Liebert® PEX+Chilled Water Series

Precision Air Conditioning

Technical Manual

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Purpose of the Document

This document applies to the series of precision air conditioners and cooling solutions which maintain optimal environmental control of technological ecosystems at minimal operating costs. This document gives an overview of the specifications, installation, commissioning, and maintenance procedures with troubleshooting from the user perspective. The figures used in this document are for reference only.

Please read this manual carefully before installing, maintaining, and troubleshooting.

Liebert PEX+ Chilled Water precision CRAC is a professional device, only professionals are permitted to access the unit and is kept in a place where access is restricted to common people.

Styling used in this Guide

The styles used in the manual will be defined as mentioned in the following table:

Situation	Description
Warning/Danger/Caution 	• *The Warning/Danger/Caution note indicates a hazardous or potentially harmful situation that can result in death or injury. It also indicates instructions that need to be adhered to, failing which may result in danger and safety issues thereby having an adverse effect on the reliability of the device and security. Even for practices not related to physical injury, to avoid equipment damage, performance degradation, or interruption in service, follow the warning instruction.*
Note 	• *The Note section indicates additional and useful information. It also calls attention to best practices and industry-best protocols that are standardized and help make maximum utilization of the resources at hand. Helpful information related to the product also comes under the Note heading, helping the users with the definitions, concepts, and terminologies used in the manual.*

Version History

Version	Revision Date	Issue	Changes
31013260	05.05.2020		---

Safety Precautions and Measures

The important safety precautions and measures that should be followed during the installation and maintenance are described in the following sections.

Read the manual prior to installation and operation of the unit. Only qualified personnel should move, install, or service this equipment.

Before working on the equipment, the user reads and considers all precautions, compliance and safety measures. The unit control must be used exclusively for the purpose which it is intended for; the manufacturer takes no liability for incorrect use or a modification to the unit control.

Adhere to all the Warnings and Cautionary measures included in the manual.

Please read this manual carefully before installing, maintaining and troubleshooting; especially the Warning/Danger/Caution information in the User Guide. Apart from the User Guide, also pay attention to the warning labels on the unit and its components.

This manual is retained for the entire service life of the unit. The user must read all the precautions, danger, warnings, and cautionary measures mentioned in the manual prior to carrying out any operations on the unit. Each unit is equipped with an electric insulation which allows the users to work in safe conditions. The main switch is positioned on the electrical panel cover; to access it, open the right door. Before any maintenance operation, switch off the unit with this electrical insulation device to eliminate risks such as electrical shocks, burns, automatic restarting, moving parts, and remote control. The panel key, supplied along with the unit, must be kept by the personnel responsible for the maintenance. The protective covers can be removed after the electric power has been cut off by opening the main switch.

In the following sections, notice the various cautionary measures and warnings that need to be read carefully prior to installing or operating the system.

Disconnect the local and remote power supplies prior to working with the unit.

Prior to the installation process, read all the instructions, verify if all the parts are in place, and check the nameplate to ensure the voltage matches the available utility power for the unit.

The controller doesn't isolate power from the unit even in the Off mode, and some internal components still require and receive power during the Off mode.

If the unit door is open while the fans are operating, the airflow may result in abrupt slamming of the door resulting in injury. Another aspect is the presence of small objects in the fans bay that can result in object ejection during the fan start-up and there is a probable risk of being hit by these objects resulting in grievous injury and causing equipment damage.

The unit contains fluids and gases under high pressure. Therefore, the pressure should be relieved before working with the piping.

Various components such as electrical heater, infrared humidifiers or electrode humidifier are extremely hot during the unit operation. Therefore, allow sufficient time for the unit to cool down before working with the unit cabinet. Handle the unit with extreme caution and wear safety equipment such as protective gloves, safety shoes, and arm protection while working with the hot compressors, discharge lines, and reheats.

There is a risk of water leaking that can damage both the equipment and the building. Effective water drain connection and facilities should be available. Installation should be precise. Implementation of the application and service practices should be appropriate and fault-free. Failure to comply with these norms will result in water leakage from the unit. Water leakage can lead to massive damage and loss of critical equipment in the hosting ecosystem. Therefore, care should be taken to ensure that the unit is not located directly above any equipment that could sustain damage due to water and excessive moisture. Use of a leak detection system for the unit and system supply lines are recommended by Vertiv Co.

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Chapter 1: Product Overview

1.1. Product Introduction

The Liebert® PEX+Chilled Water units (hereafter Liebert PEX+CW) are the next generation series of Precision Air Conditioners (PAC) that provide precise environmental control. The Liebert PEX+ chilled water models consist of wide range of cooling capacity from 30 kW to 200 kW for large, medium and small data centers. Incorporating the high standards associated with the Liebert name, the PEX+CW series utilizes the latest technology, system components, and streamlined manufacturing process.

Liebert PEX+CW air conditioners are products that are specifically designed for the special requirements of data centers, computer rooms, and similar ecosystems wherein optimum cooling is required along with a high degree of reliability and variability. It addresses the needs and challenges associated with such critical applications and setups. It caters to sensitive applications which need a suitable environment for optimal performance. Therefore, care should be taken while testing these sensitive products or maintaining a favorable environment for mission critical equipment, as even a slight deviation may lead to inaccurate results. Precision Air Conditioning must not only keep room conditions within a specific range but also be able to react quickly to a drastic change in heat load and prevent wide temperature fluctuations.

The PEX+CW PAC unit comes with the features such as high reliability, high sensible heat ratio, and large airflow. It is an excellent system that adheres to the standards of Precision Air Cooling in terms of energy-efficiency, space requirements, and reliability.

1.2. Model Description

This chapter introduces the model, appearance, components, optional configuration and refrigerant requirements of Liebert® PEX+. The appearance of 'Liebert PEX+ Chilled Water Series Precision Air Conditioner' ("PEX+ CW" for short hereafter) is shown in Figure 1-1.

Figure 1-1 Liebert PEX+ Series Model

1.3. Model Nomenclature

The Liebert® PEX+CW series model is fully-defined by 25 digits, as represented in Table 1-1.

Table 1-1 Liebert PEX+CW Model Nomenclature

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
P	2	0	9	0	D	C	1	N	2	H	S	1	2	L	1	D	0	0	0	C	E	0	0	0

Digit 1 Product Model	
P	***PEX+***
Digit 2 Product Modulus	
1-3	***Number of Modules/ Bays***
Digit 3 Net Cooling Capacity kW	
0-9	***Nominal Net Cooling Capacity- kW***
Digit 4 Net Cooling Capacity kW	
0-9	***Nominal Net Cooling Capacity- kW***
Digit 5 Net Cooling Capacity kW	
0-9	***Nominal Net Cooling Capacity- kW***
Digit 6 Air Discharge	
U	***Upflow***
D	***Downflow***
Digit 7 System Type	
C	***Chilled Water***
Digit 8 Airflow	
1	***EC Plug Fan***
Digit 9 Power Supply	
C	208 V/ 3 Ph/ 60 Hz
D	230 V/ 3 Ph/ 60 Hz
A	460 V/ 3 Ph/ 60 Hz
M	380-415 V / 3 Ph/ 50 Hz
N	380-415 V / 3 Ph/ 50/ 60 Hz+N
Digit 10 Cooling System	
2	***CW Two way Valves***
3	CW Three way Valves
Digit 11 Humidification	
0	None
H	***Infrared Humidifier***
S	Electrode Humidifier
Digit 12 Display	
9	9-inch HMI Display
S	***Small Display***
L	Large Display
Digit 13 Re-heating	
0	None
1	***Electrical Heating Std. 1 Stage***
2	Electrical heating Opt. 2 Stage

Digit 16 Enclosure Option	
1	***Standard Color Black, Orange Peel Grain Coating (ZP7021)***
2	White Orange Peel Grain Coating (G101)
6	Color Charcoal Grey w/ Double Skin (ZP0420)
Digit 17 Mains Switch High Voltage Option	
D	***Main non-Locking Disconnect***
P	Dual Power Supply Parallel
A	Dual Power Supply Interlocking Contactor
T	Dual Power Supply Auto Transfer Switch
Digit 18 Installation Option	
0	None, Standard Pipe, No Low Ambient Kit
H	Re-heat & Humidity Lockout
Digit 19 Monitoring	
0	***None***
7	Unity Card
8	Unity Card*2
Digit 20 Sensors	
0	***None***
A	Supply Air Pressure Sensor
S	Smoke Sensor
H	High Temperature
F	Smoke & High Temp
N	Supply Air Temperature Sensor
R	Remote Sensor
W	Water Temperature Sensor IN/OUT
L	Water Flow Sensor
X	Other Sensor
Digit 21 Packaging	
P	Package- Standard Cardboard and Wooden Pallet
C	***Packaging– Wooden Crate***
Digit 22 Special Requirements	
E	***For Export***
Digit 23 Order Identifier	
0	***Standard Static***
1	High ESP 100 Pa
2	High ESP 200 Pa
3	Other High ESP
X	SFA Included

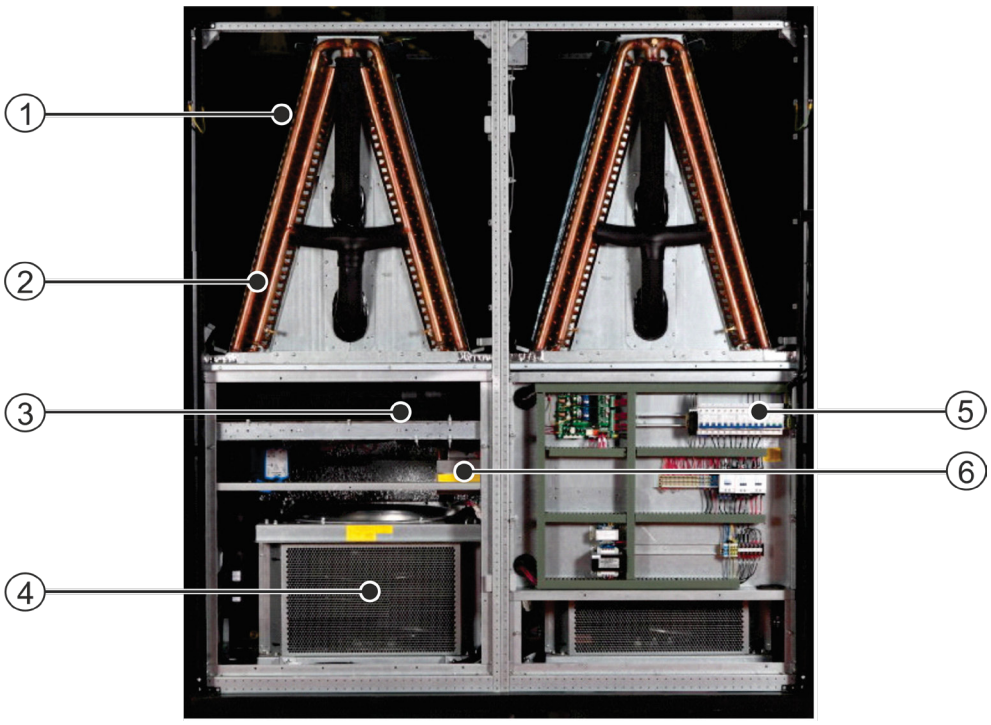
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
P	2	0	9	0	D	C	1	N	2	H	S	1	2	L	1	D	0	0	0	C	E	0	0	0

Digit 14 Filtration		Digit 24 Order Identifier	
2	***G4***	***0***	***None***
3	F5	1	SFA Included
Digit 15 Coil and Valves		**Digit 25 Order Identifier**	
L	***CW Coil, Standard Pressure MBV (≤ 1.6 Mpa)***	***0***	***None***
		1	SFA Included
H	CW Coil, High Pressure MBV		

The standard components are represented in ***'Bold Italic'*** font in Table 1-1.

1.4. Components of PEX+CW Model

An overview of the main components, optional components and features of the Liebert® PEX+CW is mentioned in this section. Liebert PEX+CW components include indoor unit, outdoor unit, and remote monitoring software. Figure 1-2 shows main components of PEX+ model.



No.	Description	No.	Description
1	Filter	4	Fan
2	Cooling Coil	5	Control Board
3	Heater	6	Infrared Humidifier

Figure 1-2 Main Components of PEX+CW Model

The indoor unit includes Compressor, Evaporator, Electronic Expansion Valve (EEV), Infrared Humidifier, EC Fan, Electrical Heating, Sight Glass, Filter Dryer, and iCOM Controller.

1.4.1. Cabinet

The cabinet frame is constructed from 2.5 mm, 2.0 mm and 1.2 mm folded galvanized steel. The exterior panels are constructed from 1.2mm zinc coated sheet of steel and insulated with foam insulation. The cabinet is powder coated in Charcoal Grey color and has a textured finish. The hinged front doors can be removed, and includes captive 1/4 turn fasteners.

1.4.2. EC Fans

The EC Fans used in the Liebert® PEX+CW models are energy-efficient and innovative with integrated electronics and a maintenance-free design.

- Ability to regulate the airflow and reduce the fan input power leading to high energy-efficiency.
- Easy-to-connect facility with minimum wiring leading to a high performance with a great variety of possible airflow rates.

Figure 1-3 EC Fan

1.4.3. Infrared Humidifier

The infrared humidifier consists of infrared humidifier lamp, water injection valve, humidifier water dish, temperature alarm protection devices and water level alarm device.
The infrared humidifier in the Liebert PEX+CW series provides quicker and more responsive operation which is quite important for mission-critical applications. The humidifiers reduce the dependency of water quality and simultaneously achieve full capacity in quick time using almost any water quality.

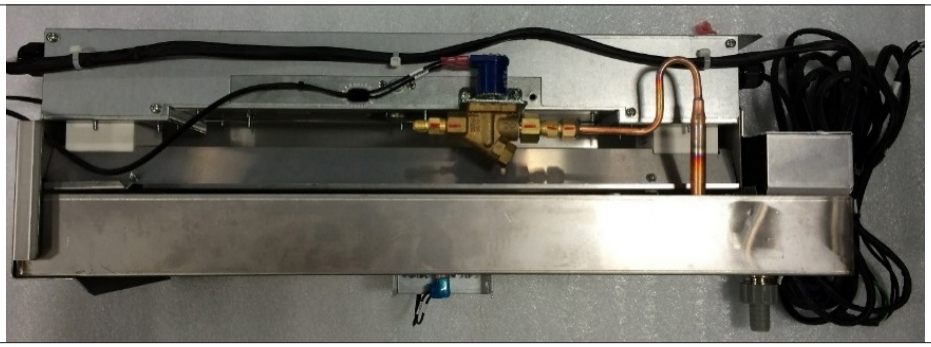


Figure 1-4 Infrared Humidifier

1.4.4. Electrical Heater

Liebert® PEX+ CW models equipped with PTC electrical heater, which features faster heating rate, uniform heating, safety and reliability. The material used in PTC electrical heating for heating purpose are ceramic element and aluminum pipe.

These electrical heaters features lower running temperatures, less susceptible to overheating and long lasting due to less wear thereby ensuring operational safety and lower maintenance and smooth operation

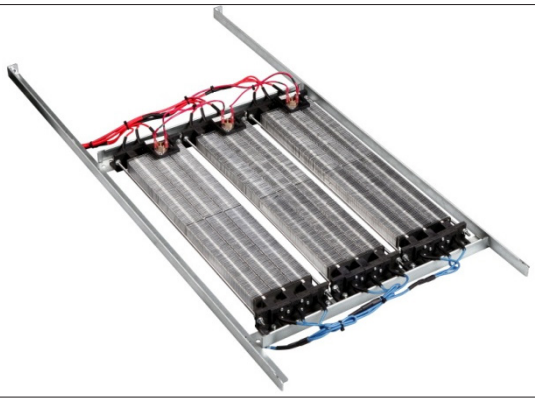


Figure 1-5 Electrical Heater

1.4.5. Water Flow Regulating Valve

The water flow regulating valve (as shown in Figure 1-6) can regulate the chilled water flow according to the cooling requirement of the unit by controlling the water flow passing through the cooling coil thus enables the unit to operate stably within the temperature and humidity setpoint range. User can select two-way or three-way water flow regulating valve according to different applications.

