PPE).



Ensure that all required safety measures are followed such as: wearing protective clothing (shoes, gloves and safety glasses), using appropriate tools, employing qualified and skilled technicians (electricians, refrigeration engineers) trained in the use of flammable refrigerants and following local regulations (see Annex E in EN 378-4-Guidelines for repairs of equipment using flammable refrigerants A2L).



CAUTION: The adiabatic control panel load break switch, must be set to position “0” (lock) before any maintenance activity on the unit.



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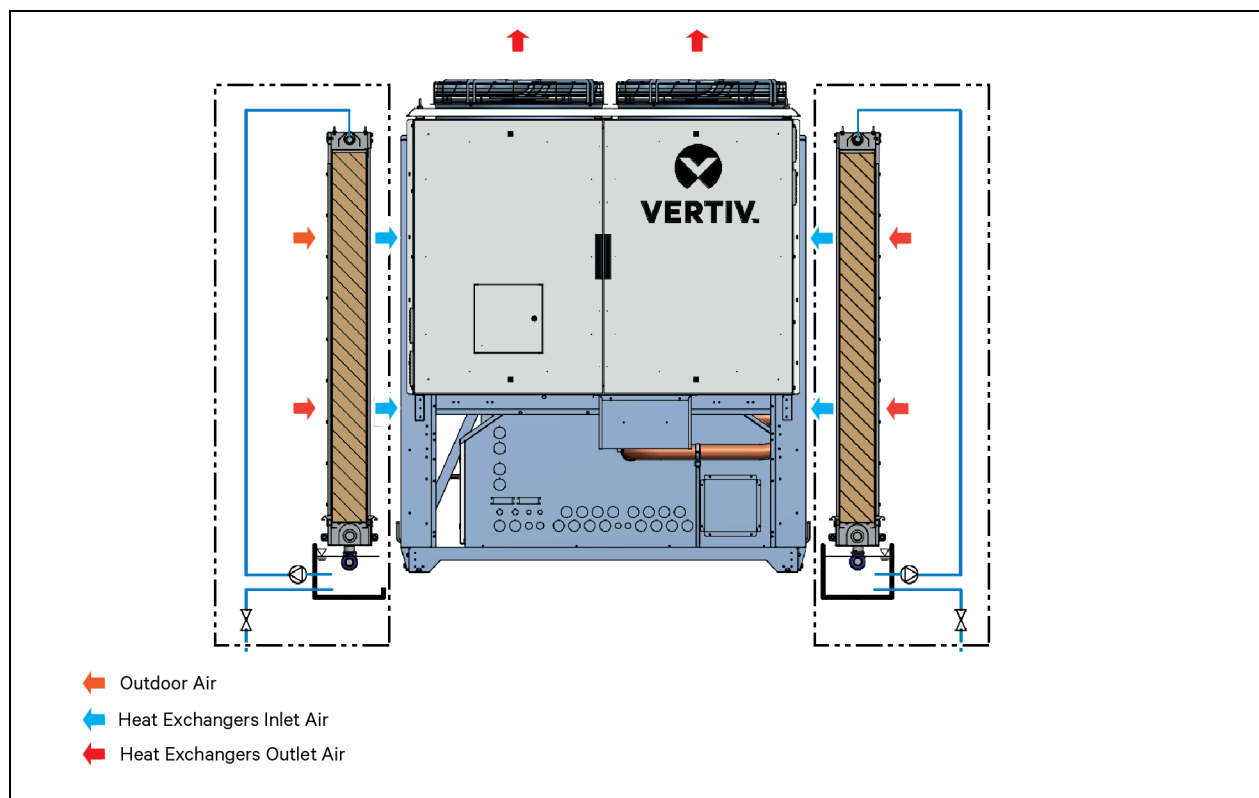
3 System Overview

3.1 Introduction

The currently designed adiabatic pre-cooling systems are only aimed at extending the chiller operating range with higher external temperatures whereas the Vertiv™ Liebert® AFC is designed to steadily decrease the external air temperature so as to reduce the condensing temperature and/or increase the free cooling capacity, for a higher unit efficiency.

The technology involves a PAD wetted with mains water, with external air flowing through it and water evaporating making the air fresher. The hydraulic diagram below explains the operating concept of the adiabatic system and its interaction with the chiller.

Figure 3.1 Operating Principle of Adiabatic System



NOTE: The elements of the adiabatic kits are those enclosed in the dash-dot lines.

NOTE: The water pipes and the valve system for the circulation of water chilled and to be chilled are considered as entirely enclosed inside the machine volume.

While the adiabatic system is operating, the free cooling chiller has cooling air available at a temperature lower than the ambient temperature, in a degree depending on the external thermo-humidity conditions. The **Table 3.1** on the next page shows the performance of the adiabatic system, for various external air temperature and humidity values.

Table 3.1 Adiabatic System Performance

Air Condition after Pad																	
		Tdb [°C]	RH [%]	Tdb [°C]	RH [%]	Tdb [°C]	RH [%]	Tdb [°C]	RH [%]	Tdb [°C]	RH [%]	Tdb [°C]	RH [%]	Tdb [°C]	RH [%]	Tdb [°C]	RH [%]
Air Tempera ture before Pad [°C]	50	29.6	61	33.2	69	36.3	75										
	48	28.3	61	31.8	69	34.7	75										
	46	27.1	61	30.3	69	33.1	76	35.6	81								
	44	25.8	62	28.9	70	31.5	76	33.9	81								
	42	24.6	62	27.4	70	30	76	32.2	81	34.2	85						
	40	23.3	63	26	70	28.4	76	30.5	81	32.5	85	34.2	89				
	38	22.1	63	24.6	70	26.8	76	28.9	81	30.7	85	32.4	89	34	92		
	36	20.8	64	23.2	71	25.3	76	27.2	81	29	85	30.6	89	32.1	92	33.5	95
	34	19.8	65	21.7	71	23.7	76	25.6	81	27.2	85	28.8	89	30.2	92	31.6	95
	32	18.5	66	20.3	71	22.2	77	23.9	81	25.5	85	27	89	28.4	92	29.7	95
	30	17.2	66	19	72	20.6	77	22.3	81	23.8	85	25.2	89	26.5	92	27.7	95
	28	15.7	66	17.4	72	19.1	77	20.6	82	22.1	85	23.4	89	24.6	92	25.8	95
	26	14.4	66	16	72	17.5	77	19	82	20.3	86	21.6	89	22.8	92	23.9	95
	24	13	67	14.6	73	16	77	17.3	82	18.6	86	19.8	89	20.9	92	22	95
	22	11.7	67	13.1	73	14.4	78	15.7	82	16.9	86	18	89	19.1	92	20.1	95
	20	10.4	68	11.7	73	12.9	78	14.1	82	15.2	86	16.2	89	17.2	92	18.2	95
	18	9	69	10.2	74	11.3	78	12.4	82	13.4	86	14.4	89	15.4	92	16.3	95
	16	7.6	69	8.7	74	9.8	78	10.8	82	11.7	86	12.6	89	13.5	92	14.4	95
	14	6.2	70	7.2	74	8.2	79	9.1	83	10	86	10.9	89	11.7	92	12.5	95
	12	4.8	70	5.7	75	6.6	79	7.5	83	8.3	86	9.1	89	9.8	92	10.6	95
10	3.4	71	4.2	75	5.0	79	5.8	83	6.5	86	7.3	90	8	92	8.7	95	
8	2.0	71	2.7	76	3.4	80	4.1	83	4.8	87	5.5	90	6.1	92	6.8	95	
6	0.5	71	1.2	76	1.8	80	2.4	83	3.1	87	3.7	90	4.3	92	4.9	95	
5	-0.2	71	0.4	76	1.0	80	1.6	83	2.2	87	2.8	90	3.4	92	3.9	95	
		10		20		30		40		50		60		70		80	
Air RH before pad [%]																	

NOTE: This performance table is referred to free cooling model with high efficiency fans at nominal air flow. For different configurations, refer to rating tool.

Legend
T out > 35 °C
30 °C < T out < 35 °C
25 °C < T out < 30 °C
20 °C < T out < 25 °C
15 °C < T out < 20 °C
7 °C < T out < 15 °C
Freezing Risk

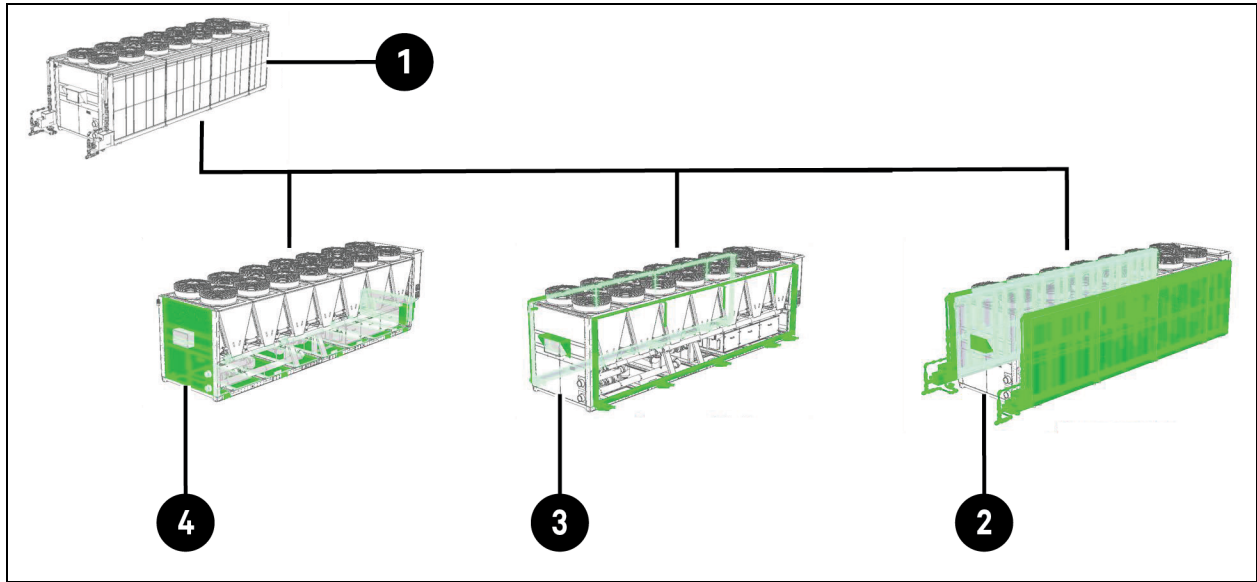
Adiabatic system Options

There are 4 different adiabatic predispositions of the unit:

- **None:** Unit without predisposition for the Adiabatic kit. With this configuration it is not possible to install the standard Adiabatic kit.
- **Premium Adiabatic Pad System/direct flow:** Unit with predisposition for the adiabatic kit with direct flow. The Adiabatic direct flow kit must be installed on site together with the unit. This system does not recirculate water; the water recirculation system can be shared among several units and must be properly design by the installer.
- **Premium AD Pad System / with recirculation:** Unit with predisposition for the autonomous recirculation system with pump and tank. The Adiabatic recirculation kit must be installed on site together with the unit. The system operated with stand-alone adiabatic hydraulic circuit, including two water tanks, 2 recirculation pumps (one for each side of the unit) and one control panel.
- **Predisposition for Premium Adiabatic Pad System:** Unit with predisposition for the future installation of the Adiabatic kit. With this configuration is possible to select also coil filters and protection grids.

While the predisposition of the unit is done in the factory, the interface kit and the adiabatic system kit are assembled in the field, as can be seen in the **Figure 3.2** on the next page .

Figure 3.2 Adiabatic System Options



Item	Description
1	AFC with premium PAD adiabatic system
2	Adiabatic kit
3	Interface Kit
4	Unit predisposition

The unit predisposition includes a modification of the chilled water connections, the addition of closure panels and an electrical predisposition.

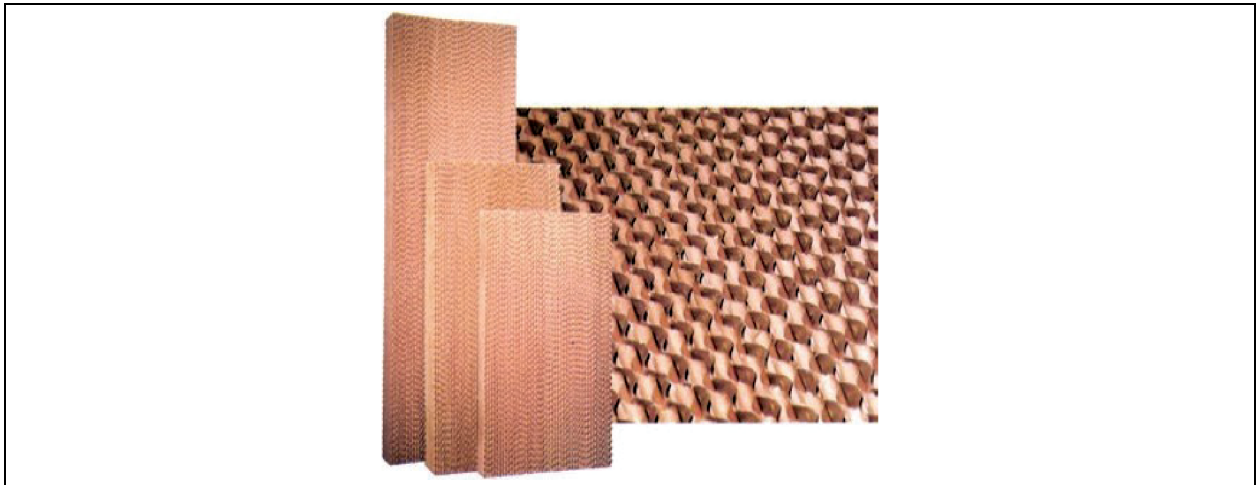
The interface kit, assembled in the field, includes some brackets and air sealing panels, the screws kit for field assembly and the electrical equipment.

The Adiabatic kit, assembled on the field, includes a control panel, two pumping groups and the PADs section.

3.1.1 Organic evaporative panel

- **Maximum performance:** Organic material is designed to provide the largest possible air-to-water contact surface area (approximately 460 m²/m³). Such a large area enables optimal evaporative cooling and humidification from the evaporation.
- **Coils protection:** Designed to eliminate dust particles and other impurities. Coils filter not needed.
- **Maximum durability:** Made from special cellulose paper impregnated with insoluble chemical components to ensure a long working life in the system.
- **Maximum resistance:** Appropriate bleed off and regular brushing keep the organic evaporative panel in operation for unclean water and various air conditions.

Figure 3.3 Organic Evaporative Panel



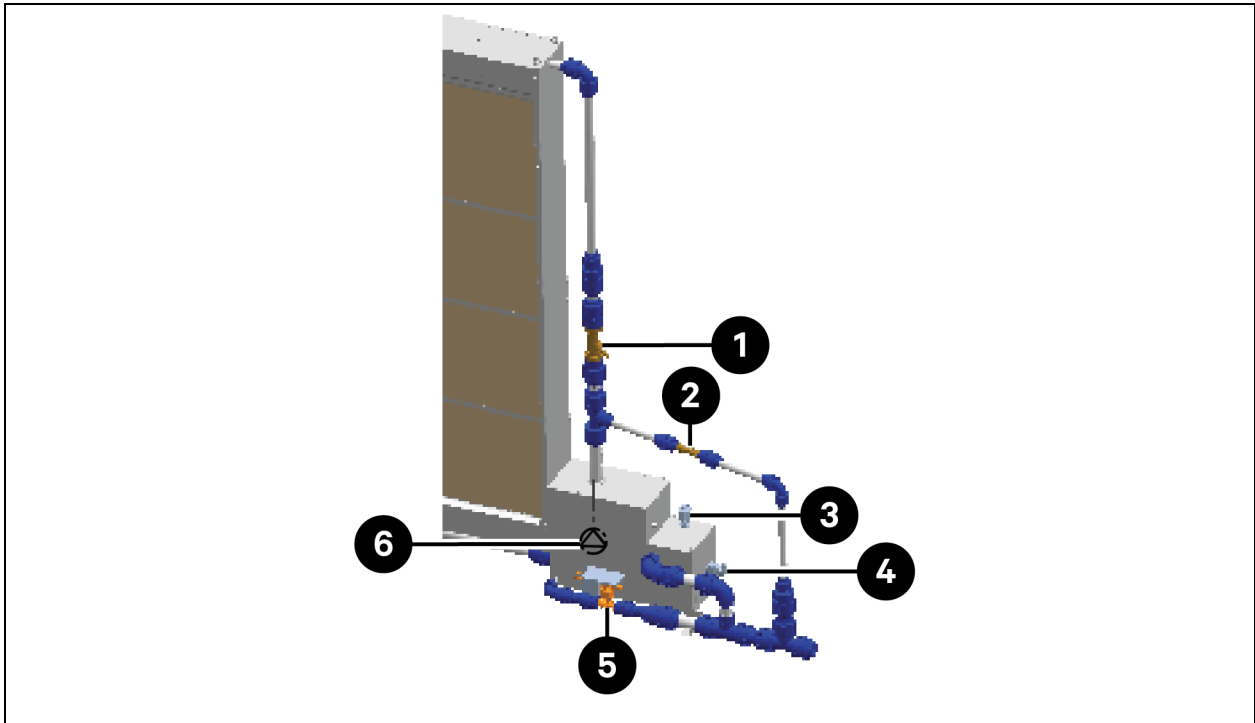
PN	Description
10050957	Pad Cassette C1 for AFC (600 mm)
10050958	Pad Cassette C2 for AFC (418 mm)
10050959	Pad Cassette C3 for AFC (300 mm)

Unit Frame	Composition		
	10050957	10050958	10050959
AFC 10 Fans	12		
		10	
			4
AFC 12 Fans	18		
		6	
			6
AFC 14 Fans	18		
		12	
			6
AFC 16 Fans	24		
		8	
			8
AFC 18 Fans	24		
		14	
			8

Unit Frame	Composition		
	10050957	10050958	10050959
AFC 20 Fans	30		
		10	
			10

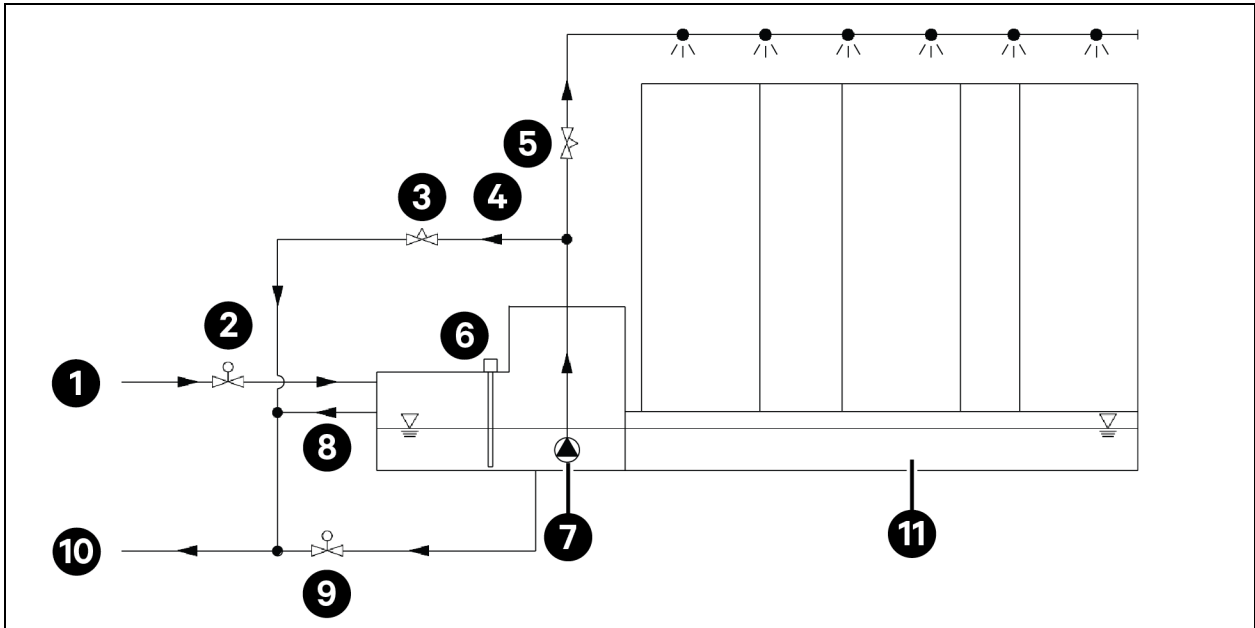
3.2 Pumping Assembly (Only for Recirculation Version)

Figure 3.4 Pumping Assembly



Item	Description	Qty (Each Pump Assembly)
1	Irrigation flow valve	1
2	Bleed off valve	1
3	Level sensor	1
4	Filling solenoid valve	1
5	Motor operated for drain valve	1
6	Recirculation pump	1

Figure 3.5 Functional Diagram



Item	Description
1	Water supply
2	Filling solenoid valves
3	Regulation valves with flow meter (bleed off)
4	Constant bleed off
5	Regulation valves with Flow meter (irrigation)
6	Maximum/Minimum level detector
7	Water recirculation pump
8	Overflow
9	Valves with actuator (drainage)
10	Drainage
11	Water basin foot

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4 Installation Requirement and Connections

4.1 Overview

To ensure optimum operation and maintenance, adiabatic system must be placed on a flat level surface, with a drain, so possible leaks during installation, start-up, operation, and maintenance can be controlled.

Assembly in conjunction with an air-cooled unit must ensure the air passes through the evaporative panels, by closing off the perimeter sides to prevent a potential bypass in the air flow and ensure the adiabatic operation of the system.

4.2 Installation on Site and Service Space

Adiabatic system must be assembled once the chiller is installed in final position.

Thermo-hygrometric conditions of the operating place:

- **Ambient temperature:** 5 °C to 50 °C.
- **Relative humidity:** 5% HR to 97% HR.

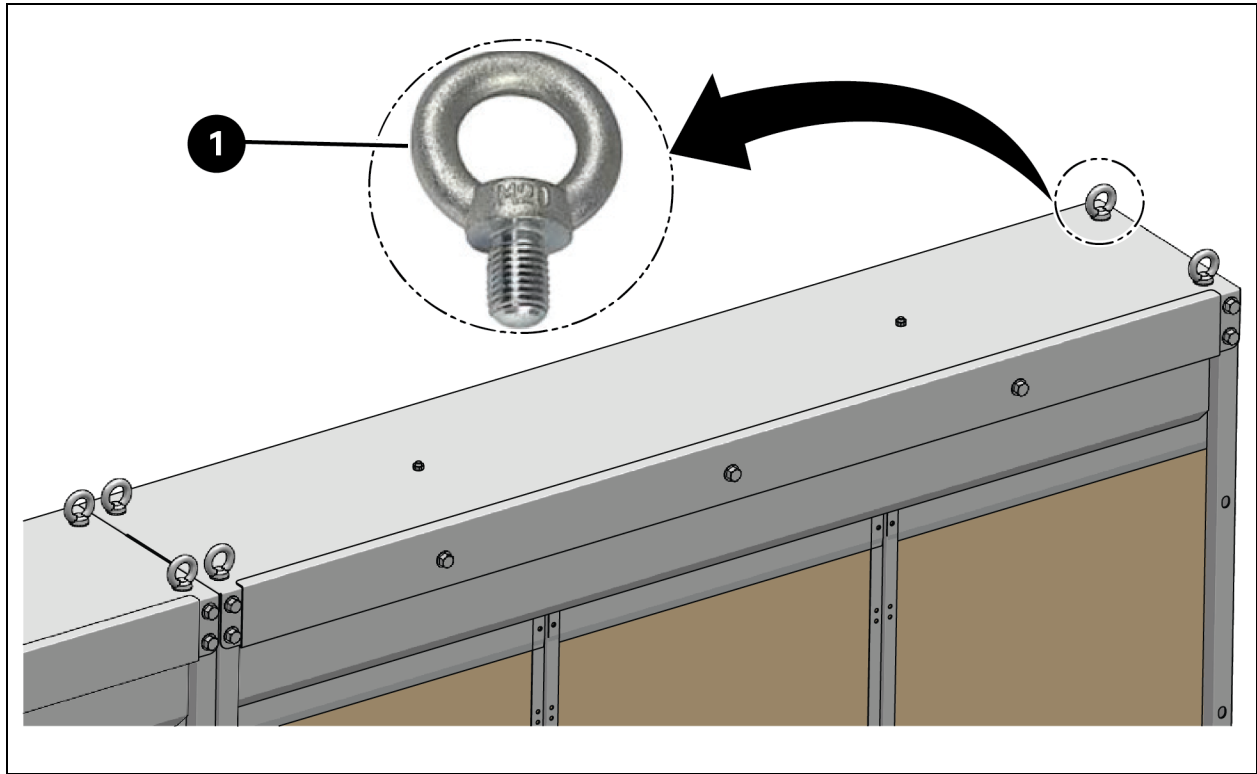
4.3 Anchor Eyebolts

The adiabatic system is equipped with 4 male lifting eyebolts to facilitate transport tasks. These eyebolts can be disassembled as they have the threads for the installation.

It is mandatory to lift the module using an H-shape structure that allows the force to be applied vertically on each of the 4 eyebolts.

The **Figure 4.1** on the next page show the eyebolts installed on the adiabatic system:

Figure 4.1 Eyebolts Installation



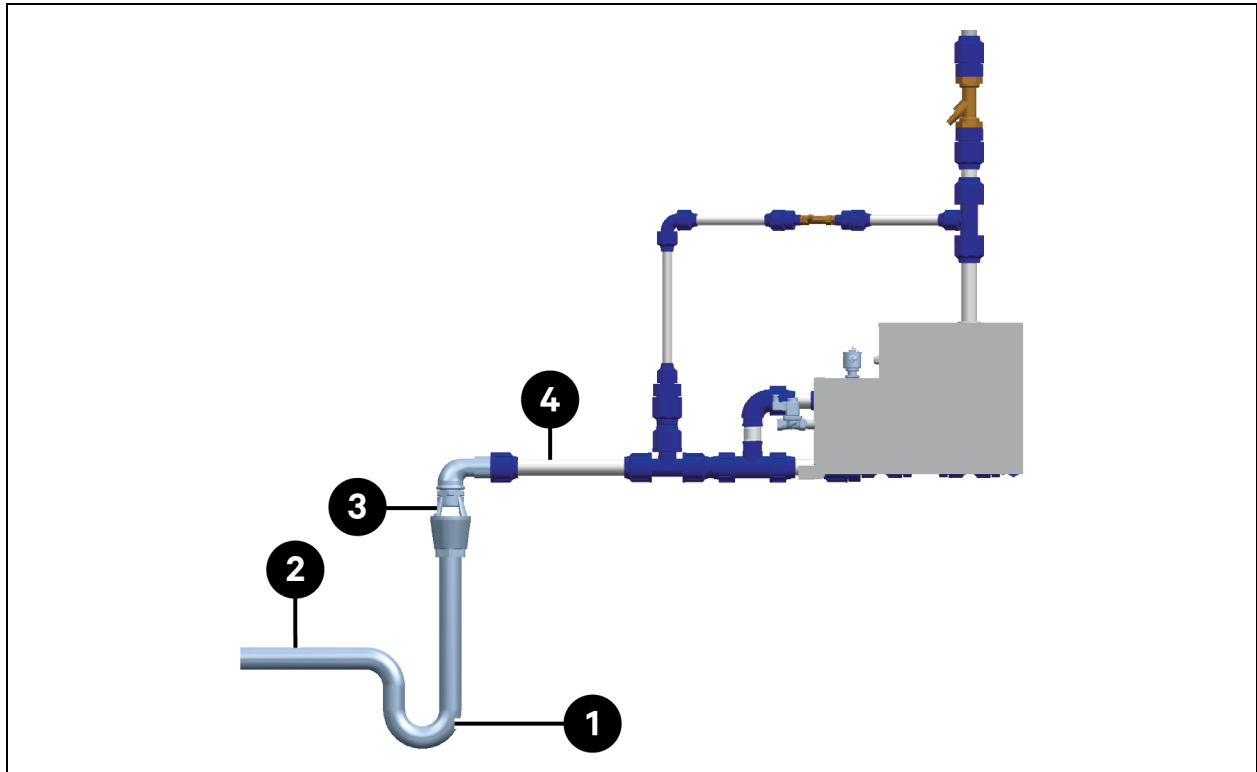
IMPORTANT! The use of the four eyebolts per module is mandatory for lifting the equipment.

4.4 Water Connection

Vertiv™ Liebert® Adiabatic System AFC works in accordance with the irrigation of the evaporative panels.

1. Make sure that the supply water temperature must be between 5 °C and 25 °C.
2. Make sure that the supply water pressure for optimal functioning is at least 2.5 bar.
3. Connect the water network supply to the solenoid supply valve, placing a filter upstream.
4. Connect the common outlet for the 50 mm diameter drain/overflow/constant bleed off to the drainage network.
5. Make sure that the water outlet connection to the drain must have a water trap and a tundish, as shown in the **Figure 4.2** on the facing page .
6. Make sure that the system has the normal slope of the drainage line.

Figure 4.2 Water Connections



Item	Description
1	Water trap
2	Minimum slope 0.5%
3	Tundish
4	Minimum slope 0.5%

4.5 Recirculation Pump

Connect adiabatic electrical panel with pump terminal box using pump's cable (if needed use extension cable from kit 10038071).

Refer to [Adiabatic EP wiring diagram](#) on page 121.

Table 4.1 Pump Technical Data

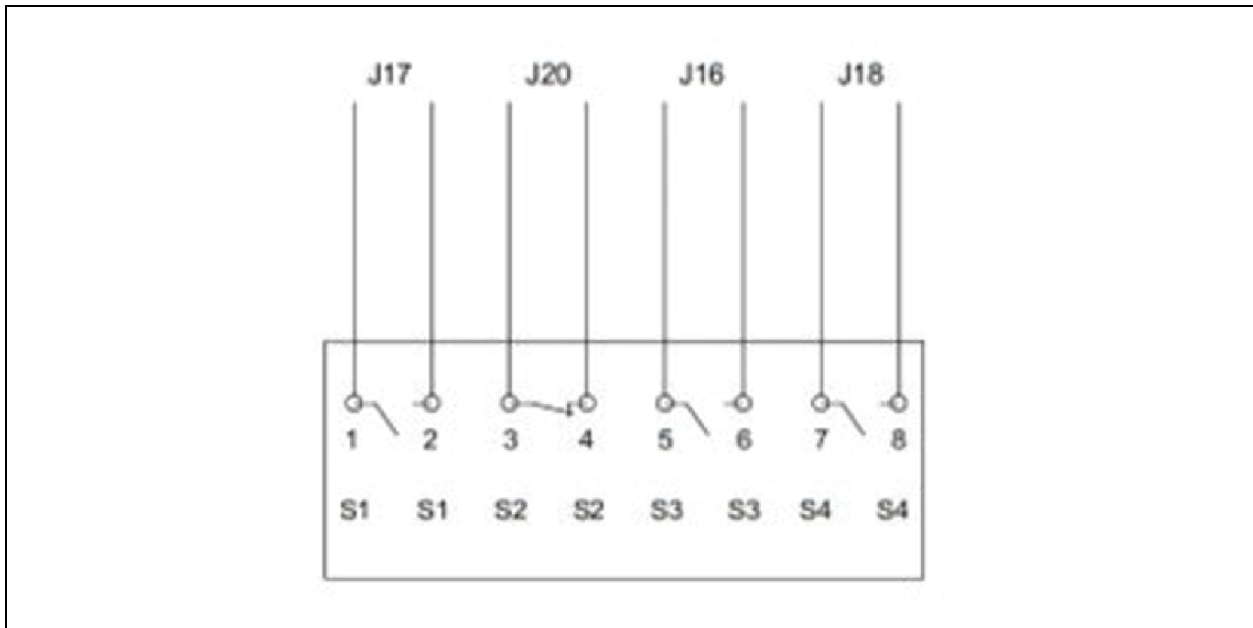
Item	Category	Values
Electrical power supply	Service voltage (VAC)	230
	Frequency (Hz)	50
	Motor nominal power (W)	1200
	Consumption (A)	7.8
Degree of protection	Degree of protection according to EN60529	IP 68

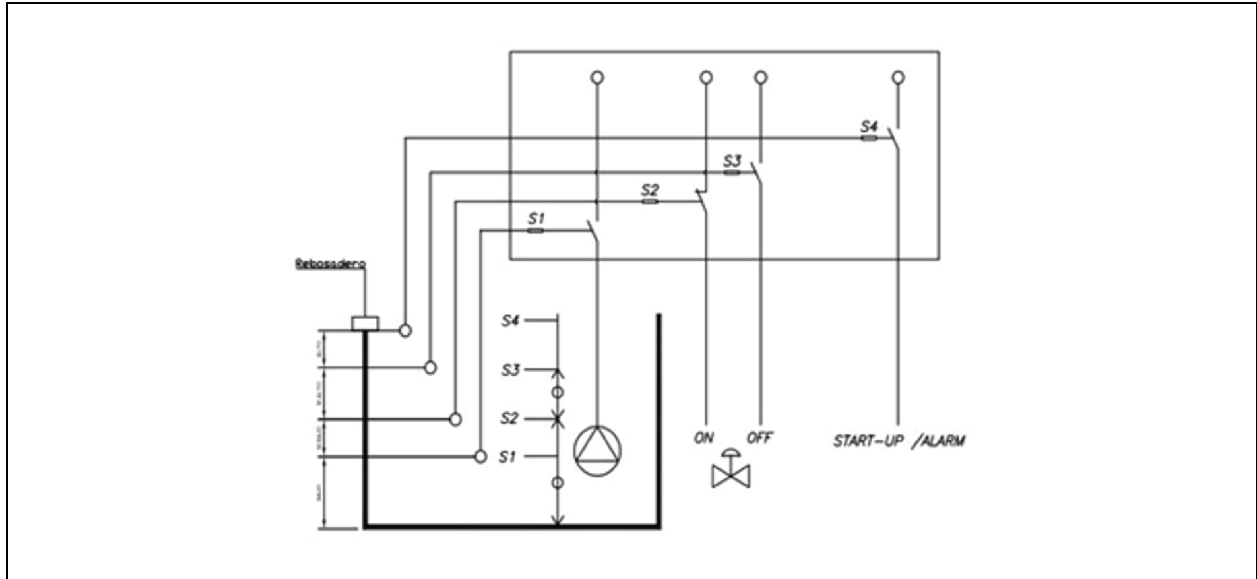
Table 4.1 Pump Technical Data (continued)

Item	Category	Values
Environmental conditions	Max. fluid temperature (°C)	35
Functional data	Max working height (m)	10
	Max. working flow (m ³ /h)	16

4.6 Level Sensor

1. **Low level sensor (S1):** This connection is mandatory to protect the operation of the recirculation pump since it activates and deactivates the pump when it detects a low water level in the basin (J17 low water level sensor NO).
2. **High level switch (S2):** The mid-low level detector is used to regulate the water supply via the filling solenoid valve. (J20 medium-high level NC).
3. **Mid-high level detector (S3):** The mid-high level is used to produce a warning in the case the water has exceeded the deposit's high level. Hence, it closes the water supply via the filling solenoid valve (J16 medium-high level NO).
4. **High level detector (S4):** The high level is used to warn that the water has exceeded the high level of the basin prior to the overflow. It is the start-up during the first starter and the one which indicates the alarm state* (J18 high level NO).



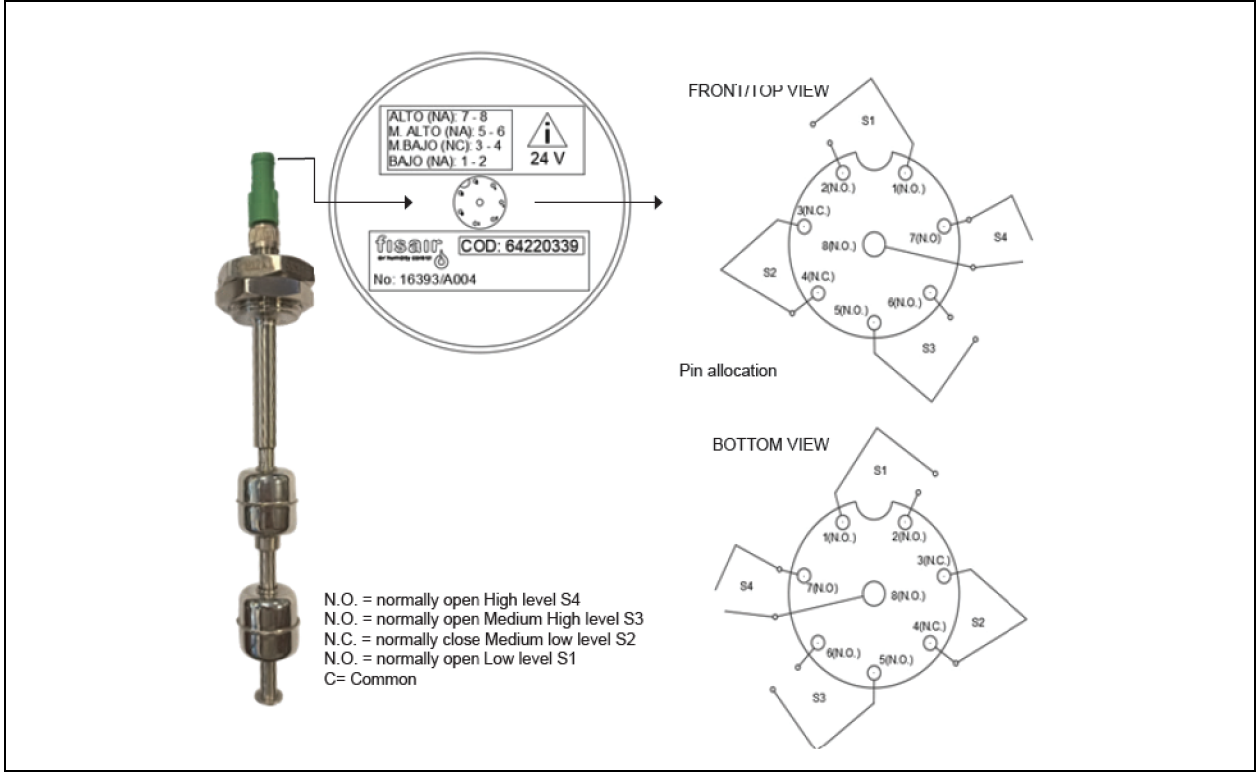


NOTE: There is an alarm for the condition when the maximum level is exceeded during a factory programmed time. With FISAIR control panel. (2 hours OFF, T06+2 hour OFF).