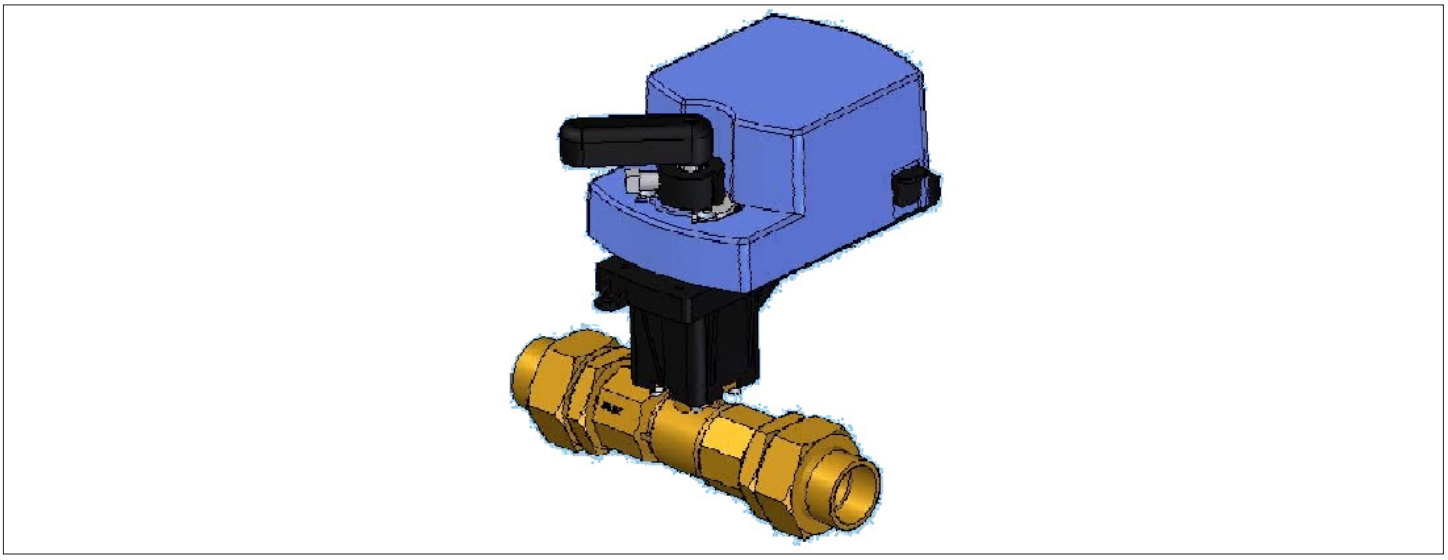


Figure 1-6 Water Flow Regulating Valve

1.4.6. Safety Controlling Device

The electrical reheat is equipped with automatic and manual reset temperature controller which can promptly disconnect and protect the electrical heater when the temperature of the heater is too high.
The infrared humidifier is equipped with manual reset dry burning prevention temperature controller, manual reset safe switch and high water level alarm switch. When there is dry burning and the temperature is too high, the power of the humidifier can be automatically disconnected to protect the humidifier from the damage.

1.4.7. Cooling Coil

Liebert PEX+ CW series is equipped with a fin-tube copper cooling coil which provides high efficiency, high Sensible Heat Ratio (SHR), and low air-side pressure drop. The coil is a construction of enhanced surface aluminum fins mechanically bonded to the surface of copper tubes; the coil frame is fabricated from hot dipped galvanized sheet metal. The water circuits are specifically designed for even water distribution to improve heat transfer rate whilst maintaining pressure drop. The coil fins have a hydrophilic coating as standard and the condensate pan is made from stainless steel.

1.4.8. Filter

The unit uses a standard filter that complies with US ASHRAE52-76 and Eurovent 4/5 standards, and the dust resistance value is 90% (EU4 standard). It is easy to replace. To ensure efficient operation, the dust filter must be checked once a month, and be replaced as required.

Figure 1-7 Filter

1.4.9. Water Leak Detecting System

The advanced water leak detecting system can signal the alarm information to the controller of PAC unit or a stand-alone monitoring system. The number of the sensors in parallel connection is not limited, but each unit has only one water leakage alarm.

1.4.10. iCOM Controller

The iCOM controller is designed for the special requirements of the data center, equipment or computer room. It features good stability, high controlling precision and intelligence.

The front door of the chilled water PAC unit is facilitated with a display and operating panel. This interface enables the operators to easily monitor, observe and deal with issues triggered during operation in time. The iCOM controlling system also supports the multi-units and teamwork mode. There are two types of display options: Large display with 480x480 pixels and standard Small display with 128x64 pixels, as shown in Figure 1-8.

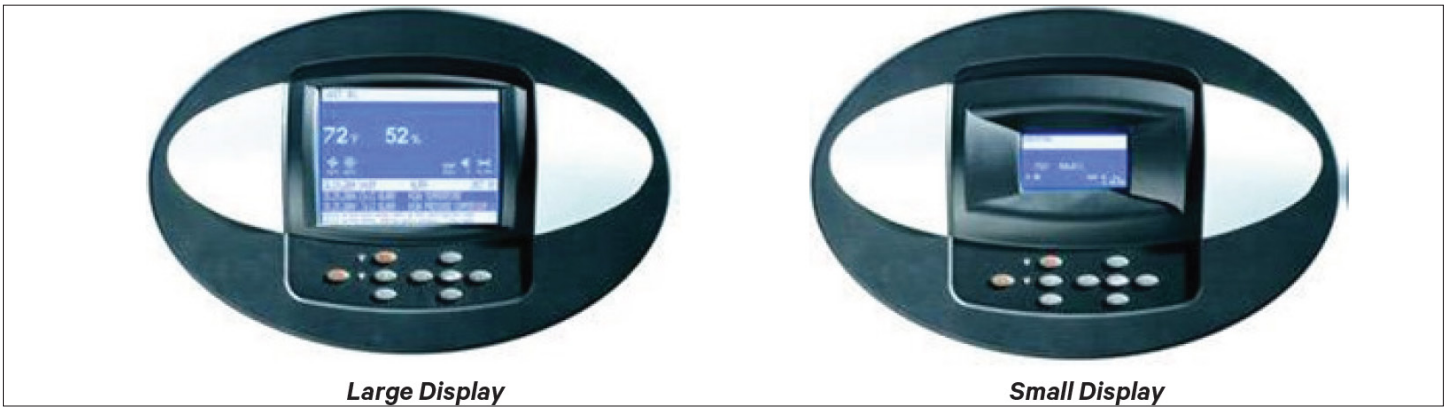


Figure 1-8 iCOM Controller

Liebert PEX+CW PAC adopts Small display with 128 × 64 dot matrix, blue backlight LCD screen as a standard to display the present temperature, humidity, temperature, and humidity setting values, unit output percentage graph (fan, valve, heating, dehumidification, and humidification) and alarm information.

1.5. Optional Components

- **Two-stage Electric Heater**

The two-stage electrical heater can be selected based on the heating requirement. The electrical heater can be divided into two stages by configuring the controller. The heater starts step-wise according to the heating requirement. It not only maintains the room temperature but also reduces the energy consumption.

- **Up Flow Plenum**

All plenums have grills at the outlet to streamline the airflow movement across the room. The plenum grills can be manually regulated by changing the direction of airflow as per the site requirement. In the case of customized design requirement of the Plenum, contact Vertiv local representative.

- **Belt Leak Detector**

Belt leak detector can provide a signal to the controller to trigger an alarm of air conditioner unit. The controller performs several different conditions according to the setpoints:

1. Water Alarm Shuts Unit Down
2. Water Alarm Shuts Hum Down

- **Smoke Detectors**

Smoke detection system facilitates the data center to detect smoke in the unique air-flow environment. The equipment room is outfitted with hot and cold aisles, underfloor and overhead spaces, each separated to contain airflow within the space. The active smoke detection technique triggers an alarm with the first sign of smoke.

- **Fire Detectors**

The fire detector can check the field return air temperature. It triggers fire alarm when the smoke level continues to rise along with elevated room temperature, or the temperature is too high and reaches the fire alarm threshold. The primary purpose of the sensor is to examine the air temperature and to initialize the anti-fire measures installed in the facility.

- **Supply Air Temperature Sensor**

Supply Air Temperature Sensor is used to modulate the heating and cooling effect of the unit by controlling the supply air temperature through plenum. Temperature limits are field adjustable via display interface. The heating or cooling warning activates when the temperature exceeds the thresholds.

- **Water Temperature Sensor IN/OUT**

The 2t temperature sensor can be used to measure the CW temperature status combined with the water flow data which further used to calculate the cooling capacity of the Liebert® PEX+CW unit.

- **High Efficiency Filter**

The unit is also available with the option of high efficiency filter for the environment requiring higher air cleanliness.

- **Electrode Humidifier**

The electrode humidifier uses the electrodes to boil the water in humidifier bottle to produce steam for humidification purpose. It has a specific (soft water) requirements in terms of water quality and sizes of inlet/outlet pipes as compared to the standard infrared humidifier.

- **Three-way Motorized Ball Valve (MBV)**

Three-way MBV can better regulate water flow in the system and also adapts as per more environmental requirements.

- **Supply Air Pressure Sensor**

Supply Air Pressure Sensor is only used for downflow units. It detects the static pressure under the floor of equipment room. The controller can read the values of static pressure.

- **Dual Power Supply Parallel**

In dual power supply parallel, there are two power sources (main and backup) that can be manually switched to backup source in case of power supply failure of main power source to operation of the unit continually.

- **Dual Power Supply Auto Alternate (Interlocking contactor/Automatic Transfer Switch)**

It consists of dual power supply (interlocking contractor 4P). It uses an automatic power switching circuit between the common power supply and backup power supply that is activated if an emergency power supply is required.

- **IS - Unity Card**

IS-UNITY Card can provide two kinds communication protocol: SNMP, Modbus and BACnet that supports standards and norms of the industrial communication protocol.

Chapter 2: Storage & Operating Environment Requirements

2.1. Storage Requirement

Refer Table 2-1 & Table 2-2 for storage environment and operating environment requirement.

Table 2-1 Storage Environment Requirements

Item	Requirement
General requirements	Clean room (no dust)
Environment humidity	5% RH to 85% RH (non-condensing)
Ambient temperature	-20 °C to + 54 °C
Storage time	Total transportation and storage time should not exceed six months, otherwise the performance of the system needs to be re-calibrated.

2.2. Operating Requirement

Table 2-2 Operating Environment Requirements

Item	Requirement
Ambient temperature	Indoor temperature: 18 °C to 40 °C, Outdoor (Chilled Water): Chilled water supply temperature: min 5°C; max 20 °C, Chilled water pressure: max. 16bar
Protection level (cooling unit)	IP20
Altitude	<1000 m, derating is required when located altitude is above 1000 m
Operation voltage range	380 V (-10%) to 415 V (+6%), 3 Ph + N~50/60 Hz

Please contact Vertiv local representative when operating in the following conditions.

1. *The voltage of the air conditioning unit is beyond the range of the operating voltage.*
2. *The altitude is higher than 1000 m.*
3. *If the operating condition is not as per Table 2-2.*

2.3. Noise Level Limits

Under the airflow free return circumstance, the sound pressure level is less than 70 dB for all models. Figure 2-1 and Figure 2-2 provide the noise level measuring points of the unit

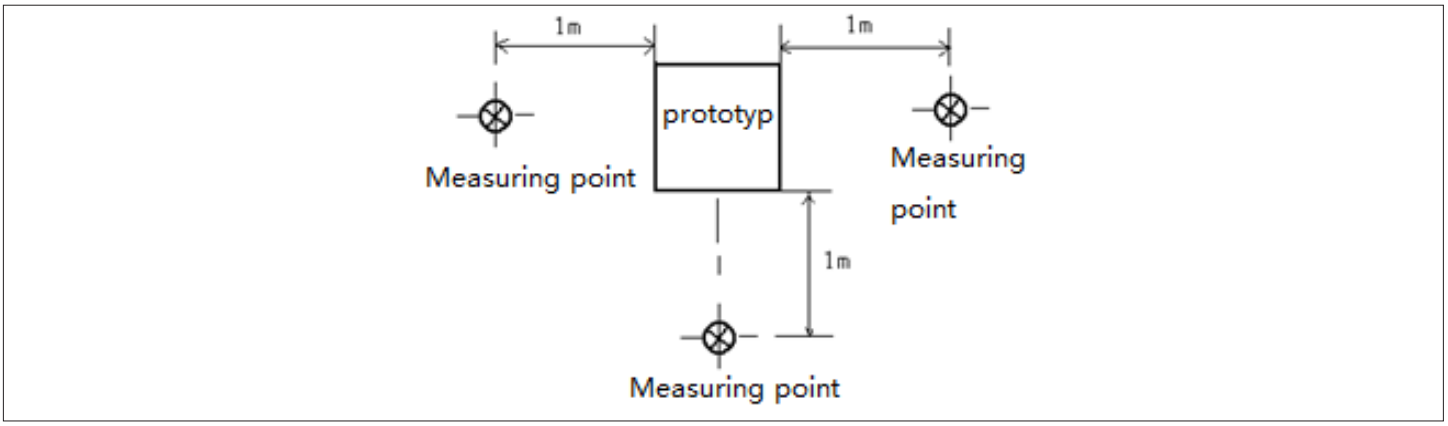


Figure 2-1 Noise Level Measurement (Top View)

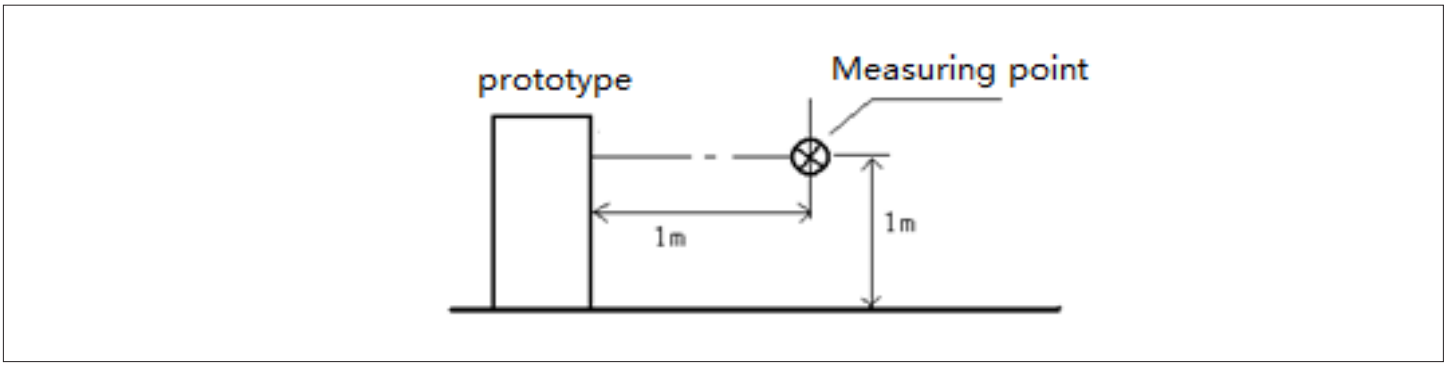


Figure 2-2 Noise Level Measurement (Side View)

Chapter 3: Technical Parameters

This chapter details the technical parameters of Liebert® PEX+CW series. Table 3-2 provides the technical parameters of Liebert PEX+CW models P1030-P2110 and Table 3-2 provides the technical parameters of Liebert PEX+CW models P2120-P3200. All models have upflow version.

Table 3-1 Technical Parameters of the P1030 to P2110 Models (Upflow Units)

Parameters			Unit Model								
			P1030U	P1040U	P1050U	P1060U	P2070U	P2080U	P2090U	P2100U	P2110U
Net Cooling Capacity/ Net Sensible Cooling capacity	24 °C DB, 50 %RH	Net Cooling Capacity (kW)	30.4	40.5	51.2	60.6	71.9	80.8	92.7	100.6	111.8
		Net Sensible Cooling capacity (kW)	27.0	34.4	41.4	48.1	61.1	70.1	75.1	83.2	91.7
Fan	Standard Airflow Rate (m^3/h)		9200	9600	10200	11200	17000	20400	18600	21300	23200
	Number of Fan		1	1	1	1	2	2	2	2	2
	ESP (Pa)		50	50	50	50	50	50	50	50	50
	Fan Power (kW)		1.59	1.82	2.18	1.96	2.75	4.19	3,53	4.85	4.24
Coil	Surface Area (m^2)		1.48	1.48	1.48	1.48	2.63	2.63	2.63	2.63	2.96
	Face Velocity (m/s)		1.73	1.8	1.91	2.1	1.79	2.15	1.96	2.25	2.18
Electrical Reheat	Reheat Power (kW)		6	6	6	6	9	9	9	9	9
Humidifier (optional infrared or electrode humidifier)	Humidification Capacity (kg/h)		4.5	4.5	4.5	4.5	10	10	10	10	10
	Humidifier Water Pan		Stainless Steel								
Filter	Filter Number		4	4	4	4	8	8	8	8	8
	Size	mm	923x418 x46	923x418 x46	923x418 x46	923x418 x46	835x418 x46	835x418 x46	835x418 x46	835x418 x46	835x418 x46

Parameters			Unit Model								
			P1030U	P1040U	P1050U	P1060U	P2070U	P2080U	P2090U	P2100U	P2110U
Interface Dimensions	Chilled Water In and Out Pipes OD (mm)		32	32	42	42	42	42	54	54	54
	Infrared Humidifier Pipe OD (mm)		6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.35
	Condensation Water Drainage Pipe OD (mm)		19	19	19	19	19	19	19	19	19
Chilled Water Supply Requirement	24 °C DB, 50 %RH	Inlet Water Flow (l/s)	1.45	1.93	2.44	2.89	3.42	3.85	4.42	4.79	5.32
		Pressure Drop (kPa)	52.1	59.7	74.8	69.4	63.1	79.1	75.5	88	98.7
Net Weight (kg)			300	310	330	350	490	500	510	520	540
Electrical Parameters (Complete System)	FLA (A)		14.3	14.3	14.3	14.3	23.7	23.7	23.7	23.7	23.7
	Main MCB (A)		100	100	100	100	100	100	100	100	100

Table 3-2 Technical Parameters of the P2120 to P3200 Models (Upflow Units)

Parameters			Unit Model								
			P2120U	P2130U	P2140U	P3150U	P3160U	P3170U	P3190U	P3190U	P3200U
Net Cooling Capacity/ Net Sensible Cooling capacity	24 °C DB, 50 %RH	Net Cooling Capacity (kW)	120.5	131.0	138.6	150.1	161.7	170.6	178.1	192.5	203.0
		Net Sensible Cooling capacity (kW)	100.1	104.9	109.9	123.9	132.1	139.9	147.5	153.4	161.2
Fan	Standard Airflow Rate (m^3/h)		25900	24800	25600	31600	33100	35400	38000	36000	37500
	Number of Fan		2	2	2	3	3	3	3	3	3
	ESP (Pa)		50	50	50	50	50	50	50	50	50
	Fan Power (kW)		5.42	5.16	5.53	7.33	8.41	6.87	8.22	7.47	8

Parameters			Unit Model								
			P2120U	P2130U	P2140U	P3150U	P3160U	P3170U	P3190U	P3190U	P3200U
Coil	Surface Area (m^2)		2.96	2.96	3.29	3.95	4.44	4.44	4.44	4.44	4.94
	Face Velocity (m/s)		2.43	2.33	2.08	2.21	2.07	2.21	2.38	2.25	2.11
Electrical Reheat	Reheat Power (kW)		9	9	9	12	12	12	12	12	12
Humidifier (optional infrared or electrode humidifier)	Humidification Capacity (kg/h)		10	10	10	10	10	10	10	10	10
	Humidifier Water Pan		Stainless Steel								
Filter	Filter Number		8	8	8	12	12	12	12	12	12
	Size	mm	923x418 x46	923x418 x46	1020x418 x46	835x418 x46	923x418 x46	923x418 x46	923x418 x46	923x418 x46	923x418 x46
Interface Dimensions	Chilled Water In and Out Pipes OD (mm)		54	54	54	66.8	66.8	66.8	66.8	66.8	66.8
	Infrared Humidifier Pipe OD (mm)		6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.35
	Condensation Water Drainage Pipe OD (mm)		19	19	19	19	19	19	19	19	19
Chilled Water Supply Requirement	24 °C DB, 50 %RH	Inlet Water Flow (l/s)	5.74	6.24	6.6	7.15	7.7	8.12	8.48	9.17	9.67
		Pressure Drop (kPa)	113.7	94.4	95.1	85.1	89.6	99.1	107.5	87.2	87
Net Weight (kg)			550	560	580	770	790	810	820	840	850
Electrical Parameters (Complete System)	FLA (A)		23.7	23.7	23.7	32.9	32.9	32.9	32.9	32.9	32.9
	Main MCB (A)		100	100	100	100	100	100	100	100	100

- *The unit's cooling capacity test: the inlet temperature of chilled water is 7 °C, and the outlet temperature is 12 °C.*
- *The static pressure outside the fan of upflow unit is 50 Pa, downflow unit is 20 Pa.*
- *Filter based ASHRAE52.1-1992, artificial weight method, the average filtration efficiency above 90%; filtration grade G4 (EN779).*
- *FLA: The largest full-load current value is not the sum of the rated full load current of all components, but the sum of the largest rated full load current of the relevant operational components under the maximum power load operation.*
- *Consult Vertiv Co., Ltd, if the data, which you need, is not included in preceding tables.*

For Downflow Unit

Table 3-3 provides the technical parameters of Liebert PEX+CW models P1030-P2110 and Table 3-4 provides the technical parameters of Liebert PEX+CW models P2120-P3200. All models have downflow version.

Table 3-3 Technical Parameters of the P1030 to P2110 Models (Downflow Units)

Parameters			Unit Model								
			P1030D	P1040D	P1050D	P1060D	P2070D	P2080D	P2090D	P2100D	P2110D
Net Cooling Capacity/ Net Sensible Cooling capacity	24 °C DB, 50 %RH	Net Cooling Capacity (kW)	30.4	40.5	51.1	60.6	71.8	80.8	92.6	100.5	111.8
		Net Sensible Cooling capacity (kW)	27.0	34.4	41.4	48.1	61.0	70.1	75.1	83.2	91.7
Fan	Standard Airflow Rate (m^3/h)		9200	9600	10200	11200	17000	20400	18600	21300	23200
	Number of Fan		1	1	1	1	2	2	2	2	2
	ESP (Pa)		20	20	20	20	20	20	20	20	20
	Fan Power (kW)		1.16	1.31	1.54	1.64	1.94	3.03	2.44	3.43	3.56
Coil	Surface Area (m^2)		1.48	1.48	1.48	1.48	2.63	2.63	2.63	2.63	2.96
	Face Velocity (m/s)		1.73	1.8	1.91	2.1	1.79	2.15	1.96	2.25	2.18
Electrical Reheat	Reheat Power (kW)		6	6	6	6	9	9	9	9	9

Parameters			Unit Model								
			P1030D	P1040D	P1050D	P1060D	P2070D	P2080D	P2090D	P2100D	P2110D
Humidifier (optional infrared or electrode humidifier)	Humidification Capacity (kg/h)		4.5	4.5	4.5	4.5	10	10	10	10	10
	Humidifier Water Pan		Stainless Steel								
Filter	Filter Number		4	4	4	4	8	8	8	8	8
	Size	mm	923x418 x46	923x418 x46	923x418 x46	923x418 x46	835x418 x46	835x418 x46	835x418 x46	835x418 x46	923x418 x46
Interface Dimensions	Chilled Water In and Out Pipes OD (mm)		32	32	42	42	42	42	54	54	54
	Infrared Humidifier Pipe OD (mm)		6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.35
	Condensation Water Drainage Pipe OD (mm)		19	19	19	19	19	19	19	19	19
Chilled Water Supply Requirement	24 °C DB, 50 %RH	Inlet Water Flow (l/s)	1.45	1.93	2.44	2.89	3.42	3.85	4.42	4.79	5.32
		Pressure Drop (kPa)	52.1	59.7	74.8	69.4	63.1	79.1	75.5	88.0	98.7
Net Weight (kg)			300	310	330	350	490	500	510	520	540
Electrical Parameters (Complete System)	FLA (A)		14.3	14.3	14.3	14.3	23.7	23.7	23.7	23.7	23.7
	Main MCB (A)		100	100	100	100	100	100	100	100	100

Table 3-4 Technical Parameters of the P2120 to P3200 Models (Downflow Units)

Parameters			Unit Model								
			P2120D	P2130D	P2140D	P3150D	P3160D	P3170D	P3190D	P3190D	P3200D
Net Cooling Capacity/ Net Sensible Cooling capacity	24 °C DB, 50 %RH	Net Cooling Capacity (kW)	120.5	131.0	140.4	150.2	161.7	170.6	181.5	192.5	207.8
		Net Sensible Cooling capacity (kW)	100.1	104.9	111.6	123.9	132.2	139.9	150.6	153.4	164.9
Fan	Standard Airflow Rate (m^3/h)		25900	24800	26100	31600	33100	35400	39000	36000	38400
	Number of Fan		2	2	2	3	3	3	3	3	3
	ESP (Pa)		20	20	20	20	20	20	20	20	20
	Fan Power (kW)		4.69	4.42	4.80	4.99	5.65	5.83	7.38	6.40	7.13
Coil	Surface Area (m^2)		2.96	2.96	3.29	3.95	4.44	4.44	4.44	4.44	4.94
	Face Velocity (m/s)		2.43	2.33	2.19	2.21	2.07	2.21	2.44	2.25	2.16
Electrical Reheat	Reheat Power (kW)		9	9	9	12	12	12	12	12	12
Humidifier (optional infrared or electrode humidifier)	Humidification Capacity (kg/h)		10	10	10	10	10	10	10	10	10
	Humidifier Water Pan		Stainless Steel								
Filter	Filter Number		8	8	8	12	12	12	12	12	12
	Size	mm	923x418 x46	923x418 x46	1020x418 x46	835x418 x46	923x418 x46	923x418 x46	923x418 x46	923x418 x46	1020x418 x46
Interface Dimensions	Chilled Water In and Out Pipes OD (mm)		54	54	54	66.8	66.8	66.8	66.8	66.8	66.8
	Infrared Humidifier Pipe OD (mm)		6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.35	6.35
	Condensation Water Drainage Pipe OD (mm)		19	19	19	19	19	19	19	19	19

Parameters			Unit Model								
			P2120D	P2130D	P2140D	P3150D	P3160D	P3170D	P3190D	P3190D	P3200D
Chilled Water Supply Requirement	24 °C DB, 50 %RH	Inlet Water Flow (l/s)	5.74	6.24	6.69	7.15	7.70	8.12	8.64	9.17	9.90
		Pressure Drop (kPa)	113.7	94.4	97.5	85.1	89.6	99.1	111.5	87.2	91
Net Weight (kg)			550	560	580	770	790	810	820	840	850
Electrical Parameters (Complete System)	FLA (A)		23.7	23.7	23.7	32.9	32.9	32.9	32.9	32.9	32.9
	Main MCB (A)		100	100	100	100	100	100	100	100	100

- *The unit's cooling capacity test: the inlet temperature of chilled water is 7 °C, and the outlet temperature is 12 °C.*
- *The static pressure outside the fan of upflow unit is 50 Pa, downflow unit is 20 Pa.*
- *Filter based ASHRAE52.1-1992, artificial weight method, the average filtration efficiency above 90%; filtration grade G4 (EN779).*
- *FLA: The largest full-load current value is not the sum of the rated full load current of all components, but the sum of the largest rated full load current of the relevant operational components under the maximum power load operation.*
- *Consult Vertiv, if the any required technical specification is other than preceding tables.*

Chapter 4: Mechanical and Electrical Parameters

4.1. Installation Space Requirements

Adequate installation space for the indoor unit must be provided. The indoor unit of the air-cooled product must be installed on the floor of equipment room or computer room and the outdoor unit must be installed outside data center, open to the external ambient.

- *Do not use the indoor unit in the open and severe outdoor environment.*
- *Avoid locating the indoor unit in concave or narrow areas, which can obstruct the airflow, shorten the cooling cycle and result in air return short cycle and air noise.*
- *Avoid locating multiple indoor units close to each other. This can result in short cycle of air and create load imbalance.*
- *Do not install the unit within the vicinity of any other precision cooling equipment to prevent the leakage of condensed water produced due to imbalance load condition.*
- *Do not install other devices (such as smoke detector) over the indoor cabinet*

4.1.1. Maintenance Space Requirement

When installing the unit, a minimum maintenance space of 900 mm must be reserved in-front of the air conditioning unit. The requirement for maintenance space is shown in Figure 4-1.

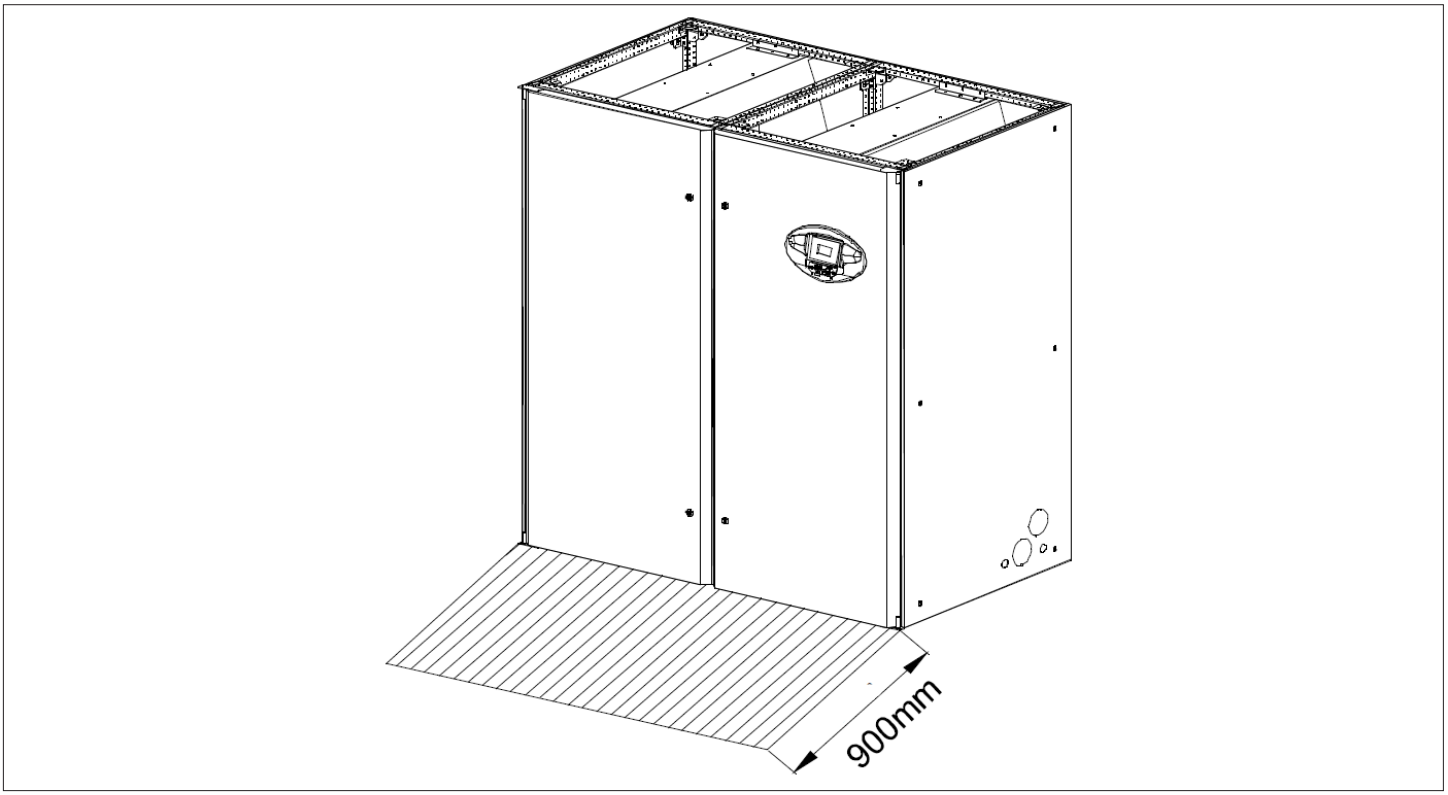


Figure 4-1 Maintenance Space of Unit

4.2. System Arrangement during Installation

Figure 4-2 shows the piping connection of indoor and outdoor units of the chilled water series AC.

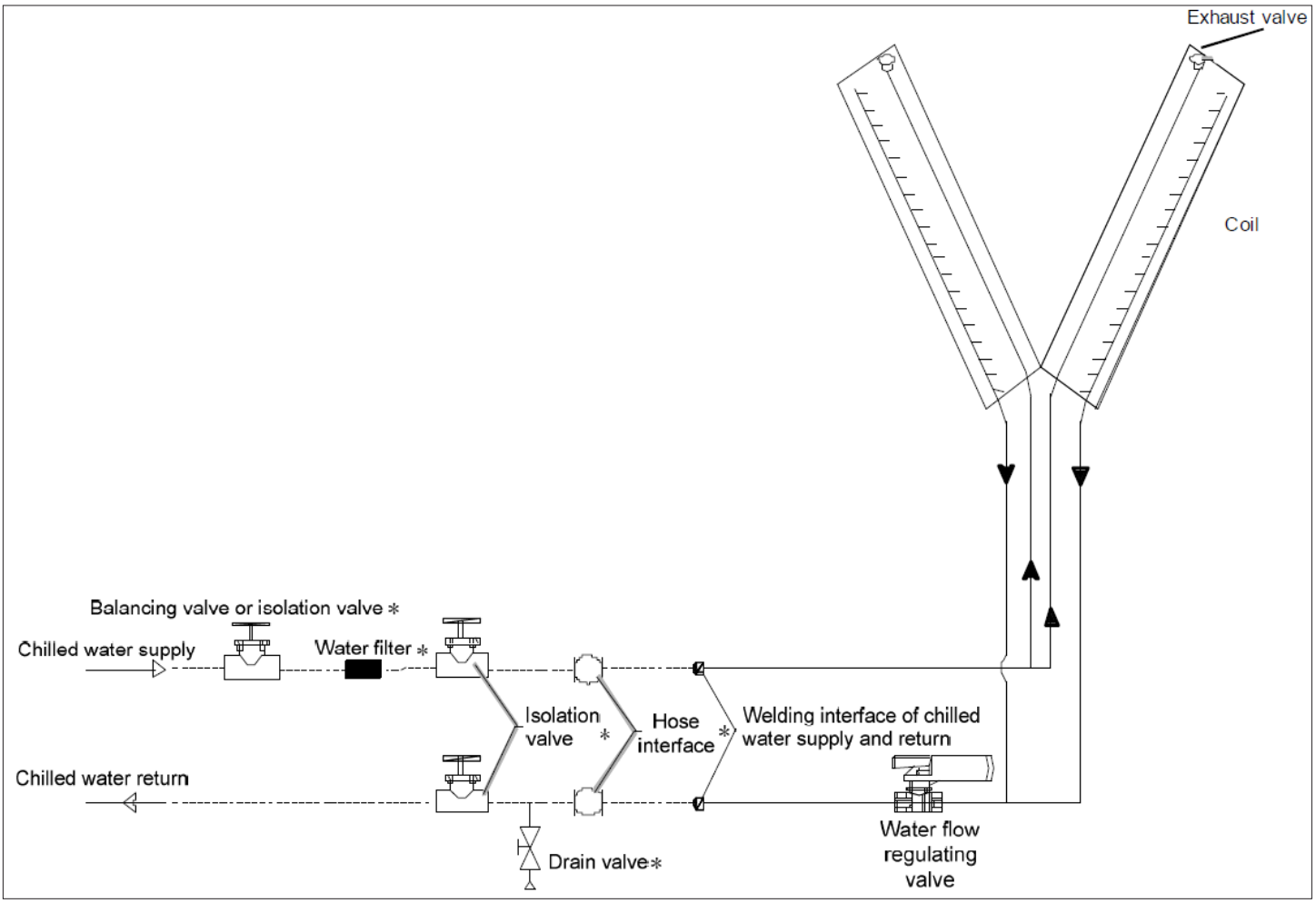


Figure 4-2 System Arrangement

The following points should be considered before checking out the overall layout diagram of an entire system as an example of single system.