- Connection voltage: 24 VCC/24 VAC
- Max voltage: 175 VCC/110 VAC
- Max current: 1 Acc
- Temperature: -20 °C to 130 °C
- Min density: 0.75 gr/cm³

Notice

Remove the fixing mesh just before the equipment is placed in the final location, medium/minimum water level sensor (NO contact).



Notice

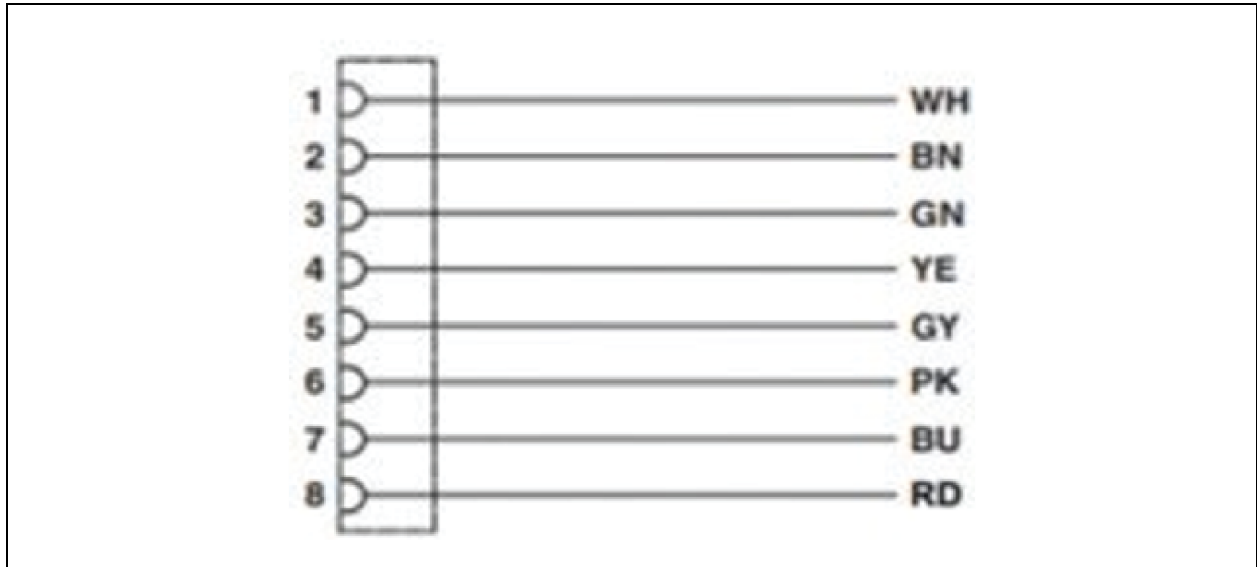
Pin 5 (/) must be left without connection.

Figure 4.3 Mesh to fix the float.



Connected by colors corresponding to the wiring of the detector connection.

Figure 4.4 Circuit Diagram



Circuit diagram showing the interdependence between pins and wire colors of the M12 connector with 3 m cable.

Notice

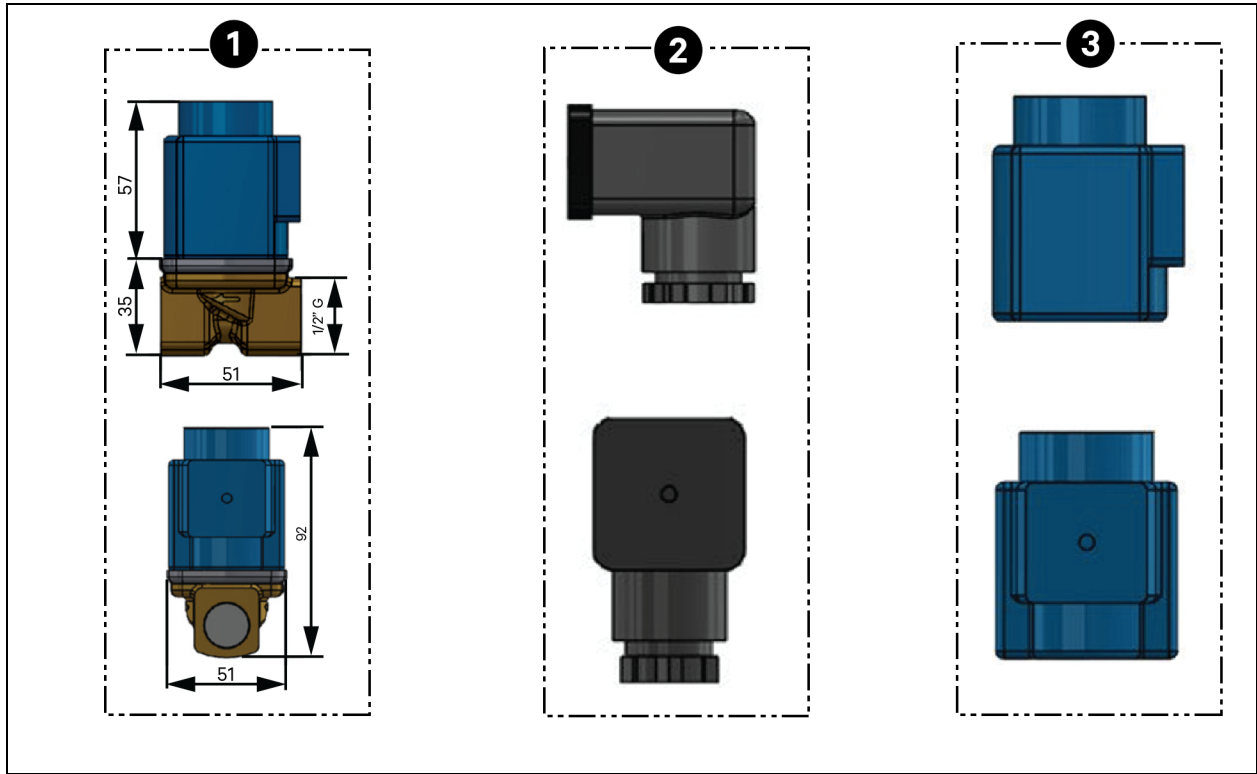
Remove the fixing mesh just before the equipment is placed in the final location. Medium/Minimum water level sensor (NO contact).

4.7 Filling Solenoid Valve

The water supply NC solenoid valve of the tank is composed of the body of the valve, the coil and the connector. The coil and the connector are supplied for a 24 VDC connection.

Connect to J13 (NC) terminal block in adiabatic electrical panel (using cable from kit 10038071). Refer to [Adiabatic EP wiring diagram](#) on page 121.

Figure 4.5 Tool Kit



Item	Description
1	Water supply solenoid valve (c/w coil)/ 3/4 in brass
2	Connector 24 VDC (L1+N+T)
3	Coil 24 VDC

Property	Condition	Condition
Electric supply: Service voltage/frequency/power	Tipo 24 VDC	24 VDC and 16 W
Water supply	24 VDC and 16 W	3/4 in. G
Work conditions	Room temperature range	-40 °C to 50 °C
	Fluid temperature range	-30 °C to 100 °C
Degree of protection	IP65	

! **WARNING! Pay attention at the polarity of the coil.**

4.8 Motor Operated Drain Valve

4.8.1 Valve technical data

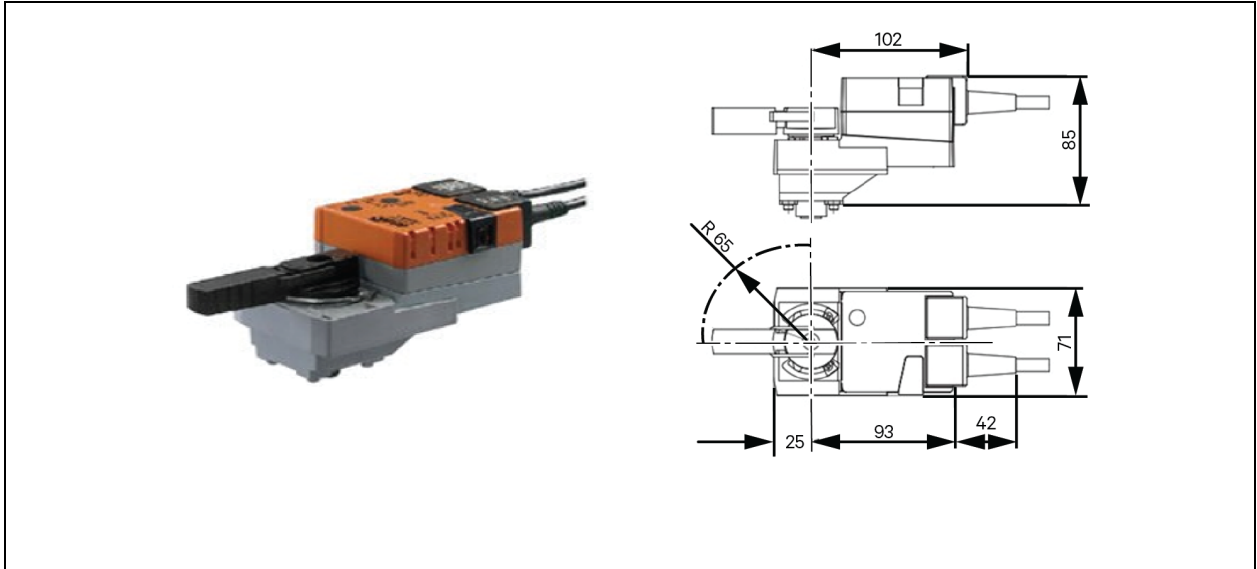
Figure 4.6 Motor Operated Drain Valve



R2020 - S2	DN	Rp	kvs	PN
	20	3/4"	32 m ³ /h	40

4.8.2 Actuator technical data

Figure 4.7 Actuator



Category	Specification	Value
Electrical data	Nominal voltage	AC/DC 24 V
	Nominal voltage frequency	50 Hz/60 Hz
	Nominal voltage range	AC 19.2 V to 28.8 V / DC 19.2 V to 28.8 V
	Power consumption in operation	1.5 W
	Power consumption in rest position	0.2 W
	Power consumption for wire sizing	2 VA
	Auxiliary switch	1 X SPDT, 0 to 100%
	Switch capacity auxiliary switch	1 mA to 3 A (0.5 A inductive), AC 250 V
	Connection supply / control	Cable 1 m, 3 x 0.75 mm ²
	Connection auxiliary switch	Cable 1 m, 3 x 0.75 mm ²
	Parallel operation	Yes (note the performance data)
Functional data	Torque motor	5 Nm
	Manual override	with push, button can be locked
	Running time motor	90s/900
	Sound power level, motor	35 dB(A)
	Position indication	Mechanically, pluggable

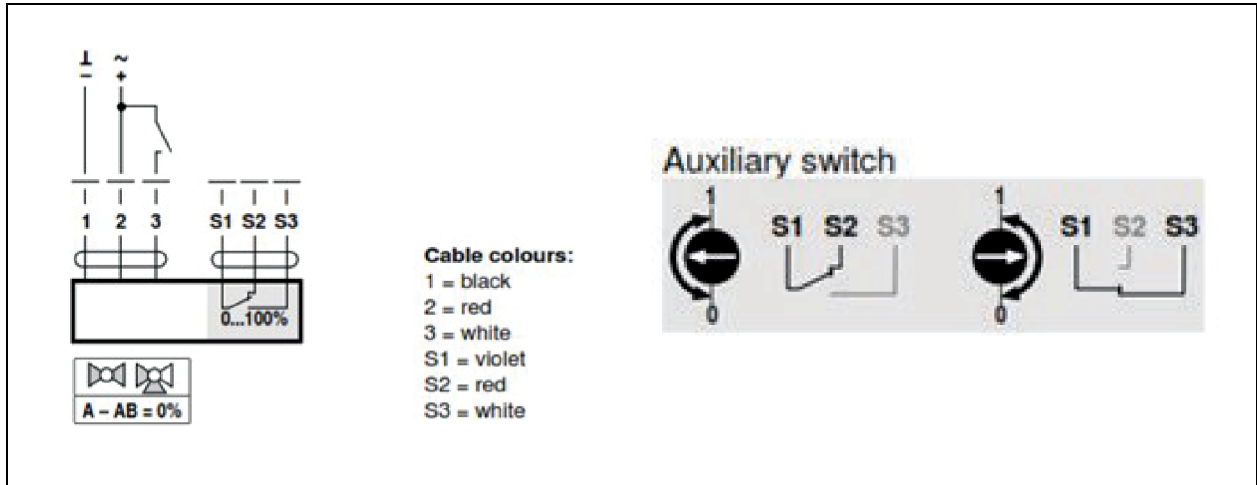
Category	Specification	Value
Safety	Protection class IEC/EN	III safety extra low voltage (SELV)
	Protection class UL	UL Class 2 Supply
	Protection class auxiliary switch IEC/EN	IL reintroduced insulation
	Degree of protection IEC/EN	IP54
	Degree of protection NEMA/UL	NEMA 2
	Enclosure	UL Enclosure Type 2
	EMC	CE according to 2014/35/EU
	Low voltage directive	CE according to 2014/35/EU
	Certification ICE/EN	ICE/EN 60730- 1 and ICE/EN 60730-2-14
	Certification UL	cUL us according to UL60730-1A, UL60730-2-14 and CAN/CSA E60730- 1:02
	Certification UL note	The UL marking on the actuator depends on the production site, the device is UL compliant in any case
	Mode of operation	Type 1
	Rate impulse voltage supply/control	0.8 kW
	Rate impulse voltage auxiliary switch	2.5 kW
	Control pollution degree	3
	Ambient temperature	-30 °C to 50 °C
	Storage temperature	-40 °C to 80 °C
	Ambient humidity	Max. 95% r.H, non-condensing
	Servicing	maintenance free
	Weight	Weight

4.8.3 Wiring diagram



WARNING! Pay attention at the polarity of the coil.

Figure 4.8 24 VDC Voltage Supply



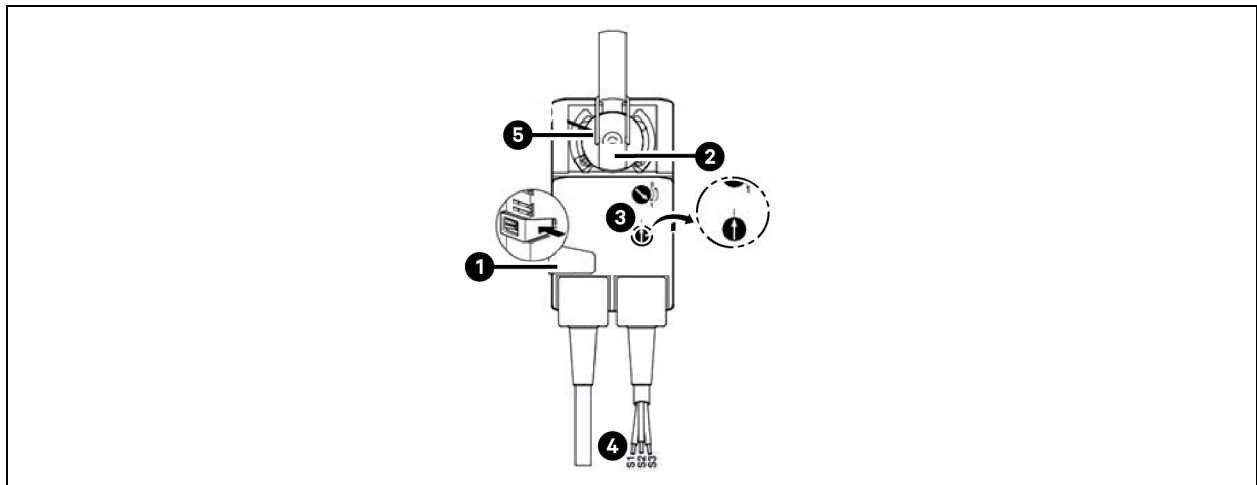
Connect actuator's cables using elongations (from kit 10038071).

Power supply cables (1,2) to J12, forced drain (3) to J14, feedback (S1, S2) to J15.

4.8.4 Control for manual operation

NOTE: Perform settings on the actuator only in deenergized state.

Figure 4.9 Manual Operation



Item	Name	Description
1	Gear disengagement	Gear disengagement holding button pressed down, gear is disengaged. Manual override is possible
2	Adapter	Form fit adapter turn until line A displays the desired switching position of the actuator and release button 1
3	Auxiliary switch	Auxiliary switch turn rotary knob until the arrow points to the vertical line
4	Cable	Cable connect continuity tester to S1 + S2 to S1 + S3. If the auxiliary switch should switch in the opposite direction, rotate the auxiliary switch by 180.

4.9 Irrigation Flow Valve Setting

1. Set the irrigation flow valve to ensure uniform water supply of the surface area of the panels.
2. Irrigate the panels with a water flow significantly higher than the evaporated fraction. This excess of water from the panels falls into the water tank and flows back to the pumping assembly.
3. To set the valve to the correct irrigation flow (see **Table 4.2** below) use a 6 mm allen key is used. Flow at any time can be observed in the flow indicator.
4. For precise settings, turn the screw several times to reach to the limit of the valve.
5. Use an 8 mm allen key, to adjust the set flow to ensure a constant irrigation flow.

Figure 4.10 Flow Valve



Table 4.2 Vertiv™ Liebert® AFC Frame

AFC Frame	Water Flow for each Pumping Assembly (l/min) [Organic Pads]
10 Fans	76
12 Fans	91
14 Fans	107
16 Fans	122
18 Fans	137
20 Fans	152

4.10 Bleed Off Valve Setting

Since only water is evaporating in the adiabatic cooling process, dissolved mineral salts remain in solution, and gradually increase in concentration, despite new water being added to compensate for the evaporation.

To prevent the formation of mineral deposits (scaling) on the surfaces of the evaporative panel (this would lead to a progressive decrease in performances and airflow), it is essential to discharge some of the recirculated water to the drainage network in combination with the evaporation process.

The bleed off flow is calculated based on the cycle of concentration (COC), which is the ratio between the recirculated water and the makeup water, referred to a specific physical parameter (i.e. conductivity).

Figure 4.11 Bleed Off Valve

Bleed off flow = Evaporation/(COC-1)

Based on makeup water conductivity:

- 100 $\mu\text{S}/\text{cm}$ \rightarrow COC = 9
- 550 $\mu\text{S}/\text{cm}$ \rightarrow COC = 6

For intermediate values, do a linear interpolation.

Example:

- Evaporation water flow = 20 l/min
- Makeup water conductivity = 550 $\mu\text{S}/\text{cm}$ \rightarrow COC = 6 bleed off flow = $20/(6-1) = 4$ l/min

If the evaporated flow rate is not available at the commissioning phase, as a first attempt the flow of the bleed off valve can be set approximately at 10% of total irrigation flow. By regularly observing the state of the panels (on the air input side) after 1 week working, if there are no signs of mineral deposits whitening the surface, the bleed off flow can be slightly reduced, or, if deposits are noticeable, it shall be increased.

5 Water Specifications

Water characteristics listed in **Table 5.1** below are main prerequisite for ensuring the system functionality and a good service life of the PAD.

Table 5.1 Specification

Constituent	Recommended Value
Total hardness (as CaCO ₃)	20 to 100 mg/l
Silica (as SiO ₂)	< 30 mg/l
Iron (as Fe)	< 0.2 mg/l
Oils and fats	< 2 mg/l
Total dissolved solids	< 450 mg/l
PH	6.0 to 8.0

Notice

Any deviations from the recommended ranges should be discussed with Vertiv, as well as any water treatments like softening or reverse osmosis.

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6 System Installation

6.1 Parts Identification and Layout

These instructions are only guidance.

We recommend that installation engineer should read and understand these instructions thoroughly before starting the installation.

These operations must be carried out by appropriately qualified personnel.

Follow local safety guidelines, especially personal safety, two packages will arrive, which will contain all the necessary component parts of the equipment:

- **Package A:** Contains all the modules of zone A (left side, looking Vertiv™ Liebert® AFC chiller from adiabatic electrical panel side) including pads, frames, pump, tank and connecting U profiles.
- **Package B:** Contains all the modules of zone B (right side, looking Liebert® AFC chiller from adiabatic electrical panel side) including pads, frames, pump, tank and connecting U profiles.

See **Figure 6.1** on page 33 to **Figure 6.6** on page 38 to identify the two zones, each component and its position.

Module [0]:

The equipment is made of modules which are easily assembled using serial numbers. Each zone can be composed of between 3 and 5 modules.

- Zone A: Zone A modules are identified by the suffix “OA”

There are five different modules in zone A. Depending on the number of fans one or the other will be used. Name of modules in zone A are:

- [OA1],[OA2],...,[OAn] modules (cover 4 fans)
- [OA1S],[OA2S],...,[OAnS] semi-modules (cover 2 fans).

The progressive numbering starts from the pumping assembly side and the modules are arranged as in the following figures.

- Zone B: Zone B modules are identified by the suffix “OB”

There are five different modules in zone B. Depending on the number of fans one or the other will be used. Name of modules in zone B are:

- [OB1],[OB2],...,[OBn] modules (cover 4 fans)
- [OB1S],[OB2S],...,[OBnS] semi-modules (cover 2 fans).

The progressive numbering starts from the pumping assembly side and the modules are arranged as in the following figures.

Connecting U profiles [4]:

- Zone A: The modular connecting U profiles, identified by the suffix 4A, joint two modules. Name of modules in zone A: [4A1],...,[4Am]
- Zone B: The modular connecting U profiles, identified by the suffix 4B, joint two modules. Name of modules in zone B: [4B1],...,[4Bm]

NOTE: For each zone, the total quantity of modular connecting U profiles (m) will be equal to one unit less than the number of modules (n). $m = n - 1$.

The units vary according to the number of modules and fans they have. The designation is given according to the position in which the unit is mounted. The different possibilities, ranging from 10 to 20 total air fans, are shown **Table 6.1** below.

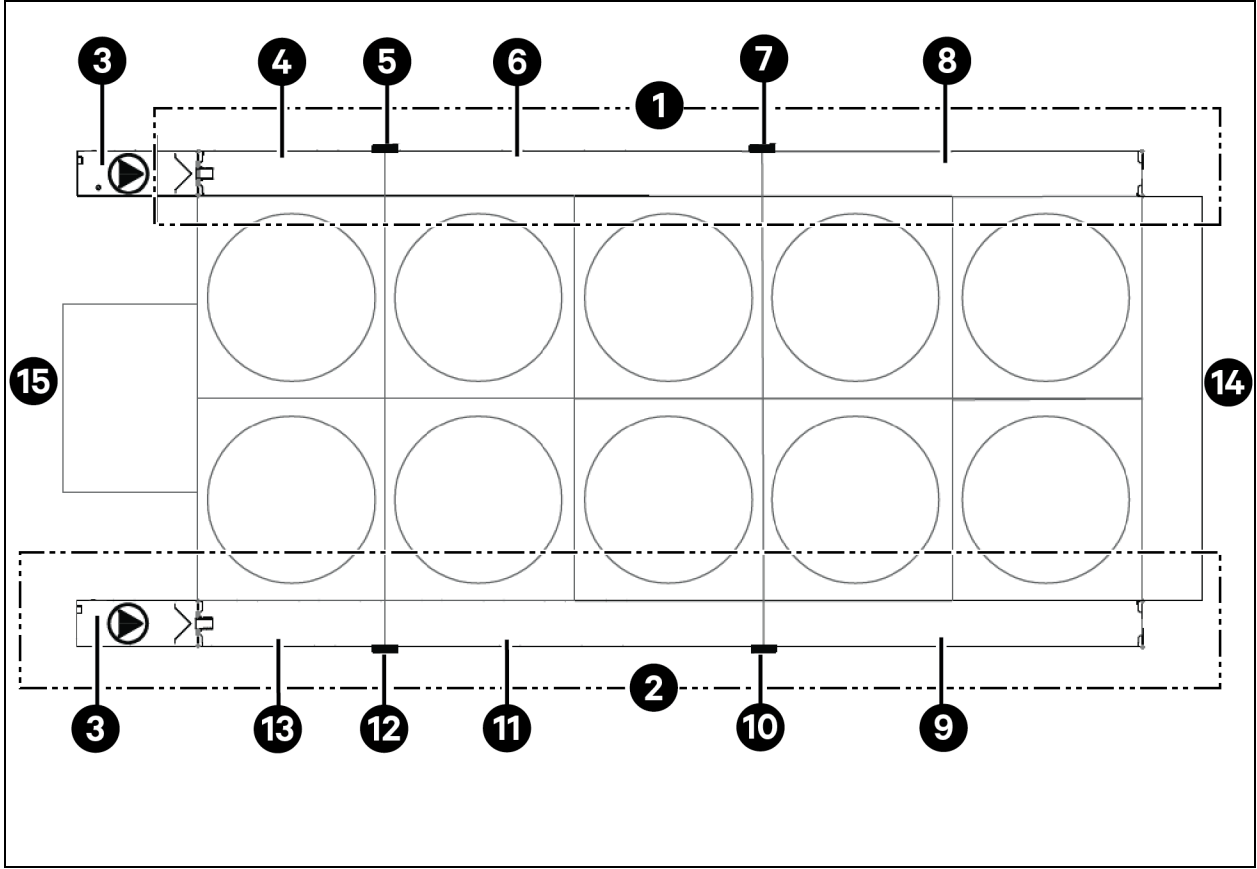
The codification of all relevant components to assembly or disassembly the adiabatic system is shown in **Table 6.1** below.

Table 6.1 Assembly or Disassembly the Adiabatic System

Code	Description
0A1, 0A1S, ..., 0An, 0AnS	Modules zone A
0B1, 0B1S, ..., 0Bn, 0BnS	Modules zone B
1A	Pumping assembly zone A
1B	Pumping assembly zone B
C1, C2 or C3	Cassette
4A1, ..., 4Am	Modular connecting U profile zone A
4B1, ..., 4Bm	Modular connecting U profile zone B
5D	Clamps
6E	Wall gland
7F	Screws M5
8G	Earbolts
9H	Tube holding bracket
11A1S, 11A1, ..., 11AnS, 11An	Backflow manifolds zone A
11B1S, 11B1, ..., 11BnS, 11Bn	Backflow manifolds zone B

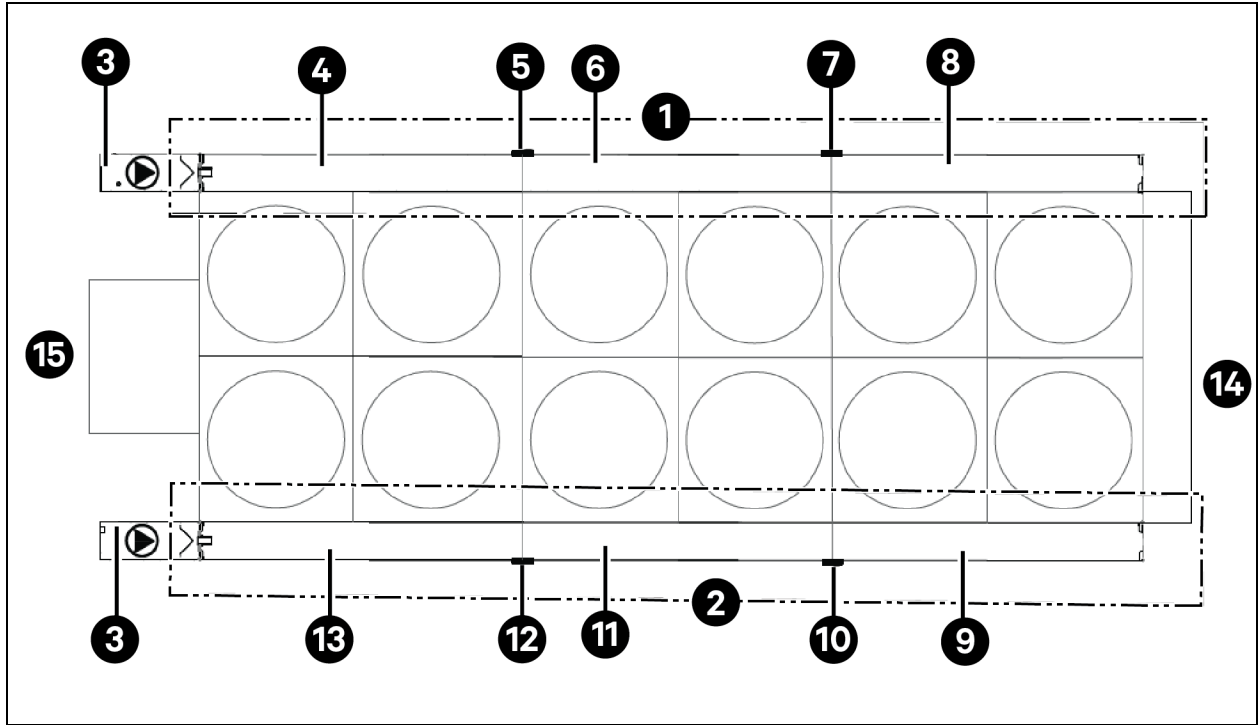
The **Figure 6.1** on the facing page show module (left) and semi-module (right). Both are mainly composed by frame, some cassettes and the top closure profile.

Figure 6.1 Adiabatic System 10 Fans



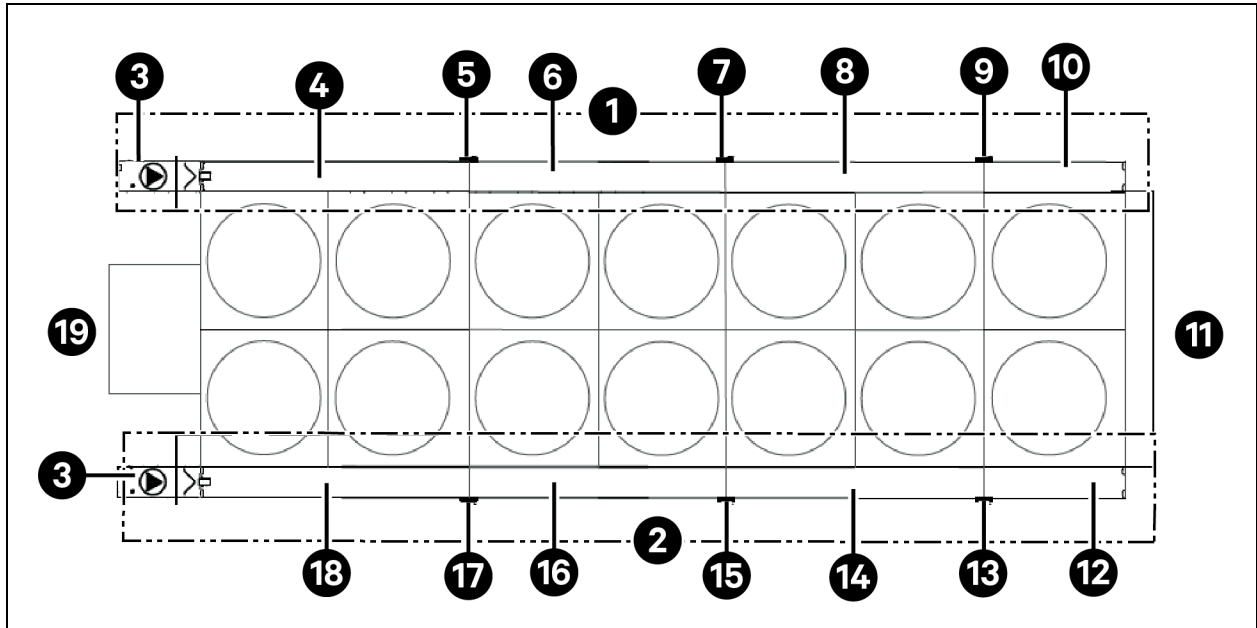
Item	Description
1	Zone A
2	Zone B
3	Dep
4	Mod OA1S
5	4A1
6	Mod OA2
7	4A2
8	Mod OA3
9	Mod OB3
10	4B2
11	Mod OB2
12	4B1
13	Mod OB1S
14	Chillar AP
15	Adiabatic EP

Figure 6.2 Adiabatic System 12 Fans



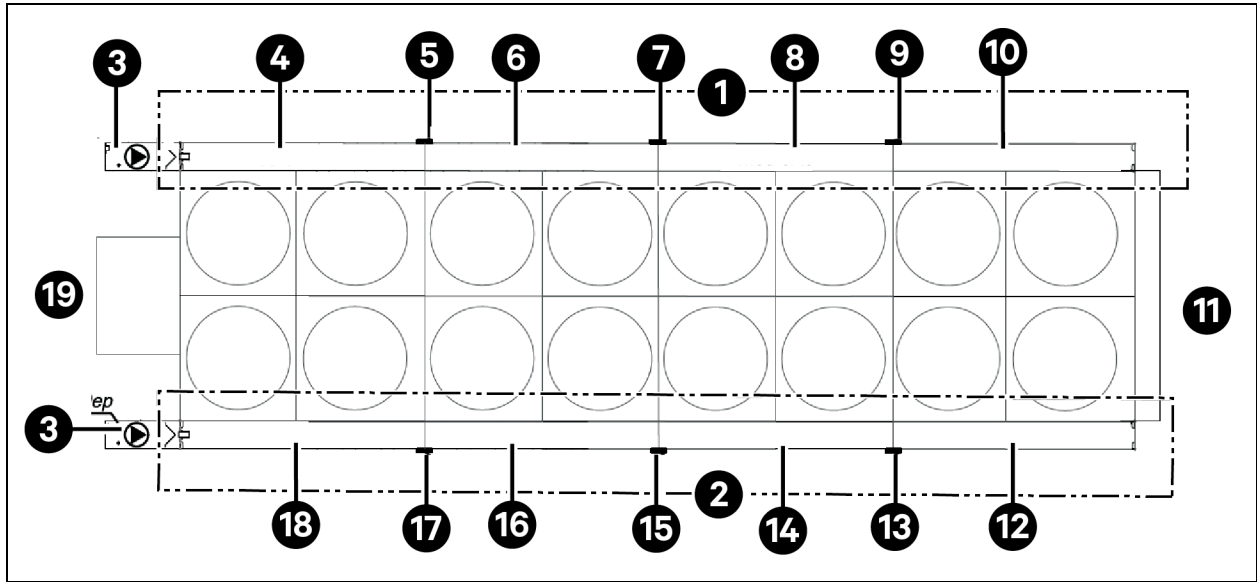
Item	Description
1	Zone A
2	Zone B
3	Dep
4	Mod OA1
5	4A1
6	Mod OA2
7	4A2
8	Mod OA3
9	Mod OB3
10	4B2
11	Mod OB2
12	4B1
13	Mod OB1
14	Chillar EP
15	Adiabatic EP

Figure 6.3 Adiabatic System 14 Fans



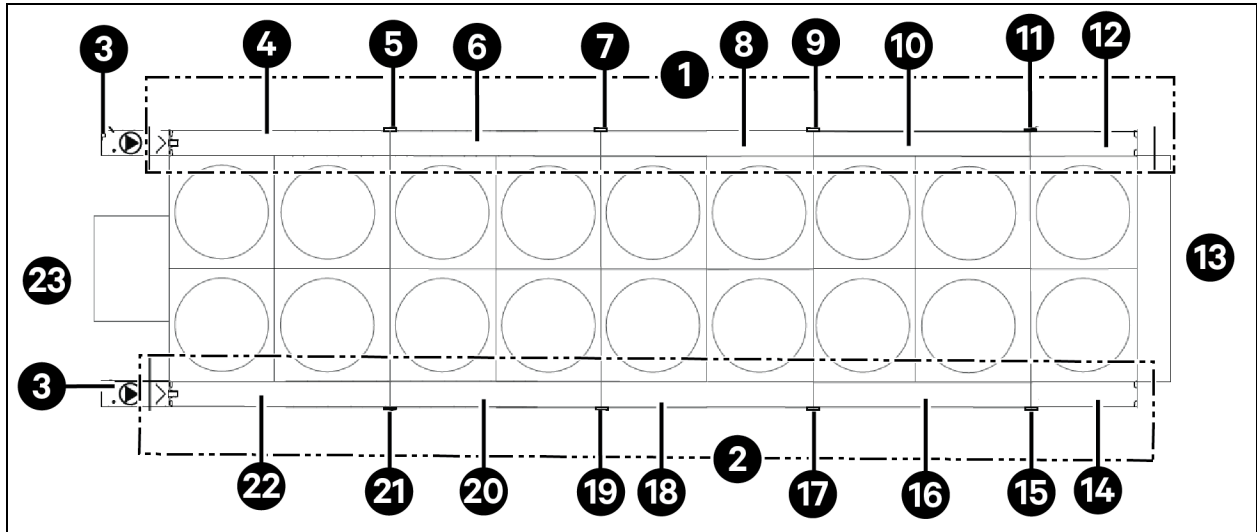
Item	Description
1	Zone A
2	Zone B
3	Dep
4	Mod OA1
5	4A1
6	Mod OA2
7	4A2
8	Mod OA3
9	4A3
10	Mod OA4S
11	Chiller EP
12	Mod OB4S
13	4B3
14	Mod OB3
15	4B2
16	Mod OB2
17	4B1
18	Mod OB1
19	Adiabatic EP

Figure 6.4 Adiabatic System 16 Fans



Item	Description
1	Zone A
2	Zone B
3	Dep
4	Mod OA1
5	4A1
6	Mod OA2
7	4A2
8	Mod OA3
9	4A3
10	Mod OA4
11	Chiller EP
12	Mod OB4
13	4B3
14	Mod OB3
15	4B2
16	Mod OB2
17	4B1
18	Mod OB1
19	Adiabatic EP

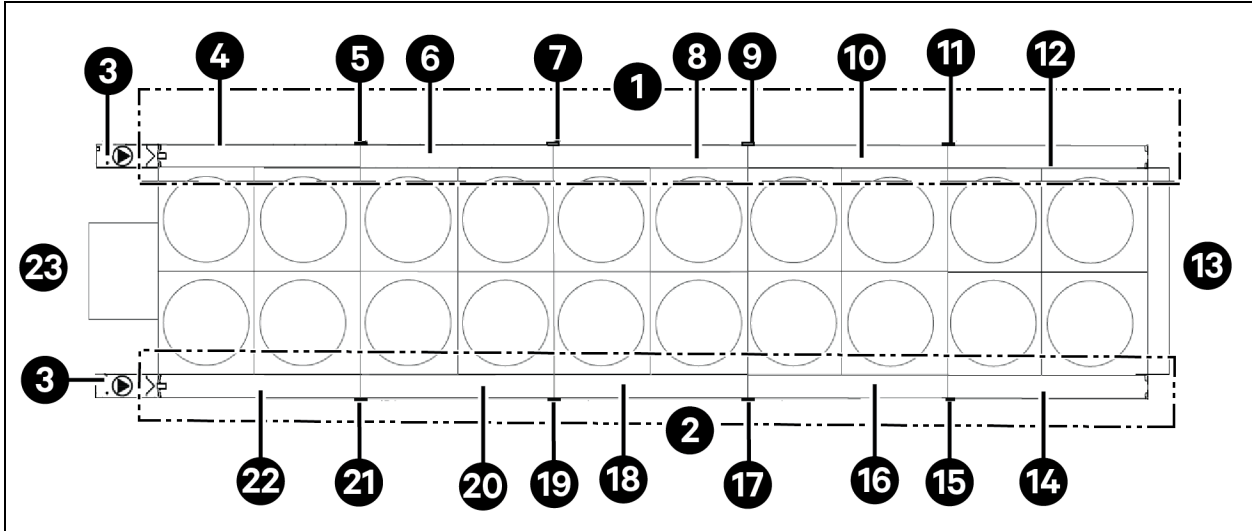
Figure 6.5 Adiabatic System 18 Fans



Item	Description
1	Zone A
2	Zone B
3	Dep
4	Mod OA1
5	4A1
6	Mod OA2
7	4A2
8	Mod OA3
9	4A3
10	Mod OA4
11	4A4
12	Mod OA5S
13	Chiller EP
14	Mod OB5S
15	4B4
16	Mod OB4
17	4B3
18	Mod OB3
19	4B2
20	Mod OB2

Item	Description
21	4B1
22	Mod OB1
23	Adiabatic EP

Figure 6.6 Adiabatic System 20 Fans

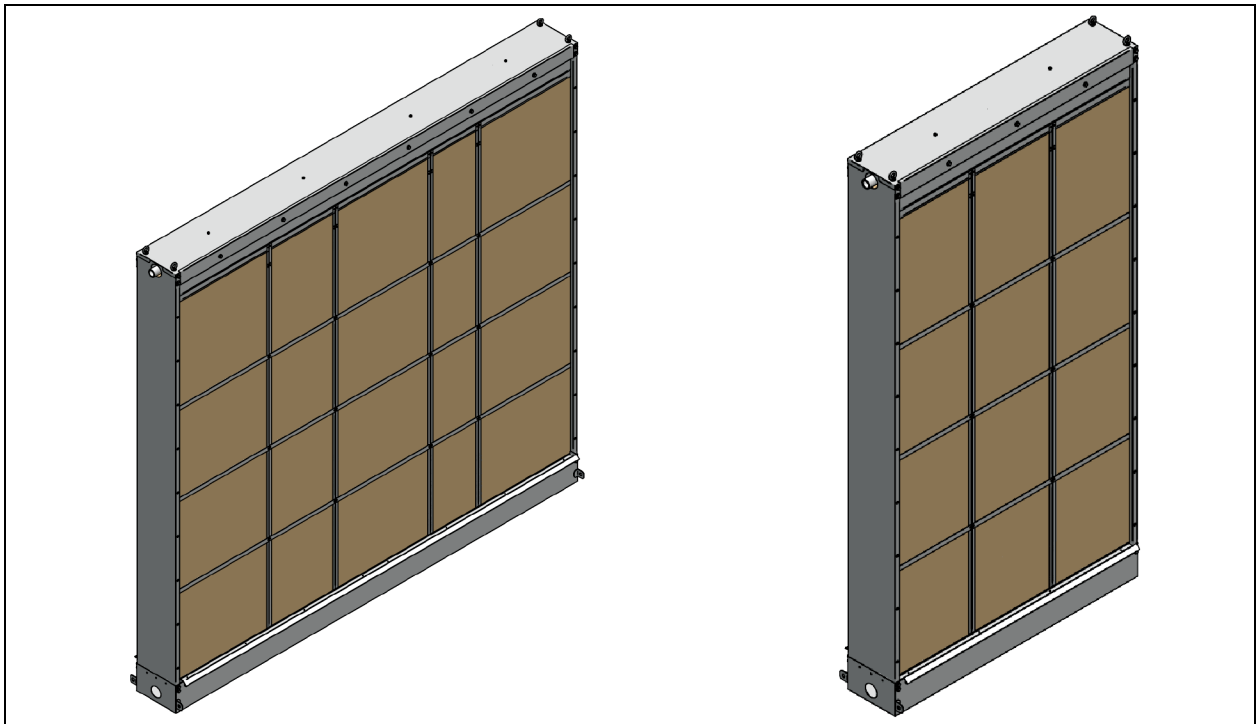


Item	Description
1	Zone A
2	Zone B
3	Dep
4	Mod OA1
5	4A1
6	Mod OA2
7	4A2
8	Mod OA3
9	4A3
10	Mod OA4
11	4A4
12	Mod OA5
13	Chiller EP
14	Mod OB5
15	4B4
16	Mod OB4

Item	Description
17	4B3
18	Mod 0B3
19	4B2
20	Mod 0B2
21	4B1
22	Mod 0B1
23	Adiabatic EP

The picture below show module (left) and semi-module (right). Both are mainly composed by frame, some cassettes and the top closure profile.