- ———————: *Factory piping*
- ----------: Field piping *(by technical personnel)*
- *Components (marked with *) are not supplied by Vertiv Co. but are recommended for proper circuit operation and maintenance.*
- *After the installation, exhaust the AC unit before filling water to ensure the efficiency of the coil.*
- *In winter, the AC unit does not operate for a long term; empty the water in AC unit to protect the heat exchanger from frost cracking.*

4.3. Mechanical Installation

4.3.1. Indoor Unit Size and Weight (Product Dimension)

The dimensions and operational weight of the indoor units are depicted in Figure 4-3 & Figure 4-4 and Table 4-1 respectively.

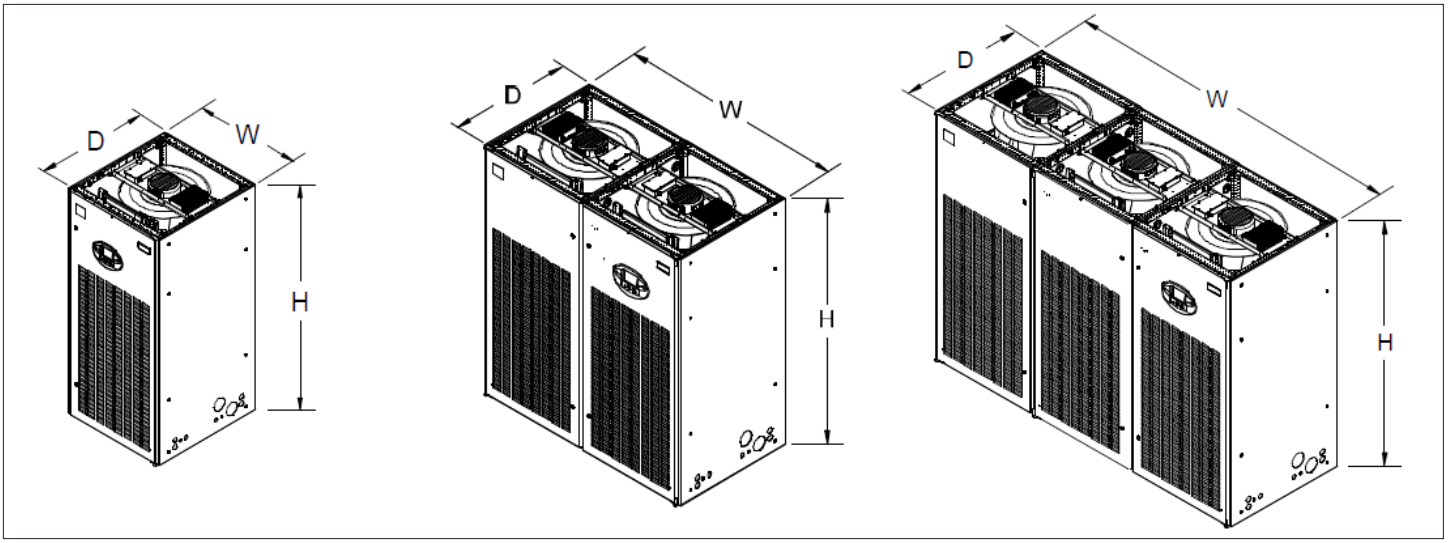


Figure 4-3 Upflow Indoor Unit

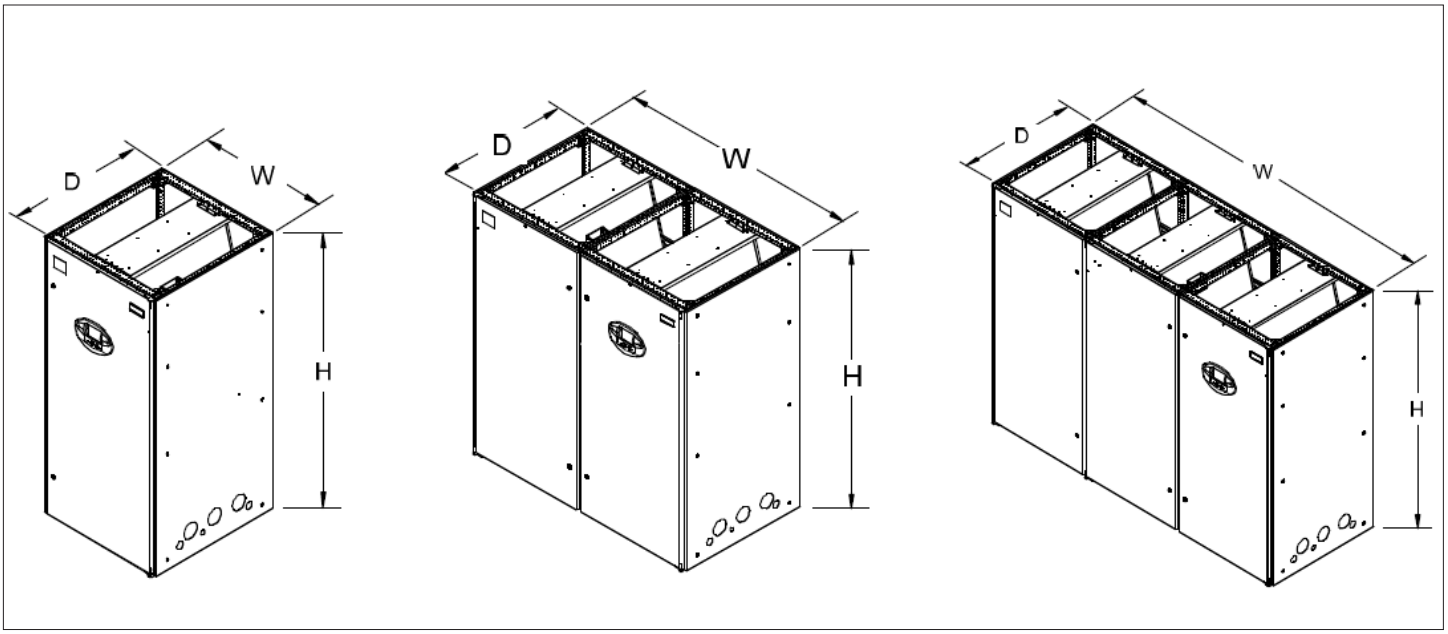


Figure 4-4 Downflow Indoor Unit

Table 4-1 Indoor Unit Size and Weight

Product Number	Dimensions (W×D×H)		Net Weight (kg)
	mm	inch	
P1030	930 × 995 × 1975	36.6”×39.2”×77.7”	300
P1040	930 × 995 × 1975	36.6”×39.2”×77.7”	310
P1050	930 × 995 × 1975	36.6”×39.2”×77.7”	330
P1060	930 × 995 × 1975	36.6”×39.2”×77.7”	350
P2070	1680 × 995 × 1975	66.1”×39.2”×77.7”	490
P2080	1680 × 995 × 1975	66.1”×39.2”×77.7”	500
P2090	1680 × 995 × 1975	66.1”×39.2”×77.7”	510
P2100	1680 × 995 × 1975	66.1”×39.2”×77.7”	520
P2110	1830 × 995 × 1975	72.0”×39.2”×77.7”	540
P2120	1830 × 995 × 1975	72.0”×39.2”×77.7”	550
P2130	1830 × 995 × 1975	72.0”×39.2”×77.7”	560
P2140	1830 × 995 × 1975	72.0”×39.2”×77.7”	580
P3150	2505 × 995 × 1975	98.6”×39.2”×77.7”	770
P3160	2730 × 995 × 1975	107.5”×39.2”×77.7”	790
P3170	2730 × 995 × 1975	107.5”×39.2”×77.7”	810
P3180	2730 × 995 × 1975	107.5”×39.2”×77.7”	820
P3190	2730 × 995 × 1975	107.5”×39.2”×77.7”	840
P3200	2730 × 995 × 1975	107.5”×39.2”×77.7”	850

4.4. Position and Dimension of Air Outlet on Top Cover

The position and dimensions of cut-out of the all models of PEX+CW upflow units are shown in Figure 4-5 and in Table 4-2 respectively.

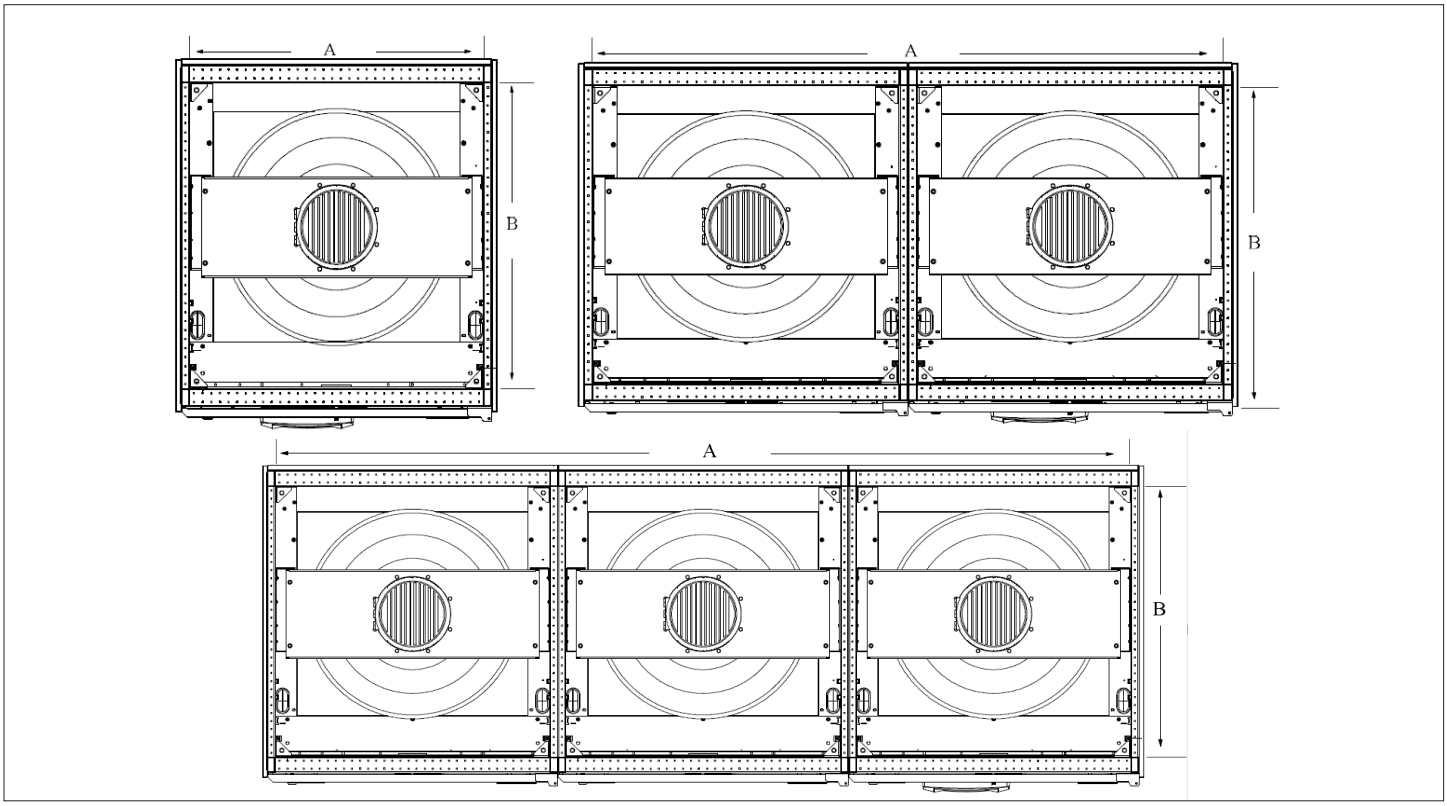


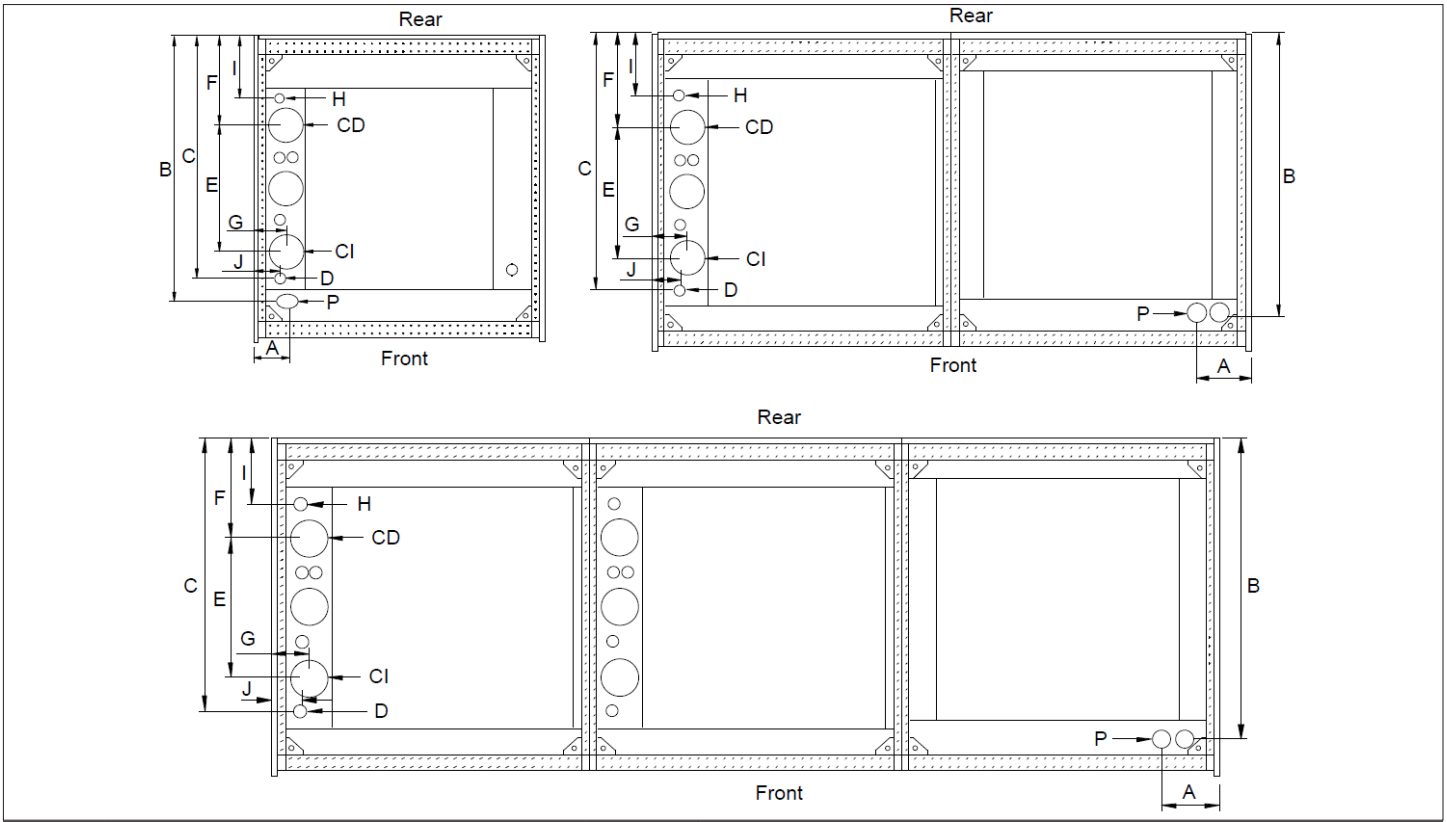
Figure 4-5 The Position of Cut-out Upflow Unit

Table 4-2 Dimensions of Air Outlet on Top Cover of Upflow Unit(inch/mm)

Types of Model	A	B
	mm	mm
P1030-P1060	850	850
P2070-P2100	1600	850
P2110-P2140	1750	850
P3150	2425	850
P3160-P3200	2650	850

4.4.1. Base Pallet Cut-out Location Dimension

The position and dimensions of air outlet on the top cover of downflow unit are shown in Figure 4-6 and in Table 4-3 respectively.