Figure 6.7 Module (Left) and Semi Module (Right)

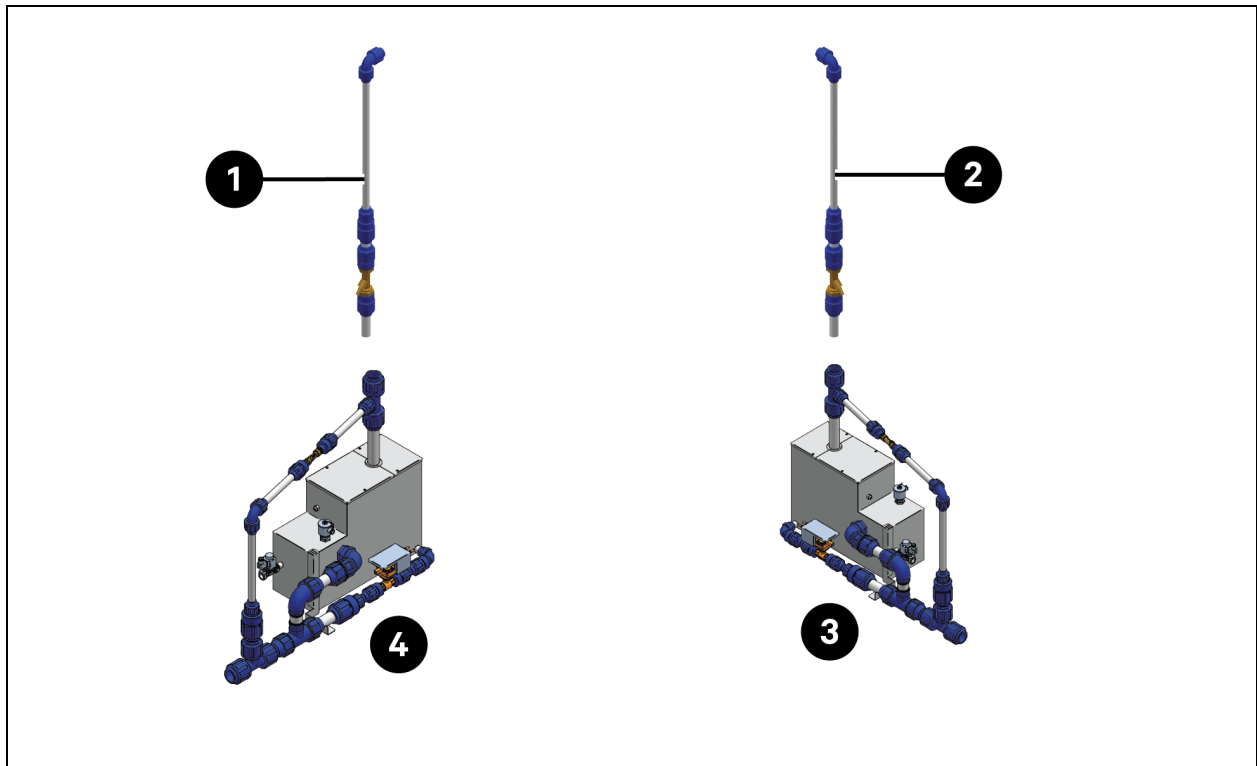


Pumping assemblies [1A or 1B]

Pumping assemblies are delivered disassembled in two parts, so they have different identification. The only difference between the components in the pumping assemblies is whether they are connected to zone A modules or zone B modules.

Front riser pipe [1A2] / [1B2] is supplied disassembled.

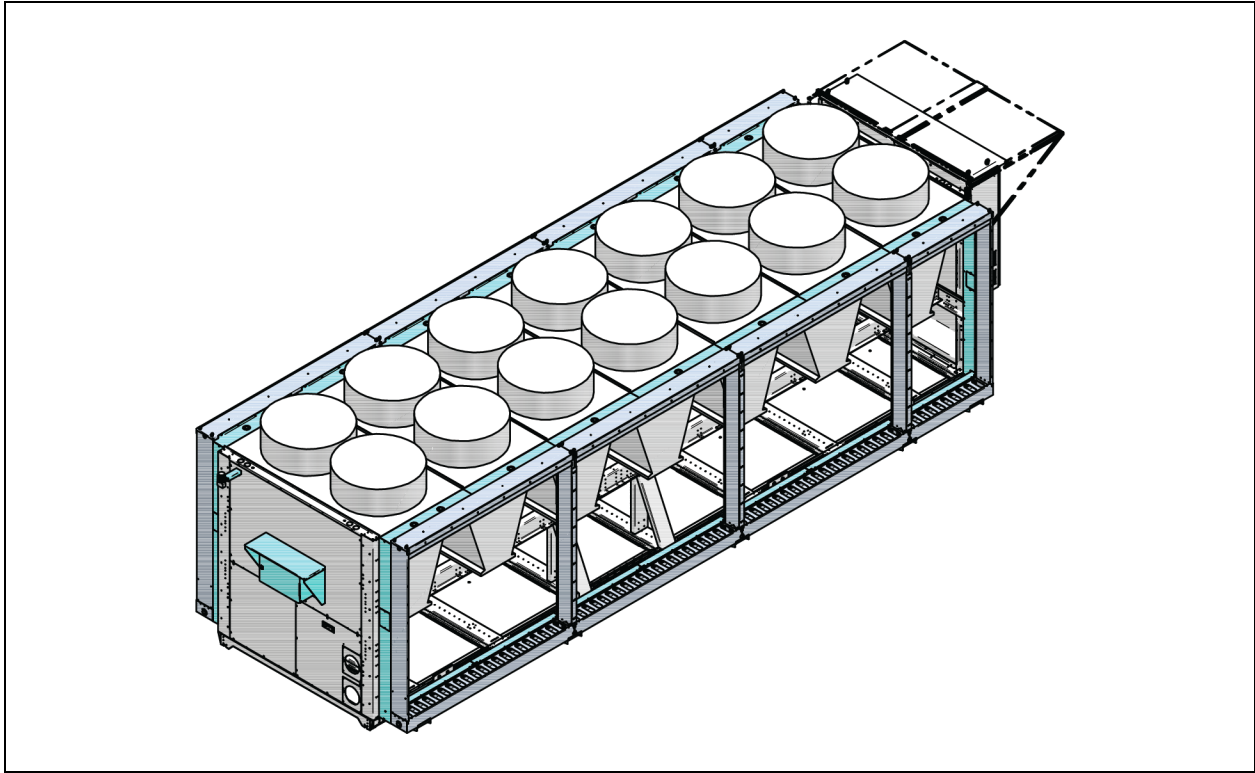
Figure 6.8 Pumping Assemblies



Item	Description
1	1A2
2	1B2
3	Pump module 1A
4	Pump module 1B

6.2 Screws List

Figure 6.9 Vertiv™ Liebert® AFC Layout



Screw Kit List for Assembly						
	AFC 10 Fans	AFC 12 Fans	AFC 14 Fans	AFC 16 Fans	AFC 18 Fans	AFC 20 Fans
Description						
Screw TEF M6X16-DIN 6921 INOX	210	236	266	292	322	348
Square Caged Nut M6 INOX SP. 2	64	72	80	88	96	104
Flanged Hex Nuts M6 DIN 6923 ISO 4161	96	114	132	150	168	186
Washer M12 ISO7089 HDG 200HV	32	32	40	48	48	56
Washer GROWER M12 DIN7980 C60/C70	32	32	40	48	48	56
Screw EH M12X35 GALV. 8.8 UNI 5739 DIN 933	32	32	40	48	48	56
Screw TEF M5X16-DIN 6921 INOX	56	66	76	86	96	106
Screw TEF M8X25-DIN 6921 INOX	24	24	36	36	48	48
Nut Self-locking M8-DIN 982 INOX	24	24	36	36	48	48
Washer PLANK D.8,4X17-UNI 6592 INOX	48	48	72	72	96	96
S/TP Screw TE 4.8X13 6950/DIN 6928 GEOMET	40	48	56	64	72	80

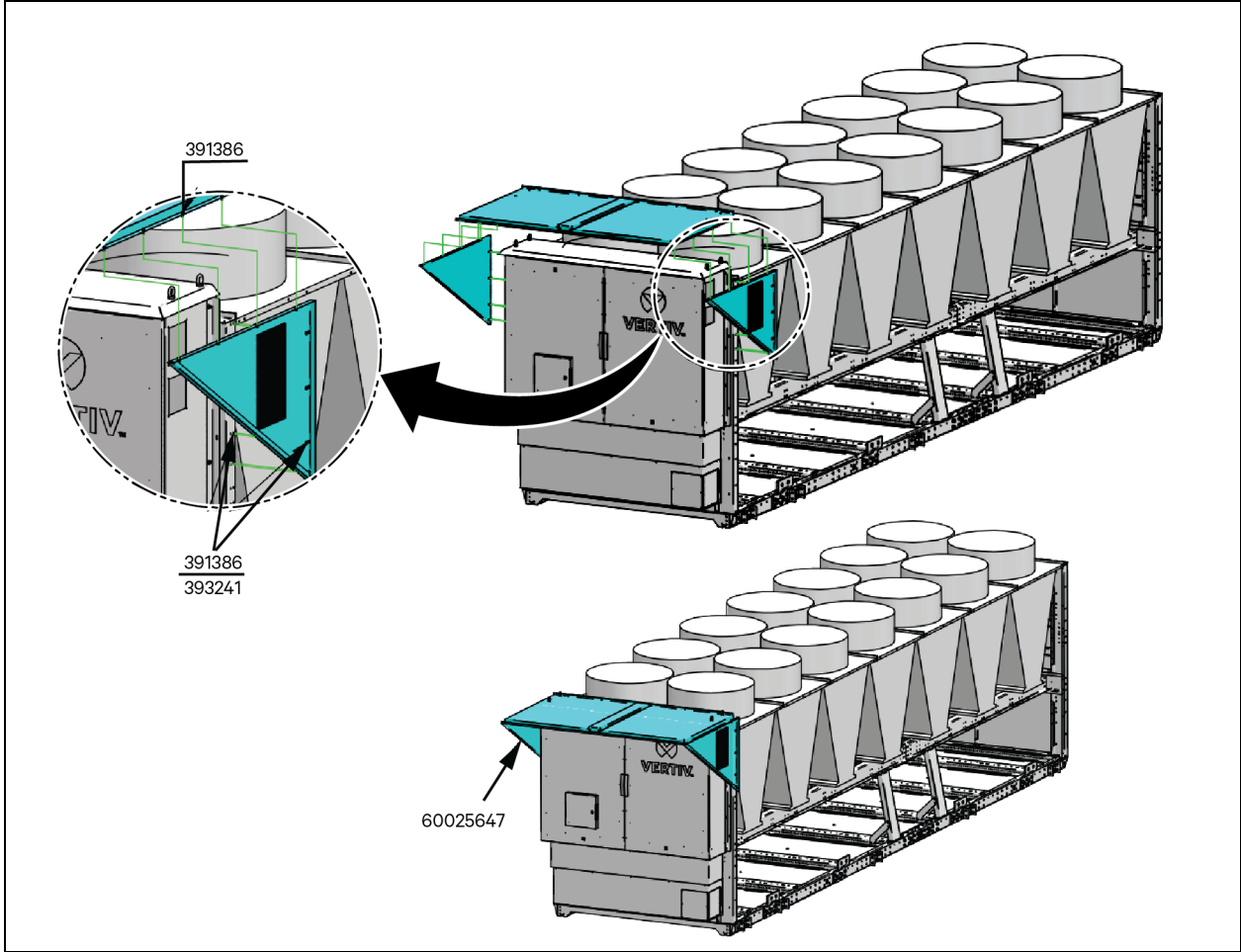
Screw Kit List for Assembly						
	AFC 10 Fans	AFC 12 Fans	AFC 14 Fans	AFC 16 Fans	AFC 18 Fans	AFC 20 Fans
Description						
Screw TE M10X30-UNI 5739 EN ISO 4017 DIN 933 INOX	4	4	4	4	4	4
Washer Plank D.10,5X30X2,5--UNI6593 INOX	4	4	4	4	4	4
Washer Plank Grower D.10-UNI 3545 UNI 1751/52 INOX	4	4	4	4	4	4
Gasket SR-120 PVC ADES. 25x3	10m	10m	10m	10m	10m	10m
Gasket SR-120 PVC ADES. 200x3	8 x L250 mm	8 x L250 mm	10 x L250 mm	12 x L250 mm	12 x L250 mm	14 x L250 mm

6.3 Assembly Instructions

Installation of protection roof for Vertiv™ Liebert® AFC electrical panel (optional)

If roof is ordered, it must be installed on the Adiabatic system.

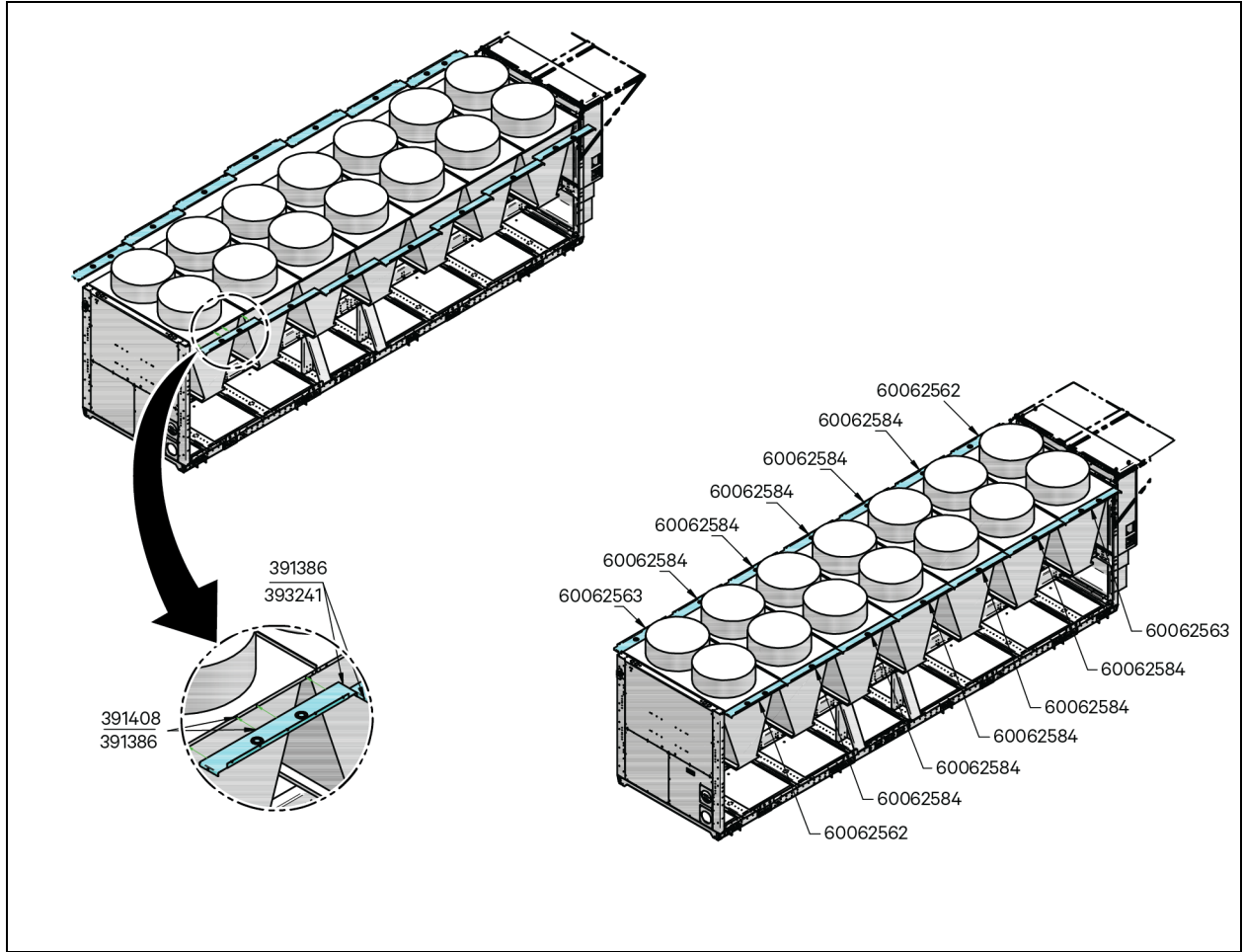
Figure 6.10 Protection Roof for Vertiv™ Liebert® AFC Electrical Panel (Optional)



Description	PN	10 Fans	12 Fans	14 Fans	16 Fans	18 Fans	20 Fans
Roof Box EP AFC-M (3 Pieces)	170880007653	1	1	1	1	1	1
Roof Box EP AFC-M (3 Pieces)	170880007655	1	1	1	1	1	1
Roof Box EP AFC-M (3 Pieces)	170880007654	1	1	1	1	1	1
Screw TEF M6X16-DIN 6921 INOX		24	24	24	24	24	24
Flanged Hex Nuts M6 DIN 6923 ISO 4161		16	16	16	16	16	16

Installation of upper plugging

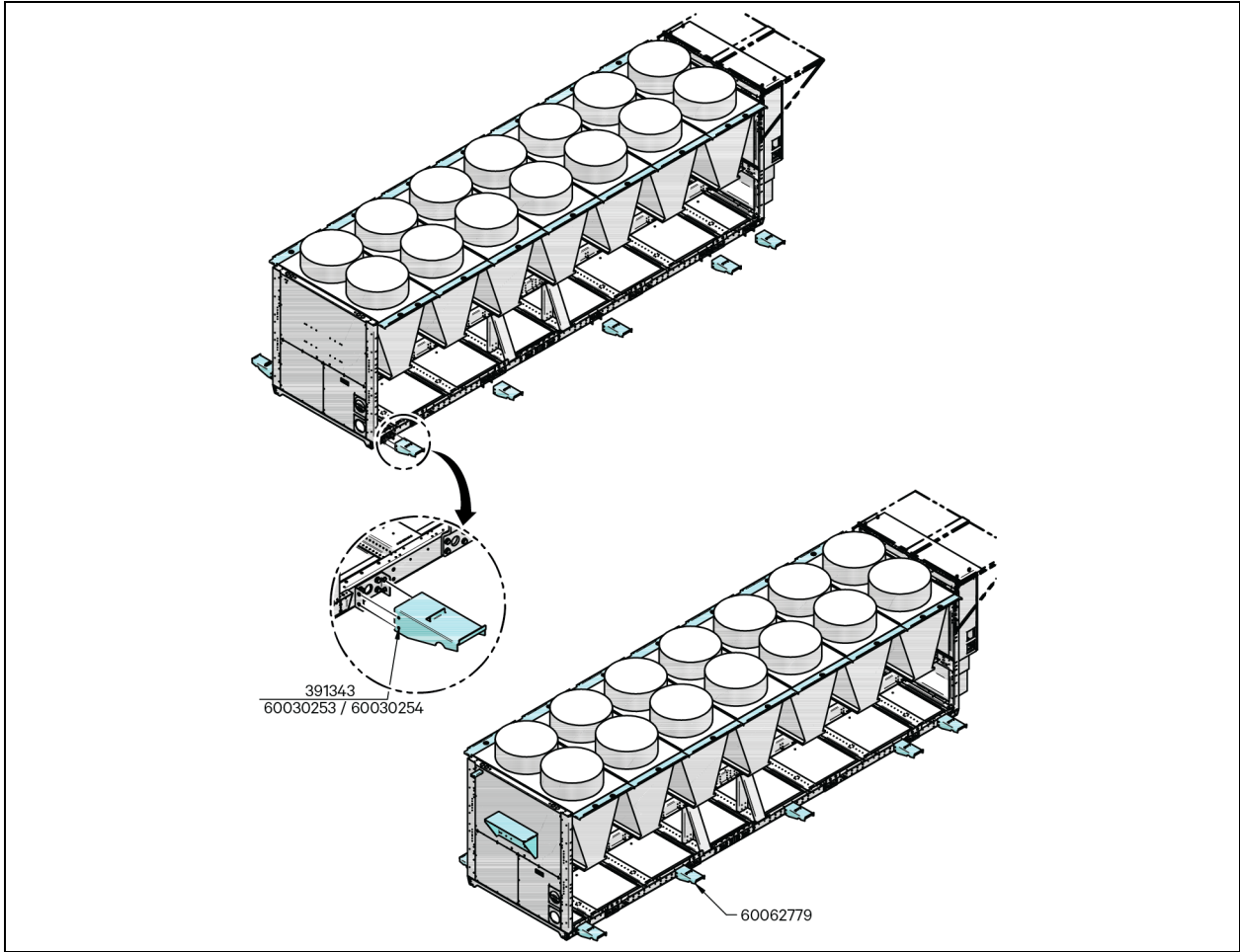
Figure 6.11 Installation of Upper Plugging



Description	PN	10 Fans	12 Fans	14 Fans	16 Fans	18 Fans	20 Fans
Roof Box EP AFC-M (3 Pieces)	170880009110	6	8	10	12	14	16
Roof Box EP AFC-M (3 Pieces)	170880009107	2	2	2	2	2	2
Roof Box EP AFC-M (3 Pieces)	170880009107	2	2	2	2	2	2
Screw TEF M6X16-DIN 6921 INOX		56	68	80	92	104	116
Square caged nut M6 INOX SP. 2		40	48	56	64	72	80
Flanged Hex Nuts M6 DIN 6923 ISO 4161		16	20	24	28	32	36

Installation of main PAD supports

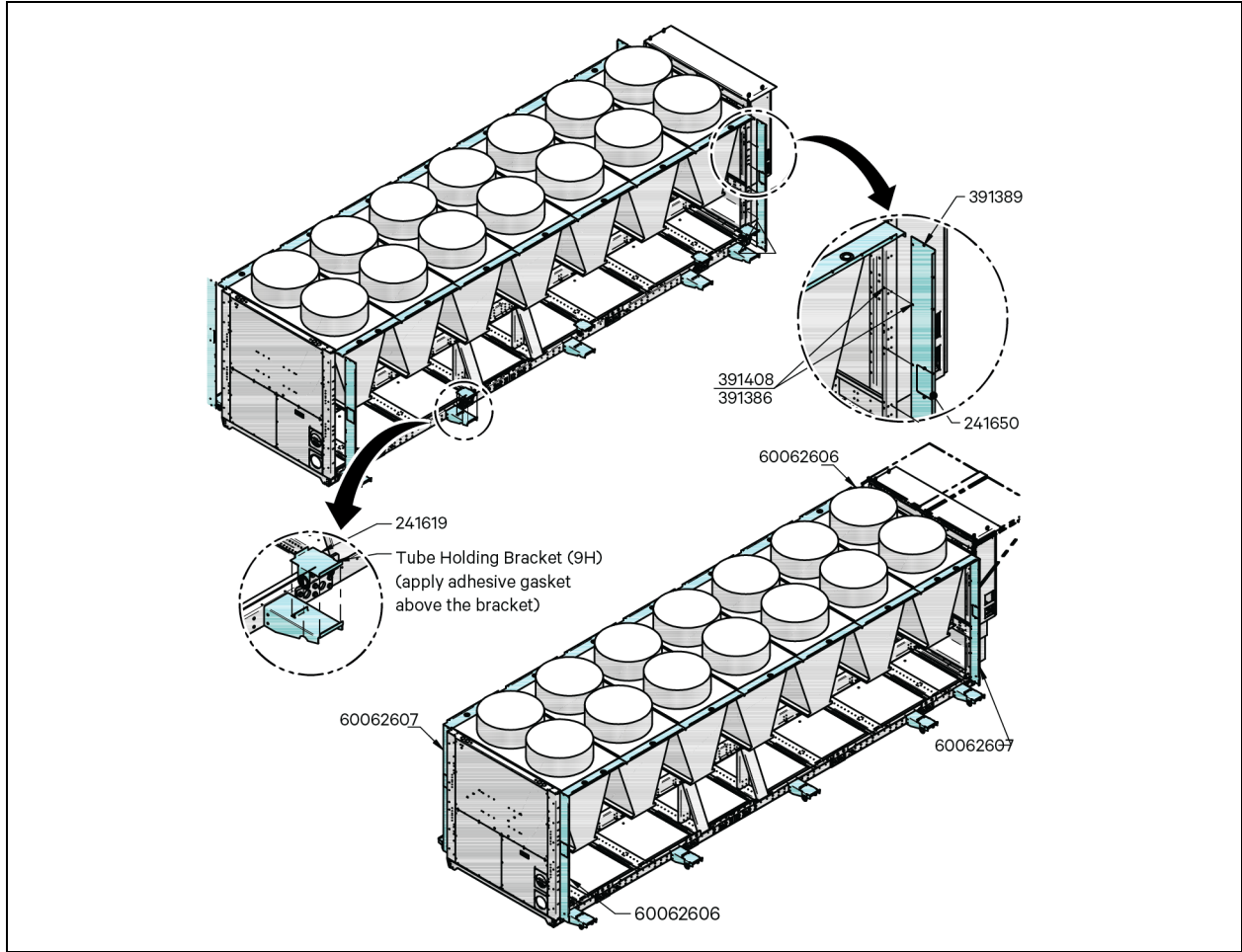
Figure 6.12 Installation of Main PAD Supports



Description	PN	10 Fans	12 Fans	14 Fans	16 Fans	18 Fans	20 Fans
Support Adiabatic	170880009117	8	8	10	12	12	14
Washer M12 ISO7089 HDG 200HV	135300000798	32	32	40	48	48	56
Washer Grower M12 DIN7980	135300000800	32	32	40	48	48	56
Screw EH M12X35 GALV. 8.8		32	32	40	48	48	56

Installation of lateral plugging and lower pipe supports

Figure 6.13 Installation of Lateral Plugging and Lower Pipe Supports



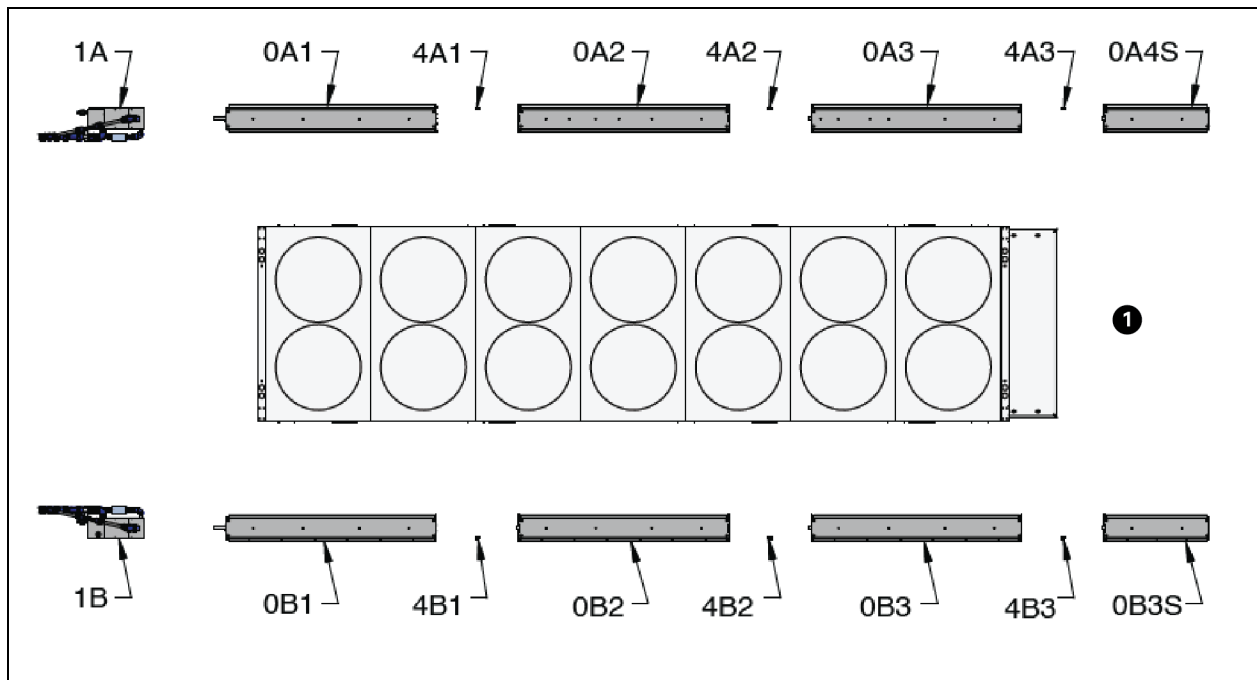
Description	PN	10 Fans	12 Fans	14 Fans	16 Fans	18 Fans	20 Fans
Lateral Plug For Adiabatic System	170880009109	2	2	2	2	2	2
Lateral Plug For Adiabatic System	170880009115	2	2	2	2	2	2
Tube Holding Bracket (9H)		8	8	10	12	12	14
Screw TEF M6X16-DIN 6921 INOX		24	24	24	24	24	24
Square Caged Nut M6 INOX SP. 2		24	24	24	24	24	24
Screw TEF M5X16-DIN 6921 INOX		4	4	4	4	4	4
Gasket SR-120 PVC ADES. 25x3		10 m	10 m	10 m	10 m	10 m	10 m
Gasket SR-120 PVC ADES. 200x3		8 x L250 mm	8 x L250 mm	10 x L250 mm	12 x L250 mm	12 x L250 mm	14 x L250 mm

Modules layout

Place the modules around the chiller, close to the right position.

NOTE: This example shows how to fit a 6 modular design with 14 air fans, 7 per zone (A or B). All other designs and configurations follow the same procedure:

Figure 6.14 Modules Layout



Item	Description
	Chiller E.P. side

Cassette disassembly

Remove the cassette closure strip by releasing the grooved closing screws on the front, top of the module. Once these strips are removed, take out the cassettes from the front of the module.

Notice

Cassettes have some vaseline oil, pay attention to clothes and do not remove vaseline from cassette.

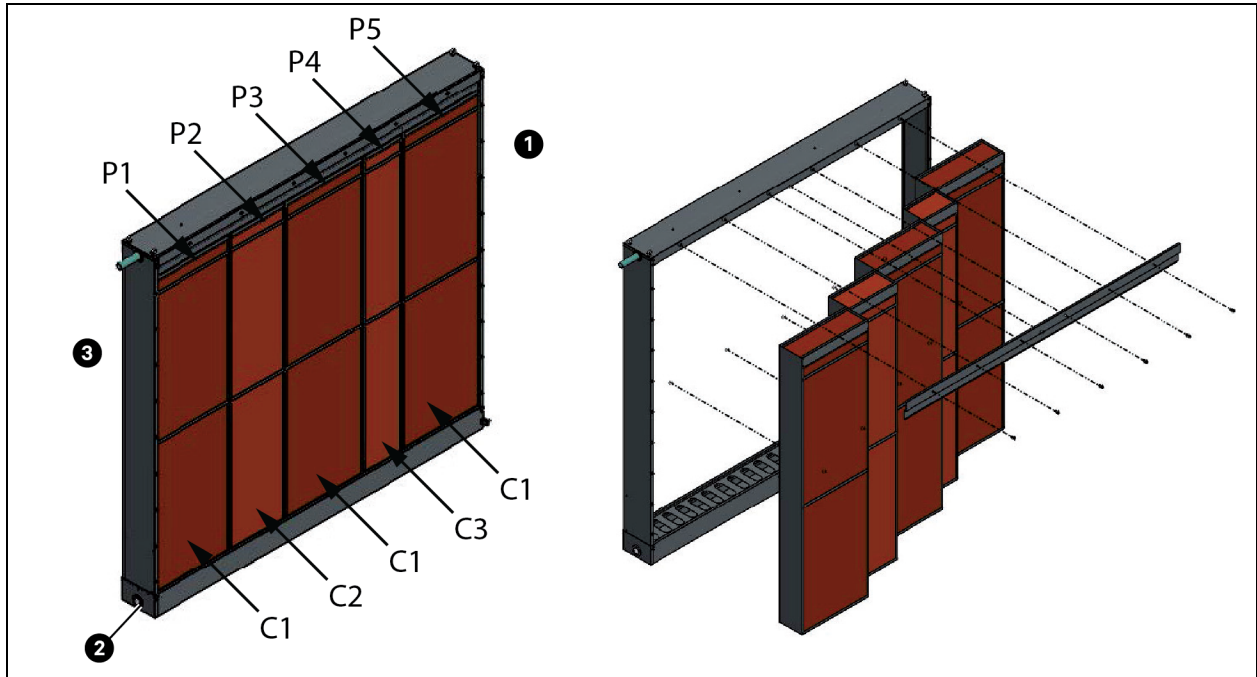
If the oil is accidentally removed, it should be renewed for facilitate removal and installation of the cassettes on the frames.

Cassettes layout for modules 0Ax, 0Bx (larger module)

On the larger modules, which contain 4 fans and 5 cassettes are installed. The 5 cassettes must be mounted according to the below table and **Figure 6.15** on the next page .