Sym.	Description	Sym.	Description
P	Power cable entry	D	Drain pipe hole
H	Water inlet for humidifier	CI/CO	Chilled water inlet and outlet

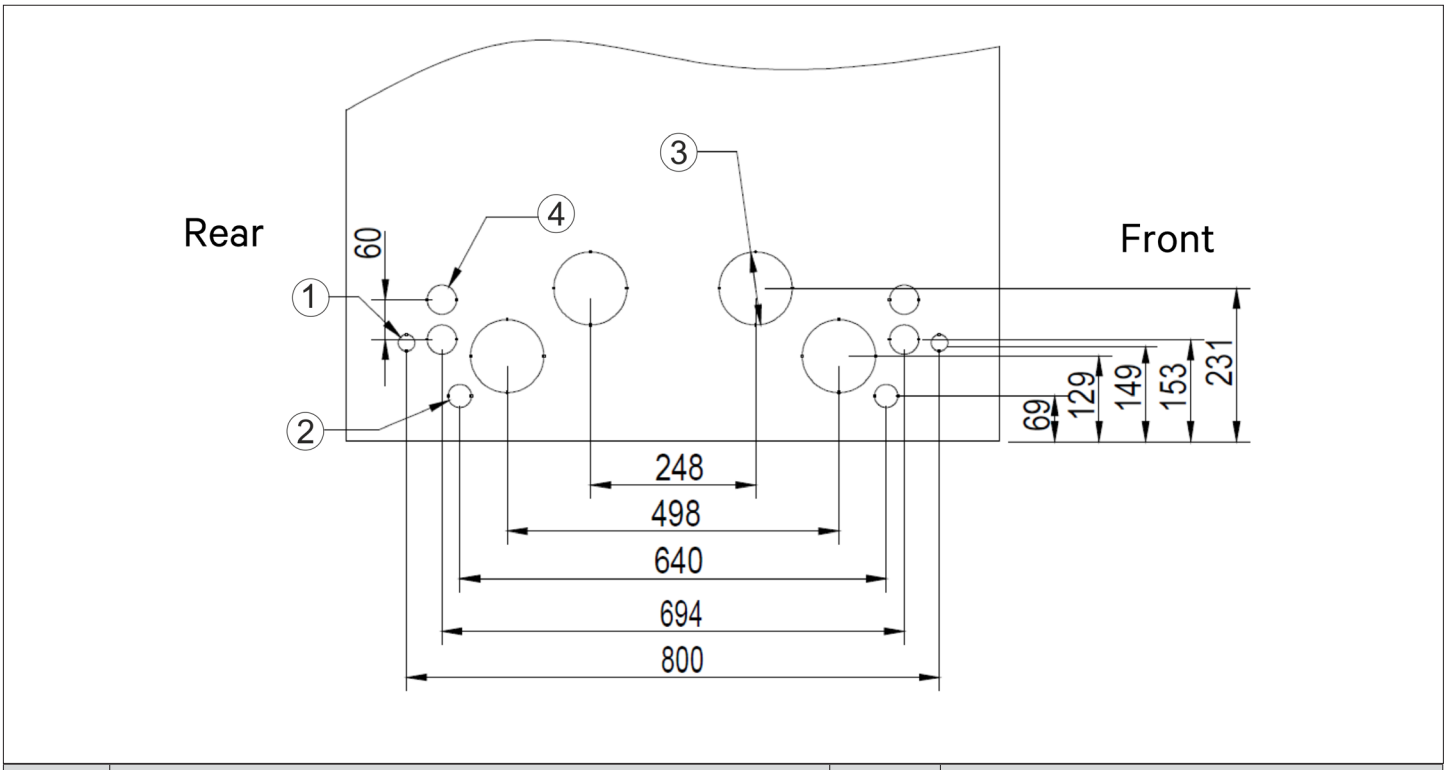
Figure 4-6 The Position of Air Outlet on Top Cover Upflow Unit

Table 4-3 Dimensions of Air Outlet on Top Cover of Downflow Unit (inch/mm)

Types of Model	A	B	C	E	F	G	I	J	D	H	P	CI	CO
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
P1030~P1050	117	852	779	404	290	105	205	85	35	35	51x76	110	110
P1060	141	797	797	404	290	108	187	66	35	35	51x76	110	110
P2070-P2100	180	887	779	404	290	105	205	85	35	35	56	110	110
P2110-P2140	167	874	792	404	290	108	192	88	35	35	56	110	110
P3150	180	887	779	404	290	105	205	85	35	35	56	110	110
P3160	182	887	779	404	290	105	205	85	35	35	56	110	110
P3170-P3200	167	874	792	404	290	108	192	88	35	35	56	110	110

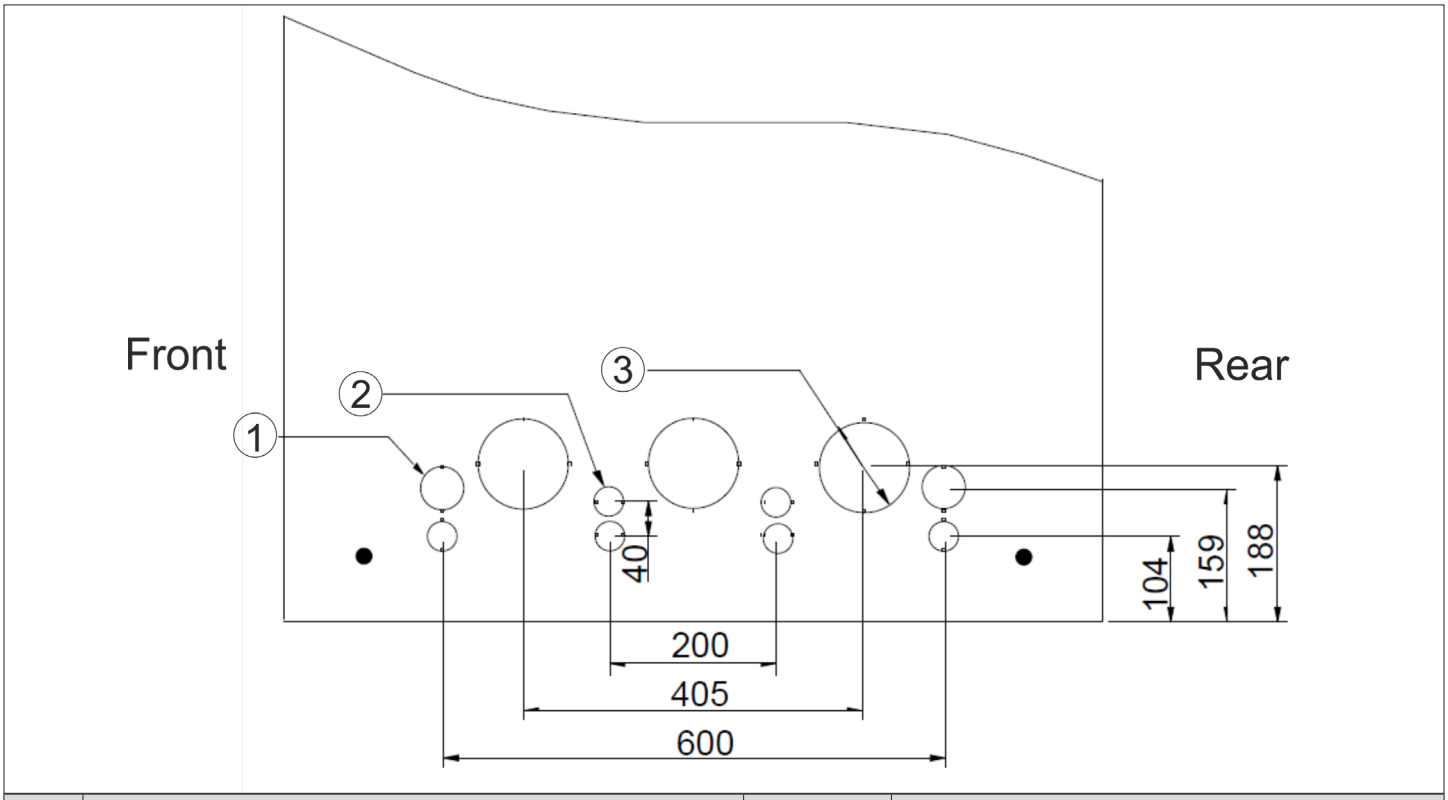
4.4.2. Side Panel Knock-out Location

If it is difficult to route piping and cabling from the base then route the connection from side panel. The locations and dimensions of knock-out holes are shown in Figure 4-7 and Figure 4-8. Select the inlet and outlet holes according to the requirements. Ensure only one service is used per opening.



No.	Description	No.	Description
1	2-Ø25 Knock-out hole	3	4-Ø110 Knock-out hole
2	2-Ø35 Knock-out hole	4	4-Ø44 Knock-out hole

Figure 4-7 Knock-out Holes on Side Panel of the Upflow Unit (unit: mm)



No.	Description	No.	Description
1	2-Ø52 Knock-out hole	3	3-Ø110 Knock-out hole
2	6-Ø35 Knock-out hole		

Figure 4-8 Knock-out Holes on Side Panel of the Downflow Unit (unit: mm)

The unit has knock-outs on the panels, ensure to mount sleeve to the cable holes to avoid cutting of the cables.

4.4.3. Plenum Dimension (for Upflow)

Following are the plenum dimension for Liebert® PEX+CW series upflow units as per one, two and three bays as shown in Figure 4-9, Figure 4-10, Figure 4-11 and in Table 4-4 respectively.

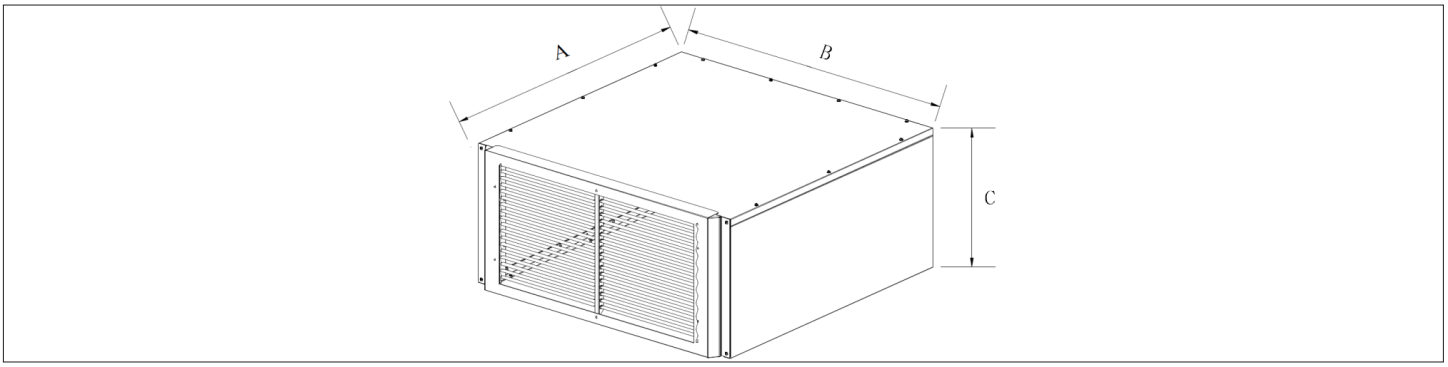


Figure 4-9 Plenum Dimensions of P1030 and P1060 Upflow Unit

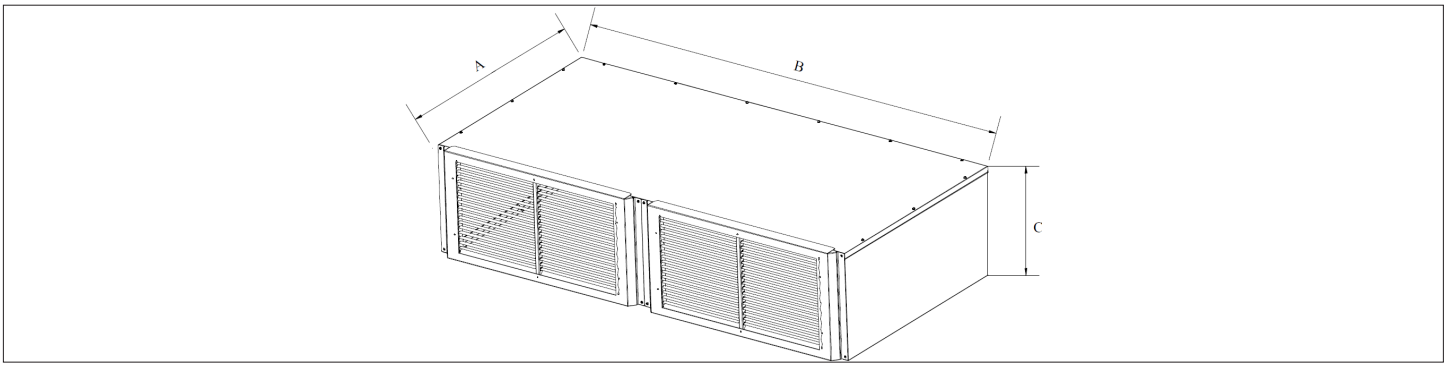


Figure 4-10 Plenum Dimensions of P2070 toP2140 Upflow Unit

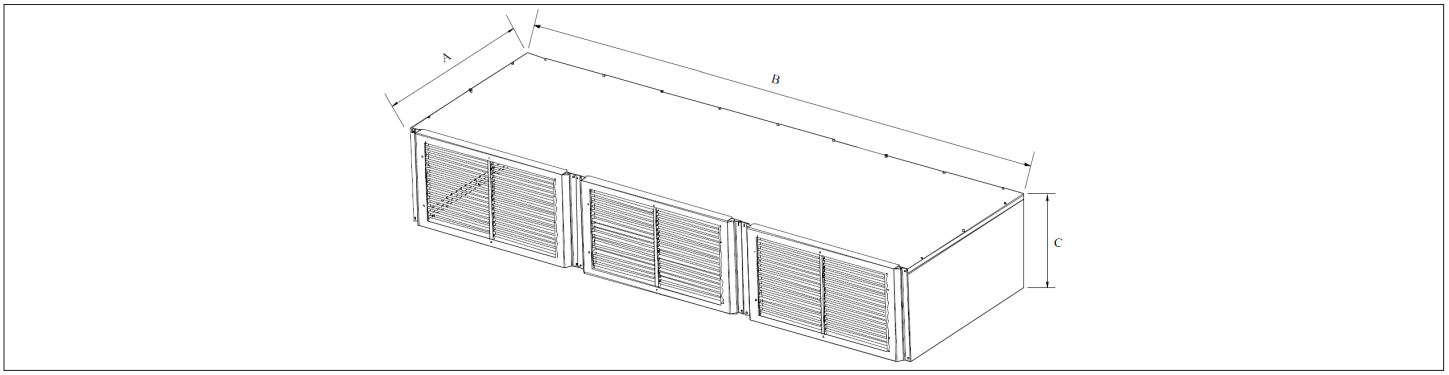


Figure 4-11 Plenum Dimensions of P3160 to P3200 Upflow Unit

Table 4-4 Dimensions of Air Outlet on Top Cover of Upflow Unit(inch/mm)

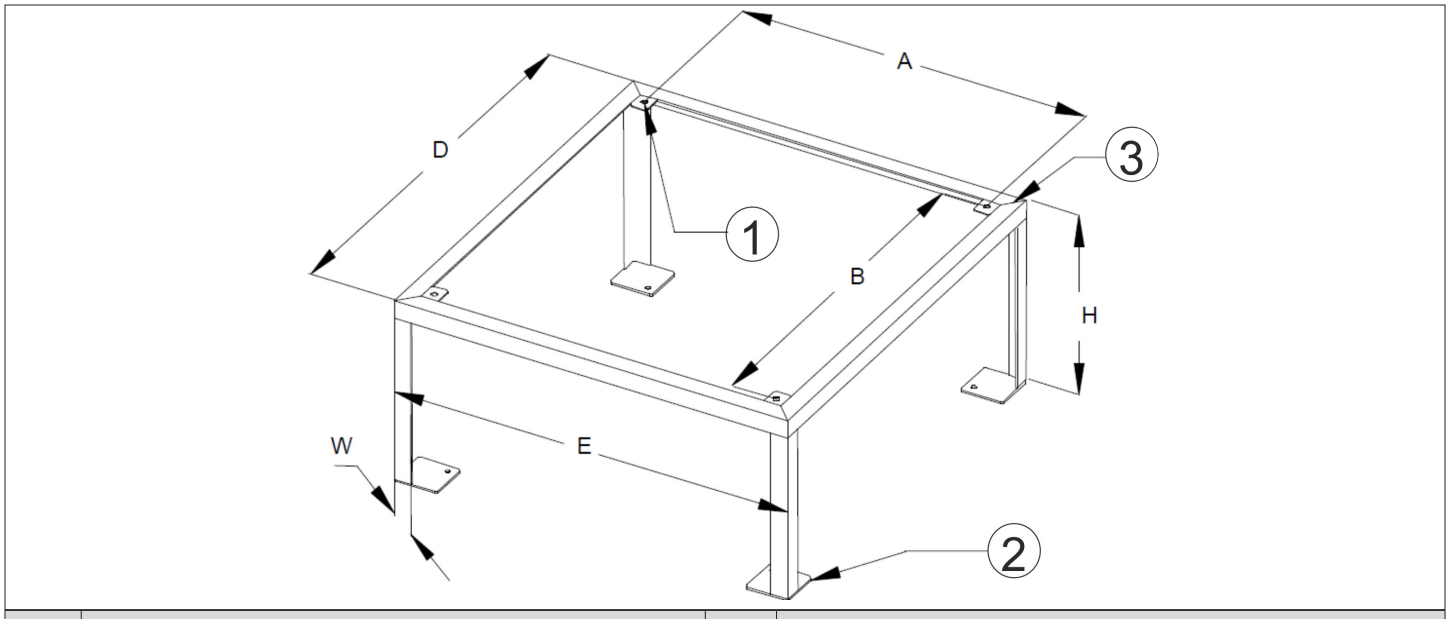
Types of Model	A (Depth)	B (Width)	C (Height)
	mm	mm	mm
P1040 - P1060	995	930	400 (600, optional)
P2070 - P2100	995	1680	400 (600, optional)
P2110 - P2140	995	1830	400 (600, optional)
P3150	995	2505	400 (600, optional)
P3160 - P3200	995	2730	400 (600, optional)

If the plenum height requirement is more than 600 mm then consult Vertiv local representative for more details on non-standard production.