Condition					
Position	P1	P2	P3	P4	P5
Width	600 mm	418 mm	600 mm	300 mm	600 mm
Denomination	C1	C2	C1	C3	C1

Figure 6.15 Disassembling the Cassette



Item	Description
1	External side
2	Module frame
3	Chiller side

Notice

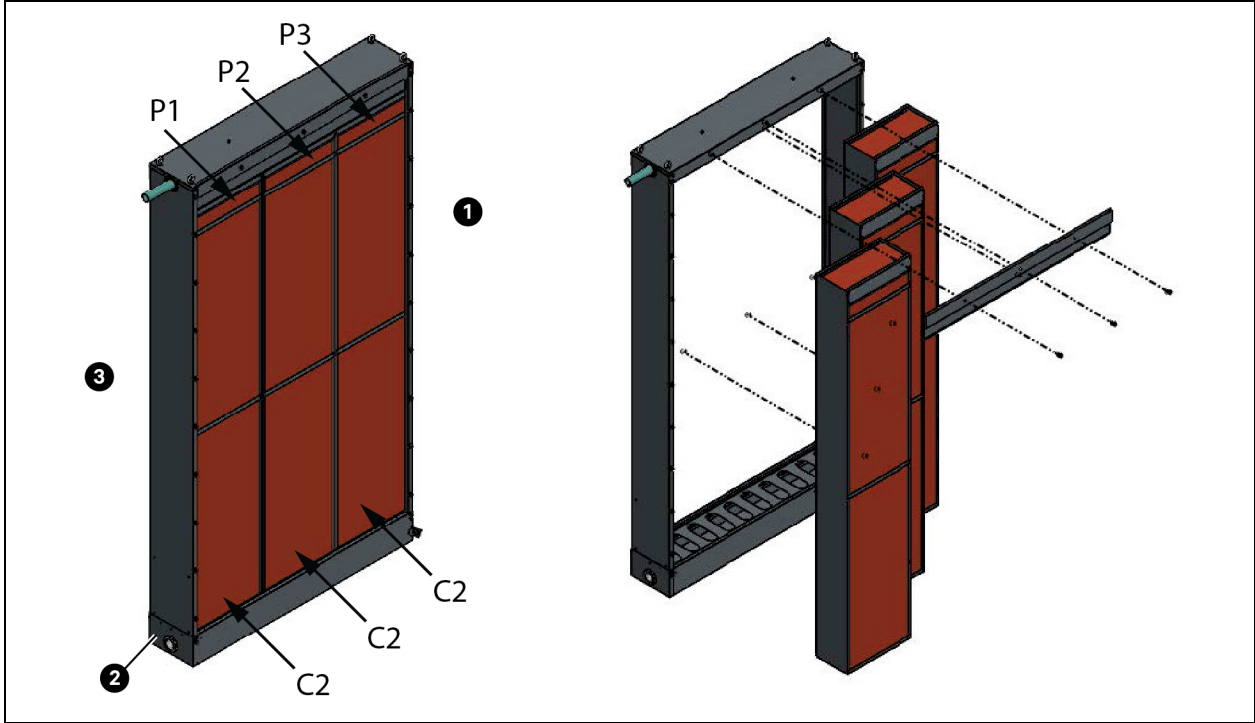
As a reference for the assembly and disassembly of the cassettes, the marked tube should be located on the left side, as shown in **Figure 6.15** above .

Cassettes layout for modules 0AxS, 0BxS (smaller module)

On the smaller modules, which contain 2 fans, 3 cassettes are installed. The 3 cassettes must be mounted following the table and **Figure 6.16** on the facing page .

Position	P1	P2	P3
Width	418 mm	418 mm	418 mm
Denomination	C2	C2	C2

Figure 6.16 Cassettes Layout for Modules 0AxS, 0BxS



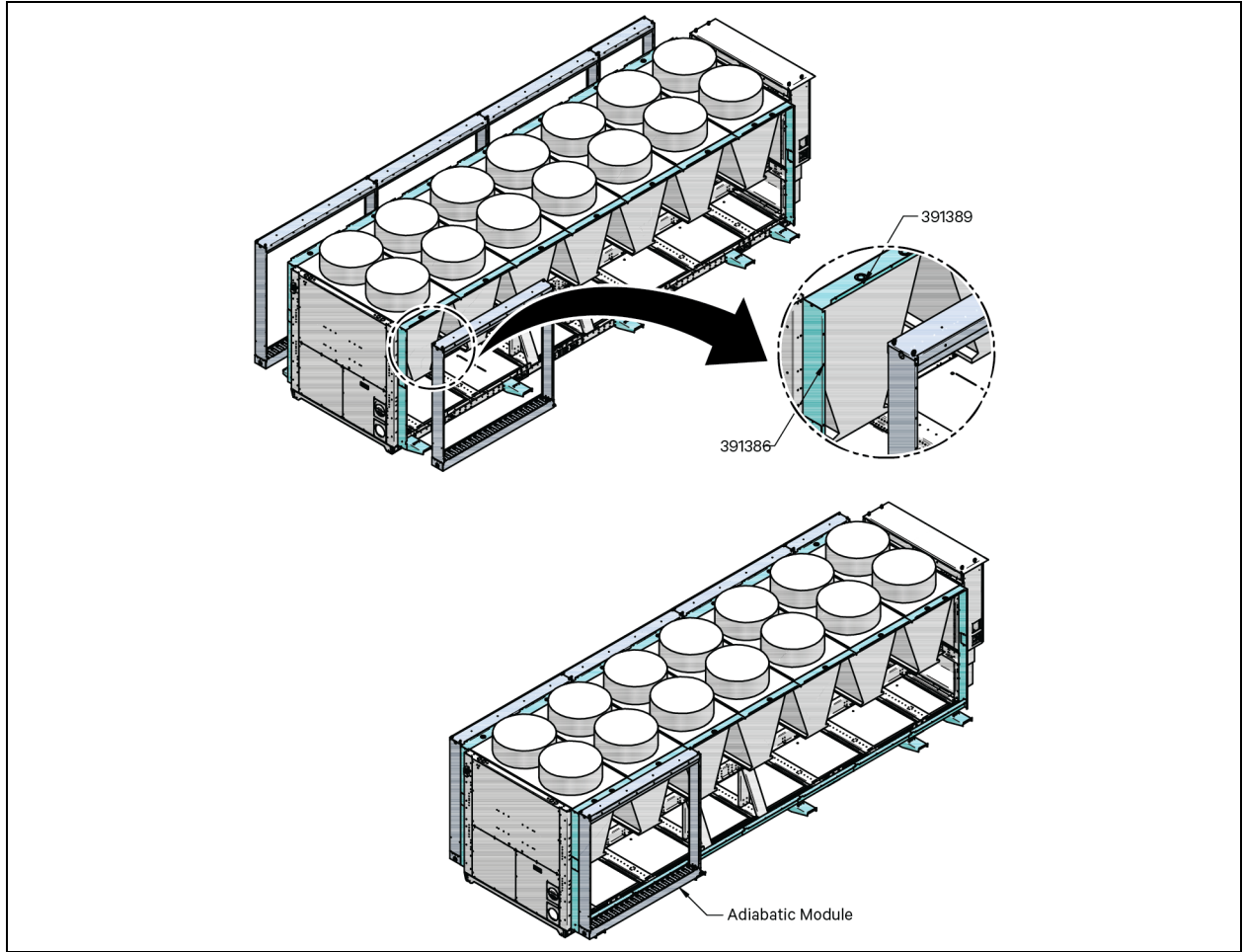
Item	Description
1	External side
2	Module frame
3	Chiller side

Notice

As a reference for the assembly and disassembly of the cassettes, the marked tube should be located on the left side, as shown in **Figure 6.16** above .

Installation of modules (without cassettes) on the chiller

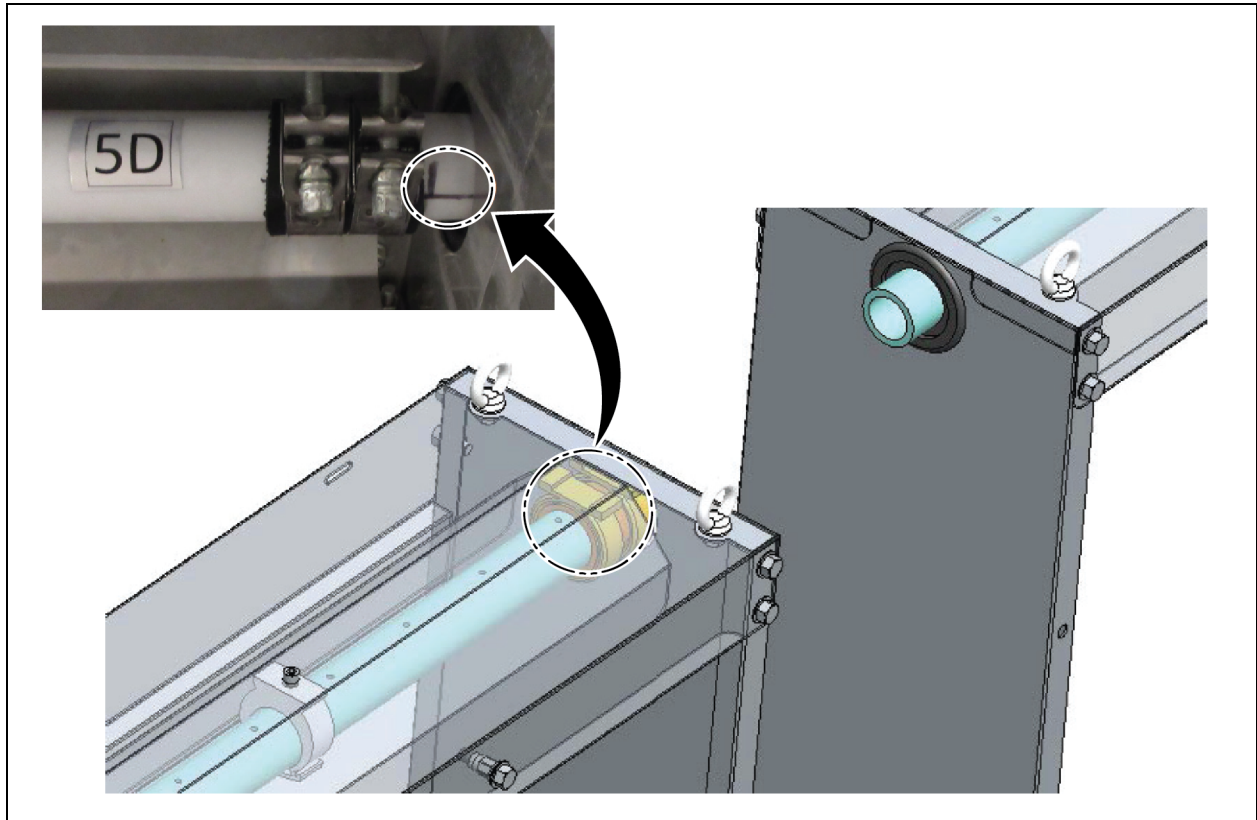
Figure 6.17 Installation of Modules (Without Cassettes) on the Chiller



1. Attach the modules to the chiller from left to right order.
2. Place the first module (only frame without cassettes) next to the chiller, matching the horizontal line of upper holes and the left vertical profile with the corresponding part of the perimeter of the chiller.
3. Once positioned, use screws to fix the structure, without final tightening.

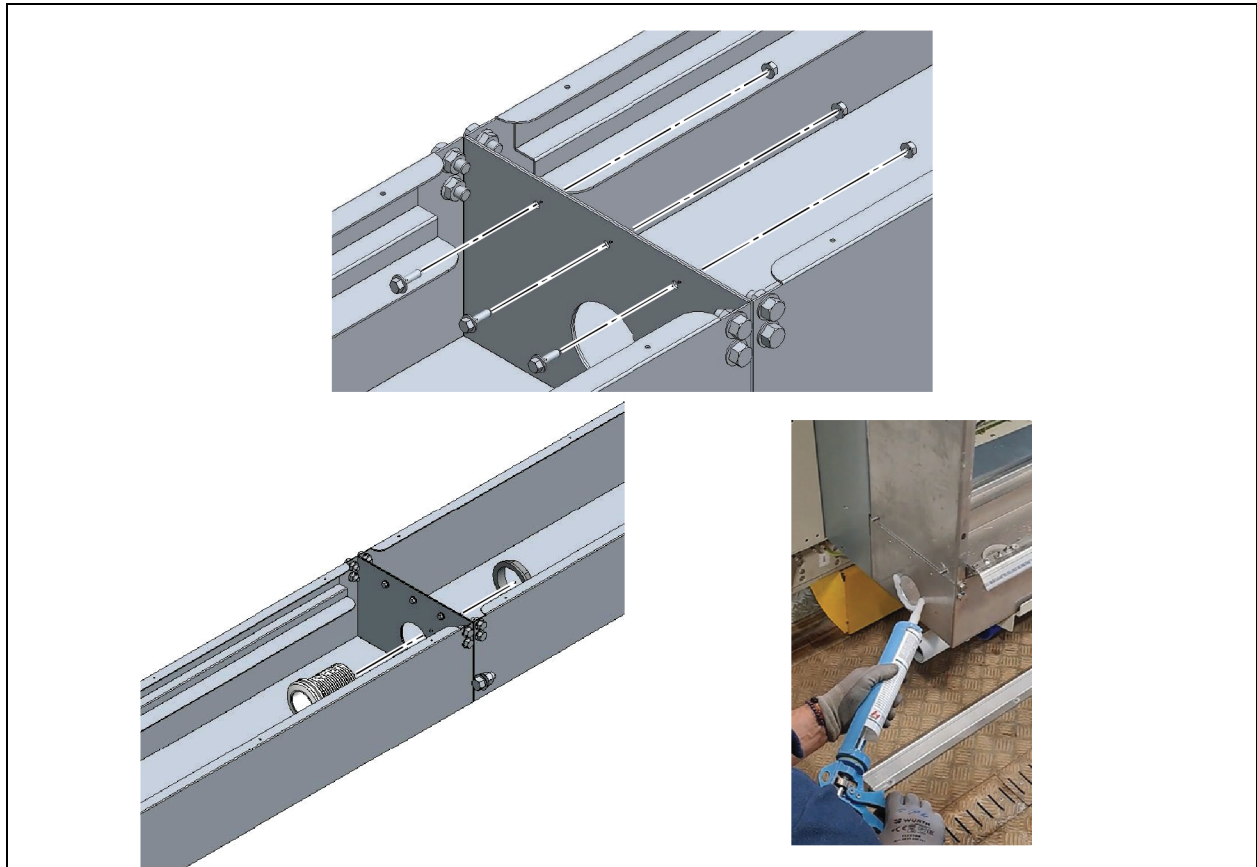
Description	10 Fans	12 Fans	14 Fans	16 Fans	18 Fans	20 Fans
SCREW TEF M5X16-DIN 6921 INOX	50	60	70	80	90	100
SCREW TEF M6X16-DIN 6921 INOX	20	20	20	20	20	20

4. Take the second module, fit it besides the first module by inserting the male pipe, that protrudes into the female binding pipe in the previous module, pay attention to the orientation: holes must be on the upper side and black line on the lower side (see **Figure 6.18** on the facing page), then tighten the two pre-assembled clamps [5D] to finish joining and fixing to the top.

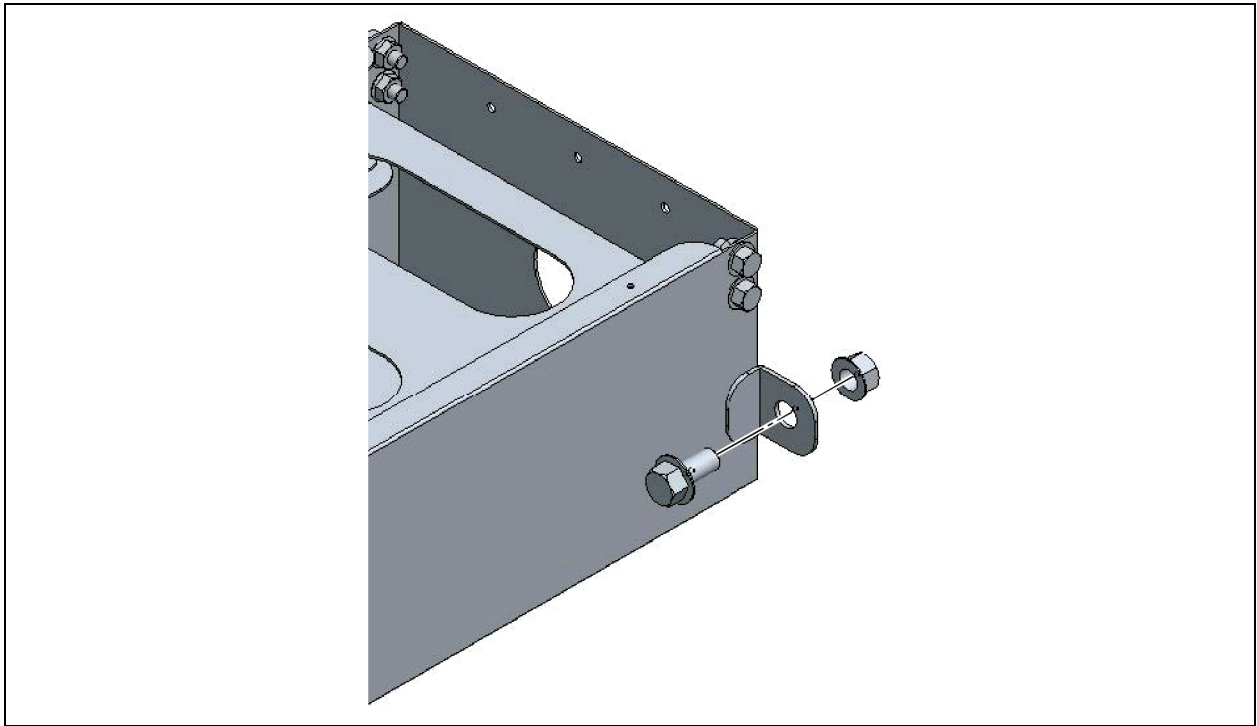
Figure 6.18 Installing the Second Module

5. Align the walls to introduce the M5 screws [7F], at the bottom. After that, use the wall glands [6E] to join the two water basins through the hole located for this purpose. Place the fixings on either side.
6. Apply the silicone before connecting two cassettes under wall gland (all around the hole), as shown in **Figure 6.19** on the next page .

Figure 6.19 Applying the Silicone Sealant

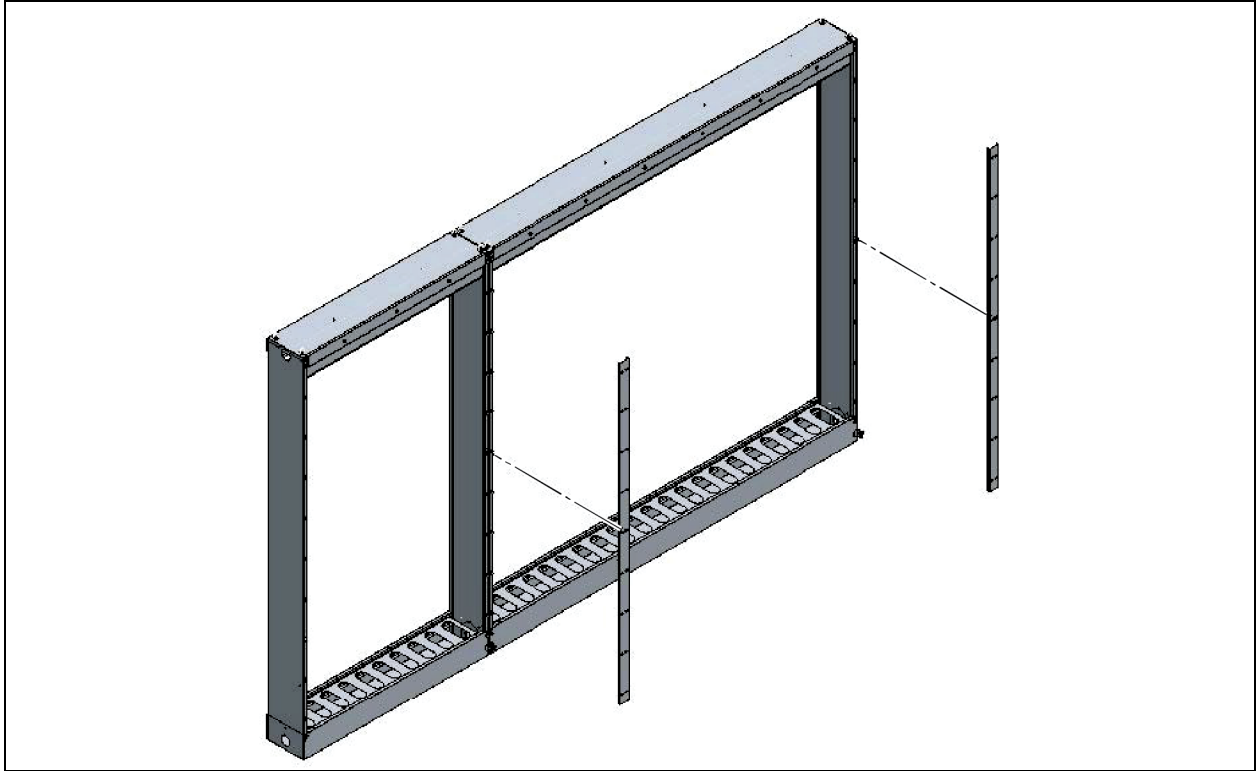


7. Place the ear bolt [8G] that also joins the two modules at the bottom.

Figure 6.20 Attaching two Modules with the Ear Bolt

8. Place the modular connecting U profile [4] that joins the two vertical profiles on the modules and install the screws.

Figure 6.21 Joining the two Vertical Profiles

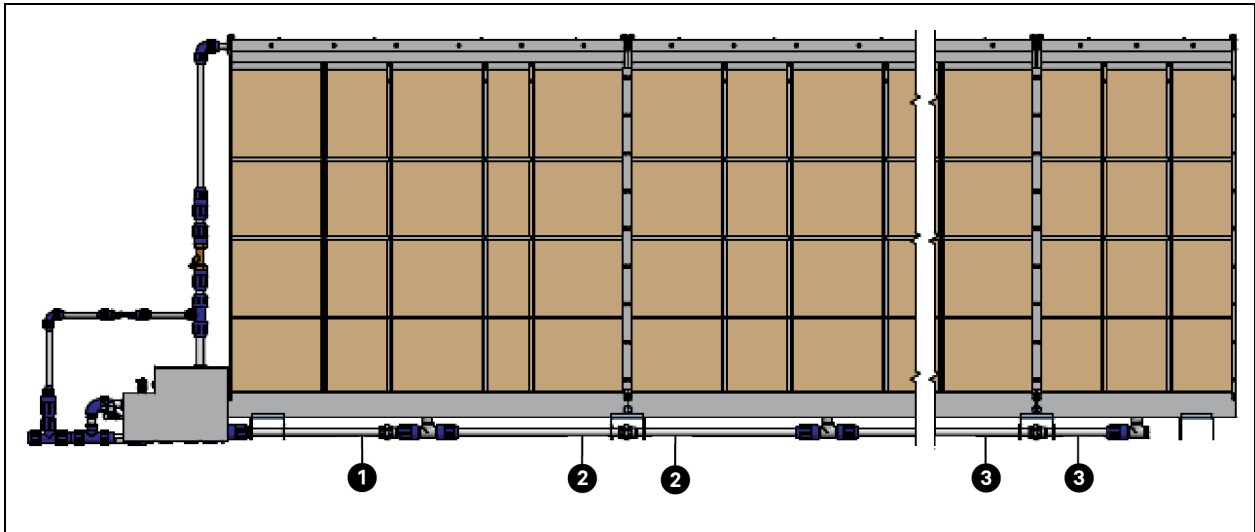


9. Install hydraulic tee under the second module and use pipe to link the two modules. Repeat the previous steps for the other modules.
10. On the other side of the chiller, repeat the process in the same way.

Installation of backflow manifolds

1. Install the manifolds 11A* and 11B* according to the following scheme:

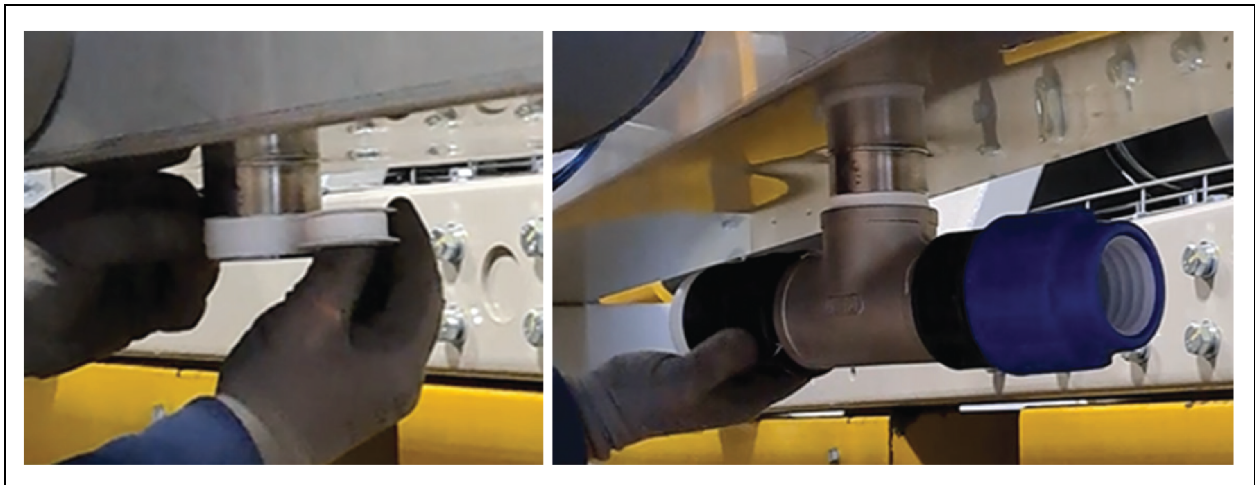
Figure 6.22 Installing the Manifolds



Item	Description
1	11A1 / 11A1S 11B1 / 11B1S
2	11A2 11B2
3	11An / 11AnS 11Bn / 11BnS

2. Use PTFE tape for installing the tee steel fittings to the water basin drain connections:

Figure 6.23 Installing the PTFE Tape



Installation of pumping assemblies

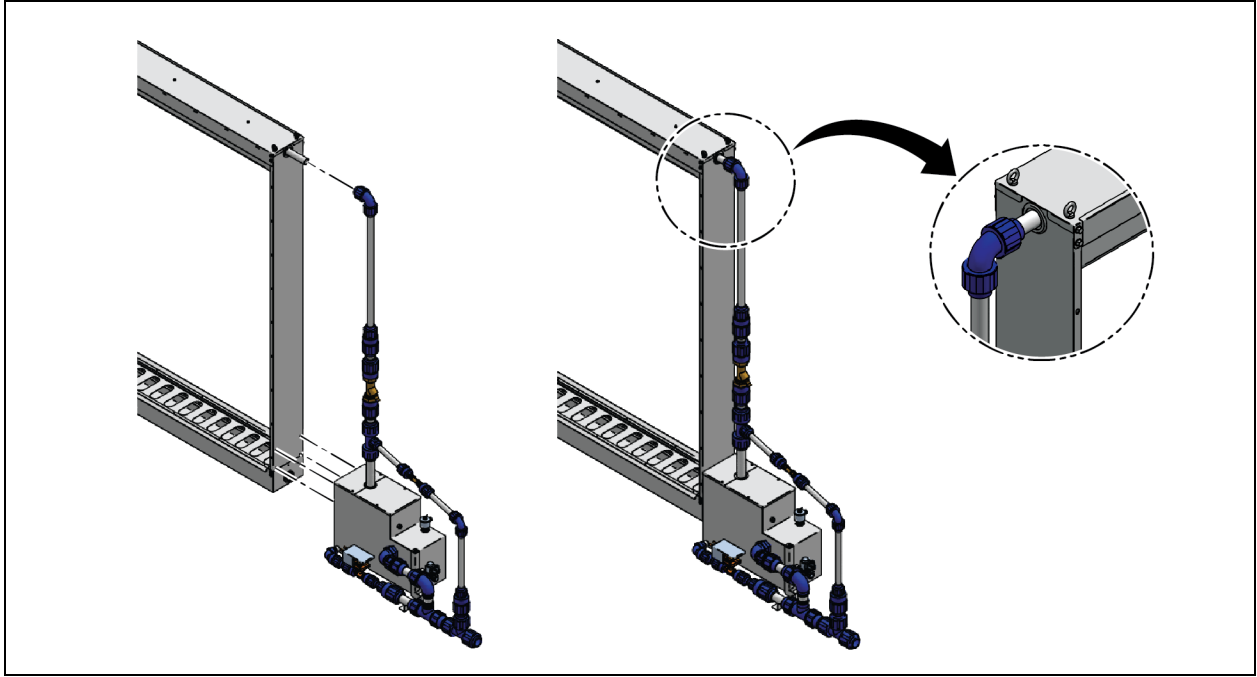
1. Assemble the two components that make up each pumping assembly, join to structure [1A] / [1B], with the front riser pipe [1A2] / [1B2].

Figure 6.24 Installing the Front Riser Pipe



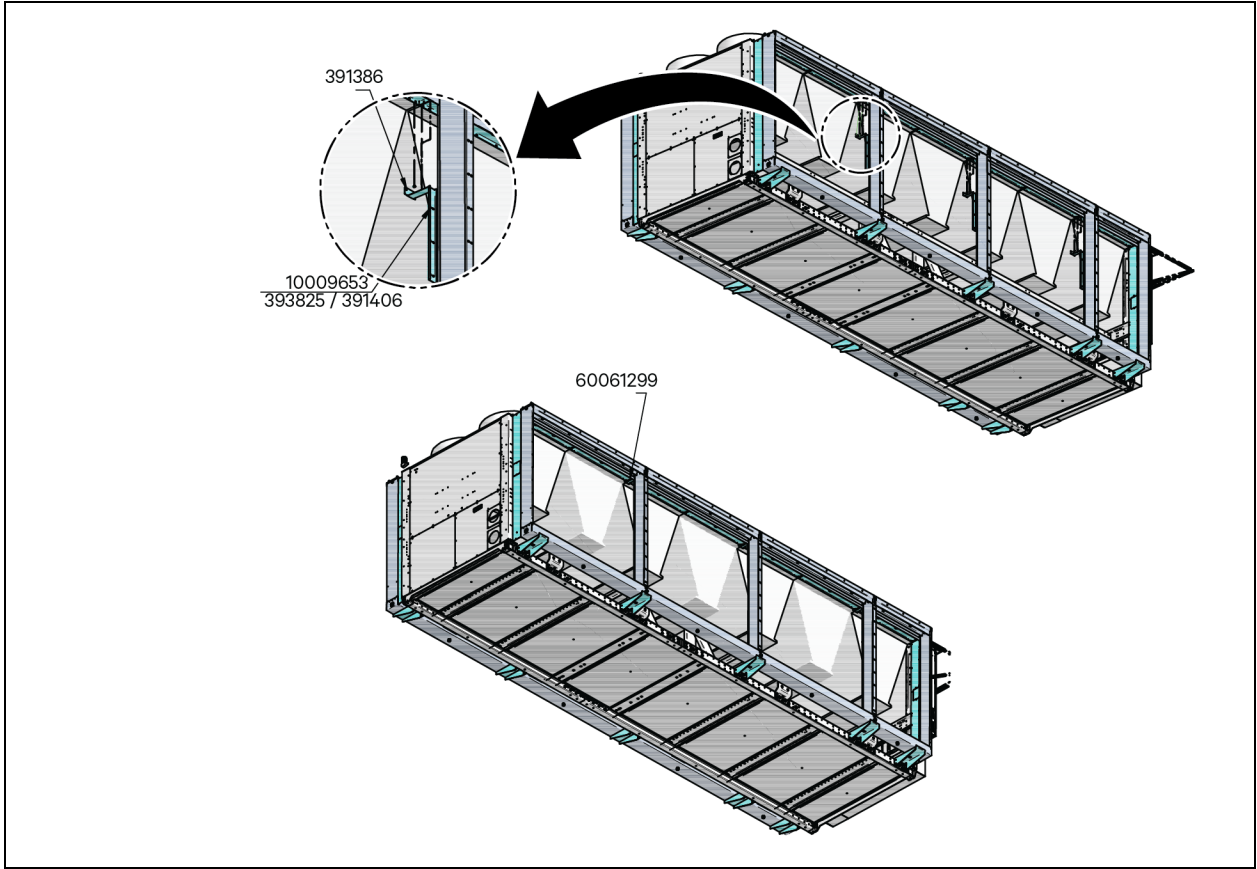
2. Attach each pumping assembly [1A] / [1B] to the structure corresponding to module 1 using the 4 bolts on the side of the casting.

Figure 6.25 Attaching the Pumping Assembly



Install anti-tipping brackets

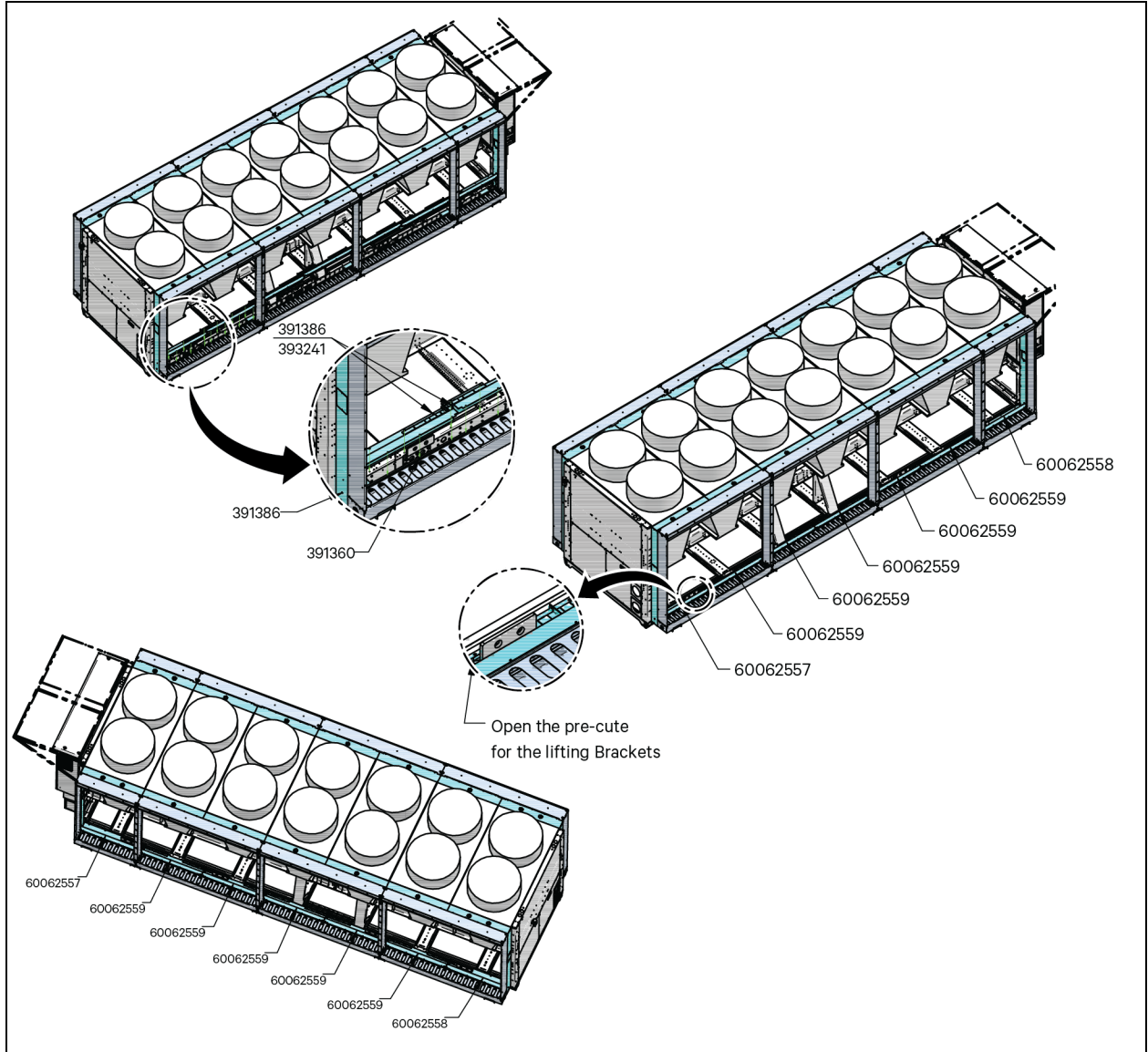
Figure 6.26 Installing the Anti-tipping Brackets



Description	Pn	10 Fans	12 Fans	14 Fans	16 Fans	18 Fans	20 Fans
Bracket internal adiabatic	60061299	4	4	6	6	8	8
Screw TEF M6X16-DIN 6921 INOX		8	8	12	12	16	16
Screw TEF M8X25 DIN 6921 INOX		24	24	36	36	48	48
Nut selflocking M8-DIN 982 INOX		24	24	36	36	48	48
Washer plank D.8,4X17-UNI 6592 393825 INOX		48	48	72	72	96	96

Install lower plugging

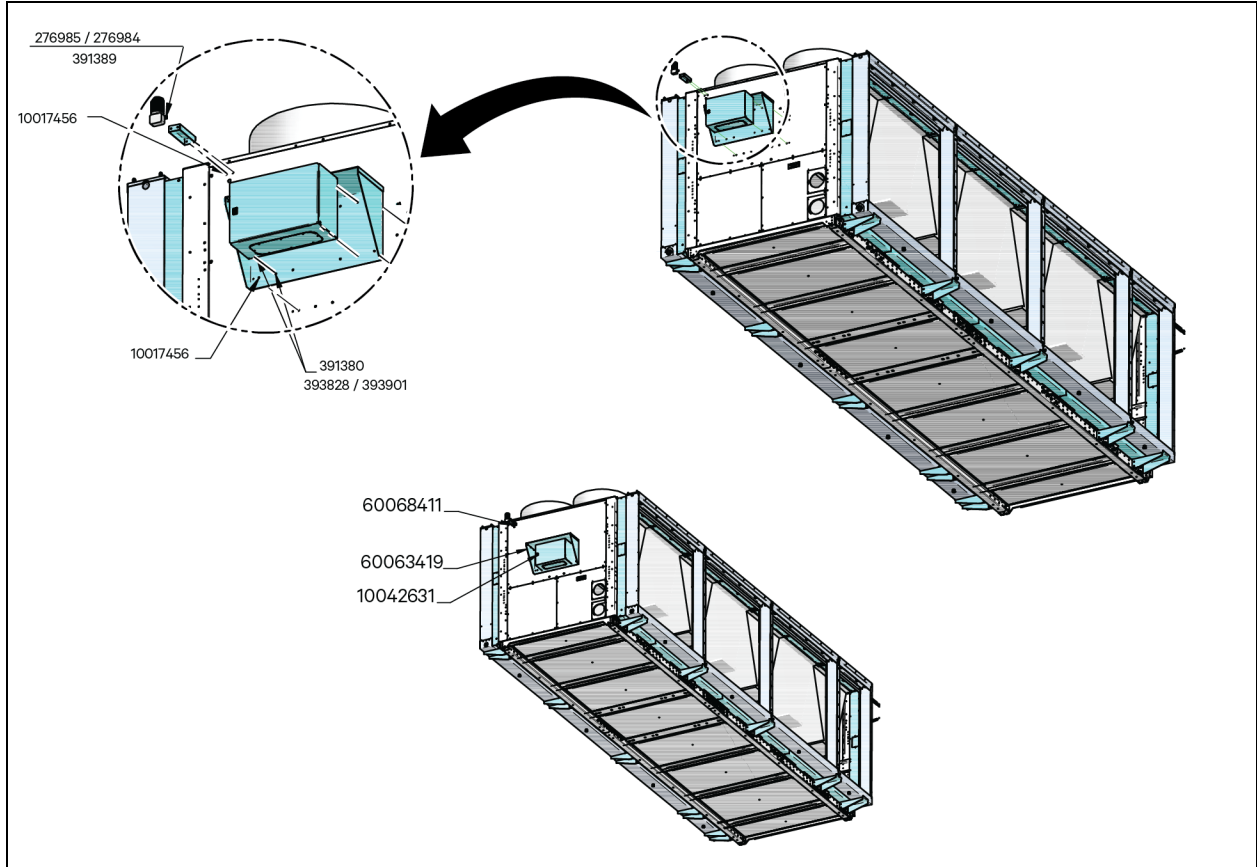
Figure 6.27 Installing the Lower plugging



Description	PN	10 Fans	12 Fans	14 Fans	16 Fans	18 Fans	20 Fans
Lower plug for adiabatic system	170880009111	2	2	2	2	2	2
Lower plug for adiabatic system	170880009108	2	2	2	2	2	2
Lower plug for adiabatic system	170880009106	6	8	10	12	14	16
Screw TEF M6X16-DIN 6921 INOX		72	86	100	114	128	142
S/TP Screw TE 4.8X13 6950/DIN 6928 Geomet		40	48	56	64	72	80
Flanged HEX NUTS M6 DIN 6923 ISO 41 61		64	78	92	106	120	134

Install control panel, roof and RH sensor

Figure 6.28 Installing the Control Panel, Roof and RH Sensor



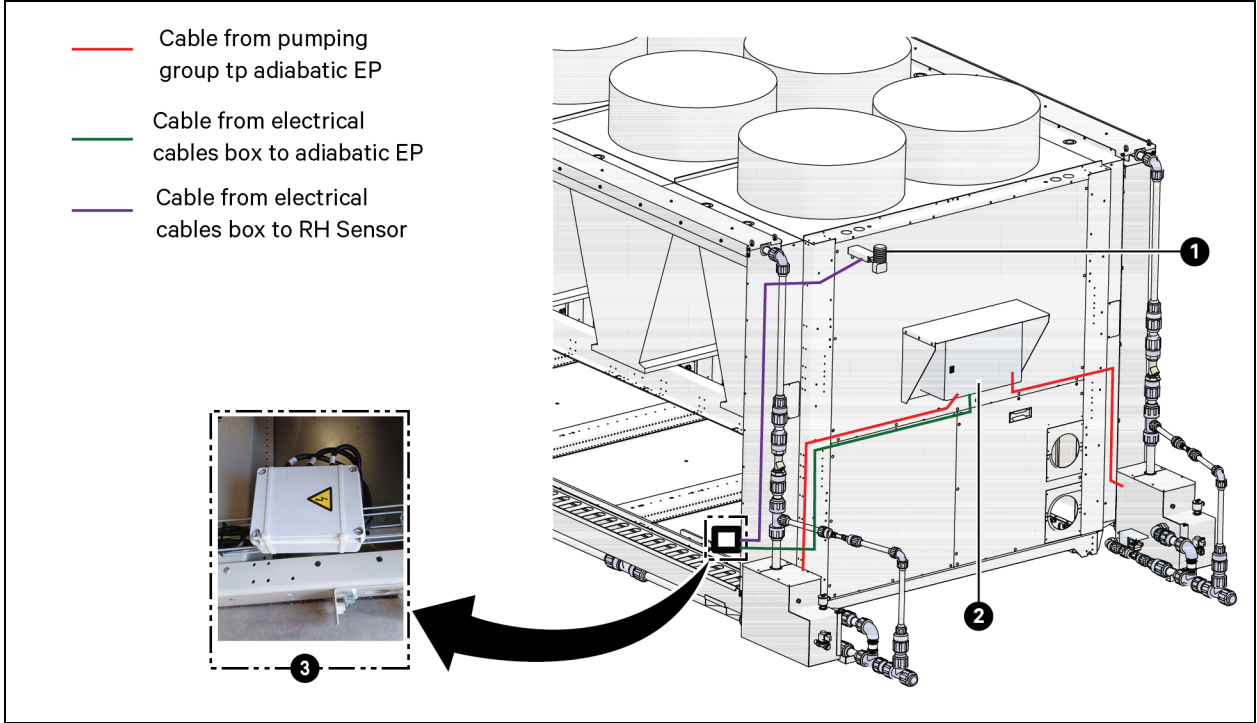
Description	PN	10 Fans	12 Fans	14 Fans	16 Fans	18 Fans	20 Fans
Screw TE M10X30-UNI 5739 EN ISO 4017 DIN 933 INOX		4	4	4	4	4	4
Washer plank D.10,5X30X2,5--UNI6593 INOX		4	4	4	4	4	4
Washer plank growder D.10-UNI 3545 UNI 1751/52 INOX		4	4	4	4	4	4
Roof EP adiabatic control AFC-M	170880009114	1	1	1	1	1	1
Sensor bracket QFA3171	170880009113	1	1	1	1	1	1
Screw TEF M6X16-DIN 6921 INOX		6	6	6	6	6	6
Sensor QFA3171 4.20 mA		1	1	1	1	1	1
Screw TEF M5X16-DIN 6921 INOX		2	2	2	2	2	2

Electrical connections

1. Connect all electrical connections, according to the wiring diagrams (see [Adiabatic EP wiring diagram](#) on page 121), the [Installation Requirement and Connections](#) on page 15 and [Figure 6.29](#) on the facing page.

- 2. Rear panel is equipped with pre-cuts, open and use them with cable grommets for cable routing. If needed fix cable channel (not supplied) under adiabatic electrical panel.

Figure 6.29 Rare Panel Cables

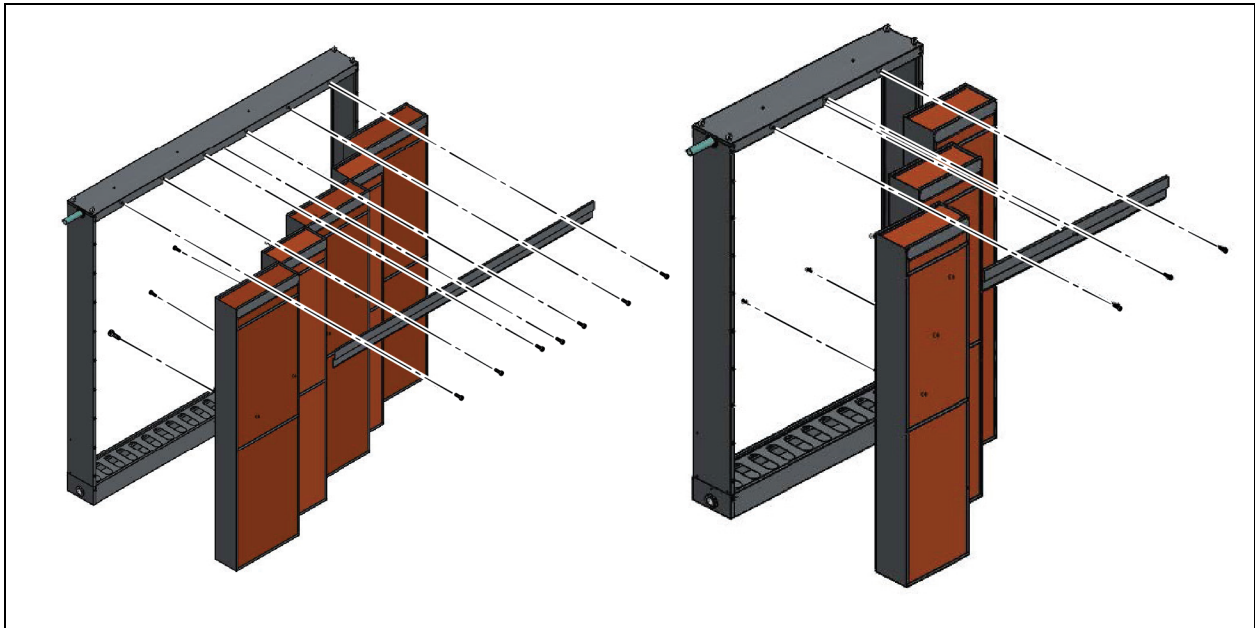


Item	Description
1	RH sensor
2	Adiabatic electric panel
3	Electric cable box

Installation of cassettes

Re-insert the cassettes into the module frame by fixing them with the cassette top closure plates, and their respective screws, this is the reverse to the previous step 6.

Figure 6.30 Reinserting the Cassettes into the Module



Notice

Pay special attention to the “air flow” stickers that define the direction of airflow by means of an arrow and place the cassettes in correct position.

7 Cleaning and Maintenance

7.1 General

An inspection, emptying and cleaning plan must be prepared depending on the treated air and feed water quality.

Vertiv™ Liebert® Adiabatic System should be cleaned regularly to prevent contamination. All the component surfaces (pads, pipes, and especially the water deposit) must be disinfected with an appropriate solution.

Special attention must be paid to the cleanliness of the piping system, especially where it diverts; and the cleaning process must reach all parts of the system.



CAUTION: During cold season (ambient temperature stably lower than 8 °C) or in general when there is the risk of freezing, make sure the system is completely drain and dry.

7.2 Scale Formation Process

Mains water is not pure as it contains dissolved calcium and magnesium salts (among others) that can be deposited in the form of scale. These salts can clog and harden the pads and make its water absorption more difficult, thus decreasing performance. If this occurs, the pad should be replaced.

7.3 Pads Cleaning Protocol

To ensure a correct operation of the adiabatic system and the longest possible PAD's life, it is necessary to consider the following aspects:

- For drinking and industrial water supplies their operating life basically depends on the constant bleed off system for mineral salts working correctly to prevent the formation of lime deposits on surfaces. If it is not regulated properly, the panels must be replaced in a short period of time, because the air passing through the panels becomes blocked by the formation of these deposits.
- **Check of the leaks:** If water leaks are observed from the PAD, check if the water flow rate is too high (in this case adjust the shutter valve), if the PAD is damaged or if the connections are damaged. If there is a leak from the PAD the adiabatic system must be switched off and the leakage point must be sealed with silicone. A light dripping at the start with completely dry PAD is normal, but must stop when the PAD is completely wetted.
- **Daily maintenance:** Dry the PAD (automatically by the control) every day.
- **Monthly maintenance:** Dry the PAD completely. Brush the PAD downwards. It is recommended to try brushing on a small section of PAD. When you are sure the PAD cannot be damaged by the brush, clean completely.

After brushing, rinse the PAD with a low-pressure jet.

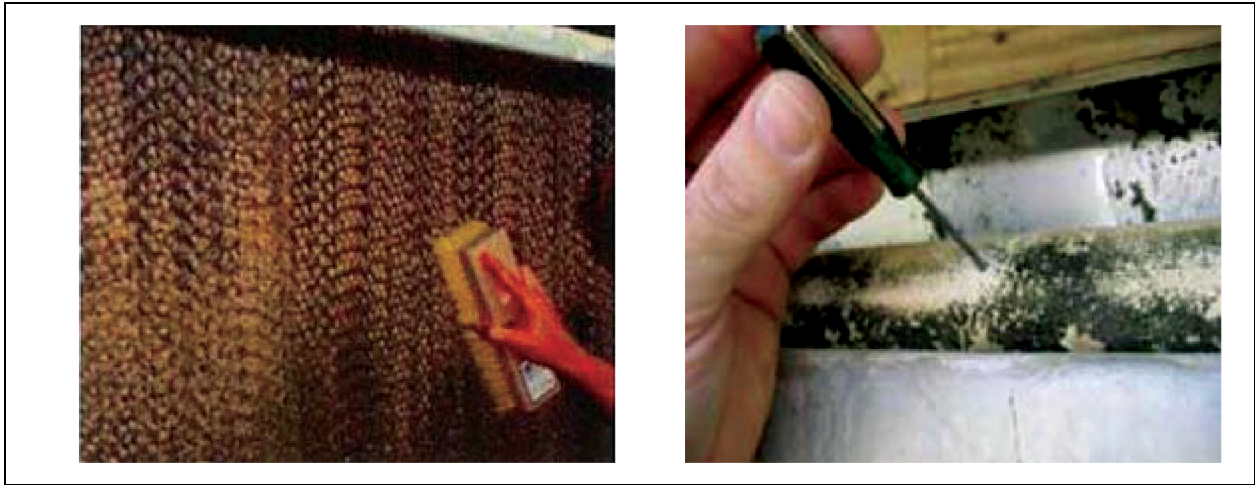
IMPORTANT! Do not use high pressure or steam nozzles to wash the pad!

After brushing and then rinsing, switch the adiabatic system on so that the wet PAD removes all residual dirt traces.

After the final PAD wetting, remember to empty the tank so that the dirt accumulated inside does not circulate again in the system.

If present, clean also the tank, emptying it and removing organic and inorganic residues from the walls, the bottom and any other part. After that, wash the tank by clean water.

Figure 7.1 Tank Cleaning



If, after applying the above method, the pads are still not clean enough, a cleaning with a solution of vinegar or oxiclean can be use:

1. Set mode to MAN (manual)
2. Set timer value T06 to 0
3. Once stable operation is reach, add industrial vinegar directly to the water in the tank at a ratio of 0.016 liters of industrial vinegar per 1 liter of water, quantities for each Vertiv™ Liebert® AFC chiller are shown in the **Table 7.1** below .

Table 7.1 Quantity of Liebert® AFC Chiller

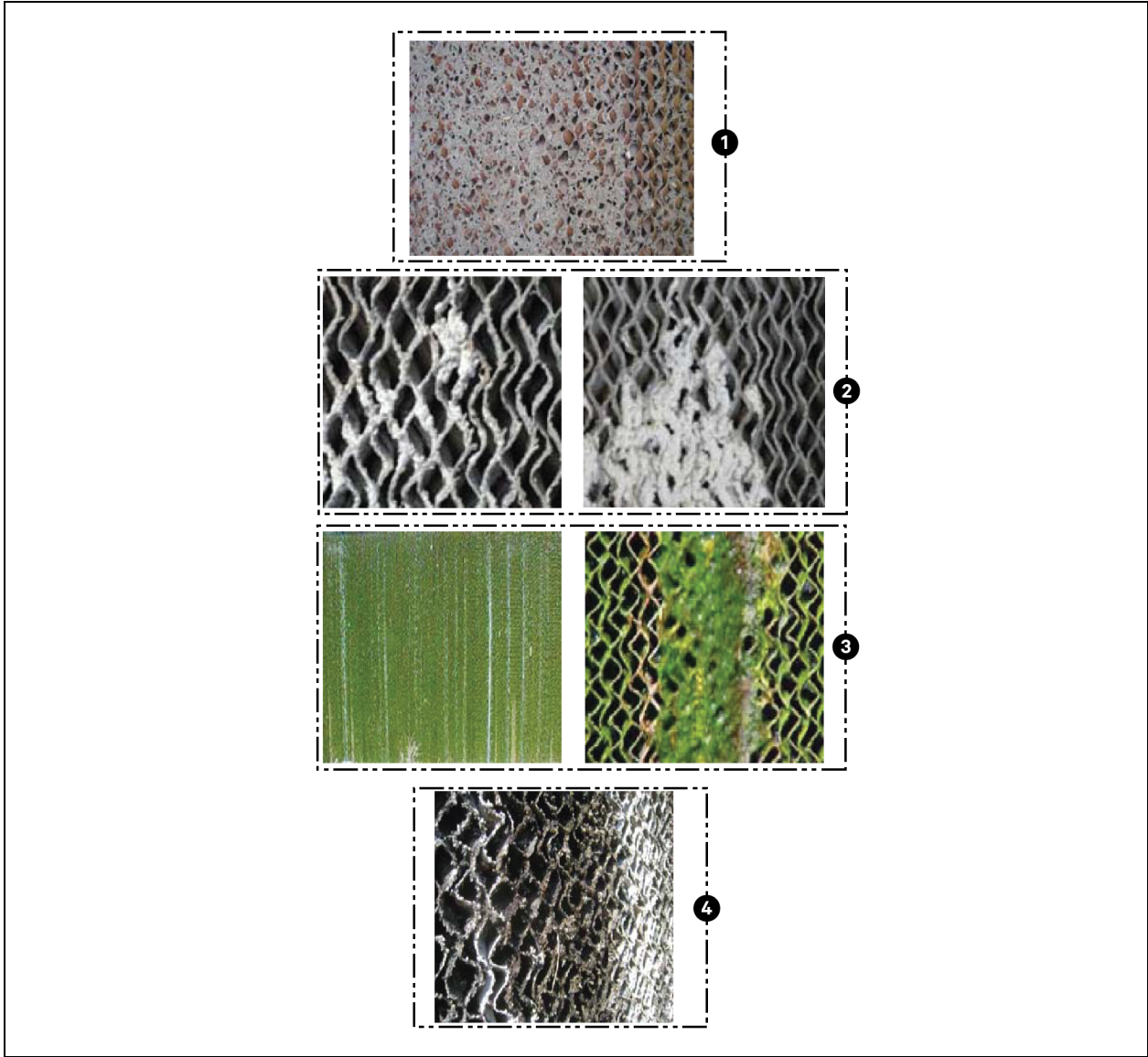
Unit Fans	Water Quantity (Full Basin) [Liter]	Vinegar Quantity [Liter]
10	255	4.1
12	292	4.7
14	329	5.3
16	367	5.9
18	404	6.5
20	441	7.1

4. Once the pump has started (*green led On*), keep the equipment running for about two hours. Then turn it off, wait for it to drain completely, which should take at least one hour and then stop it by pressing the red off button.
5. Perform the cycle again, following steps 3 to 4 , two times.
6. Run the cycle again, following step 4 , this time without adding the industrial vinegar, to finish cleaning the cassettes.
7. Let the panel dry and observe if the lime scale on the panel has been removed. If not, repeat steps 3 to 6 as many times as necessary.
8. Once the pad cleaning process is finished, set the T06 timer back to the desired value.

If a correct maintenance is not performed, the adiabatic system can become a breeding ground for bacteria, fungi, moulds, and so on. The expected PAD life is therefore significantly decreased, with a deterioration shown in the **Figure 7.2** below .

NOTE: Pads must be replaced in these conditions!

Figure 7.2 Deterioration of Pads



Item	Description
1	Dirt and incorrect distribution
2	Limescale
3	Alga growth
4	Limescale and mould

7.4 Cleaning and Maintenance of Other Components

The following component require maintenance:

The irrigation pump: The most important thing is to monitor to ensure dirt does not obstruct the suction-impulsion circuit, and electricity consumption is below the power rating on its plate.

Control valves: These must be inspected in accordance with their mechanical regulation. Solenoid valve: This must be inspected in accordance with its mechanical closure and opening. Metal filter: This must be cleaned manually.

Water circuit: Special attention must be paid to cleaning the piping system and above all the junctions. Clean regularly (monthly) the distribution circuit and the pipes, particularly if there are areas with incorrect distribution, removing the dirt and pumping clean water.

Open the clogged holes of the pipes with a punch.

Water basins and pumping assembly: Clean the basins (if any) and the hydraulic system every month or more frequently, depending on the environmental use conditions. Elements holding bodies of still water are renowned for generating microorganisms, and algae. The maintenance director must implement an inspection plan for emptying and cleaning the pump tank based on the quality of the air treated and the water supply.

Regular observations are recommended for correct maintenance during the days following startup, to find out how the specific installation is behaving, and to establish the emptying and cleaning program. Similarly, during long periods of inactivity (summer in the case of humidification for comfort, and winter for evaporative refrigeration) it is essential to totally empty and clean the tank.

Element	Cleaning and Maintenance Frequency
Pumping assembly	Monthly
Control Valves	Annually
Solenoid Valves	Annually
Mental Filter	Monthly
Evaporative Panels	Annually
Water Basins	Monthly
Water Circuit	Monthly

As regards the disinfection of the remaining components, the same bleach disinfectant solution can be employed. The number and regularity of the application of disinfection processes must be established by the person responsible for the installation, considering the length of time the unit is operational, its placement, piping system, water quality, etc.

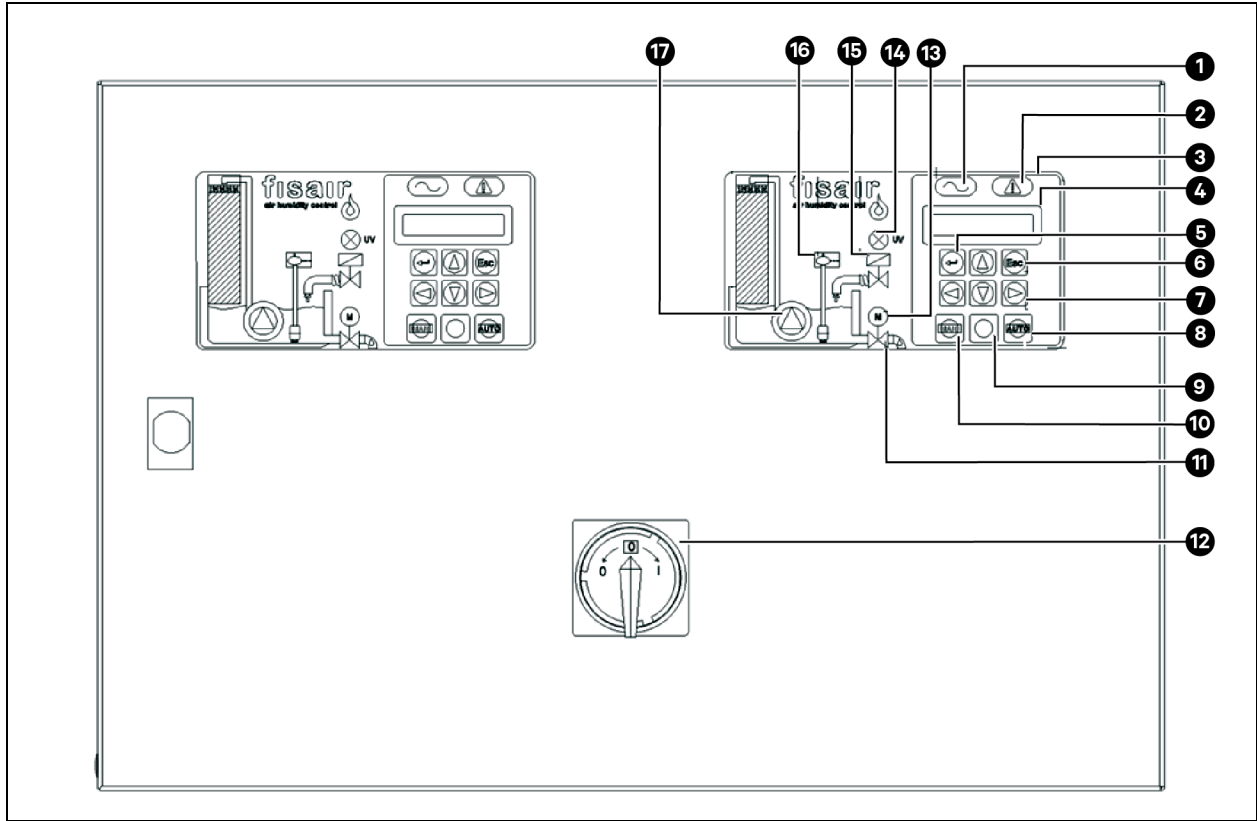
As a result, it is worth insisting once more on the importance of good operational practice, based mainly on the appropriate regulation of the bleed off system, and correctly regulating the irrigation/drainage.





Another highly recommended practice is to add water treatment.

8 Control Panel

8.1 Hardware Description

Figure 8.1 Front Cover



LED/Key/Component	Item	Description
	1	LED. Yellow. Live equipment
	2	LED. Red. General fault
	3	HMI. Command and display interface SEF-027.1 Art. Cod.: 52300012
	4	Display screen














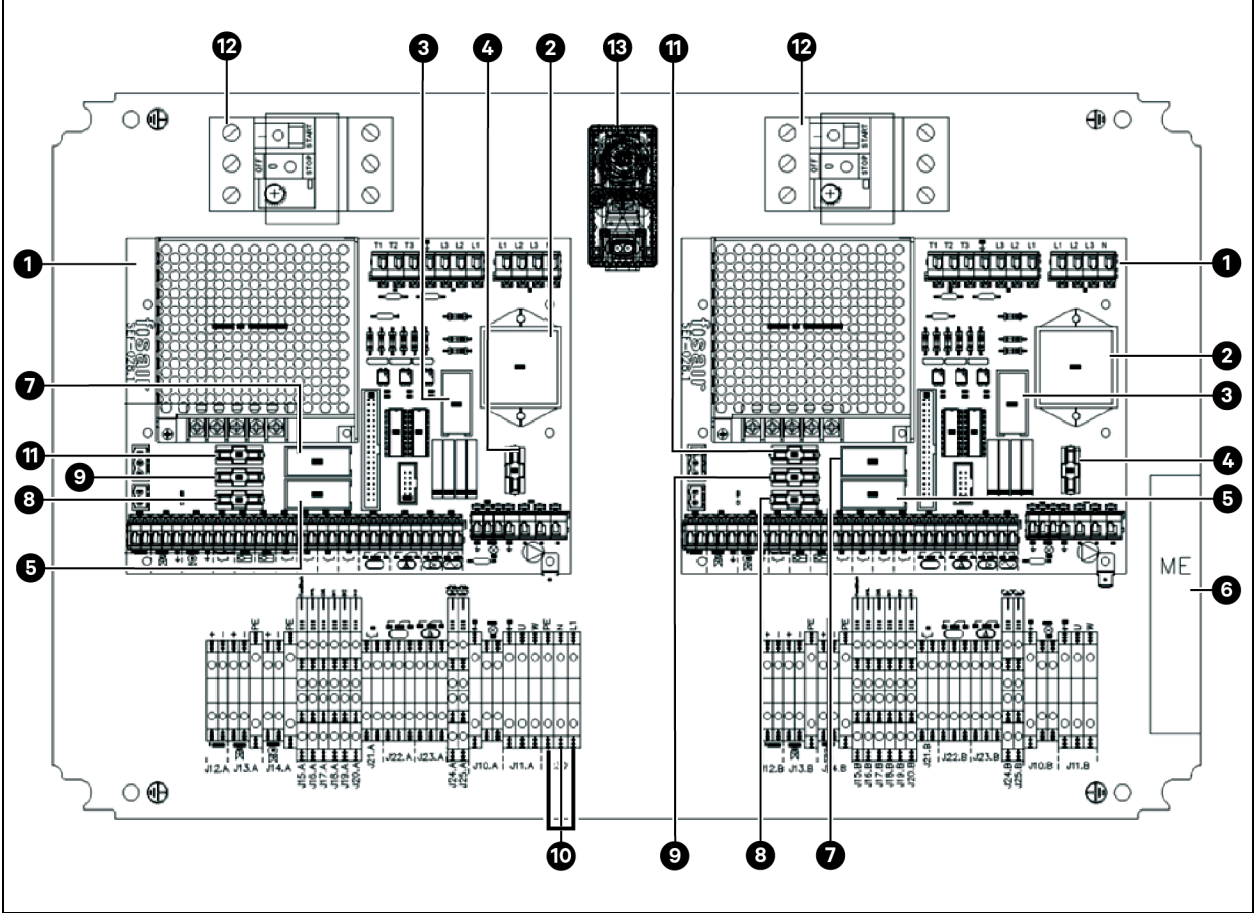
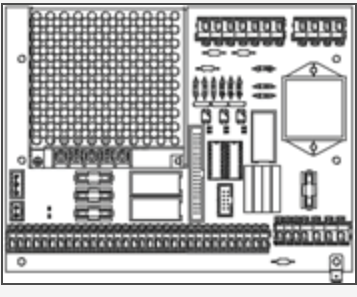







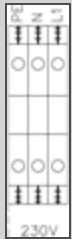
LED/Key/Component	Item	Description
	5	OK button (ENTER)
	6	Back button (ESC)
	7	Navigation keys
	8	Operating key in Automatic mode
	9	Start/stop status change button
	10	Operating key in Manual mode
	11	LED. Green. Indicates the drain motor valve is open (requires feedback connection)
	12	Disconnect switch (1) for cutting and isolating the supply voltage; possibility of locking by padlock (not supplied) Art. Cod.: 64300129
	13	LED. Green. Indicates the drain valve motor is powered
	14	LED. Blue. UV Lamp is operating
	15	LED. Yellow. Indicates the water supply solenoid valve is powered
	16	Float switch status LED: Yellow: Indicates level below minimum Green: Indicates operating level Red: Indicates maximum water level Flashing red: Indicates fault
	17	Water pump status LED: Green: Water pump running Red: Malfunction

Figure 8.2 Internal Components



LED/Key/Component	Item	Description
	1	Electronic power card SEF-028.1 Art. Cod.: 523000013
	2	Relay RL1 for water recirculation pump Art. Cod.: 64130019
	3	Relay RL2 for UV lamp Art. Cod.: 64130018
	4	Fuse F5 for UV lamp protection Art. Cod.: 64600013
	5	Relay RL3 for water supply solenoid valve Art. Cod.: 64130018
<p data-bbox="363 1178 397 1199">ME</p>	6	Corrosion suppressor adhesive
	7	RL8 relay for motor-valve drain/emptying Code Art: 64130018
	8	Fuse F2 for auxiliary power protection Art. Cod.: 64600012
	9	Fuse F3 to protect the water supply solenoid valve Art. Cod.: 64600012
	10	Power terminals (X1)


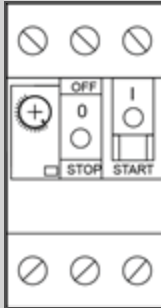
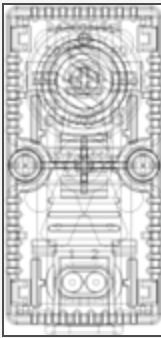
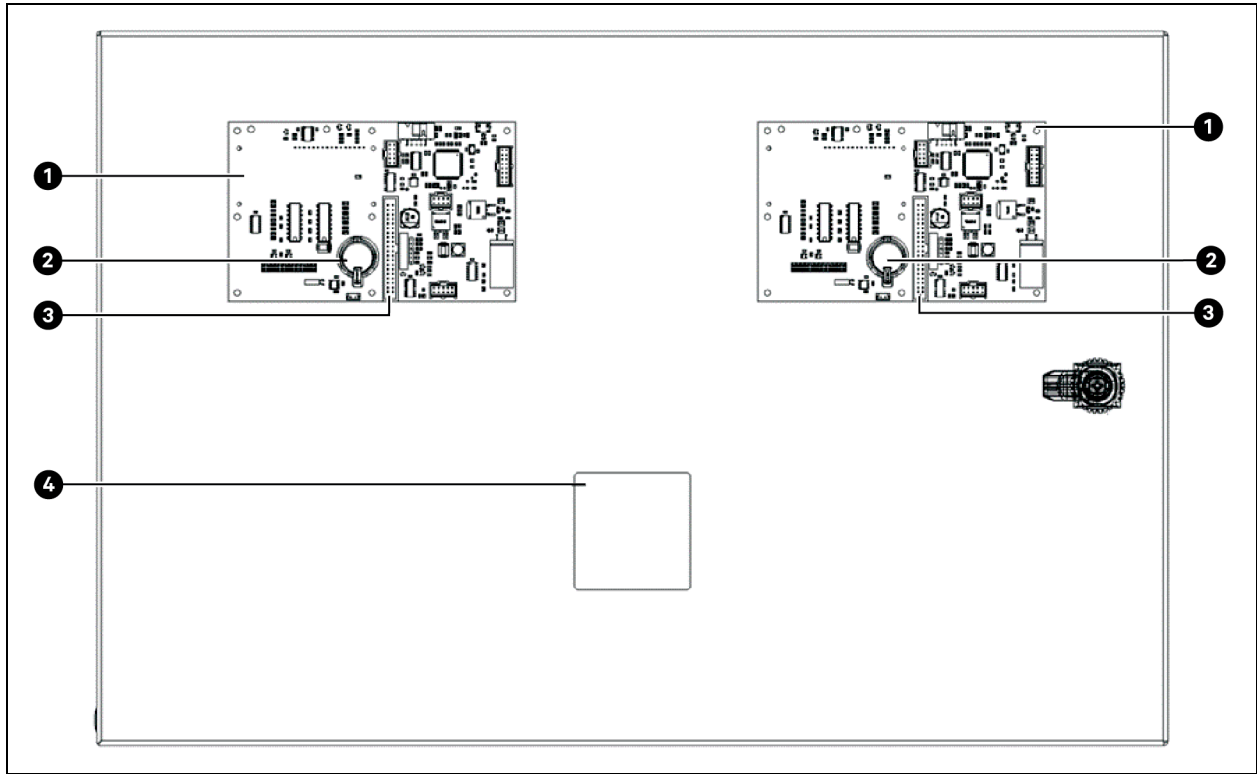
LED/Key/Component	Item	Description
	11	Fuse F4 for drain/emptying motor valve protection Art. Cod.: 64600012
	12	Magneto-thermal circuit breaker (U1 in electrical diagram) to protect water pump Art. Cod.: 64350030 (550W single-phase pump)
	13	Control panel cooling fan thermostat

Figure 8.3 Inside Cover

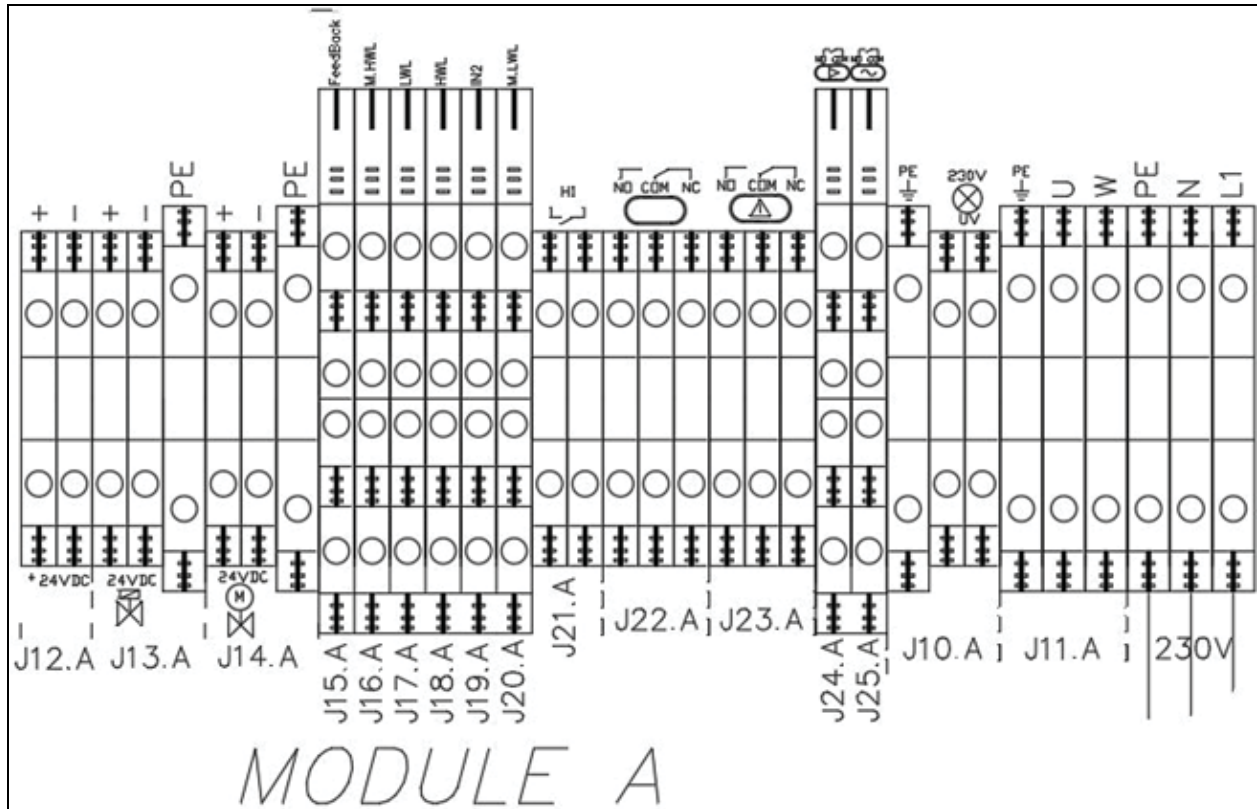


LED/Key/Component	Item	Description
	1	Central processing card SEF-025.1 Art. Cod.: 52300010
	2	Battery 3V CR2032 Art. Cod.: 69101000
	3	40 pins Flat cable connector 40 pins. Between SEF-28.1 and SEF-025.1
	4	Disconnector switch (1) for cutting and isolating the supply voltage; possibility of locking by padlock (not supplied) Art. Cod.: 64300129

8.2 Connections

1. Connect the standard accessories to the module A/B terminals according to [Dimensions and Weights](#) on page 90 and [Installation Requirement and Connections](#) on page 15 .