4.5. Indoor Installation

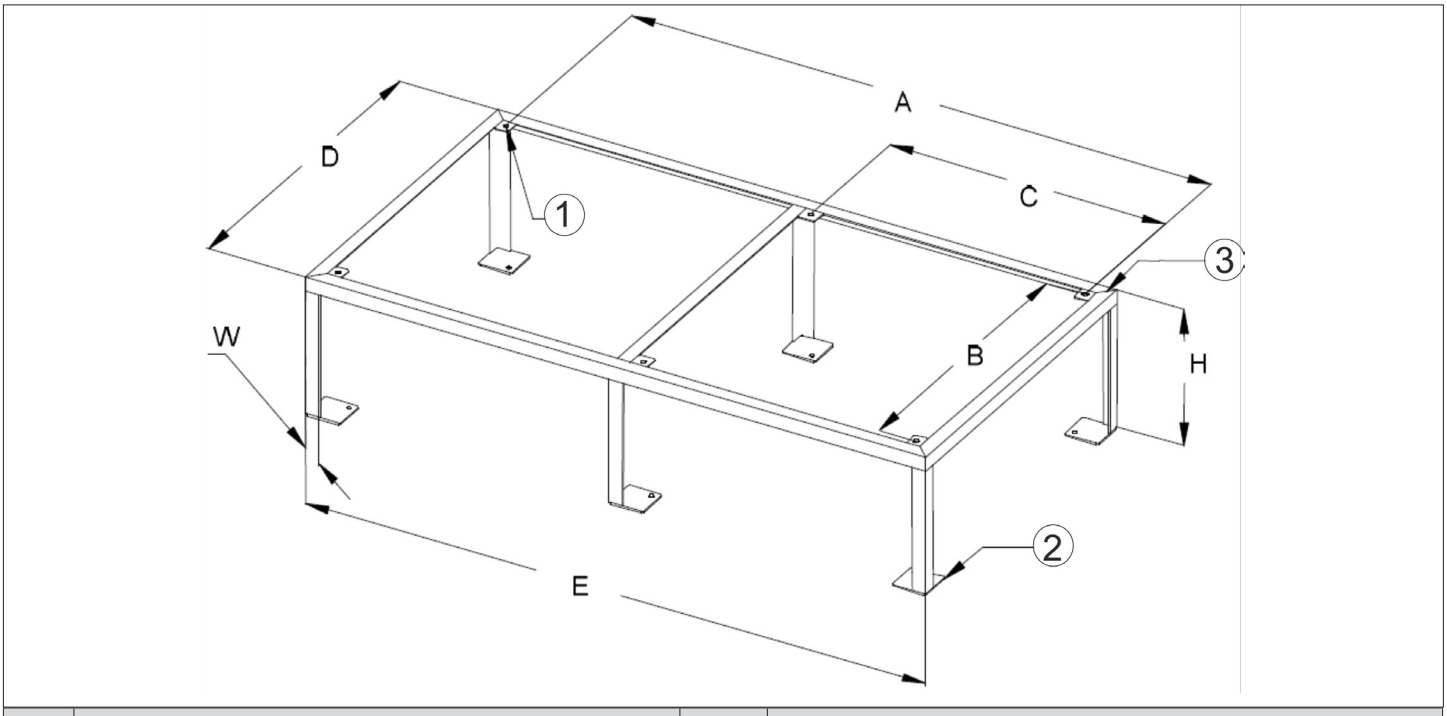
- **Mounting Floor Stand**

The mounting floor stand is to be prepared by the installation team according to the dimensions, weight, and height of the unit to ensure that the structure is rigid, the floor stand should be sized according to the number of bays in the unit model as shown in Figure 4-12, Figure 4-13, Figure 4-14 and Table 4-5 respectively.



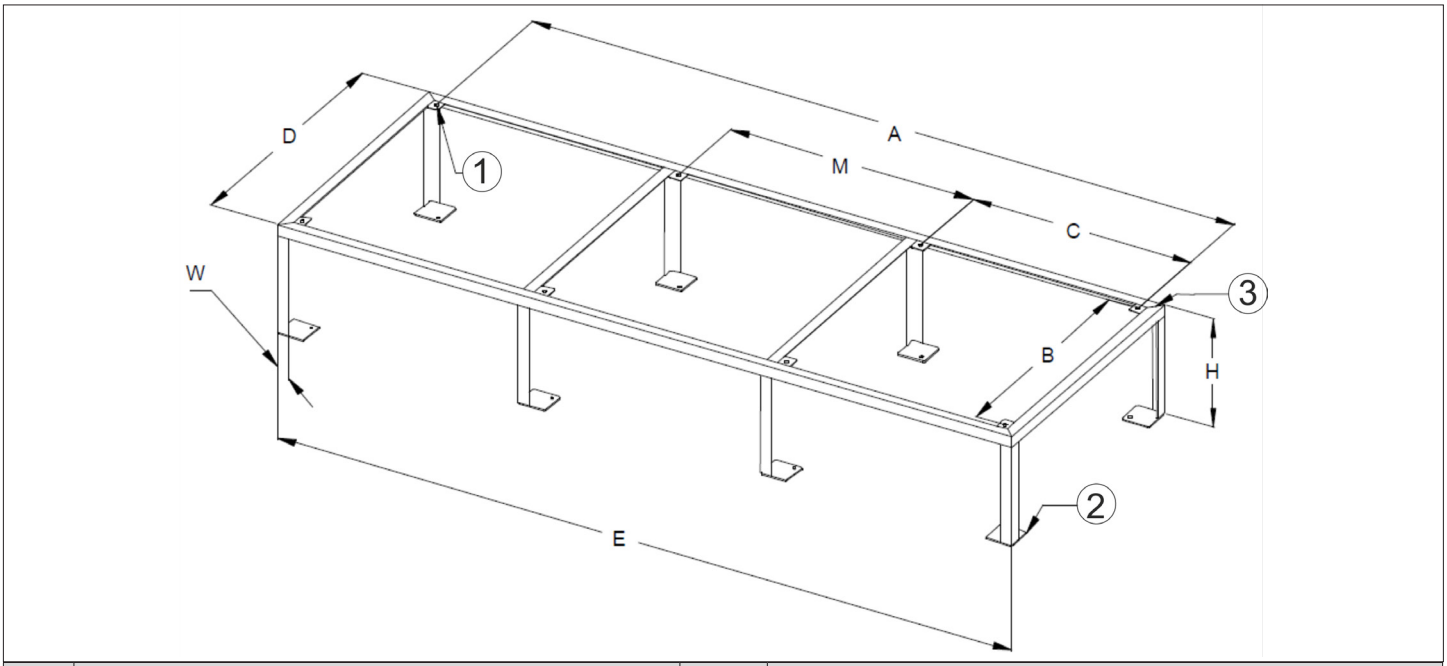
No.	Description	No.	Description
1	4-Ø14 hole	3	Need rubber cushion
2	Need rubber cushion, 4PCS		

Figure 4-12 Mounting Floor Stand of One Bay Series



No.	Description	No.	Description
1	6-Ø14 hole	3	Need rubber cushion
2	Need rubber cushion, 6PCS		

Figure 4-13 Mounting Floor Stand of Two Bay Series



No.	Description	No.	Description
1	8-Ø14 hole	3	Need rubber cushion
2	Need rubber cushion, 4PCS		

Figure 4-14 Mounting Floor Stand of Three Bay Series

Table 4-5 Mounting Floor Stand Dimensions (inch/mm)

Model	A	B	C	D	E	M	F	H	W
P1030 - P1060	810	860	/	980	930	/	/	400 <H≤550	40
							F≤240	550 <H≤1100	50
P2070 - P2100	1560	860	735	980	1680	/	/	400 <H≤550	40
							F≤240	550 <H≤1100	50
P2110 ~ P2140	1710	860	810	980	1830	/	/	400 <H≤550	40
							F≤240	550 <H≤1100	50
P3150	2385	860	735	980	2505	825	/	400 <H≤550	40
							F≤240	550 <H≤1100	50
P2090 ~ P2100	2610	860	810	980	2730	900	/	400 <H≤550	40
							F≤240	550 <H≤1100	50

- *Refer to Table 4-5 A/B/C/M as the center of the base from the mounting hole D/ E is the size of the base frame and front door will 15 mm above the mounting base.*
- *H is the height of the base, F is the distance between the joint angle steel and the floor.*
- *W is the width of the angle iron, it is recommended to use size of the angles 40 mm x 40 mm x 3 mm or 50 mm x 50 mm x 4 mm specification.*
- *For the downflow unit, the base must be greater than the height of 400 mm.*
- *For the upflow unit, the base height must be about 200 mm.*
- *The side panels are suspended to the frame of the unit, ensure that floor stand should bear the weight of the panels.*
- *The distance between the obstacles that may obstruct the air supply around the upper edge of the base and the outer edge of the EC fan shall be greater than 160 mm.*

- **Installing Floor Stand**

Determine the installation position according to the space requirements of the unit, and fix the floor stand onto the selected mounting position. The floor stand is fixed to the ground using expansion bolts or spot welding, and the alignment of the floor stand is calibrated by a horizontal ruler before it is fixed. Ensure that the top surface of floor stand is at uniform level. While designing and installing the downflow unit which requires lowering of EC fan, we must consider the proper gap distance and the base strength of the floor stand.

- **Vibration Absorption Treatment**

Place a layer of rubber cushion on the top, side of the base and on the bottom of the steel plate respectively to prevent transmission of vibration during operation of the unit. Refer Table 4-6 for more details.

Table 4-6 Dimensions of Rubber Cushion for Vibration Absorbing

Item		Specification
Rubber cushion (NBR)	Top	Thickness: 3 mm to 5 mm
	Lateral	Thickness: 2 mm to 3 mm
	Bottom	Thickness: 10 mm to 12 mm

4.6. Chilled Water Pipings

In Liebert PEX+ CW unit water pressure should be able to overcome the water pressure drop caused by all the components of chilled water piping system. Considering the possibility that water pressure drop would increase due to obstacles and impurities resulting from long-time running of the system. The following principles can be referred to when connecting the pipe:

- Chilled water in pipes should be equipped with the water filter (1 mm mesh) and several isolating valves.
- One of the isolating valves can be balance valve.
- Install pressure gauge for the in and out pipes, so as to adjust the flow rate through the actual pressure drop.

Figure 4-15 shows the piping connection of the CW unit.

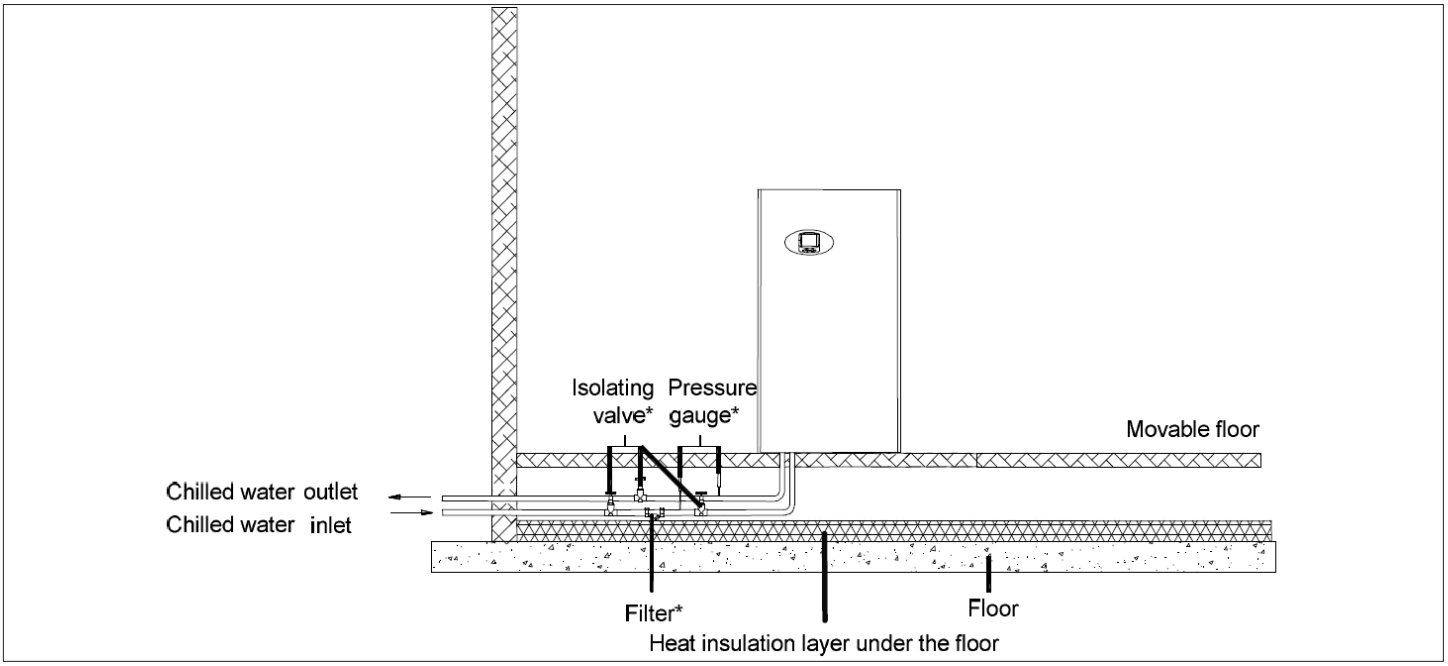


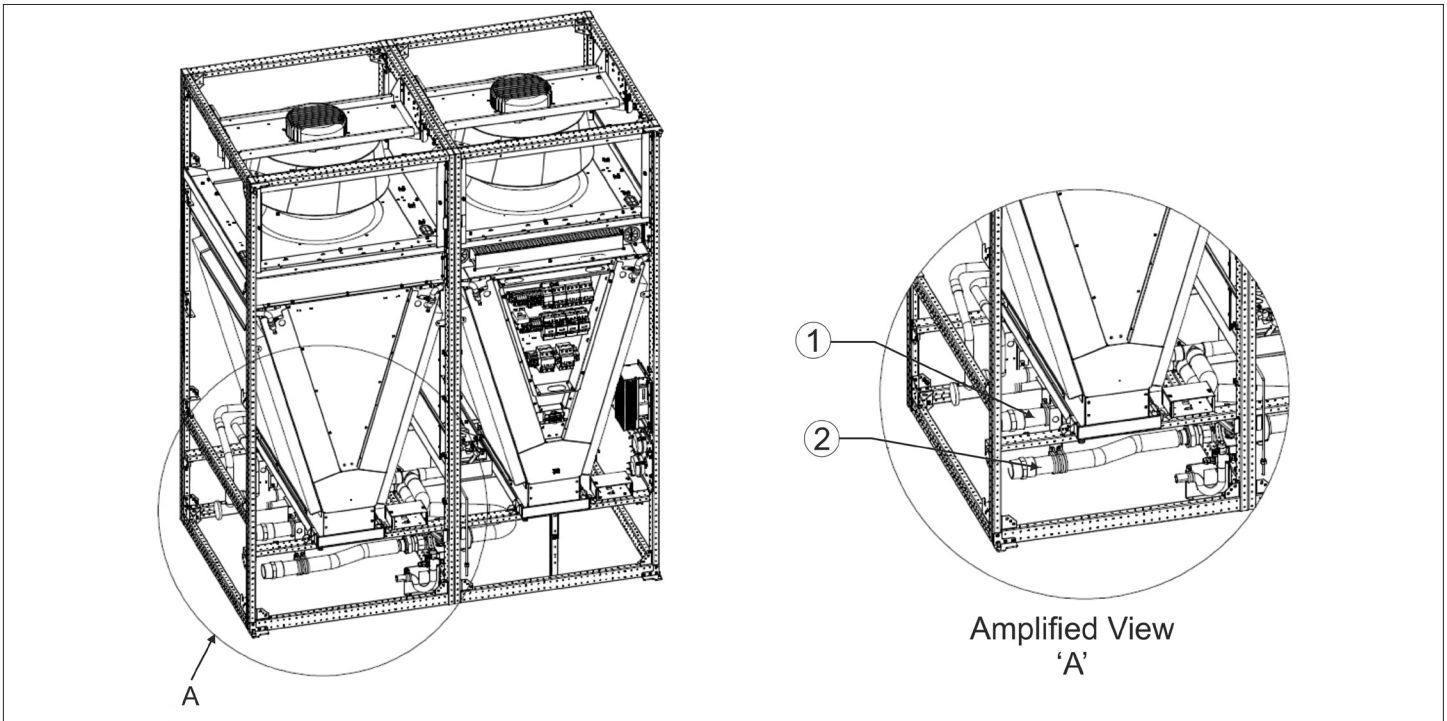
Figure 4-15 Chilled Water Piping Connections

4.6.1. Chilled Water Inlet and Outlet Piping Connection

- The chilled water supply and return pipes are connected with the Air Handling Unit (AHU) by threaded connector (optional flanges or copper brazing mode), as shown in Figure 4-16 and Figure 4-17. The supply and return pipes should be brazed according to the labels on the unit. Do not reverse the connection. Chilled water supply and return pipes can be connected through the base pallet or the side panel. The chilled water supply pipes should be equipped with the water filter with over 60 meshes to facilitate the clearance of impurities in the pipes.