Figure 8.4 Module A

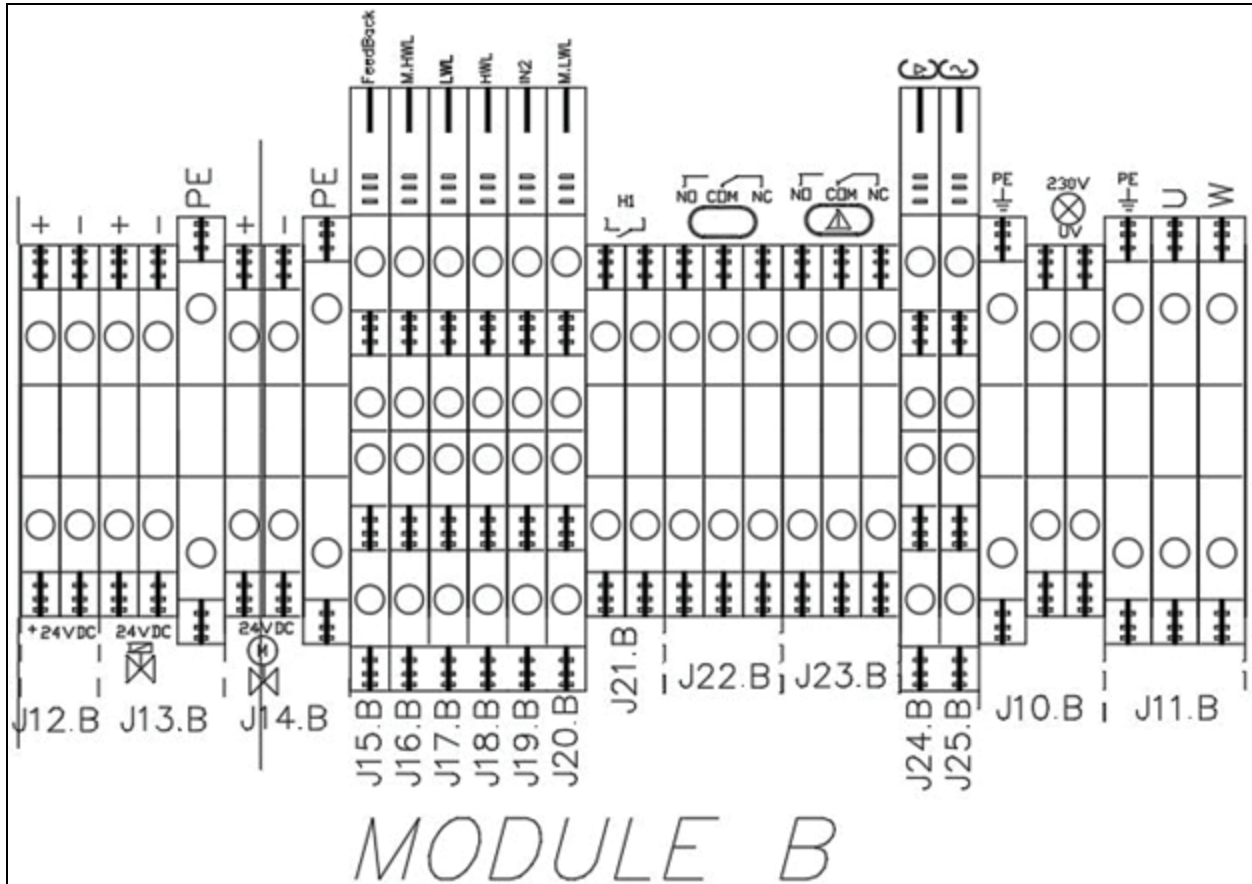


Connection	Description	Maximum Power and Maximum Voltage
J12.A*	Water drain/emptying motor-valve supply	5W and 24VDC
J13.A	Water supply solenoid valve	14W 24Vdc
J14.A*	Water drain/emptying motor valve	40W 24Vdc
J15.A*	Emptying motor valve feedback position (limit switch opened)	Not powered
J16.A	Medium / Maximum water level sensor (NO contact)	Not powered
J17.A	Minimum water level sensor (NO contact)	Not powered
J18.A	Maximum water level sensor (NO contact)	Not powered
J19**	Forced drainage remote signal: The rest of the signals are ignored, until the forces drainage signal ends, at that moment, it returns to the previous state.	Not powered
J20.A	Medium / Minimum water level sensor (NO contact)	Not powered
J21.A**	Remote interlock ON/OFF in automatic mode	Not powered
J22.A	Not used	500VA 250V

Connection	Description	Maximum Power and Maximum Voltage
J23.A	Remote fault signal	500VA 250V
J24.A	Remote operation signal	500VA 250V
J25.A	Remote voltage signal	500VA 250V
J10.A	UV lamp supply	40W 230V
J11.A	Water recirculation pump	240W to 400 V 370W to 230 V

SEF-028.1 Connection	Actuator	
	Actuator Wire Number (Code)	Actuator Wire Color
J12 +	2	Red
J12 -	1	Black
J14+	3	White
J14-	-	
J14 ground	-	-
J15 a	S1	Violet
J15 b	S2	Red
Turning sense		-

Figure 8.5 Module B



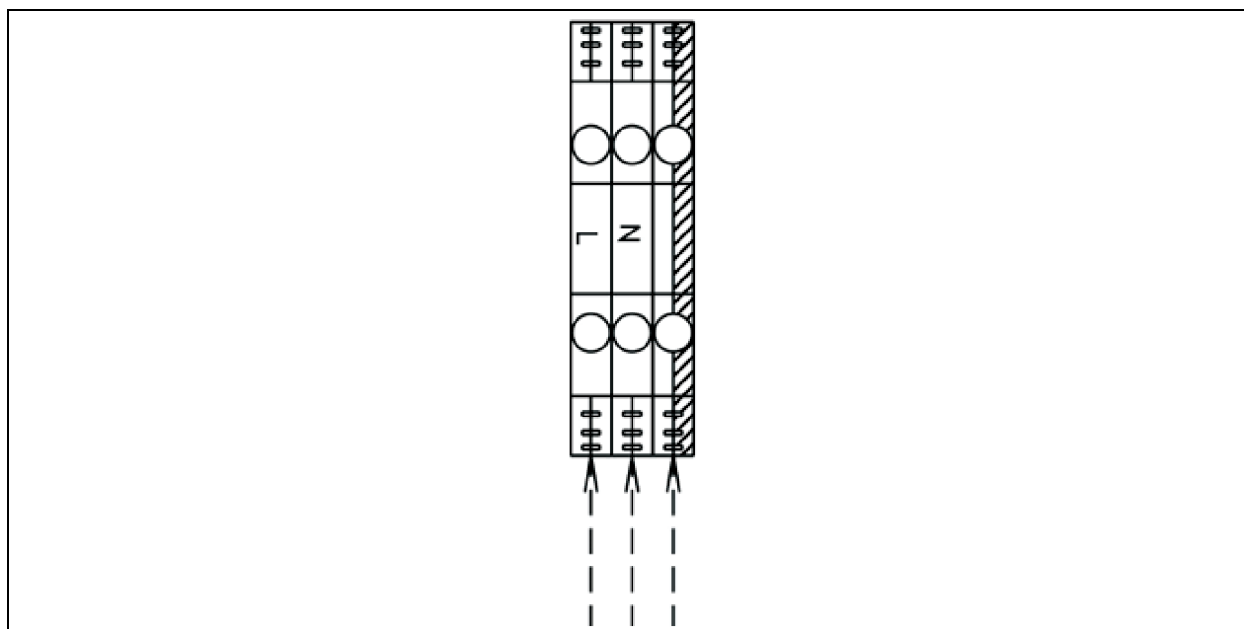
Connections	Description	Maximum Power and Maximum Voltage
J12.B*	Water drain/emptying motor-valve supply	5W 24Vdc
J13.B	Water supply solenoid valve	14W 24Vdc
J14.B*	Water drain/emptying motor valve	40W 24Vdc
J15.B*	Emptying motor valve feedback position (limit switch opened)	Not powered
J16.B	Maximum water level sensor (NC contact)	Not powered
J17.B	Minimum water level sensor (NO contact)	Not powered
J18.B**	UV lamp operating sensor (if applicable)	Not powered
J19.B**	Forced drainage remote signal: The rest of the signals are ignored, until the forces drainage signal ends, at that moment, it returns to the previous state.	Not powered
J20.B**	External fault lock	Not powered
J21.B**	Remote interlock ON/OFF in automatic mode	Not powered
J22.B	Not used.	500VA 250V
J23.B	Remote fault signal	500VA 250V

Connections	Description	Maximum Power and Maximum Voltage
J24.B	Remote operation signal	500VA 250V
J25.B	Remote voltage signal	500VA 250V
J10.B	UV lamp supply	40W 230V
J11.B	Water recirculation pump	240W to 400 V 370W to 230 V

SEF-028.1 connection	Actuator	
	Actuator Wire Number (Code)	Actuator Wire Color
J12 +	2	Red
J12 -	1	Black
J14+	3	White
J14-	-	-
J14 ground	-	-
J15 a	S1	Violet
J15 b	S2	Red
Turning sense	-	-

With the disconnecter in position 0, connect the appropriate mains supply to the supply terminals X1.

Single-phase line connection



Proper wiring prevents electrical noise. Electrical noise can produce undesirable effects on electronic control circuits, which affects controllability. Electrical noise is generated by electrical equipment, such as: inductive loads, electric motors, solenoid coils, welding machinery, or fluorescent light circuits. The electrical noise or interference generated from these sources (and the effect on controllers) is difficult to define, but the most common symptoms are erratic control or intermittent operational problems.

IMPORTANT! For maximum EMC effectiveness, wire all humidity, high limit, and airflow controls using multicolored shielded/screened plenum-rated cable with a drain wire for the shield/screen. Connect the drain wire to the shield/screen ground terminal with wire less than 50 mm (2 in.) in length.

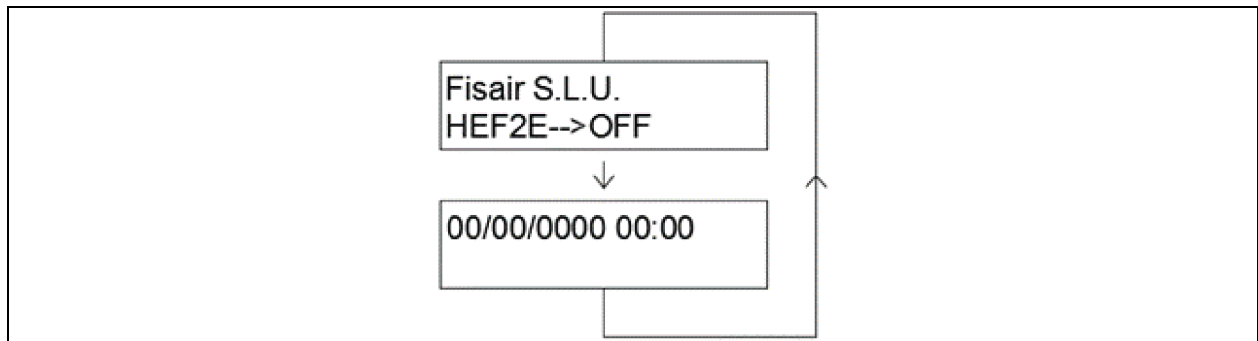
NOTE: Do not ground shield at the device end.

8.3 Supervision and Principal Operation Modes

START: This is the main screen that appears once the equipment is powered by the disconnecter (I1) which shows the following information through 2 screens that alternate continuously:

Screen 1:

- Name of the Company:
- Status indication: HEF2E → OFF

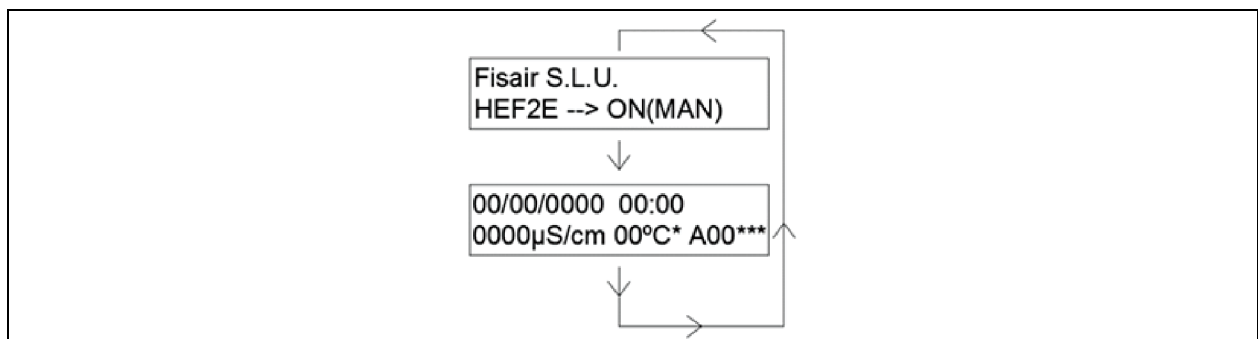


Screen 2:

- Date: 01/01/2019
- Time: 21:00

To start the device, select either of the two available configuration modes, manual (MAN) or automatic (AUTO):

MAN: Select manual mode (MAN) from the command and display to enter that mode. The following information is shown on the Display through 2 screens that alternate continuously.



Screen 1:

- Name of the Company:
- Status indication: HEF2E→ ON (MAN)

Screen 2:

- Date: 01/01/2019
- Time: 21:00
- Conductivity value and water temperature (µS/cm). * In the case of having conductivity Control.

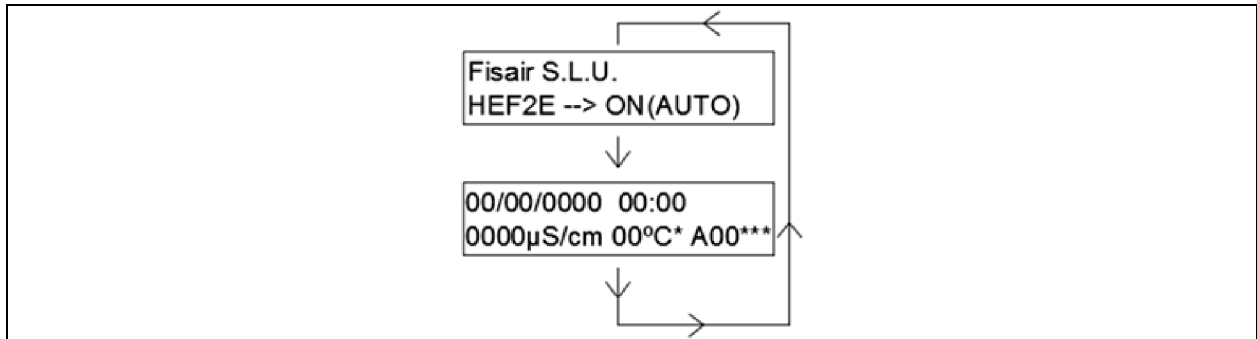
NOTE: If there is a fault, an alarm code is shown on the second line of the display; see Alarms on page 87 for more information.

Manual Mode Operation:

The unit operates directly when manual mode is enabled. No activation of H1 (contacts J21) is required, and the unit is always active unless switch I1 is turned off or key (6) of the HMI is pressed.

NOTE: If there is a fault, an alarm code is shown on the second line of the display; see Alarms on page 87 for more information.

AUTO: Select Automatic mode (AUTO) from the command and display interface to enter that mode. The following information is shown on the Display through 2 screens that alternate continuously.



Screen 1:

- Name of the Company:
- Status indication: HEF2E→ ON (AUTO)

Screen 2:

- Date: 01/01/2019
- Time: 21:00
- Conductivity value and water temperature (µS/cm). * In the case of having conductivity Control.

Automatic mode operation: The equipment operates when automatic mode is enabled and the H1 signal (J21 contacts) is on. To stop the unit in automatic mode, it is necessary to deactivate the H1 signal (contacts J21) or by pressing the key (6) on the HMI.

NOTE: If the disconnecter is turned off and on again, the Automatic mode is retained and will turn the unit off or on depending on the status of the H1 signal.

NOTE: If there is a fault, an alarm code is shown on the second line of the display; see [Alarms](#) on page 87 for more information.

8.4 Configuration

1. Configure the basic control panel according to the air handling needs as part of the process incorporating the adiabatic system.
2. Pay special attention to the water supply quality, the application hygiene requirements, and the required work cycles.
3. To do this, select the different configuration options using the control and display interface buttons.
4. The different configuration modes are shown on the Display screen (integrated in the command and display interface).
5. To enter the configuration menu, press the keys ←→ at the same time for a few seconds.
6. Move from one screen to another using the vertical arrows. Use the right arrow to advance to the next level within a screen, and the left arrow to go back a level.

The possible configurations are shown below:

8.4.1 Draining

The draining of the basin is configured using the following control options:

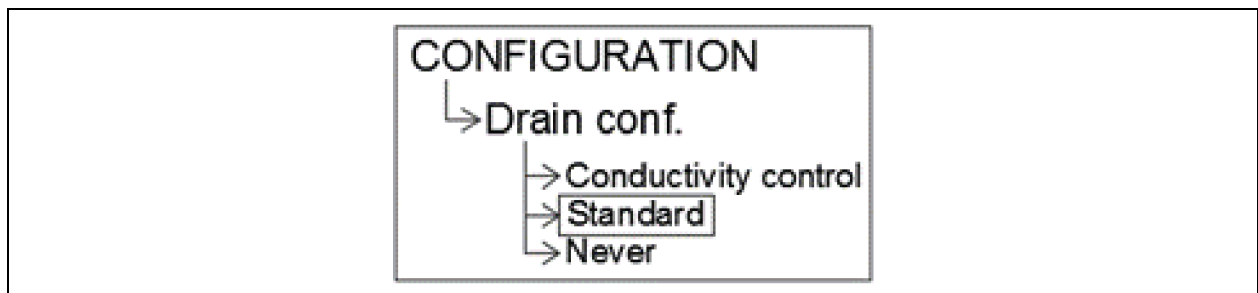
Forced draining

By means of the external draining/emptying signal connected to contact J19, a forced drain is performed until this signal is no longer active. It consists of the following procedure:

The drain motor-valve is opened until the external signal J19 is disconnected.

This signal will override the previous settings and is activated physically from the signal or by means of the optional communications.

Standard draining



In the standard control draining configuration, two types of drainings processes are performed:

1. Complete draining of the basin:
 - Timer T05* (Min. NEVER / Max. 24h)

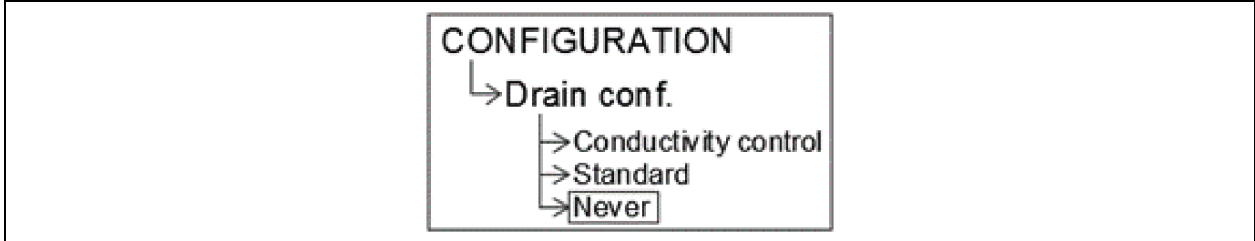
While the equipment is running, it is fully emptied periodically according to the time value set in T05.

- Timer T06* (min. 0 h / Max. 24h)

The delay time for complete emptying is set according to the time value in T06, with the equipment switched off.

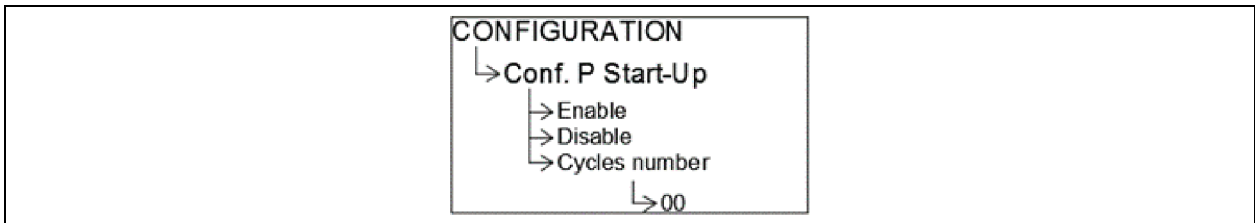
- 2. Draining by unit stop:
 - When the unit is stopped, it is emptied once the time value defined in T06* has elapsed, once this time has elapsed, the emptying cycles start to ensure complete drying of the cassette and the basin.
 - Timer T04* is used to set the opening time of the emptying motor-valve during each operating/periodic emptying cycle.

No draining (never)



The basin is never emptied

8.4.2 Configuration prior to start-up and pre-start-up



The pre-start-up process can be enabled and the number of cycles to be repeated specified.

This process consists of carrying out the following repeat cycles for the number of times established: Keep the water recirculation pump running for 10 minutes then empty the basin for 10 minutes.

This process cleans dust produced in the manufacturing process from the panel.

During the pre-start-up cycle, the duct fans for the air to be treated must be turned off.

The UV lamp must not be switched on during this process.

Once this function is enabled, the equipment must be started at the Manual mode (MAN) to proceed with the start-up cycles. The following control options are available:

- Enabled:

Enables the start-up process.

- Disabled (*):

Enables the start-up process.

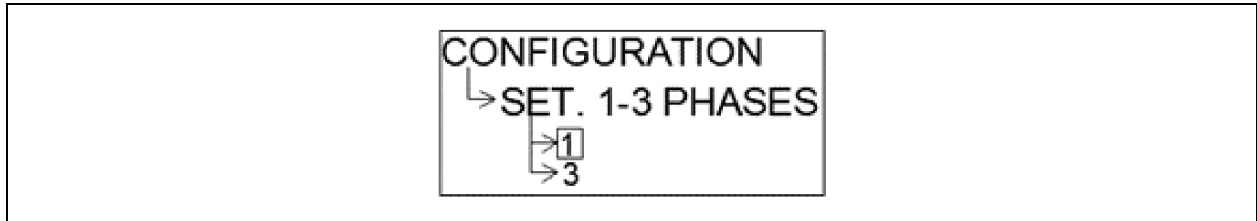
- No. Cycles : (min. 0 cycles/max. 10 cycles).

Sets the start-up process cycles number.

The factory set value is 6 cycles.

(*) Once this function is enabled, the equipment must be started in manual mode (MAN) to proceed with the commissioning cycles.

8.4.3 Conf. 1-3 PHASES

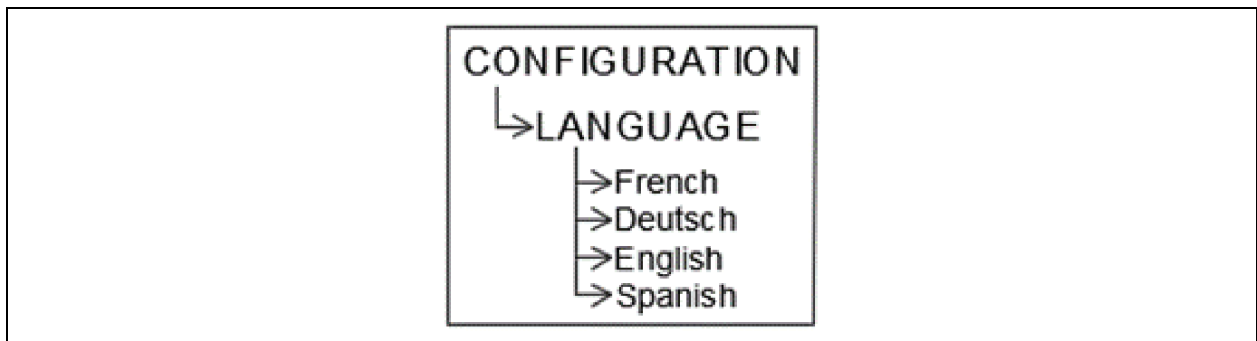


Select whether you have a single-phase or three-phase power supply.

8.4.4 Bus configuration

Data bus is available only on request.

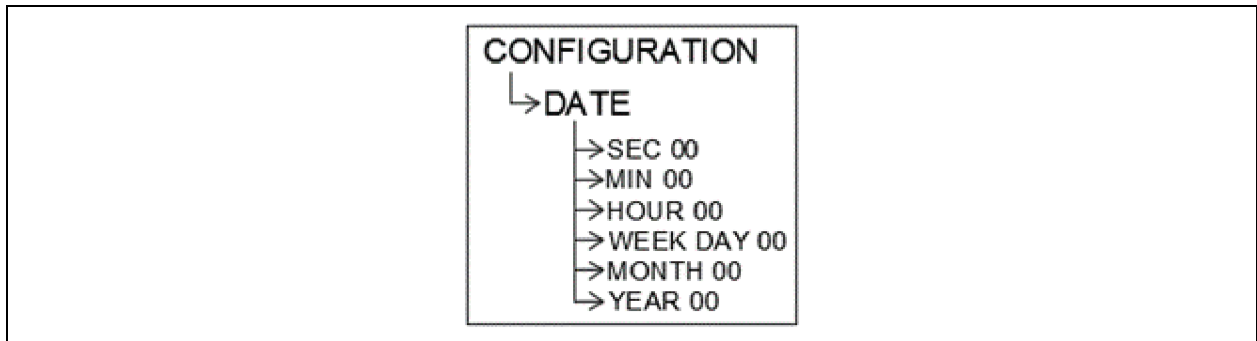
8.4.5 Language



Select the language you want from the Display:

- Español
- English
- Deutsch
- Francais

8.4.6 Date



Set the exact date and time by entering the data shown on the following screens:

- Seconds
- Minutes
- Time
- Day of the week
- Month
- Year

8.5 Settings

Notice

Make sure that the periodic emptying cycles are in accordance with the local applicable regulations.

Notice

The factory settings of the following parameters must be intended as initial trial values. To ensure proper operation, parameters must be suitably modified during the commissioning phase, considering that the functional dynamics of the adiabatic system are influenced by the real operating conditions (tap water pressure, evaporated flow, bleed off flow) which can differ significantly from one installation to another.

The desired values for the different parameters to be set are configured in this section. The conductivity set-point and the different timers are configured. Each parameter has a range of values it can be set to.

The different parameters to be set are shown on the Display screen (integrated in the command and display interface).

Move from one screen to another using the vertical arrows. Use the right arrow to advance to the next level within a screen, and the left arrow to go back a level.

SET-POINT $\mu\text{S}/\text{cm}$ (if applicable)

Enter the conductivity set-point. If this conductivity value is exceeded, the motorized drain valve is activated, and the water is renewed to the desired conductivity (lower than the Set point).

It must be remembered that the TIMER T07 regulates the time for the set-point value to be exceeded before opening the drain valve, while TIMER T02 established the time between partial emptyings. The range varies from 0-1999 $\mu\text{S}/\text{cm}$.

TIMER T01 (ex SW1 AB)

Enter the recirculation pump delay time after the minimum water level is detected. This is not too short to cause the phenomenon of spiking but not too long for the minimum water level to shut down the pump.

The Timer range is from 30 s to 1000 s. The factory set value is 90 s.

TIMER T02 (ex SW1 CD)

Enter the time between partial emptying of the basin with conductivity control. The Timer range is from 1 min to 15 min.

The factory set value is 5 min.

TIMER T03 (ex SW2 AB)

Enter the complete emptying confirmation time. This is the maximum time for the level sensor to confirm the minimum water level or obstruction of the drain after the emptying command.

The Timer range is from 1 min to 60 min. The factory set value is 10 min.

TIMER T04 (ex SW2 CD)

Enter the additional complete emptying time, during which the emptying motor valve will be open. The Timer range is from 30 min to 400 min.

The factory set value is 60 min.

TIMER T05 (ex SW3 AB)

Enter the complete emptying frequency during operation. The Timer range is from 0 min to 24 h.

The factory set value is 0 min. 0 min = never

TIMER T06 (ex SW3 CD)

Enter the delay before complete emptying after the equipment has been turned off.

The timer range is from 0 h to 24 h. The factory set value is 1 h.

0 h = Empties as soon as the equipment is switched off.

TIMER T07 (ex SW4 CD)

Enter the set-point time before partial emptying, by opening the drain motor-valve, due to the conductivity being continuously exceeded.

The Timer range is from 5 s to 360 s. The factory set value is 30 s.

TIMER T08

Enter the maximum time for the filling to occur: Time for the minimum level to be reached once the basin is on process of filling.

The Timer range is from 5 min to 60 min. The factory set value is 15 min.

TIMER MAX HISTERESIS

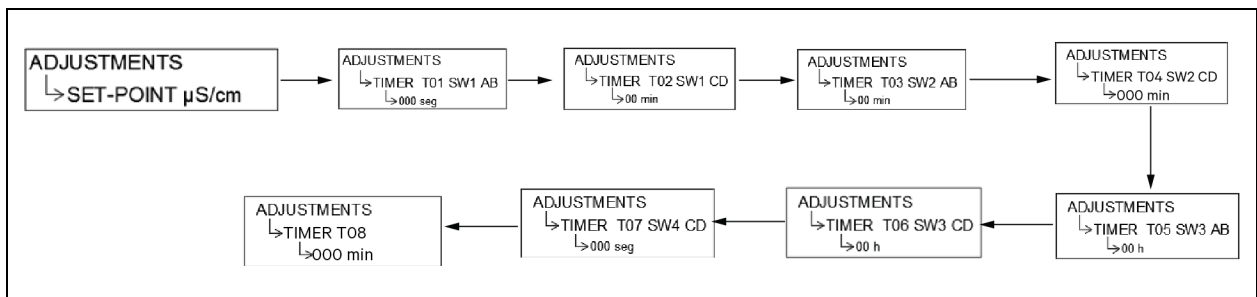
Enter the time to activate the solenoid valve when it goes from high level to operating level. Operates when the filling cycles have been completed,

The timer range is from 1 s to 90 s. The factory set value is 18 s.

TIMER T10

Enter the time for the first start of the pump in which the shutdown of the solenoid valve at the high level is ignored. Operates only on the first start, after which the pump will start with TIMER O1.

The timer range is from 30 s to 1000 s. The factory set value is 210 s.



8.6 Startup

Startup recommendations

Notice

Before starting the air fans, to remove inorganic dust from the panel surfaces, for the purpose of preventing air flow contamination and avoid extra foam formation, it is recommended to repeat the following cycle for 6 periods: 10 min of pump operation (recirculating the water) and then, 10 min of emptying.

Notice

To avoid leaks, double check that all links/threads are well fixed and adjusted at the commissioning.

Notice

Double check water basins mandatory levelling. This is a very important point because a fine levelling is a must for a correct operation of the level detector and the inlet float valve water level.

Notice

To avoid airflow by-pass, double check that gap cover plates and fixing plates are well installed and adjusted.

Notice

Make sure that the correct amount of water (according to the technical specification) is established in the balancing valves.

Notice

Make sure to remove the protection screen from the level detector.

After the pre-installation steps and all connections have been made according to the corresponding electrical diagram:

1. Check the mains voltage corresponds to the needed supply voltage according to its corresponding electrical diagram.
2. Switch the disconnecter I1 status from position 0 to 1.

Fisair S.L.U. 00/00/0000 00:00
HEF2E → OFF

The LEDs over the control and display interface are swept and the “low voltage” remote signaling contact is activated (Connection J25).

3. The initial adjustments (configuration and settings) to the working mode choice are made.
 - a. UV lamp (if applicable)

Turn the UV lamp on or off using the navigation buttons.

See [Assembly Instructions](#) on page 42.

- b. Conductivity probe: (if applicable)

Adjusting the SET-POINT: The conductivity SET-POINT is adjusted as in [General](#) on page 63.

- Recommendation:

The set point should be 20% higher than the first reading made, when filling the clean water basin is filled for the first time. The TIMER T01 must be coded to perform this reading (see [Scale Formation Process](#) on page 63) at 1000 s, so the reading can be done without starting the pump as starting the pump would contaminate the water in the basin. Once this reading is noted, reset the TIMER T01 to the factory setting or according to contractual requirements.

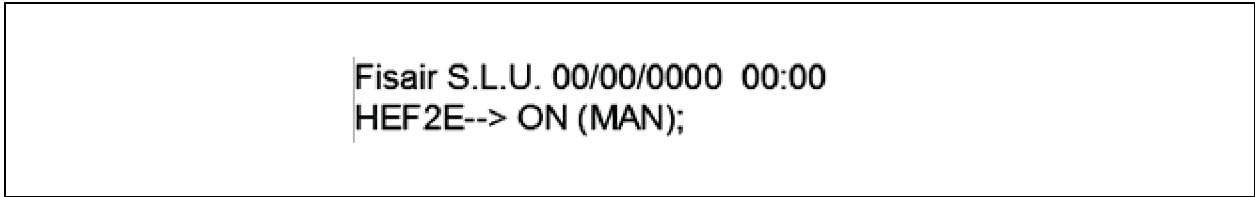
Partial emptying operation (if Conductivity Control is applied):

- Once the SET-POINT and TIMER T07 are exceeded (the latter establishes the time the set-point must be continuously exceeded), the emptying motor valve will open and the water in the basin will be renewed, due to the filling solenoid valve staying open (the filling solenoid valve is controlled and closes only when the maximum level is detected).
 - A minimum partial emptying of 100s will be performed, the motor valve will be closed, and the basin filled until the float valve cuts out. The filling solenoid valve will remain open (the closing of the filling solenoid valve is controlled only by the maximum level detector).
 - If the probe has no reading (it is not in contact with the water), this means the water level has dropped below the probe electrodes. The motor valve will close, and a new partial emptying cycle will begin, with the TIMER T02 taking note of the minimum time between partial emptying and TIMER T07 of the set-point time of the conductivity being continuously exceeded.
 - The complete cycle of this operation is performed without the pump being shut down.
4. Selecting the working mode that best suits your needs: automatic or manual:

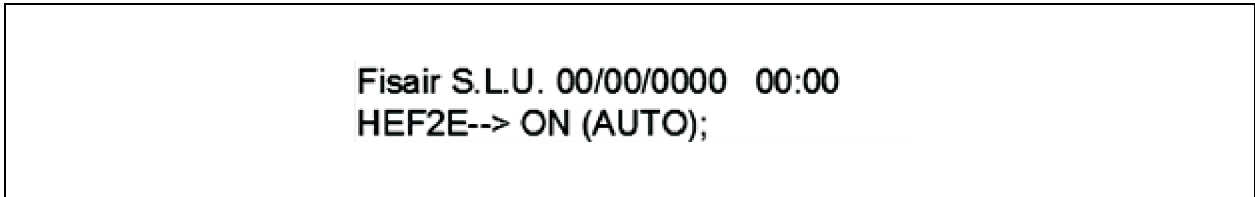
The desired working mode is selected using the MAN or AUTO buttons. (Remember to have the I1 disconnecter in position 1)

See [Supervision and Principal Operation Modes](#) on page 77 to display the equipment status (MAN, AUTO or START).

- MAN → START OPERATION



- AUTO → START OPERATION



5. Operation:
- a. If the UV lamp is on, the LED flashes blue until the confirmation of the ignition sensor is received. It will then stop flashing and be lit continuously in blue. If the lamp is submerged, J18 must be bridged (IN1) as it works for hours.
 - b. Once the working mode has been chosen (MAN or AUTO), the water supply solenoid valve LED lights up to fill the basin until the mechanical float valve closes. If there is a fault in the mechanical float valve, the basin continues filling until the level sensor detects the maximum water level (LED turns red).
 - c. Once the minimum water level has been reached (green LED), the water recirculation pump turns on (green LED) after the time established in TIMER T01.

- d. During operation or after switching off, the LEDs will light up depending on the emptying settings.
- e. During the operation whether MAN or AUT an alarm code will be seen on the display if there is an anomaly (see [Supervision and Principal Operation Modes](#) on page 77).
- f. If the equipment has a conductivity meter option:

The conductivity reading will appear in the display in $\mu\text{S}/\text{cm}$ (see [Supervision and Principal Operation Modes](#) on page 77).

8.7 Alarms

List of alarms:

Single for Alarm	Component	Description of the Alarm	Recommended Action
40*	CPU	Internal card failure: SEF-025.1	Contact Technical Services
41*	RAM memory	RAM memory	Replace battery and/or contact Technical Services to reload the program into RAM memory
42*	Conductivity probe	Connection error or damaged component	Check the connection and/or contact Technical Services
43	Level switch	Connection error or damaged component	Contact Technical Services
44*	Magneto-thermal circuit breaker	Connection error, over current or lack of phases	Check the connection, ensure the power network is correct. Fault repaired: Reset circuit breaker
45*	UV lamp	The contact IN1 has not been closed by the lamp sensor	Check the UV lamp sensor signal
46	Drain/emptying motor-valve	Emptying confirmation time has elapsed; no minimum level of water detected	Check proper operation of the emptying motor valve
47	Water supply	Fill confirmation time has elapsed; no minimum level of water detected	Check proper operation of the water supply solenoid valve
48	Drain/emptying motor-valve	Established time has elapsed without detecting feedback from the drain/emptying motor valve	Check proper operation of the motor valve feedback connection
49	Conductivity	Unable to reduce water conductivity	Check proper operation of the conductivity sensor. Check conductivity set-point
50*	External fault	IN3 open if external component installed.	
51*	UV lamp immersion in basin	This lamp has been used for over 16,000 hours	Replace UV lamp with a new one. Reset timer 16,000 h according to chapter 8.5 UV lamp configuration

*These alarms stop the operation of the equipment. Once you have resolved the problem, you must turn the device off and on again to reset to initial status.

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Appendices

Appendix A: Technical Support and Contacts

A.1 Technical Support/Service in the United States

Vertiv Group Corporation

24x7 dispatch of technicians for all products.

1-800-543-2378

Liebert® Thermal Management Products

1-800-543-2378

Liebert® Channel Products

1-800-222-5877

Liebert® AC and DC Power Products

1-800-543-2378

A.2 Locations

United States

Vertiv Headquarters

505 N Cleveland Ave

Westerville, OH 43082

Europe

Via Leonardo Da Vinci 8 Zona Industriale Tognana

35028 Piove Di Sacco (PD) Italy

Asia

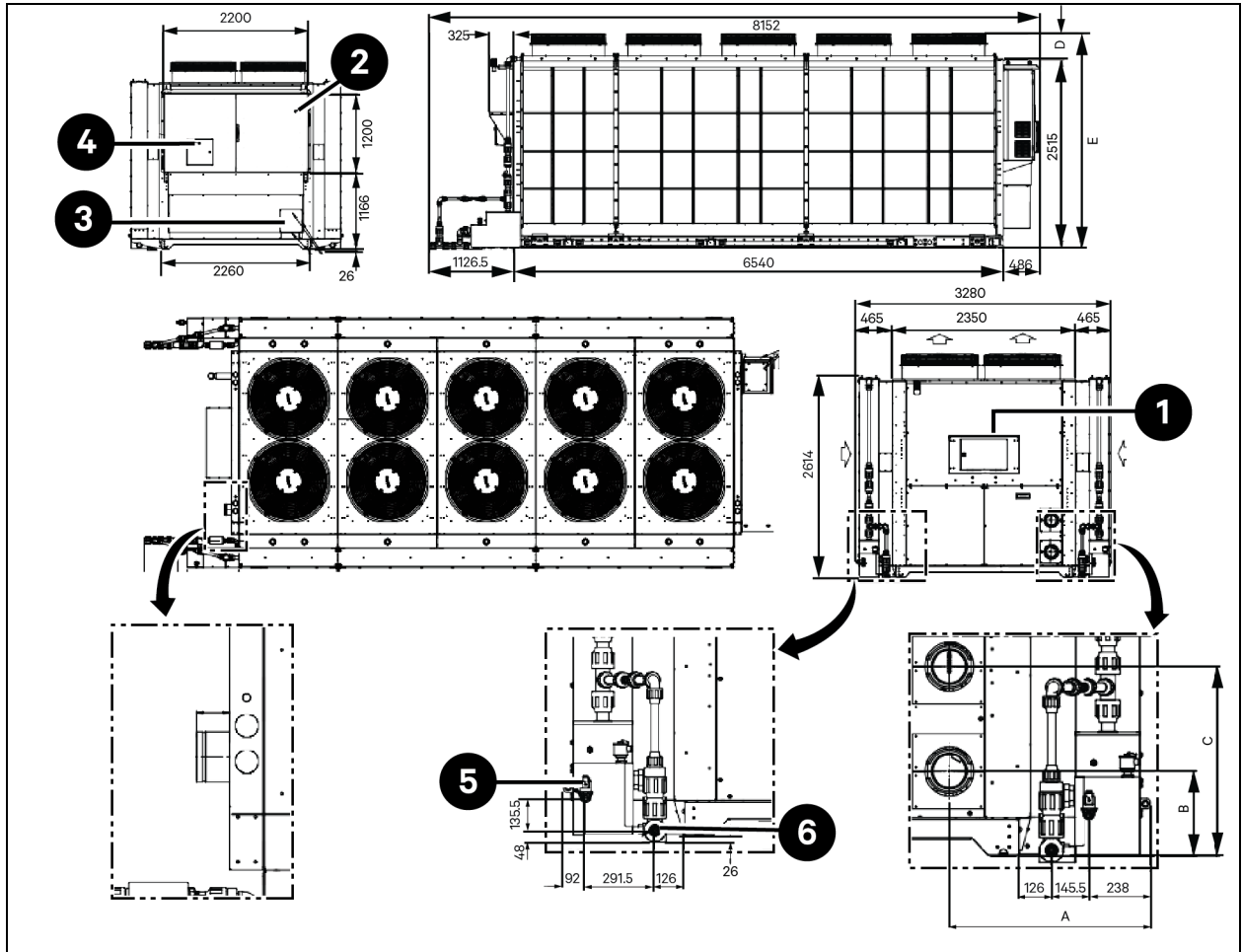
7/F, Dah Sing Financial Centre

3108 Gloucester Road, Wanchai

Hong Kong

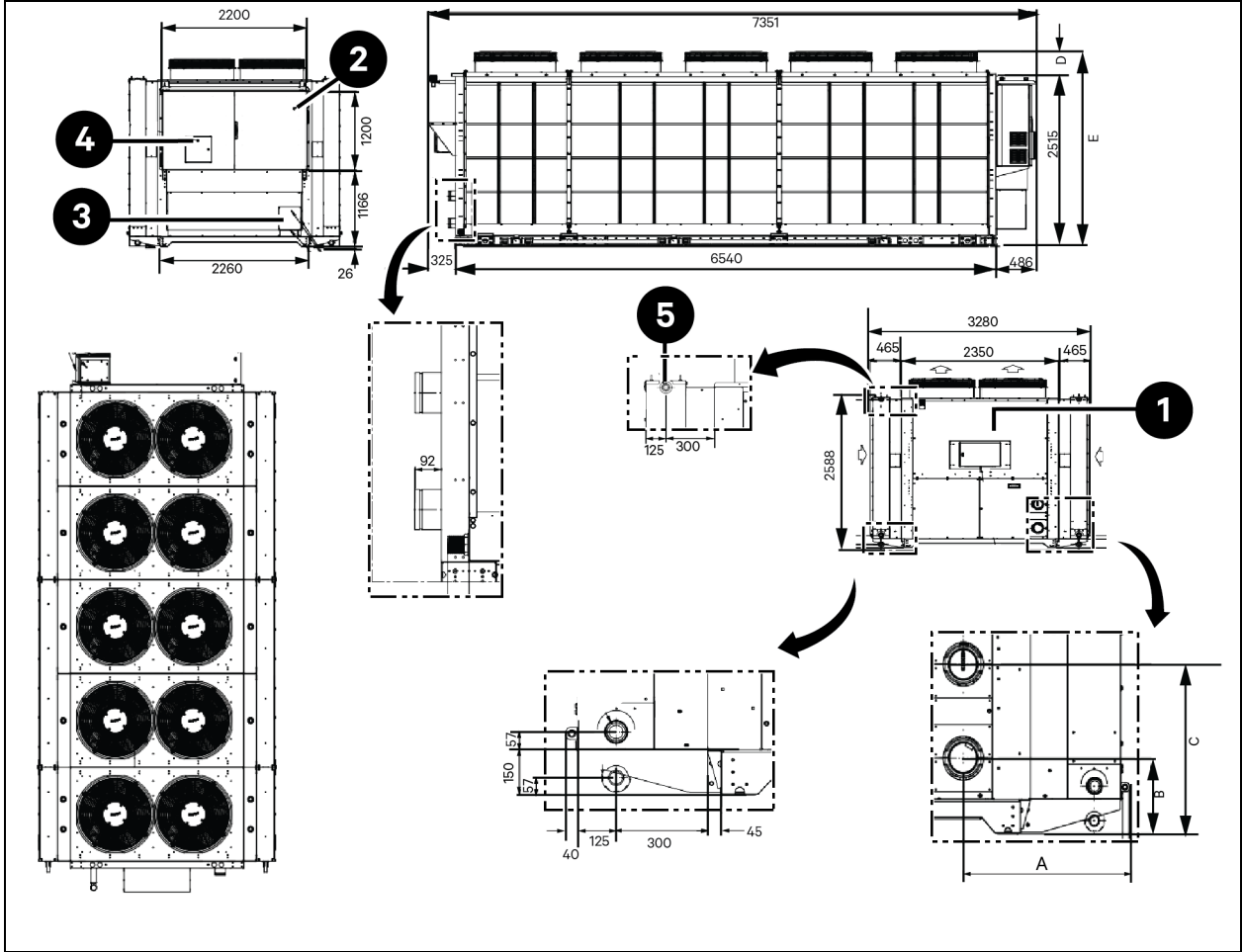
Appendix B: Dimensions and Weights

Figure A.1 Recirculation Version - 10 Fans Units



Item	Description
1	Supply cable inlet for adiabatic system
2	Power electric panel
3	Supply cable inlet
4	Auxiliary and displays electrical panel
5	Adiabatic water filling connection (3/4 in. G)
6	Adiabatic water drain connection (press fitting 0.50 mm)

Figure A.2 Direct Flow Version - 10 Fans Units



Item	Description
1	Supply cable inlet for adiabatic system
2	Power electric panel
3	Supply cable inlet
4	Auxiliary and displays electrical panel
5	Return to the tanks

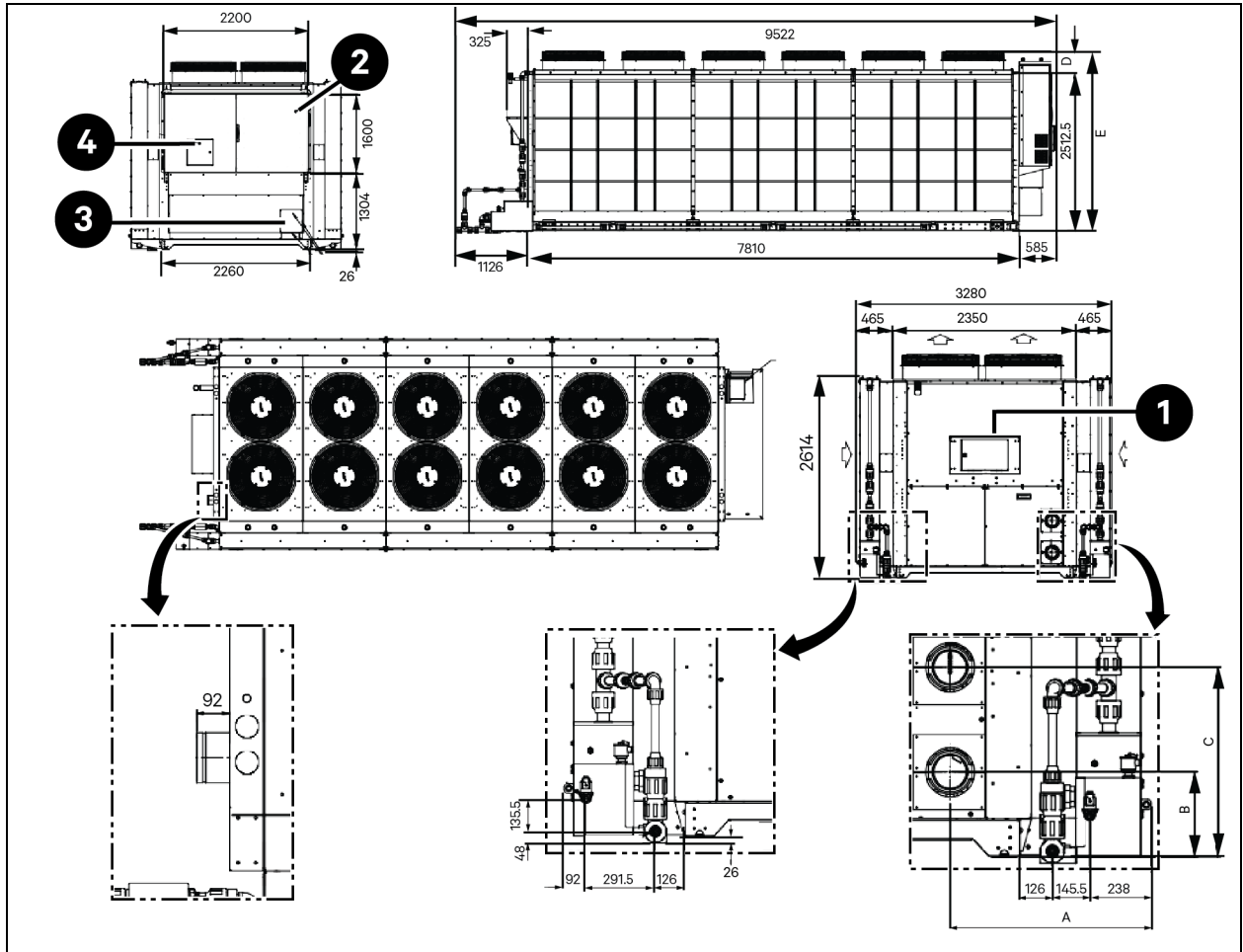
						Base Fans		Premium Fans		Low Noise Fans		Chilled water connections			
Model	Single Pump Versions ΔT=6°C	N. Fans	A	B	C	D	E	D	E	D	E	"X" (mm)		2962*Y" (mm)	
			(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	Inlet	Outlet	
CIZ 065 CH4 065	With out Pumps	10	787	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN125-5"-139,7	Outlet	Grooved pipes connections DN125-5"-139,7
	With Pumps std low press.		787	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		787	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		787	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
CIZ 075 CH4 075	With out Pumps	10	787	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN125-5"-139,7	Outlet	Grooved pipes connections DN125-5"-139,7
	With Pumps std low press.		787	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		787	329	713	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		787	329	713	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
FIZ 065 FH4 065	With out Pumps	10	787	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN125-5"-139,7	Outlet	Grooved pipes connections DN125-5"-139,7
	With Pumps std low press.		787	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		787	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		787	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	

						Base Fans		Premium Fans		Low Noise Fans		Chilled water connections			
Model	Single Pump Versions ΔT=6°C	N. Fans	A	B	C	D	E	D	E	D	E	"X" (mm)		2962*Y" (mm)	
			(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	Inlet	Outlet	
FIZ 065 FH4 065	With out Pumps	10	787	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN125-5"-139,7	Outlet	Grooved pipes connections DN125-5"-139,7
	With Pumps std low press.		787	329	713	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		787	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		787	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
NIZ 065 NH4 065	With out Pumps	10	780	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN125-5"-139,7	Outlet	Grooved pipes connections DN125-5"-139,7
	With Pumps std low press.		780	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		780	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		780	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
NIZ 065 NH4 065	With out Pumps	10	780	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN125-5"-139,7	Outlet	Grooved pipes connections DN125-5"-139,7
	With Pumps std low press.		780	329	713	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		780	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		780	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	

						Base Fans		Premium Fans		Low Noise Fans		Chilled water connections			
Model	Single Pump Versions ΔT=6°C	N. Fans	A	B	C	D	E	D	E	D	E	"X" (mm)		2962*Y" (mm)	
			(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	Inlet	Outlet	
CIZ 065 CH4 065	With out Pumps	10	787	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN125-5"-139,7	Outlet	Grooved pipes connections DN125-5"-139,7
	With Pumps std low press.		787	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		787	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		787	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
CIZ 075 CH4 075	With out Pumps	10	787	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN125-5"-139,7	Outlet	Grooved pipes connections DN125-5"-139,7
	With Pumps std low press.		787	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		787	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		787	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
FIZ 065 FH4 065	With out Pumps	10	787	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN125-5"-139,7	Outlet	Grooved pipes connections DN125-5"-139,7
	With Pumps std low press.		787	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		787	329	713	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		787	329	713	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	

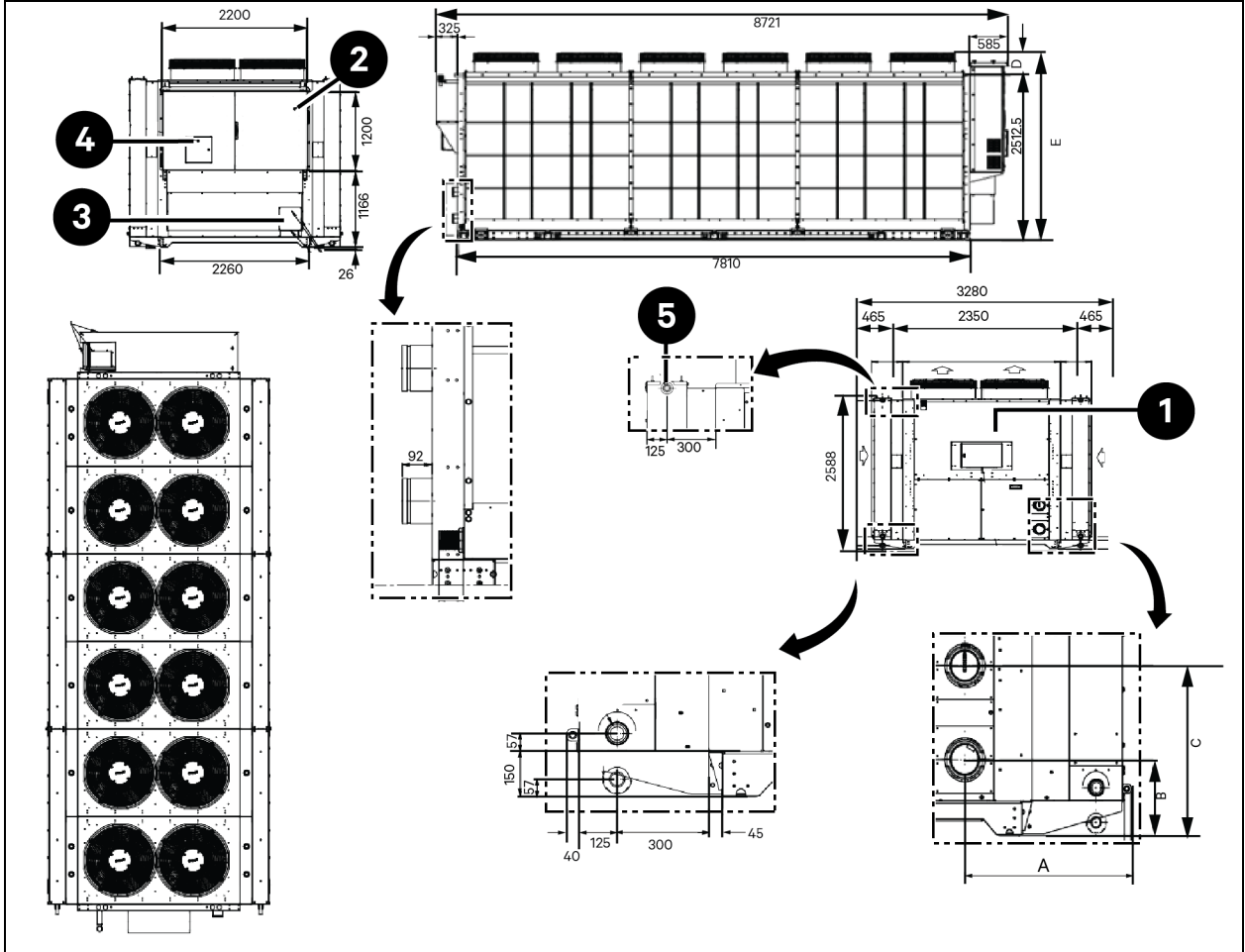
						Base Fans		Premium Fans		Low Noise Fans		Chilled water connections			
Model	Single Pump Versions ΔT=6°C	N. Fans	A	B	C	D	E	D	E	D	E	"X" (mm)		2962*Y" (mm)	
			(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	Inlet	Outlet	
FIZ 065 FH4 065	With out Pumps	10	787	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN125-5"-139,7	Outlet	Grooved pipes connections DN125-5"-139,7
	With Pumps std low press.		787	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		787	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		787	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
NIZ 065 NH4 065	With out Pumps	10	780	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN125-5"-139,7	Outlet	Grooved pipes connections DN125-5"-139,7
	With Pumps std low press.		780	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		780	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		780	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
NIZ 065 NH4 065	With out Pumps	10	780	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN125-5"-139,7	Outlet	Grooved pipes connections DN125-5"-139,7
	With Pumps std low press.		780	329	734	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		780	329	713	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		780	329	713	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	

Figure A.3 Recirculation Version (x1Z) - 12 Fans Units



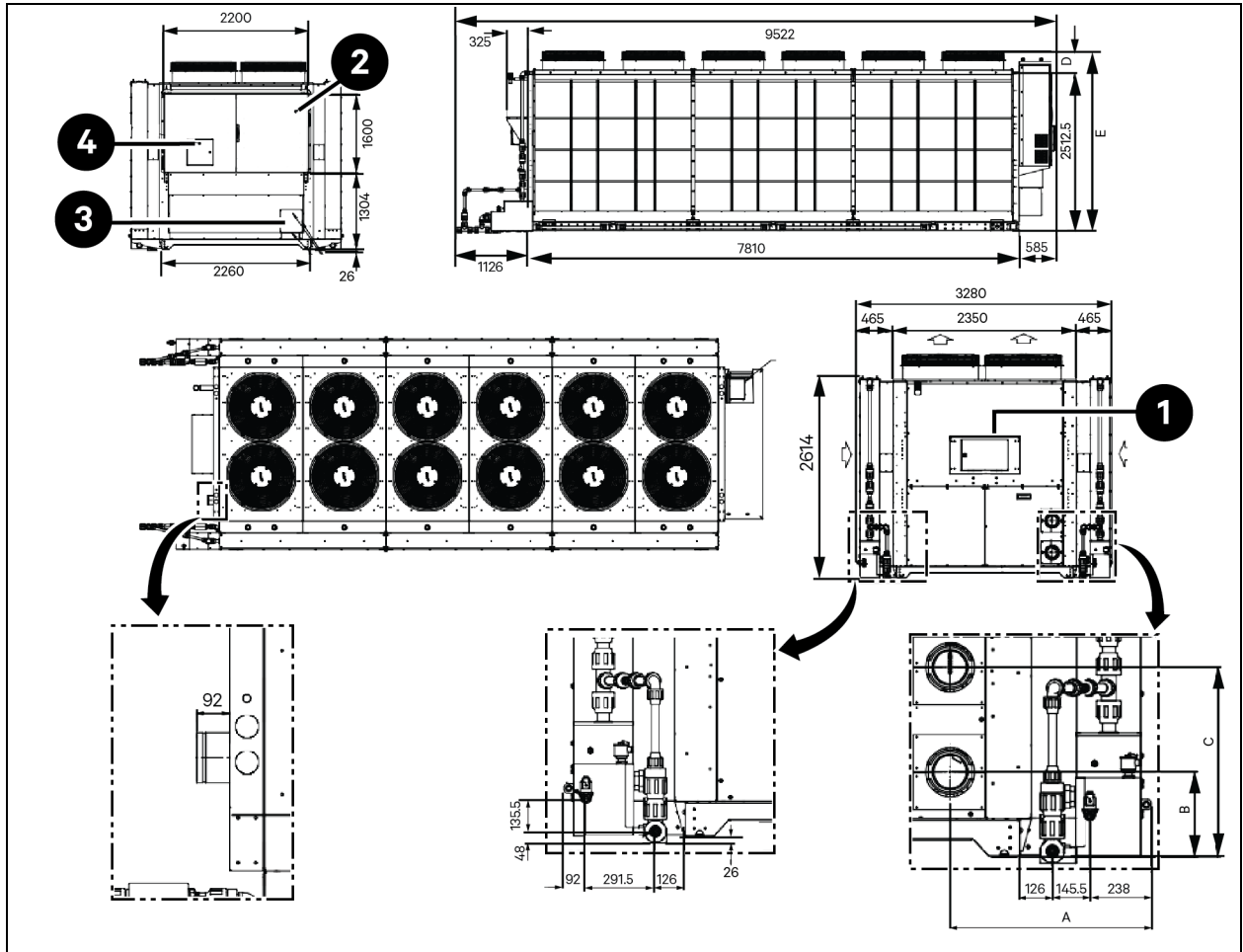
Item	Description
1	Supply cable inlet for adiabatic system
2	Power electric panel
3	Supply cable inlet
4	Auxiliary and displays electrical panel

Figure A.4 Direct Flow Version (xIZ) - 12 Fans Units



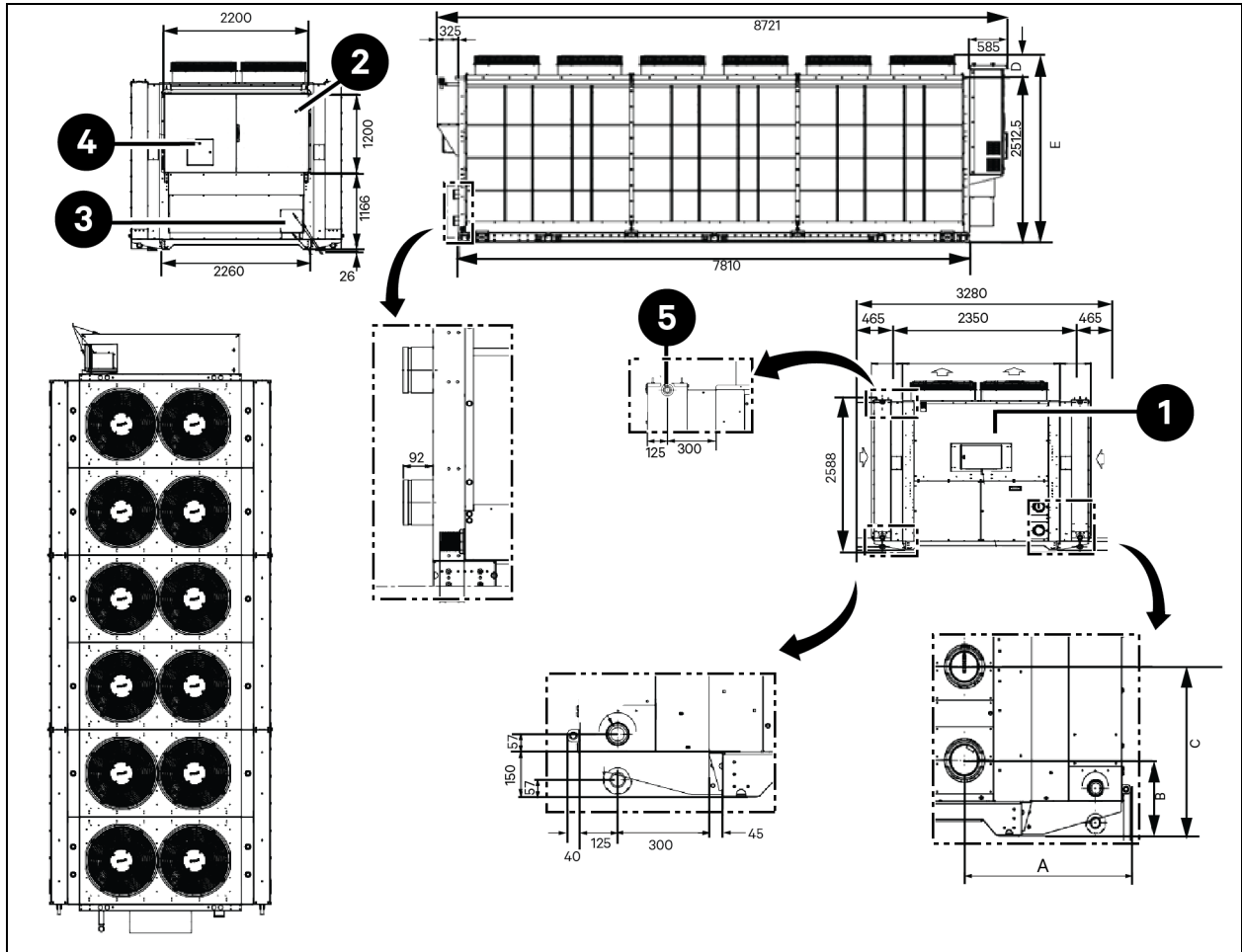
Item	Description
1	Supply cable inlet for adiabatic system
2	Power electric panel
3	Supply cable inlet
4	Auxiliary and displays electrical panel
5	Return to the tanks

Figure A.5 Recirculation Version (xH4 or xH3) - 12 Fans Units



Item	Description
1	Supply cable inlet for adiabatic system
2	Power electric panel
3	Supply cable inlet
4	Auxiliary and displays electrical panel

Figure A.6 Direct Flow Version (xH4 or xH3) 12 Fans Units



Item	Description
1	Supply cable inlet for adiabatic system
2	Power electric panel
3	Supply cable inlet
4	Auxiliary and displays electrical panel
5	Return to the tanks

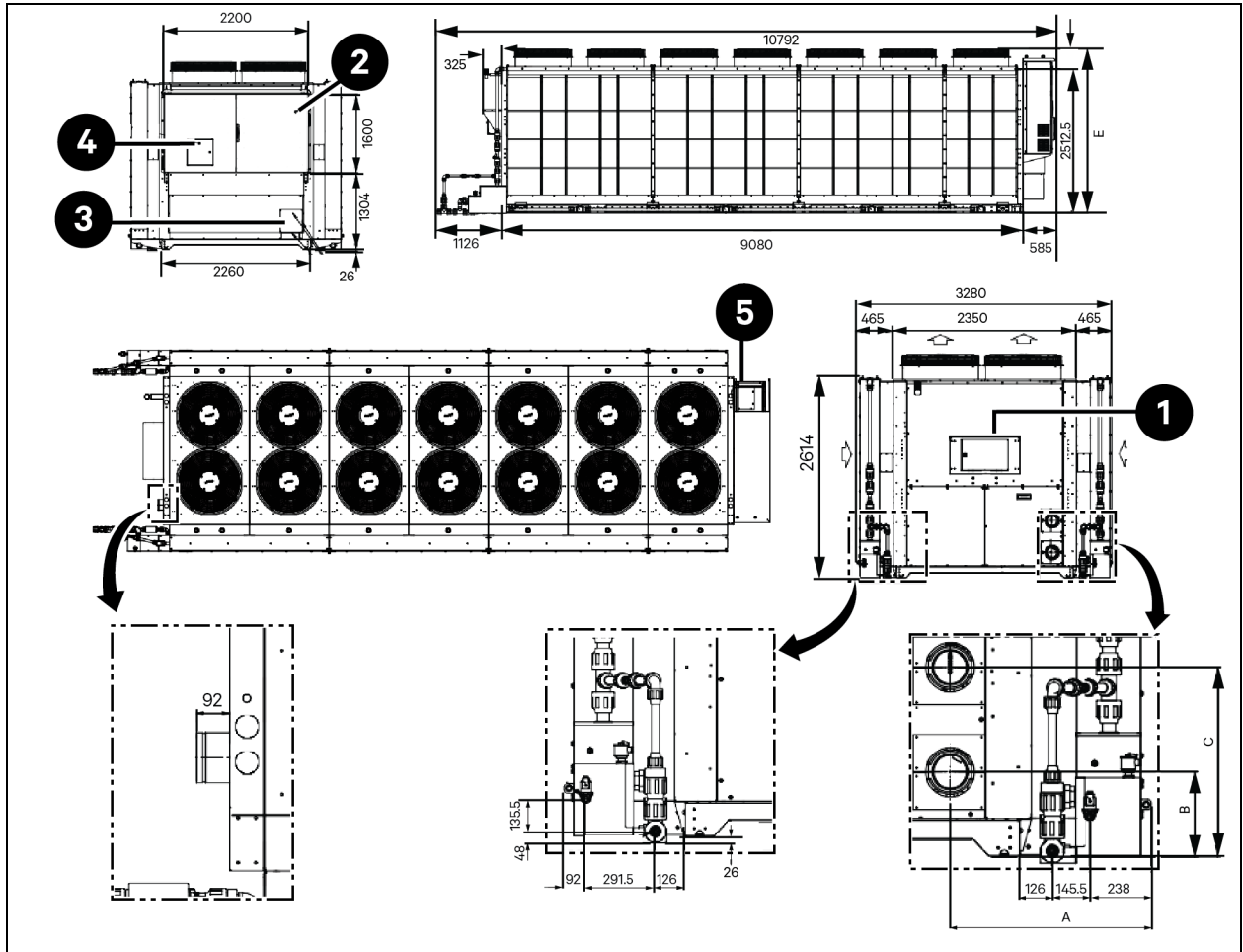
						Base Fans		Premium Fans		Low Noise Fans		Chilled water connections			
Model	Single Pump Version S ΔT=6°C	N. Fans	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	D (mm)	E (mm)	D (mm)	E (mm)	X (mm)		2962 Y (mm)	
CIZ 080 CH4/ CH3 080	With out Pumps	12	787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN125-5"-139,7	Outlet	Grooved pipes connections DN125-5"-139,7
	With Pumps std low press.		787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		787	327.5	713	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		787	327.5	713	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
CIZ 085 CH4/ CH3 090	With out Pumps	12	787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN125-5"-139,7	Outlet	Grooved pipes connections DN125-5"-139,7
	With Pumps std low press.		787	327.5	713	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
FIZ 080 FH4/ FH3 080	With out Pumps	12	787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN125-5"-139,7	Outlet	Grooved pipes connections DN125-5"-139,7
	With Pumps std low press.		787	327.5	713	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	

						Base Fans		Premium Fans		Low Noise Fans		Chilled water connections			
Model	Single Pump Versions $\Delta T=6^{\circ}C$	N. Fans	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	D (mm)	E (mm)	D (mm)	E (mm)	X (mm)		2962 Y (mm)	
FIZ 080 FH4/ FH3 080	With out Pumps	12	787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN125-5"-139,7	Outlet	Grooved pipes connections DN125-5"-139,7
	With Pumps std low press.		787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
NIZ 080 NH4/N H3 080	With out Pumps	12	787	327.5	713	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN125-5"-139,7	Outlet	Grooved pipes connections DN125-5"-139,7
	With Pumps std low press.		787	327.5	713	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
NIZ 085 NH4/N H3 090	With out Pumps	12	787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN125-5"-139,7	Outlet	Grooved pipes connections DN125-5"-139,7
	With Pumps std low press.		787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	

						Base Fans		Premium Fans		Low Noise Fans		Chilled water connections			
Model	Single Pump Version S ΔT=6°C	N. Fans	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	D (mm)	E (mm)	D (mm)	E (mm)	X (mm)		2962 Y (mm)	
CIZ 080 CH4/ CH3 080	With out Pumps	12	787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN125-5"-139,7	Outlet	Grooved pipes connections DN125-5"-139,7
	With Pumps std low press.		787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
CIZ 085 CH4/ CH3 090	With out Pumps	12	787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN125-5"-139,7	Outlet	Grooved pipes connections DN125-5"-139,7
	With Pumps std low press.		787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
FIZ 080 FH4/ FH3 080	With out Pumps	12	787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN125-5"-139,7	Outlet	Grooved pipes connections DN125-5"-139,7
	With Pumps std low press.		787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	

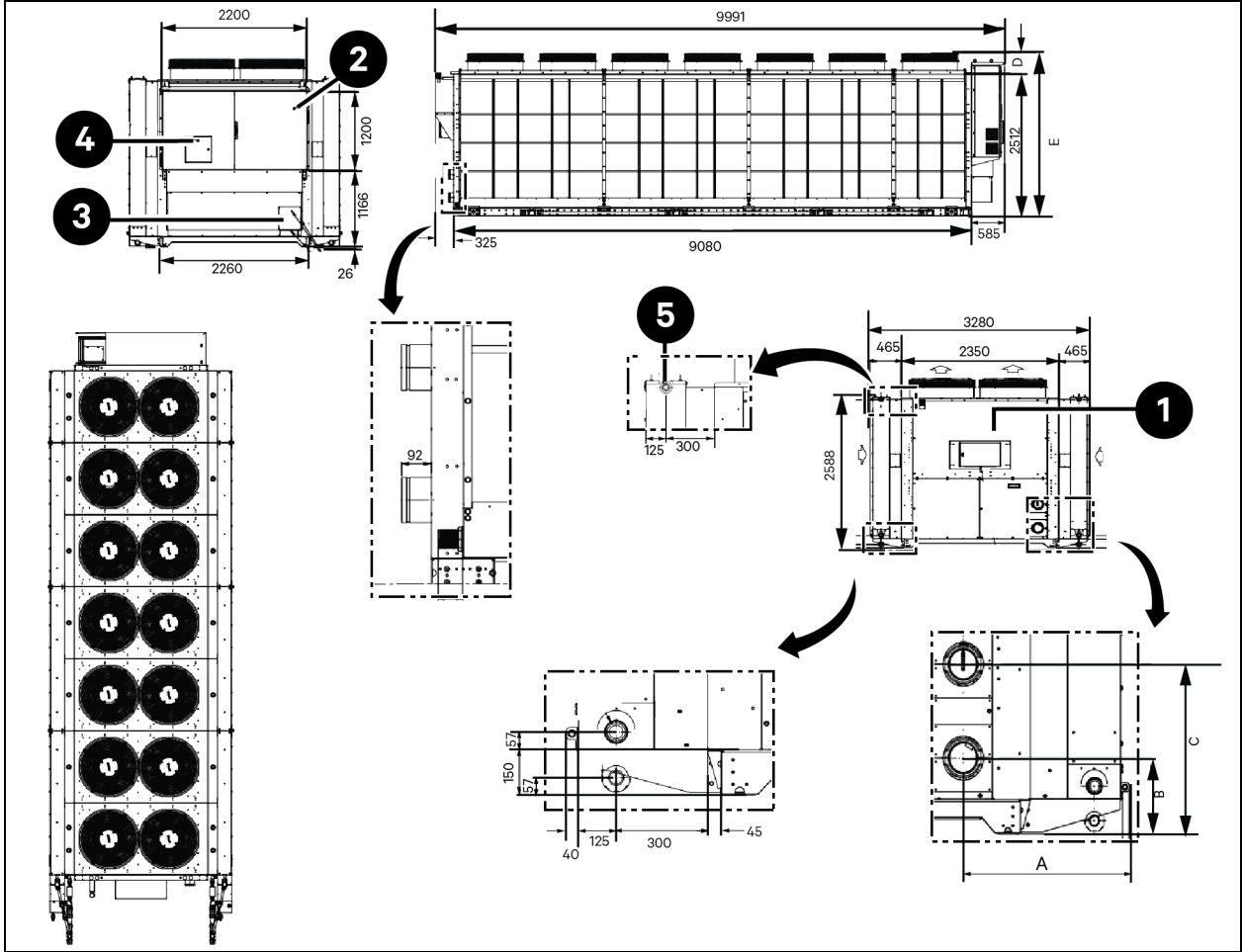
						Base Fans		Premium Fans		Low Noise Fans		Chilled water connections			
Model	Single Pump Versions $\Delta T=6^{\circ}C$	N. Fans	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	D (mm)	E (mm)	D (mm)	E (mm)	X (mm)		2962 Y (mm)	
FIZ 080 FH4/ FH3 080	With out Pumps	12	787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN125-5"-139,7	Outlet	Grooved pipes connections DN125-5"-139,7
	With Pumps std low press.		787	327.5	713	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
NIZ 080 NH4/N H3 080	With out Pumps	12	787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN125-5"-139,7	Outlet	Grooved pipes connections DN125-5"-139,7
	With Pumps std low press.		787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
NIZ 085 NH4/N H3 090	With out Pumps	12	787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN125-5"-139,7	Outlet	Grooved pipes connections DN125-5"-139,7
	With Pumps std low press.		787	327.5	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		787	327.5	713	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		787	327.5	713	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	

Figure A.7 Recirculation Version - 14 Fans Units



Item	Description
1	Supply cable inlet for adiabatic system
2	Power electric panel
3	Supply cable inlet
4	Auxiliary and displays electrical panel

Figure A.8 Direct Flow Version - 14 Fans Units

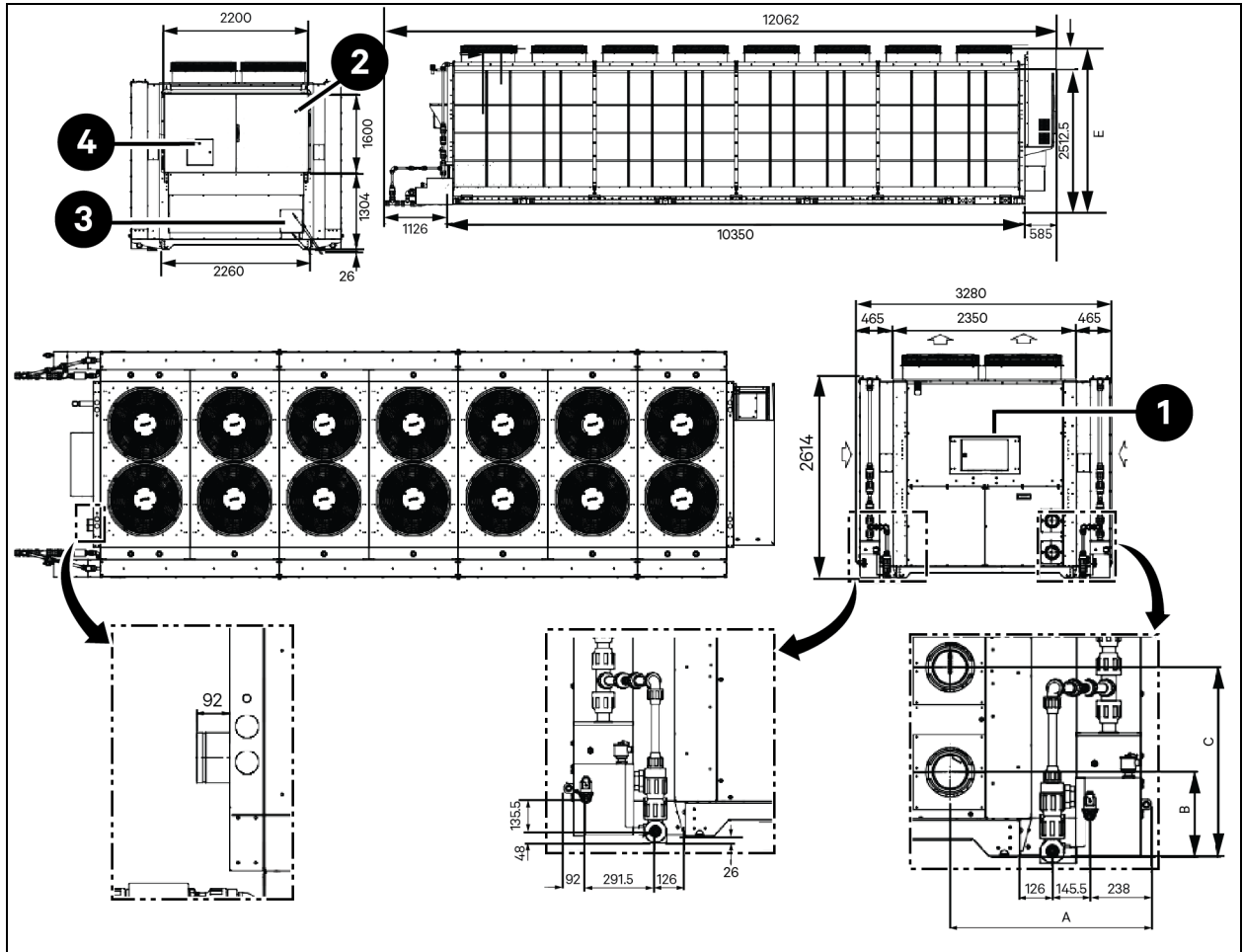


Item	Description
1	Supply cable inlet for adiabatic system
2	Power electric panel
3	Supply cable inlet
4	Auxiliary and displays electrical panel
5	Return to the tanks