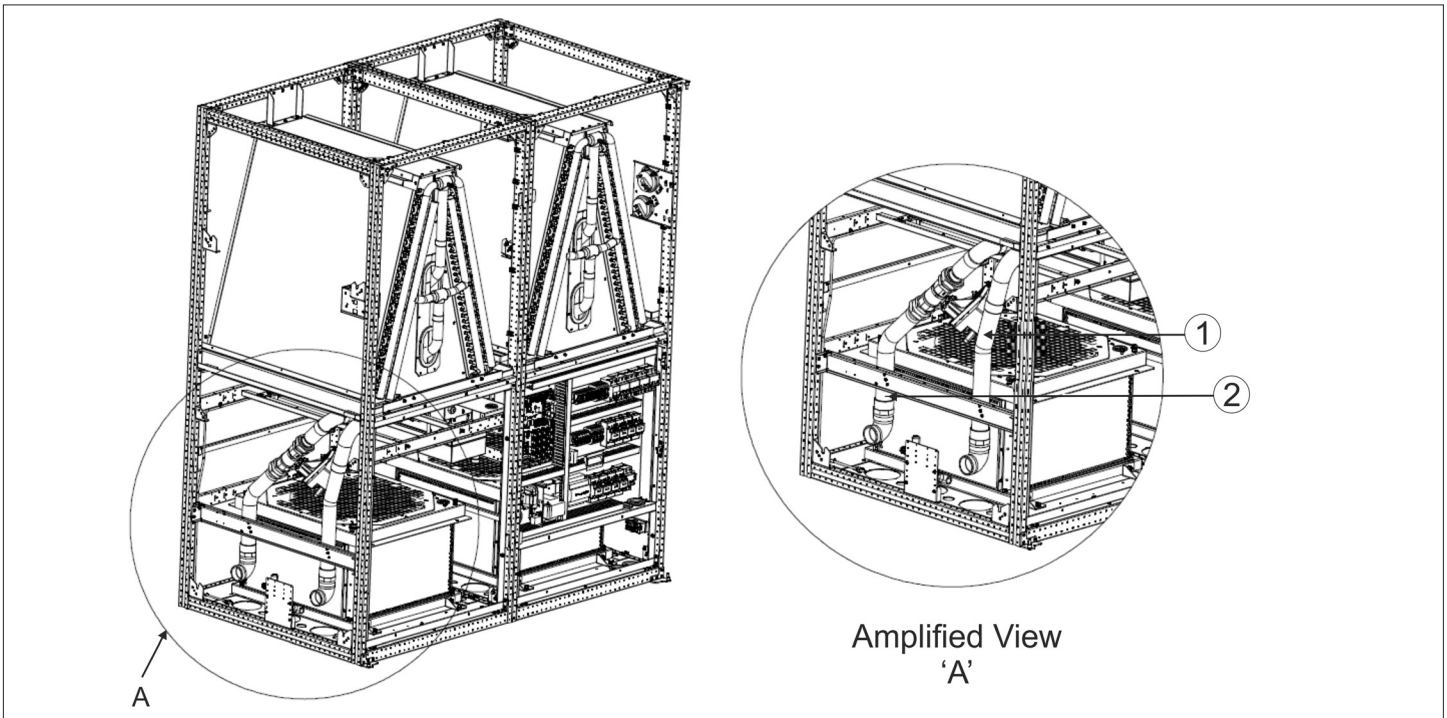
- The chilled water supply and return pipes need to be equipped with several isolation valves, which can cut off water sources during maintenance. One of the isolation valves can be a balancing valve. Chilled water system with a balancing valve would be more efficient and more accurate in controlling water distribution.

- Water pressure should be sufficient to overcome the water pressure drop caused by all the components of the water system. Considering the possibility that water pressure drop would increase due to deposition or impurities resulted from long-time running of the system. Therefore, when choosing the fluid recirculating component (e.g. pump), we should consider making 20% to 25% redundancy. The weight of the water pipes connected with the unit should not be assumed by the unit. The chilled water supply and return pipes must be kept warm. Table 4-7 shows the connecting dimensions of chilled water supply and return pipes of Liebert® PEX+ CW units.



No.	Description	No.	Description
1	Water supply pipe	2	Water return pipe

Figure 4-16 Connection of Chilled Water Supply and Return Pipes (upflow units)



No.	Description	No.	Description
1	Water supply pipe	2	Water return pipe

Figure 4-17 Connection of Chilled Water Supply and Return Pipes (downflow units)

Table 4-7 Male Screw of Chilled Water In and Out Pipes

Model	OD of Chilled Water In and Out Pipes (mm)
P1030~P1050	32
P1060~P2080	42
P2090~P2140	54
P3150~P3200	66.8

4.7. Ducting System

The unit is classified into upflow and downflow as shown in Figure 4-18 by the airflow mode. For the connecting multiple upflow units, the duct or plenum can be used and It should be synthetically connected.

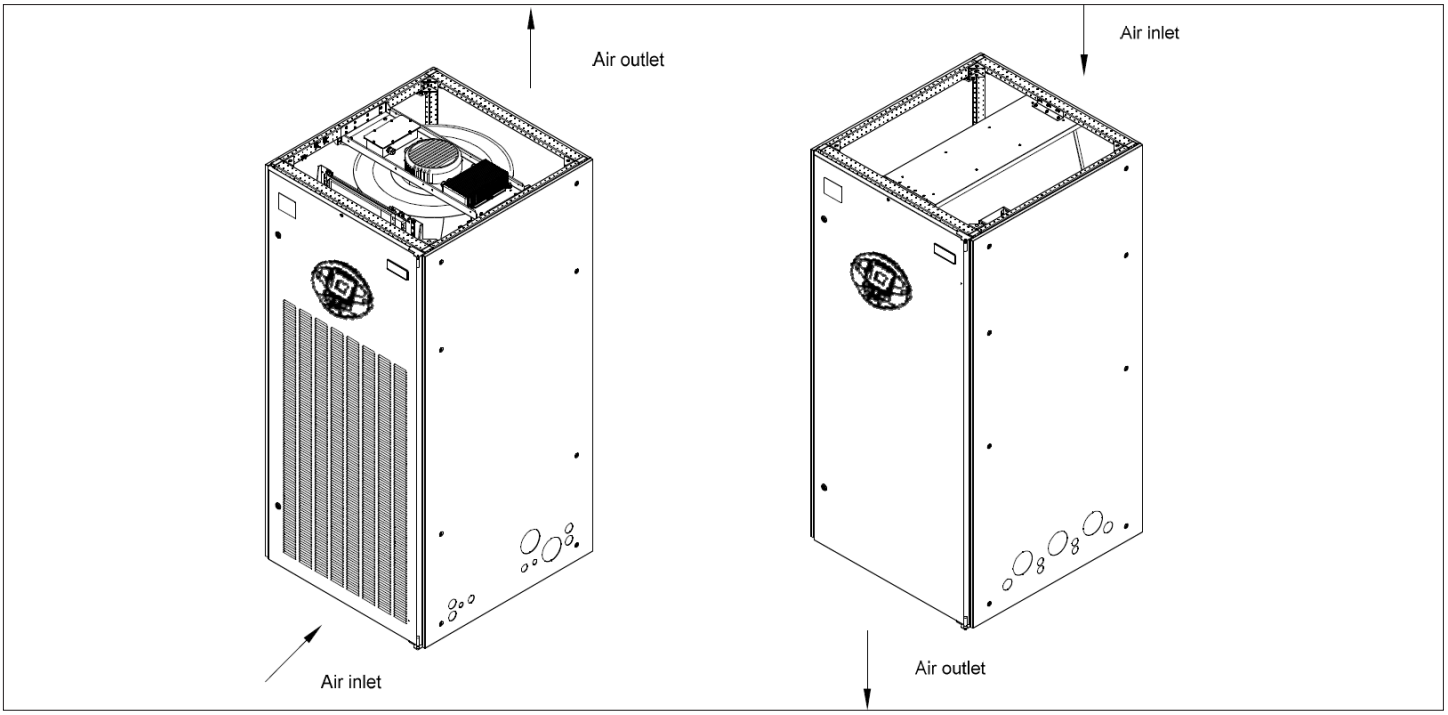


Figure 4-18 Discharge Models

Please refer to the following principles for installing ducts.

1. The ratio between length and width of the rectangular duct shall not exceed 4:1.

2. The arc or slash rectangular bend can be adopted for the elbow bend of the rectangular duct. The flow deflector is required, if the side length is equal to or longer than 500 mm.

3. The reinforcing measurement is required, if the side length of the rectangular duct is equal to or longer than 630 mm, the side length of heat insulating duct is equal to or longer than 800 mm and the length of duct is longer than 1200 mm.

4. The exterior of duct and its accessories should be smooth. Their arcs should be even, and the gap of joints should be sealed. The joints and the regulating device of duct and its accessories cannot be fitted on the wall or in the ceiling.

5. The sealed test of duct must be in accordance with the norms of air leak checks and lighting.

For pipe layout - When several air conditioner units are connected with the same plenum chamber, try to reduce or even avoid the interference of outlet airflow between air conditioner units. Pay special attention to it when connecting the pipes.

4.8. Electrical Parameters

Table 4-8 represents rated full load ampere (FLA) of Liebert® PEX+ CW units

Table 4-8 Rated Full Load Ampere (FLA) (unit: A)

Model	Full Load Amps (Fans only – no heating and no humidification	Unit with 1 Stage Heating (No humidifica-tion)	Unit with 2 Stage Heating (No humidifica-tion)	Unit with Electrode Humidifier (No heating)	Unit with Infrared Humidifier (No heating)
	(A)	(B)	(C)	(D)	(E)
P1030	5.4	15.4	25.4	10.8	11.5
P1040	5.4	15.4	25.4	10.8	11.5
P1050	5.4	15.4	25.4	10.8	11.5
P1060	5.5	15.5	25.5	10.9	11.6
P2070	10.8	25.9	40.9	21.6	23.0
P2080	10.8	25.9	40.9	21.6	23.0
P2090	10.8	25.9	40.9	21.6	23.0
P2100	10.8	25.9	40.9	21.6	23.0
P2110	11.0	26.1	41.1	21.8	23.2
P2120	11.0	26.1	41.1	21.8	23.2
P2130	11.0	26.1	41.1	21.8	23.2
P2140	11.0	26.1	41.1	21.8	23.2
P3150	16.2	36.2	56.2	27.0	28.4
P3160	16.2	36.2	56.2	27.0	28.4
P3170	16.5	36.5	56.5	27.3	28.7
P3180	16.5	36.5	56.5	27.3	28.7
P3190	16.5	36.5	56.5	27.3	28.7
P3200	16.5	36.5	56.5	27.3	28.7

- *The standard model is configured with humidifier and 1-stage electrical heater.*
- *The FLA of the standard unit is the same as the unit fitted with 1-stage heater (no humidifier).*
- *MCB and cable sizes are selected as per the local electrical standards.*

Chapter 5: iCOM Controller Operation

This chapter explains name, definitions, working and features of Liebert® iCOM controller, this includes LCD, Button, Structure Chart of Control Menu, Start-Up Interface, Main Interface and Event features. The iCOM controller adopts various menu operation, display board monitors. It also enables user easy browsing or settings values; to access event records, graph data, sensor data and alarm setting through various menu options on the screen.

It features a LCD backlight screen designed for saving energy. If no button is pressed within a certain period of time (default: 5min), the backlight will be Off, until one of the buttons is pressed.

The advanced microprocessor makes the Liebert PEX+ chilled water AC control the temperature and humidity of the equipment room accurately, Its features are as follows:

- Easy operation interface, multiple password protection to prevent unauthorized operation.
- Liebert iCOM has the restoration on a power-down and high, low voltage protection functions.
- Displays the operating time of important components through menu operation screen.
- Expert class malfunction diagnosis system can automatically display the present malfunction information to facilitate easy maintenance.
- It can store 400 historical records, including MESSAGE, WARNING and ALARM.
- It has RS485 interface, adopting the industrial communication protocol.
- Temperature setting value: the range is 5 °C to 40 °C.
- Humidity setting value: the range is 20% RH to 80% RH.
- Humidity control mode: the control modes contains Pred, Comp, Rel.
- Supply Air Temperature limit: Enable and Disable can be selected.
- Supply Air Temperature limit setting value: the range is 5 °C to 25 °C.

The microprocessor is capable of generating following audible and visual alarms.

1. High temperature alarm
2. Low temperature alarm
3. High humidity alarm
4. Low humidity alarm
5. Loss of airflow alarm
6. Some self-defined alarms

5.1. LCD Screen

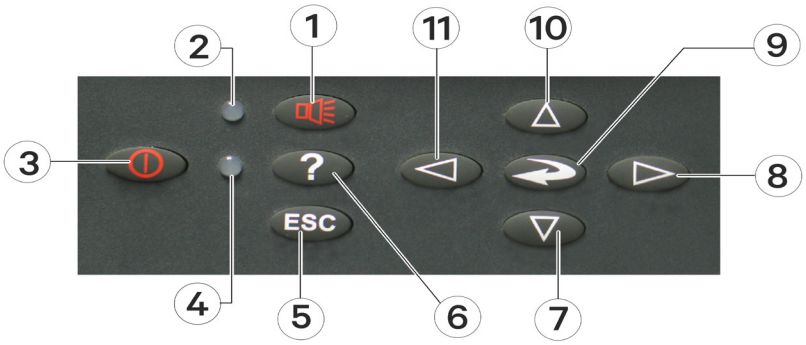
LCD Screen is located on the front panel of the Liebert PEX+CW series. The LCD displays the current state of the equipment room such as temperature, humidity and so on. You can also read and modify the equipment configuration through the LCD. The LCD uses white back-light, if no button is pressed within a certain period of time (settable; default: 5min), the back-light turns off until any one button of the panel is pressed.

5.2. Button and Indicator Panel

Nine buttons and two indicators are located on the button & indicator panel as shown in Figure 5-1, Including:

- Indicators: alarm indicator and operation indicator

Buttons: ON/ OFF button, Enter button, ESC button, Up button, Down button, Left button, Right button, Alarm silence button, and Help button.



No.	Description	No.	Description
1	Alarm silence button	7	Down button
2	Alarm indicator	8	Right button
3	ON/OFF button	9	Enter button
4	Operation indicator	10	Up button
5	ESC button	11	Left button
6	Help button		

Figure 5-1 Button and Indicator Panel

The indicators are described in Figure 5-2. The functions of the buttons are described in Table 5-2.

Table 5-1 Indicator Description

Indicator	Description
Alarm indicator	The alarm indicator turns on red upon alarms triggered. It is off after the alarm has been cleared
Operation indicator	The operation indicator turns on green when the unit is operating. When the unit is shut down, the indicator is yellow

Table 5-2 Button Description

Button	Function Description
ON/OFF button	• Switch on/ off the system. Press the ON/ OFF button to shut down the unit, or to start an idle system. • Test the display state of the back-light of the LCD and the operation indicator. • After powering-on, when the system is stand-by (defined as test state in this manual), press the ON/ OFF button to turn on the unit, the indicator turns to green, and the LCD back-light turns on. This is for testing whether the LCD back-light and the operation indicator are normal.
Enter button	• Enter the selected menu or save the setting after parameters are changed. Select the menu or parameter by pressing the direction button, the menu and the parameter is high-lighted. • Test the display of characters. • When the system is in the test state, press the Enter button that will display the ASCII code. This function is used to test whether the characters are displayed normally on the LCD.
ESC button	• Quit the current menu. • Abolish the current change of parameters. • Test the LCD high light. • Press the ESC button to switch the LCD between light and high light when the system is in the test state. This function can test whether the LCD high light is normal.
Up button	• Increase the value of the displayed parameters during parameter setting. • Scroll a row or a screen up in the query state. • Test the buzzer. • Press the Up button when the system is in the test state to increase the buzzing frequency (initial value: 0%). Meanwhile the buzzer will sound at the set frequency This function is used to test whether the buzzer is normal.
Down button	• Decrease the value of the displayed parameters during parameter setting. • Scroll a row or a screen down in the query state. • Test the buzzer. • If the buzzer frequency is not 0%, press the down button to decrease the buzzing frequency when the system is in the test state. Meanwhile the buzzer will sound at the set frequency. This function is used to test whether the buzzer is normal.

Button	Function Description
Left button	• Select the left bit during the parameter setting operation. • Test the LCD contrast. • Press the Left button when the system is in the test state to decrease the LCD contrast (by default: 100%) This function is used to test whether the LCD contrast is normal.
Right button	• Select the right bit during the parameter setting operation. • Test the LCD contrast. • If the LCD contrast is not 100%, press the right button when the system is in the test state to increase the LCD contrast. This function is used to test whether the LCD contrast is normal.
Alarm silence button	• The system will issue an alarm sound upon alarms. If you press the Alarm Silence button, the alarm sound will be eliminated. • Clear the current alarm after the alarm sound is silenced. • Test the alarm indicator and rest the LCD contrast and buzzer frequency. • Press the alarm silence button when the system is in the test state to switch the alarm indicator between on and off. It can test whether the alarm indicator is normal. Meanwhile, reset the LCD contrast to 100% and buzzer frequency to 0%.
Help button	• Display the online help. • Test the yellow display of the LCD operation indicator. • When the system is in the test state, press the Help button to switch on and off the LCD operation indicator. This function is used to test whether the yellow display of the LCD operation indicator is normal.

- *After the system is power-on, the system will resume the operation state before power-off. For example, if the system is in the work state when its power-off, it goes to the work state automatically after power-on. You do not need to start it manually.*
- *When the system is in the test state, the setpoints will not be written into the iCOM controller.*

5.3. Start-Up Interface

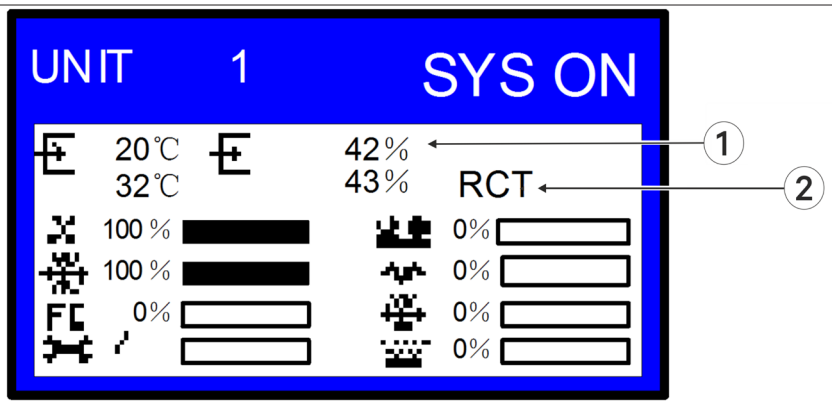
After the system is powered on, it is in the dwelling state. The LCD will display the interface shown in Figure 5-2.

Figure 5-2 Startup Interface

5.4. Main Interface

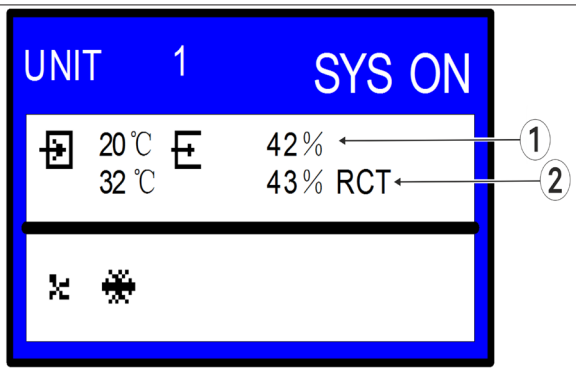
After power-on, the LCD will enter the main interface after about 60s. The main interface provides the general information about relative equipment status, including current temperature and humidity; temperature and humidity setpoints; equipment output status (fan, water valve, cooling, heating, dehumidifying, humidifying); alarm and maintenance status.

The main interface has two display modes: Graphical and Simple. The difference between these two display modes is that the graphical interface (see Figure 5-3) displays the percentage output chart of the function components, while the simple interface (see Figure 5-4) displays only the icons of current operation mode only. The switching of two modes can be realized by operating the menu. For details, refer to DISPLAY SETUP.
The upper left corner of the main interface displays the current unit number; the upper right corner displays the current system status If there is no button operation for 255sec on other menu display screen, the LCD screen returns to the main interface.



No.	Description	No.	Description
1	Setpoint	2	Present value

Figure 5-3 Graphical Mode of Main Interface



No.	Description	No.	Description
1	Setpoint	2	Present value

Figure 5-4 Simple Mode of Main Interface

The icons of the graphical and simple modes on the main interface are defined in Table 5-3.

Table 5-3 Definition of Icons

Icon	Definition	Icon	Definition
	Fan running	FC	Free cooling
	Cooling		Maintenance
	Hot water heating		Dehumidifying
	Electrical heating		Humidifying

5.5. User Menus

Press the enter or down button on the main interface to enter the User Menus, as shown in Figure 5-5. The User Menus are displayed in six pages, each displaying one or two submenus. Press the Enter button to highlight the submenu, the Up or Down button to browse the submenus, and the Enter button to enter the selected one.

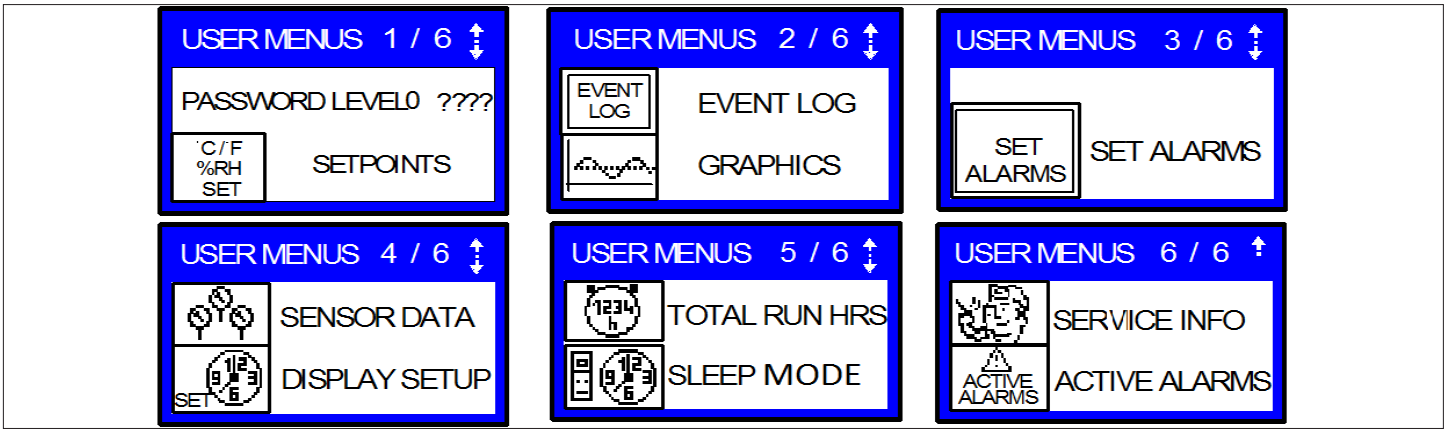


Figure 5-5 User Menus

Refer Appendix II, the structure chart of iCOM controller (User Menu)

5.5.1. Password

The password is necessary for different level menus. After entering the password (user password: 149), use the up and down navigation buttons to browse/ change all the options/parameters in User Menu, and then press the enter button to enter the selected option.

5.5.2. Setpoints

The setpoints disappear when the power is lost. Use the User Menus to browse and set parameters in the SETPOINTS submenu. The left row displays the parameter codes; the middle row; the parameter name; the right row and the setpoints, as shown in Table 5-4.

Table 5-4 Descriptions of Setpoint Parameters

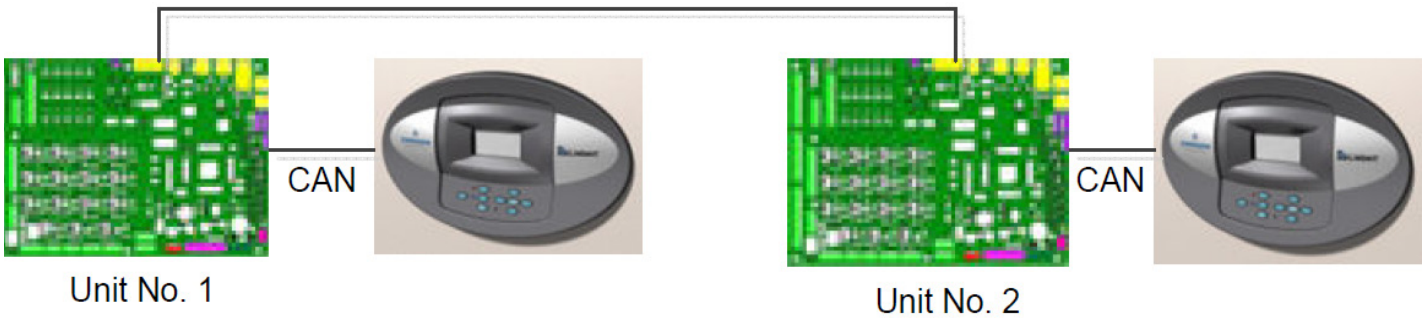
Parameters		Default	Setting range	Description
U102	TEMP SET	23 °C	5 °C to 40 °C	Temperature Setpoint
	TEMP ACT	23 °C	0 °C to 45 °C	Temperature Setpoint Act
U103	TEMP SENS	2 (Return Sensor)	0 = SUP 1 = REM 2 = RET	Temperature Control Sensor
U104	HUM SET	50%	20% to 80%	Humidity Setpoint
		8.9 °C	5.0 °C to18.3 °C	Dew Point Setpoint
U105	HUM SENS	2 (Return Sensor)	1 = REM 2 = RET	Humidity Control Sensor
U106	HUM CTRL	2 (Predictive)	0 = Rel 1 = Comp 2 = Pred 3 = DewP	Humidity Control Type
U107	FAN SET	22.8 °C	5.0 °C to 40.0 °C	Fan Setpoint
U108	FAN SENS	2 (Return Sensor)	0 = SUP 1 = REM 2 = RET 3 = MAN	Fan Control Sensor
U110	SMART AI	0 (Disabled)	0 = No 1 = Yes	Smart Aisle Enabled
U113	2ND SETP	23 °C	5 °C to 40 °C	2nd Temperature Setpoint
U114	SUP TEMP	5 °C	5 °C to 27 °C	Supply Temp Limit Setpoint
U116	BACK TSP	23 °C	5 °C to 40 °C	BMS Backup Temp Setpoint
U117	BACK FAN	23 °C	5 °C to 40 °C	BMS Backup Fan Setpoint
	BACK SPD	100%	0% to 100%	BMS Backup Fan Speed
U119	RCOMP SP	23 °C	5 °C to 40 °C	Return Compensation Setpoint

If you want to modify the preceding setpoints, enter the password before entering the SETPOINTS menu. Then press the Enter button to enter the submenu and use the Up and Down button to scroll the options. Press the Enter button to select one parameter, use the Up or Down button to set the value, and press the Enter button to save the change.

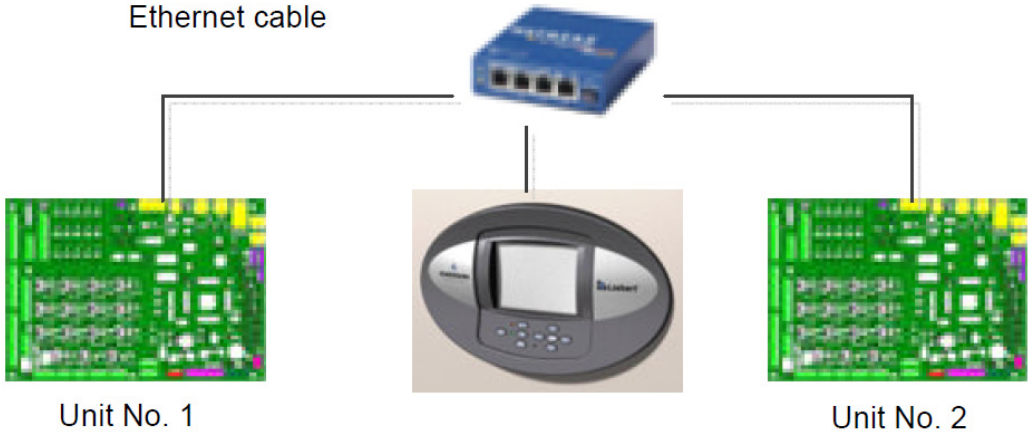
5.6. Multi-units and Teamwork Modes

Liebert® iCOM controller enables PEX+ chilled water unit to connect multiple units in single network through the teamwork mode. This teamwork mode facilitates corresponding network connection and network setting.

The control board and graphic display can be connected to an Ethernet network through a CAT5 cable, as shown in Figure 5-6. Up to 32 units (control boards) and up to 32 graphic displays can be connected together by using the Global Bus Protocol. The two units (two control boards or one control board and one large graphic display) can be directly connected through a crossed Ethernet cable, and multiple units can be interconnected in a networking with the help of a hub or a switch, as shown in Figure 5-7.



Control Board Connection with Small Display Screen



Control Board Connection with Large Display Screen

Figure 5-6 Networking of the Two Units

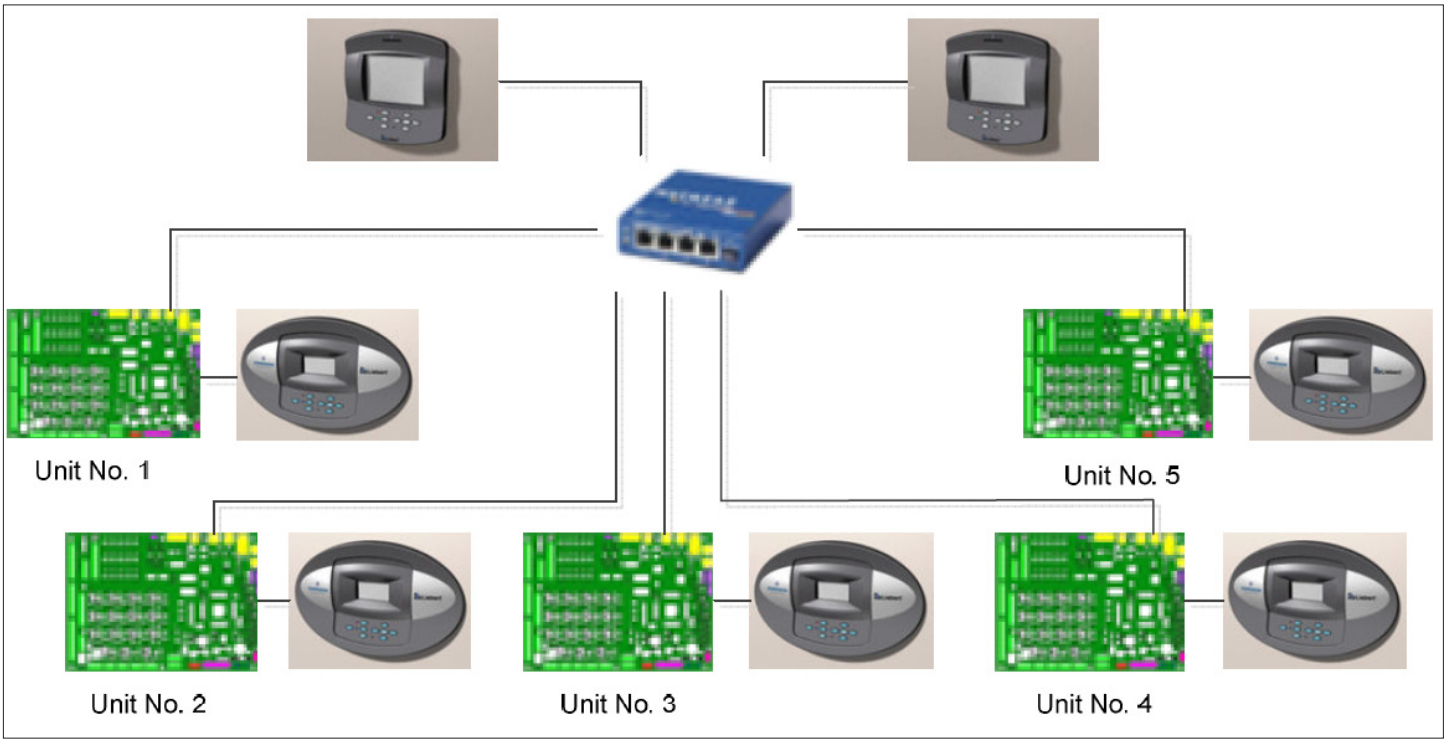


Figure 5-7 Networking of the Multiple Units

5.7. Teamwork Modes

Following are the teamwork modes to group Liebert PEX+CW units in a network

- No Teamwork
- Teamwork Mode 1
- Teamwork Mode 2
- Teamwork Mode 3

All Liebert iCOM controlled cooling units in a network must be set to run in the same teamwork mode