						Base Fans		Premium Fans		Low Noise Fans		Chilled water connections			
Model	Single Pump Version S ΔT=6°C	N. Fans	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	D (mm)	E (mm)	D (mm)	E (mm)	"X" (mm)		"2962"Y" (mm)	
CIZ 095 CH4/ CH3 100	With out Pumps	14	788	328	734	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN150-6"-168.3	Outlet	Grooved pipes connections DN150-6"-168.3
	With Pumps std low press.		788	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		788	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		788	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
CIZ 110 CH4/ CH3 110	With out Pumps	14	788	328	734	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN150-6"-168.3	Outlet	Grooved pipes connections DN150-6"-168.3
	With Pumps std low press.		788	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		788	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		788	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
FIZ 095 FH4/F H3 100	With out Pumps	14	788	328	734	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN150-6"-168.3	Outlet	Grooved pipes connections DN150-6"-168.3
	With Pumps std low press.		788	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		788	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		788	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	

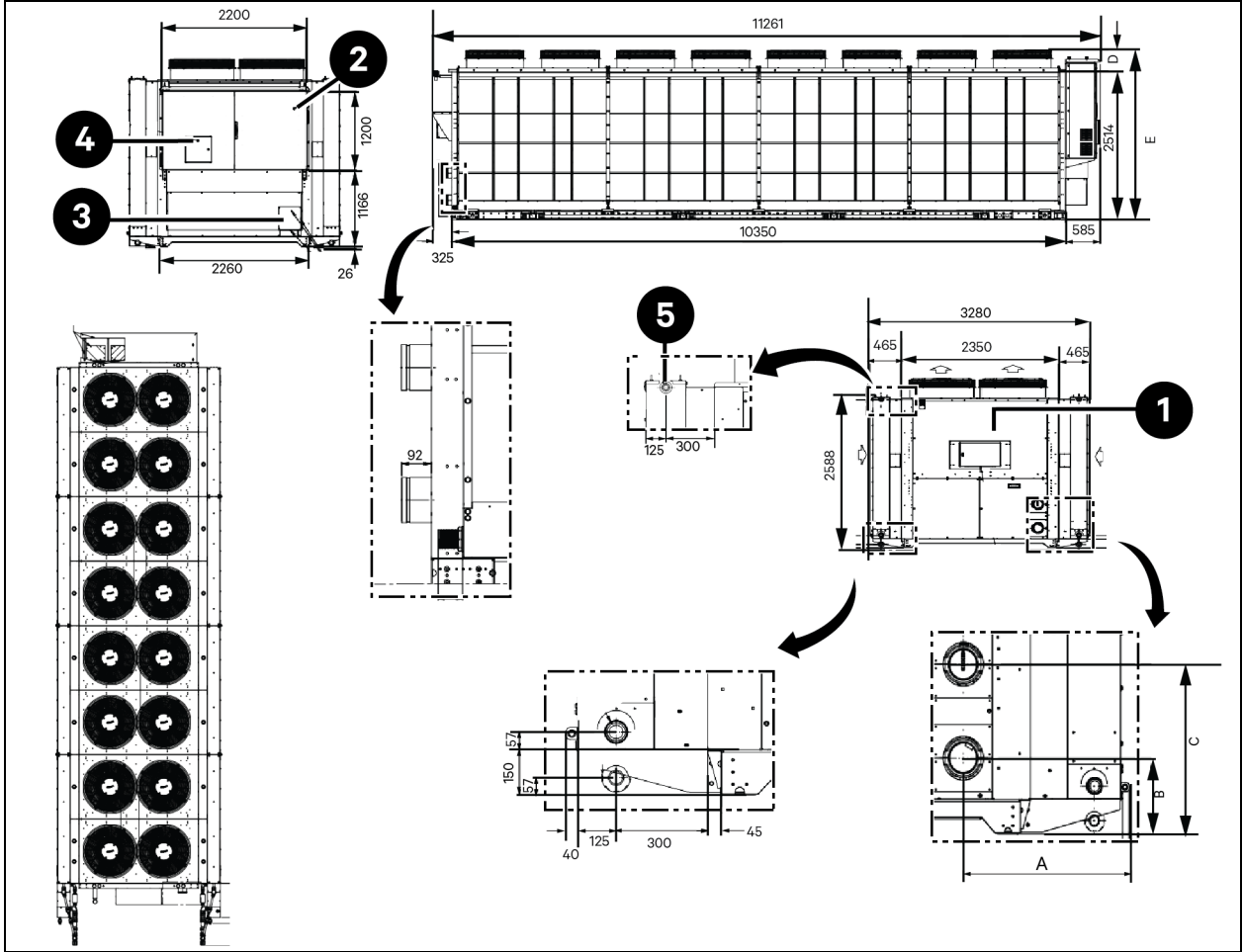
						Base Fans		Premium Fans		Low Noise Fans		Chilled water connections			
Model	Single Pump Version S ΔT=6°C	N. Fans	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	D (mm)	E (mm)	D (mm)	E (mm)	"X" (mm)		2962"Y" (mm)	
FIZ 110 FH4/F H3 110	With out Pumps	14	788	328	734	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN150-6"-168.3	Outlet	Grooved pipes connections DN150-6"-168.3
	With Pumps std low press.		788	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		788	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		788	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
NIZ 095 NH4/N H3 100	With out Pumps	14	780	328	734	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN150-6"-168.3	Outlet	Grooved pipes connections DN150-6"-168.3
	With Pumps std low press.		780	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		780	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		780	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
NIZ 110 NH4/N H3 110	With out Pumps	14	780	328	734	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN150-6"-168.3	Outlet	Grooved pipes connections DN150-6"-168.3
	With Pumps std low press.		780	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		780	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		780	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	

Figure A.9 Recirculation Version - 16 Fans Units



Item	Description
1	Supply cable inlet for adiabatic system
2	Power electric panel
3	Supply cable inlet
4	Auxiliary and displays electrical panel

Figure A.10 Direct Flow Version - 16 Fans Units



Item	Description
1	Supply cable inlet for adiabatic system
2	Power electric panel
3	Supply cable inlet
4	Auxiliary and displays electrical panel
5	Return to the tanks

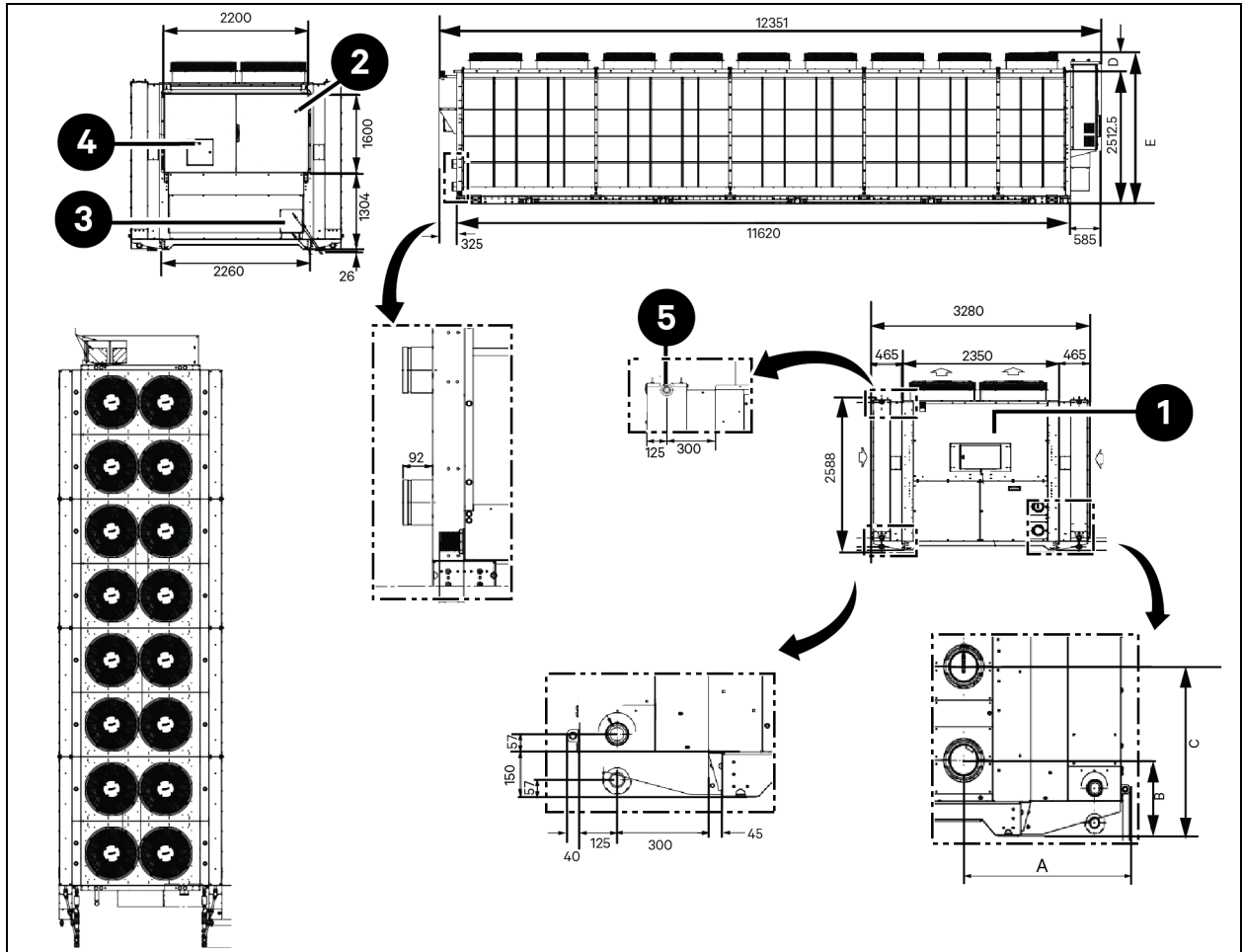
						Base Fans		Premium Fans		Low Noise Fans		Chilled water connections			
Model	Single Pump Version S ΔT=6°C	N. Fans	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	D (mm)	E (mm)	D (mm)	E (mm)	X (mm)		2962 Y (mm)	
CIZ 125 CH4/C H3 125	With out Pumps	16	778	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN150-6"-168.3	Outlet	Grooved pipes connections DN150-6"-168.3
	With Pumps std low press.		778	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		778	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		778	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
CH4/C H3 140	With out Pumps	16	778	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN150-6"-168.3	Outlet	Grooved pipes connections DN150-6"-168.3
	With Pumps std low press.		778	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		778	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		778	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
FIZ 125 FH4/F H3 125	With out Pumps	16	778	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN150-6"-168.3	Outlet	Grooved pipes connections DN150-6"-168.3
	With Pumps std low press.		778	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		778	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		778	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	

						Base Fans		Premium Fans		Low Noise Fans		Chilled water connections			
Model	Single Pump Versions $\Delta T=6^{\circ}C$	N. Fans	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	D (mm)	E (mm)	D (mm)	E (mm)	X (mm)		2962 Y (mm)	
FH4/FH3 140	With out Pumps	16	778	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN150-6"-168.3	Outlet	Grooved pipes connections DN150-6"-168.3
	With Pumps std low press.		778	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		778	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		778	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
NIZ 125 NH4/NH3 125	With out Pumps	16	772	328	733	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN150-6"-168.3	Outlet	Grooved pipes connections DN150-6"-168.3
	With Pumps std low press.		772	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		772	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		772	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
NH4/NH3 140	With out Pumps	16	772	328	733	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN150-6"-168.3	Outlet	Grooved pipes connections DN150-6"-168.3
	With Pumps std low press.		772	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		772	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		772	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	

						Base Fans		Premium Fans		Low Noise Fans		Chilled water connections			
Model	Single Pump Version S ΔT=6°C	N. Fans	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	D (mm)	E (mm)	D (mm)	E (mm)	X (mm)		2962 Y (mm)	
CIZ 125 CH4/C H3 125	With out Pumps	16	778	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN150-6"-168.3	Outlet	Grooved pipes connections DN150-6"-168.3
	With Pumps std low press.		778	328	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		778	328	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		778	328	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
CH4/C H3 140	With out Pumps	16	778	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN150-6"-168.3	Outlet	Grooved pipes connections DN150-6"-168.3
	With Pumps std low press.		778	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		778	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		778	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
FIZ 125 FH4/F H3 125	With out Pumps	16	778	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN150-6"-168.3	Outlet	Grooved pipes connections DN150-6"-168.3
	With Pumps std low press.		778	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		778	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		778	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	

						Base Fans		Premium Fans		Low Noise Fans		Chilled water connections			
Model	Single Pump Versions $\Delta T=6^{\circ}C$	N. Fans	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	D (mm)	E (mm)	D (mm)	E (mm)	X (mm)		2962 Y (mm)	
FH4/FH3 140	With out Pumps	16	778	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN150-6"-168.3	Outlet	Grooved pipes connections DN150-6"-168.3
	With Pumps std low press.		778	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		778	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		778	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
NIZ 125 NH4/NH3 125	With out Pumps	16	772	328	733	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN150-6"-168.3	Outlet	Grooved pipes connections DN150-6"-168.3
	With Pumps std low press.		772	328	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		772	328	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		772	328	733	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
NH4/NH3 140	With out Pumps	16	772	328	733	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN150-6"-168.3	Outlet	Grooved pipes connections DN150-6"-168.3
	With Pumps std low press.		772	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		772	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		772	328	784	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	

Figure A.11 Direct Flow Version - 18 Fans Units

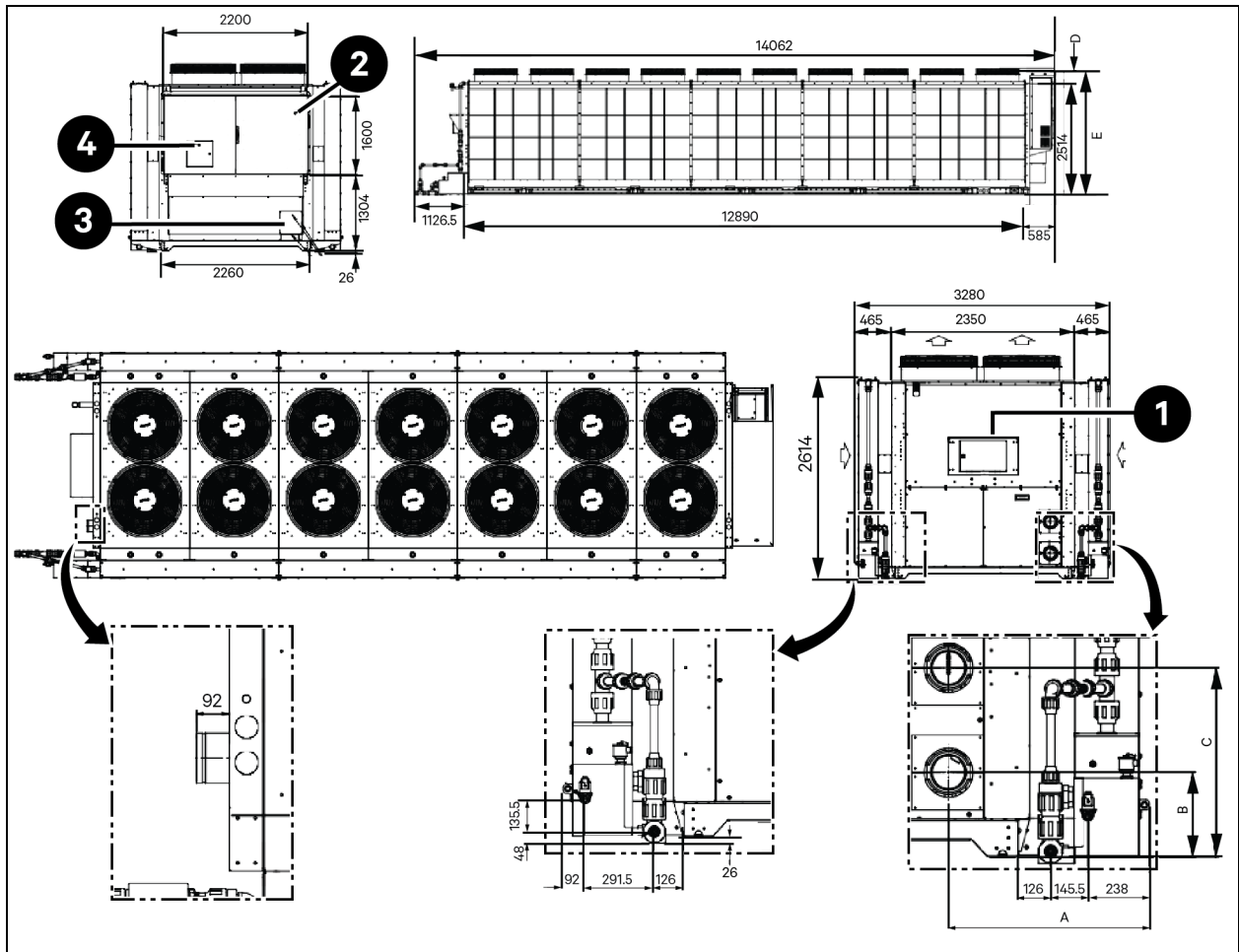


Item	Description
1	Supply cable inlet for adiabatic system
2	Power electric panel
3	Supply cable inlet
4	Auxiliary and displays electrical panel
5	Return to the tanks

						Base Fans		Base Fans		Low Noise Fans		Chilled water connections			
Model	Single Pump Version S ΔT=9°C	N. Fans	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	D (mm)	E (mm)	D (mm)	E (mm)	"X" (mm)		2962"Y" (mm)	
CIZ 140	With out Pumps	18	788	328	758	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN150-6"-168.3	Outlet	Grooved pipes connections DN150-6"-168.3
	With Pumps std low press.		788	328	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		788	328	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		788	328	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
CH4/C H3 165	With out Pumps	18	788	328	758	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN150-6"-168.3	Outlet	Grooved pipes connections DN150-6"-168.3
	With Pumps std low press.		788	328	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		788	328	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		788	328	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
FIZ 140	With out Pumps	18	788	328	758	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN150-6"-168.3	Outlet	Grooved pipes connections DN150-6"-168.3
	With Pumps std low press.		788	328	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		788	328	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		788	328	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	

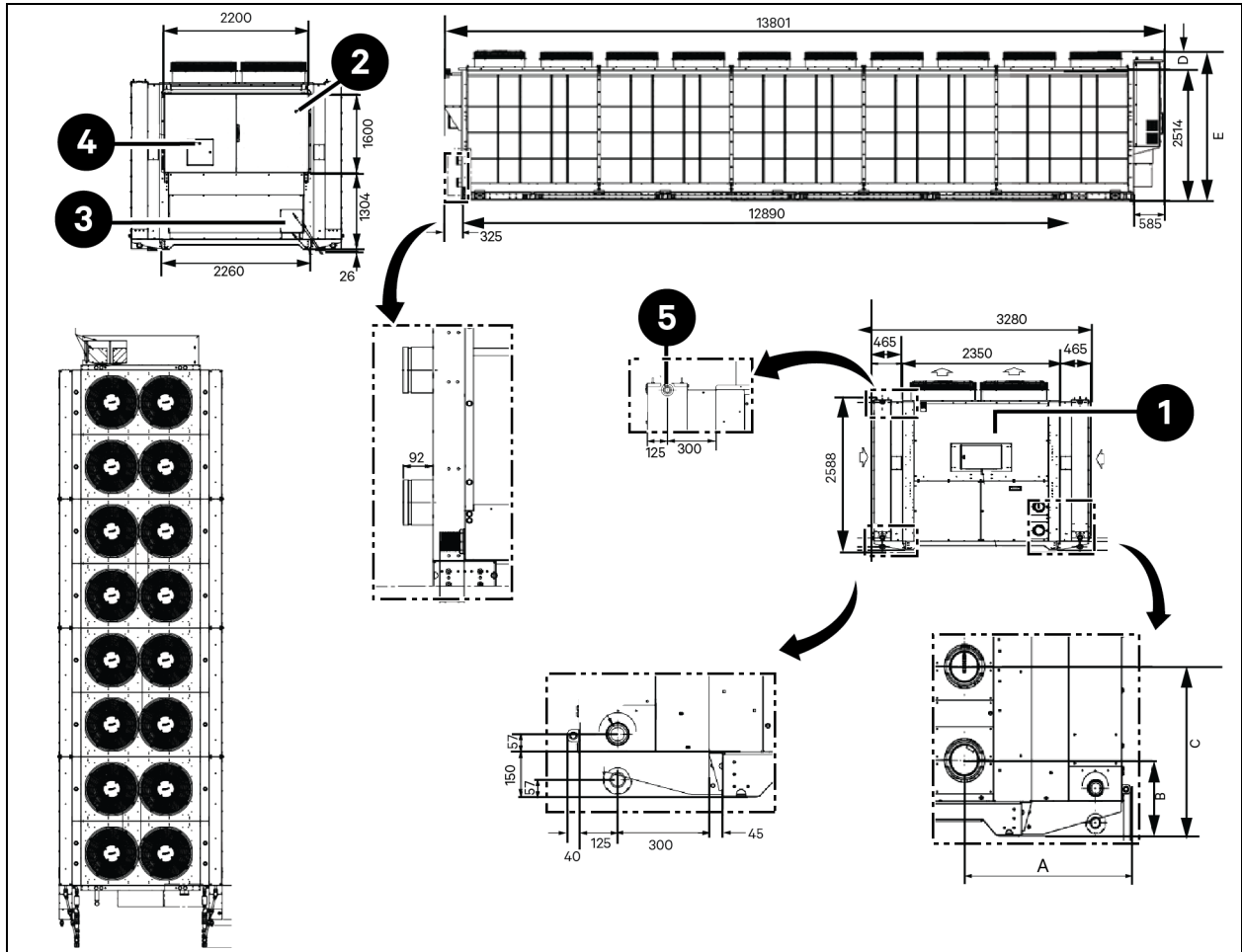
						Base Fans		Base Fans		Low Noise Fans		Chilled water connections			
Model	Single Pump Version S ΔT=9°C	N. Fans	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	D (mm)	E (mm)	D (mm)	E (mm)	"X" (mm)		2962"Y" (mm)	
FH4/F H3 165	With out Pumps	18	788	328	758	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN150-6"-168.3	Outlet	Grooved pipes connections DN150-6"-168.3
	With Pumps std low press.		788	328	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		788	328	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		788	328	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
NIZ 140	With out Pumps	18	780	328	758	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN150-6"-168.3	Outlet	Grooved pipes connections DN150-6"-168.3
	With Pumps std low press.		780	328	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		780	328	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		780	328	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
NH4/N H3 165	With out Pumps	18	780	328	758	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN150-6"-168.3	Outlet	Grooved pipes connections DN150-6"-168.3
	With Pumps std low press.		780	328	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		780	328	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		780	328	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	

Figure A.12 Recirculation Version - 20 Fans Units



Item	Description
1	Supply cable inlet for adiabatic system
2	Power electric panel
3	Supply cable inlet
4	Auxiliary and displays electrical panel

Figure A.13 Direct Flow Version - 20 Fans Units



Item	Description
1	Supply cable inlet for adiabatic system
2	Power electric panel
3	Supply cable inlet
4	Auxiliary and displays electrical panel
5	Return to the tanks

							Base Fans		Premium Fans		Low Noise Fans		Chilled water connections		
Model	Single Pump Version S ΔT=9°C	N. Fans	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	D (mm)	E (mm)	D (mm)	E (mm)	X (mm)	2962 Y (mm)		
CIZ 150	With out Pumps	20	787.5	327.5	758	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN150-6"-168.3	Outlet	Grooved pipes connections DN150-6"-168.3
	With Pumps std low press.		787.5	327.5	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		787.5	327.5	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		787.5	327.5	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
CH4/C H3 180	With out Pumps	20	787.5	327.5	758	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN150-6"-168.3	Outlet	Grooved pipes connections DN150-6"-168.3
	With Pumps std low press.		787.5	327.5	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		787.5	327.5	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		787.5	327.5	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
CH4/C H3 195	With out Pumps	20	787.5	327.5	758	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN150-6"-168.3	Outlet	Grooved pipes connections DN150-6"-168.3
	With Pumps std low press.		787.5	327.5	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		787.5	327.5	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		787.5	327.5	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	

							Base Fans		Premium Fans		Low Noise Fans		Chilled water connections		
Model	Single Pump Version S ΔT=9°C	N. Fans	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	D (mm)	E (mm)	D (mm)	E (mm)	X (mm)	2962 Y (mm)		
FIZ 150	With out Pumps	20	787.5	327.5	758	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN150-6"-168.3	Outlet	Grooved pipes connections DN150-6"-168.3
	With Pumps std low press.		787.5	327.5	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		787.5	327.5	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		787.5	327.5	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
FH4/F H3 180	With out Pumps	20	787.5	327.5	758	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN150-6"-168.3	Outlet	Grooved pipes connections DN150-6"-168.3
	With Pumps std low press.		787.5	327.5	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		787.5	327.5	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		787.5	327.5	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
FH4/F H3 195	With out Pumps	20	787.5	327.5	758	271	2783.5	352.5	2865	332.5	2845	Inlet	Grooved pipes connections DN150-6"-168.3	Outlet	Grooved pipes connections DN150-6"-168.3
	With Pumps std low press.		787.5	327.5	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With Pumps high press.		787.5	327.5	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	
	With inverter Pump		787.5	327.5	758	271	2783.5	352.5	2865	332.5	2845	Inlet		Outlet	

Appendix C: Adiabatic EP wiring diagram

Figure A.14 Module A

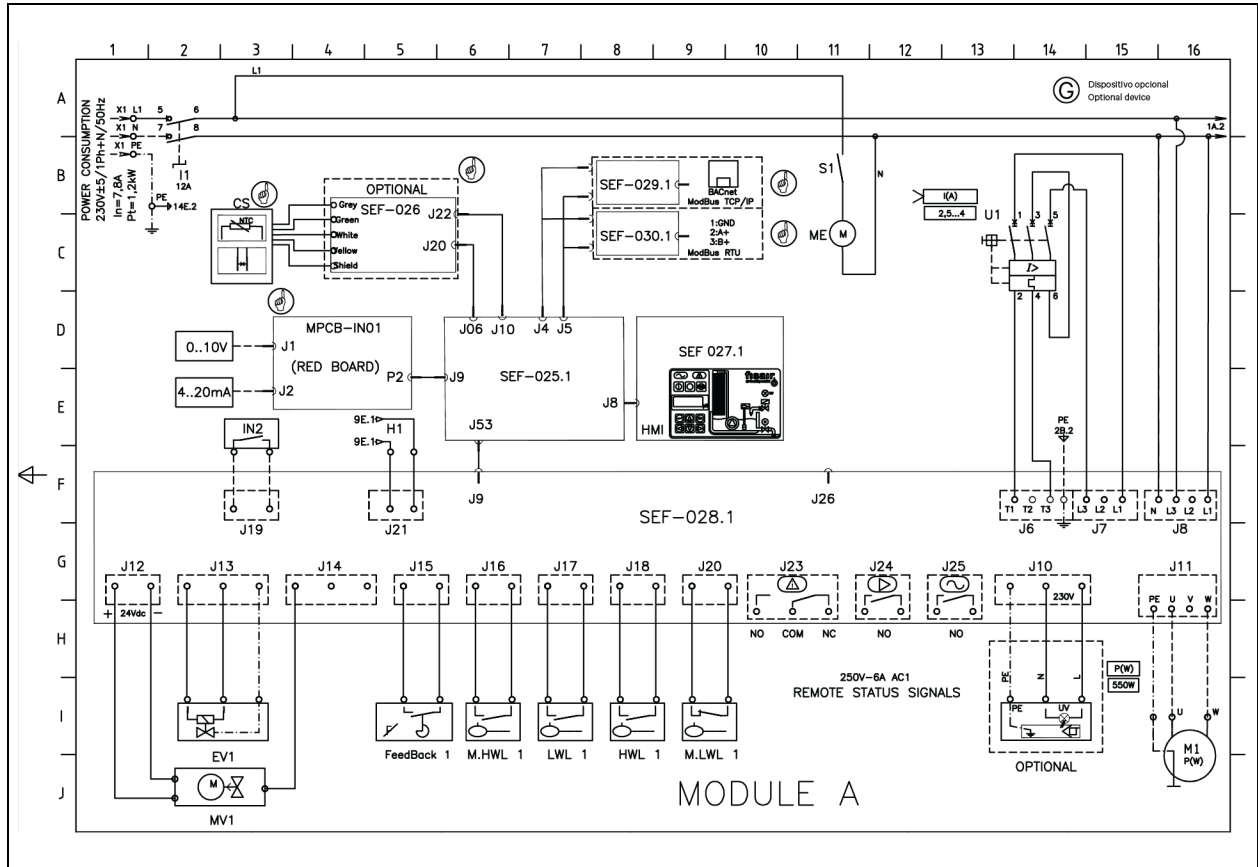


Figure A.15 Module B

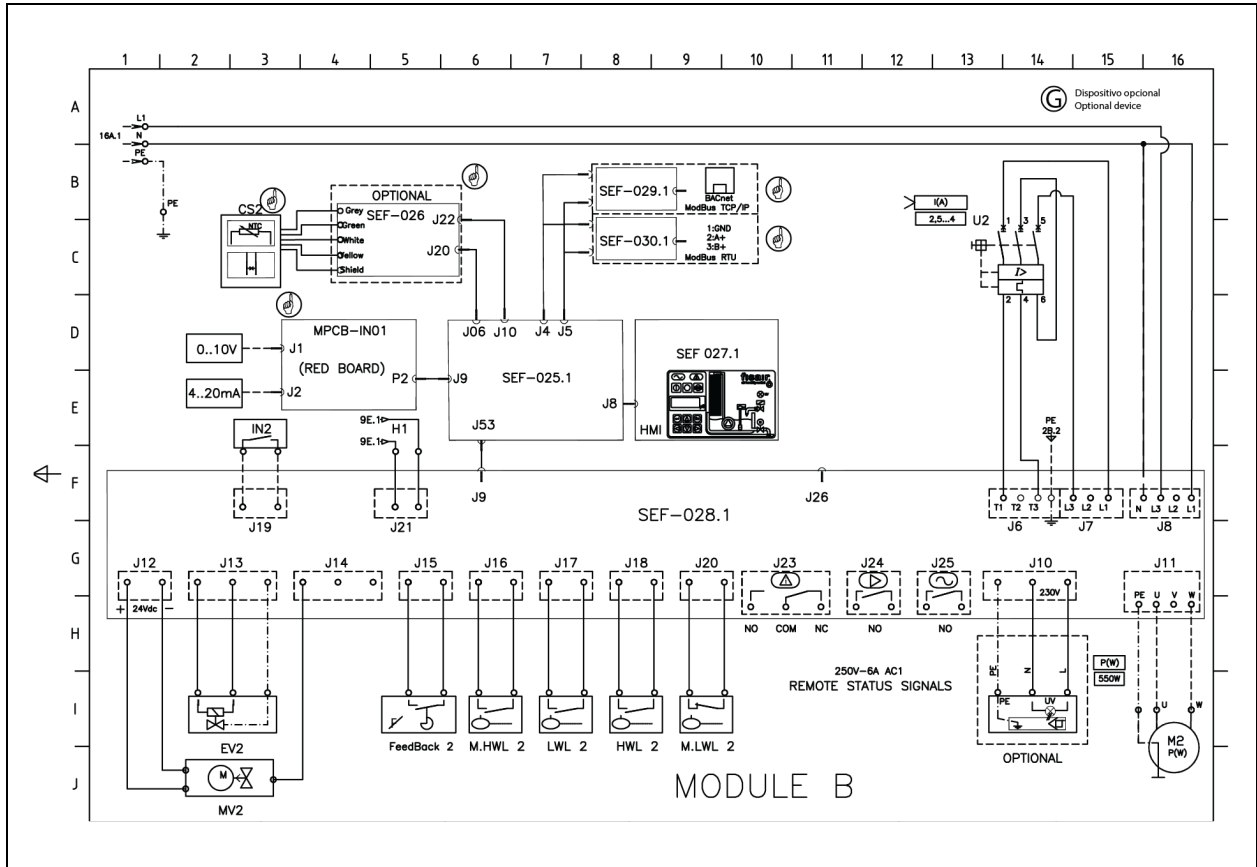
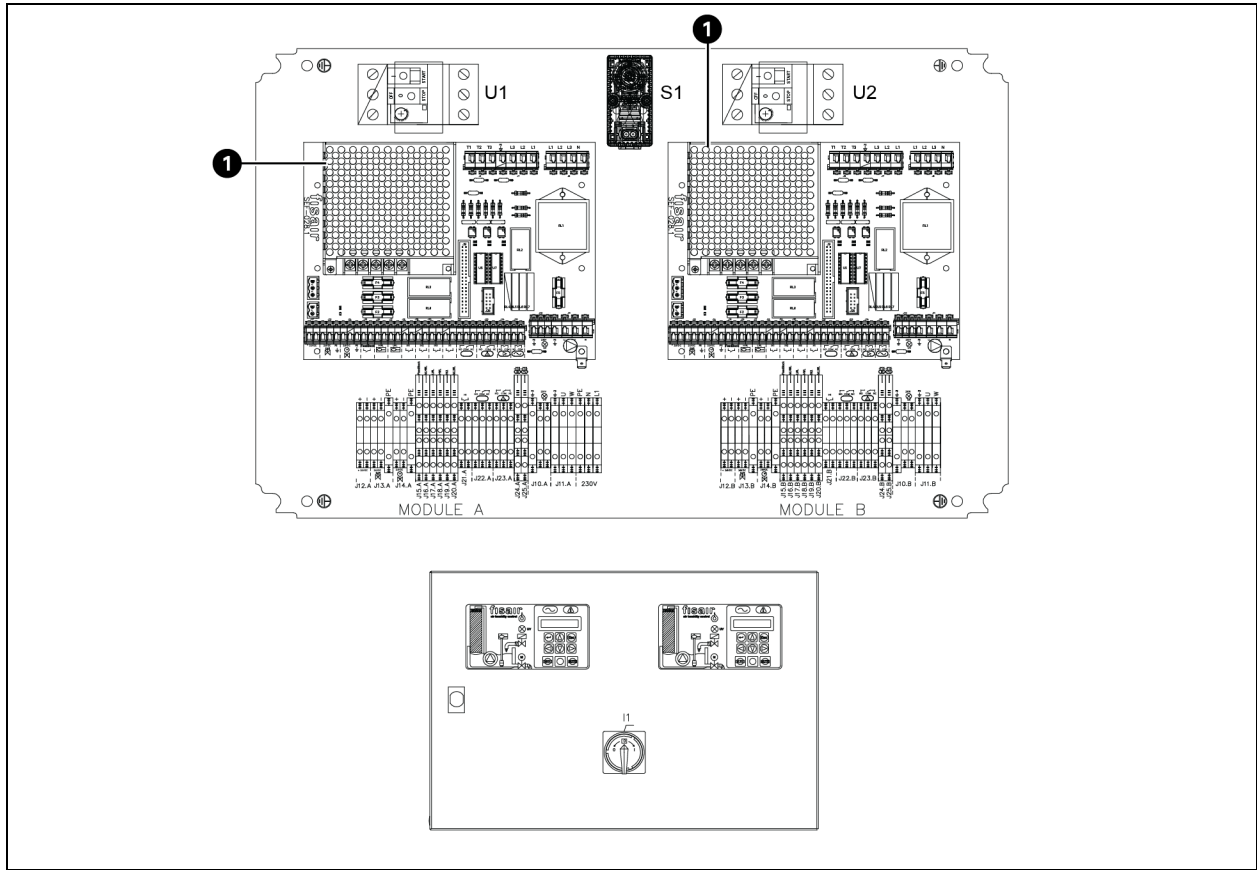


Figure A.16 Wiring Diagram Module A and Module B



Item	Description
1	Fuente De Alimentacion

Name	Description	Position	Name	Description	Position	Name	Description	Position
I1	Isolator switch	1A2	Mv1	Drain valve	11.4	MPCB-IN01	Voltage / Current Board external control	1D.3
U1	Motor circuit breaker	1B14	M.LWL 1	Low water level switch	11.9	U2	Motor circuit breaker	2B.14
F2	Auxiliary supply fuse	2F.6	LWL 1	Low water level switch	11.7	Ev2	Fill valve	2I.3
F3	Ev1 fuse		M.HWL 1	M.High water level switch	11.6	M1	Pump motor	1J.16
F4	Mv1 fuse		HWL 1	High water level switch	11.8	M2	Pump motor	2J.16
F5	UV Lamp fuse		SEF-025.1	CPU		Mv2	Drain valve	2I.4
H1	Remote conection for turn-on the	SEF-026		Conductivity sensor	M.LWL 2		M.Low water level swith	2I.9

Name	Description	Position	Name	Description	Position	Name	Description	Position
	adiabatic system in AUTO							
RL1	Pump relay	SEF-027.1		HMI. (keyboard & bright synoptic)	LWL 2		Low water level swith	2I.7
RL3	Drain valve relay	SEF-028.1		Power and conectivity interface	M.HWL 2		M.High water level swith	2I.6
RL8 M1	Fill valve relay	SEF-029.1		ModBus TCP/IP interface Cardboard (Optional)	HWL 2		High water level swith	2I.8
Ev1	Pump motor Fill valve	1J16 SEF-030.1		ModBus/RTU interface Cardboard (Optional)	ME S1		Cooling Fan	1C.11
		1I3 CS		Conductivemeter			Thermostat Cooling Fan	1B.11

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